THE

ENCYCLOPÆDIA BRITANNICA

ELEVENTH EDITION

FIRST	edition,	published in	three	volumes,	1768—1771.
SECOND	"	"	ten	"	1777—1784.
THIRD	"	"	eighteen	"	1788—1797.
FOURTH	"	"	twenty	"	1801—1810.
FIFTH	"	"	twenty	"	1815—1817.
SIXTH	"	"	twenty	"	1823—1824.
SEVENTH	"	"	twenty-one	"	1830—1842.
EIGHTH	"	"	twenty-two	"	1853—1860.
NINTH	"	"	twenty-five	"	1875—1889.
TENTH	"	ninth edition and eleven supplementary volumes,			1902—1903.
ELEVENTH	"	published in twenty-nine volumes,			1910—1911.

VOL01_A-ANDROPHAGI

Britannica

THE

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

FIRST

SECOND

THIRD

FOURTH

FIFTH

SIXTH

SEVENTH

EIGHTH

NINTH

TENTH

ELEVENTH

edition, published in three

volumes, 1768 — 1771.

ten „ 1777 — 1784.

eighteen „ 1788 — 1797.

twenty „ 1801 — 1810.

twenty „ 1815 — 1817.

twenty „ 1823 — 1824.

twenty-one „ 1830 — 1842.

twenty-two „ j853 — 1860,

twenty-five „ 1875 — 1889. ninth edition and eleven

supplementary volumes, 1902 — 1903.

publUhed in twenty-nine volumes, 1910 — 1911.

COPYRIGHT

in all countries subscribing to the

Bern Cbnvention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the UNIVERSITY OF CAMBRIDGE

All rights reserved

THE

ENCYCLOPAEDIA BRITANNICA

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME I

A to ANDROPHAGI

New York

Encyclopaedia Britannica, Inc.

342 Madison Avenue

Copyright, in the United States of America, igio, Hie Encyclopaedia Britannica Company

DEDICATED BY PERMISSION

TO

HIS MAJESTY GEORGE THE FIFTH

KING OF GREAT BRITAIN AND IRELAND AND OF THE BRITISH DOMINIONS BEYOND THE SEAS

EMPEROR OF INDIA

AND TO

WILLIAM HOWARD TAFT

PRESIDENT OF THE UNITED STATES OF AMERICA

PREFATORY NOTE

THE Encyclopedia Britannica, of which the Eleventh Edition is now issued by the University of Cambridge, has a history extending over 140 years. The First Edition, in three quarto volumes, was issued in weekly numbers (price 6d. each) from 1768 to 1771 by “a Society of Gentlemen in Scotland.” The proprietors were Colin MacFarquhar, an Edinburgh printer, and Andrew Bell, the principal Scottish engraver of that day. It seems that MacFarquhar, a man of wide knowledge and excellent judgment, was the real originator of the work, though his want of capital prevented his undertaking it by himself. The work was edited and in great part written by William Smellie, another Edinburgh printer, who was bold enough to undertake “fifteen capital sciences” for his own share. The numerous plates were engraved by Bell so admirably that some of them have been reproduced in every edition down to the present one.

The plan of the work differed from all preceding ” dictionaries of arts and sciences,” as encyclopaedias were usually called until then in Great Britain; it combined the plan of Dennis de Coetlogon (17ˆ5) with that in common use — on the one hand keeping important subjects together, and on the other facilitating reference by numerous and short separate articles arranged in alphabetical order. Though the infant Encyclopedia Britannica omitted the whole field of history and biography as beneath the dignity of encyclopaedias, it speedily acquired sufficient popularity to justify the preparation of a new edition on a much larger scale. The decision to include history and biography caused the secession of Smellie; but MacFarquhar himself edited the work, with the assistance of James Tytler, famous as the first Scottish aeronaut, and for the first time produced an encyclopaedia which covered the whole field of human knowledge. This Second Edition was issued in numbers from June 1777 to September 1784, and was afterwards bound up in ten quarto volumes,

containing (8595 pages and 340 plates) more than three times as much material as the first Edition.

These earliest editions of the Encyclopedia Britannica consisted mainly of what may be described as compilation; like all their predecessors, from the time of Alsted to that of Ephraim Chambers, they had been put together by one or two men who were still able to take the whole of human knowledge for their province. It was with the Third Edition that the plan of drawing on specialist learning, which has since given the Encyclopedia Britannica its high reputation, was first adopted. This edition, which was begun in 1788 and completed, in eighteen volumes, in 1797, was edited by MacFarquhar until his death in 1793, when about two-thirds of the work were completed. Bell, the surviving proprietor, then appointed George Gleig — afterwards Bishop of Brechin— -as

editor, and it was he who enlisted the assistance, as contributors, of the most eminent men of science then living in Scotland. Professors Robison, Thomas Thomson and Playfair were the most notable of these new specialist contributors, and a Supplement in two volumes was issued in 1801 to allow them to extend their work to those earlier letters of the alphabet which had already been issued by MacFarquhar. It was their labours which first gave the Encyclopedia Britannica its pre-eminent standing among works of reference, and prepared the way for it to become, as a later editor claimed, not merely a register but an instrument of research, since thereafter the leading specialists in all departments were invited to contribute their unpublished results to its pages.

In the Fourth Edition, published by Andrew Bqll in twenty volumes from 1801 to 1810, the principle of specialist contributions was considerably extended, but it was only brought to such degree of perfection as was possible at the time by Archibald Constable, “the great Napoleon of the realms of print,” who purchased the copyright of the Encyclopedia Britannica soon after Bell’s death in 1809. Constable lavished his energy and his money on the famous “Supplement to the Fourth, Fifth and Sixth Editions,” which in 1813 he commissioned Macvey Napier to edit. It was with the appearance of this Supplement that the Encyclopedia Britannica ceased to be a

purely Scottish undertaking, and blossomed out into that great cosmopolitan or international enterprise which it has since become. The most eminent writers, scholars and men of science in England and on the continent of Europe, as well as in Scotland itself, were enlisted in the work: Sir Walter Scott, Jeffrey, Leslie, Playfair and Sir Humphry Davy, Dugald Stewart — who received the then unpre- cedented sum of ˆ1000 for a single contribution — Ricardo, Malthus and Thomas Young, with foreign men of science like Arago and Biot. From this time onward, indeed, a list of the contributors to successive editions of the Encyclopedia Britannica would be a list of the most eminent British and American writers and thinkers of each generation; the work had become the product of the organized co-operation of acknowledged leaders of the world's thought, in every department of human knowledge. For this advance the credit is mainly due to Constable.

The Fifth and Sixth Editions, each in twenty volumes, issued by Constable between 1815 and 1824, were practically reprints of the Fourth, the Supplement — issued in six volumes from 18 16 to 1824 — being considered adequate'to supply their deficiencies. The Seventh Edition, edited by Macvey Napier on the same lines as the Supplement, of which it incorporated a great part, was brought out by a new publisher, Adam Black, who had bought the copyright on.Constable's failure. This edition was issued from 1830 to 1842, and was comprised in twenty-one volumes, which included a general index to the whole work. The Eighth Edition, under the editorship of T. Stewart Traill, was issued by the firm of A. & C. Black, from 1853 to i860, in twenty-one volumes, with a separate index volume.

The Ninth Edition was then undertaken by the same firm on a scale which Adam Black con- sidered so hazardous that he refused to have any part in the undertaking, and he accordingly advertised his retirement from the firm. This Edition began to appear in 1875, under the editor- ship of Thomas Spencer Baynes, and was completed in 1889 by William Robertson Smith. It consisted of twenty-four volumes, containing 21,572 pages and 302 plates, with a separate index volume. Adam Black's prognostications of failure were signally. falsified by the success of the work, of which nearly half a million sets — including American pirated and mutilated editions — were ultimately sold. The great possibilities of popularity for the Encyclopedia Britannica in Great

Britain were only realized, however, when in 1898 The Times

undertook tosell a verbatim reprint of the Ninth Edition at about half the price originally asked for it by the publishers. The success of this reprint led to the publication by The Times in 1992 of an elaborate supplement in eleven New Volumes (one containing new maps and one a comprehensive index to the whole work), constituting, with the previous twenty-four volumes, the Tenth Edition. The Eleventh Edition, which super- sedes both Ninth and Tenth, and represents in an entirely new and original form a fresh survey of the whole field of human thought and achievement, written by some 1500 eminent specialists drawn from nearly every country of the civilized world, incorporating the results of research and the progress of events up to the middle of 19 10, is now published by the University of Cambridge, where it is hoped that the Encyclopedia Britannica has at length found a permanent home.

It will be seen from this brief survey of the history of the Encyclopedia Britannica that, while the literary and scholarly success of the work has been uniform and continuous, its commercial career has naturally. been subject to vicissitudes. Six different publishing firms have been at various times associated with its production; and the increasing magnitude of the work, con- sequent on the steady growth of knowledge, made this wellnigh inevitable. The Encyclopedia Britannica has to-day become something more than a commercial venture, or even a national enterprise. It is a vast cosmopolitan work of learning, which can find no home so appropriate as an ancient university.

The present publication of the new Encyclopedia Britannica by the University of Cambridge is a natural step in the evolution of the university as an educational institution and a home of research. The medieval University of Cambridge began its educational labours as an institution intended almost exclusively for the instruction of the clergy, to whose needs its system of studies was necessarily in a large measure accommodated. The Revival of Learning, the Renaissance and the Reformation widened its sphere of intellectual work and its interests, as well as its actual curriculum. The 19th century saw the complete abolition of the various tests which formerly shut the gates of the English universities against a large part of the people. The early establishment in Cambridge of special colleges for women was also a sign of expanding activities. About the same time the University Extension movement, first advocated at Cambridge in 187 1 on the ground that the ancient universities were not mere clusters of private establishments but national institutions, led to a wider conception of the possibilities of utilizing the intellectual resources of the universities for the general diffusion of knowledge and culture; and

the system of Local Examinations brought the university into close contact with secondary education throughout the country. But the public to which the University of Cambridge thus appealed, though wider than that of the college lecture-rooms, was still necessarily limited. Practically it is only through the medium of the University Press that Cambridge can enter into and maintain direct relations with the whole of the English-speaking world. The present time seems appropriate for an effort towards thus signally extending the intellectual and educational influence of the university.

To this end, the University of Cambridge has undertaken the publication of the Encyclopedia Britannica, and now issues the Eleventh Edition of that work. These twenty-eight volumes and index aim at achieving the high ambition of bringing all extant knowledge within the reach of every class of readers While the work, in its present form, is to some extent based on the

preceding edition, the whole field has been re-surveyed with the guidance of the most eminent specialists. The editors early decided that the new edition should be planned and written as a whole, and refused to content themselves with the old-fashioned plan of regarding each volume as a separate unit, to be compiled and published by itself. They were thus able to arrange their material so as to give an organic unity to the wh6le work and to place all the various subjects under their natural headings, in the form which experience has shown to be the most convenient for a work of universal reference. An important consequence of this method of editing is that the twenty-eight volumes are now ready for publication at the same time, and that the complete work can be offered to the public in its entirety. Although the work has been reduced to the smallest compass consistent with lucidity — bibliographies of all subjects which call for assistance of this nature being provided in aid of more detailed study — the aim throughout has been to maintain the highest standard of scholarly authority, and to provide a thorough elucidation of important scientific problems for which the modern inquirer has no adequate text-books. This Eleventh Edition of the Encyclopedia Britannica is now, therefore, offered to the public by the University of Cambridge in the hope and belief that it will be found to be a trustworthy guide to sound learning, and an, instrument of culture of world-wide influence.

Cambridge,

November I, igio.

EDITORIAL INTRODUCTION

ELSEWHERE in these volumes, under the heading of Encyclopaedia (vol. ix. p. 369), an account is given in detail of the particular form of literature to which that name applies. It is no longer necessary, as was done in some of the earlier editions of the Encyclopedia Britannica, to defend in a Preface the main principle of the system by which subjects are divided for treatment on a dictionary plan under the headings most directly suggesting explanation or discussion. The convenience of an arrangement of material based on a single alphabetization of subject words and proper t ih b k names has established itself in the common sense of mankind, and in recent years has led to the multiplication of analogous works of reference. There are, however, certain points in the execution of the Eleventh Edition to which, in a preliminary survey, attention may profitably be drawn.

The Eleventh Edition and its Predecessors.

It is important to deal first with the relationship of the Eleventh Edition to its predecessors, iu

addition to providing a digest of general information, such as is required in a reference-book pure and

simple, the object of the Encyclopedia Britannica has always been to give reasoned dis- _ „

• ,1 .1 - r .i 1 - ■ . \ ± - ˆ Debt to earlier

cussions on all the great questions of practical or speculative interest, presenting the edit i 0ns

results of accumulated knowledge and original inquiry in the form of articles which are themselves authoritative contributions to the literature of their subjects, adapted for the purpose of systematic reading and study. In this way its successive editions have been among the actual sources through which progressive improvements have been attained in the exposition of many important branches of learning. The Ninth Edition in particular, to which the Eleventh is the lineal successor — for the name of the Tenth was used only to indicate the incorporation of supplementary vol- umes which left the main fabric untouched — was universally recognized as giving the va j ue most scholarly contemporary expression to this constructive ideal. The reputation thus gained by the Encyclopedia Britannica as a

comprehensive embodiment of accurate scholarship— the word being used here for authoritative exposition in all departments of knowledge — carries with it a responsibility which can only be fulfilled by periodical revision in the light of later research. Yet in any complete new edition, and certainly in that which is here presented, due acknowledgment must be made to the impulse given by those who kept the sacred fire burning in earlier days. In this respect, if a special debt is owing to the editors of the Ninth Edition, and particularly to the great services of Robertson Smith, it must not be forgotten that long before their time the Encyclopedia Britannica had enlisted among its contributors many eminent writers, whose articles, substantially car- ried forward at each revision, became closely associated with the name and tradition of the work. 1 To

‘ In earlier days the reverence due to deceased authority was perhaps carried to extreme lengths. The following footnote, attached in the Eighth Edition to Sir Walter Scott’s article Drama, may be cited: — “It is proper to state here . . . that this article is reprinted as it originally appeared in the supplement to the fourth, fifth and sixth editions of this work without any of those adaptations which the course of time and change

preserve the continuity of its historic associations, so far as might be consistent with the public interest,

and with what was due to progress in knowledge, was one of the first duties of those responsible for a

new edition; and just as the Ninth Edition carried forward, with notable additions or substitutions, work

contributed to the Eighth and earlier editions, so it provided matter for utilization in the Eleventh, which

in its turn had to accommodate the new knowledge of a later generation.

In considering the treatment, however, of the mass of material thus handed down, the editor of the

Eleventh Edition had an entirely new situation to deal with. It is necessary here to explain why it is

that the Eleventh Edition is much more than a revision — is, indeed, a new edifice as com-

. . pared with the structure of the Ninth Edition. In the whole architecture of the latter

departure. c

there was a serious flaw, due to no want of ability in editors or contributors, but to the conditions imposed upon them in the system of publication.

The economic and mechanical obstacles to the production of a great encyclopaedia otherwise than in a series of volumes separately issued at intervals during a number of years were formerly considered prohibitive. Thus the Ninth Edition, the first volume of which was published in 1875 f C ° d ˆ anc * ˆ e twenty-fifth in 1889, was incomplete for some sixteen years after its real incep- tion. Not only does such a long interval between the start and the finish involve the possibility of a change in editorial direction and conception such as happened in 1881 when Spencer Baynes was compelled by ill-health to hand over the reins to Robertson Smith; but even if the same editorial policy remained to dominate the work, the continual progress of time was constantly chang- ing the conditions under which it was exercised. With such a system of publication an encyclopaedia can have no proper unity of conception or uniformity of treatment. It cannot be planned from the beginning so as to present at its completion a satisfactory synoptic view of any department of knowledge. The historical record is restricted by the accident of the dates at which the separate vol- umes are published, in such a way that the facts included in one volume may contradict those in another. Individual volumes, the contents of which are arbitrarily determined by the alphabetical order of headings, may indeed be abreast of the learning and accomplishments of their day, but each time a later volume appears the circumstances have altered," and there is every

J f f C . ° . *chance that some integral portion of what had previously been published may be division under ,..,, , ° L .. , . , . . , ,.... . _ ,, . / .*

different dates stultified. Those who were responsible' for the execution 01 the Ninth Edition of the

Encyclopedia Brilannica did their best under an impossible system. They made it a collection of detached monographs of the highest authority and value. In their day the demand of a modern public for "

up-to-date-ness ” had not come into existence, and it seemed perfectly reason- able in 1879 to bring the article on the history of England no further than the accession of Queen Victoria. But it was not their failure to appreciate the importance of dealing with the latest events in history that made so much of the Ninth Edition useless in preparing its successor. When only this was in question, later history could be added. It was the fact that, owing to its system of publication, its arrangement was not encyclopaedic, and that in preparing an edition which for the first time had the advantage of being systematic in the distribution of its material, there was no way of adapting to its needs what had been written originally on a faulty principle.

Until the year 1902, when, within nine months, nine supplementary volumes of text were issued by The Times, no publisher had cared or dared to attempt to produce at one time the whole of any

work of similar magnitude. It was the regular practice to issue volume by volume.

. . On this system the public has been furnished with the Oxford New English Diction-

method now . ... . , . , , ■ , , . . , 1 1 ■ • 1 1 r

employed ar y ˆ stl ” mcom Pl e te m 1910, though work had begun in the early sixties and the first

volume appeared in 1888) and with the Dictionary of National Biography, while the French

La Grande Encyclopedic, which took even longer than the Ninth Edition of the Encyclopaedia Brilannica

to complete, was coming out in its thirty-one volumes between 1885 and 1902. But the proof obtained

in 1902 of the practicability of simultaneous production in the case of the supplementary volumes which

of circumstances render necessary in ordinary cases, ■ We have deemed this homage due to the genius and fame of the illustrious author, whose splendid view of the origin and progress of the dramatic art we have accordingly presented to the reader exactly as.it proceeded from his own hand, leaving every contemporaneous allusion and illustration untouched.” It may be remarked that this footnote, which was reprinted from the Seventh Edition, was itself

carried forward without being brought up to date, apparently in the same spirit; and in another footnote, also reprinted from the Seventh Edition, a reference is made to allusions “on p. 147,” which were indeed on p. 147 of the Seventh Edition, but are on p. 137 of the Eighth!

converted the Ninth into the Tenth Edition of the Encyclopaedia Britannica, made it imperative to extend this limited experiment to the making of an entirely new edition. By this means a new value might be given to a work which aimed not merely at providing a storehouse of facts, but expounding all knowledge as part of an ordered system. For the problem here was bound up with the question of the date of publication to a unique degree. In some other sorts of book the fact that successive volumes appear at certain intervals of time only affects the convenience of the purchaser — as, for instance, in the case of the Cambridge Modern History; the various volumes do not cover the same field or touch the same materials. But in an encyclopaedia it is only the alphabetization of the headings which causes them to fall in distinct volumes, and the accident of position separates the treatment of the same or closely related subjects in such a way that, if they are discussed from the point of view of widely different dates, the organic unity of the work is entirely lost. Thanks to the enterprising provision of capital, and the co-operation of a far-sighted business management, it was possible to start

the preparation of the Eleventh Edition of the Encyclopedia Britannica with the

portance to

knowledge that it would be published as a whole at one date. The separate volumes, such a wor ˆ whatever their number, would no longer represent so many lapses of time and so many distinct units in executive conception, but merely mechanical divisions for convenience in handling. And arrangements were made so that the printing of the whole edition should eventually take hardly more time than had been required for the printing and correcting of a single volume under the old system.

The opportunity thus provided was in many ways more appropriate to the making of an entirely new work than to the revision of an old one. For the Ninth Edition was wanting in pre- cisely that character of interdependence in all its parts which could now be given to the

various related articles. Moreover, experience had shown that, as compared . with other encyclopaedias of less ambitious scope, not intended for systematic study poss jbi e , or continuous reading, its arrangement as a work of reference had defects which resulted in some injustice being done to its merits as a series of individual contributions to learning. There was no reason why both these purposes should not be served, and attention be paid to distributing the material under the much larger number of headings which are required for rapid and easy reference, when once it was possible to ignore the particular order in which the subjects were treated. Since none of the work was printed or published until the whole of it was ready, new headings could always be introduced with their appropriate matter, according as the examination of what was written under another heading revealed omissions which showed that some related subject required explanation on its own account, or according as the progress of time up to the year of publication involved the emergence of new issues, to which previously no separate reference would have been expected. The execution of the Eleventh Edition, planned on uniform lines as a single organism, and thus admitting of continual improvement in detail, irrespectively of the distribution of matter under this or that letter of the alphabet, could proceed in all its parts pari passu, the various articles being kept open for revision or rewriting, so as to represent the collective knowledge and the contemporary standpoint of the date at which the whole was issued.

This new design involved the maintenance, during all the years of preparation, of an active collabora- tion among a vast body of contributors. The formal structure of the Ninth Edition necessarily dis- appeared, leaving only its component parts as building material for incorporation in the new edifice to such degree as examination might prove its adaptability. The site — in this f he field of case the whole field of knowledge — was mapped out afresh under the advice of special- knowledge. ist departmental advisers, who, in providing for the occupation of the different areas, co-operated with a central editorial staff, comprising many members, each of whom was responsi- ble to the Editor-in-Chief for a particular section of the work. In this manner what, it is hoped, is a more complete articulation of subjects was effected, while co-operation between the contributors who dealt with each homogeneous department of knowledge was combined with the concentration in editorial direction, which alone could make the Eleventh Edition of the Encyclopaedia Britannica an organic unit.

The result of the new survey was a distribution of material under a far larger number of headings than had been included in the Ninth Edition — some 40,000 instead of some 17,000; and the method of simul- taneous construction enabled the co-ordination which is of such peculiar importance in .. a work of reference to be applied systematically by the editorial staff. The authority

which attaches to the names of individual contributors remains, as before, an important feature of the Eleventh Edition, but by these means, it is hoped, the authority which attaches to the Encyclopedia Britannica itself is more firmly established. When Robertson Smith finally wrote his preface to the Index volume of the Ninth Edition, he said: — “The use of initials (as signatures to articles) was not designed to lighten the responsibility of the editors. No editor can possess the knowledge

which would enable him to control the work of his contributors in all the subjects treated The two sources of th It °^ * n t ˆ ie E nc yd°P

secure the accuracy and sufficiency of every contribution, and to prevent those repeti- tions and inconcinnities which necessarily occur where each contributor is absolutely and solely re- sponsible for the articles which bear his name.” The principle here enunciated, which represents the tradition of the Encyclopedia Britannica in the matter of the correct relationship between editors and contributors, and the responsibility attaching to individual signatures, has been adopted in the Eleventh Edition, but with all the advantages resulting alike from simultaneous production and from the fact that the Editor-in-Chief was” assisted by a much larger staff, working under conditions which enabled the editorial control to be effective to a degree unattainable under the earlier system. In concert with the numerous eminent writers whose signatures give individual inter- est and weight to their contributions, the whole work — and not only the unsigned articles, In creased value • ‘ ‘

fo f ce man y °f which indeed have equally high authority behind them — passed through the

detailed scrutiny of the editorial staff, whose duty it was to see that it provided what those who used any part of the book could reasonably expect to find, to remedy those “inconcinnities” to which Robertson Smith alluded, and to secure the accuracy in the use of names, the inclusion of dates, arid similar minutice, which is essential in a work of reference.

A great deal of the older fabric was obviously incompatible with the new scheme of treatment ; but, where possible, those earlier contributions have been preserved which are of the nature of classics in the

world of letters. By a selective process which, it is believed, gives new value to the old ... material — by the revision, at the hands of their own authors or of later authorities, of

such articles or portions of articles as were found to fit accurately into their several places — or by the inclusion under other headings of a consideration of controverted questions on which the writers may have taken a strong personal view, itself of historical interest — their retention has been effected so as to conform to the ideal of making the work as a whole representative of the best thought of a later day.

Questions of Formal Arrangement

Both in the addition of new words for new subjects, and in the employment of different words for old subjects, the progress of the world demands a reconsideration from time to time of the

headings under which its accumulated experiences can best be presented in a work which headings employs the dictionary plan as a key to its contents. No little trouble was, therefore

expended, in planning the Eleventh Edition, on the attempt to suit the word to the sub- ject in the way most likely to be generally useful for reference. While the selection has at times been, of necessity, somewhat arbitrary, it has been guided from first to last by an endeavour to follow the natural mental processes of the average educated reader. But it was impossible to interpret what

is “natural” in this connexion without consideration for the advances which have

. been made in terminological accuracy, alike in the technicalities of science and

and common , ° •” . .

sense. m the forms of language adopted by precise writers, whose usage has become or

is rapidly becoming part of the common stock. The practice of modern schools

and the vocabulary of a modern curriculum, as well as the predominating example of expert

authorities, impose themselves gradually on the public mind, and constitute new conventions which are widely assimilated. In forecasting what would be for the convenience of a new generation of readers, it has seemed best to aim at adopting the nearest approach to correct modern terminology, while avoiding mere pedantry on the one hand, and on the other a useless abandonment of well- established English custom.

It is easier, however, to lay down principles than to carry them out consistently in face of the ob- stinacy of the materials with which one is dealing in an encyclopaedia which attempts to combine accu- rate scholarship with general utility and convenience. In the case of biographical articles, _ . for instance, it was decided that the proper headings were the names by which the in- dividuals concerned are in fact commonly known. Thus “George Sand” is now dealt with under her pen-name (Sand, George) and not under that of Madame Dudevant; “George Eliot” is no longer hid- den away under her married name of Mrs Cross; and “Mark Twain” is taken as the permanent name by which the world will know Mr Clemens. But it is not only in the case of pseudonyms that there is a difficulty in deciding upon the heading which is most appropriate. In variance with the practice of the Dictionary of National Biography, all articles on titled persons are here . . . arranged under the title headings and not the family names. In principle it is believed that this is much the more convenient system, for in most cases the public (especially outside the British Islands) does not know what the family name of an English peer may be. Moreover, the system adopted by the Dictionary of National Biography sacrifices a very important feature in connexion with these bio- graphical articles, namely, the history of the title itself, which has often passed through several families and can only be conveniently followed when all the holders are kept together. As a rule, this system of putting peers under the headings of their titles agrees with the principle of adopting the names by which people actually are called; but sometimes it is too glaringly otherwise. Nobody would think of looking for Francis Bacon under the heading of Viscount St Albans, or for Horace Walpole under that of Earl of Orford. In such cases what is believed to be the natural expectation of readers has been consulted. The exceptional use, however, of the family name as a heading for persons of title has been reserved strictly for what may be regarded as settled conventions, and where

reasonably possi- ble the rule has been followed; thus Harley and St John are dealt with as Earl of Oxford and Viscount Bolingbroke respectively. On the other hand, when a celebrity is commonly known, not under his family name but under a title which eventually was changed for a different one of higher rank, the more convenient arrangement has seemed to be — notwithstanding general usage — to associate the article with the higher title, and so to bring it into connexion with the historical peerage. Thus the account of the statesman commonly called by his earlier title of Earl of Danby is deliberately placed under his later title of Duke of Leeds, and that of Lord Castlereagh under Marquess of . ,

Londonderry. If the result of such exceptions to the rule might seem to be that in cer- tain cases a reader would not know where to turn, the answer is that a reference to the Index, where cross- references are given, will decide. In the text of the work, although a great deal has been done to refer a reader from one article to another, mere cross-references — such as ” Danby, Earl of; see Leeds, Duke of” — are not included as distinct entries; it was found that the number of such headings would be very large, and they would only have duplicated the proper function of the Index, which now acts in this respect as the real guide to the contents and should be regarded as an integral part of the work.

The reference just made to the Dictionary of National Biography may here be supplemented by a few words as to the British biographies in the Eleventh Edition of the Encyclopedia Britannica. The whole standard of biographical writing of this kind has undoubtedly been raised by the labours of Sir Leslie Stephen, Dr Sidney Lee, and their collaborators, in the compilation of that invaluable work; and no subsequent publication could fail to profit, both by the scholarly example there set, and by the results of the original research embodied in it. But in the corresponding .

articles in the Encyclopedia Britannica advantage has been taken of the opportunity for biography. further research and the incorporation of later information, and they represent an in- dependent study, the details of which sometimes differ from what is given in the Dictionary, but must not for that reason be thought in haste to be incorrect. Allowance being made for a somewhat different

standard in the selection of individuals for separate biographies, and for the briefer treatment, theatf tempt has been made to carry even a

step forward the ideals of the Dictionary in regard to accuracy of detail and critical judgment. This has largely been made possible by the existence of the Dictionary, but the original work done in the Eleventh Edition of the Encyclopaedia Britannica in thesame field^ drawing as it can upon a number of biographical articles, already classics, in its earlier editions-— gives

it an independent authority even in the sphere of British national biography. More- , over, the inclusion of biographies of eminent persons who died after the Dictionary was

supplemented in 1901, and of others still living in 1910, results in a considerable extension of the biographical area, even as regards individuals of British nationality in the narrowest sense. The articles in the Encyclopaedia Britannica, however, .are of course not limited to personages of the. British Islands. Not only are biographies here included -of the great men and women of French, Genrian, Italian, Belgian, Dutch, Russian, Scandinavian, Japanese, and other foreign nationalities, a-s well.. as of those of the ancient world, but the same standard of selection has been; applied to. American and British Colonial biography as to English, Welsh, Scottish and Irish. Indeed the Encyclopedia Bri- tannica may now claim for the first time to supply a really adequate Dictionary of American National Biography, covering all those with whom the citizens of the United States are nationally concerned. It thus completes its representation of the English-speaking peoples, to all of whom English history, even in its narrower sense, is a common heritage, and in its evolution a common ex- ample. _ ;■.■■.-:.! Another form of the terminological problem, , to which reference was made above, is found in the transliteration of foreign names, and the conversion of. the names of foreign places and countries

into English equivalents. As regards the latter, there is no English standard which can

ng is r -^ ^ ^ ^ un i versa i though in particular cases there is a convention which it would ing of foreign …. ‘ , . T . .

names. ” e absurd to attempt to displace for any reason of supposed superior accuracy. It would

be pragmatical in the extreme to force upon the English-speaking world a system of call- ing all foreign places by their local names, even though it might be. thought that each nationality had a right to settle the nomenclature of its country and the towns or districts within

it. In general the English conventions must stand. One of these days, the world- may agree that an international nomen- clature is desirable and feasible, but not yet; and the country which its own citizens call Deutschland and the French I'Allemagne still remains Germany to those who, use the English language. Similarly Cologne (K din), Florence (Firenze), or Vienna (Wien) are bound to retain, their English . C " h f ° names in an English book. But all cases, are not so. simple. ; The wprld abounds in less important places, for which the English names have no standardized spelling; different English newspapers on a single day, or a single newspaper at intervals ;of a few weeks or months, give them several varieties of form; and in Asia or Africa the latest explorer always seems to have a preference for a new one which is unlike that adopted by rival geographers. When the Eleventh Edition of ., the Encyclopaedia Britannica was started, the suggestion was made that the Royal Geographical Society of London— the premier geographical society, of the world — might co-operate in an attempt to secure the adoption of a standard English geographical and topographical nomenclature. The J\ . Society, indeed, has a system of its own which to some extent aims at fulfilling this require-

ment, though it has failed to : impose it upon general use; but unfprtunately the Society's system breaks down by admitting a considerable number of exceptions and by failing to settle a very large number of cases which really themselves constitute the difficulty. The co-operation of the Royal Geographical Society for the purpose of enabling the Encyclopaedia Britannica to give prominent literary expression to an authoritative spelling for every place-name., included within its articles er maps was found to be impracticable; and it was therefore necessary for the Eleventh Edition to adopt a consistent spelling which would represent its own judgment and authority. It is hoped, that by degrees this spell- ing may recommend itself in other quarters. Where reasonably possible, the local spelling popularized by the usage of post-offices or railways has been preferred to any purely philological system of trans- literation, but there are numerous, casps where even this test of public convenience breaks down and some form of Anglicization becomes essential to an English gazetteer having an organic unity cf its own. Apart from the continuance of English conventions which appeared sufficiently crystallized, the, most, authori-

tative spelling of the foreign name has been given its simplest English transliteration, preference being given, in cases of doubt, to the form, for instance in African countries, adopted by the European na- tion in

possession or control. In the absence of any central authority or international ,, _. . ■ ■’

, . • ii i-n- • i-ii r Method adopted.

agreement, the result is occasionally different in some slight degree from any common

English variant, but this cannot well be helped when English variants are so capricious, and none. per- sistent; and the names selected are those which for purposes of reference combine the most accuracy with the least disturbance of familiar usage. Thus the German African colony of Kamerun is here called Cameroon, an English form which follows the common practice of English transliteration in regard to its initial letter, but departs, in deference to the German official nomenclature, from the older English Cameroons, a plural no longer justifiable, although most English newspapers and maps still perpetuate it.

In the case of personal names, wherever an English spelling has become sufficiently established both in literature and in popular usage it has been retained, irrespectively of any strict linguistic value. Foreign names in English shape really become English words, and they are so treated here; e.g. Alcibiades (not Alkibiades), Juggernaut (not Jagganath). But discrimination >*” Jˆi “tˆ 6 * as to where convenience rather than philological correctness should rule has been made i anguag e S . all the more difficult, especially with names representing Arabic or other Oriental originals, by the strong views of individual scholars, who from time to time attempt in their own writ- ings to impose their own transliterations upon others, in the face of well-established convention. In the course of the preparation of the Eleventh Edition of the Encyclopedia Britannica, various eminent Arabic scholars have given strong expression to their view as to the English form of the name of the Prophet of Islam, preference being given to that of Muhammad. But the old form Mahomet is a well-established English equivalent; and it is here retained for convenience in identification where the Prophet himself is referred to, the form Mahommed being generally used in distinction for other per- sons of this name. Purists may be dissatisfied with this concession to popular usage; our choice is, we believe, in the interest of the general public. If only the “correct” forms of many Oriental nanies had been employed, they would be unrecognizable except to scholars. On the other hand, while the retention of Mahomet is a typical instance of the preference given to a vernacular spelling when there is one, and customary forms are adopted for Arabic and other names’ in the headings and for

ordinary use through- out the work, in every case the more accurate scientific spelling is also given in the appropriate article. While deference has naturally been paid to the opinion of individual scholars, as far as possible, in connex- ion with articles contributed by them, uniformity throughout the work (a necessity for the purpose of Index-making, if for no other) has been secured by transliterating on the basis of schemes which have been specially prepared for each language; for this purpose the best linguistic opinions have been consulted, but due weight has been given to intelligibility on the part of a public already more or less accustomed to a stereotyped spelling. In the case of Babylonian names, a section of the general article Babylonia is specially devoted to an elucidation of 'the divergences between the renderings given by individual Assyriologists.

While the Encyclopedia Britannica has aimed, in this matter of local and personal nomenclature, at conciliating the opinion of scholars with public usage and convenience, and the present edition makes an attempt to solve the problem on reasonable lines, it should be understood that the whole question of the uniform representation in English of foreign place and „ . personal names is still in a highly unsatisfactory condition. Scholars will never get £he public to adopt the very peculiar renderings, obscured by complicated accents, which do service in purely learned circles and have a scientific justification as part of a quasi-mathematical device for accurate pronunciation. Any attempt to transliterate into English on a phonetic basis has, moreover, a radical weakness which is too often ignored. So long as pronunciation is not itself standardized, and so long as the human ear does not uniformly carry to a standardized human brain the sound that is uniformly pronounced — and it will be long before these conditions cart be fulfilled — even a phonetic system of spell- ing must adopt some convention; and in that case it is surely best, if a well-recognized convention already exists and is in use among the public at large, to adopt it rather than, to invent a new one. The point is, indeed, of more than formal importance. So long as scholars and the public are at issue on the very

essentials of the comprehension of scholarly books, which are made unreadable by the use of diacritical signs and unpronounceable spellings, culture cannot advance except within the narrowest of sects. This incompatibility is bad for the public, but it is also bad for scholarship. While the general reader

is repelled, the Orientalist is neglected, — to the loss of both. This

criticism, which sub- ee o cm- s j. an ˆj a r]y a ppij es to many other formal aspects of modern learning, may be unwelcome

to the professors, but it is the result of an extended experience in the attempt to bring accurate knowledge into digestible shape for the wide public for whom the Encyclopedia Britannica is intended. It is indeed partly because of the tendency of modern science and modern scholarship to put the artificial obstacles of a technical jargon in the path of people even of fairly high education, that it becomes imperative to bring both parties upon a common ground, where the world at large may discover the meaning of the learned research to which otherwise it is apt to be a stranger.

With regard to the various departments of natural science, there was a tendency in previous editions of the Encyclopedia Britannica to make inclusive treatises of the longer articles, and

to incorporate under the one general heading of the science itself matter which . i would more naturally, form a separate, if subordinate, subject. An attempt has now

been made to arrange the material, rather according to the heading under which, in an encyclopaedia, students would expect to find it. In any text-book on Light, for instance, the technical aspects of aberration, refraction, reflection, interference, phosphorescence, &c, would be discussed concurrently as part of the whole science, in so many chapters' of a continuous treatise. But each such chapter or subdivision in a treatise becomes in an encyclopaedia arranged on the

dictionary plan, matter to be explained where the appropriate word occurs in the alpha-

, ., betical order of headings. Under the name of the common subject of the science as a encyclopaedia ° '

method. whole, its history and general aspects are discussed, but the details concerned with the

separate scientific questions which fall within its subject-matter — on each of which often a single specialist has unique authority — are relegated to distinct articles, to the headings of which the general account becomes, if required, a key or pointer. This arrangement of the scientific material — a general article acting as pointer to subsidiary articles, and the latter relieving the general account of details which would overload it — has been adopted throughout the Eleventh Edition; and in the result it is believed that a more complete

and at the same time more authoritative survey has been attained, within the limits possible to such a work, than ever before. The single-treatise plan, which was characteristic of the Ninth Edition, is not only cumbrous in a work of reference, but lent itself to the omission altogether, under the general

heading, of specific issues which consequently received no proper treatment at all that of a s//iWe an ˆ w ˆ iere * n ˆ e D0 °^! whereas the dictionary plan, by automatically providing treatise. headings throughout the work, under which, where appropriate, articles of more or

less length may be put, enables every subject to be treated, comprehensively or in detail, yet as part of an organic whole, by means of careful articulation adapted to the requirements of an intelligent reader.

In preparing the Eleventh Edition a useful check on the possibility of such accidental omissions

as are apt to occur when the treatise plan is pursued, was provided by the decision, arrived at

- independently of any question of subdivision, to revert more closely to the original

headings form of the Encyclopedia Britannica, and to make separate headings of any words

which, purely as words, had any substantial interest either for historical or philological reasons, or as requiring explanation even for English-speaking readers. 1 The labours of Sir James Murray and his colleagues on the Oxford New English Dictionary, which has only become accessible since the Ninth Edition of the Encyclopedia Britannica was published, have enabled a precise examination to be made of all the possible headings of this kind. Such words, or groups of words, together with proper names, personal, geographical, zoological, etc., obviously exhaust the headings

1 Though, in pursuance of the ideal of making the whole book self-explanatory, a great many purely technical terms have been given their interpretation only in the course of the article on the science or art in which they are used, even these are included, with the correct references, among the headings in the Index. Similarly, biographical accounts are given of far more persons than have separate biographies. The Index in all such cases must be consulted, whether

for word or name.

under which the subject matter of an encyclopaedia can be subdivided; and thus the dictionary plan, combined with a complete logical analysis of the contents of the various arts and sciences, forms a comprehensive basis for ensuring that no question of any substantial interest can be omitted. As a rule the headings suggested by a logical subdivision of subject, as approved by the professional or scientific expert, follow the usage of words which is natural to any one speaking the English language ; but where, owing to the existence of some accepted terminology in j m P° rta ” ce of any particular line of inquiry, it departs from this ordinary usage, the dictionary plan accuraC y. . still enables a cross-reference to guide the reader, and at the same time to impart instruc- tion in the history or technical niceties of a vocabulary which is daily outgrowing the range even of the educated classes. It is highly and increasingly important that mere words should be correctly evaluated, and connected with the facts for which properly they stand.

Some Points as to Substance.

In considering the substance, rather than the form, of the Eleventh Edition, it may be remarked first that, as a work of reference no less than as a work for reading and study, its preparation has been dominated throughout by the historical point of xiew. Any account which purports to describe what actually goes on to-day, whether in the realm of mind or in the f l i stQr j an that of matter, is inevitably subject to change as years or even months pass by; but what has been, if accurately recorded, remains permanently true as such. In the larger sense the historian has here to deal not only with ancient and modern political history, as ordinarily under- stood, but with past doings in every field, and thus with the steps by which existing conditions have been reached. Geography and exploration, religion and philosophy, pure and applied science, art and literature, commerce and industry, law and economics, war and peace, sport and games, — all subjects are treated in these volumes not only on their merits, but as in continual evolution, the successive stages in which are of intrinsic interest on their own account, but also throw light on what goes before and after. The whole range of history, thus considered, has, however, been immensely widened in the Eleventh Edition as compared with the Ninth. The record of the past, thrown farther and farther back by the triumphs of modern archaeology, is limited on its nearer confines only by the date at which the Encyclopcedia

Britannica is published. Any contemporary description is indeed liable to become inadequate almost as soon as it is in the hands of the reader; but the available resources have been utilized here to the utmost, so that the salient facts up to the autumn of the year 1910 might be included throughout, not merely as isolated events, but as part of a con- sistent whole, conceived in the spirit of the historian. Thus only can the fleeting present be true to its relation with later developments, which it is no part of the task of an encyclopaedia to prophesy.

In this connexion it is advisable to explain that while the most recent statistics have been incorporated when they really represented conditions of historic value, the notion that economic development can be truly shown merely by giving statistics for the last year available is entirely false, and for this reason in many cases there has been no attempt merely statistics. to be “up-to-date” by inserting them. Statistics are used here as an illustration of the substantial existing conditions and of real progress. For the statistics of one year, and especially for those of the latest year, the inquirer must necessarily go to annual publications, not to an encyclopaedia which attempts to show the representative conditions of abiding importance. In such a work statistics are only one useful method of expressing historic evolution; their value varies con- siderably according to the nature of the subject dealt with; and the figures of the year which by accident is the last before publication would often be entirely misleading, owing to their being subject to some purely temporary influence. In general, far less tabular matter has been included in the Eleventh Edition than in the Ninth. Where it is used, it is not as a substitute for descriptive accounts, which can put the facts in readable form much better, but more appropriately as showing concisely and clearly the differences between the conditions at different periods. As years pass by,

and new statistics on all subjects become accessible, those which have been given here for their historical value are, as such, unaffected by the lapse of time; but if they had been slavishly inserted simply because they were the latest in the series of years immediately preceding publication, their precarious connexion with any continuous evolution would soon have made them futile. So much has been done in the Eleventh Edition to bring the record of events, whether in political history or in other articles, down to the latest available date, and thus to complete the picture of the world as it was in 1910, that it is necessary to deprecate any misconception which might otherwise

arise from the fact that statistics are' inserted not as events in themselves — this they may or may not be, according to the subject-matter — but as a method of expressing the substantial results of human activity; for that purpose they must be given comparatively, selected as representative, and weighed in the balance of the judicious historian.

While every individual article in an encyclopaedia which aims at authoritative exposition must be informed by the spirit of history, it is no less essential that the spirit of science should move over The spirit of ˆ e const ruction of the work as a whole. Whatever may be the deficiencies of its science. execution, the Eleventh Edition has at any rate this advantage to those who use it,

that the method of simultaneous preparation, already referred to, has enabled every subject to be treated systematically. Not only in the case of "science" itself, but in history, law, or any other kind of knowledge, its contributors were all assisting to carry out a preconcerted scheme, each aware of the relation of his or her contribution to others in the same field; and the inter- dependence of the related parts must be remembered by any reader who desires to do justice to the treatment of any large subject. Cross-references and other indications in the text are guides to the system employed, which are supplemented in greater detail by the elaborate Index. But the scientific spirit not only affects the scheme of construction as a whole: it has modified the individual treatment. Attention may perhaps be drawn to two particular points in this connexion, — the increased employment of the comparative method, and the attempt to treat opinion and controversy objectively, without partisanship or sectarianism.

The title of the Encyclopedia Britannica has never meant that it is restricted in its accounts of natural science, law, religion, art, or other subjects, to what goes on in the British dominions; but a The compara- cons iderable extension has been given in the Eleventh Edition to the amount cf tive method, information it contains concerning the corresponding activities in other countries. By approaching each subject, as far as possible, on its merits, the contributors in every department aim at appraising the achievements of civilization from whatever source they have arisen, and at the same time, by inserting special sections on different countries when this course is appropriate, they show the variations in practice under different systems of government or custom. But the subjects are not only arranged comparatively in this sense : new branches of study have arisen which are of chief importance mainly for the results attained by the

comparative method. The impetus given to comparative sociology by Herbert Spencer, the modern interest in comparative law, religion, folklore, anthropology, psychology and philology, have resulted in the accumulation of a mass of detail which it becomes the task of an encyclopaedia produced on the plan of organized co-operation to reduce to manageable proportions and intelligible perspective. Comparative bibliography, so much fostered of late years by the growth of great library organizations, undergoes in its turn the same process; and expert selection makes the references to the best books a guide to the student without overwhelming him. To deal here with all the lines of new research which have benefited by the comparative method in recent years would trench unnecessarily upon the scope of the contents of the work, where sufficient is already written. One illustration must suffice of a science in which the new treatment affects both the substance and the form of the articles in the Eleventh Edition of the Encyclopedia Britannica. Com- parative Anatomy, as a branch of Zoology, can no longer be scientifically separated from Human Anatomy. The various parts of the human body are therefore systematically treated under separate headings, in connexion not only with the arts of medicine and surgery, which depend on a knowledge of each particular structure, but with the corresponding features in the rest of the animal kingdom, the study of which continually leads to a better understanding of the human organism. Thus comparative anatomy and human anatomy take their places, with physiology and pathology, as interdependent and inter-

connected branches of the wider science of Zoology, in which all the lines of experimental inquiry and progressive knowledge lead up to a more efficient service of man and society.

In stating “the position taken by the Encyclopedia Britannica in relation to the active con- troversies of the time,” Spencer Baynes, in his Preface to the first volume of the Ninth Edition (1875), referred to the conflict of opinion then raging in regard to religion and ,

science. “In this conflict,” he said, “a work like the Encyclopedia is not called upon . / to take any direct part. It has to do with knowledge, rather than opinion, and to leal with all subjects from a critical and historical rather than a dogmatic point of view. It cannot be the organ of any sect or party in science, religion or philosophy.” The same policy has in- spired the Eleventh Edition. The Encyclopedia Britannica itself has no side or party; it attempts to give representation to all parties, sects and sides. In a work indeed which deals with

opinion and controversy at all, it is manifestly impossible for criticism to be colourless; its value as a source of authoritative exposition would be very different from what it is if individual contributors were not able to state their views fully and fearlessly. But every effort has been made to obtain, impar- tially, such statements of doctrine and belief in matters of religion and similar questions as are sat- isfactory to those who hold them, and to deal with these questions, so far as criticism is concerned, in such a way that the controversial points may be understood and appreciated, without prejudice to the argument. The easy way to what is sometimes considered impartiality is to leave controversy out altogether; .that would be to avoid responsibility at the cost of perpetuating ignorance, for it is only in the light of the controversies about them that the importance of these questions of doctrine and opinion can be realized. The object of the present work is to furnish accounts of all sub- jects which shall really explain their meaning to those who desire accurate information. Amid the variety of beliefs which are held with sincere conviction by one set of people or another, impartiality does not consist in concealing criticism, or in withholding the knowledge of divergent opinion, but in an attitude of scientific respect which is precise in stating a belief in the terms, and according to the interpretation, accepted by those who hold it. In order to give the fullest expression to this objective treatment of questions which in their essence are dogmatic, con- tributors of all shades of opinion have co-operated in the work of the Eleventh Edition of the Encyclopedia Britannica. They have been ; selected as representative after the most careful con- sideration and under the highest sense of editorial responsibility. The proportion of space devoted to these subjects is necessarily large, because they bulk largely in the minds of thinking people; and while they are treated more comprehensively than before, individual judgments as to their relative claims may naturally vary. The general estimates which prevail among the countries which repre- sent Western civilization are, however, in practical agreement on this point, and this consensus is the only ultimate criterion. In one respect the Eleventh Edition is fortunate in the time of its appearance. Since the completion of the Ninth Edition the controversies which at -that time raged round the application of historical and scientific criticism to religion have become less acute, and an objective statement of the problems, for instance, connected with the literary history of the Bible is now less encumbered with the doubts as to the effect on personal religidn which formerly prevailed. Science and theology have learnt to dwell together; and a reverent attitude towards religion, and indeed towards all the great religions, may be combined, without arriere-pensee, with a scientific comparative study of the phenomena of their institutions

and development.

Modern scientific progress has naturally affected other aspects of the Eleventh Edition no less than the literary text; and a word may be added here as to the illustrations and maps. Photography and reproductive processes generally now combine to enable much more to be done than was possible a generation ago to assist verbal explanations and descriptions by an appeal to the eye, and to make this appeal scientifically accurate both in form and colour- The older pictorial material in the Ninth Edition has undergone the same critical survey as the text ; and a large proportion of what now appears in the Eleventh Edition is not only new, but illustration represents more adequately the modern principles of the art of illustration. The microscope on the one hand, and the museum on the other, have become in an increasing degree the

instruments for attaining a scientific presentment in pictorial form of the realities of science and art. Whether for elucidating the technicalities of zoology or engineering machinery, or for showing concrete examples of ancient or modern statuary or painting, the draughtsman or the photographer has co-operated in the Eleventh Edition with the writers of the various articles, so that as far as possible their work may be accurately illustrated, in the correct sense, as distinct from any object of beautifying the book itself by pictures which might merely be interesting on their own account. Similarly the maps are not collected in an atlas, but accompany the topographical articles to which they are appropriate. Whether plate-maps or text-maps, they were all laid out with the scope, orthographical system, and other requirements of the text in view; either the cartographers have worked with the text before them — often representing new geographical authority, on the part of the contributors — or they have been directed by the geographical department of the editorial staff as to the sources on which they should draw; and the maps have been indexed as an atlas is, so that any topographical article not accompanied by a map has its appropriate map-reference in the general index. The more important coloured maps have been specially prepared by Messrs Justus Perthes of Gotha, the publishers of Stieler's Atlas, which in some instances has served as their basis; and the others have been made under the direction of Mr Emery Walker of London, in collaboration with the editorial staff. Mr Emery Walker's great knowledge and experience in the work of illustration has throughout been put ungrudgingly at the service of the Eleventh Edition.

Conclusion.

In expressing, on behalf of the editorial staff and the publishers, their indebtedness to the large number of contributors who have assisted in carrying the work to its completion, the Editor would be glad to refer to many individuals among the eminent writers who have given of their best. But the list is so long that he must content himself with a word of general thanks. It is more important to give public credit here to those who, without actually being members of the editorial staff, have taken an intimate part with them in planning and organizing the Eleventh Edition. It was necessary for the Editor to be able to rely on authoritative specialists for advice and guidance in regard to particular sciences. Foremost among these stand the subjects of Zoology and . Botany, which were under the charge respectively of Dr P. Chalmers Mitchell, Secretary of the Zoological Society of London, and Dr A. B. Rendle, Keeper of the department of Botany, British Museum. Dr Chalmers Mitchell's Advisers oa assistance in regard to Zoology extended also to the connected aspects of Comparative special Anatomy (in association with Mr F. G. Parsons), Physiology and Palaeontology. The

subjects. whole field of Biology was covered by the joint labours of Dr Chalmers Mitchell and

Dr Rendle; and their supervision, in' all stages of the work, gave unity to the co-operation of the numer- ous contributors of zoological and botanical articles. The treatment of Geology was planned by Mr H. B. Woodward; and with him were associated Dr J. A. Howe, who took charge of the department of Topographical Geology, Dr J. S. Flett, who covered that of Petrology, and Mr L. J. Spencer and Mr F. W. Rudler, who dealt comprehensively with Mineralogy and Crystallography. The late Dr Simon Newcomb planned and largely helped to carry out the articles dealing with Astronomy. Prof. J. A. Fleming acted in a similar capacity as regards Electricity and Magnetism. Prof. Hugh Callendar was responsible for the treatment of Heat; Prof. Poynting for that of Sound; and the late Prof. C. J. Joly, Royal Astronomer in Ireland, planned the articles dealing with Light and Optics. On literary subjects the Editor had the sympathetic collaboration of Mr Edmund Gosse, Librarian to the House of Lords; and Mr Marion H. Spielmann, on artistic subjects, also gave valuable help.

Among those whose association with the editorial staff was particularly close were the Rev. E. M. Walker of Oxford, as regards subjects of ancient Greek history; Mr Stanley Cook of Cambridge, who

was the Editor's chief adviser on questions of Old Testament criticism and Semitic learning generally; Dr T. Ashby, Director of the British School of Archaeology at Rome, who dealt with Italian topography and art; and Mr Israel Abrahams, who was consulted ' on Jewish subjects. Dr Peter Giles of Cambridge undertook the survey of Comparative Philology, and Sir Thomas

Barclay that of International Law. Others who gave valuable advice and assistance in regard to their various subjects were — Lord Rayleigh and Mr W. C. D. Whetham (Physical Science), Sir Archibald Geikie (Geology), Sir E. Maunde Thompson (Palaeography and Bibliology), Mr J. H. Round (History and Genealogy), Mr Phene Spiers (Architecture), Mr W. Burton (Ceramics), Mr T. M. Young of Manchester (Textile Industries), Prof. W. E. Dalby (Engineering), Dr G. A. Grierson (Indian Languages), the Rev. G. W. Thatcher (Arabic), Mr H. Stuart Jones (Roman History and Art), Dr D. G. Hogarth and Prof. Ernest Gardner (Hellenic Archaeology), the late Dr W. Fream (Agriculture), Mr W. F. Sheppard (Mathematics), Mr Arthur H. Smith (Classical Art), Dr Postgate (Latin Literature), Mr Fitzmaurice Kelly (Spanish Literature), Prof. J. G. Robertson (German Literature), Mr J. S. Cotton (India), Mr Edmund Owen (Surgery), Mr Donald Tovey (Music), Prof. H. M. Howe of Columbia University (Mining), Prof. W. M. Davis and Prof. D. W. Johnson of Harvard (American Physiography).

These names may be some indication of the amount of expert assistance and advice on which the editorial staff were able to draw, first when they were engaged in making preparations for the Eleventh Edition, then in organizing the whole body of contributors, and finally in combining their united resources in revising the work so as to present it in the finished state in which suooort it is given to the public. Constituting as they did a college of research, a centre which drew to itself constant suggestions from all who were interested in the dissemination of accurate information, its members had the advantage of communication with many other leaders of opinion, to whose help, whether in Europe or America, it is impossible to do adequate justice here. The interest shown in the undertaking may be illustrated by the fact that his late Majesty King Edward VII. graciously permitted his own unique collection of British and foreign orders to be used for the purpose of making the coloured plates which accompany the article Knighthood. Makers of history like Lord Cromer and Sir George Goldie added their authority to the work by assisting its contributors, even while not becoming contributors themselves. Custodians of official

records, presidents and secretaries of institutions, societies and colleges, relatives or descendants of the subjects of biographies, governmental or municipal officers, librarians, divines, editors, manufacturers, — from many such quarters answers have been freely given to applications for. information which is now embodied in the Encyclopedia Britannica.

In the principal Assistant-Editor, Mr Walter Alison Phillips, the Editor had throughout as his chief ally a scholarly historian of wide interests and great literary capacity. Prof. J. T. Shotwell, of Columbia University, U.S.A., in the earlier years of preparation, acted as joint _. „ „ Assistant-Editor; and Mr Ronald McNeill did important work as additional Assistant- Editor while the later stages were in progress. To Mr Charles Crawford Whinery was entrusted the direction of a separate office in New York for the purpose of dealing with American contributors and with articles on American subjects; to his loyal and efficient co-operation, both on the special subjects assigned to the American office, and in the final revision of the whole work, too high a tribute cannot be paid. The other principal members of the editorial staff in London, responsible for different depart- ments, were Mr J. Malcolm Mitchell, Dr T. A. Ingram, Mr H. M. Ross, Mr Charles Everitt, Mr O. J. R. Howarth, Mr F. R. Cana, Mr C. O. Weatherly, Mr J. H. Freese, Mr K. G. Jayne, Mr Roland Truslove, Mr C. F. Atkinson, Mr A. W. Holland, the Rev. A. J. Grieve, Mr. W. E. Garrett Fisher and Mr Arthur B. Atkins, to the last of whom, as private secretary to the Editor-in-Chief, the present writer owes a special debt of gratitude for unfailing assistance in dealing with all the problems of editorial control. On the New York staff Mr Whinery had the efficient help of Mr R. Webster, Dr N. D. Mereness, Dr F. S. Philbrick, Dr W. K. Boyd, Dr W. O. Scroggs, Mr W. T. Arndt, Mr W. L. Corbin and Mr G. Gladden.

A word must be added concerning a somewhat original feature in the editorial mechanism, the Indexing department. This department was organized from the first so that it might serve a double purpose. By indexing the articles as they came in, preparation could gradually be ~. . . made for compiling the Index which would eventually be published; and as the reference- cards gradually accumulated under systematic index-headings, the comparison of work done by different writers might assist the editing of the text itself by discovering inconsistencies or inaccuracies in points of detail or suggesting the incorporation of additional material. The text of the Eleventh Edition owes

much in this “way to suggestions originating among the staff of ladies concerned, among whom particular mention may be made of Miss Griffiths, Miss Tyler, and Miss Edmonds. The actual Index, as published, represents a concentration and sifting of the work of the Indexing department; and in order to put it into shape a further stage in the organization was necessary, which was carried through under the able direction of Miss Janet Hogarth. The completion of the Index volume, which all those who wish to make full use ; of the Eleventh Edition of the Encyclopaedia Britannica should regard as the real guide to its contents, brought finally into play all parts of the editorial machinery which had been engaged in the making of the work itself, — a vast engine of co-operative effort, dedicated to the service of the public.

HUGH CHISHOLM.

London,

December io, iqio.

A.

A.

R.

A.

C.

L.

A.

D.

A,

E.

S.

A.

F.

B.

A.

F.

P.

A.

M. C.

A.

M. CI.

A.

R. W.

A.

Si.

A.

W.*

A.

W. H.*

B.

M.*

C.

B.*

C.

E.*

INITIALS USED IN VOLUME I. TO IDENTIFY INDIVIDUAL CONTRIBUTORS,! WITH THE HEADINGS OF THE ARTICLES IN THIS VOLUME SO SIGNED.

Arthur Alcock Rambaut, M.A., D.Sc, F.R.S. f

Radcliffe Observer, Oxford. Professor of Astronomy in the University of Dublin | Airy. and Royal Astronomer of Ireland, 1892-1897. I

Sir Alfred Comyn Lyall, K.C.B. S Abdur Rahman;

See the biographical article: Lyall, Sir A. C. I Afghanistan: History.

Austin Dobson, LL.D. {Addison (in part).

See the biographical article : Dobson, Henry Austin. I

Arthur Everett Shipley, M.A., D.Sc, F.R.S. f

Fellow and Tutor of Christ's College, Cambridge. Reader in Zoology in Cam- "j Acanthocephala. bridge University. Joint-editor of the Cambridge Natural History. I

Aldred Farrer Barker, M.Sc. f Alpaca.

Professor of Textile Industries at Bradford Technical College. • \

Albert Frederick Pollard, M.A., F.R.Hist.Soc. f

Fellow of All Souls' College, Oxford ; Professor of English History in the University -j Aconcio. of London. Assistant-editor of the Dictionary of National Biography, 1893-1901. [

A. Glr. Arthur Girault. f . .

Professor of Political Economy at the University of Poitiers. Member of the i Algeria: History. International Colonial Institute. Author of Principes de Colonisation (1907-1908). I

A. G. H. A. G. Hadcock (late R.A.) . J Ammunition {in part).

Manager of the Gun Department, Elswick Works, Newcastle-on-Tyne. I

A. H. J. G. Abel Hendy Jones Greenidge, M.A., D.Litt. (Oxon.) (d. 1905). f ,.

Formerly Fellow and Lecturer of Hertford College, Oxford, and of St John's | Agrarian Laws Kin part). College, Oxford. Author of Infamia in Roman Law; &c. I

A. J. B. Alfred Joshua Butler, M.A., D.Litt. { Abyssinian Church.

Fellow and Bursar of Brasenose College, Oxford. Fellow of Eton College. I

A. J. G. Rev. Alexander J. Grieve, M.A., B.D. J Adoptianism; Alford;

Professor of New Testament and Church History, Yorkshire United Independent! .1… w . a—v... ct College, Bradford. I A1S ° P ‘ V ‘ Aml,rose » st –

A. Mw. Allen Mawer M.A. „ „ „ J” JEthelflaed; ffithelred I.;

Professor of English Language and Literature, Armstrong College, Newcastle-on- \ jE*h„| c * a _. 2ir*i,oii»<»Qrrt Tyne; formerly Fellow of Gonville and Caius College, Cambridge. I /amelslan » Z&ineiweara.

Agnes Mary Clerke. f Algol.

See the biographical article : Clerke, A. M. \

Agnes Muriel Clay (Mrs Edward Wilde) . f

Late Resident Tutor of Lady Margaret Hall, Oxford. Joint-editor of Sources of -\ Agrarian Laws (in part). Roman History, 133-70 B.C. L

Alfred Russel Wallace, LL.D., D.C.L., F.R.S; J” Acclimatization.

See the biographical article: Wallace, A. R. \

Arthur Sidgwick, M. A., LL.D. (Glasgow). f . . .

Fellow of Corpus Christi College, Oxford ; formerly Reader in Greek, Oxford Uni- 1 Aeschylus. versity. I

Arthur Willey, D.Sc, F.R.S. {Amphioxus.

Director of Colombo Museum, Ceylon. L

Arthur William Holland. { Aberdeen, 4th Earl of.

Formerly Scholar of St John’s College, Oxford. Bacon Scholar of Gray’s Inn, 1900. (.

Budgett Meakin (d. 1906), ‘ f Almohades (in part);

Author of Tlie Moors; The Land of the Moors; The Moorish Empire; &c. \ Almoravides (in part).

Charles Behont, D. es L., Litt.D. (Oxon.). f A„ ena j S

See the biographical article: Bemont, C. \ s

Charles Everitt, M.A., F.C.S., F.G.S., F.R.A.S. J Algebra: History.

Magdalen College, Oxford. t

C.F.A. Charles Francis Atkinson. J Alexandria: Battle

Formerly Scholar of Queen's College, Oxford. Captain, 1st City of London (Royal 1 American Civil War; Fusiliers). Author of The Wilderness and Cold Harbour. [Ammunition (in part).

1 A complete list, showing all individual contributors, appears in the final voluma.

c.

F. R.

c.

L.

c.

Mi.

c.

Pf.

c.

PI.

c.

R. B.

c.

S. P.*

c.

We.

D

B. Ma

D

G. H.

E.

Ch.

E.

C. B,

E.

G.

E.

Gr.

E.

He.

E.

H. M.

E.

J. R.

E.

M. W

E.O.*

INITIALS AND HEADINGS OF ARTICLES

Charles F. Richardson, Ph.D. f Alcott, A. B.;

Professor of English, Dartmouth College, U.S.A. I Alcott L. M.

H. Caldwell Lipsett. J .. ..

Formerly Editor of the Civil and Military Gazette, Lahore, India. “j Ainui; Agra.

Chedomille Mijatovich. i

Senator of the Kingdom of Servia. Envoy Extraordinary and Minister Pleni- J ■■. ..j , nf cnrwin

potentiary of the King of Servia to the Court of St James’s, 1 895-1900, and 1 Aiexanaer 01 oervia. I 902- 1 903. I

Christian Pfister, D. es L. , f

Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour. Author of -j Alcuin. Etudes sur le regne de Robert le Pieux.

Rev. Charles Plummer, M.A. f

Fellow of Corpus Christi College, Oxford. Author of Life and Times of Alfred the -j Alfred the Great. Great; &c. Ford’s Lecturer, 1 90 1. L

Charles Raymond Beazley, M.A., D.Litt. r

Professor of Modern History in the University of Birmingham. Formerly Fellow of J Andrew Of Longjumeau. Merton College, Oxford, and University Lecturer in the History of Geography. 1 Author of Henry the Navigator ; The Dawn of Modern Geography ; &c. I

Rev. Charles Stanley Phillips. f jgthelred II.

King’s College, Cambridge. Gladstone Memorial Prize, 1904. “^

Cecil Weatherly. f , . ■ ,. . ,. . .-,

Formerly Scholar of Queen’s College, Oxford. Barrister-at-Law. \ Advertisement Km part).

Duncan Black Macdonald, M.A. , D.D. rAbu Hanifa;

Professor t > f Semitic Languages, Hartford Theological Seminary, U.S.A. j Ahmad Ibn Hanbal.

David George Hogarth, M.A.

Keeper of the Ashmolean Museum, Oxford. Fellow of Magdalen College, Oxford. Fellow of the British Academy. Excavated at Paphos, 1888; Naukratis, 1899 and 1903; Ephesus, 1904-1905; Assiut, 1906-1907; Director, British School at Athens, 1897-1900; Director, Cretan Exploration Fund, 1899.

D. H. David Hannay.

Formerly British Vice-Consul at Barcelona. Author of Short History of Royal Navy, . 1 2 17-1688 ; Life of Emilio Castelar ; &c.

Adalia; Adana; Aegean Civilization; Aintab; Aleppo; Alexandria; Alexandretta; Alexandria Troas; . Amasia; Anazarbus. Abbadides; Abd-Ar-Rahman; Admiral; Agreda; Almogavares; Almohades; Almoravides; Alphonso; America: History; American War of Inde- pendence: Naval Operations; American War of 1812.

D. M. Rev. D. Meiklejohn. j Adams, John Couch.

D.Mn. Rev. Dugald Macfadyen, M.A. ‘ f Alexander, W. L.; AUon, H.

Minister of South Grove Congregational Church, Highgate. . ˆ

D. M. W. Sir Donald Mackenzie Wallace, K.C.I.E., K.C.V.O. r Alexander II of Russia” ”

Extra Groom of the Bedchamber to H.M. King George V. Director of the Foreign J , ” . . ‘

Department of The Times, 1891-1899. Author of Russia. [Alexander III., Of Russia.

E. B.* Ernest C. F. Babelon. f

Professor at the College de France. Keeper of the Dept. of Medals and Antiquities -I Africa, Roman. at the Bibliotheque Nationale. Chevalier of the Legion of Honour.

E. Br. Ernest Barker, M.A. f

Fellow and Lecturer in Modern History, St John’s College, Oxford. Formerly -{ Amalric. Fellow and Tutor of Merton College. L

_ _ _ _ r Adams, John;

Edward Channing, Ph.D. *j„^„ ..l. „„.•._,,

Professor of History, Harvard University.] A * amS ‘ 3 ° hn ? UinC¥ ‘

L Adams, Samuel.

Right Rev. Edward Cuthbert Butler, O.S.B., D.Litt. r »„„-„„.««

Abbot of Downside Abbey, Bath. J acoemeu.

Edmund Gosse, LL.D. f Aasen; Almqvist;

See the biographical article : Gosse, Edmund. < Anacreontics;

[Andersen, Hans Christian. Ernest Arthur Gardner, M.A. Abae; Acarnania;

See the biographical article: Gardner, Percy. J A e cjna

Edward Heawood, M.A. f Africa: Geography, Economics,

Librarian to Royal Geographical Society, London. Author of Geography of Africa ; &c. J, Biblioerabhv

Ellis Hovell Minns, M.A. r

Lecturer and Assistant Librarian, and formerly Fellow, Pembroke College, Cam- J Alani. bridge. University Lecturer in Palaeography. |

Emanuel Joseph Ristori, Ph.D., Assoc. M. Inst. C.E. r

Member of Council, Institute of Metals. « Aluminium.

Rev. Edward Mewburn Walker, M.A. r . . . „. .

Fellow, Senior Tutor and Librarian of Queen’s College, Oxford. | Aegina. History.

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc r

Consulting Surgeon to St Mary’s Hospital, London, and to the Children’s Hospital, J Abdomen;

Great Ormond Street. Late Examiner in Surgery at the Universities of Cambridge, 1 Abscess” Adenoids.

Durham and London. Author of A Manual of Anatomy for Senior Students. [

E. Pr. Edgar Prestage. f ,

Special Lecturer in Portuguese Literature in the University of Manchester ; J Alcoforado. Examiner in Portuguese in the Universities of London, Manchester, &c. Com- mendador, Portuguese Order of S. Thiago. *■

Edwyn Robert Bevan, M.A. 4 Alexander the Great.

New College, Oxford. Author of The House of Seleucus. t-

Rev. Ethelred Leonard Taunton (d. 1907). J" Acolyte;

Author of The English Black Monks of St Benedict; History of the Jesuits in England. \ Allen William.

Rev. Edmund Venables, M.A., D.D. (1810-1895). \ Abbey;

Canon and Precentor of Lincoln. Author of Episcopal Palaces of England. I Abbot.

Edgar Whitaker (d. 1905). _ (Ahmed Veflk

Formerly Times correspondent at Constantinople. I

Fred A. Eaton (Academy, Royal.

Secretary to the Royal Academy. I

Frederick Cornwallis Conybeare, M.A., D.Th. (Giessen). [Ablution; Agape;

Formerly Fellow of University College, Oxford. Fellow of the British Academy. 1 Anabaptists; Author of The Ancient Armenian Texts of Aristotle; Myth, Magic and Morals; &c. I Ancestor- Worship.

Frank Finn, F.Z.S. f a„„ii_,_*: T(1 «„„

Late Assistant Director of the Indian Museum, Calcutta. \ Accumauzanon.

„ „ ■ ■», titita r .SSthelbald; ffithelberht;

Frederick George Meeson Beck, M.A. I mhemth ' Weired;

Fellow and Lecturer of Clare College, Cambridge. 1 “- ”’”’”»•”»

E.

R.

B.

E.

Tn

.

E.

V.

E.

W

•

F.

A.

E.

F.

C.

C.

F.

Fe

.

F.

G.

M. B

F.

G.

P.

F.

H.

Ne.

F.

LI.

G.

F.

S.

F.

T.

M,

F.

W

.R.*

G.

•

G.

A.

B.

G.

A.

Gr.

G.

Br

G.

B.

M.

G.

C.

R.

G.

E.

C.

G.

E.

W.

G.

F.

B.

G.

L.

I ˆSthelwulf ; Alamanni.

F. R. C. Frank R. Cana.

Author of South Africa from the Great Trek to the Union.

Frederick Gymer Parsons, F.R.C.S., F.Z.S. , F.R.Anthrop.Inst. r

Vice-President, Anatomical Society of Great Britain and Ireland. Lecturer on iiim.,!,,-, r ..,i. Anatomy at St Thomas's Hospital and the London School of Medicine for Women. < Alimeniary uanai, Formerly Hunterian Professor at the Royal College of Surgeons. Anatomy.

Francis Henry. Neville, M.A. , F.R.S. J*ii /••

Fellow of Sidney Sussex College, Cambridge, and Lecturer on Physics and Chemistry. 1 Alloys (tn part).

Francis Llewelyn Griffith, M.A., Ph.D., F.S.A. r .. S j m b e i.

Reader in Egyptology, Oxford. Editor of the Archaeological Survey arid Archaeo- < *~~™ oimoei, logical Reports of the Egypt Exploration Fund. [Akhmim; Amasis; Ammon.

Abyssinia: Geography;

Africa: Geography, History (in part) ; Albert Edward. Nyanza (in part); Albert Nyanza {in part); Alexandria (in part); Algeria: Geography.

Francis Storr. J Academies

Editor of the Journal of Education (London). Officier d'Academie (Paris). |_

Sir Frank Thomas Marzials. r

Accountant-General of the Army, 1898-1904. Editor of " Great Writers " Series. "j About.

Frederick William Rudler, I.S.O., F.G.S. r Agate; Alabaster;

Curator and Librarian of the Museum of Practical Geology, London, 1879-1902. J Alexandrite; President of the Geologists' Association, 1887-1889. [Amber – Amethvst.

Count Albert Edward Wilfred Gleichen, K.C.V.O., C.B., C.M.G., D.S.O., f .. . . „.

A.D.M.O., War Office; Colonel, Grenadier Guards. Mission to Abyssinia, 1897. \ Abyssinia: History.

George A. Boulenger, D.Sc, F.R.S. r

In charge of the Collections of Reptiles and Fishes, Department of Zoology, British J AlyteS. Museum. Vice-President of the Zoological

Society of London. 1

George Abraham Grierson, CLE., Ph.D., D.Litt. f

Member of the Indian Civil Service, 1873-1903. In charge of Linguistic Survey of -j Ahom. India, 1898-1902. Gold Medallist, Asiatic Society, 1909. [

Rev. George Bryce, D.D., LL.D. . f

Head of Faculty of Science, and Lecturer in Biology and Geology in Manitoba -J Alberta. University, 1891-1904. Vice-President of Royal Society, Canada, 1908. [

George Ballard Mathews, M.A., F.R.S. C • •.

Formerly Professor of Mathematics, University College of N. Wales. Sometime -I Algebra: Special. Fellow of St John's College, Cambridge. |_

George Croom Robertson. fAbelard (in part).

See the biographical article : Robertson, G. C. \

Colonel George Earl Church. f Amazon.

See the biographical article: Church, G. E. \

George Edward Woodberry, Litt.D., LL.D. • f

Professor of Comparative Literature at Columbia University, 1891-1904. Author of < American Literature. Edgar Allan Poe; Makers of Literature; America in Literature; &c. (

G. F. Barwick. ,,,.,,,, , „ . , , „ ,. f Alfred, Duke of Saxeˆ Goburg;

Assistant-Keeper of Printed Books and Superintendent of Reading-room, British i Alice Grand- Duchess of Hesse Museum. L ' ,

Georg Lunge, Ph.D. (Breslau), Hon. Dr.Ing. (Karlsruhe). /Alkali - Manufacture.

See the biographical article : Lunge, G. \

H.

B.

Wo

H.

Cfa

.

H.

c.

c.

H.

M.

R.

H.

M.

V.

H.

P.

J.*

H.

R.

H*

H.

S.-

K.

J.P. R.

G. W. T. Rev. Griffithes Wheeler Thatcher, M.A., B.D.

Warden of Camden College, Sydney, N.S.W Formerly Tutor in Hebrew and Old Testament History at Mansfield College, Oxford.

G. P. M. George Percival Mudge, A.R.C.S., F.Z.S. [

Lecturer on Biology, London Hospital Medical College, and London School of”{ Albino. Medicine for Women. L

G. W. B. George Willis Botsford, A.M., Ph.D. J”

Professor of History of Greece and Rome in Columbia University, New York.] Amphictyony.

Author of The Roman Assemblies; &c. I ‘ ‘ ■’

Abu-l-‘ala; Abu-l-‘Atahiya; Abulfaraj; Abulfeda; ; ; Abu-1-Qasim; Abu Nuwas; Abu Tammam; Abu Ubaida; Akhtal; Alqama Ibn ‘Abada;

Amru’-ul-Qais.

Horace Bolingbroke Woodward, F.R.S., F.G.S. I

Formerly Assistant Director of the Geological Survey of England and Wales, -s AgaSSiZ J. L. R. President Geologists’ Association, 1893-1894. Wollaston Medallist, 1908. I ‘

Hugh Chisholm, M.A. [Acton Lord- Agnosticism’

Formerly Scholar of Corpus Christi College, Oxford. Editor of the nth edition of 1 Aii._ r / Pr’n’ r t ‘

the Encyclopaedia Britannica; co-editor of the 10th edition. ‘ |_ Aioeri, ■ innce l/Onsorit

Herbert Challice Crouch, M.R.C.S., L.R.C.P. ■ ■ f

Anaesthetist and Teacher of Anaesthetics at St Thomas’s, Samaritan and French ~\ Anaesthesia.

Hospitals, London. I . 1-

Hugh Munro Ross. ‘ „ f

Formerly Exhibitioner of Lincoln College, Oxford. ; Editor of the Times Engineering “j Alchemy. ,

Supplement. Author of British Railways. L ‘*

Herbert M. Vaughan, F.S.A. J

Keble College, Oxford. Author of The Last of -the Royal Stuarts ; .&c. | Albany, Countess of.

Henry Phelps Johnston. f American War of Independ-

Author .of Loyalist History of the Revolution; The Yorktown Campaign; &c. 1 ence: Land Operations.

H. R. Haxton. -! Advertisement.

Sir Henry Seton-Karr, C.M.G. „ T aˆ,~„„.*:„„. c 77 ,1

Member for St. Helen’s, 1885-1906. Author of The Call to Arms. \ Ammunition, Small Arms.

H.S.J. Henry Stuart Jones, M.A. f :.l . *

Formerly Fellow of Trinity College, Oxford. Director of the British School at 4 Amphitheatre. Rome, 1903-1905. Author of The Roman Empire. [

H. V. K. Captain Howard V. Knox, M.A. f . . „, , _

Exeter College, Oxford. \ AI P s: Flora and Fauna.

H. W. C. D. Henry William Carless Davis, M.A Fellow and Tutor of

H. W. H. Hope W. Hogg, M.A.

Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls’, Oxford, 1895-1902. { ˆ lred 5 Alredus; Ambrose,

e vv. hogg, m.a. r

Professor of Semitic Languages and Literatures in the University of Manchester, i

Anah.

■1

H. W. S. H. Wickham Steed. i

Correspondent of The Times at Rome (1 897-1902) and Vienna. |

Amedeo, Ferdinando, of Savoy.

H. Y. Sir Henry Yule, K. C.S.I. f „ ‘ ‘ „.

See the biographical article: Yule, Sir H. ˆAfghanistan: H istory.

J. A. Ba. J. Arthur Barrett, LL.B. J Admiralty Jurisdiction:

New York Bar, 1880. U.S. Supreme Court Bar, 1901. \ \ United States.

J. A. E. James Alfred Ewing, C.B., LL.D,, F.R.S., M.Inst.C.E. r

Director of (British) Naval Education,- 1903. Hon. Fellow of King’s College, J .. _ . Cambridge. Professor of Mechanism and Applied Mechanics in the University | Air-Engine. of Cambridge,- 1890-1903. [

J. A. F. John Ambrose Fleming, M.A. , D.Sc, F.R.S. • r

Pender Professor of Electrical Engineering in the University of London. Fellow of i„„ r ._j„

University College, London. Formerly Fellow of St John’s College, Cambridge, and 1 *™P«™m8ier. , .,

University Lecturer on Applied Mechanics. Author of Magnets and. Electric Currents. [_

J. A. H. John Allen Howe, B.Sc J ajv

Curator and Librarian at the Museum of Practical Geology, London. ~ _ Albian.

J. B. B. John Bagnell Bury, LiTt.D., LL.D. f ai.-j,.,, t * n m

See the biographical article: Bury, J. B. \ Alexius 1. u > 111.

J. B. B. James David Bourchier, M.A., F.R.G.S. f Albania-

Correspondent of The Times in South-Eastern Europe. Officer of the Order of \ *J oanii * > St Alexander of Bulgaria. [Alexander of Bulgaria.

J. D. Pr. John Dyneley Prince, Ph.D. ■ f

Professor of Semitic Languages at Columbia University, N.Y. Took part in the -j Akkad. Expedition to Southern Babylonia, 1888-89. t

J. P.K. James Fitzmaurice Kelly, Litt.D., F.R.Hist.S. r Acosta, J. de;

Fellow of the British Academy. Gilmour Professor of Spanish Language and Alarcon J R de* Literature in the University of Liverpool. Norman MaeColf Lecturer in' the -\ .. ' _" ." , '

University of Cambridge. Knight Commander of the Order of Alphonso XII. Alarcon, P. A. fle; Author of A History of Spanish Literature. I Aleman; Amadis de Gaula.

James Ford Rhodes, LL.D. f AHftm

See the biographical article i.Rhodes, J. Ford. \ Aaams, iv. * .

sr George Clark Anderson, M.A. Student,, Censor and Tutor of Christ Chi Formerly Fellow of Lincoln College, Oxford.

J. G. C. A. John George Clark Anderson, M.A. f •

Student,, Censor and Tutorof Christy Church, Oxford. Craven Fellow, 1896. i Ancyra.

INITIALS AND HEADINGS OF ARTICLES

J.G. Gr. John G-. Griffiths. i Accountants

Fellow and late President, Institute of Chartered Accountants. \ '"""""anis.

J. G. Sc. Sir James George Scott, K.C I.E J

xxn

J.I,

J.R.D.

J.S.

J. S. F.

J. S. K.

J. T. Be.

J. T. C.

J. T. S.*

J. V. B.

/no. W.

Ambulance.

James George bcoTT, K.C L.z.. -I Akyab.

Superintendent and Political Officer, Southern Shan States. Author of Burma ; &c. L

J, H. P. John Henry Poynting, M.A., D.Sc, F.R.S. J ■

Mason Professor of Physics and Dean of the Faculty of Science, Birmingham 1 Acoustics. University. Sometime Fellow of Trinity College, Cambridge. *-

J. H. R. John Horace Rounp, M.A., LL.D. (Edin.).' J.. .

Author of Feudal England; Peerage and Pedigree; &c. I A °eyance; Aids.

Jules Isaac. f. ... .,

Professor of History at the Lycee of Lyons, France. ^. AmpOise, u. a .

J. L.* Sir Joseph Larmor, M.A., D.Sc, LL.D., D.C.L., F.R.A.S. f

Fellow of St John's College, Cambridge. Lucasian Professor of Mathematics in J Aether Cambridge University. Secretary of the Royal Society; Author of Aether and. 1 Matter; &c. < t-

J. L. M. John Linton Myres, M.A., F.S.A., F.R;G.S. . f

Wykeham Professor of Ancient History in the University of Oxford. Formerly J AmathuSv Gladstone Professor of Greek and Lecturer in Ancient Geography, University of Liverpool. Lecturer in Classical Archaeology in University Of Oxford. L

J. M. M. John Malcolm Mitchell. J

Formerly Scholar of Queen's College, Oxford. Lecturer in Classics, East London "j Anaxagoras {in part). College (University of London). Joint-editor of Grote's History of Greece. I

J. P.-B. James George Joseph Penderel-Brodhurst. S Adam Robert

Editor of the Guardian (London). .’.’..■■’ L ‘

J. P. Pe. John Punnett Peters, Ph.D., D:D. f

Canon Residentiary, Cathedral of New York. Formerly Professor of Hebrew in J Anhar the University of Pennsylvania. In charge of the University Expedition to Baby- 1 Ibnlajl888-i895. Authorof Nippur, or Explorations and Adventures oji the Euphrates^ I

J. R. C. Joseph Rogerson Cotter, M.A. f ■ ‘■

Assistant to the Professor of Physics, Trinity’ College, Dublin. Editor of 2nd ■< Absorption of Light. * edition of Preston's Theory of Heat. [

Colonel John Richard DodeI, M.D., F.R.C.S:, R.AM r,’ Administrative Medical Officer of Cork Military District.

James Sully; LL.D. f . ,. ,

See the biographical article: Sully, ‘J..v |Ae£lfleiies.

John Smith .Flett, D.Sc, F.G.S. r . . , ;

Petrographer to the Geological Suivey. Formerly Lecturer on Petrology in Edin- J Agglomerate; burgh University. : .. – [Amphibolite; Andesite.

John Scott Keltie, LL.D., F.S.S., F.S.A. (Scot.). ‘ r

Sec. Royal Geog. Soc. Hon. Memb. Geographical Societies of Paris, Berlin, Rome, -| Abbadie; Africa: History, &c. Editor of Statesman’s Year-book. Editor of the Geographical, Journal. L

John T. Bealby. f

. Joint-author of Stanford’s Europe. Formerly editor of the Scottish Geographical -I Altai. Magazine. Translator of Sven Yie&in’s Through Asia, Central Asia and Tibet; &c. I

Joseph Thomas Cunningham, M.A., F.Z.S. f

Lecturer on Zoology at South-Western Polytechnic; Lpndon. For|merly Fellow of j Anehow University College, Oxford. Assistant Professor of Natural t|istory in the Uni- 1 **

versity of Edinburgh. Naturalist to the Marine Bidlogical Association. L

JXmes Thomson Shotwell, Ph.D. / Abelard {in part)

Professor of History in Columbia University, New York City. L

Professor of Church History, Mansfield College, Oxford. .■■■..:.:. \ ■

John Westlake, K.C, LL.D., D.C.L.

Professor of International Law;' Cambridge, 1888-19081 One of the Members for

United Kingdom of International Court of Arbitration under the Hague Convention, J Alien;

1900-1906. Author of A Treatise on Private International Law, or the Conflict Allegiance. ,-

of Laws: Chapters on the Principles of International Law, part i. " Peace," part ii. ■ '

" War."

J. W. D. Captain J. Whitly Dixon, R.N. f

Nautical Assessor to the Court of Appeal. • "j Anchor.

K. S. Kathleen Schlesinger. . r Accordion; Aeolian Harp;

Author of The Instruments of the Orchestra ; &c. i Alpenhorn.

L. D.* Louis Marie Olivier Duchesne. ■.'..,. J Adrian I., II., III.;

See the biographical article: Duchesne, L. M., O. \ Alexander I.',' II. "(popes).

L. J. S. Leonard James Spencer.

Department of Mineralogy, British Museum. Formerly Scholar of Sidney Sussex. College, Cambridge, and Harkness Scholar. Editor of the Mineralogical Magazine.

Albite; Alunite; Amblygonite; Ampibole; Analcite; Anatase; . Andalusite.

L V.* LUIGI VlLLARI. r . h "•

Italian Foreign Office (Emigration Dept.). Formerly Newspaper

Correspondent in J A J 5e ° ramm F ‘ east pf Europe; Italian Vice-Consul in New Orleans, 1906,, Philadelphia, 1907, and 1 Alexander VI. (pope); Boston; U.S.A., 1907-1910. Author of Italian Life in Town and Country; &c. [Amari.

xxx

INITIALS AND HEADINGS OF ARTICLES

M. Br. M. G.

H. 6. D.

M. Ha. M. H. C.

Margaret Bryant.

/Alexander the Great:

I Legends.

H.

Ja

M.

M.

Bh.

H.

N.

T.

H.

0.

B. C

M.

P.

►

N.

V.

O.E.

0. H.* 0. T. M.

P. A.

P. A. A. P. A. G.

P. A. K. P. A. M.

P. C. H.

P. 0. Y. P. CM.

Alecsandri.

Ampthill, Baron.

Moses Gaster, Ph.D. (Leipzig).

Chief Rabbi of the Sephardic communities of England. Vice-President, Zionist Congress, 1898, 1899, 1900. Ilchester Lecturer at Oxford on Slavonic and By- zantine Literature, 1886 and 1891. President, Folklore Society of England. Vice-President, Anglo-Jewish Association. Author of History of Rumanian Popular Literature; The Hebrew Version of the Secretum Secretorum of Aristotle.

Rt. Hon. Sir Mountstuart Elphinstone Grant-Duff, G.C.S.I., F.R.S. (1829- 1906). M.P. for the Elgin Burghs, 1857-1881. Under-Secretary of State for India, 1868-1874. Under-Secretary of State for the Colonies, 1880-1881. Governor of. Madras, 1881-1886. President of the Royal Geographical Society, 1889-1893. President of the Royal Historical Society, 1892-1899. Author of Studies in European Politics; Notes from a Diary; &c.

Marcus Hartog, M.A., D.Sc. (Lond.), F.L.S. f

Professor of Zoology in University College, Cork. Formerly Professor of Natural -j Amoeba. History in Queen’s College, Cork, and Fellow of the Royal University of Ireland. I

Montague Hughes Crackanthorpe, M.A., K.C., D.C.L. r

President of the Eugenics Education Society. Formerly Member of the General

Council of the Bar and Council of Legal Education. Late Chairman, Incorporated < "Alabama" Arbitration. Council of Law Reporting. Chairman of Quarter Sessions, Westmorland. Honorary Fellow, St John's College, Oxford. I

-{

Adad.

Aga Khan.

Morris J astro w, Jr., Ph.D.

Professor of Semitic Languages, University of Pennsylvania, U.S.A. Author Religion of the Babylonians and Assyrians; &c.

Sir Mancherjee Merwanjee Bhownaggree, K.C.I.E.

Fellow of Bombay University. M.P. (C.) Bethnal Green, North-East, 1895-1906. Author of Small History of the East India Company.

Marcus Niebuhr Tod, M.A. f . ..

Fellow and Lecturer of Oriel College, Oxford. University Lecturer in Greek) Agesuaus, Epigraphy. Corresponding Member of the German Imperial Archaeological 1 Agis. Institute. Joint-author of Catalogue of the Sparta Museum. I

Max Otto Bismarck Caspari, M.A. J Acarnania ; Achaean League :

Reader in Ancient History at London University. Lecturer in Greek at “i Actium ; Aetolia ; Ambraokt. Birmingham University, 1905-1908.

Leon Jacques Maxime Prinet.

Formerly Archivist to the French National Archives. France (Academy of Moral and Political Sciences).

Joseph Marie Noel Valois. f AHlv

Member of Academie des Inscriptions et Belles-lettres, Paris. ■ Honorary Archivist J j v (\

at the Archives Nationales. Formerly President of the Society de

THistoire del Alexanfler V. (pope;. France, and of the Soci6t6 de l'Ecole de Chartes. L

k … , u r • , fAIbret;

Auxiliary of the Institute of J A , enQOnj Counts of

Editor of 2nd ed. of

S. Otto Eppenstein, Ph.D.

Member of Scientific Staff at Zeiss's optical works, Jena. Grundzuge der Theorie der optischen Instrumente nach Abbe.

Otto Hehner, Ph.D. j* Adulteration.

Formerly President of the Society of Analytical Chemists. \

Otis Tufton Mason (d. 1908).

Curator, Department of Anthropology, National Museum, Washington, 1884-1908. Authorof Woman' sSharein Primitive Culture ; Primitive Traveland Transportation ; &c.

Paul Daniel Alphandery.

Professor of the History of Dogma, Ecole Pratique des Hautes Etudes, Sorbonne, Paris. Author of Les Idies morales chez les hilirodoxes lalines au dibut du XIII' siecle.

Philip A. Ashworth, M.A., D.Juris.

New College, Oxford. Barrister-at-Law.

P. Anderson Graham.

Editor of Country Life. Author of The Rural Exodus: the Problem of the Village and the Town.

Prince Peter Alexeivttch Kropotkin.

See the biographical article : KropotkIn, P. A.

Percy Alexander Macmahon, D.Sc, F.R.S., late Major R.A.

Deputy Warden of the Standards, Board of Trade. Joint General Secretary, British Association. Formerly Professor of Physics,

Ordnance College. President ‘ of London Mathematical Society, 1894-1896.

Peter Chalmers Mitchell, F.R.S. , D.Sc, LL.D.

Secretary to the Zoological Society of London from 1903. University Demonstrator in Comparative Anatomy and Assistant to Linacre Professor at Oxford, 1888-1891. Lecturer on Biology at Charing Cross Hospital, 1 892-1 894; at London Hospital 1894. Examiner in Biology to the Royal College of Physicians, 1892-1896, 1901- 1903. Examiner in Zoology to the University of London, 1903.

Philip Chesney Yorke, M.A. Magdalen College, Oxford.

Peter Giles, M.A., LL.D.

Fellow and Classical Lecturer of Emmanuel College, Cambridge, and University Reader in Comparative Philology.

J Aberration.

f America : Ethnology and i Archaeology.

f Alain de Lille; j Albigenses.

j Alsace-Lorraine. J Allotments.

r Altai; Amur: District; “[Anarchism.

Algebraic Forms.

Abiogenesis; Actinozoa; Alimentary Canal; Amphibia {in part).

j Aberdeen, 1st Earl of; \Allestree, B.

A; Accent; Alphabet

INITIALS AND HEADINGS OF ARTICLES

XXX]

P. La.

R. A. S. H. R. K. D.

R. L.* R. N. B.

R. P. S.

R. S. C. R. Tr. R. V. H. R. W. P. S. A. C.

S. E. B. T. As.

T.

A.

I.

T.

A.

J.

T.

H,

T.

H.

H.

T.

H.

H.*

T.

K.

C.

T.

W

. R. D

V.

B.

L.

W

Philip Lake, M.A., F.G.S.

Lecturer on Physical and Regional Geography in Cambridge University. Formerly – of the Geological Survey of India. Author of Monograph of British Cambrian Trilobites. Translator and editor of Kayser's Comparative Geology.

Robert Alexander Stewart Macalister, M.A., F.S.A. Director of Excavations for the Palestine Exploration Fund.

Sir Robert Kennaway Douglas.

Formerly Keeper of Oriental Printed Books and MSS. at the British Museum; Professor of Chinese, King's College, London. Author of The Language and Literature of China; &c.

Richard Lydekker, F.R.S.,

Author of Catalogues of Fossil Mammals, Reptiles and Birds in British Museum; The Deer of all Lands ; The Game A nimals of Africa ; &c.

Alps: Geology.

-J Acre;

Ai; Altar.

Robert Nisbet Bain (d. 1900).

Assistant Librarian, British Museum, 1883-1909. Author of Scandinavia: the Political History of Denmark, Norway and Sweden, 1513-1900; The First Romanovs, 1613 to 1725 ; Slavonic Europe : the Political History of Poland and Russia from 1469 to 1796, &c.

R. Phene Spiers, F.S.A., F.R.I.B. A.

Past President of Architectural Association. Associate and Fellow of King's College, London. Editor of Fergusson's History of Architecture. Author of Architecture: East and West; &c.

Robert Seymour Conway, M.A., Litt.D.

Professor of Latin, Victoria University of Manchester; formerly

Professor of Latin in University College, Cardiff.

Roland Truslove, M.A.

Dean, Fellow and Lecturer, Worcester College, Oxford. Formerly Scholar of Christ Church, Oxford.

Admiral Sir Richard Vesey Hamilton, G.C.B.

Senior Naval Lord of Admiralty, 1889-1891. President, Royal Naval College, Greenwich, 1891-1894.

Reginald W. Phillips, D.Sc, F.L.S.

Professor of Botany in the University College of North Wales. Author of Morpho- logy of the Algae, &c.

Stanley Arthur Cook, M.A.

Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904-1908. Council of Royal Asiatic Society, I 904-1905. Editor for Palestine Exploration Fund. Author of Critical Notes on Old Testament History ; Religion of Ancient Palestine ; &c.

Simeon Eben Baldwin, M.A., LL.D.

Professor of Constitutional and Private International Law in Yale University. Chief Justice of the Supreme Court of Errors, Connecticut. President of the Inter- national Law Association. President of the American Historical Association.

Thomas Ashby, M.A., D.Litt. (Oxon.), F.S.A.

Formerly Scholar of Christ Church, Oxford. Director of British School of Archaeo- logy at Rome.

Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.

■s Alcock, Sir R.

J Amblypoda; \ Ancylopoda.

Aagesen; Absalon; Adolphus Frederick; Alexander Nevsky; Alexius Mikhailovich; Alexius Petrovich; Alin; Andrassy, Count; .Andrew II. of Hungary.

Aisle.

Aequi.

Hon. Sec. Anthropo-

T. Athol Joyce, M.A.

Assistant in Department of Ethnography, British Museum, logical Society.

Thomas Hodgkin, LL.D., D.Litt.

See the biographical article: Hodgkin, T.

Thomas Henry Huxley, F.R.S.

See the biographical article : Huxley, Thomas H.

Colonel Sir Thomas Htjngerford Holdich K.CM G. K.C.I.E., Hon. D .Sc. f Af g hanis tan: Geography- Superintendent, Frontier Surveys, India, 1892-1898. Author of The Indian < «,»,„_ *. ,„!„«,«.„„ Borderland; The Countries of the King's Award; India; Tibet; &c. [Atgttan TUTKestan.

-j Agriculture {in part).

J Admiralty Administration

\ (British).

-j Algae.

Aaron; Abimelech; Abraham; Ahab; Amalekites; Ammonites.

:—■ –

Adria; Aemilia Via; Agrigentum; Alba Fucens; Alba Longa; Aletrium; Anagnia; Ancona.

j Affiliation.

J Ababda; “1 Africa: Ethnology.

4 Alaric.

-j Amphibia (in part).

Rev. Thomas Kelly Cheyne, D.Litt., D.D. See the biographical article:

Cheyne, T. K.

T. W. Rhys Davids, LL.D., Ph.D.

Professor of Comparative Religion in Manchester University. President of the Pali Text Society. Fellow of the British Academy. Secretary and Librarian of Royal Asiatic Society, 1885-1902. Author of Buddhism; &c.

{

Adam; Amos.

Abhidhamma;

Ajanta;

Ananda.

Vivian Byam Lewes, F.I.C., F.C.S.

Professor of Chemistry, Royal Naval College, to the Corporation of the City of London.

Chief Superintendent Gas Examiner -j Acetylene.

Sir Joseph Walton (d. 1010).

Formerly Judge of the King's Bench Div. Bar, 1899.

Chairman of the General Council of the -j Affreightment.

XXX11 W. A. B. C.

W. A. P.

W. Ba. W. C. R.-A. W. E. G.

W. Fr. W. F. Sh.

W. G.*

W. G. F. P.

W. Hi. W. M. D.

W. M. F. P. W. M. R. W. 0. B.

W. Rl.

w.

S.

w.

T.

s.

w.

W.

w.

W.

F.*

N.

W.

R.*

INITIALS AND HEADINGS OF ARTICLES

Rev William Augustus Brevoort Coolidge, M.A , F.R.G.S., D.Ph. (Bern), f Aar; Aarau; Aargau; Adda; Fellow of Magdalen Col'ege; Oxford Professor of English History, St David's j ˆdige" Albula Pass* Alp*

~ "" ~~ Author of Guide du Haul Dauphins, ; The Range of \ .. s ' ... .'.

College, Lampeter, 1880-1881.

the Todi; Guide to Grindelwald; Guide to Switzerland; The Alps in Nature and

History; &c. Editor of the Alpine Journal, 1880-1889, &c.

m Alpes Maritimes; Alps; L Altdorf .

Walter Alison Phillips, MA.

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, Oxford. Author of Modern Europe , &c.

Abbot; Aix-la-Chapelle:

Congresses; Alexander I. of Russia; Ali, of Iannina; Alliance; . Ambassador.

William Bacher, Ph.D.

Professor at the Rabbinical Seminary, Buda-Pest.

Sir William Chandler Roberts-Austen, K.C.B., D.C L., F.R.S. See the biographical article : Roberts-Austen, Sir W. C.

Sir William Edmund Garstin, G.C.M.G. '

Governing Director, Suez Canal Co. Formerly Inspector-General of Irrigation Egypt. Under-Secretary of State for Public Works. Adviser to the Ministry of Public Works in Egypt, 1904-1908.

William Fream, LL.D., F.G.S., F.L.S., F.S.S. (d. 1907) Author 6f Handbook of Agriculture.

William Fleetwood Sheppard, M.A. f

Senior Examiner in the Board- of Education. Formerly Fellow of Trinity College, -i Algebra, Cambridge. Senior Wrangler, 1884. , [_

Walcot Gibson, D.Sc, F.G.S.

H.M. Geological Survey. Author of The Gold-Bearing Rocks of the S. Transvaal; Mineral Wealth of Africa ; The Geology of Coal and Coalmining ; &c.

Sir Walter George Frank Phillimore, Bart., D.C.L., LL.D.

Judge of the King's Bench Div. President of International Law Association, 1905. Author of Book of Church Law. Edited 2nd ed. of Phillimore 's Ecclesiastical Law, and 3rd ed. of vol. iv. of Phillimore' s International Law,

Walter Hibbert, A.M.I.C.E., F.I.C., F.C.S.

Lecturer on Physics and Electro-Technology, Polytechnic, Regent Street, London.

William Morris Davis, D.Sc, Ph.D.

Professor of Geology in Larvard University. Geography. Author of Physical Geography; &c.

William M. Flinders Petrie, D.C.L., Litt.D.. See the biographical article: Petrie, W. M. F.

William Michael Rossetti.

See the biographical article: Rossetti, Dante Gabriel.

Ven. Winfrid Oldfield Burrows, M.A.

Archdeacon of Birmingham. Formerly Tutor of Christ Church, Oxford, 1884-1891, and Principal of Leeds Clergy School, 1891-1900.

William Ridgeway, M.A., D.Sc, Litt.D.

Disney Professor of Archaeology, Cambridge University, and Brereton Reader in Classics. Fellow of Caius College, Cambr.d ;e. Fellow o. the British Academy. President of Royal Anthropological institute, 1908. Author of The Early Age of Greece, &c.

William Spalding.

See the biographical article: Spalding, W.

Rear-Admiral W. T. Sampson, LL.D.

See the biographical article: Sampson, W. T.

William Wallace.

See the biographical article: Wallace, William (1844-1897).

William Warde Fowler, M.A.

Fellow of Lincoln College, Oxford. Sub-Rector, 1881-1904. Gifford Lecturer, Edinburgh University, 1908. Author of The City-State of the Greeks and Romans.

Abenezra. i Alloys (in part).

J Albert Edward Nyanza; 1 Albert Nyanza (in part).

J Agriculture (in part)

J Africa: Geology; 1 Algeria: Geology.

(Admiralty, High Court of; Admiralty Jurisdiction.

I Accumulator.

Formerly Professor of Physical i America: Physical Geography , LL.D., Ph.D.

Abydos. /Andrea del Sartoo

r ; .

i

L

J Achaeans.

J Addison (in part).

J Admiralty Administration

\ (United States).

■j Anaxagoras (in part).

William Walker Rockwell, Lic.Theol.

Assistant Professor of Church History, Union Theological Seminary, New York.

■j Ambarvalia.

r Adrian IV., V., VI.; J Alexander III., IV., VII., VIII.; [.Ancyra, Synod of.

PRINCIPAL UNSIGNED ARTICLES

Abbreviation.

Aeronautics.

Albumin.

Alimony.

Ambo.

Acid.

Aerotherapeutics.

Alcohol.

Alismaceae.

Ammonia.

Aconite.

Agapemonites.

Alcohols.

Almanac.

Amsterdam.

Addison's Disease)

Age.

Aldehydes.

Aloe.

Ana.

Adoption.

Alabama.

AlexandriaD School.

Alum.

Andaman Islands.

Advocate,

Alaska.

Alhambra.

Amazons.

Andes.

Advowson.

Alb.

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

VOLUME I

A This letter of ours corresponds to the first symbol in the Phoenician alphabet and in almost all its descendants. In Phoenician, a, like the symbols for e and for o, did not represent a vowel, but a breathing ; the vowels originally were not represented by any symbol. When the alphabet was adopted by the Greeks it was not very well fitted to represent the sounds of their language. The breathings which were not required in Greek were accordingly employed to represent some of the vowel sounds, other vowels, like i and u, being represented by an adaptation of the symbols for the semi-vowels y and w. The Phoenician name, which must have corresponded closely to the Hebrew Aleph, was taken over by the Greeks in the form Alpha (a\a). The earliest authority for this, as for the names of the 1 other Greek letters, is the grammatical drama {ypafj.ixari.Ki] Qecopia) of Callias, an earlier contemporary of Euripides, from whose works four trimeters, containing the names of all the Greek letters, are preserved

in Athenaeus x. 453 d.

The form of the letter has varied considerably. In the earliest of the Phoenician, Aramaic and Greek inscriptions (the oldest Phoenician dating about 1000 B.C., the oldest Aramaic from the 8th, and the oldest Greek from the 8th or 7th century B.C.) A rests upon its side thus — ˆf- \ <£. In the Greek alphabet of later times it generally resembles the modern capital letter, but many local varieties can be distinguished by the shortening of one leg, or by the angle at which the cross line is set — \ /\ fa ft ft, &c. From the Greeks of the west the alphabet was borrowed by the Romans and from them has passed to the other nations of western Europe. In the earliest Latin inscriptions, such as the inscription found in the excavation of the Roman Forum in 1899, or that on a golden fibula found at Praeneste in 1886 (see Alphabet), the letters are still identical in form with those of the western Greeks. Latin develops early various forms, which are compara- tively rare in Greek, as i\, or unknown, as ˆ- Except possibly Faliscan, the other dialects of Italy did not borrow their alphabet directly from the western Greeks as the Romans did, but received it at second hand through the Etruscans. In Oscan, where the writing of early inscriptions is no less careful than in Latin, the A takes the form ˆ, to which the nearest parallels are found in north Greece (Boebtia, Locris and Thessaly, and there only sporadically).

I. 1

In Greek the symbol was used for both the long and the short sound, as in English father (a) and German Ratte (&); English, except in dialects, has no sound corresponding precisely to the Greek short a, which, so far as can be ascertained, was a mid-back-wide sound, according to the terminology of H. Sweet {Primer of Phonetics, p. 107). Throughout the history of Greek the short sound remained practically unchanged. On the other hand, the long sound of_a in the Attic and Ionic dialects passed into an open e-sound, which in the Ionic alphabet was represented by the same symbol as the original e-sound (see Alphabet : Greek) . The vowel sounds vary from language to language, and the a symbol has, in consequence, to represent in many cases sounds which are not identical with the Greek a whether long or short, and also to represent several different vowel sounds in the same language. Thus the New English Dictionary distinguishes about twelve separate vowel sounds, which are represented by a in English. In general it may be said that the chief changes which affect the a-sound in different languages arise from (1) rounding, (2) fronting, i.e. changing from a sound produced far back in the mouth to a sound produced farther forward. The rounding is often produced

by combination with rounded consonants (as in English was, wall, &c), the rounding of the preceding consonant being continued into the formation of the vowel sound. Rounding has also been produced by a following /-sound, as in the English fall, small, bald, &c. (see Sweet's History of English Sounds, 2nd ed., §§ 906, 784). The effect of fronting is seen in the Ionic and Attic dialects of Greek, where the original name of the Medes, Mddoi, with a in' the first syllable (which survives in Cyprian Greek as MS.S01), is changed into Medoi {MrjSoi), with an open e-sound instead of the earlier a. In the later history of Greek this sound is steadily narrowed till it becomes identical with I (as in English seed). The first part of the process has been almost repeated by literary English, a {ah) passing into e {eh), though in present-day pronunciation the sound has developed further into a diphthongal ei except before r, as in hare (Sweet, op. cit. § 783).

In English a represents unaccented forms of several words, e.g. an (one), of, have, he, and 01 various prefixes the history of which is given in detail in the New English Dictionary (Oxford, : 1888) r vol. i. p. 4. (P. Gi,)

As a symbol the letter is used in various connexions and for various technical purposes, e.g. for a note in music, for the first of the seven dominical letters (this use is derived from its being the first of the litter ae nundinales at Rome), and generally as a sign of priority.

In Logic, the letter A is used as a symbol for the universal affirmative proposition in the general form " all x is y." The letters I, E and O are used respectively for the particular affirm- ative " some x is y," the universal negative " no x is y," and the particular negative " some x is not y." The use of these letters is generally derived from the vowels of the two Latin verbs Ajflrmo (or Aid), "I assert," and nEgO, "I deny." The use of the symbols dates from the 13th century, though some authorities trace their origin to the Greek logicians. A is also used largely in abbreviations (q.v.).

In Shipping, Ai is a symbol used to denote quality, of con- struction and material. In the various shipping registers ships are classed and given a rating after an official examination, and assigned a classification mark, which appears in addition to other particulars in those registers after the name of the ship. See Shipbuilding. It is popularly used to indicate the highest degree of excellence.

AA, the name of a large number of small European rivers. The word is derived from the Old German aha, cognate to the Latin aqua, water (cf. Ger. ach; Scand. a, aa, pronounced 0). The following are the more important streams of this name: — Two rivers in the west of Russia, both falling into the Gulf of Riga, near Riga, which is situated between them; a river in the north of France, falling into the sea below Gravelines, and navi gable as far as St Omer; and a river of Switzerland, in the can- tons of Lucerne and Aargau, which carries the waters of Lakes Baldegger and Hallwiler into the Aar. In Germany there are the Westphalian Aa, rising in the Teutoburger Wald, and joining the Werre at Herford, the Munster Aa, a tributary of the Ems, and others.

AAGESEN, ANDREW (1826-1879), Danish jurist, was educated for the law at Kristianshavn and Copenhagen, and interrupted his studies in 1848 to take partin the first Schleswig war, in which he served as the leader of a reserve battalion. In 1855 he became professor of jurisprudence at the university of Copen- hagen. In 1870 he was appointed a member of the commission for drawing up a maritime and commercial code, and the navigation law of 1882 is mainly his work. In 1879 he was elected a member of the Landsthing; but it is as a teacher at the university that he won his reputation. Among his numerous juridical works may be mentioned: Bidrag til Laeren om Overdragelse af Ejendomsret, Betnaerkinger om Rettigheder over Ting (Copenhagen, 1866, 1871- 1872); Fortegnelse over Retssamlinger, Retslitteratur i Danmark, Norge, Sverige (Copenhagen, 1876). Aagesen was Hall's suc- cessor as lecturer on Roman law at the university, and in this department his researches were epoch-making. All his pupils were profoundly impressed by his exhaustive examination of the sources, his energetic demonstration of his subject and his stringent search after truth. His noble, imposing, and yet most . amiable personality won for him, moreover, universal affection and respect.

See C. F. Bricka, Dansk. Biog. Lex. vol. i. (Copenhagen, 1887); Samlade Skrifter, edited by F. C. Bornemann (Copenhagen, 1863). (R. N. B.)

AAL, also known as A'l, Ach, or Aich, the Hindustani names for the Morinda tinctoria and Morinda citrifolia, plants exten- sively cultivated in India on account of the reddish dye-stuff which their roots contain. The name is also applied to the dye, but the common trade name is Suranji. Its properties are due to the presence of a glucoside known as Morindin, which is com- pounded from glucose and probably a trioxy-methyl-anthra- quinone.

AALBORG, a city and seaport of Denmark, the seat of a bishop; and chief town of the ami (county) of its name, on the south bank of the Limf jord, which connects the North Sea and the Cattegat. Pop. (1901) 31,457. The situation is typical of the north of Jutland. To the west the Limfjord broadens into an irregular

lake, with low, marshy shores and many islands. North-west is the Store Vildmose, a swamp where the mirage is seen in summer. South-east lies the similar Lille Vildmose. A railway connects Aalborg with Hjorring, Frederikshavn and Skagen to the north, and with Aarhus and the lines from Germany to the south. The harbour is good and safe, though difficult of access. Aalborg is a growing industrial and commercial centre, exporting grain and fish. An old castle and some picturesque houses of the 17th cen- tury remain. The Budolphi church dates mostly from the mid- dle of the 1 8th century, while the Frue church was partially burnt in 1894, but the foundation of both is of the 14th century or earlier. There are also an ancient hospital and a museum of art and antiquities. On the north side of the fjord is Norre Sundby, connected with Aalborg by a pontoon and also by an iron rail- way bridge, one of the finest engineering works in the kingdom. Aalborg received town-privileges in 1342, and the bishopric dates from 1554.

AALEN, a town of Germany, in the kingdom of Wurttemberg, pleasantly situated on the Kocher, at the foot of the Swabian Alps, about 50 m. E. of Stuttgart, and with direct railway com- munication with Ulm and Cannstatt. Pop. 10,000. Woollen and linen goods are manufactured, and there are ribbon looms and tanneries in the town, and large iron works in the neighbourhood. There are several schools and churches, and a statue of the poet Christian Schubart. Aalen was a free imperial city from 1360 to 1802, when it was annexed to Wurttemberg.

AALESUND, a seaport of Norway, in Romsdal ami (county), 145 m. N. by E. from Bergen. Pop. (1900) 11,672. It occupies two of the outer islands of the west coast, Aspo and Norvfi, which enclose the picturesque harbour. Founded in 1824, it is the principal shipping-place of Sondmore district, and one of the chief stations of the herring fishery. Aalesund is adjacent to the Jorund and Geiranger fjords, frequented by tourists. From Oje at the head of Jorund a driving-route strikes south to the Nord- fjord, and from Merok on Geiranger another strikes inland to Otta, on the railway to Lillehammer and Christiania. Aalesund is a port of call for steamers between Bergen, Hull, Newcastle and Hamburg, and Trondhjem. A little to the south of the town are the ruins of the reputed castle of Rollo, the founder, in the 9

th century, of the dynasty of the dukes of Normandy. On the 23rd of January 1904, Aalesund was the scene of one of the. most terrible of the many conflagrations to which Norwegian towns, built largely of wood, have been subject. Practically the whole town was destroyed, a gale aiding the flames, and the population had to leave the place in the night at the notice of a few minutes. Hardly any lives were lost, but the sufferings of the people were so terrible that assistance was sent from all parts of the kingdom, and by the German government, while the British government also offered it.

AALI, MEHEMET, Pasha (1815-1871), Turkish statesman, was born at Constantinople in 1815, the son of a government official. Entering the diplomatic service of his country soon after reaching manhood, he became successively secretary of the Em- bassy in Vienna, minister in London, and foreign minister under Reshid Pasha. In 1852 he was promoted to the post of grand vizier, but after a short time retired into private life. During the Crimean War he was recalled in order to take the portfolio. of foreign affairs for a second time under Reshid Pasha, and in this capacity took part in 1855 in the conference of Vienna. Again becoming in that year grand vizier, an office he filled no less than five times, he represented Turkey at the congress of Paris in 1856. In 1867 he was appointed regent of Turkey during the sultan's visit to the Paris Exhibition. Aali Pasha was one of the most zeal- ous advocates of the introduction of Western reforms under the sultans Abdul Mejid and Abdul Aziz. A scholar and a linguist, he was a match for the diplomats of the Christian powers, against whom he successfully defended the interests of his country. He died at Erenkeni in Asia Minor on the 6th of September 1871.

AAR, or Aare, the most considerable river which both rises and ends entirely within Switzerland. ■ Its total length (including all bends) from its source to its junction with the Rhine is about 181 m., during which distance it descends 5135 ft., while its

drainage area is 6804 sq. m. It rises in the great Aar glaciers, in the canton of Bern, and W. of the Grimsel Pass. It runs E. to the Grimsel Hospice, and then N.W. through the Hasli valley, form- ing on the way the magnificent waterfall of the Handegg (151 ft.), past Guttannen, and pierces the limestone barrier of the Kirchet by a grand gorge, before reaching Meiringen, situated in a plain. A little beyond, near Brienz, the river expands into the lake of Brienz, where it becomes navigable. Near the west end of that lake it receives its first important affluent, the Lutschine (left), and then runs across the swampy plain of

the Bodeli, between Interlaken (left) and Unterseen (right), before again expanding in order to form the Lake of Thun. Near the west end of that lake it receives on the left the Kander, which has just before been joined by the Simme; on flowing out of the lake it passes Thun, and then circles the lofty bluff on which the town of Bern is built. It soon changes its north-westerly for a due westerly direction, but after receiving the Saane or Sarine (left) turns N. till near Aarberg its stream is diverted W. by the Hagneck Canal into the Lake of Bienne, from the upper end of which it issues through the Nidau Canal and then runs E. to Biiren. Henceforth its course is N.E. for a long distance, past Soleure (below which the Grosse Emme flows in on the right), Aarburg (where it is joined by the Wigger, right), Olten, Aarau, near which is the junction with the Suhr on the right, and Wildegg, where the Hallwiler Aa falls in on the right. A short way beyond, below Brugg, it receives first the Reuss (right), and very shortly afterwards the Limmat or Linth (right). It now turns due N., and soon becomes itself an affluent of the Rhine (left), which it surpasses in volume when they unite at Coblenz, opposite Waldshut. (W. A. B. C.)

AARAU*, the capital of the Swiss canton of Aargau. In 1900 it had 7831 inhabitants, mostly German-speaking, and mainly Protestants. It is situated in the valley of the Aar, on the right bank of that river, and at the southern foot of the range of the Jura. It is about 50 m. by rail N.E. of Bern, and 31m. N.W. of Zurich. It is a well-built modern town, with no remarkable features about it. In the Industrial Museum there is (besides collections of various kinds) some good painted glass of the 16th century, taken from the neighbouring Benedictine monastery of Muri (founded 1027, suppressed 1841 — the monks are now quartered at Gries, near Botzen, in Tirol). The cantonal library contains many works relating to Swiss history and many MSS. coming from the suppressed Argovian monasteries. There are many industries in the town, especially silk-ribbon weaving, foundries, and factories for the manufacture of cutlery and scien- tific instruments. The popular novelist and historian, Heinrich Zschokke (1771-1848), spent most of his life here, and a bronze statue has been erected to his memory. Aarau is an important military centre. The slopes of the Jura are covered with vine- yards. Aarau, an ancient fortress, was taken by the Bernese in 14T5, and in 1798 became for a time the capital of the Helvetic republic. Eight miles by rail N.E. are the famous sulphur baths of Schinznach, just above which is the ruined castle of Habsburg, the original home of that great historical house. (W. A. B. C.)

AARD-VARK (meaning ” earth- pig “), the Dutch name for the mammals of genus Orycteropus, confined to Africa (see Eden- tata).

Several species have been named. Among them is the typical form, 0. capensis, or Cape ant-bear from South Africa, and the northern aard-vark (O. aethiopicus) of north-eastern Africa, extending into Egypt. In form these animals are some- what pig-like; the body is stout, with arched back; the limbs are short and stout, armed with strong, blunt claws; the ears disproportionately long ; and the tail very thick at the base and tapering gradually. The greatly elongated head is set on a short thick neck, and at the extremity of the snout is a disk in which the nostrils open. The mouth is small and tubular, furnished with a long extensile tongue. The measurements of a female, taken in the flesh, were head and body 4 ft., tail 173 in.; but a large indi- vidual measured 6 ft. 8 in. over all. In colour the Cape aard-vark is pale sandy or yellow, the hair being scanty and allowing the skin to show; the northern aard-vark has a still thinner coat, and is further distinguished by the shorter tail and longer head and ears. These-animals are of nocturnal and burrowir" hi'i-its. and

generally to be found near ant-hills. The strong claws make a hole in the side of the ant-hill, and the insects are collected on the extensile tongue. Aard-varks are hunted for their skins; but the flesh is valued for food, and often salted and smoked.

AARD-WOLF (earth- wolf), a South and East African carni- vorous mammal (Proteles cristatus), in general appearance like a small striped hyena, but with a more pointed muzzle, sharper ears, and a long erectile mane down the middle line of the neck and back. It is of nocturnal and burrowing habits, and feeds on decomposed animal substances, larvae and termites.

AARGAU (Fr. Argovie), one of the more northerly Swiss cantons, comprising the lower course of the river Aar (q.v.), whence its name. Its total area is 541-9 sq. m., of which 517-9 sq. m. are classed as "productive" (forests covering 172 sq. m. and vineyards 8-2 sq. m.). It is one of the least mountainous Swiss cantons, forming part of a great table-land, to the north of the Alps and the east of the Jura, above which rise low hills. The surface of the country is beautifully diversified, undulating tracts and well-wooded hills alternating with fertile valleys watered mainly by the Aar and its tributaries. It contains the famous hot sulphur springs of Baden (q.v.) and Schinznach, while at Rhein- felden there are very extensive saline springs. Just below Brugg the Reuss and the Limmat join the Aar, while around Brugg are the ruined castle cf Habsburg, the old convent of Konigsfelden (with fine painted medieval glass) and the remains of the Roman settlement of Vindonissa [Windisch]. The total population in 1900 was 206,498, almost exclusively German-speaking, but

numbering 114,176 Protestants to 91,039 Romanists and 990 Jews. The capital of the canton is Aarau (q.v.), while other im- portant towns are Baden (q.v.), Zofingen (4591 inhabitants), Reinach (3668 inhabitants), Rheinfelden (3349 inhabitants), Wohlen (3274 inhabitants), and Lenzburg (2588 inhabitants). Aargau is an industrious and prosperous canton, straw-plaiting, tobacco-growing, silk-ribbon weaving, and salmon-fishing in the Rhine being among the chief industries. As this region was, up to 141 5, the centre of the Habsburg power, we find here many historical old castles (e.g. Habsburg, Lenzburg, Wildegg), and former monasteries (e.g. Wettingen, Muri), founded by that family, but suppressed in 1841, this act of violence being one of the main causes of the civil war called the ” Sonderbund War,” in 1847 in Switzerland. The cantonal constitution dates mainly from 1885, but since 1904 the election of the executive council of five members is made by a direct vote of the people. The legisla- ture consists of members elected in the proportion of one to every 1 100 inhabitants. The “obligatory referendum” exists in the case of all laws, while 5000 citizens have the right of ” initiative ” in proposing bills or alterations in the cantonal constitution. The canton sends 10 members to the federal Nationalrat, being one for every 20,000, while the two Standerate are (since 1904) elected by a direct vote of the people. The canton is divided into eleven administrative districts, and contains 241 communes.

In 1415 the Aargau region was taken from the Habsburgs by the Swiss Confederates. Bern kept the south-west portion (Zofingen, Aarburg, Aarau, Lenzburg, and Brugg), but some districts, named the Freie Amter or ” free bailiwicks ” (Mellingen, Muri, Villmergen, and Bremgarten), with the county of Baden, were ruled as ” subject lands” by all or certain of the Confederates. In 1798 the Bernese bit became the canton of Aargau of the Helvetic Republic, the re- mainder forming the canton of Baden. In 1803, the two halves (plus the Frick glen, ceded in 1802 by Austria to the Helvetic Republic) were united under the name of Kanton Aargau, which was then ad- mitted a full member of the reconstituted Confederation.

See also Argovia (published by the Cantonal Historical Society), Aarau, from i860; F. X. Bronner, Der Kanton Aargau, 2 vols., St Gall and Bern, 1844; H. Lehmann, Die argauische Strohindustrie, Aarau, 1896; W. Merz, Die mittelalt. Burganlagen und Wehrbauten d. Kant. Argau (fine illustrated work on castles), Aarau, 2 vols., 1904-1906; W. Merz and F. E. Welti, Die Rechtsquellen d. Kant. Argau, 3 vols., Aarau, 1898-1905; J. Miiller, Der Aargau, 2 vols., Zurich, 1870; E. L. Rochholz, Aargauer Weislhumer, Aarau, 1877; E. Zschokke, Geschichte des Aargaus, Aarau, 1903. (W. A. B. C.)

AARHUS, a seaport and bishop's see of Denmark, on the east coast of Jutland, of which it is the principal port; the second largest town in the kingdom, and capital of the ami (county) of Aarhus. Pop. (1901) 51,814. The district is low-lying, fertile and well wooded. The town is the junction of railways from-all

parts of the country. The harbour is good and safe, and agricul- tural produce is exported, while coal and iron are among the chief imports. The cathedral of the 13th century (extensively restored) is the largest church in Denmark. There is a museum of art and antiquities. To the south-west (13 m. by rail), a pictur- esque region extends west from the railway junction of Skander- borg, including several lakes, through which flows the Gudenaa, the largest river in Jutland, and rising ground exceeding 500 ft. in the Himmelbjerg. The railway traverses this pleasant district of moorland and wood to Silkeborg, a modern town having one of the most attractive situations in the kingdom. The bishopric of Aarhus dates at least from 951.

AARON, the traditional founder and head of the Jewish priest- hood, who, in company with Moses, led the Israelites out of Egypt (see Exodus ; Moses) . The greater part of his life-history is preserved in late Biblical narratives, which carry back exist- ing conditions and beliefs to the time of the Exodus, and find a precedent for contemporary hierarchical institutions in the events of that period. Although Aaron was said to have been sent by Yahweh (Jehovah) to meet Moses at the " mount of God " (Horeb, Ex. iv.27), he plays only a secondary part in the incidents at Pharaoh's court. After the "exodus" from Egypt a striking account is given of the vision of the God of Israel vouchsafed to him and to his sons Nadab and Abihu on the same holy mount (Ex. xxiv. 1 seq. 9 -1 1), and together with Hur he was at the side of Moses whˆn the latter, by means of his wonder-working rod, enabled Joshua to defeat the Amalekites (xvii. 8-16). Hur and Aaron were left in charge of the Israelites when Moses and Joshua ascended the mount to receive the Tables of the Law (xxiv. 12-15), an d when the people, in dismay at the prolonged absence of their leader, demanded a god, it was at the instigation of Aaron that the golden calf was made (see Calf, Golden). This was regarded as an act of apostasy which, according to one tradition, led to the consecration of the Levites, and almost cost Aaron his life (cp. Deut. ix. 20). The incident paves the way for the account of the preparation of the new tables of stone which contain a series of laws quite distinct from the Decalogue (q.v.) (Ex. xxxiii. seq.). Kadesh, and not Sinai or Horeb, appears to have been originally the scene of these incidents (Deut. xxxiii. 8 seq.

com- pared with Ex. xxxii. 26 sqq.), and it was for some obscure offence at this place that both Aaron and Moses were prohibited from entering the Promised Land (Num. xx.). In what way they had not “sanctified” (an allusion in the Hebrew to Kadesh ” holy “) Yahweh is quite uncertain, and it would appear that it was for a similar offence that the sons of Aaron mentioned above also met their death (Lev. x. 3 ; cp. Num. xx. 12, Deut. xxxii. 51). Aaron is said to have died at Moserah (Deut. x. 6), or at Mt. Hor ; the latter is an unidentified site on the border of Edom (Num. xx. 23, xxxiii. 37 ; for Moserah see ib. 30-31), and consequently not in the neighbourhood of Petra, which has been the traditional scene from the time of Josephus {Ant. iv. 4. 7).

Several difficulties in the present Biblical text appear to have arisen from the attempt of later tradition to find a place for Aaron in certain incidents. In the account of the contention between Moses and his sister Miriam (Num. xii.), Aaron occupies only a secondary position, and it is very doubtful whether he was originally mentioned in the older surviving narratives. It is at least remarkable that he is only thrice mentioned in Deuter- onomy (ix. 20, x. 6, xxxii. 50). The post-exilic narratives give him a greater share in the plagues of Egypt, represent him as high-priest, and confirm his position by the miraculous budding of his rod alone of all the rods of the other tribes (Num. xvii. ; for parallels see Gray, comm. ad loc, p. 217). The latter story illus- trates the growth of the older exodus-tradition along with the development of priestly ritual : the old account of Korah’s revolt against the authority of Moses has been expanded, and now describes (a) the divine prerogatives of the Levites in general, and (6) the confirmation of the superior privileges of the Aaronites against the rest of the Levites, a development which can scarcely be earlier than the time of Ezekiel (xliv. 15 seq.).

Aaron’s son Eleazar was buried in an Ephraimite locality known after the grandson as the ” hill of Phinehas ” (Josh. xxiv. 33). Little

historical information has been preserved of either. The name Phinehas (apparently of Egyptian origin) is better known as that of a son of Eli, a member of the priesthood of Shiloh, and Eleazar is only another form of Eliezer the son of Moses, to whose kin Eli is said to have belonged. The close relation between Aaronite and Levitical names and those of clans related to Moses is very note- worthy, and it is a curious coincidence that the name of Aaron’s sister Miriam appears in a genealogy of Caleb (1 Chron. iv. 17) with J ether (cp. Jethro) and Heber (cp. Kenites). In view of the confusion of the traditions and the difficulty of interpreting the details sketched above,

the recovery of the historical Aaron is a work of peculiar intricacy. He may well have been the tradi- tional head of the priesthood, and R. H. Kennett has argued in favour of the view that he was the founder of the cult at Bethel (Journ. of Theol. Stud., 1905, pp. 161 sqq.), corresponding to the Mosaite founder of Dan (q.v.). This throws no light upon the name, which still remains quite obscure; and unless Aaron (Aharon) is based upon Aron, ” ark ” (Redslob, R. P. A. Dozy, J. P. N. Land), it must be placed in a line with the other un-Hebraic and difficult names associated with Moses and Aaron, which are, apparently, of South Palestinian (or North-Arabian) origin.

For the literature and a general account of the Jewish priesthood, see the articles Levites and Priest. (S. A. C.)

AARON’S ROD, the popular name given to various tall flowering plants (“hag taper,” “golden rod,” &c). In archi- tecture the term is given to an ornamental rod with sprouting leaves, or sometimes with a serpent entwined round it (from the Biblical references in Exodus vii. 10 and Numbers xvii. 8).

AARSSENS, or Aarssen, FRANCIS VAN (1572-1641), a cele- brated diplomatist and statesman of the United Provinces. His talents commended him to the notice of Advocate Johan van Oldenbarneveldt, who sent him, at the age of 26 years, as a diplomatic agent of the states-general to the court of France. He took a considerable part in the negotiations of the twelve years’ truce in 1606. His conduct of affairs having displeased the French king, he was recalled from his post by Oldenbarneveldt in 1616. Such was the hatred he henceforth conceived against his former benefactor, that he did his very utmost to effect his ruin. He was one of the packed court of judges who in 1619 condemned the aged statesman to death. For his share in this judicial murder a deep stain rests on the memory of Aarssens. He afterwards be- came the confidential counsellor of Maurice, prince of Orange, and afterwards of Frederick Henry, prince of Orange, in their conduct of the foreign affairs of the republic. He was sent on special embassies to Venice, Germany and England, and dis- played so much diplomatic skill and finesse that Richelieu ranked him among the three greatest politicians of his time.

AASEN, IVAR (1813-1896), Norwegian philologist and lexico- grapher, was born at Aasen i Orsten, in Sondmore, Norway, on the 5th of August 1813. His father, a small peasant-farmer named Ivar Jonsson, died in 1826. He was brought up to farm- work, but he assiduously cultivated all his leisure in reading, and when he was eighteen he opened an elementary school in his native parish. In 1833

he entered the household of H. C. Thore- sen, the husband of the eminent writer Magdalene Thoresen, in Hero, and here he picked up the elements of Latin. Gradually, and by dint of infinite patience and concentration, the young peasant became master of many languages, and began the scientific study of their structure. About 1841 he had freed himself from all the burden of manual labour, and could occupy his thoughts with the dialect of his native district, the Sondmore; his first publication was a small collection of folk-songs in the Sondmore language (1843). His remarkable abilities now attracted general attention, and he was helped to continue his studies un- disturbed. His Grammar of the Norwegian Dialects (1848) was the result of much labour, and of journeys taken to every part of the country. Aasen's famous Dictionary of the Norwegian Dialects appeared in its original form in 1850, and from this publication dates all the wide cultivation of the popular language in NoTt wegian, since Aasen really did no less than construct, out of the different materials at his disposal, a popular language or definite folke-maal for Norway. With certain modifications, the most important of which were introduced later by Aasen himself, this artificial language is that which has been adopted ever since by those who write in dialect, and which later enthusiasts have once more endeavoured to foist upon Norway as her official

language in the place of Dano-Norwegian. Aasen composed poems and plays in the composite dialect to show how it should be used ; one of these dramas, The Heir (1855), was frequently acted, and may be considered as the pioneer of all the abundant dialect-literature of the last half-century, from Vinje down to Garborg. Aasen continued to enlarge and improve his grammars and his dictionary. He lived very quietly in lodgings in Chris- tiania, surrounded by his books and shrinking from publicity, but his name grew into wide political favour as his ideas about the language of the peasants became more and more the watch- word of the popular party. Quite early in his career, 1842, he had begun to receive a stipend to enable him to give his entire attention to his philological investigations ; and the Storthing — conscious of the national importance of his work — treated him in this respect with more and more generosity as he advanced in years. He continued his investigations to the last, but it may be said that, after the 1873 edition of his Dictionary, he added but little to his stores. Ivar Aasen holds perhaps an isolated place in literary history as the one man who has invented, or at least selected and constructed, a language which has pleased so many thousands of his countrymen that they have accepted it for their schools, their sermons and their songs. He died in Christiania on the 23rd of September 1896, and was

buried with public honours. (E. G.)

AB, the fifth month of the ecclesiastical and the eleventh of the civil year of the Jews. It approximately corresponds to the period of the 15th of July to the 15th of August. The word is of Babylonian origin, adopted by the Jews with other calendar names after the Babylonian exile. Tradition ascribes the death of Aaron to the first day of Ab. On the ninth is kept the Fast of Ab, or the Black Fast, to bewail the destruction of the first temple by Nebuchadrezzar (586 B.C.) and of the second by Titus (a.d. 70).

ABA. (1) A form of altazimuth instrument, invented by, and called after, Antoine d'Abbadie ; (2) a rough homespun manu- factured in Bulgaria; (3) a long coarse shirt worn by the Bedouin Arabs.

ABABDA (the Gebadei of Pliny, probably the Troglodytes of classical writers), a nomad tribe of African " Arabs " of Hamitic origin. They extend from the Nile at Assuan to the Red Sea, and reach northward to the Kena-Kosseir road, thus occupying the southern border of Egypt east of the Nile. They call them- selves " sons of the Jinns." With some of the clans of the Bisharin (q.v.) and possibly the Hadendoa (q.v.) they represent the Blemmyes of classic geographers, and their location to-day is almost identical with that assigned them in Roman times. They were constantly at war with the Romans, who at last subsidized them. In the middle ages they were known as Beja (q.v.), and convoyed pilgrims from the Nile valley to Aidhab, the port of embarkation for Jedda. From time immemorial they have acted as guides to caravans through the Nubian desert and up the Nile valley as far as Sennar. To-day many of them are employed in the telegraph service across the Arabian desert. They inter- married with the Nuba, and settled in small colonies at Shendi and elsewhere long before the Egyptian invasion (a.d. 1820-1822). They are still great trade carriers, and visit very distant districts. The Ababda of Egypt, numbering some 30,000, are governed by an hereditary "chief." Although nominally a vassal of the Khedive he pays no tribute. Indeed he is paid a subsidy, a por- tion of the road-dues, in return for his safeguarding travellers from Bedouin robbers. The sub-sheikhs are directly responsible to him. The Ababda of Nubia, reported by Joseph von Russegger, who visited the country in 1836, to number some 40,000, have since diminished, having probably amalgamated with the Bisharin, their hereditary enemies when they were themselves a powerful nation. The Ababda generally speak Arabic (mingled with Barabra [Nubian] words), the result of their long-continued contact with Egypt; but the southern and south-eastern portion of the tribe in many cases still retain their Beja dialect, To- Bedawiet. Those of Kosseir will not speak this before

strangers, as they believe that to reveal the mysterious dialect would bring ruin on them. Those nearest the Nile have much fellah blood in them. As a tribe they claim an Arab origin, apparently through

their sheikhs. They have adopted the dress and habits of the fellahin, unlike their kinsmen the Bisharin and Hadendoa, who go practically naked. They are neither so fierce nor of so fine a physique as these latter. They are lithe and well built, but small: the average height is little more than 5 ft, except in the sheikh clan, who are obviously of Arab origin. Their complexion is more red than black, their features angular, noses straight and hair luxuriant. They bear the character of being treacherous and faithless, being bound by no oath, but they appear to be honest in money matters and hospitable, and, however poor, never beg. Formerly very poor, the Ababda became wealthy after the British occupation of Egypt. Their chief settlements are in Nubia, where they live in villages and employ themselves in agriculture. Others of them fish in the Red Sea and then hawk the salt fish in the interior. Others are pedlars, while charcoal- burning, wood-gathering and trading in gums and drugs, especi- ally in senna leaves, occupy many. Unlike the true Arab, the Ababda do not live in tents, but build huts with hurdles and mats, or live in natural caves, as did their ancestors in classic times. They have few horses, using the camel as beast of burden or their ” mount ” in war. They live chiefly on milk and durra, the latter eaten either raw or roasted. They are very superstitious, believing, for example, that evil would overtake a family if a girl member should, after her marriage, ever set eyes on her mother: hence the Ababda husband has to make his home far from his wife’s village. In the Mahdist troubles (1882-1898) many ” friendlies ” were recruited from the tribe.

For their earlier history see Beta; see also Bisharin, Haden- doa, Kabbabish; and the following authorities: — Sir F. R. Win- gate, Mahdism and the Egyptian Sudan (Lond..l89l) ; Giuseppe Sergi, Africa: Antr apologia delta Stirpe Camitica (Turin, 1897); A. H. Keane, Ethnology of Egyptian Sudan (Lond. 1884); Anglo-Egyptian Sudan, edited by Count Gleichen (Lond. 1905); Joseph von Rus- segger, Die Reisen in Afrika (Stuttgart, 1841-1850). (T. A. J.)

ABACA, or Abaka, a native name for the plant Musa textilis, which produces the fibre called Manila Hemp (q.v,).

ABACUS (Gr. afial;, a slab; Fr. abaque, tailloir), in archi- tecture, the upper member of the capital of a column. Its chief function is to provide a larger supporting surface for the archi-, trave or arch it has to carry. In the Greek Doric order the abacus is a plain square slab. In

the Roman and Renaissance Doric orders it is crowned by a moulding. In the Archaic-Greek Ionic order, owing to the greater width of the capital, the abacus is rectangular in plan, and consists of a carved ovolo moulding. In later examples the abacus is square, except where there are angle volutes, when it is slightly curved over the same. In the Roman and Renaissance Ionic capital, the abacus is square with a fillet on the top of an ogee moulding, but curved over angle volutes. In the Greek Corinthian order the abacus is moulded, its sides are concave and its angles canted (except in one or two excep- tional Greek capitals, where it is brought to a sharp angle) ; and the same shape is adopted in the Roman and Renaissance Corin- thian and Composite capitals, in some cases with the ovolo moulding carved. In Romanesque architecture the abacus is square with the lower edge splayed off and moulded or carved, and the same was retained in France during the medieval period; but in England, in Early English work, a circular deeply moulded abacus was introduced, which in the 14th and 15th cen- turies was transformed into an octagonal one. The diminutive of Abacus, Abaciscus, is applied in architecture to the chequers or squares of atessellatedpavement. ” Abacus ” is also the name of an instrument employed by the ancients for arithmetical calculations; being used as counters. Fig.

L

Fig. 1. — Roman Abacus.

pebbles, bits of bone or coins 1 shows a Roman abacus taken

from an ancient monument. It contains seven long and seven shorter rods or bars, the former having four perforated beads running on them and the latter one. The bar marked I indi- cates units, X tens, and so on up to millions. The beads on the shorter bars denote fives, — five units, five tens, &c. The rod 6 and corresponding short rod are for marking ounces ; and the short quarter rods for fractions of an ounce.

The Swan-Pan of the Chinese (fig. 2) closely resembles the Roman abacus in its construction and use. Computations are

made with it by means of balls of bone or ivory run- ning on slender bamboo rods, similar to the simpler board, fitted up with beads strung on wires; which is employed in teaching the rudiments of arithmetic in 8 3 2 7/5408 English schools Fig. 2.— Chinese Swan-Pan. The name of abacus

is also given, in logic, to an instrument, often called the ” logical machine,” analogous to the mathematical abacus. • It is constructed to show all the possible combinations of a set of logical terms with their nega- tives, and, further, the way in which these combinations are affected by the addition of attributes or other limiting words, i.e. to simplify mechanically the solution of logical problems. These instruments are all more or less elaborate developments of the ” logical slate,” on which were written in vertical-columns all the combinations of symbols or letters which could be made logically out of a definite number of terms. These were com- pared with any given premises, and those which were incom- patible were crossed off. In the abacus the combinations are inscribed each on a single slip of wood or similar substance, which is moved by a key; incompatible combinations can thus be mechanically removed at will, in accordance with any given series of premises. The principal examples of such machines are those of W. S. Jevons {Element. Lessons in Logic, c. xxiii.), John Venn (see his Symbolic Logic, 2nd ed., 1894, p. 13s), and Allan Marquand (see American Academy of Arts and Sciences, 1885, pp. 303-7, and Johns Hopkins University Studies in Logic,

1883).

ABADDON, a Hebrew word meaning ” destruction.” In poetry it comes to mean “place of destruction,” and so the under- world or Sheol (cf. Job xxvi. 6 ; Prov. xv. n). In Rev. ix. n Abaddon (‘Afia55u>v) is used of hell personified, the prince of the underworld. The term is here explained as Apollyon {q.v.) , the ” destroyer.” W. Baudissin (Herzog-Hauck, Realencyklo- pddie) notes that Hades and Abaddon in Rabbinic writings are employed as personal names, just as shemayya in Dan. iv. 23, shdmayim (” heaven “), and makom (” place “) among the Rabbins, are used of God.

ABADEH, a small walled town of Persia, in the province of Fars, situated at an elevation of 6200 ft. in a fertile plain on the high road between Isfahan and Shiraz, 140 m. from the former and 1 70 m. from the latter place. Pop. 4000. It is the chief place of the Abadeh-Iklid district, which has 30 villages ; it has tele- graph and post offices, and is famed for its carved wood-work, small boxes, trays, sherbet spoons, &c, made of the wood of pear and box trees.

ABAE (“A/3

tion on a circular hill standing about 500 £t. above the little plain of Exarcho ; one gateway remains, and there are also traces of town walls below. The temple site was on a low spur of the hill, below the

town. An early terrace wall supports a pre- cinct in which are a stoa and some remains of temples ; these were excavated by the British School at Athens in 1894, but very little was found.

See also W. M. Leake, Travels in Northern Greece, ii. p. 163; Journal of Hellenic Studies, xvi. pp. 291-312 (V. W. Yorke).

(E. GR.)

ABAKANSK, a fortified town of Siberia, in the Russian government of Yeniseisk, on the river Yenisei, 144 m. S.S.W. of Krasnoyarsk, in lat. 54°2o' N., long. 9i°4o' E. This is considered the mildest and most salubrious place in Siberia, and is remark- able for certain tumuli (of the Li Kitai) and statues of men from seven to nine feet high, covered with hieroglyphics. Peter the Great had a fort built here in 1707. Pop. 2000.

ABALONE, the Spanish name used in California for various species of the shell-fish of the Haliotidae family, with a richly coloured shell yielding mother-of-pearl. This sort of Haliotis is also commonly called " ear-shell," and in Guernsey " ormer " (Fr. ormier, for oreille de mer). The abalone shell is found especially at Santa Barbara and other places on the southern Californian coast, and when polished makes a beautiful ornament. The mollusc itself is often eaten, and dried for consumption in China and Japan.

ABANA (or Amanah, classical Chrysorrhoas) and PHARPAR, the "rivers of Damascus" (2 Kings v. 12), now generally identified with the Barada {i.e. " cold ") and the A'waj {i.e. " crooked ") respectively, though if the reference to Damascus be limited to the city, as in the Arabic version of the Old Testa- ment, Pharpar would be the modern Taura. Both streams run from west to east across the plain of Damascus, which owes to them much of its fertility, and lose themselves in marshes, or lakes, as they are called, on the borders of the great Arabian desert. John M'Gregor, who gives an interesting description of them in his Rob Roy on the Jordan, affirmed that as a work of hydraulic engineering, the system and construction of the canals, by which the Abana and Pharpar were used for irrigation, might be considered as one of the most complete and extensive in the world. As the Barada escapes from the mountains through a narrow gorge, its waters spread out fan-like, in canals or " rivers," the name of one of which, Nahr Banias, retains a trace of Abana.

ABANCOURT, CHARLES XAVIER JOSEPH DE FRANQUE- VILLE D' (1758-1792), French statesman, and nephew of Calonne. He was Louis

XVI.‘s last minister of war (July 1792), and organized the defence of the Tuileries for the 10th of August. Commanded by the Legislative Assembly to send away the Swiss guards, he refused, and was arrested for treason to the nation and sent to Orleans to be tried. At the end of August the As- sembly ordered Abancourt and the other prisoners at Orleans to be transferred to Paris with an escort commanded by Claude Founder, ” the American.” At Versailles they learned of the massacres at Paris, and Abancourt and his fellow-prisoners were murdered in cold blood on the 8th of September 1792. Fournier was unjustly charged with complicity in the crime.

ABANDONMENT (Fr. abandonnement, from abandonner, to abandon, relinquish; abandonner was originally equivalent to mettred bandon, to leave to the jurisdiction, i.e. of another, bandon being from Low Latin bandum, bannum, order, decree, ” ban “), in law, the relinquishment of an interest, claim, privilege or possession. Its signification varies according to the branch of the law in which it is employed, but the more important uses of the word are summarized below.

Abandonment of an Action is the discontinuance of pro- ceedings commenced in the High Court of Justice either because the plaintiff is convinced that he will not succeed in his action or for other reasons. Previous to the Judicature Act of 1875, con- siderable latitude was allowed as to the time when a suitor might abandon his action, and yet preserve his right to bring another action on the same suit (see Nonsuit) ; but since 1875 this right has been considerably curtailed, and a plaintiff who

has delivered his reply (see Pleading) , and afterwards wishes to abandon his action, can generally obtain leave so to do only on condition of bringing no further proceedings in the matter.

Abandonment in marine insurance is the surrender of the ship or goods insured to the insurers, in the case of a constructive total loss of the thing insured. For the requisites and effects of abandonment in this sense see Insurance, Marine.

Abandonment of wife and children is dealt with under Desertion, and the abandonment or exposure of a young child under the age of two, which is an indictable misdemeanour, is dealt with under Children, Cruelty to.

Abandonment of domicile is the ceasing to reside perman- ently in a former domicile coupled with the intention of choosing a new domicile. The presumptions which will guide the court in deciding whether a former domicile has been abandoned or not must be inferred from the facts of each individual case. See Domicile.

Abandonment of an easement is the relinquishment of some accommodation or right in another's land, such as right of way, free access of light and air, &c. See Easement.

Abandonment of railways has a legal signification in Eng- land recognized by statute, by authority of which the Board of Trade may, under certain circumstances, grant a .warrant to a railway authorizing the abandonment of its line or part of it.

ABANO, PIETRO D' (1250-1316), known also as Petrus de Apono or Aponensis, Italian physician and philosopher, was born at the Italian town from which he takes his name in 1250, or, according to others, in 1246. After studying medicine and philosophy at Paris he settled at Padua, where he speedily gained a great reputation as a physician, and availed himself of it to gratify his avarice by refusing to visit patients except for an exorbitant fee. Perhaps this, as well as his meddling with astrology, caused him to be charged with practising magic, the particular accusations being that he brought back into his purse, by the aid of the devil, all the money he paid away, and that he possessed the philosopher's stone. He was twice brought to trial by the Inquisition ; on the first occasion he was acquitted, and he died (13 16) before the second trial was completed. He was found guilty, however, and his body was ordered to be exhumed and burned ; but a friend had secretly removed it, and the Inquisition had, therefore, to content itself with the public pro- clamation of its sentence and the burning of Abano in effigy. In his writings he expounds and advocates the medical and philo- sophical systems of Averroes and other Arabian writers. His best known works are the Conciliator differ entiarum quae inter philosophos et medicos versantur (Mantua, 1472 ; Venice, 1476), and De venenis eorumque remediis (1472), of which a French translation was published at Lyons in 1593.

ABANO BAGNI, a town of Venetia, Italy, in the province of Padua, on the E. slope of the Monti Euganei ; it is 6 m. S.W. by rail from Padua. Pop. (1901) 4556. Its hot springs and mud baths are much resorted to, and were known to the Romans as Aponi fons or Aquae Paiavinae. Some remains of the ancient baths have been discovered (S. Mandruzzato, Trattato dei Bagni d' Abano, Padua, 1789). An oracle of Geryon lay near, and the so-called sortes Praenestinae (C.I.L. i., Berlin,

1863; 1438-1454), small bronze cylinders inscribed, and used as oracles, were per- haps found here in the 16th century.

ABARIS, a Scythian or Hyperborean, priest and prophet of Apollo, who is said to have visited Greece about 770 B.C., or two or three centuries later. According to the legend, he travelled throughout the country, living without food and riding on a golden arrow, the gift of the god ; he healed the sick, foretold the future, worked miracles, and delivered Sparta from a plague (Herod, iv. 36 ; Iamblichus, De Vit. Pythag. xix. 28). Suidas credits him with several works : Scythian oracles, the visit of Apollo to the Hyperboreans, expiatory formulas and a prose theogony.

ABATED, an ancient technical term applied in masonry and metal work to those portions which are sunk beneath the surface, as in inscriptions where the ground is sunk round the letters so is to leave the letters or ornament in relief.

ABATEMENT (derived through the French abaitre, from the Late Latin batter e, to beat), a beating down or diminishing or doing away with ; a term used especially in various legal phrases.

Abatement of a nuisance is the remedy allowed by law to a person or public authority injured by a public nuisance of de- stroying or removing it, provided no breach of the peace is com- mitted in doing so. In the case of private nuisances abatement is also allowed provided there be no breach of the peace, and no damage be occasioned beyond what the removal of the nuisance requires. (See Nuisance.)

Abatement of freehold takes place where, after the death of the person last seised, a stranger enters upon lands before the entry of the heir or devisee, and keeps the latter out of possession. It differs from intrusion, which is a similar entry by a stranger on the death of a tenant for life, to the prejudice of the reversioner, or remainder man ; and from disseisin, which is the forcible or fraudulent expulsion of a person seised of the freehold. (See Freehold.)

Abatement of debts and legacies. When the equitable assets (see Assets) of a deceased person are not sufficient to satisfy fully all the creditors, their debts must abate proportion- ately, and they must accept a dividend. Also, in the case of legacies when the funds or assets out of which they are payable are not sufficient to pay them in full, the legacies abate in proportion, unless there is a priority given specially to any particular legacy (see Legacy). Annuities are also subject to the same rule as general legacies.

Abatement in pleading, or plea in abatement, was the de- feating or quashing of a particular action by some matter of fact, such as a defect in form or the personal incompetency of the parties suing, pleaded by the defendant. It did not involve the merits of the cause, but left the right of action subsisting. In criminal proceedings a plea in abatement was at one time a common practice in answer to an indictment, and was set up for the purpose of defeating the indictment as framed, by alleging misnomer or other misdescription of the defendant. Its effect for this purpose was nullified by the Criminal Law Act 1826, which rtquired the court to amend according to the truth, and the Criminal Procedure Act 1851, which rendered description of the defendant Unnecessary. All pleas in abatement are now abolished (R.S.C. Order 21, r. 20). See Pleading.

Abatement in litigation. In civil proceedings, no action abates by reason of the marriage, death or bankruptcy of any of the parties, if the cause of action survives or continues, and does not become defective by the assignment, creation or devolution of any estate or title pendente lite (R.S.C. Order 17, r. 1). Crim- inal proceedings do not abate on the death of the prosecutor, being in theory instituted by the crown, but the crown itself may bring about their termination without any decision on the merits and without the assent of the prosecutor.

Abatement of false lights. By the Merchant Shipping Act 1854, the general lighthouse authority (see Lighthouse) has power to order the extinguishment or screening .■ of any light which may be mistaken for a light proceeding from a lighthouse.

Abatement in commerce is a deduction sometimes made at a custom-house from the fixed duties on certain kinds of goods, on account of damage or loss sustained in warehouses. The rate and conditions of such deductions are regulated, in England, by the Customs Consolidation Act 1853. (See also Drawback; Rebate.)

‘ Abatement in heraldry is a badge in coat-armour, indi- cating some kind of degradation or dishonour. It is called also rebatement.

ABATI, or Dell’ Abbato, NICCOLO (1512-1571), a celebrated fresco-painter of Modena, whose best works are there and at Bologna. He accompanied Primaticcio to France, and assisted in decorating the palace at Fontainebleau (1552-1571). Hispic- tures exhibit a combination of skill in drawing, grace and natural colouring. Some of his easel pieces in oil are in different collec- tions ; one of the finest, in the Dresden Gallery, represents the martyrdom of St Peter and St Paul.

ABATIS, Abattis or Abbattis (a French word meaning a heap

of material thrown), a term in field fortification for an obstacle formed of the branches of trees laid in a row, with the tops directed towards the enemy and interlaced or tied with wire. The abatis is used alone or in combination with wire-entangle- ments and other obstacles.

ABATTOIR (from abattre, to strike down), a French word often employed in English as an equivalent of “slaughter-house” (g.v.), the place where animals intended for food are killed.

ABAUZIT, FIRMIN (1670-1767), a learned Frenchman, was born of Protestant parents at Uzes, in Languedoc. His father died when he was but two years of age; and when, on the revo- cation of the edict of Nantes in 1685, the authorities took steps to have him educated in the Roman Catholic faith, his mother contrived his escape. For two years his brother and he lived as fugitives In the mountains of the Cevennes, but they at last reached Geneva, where their mother afterwards joined them on escaping from the imprisonment in which she was held from the time of their flight. Abauzit at an early age acquired great pro- ficiency in languages, physics and theology. In 1698 he went to Holland, and there became acquainted with Pierre Bayle, P. Jurieu and J. Basnage. Proceeding to England, he was intro- duced to Sir Isaac Newton, who found in him one of the earliest defenders of his discoveries. Sir Isaac corrected in the second edition of his Principia an error pointed out. by Abauzit, and, when sending him the Commercium Epistolicum, said, ” You are well worthy to judge between Leibnitz and me.” The reputation of Abauzit induced William III. to request him to settle in England, but he did not accept the king’s offer, preferring to return to Geneva. There from 171 5 he rendered valuable assist- ance to» a society that had been formed for translating the New Testament into French. He declined the offer of the chair of philosophy in the university in 1723, but accepted, in 1727, the sinecure office of librarian to the city of his adoption. Here he died at a good old age, in 1767. Abauzit was a man of great learning and of wonderful versatility. Whatever chanced to be discussed, it used to be said of Abauzit, as of Professor W. Whewell of more modern times, that he seemed to have made it a subject of particular study. Rousseau, who was jealously sparing of his praises, addressed to him, in his Nouvelle Heloise, a fine pane- gyric; and when a stranger flatteringly told Voltaire he had come to see a great man, the

philosopher asked him if he had seen Abauzit. Little remains of the labours of this intellectual giant, his heirs having, it is said, destroyed the papers that came into their possession, because their own religious opinions were different. A few theological, archaeological and astronomical articles from his pen appeared in the Journal Helvitique and else- where, and he contributed several papers to Rousseau's Dictionnaire de musique (1767). He wrote a work throwing doubt on the canonical authority of the Apocalypse, which called forth a reply from Dr Leonard Twells. He also edited and made valuable additions to J. Spon's Histoire de la rSpublique de Geneve. A collection of his writings was published at Geneva in 1770 (CEuvres de feu M. Abauzit), and another at London in 1773 (CEuvres diverses de M. Abauzit). Some of them were translated into English by Dr Edward Harwood (1774).

Information regarding Abauzit will be found in J. Senebier's Histoire Litteraire de Geneve, Harwood's Miscellanies, and W. Orme's Bibliotheca Biblica (1824).

'ABA YE, the name of a Babylonian 'amora (?.».), born in the middle of the 3rd century. He died in 339.

'ABBA 'ARIKA, the name of the Babylonian 'amora (q.v.) of the 3rd century, who established at Sura the systematic study of the Rabbinic traditions which, using the Mishnah as text, led to the compilation of the Talmud. He is commonly known as Rab.

ABBADIDES, a Mahommedan dynasty which arose in Spain on the downfall of the western caliphate. It lasted from about 1023 till 1091, but during the short period of its existence was singu- larly active and typical of its time. The founder of the house was Abd-ul-Qasim Mahommed, the cadi of Seville in 1023. He was the chief of an Arab family settled in the city from the first days of the conquest. The Beni-abbad were not of ancient descent, though the poets, whom they paid largely, made an illustrious

pedigree for them when they had become powerful. They were, however, very rich. Abd-ul-Qasim gained the confidence of the townsmen by organizing a successful resistance to the Berber soldiers of fortune who were grasping at the fragments of the caliphate. At first he professed to rule only with the advice of a council formed of the nobles, but when his power became estab- lished he dispensed with this show of republican government, and then gave himself the appearance of a legitimate title by protect- ing an impostor who professed to be the caliph Hisham II. When Abd-ul-Qasim died in 1042

he had created a state which, though weak in itself, was strong as compared to the little powers about it. He had made his family the recognized leaders of the Mahom- medans of Arab and native Spanish descent against the Berber element, whose chief was the king of Granada. Abbad, surnamed El Motaddid, his son and successor, is one of the most remarkable figures in Spanish Mahommedan history ˆ He had a striking re- semblance to the Italian princes of the later middle ages and the early renaissance, of the stamp of Filipo Maria Visccnti. El Motaddid was a poet and a lover of letters, who was also a poisoner, a drinker of wine, a sceptic and treacherous to the utmost degree. Though he waged war all through his reign he very rarely appeared in the field, but directed the generals, whom he never trusted, from his ” lair ” in the fortified palace, the Alcazar of Seville. He killed with his own hand one of his sons who had rebelled against him. On one occasion he trapped a number of his enemies, the Berber chiefs of the Ronda, into visiting him, and got rid of them by smothering them in the hot room of a bath. It was his taste to preserve the skulls of the enemies he had killed — those of the meaner men to be used as flower-pots, while those of the princes were kept in special chests. His reign until his death on the 28th of February 1069 was mainly spent in extending his power at the expense of his smaller neigh- bours, and in conflicts with his chief rival the king of Granada. These incessant wars weakened the Mahommedans, to the great advantage of the rising power of the Christian kings of Leon and Castile, but they gave the kingdom of Seville a certain superiority over the other little states. After 1063 he was assailed by Fernando El Magno of Castile and Leon, who marched to the gates of Seville, and forced him to pay tribute. His son, Mahommed Abd-ul-Qasim Abenebet — who reigned by the title of El Motamid-ˆ-was the third and last of the Abbadides. He was a no less remarkable person than his father and much more amiable. Like biia he was a poet, and a favourer of poets. El Motamid went, however, considerably further in patronage of literature than his father, for he chose as his favourite and prime minister the poet Ibn Ammar. In the end the vanity and featherheadedness of Ibn Ammar drove his master to kill him. El Motamid was even more influenced by his favourite wife, Romaica, than by his vizir. He had met her paddling in the Guadalquivir, purchased her from her master, and made her his wife. The caprices of Romaica, and the lavish extravagance of Motamid in his efforts to please her, form the subject of many stories. In politics he carried on the feuds of his family with the Berbers, and in his efforts to extend his dominions could be as faithless as his father. His wars and his extravagance exhausted his treasury, and he oppressed his subjects by taxes. In 1080 he brought down upon himself the vengeance of

Alphonso VI. of Castile by a typical piece of flighty oriental barbarity. He had endeavoured to pay part of his tribute to the Christian king with false money. The fraud was detected by a Jew, who was one of the envoys of Alphonso. El Motamid, in a moment of folly and rage, crucified the Jew and imprisoned the Christian members of the mission. Alphonso retaliated by a destructive raid. When Alphonso took Toledo in 1085, El Motamid called in Yusef ibn Tashfin, the Almoravide (see Spain, History, and Almoravides). During the six years which preceded his deposition in 1091, El Motamid behaved with valour on the field, but with much meanness and political folly. He endeavoured to curry favour with Yusef by betraying the other Mahommedan princes to him, and intrigued to secure the alliance of Alphonso against the Almoravide. It was probably during this period that he sur- rendered his beautiful daughter Zaida to the Christian king, who

made her his concubine, and is said by some authorities to have married her after she bore him a son, Sancho. The vacillations and submissions of El Motamid did not save him from the fate which overtook his fellow-princes. Their scepticism and extor- tion had tired their subjects, and the mullahs gave Yusef a ” fetva ” authorizing him to remove them in the interest of religion. In iooi the Almoravides stormed Seville. El Motamid, who had fought bravely, was weak enough to order his sons to surrender the fortresses they still held, in order to save his own life. He died in prison in Africa in 1095.

Authorities. — Dozy, Histoire des Musulmans d’Espagne, Leiden, 1861; and Historia Abbadidarum (Scriptorum Arabum loci de Abbadidio), Leiden, 1846. (D. H.)

ABBADIE, ANTOINE THOMSON D’ (1810-1807), and AR- NAUD MICHEL D’ (1815-1893), two brothers notable for their travels in Abyssinia during the first half of the 19th century. They were both born in Dublin, of a French father and an Irish mother, Antoine in 1810 and Arnaud in 1815. The parents re- moved to France in 1818, and there the brothers received a careful scientific education. In 1835 the French Academy sent Antoine on a scientific mission to Brazil, the results being pub- lished at a later date (1873) under the title of Observations relatives a la physique du globe failes au Bresil et en Ethiopie. The younger Abbadie spent some time in Algeria before, in 1837, the two brothers started for Abyssinia, landing at Massawa in February 1838. They visited various parts of Abyssinia, including the then little-known districts of Ennarea and Kaffa, sometimes together

and sometimes separately. They met with many difficulties and many adventures, and became involved in political intrigues, Antoine especially exercising such influence as he possessed in favour of France and the Roman Catholic missionaries. After collecting much valuable information concerning the geography, geology, archaeology and natural history of Abyssinia, the brothers returned to France in 1848 and began to prepare their materials for publication. The younger brother, Arnaud, paid another visit to Abyssinia in 1853. The more distinguished brother, Antoine, became involved in various controversies re- lating both to his geographical results and his political intrigues. He was especially attacked by C. T. Beke, who impugned his yeracity, especially with reference to the journey to Kaffa. But time and the investigations of subsequent explorers have shown that Abbadie was quite trustworthy as to his facts, though wrong in his contention — hotly contested by Beke — that the Blue Nile was the main stream. The topographical results of his explora- tions were published in Paris in 1860-1873 in Giodesie d' Ethiopie, full of the most valuable information and illustrated by ten maps. Of the Gtographie de V Ethiopie (Paris, 1890) only one volume has been published. In Un Catalogue raisonni de manuscrits Uhiopicns (Paris, 1859) is a description of 234 Ethiopian manuscripts col- lected by Antoine. He also compiled various vocabularies, in- cluding a Dictionnaire de la langue amarinna (Paris, 1881), and prepared an edition of the Shepherd of Hermas, with the Latin version, in i860. He published numerous papers dealing with the geography of Abyssinia, Ethiopian coins and ancient inscriptions. Under the title of Reconnaissances magnetiques he published in 1890 an account of the magnetic observations made by him in the course of several journeys to the Red Sea and the Levant. The general account of the travels of the two brothers was published by Arnaud in 1868 under the title of Bonze ans dans la Haute- Ethiopie. Both brothers received the grand medal of the Paris Geographical Society in 1850. Antoine was a knight of the Legion of Honour and a member of the Academy of Sciences. He died in 1897, and bequeathed an estate in the Pyrenees, yielding 40,000 francs a year, to the Academy of Sciences, on condition of its producing within fifty years a catalogue of half-a-million stars. His brother Arnaud died in 1893. (J. S. K.)

ABBADIE, JAKOB (16547-1727), Swiss Protestant divine, was born at Nay in Bern. He studied at Sedan, Saumur and Puylaurens, with such success that he received the degree of doctor in theology at the age of seventeen. After spending some years in Berlin as minister of a French Protestant church, where he had great success as a preacher, he accompanied Marshal

Schomberg, in 1688, to England, and next year became minister of the French church in the Savoy, London. His strong attach- ment to the cause of King William appears in his elaborate de- fence of the Revolution (Defense de la nation britannique, 1692) as well as in his history of the conspiracy of 1696 (Histoire de la grande conspiration d' Angleterre) . The king promoted him to the deanery of Killaloe in Ireland. He died in London in 1727. Abbadie was a man of great ability and an eloquent preacher, but is best known by his religious treatises, several of which were translated from the original French into other languages and had a wide circulation throughout Europe. The most important of these are Trails de la verite de la religion chretienne (1684); its continuation, Traite de la diviniti de J esus-C hrist (1689); and V Art de se connaitre soi-meme (1692).

'ABBAHU, the name of a Palestinian 'amora (q.v.) who flour- ished c. 279-320. 'Abbahu encouraged the study of Greek by Jews. He was famous as a collector of traditional lore, and is very often cited in the Talmud.

ABBA MARI (in full, Abba Mari ben Moses ben Joseph), French rabbi, was born at Lunel, near Montpellier, towards the end of the 13th century. He is also known as Yarhi from his birthplace (Heb. Yerah, i.e. moon, lune), and he further took the name Astruc, Don Astruc or En Astruc of Lunel. The descendant of men learned in rabbinic lore, Abba Mari devoted himself to the study of theology and philosophy, and made himself acquainted with the writing of Moses Maimonides and Nachmanides as well as with the Talmud. In Montpellier, where he lived from 1303 to 1306, he was much distressed by the prevalence of Aristotelian rationalism, which, through the medium of the works of Maimon- ides, threatened the authority of the Old Testament; obedience to the law, and the belief in miracles and revelation. He, there- fore, in a series of letters (afterwards collected under the title Minhat Kenaot, i.e. " Jealousy Offering ") called upon the famous rabbi Solomon ben Adret of Barcelona to come to the aid of orthodoxy. Ben Adret, with the approval of other prominent Spanish rabbis, sent a letter to the . community at Montpellier proposing to forbid the study of philosophy to those who were less than thirty years of age, and, in spite of keen opposition from the liberal section, a decree in this sense was issued by ben Adret in 1305. The result was a great schism among the Jews of Spain and southern France, and a new impulse was given to the study of philosophy by the unauthorized interference of the Spanish rabbis. On the expulsion of the Jews from France by'Philip IV. in 1306, Abba Mari settled at Perpignan, where he published the letters connected with the controversy. His subsequent history is unknown. Beside the letters, he was the author

of liturgical poetry and works on civil law.

Authorities. — Edition of the Minhat Kenaot by M. L. Bislichis (Pressburg, 1838); E. Renan, Les rabbins frangais, pp. 647 foil.; Perles, Salomo ben Abraham ben Adereth, pp. 15-54; Jewish En- cyclopaedia, s.v. ” Abba Mari.”

ABBAS I. (1813-1854), pasha of Egypt, was a son of Tusun Pasha and grandson of Mehemet Ali, founder of the reigning dynasty. As a young man he fought in Syria under Ibrahim Pasha (q.v.) , his real or supposed uncle. The death of Ibrahim in November 1848 made Abbas regent of Egypt, and in August following, on the death of Mehemet Ali — who had been deposed in July 1848 on account of mental weakness, — Abbas succeeded to the pashalik. He has been generally described as a mere voluptuary, but Nubar Pasha spoke of him as a true Turkish gentleman of the old school. He was without question a re- actionary, morose and taciturn, and spent nearly all his time shut up in his palace. He undid, as far as lay in his power, the works of his grandfather, good and bad. Among other things he abol- ished trade monopolies, closed factories and schools, and reduced the strength of the army to 9000 men. He was inaccessible to adventurers bent on plundering Egypt, but at the instance of the British government allowed the construction of a railway from Alexandria to Cairo. In July 1854 he was murdered in Benha Palace by two of his slaves, and was succeeded by his uncle, Said Pasha.

ABBAS II. (1874-),khedive of Egypt. Abbas Hilrhi Pasha,

great-great-grandson of Mehemet AH, born on the 14th of July 1874, succeeded his father, Tewfik Pasha, as khedive of Egypt on the 8th of January 1892. When a boy he visited England, and he had an English tutor for some time in Cairo. He then went to school in Lausanne, and from there passed on to the Theresianum in Vienna. In addition to Turkish, his mother tongue, he ac- quired fluency in Arabic, and a good conversational knowledge of English, French and German. He was still at college in Vienna when the sudden death of his father raised him to the Khedivate; and he was barely of age according to Turkish law, which fixes majority at eighteen in cases of succession to the throne. For some time he did not co-operate very cordially with Great Britain. He was young and eager to exercise his new power. His throne and life had not been saved for him by the British, as was the

case with his father. He was surrounded by intriguers who were playing a game of their own, and for some time he appeared almost disposed to be as reactionary as his great-uncle Abbas I. But in process of time he learnt to under- stand the importance of British counsels. He paid a second visit to England in 1900, during which he frankly acknowledged the great good the British had done in Egypt, and declared himself ready to follow their advice and to co-operate with the British officials administering Egyptian affairs. The establishment of a sound system of native justice, the great remission of taxation, the reconque§t of the Sudan, the inauguration of the stupendous irrigation works at Assuan, the increase of cheap, sound educa- tion, each received his approval and all the assistance he could give. ,He displayed more interest in agriculture than in state- craft, and his farm of cattle and horses at Koubah, near Cairo, would have done credit to any agricultural show in England; at Montaza, near Alexandria, he created a similar establishment. He married the Princess Ikbal Hanem and had several children. Mahommed Abdul Mouneim, the heir-apparent, was born on the 20th of February 1899.

ABBAS I. (c. 1557-1628 or 1629), shah of Persia, called the Great, was the son of shah Mahommed (d. 1 586) . In the midst of general anarchy in Persia, he was proclaimed ruler of Khorasan, and obtained possession of the Persian throne in 1586. Deter- mined to raise the fallen fortunes of his country, he first-directed his efforts against the predatory Uzbegs, who occupied and har- assed Khorasan. After a long and severe struggle, he regained Meshed, defeated them in a great battle near Herat in 1597, and drove them out of his dominions. In the wars he carried on with the Turks during nearly the whole of his reign, his successes were numerous, and he acquired, or regained, a large extent of territory. By the victory he gained at Bassora in 1605 he ex- tended his empire beyond the Euphrates; sultan Ahmed I. was forced to cede Shirvan and Kurdistan in 161 1; the united armies of the Turks and Tatars were completely defeated near Sultanieh in 1 61 8, and Abbas made peace on very favourable terms; and on the Turks renewing the war, Bagdad fell into his hands after a year's siege in 1623. In 1622 he took the island of Ormuz from the Portuguese, by the assistance of the British, and much of its trade was diverted to the town of Bander-Abbasi, which was named after the shah. When he died, his dominions reached from the Tigris to the Indus. Abbas distinguished himself, not only by his successes in arms, and by the magnificence of his court and of the buildings which he erected, but also by his re- forms in the administration of his kingdom. He encouraged com- merce, and, by constructing highways and building bridges, did much to facilitate it. To foreigners, especially Christians,

he showed a spirit of tolerance; two Englishmen, Sir Anthony and Sir Robert Shirley, or Sherley, were admitted to his confidence. His fame is tarnished, however, by numerous deeds of tyranny and cruelty. His own family, especially, suffered from his fits of jealousy; his eldest son was slain, and the eyes of his other children were put out, by his orders.

See The Three Brothers, or Travels of Sir Anthony, Sir Robert Sherley, &c. (London, 1825); Sir C. R. Markham, General Sketch of the History of Persia (London, 1874).

ABBASIDS, the name generally given to the caliphs of Bagdad, the second of the two great dynasties of the Mahommedan em-

pire. The Abbasid caliphs officially based their claim to the throne on their descent from Abbas (a.d. 566-652), the eldest uncle of Mahomet, in virtue of which descent they regarded themselves as the rightful heirs of the Prophet as opposed to the Omayyads, the descendants of Omayya. Throughout the second period of the Omayyads, representatives of this family were among their most dangerous opponents, partly by the skill with which they undermined the reputation of the reigning princes by accusations against their orthodoxy, their moral character and their administration in general, and partly by their cunning manipulation of internecine jealousies among the Arabic and non- Arabic subjects of the empire. In the reign of Merwan II. this opposition culminated in the rebellion of Ibrahim the Imam, the fourth in descent from Abbas, who, supported by the province of Khorasan, achieved considerable successes, but was captured (a.d. 747) and died in prison (as some hold, assassinated). The quarrel was taken up by his brother Abdallah, known by the name of Abu'l-Abbas as-Saffah, who after a decisive victory on the Greater Zab (750) finally crushed the Omayyads and was proclaimed caliph.

The history of the new dynasty is marked by perpetual strife and the development of luxury and the liberal arts, in place of the old-fashioned austerity of thought and manners. Mansur, the second of the house, who transferred the seat of government to Bagdad, fought successfully against the peoples of Asia Minor, and the reigns of Harun al-Rashid (786-809) and Mamun (813- 833) were periods of extraordinary splendour. But the empire as a whole stagnated and then decayed rapidly. Independent mon- archs established themselves in Africa and Khorasan (Spain had remained Omayyad throughout), and in the north-west the Greeks successfully encroached. The ruin of the dynasty came, however, from those Turkish slaves who were constituted as a royal bodyguard by Moqtasim (833-842). Their power

steadily grew until Radi (934-941) was constrained to hand over most of the royal functions to Mahommed b. Raik. Province after province renounced the authority of the caliphs, who were merely lay figures, and finally Hulagu, the Mongol chief, burned Bagdad (Feb. 28th, 1258). The Abbasids still maintained a feeble show of authority, confined to religious matters, in Egypt under the Mamelukes, but the dynasty finally disappeared with Mota- wakkil III., who was carried away as a prisoner to Constantinople by Selim I.

See Caliphate (Sections B, 14 and C), where a detailed account of the dynasty will be found.

ABBAS MIRZA (c. 1783-1833), prince of Persia, was a younger son of the shah, Feth Ali, but on account of his mother's royal birth was destined by his father to succeed him. Entrusted with the government of a part of Persia, he sought to rule it in Euro- pean fashion, and employed officers to reorganize his army. He was soon at war with Russia, and his aid was eagerly solicited by both England and Napoleon, anxious to checkmate one another in the East. Preferring the friendship of France, Abbas continued the war against Russia, but his new ally could give him very little assistance, and in 1814 Persia was compelled to make a disadvan- tageous peace. He gained some successes during a war between Turkey and Persia which broke out in 1821, but cholera attacked his army, and a treaty was signed in 1823. His second war with Russia, which began in 1825, was attended with the same want of success as the former one, and Persia was forced to cede some territory. When peace was made in 1828 Abbas then sought to restore order in the province of Khorasan, which was nominally under Persian supremacy, and while engaged in the task died at Meshed in 1833. In 1834 his eldest son, Mahommed Mirza, suc- ceeded Feth Ali as shah. Abbas was an intelligent prince, possessed some literary taste, and is noteworthy on account of the comparative simplicity of his life.

ABBAS-TUMAN, a spa in Russian Transcaucasia, government of Tiflis, 50 m. S.W. of the Borzhom railway station and 65 m. E. of Batum, very picturesquely situated in a cauldron-shaped valley. It has hot sulphur baths (93§°-n8£° Fahr.) and an astronomical observatory (4240 ft.).

ABBAZIA, a popular summer and winter resort of Austria, in

Istria, 56 m. S.E. of Trieste by rail. Pop. (1900) 2343. It is situated on the Gulf of Quarnero in a sheltered position at the foot of the Monte Maggiore (4580 ft.), and is surrounded by beautiful woods of laurel. The average temperature is 50° Fahr. in winter, and 77 Fahr. in summer. The old abbey, San Giacomo della Priluca, from which the place derives its name, has been converted into a villa. Abbazia is frequented annually by about 16,000 visitors. The whole sea-coast to the north and south of Abbazia is rocky and picturesque, and contains several smaller winter-resorts. The largest of them is Lovrana (pop. 513), situ- ated s m. to the south.

ABBESS (Lat. abbatissa, fern, form of abbas, abbot), the female superior of an abbey or convent of nuns. The mode of election, position, rights and authority of an abbess correspond generally with those of an abbot (q.v.). The office is elective, the choice being by the secret votes of the sisters from their own body. The abbess is solemnly admitted to her office by episcopal benediction, together with the conferring of a staff and pectoral cross, and holds for life, though liable to be deprived for misconduct. The council of Trent fixed the qualifying age at forty, with eight years of profession. Abbesses have a right to demand absolute obedi- ence of their nuns, over whom they exercise discipline, extending even to the power of expulsion, subject, however, to the bishop. As a female an abbess is incapable of performing the spiritual functions of the priesthood belonging to an abbot. She can- not ordain, confer the veil, nor excommunicate. In England abbesses attended ecclesiastical councils, e.g. that of Becanfield in 694, where they signed before the presbyters.

By Celtic usage abbesses presided over joint-houses of monks and nuns. This custom accompanied Celtic monastic missions to France and Spain, and even to Rome itself. At a later period, a.d. 1115, Robert, the founder of Fontevraud, committed the government of the whole order, men as well as women, to a female superior.

In the German Evangelical church the title of abbess(Aebtissin) has in some cases — e.g. Itzehoe — survived to designate the heads of abbeys which since the Reformation have continued as Stifle, i.e. collegiate foundations, which provide a home and an income for unmarried ladies, generally of noble birth, called canonesses (Kanonissinen) or more usually Stiftsdamen. This office of abbess is of considerable social dignity, and is sometimes filled by prin- cesses of the reigning houses.

ABBEVILLE, a town of northern France, capital of an arron- dissement in the department of Somme, on the Somme, 12 m. from its mouth in

the English Channel, and 28 m. N.W. of Amiens on the Northern railway. Pop. (1901) 18,519; (1906) 18,971. It lies in a pleasant and fertile valley, and is built partly on an island and partly on both sides of the river, which is canalized from this point to the estuary. The streets are narrow, and the houses are mostly picturesque old structures, built of wood, with many quaint gables and dark archways. The most remarkable building is the church of St Vulfran, erected in the 15th, 16th and 17th centuries. The original design was not completed. The nave has only two bays and the choir is insig- nificant. The facade is a magnificent specimen of the flamboyant Gothic style, flanked by two Gothic towers. Abbeville has several other old churches and an hotel-de-ville, with a belfry of the 13 th century. Among the numerous old houses, that known as the Maison de Francois I", which is the most remarkable, dates from the 16th century. There is a statue of Admiral Courbet (d. 1885) in the chief square. The public institutions include tribunals of first instance and of commerce, a board of trade-arbitrators, and a communal college. Abbeville is an important industrial centre; in addition to its old-established manufacture of cloth, hemp-spinning, sugar-making, ship-building and locksmiths' work are carried on; there is active commerce in grain, but the port has little trade.

Abbeville, the chief town of the district of Ponthieu, first appears in history during the 9th century. At that time belong- ing to the abbey of St Riquier, it was afterwards governed by the counts of Ponthieu. Together with that county, it came into the possession of the Alencon and other French families, and after-

wards into that of the house of Castille, from whom by marriage it fell in 1 272 to Edward I., king of England. French and English were its masters by turns till 1435 when, by the treaty of Arras, it was ceded to the duke of Burgundy. In 1477 it was annexed by Louis XI., king of France, and was held by two illegitimate branches, of the royal family in the 16th and 17 th centuries, being in 1696 reunited to the crown.

ABBEY, EDWIN AUSTIN (1852-), American painter, was born at Philadelphia, Pennsylvania, on the 1st of April 1852. He left the schools of the Pennsylvania Academy of Fine Arts at the age of nineteen to enter the art department of the publishing house of Harper & Brothers in New York, where, in company with such men as Howard Pyle, Charles Stanley Reinhart, Joseph Pennell and Alfred Parsons, he became very successful as an illustrator. In 1878 he was sent by the Harpers to England to gather material for illustrations of the poems of Robert Herrick. These, published in 1882, attracted much attention, and were followed by illustrations for Goldsmith's She Stoops to

Conquer (1887), for a volume of Old Songs (1889), and for the comedies (and a few of the tragedies) of Shakespeare. His water-colours and pastels were no less successful than the earlier illustrations in pen and ink. Abbey now became closely identified with the art life of England, and was elected to the Royal Institute of Painters in Water-Colours in 1883. Among his water-colours are ” The Evil Eye ” (1877); ” The Rose in October” (1879); ” An Old Song” (1886); “The Visitors” (1890), and “The Jong- leur ” (1892). Possibly his best known pastels are ” Beatrice, ” ” Phyllis,” and ” Two Noble Kinsmen.” In 1890 he made his first appearance with an oil painting, ” A May Day Morn,” at the Royal Academy in London. He exhibited ” Richard duke of Gloucester and the Lady Anne ” at the Royal Academy in 1896, and in that year was elected A.R.A., becoming a full R.A. in 1898. Apart from his other paintings, special mention must be made of the large frescoes entitled ” The Quest of the Holy Grail,” in the Boston Public Library, on which he was occupied for some years; and in 1901 he was commissioned by King Edward VII. to paint a picture of the coronation, containing many portraits elaborately grouped. The dramatic subjects, and the brilliant colouring of his oil pictures, gave them pronounced individuality among the works of contemporary painters. Abbey became a member not only of the Royal Academy, but also of the National Academy of Design of New York, and honorary member of the Royal Bavarian Society, the Societe Nationale des Beaux Arts (Paris), the American Water-Colour Society, etc. He received first class gold medals at the International Art Exhibition of Vienna in 1898, at Philadelphia in 1898, at the Paris Exhibitions of 1889 and 1900, and at Berlin in 1903; and was made a cheva- lier of the French Legion of Honour.

ABBEY (Lat. abbatia; from Syr. abba, father), a monastery, or conventual establishment, under the government of an abbot or an abbess. A priory only differed from an abbey in that the superior bore the name of prior instead of abbot. This was the case in all the English conventual cathedrals, e.g. Canterbury, Ely, Norwich, &c, where the archbishop or bishop occupied the abbot’s place, the superior of the monastery being termed prior, Other priories were originally offshoots from the larger abbeys, to the abbots of which they continued subordinate; but in later times the actual distinction between abbeys and priories was lost.

The earliest Christian monastic communities (see Monasti- cism) with which we are acquainted consisted of groups of cells or huts collected about a common centre, which was usually the abode of some anchorite celebrated for superior holiness or singular asceticism, but without any attempt at orderly arrange- ment. The formation of such

communities in the East does not date from the introduction of Christianity. The example had been already set by the Essenes in Judea and the Therapeutae in Egypt.

In the earliest age of Christian monasticism the ascetics were accustomed to live singly, independent of one another, at no great distance from some village, supporting themselves by the labour of their own hands, and distributing the surplus after the supply of their own scanty wants to the poor. Increasing religious-

fervour, aided by persecution, drove them farther and farther away from the abodes of men into mountain solitudes or lonely deserts. The deserts of Egypt swarmed with the ” cells ” or huts of these anchorites. Anthony, who had retired to the Egyptian Thebaid during the persecution of Maximin, a.d. 312, was the most celebrated among them for his austerities, his sanctity, and his power as an exorcist. His fame collected round him a host of followers, emulous of his sanctity. The deeper he withdrew into the wilderness, the more numerous his disciples became. They refused to be separated from him, and built their cells round that of their spiritual father. Thus arose the first monastic com- munity, consisting of anchorites living each in his own little dwelling, united together under one superior. Anthony, as Neander remarks (Church History, vol. iii. p. 316, Clark’s trans.), ” without any conscious design of his own, had become the founder of a new mode of living in common, Coencbitism.” By degrees order was introduced in the groups of huts. They were arranged in lines like the tents in an encampment, or the houses in a street. From this arrangement these lines of single cells came to be known as Laurae, AavpCu., ” streets ” or ” lanes. ”

The real founder of coenobian (kolvos, common, and (3£os, life) monasteries in the modern sense was Pachomius, an Egyptian of the beginning of the 4th century. The first community estab- lished by him was at Tabennae, an island of the Nile in Upper Egypt. Eighf others were founded in his lifetime, numbering 3000 monks. Within fifty years from his death his societies could reckon 50,000 members. These coencbia resembled vil- lages, peopled by a hard-working religious community, all of one sex. The buildings were detached, small and of the humblest character- Each cell or hut, according to Sozomen (H.E. iii. 14), contained three monks. They took their chief meal in a common refectory at 3 p.m., up to which hour they usually

fasted. They ate in silence, with hoods so drawn over their faces that they could see nothing but what was on the table before them. The monks spent all the time, hot devoted to religious services or study, in manual labour. Palladius, who visited the Egyptian monasteries about the close of the 4th century, found among the 300 members of the coenobium of Panopolis, under the Pacho- mian rule, 15 tailors, 7 smiths, 4 carpenters, 12 camel-drivers and 1 5 tanners. Each separate community had its own oeconomus or steward, who was subject to a chief oeconomus stationed at the head establishment. All the produce of the monks' labour was committed to him, and by him shipped to Alexandria. The money raised by the sale was expended in the purchase of stores for the support of the communities, and what was over was devoted to charity. Twice in the year the superiors of the several coenobia met at the chief monastery, under the presidency of an archimandrite (" the chief of the fold," from /j,av8pa, a fold), and at the last meeting gave in reports of their administration for the year. The coenobia of Syria belonged to the Pachomian institution. We learn many details concerning those in the vicinity of Antioch from Chrysostom's writings. The monks lived in separate huts, KaKbfiia, forming a religious hamlet on the mountain side. They were subject to an abbot, and observed a common rule. (They had no refectory, but ate their common meal, of bread and water only, when the day's labour was over, reclining on strewn grass, sometimes out of doors.) Four times in the day they joined in prayers and psalms.

The necessity for defence from hostile attacks, economy of space and convenience of access from one part of the community to another, by degrees dictated a more compact and orderly arrangement of the buildings of a monastic coenobium. Large piles of building were erected, with strong outside walls, capable of resisting the assaults of an enemy, within which all the neces- Saota sary edifices were ranged round one or more open Laura, courts, usually surrounded with cloisters. The usual Eastern arrangement is exemplified in the plan of the convent of Santa Laura, Mount Athos (Laura, the designation of a monastery generally, being converted into a female saint).

This monastery, like the oriental monasteries generally, is surrounded by a strong and lofty blank stone wall, enclosing an

Mount Athos.

area of between 3 and 4 acres. The longer side extends to a length of about 500 feet. There is only one main entrance, on the north side (A), defended by three separate iron doors. Near the entrance is a large tower (M), a constant feature in the monasteries of the Levant. There

is a small postern gate at L. The enceinte comprises two large open courts, surrounded with buildings connected with cloister galleries of wood or stone. The outer court, which is much the larger, contains the granaries and storehouses (K), and the kitchen (H) and other offices connected with the refectory (G) . Immediately adjacent to the gateway is a two-storied guest-house, opening from a cloister ©. The inner court is surrouiwed by a cloister (EE), from which open the monks' cells (II) . In the centre of this court stands the catholicon or conventual church, a square building with an apse of the cruci- form domical Byzantine type, approached by a domed narthex. In front of the church stands a marble fountain {F) , covered by a dome supported on columns. Opening^rom the western side of the cloister, but actually standing in the outer court, is the refec- tory (G), a large cruciform building, about 100 feet each way, decorated within with frescoes of saints. At the upper end is a semicircular recess, recalling the triclinium of the Lateran Palace

A. Gateway.

B. Chapels.

C. Guest-house.

D. Church.

E. Cloister.

F. Fountain. –

G. Refectory. H. Kitchen. I. Cells.

K. Storehouses. L. Postern gate. M. Tower.

Fig. i.— Monastery of Santa Laura, Mount Athos (Lenoir).

at Rome, in which is placed the seat of the hegumcnos or abbot. This apartment is chiefly used as a hall of meeting, the oriental monks usually taking their meals in their separate cells. St Laura is exceeded in magnitude by the convent of Vato- pede, also on Mount Athos. This enormous establish- ment covers at leasts acres of ground, and contains so many separate buildings within its massive walls that it. resembles a fortified town. It lodges above 300 monks, and the establish- ment of the hegumenos is described as resembling the court of a petty sovereign prince. The immense refectory,, of the same cruciform shape as that of St Laura, will accommodate 500 guests at its 24 marble tables-

The annexed plan of a Coptic monastery, from Lenoir, shows a church of three aisles, with cellular apses, and two ranges of cells on either side of an oblong gallery.

Monasticism in the West owes its extension and develop- ment to Benedict of Nursia (born a.d. 480). His rule was diffused with miraculous rapidity from the parent foundation on Monte Cassino through the whole of western Europe, and every country witnessed the erection of monasteries far exceed- ing anything that had yet been-seen in spaciousness and splendour. Few great towns in Italy were without their Bene- dictine convent, and they quickly rose in all the great centres of population in England, France and Spain. The number of these monasteries founded between a.d. 520. and 700 is

Vatopede.

StQaU.

Fig. 2. — Plan of Coptic Monastery. A. Narthex. B. Church.

C. Corridor, with cells on each side.

D. Staircase.

amazing. Before the Council of Constance, a.d. 1415, no fewer than 15,070 abbeys had been established of this order alone. The buildings of a Benedictine abbey were dlctlae. uniformly arranged after one plan, modified where necessary (as at Durham and Worcester, where the monasteries stand close to the steep bank of a river) to accommodate the arrangement to local circumstances. We have no existing examples of the earlier monasteries of the Benedictine order. They have all yielded to the ravages of time and the violence of man. But we have fortunately preserved to us an elaborate plan of the great Swiss monastery of St Gall, erected about a.d. 820. which puts us in pos- session of the whole arrangements of a monastery of the first class towards the early part of the 9th century. This curious and

interesting plan has been made the subject of a memoir both by Keller (Zurich, 1844) and by Pro- fessor Robert Willis {Arch. Journal, 1848, vol. v. pp. 86-117. To the latter we are indebted for the sub- stance of the following de- scription, as well as for the plan, reduced from his elucidated transcript of the original preserved in the archives of the

convent. The general appearance of the convent is that of a town of isolated houses with streets running between them. It is evidently planned in com- pliance with the Benedictine rule, which enjoined that, if possible, the monastery should contain within itself every necessary of life, as well as the buildings more intimately connected with the religious and social life of its inmates. It should comprise a mill, a bakehouse, stables and cow-houses, together with accommodation for carrying on all necessary mechanical arts within the walls, so as to obviate the necessity of the monks going outside its limits.

The general distribution of the buildings may be thus described : — The church, with its cloister to the south, occupies the centre of a quadrangular area, about 430 feet square. The buildings, as in all great monasteries, are distributed into groups. The church forms the nucleus, as the centre of the religious life of the community. In closest connexion with the church is the group of buildings appropriated to the monastic life and its daily requirements — the refectory for eating, the dormitory for sleeping, the common room for social intercourse, the chapter-house for religious and disciplinary conference. These essential elements of monastic life are ranged about a cloister court, surrounded by a covered arcade, affording communication sheltered from the elements between the various buildings. The infirmary for sick monks, with the physician's house and physic garden, lies to the east. In the same group with the in- firmary is the school for the novices. The outer school, with its head- master's house against the opposite wall of the church, stands outside the convent enclosure, in close proximity to the abbot's house, that he might have a constant eye over them. The buildings devoted to hospitality are divided into three groups, — one for the reception of distinguished guests, another for monks visiting the monastery, a th'ujd for poor travellers and pilgrims. The first and third are placed to the right and left of the common entrance of the monastery, — the hospitium for distinguished guests being placed on the north side of the church, not far from the abbot's house; that for the poor on the south side next to the farm buildings. The monks are lodged in a guest-house built against the north wall of the church. The group of buildings connected with the material wants of the establishment is placed to the south and west of the church, and is distinctly separated from the monastic buildings. The kitchen, buttery and offices are reached by a passage from the west end of the refectory, and are con- nected with the bakehouse and brewhouse, which are placed still farther away. The whole of the southern and western sides is devoted to workshops, stables and farm-buildings. The buildings, with some exceptions, seem to have been of one story only, and all but the church were probably

erected of wood. The whole includes thirty- three separate blocks. The church (D) is cruciform, with a nave of nine bays, and a semicircular apse at either extremity. That to the west is surrounded by a semicircular colonnade, leaving an open ” paradise ” (E) between it and the wall of the church. The whole

area is divided by screenˆ into various chapels. The high altar (A) stands immediately to the east of the transept, or ritual choir; the altar of St Paul (B) in the eastern, and that of St Peter © in the western apse. A cylindrical campanile stands detached from the church on either side of the western apse (FF).

The ” cloister court ” (G) on the south side of the nave of the

Ground- plan of St Gall.

A. B. C. D. E. FF.

G. H.

I.

J- K. L.

M. N. O. P.. P 2 . Q-

Church. High altar. Altar of St Paul. Altar of St Peter. Nave. Paradise. Towers.

Monastic Buildings.

U. House for blood-letting; V. School.

W. Schoolmaster’s lodgings. X1X1 . Guest-house for those of

superior rank. ‘

X 2 X 2 . Guest-house for the poor. Y. Guest-chamber for strange

monks.

Cloister.

Calefactory, with dormitory Z.

over. a.

Necessary. b.

Abbot’s house. – c, c.

Refectory. d.

Kitchen. e.

Bakehouse and brewhouse. /.

Cellar. %.

Parlour. [over. h.

Scriptorium with library k, k Sacristy and vestry.

House of Novices— I .chapel ; /.

2. refectory; 3. calefac- rn

tory; 4. dormitory; 5. n.

master’s room; 6. cham- 0.

hers. _ p.

Infirmary — 1-6 as above in ‘ q.

the house of novices. r.

Doctor’s house. s, s

Physic garden. t,t,

Menial Department.

Factory.

Threshing-floor.

Workshops.

Mills.

Kiln.

Stables.

Cow-shed&

Goat-sheds*

Pig-sties. *. Sheep-folds.

k. Servants' and workmen's sleeping-chambers.

Gardener's house. m. Hen and duck house.

Poultry-keeper's house.

Garden.

Cemetery. [bread.

Bakehouse for sacramental

Unnamed in plan, s, s. Kitchens. /. Baths.

R.

S. T.

church has on its east side the " pisalis "or " calefactory "(H), the common sitting-room oi the brethren, warmed by flues beneath the floor. On this side in later monasteries we invariably find the chapter-house, the absence of which in this ptap'U somewhat surprising. It appears, however, from the inscriptions oft the plan itself, that the north walk of the cloisters served for the purposes s a chapter-house, and was fitted up with benches on the long sides. Above the calefactory is the " dormitory " opening into the south transept of the church, to enable the monks to attend the nocturnal services with

H

ABBEY

readiness. A passage at the other end leads to the "necessarium" (I), a portion of the monastic buildings always planned with extreme care. The southern side is occupied by the " refectory " (K), from the west end of which by a vestibule the kitchen (L) is reached._ This is separated from the main buildings of the monastery, and is connected by a long passage with a building containing the bakehouse and brewhouse (M), and the sleeping-rooms of the servants. The upper story of the refectory is the " vestiarium," where the ordinary clothes of the brethren were kept. On the western side of the cloister is an-

other two-story building (N). The cellar is below, and the larder and store-room above. Between this building and the church, opening by one door into the cloisters, and by another to the outer part of the monastery area, is the ” parlour ” for interviews with visitors from the external world (O). On the eastern side of the north transept is the “scriptorium ” or writing-room (Pi), with the library above.

To the east of the church stands a group of buildings comprising two miniature conventual establishments, each complete in itself. Each has a covered cloister surrounded by the usual buildings, i.e. refectory, dormitory, &c, and a church or chapel on one side, placed back to back. A detached building belonging to each contains a bath and a kitchen. One of these diminutive convents is appropriated to the ” oblati ” or novices (Q), the other* to the sick monks as an ” infirmary ” (R).

The ” residence of the physicians ” (S) stands contiguous to the infirmary, and the physic garden (T) at the north-east corner of the monastery. Besides other rooms, it contains a drug store, and a chamber for those who are dangerously ill. The ” house for blood-letting and purging ” adjoins it on the west (U).

The ” outer school,” to the north of the convent area, contains a large schoolroom divided across the middle by a screen or partition, and surrounded by fourteen little rooms, termed the dwellings of the scholars. The head-master’s house (W) is opposite, built against the side w_all of the church. The two ” hospitia ” or ” guest-hoUses ” for the entertainment of strangers of different degrees (Xj X 2) comprise a large common chamber or refectory in the centre, surrounded by sleeping-apartments. Each is provided with its own brewhouse and bakehouse, and that for travellers of a superior order has a kitchen and storeroom, with bedrooms for their servants and stables for their horses. There is also an ” hospitium ” for strange monks, abutting on the north wall of the church (Y).

Beyond the cloister, at the extreme verge of the convent area to the south, stands the ” factory ” (Z), containing workshops for shoe-makers, saddlers (or shoemakers, sellarii), cutlers and grinders, trencher-makers, tanners, curriers, fullers, smiths and goldsmiths, with their dwellings in the rear. On this side we also find the farm-buildings, the large granary and threshing-floor (a), mills ©, malt-house (d). Facing the west are the stables (e), ox-sheds (/), goat-stables (g), piggeries {h), sheep-folds (t), together with the servants’ and labourers’ quarters (k). At the south-east corner we find the hen and duck house, and poultry-yard (m), and the dwelling of the keeper

(«). Hard by is the kitchen garden (o), the beds bearing the names of the vegetables growing in them, onions, garlic, celery, lettuces, poppy, carrots, cabbages, &c, eighteen in all. In the same way the physic garden presents the names of the medicinal herbs, and the cemetery (p) those of the trees, apple, pear, plum, quince, &c, planted there.

A curious bird's-eye view of Canterbury Cathedral and its an- nexed conventual buildings, taken about 1165, is preserved in the

Great Psalter in the library of Trinity College, Cam- buty"* bridge. As elucidated by Professor Willis, 1 it exhibits Cathedral, the plan of a great Benedictine monastery in the 12th

century, and enables us to compare it with that of the gth as seen at St Gall. We see in both the same general principles of arrangement, which indeed belong to all Eenedictine monas- teries, enabling us to determine with precision the disposition of the various buildings, when little more than fragments of the walls exist. From some local reasons, however, the cloister and monastic buildings are placed on the north, instead, as is far more commonly the case, on the south of the church. There is also a separate chapter-house, which is wanting at St Gall.

The buildings at Canterbury, as at St Gall, form separate groups. The church forms the nucleus. In immediate contact with this, on the north side, lie the cloister and the group of buildings devoted to the monastic life. Outside of these, to the west and east, are the " halls and chambers devoted to the exercise of hospitality, with which every monastery was pro- vided, for the purpose of receiving as guests persons who visited it, whether clergy or laity, travellers, pilgrims or paupers." To the north a large open court divides the monastic from the menial buildings, intentionally placed as remote as possible from the

1 The A rchitectural History of the Conventual Buildings of the Monastery of Christ Church in Canterbury. By the Rev. Robert Willis. Printed for the Kent Archaeological Society, 1869.

conventual buildings proper, the stables, granaries, barn, bake- house, brewhouse, laundries, &c, inhabited by the lay servants of the establishment. At the greatest possible distance from the church, beyond the precinct of the convent, is the eleemosynary department. The almonry for the relief of the poor, with a great hall annexed, forms the paupers' hospitium.

The most important group of buildings is naturally that de- voted to monastic life. This includes two cloisters, the great cloister surrounded by the buildings essentially connected with the daily life of the monks, — the church to the south, the refectory or frater-house here as always on the side opposite to the church, and farthest removed from it, that no sound or smell of eating might penetrate its sacred precincts, to the east the dormitory, raised on a vaulted undercroft, and the chapter-house adjacent, and the lodgings of the cellarer to the west. To this officer was committed the provision of the monks' daily food, as well as that of the guests. He was, therefore, appropriately lodged in the immediate vicinity of the refectory and kitchen, and close to the guest-hall. A passage under the dormitory leads eastwards to the smaller or infirmary cloister, appropriated to the sick and infirm monks. Eastward of this cloister extend the hall and chapel of the infirmary, resembling in form and arrangement the nave and chancel of an aisled church. Beneath the dormitory, looking out into the green court or herbarium, lies the " pisalis " or " cale- factory," the common room of the monks. At its north-east corner access was given from the dormitory to the necessarium, a portentous edifice in the form of a Norman hall, 145 ft. long by 25 broad, containing fifty-five seats. It was, in common with all such offices in ancient monasteries, constructed with the most careful regard to cleanliness and health, a stream of water running through it from end to end. A second smaller dormitory runs from east to west for the accommodation of the conventual officers, who were bound to sleep in the dormitory. Close to the refectory, but outside the cloisters, are the domestic offices con- nected with it: to the north, the kitchen, 47 ft. square, sur- mounted by a lofty pyramidal roof, and the kitchen court; to the west, the butteries, pantries, &c. The infirmary had a small kitchen of its own. Opposite the refectory door in the cloister are two lavatories, an invariable adjunct to a monastic dining-hall, at which the monks washed before and after taking food.

The buildings devoted to hospitality were divided into three groups. The prior's group " entered at the south-east angle of the green court, placed near the most sacred part of the cathedral, as befitting the distinguished ecclesiastics or nobility who were assigned to him." The cellarer's buildings were near the west end of the nave, in which ordinary visitors of the middle class were hospitably entertained. The inferior pilgrims and paupers were relegated to the north hall or almonry, just within the gate, as iar as possible from the other two.

Westminster Abbey is another example of a great Benedictine abbey, identical in its general arrangements, so far as they can be traced, with those described above. The cloister and monastic buildings he to

the south side of the church. m iasLn Parallel to the nave, on the south side of the cloister, Abbey. was the refectory, with its lavatory at the door. On the eastern side we find the remains of the dormitory, raised on a vaulted substructure and communicating with the south transept. The chapter-house opens out of the same alley of the cloister. The small cloister lies to the south-east of the larger cloister, and still farther to the east we have the remains of the infirmary with the table hall, the refectory of those who were able to leave their chambers. The abbot's house formed a small courtyard at the west entrance, close to the inner gateway. Considerable portions of this remain, including the abbot's parlour, celebrated as " the Jerusalem Chamber," his hall, now used for the Westminster King's Scholars, and the kitchen and butteries beyond.

St Mary's Abbey, York, of which the ground-plan is annexed, exhibits the usual Benedictine arrangements. The precincts are surrounded by a strong fortified wall on three York.

sides, the river Ouse being sufficient protection on the fourth side. The entrance was by a strong gateway (U) to the north. Close to the entrance was a chapel, where is now the

ABBEY

*5

church of St Olaf (W), in which the new-comers paid their devo- tions immediately on their arrival. Near the gate to the south was the guest-hall or hospitium (T). The buildings are com- pletely ruined, but enough remains to enable us to identify the grand cruciform church (A), the cloister-court with the chapter- house (B), the refectory (I), the kitchen-court with its offices (K, O, O) and the other principal apartments. The infirmary has perished completely.

Some Benedictine houses display exceptional arrangements, dependent upon local circumstances, e.g. the dormitory of Worcester runs from east to west, from the west walk of the cloister, and that of Durham is built over the west, instead of

Fig

4-

St

Mary's Abbey, York (Benedictine).-

— Churton’s Monastic Ruins

A.

Church.

0.

Offices.

B.

Chapter-house. •

P.

Cellars.

C.

Vestibule to ditto.

Q-

Uncertain.

E.

Library or scriptorium.

R.

Passage to abbot’s house.

F.

Calefactory’.

S.

Passage to common house

G.

Necessary.

T.

Hospitium.

H.

Parlour.

U.

Great gate.

I.

Refectory.

V.

Porter’s lodge.

K.

Great kitchen and court.

W.

Church of St Olaf.

L.

Cellarer’s office.

X.

Tower.

M.

Cellars.

Y.

Entrance from Bootham.

N.

Passage to cloister.

as usual, over the east walk; but, as a general rule, the arrange- ments deduced from the examples described may be regarded as invariable.

The history of monasticism is one of alternate periods of decay and revival. With growth in popular esteem came increase in material wealth, leading to luxury and worldliness. The first religious ardour cooled, the strictness of the rule was relaxed, until by the ioth century the decay of discipline was so complete in France that the monks are said to have been frequently un- acquainted with the rule of St Benedict, and even ignorant that they were bound by any rule at all. The reformation of abuses generally took the form of the establishment of new monastic orders, with new and more stringent rules, requiring a modifica- tion of the architectural arrangements. One of the earliest of

these reformed orders was the Cluniac. This order took its name from the little village of Cluny, 12 miles N.W. of M&con, near which, about a.d. 909, a reformed Benedictine ciuay abbey was founded by William," duke of Aquitaine and count of Auvergne, under Berno, abbot of Beaume. He was succeeded by Odo, who is often regarded as the founder of the order. The fame of Cluny spread far and wide. Its rigid rule was adopted by a vast number of the old Benedictine abbeys, who placed themselves in affiliation to the mother society, while new foundations sprang up in large numbers, all owing allegiance to the " archabbot," established at Cluny. By the end of the 12th century the number of monasteries affiliated to Cluny in the various countries of western Europe amounted to 2000. The monastic establishment of Cluny was one of the most extensive and magnificent in France. We may form some idea of its enormous dimensions from the fact recorded, that when, a.d. 1245, Pope Innocent IV., accompanied by twelve cardinals,

ˆh

B.

Narthex.

G.

C.

Choir.

H

D.

High-altar.

K

E.

Retro-altar.

L.

Fig. 5. — Abbey of Cluny, from Viollet-le-Duc. A. Gateway. F. Tomb of St Hugh. M. Bakehouse.

Nave. N. Abbey buildings.

Cloister. O. Garden.

Abbot's house. P. Refectory.

Guest-house.

a patriarch, three archbishops, the two generals of the Carthu- sians and Cistercians, the king (St Louis), and three of his sons, the queen mother, Baldwin, count of Flanders and emperor of Constantinople, the duke of Burgundy, and six lords, visited the abbey, the whole party, with their attendants, were lodged within, the monastery without disarranging the monks, 400 in number. Nearly the whole of the abbey buildings, including the magnificent church, were swept away at the close of the 18th century. When the annexed ground-plan was taken, shortly before its destruc- tion, nearly all the monastery, with the exception of the church, had been rebuilt.

The church, the ground-plan of which bears a remarkable resem- blance to that of Lincoln Cathedral, was of vast dimensions. It was 656 ft. by 130 ft. wide. The nave was 102 ft. and the aisles 60 ft. high. The nave (G) had double vaulted aisles on either side. Like Lincoln, it had an eastern as well as a western transept, each furnished with apsidal chapels to the east. The western transept was 213 ft. long, and the eastern 123 ft. The choir terminated in a semicircular apse (F), surrounded by five chapels, also semi- circular. The western entrance was approached by an ante-church, or narthex (B), itself an aisled church of no mean dimensions, flanked by two towers, rising from a stately flight of steps bearing a large stone cross. To the south of the church lay the cloister-court (H), ofc immense size, placed much farther to the west than is usually the

case. On the south side of the cloister stood the refectory (P), an immense building, ioo ft. long and 60 ft. wide, accommodating six longitudinal and three transverse rows of tables. It was adorned with the portraits of the chief benefactors of the abbey, and with Scriptural subjects. The end wall displayed the Last Judgment. We are unhappily unable to identify any other of the principal buildings (N). The abbot's residence (K), still partly standing, adjoined the entrance-gate. The guest-house (L) was close by. The bakehouse (M), also remaining, is a detached building of immense size.

The first English house of the Cluniac order was that of Lewes, founded by the earl of Warren, c. a.d. 1077. Of this only a few

fragments of the domestic buildings exist. The best Ctaniac. preserved Cluniac houses in England are Castle Acre,

Norfolk, and Wenlock, Shropshire. Ground-plans of. both are given in Britton's Architectural Antiquities. They show several departures from the Benedictine arrangement. In each. the prior's house is remarkably perfect. All Cluniac houses in England were French colonies, governed by priors of that nation. They did not secure their independence nor become " abbeys " till the reign of Henry VI. The Cluniac revival, with all its brilliancy, was but short-lived. The celeb- rity of this, as of other orders, worked its moral ruin. With their growth in wealth and dignity the Cluniac foundations became as worldly in life and as relaxed in discipline as their predecessors, and a fresh reform was needed.

The next great monastic revival, the Cistercian, arising in the last years of the nth century, had a wider diffusion, and a Cistercian l° n g er an d more honourable existence. Owing its real " origin, as a distinct foundation of reformed Benedic- tines, in the year 1098, to Stephen Harding (a native of Dorset- shire, educated in the monastery of Sherborne), and deriving its name from Citeaux (Cistercium) , a desolate and almost inacces- sible forest solitude, on the borders of Champagne and Bur- gundy, the rapid growth and wide celebrity of the order are undoubtedly to be attributed to the enthusiastic piety of St Bernard, abbot of the first of the monastic colonies, subsequently sent forth in such quick succession by the first Cistercian houses, the far-famed abbey of Clairvaux (de Clara Valle), a.d. 1116. The rigid self-abnegation, which was the ruling principle of this reformed congregation of the Benedictine order, extended itself to the churches and other buildings erected by them. The characteristic of the Cistercian abbeys was the extremest sim- plicity and a studied

plainness. Only one tower — a central one — was permitted, and that was to be very low. Unnecessary pinnacles and turrets were prohibited. The triforium was omitted. The windows were to be plain and undivided, and it was forbidden to decorate them with stained glass. All needless ornament was proscribed. The crosses must be of wood; the candlesticks of iron. The renunciation of the world was to be evidenced in all that met the eye. The same spirit manifested itself in the choice of the sites of their monasteries. The more dismal, the more savage, the more hopeless a spot appeared, the more did it please their rigid mood. But they came not merely as ascetics, but as improvers. The Cistercian monas- teries are, as a rule, found placed in deep well-watered valleys. They always stand on the border of a stream; not rarely, as at Fountains, the buildings extend over it. These valleys, now so rich and productive, wore a very different aspect when the brethren first chose them as the place of their retirement. Wide swamps, deep morasses, tangled thickets, wild impassable forests, were their prevailing features. The ” bright valley,” Clara Vallis of St Bernard, was known as the ” valley of Worm- wood,” infamous as a den of robbers. ” It was a savage dreary solitude, so utterly barren that at first Bernard and his com- panions were reduced to live on beech leaves.” — (Milman’s Lat. Christ, vol. iii. p. 335.)

All Cistercian monasteries, unless the circumstances of the locality forbade it, were arranged according to one plan. The Clairvaux. g enera ‘ arrangement and distribution of the various

buildings, which went to make up one of these vast establishments, may be gathered from that of St Bernard’s own abbey of Clairvaux, which is here given. It will.be observed that the abbey precincts are surrounded by a strong wall, fur-

nished at intervals with watch-towers and other defensive works. The wall is nearly encircled by a stream of water, artificially diverted from the small rivulets which flow through the precincts, furnishing the establishment with an abundant supply in every part, for the irrigation of the gardens and orchards, the sanitary requirements of the brotherhood and for the use of the offices and workshops.

The precincts are divided across the centre by a wall, running from N. to S., into an outer and inner ward, — the former containing the menial, the latter the monastic buildings. The precincts are entered by a gateway (P), at the extreme western extremity, giving admission to the lower ward. Here the barns, granaries, stables, shambles, workshops and workmen’s lodgings were placed, without any regard to symmetry, convenience being the only consideration. Advancing

eastwards, we have before us the wall separating the

Fig. 6. — Clairvaux, No. 1 (Cistercian), General Plan.

A.

Cloisters.

I.

Wine-press and

O.

Public presse.

B.

Ovens, and corn

hay-chamber.

P.

Gateway.

and oil mills.

K.

Parlour.

R.

Remains of old

C.

St Bernard’s cell.

L.

Workshops and

monastery.

D.

Chief entrance.

workmen’s lodg-

S.

Oratory.

E.

Tanks for fish.

ings.

V.

Tile-works.

F.

Guest-house.

M

Slaughter-house.

X.

Tile-kiln.

G.

Abbot’s house.

N.

Barnsand stables.

Y.

Water-courses.

H.

Stables.

outer and inner ward, and the gatehouse (D) affording communica-
tion between the two. On passing through the gateway, the outer

court of the inner ward was entered, with the western facade of the monastic church in front. Immediately on the right of entrance was the abbot's house (G), in close proximity to the guest-house (F). On the other side of the court were the stables, for the accommodation of the horses of the guests and their attendants (H). The church occupied a central position. To the south was the great cloister (A) , surrounded by the chief monastic buildings, and farther to the east the smaller cloister, opening out of which were the infirmary, novices' lodgings and quarters for the aged monks. Still farther to the east, divided from the monastic buildings by a wall, were the vegetable gardens and orchards, and tank for fish. The large fish-ponds, an indispensable adjunct to any ecclesiastical foundation, on the for- mation of which the monks lavished extreme care and pains, and which often remain as almost the only visible traces of these vast establishments, were placed outside the abbey walls.

Plan No. 2 furnishes the ichnography of the distinctly monastic buildings on a larger scale. The usually unvarying arrangement of the Cistercian houses allows us to accept this as a type of the monas- teries of this order. The church (A) is the chief feature. It consists

of a vast nave of eleven bays, entered by a narthex, with a transept and short apsidal choir. (It may be remarked that the eastern limb in all unaltered Cistercian churches is remarkably short, and usually square.) To the east of each limb of the transept are two square chapels, divided according to Cistercian rule by solid walls. Nine radiating chapels, similarly divided, surround the apse. The stalls of the monks, forming the ritual choir, occupy the four eastern bays of the nave. There was a second range of stalls in the extreme western bays of the nave for the fratres conversi, or lay brothers. To the south of the church, so as to secure as much sun as possible, the cloister was invariably placed, except when local reasons forbade it. Round the cloister (B) were ranged the buildings connected with the monks' daily life. The chapter-house © always opened out of the east walk of the cloister in a line with the south transept. In

Fig. 7. — Clairvaux

, No. 2 (Cistercian), Monastic Buildings.

A.

Church.

L. Lodgings of nov-

S.

Cellars and store

B.

Cloister.

ices.

houses.

C.

Chapter-house.

M. Old guest-house.

T.

Water-course.

D.

Monks’ parlour.

N. Old abbot’s lodg-

U.

Saw-mill and oil

E.

Calefactory.

ings.

mill.

F.

Kitchen and court.

O. Cloister of super-

V.

Currier’s work-

G.

Refectory.

numerary

shop.

H

Cemetery.

monks.

X.

Sacristy.

I.

Little cloister.

P. Abbot’s hall.

Y.

Little library.

K.

Infirmary.

Q. Cell of St Bernard. R. Stables.

Z.

Undercroft of dor- mitory.

Cistercian houses this was quadrangular, and was divided by pillars and arches into two or three aisles. Between it and the transept we find the sacristy (X), and a small book-room (Y), armariolum, where the brothers deposited the volumes borrowed from the library. On the

other side of the chapter-house, to the south, is a passage (D) communicating with the courts and buildings beyond. This was sometimes known as the parlour, colloquii locus, the monks having the privilege of conversation here. Here also, when discipline became relaxed, traders, who had the liberty of admission, were allowed to display their goods. Beyond this we often find the calefactorium or day-room — an apartment warmed by flues beneath the pavement, where the brethren, half frozen during the night offices, betook themselves after the conclusion of lauds, to gain a little warmth, grease their sandals and get themselves ready for the work of the day. In the plan before us this apartment (E) opens from the south cloister walk, adjoining the refectory. The place usually assigned to it is occupied by the vaulted substructure of the dormitory (Z). The dormi-

tory, as a rule, was placed on the east side of the cloister, running over the calefactory and chapter-house, and joined the south transept, where a flight of steps admitted the brethren into the church for nocturnal services. Opening out of the dormitory was always the necessarium, planned with the greatest regard to health and cleanliness, a water-course invariably running from end to end. The refectory opens out of the south cloister at G. The position of the refectory is usually a marked point of difference between Benedictine and Cistercian abbeys. In the former, as at Canterbury, the refec- tory ran east and west parallel to the nave of the church, on the side of the cloister farthest removed from it. In the Cistercian monas- teries, to keep the noise and smell of dinner still farther away from the sacred building, the refectory was built north and south, at right angles to the axis of the church. It was often divided, sometimes into two, sometimes, as here, into three aisles. Outside the refectory door, in the cloister, was the lavatory, where the monks washed their hands at dinner-time. The buildings belonging to the material life of the monks lay near the refectory, as far as possible from the church, to the S.W. With a distinct entrance from the outer court was the kitchen court (F), with its buttery, scullery and larder, and the im- portant adjunct of a stream of running water. Farther to the west, projecting beyond the line of the west front of the church, were vast vaulted apartments (SS), serving as cellars and storehouses, above which was the dormitory of the conversi. Detached from these, and separated entirely from the monastic buildings, were various work- shops, which convenience required to be banished to the outer pre- cincts, a saw-mill and oil-mill (UU) turned by water, and a currier's shop (V) , where the sandals and leathern girdles of the monks were made and repaired.

Returning to the cloister, a vaulted passage admitted to the small

cloister (I), opening from the north side of which were eight small cells, assigned to the scribes employed in copying works for the library, which was placed in the upper story, accessible by a turret staircase. To the south of the small cloister a long hall will be noticed. This was a lecture-hall, or rather a hall for the religious disputations customary among the Cistercians. From this cloister opened the infirmary (K), with its hall, chapel, cells, blood-letting house and other dependencies. At the eastern verge of the vast group of build- ings we find the novices' lodgings (L), with a third cloister near the novices' quarters and the original guest-house (M). Detached from the great mass of the monastic edifices was the original abbot's house (N), with itsdining-hall(P). Closely adjoining to this, so that the eye of the father of the whole establishment should be constantly over those who stood the most in need of his watchful care, — those who were training for the monastic life, and those who had worn them- selves out in its duties, — was a fourth cloister (0), with annexed buildings, devoted to the aged and infirm members of the establish- ment. The cemetery, the last resting-place of the brethren, lay to the north side of the nave of the church (H).

It will be seen from the above account that the arrangement of a Cistercian monastery was in accordance with a clearly defined system, and admirably adapted to its purpose. The base court nearest to the outer wall contained the buildings belonging to the functions of the body as agriculturists and employers of labour. Advancing into the inner court, the buildings devoted to hospitality are found close to the entrance; while those connected with the supply of the material wants of the brethren, — the kitchen, cellars, &c, — form a court of themselves outside the cloister and quite detached from the church. The church refectory, dormitory and other buildings belonging to the. pro- fessional life of the brethren surround the great cloister. The small cloister beyond, with its scribes' cells, library, hall for disputations, &c, is the centre of the literary life of the com- munity. The requirements of sickness and old age are carefully provided for in the infirmary cloister and that for the aged and infirm members of the establishment. The same group contains the quarters of the novices.

This stereotyped arrangement is further shown by the illus- tration of the mother establishmet of Citeaux.

A cross (A), planted on the high road, directs travellers to the gate of the monastery, reached by an avenue of trees. On one side of the gate-house (B) is a long building © , probably the almonry, cit eattx with a dormitory above for the lower class of guests. On the ■ ■

other side is a chapel(D). As soon as the porter heard a stranger knock at the gate, he rose, saying, Deo gratias,the opportunity for the exercise. of hospitality being regarded as a cause for thankfulness. On opening the door he welcomed the new arrival with a blessing — Benedicite. He fell on his knees before him, and then went to inform the abbot. However important the abbot's occupations might be, he at once hastened to receive him whom heaven had sent. He also threw himself at his guest's feet, and conducted him to the chapel (D) purposely built close to the gate. After a short prayer, the abbot committed the guest to the care of the brother hospitaller, whose duty it was to provide for his wants and conduct the beast on which .h«ˆ

might be riding to the stable (F), built adjacent to the inner gate-house (E). This inner gate conducted into the base court (T), round which wer"! placed the barns, stables, cow-sheds, &c. On the eastern side stood the dormitory of the lay brothers, fratres conversi (G), detached f n. m the cloister, i ,ith cellars and storehouses below. At H, also outs : de the mona tic buildings proper, was the abbot's house, and ani.exed to it the guest-house. For these buildings there was a separate door of entrance into the church (S). The large cloister, with its s.-rroun jing arcades, is seen at V. On the south end

Crojects the refectory (K), with its kitchen at I, accessible from the ase court. The long gabled building on the east side of the cloister contained on the ground floor the chapter-house and calefactory, with the monks' dormitory above (M), communicating with the south transept of the church. At L was the staircase to the dormitory. The small cloister is at W, where were the carols or cells of the scribes, with the library (P) over, reached by a turret staircase. At R we see a portion of the infirmary. The whole precinct is sur- rounded by a strong buttressed wall (XXX), pierced with arches,

Fig. 8. — Bird's-eye view of Citeaux.

A. Cross.

B. Gate-house.

C. Almonry.

D. Chapel.

E. Inner gate-house.

F. Stable.

G. Dormitory of lay

brethren.

H. Abbot's house. I. Kitchen. K. Refectory. L. Staircase to dor- mitory. M. Dormitory. N. Church. P. Library.

R. Infirmary.

S. Doortothechurch for the lay bro- thers.

T. Base court.

V. Great cloister.

W. Small cloister.

X. Boundary wall.

through which streams of water are introduced. It will be noticed that the choir of the church is short, and has a square end instead of the usual apse. The tower, in accordance with the Cistercian rule, is very low. The windows throughout accord with the studied simplicity of the order.

The English Cistercian houses, of which there are such ex- tensive and beautiful remains at Fountains, Rievaulx, Kirkstall, Tintern, Netley, &c, were mainly arranged after the same plan, with slight local variations. As an example, we give the ground-

plan of Kirkstall Abbey, which is one of the best pre- Abbey. served. The church here is of the Cistercian type,

with a short chancel of two squares, and transepts with three eastward chapels to each, divided by solid walls (2 2 2). The whole is of the most studied plainness. The windows are unornamented, and the nave has no triforium. The cloister to the south (4) occupies the whole length of the nave. On the east side stands the two-aisled chapter-house (5), between which and the south transept is a small sacristy (3),

and on the other side two small apartments, one of which was probably the parlour (6). Beyond this stretches southward the

calefactory or day-room of the monks (14). Above this whole range of building runs the monks' dormitory, opening by stairs into the south transept of the church. At the other end were the necessaries. On the south side of the cloister we have the re- mains of the old refectory (11), running, as in Benedictine houses, from east to west, and the new refectory (12), which, with the increase of the inmates of the house, superseded it, stretching, as is usual in Cistercian houses, from north to south. Adjacent to this apartment are the remains of the kitchen, pantry and buttery. The arches of the lavatory are to be seen near the refectory entrance. The western side of the cloister is, as usual, occupied by vaulted cellars, supporting on the upper story the dormitory of the lay brothers (8). Extending from the

Fig. 9. — Kirkstall Abbey, Yorkshire (Cistercian).

Church.

Chapels.

Sacristy.

Cloister.

Chapter-house.

Parlour.

Punishment cell (?).

Cellars, with dormitories for

conversi over. Guest-house.

10. Common room.

11. Old refectory.

12. New refectory.

13. Kitchen court.

14. Calefactory or day-room.

15. Kitchen and offices. 16-19. Uncertain ; perhaps offices

connected with the in- firmary. 20. Infirmary or abbot's house.

south-east angle of the main group of buildings are the walls and foundations of a secondary group of considerable extent. These have been identified either with the hospitium or with the abbot's house, but they occupy the position in which the infir- mary is more usually found. The hall was a very spacious apart- ment, measuring 83 ft. in length by 48 ft. 9 in. in breadth, and was divided by two rows of columns. The fish-ponds lay between the monastery and the river to the south. The abbey mill was situated about 80 yards to the north-west. The mill- pool may be distinctly traced, together with the gowt or mill stream.

Fountains Abbey, first founded a.d. 1132, is one of the largest and best preserved Cistercian houses in England. But the earlier buildings received considerable additions and alterations in the later period of 'the order, causing Abbey. deviations from the strict Cistercian type. The church stands a short distance to the north of the river Skell, the

buildings of the abbey stretching down to and even across the stream. We have the cloister (H) to the south, with the three- aisled chapter-house (I) and calefactory (L) opening from its eastern walk, and the refectory (S), with the kitchen (Q) and buttery (T) attached, at right angles to its southern walk.

£$**

Fig. 10. — Ground-plan of Fountains Abbey, Yorkshire.

A. Naveof thechurch.

B. Transept.

C. Chapels.

D. Tower.

E. Sacristy.

F. Choir.

G. Chapel of nine

altars. H. Cloister. I. Chapter-house. K. Base court. L. Calefactory. M. Water-course.

N. Cellar.

O. Brewhouse.

P. Prisons.

Q. Kitchen.

R. Offices.

S. Refectory.

T. Buttery.

U. Cellars and store- houses.

V. Necessary.

W. Infirmary (?).

X. Guest-houses.

Y. Mill bridge.

Gate-house. Abbot's House.

, Passage. . Great hall. . Refectory. . Buttery. . Storehouse. , Chapel.

7. Kitchen.

8. Ashpit.

9. Yard.

10. Kitchen tank.

Parallel with the western walk is an immense vaulted sub- structure (U), incorrectly styled the cloisters, serving as cellars and store-rooms, and supporting the dormitory of the conversi above. This building extended across the river. At its S.W. corner were the necessaries (V), also built, as usual, above the swiftly flowing stream. The monks' dormitory was in its usual

position above the chapter-house, to the south of the transept. As peculiarities of arrangement may be noticed the position of the kitchen (Q), between the refectory and calefactory, and of the infirmary (W) (unless there is some error in its designation) above the

river to the west, adjoining the guest-houses (XX). We may also call attention to the greatly lengthened choir, commenced by Abbot John of York, 1203-1211, and carried on by his successor, terminating, like Durham Cathedral, in an eastern transept, the work of Abbot John of Kent, 12 20-1 247, and to the tower (D), added not long before the dissolution by Abbot Huby, 1494-1526, in a very unusual position at the north- ern end of the north transept. The abbot's house, the largest and most remarkable example of this class of buildings in the king- dom, stands south to the east of the church and cloister, from which it is divided by the kitchen court (K), surrounded by the ordinary domestic offices. A considerable portion of this house was erected on arches over the Skell. The size and character of this house, probably, at the time of its erection, the most spacious house of a subject in the kingdom, not a castle, bespeaks the wide departure of the Cistercian order from the stern simplicity of the original foundation. The hall (2) was one of the most spacious and magnificent apartments in medieval times, measur ing 170 ft. by 70 ft. Like the hall in the castle at Winchester, and Westminster Hall, as originally built, it was divided by 18 pillars and arches, with 3 aisles. Among other apartments, for the designation of which we must refer to the ground-plan, was a domestic oratory or chapel, 465 ft. by 23 ft. and a kitchen (7), 50 ft. by 38 ft. The whole Arrangements and character of the building bespeak the rich and powerful feudal lord, not the humble father of a body of hard-working brethren, bound by vows to a life of poverty and self-denying toil. In the words of Dean Milman, " the superior, once a man bowed to the earth with humility, care-worn, pale, emaciated, with a coarse habit bound with a cord, with naked feet, had become an abbot on his curvetting palfrey, in rich attire, with his silver cross before him, travelling to take his place amid the lordliest of the realm." — (Lai. Christ, vol. iii. p. 330.)

The buildings of the Austin canons or Black canons (so called from the colour of their habit) present few distinctive peculiari- ties. This order had its first seat in England at Col- chester, where a house for Austin canons was founded -" *

, . . Canons.

about a.d. 1105, and it very soon spread widely. As

an order of regular clergy, holding a middle position between monks and secular canons, almost resembling a community of parish priests living under rule, they adopted naves of great length to accommodate large congregations. The choir is usually long, and is sometimes, as at Llanthony and Christ Church (Twynham), shut off from the aisles, or,

as at Bolton, Kirkham, &c, is destitute of aisles altogether. The nave in the northern houses, not unfrequently, had only a north aisle, as at Bolton, Brinkburn and Lanercost. The arrangement of the monastic buildings followed the • ordinary type. The prior's lodge was almost invariably attached to the S.W. angle of the nave. The annexed plan of the Abbey of St Augustine's at Bristol, now the cathedral church of Cat ˆgˆ„i that city, shows the arrangement of the buildings, which departs very little from the ordinary Benedictine type. The Austin canons' house at Thornton, in Lincolnshire, is re- markable for the size and magnificence of its gate-house, the upper floors of which formed the guest-house of the establish- ment, and for possessing an octagonal chapter-house of Decorated date.

The Premonstralensian regular canons, or White canons, had as many as 35 houses in England, of which the most perfect remaining are those of Easby, Yorkshire, and Bayham, Kent. The head house of the order in England was trJˆa?*' Welbeck. This order was a reformed branch of the slaas. Austin canons, founded, a.d. 1119, by Norbert (born at Xanten, on the Lower Rhine, c. 1080) at Premontr6, a secluded marshy valley in the forest of Coucy in the diocese of Laon. The order spread widely. Even in the founder's lifetime it possessed houses in Syria and Palestine. It ; long

maintained its rigid austerity, till in the course of years wealth impaired its discipline, and its members sank into indolence and luxury. The Premonstratensians were brought to England shortly after a.d. 1140, and were first settled at Newhouse, in Lincolnshire, near the Humber. The ground-plan of Easby Abbey, owing to its situation on the edge of the steeply sloping banks of a river, is singularly irregular. The cloister is duly placed on the south side of the church, and the chief buildings occupy their usual positions round it. But the cloister garth, as at Chichester, is not rectangular, and all the surrounding build- ings are thus made to sprawl in a very awkward fashion. The church follows the plan adopted by the Austin canons in their northern-abbeys, and has only one aisle to the nave — that to the north; while the choir is long, narrow and aisleless. Each tran- sept has an aisle to the east, forming three chapels.

The church at Bayham was destitute of aisles either to nave or choir. The latter terminated in a three-sided apse. This church is remarkable for its exceeding narrowness in proportion to its length. Extending in

longitudinal dimensions 257 ft., it is

Fig. II. — St Augustine's Abbey, Bristol (Bristol Cathedral).

Church.

Great cloister.

Little cloister.

Chapter-house.

Calefactory.

Refectory.

Parlour.

H.

I.

K.

L.

P.

Kitchen. Kitchen court. Cellars. Abbot's hall. Abbot's gateway.

R. Infirmary.

S. Friars' lodging. T. King's hall. V. Guest-house. W. Abbey gateway. X. Barns, stables, &c. Y. Lavatory.

not more than 25 ft. broad. Stern Premonstratensian canons wanted no congregations, and cared for no possessions; there- fore they built their church like a long room.

The Carthusian order, on its establishment by St Bruno, about a.d. 1084, developed a greatly modified form and arrange- ment of a monastic institution. The principle of this staas"" order, which combined the coenobitic with the solitary life, demanded the erection of buildings on a novel plan. This plan, which was first adopted by St Bruno and his twelve companions at the original institution at Chartreux, near Grenoble, was maintained in all the Carthusian establish- ments' throughout Europe, even after the ascetic severity of

the order had been to some extent relaxed, and the primitive simplicity of their buildings had been exchanged for the magnifi- cence of decoration which characterizes such foundations as the Certosas of Pavia and Florence. According to the rule of St Bruno, all the members of a Carthusian brotherhood lived in the most absolute solitude and silence. Each occupied a small detached cottage, standing by itself in a small garden surrounded by high walls and connected by a common corridor or cloister. In these cottages or cells a Carthusian monk passed his time in the strictest asceticism, only leaving his solitary dwelling to attend the services of the Church, except on certain days when the brotherhood assembled in the refectory. The peculiarity of the arrangements of a Carthusian monastery, or charter-house, as it was called in England, from a corruption of the French chartreux, is exhibited in the plan of that of Clermont, from Viollet-le-Duc.

The whole establishment is surrounded by a wall, furnished at intervals with watch towers ® . The enclosure is divided into two courts, CtermoaL ˚f which the eastern court, surrounded by a cloister, from which the cottages of the monks (I) open, is much thelarger. The two courts are divided by the main buildings of the monastery,

including the church, the sanctuary (A), divided from B, the monks' choir, by a screen with two altars, the smaller cloister to the, south (S) surrounded by the chapter-house (E), the refectory (X) — these buildings occupying their normal position — and the chapel of Pontgibaud (K). The kitchen with its offices (V) lies behind the refectory, accessible from the outer court without entering the cloister. To the north of the church, beyond the sacristy (L), and the side chapels (M), we find the cell of the sub-prior (a) , with its garden. The lodgings of the prior (G) occupy the centre of the outer court, immediately in front of the west door of the church, and face the gateway of the convent (O). A small raised court with a fountain © is beforeit. This outer court also contains the guest-chambers (P), the stables and lodgings of the lay brothers (N), the barns and granaries (Q), the dovecot (H) and the bakehouse (T). At Z is the prison. (In this outer court, in all the earlier foundations, as at Witham, there was a smaller church in addition to the larger church of the monks.) The outer and inner courts are connected by a long passage (F), wide enough to admit a cart laden with wood to supply the cells of the brethren with fuel. The number of cells surrounding the great

A. Church.

B. Monks' choir.

C. Prior’s garden.

D. Great cloister.

E. Chapter-house.

F. Passage.

G. Prior’s lodg-

ings.

H. Dovecot.

I. Cells.

K. Chapel of Pont- gibaud.

L. Sacristy.

M. Chapel.

N. Stables.

O. Gateway.

P. Guest-cham- bers.

Q. Barns and granaries.

R. Watch-tower.

S. Little cloister.

T. Bakehouse.

V. Kitchen.

X. Refectory.

Y. Cemetery.

Z. Prison.

a. Cell of sub-

b.

prior. Garden of do.

Fig. 12. — Carthusian monastery of Clermont.

cloister is 18. They are all arranged on a uniform plan. Each little dwelling contains three rooms: a sitting-room ©, warmed by a stove in winter; a sleeping-room (D), furnished with a bed, a table, a bench, and a bcokcase; and a closet (E). Between the cell and the cloister gallery (A) is a passage or corridor (B), cutting off the inmate of the cell from all sound or movement which might interrupt his meditations. The superior had free access to this corridor, and through open niches was able to inspect the garden without being seen. At I is the hatch or turn-table, in which the daily allowance of food was deposited by a brother appointed for that purpose, affording no view either inwards or outwards. H is the garden, cultivated by the occupant of the cell. At K is the wood-house. F is a covered walk, with the necessary at the end.

The above arrangements are found with scarcely any varia- tion in all the charter = houses of western Europe. The Yorkshire Charter-house of Mount Grace, founded by Thomas Holland, the young duke of Surrey, nephew of Richard II. and marshal of England, during the revival of the popularity of the order, about a.d. 1397, is the most perfect and best preserved English example. It is characterized by all the simplicity of the order. The church is a modest building, long, narrow and aisleless. Within the wall of enclosure are two courts. The smaller of the two, the south, presents the usual arrangement of church, re- fectory, &c, opening out of a cloister. The buildings are plain and solid. The northern court contains the cells, 14 in number- It is surrounded by a double stone wall, the two walls being about 30 ft. or 40 ft. apart. Between these, each in its own

garden, stand the cells; low-built two-storied cottages, of two or three rooms on the ground floor, lighted by a larger and a smaller window to the side, and provided with a doorway to the court, and one at the back, opposite to one in the outer wall, through which the monk may have conveyed the sweepings of his cell and the refuse of his garden to the ” eremus ” beyond. By the side of the door to the court is a little hatch through which the daily pittance of food was supplied, so contrived by turning at an angle in the wall that no one could either look in or look out. A very perfect example of this hatch — an arrange

ment belonging to all Carthusian houses — exists at Miraflores, near Burgos, which remains nearly as it was completed in 1480.

A. Cloister gallery.

B. Corridor.

C. Living-room.

D. Sleeping-room.

E. Closets.

F. Covered walk.

G. Necessary. H. Garden. I. Hatch. K. Wood-house.

Fig. 15. — Carthu.-ian cell, Clermont.

There were only nine Carthusian houses in England. The earliest was that at VVitham in Somersetshire, founded by Henry II., by whom the order was first brought into England. The wealthiest and most magnificent was that of Sheen or Rich- mond in Surrey, founded by Henry V,. about a.d. 1414. The dimensions of the buildings at Sheen are stated to have been remarkably large. The great court measured 300 ft. by 250 ft.; the cloisters were a square of 500 ft.; the hall was no ft. in length by 60 ft. in breadth. The most celebrated historically is the Charter-house of London, founded by Sir Walter Manny a.d. 1371, the name of which is preserved by the famous public school established on the site by Thomas Sutton a.d. 161 1, now removed to Godalming.

An article on monastic arrangements would be incomplete without some account of the convents of the Mendicant or Preaching Friars, including the Black Friars or Domini- Frtars. ‘ cans, the Grey or Franciscans, the White or Carmelites, the Eremite or Austin Friars. These orders arose at the beginning of the 13th-century, when the Benedictines, together with their various reformed branches, had terminated their active mission, and Christian Europe was ready for a new re- ligious revival. Planting themselves, as a rule, in large towns, and by preference in the poorest and most densely populated districts, the Preaching Friars were obliged to adapt their buildings to the requirements of the site. Regularity of arrange- ment, therefore, was not possible, even if they had studied it. Their churches, built for the reception of large congregations of hearers rather than worshippers, form a class by themselves, totally unlike those of the elder orders in

ground-plan and character. They were usually long parallelograms unbroken by transepts. The nave very usually consisted of two equal bodies, one containing the stalls of the brotherhood, the other left entirely free for the congregation. The constructional choir is often wanting, the whole church forming one uninterrupted structure, with a continuous range of windows. The east end was usually square, but the Friars Church at Winchelsea had a polygonal apse. We not unfrequently find a single transept, sometimes of great size, rivalling or exceeding the nave. This arrangement is frequent in Ireland, where the numerous small friaiME afford admirable exemplifications of these peculiarities

of ground-plan. The friars' churches were at first destitute of towers; but in the 14th and 15th centuries, tall, slender towers were commonly inserted between the nave and the choir. The Grey Friars at Lynn, where the tower is hexagonal, is a good example. The arrangement of the monastic buildings is equally peculiar and characteristic. We miss entirely the regularity of the buildings of the earlier orders. At the Jacobins at Paris, a cloister lay to the north of the long narrow church of two parallel aisles, while the refectory— a room of immense length, quite detached from the cloister — stretched across the area before the west front of the church. At Toulouse the nave also has two parallel aisles, but the choir is apsidal, with radiating chapel. The refectory stretches northwards at right angles to the cloister, which lies to the north of the church, having the chapter-house and sacristy on the east. As examples of English friaries, the Dominican house at Norwich, and those Qjˆester. of the Dominicans and Franciscans at Gloucester, may be mentioned. The church of the Black Friars of Norwich departs from the original type in the nave (now St Andrew's Hall), in having regular aisles. In this it resembles the earlier examples of the Grey Friars at Reading. The choir is long and aisleless; an hexagonal tower between the two, like that existing at Lynn, has perished. The cloister and monastic buildings remain tolerably perfect to the north. The Dominican convent at Gloucester still exhibits the cloister-court, on the north side of which is the desecrated church. The refectory is on the west side and on the south the dormitory of the 13th century. This is a remarkably good example. There were 18 cells or cubicles on each side, divided by partitions, the bases of which remain. On the east side was the prior's house, a building of later date. At the Grey or Franciscan Friars, the church , followed the ordinary type in having two equal bodies, each gabled, with a continuous range of windows. There was a slender tower be-tween the nave and the choir. Of the convents of the Carmelite or White Friars we have a good example in the Abbey Huiae.' of Hulne,

near Alnwick, the first of the order in England, founded a.d. 1240. The church is a narrow oblong, destitute of aisles, 123 ft. long by only 26 ft. wide. The cloisters are to the south, with the chapter-house, &c, to the east, with the dormitory over. The prior's lodge is placed to the west of the cloister. The guest-houses adjoin the entrance gateway, to which a chapel was annexed on the south side of the conventual area. The nave of the church of the Austin Friars or Eremites in London is still standing. It is of Decorated date, and has wide centre and side aisles, divided by a very light and graceful arcade. Some fragments of the south walk of the cloister of the Grey Friars remained among the buildings of Christ's Hospital (the Blue-Coat School), while they were still standing. Of the Black Friars all has perished but the name. Taken as a whole, the remains of the establishments of the friars afford little warrant for the bitter invective of the Benedictine of St Alban's, Matthew Paris: — "The friars who have been founded hardly 40 years have built residences as the palaces of kings. These are they who, enlarging day by day their sumptuous edifices, encircling them with lofty walls, lay up in them their incalculable treasures, imprudently transgressing the bounds of poverty and violating the very fundamental rules of their profession." Allowance' must here be made for jealousy of a rival order just rising in popularity.

Every large monastery had depending upon it one or more smaller establishments known as cells. These cells were monastic colonies, sent forth by the parent house, and planted on some outlying estate. As an example, we may refer to the small religious house of St Mary Magdalene's, a cell of the great Benedictine house of St Mary's, York, in the valley of the Witham, to the south-east of the city 01 Lincoln. This consists of one long narrow range of building, of which the eastern part formed- the chapel and the western contained the apartments of the handful of monks of which it was the home. To the east may be traced the site of the abbey mill, with its dam and mill-lead. These cells, when belonging to a Cluniac house, were called Obediential The plan given by

Cells.

Viollet-le-Duc of the Priory of St Jean des Bons Hommes, a Cluniac cell, situated between the town of Avallon and the village of Savigny, shows that these diminutive establishments comprised every essential feature of a monastery, — chapel, cloister, chapter-room, refectory,

dormitory, all grouped ac- cording to the recognized arrangement. These Cluniac obedientiae differed from the ordinary Benedictine cells in being also places of punishment, to which monks who had been guilty of any grave infringement of the rules were relegated as to a kind of peniten- tiary. Here they were placed under the authority of a prior, and were condemned to severe manual labour, fulfilling the duties usually executed by the lay brothers, who acted as farm-servants. The outlying farming establishments belonging to the monastic foundations were known as villae or granges. They gave employment to a body of conversi and labourers under the management of a monk, who bore the title of Brother Hospitaller — the granges, like their parent institutions, affording shelter and hospitality to belated travellers.

Authorities. — Dugdale, Monasticon; Lenoir, Architecture monas- tique (1852-1856); Viollet : le-Duc, Dictionnaire raisonnee de I'archi- lecture francaise; Springer, Klosterleben und Klosterkunst (1886); Kraus, Geschichte der christlichen Kunst (1896). ' (E. V.)

ABBON OF FLEURY, or Abbo Floriacensis (c. 945- 1004), a learned Frenchman, born near Orleans about 945. He distinguished himself in the schools of Paris and Reims, and was especially proficient in science as known in his time. He spent two yeˆrs in England, assisting Archbishop Oswald of York in restoring the monastic system, and was abbot of Romsey. After his return to France he was made abbot of Fleury on the Loire (988). He was twice sent to Rome by King Robert the Pious (986, 996), and on each occasion succeeded in warding off a threatened papal interdict. He was killed at La Reole in 1004, in endeavouring to quell a monkish revolt. He wrote an Epitome de vitis Romanorum pontificum, besides controversial treatises, letters, &c. (see Migne, Patrologia Latina, vol. 139). His life, written by his disciple Almoin of Fleury, in which much of Abbon's correspondence was reproduced, is of great import- ance as a source for the reign of Robert II., especially with reference to the papacy (cf. Migne, op. cit. vol. 139).

See Ch. Pfister, Etudes sur le rigne de Robert le Pieux (1885) ; Cuissard-Gaucheron, " L'Ecole de Fleury-sur-Loire a la fin du io e siecle," in Memoires de la societe archeol. de I'Orleanais, xiv. (Orleans, 1875) ; A. Molinier, Sources de I'histoire de France,

ABBOT, EZRA (1810-1884), American biblical scholar, was born at Jackson, Waldo county, Maine, on the 28th of April 1819. He graduated at Bowdoin College in 1840; and in 1847, at the request of Prof. Andrews Norton, went to Cambridge, where he was principal of

a public school until 1856. He was assistant librarian of Harvard University from 1856 to 1872, and planned and perfected an alphabetical card catalogue, combining many of the advantages of the ordinary dictionary catalogues with the grouping of the minor topics under more general heads, which is characteristic of a systematic catalogue. From 1872 until his death he was Bussey Professor of New Testament Criticism and Interpretation in the Harvard Diyinity School. His studies were chiefly in Oriental languages and the textual criticism of the New Testament, though his work as a bibliographer showed such results as the exhaustive list of writings (5300 in all) on the doctrine of the future life, appended to W: R. Alger's History of the Doctrine of a Future Life, as it has prevailed in all Nations and Ages (1862), and published separately in 1864. His publications, though always of the most thorough and scholarly character, were to a large extent dispersed in the pages of reviews, dictionaries, concord- ances, texts edited by others, Unitarian controversial treatises, &c. ; but he took a more conspicuous and more personal part in the preparation (with the Baptist scholar, Horatio B. Hackett) of the enlarged American edition of Dr (afterwards Sir) William Smith's Dictionary of the Bible (1867-1870), to which he contri- buted more than 400 articles besides greatly improving the bibliographical completeness of the work; was an efficient member of the American revision committee employed in connexion with the Revised Version (1881-1885) °f the King

James Bible; and aided in the preparation of Caspar Rene' Gregory's Prolegomena to the revised Greek New Testament of Tischendorf. His principal single production, representing his scholarly method and conservative conclusions, was The Author- ship of the Fourth Gospel: External Evidences (1880; second edition, by J. H. Thayer, with other essays, 1889), originally a lecture, and in spite of the compression due to its form, up to that time probably the ablest defence, based on external evi- dence, of the Johannine authorship, and certainly the com- pletest treatment of the relation of Justin Martyr to this gospel. Abbot, though a layman, received the degree of S. T. D. from Harvard in 1872, and that of D.D. from Edinburgh in 1884. He died in Cambridge, Massachusetts, on the 21st of March

1884.

See S. J. Barrows, Ezra Abbot (Cambridge, Mass., 1884).

ABBOT, GEORGE (1 562-1633), English divine, archbishop of Canterbury, was born on the 19th of October 1562, at Guildford in Surrey, where his father was a cloth-worker. He studied, and then

taught, at Balliol College, Oxford, was chosen master of University College in 1597, and appointed dean of Winchester in 1600. He was three times vice-chancellor of the university, and took a leading part in preparing the authorized version of the New Testament. In 1608 he went to Scotland with the earl of Dunbar to arrange for a union between the churches of England and Scotland. He so pleased the king (James I.) in this affair that he was made bishop of Lichfield and Coventry in 1609, was translated to the see of London a month afterwards, and in less than a year was raised to that of Canterbury. His puritan instincts frequently led him not only into harsh treat- ment of Roman Catholics, but also into courageous resistance to the royal will, e.g. when he opposed the scandalous divorce suit of the Lady Frances Howard against the earl of Essex, and again in 16 18 when, at Croydon, he forbade the reading of the declara- tion permitting Sunday sports. He was naturally, therefore, a promoter of the match between the elector palatine and the Princess Elizabeth, and a firm opponent of the projected mar- riage of the prince of Wales with the infanta of Spain. This policy brought upon him the hatred of Laud (with whom he had previously come into collision at Oxford) and the court, though the king himself never forsook him. In 1622, while hunting in Lord Zouch's park at Bramshill, Hampshire, a bolt from his cross-bow aimed at a deer happened to strike one of the keepers, who died within an hour, and Abbot was so greatly distressed by the event that he fell into a state of settled melan- choly. His enemies maintained that the fatal issue of this accident disqualified him for his office, and argued that, though the homicide was involuntary, the sport of hunting which had led to it was one in which no clerical person could lawfully indulge. The king had to refer the matter to a commission of ten, though he said that "an angel might have miscarried after this sort." The commission was equally divided, and the king gave a casting vote in the archbishop's favour, though signing also a formal pardon or dispensation. After this the arch- bishop seldom appeared at the council, chiefly on account of his infirmities. He attended the king constantly, however, in his last illness, and performed the ceremony of the coronation of Charles I. His refusal to license the assize sermon preached by Dr Robert Sibthorp at Northampton on the 22nd of February 1626-1627, in which cheerful obedience was urged to the king's demand for a general loan, and the duty proclaimed of absolute non-resistance even to the most arbitrary royal commands, led Charles to deprive him of his functions as primate, putting them in commission. The need of summoning parliament, however, soon brought about a nominal restoration of the archbishop's powers. His presence being unwelcome at court, he lived from that' time in retirement, leaving Laud and his party in

undisputed ascendancy. He died at Croydon on the 5th of August 1633, and was buried at Guildford, his native place, where he had endowed a hospital with lands to the value of £300 a year. Abbot was a conscientious prelate, though narrow in view and often harsh towards both separatists and Romanists. He wrote a large number of works, the most interesting being

his discursive Exposition on the Prophet Jonah (1600), which was reprinted in 1845. His Geography, or a Brief Description of the Whole World (1599), passed through numerous editions.

The best account of him is in S. R. Gardiner's History of England.

ABBOT, GEORGE (1 603-1 648), English writer, known as " The Puritan," has been oddly and persistently mistaken for others. He has been described as a clergyman, which he never was, and as son of Sir Morris (or Maurice) Abbot, and his writ- ings accordingly entered in the bibliographical authorities as by the nephew of the archbishop of Canterbury. One of the sons of Sir Morris Abbot was, indeed, named George, and he was a man of mark, but the more famous George Abbot was of a different family altogether. He was son or grandson (it is not clear which) of Sir Thomas Abbot, knight of Easington, East Yorkshire, having been born there in 1603-1604, his mother (or grandmother) being of the ancient house of Pickering. Of his early life and training nothing is known. He married a daughter of Colonel Purefoy of Caldecote, Warwickshire, and as his monument, which may still be seen in the church there, tells, he bravely held the manor house against Princes Rupert and Maurice during the civil war. As a layman, and nevertheless a theologian and scholar of rare ripeness and critical ability, he holds an almost unique place in the literature of the period. The terseness of his Whole Booke of Job Paraphrased, or made easy for any to understand (1640, 4 to), contrasts favourably with the usual prolixity of the Puritan expositors and commentators. His Vindiciae iSabbatki (1641, 8vo) had a profound and lasting influence in the long Sabbatarian controversy. His Brief Notes upon the Whole Book of Psalms (1651, 4to), as its date shows, was posthumous. He died on the 2nd of February 1648.

Authorities. — MS. collections at Abbeyville for history of all of the name of Abbot, by J. T. Abbot, Esq., F.S.A., Darlington ; Dug- dale's Antiquities of Warwickshire, 1730, p. 1099; Wood's Athenae (Bliss), ii.

141, 594; Cox's Literature of the Sabbath.

ABBOT, ROBERT (is88?i662?), English Puritan divine. Noted as this worthy was in his own time, and representative in various ways, he has often since been confounded with others, e.g. Robert Abbot, bishop of Salisbury. He is also wrongly described as a relative of Archbishop Abbot, from whom he acknowledges very gratefully, in the first of his epistles dedi catory of A Hand of Fellowship to Helpe Keepe out Sinne and Antichrist (1623, 4to), that he had " received all " his " worldly maintenance," as well as " best earthly countenance " and " fatherly incouragements." The worldly maintenance was the presentation in 1616 to the vicarage of Cranbrook in Kent. He had received his education at Cambridge, where he pro- ceeded M.A. r and was afterwards incorporated at Oxford. In 1639, in the epistle to the reader of his most noticeable book historically, his Triall of our Church-Forsakers, he tells us, "I have lived now, by God's gratious dispensation, above fifty years, and in the place of my allotment two and twenty full." The former date carries us back to 1588-1589, or perhaps 1 587-1 588 — the •" Armada " year — as his birth-time; the latter to 1616- 161 7 {ut supra). In his Bee Thankfull London and her Sisters (1626), he describes himself as formerly "assistant to a reverend divine . . . now with God," and the name on the margin is " Master Haiward of Wool Church (Dorset)." This was doubt- less previous to his going to Cranbrook. Very remarkable and effective was Abbot's ministry at Cranbrook, where his parish- ioners were as his own " sons and daughters " to him. Yet, Puritan though he was, he was extremely and often unfairly antagonistic to Nonconformists. He remained at Cranbrook until 1643, when, Parliament deciding against pluralities of ecclesiastical offices, he chose the very inferior living of South- wick, Hants, as between the one and the other. He afterwards succeeded the " extruded " Udall of St Austin's, London, where according to the Warning-piece he was still pastor in 1657. He disappears silently between 1657-1658 and 1662. Robert Abbot's books are conspicuous amongst the productions of his time by their terseness and variety. In addition to those mentioned above he wrote Milk for Babes, or a Mother's Catechism for her Children (1646), and A Christian Family builded by God, or Direc- tions for Governors of Families (1653).

Authorities. — Brook's Puritans, iii. 182,3; Walker's Sufferings, ii. 183; Wood's Athenae (Bliss), i. 323; Palmer's Nonconf. Mem. ii. 218, which confuses him most oddly of all with one of the ejected ministers of 1662.

ABBOT, WILLIAM (1798-1843), English actor, was born in Chelsea,

and made his first appearance on the stage at Bath in 1806, and his first London appearance in 1808. At Covent Garden in 1813, in light comedy and melodrama, he made his first decided success.' He was Pylades to Macready's Orestes in Ambrose Philips's Distressed Mother when Macready made his first appearance at that theatre (1816). He created the parts of Appius Claudius in Sheridan Knowles's Virginius (1820) and of Modus in his Hunchback (1832). In 1827 he organized the com- pany, including Macready and Miss Smithson, which acted Shakespeare in Paris. On his return to London he played Romeo to Fanny Kemble's Juliet (1830). Two of Abbot's melodramas, The Youthful Days of Frederick the Great (181 7) and Swedish Patriotism (1819), were produced at Covent Garden. He died in poverty at Baltimore, Maryland.

ABBOT (from the Hebrew ab, a father, through the Syriac abba, Lat. abbas, gen. abbatis, O.E. abbad, fr. late Lat. form abbad-em changed in 13th century under influence of the Lat. form to abbat, used alternatively till the end of the 17th century; Ger. Abt; Fr. abbe), the head and chief governor of a community of monks, called also in the East hegumenos or archimandrite. The title had its origin in the monasteries of Syria, whence it spread through the East, and soon became accepted generally in all languages as the designation of ths head of a monastery. At first it was employed as a respectful title for any monk, as we learn from St Jerome, who denounced the custom on the ground that Christ had said, " Call no man father on earth " (in Epist. ad Gal. iv. 6, in Matt, xxiii. 9), but it was soon restricted to the superior. The name "abbot," though general in the West, was never universal. Among the Dominicans, Carmelites, Augustinians, &c, the superior was called Praepositus, "provost," and Prior; among the Francis- cans, Custos, "guardian"; and 'by the monks of Camaldoli, Major.

In Egypt, the first home of monasticism, the jurisdiction of the abbot, or archimandrite, was but loosely defined. Some- times he ruled over only one community, sometimes over several, each of which had its own abbot as well. Cassian speaks of an abbot of the Thebaid who had 500 monks under him, a number exceeded in other cases. By the rule of St Benedict, which, until the reform of Cluny, was the norm in the West, the abbot has jurisdiction over only one community. The rule, as was inevit- able, was subject to frequent violations; but it was not until the foundation of the Cluniac Order that the idea of a supreme abbot, exercising jurisdiction over all the houses of an order, was definitely recognized. New styles were devised to express this new relation; thus the abbot of Monte Cassino was called abbas abbatum, while the chiefs of other orders had the titles abbas generalis, or

magister or minister generalis.

Monks, as a rule, were laymen, nor ‘at the outset was the abbot any exception. All orders of clergy, therefore, even the “doorkeeper,” took precedence of him. For the reception of the sacraments, and for other religious offices, the abbot and his monks were commanded to attend the nearest church (Novellae, 133, c. ii.). This rule naturally proved inconvenient when a monastery was situated in a desert or at a distance from a city, and necessity compelled the ordination of abbots. This innova- tion was not introduced without a struggle, ecclesiastical dignity being regarded as inconsistent with the higher spiritual life, but, before the close of the 5th century, at least in the East, abbots seem almost universally to have become deacons, if not pres- byters. The change spread more slowly in the West, where the office of abbot was commonly filled by laymen till the end of the 7th century, and partially so up to the nth. Ecclesiastical councils were, however, attended by abbots. Thus at that held at Constantinople, a.d. 448, for the condemnation of Eutyches, 23 archimandrites or abbots sign, with 30 bishops, and, c. a.d. 690, Archbishop Theodore promulgated a canon, inhibiting

bishops from compelling abbots to attend councils. Examples are not uncommon in Spain and in England in Saxon times. Abbots were permitted by the second council of Nicaea, a.d. 787, to ordain their monks to the inferior orders. This rule was adopted in the West, and the strong prejudice against clerical monks having gradually broken down, eventually monks, almost without exception, took holy orders.

Abbots were originally subject to episcopal jurisdiction, and continued generally so, in fact, in the West’till the nth century. The Code of Justinian (lib. i. tit. iii. de Ep. leg. xl.) expressly subordinates the abbot to episcopal oversight. The first case recorded of the partial exemption of an abbot from episcopal control is that of Faustus, abbot of Lerins, at the council of Aries, a.d. 456; but the exorbitant claims and exactions of bishops, to which this repugnance to episcopal control is to be traced, far more than to the arrogance of abbots, rendered it increasingly frequent, and, in the 6th century, the practice of exempting religious houses partly or altogether from episcopal control, and making them responsible to the pope alone, received an impulse from Gregory the Great. These exceptions, intro- duced with a good object, had grown into a widespread evil by the 12 th century,

virtually creating an imperium in imperii), and depriving the bishop of all authority over the chief centres of influence in his diocese. In the 12th century the abbots of Fulda claimed precedence of the archbishop of Cologne. Abbots more and more assumed almost episcopal state, and in' defiance of the prohibition of early councils and the protests of St Bernard and others, adopted the episcopal insignia of mitre, ring, gloves and sandals. It has been maintained that the right to wear mitres was sometimes granted by the popes to abbots before the nth century, but the documents on which this claim is based are not genuine (J. Braun, Liturgische Gewandung, p. 453). The first undoubted instance is the bull by which Alexander II. in 1063 granted the use of the mitre to Egelsinus, abbot of the monas- tery of St Augustine at Canterbury (see Mitre). The mitred abbots in England were those of Abingdon, St Alban's, Bardney, Battle, Bury St Edmund's, St Augustine's Canterbury, Col- chester, Croyland, Evesham, Glastonbury, Gloucester, St Benet's Hulme, Hyde, Malmesbury, Peterborough, Ramsey, Reading, Selby, Shrewsbury, Tavistock, Thorney, Westminster, Winch- combe, St Mary's York. Of these the precedence was originally yielded to the abbot of Glastonbury, until in a.d. i i 54 Adrian IV. (Nicholas Breakspear) granted it to the abbot of St Alban's, in which monastery he had been brought up. Next after the abbot of St Alban's ranked the abbot of Westminster. To distinguish abbots from bishops, it was ordained that their mitre should be made of less costly materials, and should not be ornamented with gold, a rule which was soon entirely disregarded, and that the crook of their pastoral staff should turn inwards instead of outwards, indicating that their jurisdiction was limited to their own- house.

The adoption of episcopal insignia by abbots was followed by an encroachment on episcopal functions, which had to be specially but ineffectually guarded against by the Lateran council, a.d. 1123. In the East, abbots, if in priests' orders, with the consent of the bishop, were, as we have seen, permitted by the second Nicene council, a.d. 787, to confer the tonsure and admit to the order of reader; but gradually abbots, in the West also, advanced higher claims, until we find them in a.d. 1489 permitted by Innocent IV. to confer both the subdiaconate and diaconate. Of course, they always and everywhere had the power of admitting their own monks and vesting them with the religious habit.

When a vacancy occurred, the bishop of the diocese chose the abbot out of the monks of the convent, but the right of election was transferred by jurisdiction to the monks themselves, reserv- ing to the bishop the confirmation of the election and the bene- diction of the

new abbot. In abbeys exempt from episcopal jurisdiction, the confirmation and benediction had to be conferred by the pope in person, the house being taxed with the expenses of the new abbot's journey to Rome. By the rule of St Benedict, the consent of the laity was in some undefined way required;

but this seems never to have been practically enforced. It was necessary that an abbot should be at least 25 years of age, of legitimate birth, a monk of the house, unless it furnished no suitable candidate, when a liberty was allowed of electing from another convent, well instructed himself, and able to instruct others, one also who had learned how to command by having practised obedience. In some exceptional cases an abbot was allowed to name his own successor. Cassian speaks of an abbot in Egypt doing this; and in later times we have another example in the case of St Bruno. Popes and sovereigns gradually en- croached on the rights of the monks, until in Italy the pope had usurped the nomination of all abbots, and the king in France, with the exception of Cluny, Premontre and other houses, chiefs of their order. The election was for life, unless the abbot was canonically deprived by the chiefs of his order, or when he was directly subject to them, by the pope or the bishop.

The ceremony of the formal admission of a Benedictine abbot in medieval times is thus prescribed by the consuetudinary of Abingdon. The newly elected abbot was to put off his shoes at the door of the church, and proceed barefoot to meet the mem- bers of the house advancing in a procession. After proceeding up the nave, he Was to kneel and pray at the topmost step of the entrance of the choir, into which he was to be introduced by the bishop or his commissary, and placed in his stall. The monks, then kneeling, gave him the kiss of peace on the hand, and rising, on the mouth, the abbot holding his staff of office. He then put on his shoes in the vestry, and a chapter was held, and the bishop or his commissary preached a suitable sermon.

The power of the abbot was paternal but absolute, limited, however, by the canons of the church, and, until the general establishment of exemptions, by episcopal control. As a rule, however, implicit obedience was enforced; to act without his orders was culpable; while it was a sacred duty to execute his orders, however unreasonable, until they were withdrawn. Examples among the Egyptian monks of this blind submission to the commands of the superiors, exalted into a virtue by those who regarded the entire crushing of the individual will as the highest excellence, are detailed by Cassian and others, — e.g. a monk watering a dry stick, day after day, for months, or endeavouring

to remove a huge rock immensely exceeding his powers. St Jerome, indeed, lays down, as the principle of the compact between the abbot and his monks, that they should obey their superiors in all things, and perform whatever they commanded (Ep. 2, ad Eustoch. de cuslod. virgin.). So despotic did the tyranny become in the West; that in the time of Charle- magne it was necessary to restrain abbots by legal enactments from mutilating their monks and putting out their eyes; while the rule of St Columban ordained 100 lashes as the punishment for very slight offences. An abbot also had the power of ex- communicating refractory nuns, which he might use if desired by their abbess.

The abbot was treated with the utmost submission and reverence by the brethren of his house. When he appeared either in church or chapter all present rose and bowed. His letters were received kneeling, like those of the pope and the king. If he gave a command, the monk receiving it was also to kneel. No monk might sit in his presence, or leave it without his permission. The highest place was naturally assigned to him, both in church and at table. In the East he was commanded to eat with the other monks. In the West the rule of St Benedict appointed him a separate table, at which he might entertain guests and strangers. This permission opening the door to luxurious living, the council of Aix, a.d. 817, decreed that the abbot should dine in the refectory, and be content with the ordinary fare of the monks, unless he had to entertain a guest. These ordinances proved, however, generally ineffectual to secure strictness of diet, and contemporaneous literature abounds with satirical remarks and complaints concerning the inordinate extravagance of the tables of the abbots. When the abbot con- descended to dine in the refectory, his chaplains waited upon him with the dishes, a servant, if necessary, assisting them. At St Alban's the abbot took the lord's seat, in the centre of the

high table, and was served on silver plate, and sumptuously entertained noblemen, ambassadors and strangers of quality. When abbots dined in their own private hall, the rule of St Benedict charged them to invite their monks to their table, provided there was room, on which occasions the guests were to abstain from quarrels, slanderous talk and idle gossiping.

The ordinary attire of the abbot was according to rule to be the same as that of the monks. But by the 10th century the rule was commonly

set aside, and we find frequent complaints of abbots dressing in silk, and adopting sumptuous attire. They sometimes even laid aside the monastic habit altogether, and assumed a secular dress. 1 This was a necessary consequence of their following the chase, which was quite usual, and indeed at that time only natural. With the increase of wealth and power, abbots had lost much of their special religious character, and become great lords, chiefly distinguished from lay lords by celibacy. Thus we hear of abbots going out to sport, with their men carrying bows and arrows; keeping horses, dogs and huntsmen ; and special mention is made of an abbot of Leicester, c. 1360, who was the most skilled of all the nobility in hare- hunting. In magnificence of equipage and retinue the abbots vied with the first nobles of the realm. They rode on mules with gilded bridles, rich saddles and housings, carrying hawks on their wrist, followed by an immense train of attendants. The bells of the churches w.ere rung as they passed. They associated on equal terms with laymen of the highest distinction, and shared all their pleasures and pursuits. This rank and power was, however, often used most beneficially. For instance, we read of Whiting, the last abbot of Glastonbury, judicially mur- dered by Henry VIII., that his house was a kind of well-ordered court, where as many as 300 sons of noblemen and gentlemen, who had been sent to him for virtuous education, had been brought up, besides others of a meaner rank, whom he fitted for the universities. His table, attendance and officers were an honour to the nation. He would entertain as many as 500 persons of rank at one time, besides relieving the poor of the vicinity twice a week. He had his country houses and fisheries, and when he travelled to attend parliament his retinue amounted to upwards of 100 persons. The abbots of Cluny and Vendome were, by virtue of their office, cardinals of the Roman church.

In process of time the title abbot was improperly transferred to clerics who had no connexion with the monastic system, as to the principal of a body of parochial clergy; and under the Carolingians to the chief chaplain of the king, Abbas Curiae, or military chaplain of the emperor, Abbas Castrensis. .It even came to be adopted by purely secular officials. Thus the chief magistrate of the republic at Genoa was called Abbas Populi. Du Cange, in his glossary, also gives us Abbas Campanilis, Clocherii, Palatii, Scholaris, &c.

Lay abbots (M. Lat. defensorcs, abbacomites, abbates laid, abbates milites, abbates saeculares or irreligiosi, abbatiarii, or sometimes simply abbates) were the outcome of the growth of the feudal system from the 8th century onwards. The practice of commendation, by which — to meet a contemporary emergency —the revenues of the community were handed over to a lay lord, in return for his

protection, early suggested to the em- perors and kings the expedient of rewarding their warriors with rich abbeys held in commendam. During the Carolingian epoch the custom grew up of granting these as regular heritable fiefs or benefices, and by the 10th century, before the great Cluniac reform, the system was firmly established. Even the abbey of St Denis was held in commendam by Hugh Capet. The example of the kings was followed by the feudal nobles, sometimes by making a temporary concession permanent, sometimes without any form of commendation whatever. In England the abuse was rife in the 8th century, as may be gathered from the acts of the council of Cloveshoe. These lay abbacies were not merely a question of overlordship, but implied the concentration in lay hands of all the rights, immunities and jurisdiction of the foundations, i.e. the more or less complete secularization of

1 Walworth, the fourth abbot of St Alban's, c. 930, is charged by Matthew Paris with adopting the attire of a sportsman.

spiritual institutions. The lay abbot took his recognized rank in the feudal hierarchy, and was free to dispose of his fief as in the case of any other. The enfeoffment of abbeys differed in form and degree. Sometimes the monks were directly subject to the lay abbot; sometimes he appointed a substitute to perform the spiritual functions, known usually as dean (decanus), but also as abbot (abbas legitimus, monasticus, regularis). When the great reform of the nth century had put an end to the direct jurisdiction of the lay abbots, the honorary title of abbot con- tinued to be held by certain of the great feudal families, as late as the 13th century and later, the actual head of the community retaining that of dean. The connexion of the lesser lay abbots with the abbeys, especially in the south of France, lasted longer; and certain feudal families retained the title of abbis chevaliers (abbates milites) for centuries, together with certain rights over the abbey lands or revenues. The abuse was not confined to the West. John, patriarch of Antioch, at the beginning of the 12th century, informs us that in his time most monasteries had been handed over to laymen, beneficiarii, for life, or for part of their lives, by the emperors.

In conventual cathedrals, where the bishop occupied the place of the abbot, the functions usually devolving on the superior of the monastery were performed by a prior.

The title abbt (Ital. abbate), as commonly used in the Catholic church on the European continent, is the equivalent of the English " Father," being loosely applied to all who have re- ceived the tonsure. This use of the title is said to have originated in the right conceded to the king

of France, by the concordat between Pope Leo X. and Francis I. (1516), to appoint abbes commendataires to most of the abbeys in France. The expecta- tion of obtaining these sinecures drew young men towards the church in considerable numbers, and the class of abbes so formed' — abbes de cour they were sometimes called; and sometimes (ironically) abbes de sainte espSrance, abbes of St Hope — came to hold a recognized position. The connexion many of them had with the church was of the slenderest kind, consisting mainly in adopting the name of abbe, after a remarkably moderate course of theological study, practising celibacy and wearing a distinctive dress — a short dark-violet coat with narrow collar. Being men of presumed learning and undoubted leisure, many of the class found admission to the houses of the French nobility as tutors or advisers. Nearly every great, family had its abbe. The class did not survive the Revolution; but the courtesy title of abbe, having long lost all connexion in people's minds with any special ecclesiastical function, remained as a convenient general term applicable to any clergyman.

In the German Evangelical church the title of abbot (Abt) is sometimes bestowed, like a b b6, as an honorary distinction, and sometimes survives to designate the heads of monasteries converted at the Reformation into collegiate foundations. Of these the most noteworthy is the abbey of Lokkum in Hanover, founded as a Cistercian house in n 63 by Count Wilbrand of Hallermund, and reformed in 1593. The abbot of Lokkum, who still carries a pastoral staff, takes precedence of all the clergy of Hanover, and is ex officio a member of the consistory of the kingdom. The governing body of the abbey Consists of abbot, prior and the " convent " of Canons (Stiftsherren) .

See Joseph Bingham, Origines ecclesiasticae (1840); Du Cange, Ghssarium med. et inf. Lat. (ed. 1883); J. Craigie Robertson, Hist. of the Christian Church (1858-1873); Edmond Martene, De antiquis ecdesiae ritibus (Venice, 1783); C. F. R. de Montalembert, Les moines a" Occident depuis S. Benott jusqu'a S. Bernard (1860-1877) ; Achille Luchaire, Manuel des institutions franQaises (Par. 1892).

(E. V. ; W. A. P.)

ABBOTSFORD, formerly the residence of Sir Walter Scott, situated on the S. bank of the Tweed, about 3 m. W. of Melrose, Roxburghshire, Scotland, and nearly 1 m. from Abbotsford Ferry station on the North British railway, connecting Selkirk and Galashiels. The nucleus of the estate was a small farm of 100 acres, called Cartleyhole, nicknamed Clarty (i.e. muddy) Hole, and bought by Scott on the lapse of his lease (181 1) of the neighbouring house of Ashestiel. It was added to from

time to time, the last and principal acquisition being that of Toftfield

(afterwards named Huntlyburn), purchased in 1817. The new house was then begun and completed in 1824. The general ground-plan is a parallelogram, with irregular outlines, one side overlooking the Tweed; and the style is mainly the Scottish Baronial. Into various parts of the fabric were built relics and curiosities from historical structures, such as the doorway of the old Tolbooth in Edinburgh. Scott had only enjoyed his residence one year when (1825) he met with that reverse of fortune which involved the estate in debt. In 1830 the library and museum were presented to him as a free gift by the creditors. The property was wholly disencumbered in 1847 by Robert Cadell, the publisher, who cancelled the bond upon it in ex- change for the family's share in the copyright of Sir Walter's works. Scott's only son Walter did not live to enjoy the property, having died on his way from India in 1847. Among subsequent possessors were Scott's son-in-law, J. G. Lockhart, J. R. Hope Scott, Q.C., and his daughter (Scott's great-granddaughter), the Hon. Mrs Maxwell Scott. Abbotsford gave its name to the " Abbotsford Club," a successor of the Bannatyne and Maitland clubs, founded by W. B. D. D. Turnbull in 1834 in Scott's honour, for printing and publishing historical works connected with his writings. Its publications extended from 1835 to 1864. See Lockhart, Life of Scott; Washington Irving, Abbotsford and Newstead Abbey; W. S. Crockett, The Scott Country.

ABBOTT, EDWIN ABBOTT (1838-), English school- master and theologian, was born on the 20th of December 1838. He was educated at the City of London school and at St John's Collegeˆ Cambridge, where he took the highest honours in the classical, mathematical and theological triposes, and became fellow of his college. In 1862 he took orders. After holding masterships at King Edward's School, Birmingham, and at Clifton College, he succeeded G. F. Mortimer as headmaster of the City of London school in 1865 at the early age of twenty- six. He was Hulsean lecturer in 1876. He retired in 1889, and devoted himself to literary and theological pursuits. Dr Abbott's liberal inclinations in theology were prominent both in his educational views and in his books. His Shakespearian Gram- mar (1870) is a permanent contribution to English philology. In 1885 he published a life of Francis Bacon. His theo- logical writings include three anonymously published religious romances — Philochristus(i8j8),Onesimus (1882), Silanus (1906). More weighty contributions are the anonymous

theological discussion The Kernel and the Husk (1886), Fhilomythus (1891), his book on Cardinal Newman as an Anglican (1892), and his article “The Gospels ” in the ninth edition of the Encyclopaedia Britannica, embodying a critical view which caused considerable stir in the English theological world; he also wrote St Thomas of Canterbury, his Death and Miracles (1898), Johannine Vocabu- lary (1905), Johannine Grammar (1906).

His brother, Evelyn Abbott (1843-1901), was a well-known tutor of Balliol, Oxford, and author of a scholarly History of Greece.

ABBOTT, EMMA (1849-1891), American singer, was born at Chicago and studied in Milan and Paris. She had a fine soprano voice, and appeared first in opera in London under Colonel Mapleson’s direction at Covent Garden, also singing at important concerts. She organized an opera company known by her name, and toured extensively in the United States, where she had a great reputation. In 1873 she married E. J. Wetherell. She died at Salt Lake City on the 5th of January 1801.

ABBOTT, JACOB (1803-1879), American writer of books for the young, was born at Hallowell, Maine, on the 14th of November 1803. He graduated at Bowdoin College in 1820; studied at Andover Theological Seminarf in 1821, 1822, and 1824; was tutor in 1824-1825, and from 1825 to 1829 was professor of mathematics and natural philosophy in Amherst College; was licensed to preach by the Hampshire Association in 1826; founded the Mount Vernon School for young ladies in Boston in 1829, and was principal of it in 1829-1833; was pastor of Eliot Congregational Church (which he founded), at Roxbury, Mass., in 1834-1835; and was, with his brothers, a founder, and in 1843-1851 a principal of Abbott’s Institute, and in 1845-1848

of the Mount Vernon School for boys, in New York City. He was a prolific author, writing juvenile stories, brief histories and biographies, and religious books for the general reader, and a few works in popular science. He died on the 31st of October 1879 at Farmington, Maine, where he had spent part of his time since 1839, and where his brother Samuel Phillips Abbott founded in 1844 the Abbott School, popularly called ” Little Blue.” Jacob Abbott’s ” Rollo Books “—Rollo at Work, Rollo atˆ Play, Rollo in Europe, &c. (28 vols.) — are the best known of his writings, having as their chief characters a representative boy and his associates. In them Abbott did for one or two generations of young American readers a service not unlike that performed earlier, in England and America, by the authors of Evenings at Home, Sandford and Merlon, and the Parent’s Assistant. Of his other writings (he produced more than two hundred volumes in all),

the best are the Franconia Stories (10 vols.), twenty-two volumes of biographical histories in a series of thirty-two volumes (with his brother John S. C. Abbott), and the Young Christian, — all of which had enormous circulations.

His sons, Benjamin Vaughan Abbott (1830-1890), Austin Abbott (1831-1896), both eminent lawyers, Lyman Abbott (q.v.), and Edward Abbott (1841-1908), a clergyman, were also well-known authors.

See his Young Christian, Memorial Edition, with a Sketch of the Author by one of his sons, i.e. Edward Abbott (New York, 1882), with a bibliography of his works.

ABBOTT, JOHN STEVENS CABOT (1805-1877), American writer, was born in Brunswick, Maine, on the 18th of September 1805. He was a brother of Jacob Abbott, and was associated with him in the management of Abbott's Institute, New York City, and in the preparation of his series of brief historical biographies. He is best known, however, as the author of a partisan and unscholarly, but widely popular and very readable History of Napoleon Bonaparte (1855), in which the various elements and episodes in Napoleon's career are treated with some skill in arrangement, but with unfailing adulation. Dr Abbott graduated at Bowdoin College in 1825, prepared for the ministry at Andover Theological Seminary, and between 1830 and 1844, when he retired from the ministry, preached successively at Worcester, Roxbury and Nantucket, Massachusetts. He died at Fair Haven, Connecticut, on the 17th of June 1877. He was a voluminous writer of books on Christian ethics, and of his- tories, which now seem unscholarly and untrustworthy, but were valuable in their time in cultivating a popular interest in history. In general, except that he did not write juvenile fiction, his work in subject and style closely resembles that of his brother, Jacob Abbott.

ABBOTT, LYMAN (1835-), American divine and author, was born at Roxbury, Massachusetts, on the 18th of December 1835, the son of Jacob Abbott. He graduated at the University of New York in 1853, studied law, and was admitted to the bar in 1856; but soon abandoned the legal profession, and, after studying theology with his uncle, J. S. C. Abbott, was ordained a minister of the Congregational Church in i860. He was pastor of a church in Terre Haute, Indiana, in 1860-1865, and of the New England Church in New York City in 1865-1869. From 1865 to 1868 he was secretary of the American Union (Freedman's) Commission. In 1869 he resigned his pastorate to devote him- self to literature. He was an associate editor of Harper's Maga- zine, was editor of the Illustrated Christian Weekly, and was co-

editor (1876-1881) of The Christian Union with Henry Ward Beecher, whom he succeeded in 1888 as pastor of Plymouth Church, Brooklyn. From this pastorate he resigned ten years later. From 188 1 he was editor-in-chief of The Christian Union, renamed The Outlook in 1893; this periodical reflected his efforts toward social reform, and, in theology, a liberality, humanitarian and nearly unitarian. The latter characteristics marked his publisked works also.

His works include Jesus of Nazarelh\i86<)) ; Illustrated Commentary on the New Testament (4 vols., 1875); A Study in Human Nature (1885); Life of Christ (1894); Evolution of Christianity (Lowell Lectures, 1896); The Theology of an Evolutionist (1897); Chris- tianity and Social Problems (1897) ; Life and Letters of Paid (1898) .;

The Life that Really is (1899); Problems of Life (1900); The Rights of Man (1901); Henry Ward Beecher (1903); The Christian Ministry (1905); The Personality of God (1905); Industrial Problems (1905); and Christ's Secret of Happiness (1907). He edited Sermons of Henry Ward Beecher (2 vols., 1868).

ABBOTTABAD, a town of British India, 4120 ft. above sea- level, 63 m. from Rawalpindi, the headquarters of the Hazara district in the N.W. Frontier Province, called after its founder, Sir James Abbott, who settled this wild district after the annexa- tion of the Punjab. It is an important military cantonment and sanatorium, being the headquarters of a brigade in the second division of the northern army corps. In 1901 the population of the town and cantonment was 7764.

ABBREVIATION (Lat. brevis, short), strictly a shortening; more particularly, an " abbreviation " is a letter or group of letters, taken from a word or words, and employed to represent them for the sake of brevity. Abbreviations, both of single words and of phrases, having a meaning more or less fixed and recognized, are common in ancient writings and inscriptions (see Palaeography and Diplomatic), and very many are in use at the present time. A distinction is to be observed between abbreviations and the contractions that are frequently to be met with in old manuscripts, and even in early printed books, whereby letters are dropped out here and there, or particular collocations of letters represented by somewhat arbitrary sym- bols. The commonest form of abbreviation is the substitution for a word of its initial letter; but, with a view to prevent ambiguity, one or more of

the other letters are frequently added. -Letters are often doubled to indicate a plural or a superlative.

I. Classical Abbreviations. — The following list contains

a selection from the abbreviations that occur in the writings

and inscriptions of the Romans: —

A. A. Absolvo, Aedilis, Aes, Ager, Ago, Aio, Amicus, Annus,

Antiquo, Auctor, Auditor, Augustus, Aulus, Aurum,

Aut. A.A. Aes alienum, Ante audita, Apud agrum, Aurum argentum.

AA. Augusti. AAA. Augusti tres.

A.A.A.F.F. Auro argento aere flando feriundo. 1 A.A.V. Alter ambove. A.C. Acta causa, Alius civis.

A.D. Ante diem; e.g. A.D.V. Ante diem quintum.

A.D.A. Ad dandos agros. AED. Aedes, Aedilis, Aedilitas. AEM. and AIM. Aemilius, Aemilia. AER. Aerarium. AER.P. Aere publico. A.F. Actum fide, Auli Alius.

AG. Ager, Ago, Agrippa.

A.G. Animo grato, Aulus Gellius.

A.L.AE. and A.L.E. Arbitrium litis aestimandae. A.M. and A.MILL.Ad milliarium. AN. Aniensis, Annus, Ante.

ANN 7 . Annales, Anni, Annona. ANT. Ante, Antonius. A.O. Alii omnes, Amico optimo.

AP. Appius, Apud.

A.P. Ad pedes, Aedilitia potestate.

A.P.F. Auro {or argento) publico feriundo. A. P.M. Amico posuit monumentum, Annorum plus minus. A.P.R.C. Anno post Romam conditam. ARG. Argentum. AR.V.V.D.D. Aram votam volens dedicavit, Arma votiva dono

dedit. AT. A tergo. Also A TE. and A TER.

A.T.M.D.O. Aio te mihi dare oportere. AV. Augur, Augustus, Aurelius.

A.V. Annos vixit.

A.V.C. Ab urbe condita. AVG. Augur, Augustus.

AVGG. Augusti (generally of two). AVGGG. Augusti tres. AVT.PR.R. Auctoritas provinciae Romanorum.

B.

B. Balbius, Balbus, Beatus, Bene, Beneficiarius, Beneficium,

Bonus, Brutus, Bustum. B. for V. Berna Bivus, Bixit.

B.A. Bixit anos, Bonis auguriis, Bonus amabilis.

BB. or B.B. Bene bene, i.e. optime, Optimus. B.D. Bonae deae, Bonum datum.

B.DD. Bonis deabus.

B.D.S.M

B.F.

B.F.

B.H.

B.I.

B.M.

B.N.

BN.H.I.

B.P.

B.Q.

B.RP.N.

BRT.

B.T.

B.V.

B.V.V.

BX.

C.

C.B.

C.C.

C.C.C.

C.C.F.

CC.VV.

CD.

CES.

C.F.

C.H.

C.I.

CL.

CL.V.

CM.

CN.

COH.

COL.

COLL.

COM.

CON.

COR.

COS.

C.P.

C.R. CS. C.V. CVR.

D.

D.C D.D.

D.D.D.

D.E.R.

DES.

D.I.

D.I.M.

D.M.

D.O.M.

D.P.S.

E.

EG.

E.M.

EQ.M.

E.R.A.

F.C.

F.D.

F.F.F.

FL.

F.L.

FR.

F.R.

G.

G.F.

1 Describing the function of the triumviri monelales.

Bene de se merenti.

Bona femina, Bona fides, Bona fortuna, Bonum factum.

Bona femina, Bona filia.

Bona hereditaria, Bonorum heres.

Bonum judicium. B.I.I. Boni judicis judicium.

Beatae memoriae, Bene merenti.

Bona nostra, Bonum nomen.

Bona hie invenies.

Bona paterna, Bonorum potestas, Bonum publicum.

Bene quiescat, Bona quaesita.

Bono reipublicae natus.

Britannicus.

Bonorum tutor, Brevi tempore.

Bene vale, Bene vixit, Bonus vir.

Balnea vina Venus.

Bixit, for vixit.

C.

Caesar, Caius, Caput, Causa.Censor.Civis, Conors, Colonia, Comitialis (dies), Condemno, Consul, Cum, Curo, Custos.

Caia, Centuria, Cum, the prefix Con.

Civis bonus, Commune bonum, Conjugi benemerenti, Cui bono. . .

Calumniae causa, Causa cognita, Conjugi carissimae, Con- silium cepit, Curiae consulto.

Calumniae cavendae causa.

Caesar (or Caius) curavit faciendum, Caius Caii fihus.

Clarissimi viri.

Caesaris decreto, Caius Decius, Comitialibus diebus.

Censor, Censores. CESS. Censores.

Causa fiduciae, Conjugi fecit, Curavit faciendum.

Custos heredum, Custos hortorum.

Caius Julius, Consul jussit, Curavit judex.

Clarissimus, Claudius, Clodius, Colonia.

Clarissimus vir, Clypeum vovit.

Caius Marius, Causa mortis.

Cnaeus.

Coheres, Cohors.

Collega, Collegium, Colonia, Columna.

Collega, Coloni, Coloniae.

Comes, Comitium, Comparatum.

Conjux, Consensus, Consiliarius, Consul, Consularis.

Cornelia (tribus), Cornelius, Corona, Corpus.

Consiliarius, Consul, Consulares. COSS. Consules.

Carissimus or Clarissimus puer, Civis publicus, Curavit ponendum.

Caius Rufus, Civis Romanus, Curavit reficiendum.

Caesar, Communis, Consul.

Clarissimus or Consularis vir. Cura, Curator, Curavit, Curia.

D. Dat, Dedit, &c, De, Decimus, Decius, Decretum, Decurio,

Deus, Dicit, &c, Dies, Divus, Dominus, Domus,

Donum. Decurio coloniae, Diebus comitialibus, Divus Caesar. Dea Dia.Decurionumdjpcreto, Dedicavit, Deo dedit, Dono

dedit. Datum decreto decurionum, Dono dedit dedicavit. De ea re. Designatus.

Dedit imperator, Diis immortalibus, Diis inferis. Deo invicto Mithrae, Diis inferis Manibus. Deo Magno, Dignus memoria, Diis Manibus, Dolo malo. Deo Optimo Maximo. Dedit proprio sumptu, Deo perpetuo sacrum, De pecunia

sua.

E. Ejus, Eques, Erexit; Ergo, Est, Et, Etiam, Ex. Aeger, Egit, Egregius.

Egregiae memoriae, Ejusmodi, Erexit monumentum. Equitum magister. Ea res agitur.

F. .

Fabius, Facere, Fecit, &c, Familia, Fastus (dies), Felix,

Femina, Fides, Filius, Flamen, Fortuna, Frater, Fuit,

Functus. Faciendum curavit, Fidei commissum, Fiduciae causa. Fidem dedit, Flamen Dialis, Fraude donavit. Ferro flamma fame, Fortior fortuna fato. Filius, Flamen, Flaminius, Flavius. Favete Unguis, Fecit libens, Felix liber. Forum, Fronte, Frumentarius. Forum Romanum.

G. Gaius (= Caius), Gallia, Gaudium, Gellius, Gemina, Gens,

Gesta, Gratia. Gemina fidelis (applied to a legion). So G.P.F. Gemina

pia fidelis.

28

ABBREVIATION

GL. GN. G.P.R.

H.

HER.

H.L.

H.M.

H.S.E.

H.V.

I.

IA.

I.C.

ID.

I.D.

I.D.M.

I.F.

I.H.

IM.

IMP.

I.O.M.

I. P.

I.S.V.P.

Gloria.

Genius, Gens, Genus, Gnaeus (= Cnaeus).

Genio populi Romani.

H. Habet, Heres, Hie, Homo, Honor, Hora. Heres, Herennius. HER. and HERC. Hercules. Hac lege, Hoc loco, Honesto loco. Hoc monumentum, Honesta mulier, Hora mala. Hie sepultus est, Hie situs est. Haec urbs, Hie vivit, Honeste vixit, Honestus vir.

I. Immortalis, Imperator, In, Infra, Inter, Invictus, Ipse,

Isis, Judex, Julius, Junius, Jupiter, Justus. Jam, Intra.

Julius Caesar, Juris Gonsultum, Jus civile. Idem, Idus, Interdum.

Inferis diis, Jovi dedicatum, Jus dicendum, Jussu Dei. Jovi deo magno. In foro, In fronte.

Jacet hie, In honestatem, Justus homo. Imago, Immortalis, Immunis, Impensa. Imperator, Imperium. Jovi optimo maximo.

In publico, Intra provinciam, Justa persona. Impensa sua vivus posuit.

K. Kaeso, Caia, Calumnia, Caput, Carus, – Castra. and KL. Kalendae.

L. Laeiius, Legio, Lex, Libens, Liber, Libra, Locus, Lollius,

Lucius, Ludus. Libens, Liberi, Libertus.

K.

K., KAL.

L.

LB.

L.D.D.D. Locus datus decreto decurionum.

Legatus, Legio.

Liber, Liberalitas, Libertas, Libertus, Librarius.

Leges, Libentissime, Liberti.

Libens merito, Locus monumenti.

Laribus sacrum, Libens solvit, Locus sacer.

Ludus.

Ludos publicos fecit.

M. Magister, Magistratus, Magnus, Manes, Marcus, Marius,

Marti, Mater,Memoria,Mensis, Miles, Monumentum,

Mortuus, Mucius, Muiier. Manius.

Magno Deo, Manibus diis, Matri deum, Merenti dedit. Mensis. MESS. Menses. Mala fides, Marci filius, Monumentum fecit. Matri Idaeae, Matri Isidi, Maximo Jovi.

LEG.

LIB.

LL.

L.M.

L.S.

LVD.

LV.P.F.

M.

M'.

M.D.

MES.

M.F.

M.I.

MNT. and MON. Moneta.

M.P. Male positus, Monumentum posuit.

M.S. Manibus sacrum, Memoriae sacrum, Manu scriptum.

MVN. Municeps, or municipium; so also MN., MV. and MVNIC.

M.V.S. Marti ultori sacrum, Merito votum solvit.

I*

N. Natio, Natus, Nefastus (dies), Nepos, Neptunus, Nero,

Nomen, Non, Nonae, Noster, Novus, Numen, Nume-

rius, Numerus, Nummus. NEP. Nepos, Neptunus.

N.F.C. Nostrae fidei commissum. N.L. Non licet, Non liquet, Non longe.

N.M.V. Nobilis memoriae vir.

NN. Nostri. NN., NNO. and NNR. Nostrorum.

NOB. Nobilis. NOB., NOBR. andNOV. Novembris. N.P. Nefastus primo (i.e. priore parte diei), Non potest.

O. O. Ob, Officium, Omnis, Oportet, Optimus, Opus, Ossa.

OB. Obiit, Obiter, Orbis.

O.C.S. Ob cives servatos. O.H.F. Omnibus honoribus functus. O.H.S.S. Ossa hie sita sunt. OR. Hora, Ordo, Ornamentum.

O.T.B.Q. Ossa tua bene quiescant.

P. P. Pars, Passus, Pater, Patronus, Pax, Perpetuus, Pes, Pius,

Plebs, Pondo, Populus, Post, Posuit, Praeses, Praetor,

Primus, Pro, Provincia, Publicus, Publius, Puer. P.C. Pactum conventum, Patres conscripti, Pecunia consti-

tuta, Ponendum curavit, Post consulatum, Potestate

censoria. P.F. Pia fidelis, Pius felix, Promissa fides, Publii filius.

P.M. Piae memoriae, Plus minus, Pontifex maximus.

P.P. Pater patratus.Pater patriae.Pecunia publica.Praepositus,

Primipilus, Propraetor. PR. Praeses, Praetor, Pridie, Princeps.

P.R. Permissu reipublicae, Populus Romanus.

P.R.C. Post Romam conditam.

PR.PR. P.S.

P.V.

Q-

Q.D.R. Q.I.S.S.

R.

Praefectus praetorii. Propraetor.

Pecunia sua, Plebiscitum, Proprio sumptu, Publicae

saluti. Pia victrix, Praefectus urbi, Praestantissimus vir.

Q.

Quaestor, Quando, Quantus, Que, Qui, Quinquennalis,

Quintus, Quirites. Qua de re. Quae infra scripta sunt; so Q.S.S.S. Quae supra, &c.

euaecunque, Quinquennalis, Quoque. uaestor reipublicae.

R.

Recte, Res, Respublica, Retro, Rex, Ripa, Roma, Romanus, Rufus, Rursus. R.C. Romana civitas, Romanus civis.

RESP. and RP. Respublica. RET.P. and RP. Retro pedes.

S.

S.

SAC.

S.C.

S.D.

S.D.M.

SER.

S.E.T.L.

SN.

S.P.

S.P.Q.R.

S.S.

Sacrum, Scriptus, Semis, Senatus, Sepultus, Servius, Servus, Sextus, Sibi, Sine, Situs, Solus, Solvit, Sub, Suus.

Sacerdos, Sacrificium, Sacrum.

Senatus consultum.

Sacrum diis, Salutem dicit, Senatus decreto, Sententiam dedit.

Sacrum diis Manibus, Sine dolo malo.

Servius, Servus.

Sit ei terra levis.

Senatus, Sententia, Sine.

Sacerdos perpetua, Sine pecunia, Sua pecunia.

Senatus populusque Romanus.

Sanctissimus senatus, Supra scriptum.

S.V.B.E.E.Q.V. Si vales bene est, ego quidem valeo.

T.

TB., TI.

TB., TR

T.F.

TM.

T.P.

TVL.

V.

V.A. V.C. V.E. V.F. V.P. V.R.

T.

Terminus, Testamentum, Titus, Tribunus, Tu, Turma, Tutor. and TIB. Tiberius. and TRB. Tribunus.

Testamentum fecit,Titi filius,Titulum fecit,Titus Flavius. Terminus, Testamentum, Thermae.

Terminum posuit, Tribunicia potestate, Tribunus plebis. Tullius, Tullus.

V. Urbs, Usus, Uxor, Vale, Verba, Vestalis, Vester, . Vir,

Vivus, Vixit, Volo, Votum. Veterano assignatus, Vixit annos. Vale conjux, Vir clarissimus, Vir consularis. Verum etiam, Vir egregius, Visum est. Usus fructus, Verba fecit, Vivus fecit. Urbis praefectus, Vir perfectissimus, Vivus posuit. Urbs Roma, Uti rogas, Votum reddidit.

Clarissimus, Circum.

II. Medieval Abbreviations. — Of the different kinds of abbreviations in use in the middle ages, the following are examples : —

A.M. Ave Maria.

B.P. Beatus Paulus, Beatus Petrus.

CC. Carissimus (also plur. Carissimi),

D. Deus, Dominicus, Dux.

D.N. PP. Dominus noster Papa.

FF. Felicissimus, Fratres, Pandectae (prob. for Gr. II).

I.C. or I.X. Jesus Christus.

I.D.N. In Dei nomine.

KK. Karissimus (or -mi).

MM. Magistri, Martyres, Matrimonium, Meritissimus.

O.S.B. Ordinis Sancti Benedicti.

PP. Papa, Patres, Piissimus.

R.F. Rex Francorum.

R.P.D. Reverendissimus Pater Dominus.

S.C.M. Sacra Caesarea Majestas.

S.M.E. Sancta Mater Ecclesia.

S.M.M. Sancta Mater Maria.

S.R.I. Sanctum Romanum Imperium.

S.V. Sanctitas Vestra, Sancta Virgo.

V. Venerabilis, Venerandus.

V.R. P. Vestra Reverendissima Paternitas.

III. Abbreviations now in use. — The import of these will often be readily understood from the connexion in which they occur. There is no occasion to explain here the common abbreviations used for Christian names, books of Scripture, months of the year, points of the compass, grammatical and mathematical terms, or familiar titles, like ” Mr,” &c.

The ordinary abbreviations, now or recently in use, may be conveniently classified under the following headings: —

ABBREVIATION

I. Abbreviated Titles and Designations.

A.A. Associate of Arts.

A.B. Able-bodied seaman; (in America) Bachelor of Arts.

A.D.C. Aide-de-Camp.

A.M. (Artium Magister), Master of Arts.

A.R.A. Associate of the Royal Academy.

A.R.I. B. A. Associate of the Royal Institution of British Architects.

A.R.S.A. Associate of the Royal Scottish Academy.

B.A. Bachelor of Arts.

Bart. Baronet.

B.C.L. Bachelor of Civil Law.

B.D. Bachelor of Divinity.

B.LL. Bachelor of Laws.

B.Sc. Bachelor of Science.

C. Chairman.

C.A. Chartered Accountant.

C.B. Companion of the Bath.

C.E. Civil Engineer.

CLE. Companion of the Order of the Indian Empire.

CM. (Chirurgiae Magister), Master in Surgery.

C.M.G. Companion of St Michael and St George.

C.S.I. Companion of the Star of India.

D.C.L. Doctor of Civil Law.

D.D. Doctor of Divinity.

D.Lit. or Litt. D. Doctor of Literature.

D.M. Doctor of Medicine (Oxford).

D.Sc. Doctor of Science.

D.S.O. Distinguished Service Order.

Ebor. {Eboracensis) of York. 1

F.C.S. Fellow of the Chemical Society.

F.D. (Fidei Defensor), Defender of the Faith.

F.F.P.S. Fellow of the Faculty of Physicians and Surgeons

(Glasgow) . F.G.S. Fellow of the Geological Society. F.K.Q. C.P.I. Fellow of King and Queen's College of Physicians

in Ireland. F.L.S. ' Fellow of the Linnaean Society. F.M. Field Marshal.

F.P.S. Fellow of the Philological Society. F.R.A.S. Fellow of the Royal Astronomical Society. F.R C.P. Fellow of the Royal College of Physicians. F.R.C.P.E. Fellow of the Royal College of Physicians of Edinburgh. F.R.C.S. Fellow of the Royal College of Surgeons. F.R.G.S. Fellow of the Royal Geographical Society. F.R.H.S. Fellow of the Royal Horticultural Society. F.R. Hist. Soc. Fellow of the Royal Historical Society. F.R.I. B.A. Fellow of the Royal Institution of British Architects. F.R.S. Fellow of the Royal Society. F.R.S.E. Fellow of the Royal Society of Edinburgh. F.R.S.L. Fellow of the Royal Society of Literature. F.S.A. Fellow of the Society of Antiquaries. F.S.S. Fellow of the Statistical Society. F.Z.S. Fellow of the Zoological Society. G.C.B. Knight Grand Cross of the Bath. G.C.H. Knight Grand Cross of Hanover. G.C.I.E. Knight Grand Commander of the Order of the Indian

Empire. G.C.M.G. Knight Grand Cross of St Michael and St George. G.C.S.I. Knight Grand Commander of the Star of India. G.C.V.O. Knight Grand Commander of the Victorian Order. H.H. His or Her Highness.

H.I.H. His or Her Imperial Highness. H.I.M. His or Her Imperial Majesty. H.M. His or Her Majesty.

H.R.H. His or Her Royal Highness. H.S.H. His or Her Serene Highness.

J.C.D. (Juris Canonici Doctor, or Juris Civilis Doctor), Doctor of Canon or Civil Law.

J.U.D. (Juris utrinsque Doctor), Doctor of Civil and Canon Law. .P. Justice of the Peace.

K.C. King's Counsel.

K.C.B. Knight Commander of the Bath.

K.C.I. E. Knight Commander of the Order of the Indian Empire. K.C.M.G. Knight Commander of St Michael and St George. – K.C.S.I. Knight Commander of the Star of India. K.C.V.O. Knight Commander of the Victorian Order.

K.G. Knight of the Garter.

K.P. Knight of St Patrick.

K.T. Knight of the Thistle.

L.A.H. Licentiate of the Apothecaries' Hall.

L.C.C. London County Council, or Councillor.

L.C.j. Lord Chief Justice-

1 An archbishop or bishop, in writing his signature, substitutes for his surname the name of his see; thus the prelates of Canterbury, York, Oxford. London, &c, subscribe themselves with their initials (Christian names only), followed by Cantuar., Ebor., Oxon., Londin. (sometimes London.), &c.

L.T. Lord Justice.

L.L.A. Lady Literate in Arts.

LL.B. (Legum Baccalaureus) , Bachelor of Laws.

LL.D. (Legum Doctor) , Doctor of Laws.

LL.M. (Legum Magister), Master of Laws.

L.R.C.P. Licentiate of the Royal College of Physicians.

L.R.C.S. Licentiate of the Royal College of Surgeons.

L.S.A. Licentiate of the Apothecaries' Society.

M.A. Master of Arts.

M.B. (Medicinae Baccalaureus) , Bachelor of Medicine.

M.C. Member of Congress.

M.D. (Medicinae Doctor), Doctor of Medicine.

M.Inst.C.E. Member of the Institute of Civil Engineers.

M.P. Member of Parliament.

M.R. Master of the Rolls.

M.R.C.P. Member of the Royal College of Physicians.

M.R.C.S. Member of the Royal College of Surgeons.

M.R.I. A. Member of the Royal Irish Academy.

Mus.B. Bachelor of Music.

Mus.D. Doctor of Music.

M.V.O. Member of the Victorian Order.

N.P. Notary Public.

O.M. Order of Merit.

P.C. Privy Councillor.

Ph.D. (Philosopkiae Doctor), Doctor of Philosophy.

P.P. Parish Priest.

P.R.A. President of the Royal Academy.

R. (Rex, Regina), King, Queen.

R. & I. Rex et Imperator.

R.A. Royal Academician, Royal Artillery.

R.A.M. Royal Academy of Music.

R.E. Royal Engineers.

Reg. Prof. Regius Professor.

R.M. Royal Marines, Resident Magistrate.

R.N. Royal Navy.

S. or St. Saint.

S.S.C. Solicitor before the Supreme Courts [of Scotland].

S.T.P. (Sacrosanctae Theologiae Professor), Professor of Sacred Theology.

V.C. Vice-Chancellor, Victoria Cross.

V.G. Vicar-General.

V.S. Veterinary Surgeon.

W.S. Writer to the Signet [in Scotland] . Equivalent to Attorney.

2. Abbreviations Denoting Monies, Weights, and

Measures. 2

ac.

acre.

lb. or lb. (libra), pound (weight)

bar.

barrel.

m. or mi. mile, minute.

bus.

bushel.

% minim.

c.

cent.

mo. month.

c. (or

cub.) ft. &c

. cubic foot,&c

na. nail.

cwt.

hundredweight.

oz. ounce.

d.

(denarius)

penny.

pk. peck.

deg.

degree.

po. pole. • ˆ

dr.

drachm or

dram.

pt. pint.

dwt.

pennyweight.

q. (quadrans), farthing.

f.

franc.

qr. quarter.

fl.

florin.

qt. quart.

ft.

foot.

ro. rood.

fur.

furlong.

Rs. 8 rupees.

gal.

gallon.

s. or / (solidus), shilling.

gr.

grain.

s. or sec. second.

h. or

ir. hour.

sc. or scr. scruple-.

hhd.

hogshead.

sq. ft. &c. square foot, &c.

in.

inch.

st. stone.

kilo.

kilometre.

yd. yard.

L., 1

£,*orl. (

libra), pound

(money).

3. Miscellaneous Abbreviations.

A. Accepted.

A.C. (Ante Christum), Before Christ.

ace, a/c. or acct. Account.

A.D. (Anno Domini), In the year of our Lord.

A.E.I.O.U. Austriae est imperare orbi universo, 4 or Alles Erdreich

1st Oesterreich Unterthan. Aet. or Aetat. (Aetatis, [anno]), In the year of his age. A.H. (Anno Hegirae), In the year of the Hegira (the Mohammedan'

era).

' Characters, not properly abbreviations, are used in the same way; e.g. ° ' " for "degrees, minutes, seconds " (circular measure);. ?> 3> 3 f° r "ounces, drachms, scruples." | is probably to be traced, to the written form of the z in "on."

- These forms (as well as $, the symbol for the American dollar) are placed before their amounts.

4 It is given to Austria to rule Me whole earth. The device of Austria, first adopted by Frederick III.

A.M. (Anno Mundi), In the year of the world.

A.M. (Ante meridiem), Forenoon.

Anon. Anonymous.

A.U.C. (Anno urbis conditae). In the year from the building of the

city (i.e. Rome). A.V. Authorized version of the Bible.

b. born.

B.V.M. The Blessed Virgin Mary. B.C. Before Christ.

c. circa, about.

C. or Cap. (Caput), Chapter.

C. Centigrade (or Celsius's) Thermometer

cent. 1 (Centum), A hundred, frequently £100.

Cf. or cp. (Confer), Compare.

Ch. or Chap. Chapter.

C.M.S. Church Missionary Society.

Co. Company, County.

C.O.D. Cash on Delivery.

Cr. Creditor.

curt. Current, the present month.

d. died.

D.G. (Dei gratia), By the grace of God.

Do. Ditto, the same.

D.O.M. (Deo Optimo Maximo), To God the Best and Greatest.

Dr. Debtor.

D.V. (Deo volente), God willing.

E.& O.E. Errors and omissions excepted.

e.g. (Exempli gratia). For example.

etc. or &c. (El caetera), And the rest; and so forth.

Ex. Example.

F. or Fahr. Fahrenheit's Thermometer.

Fee. (Fecit), He made (or did) it.

fl. Flourished.

Fo. or Fol.- Folio.

f.o.b. Free on board.

G.P.O. General Post Office.

H.M.S. His Majesty's Ship, or Service.

lb. dr Ibid. (Ibidem), In the same place.

Id. (Idem), The same.

i.e. (id est), That is.

I.H.S. A symbol for "Jesus," derived from the first three letters of the Greek (I H 2) ; the correct origin was lost sight of, and the Romanized letters were then interpreted erroneously as standing for Jesus, Hominum Salvator, the Latin " h " and Greek long " e " being confused.

I.M.D.G. (In majorem Dei gloriam), To the greater glory of God.

Inf. (Infra), Below.

Inst. Instant, the present month.

I.O.U. I owe you.

i.q. (Idem quod), The same as.

k.t.X. (koX tA Xourd), Et caetera, and the rest.

L. or Lib. (Liber), Book.

Lat. Latitude.

I.e. (Loco citato), In the place cited.

Lon. or Long. Longitude.

L.S. (Locus sigtih), The place of the seal.

Mem. (Memento), Remember, Memorandum.

MS. Manuscript. MSS. Manuscripts.

N.B. (Nota bene), Mark well; take notice.

N.B. North Britain (i.e. Scotland).

N.D. No date.

nem. con. (Nemine contradicente) , No one contradicting.

No. (Numero), Number.

N.S. New Style.

N.T. New Testament.

ob. (Obiit), Died.

Obs. Obsolete.

O.H.M.S. On His Majesty's Service.

O.S. Old Style.

O.S.B. Ordo Sancti Benedicti (Benedictines).

O.T. Old Testament.

P. Page. Pp. Pages.

J9 (Per), For; e.g. $ lb., For one pound.

Pinx. (Pinxit), He painted it.

P.M. (Post Meridiem), Afternoon.

P.O. Post Office, Postal Order.

P.O.O. Post Office Order.

P.P.C. (Pour prendre conge), To take leave.

P.R. Prize-ring.

prox. (Proximo [mense]), Next month.

P.S. Postscript.

Pt. Part.

p.t. or pro tern. (Pro tempore), For the time.

P.T.O. Please turn over.

Q., Qu., or Qy. Query; Question.

q.d. (Quasi dicat), As if he should say; as much as to say.

Q.E.D. (Quod erat demonstrandum). Which was to be demonstrated.

Q.E.F. (Quod erat faciendum), Which was to be done.

‘ “Per cent.” is often signified by%, a form traceable to “too,”

q.s. or quant, suff. (Quantum sufficit), As much as is sufficient.

q.v. (Quod vide), Which see.

R. or 5. (Recipe), Take.

V (= r. for radix), The sign of the square root.

R.I. P. (Requiescat in pace!), May he rest in peace!

R.S.V.P. (Respondez s’il vous plait), Please reply.

sc. (Scilicet) , Namely ; that is to say.

Sc. or Sculp. (Sculpsit), He engraved it.

S.D.U.K. Society for the Diffusion of Useful Knowledge.

seq.or sq., seqq. or sqq. (Sequens, Sfiquentia), The following.

S.J. Society of Jesus.

s.p. (Sine prole), Without offspring.

S.P.C.K. Society for the Promotion of Christian Knowledge.

S.P.G. Society for the Propagation of the Gospel.

S.T.D.)

S.T.B. [Doctor, Bachelor, Licentiate of Theology.

S.T.L.)

Sup. (Supra), Above.

s.v. (Sub voce), Under the word (or heading).

T.C.D. Trinity College, Dublin.

ult. (Ultimo [mense]), Last month.

U.S. United States.

U.S.A. United States of America.

v. (Versus), Against.

v. or vid. (Vide), See.

viz. (Videlicet), Namely.

Xmas. Christmas. This X is a Greek letter, corresponding to Ch.

See also Graevius's Thesaurus Antiquitatum (1694, sqq.); Nicolai'a Tractatus de Siplis Veterum ; Mommsen's Corpus Inscriptionum Latinarum (1863, sqq.); Natalis de WcJlly's Paleographie (Paris, 1838); Alph. Chassant's Paleographie (1854), and Dictionnaire des Abreviations (3rd ed.'l866) ; Campelli, Dizionario di Abbreviature (1899).

ABBREVIATORS, a body of writers in the papal chancery, whose business was to sketch out and prepare in due form the pope's bulls, briefs and consistorial decrees before these are written out in extenso by the scriptorcs. They are first men- tioned in Extravagantes of John XXII. and of Benedict XII. Their number was fixed at seventy-two by Sixtus IV. From the time of Benedict XII. (1334-1342) they were classed as de Parco majori or Praesidentiae majoris, and de Parco minori. The name was derived from a space in the chancery, surrounded by a grating, in which the officials sat, which is called higher or lower (major or minor) according to the proximity of the seats to that of the vice-chancellor. After the protonotaries left the sketching of the minutes to the abbreviators, those de Parco majori, who ranked as prelates, were the most important officers of the apostolic chancery. By Martin V. their signature was made essential to the validity of the acts of the chancery; and they obtained in course of time many important privileges. They were suppressed in 1908 by Pius X. and their duties were trans- ferred to the protonotarii apostolici particip antes. (See Cueia Roman a.)

ABDALLATIF, or Abd-ul-Latif (1162-1231), a celebrated physician and traveller, and one of the most voluminous writers of the East, was born at Bagdad in 1162. An interesting memoir of Abdallatif, written

by himself, has been preserved with addi- tions by Ibn-Abu-Osaiba (Ibn abi Usaibia), a contemporary. From that work we learn that the higher education of the youth of Bagdad consisted principally in a minute and careful study of the rules and principles of grammar, and in their committing to memory the whole of the Koran, a treatise or two on philology and jurisprudence, and the choicest Arabian poetry. After attaining to great proficiency in that kind of learning, Abdallatif applied himself to natural philosophy and medicine. To enjoy the society of the learned, he went first to Mosul (1189), and afterwards to Damascus. With letters of recommendation . from Saladin's vizier, he visited Egypt, where the wish he had long cherished to converse with Maimonides, " the Eagle of the Doctors," was gratified. He afterwards formed one of the circle of learned men whom Saladin gathered around him at Jerusalem. He taught medicine and philosophy at Cairo and at Damascus for a number of years, and afterwards, for a shorter period, at Aleppo. His love of travel led him in his old age to visit different parts of Armenia and Asia Minor, and he was setting out on a pilgrimage to Mecca when he died at Bagdad in 1231. Abdal- latif was undoubtedly a man of great knowledge and of an inquisitive and penetrating mind. Of the numerous works—' mostly on medicine — which Osaiba ascribes to him, one ODly,

fiis graphic and detailed Account of Egypt (in two parts), appears to be known in Europe. The manuscript, discovered by Edward Pococke the Orientalist, and preserved in the, Bodleian Library, contains a vivid description of a famine caused, during the author's residence in Egypt, by the Nile failing to overflow its banks. It was translated into Latin by Professor White of Oxford in 1800, and into French, with valuable notes, by De Sacy in 1810.

ABD-AR-RAHMAN, the name borne by five princes of the Omayyad dynasty, amirs and caliphs of Cordova, two of them being rulers of great capacity.

Abd-ar- Rahman I. (756-788) was the founder of the branch of the family which ruled for nearly three centuries in Mahom- medan Spain. When the Omayyads were overthrown in the East by the Abbasids he was a young man of about twenty years of age. Together with his brother Yahya, he took refuge with Bedouin tribes in the desert. The Abbasids hunted their enemies down without mercy. Their soldiers overtook the brothers; Yahya was slain, and Abd-ar-rahman saved

himself by fleeing first to Syria and thence to northern Africa, the common refuge of all who endeavoured to get beyond the reach of the Abbasids. In the general confusion of the caliphate produced by the change of dynasty, Africa had fallen into the hands of local rulers, formerly amirs or lieutenants of the Omay- yad caliphs, but now aiming at independence. After a time Abd-ar-rahman found that his life was threatened, and he fled farther west, taking refuge among the Berber tribes of Mauri- tania. In the midst of all his perils, which read like stories from the Arabian Nights, Abd-ar-rahman had been encouraged by reliance on a prophecy of his great-uncle Maslama that he would restore the fortune of the family. He was followed in all his wanderings by a few faithful clients of the Omayyads. In 755 he was in hiding near Ceuta, and thence he sent an agent over to Spain to ask for the support of other clients of the family, descendants of the conquerors of Spain, who were numerous in the province of Elvira, the modern Granada. The country was in a state of confusion under the weak rule of the amir Vusef, a mere puppet in the hands of a faction, and was torn by tribal dissensions among the Arabs and by race conflicts be- tween the Arabs and Berbers. It offered Abd-ar-rahman the opportunity he had failed to find in Africa. On the invitation of his partisans he landed at Almufiecar, to the east of Malaga, in September 755. For a time he was compelled to submit to be guided by his supporters, who were aware of the risks of their venture. Yusef opened negotiations, and offered to give Abd- ar-rahman one of his daughters in marriage and a grant of land. This was far less than the prince meant to obtain, but he would probably have been forced to accept the offer for want of a better if the insolence of one of Yusef's messengers, a Spanish renegade, had not outraged a chief partisan of the Omayyad cause. He taunted this gentleman, Obeidullah by name, with being unable to write good Arabic. Under this provocation Obeidullah drew the sword. In the course of 756 a campaign was fought in the valley of the Guadalquivir, which ended, on the 16th of May, in the defeat of Yusef outside Cordova. Abd- ar-rahman's army was so ill provided that he mounted almost the only good war-horse in it; he had no banner, and one was improvised by unwinding a green turban and binding it round the head of a spear. The turban and the spear became the banner of the Spanish Omayyads. The long reign of Abd-ar- rahman I. was spent in a struggle to reduce his anarchical Arab and Berber subjects to order. They had never meant to give themselves a master, and they chafed under his hand, which grew continually heavier. The details of these conflicts belong to the general history of Spain. It is, however, part of the personal history of Abd-ar-rahman that when in 763 he was compelled to fight at the very gate of his capital with rebels acting on

behalf of the Abbasids, and had won a signal victory, he cut off the heads of the leaders, filled them with salt and camphor and sent them as a defiance to the eastern caliph. His hist years were spent amid a succession of palace conspiracies, repressed with cruelty. Abd-ar-rahman grew embittered and

ferocious. He was a fine example of an oriental founder of a, dynasty, and did his work so well that the Omayyads lasted in Spain for two centuries and a half.

Abd-ar-Rahman II. (822-852) was one of the weaker of the Spanish Omayyads. He was a prince with a taste for music and literature, whose reign was a time of confusion. It is chiefly memorable for having included the story of the " Martyrs ot Cordova," one of the most remarkable passages in the religious history of the middle ages.

Abd-ar-Rahman III. (912-961) was the greatest and the most successful of the princes of his dynasty in Spain (for the general history of his reign see Spain, History) . He ascended the throne when he was barely twenty-two and reigned for half a century. His life was so completely identified with the govern- ment of the state that he offers less material for biography than his ancestor Abd-ar-rahman I. Yet it supplies somt passages which show the real character of an oriental dynasty even at its best. Abd-ar-rahman III. was the grandson of his predecessor, Abdallah, one of the weakest and worst of the Spanish Omayyads. His father, Mahommed, was murdered by a brother Motarrif by order of Abdallah. The old sultan was so far influenced by humanity and remorse that he treated his grandson kindly. Abd-ar-rahman III. came to the throne when the country was exhausted by more than a generation of tribal conflict among the Arabs, and of strife between them and the Mahommedans of native Spanish descent. Spaniards who were openly or secretly Christians had acted with the renegades. These ele- ments, which formed the bulk of the population, were not averse from supporting a strong ruler who would protect them against the Arab aristocracy. These restless nobles were the most serious of Abd-ar-rahman's enemies. Next to them came the Fatimites of Egypt and northern Africa, who claimed the caliphate, and who aimed at extending their rule over the Mahommedan world, at least in the west. Abd-ar-rahman subdued the nobles by means of a mercenary army, which in- cluded Christians. He repelled the Fatimites, partly by sup- porting their enemies in Africa, and partly by claiming the caliphate for himself. His ancestors in Spain had been content with the title of sultan.. The caliphate was thought only to belong to the prince who ruled over the sacred cities of Mecca and Medina. But the force of this tradition had been so far weakened that

Abd-ar-rahman could proclaim himself caliph on the 16th of January 929, and the assumption of the title gave him increased prestige with his subjects, both in Spain and Africa. His worst enemies were always his fellow Mahom- medans. After he was defeated by the Christians at Alhandega in 939 through the treason of the Arab nobles in his army (see Spain, History) he never again took the field. He is accused of having sunk in his later years into the self-indulgent habits of the harem. When the undoubted prosperity of his dominions is quoted as an example of successful Mahommedan rule, it is well to remember that he administered well not by means of but in spite of Mahommedans. The high praise given to his administration may even excite some doubts as to its real ex- cellence. We are told that a third of his revenue sufficed for the ordinary expenses of government, a third was hoarded and a third spent on buildings. A very large proportion of the surplus mu,st have been wasted on the palace-town of Zahra, built three miles to the north of Cordova, and named after a favourite concubine. Ten thousand workmen are said to have been employed for twenty-five years on this wonder, of which no trace now remains, The great monument of early Arabic architecture in Spain, the mosque of Cordova, was built by his predecessors, not by him. It is said that his harem included six thousand women. Abd-ar-rahman was tolerant, but it is highly probable that he was very indifferent in religion, and it is certain that he was a thorough despot. One of the most authentic sayings attributed to him is his criticism of Otto I. of Germany, recorded by Otto's ambassador, Johann, abbot of Gorze, who has left in his Vita an incomplete account of his embassy (in Pertz, Mon. Germ. Scriptores, iv. 355-377). He blamed the king of Germany for trusting his nobles, which he said

could only increase their pride and leaning to rebellion. His confession that he had known only twenty happy days in his long reign is perhaps a moral tale, to be classed with the " omnia fui, et nil expedit " of Septimius Severus.

In the agony of the Omayyad dynasty in Spain, two princes of the house were proclaimed caliphs for a very short time, Abd-ar-rahman IV. Mortada (1017), and Abd-ar-rahman V. Mostadir (1023-1024). Both were the mere puppets of factions, who deserted them at once. Abd-ar-rahman IV. was murdered in the year in which he was proclaimed, at Guadiz, when fleeing from a battle in which he had been deserted by his supporters. Abd-ar-rahman V. was proclaimed

caliph in December 1023 at Cordova, and murdered in January 1024 by a mob of unemployed workmen, headed by one of his own cousins.

The history of the Omayyads in Spain is the subject of the Histoire des Musulmans d'Espagne, by R. Dozy (Leiden, 1861). (D. H.)

ABD-EL-AZIZ IV. (1880-), sultan of Morocco, son of Sultan Mulai el Hasan III. by a Circassian wife. He was fourteen years of age on his father's death in 1894. By the wise action of Si Ahmad bin Musa, the chamberlain of El Hasan, Abd-el- Aziz's accession to the sultanate was ensured with but little fighting. Si Ahmad became regent and for six years showed himself a capable ruler. On his death in 1900 the regency ended, and Abd-el-Aziz took the reins of government into his own hands, with an Arab from the south, El Menebhi, for his chief adviser. Urged by his Circassian mother, the sultan sought advice and counsel from Europe and endeavoured to act up to it. But disinterested advice was difficult to obtain, and in spite of the unquestionable desire of the young ruler to do the best for the country, wild extravagance both in action and expenditure resulted, leaving the sultan with depleted exchequer and the confidence of his people impaired. His in- timacy with foreigners and his imitation of their ways were sufficient to rouse fanaticism and create dissatisfaction. His attempt to reorganize the finances by the systematic levy of taxes was hailed with delight, but the government was not strong enough to carry the measures through, and the money which should have been used to pay the taxes was employed to purchase firearms. Thus the benign intentions of Mulai Abd- el-Aziz were interpreted as weakness, and Europeans were accused of having spoiled the sultan and of being desirous of spoiling the country. When British engineers were employed to survey the route for a railway between Mequinez and Fez, this was reported as indicating an absolute sale of the country. The fanaticism of the people was aroused, and a revolt broke out near the Algerian frontier. Such was the condition of things when the news of the Anglo-French Agreement of 1904 came as a blow to Abd-el-Aziz, who had relied on England for support and protection against the inroads of France. On the advice of Germany he proposed the assembly of an international conference at Algeciras in 1906 to consult upon methods of reform, the sultan's desire being to ensuie a condition of affairs which would leave foreigners with no excuse for interference in the control of the country, and would promote its welfare, which Abd-el-Aziz had earnestly desired from his accession to power. The sultan gave his adherence to the Act of the Algeciras Conference, but the state of anarachy into which Morocco fell during the latter half of 1906 and the beginning of 1907 showed that the young ruler lacked strength sufficient to make his will respected by his

turbulent subjects. In May 1907 the southern tribes invited Mulai Hafid, an elder brother of Abd-el-Aziz, and viceroy at Marrakesh, to become sultan, and in the following August Hafid was proclaimed sovereign there with all the usual formalities. In the meantime the murder of Europeans at Casablanca had led to the occupation of that port by France. In September Abd-el-Aziz arrived at Rabat from Fez and endeavoured to secure the support of the European powers against his brother. From France he accepted the grand cordon of the Legion of Honour, and was later enabled to negotiate a loan. His leaning to Christians aroused further opposition to his rule, and in January 1908 he was declared deposed by the ulema of Fez, who offered the throne to Hafid,

After months of inactivity Abd-el-Aziz made an effort to re- store his authority, and quitting Rabat in July he marched on Marrakesh. His force, largely owing to treachery, was com- pletely overthrown (August 19th) when near that city, and Abd-el-Aziz fled to Settat within the French lines round Cas- ablanca. In November he came to terms with his brother, and thereafter took up his residence in Tangier as a pensioner of the new sultan. He declared himself more than reconciled to the loss of the throne, and as looking forward to a quiet, peaceful life. (See Morocco, History.)

ABD-EL-KADER (c. 1807-1883), amir of Mascara, the great opponent of the conquest of Algeria by France, was born near Mascara in 1807 or 1808. His family were sherifs or descend- ants of Mahomet, and his father, Mahi-ed-Din, was celebrated throughout North Africa for his piety and charity. Abd-el- Kader received the best education attainable by a Mussulman of princely rank, especially in theology and philosophy, in horsemanship and in other manly exercises. While still a youth he was taken by his father on the pilgrimage to Mecca and Medina and to the tomb of Sidi Abd-el-Kader El Jalili at Bag- dad — events which stimulated his natural tendency to religious enthusiasm. While in Egypt in 1827, Abd-el-Kader is stated to have been impressed, by the reforms then being carried out by Mehemet Ali, with the value of European civilization, and the knowledge he then gained affected his career. Mahi-ed-Din and his son returned to Mascara shortly before the French occupa- tion of Algiers (July 1830) destroyed the government of the Dey. Coming forward as the champion of Islam against the infidels, Abd-el-Kader was proclaimed amir at Mascara in 1832. He prosecuted the war against France vigorously and in a short time had rallied to his standard all the tribes of western Algeria. The story of his fifteen years' struggle against the French is given under Algeria. To the beginning of 1842 the contest went in favour of the amir; thereafter he found in Marshal Bugeaud an

opponent who proved, in the end, his master. Throughout this period Abd-el-Kader showed himself a born leader of men, a great soldier, a capable administrator, a per- suasive orator, a chivalrous opponent. His fervent faith in the doctrines of Islam was unquestioned, and his ultimate failure was due in considerable measure to the refusal of the Kabyles, Berber mountain tribes whose Mahommedanism is somewhat loosely held, to make common cause with the Arabs against the French. On the 21st of December 1847, the amir gave himself up to General Lamoriciere at Sidi Brahim. On the 23rd, his submission was formally made to the due d'Aumale, then governor of Algeria. In violation of the promise that he Would be allowed to go to Alexandria or St Jean d'Acre, on the faith of which he surrendered, Abd-el-Kader and his family were detained in France, first at Toulon, then at Pau, being in November 1848 transferred to the chateau of Amboise. There Abd-el-Kader remained until October 1852, when he was re- leased by Napoleon III. on taking an oath never again to dis- turb Algeria. The amir then took up his residence in Brusa, removing in 1855 to Damascus. In July i860, when the Moslems of that city, taking advantage of disturbances among the Druses of Lebanon, attacked the Christian quarter and killed over 3000 persons, Abd-el-Kader helped to repress the outbreak and saved large numbers of Christians. For this action the French government, which granted the amir a pension of £4000, bestowed on him the grand cross of the Legion of Honour. In 1865, he visited Paris and London, and was again in Paris at the exposition of 1867. In 1871, when the Algerians again rose in revolt, Abd-el-Kader wrote to them counselling submission to France. After his surrender in 1847 he devoted himself anew to theology and philosophy, and composed a philosophical treatise, of which a French translation was published in 1858 under the title of Rappel a V intelligent. Avis a Vindiffrent. He also wrote a book on the Arab horse. He died at Damascus on the 26th of May 1883.

See Commdt. J. Pichon, Abd el Kader, 1807-1883 (Paris [1899],); Alex. Bellemare, Abd-el-Kader: sa vie politique et militaire (Paris, 1863) ; Col. C. H. Churchill, The Life of Abdel Kader (London, 1867).

ABDERA— ABDOMEN

ABDERA, an ancient seaport town on the south coast of Spain, between Malaca and New Carthage, in the district in- habited by the Bastuli. It was founded by the Carthaginians as a trading station, and after a period of decline became under the Romans one of the more important towns in the province of Hispania Baetica. It was situated on a hill above the modern Adra (q.v.). Of its coins the most ancient bear the Phoenician inscription abdrt with the head of Heracles

(Melkarth) and a tunny-fish; those of Tiberius (who seems to have made the place a colony) show the chief temple of the town with two tunny-fish erect in the form of columns. For inscriptions re- lating to the Roman municipality see C.I.L. ii. 267.

ABDERA, a town on the coast of Thrace near the mouth of the Nestos, and almost opposite Thasos. Its mythical founda- tion was attributed to Heracles, its historical to a colony from Clazomenae in the 7th century B.C. But its prosperity dates from 544 B.C., when the majority of the people of Teos migrated to Abdera after the Ionian revolt to escape the Persian yoke (Herod, i. 168); the chief coin type, a gryphon, is identical with that of Teos; the coinage is noted for the beauty and variety of its reverse types. The town seems to have declined in importance after the middle of the 4th century. The air of Abdera was proverbial as causing stupidity; but among its citizens was the philosopher Democritus. The ruins of the town may still be seen on Cape Balastra; they cover seven small hills, and extend from an eastern to a western harbour; on the S.W. hills are the remains of the medieval settlement of Polystylon.

Mittheti. d. deutsch. Inst. Athens, xii. (1887), p. 161 (Regel); M6m. de I' Acad, des Inscriptions, xxxix. 211; K. F. Hermann, Ges. Abh. 90-11 1, 370 ff.

ABDICATION (Lat. abdicatio, disowning, renouncing, from ab, from, and dicare, to declare, to proclaim as not belonging to one), the act whereby a person in office renounces and gives up the same before the expiry of the time for which it is held. In Roman law, the term is especially applied to the disowning of a member of a family, as the disinheriting of a son, but the word is seldom used except in the sense of surrendering the supreme power in a state. Despotic sovereigns are at liberty to divest themselves of their powers at any time, but it is other- wise with a limited monarchy. The throne of Great Britain cannot be lawfully abdicated unless with the consent of the two Houses of Parliament. When James II., after throwing the great seal into the Thames, fled to France in 1688, he did not formally resign the crown, and the question was discussed in parliament whether he had forfeited the throne or had abdicated. The latter designation was agreed on, for in a full assembly of the Lords and Commons, met in convention, it was resolved, in spite of James's protest, " that King James II. having endea- voured to subvert the constitution of the kingdom, by breaking the original contract between king and people, and, by the advice of Jesuits and other wicked persons, having violated the fundamental laws, and having withdrawn himself out of this kingdom, has abdicated the government, and that the throne is

thereby vacant." The Scottish parliament pronounced a decree of forfeiture and deposition. Among the most memor- able abdications of antiquity may be mentioned that of Sulla the dictator, 79 B.C., and that of the Emperor Diocletian, a.d. 305. The following is a list of the more important abdications of later times: —

A.D.

Benedict IX., pope -. 1048

Stephen II. of Hungary 1131

Albert (the Bear) of Brandenburg 1169

Ladislaus III. of Poland 1206

Cetestine V., pope Dec. 13, 1294

John Baliol of Scotland 1296

John Cantacuzene, emperor of the East 1355

Richard II. of England Sept. 29, 1399

John XXIII., pope . . 1415

Erie VII. of Denmark and XIII. of Sweden . . . 1439

Murad II., Ottoman Sultan 1444 and 1445

Charles V., emperor 1556

Christina of Sweden 1654

John Caaimir of Poland . . ■ . . . t . . . 1668

1.2

James II. of England

Frederick Augustus of Poland ....

Philip V. of Spain

Victor Amadeus II. of Sardinia . . . Ahmed III., Sultan of Turkey .... Charles of Naples (on accession to throne of Spain) Stanislaus II. of Poland

m

A.D.

1688 1704

• ■ 1724

1730

1730 1759 1795

Charles Emanuel IV. of Sardinia …. June 4, 1802

Charles IV. of Spain . . . . . Mar. 19, 1808

Joseph Bonaparte of Naples June 6,1808

Gustavus IV. of Sweden Mar. 29, 1809

Louis Bonaparte of Holland July 2, 1810

Napoleon I., French Emperor. April 4, 1814, and June 22, 1815

Victor Emanuel of Sardinia Mar. 13, 182 1

Charles X. of France Aug. 2, 1830

Pedro of Brazil 1 April 7, 1831

Miguel of Portgual May 26, 1834

William I. of Holland Oct. 7, 1840

Louis Philippe, king of the French . . . Feb. 24, 1848

Louis Charles of Bavaria Mar. 21, 1848

Ferdinand of Austria Dec. 2, 1848

Charles Albert of Sardinia Mar. 23, 1849

Leopold II. of Tuscany July 21, 1859

Isabella II. of Spain l une 2 5′ 1 ˆ7°

Amadeus I. of Spain Feb. n, 1873

Alexander of Bulgaria Sept. 7, 1886

Milan of Servia Mar. 6, 1889

ABDOMEN (a Latin word, either from abdere, to hide, or from a form adipomen, from adeps, fat), the belly, the region of the body containing most of the digestive organs. (See for ana- tomical details the articles Alimentary Canal, and Anatomy, Superficial and Artistic.)

Abdominal Surgery. — The diseases affecting this region are dealt with generally in the article Digestive Organs, and under their own names (e.g. Appendicitis). The term ” ab- dominal surgery ” covers generally the operations which involve opening the abdominal cavity, and in modern times this field of work has been greatly extended. In this Encyclopaedia the surgery of each abdominal organ is dealt with, for the most part, in connexion with the anatomical description of that organ (see Stomach, Kidney, Liver, &c.) ; but here the general principles of abdominal surgery may be discussed.

Exploratory Laparotomy. — In many cases of serious intra- abdominal disease it is impossible for the surgeon to say exactly what is wrong without making an incision and introducing his finger, or, if need be, his hand among the intestines. With due care this is not a perilous or serious procedure, and the great ad- vantage appertaining to it is daily being more fully recognized. It was Dr Oliver Wendell Holmes, the American physiologist and poet, who remarked that one cannot say of what wood a table is made without lifting up the cloth; so also it is often impossible to say what is wrong inside the abdomen without making an opening into it. When an opening is made in such circumstances— provided only it is done soon enough — the successful treatment of the case often becomes a simple matter. An exploratory operation, therefore, should be promptly resorted to as a means of diagnosis, and not left as a last resource till the outlook is well-nigh hopeless.

It is probable that if the question were put to any experienced hospital surgeon if he had often had cause to regret having advised recourse to an exploratory operation on the abdomen, his answer would be in the negative, but that, on the other hand, he had not infrequently had cause to regret that he had not resorted to it, post-mortem examination having shown that if only he had insisted on an exploration being made, some band, some adhesion, some tumour, some abscess might have been satisfactorily dealt with, which, left unsuspected in the dark cavity, was accountable for the death. A physician by himself is helpless in these cases.

Much of the rapid advance which has of late been made in the results of abdominal surgery is due to the improved rela- tionship which exists between the public and the surgical pro- fession. In former days it was not infrequently said, ” If a surgeon is called in he is sure to operate.” Not only have the

‘Pedro had succeeded to the throne of Portugal in 1826, but abdicated it at once in favour of his daughter.

II

public said this, but even physicians have been known to suggest it, and have indeed used the equivocal expression, the “apothe- osis of surgery,” in connexion with the operative treatment, of a serious abdominal lesion. But fortunately the public have found out that the surgeon, being an honest man, does not advise operation unless he believes that it is necessary or, at any rate, highly advisable. And this happy discovery has led to much more confidence being placed in his decision. It has truly been said that a surgeon is a physician who can operate, and the public have begun to realize the fact that it is useless ■ to try to relieve an acute abdominal lesion by diet or drugs. Not many years ago cases of acute, obscure or chronic affections of the abdomen which were admitted into hospital were sent as a matter of course into the medical wards, and after the effect of drugs had heen tried with expectancy and failure, the services of a surgeon were called in. In acute cases this delay spoilt all surgical chances, and the idea was more widely spread ; that surgery, after all, was a poor handmaid to medicine. But now things are different. Acute or obscure abdominal cases are promptly relegated to the surgical wards; the surgeon is at once sent for, and if operation is thought desirable it is performed without any delay. The public have found that the surgeon is not a reckless operator, but a man who can take a broad view of a case in all its bearings. And so it has come about that the results of operations upon the interior of the abdomen have been improving day by day. And doubtless they will continue to improve.

A great impetus was given to the surgery of wounded, morti- fied or diseased pieces of intestine by the introduction from Chicago of an ingenious contrivance named, after the inventor, Murphy’s button. This consists of a short nickel-plated tube in two pieces, which are rapidly secured in the divided ends of the bowel, and in such a

manner that when the pieces are subse- quently ” married ” the adjusted ends of the bowel are securely fixed together and the canal rendered practicable. In the course of time the button loosens itself into the interior of the bowel and comes away with the alvine evacuation. In many other cases the use of the button has proved convenient and successful, as in the establishment of a permanent communication between , the stomach and the small intestine when the ordinary gateway between these parts of the alimehtary canal is obstructed by an irremovable malignant growth; between two parts of the small intestine so that some obstruction may be passed; be- tween smal! and large intestine. The operative procedure goes by the name of short-circuiting; it enables the contents of the bowel to get beyond an obstruction. In this way also a perma- nent working communication can be set up between the gall- bladder, or a dilated bile-duct, and the neighbouring small intestine — the last-named operation bears the precise but very clumsy name of choledocoduodenostomy. By the use of Murphy’s ingenious apparatus the communication of two parts can be secured in the shortest possible space of time, and this, in many of the cases in which it is resorted to, is of the greatest importance. But there is this against the method — that some- times ulceration occurs around the rim of the metal button, whilst at others the loosened metal causes annoyance in its passage along the alimentary canal. Some surgeons therefore prefer to use a bobbin of decalcified bone or similar soft material, while others rely upon direct suturing of the parts. The last- named method is gradually increasing in popularity, and of course, when time and circumstances permit, it is the ideal method of treatment. The cause of death in the case of intestinal obstruction is usually due to the blood being poisoned by the absorption of the products of decomposition of the fluid contents of the bowel above the obstruction. It is now the custom, therefore, for the surgeon to complete his operation for the relief of obstruction by drawing out a loop of the distended bowel, incising and evacuating it, and then carefully suturing and returning it. The surgeon who first recognized the lethal effect of the absorption of this stagnant fluid— or, at any rate, who first suggested the proper method of treating it — was Lawson Tait of Birmingham, who on the occurrence of grave symptoms

after operating on the abdomen gave small, repeated’ (loses of Epsom salts to wash away the harmful liquids of the bowel and to enable it at the satne time to empty itself of the g£S, which, by distending the intestines, was interfering with respiration and circulation. .

Amongst still more recent improvements in abdominal surgery may be mentioned, the placing of the patient in the sitting position as soon as

practicable after the operation, and the slow administration of a hot saline solution into the lower bowel; or, in the more desperate cases, of injecting pints of this “■ normal saline ” fluid into the loose tissue of the armpit. Hot water thus administered or injected is quickly taken into the blood, increasing its volume, diluting its impurities’ and quenching the great thirst which is so marked a symptom in this condition.

Gunshot Wounds’ of the Abdomen.— -If a revolver bullet passes through the abdomen, the coils of intestine are likely to be traversed by it in several places. If the bullet be small arid, by chance, surgically clean, it is possible that the openings may tightly close up behind it so that no leakage takes place into the general peritoneal cavity. If increasing collapse suggests that serious bleeding is occurring within the abdomen, the cavity is opened forthwith and a thorough exploration made. When it is uncertain if the bowel has been traversed or not, it is Well to wait before opening the abdomen, due preparation being made for performing that operation on the first appearance of symptoms indicative of perforation having occurred: Small perforating wounds of the bowel are treated by such suturing as the circumstances may suggest, the interior of the abdominal cavity being rendered as free from septic micro-organisms as possible. It is by the malign influence of such germs that a fatal issue is determined in the case of an abdominal wound, whether inflicted by firearms or by a pointed weapon. If aseptic procedure can be promptly resorted to and thoroughly carried out, abdominal wounds do well, but these essentials cannot be obtained upon the field of battle. When after an action wounded men come pouring into the field-hospital, the many cannot be kept waiting whilst preparations are being made for the thorough carrying out of a prolonged aseptic abdominal operation upon a solitary case. Experience in the South African war of 1809-1002 showed that Mauser bullets could pierce coils of intestine and leave the soldiers in such a condition that, if treated by mere ” expectancy,” more than 50 % recovered, whereas if operations were resorted to, fatal septic peritonitis was likely to ensue. In the close proximity of the fight, where time, assistants, pure water, towels, lotions and other necessaries for carrying out a thoroughly aseptic operation cannot be forthcoming, gunshot wounds of the ab- domen had best not be interfered with.

Stabs of the abdomen are serious if they have penetrated the abdominal wall, as, at the time of injury, septic germs may have been introduced, or the bowel may have been wounded. In either case a fatal inflammation of the peritoneum may. be set up. It is inadvisable to probe a wound in order to find out if the belly-cavity has been

penetrated, as the probe itself might carry inwards septic germs. In case of doubt it is better to en- large the wound in order to, determine its depth, and to disinfect and close it if it be non-penetrating. If, however, the belly- cavity has been opened, the neighbouring pieces of bowel should be examined, cleansed and, if need be, sutured. Should there have been an escape of the contents of the bowel the ” toilet of the peritoneum ” would be duly made, and a drainage-tube woiild be left in. If the stab had injured a large blood-vessel either of the abdominal cavity, or of the liver or of some other organ, the bleeding would be arrested by ligature or suture, and the extravasated blood sponged out. Before the days of antiseptic surgery, and of exploratory abdominal operations, these cases were generally allowed to drift to almost certain death, unrecognized and almost untreated : at the present time a large number of them are saved.

Intussusception. — This is a terribly fatal disease of infants ‘and children, in which a piece of bowel slips into, and is gripped by,

the piece next below it. Formerly it was generally the custom to endeavour to reduce the invagination by passing air or water up the rectum under pressure — a speculative method of treat- ment which sometimes ended in a fatal rupture of the distended bowel, and often — one might almost say generally — failed to do what was expected of it. The teaching of modern surgery is that a small incision into the abdomen and a prompt withdrawal of the invaginated piece of bowel can be trusted to do all that, .and more than, injection can effect, without blindly risking a rupture of the bowel. It is certain that when the surgeon is unable to unravel the bowel with his fingers gently applied to the parts themselves, no speculative distension of the bowel could have been effective. But the outlook in these distressing cases, even when the operation is promptly resorted to, is ex- tremely grave, because of the intensity of the shock which the intussusception and resulting strangulation entail. Still, every operation gives them by far the best chance.

Cancer of the Intestine. — With the introduction of aseptic methods of operating, it has been found that the surgeon can reach the bowel through the peritoneum easily and safely. With the peritoneum opened, moreover, he can explore the diseased bowel and deal with it as circumstances suggest. . If the can- cerous mass is fairly movable the affected piece of bowel is excised and the cut ends are spliced

together, and the continuity uf the alimentary «canal is permanently re-established. Thus in the case of cancer of the large intestine which is not too far advanced, the surgeon expects to be able not only to relieve the obstruction of the bowel, but actually to cure the patient of his disease. When the lowest part of the bowel was found to be occupied by a cancerous obstruction, the surgeon used formerly to secure an easy escape for the contents of the bowel by making an opening into the colon in the left loin. But in recent years this operation of lumbar colotomy has been almost entirely replaced by opening the colon in the left groin. This operation of inguinal colotomy is usually divided into two stages: a loop of the large intestine is first drawn out through the ab- dominal wound and secured by stitches, and a few days after- wards, when it is firmly glued in place by adhesive inflammation, it is cut across, so that subsequently the motions can no longer find their way into the bowel below the artificial anus. If at the first stage of the operation symptoms of obstruction are urgent, one of the ingenious glass tubes with a rubber conduit, which Mr F. T. Paul has invented, may be forthwith introduced into the distended bowel, so that the contents may be allowed to escape without fear of soiling the peritoneum or even the surface-wound. (E. O.*)

ABDUCTION (Lat. abductio, abducere, to lead away), a law term denoting the forcible or fraudulent removal of a person, limited by custom to the case where a woman is the victim. In the case of men or children, it has been usual to substitute the term kidnapping (q.v.). The old English laws against abduc- tion, generally contemplating its object as the possession of an heiress and her fortune, have been repealed by the Offences against the Person Act 1861, which makes it felony for any one from motives of lucre to take away or detain against her will, with intent to marry or carnally know her, &c, any woman of any age who has any interest in any real or personal estate, or is an heiress presumptive, or co-heiress, or presumptive next of kin to any one having such an interest; or for any one to cause such a woman to be married or carnally known by any other person; or for any one with such intent to allure, take away, or detain any such woman under the age of twenty-one, out of the possession and against the will of her parents or guardians. By s. 54, forcible taking away or detention against her will of any woman of any age with like intent is felony. The same act makes abduction without even any such intent a misdemeanour, where an unmarried girl under the age of six- teen is unlawfully taken out of the possession and against the will of her parents or guardians. In such a case the girl’s con- sent is immaterial, nor is it a defence that the person charged reasonably believed that

the girl was sixteen or over. The Criminal Law Amendment Act 1885 made still more stringent

provisions with reference to abduction by making the procura- tion or attempted procuration of any virtuous female under the age of twenty-one years a misdemeanour, as well as the abduction of any girl under eighteen years of age with the intent that she shall be carnally known, or the detaining of any female against her will on any premises, with intent to have, Or that another person may have, carnal knowledge of her. In Scotland, where there is no statutory adjustment, abduction is similarly dealt with by practice.

ABD-UL-AZIZ (1830-1876), sultan of Turkey, son of Sultan Mahmud II., was born on the 9th of February 1830, and suc- ceeded his brother Abd-ul-Mejid in 1861. His personal in- terference in government affairs was not very marked, and extended to little more than taking astute advantage of the constant issue of State loans during his reign to acquire wealth, which was squandered in building useless palaces and in other futile ways: he is even said to have profited, by means of “bear” sales, from the default on the Turkish debt in 1875 and the consequent fall in prices. Another source of revenue was afforded by Ismail Pasha, the khedive of Egypt, who paid heavily in bakshish for the firman of 1866, by which the succes- sion to the khedivate was made hereditary from father to sob in direct line and in order of primogeniture, as well as for the subsequent firmans of 1867, 1869 and 1872 extending the khedive’s prerogatives. It is, however, only fair to add that the sultan was doubtless influenced by the desire to bring about a similar change in the succession to the Ottoman throne and to ensure the succession after him of his eldest son, Yussuf Izz-ed-din. Abd-ul-Aziz visited Europe in 1867. being the first Ottoman sultan to do so, and was made a Knight of the Garter by Queen Victoria. In 1869 he received the visits of the emperor of Austria, the .Empress Eugenie and other foreign princes, on their way to the opening of the Suez Canal, and King Edward VII., while prince of Wales, twice visited Constantinople during his reign. The mis- government and financial straits of the country brought on the outbreak of Mussulman discontent and fanaticism which eventually culmi- nated in the murder of two consuls at Salonica and in the ” Bulgarian atrocities,” and cost Abd-ul-Aziz his throne. His deposition on the 30th of May 1876 was hailed with joy through- out Turkey; a fortnight later he was found dead in the palace where he was confined, and trustworthy medical evidence attributed his death to suicide. Six children survived him: Prince Yussuf Izz-ed-din, born 1857; Princess Saliha, wife of Kurd Ismail Pasha; Princess Nazim6, wife of Khalid Pasha; Prince Abd-ul-Mejid, born 1869; Prince Seif-ed-

din, born 1876; Princess Emine, wife of Mahommed Bey; Prince Shefket, born 1872, died 1899.

ABD-UL-HAMID I. {1725-1789), sultan of Turkey, son of Ahmed III., succeeded his brother Mustafa III. in 1773. Long confinement in the palace aloof from state affairs had left him pious, God-fearing and pacific in disposition. At his accession the financial straits of the treasury were such that the usual donative could not be given to the janissaries. War was, how- ever, forced on him, and less than a year after his accession the complete defeat, of the Turks at Kozluja led to the treaty of Kuchuk Kainarji (21st July 1774), the most disastrous, especially in its after effects, that Turkey has ever been obliged to con- clude. • (See Turkey.) Slight successes in Syria and the Morea against rebellious outbreaks there could not compensate for the loss of the Crimea, which Russia soon showed that she meant to absorb entirely. In 1787 war was again declared against Russia, joined in the following year by Austria, Joseph II. being entirely won over to Catherine, whom he accompanied in her triumphal progress in the Crimea. Turkey held her own against the Austrians, but in 1788 Ochakov fell to the Russians. Four months later, on the 7th of April 1789, the sultan died, aged sixty-four.

ABD-UL-HAMID II. (1842-), sultan of Turkey, son of Sultan Abd-ul-Mejid, was born on the 21st of September 1842, and succeeded to the throne on the deposition of his brother Murad V., on the 31st oi August 1876. He accompanied his

uncle S,ultatt Abd-ul-Aziz On his Visit to England and France in 1867. At his accession spectators were struck by the fearless manner in which he rode, practically unattended, on his way to be girt with the sword of Eyub. He was supposed to be of liberal principles, and the more conservative of his subjects were for some years after his accession inclined to regard him with suspicion as a too ardent reformer. But the circumstances of the country at his accession were ill adapted for liberal developments. Default in the public funds and an empty treasury, the insurrection in Bosnia and the Herzegovina, the war with Servia and Montenegro, the feeling aroused throughout Europe by the methods adopted in stamping out the Bulgarian rebellion, all combined to prove to the new sultan that he could expect little aid from the Powers. But, still clinging to the groundless belief, for which British statesmen had, of late at least, afforded Turkey no justification, that Great Britain at all events would support him, he obstinately refused to give ear to the pressing requests of the

Powers that the necessary reforms should be instituted. The international Conference which met at Constantinople towards the end of 1876 was, indeed, startled by the salvo of guns heralding the promulgation of a constitu- tion, but the demands of the Conference were rejected, in spite of the solemn warnings addressed to the sultan by the Powers; Midhat Pasha, the author of the constitution, was exiled; and soon afterwards ˆis work was suspended, though figuring to this day on the Statute-Book. Early in 1877 the disastrous war with Russia followed. The hard terms, embodied in the treaty of San Stefano, to which Abd-ul-Hamid was forced to consent, were to some extent amended at Berlin, thanks in the main to British diplomacy (see Europe, History); but by this time the sultan had lost all confidence in England, and thought that he discerned in Germany, whose supremacy was evidenced in his eyes by her capital being selected as the meeting-place of the Congress, the future friend of Turkey. He hastened to employ Germans for the reorganization of his finances and his army, and set to work in the determination to maintain his empire in spite of the difficulties surrounding him, to resist the encroachments of foreigners, and to take gradually the reins of absolute power into his own hands, being animated by a profound distrust, not unmerited, of his ministers. Financial embarrassments forced him to consent to a foreign control over the Debt, and the decree of December 1881, whereby many of the revenues of the empire were handed over to the Public Debt Administration for the benefit of the bondholders, was a sacrifice of principle to which he could only have con- sented with the greatest reluctance. Trouble in Egypt, where a discredited khedive had to be deposed, trouble on the Greek frontier and in Montenegro, where the Powers were determined that the decisions of the Berlin Congress should be carried into effect, were more or less satisfactorily got over. In his attitude towards Arabi, the would-be saviour of Egypt, Abd-ul-Hamid showed less than his usual astuteness, and the resulting con- solidation of England's hold over the country contributed still further to his estrangement from Turkey's old ally. The union in 1885 of Bulgaria with Eastern Rumelia, the severance of which had been the great triumph of the Berlin Congress, was another blow. Few people south of the Balkans dreamed that Bulgaria could be anything but a Russian province, and appre- hension was entertained of the results of the union 'until it was seen that Russia really and entirely disapproved of it. Then the best was made of it, and for some years the sultan preserved towards Bulgaria an attitude skilfully calculated so as to avoid running counter either to Russian or to German wishes. Germany's friendship was not entirely disinterested, and had to be fostered with a railway or loan concession from time to time, until in 1899 the great object aimed at, the Bagdad railway, was con- ceded.

Meanwhile, aided by docile instruments, the sultan had succeeded in reducing his ministers to the position of secretaries, and in concentrating the whole administration of the country into his own hands at Yildiz. But internal dissension was not thereby lessened. Crete was constantly in turmoil, the Greeks were dissatisfied, and from, about r8

violent agitation with a view to obtaining the reforms promised them at Berlin. Minor troubles had occurred in 1892 and 1893 at Marsovan and Tokat. In 1894 a more serious rebellion in the mountainous region of Sassun was ruthlessly stamped out; the Powers insistently demanded reforms, the eventual grant of which in the autumn of 1895 was the signal for a series of massacres, brought on in part by the injudicious and threaten- ing acts of the victims, and extending over many months and throughout Asia Minor, as well as in the capital itself. The reforms became more or less a dead letter. Crete indeed profited by the grant of extended privileges, but these did not satisfy its turbulent population, and early in 1897 a Greek expedition sailed to unite the island to Greece. War followed, in which Turkey was easily successful and gained a small rectification of frontier; then a few months later Crete was taken over ” en depot ” by the Four Powers — Germany and Austria not partici- pating, — and Prince George of Greece was appointed their mandatory. In the next year the sultan received the visit of the German emperor and empress.

Abd-ul-Hamid had always resisted the pressure of the European Powers to the last moment, in order to seem to yield only to over- whelming force, while posing as the champion of Islam against aggressive Christendom. The Panislamic propaganda was en- couraged; the privileges of foreigners in the Ottoman Empire — often an obstacle to government — were curtailed; the new railway to the Holy Places was pressed on, and emissaries were sent to dis- tant countries preaching Islam and the caliph’s supremacy. This appeal to Moslem sentiment was, however, powerless against the disaffection due to perennial misgovernment. In Mesopotamia and Yemen disturbance was endemic; nearer home, a semblance of loyalty was maintained in the army and among the Mussulman population by a system of delation and espionage, and by whole- sale arrests ; while, obsessed by terror of assassination, the sultan withdrew himself into fortified seclusion in the palace of Yildiz.

The national humiliation of the situation in Macedonia (q.v.), together with the resentment in the army against the palace spies and informers, at last brought matters to a crisis. The remarkable revolution associated with the names of Niazi Bey and Enver Bey, the

young Turk leaders, and the Com- mittee of Union and Progress is described elsewhere (see Tukkey: History); here it must suffice to say that Abd-ul-Hamid, on learning of the threat of the Salonica troops to march on Con- stantinople (July 23), at once capitulated. On the 24th an irade announced the restoration of the suspended constitution of 1875; next day, further iradSs abolished espionage and the censorship, and ordered the release of political prisoners. On the 10th of December the sultan opened the Turkish parlia- ment with a speech from the throne in which he said that the first parliament had been " temporarily dissolved until the education of the people had been brought to a sufficiently high level by the extension of instruction throughout the empire."

The correct attitude of the sultan did not save him from the suspicion of intriguing with the powerful reactionary ele- ments in the state, a suspicion confirmed by his attitude to- wards the counter-revolution of the 13th of April, when an insurrection of the soldiers and the Moslem populace of the capital overthrew the committee and the ministry. The com- mittee, restored by the Salonica troops, now decided on Abd- ul-Hamid's deposition, and on the 27 th of April his brother Reshid Effendi was proclaimed sultan as Mahommed V. The ex-sultan was conveyed into dignified captivity at Salonica.

ABD-UL-MEJID (1823-1861), sultan of Turkey, was born on the 23rd of April 1823, and succeeded his father Mahmud II. on the 2nd of July 1839. Mahmud appears to have been unable to effect the reforms he desired in the mode of educating his children, so that his son received no better education than that given, according to use and wont, to Turkish princes in the harem. When Abd-ul-Mejid succeeded to the throne, the affairs of Turkey were in an extremely critical state. At the very time his father died, the news was on its way to Constanti- nople that the Turkish army had been signally defeated at Nezib by that of the rebel Egyptian viceroy, Mehemet Ah;

and the Turkish fleet was at the same time on its way to Alex- andria, where it was handed over by its commander, Ahmed Pasha, to the same enemy, on the pretext that the young sultan's advisers were sold to Russia. But through the intervention of the European Powers Mehemet Ali was obliged to come to terms, and the Ottoman empire was saved. (See Mehemet Ali.) In compliance with his father's express instructions, Abd-ul-Mejid set at once about carrying out the reforms

to which Mahmud had devoted himself. In November 1839 was proclaimed an edict, known as the Hatt-i-sherif of Gulhane, consolidating and enforcing these reforms, which was supplemented at the close of the Crimean war by a similar statute issued in February 1856. By these enactments it was provided that all classes of the sultan's subjects should have security for their lives and property; that taxes should be fairly imposed and justice impartially administered; and that all should have full religious liberty and equal civil rights. The scheme met with keen opposition from the Mussulman governing classes and the ulema, or privileged religious teachers, and was but partially put in force, especially in the remoter parts of the empire; and more than one conspiracy was formed against the sultan's life on account of it. Of the other measures of reform promoted by Abd-ul-Mejid the more important were — the reorganization of the army (1843-1844), the institution of a council of public instruc- tion (1846), the abolition of an odious and unfairly imposed capitation tax, the repression of slave trading, and various pro- visions for the better administration of the public service and for the advancement of commerce. For the public history of his times — the disturbances and insurrections in different parts of his dominions throughout his reign, and the great war suc- cessfully carried on against Russia by Turkey, and by England, France and Sardinia, in the interest of Turkey (1853-1856) — see Turkey, and Crimean War. When Kossuth and others sought refuge in Turkey , after the failure of the Hungarian rising in 1849, the sultan was called on by Austria and Russia to surrender them, but boldly and determinedly refused. It is to his credit, too, that he would not allow the conspirators against his own life to be put to death. Pie bore the character of being a kind and honourable man, if somewhat weak, and easily led. Against this, however, must be set down his ex- cessive extravagance, especially towards the end of his life. He died on the 25th of June 1861, and was succeeded by his brother, Abd-ul-Aziz, as the oldest survivor of the family of Osman. He left several sons, of whom two, Murad V. and Abd-ul-Hamid II., eventually succeeded to the throne. In his reign was begun. the reckless system of foreign loans, carried to excess in the ensuing reign, and culminating in default, which led to the alienation of European sympathy from Turkey and, indirectly, to the dethronement and death of Abd-ul-Aziz. ABDOR RAHMAN KHAN, amir of Afghanistan (c. 1844- 1901), was the son of Afzul Khan, who was the eldest son of Dost Mahomed Khan, the famous amir, by whose success in war the Barakzai family established their dynasty in the ruler- ship of Afghanistan. Before his death at Herat, 9th June 1863, Dost Mahomed had nominated as his successor Shere Ali, his third son, passing over the two elder brothers, Afzul Khan and Azim Khan;

and at first the new amir was quietly recognized. But after a few months Afzul Khan raised an insurrection in the northern province, between the Hindu Kush mountains and the Oxus, where he had been governing when his father died; and then began a fierce contest for power among the sons of Dost Mahomed, which lasted for nearly five years. In this war, which resembles in character, and in its striking vicissitudes, the English War of the Roses at the end of the 15th century, Abdur Rahman soon became distinguished for ability and daring energy. Although his father, Afzul Khan, who had none of these qualities, came to terms with the Amir Shere Ali, the son's behaviour in the northern province soon excited the amir's suspicion, and Abdur Rahman, when he was summoned to Kabul, fled across the Oxus into Bokhara. Shere Ali threw Afzul Khan into prison, and a serious revolt followed in south Afghanistan; but the amir had scarcely suppressed it by

winning a desperate battle, when Abdur Rahman's reappear- ance in the north was a signal for a mutiny of the troops stationed in those parts and a gathering of armed bands to his standard. After some delay and desultory fighting, he and his uncle, Azim Khan, occupied Kabul (March 1866). The amir Shere Ali marched up against them from Kandahar; but in the battle that ensued at Sheikhabad on 10th May he was deserted by a large body of his troops, and after his signal defeat Abdur Rahman released his father, Afzul Khan, from prison in Ghazni, and installed him upon the throne as amir of Afghanistan. Notwithstanding the new amir's incapacity, and some jealousy between the real leaders, Abdur Rahman and his uncle, they again routed Shere Ali's forces, and occupied Kandahar in 1867; and when at the end of that year Afzul Khan died, Azim Khan succeeded to the rulership, with Abdur Rahman as his governor in the northern province. But towards the end of 1868 Shere Ali's return, and a general rising in his favour, resulting in their defeat at Tinah Khan on the 3rd of January 1869, forced them both to seek refuge in Persia, whence Abdur Rahman pro- ceeded afterwards to place himself under Russian protection at Samarkand. Azim died in Persia in October 1869.

This brief account of the conspicuous part taken by Abdur Rahman in an eventful war, at the beginning of which he was not more than twenty years old, has been given to show the rough school that brought out his qualities of resource and fortitude, and the political capacity needed for rulership in Afghanistan. He lived in exile for eleven years, until on the death, in 1879, of Shere Ali, who had retired from Kabul when the British armies entered Afghanistan, the Russian governor- general at Tashkent sent for Abdur Rahman, and pressed

him to try his fortunes once more across the Oxus. In March 1880 a report reached India that he was in northern Afghanistan; and the governor-general, Lord Lytton, opened communications with him to the effect that the British government were pre- pared to withdraw their troops, and to recognize Abdur Rahman as amir of Afghanistan, with the exception of Kandahar and some districts adjacent. After some negotiations, an interview took place between him and Mr (afterwards Sir) Lepel Griffin, the diplomatic representative at Kabul of the Indian government, who described Abdur Rahman as a man of middle height, with an exceedingly intelligent face and frank and courteous manners, shrewd and able in conversation on the business in hand. A: the durbar on the 22nd of July 1880, Abdur Rahman was officially recognized as amir, granted assistance in arms and money, and promised, in case of unprovoked foreign aggression, such further aid as might be necessary to repel it, provided that he followed British advice in regard to his external relations. The evacua- tion of Afghanistan was settled on the terms proposed, and in i88i the British troops also made over Kandahar to the new amir; but Ayub Khan, one of Shere Ali's sons, marched upon that city from Herat, defeated Abdur Rahman's troops, and occupied the place in July. This serious reverse roused the amir, who had not at first displayed much activity. He led a force from Kabul, met Ayub's army close to Kandahar, and the complete victory which he there won forced Ayub Khan to fly into Persia. From that time Abdur Rahman was fairly seated on the throne at Kabul, and in the course of the next few years he consolidated his dominion over all Afghanistan, suppress- ing insurrections by a sharp and relentless uae of his despotic authority. Against the severity of his measures the powerful Ghilzai tribe revolted, and were crushed by the end of 1887. In that year Ayub Khan made a fruitless inroad from Persia; and in 1888 the amir's cousin, Ishak Khan, rebelled against him in the north; but these two enterprises came to nothing.

In 1885, at the moment when (see Afghanistan) the amir was in conference with the British viceroy, Lord Dufferin, in India, the news came of a collision between Russian and Afghan troops at Panjdeh, over a disputed point in the demarcation of the north-western frontier of Afghanistan. Abdur Rahman's attitude at this critical juncture is a good example of his political sagacity. To one who had been a man of war from his youth up, who had won and lost many fights, the rout of a detachment

and the forcible seizure of some debateable frontier lands was an untoward incident; but it was no sufficent reason for calling upon the British, although they had guaranteed his territory's integrity, to vindicate his rights by hostilities which would certainly bring upon him a Russian invasion from the north, and would compel his British allies to throw an army into Afghanistan from the south-east. His interest lay in keeping powerful neighbours, whether friends or foes, outside his king- dom. He knew this to be the only policy that would be sup- ported by the Afghan nation; and although for some time a rupture with Russia seemed imminent, while the Indian govern- ment made ready for that contingency, the amir's reserved and circumspect tone in the consultations with him helped to turn the balance between peace and war, and substantially conduced towards a pacific solution. Abdur Rahman left on those who met him in India the impression of a clear-headed man of action, with great self-reliance and hardihood, not without indications of the implacable severity that too often marked his administra- tion. His investment with the insignia of the highest grade of the Order of the Star of India appeared to give him much pleasure.

From the end of 1888 the amir passed eighteen months in his northern provinces bordering upon the Oxiis, where he was engaged in pacifying the country that had been disturbed by revolts, and in*punishing with a heavy hand all who were known or suspected to have taken any part in rebellion. Shortly after- wards (1892) he succeeded in finally beating down the resistance of the Hazara tribe, who vainly attempted to defend their immemorial independence, within their highlands, of the central authority at Kabul.

In 1803 Sir Henry Durand was deputed to Kabul by the government of India for the purpose of settling an exchange of territory required by the demarcation of the boundary between north-eastern Afghanistan and the Russian possessions, and in order to discuss with the amir other pending questions. The amir showed his usual ability in diplomatic argument, his tenacity where his own views or claims were in debate, with a sure underlying insight into the real situation. The territorial exchanges were amicably agreed upon; the relations between the Indian and Afghan governments, as previously arranged, were confirmed; and an understanding was reached upon the important and difficult subject of the border line of Afghanistan on the east, towards India. In 1895 the amir found himself unable, by reason of ill-health, to accept an invitation from Queen Victoria to visit England; but his second son Nasrullah Khan went in his stead.

Abdur Rahman died on the 1st of October 1901, being succeeded by

his son Habibullah. He had defeated all enterprises by rivals against his throne; he had broken down the power of local chiefs, and tamed the refractory tribes; so that his orders were irresistible throughout the whole dominion. His govern- ment was a military despotism resting upon a well-appointed army; it was administered through officials absolutely sub- servient to an inflexible will and controlled by a widespread system of espionage; while the exercise of his personal authority was too often stained by acts of unnecessary cruelty. He held open courts for the receipt of petitioners and the dispensation of justice; and in the disposal of business he was indefatigable. He succeeded in imposing an organized government upon the fiercest and most unruly population in Asia; he availed himself of European inventions for strengthening his armament, while he sternly set his face against all innovations which, like rail- ways and telegraphs, might give Europeans a foothold within his country. His adventurous life, his forcible character, the position of his state as a barrier between the Indian and the Russian empires, and the skill with which he held the balance in dealing with them, combined to make him a prominent figure in contemporary Asiatic politics and will mark his reign as an epoch in the history of Afghanistan.

The amir received an annual subsidy from the British govern- ment of 185 lakhs of rupees. He was allowed to import muni- tions of war. In 1896 he adopted the title of Zia-ul-Millat-ud-

Din (Light of the nation and religion); and his zeal for the cause of Islam induced him to publish treatises on Jehad. His eldest son Habibullah Khan, with his brother Nasrullah Khan, was born at Samarkand. His youngest son, Mahomed Omar Jan, was born in 1889 of an Afghan mother, connected by descent with the Barakzai family.

See also S. Wheeler, F.R.G.S., The Amir Abdur Rahman (London, 1895); The Life of Abdur Rahman, Amir of Afghanistan, G.C.B., G.C.S.I., edited by Mir Munshi, Sultan Mahommed Khan (2 vols., London, 1900) ; At the Court of the Amir, by J. A. Grey (1895).

(A. l_*. J-..)

ABECEDARIANS, a nickname given to certain extreme Anabaptists (q.v.), who regarded the teaching of the Holy Spirit as all that was necessary, and so despised all human learning and even the power of reading the written word.

A BECKETT, GILBEBT ABBOTT ‘(1811-1856), English writer, was born in north London on the 9th of January 1811. He belonged to a family

claiming descent from the father of St Thomas Becket. His elder brother, Sir William a Beckett (1806-1869), became chief justice of Victoria (Australia). Gil- bert Abbott a. Beckett was educated at Westminster school, and was called to the bar at Gray's Inn in 1841. He edited Figaro in London , and was one of the original staff of Punch and a contributor all his life. He was an active journalist on The Times and The Morning Herald, contributed a series of light articles to The Illustrated London News, conducted in 1846 The Almanack of the Month and found time to produce some fifty or sixty plays, among them dramatized versions of Dickens's shorter stories in collaboration with Mark Lemon. As poor-law commissioner he presented a valuable report to the home

secretary regarding scandals in connexion with the AndoYer

Union, and in 1849 he became a metropolitan police magistrate. He died at Boulogne on the 30th of August 1856 of typhus fever.

His eldest son Gilbert Arthur A Beckett (1837-1891) was born at Hammersmith on the 7th of April 1837. He went up to Christ Church, Oxford, as a Westminster scholar in 1855, graduating in i860. He was entered at Lincoln's Inn, but gave his attention chiefly to the drama, producing Diamonds and Hearts at the Hayrnarket in 1867, which was followed by other light comedies. His pieces include numerous burlesques and pantomimes, the libretti of Savonarola (Hamburg, 1884) and of The Canterbury Pilgrims (Drury Lane, 1884) for the music of Dr (afterwards Sir) C. V. Stanford. The Happy Land (Court Theatre, 1873), a political burlesque of W. S. Gilbert's Wicked World, was written in collaboration with F. L. Tomline. For the last ten years of his life he was on the regular staff' of Punch. His health was seriously affected in 1889 by the death of his only son, and he died on the 15th of October 1891.

A younger son, Arthur William a Beckett (1844-1909), a well-known journalist and man of letters, was also on the staff of Punch from 1874 to 1902, and gave an account of his father and his own reminiscences in The A Becketts of Punch (1903). He died in London on the 14th of January 1909.

See also M. H. Spielmann, The History of Punch (1895).

ABEDNEGO, the name given in Babylon to Azariah, one of the companions of Daniel (Dan. i. 7, &c). It is probably a corruption, perhaps deliberate, of Abednebo, " servant of Nebo," though G. Hoffmann thinks that the original form was Abednergo, for

Abednergal, ” servant of the god Nergal.” C. H. Toy compares Barnebo, “son of Nebo,” of which he regards Barnabas as a slightly disguised form {Jewish Ency- clopaedia) .

ABEKEN, HEINRICH (1809-1872), German theologian and Prussian official, was born at Berlin on the 8th of August 1809. He studied theology at Berlin and in 1834 became chaplain to the Prussian embassy in Rome. In 1841 he visited England, being commissioned by King Frederick William IV. to make arrangements for the establishment of the Protestant bishopric of Jerusalem. In 1848 he received an appointment in the Prussian ministry for foreign affairs, and in 1853 was promoted to be privy councillor of legation (Geheimer Legationsrath) . He was much employed by Bismarck in the writing of official despatches, and stood high in the favour of King William, whom he often

accompanied on his journeys as representative of the foreign office. He was present with the king during the campaigns of 1866 and 1870-71. In 1851 he published anonymously Babylon und Jerusalem, a slashing criticism of the views of the Countess von Hahn-Hahn (q.v.).

See Heinrich Abeken, ein schlichtes Leben in bewegter Zeit (Berlin, 1898J, by his widow. This is valuable by-reason of the letters written from the Prussian headquarters.

ABEL (Hebrew for breath), the second son of Adam, slain by Cain, his elder brother (Gen. iv. 1-16). The narrative in Genesis which tells us that ” the Lord had respect unto Abel and to his offering, but unto Cain and to his offering he had not respect,” is supplemented by the statement of the New Testament, that ” by faith Abel offered unto God a more excellent sacrifice than Cain” (Heb. xi. 4,), and that Cain slew Abel “because his own works were evil and his brother’s righteous” (1 John iii. 12). See further under Cain. The name has been identified with the Assyrian ablu, ” son,” but this is far from certain. It more probably means ” herdsman ” (cf. the name Jabal), and a distinction is drawn between the pastoral Abel and the agriculturist Cain. If Cain is the eponym of the Kenites it is quite possible that Abel was originally a South Judaean demigod or hero; on this, see Winckler, Gesch. Israels, ii. p. 189; E. Meyer, Israeliten, p. 395. A sect of Abelitae, who seem to have lived in North Africa, is mentioned by Augustine (De

Haeresibus, lxxxvi.).

ABEL, SIR FREDERICK AUGUSTUS, Bart. (1827-1902), English chemist, was born in London on the 17th of July 1827. After studying chemistry for six years under A. W. von Hofmann at the Royal College of Chemistry (established in London in 1845), he became professor of chemistry at the Royal Military Academy in 1851, and three years later was appointed chemist to the War Department and chemical referee to the government. During his tenure of this office, which lasted until 1888, he carried out a large amount of work in connexion with the chemistry of explosives. One of the most important of his investigations had to do with the manufacture of gun- cotton, and he developed a process, consisting essentially of reducing the nitrated cotton to fine pulp, which enabled it to be prepared with practically no danger and at the same time yielded the product in a form that increased its usefulness. This work to an important extent prepared the way for the " smokeless powders " which came into general use towards the end of the 19th century; cordite, the particular form adopted by the British government in 1891, was invented jointly by him and Professor James Dewar. Our knowledge of the explosion of ordinary black powder was also greatly added to by him, and in conjunction with Sir Andrew Noble he carried out one of the most complete inquiries on record into its behaviour when fired. The invention of the apparatus, legalized in 1879, for the determination of the flash-point of petroleum, was another piece of work which fell to him by virtue of his official position. His first instrument, the open-test apparatus, was prescribed by the act of 1868, but, being found to possess certain defects, it was superseded in 1879 by the Abel close-test instrument (see Petroleum). In electricity Abel studied the construction of electrical fuses and other applica- tions of electricity to warlike purposes, and his work on problems of steel manufacture won him in 1897 the Bessemer medal of the Iron and Steel Institute, of which from 1891 to 1893 he was president. He was president of the Institution of Electrical Engineers (then the Society of Telegraph Engineers) in 1877. He became a member of the Royal Society in i860, and received a royal medal in 1887. He took an important part in the work of the Inventions Exhibition (London) in 1885, and in 1887 became organizing secretary and first director of the Imperial Institute, a position he held till his death, which occurred in London on the 6th of September 1902. He was knighted in 1891, and created a baronet in 1893.

Among his books were— Handbook of Chemistry (with C. L. Bloxam), Modern History of Gunpowder (1866), Gun-cotton (1866), On Explosive Agents (1872), Researches in Explosives (1875), and

Electricity applied to Explosive Purposes (1884). He also wrote several important articles in the ninth edition of the Encyclo- paedia Britannica.

ABEL, KARL FRIEDRICH (1 725-1 787), German musician, was born in Kothen in 1725, and died on the 20th of June 1787 in London. He was a great player on the viola ˆ a gamba, and composed much music of importance in its day for that instrument. He studied under Johann Sebastian Bach at the Leipzig Thomasschule; played for ten years (1748-T758) under A. Hasse in the band formed at Dresden by the elector of Saxony; and then, going to England, became (in 1759) chamber-musician to Queen Charlotte. He gave a concert of his own compositions in London, performing on various instruments, one of which, the pentachord, was newly invented. In 1762 Johann Christian Bach, the eleventh son of Sebastian, came to London, and the friendship between him and Abel led, in 1764 or 1765, to the establishment of the famous concerts subsequently known as the Bach and Abel concerts. For ten years these were organ- ized by Mrs Cornelys, whose enterprises were then the height of fashion. In 1775 the concerts became independent of her, and were continued by Abel unsuccessfully for a year aftˆr Bach's death in 1782. At them the works of Haydn were first produced in England. After the failure of his concert under- takings Abel still remained in great request as a player on various instruments new and old, but he took to drink and thereby hastened his death. He was a man of striking presenceˆ of whom several fine portraits, including two by Gainsborough, exist.

ABEL, NIELS HENRIK (1802-1829), Norwegian mathe- matician, was born at Findoe on the 25th of August 1802. In 1 81 5 he entered the cathedral school at Christiania, and three years later he gave proof of his mathematical genius by his brilliant solutions of the original problems proposed by B. Holmboe. About this time, his father, a poor Protestant minister, died, and the family was left in straitened circum- stances; but a small pension from the state allowed Abel to enter Christiania University in 182 1. His first notable work was a proof of the impossibility of solving the quintic equation by radicals. This investigation was first published in 1824 and in abstruse and difficult form, and afterwards (1826) more elaborately in the first volume of Crelle's Journal. Further state aid enabled him to visit Germany and France in 1825, and having visited the astronomer Heinrich Schumacher (1780- 1850) at Hamburg, he spent six months in Berlin, where he became intimate with August Leopold Crelle, who was then about to publish his mathematical journal. This project was warmly encouraged by Abel, who contributed much to the success of the venture. From Berlin he passed to Freiberg, and here he made his

brilliant researches in the theory of func- tions, elliptic, hyperelliptic and a new class known as Abelians being particularly studied. In 1826 he moved to Paris, and during a ten months' stay he met the leading mathematicians of France ; but he was little appreciated, for his work was scarcely known, and his modesty restrained him from pro- claiming his researches. Pecuniary embarrassments, from which he had never been free, finally compelled him to abandon his tour, and on his return to Norway he taught for some time at Christiania. In 1829 Crelle obtained a post for him at Berlin, but the offer did not reach Norway until after his death near Arendal on the 6th of April. t

The early death of this talented mathematician, of whom Legendre said " quelle tite celle du jetine Norvegien ! ", cut short a career of extraordinary brilliance and promise. Under Abel's guidance, the prevailing obscurities of analysis began to. be cleared, new fields were entered upon and the study of functions so advanced as to provide mathematicians with numerous ramifications along which progress could be made. His works, the greater part of which originally appeared in Crelle's Journal, were edited by Holmboe and published in 1839 by the Swedish government, and a more complete edition by L. Sylow and S. Lie was published in 1881.

For further details of his mathematical investigations see

the articles Groom, Theory or, and Functions of Complex Variables.

See C. A. Bjerknes, Niels Henrik Abel: Tableau de savie et son action scientifique (Paris, 1885); Lucas de Peslouan, Niels Henrik Abel (Paris, 1906).

ABEL (better Abell), THOMAS (d. 1540), an English priest who was martyred during the reign of Henry VIII. The place and date of his birth are unknown. He was educated at Oxford and entered the service of Queen Catherine some time before 1528, when he was seHt by her to the emperor Charles V. on a mission relating to the proposed divorce. On his return he was presented by Catherine to the living of Bradwell, in Essex, and remained to the last a staunch supporter of the unfortunate queen. In 1533, he published his Invicta Veritas (with the fictitious pressmark of Luneberge, to avoid suspicion), which contained an answer to the numerous tracts supporting Henry's ecclesiastical claims. After an imprisonment of more than six years,

Abel was sentenced to death for denying the royal supremacy in the church, and was executed at Smithfield on the 30th of July 1540. There is still to be seen on the wall of his prison in the Tower the symbol of a bell with an A upon it and the name Thomas above, which he carved during his confinement. He was beatified by Pope Leo XIII.

See J. Gillow's Bibl. Dictionary of Eng. Catholics, vol. i.; Calendar of State Papersˆ&f Henry VIII., vols, iv.-vii. passim.

ABELARD, PETER (1079ˆ1142), scholastic philosopher, was born at Pallet (Palais), not far from Nantes, in 1079. He was the eldest son of a noble Breton house. The name Abaelardus (also written AbaUardus, Abaielardus, and in many other ways) is said to be a corruption of Habelardus, substituted by himself for a nickname Bajolardus given to him when a student. As a boy, he showed an extraordinary quickness of apprehension, and, choosing a learned life instead of the knightly career natural to a youth of his birth, early became an adept in the art of dialectic, under which name philosophy, meaning at that time chiefly the logic of Aristotle transmitted through Latin channels, was the great subject of liberal study in the episcopal schools. Roscellinus, the famous canon of Compiegne, is mentioned by himself as his teacher; but'wnether he heard this champion of extreme Nominalism in early youth, when he wandered about from school to school for instruction and exercise, or some years later, after he had already begun to teach for himself, remains uncertain. His wanderings finally brought him to Paris, still under the age of twenty. There, in the great cathedral school of Notre-Dame, he sat for a while under the teaching of William of Champeaux, the disciple of St Anselm and most advanced of Realists, but, presently stepping forward, he overcame the master in discussion, and thus began a long duel that issued in the downfall of the philosophic theory of Realism, till then dominant in the early Middle Age. First, in the teeth of opposi- tion from the metropolitan teacher, while yet only twenty-two, he proceeded to set up a school of his own at Melun, whence, for more direct competition, he removed to Corbeil, nearer Paris. The success of his teaching was signal, though for a time he had to quit the field, the strain proving too great for his physical strength. On his return, after 1108, he found William lecturing no longer at Notre-Dame, but in a monastic retreat outside the city, and there battle was again joined between them. Forcing upon the Realist a material change of doctrine, he was once more victorious, and thenceforth he stood supreme. His dis- comfited rival still had power to keep him from lecturing in Paris, but soon failed in this last effort also. From Melun, where he had resumed teaching, Abelard passed to the capital, and set up his school on the

heights of St Genevieve, looking over Notre-Dame. From his success in dialectic, he next turned to theology and attended the lectures of Anselm at Laon. His triumph over the theologian was complete; the pupil was able to give lectures, without previous training or special study, which were acknowledged superior to those of the master. Abelard was now at the height of his fame. He stepped into the chair at Notre-Dame, being also nominated canon, about the year 1115.

Few teachers ever held such sway as Abelard now did for a time. Distinguished in figure and manners, he was seen sur- rounded by crowds — it is said thousands — of students, drawn from all countries by the fame of his teaching, in which acuteness of thought was relieved by simplicity and grace of exposition. Enriched by the offerings of his pupils, and feasted with universal admiration, he came, as he says, to think himself the only philosopher standing in the world. But a change in his fortunes was at hand. In his devotion to science, he had hitherto lived a very regular life, varied only by the excitement of conflict: now, at the height of his fame, other passions began to stir within him. There lived at that time, within the precincts of Notre-Dame, under the care of her uncle, the canon Fulbert, a young girl named Heloise, of noble extraction, and born about noi. Fair, but still more remarkable for her knowledge, which extended beyond Latin, it is said, to Greek and Hebrew, she awoke a feeling of love in the breast of Abelard; and with intent to win her, he sought and gained a footing in Fulbert's house as a regular inmate. Becoming also tutor to the maiden, he used the unlimited power which he thus obtained over her for the purpose of seduction, though not without cherishing a real affection which she returned in unparalleled devotion. Their relation interfering with his public work, and being, moreover, ostentatiously sung by himself, soon became known to all the world except the too-confiding Fulbert; and, when at last if could not escape even his vision, they were separated only to meet in secret. Thereupon Heloise found herself preg- nant, and was carried off by her lover to Brittany, where she gave birth to a son. To appease her furious uncle, Abelard now proposed a marriage, under the condition that it should be kept secret, in order not to mar his prospects of advancement in the church; but of marriage, whether public or secret, Heloise would hear nothing. She appealed to him not to sacrifice for her the independence of his life, nor did she finally yield to the arrangement without the darkest forebodings, only too soon to be realized. The secret of the marriage was not kept by Fulbert; and when Heloise, true to her singular purpose, boldly denied it, life was made so unsupportable to her that she sought refuge in the convent of Argenteuil. Immediately Fulbert, believing that her husband, who

aided in the flight, designed to be rid of her, conceived a dire revenge. He and some others broke into Abelard's chamber by night, and perpetrated on him the most brutal mutilation. Thus cast down from his pinnacle of greatness into an abyss of shame and misery, there was left to the brilliant master only the life of a monk. The priesthood and ecclesiastical office were canonically closed to him. Heloise, not yet twenty, consummated her work of self-sacrifice at the call of his jealous love, and took the veil.

It was in the abbey of St Denis that Abelard, now aged forty, sought to bury himself with his woes out of sight. Finding, however, in the cloister neither calm nor solitude, and having gradually turned again to study, he yielded after a year to urgent entreaties from without and within, and went forth to reopen his school at the priory of Maisoncelle (11 20). His lectures, now framed in a devotional spirit, were heard again by crowds of students, and all his old influence seemed to have returned; but old enmities were revived also, against which he was no longer able as before to make head. No sooner had he put in writing his theological lectures (apparently the Inlroductio ad Theolo- giam that has come down to us), than his adversaries fell f ou l of his rationalistic interpretation of the Trinitarian dogma. Charging him with the heresy of Sabellius in a provincial synod held at Soissons in n 21, they procured by irregular practices a condemnation of his teaching, whereby he was made to throw his book into the flames and then was shut up in the convent of St Mddard at Soissons. After the other, it was the bitterest possible experience that could befall him, nor, in the state of mental desolation into which it plunged him, could he find any comfort from being soon again set free. The life in his own monastery proved no more congenial than formerly. For this Abelard himself was partly responsible. He took a sort of malicious pleasure in irritating the monks. Quasi jocando, he

cited Bede to prove that Dionysius the Areopagite had been bishop of Corinth, while they relied upon the statement of the abbot Hilduin that he had been bishop of Athens. When this historical heresy led to the inevitable persecution, Abelard wrote a letter to the abbot Adam in which he preferred to the authority of Bede that of Eusebius' Historia Ecclesiastica and St Jerome, according to whom Dionysius, bishop of Corinth, was distinct from Dionysius the Areopagite, bishop of Athens and founder of the abbey, though, in deference to Bede, he

suggested that the Areopagite might also have been bishop of Corinth. Life in the monastery was intolerable for such a troublesome spirit, and Abelard, who had once attempted to escape the persecution he had called forth by flight to a monastery at Provins, was finally allowed to withdraw. In a desert place near Nogent-sur-Seine, he built himself a cabin of stubble and reeds, and turned hermit. But there fortune came back to him with a new surprise. His retreat becoming known, students flocked from Paris, and covered the wilderness around him with their tents and huts. When he began to teach again he found consolation, and in gratitude he consecrated the new oratory they built for him by the name of the Paraclete.

Upon the return of new dangers, or at least of fears, Abelard left the Paraclete to make trial of another refuge, accepting an invitation to preside over the abbey of St Gildas-de-Rhuys, on the far-off shore of Lower Brittany. It proved a wretched exchange. The region was inhospitable, the domain a prey to lawless exaction, the house itself savage and disorderly. Yet for nearly ten years he continued to struggle with fate before he fled from his charge, yielding in the end only under peril of violent death. The misery of those years was not, however, unrelieved; for he had been able, on the breaking up of Heloise's convent at Argenteuil, to establish her as head of a new religious house at the deserted Paraclete, and in the capacity of spiritual director he often was called to revisit the spot thus made doubly dear to him. All this time Heloise had lived amid universal esteem for her knowledge and character, uttering no word under the doom that had fallen upon her youth; but now, at last, the occasion came for expressing all the pent-up emotions of her soul. Living on for some time apart (we do not know exactly where), after his flight from St Gildas, Abelard wrote, among other things, his famous Historia Calamitalum, and thus moved her to pen her first Letter, which remains an unsurpassed utterance of human passion and womanly devotion; the first being followed by the two other Letters, in which she finally accepted the part of resignation which, now as a brother to a sister, Abelard commended to her. He not long after was seen once more upon the field of his early triumphs lecturing on Mount St Genevieve in 11 36 (when he was heard by John of Salisbury), but it was only for a brief space: no new triumph, but a last great trial, awaited him in the few years to come of his chequered life. As far back as the Paraclete days, he had counted as chief among his foes Bernard of Clairvaux, in whom was incarnated the principle of fervent and unhesitating faith, from which rational inquiry like his was sheer revolt, and now this uncompromising spirit was moving, at the instance of others, to crush the growing evil in the person of the

boldest offender. After preliminary negotiations, in which Bernard was roused by Abelard's steadfastness to put forth all his strength, a council met at Sens (1141), before which Abelard, formally arraigned upon a mumber of heretical charges, was prepared to plead his cause. When, however, Bernard, not without foregone terror in the prospect of meeting the redoubt- able dialectician, had opened the case, suddenly Abelard ap- pealed to Rome. The stroke availed him nothing; for Bernard, who had power, notwithstanding, to get a condemnation passed at the council, did not rest a moment till a second condemnation was procured at Rome in the following year. Meanwhile, on his way thither to urge his plea in person, Abelard had broken down at the abbey of Cluny, and there, an utterly fallen man, with spirit of the humblest, and only not bereft of his intellectual force, he lingered but a few months before the approach of death. Removed by friendly hands, for the relief of his sufferings,

to the priory of St Marcel, near Chalori-sur-Saone, he died or the 21st of April 1142. First buried at St Marcel, Kis remains soon after were carried off in secrecy to the Paraclete, and giver over to the loving care of Heloise, who in time came herself tc rest beside them (1164). The bones of the pair were shifted more than once afterwards, but they were marvellously pre- served even through the vicissitudes of the French Revolution, and now they lie united in the well-known tomb in the cemetery of P&re-la-Chaise at Paris.

Great as was the influence exerted by Abelard on the minds of his contemporaries and the course of medieval thought, he has been little known in modern times but for his connexion with Heloise. Indeed, it was not till the 19th century, when Cousin in 1836 issued the collection entitled Ouvrages inidits d'AMlard, that his philosophical performance could be judged at first hand; of his strictly philosophical works only one, the ethical treatise Scito te ipsum, having been published earlier, namely, in 1721. Cousin's collection, besides giving extracts from the theological work Sic et Non (an assemblage of opposite opinions on doctrinal points, culled from the Fathers as a basis for discussion, the main interest in which lies in the fact that there is no attempt to reconcile the different opinions), includes the Dialectica, commentaries on logical works of Aristotle, Porphyry and Boethius, and a fragment, De Generibus et Speciebus. The last-named work, and also the psychological treatise De Intellectibus, published apart by Cousin (in Fragmens Philosophiques, vol. ii.), are now "considered upon internal evidence not to be by Abelard himself, but only to have sprung out of his school. A genuine work, the Glossulae super Porphy- rium, from which Charles de Remusat, in his classical monograph Aboard (1845), has given extracts, remains in manuscript.

The general importance of Abelard lies in his having fixed more decisively than any one before him the scholastic manner of philosophizing, with its object of giving a formally rational expression to the received ecclesiastical doctrine. However his own particular interpretations may have been condemned, they were conceived in essentially the same spirit as the general scheme of thought afterwards elaborated in the 13th century with approval from the heads of the church. Through him was prepared in the Middle Age the ascendancy of the philo- sophical authority of Aristotle, which became firmly established in the half-century after his death, when first the completed Organon, and gradually all the other works of the Greek thinker, came to be known in the schools: before his time it was rather upon the authority of Plato that the prevailing Realism sought to lean. As regards his so-called Couceptualisni and his attitude to the question of Universals, see Scholasticism. Outside of his dialectic, it was in ethics that Abelard showed greatest activity of philosophical thought; laying very particular stress upon the subjective intention as determining, if not the moral char- acter, at least the moral value, of human action. His thought in this direction^ wherein he anticipated something of modern speculation, is the more remarkable because his scholastic successors accomplished least in the field of morals, hardly venturing to bring the principles and rules of conduct wider pure philosophical discussion, even after the great ethical inquiries of Aristotle became fully known to them.

Bibliography.— Abelard's own works remain the best sources for his life, especially his Historia Calamitatum, an autobiography, and the correspondence with Heloise. The literature on Abelard is extensive, but consists principally of monographs ^ on different aspects of his philosophy. Charles de Remusat's Abilard (2 vols., 1845) remains an authority; it must be distinguished from his drama Abelard (1877), which is an attempt to give a picture of medieval life. McCabe's life of Abelard is written closely from the sources. See also. the valuable analysis by Nitsch in the article "Abalard" in Hauck's Realencyklopadie f. prot. Theoi. u. Kirche, 3rd ed., 1896. There is a comprehensive bibliography in U. Chevalier, Repertoire des sources hist, du moyen dge, s. "Abailard." (G. C. R. ; J. T. S.*)

ABELIN, JOHANN PHILIPP, an early 16th-century German chronicler, was born, probably, at Strasburg, and died there between the years 1634 and 1637. He wrote numerous histories over the pseudonyms of Philipp Arlanibaus, Abeleus and Johann Ludwig Gottfried or Gotofredus, hie earliest works of importance

being his history of the German wars of Gustavus Adolphus, entitled Arma Suecica (pub. 1631-1634, in 12 parts), and the Inventarium Sueciae (1632) — both compilations from existing records. His best known work is the Theatrum Europaeum, a series of chronicles of the chief events in the history of the world down to 1619. He was himself responsible for the first two volumes. It was continued by various writers and grew to twenty-one volumes (Frankf. 1633-1738). The chief interest of the work is, however, its illustration by the beautiful copper- plate engravings of Matthaus Merian (1593-1650). Abelin also wrote a history of the antipodes, Historia Antipodum (post- humously pub. Frankf. 1655), and a history of India.

See G. Droysen, Arlanibaeus, Godofredus, Abelinus (Berlin, 1864); and notice in Allgemeine Deutsche Biographie.

ABENCERRAGES, a family or faction that is said to have held a prominent position in the Moorish kingdom of Granada in the 15th century. The name appears to have been derived from the Yussuf ben-Serragh, the head of the tribe in the time of Mahommed VII., who did that sovereign good service in his struggles to retain the crown of which he was three times de- prived. Nothing is known of the family with certainty; but the name is familiar from the interesting romance of Gines Perez de Hita, Guerras chiles de Granada, which celebrates the feuds of the Abencerrages and the rival family of the Zegris, and the cruel treatment tojwhich the former were subjected. J. P. de Florian's Gonsalve de Cordoue and Chateaubriand's Le dernier des Abencerrages are imitations of Perez de Hita's work. The hall of the Abencerrages in the Alhambra takes its name from being the reputed scene of the massacre of the family.

ABENDANA, the name of two Jewish theologians.- (1) Jacob (1630-1695), rabbi (Hakham) of the Spanish Jews in London from 1680. Like his brother Isaac, Jacob Abendana had a circle of Christian friends, and his reputation led to the appreciation of Jewish scholarship by modern Christian theo- logians. (2) Isaac (c. 1650-1710), his brother, taught Hebrew at Cambridge and afterwards at Oxford. He compiled a Jewish Calendar and wrote Discourses on the Ecclesiastical and Civil Polity of the Jews (1706).

ABENEZRA (Ibn Ezra), or, to give him his full name, Abraham ben Meir Ibn Ezra (1092 or 1093-1167), one of the most distinguished Jewish men of letters and writers of the Middle Ages. He was born at Toledo, left his native land of Spain before 1140 and led until his

death a life of restless wandering, which took him to North Africa, Egypt, Italy (Rome, Lucca, Mantua, Verona), Southern France(Narbonne, Beziers), Northern France (Dreux), England (London), and back again to the South of France. At several of the above-named places he remained for some time and developed a rich literary activity. In his native land he had already gained the reputation of a distin- guished poet and thinker; but, apart from his poems, his works, which were all in the Hebrew language, were written in the second period of his life. With these works, which cover in the first instance the field of Hebrew philology and Biblical exegesis, he fulfilled the great mission of making accessible to the Jews of Christian Europe the treasures of knowledge enshrined in the works written in Arabic which he had brought with him from Spain. His grammatical writings, among which Moznayim ("the Scales," written in 1140) and Zahot ("Correctness," written in 1141) are the most valuable, were the first expositions of Hebrew grammar in the Hebrew language, in which the system of Hayyuj and his school prevailed. He also translated into Hebrew the two writings of Hayyuj in which the founda- tions of the system were laid down Of greater original value than the grammatical works of Ibn Ezra are his commentaries on most of the books of the Bible, of which, however, a part has been lost. His reputation as an intelligent and acute ex- pounder of the Bible was founded on his commentary on the Pentateuch, of which the great popularity is evidenced by the numerous commentaries which were written upon it. In the editions of this commentary (ed. princ. Naples 1488) the commentary on the book of Exodus is replaced by a second, more complete commentary of Ibn Ezra, while the first and

shorter commentary on Exodus was not printed until 1840, The great editions of the Hebrew Bible with rabbinical com- mentaries contained also commentaries of Ibn Ezra's on the following books of the Bible: Isaiah, Minor Prophets, Psalms, Job, Pentateuch, Daniel; the commentaries on Proverbs, Ezra and Nehemiah which bear his name are really those of Moses Kimhi. Ibn Ezra wrote a second commentary on Genesis as he had done on Exodus, but this was never finished. There are second commentaries also by him on the Song of Songs, Esther and Daniel. The importance of the exegesis of Ibn Ezra con- sists in the fact that it aims at arriving at the simple sense of the text, the so-called " Pcsohat," on solid grammatical prin- ciples. It is in this that, although he takes a great part of his, exegetical material from his predecessors, the originality of his mind is everywhere apparent, an originality which displays itself also in the witty and lively language of his commentaries. To judge by certain signs, of which Spinoza in

his Tractatus Theologico Politicus makes use, Ibn Ezra belongs to the earliest pioneers of the criticism of the Pentateuch. His commentaries, and especially some of the longer excursuses, contain numerous contributions to the philosophy of religion. One writing in particular, which belongs to this province (Yosod Mera), on the division and the reasons for the Biblical commandments, he wrote in n 58 for a London friend, Joseph b. Jacob. In his philosophical thought neo-pla tonic ideas prevail; and astrology also had a place in his view of the world. He also wrote various works on mathematical and astronomical subjects. Ibn Ezra died on the 28th of January 1167, the place of his death being unknown.

Among the literature on Ibn Ezra may be especially mentioned : M. Friedlander, Essays on the Writings of Ibn Ezra (London, 1877); VV. Bacher, Abraham Ibn Ezra als Grammatiker (Strasburg, 1882); M. Steinschneider, Abraham Ibn Ezra,, in the Zeitschrift fiir Mathe- matik und Physik, Band xxv., Supplement: D. Rosin, Die Religions-philosophie Abraham Ibn Ezra's in vols. xlii. and xliii. of the Monat-schrift fiir Geschichte tmd Wissenschaft des Judenthums; his Diwan was edited by T. Egers (Berlin, 1886): a collection of his poems, Reime und Gcdichte, with translation and commentary, were pub- lished by D. Rosin in several annual reports of the Jewish theological Seminary at Breslau (1885-1894). (W. Ba.)

ABENSBERG, a town of Germany, in the kingdom of Bavaria, on the Abens, a tributary of the Danube, 18 m. S.W. of Regens- burg, with which it is connected by rail. Pop. 2202. It has a small spa, and its sulphur baths are resorted to for the cure of rheumatism and gout. The town is the Cas'tra Abusina of the Romans, and Roman remains exist in the neighbourhood. Here, on the 20th of April 1809, Napoleon gained a signal victory over the Austrians under the Archduke Louis and General Hiller.

ABEOKUTA, a town of British West Africa in the Egba division of the Yoruba country, S. Nigeria Protectorate. It is situated in 7° 8′ N, 3 25′ E., on the Ogun river, 64 m. N. of Lagos by railway, or 81 m. by water. Population, approxi- mately 60,000. Abeokuta lies in a beautiful and fertile country, the surface of which is broken by masses of grey granite. It is spread over an extensive area, being surrounded by mud walls 18 miles in extent. Abeokuta, under the reforming zeal of its native rulers, was largely transformed during the early years of the 20th century. Law courts, government offices, prisons and a substantial bridge were built, good roads made, and a large staff of sanitary inspectors appointed. The streets are generally narrow and the houses built of mud. There are numerous markets in which a

considerable trade is done in,, native products and articles of European manufacture. Palm- oil, timber, rubber, yams and shea-butter are the chief articles of trade. An official newspaper is published in the Yoruba and English languages. Abeokuta is the headquarters of the Yoruba branch of the Church Missionary Society, and British and American missionaries have met with some success in their civilizing work". In their schools about 2000 children are educated. The completion in 1899 of.a railway from Lagos helped not only to develop trade but to strengthen generally the in- fluence of the white man.

Abeokuta (a word meaning "under the. rocks"), dating

from 1825, owes its origin to the incessant inroads of the slave-hunters from Dahomey and Ibadan, which compelled, the village populations scattered over the open country to take refuge in this rocky stronghold against the common enemy. Here they constituted themselves a free confederacy of many distinct tribal groups, each preserving the traditional customs, religious rites and even the very names of their original villages. Yet this apparently incoherent aggregate held its grouSid suc- cessfully against the powerful armies often sent against the place both by the king of Dahomey from the west, and by the people of Ibadan from the north-east.

The district of Egba, of which Abeokuta is the capital, has an estimated area of 3000 sq. m. and a population of some 350,000. It is officially known as the Abeokuta province of the Southern Nigeria protectorate. It contains luxuriant forests of palm- trees, which constitute the chief wealth of the people. Cotton is indigenous and is grown for export. The Egbas are enthusi- astic farmers and have largely adopted European methods of cultivation. They are very tenacious of their independence, but accepted without opposition the establishment of a British protectorate, which, while putting a stop to inter-tribal warfare, slave-raiding and. human sacrifices, and exercising control over the working of the laws, left to the people executive and fiscal autonomy. The administration is in the hands of a council of chiefs which exercises legislative, executive and, to some extent, judicial functions.' The president of this council, or ruling chief — chosen from among the members of the two recognized reign- ing families — is called the alake, a word meaning "Lord of Ake," Ake being the name of the principal quarter of Abeokuta, after the ancient

capital of the Egbas. The alake exercises little authority apart from his council, the form of government being largely democratic. Revenue is chiefly derived from tolls or import duties. A visit of the alake to England in 1904 evoked considerable public interest. The chief was a man of great intelligence, eager to study western civilization, and an ardent agriculturist.

See the publications of the Church Missionary Society dealing with the Yoruba Mission; Col. A. B. Ellis's The Yoruba-speaklng Peoples (London, 1894) ; and an article on Abeokuta by Sir Wm. Macgregor, sometime governor of Lagos, in the African Society's Journal, No. xii. (London, July 1904).

ABERAVON, a contributory parliamentary and municipal borough of Glamorganshire, Wales, on the right bank of the Avon, near its mouth in Swansea Bay, nm. E.S.E. of Swansea and 170 m. from London by rail. Pop. (1901) 7553. It has a station on the Rhondda and Swansea Bay railway and is also on the main South Wales line of the Great Western, whose station, however, is at Port Talbot, half a mile distant, on the eastern side of the Avon. The valley of the Avon, which is only some three miles long, has been from about 1840 a place of much metallurgical activity. There are tinplate and engineering works within the borough. At Cwmavon, 15 m. to the north-east, are large copper-smelting works established in 1838, acquired two years later by the governor and Company of the Copper Miners of England, but now worked by the Rio Tin to Copper Company. There are also iron, steel and tinplate works both at Cwmavon and at Port Talbot, which, when; it consisted only of docks, was appropriately known as Aberavon Port.

The town derives its name from the river Avon (corrupted from Avan), which also gave its name to a medieval lordship. On the Norman conquest at Glamorgan, Caradoc, the eldest son of the defeated prince, Lestyn ab Gwrgan, continued to hold this lordship, and for the defence of the passage of the river built here a castle whose foundations are still traceable in a field near the churchyard. His descendants (who from the 13th century onwards styled themselves De Avan or D'Avene) established, under the protection of the castle, a chartered town, which in 1372 received a further charter from Edward Le Despeftser, into whose family the lordship had come on an exchange of lands. In modern times these charters were not acted^upon, the town being deemed a borough by prescription, but in r86i it was incorporated under the Municipal Corporations Act. Since 1832 it has belonged to the Swansea parliamentary dis-

trict of boroughs, uniting with Kenfig, Loughor, Neath. and Swansea to return one member; but in 1885 the older portion of Swansea was given a separate member.

ABERCARN, an urban district in the southern parliamentary division of Monmouthshire, England, 10 m. N.W. of Newport by the Great Western railway. Pop. (1901) 12,607. There are collieries, ironworks and tinplate works in the district; the town, which lies in the middle portion of the Ebbw valley, being situated on the south-eastern flank of the great mining region Of Glamorganshire and Monmouthshire.

ABERCORN, JAMES HAMILTON ist Earl 6t> (c. 1575-1618), was the eldest sOn of Claud Hamilton, Lord Paisley (4th son of James, 2nd earl of Arran, and duke of Chatelherault), and of ■ Margaret, daughter of George, 6th Lord Seton. He was made sheriff of Linlithgow in 1600, received large grants of lands in Scotland and Ireland, was created in 1603 baron of Abercorn, and on the 10th of July 1606 was rewarded for his services in the matter of the union by being made eari of Abercorn, and Baron Hamilton, Mount Castle and Kilpatrick. He married Marion, daughter of Thomas, 5th Lord Boyd, and left five sons, of whoro the eldest, baron of Strabane, succeeded him as 2nd earl of Abercorn. He died on the 23rd of March 1618. The title of Abercorn, held by the head of the Hamilton family, became a marquessate in 1790, and a dukedom in 1868, the 2nd duke of Abercorn (b. 1838) being a prominent Unionist politician and chairman of the British South Africa Company,

ABERCROMBIE, JOHN (1780-1844), Scottish physician, was the son of the Rev. George Abercrombie of Aberdeen, where he was born on the 10th of October 1780. He was edu- cated at the university of Edinburgh, and after graduating as M.D. in 1803 he settled down to practise in that city, where he soon attained a leading position. From 18 16 he published various papers in the. Edinburgh Medical and Surgical Journal, which formed the basis of his Pathological and Practical Re- searches on Diseases of the Brain and Spinal Cord, and of his Researches on the Diseases of the Intestinal Canal, Liver and other Viscera of the Abdomen, both published in 1828. He also found time for philosophical speculations, and in 1830 he pub- lished his Inquiries concerning the Intellectual Powers of Man and the Investigation of Truth, which was followed in 1833 by a sequel, The Philosophy of the Moral Feelings. Both works, though showing little originality of thought, achieved wide popularity. He died at Edinburgh on the 14th of November

1844.

ABERCROMBY, DAVID, a 17th-century Scottish physician who was sufficiently noteworthy a generation after the probable date of his death to have his Nova Medicinae Praxis reprinted at Paris in 1740. During his lifetime his Tula ac effi-cax luis venereae saepe absque ■mercurio ac semper absque salivatione mercuriali curando methodus (1684) was translated into French, Dutch and German. Two other works by him were De Pulsus Variatione (London, 1685), and A r s explorandi medicas facultates plantarum ex solo sapor e (London, 1685— 1688). His Opuscula were collected in 1687. These professional writings gave him a place and memorial in A. von Haller's Bibliotheca Medicinae Pract. (4 vols. 8vo, 1779, torn. iii. p. 619); but he claims notice rather by his remarkable controversial books in theology and philosophy than by his medical writings. Bred up at Douai as a Jesuit, he abjured popery, and published Protestancy proved Safer than Popery (London, 1686). But the most noticeable of his productions is A Discourse of Wit (London, 1685), which contains some of the most characteristic and most definitely-put metaphysical opinions of the Scottish philosophy of common sense. It was followed by Academia Scientiarum (1687), and by A Moral, Treatise of the Power of Interest (1690), dedicated to Robert Boyle. A Short Account of Scots Divines, by him, was printed at Edinburgh in 1833, edited by James Maidment. The exact date of his death is unknown, but ac-cording to Halle r he was alive early in the 18th century.

ABERCROMBY,, PATRICK (1656-c. 1716), Scottish physician and antiquarian, was the third son of Alexander Abercromby of Fetterneir in Aberdeenshire, and brother of- Francis Aber-

cromby, who was created Lord Glasford by James II. He was born at Forfar in 1656 apparently of a Roman Catholic family. Intending to become a doctor of medicine he entered the university of St Andrews, where he took his degree of M.D. in 1685, but apparently he spent most of his youthful years abroad. It has been stated that he attended the university of Paris. The Discourse of Wit (1685), sometimes assigned to him, belongs to Dr David Abercromby (?.».). On his return to Scotland, he is found practising as a physician in Edinburgh, where, besides his professional duties, he gave himself with characteristic zeal to the study of antiquities. He was appointed physician to James II. in 1685, but the revolution deprived him of the post. Living during the agitations for the union of England and Scotland, he took part in the war of pamphlets inaugurated and sustained by prominent men on

both sides of the Border, and he crossed swords with no less redoubtable a foe than Daniel Defoe in his Advantages of the Act of Security compared with those of the intended Union (Edinburgh, 1707), and A Vindication of the Same against Mr De Foe (ibid.). A minor literary work of Abercromby's was a translation of Jean de Beaugue's Histoire de la guerre d'Hcosse (1556) which appeared in 1707. But the work with which his name is perma- nently associated is his Martial Achievements of the Scots Nation, issued in two large folios, vol. i. 1711, vol. ii. 1716. In the title-page and preface to vol. i. he disclaims the ambition of being an historian, but in vol. ii., in title-page and preface alike, he is no longer a simple biographer, but an historian. Even though, read in the light of later researches, much of the first volume must necessarily be relegated to the region of the mythical, none the less was the historian a laborious and accom- plished reader and investigator of all available authorities, as well manuscript as printed; while the roll of names of those who aided him includes every man of note in Scotland at the time, from Sir Thomas Craig and Sir George Mackenzie to Alexander Nisbet and Thomas Ruddiman. The date of Aber- cromby's death is uncertain. It has been variously assigned to 1715, 1716, 1720, and 1726, and it is usually added that he left a widow in great poverty. The Memoirs of the Abercrombys, commonly attributed to him, do not appear to have been pub- lished.

See Robert Chambers, Eminent Scotsmen, s.v.; William Anderson, Scottish Nation, s.v.; Alexander Chalmers, Biog. Diet., s.v.; George Chalmers, Life of Ruddiman; William Lee, Defoe.

ABERCROMBY, SIR RALPH (1734-1801), British lieutenant- general, was the eldest son of George Abercromby of Tullibody, Clackmannanshire, and was born in October 1734. Educated at Rugby and Edinburgh University, in 1754 he was sent to Leipzig to study civil law, with a view to his proceeding to the Scotch bar. On returning from the continent he expressed a strong preference for the military profession, and a cornet's commission was accordingly obtained for him (March 1756) in the 3rd Dragoon Guards. He served with his regiment in the Seven Years' war, and the opportunity thus afforded him of studying the methods of the great Frederick moulded his military character and formed his tactical ideas. He rose through the intermediate grades to the rank of lieutenant-colonel of the regiment (1773) and brevet colonel in 1780, and in 1781 he became colonel of the King's Irish infantry. When that regi- ment was disbanded in 1783 he retired upon half pay. That up to this time he had scarcely been engaged in active service was owing mainly to his disapproval of the policy of the govern ment, and especially to his sympathies with the American colonists in their struggles for independence; and his retirement is no doubt to be ascribed to similar feelings. On leaving the army he for a time took up political life as member of .Parlia- ment for Clackmannanshire. This, however, proved uncongenial, and, retiring in favour of his brother, he settled at Edinburgh and devoted himself to the education of his children. But on France declaring war against England in 1793, he hastened to resume his professional duties; and, being esteemed one of the ablest and most intrepid officers in'the whole British forces, he was appointed to the command of a brigade under the duke of

York, for service in Holland. He commanded the advanced 1 guard in the action at Le Cateau, and was wounded at Nijmwegen. The duty fell to him of protecting the British army in its dis- astrous retreat out of Holland, in the winter of 1794-1795. In 1795 he received the honour of a knighthood of the Bath, in acknowledgment of his services. The same year he was ap- pointed to succeed Sir Charles Grey, as commander-in-chief of the British forces in the West Indies. In 1796 Grenada was suddenly attacked and taken by a detachment of the army under his orders. He afterwards obtained possession of the settlements of Demerara and Essequibo, in South America, and of the islands of St Lucia, St Vincent and Trinidad. He returned in 1797 to Europe, and, in reward for his important services, was appointed colonel of the regiment of Scots Greys, entrusted with the governments of the Isle of Wight, Fort-George and Fort- Augustus, and raised to the rank of lieutenant-general. He held, in 1 797-1 798, the chief command of the forces in Ire- land. There he laboured to

maintain the discipline of the army, to suppress the rising rebellion, and to protect the people from military oppression, with a care worthy alike of a great general and an enlightened and beneficent statesman. When he was appointed to the command in Ireland, an invasion of that country by the French was confidently anticipated by the English govern- ment. He used his utmost efforts to restore the discipline of an army that was utterly disorganized; and, as a first step, he anxiously endeavoured to protect the people by re-establishing the supremacy of the civil power, and not allowing the military to be called out, except when it was indispensably necessary for the enforcement of the law and the maintenance of order. Finding that he received no adequate support from the head of the Irish government, and that all his efforts were opposed and thwarted by those who presided in the councils of Ireland, he resigned the command. His departure from Ireland was deeply lamented by the reflecting portion of the people, and was speedily followed by those disastrous results which he had anticipated, and which he so ardently desired and had so wisely endeavoured to prevent. After holding for a short period the office of com- mander-in-chief in Scotland, Sir Ralph, when the enterprise against Holland was resolved upon in 1799, was again called to command under the duke of York. The campaign of 1799 ended in disaster, but friend and foe alike confessed that the most decisive victory could not have more conspicuously proved the talents of this distinguished officer. His country applauded the choice when, in 1801, he was sent with an army to dispossess the French of Egypt. His experience in Holland and the West Indies particularly fitted him for this new command, as was proved by his carrying his army in health, in spirits and with the requisite supplies, in spite of very great difficulties, to the destined scene of action. The debarkation of the troops at Aboukir, in the face of strenuous opposition, is justly ranked among the most daring and brilliant exploits of the English army. A battle in the neighbourhood of Alexandria (March 21, 1 801) was the sequel of this successful landing, and it was Abercromby's fate to fall in the moment of victory. He was struck by a spent ball, which could not be extracted, and died seven days after the battle. His old friend and commander the duke of York paid a just tribute to the great soldier's memory in general orders: "His steady observance of discipline, his ever-watchful attention to the health and wants of his troops, the persevering and unconquerable spirit which marked his military career, the splendour of his actions in the field and the heroism of his death, are worthy the imitation of all who desire, like him, a life of heroism and a death of glory." By a vote of the House of Commons, a monument was erected in his honour in St Paul's cathedral. His widow was created Baroness Aber- cromby of Tullibody

and Aboukir Bay, and a pension of £2000 a year was settled on her and her two successors in the title. _

A memoir of the later years of his life (1793-1801) by his third son, James (who was Speaker of the House of Commons, 1835-1S39, and became Lord Dunfermline), was published in 1861. For a shorter account of Sir Ralph Abercromby see Wilkinson, Twefa British Soldiers (London, 1899).

ABERDARE, HENRY AUSTIN BRUCE, isx Baron (1815-

1895), English statesman, was born at Dufiryn, Aberdare, Glamorganshire, on the 16th of April 181 5, the son of John Bruce, a Glamorganshire landowner. John Brace's original family name was Knight, but on coming of age in 1805 he assumed the name of Bruce, his mother, through whom he in- herited the Duffryn estate, having been the daughter of William Bruce, high sheriff of Glamorganshire. Henry Austin Bruce was educated at Swansea grammar school, and in 1837 was called to the bar. Shortly after he had begun to practise, the discovery of coal beneath the Duffryn and other Aberdare Valley estates brought the family great wealth. From 1847 to 1852 he was stipendiary magistrate for Merthyr Tydvil and Aberdare, resigning the position in the latter year, when he entered parliament as Liberal member for Merthyr Tydvil. In 1862 he became under-secretary for the home department, and in 1869, after losing his seat at Merthyr Tydvil, but being re-elected for Renfrewshire, he was made home secretary by W. E. Gladstone. His tenure of this office was conspicuous for a reform of the licensing laws, and he was responsible for the Licensing Act of 1872, which constituted the magistrates the licensing authority, increased the penalties for misconduct in public-houses and shortened the number of hours for the sale of drink. In 1873 he relinquished the home secretaryship, at Gladstone's request, to become lord president of the council, and was almost *imultaneously raised to the peerage as Baron Aberdare. The defeat of the Liberal government in the following year terminated Lord Aberdare's official political life, and he sub- sequently-devoted himself to social, educational and economic questions. In 1876 he was elected F.R.S.; from 1878 to 1892 he was president of the Royal Historical Society; and in 1881 he became president of the Royal Geographical Society. In 1882 he began a connexion with West Africa which lasted the rest of his life, by accepting the chairmanship of the National African

Company, formed by Sir George Taubman Goldie, which in 1886 received a charter under the title of the Royal Niger Company and in 1899 was taken over by the British government, its territories being constituted the protectorate of Nigeria. West African affairs, however, by no means exhausted Lord Aberdare's energies, and it was principally through his efforts that a charter was in 1894 obtained for the university of Wales at Cardiff. Lord Aberdare, who in 1885 was made a G.C.B., presided over several Royal Commissions at different times. He died in London on the 25th of February 1895. His second wife was the daughter of Sir William Napier, the historian of the Peninsular war, whose Life he edited.

ABERDARE, a market town of Glamorganshire, Wales, situated (as the name implies) at the confluence of the Dar and Cynon, the latter being a tributary of the Taff. Pop. of urban district (1901), 43,365. It is 4 m. S.W. of Merthyr Tydvil, 24 from Cardiff and 160 from London by rail. It has a station on the Pontypool and Swansea section of the Great Western railway, and is also served by the Llwydcoed and Abernant stations which are on a branch line to Merthyr. The Taff Vale line (opened 1846) has a terminus in the town. The Glamorgan canal has also a branch (made in 181 1) running from Abercynon to Aberdare. From being, at the beginning of the 19th century, a mere village in an agricultural district, the place grew rapidly in population owing to the abundance of its coal and iron ore, and the population of the whole parish (which was only i486 in 1801) increased tenfold during the first half of the century. Iron- works were established at Llwydcoed and Abernant in 1799 and 1800 respectively, followed by others at Gadlys and Aberaman in 1827 and 1847. These have not been worked since about 1875, and the only metal industries remaining in the town are an iron foundry or two and a small tinplate works at Gadlys (established in 1868). Previous to 1836, most of the coal worked in the parish was consumed locally, chiefly in the ironworks, but in that year the working of steam coal for export was begun, pits were sunk in rapid succession, and the coal trade, which at least since 1875 has been the chief support of the town, soon reached huge dimensions. There are also several brickworks and breweries. During the latter half of the 19th century,

considerable public improvements were effected in the town, making it, despite its neighbouring collieries, an agreeable place of residence. Its institutions included a post-graduate theo- logical college (opened in connexion with the Church of England in 1892, until 1907, when it was removed to Llandaff). There is a public park of fifty acres with two small lakes. Aberdare, with the ecclesiastical parishes of St Fagan's (TrecynOn) and Aberaman carved out of the ancient parish,

has some twelve Anglican churches, one Roman Catholic church (built in 1866 in Monk Street near the site of a cell attached to Penrhys Abbey) and over fifty Nonconformist chapels. The services in the majority of the chapels are in Welsh. The whole parish falls within the parliamentary borough of Merthyr Tydvil. The urban district includes what were once the separate villages of Aberaman, Abernant, Cwmbach, Cwmaman, Cwmdare, Llwyd- coed and Trecyhon. There are several cairns and the remains of a circular British encampment on the mountain between Aberdare and Merthyr. Hirwaun moor, 4 m. to the N.W. of Aberdare, was according to tradition the scene of a battle at which Rhys ap Jewdwr, prince of Dyfed, was defeated by the allied forces of the Norman Robert Fitzhamon and Iestyn ab Gwrgan, the last prince of Glamorgan.

ABERDEEN, GEORGE GORDON, ist Earl of (1637-1720), lord chancellor of Scotland, son of Sir John Gordon, ist baronet of Haddo, Aberdeenshire, executed by the Presbyterians in 1644, was born on the 3rd of October 1637. He graduated M.A., and was chosen professor at King's College, Aberdeen, in 1658. Subsequently he travelled and studied civil law abroad. At the Res oration the sequestration of his father's lands was annulled, and in 1665 he succeeded by the death of his elder brother to the baronetcy and estates. He returned home in 1667, was admitted advocate in 1668 and gained a high-legal reputation. He represented Aberdeenshire in the Scottish parliament of 1669 and in the following assemblies, during his first session strongly opposing the projected union of the two legislatures. In November 1678 he was made a privy councillor for Scotland, and in 1680 was raised to the bench as Lord Haddo. He was a leading member of the duke of York's administration, was created a lord of session in June and in November 1681 president of the court. The same year he is reported as moving in the council for the torture of witnesses. 1 In 1682 he was made lord chancellor of Scotland, and was created, on the 13th of November, earl of Aberdeen, Viscount Formartine, and Lord Haddo, Methlick, Tarves and Kellie, in the Scottish peerage, being appointed also sheriff principal of Aberdeenshire and Midlothian. Burnet reflects unfavourably upon him, calls him " a proud and covetous man," and declares " the new chancellor exceeded all that had gone before him." 2 He executed the laws enforcing religious conformity with severity, and filled the parish churches, but resisted the excessive measures of tyranny pre- scribed by the English government; and in consequence of an intrigue of the duke of Queensberry and Lord Perth, who gained the duchess of Portsmouth with a present of £27,000, he was dismissed in 1684. After his fall he was subjected to various petty

prosecutions by his victorious rivals with the view of discovering some act of maladministration on which to found a charge against him, but the investigations only served to strengthen his credit. He took an active part in parliament in 1685 and 1686, but remained a non-juror during the whole of William's reign, being frequently fined for his non-attendance, and took the oaths for the first time after Anne's accession, on the nth of May 1703. In the great affair of the Union in 1707, while protesting against the Completion of the treaty till the act declaring the Scots aliens should be repealed, he refused to support the opposition to the measure itself and refrained from attending parliament when the treaty was settled. He died on the 20th of April 1720, after having amassed a large fortune. He is described by John Mackay as " very knowing in the laws and constitution of his country and" is believed to be the solidest statesman in Scotland, a fine orator, speaks slow but sure."

1 Sir J. Lauder's Hist. Notices (Bannatyne Club, 1848), p. 297. 2 Hist, of his own Times, i. 523.

His person was said to be deformed, and his " want of mine or deportment " was alleged as a disqualification for the office of lord chancellor. He married Anne, daughter and sole heiress of George Lockhart of Torbrecks, by whom he had six children, his only surviving son, William, succeeding him as 2nd earl of Aberdeen.

See Letters to George, earl of Aberdeen (with memoir: Spalding Club, 1851); Hist. Account of the Senators of the College of Justice, by G. Brunton and D. Haig (1832), p. 4.08; G. Crawfurd's Lives of the Officers of State (1726), p. 226; Memoirs of Affairs in Scotland, by Sir G. Mackenzie (182 1), p. 148; Sir J. Lauder's (Lord Fountainhall) Journals (Scottish Hist. Society, vol. xxxvi., 1900); J. Mackay's Memoirs (1733), p. 215; A. Lang's Hist, of Scotland, iii. 369, 376.

(P. C. Y.) '

ABERDEEN, GEORGE HAMILTON GORDON, 4TH Earl of (1784-1860), English statesman, was the eldest son of George Gordon, Lord Haddo, by his wife Charlotte, daughter of William Baird of Newbyth, Haddingtonshire, and grandson of George, 3rd earl of Aberdeen. Born in Edinburgh on the 28th of January 1784, he lost his father in 1791 and his mother in 1795; and as his grandfather

regarded him with indifference, he went to reside with Henry Dundas, afterwards Viscount Melville. At the age of fourteen he was permitted by Scotch law to name his own curators, or guardians, and selecting William Pitt and Dundas for this office he spent much of his time at their houses,, thus meeting many of the leading politicians of the day. He was educated at “Harrow, and St John’s College, Cambridge, where he graduated as a nobleman in 1804. Before this time, however, he had become earl of Aberdeen on his grandfather’s death in 1801, and had travelled over a large part of the continent of Europe, meeting on bis journeys Napoleon Bonaparte and other persons of distinction. He also spent some time in Greece, and on his return to England founded the Athenian Society, member- ship of which was confined to those who had travelled in that country. Moreover, he wrote an article in the Edinburgh Review of July 1805 criticizing Sir William Gill’s Topography of Troy, and these circumstances led Lord Byron to refer to him in English Bards and Scotch Reviewers as ” the travell’d thane, Athenian Aberdeen.” Having attained his majority in 1805, he married on the 28th of July Catherine Elizabeth Hamilton, daughter of John James, 1st marquess of Abercorn. In De- cember 1806 he was elected a representative peer for Scotland, and took his seat as a Tory in the House of Lords, but for some years he took only a slight part in public business. However, by his birth, his abilities and his connexions alike he was marked out for a high position, and after the death of his wife in February 18 1 2 he was appointed ambassador extraordinary and minister plenipotentiary at Vienna, where he signed the treaty of Toplitz between Great Britain and Austria in October 1813 ; and accompanying the emperor Francis I. through the subsequent campaign against France, he was present at the battle of Leipzig. He Was one of the British representatives at the congress of Chatillon in February 1814, and in the same capacity was present during the negotiations which led to the treaty of Paris in the following May. Returning home he was created a peer of the United Kingdom as Viscount Gordon of Aberdeen (1814), and made a member of the privy council. On the 15th of July 18 15 he married Harriet, daughter of the Hon. John Douglas, and widow of James, Viscount Hamilton, and thus became doubly connected with the family of the marquess of Abercorn. During the ensuing thirteen years Aberdeen took a less prominent part in public affairs, although he succeeded in passing the Entail (Scotland) Act of 1825. He kept in touch, however, with foreign politics, and having refused to join the ministry of George Canning in 1827, became a member of the cabinet of the duke of Wellington as chancellor of the duchy of Lancaster in January 1828. In the following June he was transferred to the office of secretary of state for foreign affairs, and having acquitted himself with

credit with regard to the war between Russia and Turkey, and to affairs in Greece, Portugal and France, he resigned with Wellington in November 1830, and shared his leader's attitude towards the Reform Bill of 1832. As a Scotsman, Aberdeen was interested in the ecclesiastical controversy which culminated

in the disruption of 1843. In 1840 he introduced a bill to settle the vexed question of patronage; but disliked by a majority in the general assembly of the Scotch church, and unsupported by the government, it failed to become law, and some opprobrium was cast upon its author. In 1843 he brought forward a similai measure " to remove doubts respecting the admission of ministers to benefices." This Admission to Benefices Act, as it was called, passed into law, but did not reconcile the opposing parties.

During the short administration of Sir Robert Peel in 1834 and 1835, Aberdeen had filled the office of secretary for the colonies, and in September 1841 he took office again under Peel, on this occasion as foreign secretary; » the five years during which he held this position were the most fruitful and successful of his public life. He owed his success to the confidence placed in him by Queen Victoria, to his wide knowledge of European politics, to his intimate friendship with Guizot, and not least to his own conciliatory disposition. Largely owing to his efforts, causes of quarrel between Great Britain and France in Tahiti, over the marriage of Isabella II. of Spain, and in other direc- tions, were removed. More important still were his service's in settling the question of the boundary between the United States and British North America at a time when a single in- judicious word would probably have provoked a war. In 1845 he supported Peel when in a divided cabinet he proposed to suspend the duty on foreign corn, and left office with that minister in July 1846. After Peel's death in 1850 he became the recognized leader of the Peelites, although since his resigna- tion his share in public business had been confined to a few speeches on foreign • affairs. His dislike of the Ecclesiastical Titles Assumption Bill, the rejection of which he failed to secure in 1851, prevented him from joining the government of Lord John Russell, or from forming an administration himself in this year. In December 1852, however, be became first lord of the treasury and head of a coalition ministry of Whigs and Peelites. Although united on free trade and in general on ques- tions of domestic reform, a cabinet which contained Lord Palmerston and Lord John Russell, in addition to Aberdeen, was certain to differ on questions of foreign policy. The strong and masterful character of these and other colleagues made the task of the prime minister one of unusual difficulty, a fact which was recognized by contemporaries. Charles Greville in his Memoirs says, "

In the present cabinet are five or six first-rate men of equal, or nearly equal, pretensionˆ none of them- likely to acknowledge the superiority or defer to the opinions of any other, and every one of these five or six considering himself abler and more important than their premier"; and Sir James Graham wrote, " It is a powerful team, but it will require good driving." The first year of office passed off successfully, and it was owing to the steady support of the prime minister that Gladstone's great budget of 1853 was accepted by the cabinet. This was followed by the outbreak of the dispute between France and Turkey over the guardianship of the holy places at Jerusalem, which, after the original cause of quarrel had" been forgotten, developed into the Crimean war. The tortuous negotiations which preceded the struggle need not- be discussed here, but in defence of Aberdeen it may be said that he hoped and strove for peace to the last. Rightly or wrongly, however, he held that Russell was indispensable to the cabinet, and that a resignation would precipitate war. His outlook, usually so clear, was blurred by these, considerations, and he lacked the strength to force the suggestions which he made in the autumn of 1853 upon his imperious colleagues. Palmerston, supported by Russell and well served by Lord Stratford de Redcliffe, British ambassador at Constantinople, favoured a more aggres- sive policy, and Aberdeen, unable to control Palmerston, and unwilling to let Russell go, cannot be exonerated from blame. When the war began he wished to prosecute it vigorously; but the stories of misery and mismanagement from the seat of war deprived the ministry of public favour. Russell' resigned; and on the 29th of January 1855 a motion by J. A. Roebuck, fqr the appointment of a select committee to enquire into the con- duct of the war £ was carried in the House of Commons by a

large majority. Treating this as a vote of want of confidence Aberdeen at once resigned office, and the queen bestowed upon him the order of the Garter. He smoothed the way for Palmerston to succeed him, and while the earl of Clarendon re- mained at the foreign, office he aided him with advice and was consulted on matters of moment. He died in London on the 14th of December i860, and was buried in the family vault at Stanmore. By his first wife he had one son and three daughters, all of whom predeceased their father. By his second wife, who died in August 1833, he left four sons and one daughter. His eldest son, George John James, succeeded as 5th earl; his second son was General Sir Alexander Hamilton-Gordon, K.C.B.; his third son was

the Reverend Douglas Hamilton-Gordon; and his youngest son Arthur Hamilton, after holding various high offices under the crown, was created Baron Stanmore in 1893. Among the public offices held by the earl were those of lord- lieutenant of Aberdeenshire, president of the society of Anti- quaries from 1812 to 1846 and fellow of the Royal Society.

Aberdeen was a distinguished scholar with a retentive memory and a wide knowledge of literature and art. His private life was exemplary, and he impressed his contemporaries with the loftiness of his character. Hi's manner was reserved, and as a speaker he was weighty rather than eloquent. In public life he was remarkable for his generosity to his political opponents, and for his sense of justice and honesty. He did not, however, possess the qualities which impress the populace, and he iacked the strength which is one of the essential gifts of a statesman. His character is perhaps best described by a writer who says " his strength was not equal to his goodness." His foreign policy was essentially one of peace and non-intervention, and in pursuing it he was accused of favouring the despotisms of Europe. Aberdeen was a model landlord. By draining the land, by planting millions of trees and by erecting numerous build- ings, he greatly improved the condition of his Aberdeenshire estates, and studied continually the welfare of his dependants. A bust of him by Matthew Noble is in Westminster Abbey, and his portrait was painted by Sir Thomas Lawrence. He wrote An Inquiry into the Principles of Beauty in Grecian Architecture (London, 1822), and the Correspondence of the Earl of Aberdeen has been printed privately under the direction of his son, Lord Stanmore.

The 6th earl, George (1841-1870), son of the 5th earl, was drowned at sea, and was succeeded by his brother John Campbell Gordon, 7th earl of Aberdeen (b. 1847), a prominent Liberal politician, who was lord-lieutenant of Ireland in 1886, governor- general of Canada 1893-1898, and again the lord-lieutenant of Ireland when Sir Henry Campbell-Bannerman formed his ministry at the close of 1905.

See Lord Stanmore, The Earl of Aberdeen (London, 1893); C. C. F. Greville, Memoirs, edited by H. Reeve (London, 1888); Spencer Walpole, History of England (London, 1878-1886), and Life of Lord John Russell (London, 1889) ; A. W. Kinglake, Invasion of the Crimea (London, 1877-1888); Sir T. Martin, Life of the Prince Consort (London, 1875-1880); J. Morley, Life of Gladstone (London, 1903). (A. W, H.*)

ABERDEEN, a royal burgh, city and county of a city, capital of

Aberdeenshire, and chief seaport in the north of Scotland. It is the fourth Scottish town in population, industry and wealth, and stands on a bay of the North Sea, between the mouths of the Don and Dee, 1305 m. N. E. of Edinburgh by the North British railway. Though Old Aberdeen, extending from the city suburbs to the southern banks of the Don, has a separate charter, privileges and history, the distinction between it and New Aberdeen can no longer be said to exist; and for parlia- mentary, municipal and other purposes, the two towns now form practically one community. Aberdeen's popular name of the " Granite City " is justified by the fact that the bulk of the town is built of granite, but to appreciate its more poetical designation of the " Silver City by the Sea," it should be seen after a heavy rainfall when its stately structures and countless houses gleam pure and white under the brilliant sunshine. The area of the city extends to 6602 acres, the burghs of Old Aberdeen and Woodside, and the district, of Torry (for parliamentary purposes

in the constituency of Kincardineshire) to the south of the Dee, having been incorporated in 1891. The city comprises eleven wards and eighteen ecclesiastical parishes, and is under the jurisdiction of a council with lord provost, bailies, treasurer and dean of guild. The corporation owns the water (derived from the Dee at a spot 21 m. W.S.W. of the city) and gas supplies, ■ electric lighting and tramways. Since 1885 the city has returned two members to Parliament. Aberdeen is served by the Cale- donian, Great North of Scotland and North British railways (occupying a commodious joint railway station), and there is regular communication by sea with London and the chief ports on the eastern coast of Great Britain and the northern shores of the Continent. The mean temperature of the city for the year is 45'8° F., for summer 56 F., and for winter 37-3° F. The average yearly rainfall is 30-57 inches. The city is one of the healthiest in Scotland.

Streets and Buildings. — Roughly, the extended city runs north and south. From the new bridge of Don to the " auld brig " of Dee there is tramway communication via King Street, Union Street and Holburn Road — a distance of over five miles. Union Street is one of the most imposing thoroughfares in the British Isles. From Castle Street it runs W. S. W. for nearly a mile, is 70 ft. wide, and contains the principal shops and most of the modern public buildings, all of granite. Part of the street crosses the Denburn ravine (utilized for the line of the Great North of Scotland railway) by a fine granite arch of 132 ft. span, portions of the older town still fringing the gorge, fifty feet below the level of Union Street. Amongst the more conspicuous secular buildings in the street may be mentioned the Town and County Bank, the Music

Hall, with sitting accommodation for 2000 persons, the Trinity Hall of the incorporated trades (origin- ating in various years between 1398 and 1527, and having charit- able funds for poor members, widows and orphans), containing some portraits by George Jamesone, a noteworthy set of carved oak chairs, dating from 1574, and the shields of the crafts with quaint inscriptions; the office of the Aberdeen Free Press, one of the most influential papers in the north of Scotland; the Palace Hotel; the office of the Northern Assurance Company, and the National Bank of Scotland. In Castle Street, a con- tinuation eastwards of Union Street, are situated the Municipal and County Buildings, one of the most splendid granite edifices in Scotland, in the Franco-Scottish Gothic style, built in 1867-1878. They are of four stories and contain the great hall with an open timber ceiling and oak-panelled walls; the Sheriff Court House; the Town Hall, with excellent portraits of Prince Albert (Prince Consort), the 4th earl of Aberdeen, the various lord provosts and other distinguished citizens. In the vestibule of the en- trance corridor stands a suit of black armour believed to have been worn by Provost Sir Robert Davidson, who fell in the battle of Harlaw, near Inverurie, in 141 1. From the south-western corner a grand tower rises to a height of 210 ft., commanding a fine view of the city and surrounding country. Adjoining the- municipal buildings is the North of Scotland Bank, of Greek design, with a portico of Corinthian columns, the capitals of which are exquisitely carved. On the opposite side of the street is the fine building of the Union Bank. At the upper end of Castle Street stands the Salvation Army Citadel, an effective castellated mansion, the most imposing ” barracks ” possessed anywhere by this organization. In front of it is the Market Cross, a beautiful, open-arched, hexagonal structure, 21 ft. in diameter and 18 ft. high. The original was designed in 1682 by John Montgomery, a native architect, but in 1842 it was removed hither from, its old site and rebuilt in a better style. On the entablature surmounting the Ionic columns are panels contain- ing medallions of Scots sovereigns from James I. to James VII. From the centre rises a shaft, 125 ft. high, with a Corinthian capital on which is the royal unicorn rampant. On an eminence east of Castle Street are the military barracks. In Market Street are the Mechanics’ Institution, founded in 1824, with a good, library; the Post and Telegraph offices; and the Market, where provisions of all kinds and general wares are sold. The Fish Market, on the Albert Basin, is a busy scene in the early morning.

The Art Gallery and Museum at Schoolhill, built in the Italian

Renaissance style of red and brown granite, contains an excellent collection of pictures, the Macdonald Hall of portraits of contemporary artists by themselves being of altogether exceptional interest and unique of its kind in Great Britain. The public library, magnificently housed, contains more than 60,000 volumes. The theatre in Guild Street is the chief seat of dra- matic, as the Palace Theatre in Bridge Place is of variety enter- tainment. The new buildings of Marischal College fronting Broad Street, opened by King Edward VII. in 1906, form one of the most splendid examples of modern architecture in Great Britain; the architect, Alexander Marshall Mackenzie, a native of Aberdeen, having adapted his material, white granite, to the design of a noble building with the originality of genius.

Churches. — Like most Scottish towns, Aberdeen is well equipped with churches, most of them of good design, but few of special interest. The East and West churches of St Nicholas, their kirkyard separated from Union Street by an Ionic facade, 1475 ft. long, built in 1830, form one continuous building, 220ft. in length, including the Drum Aisle (the ancient burial-place of the Irvines of Drum) and the Collison Aisle, which divide them and which formed the transept of the 12th-century church of St Nicholas. The West Church was built in 1775, in the Italian style, the East originally in 1834 in the Gothic. In 1874 a fire destroyed the, East Church and the old central tower with its fine peal of nine bells, one of which, Laurence or “Lowrie,” was 4 ft. in diameter at the mouth, 35 ft. high and very thick. The church was rebuilt and a massive granite tower erected over the intervening aisles at the cost of the municipality, a new peal of 36 bells, cast in Holland, being installed to com- memorate the Victorian jubilee of 1887. The Roman Catholic Cathedral in Huntly Street, a Gothic building, was erected in 1859. The see of Aberdeen was first founded at Mortlach in Banffshire by Malcolm II. in 1004 to celebrate his victory there over the Danes, but in 113 7 David I. transferred the bishopric to Old Aberdeen, and twenty years later the cathedral of St Machar, situated a few hundred yards from the Don, was begun. Save during the episcopate of William Elphinstone (1484-1511), the building progressed slowly. Gavin Dunbar, who followed him in 15 18, was enabled to complete the structure by adding the two western spires and the southern transept. The church suffered severely at the Reformation, but is Still used as the parish church. It now consists of the nave and side aisles. It is chiefly built of outlayer granite, and, though the plainest cathedral in Scotland, its stately simplicity and severe symmetry lend it unique distinction. On the flat panelled ceiling, of the nave are the heraldic shields of the princes, noblemen

and bishops who shared in its erection, and the great west window contains modern painted glass of excellent colour and design. The cemeteries are St Peter's in Old Aberdeen, Trinity near the links, Nellfield at the junction of Great Western and Holburn Roads, and Allenvale, very tastefully laid out, adjoining Duthie Park.

Education. — Aberdeen University consists of King's College in Old Aberdeen, founded by Bishop Elphinstone in 1494, and Marischal College, in Broad Street, founded in 1593 by George Keith, 5th earl Marischal, which were incorporated in i860. Arts and divinity are taught at King's, law, medicine and science at Marischal. The number of students exceeds 800 yearly. The buildings of both colleges are the glories of Aberdeen. King's forms a quadrangle with interior court, two sides of which have been rebuilt, and a library wing has been added. The Crown Tower and the Chapel, the oldest parts, date from 1500. The former is surmounted by a structure about 40 ft. high, consisting of a six-sided lantern and royal crown, both sculptured, and resting on the intersections of two arched ornamental slips rising from the four corners of the top of the tower. The choir of the chapel still contains the original oak canopied stalls, miserere seats and lofty open screens in the French flamboyant style, and of unique beauty of design and execution. Their preservation was due to the enlightened energy of the principal at the time of the Reformation, who armed his folk to save the

building from the barons of the Mearns after they had robbed St Machar's of its bells and lead. Marischal College is a stately modern building, having been rebuilt in 1836-1841, and greatly extended several years later at a cost of £100,000. The additions to the buildings opened by King Edward VII. in 1906 have been already mentioned. The beautiful Mitchell Tower is so named from the benefactor (Dr Charles Mitchell) who provided the splendid graduation hall. The opening of this tower in 1895 signalized the commemoration of the four hundredth anniversary of the foundation of the university. The University Library comprises nearly 100,000 books. A Botanic Garden was pre- sented to the university in 1899. Aberdeen and Glasgow Uni- versities combine to return one member to Parliament. The United Free Church Divinity Hall in Alford Place, in the Tudor Gothic style, dates from 1850. The Grammar School, founded in 1263, was removed in 1 861-1863 from its old quarters in Schoolhill to a large new building, in the Scots Baronial style, off Skene Street. Robert Gordon's College in Schoolhill was founded in 1729 by Robert Gordon of Straloch and further endowed in 1816 by Alexander Simpson of Collyhill. Originally devoted (as Gordon's Hospital) to the instruction and maintenance of the sons of poor

burgesses of guild and trade in the city, it was re- organized in 1 88 1 as a day and night school for secondary and technical education, and has since been unusually successful. Besides a High School for Girls and numerous board schools, there are many private higher-class schools. Under the Endow- ments Act 1882 an educational trust was constituted which possesses a capital of £155,000. At Blairs, in Kincardineshire, five miles S. W. of Aberdeen, is St Mary's Roman Catholic College for the training of young men intended for the priesthood.

Chirities. — The Royal Infimary, in Woolmanhill, established in 1740, rebuilt in the Grecian style in 1833-1840, and largely extended after 1887 as a memorial of Queen Victoria's jubilee; the Royal Asylum, opened in 1800; the Female Orphan Asylum, in Albyn Place, founded in 1840; the Blind Asylum, in Huntly Street, established in 1843; the Royal Hospital for Sick Chil- dren; the Maternity Hospital, founded in 1823; the City Hospital for Infectious Diseases; the Deaf and Dumb Institu- tion;' Mitchell's Hospital in Old Aberdeen; the East and West Poorhouses, with lunatic wards; and hospitals devoted to specialized diseases, are amongst the most notable of the charit- able institutions. There are, besides, industrial schools for boys and girls and for Roman Catholic children, a Female School of Industry, the Seabank Rescue Home, Nazareth House and Orphanage, St Martha's Home for Girls, St Margaret's Conva- lescent Home and Sisterhood, House of Bethany, the Convent of the Sacred Heart and the Educational Trust School.

Parks and Open Spaces. — Duthie Park, of 50 acres, the gift of Miss Elizabeth Crombie Duthie of Ruthrieston, occupies an excellent site on the north bank of the Dee. Victoria Park (13 acres) and its extension Westburn Park (13 acres) are situated in the north-western area; farther north lies Stewart Park (n acres), called after Sir D. Stewart, lord provost in 1893. The capacious links bordering the sea between the mouths of the two rivers are largely resorted to for open-air recreation; there is here a rifle range where a " wapinschaw," or shooting tourna- ment, is held annually. Part is laid out as an 18-hole golf course; a section is reserved for cricket and football; a portion has been railed off for a race-course, and a bathing-station has been erected. Union Terrace Gardens are a popular rendezvous in the heart of the city.

Statues. — In Union Terrace Gardens stands a colossal statue in bronze of Sir William Wallace, by W. G. Stevenson, R.S.A. (1888). In the same gardens are a bronze statue of Burns and Baron Marochetti's seated figure of Prince Albert. In front of Gordon's College is the bronze statue, by T. S. Burnett, A.R.S.A., of General Gordon (1888). At

the east end of Union Street is the bronze statue of Queen Victoria, erected in 1893 by the royal tradesmen of the city. Near the Cross stands the granite statue of the 5th duke of Gordon (d. 1836). Here may also be mentioned the obelisk of Peterhead granite, 70 ft. high, erected in the square of Marischal College to the memory of Sir James

M'Grigor (1778-1851), the military surgeon and director-general of the Army Medical Department, who was thrice elected lord rector of the College.

Bridges. — The Dee is crossed by four bridges-, — the old bridge, the Wellington suspension bridge, the railway bridge, and Vic- toria Bridge, opposite Market Street. The first, till 1832 the only access to the city from the south, consists of seven semi- circular ribbed arches, is about 30 ft. high, and was built early in the 16th century by Bishops Elphinstone and Dunbar. It was nearly all rebuilt in 1718-1723, and in 1842 was widened from 14I to 26 ft. The bridge of Don has five granite arches, each 75 ft. in span, and was built in 1827-1832. A little to the west is the Auld Brig o' Balgownie, a picturesque single arch spanning the deep black stream, said to have been built by King Robert I., and celebrated by Byron in the tenth canto of Don Juan.

Harbour. — A defective harbour, with a shallow sand and gravel bar at its entrance, long retarded the trade of Aberdeen, but under various acts since 1773 it was greatly deepened. The north pier, built partly by Smeaton in 1775-1781, and partly by Telford in 1810-1815, extends nearly 3000 ft. into the North Sea. It increases the depth of. water on the bar from a few feet to 22 or 24 ft. at spring tides and to 17 or 18 ft. at neap. A wet dock, of 29 acres, and with 6000 ft. of quay, was completed in 1848 and called Victoria Dock in honour of the queen's visit to the city in that year. Adjoining it is the Upper Dock. By the Harbour Act of 1868, the Dee near the harbour was diverted from the south at a cost of £80,000, and 90 acres of new ground (in addition to 25 acres formerly made up) were provided on the north side of the river for the Albert Basin (with a graving dock), quays and warehouses. A breakwater of concrete, 1050 ft. long, was constructed on the south side of the stream as a protection against south-easterly gales. On Girdleness, the southern point of the bay, a lighthouse was built in 1833. Near the harbour mouth are three batteries mounting nineteen guns.

Industry. — Owing to the variety and importance of its chief industries Aberdeen is one of the most prosperous cities in Scotland. Very durable grey granite has been quarried near Aberdeen for more than 300 years, and blocked and dressed paving " setts," kerb and building stones, and monumental and other ornamental work of granite have long been exported from the district to all parts of the world. This, though once the predominant industry, has been surpassed by the deep-sea fisheries, which derived a great impetus from beam-trawling, introduced in 1882, and steam line fishing in 2889, and threaten to rival if not to eclipse those of Grimsby. Fish trains are despatched to London daily. Most of the leading industries date from the 18th century, amongst them woollens (1703), linen (1749) and cotton (1779). These give employment to several thousands of operatives. The paper-making industry is one of the most famous and oldest in the city, paper having been first made in Aberdeen in 1694. Flax-spinning and jute and comb- making factories are also very flourishing, and there are suc- cessful foundries and engineering works. There are large distilleries and breweries, and chemical works employing many hands. In the days of wooden ships ship-building was a flourish- ing industry, the town being noted for its fast clippers, many of which established records in the " tea races." The introduction of trawling revived this to some extent, and despite the distance of the city from the iron fields there is a fair yearly output of iron vessels. Of later origin are the jam, pickle and potted meat factories, hundreds of acres having been laid down in strawberries and other fruits within a few miles of the city.

History. — Aberdeen was an important place as far back as the 1 2th century. William the Lion had a residence in the city, to which he gave a charter in n 79 confirming the corporate rights granted by David I. The city received other royal charters later. It was burned by the English king, Edward III., in 1336, but it was soon rebuilt and extended, and called New Aberdeen. The burgh records are the oldest in Scotland. They begin in 1398 and with one brief break are complete to the present day. For many centuries the city was subject to attacks by the neighbouring barons, and was strongly fortified,

but the gates were all removed by 1770. In 1497 a blockhouse was built at the harbour mouth as a protection against the English. During the struggles between the Royalists and Covenanters the city was impartially plundered by both sides. In 1 71 5 the Earl Marischal proclaimed the Old Pretender at Aberdeen, and in 1745 the duke of Cumberland resided for a short time in the city before attacking the Young Pretender. The motto on the city arms is " Bon Accord," which formed the watchword of the Aberdonians while aiding Robert Bruce

in his battles with the English.

Population. — In 1396 the population was about 3000. By 1801 it had become 26,992; in 1841 it was 63,262; (1891) 121,623;

(1901) 153,503-

Authorities. — The charters of the burgh; extracts from the council register down to 1625, and selections from the letters, guildry and treasurer's accounts, forming 3 vols, of the Spalding Club; Cosmo Innes, Registrum Episcopatus Aberdenensis, Spalding Club ; Walter Thorn, The History of Aberdeen (1811); Robert Wilson, Historical Account and Delineation of Aberdeen (1822); William Kennedy, The Annals of Aberdeen (1818); Orem, Description of the Chanonry, Cathedral and King's College of Old Aberdeen, 1724-1725 (1830) ; Sir Andrew Leith Hay of Rannes, The Castellated Architecture of A berdeen ; Giles, Specimens of Old Castellated Houses of A berdeen (1838); James Bryce, Lives of Eminent Men of Aberdeen (1841); J. Gordon, Description of Both Towns of Aberdeen (Spalding Club, 1842) ; Joseph Robertson, The Book of Bon-Accord (Aberdeen, 1839) ; W. Robbie, Aberdeen: its Traditions and History (Aberdeen, 1893); C. G. Burr and A. M. Munro, Old Landmarks of Aberdeen (Aberdeen, 1886) ; A. M. Munro, Memorials of the Aldermen, Provosts and Lord Provosts of Aberdeen (Aberdeen, 1897) ; P. J. Anderson, Charters, &c, illustrating the History of the Royal Burgh of Aberdeen (Aberdeen, 1890) ; Selections from the Records of Marischal Collige (New Spalding Club, 1889, 1898-1899); J. Cooper, Chartulary of the Church of St Nicholas (New Spalding Club, 1888, 1892); G. Cadenhead, Sketch of the Territorial History of the Burgh of Aberdeen (Aberdeen, 1876); W. Cadenhead, Guide to the City of Aberdeen (Aberdeen, 1897); A. Smith, History and Antiquities of New and Old Aberdeen (Aberdeen,

1882).

ABERDEEN, a city and the county-seat of Brown county, South Dakota, U.S.A., about 125 m. N.E. of Pierre. Pop. (1890) 3182; (1900) 4087, of whom 889 were foreign born; (1905) 5841; (1910) 10,753. Aberdeen is served by the Chicago, Mil- waukee and St Paul, the Great Northern, the Minneapolis and St Louis, and the Chicago and North Western railways. It is the financial and trade centre for the northern part of the state, a fine agricultural region, and in 1908 had five banks and a number of wholesale houses. The city is the seat of the Northern Normal and Industrial School, a state institution, and has a Carnegie library; the principal buildings are the court house and the

government buildings. Artesian wells furnish good water-power, and artesian-well supplies, grain pitchers, brooms, chemicals and flour are manufactured. The municipality owns and operates the water- works. Aberdeen was settled in 1880, and was chartered as a city in 1883.

ABERDEENSHIRE, a north-eastern county of Scotland, bounded N. and E. by the North Sea, S. by Kincardine, Forfar and Perth, and W. by Inverness and Banff. It has a coast-line of 65 m., and is the sixth Scottish county in area, occupying 1,261,887 acres or 1971 sq.m. The county is generally hilly, and from the south-west, near the centre of Scotland, the Grampians send out various branches, mostly to the north-east. The shire is popularly divided into five districts. Of these the first is Mar, mostly between the Dee and Don, which nearly covers the southern half of the county and contains the city of Aberdeen. It is mountainous, especially Braemar (q.v.), which contains the greatest mass of elevated land in the British Isles. The soil on the Dee is sandy, and on the Don loamy. The second district, Formartine, between the lower Don and Ythan, has a sandy coast, which is succeeded inland by a clayey, fertile, tilled tract, and then by low hills, moors, mosses and tilled land. Buchan, the third district, lies north of the Ythan, and, com- prising the north-east of the county, is next in size to Mar, parts of the coast being bold and rocky, the interior bare, low, flat, undulating and in places peaty. On the coast, 6 m. S. of Peter- head, are the Bullers of Buchan — a basin in which the sea, enter- ing by a natural arch, boils up violently in stormy weather. I Buchan Ness is the most easterly point of Scotland. The fourth

district, Garioch, in the centre of the shire, is a beautiful, undu- lating, loamy, fertile valley, formerly called the granary of Aberdeen. Strathbogie, the fifth district, occupying a consider- able area south of the Deveron, mostly consists of hills, moors and mosses. The mountains are the most striking of the physical features of the county. Ben Macdhui (4296 ft.), a magnificent mass, the second highest mountain in Great Britain, Braeriach (4248), Cairntoul (4241), Ben- na-bhuaird (3924), Ben Avon (3843), ” dark ” Lochnagar (3786), the subject of a well-known song by Byron, Cairn Eas (3556), Sgarsoch (3402), Culardoch (2953) , are the principal heights in the division of Mar. Farther north rise the Buck of Cabrach (2368) on the Banffshire border, Tap o’ Noth (1830), Bennachie (1698), a beautiful peak which from its central position is a landmark visible from many different parts of the county, and which is celebrated in John Imlah’s song, ” O

gin I were where Gadie rins," and Foudland {1529). The chief rivers are the Dee, 90 m. long; the Don, 82 m. ; the Ythan. 37 m., with mussel-beds at its mouth; the Ugie, 20 m., and the Deveron, 62 m., partly on the boundary of Banffshire. The rivers abound with salmon and trout, and the pearl mussel occurs in the Ythan and Don. A valuable pearl in the Scottish crown is said to be from the Ythan. Loch Muick, the largest of the few lakes in the county, 13 10 ft. above the sea, 2j m. long and j to j m. broad, lies some 8J m. S.W. of Ballater, and has Altnagiuthasstch, a royal shooting-box, near its south-western end. Loch Strathbeg, 6 m. S.E. of Fraserburgh, is only separated from the sea by a narrow strip of land. There are noted chalybeate springs at Peterhead, Fraserburgh, and Pannanich near Ballater. Geology. — The greater part of the county is composed of crystalline schists belonging to the metamorphic rocks of the Eastern Highlands. In the upper parts of the valleys of the Dee and the Don they form well-marked groups, of which the most characteristic are (1) the black schists and phyllites, with calc- flintas, and a thin band of tremolite limestone, (2) the main or Blair Atholl limestone, (3) the quartzite. These divisions are folded on highly inclined or vertical axes trending north-east and south-west, and hence the same zones are repeated over a considerable area. The quartzite is generally regarded as the highest member of the series. Excellent sections showing the component strata occur in Glen Clunie and its tributary valleys above Braemar. Eastwards down the Dee and the Don and northwards across the plain of Buchan towards Rattray Head and Fraserburgh there is a development of biotite gneiss, partly of sedimentary and perhaps partly of igneous origin. A belt of slate which has been quarried for roofing purposes runs along the west border of the county from Turriff by Auchterless and the Foudland Hills towards the Tap o' Noth near Gartly. The metamorphic rocks have been invaded by igneous materials, some before, and by far the larger series after the folding of the strata. The basic types of the former are represented by the sills of epidiorite and hornblende gneiss in Glen Muick and Glen Callater, which have been permeated by granite and pegmatite in veins and lenticles, often foliated. The later granites subse- quent to the plication of the schists have a wide distribution on the Ben Macdhui and Ben Avon range, and on Lochnagar; they stretch eastwards from Ballater by Tarland to Aberdeen and north to Bennachie. Isolated masses appear at Peterhead and at Strichen. Though consisting mainly of biotite granite, these later intrusions pass by intermediate stages into diorite, as in the area between Balmoral and the head-waters of the Gairn. The granites have been extensively quarried at Rubislaw, Peter-head and Kemnay. Serpentine and troctolite, the precise age of which is uncertain, occur at the Black Dog rock north of Aberdeen, at

Belhelvie and near Old Meldrum. Where the schists of sedimentary origin have been pierced by these igneous intrusions, they are charged with contact minerals such as silli- manite, cordierite, kyanite and andalusite. Cordierite-bearing rocks occur near Ellon, at the foot of Bennachie, and on the top of the Buck of Cabrach. A banded and mottled calc-silicate hornfels occurring with the limestone at Derry Falls, W. N.W. of Braemar, has yielded malacolite, wollastonite, brown idocrase, garnet, sphene and hornblende. A larger list of minerals has

been obtained from an exposure of limestone and associated beds in Glen Gairn, about four miles above the point where that river joins the Dee. Narrow belts of Old Red Sandstone, resting unconformably on the old platform of slates and schists, have been traced from the north coast at Peterhead by Turriff to Fyvie, and also from Huntly by Gartly to Kildrummy Castle. The strata consist mainly of conglomerates and sandstones, which, at Gartly and at Rhynie, are associated with lenticular bands of andesite indicating contemporaneous volcanic action. Small outliers of conglomerate and sandstone of this age have recently been found in the course of excavations in Aberdeen. The glacial deposits, especially in the belt bordering the coast between Aberdeen and Peterhead, furnish important evidence. The ice moved eastwards off the high ground at the head of the Dee and -the Don, while the mass spreading outwards from the Moray Firth invaded the low plateau of Buchan; but at a certain stage there was a marked defection northwards parallel with the coast, as proved by the deposit of red clay north of Aberdeen. At a later date the local glaciers laid down materials oil top of the tfed clay. The committee appointed by the British Association (Report for 1897, p. 333) proved that the Greensand, which has yielded a large suite of Cretaceous fossils at Moreseat, in the parish of Cruden, occurs in glacial drift, resting probably on granite. The strata from which the Moreseat fossils were derived are not now found in place in that part of: Scotland, but Mr Jukes Brown considers that the horizon of the fossils is that of the lower Greensand of the Isle of Wight or the Aptien stage of France. Chalk flints are widely distributed in the drift between Fyvie and the east coast of Buchan. At Plaidy a patch of clay with Liassic fossils occurs. At several localities between Logie Coldstone and Dinnet a deposit of diatomite (Kieselguhr) occurs beneath the peat.

Flora and Fauna. — The tops of the highest mountains have an arctic flora. At the royal lodge on Loch Muick, 1350 ft. above the sea, grow larches, vegetables, currants, laurels, roses, &c. Some ash-trees, four or five feet in girth, are growing at 1300 ft. above the sea. Trees, especially Scotch fir and larch, grow well, and Braemar is rich in natural timber, said to surpass any in the north of Europe. Stumps of

Scotch fir and oak found in peat are sometimes far larger than any now growing. The mole is found at 1800 ft. above the sea, and the squirrel at 1400. Grouse, partridges and hares are plentiful, and rabbits are often too numerous. Red deer abound in Braemar, the deer forest being the most extensive in Scotland.

Climate and Agriculture. — The climate, except in the moun- tainous districts, is comparatively mild, owing to the proximity of much of the shire to the sea. The mean annual temperature at Braemar is 43-6° F., and at Aberdeen 45-8°. The mean yearly rainfall varies from about. 30 to 37 in. The summer climate of the upper Dee and Don valleys is the driest and most bracing in the British Isles, and grain is cultivated up to 1600 ft. above the sea, or 400 to 500 ft. higher than elsewhere in North Britain. Poor, gravelly, clayey and peaty soils prevail, but tile-draining, bones and guano, and the best methods of modern tillage, have greatly increased the produce. Indeed, in no part of Scotland has a more productive soil been made out of such unpromising material. Farm-houses and steadings have much improved, and the best agricultural implements and machines are in general use. About two-thirds of the population depend entirely on agriculture. Farms are small compared with those in the south-eastern counties. Oats are the predominant crop, wheat has practically gone out of cultivation, but barley has largely increased. The most distinctive industry is cattle-feed- ing. A great number of the home-bred crosses are fattened for the London and local markets, and Irish animals are imported on an extensive scale for the same purpose, while an exceedingly heavy business in dead meat for London and the south is done all over the county. Sheep, horses and pigs are also raised in large numbers.

Fisheries. — A large fishing population in villages along the coast engage in the white and herring fishery, which is the next most important industry to agriculture, its development having

been due almost exclusively to the introduction of steam trawlers. The total value of the annual catch, of which between a half and a third consists of herrings, amounts to £1,000,000. Had- docks are salted and rock-dried (speldings) or smoked (finnans). The ports and creeks are divided into the fishery districts of Peterhead, Fraserburgh and Aberdeen, the last of which in- cludes also three Kincardineshire ports. The herring season for Aberdeen, Peterhead and Fraserburgh is from June to September, at which time the ports are crowded with boats

from other Scottish districts. There are valuable salmon- fishings — rod, net and stake-net — on the Dee, Don, Ythan and Ugie. The average annual despatch of salmon from Aberdeen- shire is about 400 tons.

Other Industries. — Manufactures are mainly prosecuted in or near the city of Aberdeen, but throughout the rural districts there is much milling of corn, brick and tile making, smith-work, brewing and distilling, cart and farm-implement making, casting and drying of peat, and timber-felling, especially on Deeside and Donside, for pit-props, railway sleepers, laths and barrel- staves. There are a number of paper-making establishments, most of them on the Don near Aberdeen.

The chief source of mineral wealth is the noted durable granite, which is quarried at Aberdeen, Kemnay, Peterhead and else- where. An acre of land on being reclaimed has yielded £40 to £50 worth of causewaying stones. Sandstone and other rocks are also quarried at different parts. The imports. are mostly coal, lime, timber, iron, slate, raw materials for the textile manufactures, wheat, cattle-feeding stuffs, bones, guano, sugar, alcoholic liquors, fruits. The exports are granite (rough- dressed and polished), flax, woollen and cotton goods, paper, combs, preserved provisions, oats, barley, live and dead cattle. Communications. — From the south Aberdeen city is approached by the Caledonian (via Perth, Forfar and Stonehaven), and the North British {via Dundee, Montrose and Stonehaven) railways, and the shire is also served by the Great North of Scotland railway, whose main line runs via Kintore and Huntly to Keith and Elgin. There are branch lines from various points opening up the more populous districts, as from Aberdeen to Ballater by Deeside, from Aberdeen to Fraserburgh (with a branch at Maud for Peterhead and at Ellon for Cruden Bay and Boddam), from Kintore to Alf ord, and from Inverurie to Old Meldrum and also to Macduff. By sea there is regular communication with London, Leith, Inverness, Wick, the Orkneys and Shetlands, Iceland and the continent. The highest of the macadamized roads crossing the eastern Grampians rises to a point 2200 ft. above sea-level.

Population and Government. — In 1891 the population num- bered 284,036 and in 1901 it was 304,439 (of whom 159,603 were females), or 154 persons to the sq. m. In 1901 there were 8 persons who spoke Gaelic only, and 1333 who spoke Gaelic and English. The chief towns are Aberdeen (pop. in 1901, i53,5 3), Bucksburn (2231), Fraserburgh (9105), Huntly (4136), Inverurie (3624), Peterhead (11,794), Turriff (2273). The Supreme Court of Justiciary sits in

Aberdeen to try cases from the counties of Aberdeen, Banff and Kincardine. The three counties are under a sheriff, and there are two sheriffs-substitute resident in Aberdeen, who sit also at Fraserburgh, Huntly, Peterhead and Turriff. The sheriff courts are held in Aberdeen and Peterhead. The county sends two members to parliament — one for East Aberdeenshire and the other for West Aberdeen- shire. The county town, Aberdeen (q.v.), returns two members. Peterhead, Inverurie and Kintore belong to the Elgin group of parliamentary burghs, the other constituents being Banff, Cullen and Elgin. The county is under school-board juris- diction, and there are also several voluntary schools. There are higher-class schools in Aberdeen, and secondary schools at Huntly, Peterhead and Fraserburgh, and many of the other schools in the county earn grants for secondary education. The County Secondary Education Committee dispense a large sum, partly granted by the education department and partly con- tributed by local authorities from the "residue" grant, and support, besides the schools mentioned, local classes and lectures

in agriculture, fishery and other technical subjects, in addition to subsidizing the agricultural department of the university of Aberdeen. The higher branches of education have always been thoroughly taught in the schools throughout the shire, and pupils have long been in the habit of going directly from the schools to the university.

The native Scots are long-headed, shrewd, careful, canny, active, persistent, but reserved and blunt, and without demon- strative enthusiasm. They have a physiognomy distinct from the rest of the Scottish people, and have a quick, sharp, rather angry accent. The local Scots dialect is broad, and rich in diminutives, and is noted for the use of e for or «,/for wh, d for th, &c. So recently as 1830 Gaelic was the fireside language of almost every family in Braemar, but now it is little used.

History. — The country now forming the shires of Aberdeen and Banff was originally peopled by northern Picts, whom Ptolemy called Taixali, the territory being named Taixalon. Their town "of Devana, once supposed to be the modern Aber- deen, has been identified by Prof. John Stuart with a site in the parish of Peterculter, where there are remains of an ancient camp at Normandykes, and by Dr W. F. Skene with a station on Loch Davan, west of Aboyne. So-called Roman camps have also been discovered on the upper Ythan and Deveron, but evidence of effective Roman occupation is still to seek. Traces of the native inhabitants, however, are much less equivocal. Weems or earth-houses are fairly common in the west. Relics of crannogs or lake-dwellings exist at Loch Ceander, Or Kinnord, 5 m. north-east of

Ballater, at Loch Goul in the parish of New Machar and elsewhere. Duns or forts occur on hills at Dunecht, where the dun encloses an area of two acres, Barra near Old Meldrum, Tap o' Noth, Dunnideer near Insch and other places. Monoliths, standing stones and "Druidical" circles of the pagan period abound, and there are many examples of the sculptured stones of the early Christian epoch. Efforts to convert the Picts were begun by Ternan in the 5th century, and continued by Columba (who founded a monastery at Old Deer), Drostan, Maluog and Machar, but it was long before they showed lasting results. Indeed, dissensions within the Columban church and the expulsion of the clergy from Pictland by the Pictish king Nectan in the 8th century undid most of the progress that had been made. The Vikings and Danes periodi- cally raided the coast, but when (1040) Macbeth ascended the throne of Scotland the Northmen, under the guidance of Thor- finn, refrained from further trouble in the north-east. Macbeth was afterwards slain at Lumphanan (1057), a cairn on Perkhill marking the spot. The influence of the Norman conquest of England was felt even in Aberdeenshire. Along with numerous Anglo-Saxon exiles, there also settled in the country Flemings who introduced various industries, Saxons who brought farming, and Scandinavians who taught nautical skill. The Celts revolted more than once, but Malcolm Canmore and his successors crushed them and confiscated their lands. In the reign of Alex- ander I. (d. 1 1 24) mention is first made of Aberdeen (originally called Aberdon and, in the Norse sagas, Apardion), which re- ceived its charter from William the Lion in 1179, by which date its burgesses had already combined with those of Banff, Elgin, Inverness and other trans-Grampian communities to form a free Hanse, under which they enjoyed exceptional trading privi- leges. By this time, too, the Church had been organized, the bishopric of Aberdeen having been established in 1 1 50. In the 12th and 13th centuries some of the great Aberdeenshire families arose, including the earl of Mar (c. n 22), the Leslies, Freskins (ancestors of the dukes of Sutherland), Durwards, Bysets, Comyns and Cheynes, and it is significant that in most cases their founders were immigrants. The Celtic thanes and their retainers slowly fused with the settlers. They declined to take advantage of the disturbed condition of the country during the wars of the Scots independence, and. made common cause with the bulk of the nation. Though John Comyn (d. 1300?), one of the competitors for the throne, had considerable interests in the shire, his claim received locally little support. In 1296 Edward I. made a triumphal march to the north to terrorize the

more turbulent nobles. Next year William Wallace surprised the English garrison in Aberdeen, but failed to capture the castle. In 1303 Edward again visited the county, halting at the castle of Kildrummy, then in the possession of Robert Bruce, who shortly afterwards became the acknowledged leader of the Scots and made Aberdeen his headquarters for several months. De- spite the seizure of Kildrummy Castle by the English in 1306, Brace's prospects brightened from 1308, when he defeated John Comyn, earl of Buchan (d. 1313?), at Inverurie. For a hundred years after Robert Brace's death (1329) there was intermittent anarchy in the shire. Aberdeen itself was burned by the English in 1336, and the re-settlement of the districts of Buchan and Strathbogie occasioned constant quarrels on the part of the dis- possessed. Moreover, the crown had embroiled itself with some of the Highland chieftains, whose independence it sought to abolish. This policy culminated in the invasion of Aberdeen- shire by Donald, lord of the Isles, who was, however, defeated at Harlaw, near Inverurie, by the earl of Mar in 141 1. In the 15th century two other leading county families appeared, Sir Alexander Forbes being created Lord Forbes about 1442, and Sir Alexander Seton Lord Gordon in 1437 and earl of Huntly in 1445. Bitter feuds raged between these families for a long period, but the Gordons reached the height of their power in the first half of the ,16th century, when their domains, already vast, were enhanced by the acquisition, through marriage, of the earldom of Sutherland (1514). Meanwhile commerce with the Low Countries, Poland and the Baltic had grown apace, Camp- vere, near Flushing in Holland, becoming the emporium of the Scottish traders, while education was fostered by the foundation of Ring's College at Aberdeen in 1497 (Marischal College followed a century later). At the Reformation so little intuition had the clergy of the drift of opinion that at the very time that religious structures were being despoiled in the south, the building and decoration of churches went on in the shire. The change was acquiesced in without much tumult, though rioting took place in Aberdeen and St Machar's cathedral in the city suffered damage. The 4th earl of Huntly offered some resistance, on behalf of the Catholics, to the influence of Lord James Stuart, afterwards the Reg&it Murray, but was defeated and killed at Corrichie on the hill of Fare in 1562. As years passed it was apparent that Presbyterianism was less generally acceptable than Episcopacy, of which system Aberdeenshire remained for generations the stronghold in Scotland. Another crisis in ecclesi- astical affairs arose in 1638, when the National Covenant was ordered to be subscribed, a demand so grudgingly responded to that the marquis of Montrose visited the

shire in the following year to enforce acceptance. The Cavaliers, not being disposed to yield, dispersed an armed gathering of Covenanters in the affair called the Trot of Turriff (1630), in which the first blood of the civil war was shed. The Covenanters obtained the upper hand in a few weeks, when Montrose appeared at the bridge of Dee and compelled the surrender of Aberdeen, which had no choice but to cast in its lot with the victors. Montrose, however, soon changed sides, and after defeating the Covenanters under Lord Balfour of Burleigh (1644), delivered the city to rapine. He worsted the Covenanters again after a stiff fight on the 2nd of July 1645, at Alford, a village in the beautiful Howe of Alford. Peace was temporarily restored on the " engagement " of the Scots commissioners to assist Charles I. On his return from Holland in 1650 Charles II. was welcomed in Aberdeen, but in little more than a year General Monk entered the city at the head of the Cromwellian regiments. The English garrison re- mained till 1650, and next year the Restoration was effusively hailed, and prelacy was once more in the ascendant. Most of the Presbyterians conformed, but the Quakers, more numerous in the shire and the adjoining county of Kincardine than anywhere else in Scotland, were systematically persecuted. After the Revolution (1688) episcopacy passed under a cloud, but the clergy, yielding to force majeure, gradually accepted the inevitable, hoping, as long as Queen Anne lived, that prelacy might yet be recognized as the national form of Church government. Her death dissipated these dreams, and as George I., her successor,

was antipathetic to the clergy, it happened that Jacobitism and episcopalianism came to be regarded in the shire as identical, though in point of fact the non-jurors as a body never counte- nanced rebellion. The earl of Mar raised the standard of revolt in Braemar (6th of September 171 5); a fortnight later James was proclaimed at Aberdeen cross; the Pretender landed at Peterhead on the 22nd of December, and in February 17 16 he was back again in France. The collapse of the first rising ruined many of the lairds, and when the second rebellion occurred thirty years afterwards the county in the main was apathetic, though the insurgents held Aberdeen for five months, and Lord Lewis Gordon won a trifling victory for Prince Charles Edward at Inverurie (23rd of December 1745). The duke of Cumberland relieved Aberdeen at the end of February 1746, and in April the Young Pretender was a fugitive. Thereafter the people devoted themselves to agriculture, industry and commerce, which developed by leaps and bounds, and, along with equally remarkable progress in education, transformed the aspect of the shire and made the community as a whole one of the most prosperous in Scotland.

See W. Watt, History of Aberdeen and Banff (Edinburgh, 1900);

Collections for a History of the Shires of Aberdeen and Banff (edited by Dr Joseph Robertson, Spalding Club) ; Sir A, Leith-Hay, Castles of Aberdeenshire (Aberdeen, 1887); J. Davidson, Inverurie and the Earldom of the Garioch (Edinburgh, 1878) ; Pratt, Buchan (rev. by R. Anderson), (Aberdeen, 1900); A. I. M'Connochie, Deeside .(Aberdeen, 1895).

ABERDOUR, a village of Fifeshire, Scotland. Pleasantly situated on the shore of the Firth of Forth, 175 m. N.W. of Edinburgh by the North British railway and 7 m. N.W. of Leith by steamer, it is much resorted to for its excellent sea-bathing. There are ruins of a castle and an old decayed church, which contains some fine Norman work. About 3 m. S.W. is Doni- bristle House, the seat of the earl of Murray (Moray), and the scene of the murder (Feb. 7, 1592) of James, 2nd (Stuart) earl of Murray. The island of Inchcolm, or Island of Columba, J m. from the shore, is in the parish of Aberdour. As its name implies, its associations date back to the time of Columba. The primitive stone-roofed oratory is supposed to have been a hermit's cell. The Augustinian monastery was founded in 1 1 23 by Alexander I. The buildings are well preserved, consisting of a low square tower, church, cloisters, refectory and small chapter- house. The island of Columba was occasionally plundered by English and other rovers, but in the 16th century it became the property of Sir James Stuart, whose grandson became 2nd earl of Murray by virtue of his marriage to the elder daughter of the 1st earl. From it comes the earl's title of Lord St Colme (161 1).

ABERDOVEY (Aberdyfi: the Dyfi is the county frontier), a seaside village of Merionethshire, North Wales, on the Cambrian railway. Pop. (1901) 1466. It lies in the midst of beautiful scenery, 4 m. from Towyn, on the N. bank of the Dyfi estuary, commanding views of Snowdon, Cader Idris, Arran Mawddy and Plynlimmon. The Dyfi, here a mile broad, is crossed by a ferry to Borth sands, whence a road leads to Aberystwyth. The sub- merged " bells of Aberdovey " (since Seithennin " the drunkard " caused the formation of Cardigan Bay) are famous in a Welsh song. Aberdovey is a health and bathing resort.

ABERFOYLE, a village and parish of Perthshire, Scotland, 34I m. N. by W. of Glasgow by the North British railway. Pop. of parish (1901) 1052. The village is situated at the base of Craigmore (1271 ft. high) and on the Laggan, a head- water of the Forth. Since 1885, when the duke of Montrose constructed a road over the eastern shoulder of Craigmore to join the older road at the entrance of the Trossachs pass, Aberfoyle has be- come the alternative route to the Trossachs and Loch Katrine. Loch Ard, about 2 m. W. of Aberfoyle, lies 105 ft. above

the sea. It is 3 m. long (including the narrows at the east end) and 1 m. broad. Towards the west end is Eilean Gorm (the green isle), and near the north-western shore are the falls of Ledard. Two m. N.W. is Loch Chon, 290 ft. above the sea, if m. long, and about 5 m. broad. It drains by the Avon Dhu to Loch Ard, which is drained in turn by the Laggan. The slate quarries on Craigmore are the only industry in Aberfoyle.

S3

ABERGAVENNY, a market town and municipal borough in the northern parliamentary division of Monmouthshire, England, 14 m. W. of Monmouth on the Great Western and the London and North-Western railways. Pop. (1001) 7795. It is situated at the junction of a small stream called the Gavenny with the river Usk; and the site, almost surrounded by lofty hills, is very beautiful. The town was formerly walled, and has the remains of a castle built soon after the conquest, frequently the scene of border strife. The church of St Mary belonged origin- ally to a Benedictine monastery founded early in the 12th cen- tury. The existing building, however, is Decorated and Perpen- dicular, and contains a fine series of memorials of dates from the 13th to the 1 7th century. There is a free grammar school, which till 1857 had a fellowship at Jesus College, Oxford. Breweries, ironworks, quarries, brick fields and collieries in the neighbour- hood are among the principal industrial establishments. Aber- gavenny was incorporated in 1899, and is governed by a mayor, 4 aldermen and 12 councillors. Area, 825 acres.

This was the Roman Gobannium, a small fort guarding the road along the valley of the Usk and ensuring quiet among the hill tribes. There is practically no trace of this fort. Abergavenny (Bergavenny) grew up under the protectionof the lords of Abergavenny, whose title dated from William I. Owing to its situation, the town was frequently embroiled in the border warfare of the 12th and 13th centuries, and Giraldus Cambrensis relates how in 1 175 the castle was seized by the Welsh. Hamelyn de Baalun, first lord of Aber- gavenny, founded the Benedictine priory, which was subsequently endowed by William de Braose with a tenth of the profits of the castle and town. At the dissolution of the priory part of this en- dowment went towards the foundation of a free grammar school, the site itself passing to the Gunter family. During the Civil War prior to the siege of Raglan Castle in 1645, Charles I. visited Aber- gavenny, and presided in person over the trial of Sir Trevor Williams and other parliamentarians. In 1639

Abergavenny received a charter of incorporation under the title of bailiff and burgesses. A charter with extended privileges was drafted in 1657, but appears never to have been enrolled or to have come into effect. Owing to the refusal of the chief officers of the corporation to take the oath of allegiance to William III. in 1688, the charter was annulled, and the town subsequently declined in prosperity. The act of 27 Henry VIII., which provided that Monmouth, as county town, should return one burgess to parliament, further stated that other ancient Monmouthshire boroughs were to contribute towards the payment of the member. In consequence of this clause Abergavenny on various occasions shared in the election, the last instance being in 1685. Reference to a market at Abergavenny is found in a charter granted to the prior by William de Braose (d. 121 1). The right to hold two weekly markets and three yearly fairs, as hitherto held, was confirmed in 1657. Abergavenny was celebrated for the production of Welsh flannel, and also for the manufacture, whilst the fashion prevailed, of periwigs of goats' hair.

The title of Baron Abergavenny, in the Neville family, dates from Edward Neville (d. 1476), who was the youngest son of the 1st earl of Westmoreland by Joan Beaufort, daughter of John of Gaunt. He married the heiress of Richard, earl of Worcester, whose father had inherited the castle and estate of Abergavenny, and was sum- moned in 1392 to parliament as Lord Bergavenny. Edward Neville was summoned to parliament with this title in 14.50. His direct male descendants ended in 1587 in Henry Neville, but a cousin, Edward Neville (d. 1622), was confirmed in the barony in 1604. From him it has descended continuously, the title being increased to an earldom in 1784; and in 1876 William Nevill (sic), 5th earl (b. 1826), an indefatigable and powerful supporter of the Conservative party, was created 1st marquess of Abergavenny. (See Neville.)

ABERIGH-MACKAY, GEORGE ROBERT (1848-188 1), Anglo- Indian writer, son of a Bengal chaplain, was born on the 25th of July 1848, and was educated at Magdalen College School and Cambridge University. Entering the Indian education depart- ment in 1870, he became professor of English literature in Delhi College in 1873, tutor to the raja of Rutlam 1876, and principal of the Rajkumar College at Indore in 1877. He is best known for his book Twenty-one Days in India (1878-1879), a satire upon Anglo-Indian society and modes of thought. This book gave promise of a successful literary career; but the author died at the age of thirty-three.

ABERNETHY, JOHN (1680- 1740), Irish Presbyterian divine, was born at Coleraine, county Londonderry, where his father was

Nonconformist minister, on the 19th of October 1680. In his thirteenth year he entered the university of Glasgow, and on concluding his course there went on to Edinburgh, where his

intellectual and social attainments gained him; a ready entrance' into the most cultured circles. Returning home he received licence to preach from his Presbytery before he was twenty one. In 1701 he was urgently invited to accept charge of an important congregation in Antrim; and after an interval of two years, mostly spent in further study in Dublin, he was ordained there on the 8th of August 1703. Here he did notable work, both as a debater in the synods and assemblies of his church and as an ; evangelist. In 17 12 he lost his wife (Susannah Jordan), and the loss desolated his life for many years. In i 7 1 7 he was invited to the congregation of Usher's Quay, Dublin, and contemporane- ously to what was called the Old Congregation of Belfast. The synod assigned him to Dublin. After careful consideration he declined to accede, and remained at Antrim. This refusal was regarded then as ecclesiastical high- treason; and a controversy of the most intense and disproportionate character followed, Aber- nethy standing firm for religious freedom and repudiating the; sacerdotal assumptions of all ecclesiastical courts. The contro- versy and quarrel bears the name of the two camps in the con- flict, the "Subscribers " and the " Non-subscribers." Out-and- out evangelical as John Abernethy was, there can be no question that he and his associates sowed the seeds of that after-struggle (1821-1840) in which, under the leadership of Dr Henry Gboke, the Arian and Socinian elements of the Irish Presbyterian Church were thrown out. Much of what he contended for, and which the " Subscribers " opposed bitterly, has been silently granted in the lapse of time. In 1 726 the " Non-subscribers," spite of an almost wofully pathetic pleading against separation by Abernethy, were cut off, with due ban and solemnity, from the Irish Presbyterian Church. In 1730, although a " Non-subscriber," he was invited to Wood Street, Dublin, whither he removed. In 1731 came on the greatest controversy in which Abernethy engaged, viz. in relation to the Test Act nominally, but practically on the entire question of tests and disabilities. His stand was " against all laws that, upon account of mere differences of religious opinions and forms of worship, excluded men of integrity and ability from serving their country." He was nearly a* century in ad- vance of his age. He had to reason with those who denied that a Roman Catholic or Dissenter could be a " man of integrity and ability." His Tracts- — afterwards collected— did fresh service, generations later, and his name is honoured by all who love freedom of conscience and opinion. He died in December 1740. See Dr

Duchal's Life, prefixed to Sermons (1762) ; Diary in MS., 6 vols. 4to; Reid's Presbyterian Church in Ireland, iii. 234.

ABERNETHY, JOHN (1764-1831), English surgeon, grandson of John Abernethy (see above), was born in London on the 3rd of April 1764. His father was a London merchant. Edu- cated at Wolverhampton grammar school, he was apprenticed in 1779 to Sir Charles Blicke (1745-1815), surgeon to St Bar- tholomew's Hospital, London. He attended the anatomical lectures of Sir William Blizard (1743-1835) at the London Hospital, and was early employed to assist as "demonstrator "; he also attended Percival Pott's surgical lectures at St Bartholo- mew's Hospital, as well as the lectures of John Hunter. On Pott's resignation of the office of surgeon of St Bartholomew's, Sir Charles Blicke, who was assistant-surgeon, succeeded him, and Abernethy was elected assistant-surgeon in 1787. In this capacity he began to give lectures at his house in Bartholomew Close, which were so well attended that the governors of the hospital built a regular theatre (1790-1791), and Abernethy thus became the founder of the distinguished school of St Bartholo- mew's. He held the office of assistant-surgeon of the hospital for the long period of twenty-eight years, till, in 1815, he was elected principal surgeon. He had before that time been ap- pointed lecturer in anatomy to the Royal College of Surgeons (18 14) . Abernethy was not a great operator, though his name is associated with the treatment of aneurism by ligature of the external iliac artery. His Surgical Observations on the Constitu- tional Origin and Treatment of Local Diseases (1809) — known as " My Book," from the great frequency with which he referred his patients to it, and to page 72 of it in particular, under that name — was one of the earliest popular works on medical science.

He taught that local diseases were frequently the results of disordered states of the digestive organs, and were to be treated by purging and attention to diet. As a lecturer he was ex- ceedingly attractive, and his success in teaching was largely attributable to the persuasiveness with which he enunciated his views. It has been said, however, that the influence he exerted on those who attended his lectures was not beneficial in this respect, that his opinions were delivered so dogmatically, and all who differed from him were disparaged and denounced so contemptuously, as to repress instead of stimulating inquiry. The celebrity he attained in his practice was due not only to his great professional skill, but also in part to the singularity of his

manners. He used great plainness of speech in his intercourse with his patients, treating them often brusquely and sometimes even rudely. In the circle of his family and friends he was courteous and affectionate; and in all his dealings he was strictly just and honourable. He resigned his position at St Bartholo- mew's Hospital in 1827, and died at his residence at Enfield on the 20th of April 1831.

A collected edition of his works was published in 1 830. A bio- graphy, Memoirs of John Abernethy, by George Macilwain, appeared in 1853.

ABERRATION (Lat. ab, from or away, errare; to wander), a deviation or wandering, especially used in the figurative sense: as in ethics, a deviation from the truth; in pathology, a mental derangement; in zoology and botany, abnormal development or structure. In optics, the word has two special applications; (1) Aberration of Light, and (2) Aberration in Optical Systems. These subjects receive treatment below.

I. Aberration of Light

This astronomical phenomenon may be defined as an apparent motion of the heavenly bodies; the stars describing annually orbits more or less elliptical, according to the latitude of the star; consequently at any moment the star appears to be dis- placed from its true position. This apparent motion is due to the finite velocity of light, and the progressive motion of the observer with the earth, as it performs its yearly course about the sun. It may be familiarized by the following illustrations. Alexis Claude Clairaut gave this figure: Imagine rain to be falling vertically, and a person carrying a thin perpendicular tube to be standing on the ground. If the bearer be stationary, rain-drops will traverse the tube without touching its sides; if, however, the person be walking, the tube must be inclined at an angle varying as his velocity in order that the rain may traverse the tube centrally. J. J. L. de Lalande gave the illus- tration of a roofed carriage with an open front: if the carriage be stationary, no rain enters; if, however, it be moving, rain enters at the front. The " umbrella " analogy is possibly the best known figure. When stationary, the most efficient position in which to hold an umbrella is obviously vertical; when walk- ing, the umbrella must be held more and more inclined from the vertical as the walker quickens his pace. Another familiar figure, pointed out by P. L. M. de Maupertuis, is that a sportsman, when aiming at a bird on the wing, sights his gun some distance ahead of the bird, the distance being proportional to the velocity of the bird. The mechanical idea, named the parallelogram of velocities, permits a ready and easy

graphical representation of these facts. Reverting to the analogy of Clairaut, let AB (fig. 1) represent the velocity of the rain, and AC the relative velocity of the person bearing the tube. The diagonal AD of the parallelogram, of which AB and AC are adjacent sides, will represent, both in direction and magnitude, the motion of the rain as apparent to the observer. Hence for the rain to centrally traverse the tube, this must be inclined at an angle BAD to the vertical; this angle is conveniently termed the aberration due to these two motions. The umbrella analogy is similarly explained; the most efficient position being when the stick points along the resultant AD.

The discovery of the aberration of light in 1725, due to James Bradley, is one of the most important in the whole domain of

C A

Fig. 1.

astronomy. That it was unexpected there can be no ;dbubt; and it was only by extraordinary perseverance and perspicuity that Bradley was able to explain it in 1727. Its origin is seated in attempts made to free from doubt the prevailing discordances as to whether the stars possessed appreciable parallaxes. The Copernican theory of the solar system — that the earth revolved annually about the sun — had received confirmation by the ob- servations of Galileo and Tycho Brahe, and the mathematical investigations of Kepler and Newton. As early as 1573, Thomas Digges had suggested that this theory should necessitate a parallactic shifting of the stars, and, consequently, if such stellar parallaxes existed, then the Copernican theory would receive additional confirmation. Many observers claimed to have determined such parallaxes, but Tycho Brahe and G. B. Riccioli concluded that they existed only in the minds of the observers, and were due to instrumental and personal errors. In 1680 Jean Picard, in his Voyage d' Uranibourg, stated, as a result of ten years' observations, that Polaris, or the Pole Star, exhibited variations in its position amounting to 40″ annually; some astronomers endeavoured to explain this by parallax, but these attempts were futile, for the motion was at variance with that which parallax would occasion. J. Flamsteed, from measure- ments made in 1689 and succeeding years with his mural quad- rant, similarly concluded that the declination of the Pole Star was 40″ less in July than in September. R. Hooke, in 1674, published his observations of 7 Draconis, a star of the second magnitude which passes practically overhead in the latitude of London, and whose observations are therefore singularly free from the complex corrections due to astronomical refraction, and concluded that this

star was 23″ more northerly in July than in October.

When James Bradley and Samuel Molyneux entered this sphere of astronomical research in 1725, there consequently prevailed much uncertainty as to whether stellar parallaxes had been observed or not; and it was with the intention of definitely answering this question that these astronomers erected a large telescope at the house of the latter at Kew. They determined to reinvestigate the motion of 7 Draconis; the telescope, constructed by George Graham (1675-1751), a celebrated instrument-maker, was affixed to a vertical chimney- stack, in such manner as to permit a small oscillation of the eyepiece, the amount of which, i.e. the deviation from the vertical, was regulated and measured by the introduction of a screw and a plumb-line. The instrument was set up in November 1725, and observations on 7 Draconis were made on the 3rd, 5th, nth, and 12th of December. There was apparently no shifting of the star, which was therefore thought to be at its most southerly point. On the 17th of December, however, Bradley observed that the star was moving southwards, a motion further shown by observations on the 20th. These results were unexpected, and, in fact, inexplicable by existing theories; and an examina- tion of the telescope showed that the observed anomalies were not due to instrumental errors. The observations were continued, and the star was seen to continue its southerly course until March, when it took up a position some 20″ more southerly than its December position. After March it began to pass north- wards, a motion quite apparent by the middle of April; in June it passed at the same distance from the zenith as it did in De- cember; and in September it passed through its most northerly position, the extreme range from north to south, i.e. the angle between the March and September positions, being 40”.

This motion is evidently not due to parallax, for, in this case, the maximum range should be between the June and December positions; neither was it due to observational errors. Bradley and Molyneux discussed several hypotheses in the hope of fixing the solution. One hypothesis was: while 7 Draconis was stationary, the plumb-line, from which the angular measurements were made, varied; this would follow if the axis of the earth varied. The oscillation of the earth’s axis may arise in two distinct ways; distinguished as ” nutation of the axis ” and ” variation of latitude. ” Nutation, the only form of oscilla- tion imagined by Bradley, postulates that while the earth’s

axis is fixed with respect to the earth, i.e. the north and south poles occupy permanent geographical positions, yet the axis is not directed towards a fixed point in the heavens; variation of latitude, however, is associated with the shifting of the axis within the earth, i.e. the geographical position of the north pole varies.

Nutation of the axis would determine a similar apparent motion for all stars: thus, all stars having the same polar distance as y Draconis should exhibit the same apparent motion after or before this star by a constant interval. Many stars satisfy the condition of equality of polar distance with that of y Draconis, but few were bright enough to be observed in Moly- neux's telescope. One such star, however, with a right ascension 1 nearly equal to that of y Draconis, but in the opposite sense, was selected and kept under observation. This star was seen to possess an apparent motion similar to that which would be a consequence of the nutation of the earth's axis; but since its declination varied only one half as much as in the case of 7 Dra- conis, it was obvious that nutation did not supply the requisite solution. The question as to whether the motion was due to. an irregular distribution of the earth's atmosphere, thus involving abnormal variations in the refractive index, was also investi- gated; here, again, negative results were obtained.

Bradley had already perceived, in the case of the two stars previously scrutinized, that the apparent difference of declina- tion from the maximum positions was nearly proportional to the sun's distance from the equinoctial points; and he realized the necessity for more observations before any generalization could be attempted. For this purpose he repaired to the Rectory, Wanstead, then the residence of Mrs Pound, the widow of his uncle James Pound, with whom he had made many observations of the heavenly bodies. Here he had set up, on the 19th of August 1727, a more convenient telescope than that at Kew, its range extending over 6j° on each side of the zenith, thus covering a far larger area of the sky. Two hundred stars in the British Catalogue of Flamsteed traversed its field of view; and, of these, about fifty were kept under close observation. His conclusions may be thus summarized: (1) only stars near the solstitial colure had their maximum north and south positions when the sun was near the equinoxes, (2) each star was' at its maximum positions when it passed the zenith at six o'clock morning and evening (this he afterwards showed to be inaccurate, and found the greatest change in declination to be proportional to the latitude of the star), (3) the apparent motions of all stars at about the same time was in the same direction.

A re-examination of his previously considered hypotheses as to the

cause of these phenomena was fruitless; the true theory was ultimately discovered by a pure accident, comparable in simplicity and importance with the association of a falling apple with the discovery of the principle of universal gravitation. Sailing on the river Thames, Bradley repeatedly observed the shifting of a vane on the mast as the boat altered its course; and, having been assured that the motion of the vane meant that the boat, and not the wind, had altered its direction, he realized that the position taken up by the vane was determined by the motion of the boat and the direction of the wind. The application of this observation to the phenomenon which had so long perplexed him was not difficult, and, in 1727, he published his theory of the aberration of light — a corner-stone of the edifice of astronomical science. Let S (fig. 2) be a star and the observer be carried along the line AB; let SB be perpendicular to AB. If the observer be stationary at B, the star will appear in the direction BS; if, however, he traverses the distance BA in the same time as light passes from the star to his eye, the star will appear in the direction AS. Since, however, the ob- server is not conscious of his own translatory motion with the earth in its orbit, the star appears to have a displacement which is at all times parallel to the motion of the observer. To generalize this, let S (fig. 3) be the sun, ABCD the earth's orbit, and s the true position of a star. When the earth is at A, in consequence of aberration, the star

Fig. 2.

is displaced to a point c, its displacement sa being parallel to the earth's motion at A; when the earth is at B, the star appears at b; and so on throughout an orbital re- volution of the earth. Every star, therefore, describes an apparent orbit, which, if the line joining the sun and the star be perpendicular to the plane ABCD, will be ex- actly similar to that of the earth, i.e. almost a circle. As the star decreases in lati- tude, this circle will be viewed more and more ob- liquely, becoming a flatter and flatter ellipse until, with A r zero latitude, it degenerates into a straight line (fig. 4). The major axis of any such aberrational ellipse is always parallel to AC, i.e. the ecliptic, and since it is equal to the ratio of the velocity

1

3 L,/

X

/ *^

/

/ *

/

/ \

/

!*■■’.■

/ ‘

V

s /

r

/

\

„*’

”■•

”—....

B

Fig. 3.

:o

Lat. 90″

o

L»L«o

o

Lat«S*

o

Lat.yf Late*

Fig. 4.

of light to the velocity of the earth, it is necessarily constant. This constant length subtends an angle of about 40″ at the earth; the “constant of aberration ” is half this angle. The generally accepted value is 20-445”, due to Stnive; the last two figures are uncertain, and all that can be definitely affirmed is that the value lies between 20-43″ and 20-48”. The minor axis, on the other hand, is not constant, but, as we have already seen, depends on the latitude, being the product of the major axis into the sine of the latitude.

Assured that his explanation was true, Bradley cor- rected his observations for aberration, but he found that there still remained a residuum which was evi- dently not a parallax, for it did not exhibit an annual cycle. He reverted to his early idea of a nutation of the earth’s axis, and was rewarded by the discovery that the earth did possess such an oscillation (see Astronomy). Bradley recognized the fact that the experimental determination of the aberration constant gave the ratio of the velocities of light and of the earth; hence, if the velocity of the earth be known, the velocity of light is determined. In recent years much attention has been given to the nature of the propagation of light from the heavenly bodies to the earth, the argument generally being centred about the relative effect of the motion of the aether on the velocity of light. This subject is discussed in the articles Aether and Light.

References. — A detailed account t>f Bradley’s work is given in S. Rigaud, Memoirs of Bradley (1832), and in Charles Hutton, Mathematical and Philosophical Dictionary (1795); a particularly clear and lucid account is given in H. H. Turner, Astronomical Discovery (1904). The subject receives treatment in all astronomical works.

II. Aberration in Optical Systems

Aberration in optical systems, i.e. in lenses or mirrors or a series of them, may be defined as the non-concurrence of rays from the points of an object after transmission through the system; it happens generally that an image formed by such a system is irregular, and consequently the correction of optical systems for aberration is of fundamental importance to the instrument-maker. Reference should be made to the articles Reflexion, Refraction, and Caustic for the general char- acters of reflected and refracted rays (the article Lens considers in detail the properties of this instrument, and should also

be consulted) ; in this article will be discussed the nature, varieties and modes of aberrations mainly from the practical point of view, i.e. that of the optical-instrument maker.

Aberrations may be divided in two classes: chromatic (Gr. X/xojua, colour) aberrations, caused by the composite nature of

the light generally applied (e.g. white light), which is dispersed by refraction, and monochromatic (Gr. p6vm, one) aberrations produced without dispersion. Consequently the monochro- matic class includes the aberrations at reflecting surfaces of any coloured light, and at refracting surfaces of monochromatic or light of single wave length.

(a) Monochromatic Aberration.

The elementary theory of optical systems leads to the theorem: Rays of light proceeding from any ” object point ” unite in an “image point”; and therefore an “object space” is repro- duced in an ” image space.” The introduction of simple auxiliary terms, due to C. F. Gauss (Dioptrische Untersuchungen, Got- tingen, 1841), named the focal lengths and focal planes, permits the determination of the image of any object for any system (see Lens). The Gaussian theory, however, is only true so long as the angles made by all rays with the optical axis (the symmet- rical axis of the system) are infinitely small, i.e. with infinitesimal objects, images and lenses; in practice these conditions are not realized, and the images projected by uncorrected systems are, in general, ill defined and often completely blurred, if the aper- ture or field of view exceeds certain limits. The investigations of James Clerk Maxwell (Phil.Mag., 1856; Quart. Journ. Math., 1858, and Ernst Abbe 1) showed that the properties of these reproductions, i.e. the relative position and magnitude of the images, are not special properties of optical systems, but neces- sary consequences of the supposition (in Abbe) of the repro- duction of all points of a space in image points (Maxwell assumes a less general hypothesis), and are independent of the manner in which the reproduction is effected. These authors proved, however, that no optical system can justify these suppositions, since they are contradictory to the fundamental laws of reflexion and refraction. Consequently the Gaussian theory only supplies a convenient method of approximating to reality; and no con- structor would attempt to realize this unattainable ideal. All that at present can be attempted is, to reproduce a single plane in another

plane; but even this has not been altogether satis- factorily accomplished, aberrations always occur, and it is im- probable that these will ever be entirely corrected.

This, and related general questions, have been treated — besides the above-mentioned authors — by M. Thiesen {Berlin. Akad. Sitzber. , 1890, xxxv. 799; Berlin Phys.Ges.Verh., 1892) and H. Bruns (Leipzig. Math. Phys. Ber., 1895, xxi. 325) by means of Sir W. R. Hamilton s “characteristic function” (Irish Acad. Trans., “Theory of Systems of Rays,” 1828, et seq.). Reference may also be made to the treatise of Czapski-Eppenstein, pp. 155-161.

A review of the simplest cases of aberration will now be given. (1) Aberration of axial points (Spherical aberration in the re- stricted sense). If S (fig. 5) be any optical system, rays pro- ceeding from an axis point O under an angle u\ will unite in the axis point O’i ; and those under an angle w 2 in the axis point 0′ 2 . If there be refraction at a cpllective spherical surface, or through a thin positive lens, 0′ 2 will lie in front of O’i so long as the angle w 2 is greater than «i (“under correction”); and conversely with a dispersive surface or lenses (“over correction”). The caustic, in the first case, resembles the sign > (greater than) ; in the second < (less than). If the angle u\ be very small, O'i is the Gaussian image; and O'i 0′ 2 is termed the " longitudinal aberration," and 0'iR the " lateral aberration " of the pencils with aperture w 2 . If the pencil with the angle w 2 be that of the maximum aberration of all the pencils transmitted, then in a plane perpendicular to the axis at O'i there is a circular " disk of confusion " of radius 0'iR, and in a parallel plane at 0′ 2 another one of radius 0′ 2 R 2 ; between these two is situated the " disk of least confusion."

The largest opening of the pencils, which take part in the reproduction of O, i.e. the angle u, is generally determined by the margin of one of the lenses or by a. hole in a thin plate placed between, before, or behind the lenses of the system. This hole is termed the “stop” or “diaphragm”; Abbe used the term ” aDerture stop ” for both the hole and the limiting margin of the

•The investigations of E. Abbe on geometrical optics, originally published only in his university lectures, were first compiled by S. Czapski in 1893.’ See below, Authorities.

Fig. 5.

lens. The component Si of the system, situated between the aperture stop and the object O, projects an image of the dia- phragm, termed

by Abbe the “entrance pupil”: the “exit pupil ” is the image formed by the component S 2 , which is placed behind the aperture stop. All rays which issue from O and pass through the aperture stop also pass through the entrance and exit pupils, since these are images of the aperture stop. Since the maximum aperture of the pencils issuing from O is the angle u subtended by the entrance pupil at this point, the magni- tude of the aberration will be determined by the position and diameter of the entrance pupil. If the system be entirely behind the aperture stop, then this is itself the entrance pupil (” front stop “); if entirely in front, it is the exit pupil (” back stop “).

If the object point be infinitely distant, all rays received by the first member of the system are parallel, and their inter- sections, after traversing the system, vary according to their ” perpendicular height of incidence,” i.e. their distance from the axis. This distance replaces the angle u in the preceding considerations; and the aperture, i.e. the radius of the entrance pupil, is its maximum value.

(2) Aberration of elements, i.e. smallest objects at right angles to the axis. — If rays issuing from O (fig. 5) be concurrent, it does not follow ; , that points in a • portion of a plane perpendicular at

O to the axis ˆ£ˆr”lf S “2fS?”’’-*ˆ— : R *

will be also con- O current, even if the part of the plane be very small. With

a considerable aperture, the neighbouring point N will be reproduced, but attended by aberrations com- parable in magnitude to ON. These aberrations are avoided if, according to Abbe, the ” sine condition,” sin w’i/sin «i = sin «’ 2 /sin « 2 , holds for all rays reproducing the point O. If the object point O be infinitely distant, U\ and w 2 are to be replaced by h\ and hi, the perpendicular heights of incidence; the ” sine condition ” then becomes sin i/i/Ai = sin u\lh 2 . A system ful- filling this condition and free from spherical aberration is called ” aplanatic ” (Greek a-, privative, irXavr), a wandering). This word was first used by Robert Blair (d. 1828), professor of prac- tical astronomy at Edinburgh University, to characterize a superior achromatism, and, subsequently, by many writers to denote freedom from spherical aberration. Both the aberration of axis points, and the deviation from the sine condition, rapidly increase in most (uncorrected) systems with the aperture.

(3) Aberration of lateral object points (points beyond the axis) with narrow pencils. Astigmatism. — A point O (fig. 6) at a finite distance

from the axis (or with an infinitely ” distant object, a point which subtends a finite angle at the system) is, in general, even then not sharply reproduced, if the pencil of rays issuing from it and traversing the system is made infinitely narrow by reducing the aperture stop; such a pencil consists of the rays which can pass from the object point through the now infinitely small entrance pupil. It is seen (ignoring exceptional cases) that the pencil does not meet the refracting or reflecting surface at right angles; therefore it is astigmatic (Gr. a-, privative, ariyfia, a point). Naming the central ray passing through the entrance pupil the ” axis of the pencil ” or ” principal ray,” we can say: the rays of the pencil intersect, not in one point, but in two focal lines, which we can assume to be at right angles to the principal ray; of these, one lies in the plane containing the principal ray and

Fig.

the axis of the system, i.e. in the ” first principal section ” or ” meridional section,” and the other at right angles to it, i.e. in the second principal section or sagittal section. We receive, therefore, in no single intercepting plane behind the system, as, for example, a focussing screen, an image of the object point; on the other hand, in each of two planes lines O’ and O” are separately formed (in neighbouring planes ellipses are formed), and in a plane between O’ and O” a circle of least confusion. The interval O’O”, termed the astigmatic difference, increases, in general, with the angle W made by the principal ray OP with the axis of the system, i.e. with the field of view. Two ” astig- matic image surfaces ” correspond to one object plane; and these are in contact at the axis point; on the one lie the focal lines of the first kind, on the other those of the second. Systems in which the two astigmatic surfaces coincide are termed ana- stigmatic or stigmatic.

Sir Isaac Newton was probably the discoverer of astigmation; the position of the astigmatic image lines was determined by Thomas Young (A Course of Lectures on Natural Philosophy, 1807); and the theory has been recently developed by A. Gullstrand (Skand. Arch.f. physiol., 1890, 2, p. 269; Allgemeine Theorie der monochromat. Aberrationen, etc., Upsala, 1900; Arch.f. Ophth., 1901, 53, pp. 2, 185). A bibliography by P. Culmann is given in M. von Rohr’s Die Bilder- zeugung in optischen Instrumenten (Berlin, 1904).

(4) A berralion of lateral object points with broad pencils. Coma. — By opening the stop wider, similar deviations arise for lateral points as have been already discussed for axial points; but in this case they are much more complicated. The course of the rays in the meridional section is no longer symmetrical to the principal ray of the pencil; and on an intercepting plane there appears, instead of a luminous point, a patch of light, not sym- metrical about a point, and often exhibiting a resemblance to a comet having its tail directed towards or away from the axis. From this appearance it takes its name. The unsymmetrical form of the meridional pencil — formerly the only one considered — is coma in the narrower sense only; other errors of coma have been treated by A. Konig and M. von Rohr {op. cit.) , and more recently by A. Gullstrand {op. cit.; Ann. d. Phys., 1905, 18, p. 941).

(5) Curvature of the field of the image. — If the above errors be eliminated, the two astigmatic surfaces united, and a sharp image obtained with a wide aperture — there remains the necessity to correct the curvature of the image surface, especially when the image is to be received upon a plane surface, e.g. in photography. In most cases the surface is concave towards the system.

(6) Distortion of the image. — If now the image be sufficiently sharp, inasmuch as the rays proceeding from every object point meet in an image point of satisfactory exactitude, it may happen that the image is distorted, i.e. not sufficiently like the object. This error consists in the different parts of the object being re- produced with different magnifications; for instance, the inner parts may differ in greater magnification than the outer (" barrel- shaped distortion "), or conversely (" cushion-shaped distortion") (see fig. 7). Systems free of this aberration are called " ortho-

scopic " {6p66s, right, o-Korreiv, to look) . This aberration is quite distinct from that of the sharpness of reproduction ; in unsharp reproduction, the question of dis- tortion arises if only parts of the object can be recognized in the figure. If, in an unsharp image, a patch of light corresponds to an object point, the "centre of gravity" of the patch may be regarded as the image point, this being the point where the plane receiv- ing the image, e.g. a focussing screen, intersects the ray passing through the middle of the stop. This assumption is justified if a poor image on the focussing screen remains stationary when the aperture is diminished; in practice, this generally occurs. This ray, named by Abbe a " principal ray " (not to be confused with the "principal rays" of the Gaussian theory), passes through the centre of the entrance pupil before the first refraction,

Object

Barrel shaped

Cushion shaped

Distorted image

Fig. 7.

and the centre of the exit pupil after the last refraction. From this it follows that correctness of drawing depends solely upon the principal rays; and is independent of the sharpness or curvature of the image field. Referring to fig. 8, we have O'Q'/OQ =a' tan it/ /a tan w— i/N, where N is the " scale " or magnification of the image. For N to be constant for all values of w, a' tan w'/ a tan w must also be constant. If the ratio a'ja be sufficiently constant, as is often the case, the above relation reduces to the " condition of Airy," i.e. tan w' j tan w—& constant. This simple relation (see Camb. Phil. Trans., 1830, 3, p. 1) is fulfilled in all systems which are symmetrical with respect to their diaphragm (briefly named " symmetrical or holosymmetrical objectives "), or which consist of two like, but different-sized, components, placed from the diaphragm in the ratio of their size, and presenting the same curvature to it (hemisymmetrical objectives); in these systems tan w'l tan w=i. The constancy of a' /a necessary for this re- lation to hold was pointed out ˆ ' by R. H. Bow {Brit. Journ. Photo g., 1861), and Thomas Sutton {Photographic Notes, 1862); it has been treated by O. Lummer and by M. von Rohr {Zeit. f. Instrumentenk., 1897, 17, and 1898, 18, p. 4). It requires the middle of the aperture stop to be reproduced in the centres of the entrance and exit pupils without spherical aberration. M. von Rohr showed that for systems fulfilling neither the Airy nor the Bow-Sutton condition, the ratio a' tan w 1 fa tan w will be constant for one distance of the object. This combined condition is exactly fulfilled by holosymmetrical objectives reproducing with the scale 1, and by hemisymmetrical, if the scale of reproduction be equal to the ratio of the sizes of the two components.

Analytic Treatment of Aberrations. — The preceding review of the several errors of reproduction belongs to the " Abbe theory of aberrations," in which definite aberrations are discussed separ- ately; it is well suited to practical needs, for in the construction of an optical instrument certain errors are sought to be elimi- nated, the selection of which is justified by experience. In the mathematical sense, however, this selection is arbitrary; the re- production of a finite

object with a finite aperture entails, in all probability, an infinite number of aberrations. This number is only finite if the object and aperture are assumed to be ” in- finitely small of a certain order”; and with each order of infinite smallness, i.e. with each degree of approximation to reality (to finite objects and apertures), a certain number of aberrations is associated. This connexion is only supplied by theories which treat aberrations generally and analytically by means of indefinite series.

A ray proceeding from an object point O (fig. 9) can be de- fined by the co-ordinates (£, tj) of this point O in an object plane I, at right angles to the axis, and two other co- ordinates (*, y), the point in which the ray intersects the entrance pupil,

i.e. the plane II. Similarly the corresponding image ray may be defined by the points (£’ ‘,ij’)> and (*’, y’), in the planes I’ and II’. The origins of these four plane co-ordinate systems may be collinear with the axis of the optical system; and the corre- sponding axes may be parallel. Each of the four co-ordinates i;’,il’,x’,y’ are functions of £,,t\,x,y; and if it be assumed that the field of view and the aperture be infinitely small, then £ , ij, x, y are of the same order of infinitesimals; consequently by expand- ing £’, v\ x’, y’ in ascending powers of £, ij, x, y, series are ob- tained in which it is only necessary to consider the lowest powers. It is readily seen that if the optical system be symmetrical, the origins of the co-ordinate systems collinear with the optical axis

and the corresponding axes parallel, then by changing the signs of £ ,77, x, y, the values £’, 77, x , y must likewise change their sign, but retain their arithmetical values; this means that the series are restricted to odd powers of the unmarked variables.

The nature of the reproduction consists in the rays proceeding from a point O being united in another point O’; in general, this will not be the case, for £’, 77′ vary if £, 77 be constant, but x, y variable. It may be assumed that the planes I’ and II’ are drawn where the images of the planes I and II are formed by rays near the axis by the ordinary Gaussian rules; and by an extension of these rules, not, however, corresponding to reality, the Gauss image point O’ , with co-ordinates £’ , 17 ‘0, of the point O at some distance from the axis could be constructed. Writing A£’ = £’ — f’ and Ar)’ = ?/— 7/0, then A£’ and

A77′ are the aberrations belonging to £, 77 and *, y, and are functions of these magnitudes which, when expanded in series, contain only odd powers, for the same reasons as given above. On account of the aberrations of all rays which pass through O, a patch of light, depending in size on the lowest powers of £, 17, x, y which the aberrations contain, will be formed in the plane I'. These degrees, named by J. Petzval (Berichl iiber die Ergebnisse einiger dioptrischer Untersuchungen,. Buda Pesth, 1843; Akad. Sitzber., Wien, 1857, vols.xxiv.xxvi.) "the numerical orders of the image," are consequently only odd powers; the condition for the for- mation of an image of the mth order is that in the series for A£ ' and A77′ the coefficients of the powers of the 3rd, 5th . . . (»»-2)th degrees must vanish. The images of the Gauss theory being of the third order, the next problem is to obtain an image of 5th order, or. to make the coefficients of the powers of 3rd degree zero. This necessitates the satisfying of five equations; in other words, there are five alterations of the 3rd order, the vanishing of which produces an image of the 5th order.

The expression for these coefficients in terms of the constants of the optical system, i.e. the radii, thicknesses, refractive indices and distances between the lenses, was solved by L. Seidel (Astr. Nach., 1856, p. 289); in 1840, J. Petzval constructed his portrait objective, unexcelled even at the present day, from similar cal- culations, which have never been published (see M. von Rohr, Thcorie und Geschichte des photographischen Objectivs, Berlin, 1899, p. 248). The theory was elaborated by S. Finterswalder (Miinchen. Akad. AbhandL, 1891, 17, p. 519), who also published a posthumous paper of Seidel containing a short view of his work (Miinchen. Akad. Sitzber., 1898, 28, p. 395) ; a simpler form was given by A. Kerber (Bei- trage zur Dioplrik, Leipzig, 1895-6-7-8ˆ9). A. Konigand M. von Rohr (see M. von Rohr , Die Bilderzeugung in optischen Instrumenten, pp. 3l7-3 2 3) have represented Kerber's method, and have deduced the Seidel formulae from geometrical considerations based on the Abbe method, and have interpreted the analytical results geometrically (pp. 212-316).

The aberrations can also be expressed by means of the "char- acteristic function " of the system and its differential coefficients, instead of by the radii, &c, of the lenses; these formulae are not immediately applicable, but give, however, the relation between the number of aberrations and the order. Sir William Rowan Hamilton (British Assoc. Report, 1833, p. 360) thus derived the aberrations of the third order; and in later times the method was pursued by Clerk Maxwell (Proc. London Math. Soc, 1874-1875; see also the treatises of R. S. Heath and L. A. Herman), M. Thiesen (Berlin. Akad. Sitzber., 1890, 35, p. 804), H. Bruns {Leipzig. Math. Phys.Ber., 1895, 2I > p. 410), and

particularly successfully by K. Schwartzschild (Ghtlingen. Akad. AbhandL, 1905, 4, No. 1), who thus discovered the aberrations of the 5th order (of which there are nine), and possibly the shortest proof of the practical (Seidel) formulae. A. Gullstrand (vide supra, and Ann. d. Phys., 1905, 18, p. 941) founded his theory of aberrations on the differential geometry of surfaces.

The aberrations of the third order are: (1) aberration of the axis point; (2) aberration of points whose distance from: the Aberra- ax ‘ s * s ver y sm ˆl» l ess than of the third order — the ttons of deviation from the sine condition and coma here fall the third together in one class; (3) astigmatism; (4) curvature order – of the field; (5) distortion.

(1) Aberration of the third order of axis points is dealt with in all text-books on optics. It is important for telescope objec- tives, since their apertures are so small as to permit higher orders to be neglected. For a single lens of very small thickness and given power, the aberration depends upon the ratio of the radii r:r r , and is a minimum (but never zero) for a certain value of this ratio; it varies inversely with the refractive index (the

power of the lens remaining constant). The total aberration of two or more very thin lenses in contact, being the sum of the individual aberrations, can be zero. This is also possible if the lenses have the same algebraic sign. Of thin positive lenses with »=i-5, four are necessary to correct spherical aberration of the third order. These, systems, however, are not of great practical importance. In most cases, two thin lenses are combined, one of which has just so strong a positive aberration (” under-correc- tion,” vide supra) as the other a negative; the first must be a positive lens and the second a negative lens; the powers, however, may differ, so that the desired effect of the lens is maintained. It is generally an advantage to secure a great refractive effect by several weaker than by one high-power lens. By one, and likewise by several, and even by an infinite number of thin lenses in contact, no more than two axis points can be repro- duced without aberration of the third order. Freedom from aberration for two axis points, one of which is infinitely distant, is known as ” Herschel’s condition.” All these rules are valid, inasmuch as the thicknesses and distances of the lenses are not to be taken into account.

(2) The condition for freedom from coma in the third order is also of importance for telescope objectives; it is known as ” Fraunhofer’s condition.” (4) After eliminating the aberration on the axis, coma and astigmatism, the relation for the flatness of the field in the’ third order

is expressed by the " Petzval equation," Si/r(w'-«)= o, where r is the radius of a refracting surface, n and n' the refractive indices of the neighbouring media, and 2 the sign of summation for all refracting surfaces.

Practical Elimination of Aberrations. — The existence of an optical system, which reproduces absolutely a finite plane on another with pencils of finite aperture, is doubtful; but practical systems solve this problem with an accuracy which mostly suffices for the special purpose of each species of instrument. The problem of finding a system which reproduces a given object upon a given plane with given magnification (in so far as aber- rations must be taken into account) could be dealt with by means of the approximation theory; in most cases, however, the analytical difficulties are too great. Solutions, however, have been obtained in special cases (see A. Konig in M. von Rohr's Die Bilderzeugung, p. 373; K. Schwarzsehild, Gottingen. Akad. AbhandL, 1905, 4, Nos. 2and3). At the present time constructors almost always employ the inverse method: they compose a system from certain, often quite personal experiences, and test, by the trigonometrical calculation of the paths of several rays, whether the system gives the desired reproduction (examples are given in A. Gleichen, Lehrbuch der geomelrischen Optik, Leipzig and Berlin, 1902). The radii, thicknesses and distances are continually altered until the errors of the image become sufficiently small. By this method only certain errors of repro- duction are investigated, especially individual members, or all, of those named above. The analytical approximation theory is often employed provisionally, since its accuracy does not generally suffice.

In order to render spherical aberration and the deviation from the sine condition small throughout the whole aperture, there is given to a ray with a finite angle of aperture u* (with infinitely distant objects: with a finite height of incidence h*) the same distance of intersection, and the same sine ratio as to one neighbouring the axis (u* or h* may not be much smaller than the largest aperture U or H to be used in the system). The rays with an angle of aperture smaller than u* would not have the same distance of intersection and the same sine ratio'; these deviations are called "zones," and the constructor en- deavours to reduce these to a minimum. The same holds for the errors depending upon the angle of the field of view, w: astigmatism, curvature of field and distortion are eliminated for a definite value, w*; "zones of astigmatism, curvature- of field and distortion " attend smaller values of w. The practical optician names such systems: "corrected for the angle of aperture u* (the height of incidence h*), or the angle of field of view w*." Spherical aberration and changes of the sine ratios are

often represented graphically as functions of the aperture;

in the same way as the deviations of two astigmatic image sur- faces of the image plane of the axis point are represented as functions of the angles of the field of view.

The final form of a practical system consequently rests on compromise; enlargement of the aperture results in a diminution of the available field of view, and vice versa. The following may be regarded as typical: — (i) Largest aperture; necessary corrections are — for the axis point, and sine condition; errors of the field of view are almost disregarded; example — high- power microscope objectives. (2) Largest field of view; neces- sary corrections are — for astigmatism, curvature of field and distortion; errors of the aperture only slightly regarded; ex- amples — photographic widest angle objectives and oculars. Between these extreme examples stands the ordinary photo- graphic objective: the portrait objective is corrected more with regard to aperture; objectives for groups more with regard to the field of view. (3) Telescope objectives have usually not very large apertures, and small fields of view; they should, however, possess zones as small as possible, and be built in the simplest manner. They are the best for analytical computation.

(b) Chromatic or Colour Aberration. In optical systems composed of lenses, the position, magnitude and errors of the image depend upon the refractive indices of the glass employed (see Lens, and above, ” Monochromatic Aberration “) . Siqce the index of refraction varies with the colour • or wave length of the light (see Dispersion), it follows that a system of lenses (uncorrected) projects images of different colours in somewhat different places and sizes and with differ- ent aberrations; i.e. there are ” chromatic differences ” of the distances of intersection, of magnifications, and of mono- chromatic aberrations. If mixed light be employed (e.g. white light) all these images are formed; and since they are all ulti- mately intercepted by a plane (the retina of the eye> a focussing screen of a camera, &c), they cause a confusion, named chro- matic aberration; for instance, instead of a white margin on a dark background, there is perceived a coloured margin, or narrow spectrum. The absence of this error is termed achroma- tism, and an optical system so corrected is termed achromatic. A system is said to be ” chromatically under-corrected ” when it shows the same kind of chromatic error as a thin positive lens,

otherwise it is said to be ” over-corrected.”

If, in the first place, monochromatic aberrations be neglected —in other words, the Gaussian theory be accepted — then every reproduction is determined by the positions of the focal planes, and the magnitude of the focal lengths, or if the focal lengths, as ordinarily happens, be equal, by three constants of repro- duction. These constants are determined by the data of the system (radii, thicknesses, distances, indices, &c, of the lenses); therefore their dependence on the refractive index, and conse- quently on the colour, are calculable (the formulae are given in Czapski-Eppcnstein, Grundziige der Theorie der optischeii Instrumcnte (1903, p. 166). The refractive indices for different wave lengths must be known for each kind of glass made use of. In this manner the conditions are maintained that any one constant of reproduction is equal for two different colours, i.e. this constant is achromatized. For example, it is possible, with one thick lens in air, to achromatize the position of a. focal plane of the magnitude of the focal length. If all three constants of reproduction be achromatized, then the Gaussian image for all distances of objects is the same for the two colours, and the system is said to be in ” stable achromatism.”

In practice it is more advantageous (after Abbe) to determine the chromatic aberration (for instance, that of the distance of intersection) for a fixed position of the object, and express it by a sum in which each component contains the amount due to each refracting surface (see Czapski-Eppenstein, op. cit. p.\i7o; A. KSnig in M. v. Rohr’s collection, Die Bildcrzeugung, p. 340). In a plane containing the image point of one colour, ah’other colour produces a disk of confusion; this is similar to the con- fusion caused by two ” zones ” in spherical aberration. For infinitely distant objects the radius of the chromatic disk of.

confusion is proportional to the linear aperture, and independent of the focal length (vide supra, ” Monochromatic Aberration of the; Axis Point “); and since this disk becomes the less harmful with” an increasing image of a given object, or with increasing focal length, it follows that the deterioration of the image is propor- tional to the ratio of the aperture to the focal length, i.e. the ” relative aperture.” (This explains the gigantic focal lengths in vogue before the discovery of achromatism.)

Examples. — (a) In a very thin lens, in air, only one constant of reproduction is to be observed, since the focal length and. the distance of the focal point are equal. If the refractive index for one colour be n, and for another n--dn, and the powers, or reciprocals of the focal

lengths, be <£ and cp+dcp, then (1) d/ = dn/(n- 1) = i/v; dn is called the dispersion, and v the dis- persive power of the glass.

(b) Two thin lenses in contact: let $1 and 4> 2 be the powers corresponding to the lenses of refractive indices «i and n-_ and radii r\, r"i, and r' 2 , r" 2 respectively; let denote the total power, and d, dni, dn 2 the changes of , n u and n 2 with the colour. Then the following relations hold: —

(2) = 1 ,+*2=(«i-i)(iA'i-iA"i) + («2-i)(iA , 2-iA" 2) = (n-i)h+(n 2 – i)k 2 ; and

(3) dcj> = hdrii + k 2 dn 2 . For achromatism d

, (4) h/k 2 = -dnjdni, or 4>i/4> 2 = V\/v 2 . Therefore posed of a collective and a dispersive lens. Consequently the powers of the two must be different (in order that be not zero (equation 2)), and the dispersive powers must also be. different y (according to 4).

Newton failed to perceive the existence of media of different dispersive powers required by achromatism; consequently he constructed large reflectors instead of refractors. James Gregory and Leonhard Euler arrived at the correct view from a false con- ception of the achromatism of the eye ; this 'was determined by Chester More Hall in 1728, Klingenstierna in 1754 and by Dollond in : 757. w ho constructed the celebrated achromatic telescopes. (See Telescope.)

Glass with weaker dispersive power (greater v) is named "crown glass"; that with greater dispersive power, "flint gla,ss." For the construction of an achromatic collective lens (positive) it follows, by means of equation (4), that a collec- tive lens I. of crown glass and a dispersive lens II. of flint glass must be chosen; the latter, although the weaker, corrects the other chromatically by its greater dispersive power. For an achromatic .dispersive lens the converse must be adopted. This is, at the ˆpresent day, the ordinary type, e.g., of telescope objective (fig. 10); the values of the four radii must satisfy the equations (2) and (4). Two other conditions may also be pos- tulated; one is 'always the elimination of the aberration on the axis; the second either the " Herschel " or " Fraunhofer condition," the latter being the best (vide supra, " Monochromatic Aberration "). In practice, however, it is often more useful to avoid the second condition by making the lenses have contact, i.e. equal radii. According to P. Rudolph (Eder's Jahrb. f. Photog., 18/91, S, p. 223; 1893, 7, p. 221), cemented objectives of" thin lenses permit the elimination of spherical aberration on the axis, if, as above, the

collective lens has a smaller refractive index; on the other hand, they permit the elimination of i astigmatism and curvature of the field, if the collective lens has a greater refractive index (this follows from the Petzval equation;. see L. Seidel, Astr. Nachr., 1856, p. 289). Should the i cemented system be positive, then the more powerful lens must: be positive; and, according to (4), to the greater power belongs the weaker dispersive power (greater v), that is to. say, crown glass;, consequently the crown glass must have the greater refractive index for astigmatic and plane images. In all earlier kinds of glass, however, the dispersive power increased with the refractive iiideX; “that is,’ v decreased as n increased; but some of tjie/JeHaˆiaslˆs by.‘E. Abbe and 0. Schott were craven

Fig. 10.

glasses of high refractive index, and achromatic systems from such crown glasses, with flint glasses of lower refractive index, are called the ” new achromats,” and were employed by P. Rudolph in the first ” anastigmats ” (photographic objectives).

Instead of making d vanish, a certain value can be assigned to it which will produce, by the addition of the two lenses, any desired chromatic deviation, e.g. sufficient to eliminate one present in other parts of the system. If the lenses I. and II. be cemented and have the same refractive index for one colour, then its effect for that one colour is that of a lens of one piece; by such decomposition of a lens it can be made chromatic or achromatic at will, without altering its spherical effect. If its chromatic effect (d/) be greater than that of the same lens, this being made of the more dispersive of the two glasses em- ployed, it is termed ” hyper-chromatic.”

For two thin lenses separated by a distance D the condition for achromatism is D = {v 1/1 + ˆ2/2) {vi + vti; if Vi = vt (e.g. if the lenses be made of the same glass), this reduces to D = | (/1 + /2), known as the “condition for oculars.”

If a constant of reproduction, for instance the focal length, be made equal for two colours, then it is not the same for other colours, if two different glasses are employed. For example, the condition for achromatism (4) for two thin lenses in contact is fulfilled in only one part of the spectrum, since dn 2 /dn 1 varies within the spectrum. This

fact was first ascertained by J. Fraunhofer, ‘who defined the colours by means of the dark lines in the solar spectrum; and showed that the ratio of the disper- sion of two glasses varied about 20% from the red to the violet (the variation for glass and water is about 50%). If, therefore, for two colours, a and b, f„=fb =/, then for a third colour, c, the focal length is different, viz. if c lie between a and b, then f c

In fig. 11, taken from M. von Rohr’s Tkeorie und Geschichte des photo graphischen Objeclivs, the abscissae are focal lengths, and the ordinates wave-lengths; of the latter the Fraunhofer lines used are —

A’ C D Green Hg. F G’

767-7 6563 589-3 546-1

Violet Hg. 405-1 fifi, lengths are the lines C

486-2 434-1

and the focal made equal for and F. In the neighbourhood of 550 /i/i the tangent to the curve is parallel to the axis of wave-lengths; and the focal length varies least over a fairly large range of colour, therefore in this neighbour- hood the colour union is at its best. Moreover, this region of the spectrum is that which appears brightest to the human eye, and consequently this curve of the secondary spectrum, obtained by makiD? fc = fn is, according to the experiments of Sir G. G. Stokes (Proc. Roy.Soc, 1878), the most suitable for visual Fig 11.— Secondary Spectrum of ins t rume nts (” optical achro- the combination O. 1726, O. .. „.. i r . .. 108. Optical correction / C =/ P = matism ‘)• In a similar man- 100 mm. The ordinates give the ner, for systems used in photo- wave-lengths in up. The ab- graphy, the vertex of the sebsae give/X-/cino-oimm., colour curve must be p l ace d

re nC1 [!F a »£ * -.v in the position of the maxi

(From M. v. Rohr, op. at.) r .....

mum sensibility of the plates; this is generally supposed to be at G’ ; and to accomplish this the

U u

F and violet mercury lines are united. This artifice is specially adopted in objectives for astronomical photography (“pure actinic achromatism”). For ordinary photography, however, there is this

disadvantage: the image on the focussing-screen and the correct adjustment of the photographic sensitive plate are not in register; in astronomical photography this difference is constant, but in other kinds it depends on the distance of the objects. On this account the lines D and G' are united for ordi- nary photographic objectives; the optical as well as the actinic image is chromatically inferior, but both lie in the same place; and consequently the best correction lies in F (this is known as the " actinic correction " or " freedom from chemical focus ").

Should there be in two lenses in contact the same focal lengths for three colours a, b, and c, i.e. f a =fb=f \=f, then the relative partial dispersion (« c -n &) (»„-» b) must be equal for the two kinds of glass employed. This follows by considering equation (4) for the two pairs of colours ac and be. Until recently no glasses were known with a proportional degree of absorption; but R. Blair (Trans. Edin. Soc., 1701, 3, p. 3), P. Barlow, and F. S. Archer overcame the difficulty by constructing fluid lenses between glass walls. Fraunhofer prepared glasses which re- duced the secondary spectrum; but permanent success was only assured on the introduction of the Jena glasses by E. Abbe and O. Schott- In using glasses not having proportional dispersion, the deviation of a third colour can be eliminated by two lenses, if an interval be allowed between them; or by three lenses in contact, which may not all consist of the old glasses. In uniting three colours an ” achromatism of a higher order ” is derived; there is yet a residual “tertiary spectrum,” but it can always be neglected.

The Gaussian theory is only an approximation; monochro- matic or spherical aberrations still occur, which will be different for different colours; and should they be compensated for one colour, the image of another colour would prove disturbing. The most important is the chromatic difference of aberration of the axis point, which is still present to disturb the image, after par-axial rays of different colours are united by an appro- priate combination of glasses. If a collective system be corrected for the axis point for a definite wave-length, then, on account of the greater dispersion in the negative components — the flint glasses, — over-correction will arise for the shorter wave-lengths (this being the error of the negative components), and under-correction for the longer wave-lengths (the error of crown glass lenses preponderating in the red). This error was treated by Jean le Rond d’Alembert, and, in special detail, by C. F. Gauss. It increases rapidly with the aperture, and is more important with medium apertures than the secondary spectrum of par-axial rays; consequently, spherical aberration must be eliminated for two colours, and if this be impossible, then it must be eliminated for those particular wave-lengths which are most effectual for the instrument in question (a graphical representation of this error is given in M. von Rohr, Theorie und Geschichte des photo graphischen Objectivs).

The condition for the reproduction of a surface element in the place of a sharply reproduced point — the constant of the sine relation — must also be fulfilled with large apertures for several colours. E. Abbe succeeded in computing microscope objectives free from error of the axis point and satisfying tie sine condition for several colours, which

therefore, according to his definition, were ” aplanatic for several colours “; such sys- tems he termed ” apochromatic.” While, however, the magnifU cation of the individual zones is the same, it is not the same for red as for blue; and there is a chromatic difference of magnifica- tion. This is produced in the same amount, but in the opposite sense, by the oculars, which are used with these objectives (” compensating oculars “), so that it is eliminated in the image of the whole microscope. The best telescope objectives, and photographic objectives intended for three-colour work, are also apochromatic, even if they do not- possess quite the same quality of correction as microscope objectives do. The chromatic differences of other errors of reproduction have seldom practical importances.

Authorities. — The standard treatise in English is H. D. Taylor, A System of Applied Optics (1906); reference may also be made to R. S. Heath, A Treatise on Geometrical Optics (2nd ed., 1895); and L. A. Herman, A Treatise on Geometrical Optics (1900). The ideas of Abbe were first dealt with in S. Czapski, Theorie der optischen Instrument nach Abbe, published separately at Breslau in 1893, and as vol. ii. of Winkelmann’s Handbuch der Physik in 1894; a second edition, by Czapski and O. Eppenstein, was published at Leipzig in 1903 with the title, Grundziige der Theorie der optischen Instrument nach Abbe, and in vol. ii. of the 2nd ed. of Winkelmann’s Handbuch der Physik. The collection of the scientific staff of Carl Zeiss at Jena, edited by M. von Rohr, Die Bilderzeugung in optischen Inslrumenten vom Standpunkte der geometrischen OpHk (Berlin, 1904), contains articles by A. Konig and M. von Rohr specially dealing with aberrations. (O. E.)

ABERSYCHAN, an urban district in the northern parlia- mentary division of Monmouthshire, England, 11 m. N. by W. of Newport, on the Great Western, London and North- Western, and Rhymney railways. Pop. (1901) 17,768. It lies in the narrow upper valley of the Afon Lwyd on the eastern edge of the great coal and iron mining district of Glamorganshire and Monmouthshire, and its large industrial population is occupied in the mines and ironworks. The neighbourhood is wild and mountainous.

ABERTILLERY, an urban district in the western parlia- mentary division of Monmouthshire, England, 16 m. N.W. of Newport, on the Great Western railway. Pop. (1891) 10,846; (1901) 21,945. It lies in the mountainous mining district of Monmouthshire a*d

Glamorganshire, in the valley of the Ebbw Fach, and the large industrial population is mainly employed in the numerous coal-mines, ironworks and tinplate works. Farther up the valley are the mining townships of Nantyglo and Blaina, forming an urban district with a population (1901) of 13,489-

ABERYSTWYTH, a municipal borough, market-town and seaport of Cardiganshire, Wales, near the confluence of the rivers Ystwy th and Rheidol, about the middle of Cardigan Bay. Pop. (1901) 8013. It is the terminal station of the Cambrian railway, and also of the Manchester and Milford line. It is the most popular watering-place on the west coast of Wales, and possesses a pier, and a fine sea-front which stretches from Consti- tution Hill at the north end of the Marine Terrace to the mouth of the harbour. The town is of modern appearance, and con- tains many public buildings, of which the most remarkable is the imposing but fantastic structure of the University College of Wales near the Castle Hill. Much of the finest scenery in mid- Wales lies within easy reach of Aberystwyth.

The history of Aberystwyth may be said to date from the time of Gilbert Strongbow, who in 1109 erected a fortress on the present Castle Hill. Edward I. rebuilt Strongbow's castle in 1277, after its destruction by the Welsh. Between the years 1404 and 1408 Aberystwyth Castle was in thehandsof Owen Glen- dower, but finally surrendered to Prince Harry of Monmouth, and shortly after this the town was incorporated under the title of Ville de Lampadarn, the ancient name of the place being Llan- badarn Gaerog, or the fortified Llanbadarn, to distinguish it from Llanbadarn Fawr, the village one mile inland. It is thus styled in a charter granted by" Henry VIII., but by Elizabeth's time the town was invariably termed Aberystwyth in all docu- ments. In 1647 the parliamentarian troops razed the castle to the ground, so that its remains are now inconsiderable, though portions of three towers still exist. Aberystwyth was a contri- butory parliamentary borough until 1885, when its representation was merged in that of the county. In modern times Aberyst- wyth has become a Welsh educational centre, owing to the erection here of one of the three colleges of the university of Wales (1872), and of a hostel for women in connexion with it. In 1905 it was decided to fix here the site of the proposed Welsh National Library.

ABETTOR (from " to abet," O. Fr. abeter, a and beter, to bait, urge dogs upon any one ; this word is probably of Scandi- navian origin, meaning to cause to bite), a law term implying one who instigates, encourages or assists another to commit an offence. An abettor differs from an accessory (q.v.) in that he must be present at the commission

of the crime; all abettors

(with certain exceptions) are principals, and, in the absence of specific statutory provision to the contrary, are punishable to the same extent as the actual perpetrator of the offence. A person may in certain cases be convicted as an abettor in the commission of an offence in which he or she could not be a principal, e.g. a woman or boy under fourteen years of age in aiding rape, or a solvent person in aiding and abetting a bankrupt to commit offences against the bankruptcy laws.

ABEYANCE (O. Fr. abeance, ” gaping”), a state of expectancy in respect of property, titles or office, when the right to them is not vested in any one person, but awaits the appearance or determination of the true owner. In law, the term abeyance can only be applied to such future estates as have not yet vested or possibly may not vest. For example, an estate is granted to A for life, with remainder to the heir of B, the latter being alive; the remainder is then said to be in abeyance, for until the death of B it is uncertain who his heir is. Similarly the freehold of a benefice, on the death of the incumbent, is said to be in abeyance until the next incumbent takes possession. The most common use of the term is in the case of peerage dignities. If a peerage which passes to heirs-general, like the ancient baronies by writ, is held by a man whose heir-at-law is neither a male, nor a woman who is an only child, it goes into abeyance on his dqath between two or more sisters or their heirs, and is held by no one till the abeyance is terminated; if eventually only one person represents the claims of all the sisters, he or she can claim the termination of the abeyance as a matter of right. The crown can also call the peerage out of abeyance at any moment, on petition, in favour of any one of the sisters or their heirs between whom it is in abeyance. The question whether ancient earldoms created in favour of a man and his ” heirs ” go into abeyance like baronies by writ has been raised by the claim to the earldom of Norfolk created in 131 2, discussed before the Committee for Privileges in 1906. It is common, but incorrect, to speak of peerage dignities which are dormant (i.e. unclaimed) as being in abeyance. (J. H. R.)

AB6AR, a name or title borne by a line of kings or toparchs, apparently twenty-nine in number, who reigned in Osrhoene and had their capital at Edessa about the time of the Christian era. According to an old tradition, one of these princes, perhaps Abgar V. (Ukkama or Uchomo, ” the black “), being afflicted with leprosy, sent a letter to Jesus, acknowledging his divinity, craving his help and offering him an asylum in his own residence, but Jesus wrote a letter declining to go, promising, however, that after his ascension he would send one of

his disciples. These letters are given by Eusebius (Eccl. Hist. i. 13), who declares that the Syriac document from which he translates them had been preserved in the archives at Edessa from the time of Abgar. Eusebius also states that in due course Judas, son of Thaddaeus, was sent (in 340 = a.d. 29). In another form of the story, de- rived from Moses of Chorene, it is said further that Jesus sent his portrait to Abgar, and that this existed in Edessa (Hist. Armen., ed. W. Whiston, ii. 29-32). Yet another version is found in the Syriac Doctrina Addaei (Addaeus = Thaddaeus), edited by G. Phillips (1876). Here it is said that the reply of Jesus was given not in writing, but verbally, and that the event took place in 343 (a.d. 32). Greek forms of the legend are found in the Acta Thaddaei (C. Tischendorf, Acta apostolorurf. apocr. 261 ff.).

These stories have given rise to much discussion. The testi- mony of Augustine and Jerome is to the effect that Jesus wrote nothing. The correspondence was rejected as apocryphal by Pope Gelasius and a Roman Synod (c. 495), though, it is true, this view has not been shared universally by the Roman churck (Tillemont, Memoires, i. 3, pp. 990 ff.). Amongst Evangelicals the spuriousness of the letters is almost generally admitted. Lipsius (Die Edessenische Abgar sage, 1880) has pointed out anachronisms which seem to indicate that the story is quite unhistorical. The first king of Edessa of whom we have any trustworthy information is Abgar VIII., bar Ma'nu (a.d. 176- 213). It is suggested that the legend arose from a desire to trace the christianizing of his kingdom to an apostolic source.

Eusebius gives the legend in its oldest form; it was worked up in the Doctrina Addaei in the second half of the 4th century; and Moses of Chorene was dependent upon both these sources.

Bibliography. — R. Schmidt in Herzog-Hauck, Realencyklopadie ; Lipsius, Die Edessenische Abgarsage kritisch uniersucht (1880) ; Matthes, Die Edessenische Abgarsage auf ihre Fortbildung uniersucht (1882); Tixerorit, Les Origines de I'eglise d'Edesse et la ligende d'A. (1888) ; A. Harnack, Geschichte d. altchristlichen Litleratur, i. 2 (1893) ; L. Duchesne, Bulletin critique, 1889, pp. 41-48; for the Epistles see Apocryphal Literature, sect. "New Testament " (c).

ABHIDHAMMA, the name of one of the three Pitakas, or baskets of tradition, into which the Buddhist scriptures (see Buddhism) are

divided. It consists of seven works: 1. Dhamma Sangani (enumeration of qualities). 2. Vibhanga (exposition). 3. Katha Vatthu (bases of opinion). 4. Puggala Pannatti (on individuals). 5. Dhatu Katha (on relations of moral disposi- tions). 6. Yamaha (the pairs, that is, of ethical states). 7. Patthana (evolution of ethical states). These have now been published by the Pali Text Society. The first has been translated into English, and an abstract of the third has been pub- lished. The approximate date of these works is probably from about 400 B.C. to about 250 B.C., the first being the oldest and the third the latest of the seven. Before the publication of the texts, when they were known only by hearsay, the term Abhidhamma was usually rendered "Metaphysics." This is now seen to be J quite erroneous. Dhamma means the doctrine, and •Abhidhamma has a relation to Dhamma similar to that of by- law to law. It expands, classifies, tabulates, draws corollaries from the ethical doctrines laid down in the more popular treat- ises. There is no metaphysics in it at all, only psychological ethics of a peculiarly dry and scholastic kind. And there is no originality in it; only endless permutations and combinations of doctrines already known and accepted. As in the course of centuries the doctrine itself, in certain schools, varied, it was felt necessary to rewrite these secondary works. This was first done, so far as is at present known, by the Sarvastivadins (Realists), who in the century before and after Christ produced a fresh set of seven Abhidhamma books. These are lost ini India, but still exist in Chinese translations. The translations have been analysed in a masterly way by Professor Takakusu in the article mentioned below. They deal only with psychological ethics. In the course of further centuries these books in turn were superseded by new treatises; and in one school at least,,: that of the Maha-yana (great vehicle) there was eventually developed a system of metaphysics. But the word Abhidhamma then fell out of use in that school, though it is still : used in the schools that continue to follow the original seven books.

See Buddhist Psychology by Caroline Rhys Davids (London, 1900), a translation of the Dhamma Sangant, with valuable introduction; "Schools of Buddhist Belief," by T. W. Rhys Davids, in Journal of the Royal Asiatic Society, 1892, contains an abstract of the Katha Vatthu; "On the Abhidhamma books of the Sarvastivadins," by Prof. Takakusu, in Journal of the Pali Text Society, 1905.

(T. W. R. D.)

ABHORRERS, the name given in 1679 to the persons who expressed their abhorrence at the action of those who had signed •petitions urging King Charles II. to assemble parliament. Feel- ing against

Roman Catholics, and especially against James, duke of York, was running strongly; the Exclusion Bill had . been passed by the House of Commons, and the popularity of James, duke of Monmouth, was very great. To prevent this bill from passing into law, Charles had dissolved parliament in July 1679, and in the following October had prorogued its suc cessor without allowing it to meet. He was then deluged with petitions urging him to call it together, and this agitation was opposed by Sir George Jeffreys (q.ii.) and Francis Wythens, who presented addresses expressing "abhorrence" of the "Peti- tioners," and thus initiated the movement of the abhorrers, who supported the action of the king. "The frolic went all over England," says Roger North; and the addresses of the Ab- horrers which reached the king from all parts of : the country formed a counterblast to those of the Petitioners. It is said that the terms Whig and Tory were first applied to English poli- tical parties in consequence of this .dispute.

ABIATHAR (Heb. Ebyathar, "the [divine] father is pre- eminent"), in the Bible, son of Ahimelech or Ahijah, priest at Nob. The only one of the priests to escape from Saul's massacre, he fled to David at Keilah, taking with him the ephod (1 Sam. xxii. 20 f., xxiii. 6, 9). He was of great service to David, especi- ally at the time of the rebellion of Absalom (2 Sam. xv. 24, 29, 35, xx. 25). In 1 Kings iv. 4 Zadok and Abiathar are found acting together as priests under Solomon. In 1 Kings i. 7, 19, 25, however, Abiathar appears as a supporter of Adonijah, and in ii. 22 and 26 it is said that he was deposed by Solomon and banished to Anathoth. In 2 Sam. viii. 17 "Abiathar, the son of Ahimelech" should be read, with the Syriac, for "Ahimelech, the son of Abiathar." For a similar confusion see Mark ii. 26.

ABICH, OTTO WILHELM HERMANN VON (1806-1886), German mineralogist and geologist, was born at Berlin on the nth of December 1806, and educated at the university in that city. His earliest scientific work related to spinels and other minerals, and later he made special studies of fumaroles, of the mineral deposits around volcanic vents and of the structure of volcanoes. In 1842 he was appointed professor of mineralogy in the university of Dorpat, and henceforth gave attention to the geology and mineralogy of Russia. Residing for some time at Tiflis he investigated the geology of the Caucasus. Ultimately he retired to Vienna, where he died on the 1st of July 1886. The mineral Abichite was named after him.

Publications. — Vues illustratives de quelques phenomenes giolo- giques, prises sur le , Vesuve et I'Etna, pendant les annees 1833 et 1834 (Berlin, 1 836) ; Ueber die Natur und den Zusammenhang der vulccCnis'chen Bildungen (Brunswick, 1841); Geologische

Forschungen in den Kaukasischen Landern (3 vols., Vienna, 1878, 1882, and 1887).

ABIGAIL (Heb. Abigayil, perhaps “father is joy”), or Abigal (2 Sam. iii. 3), in the Bible, the wife of Nabal the Carmelite, on whose death she became the wife of David (1 Sam. xxv.). By her David had a son, whose name appears in the Hebrew of 2 Sam. iii. 3 as Chileab, in the Septuagint as Daluyah, and in 1 Chron. iii. 1 as Daniel. The name Abigail was also borne by a sister of David (2 Sam. xvii. 25; 1 Chron. ii. 16 f.). From the former (self-styled “handmaid” 1 Sam. xxv. 25 f.) is derived the colloquial use of the term for a waiting-woman (cf . Abigail, the “waiting gentlewoman,” in Beaumont and Fletcher’s Scornful Lady). ‘

ABIJAH (Heb. Abiyyah and Abiyyahu, “Yah is father”), a name borne by nine different persons mentioned in the Old Testament, of whom the most noteworthy are the following.

(1) The son and successor of Rehoboam, king of Judah (2 Chron. xii. 16-xiii.), reigned about two yeaTs (918-915 B.C.). The ac- counts of him in the books of Kings and Chronicles are very con- flicting (compare 1 Kings xv. 2 and 2 Chron. xi.20 with 2 Chron. xiii.2). The Chronicler tells us that he has drawn his facts from the Midrash (Commentary) of the prophet Iddo. This is perhaps sufficient to explain- the character of the narrative. (2) The second son of Samuel (1 Sam. viii. 2; 1 Chron. vi. 28 [13]). He and his brother Joel judged at Beersheba. Their misconduct was made by the elders of Israel a pretext for demanding a king (1 Sam. viii. 4). (3) A son of Jeroboam I., king of Israel; he died young (1 Kings’ xiv. 1 ff., 17). (4) Head of the eighth order of priests (1 Chron. xxiv. 10), the order to which Zacharias, the father of John the Baptist, belonged (Luke i. 5).

The alternative form Abijam is probably a mistake, though it is upheld by M. Jastrow. – ‘

ABILA, (1) a city of ancient Syria, the capital of the tetrarchy of Abilene, a territory whose extent it is impossible to define. It is generally called Abila of Lysanias, to distinguish it from

(2) below. Abila was an important town on the imperial high- way from Damascus to Heliopolis (Baalbek). The site is indi- cated by ruins of a temple, aqueducts, &c, and inscriptions on the banks of the river Barada atSuk Wadi Barada, a village called by early Arab geographers Abil-es-Suk, between Baalbek and Damascus. Though the names Abel and Abila differ in derivation and in meaning, their similarity has

given rise to the tradition that this was the place of Abel's burial. According to Josephus, Abilene was a separate Iturean kingdom till a.d. 37, when it was granted by Caligula to Agrippa I.; in 52 Claudius

granted it to Agrippa II. (See also Lysanias.) (2) A city in Perea, now Abil-ez-Zeit.

ABILDGAARD, NIKOLAJ ABRAHAM (1744-1800), called "the Father of Danish Painting," was born at Copenhagen/the son of Soren Abildgaard, an antiquarian draughtsman of repute. He formed his style on that of Claude and of Nicolas Poussin; and was a cold theorist, inspired not by nature but by art. As a technical painter he attained remarkable success, his tone being very harmonious and even, but the effect, to a foreigner's eye, is rarely interesting. His works are scarcely known out of Copen- hagen, where he won an immense fame in his own generation. He was the founder of the Danish school of painting, and the master of Thorwaldsen and Eckersberg.

ABIMELECH (Hebrew for "father of [or is] the king "). (1) A king of Gerar in South Palestine with whom Isaac, in the Bible, had relations. The patriarch, during his sojourn there, alleged that his wife Rebekah was his sister, but the king doubting this remonstrated with him and pointed out how easily adultery might have been unintentionally committed (Gen. xxvi.). Abimelech is called " king of the Philistines," but the title is clearly an anachronism. A very similar story is told of Abraham and Sarah (ch. xx.), but here Abimelech takes Sarah to wife, although he is warned by a divine vision before the crime is actually committed. The incident is fuller and shows a great advance in ideas of morality. Of a more primitive character, however, is another parallel story of Abraham at the court of Pharaoh, king of Egypt (xii. 10-20), where Sarah his wife is taken into the royal household, and the plagues sent by Yahweh lead to the discovery of the truth. Further incidents in Isaac's life at Gerar are narrated in Gen. xxvi. (cp. xxi. 22-34, time of Abraham), notably a covenant with Abimelech at Beer-sheba (whence the name is explained "well of the oath"); (see Abraham). By a pure error, or perhaps through a confusion in the traditions, Achish the Philistine (of Gath, 1 Sam. xxi., xxvii.), to whom David fled, is called Abimelech in the super- scription to Psalm xxxiv.

(2) A son of Jerubbaal or Gideon (g.v.), by his Shechemite concubine (Judges viii. 31, ix.). On ' the death of Gideon, Abimelech set himself

to assert the authority which his father had earned, and through the influence of his mother's clan won over the citizens of Shechem. Furnished with money from the treasury of the temple of Baal-berith, he hired a band of followers and slew seventy (cp. 2 Kings x. 7) of his brethren at Ophrah, his father's home. This is one of the earliest recorded instances of a practice common enough on the accession of Oriental despots. Abimelech thus became king, and extended his authority over central Palestine. But his success was short-lived, and the sub- sequent discord between Abimelech and the Shechemites was regarded as a just reward for his atrocious massacre. Jotham, the only one who is said to have escaped, boldly appeared on Mount Gerizim and denounced the ingratitude of the townsmen towards the legitimate sons of the man who had saved them from Midian. " Jotham's fable " of the trees who desired a king may be foreign to the context; it is a piece of popular lore, and cannot be pressed too far: the nobler trees have no wish to rule over others, only the bramble is self-confident. The " fable " appears to be antagonistic to ideas of monarchy. The origin of the conflicts which subsequently arose is not clear. Gaal, a new-comer, took the opportun'ty at the time of the vintage, when there was a festival in tha temple, to head a revolt and seized Shechem. Abimelech, warned by his deputy Zebul, left his residence at Arumah and approached the city. In a fine bit of realism we are told how Gaal observed the approaching foe and was told by Zebul, " You see the shadow of the hills as men," and as they drew nearer Zebul's ironical remark became a taunt, " Where is now thy mouth ? is not this the people thou didst despise? go now and fight them!" This revolt, which Abime- lech successfully quelled, appears to be only an isolated episode. Another account tells of marauding bands of Shechemites which disturbed the district. The king disposed his men (the whole chapter is specially interesting for the full details it gives of the nature of ancient military operations), and after totally

destroying Shechem, proceeded against Thebez, which had also revolted. Here, while storming the citadel, he was struck on the head by a fragment of a millstone thrown from the wall by a woman. To avoid the disgrace of perishing by a woman's hand, he begged his armour-bearer to run him through the body, but his memory was not saved from the ignominy he dreaded (2 Sam. xi. 21). It is usual to regard Abimelech's reign as the first attempt to establish a monarchy in Israel, but the story is mainly that of the rivalries of a half-developed petty state, and of the ingratitude of a community towards the descendants of its deliverer. (See, further, Jews, Judges.) (S. A. C.)

ABINGDON, a market town and. municipal borough in the Abingdon parliamentary division of Berkshire, England, 6 m. S. of Oxford, the

terminus of a branch of the Great Western railway from Radley. Pop. (1901) 6480. It lies in the fiat valley of the Thames, on the west (right) bank, where the small river Ock flows in from the Vale of White Horse. The church of St Helen stands near the river, and its fine Early English tower with Perpendicular spire is the principal object in the pleasant views of the town from the river. The body of the church, which has five aisles, is principally Perpendicular. The smaller church of St Nicholas is Perpendicular in appearance, though parts of the fabric are older. Of a Benedictine abbey there remain a beautiful Perpen'dicular gateway, and ruins of buildings called the prior's house, mainly Early English, and the guest house, with other fragments. The picturesque narrow-arched bridge over the Thames near St Helen's church dates originally from 1416. There may be mentioned further the old buildings of the grammar school, founded in 1563, and of the charity called Christ's Hospital (1583); while the town-hall in the market- place, dating from 1677, is attributed to Inigo Jones. The grammar school now occupies modern buildings, and ranks among the lesser public schools of England, having scholarships at Pembroke College, Oxford. St Peter's College, Radley, 2 m. from Abingdon, is one of the principal modern public schools. It was opened in 1847. The buildings lie close to the Thames, and the school is famous for rowing, sending an eight to the regatta at Henley each year. Abingdon has manufactures of clothing and carpets and a large agricultural trade. The borough is under a mayor, four aldermen and twelve councillors. Area, 730 acres.

Abingdon (Abbedun, Abendun) was famous for its abbey, which was of great wealth and importance, and is believed to have been founded in A.D. 675 by Cissa, one of the subreguii of Centwin. Abun- dant charters from early Saxon monarchs are extant confirming various laws and privileges to the abbey; and the earliest of these, from King Ceadwalla, was granted before A.D. 688. In the reign of Alfred the abbey was destroyed by the Danes, but it was restored by Edred, and an imposing list of possessions in the Domesday survey evidences recovered prosperity. William the Conqueror in 1084 celebrated Easter at Abingdon, and left his son, afterwards Henry I., to be educated at the abbey. After the dissolution in 1538 the town sank into decay, and in 1555, on a representation of its pitiable condition, Queen Mary granted a charter establishing it as a free borough corporate with a common council consisting of a mayor, two bailiffs, twelve chief burgesses, and sixteen second- ary burgesses, the mayor to be clerk of the market, coroner and a justicS of the peace. The council was empowered to elect one burgess to parliament, and this right continued' until the Redistri- bution of Seats Act of 1885. A town

clerk and other officers were also appointed, and the town boundaries described in great detail. Later charters from Elizabeth, James I., James II., George II. and George III. made no considerable change. James II. changed the style of the corporation to that of a mayor, twelve aldermen and twelve burgesses. The abbot seems to have held a market from very early times, and charters for the holding of markets and fairs were granted by various sovereigns from Edward I. to George II. In the 13th and 14th centuries Abingdon was a flourishing agri- cultural centre with an extensive trade in wool, and a famous weav- ing and clothing manufacture. The latter industry declined before the reign of Queen Mary, but has since been revived.

The present Christ's Hospital originally belonged to the Gild of the Holy Cross, on the dissolution of which Edward VI. founded the hospital under its present name. .

See Victoria County History, Berkshire; Joseph Stevenson, Chronicon Monasterii de Abingdon, A.D. 201-1189 (Rolls Series, 2 vols., London, 1858).

ABINGER, JAMES SCARLETT, 1ST Baeon (1 760-1844),

English judge, was born on the 13 th of December 1769 in Jamaica, where his father, Robert Scarlett, had property. In the summer of 1785 he was sent to England to complete his education, and went to Trinity College, Cambridge, taking his B.A. degree in 1789. Having entered the Inner Temple he was called to the bar in 1791, and joined the northern circuit and the Lancashire sessions. Though he had no professional connexions, by steady application he gradually obtained a large practice, ultimately confining himself to the Court of King's Bench and the northern circuit. He took silk in 1816, and from this time till the close of 1834 he was the mosˆ successful lawyer at the bar; he was particularly effective before a jury, and his income reached the high-water mark of £18,500, a large sum for that period. He began life as a Whig, and first entered parliament in 1819 as member for Peterborough, representing that constitu- ency with a short break (1822-1823) till 1830, when he was elected for the borough of Malton. He became attorney-general, and was knighted when Canning formed his ministry in 1827; and though he resigned when the duke of Wellington came into power in 1828, he resumed office in 1829 and went out with the duke of Wellington in 1830. His

opposition to the Reform Bill caused his severance from the Whig leaders, and having joined the Tories he was elected, first for Colchester and then in 1832 for Norwich, for which borough he sat until the dissolution of parliament. He was appointecVlord chief baron of the exchequer in 1834, and presided in that court for more than nine years. While attending the Norfolk circuit on the 2nd of April he was suddenly seized with apoplexy, and died in his lodgings at Bury on the 7th of April 1844. He had been raised to the peerage as Baron Abinger in 1835, taking his title from the Surrey estate he had bought in 1813. The qualities which brought him success at the bar were not equally in place on the bench; he was partial, dictatorial and vain; and complaint was made of his domineering attitude towards juries. But his acuteness of mind and clearness of ex- pression remained to the end. Lord Abinger was twice married (the second time only six months before his death), and by his first wife (d. 1829) had three sons and two daughters, the title passing to his eldest son Robert (1794-1861). His second son, General Sir James Yorke Scarlett (1799-1871), leader, of the heavy cavalry charge at Balaclava, is dealt with in a separate article; and his elder daughter, Mary, married John, Baron Campbell, and was herself created Baroness Stratheden (Lady Stratheden and Campbell) (d. i860). Sir Philip Anglin Scarlett (d. 1831), Lord Abinger's younger brother, was chief justice of Jamaica.

See P. C. Scarlett, Memoir of James, 1st Lord Abinger (1877); Foss's Lives of the Judges; E. Manson, Builders of our Law (1904).

ABINGTON, FRANCES (1737-1815), English actress, was the daughter of a private soldier named Barton, and was, at first, a flower girl and a street singer. She then became servant to a French milliner, obtaining a taste in dress and a knowledge of French which afterwards stood her in good stead. Her first appearance on the stage was at the Haymarket in 1755 as Miranda in Mrs Centlivre's Busybody. In 1756, on the recom- mendation of Samuel Foote, she became a member of the Drury Lane company, where she was overshadowed by Mrs Pritchard and Kitty Clive. In 1759, after an unhappy marriage with her music-master, one of the royal trumpeters, she is mentioned in the bills as Mrs Abington. Her first success was in Ireland as Lady Townley, and it was only after five years, on the pressing invitation of Garrick, that she returned to Drury Lane. There she remained for eighteen years, being the original of more than thirty important characters, notably Lady Teazle (1777). Her Beatrice, Portia, Desdemona and Ophelia were no less liked than her Miss Hoyden, Biddy Tipkin, Lucy Lockit and Miss Prue. It was in the last character in Love for Love that Reynolds painted his best portrait of her. In 1782 she left Drury Lane for Covent Garden. After an absence from the stage from 1790 until

1797, she reappeared, quitting it finally in 1799. Her am- bition, personal wit and cleverness won her a distinguished position in society, in spite of her humble origin. Women of fashion copied her frocks, and a head-dress she wore was widely

adopted and known as the ” Abington cap.” She died on the 4th of March 1815.

ABIOGENESIS, in biology, the term, equivalent to the older terms ” spontaneous generation,” Generatio aequivoca, Generatio primaria, and of more recent terms such as archegenesis and archebiosis, for the theory according to which fully formed living organisms sometimes arise from not-living matter. Aristotle explicitly taught abiogenesis, and laid it down as an observed fact that some animals spring from putrid matter, that plant- lice arise from the dew which falls on plants, that fleas are developed from putrid matter, and so forth. T. J. Parker {Elementary Biology) cites a passage from Alexander Ross, who, commenting on Sir Thomas Browne’s doubt as to ” whether mice may be bred by putrefaction,” gives a clear statement of the common opinion on abiogenesis held until about two centuries ago. Ross wrote: ” So may he (Sir Thomas Browne) doubt whether in cheese and timber worms are generated; or if beetles and wasps in cows’ dung; or if butterflies, locusts, grasshoppers, shell-fish, snails, eels, and such like, be procreated of putrefied matter, which is apt to receive the form of that creature to which it is by formative power disposed. To question this is to question reason, sense and experience. If he doubts of this let him go to Egypt, and there he will find the fields swarming with mice, begot of the mud of Nylus, to the great calamity of the in- habitants.”

The first step in the scientific refutation of tha*heory of abio- genesis was taken by the Italian Redi, who, in 1668, proved that no maggots were ” bred ” in meat on which flies were pre- vented by wire screens from laying their eggs. From the 17 th century onwards it was gradually shown that, at least in the case of all the higher and readily visible organisms, abiogenesis did not occur, but that omne vivum e vivo, every living thing came from a pre-existing living thing.

The discovery of the microscope carried the refutation further. In 1683 A. van Leeuwenhoek discovered bacteria, and it was soon found that however carefully organic matter might be protected by screens, or by being placed in stoppered receptacles, putrefaction set in, and was invariably accompanied by the appearance of myriads of bacteria and other low organisms. As knowledge of microscopic forms of life increased, so the apparent possibilities of abiogenesis increased, and it became a tempting hypothesis that whilst the higher forms of life

arose only by generation from their kind, there was a perpetual abiogenetic fount by which the first steps in the evolution of living organisms continued to arise, under suitable conditions, from inorganic matter. It was due chiefly to L. Pasteur that the occurrence of abiogenesis in the microscopic world was disproved as much as its occurrence in the macroscopic world. If organic matter were first sterilized and then prevented from contamination from without, putrefaction did not occur, and the matter re- mained free from microbes. The nature of sterilization, and the difficulties in securing it, as well as the extreme delicacy of the manipulations necessary, made it possible for a very long time to be doubtful as to the application of the phrase omne vivum e vSo to the microscopic world, and there still remain a few belated supporters of abiogenesis. Subjection to the tempera- ture of boiling water for, say, half an hour seemed an efficient mode of sterilization, until it was discovered that the spores of bacteria are so involved in heat-resisting membranes, that only prolonged exposure to dry, baking heat can be recognized as an efficient process of sterilization. Moreover, the presence of bacteria, or their spores, is so universal that only extreme pre- cautions guard against a re-infection of the sterilized material. It may now be stated definitely that all known living organisms arise only from pre-existing living organisms.

So far the theory of abiogenesis may be taken as disproved. It must be noted, however, that this disproof relates only to known existing organisms. All these are composed of a definite substance, known as protoplasm (?.».), and the modern refutation of abiogenesis applies only to the organic forms in which proto- plasm now exists. It may be that in the progress of science it may yet become possible to construct living protoplasm from

non-living material. The refutation of abiogenesis has no further bearing on this possibility than to make it probable that if protoplasm ultimately be formed in the laboratory, it will be by a series of stages, the earlier steps being the formation of some substance, or substances, now unknown, which are not proto- plasm. Such intermediate stages may have existed in the past, and the modern refutation of abiogenesis has no application to the possibility of these having been formed from inorganic matter at some past time. Perhaps the words archebiosis, or archegenesis, should be reserved for the theory that protoplasm in the remote past has been developed from not-living matter by a series of

steps, and many of those, notably T. H. Huxley, who took a large share in the process of refuting contemporary abiogenesis, have stated their belief in a primordial archebiosis. (See Biogenesis and Life.) (P. C. M.)

ABIPONES, a tribe of South American Indians of Guaycuran stock recently inhabiting the territory lying between Santa Fe and St Iago. They originally occupied the Chaco district of Paraguay, but were driven thence by the hostility of the Spaniards. According to Martin Dobrizhoffer, a Jesuit missionary, who, towards the end of the 18th century, lived among them for a period of seven years, they then numbered not more than 5000. They were a well-formed, handsome people, with black eyes and aquiline noses, thick black hair, but no beards. The hair from the forehead to the crown of the head was pulled out, this con- stituting a tribal mark. The faces, breasts and arms of the women were covered with black figures of various designs made with thorns, the tattooing paint being a mixture of ashes and blood. The lips and ears of both sexes were pierced. The men were brave fighters, their chief weapons being the bow and spear. No child was without bow and arrows; the bow-strings were made of foxes' entrails. In battle the Abipones wore an armour of tapir's hide over which a jaguar's skin was sewn. They were excellent swimmers and good horsemen. For five months in the year when the floods were out they lived on islands or even in shelters built in the trees. They seldom married before the age of thirty, and were singularly chaste. " With the Abipones," says Darwin, " when a man chooses a wife, he bargains with the parents about the price. But it frequently happens that the girl rescinds what has been agreed upon between the parents and bridegroom, obstinately rejecting the very mention of marriage. She often runs away and hides herself, and thus eludes the bridegroom." Infanticide was systematic, never more than two children being reared in one family, a custom doubtless originating in the difficulty of subsistence. The young were suckled for two years. The Abipones are now believed to be extinct as a tribe.

Martin Dobrizhoffer's Latin Historia de Abiponibus (Vienna, 1784) was translated into English by Sara Coleridge, at the suggestion of Southey, in 1822, under the title of An Account of the Abipones (3 vols.).

ABITIBBI, a lake and river of Ontario, Canada. The lake, in 49 N., 8o° W., is 60 m. long and studded with islands. It is shallow, and the shores in its vicinity are covered with small timber. It was formerly employed by the Hudson's Bay Com- pany as part of a canoe route to the fur lands of the north. The construction of the Grand Trunk Pacific

railway through this district has made it of some importance. Its outlet is Abitibbi river, a rapid stream, which after a course of 200 m. joins the Moose river, flowing into James Bay.

ABJURATION (from Lat. abjurare, to forswear), a solemn repudiation or renunciation on oath. At common law, it signified the oath of a person who had taken sanctuary to leave the realm for ever; this was abolished in the reign of James I. The Oath of Abjuration, in English history, was a solemn disclaimer, taken by members of parliament, clergy and laymen against the right of the Stuarts to the crown, imposed by laws of William III., George I. and George III.; but its place has since been taken by the oath of allegiance.

ABKHASIA, or Abhasia, a tract of Russian Caucasia, govern- ment of Kutais. The Caucasus mountains on the N. and N.E. divide it from Circassia; on the S.E. it is bounded by Mingrelia;

1.3

and on the S.W. by the Black Sea. Though the country is generally mountainous, with dense forests of oak and walnut, there are some deep, well-watered valleys, and the climate is mild. The soil is fertile, producing wheat, maize, grapes, figs, pomegranates and wine. Cattle and horses are bred. Honey is produced; and excellent arms are made. This country was subdued (c. 550) by the Emperor Justinian, who introduced Christianity. Native dynasties ruled from 735 to the 15th century, when the region was conquered by the Turks and became Mahommedan. The Russians acquired possession of it piecemeal between 1829 and 1842, but their power was not firmly established until after 1864. Area, 2800 sq. m. The principal town is Sukhum-kaleh. Pop. 43,000, of whom two- thirds are Mingrelians and one-third Abkhasians, a Cherkess or Circassian race. The total number of Abkhasians in the two governments of Kutais and Kuban was 72,103 in 1897; large numbers emigrated to the Turkish empire in 1864 and 1878.

ABLATION (from Lat. ablalus, carried away), the process of removing anything; a term used technically in geology of the wearing away of a rock or glacier, and in surgery for operative removal.

ABLATITIOUS (from Lat. ablatus, taken away), reducing or withdrawing; in astronomy a force which interferes between the moon and the earth to lessen the strength of gravitation is called ” ablatitious,” just as it is called ” addititious ” when it increases that strength.

ABLATIVE (Lat. ablativus, sc. casus, from ablatum, taken away), in grammar, a case of the noun, the fundamental sense of which is direction from; in Latin, the principal language in which the case exists, this has been extended, with or without a preposition, to the instrument or agent of an act, and the place or time at, and manner in, which a thing is done. The case is also found in Sanskrit, Zend, Oscan and Umbrian, and traces remain in other languages. The ” Ablative Absolute,” a gram- matical construction in Latin, consists of a noun in the ablative case, with a participle, attribute or qualifying word agreeing with it, not depending on any other part of the sentence, to express the time, occasion or circumstance of a fact.

ABLUTION (Lat. ablutio, from abluere, ” to wash off “), a washing, in its religious use, destined to secure that ceremonial or ritualistic purity which must not be confused with the physical or hygienic cleanliness of persons and things obtained by the use of soap and water. 1 Indeed the two states may con- tradict each other, as in the case of the 4th-century Christian pilgrim to Jerusalem who boasted that she had not washed ner face for eighteen years for fear of removing therefrom the holy chrism of baptism. The purport, then, of ablutions is to remove, not dust and dirt, but the — to us imaginary — stains contracted by contact with the dead, with childbirth, with menstruous, women, with murder whether wilf,ul or involuntary, with almost any form of bloodshed, with persons of inferior caste, with dead animal refuse, e.g. leather or excrement, with leprosy, madness and any form of disease. Among all races in a certain grade of development such associations are vaguely felt to be dangerous and to impair vitality. In a later stage the taint is regarded as alive, as a demon or evil spirit alighting on and passing into the things and persons exposed to contamina- tion. In general, water, cows’ urine and blood of swine are the materials used in ablutions. Of these water is the commonest, and its efficacy is enhanced if it be running, and still more if a magical or sacramental virtue has been imparted to it by ritual blessing or consecration. Some concrete examples will best illustrate the nature of such ablutions. In the Atharva-Veda, vii. 1 16, we have this allopathic remedy for fever. The patient’s skin burns, that of a frog is cold to the touch; therefore tie to the foot of the bed a frog, bound with red and black thread, and wash down the sick man so that the water of ablution falls

1 In its technical ecclesiastical sense the ablution is the ritual washing of the chalice and of the priest’s fingers after the celebration of Holy Communion in the Catholic Church. The wine and water used for this purpose are themselves sometimes called “the ablution.”

on the frog. Let the medicine man or magician pray that the fever may pass into the frog, and the frog be forthwith re- leased, and the cure will be effected. In the old Athenian Anthesteria the blood of victims was poured over the unclean. A bath of bulls' blood was much in vogue as a baptism in the mysteries of Attis. The water must in ritual washings run ,off in order to carry away the miasma or unseen demon of disease; and accordingly in baptism the early Christians used living or running water. Nor was it enough that the person baptized should himself enter the water; the baptizer must pour it over his head, so that it run down his person. Similarly the Brahman takes care, after ablution of a person, to wipe the cathartic water off from head to feet downwards, that the malign influence may pass out through the feet. The same care is shown in ritual ablutions in the Bukovina and elsewhere.

Water and fire, spices and sulphur, are used in ritual cleans- ings, says Iamblichus in his book on mysteries (v. 2.3), as being specially full of the divine nature. Nevertheless in all religions, and especially in the Brahmanic and Christian, the cathartic virtue of water is enhanced by the introduction into it by means of suitable prayers and incantations of a divine or magical power. Ablutions both of persons and things are usually cathartic, that is, intended to purge away evil influences {naOaipuv, to make Kadapos, pure). But, as Robertson Smith observes, "holi- ness is contagious, just as uncleanness is "; and common things and persons may.becomc taboo, that is, so holy as to be dangerous and useless for daily life through the mere infection of holiness. Thus in Syria one who touched a dove became taboo for one whole day, and if a drop of blood of the Hebrew sin-offering fell on a garment it had to be ritually washed off. It was as neces- sary in the Hebrew religion for the priest to wash his hands after handling the sacred volume as before. Christians might not enter a church to say their prayers without first washing their hands. So Chrysostom says: "Although our hands may be already pure, yet unless we have washed them thoroughly, we do not spread them upwards in prayer." Tertullian (c. 200) had long before condemned this as a heathen custom; none the less, it was insisted on in later ages, and is a survival of the pagan lustrations or irtpippavriipia. Sozomen (vi. 6) tells how a priest sprinkled Julian and Valentinian with water according to the heathen custom as they entered his temple. The same custom prevails among Mahommedans. Porphyry {de Abst. ii. 44) relates that one who touched a sacrifice meant to avert divine anger must bathe and wash

his clothes in running water before returning to his city and home, and similar scruples in regard to holy objects and persons have been observed among the natives of Polynesia, New Zealand and ancient Egypt. The rites, met within all lands, of pouring out water or bathing in order to produce rain from heaven, differ in their significance from ablutions with water and belong to the realm of sympa- thetic magic. ‘

There are certain forms of purification which one does not know whether to describe as ablutions or anointings. Thus Demosthenes in his speech “On the crown” accused Aeschines of having ” purified the initiated and wiped them clean with (not from) mud and pitch.” Smearing with gypsum (riTavo’;, titanos) had a similar purifying effect, and it has been suggested 1 that the Titans were no more than old-world votaries who had so disguised themselves. Perhaps the use of ashes in mourning had the same origin. In the rite of death-bed penance given in the old Mozarabic Christian ritual of Spain, ashes were poured over, the sick man.

Authorities. — W. R. Smith, Religion of the Semites; Jul. Well- hauson, Reste arabischen Heidentums (= Skizzen und Vorarbeiten, iii. 2nd ed., Berlin, 1897); John Spencer, De legibus Hebraeorum ritualibus (Tubingae, 1732); Art. “Clean and Unclean ” in Hastings’ Bible Dictionary and in Jewish Encyclopedia, vol. iv. ; J. G. Frazer, Adonis, Attis, Osiris (London, 1906); Joseph Bingham, Antiquities of the Christian Church, bk. viii. ; Hermann Oldcnberg, Die Religion des Veda’s, Berlin, 1894. (F. C. C.)

ABNAKI (” the whitening sky at daybreak,” i.e. Easterners), a confederacy of North American Indians of Algonquian stock, 1 By J. E. Harrison, Prolegomena to Creek Religion, p. 493.

called Terra teens by ■ the New England tribes and colonial writers. It included the Passamaquoddy, Penobscot, Norridge- wock, Malecite and other tribes. 1ˆ formerly occupied what is now Maine arid southern New Brunswick. All the tribes were loyal to the French during the early years of the 18th century, but after the British success in Canada most of them withdrew to St Francis, Canada, subsequently entering into an agreement with the British authorities. The Abnaki now number some

1600.

For, details see Handbook of American Indians, edited by F. W. Hodge (Washington, 1907).

ABNER (Hebrew for ” father of [or is a] light “), in the Bible, first cousin of Saul and commander-in-chief of his army (1 Sam. xiv. 50, xx. 25). He is only referred to incidentally in Saul’s history [1 Sam. xvii. 55, xxvi. 5), and is not mentioned, in the account of the disastrous battle of Gilboa when Saul’s power was crushed. Seizing the only surviving son, Ishbaal, he set him up as king over Israel at Mahanaim, east of the Jordan. David, who was accepted as king by Judah alone, was mean- while reigning at Hebron, and for some time war was carried on between the two parties. The only engagement between the rival factions which is told at. length is noteworthy, inasmuch as it was preceded by an encounter at Gibeon between twelve chosen men from each side, in which the whole twenty-four seem to have perished (2 Sam. ii. 12). 1 In the general engagement which followed, Abner was defeated and put to flight. He was closely pursued by Asahel, brother of Joab, who is said to have been ” light of foot as a wild roe.”. As Asahel would not desist from the pursuit, though warned, Abner was compellecj to slay him in . self-defence. This originated a d,eadly feud between the leaders of the opposite parties, for Joab, as next of kin to Asahel, was by the law and custom of the country the avenger of his blood. ‘ For some time. afterwards the war was carried on, the advantage being invariably on the side of David. At length Ishbaal lost the main prop of his tottering cause by remonstrat- ing with Abner for marrying Rizpah, one of Saul’s concubines, an alliance which, according to Oriental notions, implied pre- tensions to the throne (cp. 2 Sam. xvi. 21 sqq.; 1 Kings ii. 21 sqq.). Abner was indignant at the deserved rebuke, and im- mediately opened negotiatons with David, who welcomed him on the condition that his wife Michal should be restored to him. This was done, and the proceedings were ratified by a feast. Almost immediately after, however, Joab, who had been sent away, perhaps intentionally returned and slew Abner at the gate of Hebron. The ostensible motive for the assassination was a desire to avenge Asahel, and this would be a sufficient justification for the deed according to the moral standard of the time. The conduct of David after the event was such as to show ■that he had no complicity in the act, though he could not ven- ture to punish its perpetrators (2 Sam. iii. 31-39; cp. 1 Kings ii. 31 seq.). (See David.)

ABO (Finnish Turku), a city and seaport, the capital of the province of Abo-Bjorncborg, in the grand duchy of Finland, on the Aura-joki, about 3 m. from where it falls into the gulf of Bothnia. Pop. (1810) 10,224; (1S70) 19,617; (1904) 42,639., It is 381 m. by rail from St Petersburg via Tavastehus, and is in regular steamer communication with St Petersburg, Vasa,,] Stockholm, Copenhagen and Hull. It was

already a place of, importance when Finland formed part of the kingdom of Sweden., When the Estates of Finland seceded from Sweden and accepted the Emperor Alexander of Russia as their grand duke at the Diet of Borga in 1809, Abo became the capital of the new state, and so remained till 1819 when the seat of government was transferred to Helsingfors. In November 1827 nearly the .whole city was burnt down, the university and its valuable library being entirely destroyed. Before this calamity Abo, contained n 10 houses and 13,000 inhabitants; and its university had 40 professors, more than 500 students, and a library of up- wards of 30,000 volumes, together with a botanical garden, an

1 The object of the story of the encounter is to explain the name Helkath-hazzurim, the meaning of which is doubtful (Ency. Bib. col., 2006; Batten m Zeit.f. alt-test. Wissens. 1906, pp. 90 sqq.). . ,

observatory and a chemical laboratory. The university has since been removed to Helsingfors. Abo remains the ecclesias- tical capital of Finland, is the seat of the Lutheran archbishop and contains a fine cathedral dating from 1258 and restored after the fire of 1827. The cathedral is dedicated to St Henry, the patron saint of Finland, an English missionary who intro- duced Christianity into the country in the 12th century. Abo is the seat of the first of the three courts of appeal of Finland. It has two high schools, a school of commerce and a school of navigation. The city is second only to Helsingfors for its trade; sail-cloth, cotton and tobacco are manufactured, and there are extensive saw-mills. There is also a large trade in timber and a considerable butter export. Ship-building has considerably developed, torpedo-boats being built here for the Russian navy. Vessels drawing 9 or 10 feet come up to the town, but ships of greater draught are laden and discharged at its harbour (Born- holm, on Hyrvinsala Island), which is entered yearly by from 700 to 800 ships, of about 200,000 tons.

ABO-BJORNEBORG, a province occupying the S.W, corner of Finland and including the Aland islands. It has a total area of 24,171 square kilometres and a population (1900) of 447,098, of whom 379,622 spoke Finnish and 67,260 Swedish; 446,900 were of the Lutheran religion. The province occupies a promi- nent position in Finland for its manufacture of cottons, sugar refinery, wooden goods, metals, machinery, paper, &c. Its chief towns are: Abo (pop. 42,639),

Bjorneborg (16,053), Raumo (5501), Nystad (4165), Mariehamn (1171), Nadendal (917).

ABODE (from ” abide,” to dwell, properly ” to wait for ,” to bide) , generally, a dwelling. In English law this term has a more restricted meaning than domicile, being used to indicate the place of a man’s residence or business, whether that be either temporary or permanent. The law may regard for certain purposes, as a man’s abode, the place where he carries on busi- ness, though he may reside elsewhere ; so that the term has come to have a looser significance than residence, which has been defined as ” where a man lives with his family and sleeps at night” (R. v. Hammond, 1852, 17 Q.B. 772). In serving a notice of action, a solicitor’s place of business may be given as his abode (Roberts v. Williams, 1835, 5 LJ.M.C. 23), and in more recent decisions it has been similarly held that where a notice was required to be served under the Public Health Act 1875, either personally or to some inmate of the owner’s or occupier’s ” place of abode, ” a place of business was sufficient.

ABOMASUM (caillelte), the fourth or rennet stomach of Ruminantia. From the omasum the food is finally deposited in the abomasum, a cavity considerably larger than either the second or third stomach, although less than the first. The base of the abomasum is turned to the omasum. It is of an irregular conical form. It is that part of the digestive apparatus which is analogous to the single stomach of other Mammalia, as the •food there undergoes the process of chymification, after being macerated and ground down in the three first stomachs.

ABOMEY, capital of the ancient kingdom of Dahomey, West Africa, now included in the French colony of the same name. It is 70 m. N. by rail of the seaport of Kotoiiu, and has a popula- tion of about 15,000. Abomey is built on a rolling plain, 800 ft. above sea-level, terminating in short bluffs to the N.W., where it is bounded by a long depression. The town was surrounded by a mud wall, pierced by six gates, and was further protected by a ditch 5 ft. deep, filled with a dense growth of prickly acacia, the usual defence of West African strongholds. Within the walls, which had a circumference of six miles, were villages separated by fields, several royal palaces, a market-place and a large square containing the barracks. In November 1892, Bchanzin, the king of Dahomey, being defeated by the French, set fire to Abomey and fled northward. Under French adminis- tration the town has been rebuilt, placed (1905) in railway communication with the coast, and given an ample water supply by the sinking of artesian wells.

ABOMINATION (from Lat. ab, from, and ominare, to fore- bode), anything contrary to omen, and therefore regarded, with aversion; a word used often in the Bible to denote evil doctrines

or ceremonial practices which were impure. An incorrect deri- vation was ab homine (i.e. inhuman), and the spelling of the adjective ” abominable ” in the first Shakespeare folio is always ” abhominable.” Colloquially ” abomination ” and ” abomin- able ” are used to mean simply excessive in a disagreeable sense.

ABOR HILLS, a tract of country on the north-east frontier of India, occupied by an independent tribe called the Abors. It lies north of Lakhimpur district, in the province of eastern Bengal and Assam, and is bounded on the east by the Mishmi Hills and on the west .by the Miri Hills, the villages of the tribe extending to the Dibong river. The term Abor is an Assamese word, signifying “barbarous” or “independent,” and is applied in a general sense by the Assamese to many frontier tribes; but in its restricted sense it is specially given to the above tract. The Abors, together with the cognate tribes of Miris, Daphlas and Akas, are supposed to be descended from a Tibetan stock. They are a quarrelsome and sulky race, violently divided in their political relations. In’ former times they committed fre- quent raids upon the plains of Assam, and have been the object of more than one retaliatory expedition by the British govern- ment. In 1893-94 occurred the first Bor Abor expedition. Some military police sepoys were murdered in British territory, and a force of 600 troops was sent, who traversed the Abor country, and destroyed the villages concerned in the murder and all other villages that opposed the expedition. A second expedition became necessary later on, two small patrols having been treacherously murdered; and a force of 100 British troops traversed the border of the Abor country and punished the tribes, while a blockade was continued against them from 1894 to 1900.

See Colonel Dalton’s Ethnology of Bengal, 1872.

ABORIGINES, a mythical people of central Italy, connected in legendary history with Aeneas, Latinus and Evander. They were supposed to have descended from their mountain home near Reate (an smcient Sabine town) upon Latium, whence they expelled the Siceli and subsequently settled down as Latini under a King Latinus (Dion Halic. i. 9. 60). The most gener- ally accepted etymology of the name (ab origine), according to which they were the original inhabitantsˆ = Gk. avrox&oves) of the country, is inconsistent with the fact that the oldest authorities (e.g. Cato in his Ongines) regarded them as Hellenic immigrants, not as a native Italian people. Other explanations

suggested are arborigines, “tree-born,” and aberrigines, “nomads.” His- torical and ethnographical discussions have led to no result;; the most that can be said is that, if not a general term, ” abori- gines ■” may be the name of an Italian stock, about whom the ancients knew no more than ourselves.

In modern times the term “Aborigines” has been extended in signification, and is used to indicate the inhabitants found in a country at its first discovery, in contradistinction to colonies or new races, the time of whose introduction into the country is known. .

The Aborigines’ Protection Society was founded in 1838 in England as the result of a royal commission appointed at the instance of Sir T. Fowell Buxton to, inquire into the treatment of the indigenous populations of the various British colonies,; The inquiry revealed the gross cruelty and injustice with which the natives had been often treated. Since its foundation the ‘ society has done much to make English colonization a synonym for humane and generous treatment of savage races.

ABORTION (from Lat. aboriri, to fail to be born, or perish), in obstetrics, the premature separation and expulsion of the contents of the pregnant uterus. It is a common terminology to call premature labour of an accidental type a “miscarriage,” in order to distinguish ” abortion ” as a deliberately induced act, whether as a medical necessity by the accoucheur,’ or as. a criminal proceeding (see Medical Jurisprudence) ; otherwise the term “abortion” would ordinarily be used when occurring before the eighth month of gestation, and “premature labour” subsequently. As an accident of pregnancy, it is far from un- common, although its. relative frequencyˆ as compared with that of completed gestation, has been very differently estimated by accoucheurs. It is, more liable to occur in the earlier than

in the later months of pregnancy, and it would also appear to occur more readily at the periods corresponding to those of the menstrual discharge. It may be induced by numerous causes, both of a local and general nature. Malformations of the pelvis, accidental injuries and the diseases and displacements to which the uterus is liable, on the one hand; and, on the other, various morbid conditions of the ovum or placenta leading to the death of the foetus, are among the direct local causes. The general causes embrace certain states of the system which

are apt to exercise a more or less direct influence upon the progress of utero-gestation. The tendency to recurrence in persons who have previously miscarried is well known, and should ever be borne in mind with the view of avoiding any cause likely to lead to a repetition of the accident. Abortion resembles ordinary labour in its general phenomena, excepting that in the former hemorrhage often to a large extent forms one of the leading symptoms. The treatment embraces the means to be used by rest, astringents and sedatives, to prevent the occurrence when it merely threatens; or when, on the contrary, it is inevitable, to accomplish as speedily as possible the complete removal of the entire contents of the uterus.

Among primitive savage races abortion is practised to a far less extent than infanticide (q.v.), which offers a simpler way of getting rid of inconvenient progeny. But it is common among the American Indians, as well as in China, Cambodia and India, although throughout Asia it is generally contrary both to law and religion. How far it was considered a crime among the civilized nations of antiquity has long been debated. Those who maintain the impunity of the practice rely for their authority upon certain passages in the classical authors, which, while bitterly lamenting the frequency of this enormity, yet never allude to any laws by which it might be suppressed. For example, in one of Plato's dialogues (Theaet.), Socrates is made to speak of artificial abortion as a practice, not only common but allowable; and Plato himself authorizes it in his Republic (lib. v.). Aristotle (Polit. lib. vii. c. 17) gives it as his opinion that no child ought to be suffered to come into the world, the mother being above forty or the father above fifty-five years of age. Lysias maintained, in one of his pleadings quoted by Harpocration, that forced abortion could not be considered homicide, because a child in utero was not an animal, and had no separate existence. Among the Romans, Ovid {Amor. lib. ii.), Juvenal (Sat. vi. 504) and Seneca (Consol. ad Hel. 16) mention the frequency of the offence, but maintain silence as to any laws for punishing it. On the other hand, it is argued that the authority of Galen and Cicero (pro Cluentio) place it beyond a doubt that, so far from being allowed to pass with impunity, the offence in question was sometimes punished by death; that the authority of Lysias is of doubtful authenticity; and that the speculative reasonings of Plato and Aristotle, in matters of legislation, ought not to be confounded with the actual state of the laws. Moreover, Stobaeus (Serm. 73) has preserved a passage from Musonius, in which that philosopher expressly states that the ancient law-givers inflicted punishments on females who caused themselves to abort. After the spread of Christianity among the Romans, however, foeticide became equally

criminal with the murder of an adult, and the barbarian hordes which afterwards overran the empire also treated the offence as a crime punishable with death. This severe penalty remained in force in all the countries of Europe until the Middle Ages. With the gradual disuse of the old barbarous punishments so universal in medieval times came also a reversal of opinion as to the magnitude of the crime involved in killing a child not yet born. But the exact period of transition is not clearly marked.

In England the Anglo-Saxons seem to have regarded abortion only as an ecclesiastical offence. Sir Matthew Hale (1609-1676) tells us that if anything is done to "a woman quick or great with child, to make an abortion, or whereby the child within her is killed, it is not murder or manslaughter by the law of England, because it is not yet in rerum natura." But the •ommon law appears, nevertheless, to have treated as a mis-

demeanour any attempt to effect the destruction of such an infant, though unsuccessful. Blackstone (1723-1780), to be sure, a hundred years later, says that, " if a woman is quick with child, and by poison or otherwise killeth it in her womb, or if any one beat her, whereby the child dieth in her body, and she is delivered of a dead child, this, though not murder, was, by the ancient law, homicide or manslaughter." Whatever may have been the exact view taken by the common law, the offence was made statutory by an act of 1803, making the attempt to cause the miscarriage of a woman, not being, or not being proved, to be quick with child, a felony, punishable with fine, imprisonment, whipping or transportation for any term not exceeding fourteen years. Should the woman have proved to have quickened, the attempt was punishable with death. The provisions of this statute were re-enacted in 1828. The English law on the subject is now governed by the Offences against the Person Act 1861, which makes the attempting to cause miscarriage by administering poison or other noxious thing, or unlawfully using any instrument equally a felony, whether the woman be, or be not, with child. No distinction is now made as to whether the foetus is or is not alive, legislation appearing to make the offence statutory with the object of prohibiting any risk to the life of the mother. If a woman ad- ministers to herself any poison or other noxious thing, or unlaw- fully uses any instrument or other means to procure her own miscarriage, she is guilty of felony. The punishment for the offence is penal servitude for life or not less than three years, or imprisonment for not more than two years. If a child is born alive, but in consequence of its premature birth, or of the means employed, afterwards dies, the offence is murder; the general law as to accessories applies to the offence.

In all the countries of Europe the causing of abortion is now punishable with more or less lengthy terms of imprisonment. Indeed, the tendency in continental Europe is to regard the abortion as a crime against the unborn child, and several codes (notably that of the German Empire) expressly recognize the life of the foetus, while others make the penalty more severe if abortion has been caused in the later stages of pregnancy, or if the woman is married. According to the weight of authority in the United States abortion was not regarded as a punishable offence at common law, if the abortion was produced with the consent of the mother prior to the time when she became quick with child; but the Supreme Courts of Pennsylvania and North Carolina held it a crime at common law, which might be com- mitted as soon as gestation had begun (Mills v. Com. 13 Pa. St. 630; State v. Slagle, 83 N.C. 630). The attempt is a punishable offence in several states, but not in Ohio. Nor was it ever murder at common law to take the life of the child at any period of gestation, even in the very act of delivery (Mitchell v. Com. 78 Ky. 204). If the death of the woman results it is murder at common law (Com. v. Parker, 9 Met. [Mass.] 263). It is now a statutory offence in all states of the Union, but the woman must be actually pregnant. In most states not only is the person who causes the abortion punishable, but also any one who sup- plies any drug or instrument for the purpose. The woman, however, is not an accomplice (except by statute as in Ohio, State v. M'Coy, 39 N.E. 316), nor is she guilty of any crime unless by statute as in New York (Penal Code, § 295) and Cali- fornia (Penal Code, § 275) and Connecticut (Gen. Stats. 1902, §1156). She may be a witness, and her testimony does not need corroboration. The attempt is also a crime in New York (1905, People v. Conrad, 102 App. D. 566).

Authorities. — Ploucquet, Commentarius Medicus in processus criminales super homicidio et infanticidio, &c. (1736); Burke Ryan, Infanticide, its Law, Prevalence, Prevention and History (1862); G. Greaves, Observations on the Laws referring to Child-Murder and , Criminal Abortion (1864); Storer and Heard, Criminal Abortion, its Nature, Evidence and Law (Boston, 1868); J. Cave Browne, Infanticide, its Origin, Progress and Suppression (1857); T. R. Beck, Medical Jurisprudence (1842); A. S, Taylor, Principles and Practice of Medical Jurisprudence (1894) ; Sir. J. Stephen, History of the Criminal Law of England (1883); Sir W. O. Russell, Crimes and Misdemeanours (3 vols., 1896); Archbold ' s Pleading and Evidence in Criminal Cases (1900) ; Roscoe's Evidence in Criminal Cases (1898) ;

Treub, van Oppenraag and Vlaming, The Right to Life of the Unborn Child (New York, 1903) ; L. Hochheimer, Crimes and Criminal Procedure (New York, 1897); A. A. Tardieu, &tude medico-legal sur I'avorlement (Paris, 1904) ; F. Berolzheimer, System der Rechts- tend Wissenschaftsphilosophie (Munich, 1904).

ABOUKIR, a village on the Mediterranean coast of Egypt, 145 m. N.E. of Alexandria by rail, containing a castle used as a state prison by Mehemet Ali. Near the village are many remains of ancient buildings, Egyptian, Greek and Roman. About 2 m. S.E. of the village are ruins supposed to mark the site of Canopus. A little farther east the Canopic branch of the Nile (now dry) entered the Mediterranean.

Stretching eastward as far as the Rosetta mouth of the Nile is the spacious bay of Aboukir, where on the 1st of August 1798 Nelson fought the battle of the Nile, often referred to as the battle of Aboukir. The latter title is applied more properly to an engagement between the French-expeditionary army and the Turks fought on the 25th of July 1799. Near Aboukir, on the 8th of March 1801, the British army commanded by Sir R. Abercromby landed from its transports in the face of a strenuous opposition from a French force entrenched on the beach. (See French Revolutionary Wars.)

ABOUT, EDMOND FRANCOIS VALENTIN (1828-1885), French novelist, publicist and journalist, was born on the 14th of February 1828, at Dieuze, in Lorraine. The boy's school career was brilliant. In 1848 he entered the Ecole Normale, taking the second* place in the annual competition for admis- sion, Taine being first. Among his college contemporaries were Taine, Francisque, Sarcey, Challemel-Lacour and the ill-starred Prevost-Paradol. Of them all About was, according to Sarcey, the most highly vitalized, exuberant, brilliant and " undisci- plined." At the end of his college career he joined the French school in Athens, but if we may believe his own account, it had never been his intention to follow the professorial career, for which the Ecole Normale was a preparation, and in 1853 he returned to France and frankly gave himself to literature and journalism. A book on Greece, La Grece contemporaine (1855), which did not spare Greek susceptibilities, had an immediate success. In Tolla (1855) About was charged with drawing too freely on an earlier Italian novel, Vittoria Savelli (Paris, 1841). This caused a strong prejudice against him, and he was the object of numerous attacks, to which he was ready enough to retaliate. The Lettres d'un bon jeune homme, written to the Figaro under the signature of Valentin de Quevilly, provoked more animosities. During the next few years, with indefatigable energy, and generally with full public recognition, he wrote novels,

stories, a play — which failed, — a book-pamphlet on the Roman question, many pamphlets on other subjects of the day, newspaper articles innumerable, some art criticisms, rejoinders to the attacks of his enemies, and popular manuals of political economy, L'A B C dn travailleur (1868), Le progres (1864). About's attitude towards the empire was that of a candid friend. He believed in its improvability, greeted the liberal ministry of Emile Ollivier at the beginning of 1870 with delight and wel- comed the Franco- German War. That day of enthusiasm had a terrible morrow. For his own personal part he lost the loved home near Saverne in Alsace, which he had purchased in 1858 out of the fruits of his earlier literary successes. With the fall of the empire he became a republican, and, always an inveterate anti-clerical, he threw himself with ardour into the battle against the conservative reaction which made head during the first years of the republic. From 1872 onwards for some five or six years his paper, the XIX' Siecle, of which he was the heart and soul, became a power in the land. But the republicans never quite forgave the tardiness of his conversion, and no place rewarded his later zeal. On the 23rd January 1884 he was elected a member of the French Academy, but died on the 16th of January 1885, before taking his seat. His journalism — of which specimens in his earlier and later manners will be found in the two series of Lettres d'un bon jeune homme a sa cousine Madeleine (1861 and 1863), and the posthumous collection, Le dix-neuvibme siecle (1892) — was of its nature ephemeral. So were the pamphlets, great and small. His political economy

was that of an orthodox popularizer, and in no sense epoch- making. His dramas are negligible. His more serious novels, Madelon (1863), L'infdme (1867), the three that form the trilogy of the Vieille Roche (1866), and Le roman d'un brave homme (1880)— a kind of counterblast to the view of the French workman presented in Zola's Assommoir — contain striking and amusing scenes, no doubt, but scenes which are often suggestive of the stage, while description, dissertation, explanation too frequently take the place of life. His best work after all is to be found in the books that are almost wholly farcical, Le nez d'un notaire (1862); Le roi des montagnes (1856); L'homme A I'oreille cassie (1862); Trente et quarante (1858); Le cos de M. Guerin (1862). Here his most genuine wit, his spright- liness, his vivacity, the fancy that was in him, have free play. " You will never be more than a little Voltaire," said one of his masters when he was a lad at school. It was a true prophecy. (F. T. M.)

ABRABANEL, ISAAC, called also Abravanel, Abarbanel (1437-1508), Jewish statesman, philosopher, theologian and commentator, was born at Lisbon of an ancient family which claimed descent from the

royal house of David. Like many of the Spanish Jews he united scholarly tastes with political ability He held a high place in the favour of King Alphonso V., who entrusted him with .the management of important state affairs. On the death of Alphonso in 148 1, his counsellors and favourites were harshly treated by his successor John, and Abrabanel was compelled to flee to Spain, where he held for eight years (1484- 1492) the post of a minister of state under Ferdinand and Isabella. When the Jews were banished «from Spain in 1492, no exception was made in Abrabanel's favour. He afterwards resided at Naples, Corfu and Monopoli, and in 1503 removed to Venice, where he held office as a minister of state till his death in 1508. His repute as a commentator on the Scriptures is still high; in the 17th and 18th centuries he was much read by Christians such as Buxtorf. Abrabanel often quotes Christian authorities, though he opposed Christian exegesis of Messianic passages. He was one of the first to see that for Biblical exegesis it was necessary to reconstruct the social environment of olden times, and he skilfully applied his practical knowledge of state- craft to the elucidation of the books of Samuel and Kings.

ABRACADABRA, a word analogous to Abraxas (q.v.), used as a magical formula by the Gnostics of the sect of Basilides in invoking the aid of beneficent spirits against disease and misfortune. It is found on Abraxas stones which were worn as amulets. Subsequently its use spread beyond the Gnostics, and in modern times it is applied contemptuously (e g. by the early opponents of the evolution theory) to a conception or hypothesis which purports to be a simple solution of apparently insoluble phenomena. The Gnostic physician Serenus Sam- monicus gave precise instructions as to its mystical use in avert- ing or curing agues and fevers generally. The paper on which the word was written had to be folded in the form of a cross, suspended from the neck by a strip of linen so as to rest on the pit of the stomach, worn in this way for nine days, and then, before sunrise, cast behind the wearer into a stream running to the east. The letters were usually arranged as a triangle in one of the following ways: —

ABRACADABRA ABRACADABRA

ABRACADABR BRACADABR

ABRACADAB RACADAB

ABRACADA ACADA

ABRACAD CAD

ABRAHAM, or Abram (Hebrew for ” father is high “), the ancestor of the Israelites, the first of the great Biblical patri- archs. His life as narrated in the book of Genesis reflects the traditions of different ages. It is the latest writer (P) who men-

tions Abram (the original form of the name), Nahor and Haran, sons of Terah, at the close of a genealogy of the sons of Shem, which includes among its members Eber the eponym of the Hebrews. Terah is said to have come from Ur of the Chaldees, usually identified with Mukayyar in south Babylonia. He migrated to Haran 1 in Mesopotamia, apparently the classical Carrhae, on a branch of the Habor. Thence, after a short stay, Abram with his wife Sarai, and Lot the son of Haran, and all their followers, departed for Canaan. The oldest tradition does not know of this twofold move, and seems to locate Abram’s birthplace and the homes of his kindred at Haran (Gen. xxiv. 4, 7, xxvii. 43). At the divine command, and encouraged by the promise that Yahweh would make of him, although hitherto childless, a great nation, he journeyed down to Shechem, and at the sacred tree (cf. xxxv. 4, Josh. xxiv. 26, Judg. ix. 6) received a new promise that the land would be given unto his seed. Having built an altar to commemorate the theophany, he removed to a spot between Bethel and Ai, where he built another altar and called upon (i.e. invoked) the name of Yahweh (Gen. xii. 1-9). Here he dwelt for some time, until strife arose between his herdsmen and those of Lot. Abram thereupon proposed to Lot that they should separate, and allowed his nephew the first choice. Lot preferred the fertile land lying east of the Jordan, whilst Abram, after receiving another promise from Yahweh, moved down to the oaks of Mamre in Hebron and built an altar. In the subsequent history of Lot and the destruction of Sodom and Gomorrah, Abram appears prominently in a fine passage where he intercedes with Yahweh on behalf of Sodom, and is promised that if ten righteous men can be found therein the city shall be preserved (xviii. 16-33).

A peculiar passage, more valuable for the light it throws upon primitive ideas than for its contribution to the history of Abram, narrates the patriarch’s visit to Egypt. Driven by a famine to take

refuge in Egypt (cf. xxvi. 1, xli. 57) xlii. 1), he feared lest his wife's beauty should arouse the evil designs of the Egyptians and thus endanger his own safety, and alleged that Sarai was his sister. This did not save her from the Pharaoh, who took her into the royal harem and enriched Abram with herds and servants. But when Yahweh "plagued Pharaoh and his house with great plagues" suspicion was aroused, and the Pharaoh rebuked the patriarch for his deceit and sent him away under an escort (xii. 10-xiii. 1). This story of Abram and his increased wealth (xiii. 2) receives no comment at the hands of the narrator, and in its present position would make Sarai over sixty years of age (xii. 4, xvii. 1, 17). A similar experience is said to have happened to Abraham and Sarah at Gerar with the Philistine king Abimelech (xx. E), but the tone of the narrative is noticeably more advanced, and the presents which the patri- arch receives are compensation for the king's offence. Here, however, Sarah has reached her ninetieth year (xvii. 17). (The dates are due to the post-exilic framework in which the stories are inserted.) Still another episode of the same nature is re- corded of Isaac and Rebekah at Gerar, also with Abimelech. Ethically it is the loftiest, and Isaac obtains his wealth simply through his successful farming. Arising out of the incident is an account of a covenant between Abimelech and Isaac (xxvi. 16-33, J)» a duplicate of which is placed in the time of Abraham (xxi. 22-34, J and E). Beersheba, which figures in both, is cele- brated by the planting of a sacred tree and (like Bethel) by the invocation of the name of Yahweh. This district is the scene of the birth of Ishmael and Isaac. As Sarai was barren (cf; xi. 30) 2 the promise that his seed should possess the land seemed incapable of fulfilment. According to one rather obscure narra- tive, Abram's sole heir was the servant, who was over his household, apparently a certain Eliezer of Damascus 3 (xv. 2,

1 The name is not spelt with the same guttural as Haran the son of Terah.

2 Barrenness is a motif which recurs in the stories of Rebekah, Rachel, the mother of Samson, and Hannah (Gen. xxv. 21, xxix. 31 ; Judg. xiii. 2; 1 Sam. i. 5).

3 Abram's connexion with Damascus is supplemented in the traditions of Nicolaus of Damascus as cited by Josephus (Antiq. 1.7. a).

the text is corrupt). He is now promised as heir one of his own flesh, and a remarkable and solemn passage records how the promise was ratified by a covenant. The description is particu- larly noteworthy for the sudden appearance of birds of prey, which attempted to carry off the victims of the sacrificial cove- nant. The interpretation of the evil

omen is explained by an allusion to the bondage of the Israelites in Egypt and theii return in the fourth generation (xv. 16; contrast v, 13, after four hundred years; the chapter is extremely intricate and has the appearance of being of secondary origin). The main narrative now relates how Sarai, in accordance with custom, gave to Abram her Egyptian handmaid Hagar, who, when she found she was with child, presumed upon her position to the extent that Sarai, unable to endure the reproach of barrenness (cf. the story of Hannah, 1 Sam. i. 6), dealt harshly with her and forced her to flee (xvi. 1-14, J; on the details see Ishmael). Another tradi- tion places the expulsion of Hagar after the birth of Isaac. It was thirteen years after the birth of Ishmael, according to the latest narratives, that God appeared unto Abram with a renewed promise that his posterity should inhabit the land. To mark the solemnity of the occasion, the patriarch's name was changed to Abraham, and that of his wife to Sarah. 4 A covenant was concluded with him for all time, and as a sign thereof the rite of circumcision was instituted (xvii. P). The promise of a son to Sarah made Abraham "laugh", a punning allusion to the name Isaac (q.v.) which appears again in other forms. Thus, it is Sarah herself who "laughs" at the idea, when Yahweh appears to Abraham at Mamre (xviii. 1-15, J), or who, when the child is born cries " God hath made me laugh; every one that heareth will laugh at me" (xxi. 6, E). Finally, there is yet another story which attributes the flight of Hagar and Ishmael to Sarah's jealousy at the sight of IshmaePs "mocking" (rather dancing or playing, the intensive form of the verb "to laugh") on the feast day when Isaac was weaned (xxi. 8 sqq.). But this last story is clearly out of place, since a child who was then fourteen years old (cf . xvii. 24, xxi. 5) could scarcely be described as a weak babe who had to be carried (xxi. 14; see the commentaries).

Abraham was now commanded by God to offer up Isaac in the land of Moriah. Proceeding to obey, he was prevented by an angel as he was about to sacrifice his son, and slew a ram which he found on the spot. As a reward for his obedience he received another promise of a numerous seed and abundant prosperity (xxii. E). Thence he returned to Beersheba. The story is one of the few told by E, and significantly teaches that human sacrifice was not required by the Almighty (cf. Mic. vi. 7 seq.). The interest of the narrative now extends to Isaac alone. To his "only son" (cp. xxii. 2, 12) Abraham gave all he had, and dismissed the sons of his concubines to the lands outside Palestine; they were thus regarded as less intimately related to Isaac and his descendants (xxv. 1-4, 6). The measures taken by the patriarch for the marriage of Isaac are circum- stantially described. His head-servant was sent to his master's country and kindred to find a suitable bride,

and the necessary preparation for the story is contained in the description of Nahor's family (xxii. 20-24). The picturesque account of the meeting with Rebekah throws interesting light on oriental custom. Marriage with one's own folk (cf. Gen. xxvii. 46, xxix. 19; Judg. xiv. 3), and especially with a cousin, is recom- mended now even as in the past. For its charm the story is comparable with the account of Jacob's experiences in the same land (xxix.). For the completion of the history of Abraham the compiler of Genesis has used P's narrative. Sarah is said to have died at a good old age, and was buried in the cave of Machpelah near Hebron, which the patriarch had purchased, with the adjoining field, from Ephron the Hittite (xxiii.) ; and here he himself was buried. Centuries lafter the tomb became a place of pilgrimage and the traditional site is marked by a fine mosque. 5

4 Abram (or Abiram) is a familiar and old-attested name meaning "(my) father is exalted"; the meaning of Abraham is obscure and the explanation Gen. xvii. 5 is mere word-play. It is possible that raham was originally only a dialectical form of ram.

6 See Sir Charles Warren's description, Hasting's Diet. Bible, vol. iii. pp. 200 seq. The so-called Babylonian colouring of Gen.

ABRAHAM

7 1

The story of Abraham is of greater value for the study of Old Testament theology than for the history of Israel. He became to the Hebrews the embodiment of their ideals, and stood at their head as the founder of the nation, the one to whom Yahweh had manifested his love by frequent promises and covenants. From the time when he was bidden to leave his country to enter the unknown land, Yahweh was ever present to encourage him to trust in the future when his posterity should possess the land; and so, in its bitterest hours, Israel could turn for consolation to the promises of the past which enshrined in Abraham its hopes for the future. Not only is Abraham the founder of religion, but he, of all the patriarchal figures, stands out most prominently as the recipient of the promises (xii. 2 seq. 7, xiii. 14-17, xv., xvii., xviii. 17-19, xxii. 17 seq.; cf. xxiv. 7), and these the apostle Paul associates with the coming of Christ, and, adopting a characteristic and artificial style of interpretation prevalent in his time, endeavours to force a Messianic interpre- tation out of them. 1

For the history of the Hebrews the life of Abraham is of the same value as other stories of traditional ancestors. The narra- tives, viewed

dispassionately, represent him as an idealized sheikh (with one important exception, Gen. xiv., see below), about whose person a number of stories have gathered. As the father of Isaac and Ishmael, he is ultimately the common an- cestor of the Israelites and their nomadic fierce neighbours, men roving unrestrainedly like the wild ass, troubled by and troubling every one (xvi. 12). As the father of Midian, Sheba and other Arabian tribes (xxv. 1-4), it is evident that some degree of kinship was felt by the Hebrews with the dwellers of the more distant south, and it is characteristic of the genealogies that the mothers (Sarah, Hagar and Keturah) are in the descending scale as regards purity of blood. This great ancestral figure came, it was said, from Ur in Babylonia and Haran and thence to Canaan. Late tradition supposed that the migration was to escape Babylonian idolatry (Judith v., Jubilees xii.; cf. Josh. xxiv. 2), and knew of Abraham's miraculous escape from death (an obscure reference to some act of deliverance in Is. xxix. 22). The route along the banks of the Euphrates from south to north was so frequently taken by migrating tribes that the tradition has nothing improbable in itself, but the prominence given in the older narratives to the view that Haran was the home gives this the preference. It was thence that Jacob, the father of the tribes of Israel, came and the route to Shechem and Bethel is precisely the same in both. A twofold migration is doubtful, and, from what is known of the situation in Palestine in the 13th century b.c, is extremely improbable. Further, there is yet another parallel in the story of the conquest by Joshua (q.v.), partly implied and partly actually detailed (cf. also Josh. viii. 9 with Gen. xii. 8, xiii. 3), whence it would appear that too much importance must not be laid upon any ethnological interpretation which fails to account for the three versions. That similar traditional elements have influenced them is not unlikely; but to recover the true historical foundation is difficult. The invasion or immigration of certain tribes from the east of the Jordan; the presence of Aramaean blood among the Israelites (see Jacob) ; the origin of the sanctity of venerable sites, — these and other consideratons may readily be found to account for the traditions. Noteworthy coincidences in the lives of Abraham and Isaac, noticed above, point to the fluctu- ating state of traditions in the oral stage, or suggest that Abra- ham's life has been built up by borrowing from the common stock of popular lore. 2 More original is the parting of Lot and Abraham at Bethel. The district was the scene of contests between Moab and the Hebrews (cf. perhaps Judg. iii.), and if this explains part of the story, the physical configura- tion of the Dead Sea may have led to the legend of the xxiii. has been much exaggerated; see S. R. Driver, Genesis, ad loc. ; S. A. Cook, Laws of Moses, p. 208.

1 See H. St. J. Thackeray, Relation of St Paul to Contemporary Jewish Thought, p. 69 seq. (1900).

2 On the other hand, the coincidences in xx. xxi. are due to E, who is also the author of xxii. Apart from these the narratives of Abraham are from J and P.

destruction of inhospitable and vicious cities (see Sodom and Gomorrah).

Different writers have regarded the life of Abraham differently. He has been viewed as a chieftain of the Amorites (q.v.), as the head of a great Semitic migration from Mesopotamia; or, since Ur and Haran were seats of Moon- worship, he has been identi- fied with a moon-god. From the character of the literary evi- dence and the locale of the stories it has been held that Abraham was originally associated with Hebron. The double name Abram- Abraham has even suggested that two personages have been combined in the Biblical narrative; although this does not explain the change from Sarai to Sarah. 3 But it is important to remember that the narratives are not contemporary, and that the interesting discovery of the name Abi-ramu (Abram) on Babylonian contracts of about 2000 B.C. does not prove the Abram of the Old Testament to be an historical person, even as the fact that there were ” Amorites ” in Babylonia at the same period does not make it certain that the patriarch was one of their number. One remarkable chapter associates Abraham with kings of Elam and the east (Gen. xiv.). No longer a peaceful sheikh but a warrior with a small army of 318 followers, 4 he overthrows a combination of powerful monarchs who have ravaged the land. The genuineness of the narrative has been strenuously maintained, although upon insufficient grounds.

“It is generally recognized that this chapter holds quite an isolated place in the Pentateuchal history; it is the only passage which presents Abraham in the character of a warrior, and connects him with historical names and political movements, and there are no clear marks by which it can be assigned to any one of the docu- ments of which Genesis is made up. Thus, while one school of interpreters finds in the chapter the earliest fragment of the political history of western Asia, some even holding with Ewald that the narrative is probably based on old Canaanite records, other critics, as Noldeke, regard the whole as unhistorical and comparatively late in origin. On the latter view, which finds its main support in the intrinsic difficulties of the narrative, it is scarcely possible to avoid the conclusion that the chapter is one of the latest additions to the Pentateuch (Wellhausen

and many others).” 6

On the assumption that a recollection of some invasion in remote days may have been current, considerable interest is attached to the names. Of these, Amraphel, king of Shinar (i.e. Babylonia, Gen. x. 10), has been identified with Kham- murabi, one of the greatest of the Babylonian kings (c. 2000 B.C.), and since he claims to have ruled as far west as the Mediterranean Sea, the equation has found considerable favour. Apart from chronological difficulties, the identification of the king and his country is far from certain, and at the most can only be regarded as possible. Arioch, king of Ellasar, has been connected with Eriaku of Larsa — the reading has been ques- tioned — a contemporary with Khammurabi. Chedorlaomer, king of Elam, bears what is doubtless a genuine Elamite name. Finally, the name of Tid’al, king of Goiim, may be identical with a certain Tudhulu the son of Gazza, a warrior, but appar- ently not a king, who is mentioned in a Babylonian inscription, and Goiim may stand for Gutim, the Guti being a people who lived to the east of Kurdistan. Nevertheless, there is as yet no monumental evidence in favour of the genuineness of the story, and at the most it can only be said that the author (of what- ever date) has derived his names from a trustworthy source, and in representing an invasion of Palestine by Babylonian overlords has given expression to a possible situation. 6 The improbabilities and internal difficulties of the narrative remain

3 According to Breasted (Amer. Journ. of Sem. Lit., 1904, p. 36), the “field of Abram ” occurs among the places mentioned in the list of the Egyptian king Shishak (No. 71-2) in the 10th century. See also his History of Egypt, p. 530.

4 The number is precisely that of the total numerical value of the consonants of the name “Eliezer ” (Gen. xv. 2); an astral signi- fication has also been found. ,

s W. R. Smith, Ency. Brit. (9th ed., 1883), art. ” Melchizedek.” 6 That the names may be those of historical personages is no proof of historical accuracy: “We cannot therefore conclude that the whole account is accurate history, any more than we can argue that Sir Walter Scott’s Anne of Geierstein is throughout a correct account of actual events because we know that Charles the Bold and Margaret of Anjou were real people ” (W. H. Bennett, Century Bible: Genesis, p. 1S6).

untouched, only the bare outlines may very well be historical. If, as most critics agree, it is a historical romance (cf., e.g., the book of Judith), it is possible that a writer, preferably one who lived in the post-exilic age and was acquainted with Babylonian history, desired to enhance the greatness of Abraham by exhibit- ing his military success against the monarchs of the Tigris and Euphrates, the high esteem he enjoyed in Palestine and his lofty character as displayed in his interview with Melchizedek.

See further, Pinches, Old Test, in Light of Hist. Records, pp. 208- 236; Driver, Genesis, p. xlix., and notes on ch. xiv. ; Addis, Docu- ments of the Hexateuch, ii. pp. 208-213; Carpenter and Harford- Battersby, Tlie Hexateuch, i. pp. 157-159, 168; Bezold, Bab.-Assyr. Keilinschriften, pp. 24 sqq., 54 sqq.; A. Jeremias, Altes Test, im Lichte d. Alien Orientsˆ, pp. 343 seq.; also the literature to the art. Genesis. Many fanciful legends about Abraham founded on Biblical accounts orspun out of the fancy are to be found in Josephus, and in post-Biblical and Mahommedan literature; for these, re- ference may be made to Beer, Leben Abrahams (1859); Griin- baum, Neue Beitrage z. semit. Sagenkunde, pp. 89 seq. (1893) ; the apocryphal “Testament of Abraham ” (M. R. James in Texts and Studies, 1892); W. Tisdall, Original Sources of the Quran, passim (1905). (S. A. C.)

ABRAHAM A SANCTA CLARA (1644-1709), Austrian divine, was born at Kreenhejnstetten, near Messkirch, in July 1644. His real name was Ulrich Megerle. In 1662 he joined the order of Barefooted Augustinians, and assumed the name by which he is known. In this order he rose step by step until he became prior provincialis and definitor of his province. Having early gained a great reputation for pulpit eloquence, he was appointed court preacher at Vienna in 1669. The people flocked to hear him, attracted by the force and homeliness of his language, the grotesqueness of his humour, and the impartial severity with which he lashed the follies of all classes of society and of the court in particular. In general he spoke as a man of the people, the predominating quality of his style being an over- flowing and often coarse wit. There are, however, many pass- ages in his sermons in which he rises to loftier thought and uses more dignified language. He died at Vienna on the 1st of December 1709. In his published writings he displayed much the same qualities as in the pulpit. Perhaps the most favourable specimen of his style is his didactic novel entitled Judas der Erzschelm (4 vols., Salzburg, 1686-1695).

His works have been several times reproduced in whole or in part,

though with many spurious interpolations. The best edition is that published in 21 vols, at Passau and Lindau (1835-1854). See Th. G. von Karajan, Abraham a Sancta Clara (Vienna, 1867); Blanckenburg, Studien uber die Sprache Abrahams a S. C. (Halle, 1897); Sexto, Abraham a S. C. (Sigmaringen, 1896); Schnell, Pater A. a S. C. (Munich, 1895) ; H. Mareta, Uber Judas d. Erzschelm (Vienna, 1875).

ABRAHAM IBN DAUD (c. 1110-1180), Jewish historiographer and philosopher of Toledo. His historical work was the Book of Tradition (Sepher Haqabala), a chronicle down to the year 1161. This was a defence of the traditional record, and also contains valuable information for the medieval period. It was translated into Latin by Genebrad (1519). His philosophy was expounded in an Arabic work better known under its Hebrew title ‘Emunah Ramah {Sublime Faith). This was translated into German by Weil (1882). Ibn Daud was one of the first Jewish scholastics to adopt the Aristotelian system; his predecessors were mostly neo-Platonists. . Maimonides owed a good deal to him.

ABRAHAMITES, a sect of deists in Bohemia in the 18th century, who professed to be followers of the pre-circumcised Abraham. Believing in one God, they contented themselves with the Decalogue and the Paternoster. Declining to be classed either as Christians or Jews, they were excluded from the edict of toleration promulgated by the emperor Joseph II. in 1781, and deported to various parts of the country, the men being drafted into frontier regiments. Some became Roman Catholics, and those who retained their ” Abrahamite ” views were not able to hand them on to the next generation.

ABRAHAM-MEN, the nickname for vagrants who infested England in Tudor times. The phrase is certainly as old as 1561, and was due to these beggars pretending that they were patients discharged from the Abraham ward at Bedlam. The genuine Bedlamite was allowed to roam the country on his discharge,

soliciting alms, provided he wore a badge. This humane privi- lege was grossly abused, and thus gave rise to the slang phrase ” to sham Abraham.”

ABRANTES, a town of central Portugal, in the district of Santarem, formerly included in the province of Estremadura; on the right bank of the river Tagus, at the junction of the Madrid-Badajoz-Lisbon railway with the Guarda-Abrantes line. Pop. (1900) 7255. Abrantes, which occupies the crest of a hill covered with olive woods, gardens and vines, is a fortified town, with a thriving trade in fruit, olive oil and

grain. As it commands the highway down the Tagus valley to Lisbon, it has usually been regarded as an important military position. Originally an Iberian settlement, founded about 300 B.C., it received the name Aurantes from the Romans; perhaps owing to the alluvial gold (aurum) found along the Tagus. Roman mosaics, coins, the remains of an aqueduct, and other antiquities have been discovered in the neighbourhood. Abrantes was cap- tured on the 24th of November 1807 by the French under General Junot, who for this achievement was created duke of Abrantes. By the Convention of Cintra (22nd of August 1808) the town was restored to the British and Portuguese.

ABRASION (from Lat. ab, off, and radere, to scrape), the process of rubbing off or wearing down, as of rock by moving ice, or of coins by wear and tear; also used of the results of such a process as an abrasion or excoriation of the skin. In machinery, abrasion between moving surfaces has to be prevented as much as possible by the use of suitable materials, good fitting and lubrication. Engineers and other craftsmen make extensive use of abrasion, effected by the aid of such abrasives as emery and carborundum, in shaping, finishing and polishing their work.

ABRAUM SALTS (from the German Abraum-salze, salts to be removed), the name given to a mixed deposit of salts, including halite, carnallite, kieserite, &c, found in association with rock- salt at Stassfurt in Prussia.

ABRAXAS, or Abrasax, a word engraved on certain antique stones, called on that account Abraxas stones, which were used as amulets or charms. The Basilidians, a Gnostic sect, attached importance to the word, if, indeed, they did not bring it into use. The letters of a.fipat;a.s, in the Greek notation,make up the number 365, and the Basilidians gave the name to the 365 orders of spirits which, as they conceived, emanated in succession from the Supreme Being. These orders were supposed to occupy 365 heavens, each fashioned like, but inferior to that above it; and the lowest of the heavens was thought to be the abode of the spirits who formed the earth and its inhabitants, and to whom was committed the administration of its affairs. Abraxas stones are of very little value. In addition to the word Abraxas and other mystical characters, they have often cabalistic figures engraved on them. The commonest of these have the head of a fowl, and the arms and bust of a man, and terminate in the body and tail of a serpent.

ABROGATION (Lat. abrogare, to repeal or annul a law; rogare, literally ” to ask,” to propose a law), the annulling or repealing of a

law by legislative action. Abrogation, which is the total annulling of a law, is to be distinguished from the term derogation, which is used where a law is only partially abrogated. Abrogation may be either express or implied. It is express either when the new law pronounces the annulment in general terms, as when in a concluding section it announces that all laws contrary to the provisions of the new one are repealed, or when in particular terms it announces specifically the preceding laws which it repeals. It is implied when the new law contains provisions which are positively contrary to the former laws without expressly abrogating those laws, or when the condition of things for which the law had provided has changed and consequently the need for the law no longer exists. The abrogation of any statute revives the provisions of the common law which had been abrogated by that statute. See Statute; Repeal.

ABRUZZI E MOLISE, a group of provinces (compartimento) of Southern Italy, bounded N. by the province of Ascoli, N.W. and

W. by Perugia, S.W. by Rome and Caserta, S. by Benevento, E. by Foggia and N.E. by the Adriatic Sea. It comprises the provinces of Teramo (population in iqoi, 307,444), Aquila (396, 62g), Chieti (370,907) and Campobasso (366,571), which, under the kingdom of Naples, respectively bore the names Abruzzo Ulteriore I., Abruzzo Ulteriore II., Abruzzo Citeriore (the reference being to their distance from the capital) and Molise. The total area is 6567 sq. m. and the population (1901) 1,441,551. The district is mainly mountainous in the interior, including as it does the central portion of the whole system of the Apennines and their culminating point, the Gran Sasso d'ltalia. Towards the sea the elevation is less considerable, the hills consisting mainly of somewhat unstable clay and sand, but the zone of level ground along the coast is quite inconsider- able. The coast line itself, though over 100 miles in length, has not a single harbour of importance. The climate varies considerably with the altitude, the highest peaks being covered with snow for the greater part of the year, while the valleys running N.E. towards the sea are fertile and well watered by several small rivers, the chief of which are the Tronto, Vomano, Pescara, Sangro, Trigno and Biferno. These are fed by less important streams, such as the Aterno and Gizio, which water the valleys between the main chains of the Apennines. They are liable to be suddenly swollen by rains, and floods and land- slips often cause considerable damage. This danger has been increased, as elsewhere in

Italy, by indiscriminate timber-felling on the higher mountains without provision for re-afforestation, though considerable oak, beech, elm and pine forests still exist and are the home of wolves, wild boars and even bears. They also afford feeding-ground for large herds of swine, and the hams and sausages of the Abruzzi enjoy a high reputation. The rearing of cattle and sheep was at one time the chief occupation of the inhabitants, and many of them still drive their flocks down to the Campagna di Roma for the winter months and back again in the summer, but more attention is now devoted to cultivation. This flourishes especially in the valleys and in the now drained bed of the Lago Fucino. The industries are various, but none of them is of great importance. Arms and cutlery are produced at Campobasso and Agnone. At the exhibition of Abruzzese art, held at Chieti in 1905, fine specimens of goldsmiths' work of the 15th and 16th centuries, of majolica of the 17th and 18th centuries, and of tapestries and laces were brought together; and the reproduction of some of these is still carried on, the small town of Castelli being the centre of the manufacture. The river Pescara and its tributary the Tirino form an important source of power for generating elec- tricity. The chief towns are (1) Teramo, Atri, Campli, Penne, Castellammare Adriatico; (2) Aquila, Avezzano, Celano, Taglia- cozzo, Sulmona; (3) Chieti, Lanciano, Ortona, Vasto; (4) Campobasso, Agnone, Isernia. Owing to the nature of the country, communications are not easy. Railways are (1) the coast railway (a part of the Bologna-Gallipoli line), with branches from Giulianova to Teramo and from Termoli to Campobasso; (2) a line diverging S.E. from this at Pescara and running via Sulmona (whence there are branches via Aquila and Rieti to Terni, and via Carpinone to (a) Isernia and Caianello, on the line from Rome to Naples, and (6) Campobasso and Benevento), and Avezzano (whence there is a branch to Roccasecca) to Rome.

The name Abruzzi is conjectured to be a medieval corruption of Praetuttii. The district was, in Lombard times, part of the duchy of Spoleto, and, under the Normans, a part of that of Apulia; it was first formed into a single province in 1240 by Frederick II., who placed the Justiciarius Aprutii at Solmona and founded the city of Aquila. After the Hohenstauffen lost their Italian dominions, the Abruzzi became a province of the Angevin kingdom of Naples, to which it was of great strategic importance. The division into three parts was not made until the 17 th century. The Molise, on the other hand, formed part of the Lombard duchy of Benevento, and was^placed under the Justiciarius of Terra di Lavoro by Frederick II.: after various changes it became part of the Capitanata, and was only formed

into an independent province in 181 1. The people are remark ably

conservative in beliefs, superstitions and traditions.

See V. Bindi, Monumenti storici ed artistici degli Abruzzi (Naples, 1889); A. de Nino, Usi e coslumi Abruzzesi (Florence, 1879-1883).

ABSALOM (Hebrew for “father of [or is] peace”), in the Bible, the third son of David, king of Israel. He was deemed the handsomest man in the kingdom. His sister Tamar having been violated by David’s eldest son Amnon, Absalom, after waiting two years, caused his servants to murder Amnon at a feast to which he had invited all the king’s sons (2 Sam. xiii.). After this deed he fled to Talmai, ” king ” of Geshur (see Josh. xii. 5 or xiii. 2), his maternal grandfather, and it was not until five years later that he was fully reinstated in his father’s favour (see Joab). Four years after this he raised a revolt at Hebron, the former capital. Absalom was now the eldest surviving son of David, and the present position of the narratives (xv.xx.) — after the birth of Solomon and before the struggle between Solomon and Adonijah — may represent the view that the suspicion that he was not the destined heir of his father’s throne excited the impulsive youth to rebellion. All Israel and Judah flocked to his side, and David, attended only by the Cherethites and Pelethites and some recent recruits from Gath, found it expedient to flee. The priests remained behind in Jerusalem, and their sons Jonathan and Ahimaaz served as his spies. Absalom reached the capital and took counsel with the renowned Ahithophel. The pursuit was continued and David took refuge beyond the Jordan. A battle was fought in the ” wood of Ephraim ” (the name suggests a locality west of the Jordan) and Absalom’s army was completely routed. He himself was caught in the boughs of an oak-tree, and as David had strictly charged his men to deal gently with the young man, Joab was informed. What a common soldier refused to do even for a thousand shekels of silver, the king’s general at once undertook. Joab thrust three spears through the heart of Absalom as he struggled in the branches, and as though this were not enough, his ten armour-bearers came around and slew him. The king’s overwhelming grief is well known. A great heap of stones was erected where he fell, whilst another monument near Jerusalem (not the modern ” Absalom’s Tomb,” which is of later origin) he himself had erected in his lifetime to perpetuate his name (2 Sam. xviii. 17 seq.). But the latter notice does not seem to agree with xiv. 27 (cf. 1 Kings xv. 2). On the narratives in 2 Sam. xiii.-xix., see further David; Samuel, Books or.

ABSALON (c. 1128-1201), Danish archbishop and statesman, was born about 11 28, the son of Asser Rig of Fjenneslev, at whose castle he and his brother Esbjorn were brought up along with the young prince

Valdemar, afterwards Valdemar I. The Rigs were as pious and enlightened as they were rich. They founded the monastery of Soro as a civilizing centre, and after giving Absalon the rudiments of a sound education at home, which included not only book-lore but every manly and martial exercise, they sent him to the university of Paris. Absalon first appears in Saxo's Chronicle as a fellow-guest at Roskilde, at the banquet given, in 11 57, by King Sweyn to his rivals Canute and Valdemar. Both Absalon and Valdemar narrowly escaped as- sassination at the hands of their treacherous host on this occa- sion, but at length escaped to Jutland, whither Sweyn followed them, but was defeated and slain at the battle of Grathe Heath. The same year (n 58) which saw Valdemar ascend the Danish throne saw Absalon elected bishop of Roskilde. Henceforth Absalon was the chief counsellor of Valdemar, and the promoter of that imperial policy which, for three generations, was to give Denmark the dominion of the Baltic. Briefly, it was Absalon's intention to clear the northern sea of the Wendish pirates, who inhabited that portion of the Baltic littoral which we now call Pomerania, and ravaged the Danish coasts so unmercifully that at the accession of Valdemar one-third of the realm of Denmark lay wasted and depopulated. The very existence of Denmark demanded the suppression and conversion of these stiff-necked pagan freebooters, and to this double task Absalon devoted the best part of his life. The first expedition against the Wends, conducted by .Absalon in person, set out in 1160, but it was not

till 1168 that the chief Wendish fortress, at Arkona in Riigen, containing the sanctuary of their god Svantevit, was surrendered, the Wends agreeing to accept Danish suzerainty and the Christian religion at the same time. From Arkona Absalon proceeded by sea to Garz, in south Riigen, the political capital of the Wends, and an all but impregnable stronghold. But the unexpected fall of Arkona had terrified the garrison, which surrendered unconditionally at the first appearance of the Danish ships. Absalon, with only Sweyn, bishop of Aarhus, and twelve " house- carls," thereupon disembarked, passed between a double row of Wendish warriors, 6000 strong, along the narrow path winding among the morasses, to the gates of the fortress, and, proceeding to the temple of the seven-headed god Rugievit, caused the idol to be hewn down, dragged forth and burnt. The whole popula- tion of Garz was then baptized, and Absalon laid the foundations of twelve churches in the isle of Riigen. The destruction of this chief sally-port of the Wendish pirates enabled Absalon

considerably to reduce the Danish fleet. But he continued to keep a watchful eye over the Baltic, and in 1170 destroyed another pirate stronghold, farther eastward, at Dievenow on the isle of Wollin. Absalon's last military exploit was the annihilation, off Strela (Stralsund), on Whit-Sunday n 84, of a Pomeranian fleet which had attacked Denmark's vassal, Jaromir of Riigen. He was now but fifty-seven, but his strenuous life had aged hin>; and he was content to resign the command of fleets and armies to younger men, like Duke Valdemar, after- wards Valdemar II., and to confine himself to the administration of the empire which his genius had created. In this sphere Absalon proved himself equally great. The aim of his policy was to free Denmark from the German yoke. It was contrary to his advice and warnings that Valdemar I. rendered fealty to the emperor Frederick Barbarossa at Dole in 1162; and when, on the accession of Canute V. in 1182, an imperial ambassador arrived at Roskilde to receive the homage of the new king, Absalon resolutely withstood him. " Return to the emperor," cried he, " and tell him that the king of Denmark will in no wise show him obedience or do him homage." As the archpastor of Denmark Absalon also rendered his country inestimable services, building churches and monasteries, introducing the religious orders, founding schools and doing his utmost to promote civilization and enlightenment. It was he who held the first Danish Synod at Lund in 1167. In n 78 he became archbishop of Lund, but very unwillingly, only the threat of excommunica- tion from the holy see finally inducing him to accept the pallium. Absalon died on the 21st of March 1201, at the family monastery of Soro, which he himself had richly embellished and endowed.

Absalon remains one of the most striking and picturesque figures of the Middle Ages, and was equally great as churchman, statesman and warrior. That he enjoyed warfare there can be no doubt; and his splendid physique and early training had well fitted him for martial exercises. He was the best rider in the army and the best swimmer in the fleet. Yet he was not like the ordinary fighting bishops of the Middle Ages, whose sole concession to their sacred calling was to avoid the " shedding of blood " by using a mace in battle instead of a sword. Absalon never neglected his ecclesiastical duties, and even his wars were of the nature of crusades. Moreover, all his martial energy notwithstanding, his personality must have been singularly winning; for it is said of him that he left behind not a single enemy, all his opponents having long since been converted by him into friends.

See Saxo, Gesta Danorum, ed. Holder (Strassburg, 1886), books x.ˆ xvi. ; Steinstrup, Danmark's Riges Historic. Oldtiden eg den asldre Middelalder, pp. 570-735 (Copenhagen, 1897-1905). (R. N. B.)

ABSCESS (from Lat. abscedere, to separate), in pathology, a collection of pus among the tissues of the body, the result of bacterial inflammation. Without the presence of septic organ- isms abscess does not occur. At any rate, every acute abscess contains septic germs, and these may have reached the inflamed area by direct infection, or may have been carried thither by the blood-stream. Previous to the formation of abscess some- thing has occurred to lower the vitality of the affected tissue —

some gross injury, perchance, or it may be that the power of resistance against bacillary invasion was lowered by reason of constitutional weakness. As the result, then, of lowered vitality, a certain area becomes congested and effusion takes place into the tissues. This effusion coagulates and a hard, brawny mass is formed which softens towards the centre. If nothing is done the softened area increases in size, the skin over it becomes thinned, loses its vitality (mortifies) and a small “slough” is formed. When the slough gives way the pus escapes and, tension being relieved, pain ceases. A local necrosis or death of tissue takes place at that part of the inflammatory swelling farthest from the healthy circulation. When the attack of septic inflammation is very acute, death of the tissue occurs en masse, as in the core of a boil or carbuncle. Sometimes, however, no such mass of dead tissue is to be observed, and all that escapes when the skin is lanced or gives way is the creamy pus. In the latter case the tissue has broken down in a molecular form. ‘After the escape of the core or slough along with a certain amount of pus, a space, the abscess-cavity, is left, the walls of which are lined with new vascular tissue which has itself escaped destruc- tion. . This lowly organized material is called granulation tissue, and exactly resembles the growth which covers the floor of an ulcer. These granulations eventually fill the contracting cavity and obliterate it by forming interstitial scar-tissue. This is called healing by second intention. ■ Pus may accumulate in a normal cavity, such as a joint or bursa, or in the cranial, thoracic or abdominal cavity. In all these situations, if the diagnosis is clear, the principle of treatment is evacuation and drainage. When evacuating an abscess it is often advisable to scrape away the lining of unhealthy granulations and to wash out the cavity with an antiseptic lotion. If the after-drainage of the cavity is thorough the formation of pus ceases and the watery discharge from the abscess wall subsides. As the cavity contracts the discharge becomes less, until at last the drainage tube can be removed and the external wound allowed to heal. The large collections of pus which form in connexion with disease of the spinal column in the cervical, dorsal and lumbar regions are now treated by free evacuation of the tuberculous pus, with careful

antiseptic measures. The opening should be in as de- pendent a position as possible in order that the drainage may be thorough. If tension recurs after opening has been made, as by the blocking of the tube, or by its imperfect position, or by its being too short, there is likely to be a fresh formation of pus, and without delay the whole procedure must be gone through again. (E. O.*)

ABSCISSA (from the Lat. abscissus, cut off), in the Cartesian system of co-ordinates, the distance of a point from the axis of y measured parallel to the horizontal axis (axis of x). Thus PS (or OR) is the abscissa of P. The word appears for the first time in a Latin work written by Stefano degli Angeli (1623-1607), a professor of mathematics in Rome. (See Geometry, § Analytical.)

ABSCISSION (from Lat. abscindere), a tearing away, or cut- ting off; a term used sometimes in prosody for the elision of a vowel before another, and in surgery especially for abscission of the cornea, or the removal of that portion of the eyeball situated in front of the attachments of the recti muscles; in botany, the separation of spores by elimination of the connexion.

ABSCOND (Lat. abscondere, to hide, put away), to depart in a secret manner; in law, to remove from the jurisdiction of the courts or so to conceal oneself as to avoid their jurisdiction. A person may ” abscond ” either for the purpose of avoiding arrest for a crime (see Arrest), or for a fraudulent purpose, such as the defrauding of his creditors (see Bankruptcy).

ABSENCE (Lat. absentia), the fact of being “away,” either in body or mind; ” absence of mind ” being a condition in which the mind is withdrawn from .what is passing. The special occasion roll-call at Eton College is called ” Absence,” which the boys attend in their tall hats. A soldier must get permission or “leave of absence” before he can be away from his regiment. Seven years’ absence with no sign of life either by letter or

message is held presumptive evidence of death in the law courts.

ABSENTEEISM, a term used primarily of landed proprietors who absent themselves from their estates, and live and spend their incomes elsewhere; in its more extended meaning it in- cludes all those (in addition to landlords) who live out of a country or locality but derive

their income from some source within it. Absenteeism is a question which has been much de- bated, and from both the economic and moral point of view there is little doubt that it has a prejudicial effect. To it has been attributed in a great measure the unprosperous condition of the rural districts of France before the Revolution, when it was unusual for the great nobles to live on their estates unless compelled to do so by a sentence involving their ” exile ” from Paris. It has also been an especial evil in Ireland, and many attempts were made to combat it. As early as 1727 a tax of four shillings in the pound was imposed on all persons .holding offices and employments in Ireland and residing in England. This tax was discontinued in 1753, but was re-imposed in 1769. In 1774 the tax was reduced to two shillings in the pound, but was dropped after some years. It was revived by the Independent Parliament in 1782 and for some ten years brought in a sub- stantial amount to the revenue, yielding in’ 1790 as much as £63,089.

Authorities. — For a discussion of absenteeism from the economic point of view see N. W. Senior, Lectures on the Rate of Wages, Political Economy; J. S. Mill, Political Economy; J. R. McCulloch, Treatises and Essays on Money, &c, article “Absenteeism “; A. T. Hadley, Economics; on absenteeism in Ireland see A. Young, Tour in Ireland (1780); T. Prior, List of Absentees (1729); E. Wakefield, Account of Ireland (1812); W. E. H. Lecky, Ireland in the 18th Century (1892); A. E. Murray, History of the Commercial and Financial Relations between England and Ireland (1903) ; Parlia- mentary Papers, Ireland, 1830, vii., ditto, 1845, xix.-xxii.; in France, A. de Monchretien, Traicte de I’cekonomie politique (1615); A. de Tocqueville, L’Ancien Regime (1857); H. Taine, Les Origines de la France content poraine, I’ancien Regime (1876).

ABSINTHE, a liqueur or aromatized spirit, the characteristic flavouring matter of which is derived from various species of wormwood {Artemisia absinthium). Among the other substances generally employed in its manufacture are angelica root, sweet flag,, dittany leaves, star-anise fruit, fennel and hyssop. A colourless ” alcoholate ” (see Liqueurs) is first prepared, and to this the well-known green colour of the beverage is imparted by maceration with green leaves of wormwood, hyssop and mint. Inferior varieties are made by means of essences, the distillation process being omitted. There are two varieties of absinthe, the French and the Swiss, the latter of which is of a higher alcoholic strength than the former. The best absinthe contains 70 to 80% of alcohol. It is said to improve very materially by storage. There is a popular belief to the effect that absinthe is frequently adulterated with copper, indigo or other dye-

stuffs (to impart the green colour), but, in fact, this is now very rarely the case. There is some reason to believe that excessive absinthe-drinking leads to effects which are specifically worse than those associated with over-indulgence in other forms of alcohol.

ABSOLUTE (Lat. absohere, to loose, set free), a term having the general signification of independent, self-existent, uncondi- tioned. Thus we speak of ” absolute ” as opposed to ” limited ” or ” constitutional ” monarchy, or, in common parlance, of an ” absolute failure,” i.e. unrelieved by any satisfactory circum- stances. In philosophy the word has several technical uses. (1) In Logic, it has been applied to non-connotative terms which do not imply attributes (see Connotation), but more commonly, in opposition to Relative, to terms which do not imply the exist- ence of some other (correlative) term; e.g. ” father ” implies ” son,” ” tutor ” ” pupil,” and therefore each of these terms is relative. In fact, however, the distinction is formal, and, though convenient in the terminology of elementary logic, cannot be strictly maintained. The term ” man,” for example, which, as compared with ” father,” ” son,” ” tutor,” seems to be absolute, is obviously relative in other connexions; in various contexts it implies its various possible opposites, e.g. ” woman,” ” boy,” ” master,” ” brute.” In other words, every term which is

susceptible of definition is ipso facto relative, for definition is precisely the segregation of the thing defined from all other things which it is not, i.e. implies a relation. Every term which has a meaning is, therefore, relative, if only to its contradictory.

(2) The term is used in the phrase ” absolute knowledge ” to imply knowledge per se. It has been held, however, that, since all knowledge implies a knowing subject and a known object, absolute knowledge is a contradiction in terms (see Relativity) . So also Herbert Spencer spoke of “absolute ethics,” as opposed to systems of conduct based on particular local or temporary laws and conventions (see Ethics).

(3) By far the most important use of the word is in the phrase “the Absolute” (see Metaphysics). It is sufficient here to indicate the problems involved in their most elementary form. The process of knowledge in the sphere of intellect as in that of natural science is one of generalization, i.e. the co-ordination of particular facts under general statements, or in other words, the explanation of one fact by another, and that other by a third, and so on. In this way the particular facts or existences are left behind in the search for higher, more inclusive conceptions; as twigs are traced to one branch, and branches to one trunk, so, it is held, all the plurality of sense-given

data is absorbed in a unity which is all-inclusive and self existent, and has no ” beyond.” By a metaphor this process has been described as the 666s dvw (as of tracing a river to its source). Other phrases from different points of view have been used to describe the idea, e.g. First Cause, Vital Principle (in connexion with the origin of life), God (as the author and sum of all being), Unity, Truth {i.e. the sum and culmination of all knowledge), Causa Causans, &c. The idea in different senses appears both in ideal istic and realistic systems of thought.

The theories of the Absolute may be summarized briefly as follows. (1) The Absolute does not exist, and is not even in any real sense thinkable. This view is held by the empiricists, who hold that nothing is knowable save phenomena. The Absolute could not be conceived, for all knowledge is susceptible of defini- tion and, therefore, relative. The Absolute includes the idea of necessity, which the mind cannot cognize. (2) The Absolute exists for thought only. In this theory the absolute is the un- known x which the human mind is logically compelled to postu- late a priori as the only coherent explanation and justification of its thought. (3) The Absolute exists but is unthinkable, because it is an aid to thought which comes into operation, as it were, as a final explanation beyond which thought cannot go. . Its existence is shown by the fact that without it all demonstra- tion would be a mere circulus in probando or verbal exercise, because the existence of separate things implies some one thing which includes and explains them. (4) The Absolute both exists and is conceivable. It is argued that we do in fact conceive it in as much as we do conceive Unity, Being, Truth. The concep- tion is so clear that its inexplicability (admitted) is of no account. Further, since the unity of our thought implies the absolute, and since the existence of things is known only to thought, it appears absurd that the absolute itself should be regarded as non-existent. The Absolute is substance in itself, the ultimate “basis and matter of existence. All things are merely manifesta- tions of it, exist in virtue of it, but are not identical with it. (5) Metaphysical idealists pursue this line of argument in a dif- ferent way. For them nothing exists save thought; the only existence that can be predicated of any thing and, therefore, of the Absolute, is that it is thought. Thought creates God, things, the Absolute. (6) Finally, it has been held that we can conceive the Absolute, though our conception is only partial, just as our conception of all things is limited by the imperfect powers of human intellect. Thus the Absolute exists for us only in our thought of it (4 above). But thought itself comes from the Absolute which, being itself the pure thought of thoughts, separates from itself individual minds. It is, therefore, perfectly natural that human thought, being

essentially homogeneous with the Absolute, should be able by the consideration of the universe to arrive at some imperfect conception of the source from which all is derived.

The whole controversy is obscured by inevitable difficulties in terminology. The fundamental problem is whether a thing which is by hypothesis infinite can in any sense be defined, and if it is not defined, whether it can be said to be cognized or thought. It would appear to be almost an axiom that anything which by hypothesis transcends the intellect (i.e. by including subject and object, knowing and known) is ipso facto beyond the limits of the knower. Only an Absolute can cognize an absolute.

ABSOLUTION (Lat. absolutio from absolvo, loosen, acquit), a term used in civil and ecclesiastical law, denoting the act of setting free or acquitting. In a criminal process it signifies the acquittal of an accused person on the ground that the evidence has either disproved or failed to prove the charge brought against him. In this sense it is now little used, except in Scottish law in the forms assoilzie and absolvitor. The ecclesiastical use of the word is essentially different from the civil. It refers not to an accusation, but to sin actually committed (after baptism) ; and it denotes the setting of the sinner free from the guilt of the sin, or from its ecclesiastical penalty (excommunication), or from both. The authority of the church or minister to pronounce absolution is based on John xx. 23; Matt, xviii. 18; James v. 16, &c. In primitive times, when confession of sins was made before the congregation, the absolution was deferred till the penance was completed; and there is no record of the use of any special formula. Men were also encouraged, e.g. by Chrysostom, to confess their secret sins secretly to God. In course of time changes grew up. (1) From the 3rd century onwards, secret (auricular) confession before a bishop or priest was practised. For various reasons it became more and more common, until the fourth Lateran council (12 15) ordered all Christians of the Roman obedience to make a confession once a year at least. In the Greek church also private confession has become obligatory. (2) In primitive times the penitent was reconciled by imposition of hands by the bishop with or without the clergy: gradually the office was left to be discharged by priests, and the outward action more and more disused. (3) It became the custom to give the absolution to penitents immediately after their confession and before the penance was performed. (4) Until the Middle Ages the form of absolution after

private confession was of the nature of a prayer, such as ” May the Lord absolve thee”; and this is still the practice of the Greek church. But about the 13th century the Roman formula was altered, and the council of Trent (1551) declared that the “form” and power of the sacrament of penance lay in the words Ego te absolvo, &c, and that the accompanying prayers are not essential to it. Of the three forms of absolution in the Anglican Prayer Book, that in the Visitation of the Sick (disused in the church of Ireland by decision of the Synods of 1871 and 1877) runs “I absolve thee,” tracing the authority so to act through the church up to Christ: the form in the Communion Service is precative, while that in Morning and Evening Prayer is indicative indeed, but so general as not to imply anything like a judicial decree of absolution. In the Lutheran church also the practice of private confession survived the Reformation, together with both the exhibitive (I forgive, &c.) and declaratory (I declare and pronbunce) forms of absolution. In granting absolution, even after general con- fession, it is in some places still the custom for the minister, where the numbers permit of it, to lay his hands on the head of each penitent. (W. O. B.)

ABSOLUTISM, in aesthetics, a term applied to the theory that beauty is an objective attribute of things, not merely a subjec- tive feeling of pleasure in him who perceives. It follows that there is an absolute standard of the beautiful by which all ob- jects can be judged. The fact that, in practice, the judgments even of connoisseurs are perpetually at variance, and that the so-called criteria of one place or period are more or less opposed to those of all others, is explained away by the hypothesis that individuals are differently gifted in respect of the capacity to appreciate. (See Aesthetics.)

In political philosophy absolutism, as opposed to constitu- tional government, is the despotic rule of a sovereign unrestrained by laws and based directly upon force. In the strict sense such

governments are rare, but it is customary to apply the term to a state at a relatively backward stage of constitutional develop- ment.

ABSORPTION OF LIGHT. The term “absorption” (from Lat. absorbere) means literally ” sucking up ” or ” swallowing,” and thus a total incorporation in something, literally or figura- tively ; it is technically used in animal physiology for the function of certain vessels which suck up fluids; and in light and optics absorption spectrum and absorption band are terms used in the discussion of the transformation of rays in various media.

If a luminous body is surrounded by empty space, the light which it

emits suffers no loss of energy as it travels outwards. The intensity of the light diminishes merely because the total energy, though unaltered, is distributed over a wider and wider surface as the rays diverge from the source. To prove this, it will be sufficient to mention that an exceedingly small deficiency in the transparency of the free aether would be sufficient to pre- vent the light of the fixed stars from reaching the earth, since their distances are so immense. But when light is transmitted through a material medium, it always suffers some loss, the light energy being absorbed by the medium, that is, converted partially or wholly into other forms of energy such as heat, a portion of which transformed energy may be re-emitted as radiant energy of a lower frequency. Even the most transparent bodies known absorb an appreciable portion of the light trans- mitted through them. Thus the atmosphere absorbs a part of the sun's rays, and the greater the distance which the rays have to traverse the greater is the proportion which is absorbed, so that on this account the sun appears less bright towards sunset. On the other hand, light can penetrate some distance into all substances, even the most opaque, the absorption being, however, extremely rapid in the latter case.

The nature of the surface of a body has considerable influence on its power of absorbing light. Platinum black, for instance, in which the metal is in a state of fine division, absorbs nearly all the light incident on it, while polished platinum reflects the greater part. In the former case the light penetrating between the particles is unable to escape by reflexion, and is finally absorbed.

The question of absorption may be considered from either of two points of view. We may treat it as a superficial effect, especially in the case of bodies which are opaque enough or thick enough to prevent all transmission of light, and we may investi- gate how much is reflected at the surface and how much is ab- sorbed; or, on the other hand, we may confine our attention to the light which enters the body and inquire into the relation between the decay of intensity and the depth of penetration. We shall take these two cases separately.

Absorptive Power.— When none of the radiations which fall on a body penetrates through its substance, then the ratio of the amount of radiation of a given wave-length which is absorbed to the total amount received is called the " absorptive power " of the body for that wave-length. Thus if the body absorbed half the incident radiation its absorptive power would be §, and if it absorbed all the incident radiation its absorptive power would be 1. A body which absorbs all radiations of all wave- lengths would be called a "perfectly black body." No such body actually exists, but such substances as lamp-

black and platinum-black approximately fulfil the condition. The fraction of the incident radiation which is not absorbed by a body gives a measure of its reflecting power, with which we are not here concerned. Most bodies exhibit a selective action on light, that is to say, they readily absorb light of particular wave-lengths, light of other wave-lengths not being largely absorbed. All bodies when heated emit the same kind of radiations which they absorb — an important principle known as the principle of the equality of radiating and absorbing powers. Thus black sub- stances such as charcoal are very luminous when heated. A tile of white porcelain with a black pattern on it will, 1/ heated red-hot, show the pattern bright on a darker ground. On the other hand, those substances which either are good reflectors or

good transmitters, are not so luminous at the same temperature; for instance, melted silver, which reflects well, is not so luminous as carbon at the same temperature, and common salt, which is very transparent for most kinds of radiation, when poured in a fused condition out of a bright red-hot crucible, looks almost like water, showing only a faint red glow for a moment or two. But all such bodies appear to lose their distinctive properties when heated in a vessel which nearly encloses them, for in that case those radiations which they do not emit are either trans- mitted through them from the walls of the vessel behind, or else reflected from their surface. This fact may be expressed by saying that the radiation within a heated enclosure is the same as that of a perfectly black body.

Coefficient of Absorption, and Law of Absorption. — The law which governs the rate of decay of light intensity in passing through any medium may be readily obtained. If Io represents the intensity of the light which enters the surface, Ii the intensity after passing through i centimetre, I 2 the intensity after passing through 2 centimetres, and so on; then we should expect that whatever fraction of Io is absorbed in the first centimetre, the same fraction of Ii will be absorbed in the second. That is, if an amount /To is absorbed in the first centimetre, jli is absorbed in the second, and so on. We have then

ii = iod-i)

l 2 = iiCi-j”) = io(i-i) 2

I s = I 2 (l-7) = I (l_j)3 and so on, so that if I is the intensity after passing through a thickness / in centimetres

I = Io(l-j)' (I).

We might call j, which is the proportion absorbed in one centimetre, the " coefficient of absorption " of the medium. It would, however, not then apply to the case of a body for which the whole light is absorbed in less than one centimetre. It is better then to define the coefficient of absorption as a quantity k such that kin of the light is absorbed in i/»th part of a centi- metre, where n may be taken to be a very large number. The formula (i) then becomes

I = I e-* ((2)

where e is the base of Napierian logarithms, and k is a constant which is practically the same as j for bodies which do ndt absorb very rapidly.

There is another coefficient of absorption (k) which occurs in Helmholtz's theory of dispersion (see Dispersion). It is closely related to the coefficient k which we have just defined, the equation connecting the two being k — ˆKKJ\,\ being the wave- length of the incident light.

The law of absorption expressed by the formula (2) has been verified by experiments for various solids, liquids and gases. The method consists in comparing the intensity after trans- mission through a layer of known thickness of the absorbent with the intensity of light from the same source which has not passed through the medium, k being thus obtained for various thicknesses and found to be constant. In the case of solutions, if the absorption of the solvent is negligible, the effect of in- creasing the concentration of the absorbing solute is the same as that of increasing the thickness in the same ratio. In a similar way the absorption of light in the coloured gas chlorine is found to be unaltered if the thickness is reduced by compres- sion, because the density is increased in the same ratio that the thickness is reduced. This is not strictly the case, however, for such gases and vapours as exhibit well-defined bands of absorption in the spectrum, as these bands are altered in char- acter by compression.

If white light is allowed to fall on some coloured solutions, the transmitted light is of one colour when the thickness of the solution is small, and of quite another colour if the thickness is great. This curious phenomenon is known as dichromatism (from 5i-, two, and

xp&H”-, colour). Thus, when a strong light is viewed through a solution of chlorophyll, the light seen is a brilliant green if the thickness is small, but a deep blood-red for thicker layers. This effect can be explained as follows. The solution is moderately transparent for a large number of rays

in the neighbourhood of the green part of the spectrum; it is, on the whole, much more opaque for red rays, but is readily penetrated by certain red rays belonging to a narrow region of the spectrum. The small amount of red transmitted is at first quite overpowered by the green, but having a smaller coefficient of absorption, it becomes finally predominant. The effect is complicated, in the case of chlorophyll and many other bodies, by selective reflexion and fluorescence.

For the molecular theory of absorption, see Spectroscopy.

References. — A. Schuster's Theory of Optics (1904); P. K. L. Drude's Theory of Optics (Eng. trans., 1902); F. H. Wiillner's Lehrbuch der Experimentalphysik, Bd. iv. (1899). (J. R. C.)

ABSTEMII (a Latin word, from abs, away from, temetum, intoxicating liquor, from which is derived the English " abste- mious " or temperate), a name formerly given to such persons as could not partake of the cup of the Eucharist on account of their natural aversion to wine. Calvinists allowed these to com- municate in the species of bread only, touching the cup with their lip; a course which was deemed a profanation by the Lutherans. Among several Protestant sects, both in Great Britain and America, abstemii on a somewhat different principle have appeared in modern times. These are total abstainers, who maintain that the use of stimulants is essentially sinful, and allege that the wine used by Christ and his disciples at the supper was unfermented. They accordingly communicate in the unfermented " juice of the grape."

ABSTINENCE (from Lat. abstinere, to abstain), the fact or habit of refraining from anything, but usually from the indul- gence of the appetite and especially from strong drink. " Total abstinence " and " total abstainer " are associated with taking the pledge to abstain from alcoholic liquor (see Temperance). In the discipline of the Christian Church abstinence is the term for a less severe form of Fasting (g.v.).

ABSTRACTION (Lat. abs and trahere), the process or result of drawing away; that which is drawn away, separated or derived. Thus the noun is used for a summary, compendium or epitome of a larger work, the gist of which is given in a concentrated form. Similarly an absent-minded man is said to be " abstracted," as paying no attention to the matter in hand. In philosophy the word has several closely related technical senses. (1) In formal logic it is applied to those terms which denote qualities, attributes, circumstances, as opposed to concrete terms, the names of things; thus " friend " is concrete, " friendship " abstract. The term which expresses the connotation of a word is therefore an abstract term, though it is probably not itself connotative; adjectives are concrete, not abstract, e.g. " equal " is concrete, " equality " abstract (cf. Aristotle's aphaeresis and prosthesis). (2) The process of abstraction takes an important place both in psychological and metaphysical speculation. The psychologist finds among the earliest of his problems the question as to the process from the perception of things seen and heard to mental conceptions, which are ultimately distinct from immediate perception (see Psychology). When the mind, beginning with isolated individuals, groups them together in

virtue of perceived resemblances and arrives at a unity in plurality, the process by which attention is diverted from individuals and concentrated on a single inclusive concept {i.e. classification) is one of ab- straction. All orderly thought and all increase of knowledge depend partly on establishing a clear and accurate connexion between particular things and general ideas, rules and principles. The nature of the resultant concepts belongs to the great contro- versy between Nominalism, Realism and Conceptualism. Meta- physics, again, is concerned with the ultimate problems of matter and spirit; it endeavours to go behind the phenomena of sense and focus its attention on the fundamental truths which are the only logical bases of natural science. This, again, is a process of abstraction, the attainment of abstract ideas which, apart from the concrete individuals, are conceived as having a substantive existence. The final step in the .process is the conception of the Absolute (q.v.), which is abstract in the most complete sense.

Abstraction differs from Analysis, inasmuch as its object is to select a particular quality for consideration in itself as it is

found in all the objects to which it belongs, whereas analysis considers all the qualities which belong to a single object.

ABSTRACT OF TITLE, in English law, an epitome of the various instruments and events under and in consequence of which the vendor of an estate derives his title thereto. Such an abstract is, upon the sale or mortgage of an estate, prepared by some competent person for the purchaser or mortgagee, and verified by his solicitor by a comparison with the original deeds. (See Conveyancing.)

ABT, FRANZ (1810-1885), German composer, was born on the 22nd of December 18 19 at Eilenburg, Saxony, and died at Wiesbaden on the 31st of March 1885. The best of his popular songs have become part of the recognized art-folk-music of Ger- many; his vocal works, solos, part-songs, &c, enjoyed an extra- ordinary vogue all over Europe in the middle of the 19th century, but in spite of their facile tunefulness have few qualities of last- ing beauty. Abt was kapellmeister at Bernburg in 1841, at Zurich in the same year and at Brunswick from 1852 to 1882, when he retired to Wiesbaden.

ABU, a mountain of Central India, situated in 24 36′ N. lat. and 72 43′

E. long., within the Rajputana state of Sirohi. It is an isolated spur of the Aravalli range, being completely detached from that chain by a narrow valley 7 miles across, in which flows the western Banas. It rises from the surrounding plains of Marwar likeva precipitous granite island, its various peaks ranging from 4000 to 5653 feet. The elevations and platforms of the mountain are covered with elaborately sculptured shrines, temples and tombs. On the top of the hill is a small round plat- form containing a cavern, with a block of granite, bearing the impression of the feet of Data-Bhrigu, an incarnation of Vishnu. This is the chief place of pilgrimage for the Jains, Shrawaks and Banians. The two principal temples are situated at Deulwara, about the middle of the mountain, and five miles south-west of Guru Sikra, the highest summit. They are built of white marble, and are pre-eminent alike for their beauty and as typical speci- mens of Jain architecture in India. The more modern of the two was built by two brothers, rich" merchants, between the years 1 197 and 1247, and for delicacy of carving and minute beauty of detail stands almost unrivalled, even in this land of patient and lavish labour. The other was built by another merchant prince, Vimala Shah, apparently about a.d. 1032, and, although simpler and bolder in style, is as elaborate as good taste would allow in a purely architectural object. It is one of the oldest as well as one of the most complete examples of Jain architecture known. The principal object within the temple is a cell lighted only from the door, containing a cross-legged seated figure of the god Parswanath. The portico is composed of forty-eight pillars, the whole enclosed in an oblong courtyard about 140 feet by 90 feet, . surrounded by a double colonnade of smaller pillars, forming porticos to a range of fifty-five cells, which enclose it on all sides, exactly as they do in a Buddhist monastery (vihdra). In this temple, however, each cell, instead of being the residence of a monk, is dccupied by an image of Parswanath, and over the door, or on the jambs of each, are sculptured scenes from the life of the deity. The whole interior is magnificently ornamented.

Abu is now the summer residence of the governor-general's agent for Rajputana, and a place of resort for Europeans in the hot weather. It is 16 miles from the Abu road station of the Rajputana railway. The annual mean temperature is about 70 , rising to 90 in April; but the heat is never oppressive. The annual rainfall is about 68 inches. The hills are laid out with driving-roads and bridle-paths, and there is a beautiful little lake. The chief buildings are a church, club, hospital and a Lawrence asylum school for the children of British soldiers.

ABU-BEKR (573-634), the name (" Father of the virgin") of the first of the Mahommedan caliphs (see Caliph). He was originally called Abd-

el-Ka'ba (" servant of the temple "), and received the name by which he is known historically in con- sequence of the marriage of his virgin daughter Ayesha to Mahomet. He was born at Mecca in the year a.d. 573, a Koreishite of the tribe of Beni-Taim. Possessed of immense wealth, which he had himself acquired in commerce, and held

in high esteem as a judge, an interpreter of dreams and a depositary of the traditions of his race, his early accession to Islamism was a fact of great importance. On his conversion he assumed the name of Abd-Alla (servant of God). His own belief in Mahomet and his doctrines was so thorough as to procure for him the title El Siddik (the faithful), and his success in gaining converts was correspondingly great. In his personal . relationship to the prophet he showed the deepest veneration and most unswerving devotion. When Mahomet fled from Mecca, Abu-Bekr was his sole companion, and shared both his hardships and his triumphs, remaining constantly with him until the day of his death. During his last illness the prophet indicated Abu-Bekr as his successor by desiring him to offer up prayer for the people. The choice was ratified by the chiefs of the army, and ultimately confirmed, though AH, Mahomet's son- in-law, disputed it, asserting his own title to the dignity. After a time Ali submitted, but the difference of opinion as to his claims gave rise to the controversy which still divides the followers of the prophet into the rival factions of Sunnites and Shiites. Abu-Bekr had scarcely assumed his new position (632), under the title Calif et-Resul- Allah (successor of the prophet of God) , when he was called to suppress the revolt of the tribes Hejaz and Nejd, of which the former rejected Islamism and the latter refused- to pay tribute. He encountered formidable opposition from different quarters, but in every case he was successful, the severest struggle being that with the impostor Mosailima, who was finally defeated by Khalid at the battle of Akraba. Abu-Bekr's zeal for the spread of the new faith was as conspicuous as that of its founder had been. When the internal disorders had been repressed and Arabia completely subdued, he directed his generals to foreign conquest. The Irak of Persia was overcome by Khalid in a single campaign, and there was also a successful expedition into Syria. After the hard-won victory over Mosailima, Omar, fearing that the sayings of the prophet would be entirely forgotten when those who had listened to them had all been removed by death, induced Abu-Bekr to see to their preservation in a written form. The record, when completed, was deposited with Hafsa, daughter of Omar, and one of the wives of Mahomet. It was held in great reverence by all Moslems, though it did not possess canonical authority, and furnished most of the materials out of which the Koran, as it now exists, was prepared. When the authoritative

version was completed all copies of Hafsa's record were destroyed, in order to prevent possible disputes and divi- sions. Abu-Bekr died on the 23rd of August 634. Shortly, before his death, which one tradition ascribes to poison, another to natural causes, he indicated Omar as his successor, after the manner Mahomet had observed in his own case.

ABU HAMED, a town of the Anglo- Egyptian Sudan on the 1 right bank of the Nile, 345 m. by rail N. of Khartum. It stands, at the centre of the great S-shaped bend of the Nile, and from it the railway to Wadi Haifa strikes straight across the Nubian desert, a little west of the old caravan route to Korosko. A – branch railway, 138 m. long, from Abu Hamed goes down the right bank of the Nile to Kareima in the Dongola mudiria. The town is named after a celebrated sheikh buried here, by whose tomb travellers crossing the desert used formerly to deposit all superfluous goods, the sanctity of the saint's tomb ensuring their safety.

ABU IIANIFA AN-NU'MAN IBN THABIT, Mahommedan canon lawyer, was born at Kufa in a.h. 80 (a.d. 699) of non- ; Arab and probably Persian parentage. Few events of his life are known to us with any certainty. He was a silk-dealer and a man of considerable means, so that he was able to give his time to legal studies. He lectured at Kufa upon canon law (fiqh) and was a consulting lawyer (mufti), but refused steadily to take any public post. When al-Mansur, however, was build- ing Bagdad (145-149) Abu Hanifa was one of the four over- seers whom he appointed over the craftsmen (G. Le Strange, Baghdad during the Abbasid Caliphate, p. 17). In a.h. 150 (a.d. 767) he died there under circumstances which are very differently reported. A persistent but apparently later tradition •

asserts that he died in prison after severe beating, because he refused to obey al-Mansur's command to act as a judge (cadi, qddi). This was to avoid a responsibility for which he felt unfit — a frequent attitude of more pious Moslems. Others say that al-Mahdi, son of al-Mansur, actually constrained him to be a judge and that he died a few days after. It seems certain that he did suffer imprisonment and beating for this reason, at the hands of an earlier governor of Kufa under the Omayyads (Ibn Qutaiba, Ma'drif, p. 248). Also that al-Mansur desired to make him judge, but compromised upon his inspectorship of buildings (so in Tabarl). A late story is that the judgeship was only a pretext with al-Mansur, who considered him a partisan of the 'Alids

and a helper with his wealth of Ibrahim ibn ‘Abd Allah in his insurrection at Kufa in 145 (Weil, Geschichte, ii. 53 ff.).

For many personal anecdotes see de Slane’s transl. of Ibn Khallikan iii. 555 ff., iv. 272 ff. For his place as a speculative jurist in the history of canon law, see Mahommedan Law. He was buried in eastern Bagdad, where his tomb still exists, one of the few surviving sites from the time of al-Man§ur, the founder. (Le Strange 191 ff.)

See C. Brockelmann, Geschichte, i. 169 ff. ; Nawawi’s Biogr. Diet. pp. 698-770; Ibn Hajar al-Haitami’s Biography, publ. Cairo, A.H. 1304 ; legal bibliography under Mahommedan Law. (D. B. Ma.)

ABU KLEA, a halting-place for caravans in the Bayuda Desert, Anglo-Egyptian Sudan. It is on the road from Merawi to Metemma and 20 m. N. of the Nile at the last-mentioned place. Near this spot, on the 17th of January 1885, a British force marching to the relief of General Gordon at Khartum was attacked by the Mahdists, who were repulsed. On the 19th, when the British force was nearer Metemma, the Mahdists re- newed the attack, again unsuccessfully. Sir Herbert Stewart, the commander of the British force, was mortally wounded on the 19th, and among the killed on the 17th was Col. F. G. Burnaby (see Egypt, Military Operations).

ABU-L-‘ALA UL-MA’ARRI [Abu-l-‘Ala Ahmad ibn ‘Abdallah ibn Sulaiman] (973-1057), Arabian poet and letter-writer, be- longed to the South Arabian tribe Tanukh, a part of which had migrated to Syria before the time of Islam. He was born in 973 at Ma’arrat un-Nu’man, a Syrian town nineteen hours’ journey south of Aleppo, to the governor of which it was subject at that time. He lost his father while he was still an infant, and at the age of four lost his eyesight owing to smallpox. This, however, did not prevent him from attending the lectures of the best teachers at Aleppo, Antioch and Tripoli. These teachers were men of the first rank, who had been attracted to the court of Saif-ud-Daula, and their teaching was well stored in the re- markable memory of the pupil. At the age of twenty-one Abu-l-‘Ala returned to Ma’arra, where he received a pension of thirty dinars yearly. In 1007 he visited Bagdad, where he was admitted to the literary circles, recited in the salons, academies and mosques, and made the acquaintance of men to whom he addressed some of his letters later. In 1009 he returned to Ma’arra, where he spent the rest of his life in teaching and writing. During this period of scholarly quiet he developed his characteristic advanced views on vegetarianism, cremation of the dead and the desire for extinction after death.

Of his works the chief are two collections of his poetry and two of his letters. The earlier poems up to 1029 are of the kind usual at the time. Under the title of Saqt uz-Zand they have been published in Bulaq (1869), Beirut (1884) and Cairo (1886). The poems of the second collection, known as the LuzUm ma lam yalzam, or the Luzumiyyat, are written with the difficult rhyme in two consonants instead of one, and contain the more original, mature and somewhat pessimistic thoughts of the author on mutability, virtue, death, &c. They have been published in Bombay (1886) and Cairo (1889). The letters on various literary and social subjects were published with commentary by Shain Effendi in Beirut (1894), and with English translation, &c, by Prof. D. S. Margoliouth in Oxford (1898). A second collection of letters, known as the Risdlat ul-Ghufrdn, was summarized and partially translated by R. A. Nicholson in the Journal of the Royal Asiatic Society (1900, pp. 637 ff.; 1902, pp. 75 ff., 337 ff,, 813 ff.).

. Bibliography. — C. Rieu, De Abu-l-‘Alae Poetae Arabici vita et carminibus (Bonn, 1843); A. von Kremer, Uber die philosophischen Gedichte des Abu-l-‘Ala (Vienna, 1888); cf. also the same writer’s articles in the Zeitschrift der deutschen morgenldndischen Gesellschaft (vols, xxix., xxx., xxxi. and xxxviii.). For his life see the intro- duction to D. S. Margoliouth’s edition of the letters, supplemented by the same writer’s articles “Abu-l-‘Ala al-Ma’arri’s Correspond- ence on Vegetarianism ” in the Journal of the Royal Asiatic Society (1902, pp. 289 ff.). (G. W. T.)

ABU-L-‘ATAHIYA [Abu Ishaq Isma’il ibn Qasim al-‘Anazi] (748-828), Arabian poet, was born at ‘Ain ut-Tamar in the Hijaz near Medina. His ancestors were of the tribe of ‘Anaza. His youth was spent in Kufa, where he was engaged for some time in selling pottery. Removing to Bagdad, he continued his business there, but became famous for his verses, especially for those addressed to ‘Utba, a slave of the caliph al-Mahdi. His affection was unrequited, although al-Mahdi, and after him Harun al-Rashld, interceded for him. Having offended the caliph, he was in prison for a short time. The latter part of his life was more ascetic. He died in 828 in the reign of al-Ma’mun. The poetry of Abu-l-‘Atahiya is notable for its avoidance of the artificiality almost universal in his days. The older poetry of the desert had been constantly imitated up to this time, al- though it was not natural to town life. Abu-l-‘Atahiya was one of the first to drop the old qasida (elegy) form. He was very fluent and used many metres. He is also regarded as one of the earliest philosophic poets of the Arabs. Much of his poetry is concerned with the observation of common life and morality, and at times is pessimistic. Naturally, under the circumstances, he was strongly suspected of heresy.

His poems (Diwan) with life from Arabian sources have been published at the Jesuit Press in Beirut (1887, 2nd ed. 1888). On his position in Arabic literature see W. Ahlwardt, Diwan des Abu Nowas (Greifswald, 1861), pp,. 21 ff. ; A. von Kremer, Cultur geschichte des Orients (Wien, 1877), vol. ii. pp. 372 ff. (G. W. T.)

•ABULFARAJ [Abu-1-Faraj ‘All ibn ul-Husain ul-Isbahani] (897-967), Arabian scholar, was a member of the tribe of the Quraish (Koreish) and a direct descendant of Marwan, the last of the Omayyad caliphs. He was thus connected with the Omayyad rulers in Spain, and seems to have kept up a corre- spondence with them and to have sent them some of his works. He was born in Ispahan, but spent his youth and made his early studies in Bagdad. He became famous for his knowledge of early Arabian antiquities. His later life was spent in various parts of the Moslem world, in Aleppo with Saif-ud-Daula (to whom he dedicated the Book of Songs), in Rai with the Buyid vizier Ibn ‘Abbad and elsewhere. In his last years he lost his reason. In religion he was a Shiite. Although he wrote poetry, also an anthology of verses on the monasteries of Mesopotamia and Egypt, and a genealogical work, his fame rests upon his Book of Songs (Kitdb ul-Aghdni), which gives an account of the chief Arabian songs, ancient and modern, with the stories of the composers and singers. It contains a mass of information as to the life and customs of the early Arabs, and is the most valuable authority we have for their pre-Islamic and early Moslem days. A part of it was published by J. G. L. Kosegarten with Latin translation (Greifswald, 1840). The text was published in 20 vols, at Bulaq in 1868. Vol. xxi. was edited by R. E. Briinhow (Leyden, 1888). A volume of elaborate indices was edited by I, Guidi (Leyden, 1900), and a missing fragment of the text was published by J. Wellhausen in the Zeitschrift der deutschen morgen- ldndischen Gesellschaft, vol. 50, pp. 146 ff.

For his life see M’G. de Slane’s translation of Ibn Khallikan’s Biographical Dictionary, vol. ii. pp. 249 ff. (G. W. T.)

ABUL FAZL, wazir and historiographer of the great Mogul emperor, Akbar, was born in the year a.d. 1551. His career as a minister of state, brilliant though it was, would probably have been by this time forgotten but for the record he himself has left of it in his celebrated history. The Akbar Nameh, or Book of Akbar, as Abul Fazl’s chief literary work, written in Persian, is called, consists of two parts — the first being a com- plete history of Akbar’s reign and the second, entitled Ain-i- Akbari, or Institutes of Akbar, being an account of the religious and political constitution and administration of the empire. The style is singularly elegant, and the contents of the second

part possess a unique and lasting interest. An excellent trans- lation of the Ain by Francis Gladwin was published in Calcutta, 1 783-1 786. It was reprinted in London very inaccurately, and copies of the original edition are now exceedingly rare and correspondingly valuable. It was also translated by Professor Blockmann in 1848. Abul Fazl died by the hand of an assassin, while returning from a mission to the Deccan in 1602. The murderer was instigated by Prince Selim, afterwards Jahangir, who had become jealous of the minister's influence.

ABULFEDA [Abu-1-Fida' Isma'Il ibn 'All 'Imad-ud-Dnl] (1273-1331), Arabian historian and geographer, was born at Damascus, whither his father Malik ul-Afdal, brother of the prince of Hamah, had fled from the Mongols. He was a de- scendant of Ayytib, the father of Saladin. In his boyhood he devoted himself to the study of the Koran and the sciences, but from his twelfth year was almost constantly engaged in military expeditions, chiefly against the crusaders. In 1285 he was present at the assault of a stronghold of the knights of St John, and he took part in the sieges of Tripoli, Acre and Qal'at ar-Rum. In 1298 he entered the service of the Mameluke Sultan Malik al-NS.sir and. after twelve years was invested by him with the governorship of Hamah. In 13 12 he .became prince with the title Malik us-Salih, and in 1320 received the hereditary rank of sultan with the title Malik ul-Mu'ayyad. For more than twenty years altogether he reigned in tran- quillity and splendour, devoting himself to the duties of govern- ment and to the composition of the works to which he is chiefly indebted for his fame. He was a munificent patron of men of letters, who came in large numbers to his court. He died in 133 1. His chief historical work in An Abridgment of the History of the Human Race, in the form of annals extending from the creation of the world to the year 1329 (Constantinople, 2 vols. 1869). Various translations of parts of it exist, the earliest being a Latin rendering of the section relating to the Arabian conquests in Sicily, by Dobelius, Arabic professor at Palermo, in 1610 (preserved in Muratori's Rerum Italicarum Scriptores, vol. i.). The section dealing with the pre-Islamitic period was edited with Latin translation by H. O. Fleischer under the title Abulfedae Historia Ante-Islamica (Leipzig, 183 1). The part dealing with the Mahommedan period was edited, also with Latin translation, by J. J. Reiske as Annates Muslemici (5 vols., Copenhagen, 1789-1794). His Geography is, like much of the his- tory, founded on the works of his predecessors, and so ultimately on the work of Ptolemy. A long introduction on various geo- graphical matters is followed by twenty-

eight sections dealing in tabular form with the chief towns of the world. After each name are given the longitude, latitude, ” climate,” spelling, and then observations generally taken from earlier authors. Parts of the work were published and translated as early as 1650 (cf. Carl Brockelmann’s Geschichte der Arabischen Litteratur, Berlin, 1902, vol. ii. pp. 44-46). The text of the whole was pub- lished by M’G. de Slane and M. Reinaud (Paris, 1840), and a French translation with introduction by M. Reinaud and Stanislas Guyard (Paris, 1848-1883). (G. W. T.)

ABU-L-QASIM [Khalaf ibn ‘Abbas uz-Zahrawi], Arabian physician and surgeon, generally known in Europe as Abul- casis, flourished in the tenth century at Cordova as physi- cian to the caliph ‘Abdur-RahmSn III. (912-961). No details of his life are known. A part of his compendium of medicine was published in Latin in the 16th century as Liber theoricae nee non praclicae Alsaharavii (Augsburg, 1519). His manual of surgery was published at Venice in 1497, at Basel in 1541, and at Oxford Abulcasis de Chirurgia arabice et latine cura Johannis Channing (2 vols. 1778).

For his other works see Carl Brockelmann, Geschichte der arabi- schen Litteratur (Weimar, 1898), vol. i. pp. 239-240. (G. W. T.)

ABUNDANTIA (” Abundance “), a Roman goddess, the personification of prosperity and good fortune. Modelled after the Greek Demeter, she is practically identical with Copia, Annona and similar goddesses. On the coins of the later Roman emperors she is frequently represented holding a cornucopia, from which she shakes her gifts, thereby at the same time in-

dicating the liberality of the emperor or empress. She may be compared with Domina Abundia (Old Fr. Dame Habonde, Notre Dame d’Abondance), whose name often occurs in poems of the Middle Ages, a beneficent fairy, who brought plenty to those whom she visited (Grimm, Teutonic Mythology, tr. 1880, i. 286-287).

ABU NUWAS [Abu ‘AH Hal-asan ibn Hani’al-Hakaml] (c. 756-810), known as Abu Nuwas, Arabian poet, was born in al- Ahwaz, probably about 756. His mother was a Persian, his father a soldier, a native of Damascus. His studies were made in Basra under Abu Zaid and . Abu “Ubaida (q.v.), and in Kufa under Khalaf al-Ahmar. He is also said to have spent a year with the Arabs in the desert to gain purity of language. Settling in Bagdad he enjoyed the favour of HarOn al-Rashid and al-Amln, and died there probably about 810. The greater part of his life was characterized by great licentiousness and disregard

of religion, but in his later days he became ascetic. Abu Nuwas is recognized as the greatest poet of his time. His mastery of language has led to extensive quotation of his verses by Arabian scholars. Genial, cynical, immoral, he drew on all the varied life of his time for the material of his poems. In his wine-songs especially the manners of the upper classes of Bagdad are revealed. He was one of the first to ridicule the set form of the qasida (elegy) as unnatural, and has satirized this form in several poems. See I. Goldziher, Abhandlungen zur Arabischen Philologie (Leyden, 1 896) , i. pp. 145 ff . His poems were collected by several Arabian editors. One such collection (the MS. of which is now in Vienna) contains nearly 5000 verses grouped under the ten headings: wine, hunting, praise, satire, love of youths, love of women, obscenities, blame, elegies, renunciation of the world. His collected poems (Diwan) have been published in Cairo (i860) and in Beirut (1884). The wine-songs were edited by W. Ahlwardt under the title Diwan des Abu Nomas. 1. Die Weinlieder (Greifswald, 1861). (G. W. T.)

ABU SIMBEL, or Ipsambul, the name of a group of temples of Rameses II. (c. 1250 B.C.) in Nubia, on the left bank of the Nile, 56 m. by river S. of Korosko. They are hewn in the cliffs at the riverside, at a point .where the sandstone hills on the west reach the Nile and form the southern boundary of a wider portion of the generally barren valley. The temples are three in number. The principal temple, probably the greatest and most imposing of all rock-hewn monuments, was discovered by Burckhardt in 1 8 1 2 and opened by Belzoni in 1 8 1 7 . (The front has been cleared several times, most recently in 1892, but the sand is always pressing forward from the north end.) The hillside was recessed to form the facade, backed against which four immense seated colossi of the king, in pairs on either side of the entrance, rise from a platform or forecourt reached from the river by a flight of steps. The colossi are no less than 65 ft. in height, of nobly placid design, and are accompanied by smaller figures of Rameses' queen and their sons and daughters; behind and over them is the cornice, with the dedication below in a line of huge hiero- glyphs, and a long row of apes, standing in adoration of the rising sun above. The temple is dedicated primarily to the solar gods Amenr£ of Thebes and Raharakht of Heliopolis, the true sun god; it is oriented to the east so that the rays of the sun in the early morning penetrate the whole length of two great halls to the innermost sanctuary and fall upon the central figures of Amenrg and Rameses, which are there enthroned with Ptah of Memphis and Raharakht on either side. The interior of the temple is decorated with coloured sculpture of fine workmanship and in good preservation; the scenes are more than usually interesting;

some are of religious import (a*mongst them Ra- meses as king making offerings to himself as god), others illus- trate war in Syria, Libya and Ethiopia: another series depicts the events of the famous battle with the Hittites and their allies at Kadesh, in which Rameses saved the Egyptian camp and army by his personal valour. Historical stelae of the same reign are engraved inside and outside the temple; the most interest- ing is that recording the marriage with a Hittite princess in the 34th year. Not the least important feature of the temple be- longs to a later age, when some Greek, Carian and Phoenician

soldiers of one of the kings named Psammetichus (apparently Psammetichus II., 594-589 B.C.) inscribed their names upon the two southern colossi, doubtless the only ones then clear of sand. These graffiti are of the highest value for the early history of the alphabet, and as proving the presence of Greek mercenaries in the Egyptian armies of the period. The upper part of the second colossus (from the south) has fallen; the third was re- paired by Sethos II. not many years after the completion of the temple. This great temple was wholly rock-cut, and is now threatened by gradual ruin by sliding on the planes of stratifica- tion. A small temple, immediately to the south of the first, is believed to have had a built antechamber: it is the earliest known example of a ” birth chapel,” such as was usually attached to Ptolemaic temples for the accommodation of the divine mother-consort and her son. The third and northernmost temple, separated from the others by a ravine, is on a large scale; the colossi of the facade are six in number and 33 ft. high, repre- senting Rameses and his queen Nefrere, who dedicated the temple to the goddess Hathor. The whole group forms a singular monu- ment of Rameses’ unbounded pride and self-glorification.

See Egypt; J. H. Breasted, Ancient Records, -Egypt, vol. iii. pp. 124 et seq., esp. 212; “The Temples of Lower Nubia,” in the American Journal of Semitic Languages and Literatures, October 1906. (F. Ll. G.)

ABU TAMMAM [Habib ibn Aus] (807-846), Arabian poet, was, like Buhturl, of the tribe of Tai (though some say he was the son of a Christian apothecary named Thaddeus, and that his genea- logy was forged). He was born in Jasim (Josem), a place to the north-east of the Sea of Tiberias or near Manbij (Hierapolis). He seems to have spent his youth in Horns, though, according to one story, he was employed

during his boyhood in selling water in a mosque in Cairo. His first appearance as a poet was in Egypt, but as he failed to make a living there he went to Damascus and thence to Mosul. From this place he made a visit to the governor of Armenia, who awarded him richly. After 833 he lived mostly in Bagdad, at the court of the caliph Mo'tasim. From Bagdad he visited Khorassan, where he enjoyed the favour of 'Abdallah ibn T^^ir- About 845 he was in Ma'arrat un-Nu'man, where he met Buhturl. He died in Mosul. Abu Tammam is best known in literature as the compiler of the collec- tion of early poems known as the Hatndsa (q.v.). Two other collections of a similar nature are ascribed to him. His own poems have been somewhat neglected owing to the success of his com- pilations, but they enjoyed great repute in his lifetime, and were distinguished for the purity of their style, the merit of the verse and the excellent manner of treating subjects. His poems (Diwan) were published in Cairo (a.d. 1875). '

See Life in Ibn Khallikan's Biographical Dictionary, trans, by M'G. de Slane (Paris. and London, 1842), vol. i. pp. 348 ff.; and in the Kitdb ul-Aghani (Book of Songs) of Abulfaraj (Bulaq, 1869), vol. xv. pp. 100-108. (G. W. T.)

ABUTILON (from the Arabic aubiilililn, a name given by Avicenna to this or an allied genus), in botany, a genus of plants, natural order Malvaceae (Mallows), containing about eighty species, and widely distributed in the tropics. They are free- growing shrubs with showy bell-shaped flowers, and are favourite greenhouse plants. They may be grown outside in England during the summer months, but a few degrees of frost is fatal to them. They are readily propagated from cuttings taken in the spring or at the end of the summer. A large number of horti- cultural varieties have been developed by hybridization, some of which have a variegated foliage.

ABUTMENT, a construction in stone or brickwork designed to receive and resist the lateral pressure of an arch, vault or strut. When built outside a wall it is termed a buttress.

ABU UBAIDA [Ma'mar ibn ul-Muthanna] (728-825), Arabian scholar, was born a slave of Jewish Persian parents in Ba§ra, and in his youth was a pupil of Abu'Amr ibn ul-'Ala. In 803 he was called to Bagdad by Harun al-Rashid. He died in Ba?ra. He was one of the most learned and authoritative scholars of his time in all matters pertaining to the Arabic language, anti- quities and stories, and is constantly cited by later authors and compilers. Jahiz held him to be the most learned scholar in all

branches of human knowledge, and Ibn Hisham accepted his interpretation even of passages in the Koran. The titles of 105 of his works are mentioned in the Fihrist, and his Book of Days is the basis of parts of the history of Ibn al-Athir and of the Book of Songs (see Abulfaraj) , but nothing of his (except a song) seems to exist now in an independent form. He is often described as a Kharijite. This, however, is true only in so far as he denied the privileged position of the Arab people before God. He was, however, a strong supporter of the Shu'ubite movement, i.e. the movement which protested against the idea of the superi- ority of the Arab race over all others. This is especially seen in his satires on Arabs (which made him so hated that no man followed his bier when he died). He delighted in showing that words, fables, customs, &c, which the Arabs believed to be peculiarly their own, were derived from the Persians. In these matters he was the great rival of Asma'i (q.v.).

See Life in Ibn Khallikan's Biographical Dictionary, trans, by M'G. de Slane (Paris and London, 1842), vol. iii. pp. 388-398; also I. Goldziher's Muhammedanische Studien (Halle, 1888), vol. i. pp. 194-206. (G. W. T.)

ABYDOS, an ancient city of Mysia, in Asia Minor, situated at Nagara Point on the Hellespont, which is here scarcely a mile broad. It probably was originally a Thracian town, but was afterwards colonized by Milesians. Here Xerxes crossed the strait on his bridge of boats when he invaded Greece. Abydos is celebrated for the vigorous resistance it made against Philip V. of Macedon (200 B.C.), and is famed in story for the loves of Hero and Leander. The town remained till late Byzantine times the toll station of the Hellespont, its importance being transferred to the Dardanelles {q.v.), after the building of the " Old Castles " by Sultan Mahommed II. (c. 1456).

See Choiseul-Gouffier, Voyage dans I'empire ottoman (Paris, 1842).

ABYDOS, one of the most ancient cities of Upper Egypt, about 7 m. W. of the Nile in lat. 26° 10′ N. The Egyptian name was Abdu, " the hill of the symbol or reliquary," in which the sacred head of Osiris was preserved. Thence the Greeks named it Abydos, like the city on the Hellespont; the modern Arabic name is Arabet el Madfunek. The history of the city begins in the late prehistoric age, it having been founded by the pre-Menite kings (Petrie, Abydos, ii. 64), whose town, temple and tombs have been found there. The kings of the 1st dynasty, and some of the Hnd dynasty, were also buried here, and the temple was renewed and enlarged by them. Great forts were built on the desert behind the town by three kings of the Hnd dynasty. The

temple and town continued to be rebuilt at intervals down to the times of the XXXth dynasty, and the cemetery was used continuously. In the Xllth dynasty a gigantic tomb was cut in the rock by Senwosri (or Senusert) III. Seti I. in the XIX th dynasty founded a great new temple to the south of the town in honour of the ancestral kings of the early dynasties; this was finished by Rameses (or Ramessu) II., who also built a lesser temple of his own. Mineptah (Merenptah) added a great Hypogeum of Osiris to the temple of Seti. The latest building was a new temple of Nekhtnebf in the XXXth dynasty. From the Ptolemaic times the place continued to decay and no later works are known (Petrie, Abydos, i. and ii.).

The worship here was of the jackal god Upuaut (Ophois, Wepwoi), who " opened the way " to the realm of the dead, in- creasing from the 1st dynasty to the time of the Xllth dynasty and then disappearing after the XVIIIth. Anher appears in the Xlth dynasty; and Khentamenti, the god of the western Hades, rises to importance in the middle kingdom and- then vanishes in the XVIIIth. The worship here of Osiris in his various forms begins in the Xllth dynasty and becomes more important in later times, so that at last the whole place was considered as sacred to him (Abydos, ii. 47).

The temples successively built here on one site were nine or ten in number, from the 1st dynasty, 5500 B.C. to the XXVIth dynasty, 500 B.C. The first was an enclosure, about 30 X 50 ft., surrounded by a thin wall of unbaked bricks. Covering one wall of this came the second temple of about 40 ft. square in a wall about 10 ft. thick. An outer temmos (enclosure) wall surrounded the ground. This outer wall was thickened about the Hnd or

Illrd dynasty. The eld temple entirely vanished in the IVth dynasty, and a smaller building was erected behind it, enclosing a wide hearth of black ashes. Pottery models of offerings arc found in the ashes, and these were probably the substitutes for sacrifices decreed by Cheops (Khufu) in his temple reforms. A great clearance of temple offerings was made now, or earlier, and a chamber full of them has yielded the fine ivory carvings and the glazed figures and tiles which show the splendid work of the 1st dynasty. A vase of Menes with purple inlaid hiero- glyphs in green glaze and the tiles with relief figures are the most important pieces. The noble statuette of Cheops in ivory, found in the stone chamber of the temple, gives the only portrait of this

greatest ruler. The temple was rebuilt entirely on a larger scale by Pepi I. in the Vlth dynasty. He placed a great stone gateway to the temenos, an outer temenos wall and gateway, with a colonnade between the gates. His temple was about 40X50 ft. inside, with stone gateways front and back, showing that it was of the processional type. In the Xlth dynasty Menthotp (Mentuhotep) III. added a colonnade and altars. Soon after, Sankhkere entirely rebuilt the temple, laying a stone pavement over the area, about 45 ft. square, besides subsidiary chambers. Soon after Senwosri (Senusert) I. in the Xllth dynasty laid massive foundations of stone over the pavement of his predecessor. A great temenos was laid out enclosing a much larger area, and the temple itself was about three times the earlier size.

The XVTIIth dynasty began with a large chapel of Amasis (Ahniosi, Aahmes) I., and then Tethmosis (Thothmes, Tahutmes) III. built'a far larger temple, about 130X200 ft. He made also a processional way past the side of the temple to the cemetery beyond, with a great gateway of granite. Rameses III. added a large building; and Amasis II. in the XXVIth dynasty rebuilt the temple again, and placed in it a large monolith shrine of red granite, finely wrought. The foundations of the successive temples were comprised within about 18 ft. depth of ruins; these needed the closest examination to discriminate the various buildings, and were recorded by over 4000 measurements and 1000 levellings (Petrie, Abydos, ii.).

The temple of Seti I. was built on entirely new ground half a mile to the south of the long series of temples just described. This is the building best known as the Great Temple of Abydos, being nearly complete and an impressive sight. A principal object of it was the adoration of the early kings, whose cemetery, to which it forms a great funerary chapel, lies behind it. The long list of the kings of the principal dynasties carved on a wall is known as the " Table of Abydos." There were also seven chapels for the worship of the king and principal gods. At the back were large chambers connected with the Osiris worship (Caulfield, Temple of the Kings); and probably from these led out the great Hypogeum for the celebration of the Osiris mys- teries, built by Mineptah (Murray, Osireion). The temple was originally 550 ft. long, but the forecourts are scarcely recognizable, and the part in good state is about 250 ft. long and 350 ft. wide, including the wing at the side. Excepting the list of kings and a panegyric on Rameses II., the subjects are not historical but mythological. The work is. celebrated for its delicacy and re- finement, but lacks the life and character of that in earlier ages. The sculptures have been mostly published in hand copy, not facsimile, by Mariette in his Abydos, i. The adjacent temple of Rameses II. was

much smaller and simpler in plan; but it had a fine historical series of scenes around the outside, of which the lower parts remain. A list of kings, similar to that of Seti, formerly stood here; but the fragments were removed by the French consul and sold to the British Museum.

The Royal Tombs of the earliest dynasties were placed about a mile back on the great desert plain. The earliest is about 10X20 ft. inside, a pit lined with brick walls, and originally roofed with timber and matting. Others also before Menes are 15X25 ft. The tomb probably of Menes is of the latter size. After this the tombs increase in size and complexity. The tomb-pit is surrounded by chambers to hold the offerings, the actual sepulchre being a great wooden chamber in the midst of the

brick-lined pit. Rows of small tomb-pits for the servants of the king surround the royal chamber, many dozens of such burials being usual. By the end of the Ilnd dynasty the type changed to a long passage bordered with chambers on either hand, the royal burial being in the middle of the length. The greatest of these tombs with its dependencies covered a space of over 3000 square yards. The contents of the tombs have been nearly destroyed by successive plunderers; enough re- mained to show that rich jewellery was placed on the mummies, a profusion of vases of hard and valuable stones from the royal table service stood about the body, the store-rooms were filled with great jars of wine, perfumed ointment and other supplies, and tablets of ivory and of ebony were engraved with a record of the yearly annals of the reigns. The sealings of the various officials, of which over 200 varieties have been found, give an insight into the public arrangements (Petrie, Royal Tombs, i. and ii.).

The cemetery of private persons begins in the 1st dynasty with some pit tombs in the town. It was extensive in the Xllth and XIHth dynasties and contained many rich tombs. In the XVIIIth-XXth dynasties a large number of fine tombs were made, and later ages continued to bury here till Roman times. Many hundred funeral steles were removed by Mariette's work- men, without any record of the burials (Mariette, Abydos, ii. and iii.). Later excavations have been recorded by Ayrton, Abydos, iii.; Maclver, El Amrah and Abydos; and Garstang, El Arabah.

The forts lay behind the town. That known as Shunet oz Zebib is about 450X250 ft. over all, and still stands 30 ft. high. It was built by Khasekhemui, the last king of the Ilnd dynasty. Another fort nearly as large adjoined it, and is probably rather older. A third fort of a squarer form is now occupied by the Coptic convent; its age cannot be

ascertained (Ayrton, Abydos, iii.). (W. M.F. P.)

ABYSS (Gr. d-, privative, /Sucrcroj, bottom), a bottomless depth ; hence any deep place. From the late popular abyssimus (superlative of Low Latin abyssus) through the French abisme (i.e. abtme) is derived the poetic form abysm, pronounced as late as 1616 to rhyme with time. The adjective ” abyssal ” or ” abysmal ” has been used by zoologists to describe deep regions of the sea; hence abysmal zone, abysmal flora and fauna, abys- mal accumulations, the deposit on the abysmal bed of the ocean. In heraldry, the abyss is the middle of an escutcheon. In the Greek version of the Old Testament the word represents (1) the original chaos (Gen. i. 2), (2) the Hebrew tekom (” a surging water-deep “), which is used also in apocalyptic and kabba- listic literature and in the New Testament for hell, the place of punishment (cf. Eurip. Phoen. for the ” yawning chasm ‘ of Tartarus “) ; in the Revised (not the Authorized) version abyss is generally used for this idea. Primarily in the Septuagint cosmography the word is applied (a) to the Waters under the earth which originally covered it, and from which the springs and rivers are supplied, (b) to the waters of the firmament which were regarded as closely connected with those below. Deriva- tively, from the general idea of depth, it acquired the meaning of the place of the dead, though apparently never quite the same as Sheol. In Revelation it is the prison of evil spirits whence” they may occasionally be let loose, and where’ Satan is doomed to spend idoo years. Beneath the altar in the temple of Jeru- salem there was believed to be a passage which led down to the abyss of the world, where the foundation-stone of the earth was laid. In rabbinical cosmography the abyss is a region of Gehenna situated below the ocean bed and divided into three or seven parts imposed one above the other. In the Kabbalah the abyss as the opening into the lower world is the abode of evil spirits, and corresponds to the opening of the abyss to the world above. In general the abyss is regarded vaguely as a place’ of indefinite extent, the abode of mystery and sorrow.

See G. Schiaparelli, Astronomy in the Old Testament (Eng. trans., Oxford, 1905).

ABYSSINIA (officially Ethiopia), an inland country and empire of N.E. Africa lying, chiefly, between 5 and 15 N. arid 35 and 42 E. It is bounded N. by Eritrea (Italian). W.

English Miles

50 100 150 200 250

If J <«! PROTECTORATE mm u dol?

Emery Walker sc.

by the Anglo-Egyptian Sudan, S. by British East Africa, S.E. and E. by the British, Italian and French possessions in Somali- land and on the Red Sea. The coast lands held by European powers, which cut off Abyssinia from access to the sea, vary in width from 40 to 250 miles. The country approaches nearest to the ocean on its N.E. border, where the frontier is drawn about 40 m. from the coast of the Red Sea. Abyssinia is narrowest in the north, being here 230 m. across from east to west. It broadens out southward to a width of 900 m. along the line of 9 N., and resembles in shape a triangle with its apex to the north. It is divided into Abyssinia proper (i.e. Tigre, Amhara, Gojam, &c), Shoa, Kaffa and Galla land — all these form a geographical unit— and central Somaliland with Harrar. To the S.W. Abys- sinia also includes part of the low country of the Sobat tributary of the Nile. The area of the whole state is about 350,000 sq. m., of which Abyssinian Somaliland covers fully a third.

(1) Physical Features.—. Between the valley of the. Upper Nile and the low lands which skirt the south-western shores of the Red Sea and the Gulf of Aden is a region of elevated plateaus from which rise various mountain ranges. These tablelands and mountains constitute Abyssinia, Shoa, Kaffa and Galla land. On nearly every side the walls of the plateaus rise with considerable abruptness from the plains, constituting outer mountain chains. The Abyssinian highlands are thus a clearly marked orographic division. From Ras Kasar. (18°. N.), to Annesley Bay (15 N.) the eastern wall of the plateau runs parallel to the Red Sea. It then turns due S. and follows closely the line of 40° E. for some 400 m. About 9° N. there is a break in the wall) through which the river Hawash flows eastward. The main range at this point trends S.W,-, while south of the Hawash valley, which is some 3000 ft. below the level of the mountains, another massif rises in a direct line ; . south. This

second range sends a chain (the Harrar hills) eastward to the Gulf of Aden. The two chief eastern ranges maintain a parallel course S. by W., with a broad upland valley between — in which valley are a series of lakes — to about 3° N., the outer (eastern) spurs of the plateau still keeping along the line of 40° E. The southern escarpment of the plateau is highly irregular, but has a general direction N.W. and S.E. from 6° N. to 3° N. It overlooks the depression in which is Lake Rudolf and — east of that lake — southern Somaliland. The western wall of the plateau from 6° N. to n° N. is well marked and precipitous. North of n° N. the hills turn more to the east and fall more gradually to the plains at their base. On its northern face also the plateau falls in terraces to the level of the eastern Sudan*. The eastern escarp- ment is the best defined of these outer ranges. It has a mean height of from 7000 to 8000 ft., and in many places rises almost perpendicularly from the plain. Narrow and deep clefts, through which descend mountain torrents to lose themselves in the sandy soil of the coast land, afford means of reaching the plateau, or the easier route through the Hawash valley may be chosen. On surmounting this rocky barrier the traveller finds that the encircling rampart rises little above the normal level of the plateau.

(2) The aspect of the highlands is most impressive. The northern portion, lying mainly between io° and 15° N., consists of a huge mass of Archaean rocks with a mean height of from 7000 to 7 500 ft. above the sea, and is flooded in a deep central depression by the waters of Lake Tsana. Above the plateau rise several irregular and generally ill-defined mountain ranges which attain altitudes of from 12,000 to over 15,000 ft. Many of the mountains are of weird and fantastic shape. Character- istic of the country are the enormous fissures which divide it, formed in the course of ages by the erosive action of water. They are in fact the valleys of the rivers which, rising on the uplands or mountain sides, have cut their way to the surrounding low- lands. Some of the valleys are of considerable width; in other cases the opposite walls of the gorges are but two or three hundred yards apart, and fall almost vertically thousands of feet, representing an erosion of hard rock of many millions of cubic feet. One result of the action of the water has been the formation of numerous isolated flat-topped hills or small plateaus, known as ambas, with nearly perpendicular sides. The highest peaks are found in the Simen (or Semien) and Gojam ranges. The Simen Mountains lie N.E. of Lake Tsana and cul- minate in the snow-covered peak of Daschan (Dajan), which has an altitude of 15, 160 ft. A few miles east and north re- spectively of Dajan are Mounts Biuat and Abba Jared, whose summits are a few feet only below that of Dajan. In the Chok Mountains in Gojam Agsias

Fatra attains a height of 13,600 ft.

Parallel with the eastern escarpment are the heights of Baila (12,500 ft.), Abuna Josef (13,780 ft.), and Kollo (14,100 ft.), the last-named being S.VV. of Magdala. The valley between these hills and the eastern escarpment is one of the longest and most profound chasms in Abyssinia. Between Lake Tsana and the eastern hills are Mounts Guna (13,800 ft.) and Uara Sahia (13,000 ft.). The figures given are, however, approximate only. The southern portion of the highlands — the 10° N. roughly marks the division between north and south — has more open tableland than the northern portion and fewer lofty peaks. Though there are a few heights between 10,000 and 12,000 ft., the majority do not exceed 8000 ft. But the general character of the southern regions is the same as in the north — a much-broken hilly plateau.

Most of the Abyssinian uplands have a decided slope to the north-west, so that nearly all the large rivers find their way in that direction to the Nile. Such are the Takazze in the north, the Abai in the centre, and the Sobat in the south, and through these three arteries is discharged about four-fifths of the entire drainage. The rest is carried off, almost due north by the Khor Baraka, which occasionally reaches the Red Sea south of Suakin; by the Hawash, which runs out in the saline lacustrine district near the head of Tajura Bay; by the Webi Shebeli (Wabi- Shebeyli) and Juba, which flow S.E. through Somaliland, though

the Shebeli fails to reach the Indian Ocean; and by the Omo, the main feeder of the closed basin of Lake Rudolf.

The Takazze, which is the true upper course of the Atbara, has its head-waters in the central tableland; and falls from about 7000 to 2500 ft. in the tremendous crevasse through which it sweeps round west, north and west again down to the western terraces, where it passes from Abyssinian to Sudan territory. During the rains the Takazze (i.e. the ” Terrible “) rises some 18 ft. above its normal level, and at this time forms an impassable barrier between the northern and central provinces. In its lower course the river is known by the Arab name Setit. The Setit is joined (14° 10′ N, 36 E.) by the Atbara, a river formed by several streams which rise in the mountains W. and N.W. of Lake Tsana. The Gash or Mareb is the most northerly of the Abyssinian rivers which flow towards the Nile valley. Its head-waters rise on the landward side of the eastern escarp- ment within 50 miles of Annesley Bay on the Red Sea. It reaches the Sudan plains near Kassala, beyond which place its waters are dissipated in the sandy

soil. The Mareb is dry for a great part of the year, but like the Takazze is subject to sudden freshets during the rains. Only the left bank of the upper course of the river is in Abyssinian territory, the Mareb here forming the boundary between Eritrea and Abyssinia.

(3) The Abai — that is, the upper course of the Blue Nile — has its source near Mount Denguiza in the Gojam highlands (about n° N. and 37 E.), and first flows for 70 m. nearly due north to the south side of Lake Tsana. Tsana (q.v.), which stands from 2500 to 3000 ft. below the normal level of the plateau, has somewhat the aspect of a flooded crater. It has an area of about 1 100 sq. m., and a depth in some parts of 250 ft. At the south-east corner the rim of the crater is, as it were, breached by a deep crevasse through which the Abai escapes, and here develops a great semicircular bend like that of the Takazze, but in the reverse direction — east, south and north-west — down to the plains of Sennar, where it takes the name of Bahr-el-Azrak or Blue Nile. The Abai has many tributaries. Of these the Bashilo rises near Magdala and drains eastern Amhara; the Jamma rises near Ankober and drains northern Shoa ; the Muger rises near Adis Ababa and drains south-western Shoa; the Didessa, the largest of the Abai's affluents, rises in the Kaffa hills and has a generally S. to N. course; the Yabus runs near the western edge of the plateau escarpment. All these are perennial rivers. The right-hand tributaries, rising mostly on the western sides of the plateau, have steep slopes and are generally torrential in character. The Bolassa, however, is perennial, and the Rahad and Dinder are important rivers in flood-time.

In the mountains and plateaus of Kaffa and Galla in the south-west of Abyssinia rise the Baro, Gelo, Akobo and other of the chief affluents of the Sobat tributary of the Nile. The Akobo, in about 7 50′ N. and 33° E., joins the Pibor, which in about 85° N. and 33 20′ E. unites with the Baro, the river below the confluence taking the name of Sobat. These rivers descend from the mountains in great falls, and like the other Abyssinian streams are unnavigable in their upper courses. The Baro on reaching the plain becomes, however, a navigable stream affording an open waterway to the Nile. The Baro, Pibor and Akobo form for 250 m. the W. and S.W. frontiers of Abyssinia (see Nile, Sobat and Sudan).

The chief river of Abyssinia flowing east is the Hawash (Awash, Awasi), which rises in the Shoan uplands and makes a semicircular bend first S.E. and then N.E. It reaches the Afar (Danakil) lowlands through a broad breach in the eastern escarpment of the plateau, beyond which it is joined on its left bank by its chief affluent, the Germama (Kasam), and then trends round in the direction of Tajura

Bay. Here the Hawash is a copious stream nearly 200 ft. wide and 4 ft. deep, even in the dry season, and during the floods rising 50 or 60 ft. above low-water mark, thus inundating the plains for many miles along both its banks. Yet it fail's to reach the coast, and after a winding course of about 500 m. passes (in its lower reaches) through a series of badds (lagoons) to Lake Aussa, some 60 or 70 m. from the head of Tajura Bay. In this lake the river is

lost. This remarkable phenomenon is explained by the position of Aussa in the centre of a saline lacustrine depression several hundred feet below sea-level. While most of the other lagoons are highly saline, with thick incrustations of salt round their margins, Aussa remains fresh throughout the year, owing to the great body of water discharged into it by the Hawash.

Another lacustrine region extends from the Shoa heights south-west to the Samburu (Lake Rudolf) depression. In this chain of lovely upland lakes, some fresh, some brackish, some completely closed, others connected by short channels, the chief links in their order from north to south are:— Zwai, com- municating southwards with Hara and Lamina, all in the Arusi Galla territory; then Abai with an outlet to a smaller tarn in the romantic Baroda and Gamo districts, skirted on the west sides by grassy slopes and wooded ranges from 6000 to nearly 9000 ft. high; lastly, in the Asille country, Lake Stefanie, the Chuwaha of the natives, completely closed and falling to a level of about 1800 ft. above the sea. To the same system obviously belongs the neighbouring Lake Rudolf (q.v.), which is larger than all the rest put together. This lake receives at its northern end the waters of the Omo, which rises in the Shoa highlands and is a perennial river with many affluents. In its course of some 370 m. it has a total fall of about 6000 ft. (from 7600 at its source to 1600 at lake-level), and is consequently a very rapid stream, being broken by the Kokobi and other falls, and navi- gable only for a short distance above its mouth. The chief rivers of Somaliland (q.v.), the Webi Shebeli and the Juba (q.v.), have their rise on the south-eastern slopes of the Abyssinian escarp- ment, and the greater part of their course is through territory belonging to Abyssinia. There are numerous hot springs in Abyssinia, and earthquakes, though of no great severity, are not uncommon.

(4) Geology. — The East African tableland is continued into Abyssinia. Since the visit of W. T. Blanford in 1870 the geology has received little

attention from travellers. The following formations are represented: —

Sedimentary and Metamorphic. Recent. Coral, alluvium, sand.

Tertiary. (?) Limestones of Harrar.

Jurassic. Antalo Limestones.

Triassic (?). Adigrat Sandstones.

Archaean. Gneisses, schists, slaty rocks.

Igneous. Recent. Aden Volcanic Series.

Tertiary, Cretaceous (?). Magdala group. Jurassic. Ashangi group.

Archaean. — The metamorphic rocks compose the main mass of the tableland, and are exposed in every deep valley in Tigre and along the valley of the Blue Nile. Mica schists form the prevalent rocks. Hornblende schists also occur and a compact felspathic rock in the Suris defile. The foliae of the schists strike north and south.

Triassic (?). — In the region of Adigrat the metamorphic rocks are invariably overlain by white and brown sandstones, un- fossiliferous, and attaining a maximum thickness of 1000 feet. They are overlain by the fossiliferous limestones of the Antalo group. Around Chelga and Adigrat coal-bearing beds occur, which Blanford suggests may be of the same age as the coal- bearing strata of India. The Adigrat Sandstone possibly represents some portion of the Karroo formation of South Africa.

Jurassic. — The fossiliferous limestones of Antalo are generally horizontal, but are in places much disturbed when interstratified with trap rocks. The fossils are all characteristic Oolite forms and include species of Hemicidaris, Pholadomya, Ceromya, Trigonia and Alaria.

Igneous Rocks.— Above a height of 8000 ft. the country con sists of bedded traps belonging to two distinct and unconform- able groups. The lower (Ashangi group) consists of basalts and dolerites often amygdaloidal. Their relation to the Antalo

limestones is uncertain, but Blanford considers them to be not later in age than the Oolite. The upper (Magdala group) con- tains much trachytic rock of considerable thickness, lying perfectly horizontally, and giving rise to a series of terraced ridges characteristic of central Abyssinia. They are inter- bedded with unfossiliferous sandstones and

shales. Of more recent date (probably Tertiary) are some igneous rocks, rich in alkalis, occurring in certain localities in southern Abyssinia. Of still more recent date are the basalts and ashes west of Massawa and around Annesley Bay and known as the Aden Volcanic Series. With regard to the older igneous rocks, the enormous amount they have suffered from denudation is a prominent feature. They have been worn into deep and narrow ravines, sometimes to a depth of 3000 to 4000 ft.

(5) Climate. — The climate of Abyssinia and its dependent territories varies greatly. Somaliland and the Danakil lowlands have a hot, dry climate producing semi-desert conditions; the country in the lower basin of the Sobat is hot, swampy and malarious. But over the greater part of Abyssinia as well as the Galla highlands the climate is very healthy and temperate. The country lies wholly within the tropics, but its nearness to the equator is counterbalanced by the elevation of the land. In the deep valleys of the Takazze and Abai, and generally in places below 4000 ft., the conditions are tropical and fevers are prevalent. On the uplands, however, the air is cool and bracing in summer, and in winter very bleak. The mean range of temperature is between 6o° and 80° F. On the higher moun- tains the climate is Alpine in character. The atmosphere on the plateaus is exceedingly clear, so that objects are easily recognizable at great distances. In addition to the variation in climate dependent on elevation, the year may be divided into three seasons. Winter, or the cold season, lasts from October to February, and is followed by a dry hot period, which about the middle of June gives place to the rainy season. The rain is heaviest in the Takazze basin in July and August. In the more southern districts of Gojam and Wallega heavy rains continue till the middle of September, and occasionally October is a wet month. There are also Spring and winter rains; indeed rain often falls in every month of the year. But the rainy season proper, caused by the south-west monsoon, lasts from June to mid-September, and commencing in the north moves southward. In the region of the Sobat sources the rains begin earlier and last longer. The rainfall varies from about 30 in. a year in Tigre and Amhara to over 40 in. in parts of Galla land. The rainy season is of great importance not only to Abyssinia but to the countries of the Nile valley, as the prosperity of the eastern Sudan and Egypt is largely dependent upon the rain- fall. A season of light rain may be sufficient for the needs of Abyssinia, but there is little surplus water to find its way to the Nile; and a shortness of rain means a low Nile, as practically all the flood water of that river is derived from the Abyssinian tributaries (see Nile).

(6) Flora and Fauna. — As in a day's journey the traveller may pass

from tropical to almost Alpine conditions of climate, so great also is the range of the flora and fauna. In the valleys and lowlands the vegetation is dense, but the general appearance of the plateaus is of a comparatively bare country with trees and bushes thinly scattered over it. The glens and ravines on the hillside are often thickly wooded, and offer a delightful contrast to the open downs. These conditions are particularly characteristic of the northern regions; in the south the vegeta- tion on the uplands is more luxuriant. Among the many varie- ties of trees and plants found are the date palm, mimosa, wild olive, giant sycamores, junipers and laurels, the myrrh and other gum trees (gnarled and stunted, these flourish most on the eastern foothills), a magnificent pine (the Natal yellow pine, which resists the attacks of the white ant), the fig, orange, lime, pomegranate, peach, apricot, banana and other fruit trees; the grape vine (rare), blackberry and raspberry; the cotton and indigo plants, and occasionally the sugar cane. There are in the south large forests of valuable timber trees; and the coffee plant is indigenous in the Kaffa country, whence it takes

its name. Many kinds of grasses and flowers abound- Large areas are covered by the kussa, a hardy member of the rose family, which grows from 8 to 10 ft. high and has abundant pendent red blossoms. The flowers and the leaves of this plant are highly prized for medicinal purposes. The fruit of the kurarina, a tree found almost exclusively in Shoa, yields a black grain highly esteemed as a spice. On the tableland a great variety of grains and vegetables are cultivated. A fibrous plant, known as the sanseviera, grows in a wild state in the semi-desert regions of the north and south-east.

In addition to the domestic animals enumerated below (§ 8) the fauna is very varied. Elephant and rhinoceros are numerous in certain low-lying districts, especially in the Sobat valley. The Abyssinian rhinoceros has two horns and its skin has no folds. The hippopotamus and crocodile inhabit the larger rivers flowing west, but are not found in the Hawash, in which, however, otters of large size are plentiful. Lions abound in the low countries and in Somaliland. In central Abyssinia the lion is no longer found except occasionally in the river valleys. Leopards, both spotted and black, are numerous and often of great size; hyaenas are found everywhere and are hardy and fierce; the lynx, wolf, wild dog and jackal are also common. Boars and badgers are more rarely seen. The giraffe is found in the western districts, the zebra and wild ass frequent the lower plateaus and the

rocky hills of the north. There are large herds of buffalo and antelope, and gazelles of many varieties and in great numbers are met with in most parts of the country. Among the varieties are the greater and lesser kudu (both rather rare); the duiker, gemsbuck, hartebeest, gerenuk (the most common — it has long thin legs and a camel-like neck); klip- springer, found on the high plateaus as well as in the lower dis- tricts; and the dik-dik, the smallest of the antelopes, its weight rarely exceeding io lb, common in the low countries and the foothills. The civet is found in many parts of Abyssinia, but chiefly in the Galla regions. Squirrels and hares are numerous, as are several kinds of monkeys, notably the guereza, gelada, guenon and dog-faced baboon. They range from the tropical lowlands to heights of 10,000 ft.

Birds are very numerous, and many of them remarkable for the beauty of their plumage. Great numbers of eagles, vultures, hawks, bustards and other birds of prey are met with; and partridges, duck, teal, guinea-fowl, sand-grouse, curlews, wood- cock, snipe, pigeons, thrushes and swallows are very plentiful. A fine variety of ostrich is commonly found. Among the birds prized for their plumage are the marabout, crane, heron, black- bird, parrot, jay and humming-birds of extraordinary brilliance. Among insects the most numerous and useful is the bee, honey everywhere constituting an important part of the food of the inhabitants. Of an opposite class is the locust. Serpents are not numerous, but several species are poisonous. There are thousands of varieties of butterflies and other insects.

(7) Provinces and Towns. — Politically, Abyssinia is divided into provinces or kingdoms and dependent territories. The chief provinces are Tigre, which occupies the N.E. of the country; Amhara or Gondar, in the centre; Gojam, the district enclosed by the great semicircular sweep of the Abai; and Shoa (q.v.), which lies east of the Abai and south of Amhara. Besides these ancient provinces and several others of smaller size, the empire includes the Wallega region, lying S.W. of Gojam; the Harrar province in the east; Kaffa (q.v.) and Galla land, S.W. and S. of Shoa; and the central part of Somaliland.

With the exception of Harrar (q.v.), a city of Arab foundation, there are no large towns in Abyssinia. Harrar is some 30 m. S.E. of Dire Dawa, whence there is a railway (188 m. long) to Jibuti on the Gulf of Aden. The absence of large towns in Abyssinia proper is due to the provinces into which the country is divided having been for centuries in a state of almost continual warfare, and to the frequent change of the royal residences on the exhaustion of fuel supplies. The earliest capital appears to have been Axum (q.v.) in Tigre, where there are extensive ruins. In the middle ages Gondar in Amhara became the

capital of the country and was so regarded up to the middle of the 19th

century. Since 1892 the capital has been Adis Ababa in the kingdom of Shoa.

The other towns of Abyssinia worthy of mention may be grouped according to their geographical position. None of them has a permanent population exceeding 6000, but at several large markets are held periodically. In Tigre there are Adowa or Adua (17 m. E. by N. of Axum), Adigrat, Macalleand Antalo. The three last-named places are on the high plateau near its eastern escarpment and on the direct road south from Massawa to Shoa. West of Adigrat is the monastery of Debra-Domo, one of the most celebrated sanctuaries in Abyssinia.

In Amhara there are: — Magdala (q.v.), formerly the residence of King Theodore, and the place of imprisonment of the British captives in 1866. Debra-Tabor ("Mount Tabor"), the chief royal residence during the reign of King John, occupies a strong strategic position overlooking the fertile plains east of Lake Tsana, at a height of about 8,620 ft. above the sea ; it has a population of 3000, including the neighbouring station of Samara, headquarters of the Protestant missionaries in the time of King Theodore. Ambra-Mariam, a fortified station midway between Gondar and Debra-Tabor near the north-east side of Lake Tsana, with a population of 3000; here is the famous shrine and church dedicated to St Mary, whence the name of the place, " Fort St Mary." Mahdera-Mariam (" Mary's Rest "), for some time a royal residence, and an important market and great place of pilgrimage, a few miles south-west of Debra- Tabor; its two churches of the " Mother " and the " Son " are held in great veneration by all Abyssinians; it has a permanent population estimated at over 4000, Gallas and Amharas, the former mostly Mahommedan. Sokota, one of the great central markets, and capital of the province of Waag in Am'hara, at the converging point of several main trade routes;" the market is numerously atterfded, especially by dealers in the salt blocks which come from Lake Alalbed. The following towns are in Shoa: — Ankober, formerly the capital of the kingdom; Aliu- Amba, east of Ankober on the trade route to the Gulf of Aden; Debra-Berhan (Debra-Bernam) (" Mountain of Light "), once a royal residence; Liche (Litche), one of the largest market towns in southern Abyssinia. Lieka, the largest market in Galla land, has direct communications with Gojam, Shoa and other parts of the empire. Bonga, the commercial centre of Kaffa, and Jiren, capital of the neighbouring province of Jimma, are frequented by traders from all the surrounding provinces, and also by foreign merchants from the seaports on the Gulf of Aden.

Apart from these market-places there are no settle- ments of any size in southern Abyssinia.

Communications. — The Jibuti-Dire Dawa railway has been mentioned above. The continuation of this railway to the capital was begun in 1006 from the Adis Ababa end. There are\ few roads in Abyssinia suitable for wheeled traffic. Transport is usually carried on by mules, donkeys, pack-horses and (in the. lower regions) camels- From Dire Dawa to Harrar there is a well-made carriage road, and from, Harrar to Adis Ababa the caravan track is kept in good order, the river Hawash being spanned by an iron bridge. There is also a direct trade route from Dire Dawa to the capital. Telegraph lines connect Adis Ababa and several important towns in northern Abyssinia with Massawa, Harrar and Jibuti. There is also a telephonic service, the longest line being from Harrar to the capital.

(8) Agriculture. — The soil is exceedingly fertile, as is evident from the fact that Egypt owes practically all its fertility to the sediment carried into the Nile by its Abyssinian tributaries. Agriculture is extensively followed, chiefly by the Gallas, the indolence of the Abyssinians preventing them from being good farmers. In the lower regions a wide variety of crops are grown — among them maize, durra, wheat, barley, rye, teff, pease, cotton and sugar-cane — and many kinds of fruit trees are culti- vated. Teff is a kind of millet with grains about the size of an ordinary pin-head, of which is made the bread commonly eaten. The low grounds also produce a grain, tocussa, from which black bread is made. Besides these, certain oleaginous plants, the suf, nuc and selite (there are no European equivalents for the

native names), and the ground-nut are largely grown. The castor bean grows wild, the green castor in the low, damp regions, the red castor at medium altitudes. The kat plant, a medicinal herb which has a tonic quality, is largely grown in the Harrar province. On the higher plateaus the hardier cereals only are cultivated. Here the chief crops are wheat, barley, teff, peppers, vegetables of all kinds and coffee. Above 10,000 ft. the crops are confined practically to barley, oats, beans and occasionally wheat.

Coffee is one of the most important products of the country, and its original home is believed to be the Kaffa highlands. It is cultivated in

the S., S.E. and S.W. provinces, and to a less extent in the central districts. Two qualities of coffee are cultivated, one known as Abyssinian, the other as Harrar- Mocha. The ” Abyssinian ” coffee is grown very extensively throughout the southern highlands. Little attention is paid to the crop, the berries being frequently gathered from the ground, and consequently the coffee is of comparatively low grade. ” Harrar-Mocha ” is of first-class quality. It is grown in the highlands of Harrar, and cultivated with extreme care. The raising of cotton received a considerable impetus in the early years of the 20th century. The soil of the Ha wash valley proved particularly suitable for raising this crop. In the high plateaus the planting of seeds begins in May, in the lower pla- teaus and the plains in June, but in certain parts where the summer is long alid rain abundant sowing and reaping are going on at the same time. Most regions yield two, many three crops a year. The methods of culture are primitive, the plough commonly used being a long pole with two vertical iron teeth and a smaller pole at right angles to which oxen are attached. This implement costs about four shillings. The ploughing is done by the men, but women and girls do the reaping. The grain is usually trodden out by cattle and is often stored in clay- lined pits. Land comparatively poor yields crops eight to ten- fold the quantity sown; the major part of the land, yields twenty to thirtyfold. In the northern parts of the empire very little land is left uncultivated. The hillsides are laid out in terraces and carefully irrigated in the dry season, the channels being often two miles or more long. Of all the cereals barley is the most widely grown. The average rate of pay to an agri- cultural labourer is about threepence a day in addition to food, which may cost another penny a day.

The Abyssinians keep a large number of domestic animals. Among cattle the Sanga or Galla ox is the most common. The bulls are usually kept for ploughing, the cow being preferred for meat. Most of the cattle are of the zebu or hump-backed variety, but there are also two breeds — one large, the other resembling the Jersey cattle — which are straight-backed. The horns of the zebu variety are sometimes four feet long. Sheep, of which there are very large flocks, belong to the short and fat-tailed variety. The majority are not wool-bearing, but in one district a very small black sheep is raised for wool. The small mountain breed of sheep weigh no more than 20 to 30 lb apiece. Goats -are of both the long and short-haired varieties. The horns of the large goats are often thirty inches in length and stand up straight from the head. The goats from the Arusi Galla country have fine silky hair which is sometimes sixteen inches long. The meat of both sheep and goats is excellent; that of the latter is pre- ferred by the natives. In

1904 the estimated number of sheep and goats in the country was 20,000,000. Large quantities of butter, generally rancid, are made from the milk of cows, goats and sheep. In the Leka province small black pigs are bred in considerable numbers. The horses (very numerous) are small but strong; they are generally about 14 hands in height. The best breeds come from the Shoa uplands. The ass is also small and strong; and the mule, bred in large numbers, is of excellent quality, and both as a transport animal and as a mount is preferred to the horse. The mule thrives in every condition of climate, is fever-proof, travels over the most difficult mountain passes with absolute security, and can carry with ease a load of 200 lb. The average height of a mule is 12ˆ hands. The country is admirably adapted for stock-raising.

(9) Minerals. — In the south and south-west provinces placer gold mines by the banks of watercourses are. worked by Gallas as an industry subsidiary to tending their flocks and fields.' In the Wallega district are veins of gold-bearing quartz, mined to a certain extent. There are also gold mines in southern Shoa. The annual output of gold is worth not less than £500,000. Only a small proportion is exported. Besides gold, silver, iron, coal and other minerals are found. Rock-salt is obtained from the province of Tigr6.

Trade and Currency. — Abyssinia being without seaports, the external trade is through Massawa (Italian) in the north, Jibuti (French), Zaila and Berbera (British) in the south, and for all these ports Aden is a distributing centre. For Tigre and Amhara products Massawa is the best port, for the rest of the empire, Jibuti. For southern Abyssinia, Kaffa and Galla lands, Harrar is the great entrepot, goods being forwarded thence to Jibuti and the other Somaliland ports. There is also a con- siderable trade with the Anglo-Egyptian Sudan through the frontier towns of Rosaires and Gallabat. At the French and British ports there is freedom of trade, but on goods for Abys- sinia entering Massawa a discriminating tax is levied if they are not imported from Italy.

The chief articles of export are coffee, skins, ivory, civet, ostrich feathers, gum, pepper, kat plant (used by Moslems for its stimulating properties), gold (in small quantities) and live stock. The trade in skins is mainly with the Uaited States through Aden; America also takes a large propoition of the coffee exported. For live stock there is a good trade with Madagascar. The chief imports are cotton goods, the yearly value of this trade being fully £250,000; the sheetings are largely American; the. remainder English and Indian. No other article of import approaches cotton in importance, but a conˆ siderable trade

is done in arms and ammunition, rice, sugar, flour and other foods, and a still larger trade in candles and matches (from Sweden), oil, carpets (oriental and European), hats and umbrellas. Commerce long remained in a backward condition; but under the Emperor Menelek II. efforts were made to develop the resources of the country, and in 1905 the total volume of trade exceeded £1,000,000.

Until the end of the 19th century the usual currency was the Maria Theresa dollar, bars of rock-salt and cartridges. In 1894 a new coinage was introduced, with the Menelek dollar or talari, worth about two shillings, as the standard. This new coinage gradually superseded the older currency. In 1905 the Bank of Abyssinia, the first banking house in the country, was founded, with its headquarters at Adis Ababa. The bank, which was granted a monopoly of banking business in the empire for fifty years, has a capital of £500,000, has the power to issue notes, to mint the Abyssinian coinage, and to engage in commercial operations. It was founded under Egyptian law by the National Bank of Egypt, which insti- tution had previously obtained a concession from the emperor Menelek.

(10) Government. — The political institutions are of a feudal character. Within their provinces the rases (princes) exercise large powers. The emperor, styled negus negusti (king of kings), is occasionally assisted by a council of rases. In October 1907 an imperial decree announced the constitution of a cabinet on European lines, ministers being appointed to the portfolios of foreign affairs, war, commerce, justice and finance. The legal system is said to be based on the Justinian code. From the decisions of the judges there is a right of appeal to the emperor. The chief judicial official is known as the affa-negus (breath of the king). The Abyssinian church (q.v.) is presided over by an abuna, or archbishop. The land is not held in fee simple, but is subject to the control of the emperor or the church. Revenue is derived from an ad valorem tax on all imports; the purchase and sale of animals; from royalties on trading concessions, and in other ways, including fees for the administration of justice. Education, of a rudimentary character, is given by the clergy. In 1907 a system of compulsory education ” of all male children over the age of 12 ” was decreed. The education was to be state

provided, Coptic teachers were brought from Egypt and school buildings were erected.

The Abyssinian calendar is as follows: — The Abyssinian year of 365 days (366 in leap-year) begins on the 1st of Maskarram, which corresponds to about the 10th of September. The months have thirty days each, and are thus named: Maskarram, Tekemt, Hadar, Tahsas, Tarr, Yekatit, Magawit, Miaziah, Genbot, Sanni, Hamle, Nas'hi. The remaining five days in the year, termed Pagmen or Quaggimi (six in leap-year, the extra day being named Kadis Yohannis), are put in at the end and treated as holidays. Abyssinian reckoning is about seven years eight months behind the Gregorian. Festivals, such as Easter, fall a week later than in western Europe.

Army. — A small standing army is maintained in each province of Abyssinia proper. Every able-bodied Abyssinian is expected to join the army in case of need, and a force, well armed with modern weapons, approaching 250,000 can be placed in the field. The cavalry is chiefly composed of Galla horsemen. (F. R. C.)

Ethnology

(11) The population of the empire is estimated at from 3,500,000 to 5,000,000. The inhabitants consist mainly of the Abyssinians, the Galla and the Somali (the two last-named peoples are separately noticed). Of non- African races the most numerous are Armenians, Indians, Jews and Greeks. There is a small colony of British, French, Italians and Russians. The following remarks apply solely to Abyssinia proper and its in- habitants. It should be remembered that the term " Abys- sinian " is purely geographical, and has little or no ethnical significance; it is derived from the Arabic Habesh, "mixed," and was a derisive name applied by the Arabs to the hetero- geneous inhabitants of the Abyssinian plateau.

Abyssinia appears to have been originally peopled by the eastern branch of the Hamitic family, which has occupied this region from the remotest times, and still constitutes the great bulk of its inhabitants, though the higher classes are now strongly Semitized. The prevailing colour in the central provinces (Amhara, Gojam) is a deep brown, northwards (Tigr6, Lasta) it is a pale olive, and here even fair complexions are seen. South- wards (Shoa, Kobbo, Amuru) a decided chocolate and almost sooty black is the rule. Many of the people are distinctly negroid, with big lips, small nose, broad at the base, and frizzly or curly black hair. The negroid element in the population is due chiefly to the number of negro women who have been im- ported into the harems of the Abyssinians. The majority, however, may be described as a mixed Hamito-Semitic people, who are in general well formed and handsome, with straight and regular features, lively eyes,

hair long and straight or somewhat curled and in colour dark olive, approaching to black. The Galla, who came originally from the south, are not found in many parts of the country, but predominate in the Wollo dis- trict, between Shoa and Amhara. It is from the Galla that the Abyssinian army is largely recruited, and, indeed, there are few of the chiefs who have not an admixture of Galla blood in their veins.

As regards language, several of the indigenous groups, such as the Khamtas of Lasta, the Agau or Agaos of Agaumeder (" Agao land ") and the Falashas (q.v.), the so-called " Jews " of Abys- sinia, still speak rude dialects of the old Hamitic tongue. But the official language and that of all the upper classes is of Semitic origin, derived from the ancient Himyaritic, which is the most archaic member of the Semitic linguistic family. Geez, as it is called, was introduced with the first immigrants from Yemen, and although no longer spoken is still studied as the liturgical language of the Abyssinian Christians. Its literature consists of numerous translations of Jewish, Greek and Arabic works, besides a valuable version of the Bible. (See Ethiopia.) The best modern representative of Geez is the Tigrina of Tigr6 and Lasta, which is much purer but less cultivated than the Amharic dialect, which is used in state documents, is current in the central and southern provinces and is much affected by Hamitic ele- ments. All are written in a peculiar syllabic script which, un-

like all other Semitic forms, runs from left to right, and is derived from that of the Sabaeans and Minaeans, still extant in the very old rock-inscriptions of south Arabia.

The hybridism of the Abyssinians is reflected in their political and social institutions, and especially in their religious beliefs and practices. On a seething mass of African heathendom, already in early times affected by primitive Semitic ideas, was suddenly imposed a form of Christianity which became the state religion. While the various ethnical elements have been merged in the composite Abyssinian nation, the primitive and more ad- vanced religious ideas have nowhere been fused in a uniform Christian system. Foreigners are often surprised at the strange mixture of savagery and lofty notions in a Christian community which,. for instance, accounts accidental manslaughter as wilful murder. Recourse is still had to dreams as a means of detecting crime. A priest is summoned, and, if his prayers and curses fail, a small boy is drugged, and " whatever person he dreams of is fixed on as the criminal. ... If the boy does not dream of the person whom the priest has determined on as the criminal, he is kept under drugs until he does what is required of him " (Count Gleichen, With the Mission to Menelik, chap, xvi., 1898).

The Abyssinian character reflects the country's history. Murders and executions are frequent, yet cruelty is not a marked feature of their, character; and in war they seldom kill their prisoners. When a man is convicted of murder, he is handed over to the relatives of the deceased, who may either put him to death or accept a ransom. When the murdered person has no relatives, the priests take upon themselves the office of avengers. The natural indolence of the people has been fostered by the constant wars, which have discouraged peaceful occupations. The soldiers live by plunder, the monks by alms. The haughtiest Abyssinian is not above begging, excusing himself with the remark, " God has given us speech for the purpose of begging." The Abyssinians are vain and selfish, irritable but easily ap- peased; and are an intelligent bright people, fond of gaiety. On every festive occasion, as a saint's day, birth, marriage, &c, it is customary for a rich man to collect his friends and neigh- bours, and kill a cow and one or two sheep. The principal parts of the cow are eaten raw while yet warm and quivering, the re- mainder being cut into small pieces and cooked with the favour- ite sauce of butter and red pepper paste. The raw meat eaten in this way is considered to be very superior in taste and much more tender than when cold. The 'statement by James Bruce respecting the cutting of steaks from a live cow has frequently been called in question, but there can be no doubt that Bruce actually saw what he narrates. Mutton and goat's flesh are the meats most eaten: pork is avoided on religious grounds, and the hare is never touched, possibly, as in other countries, from superstition. Many forms of game are forbidden; for example, all water-fowl. The principal drinks are mlse, a kind of mead, and bousa, a sort of beer made from fermented cakes. The Abyssinians are heavy eaters and drinkers, and any occasion is seized as an excuse for a carouse. Old and young, of both sexes, pass days and nights in these symposia, at which special customs and rules prevail. Little bread is eaten, the Abyssinian preferring a thin cake of durra meal or teff, kneaded with water and exposed to the sun till the dough begins to rise, when it is baked. Salt is a luxury; " he eats salt " being said of a spend- thrift. Bars of rock-salt, after serving as coins, are, when broken up, used as food. There is a general looseness of morals: marriage is a very slight tie, which can be dissolved at any time by either husband or wife. Polygamy is by no means uncommon. Hence there is little family affection, and what exists is only between children of the same father and mother. Children of the same father, but of different mothers, are said to be " always enemies to each other." (Samuel Gobat's Journal of a Three Years' Residence in Abyssinia, 1834.)

The dress of the Abyssinians is much like that of the Arabs. It consists

of close-fitting drawers reaching below the knees, with a sash to hold them, and a large white robe. The Abys- sinian, however, is beginning to adopt European clothes on the I upper part of the body, and European hats are becoming common.

The Christian Abyssinians usually go barehead and barefoot, in contrast to the Mahommedans, who wear turbans and leather sandals. The women's dress is a smock with sleeves loose to the wrist, where they fit tightly. The priests wear a white jacket with loose sleeves, a head-cloth like a turban and a special type of shoe with turned-up toes and soles projecting at the heel. In the Woldeba district hermits dress in ochre-yellow cloths, while the priests of some sects wear hides dyed red. Clothes are made of cotton, though the nobles and great people wear silk robes presented by the emperor as a mark of honour. The possessor of one of these is allowed to appear in the royal presence wearing it instead of having one shoulder bared, as is the usual Abyssinian method of showing respect. A high-born man covers himself to the mouth in the presence of inferiors. The men either cut their hair short or plait it; married women plait their hair and wind round the head a black or parti-coloured silk handkerchief; girls wear their hair short. In the hot season no Abyssinian goes without a flag-shaped fan of plaited rushes. The Christian Abyssinians, men and women, wear a blue silk cord round the neck, to which is often attached a crucifix. For ornament women wear silver ankle-rings with bells, silver neck- laces and silver or gold rosettes in the ears. Silver rings on fingers and also on toes are common. The women are very fond of strong scents, which are generally oils imported from India and Ceylon. The men scarcely ever appear without a long curved knife, generally they carry shield and spear as well. Although the army has been equipped with modern rifles, the common weapon of the people is the matchlock, and slings are still in use. The original arms were a sickle-shaped sword, spear and shield. The Abyssinians are great hunters and are also clever at taming wild beasts. The nobles hunt antelopes with leopards, and giraffes and ostriches with horse and grey- hound. In elephant-hunting iron bullets weighing a quarter of a pound are used; thro wing-clubs are employed for small game, and lions are hunted with the spear. Lion skins belong to the emperor, but the slayer keeps a strip to decorate his shield.

Stone and mortar are used in building, but the Abyssinian houses are of the roughest kind, being usually circular huts, ill made and

thatched with grass. These huts are sometimes made simply of straw and are surrounded by high thorn hedges, but, in the north, square houses, built in stories, flat-roofed, the roof sometimes laid at the same slope as the hillside, and some with pitched thatched roofs, are common. The inside walls are plastered with cow-dung, clay and finely chopped straw. None of the houses have chimneys, and smoke soon colours the in- terior a dark brown. Generally the houses are filthy and ill ventilated and swarm with vermin. Drainage and sanitary arrangements do not exist. The caves of the highlands are often used as dwellings. The most remarkable buildings in Abyssinia are certain churches hewn out of the solid rock. The chief native industries are leather-work, embroidery and filigree metal- work; and the weaving of straw mats and baskets is extensively practised. The baskets are particularly well made, and are frequently used to contain milk.

Abyssinian art is crude and is mainly reserved for rough frescoes in the churches. These frescoes, however, often exhibit considerable skill, and are indicative of the lively imagination of their painters. They are in the Byzantine style and the colour- ing is gaudy. Saints and good people are always depicted full face, the devil and all bad folk are shown in profile. Among the finest frescoes are those in the church of the Holy Trinity at Adowa and those in the church at Kwarata, on the shores of Lake Tsana. The churches are usually circular in form, the walls of stone, the roof thatched.

The chief musical instruments are rough types of trumpets and flutes, drums, tambourines and cymbals, and quadrangular harps.

History

(12) Abyssinia, or at least the northern portion of it, was included in the tract of country known to the ancients as Ethiopia, the northern limits of which reached at one time

to about Syene. The connexion between Egypt and Ethiopia was in early times very intimate, and occasionally the two coun- tries were under the same ruler, so that the arts and civilization of the one naturally found their way into the other. In early times, too, the Hebrews had commercial intercourse with the Ethiopians; and according to Abyssinian tradition the queen of Sheba who visited Solomon was a monarch of their country, and from their son Menelek the kings of Abyssinia claim descent. During the Captivity many of the Jews settled here and brought with them a knowledge of the Jewish religion. Under the Ptolemies, the arts as well as the enterprise of the Greeks entered Ethiopia, and led to the establishment of Greek

colonies. A Greek inscription it Adulis, no longer extant, but copied by Cosmas of Alexandria, and preserved in his Topographia Chris- tiana, records that Ptolemy Euergetes, the third of the Greek dynasty in Egypt, invaded the countries on both sides of the Red Sea, and having reduced most of the provinces of Tigre to subjection, returned to the port of Adulis, and there offered sacrifices to Jupiter, Mars and Neptune. Another inscription, not so ancient, found at Axum, states that Aizanas, king of the Axumites, the Homerites, &c, conquered the nation of the Bogos, and returned thanks to his father, the god Mars, for his victory. Out of these Greek colonies appears to have arisen the kingdom of Auxume which flourished from the 1st to the 7th century a.d. and was at one time nearly coextensive with Abyssinia proper. The capital Auxume and the seaport Adulis were then the chief centres of the trade with the interior of Africa in gold dust, ivory, leather, a'romatics, &c. At Axum, the site of the ancient capital, many vestiges of its former great- ness still exist; and the ruins of Adulis, which was once a sea- port on the bay of Annesley, are now about 4 m. from the shore (see Ethiopia, The Axumite Kingdom).

(13) Christianity was introduced into the country by Fru- mentius (q.v.), who was consecrated first bishop of Ethiopia by St Athanasius of Alexandria about a.d. 330. From . . . the scanty evidence available it would appear that tion of the new religion at first made little progress, and the Christ!' Axumite kings seem to have been among the latest " llt y- converts. Towards the close of the 5th century a great company of monks are believed to have established themselves in the country. Since that time monachism has been a power among the people and not without its influence on the course of events. In the early part of the 6th century the king of the Homerites, on the opposite coast of the Red Sea, having persecuted the Christians, the emperor Justinian I. requested the king of Auxume, Caleb or El-Esbaha, to avenge their cause. He ac- cordingly collected an army, crossed over into Arabia, and con- quered Yemen (c. 525), which remained subject to Ethiopia for about fifty years. This was the most flourishing period in the annals of the country. The Ethiopians possessed the richest part of Arabia, carried on a large trade, which extended as far as India and Ceylon, and were in constant communication with the Greek empire. Their expulsion from Arabia, followed by the conquest of Egypt by the Mahommedans in the middle of the 7th century, changed this state of affairs, and the continued advances of the followers of the Prophet at length cut them off from almost every means of communication with the civilized world; so that, as Gibbon says, " encompassed by the enemies of their religion, the Ethiopians slept for near a thousand years, forgetful of the world

by whom they were forgotten." About a.d. 1000, a Jewish princess, Judith, conceived the design of murdering all the members of the royal family, and of establish- ing herself in their stead. During the execution of this project, the infant king was carried off by some faithful adherents, and conveyed to Shoa, where his authority was acknowledged, while Judith reigned for forty years over the rest of the kingdom, and transmitted the crown to her descendants. In 1268 the kingdom was restored to the royal house in the person of YektinO Amlak.

(14) Towards the close of the 15th century the Portuguese missions into Abyssinia began. A belief had long prevailed in Europe of the existence of a Christian kingdom in the far east, whose monarch was known as Prester John, and various

expeditions had been sent in quest of it. Among others who had engaged in this search was Pedro de Covilham, who

arrived in Abyssinia in 1490, and, believing that he guese k ac ˆ at l en g tn reached the far-famed kingdom, presented

influence, to the negus, or emperor of the country, a letter from his

master the king of Portugal, addressed to Prester John. Covilham remained in the country, but in 1507 an Armenian named Matthew was sent by the negus to the king of Portugal to request his aid against the Mahommedans. In 1520 a Portuguese fleet, with Matthew on board, entered the Red Sea in compliance with this request, and an embassy from the fleet visited the negus, Lebna Dengel Dawit (David) II., and remained in Abyssinia for about six years. One of this embassy was Father Francisco Alvarez, from whom we have the earliest and not the least interesting account of the country. Between 1528 and 1540 armies of Mahommedans, under the renowned general Mahommed Gran (or Granye, probably a Somali or a Galla) , entered Abyssinia from the low country to the south-east, and overran the kingdom, obliging the emperor to take refuge in the mountain fastnesses. In this extremity recourse was again had to the Portuguese. John Bermudez, a subordinate member of the mission of 1520, who had remained in the country after the departure of the embassy, was, according to his own statement (which is untrust- worthy), ordained successor to the abuna (archbishop), and sent to Lisbon. Bermudez

certainly came to Europe, but with what credentials is ‘not known. Be that as it may, a Portuguese fleet, under the command of Stephen da Gama, was sent from India and arrived at Massawa in February 1541. Here he received an ambassador from the negus beseeching him to send help against the Moslems, and in the July following a force of 450 musqueteers, under the command of Christopher da Gama, younger brother of the admiral, marched into the interior, and being joined by native troops were at first successful against the enemy; but they were subsequently defeated, and their com- mander taken prisoner and put to death (August 1542). On the 21st of February 1543, however, Mahommed Granye was shot in an engagement and his forces totally routed. After this, quarrels arose between the negus and Bermudez, who had returned to Abyssinia with Christopher da Gama and who now wished the emperor publicly to profess himself a convert to Rome. This the negus refused to do, and at length Bermudez was obliged to make his way out of the country. The Jesuits who had accompanied or followed the da Gama expedition into Abyssinia, and fixed their headquarters at Fremona (near Adowa), were oppressed and neglected, but not actually expelled. In the beginning of the 17th century Father Pedro Paez arrived at Fremona, a man of great tact and judgment, who soon rose into high favour at court, and gained over the emperor to his faith. He directed the erection of churches, palaces and bridges in different parts of the country, and carried out many useful works. His successor Mendez was a man of much less concili- atory manners, and the feelings of the people became strongly excited against the intruders, till at length, on the death of the negus Sysenius, Socinius or Seged I., and the accession of his son Fasiiidas in 1633, they were all sent out of the country,

after having had a footing there for nearly a century Po’ncet anc * a ˆ a ˆ – ■ ˆ ne French physician C. J. Poncet, who and Bmcc. went there in 1698, via Sennar and the Blue Nile, ‘vas

the only European that afterwards visited the country before Bruce in 1769. James Brace’s main object was to dis- cover the sources of the Nile, which he was convinced lay in Abyssinia. Accordingly, leaving Massawa in September 1769, he travelled via Axum to Gondar, where he was well received by King Tekla Haimanot II. He accompanied the king on a warlike expedition round Lake Tsana, moving S. round the eastern shore, crossing the genuine Blue Nile (Abai) close to its point of issue from the lake and returning via the western shore. On a second expedition of his own he proved to his own satis- faction that the river originated some 40 miles S.W. of the lake at a place called Geesh (4th of November 1770). He showed that this river flowed into

the lake, and left it by its now well- known outlet. Bruce subsequently returned to Egypt (end of

1772) via Gondar, the upper Atbara, Sennar, the Nile and the Korosko desert (see Bruce, James).

(15) In order to attain a clear view of native Abyssinian history, as distinct from the visits and influence of Europeans, it must be borne in mind that during the last three hundred years, and indeed for a longer period, for

(16) Mention must here be made of the first British mission, under Lord Valentia and Mr Henry Salt, which was sent in 1805 to conclude an alliance with Abyssinia, and Brltlsn obtain a port on the Red Sea in case France secured mission Egypt by dividing up the Turkish empire with Russia, and mis- This mission was succeeded by many travellers, slo ° ar y missionaries and merchants of all countries, and the

stream of Europeans continued until well into Theodore's reign. For convenience' sake we insert at this point a partial list of mis- sionaries and others who visited the country during the second third of the 19th century — merely calling attention to the fact that their visits were distributed over widely different parts of the country, ruled by distinct lines of monarchs or governors. In 1830 Protestant missionary enterprise was begun by Samuel Gobat and Christian Kugler, who were sent out by the Church Missionary Society, and were well received by the ras of Tigre. Mr Kugler died soon after his arrival, and his place was subse- quently supplied by Mr C. W. Isenberg, who was followed by Dr Ludwig Krapf, the discoverer of Mount Kenya, and others. Mr (afterwards Bishop) Gobat proceeded to Gondar, where he also met with a favourable reception. In 1833 he returned to Europe, and published a journal of his residence in Abyssinia. In 1834 Gobat went back to Tigre, but in 1836 ill health compelled him to leave. In 1838 other missionaries were obliged to leave the country, owing to the opposition of the native

priests. Messrs Isenberg and Krapf went south, and' established themselves at Shoa. The former soon after returned to England, but Mr Krapf remained in Shoa till March 1842, when he re- moved to Mombasa. Dr E. Riippell, the German naturalist, visited the country in 1831, and remained nearly two years. M. E. Combes and M. Tamisier

arrived at Massawa in 1835, and visited districts which had not been traversed by Europeans since the time of the Portuguese. One who did much at the time to extend our geographical knowledge of the country was Dr C. T. Beke (q.v.), who was there from 1840 to 1843. Mr Mansfield Parkyns was there from 1843 to 1846, and wrote the most inter- esting book on the country since the time of Bruce. Bishop Gobat having conceived the idea of sending lay missionaries into the country, who would engage in secular occupations as well as carry on missionary work, Dr Krapf returned to Abys- sinia in 1855 with Mr Flad as pioneers of that mission; Krapf, however, was not permitted to remain in the country. Six lay workers came out at first, and they were subsequently joined by others. Their secular work, however, appears to have been more valuable to Theodore than their preaching, so that he employed them as workmen to himself, and established them at Gaffat, near his capital. Mr Stern arrived in Abyssinia in i860, and after a visit to Europe returned in 1863, accompanied by Mr and Mrs Rosenthal. 1

(17) Wolda Selassie of Tigre was succeeded in 1817, through force of arms, by Sabagadis of Agame, and the latter, as ras of Rivalry or Tigre, introduced various Englishmen, whom he much British admired, into the country. He increased the pros- and French p er ;ty f his land considerably, but by so doing ac ions. rouse(j the jealousy of Ras Marie of Amhara — to whom he had refused tribute — and Ubie, son of Hailo Mariam, a governor of Simen. In an ensuing battle (in January 183 1), both Sabagadis and Marie were killed, and Ubie retired to watch events from his own province. Marie was shortly succeeded in the ras-ship of Amhara by Ali, a nephew of Guxa and a Mahommedan. But Ubie, who was aiming at the crown, soon attacked Ras Ali, and after several indecisive campaigns proclaimed himself negus of Tigre. To him came many French missionaries and travellers, chief of whom were Lieut. Lefebvre, charged (1839) with political and geographical missions, and Captains Galinier and Ferret, who completed for him a useful triangulation and survey of Tigre and Simen (1840-1842). The brothers Antoine and Arnaud d'Abbadie (q.v.) spent ten years (1838-1848) in the country, making scientific investigations of great value, and also involving themselves in the stormy politics of the country. Northern Abyssinia was now divided into two camps, the one, Amhara and Ras Ali, under Protestant British, and the other, Tigre and Ubie, under Roman Catholic French, influence. The latent hostility between the two factions threat- ened at one time to develop into a religious war, but no serious campaigns took place until Kassa (later Theodore) appeared on the scene.

(18) Lij (= Mr) Kassa was born in Kwara, a small district of Western

Amhara, in 18 18. His father was a small local chief,

and his uncle was governor of the districts of Dembea, 1'l e °^ e Kwara and Chelga between Lake Tsana and the un- defined N.W. frontier. He was educated in a monas- tery, but preferred a more active life, and by his talents and energy came rapidly to the front. On the death of his uncle he was made chief of Kwara, but in consequence of the arrest of his brother Bilawa by Ras Ali, he raised the standard of revolt against the latter, and, collecting a large force, re- peatedly beat the troops that were sent against him by the ras (1841-1847). On one occasion peace was restored by his receiving Tavavich, daughter of Ras Ali, in marriage; and this lady is said to have been a good and wise counsellor during her lifetime. He next turned his arms against the Turks, in the direction of Massawa, but was defeated; and the mother of'Ras Ali having insulted him in his fallen condition, he proclaimed his independ- ence. As his power was increasing, to the detriment of both Ras

1 Since Theodore's time Protestant missionary work, except by natives, has been stopped.

emperor Theodore.

poweroi Shoa.

Ali and Ubie, these two princes combined against him, but were heavily defeated by him at Gorgora (on the southern shore of Lake Tsana) in 1853. Ubie retreated to Tigre, and Ras Ali fled to Begemeder, where he eventually died. Kassa now ruled in Amhara, but his ambition was to attain to supreme power, and he turned his attention to conquering the remaining chief divisions of the country, Gojam, Tigre and Shoa, Growing which still remained unsubdued. Berro, ras of Gojam, in order to save himself, attempted to combine with Tigre, but his army was intercepted by Kassa and totally de- stroyed, himself being taken prisoner and executed (May 1854). Shortly afterwards Kassa moved against Tigre, defeated Ubie's forces at Deragie, in Simen (February 1855), took their chief prisoner and proclaimed himself negus negusti of Ethiopia under the name of Theodore III. He now turned his attention to Shoa.

(19) Retracing our steps for a moment in that direction, we find that in 1813 Sahela (or Sella) Selassie, younger son of the preceding ras, Wassen Seged, had proclaimed himself negus or king. His reign was long and beneficent. He restored the towns of Debra-Berhan and Angolala, and founded Entotto, the strong stone-built town whose

ruins overlook the modern capital, Adis Ababa. In the terrible ” famine of St Luke “in 1835, Selassie still further won the hearts of his subjects by his wise measures and. personal generosity; and by extending his hospitality to Europeans, he brought his country within the closer ken of civilized European powers. During his reign he received the missions of Major W. Cornwallis Harris, sent by the governor-general of India (1841), and M. Rochet d’Hericourt, sent by Louis Philippe (1843), with both of whom he concluded friendly treaties on behalf of their respective governments. He also wrote to Pope Pius IX., asking that a Roman Catholic bishop should be sent to him. This request was acceded to, and. the pope despatched Monsignor Massaja to Shoa. But before the prelate could reach the country, Selassie was dead (1847), leaving his eldest son, Haeli Melicoth, to succeed him. Melicoth at once proclaimed himself negus, and by sending for Massaja, who had arrived at Gondar, gave rise to the sus- picion that he wished to have himself crowned as emperor. By increasing his dominions at the expense of the Gallas, he still further roused the jealousy of the northerners, and a treaty which he concluded with Ras Ali against Kassa in 1850 deter- mined the latter to crush him at the earliest opportunity.

Thus it was that in 1855 Kassa, under the name of the em- peror Theodore, advanced against Shoa with a large army. Dissensions broke out among the Shoans, and after a desperate and futile attack on Theodore at Debra-Berhan, Haeli Melicoth died of exhaustion and fever, nominating with his last breath his eleven-year-old son Menelek 2 as successor (November 1855). Darg6, Haeli’s brother, took charge of the young prince, but after a hard fight with Angeda, one of Theodore’s rases, was obliged to capitulate. Menelek was handed over to the negus, taken to Gondar, and there trained in Theodore’s service.

(20) Theodore was now in the zenith of his career. He is described as being generous to excess, free from cupidity, merciful to his vanquished enemies, and strictly continent, but subject to violent bursts of anger and possessed of unyielding pride and fanatical religious zeal. He was also a man of education and intelligence, superior to those among whom he lived, with natural talents for governing and gaining the esteem of others. He had, further, a noble bearing and majestic walk, a frame capable of enduring any amount of fatigue, and is said to have been ” the best shot, the best spearman, the best runner, and the best horseman in Abyssinia.” ‘ Had he contented himself with the sovereignty of Amhara and Tigre, he might have maintained his position; but he was led to exhaust his strength against the Wollo Gallas, which was probably one of the chief causes of his ruin. He obtained several victories over that people, ravaged

their country, took possession of Magdala, which he afterwards made his principal stronghold, and. enlisted many of the chiefs and their followers in his own ranks. As has been shown, he also reduced the kingdom of Shoa, and took Ankober, the capital;

s Menelek means '•' a second self."

but in the meantime his own people were groaning under his heavy exactions, rebellions were breaking out in various parts of his provinces, and his good queen Tavavich was now dead.

The British consul, Walter C. Plowden, who was strongly attached to Theodore, having been ordered by his government Theodore's in i860 to return to Massawa, was attacked on his quarrel way by a rebel named Garred, mortally wounded, with Great an{ j (- a k en p r i SO ner. Theodore attacked the rebels, and in the action the murderer of Mr Plowden was slain by his friend and companion Mr J. T. Bell, an engineer, but the latter lost his life in preserving that of Theodore. The deaths of the two Englishmen were terribly avenged by the slaughter or mutilation of nearly 2000 rebels. Theodore soon after married his second wife Terunish, the proud daughter of the late governor of Tigre, who felt neither affection nor respect for the upstart who had dethroned her father, and the union was by no means a happy one. In 1862 he made a second expedition against the Gallas, which was stained with atrocious cruelties. Theodore had now given himself up to intoxication and lust. When the news of Mr Plowden's death reached England, Captain C. D. Cameron was appointed to succeed him as consul, and arrived at Massawa in February 1862. He proceeded to the camp of the king,' to whom he pre- sented a rifle, a pair of pistols and a letter in the queen's name. In October Captain Cameron was sent home by Theodore, with a letter to the queen of England, which reached the Foreign Office on the 1 2 th of February 1863. This letter was put aside and no answer returned, and to this in no small degree are to be attri- buted the difficulties that subsequently arose with that country. In November despatches were received from England, but no answer to the emperor's letter, and this, together with a visit paid by Captain Cameron to the Egyptian frontier town of Kassala, greatly offended him; accordingly in January 1864 Captain Cameron and his suite, with Messrs Stern and Rosenthal, were cast into prison. When the news of this reached England, the government resolved, when too late, to send an answer to the emperor's letter, and

selected Mr Hormuzd Rassam to be its bearer. He arrived at Massawa in July 1864, and immedi- ately despatched a messenger requesting permission to present himself before the emperor. Neither to this nor a subsequent application was any answer returned till August 1865, when a curt note was received, stating that Consul Cameron had been released, and if Mr Rassam still desired to visit the king, he was to proceed by the route of Gallabat. Later in the year Theodore became more civil, and the British party on arrival at the king's camp in Damot, on the 25th of January 1866, were received with all honour, and were afterwards sent to Kwarata, on Lake Tsana, there to await the arrival of the captives. The latter, reached Kwarata on the 12th of March, and everything appeared to proceed favourably. A month later they started for the coast, but had not proceeded far when they were all brought back and put into confinement. Theodore then wrote a letter to the queen, requesting European workmen and machinery to be sent to him, and despatched it by Mr Flad. The Europeans, although detained as prisoners, were not at first unkindly treated; but in the end of June they were sent to Magdala, where they were soon afterwards put in chains. They suffered hunger, cold and misery, and were in constant fear of death, till the spring of 1868 when they were relieved by the British troops.

(21) In the meantime the power of Theodore in the country was rapidly waning. Shoa had already shaken off his yoke; Go jam was virtually independent; Walkeit and Simen were under a rebel chief; and Lasta, Waag and the country about Lake Ashangi had submitted to Wagshum Gobassie, who had also overrun Tigre and appointed Dejaj Kassai his governor. The latter, however, in 1867 rebelled against his master and assumed the supreme power of that province. This was the state of matters when the English troops made their appearance in the country. With a view if possible to effect the release of the prisoners by conciliatory measures, Mr Flad was sent back, with some artisans and machinery, and a letter from the queen, stating that these would be handed over to his majesty on the

release of the prisoners and their return to Massawa. This, however, failed to influence the emperor, and the English government at length saw that they must have recourse to arms. In July 1867, therefore, it was resolved to send an army into Abyssinia to enforce the release of the captives, under Sir Robert Napier (1st Baron Napier of Magdala). The landing- place selected was Mulkutto (Zula), on Annesley Bay, the point of the coast nearest to the site of the ancient Adulis, and we are told that "the pioneers of the English expedition followed to some extent in the footsteps of the adventurous soldiers of Ptolemy, and met with a few faint traces ff r ° ert of this old-world enterprise " (C. R.

Markham). The expeditioa. force amounted to upwards of 16,000 men, besides 12,640 belonging to the transport service, and followers, making in all upwards of 32,000 men. The task to be accomplished was to march over 400 miles of a mountainous and little-known country, inhabited by savage tribes, to the camp or fortress of Theodore, and compel him to deliver up his captives. The commander-in-chief landed on the 7 th of January 1868, and soon after the troops began, to move forward through the pass of Senafe, and southward through the districts of Agame, Tera, Endarta, Wojerat, Lasta and Wadela. In the meantime Theodore had been reduced to great straits. His army, which at one time numbered over 100,000 men, was rapidly deserting him, and he could hardly obtain food for his followers. He resolved to quit his captial Debra- Tabor, which he burned, and set out with the remains of his army for Magdala. During this march he displayed an amount of engineering skill in the construction of roads, of military talent and fertility of resource, that excited the admiration and astonishment of his enemies. On the afternoon of the 10th of April a force of about 3000 men suddenly poured down upon the English in the plain of Arogie, a few miles from Magdala. They advanced again and again to the charge, but were each time driven back, and finally retired in good order. Early next morning Theodore sent Lieut. Prideaux, one of the captives, and Mr Flad, accompanied by a native chief, to the English camp to sue for peace. Answer was returned, that if he would deliver up all the Europeans in his hands, and submit to the queen of England, he would receive honourable treatment. The captives were liberated and sent away, and accompanying a letter to the English general was a present of 1000 cows and 500 sheep, the acceptance of which would, according to Eastern custom, imply that peace was granted. Through some misunderstanding, word was sent to Theodore that the present would be accepted, and he felt that he was now safe; but in the evening he learned that it had not been received, and despair again seized him. Early next morning he attempted to escape with a few of his followers, but subsequently returned. The same day (13 th April) Magdala was stormed and taken, practically without loss, and within they found the dead body of the emperor, who had fallen by his own hand. The inhabit- ants and troops were subsequently sent away, the fortifications destroyed and the town burned. The queen Terunish having expressed her wish to go back to her own country, accompanied the British army, but died during the march, and her son Alam- ayahu, the only legitimate son of the emperor, was brought to England, as this was the desire of his father. 1 The success of the expedition was in no small degree owing to the aid afforded by the several native chiefs through whose country it passed, and no one did

more in this way than Dejaj Kassa or Kassai of Tigre. In acknowledgment of this, several pieces of ordnance, small arms and ammunition, with much of the surplus stores, were handed over to him, and the English troops left the country in May 1868.

(22) It is now time to return to the story of the young prince Menelek, who, as we have seen, had been nomin- Meaelek ated by his late father as ruler of Shoa, but was U., klag in Theodore's power in Tigre. The following table "Shoa. shows his descent since the beginning of the 19th century: —

1 He was subsequently sent to school at Rugby, but died in his nineteenth year, on the 14th of November 1879. He was buried at St George's Chapel, Windsor.

Asfa Nassen, d. 1807

Wassan Seged = Woizero Zenebe Work d. 1811 I

Becurraye Sella Selassie "Woizero Betsabesh

(1795-1847) I

Haeli Melicoth = Ejigayu

(1825-1855)

Siefu

Darge

Menelek II. = Tai'tu b. 1844

(1826-1860) b. 1827 Mashasha

1 son Zauditu Tanina Work

(dead) (Judith) (daughter)

On the retirement of Theodore's forces from Shoa in 1855, Siefu, brother of Haeli Melicoth, proclaimed himself negus of Shoa at Ankober, and beat the local representatives of the northern government. The emperor returned, however, in 1858, and after

several repulses succeeded in entering Ankober, where he behaved with great cruelty, murdering or mutilating all the inhabitants. Siefu kept up a gallant defence for two more years, but \yas then killed by Kebret, one of his own chiefs. Thus chaos again reigned supreme in Shoa. In 1865, Menelek, now a dejazmach 1 of Tigre, took advantage of Theodore's diffi- culties with the British government and escaped to Workitu, queen of the Wollo Galla country. The emperor, who held as hostage a son of Workitu, threatened to kill the boy unless Menelek were given up; but the gallant queen refused, and lost both her son and her throne. The fugitive meanwhile arrived safely in Shoa, and was there acclaimed as negus. For the next three years Menelek devoted himself to strengthening and disciplining his army, to legislation, to building towns, such as Liche (near Debra-Berhan), Worra Hailu (Wollo Galla country), fcc, and to repelling the incursions of th

1 A title variously translated. A dejazmach (dejaj) is a high official, ranking immediately below a ras. ˆ

(23) Menelek's kingdom was meanwhile torn in twain by serious dissensions, which had been instigated by his concubine Bafana. This lady, to whom he was much attached, had been endeavouring to secure the succession of one of her own sons to the throne of Shoa, and had almost succeeded in getting rid of Mashasha, son of Siefu and cousin of Menelek, who was the ap- parent heir. On the approach of John, the Shoans united for a time against their common enemy. But after a few skirmishes they melted away, and Menelek was obliged to submit and do obeisance to John. The latter behaved with much generosity, but at the same time imposed terms which effectually deprived Shoa of her independence (March 1878). In 1879 Gordon was sent on a fresh mission to John on behalf of Egypt; but he was treated with scant courtesy, and was obliged to leave the country without achieving anything permanent.

The Italians now come on the scene. Assab, a port near the southern entrance of the Red Sea, had been bought from the local sultan in March 1870 by an Italian company, which, after acquiring more land in 1879 and i88p, f^/'J'f was bought out by the Italian government in 1882. influence. In this year Count Pietro Antonelli was despatched to Shoa in order to improve the prospects of the colony by treaties with Menelek and the sultan of Aussa. Several missions followed upon this one, with more or less successful results; but both John and Menelek became uneasy when Beilul, a port to the north of Assab Bay, was occupied by the Italians in January 1885, and Massawa taken over by them from Egypt in the following month. This latter act was greatly

resented by the Abyssinians, for by a treaty concluded with a British and Egyptian mission under Admiral Hewett and Mason Pasha 2 in the previous year, free transit of goods was to be allowed through this port. Matters came to a head in January 1887, when the Abyssinians, in con- sequence of a refusal from General Gene to withdraw his troops, surrounded and attacked a detachment of 500 Italian troops at Dogali, killing more than 400 of them. Reinforcements were sent from Italy, whilst in the autumn the British government stepped in and tried to mediate by means of a mission under Mr (afterwards Sir Gerald) Portal. His mission, however proved abortive, and after many difficulties and dangers he returned to Egypt at the end of the year. In April 1888 the Italian forces, numbering over 20,000 men, came into touch with the Abys- sinian army; but negotiations took the place of fighting, with the result that both forces retired, the Italians only leaving some s°oo troops in Eritrea, as their colony was flow called. Meanwhile John had not been idle with regard to the dervishes, who had in the meantime become masters of the Egyptian Sudan. Although he had set his troops in motion too late to relieve Kassala, Ras Alula, his chief general, had succeeded in inflicting a handsome defeat on Osman Digna at Kufit in Sep- tember 1885. Fighting between the dervishes and the Abys- sinians continued, and in August 1887 the dervishes entered and sacked Gondar. After some delay, King John took the field in force against the enemy, who were still harassing the north- west of his territory. A great battle ensued at Gallabat, in which the dervishes, under Zeki Tumal, .were beaten. But a stray bullet struck the king, and the Abyssinians decided to retire. The king died during the night, and his body fell into the hands of the enemy (9th March 1889).

(24) Immediately the news of John's death reached Menelek, he proclaimed himself emperor, and received the submission of Gondar, Gojam and 'several other provinces. In common with other northern princes, Mangasha, emperor. reputed son and heir of King John, with the yellow- eyed Ras Alula,' refused to acknowledge the sovereignty of Menelek; but, on the latter marching against them in the following January with a large army, they submitted. As it happened, Count Antonelli was with Menelek when he claimed

1 The main object of this mission was to seek John's assistance in evacuating the Egyptian garrisons in the Sudan, which were threatened by the dervishes.

3 Ras Alula died February 1897, aged about 52. He had raised himself by his military talents from being a groom and private soldier to the position of generalissimo of the army.

the throne, and promptly concluded (2nd of May 1889) with him on behalf of Italy a friendly treaty, to be known hereafter as the famous Uccialli treaty. In consequence of this the Italians occupied Asmara, made friends with Mangasha and received Ras Makonnen, 1 Menelek's nephew, as his plenipo- tentiary in Italy. Thus it seemed as though hostilities between the two countries had come to a definite end, and that peace was assured in the land. For the next three years the land was fairly quiet, the chief political events being the convention (6th February 1891) between Italy and Abyssinia, protocols between Italy and Great Britain (24th March and 15th April 1891) and a proclamation by Menelek (10th April 1891), all on the subject of boundaries. As, however, the Italians became more and more friendly with Mangasha and Tigre the apprehensions of Menelek increased, till at last, in February 1893, he wrote denouncing the Uccialli treaty, which differed in- the Italian and Amharic versions. According to the former, the negus was bound to make use of Italy as a channel for communicating with other powers, whereas the Amharic version left it optional. Mean- while the dervishes were threatening Eritrea. A fine action by Colonel Arimondi gained Agordat for Italy (21st December 1893), and a brilliant march by Colonel Baratieri resulted in the acquisition of Kassala (17th July 1894).

On his return Baratieri found that Mangasha was intriguing with the dervishes, and had actually crossed the frontier with a large army: 'At Koatit and Senafe (13th to 15th January 1895) Mangasha was met and heavily defeated by Baratieri, who occupied Adrigat in March. But as the year wore on the Italian commander pushed his forces unsupported too far to the south. Menelek was advancing with a large army in national support of Mangasha, and the subsequent reverses at Amba Alagi (7th December 1895) and Macalle (23rd January 1896) forced the Italians to fall back.

Reinforcements of many thousands were meanwhile arriving at Massawa, -and in February Baratieri took the field at the head of over 13,000 men. Menelek's army, amounting Adowa *° a t>out 90,000, had during this time advanced, and was occupying a strong position at Abbar Garima, near Adua (or Adowa). Here Baratieri attacked him on the 1st of March, but the difficulties of the country were great, and one of the four Italian brigades had pushed too far forward. This brigade was attacked by overwhelming numbers, and on ;the remaining brigades advancing in support, they were successively cut

to pieces by the encircling masses of the enemy. The Italians lost over 4500 white and 2000 native troops killed and wounded, and over 2500 prisoners, of which 1600 were white, whilst the Abyssinians owned to a loss of over 3000. General Baldissera advanced with a large body of reinforcements to avenge this defeat, but the Abyssinians, desperately short of supplies, had already retired, and beyond the peaceful relief of Adrigat no further operations took place. It may here be remarked that the white prisoners taken by Menelek were exceedingly well treated by him, and that he behaved throughout the struggle with Italy with the greatest humanity and dignity. On the 26th of October following a provisional treaty of peace was concluded at Adis Ababa, annulling the treaty of Uccialli and recognizing the absolute independence of Abyssinia. This treaty was ratified, and fOllowed-t>y other treaties and agree- ments defining the Eritrean-Abyssinian and the Abyssinian- Italian Somaliland frontiers (see Italy, History, and Somali- land, Italian). .

(25) The war, so disastrous to Italy, attracted the attention of all Europe to Abyssinia and its monarch, and numerous Menelek missions, two Russian, three French and one British, asinde- were despatched to the country, and hospitably re- monlrc/i ceived h Y Menelek. The British one, under Mr (after- wards Sir) Rennell Rodd, concluded a friendly treaty with Abyssinia (15th of May 1897), but did not, except in the direction of Somaliland, touch on frontier questions, which for several years continued a subject of discussion. During the

1 Ras of Harrar, which province had been conquered and occupied by Menelek in January 1887.

same year (1897) a small French expedition under Messrs Clochette and de Bonchamps endeavoured to reach the Nile, but, after surmounting many difficulties, stuck in the marshes of the Upper Sobat, and was obliged to return. Another expe- dition of Abyssinians, under Dejaj Tasamma and accompan- ied by three Europeans— Faivre (French), Potter (Swiss) and Artomonov (Russian) — started early in 1898, and reached the Nile at the Sobat mouth in June, a few days only before Major Marchand and his gallant companions arrived on the scene. But no contact was made, and the expedition returned to Abyssinia.

In the same year Menelek proceeded northwards with a large army for the purpose of chastising Mangasha, who was again rebelling against his authority. After some trifling fighting Mangasha submitted, and Ras Makonnen despatched a force to subdue Beni Shangul, the chief of

which gold country, Wad Tur el Guri, was showing signs of disaffection. This effected, the Abyssinians almost came into contact with the Egyptian troops sent up the Blue Nile (after the. occupation of Khartum) to Famaka and towards Gallabat; but as both sides were anxious to avoid a collision over this latter town, no hostile' results ensued. An excellent understanding was, in fact, estab- lished between these two contiguous countries, in spite of occa- sional disturbances by bandits on the frontier. On this frontier question, a treaty was concluded on the 15th of May 1902 between England and Abyssinia for the delimitation of the Sudan- Abyssinian frontier. Menelek, in addition, agreed hot to obstruct the waters of Lake Tsana, the Blue Nile or the Sobat, so as not to interfere with the Nile irrigation question, and' he also agreed to give a concession, if such should be required, for the construction of a British railway through his dominions, to connect the Sudan with Uganda. A combined British-Abys- sinian expedition (Mr A. E. Butter's) was despatched in 1901 to propose and survey a boundary between Abyssinia on the orie side and British East Africa and Uganda on the other; and the report of the expedition was made public by the British govern- ment in November 1904. It was followed in 1908 by an agreed ment defining the frontiers concerned.

(26) In 1899 the rebellion of the so-called " mad " mullah (Hajji Mahommed Abdullah) began on the borders – of British Somaliland. An Abyssinian expedition was, at Great Britain's request, sent against the mullah, tio'ˆwftti '■'■ but without much effect. In the spring and Britain ■*'.' summer of 1901 a fresh expedition from Harrar was against the undertaken against the mullah, who was laying waste fjˆa/ i the Ogaden country. Two British officers accompanied this force, which was to co-operate with British troops advancing from Somaliland; but little was achieved by the Abyssinianˆ and after undergoing considerable privations and losses, 1 arid harassing the country generally, including that of sOme friendly tribes, it returned to Harrar. During the 1902-3 campaign Of General (Sir) W. H. Manning, Menelek provided a force 6f } 5o6o to co-operate with the British and to occupy the Webi Shebeli and south-western parts of the Haud. This time the Abyssifiiaris were more successful, and beat the rebels in a pitched fight; but the difficulties of the country again precluded effective co-opera-ˆ tion. During General Egerton's campaign (1903-4) yet another force of 5000 Abyssinians was despatched towards Somaliland. Accompanied by a few British officers, it worked its way south- ward, but did not contribute much towards the final solution. In any case, however, it is significant that the Abyssinians havˆ repeatedly been willing to co-operate with the

British Sway from their own country.

Regarding the question of railways, the first concession for ‘a railway from the coast at Jibuti (French Somaliland) to the interior was grantedby Menelek to a French company ‘ :

in 1894. The company having met with numberless “.Bmvˆaa difficulties and financial troubles, the French gOvern- influenced ment, on the extinction of the company’s funds, came ! to the rescue and provided money for the construction. (In the alternative British capitalists interested in the company wbuTd have obtained control of the line.), The ; French .gayernment’ˆ

ABYSSINIAN CHURCH

help enabled the railway to be compieted to Dire Dawa, 28 m. from Harrar, by the last day of 1902. Difficulties arose over the continuation of the railway to Adis Ababa and beyond, and the proposed internationalization of the line. These diffi- culties, which hindered the work of construction for years, were composed (so far as the European Powers interested were con- cerned) in 1906. By the terms of an Anglo-French-Italian agreement, signed in London on the 13th of December of that year, it was decided that the French company should build the railway as far as Adis Ababa, while railway construction west of that place should be under British auspices, with the stipula- tion that any railway connecting Italy's possessions on the Red Sea with its Somaliland protectorate should be built under Italian auspices. A British, an Italian and an Abyssinian representative were to be appointed to the board of the French company, and a French director to the board of any British or Italian company formed. Absolute equality of treatment on the railway and at Jibuti was guaranteed to the commerce of all the Powers.

Meanwhile the country slowly developed in parts and opened out cautiously to European influences. Most of the Powers appointed representatives at Menelek's capital — the British minister-plenipotentiary and consul-general, Lieut.Colonel Sir J. L. Harrington, having been appointed shortly after the British mission in 1897. In December 1903 an American mission visited Adis Ababa, and a commercial treaty between the United States and Abyssinia was signed. A German mission visited the country early in 1905 and also concluded a treaty of commerce with the negus. Later in the year a German minister was ap pointed to the court of the emperor.

After 1897 British influence in Abyssinia, owing largely no doubt to the conquest of the Sudan, the destruction of the dervish power and the result of the Fashoda incident, was sensibly on the increase. Of the remaining powers France occupied the most important position in the country. Ras Makonnen, the most capable and civilized of Menelek's probable successors, died in March 1906, and Mangasha died later in the same year; the question of the succession therefore opened up the possibility that, in spite of recent civilizing influences, Abyssinia might still relapse in the future into its old state of conflict. The Anglo-French-Italian agreement of December 1906 contained provisions in view of this contingency. The preamble of the document declared that it was the common interest of the three Powers "to maintain intact the integrity of Ethiopia," and Article I. provided for their co-operation in

maintaining “the political and territorial status quo in Ethiopia.” Should, however, the status quo be disturbed, the powers were to concert to safeguard their special interests. The terms of the agreement were settled in July 1906, and its text forthwith communicated to the negus. After considerable hesitation Menelek sent, early in December, a note to the powers, in which, after thanking them for their intentions, he stipulated that the agreement should not in any way limit his own sovereign rights. In June 1908, by the nomination of his grandson, Lij Yasu (b. 1896), as his heir, the emperor endeavoured to end the rivalry between various princes claiming the succession to the throne. (See Menelek.) A convention with Italy, concluded in the same year, settled the frontier questions outstanding with that country. (G.*)

Bibliography. — For general information see A. B. Wylde’s Mod- ern Abyssinia (London, 1901), a volume giving the result of many years’ acquaintance with the country and people ; Voyage en A byssinie . . . 1839-43, par une commission scientifique, by Th. Lefebvre and others (6 vols, and atlas, 3 vols., Paris, 1845-54) ! Elisee Reclus, Nouvelle geographic universelle, vol. x. chap. v. (Paris, 1885). For latest geographical and kindred information consult the Geographical Journal (London), especially “A Journey through Abyssinia,” vol. xv. (1900), and “Exploration in the Abai Basin,” vol. xxvii. (1906), both by H. Weld Blundell, and “From the Somali Coast through S. Ethiopia to the Sudan,” vol. xx. (1902), by C. Neumann; Antoine d’Abbadie, Geographic de I’Ethiopie (Paris, 1890). The British parliamentary paper Africa, No. 13 (1904), is a report on the survey of the S.E. frontier by Capt. P. Maud, R.E., and contains A valuable map. For geology, &c., see W. T, Blanford, Observa- tions on the Geology and Zoology of Abyssinia (London, 1870);

C. Futterer, “Beitrage zur Kenntniss des Jura in Ost-Afrika,” Zeit. Deutsch. Geol. Gesell. xlix. p. 568 (1897); C. A. Raisin, “Rocks from Southern Abyssinia,” Quart. Journ. Geol. Soc. vol. lix. pp. 292-306

(1903).

Among works by travellers describing the country are — James Bruce’s Travels to discover the Source of the Nile [1768-1773] (Edin- burgh, 1813, 3rd ed., 8 vols.); The Highlands of Aethiopia (3 vols., London, 1844), by Sir W. Cornwallis Harris, dealing with the Danakil country, Harrar and Shoa; Mansfield Parkyns, Life in Abyssinia; being notes collected during three years’ residence and travels (2nd ed., London, 1868); Antoine d’Abbadie, Douze ans dans la Haute- Ethiopie (Paris, 1868); P. H. G. Powell-Cotton, A Sporting Trip through

Abyssinia (London, 1902); A. Donaldson Smith, Through Unknown African Countries (London, 1897); M. S. Wellby, 'Twixt Sirdar and Menelik (London, 1901). For history see — A. M. H. J. Stokvis' Manuel d'histoire, vol. i. pp. 439-46, and vol. ii. pp. lxxiv-v (Leiden, 1888-89), which contains lists of the sovereigns of Abyssinia, Shoa and Harrar, from the earliest times, with brief notes. Texts of treaties between Abyssinia and the European Powers up to 1896 will be found in vol. i. of Sir E. Hertslet's The Map of Africa by Treaty (London, 1896). L. J. Morie's Histoire de I'Ethiopie: Tome ii, "L'Abyssinie " (Paris, 1904), is a comprehensive survey (the views on modern affairs being coloured by a strong anti-British bias). For more detailed historical study consult C. Beccari's Notizia e Saggi di opere e documenti inediti riguardanti la Storia di Etiopia durante i Secoli XVI., XVII. e XVIII. (Rome. 1903), a valuable guide to the period indicated; E. Glaser, Die Abessinier in Arabien und Afrika (Munich, 1895); The Portuguese Expedition to Abys- sinia tn 1541-1543 as narrated by Castanhoso (with the account of Bermudez), translated and edited by R. S. Whiteway (London, Hakluyt' Society, 1902), which contains a bibliography; Futuh el- Habacha, a contemporary Arab chronicle of the wars of Mahommed Gran, translated into French by Antoine d'Abbadie and P. Pau- litschke (Paris, 1898) ; A Voyage to Abyssinia by Father Jerome Lobo, from the French [by Samuel Johnson] (London, 1735); Record of the Expedition to Abyssinia, 3 vols., an official history of the war of 1868, by Major T. J. Holland and Capt. H. Hozier (London, 1870); Hormuzd Rassam, Narrative of the British Mission to Theodore [1865-1868] (2 vols., London, 1869); Henry Blanc, A Narrative of Captivity in Abyssinia (London, 1868), by one of Theodore's prisoners; Sir Gerald H. Portal, My Mission to Abyssinia (London, 1892), an account of the author's embassy to King John in 1887; Count A. E. W. Gleichen, With the Mission to Menelik, 1897 (London, 1898), containing the story of the Rennell Rodd mission; R. P. Skinner, Abyssinia of To-Day (London, 1906), a record of the first American mission to the country; G. F. H. Berkeley, The Cam- paign of Adowa and the Rise of Menelik (London, 1902). Books deal- ing with missionary enterprise are — Journal of a Three Years' Residence in Abyssinia, by Bishop Samuel Gobat (London, 1834); J. L. Krapf, Travels, Researches and Missionary Labours during an 18 years' residence in Eastern Africa (London, i860); Cardinal G. Massaja, / miei Trentacinque anni di Missione nell' Alta Etiopia (10 vols., Milan, 1886-1893). Political questions are referred to by T. Lennox Gilmour, Abyssinia: the Ethiopian Railway and the Powers (London, 1906); H. le Roux, Menelik et nous (Paris, 1901); Charles Michel, La question d'Ethiopie (Paris, 1905). (F. R. C.)

ABYSSINIAN CHURCH. As the chronicle of Axum relates, Christianity was adopted in Abyssinia in the 4th century. About a.d. 330 Frumentius was made first bishop of Ethiopia by Athanasius, patriarch of Alexandria. Cedrenus and Nice- phorus err in dating Abyssinian Christianity from Justinian, c. 542. From Frumentius to the present day, with one break, the Metropolitan (Abuna) has always been appointed from Egypt, and, oddly enough, he is always a foreigner. Little is known of church history down to the period of Jesuit rule, which broke the connexion with Egypt from about 1500 to 1633. But the Abyssinians rejected the council of Chalcedon, and still remain monophysites. Union with the Coptic Church {q.v.) continued after the Arab conquest in Egypt. Abu Salih records (12th century) that the patriarch used always to send letters twice a year to the kings of Abyssinia and Nubia, till Al Hakim stopped the practice. Cyril, 67th patriarch, sent Severus as bishop, with orders to put down polygamy and to enforce observance of canonical consecration for all churches. These examples show the close relations of the two churches in the Middle Ages. But early in the 16th century the church was brought under the influence of a Portuguese mission. In 1439, in the reign of Zara Yakub, a religious discussion between an Abyssinian, Abba Giorgis, and a Frank had led to the despatch of an embassy from Abyssinia to the Vatican; but the initiative in the Roman Catholic missions to Abyssinia was taken, not by Rome, but by Portugal, as an incident in the struggle with the Mussulmans for the command of the trade route to India by the

Red Sea. In 1507 Matthew, or Matheus, an Armenian, had been sent as Abyssinian envoy to Portugal to ask aid against the Mussulmans, and in 1520 an embassy under Dom Rodrigo de Lima landed in Abyssinia. An interesting account of this mission, which remained for several years, was written by Francisco Alvarez, the chaplain. Later, Ignatius Loyola wished to essay the task of conversion, but was forbidden. Instead, the pope sent out Joao Nunez Barreto as patriarch of the East Indies, with Andre de Oviedo as bishop; and from Goa envoys went to Abyssinia, followed by Oviedo himself, to secure the king’s adherence to Rome. After repeated failures some measure of success was achieved, but not till 1604 did the king make formal submission to the pope. Then the people rebelled and the king was slain. Fresh Jesuit victories were followed sooner or later by fresh revolt, and Roman rule hardly triumphed when once for all it was overthrown. In 1633 the Jesuits were expelled and allegiance to

Alexandria resumed.

There are many early rock-cut churches in Abyssinia, closely resembling the Coptic. After these, two main types of archi- tecture are found — one basilican, the other native. The cathe- dral at Axum is basilican, though the early basilicas are nearly all in ruins — e.g. that at Adulis and that of Martula Mariam in Gojam, rebuilt in the 16th century on the ancient foundations. These examples show the influence of those architects who, in the 6th centaury, built the splendid basilicas at Sanaa and else- where in Arabia. Of native churches there are two forms — one square or oblong, found in Tigre; the other circular, found in Amhara and Shoa. In both, the sanctuary is square and stands clear in the centre. An outer court, circular or rectangular, surrounds the body of the church. The square type may be due to basilican influence, the circular is a mere adaptation of the native hut: in both, the arrangements are obviously based on Jewish tradition. Church and outer court are usually thatched, with wattled or mud-built walls adorned with rude frescoes. The altar is a board on four wooden pillars having upon it a small slab (tabut) of alabaster, marble, or shittim wood, which forms its essential part. At Martula Mariam, the wooden altar overlaid with gold had two slabs of solid gold, one 500, the other 800 ounces in weight. The ark kept a.t Axum is described as 2 feet high, covered with gold and gems. The liturgy was celebrated on it in the king's palace at Christmas, Epiphany, Easter and Feast of the Cross.

Generally the Abyssinians agree with the Copts in ritual and practice. The LXX. version was translated into Geez, the literary language, which is used for all services, though hardly understood. Saints and angels are highly revered, if not adored, but graven images are forbidden. Fasts are long and rigid. Confession and absolution, strictly enforced, give great power to the priesthood. The clergy must marry, but once only. Pil- grimage to Jerusalem is a religious duty and covers many sins.

Authorities. — Tellez, Historia de Ethiopia (Coimbra, 1660) ; Alvarez, translated and edited for the Hakluyt Soc. by Lord Stanley of Alderley, under the title Narrative of the Portuguese Embassy to Abyssinia (London, 1881); Ludolphus, History of Ethiopia (London, 1684, and other works) ; T. Wright, Christianity of Arabia (London, 1855); C. T. Beke. "Christianity among the Gallas," Brit. Mag. (London, 1847); J. C. Hotten, Abyssinia Described (London, 1868); "Abyssinian Church Architecture," Royal Inst. Brit. Arch. Trans- actions, 1869; Ibid. Journal, March 1897; Archaeologia, vol. xxxii. ; J. A. de Graca Barreto, Documenta historian ecclesiae Habessinarum illustrantia

(Olivipone, 1879) ; E. F. Kromrei, Glaubenlehre und Gebrduche der dlleren Abessinischen Kirche (Leipzig, 1895); F. M. E. Pereira, Vida do Abba Samuel (Lisbon, 1894); Idem, Vida do Abba Daniel (Lisbon, 1897) ; Idem, Historia dos Martyres de Nagran (Lisbon, 1899); Idem, Chronica de Susenyos (Lisbon, text 1892, tr. and notes 1900) ; Idem, Martyrio de Abba Isaac (Coimbra, 1903) ; Idem, Vida de S. Paulo de Thebas (Coimbra, 1904) ; Archdeacon Dowling, The Abyssinian Church, (London, 1909) ; and periodicals as under Coptic Church. (A. J. B.)

ACACIA, a genus of shrubs and trees belonging to the family Leguminosae and the sub-family Mimoseae. The small flowers are arranged in rounded or elongated clusters. The leaves are compound pinnate in general (see fig.). In some instances, however, more especially in the Australian species, the leaflets are suppressed and the leaf-stalks become vertically flattened,

and serve the purpose of leaves. The vertical position protects the structure from the intense sunlight, as with their edges towards the sky and earth they do not intercept light so fully as ordinary horizontally placed leaves. There are about 450 species of acacia widely scattered over the warmer regions of the globe. They abound in Australia and Africa. Various species yield gum. True gum-arabic is the product of Acacia Senegal, abun- dant in both east and west tropical Africa. Acacia arabica is the gum-arabic tree of India, but yields a gum inferior to the true gum-arabic. An astringent medicine, called catechu (q.v.) or cutch, is procured from several species, but more especially from Acacia catechu, by boiling down the wood and evaporating the solution so as to get an extract. The bark of Acacia arabica, under the name of babul or babool, is used in Scinde for tanning. The bark of various Australian species, known as wattles, is also very rich in tannin and forms an important article of export. Such are Acacia pycnantha, golden wattle, A. decurrens, tan wattle, and A. dealbata, silver wattle. The pods of Acacia nilotica, under the name of neb-neb, and of other African species

Acacia Senegal, flowering branch, natural size (after A. Meyer and Schumann). From Strasburger's Lehrbuch der Botanik.

are also rich in tannin and used by tanners. The seeds of Acacia niopo are roasted and used as snuff in South America. Some species afford valuable timber; such are Acacia melan- oxylon, black wood of Australia, which attains a great size; its wood is used for furniture, and takes a high polish ; and Acacia komalophylla (also Australian), myall wood, which yields a fragrant timber, used for ornamental

purposes. Acacia formosa supplies the valuable Cuba timber called sabicu. Acacia seyal is supposed to be the shittah tree of the Bible, which supplied shittim-wood. Acacia heterophylla, from Mauritius and Bourbon, and Acacia koa from the Sandwich Islands are also good timber trees. The plants often bear spines, especially those growing in arid districts in Australia or tropical and South Africa. These sometimes represent branches which have become short, hard and pungent, or sometimes leaf-stipules. Acacia armata is the kangaroo-thorn of Australia, A. giraffae, the African camel- thorn. In the Central American Acacia sphaerocephala (bull- thorn acacia) and A. spadicigera, the large thorn-like stipules are hollow and afford shelter for ants, which feed on a secretion of honey on the leaf-stalk and curious food-bodies at the tips of the leaflets; in return they protect the plant against leaf-cutting insects. In common language the term Acacia is often applied to species of the genus Robihia (q.v.) which / belongs also to the

Leguminous family, but is placed in a different section. Robinia Pseud-acacia, or false acacia, is cultivated in the milder parts of Britain, and forms a large tree, with beautiful pea-like blossoms. The tree is sometimes called the locust tree.

ACADEMIES. The word “academy” is derived from “the olive grove of Academe, Plato’s retirement, ” the birthplace of the Academic school of philosophy (see under Academy, Greek). The schools of Athens after the model of the Academy continued to flourish almost without a break for nine centuries till they were abolished by a decree of Justinian. It was not without significance in tracing the history of the word that Cicero gave the name to his villa near Puteoli. It was there that he entertained his cultured friends and held the symposia which he afterwards elaborated in Academic Questions and other philosophic and moral dialogues.

“Academy,” in its modern acceptation, may be defined as a society or corporate body having for its object the cultivation and promotion of literature, of science and of art, either sever- ally or in combination, undertaken for the pure love of these pursuits, with no interested motive. Modern academies, more- over, have, almost without exception, some form of public recognition; they are either founded or endowed, or subsidized, or at least patronized, by the sovereign of the state. The term ” academy ” is very loosely used in modern times; and,

in essentials, other bodies with the title of ” society ” or ” college,” or even ” school; ” often embody the same idea; we are only concerned here, however, with those which, bearing the title of academy, are of historical importance in their various spheres.

Early History. — The first academy, as thus defined, though it might with equal justice claim to- be the first of universities, was the museum of Alexandria founded at the beginning of the 3rd century B.C. by the first of the Ptolemies. There all the sciences then known were pursued, and the most learned men of Greece and of the East gathered beneath its spacious por- ticos. Here, too, was the nucleus of the famous library of Alexandria.

Passing over the state institute for the promotion of science founded at Constantinople by Caesar Bardas in the 9th century, and the various academies established by the Moors at Granada, at Corduba and as far east as Samarkand, we come to the academy over which Alcuin presided, a branch of the School of the Palace established by Charlemagne in 782. This academy was the prototype of the learned coteries of Paris which Moliere afterwards satirized. It took all knowledge for its province; it included the learned priest and the prince who could not write his own name, and it sought to solve all problems by witty definitions.

The David of Alcuin’s academy (such was the name that the emperor assumed) found no successors or imitators, and the tradition of an Oxford academy of Alfred the Great has been proved to rest on a forgery. The academy of arts founded at Florence in 1270 by Brunetto Latini was short-lived and has left no memories, and modern literary academies may be said to trace their lineage in direct descent from the troubadours of the early 14th century. The first Floral Games were held at Tou- louse in May 1324, at the summons of a gild of troubadours, who invited ” honourable lords, friends and companions who possess the science whence spring joy, pleasure, good sense, merit and politeness ” to assemble in their garden of the ” gay science ” and recite their works. The prize, a golden violet, was awarded to Vidal de Castelnaiidary for a poem to the glory of the Virgin. In spite of the English invasion and other adversities the Floral Games survived till, about the year 1500, their permanence was secured by the munificent bequest of Clemence Isaure, a rich lady of Toulouse. In 1694 the AcadSmie its Jeux Floraux was constituted an academy by letters patent of Louis XIV. ; its statutes were reformed and the number of members raised to 36. Suppressed during the Revolution it was revived in 1806, and still continues to award amaranths of gold and silver lilies, for which there is keen competition.

Provence led the way, but Italy of the Renaissance is the soil in which academies most grew and flourished. The Accademia

1.4

Pontaniana, to give it its subsequent title, was founded at Flor- ence in 1433 by Antonio Beccadelli of Palermo and fostered by Lauren tius Valla. Far more famous was the Accademia Pla- tonica, founded c. 1442 by Cosimo de' Medici, which numbered among its members Marsilio Ficino, Pico della Mirandola, Machia- velli and Angelo Poliziano. It was, as the name implies, chiefly occupied with Plato, but it added to its objects the study of Dante and the purification of the Italian language, and though it lived for barely half a century, yet its influence as a model for similar learned societies was great and lasting.

Modern Academics. — Academies have played an important part in the revival of learning and in the birth of scientific inquiry. They mark an age of aristocracies when letters were the distinction of the few and when science had not been differ- entiated into distinct branches, each with its own specialists. Their interest is mainly historical, and it cannot be maintained that at the present day they have much direct influence on the advancement of learning either by way of research or of publi- cation. For example, the standard dictionaries of France, Germany and England are the work, not of academies, but of individual scholars, of Littre, Grimm and Murray. Matthew Arnold's plea for an English academy of letters to save his countrymen from the note of vulgarity and provinciality has met with no response. Academies have been supplanted, socially by the modern club, and intellectually by societies devoted to special branches of science. Those that survive from the past serve, like the Heralds' College, to set an official stamp on literary and scientific merit. The principal academies of Europe, past and present, may be dealt with in various classes, according to the subjects to which they are devoted.

I. Scientific Academies

Austria. — The Kaiserliche Akademie der Wissenschaften. at Vienna, originally projected by Leibnitz, was founded by the emperor Ferdinand I. in 1846, and has two classes — mathe- matics and natural science, and history and philology.

Belgium and the Netherlands. — A literary society was founded at Brussels in 1769 by Count Cobenzl, the prime minister of Maria Theresa, which after various changes of name and con- stitution

became in 1816 the AcadSmie imperiale et royale des sciences et belles-lettres, under the patronage of William I. of the Netherlands. It has devoted itself principally to natural his- tory and antiquities. The Royal Institute of the Low Countries was founded in 1808 by King Louis Bonaparte. It was replaced in 1 85 1 by the Royal Academy of Sciences at Amsterdam, to which in 1856 a literary section was added.

Denmark. — The Kongelige danske videnskabernes selskab (Royal Academy of Sciences) at Copenhagen owes its origin to Christian VI., who in 1742 invited six Danish numismatists to arrange his cabinet of medals. Historians and antiquaries were called in to assist at the sittings, and the commission developed into a sort of learned club. The king took it under his protec- tion, enlarged its scope by the addition of natural history, physics and mathematics, and in 1743 constituted it a royal academy with an endowment fund.

France. — The old Academie des sciences had the same origin as the more celebrated AcadSmie francaise. A number of men of science had for some thirty years met together, first at the house of P. Marsenne, then at that of Montmort, a member of the Council of State, afterwards at that of Melchisedec Thevenot, the learned traveller. It included Descartes, Gassendi, Blaise and Etienne Pascal. Hobbes, the author of Leviathan, was presented to it during his visit to Paris in 1640. Colbert con- ceived the idea of giving an official status to this learned club. A number of chemists, physicians, anatomists and eminent mathematicians, among whom were Christian Huyghens and Bernard Frenicle de Bessy (1605-1675), the author of a famous treatise on magic squares, were chosen to form the nucleus of the new society. Pensions were granted by Louis XIV. to each of the members, and a fund for instruments and experiment was placed at their disposal. They began their session on the 22nd of December 1666 in the Royal Library, meeting twice &

week — the mathematicians on Wednesdays, the physicists on Saturdays. Duhamel was appointed permanent secretary, a post he owed more to his polished Latinity than to his scientific attainments, all the proceedings of the society being recorded in Latin, and C. A. Couplet was made treasurer. At first the academy was rather a laboratory and observatory than an academy proper. Experiments

were undertaken in common and results discussed. Several foreign savants, in particular the Danish astronomer Roemer, joined the society, attracted by the liberality of the Grand Monarque; and the German physi- cian and geometer Tschirnhausen and Sir Isaac Newton were made foreign associates. The death of Colbert, who was suc- ceeded by Louvois, exercised a disastrous effect on the fortunes of the academy. The labours of the academicians were diverted from the pursuit of pure science to such works as the construc- tion of fountains and cascades at Versailles, and the mathema- ticians were employed to calculate the odds of the games of lansquenet and basset. In 1699 the academy was reconstituted by Louis Phelypeaux, comte de Pontchartrain, under whose department as secretary of state the academies came. By its new constitution it consisted of twenty-five members, ten honorary, men of high rank interested in science, and fifteen pensionaries, who were the working members. Of these three were geometricians, three astronomers, three mechanicians, three anatomists, and three chemists. Each of these three had two associates, and, besides, each pensionary had the privilege of naming a pupil. There were eight foreign and four free associates. The officers were, a president and a vice-president, named by the king from among the honorary members, and a secretary and treasurer chosen from the pensionaries, who held office for life. Fontenelle, a man of wit, and rather a popularizer of science than an original investigator, succeeded Duhamel as secretary. The constitution was purely aristocratical, differing in that respect from that of the French Academy, in which the principle of equality among the members was never violated. Science was not yet strong enough to dispense with the patronage of the great. The two leading spirits of the academy at this period were Clairault and Reaumur. To trace the subsequent fortunes of this academy would be to write the history of the rise and progress of science in France. It has reckoned among its members Laplace, Buffon, Lagrange, D'Alembert, Lavoisier, and Jussieu, the father of modern botany. On the 21st of December 1792 it met for the last time, and it was suppressed with its sister academies by the act of the Convention on the 8th of April 1793. Some of its members were guillotined, some were imprisoned, more were reduced to poverty. The aristo- cracy of talent was almost as much detested and persecuted by the Revolution as that of rank.

In 1795 the Convention decided on founding an Institut National which was to replace all the academies, and its first class corresponded closely to the old academy of sciences. In 1816 the Academie des sciences was reconstituted as a branch of the Institute. The new academy has reckoned among its members, besides many

other brilliant men, Carnot the engineer, the physicists Fresnel, Ampere, Arago, Biot, the chemists Gay- Lussac and Thenard, the zoologists G. Cuvier and the two Geoffroy Saint- Hilaires. In France there were also considerable academies in most of the large towns. Montpellier, for example, had a royal academy of sciences, founded in 1706 by Louis XIV., on nearly the same footing as that of Paris, of which, indeed, it was in some measure the counterpart. It was reconstituted in 1847, and organized under three sections — medicine, science and letters. Toulouse also has an academy, founded in 1640, under the name of Societe de lanternistes; and there were analo- gous institutions at Nimes, Aries, Lyons, Dijon, Bordeaux and elsewhere.

Germany. — The Collegium Curiosum was a scientific society, founded by J. C. Sturm, professor of mathematics and natural philosophy in the university of Altorf, in Franconia, in 1672, on the plan of the Accademia del Cimento. It originally consisted of twenty members, and continued to flourish long after the death of its founder. The early labours of the society were

devoted to the repetition (under varied conditions) of the mosi notable experiments of the day, or to the discussion of the re- sults. Two volumes (1676-1685) of proceedings were published by Sturm. The former, Collegium Experimental sive Curiosum, begins with an account of the diving-bell, “a new invention”; next follow chapters on the camera obscura, the Torricellian experiment, the air-pump, microscope, telescope, &c.

The Akademie der Wissenschaften zu Berlin, if judged by the work it has produced, holds the first place in Germany. Its origin was the Societas Regia Scientiarum, constituted in 1 700 by Frederick I. on the comprehensive plan of Leibnitz, who was its first president. Hampered and restricted under Frederick William I., it was reorganized under Frederick II. on the French model furnished by Maupertuis, and received its present con- stitution in 181 2. It is divided into two classes and four sections — physical and mathematical, philosophical and historical. Each section has a permanent secretary with a salary of 1200 marks, and each of the 50 regular members is paid 600 marks a year. Among the contributors to its transactions (first volume published in 17 10), to name only the dead, we find Immanuel Bekker, Bockling, Bernoulli, F. Bopp, P. Buttmann, Encke (of comet fame), L. Euler, the brothers Grimm, the two Humboldts, Lachmann, Lagrange, Leibnitz, T. Mommsen, J. Miiller, G. Niebuhr, C. • Ritter (the geographer), Savigny and Zumpt. Frederick II. presented in 1768.4 Dissertation on Ennui. To the Berlin Academy we owe the

Corpus Inscriptionum Grae- carum, the Corpus Inscriptionum Latinarum, and the Monumenta Germaniae Historica.

The Akademie der Wissenschaften zu Mannheim was founded by the elector Palatine in 1755. Since 1780 it has devoted itself specially to meteorology, and has published valuable observa- tions under the title of Ephemerides Societatis Meteor ologicae Theodoro-Palatinae.

The Bavarian Akademie der Wissenschaften zu Mtinchen was founded in 1759. It is distinguished from other academies by the part it has played in national education. Maximilian Joseph, the enlightened elector (afterwards king) of Bavaria, induced the government to hand over to it the organization and super- intendence of public instruction, and this work was carried out by Privy-councillor Jacobi, the president of the academy. In recent years the academy has specially occupied itself with natural history.

The Konigliche Akademie der Wissenschaften, at Erfurt, which dates from 1754 and devotes itself to applied science, and the Hessian academy of sciences at Giessen, which publishes medical transactions, also deserve mention.

Great Britain and Ireland. — In 1616 a scheme for founding a royal academy was started by Edmund Bolton, an eminent scholar and antiquary, who in his petition to King James I., which was supported by George Villiers, marquis of Buckingham, proposed that the title of the academy should be “King James, his Academe or College of honour.” A list of the proposed original members is still extant, and includes the names of George Chapman, Michael Drayton, Ben Jonson, John Selden, Sir Kenelm Digby and Sir Henry Wotton. The constitution is of interest as reflecting the mind of the learned king. The academy was to consist of three classes, — tutelaries, who were to be Knights of the Garter, auxiliaries, all noblemen or ministers of state, and the essentials, “called from out of the most famous lay gentlemen of England, and either living in the light of things, or without any title of profession or art of life for lucre.” Among other duties to be assigned to this academy was the licensing of all books other than theological. The death of King James put an end to the undertaking. In 1635 a second attempt to found an academy was made under the patronage of Charles I., with the title of “Minerva’s Museum,” for the instruction of young noblemen in the liberal arts and sciences, but the project was soon dropped. (For the “British Academy” see III. below.) About 1645 the more ardent followers of Bacon used to meet, some in London, some at Oxford, for the discussion of subjects connected with experimental science. This was

the original oi the Royal Society (q.v.), which received its charter in 1663.

A society was formed in Dublin, similar to the Royal Society in London, as early as 1683; but the distracted state of the country proved unpropitious to the cultivation of philosophy and literature. The Royal Irish Academy grew from a society established in Dublin about 1782 by a number of gentlemen, most of whom belonged to the university. They held weekly meetings, and read, in turn, essays on various subjects. They professed to unite the advancement of science with the history of mankind and polite literature. The first volume of transac- tions appeared in 1788.

Hungary. — The Magyar Tudomdnyos Akademia (Hungarian Academy of Sciences) was founded in 1825 by Count Stephen Szechenyi for the encouragement of the study of the Hungarian language and the various sciences. It has about 300 members and a fine building in Budapest containing a picture gallery and housing various national collections.

Italy.ˆ-The Academia Secretorum Naturae was founded at Naples in 1 560 by Giambattista della Porta. It arose like the French Academy from a little club of friends who met at della Porta ‘s house and called themselves the Otiosi. The condition of membership was to have made some discovery in natural science. Della Porta was suspected of practising the black arts and summoned to Rome to justify himself before the papal court. He was acquitted by Paul V., but commanded to close his academy.

The Accademia dci Lincei, to which della Porta was admitted when at Rome, and of which he became the chief ornament, had been founded in 1603 by Federigo Cesi, the marchese di Monti- celli. Galileo and Colonna were among its earliest members. Its device was a lynx with upturned eyes, tearing a Cerberus with its claws. As a monument the Lincei have left the magni- ficent edition of Fernandez de Oviedo’s Natural History of Mexico (Rome, 1651, fol.), printed at the expense of the founder and elaborately annotated by the members. This academy was resuscitated in 1870 under the title of Reale Accademia dei Lincei, with a literary as well as a scientific side, endowed in 1878 by King Humbert; and in 1883 it received official recog- nition from the Italian government, being lodged in the Corsini palace, whose

owner made over to it his library and collections.

The Accademia del Cimento was founded at Florence in 1657 by Leopold de' Medici, brother of the grand duke Ferdinand II., at the instigation of Vincenzo Viviani, the geometrician. It was an academy of experiment, a deliberate protest against the deductive science of the quadrivium. Its founder left it when he was made a cardinal, and it lasted only ten years, but the grand folio published in Italian (afterwards translated into Latin) in 1667 is a landmark in the history of science. It contains ex- periments on the pressure of the air (Torricelli and Borelli were among its members), on the incompressibility of water and on universal gravity.

Science in Italy is now represented by the Reale Accademia idle Scienze (Royal Academy of Sciences), founded in 1757 as a private society, and incorporated under its present name by royal warrant in 1783. It consists of 40 full members, who must be residents of Turin, 20 non-resident, and 20 foreign members. It publishes a yearly volume of proceedings and awards prizes to learned works. There are, besides, royal academies of science at Naples, Lucca and Palermo.

Portugal. — The Academia Real das Sciencias (Royal Academy of Sciences) at Lisbon dates from 1779. It was reorganized in 185 1 and since then has been chiefly occupied in the publication of Portugaliae Monumenta Historica.

Russia. — The Academie Imperiale des sciences de Saint- Peters- bourg, Imperatorskaya Akademiya natik, was projected by Peter the Great. The advice of Wolff and Leibnitz was sought, and several learned foreigners were invited to become members. Peter himself drew the plan, and signed it on the 10th of February 1724; but his sudden death delayed its fulfilment. On the 21st of December 1725, however, Catherine I. established it according to his plan, and on the 27th the society met for the first time. On the 1st of August 1726, Catherine honoured the meeting with her presence, when Professor G. B. Bilfinger, a

German scientist, delivered an oration upon the determination of magnetic variations and longitude. Shortly afterwards the empress settled a fund of £4982 per annum for the support of the academy; and 15 eminent members were admitted and pensioned, under the title of professors in the various branches of science and literature. The most distinguished of these were Nicholas and Daniel Bernouilli, the two Delisles, Bilfinger, and Wolff.

During the short reign of Peter II. the salaries of members were discontinued, and the academy neglected by the Court; but it was again patronized by the empress Anne, who added a seminary under the superintendence of the professors. Both institutions flourished for some time under the direction of Baron Johann Albrecht Korff (1697-1766). At the accession of Elizabeth the original plan was enlarged and improved; learned foreigners were drawn to St Petersburg; and, what was considered a good omen for the literature of Russia, two natives, Lomonosov and Rumovsky, men of genius who had prosecuted their studies in foreign universities, were enrolled among its members. The annual income was increased to £10,659, and sundry other advantages were conferred upon the institution. Catherine II. utilized the academy for the advance- ment of national culture. She altered the court of directors greatly to the advantage of the whole body, corrected many of its abuses, added to its means, and infused a new vigour and spirit into its researches. By her recommendation the most intelligent professors visited all the provinces of her vast do- minions, with most minute and ample instructions to investigate the natural resources, conditions and requirements, and report on the real state of the empire. The result was that no country at that time could boast, within so few years, such a number of excellent official publications on its internal state, its natural productions, its topography, geography and history, and on the manners, customs and languages of the different tribes that inhabited it, as came from the press of this academy. In its researches in Asiatic languages, oriental customs and religions, it proved itself the worthy rival of the Royal Asiatic Society in England. The first transactions, Commentarii Academiae Scientiarum Imperialis Petropolitanae ad annum 1726, with a dedication to Peter II., were published in 1728. This was con- tinued until 1747, when the transactions were called Novi Commentarii Academiae, &c; and in 1777, Acta Academiae Scientiarum Imperialis Petropolitanae, with some alteration in the arrangements and plan of the work. The papers, hitherto in Latin only, were now written indifferently in Latin or in French, and a preface added, Partie Historique, which contains an ac- count of the society's meetings. Of the Commentaries, fourteen volumes were published: of the New Commentaries (17 50-1 776) twenty. Of the Acta Academiae two volumes are printed every year. In 1872 there was published at St Petersburg in 2 vols,, Tableau gineral des matieres contenues dans les publications de V Acadimie Imperiale des Sciences de St Petersbourg. The academy is composed, as at first, of fifteen professors, besides the president and director. Each of the professors has a house and an annual stipend of from £200 to £600. Besides the pro- fessors, there are four pensioned adjuncts, who are

present at the meetings of the society, and succeed to the first vacancies. The buildings and apparatus of this academy are on a vast scale. There is a fine library, of 36,000 books and manuscripts; and an extensive museum, considerably augmented by the collections made by Pallas, Gmelin, Guldenstadt and other professors, during their expeditions through the Russian empire. The motto of the society is Paulatim.

Spain. — The Real Academia Espanola at Madrid (see below) had a predecessor in the Academia Naturae curiosorum (dating from 1657) modelled on that of Naples. It was reconstituted in 1847 after the model of the French academy.

Sweden. — The Kongliga Svenska Velenskaps Akademien owes its institution to six persons of distinguished learning, among whom was Linnaeus. They met on the 2nd of June 1739, and formed a private society, the Collegium Curiosorum; and at the end of the year their first publication made its appearance.

As the meetings continued and the members increased the society attracted the notice of the king; and on the 31st of March 1741 it was incorporated as the Royal Swedish Academy. Though under royal patronage and largely endowed, it is, like the Royal Society in England, entirely self-governed. Each of the members resident at Stockholm becomes in turn president, and continues in office for three months. The dissertations read at each meeting are published in the Swedish language, quarterly, and make an annual volume. The first forty volumes, octavo, completed in 1779, are called the Old Transactions.

United States of America. — The oldest scientific association in the United States is the American Philosophical Society Held at Philadelphia for Promoting Useful Knowledge. It owed its origin to Benjamin Franklin, who in 1743 published ” A Proposal for Promoting Useful Knowledge among the British Plantations in America,” which was so favourably received that in the same year the society was organized, with Thomas Hopkinson (1709-1751) as president and Franklin as secretary. In 1769 it united with another scientific society founded by Franklin, called the Anlerican Society Held at Philadelphia for Promoting Useful Knowledge, and adopted its present name, adding the descriptive phrase from the title of the American Society,

and elected Franklin president, an office which he held until his death (1790). The American Philo- sophical Society is national in scope and is exclusively scien- tific; its Transactions date from 1771, and its Proceedings from 1838. It has a hall in Philadelphia, with meeting-rooms and a. valuable library and collection of interesting portraits and relics. David Rittenhouse was its second and Thomas Jefferson was its third president. In 1786 John Hyacinth de Magellan, of London, presented a fund, the income of which was to supply a gold medal for the author of the most important discovery " relating to navigation, astronomy or natural philosophy (mere natural history excepted)." An annual general meeting is held.

The American Academy of Arts and Sciences (Boston), the second oldest scientific organization in the United States, was chartered in Massachusetts in 1780 by some of the most promi- nent men of that time. James Bowdoin was its first president, John Adams its second. The Academy published Memoirs beginning in 1785, and Proceedings from 1846. The Rumford Premium awarded through it for the most " important discovery or useful improvement on Heat, or on Light " is the income of $5000 given to the Academy by Count Rumford.

The National Academy of Sciences (1863) was incorporated by Congress with the object that it " shall, whenever called upon by any department of the Government, investigate, examine, experiment and report upon any subject of science or art." Its membership was first limited to 50; after the amendment of the act of incorporation in 1870 the limit was placed at 100; and in 1907 it was prescribed that the resident membership should not exceed 1 50 in number, that not more than 10 members be elected in any one year, and that the number of foreign associates be restricted to 50. The Academy is divided into six committees: mathematics and astronomy; physics and en- gineering; chemistry; geology and palaeontology; biology; and anthropology. It gives several gold medals for meritorious researches and discoveries. It publishes scientific monographs (at the expense of the Federal Government) . Its presidents have been Alexander D. Bache, Joseph Henry, Wm. B. Rogers, Othniel C. Marsh, Wolcott Gibbs, Alexander Agassiz and Ira Remsen.

The Academy of Natural Sciences of Philadelphia was or- ganized in 181 2. It has a large library, very rich in natural history, and its museum, with nearly half a million specimens, is particularly strong in conchology and ornithology. The society has published Journals since 1817, and Proceedings since 1 841; it also has published the American Journal of Conchology. The American Entomological Society (in 1 859-1 867 the Entomo- logical Society of Philadelphia, and since 1876

part of this academy) has published Proceedings since 1861, and the Entomo- logical News (a monthly).

There are also other scientific organizations like the American Association for the Advancement of Science (chartered in 1874, as a continuation of the American Association of Geologists, founded in 1840 and becoming in 1842 the American Association of Geologists and Naturalists), which publishes its Proceedings annually; the American Geographical Society (1852), with headquarters in New York; the National Geographic Society (1888), with headquarters in Washington, D.C.; the Geological Society of America (1888), the American Ornithologists' Union (1883), the American Society of Naturalists (1883), the Botanical Society of America (1893), the American Academy of Medicine (1876); and local academies of science, or of special sciences, in many of the larger cities. The Smithsonian Institution at Washington is treated in a separate article.

II. Academies of Belles Lettres

Belgium. — Belgium has always been famous for its literary societies. The little town of Diest boasts that it possessed a society of poets in 1302, and the Catherinists of Alost date from 1 107. It is at least certain that numerous Chambers of Rhetoric (so academies were then called) existed in the first years of the rule of the house of Burgundy.

France. — The French Academy (I'Acade'mie franqaise) was established by order of the king in the year 1635, but in its original form existed four or five years earlier. About the year 1629 certain literary friends in Paris agreed to meet informally each week at the house of Valentin Courart, the king's secretary. The conversation turned mostly on literary topics; and when one of the number had finished some literary work, he read it to the rest, and they gave their opinions upon it. The fame of these meetings, though the members were bound to secrecy, reached the ears of Cardinal Richelieu, who promised his protection and offered to incorporate the society by letters patent. Nearly all the members would have preferred the charms of privacy, but, considering the risk they would run in incurring the cardinal's displeasure, and that by the letter of the law all meetings of any sort were prohibited, they expressed their gratitude for the high honour the cardinal thought fit to confer on them, proceeded at once to organize their body, settle their laws and constitution, appoint officers and choose a name. Letters patent were granted by the king on the 29th of January 1635. The officers consisted of a director and a chancellor, chosen by lot, and a permanent secretary, chosen by vote. They elected also a publisher,

not a member of the body. The director presided at the meetings, being considered as primus inter pares. The chancellor kept the seals and sealed all the official documents of the academy. The cardinal was ex officio protector. The meetings were held weekly as before.'

The object for which the academy was founded, as set forth in its statutes, was the purification of the French language. " The principal function of the academy shall be to labour with all care and diligence to give certain rules to our language, and to render it pure, eloquent and capable of treating the arts and sciences " (Art. 24). They proposed " to cleanse the language from the impurities it has contracted in the mouths of the common people, from the jargon of the lawyers, from the mis- usages of ignorant courtiers, and the abuses of the pulpit" {Letter of A cademy to Cardinal Richelieu) .

The number of members was fixed at forty. The original members formed a nucleus of eight, and it was not till 1639 that the full number was completed. Their first undertaking con- sisted of essays written by the members in rotation. To judge by the titles and specimens which have come down to us, these possessed no special originality or merit, but resembled the hnSdˆeis of the Greek rhetoricians. Next, at the instance of Cardinal Richelieu, they undertook a criticism of Corneille's Cid, the most popular work of the day. It was a rule of the academy that no work could be criticized except at the author's request, and fear of incurring the cardinal's displeasure wrung from Corneille an unwilling consent. The critique of the academy was re-written several times before it met with the cardinal's approbation. After six months of elaboration, it was published

under the title, Sentiments de Vacadimie fransaise sur le Cid. This judgment did not satisfy Corneille, as a saying attributed to him on the occasion shows. "Horalius," he said, referring to his last play, " was condemned by the Duumviri, but he was absolved by the people." But the crowning labour of the academy, begun in 1639, was a dictionary of the French language. By the twenty-sixth article of their statutes, they were pledged to compose a dictionary, a grammar, a treatise on rhetoric and one on poetry. Jean Chapelain, one of the original members and leading spirits of the academy, pointed out that the diction- ary would naturally be the first of these works to be undertaken, and drew up a plan of the work, which was to a great

extent carried out. A catalogue was to be made of all the most approved authors, prose and verse: these were to be distributed among the members, and all approved words and phrases were to be marked for incorporation in the dictionary. For this they resolved themselves into two committees, which sat on other than the regular days. C. F. de Vaugelas was appointed editor in chief. To remunerate him for his labours, he received from the cardinal a pension of 2000 francs. The first edition of this dictionary appeared in 1694, the sixth and last in 1835, since when complements have been added.

This old Academie jranqaise perished with the other pre-revolutionary academies in 1793, and it has little but the name in common with the present academy, a section of the Institute. That Jean Baptfste Suard, the first perpetual secretary of the new, had been a member of the old academy, is the one con- necting link.

The chronicles of the Institute down to the end of 1895 have been given in full by the count de Franqueville in Le premier siecle de I'lnstitut de France, and from it we extract a few lead- ing facts and dates. Before the Revolution there were in exist- ence the following institutions: — (1) the Acadimie de poesie et de musique, founded by Charles IX. in 1570 at the instigation of Baif, which counted among its members Ronsard and most of the Pleiade; (2) the Acadimie des inscriptions el medailles, founded in 1701; (3) the Academie des inscriptions et belles- lettres; (4) the old Academie des sciences; (5) the Acadimie de peinture et de sculpture, a school as well as an academy; (6) the Academie d' architecture.

The object of the Convention in 1795 was to rebuild all the institutions that the Revolution had shattered and to combine them in an organic whole; in the words of the preamble: — " II y a pour toute la Ripublique un Institut national charge de recueiller les dicouvertes, de perfeclionner les arts el les sciences." As Renan has remarked, the Institute embodied two ideas, one disputable, the other of undisputed truth: — That science and art are a state concern, and that there is a solidarity between all branches of knowledge and human activities. The Institute was at first composed of 184 members resident in Paris and an equal number living in other parts of France, with 24 foreign members, divided into three classes, (1) physical and mathe- matical science, (2) moral and political science, (3) literature and the fine arts. It held its first sitting on the 4th of April 1796. Napoleon as first consul suppressed the second class, as subversive of government, and reconstituted the other classes as follows: (1) as before, (2) French language and literature, (3) ancient history and literature, (4) fine arts. The class of moral and political science was restored on the

proposal of M. Guizot in 1832, and the present Institute consists of the five classes named above. Each class or academy has its own special jurisdiction and work, with special funds; but there is a general fund and a common library, which, with other common affairs, are managed by a committee of the Institute — two chosen from each academy, with the secretaries. Each member of the Institute receives an annual allowance of 1 200 francs, and the secretaries of the different academies have a, salary of 6000 francs.

The class of the Institute which deals with the language and literature takes precedence, and is known as the Acadimie jrancaise. There was at first no perpetual secretary, each secretary of sections presiding in turn. Shortly afterwards

J. B. Suard was elected to the post, and ever since the history of the academy has been determined by the reigns of its succes- sive perpetual secretaries. The secretary, to borrow an epigram of Sainte-Beuve, both reigns and governs. There have been in order: Suard (13 years), Francois Juste Raynouard (9 years), Louis Simon Auger, Francois Andrieux, Arnault, Villemain (34 years), Henri Joseph Patin, Charles Camille Doucet (19 years), Gaston Boissier. Under Raynouard the academy ran a tilt against the abb6 Delille and his followers. Under Augˆr it did battle with romanticism, ” a new literary schism.” Auger did not live to see the election of Lamartine in 1829, and it needed ten more years for Victor Hugo after many vain assaults to enter by the breach. The academy is professedly non-political. It accepted and even welcomed in succession the empire, the restoration and the reign of Louis Philippe, and it tolerated the republic of 1848; but to the second empire it offered a passive resistance, and no politician of the second empire, what- ever his gifts as an orator or a writer, obtained an armchair. The one seeming exception, Emile Ollivier, confirms the rule. He was elected on the eve of the Franco-German war, but his discours de reception, a eulogy of the emperor, was deferred and never delivered. The Institute appears in the annual budget for a grant of about 700,000 fr. It has also large vested funds in property, including the magnificent estate and library of Chantilly bequeathed to it by the due d’Aumale. It awards various prizes, of which the most considerable are the Montyon prizes, each of 20,000 fr., one for the poor Frenchman who has performed the most virtuous action during the year, and one for the French author who has published the book of most service to morality. The conditions are liberally interpreted; the first prize is divided among a number of the deserving poor, and the second has been assigned for lexicons to Moliere, Corneille and Madame de Sevigne.

One alteration in the methods of the French Academy has to be chronicled: in 1859 it became the custom to discuss the claims of the candidates at a preliminary meeting of the members. In 1880, on the instance of the philosopher Caro, supported by A. Dumas, fils, and by the aged Desire Nisard, it was decided to abandon this method.

A point of considerable interest is the degree in which, since its foundation, the French Academy has or has not represented the best literary life of France. It appears from an examination of the lists of members that a surprising number of authors of the highest excellence have, from one cause or another, escaped- the honour of academic " immortality." When the academy, was founded in 1634, the moment was not a very brilliant one in French letters. Among the forty original members we find: only ten who are remembered in literary history; of these four may reasonably be considered famous still — Balzac, Chapelain, Racan and Voiture. In that generation Scarron was never one of the forty, nor do the names of Descartes, Malebranche or Pascal occur; Descartes lived in Holland, Scarron was paralytic, Pascal was best known as a mathematician — (his Lettres pro- vincioles was published anonymously) — and when his fame was rising he retired to Port Royal, where he lived the life of a recluse. The due de la Rochefoucauld declined the honour from a proud modesty, and Rotrou died too soon to be elected. The one astounding omission of the 17 th century, however, is the name of Moliere, who was excluded by his profession as an actor. 1 On the other hand, the French Academy was never more thoroughly representative of letters than when Boileau, Corneille, La Fontaine, Racine, and Quinault were all members. Of the great theologians of that and the subsequent age, the Academy contained Bossuet, Flechier, Fenelon, and Massillon, but not Bourdaloue. La Bruyere and Fontenelle were among the forty, but not Saint-Simon, whose claims as a man of letters were unknown to his contemporaries. Early in the 18th century almost every literary personage of eminence found his place naturally in the Academy. The only exceptions of importance

1 The Academy has made the amende honorable by placing in the Salle des stances a bust of Moliere, with the inscription "Rienne manque a sa gloire, il manquait d, la notre."

were Vauvenargues, who died too early for the honour, and two men of genius but of dubious social position, Le Sage and the abbe Prevost

d'Exiles. The approach of the Revolution affected gravely the personnel of the Academy. Montesquieu and Voltaire belonged to it, but not Rousseau or Beaumarchais. Of the Encyclopaedists, the French Academy opened its doors to D'Alembert, Condorcet, Volney, Marmontel and La Harpe, but not to Diderot, Rollin, Condillac, Helvetius or the Baron d'Holbach. Apparently the claims of Turgot and of Quesnay did not appear to the Academy sufficient, since neither was elected. In the transitional period, when the social life of Paris was distracted and the French Academy provisionally closed, neither Andre Chenier nor Benjamin Constant nor Joseph de Maistre became a member. In the early years of the 19th century considerations of various kinds excluded from the ranks of the forty the dissimilar names of Lamennais, Prudhon, Comte and Bdranger. Critics of the French Academy are fond of point- ing out that neither Stendhal, nor Balzac, nor Theophile Gautier, nor Flaubert, nor Zola penetrated into the Mazarine Palace. It is not so often remembered that writers so academic as Thierry and Michelet and Quinet suffered the same exclusion. In later times neither Alphonse Daudet nor Edmond de Goncourt, neither Guy de Maupassant nor Ferdinand Fabre, has been among the forty immortals. The non-election, after a long life of distinc- tion, of the scholar Fustel de Coulanges is less easy to account for. Verlaine, although a poet of genius, was of the kind that no academy can ever be expected to recognize.

Concerning the influence of the French Academy on the lan- guage and literature, the most opposite opinions have been advanced. On the one hand, it has been asserted that it has corrected the judgment, purified the taste and formed the lan- guage of French writers, and that to it we owe the most striking characteristics of French literature, its purity, delicacy and flexi- bility. Thus Matthew Arnold, in his Essay on the Literary Influence of Academies, has pronounced a glowing panegyric on the French Academy as a high court of letters, and a rallying-point for educated opinion, as asserting the authority of a master in matters of tone and taste. To it he attributes in a great measure that thoroughness, that openness of mind, that absence of vulgarity which he finds everywhere in French literature; and to the want of a similar institution in England he traces that eccentricity, that provincial spirit, that coarseness which, as he thinks, are barely compensated by English genius. Thus, too, Renan, one of its most distinguished members, says that it is owing to the academy " qu'on pent tout dire sans appareil scholastique avec la langue des gens du monde." " Ah ne dites," he exclaims, " qu'ils n'ont rien fait, ces obscures beaux esprits dont la vie se passe a instruire le prods des mots, A peser les syllables. lis ont fait un chef-d'asuvre — la langue

franqaise.” On the other hand, its inherent defects have been well summed up by P. Lanfrey in his Histoire de Napoleon: ” This institution had never shown itself the enemy of despotism. Founded by the monarchy and for the monarchy, eminently favourable to the spirit of intrigue and favouritism, incapable of any sustained or combined labour, a stranger to those great works pursued in common which legitimize and glorify the existence of scientific bodies, occupied exclusively with learned trifles, fatal to emulation, which it pretends to stimulate, by the compromises and calcu- lations to which it subjects it, directed in everything by petty considerations, and wasting all its energy in childish tourna- ments, in which the flatteries that it showers on others are only a foretaste of the compliments it expects in return for itself, the French Academy seems to have received from its founders the special mission to transform genius into bel esprit, and it would be hard to produce a man of talent whom it has not demoralized. Drawn in spite of itself towards politics, it alternately pursues and avoids them; but it is specially attracted by the gossip of politics, and whenever it has so far emancipated itself as to go into opposition, it does so as the champion of ancient prejudices. If we examine its influence on the national genius, we shall see that it has given it a flexibility, a brilliance, a polish, which it never possessed before; but it has done so at the expense of its

masculine qualities, its originality, its spontaneity, its vigour, its natural grace. It has disciplined it, but it has emasculated, impoverished and rigidified it. It sees in taste, not a sense of the beautiful, but a certain type of correctness, an elegant form of mediocrity. It has substituted pomp for grandeur, school routine for individual inspiration, elaborateness for simplicity, fadeur and the monotony of literary orthodoxy for variety, the source and spring of intellectual life; and in the works produced under its auspices we discover the rhetorician and the writer, never the man. By all its traditions the academy was made to be the natural ornament of a monarchical society. Richelieu conceived and created it as a sort of superior centralization applied to intellect, as a high literary court to maintain intel- lectual unity and protest against innovation. Bonaparte, aware of all this, had thought of re-establishing its ancient privileges; but it had in his eyes one fatal defect — esprit. Kings of France could condone a witticism even against themselves, a parvenu could not.”

On the whole the influence of the French Academy has been conservative rather than creative. It has done much by its example for style, but its attempts to impose its laws on lan- guage have, from the nature of the case, failed. For, however perfectly a dictionary or a

grammar may represent the existing language of a nation, an original genius is certain to arise — a Victor Hugo or an Alfred de Musset — who will set at defiance all dictionaries and academic rules.

Germany. — Of the German literary academies the most cele- brated was Die Fruchtbringende Gesellschaft (the Fruitful Society), established at Weimar in 161 7. Five princes were among the original members. The object was to purify the mother tongue. The German academies copied those of Italy in their quaint titles and petty ceremonials, and exercised little permanent influence on the language or literature of the country.

Italy. — Italy in the 16th century was remarkable for the number of its literary academies. Tiraboschi, in his History of Italian Literature, has given a list of 171; and Jarkius, in his Specimen Historiae Academiarum Condilarum, enumerates nearly 700. Many of these, with a sort of Socratic irony, gave themselves ludicrous names, or names expressive of ignorance. Such were the Lunatici of Naples, the Estravaganti, the Ful- minales, the Trapessati, the Drowsy, the Sleepers, the Anxious, the Confused, the Unstable, the Fantastic, the Transformed, the Ethereal. ” The first academies of Italy chiefly directed their attention to classical literature; they compared manuscripts; they suggested new readings or new interpretations; they de- ciphered inscriptions or coins, they sat in judgment on a Latin ode or debated the propriety of a phrase. Their own poetry had, perhaps, never been neglected; but it was not till the writings of Bembo furnished a new code of criticism in the Italian language that they began to study it with the same minuteness as modern Latin.” ” They were encouragers of a numismatic and lapidary erudition, elegant in itself, and throwing for ever little specks of light on the still ocean of the past, but not very favourable to comprehensive observation, and tending to bestow on an unprofitable pedantry the honours of real learning.” 1 The Italian nobility, excluded as they mostly were from politics, and living in cities, found in literature a consolation and a career. Such academies were oligarchical in their constitution; they encouraged culture, but tended to hamper genius and extinguish originality. Far the most celebrated was the Accademia della Crusca or Furfuralorum; that is, of bran, or of the sifted, founded in 1582. The title was borrowed from a previous society at Perugia, the Accademia degli Scossi, of the well-shaken. Its device was a sieve; its motto, “II phi bel fior ne coglie ” (it collects the finest flower); its principal object the purification of the language. Its great work was the Vocabulario della Crusca, printed at Venice in 161 2. It was composed avowedly on Tuscan principles, and regarded the 14th century as the Augustan period of the language. Paul Beni assailed it in his Anti-

Crusca, and this exclusive Tuscan purism has disappeared in subsequent editions. The Accademia della Crusca is now incorporated with 1 Hallam's Int. to Lit. of Europe, vol. i. p. 654, and vol. ii. p. 502.

two older societies — the Accademia degll Apatici (the Impartials) and the Accademia Flotenlina.

Among the numerous other literary academies of Italy we may mention the academy of Naples, founded about 1440 by Alphonso, the king; the Academy of Florence, founded 1540, to illustrate and perfect the Tuscan tongue, especially by the close study of Petrarch; the Intronati of Siena, 1525; the Infiammati of Padua, 1534; the Rozzi of Siena, suppressed by Cosimo, 1568.

The Academy of Humorists arose from a casual meeting of witty noblemen at the marriage of Lorenzo Marcini, a Roman gentleman. It was carnival time, and to give the ladies some diversion they recited verses, sonnets and speeches, first im- promptus and afterwards set compositions. This gave them the name, Belli Humori, which, after they resolved to form an academy of belles lettres, they changed to Humoristi.

In 1690 the Accademia degli Arcadi was founded at Rome, for the purpose of reviving the study of poetry, by Crescimbeni, the author of a history of Italian poetry. Among its members were princes, cardinals and other ecclesiastics; and, to avoid disputes about pre-eminence, all came to its meetings masked and dressed like Arcadian shepherds. Within ten years from its establishment the number of academicians was 600.

The Royal Academy of Savoy dates from 17 19, and was made a royal academy by Charles Albert in 1848. Its emblem is a gold orange tree full of flowers and fruit; its motto " Flores fructusque perennes," the same as that of the famous Florimen- tane Academy, founded at Annecy by St Francis de Sales. It has published valuable memoirs on the history and antiquities of Savoy.

Spain. — The Real Academia Espanola at Madrid held its first meeting in July 17 13, in the palace of its founder, the duke d'Escalona. It consisted at first of 8 academicians, including the duke; to which number 14 others were afterwards added, the founder being chosen president or director. In 17 14 the king granted them the royal

confirmation and protection. Their device is a crucible in the middle of the fire, with this motto, Limpia, fixa, y da esplendor — ” It purifies, fixes, and gives bright- ness.” The number of its members was limited to 24; the duke d’Escalona was chosen director for life, but his successors were elected yearly, and the secretary for life. Their object, as marked out by the royal declaration, was to cultivate and im- prove the national language. They were to begin with choosing carefully such words and phrases as have been used by the best Spanish writers; noting the low, barbarous or obsolete ones; and composing a dictionary wherein these might be distinguished from the former.

Sweden. — The Svenska Akademien was founded in 1786, for the purpose of purifying and perfecting the Swedish language. A medal is struck by its direction every year in honour of some illustrious Swede. This academy does not publish its transac- tions.

III. Academies of Archaeology and History

France. — The old Acadimie des inscriptions et belles-lettres (or ” Petite Academie,” founded in 1663) was an offshoot of the French Academy, which then at least contained the Mite of French learning. Louis XIV. was of all French kings the one most occupied with his own aggrandisement. Literature, and even science, he only encouraged so far as they redounded to his own glory. Nor were literary men inclined to assert their independence. Boileau well represented the spirit of the age when, in dedicating his tragedy Berenice to Colbert, he wrote: ” The least things become important if in any degree they can serve the glory and pleasure of the king.” Thus it was that the Academy of Inscriptions arose. At the suggestion of Colbert a company (a committee we should now call it) had been ap- pointed by the king, chosen from the French Academy, charged with the office of furnishing inscriptions, devices and legends for medals. It consisted of four academicians: Chapelain, then considered the poet laureate of France, one of the authors of the critique on the Cid; the abb6 Amable de Bourzeis (1606-

1671); Francois Charpentier (1620-1702), an antiquary of high repute among his contemporaries; and the abbe Jacques de Cassagnes (1636-1679), who owed his appointment more to the fulsome flattery of his odes than to his really learned translations of Cicero and Sallust. This company used to meet in Colbert’s library in the winter, at his country-house at Sceaux in the summer, generally on Wednesdays, to serve the convenience of the minister, who was always present. Their meetings were principally occupied with discussing the inscriptions, statues and pictures intended for the decoration of Versailles; but

Colbert, a really learned man and an enthusiastic collector of manuscripts, was often pleased to converse with them on matters of art, history and antiquities. Their first published work was a collection of engravings, accompanied by descrip- tions, designed for some of the tapestries at Versailles. Louvois, who succeeded Colbert as a superintendent of buildings, revived the company, which had begun to relax its labours. F61ibien, the learned architect, and the two great poets Racine and Boileau, were added to their number. A series of medals was commenced, entitled Midailles de la Grande Histoire, or, in other words, the history of the Grand Monarque.

But it was to M. de Pontchartrain, comptroller-general of finance, and secretary of state, that the academy owed its in- stitution. He added to the company Renaudot and Jacques Tourreil, both men of vast learning, the latter tutor to his son, and put at its head his nephew, the abbe Jean Paul Bignon, librarian to the king. By a new regulation, dated the 16th of July 1 70 1, the Acadimie royale des inscriptions et midailles was instituted, being composed of ten honorary members, ten pensioners, ten associates, and ten pupils. Its constitution was an almost exact copy of that of the Academy of Sciences. Among the regulations we find the following, which indicates clearly the transition from a staff of learned officials to a learned body: ” The academy shall concern itself with all that can contribute to the perfection of inscriptions and legends, of designs for such monuments and decorations as may be submitted to its judg- ment; also with the description of all artistic works, present and future, and the historical explanation of the subject of such works; and as the knowledge of Greek and Latin antiquities, and of these two languages, is the best guarantee for success in labours of this class, the academicians shall apply themselves to all that this division of learning includes, as one of the most worthy objects of their pursuit.”

Among the first honorary members we find the indefatigable Mabillon (excluded from the pensioners by reason of his orders), Pere La Chaise, the king’s confessor, and Cardinal Rohan; among the associates Fontenelle and Rollin, whose Ancient History was submitted to the academy for revision. In 1711 they completed L’Histoire mitallique du roi, of which Saint- Simon was asked to write the preface. In 1716 the regent changed its title to that of the Acadimie des inscriptions et belles- lettres, a title which better suited its new character.

In the great battle between the Ancients and the Moderns which divided the learned world in the first half of the 18th century, the Academy of Inscriptions naturally espoused the cause of the Ancients,

as the Academy of Sciences did that of the Moderns. During the earlier years of the French Revolu- tion the academy continued its labours uninterruptedly; and on the 22nd of January 1793, the day after the death of Louis XVI., we find in the Proceedings that M. Brequigny read a paper on the projects of marriage between Queen Elizabeth and the dukes of Anjou and Alencon. In the same year were published the 45th and 46th vols, of the Mimoires de I'acadSmie. On the 2nd of August of the same year the last stance of the old academy was held. More fortunate than its sister Academy of Sciences, it lost only three of its members by the guillotine. One of these was the astronomer Sylvain Bailly. Three others sat as members of the Convention; but for the honour of the academy, it should be added that all three were distinguished by their moderation.

In the first draft of the new Institute, October 25, 1795, no class corresponded exactly to the old Academy of Inscrip- tions; but most of the members who survived found themselves

re-elected either in the class of moral and political science, under which history and geography were included as sections, or more generally under the class of literature and fine arts, which em- braced ancient languages, antiquities and monuments.

In 1816 the academy received again its old name. The Pro- ceedings of the society embrace a vast field, and are of very various merits. Perhaps the subjects on which it has shown most originality are comparative mythology, the history of science among the ancients, and the geography and antiquities of France. The old academy has reckoned among its members De Sacy the orientalist, Dansse de Villoison (1750-1805) the philologist, Anquetil du Perron the traveller, Guillaume J. de C. L. Sainte-Croix and du Theil the antiquaries, and Le Beau, who has been named the last of the Romans. The new academy has inscribed on its lists the names of Champollion, A. Remusat, Raynouard, Burnouf and Augustin Thierry.

In consequence of the attention of several literary men in Paris having been directed to Celtic antiquities, a Celtic Academy was established in that city in 1805. Its objects were, first, the elucidation of the history, customs, antiquities, manners and monuments of the Celts, particularly in France; secondly, the etymology of all the European languages, by the aid of the Celto-British, Welsh and Erse ; and,

thirdly, researches relating to Druidism. The attention of the members was also particu- larly called to the history and settlements of the Galatae in Asia. Lenoir, the keeper of the museum of French monuments, was appointed president. The academy still exists as La sociite nationale des antiquaires de France.

Great Britain. — The British Academy was the outcome of a meeting of the principal European and American academies, held at Wiesbaden in October 1899. A scheme was drawn up for an international association of the academies of the world under the two sections of natural science and literary science, but while the Royal Society adequately represen ted Englandinscience there was then no existing institution that could claim to represent England in literature, and at the first meeting of the federated academies this chair was vacant. A plan was proposed by Professor H. Sidgwick to add a new section to the Royal Society, but after long deliberation this was rejected by the president and council. The promoters of the plan thereupon determined to form a separate society, and invited certain persons to become the first members of a new body, to be called "The British Academy for the promotion of historical, philosophical and philological studies." The unincorporated body thus formed petitioned for a charter, and on the 8th of August 1902 the royal charter was granted and the by-laws were allowed by order in council. The objects of the academy are therein defined — "the promo tion of the study of the moral and political sciences, including history, philosophy, law, politics and economics, archaeology and philology." The number of ordinary fellows (so all members are entitled) is restricted to one hundred, and the academy is governed by a president (the first being Lord Reay) and a council of fifteen elected annually by the fellows.

Italy. — Under this class the Accademia Ercolanese (Academy of Herculaneum) properly ranks. It was established at Naples about 1755, at which period a museum was formed of the anti- quities found at Herculaneum, Pompeii and other places, by the marquis Tanucci, who was then minister of state. Its object was to explain the paintings, &c, discovered at those places. For this purpose the members met every fortnight, and at each meeting three paintings were submitted to three academicians, who made their report at their next sitting. The first volume of their labours appeared in 1775, and they have been continued under the title of Antichitd di Ercolano. They contain engravings, of the principal paintings, statues, bronzes, marble figures, medals, utensils, &c, with explanations. In the year 1807 an academy of history and antiquities, on a new plan, was estab- lished at Naples by Joseph Bonaparte. The number of members was limited to forty, twenty of whom were to be appointed by the king; and these twenty

were to present to him, for his choice, three names for each of those needed to complete the full number. Eight thousand ducats were to be annually allotted for the

current expenses, and two thousand for prizes to the authors of four works which should be deemed by the academy most deserving of such a reward. A grand meeting was to be held every year, when the prizes were to be distributed and analyses of the works read. The first meeting took place on the 25th of April 1807; but the subsequent changes in the political state of Naples prevented the full and permanent establishment of this institution. In the same year an academy was established at Florence for the illustration of Tuscan antiquities, which pub- lished some volumes of memoirs.

IV. Academies of Medicine and Surgery

Austria. — The defunct Academy of Surgery at Vienna was instituted in 1784 by the emperor Joseph II. under the direction of the distinguished surgeon, Giovanni Alessandro Brambilla (1728-1800). For many years it did important work, and though closed in 1848 was reconstituted by the emperor Francis Joseph in 1854. In 1874 it ceased to exist; its functions had become mainly military, and were transferred to newer schools.

France. — Acadimie de Medecine. Medicine is a science which has always engaged the attention of the kings of France. Charle- magne established a school of medicine in the Louvre, and various societies have been founded, and privileges granted to the faculty by his successors. The Acadimie de midecim succeeded to the old Acadimie royale de chirurgie et sociiti royale de midecine. It was erected by a royal ordinance, dated December 20, 1820. It was divided into three sections — medicine, surgery and pharmacy. In its constitution it closely resembled the Acadimie des sciences. Its function was to preserve or propagate vaccine matter, and answer inquiries addressed to it by the government on the subject of epidemics, sanitary reform and public health generally. It has maintained an enormous correspondence in all quarters of the globe and published extensive minutes.

Germany. — The Academia Naturae Curiosi, afterwards called the Academia Caesar aea Leopoldina, was founded in 1662 by J. L. Bausch, a physician of Leipzig, who published a general invitation to medical men to communicate all extraordinary cases that occurred in the course of their practice. The works of the Naturae Curiosi were at first published separately ; but in 1770 a new arrangement was

planned for publishing a volume of observations annually. From some cause, however, the first volume did not make its appearance until 1784, when, it was published under the title of Ephemerides. In 1687 the emperor Leopold took the society under his protection, and its name was changed in his honour. This academy has no fixed abode, but follows the home of its president. Its library remains at Dresden. By its constitution the Leopoldine Academy consists of a presi- dent, two adjuncts or secretaries and unlimited colleagues or members. At their admission the last come under a twofold obligation — first, to choose some subject for discussion out of the animal, vegetable or mineral kingdoms, not previously treated by any colleague of the academy ; and, secondly, to apply them- selves to furnish materials for the annual Ephemerides. .

V. Academies of the Fine Arts

France. — The Acadimie royale de peinture et de sculpture at Paris was founded by Louis XIV. in 1648, under the title of Acadimie royale des beaux arts, to which was afterwards united the Acadimie d' architecture, founded 1671. It is composed of painters, sculptors, architects, engravers and musical composers. From among the members of the society who are painters, is chosen the director of the French Acadimie des beaux arts at Berne, also instituted by Louis XIV. in 1677. The director's province is to superintend the studies of the painters, sculptors, &c, who, chosen by competition, are sent to Italy at the expense of the government, to complete their studies in that country. Most of the celebrated French painters have begun their career in this way.

The Acadimie nationale de musique is the official and adminis- trative name given in France to the grand opera. In 1570 the poet Baif established in his house a school of music, at which ballets and masquerades were given. In 1645 Mazarin brought

from Italy a troupe of actors, and established them in the rue du Petit Bourbon, where they gave Jules Strozzi's Achitte in Sciro, the first opera performed in France. After Moliere's death in 1673, his theatre in the Palais Royal was given to Sulli, and there were performed all Gluck's great operas; there Vestris danced, and there was produced Jean Jacques Rousseau's Devin du Village.

Great Britain. — The Royal Academy of Arts in London, founded in 1768, is described in a separate article. (See Academy, Royal.)

The Academy of Ancient Music was established in London in 1 7 10, with the view of promoting the study and practice of vocal and instrumental harmony. This institution had a fine musical library, and was aided by the performances of the gentlemen of the Chapel Royal and the choir of St Paul's, with the boys belonging to each, and continued to flourish for many years. About 1734 the academy became a seminary for the instruction of youth in the principles of music and the laws of harmony. The Royal Academy of Mkisic was formed for the performance of operas, composed by Handel, and conducted by him at the theatre in the Haymarket. The subscription amounted to £50,000, and the king, besides subscribing £1000, allowed the society to assume the title Royal. It consisted of a governor, deputy-governor and twenty directors. A contest between Handel and Senesino, one of the performers, in which the directors took the part of the latter, occasioned the dis- solution of the academy after it had existed with honour for more than nine years. The present Royal Academy of Music dates from 1822, and was incorporated in 1830. It instructs pupils of both sexes in music. (See also the article Conserva- toire for colleges of music.)

Italy. — In 1778 an academy of painting and sculpture was established at Turin. The meetings were held in the palace of the king, who distributed prizes among the most successful members. In Milan an academy of architecture was established so early as 1380, by Gian Galeazzo Visconti. About the middle of the 1 8th century an academy of the arts* was established there, after the example of those at Paris and Rome. The pupils were furnished with originals and models, and prizes were distributed by competent judges annually. The prize for painting was a gold medal. Before the effects of the French Revolution reached Italy this was one of the best establishments of the kind in that kingdom. In the hall of the academy were some admirable examples of Correggio, as well as several statues of great merit, particularly a small bust of Vitellius, and a torso of Agrippina, of most exquisite beauty. The academy of the arts, which had been long established at Florence, fell into decay, but was restored in the end of the 18th century. In it there are halls for nude and plaster figures, for .the use of the sculptor and the painter, with models of all the finest statues in Italy. But the treasures of this and the other institutions for the fine arts were greatly diminished during the occupancy of Italy by the French. The academy of the arts at Modena, after being plundered by the French, dwindled into a petty school for drawing from living models. There is also an academy of the fine arts in Mantua, and

another at Venice.

Russia. — The academy of St Petersburg was established in 1757 by the empress Elizabeth, at the suggestion of Count Shuvalov, and annexed to the academy of sciences. The fund for its support was £4000 per annum, and the foundation ad- mitted forty scholars. Catherine II. formed it into a separate institution, augumented the annual revenue to £12,000, and increased the number of scholars to three hundred; she built for it a large circular building, which fronts the Neva. The scholars are admitted at the age of six, and continue until they have attained that of eighteen. They are. clothed, fed and lodged at the expense of the crown; and are instructed in read- ing, writing, arithmetic, French, German and drawing. At the age of fourteen they are at liberty to choose any of the following arts; first, painting in all its branches, architecture, mosaic, enamelling, &c; second, engraving on copper-plates, seal- cutting, &c; third, carving on wood, ivory and amber; fourth,

watch-making, turning, instrument-making, casting statues in bronze and other metals, imitating gems and medals in paste and other compositions, gilding and varnishing. Prizes aie annually distributed, and from those who have obtained four prizes, twelve are selected, who are sent abroad at the charge of the crown. A certain sum is paid to defray their travelling expenses; and when they are settled in any town, they receive during four years an annual salary of £60. The academy has a small gallery of paintings for the use of the scholars; and those who have made great progress are. permitted to copy the pictures in the imperial collection. For the purpose of design, there are full-size models of the best antique statues in Italy.

South America. — There are several small academies in the various towns of South America, the only one of note being that of Rio de Janeiro, founded by John VI. of Portugal in 18 16 and now known as the Escola National de Bellas Artes.

Spain. — In Madrid an academy for painting, sculpture and architecture, the Academia de Bellas Artes de San Fernando, was founded by Philip V. The minister for foreign affairs is presi- dent. Prizes are distributed every three years. In Cadiz a few students are supplied by government with the means of drawing and modelling from figures; and such as are not able to purchase the requisite instruments are provided with them.

Sweden. — An academy of the fine arts was founded at Stock- holm in the year 1733 by Count Tessin. In its hall are the ancient figures of

plaster presented by Louis XIV. to Charles XI. The works of the students are publicly exhibited, and prizes are distributed annually. Such of them as display distinguished ability obtain pensions from government, to enable them to reside in Italy for some years, for the purposes of investigation and improvement. In this academy there are nine professors and generally about four hundred students.

Austria. — In the year 1705 an academy of painting, sculpture and architecture was established at Vienna, with the view of encouraging and promoting the fine arts.

United States of America. — In America the institution similar to the Royal Academy of Arts in London is the National Academy of Design (1826), which in 1906 absorbed the Society of American Artists, the members of the society becoming members of the academy.

The volume of excerpts from the general catalogue of books in the British Museum, ‘Academies,” 5 parts and index, furnishes a complete bibliography. (F. S.)

ACADEMY, GREEK or Academe (Gr. aKa.8rmet.aor enadritiLa), the name given to the philosophic successors of Plato. The name is derived from a pleasure-garden or gymnasium situated in the suburb of the Ceramicus on the river Cephissus about a mile to the north-west of Athens from the gate called Dipylum. It was said to have belonged to the ancient Attic hero Academus, who, when the Dioscuri invaded Attica to recover their sister Helen, carried off by Theseus, revealed the place where she was hidden. Out of gratitude the Lacedaemonians, who reverenced the Dioscuri, always spared the Academy during their invasions of the country. It was walled in by Hipparchus and was adorned with walks, groves and fountains by Cimon (Plut. Citn. 13), who bequeathed it as a public pleasure-ground to his fellow-citizens. Subsequently the garden became the resort of Plato (q.v.), who had a small estate in the neighbourhood. Here he taught for nearly fifty years till his death in 348 B.C., and his followers continued to make it their headquarters. It was closed for teach- ing by Justinian in a.d. 529 along with the other pagan schools. Cicero borrowed the name for his villa near Puteoli, where he composed his dialogue .The Academic Questions.

The Platonic Academy (proper) lasted from the days of Plato to those of Cicero, and during its whole course there is traceahle a distinct continuity of thought which justifies its examination as a real-intellectual unit. On the other hand, this continuity of thought is by no means an identity. The Platonic doctrine was so far modified in the

hands of successive scholarchs that th,e Academy has been divided into either two, three or five ma jp sections (Sext. Empir. Pyrrh. Hyp. i. 220). Finally, in the days pf Philo* , Antiochus and Cicero, the metaphysical dogrqatis-to

of Plato had been changed into an ethical syncretism which combined elements from the Scepticism of Carneades and the doctrines of the Stoics; it was a change from a dogmatism which men found impossible to defend, to a probabilism which afforded a retreat from Scepticism and intellectual anarchy. Cicero represents at once the doctrine of the later Academy and the general attitude of Roman society when he says, ” My words do not proclaim the truth, like a Pythian priestess; but I conjecture what is probable, like a plain man; and where, I ask, am I to search for anything more than verisimilitude?” And again: “The characteristic of the Academy is never to interpose one’s judgment, to approve what seems most probable, to compare together different opinions, to see what may be advanced on either side and to leave one’s listeners free to judge without pretending to dogmatize.”

The passage from Sextus Empiricus, cited above, gives the general view that there were three academies: the first, or Old, academy under Speusippus and Xenocrates; the second, or Middle, academy under Arcesilaus and Polemon; the third, or New, academy under Carneades and Clitomachus. Sextus notices also the theory that there was a fourth, that of Philo of Larissa and Charmidas, and a fifth, that of Antiochus. Diogenes Laertius says that Lacydes was the founder of the New Academy (i. 19, iv. 59). Cicero {de Oral. iii. 18, &c.) and Varro insist that there were only two academies, the Old and the New. Those who maintain that there is no justification for the five-fold division hold that the agnosticism of Carneades was really latent in Plato, and became prominent owing to the necessity of re- futing the Stoic criterion.

The general tendency of the Academic thinkers was towards practical simplicity, a tendency due in large measure to the inferior intellectual capacity of Plato’s immediate successors. Cicero (de Fin. v. 3) says generally of the Old Academy: ” Their writings and method contain all liberal learning, all history, all polite discourse; and besides they embrace such a variety of arts, that no one can undertake any noble career without their aid. ... In a word the Academy is, as it were, the workshop of every artist.” It is true that these men turned to scientific

investigation, but in so doing they escaped from the high alti- tudes in which Plato thought, and tended to lay emphasis on the mundane side of philosophy. Of Plato's originality and speculative power, of his poetry and enthusiasm they inherited nothing, " nor amid all the learning which has been profusely lavished upon investigating their tenets is there a single deduc- tion calculated to elucidate distinctly the character of their progress or regression " (Archer Butler, Led. on Anc. Phil.

»• 3i5)-

The modification of Academic doctrine from Plato to Cicero may be indicated briefly under four heads.

(1) Plato's own theory of Ideas was not accepted even by Speusippus and Xenocrates. They argued that the Good cannot be the origin of things, inasmuch as Goodness is only found as an attribute of things. Therefore, the idea of Good must be secondary to some other more fundamental principle ©f exist- ence. This unit Speusippus attempted to find in the Pytha- gorean number-theory. From it he deduced three principles, one for numbers, one for magnitude, one for the soul. The Deity he conceived as that living force which rules all and resides everywhere. Xenocrates, though like Speusippus in- fected with Pythagoreanism, was the most faithful .of Plato's successors. He distinguished three spheres, the sensible, the intelligible, and a third compounded of the two, to which corre- spond respectively, sense, intellect and opinion (56£a). Cicero notes, however, that both Speusippus and Xenocrates abandon the Socratic principle of hesitancy.

(2) Up to Arcesilaus, the' Academy accepted the principle of finding a general unity in all things, by the aid of which a principle of certainty might be found. Arcesilaus, however, broke new ground by attacking the very possibility of certainty. Socrates had said, " This alone I know, that I know nothing." But Arcesilaus went farther and denied the possibility of even the Socratic minimum of certainty: "I cannot know even

whether I know or not." Thus from the dogmatism of the master the Academy plunged into the extremes of agnostic criticism.

(3) The next stage in the Academic succession was the moder- ate scepticism of Carneades, which owed its existence to his opposition to Chrysippus, the Stoic. To the Stoical theory of perception, the avraala KaraAr/xruoj, by which they expressed a conviction of certainty

arising from impressions so strong as to amount to science, he opposed the doctrine of acatalepsia, which denied any necessary correspondence between perceptions and the objects perceived. He saved himself, however, from absolute scepticism by the doctrine of probability or verisimilitude, which may serve as a practical guide in life. Thus his criterion of imagination (4 > a.VTa

(4) In the last period we find a tendency not only to reconcile the internal divergences of the Academy itself, but also to con- nect it with parallel growths of thought. Philo of Larissa en- deavours to show that Carneades was not opposed to Plato, and further that the apparent antagonism between Plato and Zeno was due to the fact that they were arguing from different points of view. From this syncretism emerged the prudent non-committal eclecticism of Cicero, the last product of Aca- demic development.

For detailed accounts of the Academicians see Speusippus, Xenocrates, &c. ; also Stoics and Neoplatonism. Consult his- tories of philosophy by Zeller and Windelband, and Th. Gomperz, Greek Thinkers, ii. 270 (Eng. tr., London, 1905).

ACADEMY, ROYAL. The Royal Academy of Arts in London, to give it the original title in full, was founded in 1768, ” for the purpose of cultivating and improving the arts of painting, sculp- ture and architecture.” Many attempts had previously been made in England to form a society which should have for its object the advancement of the fine arts. Sir James Thornhill, his son-in-law Hogarth, the Dilettanti Society, made efforts in this direction, but their schemes were wrecked by want of means. Accident solved the problem. The crowds that attended an exhibition of pictures held in 1758 at the Foundling Hospital for the benefit of charity, suggested a way of making money hitherto unsuspected. Two societies were quickly formed, one calling itself the ” Society of Artists ” and the other the ” Free Society of Artists.” The latter ceased to exist in 1774. The former flourished, and in 1765 was granted a royal charter under the title of the ” Incorporated Society of Artists of Great Britain.” But though prosperous it was not united. A number of the members, including the most eminent artists of the day, resigned in 1768, and headed by William Chambers the archi- tect, and Benjamin West, presented on 28th November in that year to George III., who had already shown his interest in the fine arts, a memorial soliciting his ” gracious assistance, patron- age and protection,” in ” establishing a society for promoting the arts of design.” The memorialists stated that the two prin- cipal objects they had in view were the establishing of ” a well- regulated school or academy of design for the use of students in the arts, and an

annual exhibition open to all artists of distin- guished merit; the profit arising from the last of these institu- tions ” would, they thought, ” fully answer all the expenses of the first,” and, indeed, leave something over to be distributed ” in useful charities.” The king expressed his agreement with the proposal, but asked for further particulars. These were furnished to him on the 7th of December and approved, and on the 10th of December they were submitted in form, and the docu- ment embodying them received his signature, with the words, ” I approve of this plan; let it be put into execution.” This document, known as the ” Instrument,” defined under twenty- seven heads the constitution and government of the Royal Academy, and contained the names of the thirty-six original members nominated by the king. Changes and modifications

in the laws and regulations laid down in it have of course been made, but none of them without the sanction of the sover- eign, and the ” Instrument ” remains to this day in all essential particulars the Magna Charta of the society. Four days after the signing of this document — on the 14th of December — twenty- eight of the first nominated members met and drew up the Form of Obligation which is still signed by every academician on receiv- ing his diploma, and also elected a president, keeper, secretary, council and visitors in the schools; the professors being chosen at a further meeting held on the 17th. No time was lost in establishing the schools, and on the 2nd of January 1769 they were opened at some rooms in Pall Mall, a little eastward of the site now occupied by the Junior United Service Club, the presi- dent, Sir Joshua Reynolds, delivering on that occasion the first of his famous ” discourses.” The opening of the first exhibition at the same place followed on the 26th of April.

The king when founding the Academy undertook to supply out of his own privy purse any deficiencies between the receipts derived from the exhibitions and the expenditure incurred on the schools, charitable donations for artists, &c. For twelve years he was called upon to do so, and contributed in all some- thing over £5000, but in 1 781 there was a surplus, and no further call has ever been made on the royal purse. George III. also gave the Academy rooms in what was then his own palace of Somerset House, and the schools and offices were removed there in 1 771, but the exhibition continued to be held in Pall Mall, till the completion in 1780 of the new Somerset House, when the Academy took possession of the apartments in it which the king, on

giving up the palace for government offices, had expressly stipulated should be provided. Here it remained till 1837, when the government, requiring the use of these rooms, offered in exchange a portion of the National Gallery, then just erected in Trafalgar Square. The offer, which contained no conditions, was accepted. But it was not long before the necessity for a further removal became imminent. Already in 1850 notice was given by the government that the rooms occupied by the Aca- demy would be required for the purposes of the National Gallery, and that they proposed to give the Academy £40,000 to provide themselves with a building elsewhere. The matter slumbered, however, till r8s8, when the question was raised intheHouseof Commons as to whether it would not be justifiable to turn the Academy out of the National Gallery without making any pro- vision for it elsewhere. Much discussion followed, and a royal commission was appointed in 1863 ” to inquire into the present position of the Royal Academy in relation to the fine arts, and into the circumstances and conditions under which it occupies a portion of the National Gallery, &c.” In their report, which contained a large number of proposals and suggestions, some of them since carried out, the commissioners stated that they had ” come to the clear, conclusion that the Royal Academy have 00 legal, but fhat they have a moral claim to apartments at the public expense.” Negotiations had been already going on between the government and the Academy for the appropriation to the latter of a portion of the site occupied by the recently purchased Burlington House, on which the Academy offered to erect suitable buildings at its own expense. The negotiations were renewed in 1866, and in March in the following year a lease of old Burlington House, and a portion of the garden behind it, was granted to the Academy for 999 years at a peppercorn rent, subject to the condition that ” the premises shall be at all times exclusively devoted to the purpose of the cultivation of the fine arts.” The Academy immediately proceeded to erect, on the garden portion of the site thus acquired, exhibition galleries and schools, which were opened in 1869, further additions being made in 1884. An upper storey was also added to old Burlington House, in which to place the diploma works, the Gibson statuary and other works of art. Altogether the Academy, out of its accumulated savings, has spent on these buildings more than £160,000. They are its own property, and are maintained entirely at its expense.

The government of the Academy was by the ” Instrument ” vested in ” a president and eight other persons, who shall form

a council.” Four of these were to retire every year, and the seats were to go by rotation to every academician. The number was increased in

1870 to twelve, and reduced to ten in 1875. The rules as to retirement and rotation are still in force. Newly elected academicians begin their two years' service as soon as they have received their diploma. The council has, to quote the "Instrument," "the entire direction and management of the business " of the Academy in all its branches; and also the framing of new laws and regulations, but the latter, before coming into force, must be sanctioned by the general assembly and approved by the sovereign. The general assembly consists of the whole body of academicians, and meets on certain fixed dates and at such other times as the business may require; also at the request to the president of any five members. The principal executive officers of the Academy are the president, the keeper, the treasurer, the librarian and the secretary, all now elected by the general assembly, subject to the approval of the sovereign. The president is elected annually on the founda- tion day, 10th December, but the appointment is virtually for life. No change has ever been made in the conditions attached to this office, with the exception of its being now a salaried instead of an unsalaried post. The treasurership and librarian- ship, both offices originally held not by election but by direct appointment from the sovereign, are now elective, the holders being subject to re-election every five years, and the keepership is also held upon the same terms; while the secretaryship, which up to 1873 had always been filled like the other offices by an academician, has since then been held by a layman. Other officers elected by the general assembly are the auditors (three academicians, one of whom retires every year), the visitors in the schools (academicians and associates), and the professors of painting, sculpture and architecture — who must be members — and of anatomy and chemistry. There are also a registrar, and curators and teachers in the schools, who are appointed by the council. –

The thirty-six original academicians were named by George III. Their successors have been elected, up to 1867, by academi- cians only — since that date by academicians and associates together. The original number was fixed in the " Instrument " at forty, and has so remained. Each academician on his election has to present an approved specimen of his work — called his diploma work — before his diploma is submitted to the sovereign for signature. On receiving his diploma he signs the Roll of Institution as an academician, and takes his seat in the general assembly. The class of associates, out of whom alone the academi- cians can be elected, was founded in 1769 — they were " to be elected from amongst the exhibitors, and be entitled to every advantage enjoyed by the royal academicians, excepting that of having a voice in the deliberations or any share in the govern- ment of

the Academy." Those exhibitors who wished to beˆ come candidates had to give in their names at the close of the exhibition. This condition no longer exists, candidates having since 1867 merely to be proposed and seconded by members of the Academy. On election, they attend at a council meeting to sign the Roll of Institution as an associate, and receive a diploma signed by the president and secretary. In 1867 also associates were admitted to vote at all elections of members; in 1868 they were made eligible to serve as visitors in the schools, and in 1886 to become candidates for the professorships of painting, sculpture and architecture. At first the number of associates was limited to twenty; in 1866 the number was made indefinite with a minimum of twenty, and in 1876 the minimum was raised to thirty. Vacancies in the lists of academi- cians and associates caused by death or resignation can be filled up at any time within five weeks of the event, except in the months of August, September and October, but a vacancy in the associate list caused by election only dates from the day on which the new academician receives his diploma. The mode of election is the same in both cases, first by marked lists and afterwards by .ballot. All who at the first marking have four or more votes are marked for again, and the two highest then go to the ballot. Engravers have always constituted a separate

class, and up to 1855 they were admitted to the associateship only, the number, six, being in addition to the other associates; now the maximum is four, of whom not more than two may be academicians. A class of honorary retired academicians was established in 1862, and of honorary retired associates in 1884. The first honorary foreign academicians were elected in 1869. The honorary members consist of a chaplain, an antiquary, a secretary for foreign correspondence, and professors of ancient history and ancient literature. These posts, which date from the foundation of the Academy, have always been held by distinguished men.

Academy Schools. — One of the most important functions of the Royal Academy, and one which for nearly a century it discharged alone, was the instruction of students in art. The first act, as has been shown, of the newly founded Academy was to establish schools — " an Antique Academy," and a " School for the Living Model " for painters, sculptors and architects. In the first year, 1769, no fewer than seventy-seven students entered. A school of painting was added in 1815, and

special schools of sculpture and architecture in 1 87 1. It would occupy too much space to follow the various changes that have been made in the schools since their establishment. In one important respect, however, they remain the same, viz. in the instruction being gratuitous — no fees have ever been charged. Up to the removal of the Academy to its present quarters the schools could not be kept permanently open, as the rooms occupied by them were wanted for the exhibition. They are now open all the year round with the exception of a fortnight at Christmas, and the months of August and September. They consist of an antique school, upper and lower schools of painting, a school of drawing from the life, a school of modelling from the life and an architectural school. Ad- mission is gained by submitting certain specimens of drawing or modelling, and the successful candidates, called probationers, have then to undergo a further test in the schools, on passing which they are admitted as students for three years. At the end of that time they are again examined, and if qualified admitted for a further term of two years. These examinations are held twice a year, in January and July. Female students were first admitted in i860. There are many scholarships, money prizes and medals to be gained by the various classes of students during the time of studentship, including travelling studentships of the value of £200 for one year, gold and silver medals, and prizes varying from £50 to £10. There are per- manent curators and teachers in all the schools, but the principal teaching is done by the visitors, academicians and associates, elected to serve in each school. The average cost of maintaining these schools, including salaries, fees, cost of models, prizes, books, main- tenance of building, &c, is from £5000 to £6000 a year, apart from certain scholarships and prizes derived from moneys given or be- queathed for this purpose, such as the Landseer scholarships, the Creswick prize, the Armitage prizes and the Turner scholarship and gold medal.

Charities. — Another of the principal objects to which the profits of the Royal Academy have been devoted has been the relief of dis- tressed artists and their families. From the commencement of the institution a fund was set apart for this purpose, and subsequently a further sum was allotted to provide pensions for necessitous members of the Academy and their widows. Both these funds were afterwards merged in the general fund, and various changes have from time to time been made in the conditions under which pensions and donations have been granted and in their amount. At the present time pensions not exceeding a certain fixed amount may be given to academicians and associates, sixty years of age, who have retired and whose circumstances show them to be in need, provided the sum given does

not make their total annual income exceed a certain limit, and the same amounts can be given to their widows subject to the same conditions. No pensions are granted without very strict inquiry into the circumstances of the applicant, who is obliged to make a yearly declaration as to his or her income. The average annual amount of these pensions has been latterly about £2000. Pensions are also given according to the civil service scale to certain officers on retirement. It may be stated here that with the exception of these pensions and of salaries and fees for official services, no member of the Academy derives any pecuniary benefit from the funds of the institution. Donations to distressed artists who are or have been exhibitors at the Royal Academy, their widows and children under twenty-one years of age, are made twice a year in February and August. The maximum amount that can be granted to any one applicant in one donation is £100, and no one can receive a grant more than once a year. The average yearly amount thus expended is from £1200 to £1500. Jn addition to these charities from its general funds, the Academy administers for the benefit of artists, not members of the Academy, certain other funds which have been bequeathed to it for charitable purposes, viz. the Turner fund, the Cousins fund, the Cooke fund, the Newton bequest and the Edwards fund (see below).

Exhibitions. — The source from which have been derived the funds for carrying on the varied work of the Royal Academy, its schools, its charities and general cost of administration, and which has

enabled it to spend large sums on building, and provided it with the means of maintaining the buildings, has been the annual exhibitions. With the exception of the money left by John Gibson, R.A., some of which was spent in building the gallery containing the statues and bas-reliefs bequeathed by him, these exhibitions have provided the sole source of revenue, all other moneys that have come to the Academy having been either left in trust, or been constituted trusts, for certain specific purposes. The first exhibition in 1769 contained 136 works, of which more than one-half were contributed by members, and brought in £699: 17: 6. In 1780, the first year in which the receipts exceeded the expenditure, the number of works was 489, of which nearly one-third were by members, and the sum received was £3069: Is. This increase continued gradually with fluctuations, and in 1836, the last year at Somerset House, the number of works was 1 154, and the receipts were £5179: 19s. No great addition to the number of works exhibited took place at Trafalgar Square, but the receipts steadily grew, and their careful management enabled the Academy, when the time came for moving, to erect its own buildings and become no longer dependent on the government for a home. The

greater space afforded by the galleries at Burlington House rendered it possible to increase the number of works exhibited, which of late years has reached a total of over 2000, while the receipts have also been such as to provide the means for further building, and for a largely increased expenditure of all kinds. It may be noted that the number of works sent for exhibition soon began to exceed the space available. In 1868, the last year at Trafalgar Square, the number sent was 301 1. This went on increasing, with occasional fluctuations, at Burlington House, and in the year 1900 it reached the number of 13,462. The annual winter exhibition of works by old masters and deceased British artists was begun in 1870. It was never intended to be a source of revenue, but appreciation by the public has so far prevented it from being a cause of loss. The summer exhibition of works by living artists opens on the first Monday in May , and closes on the first Monday in August. The winter exhibition of works by deceased artists opens on the first Monday in January, and closes on the second Saturday in March. The galleries containing the diploma works, the Gibson statuary and other works of art are open daily, free.

Presidents of the Royal Academy. — Sir Joshua Reynolds, 1768- 1792; Benjamin West (resigned), 1792-1805; James Wyatt (president-elect), 1805; Benjamin West (re-elected), 1806-1820; Sir Thomas Lawrence, 1820-1830; Sir Martin Archer Shee, 1830- 1850; Sir Charles Lock Eastlake, 1 850-1 865; Sir Francis Grant, 1866-1878; Frederick, Lord Leighton of Stretton, 1878-1896; Sir John Everett Millais, 1896; Sir Edward John Poynter, 1896.

The library contains about 7000 volumes, dealing with the history, the theory and the practice of the various branches of the fine arts, some of them of great rarity and value. It is open daily to the students and members, and to other persons on a proper introduction.

The trust funds administered by the Royal Academy are :—

The Turner fund (J. M. W. Turner, R.A.), which provides sixteen annuities of £50 each, for artists of repute not members of the Academy, also a biennial scholarship of £50 and a gold medal for a landscape painting.

The Chantrey fund (Sir Francis Chantrey, R.A.), the income of which, paid over by the Chantrey trustees, is spent on pictures and sculpture. (See Chantrey.)

The Creswick fund (Thomas Creswick, R.A.), which provides an annual prize of £30 for a landscape painting in oil.

The Cooke fund (E. W. Cooke, R.A.), which provides two annuities of £35 each for painters not members of the Academy, over sixty years of age and in need.

The Landseer fund (Charles Landseer, R.A-.), which provides four scholarships of £40 each, two in painting and two in sculpture, tenable for two years, open to students at the end of the first two years of studentship, and given for the best work done during the second year.

The Armitage fund (E. Armitage, R.A.), which provides two annual prizes of £30 and £10, for a design in monochrome for a figure picture.

The Cousins fund (S. Cousins,, R.A.), which provides sevenannuities of £80 each for deserving artists, not members of the Academy, in need of assistance.

The Newton bequest (H. C. Newton), which provides an annual sum of £60 for the indigent widow of a painter.

The Bizofund (John Bizo) , to be used in the scientific investigation into the nature of pigments and varnishes, &c.

The Edwards fund (W. J. Edwards), producing £40 a year for the benefit of poor artists or artistic engravers.

The Leighton bequest (Lord Leighton, P. R.A.), received from Mrs Orr and Mrs Matthews in memory of their brother, the income from which, about £300, is expended on the decoration of public places and buildings. , _

The literature concerning the Royal Academy consists chiefly of pamphlets and articles of more or less ephemeral value. More serious works are: William Sandby, The History of the Royal Academy of Arts (London, 1862) (withdrawn from circulation on a question of copyright); Report from the Select Committee on Arts and their Connexion with Manufactures, with the Minutes of Evidence and Appendix (London, 1836) ; Report of the Royal Commission on the Royal Academy , with Minutes of Evidence and Appendix (London, 1863); Martin

Archer Shee, The Life of Sir M. A. Shee, P.R.A. (London, i860); C. R. Leslie, R.A., and Tom Taylor, Life and Times of Sir Joshua Reynolds, P.R.A. (London, 1 865); J. E. Hodgson, R.A. (the late), and Fred. A. Eaton, Sec. R.A., ” The Royal Academy in the Last Century,” Art Journal, 1889-1891. But the chief sources of informa- tion on the subject are the minute-books of the council and of the general assembly, and the annual reports, which, however, only date from 1859. (F. A. E.)

ACADIAN, in geology, the name given by Sir J. W. Dawson in 1867 to a series of black, red and green shales and slates, with dark grey limestones, which are well developed at St John, New Brunswick; Avalon in E. Newfoundland, and Braintree in E. Massachusetts. These rocks are of Middle Cambrian age and possess a Paradoxides fauna. They have been correlated with limestone beds in Tennessee, Alabama, Central Nevada and British Columbia (St Stephen).

See Cambrian System; also C. D. Walcott, Bull. U.S. Geol. Survey, No. 81, 1891 ; and Sir J. W. Dawson, Acadian Geology, 1st ed. 1855, 3rd ed. 1878.

ACADIE, or Acadia, a name given by the French in 1603 to that part of the mainland of North America lying between the latitudes 40 and 46 . In the treaty of Utrecht (1713) the words used in transferring the French possessions to Britain were ” Nova Scotia or Acadia.” See Nova Scotia for the limits included at that date under the term.

ACANTHOCEPHALA, a compact group of cylindrical, para- sitic worms, with no near allies in the animal kingdom. Its members are quite devoid of any mouth or alimentary canal, but have a well-developed body cavity into which the eggs are dehisced and which communicates with the exterior by

From Cambridge Natural History, vol. ii., “Worms, &c,” by permission of Macmiltan & Co., Lid.

Fig. 1.

A, Five specimens of Echinorhynchus acus, Rud., attached to a piece of intestinal wall,

B, The proboscis of one still more highly magnified.

means of an oviduct. The size of the animals varies greatly, from forms a few millimetres in length to Gigantorhynchus gigas, which measures from 10 to 65 cms. The adults live in great numbers in the

alimentary canal of some vertebrate, usually fish, the larvae are as a rule encysted in the body cavity of some invertebrate, most often an insect or crustacean, more rarely a small fish. The body is divisible into a proboscis and a trunk with sometimes an intervening neck region. The proboscis bears rings of recurved hooks arranged in horizontal rows, and it is by means of these hooks that the animal attaches itself to the tissues of its host. The hooks may be of two or three shapes. Like the body, the proboscis is hollow, and its cavity is separated from the body cavity by a septum or pro-r boscis sheath. Traversing the cavity of the proboscis are muscle-strands inserted into the tip of the proboscis at one end and into the septum at the other. Their contraction causes the proboscis to be i»vaginated into its cavity (fig. 2). But the whole proboscis apparatus can also be, at least partially, withdrawn into the body cavity, and this is effected by two retractor muscles which run from the posterior aspect of the septum to the body wall (fig. 3).

The skin is peculiar. Externally is a thin cuticle; this covers the epidermis, which consists of a syncytium with no cell limits. The syncytium is traversed by a series of branching tubules containing fluid and is controlled by a few wandering, amoeboid nuclei (fig. 2). Inside the syncytium is a not very regular layer of circular muscle fibres, and within this again some rather scattered longitudinal fibres; there is no endo- thelium. In their minute structure the muscular fibres resemble those of Nematodes. Except for the absence of the longi- tudinal fibres the skin of the proboscis resembles that of the body, but the fluid-containing tubules of the latter are shut off from those of the body. The canals of the proboscis open ultimately into a circular vessel which runs round its base. From the circular canal two sac-like diverticula called the

From Cambridge Natural History, vol. ii., “Worms, &c,” by permission of Macmillan& Co., Ltd.

Fig. 2. — A longitudinal section through the anterior end of Echinorhynchus haeruca, Rud. (from Hamann).

a, The proboscis not fully ex-

b, Proboscis-sheath. [panded.

c, Retractor muscles of the pro-

d, Cerebral ganglion. [boscis.

e, Retinaculum enclosing a

nerve. /, One of the retractors of the g, A lemniscus. [sheath.

h, One of the spaces in the sub- cuticular tissue.

i, Longitudinal muscular layer.

7, Circular muscular layer.

k, Line of division between the sub-cuticular tissue of the trunk and that of the pro- boscis with the lemnisci.

" lemnisci " depend into the cavity of the body (fig. 2). Each consists of a prolongation of the syncytial material of the proboscis skin, penetrated by canals and sheathed with a scanty muscular coat. They seem to act as reservoirs into which the fluid of the tense, extended proboscis can withdraw when it is retracted, and from which the fluid can be driven out when it is wished to expand the proboscis.

There are no alimentary canal or specialized organs for circula- tion or for respiration. Food is imbibed through the skin from the digestive juices of the host in which the Acanthocephala live.

J. Kaiser has described as kidneys two organs something like minute shrubs situated dorsally to the generative ducts into which they open. At the end of each twig is a membrane pierced by pores, and a number of cilia depend into the lumen of the tube; these cilia maintain a constant motion.

The central ganglion of the nervous system lies in the proboscis-sheath or septum. It supplies the proboscis with nerves and gives off behind two stout trunks which supply the body (fig. 2). Each of these trunks is surrounded by muscles, and the com plex retains the old name of " retinaculum." In the male at

Some scattered papillae

least there is also a genital ganglion may possibly be sense-organs.

The Acanthocephala are dioecious. There is a " stay " called the " ligament " which runs from the hinder end of the proboscis- sheath to the posterior end of the body. In this the two testes lie (fig. 3). Each opens in a vas deferens which bears three diverticula or vesiculae

seminales, and three pairs of cement glands also are found which pour their secretions through a duct into the vasa deferentia. The latter unite and end in a penis which opens posteriorly.

The ovaries arise like the testes as rounded bodies in the ligament. From these masses of ova dehisce into the body cavity and float in its fluid. Here the eggs are fertilized and here they segment so that the young em- bryos are formed within their mother's body. The embryos escape into the uterus through the " bell," a funnel- like opening continuous with the uterus. Just at the junction of the " bell " and the uterus there is a second small opening situated dorsally. The " bell " swallows the matured em- bryos and passes them on into the uterus, and thus out of the body via the oviduct, which opens at one end into the uterus and at the other on to the exterior at the posterior end of the body. But should the " bell " swallow any of the ova, or even one of the younger embryos, these are passed back into the body cavity through the second and dorsal opening.

The embryo thus passes from the body of the female into the alimentary canal of the host and leaves this with the faeces. It is then, if lucky, eaten by some crustacean, or insect, more rarely by a fish. In the stomach it Fig. 3.— An optical sec- casts its membranes and becomes tion through a male Neo- mobile, bores through the stomach walls and encysts usually in the body- cavity of its first and invertebrate host. By this time the embryo has all the organs of the adult perfected save only the reproductive; these develop ˆ/Rˆctoˆfc pro- only when the first host is swallowed boscis sheath. by the second or final host, in which

g, g, Lemnisci, each with case the parasite attaches itself to the wall of the alimentary canal and becomes adult.

A curious feature shared by both larva and adult is the large size of 0, Glands on vas deferens. many f the cells, e.g. the nerve cells p, Giant nucleus in skin. , J , ...

q, Opening of vas deferens, ana tne Dell. ,..,,,,

- O. Hamann has divided the group

into three families, to which a fourth must be added.

(i.) Fam. Echinorhynchidae. This is by far the largest family and contains the commonest species; the larva of Echino- rhynchus proteus lives in Gammarus pulex and in small fish, the adult is common in many fresh-water fish: E. polymorphous, larval host the crayfish, adult host the duck: E. angustatus occurs as a larva in Asellus aquaticus, as an adult in the perch, pike and barbel: E. moniliformis has for its larval host the larvae of the beetle Blaps mucronata, for its final host certain mice, if introduced into man it lives well: E. acus is common in whiting: E. porrigeus in the fin-whale, and E. strumosus in the seal. A species named E. hominis has been described from a boy.

From Cambridge Natural His- tory, vol. ii., “Worms, &c,” by permission of Macmilian & Co., Ltd.

rhynchus clavaeceps, (from Hamann).

a, Proboscis.

b, Proboscis sheath.

c, Retractor of the boscis

Zed.

pro-

two giant nuclei. h, Space in sub-cuticular

layer of the skin. I, Ligament. m, m, Testes.

(ii.) Fam. Gigantorhynchidae. A small family of large forms with a ringed and flattened body. Gigantorhynchus gigas lives normally in the pig, but is not uncommon in man in South Russia, its larval host is the grub of Melolonlha vulgaris, Cetonis auratus, and in America probably of Lachnosterna arcuata: G. echino- discus lives in the intestine of ant-eaters: G. spira in that of the

From Cambridge Natural History, vol. Macmilian & Co., Ltd.

Worms &c, ” by permission of

Fig. 4.

A, The larva of Echinorhynchus proteus from the body cavity of Phoxinus laevis, with the proboscis retracted and the whole still enclosed in a capsule.

B, A section through the same; o, the invaginated proboscis; b, proboscis sheath; c, beginning of the neck; d, lemniscus. Highly magnified (both from Hamann).

king vulture, Sarcorhampus papa, and G. taeniodes in Dicholopus cristatus, a cariama.

(iii.) Fam. Neorhynchidae. Sexually mature whilst still in the larval stage. Neorhynchus clavaeceps in Cyprinus carpio has its larval form in the larva of Sialis lutaria and in the leech Nephelis octocula: N . agilis is found in Mugil auratus and M. cephalus.

(iv.) Apororhynchidae. With no pro- boscis. This family contains the single species Apororhynchus hemignalhi, found near the anus of Hemignathus procerus, a Sandwich Island bird.

Authorities. — O. Hamann, O. Jen. Zeitschr. xxv., 189 1, p. 113; Zool. Anz. xv., 1892, 195; J. Kaiser, Bibl. Zool. ii., 1893; A. E. Shipley, Quart. Journ. Micr. Sci. xxxix., 1896; ibid, xlii., 1899, p. 361; Villot, Zool. Anz. viii., 1885, p. 19.

(A. E. S.)

ACANTHUS (the Greek and Latin name for the plant, connected with a.Krj, a sharp point), a genus of plants belonging to the natural order Acan- thaceae. The species are natives of the southern parts of Europe and the warmer parts of Asia and Africa. The best – known is Acanthus mollis (brank- ursine, or bears’ breech), a common …,-„ „ „

. „, , , ,-, -*r f* History, vol. 11., Worms, &c.,’

species throughout the Mediterranean by pe rm i ss ion of Macmilian & region, having large, deeply cut, hairy, Co., Ltd. shining leaves. Another species Acan- J£V£B£#S2 thus spinosus, is so called from its spiny p roteus f rom tne body leaves. They are bold, handsome cavity of Phoxinus laevis plants, with stately spikes, 2 to 3 ft. (from

Hamann). Highly high, of flowers with spiny bracts. A. mag ˆ,| d – a c < ˆtckˆd mollis, A. latifolius and A. longifolius trun k ; e> ‘ ‘ e% lemnisci! are broad-leaved species; A. spinosus

and A. spinosissimus have narrower, spiny toothed leaves. In decoration, the acanthus was first reproduced in metal, and subsequently carved in stone by the Greeks. – It was afterwards, with various changes, adopted in all succeeding styles of architecture as a basis of ornamental decoration. There are two types, that found in the Acanthus spinosus, which was followed by the Greeks, and that in the Acanthus mollis, which seems to have been preferred by the Romans.

ACAPULCO, a city and port of the state of Guerrero on the Pacific coast of Mexico, 190 m. S.S.W. of the city of Mexico, Pop. (1900) 4932. It is located on a deep, semicircular bay.

From Cambridge Natural

ACARNANIA— ACCENT

in

almost land-locked, easy of access, and with so secure an anchor- age that vessels can safely lie alongside the rocks that fringe the shore. It is the best harbour on the Pacific coast of Mexico, and it is a port of call for steamship lines running between Panama and San Francisco. The town is built on a narrow strip of low land, scarcely half a mile wide, between the shore line and the lofty mountains that encircle the bay. There is great natural beauty in the surroundings, but the mountains render the town difficult of access from the interior, and give it an exceptionally hot and unhealthy climate. The effort to admit the cooling sea breezes by cutting through the mountains a passage called the Abra de San Nicolas had some beneficial effect. Acapulco was long the most important Mexican port on the Pacific, and the only depot for the Spanish fleets plying between Mexico and Spain’s East Indian colonies from 1778 until the independence of Mexico, when this trade was lost. The town has been chosen as the terminus for two railway lines seeking a Pacific port— the Interoceanic and the Mexican Central. The town suffered considerably from earthquakes in July and August 1900. There are exports of hides, cedar and fruit, and the adjacent district of Tabares produces cotton, tobacco, cacao, sugar cane, Indian corn, beans and coffee.

ACARNANIA, a district of ancient Greece, bounded on the W. by the Ionian Sea, on the N. by the Ambracian Gulf, on the E. and S. by Mt.

Thyamus and the Achelous. The Echinades islands, off the S.W. coast, are gradually being joined up to the mainland. Its most populous region was the plain of the Achelous, commanded by the principal town Stratus; com- munication with the coast was impeded by mountain ridges and lagoons. Its people long continued in semi-barbarism, having little intercourse with the rest of Greece. In the 5th century B.C. with the aid of Athens they subdued the Corinthian factories on their coast. In 391 they submitted to the Spartan king Agesilaus; in 371 they passed under Theban control. In the Hellenistic age the Acarnanians were constantly assailed by their Aetolian neighbours. On the advice of Cassander they made effective their ancient cantonal league, apparently after the pattern of Aetolia. In the 3rd century they obtained assistance from the Illyrians, and formed a close alliance with Philip V. of Macedonia, whom they supported in his Roman wars, their new federal capital, Leucas, standing a siege in his interest. For their sympathy with his successor Perseus they were de- prived of Leucas and required to send hostages to Rome (167). The country was finally desolated by Augustus, who drafted its inhabitants into Nicopolis and Patrae. Acarnania took a prominent part in the national uprising of 1821; it is now joined with Aetolia as a nome. The sites of several ancient towns in Acarnania are marked by well-preserved walls, especially those of Stratus, Oeniadae and Limnaea.

Authorities. — Strabo vii. 7, x. 2; Thucydides; Polybius iv. 40; Livy xxxiii. 16-17; Corpus Inscr. Graecarum, no. 1739; E. Oberhummer, Akarnanien im Altertum (Munich, 1887); Heuzey, Mt. Olympe et VAcarnanie (Paris, i860). (M. O. B. C. ; E. Gr.)

ACARUS (from Gr. dxapt, a mite), a genus of Arachnids, repre- sented by the cheese mite and other forms.

ACASTUS, in Greek legend, the son of Pelias, king of Iolcus in Thessaly (Ovid, Metam. viii. 306; Apollonius Rhodius i. 224; Pindar, Nemea, iv. 54, v. 26). He was a great friend of Jason, and took part in the Calydonian boar-hunt and the Argonautic expedition. After his father's death he instituted splendid funeral games in his honour, which were celebrated by artists and poets, such as Stesichorus. His wife Astydameia (called Hippolyte in Horace, Odes, iii. 7. 17) fell in love with Peleus (q.v.), who had taken refuge at Iolcus, but when her advances were rejected accused him falsely to her husband. Acastus, to avenge his fancied wrongs, left Peleus asleep on Mount Pelion, having first hidden his famous sword. On awaking, Peleus was attacked by the Centaurs, but saved by Cheiron. Having re- covered his sword he returned to Iolcus and slew Acastus and Astydameia. Acastus was represented with his famous horses in the painting of the

Argonautic expedition by Micon in the temple of the Dioscuri at Athens.

ACATALEPSY (Gr. d-, privative, and Kara\a^avei.v, to seize), a term used in Scepticism to denote incomprehensibility.

ACAULESCENT (Lat. acaulescens, becoming stemless, from a, not, and caulis, a stem), a term used of a plant apparently stemless, as dandelion, the stem being almost suppressed.

ACCA LARENTIA (not Laurentia), in Roman legend, the wife of the shepherd Faustulus, who saved the lives of the twins Romulus and Remus after they had been thrown into the Tiber. She had twelve sons, and on the death of one of them Romulus took his place, and with the remaining eleven founded the college of the Arval brothers (Fratres Arvales). The tradition that Romulus and Remus were suckled by a wolf has been explained by the suggestion that Larentia was called lupa (" courtesan," literally " she-wolf ") on account of her immoral character (Livy i. 4; Ovid, Fasti, iii. 55). According to another account, Larentia was a beautiful girl, whom Hercules won in a game of dice (Macrobius i. 10; Plutarch, Romulus, 4, 5, Quaest. Rom. 35; Aulus Gellius vi. 7). The god advised her to marry the first man she met in the street, who proved to be a wealthy Etruscan named Tarutius. She inherited all his property and bequeathed it to the Roman people, who out of gratitude instituted in her honour a yearly festival called Larentalia (Dec. 23). According to some, Acca Larentia was the mother of the Lares, and, like Ceres, Tellus, Flora and others, symbolized the fertility of the earth — in particular the city lands and their crops.

See Mommsen, " Die echte und die falsche Larentia," in Romische Forschungen, ii. 1879; E. Pais, Ancient Legends of Roman History (Eng. trans. 1906), whose views on the subject are criticized by W. W. Fowler in W. H. D. Rouse's The Year's Work in Classical Studies (1907) ; C. Pascal, Studii di antichitd, e Mitologia (1896).

ACCELERATION (from Lat. accelerare, to hasten, celer, quick), hastening or quickening; in mechanics, a term employed to denote the rate at which the velocity of a body, whose motion is not uniform, either increases or decreases. (See Mechanics and Hodograph.)

ACCENT. The word " accent " has its origin in the Lat. accentus, which in its turn is a literal translation of the Gr. 7rpocra)6[a. The early Greek grammarians used this term for the musical accent which characterized their own language, but later the term became

specialized for quantity in metre, whence comes the Eng. prosody. Besides various later developments of usage it is important to observe that ” accent ” is used in two different and often contrasted senses in connexion with language. In all languages there are two kinds of accent: (1) musical chromatic or pitch accent; (2) emphatic or stress accent. The former indicates differences in musical pitch between one sound and another in speech, the latter the difference between one syllable and another which is occasioned by emitting the breath in the production of one syllable with greater energy than is employed for the other syllables of the same word. These two senses, it is to be noticed, are different from the common usage of the word in the statement that some one talks with a foreign or with a vulgar accent. In these cases, no doubt, both differences of intonation and differences of stress may be included in the statement, but other elements are frequently no less marked, e.g. the pronunciation of t and d as real dentals, whereas the English sounds so described are really produced not against the teeth but against their sockets, the inability to produce the interdental th whether breathed as in thin or voiced as in this and its representation by d or z, the production of o as a uniform sound instead of one ending as in English in a slight u sound, or such dialect changes as lydy (laidy) for lady, or toime for time (taime) .

In different languages the relations between pitch and stress differ very greatly. In some the pitch or musical accent pre- dominates. In such languages if signs are employed to mark the position of the chief accent in the word it will be the pitch and not the stress accent which will be thus indicated. Amongst the languages of ancient times Sanskrit and Greek both indicate by signs the position of the chief pitch accent in the word, and the same method has been employed in modern times for lan- guages in which pitch accent is well marked, as it is, for example.

in Lithuanian, the language still spoken by some two millions of people on the frontier between Prussia and Russia in the neighbourhood of Konigsberg and Vilna. Swedish also has a well-marked musical accent. Modern Greek has changed from pitch to stress, the stress being generally laid upon the same syllable in modern as bore the pitch accent in ancient Greek.

In the majority of European languages, however, stress is more conspicuous than pitch, and there is plenty of evidence to show that

the original language from which Greek, Latin, Celtic, Teutonic, Slavonic and other languages of Europe are descended, possessed stress accent also in a marked degree. To the existence of this accent must be attributed a large part of the phenomena known as Ablaut or Gradation (see Indo- European Languages). In modern languages we can see the same principle at work making Acton out of the O. Eng. (Anglo- Saxon) ac-tun (oak- town), and in more recent times producing the contrast between New Town and Newton. In French, stress is less marked than it is in English, but here also there is evidence to show that in the development from Latin to French a very strong stress accent must have existed. The natural result of producing one syllable of a word with greater energy than the others is that the other syllables have a less proportion of breath assigned to them and therefore tend to become indistinct or altogether inaudible. Thus the strong stress accent existing in the transition period between Latin and French led to the curtailing of long Latin words like latrocinium or hospit&le into the words which we have borrowed from French into English as larceny and hotel. It will be observed that the first syllable and that which bears the accent are the two which best withstand change, though the strong tendency in English to stress heavily the first syllable bids fair ultimately to oust the e in the pro- nunciation of larceny. No such changes arise when a strong pitch accent is accompanied by a weaker stress accent, and hence languages like ancient Sanskrit and ancient Greek, where such conditions existed, preserve fuller forms than their sister languages or than even their own descendants, when stress takes the place of pitch as the more important element in accent.

In both pitch and stress accent different gradations may be observed. In pitch, the accent may be uniformˆ rising or falling. Or there may be combinations of rising and falling or of falling and rising accents upon the same syllable. In ancient Greek, as is well known, three accents are distinguished — (i) the acute (‘), a rising accent; (2) the grave (‘), apparently merely the indication that in particular positions in the sentence the acute accent is not used where it would occur in the isolated word; and (3) the circumflex, which, as its form (A) shows, and as the ancient grammarians inform us, is a combination of the rising and the falling accent upon the same syllable, this syllable being always long. Different Greek dialects, however, varied the syllables of the word on which the accent occurred, Aeolic Greek, for example, never putting the acute on the last syllable of a word, while Attic Greek had many words so accented.

The pitch accent of the Indo-European languages was origin- ally free, i.e. might occur on any syllable of a word, and this condition of things

is still found in the earliest Sanskrit literature. But in Greek before historical times the accent had become limited to the last three syllables of a word, so that a long word like the Homeric genitive tpo)itvow could in no circumstances be accented on either of its first two syllables, while if the final syllable was long, as in the accusative plural cbepontvovs, the accent could go back only to the second syllable from the end. As every vowel has its own natural pitch, and a frequent inter- change between e (a high vowel) and (a low vowel) occurs in the Indo-European languages, it has been suggested that e originally went with the highest pitch accent, while appeared in syllables of a lower pitch. But if there is any foundation for the theory, which is by no means certain, its effects have been distorted and modified by all manner of analogical processes. Thus iroi.iJ.riv with acute accent and dainwv with the acute accent on the preceding syllable would correspond to the rule, so would dXrjˆfe and e7ros, but there are many exceptions like 686s where the acute accent accompanies an vowel. Somewhat similar

distinctions characterize syllables which are stressed. The strength of the expiration may be greatest either at the begin- ning, the end or the middle of the syllable, and, according as it is so, the accent is a falling, a rising, or a rising and falling one. Syllables in which the stress is produced continuously whether increasing or decreasing are called single-pointed syllables, those in which a variation in the stress occurs without being strong enough to break the syllable into two are called double- pointed syllables. These last occur in some English dialects, but are commonest in languages like Swedish and Lithuanian, which have a ” sing-song ” pronunciation. It is often not easy to decide whether a syllable is double-pointed or whether what we hear is really two-single-pointed syllables. There is no separ- ate notation for stress accent, but the acute (‘) is used for the increasing, the grave (‘) for the decreasing stress, and the circum- flex (“) for the rising and falling (increasing and decreasing) and (*) for the opposite. A separate notation is much to be desired, as the nature of the two accents is so different, and could easily be devised by using S for the falling, (‘) for the rising stress, and “» for the combination of the two in one syllable. This would be clearer than the upright stroke ( ) preceding the stressed syllable, which is used in some phonetic works.

The relation between the two accents in the same language at the same time is a subject which requires further investiga- tion. It is generally assumed that the chief stress and the chief pitch in a word coincide, but this is by no means certain for all cases, though the incidence of the chief stress accent in modern Greek upon the same syllable as had the chief pitch accent in ancient times suggests that the

two did frequently fall upon the same syllable. On the other hand, in words like the Sanskrit saptd, the Gr. brra, the pitch accent which those languages indicate is upon a syllable which certainly, in the earliest times at least, did not possess the principal stress. For forms in other languages, like the Lat. septem or the Gothic sibun, show that the a of the final syllables in Sanskrit and Greek is the repre- sentative of a reduced syllable in which, even in the earliest times, the nasal alone existed (see under N for the history of these so-called sonant nasals). It is possible that sporadic changes of accent, as in the Gr. p.r)rt)p compared with the Sanskrit mala, is owing to the shifting of the pitch accent to the same syllable as the stress occupied.

There is no lack of evidence to show that the stress accent also may shift its position in the history of a language from one syllable to another. In prehistoric times the stress in Latin must have rested upon the first syllable in all cases. Only on this hypothesis can be explained forms like peperci (perfect of parco) and collido (a compound of laedo). In historical times, when the stress in Latin was on the second syllable from the end of the word if that syllable was long, or on the third syllable from the end if the second from the end was short, we should have expected to find *peparci and *collaedo, for throughout the historical period the stress rested in these words upon the second syllable from the end. The causes for the change of position are not always easy to ascertain. In words of four syllables with a long penult and words of five syllables with a short penult there probably developed a secondary accent which in course of time replaced the earlier accent upon the first syllable. But the number of such long words in Latin is com- paratively small. It is no less possible that relations between the stress and pitch accents were concerned. For unless we are to regard the testimony of the ancient Latin grammarians as altogether untrustworthy there was at least in classical Latin a well-marked pitch as well as a stress accent. This question, which had long slumbered, has been revived by Dr J. Vendryes in his treatise entitled Recherches sur Phistoire et les eflets de I'intensite initiale en latin (Paris, 1902).

In English there is a tendency to throw the stress on to the first syllable, which leads in time to the modification of borrowed words. Thus throughout the 18th century there was a struggle going on over the word balcony, which earlier was pronounced balcony. Swift is the first author quoted for the pronunciation bdlcony, and Cowper's balcony in "John Gilpin" is among the latest instances of the old pronunciation. Disregarding the Latin quantity of orator and

senator, English by throwing the stress on the first syllable has converted them into orator and senator, while Scots lawyers speak also of a curator. How far French influence plays a part here is not easy to say.

Besides the accent of the syllable and of the word, which have been already discussed, there remains the accent of the sentence. Here the problem is much more complicated. The accent of a word, whether pitch or stress, may be considerably modified in the sentence. From earliest times some words have become parasitic or enclitic upon other words. Pronouns more than most words are modified from this cause, but conjunctions like the Gr. re (“and “), the Lat. que, have throughout their whole history been enclitic upon the preceding word. A very important word may be enclitic, as in English don’t, shan’t. It is to be remembered that the unit of language is rather the sentence than the word, and that the form which is given to the word in the dictionary is very often not the form which it takes in actual speech. The divisions of words in speech are quite different from the divisions on the printed page. Sanskrit alone amongst languages has consistently recognized this, and preserves in writing the exact combinations that are spoken.

Accent, whether pitch or stress, can be utilized in the sentence to express a great variety of meanings. Thus in English a sentence like You rode to Newmarket yesterday, which contains five words, may be made to express five different statements by putting the stress upon each of the words in turn. By putting the stress on you the person addressed is marked out as distinct from certain others, by putting it upon rode other means of locomotion to New- market are excluded, and so on. With the same order of words five interrogative sentences may also be expressed, and a third series of exclamatory sentences expressing anger, incredulity, &c, may be obtained from the same words. It is to be noticed that for these two series a different intonation, a different musical (pitch) accent appears from that which is found in the same words when employed to make a matter-of-fact statement.

In languages like Chinese, which have neither compound words nor inflection, accent plays a very important part. As the words are all monosyllabic, stress could obviously not be so important as pitch as a help to distinguish different senses attached to the same vocable, and in no other language is variety of pitch so well developed as in Chinese. In languages which, like English, show comparatively little

pitch accent it is to be noticed that the sentence tends to develop a more musical character under the influence of emotion. The voice is raised and at the same time greater stress is generally employed when the speaker is carried away by emotion, though the connexion is not essential and strong emotion may be expressed by a lowering as well as by a raising of the voice. In either case, however, the stress will be greater than the normal.

Bibliography. — H. Sweet, Primer of Phonetics (1890, now in 3rd edition), § 96 ff., History of English Sounds (1888), §110 ff., and other works; E. Sievers, Grundziige der Phonetik (1893), § 53 2 ff- 1 O. Jespersen, Lehrbuch der Phonetik (1904), an abbreviated German translation of the author's larger work in Danish, § 216 ff. The books of Sievers and Jespersen give (especially Sievers) full references to the literature of the subject. For the accent system of the Indo- European languages see " Betonung " in Brugmann's Grundriss der vergleichenden Grammatik der indogermanischen Sprachen,vol.i. (1897), or, with considerable modifications, his Kurze vergleichende Grammatik der idg. Sprachen (1902), §§ 32-65 and 343"35°- (P- Gl.)

ACCEPTANCE (Lat. accepiare, frequentative form of accipere, to receive), generally, a receiving or acknowledgment of receipt; in law, the act by which a person binds himself to comply with the request contained in a bill of exchange (q.v.), addressed to him by the drawer. In all cases it is understood to be a promise to pay the bill in money, the law not recognizing an acceptance in which the promise is to pay in some other way, e.g. partly in money and partly by another bill. Acceptance may be either general or qualified. A general acceptance is an engagement to pay the bill strictly according to its tenor, and is made by the drawee subscribing his name, with or without the word " ac- cepted," at the bottom of the bill, or across the face of it. Quali- fied acceptance may be a promise to pay on a contingency occur- ring, e.g. on the sale of certain goods consigned by the drawer to the acceptor. No contingency is allowed to be mentioned in the body of the bill, but a qualified acceptance is quite legal, and equally binding with a general acceptance upon the acceptor when the contingency has occurred. It is also qualified accept- ance where the promise is to pay only part of the sum mentioned in the bill, or to pay at a different time or place from those specified. As a qualified acceptance is so far a disregard of the drawer's order, the holder is not obliged to take it; and if he chooses to take it he must give notice to antecedent parties, acting at his own risk if they dissent. In all cases acceptance involves the signature of the acceptor either by himself or by

some person duly authorized on his behalf. A bill can be accepted in

the first instance only by the person or persons to whom it is addressed; but if he or they fail to do so, it may, after being protested for non-acceptance, be accepted by some one else ” supra protest,” for the sake of the honour of one or more of the parties concerned in it, and he thereupon acquires a claim against the drawer and all those to whom he could have resorted.

ACCEPTILATION (from Lat. acceptilatio) , in Roman and Scots law, a verbal release of a verbal obligation. This formal mode of extinguishing an obligation contracted verbally received its name from the book-keeping term acceptilatio, entering a receipt, i.e. carrying it to credit. The words conveying the release had to correspond to, or strictly cover, the expressed obligation. Figuratively, in theology, • the word acceptilation means free remission or forgiveness of sins.

ACCESS (Lat. accessus), approach, or the means of approach- ing. In law, the word is used in various connexions. The pre- sumption of a child’s legitimacy is negatived if it be proved that a husband has not had access to his wife within such a period of time as would admit of his being the father. (See Legiti- macy.) In the law of easements, every person who has land adjoining a public road or a public navigable river has a right of access to it from his land. So, also, every person has a right of access to air and light from an ancient window. For the right of access of parents to children under the guardianship of the court, see Infant.

ACCESSION (from Lat. accedere, to go to, to approach), in law, a method of acquiring property adopted from Roman law, by which, in things that have a close connexion with or dependence on one another, the property of the principal draws after it the property of the accessory, according to the principle, accessio cedet principali. Accession may take place either in a natural way, such as the growth of fruit or the pregnancy of animals, or in an artificial way. The various methods may be classified as (1) land to land by accretion or alluvion; (2) moveables to land (see Fixtures); (3) moveables to moveables; (4) moveables added to by the art or industry of man; this may be by speci- fication, as when wine is made out of grapes, or by confusion, or commixture, which is the mixing together of liquids or solids, respectively. In the case of industrial accession ownership is determined according as the natural or manufactured substance is of the more importance, and, in general, compensation is pay- able to the person who has been dispossessed of his property.

In a historical or constitutional sense, the term ” accession ” is applied to the coming to the throne of a dynasty or line of sovereigns or of a

single sovereign.

” Accession ” sometimes likewise signifies consent or acquies- cence. Thus, in the bankruptcy law of Scotland, where there is a settlement by a trust-deed, it is accepted on the part of each creditor by a “„deed of accession.”

ACCESSORY, a person guilty of a felonious offence, not as principal, but by participation; as by advice, command, aid or concealment. In certain crimes, there can be no accessories; all concerned being principals, whether present or absent at the time of their commission. These are treason, and all offences below the degree of felony, as specified in the Offences against the Person Act 1861.

There are two kinds of accessories — before the fact, and after it. The first is he who commands or procures another to commit felony, and is not present himself; for if he be present, he is a principal. The second is he who receives, harbours, assists, or comforts any man that has done murder or felony, whereof he has knowledge. An accessory before the fact is liable to the same punishment as the principal; and there is now indeed no practical difference between such an accessory and a principal in regard either to indictment, trial or punishment. Acces- sories after the fact are in general punishable with imprisonment (with or without hard labour) for a period not exceeding two years, but in the case of murder punishable by penal servitude for life, or not less than three years, or by imprisonment (witb or without hard labour) to the extent of two years.

The law of Scotland makes no distinction between the acces- sory to any crime and the principal (see Art and Part). Except in the case of treason, accession after the fact is not noticed by the law of Scotland, unless as an element of evidence to prove previous accession.

ACCIAJUOLI, DONATO (1428-1478), Italian scholar, was born at Florence in 1428. He was famous for his learning, especially in Greek and mathematics, and for his services to his native state. Having previously been entrusted with several important embassies, he became Gonfalonier of Florence in 1473. He died at Milan in 1478, when on his way to Paris to ask the aid of Louis XL on behalf of the Florentines against Pope Sixtus IV. His body was taken back to Florence, and buried in the church of the Carthusians at the public

expense, and his daughters were portioned by his fellow-citizens, the fortune he left being, owing to his probity and disinterestedness, very small. He wrote a Latin translation of some of Plutarch's Lives (Florence, 1478); Commentaries on Aristotle's Ethics and Politics; and the lives of Hannibal, Scipio and Charlemagne. In the work on Aristotle he had the co-operation of his master Argyropulus.

ACCIDENCE (a mis-spelling of " accidents," from the Latin neuter plural accidentia, casual events) , the term for the gram- matical changes to which words are subject in their inflections as to gender, number, tense and case. It is also used to denote a book containing the first principles of grammar, and so of the rudiments of any subject or art.

ACCIDENT (from Lat. accidere, to happen), a word of widely variant meanings, usually something fortuitous and unexpected ; a happening out of the ordinary course of things. In the law of tort, it is defined as "an occurrence which is due neither to design nor to negligence "; in equity, as " such an unforeseen event, misfortune, loss, act or omission, as is not the result of any negligence or misconduct." So, in criminal law, " an effect is said to be accidental when the act by which it is caused is not done with the intention of causing it, and when its occurrence as a consequence of such act is not so probable that a person of ordinary prudence ought, under the circumstances, to take reasonable precaution against it " (Stephen, Digest of Criminal Law, art. 210). The word may also have in law the more extended meaning of an unexpected occurrence, whether caused by any one's negligence or not, as in the Fatal Accidents Act 1846, Notice of Accidents Act 1894. See also Contract, Criminal Law, Employers' Liability, Insurance, Tort, &c.

In logic an " accident " is a quality which belongs to a subject but not as part of its essence (in Aristotelian language Kara ovjxBefi-qKos, the scholastic per accidens). Essential attributes are necessarily, or causally, connected with the subject, e.g. the sum of the angles of a triangle; accidents are not deducible from the nature, or are not part of the necessary connotation, of the subject, e.g. the area of a triangle. It follows that in- creased knowledge, e.g. in chemistry, may show that what was thought to be an accident is really an essential attribute, or vice versa. It is very generally held that, in reality, there is no such thing as an accident, inasmuch as complete knowledge would establish a causal connexion for all attributes. An accident is thus merely an unexplained attribute. Accidents have been classed as (1) " inseparable," i.e. universally present, though no causal connexion is established, and (2) " separable," where the connexion is neither

causally explained nor universal. Propositions expressing a relation between a subject and an accident are classed as ” accidental,” ” real” or ” ampliative,” as opposed to ” verbal ” or ” analytical,” which merely express a known connexion, e.g. between a subject and its connotation (q.v.).

ACCIDENTALISM, a term used (1) in philosophy for any system of thought which denies the causal nexus and maintains that events succeed one another haphazard or by chance (not in the mathematical but in the popular sense). In metaphysics, accidentalism denies the doctrine that everything occurs or re- sults from a definite cause. In this connexion it is synonymous with Tychism (tvxv, chance), a term used by C. S. Peirce for the theories which make chance an objective factor in the

process of the Universe. Opponents of this accidentalism main- tain that what seems to be the result of chance is in reality due to a cause or causes which, owing to the lack of imagination, knowledge or scientific instruments, we are unable to detect. In ethics the term is used, like indeterminism, to denote the theory that mental change cannot always be ascribed to previously ascertained psychological states, and that volition is not causally related to the motives involved. An example of this theory is the doctrine of the liberum arbitrium indifferentiae (“liberty of indifference”), according to which the choice of two or more alternative possibilities is affected neither by con- temporaneous data of an ethical or prudential kind nor by crystallized habit (character). (2) In painting, the term is used for the effect produced by accidental lights (Ruskin, Modern Painters, I. n. 4, iii. § 4, 287). (3) In medicine, it stands for the hypothesis that disease is only an accidental modification of the healthy condition, and can, therefore, be avoided by modifying external conditions.

ACCIUS, a Latin poet of the 16th century, to whom is attri- buted a paraphrase of Aesop’s Fables, of which Julius Scaliger speaks with great praise.

ACCIUS, LUCIUS, Roman tragic poet, the son of a freedman, was born at Pisaurum in Umbria, in 170 b.c. The year of his death is unknown, but he must have lived to a great age, since Cicero {Brutus, 28) speaks of having conversed with him on literary matters. He was a prolific writer and enjoyed a very high reputation (Horace, Epistles, ii. 1, 56; Cicero, Pro Plancio, 24). The titles and considerable fragments (about 700 lines) of some fifty plays have been preserved. Most of these were free translations from the Greek, his favourite subjects being the legends of the Trojan war and the house of Pelops. The national

history, however, furnished the theme of the Brutus and Decius, — the expulsion of the Tarquins and the self-sacrifice of Publius Decius Mus the younger. The fragments are written in vigorous language and show a lively power of description.

Accius' wrote other works of a literary character: Didascalicon and Pragmaticon libri, treatises in verse on the history of Greek and Roman poetry, and dramatic art in particular; Parerga and Praxidica (perhaps identical) on agriculture; and an Annates . He also introduced innovations in orthography and grammar.

See Boissier, Le Poete Accius, 1856; L. Miiller, De Accii fabulis Disputatio (1890) ; Ribbeck, Geschichte der romischen Dichtung (1892) ; editions of the tragic fragments by Ribbeck (1897), of the others by Bahrens (1886); Plessis, Poesie latine (1909).

ACCLAMATION (Lat. acclamatio, a shouting at), in delibera- tive or electoral assemblies, a spontaneous shout of approval or praise. Acclamation is thus the adoption of a resolution or the passing of a vote of confidence or choice unanimously, in direct distinction from a formal ballot or division. In the Roman senate opinions were expressed and votes passed by acclamation in such forms as Omnes, omnes, Aequum est, Justum est, &c; and the praises of the emperor were celebrated in certain pre-arranged sentences, which seem to have been chanted by the whole body of senators. In ecclesiastical councils vote by acclamation is very common, the question being usually put in the form, placet or non placet. The Sacred College has sometimes elected popes by acclamation, when the cardinals simultaneously and without any previous consultation " acclaimed " one of their number as pontiff. A further ecclesiastical use of the word is in its application to set forms of praise or thanksgiving in church services, the stereotyped responses of the congregation. In modern parliamentary usage a motion is carried by acclamation when, no amendment being proposed, approval is expressed by shouting such words as Aye or Agreed.

ACCLIMATIZATION, the process of adaptation by which animals and plants are gradually rendered capable of surviving and flourishing in countries remote from their original habitats, or under meteorological conditions different from those which they have usually to endure, and at first injurious to them.

The subject of acclimatization is very little understood, and some writers have even denied that it can ever take place. It

is often confounded with domestication or with naturalization; but these are both very different phenomena. A domesticated animal or a cultivated plant need not necessarily be acclimatized; that is, it need not be capable of enduring the severity of the seasons without protection. The canary bird is domesticated but not acclimatized, and many of our most extensively culti- vated plants are in the same category. A naturalized animal or plant, on the other hand, must be able to withstand all the vicissitudes of the seasons in its new home, and it may therefore be thought that it must have become acclimatized. But in many, perhaps most cases of naturalization (see Appendix below) there is no evidence of a gradual adaptation to new conditions which were at first injurious, and this is essential to the idea of acclimatization. On the contrary, many species, in a new country and under somewhat different climatic conditions, seem to find a more congenial abode than in their native land, and at once flourish and increase in it to such an extent as often to exterminate the indigenous inhabitants. Thus L. Agassiz (in his work on Lake Superior) tells us that the road- side weeds of the north-eastern United States, to the number of 130 species, are all European, the native weeds having dis- appeared westwards; while in New Zealand there are, according to T. Kirk (Transactions of the New Zealand Institute, vol. ii. p. 131), no less than 250 species of naturalized plants, more than 100 of which spread widely over the country and often displace the native vegetation. Among animals, the European rat, goat and pig are naturalized in New Zealand, where they multiply to such an extejit as to injure and probably exterminate many native productions. In none of these cases is there any indica- tion that acclimatization was necessary or ever took place.

On the other hand, the fact that an animal or plant cannot be naturalized is no proof that it is not acclimatized. It has been shown by C. Darwin that, in the case of most animals and plants in a state of nature, the competition of other organisms is a far more efficient agency in limiting their distribution than the mere influence of climate. We have a proof of this in the fact that so few, comparatively, of our perfectly hardy garden plants ever run wild; and even the most persevering attempts to naturalize them usually fail. Alphonse de Candolle (Geographic botanique, p. 798) informs us that several botanists of Paris, Geneva, and especially of Montpellier, have sown the seeds of many hundreds of species of exotic hardy plants, in what appeared to be the most favourable situations, but that in hardly a

single case has any one of them become naturalized. Attempts have also been made to naturalize continental insects in Britain, in places where the proper food-plants abound and the conditions seem generally favourable, but in no case do they seem to have succeeded. Even a plant like the potato, so largely cultivated and so perfectly hardy, has not established itself in a wild state in any part of Europe.

Different Degrees of Climatal Adaptation in Animals and Plants. — Plants differ greatly from animals in the closeness of their adaptation to meteorological conditions. Not only will most tropical plants refuse to live in a temperate climate, but many species are seriously injured by removal a few degrees of latitude beyond their natural limits. This is probably due to the fact, established by the experiments of A. C. Becquerel, that plants possess no proper temperature, but are wholly de- pendent on that of the surrounding medium.

Animals, especially the higher forms, are much less sensitive to change of temperature, as shown by the extensive range from north to south of many species. Thus, the tiger ranges from the equator to northern Asia as far as the river Amur, and to the isothermal of 32 Fahr. The mountain sparrow (Passer montana) is abundant in Java and Singapore in a uniform equatorial climate, and also inhabits Britain and a con- siderable portion of northern Europe. It is true that most terrestrial animals are restricted to countries not possessing a great range of temperature or very diversified climates, but there is reason to believe that this is due to quite a different set of causes, such as the presence of enemies or deficiency of appro- priate food. When supplied with food and partially protected

from enemies, they often show a wonderful capacity of enduring climates very different from that in which they originally flour- ished. Thus, the horse and the domestic fowl, both natives of very warm countries, flourish without special protection in almost every inhabited portion of the globe. The parrot tribe form one of the most pre-eminently tropical groups of birds, only a few species extending into the warmer temperate regions; yet even the most exclusively tropical genera are by no means delicate birds as regards climate. In the Annals and Magazine of Natural History for 1868 (p. 381) is a most interesting account, by Charles Buxton, of the naturalization of parrots at Northreps Hail, Norfolk. A considerable number of African and Ama- zonian parrots, Bengal parroquets, four species of white and rose crested cockatoos, and two species of crimson lories, remained at large for many years. Several of these birds bred, and they almost all lived in the woods the whole year through, refusing to take shelter in a house constructed for their use. Even when the thermometer fell 6°

below zero, all appeared in good spirits and vigorous health. Some of these birds have lived thus ex- posed for many years, enduring the English cold easterly winds, rain, hail and snow, all through the winter — a marvellous contrast to the equable equatorial temperature (hardly ever less than 70) to which many of them had been accustomed for the first year or years of their existence. Similarly the recent ex- perience of zoological gardens, particularly in the case of parrots and monkeys, shows that, excluding draughts, exposure to changes of temperature without artificial heat is markedly beneficial as compared with the older method of strict protection from cold.

Hardly any group of Mammalia is more exclusively tropical than the Quadrumana, yet, if other conditions are favourable, some of them can withstand a considerable degree of cold. Semnopithecus schistaceus was found by Captain Hutton at an elevation of 11,000 feet in the Himalayas, leaping actively among fir-trees whose branches were laden with snow-wreaths. In Abyssinia a troop of dog-faced baboons was observed by W. T. Blanford at 9000 feet above the sea. We may therefore conclude that the restriction of the monkey tribe to warm latitudes is probably determined by other causes than tempera- ture alone.

Similar indications are given by the fact of closely allied species inhabiting very extreme climates. The recently extinct Siberian mammoth and woolly rhinoceros were closely allied to species now inhabiting tropical regions exclusively. Wolves and foxes are found alike in the coldest and hottest parts of the earth, as are closely allied species of falcons, owls, sparrows and numerous genera of waders and aquatic birds.

A consideration of these and many analogous facts might induce us to suppose that, among the higher animals at least, there is little constitutional adaptation to climate, and that in their case acclimatization is not required. But there are numer- ous examples of domestic animals which show that such adapta- tion does exist in other cases. The yak of Thibet cannot long survive in the plains of India, or even on the hills below a certain altitude; and that this is due to climate, and not to the increased density of the atmosphere, is shown by the fact that the same animal appears to thrive well in Europe, and even breeds there readily. The Newfoundland dog will not live in India, and the Spanish breed of fowls in this country suffer more from frost than most others. When we get lower in the scale the adapta- tion is often more marked. Snakes, which are so abundant in warm countries, diminish rapidly as we go north, and wholly cease at lat. 62 . Most insects are also very susceptible to cold, and seem to be

adapted to very narrow limits of temperature.

From the foregoing facts and observations we may conclude, firstly, that some plants and many animals are not constitution- ally adapted to the climate of their native country only, but are capable of enduring and flourishing under a more or less exten- sive range of temperature and other climatic conditions; and, secondly, that most plants and some animals are, more or less closely, adapted to climates similar to those of their native habitats. In order to domesticate or naturalize the former

class in countries not extremely differing from that from which the species was brought, it will not be necessary to acclimatize, in the strict sense of the word. In the case of the latter class, however, acclimatization is a necessary preliminary to natural- ization, and in many cases to useful domestication, and we have therefore to inquire whether it is possible.

Acclimatization by Individual Adaptation. — It is evident that acclimatization may occur (if it occurs at all) in two ways, either by modifying the constitution of the individual submitted to the new conditions, or by the production of offspring which may be better adapted to those conditions than their parents. The alteration of the constitution of individuals in this direction is not easy to detect, and its possibility has been denied by many writers. C. Darwin believed, however, that there were indica- tions that it occasionally occurred in plants, where it can be best observed, owing to the circumstance that so many plants are propagated by cuttings or buds, which really continue the existence of the same individual almost indefinitely. He ad- duced the example of vines taken to the West Indies from Madeira, which have been found to succeed better than those taken directly from France. But in most cases habit, however prolonged, appears to have little effect on the constitution of the individual, and the fact has no doubt led to the opinion that acclimatization is impossible. There is indeed little or no evi- dence to show that any animal to which a new climate is at first prejudicial can be so acclimatized by habit that, after sub- jection to it for a few or many seasons, it may live as healthily and with as little care as in its native country; yet we may, on general principles, believe that under proper conditions such an acclimatization would take place.

Acclimatization by Variation. — A mass of evidence exists showing that variations of every conceivable kind occur among the offspring of all plants and animals, and that, in particular, constitutional variations are by no ‘means uncommon. Among cultivated plants, for example, hardier and more tender varieties often arise. The following cases are given by C. Darwin: — Among the numerous fruit-trees raised in North America some are well adapted to the climate of the northern States and Canada, while others only succeed well in the southern States. Adaptation of this kind is sometimes very close, so that, for example, few English varieties of wheat will thrive in Scotland. Seed-wheat from India produced a miserable crop when planted by the Rev. M. J. Berkeley on land which would have produced a good crop of English wheat. Conversely, French wheat taken to the West Indies produced only barren spikes, while native wheat by its side yielded an enormous harvest. Tobacco in Sweden, raised from home-grown seed, ripens its seeds a month earlier than plants grown from foreign seed. In Italy, as .long as orange trees were propagated by grafts, they were tender; but after many of the trees were destroyed by the severe frosts of 1709 and 1763, plants were raised from seed, and these were found to be hardier and more productive than the former kinds. Where plants are raised from seed in large quantities, varieties always occur differing in constitution, as well as others differing in form or colour; but the former cannot be perceived by us unless marked out by their behaviour 1 under exceptional con- ditions, as in the following cases. After the severe winter of 1860-1861 it was observed that in a large bed of araucarias some plants stood quite unhurt among numbers killed around them. In C. Darwin’s garden two rows of scarlet runners were entirely killed by frost, except three plants, which had not even the tips of their leaves browned. A very excellent example is to be found in Chinese history, according to E. R. Hue, who, in his V Empire chinois (torn. ii. p. 359), gives the following extract from the Memoirs of the Emperor Khang: — ” On the 1st day of ihe 6th moon I was walking in some fields where rice had been sown to be ready for the harvest in the 9th moon. I observed by chance a stalk of rice which was already in ear. It was higher than all the rest, and was ripe enough to be gathered. I ordered it to be brought to me. The grain was very fine and well grown, which gave me the idea to keep it for a trial, and see if the following year it would preserve its precocity. It did so.

All the stalks which came from it showed ear before the usual time, and were ripe in the 6th moon. Each year has multiplied the produce of the preceding, and for thirty years it is this rice which has been served at my table. The grain is elongate and of a reddish colour, but

it has a sweet smell and very pleasant taste. It is called Yu-mi, Imperial rice, because it was first cultivated in my gardens. It is the only sort which can ripen north of the great wall, where the winter ends late and begins very early; but in the southern provinces, where the climate is milder and the land more fertile, two harvests a year may be easily obtained, and it is for me a sweet reflection to have procured this advantage for my people." Hue adds his testi- mony that this kind of rice flourishes in Manchuria, where no other will grow. We have here, therefore, a perfect example of acclimatization by means of a spontaneous constitutional variation.

That this kind of adaptation may be carried on step by step to more and more extreme climates is illustrated by the following examples. Sweet-peas raised in Calcutta from seed imported from England rarely blossom, and never yield seed ; plants from French seed flower better, but are still sterile; but those raised from Darjeeling seed (originally imported from England) both flower and seed profusely. The peach is believed to have been tender, and to have ripened its fruit with difficulty, when first introduced into Greece; so that (as Darwin observes) in travelling northward during two thousand years it must have become much hardier. Sir J. Hooker ascertained the average vertical range of flowering plants in the Himalayas to b#40oo ft., while in some cases it extended to 8000 ft. The same species can thus endure a great difference of temperature; but the important fact is, that the individuals have become acclimatized to the altitude at which they grow, so that seeds gathered near the upper limit of the range of a species will be more hardy than those gathered near the lower limit. This was proved by Hooker to be the case with Himalayan conifers and rhododendrons, raised in Britain from seed gathered at different altitudes.

Among animals exactly analogous facts occur. When geese were first introduced into Bogota they laid few eggs at long intervals, and few of the young survived. By degrees the fecundity improved, and in about twenty years became equal to what it is in Europe. The same author tells us that, according to Garcilaso, when fowls were first introduced into Peru they were not fertile, whereas now they are as much so as in Europe. C. Darwin adduced the following examples. Merino sheep bred at the Cape of Good Hope have been found far better adapted for India than those imported from England; and while the Chinese variety of the Ailanthus silk-moth is quite hardy, the variety found in Bengal will only flourish in warm latitudes. C. Darwin also called attention to the circumstance that writers of agricultural works generally recommend that animals should be removed from one district to another as little as possible. This advice occurs even in

classical and Chinese agricultural books as well as in those of our own day, and proves that the close adaptation of each variety or breed to the country in which it originated has always been recognized.

Constitutional Adaptation often accompanied by External Modification. — Although in some cases no perceptible alteration of form or structure occurs when constitutional adaptation to climate has taken place, in others it is very marked. C. Darwin collected a large number of cases in his Animals and Plants under Domestication.

In hisflf ontributions to the Theory of Natural Selection (p. 167), A. R.Wallace has recorded cases of simultaneous variation among insects, apparently due to climate or other strictly local causes. He found that the butterflies of the family Papilionidae, and some others, became similarly modified in different islands and groups of islands. Thus, the species inhabiting Sumatra, Java and Borneo are almost always much smaller than the closely allied species of Celebes and the Moluccas; the species or varieties of the small island of Amboyna are larger than the same species or closely allied forms inhabiting the surrounding islands; the species found in Celebes possess a peculiar form of wing, quite

distinct from that of the same or closely allied species of ad- jacent islands; and, lastly, numerous species which have. tailed wings in India and the western islands of the Archipelago, gradually lose the tail as we proceed eastward to New Guinea and the Pacific.

Many of these curious modifications may, it is true, be due to other causes than climate only, but they serve to show how powerfully and mysteriously local conditions affect the form and structure of both plants and animals; and they render it probable that changes of constitution are also continually pro- duced, although we have, in the majority of cases, no means of detecting them. It is also impossible to determine how far the effects described are produced by spontaneous favourable varia- tions or by the direct action of local conditions; but it is prob- able that in every case both causes are concerned, although in constantly varying proportions.

Selection and Survival of the Fittest as Agents in Naturalization. — We may now take it as an established fact that varieties of animals and plants occur, both in domesticity and in a state of nature, which are

better or worse adapted to special climates. There is no positive evidence that the influence of new climatal conditions on the parents has any tendency to produce variations in the offspring better adapted to such conditions. Neither does it appear that this class of variations are very frequent. It is, however, certain that whenever any animal or plant is largely propagated constitutional variations will arise, and some of these will be better adapted than others to the climatal and other conditions of the locality. In a state of nature, every recurring severe winter or otherwise unfavourable season weeds out those individuals of tender constitution or imperfect structure which may have got on very well during favourable years, and it is thus that the adaptation of the species to the climate in which it has to exist is kept up. Under domestication the same thing occurs by what C. Darwin has termed "unconscious selection." Each cultivator seeks out the kinds of plants best suited to his soil and climate and rejects those which are tender or otherwise unsuitable. The farmer breeds from such of his stock as he finds to thrive best with him, and gets rid of those which suffer from cold, damp or disease. A more or less close adaptation to local conditions is thus brought about, and breeds or races are produced which are sometimes liable to deterioration on removal even to a short distance in the same country, as in numerous cases quoted by C. Darwin (Animals and Plants under Domesti- cation).

The Method of Acclimatization. — Taking into consideration the foregoing facts and illustrations, it may be considered as proved — 1st, That habit has little (though it appears to have some) definite effect in adapting the constitution of animals to a new climate; but that it has a decided, though still slight, influence in plants when, by'the process of propagation by buds, shoots or grafts, the individual can be kept under its influence for long periods; 2nd, That great and sudden changes of climate often check reproduction even when the health of the- individuals does not appear to suffer. In order, therefore, to have the best chance of acclimatizing any animal or plant in a climate very dis- similar from that of its native country, and in which it has been proved that the species in question cannot live and maintain itself without acclimatization, we must adopt some such plan as the following: —

1. We must transport as large a number as possible of adult healthy individuals to some intermediate station, and increase them as much as possible for some years. Favourable varia- tions of constitution will soon show themselves, and these should be carefully selected to breed from, the tender and unhealthy individuals being rigidly eliminated.

2. As soon as the stock has been kept a sufficient time to pass through

all the ordinary extremes of climate, a number of the hardiest may be removed to the more remote station, and the same process gone through, giving protection if necessary while the stock is being increased, but as soon as a large number of healthy individuals are produced, subjecting them to all the vicissitudes of the climate.

It can hardly be doubted that in most cases this plan would succeed. It has been recommended by C. Darwin, and at one of the early meetings of the Socitte Zoologique d' Acclimatation, at Paris, Isodore Geoffroy St Hilaire insisted that it was the only method by which acclimatization was possible. But in looking through the long series of volumes of Reports published by this society, there is no sign that any systematic attempt at acclimat- ization has even once been made. A number of foreign animals have been introduced, and more or less domesticated, and some useful exotics have been cultivated for the purpose of testing their applicability to French agriculture or horticulture; but neither in the case of animals nor of plants has there been any sys- tematic effort to modify the constitution of the species, by breed- ing largely and selecting the favourable variations that appeared.

Take the case of the Eucalyptus globulus as an example. This is a Tasmanian gum-tree of very rapid growth and great beauty, which will thrive in the extreme south of France. In the Bulletin of the society a large number of attempts to introduce this tree into general cultivation in other parts of France are recorded in detail, with the failure of almost all of them. But no precautions such as those above indicated appear to have been taken in any of these experiments; and we have no intimation that either the society or any of its members are making systematic efforts to acclimatize the tree. The first step would be, to obtain seed from healthy trees growing in the coldest climate and at the greatest altitude in its native country, sowing these very largely, and in a variety of soils and situations, in a part of France where the climate is somewhat but not much more extreme. It is almost a certainty that a number of trees would be found to be quite hardy. As soon as these produced seed, it should be sown in the same district and farther north in a climate a little more severe. After an exceptionally cold season, seed should be collected from the trees that suffered least, and should be sown in various dis- tricts all over France. By such a process there can be hardly any doubt that the tree would be thoroughly acclimatized in any part of France, and in many other countries of central Europe; and more good would be effected by one well-directed effort of this kind than by hundreds of experiments with individual animals and plants, which only serve to show us which are the species that do not require to be acclimatized.

Acclimatization of Man. — On this subject we have, unfortu- nately, very little direct or accurate information. The general laws of heredity and variation have been proved to apply to man as well as to animals and plants; and numerous facts in the distribution of races show that man must, in remote ages at least, have been capable of constitutional adaptation to climate. If the human race constitutes a single species, then the mere fact that man now inhabits every region, and is in each case consti- tutionally adapted to the climate, proves that acclimatization has occurred. But we have the same phenomenon in single varieties of man, such as the American, which inhabits alike the frozen wastes of Hudson's Bay and Tierra del Fuego, and the hottest regions of the tropics, — the low equatorial valleys and the lofty plateaux of the Andes. No doubt a sudden transfer- ence to an extreme climate is often prejudicial to man, as it is to most animals and plants; but there is every reason to believe that, if the migration occurs step by step, man can be acclimat- ized to almost any part of the earth's surface in comparatively few generations. Some eminent writers have denied this. Sir Ranald Martin, from a consideration of the effects of the climate of India on Europeans and their offspring, believed that there is no such thing as acclimatization. Dr Hunt, in a report to the British Association in 1861, argued that "time is no agent," and — " if there is no sign of acclimatization in one generation, there is no such process." But he entirely ignored the effect of favourable variations, as well as the direct influence of climate acting on the organization from infancy.

Professor Theodor Waitz, in his Introduction to Anthropology, adduced many examples of the comparatively rapid constitu- tional adaptation of man to new climatic conditions. Negroes, for example,who have been for three or four generations acclimat- ized in North America, on returning to Africa become subject to

the same local diseases as other unacclimatized individuals. He well remarked that the debility and sickening of Europeans in many tropical countries are wrongly ascribed to the climate, but are rather the consequences of indolence, sensual gratifica- tion and an irregular mode of life. Thus the English, who cannot give up animal food and spirituous liquors, are less able to sustain the heat of the tropics than the more sober Spaniards and Portuguese. The excessive mortality of European troops in India, and the delicacy of the children of European parents, do not affect the real question of acclimatization under

proper conditions. They only show that acclimatization is in most cases necessary, not that it cannot take place. The best examples of partial or complete acclimatization are to be found where European races have permanently settled in the tropics, and have maintained themselves for several generations. There are, however, two sources of inaccuracy to be guarded against, and these are made the most of by the writers above referred, to, and are supposed altogether to invalidate results which are otherwise opposed to their views. In the first place, we have the possibility of a mixture of native blood having occurred; in the second, there have almost always been a succession of immigrants from the parent country, who continually intermingle with the families of the early settlers. It is maintained that one or other of these mixtures is absolutely necessary to enable Europeans to continue long to flourish in the tropics.

There are, however, certain cases in which the sources of error above mentioned are reduced to a minimum, and cannot seri- ously affect the results; such as those of the Jews, the Dutch at the Cape of Good Hope and in the Moluccas, and the Spaniards in South America.

The Jews are a good example of acclimatization, because they have been established for many centuries in climates very different from that of their native land; they keep themselves almost wholly free from intermixture with the people around them; and they are often so populous in a country that the inter- mixture with Jewish immigrants from other lands cannot seri- ously affect the local purity of the race. They have, for instance, attained a population of millions in such severe climates as Poland and Russia; in the towns of Algeria they have succeeded so conspicuously as to bring about an outburst of anti-semitism; and in Cochin-China and Aden they succeed in rearing children and forming permanent communities.

In some of the hottest parts of South America Europeans are perfectly acclimatized, and where the race is kept pure it seems to be even improved. Some very valuable notes on this subject were furnished to the present writer by the well-known botanist, Richard Spruce, who resided many years in South America, but who was prevented by ill-health from publishing his researches (see A. R. Wallace, Notes of a Botanist, 1908). As a careful, judicious and accurate observer, both of man and nature, he had few superiors. He says:

The white inhabitants of Guayaquil (lat. 2° 13′ S.) are kept pure by careful selection. The slightest tincture of red or black blood bars entry into any of the old families who are descendants of Spaniards from the Provincias Vascongadas or those bordering the Bay of Biscay,

where the morals are perhaps the purest (as regards the inter- course of the sexes) of any in Europe, and where for a girl, even of the poorest class, to have a child before marriage is the rarest thing possible. The consequence of this careful breeding is, that the women of Guayaquil are considered (and justly) the finest along the whole Pacific coast. They are often tall, sometimes very handsome, decidedly healthy, although pale, and assuredly prolific enough. Their sons are big, stout men, but when they lead inactive lives are apt to become fat and sluggish. Those of them, however, who have farms in the savannahs and are accustomed to take long rides in all weathers, and those whose trade obliges them to take frequent journeys in the mountainous interior, or even to Europe and North America, are often as active and as little burdened with superfluous flesh as a Scotch farmer.

The oldest Christian town in Peru is Piura (lat. 5° S.), which was founded by Pizarro himself. The climate is very hot, especially in the three or four months following the southern solstice. In March 1843 the temperature only once fell as low as 83 during the whole month, the usual lowest night temperature being 85 . Yet people of all colours find it very healthy, and the whites are very prolific. I resided in the town itself nine months, and in the neighbourhood seven months more. The population (in i863-i864)wasabout io,ooo,

of which not only a considerable proportion was white, but was mostly descended from the first emigrants after the conquest. Purity oi descent was not, however, quite so strictly maintained as at Guaya-quil. The military adventurers, who have often risen to high or even supreme rank in Peru, have not seldom been of mixed race, and fear or favour has often availed toprocure them an alliance with theoldest and pUrest-blooded families.

These instances, so well stated by Spruce, seem to demonstrate the complete acclimatization of Spaniards in some of the hottest parts of South America. Although we have here nothing to do with mixed races, yet the want of fertility in these has been often taken to be a fact inherent in the mongrel race, and has been also sometimes held to prove that neither the European nor his half-bred offspring can maintain themselves in the tropics. The following observation is therefore of interest: —

At Guayaquil for a lady of good family — married or unmarried — to be of loose morals is so uncommon, that when it does happen it is felt as a calamity by the whole community. But here, and perhaps in most other towns in South America, a poor girl of mixed race — especially

if good-looking — rarely thinks of marrying one of her own class until she has — as the Brazilians say — “approveitada de sua mocidade ” (made the most of her youth) in receiving presents from gentlemen. If she thus bring a good dowry to her husband, he does not care to inquire, or is not sensitive, about the mode in which it was acquired. The consequence of this indiscriminate sexual inter- course, especially if much prolonged, is to diminish, in some cases to paralyse, the fertility of the female. And as among people of mixed race it is almost universal, the population of these must fall off both in numbers and quality.

The following example of divergent acclimatization of the same race to hot and cold zones is very interesting, and will conclude our extracts from Spruce’s valuable notes: —

One of the most singular cases connected with this subject that have fallen under my own observation, is the difficulty, or apparent impossibility, of acclimatizing the Red Indian in a certain zone of the Andes. Any person who has compared the physical characters of the native races of South America must be convinced that these have all originated in a common stirps. Many local differences exist, but none capable of invalidating this conclusion. The warmth yet shade-loving Indian of the Amazon; the Indian of the hot, dry and treeless coasts of Peru and Guayaquil, who exposes his bare head to the sun with as much zest as an African negro; the Indian of the Andes, for whom no cold seems too great, who goes constantly bare- legged and often bare-headed, through whose rude straw hut the piercing wind of the paramos sweeps and chills the white man to the very bones ; — all these, in the colour and texture of the skin, the hair and other important features, are plainly of one and the same race.

Now there is a zone of the equatorial Andes, ranging between about 4000 and 6000 feet altitude, where the very best flavoured coffee is grown, where cane is less luxuriant but more saccharine than in the plains, and which is therefore very desirable to cultivate, but where the red man sickens and dies. Indians taken down from the sierra get ague and dysentery. Those of the plains find the tempera- ture chilly, and are stricken down with influenza and pains in the limbs. I have seen the difficulty experienced in getting farms culti- vated in this zone, on both sides of the Cordillera. The permanent residents are generally limited to the major-domo and his family; and in the dry season labourers are hired, of any colour that can be obtained — some from the low country, others from the highlands — for three, four, or five months, who gather in and grind the cane, and plant for the harvest of the following year; but the staff of resident Indian

labourers, such as exists in the farms of the sierra, cannot be kept up in the Yungas, as these half-warm valleys are called. White men, who take proper precautions, and are not chronically soaked with cane-spirit, stand the climate perfectly, but the creole whites are still too much caballeros to devote themselves to agricultural work.

In what is now the republic of Ecuador, the only peopled portions are the central valley, between the two ridges of the Andes — height 7000 to 12,000 feet — and the hot plain at their western base; nor do the wooded slopes appear to have been inhabited, except by scattered savage hordes, even in the time of the Incas. The Indians of the highlands are the descendants of others who have inhabited that region exclusively for untold ages ; and a similar affirmation may be made of the Indians of the plain. Now, there is little doubt that the progenitors of both these sections came from a temperate region (in North America) ; so that here we have one moiety ac- climatized to endure extreme heat, and the other extreme cold ; and at this day exposure of either to the opposite extreme (or even, as we have seen, to the climate of an intermediate zone) is always pernicious and often fatal. But if this great difference has been brought about in the red man, might not the same have happened to the white man? Plainly it might, time being given; for one cannot doubt that the inherent adaptability is the same in both, or (if not) that the white man possesses it in a higher degree.

The observations of Spruce are of themselves almost conclu- sive as to the possibility of Europeans becoming acclimatized in the tropics; and if it is objected that this evidence applies only to the dark-haired southern races, we are fortunately able to point to facts, almost equally well authenticated and con- clusive, in the case of one of the typical Germanic races. In South Africa the Dutch have been settled and nearly isolated for over 200 years, and have kept themselves almost or quite free from native intermixture. They are still preponderatingly fair in complexion, while physically they are tall and strong. They marry young and have large families. The population, according to a census taken in 1798, was under 22,000. In 1865 it was near 182,000, the majority being of ” Dutch, German or French origin, mostly descendants of original settlers.” In more recent times, the conditions have been so greatly changed by immigration, that the later statistics cease to have a definite meaning with regard to acclimatization. We have here a population which doubled itself every

twenty-two years; and the greater part of this rapid increase must certainly be due to the old European immigrants. In the Moluccas, where the Dutch have had settlements for 250 years, some of the inhabit- ants trace their descent to early immigrants; and these, as well as most of the people of Dutch descent in the east, are quite as fair as their European ancestors, enjoy excellent health, and are very prolific. But the Dutch accommodate themselves admirably to a tropical climate, doing much of their work early in the morning, dressing very lightly, and living a quiet, tem- perate and cheerful life. They also pay great attention to drainage and general cleanliness. In addition to these examples, it is obvious that the rapid increase of English-speaking popula- tions in the United States and in Australia is far greater than can be explained by immigration, and shows two conspicuous examples of acclimatization.

On the whole, we seem justified in concluding that, under favourable conditions, and with a proper adaptation of means to the end in view, man may become acclimatized with at least as much certainty and rapidity (counting by generations rather than by years) as any of the lower animals. The greatest difficulty in his way is not temperature, but the presence of parasitic diseases to resist which his body has not been prepared, and modern knowledge is rapidly defining these dangers and the modes of avoiding them. (A. R. W.)

Appendix

The task of collecting information as to animals which have become permanently naturalized away from their native haunts is anything but easy, as few regular records have been kept by acclimatizers. Moreover, recorders of local fauna have been almost unanimous in ignoring the introduced forms, except when they have had occasion to comment on the effects, real or supposed, of these immigrants on aboriginal faunas.

Mammals. — It is unnecessary here to dwell upon the world- wide distribution of the two rats Mus raltus and M. decumanus, and of the house-mouse M. musculus; their introduction has always been involuntary. Similarly nearly all our domestic mammals except the sheep have become feral somewhere or other, whether by intentional liberation or by escape; but the smaller ones more than the larger, such as pigs, goats, dogs and cats. This has been especially the case in Hawaii and New Zealand; in America, Australia and Hawaii, horses and cattle are also feral. Feral pigs are numerous in New Zealand.

The domestic Indian buffalo (Bos bubalus) exists as a wild animal in

North Australia; it is very liable to revert to a wild state, being little altered from its still-existing wild ancestor. A more curious case is that of the one-humped camel (Camelus dromedarius) , a beast only known in domestication, and that in arid countries; yet a number of these have become feral in the Spanish marshes, where they wade about like quadrupedal flamingoes.

The red deer (Cervus elaphus) is now widely distributed as a wild animal over New Zealand, where also the fallow-deer (C. dama) and the Indian sambar (C. aristotelis or unicolor) have been

introduced locally. The sambar, or one or other of its sub- species, has also been naturalized in Mauritius, and in the Marianne Islands in the open Pacific.

The wide introduction of the rabbit, as a wild animal, is well known. Amounting to a serious pest in Australasian colonies, it is also established in the Falklands and Kerguelen; its presence in much of Europe is attributed to early acclimatization, as it seems anciently to have been confined to the Iberian peninsula.

The hare has been established in New Zealand and Barbadoes.

Few other rodents have been designedly naturalized, but the North American grey squirrel (Sciurus cinereus) appears to be established as a wild animal in Woburn Park, Bedfordshire, England, and may probably spread thence.

To check the increase of the rabbit, stoats, weasels and pole- cats (the last in the form of the domesticated ferret) were intro- duced into New Zealand on a very large scale in the last quarter of the 19th century. They have spread widely, and have not confined their depredations to the rabbits, so that the indigenous flightless birds have suffered largely.

Another carnivore of very similar habits, the Indian mongoose (Herpestus griseus or H. mungo), has been naturalized in Jamaica, whence it has been carried to other West Indian Islands, and in the Hawaiian group. It has also been tried, but unsuccessfully, in Australia. The first introduction into Jamaica took place in 1872, and ten years later the animal was credited with saving many thousands of pounds annually by its destruction of rats. But before an equal space of time had further elapsed, it had itself become a pest; the most recent information, however, is to the effect that its numbers are now on the decline, and that the disturbed faunal equilibrium is being

readjusted.

The civets, being celebrated for their odoriferous secretion, are likely animals to have been naturalized. W. T. Blanford {Fauna of British India, ” Mammals “) thinks that the presence of the Indian form, Viverricula malaccensis, in Socotra, the Comoro Islands and Madagascar is due to the assistance of man.

The common fox of Europe has been introduced into Australia, where it is destructive to the native fauna and to lambs.

Among primates, a Ceylonese monkey (Macacus pilealus) has been naturalized in Mauritius for centuries, the circumstances of introduction being unknown.

The common Australian “opossum” or phalanger (Tricho- surus vulpecula) has been naturalized in New Zealand, although very destructive to fruit trees; the value of its fur being probably the motive. It is said that the pelage of the New Zealand specimens is superior, as might be expected from the colder climate.

Birds. — The introduction of mammals has been largely in- fluenced by economic conditions, when, indeed, it was not absolutely accidental and unavoidable; but in the case of birds it has been more gratuitous, so to speak, in many cases, and hence is looked upon with especial dislike by naturalists. The domestic birds have comparatively seldom become feral, doubt- less, as C. Darwin points out, from the reduction of their powers of flight in many cases. The guinea-fowl, however, has long been in this condition in Jamaica and St Helena, and the fowl in Hawaii and other Polynesian islands. The pheasant has been naturalized in the United States, New Zealand, Hawaii and St Helena. Its naturalization in western Europe is very ancient, but the race supposed to have been introduced by the Romans (Phasianus colchicus) has been much modified within the last century or two by the introduction of the ring-necked Chinese form (P. torquatus), which produces fertile hybrids with the old breed. Thus those acclimatized were usually, no doubt, of mixed blood, and further introductions of pure Chinese stock have tended to make the latter the dominant form, at any rate in the United States (where it is erroneously called Mongolian 1) and in New Zealand. In Hawaii and St Helena the ring-neck appears to have been the only pheasant introduced pure, but in the former the Japanese race (P. versicolor) is also naturalized.

1 The true Mongolian pheasant (P. mongolicus), a very different bird, has recently been introduced into England.

The golden pheasant (Chrysolophus pictus) is locally estab- lished in the United States, as appear to be other pheasants of less common species. The Reeves' pheasant (P. reevesi) is at large on some English estates. Of the partridges, the continental red-leg (Caccabis rufa) is established in England, and its ally, the Asiatic chukore (C. chukar), in St Helena, as is the Cali- fornian quail (Lophortyx calij arnica) in New Zealand and Hawaii. The latter, however, though thriving as an aviary bird, has failed at large in England, as did the bob-white (Ortyx virginianus) both there and in New Zealand.

The desirable character of the grouse as game-birds has led to many attempts at their acclimatization, but usually these have been unsuccessful; the red grouse (Lagopus scoticus), how- ever, the only endemic British bird, is naturalized in some parts of Europe.

Of waterfowl, the Canada goose (Branta canadensis) is natural- ized to a small extent in Britain, and also, to a less degree, the Egyptian goose (Chenalopex aegyptiacus) ; the latter bird also occurs wild in New Zealand. The modern presence of the black swan of Australia (Chenopis atrata) in New Zealand appears to be due to a natural irruption of the species about half a century ago as much as to acclimatization by man, if not more so.

Birds of prey are, unjustly enough, regarded with so little favour that few attempts have been made to naturalize them; the continental little owl {Athene noctua), however, has for some time been well established in England, where it has hardly, if ever, appeared naturally.

Pigeons have been very little naturalized; the tame bird has become feral locally in various countries, and the Chinese turtle- dove (Turtur chinensis) is established in Hawaii, as is the small East Indian zebra dove (Geopelia striata) in the Seychelles, and the allied Australian (G. tranquilla) in St Helena. There has also been very little naturalization of parrots, but the rosella parrakeet of Australia (Plalycercus eximius) is being propagated by escaped captives in the north island of New Zealand, and its ally the mealy rosella (P. pallidiceps) is locally wild in Hawaii, the stock in this case having descended from a single pair in- tentionally liberated. Attempts to naturalize that well-known Australian grass-parrakeet the budgerigar (Mclopsittacus un- dulatus) in England have so far proved abortive, and none of the species

experimented with in Norfolk and Bedfordshire effected a settlement. The greyheaded love-bird (Agapornis cana) of Madagascar is established in the Seychelles. Some of the passerine birds have been the most widely distributed, especially the house-sparrow (Passer domesticus) , which is now an integral, and very troublesome, part of the fauna in the Australasian States and in North America. It is, in fact, as notorious an example of over-successful acclimatization as the rabbit, but in Hutton and Drummond's recent work on the New Zealand animals (London, 1905) it is not regarded in this light, considering that some very common exotic birds were needed to keep down the insects, which it certainly did. Even in the United States also, it has been found a useful destroyer of weed-seeds. The house-sparrow is also feral in Argentina, some of the West Indian islands, Hawaii and the Andamans.

The allied tree-sparrow (P. montanus) has been locally naturalized in the United States; it is a more desirable bird, being less prolific and pugnacious, but it is expelled from towns by the house-sparrow.

The so-called Java sparrow (Munia oryzivora), although a destructive bird to rice, has been widely distributed by accident or design, and is now found in several East Indian islands besides Java, in south China, St Helena, India, Zanzibar and the east African coast. An allied but much smaller weaver-finch, a form of the spice-bird (Munia nisoria punctata), is introduced and well distributed over the Hawaiian islands. The little rooibek of South Africa (Estrilda astrild) has been so long and well established in St Helena that it is known in the bird trade as the St Helena waxbill, and the brilliant scarlet weaver of Mada- gascar (Foudia madagascariensis) inhabits as an imported bird Mauritius, the Seychelles and even the remote Chagos Islands.

Returning to the true finches, the only one which can compete

with the house-sparrow in the extent of its distribution by man is the goldfinch (Carduelis carduelis), now established all over New Zealand, as well as in Australia, the United States and Jamaica. It bears a good character, and is one of the marked successes of naturalization. The redpoll (Acanthis linaria), chaffinch (Fringilla coelebs) and greenfinch (Chloris chloris). are established in New Zealand, the last named being a pest there, as is also the cirl-bunting (Emberiza cirlus) — the yellow-hammer (E. citrinella) being perhaps confused with this also.

Among starlings, the Indian mynah (generally the house mynah, Acridotheres trislis, but some other species seem to have been confused with this) has been naturalized in the Andamans, Seychelles,

Reunion, Australia, Hawaii and parts of New Zealand. Its alleged destructiveness to the Hawaiian avifauna seems open to doubt.

The European starling (Sturnus vulgaris) is naturalized in New Zealand, Australia and to some extent ii > the United States. Thrushes have not been widely introduced, but the song- thrush and blackbird (Turdus musicus and Merula merula) are common in New Zealand; attempts were made, but unsuc- cessfully, to establish the latter in the United States. The so-called hedge-sparrow (Accentor modularis), really a member of this group, is one of the successful introductions into New Zealand. The robin (Erithacus rubecula) failed there.

Rooks (Corvus frugilegus) and the Australian “magpie” or piping crow (Gymnorhina) are to be found in New Zealand, but only locally, especially the former.

Reptiles and Amphibians. — Very little naturalization has been effected, or indeed apparently attempted, in regard to these groups, but the occurrence of the edible frog of the continent of Europe (Rana esculenta) as an introduced animal in certain British localities is well known. An Australian tree-frog (Hyla peronii) is naturalized in many parts of the north island of New Zealand.

Fish. — The instances of naturalization in this class are few, but important. The common carp (Cyprinus carpio), originally a Chinese fish, has for centuries been acclimatized in Europe, where indeed it is in places a true domestic creature, with definite variations. It is, however, quite feral also, and has been introduced into North America.

The Prussian carp (Carassius vulgaris) is established in New Zealand, and the nearly-allied goldfish, a domestic form (C. auratus) of Chinese origin, has been widely distributed as a pet, and is feral in some places.

The gourami (Osphromenus olfax) of the East Indies has been established in Mauritius and Cayenne, being a valuable food- fish.

The most important case of naturalization of fish is, however, the establishment of some Salmonidae in Tasmania and New Zealand. These are the common trout and sea-trout (Salmo fario and S. trutta) ; they attain a great size. So far, attempts to establish the true salmon in alien localities have been un- successful, but the American rainbow trout (S. irideus) has thriven in New Zealand, and the brook char of the same conti- nent (S. fontinalis) inhabits at least one stream there

to the exclusion of the common trout.

Invertebrates. — Many insects and other invertebrates, mostly noxious, have been accidentally naturalized, and some have been deliberately introduced, like the honey-bee, now feral in Australasia and North America, and the humble-bee, imported into New Zealand to effect the fertilization of red clover.

The spread of the European house-fly has been deliberately encouraged in New Zealand, as wherever it penetrates the native flesh-fly, a more objectionable pest, disappears.

The wide distribution of three common cockroaches (Peri- planeta americana, Blatta orientalis and Ectobia germanica) is well known, but these are chiefly house-insects.

The common small white butterfly of Europe (Pontia or Pieris rapae) is now established in North America; and the march of the jigger, or foot-infesting flea (Sarcopsylla penetrans) of tropical America, across Africa, has taken place in quite recent years.

The Romans are credited with having purposely introduced the edible snail {Helix pomatia) into England, and the common garden snail and slugs {Helix aspersa, Limax agrestis and Arion hortensis) have been unwittingly established in New Zealand. In that country, also, the earthworms of Europe are noticed to replace native forms as the ground is broken.

General Remarks. — A great deal has been said about the up- setting of the balance of nature by naturalization, and as to the ill-doing of exotic forms. But certain considerations should be borne in mind in this connexion. In the first place, naturaliza- tion experiments fail at least as often as they succeed, and often quite inexplicably. Thus, the linnet and partridge have failed to establish themselves in New Zealand. This may ultimately throw some light on the disappearance of native forms; for these have at times declined without any assignable cause.

Secondly, native forms often disappear with the clearing off of the original forest or other vegetation, in which case their recession is to a certain extent unavoidable, and the fauna which has established itself in the presence of cultivation is needed to replace them.

Thirdly, the ill effect of introduced forms on existing ones may often be due rather to the spread of disease and parasites than to actual attack; thus, in Hawaii the native birds have been found suffering from a disease which attacks poultry. And the recession of the New Zealand earthworms and flies before exotic forms probably falls under this category. As man can- not easily avoid introducing parasites, and must keep domestic animals and till the land, a certain disturbance in aboriginal faunas is absolutely unavoidable. Under certain circumstances, however, the native animals may recover, for in some cases they even profit by man's advent, and at times themselves become pests, like the Kea parrot {Nestor notabilis), which attacks sheep in New Zealand, and the bobolink or rice-bird {Dolichonyx oryzivorus) in North America. Finally, it should never be forgotten that the worst enemies of declining forms have been collectors who have not given these species the chance of recovering themselves. (F. Fn.)

ACCOLADE (from Ital. accolata, derived from Lat. collum, the neck), a ceremony anciently used in conferring knighthood; but whether it was an actual embrace (according to the use of the modern French word accolade), or a slight blow on the neck or cheek, is not agreed. Both these customs appear to be of great antiquity. Gregory of Tours writes that the early kings of France, in conferring the gilt shoulder-belt, kissed the knights on the left cheek; and William the Conqueror is said to have made use of the blow in conferring the honour of knighthood on his son Henry. At first it was given with the naked fist, a veritable box on the ear, but for this was substituted a gentle stroke with the flat of the sword on the side of the neck, or on either shoulder as well. In Great Britain the sovereign, in conferring knighthood, still employs this latter form of accolade.

" Accolade " is also a technical term in music-printing for a sort of brace joining separate staves; and in architecture it denotes a form of decoration on doors and windows.

ACCOLTI, BENEDETTO (1415-1466), Italian jurist and his- torian, was born at Arezzo, in Tuscany, of a noble family, several members of which were distinguished like himself for their attain- ments in law. He was for some time professor of jurisprudence in the university of Florence, and on the death of the celebrated Poggio, in 1459, became chancellor of the Florentine republic. He died at Florence. In conjunction with his brother Leonardo, he wrote in Latin a history of the first crusade, entitled De Bello a Christianis contra Barbaros gesto pro Christi Sepulchro et Judaea recuperandis libri tres (Venice, 1432, translated into Italian, 1543, and into French, 1620), which, though

itself of little interest, is said to have furnished Tasso with the historic basis for his Jerusalem Delivered. Another work of Accolti's — De Praestantia Virorum sui Aevi — was published at Parma in 1689. His brother Francesco (1418-1483) was also a distin- guished jurist, and was the author of Consilia seu responsa (Pisa, 1481); Commentaria super lib. ii. decretalium (Bologna, 1481); Commentaria (Pa via, 1493); de Balneis Puteolanis (1475).

ACCOLTI, BERNARDO (1465-1536), Italian poet, born at Arezzo, was the son of Benedetto Accolti. Known in his own day as /' Unico Aretino, he acquired great fame as a reciter of impromptu verse. He was listened to by large crowds, com- posed of the most learned men and the most distinguished prelates of the age. Among others, Cardinal Bembo has left on record a testimony to his extraordinary talent. His high reputation with his contemporaries seems scarcely justified by the poems he published, though they give evidence of brilliant fancy. It is probable that he succeeded better in his ex- temporary productions than in those which were the fruit of deliberation. His works, under the title Virginia, Comedia, Capitoli e Strambotti di Messcr Bernardo Accolti Aretino, were published at Florence in 1513, and have been several times reprinted.

ACCOLTI, PIETRO (1455-1532), brother of the preceding, known as the cardinal of Ancona, was born in Florence on the 15th of March 1455, and died at Rome on the 12th of December 1532 (Ciaconi, Vitae Pontificum, 1677, iii. 295). He was made bishop of Ancona, 1505, and cardinal on the 17th of March 1511, by Julius II. He was abbreviator under Leo X., and in that capacity drew up in 1520 the bull against Luther (L. Cardella, Memorie Storiche de' Cardinali, 1793, iii. 450). He held succes- sively the suburban sees of Albano and Sabina, also the sees of Cadiz, Maillezais, Arras and Cremona, and was made arch- bishop of Ravenna, 1524, by Clement VII.

F. Cristofori {Storia dei Cardinali, 1888) and others have confused him with his nephew Benedetto (1497-1549), son of Michaele; who followed him in several of his preferments, was made cardinal, 1527, by Clement VII., and is known as a writer in behalf of papal claims and as a Latin poet.

ACCOMMODATION (Lat. accommodare, to make fit, from ad, to, cum, with, and modus, measure), the process of fitting, adapting, adjusting or supplying with what is needed {e.g. housing).

In theology the term " accommodation " is used rather loosely to describe the employment of a word, phrase, sentence or idea, in a

context other than that in which it originally occurred; the actual wording of the quotation may be modified to a greater or lesser extent. Such accommodation, though sometimes purely literary or stylistic, generally has the definite purpose of instruc- tion, and is frequently used both in the New Testament and in pulpit utterances in all periods as a means of producing a reasonably accurate impression of a complicated idea in the minds of those who are for various reasons unlikely to compre- hend it otherwise. There are roughly three main kinds. (1) A later Biblical passage quotes from an earlier, partly as a literary device, but also with a view to demonstration. Some- times it is plain that the writer deliberately ” accommodates ” a quotation (cf. John xviii. 8, 9 with xvii. 12). But New Testament quotations of Old Testament predictions are often for us accommodations — striking or forced as the case may be — while the New Testament writer, ” following the exegetical methods current among the Jews of his time, Matthew ii. 15, 18, xxvi. 31, xxvii. 9 ” (S. R. Driver in Zechariah in Century Bible, pp. 259, 271), puts them forward as arguments. To say that he is merely ” describing a New Testament fact in Old Testament phraseology ” may be true of the result rather than of his design. (2) Much besides in the Bible — parable, metaphor, &c. — has been called an ” accommodation,” or divine conde- scension to human weakness. (3) German 18th-century rational- ism (see Apologetics) held that the Biblical writers made great use of conscious accommodation — intending moral common- places when they seemed to be enunciating Christian dogmas. Another expression for this, used, e.g., by J. S. Semler, is ” econ- omy,” which also occurs in the kindred sense of ” reserve ” (or of Disciplina Arcani — a modern term for the supposed early Catholic habit of reserving esoteric truths). Isaac Williams on Reserve in Religious Teaching, No. 80 of Tracts for the Times, made a great sensation; see R. W. Church’s comments in The Oxford Movement. Strictly, accommodation (2) or (3) modifies, in form or in substance, the content of religious belief; reserve,

from prudence or cunning, withholds part. ” Economy ” is used in both senses.

ACCOMMODATION BILL. An accommodation bill, as its name implies, is a bill of exchange accepted and sometimes endorsed without any receipt of value in order to afford tem- porary pecuniary aid to the person accommodated. (See Bill of Exchange.)

ACCOMPANIMENT {i.e. that which ” accompanies “), a musical term for that part of a vocal or instrumental compo- sition added to support and heighten the principal vocal or instrumental part; either by means of other vocal parts, single instruments or the orchestra. The accompaniment may be obbligato or ad libitum, according as it forms an essential part of the composition or not. The term obbligato or obbligato accompaniment is also used for an independent instrumental solo accompanying a vocal piece. Owing to the early custom of only writing the accompaniment in outline, by means of a ” figured bass,” to be filled in by the performer, and to the changes in the number, quality and types of the instruments of the orchestra, ” additional ” accompaniments have been written for the works of the older masters; such are Mozart’s ” addi- tional ” accompaniments to Handel’s Messiah or those to many of the elder Bach’s works by Robert Franz. In common parlance any support given, e.g. by the piano, to a voice or instrument is loosely called an accompaniment, which may be merely ” vamped ” by the introduction of a few chords, or may rise to the dignity of an artistic composition. In the history of song the evolution of the art side of an accompaniment is important, and in the higher forms the vocal and instrumental parts practi- cally constitute a duet, in which the instrumental part may be at least as important as that of the voice.

ACCOMPLICE (from Fr. complice, conspirator, Lat. complex, a sharer, associate, complicare, to fold together; the ac- is possibly due to confusion with ” accomplish,” to complete, Lat. compter e, to fill up), in law, one who is associated with another or others in the commission of a crime, whether as principal or accessory. The term is chiefly important where one of those charged with a crime turns king’s evidence in the expect- ation of obtaining a pardon for himself. Accordingly, as his evidence is tainted with self-interest, it is a rule of practice to direct a jury to acquit, where the evidence of an accomplice is not corroborated by independent evidence both as to the circumstances of the offence and the participation of the accused in it. An accomplice who has turned king’s evidence usually receives a pardon, but has no legal right to exemption from punishment till he has actually received it.

ACCORAMBONI, VITTORIA (1557-1585), an Italian lady famous for her great beauty and accomplishments and for her tragic history. She was born in Rome of a family belonging to the minor noblesse of Gubbio, which migrated to Rome with a view to bettering their fortunes. After refusing several offers of marriage for Vittoria, her father betrothed her to Francesco Peretti (1573), a man of no position, but a nephew of Cardinal Montalto, who was regarded as likely to

become pope. Vittoria was admired and worshipped by all the cleverest and most brilliant men in Rome, and being luxurious and extravagant although poor, she and her husband were soon plunged in debt. Among her most fervent admirers was P. G. Orsini, duke of Bracciano, one of the most powerful men in Rome, and her brother Marcello, wishing to see her the duke's wife, had Peretti murdered (1 581) . The duke himself was suspected of complicity, inasmuch as he was believed to have murdered his first wife, Isabella de' Medici. Now that Vittoria was free he made her an offer of marriage, which she willingly accepted, and they were married shortly after. But her good fortune aroused much jealousy, and attempts were made to annul the marriage; she was even imprisoned, and only liberated through the interfer- ence of Cardinal Carlo Borromeo. On the death of Gregory XIII., Cardinal Montalto, her first husband's uncle, was elected in his place as Sixtus V. (1585); he vowed vengeance on the duke of Bracciano and Vittoria, who, warned in time, fled first to Venice and thence to Said in Venetian territory. Here the

duke died in November 1585, bequeathing all his personal property (the duchy of Bracciano he left to his son by his first wife) to his widow. Vittoria, overwhelmed with grief, went to live in retirement at Padua, where she was followed by Lodovico Orsini, a relation of her late husband and a servant of the Vene- tian republic, to arrange amicably for the division of the pro- perty. But a quarrel having arisen in this connexion Lodovico hired a band of bravos and had Vittoria assassinated (22nd of December 1585). He himself and nearly all his accomplices were afterwards put to death by order of the republic.

About Vittoria Accoramboni much has been written, and she has been greatly maligned by some biographers. Her story formed the basis of Webster's drama, The Tragedy of Paolo Giordano Ursini (1612), and of Ludwig Tieck's novel, Vittoria Accoramboni (1840); it is told more accurately in D. Gnoli's volume, Vittoria Accoramboni (Florence, 1870), and an excellent sketch of her life is given in Countess E. Martinengo-Cesaresco's Lombard Studies (London, 1902). (L. V.*)

ACCORD (from Fr. accorder, to agree), in law, an agreement between two parties, one of whom has a right of action against the other, to give and accept in substitution for such right any good legal consideration. Such an agreement when executed discharges the cause of action and is called Accord and Satis- faction.

ACCORDION (Fr. accordion; Ger. Handharmonica, Ziehhar- monica), a small portable reed wind instrument with keyboard, the smallest representative of the organ family, invented in 1829 by Damian, in

Vienna.

The accordion consists of a bellows of many folds, to which is attached a keyboard with from 5 to 50 keys. The keys on being depressed, while the bellows are being worked, open valves admitting the wind to free reeds, consisting of narrow tongues of metal riveted some to the upper, some to the lower board of the bellows, having their free ends bent, some inwards, some outwards. Each key produces two notes, one from the inwardly bent reed when the bellows are compressed, the other from the outwardly bent reed by suction (as in the American organ; see Harmonium) when the bellows are expanded. The pitch of the note is determined by the length and thickness of the reeds, reduction of the length tending to sharpen the note, while reduction of the thickness lowers it. The right hand plays the melody on the keyboard, while the left works the bellows and manipulates the two or three bass harmony keys, which sound the simple chords of the tonic and dominant. The archetype of the accordion is the cheng (q.v.), or Chinese organ, between which and the harmonium it forms a connecting link structurally, although not invented for some thirty years after the harmonium. The timbre of the accordion is coarse and devoid of beauty, but in the hands of a skilful performer the best instruments are not entirely without artistic merit. Improvements in the construction of the accordion produced the concertina (q.v.), melodion and melophone.

See Adolf Mueller, Accordion-Schule oder vollstandige Anleitung, das Accordion in hurzer Zeit richtig spielen zu erlernen (Wien, 1834). See also Free Reed Vibrator. (K. S.)

ACCORSO (Accursius), MARIANGELO (c. 1400-1 544), Italian critic, was born at Aquila, in the kingdom of Naples. He was a great favourite with Charles V., at whose court he resided for thirty-three years, and by whom he was employed on various foreign missions. To a perfect knowledge of Greek and Latin he added an intimate acquaintance with several modern lan- guages. In discovering and collating ancient manuscripts, for which his travels abroad gave him special opportunities, he displayed uncommon diligence. His work entitled Diatribae in Ausonium, Solinum et Ovidium (1524) is a monument of erudi- tion and critical skill. He was the first editor of the Letters of Cassiodorus, with his Treatise on the Soul (1538); and his edition of Ammianus Marcellinus (1533) contains five books more than any former one. The affected use of antiquated terms, introduced by some of the Latin writers of that age, is humorously ridiculed by him, in a dialogue in which an Oscan, a Volscian and a Roman are introduced as interlocutors (1531). Accorso was accused of plagiarism

in his notes on Ausonius, a charge which, he most solemnly and energetically repudiated.

ACCOUNT (through O. Fr. acont, Late Lat. comptum, com- putare, to calculate), counting, reckoning, especially of moneys paid and received, hence a statement made as to the receipt and payment of moneys; also any statement as to acts or con- duct, or quite simply any narrative report of events, &c. A further sense-development is that of esteem, consideration.

As a stock-exchange term ” account ” is used in several senses. (1) The periodical settlements occurring, in London, monthly for British government and a few other first-class securities, and fortnightly for all others. The settlement extends over four days in mining shares and three days in other securities. The first day is the carry-over, ” contango,” or making-up, day, on which speculative commitments are carried over, or continued: that is, the bulls, who have bought stock for the rise, arrange the rate of interest that they have to give on their stock to a moneylender, or bear, who will pay for it or take it in for them; and the bears, who have sold for the fall, arrange the rate that they receive from the bulls or, if the stock is scarce and oversold, the backwardation or rate that they have to pay to holders of the stock who will lend it them to enable them to complete their bargains. On the second day, called ticket-day or name day, a ticket giving the name and address of the ultimate buyer and the firm which will pay for the stock is passed through the various intermediaries to the ultimate seller, so that the actual transfer of the stock can be made directly. In the mining market the passing of names takes two days. On the last day, account day, pay day or settling day, cheques are paid to meet speculative differences, or against the delivering of stock. (2) The period between two settlements. A nineteen-day account is one in which nineteen days elapse between one pay-day and another. (3) The volume or condition of commitments. A speculator is said to have a large account open when he has dealt heavily either for the rise or fall. A bull account exists in a stock or group of stocks when it or they have been bought for the rise by a large number of operators; in the contrary case, when there have been heavy sales for the fall, a bear account is developed.

ACCOUNTANT-GENERAL, formerly an officer in the English Court of Chancery, who received all moneys lodged in court, and by whom

they were deposited in bank and disbursed. The office was abolished by the Chancery Funds Act 1872, and the duties transferred to the paymaster-general (q.v.).

ACCOUNTANTS. The term “accountant” is one to which, of late years, its original meaning has been more generally at- tributed — that of an expert in the science of book-keeping. It is sometimes adopted by book-keepers, but this is an erroneous application of the term ; it properly describes those competent to design and control the systems of accounts required for the record of the multifarious and rapid transactions of trade and finance. It assumes the possession of a wide knowledge of the principles upon which accountancy is based, which may be shortly described as constituting a science by means of which all mercantile and financial transactions, whether in money or in money’s worth, including operations completed and engage- ments undertaken to be fulfilled at once or in a future, however remote, may be recorded; and this science comprises a know- ledge of the methods of preparing statistics, whether relating to finance or to any transactions or circumstances which can be stated by numeration, and of ascertaining or estimating on correct bases the cost of any operation whether in money, in commodities, in time, in life or in any wasting property. Gener- ally, accountancy may be described as being the science by means of which all operations, as far as they are capable of being shown in figures, are accurately recorded and their results ascertained and stated.

The origin of the profession of accountancy in Great Britain is difficult to trace; auditors of accounts were naturally of very History. early existence, being mentioned as officers of im- portance in the statutes of Westminster in the reign of Edward I. The art of accountancy on a scientific principle must certainly have been understood in Italy before 1495, when Friar Luca dal Borgo published at Venice his treatise on book-keeping; but the first known English book on the science

was published in London by John Gouge or Gough in 1543. It is described as A Profitable Treatyce called the Instrument or Boke to learn to knowe the good order of the kepyng of the famouse recon- ynge, called in Latin, Dare and Habere, and, in Englyshe, Debitor and Creditor. A short book of instruction was also published in 1588 by John Mellis of Southwark, in which he says, ” I am but the renuer and reviver of an auncient old copie printed here in London the 14 of August 1543: collected, published, made, and set forth by one Hugh Oldcastle, Scholemaster, who, as appeareth by his treatise, then taught Arithmetike, and this booke in Saint OUaves parish in Marke Lane.” John Mellis refers to the fact that the principle of accounts he explains

(which is a simple system of double entry) is ” after the forme of Venice.” The very interesting and able book described as The Merchants Mirrour, or directions for the perfect ordering and keeping of his accounts; framed by way of Debitor and Creditor, after the (so tearmed) Italian manner, by Richard Dafforne, accountant, published in 1635, contains many references to early books on the science of accountancy. In a chapter in this book, headed ” Opinion of Book-keeping’s Antiquity,” the author states, on the authority of another writer, that the form of book-keeping referred to had then been in use in Italy about two hundred years, “but that the same, or one in many parts very like this, was used in the time of Julius Caesar, and in Rome long before.” He gives quotations of Latin book-keeping terms in use in ancient times, and refers to ” ex Oratione Ciceronis pro Roscio Comaedo “; and he adds: ” That the one side of their booke was used for Debitor, the other for Creditor, is manifest in a certaine place, Naturalis Historiae Plinii, lib. 2, cap. 7, where hee, speaking of Fortune, saith thus:

Huic Omnia Expensa.

.Huic Omnia Feruntur accepta et in tota Ratione mortalium sola Utramque Paginam facit.”

An early Dutch writer appears to have suggested that double- entry book-keeping was even in existence among the Greeks, pointing to scientific accountancy having been invented in remote times.

There were several editions of Richard Dafforne’s book printed — the second edition having been published in 1636, the third in 1656, and another was issued in 1684. The book is a very complete treatise on scientific accountancy, it was beautifully prepared and contains elaborate explanations; the numerous editions tend to prove that the science was highly appreciated in the 17th century. From this time there has been a continuous supply of literature on the subject, many of the authors styling themselves accountants and teachers of the art, and thus proving that the professional accountant was then known and employed. Very early in the 18th century the services of an accountant practising in the city of London were made use of in the course of an investigation into the trans- actions of a director of the South Sea Company, who had been dealing in the company’s stock. During this investigation the accountant appears to have examined the books of at least two firms of merchants. His report is described Observations made upon examining the books of Sawbridge and Company, by Charles Snell, Writing Master and Accountant in Foster Lane, London.

In 1799, when Holden's Triennial Directory of London, West- minster and Southwark was first published, 11 individuals and firms were therein described as accountants; in the same direc- tory, for the period 1809-1811, the number had risen to 24; and in that for 1822-1824, there were 73 firms of practising accountants recorded.

The earliest English books dealing with scientific book-keeping were written at a time when the English and Dutch were very actively engaged in foreign trade, in succession to the Italian merchants of the 14th, 15th and 16th cen- ^°*™. turies; but it was not until the beginning of the 19th meat. century that, in consequence of the adoption of improved methods of manufacture and transit, resulting from the application of water and steam power to manufactures and methods of conveyance which largely increased the trade of Great Britain, the profession of an accountant became one which men of scientific knowledge and capacity adopted for

their business career. Corporations and companies were formed to carry out large operations previously either left to the state or not undertaken, and for the development of trades and manu- factures which were becoming less profitable when carried on by hand labour and with limited capital; and, for these, the services of public accountants were necessarily required to devise systems of accounts and methods of control, and to enable the results of the various transactions carried on to be ascertained with the least waste of power or chance of loss by negligence or fraud. The large number of companies formed in 1843 and 1844, when a great amount of capital was invested in railways and extensive speculation resulted, also added to the demand for the services of professional accountants. The Companies' Clauses Consoli- dation Act 1845 made provision for the audit of the accounts of companies regulated by act of parliament, and gave some extensive powers to the auditors, who are now, to a very large extent, selected from among professional accountants. The Companies Act of 1862 led to a large extension of the business of accountants, both as auditors and liquidators of companies; and the acts relating to bankruptcy passed between the years 1 83 1 and 1883 added to the work devolving on professional accountants. The Companies Act 1879, which affected banking companies, made provision for the audit of their accounts, and it has been found desirable, in most cases, to appoint professional accountants to this duty. The experience and professional knowledge of trained accountants have, in fact, been utilized by their appointment as auditors in the majority of joint-stock companies, whether manufacturing, banking, trading or created for any other purpose. Until the Companies Act 1900 was passed there was no general obligation upon limited companies to have auditors; this act not only requires that auditors shall be ap- pointed in all cases, but provides for their remuneration, and to a limited extent defines their rights and duties. The legis- lature evidently did not find it easy to formulate at all clearly the duties of auditors, and it seems reasonable to suppose that any general definition will prove an impossibility, as the work which auditors undertake must vary very widely, and depends largely upon the scope of the operations the accounts of which are to be examined.

The duties of practising accountants cover a very wide area: they act as trustees, liquidators, receivers and managers of Duties. businesses, the owners of which are in default or their affairs in liquidation, both under the direction of the courts and by appointment of creditors and

others; they are largely engaged as arbitrators, umpires and referees in differ- ences relating to matters of account or finance; they prepare the accounts of executors and trustees, and the necessary statements of affairs in cases of bankruptcy, both of firms and companies; they prepare accounts for prosecutions in cases of fraud and misconduct; and they are constantly called upon to unravel and properly state the accounts of complicated trans- actions. Their services are commonly required to certify the profits of businesses intended to be sold, either privately or to companies by means of a published prospectus; and, in cases of compulsory purchases of businesses by railway companies and public bodies, the statements of the profits of the businesses to be acquired are generally made by them. In a very large number of financial operations they are called upon to give ad- vice and prepare accounts, and in few business matters requiring arithmetical calculations or involving the investigation of figures, and particularly where a considerable acquaintanceship with the principles of law is needed, are their services not utilized. One of the most important duties undertaken by accountants is the audit of accounts, and this duty has, of late years, been widely extended. Originally, auditors were appointed to ex- amine and vouch statements of receipts and payments; but the provisions made in acts of parliament in relation to audit, and the requirements of most articles of association of limited com- Audltors. Ponies, put much graver responsibilities on auditors, who are now generally required to certify to the accuracy of balance sheets and of revenue and other accounts, the performance of which duties involves far more knowledge

of accounts than was once required. The efficiency, in most cases, of audits conducted by skilled accountants has led the public to attach exceptional value to their audit certificates, and to demand extensive knowledge and ability in the conduct of the audit of the accounts of public companies. One other requirement which is generally regarded as indispensable, is that the work of audit should be very expeditiously performed; for it is easy to understand that, were the presentation of the accounts of a company and the distribution of dividends materi- ally delayed in consequence of the audit, much inconvenience would result, while the value of the criticism of the accounts of business operations would be much deteriorated if it could not be made very shortly after the accounts were closed. In these circumstances, in the cases of large concerns with wide ramifica- tions and numerous transactions, it is necessary that auditors should have the help of trained assistants, and thus the personal examination of details by the auditor himself is, to a large extent, rendered unnecessary and the cost of audit materially reduced. This delegation

of duty by auditors is generally well understood, and is in accordance with the requirements of those concerned; but there has been a tendency of late years to enlarge the responsibilities of auditors to an extent which, if persisted in, might render it dangerous for men of reputation and means to accept the duties.

While the number of practising accountants has of late years been steadily increasing and their services are correspondingly appreciated, the necessity for controlling those exer- cising the profession and for improving its status has izSion. naturally become apparent. The first important steps in this direction were taken by the accountants in Scotland — the Society of Accountants in Edinburgh being incorporated by royal charter in 1854; similar societies in Glasgow and Aberdeen being also incorporated by charter in 1855 and 1867. The Institute of Accountants was formed in London in 1870, but did not receive a royal charter until the nth May 1880, when all the then existing accountants' societies and institutes in England were incorporated as the Institute of Chartered Accountants in England and Wales, and means were- provided by which all the then practising accountants in these countries could claim membership thereof. In the year 1885 the Society of Accountants and Auditors was incorporated, but has obtained no charter; this body, while numbering among its members a considerable number of practising accountants in the United Kingdom, also includes treasurers and accountants to cities and boroughs in England, as well as clerks to chartered and other accountants. A large proportion of its members also consists of accountants practising abroad. In 1888 an Institute of Chartered Accountants was formed in Ireland, and a great many institutes and societies have been formed in the British colonies and in the United States, some of which have local charters. It is curious to note, however, that, outside the United Kingdom, it was only in the British colonies that associations of practising accountants existed, until, in 1895, an Institute of Accountants (Nederlands Instituut van Accountants) was founded in Utrecht for Dutch accountants; when, although the principles of ac- countancy have been well understood and practised in Holland since the 16th century, and probably earlier, it was found necessary to borrow the words " accountant " and " account- ancy " from the English language to convey to the Dutch an idea of the meaning of the terms. Three others have since been formed, the Nederlandsche Academie van Accountants (1902); the Nationale Organisatie van Accountants (1903); and the Nederlandsche Bond van Accountants (1902). Sweden has a society, Svenska Revisorsamfundet, formed in 1899; Belgium, the Chambre Syndicate des Experts Comptables, founded in 1903. In South America,

accountants have acquired a certain status in Argentina, Uruguay and Peru.

In the United States the organization of professional account- ants is of quite recent growth. The first society formed in America was " The New York State Society of Certified Public Accountants," and shortly afterwards (in 1896) the New York state legislature passed an act authorizing the State university

to confer the degree of certified public accountant (C.P.A.) on the members of the society, while requiring all subsequent entrants to pass an examination. This degree, . however, can be obtained, like other university degrees, without being a member of the society. Other states, notably Pennsylvania, Maryland, California, Illinois, Washington and New Jersey, have followed the example of New York. In 1903 the various state societies formed themselves into a federation. There is also an independent society of practising accountants, the American Association of Public Accountants, with objects similar to those of the federation, but steps have been taken to bring about an amalgamation between the two in order to form one central society to look after their common interests, without, however, interfering with the individual organization of the various state societies.

See R. Brown, History of Accounting and Accountants (Edin- burgh), 1905, the most comprehensive book upon the subject; also G. W. Haskins, Accountancy, its Past and Present (U.S.A., 1900); S. S. Dawson, Accountant's Compendium; G. Lisle, Accounting in Theory and Practice (1899); F. W. Pixley, Auditors and their Lia- bilities (1901). The professional periodicals, The Accountant (vol. i., 1877); Accountant's Journal (vol. i., 1883-1884); The Accountants' Magazine (vol. i., 1897); Incorporated Accountants' Journal (vol. i., 1889-1890); Accountics (U.S.A., vol. i., 1897) may also be consulted, and also the Year-books of the Society of Accountants and Auditors, and of the Institute of Chartered Accountants. (J. G. Gr.)

ACCOUTREMENT (a French word, probably derived from a and coustre or coutre, an old word meaning one who has charge of the vestments in a church), clothing, apparel; a term used especially, in the plural, of the military equipment of a soldier other than his arms and clothing.

ACCRA, a port on the Gulf of Guinea in 5 31′ N., 0° 12′ W., since 1876 capital of the British Gold Coast colony. Population about 20,000, including some 150 Europeans. Accra is about 80 m. E. of Cape Coast (q.v.), the former capital of the colony. The name is derived from the Fanti word Nkran (an ant), by which designation the tribe inhabiting the surrounding district was formerly known. The town grew up around three forts established in close proximity — St James (British), Crevecceur (Dutch) and Christiansborg (Danish). The last named was ceded to Britain in 1850, Crevecceur not till 1871. Fort St James is now used as a signal station, lighthouse and prison. Accra preserves the distinctions of James Town, Ussher Town and Christiansborg, indicative of its tripartite origin. Ussher Town represents Crevecceur, the fort being renamed after H. T. Ussher, administrator of the Gold Coast (1867-1872). The sea frontage extends about three miles; there is, however, no har- bour, and steamers have to lie about a mile out, goods and passengers being landed in surf boats. The streets formerly consisted largely of mud hovels, but since a great fire in 1894, which destroyed large parts of James Town and Ussher Town, more substantial buildings have been erected. Christiansborg, the finest of the three forts, is the official residence of the governor of the colony. Westwards of the landing-place, where is the customs house, lies James Town. Beyond the fort are various public buildings leading to Otoo Street, the main thoroughfare, which runs two miles in a straight line to Christiansborg. This street contains a fine stone church built in 1895 lor the use of the Anglican community, a branch of the Bank of British West Africa, telegraph offices and the establishments of the principal trading firms. In Victoriaborg, a suburb of Ussher Town, are the residences of the principal officials, and here a racecourse has been laid out. (Accra is almost the only point along the Gold Coast where horses thrive.) Behind the town is rolling grass land, which gives place to the highlands of Aquapim and Akim. At Aburi in the Aquapim hills, 26 m. N. by E. of Accra, are the government sanatorium and botanical gardens.

Accra, the first town in the Gold Coast colony to be raised (July 1, 1896) to the rank of a municipality, is governed by a town council with power to raise and spend money. The council consists in equal proportions of nominated and elected members, no racial distinctions being made. Accra is connected by cable with Europe and South Africa, and is the sea terminus of a railway serving the districts N.E., where are flourishing cocoa plantations.

ACCRETION (from Lat. ad, to, and crescere, to grow), an addition to that which already exists; increase in any substance by the addition of particles from the outside. In law, the term is used for the increase of

property caused by gradual natural additions, as on a river bank or seashore.

‘.’• ACCRINGTON, a market town and municipal borough in the Accrington parliamentary division of Lancashire, England, 208 m. N.W. by N. from London, and 23 m. N. by W. from Manchester, on the Lancashire and Yorkshire railway. Pop. (1891) 38,603; (1901) 43,122. It lies in a deep valley on the Hindburn, a feeder of the Calder. Cotton spinning and printing works, cotton-mill machinery works, dye-works and chemical manufactures, and neighbouring collieries maintain the industrial population. The church of St James dates from 1763, and the other numerous places of worship and public buildings are all modern. The borough is under a mayor, 8 aldermen and 24 councillors. Area 3427 acres.

Accrington (Akerenton, Alkerington, Akerington) was granted by Henry de Lacy to Hugh son of Leofwine in Henry II. ‘s reign, but came again into the hands of the Lacys, and was given by them about 1200 to the monks of Kirkstall, who converted it into a grange. It again returned, however, to the Lacys in 1287, was granted in parcels, and like their other lands became merged in the duchy of Lancaster. In 1553 the commissioners of chantries sold the chapel to the inhabitants to be continued as a place of divine service. In 1836 Old and New Accrington were merely straggling villages with about 5000 inhabitants. By 1861 the population had grown to 17,688, chiefly owing to its position as an important railway junction. A charter of incorporation was granted in 1878. The date of the original chapel is unknown, but it was probably an oratory which was an offshoot of Kirkstall Abbey. Ecclesiastically the place was dependent on Altham till after the middle of the 19th century.

ACCUMULATION (from Lat. accumulare, to heap up), strictly a piling-up of anything; technically, in law, the continuous adding of the interest of a fund to the principal, for the benefit of some person or persons in the future. Previous to 1800, this accumulation of property was not forbidden by English law, provided the period during which it was to accumulate did not exceed that forbidden by the law against perpetuities, viz. the period of a life or lives in being, and twenty-one years afterwards. In 1800, however, the law was amended in consequence of the eccentric will of Peter Thellusson (173 7-1 797), an English merchant, who directed the income of his property, consisting of real estate of the annual value of about £5000 and personal estate amounting to over £600,000, to be accumulated during the lives of his children, grandchildren and great-grand- children, living at the time of his death, and the survivor of them. The property so accumulated,

which, it is estimated, would have amounted to over £14,000,000, was to be divided among such descendants as might be alive on the death of the survivor of those lives during which the accumulation was to continue. The bequest was held valid {Thellusson v. Woodford, 1798, 4 Vesey, 237). In 1856 there was a protracted lawsuit as to who were the actual heirs. It was decided by the House of Lords (June 9, 1859) in favour of Lord Rendlesham and Charles Sabine Augustus Thellusson. Owing, however, to the heavy expenses, the amount inherited was not much larger than that originally bequeathed.

To prevent such a disposition of property in the future, the Accumulations Act 1800 (known also as the “Thellusson Act”) was passed, by which it was enacted that no property should be accumulated for any longer term than either (1) the fife of the settlor; or (2) the term of twenty-one years from his death; or (3) during the minority of any person living or en ventre sa mire at the time of the death of the grantor; or (4) during the minority of any person who, if of full age, would be entitled to the income directed to be accumulated. The act, however, did not extend to any provision for payment of the debts of the grantor or of any other person, nor to any provision for raising portions for the children of the settlor, or any person interested under the settlement, nor to any direction touching the produce

of timber or wood upon any lands or tenements. The act was extended to heritable property in Scotland by the Entail Amend- ment Act 1848, but does not apply to property in Ireland. The act was further amended by the Accumulations Act 1892, which forbids accumulations for the purpose of the purchase of land for any longer period than during the minority of any person or persons who, if of full age, would be entitled to receive the income. (See also Trust and Perpetuity.) ;

ACCUMULATOR, the term applied to a number of devices whose function is to store energy in one form or another, as for example, the hydraulic accumulator of Lord Armstrong (see

Hydraulics, § 179)- In t he P resent article th f tom ls ., re ” stricted to its use in electro-technology, in which it describes a special type of battery. The ordinary voltaic cell is made by bringing together certain chemicals, whose reaction main- tains the electric currents taken from

the cell. When exhausted, such cells can be restored by replacing the spent materials, by a fresh ” charge ” of the original substances. But in some cases it is not necessary to get rid of the spent materials because they can be brought back to their original state by forcing a reverse current through the cell. The reverse current reverses the chemical action and re-establishes the original conditions thus enabling the cell to repeat its electrical work. Cells which can thus be ” re-charged ” by the action of a reverse current are called accumulators because they ” accumulate the chemical work of an electric current. An accumulator is also known as a “reversible battery,” “storage battery” or ‘ secondary battery ” The last name dates from the early days of electro-lysis When a liquid like sulphuric acid was electrolysed for a moment with the aid of platinum electrodes, it was found that the electrodes could themselves produce a current when de- tached from the primary battery. Such a current was attri- buted to an ” electric polarization ” of the electrodes, and was regarded as having a secondary nature, the implication being that the phenomenon was almost equivalent to a storage 0] electricity. It is now known that the platinum electrodes stored, not electricity, but the products of electro-chemical decomposi-tion Hence if the two names, secondary and storage cells, are used, they are liable to be misunderstood unless the interpreta- tion now put on them be kept in mind. Reversible battery is an excellent name for accumulators.

Sir W R Grove first used “polarization” effects in his gas battery but R. L. G. Plante (1834-1889) laid the foundation of modern methods. That he was clear as to the function of an accumulator is obvious from his declaration that the lead- sulphuric acid cell could retain its charge for a long time and had the power d’emmagasiner ainsi le travail chimique de la Pile voltaique: a phrase whose accuracy could not be excelled. Plante began his work on electrolytic polarization in 1859, nis obiect being to investigate the conditions under which its maxi-mum effects can be produced. He found that the greatest storage and the most useful electric effects were obtained by using lead plates in dilute sulphuric acid. After some ” forming opera- tions described below, he obtained a cell having a high electro- motive force, a low resistance, a large capacity and almost perfect freedom from polarization.

The practical value of the lead-peroxide-sulphuric-acid cell arises largely from the fact that not only are the active materials (lead and lead peroxide, Pb0 2) insoluble in the dilute acid but that the sulphate of lead formed from them in the course of dis- charge is also insoluble. Consequently, it remains fixed in the place where it is formed; and on the passage of the charging current, the original Pb0 2

and lead are reproduced in the places they originally occupied. Thus there is no material change in the distribution of masses of active material. Lastly, the active materials are in a porous, spongy condition, so that the acid is within reach of all parts of them.

Plante carefully studied the changes which occur in the formation, charge and I discharge of the cell. In form ng, he placed two sheets charge ana } * sulphuric acid , separating them by narrow strip

Plaati's f caoutc h uc (fig. 1). When a charging current is «”■ sent through the cell, the hydrogen liberated at one plate

escapes, a small quantity possibly being spent in reducing the sur-

face film of oxide generally found on lead. Some of the oxygen is always fixed on the other (positive) plate, forming a surface film ot peroxide. After a few minutes the current is reversed so that the first plate is peroxidized, and the peroxide previously formed on the second plate is reduced to metallic lead in a spongy state By repeated reversals, the surface of each plate is alter- nately peroxidized and reduced to metallic lead. In successive oxidations, the action pene- trates farther into the plate, furnishing each time a larger quantity of spongy Pb0 2 on

Fig. 1.

one plate and of spongy lead on the other. It follows that the duration of the successive charging currents also in- creases. At the beginning, a few minutes suffice; atthe.4 end, many hours are required. After the first six or eight cycles, Plante allowed a period

of repose before reversing. He claimed that the PbO, formed by reversal after repose was more strongly adherent, and also more crystalline than if no repose were allowed The following figures show the relative amounts of oxygen absorbed by a given plate in successive charges (between one charge and the next the plate stood in repose for the time stated, then was 1 educed, and again chargpd as anode) :

Separate Periods of Repose.

18 hours 2 days

4 ” 2

Charge.

First

Second

Third

Fourth

Fifth

Relative Amount of Peroxide formed.

i-o

i-57

1-71 2-14 2-43

1 the £T\

coat-‘-‘j \ ereby I \ biting I V

and so on for many days (Gladstone and Tribe, Chemistry of Secondary Batteries). Seeing that each plate is in turn oxidized and then reduced, it is evident that the spongy lead will increase at the same rate on the other plate of the cell. The process of “forming thus briefly described was not continued indefinitely, but only till a fair Proportion of the thickness of the plates was converted into the spong? material, Pb0 2 and Pb respectively. After this reversal was not permitted, the cell being put into use and always charged in driven direction. If the process of forming by .reversal be continued , tlfe positive plate is ultimately all converted into Pb0 2 and falls to

P1 p C lante made excellent cells by this method, yet three objections wprp ure-ed aeainst them. They required too much time to torm , The spofgy masses (Pb0 2 more especially) fell off for want of me- chankar support, and the separating strips of caoutchouc were not likely to have a long life. The first advance was made by C. A. Faure (1881), who greatly short- ened the time required for ” forming ” by giving the plates a preliminary coat- L ing of red lead, whereby the slow process of biting into the metal was avoided. At the first charging, the red lead on the + electrode is changed to Pb0 2 , while that on the – electrode is reduced to spongy lead. Thus one continuous opera- tion, lasting perhaps sixty hours, takes the place _ of many reversals, which, with periods of repose, last as much as three months. Faure used felt as a sepa- rating membrane, but its ˆ

use was soon abolished by p IG 2> — Tudor positive plate.

rˆE. vUrTˆSellon, J W. Swanaˆˆ

support to the spongy masses, and does away with the necessity for felt &c They are more satisfactory, however, as supporters of sponS'lead ta of the peroxide, since at the point °f contact m the ktter case the acid gives rise to a local action which slowly destroys the grid. Disintegration follows sooner or later, though the

attempts have not yet been successful enough to enable them to compete with the other forms.

For many years the battle between the " Plante type aad

Chloride cell.

"w till

in mm 1

the Faure or " pasted " type has been one in which the issue was doubtful, but the general tendency is towards a mixed type at the present time. There are many good cells, the value of all resting on the care exercised during the manufacture and also in the choice of pure materials. Increasing emphasis is laid on the purity of the water used to replace that lost by evaporation, distilled water generally being specified. The following descriptions will give a good idea of modern practice. The " chloride cell " has a Plante positive with a pasted negative. For the positive a lead casting is made, about 0-4 inch thick pierced by a number of circular holes about half an inch in diameter. Into each of these holes is thrust a roll or rosette of lead ribbon, which has been cut to the right breadth (equal to the thickness of the

plate), then ribbed or gimped, and finally coiled into a rosette. The rosettes have sufficient spring to fix themselves in the holes of the lead plate, but are keyed in position by a hydraulic press. The plates are then " formed " by pass- ing a current for a long time. In a later pattern a kind of discontinuous longitudinal rib is put in the ribbon, and increases the capacity and life by strengthening the mass without interfering with the diffusion of acid. The negative plate was formerly obtained by reducing pastilles of lead chloride, but by a later mode of

construction it is made by casting a grid with thin vertical ribs, connected horizontally by small bars of triangular section. The bars on the two faces are ” staggered, ” that is, those on one face are not opposite those on the other. The grid is pasted with a lead oxide paste and afterwards reduced; this is known as the ” exide ” negative.

The larger sizes of negative plate are of a ” box ” type, formed by riveting together two grids and filling the intervening space

m m &k eIS ‘Mi ■..:. &•# r m <&% j-73 mi »£, V', '•: ' ~ 1 '*■■ >‘ m &tf \&a S*t S*- — s .—’ .”» ■ ■ ■

m mu%

«l W* W’* iW

! i’M

f^P^tf-,f\

m

IgHi

Hi UM t£*i i4? few Hi

Fig. 3. — Tudor negative plate.

y

■ *

Fig. 4. Fig. 5. Fig. 6.

with paste. A feature of the ” chloride ” cells is the use of separators made of thin sheets of specially prepared wood. These prevent short circuits arising from scales of active material or from the ‘formation of ” trees ” of lead which sometimes grow across in certain forms of battery.

The Tudor cell has positives formed of lead plates cast in one piece with a large surface of thin vertical ribs, intersected at intervals by horizontal ribs to give the plates strength Tudor cell. ^ withstand buc yi ng i n both directions (fig. 2). The thickness of the plates is about 0-4 inch, and the developed surface is about eight times that of a smooth plate of the same size. A thoroughly adherent and homogeneous coating of peroxide of lead is formed on this large

surface by an improved

Plante process. The negative plate (fig. 3) is composed of twp grids riveted together to form a shallow box; the outer surfaces are smooth sheets pierced with many small holes. The space between them is intersected by ribs and pasted (before riveting). Many of the E.P.S. cells, made by the Electrical Power Storage Company, are of the Faure or pasted type, but the Plante formation is used for the positives of two kinds of cell. The paste for the positive plates is a mixture of red lead with sulphuric acid; for the negative plates, litharge is substituted for red lead. Figs. 4 and

E.P.S. cell.

Hart cell.

Fig. 7.

5 roughly represent the grids employed for the negative and positive plates respectively of a type used for lighting. Fig. 6 is the cross section of the casting used for the Plante positive of the larger cells for rapid discharge. Finer indentations on the side expose a large surface. Fig. 7 shows a complete cell.

The Hart cell, as used for lighting, is a combination of the Plante and Faure (pasted) types. The plates hang by side lugs on glass slats, and ˆre separated by three rows of glass tubes I inch diameter (fig. 8). The tubes rest in grooved teak wood blocks placed at the bottom of the glass boxes. The blocks also serve as base for a skeleton framework of the same material which surrounds and supports the section. Of course the wood has to be specially treated to withstand the acid. A special non-corrosive terminal is used. A coned bolt draws the lug ends of adjacent cells together, fitting in a corresponding tapered hole in the lugs, and thus increasing the contact area. The positive and negative tapers being different, a cell cannot be con- nected up in the wrong way.

In America, in addition to some of the cells already described, there are types which are not found in England. Two may be described. The Gould cell is of the Plante type. A special effort is made to reduce local and other deleterious action by starting with perfectly homogeneous plates. They are formed from sheet lead blanks by suitable machines, which gradually raise the surface into a series of ribs and grooves. The sides and middle of the blank are left untouched and amply suffice to distribute the current over the surface of the

plate. The grooves are very fine, and when the active material is formed in them by electro-chemical action, they hold it very securely.

The Hatch cell has its positive enclosed in an envelope. A very shallow porous tray (made of kaolin and silica) is filled with

Fig. 8. — Hart Accumulator.

red lead paste, an electrode of rolled sheet lead is placed on its surface, and over this again is placed a second porous tray filled Hatch cell w ˆ paste. The whole then looks like a thin earthen- ware box with the lug of the electrode projecting from one end. The negatives consist of sheet lead covered by active material. On assembling the plates, each negative is held between two positive ” boxes,” the outsides of which have pro- jecting vertical ribs. These press against the active material on the negative plates, and help to keep it in position. At the same time, the clearance between the ribs allows room for acid to circulate freely between the negative plate and the outer face of the positive envelope. Diffusion of the acid through this envelope is easy, as it is very porous and not more than ˆj inch thick.

Traction Cells. — Attempts to run tramcars by accumulators have practically all failed, but traction cells are employed for electric broughams and light vehicles for use in towns. There are no large deviations in manufacture except those imposed by limited space, weight and vibration. The plates are gener- ally thinner and placed closer together. The Plante positive is not used so much as in lighting types. The acid is generally a little stronger in order to get a higher electromotive force (e.m.f.). To prevent the active material from being shaken out of the grids, corrugated and perforated ebonite separators are placed between the plates. The ” chloride ” traction cell uses a special variety of wood separator: the ” exide ” type of plate is used for both positive and negative. Cells are now made to run 3000 or more miles before becoming useless. The specific output can be made as high as 10 or n watt-hours per pound of cell, but this involves a chance of shorter life. The average working requirement for heavy vehicles is about 50 watt-hours per 1000 lb per mile.

Ignition Cells for motor cars are made on the same lines as traction cells, though of smaller capacity. As a rule two cells are put up in ebonite or celluloid boxes and joined in series so as to give a 4-volt

battery, the pressure for which sparking coils are generally designed. The capacity ranges from 20 to 100 ampere- hours, and the current for a single cylinder engine will average one to one and a half amperes during the running intervals.

General Features. — The tendency in stationary cells is to allow plenty of space below the plates, so that any active material which falls from the plates may collect there without risk of short-circuit, &c. More space is allowed between the plates, which means that (a) there is more acid within reach, and (b) a slight buckling is not so dangerous, and indeed is not so likely to occur. The plates are now generally made thicker than formerly, so as to secure greater mechanical rigidity. At the same time, the manufacturers aim at getting the active materials in as porous a state as possible.

The figures with regard to specific output are difficult to classify. It would be most interesting to give the data in the form of watt-hours per pound of active material, and then to compare them with the theoretical values, but such figures are impossible in the nature of the case except in very special in- stances. For many purposes, long life and trustworthiness are more important than specific output. Except in the case of traction cells, therefore, the makers have not striven to reduce weight to its lowest values. Table I. shows roughly the weight of given types of cells for a given output in ampere hours. Table I.

–——

Capacity in ampere-hours if

Type of Cell.

discharged in

Weight of Cell.

9 hrs.

6 hrs.

3 hrs.

1 hr.

Ordinary light-

ing … .

200

182

153

IOI

100 pounds.

»> »»

420

380

300

210

200 „

u »»

1200

1080

880

600

670 „

Central station

and High Rate

3500

3100

2500

1700

2000 „

“. ”

6000

5400

4400

3000

3200 ,,

Traction . . .

220

185 440

155

125

40 „

90 ,.

Influence of Temperature on Capacity. — These figures are true only at ordinary temperatures. In winter the capacity is diminished, in summer it is increased. The differences are due partly to change of liquid resistance but more especially to the difference in the rate at which acid can diffuse into or out of the pores: obviously this is greater at higher temperatures. The increase in capacity on warming is appreciable, and may amount to as much as 3% per degree centigrade (Gladstone and Hibbert, Journ. Inst. Elec. Eng. xxi. 441; Heim, Electrician, Nov. 1901, p. 55; Liagre, L’Eclairage electrique, iooi,xxix. 150). Notwithstanding these results, it is not advisable to warm accumulators appreciably. At higher temperatures, local action is greatly increased and deterioration becomes more rapid. It is well, however, to avoid low winter temperatures.

Working of Accumulators. — Whatever the type of cell may be, it is important to attend to the following working requirements: — (1) The cells must be fully equal to the maximum demand, both in dis- charge rate and capacity. (2) All the cells in one series ought to be equal in discharge rate and capacity. This involves similarity of treatment. (3) The cells are erected on strong wooden stands. Where floor space is too expensive, they can be erected in tiers ; but, if possible, this should

be avoided. They ought to lie in rows, so ar- ranged that it is easy to get to one side (at least) of every cell, for examination and testing, and if need be to detach and remove it or its plates. Where a second tier is placed over the first, sufficient clearance space must be allowed for the plates to be lifted out of the lower boxes. The cells are insulated by supporting them on glass or mushroom-shaped oil insulators. If the containing vessels are made of glass, it is desirable to put them in wooden trays which dis- tribute the weight between the vessel and insulators. To prevent acid spray from filling the air of the room, a glass plate is arranged oyer each cell. The positive and negative sections are fixed in posi- tion with insulating forks or tubes, and the positive terminal of one cell is joined to the negative of the next by burning or bolting. If the latter method is adopted, the surfaces ought to be very clean and well pressed home. The joint ought to be covered by vaseline or varnish. When this has been done, examination ought to be made of each cell to see that the plates are evenly spaced, that the separators (glass tubes or ebonite forks between the plates) are in position and vertical, and that there are no scales or other adventi- tious matter connecting the plates. The floor of the cell ought to be quite clear; if anything lies there it must be removed. (4) To mix the solution a gentle stream of sulphuric acid must be poured into the water (not the other way, lest too great heating cause an accident). It is necessary to stir the whole as the mixing proceeds and to arrange that the density is about 1 190, or according to the recommendation of the maker. About five volumes of water ought to be taken to one volume of acid_. After mixing, allow to cool for two or three hours. The strong acid ought to be free from arsenic, copper and other similar impurities. The water ought to be as pure as can be obtained, distilled water being best ; rain water is also good. If potable water be employed, it will generally be improved by boiling, which removes some of the lime held in solution. The impurity in ordinary drinking water is very slight ; but as all cells lose by evaporation and require additions of water from time to time, there is a tendency for it to increase. The acid must not be put into the cells till everything is ready for charging. (5) A shunt- wound or separately-excited dynamo being ready and running so as to give at will 2-6 or 2-7 volts per cell, the acid is run into the cells. As soon as this is done, the dynamo must be switched on and charging commenced. The positive terminal of the dynamo must be joined to the positive terminal of the battery. If necessary, the + end of the machine must be found by a trial cell made of two plain lead sheets in dilute acid. It is im- portant also to maintain this first charging operation for a long time without a break. Twelve hours is a minimum time, twenty-four not too much. The charging is not even then complete, though a short interval is not so

injurious as in the earlier stage. The full charge,, required varies with the cells, but in all types a full and practically ” continuous first charge is imperatively necessary. During the early part of this charge the density of the acid may fall ; but after a time ought to increase, and finally reach the value desired for permanent working. Towards the end of the “formation ” vigilant observation must be exercised. It is important to notice whether any cells are appreciably behind the others in voltage, density or gassing. Such cells may be faulty, and in any case they must be charged and tended till their condition is like that of the others. They ought not to go on the discharge circuit till this is assured. The examination of the cells before passing them as ready for discharge includes: — (a) Density of acid as shown by the hydrometer, (b) Voltage. This may be taken when charging or when idle. In the first case it ought to be from 2-4 to 2-6 volts, according to conditions. In the second case it ought to be just over 2 volts, provided that the observation is not taken too soon after switching off the charging current. For about half an hour after that is done, the e.m.f. has a transient high value, so that, if it be desired to get the proper E.M.F. of the cell, the observation must be taken thirty minutes after the charging ceases.

■(c) Eye observations of the plates and the acid between them. The positive plates ought to show a rich dark brown colour, the negatives a dull slate-blue, and the space between ought to be quite clear and free from anything like solid matter. All the positives ought to be alike, and similarly all the negatives. If the cells show similarity in these respects they will probably be in good working order.

As to management, it is important to keep to certain simple rules, of which these are the chief: — (1) Never discharge below a potential difference of 1-85 (or in rapid discharge, 1-8) volt. (2) Never leave the cells discharged, if it be avoidable. (3) Give the cells a special full charging once a month. (4) Make a periodic examination of each cell, determining its E.M.F., density of acid, the condition of its plates and freedom from growth. Any incipient growth, however small, must be carefully watched. (5) If any cell shows signs of weakness, keep it off discharge till it has been brought back to full condition. See that it is free from any connexion between the plates which would cause short-circuiting ; the frame or support which carries the plates sometimes gets covered by a conducting layer. To restore the cell, two methods can be adopted. In private installations it may be dis- connected and

charged by one or two cells reserved for the purpose ; or, as is preferable, it may be left in circuit, and a cell in good order put in parallel with it. This acts as a ” milking ” cell, not only pre- venting the faulty one from discharging, but keeping it supplied with a charging current till its potential difference (p.d.) is normal. Every battery attendant should be provided with a hydrometer and a voltmeter. The former enables him to determine from time to time the density of the acid in the cells; instruments specially con- structed for the purpose are now easily procurable, and it is desir- able that one be provided for every 20 or 25 cells. The voltmeter should read up to about 3 volts and be fitted with a suitable con- nector to enable contacts to be made quickly with any desired cell. A portable glow lamp should also be available, so that a full light can be thrown into any cell; a frosted bulb is rather better than a clear one for this purpose. He must also have some form of wooden scraper to remove any growth from the plates. The scraping must be done gently, with as little other disturbance as possible. By the ordinary operations which go on in the cell, small portions of the plates become detached. It is important that these should fall below the plates, lest they short-circuit the cell, and therefore suffi- cient space ought to be left between the bottom of the plates and the floor of the cell for these ” scalings ” to accumulate without touching the plates. It is desirable that they be disturbed as little as possible till their increase seriously encroaches on the free space. It sometimes happens that brass nuts or bolts, &c, are dropped into a cell; these should be removed at once, as their partial solu- tion would greatly endanger the negative plates. The level of the liquid must be kept above the top of the plates. Experience shows the advisability of using distilled water for this purpose. It may sometimes be necessary to replenish the solution with some dilute acid, but strong acid must never be added.

The chief faults are buckling, growth, sulphating and disintegra- tion. Buckling of the plates generally follows excessive discharge, caused by abnormal load or by accidental short-circuiting. At such times asymmetry in the cell is apt to make some part of the plate take much more than its share of the current. That part then expands unduly, as explained later, and curvature is produced. The only remedy is to remove the plate, and press it back into shape as gently as possible. Growth arises generally from scales from one part falling on some other — say, on the negative. In the next charg- ing the scale is reduced to a projecting bit of lead, which grows still further because other particles rest on it. The remedy is, gently to scrape off any incipient growth. Sulphating, the formation of a white hard surface on the active material, is due to neglect or exces- sive discharge. It often

yields if a small quantity of sulphate of soda be added to the liquid in the cell. Disintegration is due to local action, and there is no ultimate remedy. The end can be deferred by care in working, and by avoiding strains and excessive discharge as much as possible.

Accumulators in Repose. — Accumulators contain only three active substances — spongy lead on the negative plate, spongy lead peroxide on the positive, and dilute sulphuric acid between

Table II.

Substance.

Colour.

Density.

Specific Resistance.

Lead ….

slate blue

u-3

0-0000195 ohm

Peroxide of lead

dark brown

9-28

5-6 to 6-8 „

Sulphuric acid

I-2IO

1-37

after charge Sulphuric acid

after discharge Sulphuric acid

clear liquid

I-I70

below

1-28

in pores . . . Sulphate of lead

white

1-03 6-3

8-0

non-conductor.

them. Sulphate of lead is formed on both plates during dis- charge and brought back to lead and lead peroxide again during

‘■S

t

lil

I

$

charge, and there is a consequent change in the strength of acid during every cycle. The chief properties of these substances are shown in Table II.

The curve in fig. 9 shows the relative conductivity (reciprocal of resistance) of all the strengths of sulphuric acid solutions, and by its aid and the figures in the preceding table, the specific resist- ance of any given strength can be determined.

The lead accumulator is subject to three kinds ,00c of local action. First and chiefly, local action on s6oo the positive plate, because of the contact between * lead peroxide and the lead grid which supports it. ” x “ > In carelessly made or roughly handled cells this , may be a very serious matter. It would be so

7 5r tSiT

s-

~R.~Zo <'

X

\

10 20 30 40 90 80 70 60 80 »a

Fig. 9.

in all circumstances if the lead sulphate formed on the exposed lead grid did not act as a covering for it. It explains why Plante found “repose” a useful help in “forming,” and also why positive plates slowly disintegrate; the lead support is gradu- ally eaten through. Secondly, local action on the negative plate when a more electro-negative metal settles on the lead. This often arises when the original paste or acid contains metallic impurities. Similar impurity is also introduced by scraping copper wire, &c, near a battery. Thirdly, local action due to the acid varying in strength in different parts of a plate. This may arise on either plate and is set up because two specimens of either the same lead or the same peroxide give an e.m.f. when placed in acids of different strengths. J. H. Gladstone and W. Hibbert found that the e.m.f. depends on the difference of strength. With two lead plates, a maximum of about quarter volt was obtained, the lead in the weaker acid being positive. With two peroxide plates the maximum voltage was about 0-64, the plate in stronger acid being positive to that in weaker. The electromotive force

i]

‘

-*

» J

,

,

s

s-

-

£21

J

i\

!-

-

£

-

”

-

f

–

H

-

”

C

H

(^ 1-9 :

- -j

*“in

•

1

f\

f-

V

a

■n

r

h

2

A

r

1

j

z

s

4

fa

U

J

E

to

tl

100

Fig. 10.

of a cell depends chiefly on the strength of the acid, as maybe seen from fig. 10 taken from Gladstone and Hibbert's paper (Journ. Inst. Elec. Eng., 1892). The observations with very strong acid were difficult to obtain, though even that with 98% acid marked X is believed to be trustworthy. C. Heim (Elek. Zeit, 1889), F. Streintz (Ann. Phys. Chem. xlvi. p. 449) and F. Dolezalek (Theory of Lead Accumulators, p. 55) have also given tables.

It is only necessary to add to these results the facts illustrated by the following diffusion curves, in order to get a complete clue to the behaviour of an accumulator in active work. Fig. n shows the rate of

diffusion from plates soaked in 1-175 acid and then placed in distilled water. It is from a paper by L. Duncan and H. Wiegand (Elec. World, N.Y., 1889), who were

ii

13°

ACCUMULATOR

the first to show the importance of diffusion. About one half the acid diffused out in 30 minutes, a good illustration of the slowness of this process. The rate of diffusion is much the same for both positive and negative plates; but slower for discharged plates than for charged ones. Discharge ‘ affects the rate of diffusion on the lead plate more than on the peroxide plate. This is in accordance with the density values given in Table I. For while lead sulphate is formed in the pores of both plates, the consequent expansions (and obstructions) are different; 100 volumes of lead form 290 volumes of sulphate (a threefold

§ 30

n

fif,

ed

£

“6

r0

tar

jet

■v 20

§

,n

i«°

‘£

gS.

!_

i 10

^

m

eft

IPS

ed

(t

u

?

10 15 20

Time in m/nu/ea Fig. 11.

expansion), a*nd 100 volumes of peroxide form 186 volumes of sulphate (a twofold expansion). The influence of diffusion on the electromotive force is illustrated by fig. 12. A cell was prepared with 20 % acid. It also held a porous pot contain- ing stronger acid, and into this the positive plate was suddenly transferred from the general body of liquid. The e.m.f. rose by diffusion of stronger acid into the pores. Curve I. in fig. 12 shows the rate of rise when the porous pot contained 34% acid; curve II. was obtained with the stronger (58%) acid (Gladstone and Hibbert, Phil. Mag., 1800). Of these two curves the first is more useful, because its conditions are nearer those which occur in practice.

At the end of a discharge it is a common thing for the plates to be standing in 25% acid, while inside the pores the acid may not exceed 8% or 10%. If the discharge be stopped,- we have conditions somewhat like fig. 12, and the e.m.f. begins to rise. In one minute it has gone up by about 0-08 volt, &c.

Charge arid Discharge. — The most important practical ques- tions

concerning an accumulator are: — its maximum rate of working; its capacity at various discharge rates; its efficiency; and its length of life. Apart from mechanical injury all these

depend primarily on the way the cell is made, and then on the method of charging and discharging. For each type and size of jcell there is a normal maximum discharging cur- rent. Up to this limit any current may be taken; beyond it, the cell may suffer if discharge be con- tinued for any appreciable time. The most important point to attend to is the voltage at which discharge shall cease. The potential difference at terminals must not fall below i-8o volt during discharge at ordinary rates (10 hours) or 1-75 to 1-70 volt for 1 or 2 hour rate. The reason underlying the figures is simple. These voltages indicate that the acid in the pores is not being renewed fast enough, and that if the discharge continue the chemical action will change: sulphate will not be formed in situ for want of acid. Any such change in action is fa»al to reversibility and therefore to life and constancy in capacity. To illustrate: when at slow dis- charge rates the voltage is i-8o volt, the acid in the pores has weakened to a mean value of about 2-5% (see fig. n), which is quite consistent with some part of the interior being practically pure water. With high discharge rates, something

1 1 :’

k

*’ ’”..

^

‘

/

/

Is

<*"

1.3+

V

Time in MiflufeJ

Fig. 12.

like o-i volt may be lost in the cells, by ordinary ohmic fall, s» that a voltage reading of 1-75 means an e.m.f. of a little ovei i*8 volt, and a very weak density of the acid inside the pores. Guided by these figures, an engineer can determine what ought to be the permissible drop in terminal volts for any given working conditions. Messrs W. E. Ayrton, C. G. Lamb, E. W. Smith and M. W. Woods were the first to trace the working of a cell through varied conditions (Journ. Inst. Elec. Eng., 1890), and a brief resume of their results is given below.

They began by charging and discharging between the limits of 2-4 and 1-6 volts.

Fig. 13 shows a typical discharge curve. Noteworthy points are : — (1) At the beginning and at the end there is a rapid fall in P.D., with an intermediate period of fairly uniform value. (2) When the

21

Wirki

iq

3 D

. &■ c, •//

\

Oi. :ch srg 3d

~u

re

it

10

An > p£

zc

\

S

= *.

IS

16

•S.

\

17

Q

\

H.

^

TIMl in

Hi t/r. ft on

Bt an nit q

of

Ok ch B

rg?

>■■’

1

2

3

a

$

e

7

e

9

to

a

Fig. 13.

p.D. reaches 1-6 volt the fall is so rapid that there is no advantage in continuing the action. When the P.D. had fallen to 1-6 volt the cell was automatically switched into a charging circuit, and with a current of 9 amperes yielded the curve in fig. 14. Here again there is a rapid variation in P.D. (in these cases a rise) at the beginning and end of the operation. The cells were now carried through the same cycle several times, giving almost identical values for each cycle. After some days, however, they became more and more difficult to charge, and the return on discharge was proportionately less. It became impossible to charge up to a P.D. of 2-4 volts, and finally the capacity fell away to half its first value. Examination showed that the plates were badly scaled, and that some of the scales had partially connected the plates. These scales were cleared away and the ex- periments resumed, limiting the fall of p.d. to 1-8 volt. The diffi-

2<*

Wo

•-fri

tg

>.L

01

Co

II

in

■i

Cn

grg

inn

C<

trr,

nt

•9\

Ai

T/X

i\

t

23

£

V

/

. t

ys

r

2 2

Q

«.

21

ZO

Til

W£

ioi

rs <

rot

1 S

eg/,

mi

“9

or

.h.

rgi

C

1

.

3

■

s

t

7

■

9

1

//

1

2

13

1

•

IS

Fig. 14.

culties then disappeared, showing that discharge to 1-6 volt caused injury that did not arise at a limit of 1-8. Before describing the new results it will be useful to examine these two cases in the light of the theory of e.m.f. already given.

(a) Fall in e.m.f. at beginning of discharge. — At the moment when previous charging ceases the pores of the positive plate contain strong acid, brought there by the charging current. There is consequently a high e.m.f. But the strong acid begins to diffuse away at once and the e.m.f. falls rapidly. Even if the cell were not discharged this fall would occur, and if it were allowed to rest for thirty minutes or so the discharge would have begun with the dotted line (fig. 13). {V) Final rapid fall. — The pores being clogged by sulphate the plugs cannot get acid by diffusion, and when 5 % is reached the fall in e.m.f. is disproportionately large (see fig. 10). If discharge be stopped, there is an almost instantaneous diffusion inwards and a rapid rise in e.m.f. (c)The rise in e.m.f. at beginning and end of the charging is due to acid in the pores being strengthened, partly by diffusion, partly by formation of sulphuric acid from sulphate, and partly by electrolytic carrying of strong acid to the positive plate. The injurious results at 1-6 volt arise because then the pores contain water. The chemical reaction is altered, oxide or hydrate is formed, which will partially dissolve, to be changed to sulphate when the sulphuric acid subsequently diffuses in. But formed in this way it will not appear mixed with the active masses in the electrolytic paths, but more or less alone in the pores. In this position it will more or less block the passage and isolate some of the peroxide

ACCUMULATOR

I3 1

Further, when forming in the narrow passage its disruptive action will tend to force off the outer layers. It is evident that limitation of P.D. to 1-8 volt ought to prevent these injuries, because it pre- vents exhaustion of acid in the plugs.

Fig. 15 shows the results obtained by study of successive periods of

rest, the observations being taken between the limits of 2-4 and 1-8 volts. Curves A and B show the state and capacity at the beginning. After a 10 days' rest the capacity was smaller, but repeated cycles

Discharges

with 10 amperes

.

Charges with 9 amperes.

2-2

2-4

2-2

B

Sˆ

A

2-0

1-8

1-3

2.4 2-2

2.4

2-2

D

C

2-0

s"

1-8

1-8

2-4 2-2

2-4

2-2

F

e|

20

<~

1-8

1-8

if 2-4

1

2-4

2-2

H

,C

G

2-0

u

1-8

■22-4 ‘■52-2 B2-0

g ‘- 8

2-4

2-2

J

2-0

>—

3

i\

1-8

2-4

£ z

2-2

L

K

2-0

1-8

2-4

2-4

2-2

M

2-0

*～

1-8

2-4

2-4

2-2

P

2-0

‘

1-8

1-8

O12 34 567 8 9 10 11 01 2 84 567 88 10 11

Time in hours from beginning of discharge. Time in hours from beginning of charge.

Fig. 15.

of work brought it back to C and D. A second rest (10 days), followed by many cycles, then gave E and F. After a third rest(i6 days) and many cycles, G and H were obtained. After a fourth rest (16 days) the first discharge gave I and the first charge J. Repeated cycles brought the cells back to K and L. Curves M and N show first cycle after a fifth rest (16 days) ; O and P show the final restoration brought about by repeated cycles of work. The numbers given by the integration of some of these curves are stated in Table III.

Table III.

Capacity and Efficiency under Various Conditions of Working.

Experiment.

Discharge.

Charge.

Efficiency.

Am- pere Hours.

Watt Hours.

Am- pere Hours.

Watt Hours.

Quan- tity.

Energy.

Normal cycle. Restoration

after 1st rest Ditto, after

2nd rest . . Ditto, after

3rd rest . . Discharge) immediately > after rest ; Restoration

after 8 cycles

102 100

91 82-6

56-5 56-5

8o

201-7

179

176-7

1613

no-5 no-5

156-9

104-5

103-8

96-8

86-2

86-2 71-1

83-8

230-7

228-2

213-2

190-5

190-5 158-3

184-6

97-2

96-8

94- 1

95-8

65-5 79-6

95-5

87-4

85-8

82-8

84-7

58 1 69-6

85

The table shows that the efficiency in a normal cycle may be as high as 87-4%; that during a rest of sixteen days the charged

! Thio discharge is here compared with the charge that preceded the rest; in the next line the same discharge is compared with the charge folio-wing the rest.

accumulator is so affected that about 30% of its charge is not available, and in subsequent cycles it shows a diminished capacity and efficiency; and that by repeated charges and discharges the capacity may be partially restored and the efficiency more completely so. These changes might be due to — (a) leakage or short-circuit, (&) some of the active material having fallen to the bottom of the cell or {c) some change in the active materials, (a) is excluded by the fact that the subsequent charge is smaller, and (b) by the continued in- crease of capacity during the cycles that follow the rest. Hence the third hypothesis is the one which must be relied upon. The change in the active materials has already been given. The formation of

7I

Va, -iou S f T/K of

D

sell irgso.*

C ‘on oto 1 A 7*vt It

\

II

“la

‘e

■th

“)

Ce

1.

L 77

1-6

‘*»#?

N

te

*X ”

r*

V

\ ,

*

V*”

t-r

\

t\

\ *

1

J?

•

1

•

V

16

£

3

1

^-

L.S

2\

SI

7 I

‘10

1. -s

1,0

/ s

ao

2.

S

tiO

zs

Am oen ‘ Hluri

Fig. 16.

lead sulphate by local action on the peroxide plate and by direct action of acid on spongy metal on the lead plate explains the loss of energy shown in curve M, fig. 15, while the fact that it is probably formed, not in the path of the regular currents, but on the wall of the grid (remote from the ordinary action) , gives a probable explanation of the subsequent slow recovery. The action of the acid on the lead during rest must not be overlooked.

We have seen that capacity diminishes as the discharge rate increases; that is, the available output increases as the current diminishes. R. E. B. Crompton’s diagram illustrating this fact is given in fig. 16. At the higher rates the consumption of acid is too rapid, diffusion cannot maintain its strength in the pores, and the fall comes so much earlier.

The resistance varies with the condition of the cell, as shown by the curves in fig. 17. It may be unduly increased by long or narrow lugs, and especially by dirty joints between the lugs. It is interesting to note that it increases at the end of both charge and discharge, and

,

7

*-3

1.

010

J

$

ly

£

2 X

1

P

P

if

erl

7/d

1

2 1

/

1

E.

M.

P

i/

2/

^

^

r ^

<$

>’

.,-

ZQ

h”

”’’

OM

ft

s.

r/u

y’n

lL

/Si

*ha

4

~

r|S

pj

t j

\

ISO

S

.

$

003

s

N

19

77/1

t£

n

JOL

rs.

*ro >

t I

“f

nt.

/nt

Of

w c t

< &r.

•

1

:

•

■

t

\

■

Fig. 17.

much more for the first than the second. Now the composition of the active materials near the end of charge is almost exactly the same as at the beginning of discharge, and at first sight there seems nothing to

account for the great fall in resistance from 0-0115 to 0-004 ohm ; that is, to about one-third the value. There is, however, one difference between charging and discharging — namely, that due to the strong acid near the positive, with a corresponding weaker acid near the negative electrode. The curve of conductivity for sulphuric acid shows that both strong and weak acid have much higher resist- ances than the liquid usually employed in accumulators, and it is therefore reasonable to suppose that local variations in strength of acid cause the changes in resistance. That these are not due to the constitution of the plugs is shown by the fact that, while the plugs

are almost identical at end of discharge and beginning of charge, the resistance falls from 0-0055 to 0-0033 ohm.

While a current flows through a cell , heat is produced at the rate sf ORXo-24 calories (water-gram-degree) per second. As a conse- quence the temperature tends to rise. But the change of tempera- ture actually observed is much greater during charge, and much less

during discharge, than the foregoing expression would suggest; and it is evident that, besides the heat pro- duced according to Joule's law, there are other actions which warm the cell during charge and cool it during discharge. Duncan and Wiegand (he. cit.), who first observed the thermal changes, ascribe the chief influence to the electro- chemical addition of H2SO4 to the liquid during charge and its removal during dis- charge. Fig. 18 gives some results obtained by Ayrton, Lamb, &c. This elevation of temperature (due to electrolytic strengthening of acid and local action) is a measure of the energy lost in a cycle, and ought to be minimized as much as possible.

Chemistry. — The chemical theory adopted in the foregoing pages is very simple. It declares that sulphate of lead is formed on both plates" during discharge, the chemical action being reversed in charg- ing. The following equations express the experimental results. Condition before discharge :—

-l-plate Liquid ˆ —plate

*.Pb0 2 + [\ H I gg

• 2

n

1%”

If .,

5 1 ■«

■»?

If.

/

«s

s

/

-^

/

t

N

/

4

\

/

tf

‘s

v

1

/■

V

-

/

s

>

V

f

>

\

^

s

}t£3 + 567e Time in Hours from beginning of Charge -. or Oiacharge

Fig. 18.

After discharge : — -f plate

Liquid -2p). H 2 S0 4 “1

~(x-p). Pb0 2 ~j , Ry-zjv. n 2 3vj 4 i 1

£.PbSOj ^ L(«+2£).H 2 J T _p. PbS0 4 j

—plate

r{z-P), Pb –]

During charge, the substances are restored to their original condition: the equation is therefore reversed. An equation of this general nature was published by Gladstone and Tribe in 1882, when they first suggested the ” sulphate ” theory, which was based on very numerous analyses. Confirmation was given by E.Frankland in 1883, E. Reynier 1884, A. P. P. Crova and P. Garbe 1885, C. Heim and W. F. Kohlrausch 1889, W. E. Ayrton, &c, with G. H Robertson 1890, C. H. J. B. Liebenow 1897, F. Dolezalek 1897, and M. Mugdan 1899. Yet there has been, as Dolezalek says, an incomprehensible unwillingness to accept the theory, though no suggested alternative could offer good verifiable experimental foundation. Those who seek a full discussion

will find it in Dolezalek's Theory of the Lead Accumulator. We shall take it that the sulphate theory is proved, and apply it to the conditions of charge and discharge.

From the chemical theory it will be obvious that the acid in the pores of both plates will be stronger during charge than that outside. During discharge the reverse will be the case. Fig. 19 shows a curve

>!-/

,

»<3

SO

1;

1 -j

°1

‘

s

rt

e<

1

III

I

12

(\

i

K

I

z

‘

f*

•

£i

-■

/

A

s

.

n.

IS

f«

2t

A

/

D

a

■c

ill

itt

^

H

1

—

-

‘—

/

t

T

\Mi

•1

h,

\lli

4

rt

■n

bt

9″

rn

V

Oi

L

W

V

■

M

\rt

P

r

£

•

5 6 7

t

10 11

i 13 w.

5

Fig. 19.

of potential difference during charge, with others showing the con- current changes in the percentage of Pb0 2 and the density of acid. These increase almost in proportion to the duration of the current, and indicate the decomposition of sulphate and liberation of sul- phuric acid. There are breaks in the P.D. curve at A, B, C, D where the current was stopped to extract samples for analysis, &c. The fall in e.m.f. in this sh'ort interval is noteworthy; it arises from the diffusion of stronger acid out of the pores. The final rise of pressure is due to increase in resistance and the effect of stronger acid in the pores, this last arising partly from reduced sulphate and partly from the electrolytic convection of SCu (see also Dolezalek, Theory, p. 1 13) . Fig. 20 gives the data for discharge. The percentage of Pb0 2 and

the density here fall almost in proportion to the duration of the current. The special feature is the rapid fall of voltage at the end. Several suggestions have been made about this phenomenon. The writer holds that it is due to the exhaustion of the acid in the pores. Plante, and afterwards Gladstone and Tribe, found a possible cause in the formation of a film of peroxide on the spongy lead. E. J. Wade has suggested a sudden readjustment of the spongy mass into a complex sulphate. To rebut these hypotheses it is only neces- sary to say that the fall can be deferred for a long time by pressing fresh acid into the pores hydrostatically (see Liebenow, Zeits. fur Elektrochem., 1897, iv. 61), or by working at a higher temperature. This increases the diffusion inwards of strong acid, and like the increase due to hydrostatic pressure maintains the e.m.f. The other suggested causes of the fall therefore fail. Fig. 20 also shows that when the discharge current was stopped at points A, B, C, D to extract samples, the

voltage immediately rose, owing to inward diffusion of stronger acid. The inward diffusion of fresh acid also accounts for the recuperation found after a rest which follows either a complete discharge or a partial discharge at a very rapid rate. If the discharge be complete the recuperation refers only to the electro- motive force; the pressure falls at once on closed circuit. If dis- charge has been rapid, a rest will enable the cell to resume work because it brings fresh acid into the active regions.

2-1

Ml

90

SO

£

60ˆ5

sof *°s

30

s

yi

!£

jd

OH

“•JiBI

1-8

S

a:

14

“-r

B

Z^f££-

i;-, T

K

IS

A

“1

\

^^^,

N

\

1

»a.

£.

1

*3^

k -«ar

\

-Li!

— i_

»~ .

•^m

,

~ ‘

g

V

11

O

”’”’

V

—

■■//»■£

in

hiur 1 1 “Oil

*t.i

‘in j c f t ‘«

:h. ri

10

Hi,

Pi

r-t a

>l

- 3 4 5 6 7 S 6 10 II 12 13 1*

16

Fig. 20.

As to the effect of repose on a charged cell, Gladstone and Tribe’s experiments showed that peroxide of lead lying on its lead support suffers from a local action, which reduces one molecule of PbG 2 to sulphate at the same time that an atom of the grid below it is also changed to sulphate. There is thus not only a loss of the available peroxide, but a corrosion of the grid or plate. It is through this action that the supports gradually give way. On the negative plate an action arises between the finely divided lead and the sulphuric acid, with the

result that hydrogen is set free : —

Pb+H 2 S0 4 = PbS0 4 +H 2 . This involves a diminution of available spongy lead, or lossof capacity, occasionally with serious consequences. The capacity of the lead plate is reduced absolutely, of course, but its relative value is more seriously affected. In the discharge it gets sulphated too much, because the better positive keeps up the e.m.f. too long. In the succeeding charge, the positive is fully charged before the negative t and the differences between them tend to increase in each cycle.

Kelvin and Helmholtz have shown that the e.m.f. of a voltaic cell can be calculated from the energy developed by the chemical action. For a dyad gram equivalent (= 2 grams of hydrogen, 207 grams of lead, &c), the equation connecting them is

EH I rydsL

~ “T *■ JT

46000 a L where E is the e.m.f. in volts, H is the heat developed by a dyad equivalent of the reacting substances, T is the absolute tempera- ture, and dE/dT is the temperature coefficient of the e.m.f. _ If the e.m.f. does not change with temperature, the second term is zero. The thermal values for the various substances formed and decom- posed are: — For Pb0 2 , 62400; for PbSOa, 216210; for H2SO4, 192920; and for H 2 0, 68400 calories. Writing the equation in its simplest form for strong acid, and ignoring the temperature co- efficient term,

Pb0 2 +2H 2 SOi + Pb =2PbS0 4 + 2H 2

-62440-385840 +432420 + 136720

leaving a balance of 120860 calories. Dividing by 46000 gives 2-627 volts. The experimental value in strong acid, according to Gladstone and Hibbert, is 2-607 volts, a very close approximation. For other strengths of acid, the energy will be less by the quantity of heat evolved by dilution of the acid, because the chemical action must take th,e H2SO4 from the diluted liquid. The dotted curve in fig. 10 indicates the calculated e.m.f. at various points when this is taken into account. The difference between it and the con- tinuous curve must, if the chemical theory be correct, depend on the second term in the equation. The figure shows that the observed e.m.f. is above the theoretical for all strengths from 100 down to 5 %. Below 5 the position is reversed. The question remains, Can the temperature coefficient be obtained? This is difficult, because the

value is so small, and it is not easy to secure a good cycle of observations. Streintz has given the following values :—

. IO 6

1-9223 140

1-9828 228

2-0031 335

2-0084 285

2-0105 255

2-078 130

2-2070

73

Unpublished experiments by the writer give -= =. io 6 =350 for

acid of density 1-156. With stronger acid, a true cycle could not be obtained. Taking Streintz's value, 335 for 25% acid, the second

termof theequationisTT= =29oX-ooo335=o-097i volt. The first

term gives 88800 calories = 1-9304 volt. Adding the second term, 1-9304+0-0971 =2-2075 volts. The observed value is 2-030 volts (see fig. 10), a remarkably good agreement. This calculation and the general relation shown in fig. 10 render it highly probable that, if the temperature coefficient were known for all strengths of acid, the result would be equally good. It is worth observing that the reversal of relationship between the observed and calculated curves, which takes place at 5 % or 6 %, suggests that the chemistry must be on the point of altering as the acid gets weak, a conclusion which has been already arrived at on purely chemical grounds. The thermodynamical relations are thus seen to confirm very strongly the chemical and physical analyses. 1

Accumulators in Central Stations. — As the efficiency of accumulators is not generally higher than 75%, and machines must be used to charge them, it is not directly economical to use cells alone for public supply. Yet they play an important and an increasing part in public work, because they help to maintain a constant voltage on the mains, and can be used to distribute the load on the running machinery over a much greater fraction of the day. Used in parallel with the dynamo, they quickly yield current when the load increases, and immedi- ately begin to charge when the load diminishes, thus

largely reducing the fluctuating stress on dynamo and engine for sudden variations in load. Their use is advantageous if they can be charged and discharged at a time when the steam plant would otherwise be working at an uneconomical load.

Regulation of the potential difference is managed in various ways. More cells may be thrown in as the discharge proceeds,

and taken out during charge; but this method often leads to trouble, as. some cells get unduly dis- charged, and the unity of the battery is disturbed. Sometimes the number of cells is kept fixed for supply, but the p.d. they put on the mains is re- duced during charge by employing regulating cells in opposition. Both these plans have proved unsatis- factory, and the battery is now preferably joined across the mains in parallel with the dynamo. The cells take the peaks of the load and thus relieve the dynamo and engine of sudden changes, as shown in fig. 21. Here the line 28 current (shown by the erratic curve) varied spas- modically from o to 375 amperes, yet the dynamo current varied from 100 to 150 amperes only (see line A). At the same time the line voltage (535 volts normal) was kept nearly constant. In the late evening the cells became exhausted and the dynamo charged them. Extra voltage was required at the end of a ” charge ” and was provided by a ” booster.” Originally a booster was an auxiliary dynamo worked in series with the chief machine, and driven in any convenient way. It has de-

1 For the discussion of later electrolytic theories as applied to accumulators, see Doieaatek, Theory ef me Lead Accumulator.

Fig. 21.

Lj y^!lflr#-

■ym-

FlG. 22.

veloped into a machine with two or more exciting coils, and having its armature in series with the cells (see fig. 22). The exciting coils act in opposition; the one carrying ■ the main current sets up an e.m.f. in the same direction as that of the cells, and helps the cells to discharge as the load rises. When the load is small, the voltage on the mains is highest and the shunt exciting current greatest. The booster e.m.f. now acts with the dynamo and against the cells, and causes them to take a full charge. Even this arrangement did not suffice to keep the line voltage as constant as seemed desirable in some cases, as where

lighting and traction work were put on the same plant. Fig. 23 is a diagram of a complex booster which gives very good regulation. The booster B has its armature in series with the accumulators A, and is kept running in a given direction at a con- stant speed by means of a shunt-wound motor (not shown), so that the e.m.f. induced in the armature depends on the excitation. This is made to vary in value and in direction by means of

four independent exciting coils, Ci, C2, C3, C4. The last is not essential, as it merely compensates for the small voltage drop in the armature. It is obvious that the excitation C3 will be proportionate to the difference in voltage between the battery and the mains, and it is arranged that battery volts and booster volts shall equal the volts on the mains. Under this excitation there is no tendency for the battery to charge or discharge. But any additional excitation leads to strong currents one way or the other. Excitation Ci rises with the load on the line, and gives an e.m.f. helping the battery to discharge most when the load is greatest. C 2 is dependent on the bus-bar voltage, and is greatest when the generator load is small: it opposes Ci and therefore excites the booster to charge the battery. The exact generator load at which the booster shall reverse its e.m.f. from a charging to a discharging value is adjusted by the resistance R 2 in series with C 2 . A similar resistance R3 allows the excita- tion of C 3 to be adjusted. V.ery remarkable regulation can be obtained by reversible boosters of this type. In traction and lighting stations it is quite possible to keep the variation of bus-bar pressure within 2% of the normal value, although the load may momentarily vary from a few amperes up to 200 or

300.

J. B. Entz has introduced an auxiliary device which enables him to use a much more simple booster. The Entz booster has no series coil and only one shunt coil, the direction and value of excitation due to this being controlled by a carbon regulator, having two arms, the resistance of each of which can be varied by pressure due to the magnet- izing action of a solenoid. The main current from the generator passes through the solenoid and causes one or other of the two carbon arms to have the less resistance. This change in resist- ance determines the direction of the exciter field current, and therefore the direction of the boost. A photograph of the switchboard at Greenock where this booster is in use shows the voltmeter needle as if it had been held rigid, although the exposure lasted 90 minutes. On the same photograph the ammeter needle does not appear, its in- cessant and large movements preventing any picture from being

formed.

Alkaline Accumulators. — Owing to the high electro-chemical equivalent of lead, a great saving in weight would be secured by using almost any other metal. Unfortunately no other metal and its compounds can resist the acid. Hence inventors

Fig. 23.

have been incited to try alkaline liquids as electrolytes. Many attempts have been made to construct accumulators in this way, though with only moderate success. The Lalande-Chaperon, Desmazures, Waddell-Entz and Edison are the chief cells. T. A. Edison's cell has been most developed, and is intended for traction work. He made the plates of very thin sheets of nickel- plated steel, in each of which 24 rectangular holes were stamped, leaving a mere framework of the metal. Shallow rectangular pockets of perforated nickel-steel were fitted in the holes and then burred over the framework by high pressures. The pockets contained the active material. On the positive plate this con- sisted of nickel peroxide mixed with flake graphite, and on the negative plate of finely divided iron mixed with graphite. Both kinds of active material were prepared in a special way. The

graphite gives greater con- ductivity. The liquid was a 20% solution of caustic potash. During discharge the iron was oxidized, and the nickel reduced to a lower state of oxidation. This change was reversed during charge. Fig. 24 shows the general features.

The chief results obtained by European experts showed that the e.m.f. was 1-33 volt, with a transient higher value following charge. A cell weighing 17-8 lb had a resistance of 0-0013 ohm, of 210 watt-hours, or at Another and improved cell

-Edison Accumulator.

Fig. 24.

and an output at 60 amperes 1 20 amperes of 177 watt-hours, weighing 12-7 lb gave 14-6 watt-hours per pound of cell at a 20-ampere rate, and 13-5 watt-hours per pound at a 60- ampere rate. The cell could be charged and discharged at almost any rate. A full charge could be given in 1 hour, and it would stand a discharge rate of 200

amperes (Jonrn. Inst. Elec. Eng., 1904, pp. 1-36).

Subsequently Edison found some degree of falling-off in capa- city, due to an enlargement of the positive pockets by pressure of gas. Most of the faults have been overcome by altering the form of the pocket and replacing the graphite by a metallic conductor in the form of flakes.

References. — G. Plants, Recherches sur V electricite (Paris, 1879) ; Gladstone and Tribe, Chemistry of Secondary Batteries (London, 1884); Reynier, V Accumulateur volta'ique (Paris, 1888); Heim, Die Akkumulatoren (Berlin, 1889); Hoppe, Die Akk. fiir Elektricitdt (Berlin, 1892); Schoop, Handbuch fur Akk. (Stuttgart, 1898); Sir E. Frankland, " Chemistry of Storage Batteries," Proc. Roy. Soc, 1883; Reynier, Jour. Soc. Franc, de Phys., 1884; Heim, " t). d. Einfluss der Sauredichte auf die Kapazitat der Akk.," Elek. Zeits., 1889; Kohlrausch and Heim, " Ergebnisse von Versuchen ah Akk. fiir Stationsbetrieb," Elek. Zeits., 1889; Darrieus, Bull. Soc. In- tern, des Elect., 1892; F. Dolezalek, The Theory of the Lead Accumu- lator (London, 1906) ; Sir D. Salomons, Management of Accumulators (London, 1906); E. J. Wade, Secondary Batteries (London, 1901); L. Jumau, Les Accumulateurs electriques (Paris, 1904). (W. Ht.)

ACCURSIUS {Ilal. Accorso) , FR ANCISCUS (1 1 8 2-1 260) , Italian jurist, was born at Florence about 1182. A pupil of Azo, he first practised law in his native city, and was afterwards appointed professor at Bologna, where he had great success as a teacher. He undertook the great work of arranging into one body the almost innumerable comments and remarks upon the Code, the Institutes and Digests, the confused dispersion of which among the works of different writers caused much obscurity and contradiction. This compilation, bearing the title Glossa ordinaria or magistralis, but usually known as the Great Gloss, though written in barbarous Latin, has more method than that of any preceding writer on the subject. The best edition of it is that of Denis Godefroi (1540-1621), published at Lyons in 1589, in 6 vols, folio. When Accursius was employed in this work, it is said that, hearing of a similar one proposed and begun by Odofred, another lawyer of Bologna, he feigned

indisposition, interrupted his public lectures, and shut himseli up, till with the utmost expedition he had accomplished his design. Accursius was greatly extolled by the lawyers of his own and the immediately succeeding age, and he was even called the idol of jurisconsults, but those of later times formed a much lower estimate of his merits. There can be no doubt that he disentangled the sense of many laws with

much skill, but it is equally undeniable that his ignorance of history and antiquities often led him into absurdities, and was the cause of many defects in his explanations and commentaries. ‘ He died at Bologna in 1260. His eldest son Franciscus (1225-1293), who also filled the chair of law at Bologna, was invited to Oxford by King Edward I., and in 1275 or 1276 read lectures on law in the university.

ACCUSATION (Lat. accusatio, accusare, to challenge to a causa, a suit or trial at law), a legal term signifying the charging of another with wrong-doing, criminal or otherwise. An accusa- tion which is made in a court of justice during legal proceedings is privileged (see Privilege), though, should the accused have been maliciously prosecuted, he will have a right to bring an action for malicious prosecution. An accusation made outside a court of justice would, if the accusation were false, render the accuser liable to an action for defamation of character, while, if the accusation be committed to writing, the writer of it is liable to indictment, whether the accusation be made only to the party accused or to a third person. A threat or conspiracy to accuse another of a crime or of misconduct which does not amount to a crime for the purpose of extortion is in itself indictable.

ACCUSATIVE (Lat. accusativus, sc. casus, a translation of the Gr. amaruci) ■ktSxjis, the case concerned with cause and effect, from atria, a cause), in grammar, a case of the noun, denoting primarily the object of verbal action or the destination of motion.

ACE (derived through the Lat. as, from the Tarentine form of the Gr. els), the number one at dice, or the single point on a die or card; also a point in the score of racquets, lawn- tennis, tennis and other court games.

. ACELDAMA (according to Acts i. 19, ” the field of blood “), the name given to the field purchased by Judas Iscariot with the money he received for the betrayal of Jesus Christ. A different version is given in Matthew xxvii. 8, where Judas is said to have cast down the money in the Temple, and the priests who had paid it to have recovered the pieces, with which they bought ” the potter’s field, to bury strangers in.” The MS. evidence is greatly in favour of a form Aceldamach. This would seem to mean ” the field of thy blood,” which is unsuitable. Since, however, we find elsewhere one name appearing as both Sirach and Sira (ch = «), Aceldamach may be another form of an original Aceldama (not ˆpq), the ” field of blood.” A. Klostermann, however, takes the ch to be part of the Aramaic root demach, ” to sleep “; the word would then mean ” field of sleep ” or cemetery (Probleme im Aposteltexte, 1-8, 1883), an explanation which fits in well with the

account in Matthew xxvii. The traditional site (now Hak el-Dum), S. of Jerusalem on the N.E. slope of the “Hill of Evil Counsel” (Jebel Deir Abu Tor), was used as a burial-place for Christian pilgrims from the 6th century a.d. till as late, apparently, as 1697, and especially in the time of the Crusades. Near it there is a very ancient charnel- house, partly rock-cut, partly of masonry, said to be the work of Crusaders.

ACENAPHTHENE, C 12 Hi , a hydrocarbon isolated from the fraction of coal-tar boiling at 26o°-27o° by M. P. E. Berthelot, who, in conjunction with Bardy, afterwards synthesized it from o-ethyl naphthalene {Ann. Chem. Phys., 1873, vol. xxix.). It forms white needles (from alcohol), melts at 95° and boils at 278 . Oxidation gives naphthalic acid (i-8 naphthalene dicarboxylic acid).

Acettaphthalene, C12 Hg, a hydrocarbon crystallizing in yellow tables and obtained by passing the vapour of acenaphthene over heated litharge. Sodium amalgam reduces it to acenaph 1 thene; chromic acid oxidizes it to naphthalic acid.

ACEPHALI (from a-, privative, and KeaK’fi, head), a term applied to several sects as having no head or leader; and in particular to a strict monophysite sect that separated itself, in the end of the 5th century, from the rule of the patriarch of Alexandria (Peter Mongus) , and remained ” without king or bishop ” till they were reconciled by Mark I. (799-819). 1 The term is also used to denote clerici vagrantes, i.e. clergy without title or benefice, picking up a living anyhow (cf. Hinschius i. p. 64). Certain persons in England during the reign of King Henry I. were called Acephali because they had no lands by virtue of which they could acknowledge a superior lord. The name is also given to certain legendary races described by ancient naturalists and geographers as having no heads, their mouths and eyes being in their breasts, generally identified with Pliny’s Blemmyae.

ACEPHALOUS, headless, whether literally or metaphorically, leaderless. The word is used literally in biology; and meta- phorically in prosody or grammar for a verse or sentence with a beginning wanting. In zoology, the mollusca are divided into cephalous and acephalous (Acephala), according as they have or have not an organized part of their anatomy as the seat of the brain and special senses. The Acephala, or Lamellibranchiata (q.v.), are commonly known as bivalve shell-fish. In botany the word is used for ovaries not

terminating in a stigma. Acephalocyst is the name given by R. T. H. Laennec to the hydatid, immature or larval tapeworm.

ACERENZA (anc. Aceruntia), a town of the province of Potenza, Italy, the seat of an archbishop, 155 m. N.E. of the station of Pietragalla, which is 9 m. N.W. of Potenza by rail, 2730 ft. above sea-level. Pop. (1901) 4499- Its situation is one of great strength, and it has only one entrance, on the south. It was occupied as a colony at latest by the end of the Republic, and its importance as a fortress was specially ap- preciated by the Goths and Lombards in the 6th and 7th cen- turies. It has a fine Norman cathedral, upon the gable of which is one of the best extant busts of Julian the Apostate.

ACEROSE (from Lat. acus, needle, or acer, sharp), needle- shaped, a term used in botany (since Linnaeus) as descriptive of the leaves, e.g., of pines. From Lat. acus, chaff, comes also the distinct meaning of " mixed with chaff."

ACERRA, a town and episcopal see of Campania, Italy, in the province of Caserta, 9 m. N.E. from Naples by rail. Pop. (1901) 16,443. Tne town nes on tne "g nt bank of the Agno, which divides the province of Naples from that of Caserta, 90 ft. above the sea, in a fertile but somewhat marshy district, which in the middle ages was very malarious. The ancient name (Acerrae) was also borne by a town in Umbria and another in Gallia Transpadana (the latter now Pizzighettone on the Adda, 13 m. W.N.W. of Cremona). It became a city with Latin rights in 332 B.C. and later a municipium. It was destroyed by Hannibal in 216 B.C., but restored in 210; in 90 B.C. it served as the Roman headquarters in the Social war, and was successfully held against the insurgents. It received a colony under Augustus, but appears to have suffered rnuch from floods of the river Clanis. Under the Empire we hear no more of it, and no traces of antiquity, beyond inscriptions, remain.

ACERRA, in Roman antiquity, a small box or pot for holding incense, as distinct from the turibulum (thurible) or censer in which incense was burned. The name was a'so given by the Romans to a little altar placed near the dead, on which incense was offered every day till the burial. In ecclesiastical Latin the term acerra is still applied to the incense boats used in the Roman ritual.

ACETABULUM, the Latin word for a vinegar cup, an ancient Roman vessel, used as a liquid measure (equal to about half a gill) ; it is also a word used technically in zoology, by analogy for certain cup-shaped parts, e.g. the suckers of a mollusc, the socket of the thigh-bone, &c;

and in botany for the receptacle of Fungi.

ACETIC ACID {acidum aceticum), CH 3 -C0 2 H, one of the most important organic acids. It occurs naturally in the juice of 1 See Gibbon, ch. xlvii. (vol. v. p. 129 in Bury's ed.).

many plants, and as the esters of n-hexyl and n-octyl alcohols in the seeds of Heracleum giganteum, and in the fruit of Hera- cleum sphondylium, but is generally obtained, on the large scale, from the oxidation of spoiled wines, or from the destructive distillation' of wood. In the former process it is obtained in the form of a dilute aqueous solution, in which also the colouring matters of the wine, salts, &c, are dissolved; and this impure acetic acid is what we ordinarily term vinegar (q.v.). Acetic acid (in the form of vinegar) was known to the ancients, who obtained it by the oxidation of alcoholic liquors. Wood- vinegar was discovered in the middle ages. Towards the close of the 18th century, A. L. Lavoisier showed that air was necessary to the formation of vinegar from alcohol. In 1830 J. B. A. Dumas converted acetic acid into trichloracetic acid, and in

1842 L. H. F. Melsens reconverted this derivative into the original acetic acid by reduction with sodium amalgam. The synthesis of trichloracetic acid from its elements was accomplished in

1843 by H. Kolbe; this taken in conjunction with Melsens's observation provided the first synthesis of acetic acid. An- hydrous acetic acid — glacial acetic acid — is a leafy crystalline mass melting at 16-7° C., and possessing an exceedingly pungent smell. It boils at n 8°, giving a vapour of abnormal specific gravity. It dissolves in water in all proportions with at first a contraction and afterwards an increase in volume. It is detected by heating with ordinary alcohol and sulphuric acid, which gives rise to acetic ester or ethyl acetate, recognized by its fragrant odour; or by heating with arsenious oxide, which forms the pungent and poisonous cacodyl oxide. It is a monobasic acid, forming one normal and two acid potassium salts, and basic salts with iron, aluminium, lead and copper. Ferrous and ferric acetates are used as mordants; normal lead acetate is known in commerce as sugar of lead (q.v.);- basic copper acetates are known as verdigris (q.v.).

Pharmacology and Therapeutics. — Glacial acetic acid is occa- sionally used as a caustic for corns. The dilute acid, or vinegar, may be used to bathe the skin in fever, acting as a pleasant refrigerant. Acetic acid has no valuable properties for internal administration. Vinegar, however, which contains about 5 % acetic acid, is frequently

taken as a cure for obesity, but there is no warrant for this application. Its continued employment may, indeed, so injure the mucous membrane of the stomach as to interfere with digestion and so cause a morbid and dangerous reduction in weight.

The acetates constitute a valuable group of medicinal agents, the potassium salt being most frequently employed. After absorption into the blood, the acetates are oxidized to car- bonates, and therefore are remote alkalies, and are administered whenever it is desired to increase the alkalinity of the blood or to reduce the acidity of the urine, without exerting the dis- turbing influence of alkalies upon the digestive tract. The citrates act in precisely similar fashion, and may be substituted. They are somewhat more pleasant but more expensive.

ACETO-ACETIC ESTER, $C_6H_{10}O_3$ or CH_3-CO-$CH_2COOC_2H_5$, a chemical substance discovered in 1863 by A. Geuther, who showed that the chief product of the action of sodium on ethyl acetate was a sodium compound of composition $C_6H_9O_3Na$, which on treatment with acids gave a colourless, somewhat oily liquid of composition $C_6H_{10}O_3$. E. Frankland and B. F. Duppa in 1865 examined the reaction and concluded that Geuther's sodium salt was a derivative of the ethyl ester of acetone carboxylic acid and possessed the constitution $CH_3COCHNa$-$COOC_2H_5$, This view was not accepted by Geuther, who looked upon his compound $C_6H_{10}O_3$ as being an acid: J. Wislicenus also investigated the reaction very thoroughly and accepted the Frankland-Duppa formula (Annalen, 1877, 186, p. 163; 1877, 190, p. 257).

The substance is best prepared by drying ethyl acetate over calcium chlorido and treating it with sodium wire, which is best introduced in one operation; the liquid boils and is then heated on a water bath for some hours, until the sodium all dissolves. After the reaction is completed, the liquid is acidified with dilute sulphuric acid (1:5) and then shaken

with salt solution, separated from the salt solution, washed, dried and fractionated. The portion boiling between 175° and 185°C. is redistilled. The yield amounts to about 30 % of that required by theory.

A. Ladenburg and J. A. Wanklyn have shown that pure ethyl acetate

free from alcohol will not react with sodium to produce aceto-acetic ester. L. Claisen, whose views are now accepted, studied the reactions of sodium ethylate and showed that if sodium ethylate be used in place of sodium in the above re- action the same result is obtained. He explains the reactions

thus:

CH 3 -C

ˆO

/

ONa

\ oc H +NaOC 2 H 6 =CH 3 -CM)C 2 H5,

N3C2H6

this reaction being followed by /ONa H .

CH 3 -CˆOC 2 H 5 “ > CH-COOC 2 H 6 = 2C 2 H 6 OH

X)C,H 5 H CH,-C(ONa):CHCOOC 2 H 6 ;

and oh acidification this last substance gives aceto-acetic ester. Aceto-acetic ester is a colourless liquid boiling at i8i c C. ; it is slightly soluble in water, and when distilled undergoes some decomposition forming dehydracetic acid C 8 H 8 4 . It undoubtedly contains a- keto-group, for it reacts with hydro- cyanic acid, hydroxylamine, phenylhydrazine and ammonia; sodium bisulphite also combines with it to form a crystalline compound, hence it contains the grouping CH 3 CO. J. Wis- licenus found 1 that only one hydrogen atom in the -CH 2 – group is directly replaceable by sodium, and that if the sodium be then replaced by an alkyl group, the second hydrogen atom in the group can be replaced in the same manner. These alkyl substitution products are important, for they lead to the syn- thesis of many organic compounds, on account of the fact that they can be hydrolysed in two different ways, barium hydroxide or dilute sodium hydroxide solution giving the so- called ketone hydrolysis, whilst concentrated sodium hydroxide gives the acid hydrolysis.

Ketone hydrolysis; — –

CH 3 -CO-C(XY)-CO 2 C 2 H5-}CH 8 -CO-CH(XY)-fC 2 H 6 0H-|-CO 2 ;

Acid hydrolysis: — CH 3 -CO-C(XY)-C0 2 C 2 H 6 ˆCH 3 -C0 2 H + C 2 H 6 OH + CH(XY).COOH; (where X and Y = alkyl groups) .

Both reactions occur to some extent simultaneously. Aceto- acetic ester is a most important synthetic reagent, having been used in the production of pyridines (q.v.), quinolines (q.v.), pyrazolones, furfurane (q.v.), pyrrols (q.v.), uric acid (q.v.), and many complex acids and ketones.

For a discussion as to the composition, and whether it is to be regarded as possessing the ” keto ” form CH 3 -COCH 2 -COOC2H 6 or the “enol” form CH 3 -C(OH) : CH-COOC 2 H 6 , see Isomerism, and also papers by J. Wislicenus (Ann., 1877, 186, p. 163; 1877, 190, p. 257), A. Michael (Journ. Prak. Chem., 1887, [2] 37, p. 473), L. Knorr (Ann., 1886, 238, p. 147), W. H. Perkin, senr. (Journ. of Chem. Soc, 1892, 61, p. 800) and J. U. Nef (Ann., 1.891, 266, p. 70; 1892, 270, pp. 289, 333; 1893, 276, p. 212).

ACETONE, or Dimethyl Ketone, CHs-COCHa, in chemistry, the simplest representative of the aliphatic ketones. It is present in very small quantity in normal urine, in the blood, and in larger quantities in diabetic patients. It is found among the products formed in the destructive distillation of wood, sugar, cellulose, &c, and for this reason it is always present in crude wood spirit, from which the greater portion of it may be re- covered by fractional distillation. On the large scale it is pre- pared by the dry distillation of calcium acetate (CH 3 C0 2) 2 Ca = CaC03 + CH 3 COCH 3 . E. R. Squibb (Journ. Amer. Chem. Soc, 1895, 17, p. 187) manufactures it by passing the vapour of acetic acid through a rotating iron cylinder containing a mixture of pumice and precipitated barium carbonate, and kept at a temperature of from 500 C. to 6oo° C. The mixed vapours of acetone, acetic acid and water are then led through a condensing apparatus so that the acetic acid and water are first condensed, and then the acetone is condensed in a second vessel. The barium carbonate used in the process acts as a contact substance, since the temperature at which the operation is carried out is always above the decomposition point of barium : acetate.

Crude acetone may be purified by converting it into the crystal- line sodium bisulphite compound, which is separated by filtration and then distilled with sodium carbonate.

CH

CH;

3 >C<°" T +Na 2 C0 3 = 2ˆ 8 >CO+2Na 2 S0 3 +C0 2 +H 2 0. 3 X N S0 3 Na CH 3 /

It is then dehydrated and redistilled.

Acetone is largely used in the manufacture of cordite (q.v.). For this purpose the crude distillate is redistilled over sulphuric acid and then fractionated.

Acetone is a colourless mobile liquid of pleasant smell, boiling at 56-53°C, and has a specific gravity o-8i9(o°/4°C.). It is readily soluble in water, alcohol, ether, &c. In addition to its applica- tion in the cordite industry, it is used in the manufacture of chloroform (q.v.) and sulphonal, and as a solvent. It forms a hydrazone wdth phenyl hydrazine, and an oxime with hydroxyl- amine. Reduction by sodium amalgam converts it into iso- propyl alcohol; oxidation by chromic acid gives carbon dioxide and acetic acid. With ammonia it reacts to form di- and tri- acetOneamines. It also unites directly with hydrocyanic acid to form the nitrile of a-oxyisobutyric acid.

By the action of various reagents such as lime, caustic potash, hydrochloric acid, &c, acetone is converted into condensation products, mesityl oxide C 6 Hi O, phorone C9H14O, &c, being formed. ‘ On distillation with sulphuric acid, it is converted into mesitylene CgHˆsymmetrical trimethyl benzene). Acetone has also been used in the artificial production of indigo. In the presence of iodine and an alkali it gives iodoform. Acetone has been employed medicinally in cases of dyspnoea. With potassium iodide, glycerin and water, it forms the preparation spirone, which has been used as a spray inhalation in paroxysmal sneezing and asthma.

ACETOPHENONE, or Phenyl-Methyl Ketone, C 8 H 8 or C 6 H5CO-CH 3 , in chemistry, the simplest representative of the class of mixed aliphatic-aromatic ketones. It can be prepared by distilling a mixture of dry calcium benzoate and acetate, Ca(0 2 CC 6 H 6) 2 |(CH 3 C0 2) 2 Ca = 2CaC03+2C6H 5 CO-CH a , or by condensing benzene with acetyl chloride in the presence of anhy- drous aluminium, chloride (C. Friedel and J. M. Crafts), C 6 H 6 r CHsCOClˆHCl+CeHsCOCH;,. It crystallizes in colourless plates melting at 2o°C. and boiling at 202°C. ; it is insoluble in water, but readily dissolves in the ordinary organic solvents. It is reduced by nascent hydrogen to the secondary alcohol C 6 H 5 -CH-OH-CH3 phenyl-methyl-carbinol, and on oxidation forms benzoic acid. On the addition of phenylhydrazine it gives a phenylhydrazone, and with hydroxylamine furnishes an

oxime (gˆ>C = NOH melting at S9°C. This oxime under- goes a peculiar rearrangement when it is dissolved in ether and phosphorus pentachloride is added to the ethereal solution, the excess of ether distilled off and water added to the residue being converted into the isomeric substance acetanilide, C6H5NHCOCH3, a behaviour shown by many ketoximes and known as the Beckmann change (see Berichte, 1886, 19, p. 988). With sodium ethylate in ethyl acetate solution it forms the sodium derivative of benzoyl acetone, from which benzoyl acetone, C 6 H 5 -CO-CH 2 -CO-CH3, can be obtained by acidification with acetic acid. When heated with the halogens, acetophenone is substituted in the aliphatic portion of the nucleus; thus bromine gives phenacyl bromide, C 6 H 5 CO- CH 2 Br. Numerous derivatives of acetophenone have been prepared, one of the most import- ant being orthoaminoacetophenone, NHˆ-CeHj-CO-CHs, which is obtained by boiling orthoaminophenylpropiolic acid with water. It is a thick yellowish oil boiling between 242° C. and 25o°C. It condenses with acetone in the presence of caustic soda to aquinoline. Acetonyl-acetophenone, C6H 5 -CO-CH 2 -CH 2 -CO-CH 8i is produced by condensing phenacyl bromide with sodium aceto- acetate with subsequent elimination of carbon dioxide, and oh dehydration gives aa-phenyl-methyl-furfurane. Oxazoles (q.v.) are produced on condensing phenacyl bromide with acid-amides (M. Lewy, Berichte, 1887, 20, p. 2578). K. L. Paal has also ob- tained pyrrol derivatives by condensing acetophenone-aceto- acetic-ester with substances of the type NH 2 R.

ACETYLENE

r 37

ACETYLENE, klumene or ethine, a gaseous compound of carbon and hydrogen, represented by the formula C 2 H 2 . It is a colourless gas, having a density of 0-02. When properties, prepared by the action of water upon calcium carbide, it has a very strong and penetrating odour, but when it is thoroughly purified from sulphuretted and phosphuretted hydrogen, which are invariably present with it in minute traces, this extremely pungent odour disappears, and the pure gas has a not unpleasant ethereal smell. It can be condensed into the liquid state by cold or by pressure, and experiments by G. Ansdell show that if the gas be subjected to a pressure of 21-53 atmospheres at a temperature of o° C, it is converted into the liquid state, the pressure needed increasing with the rise of temperature, and decreasing with the lowering of the tempera- ture, until at —82° C. it becomes liquid under ordinary atmo- spheric pressure. The critical point of the gas is 37° C, at which temperature a pressure of 68

atmospheres is required for lique- faction. The properties of liquid and solid acetylene have been investigated by D. Mcintosh (Jour. Chem. Soc, Abs., 1907, i. 458). A great future was expected from its use in the liquid state, since a cylinder fitted with the necessary reducing valves would supply the gas to light a house for a considerable period, the liquid occupying about rfo the volume of the gas, but in the United States and on the continent of Europe, where liquefied acetylene was made on the large scale, several fatal accidents occurred owing to its explosion under not easily explained con ditions. As a result of these accidents M. P. E. Berthelot and L. J. G. Vieille made a series of valuable researches upon the explosion of acetylene under various conditions. They found that if liquid acetylene in a steel bottle be heated at one point by a platinum wire raised to a red heat, the whole mass decom- poses and gives rise to such tremendous pressures that no cylinder would be able to withstand them. These pressures varied from 71,000 to 100,000 lb. per square inch. They, moreover, tried the effect of shock upon the liquid, and found that the repeated dropping of the cylinder from a height of nearly 20 feet upon a large steel anvil gave no explosion, but that when the cylinder was crushed under a heavy blow the impact was followed, after a short interval of time, by an explosion which was manifestly due to the fracture of the cylinder and the ignition of the escap- ing gas, mixed with air, from sparks caused by the breaking of the metal. A similar explosion will frequently follow the breaking in the same way of a cylinder charged with hydrogen at a high pressure. Continuing these experiments, they found that in acetylene gas under ordinary pressures the decomposition brought about in one portion of the gas, either by heat or the firing in it of a small detonator, did not spread far beyond the point at which the decomposition started, while if the acetylene was compressed to a pressure of more than 30 lb on the square inch, the decomposition travelled throughout the mass and became in reality detonation. These results showed clearly that liquefied acetylene was far too dangerous for general introduction for domestic purposes, since, although the occasions would be rare in which the requisite temperature to bring about detonation would be reached, still, if this point were attained, the results would be of a most disastrous character. The fact that several accidents had already happened accentuated the risk, and in Great Britain the storage and use of liquefied acetylene are prohibited.

When liquefied acetylene is allowed to escape from the cylinder in which it is contained into ordinary atmospheric pressure, some of the liquid assumes the gaseous condition with such rapidity as to cool the remainder below the temperature of — oo° C, and convert it into a

solid snow-like mass.

Acetylene is readily soluble in water, which at normal tem- perature and pressure takes up a little more than its own volume of the gas, and yields a solution giving a purple-red Solubility p rec ipitate with ammoniacal cuprous chloride and acetylene. a white precipitate with silver nitrate, these precipi- tates consisting of acetylides of the metals. The solubility of the gas in various liquids, as given by different observers, is —

100 Volumes of Brine Water Alcohol Paraffin

Carbon disulphide Fusel oil Benzene Chloroform Acetic acid Acetone

Volumes of Acetylene.

absorb 5

„ no

„ 600

150

100

„ 100

» 400

400

,, 600

2500

It will be seen from this table that where it is desired to collect and keep acetylene over a liquid, brine, i.e. water saturated with salt, is the best for the purpose, but in practice it is found that, unless water is agitated with acetylene, or the gas bubbled through, the top layer soon gets saturated, and the gas then dissolves but slowly. The great solubility of acetylene in acetone was pointed out by G. Claude and A. Hess, who showed that acetone will absorb twenty-five times its own volume of acety- lene at a temperature of 15° C. under atmospheric pressure, and that, providing the temperature is kept constant, the liquid acetone will go on absorbing acetylene at the rate of twenty-five times its own volume for every atmosphere of pressure to which

the gas is subjected.

At first it seemed as if this discovery would do away with all the troubles connected with the storage of acetylene under pressure, but it was soon found that there were serious diffi- culties still to be overcome. The chief trouble was that acetone expands a small percentage of its own volume while it is absorb- ing acetylene ; therefore it is impossible to fill a cylinder with acetone and then force in acetylene, and still more impracticable only partly to fill the cylinder with acetone, as in that case the space above the liquid would be filled with acetylene under high pressure, and would have all the disadvantages of a cylinder containing compressed acetylene only. This difficulty was overcome by first filling the cylinder with porous briquettes and then soaking them with a fixed percentage of acetone, so that after allowing for the space taken up by the bricks the quantity of acetone soaked into the brick will absorb ten times the normal volume of the cylinder in acetylene for every atmo- sphere of pressure to which the gas is subjected, whilst all danger of explosion is eliminated.

This fact having been fully demonstrated, acetylene dissolved in this way was exempted from the Explosives Act, and conse- quently upon this exemption a large business has grown up in the preparation and use of dissolved acetylene for lighting motor omnibuses, motor cars, railway carriages, lighthouses, buoys, yachts, &c, for which it is particularly adapted.

Acetylene was at one time supposed to be a highly poisonous gas, the researches of A. Bistrow and O. Liebreich having apparently shown that it acts upon the blood in the same way as carbon monoxide to form a stable com- O pooertf”s pound. Very extensive experiments, however, made by Drs N. Grehant, A. L. Brociner, L. Crismer, and others, all con- clusively show that acetylene is much less toxic than carbon monoxide, and indeed than coal gas.

When acetylene was first introduced on a commercial scale grave fears were entertained as to its safety, it being repre- sented that it had the power of combining with certain metals, more especially copper and silver, to properties. form acetylides of a highly explosive character, and that even with coal gas, which contains less than 1%, such copper compounds had been known to be formed in cases where the gas-distributing mains were composed of copper, and that accidents had happened from this cause. It was there- fore predicted that the introduction of acetylene on a large scale would be followed by numerous accidents unless copper and its alloys were rigidly excluded

from contact with the gas. These fears have, however, fortunately proved to be unfounded, and ordinary gas fittings can be used with perfect safety with this gas.

Acetylene has the property of inflaming spontaneously when brought in contact with chlorine. If a few pieces of carbide be dropped into saturated chlorine water the bubbles of gas take

fire as they reach the surface, and if a jet of acetylene be passed up into a bottle of chlorine it takes fire and burns with a heavy red flame, depositing its carbon in the form of soot. If chlorine be bubbled up into a jar of acetylene standing over water, a violent explosion, attended with a flash of intense light and the deposition of carbon, at once takes place. When the gas is kept in a small glass holder exposed to direct sunlight, the sur- face of the glass soon becomes dimmed, and W. A. Bone has shown that when exposed for some time to the sun's rays it undergoes certain polymerization changes which lead to the deposition of a film of heavy hydrocarbons on the surface of the tube. It has also been observed by L. Cailletet and later by P. Villard that when allowed to stand in the presence of water at a low temperature a solid hydrate is formed. Acetylene is The poly readily decomposed by heat, polymerizing under its merization influence to form an enormous number of organic of compounds; indeed the gas, which can itself be directly

acety one. p re p arec j f rom jt s constituents, carbon and hydrogen, under the influence of the electric arc, can be made the starting- point for the construction of an enormous number of different organic compounds of a complex character. In contact with nascent hydrogen it builds up ethylene; ethylene acted upon by sulphuric acid yields ethyl sulphuric acid; this can again be decomposed in the presence of water to yield alcohol, and it has also bean proposed to manufacture sugar from this body. Picric acid can also be obtained from it by first treating acety- lene with sulphuric acid, converting the product into phenol by solution in potash and then treating the phenol with fuming nitric acid.

Acetylene is one of those bodies the formation of which is attended with the disappearance of heat, and it is for this reason Bndo- termed an " endothermic " compound, in contradis- thermic tinction to those bodies which evolve heat in their nature of formation, and which are

called ” exothermic.” Such ace y ene. en(i thermic bodies are nearly always found to show con- siderable violence in their decomposition, as the heat of formation stored up within them is then liberated as sensible heat, and it is undoubtedly this property of acetylene gas which leads to its easy detonation by either heat or a shock from an explosion of ful- minating mercury when in contact with it under pressure. The observation that acetylene can be resolved into its constituents by detonation is due to Berthelot, who started an explosive wave in it by firing a charge of o-i gram of mercury fulminate. It has since been shown, however, that unless the gas is at a pressure of more than two atmospheres this wave soon dies out, and the decomposition is only propagated a few inches from the detonator. Heated in contact with air to a temperature of 480 C, acetylene ignites and burns with a flame, the appearance of which varies with the way in which it is brought in contact with the air. With the gas in excess a heavy lurid flame emitting dense volumes of smoke results, whilst if it be driven out in a sufficiently thin sheet, it burns with a flame of intense brilliancy and almost perfect whiteness, by the light of Which colours can be judged as well as they can by daylight. Having its ignition point below that of ordinary gas, it can be ignited by any red-hot carbonaceous matter, such as the brightly glowing end of a cigar. For its complete combustion a volume of acetylene needs approximately twelve volumes of air, forming as products of combustion carbon dioxide and water vapour. When, however, the air is present in much smaller ratio the combustion is incom- plete, and carbon, carbon monoxide, carbon dioxide, hydrogen and water vapour are produced. This is well shown by taking a cylinder one-half full of acetylene and one-half of air; on apply- ing a light to the mixture a lurid flame runs down the cylinder and a cloud of soot is thrown up, the cylinder also being thickly coated with it, and often containing a ball of carbon. If now, after a few moments’ interval to allow some air to diffuse into the cylinder, a taper again be applied, an explosion takes place, due to a mixture of carbon monoxide and air. It is probable that when a flame is smoking badly, distinct traces of carbon monoxide are being produced, but when an acetylene flame burns properly the products are as harmless as those of coal

gas, and, light for light, less in amount. Mixed with air, like every other combustible gas, acetylene forms an explosive mixture. F. Clowes has shown that it has a wider range of ex- plosive proportions when mixed with air than any of the other combustible gases, the limiting percentages being as follows: —

Acetylene 3 to 82

Hydrogen 5 to 72

Carbon monoxide 13 to 75

Ethylene 4 to 22

Methane 5 to 13

The methods which can be and have been employed from time to time for the formation of acetylene in small quantities are exceedingly numerous. Before the commercial pro- duction of calcium carbide made it one of the most ˆtom- easily obtainable gases, the processes which were most duct loo. largely adopted for its preparation in laboratories were: — first, the decomposition of ethylene bromide by dropping it slowly into a boiling solution of alcoholic potash, and purifying the evolved gas from the volatile bromethylene by washing it through a second flask containing a boiling solution of alcoholic potash, or by passing it over moderately heated soda lime; and, second, the more ordinarily adopted process of passing the products of incomplete combustion from a Bunsen burner, the flame of which had struck back, through an ammoniacal solution of cuprous chloride, when the red copper acetylide was produced. This on being washed and decomposed with hydrochloric acid yielded a stream of acetylene gas. This second method of pro- duction has the great drawback that, unless proper precautions are taken to purify the gas obtained from the copper acetylide, it is always contaminated with certain chlorine derivatives of acetylene. Edmund Davy first made acetylene in 1836 from a compound produced during the manufacture of potassium from potassium tartrate and charcoal, which under certain conditions yielded a black compound decomposed by water with consider- able violence and the evolution of acetylene. This compound was afterwards fully investigated by J. J. Berzelius, who showed it to be potassium carbide. He also made the corresponding sodium compound and showed that it evolved the same gas, whilst in 1862 F. Wohler first made calcium carbide, and found that water decomposed it into lime and acetylene. It was not, however, until 1892 that the almost simultaneous discovery was made by T. L. Willson in America and H. Moissan in France that if lime and carbon be fused together at the temperature of the electric furnace, the lime is reduced to calcium, which unites with the excess of carbon present to form calcium carbide. The cheap production of this material and the easy liberation by its aid of acetylene at once gave the gas a position of com- mercial importance. In the manufacture of calcium carbide in the electric furnace, lime and anthracite of the Manutac* highest possible degree of purity are employed. A ture of good working mixture of these

materials may be taken “aichim as being 100 parts by weight of lime with 68 parts by weight of carbonaceous material. About i-8 lb of this is used up for each pound of carbide produced. The two principal processes utilized in making calcium carbide by electrical power are the ingot process and the tapping process. In the former, the anthracite and lime are ground and carefully mixed in the right proportions to suit the chemical actions involved. The arc is struck in a crucible into which the mixture is allowed to flow, partially filling it. An ingot gradually builds up from the bottom of the crucible, the carbon electrode being raised from time to time automatically or by hand to suit the diminution of resistance due to the shortening of the arc by the rising ingot. The crucible is of metal and considerably larger than the ingot, the latter being surrounded by a mass of un-reduced material which protects the crucible from the intense heat. When the ingot has been made and the crucible is full, the latter is withdrawn and another substituted. The process is not continuous, but a change of crucibles only takes two or three minutes under the best conditions, and only occurs every ten or fifteen hours. The essence of this process is that the coke and lime are only heated to the point of combination, and are not

” boiled ” after being formed. It is found that the ingot of caldum carbide formed in the furnace, although itself consisting of pure crystalline calcium carbide, is nearly always surrounded by a crust which contains a certain proportion of imperfectly converted constituents, and therefore gives a lower yield of acetylene than the carbide itself. In breaking up and sending out the carbide for commercial work, packed in air-tight drums, the crust is removed by a sand blast. A statement of the amount made per kilowatt hour may be misleading, since a certain amount of loss is of necessity entailed during this process. For instance, in practical working it has been found that a furnace return of o- 504 lb per kilowatt hour is brought down to 0-406 lb per kilowatt hour when the material has been broken up, sorted and packed in air-tight drums. In the tapping process a fixed crucible is used, lined with carbon, the electrode is nearly as big as the crucible and a much higher current density is used. The carbide is heated to complete liquefaction and tapped at short intervals. There is no unreduced material, and the process is considerably simplified, while less expensive plant is required. The run carbide, however, is never so rich as the ingot carbide, since an excess of lime is nearly always used in the mixture to act as a flux, and

this remaining in the carbide lowers its gas- yielding power. Many attempts have been made to produce the substance without electricity, but have met with no commercial success.

Calcium carbide, as formed in the electric furnace, is a beauti- ful crystalline semi-metallic solid, having a density of 2-22, and

showing a fracture which is often shot with iridescent iTcaUum colours – lt can be kept unaltered in dry air, but the carbide. smallest trace of moisture in the atmosphere leads to

the evolution of minute quantities of acetylene and gives it a distinctive odour. It is infusible at temperatures up to 2000 C, but can be fused in the electric arc. When heated to a temperature of 245 C. in a stream of chlorine gas it becomes incandescent, forming calcium chloride and liberating carbon, and it can also be made to burn in oxygen at a dull red heat, leaving behind a residue of calcium carbonate. Under the same conditions it becomes incandescent in the vapour of sulphur, yielding calcium sulphide and carbon disulphide; the vapour of phosphorus will also unite with it at a red heat. Acted upon by water it is at once decomposed, yielding acetylene and calcium hydrate. Pure crystalline calcium carbide yields 5-8 cubic feet of acetylene per pound at ordinary temperatures, but the carbide as sold commercially, being a mixture of the pure crystalline material with the crust which in the electric furnace surrounds the ingot, yields at the best 5 cubic feet of gas per pound under proper conditions of generation. The volume of gas obtained, however, depends very largely upon the form of apparatus used, and while some will give the full volume, other apparatus will only yield, with the same carbide, 3! feet. The purity of the carbide entirely depends on the purity of the material used in its manufacture, and before this fact had been fully grasped by manufacturers, and only the purest material obtainable em- ployed, it contained notable quantities of compounds which during its decomposition by water yielded a somewhat high pro- ImpurlUes. P ort i°n of impurities in the acetylene generated from

it. Although at the present time a marvellous im- provement has taken place all round in the quality of the carbide produced, the acetylene nearly always contains minute traces of hydrogen, ammonia, sulphuretted hydrogen, phos- phuretted hydrogen, silicon hydride, nitrogen and oxygen, and sometimes minute traces of carbon monoxide and dioxide. The formation of hydrogen is caused by small traces of metallic calcium occasionally found free in the carbide, and cases have been known where this was present in such quantities that the evolved gas contained nearly 20 % of hydrogen. This takes place

when in the manufacture of the carbide the material is kept too long in contact with the arc, since this overheating causes the dissociation of some of the calcium carbide and the solution of metallic calcium in the remainder. The presence of free hydrogen is nearly always accompanied by silicon hydride formed by the combination of the nascent hydrogen with the

silicon in the carbide. The. ammonia found in the acetylene is probably partly due to the presence of magnesium nitride in the carbide.

On decomposition by water, ammonia is produced by the action of steam or of nascent hydrogen on the nitride, the quantity formed depending very largely upon the temperature at which the carbide is decomposed. The formation of nitrides and cyanamides by actions of this kind and their easy conversion into ammonia is a useful method for fixing the nitrogen of the atmosphere and rendering it available for manurial purposes. Sulphuretted hydrogen, which is invariably present in com- mercial acetylene, is formed by the decomposition of aluminium sulphide. A. Mourlot has shown that aluminium sulphide, zinc sulphide and cadmium sulphide are the only sulphur compounds which can resist the heat of the electric furnace without decom- position or volatilization, and of these aluminium sulphide is the only one which is decomposed by water with the evolu- tion of sulphuretted hydrogen. In the early samples of carbide this compound used to be present in considerable quantity, but now rarely more than ˆ % is to be found. Phosphuretted hydrogen, one of the most important impurities, which has been blamed for the haze formed by the combustion of acetylene under certain conditions, is produced by the action of water upon traces of calcium phosphide found in carbide. Although at first it was no uncommon thing to find J % of phosphuretted hydrogen present in the acetylene, this has now been so reduced by the use of pure materials that the quantity is rarely above 0-15 %, and it is often not one-fifth of that amount.

In the generation of acetylene from calcium carbide and water, all that has to be done is to bring these two nenera- compounds into contact, when they mutually react tion of upon each other with the formation of lime and acety- acetylene lene, while, if there be sufficient water present, the lime *°? H combines with it to form calcium hydrate.

Calcium carbide. CaC_2 +

Water. Acetylene. $H_2 = C_2H_2$ +

Lime. CaO

Lime. Water. Calcium hydrate. $CaO + H_2 = Ca(HO)_2$

The decomposition of the carbide by water may be brought about either by bringing the water slowly into contact with an excess of carbide, or by dropping the carbide into an excess of water, and these two main operations again may be varied by innumerable ingenious devices by which the rapidity of the contact may be modified or even eventually stopped. The result is that although the forms of apparatus utilized for this purpose are all based on the one fundamental principle of bringing about the contact of the carbide with the water which is to enter into double decomposition with it, they have been multiplied in number to a very large extent by the methods employed in order to ensure control in working, and to get away from the dangers and inconveniences which are inseparable from a too rapid generation.

In attempting to classify acetylene generators some authori- ties have divided them into as many as six different classes, but this is hardly necessary, as they may be divided into two main classes — first, those in which water is brought in contact with the carbide, the carbide being in excess during the first portion of the operation; and, second, those in which the carbide is thrown into water, the amount of water present being always in excess. The first class may again be subdivided into generators in which the water rises in contact with the carbide, in which it drips upon the carbide, and in which a vessel full of carbide is lowered into water and again with- drawn as generation becomes excessive. Some of these generators are constructed to make the gas only as fast as it is consumed at the burner, with the object of saving the expense and room which would be involved by a storage- holder. Generators with devices for regulating and stopping at will the action going on are generally termed ” automatic.” Another set merely aims at developing the gas from the carbide and putting it into a storage- holder with as little loss as possible, and these are termed

Genera- tors.

” non-automatic.” The points to be attained in a good

generator are: —

1. Low temperature of generation.

2. Complete decomposition of the carbide.

3. Maximum evolution of the gas.

4. Low pressure in every part of the apparatus.

5. Ease in charging and removal of residues.

6. Removal of all air from the apparatus before generation of the gas.

When carbide is acted upon by water considerable heat is evolved; indeed, the action develops about one-twentieth of the heat evolved by the combustion of carbon. As, however, the temperature developed is a function of the time needed to complete the action, the degree of heat attained varies with every form of generator, and while the water in one form may never reach the boiling-point, the carbide in another may become red-hot and give a temperature of over 800° C. Heating in a generator is not only a source of danger, but also lessens the yield of gas and deteriorates its quality. The best forms of generator are either those in which water rises slowly in contact with the carbide, or the second main division in which the car- bide falls into excess of water.

It is clear that acetylene, if it is to be used on a large scale as a domestic illuminant, must undergo such processes of purifica- tion as will render it harmless and innocuous to' health ttoa ca " and property, and the sooner it is recognized as ab- solutely essential to purify acetylene before consuming it the sooner will the gas acquire the popularity it deserves. The only one of the impurities which offers any difficulty in removal is the phosphuretted hydrogen. There are three sub- stances which can be relied on more or less to remove this com- pound, and the gas to be purified may be passed either through acid copper salts, through bleaching powder or through chromic acid. In experiments with these various bodies it is found that they are all of them effective in also ridding the acetylene of the ammonia and sulphuretted hydrogen, provided only that the surface area presented to the gas is sufficiently large. The method of washing the gas with acid solutions of copper has been patented by A. Frank of Charlottenburg, who finds that a concentrated solution of cuprous chloride in an acid, the liquid being made into a paste with kieselgiihr, is the most effective. Where the production of acetylene is going on on a small scale this method of purification is undoubtedly the most convenient one, as the acid present absorbs the ammonia,

and the copper salt converts th» phosphuretted and sulphuretted hydrogen into phosphates and sulphides. The vessel, however, which contains this mixture has to be of earthenware, porcelain or enamelled iron on account of the free acid present; the gas must be washed after purification to remove traces of hydro- chloric acid, and care must be taken to prevent the complete neutralization of the acid by the ammonia present in the gas. The second process is one patented by Fritz Ullmann of Geneva, who utilizes chromic acid to oxidize the phosphuretted and sulphuretted hydrogen and absorb the ammonia, and this method of purification has proved the most successful in practice, the chromic acid being absorbed by kieselgiihr and the material sold under the name of “Heratol.”

The third process owes its inception to G. Lunge, who recom- mends the use of bleaching powder. Dr P. Wolff has found that when this is used on the large scale there is a risk of the ammonia present in the acetylene forming traces of chloride of nitrogen in the purifying-boxes, and as this is a compound which deton- ates with considerable local force, it occasionally gives rise to explosions in the purifying apparatus. If, however, the gas be first passed through a scrubber so as to wash out the ammonia this danger is avoided. Dr Wolff employs purifiers in which the gas is washed with water containing calcium chloride, and then passed through bleaching-powder solution or other oxidizing material.

When acetylene is burnt from a 000 union jet burner, at all ordinary, pressures a smoky flame is obtained, but on the pres- sure being increased to 4 inches a magnificent flame results, free from smoke, and developing an illuminating value of 240 candles

per s cubic feet of gas consumed. Slightly higher values have been obtained, but 240 may be taken as the average value under these conditions. When acetylene was first introduced as a commercial illuminant in England, very small union jet nipples were utilized for its consumption, but after burning for a short time these nipples began to carbonize, the flame being distorted, and then smoking occurred with the formation of a heavy deposit of soot. While these troubles were being experienced in England, attempts had been made in America to use acetylene diluted with a certain proportion of air which permitted it to be burnt in ordinary flat flame nipples; but the danger of such admixture being recognized, nipples of the same class as those used in England were employed, and the same troubles ensued. In France, single jets made of glass were first employed, and then P. Resener, H. Luchaire, G. Ragot and others made burners in which two jets of acetylene, coming from two tubes placed some little

distance apart, impinged and splayed each other out into a butterfly flame. Soon afterwards, J. S. Billwiller introduced the idea of sucking air into the flame at or just below the burner tip, and at this juncture the Naphey or Dolan burner was introduced in America, the principle em- ployed being to use two small and widely separated jets instead of the two openings of the union jet burner, and to make each a minute bunsen, the acetylene dragging in from the base of the nipple enough air to surround and protect it while burning from contact with the steatite. This class of burner forms a basis on which all the later constructions of burner have been founded, but had the drawback that if the flame was turned low, insufficient air to prevent carbonization of the burner tips was drawn in, owing to the reduced flow of gas. This fault has now been reduced by a cage of steatite round the burner tip, which draws in sufficient air to prevent deposition.

When acetylene was first introduced on a commercial scale attempts were made to utilize its great heat of combustion by using it in conjunction with oxygen in the oxy- hydrogen blowpipe. It was found, however, that when g?Z'i eae using acetylene under low pressures, the burner tip blowpipe. became so heated as to cause the decomposition of some of the gas before combustion, the jet being choked up by the carbon which deposited in a very dense form; and as the use of acetylene under pressures greater than one hundred inches of water was prohibited, no advance was made in this direction. The introduction of acetylene dissolved under pressure in acetone contained in cylinders filled with porous material drew attention again to this use of the gas, and "by using a special construction of blowpipe an oxy-acetylene flame is produced, which is far hotter than the oxy-hydrogen flame, and at the same time is so reducing in its character that it can be used for the direct autogenous welding of steel and many minor metallurgical processes.

References. — F. H. Leeds and W. A. Butterfield, Calcium Carbide and Acetylene (1903); F. Dommer, L' Acetylene et ses appli- cations (1896); V. B. Lewes, Acetylene (1900); F. Liebetanz, Calcium-carbid und Acetylen (1899); G. Pelissier, L'Udairage t V acetylene (1897) ; C. de Perrodil, Le carbure de calcium et V acetylene (1897). For a complete list of the various papers and memoirs on Acetylene, see A. Ludwig's Fiihrer durch die gesammte Calcium- carbid-und-Acetylen-Literatur, Berlin. (V. B. L.)

ACHAEA, a district on the northern coast of the Peloponnese, stretching from the mountain ranges of Erymanthus and Cyllene on the S. to a narrow strip of fertile land on the N., border- ing the Corinthian Gulf, into which the mountain Panachaicus projects.

Achaea is bounded on the W. by the territory of Elis, on the E. by that of Srcyon, which, however, was sometimes included in it. The origin of the name has given rise to much speculation; the current theory is that the Achaeans (q.v.) were driven back into this region by the Dorian invaders of the Peloponnese, Another Achaea, in the south of Thessaly, called sometimes Achaea Phthiotis, has been supposed to be the cradle of the race. In Roman times the name of the province of Achaea was given to the whole of Greece, except Thessaly, Epirus, and Acarnania. Herodotus (i. 145) mentions the twelve cities of Achaea; these met as a religious confederacy in the

temple of Poseidon Heliconius at Helice; for their later history see Achaean League. During the middle ages, after the Latin conquest of the Eastern Empire, Achaea was a Latin princi- pality, the first prince being William de Champlitte (d. 1209). It survived, with various dismemberments, until 1430, when the last prince, Centurione Zaccaria, ceded the remnant of it to his son-in-law, Theodorus II., despot of Mistra. In 1460 it was conquered, with the rest of the Morea, by the Turks. In modern times the coast of Achaea is mainly given up to the currant industry; the currants are shipped from Patras, the second town of Greece, and from Aegion (Vostitza).

ACHAEAN LEAGUE, a confederation of the ancient towns of Achaea. Standing isolated on their narrow strips of plain, these towns were always exposed to the raids of pirates issuing from the recesses of the north coast of the Corinthian Gulf. It was no doubt as a protection against such dangers that the earliest league of twelve Achaean cities arose, though we are nowhere explicitly informed of its functions other than the common worship of Zeus Amarius at Aegium and an occasional arbitra- tion between Greek belligerents. Its importance grew in the 4th century, when we find it fighting in the Theban wars (368- 362 B.C.), against Philip (338) and Antipater (330). About 288 Antigonus Gonatas dissolved the league, which had furnished a useful base for pretenders against Cassander’s regency; but by 280 four towns combined again, and before long the ten surviving cities’of Achaea had renewed their federation. Anti- gonus’ preoccupation during the Celtic invasions, Sparta’s prostration after the Chremonidean campaigns, the wealth amassed by Achaean adventurers abroad and the subsidies of Egypt, the standing foe of Macedonia, all enhanced the league’s importance. Most of all did it profit by the statesmanship of Aratus (q.v.), who initiated its

expansive policy, until in 228 it comprised Arcadia, Argolis, Corinth and Aegina.

Aratus probably also organized the new federal constitution, the character of which, owing to the scanty and somewhat perplexing nature of our evidence, we can only approximately determine. The league embraced an indefinite number of city- states which maintained their internal independence practically undiminished, and through their several magistrates, assemblies and law-courts exercised all traditional powers of self-govern- ment. Only in matters of foreign politics and war was their competence restricted.

The central government, like that of the constituent cities, was of a democratic cast. The chief legislative powers resided in a popular assembly in which every member of the league over thirty years of age could speak and vote. This body met for three days in spring and autumn at Aegium to discuss the league's policy and elect the federal magistrates. Whatever the number of its attendant burgesses, each city counted but one on a division. Extraordinary assemblies could be convoked at any time or place on special emergencies. A council of 120 unpaid delegates, selected from the local councils, served partly as a committee for preparing the assembly's programme, partly as an administrative board which received embassies, arbitrated between contending cities and exercised penal jurisdiction over offenders against the constitution. But perhaps some of these duties concerned the dicastae and gerousia, whose functions are nowhere described. The chief magistracy was the strategia (tenable every second year), which combined with an unre- stricted command in the field a large measure of civil authority. Besides being authorized to veto motions, the strategus (general) had practically the sole power of introducing measures before the assembly. The ten elective demiurgi, who presided over this body, formed a kind of cabinet, and perhaps acted as departmental chiefs. We also hear of an under-strategus, a secretary, a cavalry commander and an admiral. All these higher officers were unpaid. Philopoemen (q.v.) transferred the seat of assembly from town to town by rotation, and placed dependent communities on an equal footing with their former suzerains.

The league prescribed uniform laws, standards and coinage; it summoned contingents, imposed taxes and fined or coerced refractory members. .

The first federal wars were directed against Macedonia; in 266- 263 the league fought in the Chremonidean league, in 243-241 against Antigonus Gonatas and Aetolia, between 239 and 229 with Aetolia

against Demetrius. A greater danger arose (227-223) from the attacks of Cleomenes III. (q.v.). Owing to Aratus's irresolute generalship, the indolence of the rich burghers and the inadequate provision for levying troops and paying mercen- aries, the league lost several battles and much of its territory; but rather than compromise with the Spartan Gracchus the assembly negotiated with Antigonus Doson, who recovered the lost districts but retained Corinth for himself (223-221). Simi- larly the Achaeans could not check the incursions of Aetolian adventurers in 220-218, and when Philip V. came to the rescue he made them tributary and annexed much of the Peloponnese. Under Philopoemen the league with a reorganized army routed the Aetolians (210) and Spartans (207, 201). After their bene- volent neutrality during the Macedonian war the Roman general, T. Quinctius Flamininus, restored all their lost possessions and sanctioned the incorporation of Sparta and Messene (191), thus bringing the entire Peloponnese under Achaean control. The league even sent troops to Pergamum against Antiochus (190). The annexation of Aetolia and Zacynthus was forbidden by Rome. Moreover, Sparta and Messene always remained un- willing members. After Philopoemen's death the aristocrats initiated a strongly philo-Roman policy, declared war against King Perseus and denounced all sympathizers with Macedonia. This agitation induced the Romans to deport 1000 prominent Achaeans, and, failing proof of treason against Rome, to detain them seventeen years. These hostages, when restored in 150, swelled the ranks of the proletariate opposition, whose leaders, to cover their maladministration at home, precipitated a war by attacking Sparta in defiance of Rome. The federal troops were routed in central Greece by Q. Caecilius Metellus Mere- donicus, and again near Corinth by L. Mummius Achaicus (146). The Romans now dissolved the league (in effect, if not in name), and took measures to isolate the communities (see Polybius). Augustus instituted an Achaean synod comprising the dependent cities of Peloponnese and central Greece; this body sat at Argos and acted as guardian of Hellenic sentiment.

The chief defect of the league lay in its lack of proper provision for securing efficient armies and regular payment of imposts, and for dealing with disaffected members. Moreover, owing to difficulties of travel, the assembly and magistracies were practi- cally monopolized by the rich, who shaped the federal policy in their own interest. But their rule was mostly judicious, and when at last they lost control the ensuing mob-rule soon ruined the country. On the other hand, it is the glory of the Achaean league to have combined city autonomy with an organized central administration, and in this way to have postponed the entire destruction of Greek liberty for over a century.

Chief Sources. — Polybius (esp. bks. ii., iv., v., xxiii., xxviii.),who is followed by Livy (bks. xxxii.-xxxv., xxxviii., &c); Pausanias vii. 9-24; Strabo viii. 384; E. Freeman, Federal Government, i. (ed. 1893, London), chs. v.ix. ; M. Dubois, Les ligues Hlolienne el Acheenne (Paris, 1885); A. Holm, Greek History, iv. ; G. Hertzberg, Ge schichte Griechenlands unter den Romern, i. (Leipzig, 1866); L. Warren, Greek Federal Coinage (London, 1863); E. Hicks, Greek Historical Inscriptions (Oxford, 1892), 169, 187, 198, 201; W. Dittenberger, Sylloge Inscriptionum Graecarum (Leipzig, 1898-1901), 236, 282, 316; H. Francotte in Musee Beige (1906), pp. 4-20. See also art. Rome, History, ii. ” The Republic,” sect. B(b).

(M. O. B. C.)

ACHAEANS (‘Axatot, Lat. Achivi), one of the four chief divisions of the ancient Greek peoples, descended, according to legend, from Achaeus, son of Xuthus, son of Hellen. This Hesiodic genealogy connects the Achaeans closely with the Ionians, but historically they approach nearer to the Aeolians. Some even hold that Aeolus is only a form of Achaeus. In the Homeric poems (1000 B.C.) the Achaeans are the master race in Greece; they are represented both in Homer and in all later traditions as having come into Greece about three generations before the Trojan war (1184 B.C.), i.e. about 1300 B.C. They found the land occupied by a people known by the ancients as Pelasgians, who continued down to classical times the main

element in the population even in the states under Achaean and later under Dorian rule. In some cases it formed a serf class, e.g. the Penestae in Thessaly, the Helots in Laconia and the Gymnesii at Argos, whilst it practically composed the whole population of Arcadia and Attica, which never came under either Achaean or Dorian rule. This people had dwelt in the Aegean from the Stone Age, and, though still in the Bronze Age at the Achaean conquest, had made great advances in the useful and ornamental arts. They were of short stature, with dark hair and eyes, and generally dolichocephalic. Their chief centres were at Cnossus (Crete), in Argolis, Laconia and Attica, in each being ruled by ancient lines of kings. In Argolis Proetus built Tiryns, but later, under Perseus, Mycenae took the lead until the Achaean conquest. All the ancient dynasties traced their descent from Poseidon, who at the time of the Achaean conquest was the chief male divinity of Greece and the islands. The Pelasgians probably spoke an Indo-

European language adopted by their conquerors with slight modifications. (See further Pelasgians for a discussion of other views.)

The Achaeans, on the other hand, were tall, fair-haired and grey-eyed, and their chiefs traced their descent from Zeus, who with the Hyperborean Apollo was their chief male divinity. They first appear at Dodona, whence they crossed Pindus into Phthiotis. The leaders of the Achaean invasion were Pelops, who took possession of Elis, and Aeacus, who became master of Aegina and was said to have introduced there the worship of Zeus Panhellenius, whose cult was also set up at Olympia. They brought with them iron, which they used for their long swords and for their cutting implements; the costume of both sexes was distinct from that of the Pelasgians; they used round shields with a central boss instead of the 8-shaped or rectangular shields of the latter; they fastened their garments with brooches, anˆ burned their dead instead of burying them as did the Pelas- gians. They introduced a special style of ornament (" geo- metric ") instead of that of the Bronze Age, characterized by spirals and marine animals and plants. The Achaeans, or Hellenes, as they were later termed, were on this hypothesis one of the fair-haired tribes of upper Europe known to the ancients as Keltoi (Celts), who from time to time have pressed down over the Alps into the southern lands, successively as Achaeans, Gauls, Goths and Franks, and after the conquest of the indigenous small dark race in no long time died out under climatic conditions fatal to their physique and morale. The culture of the Homeric Achaeans corresponds to a large extent with that of the early Iron Age of the upper Danube (Hailstatt) and to the early Iron Age of upper Italy (Villanova).

See W. Ridgeway, The Early Age of Greece (1901), for a detailed discussion of the evidence; articles by Ridgeway and J. L. Myres in the Classical Review,' vol. xvi., 1902, pp. 68-93, ! 35- See also J. B. Bury's History of Greece (1902), and art. in Journal of Hellenic Studies, xv., 1895, pp. 217 foil.; G. G. A. Murray, Rise of the Greek Epic (1907), chap, ii.; Andrew Lang, Homer and his Age (1906); G. Busolt, Griech. Gesch. ed. 2, vol. i. p. 190 (1893); D. B. Monro's ed. of the Iliad (1901), pp. 484-488. (W. Ri.)

ACHAEMENES (Hakhamani), the eponymous ancestor of the royal house of Persia, the Achaemenidae, " a clan <£pijTpi? of the Pasargadae " (Herod, i. 125), the leading Persian tribe. According to Darius in the Behistun inscription and Herod, iii. 75, vii. 11, he was the father of Tei'spes, the great-grandfather of Cyrus. Cyrus himself, in his proclamation to the Babylonians after the conquest of Babylon, does not mention his name. Whether he really was a historical

personage, or merely the mythical ancestor of the family, cannot be decided. According to Aelian {Hist. anim. xii. 21), he was bred by an eagle. We learn from Cyrus's proclamation that Tei'spes and his successors had become kings of Anshan, i.e. a part of Elam (Susiana), where they ruled as vassals of the Median kings, until Cyrus the Great in 550 B.C. founded the Persian empire. After the death of Cambyses, the younger line of the Achaemenidae came to the throne with Darius, the son of Hystaspes, who was, like Cyrus, the great-grandson of Tei'spes. Cyrus, Darius and all the later kings of Persia call themselves Achaemenides (Hakhd- manishiya) . With Darius III. Codomannus the dynasty became

extinct and the Persian empire came to an end (330). The ad- jective Achaemenius is used by the Latin poets as the equivalent of “Persian” (Horace, Odes, ii. 12, 21). See Persia.

The name Achaemenes is borne by a son of Darius I., brother of Xerxes. After the first rebellion of Egypt, he became satrap of Egypt (484 B.C.) ; he commanded the Persian fleet at Salamis, and was (460 B.C.) defeated and slain by Inarus, the leader of the second rebellion of Egypt.

ACHARD, FRANZ CARL (1753-1821), Prussian chemist, was born at Berlin on the 28th of April 1753, and died at Kunern, in Silesia, on the 20th of April 182 1. He was a pioneer in turn- ing to practical account A. S. Marggraf ‘s discovery of the presence of sugar in beetroot, and by the end of the 18th century he was producing considerable quantities of beet-sugar, though by a very imperfect process, at Kunern, on an estate which was granted him about 1800 by the king of Prussia. There too he carried on a school of instruction in sugar-manufacture, which had an international reputation. For a time he was director of the physics class of the Berlin Academy of Sciences, and he published several volumes of chemical and physical resea~ches, discovering among other things a method of working platinum.

ACHARIUS, ERIK (1757-1819), Swedish botanist, was born on the 10th of October 1757, and in 1773 entered Upsala Uni- versity, where he was a pupil of Linnaeus. He graduated M.D. at Lund in 1782, and in 1801 was appointed professor of botany at Wadstena Academy. He devoted himself to the study of lichens, and all his publications were connected with that class of plants, his Lichenogrdphia Universalis (Gottingen, 1804) being the most important. He died at Wadstena on the 13th of August 1 8 1 9.

ACHATES, the companion of Aeneas in Virgil’s Aeneid. The expression

” fidus Achates ” has become proverbial for a loyal and devoted companion.

ACHELOUS (mod. Aspropotamo, ” white river “), the largest river in Greece (130 m.). It rises in Mt. Pindus, and, dividing Aetolia from Acarnania, falls into the Ionian Sea. In the lower part of its course the river winds through fertile, marshy plains. Its water is charged with fine mud, which is deposited along its banks and at its mouth, where a number of small islands (Echi- nades) have been formed. It was formerly called Thoas, from its impetuosity; and its upper portion was called by some Inachus, the name Achelous being restricted to the shorter eastern branch. Achelous is coupled with Ocean by Homer (II. xxi. 193) as chief of rivers, and the name is given to several other rivers in Greece. The name appears in cult and in mythology as that of the typical river -god; a familiar legend is that of his contest with Heracles for Deianira.

ACHENBACH, ANDREAS (1815-), German landscape painter, was born at Cassel in 1815. He began his art education in 1827 in Diisseldorf under W. Schadow and at the academy. In his early work he followed the pseudo-idealism of the German romantic school, but on removing to Munich in 1835, the stronger influence of L. Gurlitt turned his talent into new channels, and he became the founder of the German realistic school. Although his landscapes evince too much of his aim at picture-making and lack personal temperament, he is a master of technique, and is historically important as a reformer. A number of his finest works are to be found at the Berlin National Gallery, the New Pinakothek in Munich, and the galleries at Dresden, Darmstadt, Cologne, Diisseldorf, Leipzig and Hamburg.

His brother, Oswald Achenbach (1827-1905), was bom at Diisseldorf and received his art education from Andreas. His landscapes generally dwell on the rich and glowing effects of colour which drew him to the Bay of Naples and the neighbour- hood of Rome. He is represented at most of the important German galleries of modern art.

ACHENWALL, GOTTFRIED (17 19-1772), German statistician, was born at Elbing, in East Prussia, in October 17 19. He studied at Jena, Halle and Leipzig, and took a degree at the last-named university. He removed to Marburg in 1746, where for two years he read lectures on history and on the law of nature and of nations. Here, too, he commenced those inquiries

in statistics by which his name became known. In 1748 he was given a professorship at Gottingen, where he resided till his death in 1772. His chief works were connected with statistics. The Slaalsverfassung der heutigen vornehmsten europaischen Reiche appeared first in 1749, and revised editions were pub- lished in 1762 and 1768.

ACHERON, in Greek mythology, the son of Gaea or Demeter. As a punishment for supplying the Titans with water in their contest with Zeus, he was turned into a river of Hades, over which departed souls were ferried by Charon. – The name (mean- ing the river of ” woe “) was eventually used to designate the whole of the lower world (Stobaeus, Eel. Phys. i. 41, §§ 50, 54).

ACHIACHARUS, a name occurring in the book of Tobit (i. 21 f.) as that of a nephew of Tobit and an official at the court of Esarhaddon at Nineveh. There are references in Rumanian, Slavonic, Armenian, Arabic and Syriac literature to a legend, of which the hero is Ahikar (for Armenian, Arabic and Syriac, see The Story of Ahifcar, F. C. Conybeare, Rendel Harris and Agnes Lewis, Camb. 1898), and it was pointed out by George Hoffmann in 1880 that this Ahikar and the Achiacharus of Tobit are iden- tical. It has been contended that there are traces of the legend even in the New Testament, and there is a striking similarity between it and the Life of Aesop by Maximus Planudes (ch. xxiii.xxxii.). An eastern sage Acha’icarus is mentioned by Strabo. It would seem, therefore, that the legend was un doubtedly oriental in origin, though the relationship of the various versions can scarcely be recovered.

See the Jewish Encyclopaedia and the Encyclopaedia Biblica; also M. R. James in The Guardian, Feb. 2, 1898, p. 163 f.

ACHILL (“Eagle”), the largest island off Ireland, separated from the Curraun peninsula of the west coast by the narrow Achill Sound. Pop. (1901) 4929. It is included in the county Mayo, in the western parliamentary division. Its shape is triangular, and its extent is 15 m. from E. to W. and 12 from N. to S. The area is 57 sq. m. The island is mountainous, the highest points being Slieve Croaghaun (2192 ft.) in the west, and Slievemore (2204 ft.) in the north; the extreme western point is the bold and rugged promontory of Achill Head, and the north- western and south-western coasts consist of ranges of magnifi- cent cliffs, reaching a height of 800 ft. in the cliffs of Minaun, near the village of Keel on the south. The seaward slope of Croaghaun is abrupt and in parts precipitous, and its jagged flanks, together with the

serrated ridge of the Head and the view over the broken coast-line and islands of the counties Mayo and Galway, attract many visitors to the island during summer. Desolate bogs, incapable of cultivation, alternate with the mountains; and the inhabitants earn a scanty subsistence by fishing and tillage, or by seeking employment in England and Scotland during the harvesting. The Congested Districts Board, however, have made efforts to improve the condition of the people, and a branch of the Midland Great Western railway to Achill Sound, together with a swivel bridge across the sound, improved communications and make for prosperity. Dugort, the principal village, contains several hotels. Here is a Protest- ant colony, known as ” the Settlement ” and founded in 1834. There are antiquarian remains (cromlechs, stone circles and the like) at Slievemore and elsewhere.

ACHILLES (Gr. ‘AxtXXeus), one of the most famous of the legendary heroes of ancient Greece and the central figure of Homer’s Iliad. He was said to have been the son of Peleus, king of the Myrmidones of Phthia in Thessaly, by Thetis, one of the Nereids. His grandfather Aeacus was, according to the legend, the son of Zeus himself. The story of the childhood of Achilles in Homer differs from that given by later writers. Ac- cording to Homer, he was brought up by his mother at Phthia with his cousin and intimate friend Patroclus, and learned the arts of war and eloquence from Phoenix, while the Centaur Chiron taught him music and medicine. When summoned to the war against Troy, he set sail at once with his Myrmidones in fifty ships.

Post-Homeric sources add to the legend certain picturesque details which bear all the evidence of their primitive origin, and

which in some cases belong to the common stock of Indo- Ger- manic myths. According to one of these stories Thetis used to lay the infant Achilles every night under live coals, anointing him by day with ambrosia, in order to make him immortal. Peleus, having surprised her in the act, in alarm snatched the boy from the flames; whereupon Thetis fled back to the sea in anger (Apollodorus iii. 13; Apollonius Rhodius iv. 869). According to another story Thetis dipped the child in the waters, of the river Styx, by which his whole body became invulnerable, except that part of his heel by which she held him; whence the proverbial “heel of Achilles ” (Statius, Achilleis, i. 269). With this may be compared the similar story told of the northern hero Sigurd. The boy was afterwards entrusted to the care of Chiron, who, to give him the strength necessary for war, fed him with the entrails of lions and the marrow of bears and wild boars. To prevent his going to the siege of Troy, Thetis disguised him in female apparel, and hid him

among the maidens at the court of King Lycomedes in Scyros; but Odysseus, coming to the island in the disguise of a pedlar, spread his wares, including a spear and shield, before the king's daughters, among whom was Achilles. Then he caused an alarm to be sounded; whereupon the girls fled, but Achilles seized the arms, and so revealed him- self, and was easily persuaded to follow the Greeks (Hyginus, Fab. 96; Statius, Ach. i.; Apollodorus, I.e.). This story may be compared with the Celtic legend of the boyhood of Peredur or Perceval.

During the first nine years of the war as described in the Iliad, Achilles ravaged the country round Troy, and took twelve cities. In .the tenth year occurred the quarrel with Agamemnon. In order to appease the wrath of Apollo, who had visited the camp with a pestilence, Agamemnon had restored Chryseis, his prize of war, to her father, a priest of the god, but as a compensation deprived Achilles, who had openly demanded this restoration, of his favourite slave Briseis. Achilles withdrew in wrath to his tent, where he consoled himself with music and singing, and refused to take any further part in the war. During his absence the Greeks were hard pressed, and at last he so far relaxed his anger as to allow his friend Patroclus to personate him, lending him his chariot and armour. The slaying of Patroclus by the Trojan hero Hector roused Achilles from his indifference; eager to avenge his beloved comrade, he sallied forth, equipped with new armour fashioned by Hephaestus, slew Hector, and, after dragging his body round the walls of Troy, restored it to the aged King Priam at his earnest entreaty. The Iliad concludes with the funeral rites of Hector. It makes no mention of the death of Achilles, but hints at its taking place "before the Scaean gates." In the Odyssey (xxiv. 36. 72) his ashes are said to have been buried in a golden urn, together with those of Patroclus, at a place on the Hellespont, where a tomb was erected to his memory; his soul dwells in the lower world, where it is seen -by Odysseus. The contest between Ajax and Odysseus for his arms is also mentioned. The Aethiopis of Arctinus of Miletus took up the story of the Iliad. It told how AchilLes, having slain the Amazon Penthesileia and Memnon, king of the Aethiopians, who had come to the assistance of the Trojans, was himself slain by Paris (Alexander), whose arrow was guided by Apollo to his vulnerable heel (Virgil, Aen. vi. 57; Ovid, Met. xii. 600). Again, it is said that Achilles, enamoured of Polyxena, the daughter of Priam, offered to join the Trojans on condition that he received her hand in marriage. This was agreed to; Achilles went unarmed to the temple of Apollo Thymbraeus, and was slain by Paris (Dictys iv. 11). According to some, he was slain by Apollo himself (Quint. Smyrn. iii. 61; Horace, Odes, iv. 6, 3). Hyginus

(Fab. 107) makes Apollo assume the form of Paris.

Later stories say that Thetis snatched his body from the pyre and conveyed it to the island of Leuke, at the mouth of the Danube, where he ruled with Iphigeneia as his wife; or that he was carried to the Elysian fields, where his wife was Medea or Helen. He was worshipped in many places: at Leuke, where he was honoured with offerings and games; in Sparta, Elis, and especially Sigeum on the Hellespont, where his famous tumulus was erected.

Achilles is a typical Greek hero; handsome, brave, celebrated for his fleetness of foot, prone to excess of wrath and grief, at the same time he is compassionate, hospitable, full of affection for his mother and respect for the gods. In works of art he is represented, like Ares, as a young man of splendid physical pro- portions, with bristling hair like a horse's mane and a slender neck. Although the figure of the hero frequently occurs in groups — such as the work of Scopas showing his removal to the island of Leuke by Poseidon and Thetis, escorted by Nereids and Tritons, and the combat over his dead body in the Aeginetan sculptures — no isolated statue or bust can with certainty be identified with him; the statue in the Louvre (from the Villa Borghese), which was thought to have the best claim, is generally taken for Ares or possibly Alexander. There are many vase and wall paintings and bas-reliefs illustrative of incidents in his life. Various etymologies of the name have been suggested: " with- out a lip " (&, x e '^ 0$)> Achilles being regarded as a river-god, a stream which overflows its banks, or, referring to the story that, when Thetis laid him in the fire, one of his lips, which he had licked, was consumed (Tzetzes on Lycophron, 178); " restrainer of the people " («x«-^a°s) ; " healer of sorrow " (dxe-Xonos) ; "the obscure" (connected with ax Ms, "mist"); "snake- born " («x ts)i tne snake being one of the chief forms, taken by Thetis. The most generally received view makes him a god of light, especially of the sun or of the lightning.

See E. H. Meyer, Indogermanische Mythen, ii., Achilleis, 1887; F. G. Welcker, Der epische Cyclus, 1865-1882; articles in Pauly- Wissowa, Real-Encyclopadie der classischen Altertumswissenschaft, Daremberg and Saglio's Dictionnaire des Antiquites and Roscher's Lexikon der Mythologie; see also T. W. Allen in Classical Review, May 1906; A. E. Crawley, J. G. Frazer, A. Lang, Ibid., June, July 1893, on Achilles in Scyros. In the article Greek Art, fig. 12 re- presents the conflict over

the dead body of Achilles.

ACHILLES TATIUS, of Alexandria, Greek rhetorician, author of the erotic romance, the Adventures of Leucippe and Cleitophon, flourished about a.d. 450, perhaps later. Suidas, who alone calls him Statius, says that he became a Christian and eventually a bishop — like Heliodorus, whom he imitated — but there is no evidence of this. Photius, while severely criticizing his lapses into indecency, highly praises the conciseness and clearness of his style, which, however, is artificial and laboured. Many of the incidents of the romance are highly improbable, and the char- acters, except the heroine, fail to enlist sympathy. The descrip- tive passages and digressions, although tedious and introduced without adequate reasons, are the best part of the work. The large number of existing MSS. attests its popularity. (Ediiio princeps, 1601; first important critical edition by Jacobs, 182 1; later editions by Hirschig, 1856; Hercher, 1858. There are translations in many languages; in English by Anthony H[odges], 1638, and R. Smith, 1855. See also Romance.)

Suidas also ascribes to this author an Etymology, a Miscel- laneous History of Famous Men, and a treatise On the Sphere. Part of the last is extant under the title of An Introduction to the Phaenomena of Aratus. But if the writer is the prudentissimus Achilles referred to by Firmicus Maternus (about 336) in his Matheseos libri, iv. 10, 17 (ed. Kroll), he must have lived long before the author of Leucippe. The fragment was first pub- lished in 1567, then in the Uranologion of Petavius, with a Latin translation, 1630. Nothing definite is known as to the author- ship of the other works, which are lost.

ACHILLINI, ALESSANDRO (1463-1512), Italian philosopher, born on the 29th of October 1463 at Bologna, was celebrated as a lecturer both in medicine and in philosophy at Bologna and Padua, and was styled the second Aristotle. His philosophical works were printed in one volume folio, at Venice, in 1508, and reprinted with considerable additions in 1545, 1551 and 1568. He was also distinguished as an anatomist (see Anatomy), among his writings being Corporis humani Anatomia (Venice, 1516-1524), and Anatomicae Annotationes (Bologna, 1520). He died at Bologna on the 2nd of August 1512.

His brother, Giovanni Filoteo Achillini (1466-1533), was the author of 77 Viridario and other writings, verse and prose, and his grand- nephew, Claudio Achillini (15 74-1640), was a lawyer

who achieved some notoriety as a versifier of the school of the Secentisti.

ACHIMENES (perhaps from the Gr. dx<*'M £I ˆs> an Indian plant used in magic), a genus of plants, natural order Gesneraceae (to which .belong also Gloxinia and Streptocarpus), natives of tropical America, and well known in cultivation as stove or warm greenhouse plants. They are herbaceous perennials, generally with hairy serrated leaves and handsome flowers. The corolla is tubular with a spreading limb, and varies widely in colour, being white, yellow, orange, crimson, scarlet, blue or purple. A large number of hybrids exist in cultivation. The plants are grown in the stove till the flowering period, when they may be removed to the greenhouse. They are propagated by cuttings, or from the leaves, which are cut off and pricked in well- drained pots of sandy soil, or by the scales from the underground tubes, which are rubbed off and sown like seeds, or by the seeds, which are very small.

ACHIN (Dutch Atjeh), a Dutch government forming the northern extremity of the island of Sumatra, having an esti- mated area of 20,544 sq. m. The government is divided into three assistant-residencies — the east coast, the west coast and Great Achin. The physical geography (see Sumatra) is imper- fectly understood. Ranges of mountains, roughly parallel to the long axis of. the island, and characteristic of the whole of it, appear to occupy the interior, and reach an extreme height of about 1 2,000 ft. in the south-west of the government. The coasts are low and the rivers insignificant, rising in the coast ranges and flowing through the coast states (the chief of which are Pedir, Gighen and Samalanga on the N.; Edi, Perlak and Langsar on the E.; K-luwah, Rigas and Melabuh on the W.). The chief ports are Olehleh, the port of Kotaraja or Achin (formerly Kraton, now the seat of the Dutch government), Segli on the N., Edi on the E., and Analabu or Melabuh on the W. Kotaraja lies near the northern extremity of the island, and consists of detached houses of timber and thatch, clustered in enclosed groups called kampongs, and buried in a forest of fruit-trees. It is situated nearly 3 m. from the sea, in the valley of the Achin river, which in its upper part, near Seli- mun, is 3 m. broad, the river having a breadth of 99 ft. and a depth of 1 1 ft.; but in its lower course, north of its junction with the Krung Daru, the valley broadens to 125 m. The marshy soil is covered by rice-fields, and on higher ground by kampongs full of trees. The river at its mouth is 327 ft. broad and 20-33 ft- deep, but before it lies a sandbank covered at low water by a depth of only 4 ft. The Dutch garrison in Kotaraja occupies the old Achinese citadel. The town is connected by rail with Olehleh, and the line also extends up the valley. The construction of another railway has been undertaken along the east coast. The following industries are of some importance — gold-working, weapon-making, silk-weaving, the making of pottery, fishing

and coasting trade. The annual value of the exports (chiefly pepper) is about £58,000; of the imports, from £165,000 to £250,000. The population of Achin in 1898 was estimated at 535,432, of whom328 were Europeans, 3933 Chinese, 30 Arabs, and 372 other foreign Asiatics.

The Achinese, a people of Malayan stock but darker, some- what taller and not so pleasant-featured as the true Malays; regard themselves as distinct from the other Sumatrans. Their nobles claim Arab descent. They were at one time Hinduized, as is evident from their traditions, the many Sar*krit words in their language, and their general appearance, which suggests Hindu as well as Arab blood. They are Mahommedans, and although Arab influence has declined, their nobles still wear the Moslem flowing robe and turban (though the women go un- veiled), and they use Arabic script. The chief characteristic is their love of fighting; every man is a soldier and every village has its army. They are industrious and skilful agriculturists, metal-workers and weavers. They build excellent ships. Their chief amusements are gambling and opium-smoking. Their social organization is communal. They live in kampongs, which combine to form mukims, districts or hundreds (to use the nearest English term), which again combine to form sagis, of which

there are three. Achin Uterature, unlike the language, is en- tirely Malay; it includes poetry, a good deal of theology and several chronicles. Northern Sumatra was visited by several European travellers in the middle ages, such as Marco Polo, Friar Odorico and Nicolo Conti. Some of these as well as Asiatic writers mention Lambri, a state which must have nearly occupied the position of Achin. But the first voyager to visit Achin, by that name, was Alvaro Tellez, a captain of Tristan d'Acunha's fleet, in 1506. It was then a mere dependency of the adjoining state of Pedir; and the latter, with Pasei, formed the only states on the coast whose chiefs claimed the title of sultan. Yet before twenty years had passed Achin had not only gained independence, but had swallowed up all other states of northern Sumatra. It attained its climax of power in the time of Sultan Iskandar Muda (1607-1636), under whom the subject coast extended from Aru opposite Malacca round by the north to Benkulen on the west coast, a sea-board of not less than 1100 miles; and besides this, the king's supremacy was owned by the large island of Nias, and by the continental Malay states of Johor, Pahang, Kedah and Perak.

The chief attraction of Achin to traders in the 17th century must have been gold. No place in the East, unless Japan, was so abundantly supplied with gold. The great repute of Achin as a place of trade is shown by the fact that to this port the first Dutch (1599) and first English (1602) commercial ventures to the Indies were directed. Sir James Lancaster, the English commodore, carried letters from Queen Elizabeth to the king of Achin, and was well received by the prince then reigning, Alauddin Shah. Another exchange of letters took place be- tween King James I. and Iskandar Muda in 1613. But native caprice and jealousy of the growing force of the European nations in these seas, and the rivalries between those nations themselves, were destructive of sound trade; and the English factory, though several times set up, was never long maintained. The French made one great effort (1621) to establish relations with Achin, but nothing came of it. Still the foreign trade of Achin, though subject to interruptions, was important. William Dampier (c. 1688) and others speak of the number of foreign merchants settled there — English, Dutch, Danes, Portuguese, Chinese, &c. Dampier says the anchorage was rarely without ten or fifteen sail of different nations, bringing vast quantities of rice, as well as silks, chintzes, muslins and opium. Besides the Chinese merchants settled at Achin, others used to come annually with the junks, ten or twelve in number, which arrived in June. A regular fair was then established, which lasted two months, and was known as the China camp, a great resort of foreigners.

Hostilities with the Portuguese began from the time of the first independent king of Achin; and they had little remission till the power of Portugal fell with the loss of Malacca (1641). Not less than ten times before that event were armaments despatched from Achin to reduce Malacca, and more than once its garrison was hard pressed. One of these armadas, equipped by Iskandar Muda in 1615, gives an idea of the king's resources. It consisted of 500 sail, of which 250 were galleys, and among these a hundred were greater than any then used in Europe. Sixty thousand men were embarked.

On the death of Iskandar's successor in 1641, the widow was placed on the throne; and as a female reign favoured the oligarchical tendencies of the Malay chiefs, three more queens were allowed to reign successively. In 1699 the Arab or fana- tical party suppressed female government, and put a chief of Arab blood on the throne. The remaining history of Achin was one of rapid decay.

After the restoration of Java to the Netherlands in 1816, a good deal of weight was attached by the neighbouring British colonies to the maintenance of influence in Achin; and in 18 19 a treaty of friendship

was concluded with the Calcutta govern- ment which excluded other European nationalities from fixed residence in Achin. When the British government, in 1824, made a treaty with the Netherlands, surrendering the remaining British settlements in Sumatra in exchange for certain posses-

sions on the continent of Asia, no reference was made in the articles to the Indian treaty of 1819; but an understanding was exchanged that it should be modified, while no proceedings hostile to .Achin should be attempted by the Dutch.

This reservation was formally abandoned by the British government in a convention signed at the Hague on the 2nd of November 1871; and in March 1873 the government of Batavia declared war upon Achin. Doubtless there was provo- cation, for the sultan of Achin had not kept to the understanding that he was to guarantee immunity from piracy to foreign traders; but the necessity for war was greatly doubted, even in Holland. A Dutch force landed at Achin in April 1873, an d attacked the palace. It was defeated with considerable loss, including that of the general (Kohler). The approach of the south-west monsoon precluded the immediate renewal of the attempt; but hostilities were resumed, and Achin fell in January 1874. The natives, however, maintained themselves in the interior, inaccessible to the Dutch troops, and carried on a guerilla warfare. General van der Heyden appeared to have subdued them in 1878-81, but they broke out again in 1896 under the traitor Taku Umar, who had been in alliance with the Dutch. He died shortly afterwards, but the trouble was not ended. General van Hentsz carried on a successful campaign in 1898 seq., but. in 1901, the principal Achinese chiefs on the north coast having surrendered, the pretender-sultan fled to the Gajoes, a neighbouring inland people. Several expeditions involving heavy fighting were necessary against these in 1901-4, and a certain amount of success was achieved, but the pretender escaped, revolt still smouldered and hostilities were continued.

See P. J. Veth, Atchin en zijne betrekkingen tot Nederland (Leyden, 1873); J. A. Kruijt, Atjeh en de Aljehers (Leyden, 1877); Kielstra, Beschrijving van den Atjeh-oorlog (The Hague, 1885) ; Van Langen, Aljeh's Wesskust, Tijdschrift Aardrijko, Genotktsch. (Amsterdam, 1888), p. 226; Renaud, Jaarboek van het Mynwezen (1882); J. Jacobs, Het famille-en Kampongleven op Groot Atjeh (Leyden, 1894) ; C. Snouck Hurgronje, De Atjehers (Batavia, 1894).

ACHOLI, a negro people of the upper Nile valley, dwelling on the east bank of the Bahr-el-Jebel, about a hundred miles north of Albert

Nyanza. They are akin to the Shilluks of the White Nile. They frequently decorate the temples or cheeks with wavy or zigzag scars, and also the thighs with scrolls; some pierce the ears. Their dwelling-places are circular huts with a high peak, furnished with a mud sleeping-platform, jars of grain and a sunk fireplace. The interior walls are daubed with mud and decorated with geometrical or conventional designs in red, white or grey. The Acholi are good hunters, using nets and spears, and keep goats, sheep and cattle. In war they use spears and long, narrow shields of giraffe or ox hide. Their dialect is closely allied to those of the Alur, Lango and Ja-Luo tribes, all four being practically pure Nilotic. Their religion is a vague fetishism. By early explorers the Acholi were called Shuli, a name now obsolete.

ACHROMATISM (Gr. a-, privative, xP&M a > colour), in optics, the property of transmitting white light, without decomposing it into the colours of the spectrum; ” achromatic lenses ” are lenses which possess this property. (See Lens, Aberration and Photography.)

ACID (from the Lat. root ac-, sharp; acere, to be sour), the name loosely applied to any sour substance; in chemistry it has a more precise meaning, denoting a substance containing hydrogen which may be replaced by metals with the formation of salts. An acid may therefore be regarded as a salt of hydrogen. Of the general characters of acids we may here notice that they dissolve alkaline substances, certain metals, &c, neutralize alkalies and redden many blue and violet vegetable – colouring matters.

The ancients probably possessed little knowledge indeed of acids. Vinegar (or impure acetic acid), which is produced when wine is allowed to stand, was known to both the Greeks and Romans, who considered it to be. typical of acid substances; this is philologically illustrated by the words o£bs, acidus, sour, and 8£os, acetus, vinegar. Other acids became known during the alchemistic period; and the first attempt at a generalized

conception of these substances was made by Paracelsus, who supposed them to contain a principle which conferred the properties of sourness and solubility. Somewhat sirrfilar views were promoted by Becher, who named the principle acidum primogenium, and held that it was composed of the Para- celsian elements ” earth” and “water.” At about the same time Boyle investigated several acids; he established their

general reddening of litmus, their solvent power of metals and basic substances, and the production of neutral bodies, or salts, with alkalies. Theoretical conceptions were revived by Stahl, who held that acids were the fundamentals of all salts, and the erroneous idea that sulphuric acid was the principle of all acids.

The phlogistic theory of the processes of calcination and com- bustion necessitated the view that many acids, such as those produced by combustion, e.g. sulphurous, phosphoric, carbonic, &c, should be regarded as elementary substances. This prin- ciple more or less prevailed until it was overthrown by Lavoisier's doctrine that oxygen was the acid-producing element; Lavoisier being led to this conclusion by the almost general observation that acids were produced when non-metallic elements were burnt. The existence of acids not containing oxygen was, in itself, sufficient to overthrow this idea, but, although Berthollet had shown, in 1789, that sulphuretted hydrogen (or hydro- sulphuric acid) contained no oxygen, Lavoisier's theory held its own until the researches of Davy, Gay-Lussac and Thenard on hydrochloric acid and chlorine, and of Gay-Lussac on hydro- cyanic acid, established beyond all cavil that oxygen was not essential to acidic properties.

In the Lavoisierian nomenclature acids were regarded as binary oxygenated compounds, the associated water being relegated to the position of a mere solvent. Somewhat similar views were held by Berzelius, when developing his dualistic conception of the composition of substances. In later years Berzelius renounced the " oxygen acid " theory, but not before Davy, and, almost simultaneously, Dulong, had submitted that hydrogen and not oxygen was the acidifying principle. Oppo- sition to the " hydrogen-acid " theory centred mainly about the hypothetical radicals which it postulated; moreover, the electro- chemical theory of Berzelius exerted a stultifying influence on the correct views of Davy and Dulong. In Berzelius' system

$+ \quad -$

potassium sulphate is to be regarded as $K_2O.SO_3$; electrolysis should simply effect the disruption of the positive and negative components, potash passing with the current, and sulphuric acid against the current. Experiment showed, however, that instead of only potash appearing at the negative electrode, hydrogen is also liberated; this is inexplicable by Berzelius's theory, but readily explained by the " hydrogen-acid " theory. By this theory potassium is liberated at the negative electrode and combines immediately with water to form

potash and hydrogen.

Further and stronger support was given when J. Liebig promoted his doctrine of polybasic acids. Dalton's idea that elements preferentially combined in equiatomic proportions had as an immediate inference that metallic oxides contained one atom of the metal to one atom of oxygen, and a simple ex- pansion of this conception was that one atom of oxide combined with one atom of acid to form one atom of a neutral salt. This view, which was specially supported by Gay-Lussac and Leopold Gmelin and accepted by Berzelius, necessitated that all acids were monobasic. The untenability of this theory was proved by Thomas Graham's investigation of the phosphoric acids; for he then showed that the ortho- (ordinary), pyro- and meta- phosphoric acids contained respectively 3, 2 and 1 molecules of " basic water " (which were replaceable by metallic oxides) and one molecule of phosphoric oxide, P 2 O5. Graham's work was developed by Liebig, who called into service many organic acids — citric, tartaric, cyanuric, comenic and meconic— and showed that these resembled phosphoric acid; and he estab- lished as the criterion of polybasicity the existence of com- pound salts with different metallic oxides. In formulating these facts Liebig at first retained the dualistic conception of the structure of acids; but he shortly afterwards perceived that

this view lacked generality since the halogen acids, which con- tained no oxygen but yet formed salts exactly similar in pror > - erties to those containing oxygen, could not be so regarded. This and other reasons led to his rejection of the dualistic hypo- thesis and the adoption, on the ground of probability, and much more from convenience, of the tenet that " acids are parti- cular compounds of hydrogen, in which the latter can be re- placed by metals "; while, on the constitution of salts, he held that " neutral salts are those compounds of the same class in which the hydrogen is replaced by its equivalent in metal. The substances which we at present term anhydrous acids (acid oxides) only become, for the most part, capable of forming salts with metallic oxides after the addition of water, or they are compounds which decompose these oxides at somewhat high temperatures."

The hydrogen theory and the doctrine of polybasicity as enunciated by Liebig is the fundamental characteristic of the modern theory. A polybasic acid contains more than one atom of hydrogen which is replaceable by metals; moreover, in such an acid the replacement may be entire with the formation of normal salts, partial with the formation of acid salts, or by two or more different metals with the formation of compound salts (see Salts). These facts may be illustrated

with the aid of orthophosphoric. acid, which is tribasic: —

Acid. Normal salt. Acid salts.

H 3 PO„. Ag 3 P0 4 . Na 2 HP0 4 ; NaH 2 P0 4 .

Phosphoric Silver phosphate. Acid sodium

acid. phosphates.

Compound salts. Mg(NH 4)P0 4 ; Na(NH 4)HP0 4 .

Magnesium ammonium Microcosmic

phosphate ; salt.

Reference should be made to the articles Chemical Action, Thermochemistry and Solutions, for the theory of the strength or avidity of acids.

Organic Acids. — Organic acids are characterized by the presence of the monovalent group — CO-OH, termed the carboxyl group, in which the hydrogen atom is replaceable by metals with the formation of salts, and by alkyl radicals with the formation of esters. The basicity of an organic acid, as above denned, is determined by the number of carboxyl groups present Oxy-acids are carboxylic acids which also contain a hydroxyl group; similarly we may have aldehyde-acids, ketone-acids, &c Since the more important acids are treated under their own headings, or under substances closely allied to them, we shall here confine ourselves to general relations.

Classification. — It is convenient to distinguish between ali- phatic and aromatic acids; the first named being derived from open-chain hydrocarbons, the second from ringed hydrocarbon nuclei. Aliphatic monobasic acids are further divided according to the nature of the parent hydrocarbon. Methane and its homologues give origin to the ” paraffin ” or ” fatty series ” of the general formula C„H 2 ,i + iCOOH, ethylene gives origin to the acrylic acid series, C„H 2 „-iCOOH, and soon. Dibasic acids of the paraffin series of hydrocarbons have the general formula C„H 2 (C00H) 2 n ; malonic and succinic acids are important members. The isomerism which occurs as soon as the molecule contains a few carbon atoms renders any classification based on empirical molecular formulae somewhat ineffective; on the other hand, a scheme based on molecular structure would involve more detail than it is here possible to give. For further informa- tion, the reader is referred to any standard work on organic chemistry. A list of

the acids present in fats and oils is given in the article Oils.

Syntheses of Organic- Acids. — The simplest syntheses are undoubtedly those in which a carboxyl group is obtained directly from the oxides of carbon, carbon dioxide and carbon monoxide. The simplest of all include: (1) the synthesis of sodium oxalate by passing carbon dioxide over metallic sodium heated to 350°— 360 ; (2) the synthesis of potassium formate from moist carbon dioxide and potassium, potassium carbonate being obtained simultaneously; (3) the synthesis of potassium acetate and propionate from carbon dioxide and sodium methide and sodium

ethide; (4) the synthesis of aromatic acids by the interaction of carbon dioxide, sodium and a bromine substitution derivative; and (5) the synthesis of aromatic oxy-acids by the interaction of carbon dioxide and sodium phenolates (see Salicylic Acid). Carbon monoxide takes part in the syntheses of sodium formate from sodium hydrate, or soda lime (at 2oo°-22o°), and of sodium acetate and propionate from sodium methylate and sodium ethylate at i6o°-2oo°. Other reactions which introduce carb- oxyl groups into aromatic groups are: the action of carbonyl chloride on aromatic hydrocarbons in the presence of aluminium chloride, acid-chlorides being formed which are readily decom- posed by water to give the acid; the action of urea chloride Cl-CO-NH 2 , cyanuric acid (CONH)3, nascent cyanic acid, or carbanile on hydrocarbons in the presence of aluminium chloride, acid-amides being obtained which are readily decomposed to give the acid. An important nucleus-synthetic reaction is the saponification of nitriles, which may be obtained by the interac- tion of potassium cyanide with a halogen substitution derivative or a sulphonic acid.

Acids frequently result as oxidation products, being almost invariably formed in all cases of energetic oxidation. There are certain reactions, however, in which oxidation can be success- fully applied to the synthesis of acids. Thus primary alcohols and aldehydes, both of the aliphatic and aromatic series, readily yield on oxidation acids containing the same number of carbon atoms. These reactions may be shown thus: —

RCH 2 OH -> R-CHO -> R-CO-OH. In the case of aromatic aldehydes, acids are also obtained by means of ” Cannizzaro’s reaction ” (see Benzaldehyde). An important oxidation synthesis of aromatic acids is

from hydro- carbons with aliphatic side chains; thus toluene, or methyl- benzene, yields benzoic acid, the xylenes, or dimethyl-benzene, yield methyl-benzoic acids and phthalic acids. Ketones, secondary alcohols and tertiary alcohols yield a mixture of acids on oxidation. We may also notice the disruption of un- saturated acids at the double linkage into a mixture of two acids, when fused with potash.

In the preceding instances the carboxyl group has been synthesized or introduced into a molecule; we have now to consider syntheses from substances already containing carboxyl groups. Of foremost importance are the reactions termed the malonic acid and the aceto-acetic ester syntheses; these are discussed under their own headings. The electrosyntheses call for mention here. It is apparent that metallic salts of organic acids would, in aqueous solution, be ionized, the positive ion being the metal, and the negative ion the acid residue. Esters, how- ever, are not ionized. It is therefore apparent that a mixed salt and ester, for example K0 2 C-CH 2 -CH2-C0 2 C 2 H 5 , would give only two ions, viz. potassium and the rest of the molecule. If a solu- tion of potassium acetate be electrolysed the products are ethane, carbon dioxide, potash and hydrogen; in a similar manner, normal potassium succinate gives ethylene, carbon dioxide, potash and hydrogen; these reactions may be represented: — CH 3 -C0 2 |K CH 3 C0 2 K" CH 2 -C0 2 |K CH 2 C0 2 K"

CHrCOjiK CH 3 C0 2 K – CH 2 C0 2 JK CH 2 C0 2 K' By electrolysing a solution of potassium ethyl succinate, K0 2 C(CH 2) 2 C0 2 C 2 H,, the K0 2 C groups are split off and the two residues 4(C0 2 C2H 5) 2 . In the same way, by electrolysing a mix ture of a metallic salt and an ester, other nuclei may be con- densed; thus potassium acetate and potassium ethyl succinate yield CH 3 CH 2 CH 2 C02C 2 H 5 .

Reactions. — Organic acids yield metallic salts with bases, and ethereal salts or esters (g.v.), RCOOR', with alcohols. Phosphorus chlorides give acid chlorides, R-COC1, the hy- droxyl group being replaced by chlorine, and acid anhydrides, (R-CO) 2 0, a molecule of water being split off between two carboxyl groups. The ammonium salts when heated lose one molecule of water and are converted into acid-amides, RCONH 2 , which by further dehydration yield nitriles, R- CN. The calcium

salts distilled with calcium formate yield aldehydes (q.v.); distilled with soda-lime, ketones (q.v.) result.

ACIDALIUS, VALENS (1567-1595), German scholar and critic, was

born at Wittstock in Brandenburg. After studying at Rostock, Greifswald and Helmstedt, and residing about three years in Italy, he settled at Breslau, where he is said to have embraced the Roman Catholic religion. Early in 1595 he ac- cepted an invitation to Neisse, about fifty miles from Breslau, where he died of brain fever on the 25th of May, at the age of twenty-eight. His excessive application to study, and the attacks made upon him in connexion with a pamphlet of which he was reputed the author, doubtless hastened his premature end. Acidalius wrote notes on Velleius Paterculus (1590), Curtius (1594), the panegyrists, Tacitus and Plautus, published after his death.

See Leuschner, Commentatio de A. V. Vita, Moribus, et Scriptis (‘757) I F. Adam, ” Der Neisser Rektor,” in Bericht der Philomathie in Neisse (1872).

ACID-AMIDES, chemical compounds which may be considered as derived from ammonia by replacement of its hydrogen with acidyl residues, the substances produced being known as primary, secondary or tertiary amides, according to the number of hydrogen atoms replaced. Of these compounds, the primary amides of the type R-CO-NH 2 are the most important. They may be prepared by the dry distillation of the ammonium salts of the acids (A. W. Hofmann, Ber., 1882, 15, p. 977), by the partial hydrolysis of the nitriles, by the action of ammonia or ammonium carbonate on acid chlorides or anhydrides, or by heating the esters (q.v.) with ammonia. They are solid crystalline compounds (formamide excepted) which are at first soluble in water, the solubility, however, decreasing as the carbon content of the molecule increases. They are easily hydrolysed, breaking up into their components when boiled with acids or alkalies. They form compounds with hydrochloric acid when this gas is passed into their ethereal solution; these compounds, however, are very unstable, being readily decomposed by water. On the other hand, they show faintly acid properties since the hydrogen of the amido group can be replaced by metals to give such com- pounds as mercury acetamide (CH 3 CONH) 2 Hg. Nitrous acid decomposes them, with elimination of nitrogen and the formation of the corresponding acid,

RCO-NH 2 +ONOH = R-COOH+N 2 +H 2 0. When distilled with phosphoric anhydride they yield nitriles. By the action of bromine and alcoholic potash on the amides, they are converted into amines containing one carbon atom less than the original amide, a reaction which possesses great theoretical importance (A. W. Hofmann),

R-CONH 2 -> R-CONHBr -^ R-NH 2 +K 2 C0 3 +KBr+H 2 0. Formamide, H-CONH 2 , is a liquid readily soluble in water, boiling at

about 195° C. with partial decomposition. Acetamide, CH 3 -CONH 2 , is a white deliquescent crystalline solid, which melts at 82-83° C. and boils at 222° C. It is usually prepared by distilling ammonium acetate. It is readily soluble in water and alcohol, but insoluble in ether. Benzamide, CeHfCONHj, crystallizes in leaflets which melt at 130° C. It is prepared by the action of ammonium carbonate on benzoyl chloride. It yields a silver salt which with ethyl iodide forms benzimido- ethyl ether, C 6 H 5 C : (NH)-OC 2 H 5 , a behaviour which points to the silver salt as being derived from the tautomeric imido- benzoic acid, C 6 H 5 C : (NH)-OH (J. Tafel, Ber., 1890, 23, p. 104). On the preparation of the substituted amides from the corre- sponding sodamides see A. W. Titherley (Journ. Chem. Soc, 1901, 59, p. 391). The secondary and tertiary amides of the types (RCO) 2 NH and (RCO) 3 N may be prepared by heating the primary amides or the nitriles with acids or acid anhydrides to 200 C. Thiamides of the type R-CSNH 2 are known, and result by the addition of sulphuretted hydrogen to the nitriles, or by the action of phosphorus pentasulphide on the acid-amides. They readily decompose on heating, and are easily hydrolysed by alkalies; they possess a somewhat more acid character than the acid-amides.

ACINACES (from the Greek), an ancient Persian sword, short

and straight, and “worn, contrary to the Roman fashion, on the right side, or sometimes in front of the body, as shown in the bas-reliefs found at Persepolis. Among the Persian nobility it was frequently made of gold, being worn as a badge of dis- tinction. The acinaces was an object of religious worship with the Scythians and others (Herod, iv. 62).

ACIKETA (so named by C. G. Ehrenberg), a genus of suctorial Infusoria characterized by the possession of a stalk and cup- shaped sheath or theca for the body, and endogenous budding. 0. Butschli has separated off the genus Metacineta (for A. mysta cina), which reproduces by direct bud-fission.

ACINUS (Lat. for a berry), a term in botany applied to such fruits as the blackberry or raspberry, composed of small seed- like berries, and also to those berries themselves, or to grape- stones. By analogy, acinus is applied in anatomy to similar granules or glands, or lobules of a gland.

ACIREALE, a town and episcopal see of the province of Catania, Sicily; from the town of the same name it is distant 9 m. N. by E. Pop. (1901) 35,418. It has some importance as a thermal station, and the springs were used by the Romans. It takes its name from the river Acis, into which, according to the legend, Acis, the lover of Galatea, was changed after he had been slain by Polyphemus. The rocks which Polyphemus hurled at Ulysses are identified with the seven Scogli de' Ciclopi, or Faraglioni, a little to the south of Acireale.

ACIS, in Qreek mythology, the son of Pan (Faunus) and the nymph Symaethis, a beautiful shepherd of Sicily, was the lover of the Nereid Galatea. His rival the Cyclops Polyphemus sur- prised them together, and crushed him to pieces with a rock. His blood, gushing forth from beneath, was metamorphosed by Galatea into the river bearing his name (now Fiume di Jaci), which was celebrated for the coldness of its waters (Ovid, Met. xiii. 750; Silius Italicus, Punica, xiv. 221).

ACKERMAN, FRANCIS (c. 1335-1387), Flemish soldier and diplomatist, was born at Ghent, and about 1380 became promi- nent during the struggle between the burghers of that town and Louis II. (de Male), count of Flanders. He was partly respon- sible for inducing Philip van Artevelde to become first captain of the city of Ghent in 1382, and at the head of some troops scoured the surrounding country for provisions and thus saved Ghent from being starved into submission. By his diplomatic abilities he secured the assistance of the citizens of Brussels, Louvain and Liege, and, having been made admiral of the Flemish fleet, visited England and obtained a promise of help from King Richard II. After Artevelde's death in November 1382, he acted as leader of the Flemings, gained several victories and increased his fame by skilfully conducting a retreat from Damme to Ghent in August 1385. He took part in the conclu- sion of the treaty of peace between Ghent and Philip the Bold, duke of Burgundy, the successor of Count Louis, in December 1385. Trusting in Philip, and ignoring the warnings of his friends, Ackerman remained in Flanders, and was murdered at Ghent on the 22nd of July 1387, leaving a memory of chivalry and generosity.

See Jean Froissart, Chronigues, edited by S. Luce and G. Raynaud (Paris, 1869-1897); Johannes Brandon, Chronodromon , edited by K. de Lettenhove in the Chronigues relatives a I'histoire de la Belgique sous la domination des dues de Bourgogne (Brussels, 1870).

ACKERMANN, JOHANN CHRISTIAN GOTTLIEB (1756-1801), German physician, was born at Zeulenroda, in Upper Saxony, on the 1 7 th of February 1756, and died at Altdorf on the 9th of March 1801. At the

age of fifteen he became a student of medicine at Jena under E. G. Baldinger, whom he followed to Gottingen in 1773, and afterwards he studied for two years at Halle. A few years' practice at Stendal (1778-1799), where there were numerous factories, enabled him to add many valuable original observations to his translation (1780-1783) of Bernardino Ramazzini's (1633-1714) treatise on diseases of artificers. In 1786 he became professor of medicine at the university of Altdorf, in Franconia, occupying first the chair of chemistry, and then, from 1794 till bis death in 1801, that of pathology and therapeutics. He wrote Imtitutiones Historiae Medicinae (Nuremberg, 1792)

and Institutiones Therapiae Generalis (Nuremberg and Altdorf, 1784-1795), besides various handbooks and translations.

ACKERMANN, LOUISE VICTORINE CHOQUET (1813-1890), French poet, was born in Paris on the 30th of November 1813. Educated by her father in the philosophy of the Encyclopaedists, Victorine Choquet went to Berlin in 1838 to study German, and there married in 1843 Paul Ackermann, an Alsatian philologist. After little more than two years of happy married life her husband died, and Madame Ackermann went to live at Nice with a favourite sister. In 1855 she published Contes en vers, and in 1862 Contes el poisies. Very different from these simple and charming contes is the work on which Madame Ackermann's real reputation rests. She published in 1874 Poisies, premieres poisies, poisies phUosophiques, a volume of sombre and powerful verse, expressing her revolt against human suffering. The volume was enthusiastically reviewed in the Revue des deux mondes for May 1871 by E. Caro, who, though he deprecated the impiite desespirie of the verses, did full justice to their vigour and the excellence of their form. Soon after the publication of this volume Madame Ackermann removed to Paris, where she gathered round her a circle of friends, but published nothing further except a prose volume, the Pensees d'un solitaire (1883), to which she prefixed a short autobiography. She died at Nice on the 2nd of August 1890.

See also Anatole France, La vie litteraire, 4th series (1892) ; the comte d'Haussonville, Mme. Ackermann (1882); M. Citoleux, La poesie philosophique au XlXe. siecle (vol. i., Mme. Ackermann d'apres de nombreux documents inedits, Paris, 1906).

ACKERMANN, RUDOLPH (1764-1834), Anglo-German in- ventor and publisher, was born on the 20th of April 1764 at Schneeberg, in Saxony. He had been a saddler and coach- builder in different German cities, Paris and London for ten years before, in 1795, he established a

print-shop and drawing-school in the Strand. Ackermann set up a lithographic press, and applied it in 181 7 to the illustration of his Repository of Arts, Literature, Fashions,' &c. (monthly until 1828 when forty volumes had appeared). Rowlandson and other distinguished artists were regular contributors. He also introduced the fashion of the once popular English Annuals, beginning in 1825 with Forget-me-not; and he published many illustrated volumes of topography and travel, The Microcosm of London (3 vols., 1808-1811), Westminster Abbey (2 vols., 1812), The Rhine (1820), The World in Miniature (43 vols., 1821-1826), &c. Ackermann was an enterprising man ; he patented (1801) a method for rendering paper and cloth waterproof, erected a factory at Chelsea for the purpose and was one of the first to illuminate his own premises with gas. Indeed the introduction of lighting by gas owed much to him. After the battle of Leipzig Ackermann collected nearly a quarter of a million sterling for the German sufferers. He died at Finchley, near London, on the 30th of March 1834.

ACKNOWLEDGMENT (from the old acknow, a compound of on- and know, to know by the senses, which passed through the forms oknow, aknow and acknow; acknowledge is formed on analogy of "knowledge"), an admission that something has been given or done, a term used in law in various connexions. The acknowledgment of a debt, if in writing signed by the debtor or his agent, is sufficient to take it out of the Statutes of Limita- tions. The signature to a will by a testator, if not made in the presence of two witnesses, may be afterwards acknowledged in their presence. The acknowledgment by a woman married before 1882 of deeds for the conveyance of real property not her separate property, requires to be made by her before a judge of the High Court or of a county court or before a perpetual or special commissioner. Before such an acknowledgment can be received, the judge or commissioner is required to examine her apart from her husband, touching her knowledge of the deed, and to ascertain whether she freely and voluntarily consents to it. An acknowledgment to the right of the production of deeds of conveyance is an obligation on the vendor, when he retains any portion of the property to which the deeds relate, and is entitled to retain the deeds, to produce them from time to time at the request of the person to whom the acknowledgment is given,

to allow copies to be made, and to undertake for their safe custody

(Conveyancing Act 1881, s. 9). The term “acknow- ledgment ” is, in the United States, applied to the certificate of a public officer that an instrument was acknowledged before him to be the deed or act of the person who executed it.

” Acknowledgment money ” is the sum paid in some parts of England by copyhold tenants on the death of the lord of the manor.

ACLAND, CHRISTIAN HENRIETTA CAROLINE (1750-1815), usually called Lady Harriet Acland, was born on the 3rd of January 1750, the daughter of the first earl of Ilchester. In 1770 she married John Dyke Acland, who as a member of parlia- ment became a vigorous supporter of Lord North’s policy towards the American colonies, and, entering the British army in 1774, served with Burgoyne’s expedition as major in the 20th regiment of foot. Lady Harriet accompanied her husband, and, when he was wounded at Ticonderoga, nursed him in his tent at the front. In the second battle of Saratoga Major Acland was afain badly wounded and subsequently taken prisoner. Lady Harriet was determined to be with him, and underwent great hardship to accomplish her object, proving herself a courageous and devoted wife. A story has been told that being provided with a letter from General Burgoyne to the American general Gates, she went up the Hudson river in an open boat to the enemy’s lines, arriving late in the evening. The American out- posts threatened to fire into the boat if its occupants stirred, and Lady Harriet had to wait eight ” dark and cold hours,” until the sun rose, when she at last received permission to join her husband. Major Acland died in 1778, and Lady Harriet on the 21st of July 181 5.

ACLAND, SIR HENRY WENTWORTH, Bart. (1815-1900), English physician and man of learning, was born near Exeter on the 23rd of August 181 5, and was the fourth son of Sir Thomas Dyke Acland (1787-1871). Educated at Harrow and at Christ Church, Oxford, he was elected fellow of All Souls in 1840, and then studied medicine in London and Edinburgh. Returning to Oxford, he was appointed Lee’s reader in anatomy at Christ Church in 1845, an d in 1851 Radcliffe librarian and physician to the Radcliffe infirmary. Seven years later he became regius professor of medicine, a post which he retained till 1894. He was also a curator of the university galleries and of the Bodleian Library, and from 1858 to 1887 he represented his university on the General Medical Council, of which he served as president from 1874 to 1887. He was created a baronet in 1890, and ten years later, on the 16th of October 1900, he died at his house in Broad Street, Oxford. Acland took a leading part in the revival of the Oxford medical school and in introducing the study of natural science into the

university. As Lee's reader he began to form a collection of anatomical and physiological preparations on the plan of John Hunter, and the establishment of the Oxford University museum, opened in 1861, as a centre for the en- couragement of the study of science, especially in relation to medicine, was largely due to his efforts. " To Henry Acland," said his lifelong friend, John Ruskin, " physiology was an en- trusted gospel of which he was the solitary preacher to the heathen," but on the other hand his thorough classical training preserved science at Oxford from too abrupt a severance from the humanities. In conjunction with Dean Liddell, he revolu- tionized the study of art and archaeology, so that the cultivation of these subjects, for which, as Ruskin declared, no one at Oxford cared before that time, began to flourish in the university. Acland was also interested in questions of public health. He served on the royal commission on sanitary laws in England and Wales in 1869, and published a study of the outbreak of cholera at Oxford in 1854, together with various pamphlets on sanitary matters. His memoir on the topography of theTroad, with panoramic plan (1839), was among the fruits of a cruise which he made in the Mediterranean for the sake of his health.

ACHE (Gr. cikˆ 1 ?, point), the highest point attainable; first used as an English word by Ben Jonson.

ACMITE, or Aegirite, a mineral of the pyroxene (q.v.) group, which may be described as a soda -pyroxene, being essentially a

sodium and ferric metasilicate, $NaFe(Si0_3)_2$. In its crystallo- graphic characters it is close to ordinary pyroxene (augite and diopside), being monoclinic and having nearly the same angle between the prismatic cleavages. There are, however, important differences in the optical characters: the birefringence of acmite is negative, the pleochroism is strong and the extinction angle on the plane of symmetry measured to the vertical axis is small (3°~5°)- The hardness is 6-65, and the specific gravity 3'S5- Crystals are elongated in the direction of the vertical axis, and are blackish green (aegirite) or dark brown (acmite) in colour. Being isomorphous with augite, crystals intermediate in com- position between augite or diopside and aegirite are not un- common, and these are known as aegirine-augite or aegirine- diopside.

Acmite is a characteristic constituent of igneous rocks rich in soda, such as nepheline-syenites, phonolites, &c. It was first discovered as slender crystals, sometimes a foot in length, in the pegmatite veins of the granite of Rundemyr, near Kongsberg in Norway, and was named by F. Stromeyer in 1821 from the Gr. aKfiij, a point, in allusion to the

pointed terminations of the crystals. Aegirite (named from Aegir, the Scandinavian sea -god) was described in 1835 from the elaeolite-syenite of southern Norway. Although exhibiting certain varietal differ- ences, the essential-identity of acmite and aegirite has long been established, but the latter and more recent name is perhaps in more general use, especially among petrologists.

ACNE, a skin eruption produced by inflammation of the sebaceous glands and hair follicles, the essential point in the disease being the plugging of the mouths of the sebaceous follicles by a ” comedo,” familiarly known as ” blackhead.” It is now generally acknowledged that the cause of this disease is the organism known as bacillus acnes. It shows itself in the form of red pimples or papules, which may become pustular and be attended with considerable surrounding irritation of the skin. This affection is likewise most common in early adult life, and occurs on the chest and back as well as on the face, where it may, when of much extent, produce considerable disfigurement. It is apt to persist for months or even years, but usually in time disappears entirely, although slight traces may remain in the form of scars or stains upon the skin. Eruptions of this kind are sometimes produced by the continued internal use of certain drugs, such as the iodide or bromide of potassium. In treating this condition the face should first of all be held over steaming water for several minutes, and then thoroughly bathed. The blackheads should next be removed, not with the finger-nail, but with an inexpensive little instrument known as the ” comedo expressor.” When the more noticeable of the blackheads have been expressed, the face should be firmly rubbed for three or four minutes with a lather made from a special soap composed of sulphur, camphor and balsam of Peru. Any lather remaining on the face at the end of this time should be wiped off with a soft handkerchief. As this treatment might give rise to some irritation of the skin, it should be replaced every fourth night by a simple application of cold cream. Of drugs used internally sulphate of calcium, in pill, £ grain three times a day, is a very useful adjunct to the preceding. The patient should take plenty of exercise in the fresh air, a very simple but nourishing diet, and, if present, constipation and anaemia mustibe suitably treated.

Rosacea, popularly known as acne rosacea, is a more severe and troublesome disorder, a true dermatitis with no relation to the foregoing, and in most cases secondary to seborrhea of the scalp. It is characterized by great redness of the nose and cheeks, accompanied by pustular enlargements on the surface of the skin, which produce marked disfigurement. Although often seen in persons who live too freely, it is by no means con- fined to such, but may arise in connexion

with disturbances of the general health, especially of the function of digestion, and in females with menstrual disorders. It is apt to be exceed- ingly intractable to treatment, which is here too, as in the pre- ceding form, partly local and partly constitutional. Of internal remedies preparations of iodine and of arsenic are sometimes found of service.

*5°

ACOEMETI (Gr. o.koI juntos, sleepless), an order of Eastern monks who celebrated the divine service without intermission day or night. This was done by dividing the communities into choirs, which relieved each other by turn in the church. Their first monastery was established on the Euphrates, in the begin- ning of the 5th century, and soon afterwards one was founded in Constantinople. Here also, c. 460, was founded by the consular Studius the famous monastery of the Studium, which was put in the hands of the Acoemeti and became their chief house, so that they were sometimes called Studites. At Agaunum (St Maurice in the Valais) a monastery was founded by the Bur- gundian king Sigismund, in 515, in which the perpetual office was kept up; but it is doubtful whether this had any connexion with the Eastern Acoemeti.

The Constantinopolitan Acoemeti took a prominent part in the Christological controversies of the 5th and 6th centuries, at first strenuously opposing Acacius, patriarch of Constantinople, in his attempted compromise with the monophysites; but after- wards, in Justinian's reign, falling under ecclesiastical censure for Nestorian tendencies.

See the article in Dictionary of Christian Antiquities; Wetzer und Welte, Kirchenlexicon (2nd ed.) ; and Herzog-Hauck, Realencyklo- pddie (3rd ed.) ; also the general histories of the time. (E. C. B.)

ACOLYTE (Gr. o.k6\ov8os, follower), the last of the four minor orders in the Roman Church. As an office it appears to be of local origin, and is entirely unknown in the Eastern Church, with the exception of the Armenians who borrowed it from the West. Before the council of Nicaea (325) it was only to be found at Rome and Carthage. When in 2 5 1 Pope Cornelius, in a letter to Fabius of Antioch, mentions among the Roman clergy forty-two acolytes, placing them after the subdeacons and before the other minor officials (see Eusebius, Hist. Ecc. lib. v. cap. 43), he gives no hint that the office was a new one,

but speaks of them as hold- ing an already established position. Their institution has there- fore to be sought for at an earlier date than his pontificate. It is possible that the Liber Ponlificalis refers to the office under the Latin synonym, when it says of Pope Victor (186-197) that he made sequentes cleros, a term — sequens — which Pope Gaius (283-293) uses in the sense of acolyte. While the office was well known in Rome, there is nothing to prove that it was also an order through which, as to-day, every candidate to the priest- hood must pass. The contrary is a fact proved by many monu- mental inscriptions and authentic statements. Though the office is found at Carthage, and St Cyprian (2oo?-2 58) makes many references to acolytes, whom he used to carry his letters, this seems to be the only place in Africa where they were known. Tertullian, while speaking of readers and exorcists, says nothing about acolytes; neither does St Augustine. The Irish Church did not know them; and in Spain the council of Toledo (400) makes no mention either of the office or of the order. The Statuta Ecclesiae Antiqua (falsely called the Canons of the Fourth Council of Carthage in 397), a Gallican collection, originating in the province of Aries at the beginning of the 6th century, mentions the acolyte, but does not give, as in the case of the other orders, any form for the ordination. The Roman books are silent, and there is no mention of it in the collection known as the Leonine Sacramentary; while in the so-called Gelasian Mass- book, which, as we have it, is full of Gallican additions made to St Gregory's reform, there is the same silence, though in one MS. of the 10th century given by Muratori we find a form for the ordination of an acolyte. While there is frequent mention of the acolyte's office in the Ordines Romani, it is only in the Ordo VIII. (which is not earlier than the 7 th century) that we find the very simple form for admitting an acolyte to his office. At the end of the mass the cleric, clad in chasuble and stole and bearing a linen bag on one arm, comes before the pope or bishop and receives a blessing. There is no collation of power or order but a simple admission to- an office. The evidence available, there- fore, points to the fact that the acolyte was only a local office and was not a necessary step or order for every candidate. In England, though the ecclesiastical organization came from Rome and was directed by Romans, we find no trace of such

an office or order until the time of Ecgbert of York (767), the friend of Alcuin and therefore subject to Gallican influence. The Pontifical known as Ecgbert's shows that it was then in use both as an office and as an order, and Aelfric (1006) in both his pastoral epistle and canons mentions the acolyte. The conclusion, then, which seems warranted by the evidence, is that the acolyte was an office only at Rome, and,

becoming an order in the Gallican Church, found its way as such into the Roman books at some period before the fusion of the two rites under Charlemagne.

The duties of the acolyte, as given in the Roman Pontifical, are identical with those mentioned in the Statuta Ecclesiae Antiqua of Aries: ” It is the duty of acolytes to carry the candle- sticks, to light the lamps of the church, to administer wine and water for the Eucharist.” It might seem, from the number forty- two mentioned by Pope Cornelius, that at Rome the acolytes were divided among the seven ecclesiastical regions of the city; but we have no proof that, at that date, there were six acolytes attached to each region. From the ancient division of the Roman acolytes into Palatini, or those in attendance on the pope at the Lateran palace, Stationarii, or those who served at the churches where there was a ” station,” and Regionarii, or those attached directly to the regions, it would seem that the number forty-two was only the actual number then existing and not an official number. We get a glimpse of their duties from the Ordines Romani. When the pope rode in procession to the station an acolyte, on foot, preceded him, bearing the holy chrism; and at the church seven regionary acolytes with candles went before him in the procession to the altar, while two others, bearing the vessel that contained a pre-consecrated Host, presented it for his adoration. During the mass an acolyte bore the thurible {Ordo VI.) and three assisted at the washing of the hands. At the moment of communion the acolytes received in linen bags the consecrated Hosts to carry to the assisting priests. This office of bearing the sacrament is an ancient one, and is mentioned in the legend of Tarcisius, the Roman acolyte, who was martyred on the Appian Way while carrying the Hosts from the cata- combs. The official dress of the acolyte, according to Ordo V., was a close-fitting linen garment (camisia) girt about him, a napkin hanging from the left side, a white tunic, a stole (orarium) and a chasuble (planeta) which he took off when he sang on the steps of the ambone.

At the present day, despite the earnest wish of the council of Trent (Sess. xxiii. cap. 17 d.r.), the acolyte, while remaining an order, has ceased to be essentially a clerical office, since the duties are now performed, almost everywhere, by laymen. The office has been revived, though unofficially, in the Church of England, as a result of the Tractarian movement.

See Morin, Commentarius in sacris Ecclesiae ordinationibus (Antwerp, 1685), ii. p. 209, iii. p. 152; Martene, De Antiquis Ec- clesiae ritibus (Antwerp, 1739), ii. pp. 47 and 86; Mabillon, Musaeum Italicum II. for the Ordines Romani; Muratori, Liturgia Romana Vetus; Cabrol,

Dictionnaire d'archeologie chretienne et de litureie, vol. i. col. 348-536. (E. Tn.)

ACOMINATUS (Akominatos), MICHAEL (c. 1 140-1220), Byzantine writer and ecclesiastic, was born at Chonae (the ancient Colossae). At an early age he studied at Constantinople, and about 1 175 was appointed archbishop of Athens. After the capture of Constantinople by the Franks and the establishment of the Latin empire (1204), he retired to the island of Ceos, where he died. He was a versatile writer, and composed homilies, speeches and poems, which, with his correspondence, throw considerable light upon the miserable condition of Attica and Athens at the time. His memorial to Alexis III. Angelus on the abuses of Byzantine administration, the poetical lament over the degeneracy of Athens and the monodes on his brother Nicetas and Eustathius, archbishop of Thessalonica, deserve special mention.

Edition of his works by S. Lambros (1879-1880) ; Migne, Patrologia Graeca, cxl.; see also A. Ellissen, Michael Akominatos (1846), containing several pieces with German translation ; F. Gregorovius, Geschichte der Stadt Alhen im Mittelalter, i. (1889); G. Finlay, History of Greece, iv. pp. 133-134 (1877).

His younger brother Nicetas (Niketas), sometimes called Choniates, who accompanied him to Constantinople, took up

politics as a career. He held several appointments under the Angelus emperors (amongst them that of " great logothete " or chancellor) and was governor of the " theme " of Philippopolis at a critical period. After the fall of Constantinople he fled to Nicaea, where he settled at the court of the emperor Theodoras Lascaris, and devoted himself to literature. He died between 1 2 10 and 1220. His chief work is his History, in 21 books, of the period from 1180 to 1206. In spite of its florid and bombastic style, it is of considerable value as a record (on the whole im- partial) of events of which he was either an eye-witness or had heard at first hand. Its most interesting portion is the description of the capture of Constantinople, which should be read with Villehardouin's and Paolo Rannusio's works on the same subject. The little treatise On the Statues destroyed by the Latins (perhaps, as we have it, altered by a later writer) is of special interest to the archaeologist. His dogmatic work(9?j(7aL'p6s 'Op0o5ofias, Thesaurus

Orthodoxae Fidei), although it is extant in a complete form in MS., has only been published in part. It is one of the chief authorities for the heresies and heretical writers of the 1 2th century.

Editions: History, editio princeps, H. Wolf (1557); and in the Bonn Corpus Scriptorum Hist. Byz., 1st ed.,Bekker (1835) ; Rhetorical Pieces in C. Sathas, Mee-aiuvUri Bi/9\io077kt), i. (1872); Thesaurus in Migne, Patrologia Graeca, cxxxix., cxl. ; see also C. A. Sainte-Beuve, ” Geoffroy de Villehardouin ” in Causeries du Lundi, ix. ; S. Reinach, ” La fin de l’empire grec ” in Esquisses Archeologiques (1888); C. Neumann, Griechische Geschichtsschreiber im 12. Jahrhundert (1888); Gibbon, Decline and Fall, ch. Ix. ; and (for both Michael and Nicetas) C. Krumbacher, Geschichle der byzantinischen Litteratur (1897).

ACONCAGUA, a small northern province of central Chile, bounded N. by Coquimbo, E. by Argentina, S. by Santiago and Valparaiso and W. by the Pacific. Its area is officially com- puted at 5487 sq. m. Pop. (1895) 113,165; (1902, official esti- mate based on civil registry returns) 131,255. The province is very mountainous, and is traversed from east to west by the broad valley of the Aconcagua river. The climate is hot and dry, the rainfall being too small to influence climatic conditions. The valleys are highly fertile, and where irrigation is employed large crops are easily raised. Beyond the limits of irrigation the country is semi-barren. Alfalfa and grapes are the principal products, and considerable attention is given to the cultivation of other fruits, such as figs, peaches and melons. The ” Vale of Quillota,” through which the railway passes between Valparaiso and Santiago, is celebrated for its gardens. The Aconcagua river rises on the southern slope of the volcano Aconcagua, flows eastward through a broad valley, or bay in the mountains, and enters the Pacific 12 m. north of Valparaiso. The river has a course of about 200 m., and its watsrs irrigate the best and most populous part of the province. Two other rivers — the Ligua and Choapa — traverse the province, the latter forming the northern boundary line. The capital is San Felipe, on the Aconcagua river; it had a population of 11,313 in 1895, and an estimated population of 11,660 in 1902. The other chief town is Santa Rosa de los Andes (est. pop. 6854), which is a principal station on the Transandine branch of the state railway. The only port in the province is Los Vilos, in lat. 32 S., from which a railway 40 m. long runs north-east to the valley of the Choapa. Another short line connects Cabildo, in the valley of the Ligua, with the state railway.

ACONCIO, GIACOMO (1492-1566?), pioneer of religious tolera- tion, was born at Trent, it is said, on the 7th of September 1492. He was

one of the Italians like Peter Martyr and Bernar- dino Ochino who repudiated papal doctrine and ultimately found refuge in England. Like them, his revolt against Romanism took an extremer form than Luthcranism, and after a temporary residence in Switzerland and at Strassburg, he arrived in England soon after Elizabeth's accession. He had studied law and theology, but his profession was that of an engineer, and in this capacity he found employment with the English government. He was granted an annuity of £60 on the 27th of February 1560, and letters of naturalization on the 8th of October 1561 (Cal. Slate Papers, Dom. Ser., Addenda, 1547-1566, p. 495), and was for some time occupied with draining Plumstead marshes, for which

object various acts of parliament were passed at this time {Lords" Journals, vol. i., and Commons' Journals, vol. L, passim). In 1 564 he was sent to report on the fortifications of Berwick {Cal. St. Pap. For. Ser. 1 564-1 565, passim; Acts P.C., 1 558-1 570, p. 146); his report is now in the Record Office {C.S.P. For., 1564-1565,ˆ.512).

But his real importance depends upon his contribution to the history of religious toleration. Before reaching England he had published a treatise on the methods of investigation, De Methodo, hoc est, de recte investigandarum tradendarumque Scientiarum ratione (Basel, 1558, 8vo); and his critical spirit placed him outside all the recognized religious societies of his time. On his arrival in London he had joined the Dutch Reformed Church in Austin Friars, but he was " infected with Anabaptistical and Arian opinions " and was excluded from the sacrament by Grindal, bishop of London. The real nature of his heterodoxy is revealed in his Stratagemata Satanae, published in 1565 and translated into various languages. The " stratagems of Satan " are the dogmatic creeds which rent the Christian church. Aconcio sought to find the common denominator of the various creeds; this was essential doctrine, the rest was immaterial. To arrive at this common basis, he had to reduce dogma to a low level, and his result was generally repudiated. Even Selden applied to Aconcio the remark ubi bene, nil melius; ubi male, nemo pejus. The dedication of such a work to Queen Elizabeth illus- trates the tolerance or religious laxity during the early years of her reign. Aconcio found another patron in the earl of Leicester, and died about 1566.

Authorities. — Gough's Index to Parker Soc. Publ. ; Strype's Grindal, pp. 62, 66; Bayle's Dictionnaire ; G. Tiraboschi, Storia delta le.tt. italiana (Florence, 1805-1813); Osterreichisch.es Biogr. Lexikon; Nouvelle biogr. generate; Diet. Nat. Biogr. (A. F. P.)

ACONITE {Aconitum) , a genus of plants belonging to the • natural order Ranunculaceae, the buttercup family, commonly known as aconite, monkshood or wolfsbane, and embracing about 60 species, chiefly natives of the mountainous parts of the northern hemisphere. They are distinguished by having one of the five blue or yellow coloured sepals (the posterior one) in the form of a helmet; hence the English name monkshood. Two of the petals placed under the hood of the calyx are sup- ported on long stalks, and have a hollow spur at their apex, containing honey. They are handsome plants, the tall stem being crowned by racemes of showy flowers. Aconitum Napellus, common monkshood, is a doubtful native of Britain, and is of therapeutic and toxicological importance. Its roots have occa- sionally been mistaken for horse-radish. The aconite has a short underground stem, from which dark-coloured tapering roots descend. The crown or upper portion of the root gives rise to new plants. When put to the lip, the juice of the aconite root produces a feeling of numbness and tingling. The horse-radish root, which belongs to the natural order Cruciferae, is much longer than that of the aconite, and it is not tapering; its colour is yellowish, and the top of the root has the remains of the leaves on it.

Many species of aconite are cultivated in gardens, some having blue and others yellow flowers. A conitum lycoctonum, wolfsbane, is a yellow-flowered species common on the Alps of Switzerland. The roots of Aconitum ferox supply the famous Indian (Nepal) poison called bikh, bish or nabee. It contains considerable quantities of the alkaloid pseudaconitine, which is the most deadly poison known. Aconitum palmatum yields another of the celebrated bikh poisons. The root of Aconitum luridum, of the Himalayas, is said to be as virulent as that of A. ferox or A . Napellus. As garden plants the aconites are very ornamental, hardy perennials. They thrive well in any ordinary garden soil, and will grow beneath the shade of trees. They are easily propa- gated by divisions of the root or by seeds; great care should be taken not to leave pieces of the root about owing to its very poisonous character.

Chemistry.- — The active principle of Aconitum Napellus is the alkaloid aconitine, first examined by P. L. Geiger and Hesse {Ann., 1834, 7, p. 267). Alder Wright and A. P. Luff obtained

apoaconitine, aconine and benzoic acid by hydrolysis; while, in 1892,

C. Ehrenberg and A. Purftirst {Journ. Prat. Chem., 1892, 45 , p. 604) observed acetic acid as a hydrolytic product. This, and allied alkaloids, have formed the subject of many investigations by Wyndham Dunstan and his pupils in England, and by Martin Freund and Paul Beck in Berlin. But their constitution is not yet solved, there even being some divergence of opinion as to their empirical formulae. Aconitine (C33H45NO13, according to Dunstan; C34H47NO11, according to Freund) is a crystalline base, soluble in alcohol, but very sparingly in water; its alco- holic solution is dextrorotatory, but its salts are laevorotatory. When heated it loses water and forms pyraconitine. Hydrolysis gives acetic acid and benzaconine, the chief constituent of the alkaloids picraconitine and napelline; further hydrolysis gives aconine. Pseudaconitine, obtained from AconUum ferox, gives on hydrolysis acetic acid and veratrylpseudaconine, the latter of which suffers further hydrolysis to veratric acid and pseud-aconine. Japaconitine, obtained from the Japanese aconites, known locally as ” kuza-uzu,” hydrolyses to japbenzaconine, which further breaks down to benzoic acid and japaconine. Other related alkaloids are lycaconitine and myoctonine which occur in wolfsbane, Aconitum lycoctonum. The usual test for solutions of aconitine consists in slight acidulation with acetic acid and addition of potassium permanganate, which causes the formation of a red crystalline precipitate. In 1905, Dunstan and his collaborators discovered two new aconite alkaloids, indaconi- tine in ” mohri ” {Aconitum chasmanthum, Stapf), and bikh-aconitine in ” bikh ” {Aconitum spicatum); he also proposes to classify these alkaloids according to whether they yield benzoic or veratric acid on hydrolysis {Jour. Chem. Soc, 1905, 87, pp.

1620, 1650).

‘From the root of Aconitum Napellus are prepared a liniment and a tincture. The dose of the latter (Brit. Pharmacop.) is of importance as being exceptionally small, for it is not advisable to give more than at most five drops at a time. The official preparation is an ointment which contains one part of the alka- loid in fifty. It must be used with extreme care, and in small quantities, and it must not be used at all where cuts or cracks are present in the skin.

Pharmacology of Aconite and Aconitine. — Aconite first stimu- lates and later paralyses the nerves of pain, touch and tempera- ture, if applied to the skin, broken or unbroken, or to a mucous membrane; the initial tingling therefore gives place to a long- continued anaesthetic action. Taken internally aconite acts very notably on the circulation, the respiration and the nervous system. The pulse is slowed, the number of beats per minute being actually reduced, under

considerable doses, to forty, or even thirty, per minute. The blood-pressure synchronously falls, and the heart is arrested in diastole. Immediately before arrest the heart may beat much faster than normally, though with extreme irregularity, and in the lower animals the auricles may be observed occasionally to miss a beat, as in poisoning by veratrine and colchicum. The action of aconitine on the circu- lation is due to an initial stimulation of the cardio-inhibitory centre in the medulla oblongata (at the root of the vagus nerves), and later to a directly toxic influence on the nerve-ganglia and muscular fibres of the heart itself. The fall in blood-pressure is not due to any direct influence on the vessels. The respiration becomes slower owing to a paralytic action on the respiratory centre and, in warm-blooded animals, death is due to this action, the respiration being arrested before the action of the heart. Aconite further depresses the activity of all nerve-terminals, the sensory being affected before the motor. In small doses it therefore tends to relieve pain, if this be present. The activity of the spinal cord is similarly depressed. The pupil is at first contracted, and afterwards dilated. The cerebrum is totally unaffected by aconite, consciousness and the intelligence re- maining normal to the last. The antipyretic action which con- siderable doses of aconite display is not specific, but is the result of its influence on the circulation and respiration and of its slight diaphoretic action.

Therapeutics. — The indications for its employment are limited,

but definite. It is of undoubted value as a local anodyne in sciatica and neuralgia, especially in ordinary facial or trigeminal neuralgia. The best method of application is by rubbing in a small quantity of the aconitine ointment until numbness is felt, but the costliness of this preparation causes the use of the aconite liniment to be commonly resorted to. This should be painted on the affected part with a camel's hair brush dipped in chloroform, which facilitates the absorption of the alkaloid. Aconite is indicated for internal administration whenever it is desirable to depress the action of the heart in the course of a fever. Formerly used in every fever, and even in the septic states that constantly followed surgical operations in the pre-Listerian epoch, aconite is now employed only in the earliest stage of the less serious fevers, such as acute tonsilitis, bronchitis and, notably, laryngitis. The extreme pain and rapid swelling of the vocal cords — with threatened obstruction to the respiration — that characterize acute laryngitis may often be relieved by the sedative action of this drug upon the circulation. In order to reduce the pulse to its normal rate in these cases, without at the same time lessening the power of the heart, the drug must be given in doses of about two minims of the tincture every half- hour and then every hour until the pulse falls to the normal rate.

Thereafter the drug must be discontinued. It is probably never right to give aconite in doses much larger than that named. There is one condition of the heart itself in which aconite is sometimes useful. Whilst absolutely contra-indicated in all cases of valvular disease, it is of value in cases of cardiac hyper- trophy with over-action. But the practitioner must be assured that neither valvular lesion nor degeneration of the myocardium is present.

Toxicology. — In a few minutes after the introduction of a poisonous dose of aconite, marked symptoms supervene. The initial signs of poisoning are referable to the alimentary canal. There is a sensation of burning, tingling and numbness in the mouth, and of burning in the abdomen. Death usually super- venes before a numbing effect on the intestine can be observed. After about an hour there is severe vomiting. Much motor weakness and cutaneous sensations similar to those above de- scribed soon follow. The pulse and respiration steadily fail, death occurring from asphyxia. As in strychnine poisoning, the patient is conscious and clear-minded to the last. The only post-mortem signs are those of asphyxia. The treatment is to empty the stomach by tube or by a non-depressant emetic. The physiological antidotes are atropine and digitalin or strophanthin, which should be injected subcutaneously in maximal doses. Alcohol, strychnine and warmth must also be employed.

ACONTIUS (Gr. Akontios), in Greek legend, a beautiful youth of the island of Ceos, the hero of a love-story told byCallimachus in a poem now lost, which forms the subject of two of Ovid's Heroides (xx., xxi.). During the festival of Artemis at Delos, Acontius saw Cydippe, a well-born Athenian maiden of whom he was enamoured, sitting in the temple of the goddess. He wrote on an apple the words, " I swear by the sacred shrine of the goddess that I will marry you," and threw it at her feet. She picked it up, and mechanically read the words aloud, which amounted to a solemn undertaking to carry them out. Unaware of this, she treated Acontius with contempt; but, although she was betrothed more than once, she always fell ill before the wed- ding took place. The Delphic oracle at last declared the cause of her illnesses to be the wrath of the offended goddess; where- upon her father consented to her marriage with Acontius (Aris- taenetus, Epistolae, i. 10; Antoninus Liberalis, Metamorphoses, i., tells the story with different names).

ACORN, the fruit of the oak-tree; a word also used, by analogy with the shape, in nautical language, for a piece of wood keeping the vane on the mast-head. The etymology of the word (earlier akerne, and acharn) is well discussed in the New English Dictionary. It is derived

from a word (Goth, akran) which meant ” fruit,” originally ” of the unenclosed land,” and so of the most important forest produce, the oak. Chaucer speaks of ” achornes of okes.” By degrees, popular etymology connected

the word both with ” corn ” and ” oak-horn,” and the spelling changed accordingly.

ACORUS CALAMUS, sweet-sedge or sweet-flag, a plant of the natural order Araceae, which shares with the Cuckoo Pint (Arum) the representation in Britain of that order of Monocotyledons. The name is derived from acorus, Gr. ckopos, the classical name for the plant. It was the Calamus aromaticus of the medieval druggists and perhaps of the ancients, though the latter has been referred by some to the Citron grass, Andropogon Nardus. The spice ” Calamus ” or ” Sweet-cane ” of the Scrip- tures, one of the ingredients of the holy anointing oil of the Jews, was perhaps one of the fragrant species of A ndropogon. The plant is a herbaceous perennial with a long, branched root-stock creeping through the mud, about f inch thick, with short joints and large brownish leaf-scars. At the ends of the branches are tufts of flat, sword-like, sweet-scented leaves 3 or 4 ft. long and about an inch wide, closely arranged in two rows as in the true Flag (Iris); the tall, flowering stems (scapes), which very much resemble the leaves, bear an apparently lateral, blunt, tapering spike of densely packed, very small flowers. A long leaf (spathe) borne immediately below the spike forms an appar- ent continuation of the scape, though really a lateral outgrowth from it, the spike of flowers being terminal. The plant has a wide distribution, growing in wet situations in the Himalayas, North America, Siberia and various parts of Europe, including Eng- land, and has been naturalized in Scotland and Ireland. Though regarded as a native in most counties of England at the present day, where it is now found thoroughly wild on sides of ditches, ponds and rivers, and very abundantly in some districts, it is probably not indigenous. It seems to have been spread in western and central Europe from about the end of the 16th century by means of botanic gardens. The botanist Clusius (Charles de l’Escluse or Lecluse, 1526-1609) first cultivated it at Vienna from a root received from Asia Minor in 15 74, and distributed it to other botanists in central and western Europe, and it was probably introduced into England about 1596 by the herbalist Gerard. It is very readily propagated by means of its branch- ing root-stock. It has an agreeable odour, and has been used medicinally. The starchy

matter contained in its rhizome is associated with a fragrant oil, and it is used as hair-powder. Sir J. E. Smith (Eng. Flora, ii. 158, 2nd ed., 1828) mentions it as a popular remedy in Norfolk for ague. In India it is used as an insectifuge, and is administered in infantile diarrhoea. It is an ingredient in pot-pourri, is employed for flavouring beer and is chewed to clear the voice; and its volatile oil is employed by makers of snuff and aromatic vinegar. The rhizome of Acorus Calamus is sometimes adulterated with that of Iris Pseudacorus, which, however, is distinguishable by its lack of odour, a stringent taste and dark colour.

ACOSTA, JOSfi DE (iS39?i6oo), Spanish author, was born at Medina del Campo about the year 1539. He joined the Jesuits in 1551, and in 1571 was sent as a missionary to Peru; he acted as provincial of his order from 1576 to 1581, was appointed theological adviser to the council of Lima in 1582, and in 1583 published a catechism in Quichua and Aymara — the first book printed in Peru. Returning to Spain in 1587, and placing him self at the head of the opposition to Acquaviva, Acosta was im- prisoned in 1 592-1 593; on his submission in 1594 he became superior of the Jesuits at Valladolid, and in 1598 rector of the Jesuit college at Salamanca, where he died on the 15th of Feb- ruary 1600. His treatise De natura novi orbis libri duo (Sala- manca, 1 588-1 589) may be regarded as the preliminary draft of his celebrated Historia natural y moral de las Indias (Seville, 1500) which was speedily translated into Italian (1596), French (1597), Dutch (1598), German (1601), Latin (1602) and English (1604). The Historia is in three sections: books I. and II. deal with generalities; books III. and IV. with the physical geography and natural history of Mexico and Peru; books V., VI. and VII. with the religious and political institutions of the aborigines. Apart from his sophistical defence of Spanish colonial policy, Acosta deserves high praise as an acute and diligent observer whose numerous new and valuable data are set forth in a vivid

style. Among his other publications are De procttranda salute Indorum libri sex (Salamanca, 1588), De Christo revelato libri novem (Rome, 1590), De temporibus novissimis libri quatuor (Rome, 1590), and three volumes of sermons issued respectively in 1596, 1597 and 1599.

Authorities. — Tos6 R. Carricido, El P. Jose de Acosta y su imporlancia en la literatura cientifica espaMola (Madrid, 1899); C. Sommervogel, Bibliotheque de la Compagnie de Jesus, PremOre Partie (Brussels and Paris, 1890), vol. i., col. 31-42; and Edward Grimston's translation of the Historia reprinted (1880) for the Hakluyt Society with introduction and notes by Sir Clements R. Markham. (J. F.-K.)

ACOSTA, URIEL (d. 1647), a Portuguese Jew of noble family, was born at Oporto towards the close of the 16th century. His father being a convert to Christianity, Uriel was brought up in the Roman Catholic faith, and strictly observed the rites of the church till the course of his inquiries led him, after much painful doubt, to abandon the religion of his youth for Judaism. Passing over to Amsterdam, he was received into the synagogue, having his name changed from Gabriel to Uriel. His wayward dis- position found, however, no satisfaction in the Jewish fold. He came into conflict with the authorities of the synagogue and was excommunicated. Unlike Spinoza (who was about fifteen at the time of Acosta 's death), Acosta was not strong enough to stand alone. Wearied by his melancholy isolation, he was driven to seek a return to the Jewish communion. Having re- canted his heresies, he was readmitted after an excommunication of fifteen years, but was soon excommunicated a second time. After seven years of exclusion, he once more sought admission, and, on passing through a humiliating penance, was again received. His vacillating autobiography, Exemplar Humanae Vitae, was published with a "refutation" by Limborch in 1687, and republished in 1847. In this brief work Acosta declares his opposition both to Christianity and Judaism, though he speaks with the more bitterness of the latter religion. The only authority which he admits is the lex naturae. Acosta was not an original thinker, but he stands in the direct line of the rational' Deists. His history forms the subject of a tale and of a tragedy by Gutzkow. Acosta committed suicide in 1647. The significance of his career has been much exaggerated.

ACOTYLEDONES, the name given by Antoine Laurent de Jussieu in 1789 to the lowest class in his Natural System of Botany, embracing flowerless plants, such as ferns, lycopods, horse-tails, mosses, liverworts, sea-weeds, lichens and fungi. The name is derived from the absence of a seed-leaf or cotyledon. Flowering plants bear a seed containing an embryo, with usually one or two cotyledons, or seed-leaves; while in flowerless plants there is no seed and therefore no true cotyledon. The term is synonymous with Cryptogams, by which it was replaced in later systems of classification.

ACOUSTICS (from the Gr. anobeiv to hear), a title frequently given to the science of sound, that is, to the description and theory of the phenomena which give rise to the sensation of sound (q.v.). The term " acoustics " might, however, with advantage be reserved for the aspect of the subject more im- mediately connected with hearing. Thus we may speak appro- priately of the acoustic quality of a room or hall, describing it as good or bad acoustically, according as speaking is heard in it easily or with difficulty. When a room has bad

acoustic quality we can almost always assign the fault to large smooth surfaces on the walls, floor or ceiling, which reflect or echo the voice of the speaker so that the direct waves sent out by him at any instant are received by a hearer with the waves sent out previ- ously and reflected at these smooth surfaces. The syllables overlap, and the hearing is confused. The acoustic quality of a room may be improved by breaking up the smooth surfaces by curtains or by arrangement of furniture. The echo is then broken up into small waves, none of which may be sufficiently distinct to interfere with the direct voice. Sometimes a sound- ing-board over the head of a speaker improves the hearing probably by preventing echo from a smooth wall behind him. A large bare floor is undoubtedly bad for acoustics, for when a room is filled by an audience the hearing is much improved.

Wires are frequently stretched across a room overhead, probably with the idea that they will prevent the voice from reaching the roof and being reflected there, but there is no reason to suppose that they are efficient. The only cure appears to consist in breaking up the reflecting surfaces so that the reflexion shall be much less regular and distinct. Probably drapery assists by absorbing the sound to some extent, and thus it lessens the echo besides breaking it up. (J. H. P.)

ACQUI, a city and episcopal see of Piedmont, Italy, in the province of Alessandria; from the town of that name it is 21 m. S.S.W. by rail. Pop. (1901) 13,786. Its warm sulphur springs are still resorted to; under the name of Aquae Statiellae tlrey were famous in Roman times, and Paulus Diaconus and Liut- prand speak of the ancient bath establishment. In the neigh- bourhood of the town are remains of the aqueduct which sup- plied it. The place was connected by road with Alba Pompeia and Augusta Taurinorum. The tribe of the Statielli, to whom the district belonged, had joined the Romans at an early period, but was attacked in 173 and in part transferred to the north of the Po. The town possesses a fine Gothic cathedral.

ACR£, or Aquiry, a river of Brazil and principal tributary of the Purus, rising on the Bolivian frontier and flowing easterly and northerly to a junction with the Purus at 8° 45′ S. lat. The name is also applied to a district situated on the same river and on theˆformer (1867) boundary line between Bolivia and Brazil. The region, which abounds in valuable rubber forests, was settled by Bolivians between 1870 and 1878, but was in- vaded by Brazilian rubber collectors during the next

decade and became tributary to the rubber markets of Manaos and Para. In 1899 the Bolivian government established a custom-house at Puerto Alonso, on the Acre river, for the collection of export duties on rubber, which precipitated a conflict with the Brazilian settlers and finally brought about a boundary dispute between the two republics. In July 1899 the Acreanos declared their independence and set up a republic of their own, but in the following March they were reduced to submission by Brazil. Various disorders followed until Brazil decided to occupy Puerto Alonso with a military force. The boundary dispute was finally settled at Petropolis on the 17 th of November 1903 through the purchase by Brazil of the rubber-producing territory south to about the nth parallel, estimated at more than 60,000 sq. m.

ACRE, ‘ Akka, or St Jean d’Acre, the chief town of a govern- mental district of Palestine which includes Haifa, Nazareth and Tiberias. It stands on a low promontory at the northern ex- tremity of the Bay of Acre, 80 m. N. N.W. from Jerusalem, and 25 m. S. of Tyre. The population is about 11,000; 8000 being Moslems, the remainder Christians, Jews, &c. It was long regarded as the ” Key of Palestine,” on account of its command- ing position on the shore of the broad plain that joins the inland plain of Esdraelon, and so affords the easiest entrance to the interior of the country. But trade is now passing over to Haifa, at the south side of the bay, as its harbour offers a safer road- stead, and is a regular calling place for steamers. Business, rapidly declining, is still carried on in wheat, maize, oil, sesame, &c, in the town market. There are few buildings of interest, owing to the frequent destructions the town has undergone. The wall, which is now ruinous and has but one gate, dates from the crusaders: the mosque was built by Jezzar Pasha (d. 1804) from materials taken from Caesarea Palaestina: his tomb is within. Acre is the seat of the head of the Babist religion.

History. — Few towns have had a more chequered or calami- tous history. Of great antiquity, it is probably to be identified with the ‘Aak of the tribute-lists of Tethmosis (Thothmes) III. (c. 1500 B.C.), and it is certainly the Akka of the Tell el-Amarna correspondence. To the Hebrews it was known as Acco (Re- vised Version spelling), but it is mentioned only once in the Old Testament, namely Judges i. 31, as one of the places from which the Israelites did not drive out the Canaanite inhabitants. Theoretically it was in the territory of the tribe of Asher, and Josephus assigns it by name to the district of one of Solomon’s provincial governors. Throughout the period of Hebrew domina- tion, however, its political connexions were always with Syria

rather than with Palestine proper: thus, about 725 B.C. it joined Sidon and Tyre in a revolt against Shalmaneser IV. It had a stormy experience during the three centuries preceding the Christian era. The Greek historians name it Ake (Josephus calls it also Akre); but the name was changed to Ptolemais, probably by Ptolemy Soter, after the partition of the kingdom of Alexander. Strabo refers to the city as once a rendezvous for the Persians in their expeditions against Egypt. About 165 B.C. Simon Maccabaeus defeated the Syrians in many battles in Galilee, and drove them into Ptolemais. About 153 B.C. Alex- ander Balas, son of Antiochus Epiphanes, contesting the Syrian crown with Demetrius, seized the city, which opened its gates to him. Demetrius offered many bribes to the Maccabees to obtain Jewish support 'against his rival, including the revenues of Ptolemais for the benefit of the Temple, but in vain. Jonathan threw in his lot with Alexander, and in 150 B.C. he was received by him with great honour in Ptolemais. Some years later, however, Tryphon, an officer of the Syrians, who had grown suspicious of the Maccabees, enticed Jonathan into Ptolemais and there treacherously took him prisoner. The city was also assaulted and captured by Alexander Jannaeus, by Cleopatra and by Tigranes. Here Herod built a gymnasium, and here the Jews met Petronius, sent to set up statues of the emperor in the Temple, and persuaded him to turn back. St Paul spent a day in Ptolemais. The Arabs captured the city in a.d. 638, and lost it to the crusaders in n 10. The latter made the town their chief port in Palestine. It was re-taken by Saladin in 1187, besieged by Guy de Lusignan in 1189 (see below), and again captured by Richard Cceur de Lion in 1 191. In 1229 it was placed under the control of the knights of St John (whence one of its alternative names), but finally lost by the Franks in 1 291. The Turks under Sultan Seliml. captured the city in 151 7, after which it fell into almost. total decay. Maundrell in 1697 found it a complete ruin, save for a khan occupied by some French merchants, a mosque and a few poor cottages. Towards the end of the 18th century it seems to have revived under the comparatively beneficent rule of Dhahar el-Amir, the local sheikh: his successor, Jezzar Pasha, governor of Damascus, improved and fortified it, but by heavy imposts secured for him- self all the benefits derived from his improvements. About 1780 Jezzar peremptorily banished the French trading colony, in spite of protests from the French government, and refused to receive a consul. In 1799 Napoleon, in pursuance of his scheme for raising a Syrian rebellion against Turkish domination, ap- peared before Acre, but after a siege of two months (March-May) was repulsed by the Turks, aided by Sir W. Sidney Smith and a force of British sailors. Jezzar was succeeded on his death by his son Suleiman, under whose milder rule the town

advanced in prosperity till 1831, when Ibrahim Pasha besieged and reduced the town and destroyed its buildings. On the 4th of November 1840 it was bombarded by the allied British, Austrian and French squadrons, and in the following year restored to Turkish rule.

Battle of Acre. — The battle of 1189, fought on the ground to the east of Acre, affords a good example of battles of the Crusades. The crusading army under Guy of Lusignan, king of Jerusalem, which was besieging Acre, gave battle on the 4th of October 1189 to the relieving army which Saladin had collected. The Christian army consisted of the feudatories of the kingdom of Jerusalem, numerous small contingents of European crusaders and the military orders, and contingents from Egypt, Turkestan, Syria and Mesopotamia fought under Saladin. The Saracens lay in a semicircle east of the town facing inwards towards Acre. The Christians opposed them with crossbowmen in first line and the heavy cavalry in second. At Arsuf the Christians fought coherently; here the battle began with a disjointed combat between the Templars and Saladin's right wing. The crusaders were so far successful that the enemy had to send up reinforce- ments from other parts of the field. Thus the steady advance of the Christian centre against Saladin's own corps, in which the crossbows prepared the way for the charge of the men-at-arms, met with no great resistance. But the victors scattered to plunder. Saladin rallied his men, and, when the Christians

began to retire with their booty, let loose his light horse upon them. No connected resistance was offered, and the Turks slaughtered the fugitives until checked by the fresh troops of the Christian right wing. Into this fight Guy's reserve, charged with holding back the Saracens in Acre, was also drawn, and, thus freed, 5000 men sallied out from the town to the north- ward; uniting with the Saracen right wing, they fell upon the Templars, who suffered severely in their retreat. In the end the crusaders repulsed the relieving army, but only at the cost of 7000 men. (R. A. S. M.)

ACRE, a land measure used by English-speaking races. Derived from the Old Eng. acer and cognate with the Lat. ager, Gr. aypos, Sans, ajras, it has retained its original meaning " open country," in such phrases as " God's acre," or a church- yard, " broad acres," &c. As a measure of land, it was first defined as the amount a yoke of oxen could plough in a day; statutory values were enacted in England by acts of Edward I., Edward III., Henry VIII. and George IV., and the

Weights and Measures Act 1878 now defines it as containing 4840 sq. yds. In addition to this ” statute ” or ” imperial acre,” other ” acres ” are still, though rarely, used in Scotland, Ireland, Wales and certain English counties. The Scottish acre con- tains 6150-4 sq. yds.; the Irish acre 7840 sq. yds.; in Wales, the land measures erw (4320 sq. yds.), slang (3240 sq. yds.) and paladr are called “acres”; the Leicestershire acre (2308J sq. yds.), Westmoreland acre (6760 sq. yds.) and Cheshire acre (10,240 sq. yds.) are examples of local values.

ACRIDINE, C13H9N, in chemistry, a heterocyclic ring com- pound found in crude coal-tar anthracene. It may be separated by shaking out with dilute sulphuric acid, and then precipitating the sulphuric acid solution with potassium bichromate, the resulting acridine bichromate being decomposed by ammonia. It was first isolated in 1890 by C. Graebe and H. Caro {Ann., 1871, 158, p. 265). Many synthetic processes are known for the production of acridine and its derivatives. A. Bernthsen {Ann., 1884, 224, p. 1) condensed diphenylamine with fatty acids, in the presence of zinc chloride. Formic acid yields acridine, and the higher homologues give derivatives substituted at the meso carbon atom,

N N’

+ HCOOH->C 6 H5/|\C 6 H 6 ->C6H4<|>C 6 H4

CHO CH

N N

+ CH 3 COOH->C 6 H 6 /|\C 6 H5ˆ>C 6 H 4 <|>C 6 H4

COCH 3 C(CH 3)

Acridine may also be obtained by passing the vapour of phenyl- ortho-toluidine through a red-hot tube (C. Graebe, Ber., 1884, x 7> P- W); by condensing diphenylamine with chloroform, in presence of aluminium chloride (0. Fischer, Ber., 1884, 17, p. 102) ; by passing the vapours of orthoaminodiphenylmethane over heated litharge (O. Fischer) ; by heating salicylic aldehyde with aniline and zinc chloride to 260 C. (R. Mohlau, Ber., 1886, 19, p. 2452) ; and by distilling acridone over zinc dust (C. Graebe, Ber., 1892, 25, p. 1735).

Acridine and its homologues are very stable compounds of feebly basic character. They combine readily with the alkyl iodides to form alkyl acridinium iodides, which are readily trans- formed by the action of alkaline potassium ferricyanide to N-alkyl acridones. Acridine

crystallizes in needles which melt at no° C. It is characterized by its irritating action on the skin, and by the blue fluorescence shown by solutions of its salts. On oxidation with potassium permanganate it yields acridinic acid (quinoline o/3-dicarboxylic acid) C 9 H 5 N(COOH)2. Numerous derivatives of acridine are known and may be prepared by methods analogous to those used for the formation of the parent base. For the preparation of the naphthacridines, see F.Ullmann, German Patents 117472, 118439, I2 7.586, 128754, and also Ber., 1902, 35, pp. 316, 2670. Phenyl-acridine is the parent base of chrysaniline, which is the chief constituent of the dye- stuff phosphine (a bye-product in the manufacture of rosaniline) . Chrysaniline (diamino-phenylacridine) forms red-coloured salts,

CH 6 -NH-C 6 Hr

which dye silk and wo61 a fine yellow; and the solutions of the salts are characterized by their fine yellowish-green fluorescence. It was synthesized by O. Fischer and G. Koerner (Ber., 1884, 17, p. 203) by condensing ortho-nitrobenzaldehyde with aniline, the resulting ortho-nitro-para-diamino-triphenylmethane being reduced to the corresponding orthoamino compound, which on oxidation yields chrysaniline. Benzoflavin, an isomer of chrys- aniline, is. also a dye-stuff, and has been prepared by K. Oehler (English Patent96i4)from meta-phenylenediamine and benzalde- hyde. These substances condense to form tetra-aminotriphenyl- methane, which, on heating with acids, loses ammonia and yields diaminodihydrophenylacridine, from which benzoflavin is ob- tained by oxidation. It is a yellow powder, soluble in hot water. The formulae of these substances are: —

/\/N\/\

NH 2 H 2 N

/\c

NH, Chrysaniline.

/\/N\/\

Ml

\/\ c /\/

1

/\

u

Benzoflavin.

NH 2

ACRO (or Acron), HELENIUS, Roman grammarian and com- mentator, probably flourished at the end of the 2nd century a.d. He wrote commentaries on Terence and perhaps Persius. A collection of scholia on Horace, originally anonymous in the earlier MSS., and on the whole not of great value, was wrongly attributed to him at a much later date, probably during the 15th century. It has been published by Pauly (1861) and Hauthal (1866), together with the other Horace scholia.

See Pseudoacronis Scholia in Horatium Vetusliora, ed. O. Keller

(1902-1904).

ACROBAT (Gr. &.Kpoj3aTetv, to walk on tiptoe), originally a rope-dancer; the word is now used generally to cover pro- fessional performers on the trapeze, &c, contortionists, balancers and tumblers. Evidence exists that there were very skilful performers on the tight-rope (funambuli) among the ancient Romans. Modern rope-walkers {e.g. Blondin) or wire-dancers generally use a pole, loaded at the ends, or some such assistance in balancing, and by shifting this are enabled to maintain, or readily to recover, their equilibrium.

ACROGENAE (" growing at the apex "), an obsolete botanical term, originally applied to the higher Cryptogams (mosses and ferns), which were erroneously distinguished from the lower (Algae and Fungi) by apical growth of the stem. The lower Cryptogams were contrasted as Amphigenae (" growing all over "), a misnomer, as apical growth is common 'among them.

ACROLITHS (Gr. anpokidoi, i.e. ending in stone), statues of a transition period in the history of plastic art, in which the trunk of the figure was of wood, and the head, hands and feet of marble. The wood was concealed either by gilding or, more commonly, by drapery, and the marble parts alone were exposed. Acroliths are frequently mentioned by Pausanias, the best known specimen being the Athene Areia of the Plataeans.

ACROMEGALY, the name given to a disease characterized by a true hypertrophy (an overgrowth involving both bony and soft parts) of the terminal parts of the body, especially of the face and extremities (Gr.

anpov, point, and fxeyas, large). It is more frequent in the female sex, between the ages of 25 and 40. Its causation is generally associated with disturbances in the pituitary gland, and an extract of this body has been tried in the treatment, as one of the recent developments in organo- therapeutics; thyroid extract has also been used, but without marked success, on the apparent analogy of acromegaly with myxoedema.

ACRON, a Greek physician, born at Agrigentum in Sicily, was contemporary with Empedocles, and must therefore have lived in the 5 th century before Christ. The successful measure of lighting large fires, and purifying the air with perfumes, to put a stop to the plague in Athens (430 B.C.), is said to have origin- ated with him; but this has been questioned on chronological

grounds. Suidas gives the titles of several medical works written by him in the Doric dialect.

ACROPOLIS (Gr. a/cpos, top, ir6Xts, city), literally the upper part of a town. For purposes of defence early settlers naturally chose elevated ground, frequently a hill with precipitous sides, and these early citadels became in many parts of the world the nuclei of large cities which grew up on the surrounding lower ground. The word Acropolis, though Greek in origin and asso- ciated primarily with Greek towns (Athens, Argos, Thebes, Corinth) , may be applied generically to all such citadels (Rome, Jerusalem, many in Asia Minor, or even Castle Hill at Edin- burgh). The most famous is that of Athens, which, by reason of its historical associations and the famous buildings erected upon it, is generally known without qualification as the Acropolis (see Athens).

ACROPOLlTA (AkropolItes), GEORGE (1217-1282), Byzan- tine historian and statesman, was born at Constantinople. At an early age he was sent by his father to the court of John Ducas Batatzes (Vatatzes), emperor of Nicaea, by whom and by his successors (Theodorus II. Lascaris and Michael VIII. Palaeo- logus) he was entrusted with important state missions. The office of ” great logothete ” or chancellor was bestowed upon him in 1244. As commander in the field in 1257 against Michael Angelus, despot of Epirus, he showed little military capacity. He was captured and kept for two years in prison, from which he was released by Michael Palaeologus.

Acropolita's most important political task was that of effecting a reconciliation between the Greek and Latin Churches, to which he had been formerly opposed. In 1273 he was sent to Pope Gregory X., and in the following year, at the council of Lyons, in the emperor's name he recognized the spiritual supremacy of Rome. In 1282 he was sent on an embassy to John IL, emperor of Trebizond, and died in the same year soon after his return. His historical work (XpowKi) Xvyy pa4 > ri, Annates) embraces the period from the capture of Constantinople by the Latins (1204) to its recovery by Michael Palaeologus (1261), thus forming a con- tinuation of the work of Nicetas Acominatus. It is valuable as written by a contemporary, whose official position as great logothete, military commander and confidential ambassador afforded him frequent opportunities of observing the course of events. Acropolita is considered a trustworthy authority as far as the statement of facts is concerned, and he is easy to under- stand, although he exhibits special carelessness in the construc- tion of his sentences. He was also the author of several shorter works, amongst them being a funeral oration on John Batatzes, an epitaph on his wife Eirene and a panegyric of Theodorus II. Lascaris of Nicaea. While a prisoner at Epirus he wrote two treatises on the procession of the Holy Ghost ('Einropawis, Pro- cessio Spirilus Sancti).

Editio princeps by Leo Allatius (1651), 'with the editor's famous treatise De Georgiis eorumque Scriptis; editions in the Bonn Corpus Scriptorum Hist. Byz., by I. Bekker (1836), and Migne, Patrologia Graeca, cxl.; in the Teubner series by A. Heisenberg (1903), the second volume of which contains a full life, with bibliography; see also C. Krumbacher, Geschichte der byzantinischen Litteratur (1897).

ACROSTIC (Gr. cUpos, at the end, and ot'lxos, line or verse) , a short verse composition, so constructed that the initial letters of the lines, taken consecutively, form words. The fancy for writing acrostics is of great antiquity, having been common among the Greeks of the Alexandrine period, as well as with the Latin writers since Ennius and Plautus, many of the argu- ments of whose plays were written with acrostics on their respec- tive titles. One of the most remarkable acrostics was contained in the verses cited by Lactantius and Eusebius in the 4th century, and attributed to the Erythraean sibyl, the initial letters of which form the words Tˆcrous Xpurros Qeov wos

The monks of the middle ages, who wrote in Latin, were fond of acrostics, as well as the poets of the Middle High German period, notably Gottfried of Strassburg and Rudolph of Ems.

The great poets of the Italian renaissance, among them Boc- caccio,

indulged in them, as did also the early Slavic writers. Sir John Davies (1 569-1626) wrote twenty-six elegant Hymns to Astraea, each an acrostic on ” Elisabetha Regina ” ; and Mistress Mary Fage, in Fame’s Route, 1637, commemorated 420 cele- brities of her time in acrostic verses. The same trick of com- position is often to be met with in the writings of more recent versifiers. Sometimes the lines are so combined that the final letters as well as the initials are significant. Edgar Allan Poe worked two names — one of them that of Frances Sargent Osgood — into verses in such a way that the letters of the names corresponded to the first letter of the first line, the second letter of the second, the third letter of the third, and so on.

Acrostic verse has always been held in slight estimation from a literary standpoint. Dr Samuel Butler says, in his “Character of a Small Poet,” ” He uses to lay the outsides of his verses even, like a bricklayer, by a line of rhyme and acrostic, and fill the middle with rubbish.” Addison {Spectator, No. 60) found it impossible to decide whether the inventor of the anagram or the acrostic were the greater blockhead; and, in describing the latter, says, ” I have seen some of them where the verses have not only been edged by a name at each extremity, but have had the same name running down like a seam through the middle of the poem.” And Dryden, in Mac Flecknoe, scornfully assigned Shadwell the rule of

Some peaceful province in acrostic land.

The name acrostic is also applied to alphabetical or ” abece- darian ” verses. Of these we have instances in the Hebrew psalms (e.g. Ps. xxv. and xxxiv.), where successive verses begin with the letters of the alphabet in their order. The structure of Ps. cxix. is still more elaborate, each of the verses of each of the twenty-two parts commencing with the letter which stands at the head of the part in our English translation.

At one period much religious verse was written in a form imitative of this alphabetical method, possibly as an aid to the memory. The term acrostic is also applied to the formation of words from the initial letters of other words. ‘lxOvs, referred to above, is an illustration of this. So also is the word ” Cabal,” which, though it was in use before, with a similar meaning, has, from the time of Charles II. , been associated with a particular ministry, from the accident of its being composed of Clifford, Ashley, Buckingham, Arlington and Lauderdale. Akin to this are the names by which the Jews designated their Rabbis; thus Rabbi Moses ben Maimon (better known as Maimonides) was styled “Rambam,” from the initials R.M.B.M.; Rabbi David Kimchi

(R.D.K.), ” Radak,” &c.

Double acrostics are such as are so constructed, that not only initial letters of the lines, but also the middle or last letters, form words. For example: — 1. By Apollo was my first made. 2. A shoemaker’s tool. 3. An Italian patriot. 4. A tropical fruit. The initials and finals, read downwards, give the name of a writer and his nom de plume. Answer: Lamb, Elia.

1. L yr E

2. A w L

3. M azzin I

4. B anan A

ACROTERIUM (Gr. OLUpwriipiov, the summit or vertex), in architecture, a statue or ornament of any kind placed on the apex of a pediment. The term is often restricted to the plinth, which forms the podium merely for the acroterium.

ACT (Lat. actus, actum), something done, primarily a volun- tary deed or performance, though any accomplished fact is often included. The signification of the word varies according to the sense in which it is employed. It is often synonymous with ” statute ” (see Act or Parliament). It may also refer to the result of the vote or deliberation of any legislature, the decision of a court of justice or magistrate, in which sense records, decrees, sentences, reports, certificates, &c, are called acts.

In law it means any instrument in writing, for declaring or justifying the truth of a bargain or transaction, as: •” I deliver this as my act and deed.” The origin of the legal use of the word. ” act ” is in the acta of the Roman magistrates or people, of their

courts of law, or of the senate, meaning (1) what was done before the magistrates, the people or the senate; (2) the records of such public proceedings.

In connexion with other words ” act ” is employed in many phrases, e.g. act of God, any event, such as the sudden, violent or

overwhelming occurrence of natural forces, which cannot be foreseen or provided against. This is a good defence to a suit for non-performance of a contract. Act of honour denotes the acceptance by a third party of a protested bill of exchange for the honour of any party thereto. Act of grace denotes the grant- ing of some special privilege.

In universities, the presenting and publicly maintaining a thesis by a candidate for a degree, to show his proficiency, is an act. ” The Act ” at Oxford, up to 1856 when it was abolished, was the ceremony held early in July for this purpose, and the expressions ” Act Sunday,” ” Act Term ” still survive.

In dramatic literature, act signifies one of those parts into which a play is divided to mark the change of time or place, and to give a respite to the actors and to the audience. In Greek plays there are no separate acts, the unities being strictly observed, and the action being continuous from beginning to end. If the principal actors left the stage the chorus took up the argument, and con- tributed an integral part of the play, though chiefly in the form of comment upon the action. When necessary, another drama, which is etymologically the same as an act, carried on the history to a later time or in a different place, and thus we have the Greek trilogies or groups of three dramas, in which the same characters reappear. The Roman poets first adopted the division into acts, and suspended the stage business in the intervals between them. Their number was usually five, and the rule was at last laid down by Horace in the Ars Poetica —

Neve minor, neu sit quinto productior actu

Fabula, quae posci vult, et spectata reponi.

” If you would have your play deserve success,

Give it five acts complete, nor more nor less.” {Francis.)

On the revival of letters this rule was almost universally observed by dramatists, and that there is an inherent convenience and fitness in the number five is evident from the fact that Shake- speare, who refused to be trammelled by merely arbitrary rules, adopts it in all his plays. Some critics have laid down rules as to the part each act should sustain in the development of the plot, but these are not essential, and are by no means universally recognized. In comedy the rule as to the number of acts has not been so strictly adhered to as in tragedy, a division into two acts or three acts being quite usual since the time of Moliere, who first introduced it. It may be well to mention here

Milton's Samson Agonistes as a specimen in English literature of a dramatic work founded on a purely Greek model, in which, consequently, there is no division into acts.

For " acting," as the art and theory of dramatic representation (or histrionics, from Lat. hislrio, an actor), see the article Drama.

ACTA DIURNA (Lat. 'acta, public acts or records; diurnus, daily, from dies), called also Acta Populi, Acta Publica and simply Acta or Diurna, in ancient Rome a sort of daily gazette, containing an officially authorized narrative of noteworthy events at Rome. Its contents were partly official (court news, decrees of the emperor, senate and magistrates), partly private (notices of births, marriages and deaths). Thus to some extent it filled the place of the modern newspaper (q.v.). The origin of the Ada is attributed to Julius Caesar, who first ordered the keep- ing and publishing of the acts of the people by public officers (59 B.C.; Suetonius, Caesar, 20). The Acta were drawn up from day to day, and exposed in a public place on a whitened board (see Album). After remaining there for a reasonable time they were taken down and preserved with other public documents, so that they might be available for purposes of research. The Acta differed from the Annals (which were discontinued in 133 B.C.) in that only the greater and more important matters were given in the latter, while in the former things of less note were recorded. Their publication continued till the transference of the seat of the empire to Constantinople. There are no genuine fragments extant.

Leclerc, Des journaux chez Us Remains (1838) ; Renssen, De Diurnis aliisque Romanorum Actis (1857); Hiibner, De Senatus Populique Romani Actis (i860); Gaston Boissier, Tacitus and other Roman Studies (Eng. trans., W. G. Hutchison, 1906), pp. 197-229.

ACTAEON, son of Aristaeus and Autonoe, a famous Theban hero and hunter, trained by the centaur Cheiron. According to the story told by Ovid (Metam. iii. 131; see also Apollod iii. 4), having accidentally seen Artemis (Diana) on Mount Cithaeron while she was bathing, he was changed by her into a stag, and pursued and killed by his fifty hounds. His statue was often set up on rocks and mountains as a protection against excessive heat. The myth itself probabby represents the destruction of vegetation during the fifty dog-days. Aeschylus and other tragic poets made use of the story, which was a favourite subject in ancient works of art. There is a well-known small marble group in the British Museum illustrative of the story.

ACTA SENATUS, or Commentarii Senatus, minutes of the discussions

and decisions of the Roman senate. Before the first consulship of Julius Caesar (59 B.C.), minutes of the pro- ceedings of the senate were written and occasionally published, but unofficially; Caesar, desiring to tear away the veil of mystery which gave an unreal importance to the senate's deliberations, first ordered them to be recorded and issued authoritatively. The keeping of them was continued by Augustus, but their publication was forbidden (Suetonius, Augustus, 36). A young senator (ab actis senatus) was chosen to draw up these Acta, which were kept in the imperial archives and public libraries (Tacitus, Ann. v. 4). Special permission from the city praefect was necessary in order to examine them. For authorities see Acta Diurna.

ACTINOMETER (Gr.

ACTINOMYCOSIS (Streptotrichosis), a chronic infective dis- ease occurring in both cattle and man. In both these groups it presents the same clinical course, being characterized by chronic inflammation with the formation of granulomatous tumours, which tend to undergo suppuration, fibrosis or calcification. It used to be believed that this disease was caused by a single vegetable parasite, the Ray-Fungus, but there is now an over- whelming mass of observations to show that the clinical features may be produced by a number of different species of parasites, for which the generic name Streptothrix has been generally adopted. In 1899 the committee of the Pathological Society of London recommended that the term Streptotrichosis should be used as the appropriate clinical epithet of the large class of Streptothrix infections. And since that year the name Actino- mycosis has been falling into disuse, and in any case is only used synonymously with Streptotrichosis. For a further account of these parasites see the articles on Bacteriology and on Parasitic Diseases.

Pathological Anatomy. — The naked-eye appearance of the different organs affected by Streptothrix infection varies accord- ing to the duration and acuteness of the- disease. In some tissues the appearance is that of simple inflammation, whereas in others it may be characteristic. The liver when affected shows scattered foci of suppuration, which may become aggre- gated into spheroidal masses, surrounded by a zone of inflam- mation. In the lungs the changes may be any that are produced by the following conditions. (1) An acute bronchitis. (2) A phthisical lung, grey nodules being scattered here and there almost exactly simulating tuberculous nodules. (3) An acute broncho-pneumonia with some interstitial fibrosis and a tend- ency to abscess formation. The most characteristic lesions are

in the skin. These appear as nodules, sarcomatous-looking, soft and pulpy. Their colour is mottled, yellow and purplish red. The skin over them is thinned out, and broken down in places to form one or two crateriform ulcers from which a clear sticky fluid exudes. The size varies from that of a pea to a small orange. The pus is characteristic, varying in consistency though usually viscid, and containing numerous minute specks.

The disease is more common in males than in females, and more prevalent in Germany and Russia than in England. The infection is probably spread by grain (corn or barley), on which the fungus may often be found. In a great number of recorded cases the patient has been following agricultural pursuits. The disease can only be transmitted from one individual to another with considerable difficulty, and no case of direct transmission from animal to man has yet been noted.

Clinical History. — The course of actinomycosis is usually a chronic one, but occasionally the fungus gets into the blood, when the course is that of an acute infective disease or even pyaemia. The symptoms are entirely dependent on the organ attacked, and are in no way specially characteristic. During life a diagnosis of phthisis is continually made, and only a micro- scopic examination after death renders the true nature of the disease apparent. The nature of the skin lesion is the most evident, and here the parasite can be detected early in the illness. The, only drug which appears to have any beneficial influence on the course of the disease is potassium iodide, and this has occasionally been used with great benefit. Surgical interference is usually needed, either excision of the part affected, or, where possible, a thorough scraping of the lesion and free application of antiseptics.

ACTINOZOA, a term in systematic zoology, first used by H. M. D. de Blainville about 1834, to designate animals the organs of which were disposed radially about a centre. De Blainville included in his group many unicellular forms such as Noctiluca (see Protozoa), sea-anemones, corals, jelly-fish and hydroid polyps, echinoderms, polyzoa and rotifera. T. H. Huxley afterwards restricted the term. He showed that in de Blainville's group there were associated with a number of heterogeneous forms a group of animals characterized. by being composed of two layers of cells comparable with the first two layers in the development of vertebrate animals. Such forms he distinguished as

Coelentera, and showed that they had no special affinity with echinoderms, polyzoa, &c. He divided the Coelen- tera into a group Hydrozoa, in which the sexually produced embryos were usually set free from the surface of the body, and a group Actinozoa, in which the embryos are detached from the interior of the body and escape generally by the oral aper- ture. Huxley's Actinozoa comprised the sea-anemones, corals and sea-pens, on the one hand, and the Ctenophora on the other. Later investigations, whilst confirming the general validity of Huxley's conclusions, have slightly altered the limits and definitions of his groups. (See Anthozoa, Coelentera, Cteno- phora and Hydrozoa.) (P. C. M.)

ACTION, in law, a term used by jurists in three different senses: (1) a right to institute proceedings in a court of justice to obtain redress for a wrong {actio nihil aliud est quam jus prosequendi in judicio quod alicui debetur, Bracton, de Legibus Angliae, bk. iii. ch. i., f. 98 b) ; (2) the proceeding itself {action n'est auter chose que loyall demande de son droit, Co. Litt. 285 (a)) ; (3) the particular form of the proceeding. The term is derived from the Roman law {actio), in which it is used in all three senses. In the history of Roman law, actions passed through three stages. The first period (terminated about 170 B.C. by the Lex Aebutia) is known as the system of legis actiones, and was based on the precepts of the XII. tables and used before the praetor urbanus. These actiones were five in number — sacramenti, per judicis pos- tulationem, per condictionem, per manus injeclionem, per pignoris captionem. The first was the primitive and characteristic action of the Roman law, and the others were little more than modes of applying it to cases not contemplated in the original form, or of carrying the result of it into execution when the action had been decided. The legis actiones were superseded by the formulae, I

originated by the praetor peregrinus for the determination of controversies between foreigners, but found more flexible than the earlier system and made available for citizens by the Lex Aebutia. Under both these systems the praetor referred the matter in dispute to an arbiter {judex), but in the later he settled the formula {i.e. the issues to be referred and the appropriate form of relief) before making the order of reference. In the third stage, the formulary stage fell into disuse, and after a.d. 342 the magistrate himself or his deputy decided the controversy after the defending party had been duly summoned by a libellus.

The classifications of actiones in Roman law were very numer- ous. The division which is still most universally recognized is that of actions in rem and actions in personam (Sohm, Roman Law, tr. by

Ledlie, 2nd ed. 277). An action in rem asserts a right to a particular thing against all the world. An action in per- sonam asserts a right only against a particular person. Perhaps the best modern example of the distinction is that made in maritime cases between an action against a ship after a collision at sea, and an action against the owners of the ship.

In English law the term ” action ” at a very early date became associated with civil proceedings in the Court of Common Pleas, which were distinguished from pleas of the crown, such as in- dictments or informations and for suits in the Court of Chancery or in the Admiralty or ecclesiastical courts. The English action was a proceeding commenced by writ original at the common law. The remedy was of right and not of grace. The history of actions is the history of civil procedure in the courts of common law! As a result of the reform of civil procedure by the Judicature Acts the term ” action ” in English law now means at the High Court of Justice ” a civil proceeding commenced by writ of summons or in such other manner as may be prescribed by rules of court ” {e.g. by originating summons). The proceeding thus commenced ends by judgment and execution. This definition includes pro- ceedings under the Chancery, Admiralty and Probate jurisdic- tion of the High Court, but excludes proceedings commenced by petition, such as divorce suits and bankruptcy and winding-up matters, as well as criminal proceedings in the High Court or applications for the issue of the writs of mandamus, prohibition, habeas corpus or certiorari. The Judicature Acts and Rules have had the effect of abolishing all the forms of ” action ” used at the common law and of creating one common form of legal proceeding for all ordinary controversies between subjects in whatever division of the High Court. The stages in an English action are the writ, by which the persons against whom relief is claimed are summoned before the court; the pleadings and interlocutory steps, by which the issues between the parties are adjusted; the trial, at which the issues of fact and law involved are brought before the tribunal; the judgment, by which the relief sought is granted or refused; and execution, by which the law gives to the successful party the fruits of the judgment.

The procedure varies according as the action is in the High Court, a county court or one of the other local courts of record which still survive; but there is no substantial difference in the incidents of trial, judgment and execution in any of these courts. The initial difference between actions in the High Court and the county court is that the latter are commenced by plaint lodged in the court, on which a summons is prepared by the court and served by its bailiff, whereas in

the High Court the party pre- pares the writ and lodges it in court for sealing, and when it is sealed, himself effects the service.

An action is said to ” lie ” when the law provides a remedy for some particular act or omission by a subject which infringes the legal rights of another subject. An act of such a character is said to give a ” cause of action.” In the action the person who alleges himself aggrieved claims a judgment of the court in his favour giving an adequate and appropriate remedy for the injury or damage which he has sustained by the infraction of his rights. As to the time within which an action must be brought, see Limitation, Statutes of. When the rights of a subject are in- fringed by the illegal action of the state, an action lies in England against the officers who have done the wrong, unless the claim be one arising out of breach of a contract with the state, or out

of an ” Act of State.” For a breach by the state of a contract made between the state and a subject the remedy of the subject is, as a general rule, not by action against the agents of the state who acted for the state with reference to the making or breach of the contract, but against the Crown itself by the proceeding called Petition of Right (see Petition).

While as a generic term ” action ” in its proper legal sense includes suits by the Crown and ” criminal actions ” (see Co. Litt. 284b; Bracton, de Legibus Angliae, bk. iii. ch. v. f. 1046; Brad- laugh v. Clarke, 1883, 8 App. Cas. 354, 361, 374), in popular language it is taken to mean a proceeding by a subject and is now rarely applied in England even by lawyers to criminal pro- ceedings. What are now known as ” penal actions,” i.e. pro- ceedings in which an individual who has not suffered personally by a breach of the law sues as a common informer for the statu- tory penalty either on his own benefit or on behalf also of the Crown (qui tarn pro rege quam pro se ipso), bear some analogy to the actio popularis of Roman law, from which they are derived (see the statute 4 Hen. VII. 1488); but they are now treated for most purposes as civil and not as criminal proceedings. The law of Scotland follows the lines of the civil law, and the ex- pression ” criminal action ” is in use to distinguish proceedings to punish offences against the public as distinguished from civil action, brought to enforce a private right.

In the United States, and the British colonies in which English law

runs by settlement, charter, proclamation or statute, the nature of an action is substantially the same as in England. The differences between one state of the Union and another, and one colony and another, depend mainly on the extent to which the old procedure of the common law has been abolished, simplified or reformed by local legislation.

Authorities. — Roman Law: Sohm, Institutes of Roman Law, W. G. Ledlie (2nd ed., 1901). English Law: Pollock and Maitland, English Law ; Holmes, The Common Law ; Bullen and Leake, Prec. Pleadings (3rd ed.; 6th ed. 1905).

ACTIUM (mod. Punla), the ancient name of a promontory in the north of Acarnania (Greece) at the mouth of the Sinus Ambracius (Gulf of Arta) opposite Nicopolis, built by Augustus on the north side of the strait. On the promontory was &n ancient temple of Apollo Actius, which was enlarged by Augustus, who also, in memory of the battle, instituted or renewed the quinquennial games called Actia or Ludi Actiaci. Actiaca A era was a computation of time from the battle of Actium. There was on the promontory a small town, or rather village, also called Actium.

History. — Actium belonged originally to the Corinthian colonists of Anactorium, who probably founded the worship of Apollo Actius and the Actia games; in the 3rd century it fell to the Acarnanians, who subsequently held their synods there. Actium is chiefly famous as the site of Octavian's decisive victory over Mark Antony (2nd of September 31 B.C.). This battle ended a long series of ineffectual operations. The final conflict was provoked by Antony, who is said to have been per- suaded by Cleopatra to retire to Egypt and give battle to mask his retreat; but lack of provisions and the growing demoralization of his army would sufficiently account for his decision. The fleets met outside the gulf, each over 200 strong (the totals given by ancient authorities are very conflicting). Antony's heavy battleships endeavoured to close and crush the enemy with their artillery; Octavian's light and mobile craft made skilful use of skirmishing tactics. During the engagement Cleopatra suddenly withdrew her squadron and Antony slipped away behind her. His flight escaped notice, and the conflict remained undecided, until Antony's fleet was set on fire and thus annihilated.

Authorities.— DioCassius, 50.12-51. 3; Plutarch, Anionius, 62-68; Velleius Paterculus, ii. 84-85. C. Merivale, History of the Romans under the Empire, iii. pp. 313-325 (London, 1851); V. Gardthausen, Augustus und seine Zeit, i. pp. 369-386, ii. pp. 189-201 (Leipzig, 1891) : G. Ferrero in the Revue de Paris, Mar. 15, 1906, pp. 225-243; J. Kromayer, in Hermes, xxxiv. (1899), pp. 1-54. (M. O. B. C.)

ACT OF PARLIAMENT. An act of parliament may be re- garded as a declaration of the legislature, enforcing certain rules

of conduct, or defining rights and conferring them upon or with- holding them from certain persons or classes of persons. The collective body of such declarations constitutes the statutes of the realm or written law of the British nation, in the widest sense, from Anglo-Saxon times to the present day. It is not, however, till the earlier half of the 13th century that, in a more limited constitutional sense, the statute-book is generally held to open, and the parliamentary records only begin to assume distinct out- lines late in the reign of Edward I. It gradually became a fixed constitutional principle that an act of parliament, to be valid, must express concurrently the will of the entire legislature. It was not, however, till the reign of Henry VI. that it became customary, as now, to introduce bills into parliament in the form of finished acts; and the enacting clause, regarded by constitu- tionalists as the first perfect assertion, in words, of popular right, came into general use as late as the reign of Charles II. It is thus expressed in the case of all acts other than those granting money to the crown: — ” Be it enacted by the King’s most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal and Commons in this present Parliament assembled, and by the authority of the same.” Where the act is a money grant the enacting clause is prefaced by the words, ” Most gracious Sovereign, we, Your Majesty’s most dutiful and loyal subjects, the Commons of the United Kingdom of Great Britain and Ireland, in Parliament assembled, towards making good the supply 1 which we have cheerfully granted to Your Majesty in this session of Parliament, have resolved to grant unto Your Majesty the sums hereinafter mentioned ; and do therefore most humbly beseech Your Majesty that it may be enacted, &c.” The use of the pre- amble with which acts are usually prefaced is thus quaintly set forth by Lord Coke: ” The rehearsal or preamble of the statute is a good meane to find out the meaning of the statute, and, as it were, a key to open the understanding thereof ” (Co. Litt. 79a). Originally the collective acts of each session formed but one statute, to which a general title was attached, and for this reason an act of parliament was up to 1892 generally cited as the chapter of a particular statute,

e.g. 24 and 25 Vict. c. 101. Titles were, however, prefixed to individual acts as early as 1488. Now, by the Short Titles Act 1892, it is optional to cite most important acts up to that date by their short titles, either indi- vidually or collectively. Most modern acts have borne short titles independently of the act of 1892. (See Parliament; Statute.) ACTON (JOHN EMERICH EDWARD DALBERG ACTON), ist Baron (1834-1902), English historian, only son of Sir Richard Acton, 7th baronet, and grandson of the Neapolitan admiral, Sir J. F. E. Acton, 6th baronet (q.v.), was born at Naples on the 10th of January 1834. His grandfather, who had succeeded in 1 791 to the baronetcy and family estates in Shropshire, previously held by the English branch of the Acton family, represented a younger branch which had transferred itself first to France and then to Italy, but by the extinction of the elder branch the admiral became head of the family; his eldest son, Richard, had married Marie Louise Pelline, the daughter and heiress of Emerich Joseph, due de Dalberg (q.v.), a naturalized French noble of ancient German lineage who had entered the French service under Napoleon and represented Louis XVIII. at the congress of Vienna in 1814, and after Sir Richard Acton's death in 1837 she became (1840) the wife of the 2nd Earl Gran- ville. ■ Coming of a Roman Catholic family, young Acton was educated at Oscott till 1848 under Dr (afterwards Cardinal) Wiseman, and then at Edinburgh, and at Munich under Dol- linger, whose lifelong friend he became. He had wished to go to Cambridge, but for a Roman Catholic this was then impossible. By Dollinger he was inspired with a deep love of historical re- search and a profound conception of its functions as a critical instrument. He was a master of the chief foreign languages, and began at an early age to collect a magnificent historical library, with the object, never in fact realized, of writing a great History of Liberty. In politics he was always an ardent Liberal.

1 Where the grant is not of supply, the preamble varies a little, e.g. in the Prince of Wales's Children Act 1889.

Without being a notable traveller, he spent much time in the chief intellectual centres of Europe, and in the United States, and numbered among his friends such men as Montalembert, De Tocqueville, Fustel de Coulanges, Bluntschli, von Sybel and Ranke. He was attached to Lord Granville's mission to Moscow, as British representative at the coronation of Alexander II. in 1856. In 1859 Sir John Acton settled in England, at his country house, Aldenham, in Shropshire. He was

returned to the House of Commons in that year for the Irish borough of Carlow, and became a devoted admirer and adherent of Mr Gladstone; but he was practically a silent member, and his parliamentary career came to an end after the general election of 1865, when, having headed the poll for Bridgnorth, he was unseated on a scrutiny ; he contested Bridgnorth again in 1868, but without success. Meanwhile he had become editor of the Roman Catholic monthly paper, the Rambler, in 1859, on J.H. Newman's retirement from the editorship ; and in 1862 he merged this periodical in the Home and Foreign Review. His contributions at once gave evidence of his remarkable wealth of historical knowledge. But though a sincere Roman Catholic, his whole spirit as a historian was hostile to ultramontane pretensions, and his independence of thought and liberalism of view speedily brought him into conflict • with the Roman Catholic hierarchy. As early as August 1862, Cardinal Wiseman publicly censored the Review, and when in 1864, after Dollinger's appeal at the Munich Congress for a less hostile attitude towards historical criticism, the pope issued a declaration that the opinions of Catholic writers were subject to the authority of the Roman congregations, Acton felt that there was only one way of reconciling his literary conscience with his ecclesiastical loyalty, and he stopped the publication of his monthly periodical. He continued, however, to contribute articles to the North British Review, which, previously a Scottish Free Church organ, had been acquired by friends in sympathy with him, and which for some years (until 1872, when it ceased to appear) actively pro- moted the interests of a high-class Liberalism in both temporal and ecclesiastical matters; he also did a good deal of lecturing on historical subjects. In 1865 he married the Countess Marie, daughter of the Bavarian Count Arco- Valley, by whom he had one son and three daughters. In 1869 he was raised to the peerage by Gladstone as Baron Acton ; he was an intimate friend and constant correspondent of the Liberal leader, and the two men had the very highest regard for one another. Matthew Arnold used to say that "Gladstone influences all round him but Acton; it is Acton who influences Gladstone."

In 1870 came the great crisis in the Roman Catholic world over the promulgation by Pius IX. of the dogma of papal infalli- bility. Lord Acton, who was in complete sympathy on this subject with Dollinger (q.v.), went to Rome in order to throw all his influence against it, but the step he so much dreaded was not to be averted. The Old Catholic separation followed, but Acton did not personally join the seceders, and the authorities prudently refrained from forcing the hands of so competent and influential an English layman. In 1874, when

Gladstone published his pamphlet on The Vatican Decrees, Lord Acton wrote during November and December a series of remarkable letters to The Times, illustrating Gladstone's main theme by numerous historical examples of papal inconsistency, in a way which must have been bitter enough to the ultramontane party, but demurring nevertheless to Gladstone's conclusion and in- sisting that the Church itself was better than its premisses implied. Acton's letters led to another storm in the English Roman Catholic world, but once more it was considered prudent by the Vatican to leave him alone. In spite of his reservations, he regarded "communion with Rome as dearer than life." Thenceforth he steered clear of theological polemics. He de- Voted himself to persistent reading and study, combined with congenial society. With all his capacity for study he was a man of the world, and a man of affairs, not a bookworm. Little in- deed came from his pen, his only notable publications being a masterly essay in the Quarterly Review of January 1878 on "Democracy in Europe"; two lectures delivered at Bridgnorth in

1877 on " The History of Freedom in Antiquity" and "The His- tory of Freedom in Christianity" — these last the only tangible portions put together by him of his long-projected "History of Liberty"; and an essay on modern German historians in the first number of the English Historical Review, which he helped to found (1886). After 1879 he divided his time between London, Cannes and Tegernsee in Bavaria, enjoying and reciprocating the society of his friends. In 1872 he had been given the hono- rary degree of doctor of philosophy by Munich University; in

1888 Cambridge gave him the honorary degree of LL.D., and in

1889 Oxford the D.C.L.; and in 1890 he was made a fellow of All Souls. His reputation for learning had gradually been spread abroad, largely through Gladstone's influence. The latter found him a valuable political adviser, and in 1892, when the Liberal government came in, Lord Acton was made a lord-in- waiting. Finally, in 1895, on the death of Sir John Seeley, Lord Rosebery appointed him to the Regius Professorship of Modern History at Cambridge. The choice was an excellent one. His inaugural lecture on "The Study of History," afterwards pub- lished with notes displaying a vast erudition, made a great im- pression in the university, and the new professor's influence on historical study was felt in many important directions. He delivered two valuable courses of lectures, on the French Revolu- tion and on Modern History, but it was in private that the effects of his teaching were most marked. The great Cambridge Modern History, though he did not live to see it, was planned under his editorship, and all who

came in contact with him testified to his stimulating powers and his extraordinary range of knowledge. He was taken ill, however, in 1901, and died or the 19th of June 1902, being succeeded in the title by his son, Richard Maximilian Dalberg Acton, 2nd Baron Acton (b.1870). Lord Acton has left too little completed original work to rank among the great historians ; his very learning seems to have stood in his way; he knew too much and his literary conscience was too acute for him to write easily, and his copiousness of information overloads his literary style. But he was one of the most deeply learned men of his time, and he will certainly be remembered for his influence on others. His extensive library, formed for use and not for display, and composed largely of books full of his own annotations, was bought immediately after his death by Mr Andrew Carnegie, and presented to Mr John Morley, by whom it was forthwith given to the university of Cambridge.

See Mr Herbert Paul's excellent Introductory Memoir to the interesting volume of Lord Acton's Letters to Mrs Drew (1904), and the authorities cited there; also Dom Gasquet s Lord Acton and his Circle (1906). A Bibliography of the Works of Lord Acton, by W. A. Shaw, was published by the Royal Historical Society in 1903. The Edinburgh Review of April 1903 contains a luminous essay; and Mr Bryce has a chapter on Acton in his Studies of Contemporary Biography (1903). Lord Acton's Lectures on Modern History, edited by J. N. Figgis and R. V. Laurence, appeared in 1906; and his History of Freedom and other Essays and Historical Essays and Studies (by the same editors) in 1907. (H. Ch.)

ACTON, SIR JOHN FRANCIS EDWARD, Bart. (1736-1811), prime minister of Naples under Ferdinand IV., was the son of Edward Acton, a physician at Besancon, and was born there in 1736, succeeding to the title and estates in 1791, on the death of his cousin in the third degree, Sir Richard Acton of Aldenham Hall, Shropshire. He served in the navy of Tuscany, and in 1775 commanded a frigate in the joint expedition of Spain and Tuscany against Algiers, in which he displayed such courage and resource that he was promoted to high command. In 1779 Queen Maria Carolina of Naples persuaded her brother the Grand- Duke Leopold of Tuscany to allcw Acton, who had been recom- mended to her by Prince Caramenico, to undertake the re- organization of the Neapolitan navy. The ability displayed by him in this led to his rapid advancement. He became com- mander-in-chief of both services, minister of finance, and finally prime minister. His policy was devised in concert with the English ambassador, Sir William Hamilton, and aimed at sub- stituting the influence of Austria and Great Britain for that of Spain, at Naples, and consequently

involved open opposition to France and the French party in Italy. The financialand administrative measures which were the outcome of a policy

which necessitated a great increase of armament made him intensely unpopular, and in December 1798 he shared the flight of the king and queen. For the reign of terror which followed the downfall of the Parthenopean Republic, five months later, Acton has been held responsible. In 1804 he was for a short time deprived of the reins of government at the demand of France; but he was speedily restored to his former position, which he held till, in February 1806, on the entry of the French into Naples, he had to flee with the royal family into Sicily. He died at Palermo on the 12th of August 1811.

He had married, by papal dispensation, the eldest daughter of his brother, General Joseph Edward Acton (b. 1737), who was in the Neapolitan service, and left three children, the elder son, Sir Richard, being the father of the first Lord Acton. The second son, Charles Januarius Edward (1803-1847), after being educated in England and taking his degree at Magdalene College, Cambridge, in 1823, entered the Academia Ecclesiastica at Rome. He left this with the rank of prelate, in 1828 was secretary to the nuncio at Paris and was made vice-legate of Bologna shortly afterwards. He became secretary of the congregation of the Disciplina Regolare, and auditor of the Apostolic Chamber under Gregory XVI., by whom he was made a cardinal in 1842. Cardinal Acton was protector of the English College at Rome, and had been mainly instrumental in the increase, in 1840, of the English vicariates-general to eight, which paved the way for the restoration of the hierarchy by Pius IX. in 1850. He died on the 23rd of June

1847.

ACTON, an urban district in the Ealing parliamentary division of Middlesex, England, suburban to London, 9 m. W. of St. Paul's Cathedral. Pop. (1861) 3151; (1901) 37,744. Its ap- pearance is now wholly that of a modern residential suburb. The derivation offered for its name is from Oak-town, in refer- ence to the extensive forest which formerly covered the locality. The land belonged from early times to the see of London, a grant being recorded in 1220. Henry III. had a residence here. At the time of the Commonwealth Acton was a centre

of Puritanism. Philip Nye (d. 1672) was rector; Richard Baxter, Sir Matthew Hale (Lord Chief- Justice), Henry Fielding the novelist and John Lindley the botanist (d. 1865) are famous names among residents here. Acton Wells, of saline waters, had considerable reputation in the 18th century.

ACT ON PETITION, the term for a part of the procedure in the Probate, Divorce and Admiralty Division, now of infrequent occurrence. It was more freely used in the old Admiralty and Divorce courts before the Judicature Acts. (See Pleading.)

ACTS OF THE APOSTLES. This book of the Bible, which now stands fifth in the New Testament, was read at first as the companion and sequel of the Gospel of Luke. Its separation was due to growing consciousness of the Gospels as a unit of sacred records, to which Acts stood as a sort of appendix. Historically it is of unique interest and value: it has no fellow within the New Testament or without it. The so-called Apocryphal Acts of certain apostles, while witnessing to the impression produced by our Acts as a type of edifying literature, only emphasize this fact. It is the one really primitive Church history, primitive in spirit as in substance; apart from it a connected picture of the Apostolic Age would be impossible. With it, the Pauline Epistles are of priceless historical value; without it, they would remain baffiingly fragmentary and incomplete, often even mis- leading.

1. Plan and Aim. — All agree that the Acts of the Apostles is the work of an author of no mean skill, and that he has exercised careful selection in the use of his materials, in keeping with a definite purpose and plan. It is of moment, then, to discover from his emphasis, whether by iteration or by fulness of scale, what objects he had in mind in writing. Here it is not needful to go farther back than F. C. Baur and the Tubingen school, with its theory of sharp antitheses between Judaic and Gentile Chris- tianity, of which they took the original apostles and Paul respect- ively as typical. Gradually their statement of this position underwent serious modifications, as it became realized that L 6

neither Jewish nor Gentile Christianity was a uniform genus, but included several species, and that the apostolic leaders ‘from the first stood for mutual understanding and unity. Hence the Tubingen school did its chief work in putting the needful question, not in returning the correct answer. Their answer could not be correct, because, as Ritschl showed (in his Altkath. Kirche, 2nded., 1857), their premisses were inadequate. Still the attitude created by the Tubingen theory largely persists as a biassing element in much that is written about Acts. On

the whole, however, there is a disposition to look at the book more objectively and to follow up the hints as to its aim given by the author in his opening verses. Thus (1) his second narrative is the natural sequel to his first. As the earlier one set forth in orderly sequence (Kadeˆfjs) the providential stages by which Jesus was led, ” in the power of the Spirit,” to begin the establishment of the consummated Kingdom of God, so the later work aims at setting forth on similar principles its extension by means of His chosen representatives or apostles. This involves emphasis on the identity of the power, Divine and not merely human, expressed in the great series of facts from first to last. Thus (2) the Holy Spirit appears as directing and energizing throughout the whole struggle with the powers of evil to be overcome in either ministry, of Master or disciples. But (3) the continuity is more than similarity of activity resting on the same Divine energy. The working of the energy in the disciples is condi- tioned by the continued life and volition of their Master at His Father’s right hand in heaven. The Holy Spirit, ” the Spirit of Jesus,” is the living link between Master and disciples. Hence the pains taken to exhibit (i. 2, 4 f. 8, ii. 1 ff., cf. Luke xxiv. 49) the fact of such spiritual solidarity, whereby their activity means His continued action in the world. And (4) the scope of this action is nothing less than humanity (ii. 5 ff.), especially within the Roman empire. It was foreordained that Messiah’s witnesses should be borne by Divine power through all obstacles and to ever-widening circles, until they reached and occupied Rome itself for the God of Israel — now manifest (as foretold by Israel’s own prophets) as the one God of the one race of mankind. (5) Finally, as we gather from the parallel account in Luke xxiv. 46-48, the divinely appointed method of victory is through suffering (Acts xiv. 22). This explains the large space devoted to the tribulations of the witnesses, and their constancy amid them, after the type of their Lord Himself. It forms one side of the virtual apologia for the absence of that earthly prosperity in which the pagan mind was apt to see the token of Divine approval. Another side is the recurring exhibition of the fact that these witnesses were persecuted only by those whose action should create no bias against the persecuted. Their foes were chiefly Jews, whose opposition was due partly to a stiff-necked disinclination to bow to the wider reading of their own religion — to which the Holy Spirit had from of old been pointing (cf. the prominence given to this idea in Stephen’s long speech) — and partly to jealousy of those who, by preaching the wider Messianic Evangel, were winning over the Gentiles, and particu- larly proselytes, in such great numbers.

Such, then, seem to be the author’s main motifs. They make up an

account fairly adequate to the manifoldness of the book; yet they may be summed up in three ideas, together constituting the moral which this history of the expansion of Christianity aims at bringing home to its readers. These are the universality of the Gospel, the jealousy of national Judaism, and the Divine initiative manifest in the gradual stages by which men of Jewish birth were led to recognize the Divine will in the setting aside of national restrictions, alien to the universal destiny of the Church. The practical moral is the Divine character of the Christian religion, as evinced by the manner of its extension in the empire, no less than by its original embodiment in the Founder's life and death. Thus both parts of the author's work alike tend to produce assured conviction of Christianity as of Divine origin (Luke i. 1, 4; Acts i-. 1 f.).

This view has the merit of giving the book a practical religious aim — a sine qua non to any theory of an early Christian writing. Though meant for men of pagan birth in the first instance, it is

to them as inquirers or even converts, such as " Theophilus, " that the argument is addressed. In spite of all difficulties, this religion is worthy of personal belief, even though it mean oppo- sition and suffering. Among the features of the occasion which suggested the need of such an appeal was doubtless the existence of persecution by the Roman authorites, perhaps largely at the instigation of local Judaism. To meet this special perplexity, the author holds up the picture of early days, when the great protagonist of the Gospel constantly enjoyed protection at the hands of Roman justice. It is implied that the present distress is but a passing phase, resting on some misunderstanding; meantime, the example of apostolic constancy should yield strong reassurance. The Acts of the Apostles is in fact an Apology for the Church as distinct from Judaism, the breach with which is accordingly traced with great fulness and care.

From this standpoint Acts no longer seems to end abruptly. Whether as exhibiting the Divine leading and aid, or as recording the impartial and even kindly attitude of the Roman State towards the Christians, the writer has reached a climax. " He wished, " as Harnack well remarks, " to point out the might of the Holy Spirit in the apostles, Christ's witnesses; and to show how this might carried the Gospel

from Jerusalem to Rome and gained for it entrance into the pagan world, “whilst the Jews in growing degree incurred rejection. In keeping with this, verses 26-28 of chapter xxviii. are the solemn closing verses of the work. But verses 30, 31 are an appended observation. ”

Yet the writer is, in fact, ending up most fitly on one of his keynotes, in that he leaves Paul preaching in Rome itself, ” un- molested. ” ” Paulus Romae, apex Evangelii. ”

The full force of this is missed by those who, while rejecting the idea that the author had in reserve enough Pauline history to furnish another work, yet hold that Paul was freed from the imprisonment amid which Acts leaves him (see Paul). But for those, on the other hand, who see in the writer’s own words in xx. 38, uncontradicted by anything in the sequel, a broad hint that Paul never saw his Ephesian friends again, the natural view is open that the sequel to the two years’ preaching was too well known to call for explicit record. Nor would such silence touch- ing Paul’s speedy martyrdom be disingenuous, any more than on the theory that martyrdom overtook him several years later. The writer views Paul’s death (like the horrors of Nero’s Vatican Gardens in 64) as a mere exception to the rule of Roman policy heretofore illustrated. Not even by the Roman authorities were some of Nero’s acts regarded as precedents.

2. Authorship. — External evidence, which is relatively early and widespread (e.g. Muratorian Canon, Irenaeus, Tertullian,Clement and Origen), all points to Luke, the companion and fellow- worker of Paul (Philem. 24), who probably accompanied him as physician also (Col. iv. 14). It must be noted too that evidence for his authorship of the third Gospel counts also for Acts. This carries us back at least to the second quarter of the 2nd century (Justin, Dial. 103, and most probably Marcion), when Aovkolv no doubt stood at the head of the Gospel, especially where it was used side by side with the others. We have every reason to trust the Church’s tradition at this time, particularly as Luke was not prominent enough as an associate of Paul to suggest the theory as a guess. Nor does Eusebius, who knew the ante- Nicene literature intimately, seem to know of any other view ever having been held. If, then, the traditional Lucan author- ship is to be doubted, it must be on internal evidence only. The form of the book, however, in all respects favours Luke, who was of non-Jewish birth (see Col. iv. 12-14 compared with 10 f.), and as a physician presumably a man of culture. The medical cast of much of its language, which is often of a highly technical nature, points strongly the same way; 1 while the early tradition that Luke was born in the

Syrian Antioch admirably suits the

1 This argument, first worked out by Dr W. K. Hobart, The Medical Language of St Luke (Dublin, 1882), but hitherto neglected by many Continental scholars, has been urged afresh by Harnack, Lukas der Arzt (Leipzig, 1906; Eng. trans., London, 1907), to which reference may be made for all matters connected with Lucan author- ship; comp. also R. J. Knowling in The Expositor's Greek Testa- ment.

fulness with which the origin of the Antiochene Church and its place in the further extension of the Gospel are described (see Luke). Again, the attitude of Acts towards the Roman Empire is just what would be expected from a close comrade of Paul (cf. Sir W. M. Ramsay, St Paul the Traveller and Roman Citizen, 1895), but was hardly likely to be shared by one of the next generation, reared in an atmosphere of resentment, first at Nero's conduct and then at the persecuting policy of the Flavian Caesars (see Revelation). Finally, the book itself seems to claim to be written by a companion of Paul. In chap. xvi. 10 the writer, without any previous warning, passes from the third person to the first. Paul had reached Troas. There he saw a vision invit- ing him to go to Macedonia. " But when he saw the vision, straightway we sought *o go forth into Macedonia. " Thence- forth " we " re-emerges at certain points in the narrative until Rome is reached. Irenaeus (iii. 14. 1) quotes these passages as proof that Luke, the author, was a companion of the apostle. The minute character of the narrative, the accurate description of the various journeyings, the unimportance of some of the details, especially some of the incidents of the shipwreck, are strong reasons for believing that the narrative is that of an eye-witness. If so, we can scarcely help coming to the conclusion that this eye-witness was the author of the work; for the style of this eye-witness is exactly the style of the writer who composed the previous portions (see Harnack, op. cit., reinforc- ing the argument as already worked out by B. Weiss, 1893, and especially by Sir J. C. Hawkins in Horae Synopticae, 1899, pp. 143-147). Most scholars admit that the " we " narrative is that of a personal companion of Paul, who was probably none other than Luke, in view of his traditional authorship of Acts. But many suppose that the tradition arose from confused remem- brance of the use by a later author of Luke's " we " document or travel-diary. This supposition would compel us to believe either that the skilful writer of Acts was so careless as to incor- porate a document without altering its form, or that " we " is introduced intentionally. In the latter case we must suppose either that the writer was an eye-witness, or that he wished to be thought an eye-witness. E. Zeller, a follower of Baur, adopted this latter alternative, and P. W. Schmiedel adheres to it. In- deed it is hard to see how it can be

avoided on the theory that the author of Acts used a travel-document by another hand (see below, Sources). On the whole, then, the most tenable theory is that the writer of the “we-” sections was also the author of Acts; and that he was Luke, Paul’s companion during most of his later ministry, and also his ” counterpart,” “as a Hellene, who yet had personal sympathy with Jewish primitive Christianity” (Harnack, op. cit. p. 103; see also Luke).

3. Sources. — So far from the recognition of a plan in Acts being inimical to a quest after the materials used in its composi- tion, one may say that it points the way thereto, while it keeps the literary analysis within scientific limits. The more one realizes the standpoint of the mind pervading the book as a whole, the more one feels that the speeches in the first part of Acts (e.g. that of Stephen) — and indeed elsewhere, too— are not ” free compositions ” of our author, the mere outcome of dra- matic idealization such as ancient historians like Thucydides or Polybius allowed themselves. The Christology, for instance, of the early Petrine speeches is such as a Gentile Christian writing c. 80 a.d. simply could not have imagined. Thus we are forced to assume the use of a certain amount of early Judaeo-Christian material, akin to that implied also in the special parts of the Third Gospel. Paul Feine (Eine vorkanonische Ueberlieferung des Lukas, 180,1) suggested that a single document explains this material in both works, as far as Acts xii. Others maintain that at any rate two sources underlie Acts i.-xii., or even i.-xv. (see A. Harnack, Die Apostelgeschichte, p. 131 ff.). In particular we can recognize a source embodying the traditions of the largely Hellenistic Church of Antioch, a secondary gloss from which may survive in the Bezatt addition to xi. 27, ” when we were assembled. ” Further, if our author was a careful inquirer (Luke i. 3), especially if he was in the habit of taking down in writing what he heard from different witnesses, this may explain

some of the phenomena. Such a man as Luke would have rare facilities for collecting Palestinian materials, varying no doubt in accuracy, but all relatively primitive, whether in Antioch or in Caesarea, where he probably resided for some two years in contact with men like Philip the Evangelist (xxi. 8). There and elsewhere he might also learn a good deal from John Mark, Peter’s friend (1 Pet. v. 13; Acts xii. 12). In any case the study of sources (Quellenkritik) is a comparatively new one, and the resources of analysis, linguistic in particular, are by no means exhausted. One important analogy exists

for the way in which our author would handle any written sources he may have had by him, namely, the manner in which he uses Mark's Gospel narrative in compiling his own Gospel. Guided by this objective criterion, and safeguarded by growing insight, into the author's plastic aim, we need not despair of reaching large agreement as to the nature of the sources lying behind the first half of Acts.

In the second or strictly Pauline half we are confronted by the so-called "we" passages. Of these two main theories are possible: (1) that which sees in them traces of an earlier docu- ment — whether entries in a travel-diary, or a more or less consecutive narrative written later; and (2) that which would regard the "we" as due to the author's breaking instinctively into the first person plural at certain points where he felt himself specially identified with the history. On the former hypothesis, it is still in debate whether the "we" document does or does not lie behind "more of the narrative than is definitely indicated by the formula in question (e.g. cc. xiii.-xv., xxi. 19-xxvi.). On the latter, it may well be questioned whether the presence or absence of "we" be not due to psychological causes, rather than to the writer's mere presence or absence. 1 That is, he may be writing sometimes as a member of Paul's mission at the critical stages of onward advance, sometimes rather as a witness absorbed in his hero's words and deeds (so "we" ceases between xx. 15 and xxi. 1). Naturally he would fall into the former attitude mostly when recording the definitive transition of Paul and his party from one sphere of work to another (xvi. 10 ff., xx. 5 ff., xxvii. 1 ff.). At such times the whole "mission" was as one man in its movements.

4. Historical Value. — The question of authorship is largely bound up with that as to the quality of the contents as history. Acts is divided into two distinct parts. The first (i.-xii.) deals with the church in Jerusalem and Judaea, and with Peter as central figure — at any rate in cc. i.-v. "Yet in cc. vi.xii.," as Harnack 2 observes, "the author pursues several lines at once. (1) He has still in view the history of the Jerusalem community and the original apostles (especially pf Peter and his missionary labours); (2) he inserts in vi. 1 ff. a history of the Hellenistic Christians in Jerusalem and of the Seven Men, which from the first tends towards the Gentile Mission and the founding of the Antiochene community; (3) he pursues the activity of Philip in Samaria and on the coast . . . ; (4) lastly, he relates the history of Paul up to his entrance on the service of the young Antiochene church. In the small space of seven chapters he pursues all these lines and tries also to connect them together, at the same time preparing and sketching the great transition of the Gospel from Judaism to the Greek world. As historian, he has here set himself the greatest task." No

doubt gaps abound in these seven chapters. ” But the inquiry as to whether what is narrated does not even in these parts still contain the main (acts, and is not substantially trustworthy, is not yet con cluded.” The difficulty is that we have but few external means of testing this portion of the narrative (see below, Date). Some of it may well have suffered partial transformation in oral tradi- tion before reaching our author; e.g. the nature of the Tongues at Pentecost does not accord with what we know of the gift of “tongues” generally. The second part pursues the history

1 This view has received Harnack’s support, op. cit. 89 f.

i Apostelgeschichte (1908), p. 46. Harnack finds that our sense of the trustworthiness of the book ” is enhanced by a thorough study of the chronological procedure of its author, both where he speaks and where he keeps silence.” In this aspect the book “as a whole is according to the aims of the author and in reality a historical work” (p. 41; cf. pp. 1-20, 222 ff.).

of the apostle Paul; and here we can compare the statements made in the Acts with the Epistles. The result is a general harmony, without any trace of direct use of these letters; and there are many minute coincidences. But attention has been drawn to two remarkable exceptions. These are, the account given by Paul of his visits to Jerusalem in Galatians as com- pared with Acts; and the character and mission of the apostle Paul, as they appear in his letters and in Acts.

In regard to the first point, the differences as to Paul’s move- ments until he returns to his native province of Syria-Cilicia (see Paul) do not really amount to more than can be explained by the different interests of Paul and our author respectively. But it is otherwise as regards the visits of Gal. ii. 1-10 and Acts xv. If they are meant to refer to the same occasion, as is usually assumed, 3 it is hard to see why Paul should omit reference to the public occasion of the visit, as also to the public vindication of his policy. But in fact the issues of the two visits, as given in Gal. ii. 9 f. and Acts xv. 20 f., are not at all the same. 4 Nay more, if Gal. ii. 1-10 = Acts xv., the historicity of the “Relief visit” of Acts xi. 30, xii. 25, seems definitely excluded by Paul’s narrative of events before the visit of Gal. ii. 1 ff. Accordingly. Sir W. M. Ramsay and others argue that the latter visit itself coincided with the Relief visit, and even see in Gal. ii. 10 witness thereto.

But why, then, does not Paul refer to the public charitable object of his visit? It seems easier therefore to admit that the visit of Gal. ii. 1 ff. is one altogether unrecorded in Acts, owing to its private nature as

preparing the way for public develop- ments — with which Acts is mainly concerned. In that case it would fall shortly before the Relief visit, to which there may be tacit explanatory allusion, in Gal. ii. 10 (see further Paul); and it will be shown below that such a conference of leaders in Gal. ii. 1 ff. leads up excellently both to the First Mission Journey and to Acts xv.

We pass next to the Paul of Acts. Paul insists that he was appointed the apostle to the Gentiles, as Peter was to the Cir- cumcision; and that circumcision and the observance of the Jewish law were of no importance to the Christian as such. His words on these points in all his letters are strong and decided. But in Acts it is Peter who first opens up the way for the Gentiles. It is Peter who uses the strongest language in regard to the in- tolerable burden of the Law as a means of salvation(xv. 10 f., cf. 1). Not a word is said of any difference of opinion between Peter and Paul at Antioch (Gal. ii. n ff.). The brethren in Antioch send Paul and Barnabas up to Jerusalem to ask the opinion of the apostles and elders: they state their case, and carry back the decision to Antioch. Throughout the whole of Acts Paul never stands forth as the unbending champion of the Gentiles. He seems continually anxious to reconcile the Jewish Christians to himself by personally observing the law of Moses. He circumcises the semi- Jew, Timothy; and he performs his vows in the temple. He is particularly careful in his speeches to show how deep is his respect for the law of Moses. In all this the letters of Paul are very different from Acts. In Galatians he claims perfect freedom in principle, for himself as for the Gentiles, from the obligatory observance of the law; and neither in it nor in Corinthians does he take any notice of a decision to which the apostles had come in their meeting at Jerusalem. The narrative of Acts, too, itself implies something other than what it sets in relief; for why should the Jews hate Paul so much, if he was not in some sense disloyal to their Law?

There is, nevertheless, no essential contradiction here, only such a difference of emphasis as belongs to the stand- points and aims of the two writers amid their respective

3 Though this view had the support of J. B. Lightfoot, it should be remembered that this was before the “South Galatian ” theory as to the date of Paul’s work among the Galatians came to prevail.

4 Harnack, indeed, argues (op. cit. pp. 188 ff.) that the Abstinences defined for Gentiles were in the original text of Acts xv. 20 purely moral, and had no reference to Jewish scruples as to eating blood. He regards “what is strangled” (-kuiktov) as originally a mistaken gloss,

which crept into the text. External evidence is against this, nor does it seem demanded by the context; in fact xv. 21 rather goes against it.

historical conditions. Peter's function in relation to the Gentiles belongs to the early Palestinian conditions, before Paul's dis- tinctive mission had taken shape. Once Paul's apostolate — a personal one, parallel with the more collective apostolate of " the Twelve " — has proved itself by tokens of Divine approval, Peter and his colleagues frankly recognize the distinction of the two missions, and are anxious only to arrange that the two shall not fall apart by religiously and morally incompatible usages (Acts xv.). Paul, on his side, clearly implies that Peter felt with him that the Law could not justify (Gal. ii. 15 ff.), and argues that it could not now be made obligatory in principle (cf. " a yoke," Acts xv. 10) ; yet for Jews it might continue for the time (pending the ParoUsia) to be seemly and expedient, especially for the sake of non-believing Judaism. To this he conformed his own conduct as a Jew, so far as his Gentile apos- tolate was not involved (1 Cor. ix. 19 ff.). There is no reason to doubt that Peter largely agreed with him, since he acted in this spirit in Gal. ii. n f., until coerced by Jerusalem sentiment to draw back for expediency's sake. This incident it simply did not fall within the scope of Acts (see below) to narrate, since it had no abiding effect on- the Church's extension. As to Paul's submission of the issue in Acts xv. to the Jerusalem conference, Acts does not imply that Paul would have accepted a decision in favour of the Judaizers, though he saw the value of getting a decision for hie own policy in the quarter to which they were most likely to defer. If the view that he already had an under- standing with the "Pillar " Apostles, as recorded in Gal. ii. 1-10 (see further Paul), be correct, it gives the best of reasons why he was ready to enter the later public Conference of Acts xv. Paul's ewn " free " attitude to the Law, when on Gentile soil, is just what is implied by the hostile rumours as to his conduct in Acts xxi. 21, which he would be glad to disprove as at least exaggerated (ib. 24 and 26). What is clear is that such lack of formal accord as here exists between Acts and the Epistles, tells against its author's dependence on the latter, and so favours his having been a comrade of Paul himself.

The speeches in Acts deserve special notice. Did its author follow the plan adopted by all historians of his age, or is he an Speeches. exce Ption? Ancient historians (like many of modern times) used the liberty of working up in their own language the speeches recorded by them.

They did not dream of verbal fidelity; even when'they had more exact reports before them, they preferred to mould a speaker's thoughts to their own methods of presentation. Besides this, some did not hesitate to give to the characters of their history speeches which were never uttered. The method of direct speech, so useful in producing a vivid idea of what is supposed to have passed through the mind of the speaker, was used to give force to the narrative. Now how far has the author of Acts followed the practice of his con- temporaries? Some of his speeches are evidently but summaries of thoughts which occurred to individuals or multitudes. Others claim to be reports of speeches really delivered. But all these speeches have to a large extent the same style, the style also of the narrative. They have been passed though one editorial mind, and some mutual assimilation in phraseology and idea may well have resulted. They are, moreover, all of them, the merest abstracts. The speech of Paul at Athens, as given by Luke, would not occupy more than a minute or two in delivery. But these circumstances, while inconsistent with verbal accuracy, do not destroy authenticity; and in most of the speeches (e.g. xiv. 15-17) there is a varied appropriateness as well as anallusive- ness, pointing to good information (see under Sources). There is no evidence that any speech in Acts is the free composition of its author, without either written or oral basis; and in general he seems more conscientious than most ancient historians touching the essentials of historical accuracy, even as now understood.

Objections to the trustworthiness of Acts on the ground of its

miracles require to be stated more discriminately than has some-

Mlrmcles. t' mes Deen the case. Particularly is this so as regards

the question of authorship. As Harnack observes

{Lukas der Arzt, p. 24), the " miraculous" or supernormal ele-

ment is hardly, if at all, less marked in the " we " sections, which are substantially the witness of a companion of Paul (and where efforts to dissect out the miracles are fruitless), than in the rest of the work. The scientific method, then, is to consider each " miracle " on its own merits, according as we find reason to suppose that it has reached our author more or less directly. But the record of miracle as such cannot prejudice the question of authorship. Even the form in which the gift of Tongues at Pentecost is conceived does not tell against a companion of Paul, since it may have stood in his source, and the first outpouring of the Messianic Spirit may soon have come to be thought of as unique

in some respects, parallel in fact to the Rabbinic tradition as to the inauguration of the Old Covenant at Sinai (cf. Philo, De decern oraculis, 9, n, and the Midrash on Ps. lxviii. 11).

Finally as to such historical difficulties in Acts as still perplex the student of the Apostolic age, one must remember the possi- bilities of mistake intervening between the facts and the accounts reaching its author, at second or even third hand. Yet it must be strongly emphasized, that recent historical research at the hands of experts in classical antiquity has tended steadily to verify such parts of the narrative as it can test, especially those connected with Paul's missions in the Roman Empire. That is no new result; but it has come to light in greater degree of recent years, notably through Sir W. M. Ramsay's researches. The proofs of trustworthiness extend also to the theological sphere. What was said above of the Christology of the Petrine speeches applies to the whole conception of Messianic salvation, the eschatology, the idea of Jesus as equipped by the Holy Spirit for His Messianic work, found in these speeches, as also to titles like " Jesus the Nazarene " and " the Righteous One " both in and beyond the Petrine speeches. These and other cases in which we are led to discern very primitive witness behind Acts, do not indeed give to such witness the value of shorthand notes or even of abstracts based thereon. But they do support the theory that our author meant to give an unvarnished account of such words and deeds as had come to his knowledge. The perspective of the whole is no doubt his own; and as his witnesses probably furnished but few hints for a continuous narrative, this perspec- tive, especially in things chronological, may sometimes be faulty. Yet when one remembers that by 70-80 a.d. it must have been a matter of small interest by what tentative stages the Messianic salvation first extended to the Gentiles, it is surely surprising that Acts enters into such detail on the subject, and is not content with a summary account of the matter such as the mere logic of the subject would naturally suggest. In any case, the very differ- ence of the perspective of Acts and of Galatians, in recording the same epochs in Paul's history, argues such an independence in the former as is compatible only with an early date.

Quellenkritik, then, a distinctive feature of recent research upon Acts, solves many difficulties in the way of treating it as an honest narrative by a companion of Paul. In addition, we may also count among recent gains a juster method of judging such a book. For among the results of the Tubingen criticism was what Dr W. Sanday calls " an unreal and artificial standard, the standard of the 19th century rather than the 1st, of Germany rather than Palestine, of the lamp and the study rather than of active life." This has a bearing, for instance, on the

differences between the three accounts of Paul's conversion in Acts. In the recovery of a more real standard, we owe much to men like Mommsen, Ramsay, Blass and Harnack, trained amid other methods and traditions than those which had brought the con- structive study of Acts almost to a deadlock.

5. Date. — External evidence now points to the existence of Acts at least as early as the opening years of the 2nd century. As evidence for the Third Gospel holds equally for Acts, its existence in Marcion's day (120-140) is now assured. Further, the traces of it in Polycarp 1 and Ignatius, 2 when taken together, are highly probable; and it is even widely admitted that the resemblance of Acts xiii. 22, and 1″ Ciem. xviii. 1, in features not

1 Polyc. ad Philipp. i. 2, Acts ii. 24; ii. 1, Acts x. 42; ii. 3, Acts xx. 35; vi. 3, Acts vii. 52.

2 Ign. ad Magn. v. 1, Acts i. 25; ad Smyrn. iii. 3, Acts x. 4.1.

found in the Psalm (lxxxix. 20) quoted by each, can hardly be accidental. That is, Acts was probably current in Antioch and Smyrna not later than c. a.d. 115, and perhaps in Rome as early as c. a.d. 96.

With this view internal evidence agrees. In spite of some advocacy of a date prior to a.d. 70, the bulk of critical opinion is decidedly against it. The prologue to Luke's Gospel itself implies the dying out of the generation of eye-witnesses as a class. A strong consensus of opinion supports a date about a.d. 80; some prefer 75 to 80; while a date between 70 and 75 seems no less possible. Of the reasons for a date in one of the earlier decades of the 2nd century, as argued by the Tubingen school and its heirs, several are now untenable. Among these are the supposed traces of 2nd-century Gnosticism and " hier- archical " ideas of organization; but especially the argument from the relation of the Roman state to the Christians, which Ramsay has reversed and turned into proof of an origin prior to Pliny's correspondence with Trajan on the subject. Another fact, now generally admitted, renders a 2nd-century date yet more incredible; and that is the failure of a writer devoted to Paul's memory to make palpable use of his Epistles. Instead of this he writes in a fashion that seems to traverse certain things recorded in them. If, indeed, it were proved that Acts uses the later works of Josephus, we should have to

place the book about a.d. 100. But this is far from being the case.

Three points of contact with Josephus in particular are cited. (i)The circumstances attending the death of Herod Agrippa I. in a.d. 44. HereActs xii. 21-23 ‘ s largely parallel to Jos. Antt. xix. 8. 2 ; but the latter adds an omen of coming doom, while Acts alone gives a circumstantial account of the occasion of Herod’s public appearance. Hence the parallel, when analysed, tells against de- pendence on Josephus. So also with (2) the cause of the Egyptian pseudo-prophet in Acts xxi. 37 f., Jos. Jewish War, ii. 13. 5, Antt. xx. 8. 6 ; for the numbers of his followers do not agree with either of Josephus’s rather divergent accounts, while Acts alone calls them Sicarii. With these instances in mind, it is natural to regard (3) the curious resemblance as to the (non-historical) order in which Theudas and Judas of Galilee are referred to in both as accidental, the more so that again there is difference as to numbers. Further, to make out a case for dependence at all, one must assume the mistaken order (as it may be) in Gamaliel’s speech as due to gross carelessness in the author of Acts — an hypothesis unlikely in itself. Such a mistake was far more likely to arise in oral transmission of the speech, before it reached Luke at all.

6. Place. — The place of composition is still an open question. For some time Rome and Antioch have been in favour; and Blass combined both views in his theory of two editions (see below, Text). But internal evidence points strongly to the Roman province of Asia, particularly the neighbourhood of Ephesus. Note the confident local allusion in xix. 9 to ” the school of Tyrannus ” — not ” a certain Tyrannus,” as in the in- ferior text — and in xix. 33 to ” Alexander “; also the very minute topography in xx. 13-15. At any rate affairs in that region, including the future of the church of Ephesus (xx. 28-30), are treated as though they would specially interest ” Theophilus ” and his circle; also an early tradition makes Luke die in the adjacent Bithynia. Finally it was in this region that there arose certain early glosses (e.g. on xix. 9, xx. 15), probably the earliest of those referred to below. How fully in correspondence with such an environment the work would be, as apologia for the Church against the Synagogue’s attempts to influence Roman policy to its harm, must be clear to all familiar with the strength of Judaism in ” Asia ” (cf. Rev. ii. 9, iii. 9, and see Sir W. M. Ramsay, The Letters to the Seven Churches, ch. xii.).

7. Text. — The apparatus criticus of Acts has grown consider- ably of recent years; yet mainly in one direction, that of the so- called ” Western text.” This term, which our growing knowledge, especially of the Syriac and other Eastern versions, is rendering more and more unsatisfactory, stands for a text which used to be connected almost

exclusively with the ” eccentric ” Codex Bezae, and is comparable to a Targum on an Old Testament book. But it is now recognized to have been very widespread, in both east and west, for some 200 years or more from as early as the middle of the 2nd century. The process, however, of sifting out the readings of all our present witnesses — MSS., versions, Fathers

— has not yet gone far enough to yield any sure or final result aj to the history of this text, so as to show what in its extant form; is primary, secondary, and so on. Beginnings have been made towards grouping our authorities; but the work must go or much further before a solid basis for the reconstruction of its primitive form can be said to exist. The attempts made at sue! a reconstruction, as by Blass (1895, 1897) and Hilgenfeld (1899) are quite arbitrary. The like must be said even of the contribu- tion to the problem made by August Pott, 1 though he has helped to define one condition of success — the classification of the strata in ” Western ” texts — and has taken some steps in the righl direction, in connexion with the complex phenomena of one witness, the Harklean Syriac.

Assuming, however, that the original form of the ” Western ‘ text had been reached, the question of its historical value, i.e. its relation to the original text of A cts, would yet remain. On this point the highest claims have been made by Blass. Ever since 1894 he held that both the ” Western ” text of Acts (which he styles the (3 text) and its rival, the text of th« great uncials (which he styles the a text), are due to the author’s own hand. Further, that the former (Roman) is the more original of the two. being related to the latter (Antiochene) as fuller first draft to severely pruned copy. But even in its later form, that ” /3 stands nearer the Grundschrift than o, but yet is, like a, a copy from it,” the theory is really untenable. In sober contrast of Blass’s sweeping theory stand the views of Sir W. M. Ramsay. Already in The Church in the Roman Empire (1&93) he held that the Codex Bezae rested on a recension made in Asia Minor (somewhere between Ephesus and S. Galatia), not later than about the middle of the 2nd century. Though ” some at least of the alterations in Codex Bezae arose through a gradual process, and not through the action of an individual reviser,” the revision in question was the work of a single reviser, who in his changes and additions expressed the local interpretation put upon Acts in his own time. His aim, in suiting the text to the views of his day, was partly to make it more intelligible to the public, and partly to make it more complete. To this end he “added some touches where surviving tradition seemed to contain trustworthy additional particulars,” such as the statement that Paul taught in the lecture-room of Tyrannus ” from the fifth to the tenth hour.” In his later work,

on St Paul the Traveller and the Roman Citizen (1895), Ramsay's views gain both in precision and in breadth. The gain lies chiefly in seeing beyond the Bezan text to the " Western " text as a whole.

Generally speaking, then, the text of Acts as printed by West- cott and Hort, on the basis of the earliest MSS. (*B), seems as near the autograph as that of any other part of the New Testament ; whereas the " Western " text, even in its earliest traceable forms, is secondary. This does not mean that it has no historical value of its own. It may well contain some true supplements to the original text, derived from local tradition or happy inference — a few perhaps from a written source used by Luke. Certain of these may even date from the end of the 1st century, and the larger part of them are probably not later than the middle of the 2nd. But its value lies mainly in the light cast on ecclesiastical thought in certain quarters during the epoch in question. The nature of the readings themselves, and the distribution of the witness for them, alike point to a process involving several stages and several originating centres of diffusion. The classification of groups of " Western " witnesses has already begun. When completed, it will cast light, not only on the origin and growth of this type of text, but also on the exact value of the remaining witnesses to the original text of Acts — and further on the early handling of New Testament writings generally. Acts, from its very scope, was least likely to be viewed as sacrosanct as regards its text. Indeed there are signs that its undogmatic nature caused it to be comparatively neglected at certain times and places, as, e.g., Chrysostom explicitly witnesses.

Literature. — An account of the extensive and varied literature that has gathered round Acts may be found in two representative

1 Der abendldndische Text der Apostelgeschichte u. die Wir-quelle (Leipzig, 1900). See a review in the Journal of Theol. Studies, ii. 439 ff.

commentaries, viz., H. H. Wendt's edition of Meyer (1899), and that by R. J. Knowling in The Expositor's Creek Testament, vol. ii. (1900), supplemented by his Testimony of St Paul to Christ (1905). See. also J. Moffatt, The Historical New Testament (1901). 412 ff., 655 ff.; C. Clemen, Die Apostelgesch. im Lichte der neueren Forschungen (Giessen, 1905); and A. Harnack, Die Apostelgeschichte (1908). . (J-V. B.)

ACTUARY. The name of actuarius, sc. scriba, in ancient Rome, was given to the clerks who recorded the Acta Publica of the senate, and also to the officers who kept the military accounts and enforced the due fulfilment of contracts for military supplies. In its English form the word has undergone a gradual limita- tion of meaning. At first it seems to have denoted any clerk or registrar; then more particularly the secretary and adviser of any joint-stock company, but especially of an insurance company; and it is now applied specifically to one who makes those calcula- tions as to the probabilities of human life, on which the practice of life assurance and the valuation of reversionary interests, deferred annuities, &c, are based. The first mention of the word in law is in the Friendly Societies Act of 1819, where it is used in the vague sense, " actuaries, or persons skilled in calculation," but it has received stilL further recognition in the Friendly Societies Act of 1875 and the Life Assurance Companies Act of 1870. The word has been used with precision since the establish- ment of the " Institute of Actuaries of Great Britain and Ire- land " in 1848ˆ The Quarterly Journal, Charter of Incorporation, and by-laws of this society may be usefully consulted for particu- lars as to the requirements for membership (see also Annuity). The registrar in the Lower House of Convocation is also called the actuary.

ACUMINATE (from Lat. acumen, point), sharpened or pointed, a word used principally in botany and ornithology, to denote the narrowing or lance-shaping of a leaf or of a bird's feather into a point, generally at the tip, though sometimes (with regard to a leaf) at the base. The poet William Cowper used the word to denote sharp and keen despair, but other authors, Sir T. Browne, Bacon, Bulwer, &c, use it to explain a material pointed shape.

ACUNA, CHRISTOVAL DE (1597-c. 1676), Spanish missionary and explorer, was born at Burgos in 1597. He was admitted a Jesuit in 161 2, and afterwards sent on mission work to Chile and Peru, where he became rector of the college of Cuenca. In 1639 he accompanied Pedro Texiera in his second exploration of the Amazon, in order to take scientific observations, and draw up a report for the Spanish government. The journey lasted ten months; and on the explorer's arrival in Peru, Acufia pre- pared his narrative, while awaiting a ship for Europe. The king of Spain, Philip IV., received the author coldly, and it is said even tried to suppress his book, fearing that the Portuguese, who had just revolted from Spain (1640), would profit by its information. After occupying the positions of procurator of the Jesuits at Rome and censor (calificador) of the Inquisition at Madrid, Acufia returned to South America, where he died, probably soon after 1675. His Nuevo Descubrimiento del Gran Rio de las Amazonas was

published at Madrid in 1641; French and English translations (the latter from the French, appeared in 1682 and 1698.

ACUPRESSURE (from Lat. acus, a needle, and premere, to press), the name given to a method of restraining haemorrhage, introduced by Sir J. Y. Simpson, the direct pressure of a metallic needle, either alone or assisted by a loop of wire, being used to close the vessel near the bleeding point.

ACUPUNCTURE (from Lat. acus, a needle, and pungere, to prick), a form of surgical operation, performed by pricking the part affected with a needle. It has long been used by the Chinese in cases of headaches, lethargies, convulsions, colics, &c. (See Surgery.)

ADABAZAR, an important commercial town in the Khoja Hi sanjak of Asia Minor, situated on the old military road from Constantinople to the east, and connected by a branch line with the Anatolian railway. Pop. 18,000 (Moslems, 10,000; Chris- tians, 8000). It was founded in 1540 and enlarged in 1608 by the settlement in it of an Armenian colony. There are silk and

linen industries, and an export of tobacco, walnut- wood, cocoons and vegetables for the Constantinople market. Imports are valued at £80,000 and exports at £480,000.

See V. Cuinet, Turquie d'Asie (Paris, 1890-1900). ADAD, the name of the storm-god in the Babylonian-Assyrian pantheon, who is also known as Ramman (" the thunderer "). The problem involved in this double name has not yet been definitely solved. Evidence seems to favour the view that Ramman was the name current in Babylonia, whereas Adad was more common in Assyria. To judge from analogous instances of a double nomenclature, the two names revert to two different centres for the cult of a storm-god, though it must be confessed that up to the present it has been impossible to determine where these centres were. A god Hadad who was a prominent deity in ancient Syria is identical with Adad, and in view of this it is plausible to assume — for which there is also other evidence — that the name Adad represents an importation into Assyria from Aramaic districts. Whether the same is the case with Ramman, identical with Rimmon, known to us from the Old Testament as the chief deity of Damascus, is not certain though probable. On the other hand the cult of a specific storm-god in ancient Babylonia is Vouched for by the occurrence of the sign Im — the " Sumerian " or ideographic writing for Adad-Ramman — as an element in proper names of the old Babylonian period. However this name may have originally been pronounced, so

much is certain, — that through Aramaic influences in Baby- lonia and Assyria he was identified with the storm-god of the western Semites, and a trace of this influence is to be seen in the designation Amurru, also given to this god in the religious literature of Babylonia, which as an early name for Palestine and Syria describes the god as belonging to the Amorite district.

The Babylonian storm-god presents two aspects in the hymns, incantations and votive inscriptions. On the one hand he is the god who, through bringing on the rain in due season, causes the land to become fertile, and, on the other hand, the storms that he sends out bring havoc and destruction. He is pictured on monuments and seal cylinders with the lightning and the thunderbolt, and in the hymns the sombre aspects of the god on the whole predominate. His association with the sun-god, Shamash, due to the natural combination of the two deities who alternate in the control of nature, leads to imbuing him with some of the traits belonging to a solar deity. In Syria Hadad is hardly to be distinguished from a solar deity. The process of assimilation did not proceed so far in Babylonia and Assyria, but Shamash and Adad became in combination the gods of oracles and of divination in general. Whether the will of the gods is determined through the inspection of the liver of the sacrificial animal, through observing the action of oil bubbles in a basin of water or through the observation of the movements of the heavenly bodies, it is Shamash and Adad who, in the ritual connected with divination, are invariably invoked. Similarly in the annals and votive inscriptions of the kings, when oracles are referred to, Shamash and Adad are always named as the gods addressed, and their ordinary designation in such instances is bell biri, ” lords of divination.” The consort of Adad-Ramman is Shala, while as Amurru his consort is called Aschratum. (See Babylonian and Assyrian Religion.) (M. Ja.)

ADAGIO (Ital. ad agio, at ease), a term in music to indicate slow time; also a slow movement in a symphony, sonata, &c, or an independent piece, such as Mozart’s pianoforte ” Adagio in B minor.”

ADAIR, JOHN (d. 1722), Scottish surveyor and map-maker of the 17th century. Nothing is known of his parentage, birth- place or early life. His name first came before the public in 1683, when a prospectus was published in Edinburgh entitled An Account of the Scottish Atlas, stating that ” the Privy Council of Scotland has appointed John Adair, mathematician and skilfull mechanick, to survey the shires.” In 1686 an act of tonnage was passed in Adair’s favour. He was then employed on a survey of the Scottish coast and two years later was made a fellow of the Royal Society. Two other acts of tonnage were passed for

Adair, one in 1695 and the other in 1705. In 1703 he published the first part of his Description of the Sea Coasts and Islands of Scotland, for the use of seamen. The second part never appeared. He is thought to have died in London about the end of 1722. He must have lost a considerable amount of money in the execu- tion of his work, and in 1723 some remuneration was made to his widow by the government. Some of his work is preserved in the Advocates' Library at Edinburgh and in the King's Library of the British Museum, London.

ADALBERON, or Ascelin (d. 1030 or 1031), French bishop and poet, studied at Reims and became bishop of Laon in 977. When Laon was taken by Charles, duke of Lorraine, in 988, he was put into prison, whence he escaped and sought the protec- tion of Hugh Capet, king of France. Winning the confidence of Charles of Lorraine and of Arnulf, archbishop of Reims, he was restored to his see; but he soon took the opportunity to betray Laon, together with Charles and Arnulf, into the hands of Hugh Capet. Subsequently he took an active part in ecclesi- astical affairs, and died on the 19th of July 1030 or 103 1. Adal- beron wrote a satirical poem in the form of a dialogue dedicated to Robert, king of France, in which he showed his dislike of Odilo, abbot of Cluny, and his followers, and his objection to persons of humble birth being made bishops. The poem was first pub- lished by H. Valois in the Carmen panegyricum in laudem Beren- garii (Paris, 1663), and in modern times by J. P. Migne in the Patrologia Latina, tome cxli. (Paris, 1844). Adalberon must not be confounded with his namesake, Adalberon, archbishop of Reims (d. 988 or 989).

See Richer, Historiarum libri III. et IV., which appears in the Monumenta Germaniae historica. Scriptores. Band iii. (Hanover and Berlin, 1826-1892) ; A. Olleris, CEuvres de Gerbert pape sous le nom de Sylvestre II. (Paris, 1867) ; Histoire litteraire de la France, tome vii. (Paris, 1865-1869).

ADALBERT, or Adelbert (c. 1000-1072), German arch- bishop, the most famous ecclesiastic of the nth century, was the son of Frederick, count of Goseck, a member of a noble Saxon family. He was educated for the church, and began his clerical career at Halberstadt, where he attained to the dignity of provost. Having attracted the notice of the German king, Henry III., Adalbert probably served as chancellor of the kingdom of Italy, and in 1045 was appointed archbishop of Hamburg-Bremen, his province including the Scandinavian countries, as well as

a larger part of North Germany. In 1046 he accompanied Henry to Rome, where he is said to have refused the papal chair; and in 1052 he was made legate by Pope Leo IX., and given the right to nominate bishops in his province. He sought to increase the influence of his archbishopric, sent missionaries to Finland, Greenland and the Orkney Islands, and aimed at making Bremen a patriarchal see for northern Europe, with twelve suffragan bishoprics. He consolidated and increased the estates of the church, exercised the powers of a count, denounced simony and initiated financial reforms. The presence of this powerful and active personality, who was moreover a close friend of the emperor, was greatly resented by the Saxon duke, Bernard II., who regarded him as a spy sent by Henry into Saxony. Adalbert, who wished to free his lands entirely from the authority of the duke, aroused further hostility by an attack on the privileges of the great abbeys, and after the emperor's death in 1056 his lands were ravaged by Bernard. He took a leading part in the govern- ment of Germany during the minority of King Henry IV., and was styled patronus of the young king, over whom he appears to have exercised considerable influence. Having accompanied Henry on a campaign into Hungary in 1063, he received large gifts of crown estates, and obtained the office of count palatine in Saxony. His power aroused so much opposition that in 1066 the king was compelled to assent to his removal from court. In 1069 he was recalled by Henry, when he made a further attempt to establish a northern patriarchate, which failed owing to the hostility of the papacy and the condition of affairs in the Scan- dinavian kingdoms. He died at Goslar on the 16th or 17th of March 1072, and was buried in the cathedral which he had built at Bremen. Adalbert was a man of proud and haughty bearing, with large ideas and a strong, energetic character. He made

Bremen a city of importance, and it was called by his biographer, Adam of Bremen, the New Rome.

See Adarri of Bremen, Gesta Hammenburgensis ecclesiae pontificum, edited by J. M. Lappenberg, in the Monumenta Germaniae historica. Scriptores. Band vii. (Hanover and Berlin, 1826-1892) ; C. Griinhagen, Adalbert Erzbischof von Hamburg und die Idee eines Nordischen Palriarchats (Leipzig, 1854).

ADALBERT (originally Voytech), (c. 950-997), known as the apostle of the Prussians, the son of a Bohemian prince, was born at Libice (Lobnik, Lubik), the ancestral seat near the junction of the Cidlina and the Elbe. He was educated at the monastery of Magdeburg; and in 983 was chosen bishop of Prague. The extreme severity of his rule repelled the Bohemians, whom he vainly strove to wean from their national

customs and pagan rites. Discouraged by the ill-success of his ministry, he withdrew to Rome until 993, when, in obedience to the command of the pope, he returned to his own people. Finding little amend- ment, however, in their course of living, he soon afterwards went again to Rome, and obtained permission from the pope to devote himself to missionary labours, which he carried on chiefly in North Germany and Poland. While preaching in Pomerania (997) he was assassinated by a heathen priest.

See U. Chevalier, Repertoire des sources historiques du moyen dge, Bio.-Bibl. (1905); Bolland, Acta Sanctorum, April 23; H. G. Voigt, Adalbert von Prag {1898), a thoroughly exhaustive monograph.

ADALIA (med. Anlaliyah; the crusaders' Satalia), the ancient Attalia (q.v.), the largest seaport on the south coast of Asia Minor, though in point of trade it is now second to Mersina. The unsuitability of the harbour for modern steamers, the bad anchorage outside and the extension of .railways from Smyrna have greatly lessened its former importance as an emporium for west central Anatolia. It is not connected by a chaussee with any point outside its immediate province, but it has considerable importance as the administrative capital of a rich and isolated sanjak. Adalia played a considerable part in the medieval history of the Levant. Kilij Arslan had a palace there. The army of Louis VII. sailed thence for Syria in 1 148, and the fleet of Richard of England rallied there before the conquest of Cyprus. Conquered by the Seljuks of Konia, and made the capital of the province of Tekke, it passed after their fall through many hands, including those of the Venetians and Genoese, before its final occupation by the Ottoman Turks under Murad II. (1432). In the 1 8th century, in common with most of Anatolia, its actual lord was a Dere Bey. The family of Tekke Oglu, domiciled near Perga, though reduced to submission in 1812 by Mahmud II., continued to be a rival power to the Ottoman governor till within the present generation, surviving by many years the fall of the other great Beys of Anatolia. The records of the Levant (Turkey) Company, which maintained an important agency here till 1825, contain curious information as to the local Dere Beys. The present population of Adalia, which includes many Christians and Jews, still living, as in the middle ages, in separate quarters, the former round the walled mina or port, is about 25,000. The port is served by coasting steamers of the local companies only. Adalia is an extremely picturesque, but ill-built and backward place. The chief thing to see is the city wall, outside which runs a good and clean promenade. The government offices and the houses of the better class are all outside the walls.

See C. Lanckoronski, Villes de la Pamphylie et de la Pisidie, i. (1890). (D. G. H.)

ADAM, the conventional name of the first created man according to the Bible.

1. The Name. — The use of ” Adam ” (din) as a proper name is an early error. Properly the word ddam designated man as a species; with the article prefixed (Gen. ii. 7, 8, 16, iv. 1; and doubtless ii. 20, iii. 17) it means the first man. Only in Gen. iv. 25 and v. 3-5 is ddam a quasi-proper name, though LXX. and Vulgate use ” Adam ” (ASapi) in this way freely. Gen. ii. 7 suggests a popular Hebrew derivation from dddmah, ” the ground.” Into the question whether the original story did nol give a proper name which was afterwards modified into ” Adam ‘ : — important as this question is — we cannot here eater.

2. Creation of Adam. — For convenience, we shall take ” Adam ”

as a symbol for ” the first man,” and inquire first, what does tradition say of his creation? In Gen. ii. 46-8 we read thus:— “At the time when Yahweh-Elohim 1 made earth and heaven, — earth was as yet without bushes, no herbage was as yet sprouting, because Yahweh-Elohim had not caused it to rain upon the earth, and no men were there to till the ground, but a stream 2 used to go up from the earth, and water all the face of the ground,— then Yahweh-Elohim formed the man of dust of the ground, 3 and blew into his nostrils breath of life, 4 and the man became a living being. And Yahweh-Elohim planted a garden 6 in Eden, east- ward; and there he put the man whom he had formed.” (See Eve.)

How greatly this simple and fragmentary tale of Creation differs from that in Gen. i. i-ii. 4a (see Cosmogony) need hardly be mentioned. Certainly the priestly writer who produced the latter could not have said that God modelled the first man out of moistened clay, or have adopted the singular account of the formation of Eve in ii. 21-23. Tne latter story in particular (see Eve) shows us how childlike was the mind of the early men, whose God is not ” wonderful in counsel ” (Isa. xxviii. 29), and fails in his first attempt to relieve the loneliness of his favourite. For no beast however mighty, no bird however graceful, was a fit companion for God’s masterpiece, and, apart from the serpent, the animals had no faculty of speech. All therefore that Adam

could do, asihey passed before him, was to name them, as a lord names his vassals. But here arises a difficulty. How came Adam by the requisite insight and power of observation? For as yet he had not snatched the perilous boon of wisdom. Clearly the Paradise story is not homogeneous.

3. How the Animals were named. — Some moderns, e.g. von Bohlen, Ewald, Driver (in Genesis, p. 55, but cp. p. 42), have found in ii. 19, 20 an early explanation of the origin of language. This is hardly right. The narrator assumes that Adam and Eve had an innate faculty of speech. 6 They spoke just as the birds sing, and their language was that of the race or people which descended from them. Most probably the object of the story is, not to answer any curious question (such as, how did human speech arise, or how came the animals by their names?), but to dehort its readers or hearers from the abominable vice referred to in Lev. xviii. 23.' There may have been stories in circulation like that of Ea-bani (§ 8), and even such as those of the Skidi Pawnee, in which " people " marry animals, or become animals. Against these it is said (ver. 20ft) that " for Adam he found no helper (qualified) to match him."

4. Three Riddles. — Manifold are the problems suggested by the Eden-story (see Eden ; Paradise) . For instance, did the original story mention two trees, or only one, of which the fruit was taboo? In iii. 3(cp. vv. 6, n) only " the tree in the midst of the garden " is spoken of, but in ii. 9 and iii. 22 two trees are referred to, the fruit of both of which would appear to be taboo. To this we must add that in ii. 17 " the tree of the knowledge of good and evil " appears to have the qualities of a " tree of life," except indeed to Adam. This passage seems to give us the key to the mystery. There was only one tree whose fruit was for- bidden; it might be called either " the tree of life " or " the tree of knowledge," but certainly not " the tree of knowledge of good and evil." 8 The words "life" and " knowledge " (= " wisdom ") are practically equivalent; perfect knowledge

1 The English Bible gives " the Lord God." This, however, does not adequately represent the Hebrew.

2 See commentaries of Gunkel and Cheyne. As in v. 10, the ocean-stream is meant. (See Eden.)

3 A widely spread mythic representation. (Cp. Cosmogony.)

4 See an illustration from Naville's Book of the Dead (Egyptian) in Jewish Cyclopaedia, i. 174a.

6 Or park. (See Paradise.)

8 The later Jews, however, supposed that before the Fall the animals could speak, and that they had all one language {Jubilees, iii. 28; Jos. Antiquities, i. I, 4).

7 Cheyne, Genesis and Exodus, referring to Dorsey, Traditions of the Skidi Pawnee, pp. 2, 80 ff.

8 ” Good and evil ” may be a late marginal gloss. See further Ency. Bib. col. 3578, and the commentaries (Driver leaves the phrase); also Jastrow, Relig. of Bab. and Ass. p. 553; Sayce, Hibbert Lectures, p. 242.

(so primitive man believed) would enable any being to escape death (an idea spiritualized in Prov. iii. 18).

Next, which of the trees is the ” tree of life “? Various sacred trees were known to the Semitic peoples, such as the fig-tree (cp. iii. 7), which sometimes appears, conventionalized, as a sacred tree. 9 But clearly the tree referred to was more than a ” sacred tree “; it was a tree from whose fruit or juice, as culture advanced, some intoxicating drink was produced. The Gao- kerena of the Iranians I0 is exactly parallel. At the resurrection, those who drink of the life-giving juice of this plant will obtain ” perfect welfare,” including deathlessness. It is not, however, either from Iran or from India that the Hebrew tree of life is derived, but from Arabia and Babylonia, where date-wine (cp. Enoch xxiv. 4) is the earliest intoxicant. Of this drink it may well have been said in primitive times (cp. Rig Veda, ix. 90. 5, of Soma) that it ” cheers the heart of gods ” (in the speech of the vine, Judg. ix. 13). Later writers spoke of a ” tree of mercy,” distilling the ” oil of life,” 11 i.e. the oil that heals, but 4 Esdr. ii. 12 (cp. viii. 53) speaks of the ” tree of life,” and Rev. xxii. 2 (virtually) of ” trees of life,” whose leaves have a healing virtue (cp. Ezek. xlvii. 12). The oil-tree should doubtless be grouped with the river of oil in later writings (see Paradise). Originally it was enough that there should be one tree of life, i.e. that heightened and preserved vitality.

A third enigma— why no ” fountain of life “? The references to such a fountain in Proverbs (xiii. 14, &c.) prove that the idea was familiar, 12 and in Rev. xxii. 1 we are told that the river of Paradise was a ” river of water of life “. (see Paradise), The serpent, too, in mythology is a regular symbol of water. Possibly the narrator, or redactor, desired to tone down the traces of mythology. Just as the Gathas (the ancient Zoroastrian hymns) omit Gaokerena, and the Hebrew prophets on the

whole avoid mythological phrases, so this old Hebrew thinker prunes the primitive exuberance of the traditional myth.

5. The Serpent— The keen-witted, fluently speaking serpent gives rise to fresh riddles. How comes it that Adam's ruin is effected by one of those very " beasts of the field " which he had but lately named (ii. 19), that in speech he is Adam's equal and in wisdom his superior? Is he a pale form of the Babylonian chaos-dragon, or of the serpent of Iranian mythology who sprang from heaven to earth to blight the " good creation "? It is true that the serpent of Eden has mythological affinities. In iii. 14, 15, indeed, he is degraded into a mere typical snake, but iii. 1-5 shows that he was not so originally. He is perhaps best regarded, in the light of Arabian folk-lore, as the manifestation of a demon residing in the tree with the magic fruit. 13 He may have been a prince among the demons, as the magic tree was a prince among the plants. Hence perhaps his strange boldness. For some unknown reason he was ill disposed towards Yahweh- Elohim (see iii. 36), which has suggested to some that he may be akin to the great enemy of Creation. To Adam and Eve, how- ever, he is not unkind. He bids them raise themselves in the scale of being by eating the forbidden fruit, which he declares to be not fatal to life but an opener of the eyes, and capable of equalizing men with gods (iii. 4, 5)- To the phrase " ye shall be as gods " a later writer may have added " knowing good and evil," but " to be as gods " originally meant " to live the life of gods— wise, powerful, happy." The serpent was in the main right, but there is one point which he did not mention, viz. that for any being to retain this intensified vitality the eating of the

9 See illustration in Toy's Ezekiel {Sacred Books of the Old Testament), p. 182.

10 Gaokerena is the mythic white haoma plant {Zendavesta, Vendtdad, xx. 4; Bundahish, xxvii. 4). It is an idealization of the yellow haoma of the mountains which was used in sacrifices {Yasna, x. 6-10). It corresponds to the soma plant {Asclepias acida) of the ancient Aryans of India. On the illustrative value of Gaokerena see Cheyne, Origin of the Psalter, pp. 400-439.

11 See Life of Adam and Eve (apocryphal), §§ 36, 40; Apocal. Mas. § 9 ; Secrets of Enoch, viii. 7, xxii. 8,9. " Oil of life," in a Bab. hymn, Die Keilinschriften und das Alte Testament, ed. 3, p. 526.

12 Cp. the Bab. myths of Adapa and of the Descent of lshtar. »W. R. Smith, Relig. of Semites, pp. 133. 442; Ency. Bib.,

” Serpent,” §§ 3, 4.

fruit would have to be constantly renewed. Only thus could even the gods escape death. 1

6. The Divine Command broken. — The serpent has gone the right way to work; he comprehends woman’s nature better than Adam comprehends that of the serpent. By her curiosity Eve is undone. She looks at the fruit; then she takes and eats; her husband does the same (iii. 6). The consequence (ver. 7) may seem to us rather slight: ” they knew (became sensible) that they were naked, and sewed fig-leaves together, and made themselves girdles (aprons) . ” B ut the real meaning is not slight ; the sexual distinction has been discovered, and a new sense of shame sends the human pair into the thickest shades, when Yahweh-Elohim walks abroad. The God of these primitive men is surprised: ” Where art thou? ” By degrees, he obtains a full confession — not from the serpent, whose speech might not have been edifying, but from Adam and Eve. The sentences which he passes are decisive, not only for the human pair and the serpent, but for their respective races. Painful toil shall be the lot of man; subjection and pangs that of woman. 2 The serpent too (whose unique form preoccupied the early men) shall be humiliated, as a perpetual warning to man — who is henceforth his enemy — of the danger of reasoning on and disobeying the will of God.

7. Versions of the Adam-story. — Theologians in all ages have allegorized this strange narrative. 3 The serpent becomes the inner voice of temptation, and the saying in iii. 15 becomes an anticipation of the final victory of good over evil — a view which probably arose in Jewish circles directly or indirectly affected by the Zoroastrian eschatology. . But allegory was far from the thoughts of the original narrators. Another version of the Adam-story is given by Ezekiel (xxviii. 11-19), for underneath the king of Tyre (or perhaps Missor) 4 we can trace the majestic figure of the first man. This Adam, indeed, is not like the first man of Gen. ii.-iii., but more like the “bright angel” who is the first man in the Christian Book of Adam (i. 10; Malan, p. 12). He dwells on a glorious forest-mountain (cp. Ezekiel xxxi. 8, 18), and is led away by pride to equalize himself with Elohim (cp. xxviii. 2, 2 Thess. ii. 4), and punished. And with this passage let us group Job xv. 7, 8, where Job is ironically de- scribed as vying with the first man, who was ” brought forth before the hills” (cp. Prov. viii. 25) and

“drew wisdom to him- self ” by ” hearkening in the council of Elohim.” No reference is made in Job to this hero’s fall. The omission, however, is re- paired, not only in Ezek. xxviii. 16, but also in Isa. xiv. 12-15, where the king, whose name is given in the English Bible as ” Lucifer ” (or margin, ” day-star “), ” son of the morning,” and who, like the other king in Ezekiel, is threatened with death, is a copy of the mythical Adam.

The two conceptions of the first man are widely different. The passages last referred to harmonize with the account given in Gen. i. 26, for ” in our image ” certainly suggests a being equal in brightness and in capacities to the angels — a view which, as we know, became the favourite one in apocryphal and Haggadic descriptions of the Adam before the Fall. And though the priestly writer, to whom the first Creation-story in its present form is due, says nothing about a sacred mountain as the dwell- ing-place of the first-created man, yet this mountain belongs to the type of tradition which the passage, Gen. i. 26-28, imperfectly but truly represents. The glorious first man of Ezekiel, and the god-like first men of the cosmogony (cp. Ps. viii. 5) who held the regency of the earth, 5 require a dwelling-place as far above the common level of the earth as they are themselves above the child- like Adam of the second creation-narrative (Gen. ii.). On this sacred mountain, see Cosmogony.

1 Note the food and drink of the gods in the Babylonian Adapa (or Adamu?) myth.

- The mortality of man forms no part of the curse (cp. iii. 19, ” dust thou art “).

‘ See H. Schultz, Alttest. Theologie, ed. 4, pp. 679 ff., 720 ; Driver, Genesis, p. 44.

4 See Cheyne, Genesis and Exodus.

6 Cp. the ” fair shepherd ” Yima of the Avesta (Vend, ii.), the first man and the founder of civilization to the Iranians, though not like the Yania of the Vedas.

8. Origin of the Adam-story— That the Hebrew story of the first man in both its forms is no mere recast of a Babylonian myth, is generally admitted. The holy mountain is no doubt Babylonian, and the plantations of sacred trees’, one of which at least has magic virtue, can be paralleled from the monuments (see Eden). But there is no complete parallel to the description of Paradise in Gen. ii., or to the

story of the rib, or to that of the serpent. The first part of the latter has definite Arabian affinities; the second is as definitely Hebrew. We may now add that the insertion of iii. 7 (from ” were opened”) to 19 — a passage which has probably supplanted a more archaic and definitely mythological passage — may well have been the conse- quence of the change in the conception of the first man referred to above. Still there are four Babylonian stories which may serve as partial illustrations of the Hebrew Adam-story.

The first is contained in a fragment of a cosmogony in Berossus, now confirmed in the main by the sixth tablet of the Creation- epic. It represents the creation of man as due to one of the in- ferior gods who (at Bel’s command) mingled with clay the blood which flowed from the severed head of Bel (see Cosmogony). The three others are the myths of Adapa, 6 Ea-bani and Etana. As to Adapa, it may be mentioned here that Fossey has shown reason for holding that the true reading of the name is Adamu. It thus becomes plausible to hold that ” Adam ” in Gen. ii.-iii. was originally a proper name, and that it was derived from Babylonia. More probably, however, this is but .an accidental coincidence; both odam and adamu may come from the same Semitic root meaning ” to make.” Certainly Adamu (if it is net more convenient to write ” Adapa “) was not regarded as the progenitor of the human race, like the Hebrew Adam. He was, however, certainly a man — one of those men who were not, of course, rival first-men, but were specially created and endowed. Adamu or Adapa, we are told, received from his divine father the gift of wisdom, 7 but not that of everlasting life. He had a chance, however, of obtaining the gift, or at least of eating the food and drinking the water which makes the gods ageless and immortal. But through a deceit practised upon him by his divine father Ea, he supposed the food and drink offered to him on a certain occasion by the gods to be ” food of death,” ” water of death,” just as Adam and Eve at first believed that the fruit of the magic tree would produce death (Gen. iii. 4, 5).

The second story is that of Ea-bani, 8 who was formed by the goddess Arusu (= the mother-goddess Ishtar) of a lump of clay (cp. Gen. ii. 7). This human creature, long-haired and sensual, was drawn away from a savage mode of life by a harlot, and Jastrow, followed by G. A. Barton, Worcester and Tennant, considers this to be parallel to the story which may underlie the account of the failure of the beasts, and the success of the woman Eve, as a ” help-meet ” for Adam. This, however, is most uncertain.

The third is that of Etana. 9 Here the main points are that Etana is

induced by an eagle to mount up to heaven, that he may win a boon from the kindly goddess Ishtar., Borne by the eagle, he soared high up into the ether, but became afraid. Downward the eagle and his burden fell, and in the epic of Gilgamesh we find Etana in the nether world. According to Jastrow, this attempted ascension was an offence against the gods, and his fall was his punishment. We are not told, however, that Etana had the impious desire of Ezekiel's first man, and if he fell, it was through his own timidity (contrast Ezek. xxviii. 16). But certainly the myth does help us to imagine a story in which, for some sin against the gods, some favoured hero was hurled down from the divine abode, and such a story may some day be dis- covered.

To these illustrations it is unsafe to add the scene on a cylinder preserved in the British Museum, representing two figures, a

6 See Jastrow, Rel. of Bab. and Ass. pp. 548-554; R. J. Harper, in Academy, May 30, 1891 ; Jensen, Keilinschr. Bibliothek, vi. 93 ff.

7 The wisdom was probably to qualify him as a ruler. It is too much to say with Hommel that "Adapa is the archetype of the Johannine Logos."

8 Jastrow, op. cit. p. 474 ff. ; Jensen, Rett. Bibl. vi. 120 ff.

9 Jastrow, p. 522 {.; Jensen, vi. 112 ff.

man (with horns) and perhaps a woman, both clothed, on either side of a fruit-tree, towards which they stretch out their hands. 1 For the meaning of this is extremely problematical. Some better monumental illustration may some day be found, for it is clear that the Babylonian sacred literature had much to tell of offences against the gods in the primeval age.

The student may naturaUy ask, Whence did the Israelites (a comparatively young people) obtain the original myth ? It is most probable that they obtained it through the mediation either of the Canaanites or of the North Arabians. Babylonian influence, as is now well known, was strongly felt for many centuries in Canaan, and even the cuneiform script was in common use among the high officials of the country. When the Israelites entered Canaan, they would learn myths partly of Babylonian origin. North Arabian influence must also have been strong among the Israelites, at least while they sojourned in

North Arabia. From the Kenites, at any rate, they may have received, not only a strong religious impulse, but a store of tales of the primitive age, and these stories too may have been partly influenced by Babylonian traditions. We must allow for stages of development both among the Israelites and among their tutors.

9. Biblical References to the Adam-story. — It is remarkable how little influence the Adam-story has had on the earlier parts of the Old Testament. The garden of Eden is referred to in Isa. li. 3, Ezek. xxxvi. 35, Joel ii. 5; cp. Ezek. xxviii. 13, xxxi. 8, 9, 16, 18, all of which are later. And it is mostly in the ” humanistic ” book of Proverbs that we find allusions to the ” tree of life ” (Prov. iii. 18, xi. 30, xiii. 12, xv. 4), and to the “fountain of life ” — perhaps (see § 4) an omitted portion of the old Paradise- story (Prov. x. 11, xiii. 14, xiv. 27, xvi. 22), — the only other Biblical reference (apart from Rev. xxi. 6) being in that exquisite passage, Ps. xxxvi. 9. One can hardly be surprised at this. The Adam-story is plainly of foreign origin, and could not please the greater pre-exilic prophets. In late post-exilic times, how- ever, foreign tales, even if of mythical origin, naturally came into favour, especially as religious symbols. If even now philo- sophers and theologians cannot resist the temptation to allegorize, how inevitable was it that this course should be pursued by early Jewish theologians!

10. Incipient Reflexion on the Story. — Let us give some instances of this. In Enoch brix. 6 we find the story of Eve’s temptation read in the light of that of the fallen angels (Gen. vi. 1, 2, 4) who conveyed an evil knowledge to men, and so subjected mankind to mortality. Evidently the writer fears culture. Elsewhere eating the fruit of the ” tree of wisdom ” is given as the cause of the expulsion of the human pair. In the Wisdom of Solomon (x. 1, 2) we find another view. Here, as in Ezekiel, the first man is pre-eminently wise and strong; though he transgressed, wisdom rescued him, i.e. taught him repentance (cp. Life of Adam and Eve, §§ 1-8). Elsewhere (ii. 24; cp. Jos. Ant. i. 1, 4) death is traced to the envy of the devil, still implying an exalted view of Adam. It is held that, but for his sin, Adam would have been immortal. Clearly the Jewish mind is exposed to some fresh foreign influences. As in the Talmud and the Jerusalem Targum, the serpent has even become the devil, i.e. Satan. The period of syncretism has fully come, and Zoroastrianism in particular, more indirectly than directly, is exercising an attractive power upon the Jews. For ali that, the theological thinking is char- acteristically Jewish, and such guidance as Jewish thinkers required was mainly given by Greek culture. On this subject see further Eve, § 5-

11. Growth of a Theology. — Let us now turn to the Apocalypses of

Baruch and of Ezra (both about 70 A.D.). Different views are here expressed. According to one (xvii. 3, xix. 8, xxiii. 4) the sin of Adam was the cause of physical death; according to another (liv. 15, Ivi. 6), only of premature physical death, while according to a third (xlviii. 42, 43) it is spiritual death which is to be laid to his account. Of these three views, it is only the

1 See Smith and Sayce, Chaldaean Genesis, p. 88 ; Delitzsch, Wo lag das Parodies ? p. 90; Babel and Bible, Eng. trans., p. 56, with note on pp. 114-118; Zimmern, Die Keilinschr. und das A.T., ed. 3, P- 5 2 9 ; Jeremias, Das Alte Test, im Lichte d. Alten Orient, pp. 104-106.

second which harmonizes with Gen. ii.-iii. In one of the two passages which express it we are also told that each member of the human race is ” the Adam of his own soul.” Adam, like Satan in Ecclus. xxi. 27, has become a psychological symbol. Truly, a worthy development of the seed-thoughts of the original narrator, and (must we not add ‘?) entirely opposed to any doctrine of Original Sin.

In 4 Ezra, too, we find no real endorsement of such a doctrine. It is true, not only physical death (iii. 7), but spiritual, is traced to the act of Adam (iii. 21, 22, iv. 30, 31, vii. 118-121). But two modifying facts should be noticed. One is that Adam is said to have had from the first a wicked heart, owing to which he fell, and his posterity likewise, into sin and guilt. All men have the same seed of evil in them that Adam had; they sin and die, like him. The other is that, according to iii. 7-12, there are at least two ages of the world. The first ended with the Flood, so that any consequences of Adam’s sin were, strictly speaking, of limited duration. The second began with righteous Noah and his household, ” of whom came all righteous men.” It was the descendants of these who ” began again to do un- godliness more than the former ones.” Doubtless the problem of evil is most imperfectly treated, even from the writer’s point of view. But it would be cruel to pick holes in a writer whose thinking, like that of St Paul, is coloured by emotion.

At this point we might well make more than a passing reference to St Paul (Rom. v. 14; 1 Cor. xv. 22, 45, 47), whose doctrine of sin is evidently of mixed origin. But we cannot find space for this here. In compensation let it be mentioned that in Rev. xii. 9 (cp. xx. 2) the ” great dragon,” who persecuted the woman ” clothed with the sun,” is identified with ” the old serpent, that is called the Devil and Satan.” The identification is incorrect. But it may be noticed here that the phrase ” the old serpent ” sheds some light on the Pauline phrases ” the first man Adam ” and ” the last Adam ” (1 Cor. xv. 45, 47). The underlying idea is that the new age (that of the new heaven and earth)

will be opened by events parallel to those which opened the first age. As the old serpent deceived man of old, so shall it be again. And as at the head of the first age stands the first Adam, whose doings affected all' his descendants to their harm, so at the head of the second shall stand the second Adam, whose actions shall be potent for good. There is reason to suspect that the expres- sion " the second Adam " is the coinage either of St Paul or of some one closely connected with him (as Prof. G. F. Moore has shown), for there is no proof that such terms as " the last," or " the second Adam," were generally current among the Jews.

12. Jewish Legends:— The parallelism between the first and second Adam in 1 Cor. xv. 45 is a parallelism of contrast. Jewish legends, however, suggest another sort of parallelism. The Haggadah gives the most extravagant descriptions of the glory of Adam before his fall. The most prominent idea is that being in the image of God — the God whose essence is light — he must have had a luminous body (like the angels). " I made thee of the light," says God in the Book of Adam and Eve (Malan, p. 16), " and I willed to bring children of light from thee." Similarly in Baba batra, 58a, we read, " he was of extraordinary beauty and sun-like brightness." So glorious was he that even the angels were commanded through Michael to pay homage to Adam. Satan, disobeying, was cast out of heaven; hence his ill-will towards Adam (Life of Adam and Eve, §§ 13-17; cp. Koran, xvii. 63, xx. 115, xxxviii. 74).

It only remains to give due honour to one of the most beautiful of legends, that of the deliverance of Adam's spirit from the nether world by the Christ, the earliest form of which is a Christian interpolation in Apoc. Moses, § 42 (cp. Malan, Adam and Eve, iv. 15, end). We may compare a partly parallel passage in § 37, where the agent is Michael, and notice that such legendary developments were equally popular among Jews and Christians.

Authorities. — On the apocryphal Books of Adam, see Hort, Diet, of Chr. Biography, i. 37 ff. In English we have Malan's trans- lation of the Ethiopic Book of Adam (1882), and Issaverden's translation of another Book of Adam from the Armenian (Venice, 1901). In German, see Fuchs's translations in Kautzsch's Die Apokryphen, ii. 506 ff. For full bibliography see Schurer, Gesch.

des jud. Volkes, ed. 3, iii. 288 f. On Jewish and Mahommedan legends, see Jewish Cyclopaedia, ” Adam.” On the belief in the Fall, see Tennant, The Sources of the Doctrine of the Fall and Original Sin (1903). (T. K. C.)

ADAM OF BREMEN, historian and geographer, was probably born in Upper Saxony (at Meissen, according to one tradition) before 1045. He came to Bremen about 1067-1068, most likely on the invitation of Archbishop Adalbert, and in the 24th year of the latter’s episcopate (io43?io72); in 1069 he appears as a canon of this cathedral and master of the cathedral school. Not long after this he visited the king of Denmark, Sweyn Estrithson, in Zealand; on the death of Adalbert, in 1072, he began the Historia Hammaburgensis Ecclesiae, which he finished about 1075. He died on the 12th of October of a year unknown, perhaps 1076. Adam’s Hisloria — known also as Gesta Hamma burgensis Ecclesiae Pontificum, Bremensium praesulum Hisloria, and Hisloria ecclesiastica — is a primary authority, not only for the great diocese of Hamburg-and-Bremen, but for all North German and Baltic lands (down to 1072), and for the Scandi- navian colonies as far as America. Here occurs the earliest mention of Vinland, and here are also references of great interest to Russia and Kiev, to the heathen Prussians, the Wends and other Slav races of the South Baltic coast, and to Finland, Thule or Iceland, Greenland and the Polar seas which Harald Hardrada and the nobles of Frisia had attempted to explore in Adam’s own day (before 1066). Adam’s account of North European trade at this time, and especially of the great markets of Jumne at the mouth of the Oder, of Birka in Sweden and of Ostrogard (Old Novgorod?) in Russia, is also of much value. His work, which places him among the first and best of German annalists, consists of four books or parts, and is compiled partly from written records and partly from oral information, the latter mainly gathered from experience or at the courts of Adalbert and Sweyn Estrithson. Of his minor informants he names several, such as Adelward, dean of Bremen, and William the Englishman, ” bishop of Zealand,” formerly chancellor of Canute the Great, and an intimate of Sweyn Estrithson. The fourth (perhaps the most important) book of Adam’s History, variously entitled Libellus de Situ Daniae et reliquarum quae trans Daniam sunt regionum, Descriplio Insulamm Aquilonis, &c, has often been considered, but wrongly, as a separate work.

Ten MSS. exist, of which the chief are (1-2) Copenhagen, Royal Library, Old Royal Collection, No. 2296, of 12th to 13th cents.; No. 718, of 15th cent.; (3) Leyden University, Voss. Lat. 123, of nth cent.; (4) Rome, Vatican Library, 2010; (5) Vienna, Hof- u. Staatsbibliothek,

413, of 13th cent.; (6) Wolfenbiittel, Ducal Library, Gud. 83, of 15th cent.

There are 15 editions of the Historia, in whole or part; the first published at Copenhagen, 1579 (the first of the Libellus or Descriplio Ins. Aquil. appeared at Stockholm in 1615), the best at Hanover, 1846 (by Lappenberg, in Scriplores Rerum Germanicarum; reissued by L. VVeiland, 1876), and at Paris, 1884 (in Migne's Patrologia Latina, cxlvi.). There are also three German versions, and one Danish ; the best is by J. C. M. Laurent (and W. Wattenbach) in Geschichtsschreiber d. deutsch. Vorzeit, part vii. (1850 and 1888) . See also J. Asmussen, De fontibus Adami Bremensis, 1834; Lappenberg in Pertz, Archiv, vi, 770; Aug. Bernard, De Adamo Bremensi (Paris, 1895); Beazley, Dawn of Modern Geography, ii. 514-548 (1901).

ADAM (or Adan) DE LE HALE (died c. 1288), French trouvere, was born at Arras. His patronymic is generally modernized to La Halle, and he was commonly .known to his contemporaries as Adam d'Arras or Adam le Bossu, sometimes simply as Le Bossu d'Arras. His father, Henri de le Hale, was a well-known citizen of Arras, and Adam studied grammar, theology and music at the Cistercian abbey of Vaucelles, near Cambrai. Father and son had their share in the civil discords in Arras, and for a short time took refuge in Douai. Adam had been destined for the church, but renounced this intention, and married a certain Marie, who figures in many of his songs, rondeaux, motets and jeux-partis. Afterwards he joined the household of Robert II., count of Artois; and then was attached to Charles of Anjou, brother of Charles IX., whose fortunes he followed in Egypt, Syria, Palestine and Italy. At the court of Charles, after he became king of Naples, he wrote his Jeu de Robin et Marion, the most famous of his works. He died between 1285 and 1288. Adam's shorter pieces are accompanied by music, of which a

transcript in modern notation, with the original score, is given in Coussemaker's edition. His Jeu de Robin et Marion is cited as the earliest French play with music on a secular subject. The pastoral, which tells how Marion resisted the knight, and re- mained faithful to Robert the shepherd, is based on an old chanson, Robin m'aime, Robin m'a. It consists of dialogue varied by refrains already current in popular song. The melodies to which these are set have, the character of folk-music, and are more spontaneous and melodious than the more elaborate music of his songs and motets. A modern adaptation, by Julien Tiersot, was played at Arras by a company from the Paris Opera Comique on the occasion of a festival in 1896 in honour of Adam de le Hale. His other play, Le jeu Adan or Le jeu de la Feuille'e (c. 1262), is

a satirical drama in which he introduces himself, his father and the citizens of Arras with their peculiarities. His works include a Conge, or satirical farewell to the city of Arras, and an unfinished chanson de geste in honour of Charles of Anjou, Le roi de Sidle, begun in 1282; another short piece, Le jeu du pelerin, is sometimes attributed to him.

The only MS. which contains the whole of Adam's work is the La Valliere MS. (No. 25,566) in 'the Bibliotheque Nationale, Paris, dating from the latter half of the 13th century. Many of his pieces are also contained in Douce MS. 308, in the Bodleian Library, Oxford. His CEuvres completes (1872) were edited by E. de Cousse- maker. See also an article by Paulin Paris in the Histoire litteraire de la France (vol. xx. pp. 638-675); G. Raynaud, Recueil des motets francais des XII" el XIII' siecles (1882); Canchons et Partures des . . . Adan delle Hale (Halle, 1900), a critical edition by Rudolf Berger; an edition of Adam's two jeux in Monmerque and Michel's Thedtre francais au moyen dge (1842); E. Langlois, Le jeu de Robin et Marion (1896), with a translation in modern French;. A. Guesnon, La Satire d Arras au XIII s siecle (1900) ; and a full bibliography of works on the subject in No. 6 of the Bibliotheque de bibliographies critiques, by Henri Guy.

ADAM, ALEXANDER (1741-1809), Scottish writer on Roman antiquities, was born on the 24th of June 1741, near Forres, in Morayshire. From his earliest years he showed uncommon diligence and perseverance in classical studies, notwithstanding many difficulties and privations. In 1757 he went to Edinburgh, where he studied at the university. His reputation as a classical scholar secured him a post as assistant at Watson's Hospital and the headmastership in 1761. In 1764 he became private tutor to Mr Kincaid, afterwards Lord Provost of Edinburgh, by whose influence he was appointed (in 1768) to the rectorship of the High School on the retirement of Mr Mathesbn, whose sub- stitute he had been for some time before. From this period he devoted himself entirely to the duties of his office and to the preparation of his numerous works on classical literature. His popularity and success as a teacher are strikingly illustrated by the great increase in the number of his pupils, many of whom subsequently became distinguished men, among them being Sir Walter Scott, Lord Brougham and Jeffrey. He succeeded in introducing the study of Greek into the curriculum of the school, notwithstanding the opposition of the university headed by Principal Robertson. In 1780 the university of Edinburgh conferred upon him the honorary degree of Doctor of Laws. He died on the 18th of December 1809, after an illness of five days, during which he occasionally imagined himself still at work, his last words being, " It grows dark, boys, you may go." Dr Adam's first publication was his Principles of Latin and English

Grammar (1772), which, being written in English in- stead of Latin, brought down a storm of abuse upon him. This was followed by his Roman Antiquities (1791), A Summary of Geography and History (1794) and a Compendious Dictionary of the Latin Tongue,(i8os). The MS. of a projected larger Latin dictionary, which he did not live to complete, lies in the library of the High School. His best work was his Roman Antiquities, which has passed through a large number of editions and received the unusual compliment of a German translation.

See An A ccount of the Life and Character of A. A., by A. Henderson

(1810).

ADAM, SIR FREDERICK (178ˆ1853), British general, was the son of the Rt. Hon. W. Adam of Blair-Adam, lord-lieutenant of Kinross-shire. He was gazetted an ensign at the age of four- teen and was subsequently educated at Woolwich. He became

captain in 1 799, and served with the Coldstream Guards in Egypt (1801). In 1805, having purchased the intermediate steps of promotion, he obtained command of the 21st Foot, with which regiment he served in the Mediterranean from 1805 to 1813, taking part in the battle of Maida in 1806. In 1813 he accom- panied the British corps sent to Catalonia, in which he com- manded a brigade. He fought a gallant action at Biar (April 12, 1813), and on the following day won further distinction at Castalla. In the action of Ordal, on the 12th of September, Adam received two severe wounds. He returned to England to recover, and was made a major-general in 1814. At Waterloo, Adam's brigade, of which the 52nd under Colborne (see Seaton, Lord) formed part, shared with the Guards the honour of re- pulsing the Old Guard. For his services he was made a K.C.B., and received also Austrian and Russian orders. During the long peace which followed, Sir Frederick Adam was successively employed at Malta, in the Ionian Islands as lord high commis- sioner (1824-1831) and from 1832 to 1837 as governor of Madras. He became K.C.M.G. in 1820, G.C.M.G. four years later, lieu- tenant-general in 1830, a privy councillor in 1831, G.C.B. in 1840, and full general in 1846. He died suddenly on the 17th of August 1853.

ADAM, JULIETTE (1836-), French writer, known also by her maiden

name of Juliette Lamber, was born at Verberie (Oise) on the 4th of October 1836. She has given an account of her childhood, rendered unhappy by the dissensions of her parents, in Le roman de mon enjance et de ma jeunesse (Eng. trans., London and New York, 1902). In 1852 she married a doctor named La Messine, and published in 1858 her Id&es antiproudhoniennes sur V amour, lafemme et le mariage, in defence of Daniel Stern (Mme. d'Agoult) and George Sand. On her husband's death she married in 1868 Antoine Edmond Adam (1816-1877), prefect of police in 1870, and subsequently life- senator; and she established a salon which was frequented by Gambetta and the other republican leaders against the conserva- tive reaction of the 'seventies. In the same interest she founded in 1879 the Nouvelle Revue, which she edited for the first eight years, and in the administration of which she retained a pre- ponderating influence until 1899. She wrote the notes on foreign politics, and was unremitting in her attacks on. Bismarck and in her advocacy of a policy of revanche. Mme. Adam was also generally credited with the authorship of papers on various European capitals signed " Paul Vasili," which were in reality the work of various writers. The most famous of her numerous novels is Paienne (1883). Her reminiscences, Mes premieres armes litttr aires et politiques (1904) and Mes sentiments et nos idees avant 1870 (1905), contain much interesting gossip about her distinguished contemporaries.

ADAM, LAMBERT SIGISBERT (1700-1759), French sculptor, known as Adam Vatni, was born in Nancy, son of Jacob Sigisbert Adam, a sculptor of little repute. Adam was thirty-seven when, on his election to the Academy, he exhibited at the Salon the model of the group of " Neptune and Amphitrite " for the centre of the fountain at Versailles, and thereafter found much em- ployment in the decoration of the royal residences. Among his more important works are " Nymphs and Tritons," " The Triumph of Neptune stilling the Waves," " Hunter with Lion in his Net," a relief for the chapel of St Adelaide, " The Seine and the Marne " in stone for St Cloud, " Hunting " and " Fish- ing," marble groups for Berlin, " Mars embraced by Love " and " The enthusiasm of Poetry." Adam restored with much ability the twelve statues (Lycomedes) found in the so-called Villa of Marius at Rome, and was elected a member of the Academy of St Luke. Several of his most important works were executed for Frederick the Great in Prussia.

His brother, also a sculptor, Nicolas SIbastten Adam (1705- 1778), known as Adam le jeune, born in Nancy, worked under equal encouragement. His first work of importance was his " Prometheus chained, devoured by a Vulture," executed in plaster in 1738, and carved in marble in 1763 as his " reception piece " when he was

elected into the Academy. He produced the reliefs of the ” Birth ” and ” Agony of Christ ” for the Oratory

in Paris, but his chief works are the ” Mausoleum of Cardinal de Fleury ” and, in particular, the tomb of Catherine Opalinska, queen of Poland (wife of King Stanislaus), at Nancy.

A third brother, Francois Gaspard Balthasar Adam (1710- 1761), born in Nancy, became the first sculptor of Frederick the Great and the head of the atelier of sculpture founded by that monarch, and passed the greater part of his life in Berlin. His chief works adorn the gardens and palaces of Sans Souci and Potsdam.

The work of the brothers Adam was too ornate in style to win the approval of the school that immediately followed them, and found its principal opponents in Bouchardon and Pigalle.

See Dussieux, Artistes francais a I’etranger (Paris, 1855, 8vo); Archives de I’ art francais, documents, vol. i. pp. 117-180, chiefly for; works executed for the king of Prussia; Mariette, Abecedario; Emile de la Chavignerie and Auvray, Dictionnaire general dcs artistes de Vecole francaise (Paris, 1882), mainly for works executed; Lady Dilke, French Architects and Sculptors of the 18th century (London, 4to, 1900).

ADAM, MELCHIOR (d. 1622), German divine and biographer, was born at Grotkau in Silesia after 1550, and educated in the college of Brieg, where he became a Protestant. In 1 598 he went to Heidelberg, where he held various scholastic appointments. He wrote the biographies of a number of German scholars of the 1 6th century, mostly theologians, which were published in Heidelberg and Frankfort (5 vols., 161 5-1620). He dealt with only twenty divines of other countries. All his divines are Protestants. His industry as a biographer is commended by P. Bayle, who acknowledges his obligations to Adam’s labours; and his biographies, though they have faults, are still useful.

ADAM, PAUL (1862-), French novelist, was born in Paris on the 7th of December 1862. He was prosecuted for his first novel, Chair molle (1885), but was acquitted. He collaborated with Jean Moreas in Le the chez Miranda (1886), and with Moreas and Gustave Kahn he founded the Symboliste, coming forward as one of the earliest defenders of symbolism. Among his numer- ous novels should be noted Le mystere des Joules (2 vols., 1895), a study in Boulangism, Lettres de Malaisie (1897), a fantastic romance of imaginary future politics. In 1899 he began a novel- sequence, giving the history of the Napoleonic

campaigns, the restoration and the government of Louis Philippe, comprising La force (1899), L'enfant d'Austerlitz (1901), La ruse (1902), and Au soleil de Juillet (1003). In 1900 he wrote a Byzantine romance, Basile et Sophia.

ADAM, ROBERT (1728-1792), British architect, the second son of William Adam of Maryburgh, in Fife, and the most cele- brated of four brothers, John, Robert, James and William Adam, was born at Kirkcaldy in 1 7 28. For few famous men have we so little biographical material, and contemporary references to him are sparse. He certainly studied at the university of Edinburgh, and probably received his first instruction in archi- tecture from his father, who gave proofs of his own skill and taste in the Edinburgh Royal Infirmary (now demolished). His mother was the aunt of Dr W. Robertson, the first English historian of Charles V., and in 1750 we find Robert Adam living with her in Edinburgh, and making one of the brilliant literary coterie which adorned it at that period. Somewhere between 1750 and 1754 he visited Italy, where he spent three years study- ing the remains of Roman architecture. There he was struck with the circumstance that practically nothing had survived of the Greek and Roman masterpieces except public buildings, and that the private palaces, which Vitruvius and Pliny esteemed so highly, had practically vanished. One example of such work, however, was extant in the ruins of Diocletian's palace at Spalato, in Dalmatia, and this he visited in July 1757, taking with him the famous French architect and antiquary, C. L. C16risseau, and two experienced draughtsmen, with whose assistance, after being arrested as a spy, he managed in five weeks to accumulate a sufficient number of measurements and careful plans and surveys to produce a restoration of the entire building in a fine work which he published in 1764, The Ruins of the Palace of Diocletian, &*c. Considering the shortness of the time occupied and the obstacles placed in his way by the Venetian governor and the

population of the place, the result was amazing. The influence of these studies was apparent directly and indirectly in much of his subsequent work, which, indeed, was in great measure founded upon them.

After his return to England he seems to have come rapidly to the front, and in 1762 he was appointed sole architect to the king and the Board of Works. Six years later he resigned this office, in which he was succeeded by his brother James, — who however, held the office

jointly with another, — and entered parliament as member for the county of Kinross. In 1768 he and his three brothers leased the ground fronting the Thames, upon which the Adelphi now stands, for £1200 on a ninety-nine years' lease, and having obtained, with the assistance of Lord Bute, the needful act of parliament, proceeded, in the teeth of public opposition, to erect the ambitious block of buildings which is imperishably associated with their name, indicating its joint origin by the title Adelphi, from the Greek a.St~\4>ol, the Brothers. The site presented attractive possibilities. A steep hill led down Buckingham Street to the river-side, and the plan was to raise against it, upon a terrace formed of massive arches and vaults and facing the river, a dignified quarter of fine streets and stately buildings, suggestive of the Spalato ruins. In spite of many difficulties, pecuniary and otherwise (the undertaking was completed from the proceeds of a lottery), money was raised and the work pushed on; in five years the Adelphi terrace stood complete, and the fine houses were eagerly sought after by artists and men of letters. Splendid, however, as the terrace and its houses are, both in conception and execution, the underground work which upholds them is perhaps more remarkable still. The vast series of arched vaults has been described by a modern writer as a very town, which, during the years that they were open, formed subterranean streets leading to the river and its wharves. In many places the arches stand in double tiers. In time these " streets " obtained a bad name as the haunt of suspicious characters, and they have long been enclosed and let as cellars. Between 1773 and 1778 the brothers issued a fine series of folio engravings and descriptions of the designs for many of their most important works, which included several great public buildings and numberless large private houses; a fine volume was published in 1822. For the remain- ing years of Robert's life the practice of the firm was the most extensive in the country; his position was unquestioned, and when he died in 1792 he was laid to rest in Westminster Abbey almost as a matter of course.

The art of Robert Adam was extraordinarily many-sided and prolific, and it is difficult to give a condensed appreciation of it. As an architect he was strongly under Roman and Italian in- fluences, and his style and aims were exotic rather than native. But this does not detract from their merit, nor need it diminish our estimate of his genius. It was, indeed, the most signal triumph of that genius that he was able so to mould and adapt classical models as to create a new manner of the highest charm and distinction. Out of simple curvilinear farms, of which he principally preferred the oval, he evolved combinations of extra- ordinary grace and variety, and these entered into every detail of his work. In his view the architect was intimately

concerned with the furniture and the decorations of a building, as – well as with its form and construction, and this view he carried rigorously into practice, and with astonishing success. Nothing was too small and unimportant for him — summer-houses and dog- kennels came as readily to him as the vast facades of a terrace in town or a great country house. But he never permitted minute details to obscure the main lines of a noble design. Whatever care he might have expended upon the flowing curves of a moulding or a decoration, it was strictly kept in its place; it contributed its share and no more to the total effect. He made a distinct step forward in giving shape to the idea of imparting the unity of a single imposing structure to a number of private bouses grouped in a block which is so characteristic a feature of modern town building, and though at times he failed in the breadth of grasp needful to carry out such an idea on a large scale, he has left us some fine examples of what can be accom-

plished in this direction. A delightful but theoretically Unde- sirable characteristic of his work is the use of stucco. Upon it he moulded delicate forms in subtle and beautiful proportions. His ” compo ” was used so successfully that the patent was in- fringed: many of his moulds still exist and are in constant use. That most difficult feature, the column, he handled with enthusi- asm and perfect mastery; he studied and wrote of it with minute pains, while his practice showed his grasp of the subject by all avoidance of bare imitation of the classic masters who first brought it to perfection. His work might be classic in form, but it was independently developed by himself. It would be im- possible here to give a list of the innumerable works which he executed. In London, of course, the Adelphi stands pre-eminent; the screen and gate of the Admiralty and part of Fitzroy Square are by him, Portland Place, and much of the older portion of Finsbury Circus, besides whole streets of houses in the west end. There are the famous country houses of Lord Mansfield at Caen Wood, Highgate and Luton Hoo, and decora- tions and additions to many more.

Robert Adam — with, there is reason to suspect, some help from his brother James — has left as deep and enduring a mark upon English furniture as upon English architecture. Down to his time carving was the dominant characteristic of the mobiliary art, but thenceforward the wood-worker declined in importance. French influence disposed Robert Adam to the development of painted furniture with inlays of beautiful exotic woods, and many of his designs, especially for sideboards, are extremely attractive, mainly by reason of their austere simplicity. Robert Adam was no doubt at first led to turn his thoughts towards furniture by his desire to see his light, delicate, graceful interiors, with their large sense of atmosphere and their refined and

finished detail, filled with plenishings which fitted naturally into his scheme. His own taste developed as he went on, but he was usually extremely successful, and cabinetmakers are still reproducing his most effective designs. In his furniture he made lavish use of his favourite decorative motives — wreaths and paterae, the honey- suckle, and that fan ornament which he used so constantly. Thus an Adam house is a unique product of English art. From fagade to fire-irons, from the chimneys to the ca'rpets, every- thing originated in the same order of ideas, and to this day an Adam drawing-room is to English what a Louis Seize room is to French art. In nothing were the Adams more successful than in mantelpieces and doors.' The former, by reason of their simplicity and the readiness with which the " compo " orna- ments can be applied and painted, are still made in cheap forms in great number. The latter were most commonly executed in a rich mahogany and are now greatly sought after. The extent to which the brothers worked together is by no means clear — indeed, there is an astonishing dearth of information regarding this remarkable family, and it is a reproach to English art litera- ture that no biography of Robert Adam has ever been published. John Adam succeeded to his father's practice as an architect in Edinburgh. James Adam studied in Rome, and eventually was closely associated with Robert; William is variously said to have been a banker and an architect. (J. P.-B.)

ADAH, WILLIAM (1751-1839), British lawyer and politician, eldest son of John Adam of Blair-Adam, Kinross-shire, and nephew of the architect noticed above, was born on the 2nd of August 1751, studied at the universities of Edinburgh and Glasgow, and passed at the Scottish bar in 1773. Soon after- wards he removed to England, where he entered parliament in 1774, and in 1782 was called to the common law bar. He withdrew from parliament in 1795, entered it again in 1806 as representative of the united counties of Clackmannan and Kinross, and continued a member, with some interruptions, till 181 1. He was a Whig and a supporter of the policy of Fox. At the English bar he obtained a very considerable practice. He was successively attorney and solicitor-general to the prince of Wales, one of the managers of the impeachment of Warren Hastings, and one of the counsel who defended the first Lord Melville when impeached. During his party's brief tenure of office in 1806 he was chancellor of the duchy of Cornwall, and

was afterwards a privy councillor and lord-lieutenant of Kinross- shire.

In 1814 he became a baron of Exchequer in Scotland, and was chief commissioner of the newly established jury-court for the trial of civil causes, from 1815 to 1830, when it was merged in the permanent supreme tribunal. He died at Edinburgh on the 17th of February 1839.

ADAMANT (from Gr. aSa/ias, untameable), the modern diamond (q.v.), but also a name given to any very hard substance. The Greek word is used by Homer as a personal epithet, and by Hesiod for the hard metal in armour, while Theophrastus applies it to the hardest crystal. By an etymological confusion with the Lat. adamare, to have an attraction for, it also came to be associated with the loadstone; but since the term was displaced by ” diamond ” it has had only a figurative and poetical use.

ADAMAWA, a country of West Africa, which lies roughly between 6° and 11° N., and n° and 15 E., about midway between the Bight of Biafra and Lake Chad. It is now divided between the British protectorate of Nigeria (which includes the chief town Yola, q.v.) and the German colony of Cameroon. This region is watered by the Benue, the chief affluent of the Niger, and its tributary the Faro. Another stream, the Yedseram, flows north-east to Lake Chad. The most fertile parts of the country are the plains near the Benue, about 800 ft. above the sea. South and east of the river the land rises to an elevation of 1600 ft., a”nd is diversified by numerous hills and groups of mountains. These ranges contain remarkable rock formations, towers, battlements and pinnacles crowning the hills. Chief of these formations is a gigantic pillar some 450 ft. high and 150 ft. thick at the base. It stands on the summit of a high conical hill. Mount Alantika, about 25 miles south-south-east of Yola, rises from the plain, an isolated granite mass, to the height of 6000 ft. The country, which is very fertile and is covered with luxuriant herbage, has many villages and a considerable popu- lation. Durra, ground-nuts, yams and cotton are the principal products, and the palm and banana abound. Elephants are numerous and ivory is exported. In the eastern part of the country the rhinoceros is met with, and the rivers swarm with crocodiles and with a curious mammal called the ayu, bearing some resemblance to the seal.

Adamawa is named after a Fula Emir Adama, who in the early years of the 19th century conquered the country. To the Hausa and Bornuese it was previously known as Fumbina (or South- land). The inhabitants are mainly pure negroes such as the Durra, Batta and Dekka, speaking different languages, and all fetish-worshippers. They are often of a very low type, and some of the tribes are cannibals. Slave-trading was still active among them in the early years of the

20th century. The Fula (q.v.), who first came into the country about the 15th century as nomad herdsmen, are found chiefly in the valleys, the pagan tribes holding the mountainous districts. There are also in the country numbers of Hausa, who are chiefly traders, as well as Arabs and Kanuri from Bornu. The emir of Yola, in the period of Fula lord- ship, claimed rights of suzerainty over the whole of Adamawa, but the country, since the subjection of the Fula (c. 1900), has consisted of a number of small states under the control of the British and Germans. Garua on the upper Benue, 65 m. east of Yola, is the headquarters of the German administration for the region and the chief trade centre in the north of Adamawa. Yoko is one of the principal towns in the south of the country, and in the centre is the important town of Ngaundere. After Heinrich Barth, who explored the country in 1851, the first traveller to penetrate Adamawa was the German, E. R. Flegel (1882). It has since been traversed by many expeditions, notably that of Baron von Uechtritz and Dr Siegfried Passarge (1893-1894).

An interesting account of Adamawa, its peoples and history, is given by Heinrich Barth in his Travels in North and Central Africa (new edition, London, 1890), and later information is contained in S. Passarge's Adamawa (Berlin, 1895). (See also Cameroon and Nigeria, and the bibliographies there given.)

ADAMITES, or Adamians, a sect of heretics that flourished in North Africa in the 2nd and 3rd centuries. Basing itself prob- ably on a union of certain gnostic and ascetic doctrines, this sect

pretended that its members were re-established in Adam's state of original inhocency. They accordingly rejected the form of marriage, which, they said, would never have existed but for sin, and lived in absolute lawlessness, holding that, whatever they did, their actions could be neither good nor bad. During the middle ages the doctrines of this obscure sect, which did not itself exist long, were revived in Europe by the Brethren and Sisters of the Free Spirit.

ADAMNAN, or Adomnan (c. 624-704), Irish saint and historian, was born at Raphoe, Donegal, Ireland, about the year 624. In 679 he was elected abbot of Hy or Iona, being ninth in succession from the founder, St Columba. While on a mission to the court of King Aldfrith of Northumberland in 686, he was led to adopt the Roman rules with regard to the time for celebrating Easter and the tonsure, and on his return to Iona he tried without success to enforce the change upon the monks. He died on the 23rd of September 704. Adamnan wrote a Life of St Columba, which, though abounding in fabulous matter, is of

great interest and value. The best editions are those published by W. Reeves (1857, new edit. Edinburgh, 1874) and by J. T. Fowler (Oxford, 1894). Adamnan's other well-known work, De Locis Sanctis (edited by P. Geyer, Itinera Hierosolymitana saeculi, iii.viii., &c, 1898; vol. 39 of Bienna Corpus Script. Ecc. Latin) was based, according to Bede, on information received from Arculf, a French bishop, who, on his return from the Holy Land, was wrecked on the west coast of Britain, and was enter tained for a time at Iona. This was first published at Ingolstadt in 1619 by J. Gretser, who also defended Baronius' acceptance of Arculf's narrative against Casaubon. An English translation by G. J. R. Macpherson, Arculf us' Pilgrimage in the Holy Land, was published by the Pilgrim's Text Society (London, 1889).

For full bibliography see U. Chevalier, Reperl. des sources historiques (1903), p. 40.

ADAMS, ANDREW LEITH (1827-1882), Scottish naturalist and palaeontologist, the second son of Francis Adams of Ban- chory, Aberdeen, was born on the 21st of March 1827, and was educated to the medical profession. As surgeon in the Army Medical Department from 1848 to 1873, he utilized his oppor- tunities for the study of natural history in India and Kashmir, in Egypt, Malta, Gibraltar and Canada. His observations on the fossil vertebrata of the Maltese Islands led him eventually to give special study to fossil elephants, on which he became an ac- knowledged authority. In 1872 he was elected F.R.S. In 1873 he was chosen professor of zoology in the Royal College of Science, Dublin, and in 1878 professor of natural history in Queen's College, Cork, a post which he held until the close of his life. He died at Queenstown on the 29th of July 1882.

Publications. — Notes of a Naturalist in the Nile Valley andMalta (London, 1870); other works of travel; Monograph on the British Fossil Elephants (Palaeontographical Soc), (London. 1877-1881).

ADAMS, CHARLES FRANCIS (1807-1886), American diplo- matist, son of John Quincy Adams, and grandson of John Adams, was born in Boston on the 18th of August 1807. His father, having been appointed minister to Russia, took him in 1809 to St Petersburg, where he acquired a perfect familiarity with French, learning it as his native tongue. After eight years spent in Russia and England, he attended the Boston Latin School for four years, and in 1825 graduated at Harvard. He lived two years in the executive mansion, Washington, during his father's presidential term, studying law and moving in a society where he met Webster, Clay, Jackson and Randolph. Returning to Boston, he

devoted ten years to business and study, and wrote for the North American Rediew. He also undertook the management of his father's pecuniary affairs, and actively supported him in his contest in the House of Representatives for the right of petition and the anti-slavery cause. In 1835 he wrote an effective and widely read political pamphlet, entitled, after Edmund Burke's more famous work, An Appeal from the New to the Old Whigs. He was a member of the Massachusetts general court from 1840 to 1845,. sitting for three years in the House of Representatives and for two years in the Senate;' and in 1846-1848 he edited a party journal, the Boston Whig. In 1848 he was prominent in politics as a " Conscience Whig,"

presiding over the Buffalo Convention which formed the Free Soil party and nominated Martin Van Buren for president and himself for vice-president. He was a Republican member of the Thirty-Sixth Congress, which assembled on the 5th of December 1859, and during the second session, from the 3rd of December i860 to the 4th of March 1861, he represented Massa- chusetts in the Congressional Committee of Thirty-three at the time of the secession of seven of the Southern states. His selec- tion by the chairman of this committee, Thomas Corwin, to present to the full committee certain propositions agreed upon by two-thirds of the Republican members, and his calm and able speech of the 31st of January 1861 in the House, served to make him conspicuous before congress and the country. Together with William H. Seward, he stood for the Republican policy of concession; and, while he was criticized severely and. charged with inconsistency in view of his record as a "Conscience Whig," he was of the same mind as President Lincoln, willing to con- cede non-essentials, but holding rigidly to the principle, properly understood, that there must be no extension of slavery. He believed that as the Republicans were the victors they ought to show a spirit of conciliation, and that the policy of righteousness was likewise one of expediency, since it would have for its result the holding of the border slave states with the North until the 4th of March, when the Republicans could take possession of the government atj Washington. With the incoming of the new administration Secretary Seward secured for Adams the appoint- ment of minister to Great Britain. So much sympathy was shown in England for the South that his path was beset with difficulties ; but his mission was to prevent the interference of Great Britain in the struggle; and while the work of Lincoln, Seward and Sumner, and the cause of emancipation, tended to this end, the American minister was insistent

and unyielding, and knew how to present his case forcibly and with dignity. He laboured with energy and discretion to prevent the sailing of the “Alabama “; and, when unsuccessful in this, he persistently urged upon the British government its responsibility for the destruction of American merchant vessels by the privateer. In his own diary he shows that underneath his calm exterior were serious trouble and keen anxiety; and, in fact, the strain which he underwent during the Civil War made itself felt in later years. Adams was instrumental in getting Lord John Russell to stop the “Alexandra,” and it was his industry and pertinacity in argument and remonstrance that induced Russell to order the detention in September 1863 of the two ironclad rams in- tended for the Confederate States. Adams remained in England until May 1868. His last important work was as a member, in 1871-1872, of the tribunal of arbitration at Geneva which dis- posed of the “Alabama” claims. His knowledge of the subject and his fairness of mind enabled him to render his country and the cause of international arbitration valuable service. He died at Boston on the 21st of November 1886.

He edited the works of John Adams (10 vols., 1850-1856), and the Memoirs 0} John Quincy Adams (i2vo\s., 1874-1877). See the excellent biography (Boston, 1900), in the “American Statesmen Series,” by his son, Charles Francis Adams, Jr. (J. F. R.)

ADAMS, HENRY (1838-), American historian, son of Charles Francis Adams and grandson of John Quincy Adams, was born in Boston, Massachusetts, on the 16th of February 1838. He graduated at Harvard in 1858, and from 1861 to 1868 was private secretary to his father. From 1870 to 1877 he was assistant professor of history at Harvard and from 1870 to 1876 was editor of the North American Review. He is considered to have been the first (in 1874-1876) to conduct historical seminary work in the United States. His great work is his History of the United States (1801 to 1817) (9 vols., 1889-1891), which is incom- parably the best work yet published dealing with the administra- tions of Presidents Jefferson and Madison. It is particularly notable for its account of the diplomatic relations of the United States during this period, and for its essential impartiality. Adams also published : Life of Albert Gallatin (1879), John Randolph (1882) in the “American Statesmen Series,” and Historical Essays (1891) ; besides editing Documents Relating

to New England Federalism (1877), and the Writings of Albert Gallatin (3 volumes, 1879). In collaboration with his elder brother Charles Francis Adams, Jr., he published Chapters of Erie and Other Essays (1871), and, with H. C. Lodge, Ernest Young and J. L. Laughlin,

Essays in Anglo-Saxon Law {xSˆ6).

His elder brother, John Quincy Adams (1833-1894), a graduate of Harvard (1853), practised law, and was a Demo- cratic member for several terms of the Massachusetts general court. In 1872 he was nominated for vice-president by the Democratic faction that refused to support Horace Greeley.

Another brother, Charles Francis Adams, Jr. (1835-), born in Boston on the 27th of May 1835, graduated at Harvard in 1856, and served on the Union side in the Civil War, receiving in 1865 the brevet of brigadier-general in the regular army. He was president of the Union Pacific railroad from 1884 to 1890, having previously become widely known as an authority on the management of railways. In 1900-1901 he was president of the American Historical Association. Among his writings are : Railroads, Their Origin and Problems (1878); Three Episodes of Massachusetts History (1892) ; a biography of his father, Charles Francis Adams (1900) ; Lee at Appomattox and Other Papers (1902) ; Theodore Lyman and Robert Charles Winthrop, Jr., Two Memoirs (1906) ; and Three Phi Beta Kappa Addresses (1907).

Another brother, Brooks Adams (1848-), born in Quincy, Massachusetts, on the 24th of June 1848, graduated at Harvard in 1870, and until 1881 practised law. His writings include : The Emancipation of Massachusetts (1887) ; The Law of Civiliza- tion and Decay (1895) ; America's Economic Supremacy (1900) ; and The New Empire (1902).

ADAMS, HENRY CARTER (1852-), American economist, was born at Davenport, Iowa, on the 31st of December 1852. He was educated at Iowa College and Johns Hopkins University, of which latter he was fellow and lecturer (1880- 188 2). He was afterwards a lecturer in Cornell University, and in 1887 became professor of political economy and finance in the university of Michigan. He also became statistician to the Interstate Com- merce Committee and was in charge of the transportation department in the' 1900 census. His principal works are The State in Relation to Industrial Action (1887); Taxation in the United States, 1787 to 1816 (1884) ; Public Debts (1887) ; The Science of Finance (1888) ; Economics and Jurisprudence (1897).

ADAMS, HERBERT (1858-), American sculptor, was .born at West Concord, Vermont, on the 28th of January 1858. He was educated at the Worcester (Massachusetts) Institute of Technology, and at the Massachusetts Normal Art School, and in 1885-1890 he was a pupil of Antonin Mercie in Paris. In 1890- 1898 he was an instructor in the art

school of Pratt Institute, Brooklyn, New York. In 1906 he was elected vice-president of the National Academy of Design, New York. He experi- mented successfully with some polychrome busts and tinted marbles, notably in the “Rabbi’s Daughter” and a portrait of Miss Julia Marlowe, the actress ; and he is at his best in his portrait busts of women, the best example being the study, completed in 1887, of Miss A. V. Pond, whom he afterwards married. Among his other productions are a fountain for Fitch- burg, Massachusetts (1888) ; a number of works for the Con- gressional Library, Washington, including the bronze doors (“Writing “) begun by Olin Warner, and the statue of Professor Joseph Henry ; memorial tablets for the Boston State House ; a memorial to Jonathan Edwards, at Northampton, Mass.. – statues of Richard Smith, the type-founder, in Philadelphia, and of William Ellery Channing, in Boston (1902) ; and the Vanderbilt memorial bronze doors for St Bartholomew’s Church, New York.

ADAMS, HERBERT BAXTER (1850-1901), American his- torian and educationalist, was born at Shutesbury (near Amherst), Massachusetts, on the 16th of April 1850. He graduated at Amherst, at the head of his class, in 1872 ; and between 1873 and 1876 he studied political science, history and economics at Gottingen, Berlin and Heidelberg, Germany, re- ceiving the degree of Ph,D,at Heidelberg in 1876, with the highest

honours (summa cum laude). From 1876 almost until his death he was connected with the Johns Hopkins University, Baltimore, Maryland, being in turn a fellow, an associate in history (1878- 1883), an associate professor (1883-1891) and after 1891 pro- fessor of American and institutional history. In addition he was lecturer on history in Smith College, Northampton, Massa- chusetts, in 1 8 78-1 88 1, and for many years took an active part in Chautauqua work. In 1884, also, he was one of the founders of the American Historical Association, of which he was secretary until 1000. In 1882 he founded the " Johns Hopkins University Studies in Historical and Political Science," and at the time of his death some forty volumes had been issued under his editorship. After 1887 he also edited for the United States Bureau of Educa- tion the series of monographs entitled " Contributions to Ameri- can Educational History," he himself preparing the College of William and Mary (1887), and Thomas Jefferson and the University of Virginia (1888). It was as a teacher, however, that Adams rendered his most valuable services, and many American his- torical scholars owe their training and to a considerable extent their enthusiasm to him. He died at Amherst, Massachusetts, on the 30th of July 1901.

In addition to the monographs mentioned above, he published: Maryland's Influence in Founding a National Commonwealth (1877); Methods of Historical Study (1884); Maryland's Influence upon Land Cessions to the United States (1885); and the Life and Writings of Jared Sparks (2 vols., Boston, 1893), his most important work.

See Herbert B. Adams: Tributes of Friends (Baltimore, 1902), extra volume (xxiii.) of "Studies in Historical and Political Science."

ADAMS, JOHN (1735-1826), second president of the United States of America, was born on the 30th of October 1735 in what is now the

town of Quincy, Massachusetts. His father, a farmer, also named John, was of the fourth generation in descent from Henry Adams, who emigrated from Devonshire, England, to Massachusetts about 1636; his mother was Susanna Boylston Adams. Young Adams graduated from Harvard College in 1755, and for a time taught school at Worcester and studied law in the office of Rufus Putnam. In 1758 he was admitted to the bar. From an early age he developed the habit of writing descriptions of events and impressions of men. The earliest of these is his report of the argument of James Otis in the superior court of Massachusetts as to the constitutionality of writs of assistance. This was in 1761, and the argument inspired him with zeal for the cause of the American colonies. Years afterwards, when an old man, Adams undertook to write out at length his recollections of this scene; it is instructive ta compare the two accounts. John Adams had none of the qualities of popular leadership which were so marked a characteristic of his second cousin, Samuel Adams; it was rather as a constitutional lawyer that he influenced the course of events. He was impetuous, intense and often vehement, unflinchingly courageous, devoted with his whole soul to the cause he had espoused; but his vanity, his pride of opinion and his inborn contentiousness were serious handicaps to him in his political career. These qualities were particularly manifested at a later period — as, for example, during his term as president. He first made his influence widely felt and became conspicuous as a leader of the Massachusetts Whigs during the discussions with regard to the Stamp Act of 1765. In that year he drafted the instructions which were sent by the town of Braintree to its representatives in the Massachusetts

legislature, and which served as a model for other towns in draw- ing up instructions to their representatives; in August 1765 he contributed anonymously four notable articles to the Boston Gazette (republished separately in London in 1768 as A Disser- tation on the Canon and Feudal Law) , in which he argued that the opposition of the colonies to the Stamp Act was a part of the never-ending struggle between individualism and corporate authority; and in December 1765 he delivered a speech before the governor and council in which he pronounced the Stamp Act invalid on the ground that Massachusetts being without representation in parliament, had not assented to it. In 1768 he removed to Boston. Two years later, with that degree of

moral courage which was one of his distinguishing characteristics, as it has been of his descendants, he, aided by Josiah Quincy, Jr., defended the British soldiers who were arrested after the “Boston Massacre,” charged with causing the death of four persons, in- habitants of the colony. The trial resulted in an acquittal of the officer

who commanded the detachment, and most of the soldiers; but two soldiers were found guilty of manslaughter. These claimed benefit of clergy and were branded in the hand and released. Adams's upright and patriotic conduct in taking the unpopular side in this case met with its just reward in the follow- ing year, in the shape of his election to the Massachusetts House of Representatives by a vote of 418 to 118.

John Adams was a member of the Continental Congress from 1774 to 1778. In June 1775, with a view to promoting the union of the colonies, he seconded the nomination of Washington as commander-in-chief of the army. His influence in congress was great, and almost from the beginning he was impatient for a separation of the colonies from Great Britain. On the 7 th of June 1776 he seconded the famous resolution introduced by Richard Henry Lee (q.v .) that " these colonies are, and of a right ought to be, free and independent states," and no man championed these resolutions (adopted on the 2nd of July) so eloquently and effectively before the congress. On the 8th of June he was appointed on a committee with Jefferson, Franklin, Livingston and Sherman to draft a Declaration of Independence; and although that document was by the request of the committee written by Thomas Jefferson, it was John Adams who occupied the foremost place in the debate on its adoption. Before this question had been disposed of, Adams was placed at the head of the Board of War and Ordnance, and he also served on many other important committees.

In 1778 John Adams sailed for France to supersede Silas Deane in the American commission there. But just as he em- barked that commission concluded the desired treaty of alliance, and soon after his arrival he advised that the number of com- missioners be reduced to one. His advice was followed and he returned home in time to be elected a member of the convention which framed the Massachusetts constitution of 1780, still the organic law of that commonwealth. With James Bowdoin and Samuel Adams, he formed a sub-committee which drew up the first draft of that instrument, and most of it probably came from John Adams's pen. Before this work had been completed he was again sent to Europe, having been chosen on the 27th of September 1779 as minister plenipotentiary for negotiating a treaty of peace and a treaty of commerce with Great Britain. Conditions were not then favourable for peace, however; the French government, moreover, did not approve of the choice, inasmuch as Adams was not sufficiently pliant and tractable and was from the first suspicious of Vergennes; and subse- quently Benjamin Franklin, Thomas Jefferson, John Jay and Henry Laurens were appointed to co-operate with Adams. Jefferson, however, did not cross the Atlantic, and Laurens

took little part in the negotiations. This left the management of the business to the other three. Jay and Adams distrusted the good faith of the French government. Outvoting Franklin, they decided to break their instructions, which required them to ‘make the most candid confidential communications on all subjects to the ministers of our generous ally, the king of France; to undertake nothing in the negotiations for peace or truce without their knowledge or concurrence; and ultimately to govern yourself by their advice and opinion”; and, instead, they dealt directly with the British commissioners, without con- sulting the French ministers. Throughout the negotiations Adams was especially determined that the right of the United States to the fisheries along the British-American coast should be recognized. Political conditions in Great Britain, at the moment, made the conclusion of peace almost a necessity with the British ministry, and eventually the American negotiators were able to secure a peculiarly favourable treaty. This preliminary treaty was signed on the 30th of November 1782. Before these negotiations began, Adams had spent some time in the Nether- lands. In July 1780 he had been authorized to execute the

duties previously assigned to Henry Laurens, and at the Hague was eminently successful, securing there recognition of the United States as an independent government (April 19, 1782), and negotiating both a loan and, in October 1782, a treaty of amity and commerce, the first of such treaties between the United States and foreign powers after that of February 1778 with France.

In 1785 John Adams was appointed the first of a long line of able and distinguished American ministers to the court of St James’s. When he was presented to his former sovereign, George III. intimated that he was aware of Mr Adams’s lack of confidence in the French government. Replying, Mr Adams ad- mitted it, closing with the outspoken sentiment: ” I must avow to your Majesty that I have no attachment but to my own country ” — a phrase which must have jarred upon the monarch’s sensibilities. While in London Adams published a work entitled A Defence of the Constitution of Government of the United States (1787). In this work he ably combated the views of Turgot and other European writers as to the viciousness of the frame- work of the state governments. Unfortunately, in so doing, he used phrases savouring of aristocracy which offended many of his countrymen, — as in the sentence in

which he suggested that ” the rich, the well-born and the able ” should be set apart from other men in a senate. Partly for this reason, while Washing- ton had the yote of every elector in the first presidential election of 1789, Adams received only thirty-four out of sixty- nine. As this was the second largest number he was declared vice-president, but he began his eight years in that office (1789- 1797) with a sense of grievance and of suspicion of many of the leading men. Differences of opinion with regard to the policies to be pursued by the new government gradually led to the forma- tion of two well-defined political groups — the Federalists and the Democratic-Republicans — and Adams became recognized as one of the leaders, second only to Alexander Hamilton, of the former.

In 1796, on the refusal of Washington to accept another election, Adams was chosen president, defeating Thomas Jeffer- son; though Alexander Hamilton and other Federalists had asked that an equal vote should be cast for Adams and Thomas Pinckney, the other Federalist in the contest, partly in order that Jefferson, who was elected vice-president, might be excluded altogether, and partly, it seems, in the hope that Pinckney should in fact receive more votes than Adams, and thus, in accordance with the system then obtaining, be elected president, though he was intended for the second place on the Federalist ticket. Adams’s four years as chief magistrate (1 797-1801) were marked by a succession of intrigues which embittered all his later life; they were marked, also, by events, such as the passage of the Alien and Sedition Acts, which brought discredit on the Federal- ist party. Moreover, factional strife broke out within the party itself; Adams and Hamilton became alienated, and members of Adams’s own cabinet virtually looked to Hamilton rather than to the president as their political chief. The United States was, at this time, drawn into the vortex of European complica- tions, and Adams, instead of taking advantage of the militant spirit which was aroused, patriotically devoted himself to securing peace with France, much against the wishes of Hamilton and of Hamilton’s adherents in the cabinet. In 1800, Adams was again the Federalist candidate for the presidency, but the distrust of him in his own party, the popular disapproval of the Alien and Sedition Acts and the popularity of his opponent, Thomas Jefferson, combined to cause his defeat. He then re- tired into private life. On the 4th of July 1826, on the fiftieth anniversary of the adoption of the Declaration of Independence, he died at Quincy. Jefferson died on the same day. In 1764 Adams had married Miss Abigail Smith (1744-1818), the daughter of a Congregational minister at Weymouth, Massa- chusetts. She was a woman of much ability, and her letters, written in an excellent English

style, are of great value to students of the period in which she lived. President John Quincy Adams was their eldest son.

Authorities. — C. F. Adams, The Works of John Adams, with

Life (10 vols., Boston, 1850-1856) ; John and Abigail Adams, Familiar Letters during the Revolution (Boston, 1875) ‘< J- T. Morse, John Adams (Boston, 1885: later edition, 1899), in the " American States-men Series"; and Mellen Chamberlain, John Adams, the States- man of the Revolution; with other Essays and Addresses (Boston, 1898). (E. Ch.)

ADAMS, JOHN COUCH (1819-1892), British astronomer, was born at Lidcot farmhouse, Laneast, Cornwall, on the 5th of June 1819. His father, Thomas Adams, was a tenant farmer; his mother, Tabitha Knill Grylls, inherited a small estate at Bad- harlick. From the village school at Laneast he went, at the age of twelve, to Devonport, where his mother’s cousin, the Rev. John Couch Grylls, kept a private school. His promise as a mathematician induced his parents to send him to the university of Cambridge, and in October 1839 he entered as a sizar at St John’s College. He graduated B.A. in 1843 as the senior wrangler and first Smith’s prizeman of his year. While still an under-graduate he happened to read of certain unexplained irregularities in the motion of the planet Uranus, and determined to investi- gate them as soon as possible, with a view to ascertaining whether they might not be due to the action of a remote undiscovered planet. Elected fellow of his college in 1843, he at once proceeded to attack the novel problem. It was this: from’ the observed perturbations of a known planet to deduce by calculation, assum- ing only Newton’s law of gravitation, the mass and orbit of an unknown disturbing body. By September 1845 he obtained his first solution, and handed to Professor Challis, the director of the Cambridge Observatory, a paper giving the elements of what he described as ” the new planet.”

On the 21st of October 1845 he left at Greenwich Observatory, for the information of Sir George Airy, the astronomer- royal, a similar document, still preserved among the archives. A fort- night afterwards Airy wrote asking for information about a point in the solution. Adams, who thought the query unessential, did not reply, and Airy for some months took no steps to verify by telescopic search the results of the young mathematician’s investigation. Meanwhile, Leverrier, on the 10th of November 1845, presented to the French Academy a memoir on Uranus, showing that the existing theory failed to account for its motion. Unaware of Adams’s work, he attempted a like inquiry, and on the 1st of June 1846, in a second memoir, gave the position, but

not the mass or orbit, of the disturbing body whose existence was presumed. The longitude he assigned differed by only i° from that predicted by Adams in the document which Airy possessed. The latter was struck by the coincidence, and men- tioned it to the Board of Visitors of the Observatory, James Challis and Sir John Herschel being present. Herschel, at the ensuing meeting of the British Association early in September, ventured accordingly to predict that a new planet would shortly be discovered. Meanwhile Airy had in July suggested to Challis that the planet should be sought for with the Cambridge equa- torial. The search was begun by a laborious method at the end of the month. On the 4th and 12 th of August, as afterwards appeared, the planet was actually observed; but owing to the want of a proper star- map it was not then recognized as planet- ary. Leverrier, still ignorant of these occurrences, presented on the 31st of August 1846 a third memoir, giving for the first time the mass and orbit of the new body. He communicated his results by letter to Dr Galle, of the Berlin Observatory, who at once examined the suggested region of the heavens. On the 23rd of September he detected near the predicted place a small star unrecorded in the map, and next evening found that it had a proper motion. No doubt remained that " Leverrier's planet " had been discovered. On the announcement of the fact, Herschel and Challis made known that Adams had already calculated the planet's elements and position. Airy then at length published an account of the circumstances, and Adams's memoir was printed as an appendix to the Nautical Almanac. A keen contro- versy arose in France and England as to the merits of the two astronomers. In the latter country much surprise was expressed at the apathy of Airy; in France the claims made for an unknown Englishman were resented as detracting from the credit due to Leverrier's achievement. As the indisputable facts became

known, the world recognized that the two astronomers had in- dependently solved the problem of Uranus, and ascribed to each equal glory. The new planet, at first called Leverrier by F. Arago, received by general consent the neutral name of Neptune. Its mathematical prediction was not only an unsurpassed intellectual feat; it showed also that Newton's law of gravitation, which Airy had almost called in question, prevailed even to the utmost bounds of the solar system.

The honour of knighthood was offered to Adams when Queen Victoria visited Cambridge in 1847; but then, as on a subsequent occasion, his

modesty led him to decline it. The Royal Society awarded him its Copley medal in 1848. In the same year the members of St John's College commemorated his success by founding in the university an Adams prize, to be given biennially for the best treatise on a mathematical subject. In 1851 he became president of the Royal Astronomical Society. His lay fellowship at St John's College came to an end in 1852, and the existing statutes did not permit of his re-election. But Pembroke College, which possessed greater freedom, elected him in the following year to a lay fellowship, and this he held for the rest of his life. In 1858 he became professor of mathematics at St Andrews, but lectured only for a session, when he vacated the chair for the Lowndean professorship of astronomy and geometry at Cambridge. Two years later he succeeded Challis as director of the Observatory, where he resided until his death.

Although Adams's researches on Neptune were those which attracted widest notice, the work he subsequently performed in relation to gravitational astronomy and terrestrial magnetism was not less remarkable. Several of his most striking contribu- tions to knowledge originated in the discovery of errors or fallacies in the work of his great predecessors in astronomy. Thus in 1852 he published new and accurate tables of the moon's parallax, which superseded J. K. Burckhardt's, and supplied corrections to the theories of M. C. T. Damoiseau, G. A. A. Plana and P. G. D. de Pontecoulant. In the following year his memoir on the secular acceleration of the moon's mean motion partially invalidated Laplace's famous explanation, which had held its place unchallenged for sixty years. At first, Leverrier, Plana and other foreign astronomers controverted Adams's result; but its soundness was ultimately established, and its fundamental importance to this branch of celestial theory has only developed further with time. For these researches the Royal Astronomical Society awarded him its gold medal in 1866. The great meteor shower of 1866 turned his attention to the Leonids, whose probable path and period had already been discussed by Professor H. A. Newton. Using a powerful and elaborate analysis, Adams ascertained that this cluster of meteors, which belongs to the solar system, traverses an elon- gated ellipse in S3i years, and is subject to definite perturbations from the larger planets, Jupiter, Saturn and Uranus. These results were published in 1867. Ten years later, when Mr. G. W. Hill of Washington expounded a new and beautiful method for dealing with the problem of the lunar motions, Adams briefly announced his own unpublished work in the same field, which, following a parallel course had confirmed and supplemented Hill's. In 1874-1876 he was president of the Royal Astronomical Society for the

second time, when it fell to him to present the gold medal of the year to Leverrier. The determination of the constants in Gauss's theory of terrestrial magnetism occupied him at intervals for over forty years. The calculations involved great labour, and were not published during his lifetime. They were edited by his brother, Professor W. Grylls Adams, and appear in the second volume of the collected Scientific Papers. Numerical computation of this kind might almost be described as his pastime. The value of the constant known as Euler's, and the Bernoullian numbers up to the 62nd, he worked out to an unimagined degree of accuracy. For Newton and his writings he had a boundless admiration; many of his papers, indeed, bear the cast of Newton's thought. He laboured for many years at the task of arranging and cataloguing the great collection of Newton's unpublished mathematical writings, presented in 1872

to the university by Lord Portsmouth, and wrote the account of them issued in a volume by the University Press in 1888. The post of astronomer-royal was offered him in 1881, but he preferred to pursue his peaceful course of teaching and research in Cambridge. He was British delegate to the International Prime Meridian Conference at Washington in 1884, when he also attended the meetings of the British Association at Montreal and of the American Association at Philadelphia. Five years later his health gave way, and after a long illness he died at the Cambridge Observatory on the 21st of January 1892, and was buried in St Giles's cemetery, near his home. He married in 1863 Miss Eliza Bruce, of Dublin, who survived him. An inter- national committee was formed for the purpose of erecting a monument to his memory in Westminster Abbey; and there, in May 1895, a portrait medallion, by Albert Bruce Joy, was placed near the grave of Newton, and adjoining the memorials of Darwin and of Joule. His bust, by the same sculptor, stands opposite that of Sir John Herschel in the hall of St John's College, Cambridge. Herkomer's portrait is in Pembroke College; and Mogford's, painted in 1851, is in the combination room of St John's. Another bust, taken in his youth, belongs to the Royal Astronomical Society. A memorial tablet, with an inscription by Archbishop Benson, is placed in the Cathedral at Truro; and Mr Passmore Edwards erected a public institute in his honour at Launceston, near his birthplace.

The Scientific Papers of John Couch Adams, 4to, vol. i. (1896), and vol. ii. (1900), edited by William Grylls Adams and Ralph Allen Sampson, with a memoir by Dr J. W. L. Glaisher, were published by the Cambridge University Press. The first volume contains his previously published writings; the second those left in manuscript, including the substance of his lectures on the Lunar Theory. A col-

lection, virtually complete, of Adams's papers regarding the discovery of Neptune was presented by Mrs Adams to the library of St John's College. A description of them by Professor Sampson was inserted in the Memoirs of the Royal Astronomical Society (vol. liv. p. 143). Consult: Month. Notices Roy. Astr. Soc, liii. 184; Observatory, xv. 174; Nature, xxxiv. 565, xlv. 301; Astr. Journal, No. 254; R. Grant, Hist, of Physical Astronomy, p. 168; Edinburgh Review, No. 381, p. 72.

ADAMS, JOHN QUINCY (1 767-1848), eldest son of President John Adams, sixth president of the United States, was born on the nth of July 1767, m mat part of Braintree that is now Quincy, Massachusetts, and was named after John Quincy (1689- 1767), his mother's grandfather, who was for many years a prominent member of the Massachusetts legislature. In 1778, and again in 1780, young Adams accompanied his father to Europe; studying in Paris in 17 78-1 7 79 and at the university of Leiden in 1780. In 1780, also, he began to keep that diary which forms so conspicuous a record of the doings of himself and his contemporaries. In 1781, at the age of fourteen, he accompanied Francis Dana (1743-18 n), American envoy to Russia, as his private secretary; but Dana was not received by the Russian government, and in 1782 Adams joined his father at Paris, where he acted as " additional secretary " to the American commissioners in the negotiation of the treaty of peace which concluded the War of American Independence. Instead of accompanying his father to London, he, of his own choice, returned to Massachusetts, graduated at Harvard College in 1787, three years later was admitted to practise at the bar and at once opened an office in Boston. A series of papers written by him in which he controverted some of Thomas Paine's doctrines in the Rights of Man, and later another series in which he ably supported the neutral policy of the administration toward France and England, led to his appointment by Wash- ington as minister to the Netherlands in May 1794. There was little for him to do at the Hague, but in the absence of a minister at London, he transacted certain public business with the English foreign secretary. In 1796 Washington appointed him minister to Portugal, but before his departure thither his father John Adams became president and changed his destination to Berlin (1797). While there, he ' negotiated (1799) a treaty of amity and- commerce with Prussia. On Thomas Jefferson's election to the presidency in 1800, the elder Adams recalled his son, who returned home in 1801. The next year, he was elected

to the Massachusetts senate, and in 1803 was sent to Washington as a member of the Senate of the United States.

Up to this time, John Quincy Adams was regarded as belong- ing to the Federalist party, but he now found its general policy displeasing to him, was frowned upon, as the son of his father, by the followers of Alexander Hamilton, and found himself nearly powerless as an unpopular member of an unpopular minority. He was not now, and indeed never was, a strict party man. On the first important question that came before him in the Senate, the acquisition of Louisiana, he voted with the Republicans, regardless of the opposition of his own section. In December 1807 he warmly seconded Jefferson's suggestion of an embargo and vigorously urged instant action, saying: "The president has recommended the measure on his high responsibility. I would not consider, I would not deliberate; I would act ! " Within five hours the Senate had passed the Embargo Bill and sent it to the House. The support of a measure so unpopular in New England caused him to be hated by the Federalists there and cost him his seat in the Senate; his suc- cessor was chosen on the 3rd of June 1808, several months before the usual time of filling the vacancy, and five days later Adams resigned. In the same year he attended the Republican con- gressional caucus which nominated Madison for the presidency, and thus definitely joined the Republicans. From 1806 to 1809 Adams was professor of rhetoric and oratory at Harvard.

In 1809 President Madison sent Adams to Russia to represent the United States. He arrived at St Petersburg at the psycho- logical moment when the tsar had made up his mind to break with Napoleon. Adams therefore met with a favourable recep- tion and a disposition to further the interests of American com- merce in every possible way. On the outbreak of the war between the United States and England in 181 2, he was still at St Petersburg. In September of that year, the Russian govern- ment suggested that the tsar was willing to act as mediator between the two belligerents. Madison precipitately accepted this proposition and sent Albert Gallatin and James Bayard to act as commissioners with Mr Adams; but England would have nothing to do with it. In August 1814, however, these gentle- men, with Henry Clay and Jonathan Russell, began negotiations with English commissioners which resulted in the signature of the treaty of Ghent on the 24th of December of that year. After this Adams visited Paris, where he witnessed the return of Napoleon from Elba, and then went to London, where, with Henry Clay and Albert Gallatin, he negotiated (1815) a " Con- vention to Regulate Commerce and

Navigation.” Soon after- wards he became U.S. minister to Great Britain, as his father had been before him, and as his son, Charles Francis Adams, was after him. After accomplishing little in London, he returned to the United States in the summer of 181 7 to become secretary of state in the cabinet of President Monroe.

As secretary of state, Adams played the leading part in two most important episodes, — the acquisition of Florida and the promulgation of the Monroe Doctrine. Ever since the acquisi- tion of Louisiana successive administrations had sought to include a part at least of Florida in that purchase. In 1819, after long negotiations, Adams succeeded in bringing the Spanish minister to the point of signing a treaty in which the Spaniards abandoned all claims to territory east of the Mississippi, and the United States relinquished all claim to what is now known as Texas. Before the Spanish government ratified the treaty in 1820, Mexico, including Texas, had thrown off allegiance to the mother country, and the United States had occupied Florida by force of arms. The Monroe Doctrine (g.v.) rightly bears the name of the president who in 1823 assumed the responsibility for its promulgation; but it was primarily the work of John Quincy Adams. The eight years of Monroe’s presidency (181 7-1825) are known as the ” Era of Good Feeling.” As his second term drew to a close, there was a great lack of good feeling among his official advisers, three of whom — Adams, secretary of state, Calhoun, secretary of war, and Crawford, secretary of the treasury — aspired to succeed him in his high office. In addition, Henry Clay and Andrew Jackson were also candidates. Calhoun

was nominated for the vice-presidency. Of the other four, Jackson received 99 electoral votes, Adams 84, Crawford 41, and Clay 37; as no one had a majority, the decision was made by the House of Representatives, which was confined in its choice to the three candidates who had received the largest number of votes. Clay, who was speaker of the House of Repre- sentatives, and had for years assumed a censorious attitude toward Jackson, cast his influence for Adams and thereby secured his election on the first ballot. A few days later Adams offered Clay the secretaryship of state, which was accepted. The wholly unjust and baseless charge of ” bargain and corrup- tion ” followed, and the feud thus created between Adams and Jackson greatly influenced the history of the United States.

Up to this point Adams’s career had been almost uniformly successful, but his presidency (1825-1829) was in most respects a failure, owing to the virulent opposition of the Jacksonians; in 1828 Jackson was elected president over Adams. It was during his administration that

irreconcilable differences devel- oped between the followers of Adams and the followers of Jack- son, the former becoming known as the National Republicans, who with the Anti-Masons were the precursors of the Whigs. In 1829 Adams retired to private life in the town of Quincy; but only for a brief period, for in 1830, largely by Anti-Masonic votes, he was elected a member of the national House of Repre- sentatives. On its being suggested to him that his acceptance of this position would degrade an ex-president, Adams replied that no person could be degraded by serving the people as a representative in congress or, he added, as a selectman of his town. His service in congress from 183 1 until his death is, in some respects, the most noteworthy part of his career. Through- out he was conspicuous as an opponent of the extension of slavery, though he was never technically an abolitionist, and in particular he was the champion in the House of Representatives of the right of petition at a time when, through the influence of the Southern members, this right was, in practice, denied by that body. His prolonged fight for the repeal of the so-called ” Gag Laws ” is one of the most dramatic contests in the history of congress. The agitation for the abolition of slavery, which really began in earnest with the establishment of the Liberator by William Lloyd Garrison in 1831, soon led to the sending of innumerable petitions to congress for the abolition of slavery in the District of Columbia, over which the Federal government had jurisdiction, and for other action by congress with respect to that institution. These petitions were generally sent to Adams for presentation. They aroused the anger of the pro- slavery members of congress, who, in 1836, brought about the passage of the first ” Gag Rule,” the Pinckney Resolution, presented by Henry L. Pinckney, of South Carolina. It pro- vided that all petitions relating to slavery should be laid on the table without being referred to committee or printed; and, in substance, this resolution was re-adopted at the beginning of each of the immediately succeeding sessions of congress, the Patton Resolution being adopted in 1837, the Atherton Resolu- tion, or ” Atherton Gag,” in 1838, and the Twenty-first Rule in 1840 and subsequently until repealed. Adams contended that these ” Gag Rules ” were a direct violation of the First Amend- ment to the Federal Constitution, and refused to be silenced on the question, fighting for repeal with indomitable courage, in spite of the bitter denunciation of his opponents. Each year the number of anti-slavery petitions received and presented by him increased; perhaps the climax was in 1837, when Adams presented a petition from twenty-two slaves, and, when threat- ened by his opponents with censure, defended himself with remarkable keenness and ability. At each session, also, the majority against him decreased until in 1844 his motion to repeal the Twenty-first Rule was carried by a vote of

108 to 80 and his battle was won. On the 21st of February 1848, after having suffered a previous stroke of apoplexy, he fell insensible on the floor of the Representatives' chamber, and two days later died. Few men in American public life have possessed more intrinsic worth, more independence, more public spirit and more ability than Adams, but throughout his political career he was

handicapped by a certain reserve, a certain austerity and cool- ness of manner, and by his consequent inability to appeal to the imaginations and affections of the people as a whole. He had, indeed, few intimate political or personal friends, and few men in American history have, during their lifetime, been regarded with so much hostility and attacked with so much rancour by their political opponents.

Authorities. — J. T. Morse, John Quincy Adams (Boston, 1883; new edition, 1899); Josiah Quincy, Memoir of the Life of John Quincy Adams (Boston, 1858); C. F. Adams (ed.), Memoirs of John Quincy Adams, comprising portions of his diary from 1795 to 1848 (12 vols., Philadelphia, 1874-1877). (E. Ch.)

ADAMS, SAMUEL (1722-1803), American statesman, was born at Boston, Massachusetts, on the 27th of September 1722. He was a second cousin to the elder John Adams. His father, whose Christian name was also Samuel, was a wealthy and prominent citizen of Boston, who took an active part in the politics of the town, and was a member of the Caucus (or Caulker's) Club, with which the political term "caucus" is said to have originated; his mother was Mary Fifield. Young Adams graduated from Harvard College in 1740, and three years later, on attaining the degree of A.M., chose for his thesis, "Whether it be Lawful to resist the Supreme Magistrate, if the Commonwealth cannot otherwise be preserved." Which side he took, and how the argument proceeded, is not known, but the subject was one which well forecasted his career. He began the study of law in response to his father's advice; he discontinued it in response to his mother's disapproval. He repeatedly failed in business, notably as manager of a malt-house, largely because of his incessant attention to politics; but in the Boston town- meeting he became a conspicuous example of the efficiency of that institution for training in statecraft. He has, indeed, been called the "Man of the Town Meeting." About 1748 he began to take an important part in the affairs of the town, and became a leader in the debates of a political club which he was

largely instrumental in organizing, and to whose weekly publication, the Public Advertiser, he contributed numerous articles. From 1756 to 1764 he was one of the town's tax-collectors, but in this office he was unsuccessful, his easy business methods resulting in heavy arrears.

Samuel Adams first came into wider prominence at the begin- ning of the Stamp Act episode, in 1 764, when as author of Boston's instructions to its representatives in the general court of Massa- chusetts he urged strenuous opposition to taxation by act of parliament. The next year he was for the first time elected to the lower house of the general court, in which he served until 1774, after 1766 as clerk. As James Otis's vigour and influence declined, Adams took a more and more prominent place in the revolutionary councils; and, contrary to the opinion of Otis and Benjamin Franklin, he declared that colonial representation in parliament was out of the question and advised against any form of compromise. Many of the Massachusetts revolutionary docu- ments, including the famous "Massachusetts Resolves" and the circular letter to the legislatures of the other colonies, are from his pen; but owing to the fact that he usually acted as clerk to the House of Representatives and to the several committees of which he was a member, documents were written by him which expressed the ideas of the committee as a whole. There can be no question, however, that Samuel Adams was one of the first, if not the first, of American political leaders to deny the legislative power of parliament and to desire and advocate separation from the mother country.

To promote the ends he had in view he suggested non-im- portation, instituted the Boston committees of correspondence, urged that a Continental Congress be called, sought out and introduced into public service such allies as John Hancock, Joseph Warren and Josiah Quincy, and wrote a vast number of articles for the newspapers, especially the Boston Gazette, over a multitude of signatures. He was, in fact, one of the most voluminous and influential political writers of his time. His style is clear, vigorous and epigrammatic; his arguments are characterized by strength of logic, and, like those of other patriots, are, as the dispute advances, based less on precedent

and documentary authorities and more on " natural right." Although he lacked oratorical fluency, his short speeches, like his writings, were forceful; his plain dress and unassuming ways helped to make him extremely popular with the common people, in whom he. had much greater faith than his cousin John had; and, above all, he was an eminently successful manager of men. Shrewd, wily, adroit, unfailingly tactful, an adept in all the arts of the politician, he is

considered to have done more than any other one man, in the years immediately preceding the War of Independence, to mould and direct public opinion in his community.

The intense excitement which followed the “Boston Massacre” Adams skilfully used to secure the removal of the soldiers from the town to a fort in the harbour. He it was, also, who managed the proceedings of the “Boston Tea Party,” and later he was moderator of the convention of Massachusetts towns called to protest against the Boston Port Bill. One of the objects of the expedition sent by Governor Thomas Gage to Lexington (was the capture of Adams and John Hancock, temporarily staying in Lexington, and when Gage issued his proclamation of pardon on June 12 he excepted these two, whose offences, he said, were “of too flagitious a Nature to admit of any other Consideration than that of condign Punishment.”

As a delegate to the Continental Congress, from 1774 to 1781, Samuel Adams continued vigorously to oppose any concession to the British government; strove for harmony among the several colonies in the common cause; served on numerous committees, among them that to prepare a plan of confederation; and signed the Declaration of Independence. But he was rather a de- structive than a constructive statesman, and his most important service was in organizing the forces of revolution before 1775. In 1779 he was a member of the convention which framed the constitution of Massachusetts that was adopted in 1780, and is still, with some amendments, the organic law of the commonwealth and one of the oldest fundamental laws in existence. He was one of the three members of the sub-committee which actually drafted that instrument; and although John Adams is generally credited with having performed the principal part of that task, Samuel Adams was probably the author of most of the bill of rights. In 1788, Samuel Adams was a member of the Massa- chusetts convention to ratify the Constitution of the United States. When he first read that instrument he was very much opposed to the consolidated government which it provided, but was induced to befriend it by resolutions which were passed at a mass meeting of Boston mechanics or “tradesmen” — his own firmest supporters — and by the suggestion that its ratification should be accompanied by a recommendation of amendments designed chiefly to supply the omission of a bill of rights. With- out his aid it is probable that the constitution would not have been ratified by Massachusetts. From 1789 to 1794 Adams was lieutenant-governor of his state, and from 1794 to 1797 was governor. After the formation of parties he became allied with the Democratic-Republicans rather than with the Federalists. He died on the 2nd of October 1803, at Boston.

Authorities. — Life and Public Services of Samuel Adams (3 vols., Boston, 1865), by W. V. Wells, Adams's great-grandson — a valuable biography, containing a mass of information, but noticeably biassed ; J. K. Hosmer's Samuel Adams (Boston, 1885), an excellent short biography in the "American Statesmen Series"; M. C. Tyler's Literary History of the American Revolution (2 vols., New York, 1897) ; and H. A. Cushing (ed.), The Writings of Samuel Adams (4 vols., New York, 1904-1908). (E. Ch.)

ADAMS, THOMAS (d. c. 1655), English divine, was, in 1612, "a preacher of the gospel at Willington," in Bedfordshire, where he is found until 1614, and whence issued his Heaven and Earth Reconciled, The Devil's Banquet and other works. Ini6i4-i6i5 he was at Wingrave, in Buckinghamshire, probably as vicar, and published a number of works in quick succession; in 161 8 he held the preachership at St Gregory's, under St Paul's Cathedral, and was "observant chaplain" to Sir Henry Montague, the lord chief justice of England. These bare facts we gather from epistles-dedicatory and epistles to the reader, and title-pages.

These epistles show him to have been on the most friendly terms with some of the foremost men in state and church, though his ardent protestantism offended Laud and hindered his preferment. His " occasionally " printed sermons, when collected in 1629, placed him beyond all comparison in the van of the preachers of England, and had something to do with shaping John Bunyan. He equals Jeremy Taylor in brilliance of fancies, and Thomas Fuller in wit. Robert Southey calls him " the prose Shakespeare of Puritan theologians." His numerous works dis- play great learning, classical and patristic, and are unique in their abundance of stories, anecdotes, aphorisms and puns.

His works were edited in J. P. Nichol's Puritan Divines, by J. Angus and T. Smith (3 vols. 8vo, 1862).

ADAMS, WILLIAM (d. 1620), English navigator, was born at Gillingham, near Chatham, England. When twelve years old he was apprenticed to the seafaring life, afterwards entering the British navy, and later serving the company of Barbary merchants for a number of years as master and pilot. Attracted by the Dutch trade with India, he shipped as pilot major with a little fleet of five ships despatched from

the Texel in 1598 by a company of Rotterdam merchants. The vessels, boats ranging from 75 to 250 tons and crowded with men, were driven to the coast of Guinea, where the adventurers attacked the island of Annabon for supplies, and finally reached the straits of Magellan. Scattered by stress of weather the following spring the " Charity," with Adams on" board, and the "Hope," met at length off the coast of Chile, where the captains of both vessels lost their lives in an encounter with the Indians. In fear of the Spaniards, the remaining crews determined to sail across the Pacific. On this voyage the " Hope " was lost, but in April 1600 the " Charity," with a crew of sick and dying men, was brought to anchor off the island of Kiushiu, Japan. Adams was summoned to Osaka and there examined by Iyeyasu, the guardian of the young son of Taiko Sama, the ruler, who had just died. His knowledge of ships and shipbuilding, and his nautical smattering of mathematics, raised him in the estimation of the shogun, and he was subse- quently presented with an estate at Hemi near Yokosuka; but was refused permission to return to England. In 161 1 news came to him of an English settlement in Bantam, and he wrote asking for help. In 1613 Captain John Saris arrived at Hirado in the ship " Clove " with the object of establishing a trading factory for the East India Company, and after obtaining the necessary concessions from the shogun, Adams postponed his voyage home (permission for which had now been given him) in order to take a leading part, under Richard Cocks, in the organization of this new English settlement. He had already married a Japanese woman, by whom he had a family, and the latter part of his life was spent in the service of the English trading company, for whom he undertook a number of voyages to Siam in 1616, and Cochin China in 1617 and 1618. He died on the 16th of May 1620, some three years before the dissolution of the English factory. His Japanese title was Anjin Sama, and his memory was preserved in the naming of a street in Yedo, Anjin Cho (Pilot Street), and by an annual celebration on June 15 in his honour.

See England's Earliest Intercourse with Japan, by C. VV. Hillary (1905) ; Letters written by the English Residents in Japan, ed. by N. Murakami (1900, containing Adams's Letters reprinted from Memorials of the Empire of Japan, ed. by T. Rundall, Hakluyt Society, 1850); Diary of Richard Cocks, with preface by N. Mura- kami (1899, reprinted from the Hakluyt Society ed. 1883); R. Hildreth's Japan (1855) ; J. Harris's Navigantium atque Itinerantium Bibliotheca (1764), i. 856; Voyage of John Saris, ed. by Sir E. M. Satow (Hakluyt Society, 1900) ; Asiatic Society of Japan Trans- actions, xxvi. (sec. 1898) pp. I and 194, where four more hitherto unpublished letters of Adams are given ; Collection of State Papers; East Indies, China and

Japan. The MS. of his logs written during his voyages to Siam and China is in the Bodleian Library at Oxford.

ADAMS, a township in the extreme N. of Berkshire count}', N.W. Massachusetts, U.S.A., having an area of 23 sq. m. Pop. (1880) 5591; (1890) 9213; (1900) 11,134, of whom 4376 were foreign-born; (1910, census) 13,026. It includes a poruoi. of the valley of the Hoosac river, extending to the Hoosac Range on the E., and on the W. to Mt. Williams (3040 ft.), and Greylock Mountain (353.2 ft.), partly in Williamstown, and the

highest point in the state. The valley portion is level and con- tains several settlement centres, the largest of which, a busy industrial village (manufactures of cotton and paper), bears the same name as the township, and is on a branch of the Boston and Albany railroad. The village is the nearest station to Grey- lock, which can be easily ascended, and affords fine views of the Hoosac and Housatonic valleys, the Berkshire Hills and the Green Mountains; the mountain has been a state timber reser- vation since 1898. The township's principal industry is the manu- facture of cotton goods, the value of which in 1905 ($4,621,261) was 84-1% of the value of the township's total factory pro- ducts; in 1905 no other place in the United States showed so high a degree of specialization in this industry. The township (originally "East Hoosuck") was surveyed and defined in 1749. Fort Massachusetts, at one time within its bounds, was de- stroyed in 1746 by the French. An old Indian trail between the Hudson and Connecticut valley ran through the township, and was once a leading outlet of the Berkshire country. Adams was incorporated in 1778, and was named in honour of Samuel Adams, the revolutionary leader. Part of Adams was included in the new township of Cheshire in 1793, and North Adams was set off as a separate township in 1878.

ADAM'S APPLE, the movable projection, more prominent in males than females, formed in the front part of the throat by the thyroid cartilage of the larynx. The name was given from a legend that a piece of the forbidden fruit lodged in Adam's throat. The "Adam's apple" is one of the particular points of attack in the Japanese system of self-defence known as jiu-jitsu.

ADAM'S BRIDGE, or Rama's Bridge, a chain of sandbanks extending from the island of Manaar, near the N.W. coast of Ceylon to the island of Rameswaram, off the Indian coast, and lying between the Gulf of Manaar on the S.W. and Palk Strait on the N.E. It is more than 30 m. long and offers a serious impediment to navigation. Some of the

sandbanks are dry; and no part of the shoal has a greater depth than 3 or 4 ft. at high water, except three tortuous and intricate channels which have recently been dredged to a sufficient depth to admit the passage of vessels, so as to obviate the long journey round the island of Ceylon which was previously necessary. Geological evidence shows that this gap was once bridged by a continuous isthmus which according to the temple records was breached by a violent storm in 1480. Operations for removing the ob- stacles in the channel and for deepening and widening it were begun as long ago as 1838. A service of the British India Steam Navigation Company's steamers has been established between Negapatam and Colombo through Palk Strait and this narrow passage.

ADAM SCOTUS (fl. 1180), theological writer, sometimes called Adam Anglicus or Anglo-Scotus, was born in the south of Scotland in the first half of the 12th century. About n 50 he was a Premonstratensian canon at St Andrews, and some twenty years later abbot and bishop of Candida Casa (Whithorn) in Galloway. He gained a European reputation for his writings, which are of mystico-ascetic type, and include an account of the Premonstratensian order, a collection of festival sermons, and a Soliloquia de instructione discipuli, formerly attributed to his contemporary, Adam of St Victor.

ADAMSON, PATRICK (1537-1592), Scottish divine, arch- bishop of St Andrews, was born at Perth. He studied philo- sophy, and took the degree of M.A. at St Andrews. After being minister of Ceres in Fife for three years, in 1566 he set out for Paris as tutor to the eldest son of Sir James Macgill, the clerk- general. In June of the same year he wrote a Latin poem on the birth of the young prince James, whom he described as serenissimus princeps of France and England. The French court was offended, and he was confined for six months. He was released only through the intercession of Queen Mary of Scotland and some of the principal nobility, and retired with his pupil to Bourges. He was in this city at the time of the massacre of St Bartholomew at Paris, and lived concealed for seven months in a public-house, the aged master of which, in reward for his charity to a heretic, was thrown from the roof. While in this

" Sepulchre," he wrote his Latin poetical version of the book of Job, and his tragedy of Herod in the same language. In 1572 or 1573 he returned to Scotland, and became minister of Paisley. In 1575 he was

appointed by the General Assembly one of the commissioners to settle the jurisdiction and policy of the church; and the following year he was named, with David Lindsay, to report their proceedings to the earl of Morton, then regent. In 1576 his appointment as archbishop of St Andrews gave rise to a protracted conflict with the – Presbyterian party in the Assembly. He had previously published a catechism in Latin verse dedicated to the king, a work highly approved even by his opponents, and also a Latin translation of the Scottish Confession of Faith. In 1 578 he submitted himself to the General Assembly, which procured him peace for a little time, but next year fresh accusations were brought against him. He took refuge in St Andrews Castle, where "a wise woman," Alison Pearson, who was ultimately burned for witchcraft, cured him of a serious illness. In 1 583 he went as James's ambassador to the court of Elizabeth, and is said to have behaved rather badly. On his return he took strong parliamentary measures against Presby- terians, and consequently (at a provincial synod held at St Andrews in April 1586, he was accused of heresy and excom- municated, but at the next General Assembly the sentence was remitted as illegal. In 1587 and 1588, however, fresh accusa- tions were brought against him, and he was again excommuni- cated, though afterwards on the inducement of his old opponent, Andrew Melville, the sentence was again remitted. Meanwhile he had published the Lamentations of Jeremiah, and the book of Revelation in Latin verse, which he dedicated to the king, complaining of his hard usage. But James was unmoved by his application, and granted the revenue of his see to the duke of Lennox. For the rest of his life Adamson was supported by charity; he died in 1592. His recantation of Episcopacy (1590) is probably spurious. Adamson was a man of many gifts, learned and eloquent, but with grave defects of character. His collected works, prefaced by a fulsome panegyric, in the course of which it is said that " he was a miracle of nature, and rather seemed to be the immediate production of God Almighty than born of a woman," were produced by his son-in-law, Thomas Wilson, in 1619.

ADAMSON, ROBERT (1852-1902), Scottish philosopher, was born in Edinburgh on the 19th of January 1852. His father was a solicitor, and his mother was the daughter of Matthew Buist, factor to Lord Haddington. In 185s Mrs Adamson was left a widow with small means, and devoted herself entirely to the education of her six children. Of these, Robert was successful from the first. At the end of his school career he entered the university of Edinburgh at the age of fourteen, and four years later graduated with first-class honours in mental philosophy, with prizes in every department of the faculty of Arts. He completed his university successes by winning the Tyndall-

Bruce scholarship, the Hamilton fellowship (1872), the Ferguson scholarship (1872) and the Shaw fellowship (1873). After a short residence at Heidelberg (1871), where he began his study of German philosophy, he returned to Edinburgh as assistant first to Henry Calderwood and later to A. Campbell Fraser; he joined the staff of the Encyclopaedia Britannica (9th ed.) (1874) and studied widely in the Advocates' Library. In 1876 he came to England as successor to W. S. Jevons in the chair of logic and philosophy, at Owens College, Manchester. In 1883 he received the honorary degree of LL.D. In 1893 he went to Aberdeen, and finally in 1895 to the chair of logic at Glasgow, which he held till his death on the 5th of February 1902. His wife, Margaret Duncan, the daughter of a Manchester merchant, was a woman of kindred tastes, and their union was entirely happy.

It is matter for regret to the student that Adamson's active labours in the lecture room precluded him from systematic pro- duction. His writings consisted of short articles, of which many appeared in the Encyclopaedia Britannica (9th ed.) and in Mind, a volume on Kant and another on Fichte. At the time of his death he was writing a History of Psychology, and had promised a work on Kant and the Modern Naturalists. Both in his life

and in his writings he was remarkable for impartiality. It was his peculiar virtue that he could quote his opponents without warping their meaning. From this point of view he would have been perhaps the first historian of philosophy of his time, had his professional labours been less exacting. Except during the first few years at Manchester, he delivered his lectures without manu- scripts. In 1903, under the title The Development of Modern Philosophy and Other Essays, his more important lectures were published with a short biographical introduction by Prof. W. R. Sorley of Cambridge University (see Mind, xiii. 1904, p. 73 foil.). Most of the matter is taken verbatim from the note-book of one of his students. Under the same editorship there appeared, three years later, his Development of Greek Philosophy. In addition to his professional work, he did much administrative work for Victoria University and the university of Glasgow. In the organization of Victoria University he took a foremost part, and, as chairman of the Board of Studies at Owens College, he presided over the general academical board of the Victoria University. At Glasgow he was soon elected one of the repre- sentatives on the court, and to him were due in large measure the extension of the academical session and the improved equipment of the university.

Throughout his lectures, Adamson pursued the critical and his- torical method without formulating a constructive theory of his own. He felt

that any philosophical advance must be based on the Kantian methods. It was his habit to make straight for the ultimate issue, disregarding half-truths and declining compromise. He left a hypothesis to be worked out by others ; this done, he would criticize with all the rigour of logic, and with a profound distrust of imagina- tion, metaphor and the attitude known as the will-to-believe. As he grew older his metaphysical optimism waned. He felt that the increase of knowledge must come in the domains of physical science. But this empirical tendency as regards science never modified his metaphysical outlook. He has beencalled Kantian and Neo- Kantian, Realist and Idealist (by himself, for he held that appearance and reality are co-extensive and coincident). At the same time, in his criticism of other views he was almost typical of Hegelian idealism. All processes of reasoning or judgment (i.e. all units of thought) are (1) analysable only by abstraction, and (2) are compound of deduc- tion and induction, i.e. rational and empirical. An illustration of his empirical tendency is found in his attitude to the Absolute and the Self. The ” Absolute ” doctrines he regarded as a mere disguise of failure, a dishonest attempt to clothe ignorance in the pretentious garb of mystery. The Self as a primary, determining entity, he would not therefore admit. He represented an empiricism which, so far from refuting, was actually based on, idealism, and yet was alert to expose the fallacies of a particular idealist construction (see his essay in Ethical Democracy, edited by Dr Stanton Coit).

ADAM’S PEAK, a mountain in Ceylon, about 45 miles E. from Colombo, in N. lat. 6° 55’, E. long. 80° 30’. It rises steeply to a height of 7352 feet, and commands a magnificent prospect. Its conical summit terminates in an oblong platform, 74 ft. by 24, on which there is a hollow, resembling the form of a human foot, 5 ft. 4 in. by 2 ft. 6 in.; and this has been consecrated as the footprint of Buddha. The margin of this supposed footprint is ornamented with gems, and a wooden canopy protects it from the weather. It is held in high veneration by the Sinhalese, and numerous pilgrims ascend to the sacred spot, where a priest resides to receive their offerings and bless them on their departure. By the Mahommedans the impression is regarded as that of the foot of Adam, who here, according to their tradition, fulfilled a penance of one thousand years; while the Hindus claim it as that of their god Siva.

ADANA. (1) A vilayet in the S.E. of Asia Minor, which includes the ancient Cilicia. The mountain districts are rich in unexploited mineral wealth, and the fertile coast-plain, which produces cotton, rice, cereals, sugar and much fruit, and affords abundant pasturage, is well watered by the rivers that descend from the Taurus range. Imports and

exports pass through Mersina (q.v.). (2) The chief town of the vilayet, situated in the alluvial plain about 30 m. from the sea in N. lat. 37 1', E. long. 35° 18', on the right bank of the Seihan (Sihun, anc. Sarus), which is navigable by small craft as far as the town. Adana is connected with Tersus and Mersina by a railway built in 1887, and has a magnificent stone bridge, which carries the road to Missis and the east, and dates in parts from the time of Justinian, but was restored first in 743 a.d. and called Jisr al-Walid after

the Omayyad caliph of that name, and again in 840 by the Caliph Mutasim. There are, also, a ruined castle founded by Harun al-Rashid in 782, fine fountains, good buildings, river-side quays, cotton mills and an American mission with church and schools. Adana, which retains its ancient name, rose to import- ance as a station on the Roman military road to the East, and was at one time a rival of Tarsus. The town was largely rebuilt by Mansur in 758, and during subsequent centuries it often changed hands and suffered many vicissitudes. Its position, commanding the passage of the mountains to the north of Syria, rendered it important as a military station in the contest between the Egyptians and the Turks in 1832. After the defeat of the Turkish army at Konia it was granted to Ibrahim Pasha, and though the firman announcing his appointment named him only muhassil, or collector of the crown revenue, it continued to be held by the Egyptians till the treaty of July 1840 restored it to the Porte. The chief productions of the province are cotton, corn, sesame and wool, which are largely exported. The population of the town is greatly mixed, and, having a large element of nomads in it, varies much from time to time. At its maximum it reaches nearly 50,000. (D. G. H.)

ADANSON, MICHEL (1727-1806), French naturalist, of Scottish descent, was born on the 7th of April 1727, at Aix, in Provence. After leaving the College Sainte Barbe in Paris, he was employed in the cabinets of R. A. F. Reaumur and Bernard de Jussieu, as well as in the Jardin des Plantes. At the end of 1748 he left France on an exploring expedition to Senegal, which from the unhealthiness of its climate was a terra incognita to naturalists. His ardour remained unabated during the five years of his residence in Africa. He collected and described, in greater or less detail, an immense number of animals and plants; col- lected specimens of every object of commerce; delineated maps of the country; made systematic meteorological and astrono- mical observations; and prepared grammars and dictionaries of the

languages spoken on the banks of the Senegal. After his return to Paris in 1754 he made use of a small portion of the materials he had collected in his Histoire naturelle du Slnigal (Paris, 1757). This work has a special interest from the essay on shells, printed at the end of it, where Adanson proposed his universal method, a system of classification distinct from those of Buffon and Linnaeus. He founded his classification of all organized beings on the consideration of each individual organ. As each organ gave birth to new relations, so he established a corresponding number of arbitrary arrangements. Those beings possessing the greatest number of similar organs were referred to one great division, and the relationship was considered more remote in proportion to the dissimilarity of organs. In 1763 he published his Families naturelles des plantes. In this work he developed the principle of arrangement above mentioned, which, in its adherence to natural botanical relations, was based on the system of J. P. Tournefort, and had been anticipated to some extent nearly a century before by John Ray. The success of this work was hindered by its innovations in the use of terms, which were ridiculed by the defenders of the popular sexual system of Linnaeus; but it did much to open the way for the establishment, by means principally of A. L. de Jussieu's Genera Plantarum (1789), of the natural method of the classification of plants. In 1774 Adanson submitted to the consideration of the Academy of Sciences an immense work, extending to all known beings and substances. It consisted of 27 large volumes of manuscript, employed in displaying the general relations of all these matters, and their distribution; 150 volumes more, occupied with the alphabetical arrangement of 40,000 species; a vocabulary, containing 200,000 words, with their explanations; and a number of detached memoirs, 40,000 figures and 30,000 specimens of the three kingdoms of nature. The committee to which the inspection of this enormous mass was entrusted strongly recommended Adanson to separate and publish all that was peculiarly his own, leaving out what was merely compilation. He obstinately rejected this advice; and the huge work, at which he continued to labour, was never published. He had been sleeted a member of the Academy of Sciences in 1759, and he

latterly subsisted on a small pension it had conferred on him. Of this he was deprived in the dissolution of the Academy by the Constituent Assembly, and was consequently reduced to such a depth of poverty as to be unable to appear before the French Institute when it invited him to take his place among its mem- bers. Afterwards he was granted a pension sufficient to relieve his simple wants. He died at Paris after months of severe suffering, on the 3rd of August 1806, requesting, as

the only decoration of his grave, a garland of flowers gathered from the fifty-eight families he had differentiated — ” a touching though transitory image,” says Cuvier, ” of the more durable monument which he has erected to himself in his works.” Besides the books already mentioned he published papers on the ship-worm, the baobab tree, the Adansonia digitata of Linnaeus, the origin of the varieties of cultivated plants, and gum-producing trees.

ADAPTATION (from Lat. adaptare. to fit to), a process of fitting, or modifying, a thing to other uses, and so altering its form or original purpose. In literature there may be, e.g., an adaptation of a novel for a drama, or in music an arrangement of a piece for two hands into one for four, &c. In biology, ac- cording to the doctrine of evolution, adaptation plays a prominent part as the process by which an organism or species of organisms becomes modified to suit the conditions of its life. Every change in a living organism involves adaptation; for in all cases life consists in a continuous adjustment of internal to external relations. Every living organism reacts to its environment; if the reaction is unfavourable, disability leading to ultimate extinction is the result. If the reaction is favourable, its result is called an adaptation. How far such adaptations are produced afresh in each generation, whether or no their effects are trans- mitted to descendants and so directly modify the stock, to what extent adaptations characteristic of a species or variety have come about by selection of individuals capable, in each genera- tion, of responding favourably, or how far by the selection of individuals fortuitously suitable to the environment, or, how far, possibly by the inheritance of the responses to the environ- ment, are problems of biology not yet definitely solved.

ADDA (anc. Addua), a river of North Italy. Its true source is in some small lakes near the head of the Fraele glen, but its volume is increased by the union with several smaller streams, near the town of Bormio, at the Raetian Alps. Thence it flows first S.W., then due W., through the fertile Valtellina (q.v.), passing Tirano, where the Poschiavino falls in on the right, and Sondrio, where is the junction with the Malero, right. It falls into the Lake of Como, at its northern end, and mainly forms that lake. On issuing from its south-eastern or Lecco arm, it crosses the plain of Lombardy, and finally, after a course of about 150 m., joins the Po, 8 m. above Cremona. The lower course of the Adda was formerly the boundary between the territories of Venice and of Milan; and on its banks several important battles have been fought, notably that of Lodi, where Napoleon defeated the Austrians in 1796. (W. A. B. C.)

ADDAMS, JANE (i860-), American sociologist, was born at Cedarville, Illinois, on the 6th of September i860. After graduating at Rockford (Illinois) Female Seminary (now Rock- ford College) in 1881, she spent several years in the study of economic and sociological questions in both Europe and America, and in 1889 with Miss Ellen Gates Starr established in Chicago, Illinois, the social settlement known as Hull House, of which she became the head-worker. The success of this settlement, which became a great factor for good in the city, was principally due to Miss Addams's rare executive skill and practical common-sense methods. Her personal participation in the life of the community is exemplified in her acceptance of the office of inspector of streets and alleys under the municipal government. She became widely known as a lecturer and writer on social problems and published Democracy and Social Ethics (1902), Newer Ideals of Peace (1907), and The Spirit of Youth a-nd the City Streets (1909).

ADDAX, a genus of antelopes, with one species (A. nasomacu- latus) from North Africa and Arabia. It is a little over 3 ft. high, yellowish white in colour, with a brown mane and a fringe of the same hue on the throat. Both sexes carry horns,

which are ringed and form an open spiral. The addax is a desert antelope, and in habits probably resembles the gemsbuck. It is hunted by the Arabs for its flesh and to test the speed of their horses and greyhounds; it is during these hunting parties that the young are captured for menagerie purposes.

ADDER, a name for the common viper (Viper a cevus), ranging from Wales to Saghalien island, and from Caithness to the north of Spain. The puff-adder (Bitis s. Echidna arietans) of nearly the whole of Africa, and the death-adder (Acanthophis antarcticus) from Australia to the Moluccas, are both very poisonous (see Viper). The word was in Old Eng. nadre, later nadder or naddre; in the 14th century " a nadder " was, like" a napron," wrongly divided into " an adder." It appears with the generic meaning of " serpent " in the older forms of many Teutonic languages, cf. Old High Ger. natra; Goth, nadrs. It is thus used in the Old Eng. version of the Scriptures for the devil, the " serpent " of Genesis.

ADDISON, JOSEPH (1672-1719), English essayist, poet and man of letters, eldest son of Lancelot Addison, later dean of Lichfield, was born at his father's rectory of Milston in Wiltshire, on the 1 st of May 1672. ' After having passed through several schools, the last of which

was the Charterhouse, he went to Oxford when he was about fifteen years old. He was first entered a commoner of Queen's College, but after two years was elected to a demyship of Magdalen College, having been recom- mended by his skill in Latin versification. He took his master's degree in 1693, and subsequently obtained a fellowship which he held until 1711. His first literary efforts were poetical, and, after the fashion of his day, in Latin. Many of these are pre- served in the Musae Anglicanae (1691-1699), and obtained aca- demic commendation from academic sources. But it was a poem in the third volume of Dryden's Miscellanies, followed in the next series by a translation of the fourth Georgic, which brought about his introduction to Tonson the bookseller, and (probably through Tonson) to Lord Somers and Charles Montagu. To both of these distinguished persons he contrived to commend himself by An Account of the Greatest English Poets (1694), An Address to King William (1695), after Namur, and a Latin poem entitled Pax Gulielmi (1697), on the peace of Ryswick, with the result that in 1699 he obtained a pension of £300 a year, to enable him (as he afterwards said in a memorial addressed to the crown) " to travel and qualify himself to serve his Majesty." In the summer of 1690 he crossed into France, where, chiefly for the purpose of learning the language, he remained till the end of 1 700; and after this he spent a year in Italy. In Switzerland, on his way home, he was stopped by receiving notice that he was to attend the army under Prince Eugene, then engaged in the war in Italy, as secretary from the king. But his Whig friends were already tottering in their places; and in March 1702 the death of King William at once drove them from power and put an end to the pension. Indeed Addison asserted that he never received but one year's payment of it, and that all the other expenses of his travels were defrayed by himself. He was able, however, to visit a great part of Germany, and did not reach Holland till the spring of 1703. His prospects were now suffi- ciently gloomy: he entered into treaty, oftener than once, for an engagement as a travelling tutor; and the correspondence in one of these negotiations has been preserved. Tonson had recom- mended him as the best person to attend in this character Lord Hertford, the son of the duke of Somerset, commonly called " The Proud." The duke, a profuse man in matters of pomp, was economical in questions of education. He wished Addison to name the salary he expected; this being declined, he an- nounced, with great dignity, that in addition to travelling expenses he would give a hundred guineas a year; Addison accepted the munificent offer, saying, however, that he could not find his account in it otherwise than by relying on his Grace's future patronage; and his Grace immediately intimated that he would look out for some one else. In the autumn of 1703 Addison returned to

England.

The works which belong to his residence on the continent were the earliest that showed him to have attained maturity

of skill and genius. There is good reason for believing that his tragedy of Cato, whatever changes it may afterwards have suffered, was in great part written while he lived in France, that is, when he was about twenty-eight years of age. In the winter of 1701, amidst the stoppages and discomforts of a journey across Mt. Cenis, he composed, wholly or partly, his rhymed Letter from Italy to Charles Montagu. This contains some fine touches of description, and is animated by a noble tone of classical enthusiasm. While in Germany he wrote his Dialogues on Medals, which, however, were not published till after his death. These have much liveliness of style and something of the gay humour which the author was afterwards to exhibit more strongly; but they show little either of antiquarian learning or of critical ingenuity. In tracing out parallels between passages of the Roman poets and figures or scenes which appear in ancient sculptures, Addison opened the easy course of inquiry which was afterwards prosecuted by Spence; and this, with the appa- ratus of spirited metrical translations from the classics, gave the work a likeness to his account of his travels. This account, entitled Remarks on Several Parts of Italy, &°c. (1705), he sent home for publication before his own return. It wants altogether the interest of personal narrative: the author hardly ever appears. The task in which he chiefly busies himself is that of exhibiting the illustrations which the writings of the Latin poets, and the antiquities and scenery of Italy, mutually give and re- ceive. Christian antiquities and the monuments of later Italian history had no interest for him.

With the year 1704 begins a second era in Addison's life, which extends to the summer of 17 10, when his age was thirty- eight. This was the first term of his official career; and though very barren of literary performance, it not only raised him from indigence, but settled definitely his position as a public man. His correspondence shows that, while on the continent, he had been admitted to confidential intimacy by diplomatists and men of rank; immediately on his return he was enrolled in the Kit-Cat Club, and brought thus and otherwise into communica- tion with the gentry of the Whig party. Although all accounts agree in representing him as a shy man, he was at least saved from all risk of making himself disagreeable in society, by his unassuming manners, his extreme caution and that sedulous desire to oblige, which his satirist Pope exaggerated into a positive fault. His knowledge and ability were esteemed so highly as to confirm the expectations formerly entertained of his usefulness in

public business; and the literary fame he had already acquired soon furnished an occasion for recommending him to public employment. Though the Whigs were out of office, the administration which succeeded them was, in all its earlier changes, of a complexion so mixed and uncertain that the influence of their leaders was not entirely lost. Not long after Marlborough's great victory at Blenheim, it is said that Godolphin, the lord treasurer, expressed to Lord Halifax a desire to have the great duke's fame extended by a poetical tribute. Halifax seized the opportunity of recommending Addison as the fittest man for the duty; stipulating, we are told, that the service should not be unrewarded, and doubtless satisfy- ing the minister that his protege possessed other qualifications for office besides dexterity in framing heroic verse. The Cam- paign (December 1704), the poem thus written to order, was received with extraordinary applause; and it is probably as good as any that ever was prompted by no more worthy in- spiration. It has, indeed, neither the fiery spirit which Dryden threw into occasional pieces of the sort, nor the exquisite polish that would have been given by Pope, if he had stooped to make such uses of his genius; but many of the details are pleasing; and in the famous passage of the Angel, as well as in several others, there is even something of force and imagination.

The consideration covenanted for by the poet's friends was faithfully paid. A vacancy occurred by the death of another celebrated man, John Locke; and Addison was appointed one of the five commissioners of appeal in Excise. The duties of the place must have been as light for him as they had been for his predecessor, for he continued to hold it with all the appointments

he subsequently received from the same ministry. But there is no reason for believing that he was more careless than other public servants in his time; and the charge of incompetency as a man of business, which has been brought so positively against him, cannot easily be true as to this first period of his official career. Indeed, the specific allegations refer exclusively to the last years of his life; and, if he had not really shown practical ability in the period now in question, it is not easy to see how he, a man destitute alike of wealth, of social or fashion- able liveliness and of family interest, could have been promoted, for several years, from office to office, as he was, till the fall of the administration to which he was attached. In 1706 he became one of the under-secretaries of state, serving first under Sir

Charles Hedges, who belonged to the Tory section of the government, and afterwards under Lord Sunderland, Marlborough's son-in-law, and a zealous follower of Addison's early patron, Somers. The work of this office, however, like that of the commissionership, must often have admitted of performance by deputy; for in 1707, the Whigs having become stronger, Lord Halifax was sent on a mission to the elector of Hanover ; and, besides taking Vanbrugh the dramatist with him as king- at-arms, he selected Addison as his secretary. In 1708 Addison entered parliament, sitting at first for Lostwithiel, but afterwards for Malmesbury, which he represented from 17 10 till his death. Here unquestionably he did fail. What part he may have taken in the details of business we are not informed; but he was always a silent member, unless it be true that he once attempted to speak and sat down in confusion. In 1708 Lord Wharton, the father of the notorious duke, having been named lord-lieutenant of Ireland, Addison became his secretary, re- ceiving also an appointment as keeper of records. This event happened only about a year and a half before the dismissal of the ministry.

But there are letters showing that Addison made himself acceptable to some of the best and most distinguished persons in Dublin; and he escaped without having any quarrel with Swift, his acquaintance with whom had begun some time before.

In his literary history those years of official service are almost a blank, till we approach their close. Besides furnishing a pro- logue to Steele's comedy of The Tetider Husband (1705), he admittedly gave him some assistance in its composition; he defended the government in an anonymous pamphlet on The Present State of the War (1707); he united compliments to the all-powerful Marlborough with indifferent attempts at lyrical poetry in his opera of Rosamond; and during the last few months of his tenure of office he contributed largely to the Taller. His entrance on this new field nearly coincides with the beginning of a new period in his life. Even the coalition-ministry of Godolphin was too Whiggish for the taste of Queen Anne; and the Tories, the favourites of the court, gained, both in parlia- mentary power and in popularity out of doors, by a combination of lucky accidents, dexterous management and divisions and double-dealing among their adversaries. The real failure of the prosecution of Addison's old friend Sacheverell completed the ruin of the Whigs; and in August 17 10 an entire revolution in the ministry had been completed. The Tory administration which succeeded kept its place till the queen's death in 1714, and Addison was thus left to devote four of the best years of his life, from his thirty-ninth year to his forty-third, to occupations less lucrative than those in which his time had recently

been frittered away, but much more conducive to the extension of his own fame and to the benefit of English literature. Although our information as to his pecuniary affairs is very scanty, we are entitled to believe that he was now independent of literary labour. He speaks, in an extant paper, of having had (but lost) property in the West Indies; and he is understood to have inherited something from a younger brother, who had been governor of Madras. In 1711 he purchased, for £10,000, the estate of Bilton, near Rugby — the place which afterwards be- came the residence of Mr Apperley, better known by his assumed name of ” Nimrod.”

During those four years he produced a few political writings.

Soon after the fall of the ministry, he started the Whig Examiner in opposition to the Tory Examiner, then conducted by Prior, and afterwards the vehicle of Swift’s most vehement invectives against the party he had once belonged to. These are certainly the most ill-natured of Addison’s writings, but they are neither lively nor vigorous, and the paper died after five numbers (14th* September to 12th October 17 10). There is more spirit in his allegorical pamphlet, The Trial and Conviction of Count Tariff.

But from the autumn of 17 10 till the end of 17 14 his principal employment was the composition of his celebrated periodical essays. The honour of inventing the plan of such compositions, as well as that of first carrying the idea into execution, belongs to Richard Steele, who had been a schoolfellow of Addison at the Charterhouse, continued to be on intimate terms with him after- wards and attached himself with his characteristic ardour to the same political party. When, in April 1709, Steele published the first number of the Taller, Addison was in Dublin, and knew nothing of the design. He is said to have detected his friend’s authorship only by recognizing, in the sixth number, a critical remark which he remembered having himself communicated to Steele. Shortly afterwards he began to furnish hints and sugges- tions, assisted occasionally and finally wrote regularly. Accord- ing to Mr Aitken (Life of Steele, i. 248), he contributed 42 out of the total of 271 numbers, and was part-author of 36 more. The Taller exhibited, in more ways than one, symptoms of being an experiment. For some time the projector, imitating the news- sheets in form, thought it prudent to give, in each number, news in addition to the essay; and there was a want, both of unity and of correct finishing, in the putting together of the literary materials. Addison’s contributions, in particular, are in many places as lively as anything he ever wrote; and his style, in its more familiar moods at least, had been fully formed before he returned from the continent. But, as

compared with his later pieces, these are only what the painter's loose studies and sketches are to the landscapes which he afterwards constructs out of them. In his invention of incidents and characters, one thought after another is hastily used and hastily dismissed, as if he were putting his own powers to the test or trying the effect of various kinds of objects on his readers; his most ambitious flights, in the shape of allegories and the like, are stiff and inanimate; and his favourite field of literary criticism is touched so slightly, as to show that he still wanted confidence in the taste and knowledge of the public.

The Taller was dropped in January 1711, but only to be followed by the Spectator, which was begun on the 1st day of March, and appeared every week-day till the 6th day of December 1 71 2. It had then completed the 555 numbers usually collected in its first seven volumes, and of these Addison wrote 274 to Steele's 236. He co-operated with Steele constantly from the very opening of the series; and they devoted their whole space to the essays. They relied, with a confidence which the extra- ordinary popularity of the work fully justified, on their power of exciting the interest of a wide audience by pictures and reflexions drawn from a field which embraced the whole compass of ordi- nary life and ordinary knowledge, no kind of practical themes being positively excluded except such as were political, and all literary topics being held admissible, for which it seemed possible to command attention from persons of average taste and infor- mation. A seeming unity was given to the undertaking, and curiosity and interest awakened on behalf of the conductors, by the happy invention of the Spectator's Club, for which Steele made the first sketch. The figure of Sir Roger de Coverley, how- ever, the best even in the opening group, is the only one that was afterwards elaborately depicted; and Addison was the author of most of the papers in which his oddities and amiabilities are so admirably delineated. Six essays are by Steele, who gives Sir Roger's love-story, and one paper by Budgell describes a hunting party.

To Addison the Spectator owed the most natural and elegant, if not the most original, of its humorous sketches of human character and social eccentricities, its good-humoured satires on ridiculous features in manners and on corrupt symptoms in public taste; these topics, however, making up a department

in which Steele was fairly on a level with his more famous co- adjutor. But Steele had neither learning, nor taste, nor critical acuteness sufficient to qualify him for enriching the series with such literary disquisitions as those which Addison insinuated so often into the lighter matter of his essays, and of which he gave ‘an elaborate specimen in his criticism on Paradise Lost. Still farther beyond the powers of Steele were those speculations on the theory of literature and of the processes of thought analogous to it, which, in the essays ” On the Pleasures of the Imagination,” Addison prosecuted, not, indeed, with much of philosophical depth, but with a sagacity and comprehensiveness which we shall undervalue much unless we remember how little of philosophy was to be found in any critical views previously propounded in England. To Addison, further, belong those essays which (most frequently introduced in regular alternation in the papers of Saturday) rise into the region of moral and religious meditation, and tread the elevated ground with a step so graceful as to allure the reader irresistibly to follow; sometimes, as in the ” Walk through Westminster Abbey,” enlivening solemn thought by gentle sportiveness ; sometimes flowing on with an uninterrupted sedateness of didactic eloquence, and sometimes shrouding sacred truths in the veil of ingenious allegory, as in the ” Vision of Mirza.” While, in short, the Spectator, if Addison had not taken part in it, would probably have been as lively and humor- ous as it was, and not less popular in its own day, it would have wanted some of its strongest claims on the respect of posterity, by being at once lower in its moral tone, far less abundant in literary knowledge and much less vigorous and expanded in thinking. In point of style, again, the two friends resemble each other so closely as to be hardly distinguishable, when both are dealing with familiar objects, and writing in a key not rising above that of conversation. But in the higher tones of thought and composition Addison showed a mastery of language raising him very decisively, not above Steele only, but above all his con- temporaries. Indeed, it may safely be said, that no one, in any age of English literature, has united, so strikingly as he did, the colloquial grace and ease which mark the style of an accom- plished gentleman, with the power of soaring into a strain of expression nobly and eloquently dignified.

On the cessation of the Spectator, Steele set on foot the Guar- dian, which, started in March 1713, came to an end in October, with its 175th number. To this series Addison gave 53 papers, being a very frequent writer during the latter half of its progress. None of his essays here aim so high as the best of those in the Spectator; but he often exhibits both his cheerful and well- balanced humour and his earnest desire to inculcate sound principles of literary judgment. In the last six

months of the year 1714, the Spectator received its eighth and last volume; for which Steele appears not to have written at all, and Addison to have contributed 24 of the 80 papers. Most of these form, in the unbroken seriousness both of their topics and of their manner, a contrast to the majority of his essays in the earlier volumes; but several of them, both in this vein and in one less lofty, are among the best known, if not the finest, of all his essays. Such are the ” Mountain of Miseries ” ; the antediluvian novel of ” Shalum and Hilpa”; the ” Reflections by Moonlight on the Divine Perfections.”

In April 17 13 Addison brought on the stage, very reluctantly, as we are assured, and can easily believe, his tragedy of Cato. Its success was dazzling; but this issue was mainly owing to the concern which the politicians took in the exhibition. The Whigs hailed it as a brilliant manifesto in favour of constitutional free- dom. The Tories echoed the applause, to show themselves enemies of despotism, and professed to find in Julius Caesar a parallel to the formidable Marlborough. Even with such ex- trinsic aids, and the advantage derived from the established fame of the author, Cato could never have been esteemed a good dramatic work, unless in an age in which dramatic power and insight were almost extinct. It is poor even in its poetical elements, and is redeemed only by the finely solemn tone of its moral reflexions and the singular refinement and equable smooth- ness of its diction. That it obtained the applause of Voltaire

must be ascribed to the fact that it was written in accordance with the rules of French classical drama.

The literary career of Addison might almost be held as closed soon after the death of Queen Anne, which occurred in August 1 7 14, when he had lately completed his 42nd year. His own life extended only five years longer; and in this closing portion of it we are reminded of his more vigorous days by nothing but a few happy inventions interspersed in political pamphlets, and the gay fancy of a trifling poem on Kneller’s portrait of George I.

The lord justices who, previously chosen secretly by the elector of Hanover, assumed the government on the queen’s demise, were, as a matter of course, the leading Whigs. They appointed Addison to act as their secretary. He next held, for a very short time, his former office under the Irish lord-lieu- tenant; and, late in 1716, he was made one of the lords of trade. In the course of the previous year had occurred the first of the only two quarrels with friends, into which the prudent, good- tempered and modest Addison is said to have ever been betrayed. His adversary on this occasion was Pope, who, a few years

before, had received, with an appearance of humble thankfulness, Addison's friendly remarks on his Essay on Criticism (Spectator, No. 253); but who, though still very young, was already very famous, and beginning to show incessantly his literary jealousies and his personal and party hatreds. Several little misunder- standings had paved the way for a breach, when, at the same time with the first volume of Pope's Iliad, there appeared a translation of the first book of the poem bearing the name of Thomas Tickell. Tickell, in his preface, disclaimed all rivalry with Pope, and declared that he wished only to bespeak favour- able attention for his contemplated version of the Odyssey. But the simultaneous publication was awkward; and Tickell, though not so good a versifier as Pepe, was a dangerous rival, as being a good Greek scholar. Further, he was Addison's Under-Secre- tary and confidential friend; and Addison, cautious though he was, does appear to have said (quite truly) that Tickell's trans- lation was more faithful than the other. Pope's anger could not be restrained. He wrote those famous lines in which he de- scribes Addison under the name of Atticus, and although it seems doubtful whether he really sent a copy to Addison himself, he afterwards went so far as to profess a belief that the rival translation was really Addison's own. Addison, it is pleasant to observe, was at the pains, in his Freeholder, to express hearty approbation of the Iliad of Pope, who, on the contrary, after Addison's death, deliberately printed his matchlessly malignant verses in the" Epistle to Dr Arbuthnot." In 17 16 there was acted, with little success, Addison's comedy of The Drummer, or the Haunted House. It contributes very little to his fame. From September 171 5 to June 1716 he defended the Hanoverian succession, and the proceedings of the government in regard to the rebellion, in a paper called the Freeholder, which he wrote entirely himself, dropping it with the 55th number. It is much better tempered, not less spirited and much more able in thinking than his Examiner. The finical man of taste does indeed show himself to be sometimes weary of discussing con- stitutional questions; but he aims many enlivening thrusts at weak points of social life and manners; and the character of the Fox-hunting Squire, who is introduced as the representative of the Jacobites, is drawn with so much humour and force that we regret not being allowed to see more of him.

In August 1 7 16, when he had completed his 44th year, Addison married Charlotte, countess-dowager of Warwick, a widow of fifteen years' standing. She seems to have forfeited her jointure by the marriage, and to have brought her husband nothing but the occupancy of Holland House at Kensington. The assertion that the courtship was a long one is probably as erroneous as the

contemporary rumour that the marriage was unhappy. Such positive evidence as exists tends rather to the contrary. What seems clear is, that, from obscure causes, — among which it is alleged a growing habit of intemperance was one, — Addison's health was shattered before he took the last, and certainly the most unwise, step in his ascent to political power.

For a considerable time dissensions had existed in the ministry; and these came to a crisis in April 1717, when those who had been the real chiefs passed into the ranks of the opposition. Townshend was dismissed, and Walpole anticipated dismissal by resignation. There was now formed, under the leadership of General Stanhope and Lord Sunderland, an administration which, as resting on court-influence, was nicknamed the "German ministry." Sunderland, Addison's former superior, became one of the two principal secretaries of state; and Addison him- self was appointed as the other. His elevation to such a post had been contemplated on the accession of George I., and pre- vented, we are told, by his own refusal; and it is asserted, on the authority of Pope, that his acceptance now was owing only to the influence of his wife. Even if there is no ground, as there probably is not, for the allegation of Addison's inefficiency in the details of business, his unfitness for such an office in such circumstances was undeniable and glaring. It. was impossible that a government, whose secretary of state could not open his lips in debate, should long face an opposition headed by Robert Walpole. The decay of Addison's health, too, was going on rapidly, being, we may readily conjecture, precipitated by anxiety, if no worse causes were at work. Ill-health was the reason assigned for retirement, in the letter of resignation which he laid before the king in March 17 18, eleven months after his appointment. He received a pension of £1500 a year.

Not long afterwards the divisions in the Whig party alienated him from his oldest friend. The Peerage Bill, introduced in February 17 19, was attacked, on behalf of the opposition, in a weekly paper called the Plebeian, written by Steele. Addison answered the attack in the Old Whig, and this helium plusquam civile — as Johnson calls it — was continued, with increased acrimony, through two or three numbers. How Addison* who was dying, felt after this painful controversy we are not told directly; but the Old Whig was excluded from that posthumous collection of his works (1 721-17 26) for which his executor Tickell had received from him authority and directions. It is

said that the quarrel in politics rested on an estrangement which had been growing for some years. According to a rather nebulous story, for which Johnson is the popular authority, Addison, or Addison's lawyer, put an execution for £100 in Steele's house by way of reading his friend a lesson on his extravagance. This well-meant interference seems to have been pardoned by Steele, but his letters show that he resented the favour shown to Tickell by Addison and his own neglect by the Whigs.

The disease under which Addison laboured appears to have been asthma. It became more violent after his retirement from office, and was now accompanied by dropsy. His deathbed was placid and resigned, and comforted by those religious hopes which he had so often suggested to others, and the value of which he is said, in an anecdote of doubtful authority, to have now inculcated in a parting interview with his step-son. He died at Holland House on the 17th of June 1710, six weeks after having completed his 47th year. His body, after lying in state, was interred in the Poets' Corner of Westminster Abbey.

Addison's life was written in 1843 by Lucy Aikin. This was reviewed by Macaulay in July of the same year. A more modern study is that m the " Men of Letters " series by W. J. Courthope (1884). There is a convenient one-volume edition of the Spectator, by Henry Morley (Routledge, 1868), and another in 8 vols. (1897-1898) by G. Gregory Smith. Of the Tatter there is an edition by G. A. Aitken in 8 vols. (1898). A complete edition of Addison's works (based upon Hurd) is included in Bohn's British Classics. (W. S. ; A. D.)

ADDISON'S DISEASE, a constitutional affection manifesting itself in an exaggeration of the normal pigment of the skin, asthenia, irritability of the gastro-intestinal tract, and weakness and irregularity of the heart's action: these symptoms being due to loss of function of the suprarenal glands. It is important to note, however, that Addison's Disease may occur without pigmentation, and pigmentation without Addison's Disease. The condition was first recognized by Dr Thomas Addison of Guy's Hospital, who in 1855 published an important work on The Constitutional and Local Effects of Diseases of the Suprarenal Capsules. Sir Samuel Wilks worked zealously in obtaining re-

cognition for these observations in England, and Brown-Sequard in France was stimulated by this paper to investigate the physiology of these glands. Dr Trousseau, many years later, first called the condition by Addison's name. Dr Headlam Greenhow worked at the subject for many years and embodied his observations in the Croonian Lectures of

1875. But from this time on no further work was undertaken until the discovery of the treatment of myxoedema by thyroid extract, and the consequent researches into the physiology of the ductless glands. This stimulated renewed interest in the subject, and work was carried on in many countries. But it remained for Schafer and Oliver of University College, London, to demonstrate the in- ternal secretion of the suprarenals, and its importance in normal metabolism, thereby confirming Addison's original view that the disease was due to loss of function of these glands. They demonstrated that these glands contain a very powerful extract which produces toxic effects when administered to animals, and that an active principle " adrenalin " can be separated, which excites contraction of the small blood vessels and thus raises blood pressure. The latest views of this disease thus stand: (1) that it is entirely dependent on suprarenal disease, being the result of a diminution or absence of their internal secretion, or else of a perversion of their secretion; or (2) that it is of nervous origin, being the result of changes in or irritation of the large sympathetic plexuses in the abdomen; or else (3) that it is a combination of glandular inadequacy and sympathetic irritation.

The morbid anatomy shows (1) that in over 80% of the cases the changes in the suprarenals are those d.ue to tuber- culosis, usually beginning in the medulla and resulting in more or less caseation; and that this lesion is bilateral and usually secondary to tuberculous disease elsewhere, especially of the spinal column. In the remaining cases (2) simple atrophy has been noted, or (3) chronic interstitial inflammation which would lead to atrophy; and finally (4) an apparently normal condition of the glands, but the neighbouring sympathetic ganglia diseased or involved in a mass of fibrous tissue. Other morbid conditions of the suprarenals do not give rise to the symptoms of Addison's Disease.

The onset of the disease is extremely insidious, a slow but increasing condition of weakness being complained of by the patient. There is a feeble and irregular action of the heart resulting in attacks of syncope which- may prove fatal. Blood pressure is extremely low. From time to time there may be severe attacks of nausea, vomiting or diarrhoea. The best known symptom, but one which only occurs after the disease has made considerable progress, is a gradually increasing pig- mentation of the skin, ranging from a bronzy yellow to brown or even occasionally black. This pigmentation shows itself (1) over exposed parts, as face and hands; (2) wherever pigment appears normally, as in the axillae and round the nipples; (3) wherever pressure is applied, as round the waist; and (4) occa- sionally on mucous membranes, as in the mouth.

The patient's temperature is usually somewhat subnormal. The disease is found in males far more commonly than in females, and among the lower classes more than the upper. But this latter fact is probably due to poor nourishment and bad hygienic conditions rendering the poorer classes more susceptible to tuberculosis.

The diagnosis, certainly in the early stages of the disease, and often in the later, is by no means easy. Pigmentation of the skin occurs in many conditions — as in normal pregnancy, uterine fibroids, abdominal growths, certain cases of heart disease, exophthalmic goitre, &c, and after the prolonged use of certain drugs — as arsenic and silver. But the presence of a low blood pressure with weakness and irritability of the heart and some of the preceding symptoms render the diagnosis fairly certain. The latest researches on the subject tend to indicate a more certain diagnosis in the effect on the blood pressure of adminis- tering suprarenal extract, the blood pressure of the normal subject being unaffected thereby, that of the man suffering from suprarenal inadequacy being markedly raised. The disease is treated by promoting the general health in every possible way ;

by diet; by tonics, especially arsenic and strychnine; by atten- tion to the hygienic conditions; and always by the adminis- tration of one of the many preparations of the suprarenal gland extract.

"ADDRESS, THE," an English parliamentary term for the reply of the Houses of Parliament (and particularly of the House of Commons) to the speech of the sovereign at the opening of a new parliament or session. There are certain formalities which distinguish this stage of parliamentary proceedings. The " king's speech " itself is divided into three sections: the first, addressed to " My Lords and Gentlemen," touches on foreign affairs; the second, to the " Gentlemen of the House of Com- mons," has reference to the estimates; the third, to " My Lords and Gentlemen," outlines the proposed legislation for the session. Should the sovereign in person open parliament, he does so in the House of Lords in full state, and the speaker and members of the House of Commons are summoned there into the royal presence. The sovereign then reads his speech. If the sovereign is not present in person, the speech is read by commission. The Commons then return to their House, and an address in answer is moved in both Houses. The government of the day selects two of its supporters in each House to move and second the address, and when carrying out this

honourable task they appear in levee dress. Previous to the session of 1890- 1 89 1 , the royatspeech was answered paragraph by paragraph, but ” the address ” is now moved in the form of a single resolution, thanking the sovereign for his most gracious speech. The debate on the address is used as a means of ranging over the whole government policy, amendments being introduced by the opposi- tion. A defeat on an amendment to the address is generally regarded by the government as a vote of no-confidence. After the address is agreed to it is ordered to be presented to the sovereign. The thanks of the sovereign for the address are then conveyed to the Lords by the lord steward of the household and to the Commons by the comptroller of the household.

ADELAER, or Adeler (Norwegian for ” eagle “), the surname of honour given on his ennoblement to Kurt Sivertsen (1622- 1675), the famous Norwegian-Danish naval commander. He was born at Brevig in Norway, and at the age of fifteen became a cadet in the Dutch fleet under van Tromp, after a few years entering the service of the Venetian Republic, which was engaged at the time in a war with Turkey. In 1645 he had risen to the rank of captain; and after sharing in various victories as commander of a squadron, he achieved his most brilliant success at the Dardanelles, on the 13th of May 1654, when, with his own vessel alone, he broke through the line of Turkish galleys, sank fifteen of them, and burned others, causing a loss to the enemy of 5000 men. . The following day he entered Tenedos, and compelled the complete surrender of the Turks. On returning to Venice he was crowned with honours, and became admiral-lieutenant in 1660. Numerous tempting offers were made to him by other naval powers, and in 1661 he left Venice to return to the Netherlands. Next year he was induced, by the offer of a title and an enormous salary, to accept the command of the Danish fleet from Frederick III. Under Christian V. he took the command of the combined Danish fleets against Sweden, but died suddenly on the 5th of November 1675 at Copenhagen, before the expedition set out. When in the Venetian service, Adelaer was known by the name of Curzio Suffrido Adelborst (i.e. Dutch for ” naval cadet “).

ADELAIDE (Ger. Adelheid) (931-999), queen of Italy and empress, was the daughter of Rudolph II. of Burgundy and of Bertha, daughter of Duke Burchard of Swabia. On the death of Rudolph in 937, his widow married Hugh, king of Italy, to whose son Lothair Adelaide was at the same time betrothed. She was married to him in 947; but after an unhappy union of three years Lothair died (November 22, 950). The young widow, re- markable for her character and beauty, was seized by Lothair’s successor, Berengar II., margrave of Ivrea, who, angered probably at her refusal to marry his son Adalbert and thus secure his

title to the Italian kingdom, kept her in close confinement at Como. After four months (August 951), she escaped, and took refuge at

Canossa with Atto, count of Modena-Reggio (d. 981). Mean- while Otto I., the German king, whose English wife Edgitha had died in 946, had formed the design of marrying her and claiming the Italian kingdom in her right, as a step towards the revival of the empire of Charlemagne. In September 951, accordingly, he appeared in Italy, Adelaide willingly accepted his invitation to meet him at Pavia and at the close of the year the fateful union was celebrated. From the first her part in German affairs was important. To her are ascribed the in- fluences which led in 953 to the revolt of Ludolf, Otto's son by his first marriage, the crushing of which in the following year established Adelaide's power. On the 2nd of February 962 she was crowned empress at Rome by Pope John XII. immediately after her husband, and she accompanied Otto in 966 on his third expedition to Italy, where she remained with him for six years. After Otto I.'s death (May 7, 973), Adelaide exercised for some years a controlling influence over her son, the new emperor, Otto II. The causes of their subsequent estrangement are ob- scure, but it was possibly due to the empress's lavish expenditure in charity and church building, which endeared her to ecclesiastics but was a serious drain on the imperial finances. In 978 she left the court and lived partly in Italy, partly with her brother Conrad, king of Burgundy, by whose mediation she was ulti- mately reconciled to her son. In 983, shortly before his death, she was appointed his viceroy in Italy; and was successful, in concert with the empress Theophano, widow of Otto II., and Archbishop Willigis of Mainz, in defending the right of her infant grandson, Otto III., to the German crown against the pretensions of Henry the Quarrelsome, duke of Bavaria. In June 984 the infant king was handed over by Henry to the care of the two empresses; but the masterful will of Theophano soon obtained the upper hand, and until the death of the Greek empress, on the 15th of June 991, -Adelaide had no voice in German affairs. She now assumed the regency, in concert with Bishop Willigis and a council of princes of the Empire, and held it until in 995 Otto was declared of age. In 996 the young king went to Italy to receive the imperial crown; and from this date Adelaide ceased to concern herself with worldly affairs, but devoted herself to pious exercises, to intimate correspondence with the abbots Majolus and Odilo of Cluny, and the foundation of churches and religious houses. She died on the 1 7th of December 999, and was buried in the convent of SS. Peter and Paul, her favourite foundation, at Salz in Alsace. She was proclaimed a saint by the grateful German clergy; but her name has never found a place in the Roman calendar. Like her daughter-in-

law Theo- phano and other exalted ladies of this period, Adelaide possessed considerable literary attainments {literatissima erat), and her knowledge of Latin was of use to Otto I., who only learned the language late in life and remained to the end a poor scholar.

By the emperor Otto I. she had four children: Otto II. (d. 983), Mathilda, abbess of Quedlinburg (d. 999)., Adelheid (Adelaide), abbess of Essen (d. 974), and Liutgard, who married Conrad II., duke of Franconia, and died in 955.

Adelaide's life (Vita or Epitaphium A dalheidae imperatricis) was written by St Odilo of Cluny. It is valuable only for the latter years of the empress, after she had retired from any active share in the world's affairs. The rest of her life is merely outlined, though her adventures in escaping from Berengar are treated in more detail. The best edition is in Duchesne, Bibhotheca Cluniacensis , pp. 353- 362. See Giov. Batt. Semeria, Vita politico-religiosa di s. Adeletda, &c. (Turin, 1842) ; Jul. Bentzinger, Das Leben der Kaiserin Adelheid . . . wahrend der Regierung Ottos III., Inaug. Dissertation (Breslau, 1883); J. J. Dey, Hist, de s. Adelaide, &c. (Geneva, 1862); F. P. Wimmer, Kaiserin Adelheid, Gemahlin Ottos I. des Grossen (Regensb. 1889) ; Wattenbach, Deutschlands Geschichtsquellen (Stuttgart and Berlin, 1904). Further references in Chevalier, Repertoire des sources historiques (Paris, 1903).

ADELAIDE, the capital of South Australia. It is situated in the county to which it gives name, on the banks of the river Torrens, 7 m. from its mouth. Its site is a level plain, near the foot of the Mount Lofty range, in which Mount Lofty itself reaches 2334 ft. The broad streets of the city intersect at right angles. It is divided into North Adelaide, the residential, and South Adelaide, the business quarter. A broad strip of park

lands lies between them, through which runs the river Torrens, crossed by five bridges and greatly improved by a dam on the west of the city. The banks are beautifully laid out. Broad belts of park lands surround both North and South Adelaide, and as the greater portion of these lands is planted with fine shady trees, this feature renders Adelaide one of the most attractive cities in Australasia. South Adelaide is bounded by four broad terraces facing north, south, east and west. The main thoroughfare, King William Street, runs north and south, passing through Victoria Square, a small park in the centre of the city. Handsome public buildings are numerous. Govern- ment

House stands in grounds on the north side of North Ter- race, with several other official buildings in the vicinity; but the majority are in King William Street. Here are the town hall, with the lofty Albert Tower, and the general post office, with the Victoria Tower — which, with the old and new Govern- ment offices, the Roman Catholic cathedral of St Francis Xavier and the court houses, surround Victoria Square. On North Terrace are the houses of parliament, and the institute, containing a public library and museum. Here is also Adelaide University, established by an act of 1874, and opened in 1876. The existing buildings were opened in 1882. Munificent gifts have from time to time assisted in the extension of its scope, as for example that of Sir Thomas Elder (d. 1897), who took a leading part in the foundation of the university. This gift, among other provisions, enabled the Elder Conservatorium of Music to be established, the building for which was opened in 1900. In 1903 a building for the schools of engineering and science was opened. The total number of students in the university approaches 1000. To the east of the university is the building in which the exhibition was held in commemoration of the jubilee of the colony in 1887. This building is occupied by the Royal Agricultural and Horti- cultural Society, a technical museum, &c. The school of mines and industries (1903) stands east of this again. The buildings of the numerous important commercial, social and charitable institutions add to the dignity of the city. The Anglican cathe- dral of St Peter (1878) is in North Adelaide. The Botanical Park, which has an area of 84 acres, lies on the south bank of the Torrens, on the east of the city. It includes the Zoological Garden, is beautifully laid out and forms one of the most attractive features of Adelaide. The city has a number of good statues, chief among which are copies of the Farnese Hercules (Victoria Square) and of Canova's Venus (North Terrace) , statues of Queen Victoria and Robert Burns, Sir Thomas Elder's statue at the university, and a memorial (1905) over the grave of Colonel Light, founder of the colony, in Light Square. Adelaide is governed by a mayor and six aldermen elected by the whole body of the ratepayers, and is the only Australian city in which the mayor is so elected. The chief industries are the manufacture of woollen, earthenware and iron goods, brewing, starch-making, flour-milling and soap-boiling. Adelaide is also the central share market of Australia, for West Australian gold- mines, for the silver-mines at Broken Hill, and for the copper- mines at Wallaroo, Burra Burra and Moonta; while Port Adelaide, on the neighbouring shore of St Vincent Gulf, ranks as the third in the Commonwealth. Adelaide is the terminus of an extensive railway system, the main line of which runs through Melbourne, Sydney and Brisbane to Rockhampton. In summer the climate is often oppressively hot under

the influence of winds blowing from the interior, but the proximity of the sea on the one side and of the mountains on the other allows the inhabitants to avoid the excessive heat; at other seasons, however, the climate is mild and pleasant; with a mean annual rainfall of 20-4 ins. The vice-regal summer residence is at Marble Hill, on the Mount Lofty range. Adelaide was founded in 1836 and incorporated in 1843. It received its name at the desire of King William IV., in honour of Queen Adelaide. Round the city are many pleasant suburbs, connected with it by rail and tramways; the chief of these are Burnside, Beaumont, Unley, Mitcham, Goodwood, Plymton, Hindmarsh, Prospect, St Peters, Norwood and Kensington. Glenelg is a favourite watering-place. The population of the city proper was 39,240

in 1 901; of the city and suburbs within a 10-miles radius,

162,261.

ADELARD (or Aethelard) of Bath (12th century), English scholastic philosopher, and one of the greatest savants of medieval England. He studied in France at Laon and Tours, and travelled, it is said, through Spain, Italy, North Africa and Asia Minor, during a period of seven years. At a time when Western Europe was rich in men of wide knowledge and intel- lectual eminence, he gained so high a reputation that he was described by Vincent de Beauvais as Philosophus Anglorum. He lived for a time in the Norman kingdom of Sicily and returned to England in the reign of Henry I. From the Pipe Roll (31 Henry I. 1130) it appears that he was awarded an annual grant of money from the revenues of Wiltshire. The great interest of Adelard in the history of philosophy lies in the fact that he made a special study of Arabian philosophy during his travels, and, on his return to England, brought his knowledge to bear on the current scholasticism of the time. He has been credited with a knowledge of Greek, and it is said that his translation of Euclid's Elements was made from the original Greek. It is probable, however, from the nature of the text, that his authority was aa Arabic version. This important work was published first at Venice in 1482 under the name of Campanus of Novara, but the work is always attributed to Adelard, Campanus may be re- sponsible for some of the notes. It became at once the text-book of the chief mathematical schools of Europe, though its critical notes

were of little value. His Arabic studies he collected under the title Perdifficiles Quaestiones Naturales, printed after 1472. It is in the form of a dialogue between himself and his favourite nephew, and was dedicated to Richard, bishop of Bayeux from ni3 to 1 133. He wrote also treatises on the astrolabe (a copy of this is in the British Museum), on the abacus (three copies exist in the Vatican library, the library of Leiden University and the Bibliotheque Nationale in Paris), translations of the Kharismian Tables and an Arabic Introduction to Astronomy. His great contribution to philosophy proper was the De Eodem et Diver so {On Identity and Difference) , which is in the form of letters addressed to his nephew. In this work philosophy and the world are personified as Philosophia and Philocosmia im conflict for the soul of man. Philosophia is accompanied by the liberal arts, represented as Seven Wise Virgins; the world by Power, Pleasure, Dignity, Fame and Fortune. The work deals with the current difficulties between nominalism and realism, the relation between the individual and the genus or species. Adelard regarded the individual as the really existent, and yet, from different points of view, as being himself the genus and the species. He was either the founder or the formulator of the doctrine of indifference, according to which genus and species retain their identity in the individual apart altogether from particular idiosyncrasies. For the relative importance of this doctrine see article Scholasticism.

See Jourdain, Kech.erch.es sur les traductions d'Aristote (2nd ed., 1843); Haureau, Philosophic scolastique (2nd ed., 1872), and works appended to art. Scholasticism.

ADELSBERG (Slovene Poslojina), a market- town in Carniola, Austria, 30 m. S.S.W. of Laibach by rail. Pop. (1900) 3636, mostly Slovene. About a mile from the town is the entrance to the famous stalactite cavern of Adelsberg, the largest and most magnificent in Europe. The cavern is divided into four grottoes, with two lateral ramifications which reach to the dis- tance of about a mile and a half from the entrance. The river Poik enters the cavern 60 ft. below its mouth, and is heard murmuring in its recesses. In the Kaiser-Ferdinand grotto, the third of the chain, a great ball is annually held on Whit-Monday, when the chamber is brilliantly illuminated. The Franz- Joseph- Elisabeth grotto, the largest of the four, and the farthest from the entrance, is 665 ft. in length, 640 ft. in breadth and more than 100 ft. high. Besides the imposing proportions of its chambers, the cavern is remarkable for the variegated beauty of its stalactite formations, some resembling transparent drapery, others waterfalls, trees, animals or human beings, the more grotesque being called by various fanciful appellations. These

subterranean wonders were known as far bade as 1213, but the cavern remained undiscovered in modern times until 18.16, and it is only in still more recent times that its vast extent has been fully ascertained and explored. The total length of the passages is- now estimated at over 5$ m. The connexion with the Ottokar grotto was established in 1800. The Magdalene grotto, about an hour's walk to the north, is celebrated for the extraordinary subterranean amphibian, the proteus anguinus, first discovered there. It is about a foot in length, lives on snails and worms and is provided with both lungs and gills.

ADELUNG, JOHANN CHRISTOPH (1732-1806), German grammarian and philologist, was born at Spantekow, in Pomer- ania, on the 8th of August 1732, and educated at the public schools of Anklam and Klosterbergen, and the university of Halle. In 1759 he was appointed professor at the gymnasium of Erfurt, but relinquished this situation two years later and went to reside in a private capacity at Leipzig, where he devoted him- self to philological researches. In 1787 he received the appoint- ment of principal librarian to the elector of Saxony at Dresden, where he continued to reside until his death on the 10th of September 1806.

The writings of Adelung are very voluminous, and there is not one of them, perhaps, which does not exhibit some proofs of the genius, industry and erudition of the author. By means of his excellent grammars, dictionary and various works on German style, he contributed greatly towards rectifying the ortho- graphy, refining the idiom and fixing the standard of his native tongue. His German dictionary — Grammatisch-kritisches Worter- buch der hochdeutschen Mundart (1774-1786)— bears witness to the patient spirit of investigation which Adelung possessed in so remarkable a degree, and to his intimate knowledge of the history of the different dialects on which modern German is based. No man before Jakob Grimm (q.v.) did so much for the language of Germany. Shortly before his death he issued Mithridates, oder allgcmeine Sprachenkunde (1 806) . The hint of this work appears to have been taken from a publication, with a similar title, pub- lished by Konrad von Gesner (1316-1565) in 1555; but the plan of Adelung is much more extensive. Unfortunately he did not live to finish what he had undertaken. The first volume, which contains the Asiatic languages, was published immediately after his death; the other two were issued under the superintendence of Johann Severin Vater (1771-1826). Of the very numerous works by Adelung

the following may be noted: Directorium diplomaticum (Meissen, 1802); Deutsche Sprachlehre ftir Schulen (Berlin, 1781), and the periodical, Magazin fur die deutsche Sprache (Leipzig, 1782-1784).

ADEMPTION (Lat. ademptio, from adimere, a taking away), in law, a revocation of a grant or bequest (see Legacy).

ADEN, a seaport and territory in Arabia, politically part of British India, under the governor of Bombay. The seaport is situated in 12° 45′ N. lat., and 45 4′ E. long., on a peninsula near the entrance to the Red Sea, 100 m. E. of the strait of Bab-el-Mandeb. The peninsula of Aden consists chiefly of a mass of barren and desolate volcanic rocks, extending five miles from east to west, and three from its northern shore to Ras Sanailah or Cape Aden, its most southerly point; it is connected with the mainland by a neck of flat sandy ground only a few feet high; and its greatest elevation is Jebel Shamshan, 1776 ft. above the level of the sea. The town is built on the eastern coast, in what is probably the crater of an extinct volcano, and is surrounded by precipitous rocks that form an admirable natural defence. There are two harbours, an outer, facing the town, protected by the island of Sirah, but now partially choked with mud; and an inner, called Aden Back-bay, or, by the Arabs, Bandar Tawayih, on the western side of the peninsula, which at all periods of the year admits vessels drawing less than 20 ft. On the whole, Aden is a healthy place, although it suffers considerably from the want of good water, and the heat is often very intense. From time to time additional land on the mainland has been acquired by cession or purchase, and the adjoining island of Perim, lying in the actual mouth of the Strait, was permanently occupied in 1857. Farther inland,

and along the coast,: most of the Arab chiefs are under the political control, of the British government, which pays them regular allowances. The area of the peninsula is only 15 sq. m., but the total area of British territory is returned at 80 sq. m., including Perim (5 sq. m.), and that of the Aden Protectorate is about 9000 sq. m. The seaport of Aden is strongly fortified. Modern science has converted ” Steamer Point ” into a seem- ingly impregnable position, the peninsula which the ” Point ” forms to the whole crater being cut off by a fortified line which runs from north to south, just to the east of the coal wharfs. The administration is conducted by a political resident, who is also the military commandant. Ail food requires to be imported, and the water-supply is largely derived from condensation. A little water is obtained from wells, and some from an aqueduct 7 m. long, constructed in 1867 at a cost of £30,000, besides an irregular supply from the old -reservoirs.

From its admirable commercial and military position, Aden early became the chief entrepot of the trade between Europe and Asia. It is the ‘Apafiia ev8a.lfi.a3v of the Periplus. It was known to the Romans as Arabia Felix and Attanae, and was captured by them, probably in the year 24 B.C. In 1513 it was unsuccess- fully attacked by the Portuguese under Albuquerque, but sub- sequently it fell into the hands of the Turks in 1538. In the following century the Turks themselves relinquished their con- quests in Yemen, and the sultan of Sana established a supremacy over Aden, which was maintained until the year 1735, when the sheikh of Lahej, throwing off his allegiance, founded a line of independent sultans. In 1837 a ship under British colours was wrecked near Aden, and the crew and passengers grievously maltreated by the Arabs. An explanation of the outrage being demanded by the Bombay government, the sultan undertook to make compensation for the plunder of the vessel, and also agreed to sell his town and port to the English. Captain Haines of the Indian navy was sent to complete these arrangements, but the sultan’s son refused to fulfil the promises that his father had made, A combined naval and miltary force was thereupon despatched, and the place was captured and annexed to British India on the 16th of January 1839. The withdrawal of the trade between Europe and the East, caused by the discovery of the passage round’ the Cape of Good Hope, and the misgovern- ment of the native rulers, had gradually reduced Aden to a state of comparative insignificance ; but about the time of its capture by the British the Red Sea route to India was reopened, and commerce soon began to flow in its former channel, Aden was made a free port, and was chosen as one of the coaling stations of the Peninsular and Oriental Steamship Company. Its im- portance as a port of call for steamers and a coaling station has grown immensely since the opening of the Suez Canal. It also conducts a considerable trade with the interior of Arabia, and with the Somali coast of Africa on the opposite side of the Red Sea’. The submarine cables of the Eastern Telegraph Company here diverge — on the one hand to India, the Far East and Australia, and on the other hand to Zanzibar and the Cape.

In 1839 the population was less than 1000, but in 1901 it had grown to 43,974. The gross revenue(i9oi-i902) was Rs. 37,25,91 5. There are three printing-presses, of which one is in the gaol and the other two belong to a European and a Parsee firm of mer- chants. The port is visited yearly by some 1300 steamers with a tonnage of 2 J million tons. The principal articles of import are coffee, cotton-piece goods, &c, grain, hides, coal, opium, cotton- twist and yarn. The exports are, in the main, a repetition of the imports. Of the total imports neany one-third come from the east coast of Africa, and another third from

Arabia. Of the total exports, nearly one-third again go to the east coast of Africa. The Aden brigade belongs to the western army corps of India.

ADENES (Adenez or Adans), surnamed LE ROI, French trouvere, was born in Brabant about 1240. He owed Lis educa- tion to the kindness of Henry III.; duke of Brabant, and he re- mained in favour at court for some time after the death (1261) of his patron. In 1269 he entered the service of Guy de Dampierre,, afterwards count of Flanders, probably as roi des menestreh,

and followed him in the next year on the abortive crusade in Tunis in which Louis IX. lost his life. The expedition returned by way of Sicily and Italy, and Adenes has left in his poems some very exact descriptions of the places through which he passed. The purity of his French and the absence of provincial- isms point to a long residence in France, and it has been suggested that Adenes may have followed Mary of Brabant thither on her marriage with Philip the Bold. He seems, however, to have remained in the service of Count Guy, although he made frequent visits to Paris to consult the annals preserved in the abbey of St Denis. The poems written by Adenes are four: the Enfances Ogier, an enfeebled version of the Ckevalerie Ogier de Danemarcke written by Raimbert de Paris at the beginning of the century; Berte aus granspies, the history of the mother of Charlemagne, founded on well-known traditions which are also preserved in the anonymous Chronique de France, and in the Chronique rimie of Philippe Mousket; Bueves de Comarchis, belonging to the cycle of romance gathered round the history of Aimeri de Narbonne; and a long roman d'aventures, Cliomades, borrowed from Spanish and Moorish traditions brought into France by Blanche, daughter of Louis IX., who after the death of her Spanish husband returned to the French court. Adenes probably died before the end of the 13th century.

The romances of Adenes were edited for the Academie Imp6riale et Royale of Brussels by A. Scheler and A. van Hasselt in 1874; Berte was rendered into modern French by G. Hecq (1897) and by R. Perie(i90o) ; CUomadis , by Le Chevalier de Chatelain (1859). See also the edition of Berte by Paulin Paris (1832); an article by the same writer in the Hist. litt. de la France, vol. xx. pp. 679-718; Leon Gautier, Les epopees francaises, vol. iii., &c.

ADENINE, or 6-Amino-purin, C5H5N5, in chemistry, a basic substance which has been obtained as a decomposition product of nuclein, and also from the pancreatic glands of oxen. It has been synthesized by E. Fischer (Berichte, 1897, 30, p. 2238) by heating 2.6.8-trichlorpurin with 10 times its weight of ammonia for six hours at ioo° C; by this means 6-amino-2.8-dichlor- purin is obtained, which on reduction by means of hydriodic acid and phosphonium iodide is converted into adenine. In 1898 E. Fischer also obtained it from 8-oxy-2.6-dichlorpurin \Berichte, 1898, 31, p. 104). It crystallizes in long needles; forms ialts C 5 H 5 N 6 -2HI and (C 6 H s N 5)s-H 2 SOv2H20, and is converted by nitrous acid into hypoxanthine or 6-oxypurin. On heating with hydrochloric acid at 180-200 C. it is decomposed; the products of the reaction being glycocoll, ammonia, formic acid and carbon dioxide. Various methyl derivatives of adenine have been described by E. Fischer (Berichte, 1898, 31, p. 104) and by M. Kruger (Zeit. ftir physiol. Chemie, 1894, 18, p. 434). For the constitution of adenine see Purin.

ADENOIDS, or Adenoid growths (from Gr. adevoeiSris, glandu- lar), masses of soft, spongy tissue between the back of the nose and throat, occurring mostly in young children; blocking the air-way, they prevent the due inflation of the lungs and the proper development of the chest. The growths are apt to keep up a constant catarrh near the orifice of the ventilating tubes which pass from the throat to the ear, and so render the child dull of hearing or even deaf. They also give rise to asthma, and like enlarged tonsils — with which they are often associated — they impart to the child a vacant, stupid expression, and hinder his physical and intellectual development. They cause his voice to be ” stuffy,” thick, and unmusical. Though, except in the case of a cleft palate, they cannot be seen with the naked eye, tney are often accompanied by a visible and suggestive granular condition of the wall at the back of the throat. Their presence may easily be determined by the medical attendant gently hooking the end of the index-finger round the back of the soft palate. If the tonsils are enlarged it is kinder to post- pone this digital examination of the throat until the child is under the influence of an anaesthetic for operation upon the tonsils, and if adenoids are present they can be removed at the same time that the tonsils are dealt with. Though the disease is a comparatively recent discovery, the pioneer in its treatment being Meyer of Copenhagen, it has probably existed as long as tuberculosis itself, with which affection it is somewhat distantly

connected. In the unenlightened days many children must have got well of adenoids without operation, and even a* the present time it by no means follows that because a child has these post- nasal

vegetations he must forthwith be operated on. The con- dition is very similar to that of enlarged tonsils, where with time, patience and attention to general measures, operation is often rendered unnecessary. But if the child continues to breathe with his mouth open and to snore at night, if he remains deaf and dull, and is troubled with a chronic ” cold in his head,” the question of thorough exploration of the naso-pharynx and of a surgical operation should most certainly be considered. In recent years the comparatively simple operation for their re- moval has been very frequently performed, and, as a rule, with marked benefit, but this treatment should always be followed by a course of instruction in respiratory exercises; the child must be taught regularly to fill his lungs and make the tidal air pass through the nostrils. These respiratory exercises may be resorted to before operation is proposed,- and in some cases they may render operative treatment unnecessary. Operations should not be performed in cold weather or in piercing east winds, and it is advisable to keep the child indoors for a day or two subsequent to its performance. To expose a child just after operating on his throat to the risks of a journey by train or omnibus is highly inadvisable. Although the operation is not a very painful one, it ought not to be performed upon a child except under the influence of chloroform or some other general anaesthetic. (E. O.*)

ADEPT (if used as a substantive pronounced adept, if as an adjective adept; from Lat. odeptus, one who has attained), completely and fully acquainted with one’s subject, an expert. The word implies more than acquired proficiency, a natural inborn aptitude. In olden times an adept was one who was versed in magic, an alchemist, one who had attained the great secrets of the unknown.

ADERNO, a town of the province of Catania, Sicily, 22 m. N.W. of the town of that name. Pop. (1901) 25,859. It occupies the site of the ancient Adranon, which took its name from Adranos, a god probably of Phoenician origin, in Roman times identified with Vulcan, whose chief temple was situated here, and was guarded by a thousand huge gods; there are perhaps some substructures of this building still extant outside the town. The latter was founded about 400 B.C. by Dionysius I.; very fine remains of its walls are preserved. For a time it was the headquarters of Timoleon, and it was the first town taken by the Romans in the First Punic War (263 B.C.). In the centre of the modern town rises the castle, built by Roger I.; in the chapel are frescoes representing his granddaughter, Adelasia, who founded the convent of St Lucia in 1157, taking the veil. The columns in the principal church are of black lava.

See P. Russo, Illustrazione storica di Aderno (Aderno, 1897).

ADEVISM, a term introduced by Max Miiller to imply the denial of gods (Sans, deva), on the analogy of Atheism, the denial of God. Max Miiller used it particularly in connexion with the Vedanta philosophy for the correlative of ignorance or nescience (Gifford lectures, 1892, c. ix.).

ADHlJMAR DE CHABANNES (c. 988-c. 1030), medieval his- torian, was born about 988 at Chabannes, a village in the French department of Haute- Vienne. Educated at the monastery of St Martial at Limoges, he passed his life as a monk, either at this place or at the monastery of St Cybard at Angouleme. He died about 1030, most probably at Jerusalem, whither he had gone on a pilgrimage. Adhemar's life was mainly spent in writing and transcribing chronicles, and his principal work is a his- tory entitled Chronicon Aquitanicum et Francicum or Historia Francorum. This is in three books and deals with Frankish history from the fabulous reign of Pharamond, king of the Franks, to a.d. 1028. The two earlier books are scarcely more than a copy of the Gesta regum Francorum, but the third book, which deals with the period from 814 to 1028, is of considerable his- torical importance. This is published in the Monumenta Ger- maniae historica. Scriptores. Band iv. (Hanover and Berlin, 1826- 1892). He also wrote Commemoratio abbatum Lemovicensium

basilicae S. Martialis apostoli (848-1029) and Epistola ad Jordanum Lemovicensem episcopum et alios de apostolatu S. Martialis, both of which are published by J. P. Migne in the Patrologia Latina, tome cxli. (Paris, 1844-1855).

See F. Arbellot, Etude historique et litteraire sur Ademar de Cha- bannes (Limoges, 1873); J. F. E. Castaigne, Dissertation sur le lieu de naissance et sur la famille du chroniqueur Ademar, moine de I'abbaye de St Cybard d ' Angouleme (Angoul6me, 1850).

ADHEMAR (Ademar, Aimar, Aelarz) DE MONTEIL (d. 1098), one of the principal personages of the first crusade, was bishop of Puy en Velay from before 1087. At the council of Clermont in 1095 he showed great zeal for the crusade, and hav- ing been named apostolic legate by the pope, he accompanied Raymond IV., count of Toulouse, to the east. He negotiated with Alexis Comnenus at Constantinople, re-

established at Nicaea some discipline among the crusaders, caused the siege of Antioch to be raised and died in that city of the plague on the 1st of August 1098.

See the article by C. Kohler in La Grande Encyclopedie; Biblio- graphie du Velay (1902), 640-650.

ADHESION (from Lat. adhaerere, to adhere), the process of adhering or clinging to anything. In a figurative sense, adhesion (like “adherent”) is used of any attachment to a party or move- ment; but the word is also employed technically in psychology, pathology and botany. In psychology Bain and others use it of association of idtfas and action; in pathology an adhesion is an abnormal union of surfaces; and in botany “adhesion” is used of dissimilar parts, e.g. in floral whorls, in opposition to “cohesion,” which applies to similar parts, e.g. of the same whorl.

ADIAPHORISTS (Gr. d&dˆopos, indifferent) . The Adiaphorist controversy among Lutherans was an issue of the provisional scheme of compromise between religious parties, pending a general council, drawn up by Charles V., sanctioned at the diet of Augsburg, 15th of May 1548, and known as the Augsburg Interim. It satisfied neither Catholics nor Protestants. As head of the Protestant party the young elector Maurice of Saxony negotiated with Melanchthon and others, and at Leipzig, on the 22nd of December 1548, secured their acceptance of the Interim as regards adiaphora (things indifferent), points neither enjoined nor forbidden in Scripture. This sanctioned jurisdic- tion of Catholic bishops, and observance of certain rites, while all were to accept justification by faith (relegating sola to the adiaphora). This modification was known as the Leipzig In terim; its advocates were stigmatized as Adiaphorists. Pas- sionate opposition was led by Melanchthon’s colleague, Matth. Flacius, on the grounds that the imperial power was not the judge of adiaphora, and that the measure was a trick to bring back popery. From Wittenberg he fled, April 1549, to Magde- burg, making it the headquarters of rigid Lutheranism. Practi- cally the controversy was concluded by the religious peace ratified at Augsburg (Sept. 25, 1555), which left princes a free choice between the rival confessions, with the right to impose either on their subjects; but much bitter internal strife was kept up by Protestants on the theoretical question of adiaphora; to appease this was one object of the Formula Concordiae, 1577. Another. Adiaphorist controversy between Pietists and their opponents, respecting the lawfulness of amusements, arose in 1681, when Anton Reiser (1628-1686) denounced the opera as antichristian.

See arts, by J. Gottschick in A. Hauck's Realencyklopadie (1896) ; by Fritz in I. Goschler's Diet. Encyclop. de la Theol. Cath. (1858); other authorities in J. C. L. Gieseler, Ch. Hist. (N. York ed., 1868, vol. iv.); monograph by Erh. Schmid, Adiaphora, wissenschaftlich und historisch untersucht (1809), from the rigorist point of view.

ADIGE (Ger. Etsch, anc. A thesis), a considerable river in North Italy. The true source of the Adige is in some small lakes on the summit of the Reschen Scheideck Pass (4902 ft.), and it is swollen by several other streams, near Glurns, where the roads over the Ofen and the Stelvio Passes fall in. It thence flows east to Meran, and then south-east to Botzen, where it receives the Eisak (6 ft.), and becomes navigable. It then turns south-west, and, after receiving the Noce (right) and the Avisio (left), leaves Tirol, and enters Lombardy, 13 m. south of Rovereto. After traversing North Italy, in a direction first southerly and then

easterly, it falls into the Adriatic at Porto Fossone, a few miles north of the mouth of the Po. The most considerable towns on its banks (south of Botzen) are Trent and Rovereto, in Tirol, and Verona and Legnago, in Italy. It is a very rapid river, and subject to sudden swellings and overflowings, which cause great damage to the surrounding country. It is navigable from the heart of Tirol to the sea. In Lombardy it has a breadth of 200 yds., and a depth of 10 to 16 ft., but the strength of the current renders its navigation very difficult, and lessens its value as a means of transit between Germany and Italy. The Adige has a course of about 220 m., and, after the Po, is the most important river in Italy. In Roman times it flowed, in its lower course, much farther north than at present, along the base of the Euganean hills, and entered the sea at Brondolo. In a.d. 587 the river broke its banks, and the main stream took its present course, but new streams opened repeatedly to the south, until now the Adige and the Po form conjointly one delta. (W. A. B. C.)

ADIPOCERE (from the Lat. adeps, fat, and cera, wax), a substance into which animal matter is sometimes converted, and so named by A. F. Fourcroy, from its resemblance to both fat and wax. When the Cimetiere des Innocens at Paris was removed in 1786-1787, great masses of this substance were found where the coffins containing the dead bodies had been placed very closely together. The whole body had been converted into this fatty matter, except the bones, which remained, but were extremely brittle. Chemically, adipocere consists princi- pally of a mixture of fatty acids, glycerine being absent. Saponi- fication with potash liberates a little ammonia (about 1%), and gives a mixture of the potassium salts of palmitic, margaric and

oxymargaric acids. The insoluble residue consists of lime, &c, derived from the tissues. The artificial formation of adipo- cere has been studied; it appears that it is not formed from albuminous matter, but from the various fats in the body collecting together and undergoing decomposition.

ADIRONDACKS, a group of mountains in north-eastern New York, U.S.A., in Clinton, Essex, Franklin and Hamilton counties, often included by geographers in the Appalachian system, but pertaining geologically to the Laurentian highlands of Canada. They are bordered on the E. by Lake Champlain, which separates them from the Green Mountains. Unlike the Appalachians, the Adirondacks do not form a connected range, but consist of many summits, isolated or in groups, arranged with little appearance of system. There are about one hundred peaks, ranging from 1200 to 5000 ft. in height; the highest peak, Mt. Marcy (called by the Indians Tahawus or “cloud-splitter”), is near the eastern part of the group and attains an elevation of 5344 ft. Other noted peaks are MTntyre (5210 ft.), Haystack (4918), Dix (4916) and Whiteface (4871). These mountains, consisting of various sorts of gneiss, intrusive granite and gabbro, have been formed partly by faulting but mainly by erosion, the lines of which have been determined by the presence of faults or the presence of relatively soft rocks. Lower Palaeozoic strata lap up on to the crystalline rocks on all sides of the mountain group. The region is rich in magnetic iron ores, which though mined for many years are not yet fully developed. Other mineral products are graphite, garnet used as an abrasive, pyrite and zinc ore. The mountains form the water-parting between the Hudson and the St Lawrence rivers. On the south and south- west the waters flow either directly into the Hudson, which rises in the centre of the group, or else reach it through the Mohawk. On the north and east the waters reach the St Lawrence by way of Lakes George and Champlain, and on the west they flow directly into that stream or reach it through Lake Ontario. The most important streams within the area are the Hudson,’ Black, Oswegatchie, Grass, Raquette, Saranac and Ausable rivers. The region was once covered, with the exception of the higher summits, by the Laurentian glacier, whose erosion, while perhaps having little effect on the larger features of the country, has greatly modified it in detail, producing lakes and ponds, whose number is said to exceed 1300, and causing many falls and rapids in the streams. Among the larger lakes are the Upper and Lower

Saranac, Big and Little Tupper, Schroon, Placid, Long, Raquette and Blue Mountain. The region known as the Adirondack Wilderness, or the Great North Woods, embraces between 5000 and 6000 sq. m. of mountain, lake, plateau and forest, which for scenic grandeur is almost unequalled in any other part of the United States. The mountain peaks are usually rounded and easily scaled, and as roads have been constructed over their slopes and in every direction through the forests, all points of interest may be easily reached by stage. Railways penetrate the heart of the region, and small steamboats ply upon the larger lakes. The surface of most of the lakes lies at an elevation of over 1500 ft. above the sea; their shores are usually rocky and irregular, and the wild scenery within their vicinity has made them very attractive to the tourist. The mountains are easily reached from Plattsburgh, Port Kent, Herkimer, Malone and Saratoga Springs. Every year thousands spend the summer months in the wilderness, where cabins, hunting lodges, villas and hotels are numerous. The resorts most frequented are in the vicinity of the Saranac and St Regis lakes and Lake Placid. In the Adirondacks are some of the best hunting and fishing grounds in the eastern United States. Owing to the restricted period allowed for hunting, deer and small game are abundant, and the brooks, rivers, ponds and lakes are well stocked with trout and black bass. At the head of Lake Placid stands Whiteface Mountain, from whose summit one of the finest views of the Adirondacks may be obtained. Two miles south east of this lake, at North Elba, is the old farm of the abolitionist John Brown, which contains his grave and is much frequented by visitors. Lake Placid is the principal source of the Ausable river, which for a part of its course flows through a rocky chasm from 100 to 175 ft. deep and rarely over 30 ft. wide. At the head of the Ausable Chasm are the Rainbow Falls, where the stream makes a vertical leap of 70 ft. Another impressive feature of the Adirondacks is Indian Pass, a gorge about eleven miles long, between Mt. MTntyre and Wallface Mountain. The latter is a majestic cliff rising vertically from the pass to a height of 1300 ft. Keene Valley, in the centre of Essex county, is another picturesque region, presenting a pleasing combination of peaceful valley and rugged hills. Though the climate during the winter months is very severe — the temperature sometimes falling as low as -42 F. — it is beneficial to persons suffering from pulmonary troubles, and a number of sanitariums have been established. The region is heavily forested with spruce, pine and broad-leaved trees. Lumbering is an important industry, but it has been much restricted by the creation of a state forest preserve, containing in 1907, 1,401,482 acres, and by the purchase of large tracts for game preserves and recreation grounds by private clubs. The so-called Adirondack Park, containing over

3,000,000 acres, includes most of the state preserve and large areas held in private ownership.

For a description of the Adirondacks, see S. R. Stoddard, The Adirondacks Illustrated (24th ed., Glen Falls, 1894); and E. R. Wallace, Descriptive Guide to the Adirondacks (Syracuse, 1894). For geology and mineral resources consult the Reports of the New York State Geologist and the Bulletins of the New York State Museum.

ADIS ABABA ("the new flower"), the capital of Abyssinia and of the kingdom of Shoa, in 9 1′ N., 38 56′ E., 220 m. W. by S. of Harrar, and about 450 m. S.W. of Jibuti on the Gulf of Aden. Adis Ababa stands on the southern slopes of the Entotto range, at an altitude of over 8000 ft., on bare, grassy undulations, watered by small streams flowing S.S.E. to the Hawash. It is a large straggling encampment rather than a town, with few buildings of any architectural merit. The Gebi or royal enclosure completely covers a small hill overlooking the whole neighbour- hood, while around it are the enclosures of the abuna and principal nobles, and the residences of the foreign ministers. The principal traders are Armenians and Hindus. About a mile north-east of the palace is the military camp. On the hills some five miles to the north, 1 500 ft. above the camp, are the ruins of an old fortress, and the churches of St Raguel and St Mariam. The town is in telegraphic communication with Massawa, Harrar and Jibuti. It was founded by Menelek II. in 1892 as the capital of his king-

dom in succession to Entotto, a deserted settlement some ten or twelve miles north of Adis Ababa.

ADJECTIVE (from the Lat. adjectivus, added), a word used chiefly in its grammatical sense of limiting or defining the noun to which it refers. Formerly grammarians used not to separate a noun from its adjective, or attribute, but spoke of them to- gether as a noun-adjective. In the art of dyeing, certain colours are known as adjective colours, as they require mixing with some basis to render them permanent. " Adjective law " is that which relates to the forms of procedure, as opposed to " sub- stantive law," the rules of right administered by a court.

ADJOURNMENT (through the French from the Late Lat. adjumare, to put off until or summon for another day), the act of postponing a meeting of any private or public body, par- ticularly of parliament, or any business, until another time, or indefinitely (in which case it is an

adjournment sine die). The word applies also to the period during which the meeting or business stands adjourned.

ADJUDICATION (Lat. adjudicalio; adjudicare, to award), generally, a trying or determining of a case by the exercise of judicial power; a judgment. In a more technical sense, in English and American law, an adjudication is an order of the bankruptcy courts by which a debtor is adjudged bankrupt and his property vested in a trustee. It usually proceeds from a resolutiqn of the creditors or where no composition or scheme of arrangement has been proposed by the debtor. It may be said to consummate bankruptcy, for not till then does a debtor's property actually vest in a trustee for division among the creditors, though from the first act of bankruptcy till adjudica- tion it is protected by a receiving order. As to the effect which adjudication has on the bankrupt, see under Bankruptcy. The same process in Scots law is called sequestration. In Scots law the term " adjudication " has quite a different meaning, being the name of that action by which a creditor attaches the heritable, i.e. the real, estate of his debtor, or his debtor's heir, in order to appropriate it to himself either in payment or security of his debt. The term is also applied to a proceeding of the same nature by which the holder of a heritable right, labouring under any defect in point of form, gets that defect supplied by decree of a court.

ADJUNCT (from Lat. ad, to, and jungere, to join), that which is joined on to another, not an essential part, and inferior to it in mind or function, but which nevertheless amplifies or modifies it. Adverbs and adjectives are adjuncts to the words they qualify. Learning, says Shakespeare, is an " adjunct to our- self " (Love's Labour's Lost, IV. iii. 314). Twelve members of the Royal Academy of Sciences in Paris are called " adjuncts."

ADJUSTMENT (from late Lat. ad-juxtare, derived from juxla, near, but early confounded with a supposed derivation from Justus, right}, regulating, adapting or settling; in commercial law, the settlement of a loss incurred at sea on insured goods. The calculation of the amounts to be made good to and paid by the several interests is a complicated matter. It involves much detail and arithmetic, and requires a full and accurate knowledge of the principles of the subject. Such adjustments are made by men called adjusters, who make the subject their profession. In Great Britain they are for the most part members of the Average Adjusters' Association (1870), a body which has done much careful work with a view to making and keeping the practice uniform and in accord with right principles. This association has gradually formulated, at their annual meetings, a body of practical rules which the individual members undertake to observe. (See Average and

Insurance, Marine.)

ADJUTAGE (from Fr. ajutage, from ajouter, to join on; an older English form was ” adjustage “), a mouthpiece or nozzle, so formed as to facilitate the outflow of liquids from a vessel or pipe. (See Hydraulics.)

ADJUTANT (from Lat. adjutare, to aid), a helper or junior in command, one who assists his superior, especially an officer who acts as an assistant to the officer commanding a corps of troops. In the British army the appointment of adjutant is held by a captain or lieutenant. The adjutant acts as staff officer to

the commanding officer, issues his orders, superintends the work of the orderly room and the general administration of the corps, and is responsible for musketry duties and the training of recruits. Regular officers are appointed as adjutants to all units of the auxiliary forces. On the European continent the word is not restricted to the lower units of organization; for example, in Germany the Adjutanlur includes all ” routine ” as distinct from ” general ” staff officers in the higher units, and the aides-de- camp of royal persons and of the higher commanders are also styled adjutant-generals, fliigel-adjutanten, &c. For the so-called adjutant bird see Jabiru.

ADJUTANT-GENERAL, an army official, originally (as indicated by the word) the chief assistant (Lat. adjuvare) staff-officer to a general in command, but now a distinct high functionary at the head of a special office in the British and American war departments. In England the second military member of the Army Council is styled adjutant-general to the forces. He is a general officer and at the head of his department of the War Office, which is charged with all duties relative to personnel. The adjutant-general of the United States army is one of the principal officers in the war department, the head of the bureau for army correspondence, with the charge of the records, recruiting, issue of commissions, &c. Individual Ameri- can states also have their own adjutant-general, with cognate duties regarding the state militia. In many countries, such as Germany and Russia, the term has retained its original meaning of an officer on the personal staff, and is the designation of per- sonal aides-de-camp to the sovereign.

By a looseness of translation, the superintendents of provinces, in the

order of Jesuits, who act as officials under the superin- tendence of and auxiliary to the general, are sometimes called adjutants-general.

ADLER, FELIX (1851-), American educationalist, was born at Alzey, Germany, on the 13th of August 1851. His father, a Jewish rabbi, emigrated to the United States in 1857, and the son graduated at Columbia College in 1870. After completing his studies at Berlin and Heidelberg, he became, in 1874, professor of Hebrew and Oriental Literature at Cornell University. In 1876 he established in New York City the Society for Ethical Culture, to the development and extension of which he devoted a great deal of time and energy, and before which he delivered a regular Sunday lecture. In 1902 he became professor of political and social ethics at Columbia University. He also acted as one of the editors of the International Journal of Ethics. Under his direction the Society for Ethical Culture became an important factor in educational reform in New York City, exercising through its technical training school and kinder- garten (established in January 1878) a wide influence. Dr Adler also took a prominent part in philanthropic and social reform movements, such as the establishment of a system of district nursing, the erection of model tenement houses, and tenement house reform. He published Creed and Deed (1877), The Moral Instruction of Children (1892), Life and Destiny (1903), Marriage and Divorce (1905), and The Religion of Duty (1905).

ADMETUS, in Greek legend, son of Pheres, king of Pherae in Thessaly. By the aid of Apollo, who served him as a slave — either as a punishment for having slain the Cyclopes, or out of affection for his mortal master — he won the hand of Alcestis, the most beautiful of the daughters of Pelias, king of Iolcus. When Admetus was attacked by an illness that threatened to lead to his premature death, Apollo persuaded the Moerae (Fates) to prolong his life, provided any one could be found to die in his place. His parents refused, but Alcestis consented. She is said to have been rescued from the hands of Death by Heracles, who arrived upon the scene at an opportune moment; a later story represents her as cured of a dangerous illness by his skill.

Homer, Iliad, ii. 715; Apollodorus, i. 9; Euripides, Alcestis; Plutarch, Amatorius, 17; Dissel, Der Mythus von Admetos und Alkestis, progr. Brandenburg, 1882.

ADMINISTRATION (Lat. administrare, to serve), the perform- ance or management of affairs, a term specifically used in law for the administration or disposal of the estate of a deceased person

(see Will or Testament) . It is also used generally for ” govern- ment,” and specifically for ” the government ” or the executive ‘ ministry, and in such connexions as theadministration(administer- ing or tendering) of the sacraments, justice, oaths, medicines, &c.

Letters of Administration. — Upon the death of a person intestate or leaving a will to which no executors are appointed, or when the executors appointed by the will cannot or will not act, the Probate Division of the High Court is obliged to appoint an administrator who performs the duties of an executor. This is done by the court granting letters of administration to the person entitled. Grants of administration may be either general or limited. A general grant is made where the deceased has died intestate. The order in which general grants of letters will be made by the court is as follows: (1) The husband, or widow, as the case may be; (2) the next of kin; (3) the crown; (4) a creditor; (5) a stranger. Since the Land Transfer Act 1897, the administrator is the real as well as the personal representative of the deceased, and consequently when the estate to be ad- ministered consists wholly or mainly of reality the court will grant administration to the heir to the exclusion of the next of kin. In the absence of any heir or next of kin the crown is entitled to the personality as bona vacantia, and to the reality by escheat. If a creditor claims and obtains a grant he is com- pelled by the court to enter into a bond with two sureties that he will not prefer his own debt to those of other creditors. The more important cases of grants of special letters of ad- ministration are the following: — ■

Administration cum testamento annexo, where the deceased has left a will but has appointed no executor to it, or the executor appointed has died or refuses to act. In this case the court will make the grant to the person (usually the residuary legatee) with the largest beneficial interest in the estate.

Administration de bonis non administratis: this occurs in two cases — {a) where the executor dies intestate after probate with- out having completely administered the estate; (b) where an administrator dies. In the first case the principle of administra- tion cum testamento is followed, in the second that of general grants in the selection of the person to whom letters are granted.

Administration durante minor e aetate, when the executor or the person entitled to the general grant is under age.

Administration durante absentia, when the executor or ad- ministrator is out of the jurisdiction for more than a year.

Administration pendente lite, where there is a dispute as to the person entitled to probate or a general grant of letters the court appoints an administrator till the question has been decided.

ADMINISTRATOR, in English law, the person to whom the Probate Division of the High Court of Justice (formerly the ordinary or judge of the ecclesiastical court) acting in the sover- eign's name, commits the administration (q.v.) of the goods of a person deceased, in default of an executor. The origin of ad- ministrators is derived from the civil law. Their establishment in England is owing to a statute made in the 31st year of Edward I. (1303). Till then no office of this kind was known besides that of executor; in default of whom, the ordinary had the disposal of goods of persons intestate, &c. (See also Executors, and, for intestate estates, Intestacy.)

Administrator, in Scots law, is a person legally empowered to act for another whom the law presumes incapable of acting for himself, as a father for a pupil child.

ADMIRAL, the title of the general officer who commands a fleet, or subdivision of a fleet. The origin of the word is un- doubtedly Arabic. In the 1 2th century the Mediterranean states which had close relations with the Moslem powers on the shores or in the islands of that sea, found the title amir or emir in combination with other words used to describe men in au- thority; the amir-al-mumenin — prince of the faithful — or amir- al-bahr — commander of the sea. They took the substantive " amir " and the article " al " to form one word, " amiral " or " ammiral " or " almirante." The Spaniards made mirama- molin, out of amiral-mumenin, in the same way. " Amiral," as the name of an eastern ruler, became familiar to the northern nations during the crusades. Layamon, writing in the early

years of the 13th century, speaks of the " ammiral of Babilon," and the word was for long employed in this sense. As a naval title it was first taken by the French from the Genoese during the crusade of 1 249. By the end of the 13th century it had come to be used in England as the name of the officer who commanded the Cinque Port ships. The English form " admiral " arose from popular confusion with the Latin admirabilis. Such errors were naturally produced by the fantastic etymology of the middle ages. In Spain, Alphonso the Wise of Castile, in his code of laws, the Siete Partidas (Seven Divisions), accounts for

the Spanish form ” almirante ” by its supposed derivation from the Latin admirari, since the admiral is ” to be admired ” for the difficulties and dangers he overcomes, and because he is the chief of those who see the wonders of the Lord in the deep — mirabilia ejus (sc. Domini) in profundo. Both in Spanish and in Elizabethan English the word has been applied to the flagship of an officer commanding a fleet or part of one. The Spanish almiranta is the ship of the second in command, and the capitana of the first. In this sense it is not uncommonly found in the narratives of Elizabethan voyages or campaigns, and it is so used by Milton in Paradise Lost—” the mast of some tall ammiral.”

As the title of an office it was borne by the. great military, judicial and administrative officer known in France as grand amiral; in England as lord high admiral; in Spain as almirante mayor. His functions, which were wide, have been generally absorbed by the crown, or the state, and have been divided among judicial and administrative officials (see Navy, History; Admiralty Administration; and Admiralty Jurisdiction). The title of admiral is still borne as an hereditary honour by the descendants of Columbus, the dukes of Veraqua, in Spain. It is a purely honorific distinction representing the admiralship of the islands and Ocean Sea, conferred on the discoverer by the Catholic sovereigns, Ferdinand and Isabella.

In the staff of a modern navy the admirals correspond to the general officers in the army. Where, as in Russia, the grand admiralship is annexed to the crown, the highest rank is that of lieutenant admiral general. In Great Britain there is the rank of admiral of the fleet, corresponding to field-marshal. It is, however, little more than an honorary distinction. The three active ranks are those of admiral, vice-admiral and rear-admiral, corresponding to general, lieutenant-general and major-general in the army. They are found in all navies under very slightly varied forms. The only difference which is not one of mere spelling is in the equivalent for rear-admiral, which is contre amiral in French, and in other navies of the continent of Europe involves some slight variation of the word ” contre ” (first used at the time of the French Revolution). The vice- and rear- admiral of Great Britain are again honorary titles, without the active functions, conferred in compliment on senior naval officers. ” Admiral ” is also the name given to the chief of fishery fleets. On the banks of Newfoundland it was given to officials who had powers conferred by the state. In the case of an ordinary fishing- fleet in European waters, it is of private origin, and is of merely customary use.

Authorities. — Sir N. Harris Nicolas, History of the Royal Navy; La

Ronciere, Histoire de la marine frangaise; Yonge, Geschiedenis van het Nederlandsche Zeewezen; C. Fernandez Duro, Historia de lajlrmada de Castilea. (D. H.)

ADMIRALTY ADMINISTRATION. 1. The Administrative System. — That the navy (q.v.) is the only real defence of the British islands has been recognized by English people ever since the days of King Offa, who died in 796, leaving to his successors the admirable lesson that ” he who would be secure on land must be supreme at sea.” The truth of the lesson thus learnt is sanc- tioned by all the experience of English history, and parliament has repeatedly enforced the fact. The navy is the only force that British can saf e S uar(l tne B ritish islands from hostile descents ; Empire. ˆ ‘ s tne OT ˆy f° rce that can protect their vast sea-borne commerce and food supplies; by giving safety to the home country it sets British troops free for operations abroad, md makes their passage secure; and thus, as also by giving

command of the sea, the fleet is the means by which the empire is guarded and has become a true imperial bond. It is natural for British admiralty administration to be taken here as the type of an efficient system.

British naval administration is conducted by the Board of Admiralty, and the function of that board is the maintenance and expansion of the fleet in accordance with the policy of the government, and the supplying of it with trained B ” ard ot officers and men; its distribution throughout the Admiralty. world; and its preservation in readiness and efficiency in all material and personal respects. The character of the Admiralty Board is peculiar to the British constitution, and it possesses certain features which distinguish it from other depart- ments of the state. The business it conducts is very great and complex, and the machinery by which its work is done has grown with the expansion of that business. The whole system of naval administration has been developed historically, and is not the product of the organizing skill of one or a few individuals, but an organic growth possessing marked and special characteristics. The Admiralty Board derives its character from the fact that it represents the lord high admiral, and that its powers and opera- tion depend much more upon usage than upon those instruments which actually give it authority, and which, it may be remarked, are not in harmony among themselves. The executive operations are conducted by a series of civil departments which have under- gone many changes before reaching their present constitution and relation to the Board. The salient characteristic of the admiralty is a certain flexibility and elasticity with which it works. Its members are not, in a rigid sense, heads of

depart- ments. Subject to the necessary and constitutional supremacy of the cabinet minister at their head, they are jointly and 00- equally ” commissioners for executing the office of high admiral of the United Kingdom, and of the territories thereunto belong- ing, and of high admiral of the colonies and other dominions.” The members of the Board are in direct and constant communi- cation with the first lord and with one another, as also with the civil departments which work under their control. It was en- joined by James I. that the principal officers and commissioners of the navy should be in constant communication among them- selves, consulting and advising ” by common council and argu- ment of most voices,” and should live as near together as could conveniently be, and should meet at the navy office at least twice a week. This system of intercommunication still exists in a manner which no system of minutes could give; and it may be remarked, as illustrative of the flexibility of the system, that a Board may be formed on any emergency by two lords and a secretary, and a decision arrived at then and there. Such an emergency board was actually constituted some years ago on board the admiralty yacht in order to deal on the instant with an event which had just occurred in the fleet. At the same time it must be remarked that, in practice, the first lord being person- ally responsible under the orders in council, the operations of the Board are dependent upon his direction.

The present system of administering the navy dates from the time of Henry VIII. The naval business of the country had so greatly expanded in his reign that we find the History Admiralty and Navy Board reorganized or established ; and it is worthy of remark that there existed at the time an ordnance branch, the navy not yet being dependent in that matter upon the War Department. 1 The Navy Board adminis- tered the civil departments under the admiralty, the directive and executive duties of the lord high admiral remaining with the admiralty office. A little later the civil administration was vested in a board of principal officers subordinate to the lord high admiral, and we can henceforth trace the work of civil

1 The Board of Ordnance was originally instituted for the navy, but eventually fell into military hands, to the detriment of the navy — the only navy of any nation that has not full authority over its own ordnance. In 1653, according to Oppenheim, it was, owing to its inefficiency, placed under the admiralty. In 1632 it appears to have been independent, but ” still retained that evil pre-eminence in sloth and incapacity it had already earned and has never since lost.”

administration being conducted under the navy and victualling boards apart from, but yet subject to, the admiralty itself. This was a system which continued during the time of all the great wars, and was not abolished until 1832, when Sir James Graham, by his reforms, put an end to what appeared a divided control. Whatever may have been the demerits of that system, it sufficed to maintain the navy in the time of its greatest achievements, and through all the wars which were waged with the Spaniards, the Dutch and the French. The original authority for the present constitution of the Admiralty Board is found in a declaratory act (Admiralty Act 1690), in which it is enacted that ” all and singular authorities, jurisdictions and powers which, by act of parliament or otherwise, had been lawfully vested ” in the lord high admiral of England had always apper- tained, and did and should appertain, to the commissioners for executing the office for the time being ” to all intents and pur- poses as if the said commissioners were lord high admiral of England.” The admiralty commission was dissolved in 1701, and reconstituted on the death of Prince George of Denmark, lord high admiral in 1 709. From that time forward, save for a short period in 1827-1828, when the duke of Clarence was lord high admiral, the office has. remained in commission.

A number of changes have been made since the amalgamation of the admiralty and the Navy Board by Sir James Graham in 1832 (see Navy, History), but the general principle remains the same, and the constitution of the Admiralty Board and civil departments is described below. The Board consists of the first lord and four naval lords with a civil lord, who in theory are jointly responsible, and are accustomed to meet sometimes daily, but at all times frequently; and the system developed provides for the subdivision of labour, and yet for the co- ordi- nated exertion of effort. The system has worked well in practice, and has certainly won the approval and the admiration of many statesmen. Lord George Hamilton said, before the Royal Commission on Civil Establishments, 1887, that ” It has this advantage, that you have all departments represented round a table, and that if it is necessary to take quick action, you can do in a few minutes that which it would take hours under another system to do “; and the report of the Royal Commis- sion of 1889 remarked that ” The constitution of the Board of Admiralty appears to us well designed, and to be placed under present regulations on a satisfactory footing.”

The special characteristics of the Admiralty Board which have been described are accompanied by a very peculiar and note- worthy feature, which is not without relation to the untrammelled and undefined operations of the ad- miralty. This feature arises from the discrepancy between the admiralty patent and the orders in council, for the admiralty is not administered according to the terms of the patent which invests it with authority, and its operations raise a singular point in constitutional law.

The legal origin of the powers exercised by the first lord and the Board itself is indeed curiously obscure. Under the patent the full power and authority are conferred upon ” any two or more ” of the commissioners, though, in the patent of Queen Anne, the grant was to ” any three or more of you.” It was under the Admiralty Act 1832 that two lords received the necessary authority to legalize any action of the Board; but already, under an act of 1822, two lords had been empowered to sign so long as the Board consisted of six members. We therefore find that the legal authority of the Board under the patent is vested in the Board; but in the order in council of the 14th of January 1869 the sole responsibility of the first lord was officially laid down, and in the order in council of the 19th of March 1872 the first lord was made ” responsible to your Majesty and to parliament for all the business of the admiralty. ” As a matter of fact, the authority of the first lord, independent of his colleagues, had existed in an undefined manner from ancient times. Before a select committee of the House of Commons in 1 86 1 the duke of Somerset stated that he considered the first lord responsible, that he had always ” acted under that impres- sion,” and that he believed ” all former first lords were of this

opinion ” ; while Sir James Graham said that ” the Board of Admiralty could never work, whatever the patent might be, unless the first lord were supreme, and did exercise constantly supreme and controlling authority.” It is not, therefore, sur- prising to find that there has been undoubtedly direct govern- ment without a Board. Thus, in the operations conducted against the French channel ports in 1 803-1804, Lord Melville, then first lord, took steps of great importance without the knowledge of his colleagues, though he afterwards bowed to their views, which did not coincide with his own. Again, when Lord Gambier was sent to Copenhagen in 1807, he was instructed to obey all orders from the king, through the principal secretary of state for war, and in this way received orders to attack Copenhagen, which were unknown to all but the first lord. In a similar way the secretary

of the admiralty was despatched to Paris in 1815 with instructions to issue orders as if from the Board of Admiralty when directed to do so by the foreign secretary who accompanied him, and these orders resulted in Napoleon's capture. These instances were cited, except the first of them, by Sir James Graham before the select committee of the House of Commons in 1861, in order to illustrate the elastic powers under the patent which enabled the first lord to take immediate action in matters that concerned the public safety. It is not surprising that this peculiar feature of admiralty administration should have attracted adverse criticism, and have led some minds to regard the Board as " a fiction not worth keeping up."

Between i860 and 1870 the sittings of the Board ceased to have the effective character they had once possessed. During the administration of Mr Childers, 1 first lord from 1868 to 1871 in Mr Gladstone's cabinet, a new system was introduced by which the free intercommunication of the members of the Board was hampered, and its sittings were quite discontinued. The case of the " Captain " led, however, to a return to the older practice. The " Captain " was a low freeboard masted turret ship, designed by Captain Cowper Phipps Coles, R.N. Competent critics believed that she would be unsafe, and said so before she was built; but the admiralty of Lord Derby's cabinet of 1866 gave their consent to her construction. She was commissioned early in 1870, and capsized in the Bay of Biscay on the 7th of September of that year. Mr Childers, who was nominally re- sponsible for allowing her to be commissioned, distributed blame right and left, largely upon men who had not approved of the ship at all, and had been exonerated from all share of responsi- bility for allowing her to be built. The disaster was justly held to show that a civilian first lord cannot dispense with the advan- tage of constant communication with his professional advisers. When Mr Childers retired from the admiralty in March 1871, his successor, Mr Goschen (Viscount Goschen), reverted to the original system. It cannot be said, however, that the question of ultimate responsibility is well defined. The duke of Somerset, Sir James Graham and Sir Charles Wood, afterwards Lord Halifax, held the view that the first lord was singly and person- ally responsible for the sufficiency of the fleet. Sir Arthur Hood expressed before the House of Commons committee in 1888 the view that the Board collectively were responsible; whilst Sir Anthony Hoskins assigned the responsibility to the first lord alone with certain qualifications, which is a just and reasonable view.

2. Admiralty Organization. — Under the organization which now exists, the Board of Admiralty consists of the first lord, the first and second naval lords, the additional naval lord and controller, the junior

naval lord and the civil lord, who are commissioners for executing the office of lord high admiral, and with them are the parliamentary and financial secretary and the permanent secretary. As has been explained, the first lord is responsible under the orders in council to the crown and to parliament for all admiralty business. In the hands of the

1 Admiral Sir Cooper Key, when director of naval ordnance during Mr Childers' administration, observed to the writer that no first lord of the admiralty knew so little of the working of the ad- miralty as Mr Childers, because, owing to the discontinuance of board meetings, he lost the great advantage of hearing the dis- cussion, (r. v. h.)

other lords and secretaries rest duties very carefully defined, and they direct the civil departments which are the machinery of naval administration. The first naval lord, the second naval lord and the junior naval lord are responsible to the first lord in relation to so much of the business concerning the personnel of the navy and the movements and condition of the fleet as is confided to them, and the additional naval lord or controller is responsible in the same way for the material of the navy; while the parliamentary secretary has charge of finance and some other business, and the civil lord of all shore works — i.e. docks, build- ings, &c. — and the permanent secretary of special duties. The first lord of the admiralty is the cabinet minister through whom the navy receives its political direction in accordance with im- perial policy. He is the representative of the navy in parliament, which looks to him for everything concerned with naval affairs. The members of the Board are his advisers; but if their advice is not accepted, they have no remedy except protest or resigna- tion. It cannot be denied that the responsibility of the members of the Board, if their advice should be disregarded, must cease, and it is sufficiently obvious that the remedy of resignation will not always commend itself to those whose position and advance- ment depend upon the favour of the government. Something will be said a little later concerning the working of the system and the relation of the first lord to the Board in regard to the navy estimates. In addition to general direction and supervision, the first lord has special charge of promotions and removals from the service, and of matters relating to honours and rewards, as well as the appointments of flag officers, captains and

other officers of the higher ranks. With him rests also the nomination for the major part to naval cadetships and assistant clerkships.

Apart from the first lord, the first naval lord is the most important officer of the Board of Admiralty. It seems to be unquestionable that Sir James Graham was right in describing the senior naval lord as his ” first naval adviser.” Theoretically, the first naval lord is responsible for the personnel of the fleet; but in practice he is necessarily concerned with the material also as soon as it is put into commission, and with the actual commissioning of it. It is correct to say that he is chiefly con- cerned with the employment of the fleet, though his advice has weight in regard to its character and sufficiency, and is always sought in relation to the shipbuilding programme. Broadly speaking, the first naval lord’s duties and authority cover the fighting efficiency and employment of the fleet, and upon him and upon the controller the naval business of the country largely falls. He directs the operations of the admiral superintendent of naval reserves in regard to ships, the hydrographer, the director of naval ordnance, so far as the gunnery and torpedo training establishments are concerned, and the naval intelligence department, and he has charge of all matters relating to dis- cipline. The mobilization of the fleet, both in regard to personnel and material, also falls to him, and among a mass of other busi- ness in his department are necessary preparations for the pro- tection of trade and the fisheries. It will thus be seen that the first naval lord is the chief officer of the Board of Admiralty, and that the operations of the other members of the Board all have relation to his work, which is no other than preparation for war. It may here be remarked that it appears most necessary to change the naval lords frequently, so that there may always be in the Board some one who possesses recent touch with the service afloat.

The second naval lord may be regarded as the coadjutor of the first naval lord, with whose operations his duties are very closely related, though, like every other member of the Board, he is subordinate only to the first lord. The duties of the second naval lord are wholly concerned with the personnel of the fleet, the manning of the navy and mobilization. In his hands rests the direction of naval education, training and the affairs of the royal marine forces. The training establishments and colleges are in his hands. He appoints navigating officers and lieutenants to ships (unless they be to command), sub-lieutenants, midship- men and cadets, engineer officers, gunners and boatswains, and supervises the management of the reserve. . In his province

is the mobilization of the personnel, including the coastguard and the

royal naval reserve. Necessarily, the first and second naval lords work together, and upon occasion can replace each other. 1

Most important are the duties that fall to the additional naval lord and controller. He has charge of everything that concerns the material of the fleet, and his operations are the complement of the work of the first naval lord. A great number of civil departments are directed by the controller, and his survey and supervision extend to the dockyards and building establishments of the fleet. He submits plans to the Board for new ships, and is responsible for carrying into effect its decisions in regard to all matters of construction and equipment. The building operations both in the dockyards and in private yards are therefore under his supervision. In regard to all these matters the director of naval construction and the engineer-in-chief are the heads of the civil departments that carry on the work. Again, the con- troller is responsible in regard to armament — both gunnery and torpedo — and it is the work of his department to see to all gunnery and torpedo fittings, and to magazines, shell-rooms and electric apparatus.. The officer in immediate charge of this branch of the controller's work, under his direction, is the director of naval ordnance. In regard to work at the dockyards (q.v.) the controller is aided by the director of dockyards. He supervises this officer in preparing the programme of work done in the dockyards, the provision of the material required and its appropriation to particular work in accordance with the pro- gramme. Other officers who conduct great operations under the authority and responsibility of the controller are the director of stores, who maintains all necessary supplies of coal and stores at home and abroad, and examines the store accounts of ships, and the inspector of dockyard expense accounts, who has charge of the accounts of dockyard expenditure and seeing that outlay is charged as directed. In regard to the navy estimates, the controller, through his subordinates, is responsible for the preparation and administration of the votes for shipbuilding and naval armaments, except in regard to some sub- headings of the former, and thus in recent years for the expenditure of some- thing like £15,000,000 or over.

The junior naval lord has in his hands the very important duties that are concerned with the transport, medical and victualling services, as well as the regulation of hospitals, the charge of coaling arrangements for the fleet and other duties that conduce to the practical efficiency of the navy. He also appoints chaplains, naval instructors, medical officers (except in special cases) and officers of the accountant branch. A vast business in regard to the internal economy of ships greatly occu- pies the junior lord. He has charge, for example, of uniforms, prize-money, bounties, naval savings banks, and pensions to seamen

and marines and the widows of naval and marine officers. The work of the junior naval lord places under his direction the director of transports, the director-general of the medical department, the director of victualling, and, in regard to particular matters, the director of stores, the accountant- general, the chaplain of the fleet, and the Intelligence Depart- ment, so far as the junior lord's department is concerned.

The civil lord supervises, through the director of works, the Department of Works, dealing with admiralty buildings and works, construction and labour, contracts and purchases of building stores and land. He is also responsible for the civil staff of the naval establishments, except in regard to certain officials, and for duties connected with Greenwich Hospital, compassionate allowances, charitable funds, and business of like character. The accountant-general, in regard to these matters, is directed by him, and the director of Greenwich Hospital is under his authority.

The parliamentary and financial secretary is responsible for the finance of the department, the navy estimates and matters of expenditure generally, and is consulted in regard to all matters involving reference to the treasury. His position in regard to

1 The drawback is, that a naval lord can only go on leave by throwing all his work on a colleague already overweighted with work.

estimates and expenditure is very important, and the accountant-general is his officer, while he has financial control over the director of contracts. The financial secretary also examines proposals for new expenditure.

A most important official of the Board is the permanent secretary, whose office has been described as the " nerve-centre " of the admiralty, since it is the channel through which papers for the lords of the admiralty pass for the intercommunication of departments and for the correspondence of the Board. The tradition of admiralty procedure largely rests with the perma- nent secretary, and it is most important that he should be chosen from one of the branches, and should have served in as many of them as possible, in order that he may possess a thorough knowledge of the theory and practice of the admiralty system. In addition to the secretarial duties of the permanent

secretary's department, the permanent secretary has charge of the military, naval and legal branches, each under a principal clerk, the civil branch and the record office. The various branches deal with matters concerning the commissioning of ships and the distribu- tion of the fleet, and the manning and discipline of the navy, with other associated matters, being the channels for the opera- tions of the naval iords. It is a highly important function of the department of the permanent secretary to preserve the inter-related working of the various departments, and to keep unbroken the thread of administration when a new Board is constituted.

3. Business and Responsibility. — The manner in which the Admiralty Board conducts the great operations under its charge has been indicated. It would be impossible here to describe it in detail, though something concerning the civil departments, which are the machinery of naval administration, will be found below. It will, however, indicate the character of admiralty administration if we explain to some extent the conditions which surround the preparation of the estimates and the ship- building programme, the more so because this matter has been the battle-ground of critics and supporters of the admiralty. It has already been pointed out that the naval lords, if they dissent from the estimates that are presented, have no remedy but that of protest or resignation. Into the controversies that have arisen as to the responsibility of the several lords it is unnecessary to enter here. The Admiralty Board possesses, in fact, the character of a council, and its members can only be held responsible for their advice. It has even been contended that, in the circumstances, it should not be incumbent upon them to sign the navy estimates, and there have been instances in which the estimates have been presented to parliament without the signature of certain naval lords. It is in any case obvious, as has been explained above, that the ultimate responsi- bility must always rest with the first lord and the cabinet, by whom the policy of the country is shaped and directed. In the report of the Hartington Commission in 1890 (the chairman of which became 8th duke of Devonshire) to inquire into the civil and professional administration of the Naval and Military Departments, and the relation of these departments to each other and to the treasury, the following recommendation occurs: " On the first lord alone should rest the responsibility of deciding on the provision to be made for the naval re- quirements of the empire, and the existence of a council should be held in no degree to diminish that responsibility."

Two conditions primarily rule the determination as to the strength of the navy. They are, the foreign policy of the cabinet, and, on the ground of practical expediency, the amount of money available. " The

estimates and strength of the navy," said Rear- Admiral Hotham before the select committee on the navy estimates, 1888, " are matters for the cabinet to determine." " Expense," said Sir Anthony Hoskins, " governs everything." The needs of the empire and financial considerations, as it is scarcely necessary to remark, may prove to be antithetical conditions governing the same problem, and in practice it follows that the Admiralty Board directs its operations in accordance with the views of the government, but limited by the public funds which are known to be available. Such considerations

suggest a practical limitation of responsibility, so far as the several lords of the admiralty are concerned, but it may be presumed to be their duty individually or collectively to place their views before the first lord; and Lord George Hamilton told the select committee of 1888 that, if his colleagues should represent to him that a certain expenditure was indispensable for the efficiency of the service, he would recognize that all financial considerations should be put on one side. The commis- sioners reported that this was the only common-sense view of the matter, and that it was difficult to see on what other footing the control of navy expenditure, consistently with responsibility to parliament, could be placed.

Two practical considerations are bound up with the shipbuild- ing programme — the carrying forward of the work in hand and the new construction to be begun, since it is absolutely necessary that proper provision should be made for the employment and distribution of labour in the dockyards, and for the purchase of necessary materials. Through the director of naval construction and the director of dockyards, the controller is kept informed as to the progress of work and the amount of labour required, as also in regard to the building facilities of the yards. These matters, in a general way, must form a subject of discussion between the first naval lord and the controller, who will report on the subject to the first lord. The accountant-general, as the financial officer of the Board, will be called upon to place the proposed estimates upon a financial basis, and when the views of the cabinet are known as to the amount of money available, the several departments charged with the duty of preparing the various votes will proceed with that work. The financial basis alluded to is, of course, found in the estimates of the previous year, modified by the new conditions that arise. There has been in past times a haphazard character in our shipbuilding pro- grammes, but with the introduction of the Naval Defence Act of 1889, which looked ahead and was not content with hand-to- mouth provision, a better state of things has grown up, and, with a larger sense of responsibility, a policy characterized by something of continuity has been developed.

Certainly the largest factor in the better state of things has been the growth of a strong body of public opinion as to the supreme value of the navy for national and imperial welfare.

Another important and related matter that comes before the Board of Admiralty is the character and design of ships. The naval members of the Board indicate the classes and qualities desired, and it is the practice that the sketch-design, presented in accordance with the instructions, is fully discussed by the first naval lord and the controller, and afterwards by the Board. The design then takes further shape, and when it has received the final sanction of the Board it cannot be altered without the sanction of the same authority. A similar procedure is found in the other business of the Admiralty Board, such as shore- works, docks and the preparation of offensive and defensive plans of warfare — the last being a very important matter that falls into the operations of the Naval Intelligence Department, which has been described, though not with perfect accuracy, and certainly in no large sense, as ” the brain of the navy.” That department is under the direction of the first naval lord.

The shipbuilding programme may be described as the corner- stone of the executive business of the admiralty, because upon it depends very largely the preparation of all the other votes relat- ing to numbers, stores, victualling, clothing, &c. But if the Admiralty Board is responsible through the first lord for the preparation of the estimates, it is also charged with the business of supervising expenditure. In this matter the financial secretary plays a large part, and is directed to assist the spending depart- ment of the admiralty in their duty of watching the progress of their liabilities and disbursements. Some notes on admiralty finance will be found below (section 4). The shipbuilding votes set the larger machinery of the admiralty in motion. The execu- tive departments, except in regard to the hulls and machinery of ships and the special requirements of the director of works, do not make purchases of stores, that work resting with the director of navy contracts. Most of the important executive and

spending branches are in the department of the controller, and it will be well, while we are dealing with the material side of the navy, to describe briefly their character and duties. The civil branches of the navy tributary to the controller are those of the director of naval construction, the engineer-in-chief, the directors of naval ordnance, of

dockyards and of stores, and the inspector of dockyard expense accounts. The first duty of the controller is, as has been explained, in relation to the design and construc- tion of ships and their machinery, and the executive officials who have charge of that work are the director of naval construction and the engineer-in-chief, whose operations are closely inter- related. A vast administrative stride has been made in this particular branch of the admiralty. The work of design and con- struction now go forward together, and the admiralty designers are in close touch with the work in hand at the dockyards. This has been largely brought about by the institution, in 1883, of the royal corps of naval constructors, whose members interchange their duties between the designing of ships at the admiralty and practical work at the dockyards. It is through the director of naval construction that many of the spending departments are set in motion, since he is responsible both for the design of ships and for their construction. It deserves to be noticed, how- ever, that a certain obscurity exists in regard, to the relative duties of the director of naval construction and the director of dockyards touching constructive works in the yards. The former officer has also" charge of all the work given out to contract, though it is the business of the dockyard officials to certify that the conditions of the contract have been fulfilled. In all this work the director of naval construction collaborates with the engineer-in-chief, who is an independent officer and not a sub- ordinate, and whose procedure in regard to machinery closely resembles that adopted in the matter of contract-built ships.

The director of naval ordnance is another officer of the Con- troller's Department whose operations are very closely related to the duties of the director of naval construction, and the rela- tion is both intimate and sustained, for in the Ordnance Pepart- ment everything that relates to guns, gun-mountings, magazines, torpedo apparatus, electrical fittings for guns, and other elec- trical fittings is centred. A singular feature of this branch of administration is that the navy long since lost direct control of ordnance matters, through the duties connected with naval gunnery, formerly in the hands of the master-general of the ordnance, and those of the Board of Ordnance — a department common to the sea and land services — being vested in 1855 in the secretary of state for war. A more satisfactory state of things has grown up through the appointment of the director of naval ordnance, taking the place of the naval officer who formerly advised the director of artillery at the War Office. Expenditure on ordnance has also been transferred from the army to the navy estimates, and a Naval Ordnance Store Department has been created. It cannot be said that the condition is yet satisfactory, nor can it be until the navy has

control of and responsibility for its own ordnance. The assistant-director of torpedoes is an officer instituted at the admiralty within recent years, and his duty is to assist the director of naval ordnance in all torpedo matters.

The director of dockyards replaced the surveyor of dockyards in 1885, at about which time the inspector of dockyard expense accounts was instituted. It is upon the director of dockyards (q.v.) that the responsibility of the controller devolves in regard to the management of dockyards and naval establishments at home and abroad, and to the performance of work in these estab lishments, ship and boat building, maintenance, repairs and refits. In this department the programme for work in the dock- yards is prepared, as well as certain sections of the navy estimates.

We now come to the Stores Department, with the director of stores as its chief. This officer, about the year 1869, took over the storekeeping duties previously vested in the storekeeper- general. The Naval Store Department is charged with the cus- tody and issue of naval, as distinguished from victualling and ordnance stores, to be used in naval dockyards and establish- ments for the building, fitting and repairing of warships. It

has, however, no concern with stores that belong to the Depart- ment of Works. The business of the director of stores is also to receive and issue the stores for ships of all classes in commission and reserve, and he deals with a vast array of objects and materials necessary for the fleet, and with coals and coaling. He frames the estimates for his department, but his purchases are made through the director of navy contracts. In practice the main business of the Stores Department is to see to the pro- vision of stores for the navy, and to the proper supply of these at all the establishments, and for this purpose its officials direct the movements of storeships, and arrange for the despatch of colliers, the director being charged to be ” careful to provide for His Majesty’s ships on foreign stations, and for the necessary supplies to foreign yards.” Another important business of the director of stores is the examination of the store accounts of ships as well as some other accounts. Although the director of stores is really in the department of the controller, he is super- vised in regard to the coaling of the fleet by the junior naval lord. The inspector of dockyard expense accounts has been alluded to. He is the officer charged with keeping a record of expendi- ture at the dockyards and of supervising expense accounts.

It may be useful to add a note concerning the spending of the money. Within the controller’s department, as has been ex- plained, are

centred the more important spending branches of the admiralty. While the work of design- tun.” ing ships and preparing plans is in progress, the director of stores, the director of dockyards and other officials of that department concerned are making preparation for the work. The necessary stores, comprising almost every imaginable class of materials, are brought together, and the director of stores is specially charged to obtain accurate information in regard to re- quirements. He is not, however, a purchasing officer, that work being undertaken by the director of navy contracts, who is con- cerned with the whole business of supply, except in regard to hulls and machinery of ships built by contract, and the special requirements of the director of works. At the same time, the civil departments of the admiralty being held responsible for the administration of the votes they compile, it is their duty to watch the outlay of money; and to see that it is well expended, the ac- countant-general being directed to assist them in this work. The system is closely jointed and well administered, but it possesses a very centralized character, which interferes to some extent with flexible working, and with the progress of necessary repairs, especially in foreign yards. In so far as ships given out to con- tract are concerned (and the same is the case in regard to pro- pelling machinery built by contract), the director of navy con- tracts plays no part, the professional business being conducted through the controller of the navy, who is advised thereon by the director of naval construction and the engineer-in-chief. The work conducted in private establishments is closely watched by the admiralty officials, and is thoroughly tested, but, mutatis mutandis, the system in regard to contract-built ships is practi- cally the same as that which prevails in the dockyards.

4. Naval Finance: The Accountant-General’s Department. — The subject of naval finance is one of great complexity and of vast importance. The large sums of money with which the admiralty deals in the way of both estimates and expenditure, amounting recently to about £30,000,000 annually, implies the existence of the great organization which is found in the depart- ment of the accountant-general of the navy. Under the authority of the first lord, the parliamentary and financial secretary is responsible for the finance of the admiralty in general, and for the estimates and the expenditure, the accounts and the pur- chases, and for all matters which concern the relations of the admiralty to the treasury and to other departments of the government; and in all the practical and advisory work the accountant-general is his officer, acting as his assistant with the director of naval contracts who, under the several lords, is con- cerned with the business of purchase.

The organization of the accountant-general's department has undergone many changes, and the resulting condition is the out- come of various modifications which have had for their purpose

to give to this officer a measure of financial control. There have been various views as to what the duties of the accountant- general should be. After the reorganization of the admiralty by Sir James Graham in 1832, the accountant-general was re- garded as a recording and accounting officer, wholly concerned with receipt and expenditure. His duties were limited to the auditing of accounts, payments and expenditure generally. Owing to changes effected in 1869, which made the parliamentary secretary, assisted by the civil lord, responsible for finance at the admiralty, bringing the naval and victualling store departments into his charge, the accountant-general was invested with the power of criticizing these accounts financially, though he did not as yet possess any financial control, and the position was little changed by fresh rules made in 1876. It was not until 1880 that the powers of the accountant-general were enlarged in this direc- tion. It was then ordered that he should be consulted before any expenditure which the estimates had not provided for was incurred, and before any money voted was applied to other pur- poses than those for which it was provided. The effect of this order was not happy, for the accountant-general could not under- take these duties without setting up friction with the departments whose accounts he criticized. It was contemplated by the admiralty in 1885 to make the accountant-general the assistant of the financial secretary, and to raise him to the position of a permanent officer of finance instead of being an officer of account invested with imperfect authority in the direction of control. A select committee of the House of Commons reported that the accountant-general possessed no financial control over the de- partments, and that there was an urgent need for establishing such a control. At the time the position of that officer did not enable him to exercise any sufficient general supervision over expenditure, and there was no permanent high official expressly charged with finance. Accordingly, after being submitted to a departmental committee, a fresh arrangement was made in November 1885, whereby the accountant-general, under the authority of the financial secretary, was given a direct share in the preparation of the estimates. His written concurrence was re- quired before the final approval of the votes, and each vote was referred to him for his approval or observations, and he was to exercise a financial review of expenditure and to see that it was

properly accounted for. He became, in fact, ” the officer to be consulted on all matters involving an expenditure of naval funds.” It was believed that economical administration would result; but much opposition was raised to the principle that was involved of submitting the proposals of responsible departments to the inexpert criticism of a financial authority. Mr Main, assist- ant accountant-general, stated before the Royal Commission ‘on Civil Establishments, 1887, that the effect had been to develop a tendency to withhold information or to afford only partial information, as well as to cause friction when questions were raised affecting expenditure, accompanied by protests, even in those cases in which these questions were manifestly of a legiti- mate character. The result was discouraging, and in the opinion of Mr Main had done much to weaken financial control and to defeat the purpose of the order. It is unnecessary to detail the various changes that have been made by the institution of dock- yard expense accounts in the department of the controller, and by various other alterations introduced. The treasury instituted an independent audit of store accounts which greatly affected the position of the accountant-general, and the Royal Commission on Civil Establishments reported that the Board of Admiralty were of opinion that they could dispense with the accountant- general’s review altogether. The commission was, however, of opinion that the accountant-general should be the permanent assistant and adviser, on all matters involving the outlay of public money, of the financial secretary.

The onerations of the accountant-general are now conducted in accordance with the order in council of the 18th of November 1885, and of an office memorandum issued shortly afterwards. He thus acts as deputy and assistant of the parliamentary and financial secretary, and works with a finance committee within th.- admiralty, of which the financial secretary is president and

the accountant-general himself vice-president. The duties of the department are precisely defined as consisting in the criticism of the annual estimates as to their sufficiency before they are passed, and in advising the financial and parliamentary secre- tary as to their satisfying the ordinary conditions of economy. The accountant-general also reviews the progress of liabilities and expenditure, and in relation to dockyard expenditure he considers the proposed programme of construction as it affects labour, material and machinery. He further reviews current expenditure, or the employment of labour and material, as dis- tinguished from cash payments of the yard, as well as proposals for the spending of money on new work or repairs of any kind for which estimates are currently proposed. The accountant-general’s department has three principal divisions : the estimates

division, the navy pay division, and the invoices and claims division. In the first of these is the ledger branch, occupied with the work of accounts under the several votes and sub-heads of votes, and with preparing the navy appropriation account, as well as the esti- mates and liabilities branch, in which the navy estimates are largely prepared after having been proposed and worked out in the executive departments of the admiralty. There are also ships' establishments and salaries branches. The navy pay division includes the full and half-pay branch and a registry section. There is also the seamen's pay branch, which audits ships' ledgers and wages, and has charge of all matters concerning the wages of seamen. The victualling audit is also in this branch, and is concerned with payments for savings in lieu of victual- ling and some other matters. Further, the navy pay division examines ships' ledgers, and is concerned with the service, char- acters, ages, &c, of men as well as with allotments and pensions. The third division of the accountant-general's department, known as that of invoices and claims, conducts a vast amount of clerical work through many branches, and is concerned with the management of naval savings banks and matters touching prize-money and bounties.

The importance of this great department of the admiralty cannot be overrated. It is, in the first place, of supreme im- portance that the navy estimates should be placed upon a sound financial basis; and in practice the Board requires the concur- rence of the accountant-general to the votes before they are approved, and thus in greater or less degree this officer is con- cerned in the preparation of every one of the votes. He does not concern himself with matters of larger policy outside the domain of finance, and it must be confessed that there appears to be something anomalous in his " review " of naval expenditure. It is, however, a mark of the flexibility or elasticity of the ad- miralty system that in practice the operations of the accountant-general's department work easily, and that admiralty finance is recognized as having been placed upon a sound and efficient basis. There are important financial officers outside the ac- countant-general's department concerned with assisting the controller. The inspector of dockyard expense accounts, who is entirely in the controller's department, enables him to exercise careful supervision over expenditure and the distribution of funds to special purposes. This work, however, though highly important, is merely one part of the system of financial control. Within recent years the bonds have been considerably tightened, and the work is untainted by corruption. It is true that in exercising rigid supervision over expenditure the work has become more centralized than is desirable, and it is a mark of change within recent years that local officers have been in larger

measure deprived of independent powers. This, indeed, is a necessary condition of financial control, or at least a condition which it is not easy to change where rigid control is necessary.

5. Mobilization of the Fleet. — By the mobilization of the fleet is meant the placing of naval resources upon a war footing, in readiness in all material and personal respects for hostile opera- tions. A complete mobilization for purposes of practice in peace time would dislocate seafaring life in a manner which would be justifiable only by actual war. Thus no country in peace manoeuvres calls out all its naval reserves, or makes use of the auxiliary cruisers — merchant ships for which a subvention is

paid, and which are constructed with a view to use in warfare. Experience has shown that when vessels are commissioned they are liable to numerous small breakdowns of their machinery if they are manned by crews who have no familiarity with them. Many accidents of this kind had occurred in the British navy at manoeuvres, though it could not be shown that the vessel was defective, or that the crew was either untrained or negligent. These experiments led the admiralty to adopt a new system in 1904, designed to obviate the risk that vessels would be crippled at a critical moment by want of acquaintance on the part of the crew with their machinery. Under this system all vessels which are considered to be available for war are divided into two classes: — first, those in full commission which constitute the different squadrons maintained at all times; and secondly, those which form the reserve and are kept in partial commission — or rather partially manned though in commission. These are kept at the home ports — Chatham, Portsmouth, Plymouth — in re- serve squadrons under a flag-officer who will command them in war. Each vessel has a captain, a second in command, and a proportion of other officers including engineer, navigating and torpedo officers. Two-fifths of her full complement of crew are always on board, and they include the most skilled men needed for the proper management of the machinery of all kinds — more especially that of the torpedoes and guns. These vessels go to sea for periodicaˆ practice. When therefore the fleet must be mobilized for war it will only be necessary to fill up the number of trained men by the less skilled hands from the naval barracks occupied by the sailors not belonging to any particular ship, or from the naval reserve. All ranks of the navy are placed on a roster by which they successively serve in ships in full commission, are

quartered in the naval barracks and drafted from them to the ships of the reserve, from which they return to-the sea-going ships. It is calculated that there are always men enough in the barracks to complete the crews of a small squadron for emer- gency service without disturbing the regular routine of the peace establishment. The British admiralty may claim that though the machinery at its command in the past was not perfect it has commonly been able to send a squadron to sea more rapidly than any other power in Europe. Much depends on the arrange- ment of the stores as well as the disposition of the men. The introduction at the end of the 18th century of the businesslike practice of keeping the fittings of each ship together by them- selves, did much to facilitate the rapid mobilization of a portion of the British fleet in 1790 which impressed all Europe. The prompt manning of a special service squadron in 1895 i n conse- quence of the troubles then arising in connexion with the former South African Republic, showed that even before its plans for mobilization were completed the admiralty had its resources well in hand. (R .V. H.)

As regards the navies of countries other than Great Britain, their government is in the hands of ministers or departments

variously constituted. The Russian admiralty is a countries, highly organized bureau, divided into departments, and

under the supreme control of a high admiral, usually a grand duke of the Imperial House. The German admiralty was, till 1872, a branch of the War Office, though governed by a vice- admiral under a naval prince of the reigning family. In 1872 it was severed from the War Office, though remaining an appanage thereof, and a general of the army was placed at its head. The French minister of marine, assisted by a permanent staff, controls the navy of France on a highly centralized system of adminis- tration; but the departments are well organized, and work well. The Italian fleet is governed on principles analogous to the French, but with a large admixture of the English representative element. The American system is worth describing in more detail. The president of the United States is commander-in-chief of the navy — a constitutional prerogative which he seldom asserts. United The Navy Department is administered by a civilian States secretary of the navy — a cabinet officer appointed by ^^° e ” the president — who exercises general supervision.

Next in authority is the assistant-secretary, also a civilian nominee, who acts as an assistant, and has, besides, cer-

tain specific duties, including general supervision of the marine corps, naval militia and naval stations beyond the continental limits of the United States. The details of administration are supervised by the chiefs of bureaus, of which there are eight. They are appointed by the president from the navy list for a period of four years, and have the rank of rear-admiral while serving in this capacity. They have direct control of the business and correspondence pertaining to their respective bureaus; and orders emanating from them have the same force as though issued by the secretary.

The bureau of navigation is the executive, or military, bureau and as such promulgates and enforces the orders and regulation! prescribed by the secretary; it has general direction of the procurement, education, assignment and discipline of the per- sonnel. It also controls the movements of ships, including the authorization of manoeuvres and drills, such as target practice. The bureau of equipment has charge of all electrical appliances, compasses, charts and fuel, and generally all that relates to the equipment of vessels, exclusive of those articles that come naturally under the cognizance of other bureaus. It has charge of the naval observatory, where the Ephemeris is prepared annu- ally, and of the hydrographic office, where charts, sailing direc- tions, notices to mariners, &c, are issued. The bureau of ord- nance has charge of the gun factory, proving ground, and torpedo station, and all naval magazines; all the details that pertain to the manufacture, tests, installation or storage of all offensive and defensive apparatus, including armour, ammunition hoists, ammunition rooms, &c, though much of the actual installation is performed by the bureau of construction after consultation with the bureau of ordnance. The bureau of construction and repair has charge of the designing, building and repairing of hulls of ships, including turrets, spars and many other acces- sories. It builds all boats, has charge of the docking of vessels and the care of ships in reserve. The chief of this bureau is usually a naval constructor. The bureau of steam engineering has charge of all that relates to the designing, building and repairing of steam machinery, and of all the steam connexions on board ship. The bureau of supplies and accounts procures and distributes provisions, clothing and supplies of the pay department afloat, and acts as the purchasing agent for all materials used at naval stations, except for the medical depart- ment and marine corps. It also has charge of the disbursement of money and keeping of accounts. The chief of this bureau is a pay officer. The bureau of medicine and surgery has charge of all naval hospitals, dispensaries and laboratories, and of all that pertains to the care of sick afloat and ashore. The chief of this bureau is a medical officer. The bureau of

yards and docks has charge of construction and maintenance of wet and dry docks, buildings, railways, cranes, and generally all permanent constructions at naval stations. The chief of this bureau is often a civil engineer.

Under the cognizance of the secretary's office is the office of the judge-advocate-general, an officer selected by the president from the navy list for a term of four years, with the rank of captain while so serving. He is legal adviser to the department, and reviews the records of all courts and statutory boards. Under the cognizance of the assistant-secretary's office is the office of naval intelligence, which collates information on naval matters obtainable at home and abroad. The staff is composed of naval officers on shore duty, the senior in charge being usually a captain, and known as chief intelligence officer. Several boards are employed under the various bureaus, or directly as advisers to the secretary. Some are permanent in character, while others are composed of officers employed on other duty, and are convoked periodically or when required. The naval policy board is composed of officers of high rank, and meets once a month; its duties conform to those of the general staff in armies. The board of Construction consists of the chiefs of bureaus of ordnance, equipment,' construction and repair, steam engineering, and the chief intelligence officer. Its duty is to advise the secretary in all matters relating to the con- struction policy in detail. The .general construction policy is

suggested by the naval policy board. The board of inspection and survey is composed of representatives of all bureaus, who in- spect vessels soon after commission and on return from a cruise, and report on the condition of the ship and efficiency of its per- sonnel; it also conducts the official trials of new vessels. The boards for the examination of officers for promotion are com- posed of officers of the corps to which the candidate belongs and of medical officers. Every officer is examined professionally, morally and physically at each promotion. The Navy Depart- ment is located at Washington, D.C., and occupies a building together with the State and War Departments (the latter being charged solely with army affairs).

The personnel (see also under Navy) is limited in number by law. The engineer corps was abolished in 1899, the then en- gineer-officers becoming line officers in their respective relative grades. Line officers are the military and executive branch, and are required besides to

perform engineer duties. They are graduates of the Naval Academy. Vacancies occurring in the construction corps are filled from the graduates of the Naval Academy having the highest standing in scholarship, who are given a two years' graduate course, generally abroad, on being graduated from the Academy, and are then appointed assistant naval constructors. All other staff officers are appointed directly from civil life by the president, from candidates passing prescribed examinations. Each representative and delegate in Congress has authority to nominate a candidate for naval cadet whenever his congressional district has no representative in the Naval Academy. The candidate must be a resident of the district which the congressman represents, between fifteen and twenty years old, and must pass prescribed mental and physical examinations. The president is allowed ten representatives at the Academy at all times, appointed " at large," and one appointed from the District of Columbia.

The course of instruction at the Academy is four years, each comprising eight months' study, three months' practice cruise, and one month's furlough. At the expiration of four years, cadets are sent to cruising ships for two years' further instruc- tion, and are then commissioned ensigns. After three years' further sea service, ensigns are promoted to lieutenants (junior grade). After this, promotion is dependent upon seniority alone, the senior officer in any grade being promoted to the lowest number in the next higher grade when a vacancy occurs in the higher grade, and not before. All officers are retired on three- fourths sea pay at the age of sixty-two, or whenever a board of medical officers certifies that an officer is not physically qualified to perform all duties of his grade. A few officers are allowed to retire voluntarilyincertain circumstances, tostimulate promotion. Any officer on the retired list may be ordered by the secretary to such duty as he may be able to perform: this is a legal pro- vision to provide for emergencies. Promotion in the staff corps is dependent upon seniority, though relative rank in the lower grades in some corps somewhat depends upon promotion of line officers of the same length of service, and accounts for the exist- ence of staff officers in the same grade having different ranks. All sea-going officers, after commission, are required to spend three years at sea, and are then usually employed on shore-duty for a time, according to the needs of the service — short terms of shore-duty thereafter alternating with three-year cruises. This rule is adhered to as strictly as circumstances will permit. Shore-duty includes executive or distinctly professional duties in the Navy Department, under its bureaus, and at navy yards and stations; inspection of ordnance, machinery, dynamos, &c, under construction by private firms; duty on numerous tempo- rary or

permanent boards; instructors at the Naval Academy; recruiting duty; charge of branch hydrographic offices; in- spection duty in the lighthouse establishment; at state nautical schools; as attaches with United States legations; and many others. Naval constructors (usually), civil engineers and pro- fessors of mathematics are continuously employed on shore-duty connected with their professions, the Naval Observatory, Nautical Almanac and the Naval Academy employing most of the last.

Warrant officers (boatswains, gunners, carpenters, sailmakers, warrant machinists and pharmacists) are appointed by the secretary, preference being given to enlisted men in the navy who have shown marked ability for the positions. They must be between twenty-one and thirty-five years of age, and pass an examination. After serving satisfactorily for one year under an acting appointment, they receive warrants that secure the permanency of their office. Ten years after appointment, boatswains, gunners, carpenters and sailmakers are eligible for examination for a commission as chief boatswain, &c, and as such they rank with, but next after, ensigns. Mates are rated by the secretary from seamen or ordinary seamen. They have no relative rank, but take precedence of all petty officers. Their duties approximate to those of boatswains, though they seldom serve on large cruising vessels. Clerks to pay officers are ap pointed by the secretary on the nominations of the pay officers. They have no rank and are not promoted or retired. Their appointments are revoked when their services are no longer needed.

Boys between fifteen and seventeen years old of good char- acter, who can read and write and pass the physical examination, may enlist for the term of their minority. They enlist as third- class apprentices, and are given six months' instruction at a training station; and thence go to sea in apprentice training vessels. When proficient they are transferred to regular cruising vessels as second class, and when further qualified are rated first class. All other enlistments are for four years. Recruits must speak English. Landsmen are usually sent to sea on special training-ships until proficient, and are then sent into general service. Raw recruits may enlist as landsmen, or coal-passers or mess attendants. Ordinary seamen must have served two years, and seamen four years before the mast, prior to first enlistment as such; and before enlistment in any other rating allowed on first enlistment, applicants must prove their ability to hold such rating. Landsmen, coal-passers, &c, as soon as they become proficient, are advanced to higher grades, and, if American citizens, may eventually become petty officers (ranking with army non-commissioned officers), with acting appointments. In twelve months, or as soon thereafter as proficiency is

estab- lished, the acting appointment is made permanent, and an acting appointment for the next higher grade is issued, &c. Permanent appointments are not revokable except by sentence of court- martial, and a man re-enlists in that rating for which he held a permanent appointment in his previous enlistment. All persons re-enlisting within four months after expiration of previous enlistment are entitled to a bounty equal to four months' pay, and in addition receive a " continuous service certificate," which entitles them to higher pay and to other special considera- tions. The same is true for each re-enlistment. When an en- listed man completes thirty years' service and is over fifty years of age he may retire on three-fourths pay.

The Marine corps (see Marines) is a wholly separate military body, but it is under the control of the Navy Department.

United States naval vessels are, as a rule, built at private yards under contracts awarded after competition. The government is not committed to any fixed policy or building programme. Each year the secretary recommends certain new construction. The final action rests with Congress, which must appropriate money for the new ships before the construction can be com- menced. Repairing and reconstruction are usually done at government navy yards.

Ships in commission are distributed among five stations: (1) the North Atlantic, i.e. the' Atlantic coast of the United States, Central America, and South America as far as the Amazon, also the West Indies; (2) the South Atlantic, i.e. the remainder of the Atlantic coast of South America and both coasts of South Africa; (3) the European, comprising the coast of Europe, including the inland seas, and the North Atlantic coast of Africa; (4) the Asiatic station, comprising the coast of Asia, including the islands north of the equator, also the east coast of North Africa; (5) the Pacific station, comprising the Pacific coast of North and South America, and Australia and the adjacent islands lying

south of the equator. Each station is commanded by a flag officer, and the number of ships under the command varies according to circumstances. Ships in commission on special service, such as training, gunnery, surveying ships, &c, are not attached to stations. The shore stations of the navy are enumerated in the article on

Dockyards. (W. T. S.)

ADMIRALTY, HIGH COURT OF. The High Court of Ad- miralty of England was the court of the deputy or lieutenant of the admiral. It is supposed in the Black Book of the Admiralty to have been founded in the reign of Edward I.; but it would appear, from the learned discussion of R. G. Marsden, that it was established as a civil court by Edward III. in the year 1360; the power of the admiral to determine matters of discipline in the fleet, and possibly questions of piracy and prize, being somewhat earlier. Even then the court as such took no formal shape; but the various admirals began to receive in their patents express grants of jurisdiction with powers to appoint lieutenants or de- puties. At first there were separate admirals or rear-admirals of the north, south and west, each with deputies and courts. A list of them was collected by Sir H. Spelman. These were merged in or absorbed by one high court early in the 15th century. Sir Thomas Beaufort, afterwards earl of Dorset and duke of Exeter (appointed admiral of the fleet 1407, and admiral of England, Ireland and Aquitaine 1412, which latter office he held till his death in 1426), certainly had a court, with a marshal and other officers, and forms of legal process — mandates, warrants, citations, compulsories, proxies, &c. Complaints of encroachment of jurisdiction by the Admiralty Courts led to the restraining acts, 13 Ric. II. c. 5 (1389), 15 Ric. II. c. 3 (1391) and 2 Hen. IV. c. u

(1400).

The original object of the institution of the courts or court seems to have been to prevent or punish piracy and other crimes upon the narrow seas and to deal with questions of prize; but civil jurisdiction soon followed. The jurisdiction in criminal matters was transferred by the Offences at Sea Act 1536 to the admiral or his deputy and three or four other substantial persons appointed by the lord chan- cellor, who were to proceed according to the course of the common law. By the Central Criminal Court Act 1834, cognizance of crimes committed within the jurisdiction of the admiralty was given to the central criminal court. By an act of 1844 it has been also given to the justices of assize; and crimes done within the jurisdiction of the admiralty are now tried as crimes committed within the body of a county. See also the Criminal Law Con- solidation Acts of 1861.

From the time of Henry IV. the only legislation affecting the civil jurisdiction of the High Court of Admiralty till the time of Queen Victoria is to be found in an act of 1540, enabling the admiral or his lieutenant to decide on certain complaints of freighters against

shipmasters for delay in sailing, and one of 1562, giving the lord high admiral of England, the lord warden of the Cinque Ports, their lieutenants and judges, co-ordinate power with other judges to enforce forfeitures under that act — a very curious and miscellaneous statute called ” An Act for the Maintenance of the Navy. ”

In an act of 1534, with regard to ecclesiastical appeals from the courts of the archbishops to the crown, it is provided that the appeal shall be to the king in Chancery, ” and that upon every such appeal a commission shall be directed under the great seal to such persons as shall be named by the king’s highness, his heirs or successors, like as in cases of appeal from the Admiralty Court. ” The appeal to these ” persons, ” called delegates, con- tinued until it was transferred first to the privy council and then to the judicial committee of the privy council by acts of 1832 and 1833.

The early jurisdiction of the court appears to have been exer- cised very much under the same procedure as that used by the courts of common law. Juries are mentioned, sometimes of the County and sometimes of the county and merchants. But the connexion with foreign parts led to the gradual introduction of a procedure resembling that coming into use on the continent and based on the Roman civil law. The Offences at Sea Act

1536 states the objection to this application of the civil law to the trial of criminal cases with much force: ” After the course of the civil laws, the nature whereof is that before any judgment of death can be given against the offenders, either they must plainly confess their offences (which they will never do without torture or pain), or else their offences be so plainly and directly proved by witness indifferent such as saw their offences com- mitted, which cannot be gotten but by chance at few times. ” The material enactments of the restraining statutes were as follows: — An act of 1389 (13 Ric. II. c. 5) provided that ” the admirals and their deputies shall not meddle from „ , .

Restrain*

henceforth of anything done within the realm, but only jng ActSi of a thing done upon the sea, as it hath been used in the time of the noble prince king Edward, grandfather of our lord the king that now is. ” The act of 1391 (15 Ric. II. c. 3) provided that ” of all manner of contracts, pleas and quarrels, and other things rising within the bodies of the counties as well by land as by water, and also of wreck of the sea, the admiral’s court shall have no manner of cognizance, power, nor jurisdiction; but all such manner of contracts, pleas and quarrels,

and all other things rising within the bodies of counties, as well by land as by water, as afore, and also wreck of the sea, shall be tried, deter- mined, discussed and remedied by the laws of the land, and not before nor by the admiral, nor his lieutenant in any wise. Never- theless, of the death of a man, and of a maihem done in great ships, being and hovering in the main stream of great rivers, only beneath the [bridges] of the same rivers [nigh] to the sea, and in none other places of the same rivers, the admiral shall have cognizance, and also to arrest ships in the great flotes for the great voyages of the king and of the realm; saving always to the king all manner of forfeitures and profits thereof coming; and he shall have also jurisdiction upon the said flotes, during the said voyages only; saving always to the lords, cities, and boroughs, their liberties and franchises. ” The act of 1400 (2 Hen. IV. c. n) adds nothing by way of definition or restriction, but merely gives additional remedies against encroachments, providing heavy fines for those who improperly sue in the court, and those officials of the court who improperly assert juris- diction. It was repealed by the Admiralty Court Act 1861. The statutes of Richard, except the enabling part of the second, were repealed by the Civil Procedure Acts Repeal Act 1879. The formation of a High Court of Justice rendered them obsolete.

In the reign of James I. the chronic, controversies between the courts of common law and the Admiralty Court as to the limits of their respective jurisdictions reached an acute stage. We find the records of it in the second volume of Marsden’s Select Pleas in the Court of Admiralty, and in Lord Coke’s writings: Reports, part xiii. 51; Institutes, part iv. chap. 22. In this latter passage Lord Coke records how, notwithstanding an agreement asserted to have been made in 1575 between the justices of the King’s Bench and the judge of the admiralty, the judges of the common law courts successfully maintained their right to prohibit suits in admiralty upon contracts made on shore, or within havens, or creeks, or tidal rivers, if the waters were within the body of any county, wheresoever such contracts were broken, for torts committed within the body of a county, whether on land or water, and for contracts made in parts beyond the seas. It is due to the memory of the judges of Lord Coke’s time to say that, at any rate as regards contracts made in partibus transmarinis, the same rule appears to have been applied at least as early as 1 544, the judges then holding that ” for actions transitory abroad action may lie at common law. ”

All the while, however, the patents of the admiralty judge purported to confer on him a far ampler jurisdiction than the jealousy of the other courts would concede to him. t

The patent of the last judge of the court, Sir Robert paint. Joseph Phillimore, dated the 23rd of August 1867, styles him ” Lieut. Off 1 . Princ 1 . and Commissary Gen 1 , and Special in our High Court of Admiralty of Eng. and President and Judge of the same, ” and gives to him power to take cognizance of ” all causes, civil and maritime, also all contracts, complaints, offences or suspected offences, crimes, pleas, debts, exchanges, accounts,

policies of assurance, loading of ships, and all other matters and contracts which relate to freight due for the use of ships, transportation, money or bottomry; also all suits civil and maritime between merchants or between proprietors of ships and other vessels for matters in, upon, or by the sea, or public streams, or fresh-water ports, rivers, nooks and places overflown whatsoever within the ebbing and flowing of the sea and high-water mark, or upon any of the shores or banks adjacent from any of the first bridges towards the sea through England and Ireland and the dominions thereof, or elsewhere beyond the seas.” Power is also given to hear appeals from vice-admirals; also “to arrest . . . according to the civil laws and ancient customs of our high court ... all ships, persons, things, goods, wares and merchandise”; also ” to enquire by the oaths of honest and lawful men . . . of all . . . things which . . . ought to be enquired after, and to mulct, arrest, punish, chastise and reform”; also ” to preserve the public streams of our admiralty as well for the pre- servation of our royal navy, and of the fleets and vessels of our kingdom … as of whatsoever fishes increasing in the rivers”; also ” to reform nets too straight and other unlawful engines and instruments whatsoever for the catching of fishes “; also to take cognizance ” of the wreck of the sea . . . and of the death, drowning and view of dead bodies,” and the conservation of the statutes concerning wreck of the sea and the office of coroner [1276], and concerning pillages [1353], and ” the cognizance of mayhem ” within the ebb and flow of the tide; all in as ample manner and form as they were enjoyed by Dr David Lewis [judge from 1558 to 1584], Sir Julius Caesar, and the other judges in order (22 in all) before Sir Robert Phillimore. This form of patent differs in but few respects from the earlier Latin patents — tempore Henry VIII. — except that they have a clause non obstantibus statutis.

As has been said, however, the contention of the common law judges prevailed, and the Admiralty Court (except for a tem-

„ _, porary revival under Cromwell) sank into comparative

Modern . .. , . . ‘ „„,

progress, insignificance during the 17th century. The great maritime wars of the 18th century gave scope to the exercise of its prize jurisdiction; and its international import- ance as a prize court in the latter half of the 18th and the first part of the 19th centuries is a matter of common historical knowledge. There were upwards of 1000 prize causes each year between 1803 and 181 1, in some years upwards of 2000.

There were other great judges; but Sir William Scott, after- wards Lord Stowell, is the most famous. Before his time there were no reports of admiralty cases, except Hay and Marriott’s prize decisions. But from his time onwards there has been a continuous stream of admiralty reports, and we begin to find important cases decided on the instance as well as on the prize side.

In the reign of Queen Victoria, two enabling statutes, 1840 and 1861, were passed and greatly enlarged the jurisdiction of the court. The manner in which these statutes were administered by Dr Stephen Lushington and Sir R. J. Phillimore, whose tenure of office covered the whole period of the queen’s reign till the creation of the High Court of Justice, the valuable assistance rendered by the nautical assessors from the Trinity House, the great increase of shipping, especially of steam shipping, and the number and gravity of cases of collision, salvage and damage to cargo, restored the activity of the court and made it one of the most important tribunals of the country. In 1875, by the operation of the Judicature Acts of 1873 and 1875, the High Court of Admiralty was with the other great courts of England formed into the High Court of Justice. The principal officers of the court in subordination to the judge were the registrar (an office which always points to a connexion with canon or civil law), and the marshal, who acted as the maritime sheriff, having for his baton of office a silver oar. The assistance of the Trinity Masters, which has been already mentioned, was provided for in the charter of incorporation of the Trinity House. These officers and their assistance have been preserved in the High Court of Justice.

Till the year 1859 the practitioners in the High Court of

Admiralty were the same as those in the ecclesiastical courts and distinct from those who practised in the ordinary courts. Advocates took the place of barristers, and proctors of solicitors. The place of the

attorney-general was u oaers -,„ taken by the king's or queen's advocate-general, and the court. that of the treasury solicitor by the king's or queen's procurator or proctor. There were also an admiralty advocate and an admiralty proctor. The king's advocate also represented the crown in the ecclesiastical courts, and was its standing adviser in matters of international and foreign law. The king's advocate led the bar of his courts, and before the privy council took precedence of the attorney-general. The admiralty advocate or advocate to his majesty in his office of admiralty represented specially the lords of the admiralty. In the Admiralty Court he ranked next after the king's advocate.

In an act of 1859 the practice was thrown open to barristers and to attorneys and solicitors.

Upon the next vacancy after the courts were thrown open, the crown altered the precedence and placed the queen's advo- cate after the attorney- and solicitor-general. There were two holders of the office under these conditions, Sir R. J. Phillimore and Sir Travers Twiss. The office was not filled up after the resignation of the latter. The admiralty had, when the courts were thrown open, a standing counsel for the ordinary courts and a solicitor. Questions soon arose as to the respective claims of the admiralty advocate and the counsel to the admiralty, and their acuteness was increased when the courts were fused into one High Court of Justice. Upon the resignation of Sir James Parker Deane the office of admiralty advocate was not filled up. In like manner the proctor to the admiralty has disappeared. The office of king's or queen's proctor has been kept alive but amalgamated with that of the solicitor for the treasury. That officer uses the title of king's proctor when he appears in certain matrimonial causes.

The last holder of the office of standing counsel to the ad- miralty was Alexander Staveley Hill, K.C.,M.P. Since his death the office, like those of the king's or queen's advocate and the admiralty advocate, has not been filled up; and the ordinary law officers of the crown with the assistance of a junior counsel to the admiralty (a barrister appointed by the attorney-general) perform the duties of all these offices.

The judge advocate of the fleet is a practising barrister whose function it is to advise the admiralty on all matters connected with courts-martial. Though section 61 of the Naval judge Discipline Act 1866 recognizes the possibility of his Advocate presence at a court-martial, he does not nowadays % t . the attend, but is represented by his deputy or by an officiating deputy judge advocate appointed ad hoc

by the admiralty, the commander-in-chief of the fleet or squadron who convenes the court-martial, or, if no such appointment is made, by the president of the court-martial. But though the judge advocate of the fleet does not actually attend the courts- martial very responsible duties are imposed upon him. By a minute of the Board passed in 1884 (which is still in force) all proceedings of courts-martial on officers and men of the royal navy, excepting those where the prisoner pleads guilty and no evidence is taken, are to be referred to him, with a view to the consideration of (a) the charge, (b) the evidence on which the finding is based, and © the legality of the sentence, and he writes a minute on each case for the information of the lords commis- sioners of the admiralty with regard to these points. He has no power to modify a sentence, a power which is reserved to the admiralty by § 53 (1) of the Naval Discipline Act 1866, except in the case of a death sentence, which can only be remitted by the crown. All cases where the prisoner has pleaded guilty are examined in the admiralty, and if in any case there is any reason to think that there has been any informality or that the prisoner has not understood .the effect of his plea, such case is submitted to the judge advocate of the fleet for his opinion. The judge advocate of the fleet receives no fees but is remunerated by a salary of £500 per annum.

The existence of a deputy judge of the fleet appointed by

the admiralty has been recognized by the king's regulations, but no such officer had been appointed up to 1908.

In accordance with the provisions of § 61 of the Naval Disci- pline Act 1866, in the absence of the judge advocate of the fleet and his deputy, an officiating judge advocate is appointed for each court-martial. His duties are described in detail by the king's regulations, but may be summed up as consisting of seeing that the charges are in order, pointing out any informalities or defects in the charges or in the constitution of the court, seeing that any witness required by prosecutor or prisoner is summoned, keeping the minutes of the proceedings, advising on matters of law which arise at any time after the warrant for the court- martial is issued, drawing up the findings and sentence, and forwarding the minutes when completed to the admiralty. The officiating judge advocate is usually the secretary of the flag- officer convening the court-martial or some other officer of the accountancy branch. He is remunerated for his services by a fixed fee for each day the court sits.

Ireland. — The High Court of Admiralty of Ireland, being formed on the same pattern as the High Court in England, sat in the Four Courts, Dublin, having a judge, a registrar, a marshal and a king's or queen's advocate. In peace time and war time alike it exercised only an instance jurisdiction,, though in 1793 it claimed to exercise prize jurisdiction (see Admiralty Juris- diction). No prize commission ever issued to it. By the Irish Judicature Act of 1877 it was directed that it should be amalga- mated with the Irish High Court of Justice upon the next vacancy in the office of judge, and this subsequently took place. There was no separate lord high admiral for Ireland.

Scotland. — At the Union, while the national functions of the lord high admiral were merged in the English office it was pro- vided by the Act of Union that the Court of Admiralty in Scot- land should be continued " for determination of all maritime cases relating to private rights in Scotland competent to the jurisdiction of the Admiralty Court." This court continued till 1 83 1 , when its civil jurisdiction was given to the Court of Session and the Sheriffs' Courts (see Admiralty Jurisdiction),

See Sir Travers Twiss, Black Booh of the Admiralty, Rolls series; R. G. Marsden, Select Pleas in the Court of Admiralty, published by the Selden Society; Godolphin, View of the Admiral ■ Juris- diction. (W. G. F. P.)

ADMIRALTY ISLANDS, a group of about forty islands lying north of New Guinea, between i° and 3 S., and 146 and 148 E., within the Bismarck Archipelago, belonging to Germany. The largest, Manus, is about 60 m. in length, and its highest point is about 3000 ft. above the sea; the others are very small, and rise little above sea-level. Most are of coral formation, but the hills of Manus are believed to be extinct volcanoes. The islands were discovered by the Dutch in 1616, and visited in 1767 by Philip Carteret; but no landing seems to have been effected, owing to the surrounding reefs, until the arrival of the " Challenger " in 1875. The natives are of the Papuan type, but show signs of mixed origin. They are cannibals, and many murders of whites have taken place.

ADMIRALTY JURISDICTION. The courts by which, as far as we know, admiralty jurisdiction in civil matters was first exercised were the following. In and throughout England the courts of the several admirals soon combined into one High Court of Admiralty (see Admiralty, High Court or). Within the territories of the Cinque Ports the Court of Admiralty of the Cinque Ports exercised a co-ordinate jurisdiction. In certain towns and places there were local courts of

vice-admiralty. In Scotland there existed the Scottish High Court of Admiralty, in Ireland the Irish High Court of Admiralty. Of these courts that of the Cinque Ports alone remains untouched. The Scottish court was abolished, and its civil jurisdiction given to the Court of Session and to the courts of the sheriffs by the Court of Session Act 1830 — not, however, till a decision given by it and the appeal therefrom to the House of Lords had established a remarkable rule of admiralty law in cases of collision {Hay v. le Neve, 1824, 2 Shaw, Sc. App. Cas. 395). The act states that the Court of Justiciary held cumulative jurisdiction with the Court of

Admiralty in criminal matters. The local vice-admiralty courts in England had ceased to do much work when they were abol- ished by the Municipal Corporations Act 1835; the High Court became, with the other superior courts, a component part of the High Court of Justice by virtue of the Judicature Acts 1873 and 1875. And the Irish court has in like manner become a part of the High Court of Justice in Ireland by virtue of the Judicature Act passed in 1877.

As England first, and Great Britain afterwards, acquired colonies and possessions beyond seas, vice-admiralty courts were established. The earliest known was that in Jamaica, established in the year 1662. Some vice-

admiralty courts which were created for prize purposes courts. in the last century were suffered to expire after 18 15. In the year 1863, when the act regulating the vice-admiralty courts was passed, there were vice-admiralty courts at Antigua, Bahamas, Barbadoes, Bermuda, British Columbia, British Guiana, British Honduras, Cape of Good Hope,Ceylon,Dominica, Falkland Islands, Gambia River, Gibraltar, Gold Coast, Grenada, Hong Kong, Jamaica, Labuan, Lagos, Lower Canada (otherwise Quebec), Malta, Mauritius, Montserrat, Natal, Nevis, New Brunswick, Newfoundland, New South Wales, New Zealand, Nova Scotia (otherwise Halifax), Prince Edward Island, Queens- land, St Christopher, St Helena, St Lucia, St Vincent, Sierra Leone, South Australia, Tasmania, Tobago, Trinidad, Van- couver's Island, Victoria, Virgin Islands (otherwise Tortola), and Western Australia, and (for matters of the slave trade only) Aden. By the act of 1867 one for the Straits Settlements was added. These courts have been regulated from time to time by the following statutes: 2 and 3 Will. IV. c. 51, 26 and 27 Vict, c. 24 (Vice-Admiralty Courts Act 1863), already cited, and 30 and 31 Vict. c. 45 (Vice- Admiralty Courts Act Amendment Act 1867) ; and by the slave trade acts, of

which the last and consoli- dating act was that of 1873.

In 1890 the Colonial Courts of Admiralty Act provided that, except in the colonies of New South Wales, Victoria, St Helena and British Honduras, vice-admiralty courts should be abolished, and a substitution made of colonial courts of ad- miralty. There is power, however, reserved to the crown to erect through the admiralty in any British possession any vice- admiralty court, except in India or any British possession having a representative legislature. No vice-admiralty court so estab- lished can exercise any jurisdiction except for some purpose relating to prize, the royal navy, the slave trade, foreign enlist- ment, Pacific Islanders' protection, and questions relating to treaties or conventions on international law. Vice-admiralty courts exercised all usual admiralty jurisdiction, and in addition a certain revenue jurisdiction, and jurisdiction over matters of slave trade and prize and under the Pacific Islanders' Protection Act. The appeal from vice-admiralty courts used to lie to the High Court of Admiralty of England, but has been transferred to the king in council.

By the Colonial Courts of Admiralty Act 1890, already referred to, every court of law in a British possession which is declared by its legislature to be such, or if there c ,° ot be no such declaration, which has original unlimited Admiralty. civil jurisdiction, shall be a court of admiralty.

There used at one time to be vice-admiralty courts for Calcutta, Madras and Bombay; but by the India High Courts Act 1861, § 9, the admiralty jurisdiction is given to the High Courts of these places.

Consular courts established in Turkey, China and Japan have had admiralty jurisdiction given to them, and by § 12 of the Colonial Admiralty Courts Act any courts. court established by H.M. for the exercise of jurisdic- tion in any place outside H.M.'s dominion may have admiralty jurisdiction granted to it.

By the Commonwealth of Australia Constitution Act 1900 a federal supreme court, to be called the High Court of Australia. Australians created, and the parliament of the Common- wealth may make laws conferring original jurisdiction on the High Court in matters of admiralty and maritime jurisdiction.

India,

There is a court of admiralty in the Isle of Man of which the water-bailiff is judge. He is also styled admiral. It is ˆ an ” said to have jurisdiction in salvage and over other mari-

time matters occurring within 3 leagues from the shore. Modern statutes have given admiralty jurisdiction to the City of London Court, the Court of Passage and to the county courts in the following matters : Salvage, where the value Loca? °* t ‘ le sa l ve < i property does not exceed £1000, or the Courts. claim for reward £300 ; towage, necessaries and wages, where the claim does not exceed £150; claims for damage to cargo, or by collision, up to £300 (and for sums above these prescribed limits by agreement between the parties); and claims arising out of breaches of charter parties and other contracts for carriage of goods in foreign ships, or torts in respect thereof, up to £300. This jurisdiction is restricted to subjects over which jurisdiction was possessed by the High Court of Admiralty at the time when the first of these acts was passed, except as regards the last branch of it (the "Aline," 1880, 5 Ex. Div. 227 ; R. v. Judge of City of London Court, 1892, 1 Q.B. 272). In analogy with the county court admiralty jurisdiction created in England, a limited admiralty jurisdiction has been given in Ireland to the recorders of certain boroughs and the chairmen of certain quarter sessions ; and in salvage cases, where a county court in England would have jurisdiction, magistrates, recorders and chairmen of quarter sessions may have jurisdiction as official arbitrators (Merchant Shipping Act 1894, § 547). In Scotland, admiralty suits in cases not exceeding the value of £25 are exclusively tried in the sheriff's court ; while over that limit the sheriff's court and the Court of Session have concurrent juris- diction. The sheriff has also criminal admiralty jurisdiction, but only as to crimes which he would be competent to try if committed on land (The Court of Session Act 1830, §§ 21 and 22). By an act of 182 1 an arbitral jurisdiction in cases of salvage was given to certain commissioners of the Cinque Ports.

The appeal from county courts and commissioners is to the High Court of Justice, and is exercised by a divisional court of the Probate, Divorce and Admiralty Division. In cases arising within the Cinque Ports there is an optional appeal to the Admiralty Court of the Cinque Ports. The appeal from the High Court of Justice is in ordinary admiralty matters, as in others, to the Court of Appeal, and from thence to the House of Lords. But it is specially provided by the Judicature Act 1891, as it was by the Prize Act 1864, that the appeal in prize cases shall be to the sovereign in council. • The unfortunate provisions of the legislature, giving to the jurisdiction of county courts different money limits in admiralty equity and common law cases,

make the distinction between cases coming under the admiralty jurisdiction and other civil cases of practical moment in those courts. Arguments full of learning and research have been addressed to the courts, and weighty decisions have been given, upon questions which would never have arisen if the county courts had not a larger money area of jurisdiction in admiralty cases than they have diction S ” m other matters (R. v. Judge of City of London Court, 1892, 1 Q.B. 273; the “Zeta,” 1893, App. Cas. 468). But as regards the high courts, whether in England, Scotland or Ireland, it is not now necessary to distinguish their civil admiralty jurisdiction from their ordinary civil jurisdiction, except for the purpose of seeing whether there can or cannot be process in rem. Not that every admiralty action can of right be brought in rem, but that no process in rem lies at the suit of a subject unless it be for a matter of admiralty jurisdiction — one, for instance, that could in England have been tried in the High Court of Admiralty. Now these matters of admiralty jurisdiction with process in rem range themselves under four primary and four supplementary heads. The four primary are damage, salvage, bottomry, wages; and the four supplementary are extensions due to one or other of the statutes of 1840 (Admiralty Court) and 1861 (Admiralty Court Act). They are damage to cargo carried in a ship, necessaries supplied to a ship, .mortgage of ship, and master’s claim for wages and disbursements on account of a ship. In all these cases, primary and secondary, the process of

Appeals.

Disciplin- ary.

which a plaintiff can avail himself for redress, may be either in personam as in other civil suits, or by arrest of the ship, and, in cases of salvage and bottomry, the cargo. Whenever, also, the ship can be arrested, any freight due can also be attached, by arrest of the cargo to the extent only of the freight which it has to pay. For the purpose of ascertaining whether or not process in rem would lie, there have been distinctions as nice, and the line of admiralty jurisdiction has been drawn as carefully, as in the cases of the admiralty jurisdiction of the county courts (the “Theta,” 1894, Prob. 280; the ” Gas Float Whitton,” 1897, App. Cas. 337). There have been similar questions raised in the United States, from De Lovio v. Boit (1815, 2 Gallison, 398), and Ramsay v. Allegre (1827, 12 Wheaton, 611), down to the quite modern cases which will be found quoted in the arguments and judg- ments in the “Gas Float Whitton.”

The disciplinary jurisdiction at one time exercised by the Admiralty

Court, over both the royal navy and merchant vessels, may be said to be obsolete in time of peace, the last remnant of it being suits against merchantmen for flying flags appropriate to men-of-war (the "Minerva," 1800, 3 C. Rob. 34), a matter now more' effectively provided against by the Merchant Shipping Act 1894. In time of war, however, it was exercised in some instances as long as the Ad- miralty Court lasted, and is now in consequence exercisable by the High Court of Justice (see Prize below). It was, perhaps, in consequence of its ancient disciplinary jurisdiction that the Admiralty Court was made the court to enforce certain portions of the Foreign Enlistment Act 1870.

Finally, appeals from decisions of courts of inquiry, under the Merchant Shipping Act, cancelling or suspending the certifi- cates of officers in the merchant service, may be made to the Probate, Divorce and Admiralty Division of the High Court of Justice.

The admiralty jurisdiction in criminal matters extends over all crimes committed on board British ships at sea or in tidal waters, even though such tidal waters be well within foreign territory (R. v. Anderson, 1868, L.R. 1 C.C.R. cages. 161), but not over crimes committed on board foreign vessels upon the high seas (R. v. Serva, 1845, 1 Denison C.C. 104). Whether it extended over crimes committed on foreign ships within territorial waters of the United Kingdom, and whether a zone of three miles round the shores of the United Kingdom was for such purpose territorial water, were the great questions raised in R. v. Keyn (the "Franconia," L.R. 2 Ex. Div. 126), and decided in the negative by the majority of the judges, rightly, as the writer of this article respectfully thinks. Since then, however, the legislature has brought these waters within the jurisdiction of the admiralty by the Territorial Waters Jurisdiction Act 1878. Section 2 runs as follows : " An offence committed by a person, whether he is or is not a British subject, on the open sea within the territorial waters of British dominions, is an offence within the jurisdiction of the admiral, although it may have been committed on board or by means of a foreign ship, and the person who committed such offence may be ar- rested, tried and punished accordingly." By § 7 the ".juris- diction of the admiral " is denned as " including the jurisdiction of the admiralty of England or Ireland, or either of such juris- dictions as used in any act of parliament ; and for the purpose of arresting any person charged with an offence declared by this act to be within the jurisdiction of the admiral, the territorial waters adjacent to the United Kingdom, or any other part of her majesty's dominions, shall be deemed to be within the jurisdiction of any judge, magistrate or officer." And " terri- torial waters of her majesty's dominions " are

defined as ” in reference to the sea, meaning such part of the sea adjacent to the coast of the United Kingdom, or the coast of some other part of her majesty’s dominions, as is deemed by international law to be within the territorial sovereignty of her majesty; and for the purpose of any offence declared by this act to be within the jurisdiction of the admiral, any part of the open sea within one marine league of the coast, measured from low-water mark, shall be deemed to be open sea within the territorial waters of

Prize.

her majesty’s dominions.” As to those portions of the sea and tidal waters which, by reason of their partially land-locked positions, are deemed to be in the body of a county, there is not admiralty jurisdiction, but crimes are tried as if they were com- mitted on land within the same county.

Pirates, whatever flag they pretended to fly, were, from 1360 onwards, wherever their crimes were committed, subject to the admiralty jurisdiction. The criminal jurisdiction of the ad- miralty was first exercised by the High Court of Admiralty; and then, by virtue of the Offences at Sea Act 1 536, transferred to commissioners appointed under the great seal, among whom were to be the admiral or admirals, his or their deputies. Ad- miralty sessions were held for this purpose till 1834. Admiralty criminal jurisdiction is now, by virtue of the series of statutes, the Offences at Sea Act 1799, the Central Criminal Court Act 1834, Offences at Sea Act 1844, and the criminal law consolida- tion acts passed in 1861, exercised by the Central Criminal Court and by the ordinary courts of assize. Special provision for trial in the colonies of offences committed at sea has been made by an act of William III. (1698- 1699), the Offences at Sea Act 1806, and the Admiralty Offences (Colonial) Act 1849.

The Admiralty Court had jurisdiction in matters of prize from very early times; and although since the middle of the 17th century the instance, or ordinary civil jurisdiction of the court, has been kept distinct from the prize jurisdiction, they were originally both administered and regarded as being within the ordinary jurisdiction of the lord high admiral. The early records of the admiralty show that the origin of the prize jurisdiction is to be traced to the power given to the court of the admiral to try cases of piracy and ” spoil,” i.e.

captures of foreign ships by English ships. The earliest recorded case of spoil tried before the admiral is in 1357, when the goods of a Portuguese subject, taken at sea by Englishmen from a French ship which had previously spoiled a Portuguese, were awarded by the admiral as good prize to the English captors ; and Edward III. in a letter to the king of Portugal answering a com- plaint on the subject gives the admiral's decision as a reason for refusing their restoration. During the 16th century a very large part of the business of the Admiralty Court related to spoil and piracy, and the privy council .often directed the judge of the court how to deal with the spoil cases, with regard to which foreigners who had suffered from attacks by English ships made petition for redress to the admiral or the council. The spoil suit at this time {causa spolii) was a civil proceeding resulting in a decree absolutoria, dismissing the defendant, or condemna- toria, ordering restoration to be made by him. In 1 585 the patent of Howard, the lord high admiral, authorized him to issue letters of reprisal against Spain; and an order in council regu- lating the conduct of those to whom such letters were issued provided by an additional article (1859) that all prizes were to be brought in without breaking of bulk for adjudication by the Admiralty Court. The court was also resorted to at this time by captors, sailing under commissions granted by the allies of England, such as the king of France and the Dutch. About the middle of the 17 th century separate sittings of the court for instance and prize business began, perhaps because of the con- flicting claims to droits of Charles II. and the duke of York as lord high admiral; and privateering under royal commission took the place of the former irregular "spoiling." The account which Lord Mansfield gave of the records of the Admiralty Court, that there were no prize act books earlier than 1641, or prize sentences earlier than 1648, and that before 1690 the records were in confusion, must be qualified by the correction that there are in existence prize sentences (on paper, not parchment) as early as 1 589.

Although the courts of common law hardly ever seem to have interfered with or disputed the admiralty prize jurisdiction, its exclusive nature was not finally admitted till 1782; but long previously royal ordinances (151 2, 1602) and statutes (1661, giving an alternative of commissioners, 1670, 1706) had given the Admiralty Court the only express jurisdiction over prize. The same statute of Anne and acts of 1739 and 1744 give prize

jurisdiction to any court of admiralty, and the courts of ad- miralty for the colonies and plantations in North America.

It has been a disputed question whether the prize jurisdiction of the

court was inherent, i.e. coming within the powers given by the general patent of the judge, in which no express mention of it is made, or whether it required a special commission. Upon this subject the judgment of Lord Mansfield in Lindo v. Rodney (1782, Dougl. 612), the judgment of Mr Justice Story in De Lovio v. Boit (1815, 2 Gallison, 398), and Marsden's Select Pleas of the Court of Admiralty (introduction), may be consulted. But the settled practice now and for a long time past has been for a special commission and warrant to be issued for this pur- pose. In connexion with this it is observable that in 1793 the Admiralty Court of Ireland claimed to exercise prize jurisdiction under its general patent; and it is said to have been the opinion of Sir W. Wynne that the Admiralty Court of Scotland had a similar right (Brown, Civil Law of Admiralty, vol. ii. 211, 212). Any jurisdiction of the Scottish court over prize of war was transferred to the English court by the Court of Session Act 1825, § 57. As to the Irish court, by the Act of Union it was pro- vided that there should remain in Ireland an instance court of admiralty for the determination of causes civil and maritime only.

In 1864 the constitution and procedure of prize courts, which had until then beeu prescribed by occasional acts passed for each war as it arose, were for the first time made permanent by the Naval Prize Act, by which the High Court of Admiralty and every admiralty or vice-admiralty court, or any other court exercising admiralty jurisdiction in British dominions, if for the time being authorized to exercise prize jurisdiction, were made prize courts. The High Court of Admiralty was given jurisdic- tion throughout British dominions as a prize court, and, as such, power to enforce any order of a vice-admiralty prize court and the judicial committee of the privy council in prize appeals — this power mutatis mutandis being also given to vice-admiralty prize courts. An appeal was given from any prize court to the sovereign in council. Prize courts were given jurisdiction in cases of captures made in a land expedition or an expedition made conjointly with allied forces, and power to give prize salvage on recaptured ships and prize bounty; and a form of procedure was prescribed. The High Court was also given ex- r elusive jurisdiction as a prize court over questions of ransom and petitions of right in prize cases, and power to punish masters of ships under convoy disobeying orders or deserting convoy. By the Naval Discipline Act 1866, power to award damages to convoyed ships exposed to danger by the fault of the officer in charge of the convoy was also given to the High Court. Under other statutes it had power to try questions of booty of war when referred to it by the crown, in the same way as prize causes, and claims of king's ships for salvage on recaptures from pirates, which could be condemned as

droits of admiralty, sub- ject to the owner's right to receive them on paying one-eighth of the value, and also power to seize and restore prizes captured by belligerents in violation of B ritish neutrality, or by a ship equipped in British ports contrary to British obligations of neutrality.

All jurisdiction of the High Court of Admiralty has since passed to the High Court of Justice, which is made a prize court under the Naval Prize Act, with all the powers of the Admiralty Court in that respect; and all prize causes and matters within the jurisdiction of that court as a prize court are assigned to the Probate, Divorce and Admiralty Division; and an appeal from it as a prize court lies only to the king in council (Judicature Acts 1873 and 1891).

By an act of 1894 further provision is made for the consti- tution of prize courts in British possessions. A commission, warrant or instruction from the crown or the admiralty may be issued at any time, even in peace; and upon such issue, subject to instructions from the crown, the vice-admiral of the possessions on being satisfied by information from a secretary of state that war has broken out between Great Britain and a foreign state, may make proclamation to that effect, and the commission or warrant comes into effect. The commission or

warrant may authorize a vice-admiralty court or colonial court of admiralty to act as a prize court, or establish a vice-admiralty court for that purpose, and may be revoked or altered at any time. The court is authorized to act as a prize court during the war, and shall after its conclusion continue to act as such, and finally dispose of all matters and things arising during the war, including all penalties and forfeitures incurred therein. Rules of court may also be made by order in council for regulating, subject to the Naval Prize Act, the procedure and practice of prize courts under that act, the duties and conduct of their officers and practitioners, and the fees and costs therein (Prize Courts Act 1894, §§2, 3). This latter power has been exercised; and prize rules for the High Court of Justice and the vice- admiralty prize courts were framed in 1898 (Statutory Rules and Orders, 1898).

Authorities. — -Marsden, Select Pleas of the Court of Admiralty, Selden Society, London, 1892 and 1897; Zouch, Jurisdiction of the Admiralty of England asserted; Robinson, Collectanea Maritima;

Brown, Admiralty; Edwardes, Admiralty; Phillimore, International Law, vol. i., vol. iii. part xi. ; Pritchard, Admiralty Digest, tit. Jurisdiction. (W. G. F. P.)

United States

The source of admiralty jurisdiction in the United States is Article 3, § 2 of the United States Constitution: — ” The judicial power shall extend to all cases of admiralty and mari- time jurisdiction.” The United States Supreme Court has declared that by virtue of these words the admiralty jurisdiction extends not only to the high seas but to the great lakes and the rivers connecting them, and to all public navigable waters in the United States (the ” Genesee Chief” v. Fitz-Hugh, 12 Howards U.S. Rep. 443), including even interstate canals {Ex. p. Boyer, 109 U.S. Rep. 629, the “Robert W. Parsons,” [1903] 191 U.S. 1 7) , and is not confined to tide waters. The American colonies had vice-admiralty courts with an admiralty jurisdiction equal to the largest claimed by the English admiralty courts even under Edward III. When they became states they delegated to the federal government their several ” admiralty and maritime jurisdiction,” using these words in the sense understood in every country in Europe, England excepted, and in the sense in which they had then been used in the colonies for a long time, and without reference to the very narrow jurisdiction of the English admiralty courts then existing {Waring v. Clark, 5 Howards U.S. Rep. 441).

It is settled as to the United States admiralty jurisdiction not that it is ” co-equal with that of the original English, or that of continental European admiralty, but is rather that defined by the statutes of Richard II., under the construction given to them by contemporary or immediately subsequent courts of admir- alty ” (2 Parsons Adm. 176), and that it embraced all maritime contracts, torts, injuries or offences {De Lovio v. Boit, 2 Galli- sons Rep. 398; Waring v. Clark, 5 Howards U.S. Rep. 441), and that it has never been restricted by the action of the common law courts as in England under Lord Coke (2 Parsons Adm. 166 n.; Waring v. Clark; De Lovio v. Boit).

Original admiralty jurisdiction was by the Judiciary Act of 1789 (U.S. Rev. Stats. § 563) granted to the United States dis- trict courts exclusively, except that concurrent original juris- diction was given to United States circuit courts over seizures for slave trading, and condemnations of property used by persons in insurrection (§ 629; § 5309), and in the coolie trade (§ 2159), and by the act of the 3rd of March 1901 ; the supreme court of the District of Columbia is given the same jurisdiction as the district and circuit courts. The Supreme

Court of the United States has no original jurisdiction in admiralty. All suits are brought in the first instance in the district court. Appeals lie, both on the law and on the facts, from a final decree of that court to the circuit court of appeals only, except in cases involving the juris- diction of the court, the constitutionality of a law of any state or of the United States, or the validity or construction of any treaty of the United States, and except cases of prize and capital or infamous crime, in which cases of appeal lies directly to the supreme court. In cases of gravity and importance the Supreme Court may by certiorari review the judgment of the circuit court of

appeals, but such cases are rare (re Lati Ow Bew, 141 U.S. Rep. 587; Benedict's The American Admiralty, § 607). Formerly the Judiciary Act authorized an appeal from the district court to the circuit court, and thence to the Supreme Court. But the act of the 3rd of March 1891 (Ch. 517) abolished this and created the circuit court of appeals, making it the final appellate court in admiralty, except as above stated. In any case where the district judge is unable to perform his duties or is disqualified by reason of interest or of relationship, or has acted as counsel for one of the parties to the action, it may be removed to the circuit court in that district (U.S. Rev. Stats. §§ 587, 589 and 601). These are now the only cases in which admiralty suits can come before the circuit court (Benedict's Adm. § 321).

The subject matter in cases of contract determines the juris- diction (the "General Smith," 4 Wheaton U.S. Rep. 438), and not the presence or absence of tide, salt water, current, nor that the water be an inland basin or land-locked, or a river, nor by its being a harbour, or a port within the body of the county, nor that a remedy exists at common law. The admiralty courts have jurisdiction over all matters that concern owners and proprietors of ships as such; possessory actions and petitory actions to try title of a ship; cases of mariners' wages, wharfage, dock- age, lighterage, stevedores, contracts of affreightment, charter parties, rights of- passengers as such (the "Moses Taylor," 71 U.S. Rep. 411), pilotage, towage, maritime liens and loans, bottomry, respondentia and hypothecation of ship and cargo, marine insurance, average, jettison, demurrage, collisions, con- sortship, bounties, survey and sale of vessel, salvage, seizures under the laws of impost navigation or trade, cases of prize, ransom, condemnation, restitution and damages; assaults, batteries, damages and trespasses on the high seas and navigable waters of the United States; but not suits in rem for duties (Benedict's Adm. § 303a).

The U.S. Supreme Court has held in Peoples Ferry Co. v. Beers, 20 Howards U.S. Rep. 393, and in a series of subse- quent cases that a

contract to build a vessel is not a maritime contract (the “Robert W. Parsons “) . Contracts to furnish cargo for ships and to furnish ships to carry the cargoes are maritime contracts {Graham v. Oregon R. & N. Co., [1905] 135 Fed. Rep.

608).

Whenever there is a maritime lien, even though created by state statute as to a ship in her home port, it may be enforced by suit in rem in admiralty in the federal courts (the ” General Smith”; the ” Lottawanna,” 21 Wallace Rep. 558, Benedict’s Adm. § 270). In all suits by material men for supplies and repairs or other necessaries for a foreign ship, the libellant may proceed against the ship and freight in rem or against the master or owner in personam (12th Admiralty Rule; Benedict’s Adm. § 268; the “General Smith”). Actions in rem and in personam may be joined in the same libel {Newell v. Norton, 3 Wallace 257; the ” Normandie,” 40 Fed. Rep. 590). But a contract to furnish fishermen with clothing, tobacco and other personal effects for use on a voyage is not a maritime contract, and a court of admiralty has no jurisdiction to enforce it in rem (the ” May F. Chisholm,” 1904; 129 Fed. Rep. 814). The state courts have no jurisdiction in rem over any maritime contract or tort (the “Lottawanna,” the “Belfast,” 7 Wallace Rep. 624). Ad- miralty jurisdiction in tort depends on locality; it must have occurred on the high seas or other navigable waters within admiralty cognizance (2 Parsons Adm. 347; the “Plymouth,” 3 Wallace Rep. 20; the “Genesee Chief” y. Fitz-Hugh, the ” Blackheath,” [1903] 122 Fed. Rep. 112).

The U.S. Supreme Court in the ” Harrisburg ” (119 U.S. 199) and the ” Alaska” (130 U.S. 207), after some conflict of opinion, held that the admiralty courts have no jurisdiction under the general admiralty law to try an action for damages for negli- gence on the high seas, causing death of a human being, while there was no act of Congress and no statute of the state to which the vessel belonged giving such right of action (Benedict’s Adm. §§ 2 75-3°9 a)> nor where such statute is that of a foreign country {Rundell v. Compagnie Generate, [1899] 94 Fed. Rep. 366).

Admiralty has jurisdiction in cases of spoliation and piracy,

collision and proceedings by owners to limit their liability under U.S.

Rev. Stats. §§ 4281-9.

The United States admiralty courts have always had jurisdic- tion in matters of prize (The Prize Cases, 2 Black U.S. Rep. 635). The district courts have exclusive original jurisdiction (except that circuit courts also have jurisdiction when prize is taken from persons in insurrection), and the supreme court of the District of Columbia now has concurrent jurisdiction (U.S. v. Sampson, 1902, 187 U.S. 436) and appeals are direct to the Supreme Court. Special commissioners are appointed on the breaking out of hostilities to act under the orders of the district courts (U.S. Rev. Stats. § 4621, Prize Rule 9; Benedict's Adm. §509; 680 Pieces Merchandise, 2 Sprague 233). These commis- sioners take the depositions of witnesses and report to the court the evidence upon which it adjudicates. Proceedings in prize cases must be in conformity with admiralty proceedings, where the seizure is on land (Union Insurance Co. v. U.S., 6 Wallace 759; 2 Parsons Adm. 174). The district courts have all the powers of a court of admiralty whether as instance or prize courts (Glass v. sloop " Betsy," 3 Dallas 6). To adjudicate in matters of prize is one of the ordinary functions of that court (Benedict's Adm. § 509).

The admiralty courts have jurisdiction over crimes and offences committed upon vessels belonging to citizens of the United States on the high seas or any arm of the sea or any waters within The admiralty and maritime jurisdiction of the United States (U.S. Rev. Stats. § 5339). High seas include the great lakes (U.S. v. Rogers, 150 U.S. 249). (J. A. Ba.)

Other Countries In France, and in Belgium, Spain, Portugal, Italy and Greece — countries which have adopted codes based on the Code Napo- France ˆ on — tne c i yu \ or > as it would have been formerly and called in England, the " instance," jurisdiction of

countries the admiralty is exercised by the ordinary tribunals, France g an(ˆ there are n0 separate courts of admiralty for

this purpose. France and some other countries have special commercial tribunals, which deal with shipping matters, but also with ordinary commercial cases. France has also tribunaux maritimes commerciaux (Code disciplvnair 2 et phial de la marine marchande du 24 mars 1852, lot du n mars 1891) to deal with maritime offences. Austria adopts the French law in commercial matters. Italy had tribunals of com- merce, but has given them up. She has, however, by Art. 14 of her Merchant Shipping Code, given jurisdiction to captains of ports to decide collision cases when the sum in dispute does not

exceed 200 lire.

In Germany there are no special tribunals for admiralty matters. Kammern fur Handelssachen, commercial courts, have Germany, been established in Berlin and some of the principal

seaports. These deal with shipping matters, but also with all other commercial suits.

In Denmark, Sweden and Norway there is a maritime code which came into force in Sweden in 1891, in Denmark in 1892,

and in Norway in 1893. This was intended to be one navia's code for the three countries; but each country as it nations. finally adopted the code made some modifications of its

own. Under this code there are in Norway permanent maritime courts for each town presided over by the judge of the inferior local civil court (civile underdommer) , or if there be more than one such judge then by the president, with two assessors chosen out of a list. Temporary local courts, con- sisting of the same judge with two other members of nautical skill and knowledge, can be constituted in districts where there are no permanent courts. Appeals lie to the supreme court (Hoiesteret). In Denmark maritime cases are brought before the local courts constituted for maritime and commercial causes (So-og-Handelsret). In Sweden maritime cases are brought before local courts of first instance consisting of a judge and assessors. There is an intermediate appeal to courts of second instance, and then to the supreme court, which finally decides upon all causes civil and commercial.

Maritime cases in Holland are tried by the ordinary civil tribunals,'with the same right of appeal.

" By the maritime law of nations universally and immemori- ally received there is an established method of determination whether the capture be or be not lawful prize. Before the ship or goods can be disposed of by the captor Jˆt there must be a regular judicial proceeding wherein diction. both parties may be heard and condemnation there- upon as prize in a court of admiralty judging by the law of nations and treaties. ... If the sentence of the court of ad- miralty is thought to be erroneous, there is in every maritime country a superior court of review. ..." (duke of Newcastle's letter to M. Michell, secretary to the embassy of the king of Prussia, 1753). "So far as belligerent states do not make a practice of giving up the taking of

booty at sea . . . they are required by international law to establish prize tribunals and thus give to their proceedings in the matter of prize a judicial character" (v. Holtzendorff, Rechtslexikon, tit. "Prisengerichte").

In France till the death of the duke of Montmorency in 1632 prize matters were adjudicated upon by the admiral. The duke had sold the office of admiral some years before his death to Cardinal Richelieu; but about the period of the duke's death the office of admiral appears to have been abolished, and one of grand master of navigation established in lieu. This new office was first held by Cardinal Richelieu and continued till 1695. The grand master took the admiral's place in matters of prize; but in 1659 a commission of councillors of state and masters of requests was appointed to assist the grand master and form a Conseil des Prises. From this conseil there was an appeal to the Conseil d'Elat. When the office of admiral was restored in 1695 he exercised his jurisdiction in prize matters with the assistance of the Conseil des Prises. The appeal was then given to the Conseil Royal des Finances. The Ordonnance sur la marine of August 1681 regulated the procedure. This system continued till the Revolution. The last Conseil des Prises was appointed in 1778. A law of the 14th of February 1793 abolished the Conseil des Prises and gave cognizance of prize matters " provisionally " to the tribunals of commerce. On the 8th of November 1793 (18 Brumaire, an II.) this jurisdic- tion was taken from the tribunals of commerce and given to the Conseil Extcutif. Later it was given to the Comite de Salut Public. On the 25th of October 1795 (3 Brumaire, an IV.) the jurisdiction was restored to the tribunals of commerce. This was again altered on the 27th of March 1800 (6 Germinal, an VIII.), when a Conseil des Prises was established, consisting of nine councillors of state, a commissary of the government and a secretary, all nominated by the First Consul.

On the nth of June 1806 an appeal was given to the Conseil d'Htat. It was disputed among French jurists whether the Conseil des Prises was to be considered as a body actuated only by political considerations or one exercising what the French term an " administrative jurisdiction "; which is, as nearly as a parallel to it can be found in England, administration of justice between individuals and the state.

As most of the cases arising out of the great wars had been dealt with, an ordinance of the 9th of January 1815 suppressed the Conseil des Prises and directed the ComitS du contenlieux of the Conseil d'£tat to prepare the remaining prize matters for decision by the Conseil d'Etat. Such prize matters (probably including' captures for trading in slaves) as required to be dealt with till 1854, appear to have been dealt with

by this body; an ordinance of the 9th of September 183 1 directing that the pro- ceedings before the Conseil d'Etat should be private, was held to show that the jurisdiction was not political but administrative.

An Imperial decree, however, of the 18th of July 1854 restored the Conseil des Prises, with appeal to the Conseil d'Mlat. This was for the war with Russia. A similar decree was published on the 9th of May 1859 for the war with Austria in Italy.

On the 28th of November 1861 a further decree ordered that the Conseil instituted in 1859 should so long as it was kept in being decide all prize matters; and this Conseil has decided on prizes taken in the wars with Mexico and Germany and in Cochin

China. It consists of seven judges and a commissary of the government. An appeal to the government in the Conseil d'Etat can be brought within three months. It is then decided by I'Assemblee du Conseil d'Etat.

Under the First Empire there were commissions des ports, commissions colonials and commissions consulaires, established mainly tc collect materials for the Conseil des Prises, but sometimes, when the ship and cargo were clearly those of the enemy, proceeding to actual condemnation.

In Prussia Regulations of the 20th of June 1864 established a prize council consisting of a president and six associates with a law officer. An appeal was given to an upper prize council (v. Holtzendorff, Rechtslexikon, tit. " Prisengerichte ").

By a law of the German empire of the 3rd of May 1884 the legality of prizes made during war has to be decided by prize courts, and the imperial government is authorized to determine the particulars as to the seat of such courts, their members and their proceedings (Reichsgesetzblatt of 1884, p. 49). Prize courts were established under this law on the occasion of the East African blockade in 1889 (Reichsgesetzblatt of 1889, pp. 5 sqq.).

In Italy Art. 14 of the Merchant Shipping Code provides that prize matters shall be tried by a special commission established by royal decree. On the occasion of the war' with Austria such a special commission was established by royal decree of the 20th of June 1866.

For the war with Abyssinia a fresh commission was established by royal decree of the 16th of August 1896. The composition of this commission, which was slightly different in character from that established in 1866, was as follows: (a) a first president of a court of appeal or a retired one, or a president of a section of the council of state or of cassation ; (6) two general officers of the navy; (c) a member of the ” contentious part ” of the diplomatic service; (d) two councillors of a court of appeal; (e) a captain of a port, with a commissary of the government and a secretary; five to be a quorum. There was no appeal; but the ordinary right to have recourse to the Court of Cassation at Rome, if the prize commission proceeded without jurisdiction or in excess of jurisdiction, was preserved.

By an ordinance of the 27th of March 1895 regulating the whole matter of prize in Russia, two sorts of prize tribunals of first instance were contemplated — port tribunals and fleet tribunals. The latter are for captures made by ships of the fleet, and are to be composed of some of the principal officers of the fleet. The former are to have presidents named by the emperor from among those ” qui font partie de I’ administration maritime judiciaire”; the other members are to be appointed by the ministers of the navy, justice and foreign affairs. The court of appeal is formed by the council of the admiralty with the addition of two members of the senate and a nominee of the minister of foreign affairs (Clunet, 1904, p. 271).

On the occasion of the Russo-Japanese war, port tribunals were established under the authority of this ordinance by the lord high admiral, the Grand Duke Alexis, on the 13th of March 1904, at Sebastopol — Port Alexander III., Port Arthur and Vladivostock (Clunet, 1904, p. 479; London Gazette, 22nd March 1904). Many cases were heard before these tribunals and on appeal.

The procedure in prize cases under the old law of Spain is described in Abreu (Felix Joseph de Abreu y Bertodano), Tratado juridico Politico sobre Presas de Mar (Cadiz, 1746). On the occasion of the war with the United States the Spanish govern- ment published a proclamation stating the circumstances in which captures were to be made and prizes taken; but infor- mation is lacking as to the particular constitution of the prize court or courts.

In Greece prize questions are apparently left to be tried by the ordinary tribunals. See decision of Civil Tribunal of Athens, 1898, No. 3385 (reported Clunet, 1900, p. 826).

Turkey during her war of 1877 with Russia established a prize court

and a court of appeal. The ordinance establishing these courts is set out in the London Gazette of the 6th of July 1877.

Japan established, in the war (1904-5) with Russia, prize courts at Sasdbo and Yokosco with a court, of appeal at Tokyo.

Advocates were heard before these courts, and the procedure seems generally to have been modelled upon European patterns.

Authorities. — Clunet, Journal du droit international prive, cited shortly as Clunet; v. Holzendorff, Rechtslexikon, Leipzig, 188.1 ; De Pistoye et Duverdy, Traite des prises maritimes, Paris, 1855, vol. ii., tit. viii.; Phillimore, International Law, vol. i., vol. iii. part xi. ; Autran, Code international de I'abordage, de I 'assistance, et du sauvetage maritimes, Paris, 1902 ; Raikes, The Maritime Codes of Spain and Portugal (1896), of Holland and Belgium (1898), of Italy (1900), London. (W. G. F. P.)

ADMISSION, in law, a statement made out of the witness-box by a party to legal proceedings, whether civil or criminal, or by some person whose statements are binding on that party against the interest of that party. (See Evidence.)

ADO (d. 874), archbishop of Vienne in Lotharingia, belonged to a famous Frankish house, and spent much of his middle life in Italy. He held his archiepiscopal see from 859 till his death on the 1 6th of December 874. Several of his letters are extant and reveal their writer as an energetic man of wide sympathies and considerable influence. Ado's principal works are a Martyro- logium (printed inter al. in Migne, Patrolog. lat. cxxiii. pp. 181- 420; append, pp. 419-436), and chronicle, Chronicon sive Brevia- rium chronicorum de sex mundi aetatibus de Adamo usque ad ann.

869 (in Migne, cxxiii. pp. 20-138, and Pertz, Monumenta Germ. ii. pp. 315-323, &c). Ado's chronicle is based on that of Bede, with which he combines extracts from the ordinary sources, forming the whole into a consecutive narrative founded on the conception of the unity of the Roman empire, which he traces in the succession of the emperors, Charlemagne and his heirs following immediately after Constantine and Irene. "It is," says Wattenbach, " history from the point of view of authority and preconceived opinion, which exclude any independent judgment of events. " Ado wrote also a book on the miracles (Miracula) of St Bernard, archbishop of Vienne (9th century), published in the Bollandist Acta Sanctorum; a life or Mar- ty rium of St Desiderius, bishop of Vienne (d. 608), written about

870 and published in Migne, cxxiii. pp. 435-442; and a life of St Theudericus, abbot of Vienne (563), published in Mabillon, Acta Sand. i. pp. 678-681, Migne, cxxiii. pp. 443-450, and re- vised in Bollandist Acta Sand. 29th Oct. xii. pp. 840-843.

See W. Wattenbach, Deutschlands Geschichtsquellen, vol. i. (Stuttgart and Berlin, 1904).

ADOBE (pronounced a-dd-be; also corrupted to dobie; from the Span, adobar, to plaster, traceable through Arabic to an Egyptian hieroglyph meaning ” brick “), a Spanish- American word for the sun-dried clay used by the Indians for building in some of the south-western states of the American Union, this method having been imported in the 16th century by Spaniards from Mexico, Peru, &c. A distinction is made between the smaller ” adobes, ” which are about the size of ordinary baked bricks, and the larger ” adobines, ” some of which are as much as from one to two yards long.

ADOLESCENCE (Lat. adolescentia, from adolescere, to grow up, past part, adullus, grown up, Eng. ” adult “), the term now commonly adopted for the period between childhood and maturity, during which the characteristics — mental, physical and moral — that are to make or mar the individual disclose them- selves, and then mature, in some cases by leaps and bounds, in others by more gradual evolution. The annual rate of growth, in height, weight and strength, increases to a marked extent and may even be doubled. The development in the man takes place in the direction of a greater strength, in the woman towards a fitter form for maternity. The sex sense develops, the love of nature and religion, and an overmastering curiosity both in- dividual and general. This period of life, so fraught with its power for good and ill, is accordingly the most important and by far the most difficult for parents and educationists to deal with efficiently. The chief points for attention may be briefly indicated. Health depends mainly on two factors, heredity, or the sum total of physical and mental leanings of the individual, and environment. In an ideal system of training these two factors will be so fitted in and adapted to one another, that what is weak or unprovided for in the first will be amply com- pensated for in the second.

In an ideal condition children should be brought up in the country as much as possible rather than in the town. Though adults may live

where they like within very wide limits and take no harm, children, even of healthy stock, living in towns, are continually subject to many minor ills, such as chronic catarrh, tonsilitis, bronchitis, and even the far graver pneumonia. Removed to healthier conditions in the country their ailments tend to disappear, and normal physical development supervenes. The residence should be on a well-drained soil, preferably near the sea in the case of a delicate child, on higher ground for those of more robust constitution. The child should be lightly clad in woollen garments all the year round, their thickness being slightly greater in winter than in summer. An abundance of simple well-cooked food in sufficient variety, ample time at table, where an atmosphere of light gaiety should be cultivated, and a period free from restraint both before and after meals, should be considered fundamental essentials. As regards the most suitable kinds of food — milk and fruit should be given in abundance, fresh meat once a day, and fish or eggs once a day. Bread had better be three days old, and baked in the form of small rolls to increase the ratio of crust to crumb. Both butter and sugar are good foods, and should be freely allowed in many forms.

The exercise of the body must be duly attended to. Nowa- days this is provided for in the shape of games, some being optional, others prescribed, and such sports as boating, swim- ming, fencing, &c. But severe exercise should only be allowed under adequate medical control, and should be increased very gradually. In the case of girls, let them run, leap and climb with their brothers for the first twelve years or so of life. But as puberty approaches, with all the change, stress and strain dependent thereon, their lives should be appropriately modified. Rest should be enforced during the menstrual periods of these earlier years, and milder, more graduated exercise taken at other times. In the same way all mental strain should be diminished. Instead of pressure being put on a girl's intellectual education at about this time, as is too often the case, the time devoted to school and books should be diminished. Education should be on broader, more fundamental lines, and much time should be passed in the open air. With regard to the mental training of both sexes two points must be borne in mind. First, that an ample number of hours should be set on one side for sleep, up to ten years of age not less than eleven, and up to twenty years not less than nine. Secondly, that the time devoted to " book work " should be broken up into a number of short periods, very carefully graduated to the individual child.

In every case where there is a family tendency towards any certain disease or weakness, that tendency must determine the whole circumstances of the child's life. That diathesis which is most serious

and usually least regarded, the nervous excitable one, is by far the most important and the most difficult to deal with. Every effort should be made to avoid the conditions in which the hereditary predisposition would be aroused into mischievous action, and to encourage development on simple unexciting lines. The child should be confined to the school- room but little and receive most of his training in wood and field. Other diatheses — the tuberculous, rheumatic, &c. — must be dealt with in appropriate ways.

The adolescent is prone to special weaknesses and moral per- versions. The emotions are extremely unstable, and any stress put on them may lead to undesirable results. Warm climates, tight-fitting clothes, corsets, rich foods, soft mattresses, or in- dulgences of any kind, and also mental over-stimulation, are especially to be guarded against. The day should be filled with interests of an objective — in contradistinction to subjective- kind, and the child should retire to bed at night healthily fatigued in mind and body. Let there be confidence between mother and daughter, father and son, and, as the years bring the bodily changes, those in whom the children trust can choose the fitting moments for explaining their meaning and effect, and warning against abuses of the natural functions.

For bibliography see Child.

ADOLPH OF NASSAU (c. 1255-1298), German king, son of

Walram, count of Nassau. He appears to have received a good education, and inherited his father's lands around Wiesbaden in 1ˆ76. He won considerable fame as a mercenary in many of the feuds of the time, and on the 5th of May 1292 was chosen German king, in succession to Rudolph I., an ejection due rather to the political conditions of the time than to his personal qualities. He made large promises to his supporters, and was crowned on the 1st of July at Aix-la-Chapelle. Princes and towns did homage to him, but his position was unstable, and the allegiance of many of the princes, among them Albert I., duke of Austria, son of the late king Rudolph, was merely nominal. Seeking at once to strengthen the royal position, he claimed Meissen as a vacant fief of the Empire, and in 1294 allied himself with Edward I., king of England, against France. Edward granted him a subsidy, but owing to a variety of reasons Adolph did not take the field against France, but turned his arms against Thuringia, which he had purchased from the landgrave Albert II. This bargain was resisted by the sons of Albert, and from 1294 to 1296 Adolph was campaigning in Meissen and Thuringia. Meissen was conquered, but he was not equally successful in Thuringia, and his relations with

Albert of Austria were becoming more strained. He had been unable to fulfil the promises made at his election, and the princes began to look with suspicion upon his designs. Wenceslaus II., king of Bohemia, fell away from his allegiance, and his deposition was decided on, and was carried out at Mainz, on the 23rd of May 1298, when Albert of Austria was elected his successor. The forces of the rival kings met at Gollheim on the 2nd of July 1298, where Adolph was killed, it is said by the hand of Albert. He was buried at' Rosenthal, and in 1309 his remains were removed to Spires.

See F. W. E. Roth, Geschichte des Romischen Konigs Adolf I. von Nassau (Wiesbaden, 1879); V. Domeier, Die Absetzung Adolf s von Nassau (Berlin, 1889); L. Ennen, Die Wahl des Konigs Adolf von Nassau (Cologne, 1866); L. Schmid, Die Wahl des Graf en Adolf von Nassau zum Romischen Konig; B. Gebhardt, Handbuch der deulschen Geschichte, Band i. (Berlin, 1901).

ADOLPHUS, JOHN LEYCESTER (1795-1862), English lawyer and author, was the son of John Adolphus (1768-1845), a well- known London barrister who wrote a History of England to 1783 (1802), a History of France from ijgo (1803) and other works. He was educated at Merchant Taylors' School and at St. John's College, Oxford. In 1821 he published Letters to Richard. Heber, Esq., in which he discussed the authorship of the then anonymous Waverley novels, and fixed it upon Sir Walter Scott. This conclusion was based on the resemblance of the novels in general style and method to the poems acknowledged by Scott. Scott thought at first that the letters were written by Reginald Heber, afterwards bishop of Calcutta, and the discovery of J. L. Adolphus's identity led to a warm friend- ship. Adolphus was called to the bar in 1822, and his Circuiteers, an Eclogue, is a parody of the style of two of his colleagues on the northern circuit. He became judge of the Marylebone County Court in 1852, and was a bencher of the Inner Temple. He was the author of Letters from Spain in 1856 and 18ˆ7 (1858), and was completing his father's History of England at the time of his death on the 24th of December 1862.

ADOLPHUS FREDERICK (1710-1771), king of Sweden, was born at Gottorp on the 14th of May 17 10. His father was Christian Augustus (1673-1726), duke of Schleswig-Holstein- Gottorp, bishop of Liibeck, and administrator, during the war of 1700-1721, of the duchies of Holstein- Gottorp for his nephew Charles Frederick; his mother was Albertina Frederica of Baden- Durlach. From 1727 to 1750 he was bishop of Liibeck, and administrator of Holstein-Kiel during the minority of Duke Charles Peter Ulrich, afterwards Peter III. of Russia. In 1743 he was elected heir to the throne of Sweden by the " Hat "

faction in order that they might obtain better conditions of peace from the empress Elizabeth, whose fondness for the house of Holstein was notorious (see Sweden, History). During his whole reign (1751-1771) Adolphus Frederick was little more than a state decoration, the real power being lodged in the hands of an omnipotent riksdag, distracted by fierce party

strife. Twice he endeavoured to free himself from the intoler- able tutelage of the estates. The first occasion was in 1755 when, stimulated by his imperious consort Louisa Ulrica, sister of Frederick the Great, he tried to regain a portion of the attenu- ated prerogative, and nearly lost his throne in consequence. On the second occasion, under the guidance of his eldest son, the crown prince Gustavus, afterwards Gustavus III., he suc- ceeded in overthrowing the tyrannous "Cap " senate, but was unable to make any use of his victory. He died of surfeit at Stockholm on the 12th of February 1771.

See R. Nisbet Bain, Gustavus III. and his Contemporaries, vol. i. (London, 1895). (R. N. B.)

ADONI, a town of British India, in the Bellary district of Madras, 307 m. from Madras by rail. It has manufactures of carpets, silk and cotton goods, and several factories for ginning and pressing cotton. The hill-fort above, now in ruins, was an important seat of government in Mahommedan times and is frequently mentioned in the wars of the 18th century. Pop.

(1901) 30,416.

ADONIJAH (Heb. Adoniyyah or Adoniyyahu, " Yah is Lord "), a name borne by several persons in the Old Testament, the most noteworthy of whom was the fourth son of David. He was born to Haggith at Hebron (2 Sam. iii. 4; 1 Ch. iii. 2). The natural heir to the throne, on the death of Absalom, he sought with the help of Joab and Abiathar to seize his birth- right, and made arrangements for his coronation (1 Kings i. 5 ff.). Hearing, however, that Solomon, with the help of Nathan the prophet and Bathsheba, and apparently with the consent of David, had ascended the throne, he fled for safety to the horns of the altar. Solomon spared him on this occasional Kings i. 50 ff.), but later commanded Benaiah to slay him (ii. 13 ff.), because with the approval of Bathsheba he wished to marry Abishag, formerly David's

concubine, and thus seemed to have designs on the throne.

ADONIS, in classical mythology, a youth of remarkable beauty, the favourite of Aphrodite. According to the story in Apollodorus (iii. 14. 4), he was the son of the Syrian king Theias by his daughter Smyrna (Myrrha), who had been inspired by Aphrodite with unnatural love. When Theias discovered the truth he would have slain his daughter, but the gods in pity changed her into a tree of the same name. After ten months the tree burst asunder and from it came forth Adonis. Aphro- dite, charmed by his beauty, hid the infant in a box and handed him over to the care of Persephone, who afterwards refused to give him up. On an appeal being made to Zeus, he decided that Adonis should spend a third of the year with Persephone and a third with Aphrodite, the remaining third being at his own dis- posal. Adonis was afterwards killed by a boar sent by Artemis. There are many variations in the later forms of the story (notably in Ovid, Metam. x. 298). The name is generally supposed to be of Phoenician origin (from adon— ” lord “) , Adonis himself being identified with Tammuz (but see F. Dummler in Pauly- Wissowa’s Real-encyklopadie, who does not admit a Semitic origin for either name or cult). The name Abobas, by which he was known at Perga in Pamphylia, certainly seems connected with abub (a Semitic word for “flute”; cf. ” ambubaiarum collegia ” in Horace, Satires, i. 2. 1). (See also Arris.)

Annual festivals, called Adonia, were held in his honour at Byblus, Alexandria, Athens and other places. Although there were variations in the ceremony itself and in its date, the central idea was the death and resurrection of Adonis. A vivid descrip- tion of the festival at Alexandria (for which Bion probably wrote his Dirge of Adonis) is given by Theocritus in his fifteenth idyll, the Adoniazusae. On the first day, which celebrated the union of Adonis and Aphrodite, their images were placed side by side on a silver couch, around them all the fruits of the season, ” Adonis gardens ” in silver baskets, golden boxes of myrrh, cakes of meal, honey and oil, made in the likeness of things that creep and things that fly. On the day following the image of Adonis was carried down to the shore and cast into the sea by women with dishevelled hair and bared breasts. At the same time a song was sung, in which the god was entreated to be

propitious in the coming year. This festival, like that at Athens, was held late in summer; at Byblus, where the mourning ceremony preceded, it took place in spring.

It is now generally agreed that Adonis is a vegetation spirit, whose death and return to life represent the decay of nature in winter and its

revival in spring. He is born from the myrrh- tree, the oil of which is used at his festival; he is connected with Aphrodite in her character of vegetation-goddess. A special feature of the Athenian festival was the "Adonis gar- dens," small pots of flowers forced to grow artificially, which rapidly faded (hence the expression was used to denote any transitory pleasure) . The dispute between Aphrodite and Perse- phone for the possession of Adonis, settled by the agreement that he is to spend a third (or half) of the year in the lower world (the seed at first underground and then reappearing above it), finds a parallel in the story of Tammuz and Ishtar (see Aphro- dite). The cere,mony of the Adonia was intended as a charm to promote the growth of vegetation, the throwing of the gardens and images into the water being supposed to procure a supply of rain (for European parallels see Mannhardt). It is suggested (Frazer) that Adonis is not a god of vegetation generally, but specially a corn-spirit, and that the lamentation is not for the decay of vegetation in winter, but for the cruel treatment of the corn by the reaper and miller (cf. Robert Burns's John Barleycorn).

An important element in the story is the connexion of Adonis with the boar, which (according to one version) brings him into the world by splitting with his tusk the bark of the tree into which Smyrna was changed, and finally kills him. It is probable that Adonis himself was looked upon as incarnate in the swine, so that the sacrifice to him by way of expiation on special occa- sions of an animal which otherwise was specially sacred, and its consumption by its worshippers, was a sacramental act. Other instances of a god being sacrificed to himself as his own enemy are the sacrifice of the goat and bull to Dionysus and of the bear to Artemis. The swine would be sacrificed as having caused the death of Adonis, which explains the dislike of Aphro- dite for that animal. It has been observed that whenever swine- sacrifices occur in the ritual of Aphrodite there is reference to Adonis. In any case, the conception of Adonis as a swine-god does not contradict the idea of him as a vegetation or corn spirit, which in many parts of Europe appears in the form of a boar or sow.

Authorities. — H. Brugsch, Die Adonisklage und das Linoslied (Berlin, 1852); Greve, De Adonide (Leipzig, 1877) ; W. H. Engel, Kypros, ii. (1841), still valuable; W. Mannhardt, Wald- und Feld- kulte, ii. (1905) ; M. P. Nilsson, Griechische Feste (Leipzig, 1906) ; articles in Roscher's Lexikon and Pauly-Wissowa's Encyklopadie; J. G. Frazer, The Golden Bough, ii. (2nd ed.), p. 1 15,' and Adonis, Attis and Osiris (1906) ; L. R. Farnell, Culls of the Greek Stales, ii. p. 646; W. Robertson Smith (Religion of the Semites, new ed., 1894, pp. 191, 290, 411), who, regarding Adonis as the swine-god, char- acterizes the Adonia as an annual piacular sacrifice (of swine), "in which the sacrifice has come

to be overshadowed by its popular and dramatic accompaniments, to which the Greek celebration, not forming part of the state religion, was limited.”

ADONIS, a genus of plants belonging to the natural order Ranunculaceae, known commonly by the names of pheasant's eye and Flos Adonis. They are annual or perennial herbs with much divided leaves and yellow or red flowers. Adonis autum- nalis has become naturalized in some parts of England; the petals are scarlet with a dark spot at the base. An early flowering species, Adonis vernalis, with large bright yellow flowers, is well worthy of cultivation. It prefers a deep light soil. The name is also given to the butterfly, Mazarine or Clifton Blue {Polyom- matus Adonis).

ADOPTIANISM. As the theological doctrine of the Logos which bulks so largely in the writings of the apologists of the 2nd century came to the front, the trinitarian problem became acute. The necessity of a constant protest against polytheism led to a tenacious insistence on the divine unity, and the task was to reconcile this unity with the deity of Jesus Christ. Some thinkers fell back on the " modalistic " solution which regards " Father " and " Son " as two aspects of the same subject;

but a simpler and more popular method was the " adoptianist " or humanitarian. Basing their views on the synoptic Gospels, and tracing descent from the obscure sect of the Alogi, the Adoptianists under Theodotus of Byzantium tried to found a school at Rome c. 185, asserting that Jesus was a man, filled with the Holy Spirit's inspiration from his baptism, and so attaining such a perfection of holiness that he was adopted by God and exalted to divine dignity. Theodotus was excommuni- cated by the bishop of Rome, Victor, c. 195, but his followers lived on under a younger teacher of the same name and under Artemon, while in the East similar views were expounded by Beryllus of Bostra and Paul of Samosata, who undoubtedly influenced Lucian of Antioch and his school, including Alius and, later, Nestorius.

There is thus a traceable historical connexion between the early adoptian controversy and the struggle in Spain at the end of the 8th century, to which that name is usually given. It was indeed only a renewal, under new conditions, of the conflict between two types of thought, the rational and the mystical, the school of Antioch and that of Alexandria. The writings of Theodore of Mopsuestia had become well known in the West, especially since the strife over the " three chapters " (544-533), and the opposition of Islam also partly

determined the form of men's views on the doctrine of Christ's person. We must further remember the dyophysitism which had been sanctioned at the council of Chalcedon. About 780 Elipandus (b. 718), archbishop of Toledo, revived and vehemently defended the expression Christus Filius Dei adoptivus, and was aided by his much more gifted friend Felix, bishop of Urgella. They held that the duality of natures implied a distinction between two modes of sonship in Christ — the natural or proper, and the adoptive. In support of their views they appealed to scripture and to the Western Fathers, who had used the term " adoption " as synonymous with " assumption " in the orthodox sense; and especially to Christ's fraternal relation to Christians — the brother of God's adopted sons. Christ, the firstborn among many brethren, had a natural birth at Bethlehem and also a spiritual birth begun at his baptism and consummated at his resurrection. Thus they did not teach a dual personality, nor the old Antiochene view that Christ's divine exaltation was due to his sinless virtue; they were less concerned with old disputes than with the problem as the Chalcedon decision had left it — the relation of Christ's one personality to his two natures.

Felix introduced adoptian views into that part of Spain which belonged to the Franks, and Charlemagne thought it necessary to assemble a synod at Regensburg (Ratisbon), in 792, before which the bishop was summoned to explain and justify the new doctrine. Instead of this he renounced it, and confirmed his renunciation by a solemn oath to Pope Adrian, to whom the synod sent him. The recantation was probably insincere, for on returning to his diocese he taught adoptianism as before. Another synod was held at Frankfort in 794, by which the new doctrine was again formally condemned, though neither Felix nor any of his followers appeared.

In this synod Alcuin of York took part. A friendly letter from Alcuin, and a controversial pamphlet, to which Felix re- plied, were followed by the sending of several commissions of clergy to Spain to endeavour to put down the heresy. Arch- bishop Leidrad (d. 816) of Lyons, being on one of these commis- sions, persuaded Felix to appear before a synod at Aix-la- Chapelle in 799. There, after six days' disputing with Alcuin, he again recanted his heresy. The rest of his life was spent urttier the supervision of the archbishop at Lyons, where he died in 816. Elipandus, secure in his see at Toledo, never swerved from the adoptian views, which, however, were almost univer- sally abandoned after the two leaders died.

In the scholastic discussions of the 12 th century the question came to the front again, for the doctrine as framed by Alcuin was not

universally accepted. Thus both Abelard and Peter Lombard, in the interest of the immutability of the divine substance (holding that God could not ” become ” anything),

gravitated towards a Nestorian position. The great opponent of their Christology, which was known as Nihilianism, was the German scholar Gerhoch, who, for his bold assertion of the perfect interpenetration of deity and humanity in Christ, was accused of Eutychianism. The proposition Deus non f actus est aliquid secundum quod est homo was condemned by a synod of Tours in 1163 and again by the Lateran synod of n 79, but Adoptianism continued all through the middle ages to be a source of theological dispute.

See A. Harnack, Hist, of Dogma, esp. vol. v. pp. 279-292 ; R. Ottley, The Doctrine of the Incarnation, vol. i. p. 228 ff., vol. ii. pp. 151-161 ; Herzog-Hauck, Realencyk., art. ” Adoptianismus.” (A. J. G.)

ADOPTION (Lat. adoptio, for adoptatio, from adoptare, to choose for oneself) , the act by which the relations of paternity and filiation are recognized as legally existing between persons not so related by nature. Cases of adoption were very frequent among the Greeks and Romans, and the custom was accordingly very strictly regulated in their laws. In Athens the power of adoption was allowed to all citizens who were of sound mind, and who possessed no male offspring of their own, and it could be exercised either during lifetime or by testament. The person adopted, who required to be himself a citizen, was enrolled in the family and demus of the adoptive father, whose name, however, he did not necessarily assume. In the interest of the next of kin, whose rights were affected by a case of adoption, it was provided that the registration should be attended with certain formalities, and that it should take place at a fixed time — the festival of the Thargelia. The rights and duties of adopted children were almost identical with those of natural offspring, and could not be renounced except in the case of one who had begotten children to take his place in the family of his adoptive father. Adopted into another family, children ceased to have any claim of kindred or inheritance through their natural father, though any rights they might have through their mother were not similarly affected. Among the Romans the existence of the patria potestas gave a peculiar significance to the custom of adoption. The motive to the act was not so generally childlessness, or the gratification of affection, as the desire to acquire those civil and agnate rights which were founded on the patria potestas. It was necessary, however, that the adopter should have no children of his own, and that he should be of such an age as to preclude reasonable expectation of any being born to him. Another

limitation as to age was imposed by the maxim adoptio imitatur naturam, which required the adoptive father to be at least eighteen years older than the adopted children. According to the same maxim eunuchs were not permitted to adopt, as being impotent to beget children for themselves. Adoption was of two kinds according to the state of the person adopted, who might be either still under the patria potestas ialieni juris), or his own master {sui juris). In the former case the act was one of adoption proper, in the latter case it was styled adrogation, though the term adoption was also used in a general sense to describe both species. In adoption proper the natural father publicly sold his child to the adoptive father, and the sale being thrice repeated, the maxim of the Twelve Tables took effect, Si pater filium ter venunduit, filius a patre liber esto. The process was ratified and completed by a fictitious action of recovery brought by the adoptive father against the natural parent, which the latter did not defend, and which was therefore known as the cessio in jure. Adrogation could be accomplished originally only by the authority of the people assembled in the Comitia, but from the time of Diocletian it was effected by an imperial rescript. Females could not be adrogated, and, as they did not possess the patria potestas, they could not exercise the right of adoption in either kind. The whole Roman law on the subject of adoption will be found in Justinian's Institutes, lib. i. tit. 11.

In Hindu law, as in nearly every ancient system, wills were formerly unknown, and adoptions took their place. (See Indian Law.) Adoption is not recognized in the laws of Eng- land, Scotland or the Netherlands, though there are legal means by which one may be enabled to assumethe name and arms aˆid to inherit the property of a stranger. (See Name.)

In France and Germany, countries which may be said to have embodied the Roman law in their jurisprudence, adoption is re- gulated according to the principles of Justinian, though with several more or less important modifications, rendered necessary by the usages of these countries respectively. Under French law the rights of adoption can be exercised only by those who are over fifty years of age, and who, at the time of adoption, have neither children nor legitimate descendants. They must also be fifteen years older than the person adopted. In German law the person adopting must either be fifty years of age, or at least eighteen years older than the adopted, unless a special dispen- sation is obtained. If the person adopted is a

legitimate child the consent of his parents must be obtained; if illegitimate, the consent of the mother. Both in Germany and France the adopted child remains a member of his original family, and acquires no rights in the family of the adopter other than that of succession to the person adopting.

In the United States adoption is regulated by the statutes of the several states. Adoption of minors is permitted by statute in many of the states. These statutes generally require some public notice to be given of the intention to adopt, and an order of approval after a hearing before some public authority. The consequence commonly is that the person adopted becomes, in the eyes of the law, the child of the person adopting, for all pur- poses. Such an adoption, if consummated according to the law of the domicile, is equally effectual in any other state into which the parties may remove. The relative status thus newly ac- quired is ubiquitous. (See Whitmore, Laws of Adoption; Ross v. Ross, 129 Massachusetts Reports, 243.)

The part played by the legal fiction of adoption in the consti- tution of primitive society and the civilization of the race is so important, that Sir Henry S. Maine, in his Ancient Law, ex- presses the opinion that, had it never existed, the primitive groups of mankind could not have coalesced except on terms of absolute superiority on the one side and absolute subjection on the other. With the institution of adoption, however, one people might feign itself as descended from the same stock as the people to whose sacra gentilicia it was admitted; and amicable relations were thus established between stocks which, but for this ex- pedient, must have submitted to the arbitrament of the sword with all its consequences.

ADORATION (Lat. ad, to, and os, mouth; i.e. ” carrying to one’s mouth “), primarily an act of homage or worship, which, among the Romans, was performed by raising the hand to the mouth, kissing it and then waving it in the direction of the adored object. The devotee had his head covered, and after the act turned himself round from left to right. Sometimes he kissed the feet or knees of the images of the gods themselves, and Saturn and Hercules were adored with the head bare. By a natural transition the homage, at first paid to divine beings alone, came to be paid to monarchs. Thus the Greek and Roman emperors were adored by bowing or kneeling, laying hold of the imperial robe, and presently withdrawing the hand and pressing it to the lips, or by putting the royal robe itself to the lips. In Eastern countries adoration has ever been performed in an attitude still more lowly. The Persian method, introduced by Cyrus, was to bend the knee and fall on the face at the prince’s feet, striking the earth with the

forehead and kissing the ground. This striking of the earth with the forehead, usually a fixed number of times, is the form of adoration usually paid to Eastern potentates to-day. The Jews kissed in homage. Thus in 1 Kings xix. 18, God is made to say, ” Yet I have left me seven thousand in Israel, all the knees which have not bowed unto Baal, and every mouth which hath not kissed him.” And in Psalms ii. 12, ” Kiss the Son, lest he be angry, and ye perish from the way.” (See also Hosea xiii. 2.) In England the ceremony of kissing the sovereign’s hand, and some other acts which are performed kneeling, may be described as forms of adoration. Adoration is applied in the Roman Church to the ceremony of kissing the pope’s foot, a custom which is said to have been intro- duced by the popes following the example of the emperor Diocletian. The toe of the famous statue of the apostle in

St Peter’s, Rome, shows marked wear caused by the kisses of pilgrims. In the Roman Church a distinction is made between Latria, a worship due to God alone, and Dulia or Hyperdulia, the adoration paid to the Virgin, saints, martyrs, crucifixes, &c. (See further Homage.)

ADORF, a town of Germany, in the kingdom of Saxony, 3 m. from the Bohemian frontier, at an elevation of 1400 ft. above the sea, on the Plauen-Eger and Aue-Adorf lines of rail- way. Pop. 5000. It has lace, dyeing and tanning industries, and manufactures of toys and musical instruments; and there is a convalescent home for the poor of the city of Leipzig.

ADOUR (anc. Aturrus or Adurus, from Celtic dour, water), a river of south-west France, rising in the department of Hautes Pyrenees, and flowing in a wide curve to the Bay of Biscay. It is formed of several streams having their origin in the massifs of the Pic d’Arbizon and the Pic du Midi de Bigorre, but during the first half of its course remains an inconsiderable river. In traversing the beautiful valley of Campan it is artificially aug- mented in summer by the waters of the Lac Bleu, which are drawn off by means of a siphon, and flow down the valley of Lesponne. After passing Bagneres de Bigorre the Adour enters the plain of Tarbes, and for the remainder of its course in the department of Hautes Pyrenees is of much less importance as a waterway than as a means of feeding the numerous irrigation canals which cover the plains on each side. Of these the oldest and most important is the Canal d’Alaric, which follows the right bank for 36 m. Entering the department of Gers, the Adour receives the Arros on the right bank and begins to de. scribe .the large westward curve which takes it through the department of Landes to the sea. In the last-named depart- ment it soon becomes navigable, namely, at St Sever, after pass- ing which it is joined on the left by the Larcis, Gabas, Louts and

Luy, and on the right by the Midouze, which is formed by the union of the Douze and the Midour, and is navigable for 27 m. ; now taking a south-westerly course it receives on the left the Gave de Pau, which is a more voluminous river than the Adour itself, and flowing past Bayonne enters the sea through a dangerous estuary, in which sandbars are formed, after a total course of 208 m., of which 82 are navigable. The mouth of the Adour has repeatedly shifted, its old bed being represented by the series of Hangs and lagoons extending northward as far' as the village of Vieux Boucau, 225 m. north of Bayonne, where it found a new entrance into the sea at the end of the 14th cen- tury. Its previous mouth had been 10 m. south of Vieux Boucau. The present channel was constructed by the engineer Louis de Foix in 1579. There is a depth over the bar at the entrance of io| to 16 ft. at high tide. The area of the basin of the Adour is 6565 sq. m.

ADOWA (properly Adua), the capital of Tigre, northern Abyssinia, 145 m. N.E. of Gondar and 17 m. E. by N. of Axum, the ancient capital of Abyssinia. Adowa is built on the slope of a hill at an elevation of 6500 ft., in the midst of a rich agri- cultural district. Being on the high road from Massawa to central Abyssinia, it is a meeting-place of merchants from Arabia and the Sudan for the exchange of foreign merchandise with the products of the country. During the wars between the Italians and Abyssinia (1887-96) Adowa was on three or four occasions looted and burnt; but the churches escaped destruction. The church of the Holy Trinity, one of the largest in Abyssinia, contains numerous wall-paintings of native art. On a hill about 25 m. north-west of Adowa are the ruins of Fremona, the headquarters of the Portuguese Jesuits who lived in Abys- sinia during the 16th and r7th centuries. On the 1st of March 1896, in the hills north of the town, was fought the battle of Adowa, in which the Abyssinians inflicted a crushing defeat on the Italian forces (see Italy, History, and Abyssinia, History).

ADRA (anc. Abdera), a seaport of southern Spain, in the province of Almeria; at the mouth of the Rio Grande de Adra, and on the Mediterranean Sea. Pop. (1900) 11,188. Adra is the port of shipment for the lead obtained near Berja, 10 m; north-east; but its commercial development is retarded by the lack of a railway. Besides lead, the. exports include grapes,

sugar and esparto. Fuel is imported, chiefly from the United Kingdom.

ADRAR (Berber for “uplands”), the name of various dis- tricts of the Saharan desert, Northern Africa. Adrar Suttuf is a hilly region forming the southern part of the Spanish pro- tectorate of the Rio de Oro (q.v.). Adrar or Adrar el Jebli, otherwise Adghagh, is a plateau north-east of Timbuktu. It is the headquarters of the Awellimiden Tuareg (see Tuareg and Sahara). Adrar n’Ahnet and Adrar Adhafar are smaller regions in the Ahnet country south of Insalah. Adrar Temur, the country usually referred to when Adrar is spoken of, is in the western Sahara, 300 m. north of the Senegal and separated on the north-west from Adrar Suttuf by wide valleys and sand dunes. Adrar is within the French sphere of influence. In general barren, the country contains several oases, with a total popu- lation of about 10,000. In 1900 the oasis of Atar, on the western borders of the territory, was reached by Paul Blanchet, previ- ously known for his researches on ancient Berber remains in Algeria. (Blanchet died in Senegal on the 6th of October 1900, a few days after his return from Adrar.) Atar is inhabited by Arab and Berber tribes, and is described as a wretched spot. The other centres of population are Shingeti, Wadan and Ujeft, Shingeti being the chief commercial centre, whence caravans take to St Louis gold-dust, ostrich feathers and dates. A con- siderable trade is, also done in salt from the sebkha of Ijil, in the north-west. Adrar occupies the most elevated part of a plateau which ends westwards in a steep escarpment and falls to the east in a succession of steps.

Adrar or Adgar is also the name sometimes given to the chief settlement in the oasis of Tuat in the Algerian Sahara.

ADRASTUS, in Greek legend, was the son of Talaus, king of Argos, and Lysianassa, daughter of Polybus, king of Sicyon. Having been driven from Argos by Amphiaraus, Adrastus fled to Sicyon, where he became king on the death of Polybus. After a time he became reconciled to Amphiaraus, gave him his sister Eriphyle in marriage, and returned to Argos and occupied the throne. In consequence of an oracle which had commanded him to marry his daughters to a lion and a boar, he wedded them to Polyneices and Tydeus, two fugitives, clad in the skins of these animals or carrying shields with their figures on them, who claimed his hospitality. He was the instigator of the famous war against Thebes for the restoration of his son-in-law Polyneices, who had been deprived of his rights by his brother Eteocles. Adrastus, followed by Polyneices and Tydeus, his two sons-in- law, Amphiaraus, his brother-in-law, Capaneus, Hippomedon and Parthenopaeus, marched against the city of Thebes, and on his way is said to have founded the Nemean games. This is the expedition of the ” Seven against Thebes,” which the poets have made nearly as famous as the siege of Troy. As Amphiaraus had foretold, they all lost their lives in

this war except Adrastus, who was saved by the speed of his horse Arion (Iliad, xxiii. 346). Ten years later, at the instigation of Adrastus, the war was re- newed by the sons of the chiefs who had fallen. This expedition was called the war of the ” Epigoni ” or descendants, and ended in the taking and destruction of Thebes. None of the followers of Adrastus perished except his son Aegialeus, and this affected him so greatly that he died of grief at Megara, as he was leading back his victorious army.

Apollodorus iii. 6, 7; Aeschylus, Septem contra Thebas; Euripides, Phoenissae, Supplices ; Statius, Thebais ; Herodotus v. 67.

ADRIA (anc. Atria; the form Adria or Hadria is less correct: Hatria was a town in Picenum, the modern Atri), a town and episcopal see of Venetia, Italy, in the province of Rovigo, 15 m. E. by rail from the town of Rovigo. It is situated between the mouths of the Adige and the Po, about 135 m. from the sea and but 13 ft. above it. Pop. (1901) 15,678. The town occu- pies the site of the ancient Atria, which gave its name to the Adriatic. Its origin is variously ascribed by ancient writers, but it was probably a Venetian, i.e. Illyrian, not an Etruscan, foundation — still less a foundation of Dionysius I. of Syracuse. Imported vases of the second half of the 5th century B.C. prove the existence of trade with Greece at that period; and the town

was famous in Aristotle’s day for a special breed of fowls. Even at that period, however, the silt brought down by the rivers rendered access to the harbour difficult, and the historian Philistus excavated a canal to give free access to the sea. This was still open in the imperial period, and the town, which was a municipium, possessed its own gild of sailors; but its import- ance gradually decreased. Its remains lie from 10 to 20 ft. below the modern level. The Museo Civico and the Bocchi collection contain antiquities.

See R. Schone, Le antichitd del Museo Bocchi di Adria (Rome, 1878). (T. As.)

ADRIAN, or Hadrian (Lat. Hadrianus), the name of six popes.

Adrian I., pope from 772 to 795, was the son of Theodore, a Roman nobleman. Soon after his accession the territory that had been bestowed on the popes by Pippin was invaded by Desiderius, king of the Lombards, and Adrian found it necessary to invoke the aid of Charlemagne, who entered Italy with a large army, besieged Desiderius in his capital of Pavia, took that town, banished the Lombard king to Corbie in France and united the Lombard kingdom

with the other Frankish possessions. The pope, whose expectations had been aroused, had to content himself with some additions to the duchy of Rome, and to the Exarchate, and the Pentapolis. In his contest with the Greek empire and the Lombard princes of Benevento, Adrian remained faithful to the Frankish alliance, and the friendly relations between pope and emperor were not disturbed by the difference which arose between them on the question of the worship of images, to which Charlemagne and the Gallican Church were strongly opposed, while Adrian favoured the views of the Eastern Church, and approved the decree of the council of Nicaea (787), confirming the practice and excommunicating the iconoclasts. It was in connexion with this controversy that Charlemagne wrote the so-called Libri Carolini, to which Adrian replied by letter, anathematizing all who refused to worship the images of Christ, or the Virgin, or saints. Notwith- standing this, a synod, held at Frankfort in 794, anew condemned the practice, and the dispute remained unsettled at Adrian's death. An epitaph written by Charlemagne in verse, in which he styles Adrian " father," is still to be seen at the door of the Vatican basilica. Adrian restored the ancient aqueducts of Rome, and governed his little state with a firm and skilful hand.

Adrian II., pope from 867 to 872, was a member of a noble Roman family, and became pope in 867, at an advanced age. He maintained, but with less energy, the attitude of his prede- cessor. Rid of the affair of Lothair, king of Lorraine, by the death of that prince (869), he endeavoured in vain to mediate between the Frankish princes with a view to assuring to the emperor, Louis II., the heritage of the king of Lorraine. Photius, shortly after the council in which he had pronounced sentence of deposition against Pope Nicholas, was driven from the patri- archate by a new emperor, Basil the Macedonian, who favoured his rival Ignatius. An oecumenical council (called by the Latins the 8th) was convoked at Constantinople to decide this matter. At this council Adrian was represented by legates, who presided at the condemnation of Photius, but did not suc- ceed in coming to an understanding with Ignatius on the subject of the jurisdiction over the Bulgarian converts. Like his prede- cessor Nicholas, Adrian II. was forced to submit, at least in temporal affairs, to the tutelage of the emperor, Louis II., who placed him under the surveillance of Arsenius, bishop of Orta, his confidential adviser, and Arsenius's son Anastasius, the librarian. Adrian had married in his youth, and his wife and daughter were still living. They were carried off and assassin- ated by Anastasius's brother, Eleutherius, whose reputation, however, suffered but a momentary eclipse. Adrian died in

872.

Adrian III., pope, was born at Rome. He succeeded Martin II. in 884, and died in 885, on a journey to Worms. (L. D.*)

Adrian IV. (Nicholas Breakspear), pope from n 54 to 1159, the only Englishman who has occupied the papal chair, was born before a.d. 1 100 at Langley near St Albans in Hertford- shire. His father was Robert, a priest of the diocese of Bath,

who entered a monastery and left the boy to his own resources. Nicholas went to Paris and finally became a monk of the cloister of St Rufus near Aries. He rose to be prior and in 1137 was unanimously elected abbot. His reforming zeal led to the lodging of complaints against him at Rome; but these merely attracted to him the favourable attention of Eugenius III., who created him cardinal bishop of Albano. From 1152 to 1 1 54 Nicholas was in Scandinavia as legate, organizing the affairs of the new Norwegian archbishopric of Trondhjem, and making arrangements which resulted in the recognition of Upsala as seat of the Swedish metropolitan in 1164. As a compensation for territory thus withdrawn the Danish archbishop of Lund was made legate and perpetual vicar and given the title of primate of Denmark and Sweden. On his return Nicholas was received with great honour by Anastasius IV., and on the death of the latter was elected pope on the 4th of December 11 54. He at once endeavoured to compass the overthrow of Arnold of Brescia, the leader of anti-papal sentiment in Rome. Disorders ending with the murder of a cardinal led Adrian shortly before Palm Sunday 1155 to take the previously-unheard-of step of putting Rome under the interdict. The senate thereupon exiled Arnold, and the pope, with the impolitic co-operation of Frederick I. Barbarossa, was instrumental in procuring his execution. Adrian crowned the emperor at St Peter's on the 18th of June 1155, a ceremony whjch so incensed the Romans that the pope had to leave the city promptly, not returning till November 11 56. With the aid of dissatisfied barons, Adrian brought William I. of Sicily into dire straits ; but a change in the fortunes of war led to a settlement (June 11 56) not advantageous to the papacy and displeasing to the emperor. At the diet of Besancon in October 11 57, the legates presented to Barbarossa a letter from Adrian which alluded to the beneficia conferred upon the em- peror, and the German chancellor translated this beneficia in the feudal sense. In the storm which ensued the legates were glad to escape with their lives, and the incident at length closed with a letter from the pope,

declaring that by beneficium he meant merely bonum factum. The breach subsequently became wider, and Adrian was about to excommunicate the emperor when he died at Anagnia on the 1st of September 11 59.

A controversy exists concerning an embassy sent by Henry II. of England to Adrian in 1155. According to the elaborate investigation of Thatcher, the facts seem to be as follows. Henry asked for permission to invade and subjugate Ireland, in order to gain absolute ownership of that isle. Unwilling to grant a request counter to the papal claim (based on the forged Dona- tion of Constantine) to dominion over the islands of the sea, Adrian made Henry a conciliatory proposal, namely, that the king should become hereditary feudal possessor of Ireland while recognizing the pope as overlord. This compromise did not satisfy Henry, so the matter dropped; Henry's subsequent title to Ireland rested on conquest, not on papal concession, and was therefore absolute. The much-discussed bull Lauda- biliter is, however, not genuine.

See Herzog-Hauck, Realencyklopadie, 3rd ed. (excellent bibliography), and Wetzer and Welte, Kirchenlexikon, 2nd ed., under " Hadrian IV."; also Oliver J. Thatcher, Studies concerning Adrian IV. (The University of Chicago: Decennial Publications, 1st series, vol. iv., Chicago, 1903); R. Raby, Pope Adrian IV.; An historical Sketch (London, 1849) ; and A. H.Tarleton, Life of Nicholas Breckspear (London, 1 896).

Adrian V. (Ottobuono de' Fieschi), pope in 1276, was a Genoese who was created cardinal deacon by his uncle Innocent

IV. In 1264 he was sent to England to mediate between Henry III. and his barons. He was elected pope to succeed Innocent

V. on the nth of July 1276, but. died at Viterbo on the 18th of August, without having been ordained even to the priesthood.

Adrian VI. (Adrian Dedel, not Boyens, probably not Roden- burgh, 1459-1523), pope from 1522 to 1523, was born at Utrecht in March 1459, and studied under the Brethren of the Common Life either at Zwolle or Deventer. At Louvain he pursued philosophy, theology and canon law, becoming a doctor of theo- logy (1491), dean of St Peter's and vice-chancellor of the uni- versity. In 1 507 he was appointed tutor to the seven-year-old

Charles V. He was sent to Spain in 151500 a very important

diplomatic errand ; Charles secured his succession to the see of Tortosa, and on the 14th of November 15 16 commissioned him inquisitor-general of Aragon. During the minority of Charles, Adrian was associated with Cardinal Jimenes in governing Spain. After the death of the latter Adrian was appointed, on the 14th of March 1518, general of the reunited inquisitions of Castile and Aragon, in which capacity he acted till his departure from Tarragona for Rome on the 4th of August 1522 : he was, however, too weak and confiding to cope with abuses which Jimenes had been able in some degree to check. When Charles left for the Netherlands in 1520 he made Adrian regent of Spain : as such he had to cope with a very serious revolt. In 151 7 Leo X. had created him cardinal priest 55. loannis et Pauli; on the 9th of January 1522 he was almost unanimously elected pope. Crowned in St Peter's on the 31st of August at the age of sixty-three, he entered upon the lonely path of the reformer. His programme was to attack notorious abuses one by one ; but in his attempt to improve the system of granting indulgences he was hampered by his cardinals ; and reducing the number of matrimonial dispensations was impossible, for the income had been farmed out for years in advance by Leo X. The Italians saw in him a pedantic foreign professor, blind to the beauty of classical antiquity, penuriously docking the stipends of great artists. As a peacemaker among Christian princes, whom he hoped to unite in a protective war against the Turk, he was a failure: in August 1523 he was forced openly to ally himself with the Empire, England, Venice, &c, against France; mean- while in 1522 the sultan Suleiman I. had conquered Rhodes. In dealing with the early stages of the Protestant revolt in Germany Adrian did not fully recognize the gravity of the situation. At the diet which opened in December 1522 at Nuremberg he was represented by Chieregati, whose instructions contain the frank admission that the whole disorder of the church had perchance proceeded from the Curia itself, and that there the reform should begin. However, the former professor and inquisitor-general was stoutly opposed to doctrinal changes, and demanded that Luther be punished for heresy. The statement in one of his works that the pope could err in matters of faith (" haeresim per suam determinationem aut Decrelalem asserendo ") has attracted attention ; but as it is a private opinion, not an ex cathedra- pronouncement, it is held not to prejudice the dogma of papal infallibility. On the 14th of September 1523 he died, after a pontificate too short to be effective.

Most of Adrian VI. 's official papers disappeared soon after his death. He published Quaestiones in quarlum sententiarum praesertim circa sacramenta (Paris, 1512, 1516, 1518, 1537; Rome, 1522), and Quaes- tiones quodlibeticae XII. (1st ed., Louvain, 1515). See L. Pastor, in

Geschichte der Papste, vol. iv. pt. ii.; Adrian VI. und Klemens VII. (Freiburg, 1907) ; also Wetzer and Welte, Kirchenlexikon, 2nd ed., and Herzog-Hauck, Realencyklopadie, 3rd ed., under ” Hadrian VI.”; H. Hurter, Nomenclalor lilerarius recentioris theologiae catholicae, torn. iv. (Innsbruck, 1899), 1027; The Cambridge Modern History, vol. ii. (1904), 19-21 ; H. C. Lea, A History of the Inquisition of Spain, vol. i. (1906) ; Janus, The Pope and the Council, 2nd ed. (London, 1869), 376. Biographies :— A. Lepitre, Adrien VI. (Paris, 1880); C. A. C. von Hofler, Papst Adrian VI. (Vienna, 1880); L. Casartelli, ” The Dutch Pope,” in Miscellaneous Essays (London, 1906). (W. W. R.*)

ADRIAN, SAINT, one of the praetorian guards of the emperor Galerius Maximian, who, becoming a convert to Christianity, was martyred at Nicomedia on the 4th of March 303. It is said that while presiding over the torture of a band of Christians he was so amazed at their courage that he publicly confessed his faith. He was imprisoned, and the next day his limbs were struck off on an anvil, and he was then beheaded, dying in his wife’s, St Natalia’s, arms. St Adrian’s festival, with that of his wife, is kept on the 8th of September. He is specially a patron of soldiers, and is much reverenced in Flanders, Germany and the north of France. He is usually represented armed, with an anvil in his hands or at his feet. •

ADRIAN, a city and the county-seaX of Lenawee county, Michigan, U.S.A., on the S. branch of Raisin river; near the S.E. corner of the state. Pop.(i89o) 8756 ; (1900) 9654, of whom

1136 were foreign-born: (iqio census) 10,763. It is served by five branches of the Lake Shore railway system, and by the Wabash, the Toledo and Western, and the Toledo, Detroit and Ironton railways. Adrian is the seat of Adrian College (1859; co-educational), controlled by the Wesleyan Methodist Church in 1850-1867 and since 1867 by the Methodist Protestant Church, and having departments of literature, theology, music, fine arts, commerce and pedagogy, and a preparatory school; and of St Joseph’s Academy (Roman Catholic) for girls; and 1 m. north of the city is the State Industrial Home for Girls (1879), for the reformation of juvenile offenders between the ages of ten and seventeen. Adrian has a public library. The city is situated in a rich farming region; is an important shipping point for live- stock, grain and other farm products; and is especially known as a centre for the manufacture of wire-fences. Among the other manufactories are

flouring and grist mills, planing mills, foun- dries, and factories for making agricultural implements, United States mail boxes, furniture, pianos, organs, automobiles, toys and electrical supplies. The value of the city's factory products increased from $2,124,923 in 1900 to $4,897,426 in 1904, or 130-3%; of the total value in 1904, $2,849,648 was the value of wire-work. The place was laid out as a town in 1828, and according to tradition was named in honour of the Roman emperor Hadrian. It was incorporated as a village in 1836, was made the county -seat in 1838 and was chartered as a city in

1853.

ADRIANI, GIOVANNI BATTISTA (1513-1579), Italian his- torian, was born of a patrician family of Florence, and was secretary to the republic of Florence. He was among the de- fenders of the city during the siege of 1530, but subsequently joined the Medici party and was appointed professor of rhetoric at the university. At the instance of Cosimo I. he wrote a history of his own times, from 1536 to 1574, in Italian, which is generally, but according to Brunet erroneously, considered a continuation of Guicciardini. De Thou acknowledges himself greatly indebted to this history, praising it especially for its accuracy. Adriani composed funeral orations in Latin on the emperor Charles V. and other noble personages, and was the author of a long letter on ancient painters and sculptors prefixed to the third volume of Vasari. His Istoria dei suoi tempi was published in Florence in 1583; a new edition appeared also in Florence in 1872.

SeeG. M. Mazzucchelli, Gli Scrittori a" Italia, i. p. 151 (Brescia,

1753).

ADRIANOPLE, a vilayet of European Turkey, corresponding with part of the ancient Thrace, and bounded on the N. by Bulgaria (Eastern Rumelia), E. by the Black Sea and the vilayet of Constantinople, S. by the Sea of Marmora and the Aegean Sea and W. by Macedonia. Pop. (1905) about 1,000,000; area, 15,000 sq. m. The surface of the vilayet is generally mountain- ous, except in the central valley of the Maritza, and along the banks of its tributaries, the Tunja, Arda, Ergene, &c. On the west, the great Rhodope range and its outlying ridges extend as far as the Maritza, and attain an altitude of more than 7000 ft. in the summits of the Kushlar Dagh, Karluk Dagh and Kara- Balkan. Towards the Black Sea, the less elevated Istranja Dagh stretches from north-west to south-east; and the entire south coast, which includes the promontory of Gallipoli and the western shore of the Dardanelles, is everywhere hilly or mountainous, except near the estuaries of the

Maritza, and of the Mesta, a western frontier stream. The climate is mild and the soil fertile; but political disturbances and the conservative character of the people tend to thwart the progress of agriculture and other industries. The vilayet suffered severely during the Russian occupation of 1878, when, apart from the natural dislocation of commerce, many of the Moslem culti- vators emigrated to Asia Minor, to be free from their alien rulers. Through the resultant scarcity of labour, much land fell out of cultivation. This was partially remedied after the Bulgarian annexation of Eastern Rumelia, in 1885, had driven •the Moslems of that country to emigrate in like manner to Adrianople; but the advantage was counterbalanced by the establishment of hostile Bulgarian tariffs. The important silk

industry, however, began to revive about 1890, and dairy farm- ing is prosperous; but the condition of the vilayet is far less unsettled than that of Macedonia, owing partly to the prepon- derance of Moslems among the peasantry, and partly to the nearness of Constantinople, with its Western influences. The main railway from Belgrade to Constantinople skirts the Maritza and Ergene valleys, and there is an important branch line down the Maritza valley to D6deagatch, and thence coastwise to Salonica. After the city of Adrianople (pop. 1905, about 80,000), which is the capital, the principal towns are Rodosto (35,000), Gallipoli (25,000), Kirk-Kilisseh (16,000), Xanthi (14,000), Chorlu (11,500), Demotica (10,000), Enos (8000), Gumuljina (8000) and D6deagatch (3000).

ADRIANOPLE (anc. Hadrianopolis; Turk. Edirne, or Edreneh; Slav. Odrin), the capital of the vilayet of Adrianople, Turkey in Europe; 137 m. by rail W.N.W. of Constantinople. Pop. (1905) about 80,000, of whom half are Turks, and half Jews, Greeks, Bulgars, Armenians, &c. Adrianople ranks, after Con- stantinople and Salonica, third in size and importance among the cities of European Turkey. It is the see of a Greek arch- bishop, and of one Armenian and two Bulgarian bishops. It is the chief fortress near the Bulgarian frontier, being defended by a ring of powerful modern forts. It occupies both banks of the river Tunja,. at its confluence with the Maritza, which is navigable to this point in spring and winter. The nearest sea- port by rail is Dedeagatch, west of the Maritza; Enos, at the river-mouth, is the nearest by water. Adrianople is on the rail- way from Belgrade and Sofia to Constantinople and Salonica. In appearance it is thoroughly Oriental — a mass of mean, ir- regular wooden buildings, threaded by narrow tortuous streets, with a few better buildings. Of these the most important are the Idadieh school, the school of arts and crafts, the Jewish communal school; the Greek college, Zappeion; the Imperial Ottoman Bank and Tobacco Regie; a fire-tower; a theatre; palaces for

the prefect of the city, the administrative staff of the second army corps and the defence works commission; a hand- some row of barracks; a military hospital; and a French hospital. Of earlier buildings, the most distinguished are the Eski Serai, an ancient and half-ruined palace of the sultans; the bazaar of Ali Pasha; and the 16th-century mosque of the sultan Selim II., a magnificent specimen of Turkish architecture.

Adrianople has five suburbs, of which Kiretchhan6 and Yilderim are on the left bank of the Maritza, and Kirjik stands on a hill overlooking the city. The two last named are exclu- sively Greek, but a large proportion of the inhabitants of Kiretch- hane are Bulgarian. These three suburbs — as well as the little hamlet of Demirtash, containing about 300 houses all occupied by Bulgars— are all built in the native fashion; but thej fifth suburb, Karagatch, which is on the right bank of the Maritza, and occupies the region between the railway station and the city, is Western in its design, consisting of detached residences in gardens, many of the:ii handsome villas, and all of modern European type. In all the communities schools have multiplied, but the new seminaries are of the old non-progressive type. The only exception is the Hamidieh school for boys — a govern-r ment institution which takes both boarders and day-scholars. Like the Lyceum of Galata Serai in Constantinople, it has two sets of professors, Turkish and French, and a full course of education in each language, the pupils following both courses. The several communities have each their own charitable institu- tions, the Jews being sneciallv well endowed in this respect. The Greeks have a literary society, and there is a well-organized club to which members of all the native communities, as well .as many foreigners, belong.

The economic condition of Adrianople was much impaired by the war of 1877-78, and was just showing signs of recovery when, in 1885, the severance from it of Eastern Rumelia by a Customs cordon rendered the situation worse than ever. Adrian- ople had previously been the commercial headquarters of all Thrace, and of a large portion of the region between the Balkans and the Danube, now Bulgaria. But the separation of Eastern Rumelia isolated Adrianople, and transferred to Philippopolis at

least two-thirds of its foreign trade which, as regards sea-borne merchandise, is carried on through the port of Burgas (q.v.). The city

manufactures silk, leather, tapestry, woollens, linen and cotton, and has an active general trade. Besides fruits and agricultural produce, its exports include raw silk, cotton, opium, rose-water, attar of roses, wax and the dye known as Turkey red. The surrounding country is extremely fertile, and its wines are the best produced in Turkey. The city is supplied with fresh water by means of an aqueduct carried by arches over an extensive valley. There is also a fine stone bridge over the Tunja.

Adrianople was originally known as Uskadama, Uskudama or Uskodama, but was renamed and enlarged by the Roman emperor Hadrian (117-138). In 378 the Romans were here defeated by the Goths. Adrianople was the residence of the Turkish sultans from 1361, when it was captured by Murad I., until 1453, when Constantinople fell. It was occupied by the Russians in 1829 and 1878 (see Russo-Turkish Wars).

ADRIATIC SEA (ancient Adria or Hadria), an arm of the Mediterranean Sea separating Italy from the Austro-Hungarian, Montenegrin and Albanian littorals, and the system of the Apennine mountains from that of the Dinaric Alps and adjacent ranges. The name, derived from the town of' Adria, belonged originally only to the upper portion of the sea (Herodotus vi. 127, vii. 20, ix. 92; Euripides, Hippolytus, 736), but was gradually extended as the Syracusan colonies gained in import- ance. But even then the Adriatic in the narrower sense only extended as far as the Mons Garganus, the outer portion being called the Ionian Sea: the name was sometimes, however, inaccurately used to include the Gulf of Tarentum, the Sea of Sicily, the Gulf of Corinth and even the sea between Crete and Malta (Acts xxvii. 27). The Adriatic extends N.W. from 40 to 45 45′ N., with an extreme length of nearly 500 m., and a mean breadth of about no m., but the Strait of Otranto, through which it connects at the south with the Ionian Sea, is only 45 m. wide. Moreover, the chain of islands which fringes the northern part of the eastern shore reduces the extreme breadth of open sea in this part to 90 m. The Italian shore is generally low, merging, in the north-west, into the marshes and lagoons on either hand of the protruding delta of the river Po, the sediment of which has pushed forward the coast-line for several miles within historic times. On islands within one of the lagoons opening from the Gulf of Venice, the city of that name has its unique situation. The east coast is generally bold and rocky. South of the Istrian peninsula, which separates the Gulfs of Venice and Trieste from the Strait of Quarnero, the island-fringe of the east coast extends as far south as Ragusa. The islands, which are long and narrow (the long axis lying. parallel with the coast of the mainland), rise rather

abruptly to elevations of a few hundred feet, while on the mainland, notably in the magnifi- cent inlet of the Bocche di Cattaro, lofty mountains often fall directly to the sea. This coast, though beautiful, is somewhat sombre, the prevalent colour of the rocks, a light, dead grey, contrasting harshly with the dark vegetation, which on some of the islands is luxuriant. The north part of the sea is very shallow, and between the southern promontory of Istria and Rimini the depth rarely exceeds 25 fathoms. Between Sebenico and Ortona a well-marked depression occurs, a considerable area of which exceeds 100 fathoms in depth. From a point be- tween Curzola and the north shore of the spur of Monte Gargano there is a ridge giving shallower water, and a broken chain of a few islets extends across the sea. The deepest part of the sea lies east of Monte Gargano, south of Ragusa, and west of Dur- azzo, where a large basin gives depths of 500 fathoms and upwards, and a small area in the south of this basin falls below 800. The mean depth of the sea is estimated at 133 fathoms. The bora (north-east wind) , and the prevalence of sudden squalls from this quarter or the south-east, are dangers to navigation in winter. Tidal movement is slight. (See also Mediterranean.) For the ” Marriage of the Adriatic,” or more properly “of the sea,” a ceremony formerly performed by the doges of Venice, see the article Bucentaur.

ADSCRIPT (from Lat. ad, on or to, and scribere, to write), something written after, as opposed to ” subscript,” which means written under. A labourer was called an ” adscript of the soil ” {adscriptus glebae) when he could be sold or transferred with it, as in feudal days, and as in Russia until 1861. Carlyle speaks of the Java blacks as a kind of adscripts.

ADULLAM, a Canaanitish town in the territory of the tribe of Judah, perhaps the modern “Ald-el-Ma, 7 m. N.E. of Beit-Jibrin. It was in the stronghold (” cave ” is a scribal error) of this town that David took refuge on two occasions (1 Sam. xxii. 1; 2 Sam. v. 17). The tradition that Adullam is in the great cave of Khareitun (St Chariton) is probably due to the crusaders. From the description of Adullam as the resort of ” every one that was in distress,” or ” in debt,” or ” discontented,” it has often been humorously alluded to, notably by Sir Walter Scott, who puts the expression into the mouth of the Baron of Brad- wardine in Waverley, chap, lvii., and also of Balfour of Burley in Old Mortality. In modern political history the expression ” cave of Adullam” (hence ” Adullamites “) came into common use (being first employed in a speech by John Bright on the 13th of March 1866) with regard to the independent attitude of Robert Lowe (Lord Sherbrooke), Edward Horsman and their Liberal supporters in opposition to the Reform Bill of 1866. But others had previously used it in a similar

connexion, e.g. President Lincoln in his second electoral campaign (1864), and the Tories in allusion to the Whig remnant who joined C. J. Fox in his temporary secession. From the same usage is derived the shorter political term ” cave ” for any body of men who secede from their party on some special subject.

ADULTERATION (from Lat. adulter are, to defile or falsify), the act of debasing a commercial commodity with the object of passing it off as or under the name of a pure or genuine commodity for illegitimate profit, or the substitution of an inferior article for a superior one, to the detriment of the purchaser. Although the term is mainly used in connexion with the falsification of articles of food, drink or drugs, and is so dealt with in this article, the practice of adulteration extends to almost all manufactured products and even to unmanufactured natural substances, and (as was once suggested by John Bright) is an almost inseparable — though none the less reprehensible — phase of keen trade competition. In its crudest forms as old as commerce itself, it has progressed with the growth of knowledge and of science, and is, in its most modern developments, almost a branch — and that’ not the least vigorous one — of applied science. From the mere concealment of a piece of metal or a stone in a loaf of bread or in a lump of butter, a bullet in a musk bag or in a piece of opium, it has developed into the use of aniline dyes, of anti- septic chemicals, of synthetic sweetening agents in foods, the manufacture of butter from cocoa-nuts, of lard from cotton-seed and of pepper from olive stones. Its growth and development has necessitated the employment of multitudes of scientific officers charged with its detection and the passing of numerous laws for its repression and punishment. While for all common forms of fraud the common law is in most cases considered strong enough, special laws against the adulteration of food have been found necessary in all civilized countries. A vigorous branch of chemical literature deals with it; there exist scientific societies specially devoted to its study; laboratories are main- tained by governments with staffs of highly trained chemists for its detection; and yet it not only develops and flourishes, but becomes more general, if less virulent and dangerous to health.

There are numerous references to adulteration in the classics. The detection of the base metal by Archimedes in Hiero’s crown, by the light specific gravity of the latter, is a well-known in- stance. Vitruvius speaks of the adulteration of minium with lime, Dioscorides of that of opium with other plant juices and with gum, Pliny of that of flour with white clay. Both in Rome and in Athens wine was often adulterated with colours and flavouring agents, and inspectors “were charged with looking after it.

In England, so far back as the reign of John (1203), a pro- I clamation was made throughout the kingdom, enforcing the

legal obligations of assize as regards bread; and in the following reign the statute (51 Hen. III. Stat. 6) entitled ” the pillory and tumbrel ” was framed for the express purpose of protecting the public from the dishonest dealings of bakers, vintners, brewers, butchers and others. This statute is the first in which the adul- teration of human food is specially noticed and prohibited; it seems to have been enforced with more or less rigour until the time of Anne, when it was repealed (1709). According to the Liber Albus it was strictly observed in the days of Edward I., for it states that: ” If any default shall be found in the bread of a baker in the city, the first time, let him be drawn upon a hurdle from the Guildhall to his own house through the great street where there be most people assembled, and through the great streets which are most dirty, with the faulty loaf hanging from his neck; if a second time he shall be found committing the same offence, let him be drawn from the Guildhall through the great street of Cheepe in the manner aforesaid to the pillory, and let him be put upon the pillory, and remain there at least one hour in the day; and the third time that such default shall be found, he shall be drawn, and the oven shall be pulled down, and the baker made to foreswear the trade in the city for ever.” The assize of 1634 provides that ” if there be any manner of person or persons, which shall by any false wayes or meanes, sell any meale under the kinge’s subjects, either by mixing it deceitfully or sell any musty or corrupted meal, which may be to the hurte and infection of man’s body, or use any false weight, or any de- ceitful wayes or meanes, and so deceive the subject, for the first offence he shall be grievously punished, the second he shall loose his meale, for the third offence he shall suffer the judg- ment of the pillory and the fourth time he shall foreswere the town wherein he dwelleth.” Vintners, spicers, grocers, butchers, regrators and others were subject to the like punishment for dishonesty in their commercial dealings — it being thought that the pillory, by appealing to the sense of shame, was far more deterrent of such crimes than fine or imprisonment. In the reign of Edward the Confessor a knavish brewer of the city of Chester was taken round the town in the cart in which the refuse of the privies had been collected. Ale-tasters had to look after the ale and test it by spilling some on to a wooden seat, sitting on the wet place in their leathern breeches, the stickiness of the ” resi- due obtained by evaporation ” affording the evidence of purity or otherwise. If sugar

had been added the taster adhered to the bench ; pure malt beer was not considered to yield an adhesive extract. In 1553, the lord mayor of London ordered a jury of five or six vintners to rack and draw off the suspected wine of another vintner, and to ascertain what drugs or ingredients they found in the said wine or cask to sophisticate the same. At another time eight pipes of wine were ordered to be destroyed because, on racking off, bundles of weeds, pieces of sulphur match, and ” a kind of gravel mixture sticking to the casks ” had been found.

Similar records have come down from the continental European countries. In 1390 an Augsburg wine-seller was sentenced to be led out of the city with his hands bound and a rope round his neck; in 1400 two others were branded and otherwise severely punished; in 1435 ” were the taverner Christian Corper and his wife put in a cask in which he sold false wine, and then ex- posed in the pillory. The punishment was adjudged because they had roasted pears and put them into new sour wine, in order to sweeten the wine. Some pears were hung round their necks like unto a Paternoster.” In Biebrich on the Rhine, in 1482, a wine-falsifier was condemned to drink six quarts of his own wine; from this he died. In Frankfurt, casks in which false wine had been found were placed with a red flag on the knacker’s cart, ” the jailer marched before, the rabble after, and when they came to the river they broke the casks and tumbled the stuff into the stream.” In France successive ordonnances from 1330 to 1672 forbade the mixing of two wines together under the penalty of a fine and the confiscation of the wine.

Modern British Legislation. — In modern times the English parliament has dealt frequently with the subject of food adul- teration. In 1725 it was provided that ” no dealer in tea or

manufacturer or dyer thereof, or pretending so to be, shall counterfeit or adulterate tea, or cause or procure the same to be counterfeited or adulterated, or shall alter, fabricate or manu- facture tea with terra-japonica, or with any drug or drugs what- soever; nor shall mix or cause or procure to be mixed with tea any leaves other than the leaves of tea or other ingredients whatsoever, on pain of forfeiting and losing the tea so counter- feited, adulterated, altered, fabricated, manufactured or mixed, and any other thing or things whatsoever added thereto, or mixed or used therewith, and also the sum of £100.” Six years afterwards, in 1 730-1 731, a further act was passed prescribing a penalty for ” sophisticating ” tea; it recites that several ill-dis- posed persons do frequently dye, fabricate or manufacture very great quantities of sloe leaves, liquorice leaves, and the leaves of tea

that have been before used, or the leaves of other trees, shrubs or plants in imitation of tea, and do likewise mix, colour, stain and dye such leaves and likewise tea with terra-japonica, sugar, molasses, clay, logwood, and with other ingredients, and do sell and vend the same as true and real tea, to the prejudice of the health of his majesty's subjects, the diminution of the revenue and to the ruin of the fair trader. This act provides that for every pound of adulterated tea found in possession of any person, a sum of £10 shall be forfeited. It was followed by one passed in 17667-1767, which increased the penalty to imprison- ment for not less than six nor more than twelve months. As regards coffee, an act of 17 18 recited that "divers evil-disposed persons have at the time or soon after the roasting of coffee made use of water, grease, butter or such-like materials, where- by the same is rendered unwholesome and greatly increased in weight," and a penalty of £20 is enacted. In 1803 an act refers to the addition of burnt, scorched or roasted peas, beans or other grains or vegetable substances prepared in imitation of coffee or cocoa, to coffee or cocoa, and fixes the penalty far the offence at £100, but subsequently permission was given to coffee or cocoa dealers also to deal in scorched or roasted corn, peas, beans or parsnips whole and not ground, crushed or powdered, under certain excise restrictions. An act passed in 1816 relating to beer and porter provides that no brewer of or dealer in or retailer of beer " shall receive or have in his possession, or make or mix with any worts or beer, any liquor, extract or other pre- paration for the purpose of darkening the colour of worts or beer, other than brown malt, ground or unground, or shall have in his possession or use, or mix with any worts or beer any molasses, honey, liquorice, vitriol, quassia, coculus-indiae, grains of paradise, guinea-pepper or opium, or any extracts of these, or any articles or preparation whatsoever for or as a substitute for malt or hops." Any person contravening was liable to a penalty of £200, and any druggist selling to any brewer or retail dealer any colouring or malt substitute was to be fined £500. It was only in 1847 that brewers were allowed to make for their own use, from sugar, a liquor for darkening the colour of worts or beer and to use it in brewing.

All the laws hitherto referred to were mainly passed in the interest of the inland revenue, and their execution was left entirely in the hands of the revenue officers. It was but natural that they should look primarily after the dutiable articles and not after those that brought no revenue to the state. About the middle of the 19th century many articles, however, paid import duty; butter, for instance, paid 5s. per hundredweight; cheese from is. 6d. to 2s. 6d.; flour or meal of all kinds, 4ˆd.; ginger, 10s. ; isinglass, 5s. ; and so on. Sensational and

doubtless largely exaggerated statements were from time to time published concerning the food supply of the nation. F. C. Accum (1769- 1838) by his Treatise on Adulterations of Food and Culinary Poisons (1820), and particularly an anonymous writer of a book entitled Deadly Adulteration and Slow Poisoning unmasked, or Disease and Death in the Pot and the Bottle, in which the blood-empoisoning and life-destroying adulterations of wines, spirits, beer, bread, flour, tea, sugar, spices ,■ cheesemongery, pastry, con-fectionery, medicines, dfc. &°c, are laid open to the public (1830), roused the public attention. In 1850 a physician, Dr. Arthui H. Hassall, had the happy idea of looking at ground coffet

through the microscope. Eminent chemists had previously found great difficulty in establishing any satisfactory chemical distinction between coffee, chicory and other adulterants of coffee; the microscope immediately showed the structural difference of the particles, however small. The results of Hassall's examinations were embodied in a paper which was read before the Botanical Society of London and was reported in The Times, 1850. A paper on the microscopic examination of sugar, showing the presence in that article of innumerable living mites, followed and attracted much attention. Hassall was in consequence commissioned by Thomas Wakley (1705-1862), the owner of the Lancet, to extend his examination to other articles of food, and for a period of nearly four years reports of the Lancet Analytical Sanitary Commission were regularly pub- lished, the names and addresses of hundreds of manufacturers and tradesmen selling adulterated articles being fearlessly given. The responsibility incurred was immense, but the assertions of the journal were so well founded upon fact that they were universally accepted as accurately representing the appalling state of the food supply. As instances may be cited, that of thirty-four samples of coffee only three were pure, chicory being present in thirty-one, roasted corn in twelve, beans and potato- flour each in one; of thirty-four samples of. chicory, fourteen were adulterated with corn, beans or acorns; of forty-nine samples of bread, every one contained alum; of fifty-six samples of cocoa, only eight were pure; of twenty-six milks, fourteen were adulterated; of twenty-eight cayenne peppers, only four were genuine, thirteen containing red-lead and one vermilion; of upwards of one hundred samples of coloured sugar-confec- tionery, fifty-nine contained chromate of lead, eleven gamboge, twelve red-lead, six vermilion, nine arsenite of copper and four white-lead.

In consequence of the Lancet's disclosures a parliamentary committee was appointed in 1855, the labours of which resulted in

i860 in the Adulteration of FoodandDrink Act, the first i860. act tnat dealt generally with the adulteration of food.

The first section of this enacted " that every person who shall sell any article of food or drink with which, to the knowledge of such person, any ingredient or material injurious to the health of persons eating or drinking such article has been mixed, and every person who shall sell as pure or unadul- terated any article of food or drink which is adulterated and not pure, shall for every such offence, on summary conviction, pay a penalty not exceeding £5 with costs." In the case of a second offence the name, place of abode and offence might be published in the newspapers at the offender's expense. As the act, however, left it optional to the district authorities to appoint analysts or not, and did not provide for the appointment of any officer upon whom should rest the duty of obtaining samples or of prosecuting offenders, it virtually remained a dead letter till

1872, when the Adulteration of Food and Drugs Act

came into force, prescribing a penalty not exceeding £50 for the sale of injurious food and, for a second offence, im- prisonment for six months with hard labour. Inspectors were empowered to make purchases of samples to be submitted for analysis, but appointment of analysts was still left optional. The definition of an adulterated article given in that act was essentially that still accepted at the present time, namely, " any article of food or drink or any drug mixed with any other sub- stances, with intent fraudulently to increase its weight or bulk, without declaration of such admixture to any purchaser thereof before delivering the same." The adoption of the act was sporadic, and, outside London and a few large towns, the number of proceedings against offenders remained exceedingly small. Nevertheless complaints soon arose that it inflicted considerable injury and imposed heavy and undeserved penalties upon some respectable tradesmen, mainly owing to the " want of a clear understanding of what does and does not constitute adultera- tion," and in some cases to conflicting decisions and the inex- perience of analysts.

Again a parliamentary committee was appointed which took a mass of evidence, the outcome of its inquiries being the Sale

1872.

of Food and Drugs Act 1875, which is in force at the present day, subject to amendments and additions made at /g -_

later dates. This act avoided the term “adulteration” altogether and endeavoured to give a clearer description of punishable offences: —

Section 6. ” No person shall sell to the purchaser any article of food or any drug which is not of the nature, substance and quality of the article demanded by the purchaser under a penalty not exceeding £20; provided that an offence shall not be deemed to be committed under this section in the following cases: (1) where any matter or ingredient not injurious to health has been added to the food or drug because the same is required for the production or preparation thereof as an article of commerce,’ in a state fit for carriage or consumption, and not fraudulently to increase the bulk, weight or measure of the food or drug, or conceal the inferior quality thereof; (2) where the food or drug is a proprietary medicine, or is the subject of a patent in force and is supplied in the state required by the specification of the patent; (3) where the food or drug is compounded as in the act mentioned; (4) where the food or drug is unavoidably mixed with some extraneous matter in the process of collection or preparation.”

Section 8. ” No person shall be guilty of any such offence as aforesaid in respect to the sale of an article of food or a drug mixed with any matter or ingredient not injurious to health, and not intended fraudulently to increase its bulk, weight or measure, or conceal its inferior quality, if at the time of delivering such article or drug he shall supply to the person receiving the same a notice, by a label distinctly and legibly written or printed on or with the article or drug, to the effect that the same is mixed.”

The act made the appointment of analysts compulsory upon the city of London, the vestries, county quarter sessions and town councils or boroughs having a separate police establish- ment. For the protection of the vendor, samples that had been purchased by the inspectors for analysis were to be offered to be divided into three parts, one to be submitted to the analyst, the second to be given to the vendor to be dealt with by him as he might deem fit, and the third to be retained by the inspector, and, at the discretion of the magistrate hearing any summons, to be submitted, in case of dispute, to the commissioners of inland revenue for analysis by the chemical laboratory at Somerset House. The public analyst had to give a certificate, couched in a prescribed form, to the person submitting any sample for analysis, which certificate was to be taken as evidence of the facts therein stated, in order to render the proceedings as inexpensive as

practicable. If the defendant in any prosecu- tion could prove to the satisfaction of the court that he had purchased the article under a warranty of genuineness, and that he sold it in the same state as when he purchased it, he was to be discharged from the prosecution, but no provision was made that in that event the giver of the warranty should be proceeded against.

Section 6, quoted above, gave rise to an immense amount of litigation, and already in 1879 it was found necessary to pass an amending act, making it clear that if a purchase was effected by an inspector with the intent to get the purchased article analysed, he was as much ” prejudiced ” if obtaining a sophisticated article as a private purchaser who purchased for his own use and consumption. The amending act also dealt in some small measure with a difficulty which immedi- ately after passing the act was found to arise in ascertaining whether any article was ” of the nature, substance and quality demanded by the purchaser ” — ” in determining whether an offence has been committed under section 6 by selling spirits not adulterated otherwise than by the admixture of water, it shall be a good defence to prove that such admixture has not reduced the spirit more than twenty-five degrees under proof for brandy, whisky or rum, or thirty-five under proof for gin.” Almost insuperable difficulties as to the meaning of ” nature, substance and quality ” subsequently arose as regards every conceivable food material. As it was obviously impossible for parliament

to define every article, to lay down limits of composition within which it might vary, to specify the substances or ingredients that might enter into it, to limit the proportions of the unavoid- able impurities that might be contained in it, the duty to do all this was left to the individual analysts. An enormous number of substances had to be analysed until sufficient evidence had been accumulated for the giving of correct opinions or certifi- cates. Endless disputes unavoidably arose, friction with manu- facturers and traders, unfortunately also with the referees at the inland revenue, who for many years were altogether out of touch with the analysts. Conflicting decisions come to by various benches of magistrates upon similar cases, allowing of the legal sale of an article in one district which in another had been declared illegal, rendered the position of merchants often

unsatisfactory. It was not recognized by parliament until almost a quarter of a century had elapsed that it was not enough to compel local authorities to get samples analysed, but that it was also the duty of parliament to lay down specific and clear instructions that might enable the officers to do their work. This has only been very partially done even at the present time.

A curious condition of things arose out of the definition of ” food ” given in the act of 1875: ” The term food shall include Dtttkai- every article used for food or drink by man, other than ties of drugs or water.” It had been the practice of bakers aiminis- t0 ac j (j alum to the flour from which bread was manufactured, in order to whiten the bread, and to permit the use of damaged and discoloured flour. This practice had been strongly condemned by chemists and physicians, because it rendered the bread indigestible and injurious to health. Shortly after the passing of the Food Act this objec- tionable practice was stamped out by numerous prosecutions, and alumed bread now no longer occurs. A large trade, however, continued to be carried on in baking powders consisting of alum and sodium bicarbonate. It was naturally thought that, as baking powder is sold with the obvious intention that it may enter into food, the vendors could also be proceeded against. The high court, however, held that, baking powder in itself not being an article of food, its sale could not be an offence under the Food Act. This anomaly was removed by a later act:

Under section 6 of the act of 1875 a defendant could be con- victed, even if he had no guilty knowledge of the fact that the article he had sold was adulterated. In the repealed Adultera- tion Act of 1872 the words ” to the knowledge of ” were inserted, and they were found fatal to obtaining convictions. The general rule of the law is that the master is not criminally responsible for the acts of his servants if they are done without his know- ledge or authority, but under the Food Act It was held (Brown v. Fool, 1892, 66 L.T. 649) that a master was liable for the watering of milk by one of his servants, although he had pub- lished a warning to them that they would be dismissed if found doing so. Milk might be adulterated during transit on the rail- say without the knowledge of the owner or receiver, and yet the vendor was liable to conviction.

When it is brought to the knowledge of a purchaser that the article sold to him is not of the nature, substance or quality he demanded, the sale is not to the prejudice of the purchaser. The notice may be given verbally or by a label supplied with the article. A common law notice may also be given. In Sandys v. Small, 1878, 3 Q.B.D. 449, a publican had displayed a placard within the inn to the effect that the

spirits sold in his establishment were watered. This was held, as it were, to con- tract him out of the Food Act. Similarly, in the case of butters that had been adulterated with milk, the vendors, by giving a general notice in the shop, evaded punishment under the act. A notice, is, however, of no avail if given under section 8 of the act, if the admixture has been made for fraudulent purposes. In Liddiart v. Reece, 44 J. P. 233, 1880, an inspector asked for coffee and received a packet with a label describing it as a mixture of coffee and chicory. It was sold at the price of coffee. It turned out to be a mixture containing 40% of chicory. The high court held that this was an excessive quan-

tity, and was added for the purpose of fraudulently increasing the bulk or weight. In another case, however (Otter v. Edgley, J 893, 57 J-P-457), where an inspector had asked for French coffee and had been supplied with a mixture containing 60% of chicory, the article being labelled as a mixture, the high court held that there was no evidence of fraud, and, in the case of cocoa, a mixture containing as little as 30% of cocoa and 70% of starch and sugar, the label stating it to be a mixture, was held to have been legally sold (Jones v. Jones, 1894, 58 J. P. 653). In this case the label notifying the admixture was hidden by a sheet of opaque white paper, nor had the purchaser's attention been called to it, but the price of the article was much lower than that of pure cocoa.

It is seen from these few instances, taken at random out of scores, that this clause of the act was far from clear and was very variously interpreted at the courts. The warranty clause (clause 25) also gave rise to an immense amount of litigation. In the earlier high court decisions a very narrow interpretation was given to the term " written warranty," but in later years a wider view prevailed. A general contract to supply a pure article is not a sufficient warranty unless with every delivery there is something to identify the delivery as part of the contract. An invoice containing merely a description of an article as " lard " or " pepper " is not a warranty; but if there be added the words " guaranteed pure " it is a sufficient warranty. A label upon an article is not in itself a warranty, but a label bear- ing the words " pure " or " unadulterated," coupled with an invoice which could be identified with the label, together were held to form an effective warranty.

As many thousands of samples were annually submitted by inspectors under the act to the analysts who had been appointed in 237 boroughs and districts, a very large number of cases led to disputes of law or fact, about seventy high court cases being decided within eighteen

years of the passing of the act. While these cases related to a variety of different articles and conditions, dairy produce, namely milk and butter, led to the greatest amount of litigation. It may seem to be a simple matter to ascertain whether a vendor of milk supplies his customer with milk of the ” nature, substance and quality demanded,” but milk is subject to great variations in composition owing to a large number of circumstances which will be considered below.

Not many years after the passing of the Food Act of 1875 the sale of butter substitutes assumed very large proportions, and so seriously prejudiced dairy-farmers that, as regards these, an act was passed which was not exactly an amendment of the Sale of Food and Drugs Act, although it embodied a good many provisions of that act. It was called the Margarine Act 1887. It provided that every package of articles made in imitation of butter should be labelled “margarine” A ˆf arae in letters 15 inches square. The vendor, however, was protected if he could show a warranty or invoice, whereas in the Sale of Food and Drugs Act he was not protected by invoice merely. Inspectors might take samples of ” any butter or substitute purporting to be butter ” without going through the form of purchase. The maximum penalty was raised from £20 as provided by the Food Act, to £50 in the case of a first and to £100 in the case of repeated conviction. The Margarine Act is the first statute that makes reference to and sanctions the use of preservatives, concerning which a good deal will have to be said farther on.

In the course of twenty years of administration of the Food Acts so many difficulties had arisen in reference to the various points referred to, that in 1894 a select committee was appointed to inquire into the working of the various comm a. acts and to report whether any, and if so what, amend- tee, 1894. ments were desirable. During three sessions the com- mittee sat and took voluminous evidence. They reported that where the acts had been well administered they had been most beneficial in diminishing adulteration offences. Forms of adulteration which were common prior to the passing of ‘the 1875 act, such as the introduction of alum into bread and the colouring of confectionery with poisonous material, had almost

entirely disappeared. A close connexion had been shown to exist between the extent of adulteration and the number of articles submitted for analysis under the acts, the proportion of adulterated

samples being found to diminish as the number of samples taken relatively to the population increased. Thus, in 1890, in Somersetshire one sample had been analysed for every 379 persons, the percentage of adulterated samples in those taken for analysis being as low as 3-6; in Gloucestershire one to 770 persons with 6-2 of adulteration; in Bedfordshire one to 821 with 7-1; in Derbyshire one to 3164 with 17-1 %, and in Oxford one sample to 14,963 inhabitants with no less than 41-7 % of adulterated samples. The number of samples of articles annually submitted to analysis, according to the returns obtained by the Local Government Board, steadily increased from the com- mencement onward. Whereas in 1877, 14,706 samples, and in 1883, 19,648 samples were analysed, in 1904-1905 the number was no less than 84,678, or an average of one sample to 384 inhabitants for the whole country. In, the five years 1877-1881 the pro- portion found adulterated was 16-2 %; in the following five years ending with 1886, the percentage was 13-9; in the five years ending 1891, the percentage was 11-7; and in the year 1904 the percentage was only 8-5. The select committee found that wide local differences in the administration of the acts •existed, and that in many parts of the country the local authorities had failed to exercise their powers. In one metropolitan district, eight members of the local authority had been convicted of offences under the acts, upon evidence obtained by their own inspector. The result was that the duties of the inspector of the acts were afterwards controlled by a committee of that local authority, who decided the cases in which prosecutions should be undertaken, and the administration of the acts was ” little better than a farce.” No power existed to compel local au- thorities to carry out the acts. The committee came to the con- clusion that in many cases the responsibility for the adulteration of articles of food did not rest with the retailer but with the whole- sale dealer or manufacturer; that the law punished petty offences and left great ones untouched; that it fined a small retailer and left the wholesale offender scot free. As regards warranty, they thought that the precedent created by the Margarine Act should be followed generally, and that invoices and equivalent docu- ments should have the force of warranties. They found that a considerable proportion of the food imports were adulterated, out of 890 samples of butter taken by the customs in 1895 no less than 106 being impure, and they recommended that in ad- dition to tea, which by section 30 of the act of 1875 was to be systematically analysed by the customs, prior to being passed for distribution, samples of all food imports should be taken and examined by the customs. The committee further found that the penalties imposed under the acts had for the most part been trifling and quite insufficient to serve as deterrents, the profits derived from

the sale of adulterated articles being out of pro- portion great to the insignificant fines imposed, and they recom- mended that for the second offence the penalty of £5 should be the minimum one, and that in respect to third or subsequent offences imprisonment without the option of a fine might be in- flicted. The important question of food standards was considered at great length. The absence of legal standards or definitions of articles of food had occasioned great difficulty in numerous cases, but as no authority was provided by the existing acts that might fix such standards, they recommended the formation of a scientific authority or court of reference composed of repre- sentatives of the laboratory of the Inland Revenue, of the Local Government Board, the Board of Agriculture, the General Medical Council, the Institute of Chemistry, the Pharmaceutical Society, of other scientific men and of the trading and manu- facturing community, who should have the duty of fixing stand- ards of quality and purity of food to be confirmed by a secretary of state.

The committee's deliberations and recommendations resulted in the Sale of Food and Drugs Act 1899. This unfortunately was not a comprehensive act superseding the previous acts, but was an additional and amending one, so that at the present time

four food acts run parallel and are together in force, rendering the subject from a legal point of view one of extreme complexity. In this act the growing influence of the Board of Agri- culture and the desire to assist farmers and dairymen /S99 ° more decisively than previously are clearly apparent. Section 1 empowers the customs to take samples of consignments of imported articles of food and enjoins them to communicate to the Board of Agriculture the names of the importers of adulter- ated goods, any article of food to be considered adulterated or impoverished if it has been mixed with any other substance (other than preservative or colouring matter, of such a nature and such a quantity as not to render the article injurious to health), or if any part of it has been abstracted to the detriment of the article. Margarine or cheese containing margarine has to be conspicuously marked as such; condensed, separated or skim milk has to be clearly labelled " machine-skimmed milk " or " skimmed milk," as the case may be. The next sections give to the Local Government Board and the Board of Agriculture a roving commission to see that the acts are properly enforced throughout the kingdom so as to apply the acts more equally throughout the country than heretofore, and in default of local authorities carrying out their duties empower the government departments mentioned to execute and enforce the acts at the expense of the local authorities. The importance of a regular and conscientious control of the public food supply by the local authorities was thus for

the first time, after forty years of ex- perimental legislation, fully acknowledged. In recognition of the great difficulties experienced for many years by analysts in their endeavour to fix minimum percentages for the fat and other milk constituents, and their inability to do so without statutory powers, the Board of Agriculture is authorized by section 4 to make regulations ” for determining what deficiency in any of the normal constituents of genuine milk, cream, butter or cheese, or what addition of extraneous matter or proportion of water ” in any of these materials shall raise a presump- tion, until the contrary is proved, that these articles are not genuine. In pursuance of these powers the Board of Agricul- ture did in 1901 issue their milk regulations, adopting officially the minima agreed upon by public analysts, and in 1902 the sale of butter regulations, which fixed 16 % as the maximum of water that might be contained in butter. It is important to note that the fact of a sample of milk falling short of the standard is not conclusive evidence of adulteration, but it justifies the institution of proceedings and casts the onus of proving that the sample is genuine upon the defendant. The Margarine Act of 1887 was extended to margarine cheese, the obligatory labelling of margarine packages was more precisely regulated, margarine manufacturers and dealers in that article were com- pelled to keep a register open to inspection by the Board of Agriculture, showing the quantity and designation of each con- signment, and power was given to officers of the board to enter at all reasonable times manufactories of margarine and margarine cheese. The amount of butter-fat that might be present in margarine was limited to 10 %, while under the Margarine Act of 1887 an unlimited admixture might have been made, provided that the mixture, no matter how large the percentage of butter, was sold as margarine. As is further explained’below, the difficulty of distinguishing without chemical aid between pure butter and margarine containing a considerable percentage of butter is very great, and fraudulent sales continued to be common after the passing of the Margarine Act. The labelling section of the Food Act 1875 (§ 8), which had been systematic- ally circumvented, was modified, a label beirig no longer recog- nized as distinctly and legibly written or printed, unless it is so written or printed that the notice of mixture given by the label is not obscured by other matter on the label, though labels that had been continuously in use for at least seven years before the commencement of the act were not interfered with. In conse- quence of the admitted unfairness of. asking for a portion of the contents of a properly labelled tin or package and then instituting proceedings because no declaration of admixture had been made, it was enacted that no person shall be required to sell any

article exposed for sale in an unopened tin or packet, except in the unopened tin or packet in which it is contained. This re- moved a grievance which had long been felt both by retailers and manufacturers, and is a provision of growing importance with the continually increasing sale of articles put up in factories. The warranty provisions, which, as before stated, had given rise to much litigation, were more clearly defined. A notice that a defendant would rely for his defence upon a warranty had to be given within seven days of the service of the summons or the defence would not be available, and the warrantor was em- powered to appear at the hearing and to give evidence so that no man's name could, as sometimes previously happened, be dragged into a case without due notice to him. A warranty or invoice given by a person resident outside the United Kingdom was no longer recognized as a defence, unless the defendant could prove that he had taken reasonable steps to ascertain and did in fact believe in the accuracy of the statement con- tained in the warranty. This prevented collusion between a foreign shipper and an importer; and, lastly, the definition of " food " was widened (in view of the baking-powder decision) so that the term food " shall include every article used for food or drink by man, other than drugs or water, and any article which ordinarily enters into or is used in the composition or preparation of human food, and shall also include flavoring matters and condiments."

The act of 1ˆ899 embodies, with one exception, the most important recommendations of the Food Products Committee, the exception being the omission of instituting a board of refer- ence that might deal with difficulties as they arose, guide analysts and public authorities in fixing limits for articles other than milk and butter, and take up the important questions of preservatives and colouring matters and such like. An occurrence which almost immediately followed the passing of the act showed in the strongest manner the necessity of such guiding board — namely, the outbreak of arsenical poisoning in the Midlands in the latter part of 1900.

In the month of June 1900 there occurred, mainly in the Midlands but also in other parts of England and Wales, an out- break of an illness variously described as "alcoholism," to foods. " peripheral neuritis " or "multiple neuritis." This affected about 6000 persons and resulted in about 70 deaths. It was soon ascertained that the sufferers were all beer drinkers, and several of them were employees of a local brewery,

the majority of whom had suffered jfor some months past. Although suspicion fell early upon beer, some considerable time elapsed before Dr E. S. Reynolds of Manchester discovered arsenic in dangerous proportions in the beer. Steps were im- mediately taken by brewers and sanitary authorities to ensure that this arsenical beer was withdrawn from sale, and, as a result, the epidemic came speedily to an end. In all instances where this epidemic of sickness had been traced to particular breweries, the latter had been users of brewing sugars — glucose and invert sugar — supplied by a single firm. The quantity of arsenic detected in specimens of these brewing sugars was in some cases very large, amounting to upward of four grains per pound. The implicated brewing sugars were found to have become contaminated by arsenic in course of their manufacture through the use of sulphuric acid, some specimens of which contained as much as 2-6% of arsenic. The acid had been made from highly arsenical iron pyrites, and as the manufac- turers of the glucose had not specifically contracted with the acid makers for pure acid, the latter, not knowing for what purpose the acid was to be used, had felt themselves justified in supplying impure acid. A royal commission was appointed in February 1901, with Lord Kelvin as chairman, to inquire into the matter, and an enormous amount of attention was naturally given to it by chemists and medical men. It was soon found that arsenic was very widely disseminated in two classes of food materials, namely, such as had been dried or roasted in gases resulting from the combustion of coal, and such as had been more or less chemically manufactured. All coal contains iron pyrites, and this mineral again is contaminated with arsenic.

When the coal is burned the fumes are arsenical and part of the arsenic condenses and deposits. Malt dried in English malt kilns was found to be almost invariably arsenical, and there cannot be a doubt that English beers had for many years past been thus contaminated. At the present time coal virtually free from arsenic is selected for malting, or Newlands' process, consisting of the admixture with coal of lime which renders the arsenic non-volatile, is adopted, and malt free from all but the merest traces of arsenic is manufactured. Part of the arsenic remains in the coal-ashes and wherever these deposit arsenic can be traced. Sir Edward Frankland had, many years previously, detected arsenic in the London atmosphere. Chicory roasted with coal, steaks and chops grilled over an open fire, thus obtain a minute arsenical dosing. In sugar refineries carbonic acid gas is, at one stage of the process, passed through the liquor for the purpose of precipitating lime or strontia. When this carbonic acid is derived from coal the sugar often shows traces of arsenic. When

arsenical malt or sugar infusion is fermented, as in brewing, the yeast precipitates upon itself a considerable proportion of the impurity, thus partly cleaning the beer, but all preparations made from yeast — yeast-extracts resemble to some extent meat extracts, with which they are some- times fraudulently mixed — are thus exposed to arsenical con- tamination. On the continent of Europe malt is not dried in kilns with direct access of combustion gases but on floors heated from beneath, and continental beers therefore have not been found arsenical. The second class of causes of contamination consists of chemicals. The most important chemical product is sulphuric acid. This used to be made from brimstone or native volcanic sulphur, which is virtually free from arsenic. But since about i860 sulphuric acid has been more largely made from iron or copper pyrites. Pyrites-acid is always arsenical, but can, by suitable treatment, be easily freed from that impurity. For many purposes acid that has not been purified is employed. In the Leblanc process of manufacture the first step is the conver- sion of salt into sodium sulphate by sulphuric acid. The hydro-chloric acid which is formed carries with it most of the arsenic of the sulphuric acid. Wherever such hydrochloric acid is used it introduces arsenic; thus, in the separation of glycerin from soap lyes, the alkali of the latter is neutralized with hydrochloric acid and glycerin is in consequence frequently highly arsenical. So is the soda produced in the Leblanc process, and every one of the numerous soda salts made from soda is liable to receive its share. All acids liberated from their salts by sulphuric acid, such as phosphoric, tartaric, citric, boracic, may be, and some- times are, thus contaminated. All superphosphates, made by the action of crude sulphuric acid upon bones or other phosphatic materials, and sulphate of ammonia, made from gas-liquor and acid, that is to say, two of the most important manurial materials, are arsenical, and the poison is thus spread far and wide over meadows and fields, and can be traced in the soil wherever artificial manures have been applied. The crops sometimes take up arsenic to a slight extent, but happily the plant is more selective than man, and no serious amount of poison absorption appears to be possible. The risk of contamination is, of course, much greater with substances which, like glucose, are not further purified by crystallization, but retain whatever impurity is introduced into them. Glucose is not only used in beer, in which by legal enactments it is permitted to be used, but is also substituted for sugar in a number of food products, and is liable to carry into them its contamination. Sugar confectionery, jams and marmalade, honey, and such like, are often admixed with glucose. It is difficult to say in the present state of the law whether such admixture amounts to adulteration. It was clearly made originally for fraudulent purposes, but usage and high court decisions have gradually given the

practice an air of respectability. Vinegar of sorts is also made from a glucose liquor produced by the action of sulphuric acid upon maize or other starchy material, and is, in its turn, exposed to arsenic contamination. There is hardly a chemical substance which has directly or indirectly come into contact with sulphuric acid that is not at times arsenical. Thus, while artificial colours,

now so much used for the dyeing of food products, are no longer prepared — as was rosaniline (the parent substance of so many aniline dyes) at an early stage of its manufacture— with arsenic acid, yet they are often contaminated indirectly from sulphuric acid. Furthermore, hardly any metal that results from the smelting of any ore with coal is free from arsenic, iron in par- ticular, as employed for pots and pans and implements, being highly arsenical. From the iron the many chemical preparations which contain or are made with the aid of iron salts may be arsenicated. The general presence of arsenic from some of these causes has been known for many years; outbreaks of arsenical poisoning have been due to it at various times, but neglect, forgetfulness and human shortsightedness let the matter go into oblivion, and it is safe to predict, in spite of all attention which has been given to the subject, of the panic which was created by the beer-poisoning outbreak, of the shock and injury caused to manufacturers .of many kinds, and of the watchfulness aroused in officers of health and analysts, that as long as the production of food materials or substances that go into food materials is not left to the care of nature, and as long as man adds the products of his ingenuity to our food and drink, so long will ” accidents,” like the Manchester poisoning, from time to time recur. We now search for arsenic; some other time it is lead, or antimony, or selenium, that will do the mischief. Man does what he. can according to his light, but he sees but a little patch of the sky of knowledge, while the plant or the animal building up its body from the plant has learned by inheritance to avoid the assimilation of matters noxious to it. Strictly speaking, arsenical poisoning does not belong to the subject of adulteration. It is not due to wilfulness but to stupidity, but it affords a lesson which cannot be taken too much to heart, that mankind, by relying too much upon ” science ” in feeding, is on a path that is fraught with considerable danger.

To safeguard consumers, as far as practicable, the royal commission made important recommendations concerning amendments of the Food Acts; these, as at present interpreted and administered, were

reported to be unsatisfactory for the purpose of protecting the consumer against arsenic and other deleterious substances in food. ” As a rule public analysts receive samples in order that they may pronounce upon their genuineness or otherwise, knowing nothing of the local circum- stances which led to their being taken, of their origin or the reasons for sending them. The term ‘ genuine ‘ in this sense means that the analyst has not detected such objectionable substances as he has considered it necessary to look for in the sample submitted to him. Obviously, the value of the state- ment that the sample is ‘ genuine ‘ depends upon the extent to which the analyst has means of knowing what are the objection- able substances which it is liable to contain. In present circum- stances he has not sufficient information on this point.” It was also pointed out that the application of the Food Acts to prevention of contamination of foods by deleterious substances was materially hindered by want of an official authority with the duty of dealing with the various medical, chemical and technical questions involved, and that the absence of official standards militated against, the efficiency of the existing acts. The commission advised that a special offictr be appointed by the Local Government Board to obtain by inquiries from various sources, such information as would enable the board to direct the work of local authorities in securing greater purity of food; and they further recommended that the board or court of refer- ence, which had been advised by the Committee on Food Pro- ducts Adulteration, should be established. Pending the estab- lishment of offici?! standards in respect of arsenic under the Food Acts, they were of opinion that penalties should be imposed upon any vendor of beer or any other liquid food, or of any liquor entering into the composition of food, if that liquid be shown by adequate test to contain one-hundredth of a grain or more of arsenic in the gallon, and with regard to solid food, no matter whether it be consumed habitually in large or small quantities, or whether it be taken by itself (like golden syrup), or mixed with water or other substances (like chicory or yeast

extract)— if the substance contain one-hundredth of a grain of arsenic or more to the pound. The board of reference, most urgently needed for the protection of the public and for the guidance of manufacturers and officers, has yet to be created. While from time immemorial certain articles of food have been preserved by salting, smoking, drying, or by the addition of sugar and in some cases of saltpetre, during the last quarter of the 19th century the use of chemicals acting I !j* se ‘Z a ~ more powerfully as antiseptics or preservatives ex- foorf> tended enormously, particularly in England. A very large fraction of the British food supply being obtained from abroad, a

proportionately great difficulty exists in obtain- ing the food in an entirely fresh and untainted condition. While refrigeration and cold-storage has been the chief factor in enab- ling the meat and other highly perishable foods to be imported, other steps, ensuring preservation of goods that are collected from farmers and brought together at shipping ports, are neces- sary to prevent decomposition prior to such goods coming into cold store. Thus it is well-nigh impossible to collect butter from farms in Australia or New Zealand far distant from the coast without the addition of some chemical preservative. Heavily salted goods no longer appeal to the modern palate, and, with the progress of specialized labour, the inhabitants, especi- ally of great towns, have become accustomed to resort to manu- factured provisions instead of the home-made and home-cooked food. Manufacturers of many articles of preserved food gradu- ally adopted the use of chemical preservatives, and at the present time the practice has become so general that it may be said that practically every person in the United Kingdom who has passed the suckling stage consumes daily more or less food containing chemical preservatives. The Food Act allows of the addition of any ingredient, not injurious to health, if it be required for the production or preparation of the food, or as an article of commerce, in a state fit for carriage. The legality or otherwise of the use of chemical preservatives, therefore, hinges upon their innocuousness. Upon theoretical considerations it is clear that a substance which is capable of acting as an antiseptic must act injuriously upon bacteria, fungi or yeasts, and as the human body is, generally speaking, less resistant to poisons than the low organisms in question, it would seem to follow that antiseptics are bound to affect it injuriously. It is, of course, a question of dose and proportion. It has further been said that all anti-septics possess some sort of medicinal action, and however valu- able they may be in disease when administered under the control of a competent physician, they have no business to be given in-discriminately to sick and healthy alike by purveyors of food. The result of a general desire on the part of importers and manu- facturers of food materials, of the officers under the Food Act, of the medical profession and of the public, resulted after many years of agitation and complaint and after numerous conflicting magisterial decisions, in the appointment in 1899, by the presi- dent of the Local Government Board, of a departmental com- mittee to inquire into the use of preservatives and colouring matters in food, with the reference to report: first, whether the use of such materials or any of them, in certain quantities, is injurious to health, and, if so, in what proportion does their use become injurious, and, second, to what extent and in what amounts are they used at the present time. After the examina-

tion of a great number of witnesses a report was issued in 1901. Perhaps the most important conclusion was that the instances of actual harm which were alleged to have occurred from the consumption of articles of food and drink chemically preserved were few in number, and were not at all supported by conclusive evidence. During the period which has elapsed since chemically preserved food has been used, the mortality as a whole has declined, and while this naturally cannot be put to the credit of the preservatives but is largely due to better feeding in conse- quence of the introduction of cheaper foods, which are rendered possible to some extent by the use-of preservatives, it conclusively establishes the fact that no obvious harm has been done to the health of the community. The committee made certain recom- mendations which are the most authoritative pronouncements

upon the subject. They are as follows : — That the use of form- aldehyde or formalin, or preparations thereof, in food or drinks, be absolutely prohibited, and that salicylic acid be not used in a greater proportion than one grain per pint in liquid food and one grain per pound in solid food, its presence in all cases to be declared. That the use of any preservatives or colouring matter whatever in milk offered for sale in the United Kingdom be constituted an offence under the Sale of Food and Drugs Act. That the only preservative which it shall be lawful to use in cream be boric acid, or mixtures of boric acid and borax, and in amount not exceeding 0-25 % expressed as boric acid, the amount of such preservative to be notified by a label upon the vessel. That the only preservative permitted to be used in butter and margarine be boric acid, or mixtures of boric acid and borax, to be used in proportions not exceeding 0-5 % expressed as boric acid. That in the case of all dietetic prepara- tions intended for the use of invalids or infants, chemical pre- servatives of all kinds be prohibited.

As the most commonly used chemical preservative is boric acid, free or in the form of borax, which is extensively employed in butter, cream, ham, sausages, potted meats, cured fish, and sometimes in jams and preserved fruit, the arguments for and against its employment deserve more detailed attention. It cannot be looked upon in the light of common adulteration because, in any case, the quantity used is but an inconsiderable fraction, and the cost of it is

generally greater than that of the food itself. It is not used to hide any traces of decomposition that may have taken place or to efface its effects. On the other hand, it cannot be said to be ” required for the production or preparation ” of the articles with which it is mixed, since a fraction at least of similar articles are made without preservative. It enables food to be kept from decom- position, but it also lessens the need for cleanliness and encour- ages neglect and slovenliness in factories. It has no taste, or only a very slight one, hence does not manifest itself to the consumer in the same way as does common salt, and cannot therefore be avoided by him should he desire to do so. Its pre- servative action, that is, its potency, is very slight in comparison with most other preservatives; its potential injuriousness to man must be proportionately small. It is practically without interference upon salivary, peptic or tryptic digestion, unless given in large quantities. Experiments made by F. W. Tunni- cliffe and R. Rosenheim upon children showed that neither boric acid nor borax, administered in doses of from 15 to 23 grains per diem, exerted any influence upon proteid metabolism or upon the assimilation of phosphatized materials. The fat assimilation was, if anything, improved, and the body weight increased, and the general health and well-being was in no way affected. On the other hand, evidence was adduced that in some cases digestive disturbances, after continuous administration of from 15 to 40 grains, were observable, nausea and vomiting in some, and skin irritation, in one case resulting in complete baldness, in others.

Although it is in most cases very difficult to trace any gastric disturbance to any particular article of food or one of its in- gredients, so as to exclude all other possible causes of disturbance, a fairly good case has been made out by a number of medical practitioners against boracic acid, taken in an ordinary diet and not for experimental purposes. The most exhaustive in- vestigation which has as yet been made was carried out by Dr H. W. Wiley, chief chemist to the United States department of agriculture. A large number of young men who had offered themselves as subjects for the investigations, were boarded as a special ” hygienic table,” but otherwise continued their usual vocations during the whole period of the experiment. They were placed upon their honour to observe the rules and regulations prepared by the department and to use no other food or drink than that provided, water excepted, and any water consumed away from the hygienic table was to be measured and reported. They were to continue their regular habits and not to indulge in any excessive amount of labour or exercise. Weight, tempera- ture and pulse rate were continuously recorded. The periods

during which the subjects of the experiment were kept under observation varied from thirty to seventy days, periods of rest being given during which they were permitted to eat moderately at tables other than the experimental one. There was a good and ample diet. The observations were divided into three periods : the fore period, the preservative period and the after period, during the whole of which time the rations of each member were weighed or measured and the excreta collected. Before the ” fore ” period was commenced a note was made of the quantities of food voluntarily consumed by each of the candi- dates, and from these the proper amount necessary in each case to maintain a comparatively constant body weight was calcu- lated. When a suitable result was thus arrived at, the same quantity of food was given daily during the ” preservative ” and ” after ” periods. The preservative was given in the forms of borax and of boric acid, at first mixed with butter, but subse- quently in gelatine capsules. This was found to be necessary from the fact that when the preservative was mixed with the food and concealed in it some of the members of the table evinced dislike of the food with which it was supposed to be incorporated; those who thought that the preservative was in the butter were disposed to find the butter unpalatahle, and the same was true with those who thought it might be in the milk or coffee, while, when the preservative was given openly, much less disturbance was created. The preservative was given at first in small doses such as might be consumed in commercial food that had been preserved with borax; gradually the quantities were increased in order to reach the limit of toleration for each individual. All food was weighed, measured and analysed, the same being the case with the excreta. The blood was examined periodically ■ as regards colouring matter and number of corpuscles. Every- thing was done to keep up the general health of the members and to do away with all unfavourable mental influences due to the circumstances. During the time of the experiment analyses were made of 2550 food samples and 1175 samples each of urine and faeces. The general results were as follows : there was no tendency to excite diarrhoea, and the nitrogen-metabolism was but very little influenced, if anything being slightly de- creased. As regards phosphorus the combined results of all observations indicated that the preservative increased the excretion of phosphorus to a small extent, from 97-3 % in the “fore” period, to 103-1 in the “preservative” period. The metabolism of fat was uninfluenced; there was an increase of the solid matters in the faeces and a decrease of those in the urine, from which Dr Wiley concluded that the preservatives interfered with the process of digestion and

absorption. No influence was exerted on the corpuscles and the haemoglobin of the blood. The effect of boracic acid and borax on the general health varied with the amount administered, quantities not exceeding half a gramme (7J grains) of boracic acid, or its equivalent of borax, producing no immediate effects, but the long-continued administration of such small doses seemed to produce the same results as the use of large doses over a shorter period. There was a tendency to diminish the appetite and to produce a feeling of fulness and uneasiness in the stomach and sometimes actual nausea, also one of fulness in the head mani- fested as a dull headache which disappeared when the preserva- tive was dropped. The continued administration of large doses, 60 to 75 grains per day, resulted in most cases in loss of appetite, inability to perform work of any kind and general unfitness. In most cases 45 grains per day could be taken for some time, but gradually injurious effects were observed. In some cases 30 and even 15 grains per day appeared to cause illness, but it is acknowledged that these persons may have been suffering from influenza. The administration of 7-5 grains was declared by Dr Wiley to be too much for the normal man to receive regularly, although for a limited period there might be no danger to health. Dr Wiley concludes his report: ” It appears, therefore, that both boric acid and borax, when continuously administered in small doses for a long period or when given in large quantities for a short period, create disturbance of appetite, of digestion and of health.”

Dr Wiley’s conclusions were adversely criticized by Dr O. Liebreich, who carefully studied on the spot all the conditions of the experiment and the documents relating to the investiga- tion. He pointed out that the results were so indefinite and the number of persons under control so small that ” one case of self- deception or of forgetfulness only would throw into absolute uncertainty the solution of the whole question ” ; that no lasting injury to health was found in spite of transient disturbances attributed by Dr Liebreich to other causes, and that all persons declared themselves to be in better physical condition after seven months than they had been before. On the whole the balance of evidence seems to be that while no acute injury is likely to result from boron compounds in food, they are liable to produce slighter digestive interferences.

Other chemical substances that are in use for the purpose of preserving food materials may be treated more shortly. Form- aldehyde, coming into commerce in the form of a aldehyde. 4° % solution under the name of formalin, was for a time largely used in milk. It certainly has very great antiseptic properties, as little as i part in 50,000 parts check- ing the growth of organisms in milk for some hours, but as the substance combines with albuminous matters and hardens them to an extraordinary degree, rendering, for instance, gelatine perfectly insoluble in water, it exerts an inhibitory effect on the digestive f6rments. It injures salivary, peptic and pancreatic digestion. A set of five kittens fed with milk containing 1 part in 50,000 of formaldehyde for seven weeks were strongly retarded in growth, three ultimately dying, while four control kittens fed on pure milk flourished. In even moderate doses formalin pro- duces severe pains in the abdomen and has caused death. It is now generally recognized as a substance that is admirably adapted for disinfecting a sick-room, but quite improper and unsuitable for food preservation.

Salicylic acid or orthohydroxybenzoic acid is either obtained from oil of winter-green or is made synthetically by Kolbe's process from phenol and carbonic acid. Artificial »dA C salicylic acid generally cotntains impurities (creasotic acids) which act very injuriously upon health. When pure, salicylic acid employed as a food preservative has never produced decided injurious effects, although administered by itself in fairly strong solution it acts as an irritant to the stomach and kidneys, and sometimes causes skin eruptions. It is a powerful drug in larger doses and requires careful administra- tion, especially as about 60 % of the perrons to whom it is administered show symptoms known as " salicylism," namely, deafness, headache, delirium, vomiting, sometimes haemorrhage or heart-failure. It is doubtful whether pure salicylic acid produces these symptoms. When present in proportion of 1 to 1000 it inhibits the growth of moulds and yeasts. In jams 2 grains per pound and in beverages 7 grains to a gallon are considered by manufacturers to be sufficient for preservative purposes. It is used mainly in articles of food or drink containing sugar, that is to say, in jams and preserved fruit, lime and lemon juices, syrups, cider, British wines and imported lager. Its use in butter, potted meat, milk or cream, in which it was not in- frequently met with formerly, is now quite exceptional. It has already been stated that the preservative committee recom- mended its permissive use in small proportions. To some extent benzoic acid and benzoates have taken the place of salicylic acid and salicylates, partly because salicylic acid can readily be detected analytically, while benzoic acid is not quite easily discoverable. Its antiseptic potency is about equal to

that of salicylic acid, and the arguments for or against its use are similar to those relating to the latter.

For the preservation of meat and beer, lime juice and dried fruit, sulphur dioxide (sulphurous acid) and some of the sulphites have long been employed. Sulphuring of hops and disinfection of barrels by burning brimstone matches is an exceedingly old practice. Burning sulphur is well known as a gaseous disin- fectant of rooms, bacteria being killed in air containing 1 % of the gas. As the taste and smell of sulphurous acid and of sulphites are very pronounced it .follows that but small

quantities can be added to food or drink. About 1 part in 4000 or 5000 of beer is the usual amount. While, in larger quantities, the sulphites have decided physiological activity and are apt to produce nephritis, there is not any evidence that they have ever caused injurious effects in alcoholic liquors. The excise authorities have tacitly sanctioned their employment in breweries, although the Customs and Inland Revenue Act 1885 declares that a brewer of beer shall not add any matter or thing thereto except finings or other matter or thing sanc- tioned by the commissioners of Inland Revenue, and altho'.wh sulphites are used in all breweries, the Board of Inland Revenue do neither sanction nor interfere. An antiseptic with a pro- nounced taste is obviously a safer one in the hands of a non- medical person than one virtually devoid of taste, like boric, salicylic or benzoic acids or their salts.

Sodium fluoride, a salt possessing powerfully antiseptic properties, but also at the same time clearly injurious to health and interfering with salivary and peptic digestion, has been found in butter, imported mainly from Brittany, preserva- in quantities quite inadmissible in food under any tives. circumstances. A few other chemical preservatives are occasionally used. Hydrogen peroxide has been found effective in milk sterilization, and if the substance is pure, no serious objection can be raised against it. Saccharine, and other artificial sweetening agents, having antiseptic properties, are taking- the place of sugar in beverages like ginger-beer and lemonade, but the substitution of a trace of a substance that provides sweetness without at the same time giving the substance and food value of sugar is strongly to be deprecated.

The employment of chemical preservative matters in articles intended for human consumption threatens to become a grave danger to health or well-being. Each dealer in food contributes but a little; each one claims that his particular article of food cannot be brought into

commerce without preservative, and each condemns the use of these substances by others. There is doubtless something to be said for the practice, but infinitely more against it. It cheapens food by allowing its collection in districts far away-, but the chief gainer is not the public as a whole but the manufacturer and the wholesale merchant. Our body has by inheritance acquired habits and needs that are quite foreign to chemical interference. Some day, artificially prepared foods, containing liberal quantities of matters that are not now food ingredients, may conceivably compare with natural food products, but that day is not yet, and meantime it ought to be clearly the duty of the state to see that the evil is checked 1 . The intention which has introduced this form of adulteration may be more or less beneficent, but in practice it is almost wholly evil.

A similar criticism applies to the continually extending use of colouring matter in food. Civilized man requires his food not only to be healthy and tasty, but also attractive in appear- ance. It is the art of the cook to prepare dishes that matterhi please the eye. This is a difficult art, for the various food. colouring matters which are naturally present in . meat and fish, in fruit, legumes and green vegetables are of a delicate and changeable nature and easily affected or de- stroyed by cooking. Many years ago some artful, if stupid, cook, found that green vegetables like peas or spinach, when cooked in a copper pan, by preference a dirty one, showed a far more brilliant colour than the same vegetables cooked in earthenware or iron. The manufacturer who puts up substances like peas in pots or tins for sale produces the same effect which the cook in her ignorance innocently obtained, by the wilful addition of a substance known to be injurious to health, namely, sulphate of copper. The copper combines with the chlorophyll, forming copper phyllocyanate, which, by reason of its insolubility in the gastric juice, is comparatively innocuous. Preserved peas and beans have been for' so many years " coppered " in this manner that it is difficult to induce the public to accept these vegetables when possessed of their natural colour only. Several countries endeavoured to abolish the objectionable practice, but the public pressure has been too great, and to-day the

practice is almost universal. In England the amount of copper corresponds to from one to two grains per pound of the vegetable calculated as crystallized copper sulphate. ' The opinion of the departmental committee was clearly expressed that the practice

should be prohibited. No effect has been given to the recommendation.

Milk is naturally almost white with a tint of cream colour. When adulterated with water this tint changes to a bluish one. To hide this tell-tale of a fraud, a yellow colouring matter used to be added by London milkmen. Very gradually this practice, which had its origin in fraud, has extended to all milk sold in London. The consumer, mis-educated into believing milk to be yellow, now requires it to be so. Large dairy companies have endeavoured to wean the public of its error, without success. From milk the practice extended to butter; natural butter is sometimes yellowish, mostly a faint fawn, and sometimes almost white. In agricultural districts this is well known and taken as a matter of course. In big towns, where the connexion of butter and the cow is not well known, the consumer requires butter to be of that colour which he imagines to be butter-colour. Anatto, turmeric, carrot-juice used formerly to be employed for colouring milk, butter and cheese, but of late certain aniline dyes, mostly quite as harmless physiologically as the vegetable dyes just men- tioned, are largely being used. The same aniline dyes are also employed in the manufacture of an imitation Demerara sugar from white beet sugar crystals. Aniline dyes are very frequently used by jam-makers; the natural colour of the fruit is apt to suffer in the boiling-pan, and unripe, discoloured or unsound fruit can be made brilliant and enticing by dye. The brilliant colours of cheap sugar confectionery are almost invariably pro- duced by artificial tar-colours. Most members of this class of colouring matters are quite harmless, especially in the small quantities that are required for colouring, but there are a few exceptions, picric acid, dinitrocresol, Martius-yellow, Bismarck brown and one of the tropaeolins being distinctly poisonous. On the whole, the employment of powerful aniline dyes is an advance as compared with the use of the vicious and often highly poisonous mineral colours which Hassall met with so frequently in the middle of the 10th century. Mineral colours, with very few exceptions, are no longer used in food. Oxide of iron or ochre is still very often found in potted meats, fish sauces and chocolates; dioxide of manganese is admixed with cheap chocolates. All lump sugar of commerce is dyed. Naturally it has a yellow tint. Ultramarine is added to it and counteracts the yellowness. In the same way our linen is naturally yellow and only made to look white by the use of the blue-bag.

The same idea underlies both practices, and indeed the use of all colouring matters in manufactured articles, namely, to make them look better than they would otherwise. Within bounds, this is a reasonable and laudable desire, but it also covers many sins — poor

materials, bad workmanship, faulty manu- facturing and often fraud. Like sugar, flour and rice are some- times blued to make them look white. All vinegar, most beers, all stout, are artificially coloured with burnt sugar or caramel. The line dividing the legitimate and laudable from the fraudu- lent and punishable is so thin and difficult to draw that neither the law nor its officers have ventured to draw it, and yet it is a matter which urgently requires regulation at the hands of the state. Practices which, when new, admit of regulation are almost ineradicable when they have become old and possessed of ” vested rights.” Recognizing this, the departmental com- mittee, like the royal commission on arsenical poisons, recom mended that ” means be provided, either by the establishment of a separate court of reference, or by the imposition of more direct obligation on the Local Government Board, to exercise supervision over the use of preservatives and colouring matters in foods and to prepare schedules of such as may be considered inimical to the public health.”

In close connexion with this subject is the occasional occur- rence of injurious metallic impurities in food-materials. Tin chloride is used in the West Indies to produce the yellow colour of Demerara sugar. The old processes of sugar-boiling left some of

the brown syrup attached to the crystals, giving them both their colour and their delicious aroma; with the introduction of modern processes affording a much greater yield of highly refined sugar, white sugar only was the /n^™^^ result. The consumer, accustomed to yellow sugar, had the colour artificially supplied by the action of the tin compound upon the’ sugar. At the present time all Demerara sugar, with the exception of that portion that is dyed with aniline dye, has had its colour artificially given it and conse- quently contains strong traces of tin. Soda-water, lemonade and other artificial aerated liquors are liable to tin or lead con- tamination, the former proceeding from the tin pipes and vessels, the latter from citric and tartaric acids and cream of tartar used as ingredients, these being crystallized by their manufacturers in leaden pans. Almost all “canned” goods contain more or less tin as a contamination from the tin-plate. While animal foods do not attack the tin to any great extent, their acidity being small, almost all vegetable materials, especi- ally fruits and tomatoes, powerfully corrode the tin covering of the plate, dissolving it and becoming impregnated with tin compounds. It is quite easy to obtain tin-reactions in abun- dance from every grain of tinned peaches, apples or tomatoes. These tin compounds are by no means innocuous; yet poisoning from tinned vegetable foods is of rare occurrence. On the whole, tin-plate is a very unsuitable material for the storage and preser- vation of acid goods. Certain enamels, used for glazing

earthen- ware or for coating metal cooking pots, contain lead, which they yield to the food prepared in them. Food materials that have been in contact with galvanized vessels sometimes are contami- nated with zinc. Zinc is also not infrequently present in wines. The effect of the application of the food laws has been entirely beneficial. Not only has the percentage proportion of samples found adulterated largely declined, but the gross forms of adulteration which prevailed in the middle of the Bgg^ of 19th century have almost vanished. Plenty of fraud Food Acts. still prevails, but poisoning by reckless admixture is of exceedingly rare occurrence. Whilst formerly milk was not infrequently adulterated with an equal bulk of water, few fraudulent milkmen now venture to exceed an addition of 10 or i5%- A bird's-eye view over the effect is obtained from the following figures for England and Wales: —

Year.

Number of Samples.

Percentage

of

Adulteration.

Examined.

Adulterated.

1877 1879 1884 1889 1894 1899 1904

14,706

17.049 22,951 26,956 39,516 53.056 84,678

2,826 2,535

3.3H

3,096 4,060

4.97o

7.173

19-2 14-8 14-4

u-5

10-3

9.4

8-5

The details of the working of the Food Acts in 1904 in England and Wales are set out in the table on the next page.

United States. — Each separate state has food laws of its own. From the 1st of January 1907 the “American National Pure Food Law,” applicable to the United States generally, came into force, without superseding the State food laws, the only effect of the National Law being the legalization of shipments of any food which complies with the provisions of the National Law into any state from another state, even though the food is adulterated within the meaning of the state law. The law applies to every person in the United States who receives food from another state and offers it for sale in the original unbroken packages in which he receives it, and if it is adulterated or mis-branded within the meaning of the National Law he can be punished for having received it and offering it for sale in the original unbroken package to the same extent as the person who shipped it to him can be punished. ‘ The mere fact that he is a citizen of a state selling food within that state will not excuse him; and he will be subject to prosecution to the same extent as he would be if he uttered counterfeit money. Retailers.

however, can protect themselves from prosecution when they sell goods in original unbroken packages by procuring a written guarantee, signed by the person from whom they received the goods, such guarantee stating that the goods are not adulterated within the meaning of the National Law. The guarantee must also contain the name and address of the wholesale vendor, but unless the parties signing the guarantee are residents of the United States the guarantee is void. The law affects all foods shipped from one state or district into another and also all foods intended for export to a foreign country. It also affects all food products manufactured or offered for sale in any

Table showing working of British Food Acts, 1904.

Samples

Found

Percentage

Examined.

Adulterated.

Adulterated.

Milk

30.413

4,031

ii-i

Butter ….

15.124

867

5-7

Cheese ….

2,176

20

09

Margarine

1,169

83

7-1

Lard …..

2,489

4

0-2

Bread ….

473

1

0-2

Flour

476

3

0-6

Tea ….

486

Coffee ….

2,550

161

6-3

Cocoa

477

42

8-8

Sugar .’ .

901

49

5-4

Mustard ….

812

39

4-8

Confectionery and Jam .

1.303

72

5-5

Pepper ….

2,393

43

1-8

Wine ….

308

54

17-5

Beer . . . .

1,065

75

7-0

Spirits ….

6,938

832

12-0

Drugs : —

Camphorated Oil

395

24

6l

Sweet Spirit of Nitre .

243

66

27-2

Sulphur ….

131

7

5-3

Cream of Tartar .

441

88 •

20‘0

Glycerin.

192

21

io-9

Rhubarb prepara-

tions ....

96

5

5-2

Seidlitz Powders .

81

3

3-7

Linseed

70

1

1-4

Magnesia

48

9

18-8

Mercury prepara-

tions ....

28

4

14-3

Cod Liver Oil

245

7

29

Iron Pills

16

Compound Liquorice

Powder

in

2

1-8

Tincture of Iodine

23

4

17-4

Other Drugs

1,124

124

II-O

Total Drugs

3.214

365

ii-3

Other Articles : —

Ginger ….

704

Syrup and Treacle

183

“8

4-4

Baking Powder .

281

11

3‘9

Vinegar ….

773

57

7-4

Arrowroot

467

3

o-6

Oatmeal

359

Sago ….

227

‘4

6-2

Olive Oil

306

9

2-9

Dripping and Fat

85

1

1-2

Sundries.

2,496

329

13-2

Total other Articles

All Articles

— -^ ^ — —

5,881

432

7-3

^84,678

7.173

8-5

territory or the District of Columbia, wherever such foods may have been produced. The law does not affect foods manufac- tured and sold wholly within one state, nor such as have been shipped from another state but not in the original package. While thus the National Food Law is mainly intended to regulate the food traffic between the different states, and leaves to the states freedom to regulate their

internal traffic, it must gradually tend to unify the present complicated state food legislation, and it is therefore here more usefully considered than would be the separate state laws.

The definition of adulteration as set forth in sec. 7 is as follows: — ” For the purpose of this act an article shall be deemed to be adulterated: In the case of drugs: (r) If, when a drug is sold under or by a name recognized in the United States

Pharmacopoeia or National Formulary, it differs from the stand- ard of strength, quality or purity, as determined by the test laid down in the United States Pharmacopoeia or National Formulary official at the time of investigation; provided that no drug defined in the United States Pharmacopoeia or National Formulary shall be deemed to be adulterated under this provision if the standard of strength, quality or purity be plainly stated upon the bottle, box or other container thereof although the standard may differ from that determined by the test laid down in the United States Pharmacopoeia or National Formulary. (2) If its strength or purity fall below the professed standard or quality under which it is sold. In the case of confectionery: If it contains terra alba, barytes, talc, chrome yellow or other mineral substance or poisonous colour or flavour, or other ingredient deleterious or detrimental to health, or any vinous, malt or spirituous liquor or compound or narcotic drug. In the case of food: (1) If any substance has been mixed and packed with it so as to reduce or lower or injuriously affect its quality or strength. (2) If any substance has been substituted wholly or in part for the article. (3) If any valuable constituent of the article has been wholly or in part abstracted. (4) If it be mixed, coloured, powdered, coated or stained in a manner whereby damage or inferiority is concealed. (5) If it contain any added poisonous or other added deleterious ingredient which may render such article injurious to health: provided that when in the preparation of food products for shipment they are preserved by any external application applied in such manner that the preservation is necessarily removed mechanic- ally, or by maceration in water, or otherwise, and directions for removal of said preservations shall be printed on the covering of the package, the provisions of the act shall be construed as applying only when said products are ready for consumption. (6) If it consists in whole or in part of a filthy, decomposed or putrid animal or vegetable substance, or any portion of an animal unfit for food, whether manufactured or not, or if it is the pro- duct of a diseased animal or one that has died otherwise than by slaughter. ...”

Whatever vagueness attaches to these definitions is intended to be

removed by sees. 3 and 4, which provide that the secretaries of the Treasury, of Agriculture, and of Commerce and Labour ” shall make uniform rules and regulations for carrying out the provisions of the act, including the collection and examination of specimens of food and drugs,” which examination ” shall be made in the bureau of chemistry of the department of agricul- ture, or under the direction and supervision of such bureau, for the purpose of determining from such examinations whether such articles are adulterated or misbranded within the meaning of the act.” Contravention of the act is punishable for the first offence by a fine not exceeding 500 dollars or 1 year’s imprison- ment or both, and for each subsequent offence by a fine not less than 1000 dollars or 1 year’s imprisonment or both. Under an act of congress, approved March 1903, the bureau of agriculture established standards of purity for food products, ” to determine what are regarded as adulterations therein for the guidance of the officials of the various states and of the courts of justice.” The elaborate set of food definitions and standards worked out under the guidance of the chief of the bureau, Dr H. W. Wiley, have also received legal sanction and form a corollary to the National Food Law. For each of the more important articles of food an official definition of its nature and composition has thus been established, of the utmost value to food officers, manufacturers and merchants not only in the United States but throughout the world. A few of these definitions may here find a place: —

” Lard is the rendered fresh fat from slaughtered healthy hogs. Leaf-lard is the lard rendered at moderately high temperatures from the internal fat of the abdomen of the hog, excluding that adherent to the intestines. Standard lard and standard leaf- lard are lard and leaf lard respectively, free from rancidity, con , taining not more than 1% of substances other than fatty acids, not fat, necessarily incorporated therewith in the process of rendering, and standard leaf-lard has an iodine number not

greater than 60. Milk is the lacteal secretion obtained by the complete milking of one or more healthy cows, properly fed and kept, excluding that obtained within 15 days before and 5 days after calving. Standard milk is milk containing not less than 1 2 % of total solids and not less than 85 % of solids not fat, nor less than 31 % of milk-fat. Standard skim-milk is skim-milk containing not less than 9! % of milk-solids. Standard con- densed milk and standard sweetened condensed milk

are con- densed milk and sweetened condensed milk respectively, containing no less than 28% of milk-solids, of which not less than one-fourth is milk-fat. Standard milk-fat or butter-fat has a Reichert-Meissl number not less than 24 and a specific gravity at 40° C. not less than 0-905. Standard butter is butter contain- ing not less than 82-5 % of butter-fat. Standard whole-milk cheese is cheese containing in the water-free substance not less than 50 % of butter-fat. Standard sugar contains at least 99-5 % of sucrose. Standard chocolate is chocolate containing not more than 3 % of ash insoluble in water, 3-5 % of crude fibre, and 9 % of starch, nor less than 45 % of cocoa-fat."

Numerous other standards with details too technical for reproduction here have also been fixed.

German Empire. — The law of the 14th of May 1879, largely based upon the English Food and Drugs Act 1875, regulates the trade in food. Each town or district appoints a public analyst, and there is a state laboratory in Berlin directly under the control of the ministry of the interior with advisory functions. The ministry, under the advice of this department, issues from time to time regulations concerning the sale of or details specify- ing the mode of analysis of various products of food or drink. Both in the United States and in Germany, therefore, the execu- tive officers (public analysts) have some authoritative official department for guidance and information.

Particular Articles Adulterated

We will now proceed to consider adulteration as practised during recent years in the more important articles of food.

Milk. — Milk adulteration means in modern times either addition of water, abstraction of cream, or both, or addition of chemical preservative. The old stories of the use of chalk or of sheep's brains are fables. Owing to the wide variation to which milk is naturally subjected in composition, it is exceedingly difficult to establish beyond doubt whether any given sample is in the state in which it came from the cow or has been im- poverished. The composition of cow's milk varies with many conditions. (1) The race of the animal: the large cows of the plains yielding a great quantity of poor milk, the smaller cows from hilly districts less amount of rich milk. Hence, milk from Dutch cows compares very unfavourably with that of Jerseys or short-horns. Watery and acid foods like mangolds and brewers' grains produce a more aqueous milk than do albuminous and fatty foods like oil-cakes. (2) Sudden change of food, of weather and of temperature. (3) Nervous disturbances to which even a cow is subject, as, for

instance, at shows, may greatly influence the composition of the milk. The portion obtained at the beginning of a milking is poorer in fat than that yielded towards the end. Morning milk is as a rule poorer in fat than evening milk. Soon after calving the animal gives a richer product than at later periods, both the quantity and the com- position declining towards the end of the lactation. The varia- tions due to these different circumstances may be very great, as is seen from the following analyses, fairly representing the maximum, minimum and mean composition of the milk of single cows : —

Minimum.

Maximum.

Mean.

Specific Gravity . ... Fat . . ‘ . ...

Casein

Albumen

Milk Sugar(lactose)

Water ….

1 -0264 1-67% 1-79% 0-25%

2-11%

0-35% 80-32%

1-0370 6-47% 6-29%

1-44% 6-12%

1-21% 90-69%

1-0316

3-59% 3-02% 0-50%

478%

o-7i%

87-40%

In market milk such wide variations are not so liable to occur, as the milk from one animal tends to average that from another, but even in the milk from herds of cows the variations may be considerable. The average composition of genuine milk supplied by one of the largest dairy companies in London, as established by the analysis of 120,000 separate samples recorded by Dr P. Vieth, is fat 4- 1 %, other milk solids (" solids not fat " or " non- fatty solids ") 8-8 %, total dissolved matters (total solids) 12-9 %, the variations being from 3-6 to 4-6 % in the fat and 8-6 to 9-1 % in the solids not fat. It is clear that the 4-6 % of fat could be reduced, by skimming, to 3-0 %, and the 9-1 % of solids not fat to 8-5 % by addition of water, without bringing the composition of the milk thus adulterated outside that of genuine milk. In reality even wider limits of variation must be reckoned with, because small farmers sell the milk of single cows, and this, as shown above, may fluctuate enormously. The Board of Agri- culture, in pursuance of the powers conferred upon it by the Food Act 1899, issued in 1901 " The Sale of Milk Regulations," which provide that where a sample of milk (not being milk sold as skimmed or separated or condensed milk) contains less than 3 % of milk-fat, or less than 8- 5 % of non-fatty solids, it shall be presumed, until the contrary is proved, that the milk is not genuine. But even in these cases it is open to the vendor to show, if he can, that the deficiency was due to natural causes or to unavoidable circumstances. The courts have held that when deviations are the result of negligence or ignorance the vendor is nevertheless liable to punishment. Thus, when a vendor omits to stir up the contents of a pan so as to prevent the cream from rising to the top, he may be punished, if by such omission the milk becomes altered in composition so as no longer to comply with the regulations ; or, when a farmer allows an undue interval between the milkings whereby the composition of the milk may be affected, he may be liable for the consequences. As the limits embodied in the milk regulations were necessarily fixed at figures lower than those which are usually afforded by genuine milk, and as it is a comparatively simple matter to ascertain the percentage of fatty and non-fatty solids, a strong tendency exists to bring down commercial milk to the low limits of the regulations without coming into collision with the law. The fat of milk is its most valuable and most important constituent. The exact determination of the percentage- of fat is therefore the chief problem of the milk-analyst. All analyses made prior to the year 1885 are more or less inexact, because a complete separation of the fat from the other milk constituents had not been obtained. In that year M. A. Adams, by the simple and ingenious expedient of spreading a known volume of the milk to be analysed upon a strip of blotting-paper and extracting the paper, together with the dried milk, by a fat solvent,

such as ether or benzene, succeeded in completely removing the fat from thi other constituents. Since that time simpler and more rapid means have been based upon centrifugal separation of the fat. When a measured quantity of milk is mixed with strong sulphuric acid, which dissolves the casein and other nitrogenous constituˆ ents of the milk, but leaves the fat-globules quite untouched, the latter can easily be separated in a centrifugal, in the form of an oil the volume of which can be ascertained in a suitably constructed and graduated glass vessel, and thus the percent- age ascertained very rapidly and accurately; such centrifugal contrivances constructed by H. Leffman, N. Gerber and others are now in general use in dairies, and cheese and butter factories. The amount of ” total solids ” contained in milk, that is to say, of all constituents other than water, is speedily ascertained by evaporating the water from a measured or weighed portion of milk and drying the residue obtained in a water-oven to constant weight. By subtracting from the percentage of total solids that of the fat the amount of ” solids not fat ” results, and by cautiously burning off the organic substances, the salts or mineral matters are left. When the percentage of ” solids not fat ” is less than 8-5 a simple proportion sum suffices to show what percentage of water must be present to reduce the ” solids not fat ” to the amount found. As the added water also reduces proportionately the percentage of mineral matter natural

to normal milk (about 0-71 to 0-73%), the determination of the ash affords valuable assistance to the analyst. When the amount of ash is higher than normal, tests must be made for borax, soda or other mineral matters that are often added as preservatives or acid neutralizes. Borax is easily tested for by dissolving the milk ash in a drop or two of dilute hydrochloric acid, moisten- ing a strip of yellow turmeric paper with the solution and drying it, when, in the presence of even very minute quantities of borax, the yellow colouring matter of the turmeric paper will be changed into a brilliant red-brown. Formaldehyde (which in 40% water solu tion forms the formalin of commerce) in milk affords a bright purple colour when the milk containing it is mixed with sulphuric acid containing a trace of an iron salt.

Condensed milk is milk that has been evaporated under re- duced pressure with or without the addition of sugar. Generally one part of condensed milk corresponds to three parts of the original milk. There is no case on record of adulteration of unsweetened condensed milk,

but sweetened milk has in the past been frequently prepared either from machine-skimmed or partly skimmed milk and sold as whole-milk. As sweetened condensed milk is largely used by the poorer part of the population for the feeding of infants, and as the fat of milk is, as stated before, its most valuable constituent, this class of fraud was a particularly mischievous one, and led to the inclusion in the Food Act of 1899 of a special proviso that every tin or other receptacle containing condensed, separated or skimmed milk must bear a conspicuous label showing the nature of the contents. As the bulk of con- densed milk consumed in England is imported from abroad, the customs authorities now exercise a strict supervision over the imports, and object to the importation of such condensed milk as contains less than 9% of milk-fat. The average compo- sition of sweetened condensed milk may be taken, with slight variations, to be: water 24-6%, fat 11-4%, casein and albumen 10%, milk-sugar 11-7%, cane-sugar 40-3%, mineral matters

2-0%.

Cream. — There are not any regulations nor official standards relating to this article, the value of which depends upon its contents in fat. Good stiff cream obtained by centrifugal skimming may contain as much as 60% of milk-fat, but generally dairymen's cream has only about 40%. On the other hand, milk that is abnormally rich in fat is in some places sold as cream. Attempts to compel dairymen to work up to any stated minimum of fat have failed, the English courts holding that cream is not an article that has any standard of quality, but varies with the character of the cows from which the milk is obtained and the food on which they are fed. Therefore, as re- gards the most important portion of cream, the amount of fat, adulteration does not exist unless there is a substitution for the milk-fat by an emulsified foreign fat, but cases of this descrip- tion are exceedingly rare. On the other hand, such additions of foreign materials, like starch paste or gelatine, which have for object the giving of an appearance of richness to a naturally poor and dilute article, are not uncommon. While formerly the sale of cream was entirely in the hands of milkmen, there has been of late a tendency to regard cream as an article coming within the range of grocery goods. To enable this perishable article to be kept in a grocery store it has to receive an addition of preser vative, as a rule boric preservative, in excessive amount. The purchaser may take it that all cream sold by others than milk- men, and much of that even, is thus preserved and should be shunned. The limit of boric preservative that might be per- mitted, but which is nearly always exceeded, is one-quarter of

1%.

Butter. — Of all articles of food butter has most fully received the attention of the sophisticator, because it is the most costly of the ordinary articles of diet, and because its composition is so intricate and variable that its analysis presents extraordinary difficulties and its nature exceptional and various opportunities for admixture with foreign substances. It is the intention of the producer of butter to separate the fatty portion of the milk as completely as is practicable from the other constituents of the milk without destroying the fat-globules. This can only

be done by churning, by which operation the milk-globules are caused more or less to adhere to each other without losing their individual existence. Owing to this subdivision of the fat, and perhaps to the composition of the fat itself, butter is a more digestible fatty article of food than lard or oil. It is not possible by mechanical means to remove the whole of the water and curd of the milk from the butter; indeed ” overworking ” the butter with the object of removing the water as completely as possible ruins the structure to such an extent as to make the product unmerchantable. In well-made butjter there are contained about 85% of pure milk-fat, from 12 to 13% of water, and 2 or 3% of curd and albumen, milk-sugar or its product of transformation — lactic acid, — and phosphates and other milk-salts. In some kinds of butter, Russian for instance, the percentage of water is rather less. Generally, by churning at a low temperature, a drier, at higher temperatures a wetter, butter is obtained. The curd must be got rid of as completely as practicable if the product is to have reasonable keeping properties. To prevent rapid decomposition salt in various quantities is added. Considering that 100 lb (10 gallons) of milk yield only from 35 to 4 lb of properly made butter, it is obvious that a great inducement exists to increase the yield either by leaving an undue propor- tion of water or curd, or by adding an excessive quantity of salt. In some parts of Ireland the butter is worked up with warm brine into so-called pickle butter, whereby it becomes both watered and salted in one operation. Until lately, when the English Board of Agriculture fixed a limit of 16 for the percentage of water that may legitimately be present in butter, this kind of debasement could not easily be dealt with, but even now, where a legal water-limit exists, the addition of water either as such, or in the shape of milk or of condensed milk, is very com- monly practised, more or less care being taken not to exceed the legalized limit. It is obvious that there is an ample margin of profit for the mixer who starts with Russian butter containing 10% of water and works it up with milk, fresh or condensed, to 16%, all the other milk-constituents, namely, sugar,

curd and salt, thus introduced counting as ” butter ” in the eyes of the law. A very considerable number of butter-factors in London and in other parts of England thus dilute dry butter and consider this a legitimate operation so long as they keep within the legal water-limit. Nay, they may even exceed this, if only they give to their adulterated article a euphonious name, which, while legally notifying the admixture, raises in the mind of the ignor- ant purchaser the belief that he is purchasing something particu- larly choice and excellent. ” Milk-blended butter,” with as much as 24 or more per cent of water and as little as 68 % of fat, is still largely sold to purchasers who think that they are obtain- ing extra value for their money, several attempts to deal with the scandal by legislature having led to no result. The intro- duction of water into butter is also practised on a large scale in the United States, where a branch of trade in ” renovated ” butter has sprung up. In the States a considerable quantity of butter is produced by small farmers, and by the time the product comes into the market — the addition of chemical preservatives to prevent decomposition not being permitted — the butter has so much deteriorated in quality that it fetches a very low price. It is bought up by factors, the fat melted out and washed, then again worked up with water and salt, care being generally taken to leave about 16% of water in the product, which finds a ready sale in England. It may here be pointed out that England imports an enormous quantity of butter from the continent of Europe, the colonies, Siberia and America, the imports, less exports, averaging during 1903-1906 no less than 203,300 tons annually, and the total consumption (home produce plus imports) 366,441 tons, the consumption per head of population being 19-2 lb per annum. In butter, as in most other articles of food, adulteration with water is the most common, most profitable, and least risky form of fraud. Great fortunes are thus made out of water.

There is an altogether different class of butter adulteration which concerns itself with the substitution of other fatty matters for the whole or par 4, of the really valuable portion of the butter-

fat. Margarine is the legalized and therefore legitimate butter-surrogate, prepared by churning any suitable fat with milk into a cream, solidifying the latter by injection into cold water and working the lumps together, precisely as is done in the case of the churned cream of milk. The substitution of margarine for butter is frequent, in spite of all legal enactments directed against this fraud, the semblance

between butter and margarine being so great that a trained palate is necessary to distinguish the two articles. Much more frequent and much more difficult to deal with is the sale of mixtures of butter and of margarine. In order to show the difficulties inherent to this subject, it will be necessary to consider the chemical nature of butter-fat, and to compare it with other fats that may enter into the composition of margarine. Butter-fat is butter freed from water, curd and salt and extraneous matter. Like the greater number of natural fats it consists of a mixture of triglycerides, that is, combinations of glycerin with substances of the nature of acids. These acids, in the case of fats other than butter-fat, are mainly oleic, palmitic and stearic acids. Butter-fat, in addition to these, contains other acids which sharply distinguish it from the vast majority of other fats and, with the exception of cocoa-nut oil, from those substances which are or may be used to mix with butter, by the circumstance that a considerable proportion of its acids, when separated by chemical means from the glycerin, are readily soluble in water, or may be easily volatilized either alone or in a current of steam, whereas the acids separated from the foreign fats are practically both insoluble and non- volatile. This funda- mental principle serves at once to distinguish, for example, between butter and margarine, and has been made use of by analysts not only for this purpose but also with a view to deter- mine the relative amounts of butter and margarine in a mixture of these substances. Thus butter-fat contains about 88%, more or less, of “insoluble fatty acids,” while margarine contains about 95.5%; s grammes of butter-fat when chemically decom- posed yield an amount of volatile fatty acids which requires about 26 cubic centimetres (more or less) of deci-normal alkali solution for neutralization, while margarine requires mostly less than 1 cubic centimetre (Wollny or Reichert-Meissl method). There are other differences between the two kinds of fat: the specific gravity of butter-fat is higher than that of most other fats; its power of refracting a ray of light is less; the ” iodine absorption ” of butter-fat is smaller than that of many other fatty matters, and so on. But the composition of perfectly genuine butter-fat varies within somewhat wide limits. The milk from a cow fed on good and ample food in warm weather yields a fat that is rich in characteristic butter-constituents, while a poorly fed animal, kept in the open till late in the autumn, when the nights are cold, gives milk exceptionally poor in fat, the differences expressed as ” insoluble fatty acids ” lying between 86 and 91%, and in volatile acids, expressed as ” Wollny ” numbers, between 18 and 36. Generally, therefore, summer butter is rich and autumn butter poor in volatile acids, or, geographically, Australian butter is more frequently high, Siberian often exceedingly low in these acids. The food of the animal also may, under certain conditions, yield

a notable pro- portion of its fatty matter to the butter; cows that have, for instance, been fed upon large quantities of cotton-seed cake yield butter in which the cotton-seed oil may be traced, and the same holds good with other fatty foods. All these, and other circumstances, combine to render the detection of small quan- tities of foreign fats that have been fraudulently added to butter almost a matter of impossibility. This is perfectly well known to unscrupulous butter dealers, and an enormous amount of adulteration is known to be practised. Even small amounts of adulteration could, nevertheless, often be discovered while margarine manufacturers employed considerable proportions of vegetable oils in their products, some of these oils furnishing characteristic chemical reactions allowing of their discovery. Here some firms of margarine manufacturers came to the aid of the butter-mixer and produced margarine containing nothing but animal fat, so-called ” neutral ” margarine being freely offered for fraudulent purposes. There is one fat besides butter

which contains ” volatile fatty acids,” namely, cocoa-nut oil. Since means have been found to deprive this fat of its strong cocoa-nut odour and taste, it has largely been used in the adul- teration of butter, and margarine containing cocoa-nut oil and other fatty substances has freely been manufactured and sold

specially for butter adulteration. The seat of this class of fraud

is mainly in Holland. Analysts happily found means to detect this oil when present above 10%, and numerous prosecutions made mixers more careful. Abundant evidence, however, exists showing that the simultaneous addition of water or milk so as to keep the water limit below 16% and that of margarine entirely composed of animal fats below 10% leaves a large margin of profit with a. very small chance of detection. For the moment at least analysis has had the worst of it in the battle between honesty and “business methods.”

Margarine itself is a legitimate article of commerce (when sold with due notice to the purchaser), but is frequently adulter- ated. As regards the fats used in its manufacture there does not exist any legal restriction, and as long as the fat is in a state fit for human consumption the manufacturer can make whatever mixture he pleases. In general there is no reason to think that any bad or disgusting fats are finding their way into the factories, which in most countries are under proper supervision ; the old stories about recovered grease from all sorts of offal are quite without foundation. But a considerable percentage of solid paraffin has been met with as an admixture of the fatty part of margarine. As the fatty portion” of the article is the only

one of value, some manufacturers make great efforts to produce margarine with as small a percentage of fatty matter as possible, either by incorporating excessive amounts of water or of milk — margarines with over 30% of water being met with — or by introducing sugar, glucose, starch, gelatinous matter, in fact any- thing that is cheaper than fat. The English law imposes a limitation upon the percentage of butter-fat that may be con- tained in margarine, but at present at least the tendency of manufacturers is all for having as little butter or other valuable fat in margarine as is practicable, and not to err on the other side. For the purpose of facilitating the discovery of margarine when it has been fraudulently added to butter, some countries (Germany, Belgium, Sweden) insist upon the use of from 5 to 10% of sesame oil (from the seed of Sesamum orientate or 5. indicum, belonging to the family of Bignoniaceae) in the manufacture of such margarine as is to be consumed within the countries in question. This oil yields a characteristic red colour when it, or any mixture containing it, is shaken with an hydro- chloric solution of either sugar or furfurol, and is intended to serve as an “ear-marking” substance. The addition of a little starch or arrowroot, easily discoverable chemically or by the microscope, is also required by Belgium, but in the absence of any international agreement these ear-marking additions are of little practical use. It is, however, interesting to point out that, while complying with the regulations of the governments, margarine manufacturers of the countries named have found an easy way of rendering the regulations quite nugatory: they add methyl-orange, a colouring matter which itself produces a red colour with acid and quite obscures the red colour obtained by the official test for sesame oil.

Cheese may be legitimately made from full-milk, milk that has been enriched by addition of cream, or from milk that has been more or less skimmed. It varies consequently very widely in composition, so-called cream cheese containing not less than 60% of fat; Stilton upwards of 40%; Cheddar about 30%; Dutch, Parmesan and some Swiss and Danish less than 20%. The amount of water varies with the kind and age of the cheese and may be as low as 20 and as high as 60%. Under these circumstances it is impracticable to lay down any hard-and-fast rules as to the composition of cheese. When, however, cheese is made from skimmed milk and the fat is replaced by margarine, as is the case in so-called ” filled ” or margarine cheeses, the sale of these amounts to an adulteration, unless the presence of the foreign substance is declared. It may at first sight appear strange that the person who robs milk of its most valuable

portion, the cream, may prepare a legitimate article of food from the remainder, while he who to that remainder adds something to replace the fat does an illegitimate act, but it must be taken into consideration that the replacement is frequently made with fraudulent intent and that the ordinary purchaser cannot by taste or smell distinguish the adulterated from the genuine article, while there is no difficulty in recognizing skim-milk cheese.

Lard. — Between the years' 1880 and 1S90 a gigantic fraudulent trade in adulterated lard was carried on from the United States. A great proportion of the American lard imported into England was found to consist of a mixture of more or less real lard with cotton-seed oil and beef-stearine. Cotton-seed oil is one of the cheapest vegetable oils fit for human consumption, beef-stearine the hard residue obtained in the manufacture of oleo-margarine after the more fluid fat has been pressed from the beef fat. These mixtures were made so skilfully by large Chicago manu- facturers that for some years they escaped detection. A bill introduced in 1888 into the American Senate to stop this im- posture directed general attention to the subject, and energetic measures, taken both in America and in England, quickly put an end to it. From the memorial presented in the United States Senate in support of the bill, it appeared that in about 1887 the annual production of lard in the States was estimated at 600 million pounds, of which more than 35% was adulterated. Compounds were made containing only a small quantity of lard or none at all, yet were sold as " choice refined lard " or under other eulogistic names. Many lard substitutes, chiefly made from cotton-seed oil, are still met with, but are mostly sold in a legitimate manner. From the germ of maize — which must be separated from the starchy portion of the seed before the latter can be manufactured into glucose — the oil (maize-oil) is ex- pressed, and this now is used as a lard adulterant, its detection being far more difficult than that of cotton-seed oil.

Oils. — For very many years all oils were considered to be com- posed of olein, that is to say, the triglyceride of oleic acid, with small quantities of impurities; chemists, therefore, to distin- guish oils of various origin, confined themselves to tests for these impurities, employing so-called colour reactions based upon the change of colour of the oil by various reagents such as sulphuric, nitric or phosphoric acids. These reactions were exceedingly indefinite and unsatisfactory and oil adulteration was prevalent and almost undiscbverable. It has been found, however, that the old ideas concerning the believed uniformity in the nature and constitution of oils were erroneous. Some

oils, indeed, do consist of olein, almond oil being a type, others contain a glyceride of an acid which is distinguished from oleic acid by containing one molecule less hydrogen, called linoleic acid. To this class belong cotton-seed and sesame oils. Others again include a glyceride of an acid containing still less hydrogen, linolenic acid (linseed and similar drying oils), and lastly the liver oils are still poorer in hydrogen. These various acids or the oils contained in them combine with various percentages of iodine, oleic acid absorbing the smallest proportion (about 80 %). For each oil the iodine absorption is a fairly constant quantity; this number, together with the determination of the amount of caustic alkali needed for complete saponification, the thermal rise with strong sulphuric acid or with bromine, the refraction of light and the specific gravity, now enable the analyst to form a fair idea of the nature of any sample under examination, and, in consequence of this advance in knowledge, adulteration of oils has much declined. The most common adulterant of the more valuable oils, like olive oil, is cotton-seed oil. The oils expressed from the sesame seed or the earth-nut (arachis oil) are also frequently admixed with olive oil. Almond oil is adulterated with the closely allied oils from the peach-kernel or the pine-seed. Deodorized paraffin hydrocarbons also enter sometimes as adulterants into edible oils. There is, however, a marked improvement in the purity of oils generally.

Flour and bread as sold in England are almost invariably genuine. The old forms of adulteration, such as the use of alum for the production of a white but indigestible loaf from bad

flour, have disappeared. The only admixture which has been met with during recent years is maize-meal in American produce. This is of inferior food value to wheat-meal.

Sugar in its various forms can hardly be said to be subject to adulteration by the addition of inferior substitutes. One single case of such substitution analogous to the proverbial but probably mythical sanding of sugar occurred between 1880 and 1905 in England, some crushed marble having been found in a consignment of German sugar in a large British establish- ment. There have, however, been numerous prosecutions for a fraud of another classˆ namely, the substitution of dyed beetroot sugar for Demerara sugar. Formerly the sugar produced by the old imperfect and wasteful methods of manufacture was more or less yellow or brown from adhering molasses. Sugar, as now obtained, be it from cane or beet, is white; yet the public is so wedded to its customs that white sugar except as lump or castor sugar does not find a ready sale. The manufacturer is

obliged to colour his product yellow by artificial means, that is to say, either by the addition of a little aniline dye, harmless in itself, or, as in the West Indies, mostly by the use of a small quantity of chloride of tin, so-called ” bloomer. ” European refined beet- sugar coloured with aniline dye to distinguish it from Demerara cane sugar is sold under the name of ” yellow crystals. ” These, although richer in real sugar than Demerara, are without the delicious aroma of cane syrup which belongs to the latter, and are not infrequently fraudulently substituted for Demerara.

Marmalade and Jams. — In the preparation of marmalade and jams, which articles were for a long time made from fruit and sugar only, a part of the sugar, from 10 to 15 %, is often now replaced by starch glucose. This material, consisting mainly of a mixture of dextrose and dextrin, is of much less sweetening power than ordinary sugar and mostly cheaper. It is said to prevent the crystallization which frequently used to occur in some jams. The use of glucose has been declared by the High Court {Smith v. Wisden, 1901) to be legitimate, the court holding that as there was no recognized standard for the composition of marmalade the addition of saccharine material not injurious to health could not constitute an offence. Artificial colouring matters and chemical preservatives are almost constant in- gredients of jams. To such fruits which, when boiled with sugar, do not readily yield a jelly (strawberries, raspberries) an addi- tion of apple juice is frequently made in the manufacture of jam, without much objection; the pulp of the apple, however, is sometimes bodily added as an adulterant.

Tea. — In consequence of the proviso contained in the Food Act of 1875 that tea was to be examined by the Customs on importation, such tea as was found to be admixed with other substance or exhausted tea being refused entry into England, the adulteration of tea has been virtually suppressed. Great numbers of samples are annually examined by the Customs, and a not inconsiderable proportion of these are condemned because they are either damaged or dirty, their use for the manufacture of theine being permitted, only sound and genuine tea coming to the British public. The practice, very common a generation ago, of artificially colouring tea green with a mixture of Prussian blue and turmeric, has quite vanished with the decline of the consumption of green tea.

Coffee. — A few cases of artificially manufactured coffee berries, made from flour and chicory, have been observed, but it would not be fair to speak of a practice of adulteration regarding coffee berries. Not infrequently coffee is roasted with the addition of some fatty matter or

paraffin or sugar, to give to the roasted coffee a glossy appearance. These additions as a rule are small in amount. Ground coffee is often sold adulterated with chicory, sugar or caramel. Other adulterations, reference to which is found in literature relating to the second half of the 19th century, do not seem now to occur.

Cocoa and chocolate are liable to a number of fraudulent or questionable additions. In the cheaper qualities of cocoa-powder sugar and starch — the latter in the form of sago flour or arrow- root — are admixed in very large proportions, and, in order to give to such mixtures something like the appearance of genuine

cocoa, red oxide of iron is added. This almost invariably is more or less arsenical. Cocoa-shell, a perfectly valueless material, is mixed in a very finely ground state with cocoa of the commoner kind. Owing to the enormous increase in the consumption of so- called chocolate-creams, which are masses of sugar confectionery coated with a cocoa-paste containing a large proportion of the fat of cocoa (cocoa-butter), the quantity of cocoa-butter that is obtained in the manufacture of cocoa-powders is no longer sufficient to cover the demand. Substitutes of cocoa-butter prepared from cocoa-nut oil are manufactured on a large scale, and all enter without acknowledgment into chocolates or choco- late creams. As there are not any regulations touching the composition of chocolate, sugar or starch or both are used in chocolate manufacture, and especially in that of chocolate powders in often excessive quantities. In the Dutch mode of manufacture of cocoa-powders an addition of from 3% to 4% of an alkaline salt is made for the purpose of rendering the cocoa ” soluble, ” or, more strictly, for putting it into such a physical condition that it does not settle in the cup. This addition does not, as is often alleged, render the cocoa alkaline, and is not made with any fraudulent object; several countries, however, have passed regulations fixing the maximum of the addition which may thus legitimately be made. Most of the cocoa-powders sold in England are prepared in accordance with the Dutch method.

Wine. — If ilhder this term a beverage is understood which consists of nothing but fermented grape juice, a great propor- tion of the wine consumed’ in England is not genuine wine. All port and sherry comes into commerce after having received an addition of spirit, generally made from potatoes; port and sherry would not be what they are and

as they have been for generations unless they were thus fortified. The practice can now hardly be classed among adulterations. A well-fermented wine made from the juice of properly matured grapes does not require any added alcohol in order that it should keep; imperfectly made wine is liable to turn sour; the addition of alcohol prevents this. French wines, both red and white, are hardly subject to adulteration. In wine-growing countries like France wine is so cheap and plentiful that it would be difficult to manufacture an imitation beverage cheaper than genuine wine. In Germany the conditions are different, the districts from which those wines that are exported are nominally derived being small and insufficient to cover the world's demands. The addition of sugar solution or of starch sugar is allowed within limits by German law, which not even requires that notification to the purchaser be made of the addition, and it is notorious that a very large proportion of the wine sold under the name of " hock " and some of that coming from the Moselle are thus diluted, sugared and lengthened, or, in plain terms, adulterated. Wines from the Palatinate which under their own names would not sell out of Germany are often passed off as hocks. As there is but little German red wine the law also permits this to be lengthened by the addition of white wine. For the removal of part of the acid from sour wine produced in bad vintages the addition of precipitated chalk is also permitted. Attention has been drawn in England to the very serious fact that German wines sometimes contain salts of zinc in small quantities. These are introduced by a fining agent protected by a German patent, consisting of solutions of sulphate of zinc and potassium ferro- cyanide, which, when added together in " suitable proportions," produce a precipitate of zinc-ferrocyanide which carries down all turbidity in the wine and is supposed to leave neither zinc nor ferrocyanide behind in solution. As a matter of fact, one or other of these highly objectionable substances is almost invari- ably left behind. The use of artificial colouring matters in wines does not appear now to occur.

Beer cannot be said to be adulterated, although it is well known that materials often very different from these which the general public believe to be trie proper raw materials for the Manufacture of beer, namely, water, malt and hops, are largely used. By the Customs and Inland Revenue Act 1885, sec. 4, beer is defined as any liquor " which is made or sold as a de-

scription of beer, or as a substitute for beer, and which on analysis of a sample thereof shall be found to contain more than 2% of proof spirit. " That is to say, beer is legally anything that is sold as beer provided that it has 2% of proof spirit. There is not any restriction upon the materials that are employed provided that they are not

positively poisonous. For Inland Revenue purposes, however, a prohibition has been made against the admixture of anything to beer after it has been manufactured, and excise prosecutions of publicans for watering beer are not infrequent. Formerly there was a restriction on the amount of salt that might be present in beer; this no longer exists. On the other hand it cannot be said that any injurious materials are being used by brewers, the brewing industry being, broadly speaking, most efficiently supervised and controlled by scientifically trained men. The addition to beer of bisulphate of lime, which is almost universally practised in England, is not an adulteration in the ordinary acceptation of the term. The thin beer which has taken the place of the strong ales of the past generation contains an insufficiency of alcohol to ensure keeping qualities, and it is difficult to see how modern English beers could be sold without the addition of some sort of preservative.

N cut- Alcoholic Drinks. — The same remark applies to a good many of so-called temperance beverages. Of these again it is hardly proper to speak as liable to adulteration. So-called soda- water is very often devoid of soda and is only carbonated water, but the term ” soda-water ” is a survival from the times when this was a medicinal beverage and when soda was prescribed to be present in definite amount by the pharmacopoeia. Potash and especially lithia waters very frequently contain only mere traces of the substances from which they derive their names. The sweetness of ginger-beer and often of lemonade is no longer due to sugar, as used to be the case, but to saccharine (the toluol derivative) , which is possessed of sweetness but not of nourish- ment; and since, as an antiseptic, it may affect the digestion, its use in these beverages is to be deprecated.

Vinegar ought to be the product obtained by the successive alcoholic and acetous fermentation of a sugary liquor. When this is obtained from malt or from malt admixed with other grain the vinegar is called a malt vinegar. Often, however, acid liquors pass under that name which have been made by the action of a mineral acid upon any starchy material such as maize or tapioca, with or without the addition of beet sugar. Dilute acetic acid, obtained from wood, is very frequently used as an adulterant of vinegar. When properly purified such acid is unobjectionable physiologically, but it is improper to sell it as vinegar. Adulteration of vinegar by sulphuric or other acids, formerly a common practice, is now exceedingly rare.

Spirits. — By the Sale of Food and Drugs Act Amendment Act, whisky, brandy and rum must not be sold of a less alcoholic strength than 25 under proof (corresponding to 43% of alcohol by volume), and gin 35

under proof (37% alcohol). For many years the only form of adulteration recorded by public analysts related to the alcoholic strength, the undue dilution of spirits with water being, of course, a profitable form of fraud. No ad- dition of any injurious matters to commercial spirits has been observed. It was, however, well known that a very considerable proportion of so-called brandies was not the product of the grape, but that spirits of other origin were frequently admixed with grape brandy. A report which appeared in 1902 in the Lancet on ” Brandy, its production at Cognac and the supply of genuine brandy to this country, ” served as a stimulus to public analysts to analyse commercial brandies, and convictions of retailers for selling so-called brandy followed. It was shown that genuine brandy made in the orthodox style from wine in pot-stills con- tained a considerable proportion of substances other than alcohol to which the flavour and character of brandy is due; among these flavouring materials combinations of a variety of organic acids with alcohols (chemically described as ” esters “) pre- dominate. For the present a brandy is not considered genuine unless it contains in 100,000 parts (calculated free from water) at least 60 parts of ” esters. ” As a consequence a trade has sprung up in artificially produced esters, sold for the purpose of

adding them to any spirit to fraudulently convert it into a liquor passing as ” brandy. ” The inquiries into the nature of brandy led to investigations into whisky. Formerly whisky was made from grain only and obtained by pot-still distillation, that form of ” still ” yielding a product containing a comparatively large proportion of volatile matters other than alcohol. For many years past, however, improved stillsˆ-so-called patent stills — have been adopted, enabling manufacturers to obtain a purer and far stronger product, saving carriage and storage. Attempts were made in England in 1905-1907 to restrict the term “whisky” solely to the pot-still product. But the question was referred in 1908 to a Royal Commission which reported against such a restriction. A common form of adulteration of whisky is the addition to it of spirit made on the Continent mainly from potatoes. This spirit is almost pure alcohol and is quite devoid of the injurious properties which are popularly but falsely attributed to it. The substitution of this — a very cheap and quite flavourless material — for one which owes its value more to its flavour than to its alcoholic contents, is clearly fraudulent.

Drugs. — To the adulteration of drugs but very brief reference can here be made. It is satisfactory to record that but very few of the great number of drugs included in the pharmacopoeias are liable to serious adulteration, and there are very few cases on record during recent years where real fraudulent adulteration was involved. The numerous preparations used by druggists are mostly prepared in factories under competent and careful supervision, and the standards laid down in the British Pharma- copoeia are, broadly speaking, carefully adhered to. The occur- rence of unlooked-for impurities, such as that of arsenic in sodium-phosphate or in various iron preparations, can hardly be included in the list of adulterations. In the making up of prescriptions, however, a good deal of laxity is displayed; thus, the Local Government Board report of the years 1904-1905 refers to an instance of a quinine mixture containing 23 grains of quinine-sulphate instead of 240 grains. A certain latitude in the making up of physicians' prescriptions must necessarily be allowed, but much too frequently the reaˆbnable limit of a 10% error over or under the amount of drug prescribed is exceeded. Certain perishable drugs, such as sweet spirits of nitre, or others liable to contain from their mode of manufacture metallic impurities, form the subjects of frequent prosecutions. The element of intentional fraud which characterizes many forms of food adulteration is happily generally absent in the case of drugs. (O. H.*)

ADULTERY (from Lat. adulterium), the sexual intercourse of a married person with another than the offender's husband or wife. Among the Greeks, and in the earlier period of Roman law, it was not adultery unless a married woman was the offender. The foundation of the later Roman law with regard to adultery was the lex Julia de adulteriis coercendis passed by Augustus about 17 B.C. (See Dig. 48. 5; Paull. Rec. Sent. ii. 26; Brisson, Ad Leg. Jul. de Adult.) In Great Britain it was reckoned a spiritual offence, that is, cognizable by the spiritual courts only. The common law took no further notice of it than to allow the party aggrieved an action of damages. In England, however, the action for " criminal conversation," as it was called, was nominally abolished by the Matrimonial Causes Act 1857; but by the 33 rd section of the same act, the husband may claim damages from one who has committed adultery with his wife in a petition for dissolution of the marriage, or for judicial separation. In Ireland the action for criminal conversation is still retained. In Scotland damages may be recovered against an adulterer in an ordinary action of damages in the civil court, and the latter may be found liable for the expenses of an action of divorce. if joined with the guilty spouse as a co-defender.

Adultery on the part of the wife is, by the law of Englaind, a ground for divorce, but on the part of the husband must be either incestuous

or bigamous, or coupled with cruelty qr desertion for two or more years. In the United States adultery is everywhere ground of divorce, and there is commonly no prohibition against marrying the paramour or other re-marriage by the guilty party. Even if there be such a prohibition, it would be unavailing out

of the state in which the divorce was granted; marriage being a contract which, if valid where executed, is generally treated as valid everywhere. Adultery gives a cause of action for damages to the wronged husband. It is in some states a criminal offence on the part of each party to the act, for which imprison- ment in the penitentiary or state prison for a term of years may be awarded.

In England, a complete divorce or dissolution of the marriage could, until the creation of the Court of Probate and Divorce, be obtained only by an act of parliament. This procedure is still pursued in the case of Irish divorces. In Scotland a complete divorce may be effected by proceedings in the Court of Session, as succeeding to the old ecclesiastical jurisdiction of the commis- sioners. A person divorced for adultery is, by the law of Scot- land, prohibited from intermarrying with the paramour. In France, Germany, Austria and other countries in Europe, as well as in some of the states of the United States, adultery is a criminal offence, punishable by imprisonment or fine. (See Divorce.)

AD VALOREM (Lat. for ” according to value”), the term given in commerce to a duty which is levied by customs authori- ties on goods or commodities in proportion to their value. An ad valorem duty is the opposite of a specific duty, which is chargeable on the measure or weight of goods. The United States is the one important country which has adopted in its tariff an extensive system of ad valorem duties, though it has not altogether disregarded specific duties; in some cases, indeed, the two are combined. Ad valorem duties, in the United States, are levied according to the saleable value of the goods in the country of their origin, and it is usual to require at the port of entry the production of an invoice with full particulars as to the place where, time when, and person from whom the goods were purchased, and the actual cost of the goods and the charges on them. Such an invoice is countersigned by the consul of the country for which the goods are intended. On arrival at the port of consignment the invoice is sworn to by the importer. The goods are then valued by an appraiser, and if the valuation of the appraiser exceeds that which appears on the invoice, double duty is levied, subject to appeal to a general appraiser and to boards of general appraisers.

It has been argued that, theoretically, an ad valorem duty is preferable to a specific duty, inasmuch as it falls in proper proportion” alike on the high-priced and low-priced grades of a commodity, and, no matter how the value of any article fluctu- ates, the rate of taxation automatically adjusts itself to the new value. In practice, however, ad valorem duties lead to great inequalities, and are very difficult to levy; while the relative value of two commodities may remain apparently unchanged under an ad valorem duty, yet owing to the difference in the cost of production, or through the different proportions of fixed and circulating capital employed in their manufacture, an ad valorem tax will be felt much more severely by one com- modity than by another. Again, there is always a difficulty in obtaining a true valuation on the exported goods, for values from their very nature are variable; while specific duties remain steady, and the buyer can always ascertain exactly what he will have to pay. The opening to fraud is also very great, for where, as in the United States, the object of the duty is to keep out foreign goods, every valuation at the port of shipment will be looked upon with the utmost suspicion, while it will always be a temptation to the foreign seller to undervalue, a temptation in many cases encouraged by the importer, for it lessens his tax, while the seller’s market is increased. The staff of appraisers which must necessarily be kept at each port of entry considerably raises the expense, to say nothing of the annoyance and delay caused both to importers and foreign shippers.

The term ” ad valorem ” is used also of stamp duties. By the Stamp Act 1891 certain classes of instruments, e.g. awards, bills of exchange, conveyances or transfers, leases, &c, must be stamped in England with the proper ad valorem duty, that is, the duty chargeable according to the value of the subject matter of the particular instruments or writings. (See Stamp Duties.)

ADVANCEMENT, a term technically used in English law for a sum of money or other benefit, given by a father during his lifetime to his child, which must be brought into account by the child on a distribution of the father’s estate upon an intestacy on pain of his being excluded from participating in such distri- bution. The principle is of ancient origin; as regards goods and chattels it was part of the ancient customs of London arid the province of York, and as regards land descending in copar- cenary it has always been part of the common law of England under the name of hotch-pot (q.v.). The

general rule was estab- lished by the Statutes of Distribution. The conditions under which cases of advancement arise are as follows : There must be a complete intestacy; the intestate estate must be that of the father; and the advancement must have been made in the life-time of the father. Land which belongs or would belong to a child as heir at law or customary heir need not be brought in to the common fund, even though such land was given during the father's life. The widow can gain no advantage from any advancement. No child can be forced to account for his or her advancement, but in default thereof he will be excluded from a share in the intestate's estate. As to what is an advancement there has been much conflict of judicial opinion. According to one view, nothing is an advancement unless it be given " on marriage or to establish the child in life." The other and prob- ably the correct view is that any considerable sum of money paid to a child* at that child's request is an advancement ; thus payment of a son's debts of honour has been held to be an advancement. On the other hand, trivial gifts and presents to a child are undoubtedly not advancements.

ADVANTAGE, that which gives gain or helps forward in any way. The Fr. avanl (before) shows the origin and meaning of this word, the d having subsequently crept in and corrupted the spelling. It is often contracted to "vantage." In some games (e.g. lawn tennis) the term " vantage " is used technically in scoring ("deuce" and "vantage"; "vantage sets"). A position which gives a better chance of success than its surround- ings is called a " vantage ground." In an unfavourable sense the word " advantage " is used to express a mean use made of some favourable condition (e.g. to take advantage of another man's misfortunes).

ADVENT (Lat. Adventus, sc. Redemptoris, " the coming of the Saviour "), a holy season of the Christian church, the period of preparation for the celebration of the nativity or Christmas. In the Eastern church it lasts from St Martin's Day (nth of November), and in other churches from the Sunday nearest to St Andrew's Day (30th of November) till Christmas. It is uncertain at what date the season, began to be observed. A canon of a council at Saragossa in 380, forbidding the faithful to be absent from church during the three weeks from the 17 th of December to the Epiphany, is thought to be an early reference to Advent. The first authoritative mention of it is in the Synod of Lerida (524), and since the 6th century it has been recognized as the beginning of the ecclesiastical year. With the view of directing the thoughts of Christians to the first coming of Christ as Saviour, and to his second coming as Judge, special lessons are prescribed for the four Sundays in Advents From the 6th century the season was kept as a

period of fasting as strict as that of Lent; but in the Anglican and Lutheran churches the rule is now relaxed. In the Roman Catholic church Advent is still kept as a season of penitence. Dancing and festivities are forbidden, fasting enjoined and purple vestments are worn in the church services.

In many countries Advent was long marked by diverse popular observances, some of which even still survive. Thus in England, especially the northern counties, there was a custom (now extinct) for poor women to carry round the “Advent images,” two dolls dressed one to represent Christ and the other the Virgin Mary. A halfpenny was expected from every one to whom these were exhibited, and bad luck was thought to menace the household not visited by the doll-bearers before Christmas Eve at the latest.

In Normandy the farmers still employ children under twelve

to run through the fields and orchards armed with torches, setting fire to bundles of straw, and thus it is believed driving out such vermin as are likely to damage the crops. In Italy among other Advent celebrations is the entry into Rome in the last days of Advent of the Calabrian pifferari or bagpipe players, who play before the shrines of the Holy Mother. The Italian tradition is that the shepherds played on these pipes when they cameto the manger at Bethlehem to do homage to the Saviour,

ADVENTISTS, SECOND, members of religious bodies whose distinctive feature is a belief in the imminent physical return of Jesus Christ. The first to bear the name were the followers of William Miller, and adherents have always been more numerous in America than in Europe. There is a body of Seventh Day Adventists who observe the old Sabbath (Saturday) rather than the Christian Sunday. They counsel abstemious habits, but set no time for the coming of Christ, and so are spared the per- petual disappointments that overtake the ordinary adventist. They have some 400 ministers and 60,000 members.

ADVENTITIOUS (from Lat. adventicius, coming from abroad), a quality from outside, in no sense part of the substance or circumstance: a man’s clothes, or condition of life, his wealth or his poverty, are called by Carlyle “adventitious wrappages,” as being extrinsic, superadded and not a natural part of him. In botany the word means that which is not normal to the plant, which appears irregularly and accidentally, e.g. buds or roots out of place, or strange spots and streaks not native to the flower.

ADVENTURE (from Lat. res adventura, a thing about to happen), chance, and especially chance of danger ; so a hazard- ous enterprise or remarkable incident. Thus an ” adventurer,” from meaning one who takes part in some speculative course of action, came to mean one who lived by his wits and a person of no character. The word is also used in certain restricted legal connexions. Joint adventure, for instance, may be distinguished from partnership (q.v.). A bill of adventure in maritime law (now apparently obsolete) is a writing signed by the shipmaster de- claring that goods shipped in his name really belong to another, to whom he is responsible. The bill of gross adventure in French maritime law is an instrument making a loan on maritime security.

ADVERTISEMENT, or Advertising (Fr. avertissement, warn- ing, or notice), the process of obtaining and particularly of purchasing publicity. The business of advertising is of very recent origin if it be regarded as a serious adjunct to other phases of commercial activity. In some rudimentary form the seller’s appeal to the buyer must, however, have accompanied the earliest development of trade. Under conditions of primitive barter, communities were so small that every producer was in immediate personal contact with every consumer. As the primeval man’s wolfish antipathy to the stranger of another pack gradually diminished, and as intercourse spread the infection of larger desires, the trapper could no longer satisfy his more complicated wants by the mere exchange of his pelts for his lowland neigh- bour’s corn and oil. A began to accept from B the commodity which he could in turn deliver to C, while C in exchange for B’s product gave to A what D had produced and bartered to C. The mere statement of such a transaction sufficiently presents its clumsiness, and the use of primitive forms of coin soon simplified the original process of bare barter. It is reasonable to suppose that as soon as the introduction of currency marked the abandon- ment of direct relations between purchaser and consumer an informal system of advertisement in turn rose to meet the need of publicity. At first the offer of the producer must have been brought to the trader’s attention, and the trader’s offer to the notice of the consumer, by casual personal contact, supplemented by local rumour. The gradual growth of markets and their de- velopment into periodical fairs, to which merchants from dis- tant places resorted, afforded, until printing was invented, the only means of extended advertisement. In England, during the 3rd century, Stourbridge Fair attracted traders from abroad as well as from all parts of England, and it may be conjectured that the crying of wares before the booths on the banks of the Stour

was the first form of advertisement which had any marked effect upon English commerce. As the fairs of the middle ages, with the tedious and hazardous journeys they involved, gradually gave place to a more convenient system of trade, the 15th century brought the invention of printing, and led the way to the modern development of advertising. The Americans, to whom the elab- oration of newspaper advertising is primarily due, had but just founded the first English-speaking community in the western hemisphere when the first newspaper was published in England. But although the first periodical publication containing news appeared in the month of May 1622, the first newspaper advert- isement does not seem to have been published until April 1647. It formed a part of No. 13 of Perfect Occurrences of Every Dale journall in Parliament, and other Moderate Intelligence, and it read as follows : —

A Book applauded by the Clergy of England, called The Divine Right of Church Government, Collected by sundry eminent Ministers in the Citie of London; Corrected and augmented in many places, with a briefe Reply to certain Queries against the Mimstery of England; Is printed and published for Joseph Hunscot and George Calvert, and are to be sold at the Stationers' Hall, and at the Golden Fleece in the Old Change.

Among the Mercuries, as the weekly newspapers of the day were called, was the Mercurius Elencticus, and in its 45th number, published on the 4th of October 1648, there appeared the fol lowing advertisement: —

The Reader is desired to peruse a Sermon, Entituled A Looking-Glasse for Levellers, Preached at St. Peters, Paules Wharf, on Sunday, Sept. 24th 1648, by Paul Knell, Mr. of Arts. Another Tract called A Reflex upon our Reformers, with a prayer for the Parliament.

In an issue of the Mercurius Politicus, published by Marchmont Nedham, who is described as " perhaps both the ablest and the readiest man that had yet tried his hand at a newspaper," there appeared in January 1652 an advertisement, which has often been erroneously cited as the first among newspaper advertise- ments. It read as follows: — ■

Irenodia Gratulatoria, a heroic poem, being a congratulatory panegyrick for my Lord General's return, summing up his suc- cesses in an exquisite manner. To be sold by John Holden, in the New

Exchange, London, Printed by Thomas Newcourt, 1652.

The article ” On the Advertising System,” published in the Edinburgh Review for February 1843, contains the fullest account of early English advertising that has ever been given, and it has been very freely drawn upon by all writers who have since dis- cussed the subject. But it describes this advertisement in the Mercurius Politicus as ” the very first,” and the discovery of the two earlier instances above quoted was due to the researches of a contributor to Notes and Queries.

In The Crosby Records, the commonplace-books of William Blundell, there is an interesting comment, dated 1659, on the lack of advertising facilities at that period —

It would be very expedient if each parish or village might have some place, as the church or smithy, wherein to publish (by papers posted up) the wants either of the buyer or the seller, as such a field to be let, such a servant, or such a service, to be had, &c. There was a book published in London weekly about the year 1657 which was called (as I remember) The Publick Advice. It gave information in very many of these particulars.

A year later the same diarist says —

There is an office near the Old Exchange in London called the office of Publick Advice. From thence both printed and private information of this useful nature are always to be had. But what they print is no more than a leaf or less in a diurnal. I was in this office. The diurnal consisted of sixteen pages quarto in 1689.

In No. 62 of the London Gazette, published in June 1666, the first advertisement supplement was announced —

An Advertisement— Being daily prest to the Publication of Books, Medicines, and other things not properly the business of a Paper of Intelligence, This is to notifie, once for all, that we will not charge the Gazette with Advertisements, unless they be matter of State : but that a Paper of Advertisements will be forthwith printed apart, & recommended to the Publick by another hand.

In No. 94 of the same journal, published in October 1666, there appeared a suggestion that sufferers from the Great Fire should avail themselves of this means of publicity —

Such as have settled in new habitations since the late Fire, and desire

for the convenience of their correspondence to publish the place of their present abode, or to give notice of Goods lost or found

may repair to the corner House in Bloomsbury on the East Side of the Great Square, before the House of the Right Honourable the Lord Treasurer, where there is care taken for the Receipt and Publication of such Advertisements.

The earlier advertisements, with the exception of formal notices, seem to have been concerned exclusively with either books or quack remedies. The first trade advertisement, which does not fall within either of these categories, was curiously enough the first advertisement of a new commodity, tea. The following advertisement appeared in the Mercurius Politicus, No. 435, for September 1658 —

That excellent and by all Physitians approved China Drink, called by the Chineans Tcha, by other nations Tay, alias Tee, is sold at the Sultaness Head, a cophee-house in Sweetings Rents, by the Royal Exchange, London.

The history of slavery, of privateering and of many other curious incidents and episodes of English history during the 17th and 18th centuries might be traced by examination of the anti- quated advertisements which writers upon such subjects have already collected. In order that space may be found for some consideration of the practical aspects of modern advertising, the discussion of its gradual development must be curtailed. Nor is it necessary to preface this consideration by any laboured statement of the importance which advertising has assumed.

It is a matter of common knowledge that several business houses are to be found in Great Britain, and a larger number in the United States, who spend not less than £50,000 a year in advertising, while one patent medicine company, operating both in England and the United States, has probably spent not less than £200,000 in Great Britain in one year, and an English cocoa manufacturer is supposed to have spent £150,000 in Great Britain. Some of the best works of artists as distinguished as Sir John Millais, Sir H. von Herkomer and Mr Stacy Marks have been scattered broadcast by advertisers. The purchase of Sir John Millais' picture " Bubbles " for £2200 by the proprietors of a well-known brand of soap is probably the most remarkable instance of the expenditure in this direction which an advertiser may find profitable. There are in London alone more than 350 advertising agents, of whom upwards of a hundred are known as men in a considerable way of business. The statements which from time to time

find currency in the newspapers with regard to the total amount of money annually spent upon advertising in Great Britain and in the United States are necessarily no better than conjectures, but no detailed statistics are required in order to demonstrate what every reader can plainly see for himself, that advertising has definitely assumed its position as a serious field of commercial enterprise.

Advertising, as practised at the beginning of the 20th century, may be divided into three general classes: —

1. Advertising in periodical publications.

2. Advertising by posters, signboards (other than those placed upon premises where the advertised business is conducted), transparencies and similar devices,

3. Circulars, sent in quantities to specific classes of persons to whom the advertiser specially desired to address himself.

It may be noted at the outset that advertising in periodical publications exercises a reflex influence upon these publications. The daily, weekly and monthly publications of the day are accus- tomed to look to advertisements for so large a part of their revenue that the purchaser of a periodical publication receives much greater value for his money than he could reasonably expect from the publisher if the aggregate advertising receipts did not constitute a perpetual subsidy to the publisher. It is not to be supposed, however, that the receipts from the sale of a paper cover all its expenses and that the advertising revenue is all clear profit. The average newspaper reader would be amazed if he knew at how great a cost the day's news is laid before him. A dignified journal displays no inclination to cry from the house-tops the vastness of its expenditure, but from time to time an accident enables the public to obtain information in this con- nexion. The evidence taken by a recent Copyright Commission disclosed that the expenditure of the leading English journal upon foreign news alone amounted to more than £50,000

in the course of one year, and that a year not characterized by any great war to swell the ordinary volume of cable despatches.

In the case of daily papers sold at the minimum price, it is not less obvious that the costliness of news service renders advertising revenue

indispensable, for although these less important journals spend less money, the price at which they are supplied to the news agents is very small in proportion to the cost of their pro- duction. If, however, this thought be pursued to its logical con- clusion, the advertiser must admit that he in turn receives, from those among newspaper readers who purchase his wares, prices sufficiently high to cover the cost of his advertising. So that the reader is in the curious position of directly paying a certain price for his newspaper, receiving a newspaper fairly worth more than that price, while this price is supplemented by the indirect in- cidence of a sort of tax upon many of the commodities he con- sumes. On the other hand, a great part of the advertisements in a daily newspaper have themselves an interest and utility not less than that possessed by the news. The man who desires to hire a house turns to the classified lists which the newspaper publishes day after day, and servants and employers find one another by the same means. The theatrical announcements are so much a part of the news that even if a journal were not paid for their insertion they could not be altogether omitted without inconvenience to the reader. In the main, however, it is the advertiser who seeks the reader, not the reader who seeks the advertiser, and the care with which advertisements are prepared, and the certainty with which the success or failure of a trader may be traced to his skill or want of skill as an advertiser, show that the proper use of advertising is one of the most indispensable branches of commercial training.

Before discussing in detail the methods of advertising in periodical publications it may be well to complete, for the use Poster of the general reader, a brief survey of the whole and sign subject by examining the two other classes of advertise- advertlse- ment -fhe most enthusiastic partisan of advertising will admit that posters and similar devices are very generally regarded by the public as sources of annoyance. A bold headline or a conspicuous illustration in a newspaper advertisement may for a moment force itself upon the reader's attention. In the French, and in some English newspapers, where an advertisement is often given the form of an item of news, the reader is distressed by the constant fear of being hoodwinked. He begins to read an account of a street accident, and finds at the end of the paragraph a puff of a panacea for bruises. The best English and American journals have refused to lend themselves to this sort of trickery, and in no one of the best journals printed in the English language will there be found an advertisement which is not so plainly differentiated from news matter that the reader may avoid it if he sees fit to do so. On the whole, then, newspaper advertisements ask, but do not compel attention. The whole theory of poster advertising is, on the

other hand, one of tyranny. The advertiser who pays for space upon a hoarding or wall, although he may encourage a form of art, deliberately violates the wayfarer's mind. A trade-mark or a catch-word presents itself when eye and thought are occupied with other subjects. Those who object to this class of advertisement assert, with some show of reason, that an advertisement has no more right to assault the eye in this fashion than to storm the ear by an inordinate din; and a man who came up behind another man in the street, placed his mouth close to the other's ear, and bawled a recommendation of some brand of soap or tobacco, would be regarded as an intolerable disturber of public peace and comfort. Yet if the owner of a house sees fit to paint advertisements upon his walls, his exercise of the jealously guarded rights of private property may not lightly be disturbed. For the most part, both law and public opinion content themselves with restraining the worst excesses of the advertiser, leaving many sensitive persons to suffer. . The National Society for Checking the Abuses of Public Adver- tising (known as Scapa), founded in 1803 in London, was organ- ized for purposes which it describes as follows: —

The society aims at protecting the picturesque simplicity of rural and river scenery, and promoting a regard for dignity and propriety of aspect in towns — with especial reference to the abuses of spec- tacular advertising.

It seeks to procure legislation whereby local representative bodies would be enabled to exercise control, by means of by-laws framed with a view to enabling them, at any rate, to grant relief in cases of flagrant and acknowledged abuse.

It is believed that, when regulation is applied in cases where local conditions are peculiarly favourable, the advantage will be so apparent that, by force of imitation and competition, the enforce- ment of a reasonable standard will gradually become common. The degree of restraint will, of course, depend upon the varying requirements of different places and positions. No hard-and-fast rule is suggested ; no particular class of advertisement is proscribed ; certainly no general prohibition of posters on temporary hoardings is contemplated. Within the metropolitan area sky signs have already been prohibited, and it is hoped that some corresponding check will be placed on the multiplication of the field boards which so materially diminish the pleasure or comfort of railway journeys.

The society regards with favour the imposition of a moderate tax or duty for imperial or local purposes on exposed advertisements not coming within certain categories of obviously necessary notices. The

difficulty of inducing a chancellor of the exchequer to move in a matter where revenue is not the primary consideration is not overlooked. But it is thought that any impost would materially reduce the volume of exposed advertisements, and would at once extinguish the most offensive and the most annoying class, i.e. the quack advertisements by the road sides and the bills stuck by unauthorized persons on trees, walls and palings.

Members are recommended to make it known that there exists an active repugnance to the present practice of advertising disfigurement, by giving preference, in private transactions, to makers and dealers who do not employ objectionable methods, and by avoid- ing, as far as possible, the purchase of wares which, in their individual opinion, are offensively puffed. Action on these lines is advised rather for its educational than for its immediately deterrent effect; although, in the case of many of the more expensive commodities, makers would undoubtedly be much influenced by the knowledge that they would lose, rather than gain, custom.

The foregoing proposals are based on the following estimate of the conditions of the problem. It is believed that the present licence causes discomfort or loss of enjoyment to many, and that, in the absence of authoritative restriction, it must grow far beyond its present limits; that beauty or propriety of aspect in town and country forms as real a part of the national wealth as any material product, and that to save these from impairment is a national interest; that the recent developments of vexatiously obtrusive advertising have not grown out of any necessities of honourable business, but are partly the result of a mere instinct of imitation, and partly are a morbid phase of competition by which both the consumers and the trade as a whole lose ; that restriction as regards the size and positions of advertising notices would not be a hardship to those who want publicity — since all competitors would be treated alike, each would have the same relative prominence ; that, as large sums of public money are expended on institutions intended to develop the finer taste, and on edifices of elaborate design, it must be held inconsistent with established public policy to permit the sensibilities thus imparted to be wounded, and architectural effect to be destroyed at the discretion of a limited class.

The influence of this society is to be seen in many of the restrictions which have been imposed upon advertisers since its work began. About a year after its foundation the London County Council abolished (under statutory powers obtained from Parliament) advertisements coming within the definition of sky-signs in the

London Building Act of 1894. These specifica- tions are as follows: —

“Sky sign ” means any word, letter, model, sign, device, or representation in the nature of an advertisement, announcement, or direction supported on or attached to any post, pole, standard, framework, or other support, wholly or in part upon, over, or above any building or structure, which, or any part of which, sky sign shall be visible against the sky from any point in any street or public way, and includes all and every part of any such post, pole, standard, framework, or other support. The expression ” sky sign ” shall also include any balloon, parachute, or similar device employed wholly or in part for the purposes of any advertisements or announcement on, over, or above any building, structure, or erection of any kind, or on or over any street or public way.

The act proceeds to exclude from its restrictions flagstaffs, weathercocks and any solid signs not rising more than 3 fed above the roof.

Another by-law of the London County Council, in great measure due to the observations made at coroners’ inquests, protects the public against the annoyances and the perils to

traffic occasioned by flashlight and searchlight advertisements. This by-law reads as follows: —

No person shall exhibit any flashlight so as to be visible from any street and to cause danger to the traffic therein, nor shall any owner or occupier of premises permit or suffer any flashlight to be so ex- hibited on such premises.

The expression ” flashlight ” means and includes any light used for the purpose of illuminating, lighting, or exhibiting any word, letter, model, sign, device, or representation in the nature of an advertisement, announcement, or direction which alters suddenly either in intensity, colour, or direction.

No person shall exhibit any searchlight so as to be visible from any street, and to cause danger to the traffic therein, nor shall any owner or occupier of premises permit or suffer any searchlight to be so exhibited on such premises.

The _ expression “searchlight” means and includes any light exceeding 500-candle power, whether in one lamp or lantern, or in a series of lamps or lanterns used together and projected as one concentrated light, and which alters either in intensity, colour, or direction.

Advertising vans were so troublesome in London as to be prohibited in 1853; the “sandwich-man” has in the City of London and many towns been ousted from the pavement to the gutter, from the more crowded to the less crowded streets, and as the traffic problem in the great centres of population becomes more urgent, he will probably be altogether suppressed.

Hoardings are now so restricted by the London Building Acts that new hoarflings cannot, except under special conditions, be erected exceeding 12 feet in height, and no existing hoardings can be increased in height so as to exceed that limit.

The huge signs which some advertisers, both in England and the United States, have placed in such positions as to mar the landscape, have so far aroused public antagonism that there is reason to hope that this form of nuisance will not increase.

In 1899 Edinburgh obtained effective powers of control over all sorts of advertising in public places, and this achieve- ment has been followed by no little agitation in favour of a Parliamentary enactment which should once for all do away with the defacing of the landscape in any part of the United Kingdom.

In 1907 an act was passed (Advertisements Regulation Act) of a permissive character purely, under which a local authority is enabled to make by-laws, subject to the confirmation of the Home Secretary, regulating (1) the erection of hoardings, &c, exceeding 12 feet in height, and (2) the exhibition of advertise- ments which might affect the ” amenities ” of a public place or landscape.

The English law with regard to posters has undergone very little change. The Metropolitan Police Act 1839 (2 and 3 Vict, cap. 47) first put a stop to unauthorized posting, and the In- decent Advertisements Act of 1889 (§ 3) penalized the public exposure of any picture or printed or written matter of an in- decent or obscene nature. But in general practice there is hardly any limitation to the size or character of poster advertise- ments, other than good taste and public opinion. On the other hand, public opinion is a somewhat vague entity, and there have been cases in which a conflict has arisen as to what public opinion really was, when its legally authorized exponent was in a

position to insist on its own arbitrary definition. Such an instance occurred some few years ago in the case of a large poster issued by a well-known London music-hall. The Progressive majority on the London County Council, led by Mr (afterwards Sir) J. M'Dougall, a well-known " purity " advocate, took exception to this poster, which represented a female gymnast in " tights " posed in what was doubtless intended for an alluring and attractive attitude; and, in spite of any argument, the fact remained that the decision as to renewing the licence of this music-hall rested solely with the Council. In showing that it would have no hesitation in provoking even a charge of meddling prudery, the Council probably gave a salutary warning to people who were inclined to sail rather too near the wind. But in Great Britain and America, at all events (though a doubt may perhaps exist as to some Continental countries!, the advertiser

and the artist 1 are restrained, not only by their own sense of propriety, but by fear of offending the sense of propriety in their customers.

Posters and placards in railway stations and upon public vehicles still embarrass the traveller who desires to find the name of a station or the destination of a vehicle. In respect of all these abuses it is a ˆregrettable fact that unpopularity cannot be expected to deter the advertiser. If a name has once been fixed in the memory, it remains there long after the method of its impression has been forgotten, and the purpose of advertise- ments of the class under discussion is really no more than the fixing of a trade name in the mind. The average man or woman who goes into a shop to buy soap is more or less affected by a vague sense of antagonism towards the seller. There is a rudimentary feeling that even the most ordinary transaction of purchase brings into contact two minds actuate/! by diametrically opposed interests. The purchaser, who is not asking for a soap he has used before, has some hazy suspicion that the shopkeeper will try to sell, not the article best worth the price, but the article which leaves the largest margin of profit; and the purchaser imagines that he in some measure secures himself against a bad bargain when he exercises his authority by asking for some specific brand or make of the commodity he seeks. If hehasseen any one soap so persistently advertised that his memory retains its name, he will ask for it, not because he has any reason to believe it to be better or cheaper than others, but simply because he baffles the shopkeeper, and assumes an authoritative attitude by exerting his own freedom of choice. This curious and obscure principle of action probably lies at the root of all poster advertis- ing, for the poster does not set forth an argument as does the newspaper advertisement. It hardly attempts to reason with

the reader, but merely impresses a name upon his memory. It is possible, by lavish advertising, to go so far in this direction that the trade-mark of a certain manufacturer becomes synony- mous with the name of a commodity, so that when the consumer thinks of soap or asks for soap, his concept inevitably couples the maker's name with the word " soap " itself. In order that the poster may leave any impression upon his mind, it must of course first attract his attention. The assistance which the advertiser receives from the artist in this connexion is discussed in the article Poster.

The fact that the verb " to circularize " was first used in 1848, sufficiently indicates the very recent origin of the practice of plying possible purchasers with printed letters and pamphlets. The penny postage was not established m ™ t 6 * e " in England until 1840; the halfpenny post for circulars circular. was not introduced until 1855. In the United States a uniform rate of postage at two cents was not established until 1883. In both countries cheap postage and cheap printing have so greatly encouraged the use of circulars that the sort of people whom the advertiser desires to reach — those who have the most money to spend, and whose addresses, published in directories, indicate their prosperous condition — are overwhelmed by trades-men's price-lists, appeals from charitable institutions, and other suggestions for the spending of money. The addressing of en- velopes and enclosing of circulars is now a recognized industry in many large towns both in Great Britain and in the United States. It seems, however, to be the opinion of expert advertisers that what is called " general circularizing " is unprofitable, and that circulars should only be sent to persons who have peculiar reason to be interested by their specific subject-matter. It may be noted, as an instance of the assiduity with which specialized circularizing is pursued, that the announcement of a birth, marriage or death in the newspapers serves to call forth a grotesque variety of circulars supposed to be adapted to the momentary needs of the recipient.

In concluding this review of methods of advertising, other than advertisements in periodical publications, we may add , that the most extraordinary attempt at advertisement which is known to exist is to be found at the churchyard at Godalming, Surrey, where the following epitaph was placed upon a tomb- stone: —

Sacred

To the memory of

Nathaniel Godbold Esq.

Inventor & Proprietor

of that excellent medicine

The Vegetable Balsam

For the Cure of Consumptions & Asthmas.

He departed this Life

The 17th. day of Deer. 1799

Aged 69 years.

Hie Cineres, ubique Fama.

The preparation of advertisements for the periodical press has within the last twenty years or so become so important a Adver- tas ‘ 1 t ‘ la *- a S reat number of writers and artists — many Using in of the latter possessing considerable abilities — gain a periodical livelihood from this pursuit. The ingenuity displayed pubiica- j n moc j ern newspaper advertising is unquestionably due to American initiative. The English newspaper advertisement of twenty years ago consisted for the most part of the mere reiteration of a name. An advertiser who took a column’s space supplied enough matter to fill an inch, and ingenuously repeated his statement throughout the column. Such departures from this childlike method as were made were for the most part eccentric to the point of incoherence. It may, how- ever, be said in defence of English advertisers, that newspaper publishers for a long time sternly discountenanced any attempt to render advertisements attractive. So long as an advertiser was rigidly confined to the ordinary single-column measure, and so long as he was forbidden to use anything but the smallest sort of type, there was very little opportunity for him to attract the reader’s attention. The newspaper publisher must always remember that the public buy a newspaper for the sake of the news, not for the sake of the advertisements, and that if the ad- vertisements are relegated to a position and a scope, in respect of display, so inferior that they may be overlooked, the advertiser cannot afford to bear his share of the cost of publication. Of late The Times, followed by almost all newspapers in the United Kingdom, has given the advertiser as great a degree of liberty as he really needs, and many experienced advertisers in America incline to the belief that

the larger licence accorded to American advertisers defeats its own ends. The truth, would seem to be that the advertiser will always demand, and may fairly expect, the right to make his space as fantastic in appear- ance as that allotted to the editor. When some American editors see fit to print a headline in letters as large as a man's hand, and to begin half-a-dozen different articles on the first page of a newspaper, continuing one on page 2, another on page 4, and another on page 6, to the bewilderment of the reader, it can hardly be expected that the American advertiser should submit to any very strict code of decorum. The subject of the relation between a newspaper proprietor and his advertisers cannot be dismissed without reference to the notable independence of advertisers' influence, which English and American newspaper proprietors authorize their editors to display. Whenever an in- surance company or a bank goes wrong, the cry is raised that all the editors in Christendom had known for years that the directors were imbeciles and rogues, but had conspired to keep mute for the sake of an occasional advertisement. When the British public persisted, not long ago, in paying premium prices for the shares of over-capitalized companies, the crash had no sooner come than the newspapers were accused of having puffed pro- motions for the sake of the money received for publishing pros- pectuses. As a matter of fact, in the case of the best dailies in England and America, the editor does not stand at all in awe of the advertiser, and time after time the Money Article has ruth- lessly attacked a promotion of which the prospectus appeared in the very same issue. It is indeed to the interest of the ad- vertiser, as well as to the interest of the reader, that this inde- pendence should be preserved, for the worth of any journal as an advertising medium depends upon its possessing a bona fide circulation among persons who believe it to be a serious and honestly conducted newspaper. All advertisers know that the minor weeklies, which contain nothing but trade puffs, and are scattered broadcast among people who pay nothing for their

copies, are absolutely worthless from the advertiser's point of view. The most striking difference between the periodical press of Great Britain and that of America is, that in the former country the magazines and reviews play but a secondary role, while in the United States the three or four monthlies possessing .the largest circulation are of the very first importance as advertising mediums. One reason for this is that the advertisements in an American magazine are printed on as good paper, and printed with as great care, as any other part of the contents. There are probably very few among American magazine readers who do not habitually look through the advertising pages, with the cer- tainty that they will be entertained by the beauty

of the adver- tiser's illustrations and the quaint curtness of his phrases. Another reason is that the American monthly magazine goes to all parts of the United States, while, owing to the time required for long journeys on even the swiftest trains, no American daily paper can have so general a circulation as The Times in the United Kingdom. In comparison with points on the Pacific coast, Chicago does not seem far from New York, yet, with the excep- tion of one frenzied and altogether unsuccessful attempt, no New York daily has ever attempted to force a circulation in Chicago. The American advertiser would, therefore, have to spend money on a great number of daily papers in order to reach as widespread a public as one successful magazine offers him.

There is reason to believe that the English magazine publishers have erred gravely in taking what are known in the trade as " insets," consisting of separate cards or sheets printed at the advertiser's cost, and accepted by the publisher at a specific charge for every thousand copies. This system of insetting has the grave inconvenience that the advertiser finds himself com- pelled to print as many insets as the publisher asserts that he can use. The publisher, on the other hand, is somewhat at the mercy of too enthusiastic agents and employ6s, who estimate over-confidently the edition of the periodical which will probably be printed for a certain month, and advertisers have had reason to fear that many of their insets were wasted. The added weight and bulk of the insets cause inconvenience and expense to the newsdealer, as two or three insets printed upon cardboard are equivalent to at least sixteen additional pages. Some news- dealers have further complicated the inset question by threaten- ing to remove insets unless special tribute be paid to them; and with all these difficulties to be considered, many magazine publishers have seriously considered the advisability of alto- gether discontinuing the practice of taking insets, and of confin- ing their advertisements to the sheets they themselves print. In connexion with this subject, it may be added that many readers habitually shake loose bills out of a magazine before they begin to turn the pages, and that railway stations, railway carriages and even public streets are thus littered with trampled and muddy advertisements. The old practice of distributing handbills in the streets is dying a natural death, more or less hastened by local by-laws, and when the loose bills in magazines and cheap novels have ceased to exist no one will be the loser.

Advertisements in the weekly press are on the whole more successful in England than in America. A few American weeklies cope successfully with the increasing competition of the huge Sunday editions of American daily papers. But even the most successful among

them — a paper for boys— has hardly attained the prosperity of some among its English contemporaries in the field of weekly journalism.

The merchant who turns to these pages for practical sugges- tions concerning the advertising of his own business, can be given no better advice than to betake himself to an established adver- tising agent of good repute, and be guided by his counsels. The chief part that he can himself play with advantage is to note from day to day whether the agent is obtaining advantageous positions for his announcements. Every advertiser will naturally prefer a right-hand page to a left-hand page, and the right side of the page to the left side of the page; while the advertiser who most indefatigably urges his claims upon the agent will, in the long run, obtain the largest share of the favours to be

distributed. To the merchant who inclines to consider adver- tising in connexion with the broader aspects of his calling, it may be suggested that a new channel of trade demands very serious attention. What is called in England ” postal trade,” and in America ” mail order business,” is growing very rapidly. Small dealers in both countries have complained very bitterly of the competition they suffer from the general dealers and from stores made up of departments which, under one roof, offer to the consumer every imaginable sort of merchandise. This general trading, which, on the one hand, seriously threatens the small trader, and on the other hand offers greater possibilities of profit to the proportionately small number of persons who can undertake business on so large a scale, becomes infinitely more formidable when the general dealer endeavours not only to attract the trade of a town, but to make his place of business a centre from which he distributes by post his goods to remote parts of the country. In America, where the weight of parcels carried by post is limited to 4 lb, and where the private carrying companies are forced to charge a very much higher rate for carriage from New York to California than for shorter distances, the centralization of trade is necessarily limited; but it is no secret that, at the present moment, persons residing in those parts of the United Kingdom most remote from London habitually avail themselves of the English parcel post, which carries packages up to n lb, in order to procure a great part of their household supplies direct from general dealers in London. A trading company, which conducts its operations upon such a scale as this, can afford to spend an almost un- limited sum in advertising throughout the United Kingdom, and even the trader who offers only one specific class of merchan- dise is

beginning to recognize the possibility of appealing to the whole country.

The following is a brief summary of the laws and regulations

dealing with advertisements in public places in certain

regulation. °^ tne countries of Continental Europe and in the

United States of America, the chief authority for

which is an official return issued by the British Home Office

in 1903.

France. — The permission of the owner is alone required for the placing of advertisements on private buildings; but build- ings, walls, &c, belonging to the government or local authorities are reserved exclusively for official notices, &c. ; these alone can be printed on white paper, all others must be on coloured paper. Municipal authorities control the size, construction, &c, of hoardings used for advertising purposes, and the police have full powers over the exhibition of indecent or other objectionable advertisements. The Somite pour la protection des paysages, founded in 1001, has for one of its objects the prevention of advertisements which disfigure the scenery or are otherwise objectionable.

Germany. — By §43 of the Imperial Commercial Ordinance permission to post any trade advertisement in a public street, square, &c, must be first obtained from the local police. The police also control (by §55 of the Imperial Press Law 1874) advertisements which are not of a trade character, but this regulation does not affect the right of the federal legislatures to make regulations in regard to them (§30). It would be impossible to give in any detail the police regulations as to advertisements which exist, e.g. in Prussia, but the following rules in force in Berlin may be given:— Public advertisements in public streets and places may be posted only on the appliances, such as pillar posts, &c, provided for the purpose. Owners of property may post advertisements on their own property but only such as concern their own interests. Advertisements on public conveyances are forbidden. In 1902 a Prussian law was passed authorizing the police to forbid all advertisement hoard- ings, &c, which would disfigure particularly beautiful landscapes in rural districts. The Hesse-Darmstadt Act of 1902 prohibits the placing of any advertisements, posters, &c, on a monument officially protected under the act, if it would be likely to injure the appearance of the monument. As instances of the numerous

local provisions against the abuse of advertising may be cited

those of Augsburg and Liibeck, by which any advertisement that would injure the Stadtbild or appearance of the town may be prohibited and removed by the local authority (see G. Baldwin Brown, The Care of Ancient Monuments, 1905). Full powers exist under the Imperial Criminal Code for the suppression of indecent or objectionable advertisements.

Austria. — Permission of the police is required for the exhibi- tion of printed notices in public places other than such as are of purely local or industrial interest, such as notices of entertain- ment, leases, sales, &c, or theatre programmes, and these can only be shown in places approved by the local authorities (Press Law 1862). The press-police act as advertisement censors and determine whether an advertisement can be allowed or not. In Hungary there are no general laws or regulations, but the municipalities have power to issue ordinances dealing with the question.

Italy. — All control rests with the municipal and communal authorities, who may decide on the places where advertisements may or may not be posted, and can prevent hoardings being placed on or near ancient monuments or public buildings.

Switzerland.— The Federal Government has no authority to deal with this question; certain of the cantons have regulations, e.g. Lucerne prohibits the public advertising of inferior goods by means of a false description, Basel-Stadt gives the police the power of censoring all advertisements. Many of the communal authorities throughout Switzerland have special restrictions and regulations. In Zurich the police choose the advertising stations, in Berne the municipality possesses a monopoly of the right of erecting advertisements. The Society known as the Ligue pour la conservation de la Suisse pittoresque or Schweitzeri- scher Heitnatschutz has for one of its objects the preservation of scenery from disfiguring advertisements.

United States.— There is no federal legislation on the subject, the matter being one for regulation by the states, which in most cases have left it to the various municipalities and other local authorities. With regard to indecent and objectionable advert- isements some states have special legislation on the matter, others are content with the ordinary criminal laws or police powers or with the law of nuisance or of trespass. Thus control can be exercised over such advertisements as are dangerous to public safety, health or morals. The state of New York prohibits advertisements of lotteries. It would

be impossible to give in detail the different laws and regulations passed in the various states or by municipalities. The following are some of the more striking measures adopted in certain of the states. In Massa- chusetts no advertising signs or devices are allowed on the public highways. Power has been granted to city and town authorities to regulate advertisements in, near or visible from public parks. In the District of Columbia no advertisement is allowed which obstructs a highway, and all distribution of handbills, circulars, &c, in public streets, parks, &c, is prohibited. This prohibition against what are generally known as ” dodgers ” is very general in the local regulations throughout the states. In Illinois, city councils are empowered on the incorporation of the city to regu- late and prevent the use of streets, sidewalks and public grounds for signs, handbills and advertisements, &c, and also the exhibi- tion of banners, placards, in the streets or sidewalks. Chicago has a body of most stringent rules, but they apparently have been found impossible to enforce; thus no advertisement board more than 12 ft. square within 400 ft. of a public park or boulevard, no advertisements other than small ones relating to the business carried on in the premises where the advertisement is posted, or of sales, &c, are allowed in streets where three- quarters of the houses are ” residences “only. Prohibition is also extended to the advertisements of those professing to cure diseases or giving notice of the sale of medicines. In Boston there are regulations prohibiting projecting or overhanging signs in the streets, and special rules as to the height at which street signs and advertisements must be placed. The distribu- tion of ” dodgers ” in the streets is prohibited. Advertisements for places of amusement must be approved by the committee qi> licences.

France, Belgium, Italy and certain of the cantons in Switzer- land impose a tax on advertisements, as do certain of the United Taxation States of America, where the form is usually that of a licence duty on billposters or advertising agencies. In many cases in the United States this is imposed by the muni- cipalities. In every case both in Europe and America advertise- ments in newspapers are not subject to any tax.

With regard to the literature of advertising, in addition to the his- torical article in the Edinburgh Review for February 1843, already mentioned, and that in the Quarterly Review for June 1855, the Society for Checking the Abuses of Public Advertising issue a jour- nal,

A Beautiful World. The Journal of the Society of Comparative Legislation (N.S. xvi. 1906) contains an article by W.J.B. Byles on Foreign Law and the Control of Advertisements in Public Places. The advertisers' handbooks, issued by the leading advertising agents, will also be found to contain practical information of great use to the advertiser. (H. R. H.*; C. We.)

ADVICE (Fr. avis, from Lat. ad, to, and visum, viewed), counsel given after consideration, or information from a distance giving particulars of something prospective (e.g. " advice " of an imminent battle, or of a cargo due). In commerce it is a common word for a formal notice from one person concerned in a transaction to another.

ADVOCATE (Lat. advocatus, from advocare, to summon, especially in law to call in the aid of a counsel or witness, and so generally to summon to one's assistance), a lawyer authorized to plead the causes of litigants in courts of law. The word is used technically in Scotland (see Advocates, Faculty of) in a sense virtually equivalent to the English term barrister, and a deriva- tive from the same Latin source is so used in most of the countries of Europe where the civil law is in force. The word advocatus is not often used among the earlier jurists, and appears not to have had a strict meaning. It is not always associated with legal proceedings, and might apparently be applied to a supporter or coadjutor in the pursuit of any desired object. When it came to be applied with a more specific limitation to legal services, the position of the advocatus was still uncertain. It was different from, and evidently inferior to, that of the juris-consultus, who gave his opinion and advice in questions of law, and may be identified with the consulting counsel of the present day. Nor is the merely professional advocate to be confounded with the more distinguished orator, or palronus, who came forward in the guise of the disinterested vindicator of justice. This dis- tinction, however, appears to have arisen in later times, when the profession became mercenary. By the lex Cincia, passed about two centuries B.C., and subsequently renewed, the acceptance of remuneration for professional assistance in lawsuits was pro- hibited. This law, like all others of the kind, was evaded. The skilful debater was propitiated with a present; and though he could not sue for the value of his services, it was ruled that any honorarium so given could not be demanded back, even though he died before the anticipated service was performed. The traces of this evasion of a law may be found in the existing practice of rewarding counsel by fees in anticipation of services.

The term advocatus came eventually to be the word employed when the bar had become a profession, and the qualifications, admission,

numbers and fees of counsel had become a matter of state regulation, to designate the pleaders as a class of pro- fessional men, each individual advocate, however, being still spoken of as patron in reference to the litigant with whose interest he was entrusted. The advocatus fisci, or fiscal advocate, was an officer whose function, like that of a solicitor of taxes at the present day, was connected with the collection of the revenue.

The lawyers who practised in the English courts of common law were never officially known as advocates, the word being reserved for those who practised in the courts of the civil and canon law (see Doctors' Commons). There was formerly an important official termed his majesty's advocate-general, or more shortly, the king's advocate, who was the principal law officer of the crown in the College of Advocates or Doctors' Commons, and in the admiralty and ecclesiastical courts. He discharged for these courts the duties which correspond to those of the

solicitor of the treasury (see Solicitor). His opinion was taken by the foreign office on international matters, and on high ecclesiastical matters he was also consulted; all orders in council were submitted to him for approval. The office may now be said to be obsolete, for after the resignation of Sir Travers Twiss, the last holder, in 1872, it was not filled up. There was also a second law officer of the crown in the admiralty court called the admiralty advocate. This office has long been vacant. Advo- cate is also the title still in use in some of the British colonies to denote the chief law officer of the crown there. For instance, in Sierra Leone (until 1896), Lagos and Cyprus he is called the king's advocate; in Malta, crown advocate; in Mauritius, procureur and advocate-general, and in the provinces of India advocate-general. In France, the avocats, as a body, were re- organized under the empire by a decree of the 15th of December 1810. There is, however, a distinction between avocats and avou&s. The latter, whose number is limited, act as procurators or agents, representing the parties before the tribunals, draft and prepare for them all formal acts and writings, and prepare their lawsuits for the oral debates. The office of the avocat, on the other hand, consists in giving advice as to the law, and con- ducting the causes of his clients by written and oral pleadings. The number of avocats is not limited; every licentiate of law being entitled to apply to the corporation of avocats attached to each court, and aftef presentation to the court, taking the oath of office and passing three years in attendance on some older advocate, to have himself recognised as an advocate.

In Germany the advocat no longer forms a distinct class of lawyer.

Since 1870, when a sweeping judicature act (Deutsche Justizgesetzgebung) reconstituted the judicial system, the advo- cat in his character of adviser, as distinguished from the pro- curator, who formerly represented the client in the courts, has become merged in the Rechtsanwalt, who has the dual character of counsellor and pleader.

In the middle ages the word' advocatus (Fr. avoue, Ger. Vogt) was used on the continent as the title of the lay lord charged with the protection and representation in secular matters of an abbey. The office is traceable as early ˆ ocatus as the beginning of the 5th century in the Roman ecciesiae. empire, the churches being allowed to choose defen- sors from the body of advocates to represent them in the courts. In the Frankish kingdom, under the Merovingians, these lay representatives of the churches appear as agentes, defensores and advocati; and under the Carolingians it was made obli- gatory on bishops, abbots and abbesses to appoint such officials in every county where they held property. The office was not hereditary, the advocatus being chosen, either by the abbot alone, or by the abbot and bishop concurrently with the count. The same causes that led to the development of the feudal system also affected the advocatus. In times of confusion churches and abbeys needed not so much a legal representative as an armed protector, while as feudal immunities were conceded to the ecclesiastical foundations, these required a representative to defend their rights and to fulfil their secular obligations to the state, e.g. to lead the ecclesiastical levies to war. A new class of advocatus thus arose, whose office, commonly rewarded by a grant of land, crystallized into a fief, which, like other fiefs, had by the beginning of the nth century become hereditary.

In France the advocati (avoues) were of two classes — (1) great barons, who held the advocateship of an abbey or abbeys rather as an office than a fief, though they were indemnified for the protection they afforded by a domain and Fn„ch revenues granted by the abbey: thus the duke of avoue. Normandy was advocatus of nearly all the abbeys in the duchy; (2) petty seigneurs, who held their avoueries as heredi- tary fiefs and often as their sole means of subsistence. The avoui of an abbey, of this class, corresponded to the vidame (q.v.) of a bishop. Their function was generally to represent the abbot in his capacity as feudal lord; to act as his representative in the courts of his superior lord; to exercise secular justice in the abbot's name in the abbatial court; to lead the retainers of the abbey to battle under the banner of the patron saint.

In England the word advocatus was never ; used to denote an hereditary representative of an abbot; but in some of the larger abbeys there were hereditary stewards whose functions England. an(ˆ privileges were not dissimilar to those of the continental advocati. The word advocatus, however, was in constant use in England to denote the patron of an ecclesiastical benefice, whose sole right of any importance was an hereditary one of presenting a parson to the bishop for in- stitution. In this way the hereditary right of presentation to a benefice came to be called in English an ” advowson ” (advocatio).

The advocatus played a more important part in the feudal polity of the Empire and of the Low Countries than in France, where his functions, confined to the protection of the interests of religious houses, were superseded from the 13th century on- wards by the growth of the central power and the increasing efficiency of the royal administration. They had, indeed, long ceased to be effective for their original purpose; and from the time when their office became a fief they had taken advantage of their position to pillage and suppress those whom- it was their function to defend. The medieval records, not in France only, are full of complaints by abbots of their usurpations, .exactions and acts of violence.

In Germany the title of advocatus (Vogt) was given not only to the advypati of churches and abbeys, but to the officials appointed, from early in the middle ages, by the German emperor to administer their immediate domains, in Vogt. contradistinction to the counts, who had become

hereditary princes of the Empire. The territory so administered was known as Vogtland {terra advocatorum) , a name still sometimes employed to designate the strip of country which embraces the principalities of Reuss and adjacent portions of Saxony, Prussia and Bavaria. These imperial advocati tended in their turn to become hereditary. Sometimes the emperor himself assumed the title of Vogt of some particular part of his immediate domain. In the Netherlands as well as in Germany advocati were often appointed in the cities, by the overlord or by the emperor, sometimes to take the place of the bailiff (Ger. Schultheiss, Dutch schout, Lat. scultetus), some- times alongside this official.

See Du Cange, Glossariuni (ed. 1,883, Niort), s. ” Advocati “; A. Luchaire, Manuel des institutions frangaises (Paris, 1892) ; Herzog-Hauck, Realencyklopadie (ed. Leipzig, 1896), s. ” Advocatus ec-

clesiae," where further references will be found.

ADVOCATES, FACULTY OF, the collective term by which what in England are called barristers are known in Scotland. They professionally attend the supreme courts in Edinburgh; but they are privileged to plead in any cause before the inferior courts, where counsel are not excluded by statute. They may act in cases of appeal before the House of Lords; and in some of the British colonies, where the civil law is in force, it is cus- tomary for those who practise as barristers to pass as advocates in Scotland. This body has existed by immemorial custom. Its privileges are constitutional, and are founded on no statute or charter of incorporation. The body formed itself gradually, from time to time, on the model of the French corporations of avocats, appointing like them by a general vote, a dean or doyen, who is their principal officer. It also differs from the English and Irish societies in that there is no governing body similar to the benchers, nor is there any resemblance to the quasi-collegiate discipline and the usages and customs prevailing in an inn of court. No curriculum of study, residence or professional train- ing was, until 1856, required on entering this profession; but the faculty have always had the power, believed to-be liable to control by the Court of Session, of rejecting any candidate for admission. The candidate undergoes two private examinations — the one in general scholarship, in lieu of which, however, he may produce evidence of his having graduated as master of arts in a Scottish university, or obtained an equivalent degree in an English or foreign university; and the other, at the interval of a year, in Roman, private international and Scots law. He must, before the latter examination, produce evidence of attendance at classes of Scots law and conveyancing in a Scottish university,

and at classes of, civil law, public or international law, consti- tutional law and medical jurisprudence in a Scottish or other approved university. He has then to undergo the old academic form of the public impugnment of a thesis on some title of the pandects; but this ceremony, called the public examination, has : degenerated into a mere form. A large proportion of the candi- date's entrance fees (amounting to £339) is devoted to the magnificent library belonging to the faculty, which literary investigators in Edinburgh find so eminently useful.

ADVOCATUS DIABOLI, devil's. advocate, the name popularly given to the promoter of the Faith (promoter fidei) , and officer of the Sacred Congregation of Rites at Rome, whose duty is to prepare all possible arguments against the admission of any one to the posthumous honours of beatification and canonization. This functionary is first

formally mentioned under Leo X.(i5i3~ 1521) in the proceedings in connexion with the canonization of St Lorenzo Giustiniani. In 1631 Urban VIII. made his presence,, either in person or by deputy, necessary for the validity of any act connected with the process of beatification or canonization (see Canonization). The phrase, ” devil’s advocate,” has by an easy transference come to be used of any one who puts himself up, or is put up, for the sake of promoting debate, to argue a case in which he does not necessarily believe.

ADVOWSON, or Advowzen (through O. Fr. advouson, from Lat. advocatio, a summons to), the right of presentation to a vacant ecclesiastical benefice, so called because the patron defends or advocates the claims of the person whom he presents. At what period the right of advowson arose is uncertain; it was probably the result of gradual growth. The earliest trace of the practice is found in the decree of the council of Orangej a.d. 441, which allowed a bishop, who had built a church in the, diocese of another bishop, to nominate the clerk, but not to consecrate the church. The 123rd Novel of Justinian, promul- gated about the end of the 5th century, decreed ” that if any man should erect an oratory, and desire to present a clerk thereto by himself or his heirs, if they furnish a competency for his live- lihood, and nominate to the bishop such as are worthy, they may be ordained.” The 57th Novel empowered the bishop to examine them and judge of their qualifications, and, where those were sufficient, obliged him to admit the clerk. In England, for quite two centuries after its conversion, the clergy administered only pro tempore in the parochial churches, receiving their maintenance from the cathedral church, all the appointments within the dio- cese lying with the bishop. But in order to promote the building and endowment of parochial churches those who had contributed to their erection either by a grant of land, by building or by endowment, became entitled to present a clerk of their own choice to the bishop, who was invested with the revenues derived from such contribution. After the Norman Conquest, when the boundaries between church and state were more clearly marked, it became usual for patrons to appoint to livings not only without the consent, but even against the will, of the bishops.

Advowsons are divided into two kinds, appendant and in gross. Originally the right of nominating 1 or presenting was annexed to the person who built or endowed the church, but the right gradually became annexed to the manor in which it was built, for the endowment was considered parcel of the manor, the church being built for the use’of the inhabitants, and the tithes of the manor being attached to the church. Consequently where the right of patronage (the right of the patron to present to the bishop the person whom he

has nominated to become rector or vicar of the parish to the benefice of which he claims the right of advowson) remains attached to the manor, it is called an advowson appendant, and passes with the estate by inheritance

1 The distinction between nomination to a living and presentation is to be noted. Nomination is the power, by virtue of a manor or otherwise, to appoint a clerk to the patron of a benefice, to be byi him presented to the ordinary. Presentation is the act of a patron, in offering his clerk to the bishop, to be instituted in a benefice of his gift. Nomination and presentation, though generally used in law for the same thing, must be so distinguished, for it is possible that the rights of nomination may be in one person, and the rights of presentation in another.

or sale without any special conveyance. But where, as is often the case, the right of presentation has been sold by itself, and so separated from the manor, it is called an advowson in gross. An advowson may also be partly appendant, and partly in gross, e.g. if an owner granted to another every second presentment, the advowson would be appendant for the grantor's turn and in gross for the grantee's.

Advowsons are further distinguished into presentative and collative. In a presentative advowson, the patron presents a clergyman to the bishop, with the petition that he be instituted into the vacant living. The bishop is bound to induct if he find the clergyman canonically qualified, and a refusal on his part is subject to an appeal to an ecclesiastical court either by patron or by presentee. In a collative advowson the bishop is himself the patron, either in his own right or in the right of the proper patron, which has lapsed to him through not being exercised within the statutory period of six months after the vacancy occurred. No petition is necessary in this case, and the bishop is said to collate to the benefice. Before 1898 there were also donative advowsons, but the Benefices Act 1898 made all dona- tions with cure of souls presentative. In a donative advowson, the sovereign, or any subject by special licence from the sover- eign, conferred a benefice by a simple letter of gift, without any reference to the bishop, and without presentation and in- stitution. The, .incumbent of such a living was to a great extent free from the jurisdiction of the bishop, who could only reach him through the action of an ecclesiastical court.

The Benefices Act of 1898 did not make any substantial change in the legal character of advowsons, which remain practically the same as before the act. Briefly, it prevents the dealing with the right of presentation as a thing apart from the advowson itself; increases the power of the bishops to refuse the presentation of unfit persons, and removes several abuses which had arisen in the transfer of patronage. Under the pre- viously existing law, simony, or " the corrupt presentation of any person to an ecclesiastical benefice for gift, money or reward," renders the presentation void, and subjects the persons privy or party to it to penalties; a presentation to a vacant benefice cannot be sold, and no clerk in holy orders can purchase for himself a next presentation. An advowson may, however, be sold during a vacancy, though that will not give the right to present to that vacancy; and a clerk may buy an advowson even though it be only an estate for life, and present himself on the next vacancy. Under the Benefices Act, advowsons may not be sold by public auction except in conjunction with landed property adjacent to the benefice; transfers of patronage must be registered in the registry of the diocese, and no such transfers can be made within twelve months after the last admission or institution to the benefice. Restrictions had also been imposed on the transfer of patronage of churches built under the Church Building Acts and New Parishes Acts, and on that of benefices in the gift of the lord chancellor, and sold by him in order to augment others; but agreements may be made as to the patron- age of such churches in favour of persons who have contri- buted to their building or enlargement without being void for simony.

The right of presentation may be exercised by its owner whether he be an infant, executors, trustees, coparceners (who, if they cannot agree, present in turn in order of age) or mort- gagee (who must present the nominee of the mortgagor), or a bankrupt (who, although the advowson belongs to his creditors, yet has the right to present to a vacancy). Certain owners of advowsons are temporarily or permanently disabled from exer- cising the right which devolves upon other persons; and the crown as patron paramount of all benefices can fill all churches not regularly filled by other patrons. It thus presents to all vacancies caused by simoniacal presentations, or by the incum- bent having been presented to a bishopric or in benefices belong- ing to a bishopric when the see is vacant by the bishop's death, translation or deprivation. Where a presentation belongs to a lunatic, the lord chancellor presents for him. Where it belongs to a Roman Catholic the right is exercised in his behalf by the

university of Oxford if the benefice be situate south of the river Trent, and by that of Cambridge if it be north of that river.

Besides the qualifications required of a presentee by canon law, such as being of the canonical age, and in priest's orders before admission, sufficient learning and proper orthodoxy or morals, the Benefices Act requires that a year shall have elapsed since a transfer of the right of patronage, unless it can be shown that such transfer was not made in view of a probable vacancy; that the presentee has been a deacon for three years; and that he is not unfit for the discharge of his duties by reason of physical or mental infirmity or incapacity, grave pecuniary embarrass- ment, grave misconduct or neglect of duty in an ecclesiastical office, evil life, or conduct causing grave scandal concerning his moral character since his ordination, or being party to an illegal agreement with regard to the presentation; that notice of the presentation has been given to the parish of the benefice. Except by leave of the bishop or sequestrator, the incumbent of a seques- tered benefice cannot be presented. The act also gives to both patron and presentee an alternative mode of appeal against a bishop's refusal to institute or admit, except on a ground of doctrine or ritual, to a court composed of an archbishop of the province and a judge of the High Court nominated for that purpose by the lord chancellor, a course which, however, bars resort being had to the ordinary suits of duplex querela or action of quare impedit. In case of refusal of one presentee, a lay patron may present another, and a clerical patron may do so after an unsuccessful appeal against the refusal.

Upon institution the church is full against everybody except the crown, and after six months' peaceable possession the clerk is secured in possession of the benefice, even though he may have been presented by a person who is not the proper patron. The true patron can, however, exercise his right to present at the next vacancy, and can reserve the advowson from an usurper at any time within three successive incumbencies so created adversely to his right, or within sixty years. Collation, which otherwise corresponds to institution, does not make the church full, and the true patron can dispossess the clerk at any time, unless he is a patron who collates. Possession of the benefice is completed by induction, which makes the church full against any one, including the crown. If the proper patron fails to exer- cise his right within six calendar months from the vacancy, the right devolves or lapses to the next superior patron, e.g. from an ordinary patron to the bishop, and if he makes similar default to the archbishop, and from him on similar default to the Crown. If a bishopric becomes vacant after a lapse has accrued to it, it goes to the metropolitan; but in case of a vacancy of a benefice during the vacancy of the see the crown presents. Until the right of presentation so accruing to a bishop or archbishop is exercised, the patron can still

effectually present but not if lapse has gone to the crown.

(See also Benefice; Glebe; Incumbent; Vicar.)

Authorities. — Burn, Ecclesiastical Law; Bingham's Origines Ecclesiasticae, or, the Antiquities of the English Church; Mirehouse, On Advowson; Phillimore, Ecclesiastical Law.

ADYE, SIR JOHN MILLER (1819-1900), British general, son of Major James P. Adye, was born at Sevenoaks, Kent, on the 1st of November 1819. He entered the Royal Artillery in 1836, was promoted captain in 1846, and served throughout the Crimean War as brigade-major and assistant adjutant-general of artillery (C.B., brevets of major and lieutenant-colonel). In the Indian Mutiny he served on the staff in a similar capacity. Promoted brevet-colonel in i860, he was specially employed in 1863 in the N.W. frontier of India campaign, and was deputy- adjutant-general, Bengal, from 1863 to 1866, when he returned home. From 1870 to 1875 Adye was director of artillery and stores at the War Office. He was made a K.C.B. in 1873, and was promoted to be major-general and appointed governor of the Royal Military Academy, Woolwich, in 1875, and surveyor- general of the ordnance in 1880. In 1882 he was chief of staff and second in command of the expedition to Egypt, and served throughout the campaign (G.C.B. and thanks of parliament). He held the government of Gibraltar from 1883 to 1886. Promoted

lieutenant-general in 1879, general and colonel commandant of the Royal Artillery in 1884, he retired in 1886. He unsuccess- fully contested Bath in the Liberal interest in 1892. He died on the 26th of August 1900. He was author of A Review of The Crimean War; The Defence of Cawnpore; A Frontier Cam- paign in Afghanistan; Recollections of a Military Life; and Indian Frontier Policy.

ADYTUM, the Latinized form of aSvrov (not to be entered), the innermost sanctuary in ancient temples, access to which was forbidden to all but the officiating priests. The most famous adytum in Greece was in the temple of Apollo at Delphi.

ADZE (from the Old Eng. adesa, of which the origin is un- known), a tool used for cutting and planing. It is somewhat like an axe reversed, the edge of the blade curving inward and placed at right angles to the handle. This shape is most suitable for planing uneven timber, as

inequalities are ” hooked off ” by the curved blade. (See Tools.)

AEACUS, in Greek legend, ancestor of the Aeacidae, was the son of Zeus and Aegina, daughter of the river-god Asopus. His mother was carried off by Zeus to the island of Oenone, which was afterwards called by her name. The island having been depopulated by a pestilence, Zeus changed the ants upon it into human beings (Ovid, Met. vii. 520), who were called Myrmidones (juiipAiijxes =5.ants) . Aeacus ruled over his people with such justice and impartiality that after his death he was made judge of the lower world together with Minos and Rhadamanthus. By his wife Endeis he was the father of Telamon and Peleus. His successful prayer to Zeus for rain at a time of drought (Isocrates, Evagoras, 14) was commemorated by a temple at Aegina (Pau- sanias ii. 29). He himself erected a temple to Zeus Panhellenios and helped Poseidon and Apollo to build the walls of Troy.

See Hutchinson, Aeacus, 1901.

AECLANUM, an ancient town of Samnium, Italy, 15 m. E.S.E. of Beneventum, on the Via Appia (near the modern Mirabella). It became the chief town of the Hirpini after Beneventum had become a Roman colony. Sulla captured it in 89 B.C. by setting on fire the wooden breastwork by which it was defended, and new fortifications were erected. Hadrian, who repaired the Via Appia from Beneventum to this point, made it a colony; it has ruins* of the city walls, of an aqueduct, baths and an amphi- theatre; nearly 400 inscriptions have also been discovered. Two different routes to Apulia diverged at this point, one (Via Aurelia Aeclanensis) leading through the modern Ariano to Herdoniae, the other (the Via Appia of the Empire) passing the Lacus Ampsanctus and going on to Aquilonia and Venusia; while the road from Aeclanum to Abellinum (mod. Avellini) may also follow an ancient line. H. Nissen {Italische Landes- kunde, Berlin, 1902, ii. 819) speaks of another road, which he believes to have been that followed by Horace, from Aeclanum to Trevicum and thence to Ausculum; but Th. Mommsen (Corpus Inscrip. Lai., Berlin, 1883, ix. 602) is more likely to be right in supposing that the road taken by Horace ran directly from Beneventum to Trevicum and thence to Aquilonia (though the course of this road is not yet determined in detail), and that the easier, though somewhat longer, road by Aeclanum was of later date.

AEDESIUS (d. a.d. 355), Neoplatonist philosopher, was born of a noble Cappadocian family. He migrated to Syria, attracted by the lectures of lamblichus, whose follower he became. Ac- cording to Eunapius, he

differed from lamblichus on certain points connected with magic. He taught at Pergamum, his chief disciples being Eusebius and Maximus. He seems to have modified his doctrines through fear of Constantine.

See'Ritter and Preller, 552; Ritter's Geschichte der Philosophic, T. Whittaker, The Neoplatonisls (Cambridge, 1901).

AEDICULA (diminutive of Lat. aedis or aedes, a temple or house), a small house or terhple, — a household shrine holding small altars or the statues of the Lares and Penates.

AEDILE (Lat. aedilis), in Roman antiquities, the name of certain Roman magistrates, probably derived from aedis (a temple), because they had the care of the temple of Ceres, where the plebeian archives were kept. They were originally two in

number, called " plebeian " aediles. They were created in the same year as the tribunes of the people (494 B.C.), their persons were sacrosanct or inviolable, and (at least after 471) they were elected at the Comitia Tributa out of the plebeians alone. Originally intended as assistants to the tribunes, they exercised certain police functions, were empowered to inflict fines and managed the plebeian and Roman games. According to Livy (vi. 42), after the passing of the Licinian rogations, an extra day was added to the Roman games; the aediles refused to bear the additional expense, whereupon the patricians offered to undertake it, on condition that they were admitted to the aedile- ship. The plebeians accepted the offer, and accordingly two " curule " aediles were appointed — at first from the patricians alone, then from patricians and plebeians in turn, lastly, from either — at the Comitia Tributa under the presidency of the consul. Although not sacrosanct, they had the right of sitting in a curule chair and wore the distinctive toga praetexta. They took over the management of the Roman and Megalesian games, the care of the patrician temples and had the right of issuing edicts as superintendents of the markets. But although the curule aediles always ranked higher than the plebeian, their functions gradually approximated and became practically identical.

Cicero (Legg. iii. 3, 7) divides these functions under three heads: — (1) Care of the city: the repair and preservation of temples, sewers and aqueducts; street cleansing and paving; regulations regarding traffic, dangerous animals and dilapidated buildings; precautions against fire; superintendence of baths and taverns; enforcement of sumptuary laws; punishment of gamblers and usurers; the care of public morals generally, including the prevention of foreign superstitions. They also

punished those who had too large a share of the ager publicus, or kept too many cattle on the state pastures. (2) Care of provi- sions: investigation of the quality of the articles supplied and the correctness of weights and measures; the purchase of corn for disposal at a low price in case of necessity. (3) Care of the games: superintendence and organization of the public games, as well as of those given by themselves and private individuals (e.g. at funerals) at their own expense. Ambitious persons often spent enormous sums in this manner to win the popular favour with a. view to official advancement.

In 44 Caesar added two patrician aediles, called Cereales, whose special duty was the care of the corn-supply. Under Augustus the office lost much of its importance, its juridical functions and the care of the games being transferred to the praetor, while its city responsibilities were limited by the *j- pointment of a praefectus urbi. In the 3rd century . d. it disappeared altogether.

Authorities. — Schubert, De Romanorum Aedilibus (1828) ; Hoff- mann, De Aedilibus Romanis (1,842) ; Goll, De Aedilibus sub Caesarum Imperio (i860) ; Labatut, Les Ediles et les mtzurs (1868) ; Marquardt Mommsen, Handbuch der romischen Altertiimer, ii. (1888); Soltau, Die urspriingliche Bedeutung und Competenz der Aediles Plebis (Bonn,

1882).

AEDUI, Haedui or Hedui (Gr. Mdovoi), a Gallic people of Gallia Lugdunensis, who inhabited the country between the Arar (Saone) and Liger (Loire). The statement in Strabo (ii. 3. 192) that they dwelt between the Arar and Dubis (Doubs) is incorrect. Their territory thus included the greater part of the modern departments of Sa6ne-et-Loire, Cote d'Or and Nievre. According to Livy (v. 34) , they took part in the expedi- tion of Bellovesus into Italy in the 6th century B.C. Before Caesar's time they had attached themselves to the Romans, and were honoured with the title of brothers and kinsmen of the Roman people. When the Sequani, their neighbours on the other side of the Arar, with whom they were continually quarrelling, invaded their country and subjugated them with the assistance of a German chieftain named Ariovistus, the Aedui sent Divitiacus, the druid, to Rome to appeal to the senate for help, but his mission was unsuccessful. On his arrival in Gaul (58 B.C.), Caesar restored their independence. In spite of this, the Aedui joined the Gallic coalition against Caesar (B.G. vii. 42), but after the surrender of Vercingetorix at Alesia

were glad to return to their allegiance. Augustus dismantled their native capital Bibracte on Mont Beuvray, and substituted a new town with a half-Roman, half-Gaulish name, Augusto- dunum (mod. Autun). During the reign of Tiberius (a.d. 21), they revolted under Julius Sacrovir, and seized Augustodunum, but were soon put down by Gaius Silius (Tacitus, Ann. iii. 43-46). The Aedui were the first of the Gauls to receive from the emperor Claudius the distinction of the jus honorum. The oration of Eumenius (g.v.), in which he pleaded for the restora- tion of the schools of his native place Augustodunum, shows that the district was neglected. The chief magistrate of the Aedui in Caesar's time was called Vergobrelus (according to Mommsen, "judgment-worker"), who was elected annually, possessed powers of life and death, but was forbidden to go beyond the frontier. Certain clientes, or small communities, were also dependent upon the Aedui.

See A. E. Desjardins, Geographic de la Gaule, ii. (1 876-1 893) ; T. R. Holmes, Caesar's Conquest of Caul (1899).

AEGADIAN ISLANDS (Ital. I sole Egati; anc. Aegates In- sulae), a group of small mountainous islands off the western coast of Sicily, chiefly remarkable as the scene of the defeat of the Carthaginian fleet by C. Lutatius Catulus in 241 B.C., which ended the First Punic War. Favignana (Aegusa), the largest, pop. (1901) 6414, lies 10 m. S.W. of Trapani; Levanzo (Phorbantia) 8 m. W.; while Maritimo, the ancient lepa vrjcros, 15 m. W. of Trapani, is now reckoned as a part of the group. They belonged to the Pallavicini family of Genoa until 1874, when they were bought by Signor Florio of Palermo.

AEGEAN CIVILIZATION, the general term for the prehistoric civilization, previously called "Mycenaean" because its existence was first brought to popular notice by Heinrich Schliemann's excavations at Mycenae in 1876. Subsequent discoveries, how- ever, have made it clear that Mycenae was not its chief centre in its earlier stages, or, perhaps, at any period; and, accordingly, it is more usual now to adopt a wider geographical title.

I. History of Discovery and Distribution of Remains. — Mycenae and Tiryns are the two principal sites on which evidence of a prehistoric civilization was remarked long ago by the classical Greeks. The curtain- wall and towers of the Mycenaean .citadel, its gate with heraldic lions, and the great " Treasury of Atreus " had borne silent

witness for ages before Schliemann's time; but they were supposed only to speak to the Homeric, or at farthest a rude Heroic beginning of purely Hellenic, civiliza- tion. It was not till Schliemann exposed the contents of the graves which lay just inside the gate (see Mycenae), that scholars recognized the advanced stage of art to which pre-historic dwellers in the Mycenaean citadel had attained. There had been, however, a good deal of other evidence available before 1876, which, had it been collated and seriously studied, might have discounted the sensation that the discovery of the citadel graves eventually made. Although it was recognized that certain tributaries, represented e.g. in the XVIIIth Dynasty tomb of Rekhmara at Egyptian Thebes as bearing vases of peculiar forms, were of some Mediterranean race, neither their precise habitat nor the degree of their civilization could be determined while so few actual prehistoric remains were known in the Mediterranean lands. Nor did the Aegean objects which were lying obscurely in museums in 1870, or thereabouts, provide a sufficient test of the real basis underlying the Hellenic myths of the Argolid, the Troad and Crete, to cause these to be taken seriously. Both at Sevres and Neuchatel Aegean vases have been exhibited since about 1840, the provenience being in the one case Phylakope in Melos, in the other Cephalonia. Ludwig Ross, by his explorations in the Greek islands from 1835 onwards, called attention to certain early intaglios, since known as Inselsteine; but it was not till 1878 that C. T. Newton demon- strated these to be no strayed Phoenician products. In 1866 primitive structures were discovered in the island of Therasia by quarrymen extracting pozzolana for the Suez Canal works; and when this discovery was followed up in 1870, on the neigh- bouring Santorin (Thera), by representatives of the French School at Athens, much pottery of a class now known immedi-

ately to precede the typical late Aegean ware, and many stone and metal objects, were found and dated by the geologist Fouqu6, somewhat arbitrarily, to 2000 B.C., by consideration of the superincumbent eruptive stratum. Meanwhile, in 1868, tombs at Ialysus in Rhodes had yielded to M. A. Biliotti many fine painted vases of styles which were called later the third and fourth " Mycenaean "; but these, bought by John Ruskin, and presented to the British Museum, excited less attention than they deserved, being supposed to be of some local Asiatic fabric of uncertain date. Nor was a connexion immediately detected between them and the objects found four years later in a tomb at Menidi in Attica and a rock-cut " bee-hive " grave near the Argive Heraeum.

Even Schliemann's first excavations at Hissarlik in the Troad (q.v.) did not excite surprise. But the " Burnt City " of his second stratum,

revealed in 1873, with its fortifications and vases, and a hoard of gold, silver and bronze objects, which the discoverer connected with it, began to arouse a curiosity which was destined presently to spread far outside the narrow circle of scholars. As soon as Schliemann came on the Mycenae graves three years later, light poured from all sides on the prehistoric period of Greece. It was recognized that the character of both the fabric and the decoration of the Mycenaean objects was not that of any well-known art. A wide range in space was proved by the identification of the Inselsteine and the Ialysus vases with the new style, and a wide range in time by collation of the earlier Theraean and Hissarlik discoveries. A relation between objects of art described by Homer and the Mycenaean treasure was generally allowed, and a correct opinion prevailed that, while certainly posterior, the civilization of the Iliad was reminiscent of the Mycenaean. Schliemann got to work again at Hissarlik in 1878, and greatly increased our knowledge of the lower strata, but did not recognize the Aegean remains in his ” Lydian” city of the sixth stratum, which were not to be fully revealed till Dr W. Dorpfeld resumed the work at Hissarlik in 1892 after the first explorer’s death (see Troad). But by laying bare in 1884 the upper stratum of remains on the rock of Tiryns (q.v.), Schliemann made a contribution to our knowledge of prehistoric domestic life which was amplified two years later by Chr. Tsountas’s discovery of the Mycenae palace. Schliemann’s work at Tiryns was not resumed till 1905, when it was proved, as had long been suspected, that an earlier palace underlies the one he had exposed. From 1886 dates the finding of Mycenaean sepulchres outside the Argolid, from which, and from the con- tinuation of Tsountas’s exploration of the buildings and lesser graves at Mycenae, a large treasure, independent of Schliemann’s princely gift, has been gathered into the National Museum at Athens. In that year were excavated dome-tombs, most already rifled but retaining some of their furniture, at Arkina and Eleusis in Attica, at Dimini near Volo in Thessaly, at Kampos on the west of Mount Taygetus, and at Maskarata in Cephalonia. The richest grave of all was explored at Vaphio in Laconia in 1889, and yielded, besides many gems and miscellaneous goldsmiths’ work, two golden goblets chased with scenes of bull-hunting, and certain broken vases painted in a large bold style which remained an enigma till the excavation of Cnossus. In 1890 and 1893 Staes cleared out certain less rich dome-tombs at Thoricus in Attica; and other graves, either rock-cut ” bee-hives ” or chambers, were found at Spata and Aphidna in Attica, in Aegina and Salamis, at the Heraeum (see Argos) and Nauplia in the Argolid, near Thebes and Delphi, and not far from the Thessalian Larissa. During the excavations on the Acropolis at Athens, terminated in 1888, many potsherds of the Mycenaean style were

found; but Olympia had yielded either none, or such as had not been recognized before being thrown away, and the temple site at Delphi produced nothing distinctively Aegean. The American explorations of the Argive Heraeum, concluded in 1895, also failed to prove that site to have been important in the prehistoric time, though, as was to be expected from its neighbourhood to Mycenae itself, there were traces of occupation in the later Aegean periods. Prehistoric research had now begun to extend beyond the Greek mainland. Certain central Aegean

islands, Antiparos, Ios, Amorgos, Syros and Siphnos, were all found to be singularly rich in evidence of the middle-Aegean period. The series of Syran built graves, containing crouching corpses, is the best and most representative that is known in the Aegean. Melos, long marked as a source of early objects, but not systematically excavated until taken in hand by the British School at Athens in 1896, yielded at Phylakope remains of all the Aegean periods, except the Neolithic. A map of Cyprus in the later Bronze Age (such as is given by J. L. Myres and M. O. Richter in Catalogue of the Cyprus Museum) shows more than five-and-twenty settlements in and about the Mesaorea district alone, of which one, that at Enkomi, near the site of Salamis, has yielded the richest Aegean treasure in precious metal found outside Mycenae. E. Chantre in 1894 picked up lustreless ware, like that of Hissarlik, in central Phrygia and at Pteria (q.v.), and the English archaeological expeditions, sent subsequently into north-western Anatolia, have never failed to bring back ceramic specimens of Aegean appearance from the valleys of the Rhyn- dacus, Sangarius and Halys. In Egypt in 1887 W. M. F. Petrie found painted sherds of Cretan style at Kahun in the Fayum, and farther up the Nile, at Tell el-Amarna, chanced on bits of no fewer than 800 Aegean vases in 1889. There have now been recognized in the collections at Cairo, Florence, London, Paris and Bologna several Egyptian imitations of the Aegean style which can be sjet off against the many debts which the centres of Aegean culture owed to Egypt. Two Aegean vases were found at Sidon in 1885, and many fragments of Aegean and especially Cypriote pottery have been turned up during recent excavations of sites in Philistia by the Palestine Fund. South-eastern Sicily, ever since P. Orsi excavated the Sicel cemetery near Lentini in

1877, has proved a mine of early remains, among which appear in regular succession Aegean fabrics and motives of decoration from the

period of the second stratum at Hissarlik. Sardinia has Aegean sites, e.g. at Abini near Teti; and Spain has yielded objects recognized as Aegean from tombs near Cadiz and from Saragossa. One land, however, has eclipsed all others in the Aegean by the wealth of its remains of all the prehistoric ages, viz. Crete, so much so that, for the present, we must regard it as the fountain-head of Aegean civilization, and probably .for long its political and social centre. The island first attracted the notice of archaeologists by the remarkable archaic Greek bronzes found in a cave on Mount Ida in 1885, as well as by epigraphic monuments such as the famous law of Gortyna; but the first undoubted Aegean remains reported from it were a few objects extracted from Cnossus by Minos Kalokhairinos of Candia in

1878. These were followed by certain discoveries made in the S. plain (Messara) by F. Halbherr. W. J. Stillman and H- Schliemann both made unsuccessful attempts at Cnossus, and A. J. Evans, coming on the scene in 1893, travelled in succeed- ing years about the island picking up trifles of unconsidered evidence, which gradually convinced him that greater things would eventually be found. He obtained enough to enable him to forecast the discovery of written characters, till then not sus- pected in Aegean civilization. The revolution of 1897-98 opened the door to wider knowledge, and much exploration has ensued, for which see Crete. Thus the ” Aegean Area ” has now come to mean the Archipelago with Crete and Cyprus, the Hellenic peninsula with the Ionian isles, and Western Anatolia. Evidence is still wanting for the Macedonian and Thracian coasts. Off-shoots are found in the W. Mediterranean, in Sicily, Italy, Sardinia and Spain, and in the E. in Syria and Egypt. About the Cyrenaica we are still insufficiently informed.

II. General Nature 0} the Evidence. — For details of monumental evidence the articles on Crete, Mycenae, Tiryns, Troad, Cyprus, &c, must be consulted. The most representative site explored up to now is Cnossus (see Crete, sect. Archaeology) , which has yielded not only the most various but the most continuous evidence from the Neolithic age to the twilight of classical civilization. Next in importance come Hissarlik, Mycenae, Phaestus, Hagia, Triada, Tiryns, Phylakope, Palai-kastro and Gournia.

A. The internal evidence at present available comprises —

(1) Structures. — Ruins of palaces, palatial villas, houses, built dome- or cist-graves and fortifications (Aegean isles, Greek mainland and N.W. Anatolia), but not distinct temples; small shrines, however, and temeni (religious enclosures, remains of one of which were probably

found at Petsofa near Palaikastro by J. L. Myres in 1904) are represented on intaglios and frescoes. From like sources and from inlay-work we have also representations of palaces and houses.

(2) Structural. Decoration. — Architectural features, such as columns, friezes and various mouldings; mural decoration, such as fresco-paintings, coloured reliefs and mosaic inlay.

(3) Furniture, — (a) Domestic, such as vessels of all sorts and in many materials, from huge store-jars down to tiny unguent- pots; culinary and other implements; thrones, seats, tables, &c, these all in stone or plastered terra-cotta. (b) Sacred, such as models or actual examples of ritual objects; of these we have also numerous pictorial representations, (c) Funerary, e.g. coffins in painted terra-cotta.

(4) Artistic fabrics, e.g. plastic objects, carved in stone or ivory, cast or beaten in metals (gold, silver, copper and bronze), or modelled in clay, faience, paste, &c. Very little trace has yet been found of large free sculpture, but many examples exist of sculptors' smaller work. Vases of all kinds, carved in marble or other stones, cast or beaten in metals or fashioned in clay, the latter in enormous number and variety, richly ornamented with coloured schemes, and sometimes bearing moulded decora- tion. Examples of painting on stone, opaque and transparent. Engraved objects in great number, e.g. ring-bezels and gems; and an immense quantity of clay impressions, taken from these.

(5) Weapons, tools and implements, in stone, clay and bronze, and at the last iron, sometimes richly ornamented or inlaid. Numerous representations also of the same. No actual body- armour, except suGh as was ceremonial and buried with the dead, like the gold breastplates in the circle-graves at Mycenae.

(6) Articles of personal use, e.g. brooches (fibulae), pins, razors, tweezers, &c, often found as dedications to a deity, e.g. in the Dictaean Cavern of Crete. No textiles have survived.

(7) Written documents, e.g. clay tablets and discs (so far in Crete only) , but nothing of more perishable nature, such as skin, papyrus, &c. ; engraved gems and gem impressions; legends written with pigment on pottery (rare); characters incised on stone or pottery. These show two main systems of script (see Crete).

(8) Excavated tombs, of either the pit or the grotto kind, in which the dead were laid, together with various objects of use and luxury,

without cremation, and in either coffins or loculi or simple wrappings.

(9) Public works, such as paved and stepped roadways, bridges, systems of drainage, &c.

B. There-is also a certain amount of external evidence to be gathered from—

(1) Monuments and records of other contemporary civiliza- tions, e.g. representations of alien peoples in Egyptian frescoes; imitation of Aegean fabrics and style in non-Aegean lands; allusions to Mediterranean peoples in Egyptian, Semitic or Babylonian records.

(2) Literary traditions of subsequent civilizations, especially the Hellenic, such as, e.g., those embodied in the Homeric poems, the legends concerning Crete, Mycenae, &c; statements as to the origin of gods, cults and so forth, transmitted to us by Hellenic antiquarians such as Strabo, Pausanias, Diodorus Siculus, &c.

(3) Traces of customs, creeds, rituals, &c, in the Aegean area at a later time, discordant with the civilization in which they were practised and indicating survival from earlier systems. There are also possible linguistic and even physical survivals to be considered.

III. General Features of Aegean Civilization. — The leading features of Aegean civilization, as deduced from the evidence, must be stated very briefly.

(1) Political Organization.— -The great Cretan palaces and the fortified citadels of Mycenae, Tiryns and Hissarlik, each

AEGEAN CIVILIZATION

GRAPHIC ART

Plate f

Fig. i— FLYING FISH FRESCO, PHYLAKOPI.

Cf. J.B.S. Suppl. Papers, iv.

Fig. 2— BULL, WITH LEAPING BULL-FIGHTER, TIRYNS.

Cf. Schlicmann, Tiryns, Plate XIII.

Fig. 4.— MIDDLE MINOAN VASE, CNOSSUS.

B.S.A. is.. 120, Fig. 75.

‘”+?

*’#’

mm

Fig. 3.— LAMP-STAND, PHYLAKOPI. Fig. 5.— MINIATURE FRESCOES, SHOW- Fig. 6— FILLER VASE, ZAKRO.

3-

Cf. J.H.S. Suppl. Papers, iv. Plate XXII. I. 246.

ING SPECTATORS AT ATHLETIC J.H.S. vol. X xii. plate XII.

SPORTS, CNOSSUS.

From Photo by Dr A. J. Evans.

By permission of the Society for the Promotion of Hellenic Studies.

Plate II.

AEGEAN CIVILIZATION

PLASTIC ART

Fig. 2.— MARBLE IDOLS, AMORGOS; 6-u. FIDDLE AND MALLET TYPES, 12-14, DEVELOPED TYPES.

Man, 1901, 185, No 146.

By permission of the Royal Anthropological Institute.

Fig. i— FAIENCE PLAGUE, CNOSSUS.

B.S.A. a. Plate III.

Fig. ■x —COLOURED BAS-RELIEF IN GESSO Fig. 4 — MARBLE HEAD

DURO, REPRESENTING MALE FOSSO FROM AMORGOS (ASH- mIHT[. n m .__,_, rM ˆ..,,

WITH FLEUR-DE-LIS COLLAR. MOLEAN MUSEUM). Fig. 5— BULL IN PAINTED PLASTER, CNOoSUS

B.S.A. vii. 17. Fig. 6. Ph”” “y Dr A – J- Evans –

Figs 6 7— IVORY FIGURES AND HEADS OF ATHLETES, BULL-FIGHTERS OR ACROBATS, CNOSSUS.

B.S.A. viii. Plates II. and III., and p. 72 sq.

By permission of the Society for the Promotion of Hellenic Studies.

Map showing the distribution of AEGEAN SITES

Cnosstis* ... _ iSfH, PhaestusJ

•ear

containing little more than one great residence, and dominating lower towns of meaner houses, point to monarchy at all periods. Independent local developments of art before the middle of the 2nd millennium B.C. suggest the early existence of independent units in various parts, of which the strongest was the Cnossian. After that date the evidence goes strongly to show that one political dominion was spread for a brief period, or for two brief periods, over almost all the area (see later). The great number of tribute-tallies found at Cnossus perhaps indicates that the centre of power was always there. .

(2) Religion. — The fact that shrines have so far been found within palaces and not certainly anywhere else indicates that the kings kept religious power in their own hands; perhaps they were themselves high-priests. Religion in the area seems to have been essentially the same everywhere from the earliest period, viz. the cult of a Divine Principle, resident in dominant features of nature (sun, stars, mountains, trees, &c.) and control- ling fertility. This cult passed through an aniconic stage, from which fetishes survived to the last, these being rocks or pillars, trees, weapons (e.g. bipennis, or double

war-axe, shield), &c. When the iconic stage was reached, about 2000 B.C., we find the Divine Spirit represented as a goddess with a subordinate young god, as in many other E. Mediterranean lands. The god was probably son and mate of the goddess, and the divine pair represented the genius of Reproductive Fertility in its relations with humanity. The goddess sometimes appears with doves, as uranic, at others with snakes, as chthonic. In the ritual fetishes, often of miniature form, played a great part: all sorts of plants and animals were sacred: sacrifice (not burnt, and human very doubtful), dedication of all sorts of offerings and simulacra, invocation, &c, were practised. The dead, who returned to the Great Mother, were objects of a sort of hero- worship. This early nature-cult explains many anomalous features of Hellenic religion, especially in the cults of Artemis and Aphrodite. (See Crete.)

(3) Social Organization. — There is a possibility that features of a primeval matriarchate long survived; but there is no certain evidence. Of the organization of the people under the monarch we are ignorant. There are so few representations of armed men that it seems doubtful if there can have been any professional military class. Theatral structures found at Cnossus and Phaestus, within the precincts of the palaces, were perhaps used for shows or for sittings of a royal assize, rather than for popular assemblies. The Cnossian remains contain evidence of an elaborate system of registration, account- keeping and other secretarial work, which perhaps indicates a considerable body of law. The life of the ruling class was comfortable and even luxurious from early times. Fine stone palaces, richly decorated, with separate sleeping apartments,

large halls, ingenious devices for admitting light and air, sanitary conveniences and marvellously modern arrangements for supply of water and for drainage, attest this fact. Even the smaller houses, after the Neolithic period, seem also to have been of stone, plastered within. After 1600 B.C. the palaces in Crete had more than one story, fine stairways, bath-chambers, win- dows, folding and sliding doors, &c. In this later period, the distinction of blocks of apartments in some palaces has been held to indicate the seclusion of women in harems, at least among the ruling caste. Cnossian frescoes show women grouped apart, and they appear alone on gems. Flesh and fish and many kinds of vegetables were evidently eaten, and wine and beer were drunk. Vessels for culinary, table, and luxurious uses show an infinite variety of form and purpose. Artificers' implements of many kinds were in use, bronze succeeding obsidian and other hard stones as the material.

Seats are found carefully shaped to the human person. There was evidently olive- and vine-culture on a large scale in Crete at any rate. Chariots were in use in the later period, as is proved by the pictures of them on Cretan tablets, and therefore, probably, the horse also was known. Indeed a horse appears on a gem impression. Main ways were paved. Sports, probably more or less religious, are often represented, e.g. bull-fighting, dancing, boxing, armed combats.

(4) Commerce was practised to some extent in very early times, as is proved by the distribution of Melian obsidian over all the Aegean area and by the Nilotic influence on early Minoan art. We find Cretan vessels exported to Melos, Egypt and the Greek mainland. Melian vases came in their turn to Crete. After 1600 B.C. there is very close intercourse with Egypt, and Aegean things find their way to all coasts of the Mediterranean (see below). No traces of currency have come to light, unless certain axe-heads, too slight for practical use, had that char- acter; but standard weights have been found, and representa- tions of ingots. The Aegean written documents have not yet proved (by being found outside the area) epistolary correspond- ence with other lands. Representations of ships are not common, but several have been observed on Aegean gems, gem-sealings and vases. They are vessels of low free-board, with masts. Familiarity with the sea is proved by the free use of marine motives in decoration.

(5) Treatment of the Dead. — The dead in the earlier period were laid (so far as we know at present) within cists constructed of upright stones. These were sometimes inside caves. After the burial the cist was covered in with earth. A little later, in Crete, bone-pits seem to have come into use, containing the remains of many burials. Possibly the flesh was boiled off the bones at once (" scarification "),. or left to rot in separate cists awhile; afterwards the skeletons were collected and the cists

re-used. The coffins are of small size, contain corpses with the knees drawn up to the chin and are found in excavated chambers or pits. In the later period a peculiar " bee-hive " tomb became common, sometimes wholly or partly excavated, sometimes (as in the magnificent Mycenaean " Treasuries ") constructed dome- wise. The shaft-graves in the Mycenae circle are also a late type, paralleled in the later Cnossian cemetery. The latest type of tomb is a flatly vaulted chamber approached by a horizontal or slightly inclined way, whose

sides converge above. At no period do the Aegean dead seem to have been burned. Weapons, food, water, unguents and various trinkets were laid with the corpse at all periods. In the Mycenae circle an altar seems to have been erected over the graves, and perhaps slaves were killed to bear the dead chiefs company. A painted sarco- phagus, found at Hagia Triada, also possibly shows a hero-cult of the dead.

(6) Artistic Production. — Ceramic art reached a specially high standard in fabric, form and decoration by the middle of the 3rd millennium B.C. in Crete. The products of that period com- pare favourably with any potters' work in the world. The same may be said of fresco-painting, and probably of metal work. Modelling in terra-cotta, sculpture in stone and ivory, engraving on gems, were following it closely by the beginning of the 2nd millennium. After 2000 B.C. all these arts revived, and sculpture, as evidenced by relief work, both on a large and on a small scale, carved stone vessels, metallurgy in gold, silver and bronze, advanced farther. This art and those of fresco- and vase-painting and of gem-engraving stood higher about the 15th century B.C. than at any subsequent period before the 6th century. The manufacture, modelling and painting of faience objects, and the making of inlays in many materials were also familiar to Aegean craftsmen, who show in all their best work a strong sense of natural form and an appreciation of ideal balance and decorative effect, such as are seen in the best products of later Hellenic art. Architectural ornament was also highly developed. The richness of the Aegean capitals and columns may be judged by those from the " Treasury of Atreus " now set up in the British Museum; and of the friezes we have examples in Mycenaean and Cnossian fragments, and Cnossian paintings. The magnificent gold work of the later period, preserved to us at Mycenae and Vaphio, needs only to be mentioned. It should be compared with stone work in Crete, especially the steatite vases with reliefs found at Hagia Triada. On the whole, Aegean art, at its two great periods, in the middle of the 3rd and 2nd millennia respectively, will bear comparison with any contemporary arts.

IV. Origin, Nature and History of Aegean Civilization. — The evidence, summarized above, though very various and volumin- ous, is not yet sufficient to answer all the questions which may be asked as to the origin, nature and history of this civilization, or to answer any but a few questions with absolute certainty. We shall try to indicate the extent to which it can legitimately be applied.

A. Distinctive Features. — The fact that Aegean civilization is distinguished from all others, prior or contemporary, not only by its geographical area, but by leading organic characteristics, has never

been in doubt, since its remains came to be studied seriously and impartially. The truth was indeed obscured for a time by persistent prejudices in favour of certain alien Medi- terranean races long known to have been in relation with the Aegean area in prehistoric times, e.g. the Egyptians and especi- ally the Phoenicians. But their claims to be the principal authors of the Aegean remains grew fainter with every fresh Aegean discovery, and every new light thrown on their own proper products; with the Cretan revelations they ceased altogether to be considered except by a few Homeric enthusiasts. Briefly, we now know that the Aegean civilization developed these distinctive features. (1) An indigenous script expressed in characters of which only a very small percentage are identical, or even obviously connected, with those of any other script. This is equally true both of the pictographic and the linear Aegean systems. Its nearest affinities are with the ” Asianic ” scripts, preserved to us by Hittite, Cypriote and south-west

Anatolian (Pamphylian, Lycian and Carian) inscriptions. But neither are these affinities close enough to be of any practical aid in deciphering Aegean characters, nor is it by any means certain that there is parentage. The Aegean script may be, and probably is, prior in origin to the ” Asianic “; and it may equally well be owed to a remote common ancestor, or (the small number of common characters being considered) be an entirely independent evolution from representations of natural objects (see Crete). (2) An Art, whose products cannot be confounded with those of any other known art by a trained eye. Its obliga- tions to other contemporary arts are many and obvious, especi- ally in its later stages; but every borrowed form and motive undergoes an essential modification at the hands of the Aegean craftsman, and the product is stamped with a new character. The secret of this character lies evidently in a constant attempt to express an ideal in forms more and more closely approaching to realities. We detect the dawn of that spirit which afterwards animated Hellenic art. The fresco-paintings, ceramic motives, reliefs, free sculpture and toreutic handiwork of Crete have supplied the clearest proof of it, confirming the impression already created by the goldsmiths’ and painters’ work of the Greek mainland (Mycenae, Vaphio, Tiryns). (3) Architectural plans and decoration. The arrangement of Aegean palaces is of two main types. First (and perhaps earliest in time), the chambers are grouped round a central court, being engaged one with the other in a labyrinthine complexity, and the greater oblongs are entered from a long side and divided longitudinally by pillars. Second, the main chamber is of what is known as the megaron type, i.e. it stands free, isolated from the rest of the plan by corridors, is entered from a vestibule on a short side, and has a central hearth, surrounded by

pillars and perhaps hypaethral; there is no central court, and other apartments form distinct blocks. For possible geographical reasons for this duality of type see Crete. In spite of many comparisons made with Egyptian, Babylonian and ” Hittite ” plans, both these arrangements remain incongruous with any remains of prior or contemporary structures elsewhere. Whether either plan suits the ” Homeric palace ” does not affect the present question. (4) A type of tomb, the dome or ” bee-hive,” of which the grandest examples known are at Mycenae. The Cretan ” larnax ” coffins, also, have no parallels outside the Aegean. There are other infinite singularities of detail; but the above are more than sufficient to establish the point.

B. Origin and Continuity. — With the immense expansion of the evidence, due to the Cretan excavations, a question has arisen how far the Aegean civilization, whose total duration covers at least three thousand years, can be regarded as one and continuous. Thanks to the exploration of Cnossus, we now know that Aegean civilization had its roots in a primitive Neo- lithic period, of uncertain but very long duration, represented by a stratum which (on that site in particular) is in places nearly 20 ft. thick, and contains stone implements and sherds of hand- made and hand-polished vessels, showing a progressive develop- ment in technique from bottom to top. This Cnossian stratum seems to be throughout earlier than the lowest layer at Hissarlik. It closes with the introduction of incised, white-fijled decoration on pottery, whose motives are presently found reproduced in monochrome pigment. We are now in the beginning of the Bronze Age, and the first of Evans’s ” Minoan ” periods (see Crete). Thereafter, by exact observation of stratification, eight more periods have been distinguished by the explorer of Cnossus, each marked by some important development in the universal and necessary products of the potter’s art, the least destructible and therefore most generally used archaeological criterion. These periods fill the whole Bronze Age, with whose close, by the introduction of the superior metal, iron, the Aegean Age is conventionally held to end. Iron came into general Aegean use about 1000 B.C., and possibly was the means by which a body of northern invaders established their power on the ruins of the earlier dominion. The important point is this, that throughout the nine Cnossian periods, following the Neolithic Age (nam«d by Evans, ” Minoaa I. 1, 2, 3; II. 1, 2, 3; III. 1,

2, 3 ” ; see Crete), there is evidence of a perfectly orderly and

continuous evolution in, at any rate, ceramic art. From one stage to another, fabrics, forms and motives of decoration develop gradually; so that, at the close of a span of more than two thousand years, at the least, the influences of the beginning can still be clearly seen and no trace of violent artistic intrusion can be detected. This fact, by itself, would go far to prove that the civilization continued fundamentally and essentially the same throughout. It is, moreover, supported by less abun- dant remains of other arts. That of painting in fresco, for in- stance, shows the same orderly development from at any rate Period II. 2 to the end. About institutions we have less certain knowledge, there being but little evidence for the earlier periods; but in the documents relating to religion, the most significant of all, it can at least be said that there is no trace of sharp change. We see evidence of a uniform Nature Worship passing through all the normal stages down to theoanthropism in the latest period. There is no appearance of intrusive deities or cult-ideas. We may take it then (and the fact is not disputed even by those who, like Dorpfeld, believe in one thorough racial change, at least, during the Bronze Age) that the Aegean civilization was indigenous, firmly rooted and strong enough to persist essen- tially unchanged and dominant in its own geographical area throughout the Neolithic and Bronze Ages. This conclusion can hardly entail less than a belief that, at any rate, the mass of those who-“possessed this civilization continued racially the same.

There are, however, in certain respects at certain periods, evidences of such changes as might be due to the intrusion of small conquering castes, which adopted the superior civilization of the conquered people and became assimilated to the latter. The earliest palace at Cnossus was built probably in Period II. 1 or 2. It was of the type mentioned first in the description of palace-plans above. Before Period III. 1 it was largely re- built, and arguments have been brought forward by Dorpfeld to show that features of the second type were then introduced. A similar rebuilding took place at the same epoch at Phaestus, and possibly at Hagia Triada. Now the second type, the ” megaron ” arrangement, characterizes peculiarly the palaces discovered in the north of the Aegean area, at Mycenae, Tiryns and Hissarlik, where up to the present no signs of the first type, so characteristic of Crete, have been observed. These northern ” megara ” are all of late date, none being prior to Minoan III. 1. At Phylakope, a ” megaron ” appears only in the uppermost Aegean stratum, the underlying structures being more in con- formity with the earlier Cretan. At the same epoch a notable change took place in the Aegean script. The pictographic characters, found on seals and discs of Period II. in Crete, had given way entirely to a linear system by Period III.

That system thenceforward prevailed exclusively, suffering a slight modification again in III. 2 and 3.

These and other less well marked changes, say some critics, are signs of a racial convulsion not long after 2000 B.C. An old race was conquered by a new, even if, in matters of civilization, the former capta victorem cepit. For these races respectively Dorpfeld suggests the names ” Lycian ” and ” Carian, ” the latter coming in from the north Aegean, where Greek tradition remembered its former dominance. These names do not greatly help us. If we are to accept and profit by Dorpfeld’s nomen- clature, we must be satisfied that, in their later historic habitats, both Lycians and Carians showed unmistakable signs of having formerly possessed the civilizations attributed to them in pre- historic times — signs which research has hitherto wholly failed to find. The most that can be said to be capable of proof is the infiltration of some northern influence into Crete at’ the end of Minoan Period II. ; but it probably brought about no change of dynasty and certainly no change in the prevailing race.

A good deal of anthropometric investigation has been devoted to human remains of the Aegean epoch, especially to skulls and bones found in Crete in tombs of Period II. The result of this, however, has not so far established more than the fact that the Aegean races, as a whole, belonged to the dark, long-headed

Homo Mediterraneus, whose probable origin lay in mid-eastern Africa — a fact only valuable in the present connexion in so far as it tends to discredit an Asiatic source for Aegean civilization. Not enough evidence has been collected to affect the question of racial change during the Aegean period. From the skull- forms studied, it would appear, as we should expect, that the Aegean race was by no means pure even in the earlier Minoan periods. It only remains to be added that there is some ground for supposing that the language spoken in Crete before the later Doric was non-Hellenic, but Indo-European. This inference rests on three inscriptions in Greek characters but non-Greek language found in E. Crete. The language has some apparent affinities with Phrygian. The inscriptions are post-Aegean by many centuries, but they occur in the part of the island known to Homer as that inhabited by the Eteo-Cretans, or aborigines. Their language may prove to be that of the Linear tablets.

C. History of Aegean Civilization. — History of an inferential and summary sort only can be derived from monuments in the absence of written records. The latter do, indeed, exist in the case of the Cretan civilization and in great numbers; but they are undeciphered and

likely to remain so, except in the im- probable event of the discovery of a long bi-lingual text, partly couched in some familiar script and language. Even in that event, the information which would be derived from the Cnossian tablets would probably make but a small addition to history,, since in very large part they are evidently mere inventories of tribute and stores. The engraved gems probably record divine or human names. (See Crete.)

(1) Chronology. — The earliest chronological datum that we possess is inferred from a close similarity between certain Cretan hand-made and polished vases of Minoan Period I. 1 and others discovered by Petrie at Abydos in Egypt and referred by. him to the 1st Dynasty. He goes so far as to pronounce the latter to be Cretan importations, their fabric and forms being unlike anything Nilotic. If that be so, the period at which stone im- plements were beginning to be superseded by bronze in Crete must be dated before 4000 B.C. But it will be remembered that below all Evans's " Minoan " strata lies the immensely thick Neolithic deposit. To date the beginning of this earliest record of human production is impossible at present. The Neolithic stratum varies very much in depth, ranging from nearly 20 ft. to 3 ft., but is deepest on the highest part of the hillock. Its variations may be due equally to natural denudation of a stratum once of uniform depth, or to the artificial heaping up of a mound by later builders. Even were certainty as to these alternatives attained, we could only guess at the average rate of accumula- tion, which experience shows to proceed very differently on different sites and under different social and climatic conditions. In later periods at Cnossus accumulation seems to have proceeded at a rate of, roughly, 3 ft. per thousand years. Reckoning by that standard we might push the earliest Neolithic remains back behind 10,000 B.C.; but the calculation would be worthy of little credence.

Passing by certain fragments of stone vessels, found at Cnossus, and coincident with forms characteristic of the IVth Pharaonic Dynasty, we reach another fairly certain date in the synchronism of remains belonging to the Xllth Dynasty (c. 2500 B.C. accord- ing to Petrie, but later according to the Berlin School) with products of Minoan Period II. 2. Characteristic Cretan pottery of this period was found by Petrie in the Fayum in conjunction with XII th Dynasty remains, and various Cretan products of the period show striking coincidences with Xllth Dynasty styles, especially in their adoption of spiraliform ornament. The spiral, however, it must be confessed, occurs so often in natural objects (e.g. horns, climbing plants, shavings of wood or metal) that too much stress must not be laid on the mutual parentage of spirali- form ornament in different civilizations. A diorite statuette, referable

by its style and inscription to Dynasty XIII., was dis- covered in deposit of Period II. .3 in the Central Court, and a cartouche of the ” Shepherd King,” Khyan, was also found at Cnossus. He is usually dated about 1900 B.C. This brings us to the next and most certain synchronism, that of Minoan Periods

III. i, 2, with Dynasty XVIII. (c. 1600-1400 B.C.). This co- incidence has been observed not only at Cnossus, but previously, in connexion with discoveries of scarabs and other Egyptian objects made at Mycenae, Ialysus, Vaphio, &c. In Egypt itself Kefti tributaries, bearing vases of Aegean form, and themselves similar in fashion of dress arid arrangement of hair to figures on Cretan frescoes and gems of Period III., are depicted under this and the succeeding Dynasties (e.g. Rekhmara tomb at Thebes). Actual vases of late Minoan style have been found with remains of Dynasty XVIII., especially in the town of Amenophis IV. Akhenaton at Tell el-Amarna; while in the Aegean area itself we have abundant evidence of a great wave of Egyptian influence beginning with this same Dynasty. To this wave were owed in all probability the Nilotic scenes depicted on the Mycenae daggers, on frescoes of Hagia Triada and Cnossus, on pottery of Zakro, on the shell-relief of Phaestus, &c. ; and also many forms and fabrics, e.g. certain Cretan coffins, and the faience industry of Cnossus. These serve to date, beyond all reasonable question, Periods III. 1-2 in Crete, the shaft-graves in the Mycenae circle, the Vaphio tomb, &c, to the 16th and 15th centuries B.C., and Period III. 3 with the lower town at Mycenae, the majority of the sixth stratum at Hissarlik, the Ialysus burials, the upper stratum at Phylakope, &c, to the century immediately suc- ceeding.

The terminus ad quern is less certain — iron does not begin to be used for weapons in the Aegean till after Period III. 3, and then not exclusively. If we fix its introduction to about 1000 B.C. and make it coincident with the incursion of northern tribes, remembered by the classical Greeks as the Dorian Invasion, we must allow that this incursion did not altogether stamp out Aegean civilization, at least in the southern part of its area. But it finally destroyed the Cnossian palace and initiated the ” Geometric ,: Age, with which, for convenience at any rate, we may close the history of Aegean civilization proper.

(2) Annals. — From these and other data the outlines of primi- tive

history in the Aegean may be sketched thus. A people, agreeing in its prevailing skull-forms with the Mediterranean race of N. Africa, was settled in the Aegean area from a remote Neolithic antiquity, but, except in Crete, where insular security was combined with great natural fertility, remained in a savage and unproductive condition until far into the 4th millennium B.C. In Crete, however, it had long been developing a certain civilization, and at a period more or less contemporary with Dynasties XI. and XII. (2500 B.C. ?) the scattered communities of the centre of the island coalesced into a strong monarchical state, whose capital was at Cnossus. There the king, probably also high priest of the prevailing nature-cult, built a great stone palace, and received the tribute of feudatories, of whom, probably, the prince of Phaestus, who commanded the Messara plain, was chief. The Cnossian monarch had maritime relations with Egypt, and presently sent his wares all over the S. Aegean (e.g. to Melos in the earlier Second City Period of Phylakope) and to Cyprus, receiving in return such commodities as Melian obsidian knives. A system of pictographic writing came into use early in this Palace period, but only a few documents, made of durable material, have survived. Pictorial art of a purely indigenous character, whether on ceramic material or plaster, made great strides, and from ceramic forms we may legitimately infer also a high skill in metallurgy. The absence of fortifications both at Cnossus and Phaestus suggest that at this time Crete was in- ternally peaceful and externally secure. Small settlements, in very close relation with the capital, were founded in the east of the island to command fertile districts and assist maritime commerce. Gournia and Palaikastro fulfilled both these ends: Zakro must have had mainly a commercial purpose, as the starting-point for the African coast. The acme of this dominion was reached about the end of the 3rd millennium B.C., and there- after there ensued a certain, though not very serious, decline. Meanwhile, at other favourable spots in the Aegean, but chiefly, it appears, on sites in easy relation to maritime commerce, e.g. Tiryns and Hissarlik, other communities of the early race began to arrive at civilization, but were naturally influenced by the

more advanced culture of Crete, in proportion to their nearness of vicinity. Early Hissarlik shows less Cretan influence and more external (i.e. Asiatic) than early Melos. The inner Greek mainland remained still' in a backward state. Five hundred years later— about 1600 B.C. — we observe that certain striking changes have taken place. The Aegean remains have become astonishingly uniform over the whole area; the local ceramic developments have almost ceased and been replaced by ware of one general type both of fabric and decoration.

The Cretans have stayed their previous decadence, and are once more pos- sessors of a progressive civilization. They have developed a more convenient and expressive written character by stages of which one is best represented by the tablets of Hagia Triada. The art of all the area gives evidence of one spirit and common models ; in religious representations it shows the same anthropo- morphic personification and the same ritual furniture. Objects produced in one locality are found in others. The area of Aegean intercourse has widened and become more busy. Commerce with Egypt, for example, has increased in a marked degree, and Aegean objects or imitations of them are found to have begun to penetrate into Syria, inland Asia Minor, and the central and western Mediterranean lands, e.g. Sicily, Sardinia and Spain. There can be little doubt that a strong power was now fixed in one Aegean centre, and that all the area had come under its political, social and artistic influence.

How was this brought about, and what was the imperial centre? Some change seems to have come from the north; and there are those who go so far as to say that the centre henceforward was the Argolid, and especially ” golden ” Mycenae, whose lords imposed a new type of palace and a modification of Aegean art on all other Aegean lands. Others again cite the old-established power and productivity of Crete; the immense advantage it derived from insularity, natural fertility and geo- graphical relation to the wider area of east Mediterranean civilizations; and the absence of evidence elsewhere for the gradual growth of a culture powerful enough to dominate the Aegean. They point to the fact that, even in the new period, the palm for wealth and variety of civilized production still remained with Crete. There alone we have proof that the art of writing was commonly practised, and there tribute- tallies suggest an imperial organization; there the arts of painting and sculpture in stone were most highly developed ; there the royal residences, which had never been violently destroyed, though remodelled, continued unfortified; whereas on the Greek mainland they required strong protective works. The golden treasure of the Mycenae graves, these critics urge, is not more splendid than would have been found at Cnossus had royal burials been spared by plunderers, or been happened upon intact by modern ex- plorers. It is not impossible to combine these views, and place the seat of power still in Crete, but ascribe the Renascence there to an influx of new blood from the north, large enough to instil fresh vigour, but too small to change the civilization in its essential character.

If this dominance was Cretan, it was short-lived. The security of the island was apparently violated not long after 1500 B.C., the Cnossian palace was sacked and burned, and Cretan art suffered an irreparable

blow. As the comparatively lifeless character which it possesses in the succeeding period (III. 3) is coincident with a similar decadence all over the Aegean area, we can hardly escape from the conclusion that it was due to the invasion of all the Aegean lands (or at least the Greek mainland and isles) by some less civilized conquerors, who remained politically dominant, but, like their forerunners, having no culture of their own, adopted, while they spoiled, that which they found. Who these were we cannot say; but the prob- ability is that they too came from the north, and were pre- cursors of the later ” Hellenes.” Under their rule peace was re-established, and art production became again abundant among the subject population, though of inferior quality. The Cnossian palace was re-occupied in its northern part by chieftains who have left numerous rich graves; and general commercial intercourse must have been resumed, for the uniformity of the

AEGEAN CIVILIZATION religion plmeiii.

Fig. i— LION-GUARDED GODDESS AND Fig. 2.— MALE DIVINITY BE-
Fig. 3.— GOLD SIGNET FROM ACROPOLIS SHRINE, ON A CLAY SEALING FROM TWEEN LIONS, ON A LENTOID TREASURE, MYCENAE, SHOWING THE GOD CNOSSUS. GEM FROM KYDONIA, CRETE. DESS BENEATH A SACRED TREE, WITH

B.S.A.™. a g,F,’ e . 9 . J.tr.S.™. 163.Fig.43. ADORANTS AND SACRED EMBLEMS.

J.H.S. xxi. 108, Fig, 4.

if m

‘msmk

Fig. 4.— BIRDS ON A TRIAD OF PILLARS, CNOSSUS.

B.S.A. viii. 29, Fig. 14.

Fig. 5.— CLAY SEALINGS FROM ZAKRO, WITH MINOTAUR TYPES.

B.S.A. vii. 133, Fig. 45.

By permission of

the Society for

the Promotion

of Hellenic

Studies.

Fig. 6— DUAL PILLAR WORSHIP, ON A GOLD SIGNET RING, CNOSSUS.

J.H.S. jim. 170, Fig. 48.

Fig. 7.— FAIENCE FIGURE OF THE GODDESS, WITH Fig. 8— FACADE OF SMALL TEMPLES, COMPLETED SERPENT ATTRIBUTES, CNOSSUS. FROM A FRESCO PAINTING, CNOSSUS.

B.S.A. ix. 75, Fig. 54.

J.H.S. xxi. iq3. Fig. 66.

Plate, IV

AEGEAN CIVILIZATION TYPES AND COSTUMES, ETC.

N<

1

Fig i —TESSERAE OF PORCELAIN MOSAIC IN FORM OF HOUSES AND TOWERS, CNOSSUS. B.S.A ym.ij,Fis-s.

Fig. 2.— CUP-BEARER, CNOSSUS.

Photo by Dr A. J. Evans.

Figs. 3, 5.— IVORY HEADS FROM SP ATA (ATTICA).

Reichei, Homerische Wofien, 1901, p. 103- By permission of A. Holder, Vienna.

Fig. 4.— FRESCO PAINTING OF GIRL, CNOSSUS.

B.S.A. vii. 57, Fig. 17.

Fig. 5 — Sco Fig. 3.

Fig. 6— FAIENCE FIGURE OF FEMALE VOTARY OF SNAKE-GODDESS, CNOSSUS.

B.S.A. ix. 77, Fig. 56.

Fig. 7— KEFTIU (CRETAN) BEARING AEGEAN VASE AS TRIBUTE TO PHARAOH.

From H. R. Hall, Oldest Civilization inCrecce (1001).

By permission of the Society for the Promotion of Hellenic Studies.

decadent Aegean products and their wide distribution become more marked than ever.

About 1000 B.C. there happened a final catastrophe. The palace at Cnossus was once more destroyed, and never rebuilt or re-inhabited. Iron took the place of Bronze, and Aegean art, as a living thing, ceased on the Greek mainland and in the Aegean isles including Crete, together with Aegean writing. In Cyprus, and perhaps on the south-west Anatolian coasts, there is some reason to think that the cataclysm was less complete, and Aegean art continued to languish, cut off from its fountain-head. Such artistic faculty as survived elsewhere issued in the lifeless geometric style which is reminiscent of the later Aegean, but wholly unworthy of it. Cremation took the place of burial of the dead. This great disaster, which cleared the ground for a new growth of local art, was probably due to yet another in- cursion of northern tribes, more barbarous than their predecessors, but possessed of superior iron weapons — those tribes which later Greek tradition and Homer knew as the Dorians. They crushed a civilization already hard hit; and it took two or three centuries for the artistic spirit, instinct in the Aegean area, and probably preserved in suspended animation by the survival of Aegean racial elements, to blossom anew. On this conquest seems to have ensued a long period of unrest and popular movements, known to Greek tradition as the Ionian Migration and the Aeolic and Dorian ” colonizations “; and when once more we see the Aegean area clearly, it is dominated by Hellenes, though it has not lost all memory of its earlier culture.

Bibliography. — Much of the evidence is contained in archaeo- logical periodicals, especially Annual of (he British School at Athens (1900-); Monumenli Antichi and Rendiconti d. R. Ac. d. Lincei (1901-); Ephemeris Archaiologike (1885-); Journal of Hellenic Studies, Alhenische Mittheilungen, Bulletin de correspondance hellenique, American Journal of Archaeology, &c. (all since about 1885). Special

Works: H. Schliemann's books (seeScHLiEMANN), summarized by C. Schuchhardt, Schliemann's Excavations (1891); Chr. Tsountas, Mv/ojccu (1893); Chr. Tsountas and J. I. Manatt, The Mycenaean Age (1897) ; G. Perrot and Ch. Chipiez, Histoire de I' art dans I'antiquite, vol. vi. (1895); W. Dorpfeld, Troja (1893) and Troja und Ilios (1904) ; A. Furtwangler and G. Loschke, Mykenische Vasen (1886); A. S. Murray, Excavations in Cyprus (1900); W. Ridgeway, Early Age of Greece (1901 foil.); H. R. Hall, The Oldest Civilization of Greece (1901); A. J. Evans, " Mycenaean Tree and Pillar Cult " in Journ. Hell. Studies (1901) and " Prehistoric Tombs of Knossos " in Archaeologia (1905); P. Noack, Homerische Paldsie (1903) ; Excavations at Phylahopi, by members of the British School at Athens (1904) ; Harriet A. Boyd (Mrs Hawes), Excavations at Gournia (1907) ; D. G. Hogarth, " Aegean Religion " in Hastings' Did. of Religions (1906). For a recent view of the place of Aegean civilization in the history of Hellenic culture see Die Hellenische Kultur by F. Baumgarten, &c. (1905). Various summaries, controversial articles, &c, formerly quoted, are now superseded by recent discoveries. See also Crete, Mycenae, Troad, Ceramics, Plate, &c. (D. G. H.)

AEGEAN SEA, a part of the Mediterranean Sea, being the archipelago between Greece on the west and Asia Minor on the east, bounded N. by European Turkey, and connected by the Dardanelles with the Sea of Marmora, and so with the Black Sea. The name Archipelago (q.v.) was formerly applied specifically to this sea. The origin of the name Aegean is uncertain. Various derivations are given by the ancient grammarians — one from the town of Aegae ; another from Aegea, a queen of the Amazons who perished in this sea; and a third from Aegeus, the father of Theseus, who, supposing his son dead, drowned himself in it. The following are the chief islands: — Thasos, in the extreme north, off the Macedonian coast; Samothrace, fronting the Gulf of Saros; Imbros and Lemnos, in prolongation of the peninsula of Gallipoli (Thracian Chersonese) ; Euboea, the largest of all, lying close along the east coast of Greece; the Northern Sporades, including Sciathos, Scopelos and Halonesos, running out from the southern extremity of the Thessalian coast, and Scyros, with its satellites, north-east of Euboea; Lesbos and Chios; Samos and Nikaria; Cos, with Calymnos to the north; all off Asia Minor, with the many other islands of the Sporades; and, finally, the great group of the Cyclades, of which the largest are Andros and Tenos, Naxos and Paros. Many of the Aegean islands, or chains of islands, are actually prolongations of pro-montories of the mainland. Two main chains extend right

across the sea — the one through Scyros and Psara (between which shallow banks intervene) to Chios and the hammer-shaped

promontory east of it; and the other running from the south- eastern promontory of Euboea and continuing the axis of that island, in a southward curve through Andros, Tenos, Myconos, Nikaria and Samos. A third curve, from the south-easternmost promontory of the Peloponnese through Cerigo, Crete, Carpathos and Rhodes, marks off the outer deeps of the open Mediterranean from the shallow seas of the archipelago, but the Cretan Sea, in which depths occur over 1000 fathoms, intervenes, north of the line, between it and the Aegean proper. The Aegean itself is naturally divided by the island-chains and the ridges from which they rise into a series of basins or troughs, the deepest of which is that in the north, extending from the coast of Thessaly to the Gulf of Saros, and demarcated southward by the Northern Sporades, Lemnos, Imbros and the peninsula of Gallipoli. The greater part of this trough is over 600 fathoms deep. The pro- fusion of islands and their usually bold elevation give beauty and picturesqueness to the sea, but its navigation is difficult and dangerous, notwithstanding the large number of safe and commodious gulfs and bays. Many of the islands are of volcanic formation; and a well-defined volcanic chain bounds the Cretan Sea on the north, including Milo and Kimolos, Santorin (Thera) and Therasia, and extends to Nisyros. Others, such as Paros, are mainly composed of marble, and iron ore occurs in some. The larger islands have some fertile and well-watered valleys and plains. The chief productions are wheat, wine, oil, mastic, figs, raisins, honey, wax, cotton and silk. The people are em- ployed in fishing for coral and sponges, as well as for bream, mullet and other fish. The men are hardy, well built and hand- some; and the women are noted for their beauty, the ancient Greek type being well preserved. The Cyclades and Northern Sporades, with Euboea and small islands under the Greek shore, belong to Greece; the other islands to Turkey.

AEGEUS, in Greek legend, son of Pandion and grandson of Cecrops, was king of Athens and the father of Theseus. He was deposed by his nephews, but Theseus defeated them and re- instated his father. When Theseus set out for Crete to deliver Athens from the tribute to the Minotaur he promised Aegeus that, if he were successful, he would change the black sail carried by his ship for a white one. But, on his return, he forgot to hoist the white sail, and his father, supposing that his son had lost his life, threw himself from a high rock on which he was keeping watch into the sea, which was afterwards called the Aegean. The Athenians honoured him with a statue and a shrine, and one of the Attic demes was named after him.

Plutarch, Theseus; Pausanias i. 22; Hyginus, Fab. 43; Catullus lxiv. 207.

AEGINA (Egina or Engia), an island of Greece in the Saronic Gulf, 20 m. from the Peiraeus. Tradition derives the name from Aegina, the mother of Aeacus, who was born in and ruled the island. In shape Aegina is triangular, 8 m. long from N.W. to S.E., and 6 m. broad, with an area of about 41 sq. m. The western side consists of stony but fertile plains, which are well cultivated and produce luxuriant crops of grain, with some cotton, vines, almonds and figs. The rest of the island is rugged and mountainous. The southern end rises in the conical Mount Oros, and the Panhellenian ridge stretches northward with narrow fertile valleys on either side. From the absence of marshes the climate is the most healthy in Greece. The island forms part of the modern nomas of Attica and Boeotia, of which it forms an eparchy. The sponge fisheries are of considerable importance. The chief town is Aegina, situated at the north-west end of the island, the summer residence of many Athenian merchants. Capo d'Istria, to whom there is a statue in the principal square, erected there a large building, intended for a barracks, which was subsequently used as a museum, a library and a school. The museum was the first institution of its kind in Greece, but the collection was transferred to Athens in 1834.

Antiquities. — The archaeological interest of Aegina is centred in the well-known temple on the ridge near the northern corner of the island. .Excavations were made on its site in 18 jr, by

Baron Haller von Hallerstein and the English architect C. R. Cockerell, who discovered a considerable amount of sculpture from the pediments, which was bought in 1812 by the crown prince Louis of Bavaria; the groups were set up in the Glypto- thek at Munich after the figures had been restored by B. Thor- valdsen. Their restoration was somewhat drastic, the ancient parts being cut away to allow of additions in marble, and the new parts treated in imitation of the ancient weathering. Various conjectures were made as to the arrangement of the figures. That according to which they were set up at Munich was in the main suggested by Cockerell; in the middle of each pediment was a figure of Athena, set well back, and a fallen warrior at her feet; on each side were standing spearmen, kneel- ing spearmen and bowmen, all facing towards the centre of the composition ; the corners were filled with fallen warriors. In 1001 Professor Furtwangler began a more systematic excavation of the site, and the new discoveries he then made, together with a fresh and complete study of the figures and fragments in Munich, have led to a

rearrangement of the whole, which, if not certain in all details, may be regarded as approaching finality. Accord- ing to this the figures of combatants do not all face towards the centre, but are broken up, as in other early compositions, into a series of groups of two or three figures each. A figuoe of Athena still occupies the centre of each pediment, but is set farther forward than in the old reconstruction. On each side of this, in the western pediment, is a group of two combatants over a fallen warrior; in the eastern pediment, a warrior whose opponent is falling into the arms of a supporting figure; other figures also — the bowmen especially — face towards the angles, and so give more variety to the composition. The western pediment, which is more conservative in type, represents the earlier expedition of Heracles and Telamon against Troy; the eastern, which is bolder and more advanced, probably refers to episodes in the Trojan war. There are also remains of a third pediment, which may have been produced in competition, but never placed on the temple. For the character of the sculptures see Greek Art. The plan of the temple is chiefly remarkable for the unsymmetrically placed door leading from the back of the cella into the opisthodomus. This opisthodomus was completely fenced in with bronze gratings; and the excavators believe it to have been adapted for use as an adytum (shrine).

It was disputed in earlier times whether the temple was dedicated to Zeus or Athena. Inscriptions found by the recent excavations seem to prove that it must be identified as the shrine of the local goddess Aphaea, identified by Pausanias with Britomartis and Dictynna.

The excavations have laid bare several other buildings, includ- ing an altar, early propylaea, houses for the priests and remains of an earlier temple. The present temple probably dates from the time of the Persian wars. In the town of Aegina itself are the remains of another temple, dedicated to Aphrodite; one column of this still remains standing, and its foundations are fairly preserved.

Authorities. — Antiquities of Ionia (London, 1797), ii. pi. ii.-vii.; C. R. Cockerell, The Temples of Jupiter Panhellenius at Aegina, &c. (London, i860); Ch. Gamier, Le Temple de Jupiter Panhellenien d, Egine (Paris, 1884); Ad. Furtwangler and others, Aegina, Heiligtum der Aphaia (Munich, 1906), where earlier authorities are collected and discussed. (E. Gr.)

History. — (1) Ancient. Aegina, according to Herodotus (v. 83), was a colony of Epidaurus, to which state it was originally subject. The discovery in the island of a number of gold orna- ments belonging to the latest period of Mycenaean art suggests the inference that the

Mycenaean culture held its own in Aegina for some generations after the Dorian conquest of Argos and Lacedaemon (see A. J. Evans, in Journal of Hellenic Studies, vol. xiii. p. 195). It is probable that the island was not dorized before the 9th century B.C. One of the earliest facts known to us in its history is its membership in the League of Calauria, which included, besides Aegina, Athens, the Minyan (Boeotian) Orchomenos, Troezen, Hermione, Nauplia and Prasiae, and was probably an organization of states which were still Mycenaean, for the suppression of the piracy which had sprung up in the

Aegean as a result of the decay of the naval supremacy of the Mycenaean princes. It follows, therefore, that the maritime importance of the island dates back to pre-Dorian times. It is usually stated, on the authority of Ephorus, that Pheidon (q.v.) of Argos established a mint in Aegina. Though this statement is probably to be rejected, it may be regarded as certain that Aegina was the first state of European Greece to coin money. Thus it was the Aeginetans who, within thirty or forty years of the invention of coinage by the Lydians (c. 700 B.C.), introduced to the western world a system of such incalculable value to trade. The fact that the Aeginetan scale of coins, weights and measures was one of the two scales in general use in the Greek world is sufficient evidence of the early commercial importance of the island. It appears to have belonged to the Eretrian league; hence, perhaps, we may explain the war with Samos, a leading member of the rival Chalcidian league in the reign of King Amphicfates (Herod, iii. 59), i.e. not later than the earlier half of the 7th century B.C. In the next century Aegina is one of the three principal states trading at the emporium of Nau- cratis (q.v.), and it is the only state of European Greece that has a share in this factory (Herod, ii. 178). At the beginning of the 5th century it seems to have been an entrepot of the Pontic grain trade, at a later date an Athenian monopoly (Herod, vii. 147). Unlike the other commercial states of the 7th and 6th centuries B.C., e.g. Corinth, Chalcis, Eretria and Miletus, Aegina founded no colonies. The settlements to which Strabo refers (viii. 376) cannot be regarded as any real exceptions to this statement.

The history of Aegina, as it has come down to us, is almost exclusively a history of its relations with the neighbouring state of Athens. The history of these relations, as recorded by Herodotus (v. 79-89; vi. 49-51, 73, 85-94), involve critical problems of some difficulty and interest. He traces back the hostility of the two states to a dispute about the images of the goddesses Damia and Auxesia, which the Aeginetans had carried off from Epidaurus, their parent state. The Epidaurians had been accustomed to make annual offerings to the Athenian deities Athena and Erechtheus in payment for the Athenian

olive-wood of which the statues were made. Upon the refusal of the Aeginetans to continue these offerings, the Athenians endeavoured to carry away the images. Their design was miracu- lously frustrated — according to the Aeginetan version, the statues fell upon their knees, — and only a single survivor returned to Athens, there to fall a victim to the fury of his comrades' widows, who pierced him with their brooch-pins. No date is assigned by Herodotus for this " old feud "; recent writers, e.g. J. B. Bury and R. W. Macan, suggest the period between Solon and Peisistratus, c. 570 B.C. It may be questioned, however, whether the whole episode is not mythical. A critical analysis of the narrative seems to reveal little else than a series of aetio- logical traditions, explanatory of cults and customs, e.g. of the kneeling posture of the images of Damia and Auxesia, of the use of native ware instead of Athenian in their worship, and of the change in women's dress at Athens from the Dorian to the Ionian style. The account which Herodotus gives of the hostili- ties between the two states in the early years of the 5th century B.C. is to the following effect. Thebes, after the defeat by Athens about 507 B.C., appealed to Aegina for assistance. The Aeginetans at first contented themselves with sending the images of the Aeacidae, the tutelary heroes of their island. Subse- quently, however, they entered into an alliance, and ravaged the sea-board of Attica. The Athenians were preparing to make reprisals, in spite of the advice of the Delphic oracle that they should desist from attacking Aegina for thirty years, and con- tent themselves meanwhile with dedicating a precinct to Aeacus, when their projects were interrupted by the Spartan intrigues for the restoration of Hippias. In 491 B.C. Aegina was one of the states which gave the symbols of submission (" earth and water ") to Persia. Athens at once appealed to Sparta to punish this act of. medism, and Cleomenes I. (q.v.), one of the Spartan kings, crossed over to the island, to arrest those who were responsible for it. His attempt was at first unsuccessful ;

*^

Reproduced by permission, from FurCwangh Aegina , das Heiligtum der Aphaia

LOWER TERRACE WALL

THE SANCTUARY OF APHAEA

,,f

Yards

10

*9

5

Metres

10

20

Emery Walker,

V.E.R.Fiechter.del.

but, after the deposition of Demaratus, he visited the island a second time, accompanied by his new colleague Leotychides, seized ten of the leading citizens and deposited them at Athens as hostages. After the death of Cleomenes and the refusal of the Athenians to restore the hostages to Leotychides, the Aeginetans retaliated by seizing a number of Athenians at a festival at Sunium. Thereupon the Athenians concerted a plot with Nicodromus, the leader of the democratic party in the island, for the betrayal of Aegina. He was to seize the old city, and they were to come to his aid on the same day with seventy vessels. The plot failed owing to the late arrival of the Athenian force, when Nicodromus had already fled the island. An engage- ment followed in which the Aeginetans were defeated. Subse- quently, however, they succeeded in winning a victory over the Athenian fleet. All the incidents subsequent to the appeal of Athens to Sparta are expressly referred by Herodotus to the interval between the sending of the heralds in 491 B.C. and the invasion of Datis and Artaphernes in 400 B.C. (cf. Herod, vi. 40 with 94) . There are difficulties in this story, of which the follow- ing are the principal: — (i.) Herodotus nowhere states or implies that peace was concluded between the two states before 481 B.C., nor does he distinguish between different wars during this period.

Hence it would follow that the war lasted from shortly after 507 B.C. down to the congress at the Isthmus of Corinth in 481 B.C. (ii.) It is only for two years (490 and 491) out of the twenty-five that any details are given. It is the more remarkable that no incidents are

recorded in the period between Marathon and Salamis, seeing that at the time of the Isthmian Congress the war is described as the most important one then being waged in Greece (Herod, vii. 145). (iii.) It is improbable that Athens would have sent twenty vessels to the aid of the Ionians in 498 B.C. if at the time she was at war with Aegina. (iv.) There is an incidental indication of time, which points to the period after Marathon as the true date for the events which are referred by Herodotus to the year before Marathon, viz. the thirty years that were to elapse between the dedication of the precinct to Aeacus and the final victory of Athens (Herod, v. 89). As the final victory of Athens over Aegina was in 458 B.C., the thirty years of the oracle would carry us back to the year 488 B.C. as the date of the dedication of the precinct and the outbreak of hostilities. This inference is supported by the date of the building of the 200 triremes ” for the war against Aegina ” on the advice of Themistocles, which is given in the Censtiiutien of Athens as 483-482 B.C. (Herod, vii. 144; Ath. Pol. 22. 7). It is

probable, therefore, that Herodotus is in error both in tracing back the beginning of hostilities to an alliance between Thebes and Aegina (c. 507) and in putting the episode of Nicodromus before Marathon. Overtures were unquestionably made by Thebes for an alliance with Aegina c. 507 B.C., but they came to nothing. The refusal of Aegina was veiled under the diplomatic form of ” sending the Aeacidae.” The real occasion of the out- break of the war was the refusal of Athens to restore the hostages some twenty years later. There was but one war, and it lasted from 488 to 481. That Athens had the worst of it in this war is certain. Herodotus had no Athenian victories to record after the initial success, and the fact that Themistocles was able to carry his proposal to devote the surplus funds of the state to the building of so large a fleet seems to imply that the Athenians were themselves convinced that a supreme effort was neces- sary. It may be noted, in confirmation of this view, that the naval supremacy of Aegina is assigned by the ancient writers on chronology to precisely this period, i.e. the years 490-480 (Eusebius, Chron. Can. p. 337).

In the repulse of Xerxes it is possible that the Aeginetans played a larger part than is conceded to them by Herodotus. The Athenian tradition, which he follows in the main, would naturally seek to obscure their services. , It was to Aegina rather than Athens that the prize of valour at Salamis was awarded, and the destruction of the

Persian fleet appears to have been as much the work of the Aeginetan contingent as of the Athenian (Herod, viii. 91). There are other inditations, too, of the importance of the Aeginetan fleet in the Greek scheme of defence. In view of these considerations it becomes difficult to credit the number of the vessels that is assigned to them by Herodotus (30 as against 180 Athenian vessels, cf. Greek History, sect. Authorities). During the next twenty years the philo-laconian policy of Cimon {q.v.) secured Aegina, as a member of the Spartan league, from attack. The change in Athenian foreign pol ; cy, which was consequent upon the ostracism of Cimon in 46 1 , led to what is sometimes called the First Pelopon- nesian War, in which the brunt of the fighting fell upon Corinth and Aegina. The latter state was forced to surrender to Athens after a siege, and to accept the position of a subject-ally (c. 456 B.C.). The tribute was fixed at 30 talents. By the terms of the Thirty Years' Truce (445 B.C.) Athens covenanted to restore to Aegina her autonomy, but the clause remained a dead letter. In the first winter of the Peloponnesian War (431 B.C.) Athens expelled the Aeginetans, and established a cleruchy in their island. The exiles were settled by Sparta in Thyreatis, on the frontiers of Laconia and Argolis. Even in their new home they were not safe from Athenian rancour. 1 A force landed under Nicias in 424, and put most of them to the sword. At the end of the Peloponnesian War Lysander restored the scattered remnants of the old inhabitants to the island, which was used by the Spartans as a base for opera- tions against Athens in the Corinthian War. Its greatness, however, was at an end. The part which it plays hence- forward is insignificant.

It would be a mistake to attribute the fall of Aegina solely to the development of the Athenian navy. It is probable that the power of Aegina had steadily declined during the twenty years after Salamis, and that it had declined absolutely, as well as relatively, to that of Athens. Commerce was the source of Aegina's greatness, and her trade, which appears to have been principally with the Levant, must have suffered seriously from the war with Persia. Her medism in 491 is to be explained by her commercial relations with the Persian Empire. She was forced into patriotism in spite of herself, and the glory won at Salamis was paid for by the loss of her trade and the decay of her marine. The completeness of the ruin of so powerful a state — we should look in vain for an analogous case in the history of the modern world — finds an explanation in the economic conditions of the island, the prosperity of which rested upon a basis of slave-labour. It is impossible, indeed, to accept Aristotle's (cf. Athenaeus vi. 272) estimate of 470,000 as the

1 Pericles called Aegina the "eye-sore" fam) of the Peiraeus.

number of the slave-population; it is clear,' however, that the number must have been out of all proportion to that of the free inhabitants. In this respect the history of Aegina does but anticipate the history of Greece as a whole.

The constitutional history of Aegina is unusually simple. So long as the island retained its independence the government was an oligarchy. There is no trace of the heroic monarchy and no tradition of a tyrannis. The story of Nicodromus, while it proves the existence of a democratic party, suggests, at the same time, that it could count upon little support.!

(2) Modern. — Aegina passed with the rest of Greece under the successive dominations of Macedoh, the Aetolians, Attalus of Pergamum and Rome. In 1537 the island, then a prosperous Venetian colony, was overrun and ruined by the pirate Barba- rossa (Khair-ed-Din). One of the last Venetian strongholds in the Levant, it was ceded by the treaty of Passarowitz (1718) to the Turks. In 1826-1828 the town became for a time the capital of Greece and the centre of a large commercial population (about 10,000), which has dwindled to about 4300. i _ Bibliography. — Herodotus loc. cit.; Thucydides i. 105, 108, ii. 27, iv. 56, 57. For the criticism of Herodotus's account of the relations of Athens and Aegina, Wilamowitz, Aristoteles und A then, ii. 280-288, is indispensable. See also Macan, Herodotus iv.-vi., ii. 102-120. (E. M. W.)

AEGINETA, PAULUS, a celebrated surgeon of the island of Aegina, whence he derived his name. According to Le Clerc's calculation, he lived in the 4th century of the Christian era; but Abulfaragius (Barhebraeus) places him with more prob- ability in the 7 th. The title of his most important work, as given by Suidas, is 'Eˆitoˆs 'Icltpiktjs Bi/3\ta 'Eirrd (Synopsis of Medicine in Seven Books), the 6th book of which, treating of operative surgery, is of special interest for surgical history. The whole work in the original Greek was published at Venice in 1528, and another edition appeared at Basel in 1538. Several Latin translations have been published, and an excellent English version, with commentary, by Dr F. Adams

.(1844-1848).

AEGIS (Gr. Aigis), in Homer, the shield or buckler of Zeus, fashioned for him by Hephaestus, furnished with tassels and bearing the Gorgon's head in the centre. Originally symbolical of the storm-cloud, it is probably derived from cucrcra), signifying rapid, violent motion. When the god shakes it, Mount Ida is wrapped in clouds, the thunder

rolls and men are smitten with fear. He sometimes lends it to Athene and (rarely) to Apollo. In the later story (Hyginus, Poet. Astronom. ii. 13) Zeus is said to have used the skin of the goat Amaltheia (aiyis = goat-skin), which suckled him in Crete, as a buckler when he went forth to do battle against, the giants. Another legend represents the aegis as a fire-breathing monster like the Chimaera, which was slain by Athene, who afterwards wore its skin as a cuirass (Diodorus Siculus iii. 70). It appears to have been really the goat's skin used as a belt to support the shield. When so used it would generally be fastened on the right shoulder, and would partially envelop the chest as it passed obliquely round in front and behind to be attached to the shield under the left arm. Hence, by transference, it would be employed to denote at times the shield which it supported, and at other times a cuirass, the purpose of which it in part served. In accordance with this double msaning the aegis appears in works of art sometimes as an animal's skin thrown over the shoulders and arms, sometimes as a cuirass, with a border of snakes corresponding to the tassels of Homer, usually with the Gorgon's head in the centre. It is often represented on the statues of Roman emperors, heroes and warriors, and on cameos and vases.

See F. G. Welcker, Griechische Gotterlehre (1857); L. Preller, Griechische Mylhologie, i. (1887) ; articles in Pauly-Wissowa's Real-encyclopadie, Roscher's Lexikon der Mythologie, Daremberg and Saglio's Dictionnaire des Antiquites, and Smith's Dictionary of Greek and Roman Antiquities (3rd ed., 1890).

AEGISTHUS, in Greek legend, was the son of Thyestes by his own daughter Pelopia. Having been exposed by his mother to conceal her shame, he was found by shepherds and suckled by a goat — whence his name. His uncle Atreus, who had married

Pelopia, took him to Mycenae, and brought him up as his own son. When he grew up Aegisthus slew Atreus, and ruled jointly with his father over Mycenae, until they were deposed by Agamemnon on his return from exile. After the departure of Agamemnon to the Trojan war, Aegisthus seduced his wife Clytaemnestra (more correctly Clytaemestra) and with her assistance slew him on his return. Eight years later his murder was avenged by his son Orestes.

Homer, Od. iii. 263, iv. 517; Hyginus, Fab. 87.

AEGOSPOTAMI (i.e. ” Goat Streams “), a small creek issuing into the Hellespont, N.E. of Sestos, the scene of the decisive battle in 405 B.C. by which Lysander destroyed the last Athenian armament in the Peloponnesian War (q.v.). The township of that name, whose existence is attested by coins of the 5th and 4th centuries, must have been quite insignificant.

AXFRIC, called the ” Grammarian ” (c. 955-1020?), English abbot and author, was born about 955. He was educated in the Benedictine monastery at Winchester under jEthelwold, who was bishop there from 963 to 984. iEthelwold had carried on the tradition of Dunstan in his government of the abbey of Abingdon, and at Winchester he continued his strenuous efforts. He seems to have actually taken part in the work of teaching. /Elfric no doubt gained some reputation as a scholar at Win- chester, for when, in 987, the abbey of Cernel (Cerne Abbas, Dorsetshire) was finished, he was sent by Bishop ˆElfheah (Alphege), ˆEthelwold’s successor, at the request of the chief benefactor of the abbey, the ealdorman iEthelmasr, to teach the Benedictine monks there. He was then in priest’s orders. ˆEthelma?r and his father ˆEthelweard were both enlightened patrons of learning, and became iEIfric’s faithful friends. It was at Cernel, and partly at the desire, it appears, of /Ethel- weard, that he planned the two series of his English homilies (ed. Benjamin Thorpe, 1844-1846, for the yElfric Society), com- piled from the Christian fathers, and dedicated to Sigeric, arch- bishop of Canterbury (990-994). The Latin preface to the first series enumerates some of .Elf ric’s authorities, the chief of whom was Gregory the Great, but the short list there given by no means exhausts the authors whom he consulted. In the preface to the first volume he regrets that except for Alfred’s translations Englishmen had no means of learning the true doctrine as ex pounded by the Latin fathers. Professor Earle (A.S. Literature, 1884) thinks he aimed at correcting the apocryphal, and to modern ideas superstitious, teaching of the earlier Blickling Homilies. The first series of forty homilies is devoted to plain and direct exposition of the chief events of the Christian year; the second deals more fully with church doctrine and history. ˆElfric denied the immaculate birth of the Virgin (Homilies, ed. Thorpe, ii. 466), and his teaching on the Eucharist in the Canons and in the Sermo de sacrificio in die pascae (ibid. ii. 262 seq.) was appealed to by the Reformation writers as a proof that the early English church did not hold the Roman doctrine of transub- stantiation. 1 His Latin Grammar and Glossary 2 were written for his pupils after the two books of homilies. A third series of homilies, the Lives of the Saints, dates from 996 to 997. Some of the sermons in the second series had been written in a kind of rhythmical, alliterative

prose, and in the Lives of the Saints (ed. W. W. Skeat, 1881-1900, for the Early English Text Society) the practice is so regular that most of them are arranged as verse by Professor Skeat. By the wish of ˆEthelweard he also began a paraphrase 3 of parts of the Old Testament, but under protest, for the stories related in it were not, he thought, suitable for simple minds. There is no certain proof that he remained at Cernel. It has been suggested that this part of his life was

1 See A Testimonie of Antiquitie, shewing the auncienl fayth in the Church of England touching the sacrament of the body and bloude of the Lord here publikely preached, printed by John Day (1567). It was quoted in John Foxe's Actes and Monuments (ed. 1610).

2 Ed. J. Zupitza in Sammlung englischer Denkmdler (vol. i., Berlin,

1880).

3 Edited by Edward Thwaites as Heptateuchus (Oxford, 1698); modern edition in Grein's Bibliathek der A . S. Prosa (vol. i. Cassel and Gottingen, 1872). See also B. Assmann, AbtJElfric's . . . Esther (Halle, 1885), and Abt Mlfric's Judith (in Anglia, vol. x.).

chiefly spent at Winchester; but his writings for the patrons of Cernel, and the fact that he wrote in 998 bis Canons 4 as a pastoral letter for Wulfsige, the bishop of Sherborne, the diocese in which the abbey was situated, afford presumption of continued resi- dence there. He became in 1005 the first abbot of Eynsham or Ensham, near Oxford, another foundation of ./Ethelmaer's. After his elevation he wrote an abridgment for his monks of ˆEthelwold's De consuetudine monachorum, h adapted to their rudimentary ideas of monastic life; a letter to Wulfgeat of Ylmandun 6 ; an introduction to the study of the Old and New Testaments (about 1008, edited by William L'Isle in 1623); a Latin life of his master ˆEthelwold 7 ; a pastoral letter for Wulfstan, archbishop of York and bishop of Worcester, in Latin and English; and an English version of Bede's De Temporibus. 3 The Colloquium, 9 a Latin dialogue designed to serve his scholars as a manual of Latin conversation, may date from his life at Cernel. It is safe to assume that the original draft of this, afterwards enlarged by his pupil, ˆElfric Bata, was by ˆElfric, and represents what his own scholar days were like. The last mention of ˆElfric Abbot, probably the grammarian, is in a will dating from about 1020.

There have been three suppositions about ˆElfric. (1) He was identified with ˆElfric (995-1005), archbishop of Canterbury. This view was upheld by John Bale (III. Maj. Brit. Scriptorum . . . 2nd ed., Basel,

1557-1559; vol. i. p. 149, s.v. Alfric); by Humphrey Wanley (Catalogus librorum septentrionalium, &c, Oxford, 1705, forming vol. ii. of George Hickes's Antiquae literaturae septentrionalis) ; by Elizabeth Els,tob, The English- Saxon Homily on the Birthday of St Gregory (1709; new edition, 1839); and by Edward Rowe Mores, ALlfrico, Dorobernensi, archiepiscopo, Commentarius (ed. G. J. Thorkelin, 1789), in which the conclusions of earlier writers on ˆElfric are reviewed. Mores made him abbot of St Augustine's at Dover, and finally archbishop of Canterbury. (2) Sir Henry Spelman, in his Concilia . . . (1639, vol. i. p. 583), printed the Canones ad Wulsinum episcopum, and suggested ˆElfric Putta or Putto, archbishop of York, as the author, adding some note of others bearing the name. The identity of yElfric the grammarian with jElfric archbishop of York was also discussed by Henry Wharton, in Anglia Sacra (1691, vol. i. pp. 125-134), in a dissertation reprinted in J. P. Migne's Patrologia (vol. 139, pp. 1459-70, Paris, 1853). (3) William of Malmesbury (De gestis pontificum anglorum, ed. N. E. S. A. Hamilton, Rolls Series, 1870, p. 406) suggested that he was abbot of Malmesbury and bishop of Crediton. The main facts of his career were finally elucidated by Eduard Dietrich in a series of articles contributed to C. W. Niedner's Zeitschrift fur historische Theologie (vols, for 1855 and 1856, Gotha), which have formed the basis of all subsequent writings on the subject.

Sketches of ˆElfric's career are in B. Ten Brink's Early English Literature (to Wiclif) (trans. H. M. Kennedy, New York, 1883, pp. 105-112), and by J. S. Westlake in The Cambridge History of English Literature (vol. i., 1907, pp. 1 16-129). An excellent bibliography and account of the critical apparatus is given in Dr R. Wiilker's Grundriss zur Geschichte der angelsdchsischen Litteratur (Leipzig, 1885, pp. 452-480). See also the account by Professor Skeat in Pt. iv. pp. 8-61 of his edition of the Lives of the Saints, already cited, which gives a full account of the MSS., and a discussion of ˆElfric's sources, with further bibliographical references ; and JElfric, a New Study of his Life and Writings, by Miss C. L. White (Boston, New York and London, 1898) in the " Yale Studies in English." Alcuini Interro- gations Sigewulfi Presbyteri in Genesin (ed. G. E. McLean, Halle, 1883) is attributed to ˆElfric by its editor. There are other isolated sermons and treatises by /Elfric, printed in vol. iii. of Grein's Bibl. v. A.S. Prosa.

4 Printed by Benjamin Thorpe in Ancient Laws and Institutes of England (1840), with the later pastoral for Wulfstan.

6 See E. Breck, A Fragment of JElfric; translation of JElhelwold's De Consuetudine Monachorum and its relation to other MSS. (Leipzig,

l8S 7)- .

6 Ilmington, on the borders of Warwickshire and Gloucestershire.

7 Included by J. Stevenson in the Chron. Monast. de Abingdon (vol. ii. pp. 253-266, Rolls Series, 1858).

8 See Oswald Cockayne, Leechdonis, Wortcunning and Starcraft (vol. iii., 1866, pp. xiv.-xix. and pp. 233 ei seq.) in the Rolls Series.

9 See an article by J. Zupitza in the Zeitschrift fur deutsches Altertum (vol. xix., new series, 1887).

AELIA CAPITOLINA, the city built by the emperor Hadrian, a.d. 131, and occupied by a Roman colony, on the site of Jeru- salem (q.v.), which was in ruins when he visited his Syrian dominions. Aelia is derived from the emperor's family name, and Capitolina from that of Jupiter Capitolinus, to whom a temple was built on the site of the Jewish temple.

AELIAN (Aelianus Tacticus), Greek military writer of the 2nd century a.d., resident at Rome. He is sometimes confused with Claudius Aelianus, the Roman writer referred to below. Aelian's military treatise, TaKTi/07 Gecopia, is dedicated to Hadrian, though this is probably a mistake for Trajan, and the date a.d. 106 has been assigned to it. It is a handbook of Greek, i.e. Macedonian, drill and tactics as practised by the Hellenistic successors of Alexander the Great. The author claims to have consulted all the best authorities, the chief of which was a lost treatise on the subject by Polybius. Perhaps the chief value of Aelian's work lies in his critical account of preceding works on the art of war, and in the fulness of his technical details in matters of drill. Critics of the 18th century — Guichard Folard and the prince de Ligne — were unanimous in thinking Aelian greatly inferior to Arrian, but both on his immediate successors, the Byzantines, and on the Arabs, who translated the text for their own use, Aelian exercised a great influence. The emperor Leo VI. incorporated much of Aelian's text in his own work on, the military art. The Arabic version of Aelian was made about 1350. In spite of its academic nature, the copious details to be found in the treatise rendered it of the highest value to the army organizers of the 16th century, who were engaged in fashioning a regular military system out of the semi-feudal systems of previous generations. The Macedonian phalanx of Aelian had many

points of resemblance to the solid masses of pikemen and the ” squadrons ” of cavalry of the Spanish and Dutch systems, and the translations made in the 16th century formed the groundwork of numerous books on drill and tactics. Moreover, his works, with those of Xenophon, Polybius, Aeneas and Arrian, were minutely studied by every soldier of the 16th and 17th centuries who wished to be master of his profession. It has been suggested that Aelian was the real author of most of Arrian’s Tactica, and that the T(wt/o) Geoipta is a later revision of this original, but the theory is not generally accepted.

The first edition of the Greek text is that of Robortelli (Venice, I 55 2) ! the Elzevir text (Leiden, 1613) has notes. The text in W. Rustow and H. Kochly’s Griechische Kriegsschriftsteller (1855) is accompanied by a translation, notes and reproductions of the original illustrations. A Latin translation by Theodore Gaza of Thessalonica was included in the famous collection Veteres de re militari scriptores (Rome and Venice, 1487, Cologne, 1528, &c). The French transla- tion of Machault, included in his Milices des Grecs et Romains (Paris, 16 15) and entitled De la Sergenterie des Grecs, a German translation Lom Theodore Gaza (Cologne, 1524), and the English version of Jo. B(ingham), which includes a drill manual of the English troops in the Dutch service, Tacticks of Aelian (London, 1616), are of import- ance in the military literature of the period. A later French transla- tion by Bouchard de Bussy, La Milice des Grecs ou Tactique d’£lien (Paris, 1737 and 1757); Baumgartner’s German translation in his incomplete Sammlung aller Kriegsschriftsteller der Griechen (Mann- heim and Frankenthal, 1779), reproduced in 1786 as Von Schlachtord- nungen, and Viscount Dillon’s English version (London, 1814) may also be mentioned. See also R. Forster, Studien zu den griechischen Taktikern {Hermes, xii., 1877, pp. 444-449); F. Wustenfeld, Das Heerwesen der Muhammedaner und die arabische Uebersetsung der Taktik des Aelianus (Gottingen, 1880); M. Jahns, Gesch. der Kriegswissenschaften, i. 95-97 (Munich, 1889); Rustow and Kochly, Gesch. des griechischen Kriegswesens (1852); A. de Lort-Serignan, La Phalange (1880); P. Serre, Htudes sur I’hisioire militaire et mari- time des Grecs et des Romains (1887); K. K. Miiller, in Pauly- Wissowa, Realencyclopddie (Stuttgart, 1894).

AELIAN (Claudius Aelianus), Roman author and teacher of rhetoric, born at Praeneste, flourished under Septimius Severus and probably outlived Elagabalus (d. 222). He spoke Greek so perfectly that he was called ” honey-tongued ” {neXlyXuaaos) ; although a Roman he preferred Greek authors, and wrote in Greek himself. His chief works are: On the Nature of Animals, curious and interesting stories of animal life, fre- quently used to convey moral lessons (ed. Schneider,

1784; Jacobs, 1832); Various History — for the most part preserved

only in an abridged form — consisting mainly of anecdotes of men and customs (ed. Lunemann, 1811). Both works are valu- able for the numerous excerpts from older writers. Considerable fragments of two other works On Providence and Divine Mani- festations are preserved in Suidas; .twenty Peasants' Letters, after the manner of Alciphron but inferior, are also attributed to him.

Editio princeps of complete works by Gesner, 1556; Hercher, 1864-1866. English translation of the Various History only by Fleming, 1576, and Stanley, 1665; of the Letters by Quillard (French), 1895.

JELRED, Ailred, Ethelred (1109-1166), English theo- logian, historical writer and abbot of Rievaulx, was born at Hexham about the year 1109. In his youth he was at the court of Scotland as an attendant of Henry, son of David I. He was in high favour with that sovereign, but renounced the prospect of a bishopric to enter the Cistercian house of Rievaulx in Yorkshire, which was founded in 1131 by Walter Espec. Here ˆElred remained for some time as master of the novices, but between the years 1142 and 1146 was elected abbot of Revesby in Lincolnshire and migrated thither. In 1146 he became abbot of Rievaulx. He led a life of the severest asceticism, and was credited with the power of working miracles; owing to his reputation the numbers of Rievaulx were greatly increased. In 1 1 64 he went as a missionary to the Picts of Galloway. He found their religion at a low ebb, the regular clergy apathetic and sensual, the bishop little obeyed, the laity divided by the family feuds of their rulers, unchaste and ignorant. He induced a Galwegian chief to take the habit of religion, and restored the peace of the country. Two years later he died of a decline, at Rievaulx, in the fifty-seventh year of his age. In the year 1 191 he was canonized. His writings are voluminous and have never been completely published. Amongst them are homilies "on the burden of Babylon in Isaiah "; three books "on spiritual friendship "; a life of Edward the Confessor; an account of miracles wrought at Hexham, and the tract called Relalio de Standardo. This last is an account of the Battle of the Standard (1138), better known than the similar account by Richard of Hexham, but less trustworthy, and in places obscured by a peculiarly turgid rhetoric.

See the Vita Alredi in John of Tynemouth's Nova Legenda Anglie (ed. C. Horstmann, 1901, vol. i. p. 41), whence it was taken by Capgrave. From Capgrave the work passed into the Bollandist Acta Sanctorum (Jan. ii. p. 30). This life is anonymous, but of an early date. The most complete printed collection of jElred's works is in Migne's Patrologia

Latina, vol. exev. ; but this does not include the Miracula Hagulstaldensis Ecclesiae which are printed in J. Raine's Priory of Hexham, vol. i.(Surtees Society, 1864). A complete list of works attributed to ˆElred is given in T. Tanner's Bibliotheca Britan- nico-Hibernica (1748), pp. 247-248. The Relalio de Standardo has been critically edited by R. Howlett in Chronicles, &c, of Stephen, Henry II. and Richard I., vol. iii. (Rolls Series, 1886). (H. W. C. D.)

AEMILIA VIA, or Aemilian Way. (i) A highroad of Italy, constructed in 187 B.C. by the consul M. Aemilius Lepidus, from whom it takes its name; it ran from Ariminum to Placentia, a distance of 176 m. almost straight N.W., with the plain of the Po (Padus) and its tributaries on the right, and the Apennines on the left. The 79th milestone from Ariminum found in the bed of the Rhenus at Bononia records the restoration of the road by Augustus from Ariminum to the river Trebia in 2 B.C. (Notiz. Scav., 1902, 539). The bridge by which it crossed the Sillaro was restored by Trajan in a.d. 100 (Notizie degli Scavi, 1888, 621). The modern highroad follows the ancient line, and some of the original bridges still exist. After Augustus, the road gave its name to the district which formed the eighth region of Italy (previously known as Gallia or Provincia Ariminum), at first in popular usage (as in Martial), but in official language as early as the 2nd century; it is still in use (see Emilia). The district was bounded on the N. by the Padus, E. by the Adriatic, S. by the river Crustumium (mod. Conca), and W. by the Apen- nines and the Ira (mod. Staff ora) at Iria (mod. Voghera), and corresponds approximately with the modern district. «#

(2) A road constructed in 109 B.C. by the censor M. Aemilius Scaurus from Vada Volaterrana and Luna to Vada Sabatia and thence over the Apennines to Dertona (Tortona), where it joined

the Vra Postumia from Genua to Cremona. We must, however (as Mommsen points out in C.I.L. v. p. 885), suppose that the portion of the coast road from Vada Volaterrana to Genua at least must have existed before the construction of the Via Postumia in 148 B.C. Indeed Polybius (iii. 39. 8) tells us (and this must refer to the time of the Gracchi if not earlier) that the Romans had in his time built the coast road from the Rhone to Carthago Nova; and it is incredible that the coast road in Italy itself should not have been constructed previously. It is, how- ever, a very different thing to open a road for traffic, and so to construct it that it takes its name from that construction in

perpetuity. (T. As.)

AEMILIUS, PAULUS (Paolo Emilio) (d. 1529), Italian his- torian, was born at Verona. He obtained such reputation in his own country that he was invited to France in the reign of Charles VIII., in order to write in Latin the history of the kings of France, and was presented to a canonry in Notre Dame. He enjoyed the patronage and support of Louis XII. He died at Paris on the 5th of May 1529. His De Rebus gestis Francorum was translated into French in 1581, and has also been translated into Italian and German.

AENEAS, the famous Trojan hero, son of Anchises and Aphrodite, one of the most important figures in Greek and Roman legendary history. In Homer, he is represented as the chief bulwark of the Trojans next to Hector, and the favourite of the gods, who frequently interpose to save him from danger (Iliad, v. 311). The legend that he remained in the country after the fall of Troy, and founded a new kingdom (Iliad, xx. 308; Hymn to Aphrodite, 196) is now generally considered to be of comparatively late origin. The story of his emigration is post-Homeric, and set forth in its fullest development by Virgil in the Aeneid. Carrying his aged father and household gods on his back and leading his little son Ascanius by the hand, he makes his way to the coast, his wife Creusa being lost during the con- fusion of the flight. After a perilous voyage to Thrace, Delos, Crete and Sicily (where his father dies), he is cast up by a storm, sent by Juno, on the African coast. Refusing to remain with Dido, queen of Carthage, who in despair puts an end to her life, he sets sail from Africa, and after seven years' wandering lands at the mouth of the Tiber. He is hospitably received by Latinus, king of Latium, is betrothed to his daughter Lavinia, and founds a city called after her, Lavinium. Turnus, king of Rutuli, a rejected suitor, takes up arms against him and Latinus, but is defeated and slain by Aeneas on the river Numicius. The story of the Aeneid ends with the death of Turnus. According to Livy (i. 1. 2), Aeneas, after reigning a few years over Latium, is slain by the Rutuli; after the battle, his body cannot be found, and he is supposed to have been carried up to heaven. He receives divine honours, and is worshipped under the name of Jupiter Indiges (Dionysius Halic. i. 64).

See J. A. Hild, La Legende d'linle avant Vergile (1883) ; F. Cauer, De Fabulis Graecis ad Romam conditam pertinentibus (1 884) and Die Romische Aeneassage,von Naevius bis Vergilius (1886) ; G. Boissier, "La Legende d'Enee " in Revue des Deux Mondes, Sept. 1883; A. Forstemann, Zur Geschichte des Aeneasmythus (1894) ; articles in Pauly-Wissowa's Realencyclopddie (new ed., 1894); Roscher's Lexicon der Mythologie; Daremberg and Saglio's Dictionnaire des antiquites;

Preller's Grieckische und romische Mythologie; and especially Schwegler, Romische Geschichte (1867).

Romances. — The story of Aeneas, as a sequel to the legend of Troy, formed the subject of several epic romances in the middle ages. The Roman d'&neas (c. 1160, or later), of uncertain authorship (attributed by some to Benoit de Sainte-More), the first French poem directly imitated from the Aeneid, is a fairly close adaptation of the original. The trouvere, however, omits the greater part of the wanderings of Aeneas, and adorns his narrative with gorgeous descriptions, with accounts of the mar- vellous properties of beasts and stones, and of single combats among the knights who figure in the story. He also elaborates the episodes most attractive to his audience, notably those of Dido and Aeneas and Lavinia, the last of whom plays a far more important part than in the Aeneid. Where possible, he substitutes human for divine intervention, and ignores the idea

of the glorification of Rome and Augustus, which dominates the Virgilian epic. On this work were founded the Eneide or Eneit (between n 80 and n 90) of Heinrich von Veldeke, written in Flemish and now only extant in a version in the Thuringian dialect, and the Eneydos, written by William Caxton in 1490.

See B\neas, ed. J. Salverda de Grave (Halle, 1891); see also A. Peij, Essai sur li romans d' Eneas (Paris, 1856) ; A. Duval in Hist, litteraire de la France, xix. ; Veldeke's Eneide, ed. Ettmiiller (Leipzig, 1852) and O. Behaghel (Heilbronn, 1882); Eneydos, ed. F. J. Furni- vall (1890). For Italian versions see E. G. Parodi in Sludi di filologia romanza (v. 1887).

AENEAS TACTICUS (4th century B.C.), one of the earliest Greek writers on the art of war. According to Aelianus Tacticus and Polybius, he wrote a number of treatises ('T7ro/wi7/xaTa) on the subject; the only one extant deals with the best methods of defending a fortified city. An epitome of the whole was made by Cineas, minister of Pyrrhus, king of Epirus. The work is chiefly valuable as containing a large number of historical illus- trations. Aeneas was considered by Casaubon to have been a contemporary of Xenophon and identical with the Arcadian general Aeneas of Stymphalus, whom Xenophon (Hellenica, vii. 3) mentions as fighting at the battle of Mantinea (362 B.C.).

Editions in I. Casaubon's (1619), Gronovius' (1670) and Ernesti's (1763) editions of Polybius; also separately, with notes, by J. C. Orelli (Leipzig, 18 18). Other texts are those of W. Riistow and H. Kochly

(Grieckische Kriegsschriflsteller, vol. i. Leipzig, 1853) and A. Hug, Prolegomena Critica ad Aeneae . . . editionem (Zurich. University, 1874). See also Count Beausobre, Commentaires sur la defense des places d' Aeneas (Amsterdam, 1757); A. Hug, Aeneas von Stymphalos (Zurich, 1877) ; C. C. Lange, De Aeneae commentario poliorcelico (Berlin, 1879); M. H. Meyer, Observationes in Aeneam Tacticum (Halle, 1835) ; Haase, in Johns Jahrbuch, 1835, xiv. 1 ; Max Jahns, Gesch. der Kriegswissenschaflen, i. pp. 26-28 (Munich, 1889); Ad. Bauer, in Zeitschrift fur allg. Geschichte, &c, 1886, i.; T. H. Williams in American Journal of Philology, xxv. 4; E. Schwartz in Pauly-Wissowa, Realencyclopddie (Stuttgart, 1894).

AENESIDEMUS, Greek philosopher, was born at Cnossus in Crete and taught at Alexandria, probably during the first century B.C. He was the leader of what is sometimes known as the third sceptical school and revived to a great extent the doctrine of Pyrrho and Timon. His chief work was the Pyr- rhonian Principles addressed to Lucius Tubero. His philosophy consisted of four main parts, the reasons for scepticism and doubt, the attack on causality and truth, a physical theory and a theory of morality. Of these the two former are important. The reasons for doubt are given in the form of the ten " tropes ":

(1) different animals manifest different modes of perception;

(2) similar differences are seen among individual men; (3) even for the same man, sense-given data are self-contradictory, (4) vary from time to time with physical changes, and (5) accord- ing to local relations; (6) and (7) objects are known only in- directly through the medium of air, moisture, &c, and are in a condition of perpetual change in colour, temperature, size and motion; (8) all perceptions are relative and interact one upon another; (9) our impressions become less deep by repetition and custom; and (10) all men are brought up with different beliefs, under different laws and social conditions. Truth varies infinitely under circumstances whose relative weight cannot be accurately gauged. There is, therefore, no absolute knowledge, for every man has different perceptions, and, further, arranges and groups his data in methods peculiar to himself; so that the sum total is a quantity with a purely subjective validity. The second part of his work consists in the attack upon the theory of causality, in which he adduces almost entirely those considera- tions which are the basis of modern scepticism. Cause has no existence apart from,the mind which perceives; its validity is ideal, or, as Kant would have said, subjective. The relation between cause and effect is unthinkable. If the two things are different, they are either simultaneous or in succession. If

simultaneous, cause is effect and effect cause. If not, since effect cannot precede cause, cause must precede effect, and there must be an instant when cause is not effective, that is, is not itself. By these and similar arguments he arrives at the funda- mental principle of Scepticism, the radical and universal opposi- tion of causes; Tram XSyiˆ \6yos d»rwceiTcu. Having reached

this conclusion, he was able to assimilate the physical theory of Heraclitus, as is explained in the Hypotyposes of Sextus Empiricus. For admitting that contraries co-exist for the perceiving subject, he was able to assert the co-existence of contrary qualities in the same object. Having thus disposed of the ideas of truth and causality, he proceeds to undermine the ethical criterion, and denies that any man can aim at Good, Pleasure or Happiness as an absolute, concrete ideal. All actions are product of pleasure and pain, good and evil. The end of ethical endeavour is the conclusion that all endeavour is vain and illogical. The main tendency of this destructive scepticism is essentially the same from its first crystallization by Aenesidemus down to the most advanced sceptics of to-day (see Scepticism). For the immediate successors of Aenesidemus see Ageippa, Sextus Empiricus. See also Carneades and Arcesilaus. Of the Ilvppcovaoi. Xoyoi nothing remains; we have, however, an analysis in the Myriobiblion of Photius.

See Zeller's History of Greek Philosophy; E. Saisset, JEnesid&me, Pascal, Kant; Ritter and Preller, §§ 364-370.

AEOLIAN HARP (Fr. harpe Solienne; Ger. Aolsharfe, Windharje; Ital. or pa d' Eolo), a stringed musical instrument, whose name is derived from Aeolus, god of the wind. The aeolian harp consists of a sound-box about 3 ft. long, 5 in. wide, and 3 in. deep, made of thin deal, or preferably of pine, and having beech ends to hold the tuning-pins and hitch-pins. A dozen or less catgut strings of different thickness, but tuned in exact unison, and left rather slack, are attached to the pins, and stretched over two narrow bridges of hard wood, one at each end of the sound-board, which is generally pro- vided with two rose sound-holes. To ensure a proper passage for the wind, another pine board is placed over the strings, resting on pegs at the ends of the sound-board, or on a con- tinuation of the ends raised from 1 to 3 in. above the strings. Kaufmann of Dresden and Heinrich Christoph Koch,

who im- proved the aeolian harp, introduced this contrivance, which was called by them Windfang and Windflilgel; the upper board was prolonged beyond the sound-box in the shape of a funnel, in order to direct the current of air on to the strings. The aeolian harp is placed across a window so that the wind blows obliquely across the strings, causing them to vibrate in aliquot parts, i.e. (the fundamental note not being heard) the half or octave, the third or interval of the twelfth, the second octave, and the third above it, in fact the upper partials of the strings in regular succession. With the increased pressure of the wind, the dis- sonances of the nth and 13th overtones are heard in shrill dis- cords, only to give place to beautiful harmonies as the force of the wind abates. The principle of the natural vibration of strings by the pressure of the wind was recognized in ancient times; King David, we hear from the Rabbinic records, used to hang his kinnor (kithara) over his bed at night, when it sounded in the midnight breeze. The same is related of St Dunstan of Canterbury, who was in consequence charged with sorcery. The Chinese at the present day fly kites of various sizes, having strings stretched across apertures in the paper, which produces the effect of an aerial chorus.

See Athanasius Kircher, Musurgia Universalis, where the aeolian harp is first described (1 602-1 608), p. 148; Mathew Young, Bishop of Clonfert, Enquiry into the Principal Phenomena of Sounds anal Musical Strings, pp. 170-182 (London, 1784); Gottingen Pocket Calendar (1792); Mendel's Musikalisches Conversations-Lexikon, article " Aeolsharfe." An illustration is given in Rees' Encyclo- pedia, plates, vol. ii. Misc. pi. xxv. (K. S.)

AEOLIS (Aeolia), an ancient district of Asia Minor, colonized at a very early date by Aeolian Greeks. The name was applied to the coast from the river Hermus to the promontory of Lectum, i.e. between Ionia to S. and Troas to N. The Aeolians founded twelve cities on the mainland, including Cyme, and numerous towns in Mytilene: they were said also to have settled in the Troad and even within the Hellespont.

AEOLUS, in Greek mythology, according to Homer the son of Hippotes, god and father of the winds, and ruler of the island of Aeolia. In the Odyssey (x. 1) he entertains Odysseus, gives him a favourable wind to help him on his journey, and a bag in which

the unfavourable winds have been confined. Out of curiosity, or with the idea that it contains valuable treasures, Odysseus' companions open the bag; the winds escape and drive them back to the island, whence Aeolus dismisses them with bitter reproaches. According to Virgil, Aeolus dwells on one of the Aeolian islands to the north of

Sicily, Lipara or Strongyle (Stromboli), where he keeps the winds imprisoned in a vast cavern (Virgil, Aen. i. 52). Another genealogy makes him the son of Poseidon and Ame, granddaughter of Hippotes, and a descendant of Aeolus, king of Magnesia in Thessaly, the mythical ancestor of the tribe of the Aeolians (Diodorus iv. 67).

AEON, a term often used in Greek (aLcw) to denote an indefinite or infinite duration of time; and hence, by metonymy, a being that exists for ever. In the latter sense it was chiefly used by the Gnostic sects to denote those eternal beings or manifestations which emanated from the one incomprehensible and ineffable God. (See Gnosticism.)

AEPINUS, FRANZ ULRICH THEODOR (1724-1802), German natural philosopher, was born at Rostock in Saxony on the 13th of December 1724. He was descended from John Aepinus (1499-1553), the first to adopt the Greek form (aiiravos) of the family name Hugk or Huck, and a leading theologian and con- troversialist at the time of the Reformation. After studying medicine for a time, Franz Aepinus devoted himself to the physical and mathematical sciences, in which he soon gained such distinction that he was admitted a member of the Berlin academy of sciences. In 1757 he settled in St Petersburg as member of the imperial academy of sciences and professor of physics, and remained there till his retirement in 1798. The rest of his life was spent at Dorpat, where he died on the 10th of August 1802. He enjoyed the special favour of the empress Catherine II., who appointed him tutor to her son Paul, and endeavoured, without success, to establish normal schools throughout the empire under his direction. Aepinus is best known by his re- searches, theoretical and experimental, in electricity and mag- netism, and his principal work, Tentamen Theoriae Electricitatis et Magnetismi, published at St Petersburg in 1759, was the first systematic and successful attempt to apply mathematical reason- ing to these subjects. He also published a treatise, in 1761, De distributions caloris per tellurem, and he was the author of memoirs on different subjects in astronomy, mechanics, optics and pure mathematics, contained in the journals of the learned societies of St Petersburg and Berlin. His discussion of the effects of parallax in the transit of a planet over the sun's disc excited great interest, having appeared (in 1764) between the dates of the two transits of Venus that took place in the 18th century.

AEQUI, an ancient people of Italy, whose name occurs con- stantly in Livy's first decade as hostile to Rome in the first three centuries of the city's existence. They occupied the upper reaches of the valleys of the Anio, Tolenus and Himella; the last two being mountain streams running northward ' to join the Nar. Their chief centre is said to have

been taken by the Romans about 484 B.C. (Diodorus xi. 40) and again about ninety years later (id. xiv. 106), but they were not finally subdued till the end of the second Samnite war (Livy ix. 45, fx. 1; Diod. xx. 101), when they seem to have received a limited form of franchise (Cic. Off. i. n, 35). All we know of their subsequent political condition is that after the Social war the folk of Cliternia and Nersae appear united in a res publico Aequiculorum, which was a municipium of the ordinary type (C.I.L. ix. p. 388). The Latin colonies of Alba Fucens (304 B.C.) and Carsioli (298 B.C.) must have spread the use of Latin (or what passed as such) all over the district; through it lay the chief (and for some time the only) route (Via Valeria) to Luceria and the south.

Of the language spoken by the Aequi before the Roman con- quest we have no record; but since the Marsi (q.v.), who lived farther east, spoke in the 3rd century B.C. a dialect closely akin to Latin, and since the Hernici (q.v.), their neighbours to the south-west, did the same, we have no ground for separating any of these tribes from the Latian group (see Latini). If we could be certain of the origin of the q in their name and of the relation between its shorter and its longer form (note that the i

in Aequiculus is long — Virgil, Aen. vii. 744 — which seems to con- nect it with the locative of aequum ” a plain,” so that it would mean “dwellers in the plain”; but in the historical period they certainly lived mainly in the hills) , we should know whether they were to be grouped with the q or the p dialects, that is to say, with Latin on the one hand, which preserved an original q, or with the dialect of Velitrae, commonly called Volscian (and, the Volsci were the constant allies of the Aequi), on the other hand, in which, as in the Iguvine and Samnite dialects, an original q is changed into p. There is no decisive evidence to show whether the q in Latin aequus represents an Indo-European q as in Latin quis, Umbro-Volsc. pis, or an Indo-European J + xas in equns, Umb. ekvo-. The derivative adjective Aequicus might be taken to range them with the Volsci rather than the Sabini, but it is not clear that this adjective was ever used as a real ethnicon; the name of the tribe is always Aequi, or Aequicoli. At the end of the Republican period the Aequi appear, under the name Aequiculi or Aequicoli, organized as a municipium, the territory of which seems to have comprised the upper part of the valley of the Salto, still known as Cicolano. It is probable, however, that they continued to live in their

villages as before. Of these Nersae (mod. Nesc'e) was the most considerable. The polygonal terrace walls, which exist in considerable numbers in the district, are shortly described in Rbmische Mitteilungen (1903), 147 seq., but require further study.

See further thfe articles Marsi, Volsci, Latini, and the refer- ences there given; the place-names and other scanty records of the dialect are collected by R. S. Conway, The Italic Dialects, pp. 300 ff. (R. S. C.)

AERARII (from Lat. aes, in its subsidiary sense of "poll- tax"), originally a class of Roman citizens not included in the thirty tribes of Servius Tullius, and subject to a poll-tax arbitrarily fixed by the censor. They were (1) the inhabitants of conquered towns which had been deprived of local self-govern- ment, who possessed the jus conubii and jus commercii, but no political rights; Caere is said to have been the first example of this (353 B.C.); hence the expression "in tabulas Caeritum referre " came to mean " to degrade to the status of an aerarius ": (2) full citizens subjected to civil degradation (infamia) as the result of following certain professions (e.g. acting), of dishonour- able acts in private life [e.g. bigamy) or of conviction for certain crimes; (3) persons branded by the censor. Those who were thus excluded from the tribes and centuries had no vote, were in- capable of filling Roman magistracies and could not serve in the army. According to Mommsen, the aerarii were originally the non-assidui (non-holders of land), excluded from the tribes, the comitia and the army. By a reform of the censor Appius Claudius in 312 b.c. these non-assidui were admitted into the tribes, and the aerarii as such disappeared. But in 304, Fabius Rullianus limited them to the four city tribes, and from that time the term meant a man degraded from a higher (country) to a lower (city) tribe, but not deprived of the right of voting or of serving in the army. The expressions " tribu movere " and " aerarium facere," regarded by Mommsen as identical in meaning (" to degrade from a higher tribe to a lower "), are explained by A. H. J. Greenidge — the first as relegation from a higher to a lower tribe or total exclusion from the tribes, the second as exclusion from the centuries. Other views of the original aerarii are that they were: — artisans and freedmen (Niebuhr) ; inhabitants of towns united with Rome by a hos- pilium publicum, who had become domiciled on Roman terri- tory (Lange) ; only a class of degraded citizens, including neither the cives sine sujfragio nor the artisans (Madvig) ; identical with the capite censi of the Servian constitution (Belot, Greenidge),

See A. H. J. Greenidge, Infamia in Roman Law (1894), where Mommsen's theory is criticized; E. Belot, Histoire Aes chevaliers remains, i. p. 200 (Paris, 1866); L. Pardon, De Aerariis (Berlin, 1853);

P. Willems, Le Droit public romain (1883); A. S., Wilkins in Smith's Did. of Greek and Roman Antiquities (3rd ed., 1891) ; and the usual handbooks of antiquities.

AERARIUM (from Lat. aes, in its derived sense of " money "), the name (in full, aerarium stabulum, treasure-house) given in ancient Rome to the public treasury, and in a secondary sense

to the public finances. The treasury contained the moneys and accounts of the state, and also the standards of the legions; the public laws engraved on brass, the decrees of the senate and other papers and registers of importance. These public treasures were deposited in the temple of Saturn, on the eastern slope of the Capitoline hill, and, during the republic, were in charge of the urban quaestors (see Quaestor), under the super- intendence and control of the senate. This arrangement con- tinued (except for the year 4s B.C., when no quaestors were chosen) until 28 B.C., when Augustus transferred the aerarium to two praefecti aerarii, chosen annually by the senate from ex-praetors; in 23 these were replaced by two praetors (praetores aerarii or ad aerarium), selected by lot during their term of office; Claudius in a.d. 44 restored the quaestors, but nominated by the emperor for three years, for whom Nero in 56 substituted two ex-praetors, under the same conditions. In addition to the common treasury, supported by the general taxes and charged with the ordinary expenditure, there was a special reserve fund, also in the temple of Saturn, the aerarium* sanctum (or sanctius), probably originally consisting of the spoils of war, afterwards maintained chiefly by a 5% tax on the value of all manu- mitted slaves, this source of revenue being established by a lex Manlia in 357. This fund was not to be touched except in cases of extreme necessity (Livy vii. 16, xxvii. 10). Under the emperors the senate continued to have at least the nominal management of the aerarium, while the emperor had a separate exchequer, called jiscus. But after a time, as the power of the emperors increased and their jurisdiction extended till the senate existed only in form and name, this distinction virtually ceased. Besides creating the jiscus, Augustus also established in a.d. 6 a military treasury (aerarium militare), containing all moneys raised for and appropriated to the maintenance of the army, including a pension fund for disabled soldiers. It was largely endowed by the emperor himself (see Monumentum Ancyranum, iii. 35) and supported by the proceeds of the tax on public sales and the succession duty. Its administration was in the hands of three praefecti aerarii militaris, at first appointed by lot, but afterwards by the emperor, from senators of praetorian rank, for three years. The later emperors had a separate aerarium privatum, containing the moneys allotted for their own use,

distinct from the jiscus, which they administered in the interests of the empire.

The tribuni aerarii have been the subject of much discussion. They are supposed by some to be identical with the curatores tribuum, and to have been the officials who, under the Servian organization, levied the war-tax (tribulum) in the tribes and the poll-tax on the aerarii (q.v.). They also acted as paymasters of the equites and of the soldiers on service in each tribe. By the lex Amelia (70 B.C.) the list of judices was composed, in addition to senators and equites, of tribuni aerarii. Whether these were the successors of the above, or a new order closely connected with the equites, or even the same as the latter, is uncertain. According to Mommsen, they were persons who possessed the equestrian census, but no public horse. They were removed from the list of judices by Caesar, but replaced by Augustus. According to Madvig, the original tribuni aerarii were not officials at all, but private individuals of considerable means, quite distinct from the curatores tribuum, who undertook certain financial work connected with their own tribes. Then, as in the case of the equites, the term was subsequently extended to include all those who possessed the property qualification that would have entitled them to serve as tribuni aerarii.

See Tacitus, Annals, xiii. 29, with Furneaux's notes; O. Hirsch- feld, " Das Aerarium militare in der romischen Kaiserzeit," in Fleckeisen's Jahrbuch, vol. xcvii. (1868); S. Herrlich, De Aerario et FisCo Romanorum (Berlin, 1872); and the usual handbooks and dictionaries of antiquities. On the tribuni aerarii see E. Belot, Hist, des chevaliers romains, ii. p. 276; J. N. Madvig, Opuscula Academica, ii. p. 242; J. B. Mispoulet, Les Institutions poliliques des Romains (1883), ii. p. 208; Mommsen, Romisches Staalsrecht, iii. p. 189; A. S. Wilkins in Smith s Dictionary of Greek and Roman Antiquities (3rd ed., 1890).

AERATED WATERS. Waters charged with a larger pro- portion of carbon dioxide than they will dissolve at ordinary

atmospheric pressure occur in springs in various parts of the world (see Mineral Waters) . Such waters, which also generally hold in solution a considerable percentage of saline constituents, early acquired a reputation as medicinal agents, and when carbon dioxide (" fixed air ") became familiar to chemists the possibility was recognized, as by Joseph Priestley {Directions for impregnat- ing water with fixed

air . . . to communicate the peculiar Spirit and Virtues of Pyrmont water, 17 7 2), of imitating them artificially. Many of the ordinary aerated waters of commerce, however, do not pretend to reproduce any known natural water; they are merely beverages owing their popularity to their effervescing properties and the flavour imparted by a small quantity of some salt such as sodium bicarbonate or a little fruit syrup. Their manufacture on a considerable scale was begun at Geneva so far back as 1790 by Nicholas Paul, and the excellence of the soda water prepared in London by J. Schweppe, who had been a partner of Paul's, is referred to by Tiberius Cavallo in his Essay on the Medicinal Properties of Factitious Airs, published in 1798. Many forms'of apparatus are employed for charging the water with the gas. A simple machine for domestic use, called a gasogene or seltzogene, consists of two strong glass globes con- nected one above the other by a wide glass tube which rises nearly to the top of the upper and smaller globe. Surmounting the small globe there is a spring valve, fitted to a narrow tube that passes through the wide tube to the bottom of the large globe. To use the machine, the lower vessel is filled with water, and in the upper one, round the base of the wide tube, is placed a mixture, commonly of sodium bicarbonate and tartaric acid, which with water yields carbon dioxide. The valve head is then fastened on, and by tilting the apparatus some water is made to flow through the wide tube from the lower to the upper vessel. The water in the lower globe takes up the gas thus produced, and when required for use is withdrawn by the valve, being forced up the narrow tube by the pressure of the gas. In another arrangement the gas is supplied compressed in little steel capsules, and is liberated into a bottle containing the water which has to be aerated. On a large scale, use is made of con- tinuously acting machinery which is essentially of the type devised by Joseph Bramah. The gas is prepared in a separate generator by the action of sulphuric acid on sodium bicarbonate or whiting, and after being washed is collected in a gas-holder, whence it is forced with water under pressure into a receiver or saturator in which an agitator is kept moving. Some manu- facturers buy their gas compressed in steel cylinders. The water thus aerated or carbonated passes from the receiver, in which the pressure may be 100-200 ft on the square inch, to bottling machines which fill and close the bottles; if beverages like lemonade are being made the requisite quantity of fruit syrup is also injected into the bottles, though sometimes the fruit syrup mixture is aerated in bulk. For soda water sodium bicarbonate should be added to the water before aeration, in varying proportions up to about 1 5 grains per pint, but the simple carbonated water often does duty instead. Potash water, lithia water and many others are similarly prepared, the various salts

being used in such amounts as are dictated by the experience and taste of the manufacturer. Aerated waters are sent out from the factories either in siphons {q.v.) or in bottles; the latter may be closed by corks, or by screw-stoppers or by internal stoppers consisting of a valve, such as a glass ball, held up against an indiarubber ring in the neck by the pressure of the gas. For use in ” soda-fountains ” the waters are sent out in large cylinders.

See W. Kirkby, Evolution of Artificial Mineral Waters (Manchester,

1902).

AERONAUTICS, the art of ” navigating ” the ” air.” It is divis- ible into two main branches — aerostation, dealing properly with machines which like balloons are lighter than the air, and aviation, dealing with the problem of artificial flight by means of flying machines which, like birds, are heavier than the air, and also with attempts to fly made by human beings by the aid of artificial wings fitted to their limbs.

Historically, aviation is the older of the two, and in the legends

or myths of men or animals which are supposed to have travelled through the air, such as Pegasus, Medea’s dragons and Daedalus, as well as in Egyptian bas-reliefs, wings appear as the means by which aerial locomotion is effected. In later times there are many stories of men who have attempted to fly in the same way. John Wilkins (1614-1672), one of the founders of the Royal Society and bishop of Chester, who in 1640 discussed the possi- bility of reaching the moon by volitation, says in his Mathe- matical Magick (1648) that it was related that ” a certain English monk called Elmerus, about the Confessor’s time,” flew from a town in Spain for a distance of more than a furlong; and that other persons had flown from St Mark’s, Venice, and at Nurem- berg. Giovanni Battista Dante, of Perugia, is said to have flown several times across Lake Trasimene. At the beginning of the 1 6th century an Italian alchemist who was collated to the abbacy of Tungland, in Galloway, Scotland, by James IV., undertook to fly from the walls of Stirling Castle through the air to France. He actually attempted the feat, but soon came to the ground and broke his thigh-bone in the fall — an accident which he ex- plained by asserting that the wings he employed contained some fowls’ feathers, which had an ” affinity ” for the dung-hill, whereas if they had been composed solely of eagles’ feathers they would have been attracted to the air. This anecdote furnished Dunbar, the Scottish poet, with the subject of one of his rude satires. Leonardo da Vinci about the same time approached the problem in a more scientific

spirit, and his notebooks contain several sketches of wings to be fitted to the arms and legs. In the following century a lecture on flying delivered in 16 17 by Fleyder, rector of the grammar school at Tubingen, and pub- lished eleven years later, incited a poor monk to attempt to put the theory into practice, but his machinery broke down and he was killed.

In Francis Bacon's Natural History there are two passages which refer to flying, though they scarcely bear out the assertion made by some writers that he first published the true principles of aeronautics.

The first is styled Experiment Solitary, touching Flying in the Air: — " Certainly many birds of good wing (as kites and the like)would bear up a good weight as they fly; and spreading feathers thin and close, and in great breadth, will likewise bear up a great weight, being even laid, without tilting up on the sides. The farther extension of this experiment might be thought upon." The second passage is more diffuse, but less intelligible ; it is styled Experiment Solitary, touching the Flying of unequal Bodies in the Air: — "Let there be a body of unequal weight (as of wool and lead or bone and lead) ; if you throw it from you with the light end forward, it will turn, and the weightier end will recover to be forwards, unless the body be over long. The cause is, for that the more dense body hath a more violent pressure of the parts from the first impulsion, which is the cause (though heretofore not found out, as hath been often said) of all violent motions ; and when the hinder part moveth swifter (for that it less endureth pressure of parts) than the forward part can make way for it, it must needs be that the body turn over; for (turned) it can more easily draw forward the lighter part." The fact here alluded to is the resistance that bodies experience in moving through the air, which, depending on the quantity of surface merely, must exert a proportionally greater effect on rare substances. The passage itself, however, after making every allowance for the period in which it was written, must be deemed confused, obscure and unphilosophical.

In his posthumous work, De Motu Animalium, published at Rome in i68o-i68i,G.A.Borelli gave calculations of the enormous strength of the pectoral muscles in birds; and his proposition cciv. (vol. i. pp. 322-326), entitled Est impossibile ut homines pro- priis viribus artificiose volare possint, points out the impossibility of man being able by his muscular strength to give motion to wings of sufficient extent to keep him suspended in the air. But during his lifetime two Frenchmen, Allard in 1660 and Besnier about 1678, are said to have succeeded in making short flights. An account of some of the modern attempts to construct flying machines will be found in the article

Flight and Flying; here we append a brief consideration of the mechanical aspects of the problem.

The very first essential for success is safety, which will probably only be attained with automatic stability. The underlying principle is that the centre of gravity shall at all times be on the same vertical line as the centre of pressure. The latter varies with the angle of incidence. For square planes it moves approximately as expressed

by joessel's formula, C + (o-2 +0-3 sin o) L, in which C is the distance frcm the front edge, L the length fore and aft, and a the angle of incidence. The movement is different on concave surfaces. The term aeroplane is understood to apply to flat sustaining surfaces, but experiment indicates that arched surfaces are more efficient. S. P. Langley proposed the word aerodrome, which seems the prefer- able term for apparatus with wing-like surfaces. This is the type to which results point as the proper one for further experiments. With this it seems probable that, with well-designed apparatus, 40 to 50 lb can be sustained per indicated h.p., or about twice that quantity per resistance or " thrust " h.p., and that some 30 or 40% of the weight can be devoted to the machinery, thus requiring motors, with their propellers, shafting, supplies, &c, weighing less than 20 lb per h.p. It is evident that the apparatus must be designed to be as light as possible, and also to reduce to a minimum all resistances to propulsion. This being kept in view, the strength and conse- quent section required for each member may be calculated by the methods employed in proportioning bridges, with the difference that the support (from air pressure) will be considered as uniformly distributed, and the load as concentrated at one or more points. Smaller factors of safety may also have to be used. Knowing the sections required and unit weights of the materials to be employed, the weight of each part can be computed. If a model has been made to absolutely exact scale, the weight of the full-sized apparatus may approximately be ascertained by the formula

W ' = W ⁄(I) S –

in which W is the weight of the model, S its surface', and W and S' the weight and surface of the intended apparatus. Thus if the model has been made one-quarter size in its homologous dimensions, the supporting surfaces will be sixteen times, and the total weight sixty-

four times those of the model. The weight and the surface being determined, the three most important things to know are the angle of incidence, the ” lift,” and the required speed. The fundamental formula for rectangular air pressure is well known: P = KV 2 S, in which P is the rectangular normal pressure, in pounds or kilograms, K a coefficient (0-0049 for British, and o-ll for metric measures), V the velocity in miles per hour or in metres per second, and S the surface in square feet or in square metres. The normal on oblique surfaces, at various angles of incidence, is given by the formula P = KV 2 S?), which latter factor is given both for planes and for arched surfaces in the subjoined table: —

Percentages of Air Pressure at Various Angles of Incidence

Planes (Duchemin For-

mula, VERIFIED BY LANGLEY).

Wings (Lilienthal).

N ■ P 2sina ,

Concavity 1 in 12.

I+sin 2 a

Tan-

Angle.

a.

Nor- mal.

1-

Lift. Tjcosa.

Drift. Tˆsina.

Nor- mal.

1-

Lift. 7)COSa.

Drift. Tjsino.

gential

force.

a.

-Q°

o-o

0-0

o-o

＋0-070

-8°

0-040

0-0396

-0-0055

＋0-067

0-080

0-0741

— 0-0097

＋0-064

-6°

0-I2O

0-1193

—0-0125

＋0-060

-s”

0-160

0-1594

-0-0139

＋0-055

“4°

O-20O

0-1995

-0-0139

＋0-049

-3°

0-242

0-2416

— 0-0126

＋0-043

-2°

0-286

0-2858

— O-OIOO

＋0-037

-i°

0-332

0-3318

—0-0058

＋0-031

0°

o-o

o-o

O-o

0-381

0-3810

— 0-0

＋0-024

＋ i°

0-035

0-035

0-00061 1

0-434

0-434

＋0-0075

＋0-016

＋2 U

0-070

0-070

0-00244

0-489

0-489

＋0-0170

＋o-oo8

＋3″

0-104

0-104

0-00543

0-546

0-545

+0-0285

0-0

+<

0-139

0-139

0-0097

o-6oo

o-597

+0-0418

—0-007

+5°

0-174

o-i73

0-0152

0-650

0-647

+0-0566

—0-014

+6°

0-207

0-206

0-0217

0-696

0-692

+0-0727

— 0-021

+ K

0-240

0-238

0-0293

0-737

0-731

+0-0898

— 0-028

+8°

0-273

0-270

0-0381

0-771

0-763

+0-1072

-0-035

+ 9 ”

0-305

0-300

0-0477

0-800

0-790

＋0-1251

—0-042

10°

0-337

0-332

0-0585

0-825

0-812

＋0-1432

-0-050

n°

0-369

0-362

0-0702

0-846

0-830

＋0-1614

-0-058

12°

0-398

0-390

0-0828

0-864

0-845

＋0-1803

—0-064

*K

0-431

0419

0-0971

0-879

0-856

＋0-1976

—0-070

l <

0-457

0-443

0-H55

0-891

0-864

＋0-2156

-0-074

15″

0-486

0-468

01240

0-901

0-870

+0-2332

— 0-076

The sustaining power, or ” lift,” which in horizontal flight must be equal to the weight, can be calculated by the formula L = KVˆStjcoso, or the factor may be taken direct from the table, in which the ” lift ” and the “drift” have been obtained by multiply- ing the normal ij by the cosine and sine of the angle. The last column shows the tangential pressure on concave surfaces which O. Lilien- thal found to possess a propelling component between 3 and 32°,

KSijcoso’

W

and therefore to be negative to the relative wind. Former modes of computation indicated angles of 10° to 15° as necessary for sup- port with planes. These were prohibitory in consequence of the great “drift”; but the present data indicate that, with concave surfaces, angles of 2° to 5 will produce adequate ” lift.” To com- pute the latter the angle at which the wings are to be set must first be assumed, and that of +3 will generally be found preferable. Then the required velocity is next to be computed by the formula

V = ⋁-

or for concave wings at +3 : _

V = Vo-545KS-

Having thus determined the weight, the surface, the angle of inci- dence and the required speed for horizontal support, the next step is to calculate the power required. This is best accomplished by first obtaining the total resistances, which consist of the ” drift ” and of the head resistances due to the hull and framing. The latter are arrived at preferably by making a tabular statement showing all the spars and

parts offering head resistance, and applying to each the coefficient appropriate to its ” master section,” as ascertained by experiment. Thus is obtained an ” equivalent area ” of resistance, which is to be multiplied by the wind pressure due to the speed. Care must be taken to resolve all the resistances at their proper angle of application, and to subtract or add the tangential force, which con- sists in the surface S, multiplied by the wind pressure, and by the factor in the table, which is, however, o for 3 and 32°, but positive or negative at other angles. When the aggregate resistances are known, the ” thrust h.p.” required is obtained by multiplying the resistance by the speed, and then allowing for mechanical losses in the motor and propeller, which losses will generally be 50% of indicated h.p. Close approximations are obtained by the above method whenapplied to full-sized apparatus. The following example will make the process clearer. The weight to be carried by an appar- atus was 189 lb on concave wings of 143-5 sq. ft. area, set at a positive angle of 3 . There were in addition rear wings of 29-5 sq. ft., set at a negative angle of 3 ; hence, L = i89 = o-oo5XV 2 XH3-5Xo-545.

Whence

V = A/ — V o-i

189

= 22 miles per hour,

■005X143-5X0-545 at which the air pressure would be 2-42 lb per sq. ft. The area of spars and man was 17-86 sq. ft., reduced by various coefficients to an ” equivalent surface ” of 11-70 sq. ft., so that the resistances were : —

Drift front wings, 143-5X0-0285X2-42 . . . = 9-90 ft > „ rear wings, 29-5 X (0-043 — 0-242 Xo-0523)X2-42 = 2-17,,

Tangential force at 3° = 0-00 „

Head resistance, 11-70X2-42 . . . . . = 28-31 „

2-36 h.p. for the

Total resistance = 40-38 lb

Speed 22 miles per hour. Power = ” thrust ” or 4-72 h.p. for the motor, the resistance 40-38 lb, the gliding angle of descent was

40-38X22

375

The weight being 189 lb, and

40-38 .. 189

tangent of 12°, which was verified by many experiments.

The following expressions will be found useful in computing such projects, with the aid of the table above given; —

1. Wind force, $F = KV^2$.

2. Pressure, P = KV 2 S.

3. Velocity, V

V

W

KSrjCOSa’

Surface S varies as yj-

Normal, N = KSVV, Lift, L = KSWosa. Weight, W = L = Ncosa.

8. Drift, D = KSVV»na.

9. Head area E, get an equiva-

lent.

10. Head resistance, H = EF.

1 1 . Tangential force, T = Pa.

12. Resistance, R = D+H=T.

13. Ft. lb, M=RV.

14. Thrust, h.p., =jJˆ F

5- 6.

7-

Aerostation. — Possibly the flying dove of Archytas of Tarentum is the earliest suggestion of true aerostation. According to Aulus Gellius (Nodes Atticae) it was a ” model of a dove or pigeon formed in wood and so contrived as by a certain mechanical art and power to fly: so nicely was it balanced by weights and put in motion by hidden and enclosed air.” This ” hidden and enclosed air ” may conceivably represent an anticipation of the hot-air balloon, but it is at least as probable that the apparent flight of the dove was a mere mechanical trick depending on the use of fine wires or strings invisible to the spectators.

In the middle ages vague ideas appear of some ethereal sub- stance so

light that vessels containing it would remain suspended in the air. Roger Bacon (12 14-1294) conceived of a large hollow globe made of very thin metal and filled with ethereal air or liquid fire, which would float on the atmosphere like a ship

on water. Albert of Saxony, who was bishop of Halberstadt from 1366 to 1390, had a similar notion, and considered that a small portion of the principle of fire enclosed in a light sphere would raise it and keep it suspended. The same speculation was advanced by Francis Mendoza, a Portuguese Jesuit, who died in 1626 at the age of forty-six, and by Gaspar Schott (1608- 1666), also a Jesuit and professor of mathematics at Wurzburg, though for fire he substituted the thin ethereal fluid which he believed to float above the atmosphere. So late as 1755 Joseph Galien (1600-1782), a Dominican friar and professor of philo- sophy and theology in the papal university of Avignon, proposed to collect the diffuse air of the upper regions and to enclose it in a huge vessel extending more than a mile every way, and intended to carry fifty-four times as much weight as did Noah's ark! A somewhat different but equally fantastic method of making heavy bodies rise is quoted by Schott from Lauretus Laurus, according to whom swans' eggs or leather balls filled with nitre, sulphur or mercury ascend when exposed to the sun. Laurus also stated that hens' eggs filled with dew will ascend in the same circumstances, because dew is shed by the stars and drawn up again to heaven by the sun's heat during the day. The same notion is utilized by Cyrano de Bergerac (1619-1655) in his romances describing journeys to the moon and sun, for his French traveller fastens round his body a multitude of very thin flasks rilled with the morning's dew, whereby through the attractive power of the sun's heat on the dew he is raised to the middle regions of the atmosphere, to sink again, however, on the breaking of some of the flasks.

A distinct advance on Schott is marked by the scheme for aerial.inavigation proposed by the Jesuit, Francis Lana (163 1- 1687), in his book, published at Brescia in 1670, Prodrome* ovoero Saggio di alcune invenzioni nuove promesso all' Arte Maeslra.

His idea, though useless and unpractical in so far that it could never be carried out, is yet de- serving of notice, as the principles involved are sound; and this can be said of no earlier attempt. His project was to procure four copper balls of very large dimensions (fig. 1), yet so

extremely thin that after the air was exhausted from them they would be lighter than the air they dis- placed and so would rise; and to those four balls he proposed to attach a boat, with sails, &c, which would carry up a man. He sub- mitted the whole matter to calculation, and pro- posed that the globes should be about 25 ft. in diameter and •j-|-jth of an inch in thickness; this would give from all four balls a total ascensional force of about 1200 lb, which would be quite enough to raise the boat, sails, passengers, &c. But the obvious objection to the whole scheme is, that it would be quite im- possible to construct a globe "of so large a size and of such small thickness which would even support its own weight without col- lapsing if placed on the ground, much less bear the external atmospheric pressure when the internal air was removed. Lana himself noticed this objection, but he thought that the spherical form of the copper shell would, notwithstanding its extreme thin- ness, enable it, after the exhaustion was effected, to sustain the enormous pressure, which, acting equally on every point of the surface, would tend to consolidate rather than to break the metal. His proposal to exhaust the air from the globes

Fig. I. — Lana's Aeronautical Machine.

by attaching to each a tube 36 ft. long, fitted with a stopcock, and so producing a Torricellian vacuum, suggests that he was ignorant of the invention of the air-pump by Otto von Guericke about 1650.

We now come to the invention of the balloon, which was due to Joseph Michel Montgblfier (1740-1810) and Jacques fitienne Montgolfier (1745-1700), sons of Pierre Mont- golfier, a large and celebrated papermaker at Annonay, ideation a town about 40 m. from Lyons. The brothers had balloon. observed the suspension of clouds in the atmosphere, and it occurred to them that if they could enclose any vapour of the nature of a cloud in a large and very light bag, it might rise and carry the bag with it into the air. Towards the end of 1782 they inflated bags with smoke from a fire placed under- neath, and found that either the smoke or some vapour emitted from the fire did ascend and carry the bag with it. Being thus assured of the correctness of their views, they determined to have a public ascent of a balloon on a large scale. They accord- ingly invited the States of Vivarais, then assembled at Annonay, to witness their aerostatic experiment; and on the 5th of June 1783, in the presence of a considerable concourse of spectators, a linen globe of 105 ft. in circumference was inflated over a fire fed with small bundles of chopped straw. When released it rapidly rose to a great height, and descended, at the expiration of ten minutes, at the distance of about ijm. This was the discovery of the balloon. The brothers Montgolfier imagined that the bag rose because

of the levity of the smoke or other vapour given forth by the burning straw; and it was not till some time later that it was recognized that the ascending power was due merely to the lightness of heated air compared to an equal volume of air at a lower temperature. In this balloon, no source of heat was taken up, so that the air inside rapidly cooled, and the balloon soon descended.

The news of the experiment at Annonay attracted so much attention at Paris that Barthelemi Faujas de Saint-Fond (1741- 1819), afterwards professor of geology at the Musee d'Histoire Naturelle, set on foot a subscription for paying the expense of repeating the experiment. The balloon was constructed by two brothers of the name of Robert, under the superintendence of the physicist, J. A. C. Charles. The first suggestion was to copy the process of Montgolfier, but Charles proposed the appli- cation of hydrogen gas, which was adopted. The filling of the balloon, which was made of thin silk varnished with a solution of elastic gum, and was about 13 ft. in diameter, was begun on the 23rd of August 1783, in the Place des Victoires. The hydrogen gas was obtained by the action of dilute sulphuric acid upon iron filings; and was introduced through leaden pipes; but as the gas was not passed through cold water, great difficulty was experienced in filling the balloon completely; and alto- 1 gether about 500 fb of sulphuric acid and twice that amount of iron filings were used (fig. 2). Bulletins were issued daily of the progress of the inflation; and the crowd was so great that on the 26th the bal- loon was moved secretly by night to the Champ de Mars, a distance of 2 m. On the next day an im- mense concourse of people covered the Champ de Mars, and every spot from which a view could be ob- tained was crowded. About five o'clock a cannon was discharged as

the signal for the ascent, and the balloon when liberated rose to the height of about 3000 ft. with great rapidity. A shower of rain which began to fall directly after it had left the earth in no way checked its progress; and the excitement was so great, that thousands of well-dressed spectators, many of them ladies, stood exposed, watching it intently the whole time it was in sight and

Fig. 2. — Charles' and Robert's Balloon.

were drenched to the skin. The balloon, after remaining in the air for about three-quarters of an hour, fell in a field near Gonesse, about 15

m. off, and terrified the peasantry so much that it was torn into shreds by them. Hydrogen gas was at this time known by the name of inflammable air; and balloons inflated with gas have ever since been called by the people air-balloons, the kind invented by the Montgolfiers being desig- nated fire-balloons. French writers have also very frequently styled them after their inventors, Charlieres and Monlgolfi'eres. On the 19th of September 1783 Joseph Montgolfier repeated the Annonay experiment at Versailles, in the presence of the king, the queen, the court and an immense number of spectators. The inflation was begun at one o'clock, and completed in eleven minutes, when the balloon rose to the height 6f about 1500 ft., and descended after eight minutes, at a distance of about 2 m., in the wood of Vaucresson. Suspended below the balloon, in a cage, had been placed a sheep, a cock and a duck, which were thus the first aerial travellers. They were quite uninjured, except the cock, which had its right wing hurt in consequence of a kick it had received from the sheep; but this took place before the ascent. The balloon, which was painted with orna- ments in oil colours, had a very showy appearance (fig. 3).

Fig. 3. — Montgolfier's Balloon.

The first human being who ascended in a balloon was Jean Francois Pilatre de Rozier (1756-1785), a native of Metz, who was appointed superintendent of the natural history collections of Louis XVIII. On the 15th of October 1783, and following days, he made several ascents (generally alone, but once with a companion, Girond de Villette) in a captive balloon (i.e. one attached by ropes to the ground) , and demonstrated that there was no difficulty in taking up fuel and feeding the fire, which was kindled in a brazier suspended under the balloon, when in the air. The way being thus prepared for aerial navigation, on the 21st of November 1783, Pilatre de Rozier and the marquis d'Arlandes first trusted themselves to a free fire-balloon. The experiment was made from the Jardin du Chateau de la Muette, in the Bois de Boulogne. A large fire-balloon was inflated at about two o'clock, rose to a height of about 500 ft., and passing over the Invalides and the Ecole Militaire, descended beyond the Boulevards, about 9000 yds. from the place of ascent, having been between twenty and twenty-five minutes in the air.

Only ten days later, viz. on the 1st of December 1783, Charles ascended from Paris in a balloon inflated with hydrogen gas.

The balloon, as in the case of the small one of the same kind previously launched from the Champ de Mars, was constructed by the brothers Robert, one of whom took part in the ascent. It was 27 ft. in

diameter, and the car was suspended from a hoop surrounding the middle of the balloon, and fastened to a net, which covered the upper hemisphere. The balloon ascended very gently from the Tuileries at a quarter to two o'clock, and after remaining for some time at an elevation of about 2000 ft., it descended in about two hours at Nesle, a small town about 27 m. from Paris, when Robert left the car, and Charles made a second ascent by himself. He had intended to have replaced the weight of his companion by a nearly equivalent quantity of ballast; but not having any suitable means of obtaining such at the place of descent, and it being just upon sunset, he gave the word to let go, and the balloon being thus so greatly lightened, ascended very rapidly to a height of about 2 m. After staying in the air about half an hour, he descended 3 m. from the place of ascent, although he believed the distance traversed, owing to different currents, to have been about 9 m. In this second journey he experienced a violent pain in his right ear and jaw, no doubt produced by the rapidity of the ascent. He also witnessed the phenomenon of a double sunset on the same day; for when he ascended, the sun had set in the valleys, and as he mounted he saw it rise again, and set a second time as he descended.

All the features of the modern balloon as now used are more or less due to Charles, who invented the valve at the top, sus- pended the car from a hoop, which was itself attached to the balloon by netting, &c. With regard to his use of hydrogen gas, there are anticipations that must be noticed. As early as 1766 Henry Cavendish showed that this gas was at least seven times lighter than ordinary air, and it immediately occurred to Dr. Joseph Black, of Edinburgh, that a thin bag filled with hydrogen gas would rise to the ceiling of a room. He provided, accordingly, the allantois of a calf, with the view of showing at a public lecture such a curious experiment; but for some reason it seems to have failed, and Black did not repeat it, thus allowing a great dis- covery, almost within his reach, to escape him. Several years afterwards a similar idea occurred to Tiberius Cavallo, who found that bladders, even when carefully scraped, are too heavy, and that China paper is permeable to the gas. But in 1782, the year before the invention of the Montgolfiers, he succeeded in elevating soap-bubbles by inflating them with hydrogen gas.

Researches on the use of gas for inflating balloons seem to have been carried on at Philadelphia nearly simultaneously with the experiments of the Montgolfiers; and when the news .of the latter reached America, D. Rittenhouse and F. Hopkinson, members of the Philosophical Society at Philadelphia, con- structed a machine consisting of forty-seven small hydrogen gas-balloons attached to a car or cage. After

several preliminary experiments, in which animals were let up to a certain height by a rope, a carpenter, one James Wilcox, was induced to enter the car for a small sum of money; the ropes were cut, and he remained in the air about ten minutes, and only then effected his descent by making incisions in a number of the balloons, through fear of falling into the river, which he was approaching.

Although the news of the Annonay and subsequent experi- ments in France rapidly spread all over Europe, and formed a topic of general discussion, still it was not till five first months after the Montgolfiers had first publicly sent ascents la a balloon into the air that any aerostatic experiment ?“5?’ was made in England. In November 1783 Count Francesco Zambeccari (1756-1812), an Italian who happened to be in London, made a balloon of oil-silk, 10 ft. in diameter, and weighing n lb. It was publicly shown for several days, and on the 25th it was three-quarters filled with hydrogen gas and launched from the Artillery ground at one o’clock. It descended after two hours and a half near Petworth, in Sussex, 48 m. from London. This was the first balloon that ascended from English ground. On the 22nd of February 1784 a hydrogen gas balloon, 5 ft. in diameter, was let up from Sandwich, in Kent, and descended at Warneton, in French Flanders,

75 m. distant. This was the first balloon that crossed the Channel. The first person who rose into the air from British ground appears to have been J. Tytler, 1 who ascended from the Comely Gardens, Edinburgh, on the 27th of August 1784, in a fire-balloon of his own construction. He descended on the road to Restalrig, about half a mile from the place where he rose.

But it was Vincent Lunardi who practically introduced aerostation into Great Britain. Although Tytler had the precedence by a few days still his attempts and partial success were all but unknown ; whereas Lunardi’s experiments excited an enormous amount of enthusiasm in London. He was secre- tary to Prince Caramanico, the Neapolitan ambassador, and his published letters to his guardian, the chevalier Compagni,

written while he was carrying out his project, and detail- ing all the difficulties, &c, he met with as they occurred, give an interesting and vivid account of the whole matter. His balloon was 33 ft. in circumference (fig.4),and was exposed to the public view at the

Lyceum in the Strand, where it was visited by up- wards of 20,000 people. He originally intended to ascend from Chelsea Hospital, but the conduct of a crowd at a garden at Chelsea, which de- stroyed the fire-balloon of a Frenchman named de Moret, who announced an ascent on the nth of August, but was unable to keep his word, led to the withdrawal of the Ultimately he was permitted to ascend from the Artillery ground, and on the 15th of September 1 784 the inflation with hydrogen gas took place. It was intended that an English gentleman named Biggin should accompany Lunardi; but the crowd becoming impatient, the latter judged it prudent to ascend with the balloon only partially full rather than risk a longer delay, and accordingly Mr Biggin was obliged to leave the car. Lunardi therefore ascended alone, in presence of the prince of Wales and an enormous crowd of spectators. He took up with him a pigeon, a dog and a cat, and the balloon was provided with oars, by means of which he hoped to raise or lower it at pleasure. Shortly after starting the pigeon escaped, and one of the oars became broken and fell to the ground. In about an hour and a half he descended at South Mimms, in Hertfordshire, and landed the cat, which had suffered from the cold: he then ascended again, and descended, after the lapse of about three-quarters of an hour, at Standon, near Ware, where he had great difficulty in inducing the peasants to come to his assistance; but at length a young woman, taking hold of one of the cords, urged the men to follow her example, which they then did. The excitement caused by this ascent was immense, and Lunardi at once became the star of the hour. He was pre- sented to the king, and was courted and flattered on all sides. To show the enthusiasm displayed by the people during his ascent, he tells himself, in his sixth letter, how a lady, mistaking the oar which fell for himself, was so affected by his supposed destruction that she died in a few days ; but, on the other hand, he says he was told by the judges ” that he had certainly saved the life of a young man who might possibly be reformed, and be to the public a compensation for the death of the lady “; for the jury were deliberating on the fate of a criminal, whom they must ultimately have condemned, when the balloon appeared, and to save time they gave a verdict of acquittal, and the whole court

1 Mr Tytier contributed largely to, and, indeed, appears to have been virtually editor ot, the second edition (1778-1783) of the Encyclopaedia Britannica.

Fig. 4. — Lunardi’s Balloon, leave that had been granted.

came out to view the balloon. The king also was in conference with his ministers; but on hearing that the balloon was passing, he broke

up the discussion, and with them watched the balloon through telescopes. The balloon was afterwards exhibited in the Pantheon. In the latter part of the following year (1785) Lunardi made several successful ascents from Kelso, Edinburgh and Glasgow (in one of which he traversed a distance of no m.) ; these he described in a second series of letters.

The first ascent from Ireland was made on the 19th of January 1785 by a Mr Crosbie, who on the following 19th of July at- tempted to cross St George's Channel to England but fell into the sea. The second person who ascended from Ireland was Richard Maguire. Mr Crosbie had inflated his balloon on the 12th of May 1785, but it was unable to take him up. Maguire in these circumstances offered himself as a substitute, and his offer being accepted he made the ascent. For this he was knighted by the Lord-Lieutenant. Another attempt to cross St George's Channel was made by James Sadler on the 1st of October 181 2, and he had nearly succeeded when in consequence of a change of wind he was forced to descend into the sea off Liverpool, whence he was rescued by a fishing-boat. But on the 22nd of July 1817 his second son, Windham Sadler, succeeded in crossing from Dublin to Holyhead.

The first balloon voyage across the English Channel was accomplished by Jean Pierre Blanchard (1 753-1809) and Dr. J. Jeffries, an American physician, on the 7 th of January voyages 1785. In the preceding year, on the 2nd of March, across Blanchard, who was one of the most celebrated of ˆjf llsh . the earlier aeronauts, made his first voyage from Paris in a balloon 27 ft. in diameter (fig. 5), and descended at Billan- court near Sevres. Just as the balloon was about to start, a young man jumped into the car and draw- ing his sword declared his determination to ascend with Blanch- ard. He was ulti- mately removed by force. It has some- times been incorrectly stated that he was Napoleon Bonaparte ; his name in reality was Dupont de Cham- bon. In their Channel crossing Blanchard and his companion, who started from Dover, when about one-third across found themselves descend- ing, and threw out every available thing from the boat or car. When about three- quarters across they were

Fig. 5. — Blanchard's Balloon.

descending A, Balloon of taffeta, 26 ft. in diameter, again and had to covered with a net.

,-t ' . t 1 B, Car suspended by cords from hoop C.

throw out not only D> D , D> D , Wings worked by rack-work E. the anchor and cords, F, Parachute to break the force of descent but also to strip and should the balloon burst,

throw away part of -, Tube communicating with inside of their clothing, after balloon.

which they found they were rising, and their last resource, viz. to cut away the car, was rendered unnecessary. As they ap- proached the shore the balloon rose, describing a magnificent arch high over the land. They descended in the forest of Guinnes.

On the 15th of June 1785, Pilatre de Rozier made an attempt to repeat the exploit of Blanchard and Jeffries in the reverse direction, and cross from Boulogne to England. For this

purpose he contrived a double balloon, which he expected would combine the advantages of both kinds — a fire-balloon, 10 ft. in diameter, being placed underneath a gas-balloon of 37 ft. in diameter, so that by increasing or diminishing the fire in the former it might be possible to ascend or descend without waste of gas. Rozier was accompanied by P. A. Romain, and for rather less than half an hour after the aerostat ascended all seemed to be going on well, when suddenly the whole apparatus was seen in flames, and the unfortunate adventurers came to the ground from the supposed height of more than 3000 ft. Rozier was killed on the spot, and Romain only survived about ten minutes. A monument was erected on the place where they fell, which was near the sea-shore, about 4 m. from the starting-point.

The largest balloon on record (if the contemporary accounts are correct) ascended from Lyons on the 19th of January 1784. It was more than 100 ft. in diameter, about 130 ft. t*-^ in height, and when distended had a capacity, it is

balloons, said, of over half a million cubic feet. It was called the ” Flesselles ” (from the name of its proprietor, we believe), and after having been inflated from a straw fire in seventeen minutes, it rose with seven persons in the car to the height of about 3000 ft., but descended again after the lapse of about a quarter of an hour from the time of starting, in con- sequence of a rent in the upper part.

Another large fire-balloon, 68 ft. in diameter, was constructed by the

chevalier Paul Andreani of Milan, and on the 25th of February he ascended in it from Milan, remaining in the air for about twenty minutes. This is usually regarded as the first ascent in Italy (but see Monck Mason's Aeronautica, p. 247).

On the 7th of November 1836, at half-past one o'clock, a large balloon containing about 85,000 cub. ft. of gas ascended from Vauxhall Gardens, London, carrying Robert Hollond, M.P., Monck Mason and Charles Green, and descended about two leagues from Weilburg, in the duchy of Nassau, at half-past seven the next morning, having thus traversed a distance of about 500 m. in 18 hours; Liege was passed in the course of the night, and Coblentz in the early morning. In consequence of this journey the balloon became famous as the " Nassau Balloon " (fig. 6). Charles Green (1785-1870), who constructed It and subsequently became its owner, was the most celebrated of English aeronauts, and made an extraordinary number of ascents. His first, made from the Green Park, London, on the 19th of July 1 82 1 at the coronation of George IV., was distin- guished for the fact that for the first time coal-gas was used instead of hydrogen for inflating the balloon. In 1828 he made an equestrian ascent from the Eagle Tavern, City Road, London, seated on his favourite pony. Such ascents have since been repeated; in 1852 Madame Poitevin made one from Cremorne Gardens, but was prevented from giving a second performance by police interference, the exhibition outraging public opinion. It was in descending from the " Nassau Balloon " in a parachute that Robert Cocking was killed in 1837 (see Parachute). Green was the inventor of the guide-rope, which consists of a long rope trailing below the car. Its function is to reduce the waste of gas and ballast required to keep the balloon at a proper altitude. When a balloon sinks so low that a good deal of the guide-rope rests on the ground, it is relieved of so much weight and therefore tends to rise; if on the other hand it rises so that most of the rope is lifted off the ground, it has to bear a greater weight and tends to sink.

In 1863 A. Nadar, a Paris photographer, constructed " Le Geant," which was the largest gas-balloon made up to that time and contained over 200,000 cub. ft. of gas. Underneath it was placed a smaller balloon, called a compensator, the object of which was to prevent loss of gas during the voyage. The car had two stories, and was, in fact, a model of a cottage in wicker-work, 8 ft. in height by 13 ft. in length, containing a small printing-office, a photographic department, a refreshment- room, a lavatory, &c. The first ascent took place at five o'clock on Sunday the 4th of October 1863, from the Champ de Mars. There were thirteen persons in the car, including one lady, the

princess de la Tour d'Auvergne, and the two aeronauts Louis and Jules Godard. In spite of the elaborate preparations that had been made and the stores of provisions that were taken up, the balloon descended at nine o'clock, at Meaux, the early descent being rendered necessary, it was said, bf an accident to the valve-line. At a second ascent, made a fortnight later, there were nine passengers, including Madame Nadar. The balloon descended at the expiration of seventeen hours, near Nienburg in Hanover, a distance of about 400 m. A strong wind was blowing, and it was dragged over the ground for 7 or 8 m. AH the passengers were bruised, and some seriously hurt. The balloon and car were then brought to England, and exhibited at the Crystal Palace at the end of 1863 and beginning of 1864. The two ascents of Nadar's balloon excited an extraordinary amount of enthusiasm and interest, vastly out of proportion to what they were entitled to. Nadar's idea was to obtain suffi- cient money, by the exhibition of his balloon, to carry out a plan

Fig. 6. — The Great Nassau Balloon.

of aerial locomotion he had conceived possible by means of the principle of the screw; in fact, he spoke of " Le Geant " as " the last balloon." He also started U Aeronaute, a newspaper devoted to aerostation, and published a small book, which was translated into English under the title The Right to Fly.

Directly after Nadar's two ascents, Eugene Godard con- structed a fire-balloon of nearly half a million cubic feet capa- city — more than double that of Nadar's and only slightly less than that attributed to the " Flesselles " of 1783. The air was heated by an 18-ft. stove, weighing, with the chimney, 980 lb. This furnace was fed by straw; and the " car " consisted of a gallery surrounding it. Two ascents of this balloon, the first fire-balloon seen in London, were made from Cremorne Gardens in July 1864. After the first journey the balloon descended at Greenwich, and after the second at Walthamstow, where it was injured by being blown against a tree. Notwithstanding its enormous size, Godard asserted that it could be inflated in half an hour, and the inflation at Cremorne did not occupy more than an hour. In spite of the rapidity with which the inflation was effected, few who saw the ascent could fail to receive an impression unfavourable to the fire-balloon in the matter of safety, as a rough descent, with a heated furnace as it were in the car, could not be other than most dangerous.

In the summer of 1873 the proprietors of the New York Daily Graphic, reviving a project discussed by Green in 1840, deter- mined to construct a very large balloon, and enable balloon the American aeronaut, John Wise, to realize his voyages, favourite scheme of crossing the Atlantic Ocean to Europe, by taking advantage of the current from west to east which was believed by many to exist constantly at heights above 10,000 ft. The project came to nothing owing to the quality of the material of which the balloon was made. When it was being inflated in September 1873 a rent was observed after 325,000 cub. ft. of gas had been put in, and the whole rapidly collapsed. The size was said to be such as to contain 400,000 cub. ft., so that it would lift a weight of 14,000 lb. No balloon voyage has yet been made of a length comparable to the breadth of the Atlantic. In fact only two voyages exceeding 1000 m. are on record — that of John Wise from St Louis to Henderson, N.Y., 1120 m., in 1859, and that of Count Henry de la Vaulx from Paris to Korosticheff in Russia, 1103 m., in 1900. On the nth of July 1897 Salomon Andree, with two companions, Strendberg and Frankel, ascended from Spitsbergen in a daring attempt to reach the North Pole, about 600 m. distant. One carrier pigeon, apparently liberated 48 hours after the start, was shot, and two floating buoys with messages were found, but nothing more was heard of the explorers.

At an earlydate the balloon was applied to scientific purposes. So far back as 1784, Dr Jeffries made an ascent from London in . . which he carried out barometric, thermometric and ascents. hygrometric observations, also collecting samples of the air at different heights. In 1803 the St Petersburg Academy of Sciences, entertaining the opinion that the experi- ments made on mountain-sides by J. A. Deluc, H. B. de Saus- sure, A. von Humboldt and others must give results different from those made in free air at the same heights, resolved to arrange a balloon ascent. Accordingly, on the 30th of January 1804, Sacharof, a member of the academy, ascended in a gas- balloon, in company with a French aeronaut, E. G. Robertson, who at one time gave conjuring entertainments in Paris. The ascent was made at a quarter past seven, and the descent effected at a quarter to eleven. The height reached was less than i£ m. The experiments were not very systematically made, and the chief results were the filling and bringing down of several flasks of air collected at different elevations, and the supposed observation that the magnetic dip was altered. A telescope fixed in the bottom of the car and pointing vertically down- wards enabled the travellers to ascertain exactly the spot over which they were floating at any moment. Sacharof found that, on shouting downwards through his speaking-trumpet, the echo from the earth was quite distinct, and

at his height was audible after an interval of about ten seconds (Phil. Mag., 1805, 21, p. 193).

Some of the results reported by Robertson appearing doubtful, Laplace proposed to the members of the French Academy of Sciences that the funds placed by the government at their dis- posal for the prosecution of useful experiments should be utilized in sending up balloons to test their accuracy. The proposition was supported by J. A. C. Chaptal, the chemist, who was then minister of the interior, and accordingly the necessary arrange- ments were speedily effected, the charge of the experiments being given to L. J. Gay-Lussac and J. B. Biot. The principal object of this ascent was to determine whether the magnetic force experienced any appreciable diminution at heights above the earth's surface. On the 24th of August 1804, Gay-Lussac and Biot ascended from the Conservatoire des Arts at ten o'clock in the morning. Their magnetic experiments were incommoded by the rotation of the balloon, but they found that, up to the height of 13,000 ft., the time of vibration of a magnet was ap- preciably the same as on the earth's surface. They found also that the air became drier as they ascended. The height reached was about 13,000 ft., and the temperature declined from 63° to 51 F. The descent was effected about half-past one, at Meriville, 18 leagues from Paris.

In a second experiment, which was made on the 16th of Sep-

tember 1804, Gay-Lussac ascended alone. The balloon left the Conservatoire des Arts at 9.40 a.m., and descended at 3.45 p.m. between Rouen and Dieppe. The chief result obtained was that the magnetic force, like gravitation, did not experience any sensible variation at heights from the earth's surface which we can attain to. Gay-Lussac also brought down air collected at the height of nearly 23,000 ft., and on analysis it appeared that its composition was the same as that of air collected at the earth's surface. At the time of leaving the earth the thermometer stood at 82 F., and at the highest point reached (23,000 ft.) it was 14-9° F. Gay-Lussac remarked that at his highest point there were still clouds above him.

From 1804 to 1850 there is no record of any scientific ascents in balloons having been undertaken. In the latter year J.- A. Bixio (1808-1865) and J. A. Barral (1819-1884) made two ascents of this kind. In the first they ascended from the Paris observa- tory on the 29th of June 1850, at 10.27 A – M > the balloon being inflated with hydrogen gas. The day was a rough one, and the ascent took place without any previous attempt having been made to test the ascensional force of the balloon. When liber ated, it rose with great

rapidity, and becoming fully inflated it pressed upon the network, bulging out at the top and bottom. The ropes by which the car was suspended being too short, the balloon soon covered the travellers like an immense hood. In endeavouring to secure the valve-rope, they made a rent in the balloon, a,nd the gas escaped so close to their faces as almost to suffocate them. Finding that they were descending then too rapidly, they threw overboard everything available, including their coats and only excepting the instruments. The ground was reached at ioh. 45m., near Lagny. Of course no observa- tions were made. Their second ascent was made on the 27 th of July, and was remarkable on account of the extreme cold met with. At about 20,000 ft. the temperature was 1 5° F., the balloon being enveloped in cloud; but on emerging from the cloud, at 23,000 ft., the temperature sank to -38° F., no less than 53 F. below that experienced by Gay-Lussac at the same elevation. The existence of these very cold clouds served to explain certain meteorological phenomena that were observed on the earth both the day before and the day after the ascent. Some pigeons were taken up in this, as in most other high ascents; when liberated, they showed a reluctance to leave the car, and then fell heavily downwards.

In July 1852 the committee of the Kew Observatory resolved to institute a series of balloon ascents, with the view of investi- gating such meteorological and physical phenomena as require the presence of an observer at a great height in the atmosphere. John Welsh (1824-1859) of the Kew Observatory was the observer, and the great ” Nassau Balloon” was employed, with Green himself as the aeronaut. Four ascents were made in 1852, viz. on the 17th and 26th of August, the 31st of October and the 10th of November. The heights attained were 19,510, 19,100, 12,640 and 22,930 ft., and the lowest temperatures met with in the four ascents were 8-7° F. (19,380 ft.), 12-4° F. (18,370 ft), 16-4° F. (12,640 ft.) and 10-5° F. (22,370 ft.). The decline of temperature was very regular. A siphon baro- meter, dry and wet bulb thermometers, aspirated and free, and a Regnault hygrometer were taken up. Some air collected at a considerable height was found on analysis not to differ appreci- ably in its composition from air collected near the ground. For the original observations see Phil. Trans., 1853, pp. 311-346.

At the meeting of the British Association for the Advancement of Science held at Aberdeen in 1859, a committee was appointed for the purpose of making observations in the higher ,

strata of the atmosphere by means of the balloon. ascents . For two years nothing was effected, owing to the want both of an observer and

of a suitable balloon. After its re- appointment at the Manchester meeting of 1861, the committee communicated with Henry Tracey Coxwell (1819-1900), an aeronaut who had made a good many ascents, and he agreed to construct a new balloon, of 90,000 cub. ft. capacity, on the condition that the committee would undertake to use it, and pay £25 for each high ascent made especially on its behalf, defraying

also the cost of gas, &c, so that the expense of each high ascent amounted to nearly £50. An observer being still wanted, James Glaisher, a member of the committee, offered himself to take the observations, and accordingly the first ascent was made on the 17th of July 1862, from the gas-works at Wolverhampton, this town being chosen on account of its central position in the country. Altogether, Glaisher made twenty-eight ascents, the last being on the 26th of May 1866. Of these only seven were specially high ascents, although six others were undertaken for the objects of the committee alone. On the other occasions he availed himself of public ascents from the Crystal Palace and other places of entertainment, merely taking his place like the other passengers. In the last six ascents another aeronaut and a smaller balloon were employed. The dates, places of ascent and greatest heights (in feet) attained in the twenty-eight ascents were — 1862: July 17, Wolverhampton, 26,177; July 30, Crystal Palace, 6937; August 18, Wolverhampton, 23,377; August 20, Crystal Palace, 5900; August 21, Hendon, 14,355; September 1, Crystal Palace, 4190; September 5, Wolverhamp- ton, 37,000; September 8, Crystal Palace, 5428. 1863: March 31, Crystal Palace, 22,884; . April 18, Crystal Palace, 24,163; June 26, Wolverton, 23,200; July n, Crystal Palace, 6623; July 21, Crystal Palace, 3298; August 31, Newcastle-upon-Tyne, 8033; September 29, Wolverhampton, 16,590; October 9, Crystal Palace, 7310. 1864: January 12, Woolwich, 11,897; April 6, Woolwich, 11,075; June 13, Crystal Palace, 3543; June 20, Derby, 4280; June 27, Crystal Palace, 4898; August 29, Crystal Palace, 14,581; December 1, Woolwich, 5431; December 30, Woolwich, 3735. 1865: February 27, Woolwich, 4865; October 2, Woolwich, 1949; December 2, Woolwich, 4628. 1866: May 26, Windsor, 6325.

The primary object of the ascents was to determine the temperature of the air, and its hygrometrical state at different elevations to as great a height as could be reached; and the secondary objects were — (1) to determine the temperature of the dew-point by Daniell's and

Regnault's hygrometers, as well as by the dry and wet bulb thermometers, and to compare the results; (2) to compare the readings of an aneroid barometer with those of a mercurial barometer up to the height of .5 m. ; (3) to determine the electrical state of the air, (4) the oxygenic condition of the atmosphere, and (5) the time of vibration of a magnet; (6) to collect air at different elevations; (7) to note the height and kind of clouds, their density and thickness; (8) to determine the rate and direction of different currents in the atmosphere; and (9) to make observations on sound. The instruments used were mercurial and aneroid barometers, dry and wet bulb thermometers, Daniell's dew-point hygrometer, Regnault's condensing hygrometer, maximum and minimum thermometers, a magnet for horizontal vibration, hermetically sealed glass tubes exhausted of air, and an electrometer. In one or two of the ascents a camera was taken up.

The complete observations, both as made and after reduction, are printed in the British'- Association Reports, 1 862-1 866; here only a general account of the results can be given. It appeared that the rate of the decline of temperature with elevation near the earth was very different according as the sky was clear or cloudy; and the equality of temperature at sunset and increase with height after sunset were very remarkable facts which were not anticipated. Even at the height of 5 m., cirrus clouds were seen high in the air, apparently as far above as they seem when viewed from the earth. The results of the observations differed very much, and no doubt the atmospheric conditions depended not only on the time of day, but also on the season of the year, and were such that a vast number of ascents would be requisite to determine the true laws with anything approaching to certainty and completeness. It was also clear that England is a most unfit country for the pursuit of such investigations, as, from whatever place the balloon started, it was never safe to be more than an hour above the clouds for fear of reaching the sea. It appeared from the observations that an aneroid barometer could be trusted to read as accurately as a mercurial barometer to the heights reached. The time of vibration of a horizontal

magnet was taken in very many of the ascents, and the results of ten different sets of observations indicated that the time of vibration was longer than on the earth. In almost all the ascents the balloon was under the influence of currents of air in different directions which varied greatly in thickness. The direc- tion of the wind on the earth was sometimes that of the whole mass of air up to 20,000 ft., whilst at other times the direction changed within 500 ft. of the earth. Sometimes directly oppo- site currents were met with at different

heights in the same ascent, and three or four streams of air were encountered moving in different directions. The direct distances between the places of ascent and descent, apart from the movements of the balloon under the influence of these various currents, were always very much greater than the horizontal movement of the air as meas- ured by anemometers. For example, on the 12th of January 1862, the balloon left Woolwich at 2I1. 8m. p.m., and descended at Lakenheath ; 70 m. distant from the place of ascent, at 4I1. 19m. p.m. At the Greenwich Observatory, by a Robinson anemometer, during this time the motion of the air was 6 m. only. With regard to physiological observations, Glaisher found that the frequency of his pulse increased with elevation, as also did the number of inspirations. The number of his pulsa- tions was generally 76 per minute before starting, about 90 at 10,000 ft., 100 at 20,000 ft., and no at higher elevations. But a good deal depended on the temperament of the individual. This was also the case in respect to colour; at 10,000 ft. the faces of some would be a glowing purple, whilst others would be scarcely affected; at 4 m. high Glaisher found the pulsations of his heart distinctly audible, and his breathing was very much affected, so that panting was produced by the slightest exertion; at 29,000 ft. he became insensible. In reference to the propa- gation of sound, it was at all times found that sounds from the earth were more or less audible according to the amount of mois- ture in the air. When in clouds at 4 m. high, a railway train was heard; but when clouds were far below, no sound ever reached the ear at this elevation. The discharge of a gun was heard at 10,000 ft. The barking of a dog was heard at the height of 2 m., while the shouting of a multitude of people was not audible at heights exceeding 4000 ft. In his ascent of the 5th of September 1862, Glaisher considered that he reached a height of 37,000 ft. But that figure was based, not on actual record, but on the circumstances that at 29,000 ft., when he became insensible, the balloon was rising 1000 ft. a minute, and that when he recovered consciousness thirteen minutes later it was falling 2000 ft. a minute, and the accuracy of his conclusions has been questioned. Few scientific men have imitated Glaisher in making high ascents for meteorological observations. In 1867 and 1868 Camille Flammarion made eight or nine ascents from Paris for scientific purposes. The heights attained were not great, but the general result was to confirm the observations of Glaisher; for an account see Voyages aeriens, Paris, 1870, or Travels in the Air, London, 1871, in which also some ascents by W. de Fonvielle are noticed. On the 15th of April 1875, H. T. Sivel, J. E. Croce-Spinelli and Gaston Tissandier ascended from Paris in the balloon ” Zenith,” and reached a height of 27,950 ft.; but only Tissandier came down alive, his two companions being asphyxiated.

This put an end to such attempts for a time. But Dr A. Berson and Lieut. Gross attained 25,840 ft. on the nth of May 1894; Berson, ascending alone from Strassfurt on the 4th of December 1894, attained about 31,500 ft. and recorded a temperature of —54° F.; and Berson and Stanley Spencer are stated by the latter to have attained 27,500 ft. on the 15th of September 1898 when they ascended in a hydrogen balloon from the Crystal Palace, the thermometer registering — 29 F. On the 31st of July 1901, Berson and R. J. Siiring, ascending at Berlin, actually noted a barometric reading corresponding to a height of 34,5°° ft., and possibly rose 1000 or 1500 ft. higher, though in spite of oxygen inhalations they were unconscious during the highest portion of the ascent.

The personal danger attending high ascents led Gustave Hermite and Besancon in November 1892 to inaugurate the

sending up of unmanned balloons {ballons sondes) equipped with automatic recording instruments, and kites (q.v.) have also been employed for similar meteorological purposes. (See also Meteorology.)

The balloon had not been discovered very long before it received a military status, and soon after the beginning of the French revolutionary war an aeronautic school was balloons. f° un ded at Meudon, in charge of Guyton de Morveau, the chemist, and Colonel J. M. J. Coutelle (1748-1835). Four balloons were constructed for the armies of the north, of the Sambre and Meuse, of the Rhine and Moselle, and of Egypt. In June r794 Coutelle ascended with the adjutant and general to reconnoitre the hostile army just before the battle of Fleurus, and two reconnaissances were made, each occupying four hours. It is generally stated that it was to the information so gained that the French victory was due. The balloon corps was in constant requisition during the campaign, but it does not appear that, with the exception of the reconnaissances just mentioned, any great advantages resulted, except in a moral point of view. But even this was of importance, as the enemy were much dis- concerted at having their movements so completely watched, while the French were correspondingly elated at the superior information it was believed they were gaining.- An attempt was made to revive the use of balloons in the African campaign of 1830, but no opportunity occurred in which they could be employed. It is said that in 1849 a reconnoitring balloon was sent up from before Venice, as also were small balloons

loaded with bombs to be exploded by time-fuses. In the French campaign against Italy in 1859 the French had recourse to the use of balloons, but this time there was not any aerostatic corps, and their management was entrusted to the brothers Godard. Several reconnaissances were made, and one of especial interest the day before the battle of Solferino. No information of much importance seems, however, to have been gained thereby.

In the American Civil War (1861) balloons were a good deal used by the Federals. There was a regular balloon staff attached to McClellan's army, with a captain, an assistant-captain and about 50 non-commissioned officers and privates. The apparatus consisted of two generators, drawn by four horses each; two balloons, drawn by four horses each, and an acid-cart, drawn by two horses. The two balloons used contained about 13,000 and 26,000 ft. of gas, and the inflation usually occupied about three hours. (See Royal Engineers' Papers, vol. xii.) By their aid useful information was gained about the enemy round Richmond and in other places, but eventually difficulties of transport and the topography of the theatre of war made balloon- ing impracticable; and little was heard of it after the first two years of the war.

The balloon proved itself very valuable during the siege of Paris (1870-71). It was by it alone that communication was kept up between the besieged city and the external world, as the balloons carried away from Paris the pigeons which after- wards brought back to it the news of the provinces. The total number of balloons that ascended from Paris during the siege, conveying persons and despatches, was sixty-four — the first having started on the 23rd of September 1870, and the last on the 28th of January 187 1. Gambetta effected his escape from Paris, on the 7th of October, in the balloon "Armand-Barbes," an event which doubtless led to the prolongation of the war. Of the sixty-four balloons only two were never heard of; they were blown out to sea. One of the most remarkable voyages was that of the " Ville d'Orleans," which, leaving Paris at eleven o'clock on the 21st of November, descended fifteen hours afterwards near Christiania, having crossed the North Sea. Several of the balloons on their descent were taken by the Prussians, and a good many were fired at while in the air. The average size of the balloons was from 2000 to 2050 metres, or from 70,000 to 72,000 cub. ft. The above facts are extracted from Les Ballons du siig* de Paris, a sheet published by Bulla and Sons, Paris, and compiled by the brothers Tissandier, well-known French aeronauts, which gives the name, size and times of ascent and descent of every balloon that left Paris, with the

names of the aeronaut and generally also of the passengers, the weight of despatches, the number of pigeons, &c. Only those balloons, however, are noticed in which some person ascended. The balloons were manufactured and despatched (generally from the platforms of the Orleans or the Northern railway) under the direction of the Post Office. The aeronauts employed were mostly sailors, who did their work very well. No use whatever was made in the war of balloons for purposes of reconnaissance.

Ballooning, however, as a recognized military science, only dates back to about the year 1883 or 1884, when most of the powers organized regular balloon establishments. In 1884-85 the French found balloons very useful during their campaign in Tongking; and the British government also despatched balloons with the Bechuanaland expedition, and also with that to Suakin in those years. During the latter campaign several ascents were made in the presence of the enemy, on whom it was said that a great moral effect was produced. The employ- ment of balloons has been common in nearly all modern wars.

We may briefly describe the apparatus used in military operations. The French in the campaigns of the 19th century used varnished silk balloons of about 10,000 cub. ft. capacity. The Americans in the Civil War used much larger ones,, those of 26,000 cub. ft. being found the most suitable. These were also of varnished silk. In the present day most nations use balloons of about 20,000 cub. ft., made of varnished cambric ; but the British war balloons, made of goldbeater skin, are usually of comparatively small size, the normal capacity being 10,000 cub. ft., though others of 7000 and 4500 cub. ft. have also been used, as at Suakin. The usual shape is spherical; but since 1896 the Germans, and now other nations, have adopted a long cylindrical-shaped balloon, so affixed to its cable as to present an inclined surface to the wind and thus act partly on the principle of a kite. Though coal-gas and even hot air may occasion- ally be used for inflation, hydrogen gas is on account of its lightness far preferable. In the early days of ballooning this had to be manu- factured in the field, but nowadays it is almost universally carried compressed in steel tubes. About 100 such tubes, each weighing 75 ft, are required to fill a 10,000-ft. balloon. Tubes of greater capacity have also been tried.

The balloon is almost always used captive. If allowed to go free it will usually be rapidly carried away by the wind and the results of the observations cannot easily be transmitted back. Occasions may occur when such ascents will be of value, but the usual method is to send up a captive balloon to a height of somewhere about 1000 ft. With the

standard British balloon two officers are sent up, one of whom has now particularly to attend to the management of the balloon, while the other makes the observations.

With regard to observations from captive balloons much depends on circumstances. In a thickly wooded country, such as that in which the balloons were used in the American Civil War, and in the war in Cuba (in which the balloon merely served to expose the troops to severe fire), no very valuable information is, as a rule, to be ob- tained; but in fairly open country all important movements of troops should be discernible by an experienced observer at any point within about four or five miles of the balloon. The circumstances, it may be mentioned, are such as would usually preclude one un- accustomed to ballooning from affording valuable reports. Not only is he liable to be disturbed by the novel and apparently hazardous situation, but troops and features of the ground often have so peculiar an appearance from that point of view, that a novice will often have a difficulty in deciding whether an object be a column of troops or a ploughed field. Then again, much will depend on atmo- spheric conditions. Thus, in misty weather a balloon is well-nigh useless; and in strong winds, with a velocity of anything over 20 m. an hour, efficient observation becomes a matter of difficulty. When some special point has to be reported on, such as whether there is any large body of troops behind a certain hill or wood, a rapid ascent may still be made in winds up to 30 m. an hour, but the balloon would then be so unsteady that no careful scouting could be made. It is usually estimated that a successful captive ascent can only be made in England on half the days of the year. _ As a general rule balloon ascents would be made for one of the following objects : — to examine the country for an enemy; to reconnoitre the enemy's position ; to ascertain the strength of his force, number of guns and exact situation of the various arms; also to note the plan of his earthworks or fortifications. During an action the aerial observer would be on the look-out for any movements of the enemy and give warning of flank attacks or surprises. Such an observer could also keep the general informed as to the progress of various detached parties of his own force, as to the advance of reinforcements, or to the conduct of any fighting going on at a distance. Balloon observa- tions are also of especial aid to artillery in correcting their aim.

The vulnerability of a captive balloon to the enemy's fire has been tested by many experiments with variable results. One established

Fig. i.— CLEMENT-BAYARD DIRIGIBLE.

Photo, Topical Press.

Fig. 2— ZEPPELIN VII. (DEUTSCHLAND), WRECKED JUNE 28, 1910.

Photo, Topical Press.

Fig. 3.— BRITISH ARMY DIRIGIBLE, BETA.

Photo, Topical Press.

Fig. 4.— PARSEVAL DIRIGIBLE.

Photo, Topical Press.

fact is that the range of a balloon in mid-air is extremely difficult to judge, and, as its altitude can be very rapidly altered, it becomes a very difficult mark for artillery to hit. A few bullet-holes in the fabric of a balloon make but little difference, since the size of the perforation is very minute as compared with the great surface of material, but on the other hand, a shrapnel bursting just in front of it may cause a rapid fall. It is therefore considered prudent to keep the balloon well away from an enemy, and two miles are laid down as the nearest approach it should make habitually.

Besides being of use on land for war purposes, balloons have also been tried in connexion with the naval service. In France especially regular trials have been made of inflating balloons on board ships, and sending them aloft as a look-out; but it is now generally con- tended that the difficulties of storing the gas and of manoeuvring the balloon are so great on board ship as to be hardly worth the results to be gained.

A very important development of military ballooning is that of the navigable balloon. If only a balloon could be sent up and. driven in any required direction, and brought back to its starting-point, it is obvious that it would be of the very greatest use in war.

From the very first invention of balloons the problem has been how to navigate them by propulsion. General J. B. M. C.

Meusnier (1754-1793) proposed an elongated balloon baitooas * n J 7ˆ4- It was experimented on by the brothers

Robert, who made two ascensions and claimed to have obtained a deviation of 22° from the direction of a light wind by means of aerial oars worked by hand. The relative speed was probably about 3 m. an hour, and it was so evident that a very rrruch more energetic light motor than any then known was required to stem ordinary winds that nothing more was attempted till 1852, when Henri Giffard (1825-1882) as- cended with a steam-engine of then unprecedented lightness. The subjoined table exhibits some of the results subsequently obtained : —

Experiments with Dirigible Balloons

Year.

Inventor.

Length.

Dia- meter.

Con- tents.

Lifting Capa- city.

Weight

of Balloon.

Weight

of Motor.

H.P.

Speed

per hour.

1852 1872

1884 1885

1897

1900 1901

1908 1908

Giffard . . . Dupuy de

L6me . . . Tissandier Renard and

Krebs . .

Schwarz . .

Zeppelin I. Santos Du- mont VI. ” Republique ” Zeppelin IV. .

Ft.

144

118 92

165 157 420

108

195 446

Ft.

39

49

3°

27

IS)

39

20

35

42 i

Cub. ft.

88,300

120,088 37.439

65,836 130,500 400,000

22,200 130,000 450,000

lb.

3.978

8,358 2,728-

4,402

8,133 25,000

3,100

lb.

2,794

4,728 933

2,449

6,800

19,000

lb.

462

2000 616

1174

800?

1500

3-0

o-8 i-5

9-0 16-0 32-0

16-20

80 220

Miles.

6-71

6-26

7-82

14-00 17-00 18-00

19-00

3°

Giffard, the future inventor of the injector, devised a steam- engine weighing, with fuel and water for one hour, 154 lb per horse-power, and was bold enough to employ it in proximity to a balloon inflated with coal gas. He was not able to stem a medium wind, but attained some deviation. He repeated the experiment in 1855 with a more elongated spindle, which proved unstable and dangerous. During the siege of Paris the French government decided to build a navigable balloon, and entrusted the work to the chief naval constructor, Dupuy de Lome. He went into the subject very carefully, made estimates of all the strains, resistances and speeds, and tested the balloon in 1872. Deviations of 12 were obtained from the course of a wind blow- ing 27 to 37 m. per hour. The screw propeller was driven by eight labourers, a steam-engine being deemed too dangerous; but it was estimated that had one been used, weighing as much as the men, the speed would have been doubled. Tissandier and his brother applied an electric motor, lighter than any pre- viously built, to a spindle-shaped balloon, and went up twice in 1883 and 1884. On the latter occasion he stemmed a wind of 7 m. per hour. The brothers abandoned these experiments, which had been carried on at their own expense, when the French War Department took up the problem. Renard and Krebs, the officers in charge of the War Aeronautical Department at Meudon, built and experimented with in 1884 and 1885 the fusi-

form balloon ” La France,” in which the ” master ” or maximum section was about one-quarter of the distance from the stem. The propelling screw was at the front of the car and driven by an electric

motor of unprecedented lightness. Seven ascents were made on very calm days, a maximum speed of 14 m. an hour was obtained, and the balloon returned to its starting-point on five of the seven occasions. Subsequently another balloon was constructed, said to be capable of a speed of 22 to 28 m. per hour, with a different motor. After many years of experi- ment Dr Wolfert built and experimented with in Berlin, in 1897, a cigar-shaped balloon driven by a gasoline motor. An explosion took place in the air, the balloon fell and Dr Wolfert and his assistant were killed. It was also in 1897 that an aluminium balloon was built from the designs of D. Schwarz and tested in Berlin. It was driven by a Daimler benzine motor, and attained a greater speed than ” La France “; but a driving belt slipped, and in coming down the balloon was injured beyond repair.

From 1897 onwards Count Ferdinand von Zeppelin, of the German army, was engaged in constructing an immense balloon, truly an airship, of most careful and most intelligent design, to carry five men. It consisted of an aluminium framework con- taining sixteen gas bags with a total capacity of nearly 400,000 cub. ft., and it had two cars, each containing a 16 h.p. motor. It was first tested in June 1900, when it attained a speed of 18 m. an hour and travelled a distance of 35 m. before an accident to the steering gear necessitated the discontinuance of the experiment. In 1905 Zeppelin built a second airship which had a slightly smaller capacity but much greater power, its two motors each developing 85 h.p. This, after making some successful trips, was wrecked in a violent gale, and was succeeded by a third airship, which, at its trial in October 1906, travelled round Lake Constance and showed itself able to execute numerous curves and traverses. At a second series of trials in September 1907, after some alterations had been effected, it attained a speed of 36 m. an hour, remaining in the air for many hours and carrying nine or eleven passengers. A fourth vessel of similar design, but with more powerful motors, was tried in 1908, and succeeded in travelling 250 m. in 11 hours, but owing to a storm it was wrecked when on land and burnt at Echterdingen on the 5 th of August. Subscriptions, headed by the emperor, were at once raised to enable Zeppelin to build another. Meanwhile in 1901 Alberto Santos Dumont had begun ex- periments with dirigible balloons in Paris, and on the 19th of October won the Deutsch prize by steering a balloon from St Cloud round the Eiffel tower and back in half an hour, encounter- ing on his return journey a wind of nearly 5 metres a second. An airship constructed by Pierre and Paul Lebaudy in 1904 also made a number of successful trials in the vicinity of Paris; with a motor of 40 h.p., its speed was about 25 m. an hour, and it regularly carried three passengers. In October 1907

the ” Nulli Secundus,” an airship constructed for the British War Office, sailed from Farnborough round St Paul’s Cathedral, London, to the Crystal Palace, Sydenham, a distance of about 50 m., in 3 hours 35 minutes. The weight carried, including two occupants, was 3400 lb, and the maximum speed was 24 m. an hour, with a following wind of 8 m. an hour.

Thus the principles which govern the design of the dirigible balloon may be said to have been evolved. As the lifting power grows as the cube of the dimensions, and the resistance approxi- mately as the square, the advantage lies with the larger sizes of balloons, as of ocean steamers, up to the limits within which they may be found practicable. Count Zeppelin gained an ad- vantage by attaching his propellers to the balloon, instead of to the car as heretofore; but this requires a rigid framework and a great increase of weight. Le Compagnon endeavoured, in 1892,

to substitute flapping wings for rotary propellers, as the former can be suspended near the centre of resistance. C. Danilewsky followed him in 1898 and 1899, but without remarkable results. DuDuy de Lome was the first to estimate in detail the resistances to balloon propulsion, but experiment showed that in the aggregate they were greater than he calculated. Renard and Krebs also found that their computed resistances were largely exceeded, and after revising the results they gave the formula R = o-oi685 D 2 V 2 , R being the resistance in kilograms, D the diameter in metres and V the velocity in metres per second. Reduced to British measures, in pounds, feet and miles per hour, R = 0-0006876 D 2 V 2 , which is somewhat in excess of the formula computed by Dr William Pole from Dupuy de Lome’s experiments. The above coefficient applies only to the shape and rigging of the balloon ” La France,” and combines all resist- ances into one equivalent, which is equal to that of a flat plane 18% of the “master section.” This coefficient may perhaps hereafter be reduced by one-half through a better form of hull and car, more like a fish than a spindle, by diminished sections of suspension lines and net, and by placing the propeller at the centre of resistance. To compute the results to be expected from new projects, it will be preferable to estimate the resistances in detail. The following table shows how this was done by Dupuy de Lome, and the probable corrections which should have been made by him: —

Resistances — Du

puy de Lome's

Balloon

Computed by Dupuy de L6me.

MoreProbableValues.

V =

= 2-22 m. per sec.

V = 2-82 m.

Der sec.

Area,

Co-

Air

Resist-

Co-

Air

Resist-

Part.

Sq.

effici-

Pres-

ance,

effici-

Pres-

ance,

Metres.

ent.

sure.

Kg.

ent.

sure.

Kg.

Hull, with-

out net. .

172-96

1/30

0-665

3-830

I/I5

0-875

10-091

Car .

3-25

i/5

,,

0-432

i/5

,,

0-569

Men’s bodies

3-00

i/S

”

0-400

1/2

1-312

Gas tubes .

6-40

i/5

”

0-850

1/2

2-750

Small cords

IO-OO

1/2

”

3-325

1/2

”

4-375

Large cords

9-90

i/3

”

2-194

i/3

X

2-887

11-031

21-984

When the resistances have been reduced to the lowest possible minimum by careful design, the attainable speed must depend upon the efficiency of the propeller and the relative lightness of the motor. The commercial uses of dirigible balloons, however, will be small, as they must remain housed when the wind aloft is brisk. The sizes will be great and costly, the loads small, and the craft frail and short-lived, yet dirigible balloons constitute the obvious type for governments to evolve, until they are super- seded by efficient flying machines. (See further, as to the latter, the article Flight and Flying.)

The chief danger attending ballooning lies in the descent; for if a strong wind be blowing, the grapnel will sometimes trail for miles over the ground at the rate of ten or twenty miles Practice an hour, catching now and then in hedges, ditches, roots station. ˚f trees > & c ‘> and, after giving the balloon a terrible jerk , breaking loose again, till at length some obstruction, such as the wooded bank of a stream, affords a firm hold. This danger, however, has been much reduced by the use of the ” ripping-cord,” which enables a panel to be ripped open and the balloon to be completely deflated in a few seconds, just as it is reaching the earth. But even a very rough descent is usually not productive of any very serious consequences; as, although the occupants of the car generally receive many bruises and are perhaps cut by the ropes, it rarely happens that anything worse occurs. On a day when the wind is light (supposing that there is no want of ballast) nothing can be easier than the descent, and the aeronaut can decide several miles off on the field in which he will alight. It is very important to have a good supply of ballast, so as to be able to check the rapidity of the descent, as in passing downwards through a wet cloud the weight of the balloon is enormously increased by the water deposited on it; and if there is no ballast to throw out in

compensation, the

velocity is sometimes very great. It is also convenient, if the district upon which the balloon is descending appear unsuitable for landing, to be able to rise again. The ballast consists of fine baked sand, which becomes so scattered as to be inappreciable before it has fallen far below the balloon. It is taken up in bags containing about f cwt. each. The balloon at starting is liberated by a spring catch which the aeronaut releases, and the ballast should be so adjusted that there is nearly equilibrium before leaving, else the rapidity of ascent is too great, and has to be checked by parting with gas. It is almost impossible to liberate the balloon in such a way as to avoid giving it a rotary motion about a vertical axis, which continues during the whole time it is in the air. This rotation makes it difficult for those in the car to discover in what direction they are moving; and it is only by looking down along the rope to which the grapnel is suspended that the motion of the balloon over the country below can be traced. The upward and downward motion at any instant is at once known by merely dropping over the side of the car a small piece of paper: if the paper ascends or remains on the same level or stationary, the balloon is descending; while, if it descends, the balloon is ascending. This test is exceedingly delicate.

References. — Tiberius Cavallo, Treatise on the Nature and Properties of Air and other permanently Elastic Fluids (London, 1781); Idem, History and Practice of Aerostation (London, 1785); Vincent Lunardi, Account of the First Aerial Voyage in England, in a Series of Letters to his Guardian (London, 1785) ; T. Forster, Annals of some Remarkable Aerial and Alpine Voyages (London, 1832) ;MonckMason, Aeronautica (London, 1838); John Wise, A System of Aeronautics, comprehending its Earliest Investigations (Philadelphia, 1850); Hatton Turnor, Astra Castra, Experiments and Adventures in the Atmosphere (London, 1865); J. Glaisher, C. Flammarion, W. de Fonvielle and G. Tissandier, Voyages aeriens (Paris, 1870) (translated and edited by James Glaisher under the title Travels in the Air (London, 1871); O. Chanute, Progress in Flying Machines (New York, 1894) ; W. de Fonvielle, Les Ballons sondes (Paris, 1899) ; Idem, Histoire de la navigation aerienne (Paris, 1907) ; F. Walker, Aerial Navigation (London, 1902) ; J. Lecornu, La Navigation aerienne (Paris, 1903) ; M. L. Marchis, Lecons surla navigation aerienne (Paris, 1904), containing many references to books and periodicals on pp. 701-704; Navigating the Air (papers collected by the Aero Club of America) (New York, 1907) ; A. Hildebrandt, Airships past and present (London, 1908).

AEROTHERAPEUTICS, the treatment of disease by atmo- spheric air: a

term which of late has come to be used somewhat more loosely to include also pneumotherapieutics, or the treat- ment of disease by artificially prepared atmospheres. The physical and chemical properties of atmospheric air, under ordinary pressure or under modified pressure, may be thera- peutically utilized either on the external surface of the body, on the respiratory surface, or on both surfaces together. Also modifications may be induced in the ventilation of the lungs by general gymnastics or respiratory gymnastics..

The beneficial effects of air under ordinary pressure are now utilized in the open-air treatment of phthisical patients, and the main indications of benefit resulting therefrom are reduction of the fever, improvement of appetite and the induction of sleep.

The air, however, may be modified in composition or in tempera- ture. Inhalation is the most common and successful method of applying it — when modified in composition— to the human body. The methods in use are as follows: (1) Inhalation of gases, as oxygen and nitrous oxide.. The dyspnoea and cyanosis of pneumonia, capillary bronchitis, heart failure, &c, are much relieved by the inhalation of oxygen; and nitrous oxide is largely used as an anaesthetic in minor operations. (2) Certain liquids are used as anaesthetics, which volatilize at low tempera tures, as chloroform and ether. (3) Mercury and sulphur, both of which require heat for volatilization, are very largely used. In a mercurial or sulphur bath, the patient, enveloped in a sheet, sits on a chair beneath which a spirit lamp is placed to vaporize the drug, the best results being obtained when the atmosphere is surcharged with steam at the same time. The vapour envelops the patient and is absorbed by the skin. This method is extensively used in the treatment of syphilis, and also for scabies and other parasitic affections of the skin. (4) Moist inhalations are rather losing repute in the light of modern

investigations, which tend to show that nothing lower than the larger bronchial tubes is affected. Complicated apparatus has been devised for the application, although a wide-mouthed jug filled with boiling water, into which the drug is thrown, is almost equally efficacious.

Artificial atmospheres may be made for invalids by respirators which cover the mouth and nose, the air being drawn through tow or

sponge, on which is sprinkled the disinfectant to be used. This is most valuable in the intensely offensive breath of some cases of bronchiectasis.

The air may be modified as to temperature. Cold air at 32-33 F. has been used in chronic catarrhal conditions of the lungs, with the result that cough diminishes, the pulse becomes fuller and slower and the general condition improves. The more recent observations of Pasquale di Tullio go far to show that this may be immensely valuable in the treatment of haemoptysis. The inspiration of superheated dry air has been the subject of much investigation, but with very doubtful results.

Hot air applied to the skin is more noteworthy in its therapeutic effects. If a current of hot air is directed upon healthy skin, the latter becomes pale and contracts in consequence of vaso-con- striction. But if it is directed on a patch of diseased skin, as in lupus, an inflammatory reaction is set up and the diseased part begins to undergo necrosis. This fact has been used with good results in hipus, otorrhoea, rhinitis and other nasal and laryngeal troubles.

Lastly the air may be either compressed or rarefied. The physiological effects of compressed air were first studied in diving-bells, and more recently in caissons. Caisson workers at first enjoy increased strength, vigour and appetite; later, how- ever, the opposite effect is produced and intense debility super- venes. In addition, caisson workers suffer from a series of troubles which are known as accidents of decompression. (See Caisson Disease.) But, therapeutically, compressed air has been utilized by means of pneumatic chambers large enough to hold one or more adults at the time, in which the pressure of the atmosphere can be exactly regulated. This form of treat- ment has been found of much value in the treatment of emphy- sema, early pulmonary tuberculosis (not in the presence of persistent high temperature, haemorrhage, softening or suppura- tion), delayed absorption of pleural effusions, heart disease, anaemia and chlorosis. But compressed air is contra-indicated in advanced tubercle, fever, and in diseases of kidneys, liver or intestines.

Rarefied air was used as long ago as 1835, by V. T. Junod, who utilized it for local application by inventing the Junod Boot. By means of this the blood could be drawn into any part to which it was applied, the vessels of which became gorged with blood at the expense of internal organs. More recently this method of treatment has undergone far-reaching developments and is known as the passive hyperaemic treatment.

There are also various forms of apparatus by means of which air at greater or lesser pressures may be drawn into the lungs, and for the performance of lung gymnastics of various kinds. Mr Ketchum of the United States has invented one which is much used. A committee of the Brompton Hospital, London, investigating its capabilities, decided that its use brought about (1) an increase of chest circumference, and (2) in cases of consolidation of the lung a diminution in the area of dulness.

AERTSZEN (or Aartsen), PIETER (1507-1573), called “Long Peter ” on account of his height, Dutch historical painter, was born and died at Amsterdam. When a youth he distinguished himself by painting homely scenes, in which he reproduced articles of furniture, cooking utensils, &c, with marvellous fidelity, but he afterwards cultivated historical painting. Several of his best works — altar-pieces in various churches — were destroyed in the religious wars of the Nether- lands. An excellent specimen of his style on a small scale, a picture of the crucifixion, may be seen in the Antwerp Museum. Aertszen was a member of the Academy of St Luke, in whose

books he is entered as Langhe Peter, schilder. Three of his sons attained to some note as painters.

AESCHINES (389-314 B.C.), Greek statesman and orator, was born at Athens. The statements as to his parentage and early life are conflicting; but it seems probable that his parents, though poor, were respectable. After assisting his father in his school, he tried his hand at acting with indifferent success, served with distinction in the army, and held several clerkships, amongst them the office of clerk to the B ou le. The fall of Olynthus (348) brought Aeschines into the political arena, and he was sent on an embassy to rouse the Peloponnesus against Philip. In 347 he was a member of the peace embassy to Philip of Macedon, who seems to have won him over entirely to his side. His dilatoriness during the second embassy (346) sent to ratify the terms of peace led to his accusation by Demosthenes and Timarchus on a charge of high treason, but he was acquitted as the result of a powerful speech, in which he showed that his accuser Timarchus had, by his immoral conduct, forfeited the right to speak before the people. In 343 the attack was renewed by Demosthenes in his speech On the False Embassy; Aeschines replied in a speech with the same title and was again acquitted. In 339, as one of the Athenian deputies {pylagorae) in the Amphi- ctyonic Council, he made a speech which brought about the Sacred War. By way of revenge, Aeschines endeavoured to fix the blame for these disasters upon Demosthenes. In 336, when Ctesiphon proposed that his friend Demosthenes should be

rewarded with a golden crown for his distinguished services to the state, he was accused by Aeschines of having violated the law in bringing forward the motion. The matter remained in abeyance till 330, when the two rivals delivered their speeches Against Ctesiphon and On the Crown. The result was a complete victory for Demosthenes. Aeschines went into voluntary exile at Rhodes, where he opened a school of rhetoric. He afterwards removed to Samos, where he died in the seventy-fifth year of his age. His three speeches, called by the ancients ” the Three Graces,” rank next to those of Demosthenes. Photius knew of nine letters by him which he called the Nine Muses; the twelve published under his name (Hercher, Epistolographi Graeci) are not genuine. y .

Ancient Authorities. — Demosthenes, De Corona and De Falsa Legatione; Aeschines, De Falsa Legatione and In Ctesiphontem;’ Lives by Plutarch, Philostratus and Libanius; the Exegesis of Apollonius. Editions. — Benseler (1 855-1 860) (trans, and notes), Weidner (1872), Blass (1896); Against Ctesiphon, Weidner (1872), (l878),G.A.and W.H. Simcox(l866),Drake (i872),Richardson(i889), Gwatkin and Shuckburgh (1890). English Translations. — Leland (1771), Biddle (1881), and others. See also Stechow, Aeschinis Oratoris vita (1841); Marchand, Charakteristik des Redners Aschines (1876) ; Castets, Eschine, VOrateur (1875) ; for the political problems see histories of Greece, esp. A. Holm, vol. iii. (Eng. trans., 1896) ; A. Schafer, Demosth. und seine Zeit (Leipzig, 1856-1858); also Demosthenes.

AESCHINES (5th century B.C.), an Athenian philosopher. According to some accounts he was the son of a sausage-maker, but others say that his father was Lysanias (Diog. Laert. ii. 60; Suidas, s.v.). He was an intimate friend of Socrates, who is reported to have said that the sausage-maker’s son alone knew how to honour him. Diogenes Laertius preserves a tradition that it was he, not Crito, who offered to help Socrates to escape from prison. He was always a poor man, and Socrates advised him ” to borrow from himself, by diminishing his expenditure.” He started a perfumery shop in Athens on borrowed capital, became bankrupt and retired to the Syracusan court, where he was well received by Aristippus. According to Diog. Laert. (ii. 61), Plato, then at Syracuse, pointedly ignored Aeschines, but this does not agree with Plutarch, De adulatore et amico (c. 26). On the expulsion of the younger Dionysius, he returned to Athens, and, finding it impossible to profess philosophy publicly owing to the contempt of Plato and Aristotle, was compelled to teach privately. He wrote also forensic speeches; Phrynichus, in Photius, ranks him amongst the best orators, and mentions his orations as the standard of the pure Attic

style. Hermogenes also spoke highly of him (Uepl l8eS > v). He wrote several philo- sophical dialogues: (1) Concerning virtue, whether it can be

taught; (2) Eryxias, or Erasistratus; concerning riches, whether they are good; (3) Axiochus: concerning death, whether it is to be feared, — but those extant on the several subjects are not genuine remains. J. le Clerc has given a Latin translation of them, with notes and several dissertations, entitled Silvae Philologicae, and they have been edited by S. N. Fischer (Leipzig, 1786), and K. F. Hermann, De Aeschin. Socrat. relig. (Gott. 1850). The genuine dialogues appear to have been marked by the Socratic irony; an amusing passage is quoted by Cicero in the De inventione (i. 31).

See Hirzel, Der Dialog, i. 129-140; T. Gomperz, Greek Thinkers, vol. iii. p. 342 (Eng. trans. G. 6. Berry, London, 1905).

AESCHYLUS (525-456 B.C.), Greek poet, the first of the only three Attic Tragedians of whose work entire plays survive, and in a very real sense (as we shall see) the founder of the Greek drama, was born at Eleusis in the year 525 B.C. His father, Euphorion, belonged to the ” Eupatridae ” or old nobility of Athens, as we know on the authority of the short Life of the Life P oet Si ven m tne Medicean Manuscript (see note on

“authorities” at the end). According to the same tradition he took part as a soldier in the great struggle of Greece against Persia; and was present at the battles of Marathon, Artemisium, Salamis and Plataea, in the years 490-479. At least one of his brothers, Cynaegirus, fought with him at Marathon, and was killed in attempting a conspicuous act of bravery; and the brothers’ portraits found a place in the national picture of the battle which the Athenians set up as a memorial in the Stoa Poecile (or “Pictured Porch”) at Athens.

The vigour and loftiness of tone which mark Aeschylus’ poetic work was not only due, we may be sure, to his native genius and gifts, powerful as they were, but were partly in- spired by the personal share he took in the great actions of a heroic national uprising. In the same way, the poet’s brooding thoughtfulness on deep questions — the power of the gods, their dealings with man, the dark mysteries of fate, the future life in Hades — though largely due to his turn of mind

and temperament, was doubtless connected with the place where his childhood was passed. Eleusis was the centre of the most famous worship of Demeter, with its processions, its ceremonies, its mysteries, its impressive spectacles and nocturnal rites; and these were intimately connected with the Greek beliefs about the human soul, and the underworld.

His dramatic career began early, and was continued for more than forty years. In 499, his 26th year, he first exhibited at Athens; and his last work, acted during his lifetime at Athens, was the trilogy of the Oresteia, exhibited in 458. The total number of his plays is stated by Suidas to have been ninety; and the seven extant plays, with the dramas named or nameable which survive only in fragments, amount to over eighty, so that Suidas' figure is probably based on reliable tradition. It is well known that in the 5th century each exhibitor at the tragic con- tests produced four plays; and Aeschylus must therefore have competed (between 499 and 458) more than twenty times, or once in two years. His first victory is recorded in 484, fifteen years after his earliest appearance on the stage; but in the remaining twenty-six years of his dramatic activity at Athens he was successful at least twelve times. This clearly shows that he was the most commanding figure among the tragedians of 500-458; and for more than half that time was usually the victor in the contests. Perhaps the most striking evidence of his exceptional position among his contemporaries is the well-known decree passed shortly after his death that whosoever desired to exhibit a play of Aeschylus should " receive a chorus," i.e. be officially allowed to produce the drama at the Dionysia. The existence of this decree, mentioned in the Life, is strongly confirmed by two passages in Aristophanes: first in the prologue of the Acharnians (which was acted in 425, thirty-one years after the poet's death), where the citizen, grumbling about his griefs and troubles, relates his great disappointment, when he took his seat in the theatre " expecting Aeschylus," to find that when the play came on it was Theognis; and secondly in a scene of the Frogs (acted 405 B.C.), where the throne of poetry is contested

in Hades between Aeschylus and Euripides, the former com- plains {Fr. 866) that " the battle is not fair, because my own poetry has not died with me, while Euripides' has died, and therefore he will have it with him to recite " — a clear reference, as the scholiast points out, to the continued production at Athens of Aeschylus' plays after his death.

Apart from fables, guesses and blunders, of which a word is said below, the only other incidents recorded of the poet's life that deserve mention are connected with his Sicilian visits, and the charge

preferred against him of revealing the ” secrets of Demeter.” This tale is briefly mentioned by Aristotle (Eth. iii. 2), and a late commentator (Eustratius, i2thˆ century) quotes from one Heraclides Pontius the version which may be briefly given as follows: —

The poet was acting a part in one of his own plays, where there was a reference to Demeter. The audience suspected him of revealing the inviolable secrets, and rose in fury; the poet fled to the altar of Dionysus in the orchestra and so saved his life for the moment; for even an angry Athenian crowd respected the inviolable sanctuary. He was afterwards charged with the crime before the Areopagus; and his plea ” that he did not know that what he said was secret ” was accepted by the court and secured his acquittal. The commentator adds that the prowess of the poet (and his brother) at Marathon was the real cause of the leniency of his judges. The story was afterwards developed, and embellished by additions; but in the above shape it dates back to the 4th century; and as the main fact seems accepted by Aristotle, it is probably authentic.

As to his foreign travel, the suggestion has been made that certain descriptions in the Persae, and the known facts that he wrote a trilogy on the story of the Thracian king Lycurgus, persecutor of Dionysus, seem to point to his having a special knowledge of Thrace, which makes it likely that he had visited it. This, however, remains at best a conjecture. For his repeated visits to Sicily, on the other hand, there is conclusive ancient evidence. Hiero the First, tyrant of Syracuse, who reigned about twelve years (478-467), and amongst other efforts after magnificence invited to his court famous poets and men of letters, had founded a new town, Aetna, on the site of Catana which he captured, expelling the inhabitants. Among his guests were Aeschylus, Pindar, Bacchylides and Simonides. About 476 Aeschylus; was entertained by him, and at his request wrote and exhibited a play called The Women of Aetna in honour of the new town. He paid a second visit about 472, the year in which he had produced the Persae at Athens; and the play is said to have been repeated at Syracuse at his patron’s request. Hiero died in 467, the year of the Seven against Thebes; but after 458, when the Oresteia was exhibited at Athens, we find the poet again in Sicily for the last time. In 456 he died, and was buried at Gela; and on his tomb was placed an epitaph in two elegiac couplets saying: ” Beneath this stone lies Aeschylus, son of Euphorion, the Athenian, who perished in the wheat- bearing land of Gela; of his noble prowess the grove of Marathon can speak, or the long-haired Persian who knows it well.” The authorship of this epitaph is uncertain, as the Life says it was inscribed on his grave by the people of Gela, while Athenaeus and Pausanias attribute it to Aeschylus. Probably most people would agree

that only the poet himself could have praised the soldier and kept silence about the poetry.

Of the marvellous traditions which gathered round his name little need be said. Pausanias' tale, how Dionysus appeared to the poet when a boy, asleep in his father's vineyard, and bade him write a tragedy — or the account in the Life, how he was killed by an eagle letting fall on his head a tortoise whose shell the bird was unable to crack — clearly belong to the same class of legends as the story that Plato was son of Apollo, and that a swarm of bees settled upon his infant lips as he lay in his mother's arms. Less supernatural, but hardly more historical, is the statement in the Life that the poet left Athens for Sicily in consequence of his defeat in the dramatic contest of 468 by Sophocles; or the alternative story of the same authority that the cause of his chagrin was that Simonides' elegy on the heroes

Work.

slain at Marathon was preferred to his own. Apart from the inherent improbability of such pettiness in such a man, neither story fits the facts; for in 467, the next year after Sophocles' success, we know that Aeschylus won the prize of tragedy with the Sepiem; and the Marathon elegy must have been written in 490, fourteen years before his first visit to Sicily.

In passing from Aeschylus' life to his work, we have obviously far more trustworthy data, in the seven extant plays (with the fragments of more than seventy others), and par- ticularly in the invaluable help of Aristotle's Poetics. The real importance of our poet in the development of the drama (see Drama: Greek) as compared with any of his three or four known predecessors — who are at best hardly more than names to us — is shown by the fact that Aristotle, in his brief review of the rise of tragedy {Poet. iv. 13), names no one before Aeschy- lus. He recognizes, it is true, a long process of growth, with several stages, from the dithyramb to the drama; and it is not difficult to see what these stages were. , The first step was the addition to the old choric song of an interlude spoken, and in early days improvised, by the leader of the chorus {Poet. iv. 12). The next was the introduction of an actor (iwoKptrˆs or " answerer "), to reply to the leader; and thus we get dialogue added to recitation. The " answerer " was at first the poet himself (Ar. Rhet. iii. 1). This change is

traditionally attributed to Thespis (536 B.C.), who is, however, not mentioned by Aristotle. The mask, to enable the actor to assume different parts, by whomsoever invented, was in regular use before Aeschylus' day. The third change was the enlarged range of subjects. The lyric dithyramb-tales were necessarily about Dionysus, and the inter- ludes had, of course, to follow suit. Nothing in the world so tenaciously resists innovation as religious ceremony; ˆnd it is interesting to learn that the Athenian populace (then, as ever, eager for " some new thing ") nevertheless opposed at first the introduction of other tales. But the innovators won; or other- wise there would have been no Attic drama.

In this way, then, to the original lyric song and dances in honour of Dionysus was added a spoken (but still metrical) interlude by the chorus-leader, and later a dialogue with one actor (at first the poet), whom the mask enabled to appear in more than one part.

But everything points to the fact that in the development of the drama Aeschylus was the decisive innovator. The two things that were important, when the 5th century began, if tragedy was to realize its possibilities, were (1) the disentangle- ment of the dialogue from its position as an interlude in an artistic and religious pageant that was primarily lyric; and (2) its general elevation of tone. Aeschylus, as we know on the express authority of Aristotle {Poet. iv. 13), achieved the first by the introduction of the second actor; and though he did not begin the second, he gave it the decisive impulse and con- summation by the overwhelming effect of his serious thought, the stately splendour of his style, his high dramatic purpose, and the artistic grandeur and impressiveness of the construction and presentment of his tragedies.

As to the importance of the second actor no argument is needed. The essence of a play is dialogue; and a colloquy between the coryphaeus and a messenger (or, by aid of the mask, a series of messengers), as must have been the case when Aeschy- lus began, is in reality not dialogue in the dramatic sense at all, but rather narrative. The discussion, the persuasion, the in- struction, the pleading, the contention — in short, the interacting personal influences of different characters on each other— are indispensable to anything that can be called a play, as we understand the word; and, without two "personae dramatis" at the least, the drama in the strict sense is clearly impossible. The number of actors was afterwards increased; but to Aeschylus are due the perception and the adoption of the essential step; and therefore, as was said above, he deserves in a very real sense to be called the founder of Athenian tragedy.

Of the seven extant plays, Supplices, Persae, Sepiem contra Thebas, Prometheus, Agamemnon, Choephoroe and Eumenides, five can fortunately be dated with certainty, as the archon's name

is preserved in the Arguments; and the other two approximately. The dates rest, in the last resort, on the diSaaicaXiai, or the official records of the contests, of which we know that Aristotle (and others) compiled catalogues; and some actual fragments have been recovered. The order of the plays is probably that given above; and certainly the Persae was acted in 472, Sepiem in 467, and the last three, the trilogy, in 458. The Supplices is generally, though not unanimously, regarded as the oldest; and the best authorities tend to place it not far from 490. The early date is strongly confirmed by three things: the extreme simplicity of the plot, the choric (instead of dramatic) opening, and the fact that the percentage of lyric passages is 54, or the highest of all the seven plays. The chief doubt is in regard to Prometheus, which is variously placed by good authorities; but the very low percentage of lyrics (only 27, or roughly a quarter of the whole), and still more the strong characterization, a marked advance on anything in the first three plays, point to its being later than any except the trilogy, and suggest a date somewhere about 460, or perhaps a little earlier. A few com- ments on the extant plays will help to indicate the main points of Aeschylus' work.

Supplices. — The exceptional interest of the Supplices is due to its date. Being nearly twenty years earlier than any other extant play, it furnishes evidence of a stage in the evolution of Attic drama which would otherwise have been unrepresented. Genius, as Patin says, is a " puissance libre," and none more so than that of Aeschylus; but with all allowance for the " un- controlled power " of this poet, we may feel confident that we have in the Supplices something resembling in general structure the lost works of Choerilus, Phrynichus, Pratinas and the 6th- century pioneers of drama.

The plot is briefly as follows: the fifty daughters of Danaus (who are the chorus), betrothed by the fiat of Aegyptus (their father's brother) to his fifty sons, flee with Danaus to Argos, to escape the marriage which they abhor. They claim the pro- tection of the Argive king, Pelasgus, who is kind but timid; and he (by a pleasing anachronism) refers the matter to the people, who agree to protect the fugitives. The pursuing fleet of suitors is seen approaching;, the herald arrives (with a company of followers), blusters, threatens, orders off the cowering Danaids to the ships and finally attempts to drag them away. Pelasgus interposes with a force, drives off the Egyptians and saves the suppliants. Danaus urges them to prayer, thanksgiving and maidenly

modesty, and the grateful chorus pass away to the shelter offered by their protectors.

It is clear that we have here the drama in its nascent stage, just developing out of the lyric pageant from which it sprang. The interest still centres round the chorus, who are in fact the ” protagonists ” of the play. Character and plot — the two essentials of drama, in the view of all critics from Aristotle downwards — are both here rudimentary. There are some fluctuations of hope and fear; but the play is a single situation. The stages are: the appeal; the hesitation of the king, the re- solve of the people; the defeat of insolent violence; and the rescue. It should not be forgotten, indeed, that the play is one of a trilogy — an act, therefore, rather than a complete drama. But we have only to compare it with those later plays of which the same is true, to see the difference. Even in a trilogy, each play is a complete whole in itself, though also a portion of a larger whole.

Persae. — The next play that has survived is the Persae, which has again a special interest, viz. that it is the only extant Greek historical drama. We know that Aeschylus’ predecessor, Phryni- chus, had already twice tried this experiment, with the Capture of Miletus and the Phoenician Women; that the latter play dealt with the same subject as the Persae, and the handling of its opening scene was imitated by the younger poet. The plot of the Persae is still severely simple, though more developed than that of the Suppliants. The opening is still lyric, and the first quarter of the play brings out, by song and speech, the anxiety of the people and queen as to the fate of Xerxes’ huge army. Then comes the messenger with the news of Salami’s,

including a description of the sea-fight itself which can only be called magnificent. We realize what it must have been for the vast audience — 30,000, according to Plato (Symp. 175 e) — to hear, eight years only after the event, from the supreme poet of Athens, who was himself a distinguished actor in the war, this thrilling narrative of the great battle. But this reflexion at once suggests another; it is not a tragedy in the true Greek sense, according to the practice of the 5th-century poets. It may be called in one point of view a tragedy, since the scene is laid in Persia, and the drama forcibly depicts the downfall of the Persian pride. But its real aim is not the “pity and terror” of the developed drama; it is the triumphant glorification of Athens, the

exultation of the whole nation gathered in one place, over the ruin of their foe. This is best shown by the praise of Aeschylus' great admirer and defender Aristophanes, who (Frogs, 1026-1027) puts into the poet's mouth the boast that in the Persae he had " glorified a noble exploit, and taught men to be eager to conquer their foe."

Thus, both as an historic drama and in its real effect, the Persae was an experiment; and, as far as we know, the experi- ment was not repeated either by the author or his successors. One further point may be noted. Aeschylus always has a taste for the unseen and the supernatural; and one effective incident here is the raising of Darius's ghost, and his prophecy of the disastrous battle of Plataea. But in the ghost's revelations there is a mixture of audacity and naivete, characteristic at once of the poet and the early youth of the drama. The dead Darius prophesies Plataea, but has not heard of Salamis; he gives a brief (and inaccurate) list of the Persian kings, which the queen and chorus, whom he addresses, presumably know; and his only practical suggestion, that the Persians should not again invade Greece, seems attainable without the aid of super- human foresight.

Septem contra Thebas. — Five years later came the Theban Tragedy. It is not only, as Aristophanes says (Frogs, 1024), " a play full of the martial spirit," but is (like the Supplices) one of a connected series, dealing with the evil fate of the Theban House. But instead of being three acts of a single story like the Supplices, these three plays trace the fate through three genera- tions, Laius, Oedipus and the two sons who die by each other's hands in the fight for the Theban sovereignty. This family fate, where one evil deed leads to another after many years, is a larger conception, strikingly suited to Aeschylus' genius, and con- stitutes a notable stage in the development of the Aeschylean drama. And just as here we have the tragedy of the Theban house, so in the last extant work, the Oresteia, the poet traces the tragedy of the Pelopid family, from Agamemnon's first sin to Orestes' vengeance and purification. And the names of several lost plays point to similar handling of the tragic trilogy.

The Seven against Thebes is the last play of its series; and again the plot is severely simple, not only in outline, but in detail. Father and grandfather have both perished miserably; and the two princes have quarrelled, both claiming the kingdom. Eteo- cles has driven out Polynices, who fled to Argos, gathered a host under seven leaders (himself being one) , and when the play opens has begun the siege of his own city. The king appears, warns the people, chides the clamour of women,appoints seven Thebans, including himself, to defend the seven gates, departs to his post, meets his brother in battle and both

are killed. The other six chieftains are all slain, and the enemy beaten off. The two dead princes are buried by their two sisters, who alone are left of the royal house.

Various signs of the early drama are here manifest. Half the play is lyric; there is no complication of plot; the whole action is recited by messengers; and the fatality whereby the predicted mutual slaughter of the princes is brought about is no accidental stroke of destiny, but the choice of the king Eteocles himself. On the other hand, the opening is no longer lyric (like the two earlier plays) but dramatic; the main scene, where the mes- senger reports at length the names of the seven assailants, and the king appoints the seven defenders, each man going off in silence to his post, must have been an impressive spectacle.

One novelty should not be overlooked. There is here the firs' t passage of kkvoia, or general reflexion of life, which later became a regular feature of tragedy. Eteocles muses on the fate which involves an innocent ma.n in the company of the wicked so that he shares unjustly their deserved fate. The passage (Theb. 507-608) is interesting; and the whole part of Eteocles shows a new effort of the poet to draw character, which may have some- thing to do with the rise of Sophocles, who in the year before (468) won with his first play, now lost, the prize of tragedy..

There remain only the Prometheus and the Oresteia, which show such marked advance that (it may almost be said) when we think of Aeschylus it is these four plays we have in mind.

Prometheus. — The Prometheus-trilogy consisted of three plays: Prometheus the Fire-bringer, Prometheus Bound, Prometheus Unbound. The two last necessarily came in that order; the Fire-bringer is probably the first, though recently it has been held by some scholars to be the last, of the trilogy. That Prometheus sinned against Zeus, by stealing fire from heaven; that he was punished by fearful tortures for ages; that he finally was recon- ciled to Zeus and set free, — all this was the ancient tale indisput- ably. Those who hold the Fire-bringer (Jhjp6pos) to be the final play, conjecture that it dealt with the establishment of the worship of Prometheus under that title, which is known to have existed at Athens. But the other order is on all grounds more probable; it keeps the natural sequence — crime, punishment, reconciliation, which is also the sequence in the Oresteia. Arid if the reconciliation was achieved in the second play, no scheme of action sufficing for the third drama seems even plausible. 1

However that may be, the play that survives is a poem of unsurpassed force and impressiveness. Nevertheless, from the point of view of the development of drama, there seems at first sight little scope in the story for the normal human interest of a tragedy, since the actors are all divine, except Io, who is a dis- tracted wanderer, victim of Zeus' cruelty; and between the open- ing where Prometheus is nailed to the Scythian rock, and the close where the earthquake engulfs the rock, the hero and the chorus, action in the ordinary sense is ipso facto impossible. This is just the opportunity for the poet's bold inventiveness and fine imagination. The tortured sufferer is visited by the Oceanic Nymphs, who float in, borne by an (imaginary) winged car, to console; Oceanus (riding a .griffin, doubtless also imaginary) follows, kind but timid, to advise submission; then appears Io, victim of Zeus' love and Hera's jealousy, to whom Prometheus prophesies her future wanderings and his own fate; lastly Hermes, insolent messenger of the gods, who tries in vain to extort Prometheus' secret knowledge of the future. Oceanus, the well-meaning palavering old mentor, and Hermes, the blustering and futile jack-in-office, gods though they be, are vigorous, audacious and very human character-sketches; the soft entrance of the consoling nymphs is unspeakably beautiful; and the prophecy of Io's wanderings is a striking example of that new keen interest in the world outside which was felt by the Greeks of the 5th century, as it was felt by the Elizabethan English in a very similar epoch of national spirit and enterprise two thousand years later. Thus, though dramatic action is by the nature of the case impossible for the hero,. the visitors provide real drama.

Another important point in the development of tragedy is what we may call the " balanced issue." The question in Suppliants is the protection of the threatened fugitives; in Persae the humiliation of overweening pride. So far the sym- pathy of the audience is not doubtful or divided. In- the Septem there is an approach to conflict of feeling; the banished brother has a personal grievance, though guilty of the impious crime of attacking his own country. The sympathy must be for the de- fender Eteocles; but it is at least somewhat qualified by his injustice to his brother. In Prometheus the issue is more nearly 1 The Eumenides is quoted as a parallel, because there the estab- lishment of this worship at Athens concludes the whole trilogy; but it is forgotten that in Eumenides there is much besides— the pursuit of Orestes, the refuge at Athens, the trial, the acquittal, the conciliation by Athena of the Furies; while here the story would be finished before the last play began.

balanced. The hero is both a victim and a rebel. He is punished for his benefits to man; but though Zeus is tyrannous and un- grateful, the hero's reckless defiance is shocking to Greek feeling. As the play goes on, this is subtly and delicately indicated by the attitude of the chorus. They enter overflowing with pity. They are slowly chilled and alienated by the hero's violence and impiety; but they nobly decline, at the last crisis, the mean advice of Hermes to desert Prometheus and save themselves; and in the final crash they share his fate.

Oresteia. — The last and greatest work of Aeschylus is the Oresteia, which also has the interest of being the only complete trilogy preserved to us. It is a three-act drama of family fate, like the Oedipus-trilogy; and the acts are the sin, the revenge, the reconciliation, as in the Prometheus-trilogy. Again, as in Prometheus, the plot, at first sight, is such that the conditions of drama seem to exclude much development in character-drawing. The gods are everywhere at the root of the action. The inspired prophet, Calchas, has demanded the sacrifice of the king's daughter Iphigenia, to appease the offended Artemis. The in- spired Cassandra, brought in as a spear- won slave from conquered Troy, reveals the murderous past of the Pelopid house, and the imminent slaughter of the king by his wife. Apollo orders the son, Orestes, to avenge his father by killing the murderess, and protects him when after the deed he takes sanctuary at Delphi. The Erinnyes (" Furies ") pursue him over land and sea; and at last Athena gives him shelter at Athens, summons an Athenian council to judge his guilt, and when the court is equally divided gives her casting vote for mercy. The last act ends with the reconciliation of Athena and the Furies; and the latter receive a shrine and worship at Athens, and promise favour and pros- perity to the great city. The scope for human drama seems deliberately restricted, if not closed, by such a story so handled. Nevertheless, as a fact, the growth of characterization is, in spite of all, not only visible but remarkable. Clytemnestra is one of the most powerfully presented characters of the Greek drama. Her manly courage, her vindictive and unshaken pur- pose, her hardly hidden contempt for her tool and accomplice, Aegisthus, her cold scorn for the feebly vacillating elders, and her unflinching acceptance (in the second play) of inevitable fate, when she faces at last the avowed avenger, are all portrayed with matchless force — her very craft being scornfully assumed, as needful to her purpose, and contemptuously dropped when the purpose is served. And there is one other noticeable point. In this trilogy Aeschylus, for the first time, has attempted some touches of character in two of the humbler parts, the Watchman in Agamemnon, and the Nurse in the

Choephoroe. The Watch- man opens the play, and the vivid and almost humorous senten- tiousness of his language, his dark hints, his pregnant metaphors drawn from common speech, at once give a striking touch of realism, and form a pointed contrast to the terrible drama that impends. A very similar effect is produced at the crisis of the Choephoroe by the speech of the Nurse, who coming on a message to Aegisthus pours out to the chorus her sorrow at the reported death of Orestes and her fond memories of his babyhood — with the most homely details; and the most striking realistic touch is perhaps the broken structure and almost inconsequent utter- ance of the old faithful slave's speech. These two are veritable figures drawn from contemporary life; and though both appear only once, and are quite unimportant in the drama, the innova- tion is most significant, and especially as adopted by Aeschylus.

It remains to say a word on two more points, the religious ideas of Aeschylus and some of the main characteristics of his poetry. The religious aspect of the drama in one sense was teiisiics. prominent from the first, owing to its evolution from the choral celebration of the god Dionysus. But the new spirit imported by the genius of Aeschylus into the early drama was religious in a profounder meaning of the term. The sadness of human lot, the power and mysterious dealings of the gods, their terrible and inscrutable wrath and jealousy (0,7a and d6voi), their certain vengeance upon sinners, all the more fearful il delayed. — such are the poet's constant themes, delivered with strange solemnly and impressiveness in the lyric songs,

especially in the Oresteia. And at times, particularly in the Trilogy, in his reference to the divine power of Zeus, he almost approaches a stern and sombre monotheism. " One God above all, who directs all, who is the cause of all" (Ag. 163, 1485); the watchfulness of this Power over human action (363-367), especially over the punishment of their sins; and the mysterious law whereby sin always begets new sin (Ag. 758-760): — these are ideas on which Aeschylus dwells in the Agamemnon with peculiar force, in a strain at once lofty and sombre. One specially noteworthy point in that play is his explicit repudiation of the common Hellenic view that prosperity brings ruin. In other places he seems to share the feeling; but here (Ag. 730) he goes deeper, and declares that it is not oXfios but always wickedness that brings about men's fall. All through there is a recurring note of fear in his view of man's destiny, expressed in vivid images — the " death that lurks behind the wall " (Ag. 1004), the " hidden reef which wrecks the bark, unable to weather the headland " (Eum. 561-565). In one remarkable passage of the Eumenides (517-525) this fear is extolled as a moral power which ought to be enthroned in men's

hearts, to deter them from impious or violent acts, or from the pride that impels them to such sins.

Of the poetic qualities of Aeschylus' drama and diction, both in the lyrics and the dialogue, no adequate account can be attempted ; the briefest word must here suffice. He is everywhere distinguished by grandeur and power of conception, presentation and expression, and most of all in the latest works, the Prome- theus and the Trilogy. He is pre-eminent in depicting the slow approach of fear, as in the Persae; the imminent horror of impending fate, as in the broken cries and visions of Cassandra in the Agamemnon (1072-1177), the long lament and prayers to the nether powers in the Choephoroe (315-478), and the gradual rousing of the slumbering Furies in the Eumenides (117-139). The fatal end in these tragedies is foreseen; but the effect is due to its measured advance, to the slowly darkening suspense which no poet has more powerfully rendered. Again, he is a master of contrasts, especially of the Beautiful with the Tragic: as when the floating vision of consoling nymphs appears to the tortured Prometheus (115-135); or the unmatched lyrics which tell (in the Agamemnon, 228-247) °f the death of Iphi- genia; or the vision of his lost love that the night brings to Menelaus (410-426). And not least noticeable is the extra- ordinary range, force and imaginativeness of his diction. One example of his lyrics may be given which will illustrate more than one of these points. It is taken from the long lament in the Septem, sung by the chorus and the two sisters, while following the funeral procession of the two princes. These laments may at times be wearisome to the modern reader, who does not see, and imperfectly imagines, the stately and pathetic spectacle; but to the ancient feeling they were as solemn and impressive as they were ceremonially indispensable. The solemnity is here heightened by the following lines sung by one of the chorus of Theban women (Sept. 854-860): — ■

Nay, with the wafting gale of your sighs, my sisters,

Beat on your heads with your hands the stroke as of oars,

The stroke that passes ever across Acheron,

Speeding on its way the black-robed sacred bark, —

The bark Apollo comes not near,

The bark that is hidden from the sunlight —

To the shore of darkness that welcomes all ! Authorities. — The chief

authority for the text is a single MS. at Florence, of the early nth century, known as the Medicean or M., written by a professional scribe and revised by a contemporary scholar, who corrected the copyist's mistakes, added the scholia, the arguments and the dramatis personae of three plays (Theb., Agam . Eum.), and at the end the Life of Aeschylus and the Catalogue of his Dramas. The MS. has also been further corrected by later hands. In 1896 the Italian Ministry of Public Instruction publishd the MS. in photographic facsimile, with an instructive preface by Signor Rostagno. Besides M. there are some eight later MSS. (13th to 15th century), and numerous copies of the three select plays (Sept., Pen., Prom.) which were most read in the later Byzantine period, when Greek literature was reduced to gradually diminishing excerpts. These later MSS. are of little value or authority. _ The editions, from the beginning of the 15th century to the present time, are very numerous, and the text has been further continuously

improved by isolated suggestions from a host of scholars. The three first printed copies (Aldine, 1518; Turnebus and Robortello, 1552) give only those parts of Agamemnon found in M., from which MS. some leaves were lost; in 1557 the full text was restored by Vettori (Victorius) from later MSS. After these four, the chief editions of the seven plays were those of Schutz, Porson, Butler, Wellauer, Din- dorf, Bothe, Ahrens, Paley, Hermann, Hartung, Weil, Merkel, Kirch- hoff and Wecklein. Besides these, over a hundred scholars have thrown light on the corruptions or obscurities of the text, by editions of separate plays, by emendations, by special studies of the poet's work, or in other ways. Among recent writers who have made such contributions may be mentioned Wilamowitz-Moellendorf, Enger, Conington, Blaydes, Cobet, Meineke, Madvig, Ellis, W. Headlam, Davies, Tucker, Verrall and Haigh. The Fragments have been edited by Nauck and also by Wecklein. The Aeschylean staging is discussed in Albert Miiller's Lehrbuch der griechischen Biihnenalter- thiimer; in " DieBiihnedes Aeschylos," by Wilamowitz (Hermes, xxi.) ; in Smith's Diet, of Antiquities, art. " Theatrum " (R. C. Jebb) ; in Dorpfeld and Reisch (Das griechische Theater), Haigh's Attic Theatre, and Gardner and Jevons' Manual of Greek Antiquities. English Verse Translations: Agamemnon, Milman and R. Browning; Oresteia, Suppliants, Persae, Seven against Thebes, Prometheus Vinc- tus, by E. D. A. Morshead; Prometheus, E. B. Browning; the whole seven plays, Lewis Campbell. (A. Si.)

AESCULAPIUS (Gr. ‘Ao-kX-otios), the legendary Greek god of medicine, the son of Apollo and the nymph Coronis. Tricca in Thessaly and Epidaurus in Argolis disputed the honour of his birthplace, but an oracle declared in favour of Epidaurus. He was educated by the centaur Cheiron, who taught him the art of healing and hunting. His skill in curing disease and restoring the dead to life aroused the anger of Zeus, who, being afraid that he might render all men immortal, slew him with a thunder- bolt (Apollodorus iii. 10; Pindar, Phthia, 3; Diod. Sic. iv. 71). Homer mentions him as a skilful physician, whose sons, Machaon and Podalirius, are the physicians in the Greek camp before Troy (Iliad, ii. 731). Temples were erected to Aesculapius in many parts of Greece, near healing springs or on high mountains. The practice of sleeping (incubalio) in these sanctuaries was very common, it being supposed that the god effected cures or pre- scribed remedies to the sick in dreams. All who were healed offered sacrifice — especially a cock — and hung up votive tablets, on which were recorded their names, their diseases and the manner in which they had been cured. Many of these votive tablets have been discovered in the course of excavations at Epidaurus. Here was the god’s most famous shrine, and games were celebrated in his honour every five years, accompanied by solemn processions. Herodas (Mimes, 4) gives a description of one of his temples, and of the offerings made to him. His worship was introduced into Rome by order of the Sibylline books (293 B.C.), to avert a pestilence. The god was fetched from Epidaurus in the form of a snake and a temple assigned him on the island in the Tiber (Livy x. 47; Ovid, Metam. xv. 622). Aesculapius was a favourite subject of ancient artists. He is commonly represented standing, dressed in a long cloak, with bare breast; his usual attribute is a club-like staff with a serpent (the symbol of renovation) coiled round it. He is often accom- panied by Telesphorus, the boy genius of healing, and his daughter Hygieia, the goddess of health. Votive reliefs repre- senting such groups have been found near the temple of Aescu- lapius at Athens. The British Museum possesses a beautiful head of Aesculapius (or possibly Zeus) from Melos, and the Louvre a magnificent statue.

Authorities. — L. Dyer, The Gods in Greece (1891); Jane E. Harrison, Prolegomena to the Study of Greek Religion (1903); R. Caton, Temples and Ritual of A. at Epidaurus and Athens (1900) ; articles in Pauly-Wissowa’s Real-Encyclopadie, Roscher’s Lexikon der Mytho- logie; T. Panofka, Asklepios und die Asklepiaden (1846); Alice Walton, ” The Cult of Asklepios,” in Cornell Studies in Classical Philology, iii. (New York, 1894); W. H. D. Rouse, Greek Votive Offerings (1902). •

AESERNIA (mod. Isernia), a Samnite town on the road from

Beneventum to Corfinium, 58 m. to the north-east of the former, at the junction of a road going past Venafrum to the Via Latina. These routes are all followed by modern railways — the lines to Campobasso, Sulmona and Caianello. A Roman colony was established there in 263 B.C. It became the headquarters of the Italian revolt after the loss of Corfinium, and was only recovered by Sulla at the end of the war, in 80 B.C. Remains of its fortifica-

tions are still preserved — massive cyclopean walls, which serve as foundation to the walls of the modern town and of a Roman bridge, and the subterranean channel of an aqueduct, cut in the rock, and dating from Roman times.

AESOP (Gr. Mo-uiivos), famous for his Fables, is supposed to have lived from about 620 to 560 B.C. The place of his birth is uncertain— Thrace, Phrygia, Aethiopia, Samos, Athens and Sardis all claiming the honour. We possess little trustworthy informa- tion concerning his life, except that he was the slave of Iadmon of Samos and met with a violent death at the hands of the in- habitants of Delphi. A pestilence that ensued being attributed to this crime, the Delphians declared their willingness to make compensation, which, in default of a nearer connexion, was claimed and received by Iadmon, the grandson of his old master. Herodotus, who is our authority for this (ii. 134), does not state the cause of his death; various reasons are assigned by later writers — his insulting sarcasms, the embezzlement of money entrusted to him by Croesus for distribution at Delphi, the theft of a silver cup.

Aesop must have received his freedom from Iadmon, or he could not have conducted the public defence of a certain Samian demagogue (Aristotle, Rhetoric, ii. 20). According to the story, he subsequently lived at the court of Croesus, where he met Solon, and dined in the company of the Seven Sages of Greece with Periander at Corinth. During the reign of Peisistratus he is said to have visited Athens, on which occasion he related the fable of The Frogs asking for a King, to dissuade the citizens from attempting to exchange Peisistratus for another ruler. The popular stories current regarding him are derived from a life, or rather romance, prefixed to a book of fables, purporting to be his, collected by Maximus Planudes, a monk of the 14th century. In this he is described as a monster of ugliness and deformity, as he is also represented in a well-known marble figure in the Villa Albani at Rome. That this life, however, was in existence- a century before Planudes, appears from a 13th-century MS. of it found at Florence. In Plutarch's Sym- posium of the Seven Sages, at which Aesop is a guest, there are many jests on his original servile condition, but nothing

deroga- tory is said about his personal appearance. We are further told that the Athenians erected in his honour a noble statue by the- famous sculptor Lysippus, which furnishes a strong argument against the fiction of his deformity. Lastly, the obscurity in which the history of Aesop is involved has induced some scholars to deny his existence altogether.

It is probable that Aesop did not commit his fables to writing; Aristophanes (Wasps, 1259) represents Philocleon as having learnt the ” absurdities ” of Aesop from conversation at banquets, and Socrates whiles away his time in prison by turning some of Aesop’s fables ” which he knew ” into verse (Plato, Phaedo, 61 b). Demetrius of Phalerum (345-283 B.C.) made a collection in ten books, probably in prose (Abyuv Aiv avvayuyai) for the use of orators, which has been lost. Next appeared an edition in elegiac verse, often cited by Suidas, but the author’s name is unknown. Babrius, according to Crusius, a Roman and tutor to the son of Alexander Severus, turned the fables into choliambics in the earlier part of the 3rd century a.d. The most celebrated of the Latin adapters is Phaedrus, a freedman of Augustus. Avianus (of uncertain date, perhaps the 4th century) translated 42 of the fables into Latin elegiacs. The collections which we possess under the name of Aesop’s Fables are late renderings of Babrius’s version or Upoyvuvaa iiara, rhetorical exercises of varying age and merit. . Syntipas translated Babrius into Syriac, and Andreopulos put the Syriac back again into Greek. Ignatius Diaconus, in the 9th century, made a version of 5 3 fables in choliambic tetrameters. Stories from Oriental sources were added, and from these collections Maximus Planudes made and edited the collection which has come down to us under the name of Aesop, and from which the popular fables of modern Europe have been derived.

For further information see the article Fable; Bentley, Dissert- ation on the Fables of Aesop; Du Meril, Poesies inedites du moyen dge (1854) ; J. Jacobs, The Fables of Aesop (1889) : i. The history of

the Aesopic fable; ii. The Fables of Aesop, as first printed by William Caxton, 1484, from his French translation; Hervieux, Les Fabulistes Latins (1893-1899).

Before any Greek text appeared, a Latin translation of 100 Fabulae Aesopicae by an Italian scholar named Ranuzio (Renutius) was

published at Rome, 1476. About 1480 the collection of Planudes was brought out at Milan by Buono Accorso (Accursius) , together with Ranuzio's translation. This edition, which contained 144 fables, was frequently reprinted and additions made from time to time from various MSS. — the Heidelberg (Palatine), Florentine, Vatican and Augsburg — by Stephanus (1547), Nevelet (1610), Hudson (1718), Hauptmann (1741), Furia (1810), Coray (1810), Schneider (1812) and others. A critical edition of all the previously known fables, prepared by Carl von Halm from the collections of Furia, Coray and Schneider, was published in the Teubner series of Greek and Latin texts. A Fabularum Aesopicarum sylloge (233 in number) from a Paris MS., with critical notes by Sternbach, appeared in a Cracow University publication, Rozprawy akademii umiejet- nosci (1894).

AESOPUS, a Greek historian who wrote a history of Alexander the Great, a Latin translation of which, by Julius Valerius, was discovered by Mai in 1816.

AESOPUS, CLODIUS, the most eminent Roman tragedian, flourished during the time of Cicero, but the dates of his birth and death are not known. The name seems to show that he was a freedman of some member of the Clodian gens. Cicero was on friendly terms with both him and Roscius, the equally distin- guished comedian, and did not disdain to profit by their instruc- tion. Plutarch '{Cicero, 5) mentions it as reported of Aesopus, that, while representing Atreus deliberating how he should revenge himself on Thyestes, the actor forgot himself so far in the heat of action that with his truncheon he struck and killed one of the servants crossing the stage. Aesopus made a last appearance in 55 B.C. — when Cicero tells us that he was advanced in years — on the occasion of the splendid games given "by Pompey at the dedication of his theatre. In spite of his somewhat ex- travagant living, he left an ample fortune to his spendthrift son, who did his best to squander it as soon as possible. Horace (Sat. iii. 3. 239) mentions his taking a pearl from the ear-drop of Caecilia Metella and dissolving it in vinegar, that he might have – the satisfaction of swallowing eight thousand pounds' worth at a draught.

Cicero, De Divinatione, i. 37; pro Sestio, 56, 58; Quint., Instit- xi. 3, in ; Macrobius, Sat. iii. 14.

AESTHETICS, a branch of study variously denned as the philosophy or science of the beautiful, of taste or of the fine arts. The name is something of an accident. In its original Pre, 'd'»'i Greek form (aicdrjTtKos) it means what has to do with J^_ * sense-perception as a source of knowledge; and this is still its meaning in Kant's philosophy

(” Transcen- dental Aesthetic “). Its limitation to that function of sensuous perception which we know as the contemplative enjoyment of beauty is due to A. G. Baumgarten. Although the subject does not readily lend itself to precise definition at the outset, we may indicate its scope and aim, as understood by recent writers, by saying that it deals successively with one great department of human experience, viz. the pleasurable activities of pure con- templation. By pure contemplation is here understood that manner of regarding objects of sense-perception, and more particularly sights and sounds, which is entirely motived by the pleasure of the act itself. The term ” object ” means whatever can be perceived through one of the senses, e.g. a flower, a land- scape, the flight of a bird, a sequence of tones. The contemplation may be immediate when (as mostly happens) the object is present to sense; or it may be mediate, when as in reading poetry we dwell on images of objects of sense. Whenever we become interested in an object merely as presented for our contemplation our whole state of mind may be described as an aesthetic atti- tude, and our experience as an aesthetic experience. Other expressions such as the pleasure of taste, the enjoyment and appreciation of beauty (in the larger sense of this term), will serve less precisely to mark off this department of experience.

Aesthetic experience is differentiated from other kinds of experience by a number of characteristics. We commonly speak of it as enjoyment, as an exercise and cultivation of feeling. The appreciation of beauty is pervaded and sustained by pleas-

urable feeling. In aesthetic enjoyment our capacities of feel- ing attain their fullest and most perfect development. Yet, as its dependence on a quiet attitude of contemplation might tell us, aesthetic experience is characterized by Oifferen- a certain degree of calmness and moderation of feeling. aesthetic Even when we are moved by a tragedy our feeling is expert- comparatively restrained. A rare exhibition of beauty ence – may thrill the soul for a moment, yet in general the Jˆ r j£i cs enjoyment of it is far removed from the excitement as feeling. of passion. On the other hand, aesthetic pleasure is pure enjoyment. Even when a disagreeable element is present, as in a musical dissonance or in the suffering of a tragic hero, it contributes to a higher measure of enjoy- ment. It is, moreover, free from the painful elements of craving, fatigue, conflict, anxiety and disappointment, which are apt to accompany other kinds of enjoyment; such as the satisfaction of the appetites and other needs. To this purity of aesthetic pleasure must be added its refinement, winch implies not merely a certain remoteness from the bodily needs, but the effect of a union of sense and mind in giving amplitude as well

as delicacy to our enjoyment of beauty. As the region of most pure and refined feeling, aesthetic Marked experience is clearly marked off from practical life, with off from its urgent desires and the rest. In aesthetic contempla- practical tion desire and will as a whole are almost dormant. acttYtt yt This detachment from the daily life of practical needs and aims is brought out in Kant's postulate that aesthetic enjoyment must be disinterested ("ohne Interesse"), that when we regard an object aesthetically we are not in the least concerned with its practical significance and value: one cannot, for example, at the same moment aesthetically enjoy looking at a also from painting and desire to be its possessor. In like manner, Intel- even if less apparently, aesthetic contemplation is lectuat marked off from the arduous mental work which enters actlvlt y- into the pursuit of knowledge. In contemplating an aesthetic object we are mentally occupied with the concrete, whereas all the more serious intellectual work of science involves the diffi- culties of the abstract. The contemplation is, moreover, free from those restraints which are imposed on our mental activity by the desire to obtain knowledge.

While as the highest phase of feeling aesthetic experience appears to belong to our subjective life, the hidden region of the soul, it is connected just as clearly, through the act uniform- of sense-perception, with the world of objects which is ityof our common possession. Beingthusdependentonacon- aesthetic templation of things in this common world it raises the expert- question whether, like the perception of these objects, ence ' it is a uniform experience, the same for others as for myself. We touch here on the last characteristic of aesthetic experience which needs to be noted at this stage, its uniformity or subjection to law. It is a common idea that men's judgments about matters of taste disagree to so large an extent that each individual is left very much to his subjective impressions. With regard to many of the subtler matters of aesthetic appreciation, at any rate, there is undoubtedly on a first view the appearance of a want of agreement. Contrasted with logical judgments or even with ethical ones, aesthetic judgments may no ae ˆ e

me agreeably." It means that the rose has a general power of Lorical so a ff ec ting me (at different times) and others as well. judgment The judgment is not the same as a logical one. It andjudg- does not say or imply that as a matter of fact it always meat of ˆ Qes pi ease — even jf we ˆd the limitation, those who

possess the sensibilities and the taste presupposed; for, as we know, our varying mood and state of receptivity make a profound difference in the fulness of the aesthetic enjoyment. It is a ” judgment of value ” which claims for the rose aesthetic rank as an object properly qualified to please contemplative subjects. This value, it is plain, is relative to conscious subjects; yet since it is relative to all competent ones, it may be regarded as ” objective ” — that is to say, as belonging to the object. 1

This slight preliminary inspection of the subject will prepare one for the circumstance that the scientific treatment of it has Latede- begun late, and is even now far from being complete. velopment This slowness of development is in part explained of the \yy t ne detachment of aesthetic experience from the scence. ur g en t needs of life. In a comparatively early stage of human progress some thought had to be bestowed on such pressing problems as to how to cope with the forces of nature and to turn them to useful account; how to secure in human communities obedience to custom and law. But the problem of throwing light on our aesthetic pleasures had no such urgency. 2 To this it must be added that aesthetic experience (in all but its simpler and truder forms) has been, and still is confined to a small number of persons; so that the subject does not appeal to a wiili popular interest; while, on the other hand, the sub- jects of this experience not infrequently have a strong senti- mental dislike to the idea of introducing into the region of refined feeling the cold light of scientific investig ition. Lastly, there are special difficulties inherent in the subject. One serious obstacle to a scientific theory of aesthetic experience is the illusive character of many of its finer elements — for example, the subtle differences of feeling-tone produced by the several colours as well as by their several tones and shades, by the several musical intervals, and so forth. Finally, there is the circumstance just touched on that much of this region of experience, instead of at once disclosing uniformity, seems to be rather the abode of caprice and uncertainty. The variations in taste at different levels of culture, among different races and nations and among the individual members of the same community are numerous and striking^ and might at first seem to bar the way to a scien- tific treatment of the subject. These considerations suggest that an adequate theory of aesthetic experience could only be attempted after the requisite scientific skill had been developed in other and more pressing departments of inquiry.

If we glance at the modes of treating the subject up to a quite recent date we find but little of serious effort to apply to it a

strictly scientific method of investigation. The whole theories 0/

extent of concrete experience has not been adequately subject. recognized, still less adequately examined. For the

greater part thinkers have been in haste to reach some simple formula of beauty which might seem to cover the more obvious facts. This has commonly been derived deductively from some more comprehensive idea of experience or human life as a whole. Thus in German treatises on aesthetics which have been largely thought out under the influence of philosophic idealism the beautiful is subsumed under the idea, of which it is regarded as one special manifestation, and its place in human experience has been determined by defining its logical relations to the other great co-ordinate concepts, the good and the true. These attempts to reach a general conception of beauty have often led to one-sidedness of view. And this one-sidedness has sometimes characterized the theories of those who, like Alison, have made a wider survey of aesthetic facts.

Aesthetics, like Ethics, is a Normative Science, that is to say,

1 See below for Kant's view of the aesthetic judgment, as having subjective universal validity. On the meaning of judgments of value see J. Cohn, Allgem. Asthetik, Einleitung, pp. 7 ft., and Teil i., Kap. 2 and 3.

2 Cf. Ladd, Introduction to Philosophy, pp. 330, 331.

concerned with determining the nature of a species of the desir- able or the good (in the large sense) . It seeks one or Aesthetics more regulative principles which may help us to as nor- distinguish a real from an apparent aesthetic value, m * tlve and to set the higher and more perfect illustrations of beauty above the lower and less perfect. As a science it will seek to realize its normative function by the aid of a patient, methodical investigation of facts, and by processes of observa- tion, analysis and induction similar to those carried out in the natural sciences. In speaking of aesthetics as a nor- Aesthetics mative science we do not mean that it is a practical not a one in the sense that it supplies practical rules which practical may serve- as definite guidance for the artist and the lover of beauty, in their particular problems of selecting and arranging elements of aesthetic value. It is no more a practical science than logic. The supposition that it is so is probably favoured by the idea that aesthetic theory has art for its special subject. But this is to confuse a general aesthetic theory — what the Germans call " General Aesthetics "—with a theory of art (Kunstwissenschaft). The former, with which we are here concerned, has to examine aesthetic experience as a whole; which, as we shall

presently see, includes more than the enjoy- ment and appreciation of art.

We may now indicate with more fulness the main problems of our science, seeking to give them as precise a-form as possible. At the outset we are confronted with an old and almost baffling question: ” Is beauty a single quality f tne inherent in objects of perception like form or colour?” science. Common language certainly suggests that it is. Aesthetics, too, began its inquiry at the same point of view, and its history shows how much pains men have taken in i s beauty trying to determine the nature of this attribute, as well a single as that of the faculty of the soul by which it is per- *?f˜’ ,ˆ * , ceived. Yet a little examination of the facts suffices to ° show that the theory is beset with serious difficulties. Whatever beauty may be it is certainly not a quality of an object in the same way in which the colour or the form of it is a Beauty quality. These are physical qualities, known to us by not a specific modifications of our sensations. The beauty physical of a rose or of a peach is clearly not a physical quality. *” y ‘ Nor do we in attributing beauty to some particular quality in an object, say colour, conceive of it as a phase of this quality, like depth or brilliance of colour, which, again, is known by a special modification of the sensations of colour. Hence we must say that beauty, though undoubtedly referred to a physical object, is extraneous to the group of qualities which makes it a physical object.

Beauty is frequently attributed to a concrete object as a whole — to a flower or shell, for example, as a visible whole. Our everyday aesthetic judgments are wont to leave the attributes thus vaguely referred to the concrete attributed object. Yet it is equally certain that we not infre- todit- quently speak of the beauty of some definable aspect ter ent or quality of an object, as when we pronounce the f˜ objects. contour of a mountain or of a vase to be beautiful. And it may be asked whether, in thus localizing beauty, so to speak, in one of the constituent qualities of an object, we always place it in the same quality. A mere glance at the facts will suffice to convince us that we do not. We call the facade of a Greek temple beautiful with special reference to its admirable form; whereas in predicating beauty of the ruin of a Norman castle we refer rather to what the ruin means — to the effect of an imagination of its past proud strength and slow vanquishment by the unrelenting strokes of time. This fact that beauty ap- pertains now more to one quality, now more to another, helps us to understand why certain theorists, known as formalists, regard all beauty as formal or residing in form, whereas Formalists others, the idealists or expressionalists, view it as and ex- residing in ideal content or expression. These theories, Passion- however, like other attempts to

find an adequate single principle of beauty, are unsatisfactory. Form and ideal content are each a great source of aesthetic enjoyment, and

either can be found in a degree of supremacy which practically renders the co-operation of the other unimportant. The two buildings cited above, two human faces, two musical composi- tions, may exhibit in an impressive and engrossing way the beauty of form and of expression respectively. Nor is this all. Three Beauty refuses to be confined even to these two.

ultimate There are the various beauties of colour, for example, modes of as exhibited in such familiar phenomena of nature as

a ‘ sea and sky, autumn moors and woods. A slight analysis of the constituents of objects to which we attribute beauty shows that there are at least three distinct modes of this attribute, namely (1) sensuous beauty, (2) beauty of form and (3) beauty of meaning or expression, nor do these appear to be reducible to any higher or more comprehensive principle. It requires a certain boldness to attempt to effect a rapproche- ment between the formal and the expressional factor. 1 An apparent unification of the three seems at present only possible by substituting for beauty another concept at least equally vague, such as perfection, 2 which seems to imply the idea of purposiveness, and to apply clearly only to certain domains of beauty, e.g. organic form.

We may now take another step and say that beauty appears to be a quality in objects which is not sharply differentiated Beauty from other and allied qualities. If we look at the and allied usages of speech we shall find that beauty has its coacep- kindred conceptions, such as gracefulness, prettiness °” s ‘ and others. Writers on aesthetics have spent much

time on these ” Modifications of the Beautiful.” The point emphasized here is the difficulty of drawing the line between them. Even an expert may hesitate long before saying whether a human face, a flower or a cameo should be called beautiful or pretty. Must we postulate as many allied quali- ties as there are names for these pleasing aspects of objects? Or must we do violence to usage and so stretch the word ” Beauty ” as to make it cover all qualities or aspects of objects which have aesthetic value, including those ” modifica- tions of the beautiful

” which we know as the sublime, the comic and the rest? But the wider we try in this way to make the denotation of the term the vaguer grows the connotation. We are thus left equally incapable of saying what the quality is, and in which aspect or attribute of the object it inheres. 3

It seems to follow that in constructing a scientific theory we do well to dispense with the assumption of an objective quality of beauty. Aesthetics will return to Kant and con- ttoacrf 1 ‘ ˆ ne i tself to the examination of objects called beauti- objective ful in their relation to, and in their manner of affecting quality of our minds. 4 The aesthetic value of such an object

beauty dispensed

beauty w ˆ ˆ s viewed as consisting in the possession of certain

with. assignable characteristics by means of which it is fitted

to affect us in a certain desirable way, to draw us into the enjoyable mood of aesthetic contemplation. These charac- teristics may conveniently be called aesthetic qualities. 5 Objects which are found to possess one or more of these qualities, qualities in the required degree of fulness claim a certain aesthetic value, even though they fall short of being “beautiful,” in the more exacting use of this word. They are in the direction — ” im Sinne,” as Fechner says — of beauty, conceived as something fuller and richer, answering to a higher standard of aesthetic enjoyment and a severer demand on our part. The word ” beauty ” may still be used occasionally, where no ambiguity arises, as a convenient

1 For example, that hinted at by Bosanquet in his definition of the beautiful, History of Aesthetic, p. 5.

2 Beauty is defined as Perfection by P. Souriau, La Beaute rationnelle, 2« me partie.

1 K. Groos argues well against this violent stretching of the word beautiful, Einleitung in die Asthetik, pp. 46 seq.

- Kant, in developing his idea of beauty as subjective, was probably influenced by Hume, who wrote: ” Beauty is no quality in things themselves; it exists merely in the mind which contemplates them ” {Essays, xxii.).

5 On the nature of these qualities see S. Witasek, Grundziige der

Mgem. Asthetik, p. 11.

expression for aesthetic value in all its degrees. Yet it is better to keep the term applicable to the objects commonly denoted by it by making it represent the fuller aesthetic satis- factions which flow from a rare and commanding exhibition of one or more of these qualities, from what may be described as an appreciable excellence of aesthetic quality.

By thus dispensing with the concept of beauty as some occult undefinable quality, we get rid of much of the contradiction which appears to inhere in our aesthetic experience. For ex- ample, a bit of brilliant colour in a bonnet which pleases the wearer but offends her superior in aesthetic matters takes its place as something which per se has a certain degree of aesthetic value even though the particular relations into which it has now thrust itself, palpable to the trained eye, may practically rob it of its value. In thus substituting the relative idea of aesthetic value for the absolute idea of beauty we may no doubt seem to be destroying the reality of the object of aesthetic perception. This point may more conveniently be taken up later when we consider the whole question of aesthetic illusion.

This new way of envisaging aesthetic objects requires us to make the study of their effect a prominent part of our investiga- tion. In all the valuable recent work on the subject, attention has been largely concentrated on this effect. aes ” a e e m c ° More particularly we have to investigate and illumine effect. scientifically the pleasurable side of the experience. In doing this we shall make use of all the light we can obtain from a study of known laws of pleasure. Thus we shall avail ourselves not only of the theory of the pleasure-tones of sensation Aesthetics but of that of the conditions of an agreeable exercise of and the attention upon objects, more particularly of the ‘ a,rai1 ‘ characteristics of objects which adequately stimulate p easure ‘ the attention without confusing or burdening it. Yet this does not require that we should treat the aesthetic problem as a part of the more general science of pleasure, as has been protiemot attempted by some, e.g. Grant Allen (Physiological aesthetic A esthetics) and Rutgers Marshall (Pain, Pleasure and enjoyment Aesthetics, and Aesthetic Principles). To do so would * s P« CIai be to run the risk of considering only the more general aspects and conditions of aesthetic enjoyment, whereas what we need is a theory of it as a specific kind of pleasurable experience. What is required at the present stage of development of the science is a deeper investigation of the aesthetic attitude of mind as a whole, of what we may call the aesthetic psychosis. We need to probe the act of contemplation itself, the mode

of activity of attention involved in this calm, half-dreamlike gazing Th mm on the mere look of things unconcerned with their tude of ordinary and weightier imports. We need further to aesthetic determine the effect of this contemplative attitude c ° n j-f* n – upon the several mental processes involved, the act of perception itself, with its grasp of manifold relations, the flow of ideas, the partial resurgence and transformation of emotion. In examining these effects we must keep in view the double side of the contemplative attitude, the wide range of free movement which perception and imagination claim and enjoy, and the willing subjection of the contemplative mind to the spell of the object. A deeper inspection of the con- templative mood may be expected to render clearer l t nte , ttec ‘ d the difference between the mental activity employed aesthetic in aesthetic perception and imagination and intellectual activity activity proper; between, say, the differencing of allied ˆ!l ber tints involved in the finer aesthetic enjoyment of tiated. colour and the sharper, clearer discrimination of tints required in scientific observation, and between such a grasp of relations as is required for a just appreciation of beautiful form and that severe analysis and measurement of formal elements and their relations which is insisted upon by science. As a result of a finer distinction here we may probably be in a better position to determine the point — touched on more than once in recent works on aesthetics— how far intellectual pleasure proper, e.g. that of recognizing and classifying objects, enters as a subordinate element into aesthetic enjoyment.

One point in the characterization of aesthetic experience has been reserved, namely, the question whether it is essentially a . ” form of social enjoyment. No one doubts that a man

thetic often enjoys beauty, e.g. that of a landscape, when

enjoyment alone; yet at such a moment he not only recognizes esseiiMiy tnat jjj s pleasure is a possible one for others, but is

probably aware of a sub-conscious wish that others were present to share his enjoyment. Kant went so far as to say that on a desert island a man would adorn neither his hut nor his person. However this be, it seems certain that as a rule we tend to indulge our aesthetic tastes in company with others. This habit of making aesthetic enjoyment a social experience would in itself tend to develop the sympathies and

the sympathetic intelligence and thus to promote exchanges of aesthetic experience. The content, too, of our aesthetic ex- periences would be favourable to such conjoint acts of aesthetic contemplation, and .to the mutual sharing of aesthetic experi- ences; for, as disinterested and universal modes of enjoyment detached from personal interests, they are clearly free from the egoistic exclusiveness which characterizes our private enjoy- ments which at best can only be participated in by one or two closely attached friends. Our aesthetic enjoyments are thus eminently fitted to be social ones; and as such they become greatly amplified by sympathetic resonance.

We are now in a position to consider a point much discussed of late, namely, the special connexion of aesthetic enjoyment

with the two senses, sight and hearing. Two questions Tae arise here: (i) Do the other and ” lower” senses take

senses. anv P art m aesthetic experience? (2) What are the

characteristics which give the predominance to the two ” higher ” ones ? With regard to the first it is coming to be recognized that aesthetic pleasure is not strictly confined to the two senses in question. Common language suggests that we find in certain odours and even in certain flavours a value analogous to that implied in calling an object beautiful. Hegel

excluded the other senses — even touch — on the ground A ? s f betlc f that aesthetics had to do only with art, in which touch. there was no place for perceptions of touch. A closer

examination has shown that this important sense plays a considerable part in art-effects. And even if this were not so, Hegel’s exclusion of touch from the rank of aesthetic senses would be a striking illustration of the narrowing effect on scientific theory of the identification of aesthetic objects with productions of art. To say that the experience of exploring with the fingers a velvety petal or the smooth surface of a sea- rounded pebble has no aesthetic element savours of a perverse arbitrariness. Touch is no doubt wanting in a prerogative of hearing and sight which we shall presently see to be important, namely, that being acted on by objects at a distance they admit of a simultaneous perception by a number of persons — as indeed even the sense of smell does in a measure. This is probably the chief reason why, according to certain testimony, the blind receive but little aesthetic enjoyment from tactual experience. 1 Yet this drawback is compensated to some extent by the fact that agreeable tactual

experience may be taken up as suggested meaning into our visual perceptions.

The two privileged senses, sight and hearing, owe their superi- ority to a number of considerations. They are the farthest Preroga. removed from the necessary life functions, with the tires ot pressing needs and disturbing cravings which belong to s J g ˆ. al ” 1 these. Even touch, though important as a source of

knowledge, has for its primary function to examine the things which approach our organisms in their relation to this as injurious or harmless. The two higher senses present to us material objects in their least aggressive and menacing manner: visible forms and colours, tones and their combinations, appear when compared with objects felt to be in contact with our body, to be rather semblances or distant signs of material realities than these realities themselves; and this circumstance fits these senses to be in a special way the organs of aesthetic perception with its calm, dreamlike detachment 1 See J. Cohn, Allgem. Asthetik, p. 95.

and its enjoyable freedom of movement. They are, moreover, the two senses by the use of which a number of persons may join most perfectly in a common act of aesthetic contemplation. This distinction strengthens their claims to be in a special manner the aesthetic senses, and this for a double reason. (1) It makes them sense-avenues by which each of us obtains the most immediate and most impressive conviction that aesthetic experience is a common possession of the many, and is largely similar in the case of different individuals. (2) It marks them off as the senses by the exercise of which perceptual enjoyment may most readily and certainly be increased through the resonant effects of sympathy. The experiences of the theatre and of the concert-hall sufficiently illustrate these distinguishing functions of the two senses. Other distinguishing prerogatives of sight and hearing flow from the characteristics of their sensations and perceptions, a point to be touched on later. 8

Our determination of the characteristics of the aesthetic attitude has now been carried far enough to enable us to consider another point much discussed in recent aesthetic literature, viz. the relation of this attitude to that of / ˆˆ Uc Play. The affinities of the two are striking and are and play. disclosed in everyday language, as when we speak of (a) Points the ” play ” of imagination or of ” playing ” on a ? t fˆ lnity musical instrument. Both play and aesthetic con- t nem , templation are activities which are controlled by no extraneous end, which run on freely directed only by the intrinsic delight of the

activity. Hence they both contrast with the serious work imposed on us and controlled by what we mark off as the necessities of life, such as providing for bodily wants, or rearing a family. They each add a sort of luxurious fringe to life. In aesthetic enjoyment our senses, our intelligence and our emotions are alike released from the constraint of these necessary ends, and may be said to refresh themselves in a kind of play. Finally, they are both characterized by a strong infusion of make-believe, a disposition to substitute productions of the imagination for everyday realities. In this respect, again, they form a contrast to that serious concern with fact and practical truth which the necessary aims of life impose on us. Little wonder, then, that Plato recognized in the contrast between the representative and the useful arts an analogy between play and earnest, 3 and that since the time of Schiller so much use has been made of the analogy in aesthetic works. Yet though similar, the two kinds of activity are distinguishable in <

2 Originally, as pointed out by Home and others, sight was regarded as the sense by which we received impressions of beauty. Yet the recognition of the claims of hearing date back to Plato. (See Bosanquet, Hist, of Aesth. pp. 51-52). For recent discussions of the claims of sight and hearing see article by J. Volkelt, " Der Aesth. Werth der niederen Sinne," in Zeitschrift fur Psych, u. Phys. der Sinnesorgane, vol. xxix. pp. 402 ff. ; see also below, Biblio~ graphy.

***Laws, 889 (see Bosanquet, op. cit. p. 54).**

anything corresponds in play save where games of skill take on something of the dignity of a fine art. 1

So far as to the preliminary delimiting work in aesthetic science. Only a bare indication can be made as to the methods Methods of research by which its advance can be furthered, oirv and as to the several directions of inquiry which it

""thl? w '" nave t0 f'l' ow – With regard to the former the method of investigation will consist in a careful inquiry into two orders of fact: (1) Objects which common testimony or the history of art show to be widely recognized objects of aesthetic value ; (2) records of the aesthetic experience of individuals, whether artists or amateurs.

Since aesthetic experience is brought about and its modes determined by objects possessing certain qualities, it seems evi- Examina- dent that scientific aesthetics must make an examin- tioii of ation and comparison of these a fundamental part B “** eWc of its problem. These objects will, as already hinted, include both natural ones in the inorganic and organic worlds, and works of art which can be shown to be objects of general or widely recognized aesthetic value. Without Nature as attempting here to discuss adequately the relation of supplying natural beauty to that of art we may note one or two “wirf*”’ P oints – Some contemplation and appreciation of the beautiful aspects of nature is not only prior in time to art, but is a condition of its genesis. The enjoyment of the pleasing aspects of land and sea, of mountain and dale, of the innumerable organic forms, has steadily grown with the development of culture; and this growth, though undoubtedly aided by that of the feeling for art— especially painting and poetry — is to a large extent independent of it. 2 Some of the finest insight into the secrets of beauty has been gained by those who had only a limited acquaintance with art. What is still more important in the present connexion is that the aesthetic experience gained by the direct contemplation of nature includes varieties which art cannot reproduce. It is enough to recall what Helmholtz and others have told us about the limitations of the powers of pictorial art to represent the more brilliant degrees of light; the admissions of painters themselves as to the limits of their art when it seeks to render the finer grada- tions of light and colour in such common objects as a tree-trunk or a bit of old wall. Nature, moreover, in spreading out her spaces of earth, sea and sky, and in exhibiting the action of her forces, does so on a scale which seems to make sublimity her prerogative in which art vainly endeavours to participate.

On the other hand, it is coming to be seen that the construction

of a theory of aesthetic values must be assisted by a much more

Use of precise examination than aestheticists are commonly

works of content to make, of works of art. The importance

art by the Q f i nc i uc Jine these is that they are well-defined objec- theorlst. . , , , , . .

tive expressions of what the aesthetic consciousness approves and prefers. In inquiring, for example, into the pleasing relations

of colour we might have to wait long for a theory if we were dependent on what even so gifted a writer as Ruskin can tell us about nature's juxtapositions: whereas if it can be shown that throughout the history of chromatic art or during its better period there has been a tendency to prefer certain combinations, this fact becomes a piece of convincing _.„ , evidence as to their aesthetic value. Even here, ties In however, there are sources of uncertainty. It is not using true to say that a work of art is a pure outcome of

works of tne aes thetic feeling of the artist, even if we take material. tn ' s m a comprehensive sense. It is subject to the

influence of all the temporary feelings and tendencies of the time which produced it. The aesthetic motive which is

1 Plato had a glimpse of the resemblance of art to play (see Bosanquet, op. cil. p. 54). Among modern writers the idea is specially connected with the names of Schiller and Herbert Spencer. In recent works the subject is touched on by S. Wittasek, Grundziige der allgem. Astketik. pp. 223 ff. ; Bray, Du Beau, pp. 62 ff., and by Rutgers Marshall and others referred to below in Bibliography.

s Hence to say, as Bosanquet says (op. cit. pp. 3-4), that art is to nature as the scientific conception of the world to that of the ordinary observer, seems wide of the mark.

supposed to originate it is apt to be complicated and disguised by other motives, e.g. utility in architecture, 3 an impulse to instruct if not to reform in modern fiction. Again, if it is said that a certain degree of permanence assures us of the Effects of aesthetic value of a feature of art, we are met by the custom difficulty that custom plays an important part in art, on art,stlc the result of convention fixed by tradition often simulating the aspect of a deep-seated aesthetic prefer- ence. In this connexion it is to be remarked that even so permanent an element as symmetry may owe its quasi- aesthetic value to custom, by which is understood its wide and impressive display in the organic and even the inorganic world. 4 Yet the influence of custom taken in this larger sense need not greatly disturb us. In aesthetics, as in ethics, the question of validity has to be kept distinct from that of origin. If symmetry (in general) is appreciated as aesthetically pleasing, the question of its genesis becomes immaterial. Another difficulty, not peculiar to aesthetic investigation, is that of reconstructing the modes of aesthetic consciousness represented by forms of art which differ widely from those of our own age and type of culture.

In utilizing art material for aesthetic theory the theorist will need to note the work recently done by English and German writers on primitive art. And this not merely because Value of of the value of the early forms of art for a theory of primitive the evolution of the aesthetic consciousness ; but il r tf because the embryonic stages of art are likely to have a peculiar interest as illustrating in a comparatively isolated form some of the simpler modes of aesthetic appreciation, e.g. in the grouping of colours, in the mode of covering a surface with linear ornament. Yet it is not necessary to give primitive art a considerable place in a general aesthetics. As a normative science, it is to be remembered, this is much more immediately concerned with the higher stages of aesthetic culture. In seeking to establish norms or regulative principles, we must, it is evident, make a special, study of objects of art which belong to our own level of culture. For these reasons it would appear necessary to include in a general aesthetic theory some reference to the evolution of art and of the aesthetic consciousness. A further reason for including it is that the evolution of art supplies a most valuable auxiliary criterion of degree or height of Evolution aesthetic value. Provided that we distinguish what as alter. is a real process of evolution from one of mere change nof of fashion in taste, and that we confine ourselves to the larger features of the process, we may make the

principle of evolution a serviceable one by regarding those forms and features of art as higher in respect of aesthetic value which grow distinct and relatively fixed in the later and better stages of the evolution of art. 5 This part of aesthetic investiga- tion should be made as exact as possible. Thus in dealing with the triads of colour said to be most fre- measnre- quently employed in the best period of Italian painting meat ot the observer should note and record as far as this is c “J r ff . possible not only the precise tints, but also the precise ˆ.,,1ˆ4. degrees of their several luminosities. With regard to elements of form in art, the judicious use of photography and careful measurement would probably help us to understand the practices of art in its better periods. This examination of art material by the aesthetic theorist should be supplemented by a study of what artists have written about their methods, of the rules laid down for students of art, and lastly of the generaliza- tions reached by the more scientific kind of writer upon art. 6

A proper methodical inquiry into aesthetic objects aided by a

3 K. Lange goes very far in attributing a practical motive to features of architecture commonly supposed to have aesthetic value, e.g. a regular series of similar forms (Das Wesen der Kunst, Bd. i. pp. 277 ff.).

4 K. Lange thinks that even symmetry probably has a technical origin (op. cil. pp. 283-284).

6 The question of the place of the historical development of art in aesthetic theory is carefully considered by J. Volkelt, System der Asthetik, Bd. i. 5″ Kap.

6 See, for example, a little work, The Genesis of Art-form, by G. L. Raymond.

aesthetic height.

la chil- dren, etc.

knowledge of the practices of art would lead to inductions of the type ” objects in so far as they possess such and indue- such characteristics are aesthetically valuable. ” l This tions.

preliminary work of aesthetic science in collecting and

analysing facts may be extended in two directions: by an examination (a) of the earlier and simpler forms of aesthetic experience, and (b) of the fuller and more complex experiences aerms of °^ tnose specially trained in the perception and enjoy- aesthetic ment of beauty, (a) The former would be illustrated preference by a more methodical investigation into the rudiment- ary, aesthetic likings of children, and of the surviv- ing lower races. Such inquiries may be expected to add to our knowledge of the simpler and more universal forms of aesthetic enjoyment. Some attention has been paid by Darwin and others to germs of taste in birds and other animals. Yet this line of inquiry, though of some value for a theory of the evolution of taste, seems to throw but little light on aesthetic preferences as found in man. 2 An important feature in this new investigation into simpler modes of aesthetic preference expert- ” ‘ s tnat ‘*• P rocee ds by way of experiment, that is to say, ment. a methodical testing of the aesthetic preferences of a number of individuals. Fechner introduced the method of experiment into aesthetics in his researches on the preferability (according to Zeising) of the proportion known as the ” golden section.” 3 Since his time other experimental inquiries have been made, bdth as to what forms {e.g. what variety of rectangle) and what combinations of colours are most pleasing. The results of these experiments are distinctly promising, though they have Expert- not yet been carried far enough to be made the basis of enceand perfectly trustworthy generalizations. 4 (b) A valuable judgments portion of the data for a science of aesthetics lies in the ‘ recorded experiences of artists, art critics and others who have specially developed their tastes. This source of information has certainly never been made use of in a com- plete and methodical manner by theorists, a quotation now and again from writers like Goethe and Ruskin having been deemed sufficient. Yet it is safe to say that an adequate understanding of the finer effects of beauty, both in nature and in art, presup- poses the assimilation of what is best in these records. And this not only because they commonly supply us with new and valuable varieties of experience of the more refined kind, but because the aesthetic judgments on nature and art of men in whom the feeling of beauty has been specially cultivated have a greater value than those of others. 6 It may be added that these records are wont to contain reflexions which, though wanting in scientific precision, can be utilized by science.

We now come to the work of scientific construction proper. The finer analysis of the objects which please aesthetically as Psycho- we ‘l as of the agreeable type of consciousness to which logical they minister belongs to the psychologist, and it is analysis of noteworthy that the best recent contributions to the science have been made by men who were either known as psychologists or at least had trained themselves in psychological analysis. A word or two must suffice to indicate the more important directions of the theoretic interpretation. We may in illustrating this set out from the convenient triple division of the factors in aesthetic experience: (A) the sensuous, (B) the perceptual or formal, (C) the imaginative, including all that is suggested by the aesthetic presentation, its meaning and expressiveness.

1 Kant, stopping short of an analysis of the beauty of a concrete object, said there were no aesthetic judgments of this universal form (see below). On the importance of these inductions see K. H. von Stein, Vorlesungen iiber Asthetik (Einleitung).

2 Curiously enough Thomas Reid recognized a germ of aesthetic taste in animals. Essays, Of Taste, ch. v. The aesthetic importance of the observations made on animals is dealt with by L. Bray, Du Beau, pp. 233 ff.

3 See below, and Bosanquet, op. cit. pp. 382 ff.

4 The chief lines of experimental aesthetics are indicated by W. Wundt in his Physiol. Psychologie (5 e Auflage), Bd. iii. pp. 142 ff. and 147 ff.

6 On the value of judgments of experts see K. Groos, Der asth. Genuss, p. 149.

(A) In dealing with the sensuous factor the psychologist is materially aided by the physiologist. It is sufficient to point to the contribution made to the analysis of musical _. sensations by the classical researches of Helmholtz sensuous (see below). Yet the application of a knowledge of factor. physiological conditions seems as yet to be of little ph y sl ° m service when we come to the finer aspects of this Aesthetics. sensuous experience, to the subtle effects of colour- combination, for example, and to the nuances of feeling- tone attaching to different tints. In the finer analysis of the sensuous material of aesthetic enjoyment it is the psychologist who counts. 6 Among the valuable contributions recently made in this domain one may instance the careful

determination of Jˆa/*” the aesthetically important characteristics of the sensa- problems. tions of sight and hearing, such as the finely graduated variety of their qualities (colour and tone), their capability of entering into combinations in which they preserve their individuality, including the important combinations of time and space form. With these are to be included the distinguish- ing characteristics of the concomitant feeling-tones, e.g. their comparative calmness and their clear separation from the sensations which they accompany. These characteristics help us to understand the greater refinement of these senses and also the more prolonged as well as varying enjoyment which they contribute, as well as the extension of this enjoyment by imagina- tive reproduction. 7 Next to this determination of important aesthetic characteristics of the two senses may be named a finer probing of the nuances of pleasurable tone exhibited by the several colours and tones. A point still needing special investiga- tion is extent of the sensuous factor in aesthetic enjoyment. There has been a tendency in aesthetic theory to over-intellectual- ize aesthetic experience and to find the value even of the sensuous factor in some intellectual principle, as when it is said (by Plato and Hegel among others) that a smooth or level tone and a uniform mass of colour owe their value to the principle of unity. But such prolongation (within obvious limits) in time or space is a condition of the full enjoyment of the distinctive quality of an individual tone or colour, and as such has a sensuous value. Aesthetics has to prove the sensuous value, the pleasure which is due not only to the feeling-tones of the several sensations but to those of their various combinations. Spite of a tendency of late to disparage the co-operation of the ” motor sensations ” connected with movements of the eye in the aesthetic apprecia- tion of linear form, e.g. curves, evidence suggests that certain curves, like fine gradations of colour, may owe a considerable part of their value to a mode of varying the sensuous experience which is in a peculiar manner agreeable. On the other hand, this theoretic investigation of sense-material will need to determine with care the added value due to the action of experience in giving something of meaning to particular colours and tones and their combinations, e.g. warmth of colour, height of tone.

(B) Under the scientific treatment of the perceptual or formal factor in aesthetic experience we have many special problems, of which only a few can be touched on here. Taking

this factor to include all combinations of elements in perceptual

which there is a more or less distinct perception of factor. pleasing relations, we meet here with such work as that of C. Stumpf (Ton-psychologie) in determining the way in which tones combine and tend to fuse. Later experiments have added to our knowledge of the obscure subject of colour harmony, enabling us to distinguish pleasing contrasts of colour from the more restful combinations of nearly allied tints. Our knowledge of pleasing form in the narrower sense, that is to say, space and time form, has been advanced by a number of recent inquiries. The value of symmetry, the meaning of proportion and the aesthetic value to be set on certain proportions, the forms of rhythm — these are some of the points dealt with in more general

6 Examples of a forcing of the physiological method in aesthetics may be found in the Physiological Aesthetics of Grant Allen, and the Aufgabe der Kunstphysiologie, by Georg Hirsch.

7 These aesthetic prerogatives of the sensations of hearing and sight have been well brought out in the article by J. Volkelt, already referred to.

and in special works. 1 In the case of forms, still more than in that of sensuous elements, it is needful to determine the extent to which the value of the formal aspect is modified by experience and the acquisition of meaning. This is pretty certainly the •source of the aesthetic value claimed for certain proportions, whether in the human figure or other organic forms or in the treer constructions of form in art. 2 Another problem is to determine the influence of the feeling-tones of the combining elements on the pleasing character of the whole. It is probable that a particular combination of colours owes something of its pleasure-value to a harmony of the feeling- tones of the elements. This is pretty certainly the case where the feeling-tones of the elements are closely akin, as in the case of a number of low tones of colours, or of architectural or other forms where one formal element — say, a vertical line, a rectangle of a certain proportion or a particular variety of arch — repeats itself and becomes a dominat- ing feature of the whole.

(C) The imaginative factor — which corresponds with what Fechner calls the ” indirect ” — includes all that imaginative

activity adds to our enjoyment when we contemplate xinaUve' an aest hetic object. It may consist first of all in re- factor. calling concrete experiences firmly associated with the object, as when the sight of wild-flowers in a London street calls up an image of fields and lanes. In order that these images may add to the aesthetic value of the object they must correspond to Our common associations, as distinguished from accidental individual ones. A large increase of aesthetic enjoy- ment comes to us through such suggested images. Although in general it is images of concrete objects which are called up, ideas of a more abstract character may take part though they tend in this case to assume a concrete aspect. This is illustrated in the appreciation of " typical beauty" in which a concrete form represents in an exceptional way the common form of a species, and in that of symbolic representation. An important part of this work of association is to render objects expressive of mental states, as when we read off the particular shade of feeling ex- pressed by a natural scene. 3

In the poetic contemplation of nature, her forces, her gladness

and other moods, this imaginative activity, though still deriving

its material from association, takes a freer form,

,, e l p J- leading to an investment of natural objects with a oflmagin- ° .... . ' ,

atioa. new and more fanciful meaning, as when we

" apperceive " a willow drooping over a pond or the front of an old cottage under a quasi-human form, endowing it with something akin to our own feelings and memories. What, it may be asked, is the whole range of this freer play of a life-giving fancy in our aesthetic enjoyment? Some recent theorists have attempted to answer this question by saying that it constitutes a vital element in all aesthetic con- templation. Th. Lipps and others who follow him seek to show that this vitalizing activity of the fancy, which produces a new and illusory object, is the essential ingredient in the aesthetic enjoyment of the forms of material objects. According to this theory, when in the aesthetic mood I enjoy the form of a tree, of a church steeple or of the front of a Greek temple, I am not only ascribing life and feeling to it, but am projecting myself in fancy into the object thus constructed, feeling for the moment that I am the tree or the

steeple. The process of vivification is carried out as follows. Lines represent certain movements, and in the aesthetic mood we translate all lines and so all forms back into the corresponding movements, which may be merely imagined (as

1 On the later investigations into musical consonance and harmony, harmony of colours, rhythmic and pleasing spatial forms, see Wundt, op. cit. Bd. ii. pp. 419 ff., and iii. 135 ff., 140 ff., 147 ff. and 1 54 ff. Time-form in music is specially discussed by E. Gurney, The Power of Sound, v.

2 K. Lange, who recognizes the influence of nature and custom, here denies that proportion is an aesthetic principle (Das Wesen der Kunst. II" Kap.).

3 Alison and other English Associationists have emphasized the aesthetic importance of the principle of association. Among more recent advocates of it is G. T. Fechner, Vorschule der Asthehk, and 0. Kiilpe, "fiber den associativ. Factor des asthet. Eindrucks," Vierteljahrsschrift fur wissensch. Philosophic, xxiii. pp. 145 ff.

Lipps himself thinks) or may be realized in part by sensuous elements, viz. motor sensations; which again may be regarded either as concomitants of eye movements, or as arising from an organically connected impulse to move the hand along the lines followed by the eye. 4 Thus the columns of a temple represent upward movement, and are apperceived as striving upwards so as to resist the downward pressure of the entablature. Since move- ments are the great means of expression in man, this imagina- tive reading of movement into motionless and even massive and stable forms enables us to endow them with quasi-human feelings. In looking, for example, at the weighty masses of a building we enter sympathetically into the successful strivings of the sup- porting structures to resist the downward thrust of gravity in the supported masses. The theory here briefly indicated 5 is interesting as illustrating an attempt from the psychological side to find a scientific support for philosophic idealism or ex- pressionalism. It is already beginning to be recognized in Germany as an exaggeration. It may be enough to say that as applied to forms generally, including those of sculpture and architecture, the theory is opposed by our ordinary way of speak- ing, which implies quite another point of view in the aesthetic contemplation of form, namely, that of a spectator external to the object contemplated. When our eye glides over the beauties of a statue, our imaginative activity so far from

transporting us within the object carries us as tactual feelers outside the surface. Similarly, when we delight in the divided spaces of a Gothic roof, so far from being imaginatively engaged in taking part in the efforts and strains of pillar, arch and the rest, we move in fancy along the pathways defined by the designer, tactually feeling and appreciating each dimension, each detail of form. The attempt to force a theory fitted for poetry on sculpture and archi- tecture would rob these of their distinctive aesthetic values; in the one case, of the plastic beauty of finely moulded marble surfaces as realized by imaginative excursions of the hand; and in the other case, of the perfect stillness and stability which give to great structures their solemn and quieting aspect. 6

The theory of a vitalizing play of imagination (Einftihlung) running through all modes of aesthetic contemplation is an exaggeration of the element of illusion which certainly characterizes this contemplation. As suggested above, masioa. by blotting out for the moment the perception of all save that which pleases it substitutes a new for the more solid reality of our practical mood. Moreover, as a state of perceptual absorption in which one loses consciousness of the ordinary self and its world, it has a certain resemblance to the state of ecstasy and of the hypnotic trance. 7 It is favourable to the play-like indulgence in a fanciful transformation of what is seen or heard, which may be described as a ” willing self-decep- tion,” more or less complete. Yet as we have seen, something of the real everyday world survives even in our freer aesthetic contemplation of form. Hence there is much to be said for the idea that we have in aesthetic illusion to do with a kind of double consciousness, a tendency to an illusory acceptance of the product of our fancy as the reality, restrained by a sub- conscious recognition of the everyday tangible reality behind. 8

It is evident that both in the more confined and in the freer form the element of imaginative activity in aesthetic experience will vary greatly among individuals and among peoples. Differ- ences in past experience leading to diverse habits of association,

4 This idea of imitative hand-movement in contemplating form is supported by K. Groos, Der dsth. Genuss, pp. 49 ff.

6 It is commonly spoken of as ” feeling oneself into ” (Ein- fiihlen), or as ” sympathetic feeling ” (Mitempfinden) .

1 6 Lipps'. theory is developed in a number of works, the chief of which is Asthetik: Psychologic des Schbnen und der Kunst, see esp. i er Theil, i er to 3 er Abschnitt; cf. Paul Stern, Einftihlung und Associa- tion, in which is to be found an historical sketch of the theory, and A. Hildebrand, Form in der bildenden Kunst. The play of imagina- tion in the contemplation of v form is discussed also by P. Souriau, V Esthetique du mouvement, 3 eme part., and La Suggestion dans fart, pp. 300 ff. Cf. works of Karl Groos and K. Lange named below (Bibliography) .

7 See P. Souriau, La Suggestion dans I'art (l Bre partie).

8 Cf. K. Lange, op. cit. Bd. i. p. 208.

Aesthetic emotion.

as well as in those natural dispositions which prompt one person to prefer motor images, another visual, another audile, will Variations modify the process in this enjoyable enlargement and ofimagin- transformation of what is presented to sense. It is atlve f or aesthetics at once to recognize these variations

M v y ' of imaginative activity and to determine the more common and universal directions which it follows.

The recent inquiry into our way of contemplating form is, in spite of exaggeration, valuable as showing that our distinc- _ , tions of form and expression are not absolute. Just

horm ana . r r . . . . , r ,

expression as there is the rudiment of ideal significance m colour, not so form, even in its more abstract and elementary

absolutely as p e cts, is not wholly expressionless, but may be s endowed with something of life by the imagination.

The recognition of this truth does not, however, affect the validity of our treating form and expression as two broadly distinguish- able factors of aesthetic pleasure. A line may be pleasing to sense-perception, and in addition illustrate expressional value by suggested ease of movement or pose.

Similarly, a concrete form, e.g. that of a sculptured human figure in repose, or of a graceful birch or fern, owes its aesthetic value to a happy com- bination of pleasing lines and of interesting ideas.

In close connexion with the determination of the imaginative factor in aesthetic contemplation, the psychologist is called on to define the special characteristics of aesthetic emo- tion. That our attitude when we watch a beautiful object, say the curl of a breaker as it falls, or some choice piece of sculpture, is an emotional one is certain, and ingenious attempts have been made by Home (Lord Karnes) and others to equip the emotion with a full accompaniment of corporeal activity, such as heightened respiratory activity. 1 Yet aesthetic emotion is to be contrasted with the more violent and passionate state of love and other emotions, and this differ- ence calls for further investigation. A closer inquiry into the features of that calm yet intense emotion which a rapt state of aesthetic contemplation induces is a necessary preliminary to a scientific demarcation of the sphere of beauty in the narrow or more exclusive sense, from that of the sublime, the tragic and the comic. Each of these departments of aesthetic experience has well-marked emotional characteristics; and the definition of these ” modifications of the beautiful ” has in the main been reached through an analysis of the emotional states involved. This chapter in the psychological treatment of aesthetic experi- ence has to consider two points which have occupied a prominent place in aesthetic theory. The first is the nature of ” revived ” or ” ideal ” emotion, such as is illustrated in the feeling excited sympathetically when we witness or hear of another’s sorrow or joy. The second point is the nature of those mixed emotional states which are illustrated in our aesthetic enjoyment of the sublime and the other ” modifications,” in all of which we can recognize a kind of double emotional consciousness in which painful elements accompany and modify pleasurable ones, in such a manner that in the end the latter appear to be rather strengthened than weakened. 2

The psychological treatment of aesthetic data here sketched out cannot stop at an analysis of the aesthetic state or attitude into a number of recognizable elements each of which analysis In contributes its own quantum of pleasurableness. Our aesthetics, enjoyment in contemplating, say, a green alp set above dark crags, is an indivisible whole. And it is a consciousness of this fact which makes men disposed to resent the dissection of their aesthetic enjoyment into a number of constituent pleasures. Nor

is this all. Every aesthetic object

1 See a curious passage in Home's Elements of Criticism, chap, iv., in which the emotions excited by great and elevated objects are said to express themselves externally by a special inflating inspira- tion, and by stretching upward and standing " a-tiptoe " respec- tively; also an article on " Recent Aesthetics "by Vernon Lee in the Quarterly Review, 1904, part i. pp. 420-443.

2 See Hume, Essays, " Essay of Tragedy," and the important discussions on the meaning of Aristotle's doctrine of the emotions of tragedy and of emotional purification or " alleviating discharge" ((cdflapffis) touched on by Bosanquet, op. cit. pp. 64 ff . and 234 5.

is something unique, differing in individual characteristics from all others; and as the object, so the mood of the contem- plator. One may almost say that there are as many modes of musical delight as there are worthy compositions. It would seem either that this feeling of a unique indivisible whole must be dismissed as an illusion, or that we have to admit an unexplained residue in our aesthetic experience, which may some day be explained by help of a larger and more exact conception of aesthetic harmony, of the laws of interaction and of fusion of psychical elements. 3

We may now glance at the ideal purpose of this scientific analysis and interpretation, namely, the construction of norms or regulative principles corresponding to the severally Construe- essential elements of aesthetic value ascertained. ' The tion of later psychological treatment of the subject has led aesthetic up to the formulation of certain ideal . requirements in beautiful objects. The work of Fechner in this direction (Vorschule der Asthetik) was a noteworthy contribution to this kind of construction, at once scientific and directed to the construction of ideal demands, and is still a model for workers in the same field. He has taught us how the attempt to formulate one all-comprehensive principle — e.g. unity in variety, has led to a barren abstractedness, and that we need in its place a number of more concrete principles. In formulating these principles care must be taken to determine their respective scopes and their mutual relations — to decide, for example, whether expression, to which our modern feeling undoubtedly ascribes a high value, is a universal demand in the same sense as unity or harmony of parts is admitted to be. A system of norms must further supply some comprehensive criterion by help of which degrees of

aesthetic value may be determined, as determined by the degrees of completeness of the several pleasurable activities, — sensuous, perceptual and imaginative, — and justify the form of judgment ” this object is more beautiful (or of a higher kind of beauty) than that.” Such regulative principles and standards of comparison will, it is clear, fail us just at the point where analysis stops. Edmund Gurney urges that an aesthetic prin ciple such as unity in variety is complied with equally well by musical compositions which are commonplace and leave us cold and by those which evoke the full thrill of aesthetic delight, and he concludes that the special beauty of form in the latter in- stance is appreciated by a kind of intuition which cannot be analysed (see The Power of Sound, ix.). The argument is hard to combat. It would seem that after all our efforts to define aesthetic qualities and enumerate corresponding ideal require- ments we are left with an unexplained remainder. This can only be tentatively defined as the concrete object itself in its wholeness, which is not only a perfectly harmonized combina- tion of sensuous, formal and expressional values, but impresses us as something which has a fresh individuality and the distinc- tion of aesthetic excellence.

Aesthetics is wont to treat of a certain kind of experience as if it were a closed compartment. Yet there is in reality no such perfect seclusion. Our enjoyment of beauty, though connexion to be distinguished from our intellectual and our between practical interests, touches and interacts with these, aesthetic With regard to intellectual interests it is clear that ”” a ° r i ˆ er much of the mental activity which enters into our eace: („) aesthetic enjoyment is intellectual — e.g. in the per- within- ception of the relations of form, even though it stops * e ˆ ctaal short of the abstract analysis of scientific observation. Again, in appreciating beauty of type which involves according to Taine a recognition of the most important characters of the species, we are, it is evident, close to the scientific point of view. Similarly, when scientific knowledge enables us in the mood of aesthetic contemplation to retrace imaginatively the mode of formation of a cloud or a mountain form, or the mode in which a climbing plant finds its way upwards. It is for aesthetics to recognize the fact, and to discriminate a

3 That beauty implies a peculiar blending of formal and spiritual (geistige) factors is recognized by H. Riegel, Die bildende Kunste, pp. 16 ff.

legitimate aesthetic function of scientific ideas when they en- large the scope of a pleasurable play of the imagination, and are freed from the control of a serious purpose of explaining what is seen.

A similar remark applies to the contacts of our aesthetic with our practical interests. While as dominant factors the latter are excluded from aesthetic activity they may in- practlcal Auence our feeling for beauty in an indirect and sub- interests. ordinate way. This is recognized by those {e.g. Home) who insist on a particular kind of aesthetic value under the name of relative beauty, or the pleasing aspect of fitness for a purpose. If a drinking-vessel please in part because of its perfect adaptation to its purpose, the aesthetic value ascribed to it seems to derive something from a feeling of respect for utility itself. In another way beauty reasserts in modern aesthetics that kinship with utility on which it insisted in the days of Socrates. The idea that typical beauty co- treatment incides with what is vigorous and conducive to the of beauty, conservation of the species is as old as Hobbes. 1 Darwin and his followers have developed the bio- logical conception that sexual selection tends to develop aesthetic preferences along lines which correspond to what subserves the maintenance of the species or tribe. Recent writers have shown how the rude germs of aesthetic activity in primitive types of community would subserve necessary tribal ends — e.g. musical rhythm by exercising members of the tribe in concerted war-like action. 2 Yet these interesting specula- tions have to do rather with the earlier stages of the evolution of the aesthetic faculty than with its functions in the higher stages. An idea of a social utility in aesthetic experience which does demand the attention of the theorist is that the culture of beauty and art has a socializing influence, helping to and ethics. & we to our em < >tional experience new forms of expres- sion whereby our sympathies are deepened and en- larged. 3 The further elucidation of this element of humanizing influence in aesthetic enjoyment may be expected to throw new light on the question, much discussed throughout the history of aesthetics, of the relation of the science to ethics, by showing that they have a common root in our sympathetic nature and interest in humanity.

In order to complete the outline of aesthetic theory we need to glance at the relation of general aesthetics to the special prob-

Aesthetic ‘ ems °ˆ Fine ˆ rt- ˆ ‘ s ey ident that the definition of theory and the aims and methods of art, both as a whole and in problems its several forms, involving as it does special technical of art. knowledge, may with advantage be treated apart from a general theory. (See Fine Arts.) At the same time the study of art raises larger problems which require to be dealt with to some extent by this theory. We may instance the group of problems which have to do with the relation of art to ” beauty ” in its narrower sense, such as the function of the painful and of the ugly in art, the meaning of artistic imitation and truth to nature, of idealization, and the nature of artistic illusion; also the question of the didactic and of the moral function of art. Even more special problems of art, such as the effect of the tragic, the nature of musical expression, can only be adequately treated in the light of a general aesthetic theory.

In conclusion, it may be pointed out that the psychological theorist has of late been busy in an outlying region of art-lore, inquiring into the nature of the artistic impulse and temperament, and into the processes of imaginative creation. These inquiries have been carried out to some extent in connexion with studies of the origin of art, and of the relation of art to the

1 See passage in Human Nature (first part of Tripos), ch. viii. § 5 (Molesworth’s edition of Works, vol. iv. p. 38).

2 See among others, R. Wallascheck, Primitive Music, pp. 270 ff., and Y. Hirn, The Origin of Art, pp. 9 ff. ; cf. W. Jerusalem, Einleitung in die Philosophic, pp. 116, 117.

3 The idea of this social utility in aesthetic enjoyment is touched on by Kant, Critique of Judgment (Bernard’s trans.), p. 174; and is more fully worked out by Guyau, L’Art au point de vue sociologique, ch. ii. and iii. ; cf. Rutgers Marshall, Aesthetic Principles, pp. 81-82.

social environment. Their importance for aesthetics lies in the circumstance that they are fitted to throw light upon the aesthetic consciousness as it is developed in those who are not only in a special sense cultivators of it, but represent in a peculiar manner the ideas and the aims of art. 1

History of Theories

In the following summary of the most important contributions to

aesthetic doctrine, only such writings will be recognized as contribute to a general conception of aesthetic objects or experience. These include the more systematic treatment of the subject in philosophic works as well as the more thoughtful kind of discussion of principles to be met with in writings on art by critics and others.

1. Greek Speculations. — Ancient Greece supplies us with the first important contributions to aesthetic theory, though these are scarcely, in quality or in quantity, what one might have expected from a people which had so high an appreciation of beauty and so strong a bent for philosophic speculation. The first Greek thinker of whose views on the subject we really know something is Socrates. We learn from Xenophon's account of him that he regarded the beautiful as coincident with the good, and both of them are resolvable into the useful. Every beautiful object is so called because it serves some rational end, whether the security or the gratification of man. Socrates appears to have attached little importance to the immediate gratification which a beautiful object affords to perception and contemplation, but to have emphasized rather its power of further- ing the more necessary ends of life. The really valuable point in his doctrine is the relativity of beauty. Unlike Plato, he recognized no self-beauty (airo to Ka\6v) existing absolutely and out of all relation to a percipient mind.

Of the views of Plato on the subject, it is hardly less difficult to gain a clear conception from the Dialogues, than it is in the case of ethical good. In some of these, various definitions of the beautiful are rejected as inadequate by the Platonic Plato.

Socrates. At the same time we may conclude that Plato's mind leaned decidedly to the conception of an absolute beauty, which took its place in his scheme of ideas or self existing forms. This true beauty is nothing discoverable as an attribute in another thing, for these are only beautiful things, not the beautiful itself. Love (Eros) pro duces aspiration towards this pure idea. Elsewhere the soul's in- tuition of the self-beautiful is said to be a reminiscence of its pre- natal existence. As to the precise forms in which the idea of beauty reveals itself, Plato is not very decided. His theory of an absolute beauty does not easily* adjust itself to the notion of its contributing merely a variety of sensuous pleasure, to which he appears to lean in some dialogues. He tends to identify the self -beautiful with the conceptions of the true and the good, and thus there arose the Platonic formula Ka

\oK&.ya8ia. So far as his writings embody the notion of any common element in beautiful objects, it is proportion, harmony or unity among their parts. He emphasizes unity in its simplest aspect as seen in evenness of line and purity of colour. He recognizes in places the beauty of the mind, and seems to think that the highest beauty of proportion is to be found in the union of a beautiful mind with a beautiful body. He had but a poor opinion of art, regarding it as a trick of imitation (m£mw«) which takes us another step farther from the luminous sphere of rational intuition into the shadowy region of the semblances of sense. Accordingly, in his scheme for an ideal republic, he provided for the most inexorable censorship of poets, &c, so as to make art as far as possible an instrument of moral and political training.

Aristotle proceeded to a more serious investigation of the aesthetic phenomena so as to develop by scientific analysis certain principles of beauty and art. In his treatises on poetry and rhetoric Ar i t a he gives us, along with a theory of these arts, certain Arlstot ‘ e – general principles of beauty; and scattered among his other writings we find many valuable suggestions on the same subject. He seeks (in the Metaphysics) to distinguish the good and the beautiful by saying that the former is always in action (iv irpa£«) whereas the latter may exist in motionless things as well (iv aKivtirois). At the same time he had as a Greek to allow that though essentially different things the good might under certain conditions be called beautiful. He further distinguished the beautiful from the fit, and in a passage of the Politics set beauty above the useful and necessary. He helped to determine another characteristic of the beautiful, the absence of all lust or desire in the pleasure it bestows. The universal elements of beauty, again, Aristotle finds (in the Metaphysics) to be

1 On the nature of the primitive art-culture, see Rutgers Marshall, Aesthetic Principles, ch. iii.; M. Baldwin, Social and Ethical Inter- pretations, pp. 151 ff: Y. Hirn, The Origin of Art, ch. ii. On artistic fenius and its creative process, see H. Taine, The Philosophy of Art, ‘art ii. ; P. Souriau, V Imagination -de V artiste; G. Seailks, Essai sur la genie dans I’art; E. Grosse, Kunstwissenschaftliche Studien, iii. ; Arreat, Psychologie du peintre ; L. Dauriac, Essai sur V esprit musical.

order (raˆti), symmetry and definiteness or determinateness (t6 iipiuiikvoy) . In the Poetics he adds another essential, namely, a certain magnitude ; it being desirable for a synoptic view of the whole that the object should not be too large, while clearness of perception requires that it should not be too small. Aristotle's views on art are an immense advance on those of Plato. He distinctly recog- nized (in the Politics and elsewhere) that its aim is immediate pleasure, as distinct from utility, which is the end of the mechanical arts. He took a higher view of artistic imitation than Plato, hold- ing that so far from being an unworthy trick, it implied knowledge and discovery, that its objects not only comprised particular things which happen to most, but contemplated what is probable and what necessarily exists. The celebrated passage in the Poetics, where he declares poetry to be more philosophical and serious a matter (attovBcubTepov) than philosophy, brings out the advance of Aristotle on his predecessor. He gives us no complete classification of the fine arts, and it is doubtful how far his principles, e.g. his celebrated idea of a purification of the passions by tragedy, are to be taken as applicable to other than the poetic art.

Of the later Greek and Roman writers the Neo-Platonist Plotinus deserves to be mentioned. According to him, objective reason (tous) as self-moving, becomes the formative influence Plotinus. w h; c h reduces dead matter to form. Matter when thus formed becomes a notion (\6yos), and its form is beauty. Objects are ugly so far as they are unacted upon by reason, and therefore formless. The creative reason is absolute beauty, and is called the more than beautiful. There are three degrees or stages of manifested beauty: that of human reason, which is the highest; of the human soul, which is less perfect through its connexion with a material body; and of real objects, which is the lowest mani- festation of all. As to the precise forms of beauty, he supposed, in opposition to,. Aristotle, that a single thing not divisible into parts might be beautiful through its unity and simplicity. He gives a high place to the beauty of colours in which material darkness is overpowered by light and warmth. In reference to artistic beauty he said that when the artist has notions as models for his creations, these may become more beautiful than natural objects. This is clearly a step away from Plato's doctrine towards our modern conception of artistic idealization.

2. German Writers. — We may pass by the few thoughts on the

subject to be found among medieval writers and turn to modern German theories, beginning with those of German writers as writers *^ e mos t numerous and most elaborately set forth. The (a) Svs- fi rst °^ t ^ le Germans who attempted to develop an aes- ” thetic theory as a part of a system of philosophy was Baumgarten (A esthetico) . Adopting the Leibnitz- Wolffian theory of knowledge, he sought to complete it by setting over against the clear scientific or ” logical ” knowledge garten. Q £ tne understanding, the confused knowledge of the senses, to which (as we have seen) he gave the name ” aesthetic.” Beauty with him thus corresponds with perfect sense-knowledge. Baumgarten is clearly an intellectualist in aesthetics, reducing taste to an intellectual act and ignoring the element of feeling. The details of his aesthetics are mostly unimportant. Arguing from Leibnitz's theory of the world as the best possible, Baumgarten concluded that nature is the highest embodiment of beauty, and that art must seek its supreme function in the strictest possible imitation of nature.

The next important treatment of aesthetics by a philosopher is that of Kant. He deals with the ” Judgment of Taste ” in the Critique of the Power of Judgment (J. H. Bernard's trans- lation, 1892), which treatise supplements the two better- known critiques (vide Kant), and by investigating the conditions of the validity of feeling mediates between their respective subjects, cognition and desire (volition). He takes an important step in deny- ing objective existence to beauty. Aesthetic value for him is fitness to please as object of pure contemplation. This aesthetic satis- faction is more than mere agreeableness, since it must be disinter- ested and free — that is to say, from all concern about the real exist- ence of the object, and about our dependence on it. He appears to concede a certain formal objectivity to beauty in his doctrine of an appearance of purposiveness (Zweckmdssigkeit) in the beautiful object, this being defined as its harmony with the cognative faculties involved in an aesthetic judgment (imagination and understand- ing) ; a harmony the consciousness of which underlies our aesthetic pleasure. Yet this part of his doctrine is very imperfectly developed. While beauty thus ceases with Kant to have objective validity and remains valid only for the contemplator, he claims for it universal subjective validity, since the object we pronounce to be beautiful is fitted to please all men. We know that this must be so from re- flecting on the disinterestedness of our pleasure, on its entire inde- pendence of personal inclination. Kant insists that the

aesthetic judgment is always, in logical phrase, an " individual," i.e. a singu- lar one, of the form " This object (e.g. rose) is beautiful." He denies that we can reach a valid universal aesthetic judgment of the form " All objects possessing such and such qualities are beautiful." (A judgment of this form would, he considers, be logical, not aesthetic.) In dealing with beauty Kant is thinking of nature, ranking this as a source of aesthetic pleasure high above art, for which he shows something of contempt. He seems to retreat from his doctrine of

tematlc

treatises

Baum-

pure subjectivity when he says that the highest significance oi beauty is to symbolize moral good ; going further than Ruskin when he attaches ideals of modesty, frankness, courage, &c, to the sever! primary colours of Newton's system. He has made a solid contribu- tion to the theory of the sublime, and has put forth a suggestive if a rather inadequate view of the ludicrous. But his main service to aesthetics consists in the preliminary critical determination of its aim and its fundamental problems.

Schelling is the first thinker to attempt a Philosophy of Art. He develops this as the third part of his system of transcendental ideal- ism following theoretic and practical philosophy. (See . Schelling ; also Schilling's Werke, Bd. v., and J. Watson, * c * e ™»ˆ Schelling's Transcendental Idealism, ch. vii., Chicago, 1882.) Ac- cording to Schelling a new philosophical significance is given to art by the doctrine that the identity of subject and object — "'Inch is half disguised in ordinary perception and volition — is only clearly, seen in artistic perception. The perfect perception of its real self by intelligence in the work of art is accompanied by a feeling of infinite satisfaction. Art in thus effecting a revelation of the absolute seems to attain a dignity not merely above that of nature but above that of philosophy itself. Schelling throws but little light on the con- crete forms of beauty. His classification of the arts, based on his anti- thesis of object and subject, is a curiosity in intricate arrangement. He applies his conception in a suggestive way to classical tragedy.

In Hegel's system of philosophy art is viewed as the first stage of the absolute spirit. (See Hegel; also Werke, Bd. x., and Bosan-

quet's Introduction to Hegel's Philosophy of Fine Art.) In hi

this stage the absolute is immediately present to sense- " e S e

perception, an idea which shows the writer's complete rupture with Kant's doctrine of the " subjectivity " of beauty. The beautiful is defined as the ideal showing itself to sense or through a sensuous medium. It is said to have its life in show or semblance (Schein) and so differs from the true, which is not really sensuous, but the universal idea contained in sense for thought. The form of the beautiful is unity of the manifold. The notion (Begriff) gives necessity in mutual dependence of parts (unity) , while the reality demands the semblance (Schein) of liberty in the parts. He discusses very fully the beauty of nature as immediate unity of notion and reality, and lays great emphasis on the beauty of organic life. But it is in art that, like Schelling, Hegel finds the highest revelation of the beautiful. Art makes up for the deficiencies of natural beauty by bringing the idea, into clearer light, by showing the external world in its life and spiritual animation. The several species of art in the ancient and modern worlds depend on the various combinations of matter and form. He classifies the individual arts according to this same principle of the relative supremacy of form and matter, the lowest being architecture, the highest, poetry.

Curious developments of the Hegelian conception are to be found in the dialectical treatment of beauty in its relation to the ugly, the sublime, &c, by Hegel's disciples, e.g. C. H. Weisse and J, K. F. Rosenkranz. The most important product of the Hegelian „.. . School is the elaborate system of aesthetics published by . * c F. T. Vischer (Asthetik, 3 Theile, 1846-1854). It illustrates °* .. the difficulties of the Hegelian thought and terminology; " c 2 e >iaBs. yet in dealing with art it is full of knowledge and highly suggestive.

The aesthetic problem is also treated by. two other philosophers whose thought set out from certain tendencies in Kant's system, viz. Schopenhauer and Herbart. Schopenhauer (see c , Schopenhauer, also The World as Will and Idea, trans- * ca °J> ea – lated by R. B. Haldane, esp. vol. i. pp. 219-346), abandon- , bauen _ ing also Kant's doctrine of the subjectivity of beauty, found in aesthetic contemplation the perfect emancipation of intellect from will. In this contemplation the mind is filled with pure intellectual forms, the " Platonic Ideas " as he calls them, which are objecti- fications of the will at a certain grade of

completeness of representa- tion. He exalts the state of artistic contemplation as the one in which, as pure intellect set free from will, the misery of existence is surmounted and something of blissful ecstasy attained. He holds that all things are in some degree beautiful, ugliness being viewed as merely imperfect manifestation or objectification of will. In this way the beauty of nature, somewhat slighted by Schelling and Hegel, is rehabilitated.

J. F; Herbart (q.v.) struck out another way of escaping from Kant's idea of a purely subjective beauty (Kerbach's edition of Werke, Bd. ii. pp. 339 el seq.; Bd. iv. pp. 105 et seq., M er t, ar t and Bd. ix. pp. 92 et seq.). He did, indeed, adopt Kant's view of the aesthetic judgment as singular (" individual."); though he secures a certain degree of logical universality for it by emphasizing the point that the predicate (beauty) is permanently true of the same aesthetic object. At the same time, by referring the beauty of concrete objects to certain aesthetic relations, he virtually accepted the possibility of universal aesthetic judgments (cf. supra). Since he thus reduces beauty to abstract relations he is known as a for- malist, and the founder of the formalistic school in aesthetics. He sets out with the idea that only relations please— in the Kantian sense of producing pleasure devoid of desire ; and his aim is to determine the " aesthetic elementary relations," or the simplest relations which produce this pleasure. These include those of will, so that, as he admits, ethical judgments are in a manner brought

under an aesthetic form. His typical example of aesthetic relations in objects of sense-perception is that of harmony between tones. The science of thorough-bass has, he thinks, done for music what should be done also for other departments of aesthetic experience. This doctrine of elementary relations is brought into connexion with the author's psychological doctrine of presentations with their tendencies to mutual inhibition and to fusion, and of the varying feeling-tones to which these processes give rise. This mode of treat- ing the problem of beauty and aesthetic perception has been greatly developed and worked up into a complete system of aesthetics by one of Herbart's disciples, Robert Zimmermann {Asthetik, 1858).

Lessing, in his Laocoon and elsewhere, sought to deduce the special function of an art from a consideration of the means at its disposal. Lesslasr ˆ e to °k pains to define the boundaries of poetry and painting, and in so doing he reached general reflexions upon the ends and appliances of art. Among these his distinction between arts which employ the coexistent in space and those which employ the successive (as poetry and music) is of lasting value. In his dramatic criticisms he similarly endeavoured to develop clear general principles on such points as poetic truth, improving upon Aristotle, on whose teaching he mainly relies.

Goethe wrote several tracts on aesthetic topics, as well as many aphorisms. He attempts to mediate between the claims of ideal Goethe beauty, as taught by J. J. Winckelmann, and the aims of Schiller individualization. Schiller (q.v.) discusses, in a number of disconnected essays and letters, some of the main ques- tions in the philosophy of art. He looks at art from the side of culture and the forces of human nature, and finds in an aesthetically cultivated soul the reconciliation of the sensual and rational. His letters on aesthetic education (Uber die asthetische Erziehung des Menschen, trans, by J. Weiss, Boston, 1845) are valuable, bringing out among other.' points the connexion between aesthetic activity and the universal impulse to play (Spieltrieb). Schiller's thoughts on aesthetic subjects are pervaded with the spirit of Kant's philo- sophy. Another example of this kind of reflective discussion of art by literary men is afforded us in the Vorschule der Asthetik of Jean Paul J ean P au ' Richter. This is a rather ambitious discussion of the sublime and ludicrous, which, however, contains much valuable matter on the nature of humour in romantic poetry. Among other writers who reflect more or less philosophically on the problems to which modern poetry gives rise are Wilhelm von Humboldt, the two Schlegels and Gervinus.

A word may be said in conclusion on the attempts of German savants to apply a knowledge of physiological conditions to the Coatribu- investigation of the sensuous elements of aesthetic effect, tioasby as we " as to introduce into the study of the simpler German aesthetic forms the methods of natural science. The classic savants. work of Helmholtz on " Sensations of Tone " is a highly successful attempt to ground the known facts and laws of musical composition on physics and physiology. The endeavour to determine with a like degree of precision the physiological conditions of the pleasurable effects of colours and

their combinations by E. VV. Briicke, Ewald Hering and more recent investigators, has so far failed to realize the desideratum laid down by Herbart, that there should be a theory of colour-relations equal in completeness and exactness to that of tone-relations. The experimental inquiry into simple aesthetically pleasing forms was begun by G. T. Fechner in seeking to test the soundness of Adolf Zeising's hypothesis that the most pleasing proportion in dividing a line, say the vertical part of a cross, is the " golden section," where the smaller division is to the larger as the latter to the sum. He describes in his work on " Experimental Aesthetics " (Zur experimentalen Asthetik) a series of experiments carried out on a large number ,of persons, bearing on this point, the results of which he considers to be infavour of Zeising's hypothesis.

3. French Writers. — In France aesthetic speculation grew out of the discussion by poets and critics on the relation of modern art, and „ _ especially poetry, to ancient. The writings of Malherbe Afxo"/ anc * B°" eau m the 17th century, the development of the * " dispute between the " ancients " and the " moderns " at

concrete tne en ˆ °ˆ tne I ' 7tn centurv by B. le Bouvier de Fontenelle problems. anc ˆ Charles Perrault, and the continuation of the discus- sion as to the aims of poetry and of art generally in the 1 8th century by Voltaire, Bayle, Diderot and others, not only offer to the modern theorists valuable material in the shape of a record by experts of their aesthetic experience, but disclose glimpses of im- portant aesthetic principles. A more systematic examination of the several arts (corresponding to that of Lessing) is to be found in the Cours de belles lettres of Charles Batteux (1765), in which the meaning and value of the imitation of nature by art are further elucidated, and the arts are classified (as by Lessing) according as they employ the forms of space or those of time.

The beginning of a more scientific investigation of beauty in general is connected with the name of Pere Buffier (see First Truths, _. . English translation, 1780). He confines himself to organic o/onrante ˆ orm ' an ˆ illustrates his theory by the human face. A beauty. beautiful face is at once the most common and most rare Buffier. among members of the species. This seems to be a clumsy way of saying that it is a clear expression of the typical form of the species. This idea of typical beauty (which was adopted

French systems aesthetics: The splri uallstes.

developed beau). All

Liv&que.

by Reynolds) has been worked out more recently by H. Taine. In his work, The Ideal in Art (trans, by J. Durand), he proceeds in the manner of a botanist to determine a scale of characters Talne

in the physical and moral man. The degree of the uni- versality or importance of a character, and of its beneficence or adaptation to the ends of life, determine the measure of its aesthetic value, and render the work of art, which seeks to represent it in its purity, an ideal work.

The only elaborated systems of aesthetics in French literature are those constructed by the spiritualistes, the philosophic writers who under the influence of German thinkers effected a reaction against the crude sensationalism of the 18th ‘ .

century. They aim at elucidating the higher and spiritual Jˆ jw/ c °. element in aesthetic impressions, appearing to ignore any ~ Be SD ; r /ˆ.’ capability in the sensuous material of affording a true aesthetic delight. V. Cousin and Jean Charles Levgque are the principal writers of this school. The latte an elaborate system of the subject (La Science du beauty is regarded as spiritual in its nature. The several beautiful characters of an organic body — of which the principal are magnitude, unity and variety of parts, intensity of colour, grace or flexibility, and correspondence to environment — may be brought under the conception of the ideal grandeur and order of the species. These are perceived by reason to be the mani- festations of an invisible vital force. Similarly the beauties of in- organic nature are to be viewed as the grand and orderly displays of an immaterial physical force. Thus all beauty is in its objective essence either spirit or unconscious force acting with fulness and in order.

4. English Writers. — There is nothing answering to the German conception of a system of aesthetics in English literature. The inquiries of English thinkers have been directed for the most part to such modest problems as the psychological process by which we perceive the beautiful — discussions which are apt to be regarded by German historians as devoid of real philosophical value. The writers may be conveniently arranged in two

divisions, answering to the two opposed directions of English thought : (1) the Intuitionalists, those who recognize the existence of an objective beauty which is a simple unanalysable attribute or principle of things; and (2) the Analytical theorists, those who follow the analytical and psychological method, concerning themselves with the sentiment of beauty as a complex growth out of simpler elements.

Shaftesbury is the first of the intuitional writers on beauty. In his Characteristics the beautiful and the good are combined in one ideal conception, much as with Plato. Matter in itself is ugly. The order of the world, wherein all beauty really resides, is a spiritual principle, all motion and life being the product of spirit. The principle of beauty is perceived not with the outer sense, but with an internal or moral sense which apprehends the good as well. This perception yields the only true delight, namely, spiritual enjoyment.

Francis Hutcheson, in his System of Moral Philosophy, though he adopts many of Shaftesbury's ideas, distinctly disclaims any independent self-existing beauty in objects. " All beauty," he Hutche- says, " is relative to the sense of some mind perceiving it." son> The cause of beauty is to be found not in a simple sensa- tion such as colour or tone, but in a certain order among the parts, or " uniformity amidst variety." The faculty by which this principle is discerned is an internal sense which is defined as " a passive power of receiving ideas of beauty from all objects in which there is uniformity in variety." This inner sense resembles the external senses in the immediateness of the pleasure which its activity brings ; and further in the necessity of its impressions: a beautiful thing being always, whether we will or no, beautiful. He distinguishes two kinds of beauty, absolute or original, and relative or compara- tive. The latter is discerned in an object which is regarded as an imitation or semblance of another. He distinctly states that " an exact imitation may still be beautiful though the original were entirely devoid of it." He seeks to prove the universality of this sense of beauty, by showing that all men, in proportion to the enlarge- ment of their intellectual capacity, are more delighted with uni- formity than the opposite.

In his Essays on the Intellectual Powers (viii. " Of Taste ") Thomas Reid applies his principle of common sense to the problem of beauty by saying that objects of beauty agree not only in pro- Reid.

during a certain agreeable emotion, but in the excitation along with this emotion of a belief that they possess some perfection or excellence, that beauty exists in the objects independently of our minds. His theory of beauty is severely spiritual. All beauty resides primarily in the faculties of the mind, intellectual and moral. The beauty which is spread over the face of visible nature is an emanation from this spiritual beauty, and is beauty because it sym- bolizes and expresses the latter. Thus the beauty of a plant resides in its perfect adaptation to its end, a perfection which is an expres- sion of the wisdom of its Creator.

In his Lectures on Metaphysics Sir W. Hamilton gives a short account of the- sentiments of taste, which (with a superficial resem- blance to Kant) he regards as subserving both the sub- n am ;iton. sidiary and the elaborative faculties in cognition, that is, the imagination and the understanding. The activity

The Intui- tionalists. Shaftes- bury.

of the

former corresponds to the element of variety in a beautiful object, that of the latter with its unity. He explicitly excludes all other kinds of pleasure, such as the sensuous, from the proper gratification of beauty. He denies that the attribute of beauty belongs to fitness.

John Ruskin's well-known speculations on the nature of beauty in Modern Painters (" Of ideas of beauty "), though sadly wanting in Ruskln. scientific precision, have a certain value in the history of aesthetics. For him beauty is spiritual and typical of di\ine attributes. Its true nature is appreciated by the theoretic faculty which is concerned in the moral conception and apprecia- tion of ideas of beauty, and must be distinguished from the imagina- tive or artistic faculty, which is employed in regarding in a certain way and combining the ideas received from external nature. He distinguishes between typical and vital beauty. The former is the external quality of bodies which typifies some divine attribute. The latter consists in " the appearance of felicitous fulfilment of function in living things." The forms of typical beauty are: — (i) infinity, the type of the divine incomprehensibility ; (2) unity,

the type of the divine comprehensiveness; (3) repose, the type of the divine per- manence; (4) symmetry, the type of the divine justice; (5) purity, the type of the divine energy; and (6) moderation, the type of government by law. Vital beauty, again, is regarded as relative when the degree of exaltation of the function is estimated, or generic if only the degree of conformity of an individual to the appointed functions of the species is taken into account. Ruskin's writings illustrate the extreme tendency to identify aesthetic with moral perception.

Addison's " Essays on the Imagination," contributed to the Spectator, though they belong to popular literature, contain the germ The °^ sc ' en tific analysis in the statement that the pleasures

analytical °^ imagination (which arise originally from sight) fall into theorists, two'blasses : — (1) primary pleasures, which entirely pro- Addlson. ceed from objects before our eyes; and (2) secondary pleasures, flowing from the ideas of visible objects. The latter are greatly extended by the addition of the proper enjoyment of resemblance, which is at the basis of all mimicry and wit. Addison recognizes, too, to some extent, the influence of association upon our aesthetic preferences.

In the Elements of Criticism of Home (Lord Karnes) another at- tempt is made to resolve the pleasure of beauty into its elements. Home Beauty and ugliness are simply the pleasant and un-

pleasant in the higher senses of sight and hearing. He appears to admit no general characteristic of beautiful objects beyond this power of yielding pleasure. Like Hutcheson, he divides beauty into intrinsic and relative, but understands by the latter the appearance of fitness and utility, which is excluded from the beautiful by Hutcheson.

Passing by the name of Sir Joshua Reynolds, whose theory of beauty closely resembles that of Pere Buffier, we come to the Hovarth speculations of anotherartist and painter, William Hogarth . ' He discusses, in his Analysis of Beauty, all the elements of visual beauty. He finds in this the following elements: — (1) fitness of the parts to some design; (2) variety in as many ways as possible; (3) uniformity, regularity or symmetry, which is only beautiful when it helps to preserve the character of fitness; (4) simplicity or distinctness, which gives pleasure not in itself, but through its enabling the eye to enjoy

variety with ease; (5) intricacy, which provides employment for our active energies, ieading the eye ” a wanton kind of chase “; (6) quantity or magnitude, which draws our attention and produces admiration and awe. The beauty of proportion he resolves into the needs of fitness. Hogarth applies these principles to the determination of the degrees of beauty in lines, figures and groups of forms. Among lines he singles out for special honour the serpentine (formed by drawing a line once round from the base to the apex of a long slender cone).

Burke’s speculations, in his Inquiry into the Origin of our Ideas of the Sublime and Beautiful, illustrate the tendency of English writers „ . to treat the problem as a psychological one and to intro-

ur e ‘ duce physiological considerations. He finds the elements of beauty to be : — (1) smallness; (2) smoothness; (3) gradual variation of direction in gentle curves; (4) delicacy, or the appearance of fragility: (5) brightness, purity and softness of colour. The sublime is rather crudely resolved into astonishment, which he thinks always contains an element of terror. Thus ” infinity has a tendency to fill the mind with a delightful horror.” Burke seeks what he calls ” efficient causes ” for these aesthetic impressions incertain affections of the nerves of sight analogous to those of other senses, namely, the soothing effect of a relaxation of the nerve fibres. The arbitrari- ness and narrowness of this theory cannot well escape the reader’s attention.

Alison, in his well-known Essays on the Nature and Principles of

Taste, proceeds by a method exactly the opposite to that of Hogarth

and Burke. He seeks to analyse the mental process when

son. wg eX p er ; ence t h e emotion of beauty or sublimity. He finds that this consists in a peculiar operation of the imagination, namely, the flow of a train of ideas through the mind, which ideas always correspond to some simple affection or emotion (e.g. cheer- fulness, sadness, awe) awakened by the object. He thus makes association the sole source of aesthetic delight, and denies the exist- ence of a primary source in sensations themselves. He illustrates

the working of the principle of association at great length, and

with much skill ; yet his attempt to make it the unique source of aesthetic pleasure fails completely. Francis Jeffrey's Essays on Beauty (in the Edinburgh Review, and Encyclopaedia Britannica, 8th edition) are little more than a modification of Alison's theory.

D. Stewart's chief contribution to aesthetic discussion in his Philosophical Essays consists in pointing out the unwarranted assumption lurking in the doctrine of a single quality oagald running through all varieties of beautiful object. He seeks Stewart. to show how the successive changes in the meaning of the term " beautiful "have arisen. He suggests that it originally connoted the pleasure of colour. The value of his discussion resides more in the criticism of his predecessors than in the contribution of new ideas. His conception of the sublime, suggested by the etymology of the word, emphasizes the element of height in objects.

Of the association psychologists James Mill did little more towards the analysis of the sentiments of beauty than re-state Alison's doc- trine. Alexander Bain, in his treatise, The Emotions and Bain. the Will (" Aesthetic Emotions ") , carries this examination considerably further. He seeks to differentiate aesthetic from other varieties of pleasurable emotion by three characteristics; — (1) their freedom from life-serving uses, being gratifications sought for their own sakes; (2) their purity from all disagreeable concomitants; (3) their eminently sympathetic or shareable nature. He takes a comprehensive view of the constituents of aesthetic enjoyment, in- cluding the pleasures of sensation and of its revived or its " ideal " form; of revived emotional states; and lastly the satisfaction of those wide-ranging susceptibilities which we call thelove of novelty, of contrast and of harmony. The effect of sublimity is connected with the manifestation of superior power in its highest degrees, which manifestation excites a sympathetic elation in the beholder. The ludicrous, again, is defined by Bain, improving on Aristotle and Hobbes, as the degradation of something possessing dignity in circumstances that excite no other strong emotion.

Herbert Spencer, in his First Principles, Principles of Psychology and Essays, has given an interesting turn to the psychology of aesthetics by the application of his doctrine of evolution. Adopting Schiller's idea of a connexion between aesthetic activity Herbert and play, he seeks to make it the starting-point in tracing Spencer. the evolution of aesthetic activity. Play is defined as the outcome of the superfluous energies of the organism : as the

activity of organs and faculties which, owing to a prolonged period of in- activity, have become specially ready to discharge their function, and as a consequence vent themselves in simulated actions. Aesthetic activities supply a similar mode of self-relieving discharge to the higher organs of perception and emotion; and they further^ agree with play in not directly subserving any processes conducive to life ; in being gratifications sought for their own sake only. Spencer seeks to construct a hierarchy of aesthetic pleasures according to the degree of complexity of the faculty exercised: from those of sensation up to the revived emotional experiences which constitute the aesthetic sentiment proper. Among the more vaguely revived emotions Spencer includes more permanent feelings of the race transmitted by heredity ; as when he refers the deep and indefinable emotion excited by music to associations with vocal tones expressive of feeling built up during the past history of ourspecies. His bio- logical treatment of aesthetic activity has had a wide influence, some (e.g. Grant Allen) being content to develop his evolutional method. Yet, as suggested above, his theory is now recognized as taking us only a little way towards an adequate understanding of our aesthetic experience.

Bibliography. 1 — (a) Works on General Aesthetics.

English and American.— There are no important recent works which deal with the whole subject. The following will be found helpful : Herbert Spencer, Principles of Psychology, pt. viii. c. 9, “Aesthetic Sentiments,” and the papers on “Use and Beauty,” ” Origin and Function of Music ” and others in the Essays; A. Bain, Emotions and Will, “Aesthetic Emotions”; J. Sully, Human Mind, ii. “Aesthetic Sentiment”; Grant Allen, “Physiological Aesthetics” (Meth., PI., Senses, Play); Rutgers Marshall, Pain, Pleasure and Aesthetics, and Aesthetic Principles (Meth., PI., Play).

French and Italian Works. — M. Guyau, Les Problemes de I’ esthetique contemporaine (1884) (PI., Play) ; E. Veron, L ‘Esthetique (1890) (slight PL); L. Bray, Du Beau (1002I. (PI., Play) ; P. Saurian, Li Beaute rationnelle (1904) (Meth., PI., Senses, Einf.) ; M. Pilo, Estetica (PI., Senses); A. Rolla, Storia delle idee esteliche in Italia (1905) (full account of ideas of Dante and other medieval writers, as well as of modern systems).

German Works. — K. Kostlin, Prolegomena zur Asthetik (1889)

1 Only recent works are included. Important points in each are indicated by abbreviations, namely : — Einf., for Einfuhlung (cxpres- PI., for theory of pleasure.

sional element in form). Play, for Play and aesthetic

Evol., for bearings of evolution. enjoyment. 111., for aesthetic illusion. Senses, for aesthetic value of

Judg., for aesthetic judgment. higher senses.

Meth., for method of aesthetics. Val., for aesthetic value. Norm., for normative function of

aesthetics.

(good introduction to subject) ; K. Groos, Der asthetische Genuss (1902) (Meth., Judg., Play, Senses, Einf. and 111.) ; J. Volkelt, System der Asthetik (1905) (very full and clear) (Meth., Norm., Evol., Senses, Einf.); J. Cohn, Allgemeine Asthetik (1901) (Val., Play, Einf.); K. Lange, Das Wesen der Kunst (1901) (Meth., Einf., 111., Play).

(b) Works' on History oj Aesthetics. — H. Lotze, Geschichte der Asthetik in Deutschland; M. Schasler, Kritische Geschichte der Asthetik (full and elaborate, dealing with ancient and modern theories) ; E. von Hartmann, Die deutsche Asthetik seit Kant (Ausgewahlte Werke, iii.) ; K. H. von Stein, Die Entstehung der neueren Asthetik (theories of French critics, &c.) ; F. Brunetiere, V Evolution des genres (History of critical discussions in the 17th and 1 8th centuries); B. Bosanquet, History of Aesthetics (very full, especially on ancient theories and German systems) ; W. Knight, Philosophy of the Beautiful, pt. i. " History " (Univ. Extension Manuals, a popular resume with quotations). (J. S.)

AESTIVATION (from Lat. aestivare, to spend the aestas, or summer; the word is sometimes spelled " estivation"), literally " summer residence," a term used in zoology for the condition of torpor into which certain animals pass during the hottest season in hot and dry countries, contrasted with the similar winter condition known as hibernation (q.v.). In botany the word is used of the praefloration or folded arrangement of the petals in a

flower before expansion in the summer, contrasted with " vernation " of leaves which unfold in the spring.

A3THELBALD, king of Mercia, succeeded Ceoired a.d. 716. According to Felix, Life of St Guthlac, he visited the saint at Crowland, when exiled by Ceoired and pursued by his emissaries before his accessfon, and was cheered by predictions of his future greatness. According to Bede, the whole of Britain as far north as the Humber was included within the sphere of his authority. His energy in preserving his influence is shown by several entries in the Chronicle. He made an expedition against Wessex in 733, in which year he took the royal vill of Somerton. In 740 he took advantage of the absence of Eadberht of Northumbria in a campaign against the Picts to invade his kingdom. In 743 he fought with Cuthred, king of Wessex, against the Welsh, but the alliance did not last long, as in 752 Cuthred took up arms against him. In 757 ˆEthelbald was slain by his guards at Seckington (Warwickshire) and buried at Repton. He seems to have been the most powerful and energetic king of Mercia be- tween Penda and Offa. A letter of St Boniface is preserved, in which he rebukes this king for his immoralities and encroach- ments on church property, while recognizing his merits as a monarch. By a charter of 749 he freed ecclesiastical lands from all obligations except the trinoda necessitas.

See Bede, Hist. Ecc. (ed. Plummer), v. 23 and Continuatio s.a. 740, 750, 757; Saxon Chronicle (Earle and Plummer), s.a. 716, 733, 737, 740, 741, 743, 755; Mabillon, Acta Sanctorum, ii. pp. 264, 275, 276, 2 79i 283-284; P. Jaffe, Monumenta Moguntiaca, iii. pp. 168-177; W. de G. Birch, Cartul. Saxon. 178 (1885-1893). (F. G. M. B.)

JETHELBALD, king of Wessex, was the son of ˆEthelwulf, with whom he led the West Saxons to victory against the Danes at Aclea, 851. According to Asser he rebelled against his father on the latter's return from Rome in 856, and deprived him of Wessex, which he ruled until his death in 860. On his father's death in 858 he married his widow, Judith.

See Asser, Life of Alfred (W. H. Stevenson, 1904), 12; Saxon Chronicle, s.a. 851, 855, 860.

&THELBERHT, king of Kent, son of Eormenric, probably came to the throne in a.d. 560. The first recorded event of his reign was a serious reverse at the hands of Ceawlin of Wessex in the year 568

(Chronicle) at a place called Wibbandune. jEthelberht married Berhta, daughter of Charibert, king of Paris, who brought over Bishop Liudhard as her private confessor. According to Bede, j £thelberht's supremacy in 597 stretched over all the English kingdoms as far as the Humber. The nature of this supremacy has been much disputed, but it was at any rate sufficient to guarantee the safety of Augustine in his con- ference with the British bishops. jEthelberht exercised a stricter sway over Essex, where his nephew Saberht was king. In 597 the mission of Augustine landed in Thanet and was re- ceived at first with some hesitation by the king. He seems to have acted with prudence and moderation during the conversion of his kingdom and did not countenance compulsory proselytism. jEthelberht gave Augustine a dwelling-place in Canterbury, and I. 10

Christ Church was consecrated in 603. He also made grants to found the see of Rochester, of which Justus became first bishop in 604, and his influence established Mellitus at London in the same year. A code of laws issued* by him which is still extant is probably the oldest document in the English language, and contains a list of money fines for various crimes. Towards the close of his reign his pre-eminence as Bretwalda was dis- turbed by the increasing power of Raedwald of East Anglia. He died probably in 616, and was succeeded by his son Eadbald.

See Bede, Hist. Ecc. (Plummer) i. 25, 26, ii. 3, 5; Saxon Chronicle (Earle and Plummer), s.a. 568. (F. G. M. B.)

iETHELBERHT, king of the West Saxons, succeeded to the sub-kingdom of Kent during the lifetime of his father ˆEthelwulf , and retained it until the death of his elder brother ˆEthelbald in 860, when he became sole king of Wessex and Kent, the younger brothers ˆEthelred and Alfred renouncing their claim. He ruled these kingdoms for five years and died in 865. His reign was marked by two serious attacks on the part of the Danes, who destroyed Winchester in 860, in spite of the resistance of the ealdormen Osric and /Ethelwulf with the levies of Hampshire and Berkshire, while in 865 they treacherously ravaged Kent.

See Saxon Chronicle (Earle and Plummer), s.a. 860, 865; King Alfred's Will; W. de G. Birch, Cartul. Saxon. 553.

ATHELFLAED (Ethelfleda), the " Lady of the Mercians," the eldest child of Alfred the Great, was educated with her brother Edward at her father's court. As soon as she was of marriageable age

(probably about a.d. 886), she was married to ˆEthelred, earl of Mercia, to whom Alfred entrusted the control of Mercia. On the accession of her brother Edward, ˆEthelflaed and her husband continued to hold Mercia. In 907 they fortified Chester, and in 909 and 910 either ˆEthelflaed or her husband must have led the Mercian host at the battles of Tettenhall and Wednesfield (or Tettenhall- Wednesfield, if these battles are one and the same). It was probably about this time that yEthelred fell ill, and the Norwegians and Danes from Ireland unsuccessfully besieged Chester, ˆthelflaed won the support of the Danes against the Norwegians, and seems also to have entered into an alliance with the Scots and the Welsh against the pagans. In 911 ˆEthelred died and Edward took over Middlesex and Oxford- shire. Except for this ˆEthelflaed's authority remained un- impaired. In 912 she fortified " Scergeat " and Bridgenorth, Tamworth and Stafford in 913, Eddisbury and Warwick in 914, Cherbury, " Weardbyrig " and Runcorn in 915. In 916 she sent an expedition against the Welsh, which advanced as far as Brecknock. In 917 Derby was captured from the Danes, and in the next year Leicester and York both submitted to her. She died in the same year at Tamworth (June 12), and was buried in St Peter's church at Gloucester. This noble queen, whose career was as distinguished as that of her father and brother, left one daughter, ˆElfwyn. For some eighteen months ˆElfwyn seems to have wielded her mother's authority, and then, just before the Christmas of 919, Edward took Mercia into his own hands, and ;£lfwyn was " led away " into Wessex. ˆEthel- flaed and her husband wielded almost kingly authority, and the royal title is often given them by the chroniclers.

See The Saxon Chronicle, sub ann. (especially the Mercian register in MSS. B, C and D) ; Florence of Worcester; Fragments of Irish Annals (ed. O'Conor), pp. 227-237; D.N.B., s.v. (A. Mw.)

ˆTHELFRITH, king of Northumbria, is said to have come to the throne in a.d. 593, being the son of ˆEthelric (probably reigned 568-572). He married Acha, daughter of Ella GElle), king of Deira, whom he succeeded probably in 605, expelling his son Edwin. In 603 he repelled the attack of Aidan, king of the Dalriad Scots, at Daegsastan, defeating him with great loss. The appearance of Hering, son of Hussa, ˆEthelfrith's prede- cessor, on the side of the invaders seems to indicate family quarrels in the royal house of Bernicia. Later in his reign, probably in 614, he defeated the Welsh in a great battle at Chester and massacred the monks of Bangor who were assembled to aid them by their prayers. This war may have been due partly to ˆEthelfrith's

persecution of Edwin, but it had a stra- tegic importance in the separation of the North Welsh from the Strathclyde Britons. In 617 ˆEthelfrith was defeated and slain

at the river Idle by Rsedwald of East Anglia, whom Edwin had persuaded to take up his cause.

See Bede, Chronica Majora, § 531; Hist. Ecc. (Plummer) i. 34, ii. 2; Saxon Chronicle, s.a. 593, 603, 605, 616; Hist. Brittonum, §§57.63; Annales Cambriae, s.a. 613. (F. G. M. B.)

.ffiTHELING, an Anglo-Saxon word compounded of athele, or ethel, meaning noble, and ing, belonging to, and akin to the modern German words Adel, nobility, and adelig, noble. During the earliest years of the Anglo-Saxon rule in England the word was probably used to denote any person of noble birth. Its use was, however, soon restricted to members of a royal family, and in the Anglo-Saxon Chronicle it is used almost exclusively for members of the royal house of Wessex. It was occasionally used after the Norman Conquest to designate members of the royal family. The earlier part of the word formed part of the name of several Anglo-Saxon kings, e.g. ˆEthelbert, ˆEthelwulf, /Ethelred, and was used obviously to indicate their noble birth. According to a document which probably dates from the 10th century, the wergild of an aetheling was fixed at 15,000 thrymsas, or 1 1,250 shillings. This wergild is equal to that of an archbishop and one-half of that of a king.

JSTHELNOTH (d. 1038), archbishop of Canterbury, known also as Egelnodus or Ednodus, was a son of the ealdorman ˆEthelmaer, and a member of the royal family of Wessex. He became a monk at Glastonbury, then dean of the monastery of Christ Church,— Canterbury, and chaplain to King Canute, and on the 13th of November 1020 was consecrated archbishop of Canterbury. In 1022 he went to Rome to obtain the pallium, and was received with great respect by Pope Benedict VIII. Returning from Rome he purchased at Pavia a relic said to be an arm of St Augustine of Hippo, for a hundred talents of silver and one of gold, and presented it to the abbey of Coventry. He appears to have

exercised considerable influence over Canute, largely by whose aid he restored his cathedral at Canterbury. A story of doubtful authenticity tells how he refused to crown King Harold I., as he had promised Canute to crown none but a son of the king by his wife, Emma. ˆEthelnoth, who was called the " Good," died on the 29th of October 1038, and his name appears in the lists of saints.

JETHELRED, king of Mercia, succeeded his brother Wulfhere in a.d. 675. In 676 he ravaged Kent with fire and sword, destroying the monasteries and churches and taking Rochester. iEthelred married Osthryth, the sister of Ecgfrith, king of Northumbria, but in spite of this connexion a quarrel arose between the two kings, presumably over the possession of the province of Lindsey, which Ecgfrith had won back at the close of the reign of Wulfhere. In a battle on the banks of the Trent in 679, the king of Mercia was victorious and regained the province. ˆElfwine, the brother of Ecgfrith, was slain on this occasion, but at the intervention of Theodore, archbishop of Canterbury, /Ethelred agreed to pay a wergild for the North- umbrian prince and so prevented further hostilities. Osthryth was murdered in 697 and ˆEthelred abdicated in 704, choosing Ccenred as his successor. He then became abbot of Bardney, and, according to Eddius, recommended Wilfrid to Ccenred on his return from Rome. ˆEthelred died at Bardney in 716. (See Wilfrid.)

Sources. — Eddius, Vita Wilfridi (Raine), 23. 40, 43, 45-48, 57; Bede, Hist. Ecc. (ed. Plummer), iii. 11, iv. 12,21; Saxon Chronicle, s.a. 676, 679, 704, 716. (F. G. M. B.)

.ffiTHELRED I., king of Wessex and Kent (866-871), was the fourth son of ˆEthelwulf of Wessex, and should, by his father's will, have succeeded to Wessex on the death of his eldest brother ˆEthelbald. He seems, however, to have stood aside in favour of his brother ˆEthelberht, king of Kent, to whose joint kingdoms he succeeded in 866. ˆEthelred's reign was one long struggle against the Danes. In the year of his succession a large Danish force landed in East Anglia, and in the year 868 iEthelred and his brother Alfred went to help Burgred, or Burhred, of Mercia, against this host, but the Mercians soon made peace with their foes. In 871 the Danes encamped at Reading, where they defeated ˆEthelred and his brother, but later in the year the English won a great victory at " ˆEscesdun."

A fortnight later they were defeated at Basing, but partially retrieved their fortune by a victory at " Maeretun " (perhaps

Marden in Wiltshire), though the Danes held the field. In the Easter of this year JEihehed died, perhaps of wounds received in the wars against the Danes, and was buried at Wimborne. He left a son, .Ethelwold, who gave some trouble to his cousin Edward the Elder, when the latter succeeded to the kingdom. ˆEthelweard the historian was also a descendant of this king. Authorities. — The Saxon Chronicle, sub ann. ; Birch, Cartul. Saxon, vol. ii. Nos. 516-526; D.N.B., s.v.; Eng. Hist. Review, i. 218-234. (A- Mw.)

iETHELRED II. (or Ethelred) (c. 968-1016), king of the English (surnamed The Unready, i.e. without rede or counsel), son of King Edgar by his second wife ˆElfthryth, was born in 968 or 969 and succeeded to the throne on the murder of his step-brother Edward (the Martyr) in 979. His reign was dis- astrous from the beginning. The year after his accession the Danish invasions, long unintermitted under Edgar the Peaceful, recommenced; though as yet their object was plunder only, not conquest, and the attacks were repeated in 981, 982 and 988. In 991 the Danes burned Ipswich, and defeated and slew the East Saxon ealdorman Brihtnoth at Maldon. After this, peace was purchased by a payment of £10,000 — a disastrous expedient. The Danes were .to desist from their ravages, but were allowed to stay in England. Next year /Ethelred himself broke the peace by an attack on the Danish ships. Despite the treachery of ˆElfric, the English were victorious; and the Danes sailed off to ravage Lindsey and Northumbria. In 994 Olaf Tryggvason, king of Norway, and Sweyn, king of Denmark, united in a great invasion and attacked London. Foiled by the valour of the citizens, they sailed away and harried the coast from Essex to Hampshire. ˆEthelred now resorted to the old experiment and bought them off for £16,000 and a promise of supplies. Olaf also visited ˆEthelred at the latter's request and, receiving a most honourable welcome, was induced to promise that he would never again come to England with hostile intent, an en- gagement which he faithfully kept. The Danish attacks were repeated in 997, 998, 999, and in ioooyEthelred availed himself of the temporary absence of the Danes in Normandy to invade Cumberland, at that time a Viking stronghold. Next year, however, the Northmen returned and inflicted worse evil than ever. The national defence seemed to have broken down alto- gether. In despair ˆEthelred again offered them money, which they again accepted, the sum paid on this occasion being £24,000. But soon afterwards the king, suspecting treachery, resolved to get rid of his enemies once and for all. Orders were issued commanding the slaughter

on St Brice's day (December 2) of " all the Danish men who were in England." Such a decree could obviously not be carried out literally; but we cannot doubt that the slaughter was great. This violence, however, only made matters worse. Next year Sweyn returned, his hostility fanned by the desire for revenge. For two years he ravaged and slew; in 1003 Exeter was destroyed; Norwich and Thetford in 1004. No effectual resistance was offered, despite a gallant effort here and there; the disorganization of the country was complete. In 1005 the Danes were absent in Denmark, but came back next year, and emboldened by the utter lack of resistance, they ranged far inland. In 1007 ˆEthelred bought them off for a larger sum than ever (£36,000), and for two years the land enjoyed peace. In 1009, however, in accord- ance with a resolution made by the witan in the preceding year, ˆEthelred collected such a fleet " as never before had been in England in any king's day"; but owing to a miserable court quarrel the effort came to nothing. The king then summoned a general levy of the nation, with no better result, just as he was about to attack, the traitor Edric prevented him from doing so, and the opportunity was lost. In 1010 the Danes returned, to find the kingdom more utterly disorganized than ever. " There was not a chief man in the kingdom who could gather a force, but each fled as he best might; nor even at last would any there resist another." Incapable of offering resistance, the king again offered money, this time no less than £48,000. While it was being

collected, the Danes sacked Canterbury and barbarously slew the archbishop Alphege. The tribute was paid soon afterwards; and about the same time the Danish leader Thurkill entered the English service. From 1013 an important change is discernible in the character of the Danish attacks, which now became definitely political in their aim. In this year Sweyn sailed up the Trent and received the submission of northern England, and then marching south, he attacked London. Failing to take it, he hastened west and at Bath received the submission of Wessex. Then he returned northwards, and after that " all the nation considered him as full king." London soon acknowledged him, and ˆEthelred, after taking refuge for a while with Thurkill's fleet, escaped to Normandy. Sweyn died in February 1014, and ˆthelred was recalled by the witan, on giving a promise to reign better in

future. At once he hastened north against Canute, Sweyn's son, who claimed to succeed his father, but Canute sailed away, only to return next year, when the traitor Edric joined him and Wessex submitted. Together Canute and Edric harried Mercia, and were preparing to reduce London, when ˆEthclred died there on the 23rd of April 1016. Weak, self-indulgent, improvident, he had pursued a policy of oppor- tunism to a fatal conclusion.

jEthelred's wife was Emma, or /Elfgifu, daughter of Richard I. the Fearless, duke of the Normans, whom he married in 1002. After the king's death Emma became the wife of Canute the Great, and after his death in 1035 she struggled hard to secure England for her son, Hardicanute. In 1037, however, when Harold Harefoot became sole king, she was banished; she went to Flanders, returning to England with Hardicanute in 1040. In 1043, after Edward the Confessor had become king he seized the greater part of Emma's great wealth, and the queen lived in retirement at Winchester until her death on the 6th of March 1052. By ./ Ethelred Emma had two sons, Edward the Confessor and the setheling ˆElfred (d. 1036), and by Canute she was the mother of Hardicanute. Emma's marriage with ˆEthelred was an important step in the history of the relations between England and Normandy, and J. R. Green says " it suddenly opened for its rulers a distinct policy, a distinct course of action, which led to the Norman conquest of England. From the moment of Emma's marriage Normandy became a chief factor in English politics."

Authorities. — The Anglo-Saxon Chronicle (edition by C. Plummer, 2 vols. Oxford, 1892-1899); Florence of Worcester (ed. B. Thorpe, London, 1 848-1 849) ; Encomium Emmae (ed. by G. H. Pertz in the Scriptores Rerum Germanicarum, Band xix., Hanover, 1866) for the latter part of the reign. See also J. M. Kemble, Codex Diplo- maticus acvi Saxonici (London, 1839-1848); and B. Thorpe, Ancient Laws (London, 1840). (C. S. P.*)

ˆTHELSTAN (c. 804-940), Saxon king, was the son (probably illegitimate) of Edward the elder. He had been the favourite of his grandfather Alfred, and was brought up in the household of his aunt ˆthelflaed, the " Lady of the Mercians." On the death of his father in 924, at some date after the 12th of November, ˆEthelstan succeeded him and was crowned at Kingston shortly after. The succession did not, however, take place without opposition. One Alfred, probably a descendant of jEthelred I., formed a plot to seize the king at Winchester; the plot was

discovered and Alfred was sent to Rome to defend himself, but died shortly after. The king's own legitimate brother Edwin made no attempt on the throne, but in 933 he was drowned at sea under somewhat mysterious circumstances; the later chroniclers ascribe his death to foul play on the part of the king, but this seems more than doubtful.

One of jEthelstan's first public acts was to hold a conference at Tamworth with Sihtric, the Scandinavian king of Northumbria, and as a result Sihtric received /Ethelstan's sister in marriage. In the next year Sihtric died and ˆEthelstan took over the Northumbrian kingdom. He now received, at Dacre in Cumberland, the submission of all the kings of the island, viz. Howel Dda, king of West Wales, Owen, king of Cumbria, Constantine, king of the Scots, and Ealdred of Bamburgh, and henceforth he calls himself "rex totius Britanniae." About this time (the exact chronology is uncertain) ˆEthelstan expelled Sihtric's brother

Guthfrith, destroyed the Danish fortress at York, received the submission of the Welsh at Hereford, fixing their boundary along the line of the Wye, and drove the Cornishmen west of the Tamar, fortifying Exeter as an English city.

In 934 he invaded Scotland by land and sea, perhaps owing to an alliance between Constantine and Anlaf Sihtricsson. ' The army advanced as far north as Dunottar, in Kincardineshire, while the navy sailed to Caithness. Simeon of Durham speaks of a submission of Scotland as a result; if it ever took place it was a mere form, for three years later we find a great confederacy formed in Scotland against /Ethelstan. This confederacy of 937 was joined by Constantine, king of Scotland, the Welsh of Strathclyde, and the Norwegian chieftains Anlaf Sihtricsson and Anlaf Godfredsson, who, though they came from Ireland, had powerful English connexions. A great battle was fought at Brunanburh (perhaps Brunswark or Birrenswark hill in S.E. Dumfriesshire) , in which ˆEthelstan and his brother Edmund were completely victorious. England had been freed from its greatest danger since the days of the struggle of Alfred against Guthrum.

ˆEthelstan was the first Saxon king who could claim in any real sense to be lord paramount of Britain. In his charters he is continually called " rex totius Britanniae," and he adopts for the first time the Greek title basileus. This was not merely an idle flourish, for some of his charters are signed by Welsh and

Scottish kings as subreguli. Further, ˆEthelstan was the first king to bring England into close touch with continental Europe. By the marriage of his half-sisters he was brought into connexion with the chief royal and princely houses of France and_ Germany. His sister Eadgifu married Charles the Simple, Eadhild became the wife of Hugh the Great, duke of France, Eadgyth was married to the emperor Otto the Great, and her sister ˆElfgifu to a petty German prince. Embassies passed between ˆEthelstan and Harold Fairhair, first king of Norway, with the result that Harold's son Haakon was brought up in England and is known in Scandinavian history as Haakon Adalsteinsf6stri.

yEthelstan died at Gloucester in 940, and was buried at Malmesbury, an abbey which he had munificently endowed during his lifetime. Apparently he was never married, and he certainly had no issue.

A considerable body of law has come down to us in ˆEthel- stan's name. The chief collections are those issued at Grately in Hampshire, at Exeter, at Thunresfeld, and the Judicia civitatis Lundonie. In the last-named one personal touch is found when the king tells the archbishop how grievous it is to put to death persons of twelve winters for stealing. The king secured the raising of the age limit to fifteen.

Authorities. — Primary : The Saxon Chronicle, sub ann. ; William of Malmesbury, Gesta Regum, i. 141-157, Rolls Series, containing valuable original information (v. Stubbs' Introduction, II. lx.-lxvii.) ; Birch, Cartul. Saxon, vol. ii. Nos. 641-747; A.S. Laws, (ed. Liebermann), i. 146-183; iFthelweard, Florence of Worcester. Secondary: Saxon Chronicle (ed. Plummer), vol. ii. pp. 132-142; D.N.B., s.v. (A. Mw.)

&THELWEARD (Ethelward), Anglo-Saxon historian, was the great-grandson of yEthelred, the brother of Alfred, and ealdorman or earl of the western provinces (i.e. probably of the whole of Wessex). He first signs as dux or ealdorman in 973, and continues to sign until 998, about which time his death must have taken place. In the year 991 he was associated with archbishop Sigeric in the conclusion of a peace with the victorious Danes from Maldon, and in 994 he was sent with Bishop ˆlfheah (Alphege) of Winchester to make peace with Olaf at Andover. iEthelweard was the author of a Latin Chronicle extending to the year 975. Up to the year 892 he is largely dependent on the Saxon Chronicle, with a few details of his own; later he is largely independent of

it. jEthelweard gave himself the bom- bastic title " Patricius Consul Quaestor Ethelwerdus," and un- fortunately this title is only too characteristic of the man. His narrative is highly rhetorical, and as he at the same time attempts more than Tacitean brevity his narrative is often very obscure. .ˆthelweard was the friend and patron of iElfric the grammarian.

Authorities. — Primary: The Saxon Chronicle, 994 E; Birch,

Cartularium Saxonicum; A.S. Laws (ed. Liebermann), pp. 220-224; Fabii Ethelwerdi Ckron., Mon. Hist. Brit. 449-454. Secondary: Plummer, Saxon Chronicle, vol. ii. p. ci. ; Napier and Stevenson, Crawford Charters, pp. 118-120; D.N.B., s.v. (A. Mw.)

ˆTHELWULF, king of the West Saxons, succeeded his father Ecgberht in a.d. 839. It is recorded in the Saxon Chronicle for S23 that he was sent with Eahlstan, bishop of Sherborne, and the ealdorman Wulfheard to drive out Baldred, king of Kent, which was successfully accomplished. On the accession of .Ethelwulf, iEthelstan, his son or brother, was made sub-king of Kent, Surrey, Sussex and Essex. ˆEthelwulf's reign was chiefly occupied with struggles against the Danes. After the king's defeat 843-844, the Somerset and Dorset levies won a victory at the mouth of the Parret, c. 850. In 851 Ceorl, with the men of Devon, defeated the Danes at Wigganburg, and JSthelstan of Kent was victorious at Sandwich, in spite of which they wintered in England that year for the first time. In 851 also ˆEthelwulf and ˆEthelbald won their great victory at Aclea, probably the modern Ockley. In 853 ˆEthelwulf subdued the North Welsh, in answer to the appeal of Burgred of Mercia, and gave him his daughter ˆEthelswith in marriage. 855 is the year of the Dona- tion of ˆEthelwulf and of his journey to Rome with Alfred. On his way home he married Judith, daughter of Charles the Bald. According to Asser he was compelled to give up Wessex to his son jEthelbald on his return, and content himself with the eastern sub-kingdom. He died in 858.

See Asser, Life of Alfred (W. H. Stevenson, 1904), 1-16; Saxon Chronicle, s.a. 823, 836, 840, 851, 853, 855. (F. G. M. B.)

AETHER, or Ether (Gr. cddvp, probably from

” The hypothesis of an aether has been maintained by different speculators for very different reasons. To those who maintained the existence of a plenum as a philosophical principle, nature’s abhorrence of a vacuum was a sufficient reason for imagining an all-surrounding aether, even though every other argument should be against it. To Descartes, who made extension the sole essential property of matter, and matter a necessary condi- tion of extension, the bare existence of bodies apparently at a distance was a proof of the existence of a continuous medium between them. But besides these high metaphysical necessities for a medium, there were more mundane uses to be fulfilled by aethers. Aethers were invented for the planets to swim in, to constitute electric atmospheres and magnetic effluvia, to convey sensations from one part of our bodies to another, and so on, till all space had been filled three or four times over with aethers. It is only when we remember the extensive and mischievous influence on science which hypotheses about aethers used formerly to exercise, that we can appreciate the horror of aethers which sober-minded men had during the 18th century, and which, probably as a sort of hereditary prejudice, descended even to John Stuart Mill. The disciples of Newton maintained that in the fact of the mutual gravitation of the heavenly bodies, according to Newton’s law, they had a complete quantitative account of their motions; and they endeavoured to follow out the path which Newton had opened up by investigating and measuring the attractions and repulsions of electrified and magnetic bodies, and the cohesive forces in the interior of bodies, without attempting to account for these forces. Newton himself, however, endeavoured to account for gravitation by differences of pressure in an aether; but he did not publish his theory, ‘ because he was not able from experiment and observation to give a satisfactory account of this medium, and the manner of its operation in producing the chief phenomena of nature.’ On the other hand, those who imagined aethers in order to explain phenomena could not specify the nature of the motion of these media, and could not prove that the media, as imagined by them, would produce the effects they were meant to explain. The only aether which has survived is that which was invented by Huygens to explain the propagation of fight. The

evidence for the existence of the luminiferous aether has accumulated as additional phenomena of light and other radiations have been discovered; and the properties of this medium, as deduced from the phenomena of light, have been found to be precisely

those required to explain electromagnetic phenomena."

This description, quoted from James Clerk Maxwell's article in the 9th edition of the Encyclopaedia Britannica, represents the historical position of the subject up till about i860, when Maxwell began those constructive speculations in electrical theory, based on the influence of the physical views of Faraday and Lord Kelvin, which have in their subsequent development largely transformed theoretical physics into the science of the aether.

In the remainder of the article referred to, Maxwell reviews the evidence for the necessity of an aether, from the fact that light takes time to travel, while it cannot travel as a substance, for if so two interfering lights could not mask each other in the dark fringes (see Interference of Light). Light is therefore an influence propagated as wave-motion, and moreover by trans- verse undulations, for the reasons brought out by Thomas Young and Augustin Fresnel; so that the aether is a medium which possesses elasticity of a type analogous to rigidity. It must be very different from ordinary matter as we know it, for waves travelling in matter constitute sound, which is propagated hundreds of thousands of times slower than light.

If we suppose that the aether differs from ordinary matter in degree but not in kind, we can obtain some idea of its quality from a knowledge of the velocity of radiation and of its possible intensity near the sun, in a manner applied long ago by Lord Kelvin (Trans. R. S. Edin. xxi. 1854). According to modern measurements the solar radiation imparts almost 3 gramme-calories of energy per minute per square centimetre at the distance of the earth, which is about 1-3 Xio 6 ergs per sec. per cm. 2 The energy in sunlight per cubic cm. just outside the earth's atmosphere is therefore about 4Xio~ 5 ergs; applying the law of inverse squares the value near the sun's surface would be i-8 ergs. Let E be the effective elasticity of the aether; then E = pc 2 , where p is its density, and c the velocity of light which is 3X10 l0 cm./sec. If £=a cos 11 (fi-xjc) is the linear vibration, the stress is E d£/dx; and the total energy, which is twice the kinetic energy Jp(d£/dt) 2 dx, is §p« 2 A 2 per cm., which is thus equal to i-8 ergs as above. Now \=2%cjn, so that if A/\=k, we have 3p(2xc&) 2 = i-8, giving p=io-**lr Jl and E = io 1 &^. Lord Kelvin assumed as a superior limit of k, the ratio of amplitude to wave-length, the value io -2 , which is a very safe limit. It follows that the density of the aether must exceed io~ 18 , and its elastic

modulus must exceed io 3 , which is only about io~ 8 of the modulus of rigidity of glass. It thus appears that if the amplitude of vibration could be as much as io -2 of the wave-length, the aether would be an excessively rare medium with very slight elasticity; and yet it would be capable of transmitting the supply of solar energy on which all terrestrial activity depends. But on the modern theory, which includes the play of electrical phenomena as a function of the aether, there are other considerations which show that this number io -2 is really an enormous overestimate; and it is not impossible that the co-efficient of ultimate inertia of the aether is greater than the co-efficient of inertia (of different kind) of any existing material substance.

The question of whether the aether is carried along by the earth's motion has been considered from the early days of the undulatory theory of light. In reviving that theory at the be-ginning of the 19th century, Thomas Young stated his conviction that material media offered an open structure to the substance called aether, which passed through them without hindrance " like the wind through a grove of trees." Any convection of that medium could be tested by the change of effective velocity of light, which would be revealed by a prism as was suggested by F. J. D. Arago. Before 1868 Maxwell conducted the experi- ment by sending light from the illuminated cross-wires of an observing telescope forward through the object-glass, and through a train of prisms, and then reflecting it back along the same path; any influence of convection would conspire in

altering both refractions, but yet no displacement of the image depending on the earth's motion was detected. As will be seen later, modern experiments have confirmed the entire absence of any effect, such as convection would produce, to very high precision. It has further been verified by Sir Oliver Lodge that even in very narrow spaces the aether is not entrained by its surroundings when they are put into rapid motion.

A train of ideas which strongly impressed itself on Clerk Maxwell's mind, in the early stages of his theoretical views, was put forward by Lord Kelvin in 1858; he showed that the special characteristics of the rotation of the plane of polarization,

discovered by Faraday in light propagated along a magnetic field, viz. that it is doubled instead of being undone when the light retraces its path, requires the operation of some directed agency of a rotational kind, which must be related to the magnetic field. Lord Kelvin was thereby induced to identify magnetic force with rotation, involving, therefore, angular momentum in the aether. Modern theory accepts the deduction, but ascribes the momentum to the revolving ions in the molecules of matter traversed by the light; for the magneto-optic effect is present only in material media. Long previously Lord Kelvin himself came nearer this view, in offering the opinion that magnetism consisted, in some way, in the angular momentum of the material molecules, of which the energy of irregular translations constitutes heat; but the essential idea of moving electric ions of both kinds, positive and negative, in the molecules had still to be introduced.

The question of the transparency of the celestial spaces presents itself in the present connexion. Light from stars at unfathomable distances reaches us in such quantity as to suggest that space itself is absolutely transparent, leaving open the question as to whether there is enough matter scattered through it to absorb a sensible part of the light in its journey of years from the luminous body. If the aether were itself constituted of discrete molecules, on the model of material bodies, such transparency would not he conceivable. We must be content to treat the aether as a plenum, which places it in a class by itself; and we can thus recognize that it may behave very differently from matter, though in some manner consistent with itself — a remark which is fundamental in the modern theory.

Action across a Distance contrasted with Transmitted Action. — In the mechanical processes which we can experimentally modify at will, and which therefore we learn to apprehend with greatest fulness, whenever an effect on a body, B, is in causal connexion with a process instituted in another body, A, it is usually possible to discover a mechanical connexion between the two bodies which allows the influence of A to be traced all the way across the intervening region. The question thus arises whether, in electric attractions across apparently empty space and in gravitational attraction across the celestial regions, we are invited or required to make search for some similar method of continuous transmission of the physical effect, or whether we should rest content with an exact knowledge of the laws according to which one body affects mechanically another body at a distance. The

view that our knowledge in such cases may be completely represented by means of laws of action at a distance, expressible in terms of the positions (and possibly motions) of the interacting bodies without taking any heed of the intervening space, belongs to modern times. It could hardly have been thought of before Sir Isaac Newton's discovery of the actual facts regarding uni- versal gravitation. Although, however, gravitation has formed the most perfect instance of an influence completely expressible, up to the most extreme refinement of accuracy, in terms of laws of direct action across space, yet, as is well known, the author of this ideally simple and perfect theory held the view that it is not possible to conceive of direct mechanical action independent of means of transmission. In this belief he differed from his pupil, Roger Cotes, and from most of the great mathematical astronomers of the 18th century, who worked out in detail the task sketched by the genius of Newton. They were content with a knowledge of the truth of the principle of gravitation; instead of essaying to explain it further by the properties of a

transmitting medium, they in fact modelled the whole of their natural philosophy on that principle, and tried to express all kinds of material interaction in terms of laws of direct mechanical attraction across space. If material systems are constituted of discrete atoms, separated from each other by many times the diameter of any of them, this simple plan of exhibiting their interactions in terms of direct forces between them would indeed be exact enough to apply to a wide range of questions, provided we could be certain that the laws of the forces depended only on the positions and not also on the motions of the atoms. The most important example of its successful application has been the theory of capillary action elaborated by P. S. Laplace; though even here it appeared, in the hands of Young, and in complete fulness afterwards in those of C. F. Gauss, that the definite results attainable by the hypothesis of mutual atomic attractions really reposed on much wider and less special prin- ciples — those, namely, connected with the modern doctrine of energy.

Idea of an Aether. — The wider view, according to which the hypothesis of direct transmission of physical influences expresses only part of the facts, is that all space is filled with physical activity, and that while an influence is passing across from a body, A, to another body, B, there is some dynamical process in action in the intervening region, though it appears to the senses to be mere empty space. The problem is whether we can repre-

sent the facts more simply by supposing the intervening space to be occupied by a medium which transmits physical actions, after the manner that a continuous material medium, solid or liquid, transmits mechanical disturbance. Various analogies of this sort are open to us to follow up: for example, the way in which a fluid medium transmits pressure from one immersed solid to another — or from one vortex ring belonging to the fluid to another, which is a much wider and more suggestive case; or the way in which an elastic fluid like the atmosphere transmits sound; or the way in which an elastic solid transmits waves of transverse as well as longitudinal displacement. It is on our familiarity with modes of transmission such as these, and with the exact analyses of them which the science of mathematical physics has been able to make, that our predilection for filling space with an aethereal transmitting medium, constituting a universal connexion between material bodies, largely depends perhaps ultimately it depends most of all, like all our physica conceptions, on the intimate knowledge that we can ourselves exert mechanical effect on outside bodies only through tin agencies of our limbs and sinews. The problem thus arises Can we form a consistent notion of such a connecting medium? It must be a medium which can be effective for transmitting ali the types of physical action known to us; it would be worse than no solution to have one medium to transmit gravitation, another to transmit electric effects, another to transmit light, and so on. Thus the attempt to find out a constitution for the aether will involve a synthesis of intimate correlation of the various types of physical agencies, which appear so different tt us mainly because we perceive them through different senses. The evidence for this view, that all these agencies are at bottom connected together and parts of the same scheme, was enormously strengthened during the latter half of the 19th century by the development of a relation of simple quantitative equivalence between them; it has been found that we can define quantities relating to them, under the names of mechanical energy, electric energy, thermal energy, and so on, so that when one of them disappears, it is replaced by the others to exactly equal amount. This single principle of energy has transformed physical science by making possible the construction of a network of ramifying connexions between its various departments; it thus stimulates the belief that these constitute a single whole, and encourages the search for the complete scheme of interconnexion of which the principle of energy and the links which it suggests form only a single feature.

In carrying out this scientific procedure false steps will from time to time be made, which will have to be retraced, or rather amended; but the combination of experimental science with

theory has elevated our presumption of the rationality of all natural processes, so far as we can apprehend them at all, into practical certainty; so that, though the mode of presentation of the results may vary from age to age, it is hardly conceivable that the essentials of the method are not of permanent validity.

Atomic Structure of Matter. — The greatest obstacle to such a search for the fundamental medium is the illimitable complexity of matter, as contrasted with the theoretical simplicity and uniformity of the physical agencies which connect together its different parts. It has been maintained since the times of the early Greek philosophers, and possibly even more remote ages, that matter is constituted of independent indestructible units, which cannot ever become divided by means of any mutual actions they can exert. Since the period, a century ago, when Dalton and his contemporaries constructed from this idea a scientific basis for chemistry, the progress of that subject has been wonderful beyond any conception that could previously have been entertained; and the atomic theory in some form appears to be an indispensable part of the framework of physical science. Now this doctrine of material atoms is an almost necessary corollary to the doctrine of a universal aether. For if we held that matter is continuous, one of two alternatives would be open. We might consider that matter and aether can co- exist in the same space; this would involve the co-existence and interaction pi a double set of properties, introducing great complication, which would place any coherent scheme of physical action probably beyond the powers of human analysis. Or we might consider that aether exists only where matter is not, thus making it a very rare and subtle and elastic kind of matter; then we should have to assign these very properties to the matter itself where it replaces aether, in addition to its more familiar properties, and the complication would remain. The other course is to consider matter as formed of ultimate atoms, each the nucleus or core of an intrinsic modification impressed on the surrounding region of the aether; this might conceivably be of the nature of vortical motion of a liquid round a ring-core, thus

giving a vortex atom, or of an intrinsic strain of some sort radiating from a core, which would give an electric atom. We recognize an atom only through its physical activities, as manifested in its interactions with other atoms at a distance from it; this field of physical activity would be identical with the surrounding field of aethereal motion or strain that is inseparably associated with the nucleus, and is carried on along with it as it moves. Here then we have the basis of a view in which there are not two media to be considered, but one medium, homogeneous in essence and differentiated as regards its parts only by the presence of nuclei of intrinsic strain or motion — in which the physical activities of matter are identified with those arising from the atmospheres of modified aether which thus belong to its atoms. As regards laws of general physical interactions, the atom is fully represented by the constitution of this atmosphere, and its nucleus may be left out of our discussions; but in the problems of biology great tracts of invariable correlations have to be dealt with, which seem hopelessly more complex than any known or humanly possible physical scheme. To make room for these we have to remember that the atomic nucleus has remained entirely undefined and beyond our problem; so that what may occur, say when two molecules come into close relations, is outside physical science — not, however, altogether outside, for we know that when the vital nexus in any portion of matter is dissolved, the atoms will remain, in their number, and their atmospheres, and all inorganic relations, as they were before vitality supervened.

Nature of Properties of Material Bodies. — It thus appears that the doctrine of atomic material constitution and the doctrine of a universal aether stand to each other in a relation of mutual support; if the scheme of physical laws is to be as precise as observation and measurement appear to make it, both doctrines are required in our efforts towards synthesis. Our direct knowledge of matter can, however, never be more than a rough knowledge of the general average behaviour of its molecules; for the smallest material speck that is sensible to our coarse perceptions contains myriads of atoms. The properties of the

most minute portion of matter which we can examine are thus of the nature of averages. We may gradually invent means of tracing more and more closely the average drifts of translation or orientation, or of changes of arrangement, of the atoms ; but there will always remain an unaveraged residue devoid of any recognized regularity, which we can only estimate by its total amount. Thus, if we are treating of energy, we can separate out

mechanical and electric and other constituents in it; and there will be a residue of which we know nothing except its quantity, and which we call thermal. This merely thermal energy — which is gradually but very slowly being restricted in amount as new subsidiary organized types become recognized in it- — though transmutable in equivalent quantities with the other kinds, yet is so only to a limited extent; the tracing out of the laws of this limitation belongs to the science of thermodynamics. It is the business of that science to find out what is the greatest amount of thermal energy that can possibly be recoverable into organized kinds under given circumstances. The discovery of definite laws in this region might at first sight seem hopeless; but the argument rests on an implied postulate of stability and continuity of constitution of material substances, so that after a cycle of transformations we expect to recover them again as they were originally — on the postulate, in fact, that we do not expect them to melt out of organized existence in our hands. The laws of thermodynamics, including the fundamental principle that a physical property, called temperature, can be defined, which tends towards uniformity, are thus relations between the properties of types of material bodies that can exist permanently in presence of each other; why they so maintain themselves remains unknown, but the fact gives the point d'appui. The fundamental character of energy in material systems here comes into view; if there were any other independent scalar entity, besides mass and energy, that pervaded them with relations of equivalence, we should expect the existence of yet another set of qualities analogous to those connected with temperature. (See Energetics.) .

Returning now to the aether, on our present point of view no such complications there arise; it must be regarded as a continuous uniform medium free from any complexities of atomic aggregation, whose function is confined to the transmission of the various types of physical effect between the portions of matter. The problem of its constitution is thus one which can be attacked and continually approximated to, and which may possibly be definitely resolved. It has to be competent to transmit the transverse waves of light and electricity, and the other known radiant and electric actions; the way in which this is done is now in the main known, though there are still questions as to the mode of expression and formulation of our knowledge, and also as regards points of detail. This great advance, which is the result of the gradual focussing of a century's work in the minute

exploration of the exact laws of optical and electric phenomena, clearly carries with it deeper insight into the physical nature of matter itself and its modes of inanimate interaction.

If we rest on the synthesis here described, the energy of. the matter, even the thermal part, appears largely as potential energy of strain in the aether which interacts with the kinetic energy associated with disturbances involving finite velocity of matter. It may, however, be maintained that an ultimate analysis would go deeper, and resolve all phenomena of elastic resilience into consequences of the kinetic stability of steady motional states, so that only motions, but not strains, would remain. On such a view the aether might conceivably be a perfect fluid, its fundamental property of elastic reaction arising (as at one time suggested by Kelvin and G. F. FitzGerald) from a structure of tangled or interlaced vortex filaments pervading its substance, which might conceivably arrange themselves into a stable configuration and so resist deformation. This raises the further question as to whether the transmission of gravitation can be definitely recognized among the properties of an ultimate medium; if so, we know that it must be associated with some feature, perhaps very deep-seated, or on the other hand perhaps

depending simply on incompressibility, which is not sensibly implicated in the electric and optical activities. With reference to all such further refinements of theory, it is to be borne in mind that the perfect fluid of hydrodynamic analysis is not a merely passive inert plenum; it is also a continuum with the property that no finite internal slip or discontinuity of motion can ever arise in it through any kind of disturbance; and this property must be postulated, as it cannot be explained.

Motion of Material Atoms through the Aether. — An important question arises whether, when a material body is moved through the aether, the nucleus of each atom carries some of the surround- ing aether along with it; or whether it practically only carries on its strain-form or physical atmosphere, which is transferred from one portion of aether to another after the manner of a shadow, or rather like a loose knot which can slip along a rope without the rope being required to go with it. We can obtain a pertinent illustration from the motion of a vortex ring in a fluid ; if the circular core of the ring is thin compared with its diameter, and the vorticity is not very great, it is the vortical state of motion that travels across the fluid without

transporting the latter bodily with it except to a slight extent very close to the core. We might thus examine a structure formed of an aggrega- tion of very thin vortex rings, which would move across the fluid without sensibly disturbing it; on the other hand, if formed of stronger vortices, it may transport the portion of the fluid that is within, or adjacent to, its own structure along with it as if it were a solid mass, and therefore also push aside the surrounding fluid as it passes. The motion of the well-known steady spherical vortex is an example of the latter case.

Convection of Optical Waves. — The nature of the motion, if any, that is produced in the surrounding regions of the aether by the translation of matter through it can be investigated by optical experiment. The obvious body to take in the first instance is the earth itself, which on account of its annual orbital motion is travelling through space at the rate of about 18 miles per second. If the surrounding aether is thereby disturbed, the waves of light arriving from the stars will partake of its movement; the ascertained phenomena of the astronomical aberration of light show that the rays travel to the observer, across this disturbed aether near the earth, in straight fines. Again, we may split a narrow beam of light by partial reflexion from a transparent plate, and recombine the constituent beams after they have traversed different circuits of nearly equivalent lengths, so as to obtain interference fringes. The position of these fringes will depend on the total retardation in time of the one beam with respect to the other; and thus it might be expected to vary with the direction of the earth's motion relative to the apparatus. But it is found not to vary at all, even up to the second order of the ratio of the earth's velocity to that of light. It has in fact been found, with the very great precision of which optical experiment is capable, that all terrestrial optical phenomena — reflexion, refraction, polarization linear and circular, diffraction — are entirely unaffected by the direction of the earth's motion, while the same result has recently been extended to electrostatic forces ; and this is our main experimental clue.

We pass on now to the theory. We shall make the natural supposition that motion of the aether, say with velocity (u,v,w) at the point {x,y,z) , is simply superposed on the velocity V of the optical undulations through that medium, the latter not being intrinsically altered. Now the direction and phase of the light are those of the ray which reaches the eye; and by Fermat's principle, established by Huygens for undulatory motion, the path of a ray is that track along which the disturbance travels in least time, in

the restricted sense that any alteration of any short reach of the path will increase the time. Thus the path of the ray when the aether is at rest is the curve which makes fdsjX least; but when it is in motion it is the curve which makes fdsl(\ 7 +lu+mv+nw) least, where (l,m,n) is the direction vector of 5s. The latter integral becomes, on expanding in a series,

JdsfV -J\udx +vdy+wdz)FV* +f(udx +vdy+wdz) 2 !VHs + ...,

since Ids = dx. If the path is to be unaltered by the motion of

the aether, as the law of astronomical aberration suggests, this must differ from fds [Y by terms not depending on the path — that is, by terms involving only the beginning and end of it. In the case of the free aether V is constant; thus, if we neglect squares like (w/V) 2 , the condition is that udx --vdy--wdz be the exact differential of some function . If this relation is true along all paths, the velocity of the aether must be of irrotational type, like that of frictionless fluid. Moreover, this is precisely the condition for the absence of interference between the com- ponent of a split beam; because, the time of passage being to the first order

fds/V —/{udx --vdy --wdz)V 2 ,

the second term will then be independent of the path (being a single valued function) and therefore the same for the paths' of both the interfering beams. If therefore the aether can be put into motion, we conclude (with Stokes) that such motion, in free space, must be of strictly irrotational type.

But our experimental data are not confined to free space. If c is the velocity of radiation in free space and /* the refractive index of a transparent body, V=c/ / u; thus it is the expres- sion cˆfiˆiu'dx+v'dy+w'dz) that is to be integrable explicitly, where now (u',v',ip') is what is added to V owing to the velocity (u,v,w) of the medium. As, however, our terrestrial optical appa- ratus is now all-in motion along with the matter, we must deal with the rays relative to the moving system, and to these also Fermat's principle clearly applies; thus V+ (lu'+mv'+nw') is here the velocity of radiation in the direction of the ray, but relative to the moving material system. Now the expression above given cannot be integrable exactly, under all circumstances and whatever be the axes of co-ordinates, unless (/j, 2 u',(j?v 1 ,frw') is the gradient of a continuous function. In the simplest case, that

of uniform translation, these components of the gradient will each be constant throughout the region; at a distant place in free aether where there is no motion, they must thus be equal to -u,v, J w, as they refer to axes moving with the matter. Hence the paths and times of passage of all rays relative to the material system will not be altered by a uniform motion of the system, provided the velocity of radiation relative to the system, in material of index /x, is diminished by /z _z times the velocity of the system in the direction of the radiation, that is, provided the absolute velocity of radiation is increased by i-/i" 2 times the velocity of the material system; this involves that the free aether for which ix is unity shall remain at rest. This statement constitutes the famous hypothesis of Fresnel, which thus ensures that all phenomena of ray-path and refraction, and all those depending on phase, shall be unaffected by uniform convection of the material medium, in accordance with the results of experiment.

7s the Aether Stationary or Mobile? — This theory secures that the times of passage of the rays shall be independent of the motion of the system, only up to the first order of the ratio of its velocity to that of radiation. But a classical experiment of A. A. Michelson, in which the ray-path was wholly in air, showed that the independence extends to higher orders. This result is inconsistent with the aether remaining at rest, unless we assume that the dimensions of the moving system depend, though to an extent so small as to be not otherwise detectable, on its orientation with regard to the aether that is streaming through it. It is, however, in complete accordance with a view that would make the aether near the earth fully partake in its orbital motion — a view which the null effect of convection on all terrestrial optical and electrical phenomena also strongly suggests. But the aether at a great distance must in any case be at rest ; while the facts of astronomical aberration require that the motion of that medium must be irrotational. These conditions cannot be consistent with sensible convection of the aether near the earth without involving discontinuity in its motion at some intermediate distance, so that we are thrown back on the previous theory.

Another powerful reason for taking the aether to be stationary is afforded by the character of the equations of electrodynamics; they are all of linear type, and superposition of effects is possible. Now the kinetics of a medium in which the parts can have finite

relative motions will lead to equations which are not linear — as, for example, those of hydrodynamics— and the phenomena will be far more complexly involved. It is true that the theory of vortex rings in hydrodynamics is of a simpler type; but electric currents cannot be likened to permanent vortex rings, because their circuits can be broken and the element of cyclic steadiness on which the simplicity depends is thereby destroyed.

Dynamical Theories of the Aether. — The analytical equations which represent the propagation of light in free aether, and also in aether modified by the presence of matter, were originally developed on the analogy of the equations of propagation of elastic effects in solid media. Various types of elastic solid medium have thus been invented to represent the aether, without complete success in any case. In T. MacCullagh's hands the correct equations were derived from a single energy formula by the principle of least action; and while the validity of this dynamical method was maintained, it was frankly admitted that no mechanical analogy was forthcoming. When Clerk Maxwell pointed out the way to the common origin of optical and electrical phenomena, these equations naturally came to repose on an electric basis, the connexion having been first definitely exhibited by FitzGerald in 1878; and according as the independent variable was one or other of the vectors which represent electric force, magnetic force or electric polarity, they took the form appropriate to one or other of the elastic theories above mentioned.

In this place it must suffice to indicate the gist of the more recent developments of the electro-optical theory, which in- volve the dynamical verification of Fresnel's hypothesis regard- ing optical convection and the other relations above described. The aether is taken to be at rest; and the strain-forms belong- ing to the atoms are the electric fields of the intrinsic charges, or electrones, involved in their constitution. When the atoms are in motion these strain-forms produce straining and unstrain- ing in the aether as they pass across it, which in its motional or kinetic aspect constitutes the resulting magnetic field; as the strains are slight the coefficient of ultimate inertia here involved must be great. True electric current arises solely from con- vection of the atomic charges or electrons; this current is there- fore not restricted as to form in any way. But when the rate of change of aethereal strain — that is, of (f,g,h) specified as Max- well's

electric displacement in free aether — is added to it, an analytically convenient vector (u,v ,w) is obtained which possesses the characteristic property of being circuital like the flow of an incompressible fluid, and has therefore been made funda- mental in the theory by Maxwell under the name of the total electric current.

As already mentioned, all efforts to assimilate optical pro- pagation to transmission of waves in an ordinary solid medium have failed; and though the idea of regions of intrinsic strain, as for example in unannealed glass, is familiar in physics, yet on account of the absence of mobility of the strain no attempt had been made to employ them to illustrate the electric fields of atomic charges. The idea of MacCullagh's aether, and its property of purely rotational elasticity which had been ex- pounded objectively by W. J. M. Rankine, was therefore much vivified by Lord Kelvin's specification (Comptes Renins, 1889) of a material gyrostatically constituted medium which would possess this character. More recently a way has been pointed out in which a mobile permanent field of electric force could exist in such a medium so as to travel freely in company with its nucleus or intrinsic charge — the nature of the mobility of the latter, as well as its intimate constitution, remaining unknown.

A dielectric substance is electrically polarized by a field of electric force, the atomic poles being made up of the displaced positive and negative intrinsic charges in the atom : the polariza- tion per unit volume (f',g',h') may be defined on the analogy of magnetism, and d/dt(f',g',h') thus constitutes true electric current of polarization, i.e. of electric separation in the molecules, specified per unit volume. The convection of a medium thus polarized involves electric disturbance, and therefore must con- tribute to the true electric current; the determination of this

constituent of the current is the most delicate point in the in- vestigation. The usual definition of the component current in any direction, as the net amount of electrons which crosses, towards the positive side, an element of surface fixed in space at right angles to that direction, per umt area per unit time, here gives no definite result. The establishment and convection of a single polar atom constitutes in fact a #w

because any change of the dielectric constant K arising from the convection of the material through the aether must be inde-

pendent of the sign of v and therefore be of the second order. Now the electric force (P,Q,R) is the force acting on the electrons of the medium moving with velocity v; consequently by Faraday's electrodynamic law

(P,Q,R)-(P',Q'-uc,R'+i*). where (P',Q',R') is the force that would act on electrons at rest, and (a,b,c) is the magnetic induction. The latter force is, by Maxwell's hypothesis or by the dynamical theory of an aether pervaded by electrons, the same as that which strair s the aether, and may be called the aethereal force; it thereby produces an aethereal electric displacement, say (f,g,h), according to the relation (f,g,h) = (4 xc 2) -KP'.Q'.R 1).

in which C is a constant belonging to the aether, which turns out to be the velocity of light. The current of aethereal dis- placement d/dt(f,g,h) is what adds on to the true electric current to produce the total circuital current of Maxwell.

We have now to substitute these data in the universally valid circuital relations — namely, (i) line integral of magnetic force round a circuit is equal to 4X times the current through its aperture, which may be regarded as a definition of the constitu tion of the aether and its relation to the electrons involved in it; and (ii) line integral of the electric force belonging to any material circuit (i.e. acting on the electrons situated on it which move with the velocity of the matter) is equal to minus the time-rate of change of the magnetic induction through that circuit as it moves with the matter, this being a dynamical consequence of the aethereal constitution assigned in (i).

We may now, as is somewhat the more natural course in the terrestrial application, take axes (x,y,z) which move with the matter; but the current must be invariably defined by the flux across surfaces fixed in space, so that we may say that relation (i) refers to a circuit fixed in space, while (ii) refers to one moving with the matter. These circuital relations, when expressed analytically, are then for a dielectric medium of types dy dp Ty -«2F = 4™

(«.».») = (a+«^) (/.«'■*')+»(/**).

dR_dQ = _da

dy dz dt

where and

1 See H. A. Lorentz, loc. oil. infra; J. Larmor, Aether and Matter, p. 262 and passim.

where, when magnetic quality is inoperative, the magnetic induction (a,b,c) is identical with the magnetic force (a,/3,7).

These equations determine all the phenomena. They take this simple form, however, only when the movement of the matter is one of translation. If v varies with respect to locality, or if there is a velocity of convection (p,q,r) variable with respect to direction and position, and analytical expression of the re- lation (ii) assumes a more complex form; we thus derive the most general equations of electrodynamic propagation for matter treated as continuous, anyhow distributed and moving in any manner.

For the simplest case of polarized waves travelling parallel to the axis of x, with the magnetic oscillation 7 along z and the electric oscillation Q along y, all the quantities are functions of x and / alone; the total current is along y and given with respect to our moving axes by

\dt W 4xc 2 ˆdtKirc 1)™ also the circuital relations here reduce to

dy ~d~x

-4«, ˆ= –

dx~

dy

~dt ”

thus

dx*

. dv

=4x Hi

giving, on substitution for v,

(cˆ)ˆ = Kˆ-2uˆ.

For a simple wave-train, Q varies as sin m(x-Vt), leading on substitution to the velocity of propagation V relative to the moving material, by means of the equation KV 2 + 2uV = c 2 — v 2 ; this gives, to the first order of v/c, V = c/K 5 — u/K, which is in accordance with Fresnel's law. Trains of waves nearly but not quite homogeneous as regards wave-length will as usual be propagated as wave-groups travelling with the slightly different velocity d(VK~ 1)/d\~ i , the value of K occurring in V being a function of X determined by the law of optical dispersion of the medium.

For purposes of theoretical discussions relating to moving radiators and reflectors, it is important to remember that the dynamics of all this theory of electrons involves the neglect of terms of the order (v/c) 2 , not merely in the value of K but throughout.

Recent Experimental Developments. — The modification of the spectrum of a radiating gas by a magnetic field, such as would result from the hypothesis that the radiators are the system of revolving or oscillating electrons in the molecule, was detected by P. Zeeman in 1896, and worked up, in conjunction with H. A. Lorentz, on the general lines suggested by the electron-theory of molecular constitution. While it cannot be said that the full significance of this very definite phenomenon, consisting of the splitting of the spectral line into a number of polarized components, has yet been made out, a wide field of correlation with optical theory, especially in the neighbourhood of absorption bands, has been developed by Zeeman himself, by A. H. Becquerel, by D. Macaluso and O. M. Corbino, and by other workers.

The most fundamental experimental confirmation that the theory of the aether has received on the optical side- in recent years has been the verification of Maxwell's proposition that radiation exerts mechanical force on a material system, on which it falls, which may be represented in all cases as the resultant of pressures operating along the rays, and of intensity equal at each point of free space to the density of radiant energy. A high vacuum is needed for the detection of the minute forces here concerned; but just in that case the indirect radiometer- effect of the heating of the residual gas masks the effect. P. N. Lebedew in 1900 succeeded, by operating on metallic vanes so thin that the exposed and averted faces were practically at the same

temperature, in satisfactorily verifying the relation for metals; and very soon after, E. F. Nichols and G. F. Hull published accounts of an exact and extensive research, in which the principle had been fully and precisely confirmed as regards

both transparent and opaque bodies. The experiment of J. H. Poynting may also be mentioned, in which the tangential component of the thrust of obliquely incident radiation is separately put in evidence, by the torsion produced in an arrangement which is not sensitive to the normal component or to the radiometer-pressure of the residual gas. (See Radiometer.)

Next to these researches on the pressure of radiation, which, by forming the mechanical link between radiation and matter, are fundamental for the thermodynamics of radiant energy, the most striking recent result has been the discovery of H. Rubens and E. Hagen that for dark heat rays of only about ten times the wavelength of luminous radiation, the properties of metals are determined by their electric resistance alone, which then masks all resonance due to periods of free vibration of the molecules; and, moreover, that the resistance for such alternations is practically the same as the ohmic resistance for ordinary steady currents. They found that the absorbing powers of the metals, and therefore, by the principle of exchanges, their radiating powers also, are proportional to the square roots of their electric conductivities. Maxwell had himself, at an early stage of his theory, tested the absorbing power of gold-leaf for light, and found that the effective conductivity for luminous vibrations must be very much greater than its steady ohmic value; it is, in fact, there a case of incipient conductivity, which is continually being undone on account of the rapid alternation of force before it is fully established. That, however, complete conduction should arrive with alternations only ten times slower than light was an unexpected and remarkable fact, which verifies the presumption that the process of conduction is one in which the dynamic activities of the molecules do not come into play. The corollary, that the electric resistance of a metal can be determined in absolute units by experiments on the reflexion of heat-rays from its surface, is a striking illustration of the unification of the various branches of physical science, which has come in the train of the development of the theory of the aether. (See Radiation.)

Finally, reference should be made to the phenomena of radioactivity, whether excited by the electric discharge in vacuum tubes, foreshadowed in part by Sir Wm. Crookes and G. G. Stokes,

and later by A. Schuster and others, but first fully developed with astonishing results including the experimental discovery of the free electron by J. J. Thomson, or the correlated phenomena occurring spontaneously in radio-active bodies as discovered by H. Becquerel and by M. and Mme Curie, and investigated by them and by E. Rutherford and others. These results constitute a far-reaching development of the modern or electrodynamic theory of the aether, of which the issue can hardly yet be foreseen. •

References. — Maxwell, Collected Papers-, H. A. Lorentz, Archives Neerlandaises, xxi. 1887, and xxv. 1892, and a tract, Versuch einer Theorie der electrischen und optischen Erscheinungen in bewegten Korpern (Leyden, 1895); also recent articles ” Elektrodynamik ” and ” Elektronentheorie ” in the Encyk. der Math. Wissenschaften, Band v. 13, 14; O. Lodge, ” On Aberration Problems,” Phil. Trans. 1893 and 1897; J. Larmor, Phil. Trans. 1894-95-97, and a treatise, Aether and Matter (1900), where full references are given. Of recent years most treatises on physical optics, e.g. those of P. K. L. Drude, A. Schuster, R. W. Wood, have been written largely on the basis of the general physics of the aether; while the Collected Papers of LordRayleigh should be accessible to all who desire a first-hand know- ledge of the development of the optical side of the subject. See also Molecule, Electricity, Light and Radiation, (j. L.*)

AETHICUS (= Ethictjs) ISTER, “the philosopher of Istria,” the supposed but unknown author of a description of the world written in Greek. An abridgment, under the title of Cosmo-graphia Ethici, written in barbarous Latin, and wrongly described as the work of St Jerome, probably belongs to the 7th century. After a discussion of the creation of the world and a description of the earth, an account of the wonderful journeys of Aethicus is given, with digressions on various subjects, such as Alexander the Great and the kings of Rome, full of obscure and fabulous details.

The name Aethicus is also attached to another geographical treatise probably dating from the 6th century, a reproduction,

with some unimportant additions, of the cosmography— little else than a dry list of names — of Julius Honorius.

Editions. — D'Avezac (1852); Pertz (1853); Wuttke (1854); Riese's Geographi Latini Minores (1878) ; see also Bunbury, History of A ncient Geography.

AETIOLOGY, or Etiology (from Gr. airia, cause, and \oyia, discourse) , strictly, the science or philosophy of causation, but generally used to denote the part of any special science (and especially of that of medicine and disease) which investigates the causes and origin of its phenomena. An aetiological myth is one which is regarded as having been invented ex post facto to explain some fact, name or coincidence, the true account or origin of which has been forgotten. Such myths were often based on grotesque philological analogies, according to which an existing connexion between two personalities (cities, &c.) was traced back to a common mythical origin. For a good example of the evolution of such myths, see the argument under Aegina, History.

AETION, or Eetion, a Greek painter, mentioned by Cicero, Pliny and Lucian. His most noted work, described in detail by Lucian {Herodotus or Eetion, 5), was a picture representing the marriage of Alexander and Roxana. He is said to have exhibited it at the Olympic games, and by it so to have won the favour of the president that he gave him his daughter in marriage. Through a misunderstanding of the words of Lucian, Aetion has been supposed to belong to the age of the Antonines; but there can be little doubt that he was a contemporary of Alexander and of Apelles (Brunn, Geschichte der griechischen Kiinstler, ii. p. 243). Pliny gives his date as 350 B.C.

AETIUS (fl. 350), surnamed " the Atheist," founder of an extreme sect of Arians, was a native of Coele-Syria. After working as a vine-dresser and then as a goldsmith he became a travelling doctor, and displayed great skill in disputations on medical subjects; but his controversial power soon found a wider field for its exercise in the great theological question of the time. He studied successively under the Arians, Paulinus, bishop of Antioch, Athanasius, bishop of Anazarbus, and the presbyter Antonius of Tarsus. In 3 50 he was ordained a deacon by Leontius of Antioch, but was shortly afterwards forced by the orthodox party to leave that town. At the first synod of Sirmium he won a dialectic victory over the homoiousian bishops, Basilius and Eustathius, who sought in consequence to stir up against him the enmity of Caesar Gallus. In 356 he went to Alexandria with Eunomius (q.v.) in order to advocate Arianism, but he was

banished by Constantius. Julian recalled him from exile, bestowed upon him an estate in Lesbos, and retained him for a time at his court in Constantinople. Being consecrated a bishop, he used his office in the interests of Arianism by creating other bishops of that party. At the accession of Valens (364) he retired to his estate at Lesbos, but soon returned to Constanti- nople, where he died in 367. The Anomoean sect of the Arians, of whom he was the leader, are sometimes Called after him Aetians. His work De Fide has been preserved in connexion with a refutation written by Epiphanius (Haer. Ixxvi. 10). Its main thought is that the Homousia, i.e. the doctrine that the Son (therefore the Begotten) is essentially God, is self-con- tradictory, since the idea of unbegottenness is just that which constitutes the nature of God.

See A. Harnack, History of Dogma, vol. iv. passim.

AETIUS, a Greek physician, born at Amida in Mesopotamia, flourished at the beginning of the 6th century a.d. He studied at Alexandria, and became court physician at Byzantium and comes obsequii, one of the chief officers of the imperial household. He wrote a large medical work in sixteen books, founded on Oribasius and compiled from various sources, especially Galen [Galenos]. Superstition and mysticism play a great part in his remedies. Eight books of the Greek original were printed at Venice, 1 534, and a complete Latin translation by Cornarius appeared at Basel, 1542.

See Weigel, Aetianarum exercitationum specimen (1791) ; Danelius, Beitrag zur Augenheilkunde des Aetius (1889); Zernos, Aetii sermo sextidecimus et ultimus, editio princeps (1901).

AETIUS (d. 454), a Roman general of the closing period of the Western empire, born at Dorostolus in Moesia, late in the 4th century. He was the son of Gaudentius, who, although possibly of barbarian family, rose in the service of the Western empire to be master of the horse, and later count of Africa. Aetius passed some years as hostage, first with Alaric and the Goths, and later in the camp of Rhuas, king of the Huns, acquiring in this way the knowledge which enabled him afterwards to defeat them. In 424 he led into Italy an army of 60,000 barbarians, mostly Huns, which he employed first to support the primicerius Joannes, who had proclaimed himself emperor, and, on the defeat of the latter, to enforce his claim to the supreme command of the army in Gaul upon Placidia, the empress-mother and regent for Valentinian III.

His calumnies against his rival, Count Boniface, which were at first believed by the emperor, led Boniface to revolt and call the Vandals to Africa. Upon the discovery of the truth, Boniface, although defeated in Africa, was received into favour by Valentinian; but Aetius came down against Boniface from his Gallic wars, like another Julius Caesar, and in the battle which followed wounded Boniface fatally with his own javelin. From 433 to 450 Aetius was the dominating personality in the Western empire. In Gaul he won his military reputation, upholding for nearly twenty years, by combined policy and daring, the falling fortunes of the empire. . His greatest victory was that of Chalons-sur- Marne (September 20, 451), in which he led the Gallic forces against Attila and the Huns. This was the last triumph of the empire. Three years later (454) Aetius presented himself at court to claim the emperor's daughter in marriage for his son Gaudentius; but Valentinian, suspecting him of designs upon the crown, slew him with his own hand.

See T. Hodgkin, Italy and her Invaders, vols. i. and ii. (1880).

AETOLIA, a district of northern Greece, bounded on the S. by the Corinthian Gulf, on the W. by the river Achelous, on the N. and E. by the western spurs of Parnassus and Oeta. The land naturally falls into two divisions. The basins of the lower Achelous (mod. Aspropotamo) and Euenus (Phidharis) form a series of alluvial valleys intersected by detached ridges which mostly run parallel to the coast. This district of " Old Aetolia " lacks a suitable sea-board, but the inland, and especially the plain of central Aetolia lying to the north of Lakes Hyria and Trichonis and Mount Aracynthus, forms a rich agricultural country. The northern and eastern regions are broken by an extensive complex of chains and peaks, whose rugged limestone flanks are clad at most with stunted shrubs and barely leave room for a few pre- carious mule-tracks. These heights often rise in the frontier- ranges of Tymphrestus, Oxia and Corax to more than 7000 ft.; the snow-capped pinnacle of Kiona attains to 8240 ft. A few defiles pass through this barrier to the other side of the north Greek watershed.

In early legend Old Aetolia, with its cities of Pleuron and Calydon, figures prominently. During the great migrations (see Dorians) the population was largely displaced, and the old inhabitants long remained in a backward condition. In the 5th century some tribes were still living in open villages under petty kings, addicted to plunder and piracy, and hardly recognized as

Hellenes at all. Yet their military strength was not to be despised: in 426 their archers and slingers easily repelled an Athenian invasion under Demosthenes. In the 4th century the Aetolians began to take a greater part in Greek politics, and, in return for helping Epaminondas (367) and Philip of Macedon (338), recovered control of their sea-board, to which they annexed the Acarnanian coast and the Oeniadae. Aetolia's prosperity dates from the period of Macedonian supremacy. It may be ascribed partly to the wealth and influence acquired by Aetolian mercenaries in Hellenistic courts, but chiefly to the formation of a national Aetolian league, the first effective institution of this kind in Greece. Created originally to meet the peril of an invasion by the Macedonian regents Antipater and Craterus, who had undertaken a punitive expedition against Aetolia after the Lamian War (322), and by Cassander (314-311), the confederacy grew rapidly during the subsequent period of Macedonian weakness. Since 290 it had extended its power over all the uplands of

central Greece, where its command over Heracleia (280) provided it with an important defensive position against northern invaders, its control of Delphi and the Amphictyonic council with a useful political instrument. The valour of the Aetolians was con- spicuously displayed in 279, when they broke the strength of the Celtic irruption by slaughtering great hordes of marauders. The commemorative festival of the Soteria, which the league estab- lished at Delphi, obtained recognition from many leading Greek states. After annexing Boeotia (by 245) the Aetolians controlled all central Greece. Endeavouring next to expand into Pelopon- nesus, they allied themselves with Antigonus Gonatas of Mace- donia against the Achaean league (q.v.), and besides becoming protectors of Elis and Messenia won several Arcadian cities. Their naval power extended to Cephalonia, to the Aegaean islands and even to the Hellespont. The league at its zenith had thus a truly imperial status.

Later in the century its power began to be sapped by Mace- donia. To check King Demetrius (239-229) the Aetolians joined arms with the Achaeans. In 224 they held Heracleia Trachis against Antigonus Doson, but lost control of Boeotia and Phocis. Since 228 their Arcadian possessions had been abandoned to Sparta. At the same time a new enemy arose in the Illyrian pirate

fleets, which outdid them in unscrupulousness and violence. The raids of two Aetolian chiefs in Achaean territory (220) led to a coalition between Achaea and Philip V. of Macedon, who assailed the invaders with great energy, driving them out of Peloponnesus and marching into Aetolia itself, where he surprised and sacked the federal capital Thermon. After buying peace by the cession of Acarnania (217) the league concluded a compact with Rome, in which both states agreed to plunder ruthlessly their common enemies (211). In the great war of their Roman allies against Philip the federal troops took a prominent part, their cavalry being largely responsible for the victory of Cynos- cephalae (197). The Romans in return restored central Greece to the league, but by withholding its former Thessalian posses- sions excited its deep resentment. The Aetolians now invited Antiochus III. of Syria to European Greece, and so precipitated a conflict with Rome. But in the war they threw away their chances. In 192 they wasted themselves in an unsuccessful attempt to secure Sparta. In 191 they supported Antiochus badly, and by their slackness in the defence of Thermopylae made his position in Greece untenable. Having thus isolated themselves the Aetolians stood at bay behind their walls against the Romans, who refused all compromises, and, after the general surrender in 189, restricted the league to Aetolia proper and assumed control over its foreign relations. In 167 the country suffered severely from the intrigues of a philo-Roman party, which caused a series of judicial murders and the deportation of many patriots to Italy. By the time of Sulla, when the league is mentioned for the last time, its functions were purely nominal. The federal constitution closely resembled that of the Achaean league (q.v.), for which it doubtless served as a model. The general assembly, convoked every autumn at Thermon to elect officials, and at other places in special emergencies, shaped the league's general policy; it was nominally open to all freemen, though no doubt the Aetolian chieftains really controlled it. The council of deputies from the confederate cities undertook the routine of administration and jurisdiction. The strategus (general), aided by 30 apocleti (ministers), had complete control in the field and presided over the assembly, though with restricted advisory powers. The Aetolians also used the Amphictyonic synod for passing solemn enactments. The league's relation to outlying dependencies is obscure; many of these were probably mere protectorates or " allied states " and secured no representa- tion. The federal executive Was certainly much more efficient than that of the Achaeans, and its councils suffered less from disunion; but its

generals and admirals, official or otherwise, enjoyed undue licence; hence the league deservedly gained an evil name for the numerous acts of lawlessness or violence which its troops committed. But as a champion of republican Greece against foreign enemies no other power of the age rendered equal services. After the first overthrow of the Byzantine empire

Aetolia passed to a branch of the old imperial house (1205). In the 15th century it was held by Scanderbeg (q.v.) and by the Venetians, but Mahommed II. brought it definitely under Turkish rule. In the War of Independence the Aetolians by their stubborn defence, culminating in the sieges of Missolonghi (q.v.), formed the backbone of the rebellion. Northern Aetolia remains a desolate region, inhabited mainly by Vlach shep- herds. The south-western plain, though rendered unhealthy, by lagoons, and central Aetolia yield good crops of currants, vine, maize and tobacco, which are conveyed by railway from Agrinion and Anatolikon to the coast. The country, which forms part of the modern department of Acarnania and Aetolia, contains numerous fragments of ancient fortifications. It has contributed a notable proportion of distinguished men to modern Greece.

Authorities. — Strabo pp. 450 sqq. ; Thucydides iii. 94-98 ; Diodorus xviii. 24. 5; Pausanias x. 20 sq.; Polybius and Livy passim; W. J. Woodhouse, Aetolia (Oxford, 1897); M. Dubois, Les Ligues acheenne et etolienne (Paris, 1885); E. A. Freeman, Federal Government (ed. 1893, London), ch. vi.; B. V. Head, Historia Numorum (Oxford, 1887), pp. 283-284; M. Holleaux in Bulletin de Correspondance Hellenique (1905, pp. 362-372); G. Sotiriades in ‘Er)H<:pis 'Apxa.u>\o-/i.Kri, (19OO) pp. 163-212, (19O3) pp. 73-94, and in Bulletin de Correspondance Hellenique (1907), pp. 139-184; C. Salvetti in Studi di Storia Antica, vol. ii. (Rome, 1893), PP- 270-320. (M. O. B. C.)

AFARS (Danakil), a tribe of African ” Arabs ” of Hamitic stock. They occupy the arid coast-lands between Abyssinia and the sea. They claim to be Arabs, but are more akin to the Galla and Somali. The tribe is roughly divisible into a pastoral and a coast-dwelling group. Their religion is chiefly fetich and tree-worship; many, nominally, profess Mahommedanism. They are distinguished by narrow straight noses, thin lips and small pointed chins; their cheekbones are not prominent. They are more scantily clothed than the Abyssinians or Galla, wearing, generally, nothing but a waist-cloth. Their women, when quite young, are pretty and graceful. Their huts are often tastefully

decorated, the floors being spread with yellow mats, embroidered with red and violet designs. The Afars are divided into many sub-tribes, each having an hereditary sultan, whose power is, however, limited. They are desperate fighters and in 1875 successfully resisted an attempt to bring them under Egyptian rule. In 1883-1888, however, their most important sultan concluded treaties placing his country under Italian protection. The Afar region is now partly under Abyssinian and partly under Italian authority. The Afars are also found in considerable numbers in French Somaliland. They have a saying " Guns are only useful to frighten cowards." They were formerly redoubtable pirates, but the descendants of these corsairs are now fishermen, and are the only sailors in the Red Sea who hunt the dugong.

See Fr. Scazamucci and E. H. Giglioli, Notizie sui Danakil (1884) I P. Paulitschke, Ethnographie Nordost-Afrikas (2 vols., Berlin, 1893- 1896), and Die geographische Erj 'orschung der Addl-Ldnder und Hardrs in Ost-Afrika (Leipzig, 1884).

AFER, DOMITIUS, a Roman orator and advocate, born at Nemausus (Nimes) in Gallia Narbonensis, flourished in the reigns of Tiberius, Caligula, Claudius and Nero. His pupil Quintilian calls him the greatest orator he had ever known; but he disgraced his talents by acting as public informer against some of the most distinguished personages in Rome. He gained the favour of Tiberius by accusing Claudia Pulcra, the widow of Germanicus, of adultery and the use of magic arts against the emperor. Judicious flattery secured him the consul- ship under Caligula (39) ; and under Nero he was superintendent of the water supply. He died a.d. 60, according to Jerome, of over-eating. Quintilian quotes some of his witty sayings (dicta), collections of which were published, and mentions two books by him On Witnesses.

Quintilian, Instit. vi. 3. 42, viii. 5. 16, x. I. 118, &c. ; Tac. Ann. iv. 52; Dio Cassius lix. 19, lx. 33; Pliny, Epp. viii. 18.

AFFECTION (Lat. ad, and facere, to do something to, sc. a person), literally, a mental state resulting generally from an external influence. It is popularly used of a relation between persons amounting to more than goodwill or friendship. By ethical writers the word has been used generally of distinct

states of feeling, both lasting and spasmodic; some contrast it with ” passion ” as being free from the distinctively sensual element. More specifically the word has been restricted to emotional states which are in relation to persons. In the former sense, it is the Gr. irados, and as such it appears in Descartes and most of the early British ethical writers. On various grounds, however — e.g. that it does not involve anxiety or excite- ment, that it is comparatively inert and compatible with the entire absence of the sensuous element — it is generally and use- fully distinguished from passion. In this narrower sense the word has played a great part in ethical systems, which have spoken of the social or parental ” affections ” as in some sense a part of moral obligation. For a consideration of these and similar problems, which depend ultimately on the degree in which the affections are regarded as voluntary, see H. Sidgwick, Methods of Ethics, pp. 345-349.

In psychology the terms ” affection ” and ” affective ” are of great importance. As all intellectual phenomena have by experimentalists been reduced to sensation, so all emotion has been and is regarded as reducible to simple mental affection, the element of which all emotional manifestations are ultimately composed. The nature of this element is a problem which has been provisionally, but not conclusively, solved by many psychologists; the method is necessarily experimental, and all experiments on feeling are peculiarly difficult. The solutions proposed are two. In the first, all affection phenomena are primarily divisible into those which are pleasurable and those which are the reverse. The main objections to this are that it does not explain the infinite variety of phenomena, and that it disregards the distinction which most philosophers* admit between higher and lower pleasures. The second solution is that every sensation has its specific affective quality, though by reason of the poverty of language many of these have no name. W. Wundt, Outlines of Psychology (trans. C. H. Judd, Leipzig, 1897), maintains that we may group under three main affective directions, each with its negative, all the infinite varieties in question; these are (a) pleasure, or rather pleasantness, and the reverse, (b) tension and relaxation, (c) excitement and depres- sion. These two views are antithetic and no solution has been discovered.

Two obvious methods of experiment have been tried. The first,

introduced by A. Mosso, the Italian psychologist, consists in recording the physical phenomena which are observed to accompany modifications of the affective consciousness. Thus it is found that the action of the heart is accelerated by pleasant, and retarded by unpleasant, stimuli; again, changes of weight and volume are found to accompany modifications of affection — and so on. Apart altogether from the facts that this investigation is still in its infancy and that the conditions of experiment are insufficiently understood, its ultimate success is rendered highly problematical by the essential fact that real scientific results can be achieved only by data recorded in connexion with a perfectly normal subject; a conscious or interested subject introduces variable factors which are probably incalculable.

The second is Fechner's method; it consists of recording the changes in feeling-tone produced in a subject by bringing him in contact with a series of conditions, objects or stimuli graduated according to a scientific plan and presented singly in pairs or in groups. The result is a comparative table of likes and dislikes.

Mention should also be made of a third method which has hardly yet been tried, namely, that of endeavouring to isolate one of the three " directions " by the method of suggestion or even hypnotic trance observations.

For the subject of emotion in general see modern text-books of psychology, e.g. those of J. Sully, W. James, G. T. Fechner, O. Kiilpe; Angelo Mosso, La Paura (Milan, 1884, 1900; Eng. trans. E. Lough and F. Kiesow, Lond. 1896); E. B. Titchener, Experi- mental Psychology (1905) ; art. Psychology and works there quoted.

AFFIDAVIT (Med. Lat. for " he has declared upon oath," from affidare, fides, faith), a written statement sworn or affirmed to before some person who has authority to administer an oath or affirmation. Evidence is chiefly taken by means of affidavits in the Chancery Division of the High Court of Justice in England

on a petition, summons or motion. Interlocutory proceedings before trial are conducted by affidavits, e.g. for discovery of documents, hence called affidavit of documents. Affidavits are sometimes necessary as certificates that certain formalities have been duly and legally performed (such as service of proceed- ings, &c.). They are extensively used in bankruptcy practice, in the administration of the revenue and in the inferior and county courts. In testamentary causes, all documents of any kind, such

as wills, codicils, drafts or instructions of same must be filed in the form of affidavits (termed affidavits of scripts). In Scotland the testimony of witnesses by affidavit is almost unknown, except in a few non-contentious cases as prima facie evidence. In the rules of the Supreme Court (R.S.C. Ord. XXXVIII.) certain formal requirements are laid down for all affidavits and affirmations in causes or matters depending in the High Court. An affidavit must consist of title, body or statement and jurat. It must be written or printed on foolscap, bookwise, in the first person; give correctly the names of the parties to the action; and the description and true place of abode of the deponent. An affidavit is confined, except on interlocutory motions, to such facts as the witness is able of his own knowledge to prove. The signature of the deponent must be written opposite to the jurat, which must contain the place, date and time of swearing, and this signed by the officer or magistrate before whom the affidavit is sworn. An affidavit sworn on a Sunday is not invalid. Quakers, Moravians and Separatists were first privileged to make a solemn declaration or affirmation, and by the Common Law Procedure Act 1852 and other statutes all persons prevented by religious belief from taking an oath were allowed to affirm; and, finally, by the Oaths Act 1888, every person who objects to be sworn is allowed to affirm in all places and for all purposes where an oath is required by law. By an act of 1835 justices are permitted to take affi- davits in any matter by declaration, and a person making a false affidavit in this way is liable to punishment. The same act prohibited justices of peace from administering oaths in any matter in which they had not jurisdiction as judges, except when an oath was specially authorized by statute, as in the bankruptcy law, and excepting criminal inquiries, parliamentary proceedings and instances where oaths are required to give validity to docu- ments abroad. Scottish justices can act in England and vice versa. The Oaths Act 1888 and the Commissioner of Oaths Act 1889 consolidated all previous enactments relating to oaths and gave the lord chancellor power to appoint commissioners for oaths to take affidavits for all purposes (see Oath), Under the Debtors Act 1869 a plaintiff may file an affidavit for the arrest of a debtor {affidavit to hold to bail) when the debt amounts to £50 or upwards, where it can be shown that the debtor's absence from the kingdom would materially prejudice the prosecution of the action.

Affidavits may be made abroad before any British ambassador, envoy, minister, chargS d'affaires, secretary of embassy or lega-

tion, consul or consular agent.

In the United States affidavit has the same meaning as in England and its general uses are the same, but it is not sub- stituted for oral evidence in court to anything like the extent to which that is done in the English courts of chancery. The statutes of each state designate the persons before whom affi- davits may be made outside the state, and special commissioners are appointed for that purpose by each state. Affidavits made abroad must be made before such commissioners or persons so designated, who are usually diplomatic and consular officials, justices, notaries public or mayors. " Affidavit of documents " is not generally used in the United States; discovery is procured by motion.

AFFILIATION (from Lat. ad-filiare, to adopt as a son), in law, the procedure by which the paternity of a bastard child is determined, and the obligation of contributing to its support enforced. In England a number of statutes on the subject have been passed, the chief being the Bastardy Act of 1845, and the Bastardy Laws Amendment Acts of 1872 and 1873. The mother of a bastard may summon the putative father tq

petty sessions within twelve months of the birth (or at any later time if he is proved to have contributed to the child's support within twelve months after the birth), and the justices, after hearing evidence on both sides, may, if the mother's evidence be corroborated in some material particular, adjudge the man to be the putative father of the child, and order him to pay a sum not exceeding five shillings a week for its maintenance, together with a sum for expenses incidental to the birth, or the funeral expenses, if it has died before the date of order, and the costs of the proceedings. An order ceases to be valid after the child reaches the age of thirteen, but the justices may in the order direct the payments to be continued until the child is sixteen years of age. An appeal to quarter sessions is open to the defendant, and a further appeal on questions of law to the King's Bench by rule nisi or certiorari. Should the child after- wards become chargeable to the parish, the sum due by the father may be received by the parish officer. When a bastard child, whose mother has not obtained an order, becomes chargeable to the parish, the guardians may proceed against the putative father for

a contribution. Any woman who is single, a widow, or a married woman living apart from her husband, may make an application for a summons, and it is immaterial where the child is begotten, provided it is born in England. • An application for a summons may be made before the birth of the child, but in this case the statement of the mother must be in the form of a sworn deposition. The defendant must be over fourteen years of age. No agreement on the part of the woman to take a sum down in discharge of the liability of the father is a bar to the making of an affiliation order. In the case of twins it is usual to make separate applications and obtain separate summonses. The Summary Jurisdiction Act 1879 makes due provision for the enforcement of an order of affiliation. In the case of soldiers an affiliation order cannot be enforced in the usual way, but by the Army Act 1881, if an order has been made against a soldier of the regular forces, and a copy of such order be sent to the secretary of state, he may order a portion of the soldier's pay to be retained. There is no such special legislation with regard to sailors in the royal navy.

In the British colonies, and in the states of the United States (with the exception of California, Idaho, Missouri, Oregon, Texas and Utah), there is some procedure (usually termed filiation) akin to that described above, by means of which a mother can obtain a contribution to the support of her illegitimate child from the putative father. The amount ordered to be paid may subsequently be increased or diminished (1905; 94 N.Y. Supplt. 372). On the continent of Europe, however, the legis- lation of the various countries differs rather widely. France, Belgium, Holland, Italy, Russia, Servia and the canton of Geneva provide no means of inquiry into the paternity of an illegitimate child, and consequently all support of the child falls upon the mother; on the other hand, Germany, Austria, Norway, Sweden, Denmark and the majority of the Swiss cantons pro- vide for an inquiry into the paternity of illegitimate children, and the law casts a certain amount of responsibility upon the father.

Affiliation, in France, is a term applied to a species of adoption by which the person adopted succeeds equally with other heirs to the acquired, but not to the inherited, property of the deceased. (See Adoption. Also Bastard; Poor Laws.)

Authorities. — Saunders, Law and Practice of Orders of Affiliation; Lushington, Law of Affiliation and Bastardy; Little, Poor Law Statutes. (T. A. I.)

AFFINITY (Lat. affinitas, relationship by marriage, from affinis, bordering on, related to; finis, border, boundary), in law, as distinguished from consanguinity (q.v.), the term applied to the relation which each party to a marriage, the husband and wife, bears to the kindred of the other. Affinity is usually de- scribed as of three kinds. (1) Direct: that relationship which subsists between the husband and his wife's relations by blood or between the wife and the husband's relations by blood. The marriagehaving made them one person, the blood relations of each are held as related by affinity in the same degree to the one spouse

as by consanguinity to the other. But the relation is only with the married parties themselves, and does not bring those in affinity with them in affinity with each other; so a wife's sister has no affinity to her husband's brother. This is (2) Secondary affinity. (3) Collateral affinity is the relationship subsisting between the husband and the relations of his wife's relations.

The subject is chiefly important from the matrimonial prohibi- tions by which the canon law has restricted relations by affinity. Taking the table of degrees within which marriage is prohibited on account of consanguinity, the rule has been thus extended to affinity, so that wherever relationship to a man himself would be a bar to marriage, relationship to his deceased wife will be the same bar, and vice versa on the husband's decease.

Briefly, direct affinity is a bar to marriage. This rule has been founded chiefly on interpretations of the eighteenth chapter of Leviticus. Formerly by law in England, marriages within the degrees of affinity were not absolutely null, but they were liable to be annulled by ecclesiastical process during the lives of both parties; in other words, the incapacity was only a canonical, not a civil, disability. By the Marriage Act 1835 all marriages of this kind not disputed before the passing of the act were declared absolutely valid, while all subsequent to it were declared null. This rendered null in England, and not merely voidable, a marriage with a deceased wife's sister or niece. (See Consan- guinity; Marriage.)

AFFINITY, CHEMICAL, the property or relation in virtue of which dissimilar substances are capable of entering into chemi- cal combination with each other. (See Chemistry; Chemical Action; Valency.)

AFFIRMATION (from Lat. affirmare, to assert), the declara- tion that something is true; in logic, a positive judgment, the union of the subject and predicate of a proposition; particularly, in law, the solemn declaration allowed to those who conscien- tiously object to taking an oath. (See Oath.)

AFFRAY, in law, the fighting of two or more persons in a public place to the terror (a V effroi) of the lieges. The offence is a misdemeanour at English common law, punishable by fine and imprisonment. A fight in private is an assault and battery, not an affray. As those engaged in an affray render themselves also liable to prosecution for Assault (q.v.), Unlawful Assembly (see Assembly, Unlawful), or Riot (q.v.), it is for one of these offences that they are usually charged. Any private person may, and constables and justices must, interfere to put a stop to an affray. In the United States the English common law as to affray applies, subject to certain modifications by the statutes of particular states (Bishop, Amer. Crim. Law, 8th ed., 1892, vol. i. § 53 s). The Indian Penal Code (sect. 159) adopt j the English definition of affray, with the substitution of ” actual disturbance of the peace ” for ” causing terror to the lieges.” The Queensland Criminal Code of 1899 (sect. 72) defines affray as taking part in a fight in a public highway or taking part in a fight of such a nature as to alarm the public in any other place to which the public have access. This definition is taken from that in the English Criminal Code Bill of 1880, cl. 96. Under the Roman Dutch law in force in South Africa affray falls within the definition of vis publica.

AFFRE, DENIS AUGUSTE (1793-1848), archbishop of Paris, was born at St Rome, in the department of Tarn, on the 27th of September 1793. He was educated for the priesthood at St Sulpice, where in 181 8 he became professor of dogmatic theology. After filling a number of ecclesiastical offices, he was elevated to the archbishopric of Paris in 1840. Though opposed to the government of Louis Philippe, he took no part in politics, but devoted himself to his pastoral work. His episcopate, however, is chiefly remembered owing to its tragic close. During the insurrection of June 1848 the archbishop was led to believe that by his personal interference peace might be restored between the soldiery and the insurgents. Accordingly, in spite of the warning of General Cavaignac, he mounted the barricade at the entrance to the Faubourg St Antoine, bearing a green branch as sign of peace. He had spoken only a few words, however, when the insurgents, hearing some shots, and fancying they

were betrayed, opened fire upon the national guard, and the archbishop fell, struck by a stray bullet. He was removed to his palace, where he died on the 27th of June 1848. Next day the National Assembly issued a decree expressing their great sorrow on account of his death; and the public funeral on the 7th of July was one of the most striking spectacles of its kind. The archbishop wrote several treatises of considerable value, including an Essai sur les hiProglyphes egyptiens (Paris, 1834), in which he showed that Champollion's system was insufficient to explain the hieroglyphics.

See Ricard, Les grands eveques de I'eglise de France au XIXe Steele (Lille, 1893); L. Alazard, Denis- Auguste Affre, archevique de Paris (Paris, 1905).

AFFREIGHTMENT (from "freight," q.v.). Contract of Affreightment is the expression usually employed to describe the contract between a shipowner and some other person called the freighter, by which the shipowner agrees to carry goods of the freighter in his ship, or to give to the freighter the use of the whole or part of the cargo-carrying space of the ship for the carriage of his goods on a specified voyage or voyages or for a specified time; the freighter on his part agreeing to pay a specified price, called " freight," for the carriage of the goods or the use of the ship. A ship may be let like a house to some person who takes possession and control of it for a specified term. The ..person who hires a ship in this way occupies during the currency of his term the position of shipowner. The contract by which a ship is so let may be called a charter-party; but it is not, properly speaking, a contract of affreightment, and is mentioned here only because it is necessary to remember the distinction between a charter-party of this kind, .which is some- times called a demise of the ship, and a charter-party which is a form of contract of affreightment, as will hereinafter appear.

The law with regard to the contract of affreightment is, of course, a branch of the general law of contract. The rights and obligations of the shipowner and the freighter depend, as in the case of all parties to contracts, upon the terms of the agreement entered into between them. The law, however, interferes to some extent in regulating the effect to be given to contracts. Certain

contracts are forbidden by the law, and being illegal are, therefore, incapable of enforcement. The most important example of illegality in the case of contracts of affreightment is when the contract involves trading with an enemy. The law interferes again with regard to the interpretation of the contract. The meaning to be given to the words of the contract, or, in other words, its construction, when a dispute arises about it, must be determined by the judge or court. The result is, that certain more or less common clauses in contracts of affreightment have come before the courts for construction, and the decisions in these cases are treated practically, though not perhaps quite logically, as rules of law determining the sense to be put upon certain forms of expression in common use in shipping contracts. A third way in which the law interferes is by laying down certain rules by which the rights of the parties are to be regulated in the absence of any express stipulation with regard to the matter dealt with by such rules. This is done either by statutory enactment, as by that part- (Part VIII.) of the Merchant Shipping Act 1894 which deals with the liability of shipowners; or by established rules of the unwritten law, the " common law " as it is called, as, for instance, the rule that the common 0/ law. carrier is absolutely responsible for the safe delivery of the goods carried, unless it is prevented by t v c act of God or the king's enemies. These rules of law, whether common law or statute law, regulating the obligations of carriers of goods by sea, are of most importance in cases which are uncommon though not unknown at the present day, in which there is an affreightment without any written agreement of any kind. It will, therefore, be convenient to consider first cases of this kind where there is no express agreement, oral or written, except as to the freight and destination of the goods, and where, conse- quently, the rights and obligations of the parties as to all other terms of carriage depend wholly upon the rules of law, remember- ing always that these same rules apply when there is a written

contract, except in so far as they are qualified or negatived by the terms of such contract.

The rules of the common or ancient customary law of England with.regard to the carriage of goods were no doubt first considered by the courts and established with regard to the carriage of goods by common carriers on land. These rules were applied to common carriers by water, and it may now be taken to be the general rule that shipowners who carry goods by sea are by the English law subject to the liabilities of common carriers.

(See, as to the grounds and precise extent of this doctrine, the judg- ments in Liver Alkali Company v. Johnson (1874), L.R., 9 Ex. 338, and Nugent v. Smith (1876) 1 C.P.D. 423.) In practice goods are not often shipped without a written contract or acknowledgment of the terms upon which they are to be carried. For each separate consignment or parcel of goods shipped a bill of lading is almost invariably given, and when a whole cargo is agreed to be carried the terms are set out in a document called a charter-party, signed by or on behalf of the shipowner on the one part, and the shipper, who is called the charterer, on the other part. But at present we are considering the relations of shipowner and shipper independently of any express contract, as in a case when goods are shipped and received to be carried to the place to which the ship is bound for a certain freight, but without any further agreement as to the terms of carriage. In such a case the rights of the parties depend on the rules of law, or, which is much the same thing, upon the warranties or promises which though not expressed must, as the l ” f ‘™ courts have held, be implied as arising from the relation contract between the parties as shipper and carrier. The obli- gations on the one side and the other may be defined shortly to be as follows: — The shipper must not ship goods of a nature or in a condition which he knows, or ought, if he used reasonable care, to know to be dangerous to the ship, or to other goods, unless the shipowner has notice of or has sufficient opportunity to observe their dangerous character. The shipper must be prepared, without notice from the shipowner, to take delivery of his goods with reasonable despatch on the arrival of the ship at the place of destination, being ready there to discharge in some usual discharging place. The shipper must pay the agreed freight, and will not be entitled to claim delivery until the freight has been paid. In other words, the shipowner has a lien on the goods carried for the freight payable in respect of the carriage. On the other hand, the obligation upon the shipowner is first and foremost to deliver safely at their destination the goods shipped, and this obligation is, by the common law, subject to this exception only that the shipowner is not liable for loss or damage caused by the act of God or the king’s enemies; but by statute (Merchant Shipping Act 1894, Part VIII.) it is further qualified to this extent that the shipowner is not liable for loss, happening without his actual fault or privity, by fire on board the ship, or by the robbery or embezzlement of or making away with gold or silver or jewellery, the true nature and value of which have not been declared in writing at the time of shipment; and, further,

the shipowner is not liable for damage to or loss of goods or merchandise beyond an aggregate amount, not exceeding eight pounds per ton for each ton of the ship's tonnage. The shipowner is bound by an implied undertaking, or, in other words, is made responsible by the law as if he had entered into an express undertaking: (1) that the ship is seaworthy; (2) that she shall proceed upon the voyage with reasonable despatch, and shall not deviate without necessity from the usual course of the voyage.

It is not our purpose in this article to discuss minute or doubtful questions; but in their general outline the obligations of shipper and shipowner, where no terms of carriage have been agreed, except as to the freight and destination of the goods, are such as have been described above. The importance of appreciating clearly this view of the relations of shipper and shipowner arises from the fact that these fundamental rules apply to all contracts of affreightment, whether by bill of lading, charter-party or otherwise, except in so far as they are modified or negatived by the express terms of the contract.

AFFREIGHTMENT

303

Bills of Lading.

The document signed by the master or agent for the ship- owner, by which are acknowledged the shipment of a parcel of goods and the terms upon which it is to be carried, is called a Bill of Lading. Very many different forms of bills of lading are used. For the purpose of illustration the following form (from Mr Scrutton's book on Charier-parties and Bills of Lading) has been selected as a sample: —

Shipped, in apparent good order and condition by in

and upon the good Vessel called the now lying in the port of

and bound for , with liberty to call at any ports in

any order, to sail without Pilots, and to tow and assist Vessels in dis- tress, and to deviate for the purpose of saving life or property ; and to be delivered in the like good order and condition at the afore- said port of unto or to his or their assigns, freight and all other conditions as per Charter Party. The act of God, perils of the sea, fire, barratry of the Master and Crew, enemies, pirates,

and thieves, arrests, and restraints of princes, rulers, and people, collisions; stranding, and other accidents of navigation excepted, even when occasioned by negligence, default, or error in judgment of the Pilot, Master, Mariners, or other servants of the Shipowners.

Ship not answerable for losses through explosion, bursting of boilers, breakage of shafts, or any latent defect in the machinery or hull, not resulting from want of due diligence by the Owners of the Ship, or any of them, or by the Ship's Husband or Manager.

General Average payable according to York-Antwerp Rules.

In Witness whereof, the Master or Agent of the said Ship hath affirmed to three Bills of Lading, all of this tenor and date, drawn as first, second and third, one of which Bills being accomplished, the others to stand void.

Dated in this day of 188 .

The bill of lading is an acknowledgment of the shipment of-goods in a named vessel for carriage to a specified destination on terms set forth in the document. It is usually signed by the master of the vessel, but very commonly by the agents of the shipowner or sometimes of the charterers of the vessel. A vessel may be employed by its owners to earn freight in various ways:

(1) It may be placed, as it is said, on the berth as a general ship, to receive cargo from any shippers who may desire to send goods to the port, or one of the ports, to which the vessel is bound. The mate or chief officer usually superintends the load- ing, and, as goods are shipped, a mate's receipt is given as an acknowledgment of the shipment. The mate's receipt is after-wards exchanged for the bill of lading. In the case of a shipment by a general ship the bill of lading is the evidence and memor-andum of the contract between the shipowner and the shipper.

(2) A shipper may, however, require the whole cargo space of the vessel to carry, for example, a full cargo of grain. In such a case the vessel will be chartered by the shipowner to the shipper, and the contract will be the charter-party. Even in such a case a bill or bills of lading will usually be given to enable the shipper to deal more conveniently with the goods by way of sale or otherwise. By the ancient custom of merchants recognized and incorporated in the law, the bill of lading is a document of title,

representing the goods themselves, by the transfer of which symbolical delivery of the goods may be made. But when a cargo is shipped under a charter-party, although bills of lading may be given to the charterer, it is the charter-party, and not the bills of lading, which constitutes the record of the contract between the parties — of charter-parties we shall treat below. (3) There is a third class of case which is a combination of the two with which we have dealt above. A vessel is very commonly chartered by her owner to a charterer who has no intention to ship and does not ship any cargo on his own account, but places the vessel on the berth to receive cargo from shippers who ship under bills of lading. The charterer receives the bill of lading freight and pays the charter-party freight, his object being of course to obtain a total bill of lading freight in excess of the chartered freight, and so make a profit. The master, although he usually remains the servant of the shipowner during the term of the charter-party, acts nevertheless under the directions and on behalf of the charterer in signing bills of lading. The legal effect of this situation is that shippers who ship goods under bills of lading without knowledge of the terms of the charter-party are entitled to look to the shipowner as the person responsible to them for the safe carriage of their goods. This right depends

essentially on the fact that the master who signs the bills of lading, although in doing so he is acting for the charterer, remains nevertheless the servant of the shipowner, who is not allowed to deny as against third persons, who do not know the relations between the charterer and the shipowner, that his servant, the master of the ship, has the ordinary authority of a master to bind his owner by signing bills of lading.

The forms of bills of lading vary very much, and their clauses have been the subject of judicial consideration and decision in a vast number of reported cases. The essential particulars, or at all events those common to all bills of lading, may be stated as follows:

1. The name of the shipper.

2. The name of the ship.

3. The place of loading and destination of the ship.

4. A description of the goods shipped.

5. The place of delivery.

6. The persons to whom delivery is to be made.

7. The freight to be paid.

8. The excepted perils.

9. The shipowner's lien.

The description of (1) the shipper and (2) the ship calls for no remark. The (3) description of the voyage is important, because there is, as we have already explained, an implied undertaking by the shipowner in every contract of carriage not unnecessarily to deviate from the ordinary route of the voyage upon which the goods are received to be carried. The consequences of a deviation are serious, inasmuch as the shipowner is liable, not only for any ,> loss or damage which the shipper suffers in consequence of the deviation, but for any loss of goods which occurs after the devia- tion, even though such loss is caused by one of the excepted perils. The only exception to this rule is that a deviation may be made to save life, but not to save property. It is, however, very usual to qualify the strictness of this implied undertaking by introducing in the bill of lading certain " liberties " to deviate, as, for example, in the form given above, " liberty to call at any ports in any order, to tow and assist vessels in distress, and to deviate for the purpose of saving life and property." The nature and extent of the liberty will depend on the words of the contract. The inclination of English courts has been to construe clauses giving a liberty to deviate somewhat strictly against the ship- owner.

The (4) importance of the description of the goods shipped and their condition is obvious, as the contract is to deliver them as described and in the like good condition, subject, of course, to the exceptions. It must, moreover, be noted that, as against the master or person who has himself signed the bill of lading, the statement therein of the goods shipped is absolutely con- clusive. But as against the shipowner, unless he has himself signed the bill of lading, the statement of the goods shipped is not conclusive. It is evidence as against him that the goods described were shipped, but he is allowed to rebut this evidence by proving, if he can, that the goods mentioned, or some of them, were not in fact shipped.

As to (5) the place of delivery, very serious questions frequently arise. Primarily, of course, the shipowner is bound to deliver at the place named. Should he be prevented by some obstacle or difficulty which is of a temporary nature, the vessel must wait, and delivery must be made as soon as possible. Where, however, the obstacle is permanent, or at all events such as must cause unreasonable delay, having regard to the nature of the adventure, the shipowner is excused from delivery at the place named in the bill of lading, provided the difficulty arises from an excepted peril, or in consequence of delivery at the place named being forbidden by the law of England, as may happen, for example, in the case of a declaration of war between Great Britain and the state in which the port named in the bill of lading is situate. A party to a contract cannot be held liable for breaking his contract if its performance' has become illegal. There may be other cases in which, from the circumstances of the voyage and adventure, it must be inferred that the parties intended the performance of the contract to be conditional ori

the existence at the time of performance of a certain state of things, the non-existence of which would render performance impossible. For instance, if the port named in the bill of lading became permanently closed and inaccessible to shipping in consequence of an earthquake, it would probably be held that the continued existence of the place named as a port was an implied condition of the contract, and that the shipowner was excused. Where, however, the performance of the contract remains lawful, and is not excused by the express terms of the contract, or by some implied condition, the shipowner is liable for any loss or damage suffered by the shipper by reason of his goods not being delivered at the named place, even though such delivery has become impossible. There is another reason why the precise description of the place of delivery often becomes important. It is only on the arrival of the ship at the place described as the place of delivery that the obligation of the consignee of the goods to take delivery commences. Delay involves considerable loss and expense to the shipowner. The shipper or consignee is not responsible for any delay which occurs before the ship has arrived at the place of delivery described in the bill of lading.

(6) The goods may be deliverable by the terms of the bill of lading to a named consignee, and to him only, “but more usually they are made deliverable to the ” order or assigns ” of the named consignee or of the shipper. If the goods are made deliverable to order or assigns the bill of lading is a negotiable instrument, or, in other words, the right to the goods, and the rights and liabilities under the contract contained in the bill of lading, may be transferred by indorsement and delivery of the document. When an indorsement has once been made by the shipper or consignee writing his name and nothing more on the back of the bill of lading, the rights in and under it may be transferred from hand to hand by mere delivery. A bill of lading so indorsed is said to be indorsed ” in blank.” But the shipper or consignee may restrict the negotiability of the bill of lading by indorsing it not ” in blank,” but with a direction requiring delivery to be made to a particular person or indorsee, or to his order. This is called an indorsement ” in full.” When an indorsement has been made ” in full ” to a named indorsee or order, such indorsee must again indorse ” in blank ” or ” in full ” to effect a new transfer of the rights in the bill of lading.

(7) The amount or rate of freight payable is stated in the bill of lading, either expressly, or, not uncommonly when the freight under the bill of lading is the same as under the charter-party, by reference to the charter-party. A common form of such reference is ” freight and other conditions, as per charter-party.” It may here be mentioned that this form of words does not in- corporate in the contract under the bill of lading all the terms and conditions of the charter-party, but only those which apply to the person who is to take delivery, and relate to matters ejusdem generis, or similar to the payment of freight, such as demurrage and the like. The conditions of the charter-party thus incorporated do not include, for ‘instance, the exceptions in the charter-party so as to add them to the exceptions in the bill of lading. Freight, unless it is otherwise provided by the contract, is payable only on delivery of the goods at their destination. If the voyage is interrupted and its completion becomes impossible, the shipowner cannot claim payment of freight even pro rata itineris. He loses his freight altogether. This is so even when the completion of the voyage is prevented by causes for which the shipowner is not responsible, such as the act of God or the king’s enemies, or perils which are within the express exceptions in the bill of lading. When the voyage is interrupted by accident, and indeed in any case, the goods may, by agreement between the

shipowner and the consignee, be delivered at some place short of their destination upon payment of a freight pro rata; that is to say, proportional to the length of voyage accomplished, and such an agreement may be implied in certain circumstances from the conduct of the consignee in taking delivery before they arrive at their destination. In all such cases it will be a question of fact whether the goods were in fact delivered upon the terms, express or implied, that freight

pro rata should be paid. As a rule such an agreement would not be implied where the shipowner is unable or unwilling to forward the goods to their destination, and the owner of the goods, therefore, has no option but to take delivery where offered.

When the ship is disabled and cannot proceed, or she is prevented by some obstacle from proceeding to the place of delivery named in the bill of lading, and the shipowner is unwilling or unable to forward the goods by another ship, even though he may be excused for his failure to carry the goods to their destination, he is not entitled to be paid any part of the freight; and the consignee is entitled to have the goods delivered to him either at the place where the vessel has taken refuge in her disabled condition, or, if the obstacle arises without disablement of the vessel, at the place which is nearest and most reasonably convenient at the time and in the circumstances when the further prosecution of the voyage has to be abandoned. On the other hand, after the goods have been shipped, so long as the shipowner is ready and willing to carry the goods to their destina- tion, or, if the ship is disabled, to forward them to their destina- tion by some other ship without unreasonable delay, the owner of the goods cannot require the goods to be delivered to him at any place short of their destination without payment of the full freight. Sometimes the freight, either wholly or in part, is made payable in advance. If freight payable in advance has become due, even though the ship is lost before it is paid, it must, in the absence of some special provision to the contrary, still be paid, and freight already paid in advance does not become repayable because the goods do not reach their destination. If, however, goods upon which freight has been paid in advance are lost, and the shipowner is liable for their loss, the amount of freight paid in advance must be taken into account in assessing the damage recoverable from the shipowner.

(8) There is no part of the bill of lading which is of greater

practical importance or which demands more careful considera- tion by shipowner and shipper alike than that which sets forth the excepted perils: those perils, or in other words causes of loss, for which the shipowner is to be exempt from liability. By the common law, as we have seen, the exemption of the carrier, apart from express contract, extended only to loss by the act of God or the king's enemies. The expression " act of God " requires a word of explanation. It will be sufficient to say that it is not synonymous with force majeure; but it includes every loss by force majeure in which human agency, by act or negligence, has had no part. The list of excepted perils varies much in different forms of bills of lading. In the older forms it usually included perils of the seas, robbers and pirates, restraint of princes and rulers, fire and barratry (that is, wilful wrong- doing) of the master and crew. The list, however, has grown in modern times, and is still growing; the tendency being to exempt the shipowner from liability for all loss which does not arise from his own personal default, or from the negligence of his managers or agents in failing to provide a vessel seaworthy and fit for the voyage at its commencement. It is important to point out in this connexion that there are two duties which the shipowner is always presumed to undertake, and which are assumed to be unaffected and unqualified by the exceptions, unless a contrary intention is very clearly expressed by the terms of the contract. In the first place, he undertakes abso- lutely that the ship in which the goods are shipped is fit at the commencement of the voyage for the service to be performed. If during the voyage loss arises even from dangers of the seas or other excepted peril which would not have occurred if the vessel had been seaworthy and fit for the voyage at its commencement, the shipowner is not protected by the exceptions, and is liable for the loss. In the second place, there is an implied undertaking by the shipowner that all reasonable care will be taken by himself, his servants and agents, safely to carry and deliver at their destination the goods received by him for carriage. Should loss or damage occur during the voyage, though the direct cause of such loss or damage be perils of the seas or other excepted peril, still the shipowner cannot claim exemption under the exceptions, if the shipper can prove that the loss or damage

would not have occurred but for the negligence of the master or

crew, or other servants of the shipowner. The shipowner, in other words, is bound, with his servants, to use all reasonable care to prevent loss by excepted perils and by any other cause.

It must not be supposed that even these primary obligations,

which aje introduced into every contract of affreightment not by

words but by implication, may not be excluded by the

i Pr f ss express terms of the contract. It has now become stlpula- common form to stipulate that the shipowner shall not twos. ˆ liable for any loss arising from the negligence of his

servants, or that he shall not be liable for loss by the excepted perils even when brought about by the negligence of his servants. And with regard to sea worthiness, it isnot uncommon for the shipownerto stipu- late that he shall not be responsible for loss arising even from the unseaworthiness of the ship on sailing, provided that due care has been taken by the owner and his agents and servants to make the ship seaworthy at the commencement of the voyage. There is indeed no rule of English law which prevents a shipowner from exempting himself by the terms of the bill of lading from liability for damage and loss of every kind, whether arising from unseaworthiness or any other cause whatsoever. In such a case the goods are carried at their owner's risk, and if he desires protection he must obtain it by insurance. In this respect the law of England permits greater freedom of contract than is allowed by the law of some other states. The owners, agents and masters of vessels loading in the United States of America are forbidden by an act of Congress, commonly called the Harter Act, passed in the year 1893, to insert in their contracts of affreightment any clause exempting the shipowner from liability for the negligence of his servants; but it is at the same time enacted that, provided all reasonable skill and care has been exercised by the shipowner to make the vessel seaworthy and fit for the voyage at its commencement, the shipowner shall not be liable for any loss caused by the negligence of the master or crew in the navigation of the vessel, or by perils of the sea or certain other causes set forth in the act. It is now very usual to insert in the bills of lading of British vessels loading in the United States a reference to the Harter Act, incorporating its provisions so as to make them terms and conditions of the bill of lading.

The difficulty of construing the terms of bills of lading with regard to the excepted perils, often expressed in obscure and inexact lan- guage, has given rise to much litigation, the results of which are recorded in the law reports. Where such difficulties arise the ques- tion must be, What is the true and natural meaning of the language used by the parties? This question is not governed by the general rules which we have endeavoured to explain; but the words of the contract must always be considered with reference to these rules, which are founded upon the well-established customs of merchants recognized and formulated by the courts of law.

(9) The bill of lading sometimes contains a clause as to the shipowner's lien. Without any express provision for it the ship-owner has by the common law a lien for freight. If it is desired to give the shipowner a lien for demurrage (see below) or other charges, it must be expressly provided for. The lien is the right of the shipowner to retain the goods carried until payment has been made of the freight or the demurrage, or other charge for which a lien has been given. The lien may be waived, and is lost by delivery of the goods, or by any dealing with the consignee which is inconsistent with a rfght of the shipowner to retain possession of the goods until payment has been made. The ship-owner may preserve his lien by landing the goods and retaining them in his own warehouse, or by storing them in a public ware-house, subject to the conditions required by the Merchant Shipping Act 1894.

Charter-parties.

Charter-parties are, as we have already explained, either for a voyage or for a period of time. (1) A charter-party for a voyage is a formal agreement made between the owner of the vessel and the charterers by which it is agreed that the vessel " being tight, staunch and strong, and every way fitted for the voyage," shall load at a certain named place a full cargo either of goods of a specified description or of general merchandise, and being so loaded shall proceed with all possible despatch either to a specified place or-to a place to be named at a specified port of call, and there deliver the cargo to the charterers or their assigns. There are clauses which provide for the amount of freight to be paid and the manner and time of payment; for the time, usually described as lay days, to be allowed for loading and discharging, and for the demurrage to be paid if the vessel is detained beyond the lay days; usually also a clause requiring " the cargo to be

brought to and taken from alongside at merchant's risk and expense "; a clause

that the master shall sign bills of lading for the cargo shipped either at the same rate of freight as is payable under the charter-party or very commonly at any rate of freight (but in this case with a stipulation that, if the total bill of lading freight is less than the total freight payable under the charter-party, the difference is to be paid by the charterers to the master before the sailing of the vessel); and there is usually what is called the cesser clause, by which the charterer's liability under the charter-party is to cease on shipment of the cargo, the shipowner taking a lien on the cargo for freight, dead freight and demurrage. The charter-party is made subject to exceptions similar to those which are found in bills of lading. There are also usually clauses pro- viding for the commissions to be paid to the brokers on signing the charter-party, the " address " commission to be paid to the agents for the vessel at the port of discharge, and other matters of detail. The clauses in charter-parties vary, of course, inde- finitely, but the above is probably a sufficient outline of the ordinary form of a charter-party for a voyage.

What has been said with regard to bills of lading as to the voyage, the place of delivery, the exceptions and excepted perils, and the liability of the shipowner and his lien applies equally to charter- parties. It may be desirable to add a few words on demurrage, dead freight, and on the cesser clause.

Demurrage is, properly speaking, a fixed sum per day or per hour agreed to be paid by the charterer for any time during which the vessel is detained in loading or discharging over and above the time allowed, which is, as we have said, usually described as the lay days. Sometimes the number of days during which the vessel may be kept on demurrage at the agreed rate is fixed by the charter-party. If no demurrage is provided for by the charter-party, and the vessel is kept loading or discharging beyond the lay days, the shipowner is entitled to claim damages in respect of the loss which he has suffered by the detention of his ship ; or, if the vessel is detained beyond the fixed number of demurrage days, damages for detention will be re- coverable. Sometimes there is no time fixed by the charter-party for loading or discharging. The obligation in such cases is to load or discharge with all despatch that is possible and reasonable in the circumstances; and if the loading or discharging is not done with such reasonable despatch, the shipowner will be entitled to claim

damages for detention of his ship. The rate of demurrage (if any) will generally be accepted as the measure of the damages for deten- tion, but is not necessarily the true measure. When the claim is for detention and not demurrage the actual loss is recoverable, which may be more or may be less than the agreed rate of demurrage. The contract usually provides that Sundays and holidays shall be excepted in counting the lay days, but unless expressly stipulated this exception does not apply to the computation of the period of detention after the lay days have expired.

Dead freight is the name given to the amount of freight lost, and therefore recoverable by the shipowner from the charterer as damages if a full and complete cargo is not loaded in accordance with the terms of the charter-party.

The cesser clause has come into common use because very fre- quently the charterers are not personally interested in the cargo shipped. They may be agents merely, or they may have chartered the vessel as a speculation to make a profit upon the bill of lading freight. The effect of the clause is that when the charterers have shipped a full cargo they have fulfilled all their obligations, the ship- owner discharging them from all further liability and taking instead a lien on the cargo for payment of all freight, demurrage or dead freight that may be payable to him. It has become an established rule for the construction of the cesser clause that, if the language used will permit it, the cesser of liability is assumed to be co-extensive only with the lien given to the shipowner; or, in other words, the charterers are released from those liabilities only for which a lien is given to the shipowner. The shipowner is further secured by the stipulation already referred to, that if the total freight payable under the bills of lading is less than the full chartered freight the difference shall be paid to the shipowner before the vessel sails. A difficulty which sometimes arises, notwithstanding these precautions, is that although an ample lien is given by the charter-party, the terms ot the bills of lading may be insufficient to preserve the same extensive lien as against the holder of the bills of lading. The shippers under the bills of lading, if they are not the charterers, are not liable for the chartered freight, but only for the bill of lading freight; and unless the bill of lading expressly reserves it, they are not subject to a lien for the chartered freight. The master may guard against this difficulty by refusing to sign bills of lading which do not preserve the shipowner's lien for his full chartered freight. But he is often put into a difficulty by a

somewhat improvident clause in- the charter- party requiring him to sign bills of lading as presented. See Kruger v. Moel Tryvan, 1907 A. C. 272.

(2) A time charter-party is a contract between the shipowner and charterers, by which the shipowner agrees to let and the

charterers to hire the vessel for a specified term for employment, either generally in any lawful trade or upon voyages within certain limits. A place is usually named at which the vessel is to be re-delivered to the owners at the end of the term, and the freight is payable until such re-delivery; the' owner almost always pays the wages of the master and crew, and the charterers provide coals and pay port charges; the freight is usually fixed at a certain rate per gross register ton per month, and made payable monthly in advance, and provision is made for suspension of hire in certain cases if the vessel is disabled; the master, though he usually is and remains the servant of the owner, is required to obey the orders of the charterers as regards the employment of the vessel, they agreeing to indemnify the owners from all liability to which they may be exposed by the master signing bills of lading or otherwise complying with the orders of the charterers; and the contract is made subject to exceptions similar to those in bills of lading and voyage charter-parties. This is the general outline of the ordinary form of a time charter-party, but the forms and their clauses vary, of course, very much, according to the circum- stances of each case.

It is apparent that under a time charter-party the shipowner jo a large extent parts with the control of his ship, which is employed within certain limits according to the wish and direc- tions, and for the purposes and profit of, the charterers. But, as we have already explained at the beginning of this article, the shipowner continues in possession of his vessel by his servant the master, who remains responsible to his owner for the safety and proper navigation of the ship. The result of this, as has been already pointed out, is that the holder of a bill of lading signed by the master, if he has taken the bill of lading without knowledge of the terms of the time charter-party, may hold the owner responsible for the due performance of the contract signed by the master in the ordinary course of his duties, and within his

ostensible authority as servant of the shipowner, although in fact in signing the bill of lading the master was acting as agent for and at the direction of the time charterer, and not the shipowner. In the language of the ordinary time charter-party the ship is let to the charterers; but there is no true demise, because, as we have pointed out, the vessel remains in the possession of the shipowner, the charterer enjoying the advantages and control of its employ- ment. Where the possession of a ship is given up to a hirer, who appoints his own master and crew, different considera- tions apply; but though the instrument by which the ship is let may be called a charter-party, it is not truly a contract of affreightment.

There are certain rights and obligations arising out of the relationship of shipowner and cargo-owner in circumstances of extraordinary peril or urgency in the course of a voyage, rights. which, though not strictly contractual, are well estab- lished by the customs of merchants and recognized by the law. It is obvious that, when a ship carrying a cargo is in the course of a voyage, the master to some extent represents the owners of both ship and cargo. In cases of emergency it may be necessary that the master should, without waiting for authority or instructions, incur expense or make sacrifices as agent not only of his employer, the shipowner, but also of the cargo-owner. Ship and cargo may be in peril, and it may be necessary for the safety of both to put into a port of refuge. There it may be necessary to repair the ship, and to land and warehouse, and afterwards re-ship the cargo. For these purposes the master will be obliged to incur expense, of which some part, such as the cost of repairing the ship, will be for the benefit of the shipowner; part, such as the warehousing expenses, will be for the benefit of the cargo-owner; and part, such as the port charges incurred in order to enter the port of refuge, are for the common benefit and safety of ship and cargo. Again, in a storm at sea, it may be necessary for the safety of ship and cargo to cut away a mast or to jettison, that is to say, throw overboard part of the cargo. In such a case the master, acting for the shipowner or cargo-owner, as the case may be, makes a sacrifice of part of the ship or part of the cargo, in either case for the purpose of saving ship and cargo from a danger common to both. Voluntary sacrifices so made

and extraordinary expenses incurred for the common safety are called general average (see Average) sacrifices and expenses, and are made good to the person who has made the sacrifice or incurred the expense by a general average contribution, which is

recoverable from the owners of the property saved in proportion to its value, or, in other words, each contributes rateably according to the benefit received. The law regulating the righls of the parties with regard to such contribution is called the law of General Average. It must, however, be remembered that the owner of the cargo is entitled under the contract of affreightment to the ordinary service of the ship and crew for the safe carriage of the cargo to its destination, and the shipowner is bound to pay all ordinary expenses incurred for the purpose of the voyage. He must also bear all losses arising from damage to the ship by accidents. But when extraordinary expense has been incurred by the shipowner for the safety of the cargo, he can recover such expense from the owner of the cargo as a special charge on cargo; or when an extraordinary expense has been incurred or a voluntary sacrifice made by the shipowner to save the ship and cargo from a peril common to both, he may require the owner of cargo , to contribute in general average to make good the loss.

See Carver, Carriage by Sea (London, 1905) ; Scrutton, Charter-parties and Bills of Lading (London, 1904). (W.)

AFGHANISTAN, a country of Central Asia. Estimated area 245,000 sq. m. (including Badakshan and Kafiristan). Pop. about 5,000,000. It is bounded on the N. by Russian Turkestan, on the W. by Persia, and on the E. and S. by Kashmir and the independent tribes of the North- West Frontier of India and Baluchistan. The chief importance of Afghanistan in modern days is due to its position as a ” buffer state ” intervening be- tween the two great empires of Asiatic Russia and British India. During the last quarter of the 19th century our knowledge of the country was greatly increased, and its boundaries on the N., E. and S. were strictly delimited. The second Afghan war of 1878-80 afforded an opportunity for the extension of wide geographical surveys on a scientific basis. The Russian-Afghan Boundary Commission of 1884-1886 resulted in the delimitation and mapping of the northern frontier. The Durand agreement of 1893 led to the partition of the Pathan tribes on the southern and eastern frontiers. The Pamir Commission of 1895 settled its north-eastern border. Finally the Perso-Baluch Commission of 1904-1905 defined its western face.

Beginning with the Persian border at Zulfikar on the Hari Rud river, the boundary between Afghanistan and Russia follows a line roughly parallel to the course of the Paropamisus, and about 35 m. to the north of it, till it strikes the Kushk river in Jamshidi

territory at a point which was once known as Chahil Dukteran, but is now the Russian post Kushkinski, and the terminus of a branch railway from Merv. Kushkinski is about 20 m. below the old Jamshidi settlement of Kushk, which is the capital of Badghis. The settlement and the post originally called Kushk must not be confused together. From Kushk- inski the boundary runs north-east, crossing the Murghab river near Maruchak (which is an Afghan fortress) , and thence passes north-east through the hills of the Chul, and the undulating deserts of the Aleli Turkmans, to the Oxus, leaving the valleys of Charshamba and of Andkhui (to which it runs approximately parallel) within Afghan limits. These valleys denote the limits of cultivation in this direction. Throughout all this region the boundary is generally of an artificial character, marked by pillars, but it is here and there indicated by natural features forming local lines of water-parting or water-course. The boundary meets the Oxus at Khamiab at the western extremity of the culti- vated district of Khwaja Salar, and from that point to the eastern end of Lake Victoria in the Pamirs the main channel of the Oxus river forms the northern limits of Afghanistan. (See Oxus.) Eastwards from Lake Victoria the frontier line was determined by the Pamir Boundary Commission of 1895. A part of the little Pamir is included in Afghan territory, but the boundary crosses this Pamir before the great bend northwards of the Aksu takes place, and, passing over a series of crags and un- traversable mountain ridges, is lost on the Chinese frontier in the

AFGHANISTAN

Doslit oˆ

*?

REGISTA1

b° “ L <-> p) jf bb° Longiludi East 68° of Grcenw

AFGHANISTAN

English Miles 5° 100 ‘.S c

Boundary of Afghanistan .Wv

snowfields of Sarikol. Bending back westwards upon itself, the line of Afghan frontier now follows the water-parting of the Hindu Kush; and as the Hindu Kush absolutely overhangs the

Oxus nearly opposite Ishkashim, it follows that, at this point, Afghanistan is about 10 m. wide. Thus a small and highly elevated portion of the state extends eastwards from its extreme north-eastern corner, and is attached to the great Afghan quadrilateral by the thin link of the Panja valley. These narrow limits (called Wakhan) include the lofty spurs of the northern flank of the Hindu Kush, an impassable barrier at this point, where the glacial passes reach 19,000 ft. in altitude, and the enclosing peaks 24,000 ft. The backbone or main water-divide of the Hindu Kush continues to form the boundary between Afghan- istan and those semi-independent native states which fringe Kashmir in this mountain region, until it reaches Kafiristan. From near the Dorah pass (14,800 ft.), which connects Chitral with the Panja (or Oxus) river, a long, straight, snow-clad spur reaches southwards, which divides the Kafiristan valley of Bashgol from that of Chitral, and this continues to denote the eastern limits of Afghanistan till it nearly touches the Chitral river opposite the village of Arnawai, 45 m. south of Chitral. Here the Bashgol and Chitral valleys unite and the boundary passes to the water-divide east of the Chitral river, after crossing it by a spur which leaves the insignificant Arnawai valley to the north; along this water-divide it extends to a point nearly opposite the quaint old town of Pashat in the Kunar valley (the Chitral river has become the Kunar in its course southwards), and then stretches away in an uneven and undefined line, dividing certain sections of the Mohmands from each other by hypo- thetical landmarks, till it strikes the Kabul river near Palosi.

EmcryWalkcr *ft

Thence following a course nearly due south, it reaches Landi Kotal. From the abutment of the Hindu Kush on the Sarikol in the Pamir regions to Landi Kotal, and throughout its eastern and southern limits, the boundary of Afghanistan touches districts which were brought under British political control with the formation of the North-West Frontier Provinces of India in 1901. From the neighbourhood of Landi Kotal the boundary is carried to the Safed Koh overlooking the Afridi Tirah, and then, rounding off the cultivated portions of the Kurram valley below the Peiwar, it crosses the Kaitu and passes to the upper reaches of the Tochi. Crossing these again, it is continued on the west of Waziristan, finally striking the Gomal river at Domandi. South of the Gomal it separates the interests of Afghanistan from those of Baluchistan, which here adjoins the North-West Frontier Province. From Domandi (the junction of the Kundar river with

the Gomal) the Afghan boundary marches with that of Baluchistan. (See Baluchistan.) It is carried to the south-west on a line which is largely defined by the channels of the Kundar and the Kadanai to a point beyond the Sind-Peshin terminal station of New Chaman, west of the Khojak range, and then drops southward to Shorawak and Nushki. From Nushki it crosses the Helmund desert, touching the crest of a well-defined mountain watershed for a great part of the way, and, leaving Chagai to Baluchistan, it strikes nearly west to the Persian frontier, and joins it on the Koh-i- Malik Siah mountain, south of Seistan. Two points of this part of the Afghan boundary are notable. It leaves some of the most fanatical of the Durani Afghan people on the Baluch side of the frontier in the Toba district, north of the Quetta-Chaman line of railway; and it passes 50 m. south of the Helmund river,

enclosing within Afghanistan the only approach to Seistan from India which is available during the seasons of Helmund overflow. Between Afghanistan and Persia the boundary was defined by Sir F. Goldsmid's Commission in 1872 from the Malik-Siah-Koh to the Helmund Lagoons, and rectified by the Commission under Sir Henry MacMahon in 1903-1905. Beyond these lagoons to Hashtadan it is still indefinite. The eastern limits of Hashtadan had been previously fixed as far north as the Hari Rud river at Toman Agha. From this point to Zulfikar the Hari Rud is itself the boundary.

Within the limits of this boundary Afghanistan comprises four main provinces, Northern Afghanistan or Kabul, Southern

Afghanistan or Kandahar, Herat and Afghan Turkes- proviaces. tan > together with the minor dependencies of the

Ghilzai and Hazara Highlands, Ghazni, Jalalabad and Kafiristan. All these are described in separate articles. The kingdom of Kabul is the historic Afghanistan; the link which unites it to Kandahar, Herat and the other outlying provinces having been frequently broken and again restored by amirs of sufficient strength and capability. The Herat province is largely Persian, while Afghan Turkestan is chiefly Usbeg; and in neither is the sentiment of loyalty to the central government very strong. The bond is

geographical and political rather than racial. The geographical divisions of the country are created by the basins of its chief rivers, the Kabul, the Helmund, the Hari Rud and the Oxus. The Kabul river drains Northern Afghanistan, the Hari Rud the province of Herat, and the Oxus that of Afghan Turkestan. Afghanistan is largely a country of mountains and deserts; but there are wide tracts of highly irrigated and most productive country where fruit is grown in such abundance as to become an important item in the export trade. The Afghans are expert agriculturists' and make profitable use of all the natural sources of water-supply. As practical irrigation engineers they are only rivalled by the Chinese.

The dominant mountain system of Afghanistan is the Hindu Kush, and that extension westwards of its water-divide which

is indicated by the Koh-i-Baba to the north-west of systems. Kabul, and by the Firozkhoi plateau (Karjistan),

which merges still farther to the west by gentle gradients into the Paropamisus, and which may be traced across the Hari Rud to Mashad.

The culminating peaks of the Koh-i-Baba overlooking the sources of the Hari Rud, the Helmund, the Kunduz and the Kabul very nearly reach 17,000 ft. in height (Shah Fuladi, the highest, is 16,870), and from them to the south-west long spurs divide the upper tribu- taries of the Helmund, and separate its basin from that of the Farah Rud. These spurs retain a considerable altitude, for they are marked by peaks exceeding 1 I ,000 ft. They sweep in a broad band of roughly parallel ranges to the south-west, preserving their general direction till they abut on the Great Registan desert to the west of Kandahar, where they terminate in a series of detached and broken anticlinals whose sides are swept by a sea of encroaching sand. The long, straight, level-backed ridges which divide the Argandab, the Tarnak and Arghastan valleys, and flank the route from Kandahar to Ghazni, determining the direction of that route, are outliers of this system, which geographically includes the Khojak, or Kwaja Amran, range in Baluchistan.

North of the main water-parting of Afghanistan the broad syn- clinal plateau into which the Hindu Kush is merged is traversed by the gorges of the Saighan, Bamian and Kamard tributaries of the Kunduz, and farther to the west by the Band-i-Amir or Balkh

river. Between the debouchment of the Upper Murghab from the Firozkhoi uplands into the comparatively low level of the valley above Bala Murghab, extending eastwards in a nearly straight line to the upper sources of the Shibarghan stream, the Band-i-Turkestan range forms the northern ridge between the plateau and the sand formations of the Chul. It is a level, straight-backed line of sombre mountain ridge, from the crest of which, as from a wall, the extra- ordinary configuration of that immense loess deposit called the Chul can be seen stretching away northwards to the Oxus — ridge upon ridge, wave upon wave, like a vast yellow-grey sea of storm-twisted billows. The Band-i-Turkestan anticlinal may be traced eastwards of the Balkh-ab (the Band-i-Amir) within the folds of the Kara Koh to the Kunduz, and beyond ; but the Kara Koh does not mark the northern wall of the great plateau nor overlook the sands of the Oxus plain, as does the Band-i-Turkestan. Here there intervenes a second wide synclinal plateau, of which the northern edge is defined by the flat outlines of the Elburz to the south of Mazar-i-Sharif, and immediately at the foot of this range lie the alluvial plains of Mazar

Geology.

and Tashkurghan. Opposite Tashkurghan the Oxus plain narrows to a short 25 m. On the south this great band of roughly un-dulating central plateau is bounded by the Koh-i-Baba, to the west of Kabul, and by the Hindu Kush to the north and north-east of that city. Thus the main routes from Kabul to Afghan Turkestan must cross either one or other of these ranges, and must traverse one or other of the terrific defiles which have been carved out of them by the upper tributaries of the rivers running northwards towards the Oxus. Probably in no country in the world are there gathered together within comparatively narrow limits so many clean-cut waterways, measuring thousands of feet in depth, affording such a stupendous system of narrow roadways through the hills.

After the Hindu Kush and the Turkestan mountains, that range which divides Ningrahar (or the valley of Jalalabad) from Kurram and the Afridi Tirah, and is called Safed Koh (also the name of the range south of the Hari Rud), is the most important, as it is the most impressive, in Afghanistan.

The highest peak of the Safed Koh, Sikaram, is 15,600 ft. above sea-level. From this central dominating peak it falls gently

towards the west, and gradually subsides in long spurs, reaching to within a few miles of Kabul and barring the road from Kabul to Ghazni. At a point which is not far east of the Kabul meridian an offshoot is directed southwards, which becomes the water-parting between the Kurram and the Logar at Shutargardan, and can be traced to a connexion with the great watershed of the frontier dividing the Indus basin from that of the Helmund. This main watershed retains its high altitude far to the south. There are peaks measur- ing over 12,000 ft. on the divide between the Tochi and the Ghazni plains.

So far as we know at present the geological history of Afghanistan differs widely from that of India. When, somewhere at the commencement of the Cretaceous period, the peninsula of India was connected by land with Mada- gascar and Southern Africa, all Afghanistan, Baluchistan and Persia formed part of an area which was not continuously below sea-level, but exhibited alternations of land and sea. The end of the Cretaceous period saw the beginning of a series of great earth movements ushered in by volcanic eruptions on a scale such as the earth has never since witnessed, which resulted in the upheaval of the Himalayas by a process of crushing and folding of the sedimentary rocks till marine fossils were forced to an altitude of 20,000 ft. above the sea. It was not till the Tertiary age, and even late in that age, that much of the land area of Afghanistan was raised above the sea-level. Then the ocean gradually retired into the great Central Asian depressions.

Everywhere there have been great and constant changes of level since that period, and the process of flexure and the formation of anticlinals traversing the northern districts of Afghanistan is a process which is still in action. So rapid has been the land elevation of Central Afghanistan that the erosive action of rivers has not been able to keep pace with that of upheaval ; and the result all through Afghanistan (but specially marked in the great central highlands between Kabul and Herat) is the formation of those immensely deep gorges and defiles which are locally known as daras. One of these, in the Astarab, to the south-east of Maimana, is but 30 yds. wide, and is enclosed between perpendicular limestone cliffs 1500 ft. high. C. L. Griesbach considers that the general outline of the land con- figuration has remained much the same since Pliocene times, and that the force which brought about the wrinkling of the older de- posits still continues to add fold on fcld. The highlands which shut off the Turkestan provinces from Southern Afghanistan have afforded

the best opportunities for geological investigation, and as might be expected from their geographical position, the general result of the examination of exposed sections leads to the identification of geo- logical affinity with Himalayan, Indian and Persian regions. The general configuration of the Turkestan highlands has been already indicated.

Against the last great fold which terminates this mountain area northwards are ranged the Tertiaries and recent deposits. North of Maimana they form low undulating loess hills, in which most of the Band-i-Turkestan drainage is lost. This wide-spreading loess area, formed partly of wind-blown sand and partly of detritus from the mountains, is known as Chul, and merges into the great plains south of the Oxus river, a great part of which is covered with modern aerial deposits. Beneath this Chul formation the older beds of the outer and Turkestan ranges dip and pass to an irregular out- crop near the banks of the Oxus. Between the Oxus and the hills there has already been formed a rise or flexure in the ground, which extends more or less parallel to the northern edge of the hills, and, shutting in the cultivated area of the plains, arrests all tributaries seeking to effect a junction with theOxus from the south, and leads to the formation of marshes and swamps. This appears to be the beginning of a new anticlinal which has altered the levels of the Balkh plain, and is indicative of those elevating processes which

may have been effective within historic times in changing the climate and the agricultural prospects of this part of Central Asia. The Oxus itself is steadily encroaching on its right banks and depositing detritus on the left.

No fresh discoveries of minerals likely to be of high economic value to Afghanistan have been made of late years. Such as are known and worked at present have been worked from very ancient times, and their capacity is not likely to develop greatly under the Kabul government. The most important feature in this connexion which was noted by the geologist of the Russo- Afghan Commission is the existence of vast coal beds in northern Afghanistan. In 1903 some coal mines were discovered in the Jagdalak districts.

There are no glaciers now to be found in Afghan Turkestan ; but evidences of their recent existence are abundant. The great boulder bed terraces in some of the valleys of the northern slopes of the Ferozkhoi plateau are probably of glacial origin. In the mountains west of Kabul glaciers have retired, leaving the moraines perfectly undisturbed. They are probably contemporary with the older alluvia. (T. H. H.*)

The oldest rocks which have yet been identified 1 in Afghanistan occur along the axis of the main watershed, and have been referred Rocks. to t ˆ le Carboniferous. At Robat-i-Pai near Herat, for example, there is a dark Productus limestone which seems to be identical with the Product us limestone of the Central Himalayas. These beds are conformably succeeded, along the Central Asian watershed, by a continuous series of strata which apparently repre- sent the Permian, Trias and Jurassic of Europe. They consist of marine beds alternating with freshwater and littoral deposits, together with plant beds and coal-seams of considerable thickness. The lowest beds of this series, which from their position may belong either to the Permian or to the upper part of the Carboniferous, have yielded no recognizable fossils; but they include a conglomerate which closely resembles the boulder bed near the base of the Talchir series in India. The Upper Trias has been definitely identified by the occurrence of Halobia and other fossils; while in the higher beds of the series marine forms belonging to the middle and upper Jurassic have been found.

The plant beds occur at several horizons, and among the remains which have been found in them are several forms which occur also in the Gondwana beds of India. There can be no doubt that the series as a v/hole is the equivalent of the Gondwana system, and when the country has been more closely examined the association of marine fossils with Gondwana plants will be of the greatest value in determining the precise homotaxis of the Indian deposits.

The Jurassic beds are followed, generally with perfect conformity, by the Cretaceous, which covers a large part of Afghan Turkestan and probably forms the greater part of the ranges which run south and south-west from the principal watershed. The lowest beds consist of red grits which contain Neocomian fossils, while the middle and upper Cretaceous consist chiefly of limestone and chalk. The entire system may be represented in the west, but in the Herat province and in Afghan Turkestan the middle Cretaceous seems to be absent, and it is probable that, as in other regions, the upper Cretaceous covers a much wider area than the lower beds. Tertiary and recent deposits are widely spread, filling most of the valleys and covering the plains of the Helmund. Eocene beds have not yet been proved to exist ; but this is probably owing to the imperfect know- ledge of the country, for the formation is known in Persia, Baluch- istan and the Suliman Hills. The lower part of the Miocene is marine in Herat and Afghan Turkestan; but the upper Miocene is usually of freshwater or estuarine origin. In Afghanistan, as in other regions near the great Eurasian system of folds, the Miocene includes extensive deposits of gypsum and salt. It was during this period that the forces which finally raised the country above the level of the sea began to take effect. The Pliocene consists entirely of freshwater and terrestrial deposits, which were probably laid down at the foot of the rising hills and on the floors of the intervening valleys. As the elevation continued, they were sometimes involved in the folding to which the mountains owe their origin. During this period the gradual desiccation of the country continued, and wind-blown deposits, such as the loess, began to make their appearance.

Although volcanic cones are known both in Persia and in Baluch- istan, none have yet been described in Afghanistan itself. There is, however, ample evidence that at several distinct geological periods the region has been the seat of great volcanic activity. According to C. L. Griesbach, basic volcanic rocks are interbedded with the lowest part of the plant-bearing series, and enormous outbursts took place during the Neocomian period. But the most important igneous masses are the great intrusions of syenitic granite and of basic rock which penetrate the Cretaceous beds. These are probably of Eocene or of late Cretaceous age. (P. La.)

1 We owe our knowledge of the geology of Afghanistan almost entirely to the observations of C. L. Griesbach, and a summary of

his researches will be found in Records of the Geological Survey of India, vol. xx. (1887), pp. 93-103, with map.

Omitting the group of northern routes to India from Central Asia, which pass between Kashmir and Afghanistan through the defiles of Chitral and of the Indus (see passe s, Hindu Kush), the highways of Afghanistan may be classed under two heads: (1) Foreign trade routes, and (2) Internal communications.

(1) Of the many routes which cross the frontiers of Afghanistan the most important commercially are those which connect the Oxus regions and the Central Asian khanates with Kabul, and those which lead from Kabul, Ghazni and Kandahar to the plains of India.

Kabul is linked with Afghan Turkestan and Badakshan by three main lines of communication across the Koh-i-Baba and the Hindu Kush. One of these routes follows the Balkh river to its head from Tashkurghan, and then, preserving a high general level of 8000 to 9000 f t. , it passes over the water-divides separating the upper tribu- taries of the Kunduz river, and drops into the valley formed by an- other tributary at Bamian. From Bamian it passes over the central mountain chain to Kabul either by the well-known passes of Irak (marking the water-divide of the Koh-i-Baba) and of Unai (marking the summit of the Sanglakh, a branch of the Hindu Kush), or else, turning eastwards, it crosses into the Ghorband valley by the Shibar, a pass which is considerably lower than the Irak and is very seldom snowbound. From the foot of the Unai pass it follows the Kabul river, and from the foot of the Shibar it follows the circuitous route which is offered by the drainage of the Ghorband valley to Charikar, and thence southwards to Kabul. The main points on this route are Haibak, Bajgah and Bamian. It is full of awkward grades and minor passes, but it does not maintain a high level generally, no pass (if the Shibar route be adopted) much exceeding 10,000 ft. That this has for centuries been regarded as the main route northward from Kabul, the Buddhist relics of Bamian and Haibak bear silent witness; but it may be doubted whether Abdur Rahman's talent for roadmaking has not opened out better alternative lines. One of his roads connects Haibak with the Ghorband valley by the Chahardar pass across the Hindu Kush. The pass is high (nearly 14,000 ft.), but the road is excellently well laid out, and the route, which, south of Haibak, traverses a corner of the Ghori and Baghlan districts of Badakshan, is more direct. A third route also passes through

Badakshan, and connects Kunduz with Charikar by the Khawlk pass and Panjshir river. The latter joins the Ghorband close to Charikar. The Khawak (11,600 ft.) is not a high pass; the grades are easy and the snowfall usually light. This high road is stated (on Afghan authority) to be kept open for khafila traffic all the year round by the employment of forced labour for clearing snow. It is a recently developed route and one of great importance to Kabul, both strategically and commercially.

Routes that pass through the mountain barriers of the frontier between Peshawarandthe Gomaloccur at intervals alongthe western border, and in the northern section of the Indian frontier they are all well marked. The Khyber, Kurram arid Tochi are the best known, inasmuch as all these lines of advance into Afghanistan are held by British troops or Indian levies. But the Bara valley route into the heart of the Afridi Tirah is not to be altogether overlooked, although it is not a trade route of any importance. Between Kabul and Jalalabad there are two roads, one by the Lataband pass, and the other and more difficult by the Khurd-Kabul and Jagdalak passes, the latter being the scene of the massacre of a British brigade in 1842. Between Jalalabad and Peshawar is the Khyber pass (q.v.). The Khyber was not in ancient times the main route of advance from Kabul to Peshawar. From Kabul the old route followed the Kabul river through the valley of Laghman (or Lamghan, as the Afghans call it) over a gentle water-parting into the Kunar valley, leaving Ningrahar and Jalalabad to the south. From the Kunar it crossed into Bajour by one of several open and comparatively easy passes, and from Bajour descended into India either by the Malakand or some other contiguous frontier gateway to the plains of Peshawar.

The Kurram route involves the Peiwar and Shutargardan passes (8600 and 10,800 ft. respectively) across the southern extensions of the Safed Koh range, and has never been a great trade route, however suitable as an alternative military line of advance.

Trade does not extend largely between Afghanistan and India by the Tochi route, being locally confined to the valley and the districts at its head, yet this is the shortest and most direct route between Ghazni and the frontier, and in the palmy days of Ghazni raiding was the road by which the great robber Mahmud occasionally descended on to the Indus plains. . Traces of his raiding and road- making are still visible, but it is certain that he made use of the more direct route to Peshawar far more frequently than he did of the Tochi. The exact nature of the

connexion between the head of the Tochi and the Ghazni plain is still unknown to us.

The Gomal is the great central trade route between Afghanistan and India; and the position, which is held by a tribal post at Wana, will do much to ensure its continued popularity. The Gomal in- volves no passes of any great difficulty, although it is impossible to follow the actual course of the river on account of the narrow defiles which have been cut through the recent conglomerate beds which flank the plains of the Indus. It has been carefully surveyed for a possible railway alignment; and an excellent road now connects

Tank (at its foot) with the Zhob line of communications to Quetta, and with Wana on the southern flank of Waziristan. The Gomal route is of immense importance, both as a commercial and strategic line, and in both particulars is of far greater significance than either the Kurram or the Tochi.

(2) Of theinteriorlinesof communication, those which connect the great cities of Afghanistan, Herat, Kabul and Kandahar, are obvi- ously the most important. Between Kabul and Herat there is no ” royal ” road, the existing route passing over the frequently snow- bound wastes that lie below the southern flank of the great Koh- i- Baba into the upper valleys of the Hari Rud tributaries. It is a waste, elevated, desolate region that the route traverses, and the road itself is only open at certain seasons of the year. Between Kabul and Kandahar exists the well-known and oft-traversed route by Ghazni and Kalat-i-Ghilzai . There is but one insignificant water- parting — or kotal — a little to the north of Ghazni; and the road, although unmade, may be considered equal to any road of its length in Europe for military purposes. Between Kandahar and Herat there is the recognized trade route which crosses the Helmund at Girishkand passes through Farah and Sabzawar. It includes about 360 miles of easy road, with spaces where water is scarce. Thereis not a pass of any great importance, nor a river of any great difficulty, to be encountered from end to end, but the route is flanked on the north between Kandahar and Girishk by the Zamindawar hills, con- taining the

most truculent and fanatical clans of all the Southern Afghan tribes. Little need be said of the 65 m. of route between Kandahar and the Baluchistan frontier at New Chaman. It is on the whole a route across open plains and hard, .stony " dasht"— a route which would offer no great difficulties to that railway extension from Chaman which has so long been contemplated. A very considerable trade,now passes along this route to India, in spite of almost prohibitive imposts ; but the trade does not follow the railway from New Chaman to the eastern foot of the Khojak. Long strings of camels may still be seen from the train windows patiently treading their slow way over the Khojak pass to Kila Abdullah, whilst the train alongside them rapidly twists through the mountain tunnel into the Peshin valley.

The variety of climate is immense, as might be expected. Taking the highlands of the country as a whole, there is no great difference between the mean temperature of Afghanistan and that of the lower Himalayas. Each may be placed at a point between 50° and 6o° F. But the remark- able feature of Afghan climate (as also of that of Baluchistan) is its extreme range of temperature within limited periods. The least daily range in the north is during the cold weather, the greatest in the hot. For seven months of the year (frpm May to November) this range exceeds 30 F. daily. Waves of intense cold occur, lasting for several days, and one may have to endure a cold of 12 below zero, rising to a maximum of 17° below freezing-point. On the other hand the summer temperature is exceedingly high, especially in the Oxus regions, where a shade maximum of 1 io° to 1 20° is not uncommon. At Kabul, and over all the northern part of the country to the descent at Gandamak, winter is rigorous, but especially so on the high Arachosian plateau. In Kabul the snow lies for two or three months; th*e people seldom leave their houses, and sleep close to stoves. At Ghazni the snow has been known to lie long beyond the vernal equinox; the thermometer sinks to io° and 15° below zero (Fahr.); and tradition relates the entire destruction of the population of Ghazni by snowstorms more than once.

At Jalalabad the winter and the climate generally assume an Indian character. The summer heat is great everywhere in Afghanistan, but most of all in the districts bordering on the Indus, especially Sewi, on the lower Helmund and in Seistan. All over Kandahar province the summer heat is intense, and the simoon is not unknown. The hot season throughout this part of the country is rendered more trying by frequent dust storms and

fiery winds; whilst the bare rocky ridges that traverse the country, absorbing heat by day and radiating it by night, render the summer nights most oppressive. At Kabul the summer sun has great power, though the heat is tempered occasionally by cool breezes from the Hindu Kush, and the nights are usually cool. At Kandahar snow seldom falls on the plains or lower hills; when it does, it melts at once.

At Herat, though 800 ft. lower than Kandahar, the summer climate is more temperate; and, in fact, the climate altogether is far from disagreeable. From May to September the wind blows from the N.\V. with great violence, and this extends across the country to Kandahar. The winter is tolerably mild;

snow melts as it falls, and even on the mountains does not lie long. Three years out of four at Herat it does not freeze hard enough for the people to store ice; yet it was not very far from Herat, and could not have been at a greatly higher level (at Kafir Kala, near Kassan) that, in 1750, Ahmad Shah's army, retreating from Persia, is said to have lost 18,000 men from cold in a single night. In the northern Herat districts, too, records of the coldest month (February) show the mean minimum as 17° F., and the maximum 38 . The eastern reaches of the Hari Rud river are frozen hard in the winter, rapids and all, and the people travel on it as on a road.

The summer rains that accompany the S.W. monsoon in India, beating along the southern slopes of the Himalaya, travel up the Kabul valley as far as Laghman, though they are more clearly felt in Bajour and Panjkora, under the high spurs of the Hindu Kush, and in the eastern branches of Safed Koh. Rain also falls at this season at the head of Kurram valley. South of this the Suliman mountains may be taken as the western limit of the monsoon's action. It is quite unfelt in the rest of Afghanistan, in which, as in all the west of Asia, the winter rains are the most considerable. The spring rain, though less copious, is more important to agriculture than the winter rain, unless where the latter falls in the form of snow. In the absence of monsoon influences there are steadier weather indica- tions than in India. The north-west blizzards which occur in winter and spring are the most noticeable feature, and their influence is clearly felt on the Indian frontier. The cold is then intense and the force of the wind cyclonic. Speaking generally, the Afghanistan climate is a dry one. The sun shines with splendour for three-fourths of the year, and the nights are even more clear than the days. Marked

characteristics are the great differences of summer and winter temperature and of day and night temperature, as well as the extent to which change of climate can be attained by slight change of place. As the emperor Baber said of Kabul, at one day's journey from it you may find a place where snow never falls, and at two hours' journey a place where snow almost never melts!

The Afghans vaunt the salubrity and charm of some local climates, as of the Toba hills above the Kakar country, and of some of the high valleys of the Safed Koh.

The people have by no means that immunity from disease which the bright, dry character of the climate and the fine physical aspect of a large proportion of them might lead us to expect. Intermittent and remittent fevers are very prevalent; bowel complaints are common, and often fatal in the autumn. The universal custom of sleeping on the house-top in summer promotes rheumatic and neuralgic affections; and in the Koh Daman of Kabul, which the natives regard as having the finest of climates, the mortality from fever and bowel complaint, between July and October, is great, the immoderate use of fruit predisposing to such ailments.

The term Afghan really applies to one section only of the mixed conglomeration of nationalities which forms the people of Afghanistan, but this is the dominant section known as the Durani. The Ghilzai (who is almost as powerful tl J£ a " as the Durani) claims to be of Turkish origin; the Hazaras, the Chahar-Aimak, Tajiks, Uzbegs, Kafirs and others are more or less subject races. Popularly any inhabitant of Afghanistan is known as Afghan on the Indian frontier without distinction of origin or language; but the language division between the Parsiwan (or Persian-speaking Afghan) and the Pathan is a very distinct one. The predominance of the Afghan in Afghanistan dates from the middle of the 18th century, when Ahmad Shah carved out Afghanistan from the previous con- quests of Nadir Shah and called it the Durani empire.

The Durani Afghans claim to be Ben-i-Israel, and insist on their descent from the tribes who were carried away captive from Palestine to Media by Nebuchadrezzar. Yet they also claim to be Pukhtun (or Pathan) in common with all other Pushtu-speaking tribes, whom they do not admit to be Afghan. The bond of affinity between the various peoples who compose the Pathan community is simply the bond of a common language.

All of them recognize a common code or unwritten law called Pukhtunwali, which appears to be similar in general character to the old Hebraic law, though modified by Mahommedan ordinances, and strangely similar in certain particulars to Rajput custom. Besides their division into clans and tribes, the whole Afghan people may be divided into dwellers in tents and dwellers in houses; and this division is apparently not coincident with tribal divisions, for of several of the great clans at least a part is nomad and a part settled. Such, e.g., is the case with the Durani and with the Ghilzai.

The settled Afghans form the village communities, and in part the population of the few towns. Their chief occupation is with the soil. They form the core of the nation and the main part of the army. Nearly all own the land on which they live, and which they cultivate with their own hands or by hired labour. Roundly speaking, agriculture and soldiering are their sole occupations. No Afghan will pursue a handicraft or keep a shop, though the Ghilzai Povindahs engage largely in travelling trade and transport of goods. As a race the Afghans are very handsome and athletic, often with fair complexion and flowing beard, generally black or brown, sometimes, though rarely, red; the features highly aquiline. The hair is shaved off from the forehead to the top of the head, the remainder at the sides being allowed to fall in large curls over the shoulders. Their step is full of resolution; their bearing proud and apt to be rough.

The women have handsome features of Jewish cast (the last trait often true also of the men) ; fair complexions, sometimes rosy, though usually a pale sallow; hair braided and plaited behind in two long tresses terminating in silken tassels. They are rigidly secluded, but intrigue is frequent.

The Afghans, inured to bloodshed from childhood, are familiar with death, and audacious in attack, but easily discouraged by failure; excessively turbulent and unsubmissive to law or discipline; apparently frank and affable in manner, especially when they hope to gain some object, but capable of the grossest brutality when that hope ceases. They are unscrupulous in perjury, treacherous, vain and insatiable, passionate in vindictiveness, which they will satisfy at the cost of their own lives and

in the most cruel manner. Nowhere is crime committed on such trifling grounds, or with such general impunity, though when it is punished the punishment is atrocious. Among themselves the Afghans are quarrelsome, intriguing and distrustful; estrangements and affrays are of constant occurrence; the traveller conceals and misrepresents the time and direction of his journey. The Afghan is by breed and nature a bird of prey. If from habit and tradition he respects a stranger within his threshold, he yet considers it legitimate to warn a neighbour of the prey that is afoot, or even to overtake and plunder his guest after he has quitted his roof. The repression of crime and the demand of taxation he regards alike as tyranny. The Afghans are eternally boasting of their lineage, their independence and their prowess. They look on the Afghans as the first of nations, and each man looks on himself as the equal of any Afghan.

They are capable of enduring great privation, and make excellent soldiers under British discipline, though there are but few in the Indian army. Sobriety and hardiness characterize the bulk of the people, though the higher classes are too often stained with deep and degrading debauchery. The first impression made by the Afghan is favourable. The European, especially if he come from India, is charmed by their apparently frank, open- hearted, hospitable and manly manners; but the charm is not of long duration, and he finds that the Afghan is as cruel and crafty as he is independent. No trustworthy statistics exist showing either present numbers or fluctuations in the population of Afghanistan. Within the amir's dominions there are probably from four to five millions of people, and of these the vast majority are agriculturists.

The cultivators, including landowners, tenants, hired labourers and slaves, represent the working population of the country, and as industrious and successful agriculturists they are unsurpassed in Asia. They have carried the art of irrigation to great per-

fection, and they utilize every acre of profitable soil. Certain Ghilzai clans are specially famous for their skill in the construction of the karez or underground water-channel.

The religion of the country throughout is Mahommedan. Next to Turkey, Afghanistan is the most powerful Mahommedan kingdom in existence. The vast majority of Afghans are of the Sunni sect;

but there are, in their midst, such powerful communities of Shiahs as the Hazaras of the central districts, the Kizilbashes of Kabul and the Turis of the Kurram border, nor is there between them that bitterness of sectarian animosity which is so marked a feature in India. The Kafirs of the mountainous region of Kafiristan alone are non-Mahom- medan. They are sunk in a paganism which seems to embrace some faint reflexion of Greek mythology, Zoroastrian principles and the tenets of Buddhism, originally gathered, no doubt, from the varied elements of their mixed extraction. Those contiguous Afghan tribes, who have not so long ago been converted to the faith of Islam, are naturally the most fanatical and the most virulent upholders of the faith around them. In and about the centre of civilization at Kabul, instances of Ghazism are com- paratively rare. In the western provinces about Kandahar (amongst the Durani Afghans — the people who claim to be Ben- i-Israel), and especially in Zamindawar, the spirit of fanaticism runs high, and every other Afghan is a possible Ghazi — a man who has devoted his life to the extinction of other creeds.

Persian is the vernacular of a large part of the non-Afghan population, and is familiar to all educated Afghans; it is the language of the court and of literature. Pushtu, how- ever, is the prevailing language, though it does not a d ua * e seem to be spoken in Herat, or, roughly speaking, west literature. of the Helmund. Turki is spoken in Afghan Turkestan. There is a respectable amount of Afghan literature. The oldest work in Pushtu is a history of the conquest of Swat by Shaikh Mali, a chief of the Yusafzais, and leader in the conquest (a.d. 1413-24). In 1494 Kaju Khan became chief of the same clan; during his rule Buner and Panjkora were completely conquered, and he wrote a history of the events. In the reign of Akbar, Bayazid Ansari, called Pir-i-Roshan, ” the Saint of Light,” the founder of an heretical sect, wrote in Pushtu; as did his chief antagonist, a famous Afghan saint called Akhund Darweza. The literature is richest in poetry. Abdur Rahman (17th century) is the best known poet. Another very popular poet is Khushal Khan, the warlike chief of the Khattaks in the time of Aurangzeb. Many other members of his family were poets also. Ahmad Shah, the founder of the monarchy, likewise wrote poetry. Ballads are numerous.

Education is confined to most elementary principles in Afghan- istan. Of schools or colleges for the purposes of a higher educa- tion befitted to the sons of noblemen and the more £ rfuca< / 01

, wealthy merchants there are absolutely none; but the village school is an ever-present and very open spectacle to the passer-by. Here the younger boys are collected and in- structed in the rudiments of reading, writing and religious creed by the village mullah, or priest, who thereby acquires an early influence over the Afghan mind. The method of teaching is confined to that wearisome system of loud-voiced repetition which is so annoying a feature in Indian schools; and the Koran is, of course, the text-book in all forms of education. Every Afghan gentleman can read and speak Persian, but beyond this acquirement education seems to be limited to the physical development of the youth by instruction in horsemanship and feats of skill. Such advanced education as exists in Afghan- istan is centred in the priests and physicians ; but the ignorance of both is extreme.

The government of Afghanistan is an absolute monarchy under the amir, and succession to the throne is hereditary. There are five chief political divisions in the country — namely, Kabul, Turkestan, Herat, Kandahar and Badakshan, ttonand each of which is ruled by a ” naib “or governor, who laws. is directly responsible to the amir. Under the governors of provinces the nobles and kazis (or district judges) dispense I justice much in the feudal fashion. There are three classes of

chiefs who form the council or durbar of the king. These are the sirdars, the khans and the mullahs. The sirdars are hereditary nobles, the khans are representatives of the people, and the mullahs of Mahommedan religion. The khan is elected by the clan or tribe. The clannish attachment of the Afghans is rather to the community than to the chief. These three classes of representatives are divided into two assemblies, the Durbar Shahi or royal assembly, and the Kharwanin Mulkhi or commons. The mullahs take their place in one or the other according to their individual rank. The executive officials of the amir have a selected body, called the Khilwat, which acts as a cabinet council, but no member can give advice to the crown without being asked to do so, or beyond the jurisdiction of his own department. The amir, in addition to being chief executive officer, is chief judge and supreme court of appeal. Any one has

the right to appeal to the amir for trial, and the great amirs, Dost Mahommed and Abdur Rahman, were accessible at all times to the petitions of their subjects. Next to the amir comes the court of the kazi, the chief centre of justice, and beneath the kazi comes the kotwal, who performs, as in India, the ordinary functions of a magistrate. In large provincial towns there is a punchait, or council, for the trial of commercial cases. There are government departments for the administration of revenue, customs, post-office, military affairs, &c. The general law administered in all the courts of Afghanistan is/ihat of Islam and of the customs of the country, with developments introduced by the Amir Abdur Rahman.

The Afghan army probably numbers 50,000 regulars distributed between the military centres of Herat, Kandahar, Kabul, Mazar-

i-Sharif, Jalalabad and Asmar, with detachments at

frontier outposts on the side of India. Abdur Rahman claimed that he could put 100,000 men into the field within a week for the defence of Herat. In 1896 he introduced a system of semi-enforced service whereby one man in every eight between the ages of sixteen and seventy takes his turn at military training. In this way he calculated that he could have raised 1,000,000 men armed with modern weapons, but his chief difficulty would be money and transport. The pay of the army is apt to be irregular. The amir's factories at Kabul for arms and ammunition are said to turn out about, 20,000 cartridges and 15 rifles daily, with 2 guns per week; but the arms thus produced are very heterogeneous, and the different varieties of cartridge used would cause endless complications. The two chief fastnesses of Northern Afghanistan are Herat and Dehdadi near Balkh. The latter fort took twelve years to build, and commands all the roads leading from the Oxus into Afghan Turkestan. It is armed with naval quick-firing guns, Krupp,Hotchkiss, Nordenfeld and Maxim. The chief cantonment for the same district is at Mazar-i-Sharif, 12 m. from Balkh.

Financially, Afghanistan has never, since it first became a kingdom, been able to pay for its own government, public works Finance an(ˆ armv – There appears to be no inherent reason

why this should be so. Whilst it can never (in the absence of any great mineral wealth) develop into a wealthy country, it can at least support its own population; and it would, but for the short-

sighted trade policy of Abdur Rahman, certainly have risen to a position of respectable solvency. Its revenues (about which no trustworthy information is available) are subject to great fluctuations, and probably never exceed the value of one million sterling per annum. They fell in Shere Ali's time to £700,000. The original subsidy to the amir from the Indian government was fixed at 12 lakhs of rupees (£80,000) per annum, but in 1893, in connexion with the boundary settle- ment, it was increased to £1 20,000.

Few minerals are wrought in Afghanistan, though Abdur Rahman claims in his autobiography that the country is rich Minerals * n mmes – Some small quantity of gold is taken from

the streams in Laghman and the adjoining districts. Famous silver mines were formerly worked near the head of the Panjshir valley in Hindu Kush. Kabul is chiefly supplied with iron from the Permuli (or Farmuli) district, between the Upper Kurram and Gomal, where it is said to be abundant. Iron ore is most abundant near the passes leading to Bamian,

and in other parts of Hindu Kush. Copper ore from various parts of Afghanistan has been seen, but it is nowhere worked. Lead is found in Upper Bangash (Kurram district), and in the Shinwari country (also among the branches of Saf ed Koh) , and in the Kakar country. There are reported to be rich lead mines near Herat scarcely worked. Lead, with antimony, is found near the Arghand-ab, 32 m. north-west of Ghazni, and in the Ghorband valley, north of Kabul. Most of the lead used, how- ever, comes from the Hazara country, where the ore is described as being gathered on the surface. An ancient mine of great extent and elaborate character exists at Feringal, in the Ghor- band valley. Antimony is obtained in considerable quantities at Shah-Maksud, about 30 m. north of Kandahar. Sulphur is said to be found at Herat, dug from the soil in small fragments, but the chief supply comes from the Hazara country and from Pirkisri, on the confines of Seistan, where there would seem to be a crater, or fumarole. Sal-ammoniac is brought from the same place. Gypsum is found in large quantities in the plain of Kandahar, being dug out in fragile coralline masses from near the surface. Coal (perhaps lignite) is said to be found in Zurmat (between the Upper Kurram and the Gomal) and near Ghazni. Nitre abounds in the soil over all the south-west of Afghanistan, and often affects the water of the karez or subterranean canals. The characteristic distribution of vegetation on the mountains of Afghanistan is worthy of

attention. The great mass of it is confined to the main ranges and their Vegeta- immediate off-shoots, whilst on the more distant and terminal prolongations it is almost entirely absent; in fact, these are naked rock and stone.

Take, for example, the Safed Koh. On the alpine ranee itself and its immediate branches, at a height of 6000 to 10,000 ft., we have abundant growth of large forest trees, among which conifers are the most noble and prominent, such as Cedrus Deodara, Abies excelsa, Pinus longijolia, P. Pinaster, P. Pinea (the edible pine) and the larch. We have also the yew, the hazel, juniper, walnut, wild peach and almond. Growing under the shade of these are several varieties of rose, honeysuckle, currant, gooseberry, hawthorn, rhododendron and a luxuriant herbage, among which the ranunculus family is im- portant for frequency and number of genera. The lemon and wild vine are also here met with, but are more common on the northern mountains. The walnut and oak (evergreen, holly-leaved and kermes) descend to the secondary heights, where they become mixed with alder, ash, khinjak, Arbor-vitae, juniper, with species of Astra- galus, &c. Here also are Indigoferae and dwarf laburnum.

Lower again, and down to 3000 ft. we have wild olive, species of rock-rose, wild privet, acacias and mimosas, barberry and Zizyphus; and in the eastern ramifications of the chain, Chamaerops humilis (which is applied to a variety of useful purposes) , Bignonia or trumpet flower, sissu, Salvadora persica, verbena, acanthus, varieties of Gesnerae.

The lowest terminal ridges, especially towards the west, are, as has been said, naked in aspect. Their scanty vegetation is almost wholly herbal ; shrubs are only occasional ; trees almost non-exist- ent. Labiate, composite and umbelliferous plants are most common. Ferns and mosses are almost confined to the higher ranges.

In the low brushwood scattered over portions of the dreary plains of the Kandahar table-lands, we find leguminous thorny plants of the papilionaceous sub-order, such as camel-thorn (Hedysartim Alhagi), Astragalus in several varieties, spiny rest-harrow (Ononis spinosa), the fibrous roots of which often serve as a tooth-brush; plants of the sub-order Mimosae, as the sensitive mimosa ; a plant of the rue family, called by the natives lipdd; the common worm- wood; also certain orchids, and several species of Salsola. The rue and wormwood are in general use as

domestic medicines — the former for rheumatism and neuralgia; the latter in fever, debility and dyspepsia, as well as for a vermifuge. The lipdd, owing to its heavy nauseous odour, is believed to keep off evil spirits. In some places, occupying the sides and hollows of ravines, are found the rose bay (Nerium Oleander), called in Persian khar-zarah, or ass-bane, the wild laburnum and various Indigoferae.

In cultivated districts the chief trees seen are mulberry, willow, poplar, ash, and occasionally the plane ; but these are due to man's planting.

One of the most important of these is the gum-resin of Narthex asafetida, which grows abundantly in the high and dry plains of Western Afghanistan, especially between Kandahar and u ncu ffl. Herat. The depot for it is Kandahar, whence it finds its vgtea „'„,. way to India, where it is much used as a condiment. It durts ot is not so used in Afghanistan, but the Seistan people eat Y atae. the green stalks of the plant preserved in brine. The collection of the gum-resin is almost entirely in the hands of the Kakar clan of Afghans.

In the highlands of Kabul edible rhubarb is an important local luxury. The plants grow wild in the mountains. The bleached rhubarb, which has a very delicate flavour, is altered by covering the young leaves, as they sprout from the soil, with loose stones or an empty jar. The leaf-stalks are gathered by the neighbouring hill people, and carried down for sale. Bleached and unbleached rhubarb are both largely consumed, both raw and cooked.

The walnut and edible pine-nut are both wild growths, which are exported.

The sanjit (Elaeaguns orientalis), common on the banks of water-courses, furnishes an edible fruit. An orchis found in the mountain yields the dried tuber which affords the nutritious mucilage called salep; a good deal of this goes to India.

Pistacia khinjak affords a mastic. The fruit, mixed with its resin, is used for food by the Achakzais in Southern Afghanistan. The true pistachio is found only on the northern frontier; the nuts are im- ported from Badakshan and Kunduz.

Mushrooms and other fungi are largely used as food, especially by the Hindus of the towns, to whom they supply a substitute for meat.

Manna, of at least two kinds, is sold in the bazaars. One, called turanjbiri, appears to exude, in small round tears, from the camel- thorn, and also from the dwarf tamarisk; the other, sir-kasht, in large grains and irregular masses or cakes with bits of twig imbedded, is obtained from a tree which the natives call siah chob (black wood), thought by Bellew to be a Fraxinus or Ornus.

In most parts of the country there are two harvests, as gener- ally in India. One of these, called by the Afghans bakdrak, or the spring crop, is sown in the end of autumn and Jfjtun reaped in summer. It consists of wheat, barley and a variety of lentils. The other, called pdizah or tirmdi, the autumnal, is sown in the end of spring, and reaped in autumn. It consists of rice, varieties of millet and sorghum, of maize, Phaseolus Mungo, tobacco, beet, turnips, &c. The loftier regions have but one harvest.

Wheat is the staple food over the greater part of the country. Rice is not largely distributed. In much of the eastern moun- tainous country bdjra (Holcus spicalus) is the chief grain. Most English and Indian garden-stuffs are cultivated; turnips in some places very largely, as cattle food.

The growth of melons, water-melons and other cucurbitaceous plants is reckoned very important, especially near towns; and this crop counts for a distinct harvest.

Sugar-cane is grown only in the rich plains; and though cotton is grown in the warmer tracts, most of the cotton cloth is imported.

Madder is an important item of the spring crop in Ghazni and Kandahar districts, and generally over the west, and supplies the Indian demand. It is said to be very profitable, though it takes three years to mature. Saffron is grown and exported. The castor-oil plant is everywhere common, and furnishes most of the oil of the country. Tobacco is grown very generally; that of Kandahar has much repute, and is exported to India and Bokhara. Two crops of leaves are taken.

Lucerne and a trefoil called shaflal form important fodder crops in the western parts of the country, and, when irrigated, are said

to afford ten or twelve cuttings in the season. The komal (Prangos pabularia) is abundant in the hill country of Ghazni, and is said to extend through the Hazara country to Herat. It is stored for winter use, and forms an excellent fodder. Others are derived from the Holcus sorghum, and from two kinds of panick. It is common to cut down the green wheat and barley before the ear forms, for fodder, and the repetition of this, with barley at least, is said not to injure the grain crop. Bellew gives the following statement of the manner in which the soil is sometimes worked in the Kandahar district: — Barley is sown in November; in March and April it is twice cut for fodder; in June the grain is reaped, the ground is ploughed and manured and sown with tobacco, which yields two cuttings. The ground is then prepared for carrots and turnips, which are gathered in November or December.

Of great moment are the fruit crops. All European fruits are produced profusely, in many varieties and of excellent quality. Fresh or preserved, they form a principal food of a large class of the people, and the dry fruit is largely exported. In the valleys of Kabul mulberries are dried, and packed in skins for winter use, This mulberry cake is often reduced to

Fauna,

flour, and used as such, forming in some valleys the main food of the people.

Grapes are grown very extensively, and the varieties are very numerous. The vines are sometimes trained on trellises, but most frequently over ridges of earth 8 or 10 ft. high. The principal part of the garden lands in villages round Kandahar is vineyard, and the produce must be enormous.

Open canals are usual in the Kabul valley, and in eastern Afghanistan generally; but over all the western parts of the country much use is made of the karez, which is a subterranean aqueduct uniting the waters of several springs, and conducting their combined volume to the surface at a lower level.

As regards vertebrate zoology, Afghanistan lies on the frontier of three regions, viz. the Eurasian, the Ethiopian (to which region Baluchistan seems to belong) and the Indo-Malayan. Hence it naturally partakes somewhat of the forms of each, but is in the main Eurasian.

Felidae. — F. catus, F. chaus (both Eurasian) ; F. caracal (Eur., Ind., Eth.), about Kandahar; a small leopard, stated to be found almost all over the country, perhaps rather the' cheetah (F. jubatus, Ind. and Eth.); F. pardus, the common leopard (Eth. and Ind.). The tiger exists in Afghan Turkestan.

Cantdae. — The jackal (C. aureus, Eur., Ind., Eth.) abounds on the Helmund and Argand-ab, and probably elsewhere. Wolves (C. Bengalensis) are formidable in the wilder tracts, and assemble in troops on the snow, destroying cattle and sometimes attacking single horsemen. The hyena (H. striata, Africa to India) is common. These do not hunt in packs, but will sometimes singly attack a bullock ; they and the wolves make havoc among sheep. A favourite feat of the boldest of the young men of southern Afghanistan is to enter the hyena's den, single-handed, muffle and tie him. There are wild dogs, according to Elphinstone and Conolly. The small Indian fox (Vulpes Bengalensis) is found ; also V. flavescens, common to India and Persia, the skin of which is much used as a fur.

Musielidae. — Species of mungoose (Herpestes) , species of otter, Mustela erminea, and two ferrets, one of them with tortoise-shell marks, tamed by the Afghans to keep down vermin; a marten (M. flavigula, Indian).

Bears are two: a black one, probably Ursus torquatus; and one of a dirty yellow, U. Isabellinus, both Himalayan species.

Ruminants. — Capra aegagrus and C. megaceros; a wild sheep (Ovis cycloceros or Vignei) ; Gazella subgutturosa — these are often netted in batches when they descend to drink at a stream ; G. dorcas perhaps; Cervus Wattichii, the Indian barasingha, and probably some other Indian deer, in the north-eastern mountains.

The wild hog (Sus scrofa) is found on the lower Helmund. The wild ass, Gorkhar of Persia (Equus onager), is frequent on the sandy tracts in the south-west.

The Himalayan varieties of the markhor and ibex are abundant in Kafiristan.

Talpidae. — A mole, probably Talpa Europaea; Sorex Indicus; Erinaceus collaris (Indian), and Er. auritus (Eurasian).

Bats believed to be Phyllorhinus cineraceus (Punjab species),

Scotophilus Bellii (W. India), Vesp. auritus and V. barbastellus , both found from England to India.

Rodentia. — A squirrel (Sciurus Syriacusf) ; Mus Indicus and M. Gerbellinus ; a jerboa (Dipus teluml); Alactaga Bactriana; Gerbillus Indicus, and G. erythrinus (Persian and Indian); Lagomys Nepal- ensis, a Central Asian species. A hare, probably L. ruficaudatus.

Birds. — The largest list of Afghan birds that we know of is given by Captain Hutton in the J. As. Soc. Bengal, vol. xvi. pp. 775 seq. ; but it is confessedly far from complete. Of 124 species in that list, 95 are pronounced to be Eurasian, 17 Indian, 10 both Eurasian and Indian, I (Turtur risorius) Eur., Ind. and Eth.; and 1 only, Carpo- dacus (Bucanetes) crassirostris, peculiar to the country. Afghanistan appears to be, during the breeding season, the retreat of a variety of Indian and some African (desert) forms, whilst in winter the avifauna becomes overwhelmingly Eurasian.

Reptiles. — The following particulars are from Gray :— Lizards — Pseudopus gracilis (Eur.), Argyrophis Horsfieldii, Salea Horsfieldii, Calotes Maria, C. versicolor, C. minor, C. Emma, Phrynocephalus Tickelii — all Indian forms. A tortoise (Testudo Horsfieldii) appears to be peculiar to Kabul. There are apparently no salamanders or tailed Amphibia. The frogs are partly Eurasian, partly Indian; and the same may be said of the fish, but they are as yet most imperfectly known.

The camel is of a more robust and compact breed than the tall beast used in India, and is more carefully tended. The two-humped Bactrian camel is commonly used in the Oxus regions, but is seldom seen near the Indian frontier.

Horses form a staple export to India. The best of these, however, are reserved for the Afghan cavalry. Those exported to India are usually bred in Maimana and other places in Afghan

Turkestan. The indigenous horse is the yabu, a stout, heavy-shouldered animal, of about 14 hands high, used chiefly for burden, but also for riding. It gets over incredible distances at an ambling shuffle, but is unfit for fast work and cannot stand excessive heat. The breed of horses was much improved under

the amir Abdur Rahman, who took much interest in it. Generally, colts are sold and worked too young.

The cows of Kandahar and Seistan give very large quantities of milk. They seem to be of the humped variety, but with the hump evanescent. Dairy produce is important in Afghan diet, especially the pressed and dried curd called krut (an article and name perhaps introduced by the Mongols).

There are two varieties of sheep, both having the fat tail. One bears a white fleece, the other a russet or black one. Much of the white wool is exported to Persia, and now largely to Europe by Bombay. Flocks of sheep are the main wealth of the nomad population, and mutton is the chief animal food of the nation. In autumn large numbers are slaughtered, their carcases cut up, rubbed with salt and dried in the sun. The same is done with beef and camel's flesh.

The goats, generally black or parti-coloured, seem to be a degenerate variety of the shawl-goat.

The climate is found, to be favourable to dog-breeding. Pointers are bred in the Kohistan of Kabul and above Jalala- bad — large, heavy, slow-hunting, but fine-nosed and staunch; very like the old'double-nosed Spanish pointer. There are grey- hounds also, but inferior in speed to second-rate English dogs.

The manufactures of the country have not developed much during recent years. Poshtins (sheepskin clothing) and the many varieties of camel and goat's hair-cloth which, commerce. under the name of " barak," " karak," &c, are manu- factured in the northern districts, are still the chief local products of that part of Afghanistan. Herat and Kandahar are famous for their silks, although a large proportion of the manufactured silk found on the Herat market, as well as many of the felts, carpets and embroideries, are brought from the Central Asian khanates. The district of Herat produces many of the smaller sorts of carpets (" galichas " or prayer-carpets), of excellent design and colour, the little town of Adraskand being especially famous for this industry; but they are not to be compared with the best products of eastern Persia or of the Turkman districts about Panjdeh.

The nomadic Afghan tribes of the west are chiefly pastoral, and the wool of the southern Herat and Kandahar provinces is famous for its quality. In this direction, the late boundary settlements

have undoubtedly led to a considerable development of local resources. A large quantity of wool, together with silk, dried fruit, madder and asafetida, finds its way to India by the Kandahar route.

It is impossible to give accurate trade statistics, there being no trustworthy system of registration. The value of the imports from Kabul to India in 1892-1893 was estimated at 221,000 Rx(or tens of rupees). In 1899 it was little over 217,000 Rx, the period of lowest intermediate depression being in 1897. These imports include horses, cattle, fruits, grain, wool, silk, hides, tobacco, drugs and provisions (ghi, &c). All this trade emanates from Kabul, there being no transit trade with Bokhara owing to the heavy dues levied by the amir. The value of the exports from India to Kabul also shows great fluctuation. In the year 1892-1893 it was registered at nearly 611,000 Rx. In 1894-189511 had sunk to 274,000 Rx, and in 1899 it figured at 294,600 Rx. The chief items are cotton goods, sugar and tea. In 1 898-1 899 the imports from Kandahar to India were valued at 330,000 Rx, and the exports from India to Kandahar at about 264,000 Rx. Three- fourths of the exports consist of cotton goods, and three-eighths of the imports were raw wool. The balance of the imports was chiefly made up of dried fruits. Comparison with trade statistics of previous years on this side Afghanistan is difficult, owing to the inclusion of a large section of Baluchistan and Persia within the official ” Kandahar ” returns; but it does not appear that the value of the western Afghanistan trade is much on the increase. The opening up of the route between Quetta and

Seistan has doubtless affected a trade which was already seriously hampered by restrictions. In the year after the mission of Sir Louis Dane to Kabul in 1905 it was authoritatively stated that the trade between Afghanistan and India had nearly doubled in value.

The basin of -the Kabul river especially abounds in remains of the period when Buddhism flourished. Bamian is famous for its wall-cut figures, and at Haibak (on the route between Tashkurghan and Kabul) there are some most ties?” ” interesting Buddhist remains. In the Koh-Daman, north of Kabul, are the sites of several ancient cities, the greatest of which, called Beghram, has furnished coins in scores of thousands, and has been supposed to represent Alexander’s Nicaea. Nearer Kabul, and especially on the hills some miles south of the city, are numerous topes. In the

valley of Jalalabad are many remains of the same character.

In the valley of the Tarnak are the ruins of a great city (Ulan Robat) supposed to be the ancient Arachosia. About Girishk, on the Helmund, are extensive mounds and other traces of buildings; and the remains of several great cities exist in the plain of Seistan, as at Pulki, Peshawaran and Lakh, relics of ancient Drangiana. An ancient stone vessel preserved in a mosque at Kandahar is almost certainly the same that was treasured at Peshawar in the 5th century as the begging pot of Sakya- Muni. In architectural relics of a later date than the Graeco- Buddhist period Afghanistan is remarkably deficient. Of the city of Ghazni, the vast capital of Mahmud and his race, no substantial relics survive, except the tomb of Mahmud and two remarkable brick minarets. A vast and fruitful harvest of coins has been gathered in Afghanistan and the adjoining regions.

Bibliography. — Rawlinson, England and PMSsiain the East (1875) ; H. M. Durand, The First Afghan War (1879) ; Wyllie's Essays on the External Policy of India (1875); Elphinstcne, Account of the Kingdom of Kabul (1809); Parliamentary Papers, "Afghanistan"; Curzon, Problems in the Far East ; Holdich, Indian Borderlandˆ 1901) ; India (1903) ; Indian Survey Reports; Russo-Afghan Boundary Commission (1886) ; Pamir Boundary Commission (1896). (T. H. H.*)

History

The Afghan chroniclers call their people Beni-Israil (Arab, for Children of Israel), and claim descent from King Saul (whom they call by the Mahommedan corruption Talilt) through a son whom they ascribe to him, called Jeremiah, who again had a son called Afghana. The numerous stock of Afghana were removed by Nebuchadrezzar, and found their way to the moun- tains of Ghor and Feroza (east and north of Herat). Only nine years after Mahommed's announcement of his mission they heard of the new prophet, and sent to Medina a deputation headed by a wise and holy man called Kais, to make inquiry. The deputation became zealous converts, and on their return converted their countrymen. From Kais and his three sons the whole of the genuine Afghans claim descent.

This story is repeated in great and varying detail in sundry books by Afghans, the oldest of which appears to be of the 16th century; nor do we know that any trace of the legend is found of

older date. In the version given by Major Raverty (Introd. to Afghan Grammar), Afghanah is settled by King Solomon himself in the Sulimani mountains; there is nothing about Nebuchad-rezzar or Ghor. The historian Ferishta says he had read that the Afghans were descended from Copts of the race of Pharaoh. And one of the Afghan histories, quoted by Mr Bellew, relates " a current tradition " that, previous to the time of Kais, Bilo the father of the Biluchis, Uzbak (evidently the father of the Usbegs) and Afghana were considered as brethren. As Mahom- med Usbeg Khan, the eponymus of the medley of Tatar tribes called Usbegs, reigned in the 14th century a.d., this gives some possible light on the value of these so-called traditions.

We have analogous stories in the literature of almost all nations that derive their religion or their civilization from a foreign source. To say nothing of the Book of Mormon, a con- siderable number of persons have been found to propagate the doctrine that the English people are descended from the tribes of Israel. But the Hebrew ancestry of the Afghans is

more worthy at least of consideration, for a respectable number of intelligent officers, well acquainted with the Afghans, have been strong in their belief of it ; and though the customs alleged in proof will not bear the stress laid on them, undoubtedly a prevailing type of the Afghan physiognomy has a character strongly Jewish. This characteristic is certainly a remarkable one; but it is shared, to a considerable extent, by the Kash- miris (a circumstance which led Bernier to speculate on the Kashmiris representing the lost tribes of Israel), and, we believe, by the Tajik people of Badakshan.

Relations with the Greeks. — In the time of Darius Hystaspes (500 B.C.) we find the region now called Afghanistan embraced in the Achaemenian satrapies, and various parts of it occupied by Sarangians (in Seistan), Arians (in Herat), Sattagydians (supposed in highlands of upper Helmund and the plateau of Ghazni), Dadicae (suggested to be Tajiks), Aparytae (mountain- eers, perhaps of Safed Koh, where lay the Paryetae of Ptolemy), Gandarii (in Lower Kabul basin) and Paktyes, on or near the Indus. In the last name it has been plausibly suggested that we have the Pukhtun, as the eastern Afghans pronounce their name.

Indeed, Pusht, Pasht or Pakht would seem to be the oldest name of the country of the Afghans in their traditions.

The Ariana of Strabo corresponds generally with the existing dominions of Kabul, but overpasses their limits on the west and south.

About 310'B.c. Seleucus is said by Strabo to have given to the Indian Sandrocottus (Chandragupta), in consequence of a marriage-contract, some part of the country west of the Indus occupied by an Indian population, and no doubt embracing a part of the Kabul basin. Some sixty years later occurred the establishment of an independent Greek dynasty in Bactria. (See Bactria, Media, Eucratides, Menander of India, Euthy- demus, and Persia, Ancient History.) Of the details of their history and extent of their dominion in different reigns we know almost nothing, and conjecture is often dependent on such vague data as are afforded by the collation of the localities in which the coins of independent princes have been found. But their power extended certainly over the Kabul basin, and probably, at times, over the whole of Afghanistan. The ancient architecture of Kashmir, the tope of Manikyala in the Punjab, arid many sculptures found in the Peshawar valley, show unmistakable Greek influence. Demetrius (c. 190 B.C.) is supposed to have reigned in Arachosia after being expelled from Bactria, much as, at a later date, Baber reigned in Kabul after his expulsion from Samarkand. Eucratides (181 b.c.) is alleged by Justin to have warred in India. With his coins, found abundantly in the Kabul basin, commences the use of an Arianian inscription, in addition to the Greek, supposed to imply the transfer of rule to the south of the mountains, over a people whom the Greek dynasty sought to conciliate. Under Heliocles (147 B.C.?), the Parthians, who had already encroached on Ariana, pressed their conquests into India. Menander (126 B.C.) invaded India at least to the Jumna, and perhaps also to the Indus delta. The coinage of a succeeding king, Hermaeus, indicates a barbaric irruption. There is a general correspondence between classical and Chinese accounts of the time when Bactria was overrun by Scythian invaders. The chief nation among these, called by the Chinese Yue-Chi, about 126 B.C. established themselves in Sogdiana and on the Oxus in five hordes. Near the Christian era the chief of one of these, which was called Kushan, subdued the rest, and extended his conquests over the countries south of the Hindu Kush, including Sind as well as Afghanistan, thus establishing a great dominion, of which we hear from Greek writers as Indo-Scythia. (See Yue-Chi.)

Buddhism had already acquired influence over the people of the Kabul basin, and some of the barbaric invaders adopted that system. Its traces are extensive, especially in the plains of Jalalabad and Peshawar, but also in the vicinity of Kabul.

Various barbaric dynasties succeeded each other. A notable monarch was Kanishka (see India, History) or Kanerkes, whose date is variously fixed at from 58 B.C. to a.d. 125, and whose power extended over the upper Oxus basin, Kabul, Peshawar, Kashmir

and probably far into India. His name and legends still filled the land, or at least the Buddhist portion of it, 600 years later, when the Chinese pilgrim, Hsiian Tsang, travelled in India; they had even reached the great Mahommedan philosopher, traveller and geographer, Abu-r-Raihan Muhammad al-Blrunl (see BIruni), in the nth century; and they are still celebrated in the Mongol versions of Buddhist ecclesiastical story.

Turkoman Dynasties. — In the time of Hsiian Tsang (a.d. 630-645) there were both Indian and Turk princes in the Kabul valley, and in the succeeding centuries both these races seem to have predominated in succession. The first Mahommedan attempts at the conquest of Kabul were unsuccessful, though Seistan and Arachosia were permanently held from an early date. It was not till the end of the 10th century that a Hindu prince ceased to reign in Kabul, and it fell into the hands of the Turk Sabuktagin, who had established his capital at Ghazni. There, too, reigned his famous son Mahmud, and a series of descendants, till the middle of the 12 th century, rendering the city one of the most splendid in Asia. We then have ˆa powerful dynasty, commonly believed to have been of Afghan race; and if so, the first. But the historians give them a legendary descent from Zohak, which is no Afghan genealogy. The founder of the dynasty was Alauddin, chief of Ghor, whose vengeance for the cruel death of his brother at the hands of Bahram the Ghaznevide was wreaked in devastating the great city. His nephew, Shahabuddin Mahommed, repeatedly invaded India, conquering as far as Benares. His empire in India indeed — ruled by his freedmen who after his death became independent — may be regarded as the origin of that great Mahommedan monarchy which endured nominally till 1857. For a brief period the Afghan countries were subject to the king of Khwarizm, and it was here chiefly that occurred the gallant attempts of Jalaluddin of Khwarizm to withstand the progress of Jenghiz Khan.

A passage in Ferishta seems to imply that the Afghans in the Sulimani mountains were already known by that name in the first century of the Hegira, but it is uncertain how far this may be built on. The name Afghans is very distinctly mentioned in 'Utbi's History of Sultan Mahmud, written about a.d. 1030, coupled with that of the Khiljis. It also appears frequently in connexion with the history of India in the 13th and 14th cen- turies. The successive dynasties of Delhi are generally called Pathan, but were really so only in part. Of the Khiljis (1288- 1321) we have already spoken. The Tughlaks (1321-1421) were originally Tatars of the Karauna tribe. The Lodis (1450-1526) were pure Pathans. For a century and more after the Mongol invasion the whole of the Afghan countries were under Mongol rule; but in the middle of the 14th century a native dynasty sprang up in western Afghanistan, that of the Kurts, which extended its rule over Ghor, Herat and Kandahar. The history of the Afghan countries under the Mongols is obscure; but that regime must have left its mark upon the country, if we judge from the occurrence of frequent Mongol names of places, and even of Mongol expressions adopted into familiar language.

The Mogul Dynasty. — All these countries were included in Timur's conquests, and Kabul at least had remained in the possession of one of his descendants till 1501, only three years before it fell into the hands of another and more illustrious one, Sultan Baber. It was not till 1522 that Baber succeeded in permanently wresting Kandahar from the Arghuns, a family of Mongol descent, who had long held it. From the time of his conquest of Hindustan (victory at Panipat, April 21, 1526), Kabul and Kandahar may be regarded as part of the empire of Delhi under the (so-called) Mogul dynasty which Baber founded. Kabul so continued till the invasion of Nadir Shah (1738). Kandahar often changed hands between the Moguls and the rising Safavis (or Sufis) of Persia. Under the latter it had remained from 1642 till 1708, when in the reign of Husain, the last of them, the Ghilzais, . provoked by the oppressive Persian governor Shahnawaz Khan (a Georgian prince of the Bagratid house), revolted under Mir Wais, and expelled the Persians. Mir Wais was acknowledged sovereign of Kandahar,

and eventually defeated the Persian armies sent against him, but

did not long survive (d. 1715).

Mahmud, the son of Mir Wais, a man of great courage and energy, carried out a project of his father's, the conquest of Persia itself. After a long siege, Shah Husain came forth from Ispahan with all his court, and surrendered the sword and diadem of the Sufis into the hands of the Ghilzai (October 1722). Two years later Mahmud died mad, and a few years saw the end of Ghilzai rule in Persia.

The Durani Dynasty. — In 1737-38 Nadir Shah both recovered Kandahar and took Kabul. But he gained the goodwill of the Afghans, and enrolled many in his army. Among these was a noble young soldier, Ahmad Khan, of the Saddozai family of the Abdali clan, who after the assassination of Nadir (1747) was chosen by the Afghan chiefs at Kandahar to be their leader, and assumed kingly authority over the eastern part of Nadir's empire, with the style of Dur-i-Dur&n, " Pearl of the Age," bestowing that of Durani upon his clan, the Abdalis. With Ahmad Shah, Afghanistan, as such, first took a place among the kingdoms of the earth, and the Durani dynasty, which he founded, still occupies its throne. During the twenty-six years of his reign he carried his warlike expeditions far and wide. Westward they extended nearly to the shores of the Caspian; eastward he repeatedly entered India as a conqueror. At his great battle of Panipat (January 6, 1761), with vastly inferior num- bers, he inflicted on the Mahrattas, then at the zenith of their power, a tremendous defeat, almost annihilating their vast army; but the success had for him no important result. Having long suffered from a terrible disease, he died in 1773, bequeath- ing to his son Timur a dominion which embraced not only Afghanistan to its utmost limits, but the Punjab, Kashmir and Turkestan to the Oxus, with Sind, Baluchistan and Khorasan as tributary governments.

Timur transferred his residence from Kandahar to Kabul, and continued during a reign of twenty years to stave off the anarchy which followed close on his death. He left twenty- three sons, of whom the fifth, Zaman Mirza, by help of Payindah Khan, head of the Barakzai family of the Abdalis, succeeded in grasping the royal power. For many years barbarous wars raged between the brothers, during which Zaman Shah, Shuja-ul- Mulk and Mahmud successively held the throne. The last owed success to Payindah's son, Fatteh Khan (known as the "Afghan Warwick "), a man of masterly ability in war and politics, the eldest of twenty-one

brothers, a family of notable intelligence and force of character, and many of these he placed over the provinces. Fatteh Khan, however, excited the king's jealously by his powerful position, and provoked the malignity of the king's son, Kamran, by a gross outrage on the Saddozai family. He was accordingly seized, blinded and afterwards murdered with prolonged torture, the brutal Kamran striking the first blow.

The Barakzai brothers united to avenge Fatteh Khan. The Saddozais were driven from Kabul, Ghazni and Kandahar, and with difficulty reached Herat (1818). Herat remained thus till Kamran's death (1842), and after that was held by his able and wicked minister Yar Mahommed. The rest of the country was divided among the Barakzais — Dost Mahommed, the ablest, getting Kabul. Peshawar and the right bank of the Indus fell to the Sikhs after their victory at Nowshera in 1823. The last Afghan hold of the Punjab had been lost long before — Kashmir in 1819; Sind had cast off all allegiance since 1808; the Turkes- tan provinces had been practically independent since the death of Timur Shah.

The First Afghan War, 1838-42. — In 1809, in consequence of the intrigues of Napoleon in Persia, the Hon. Mountstuart Elphinstone had been sent as envoy to Shah Shuja, then in power, and had been well received by him at Peshawar. This was the first time the Afghans made any acquaintance With Englishmen. Lieut. Alex. Burnes (afterwards Sir Alex. Burnes) visited Kabul on his way to Bokhara in 1832. In 1837 the Persian siege of Herat and the proceedings of Russia created uneasiness, and Burnes was sent by the governor-general as resident to the

amir's court at Kabul. But the terms which the Dost sought were not conceded by the government, and the rash resolution was taken of re-establishing Shah Shuja, long a refugee in British territory. Ranjit Singh, king of the Punjab, bound himself to co-operate, but eventually declined to let the expedi- tion cross his territories.

The war began in March 1838, when the "Army of the Indus," amounting to 21,000 men, assembled in Upper Sind and advanced through the Bolan Pass under the command of Sir John Keane. There was hardship, but scarcely any opposition. Kohandil Khan of Kandahar fled to Persia. That city was occupied in April 1839, an(i Shah Shuja was crowned in his grandfather's mosque. Ghazni was reached 21st July; a gate of the city was

blown open by the engineers (the match was fired by Lieut., afterwards Sir Henry, Durand), and the place was taken by storm. Dost Mahommed, finding his troops deserting, passed the Hindu Kush, and Shah Shuja entered the capital (August 7). The war was thought at an end, and Sir John Keane (made a peer) returned to India with a considerable part of the force, leaving behind 8000 men, besides the Shah's force, with Sir W. Macnaghten as envoy, and Sir A. Burnes as his colleague.

During the two following years Shah Shuja and his allies remained in possession of Kabul and Kandahar. The British outposts extended to Saighan, in the Oxus basin, and to Mullah Khan, in the plain of Seistan. Dost Mahommed surrendered (November 3, 1840) and was sent to India, where he was honourably treated. From the beginning, insurrection against the new government had been rife. The political authorities were overconfident, and neglected warnings. On the 2nd of November 1841 the revolt broke out violently at Kabul, with the massacre of Burnes and other officers. The position of the British camp, its communications with the citadel and the location of the stores were the worst possible; and the general (Elphinstone) was shattered in constitution. Disaster after disaster occurred, not without misconduct. At a conference (December 23) with the Dost's son, Akbar Khan, who had taken the lead of the Afghans, Sir W. Macnaghten was murdered by that chief's own hand. On the 6th of January 1842, after a convention to evacuate the country had been signed, the British garrison, still numbering 4500 soldiers (of whom 690 were Europeans), with some 12,000 followers, marched out of the camp. The winter was severe, the troops demoralised, the march a mass of confusion and massacre, and the force was finally overwhelmed in the Jagdalak pass between Kabul and Jalalabad.

On the 13 th the last survivors mustered at Gandamak only twenty muskets. Of those who left Kabul, only Dr Brydon reached Jalalabad, wounded and half dead. Ninety-five prisoners were afterwards recovered. The garrison of Ghazni had already been forced to surrender (December 10). But General Nott held Kandahar with a stern hand, and General Sale, who had reached Jalalabad from Kabul at the beginning of the outbreak, maintained that important point gallantly.

To avenge these disasters and recover the prisoners preparations were made in India on a fitting scale; but it was the 16th of April 1842 before General Pollock could relieve Jalalabad, after

forcing the Khyber Pass. After a long halt there he advanced (August 20), and gaining rapid successes, occupied Kabul (September 15), where Nott, after retaking and dismantling Ghazni, joined him two days later. The prisoners were happily recovered from Bamian. The citadel and central bazaar of Kabul were destroyed, and the army finally evacuated Afghan- istan, December 1842.

This ill-planned and hazardous enterprise was fraught with the elements of inevitable failure. A ruler imposed upon a free people by foreign arms is always unpopular; he is unable to stand alont; and his foreign auxiliaries soon find themselves obliged to choose between remaining to uphold his power, or retiring with the probability that it will fall after their departure. The leading chiefs of Afghanistan perceived that the maintenance of Shah Shuja':? rule by British troops would soon be fatal to their own power and position in the country, and probably to their national independence. They were insatiable in tie**

demands for office and emolument, and when they discovered that the shah, acting by the advice of the British envoy, was levying from among their tribesmen regiments to be directly under his control, they took care that the plan should fail. Without a regular revenue no effective administration could be organized; but the attempt to raise taxes showed that it might raise the people, so that for both men and money the shah's government was still obliged to rely principally upon British aid. All these circumstances combined to render the new regime weak and unpopular, since there was no force at the ruler's command except foreign troops to put down disorder or to protect those who submitted, while the discontented nobles fomented dis- affection and the inbred hatred of strangers in race and religion among the general Afghan population.

British and Russian Relations. — It has been said that the declared object of this policy had been to maintain the inde- pendence and integrity of Afghanistan, to secure the friendly alliance of its ruler, and thus to interpose a great barrier of mountainous country between the expanding power of Russia in Central Asia and the British dominion in India. After 1840, when the annexation of the Punjab had carried the Indian north-

western frontier up to the skirts of the Afghan highlands, the corresponding advance of the Russians south-eastward along the Oxus river became of closer interest to the British, particularly when, in 1856, the Persians again attempted to take possession of Herat. Dost Mahommed now became the British ally, but on his death in 1863 the kingdom fell back into civil war, until his son, Shere Ali, had won his way to undisputed rulership in 1868. In the same year Bokhara became a dependency of Russia. To the British government an attitude of non-intervention in Afghan affairs appeared in this situation to be no longer possible. The meeting between the amir Shere Ali and the viceroy of India (Lord Mayo) at Umballa in 1869 drew nearer the relations between the two governments; the amir consolidated and began to centralize his power; and the establishment of a strong, friendly and united Afghanistan became again the keynote of British policy beyond the north-western frontier of India.

When, therefore, the conquest of Khiva in 1873 by the Russians, and their gradual approach towards the amir's northern border, had seriously alarmed Shere Ali, he applied for support to the British; and his disappointment at his failure to obtain distinct pledges of material assistance, and at Great Britain's refusal to endorse all his claims in a dispute with Persia over Seistan, so far estranged him from the British connexion that he began to entertain amicable overtures from the Russian authorities at Tashkend. In 1869 the Russian government had assured Lord Clarendon that they regarded Afghanistan as completely outside the sphere of their influence; and in 1872 the boundary line of Afghanistan on the north-west had been settled between England and Russia so far eastward as Lake Victoria.

Nevertheless the correspondence between Kabul and Tash- kend continued, and as the Russians were now extending their dominion over all the region beyond Afghanistan on the north-west, the British government determined, in 1876, once more to undertake active measures for securing their political ascendancy in that country. But the amir, whose feelings of resentment had by no means abated, was now leaning toward Russia, though he mainly desired to hold the balance between two equally formidable rivals. The result of overtures made to him from India was that in 1877, when Lord Lytton, acting under direct instructions from Her Majesty's ministry, proposed to Shere Ali a treaty of alliance, Shere Ali showed himself very little disposed to welcome the offer; and upon his refusal to admit a British agent into Afghanistan the negotiations finally broke down.

Second Afghan War, 1878-80.— In the course of the following year (1878) the Russian government, to counteract the interference of England with their advance upon Constantinople, sent an envoy to Kabul empowered to make a treaty with the amir. It was immediately notified to him from India that a British mission would be deputed to his capital, but he demurred to receiving it; and when the British envoy was turned back

on the Afghan frontier hostilities were proclaimed by the viceroy in November 1878, and the second Afghan War began. Sir Donald Stewart's force, marching up through Baluchistan by the Bolan Pass, entered Kandahar with little or no resistance; while another army passed through the. Khyber Pass and took up positions at Jalalabad and other places on the direct road to Kabul. Another force under Sir Frederick Roberts marched up to the high passes leading out of Kurram into the interior of Afghanistan, defeated the amir's troops at the Peiwar Kotal, and seized the Shutargardan Pass which commands a direct route to Kabul through the Logar valley. The amir Shere Ali fled from his capital into the northern province, where he died at Mazar-i-Sharif in February 1879. In the course of the next six months there was much desultory skirmishing between the tribes and the British troops, who defeated various attempts to dislodge them from the positions that had been taken up; but the sphere of British military operations was not materi- ally extended. It was seen that the farther they advanced the more difficult would become their eventual retirement; and the problem was to find a successor to Shere Ali who could and would make terms with the British government.

In the meantime Yakub Khan, one of Shere Ali's sons, had announced to Major Cavagnari, the political agent at the headquarters of the British army, that he had succeeded his father at Kabul. The negotiations that followed ended in the con- clusion of the treaty of Gandamak in May 1879, by which Yakub Khan was recognized as amir; certain outlying tracts of Afghan- istan were transferred to the British government; the amir placed in its hands the entire control of his foreign relations, receiving in return a guarantee against foreign aggression; and the establishment of a British envoy at Kabul was at last con- ceded. By this convention the complete success of the British political and military operations seemed to have been attained; for whereas Shere Ali had made a treaty of alliance with, and had received an embassy from Russia, his son had now made an exclusive treaty with the British government, and had agreed

that a British envoy should reside permanently at his court. Yet it was just this final concession, the chief and original object of British policy, that proved speedily fatal to the whole settlement. For in September the envoy, Sir Louis Cavagnari, with his staff and escort, was massacred at Kabul, and the entire fabric of a friendly alliance went to pieces. A fresh expedition was instantly despatched across the Shutargardan Pass under Sir Frederick Roberts, who defeated the Afghans at Charasia near Kabul, and entered the city in October. Yakub Khan, who had surrendered, was sent to India; and the British army remained in military occupation of the district round Kabul until in December (1879) its communications with India were interrupted, and its position at the capital placed in serious jeopardy, by a general rising of the tribes. After they had been repulsed and put down, not without some hard fighting, Sir Donald Stewart, who had not quitted Kandahar, brought a force up by Ghazni to Kabul, overcoming some resistance on his way, and assumed the supreme command. Nevertheless the political situation was still embarrassing, for as the whole country beyond the range of British effective military control was masterless, it was undesirable to withdraw the troops before a government could be reconstructed which could stand without foreign support, and with which diplomatic relations of some kind might be arranged. The general position and prospect of political affairs in Afghanistan bore, indeed, an instructive resemblance to the situation just forty years earlier, in 1840, with the important differences that the Punjab and Sind had since become British, and that communications between Kabul and India were this time secure.

Reign of Abdur Rahman. — Abdur Rahman, the son of the late amir Shere Ali's elder brother, had fought against Shere Ali in the war for succession to Dost Mahommed, had been driven beyond the Oxus, and had lived for ten years in exile with the Russians. In March 1880 he came back across the river, and began to establish himself in the northern province of Afghan- istan. The viceroy of India, Lord Lytton, on hearing of his

reappearance, instructed the political authorities at Kabul to communicate with him. By skilful negotiations a meeting was arranged, and after pressing in vain for a treaty he was induced

to assume charge of the country upon his recognition by the British as amir, with the understanding that he should have no relations with other foreign powers, and with a formal assurance from the viceroy of protection from foreign aggression, so,long as he should unreservedly follow the advice of the British government in regard to his external affairs. The province of Kandahar was severed from the Kabul dominion; and the sirdar Shere AH Khan, a member of the Barakzai family, was installed by the British representative as its independent ruler.

For the second time in the course of this war a conclusive settlement of Afghan affairs seemed now to have been attained; and again, as in 1879, it was immediately dissolved. In July 1880, a few days after the proclamation of Abdur Rahman as amir at Kabul, came news that Ayub Khan, Shere Ali's younger son, who had been holding Herat since his father's death, had marched upon Kandahar, had utterly defeated at Maiwand a British force that went out from Kandahar to oppose him, and was besieging that city. Sir Frederick Roberts at once set out from Kabul with 10,000 men to its relief, reached Kandahar after a rapid march of 313 miles, attacked and routed Ayub Khan's army on the 1st of September, and restored British authority in southern Afghanistan. As the British ministry had resolved to evacuate Kandahar, the sirdar Shere Ali Khan, who saw that he could not stand alone, resigned and withdrew to India, and the amir Abdur Rahman was invited to take posses- sion of the province. But when Ayub Khan, who had meanwhile retreated to Herat, heard that the British forces had retired, early in 1881, to India, he mustered a fresh army and again approached Kandahar. In June the fort of Girishk, on the Helmund, was seized by his adherents; the amir's troops were defeated some days later in an engagement, and Ayub Khan took possession of Kandahar at the end of July. The amir Abdur Rahman, whose movements had hitherto been slow and uncertain, now acted with vigour and decision. He marched rapidly from Kabul at the head of a force, with which he en- countered Ayub Khan under the walls of Kandahar, and routed his army on 22nd September, taking all his guns and equipage. Ayub Khan fled toward Herat, but as the place had meanwhile been occupied by one of the amir's generals he took refuge in Persia. By this victory Abdur Rahman's rulership was established.

In 1884 it was determined to resume the demarcation, by a joint commission of British and Russian officers, of the northern boundary of Afghanistan. The work went on with much diffi-

culty and contention, until in March 1885, when the amir was at Rawalpindi for a conference with the viceroy of India, Lord Dufferin, the news came that at Panjdeh, a disputed place on the boundary held by the Afghans, the Russians had attacked and driven out with some loss the amir's troops. For the moment the consequences seemed likely to be serious; but the affair was arranged diplomatically, and the demarcation pro- ceeded up to a point near the Oxus river, beyond which the commission were unable to settle an agreement.

During the ten years following his accession in 1880 Abdur Rahman employed himself in extending and consolidating his dominion over the whole country. Some local revolts among the tribes were rigorously suppressed; and two attempts to upset his rulership — the first by Ayub Khan, who entered Afghanistan from Persia, the second and more dangerous one by Ishak Khan, the amir's cousin, who rebelled against him in Afghan Turkestan — were defeated. By 1801 the amir had enforced his supreme authority throughout Afghanistan more completely than any of his predecessor?. In 1895 the amir's troops entered Kafiristan, a wild mountainous tract on the north-east, inhabited by a peculiar race that had hitherto defied all efforts to subjugate them, but were now gradually reduced to submission. Meanwhile the delimitation of the northern frontier, up to the point where it meets Chinese territory on the east, was completed and fixed by arrangements between

the governments of Russia and Great Britain; and the eastern border of the Afghan territory, towards India, was also mapped out and partially laid down, in accordance with a convention between the two governments. The amir not only received a large annual subsidy of money from the British government, but he also obtained considerable supplies of war material; and he, moreover, availed himself very freely of facilities that were given him for the importation at his own cost of arms through India. With these resources, and with the advantage of an assurance from the British government that he would be aided against foreign aggression, he was able to establish an absolute military despot- ism inside his kingdom, by breaking down the power of the warlike tribes which held in check, up to his time, the personal autocracy of the Kabul rulers, and by organizing a regular army well furnished with European rifles and artillery. Taxation of all kinds was heavily increased, and systematically collected. The result was that whereas in former times the forces of an Afghan ruler consisted mainly of a militia, furnished by the

chiefs of tribes who held land on condition of military service, and who stoutly resisted any attempt to commute this service for money payment, the amir had at his command a large standing army, and disposed of a substantial revenue paid direct to his treasury. Abdur Rahman executed or exiled all those whose political influence he saw reason to fear, or of whose disaffection he had the slightest suspicion; his administration was severe and his punishments were cruel; but undoubtedly he put down disorder, stopped the petty tyranny of local chiefs and brought violent crime under some effective control in the districts. Travelling by the high roads during his reign was comparatively safe; although it must be added thai the excessive exactions of dues and customs very seriously damaged the external trade. In short, Abdur Rahman's reign produced an important political revolution, or reformation, in Afghanistan, which rose from the condition of a country distracted by chronic civil wars, under rulers whose authority depended upon their power to hold down or conciliate fierce and semi-independent tribes in the outlying parts of the dominion, to the rank of a formidable military state governed autocratically. He established, for the first time in the history of the. Afghan kingdom, a powerfully centralized administration strong enough to maintain order and to enforce obedience over all the country which he had united under his dominion, supported by a force sufficiently armed and disciplined to put down attempts at resistance or revolt. His policy, con- sistently maintained, was to permit no kind of foreign inter- ference, on any pretext, with the interior concerns or the econo- mical conditions of his country. From the British government he accepted supplies of arms and subsidies of money; but he would make no concessions in return, and all projects of a strategical or commercial nature, such as railways and telegraphs, proposed either for the defence or the development of his posses- sions, seem to have been regarded by the amir with extreme distrust, as methods of what has been called pacific penetration — so that on these points he was immovable. It was probably due to the strength and solidity of the executive administration organized, during his lifetime, by Abdur Rahman that, for the first time in the records of the dynasty founded by Ahmad Shah in the latter part of the 18th century, his death was not followed by disputes over the succession or by civil war.

Succession of Habibullah. — The amir Abdur Rahman died on the 1st of October 1901; and two days later his eldest son,

Habibullah, formally announced his accession to the rulership. He was recognized with acclamation by the army, by the religious bodies, by the principal tribal chiefs and by all classes of the people as their lawful sovereign; while a deputation of Indian Mahommedans was despatched to Kabul from India to convey the condolences and congratulations of the viceroy. The amir's first measures were designed to enhance his popularity and to improve his internal administration, particularly with regard to the relations of his government with the tribes, and to the system introduced by the late amir of compulsory military service, whereby each tribe was required to supply a proportionate number of recruits. With this object a council of state

for tribal affairs was established; and it was arranged that a representative of each tribe shcrald be associated with the provincial governors for the adjudication of tribal cases.

In the important matter of foreign relations Habibullah showed a determination to adopt the policy of his father, to whom the British government had given an assurance of aid to repel foreign aggression, on the condition that the amir should follow the advice of that government in regard to external affairs. This condition was loyally observed by the new amir, who referred to India all communications of an official kind received from the Russian authorities in the provinces bordering on Afghanistan. But toward the various questions left pending between the governments of India and Afghanistan the new amir maintained also his father's attitude. He gave no indications of a disposition to continue the discussion of them, or to entertain proposals for extending or altering his relations with the Indian government. An invitation from the viceroy to meet him in India, with the hope that these points might be settled in conference, was put aside by dilatory excuses, until at last the project was abandoned, and finally the amir agreed to receive at Kabul a diplomatic mission. The mission, whose chief was Sir Louis Dane, foreign secretary to the Indian government, reached Kabul early in December 1904, and remained there four months in negotiation with the amir personally and with his representatives. It was found impossible, after many inter- views, to obtain from Habibullah his consent to any addition to or variation of the terms of the assurance given by the British

government in 1880, with which he professed himself entirely satisfied, so that the treaty finally settled in March 1905 went no further than a formal confirmation of all engagements previously concluded with the amir's predecessor. It was felt in British circles at the time that a very considerable concession to Habibullah's independence of attitude was displayed in the fact that he was styled in the treaty " His Majesty "; but, in the circumstances, it seems to have been thought diplomatic to accede to the amir's determination to insist on this matter of style. But the rebuff showed that it was desirable in the interests both of the British government and of Afghanistan that an opportunity should be made for enabling the amir to have personal acquaintance with the highest Indian authorities. A further step, calculated to strengthen the relations of amity between the two governments, was taken when it was arranged that the amir should pay a visit to the viceroy, Lord Minto, in India, in January 1907; and this visit took place with great cordiality and success.

The Anglo- Russian Convention, signed on the 31st of August 1907, contained the following important declarations with regard to Afghanistan. Great Britain disclaimed any intention of altering the political status or (subject to the observance of the treaty of 1905) of interfering in the administration or annexing any territory of Afghanistan, and engaged to use her influence there in no manner threatening to Russia. Russia, on her part, recognized Afghanistan as outside her sphere of influence.

Authorities. — MacGregor, Gazetteer of Afghanistan (1871); Elphinstone, Account of the Kingdom of Kabul (1809) ; Ferrier, Histor y of the Afghans (1858); Bellew, Afghanistan and the Afghans (1879); Baber's Memoirs (1844); Kaye, History of the War in Afghanistan (1878); Malleson, History of Afghanistan (1879); Heusman, The Afghan War (1881) ; Sir H. M. Durand, The First Afghan War (1879) ; Forbes, The Afghan Wars (1892); Rawlinson, England and Russia in the East (1875); Wyllie, Essays on the External Policy of India (1875) ; A. C. Yate, England and Russia Face to Face in Asia (1887) ; C. E. Yate, Northern Afghanistan (1888); Curzon, Problems of the Far East (1894); Robertson, The Kafir of the Hindu Kush (1896); Holdich, Indian Borderland (1901); Thorburn, Asiatic Neighbours (1895); Lord Roberts, Forty-one Years in India (1898); Lady Betty Balfour, Lord Lytton's Indian Administration (1899); Hanna, Second Afghan War (1899); Gray, At the Court of the Amir (1895); Sultan Mohammad Khan, Constitution and Laws of Afghanistan (1900); Life of Abdur Rahman (1900); Angus Hamilton, Afghan- istan

(1906). (H. Y.; A. C.L.)

AFGHAN TURKESTAN, the most northern province of Afghanistan. It is bounded on the E. by Badakshan, on the N. by the Oxus river, on the N.W. and W. by Russia and the Hari Rud river, and on the S. by the Hindu Kush, the Koh-i-Baba

and the northern watershed of the Hari Rud basin. Its northern frontier was decided by the Anglo-Russian agreement of 1873, and delimited by the Russo-Afghan boundary commission of 1885, which gave rise to the Panjdeh incident. The whole territory, from the junction of the Kokcha river with the Oxus on the north-east to the province of Herat on the south-west, is some 500 m. in length, with an average width from the Russian frontier to the Hindu Kush of 114 m. It thus comprises about 57,000 sq. m. or roughly two-ninths of the kingdom of Afghan- istan. Except in the river valleys it is a poor territory, rough and mountainous towards the south, but subsiding into undulat- ing wastes and pasture-lands towards the Turkman desert, and the Oxus riverain which is highly cultivated. The population, which is mostly agricultural, settled in and around its towns and villages, is estimated at 750,000. The province includes the khanates of Kunduz, Tashkurgan, Balkh with Akcha; the western khanates of Saripul, Shibarghan, Andkhui and Maimana, sometimes classed together as the Chahar Villayet, or " Four Domains"; and such parts of the Hazara tribes as lie north of the Hindu Kush and its prolongation. The principal town is Mazar-i-Sharif, .which in modern times has supplanted the ancient city of Balkh; and TakKtapul, near Mazar, is the chief Afghan cantonment north of the Hindu Kush.

Ethnically and historically Afghan Turkestan is more con- nected with Bokhara than with Kabul, of which government it has been a dependency only since the time of Dost Mahommed. The bulk of the people of the cities are of Persian and Uzbeg stock, but interspersed with them are Mongol Hazaras and Hindus with Turkoman tribes in the Oxus plains. Over these races the Afghans rule as conquerors and there is no bond of racial unity between them. Ancient Balkh or Bactriana was a province of the Achaemenian empire, and probably was occupied in great measure by a race of Iranian blood. About 250 B.C. Diodotus (Theodotus), governor of Bactria under the Seleucidae, declared his independence, and commenced the history of the Greco-Bactrian dynasties, which succumbed to Parthian and nomadic movements about 126 B.C. After this came a Buddhist era which

has left its traces in the gigantic sculptures at Bamian and the rock-cut topes of Haibak. The district was devastated by Jenghiz Khan, and has never since fully recovered its prosperity. For about a century it belonged to the Delhi empire, and then fell into Uzbeg hands. In the 18th century it formed part of the dominion of Ahmad Khan Durani, and so remained under his son Timur. But under the fratricidal wars of Timur's sons the separate khanates fell back under the independent rule of various Uzbeg chiefs. At the beginning of the 19th century they belonged to Bokhara; but under the great amir Dost Mahommed the Afghans recovered Balkh and Tashkurgan in 1850, Akcha and the four western khanates in 1855, and Kunduz in 1859. The sovereignty over Andkhui, Shibarghan, Saripul and Maimana was in dispute between Bokhara and Kabul until settled by the Anglo-Russian agreement of 1873 in favour of the Afghan claim. Under the strong rule of Abdur Rahman these outlying territories were closely welded to Kabul; but after the accession of Habibullah the bonds once more relaxed. (T. H. H.*)

AFIUM-KARA-HISSAR {afium, opium), the popular name of Kara-hissar Sahib, a city of Asiatic Turkey, in the vilayet of Brusa, nearly 200 m. E. of Smyrna, and 50 m. S.S.E. of Kutaiah. Pop. 18,000 (Moslems, 13,000; Christians, 5000). Called Nicopolis by Leo III. after his victory over the Arabs in 740, its name was changed by the Seljuk Turks to Kara-hissar. It stands partly on level ground, partly on a declivity, and above it rises a precipitous trachytic rock (400 ft.) on the summit of which are the ruins of an ancient castle. From its situation on the route of the caravans between Smyrna and western Asia on the one hand, and Armenia, Georgia, &c, on the other, the city became a place of extensive trade, and its bazaars are well stocked with the merchandise of both Europe and the East. Opium in large quantities is produced in its vicinity and forms the staple article of its commerce ; and there are, besides, manufactures of black felts, carpets, arms and saddlery. Afium

contains several mosques (one of them a very handsome building), and is the seat of an Armenian bishop. The town is connected by railway with Smyrna, Konia, Angora and Constantinople. See V. Cuinet, Turquie d'Asie (Paris, 1894), vol. iv.

A FORTIORI (Lat. ” from a stronger [reason] “), a term used of an argument which justifies a statement not itself specifically demonstrated by reference to a proved conclusion which includes it; thus, if A is proved less than B, and is known to be greater than C, it follows a fortiori that C is less than B without further proof. The argument is frequently based merely on a comparison of probabilities (cf. Matt. vi. 30), when it constitutes an appeal to common sense.

AFRANIUS, LUCIUS, Roman general, lived in the times of the Sertorian (70-72), third Mithradatic (74-61) and Civil Wars. Of humble origin (Cic. ad Aft. i. 16. 20), from his early years he was a devoted adherent of Pbmpey. In 60, chiefly by Pompey’s support, he was raised to the consulship, but in per- forming the duties of that office he showed an utter incapacity to manage civil affairs. In the following year, while governor of Cisalpine Gaul, he obtained the honour of a triumph, and on the allotment of Spain to Pompey (55), Afranius and Marcus Petreius were sent to take charge of the government. On the rupture between Caesar and Pompey they were . compelled, after a short campaign in which they were at first successful, to surrender to Caesar at Ilerda (49), and were dismissed on promising riot to serve again in the war. Afranius, regardless of his promise, joined Pompey at Dyrrhachium, and at the battle of Pharsalus (48) had charge of Pompey’s camp. On the defeat of Pompey, Afranius, despairing of pardon from Caesar, went to Africa, and was present at the disastrous battle of Thapsus (46). Escaping from the field with a strong body of cavalry, he was afterwards taken prisoner, along with Faustus Sulla, by the troops of Sittius, and handed over to Caesar, whose veterans rose in tumult and put them to death.

See Hirtius, Bell. Afric. 95; Plutarch, Pompey; Dio Cassius xxxvii., xli.-xliii.; Caesar, B.C. i. 37-87; Appian, B.C. ii. ; for the history of the period, articles on Caesar and Pompey.

AFRANIUS, LUCIUS, Roman comic poet, flourished about 94 B.C. His comedies chiefly dealt with everyday subjects from Roman middle-class life, and he himself tells us that he borrowed freely from Menander and others. His style was vigorous and correct; his moral tone that of the period.

Horace, Epp. ii. 1. 57; Cicero, Brutus, 45, de Fin. i. 3; Quintilian x. 1. 100; fragments, about 400 lines, in Ribbeck, Scaenicae Romanorum Poesis Fragmenta, ii. (1898).

AFRICA, the name of a continent representing the largest of the three great southward projections from the main mass of the earth's surface. It includes within its remarkably regular outline an area, according to the most recent computations, of 11,262,000 sq. m., excluding the islands. 1 Separated from Europe by the Mediterranean Sea, it is joined to Asia at its N.E. extremity by the Isthmus of Suez, 80 m. wide. From the most northerly point, Ras ben Sakka, a little west of Cape Blanc, in 37 21′ N., to the most southerly point, Cape Agulhas, 34° S 1 ' I S" S., is a distance approximately of 5000 m.; from Cape Verde, 17 33′ 22″ W., the westernmost point, to Ras Hafun, 51 27′ 52″ E., the most easterly projection, is a dis- tance (also approximately) of 4600 m. The length of coast-line is 16,100 m. and the absence of deep indentations of the shore is shown by the fact that Europe, which covers only 3,760,000 sq. m., has a coast-line of 19,800 m.

I. Physical Geography

The main structural lines of the continent show both the east-to-west direction characteristic, at least in the eastern hemisphere, of the more northern parts of the world, and the north-to-south direction seen in the southern peninsulas. Africa is thus composed of two segments at right angles, the northern running from east to west, the southern from north to south, the subordinate lines corresponding in the main to these two directions.

Main Orographical Features. — The mean elevation of the con- 1 With the islands, 11,498,000 sq. m.

tinent approximates closely to 2000 ft., which is roughly the elevation of both North and South America, but is considerably less than that of Asia (31 17 ft.). In contrast with the other continents it is marked by the comparatively small area both of very high and of very low ground, lands under 600 ft. occupying an unusually small. part of the surface; while not only are the highest elevations inferior to those of Asia and South America, but the area of land over 10,000 ft. is also quite insignificant, being represented almost entirely by individual peaks and mountain ranges. Moderately elevated tablelands are thus the characteristic feature of the continent, though the surface of these is broken by higher peaks and ridges. (So prevalent are these isolated peaks and ridges that a special term [Inselberg-landschafl] has been adopted in Germany to describe this kind of country, which is thought to be in great part the result of wind

action.) As a general rule, the higher tablelands lie to the east and south, while a progressive diminution in altitude towards the west and north is observable. Apart from the low- lands and the Atlas range, the continent may be divided into two regions of higher and lower plateaus, the dividing line (somewhat concave to the north-west) running from the middle of the Red Sea to about 6° S. on the west coast. We thus obtain the following four main divisions of the continent: — (1) The coast plains— often fringed seawards by mangrove swamps — never stretching far from the coast, except on the lower courses of streams. Recent alluvial flats are found chiefly in the delta of the more important rivers. Elsewhere the coast lowlands merely form the lowest steps of the system of terraces which constitutes the ascent to the inner plateaus. (2) The Atlas range, which, orographically, is distinct from the rest of the continent, being unconnected with any other area of high ground, and separated from the rest of the continent on the south by a depressed and desert area (the Sahara) , in places below sea-level. (3) The high southern and eastern plateaus, rarely falling below 2000 ft., and having a mean elevation of about 3500 ft. (4) The north and west African plains, bordered and traversed by bands of higher ground, but generally below 2000 ft. This division includes the great desert of the Sahara.

The third arid fourth divisions may be again subdivided. Thus the high plateaus include: — (a) The South African plateau as far as about 12 S., bounded east, west and south by bands of high ground which fall steeply to the coasts. On this account South Africa has a general resemblance to an inverted saucer. Due south the plateau rim is formed by three parallel steps with level ground between them. The largest of these level areas, the Great Karroo, is a dry, barren region, and a large tract of the plateau proper is of a still more arid character and is known as the Kalahari Desert. The South African plateau is connected towards the north-east with (b) the East African plateau, with probably a slightly greater average elevation, and marked by some distinct features. It is formed by a widening out of the eastern axis of high ground, which becomes subdivided into a number of zones running north and south and consisting in turn of ranges, tablelands and depressions. The most striking feature is the existence of two great lines of depression, due largely to the subsidence of whole segments of the earth's crust, the lowest parts of which are occupied by vast lakes Towards the south the two lines converge and give place to one great valley (occupied

by Lake Nyasa), the southern part of which is less distinctly due to rifting and subsidence than the rest of the system. Farther north the western depression, sometimes known as the Central African trough or Albertine rift-valley, is occupied for more than half its length by water, forming the four lakes of Tanganyika, Kivu, Albert Edward and Albert, the first-named over 400 m. long and the longest freshwater lake in the world. Associated with these great valleys are a number of volcanic peaks, the greatest of which occur on a meridional line east of the eastern trough. The eastern depression, known as the East African trough or rift-valley, contains much smaller lakes, many of them brackish and without outlet, the only one comparable to those of the western trough being Lake Rudolf or Basso Norok. At no great distance east

of this rift-valley are Kilimanjaro — with its two peaks Kibo and Mawenzi, the former 19,321 ft, and the culminating point of the whole continent — and Kenya (17,007 ft.). Hardly less important is the Ruwenzori range (over 16,600 ft.), which lies east of the western trough. Other volcanic peaks rise from the floor of the valleys, some of the Kirunga (Mfumbiro) group, north of Lake Kivu, being still partially active, (c) The third division of the higher region of Africa is formed by the Abys- sinian highlands, a rugged mass of mountains forming the largest continuous area of its altitude in the whole continent, little of its surface falling below 5°°° ft, while the summits reach heights of 15,000 to 16,000 ft This block of country lies just west of the line of the great East African trough, the northern continuation of which passes along its eastern escarp- ment as it runs up to join the Red Sea. There is, however, in the centre a circular basin occupied by Lake Tsana.

Both in the east and west of the continent the bordering highlands are continued as strips of plateau parallel to the coast, the Abyssinian mountains being continued northwards along the Red Sea coast by a series of ridges reaching in places a height of 7000 ft. In the west the zone of high land is broader but somewhat lower. The most mountainous districts lie inland from the head of the Gulf of Guinea (Adamawa, &c), where heights of

6000 to 8000 ft. are reached. Exactly at the head of the gulf the great peak of the Cameroon, on a line of volcanic action continued by the islands to the south-west, has a height of 13,370 ft, while Clarence Peak, in Fernando Po, the first of the line of islands, rises to over 9000. Towards the extreme west the Futa Jallon highlands form an important diverging point of rivers, but beyond this, as far as the Atlas chain, the elevated rim of the continent is almost wanting.

The area between the east and west coast highlands, which north of 17 N. is mainly desert, is divided into separate basins by other bands of high ground, one of which runs nearly centrally through North Africa in a line corresponding roughly with the curved axis of the continent as a whole. The best marked of the basins so formed (the Congo basin) occupies a circular area bisected by the equator, once probably the site of an inland sea. The arid region, the Sahara — the largest desert in the world, covering 3,500,000 sq. m. — extends from the Atlantic to the Red Sea. Though generally of slight elevation it contains mountain ranges with peaks rising to 8000 ft. Bordered N.W. by the Atlas range, to the N.E. a rocky plateau separates it from the Mediterranean; this plateau gives place at the extreme east to the delta of the Nile. That river (see below) pierces the desert without modifying its character. The Atlas range, the sorth-westerly part of the continent, between its seaward and landward heights encloses elevated steppes in places 100 m. broad. From the inner slopes of the plateau numerous wadis take a direction towards the Sahara. The greater part of that now desert region is, indeed, furrowed by old water-channels.

The following table gives the approximate altitudes of the chief mountains and lakes of the continent: —

Mountains. Ft. Lakes. Ft.

Rungwe (Nyasa) . 10,400 Chad .... 850 1 Drakensberg . . 11,700′ Leopold II . . 1100

Lereko or Sattima 13,214″ Rudolf . . . 1250 (Aberdare Range) Nyasa . . . 1645″

Cameroon . . 13,370 Albert Nyanza . 2028′

Elgon . . . 14,152 s Tanganyika . . 2624″ Karissimbi (Mfum- Ngami . . . 2950

biro) . . . 14,683″ Mweru . . . 3000 Meru . . . 14,955″ Albert Edward . 3004″

Tagharat (Atlas) . 15,000′ Bangweulu. . . 3700 Simen Mountains, 15,160′ Victoria Nyanza . 3720″ Abyssinia Abai . . . 4200

Ruwenzori . . 16,619″ Kivu . . . 4829″

Kenya . . . 17,007″ Tsana . . . 5690

Kilimanjaro . . 19,321″ Naivasha . . 6135″

The Hydrographic Systems. — From the outer margin of the African plateaus a large number of streams run to the sea with comparatively short courses, while the larger rivers flow for long

1 Estimated.

” See the calculations of Capt. T. T. Behrens, Geog. Journal, vol. lexix. (1907). I. U

distances on the interior highlands before breaking through the outer ranges. The main drainage of the continent is to the north and west, or towards the basin of the Atlantic Ocean. The high lake plateau of East Africa contains the head-waters of the Nile and Congo: the former the longest, the latter the largest river of the continent. The upper Nile receives its chief supplies from the mountainous region adjoining the Central African trough in the neighbourhood of the equator. Thence streams pour east to the Victoria Nyanza, the largest African lake (covering over 26,000 sq. m.), and west and north to the Albert Edward and Albert Nyanzas, to the latter of which the effluents of the other two lakes add their waters. Issuing from it the Nile flows north, and between 7° and io° N. traverses a vast marshy level during which its course is liable to blocking by floating vegetation. After receiving the Bahr-el-Ghazal from the west and the Sobat, Blue Nile and Atbara from the Abyssinian highlands (the chief gathering ground of the flood- water), it crosses the great desert and enters the Mediterranean by a vast delta. The most remote head-stream of the Congo is the Chambezi, which flows south-west into the marshy Lake Bang- weulu. From this lake issues the Congo, known in its upper course by various names. Flowing first south, it afterwards turns north through Lake Mweru and descends to the forest-clad basin of west equatorial Africa. Traversing this in a majestic northward curve and receiving vast supplies of water from many great tributaries, it finally turns

south-west and cuts a way to the Atlantic Ocean through the western highlands. North of the Congo basin and separated from it by a broad undulation of the surface is the basin of Lake Chad — a flat-shored, shallow lake filled principally by the Shari coming from the south-east. West of this is the basin of the Niger, the third river of Africa, which, though flowing to the Atlantic, has its principal source in the far west, and reverses the direction of flow exhibited by the Nile and Congo. An important branch, however — the Benue — comes from the south-east. These four river-basins occupy the greater part of the lower plateaus of North and West Africa, the remainder consisting of arid regions watered only by intermittent streams which do not reach the sea. Of the remaining rivers of the Atlantic basin the Orange, in the extreme south, brings the drainage from the Drakensberg on the opposite side of the continent, while the Kunene, Kwanza, Ogowe and Sanaga drain the west coast highlands of the southern limb; the Volta, Komoe, Bandama, Gambia and Senegal the highlands of the western limb. North of the Senegal for over 1000 m. of coast the arid region reaches to the Atlantic. Farther north are the streams, with comparatively short courses, which reach the Atlantic and Mediterranean from the Atlas mountains.

Of the rivers flowing to the Indian Ocean the only one draining any large part of the interior plateaus is the Zambezi, whose western branches rise in the west coast highlands. The main stream has its rise in n° 21′ 3″ S. 24 22′ E. at an elevation of 5000 ft. It flows west and south for a considerable distance before turning to the east. All the largest tributaries, including the Shire, the outflow of Lake Nyasa, flow down the southern slopes of the band of high ground which stretches across the continent in io° to 12° S. In the south-west the Zambezi system interlaces with that of the Taukhe (or Tioghe), from which it at times receives surplus water. The rest of the water of the Taukhe, known in its middle course as the Okavango, is lost in a system of swamps and saltpans which formerly centred in Lake Ngami, now dried up. Farther south the Limpopo drains a portion of the interior plateau but breaks through the bounding highlands on the side of the continent nearest its source. The Rovuma, Rufiji, Tana, Juba and Webi Shebeli principally drain the outer slopes of the East African highlands, the last named losing itself in the sands in close proximity to the sea. Another large stream, the Hawash, rising in the Abyssinian mountains, is lost in a saline depression near the Gulf of Aden. Lastly, between the basins of the Atlantic and Indian Oceans there is an area of inland

drainage along the centre of the East African plateau, directed chiefly into the

lakes in the great rift-valley. The largest river is the Omo, which, fed by the rains of the Abyssinian highlands, carries down a large body of water into Lake Rudolf. The rivers of Africa are generally obstructed either by bars at their mouths or by cataracts at no great distance up-stream. But when these obstacles have been overcome the rivers and lakes afford a network of navigable waters of vast extent.

The calculation of the areas of African drainage systems, made by Dr A. Bludau (Petermanns Mitteilungen, 43, 1897, pp. 184-186) gives the following general results: —

Basin of the Atlantic .... 4,070,000 sq. m. ,, ,, Mediterranean . . . 1,680,000 ,, ,, ,, _ Indian Ocean . . . 2,086,000 „

Inland drainage area 3,452,000 „

The areas of individual river-basins are: —

Congo (length over 3000 m.) . . 1,425,000 sq. m. Nile (,, fully 4000 m.) . . I,o82,ooo l „

Niger (,, about 2600 m.) . . 808, ooo 2 „

Zambezi („ „ 2000 m.) , . 513,500 „ Lake Chad . . .. 394,000 „

Orange (length about 1300 m.) . . 370,500 s „ ,, (actual drainage area) . . 172,500 ,,

The area of the Congo basin is greater than that of any other river except the Amazon, while the African inland drainage area is greater than that of any continent but Asia, in which the corresponding area is 4,900,000 sq. m.

The principal African lakes have been mentioned in the description of the East African plateau, but some of the pheno-

mena connected with them may be spoken of more particularly here. As a rule the lakes which occupy portions of the great rift-valleys have steep sides and are very deep. This is the case with the two largest of the type, Tanganyika and Nyasa, the latter of which has depths of 430 fathoms. Others, however, are shallow, and hardly reach the steep sides of the valleys in the dry season. Such are Lake Rukwa, in a subsidiary depression north of Nyasa, and Eiassi and Manyara in the system of the eastern rift-valley. Lakes of the broad type are of moderate depth, the deepest sounding in Victoria Nyanza being under 50 fathoms. Apart from the seasonal variations of level, most of the lakes show periodic fluctuations, while a progressive desiccation of the whole region is said to be traceable, tending to the ultimate disappearance of the lakes. Such a drying up has been in progress during long geologic ages, but doubt exists as to its practical importance at the present time. The periodic fluctuations in the level of Lake Tanganyika are such that its outflow is intermittent. Besides the East African lakes the principal are: — Lake Chad, in the northern area of inland drainage; Bangweulu and Mweru, traversed by the head-stream of the Congo; and Leopold II. and Ntomba (Mantumba), within the great bend of that river. All, except possibly Mweru, are more or less shallow, and Chad appears to by drying up. The altitudes of the African lakes have already been stated.

Divergent opinions have been held as to the mode of origin of the East African lakes, especially Tanganyika, which some geologists have considered to represent an old arm of the sea, dating from a time when the whole central Congo basin was under water; others holding that the lake water has accumulated in a depression caused by subsidence. The former view is based on the existence in the lake of organisms of a decidedly marine type. They include a jelly-fish, molluscs, prawns, crabs, &c, and were at first considered to form an isolated group found in no other of the African lakes; but this supposition has been proved to be erroneous.

Islands. — With one exception — Madagascar — the African islands are small. Madagascar, with an area of 229,820 sq. m., is, after New Guinea and Borneo, the largest island of the world. It lies off the S.E, coast of the continent, from which it is separated by the deep Mozambique channel, 250 m. wide at its narrowest point. Madagascar in its general structure, as in flora and fauna, forms a connecting link between Africa and southern Asia. East of Madagascar are the small islands of Mauritius and Reunion.

Sokotra lies E.N.E. of Cape Guardafui. Off the

1 The estimate of Capt. H. G. Lyons in 1905 was 1,107,227 sq. m.

2 Including waterless tracts naturally belonging to the river-basin.

north-west coast are the Canary and Cape Verde archipelagoes, which, like some small islands in the Gulf of Guinea, are of volcanic origin.

Climate and Health. — Lying almost entirely within the tropics, and equally to north and south of the equator, Africa does not show excessive variations of temperature. Great heat is experienced in the lower plains and desert regions of North Africa, removed by the great width of the continent from the influence of the ocean, and here, too, the contrast between day and night, and between summer and winter, is greatest. (The rarity of the air and the great radiation during the night cause the temperature in the Sahara to fall occasionally to freezing point.) Farther south, the heat is to some extent modified by the moisture brought from the ocean, and by the greater elevation of a large part of the surface, especially in East Africa, where the range of temperature is wider than in the Congo basin or on the Guinea coast. In the extreme north and south the climate is a warm temperate one, the northern countries being on the whole hotter and drier than those in the southern zone; the south of the continent being narrower than the north, the influence of the surrounding ocean is more felt. The most important climatic differences are due to variations in the amount of rainfall. The wide heated plains of the Sahara, and in a lesser degree the corresponding zone of the Kalahari in the south, have an exceedingly scanty rainfall, the winds which blow over them from the ocean losing part of their moisture as they pass over the outer highlands, and becoming constantly drier owing to the heating effects of the burning soil of the interior; while the scarcity of mountain ranges in the more central parts likewise tends to prevent condensation. In the inter-tropical zone of summer precipitation, the rainfall is greatest when the sun is vertical or soon after. It is therefore greatest of all near the equator, where the sun is twice vertical, and less in the direction of both tropics. The rainfall zones are, however, somewhat deflected from a due west-to-east direction, the drier northern conditions extending southwards along the east coast, and those of the south northwards along the west. Within the equatorial zone certain

areas, especially on the shores of the Gulf of Guinea and in the upper Nile basin, have an intensified rainfall, but this rarely approaches that of the rainiest regions oi the world. The rainiest district in all Africa is a strip of coast- land west of Mount Cameroon, where there is a mean annual rainfall of about 390 in. as compared with a mean of 458 in. at Cherrapunji, in Assam. The two distinct rainy seasons of the equatorial zone, where the sun is vertical at half-yearly intervals, become gradually merged into one in the direction of the tropics, where the sun is overhead but once. Snow falls on all the higher mountain ranges, and on the highest the climate is thoroughly Alpine. The countries bordering the Sahara are much exposed to a very dry wind, full of fine particles of sand, blowing from the desert towards the sea. Known in Egypt as the khamsin, on the Mediterranean as the sirocco, it is called on the Guinea coast the harmattan. This wind is not invariably hot; its great dryness causes so much evaporation that cold is not infrequently the result. Similar dry winds blow from the Kalahari in the south. On the eastern coast the monsoons of the Indian Ocean are regularly felt, and on the south-east hurricanes are occasionally experienced.

While the climate of the north and south, especially the south, is eminently healthy, and even the intensely heated Sahara is salubrious by reason of its dryness, the tropical zone as a whole is, for European races, the most unhealthy portion of the world. This is especially the case in the lower and moister regions, such as the west coast, where malarial fever is very prevalent and deadly; the most unfavourable factors being humidity with absence of climatic variation (daily or seasonal). The higher plateaus, where not only is the average temperature lower, -but such variations are more extensive, are more healthy; and in certain localities (e.g. Abyssinia and parts of British East Africa) Europeans find the climate suitable for permanent residence. On tablelands over 6500 ft. above the sea, frost is not uncommon at night, even in places directly under the equator. The

acclimatization of white men in tropical Africa generally is dependent largely on the successful treatment of tropical diseases. Districts which had been notoriously deadly to

Europeans were rendered comparatively healthy after the discovery, in 1899, of the species of mosquito which propagates malarial fever, and the measures thereafter taken for its destruction and the filling up of swamps. The rate of mortality among the natives from tropical diseases is also high, one of the most fatal being that known as sleeping sickness. (The ravages of this disease, which also attacks Europeans, reached alarming proportions between 1893 and 1907, and in the last-named year an international conference was held in London to consider measures to combat it.) When removed to colder regions natives of the equatorial districts suffer greatly from chest complaints. Smallpox also makes great ravages among the negro population.

Flora. — The vegetation of Africa follows very closely the distribution of heat and moisture. The northern and southern temperate zones have a flora distinct from that of the continent generally, which is tropical. In the countries bordering the Mediterranean are groves of oranges and olive 1;rees, evergreen oaks, cork trees and pines, intermixed with cypresses, myrtles, arbutus and fragrant tree-heaths. South of the Atlas range the conditions alter. The zones of minimum rainfall have a very scanty flora, consisting of plants adapted to resist the great dryness. Characteristic of the Sahara is the date-palm, which flourishes where other vegetation can scarcely maintain existence, while in the semi-desert regions the acacia (whence is obtained gum-arabic) is abundant. The more humid regions have a richer vegetation — dense forest where the rainfall is greatest and variations of temperature least, conditions found chiefly on the tropical coasts, and in the west African equatorial basin with its extension towards the upper Nile; and savanna interspersed with trees on the greater part of the plateaus, passing as the desert regions are approached into a scrub vegetation consisting of thorny acacias, &c. Forests also occur on the humid slopes of mountain ranges up to a certain elevation. In the coast regions the typical tree is the mangrove, which flourishes wherever the soil is of a swamp character. The dense forests of West Africa contain, in addition to a great variety of dicotyledonous trees, two palms, the Elaeis guincensis (oil-palm) and Raphia vinifera (bamboo-pa'lm) , not found, generally speaking, in the savanna regions. The bombax or silk-cotton tree attains gigantic proportions in the forests, which are the home of the indiarubber-producing plants and of many valuable kinds of timber trees, such as odum (Chlorophora excclsa) , ebony, mahogany (Khaya senegalensis) , African teak or oak {Oldfieldia

africana) and camwood (Baphia nitida). The climbing plants in the tropical forests are exceedingly luxuriant and the undergrowth or ” bush ” is extremely dense. In the savannas the most characteristic trees are the monkey bread tree or baobab (Adansonia digitata), doom palm (Hyphaene) and euphorbias. The coffee plant grows wild in such widely separated places as Liberia and southern Abyssinia. The higher mountains have a special flora showing close agreement over wide intervals of space, as well as affinities with the mountain flora of the eastern Mediterranean, the Himalayas and Indo- China (cf. A. Engler, Uber die Hochgebirgsflora des tropischen Ajrika, 1892).

In the swamp regions of north-east Africa the papyrus and associated plants, including the soft-wooded ambach, flourish in immense quantities — and little else is found in the way of vegetation. South Africa is largely destitute of forest save in the lower valleys and coast regions. Tropical flora disappears, and in the semi-desert plains the fleshy, leafless, contorted species of kapsias, mesembryanthemums, aloes and other succu- lent plants make their appearance. There are, too, valuable timber trees, such as the yellow pine (Podocarpus elongatus), stink wood (Ocotea), sneeze wood or Cape ebony (Pteroxylon utile) and ironwood. Extensive miniature woods of heaths are found in almost endless variety and covered throughout the greater part of the year with innumerable blossoms in which red is very prevalent. Of the grasses of Africa alfa is very abundant in the plateaus of the Atlas range.

Fauna. — The fauna again shows the effect of the character- istics of the vegetation. The open savannas are the home of large ungulates, especially antelopes, the giraffe (peculiar to Africa), zebra, buffalo, wild ass and four species of rhinoceros; and of carnivores, such as the lion, leopard, hyaena, &c. The okapi (a genus restricted to Africa) is found only in the dense forests of the Congo basin. Bears are confined to the Atlas region, wolves and foxes to North Africa. The elephant (though its range has become restricted through the attacks of hunters) is found both in the savannas and forest regions, the ‘latter being otherwise poor in large game, though the special habitat of the chimpanzee and gorilla. Baboons and mandrills, with few excep- tions, are peculiar to Africa. The single-humped camel — as a domestic animal — is especially characteristic of the northern deserts and steppes.

The rivers in the tropical zone abound with hippopotami and

crocodiles, the former entirely confined to Africa. The vast herds of game, formerly so characteristic of many parts of Africa, have much diminished with the increase of intercourse with the interior. Game reserves have, however, been established in South Africa, British Central Africa, British East Africa, Somali- land, &c, while measures for the protection of wild animals were laid down in an international convention signed in May

1900.

The ornithology of northern Africa presents a close resemblance to that of southern Europe, scarcely a species being found which does not also occur in the other countries bordering the Mediterranean. Among the birds most characteristic of Africa are the ostrich and the secretary-bird. The ostrich is widely dispersed, but is found chiefly in the desert and steppe regions. The secretary-bird is common in the south. The weaver birds and their allies, including the long-tailed whydahs, are abundant, as are, among game-birds, the francolin and guinea-fowl. Many of the smaller birds, such as the sun-birds, bee-eaters, the parrots and halcyons, as well as the larger plantain-eaters, are noted for the brilliance of their plumage. Of reptiles the lizard and chameleon are common, and there are a number of venomous serpents, though these are not so numerous as in other tropical countries. The scorpion is abundant. Of insects Africa has many thousand different kinds; of these the locust is the pro- verbial scourge of the continent, and the ravages of the termites or white ants are almost incredible. The spread of malaria by means of mosquitoes has already been mentioned. The tsetse fly, whose bite is fatal to all domestic animals, is common in many districts of South and East Africa. Fortunately it is found nowhere outside Africa. (E. He.; F. R. C.)

II. Geology

In shape and general geological structure Africa bears a close resemblance to India. Both possess a meridional extension with a broad east and west folded region in the north. In both a successive series of continental deposits, ranging from the Carboniferous to the Rhaetic, rests on an older base of crystalline rocks. In the words of Professor Suess, ” India and Africa are true plateau countries.”

Of the primitive axes of Africa few traces remain. Both on the east and west a broad zone of crystalline rocks extends parallel

with the coast-line to form the margin of the elevated plateau of the interior. Occasionally the crystalline belt comes to the coast, but it is usually reached by two steps known as the coastal belt and foot-plateau. On the flanks of the primitive western axis certain ancient sedimentary strata are thrown into folds which were completed before the commencement of the mesozoic period. In the south, the later palaeozoic rocks are also thrown into acute folds by a movement acting from the south, and which ceased towards the close of the mesozoic period. In northern Africa the folded region of the Atlas belongs to the comparatively recent date of the Alpine system. None of these earth movements affected the interior, for here the. continental mesozoic deposits rest, undisturbed by folding, on the primary sedimentary and crystalline rocks. The crystalline massif, therefore, presents a solid block which has remained elevated since early palaeozoic

times, and against which earth waves of several geological periods have broken.

The formations older than the mesozoic are remarkably un-fossiliferous, so that the determination of their age is frequently a matter of speculation, and in the following table the European equivalents of the pre-Karroo formations in many regions must be regarded as subject to considerable revision.

Rocks of Archean age cover wide areas in the interior, in West and East Africa and across the Sahara. Along the coastal margins they underlie the newer formations and appear in the deep valleys and kloofs wherever denudation has laid them bare. The prevailing types are granites, gneisses and schists. In the central regions the predominant strike of the foliae is north and south. The rocks, for convenience classed as pre-Cambrian, occur as several unconformable groups, chiefly developed in the south where alone their stratigraphy has been determined. They are unfossiliferous, and in the absence of undoubted Cambrian, Ordovician and Silurian strata in Africa they may be regarded as of older date than any of these formations. The

Emery Walker so

general occurrence of jasper-bearing rocks is of interest, as these are always present in the ancient pressure-altered sedi- mentary formations of America and Europe. Some unfossili- ferous conglomerates, sandstones and dolomites in South Africa and on the west coast are considered to belong to the Cambrian, Ordovician and Silurian formations, but merely from their occurrence beneath strata yielding Devonian fossils. In Cape Colony the Silurian age of the Table Mountain Sandstone is based on such evidence.

The Devonian and Carboniferous formations are well repre- sented in the north and south and in northern Angola.

Up to the close of the palaeozoic period the relative positions of the ancient land masses and oceans remain unsolved; but the absence of marine strata of early palaeozoic age from Central Africa points to there. being land in this direction. In late Car- boniferous times Africa and India were undoubtedly united to form a large continent, called by Suess Gondwana Land. In each country the same succession of the rocks is met with; over both the same specialized orders of reptiles roamedand were entombed.

The interior of the African portion of Gondwana Land was occupied by several large lakes in which an immense thickness — amounting to over 18,000 ft. in South Africa — of sandstones and marls, forming the Karroo system, was laid down, This is

par excellence the African formation, and covers immense areas in South Africa and the Congo basin, with detached portions in East Africa. During the whole of the time — Carboniferous to Rhaetic — that this great accumulation of freshwater beds was taking place, the interior of the continent must have been undergoing depression. The commencement of the period was marked by one of the most wonderful episodes in the geological history of Africa. Preserved in the formation known as the Dwyka Conglomerate, are evidences that at this time the greater portion of South Africa was undergoing extreme glacia- tion, while the same conditions appear to have prevailed in India

Table of Formations

Recent.

Pleistocene.

Pliocene. Miocene. Oligocene.

Eocene.

Cretaceous.

rjurassic.

Some volcanic islands ; rift- valley volcanoes.

Trias.

ˆPermian. Carboniferous.

Devonian. Silurian. Ordovician. Cambrian.

Pre-Cambrian. Archean.

Sedimentary.

Allu viu m ; travertine ; coral ; sand dunes ; con- tinental dunes. Gener- ally distributed.

Ancient alluviums and gravels ; travertine. Generally distributed.

N. Africa; Madagascar.

N. Africa. N-. Africa.

N. Africa, along east and west coasts ; Madagas- car.

Extensively developed in N. Africa; along coast and foot-plateaus in east and west ; Madagascar.

N. Africa; E. Africa;

Madagascar ; Stormberg

period (Rhaetic) in S.

Africa. Beaufort Series in S.”

Africa ; Congo basin ;

Central Africa; Algeria;

Tunis. Ecca Series in S. Africa.

N. Africa; Sabaki Shales in E. Africa; Dwyka and Witteberg Series in S. Africa.

N. Africa; Angola; Bokke- veld Series in S. Africa.

Table Mountain Sandstone" in S. Africa, Silurian(?). Doubtfully represented in N. Africa, French Congo, Angola, and by Vaal River and Water- berg Series in S. Africa.,

Quartzites, conglomerates, " phyllites, jasper-bearing rocks and schists. Gener- ally distributed.

Gneisses and schists of the continental platform.

Igneous.

A long-continued suc- cession in the cen- tral and northern regions and among the island groups. Doubtfully repre- sented south of the Zambezi.

Diamond pipes of S. Africa ; Kaptian

fissure eruptions; Ashangi traps of Abyssinia.

Chief volcanic period in S. Africa.

Feebly, if anywhere developed.

. Not recorded.

Klipriversberg and Ventersdorp Series of the Transvaal (?).

S. Africa and gener- ally.

Igneous complex of sheared igneous rocks ; granites.

and Australia. At the close of the Karroo period there was a remarkable manifestation of volcanic activity which again has its parallel in the Deccan traps of India.

How far the Karroo formation extended beyond its present confines has not been determined. To the east it reached India. In the south all that can be said is that it extended to the south of Worcester in Cape Colony. The Crystal Mountains of Angola may represent its western boundary; while the absence of mesozoic strata beneath the Cretaceous rocks of the mid-Sahara indicates that the system of Karroo lakeland had here reached its most

northerly extension. Towards the close of the Karroo period, possibly about the middle, .the southern rim of the great central depression became ridged up to form the folded regions of the Zwaarteberg, Cedarberg and Langeberg mountains in Cape Colony. This folded belt gives Africa its abrupt southern

termination, and may be regarded as an embryonic indication of its present outline. The exact date of the maximum develop- ment of this folding is unknown, but it had done its work and some 10,000 ft. of strata had been removed before the com- mencement of the Cretaceous period. It appears to approximate in time to the similar earth movement and denudation at the close of the palaeozoic period in Europe. It was doubtless connected with the disruption of Gondwana Land, since it is known that this great alteration of geographical outline com- menced in Jurassic times.

The breaking up of Gondwana Land is usually considered to have been caused by a series of blocks of country being let down by faulting with the consequent formation of the Indian Ocean. Other blocks, termed horsts, remained unmoved, the island of Madagascar affording a striking example. In the African portion Ruwenzori is regarded by some geologists to be a block mountain or horst.

In Jurassic times the sea gained access to East Africa north of Mozambique, but does not appear to have reached far beyond the foot-plateau except in Abyssinia.

The Cretaceous seas appear to have extended into the central Saharan regions, for fossils of this age have been discovered in the interior. On the west coast Cretaceous rocks extend con- tinuously from Mogador to Cape Blanco. From here they are absent up to the Gabun river, where they commence to form a narrow fringe as far as the Kunene river, though often overlain by recent deposits. They are again absent up to the Sunday river in Cape Colony, where Lower Cretaceous rocks (for long con- sidered to be of Oolitic age) of an inshore character are met with. Strata of Upper Cretaceous age occur in Pondoland and Natal,

and are of exceptional interest since the fossils show an intermingling of Pacific types with other forms having Euro- pean affinities. In Mozambique and in German East Africa, Cretaceous rocks extend from the coast to a distance inland of over 100 m.

Except in northern Africa, the Tertiary formations only occur in a few isolated patches on the east and west coasts. In northern Africa they are well developed and of much interest. They contain the well-known nummulitic limestone of Eocene age, which has been traced from Egypt across Asia to China. The Upper Eocene rocks of Egypt have also yielded primeval types of the Prohoscidea and other mammalia. Evidences for the greater extension of the Eocene seas than was formerly con- sidered to be the case have been discovered around Sokoto. During Miocene times Passarge considers that the region of the Zambezi underwent extreme desiccation.

The effect of the Glacial epoch in Europe is shown in northern Africa by the moraines of the higher Atlas, and the wider exten- sion of the glaciers on Kilimanjaro, Kenya and Ruwenzori, and by the extensive accumulations of gravel over the Sahara.

The earliest signs of igneous activity in Africa are to be found in the granites, intrusive into the older rocks of the Cape peninsula, into those of the Transvaal, and into the gneisses and schists of Central Africa. The Ventersdorp boulder beds of the Transvaal may be of early palaeozoic age; but as a whole the palaeozoic period in Africa was remarkably free from volcanic and igneous disturbances. The close of the Stormberg period (Rhaetic) was one of great volcanic activity in South Africa. Whilst the later Secondary and Tertiary formations were being laid down in North Africa and around the margins of the rest of the continent, Africa received its last great accumulation of strata and at the same time underwent a consecutive series of earth-movements. The additional strata consist of the immense quantities of volcanic material on the plateau of East Africa, the basalt flows of West Africa and possibly those of the Zambezi basin. The exact period of the commencement of volcanic activity is unknown. In Abyssinia the Ashangi traps are cer- tainly post-Oolitic. In East Africa the fissure eruptions are con- sidered to belong to the Cretaceous. These early eruptions were followed by those of Kenya, Mawenzi, Elgon, Chibcharagnani, and these by the eruptions of Kibo, Longonot, Suswa and the Kyulu Mountains. The last phase of vulcanicity took

place along the great meridional rifts of East Africa, and though feebly manifested has not entirely passed away. In northern Africa a continuous sequence of volcanic events has taken place from Eocene times to latest Tertiary; but in South Africa it is doubtful if there have been any intrusions later then Cretaceous.

During this long continuance of vulcanicity, earth-movements were in progress. In the north the chief movements gave rise to the system of latitudinal folding and faulting of the Moroccan and Algerian Atlas, the last stages being represented by the formation of the Algerian and Moroccan coast-outline and the sundering of Europe from Africa at the Straits of Gibraltar. Whilst northern Africa was being folded, the East African plateau was broken up by a series of longitudinal rifts extending from Nyasaland to Egypt. The depressed areas contain the long, narrow, precipitously walled lakes of East Africa. The Red Sea also occupies a meridional trough.

Lastly there are the recent elevations of the northern coastal regions, the Barbary coast and along the east coast. (W. G.*)

III. Ethnology

In attempting a review of the races and tribes which inhabit Africa, their distribution, movements and culture, it is advisable that three points be borne in mind. The first of these is the comparative absence of natural barriers in the interior, owing to which intercommunication between tribes, the dissemination of culture and tribal migration have been considerably facilitated. Hence the student must be prepared to find that, for the most part, there are no sharp divisions to mark the extent of the various races composing the population, but that the number of what may be termed ” transitional ” peoples is unusually large. The second point is that Africa, with the exception of the lower Nile valley and what is known as Roman Africa (see Africa, Roman), is, so far as its native inhabitants are concerned, a continent practically without a history, and possessing no records from which such a history might be reconstructed. The early movements of tribes, the routes by which they reached their present abodes, and the origin of such forms of culture as may be distinguished in the general mass of customs, beliefs, &c, are largely matters of conjecture. The negro is essentially the child of the moment; and his memory, both tribal and individual, is very short. The third point is that many theories which have been formulated with respect to such matters are unsatisfactory

owing to the small amount of information concerning many of the tribes in the interior.

Excluding the Europeans who have found a home in various parts of Africa, and the Asiatics, Chinese and natives of India introduced by them (see section History below), the population of Africa consists of the following elements: African — the Bushman, the Negro, the Eastern Hamite, races. the Libyan and the Semite, from the intermingling of which in various proportions a vast number of ” transi- tional ” tribes has arisen. The Bushmen (q.v.), a race of short yellowish-brown nomad hunters, inhabited, in the earliest times of which there is historic knowledge, the land adjoining the southern and eastern borders of the Kalahari desert, into which they were gradually being forced by the encroachment of the Hottentots and Bantu tribes. But signs of their former presence are not wanting as far north as Lake Tanganyika, and even, it is rumoured, still farther north. With them may be classed provisionally the Hottentots, a pastoral people of medium stature and yellowish-brown complexion, who in early times shared with the Bushmen the whole of what is now Cape Colony. Though the racial affinities of the Hottentots have been disputed, the most satisfactory view on the whole is that they represent a blend of Bushman, Negroid and Hamitic elements. Practically the rest of Africa, from the southern fringe of the Sahara and the upper valley of the Nile to the Cape, with the exception of Abyssinia and Galla and Somali-lands, is peopled by Negroes and the ” transitional ” tribes to which their ad- mixture with Libyans on the north, and Semites (Arabs) and Hamites on the north-east and east, has given rise. A slight qualification of the last statement is necessary, in so far as, among

the Fula in the western Sudan, and the Ba-Hima, &c, of the Victoria Nyanza, Libyan and Hamitic elements are respectively stronger than the Negroid. Of the tracts excepted, Abyssinia is inhabited mainly by Semito-Hamites (though a fairly strong negroid element can be found), and Somali and Galla-lands by Hamites. North of the Sahara in Algeria and Morocco are the Libyans (Berbers, q.v.), a distinctively white people, who have in

certain respects (e.g. religion) fallen under Arab influence. In the north-east the brown-skinned Hamite and the Semite mingle in varied proportions. The Negroid peoples, which inhabit the vast tracts of forest and savanna between the areas held by Bushmen to the south and the Hamites, Semites and Libyans to the north, fall into two groups divided by a line running from the Cameroon (Rio del Rey) crossing the Ubangi river below the bend and passing between the Ituri and the Semliki rivers, to Lake Albert and thence with a slight southerly trend to the coast. North of this line are the Negroes proper, south are the Bantu. The division is primarily philological. Among the true Negroes the greatest linguistic confusion prevails; for instance, in certain parts of Nigeria it is possible to find half-a-dozen villages within a comparatively small area speaking, not different dialects, but different languages, a fact which adds greatly to the difficulty of political administration. To the south of the line the condition of affairs is entirely different; here the entire population speaks one or another dialect of the Bantu Languages (q.v.). As said before, the division is primarily linguistic and, especially upon the border line, does not always correspond with the variations of physical type. At the same time it is extremely convenient and to a certain extent justifiable on physical and psycho- logical grounds; and it may be said roughly that while the linguistic uniformity of the Bantu is accompanied by great variation of physical type, the converse is in the main true of the Negro proper, especially where least affected by Libyan and Hamitic admixture, e.g. on the Guinea coast. The variation of type among the Bantu is due probably to a varying admixture of alien blood, which is more apparent as the east coast is approached. This foreign element cannot be identified with certainty, but since the Bantu seem to approach the Hamites in those points where they differ from the Negro proper, and since the physical characteristics of Hamites and Semites are very similar, it seems probable that the last two races have entered into the composition of the Bantu, though it is highly improbable that Semitic influence should have permeated any distance from the east coast. An extremely interesting section of the population not hitherto mentioned is constituted by the Pygmy tribes inhabiting the densely forested regions along the equator from Uganda to the Gabun and living the life of nomadic hunters. The affinities of this little people are undecided, owing to the small amount of knowledge concerning them. The theories which connected them with the Bushmen do not seem to be correct. It is more probable that they are to be classed among the Negroids, with whom they

appear to have intermingled to a certain .extent in the upper basin of the Ituri, and perhaps elsewhere. As far as is known they speak no language peculiar to themselves but adopt that of the nearest agricultural tribe. They are of a dark brown complexion, with very broad noses, lips but slightly everted, and small but usually sturdy physique, though often considerably emaciated owing to insufficiency of food. Another peculiar tribe, also of short stature, are the Vaalpens of the steppe region of the north Transvaal. Practically nothing is known of them except that they are said to be very dark in colour and live in holes in the ground, and under rock shelters.

Having indicated the chief races of which in various degrees of purity and intermixture the population of Africa is formed,

it remains to consider them in greater detail, particu- ethnofogi- ‘ ar ‘y lrom the cultural standpoint. This is hardly cat zones, possible without drawing attention to the main physical

characters of the continent, as far as they affect the inhabitants. For ethnological purposes three principal zones may be distinguished; the first two are respectively a large region of steppes and desert in the north, and a smaller region of steppes and desert in the south. These two zones are

connected by a vertical strip of grassy highlaad lying mainly to the east of the chain of great lakes. The third zone is a vast region of forest and rivers in the west centre, comprising the greater part of the basin of the Congo and the Guinea coast. The rainfall, which also has an important bearing upon the culture of peoples, will be found on the whole to be greatest in the third zone and also in the eastern highlands, and of course least in the desert, the steppes and savannas standing midway between the two. As might be expected these variations are accompanied by certain variations in culture. In the best- watered districts agriculture is naturally of the greatest import- ance, except where the density of the forest renders the work of clearing too arduous. The main portion therefore of the inhabitants of the forest zone are agriculturists, save only the nomad Pygmies, who live in the inmost recesses of the forest and support themselves by hunting the game with which it abounds. Agriculture, too, flourishes in the eastern highlands, and throughout the greater part of the steppe and savanna region of the northern and southern zones, especially the latter. In fact the only Bantu tribes who are not agriculturists are the Ova-Herero of German South-

West Africa, whose purely pastoral habits are the natural outcome of the barren country they in- habit. But the wide open plains and slopes surrounding the forest area are eminently suited to cattle-breeding, and there are few tribes who do not take advantage of the fact. At the same time a natural check is imposed upon the desire for cattle, which is so characteristic of the Bantu peoples. This is con- stituted by the tsetse fly, which renders a pastoral life absolutely impossible throughout large tracts in central and southern Africa. In the northern zone this check is absent, and the number of more essentially pastoral peoples, such as the eastern Hamites, Masai, Dinka, Fula, &c, correspondingly greater. The desert regions yield support only to nomadic peoples, such as the Tuareg, Tibbu, Bedouins and Bushmen, though the presence of numerous oases in the north renders the condition of life easier for the inhabitants. Upon geographical conditions likewise depend to a large extent the political conditions pre- vailing among the various tribes. Thus among the wandering tribes of the desert and of the heart of the forests, where large communities are impossible, a patriarchal system prevails with the family as the unit. Where the forest is less dense and small agricultural communities begin to make their appearance, the unit expands to the village with its headman. Where the forest thins to the savanna and steppe, and communication is easier, are found the larger kingdoms and " empires " such as, in the north those established by the Songhai, Hausa, Fula, Bagirmi, Ba-Hima, &c, and in the south the states of Lunda, Kazembe, the Ba-Rotse, &c.

But if ease of communication is favourable to the rise of large states and the cultural progress that usually accompanies it, it is, nevertheless, often fatal to the very culture which, at first, it fostered, in so far as the absence of natural boundaries renders invasion easy. A good example of this is furnished by the history of the western Sudan and particularly of East and South-East Africa. From its geographical position Africa looks naturally to the east, and it is on this side that it has been most affected by external culture both by land (across the Sinaitic peninsula) and by sea. Though a certain amount of Indonesian and even aboriginal Indian influence has been traced in African ethnography, the people who have produced the most serious ethnic disturbances (apart from modern Europeans) are the Arabs. This is particularly the case in East Africa, where the systematic slave raids organized by them and carried out with the assistance of various warlike tribes reduced vast regions to a

state of desolation. In the north and west of Africa, how- ever, the Arab has had a less destructive but more extensive and permanent influence in spreading the Mahommedan religion throughout the whole of the Sudan.

The fact that the physical geography of Africa affords fewer natural obstacles to racial movements on the side most exposed to foreign influence, renders it obvious that the culture most characteristically African must be sought on the other side

It is therefore in the forests of the Congo, and among the lagoons and estuaries of the Guinea coast, that this earlier culture will The char- most probably be found. That there is a culture acteristic distinctive of this area, irrespective of the linguistic African] j ne diving the Bantu from the Negro proper, has now been recognized. Its main features may be summed as follows: — a purely agricultural life, with the plan- tain, yam and manioc (the last two of American origin) as the staple food; cannibalism common; rectangular houses with ridged roofs; scar-tattooing; clothing of bark-cloth or palm-fibre; occasional chipping or extraction of upper incisors; bows with strings of cane, as the principal weapons, shields of wood or wickerwork: religion, a primitive form of fetishism with the belief that death is due to witchcraft; ordeals, secret societies, the use of masks and anthropomorphic figures, and wooden gongs. With this may be contrasted the culture of the Bantu peoples to the south and east, also agriculturists, but in addition, where possible, great cattie-breeders, whose staple food is millet and milk. These are distinguished by circular huts with domed or conical roofs; clothing of skin or leather; occasional chipping or extraction of lower incisors; spears as the principal weapons, bows, where found, with a sinew cord, shields of hide or leather; religion, ancestor-worship with belief in the . power of the magicians as rain-makers. Though this difference in culture may well be explained on the supposition that the first is the older and more ‘representative of Africa, this theory must not be pushed too far. Many of the distinguishing characteristics of the two regions are doubtless due simply to environment, even the difference in religion. Ancestor-worship occurs most naturally among a people

where tribal organization has reached a fairly advanced stage, and is the natural outcome of patriotic reverence for a successful chief and his councillors. Rain-making, too, is of little importance in a well-watered region, but a matter of vital interest to an agricultural people where the rainfall is slight and irregular.

Within the eastern and southern Bantu area certain cultural variations occur; beehive huts are found among the Zulu- Xosa and Herero, giving place among the Bechuana to the cylindrical variety with conical roof, a type which, with few exceptions, extends north to Abyssinia. The tanged spear- head characteristic of the south is replaced by the socketed variety towards the north. Circumcision, characteristic of the Zulu-Xosa and Bechuana, is not practised by many tribes farther north; tooth-mutilation, on the contrary, is absent among the more southern tribes. The lip-plug is found in the eastern area, especially among the Nyasa tribes, but not in the south. The head-rest common in the south-east and the southern fringe of the forest area is not found far north of Tanganyika until the Horn of Africa is reached.

In the regions outside the western area occupied by the Negro proper, exclusive of the upper Nile, the similarities of culture outweigh the differences. Here the cylindrical type of hut prevails; clothing is of skin or leather but is very scanty; iron ornaments are worn in profusion; arrows are not feathered; shields of hide, spears with leather sheaths are found and also fighting bracelets. Certain small differences appear between the eastern and western portions, the dividing line being formed by the boundary between Bornu and Hausaland. Characteristic of the east are the harp and the throwing-club and throwing- knife, the last of which has penetrated into the forest area. Typical of the west are the bow and the dagger with the ring hilt. The tribes of the upper Nile are somewhat specialized, though here, too, are found the cylindrical hut, iron ornaments, fighting bracelets, &c, characteristic of the Sudanese tribes. Here the removal of the lower incisors is common, and circum- cision entirely absent.

Throughout the rest of the Sudan is found Senjitic culture introduced by the Arabized Libyan. Circumcision, as is usual among Mahommedan tribes, is universal, and tooth-mutilation absent; of other characteristics, the use of the sword has pene-trated to the northern portion of the forest area. The culture prevailing in the Horn of Africa is, naturally, mainly Hamito-

Semitic; here are found both cylindrical and bee-hive huts, the sword (which has been adopted by the Masai to the south), the lyre (which has found its way to some of the Nilotic tribes) and the head-rest. Circumcision is practically universal.

As has been said earlier, the history of Africa reaches back but a short distance, except, of course, as far as the lower Nile valley and Roman Africa is concerned; elsewhere no records exist, save tribal traditions, and these only relate to very recent events. Even archaeology, which can often sketch the main outlines of a people's history, is here practically powerless, owing to the insufficiency of data. It is true that stone imple- ments of palaeolithic and neolithic types are found sporadically in the Nile valley, Somaliland, on the Zambezi, in Cape Colony and the northern portions of the Congo Free State, as well as in Algeria and Tunisia; but the localities are far too few and too widely separated to warrant the inference that they are to be in any way connected. Moreover, where stone implements are found they are, as a rule, very near, even actually on, the surface of the earth; nothing occurs resembling the regular stratification of Europe, and consequently no argument based on geological grounds is possible.

The lower Nile valley, however, forms an exception; flint implements of a palaeolithic type have been found near Thebes, not only on the surface of the ground, which for several thousand years has been desert owing to the contraction of the river-bed, but also in stratified gravel of an older date. References to a number of papers bearing on the discussion to which theii discovery has given rise may be found in an article by Mr H. R. Hall in Man, 1905, No. 19. The Egyptian and also the Somali- land finds appear to be true palaeoliths in type and remarkably similar to those found in Europe. But evidence bearing on the Stone age in Africa, if the latter existed apart from the localities mentioned, is so slight that little can be said save that from the available evidence the palaeoliths of the Nile valley alone can with any degree of certainty be assigned to a remote period of antiquity, and that the chips scattered over Mashonaland and the regions occupied within historic times by Bushmen are the most recent; since it has been shown that the stone flakes were used by the medieval Makalanga to engrave their hard pottery and the Bushmen were still using stone implements in the 19th century. Other early remains, but of equally uncertain date, are the stone circles of Algeria, the Cross river and the Gambia. The large system of ruined forts and " cities " in Mashonaland, at

Zimbabwe and elsewhere, concerning which so many ingenious theories have been woven, have been proved to date from medieval times.

Thus while in Europe there is a Stone age. divided into periods according to various types of implement disposed in geological strata, and followed in orderly succession by the ages origin and of Bronze and Iron, in Africa can be found no true spread of Stone age and practically no Bronze at all. The reason tbe ra < ! lal is not far to seek; Africa is a country of iron, which is s ° c found distributed widely throughout the continent in ores so rich that the metal can be extracted with very little trouble and by the simplest methods. Iron has been worked from time immemorial by the Negroid peoples, and whole tribes are found whose chief industry is the smelting and forging of the metal. Under such conditions, questions relating to the origin and spread of the racial stocks which form the population of Africa cannot be answered with any certainty; at best only a certain amount of probability can be attained.

Five of these racial stocks have been mentioned: Bushman, Negro, Hamite, Semite, Libyan, the last three probably related through some common ancestor. Of these the honour of being considered the most truly African belongs to the two first. It is true that people of Negroid type are found elsewhere, principally in Melanesia, but as yet their possible connexion with the African Negro is little more than theoretical, and for the present purposes it need not be considered.

The origin of the Bushman is lost in obscurity, but he may be conceived as the original inhabitant of the southern portion of the continent. The original home of the Negro, at first an

agriculturist, is most probably to be found in the neighbourhood of the great lakes, whence he penetrated along the fringe of the Sahara to the west and across the eastern highlands southward. Northerly expansion was prevented by the early occupation of the Nile valley, the only easy route to the Mediterranean, but there seems no doubt that the population of ancient Egypt

contained a distinct Negroid element. The question as to the ethnic affinities of the pre-dynastic Egyptians is still unsolved; but they may be regarded as, in the main, Hamitic, though it is a question how far it is just to apply a name which implies a definite specialization in what may be comparatively modern times to a people of such antiquity.

The Horn of Africa appears to have been the centre from which the Hamites spread, and the pressure they seem to have applied to the Negro tribes, themselves also in process of expan- sion, sent forth larger waves of emigrants from the latter. These emigrants, already affected by the Hamitic pastoral culture, and with a strain of Hamitic blood in their veins, passed rapidly down the open tract in the east, doubtless exterminating their predecessors, except such few as took refuge in the mountains and swamps. The advance-guard of this wave of pastoral Negroids, in fact primitive Bantu, mingled with the Bushmen and produced the Hottentots. The penetration of the forest area must certainly have taken longer and was probably accom- plished as much from the south-east, up the Zambezi valley, as from any Other quarter. It was a more peaceful process, since natural obstacles are unfavourable to rapid movements of large bodies of immigrants, though not so serious as to prevent the spread of language and culture. A modern parallel to the spread of Bantu speech is found in the rise of the Hausa language, which is gradually enlarging its sphere of influence in the western and central Sudan. Thus those qualities, physical and otherwise, in which the Bantu approach the Hamites gradually fade as we proceed westward through the Congo basin, while in the east, among the tribes to the west of Tanganyika and on the upper Zambezi, ” transitional ” forms of culture are found. In later times this gradual pressure from the south-east became greater, and resulted, at a comparatively recent date, in the irruption of the Fang into the Gabun.

The earlier stages of the southern movement must have been accompanied by a similar movement westward between the Sahara and the forest; and, probably, at the same time, or even earlier, the Libyans crossing the desert had begun to press upon the primitive Negroes from the north. In this way were produced the Fula, who mingled further with the Negro to give birth to the Mandingo, Wolof and Tukulor. It would appear that either Libyan (Fula) or, less probably, Hamitic, blood enters into the composition of the Zandeh peoples on the Nile-Congo watershed. These Libyans or Berbers, included by G. Sergi in his ” Mediter-

ranean Race," were active on the north coast of Africa in very early times, and had relations with the Egyptians from a prehistoric period. For long these movements continued, always in the same direction, from north to south and from east to west; though, of course, more rapid changes took place in the open country, especially in the great eastern highway from north to south, than in the forest area. Large states arose in the western Sudan; Ghana flourished in the 7th century a.d., Melle in the nth, Songhai in the 14th, and Bornu in the 16th.

Meanwhile in the east began the southerly movement of the Bechuana, which was probably spread over a considerable period. Later than they, but proceeding faster, came the Zulu-Xosa (" Kaffir ") peoples, who followed a line nearer the coast and outflanked them, surrounding them on the south. Then followed a time of great ethnical confusion in South Africa, during which tribes flourished, split up and disappeared; but ere this the culture represented by the ruins in Rhodesia had waxed and waned. It is uncertain who were the builders of the forts and " cities," but it is not improbable that they may be found to have been early Bechuana. The Zulu-Xosa, Bechuana and Herero together form a group which may conveniently be termed " Southern Bantu."

Finally began a movement hitherto unparalleled in the

history of African migration; certain peoples of Zulu blood began to press north, spreading destruction in their wake. Of these the principal were the Matabele and Angoni. The move- ment continued as far as the Victoria Nyanza. Here, on the border-line of Negro, Bantu and Hamite, important changes had taken place. Certain of the Negro tribes had retired to the swamps of the Nile, and had become somewhat specialized, both physically and culturally (Shilluk, Dinka, Alur, Acholi, &c). These had blended with the Hamites to produce such races as the Masai and kindred tribes. The old Kitwara empire, which comprised the plateau land between the Ruwenzori range and Kavirondo, had broken up into small states, usually governed by a Hamitic (Ba-Hima) aristocracy. The more extensive Zang (Zenj) empire, of which the name Zanzibar (Zanguebar) is a lasting memorial, extending along the sea-board from Somaliland to the Zambezi, was also extinct. The Arabs had established themselves firmly on the coast, and thence made continual slave-raids into the interior, penetrating later to the Congo. The Swahili, inhabiting the coast-line from the equator to about 16° S., are a somewhat

heterogeneous mixture of Bantu with a tinge of Arab blood.

In the neighbourhood of Victoria Nyanza, where Hamite, Bantu, Nilotic Negro and Pygmy are found in close contact, the ethnic relations of tribes are often puzzling, but the Bantu not under a Hamitic domination have been divided by F. Stuhlmann into the Older Bantu (Wanyamwezi, Wasukuma, Wasambara, Waseguha, Wasagara, Wasaramo, &c.) and the Bantu of Later Immigration (Wakikuyu, Wakamba, Wapokomo, Wataita, Wachaga, &c), who are more strongly Hamitized and in many cases have adopted Masai customs. These peoples, from the Victoria Nyanza to the Zambezi, may conveniently be termed the " Eastern Bantu."

Turning to the Congo basin in the south, the great Luba and Lunda peoples are found stretching nearly across the continent, the latter, from at any rate the end of the 16th century until the close of the 19th century, more or less united under a single ruler, styled Muata Yanvo. These seem to have been the most recent immigrants from the south-east, and to exhibit certain affinities with the Barotse on the upper Zambezi. Among the western Baluba, or Bashilange, a remarkable politico-religious revolution took place at a comparatively recent date, initiated by a secret society termed Bena Riamba or " Sons of Hemp," and resulted in the subordination of the old fetishism to a cult of hemp, in accordance with which all hemp-smokers consider themselves brothers, and the duty of mutual hospitality, &c, is acknow- ledged. North of these, in the great bend of the Congo, are the Balolo, &c, the Balolo a nation of iron-workers; and westward, on the Kasai, the Bakuba, and a large number of tribes as yet imperfectly known. Farther west are the tribes of Angola, many of whom were included within the old " Congo empire," of which the kingdom of Loango was an offshoot. North of the latter lies the Gabun, with a large number of small tribes dominated by the Fang who are recent arrivals from the Congo. Farther to the north are the Bali and other tribes of the Cameroon, among whom many primitive Negroid elements begin to appear. Eastward are the Zandeh peoples of the Welle district (primitive Negroids with a Hamitic or, more probably, Libyan strain) , with whom the Dor tribe of Nilotes on their eastern border show certain affinities; while to the west along the coast are the Guinea Negroes of primitive type. Here, amidst great linguistic confusion, may be distinguished the tribes of Yoruba speech in the Niger delta and the east portion of the Slave Coast; those of Ewe speech, in the western portion of the latter; and those of Ga and Tshi speech, on the Gold Coast. Among the last two groups

respectively may be mentioned the Dahomi and Ashanti. Similar tribes are found along the coast to the Bissagos Islands, though the introduction in Sierra Leone and Liberia of settlements of repatriated slaves from the American plantations has in those places modified the original ethnic distribution. Leaving the forest zone and entering the more open country there are, on the north from the Niger to the Nile, a number of Negroids strongly tinged with Libyan blood and professing the Mahornmedan religion. Such are the

In Mads gascar,

Mandingo, the Songhai, the Fula, Hausa, Kanuri, Bagirmi, Kanembu, and the peoples of Wadai and Darfur; the few aborigines who persist, on the southern fringe of the Chad basin, are imperfectly known.

The island of Madagascar, belonging to the African continent, still remains for discussion. Here the ethnological conditions are Peculiar peculiar. Before the French occupation the dominant conditions people were the Hova, a Malayo-Indonesian people who must have come from the Malay Peninsula or the adjacent islands. The date of their immigration has been the subject of a good deal of dispute, but it may be argued that their arrival must have taken place in early times, since Malagasy speech, which is the language of the island, is principally Malayo- Polynesian in origin, and contains no traces of Sanskrit. Such traces, introduced with Hinduism, are present in all the cultivated languages of Malaysia at the present day. The Hova occupy the table-land of Imerina and form the first of the three main groups into which the population of Madagascar may be divided. They are short, of an olive-yellow complexion and have straight or faintly wavy hair. On the east coast are the Malagasy, who in physical characteristics stand halfway between the Hova and the Sakalava, the last occupying the remaining portion of the island and displaying almost pure Negroid characteristics.

Though the Hova belong to a race naturally addicted to sea-faring, the contrary is the case respecting the Negroid

population, and the presence of the latter in the island has been explained by the supposition that they were imported by the Hova. Other authorities assign less antiquity to the Hova immigration and believe that they found the Negroid tribes already in occupation of the island.

As might be expected, the culture found in Madagascar con- tains two elements, Negroid and Malayo-Indonesian. The first of these two shows certain affinities with the culture characteristic of the western area of Africa, such as rectangular huts, clothing of bark and palm-fibre, fetishism, &c, but cattle-breeding is found as well as agriculture. However, the Negroid tribes are more and more adopting the customs and mode of life of the Hova, among whom are found pile-houses, the sarong, fadi or tabu applied to food, a non- African form of bellows, &c, all characteristic of their original home. The Hova, during the 19th century! em- braced Christianity, but retain, nevertheless, many of their old animistic beliefs; their original social organization in three classes, andriana or nobles, hova or freemen, and andevo or slaves, has been modified by the French, who have abolished kingship and slavery. An Arab infusion is also to be noticed, especially on the north-east and south-east, coasts.

It is impossible to give a complete list of the tribes inhabiting Africa, owing to the fact that the country is not fully explored. Even where the names of the tribes are known their ethnic relations are still a matter of uncertainty in many localities.

The following list, therefore, must be regarded as purely tenta- tive, and liable to correction in the light of fuller information: —

AFRICAN TRIBAL DISTRIBUTION

LIBYANS (North Africa, excluding Egypt) Berbers, including — Kabyles Mzab Shawia Tuareg

LIBYO-NEGROID TRANSITIONAL Fula (West Sudan) Tibbu (Central Sudan)

HA MITES (East Sudan and Horn of Africa) Beja, including — Ababda Hadendoa Bisharin Beni-Amer Hamran

HA MITES— continued

(East Sudan and Horn of Africa) — continued

Galla _ Somali

Danakil (Afar) Ba-Hima, including —

Wa-Tussi

Wa-Hha

Wa-Rundi

Wa- Ruanda

HAMITO-SEMITES

Fellahin (Egypt)

Abyssinians (with Negroid admixture)

HAMITO-NEGROID TRANSITIONAL Masai Wa-Kuafi

NEGROID TRIBES

West Sudan Tukulor Wolof Serer Leybu Mandingo, including-

Kassonke

Yallonke

Soninke

Bambara

Vei

Susu

Solima

Malinke

Probably also — Mossi Borgu

Central Sudan Songhai Hausa Bagirmi Kanembu Kanuri Tama Maba Birkit Massalit Korunga Kabbaga &c.

Eastern

Fur

Dago

Kunjara

Tegele

Nuba

Kargo Kulfan Kolaji Tumali

Zondek Tribes (Akin to Nilotics, but

probably with Fula

element) Azandeh (Niam Niam) Makaraka Mundu Mangbettu Ababwa Mege Abisanga

Tombo

MabodefPˆr Momfu [element

Gurma Gurunga

aably wi andingar lements

Dagomba

Allied are —

Mampursi

Banziri Languassi

Gonja

ss”

Ndris Wia-Wia

&c.

a.

Togbo Awaka

&c.

NEGROES

West African Tribes

Tribes of Tshi and Ga Tribes of Yoruba

speech, including —

speech, including —

Khabunk&

Balanta

Ashanti

Yoruba

Bagnori

Safwi

Ibadan

Bagnum

Denkera

Ketu

Felup, including —

Bekwai

Egba

Ayamat

Nkoranza

Tebu Remo

Jola

Adansi

Jigush

Assin

Ode

Vaca

Wassaw

Illorin

Joat Karon

Ahanta

Ijesa

Fanti

Ondo

Banyum

Agona

Mahin

Banjar

Akwapim

Bini

Fulum

Akim

Kakanda

Bayot

Akwamu

Wari

&c.

Kwao

Ibo

Bujagos

Ga

Efik

Biafare

Andoni

Landuman

Tribes of Ewe speech,

Kwa

Nalu

including —

Ibibio

Baga

Ekoi

Sape

Dahomi

Inokun

Bulam

Eweawo

Akunakuna

Mendi

Agotine

Munshi

Limba

Krepi

Ik we

Gallina

Avenor

Timni

Awuna

Pessi

Agbosomi

Gola

Aflao

Kondo

Ataklu

Bassa

Krikor

Kru

Geng

Grebo

Attakpami ■

Awekwom

Aja

Agni

Ewemi

Oshiu

Appa

33°

AFRICA

[ETHNOLOGY

NEGROES — continued

Central Negroes Bolo Yako Tangala Kali Mishi Doma Mosgu, including —

Mandara

Margi

Logon

Gamergu

Keribina Yedina Kuri

&c.

Nilotics with affinity with Zandeh tribes Dor (Bongo)

NEGRO-BANTU TRANSITIONAL

Bali

Ba-Kossi

Ba-Ngwa

Ba-Nyang

Ngolo

Ba-Fo

Ba-Kundu >

Isubu

Ba-Kwiri

Abo

Dualla

Bassa

Ba-Noko

Ba-Puko

Ba-Koko

Eastern Negroes Pure Nilotics Shilluk Nuer Dinka Jur (Diur) Mittu Tibbeh Madi Lendu Alur (Lur) Acholi Lango Abaka Golo

Nilotics with affinity with Masai Latuka Bari

NILOTIC-BANTU TRANSITIONAL

Ja-Luo

PYGMY TRIBES (Central Africa) Akka Ba-Mbute Ba-Bongo Ashango &c.

BANTU NEGROIDS— continued

Western

Western

Ogowe Ashira Ishogo Ashango Bakalai Nkomi Orungu Mpongwe Oshekiani Benga Ininga Galao Apingi Okanda Osaka Aduma Mbamba Urn bete Bule Bane Yaunde Maka Bomone Kunabembe Fang (recent im- migrants from

the Congo

group) &c. Ba-Kongo, in- cluding —

Mushi-Kongo

Mussorongo

Kabinda

Ka-Kongo

Ba-Vili

Ma-Yumbe

Ba-Lumbo

Ba-Sundi

Ba-Bwende

Ba-Lali

Ba-Kunya

BANTU NEGROIDS Central

Luba-Lunda Group Ba-Luba, including —

Ba-Songe

Wa-Rua

Wa-Guha

Katanga

Ba-Shilange (with Ba-Kete ele- ment) Ba-Lunda

Probably connected are — Manyema Ba-Kumu Wa-Regga Ba-Rotse, including —

Ma-Mbunda

Ma-Supia

Ma-Shukulumbwe

Ba-Tonga and probably

Va-Lovale

Eastern

Lacuslrians Ba-Nyoro Ba-Toro Wa-Siba Wa-Sinja Wa-Kerewe Wa-Shashi Wa-Rundi Ba-Iro Ba-Ganda Ba-Soga

Ba-Kavirondo, includ- ing —

Awaware

Awarimi

Awakisii &c.

Tribes of the Congo Betid Ba-Kussu Ba-Tetela Ba-Songo Mino .Ba-Kuba Ba-Lolo Ba-Kuti Ba-Mbala Ba-Huana Ba-Yaka Ba-Pindi Ba-Kwese &c.

Tribes of the Congo

Bank

Wa-Genia

Ba-Soko

Ba-Poto

Mobali

Mogwandi

_ .. , fconnected Ba-Ngalal ^^ Zan .

Ba-Bangi] , deh group Wa-Buma

Bantu of Recent

Immigration

Wa-Kikuyu

Wa-Kamba

Wa-Pokomo

Wa-Duruma

Wa-Digo

Wa-Giriama

Wa-Taita

Wa-Nyaturu

Wa-Iramba

Wa-Mbugwe

Wa-Kaguru

... _ fpossible

Wa-Gogo J Masai

Wa-Chaga [element

Older Bantu

Wa-Nyamwezi, includ- ing—

Wa-Sukuma

Wa-Sumbwa

Wa-Nyanyembe

Wa-Tui

Wa-Kimbu

Wa-Kanongo

Wa-Wende

He

Central

Ba-Nunu Ba-Loi Ba-Teke Wa-Pfuru Wa-Mbundu Wa-Mfumu Ba-Nsinik Ma-Wumba Ma-Yakalla &c.

TRANSITIONAL FROM CENTRAL TO SOUTHERN

BANTU Amboela Ganguela Kioko Minungo Imbangala Ba-Achinji Golo Hollo

&c. Mbunda peoples in- cluding —

Bihe

Dembo

Mbaka

Ngola

Bondo

Ba-Ngala

Songo

Haku

Lubolo

Kisama &c.

Eastern

Wa-Gunda

Wa-Guru

Wa-Galla Wa-Sambara Wa-Seguha Wa-Nguru Wa-Sagara Wa-Doe Wa-Khutu Wa-Saramo Wa-Hehe Wa-Bena Wa-Sanga

Wa-Swahili (with Arab elements)

Connected are — Wa-Kisi Wa-Mpoto Ba-Tonga Ba-Tumbuka Wa-Nyika Wa- Nyam wanga A-Mambwe Wa-Fipa Wa-Rungu A-Wemba A-Chewa A-Maravi Ba-Senga Ba-Bisa A-Jawa (Yaos) Wa-Mwera Wa-Gindo Ma-Konde Ma-Wia Ma-Nganja Ma-Kua

SO UTHERN BANTU {.South and South-East Africa)

J3

j-^2

Ba-Nyai Ma-Kalanga,

including

Mashoha Ba-Ronga £ffl

J *C Be-Chuana, includ- ing —

Ba-Tlapin

Ba-Rolong

Ba-Ratlou

Ba-Taung

Ba-Rapulana

Ba-Seleka

Ba-Hurutsi

Ba-Tlaru

Ba-Mangwato

Ba-Tauana

Ba-Ngwaketse

Ba-Kuena &c.

HAMITO-BANTU

BUSHMAN TRANSITIONAL

Hottentots, in-“1

eluding — I S. W. Namaqua [Africa Koranna J

Ama-Zulu, including—

Ama-Swazi

Ama-Tonga

Matabele

Angoni

Ma-Gwangwara

Ma-Huhu

Ma-Viti

Ma-Situ

Ma-Henge &c. Ama-Xosa, including-

Ama-Gcaleka

Ama-Hahabe

Ama-Ngqika

Ama-Tembu

Ama-Pondo &c. Ova-Herero Ova-Mpo

BUSHMEN

TRIBES IN MADAGASCAR

MALA YO-INDONESIANS

Hova

Betsileo (slight Bantu admixture)

HOVA-BANTU TRANSITIONAL

Malagasy, including —

Bestimisaraka Antanosi

Antambahoaka Antsihanaka Antaimoro Antanala

Antaifasina Antaisara

Antaisaka &c.

BANTU-NEGROIDS

Sakalava, including — Menabe Milaka Ronondra Mahafali &C.

(T. A. J.)

HISTORY]

IV. History

The origin and meaning of the name of the continent are discussed elsewhere (see Africa, Roman). The word Africa was applied originally to the country in the immediate neighbourhood of Carthage, that part of the continent first known to the Romans, and it was subsequently extended with their increasing knowledge, till it came at last to include all that they knew of the continent. The Arabs still confine the name Ifrikia to the territory of Tunisia.

The valley of the lower Nile was the home in remotest antiquity of a civilized race. Egyptian culture had, however, remarkably Phoenician little direct influence on the rest of the continent, a and Greek result due in large measure to the fact that Egypt is colon iza- snut g landwards by immense deserts. If ancient ""*• Egypt and Ethiopia (q.v.) be excluded, the story of

Africa is largely a record of the doings of its Asiatic and European conquerors and colonizers, Abyssinia being the only state which throughout historic times has maintained its independence. The countries bordering the Mediterranean were first exploited by the Phoenicians, whose earliest settlements were made before iooo B.C. • Carthage, founded about 800 B.C., speedily grew into a city without rival in the Mediterranean, and the Phoenicians, subduing the Berber tribes, who then as now formed the bulk of the population, became masters of all the habitable region of North Africa west of the Great Syrtis, and found in commerce a source of immense prosperity. Both Egyptians and Carthaginians made attempts to reach the un- known parts of the continent by sea. Herodotus relates that an expedition under Phoenician navigators, employed by Necho, king of Egypt, c. 600 B.C., circumnavigated Africa from the Red Sea to the Mediterranean, a voyage stated to have been accom- plished in three years. Apart from the reported circumnaviga- tion of the continent, the west coast was well known to the Phoenicians as far as Cape Nun, and c. 520 B.C. Hanno, a Cartha- ginian, explored the coast as far, perhaps, as the Bight of Benin, certainly as far as Sierra Leone. A vague knowledge of the Niger regions was also possessed by the Phoenicians.

Meantime the first European colonists had planted themselves in Africa. At the point where the continent approaches nearest the Greek islands, Greeks founded the city of Cyrene (c. 631 B.C.). Cyrenaica became a flourishing colony, though being hemmed in on all sides by absolute desert it had little or no influence on inner Africa. The Greeks, however, exerted a powerful influence in Egypt. To Alexander the Great the city of Alexandria owes its foundation (332 B.C.), and under the Hellenistic dynasty of the Ptolemies attempts were made to penetrate southward, and in this way was obtained some knowledge of Abyssinia. Neither Cyrenaica nor Egypt was a serious rival to the Carthaginians, but all three powers were eventually supplanted by the Romans. After centuries of rivalry for supremacy 1 the struggle was ended by the fall of Carthage in 146 B.C. Within little more than a century from that date Egypt and Cyrene had become incorporated in the Roman empire. Under Rome the settled portions of the country were very prosperous, and a Latin strain was introduced into the land. Though Fezzan was occupied by them, the Romans elsewhere found the Sahara an impassable barrier. Nubia and Abyssinia were reached, but an expedition sent by the emperor Nero to discover the source of the Nile ended in failure. The utmost extent of geographical knowledge of the continent is shown in the writings of Ptolemy (2nd century a.d.), who knew of or guessed the existence of the great lake reservoirs of the Nile and had heard of the river Niger. Still Africa for the civilized world remained simply the countries bordering the Mediterranean. The continual struggle between Rome and the Berber tribes; the introduction of Christianity and the glories and sufferings of the Egyptian and African Churches; the invasion and conquest of the African provinces

1 Commercial treaties between Carthage and Rome were made in the 6th and 5th centuries B.C. The first armed conflict between the rival powers, begun in 264 B.C., was a contest for the possession of Sicily.

by the Vandals in the 5th century; the passing of the supreme power in the following century to the Byzantine empire — all these events are told fully elsewhere.

In the 7 th century of the Christian era occurred an event destined to have a permanent influence on the whole continent. Invading first Egypt, an Arab host, fanatical believers NortB in the new faith of Mahommed, conquered the whole Africa country from the Red Sea to the Atlantic and carried conquered the

Crescent into Spain. Throughout North Africa b Y tb J ! Christianity well-nigh disappeared, save in Egypt (where the Coptic Church was suffered to exist), and Upper Nubia and Abyssinia, which were not subdued by the Moslems. In the 8th, 9th and 10th centuries the Arabs in Africa were numerically weak; they held the countries they had conquered by the sword only, but in the nth century there was a great Arab immigration, resulting in a large absorption of Berber blood. Even before this the Berbers had very generally adopted the speech and religion of their conquerors. Arab influence and the Mahommedan religion thus became indelibly stamped on northern Africa. Together they spread southward across the Sahara. They also became firmly established along the eastern sea-board, where Arabs, Persians and Indians planted flourishing colonies, such as Mombasa, Malindi and Sofala, playing a role, maritime and commercial, analogous to that filled in earlier centuries by the Carthaginians on the northern sea-board. Of these eastern cities and states both Europe and the Arabs of North Africa were long ignorant.

The first Arab invaders had recognized the authority of the caliphs of Bagdad, and the Aghlabite dynasty — founded by Aghlab, one of Haroun al Raschid's generals, at the close of the 8th century — ruled as vassals of the caliphate. However, early in the 10th century the Fatimite dynasty established itself in Egypt, where Cairo had been founded a.d. 968, and from there ruled as far west as the Atlantic. Later still arose other dynasties such as the Almoravides and Almohades. Eventually the Turks, who had conquered Constantinople in 1453, a ££f „7

For a time the Moslem conquests in South Europe had virtually made of the Mediterranean an Arab lake, but the expulsion in the nth century of the Saracens from Sicily and southern Italy by the Normans was followed by descents of the conquerors on Tunisia and Tripoli. Somewhat later a busy trade with the African coast-lands, and especially with Egypt, was developed by Venice, Pisa, Genoa and other cities of North Italy. By the end of the 15th century Spain had completely thrown off the Moslem yoke, but even while the Moors were still in Granada, Portugal was strong enough to carry the war into Africa.

In 141 5 a Portuguese force captured the citadel of Ceuta on the Moorish coast. From that time onward Portugal repeatedly S aia and interfered in the affairs of Morocco, while Spain ac- Portugal quired many ports in Algeria and Tunisia. Portugal, invade the however, suffered a crushing defeat in 1578 at a! Kasr

states* aI Kebir > the Moors bein g led bv Abd el Malek I. of the then recently established Sharifan dynasty. By that time the Spaniards had lost almost all their African possessions. The Barbary states, primarily from the example of the Moors expelled from Spain, degenerated into, mere communities of pirates, and under Turkish influence civilization and commerce declined. The story of these states from the beginning of the 16th century to the third decade of the 19th century is largely made up of piratical exploits on the one hand and of ineffectual reprisals on the other. In Algiers, Tunis and other cities were thousands of Christian slaves.

But with the battle of Ceuta Africa had ceased to belong solely to the Mediterranean world. Among those who fought there was one, Prince Henry " the Navigator," son of King ofthe"* J onn !•) w h° was nred 'with the ambition to acquire Guinea for Portugal the unknown parts of Africa. Under his Coast— inspiration and direction was begun that series of Rise of voyages of exploration which resulted in the circum- trade. navigation of Africa and the establishment of Portu-

guese sovereignty over large areas of the coast-lands. Cape Bojador was doubled in 1434, Cape Verde in 1445, and by 1480 the whole Guinea coast was known. In 1482 Diogo Cam or Cao discovered the mouth of the Congo, the Cape of Good Hope was doubled by Bartholomew Diaz in 1488, and in 1498 Vasco da Gama, after having rounded the Cape, sailed up the east coast, touched at Sofala and Malindi, and went thence to India. Over all the countries discovered by their navigators Portugal claimed sovereign rights, but these were not exercised in the ex- treme south of the continent. The Guinea coast, as the first dis- covered and the nearest to Europe, was first exploited. Numerous forts and trading stations were established, the earliest being Sao Jorge da Mina (Elmina), begun in 1482. The chief commodities dealt in were slaves, gold, ivory and spices. The discovery of America (1492) was followed by a great development of the slave trade, which, before the Portuguese era, had been an overland

trade almost exclusively confined to Mahommedan Africa. The lucrative nature of this trade and the large quantities of alluvial gold obtained by the Portuguese drew other nations to the Guinea coast. English mariners went thitheras early as 1553, and they were followed by Spaniards, Dutch, French, Danish and other adventurers. Much of Senegambia was made known as a result of quests during the 16th century for the ” hills of gold ” in Bambuk and the fabled wealth of Timbuktu, but the middle Niger was not reached. The supremacy along the coast passed in the 17th century from Portugal to Holland and from Holland in the 18th and 19th centuries to France and England. The whole coast from Senegal to Lagos was dotted with forts and ” factories ” of rival powers, and this international patchwork persists though all the hinterland has become either French or British territory.

Southward from the mouth of the Congo 1 to the inhospit- able region of Damaraland, the Portuguese, from 1491 onward, acquired influence over the Bantu-Negro inhabitants, and in the early part of the 16th century through their efforts Christianity was largely adopted in the native kingdom of Congo. An irrup- tion of cannibals from the interior later in the same century broke the power of this semi-Christian state, and Portuguese activity was transferred to a great extent farther south, Sao Paulo de Loanda being founded in 1 576. The sovereignty of Portugal over this coast region, except for the mouth of the Congo, has been once only challenged by a European power, and that was in 1640- 1648, when the Dutch held the seaports.

Neglecting the comparatively poor and thinly inhabited regions of South Africa, the Portuguese no sooner discovered

1 This river was called by the Portuguese the Zaire. They appear to have made no attempt to trace its course beyond the rapids which stop navigation from the sea.

than they coveted the flourishing cities held by Arabized peoples between Sofala and Cape Guardafui. By 1520 all these Moslem sultanates had been seized by Portugal, Mozambique The being chosen as the chief city of her East African Portuguese possessions. Nor was Portuguese activity confined to ‘» Bast thg coast-lands. The lower and middle Zambezi valley ^^jf was explored (16th and 17th centuries), and here the Portuguese found semi-civilized Bantu-Negro tribes, who had been for many years in contact with the coast Arabs. Strenuous efforts were made to obtain possession of the country (modern Rhodesia)

known to them as the kingdom or empire of Monomo- tapa, where gold had been worked by the natives from about the 12th century a.d., and whence the Arabs, whom the Portuguese dispossessed, were still obtaining supplies in the 16th century. Several expeditions were despatched inland from 1569 onward and considerable quantities of gold were obtained. Portugal's hold on the interior, never very effective, weakened during the 17 th century, and in the middle of the 18th century ceased with the abandonment of the forts in the Manica district.

At the period of her greatest power Portugal exercised a strong influence in Abyssinia also. In the ruler of Abyssinia (to whose dominions a Portuguese traveller had penetrated before Vasco da Gama's memorable voyage) the Portuguese imagined they had found the legendary Christian king, Prester John, and when the complete overthrow of the native dynasty and the Christian religion was imminent by the victories of Mahommedan invaders, the exploits of a band of 400 Portuguese under Christopher da Gama during 1 541-1543 turned the scale in favour of Abyssinia and had thus an enduring result on the future of North-East Africa. After da Gama's time Portuguese Jesuits resorted to Abyssinia. While they failed in their efforts to convert the Abyssinians to Roman Catholicism they acquired an extensive knowledge of the country. Pedro Paez in 161 5, and, ten years later, Jeronimo Lobo, both visited the sources of the Blue Nile. In 1663 the Portuguese, who had outstayed their welcome, were expelled from the Abyssinian dominions. At this time Portuguese influence on the Zanzibar coast was waning before the power of the Arabs of Muscat, and by 1730 no point on the east coast north of Cape Delgado was held by Portugal.

It has been seen that Portugal took no steps to acquire the southern part of the continent. To the Portuguese the Cape of Good Hope was simply a landmark on the road to India, and mariners of other nations who followed in ani Dutch their wake used Table Bay only as a convenient spot at Table wherein to refit on their voyage to the East. By the Bay—Cape beginning of the 17th century the bay was much re- ˆ u ˚ n n J e ˆ sorted to for this purpose, chiefly by English and Dutch vessels. In 1620, with the object of forestalling the Dutch, two officers of the East India Company, on their own initiative, took possession of Table Bay in the name of King James, fearing otherwise that English ships would be " frustrated of watering but by license." Their action was not approved in London and the proclamation they issued remained without effect. The Netherlands profited by the apathy

of the English. On the advice of sailors who had been shipwrecked in Table Bay the Netherlands East India Company, in 1651, sent out a fleet of three small vessels under Jan van Riebeek which reached Table Bay on the 6th of April 1652, when, 164 years after its discovery, the first permanent white settlement was made in South Africa. The Portuguese, whose power in Africa was already waning, were not in a position to interfere with the Dutch plans, and England was content to seize the island of St Helena as her half-way house to the East. 2 In its inception the settlement at the Cape was not intended to become an African colony, but was regarded as the most westerly outpost of the Dutch East Indies. Nevertheless, despite the paucity of ports and the absence of navigable rivers, the Dutch colonists, freed from any apprehension of European trouble by the friendship between Great Britain and Holland, and leavened by Huguenot blood, gradually spread northward,

2 France acquired, as stations for her ships on the voyage to and from India, settlements in Madagascar and the neighbouring islands. The first settlement was made in 1642.

stamping their language, law and religion indelibly upon South Africa. This process, however, was exceedingly slow.

During the 18th century there is little to record in the history of Africa. The nations of Europe, engaged in the later half of the w . century in almost constant warfare, and struggling for

and supremacy in America and the East, to a large extent

revival of lost their interest in the continent. Only on the west ‘”””?*’ coast was there keen rivalry, and here the motive was

the securance of trade rather than territorial acqui- sitions. In this century the slave trade reached its highest de- velopment, the trade in gold, ivory, gum and spices being small in comparison. In the interior of the continent — Portugal’s energy being expended — no interest was shown, the nations with establishments on the coast ” taking no further notice of the inhabitants or their land than to obtain at the easiest rate what

they procure with as little trouble as possible, or to carry them off for slaves to their plantations in America ” {Encyclopaedia Britan- nica, 3rded., 1797). Even the scanty knowledge acquired by the ancients and the Arabs was in the main forgotten or disbelieved. It was the period when —

Geographers, in Afric maps,

With savage pictures filled their gaps,

And o’er unhabitable downs

Placed elephants for want of towns.

(Poetry, a Rhapsody. By Jonathan Swift.)

The prevailing ignorance may be gauged by the statement in the third edition of the Encyclopaedia Britannica that ” the Gambia and Senegal rivers are only branches of the Niger.” But the closing years of the 18th century, which witnessed the partial awakening of the public conscience of Europe to the iniquities of the slave trade, were also notable for the revival of interest in inner Africa. A society, the African Association, 1 was formed in London in 1788 for the exploration of the interior of the continent. The era of great discoveries had begun a little earlier in the famous journey (1770-177 2) of James Bruce through Abyssinia and Sennar, during which he determined the course of the Blue Nile. But it was through the agents of the African Association that knowledge was gained of the Niger regions. The Niger itself was first reached by Mungo Park, who travelled by way of the Gambia, in 1795. Park, on a second journey in 1805, passed Timbuktu and descended the Niger to Bussa, where he lost his life, having just failed to solve the question as to where the river reached the ocean. (This problem was ultimately solved by Richard Lander and his brother in 1830.) The first scientific explorer of South-East Africa, Dr Francisco de Lacerda, a Portuguese, also lost his life in that country. Lacerda travelled up the Zambezi to Tete, going thence towards Lake Mweru, near which he died in 1 798. The first recorded crossing of Africa was accomplished between the years 1802 and 181 1 by two half-caste Portuguese traders, Pedro Baptista and A. Jose, who passed from Angola eastward to the Zambezi.

Although the Napoleonic wars distracted the attention of Europe from exploratory work in Africa, those wars nevertheless _

exercised great influence on the future of the con-

ofthe tinent, both in Egypt and South Africa. The occupa-

Napoleonlc tion of Egypt (1798-1803) first by France and then r'h'T k y Great Britain resulted in an effort by Turkey to seizes the re 8 am direct control over that country, 2 followed in Cape. 181 1 by the establishment under Mehemet Ali of an

almost independent state, and the extension of Egyp- tian rule over the eastern Sudan (from 1820 onward). In South Africa the struggle with Napoleon caused Great Britain to take possession of the Dutch settlements at the Cape, and in 1814 Cape Colony, which had been continuously occupied by British troops since 1806, was formally ceded to the British crown.

The close of the European conflicts with the battle of Waterloo was followed by vigorous efforts on the part of the British govern- ment to become better acquainted with Africa, and to substitute colonization and legitimate trade for the slave traffic, declared

1 The Association, in 1831, was merged in the Royal Geographical Society.

2 The Mamelukes, whom the Turks had overthrown in the 16th century, had regained practically independent power.

illegal for British subjects in 1807 and abolished by all other European powers by 1836. To West Africa Britain devoted much attention. The slave trade abolitionists had already, in 1788, formed a, settlement at Sierra Leone, on the Guinea coast, for freed slaves, and from this establishment grew the colony of Sierra Leone, long notorious, by reason of its deadly climate, as " The White Man's Grave." 3 Farther east the establishments on the Gold Coast began to take a part in the politics of the interior, and the first British mission to Kumasi, despatched in 1817, led to the assumption of a protectorate over the maritime tribes heretofore governed by the Ashanti.

An expedition sent in 1816 to explore the Congo from its mouth did not succeed in getting beyond the rapids which bar the way to the interior, but in the central Sudan much better results were obtained. In 1823 three English travellers, Walter Oudney, Dixon Denham and Hugh Clapperton, reached Lake Chad from Tripoli — the first white men to reach that lake. The partial exploration

of Bornu and the Hausa states by Clapperton, which followed, revealed the existence of large and flourishing cities and a semi-civilized people in a region hitherto unknown. The discovery in 1830 of the mouth of the Niger by Clapperton's servant Lander, already mentioned, had been preceded by the journeys of Major A. G. Laing (1826) and Rene Caillie (1827) to Timbuktu, and was followed (1832-1833) by the partial ascent of the Benue affluent of the Niger by MacGregor Laird. In 1841 a disastrous attempt was made to plant a white colony on the lower Niger, an expedition (largely philanthropic and anti- slavery in its inception) which ended in utter failure. Never- theless from that time British traders remained on the lower Niger, their continued presence leading ultimately to the acquisi- tion of political rights over the delta and the Hausa states by Great Britain. 4 Another endeavour by the British government to open up commercial relations with the Niger countries resulted in the addition of a vast amount of information concerning the countries between Timbuktu and Lake Chad, owing to the labours of Heinrich Barth (1850-1855), originally a subordinate, but the only surviving member of the expedition sent out.

Meantime considerable changes bad been made in other parts of the continent, the most notable being — the occupation of Algiers by France in 1830, an end being thereby put to the piratical proceedings of the Barbary states; the continued expansion southward of Egyptian authority with the consequent additions to the knowledge of the Nile; and the establishment of independent states (Orange Free State and the Transvaal) by Dutch farmers (Boers) dissatisfied with British rule in Cape Colony. Natal, so named by Vasco da Gama, had been made a British colony (1843), the attempt of the Boers to acquire it being frustrated. The city of Zanzibar, on the island of that name, founded in 1832 by Seyyid Said of Muscat, rapidly attained importance, and Arabs began to penetrate to the great lakes ol East Africa, 5 concerning which little more was known (and less, believed) than in the time of Ptolemy. Accounts of a vast inland sea, and the discovery in 1848-1849, by the missionaries Ludwig Krapf and J. Rebmann, of the snow-clad mountains of Kili- manjaro and Kenya, stimulated in Europe the desire for further knowledge.

At this period, the middle of the 19th century, Protestant missions were carrying on active propaganda on the Guinea coast, in South Africa and in the Zanzibar dominions. Their work, largely beneficent, was being conducted T ˆ eera in regions and

among peoples little known, and in exp / orers . many instances missionaries turned explorers and became pioneers of trade and empire. One of the first to attempt to fill up the remaining blank spaces in the map was David Livings tone, who had been engaged since 1840m missionary work north of the Orange. In 1849 Livingstone crossed the Kalahari Desert from south to north and reached Lake Ngami.

3 In imitation of the British example, an American society founded in 1822 the negro colony (now republic) of Liberia.

4 The first territorial acquisition made by Great Britain in this region was in 1851, when Lagos Island was annexed.

6 As early as 1848 an Arab from Zanzibar journeying across the continent had arrived at Benguella.

and between 185 1 and 1856 he traversed the continent from west to east, making known the great waterways of the upper Zambezi. During these journeyings Livingstone discovered, November 1855, the famous Victoria Falls, so named after the queen of England. In 1858-1864 the lower Zambezi, the Shire and Lake Nyasa were explored by Livingstone, Nyasa having been first reached by the confidential slave of Antonio da Silva Porto, a Portuguese trader established at Bihe in Angola, who crossed Africa during 1853-1856 from Benguella to the mouth of the Rovuma. While Livingstone circumnavigated Nyasa, the more northerly lake, Tanganyika, had been visited (1858) by Richard Burton and J. H. Speke, and the last named had sighted Victoria Nyanza. Returning to East Africa with J. A. Grant, Speke reached, in 1862, the river which flowed from Victoria Nyanza, and following it (in the main) down to Egypt, had the distinction of being the first man to read the riddle of the Nile. In 1864 another Nile explorer, Samuel Baker, discovered the Albert Nyanza, the chief western reservoir of the river. In 1866 Livingstone began his last great journey, in which he made known Lakes Mweru and Bangweulu and discovered the Lualaba (the upper part of the Congo), but died (1873) before he had been able to demonstrate its ultimate course, believing indeed that the Lualaba belonged to

the Nile system. Livingstone's lonely death in the heart of Africa evoked a keener desire than ever to complete the work he left undone. H. M. Stanley, who had in 1 87 1 succeeded in finding and succouring Livingstone, started again for Zanzibar in 1874, and in the most memorable of all exploring expeditions in Africa circumnavigated Victoria Nyanza and Tanganyika, and, striking farther inland to the Lualaba, followed that river down to the Atlantic Ocean — reached in August 1877 — and proved it to be the Congo. Stanley had been preceded, in 1874, at Nyangwe, Livingstone's farthest point on the Lualaba, by Lovett Cameron, who was, however, unable farther to explore its course, making his way to the west coast by a route south of the Congo.

While the great mystery of Central Africa was being solved explorers were also active in other parts of the continent. Southern Morocco, the Sahara and the Sudan were traversed in many directions between i860 and 1875 by Gerhard Rohlfs, Georg Schweinfurth and Gustav Nachtigal. These travellers not only added considerably to geographical knowledge, but obtained invaluable information concerning the people, languages and natural history of the countries in which they sojourned. 1 Among the discoveries of Schweinfurth was one that confirmed the Greek legends of the existence beyond Egypt of a pygmy race. But the first discoverer of the dwarf races of Central Africa was Paul du Chaillu, who found them in the Ogowe district of the west coast in 1865, five years before Schweinfurth's first meeting with the Pygmies; du Chaillu having previously, as the result of journeys in the Gabun country between 1855 and 1859, made popular in Europe the knowledge of the existence of the gorilla, perhaps the gigantic ape seen by Hanno the Carthaginian, and whose existence, up to the middle of the 19th century, was thought to be as legendary as that of the Pygmies of Aristotle.

In South Africa the filling up of the map also proceeded apace. The finding, in 1869, of rich diamond fields in the valley of the Vaal river, near its confluence with the Orange, caused a rush of emigrants to that district, and led to conflicts between the Dutch and British authorities and the extension of British authority northward. In 1871 the ruins of the great Zimbabwe in Mashonaland, the chief fortress and distributing centre of the race which in medieval times worked the goldfields of South-East Africa, were explored by Karl Mauch. In the following year F. C. Selous began his journeys over South Central Africa, which continued for more than twenty years and extended over every

part of Mashonaland and Matabeleland. (F. R. C.)

V. Partition among European Powers

In the last quarter of the 19th century the map of Africa was transformed. After the discovery of the Congo the story of

1 Another great traveller of this stamp was Wilhelm Junker, who spent the greaterpartof the period i875-i886inthe east centralSudan.

exploration takes second place; the continent becomes the theatre of European expansion. Lines of partition, drawn often through trackless wildernesses, marked out the possessions of Germany, France, Great Britain and other powers. Railways penetrated the interior, vast areas were opened up to civilized occupation, and from ancient Egypt to the Zambezi the continent was startled into new life.

Before 1875 the only powers with any considerable interest in Africa were Britain, "Portugal and France. Between 1815 and 1850, as has been shown above, the British government devoted much energy, not always informed by knowledge, 'to western and southern Africa. In both directions Great Britain had met with much discouragement; on the west coast, disease, death, decaying trade and useless conflicts with savage foes had been the normal experience; in the south recalcitrant Boers and hostile Kaffirs caused almost endless trouble. The visions once entertained of vigorous negro Communities at once civilized and Christian faded away; to the hot fit of philan- thropy succeeded the cold fit of indifference and a disinclination to bear the burden of empire. The low-water mark of British interest in South Africa was reached in 1854 when independence was forced on the Orange River Boers, while in 1865 the mind of the nation was fairly reflected by the unanimous resolution of a representative House of Commons committee: 2 "that all further extension of territory or assumption of government, or new treaty offering any protection to native tribes, would be inexpedient." For nearly twenty years the spirit of that resolu- tion paralysed British action in Africa, although many circum- stances — the absence of any serious European rival, the in- evitable border disputes with uncivilized races, and the activity of missionary and trader — conspired to make British influence dominant in large areas of the continent over which the govern- ment exercised no definite authority. The freedom with which blood

and treasure were spent to enforce respect for the British flag or to succour British subjects in distress, as in the Abyssinian campaign of 1867-68 and the Ashanti war of 1873, tended further to enhance the reputation of Great Britain among African races, while, as an inevitable result of the possession of India, British officials exercised considerable power at the court of Zanzibar, which indeed owed its separate existence to a decision of Lord Canning, the governor-general of India, in 1861 recognizing the division of the Arabian and African dominions of the imam of Muscat.

It has been said that Great Britain was without serious rival. On the Gold Coast she had bought the Danish forts in 1850 and acquired the Dutch, 1871-1872, in exchange for establishments in Sumatra. But Portugal still held, both in the east and west of Africa, considerable stretches of the tropical coast-lands, and it was in 1875 that she obtained, as a result of the arbitration of Marshal MacMahon, possession of the whole of Delagoa Bay, to the southern part of which England also laid claim by virtue of a treaty of cession concluded with native chiefs in 1823. The only other European power which at the period under considera- tion had considerable possessions in Africa was France. Besides Algeria, France had settlements on the Senegal, where in 1854 the appointment of General Faidherbe as governor marked the beginning of a policy of expansion; she had also various posts on the upper Guinea coast, had taken the estuary of the Gabun as a station for her navy, and had acquired (1862) Obok at the southern entrance to the Red Sea.

In North Africa the Turks had (in 1835) assumed direct control of Tripoli, while Morocco had fallen into a state of decay though retaining its independence. The most remarkable change was in Egypt, where the Khedive Ismail had introduced a somewhat fantastic imitation of European civilization. In addition Ismail had conquered Darfur, annexed Harrar and the Somali ports on the Gulf of Aden, was extending his power southward to the equatorial lakes, and even contemplated reach- ing the Indian Ocean. The Suez Canal, opened in 1869, had a great influence on the future of Africa, as it again made Egypt the highway to the East, to the detriment of the Cape route. 2 Specially appointed to consider West African affairs.

Any estimate of the area of African territory held by European nations in 1875 is necessarily but approximate, and varies chiefly The divi- as tne com Piler of statistics rejects or accepts the sioaoftbe vague claims of Portugal to sovereignty over the continent hinterland of her coast possessions. At that period in 1875. other European nations — with the occasional excep- tion of Great Britain — were indifferent to Portugal's preten- sions, and her estimate of her African empire as covering over 700,000 sq. m. was not challenged. 1 But the area under effective control of Portugal at that time did not exceed 40,000 sq. m. Great Britain then held some 250,000 sq. m., France about 170,000 sq. m. and Spain 1000 sq. m. The area of the independent Dutch republics (the Transvaal and Orange Free State) was some 150,000 sq. m., so that the total area of Africa ruled by Europeans did not exceed 1,271,000 sq. m.; roughly one-tenth of the continent. This estimate, as it admits the full extent of Portuguese claims and does not include Madagascar, in reality considerably overstates the case.

Egypt and the Egyptian Sudan, Tunisia and Tripoli were subject in differing ways to the overlordship of the sultan of Turkey, and with these may be ranked, in the scale of organized governments, the three principal independent states, Morocco, Abyssinia and Zanzibar, as also the negro republic of Liberia. There remained, apart from the Sahara, roughly one half of Africa, lying mostly within the tropics, inhabited by a multitude of tribes and peoples living under various forms of govern- ment and subject to frequent changes in respect of political organization. In this region were the negro states of Ashanti, Dahomey and Benin on the west coast, the Mahommedan sultanates of the central Sudan, and a number of negro kingdoms in the east central and south central regions. Of these Uganda on the north-west shores of Victoria Nyanza, Cazembe and Muata Hianvo (or Yanvo) may be mentioned. The two last- named kingdoms occupied respectively the south-eastern and south-western parts of the Congo basin. In all this vast region the Negro and Negro-Bantu races predominated, for the most part untouched by Mahommedanism or Christian influences. They lacked political cohesion, and possessed neither the means nor the inclination to extend their influence beyond their own borders. The exploitation of Africa continued to be entirely the work of alien races.

The causes which led to the partition of Africa may now be

considered. They are to be found in the economic and political Causes state of western Europe at the time. Germany, which led strong and united as the result of the Franco-Prussian to par- War of 1870, was seeking new outlets for her energies Mioa – — new markets for her growing industries, and with

the markets, colonies. Yet the idea of colonial expansion was of slow growth in Germany, and when Prince Bismarck at length acted Africa was the only field left to exploit, South America being protected from interference by the known determination of the United States to enforce the Monroe Doctrine, while Great Britain, France, the Netherlands, Portugal and Spain already held most of the other regions of the world where coloniza- tion was possible. For different reasons the war of 1870 was also the starting-point for France in the building up of a new colonial empire. In her endeavour to regain the position lost in that war France had to look beyond Europe. To the two causes mentioned must be added others. Great Britain and Portugal, when they found their interests threatened, bestirred themselves, while Italy also conceived it necessary to become an African power. Great Britain awoke to the need for action too late to secure predominance in all the regions where formerly hers was the only European influence. She had to contend not only with the economic forces which urged her rivals to action, but had also to combat the jealous opposition of almost every European nation to the further growth of British power. Italy alone acted throughout in cordial co-operation with Great Britain.

It was not, however, the action of any of the great powers

1 See the tables in Behm and Wagner's Bevolkerune der Erie (Gotha, 1872).

of Europe which precipitated the struggle. This was brought about by the ambitious projects of Leopold II., king of the Belgians. The discoveries of Livingstone, Stanley and others had aroused especial interest among two classes of men in western Europe, one the manufacturing and trading class, which saw in Central Africa possibilities of commercial develop- ment, the other the philanthropic and missionary class, which beheld in the newly discovered lands millions of savages to Christianize and civilize. The possibility of utilizing both these classes in the creation of a vast state, of which he should be the chief, formed itself in the mind of Leopold II. even before Stanley had navigated the Congo. The king's action was immediate; it proved

successful; but no sooner was the nature of his project understood in Europe than it provoked the rivalry of France and Germany, and thus the international struggle was begun.

EmtryWallMf SC

At this point it is expedient, in the light of subsequent events, to set forth the designs then entertained by the European powers that participated in the struggle for Africa. Portugal was striving to retain as large a share as possible of lng ambl . her shadowy empire, and particularly to establish her tions of claims to the Zambezi region, so as to secure a belt of *^ e territory across Africa from Mozambique to Angola.

European powers.

Great Britain, once aroused to the imminence of danger, put forth vigorous efforts in East Africa and on the Niger, but her most ambitious dream was the establishment of an unbroken line of British possessions and spheres of influence from south to north of the continent, from Cape Colony to Egypt. Germany's ambition can be easily described. It was to secure as much as possible, so as to make up for lost opportunities. Italy coveted Tripoli, but that province could not be seized without risking war. For the rest Italy's territorial ambitions were confined to North-East Africa, where she hoped to acquire a dominating influence over Abyssinia. French ambitions, apart from Mada- gascar, were confined to. the northern and central portions of the continent. To extend her possessions on the Mediterranean littoral, and to connect them with her colonies in West Africa, the western Sudan, and on the Congo, by establishing her in- fluence over the vast intermediate regions, was France's first ambition. But the defeat of the Italians in Abyssinia and the impending downfall of the khalifa's power in the valley of the: upper Nile suggested a still more daring project to the French government — none other than the establishment of French <

influence over a broad belt of territory stretching across the continent from west to east, from Senegal on the Atlantic coast to the Gulf of Aden. The fact that France possessed a small part of

the Red Sea coast gave point to this design. But these conflicting ambitions could not all be realized, and Germany succeeded in preventing Great Britain obtaining a continuous band of British territory from south to north, while Great Britain, by excluding France from the upper Nile valley, dispelled the French dream of an empire from west to east.

King Leopold's ambitions have already been indicated. The part of the continent to which from the first he directed his energies was the equatorial region. In September 1876 he took what may be described as the first definite step in the modern partition of the continent. He summoned to a conference at Brussels representatives of Great Britain, Belgium, France, Germany, Austria-Hungary, Italy and Russia, to deliberate on the best methods to be adopted for the exploration and civilization of Africa, and the opening up of the interior of the continent to commerce and industry. The conference was entirely unofficial. The delegates who attended neither repre- sented nor pledged their respective governments. Their deliberations lasted three days and resulted in the foundation of " The International African Association," • with its head- quarters at Brussels. It was further resolved to establish national committees in the various countries represented, which should collect funds and appoint delegates to the International Association. The central idea appears to have been to put the exploration and development of Africa upon an international footing. But it quickly became apparent that this was an unattainable ideal. The national committees were soon working independently of the International Association, and the Associa- tion itself passed through a succession of stages until it became purely Belgian in character, and at last developed into the Congo Free State, under the personal sovereignty of King Leopold. At first the Association devoted itself to sending expeditions to the great central lakes from the east coast; but failure, more or less complete, attended its efforts in this direction, and it was not until the return of Stanley, in January 1878, from his great journey down the Congo, that its ruling spirit, King Leopold, definitely turned his thoughts towards the Congo. In June of that year, Stanley visited the king at Brussels, and in the following November a private conference was held, and a committee was appointed for the investigation of the upper Congo.

Stanley's remarkable discovery had stirred ambition in other capitals than Brussels. France had always taken a keen interest The in West Africa, and in the years 1875 to 1878 Savorgnan

struggle de Brazza had carried out a successful exploration of the Ogowe river to the south of the Gabun. De Brazza determined that the Ogowe did not offer that great waterway into the interior of which he was in search, and he returned to Europe without having heard of the discoveries of Stanley farther south. Naturally, however, Stanley's dis- coveries were keenly followed in France. In Portugal, too, the discovery of the Congo, with its magnificent unbroken waterway of more than a thousand miles into the heart of the continent, served to revive the languid energies of the Portuguese, who promptly began to furbish up claims whose age was in inverse ratio to their validity. Claims, annexations and occupations were in the air, and when in January 1879 Stanley left Europe as the accredited agent of King Leopold and the Congo com- mittee, the strictest secrecy was observed as to his real aims and intentions. The expedition was, it was alleged, proceeding up the Congo to assist the Belgian expedition which had entered from the east coast, and Stanley himself went first to Zanzibar. But in August 1879 Stanley found himself again at Banana Point, at the mouth of the Congo, with, as he himself has written, " the novel mission of sowing along its banks civilized settlements to peacefully conquer and subdue it, to remould it in harmony with modern ideas into national states, within whose limits the European merchant shall go hand in hand with the dark African trader, and justice and law and order shall prevail, and murder

for the Congo,

and lawlessness and the cruel barter of slaves shall be overcome." The irony of human aspirations was never perhaps more plainly demonstrated than in the contrast between the ideal thus set before themselves by those who employed Stanley, and the actual results of their intervention in Africa. Stanley founded his first station at Vivi, between the mouth of the Congo and the rapids that obstruct its course where it breaks over the western edge of the central continental plateau. Above the rapids he estab- lished a station on Stanley Pool and named it Leopoldville, founding other stations on the main stream in the direction of the falls that bear his name!

Meanwhile de Brazza was far from idle. He had returned to Africa at the beginning of 1880, and while the agents of King Leopold were making treaties and founding stations along the southern bank of the river, de Brazza and other French agents were equally busy on the northern bank. De Brazza was sent out to

Africa by the French committee of the International African Association, which provided him with the funds for the expedition. His avowed object was to explore the region between the Gabun and Lake Chad. But his real object was to anticipate Stanley on the Congo. The international character of the association founded by King Leopold was never more than a polite fiction, and the rivalry between the French and the Belgians on the Congo was soon open, if not avowed. In October 1880 de Brazza made a solemn treaty with a chief on the north bank of the Congo, who claimed that his authority extended over a large area, including territory on the southern bank of the river. As soon as this chief had accepted French protection, de Brazza crossed over to the south of the river, and founded a station close to the present site of Leopoldville. The discovery by Stanley of the French station annoyed King Leopold's agent, and he promptly challenged the rights of the chief who purported to have placed the country under French protection, and him- self founded a Belgian station close to the site selected by de Brazza. In the result, the French station was withdrawn to the northern side of Stanley Pool, where it is now known as Brazzaville.

The activity of French and Belgian agents on the Congo had not passed unnoticed in Lisbon, and the Portuguese government saw that no time was to be lost if the claims it had never ceased to put forward on the west coast were not to go by default. At varying periods during the 19th century Portugal had put forward claims to the whole of the West African coast, between 5° 12′ and 8° south. North of the Congo mouth she claimed the territories of Kabinda and Molemba, alleging that they had been in her possession since 1484. Great Britain had never, however, admitted this claim, and south of the Congo had declined to recognize Portuguese possessions as extending north of Ambriz. In 1856 orders were given to British cruisers to prevent by force any attempt to extend Portuguese dominion north of that place. But the Portuguese had been persistent in urging their claims, and in 1882 negotiations were again opened with the British government for recognition of Portuguese rights over both banks of the Congo on the coast, and for some distance inland. Into the details of the negotiations, which were conducted for Great Britain by the 2nd Earl Granville, who was then secretary for foreign affairs, it is unnecessary to enter; they resulted in the signing on the 26th of February 1884 of a treaty, by which Great Britain recognized the sovereignty of the king of Portugal " over that part of the west coast of Africa, situated between 8° and 5°

12′ south latitude," and inland as far as Noki, on the south bank of the Congo, below Vivi. The navigation of the Congo was to be controlled by an Anglo-Portuguese commission. The publication of this treaty evoked immediate protests, not only on the continent but in Great Britain. In face of the disapproval aroused by the treaty, Lord Granville found himself unable to ratify it. The protests had not been confined to France and the king of the Belgians. Germany had not yet acquired formal footing in Africa, but she was crouching for the spring prior to taking her part in the scramble, and Prince Bismarck had expressed, in vigorous language, the objections entertained by Germany to the Anglo-Portuguese treaty.

South Africa.

For some time before 1884 there had been growing up a general conviction that it would be desirable for the powers who were interesting themselves in Africa to come to some agreement as to " the rules of the game," and to define their respective interests so far as that was practicable. Lord Granville's ill- fated treaty brought this sentiment to a head, and it was agreed to hold an international conference on African affairs. But before discussing the Berlin conference of 1884-1885, it will be well to see what was the position, on the eve of the conference, in other parts of the African continent. In the southern section of Africa, south of the Zambezi, important events had been happening. In 1876 Great Britain had concluded an agreement with the Orange Free State for an adjustment of influence frontiers, the result of which was to leave the Kimberley consoH- diamond fields in British territory, in exchange for dated fa a payment of £90,000 to the Orange Free State. On the 1 2th of April 1877 Sir Theophilus Shepstone had issued a proclamation declaring the Transvaal — the South African Republic, as it was officially designated — to be British territory (see Transvaal). In December 1880 war broke out and lasted until March 1881, when a treaty of peace was signed. This treaty of peace was followed by a convention, signed in August of the same year, under which complete self-government was guaranteed to the inhabitants of the Transvaal, subject to the suzerainty of Great Britain, upon certain terms and

conditions and subject to certain reservations and limitations. No sooner was the convention signed than it became the object of the Boers to obtain a modification of the conditions and limitations imposed, and in February 1884 a fresh convention was signed, amending the convention of 1881. Article IV. of the new convention provided that " The South African Republic will conclude no treaty or engagement with any state or nation other than the Orange Free State, nor with any native tribe to the eastward or westward of the Republic, until the same has been approved by Her Majesty the Queen." The precise effect of the two conventions has been the occasion for interminable discussions, but as the subject is now one of merely academic interest, it is sufficient to, say that when the Berlin conference held its first meeting in 1884 the Transvaal was practically independent, so far as its internal administration was concerned, while its foreign relations were subject to the control just quoted.

But although the Transvaal had thus, between the years 1875 and 1884, become and ceased to be British territory, British influence in other parts of Africa south of the Zambezi had been steadily extended. To the west of the Orange Free State, Griqualand West was annexed to the Cape in 1880, while to the east the territories beyond the Kei river were included in Cape Colony between 1877 and 1884, so that in the latter year, with the exception of Pondoland, the whole of South-East Africa was in one form or another under British control. North of Natal, Zululand was not actually annexed until 1887, although since 1879, when the military power of the Zulus was broken up, British influence had been admittedly supreme. In December 18S4 St Lucia Bay — upon which Germany was casting covetous eyes — had been taken possession of in virtue of its cession to Great Britain by the Zulu king in 1843, and three years later an agreement of non-cession to foreign powers made by Great Britain with ths regent and paramount chief of Tongaland completed the chain of British possessions on the coast of South Africa, from the mouth of the Orange river on the west to Kosi Bay and the Portuguese frontier on the east. In the interior of South Africa the year 1884 witnessed the beginning of that final stage of the British advance towards the north which was to extend British influence from the Cape to the southern shores of Lake Tanganyika. The activity of the Germans on the west, and of the Boer republic on the east, had brought home to both the imperial and colonial authorities the impossibility of relying on vague traditional claims. In May

18S4 treaties were made with native chiefs by which the whole of the country north of Cape Colony, west of the Transraal, south of 22° S. and east of 20° E., was placed under British protection, though

a protectorate was not formally declared until the following January.

Meanwhile some very interesting events had been taking place or the west coast, north of the Orange river and south of the Portuguese province of Mossamedes. It must be sufficient here to touch very briefly on the events that preceded the foundation of the colony of German South- West Africa. For many years before 1884 German missionaries had settled among the Damaras (Herero) and Namaquas, often combining small trading operations with their missionary work. From time to time trouble arose between the missionaries and the native chiefs, and appeals were made to the German government for protection. The German government in its turn begged the British ^^"^ government to say whether it assumed responsibility fleW- for the protection of Europeans in Damaraland and Namaqualand. The position of the British government was intelligible, if not very intelligent. It did not desire to see any other European power in these countries, and it did not want to assume the responsibility and incur the expense of protecting the few Europeans settled there. Sir Bartle Frere, when governor of the Cape (18 7 7-1880), had foreseen that this attitude portended trouble, and had urged that the whole of the unoccupied coast-line, up to the Portuguese frontier, should be declared under British protection. But he preached to deaf ears, and it was as something of a concession to him that in March 1878 the British flag was hoisted at Walfish Bay, and a small part of the adjacent land declared to be British. The fact appears to be that British statesmen failed to understand the change that had come over Germany. They believed that Prince Bismarck would never give his sanction to the creation of a colonial empire, and, to the German inquiries as to what rights Great Britain claimed in Damaraland and Namaqualand, procrastinating replies were sent. Meanwhile the various colonial societies established in Germany had effected a revolution in public opinion, and, more important still, they had convinced the great chancellor. Accordingly when, in November 1882, F. A. E. Liideritz, a Bremen merchant, informed the German government of his intention to establish a factory on the coast between the Orange river and the Little Fish river, and asked if he might rely on the protection of

his government in case of need, he met with no discouragement from Prince Bismarck. In February 1883 the German ambassador in London informed Lord Granville of Liideritz's design, and asked " whether Her Majesty's government exercise any authority in that locality." It was intimated that if Her Majesty's government did not, the German government would extend to Luderitz's factory " the same measure of pro- tection which they give to their subjects in remote parts of the world, but without having the least design to establish any foot- ing in South Africa." An inconclusive reply was sent, and on the 9th of April Luderitz's agent landed at Angra Pequefia, and after a short delay concluded a treaty with the local chief, by which some 215 square miles around Angra Pequefia were ceded to Liideritz. In England and at the Cape irritation at the news was mingled with incredulity, and it was fully anticipated that Liideritz would be disavowed by his government. But for this belief it can scarcely be doubted that the rest of the unoccupied coast-line would have been promptly declared under British protection. Still Prince Bismarck was slow to act. In November the German ambassador again inquired if Great Britain made any claim over this coast, and Lord Granville replied that Her Majesty exercised sovereignty only over certain parts of the coast, as at Walfish Bay, and suggested that arrangements might be made by which Germany might assist in the settlement of Angra Pequefia. By this time Liideritz had extended his acquisi- tions southwards to the Orange river, which had been declared by the British government to be the northern frontier of Cape Colony. Both at the Cape and in England it was now realized that Germany had broken away from her former purely con- tinental policy, and, when too late, the Cape parliament showed great eagerness to acquire the territory which had lain so long at its very doors, to be had for the taking. It is not necessary to follow the course of the subsequent negotiations. On the 15th

of August 1884 an official note was addressed by the German consul at Capetown to the high commissioner, intimating that the German emperor had by proclamation taken " the territory

belonging to Mr A. Luderitz on the west coast of Africa under the direct protection of His Majesty." This proclamation covered the coast-line from the north bank of the Orange river to 26° S. latitude, and 20 geographical miles inland, including " the islands belonging thereto by the law of nations." On the 8th of September 1884 the German government intimated to Her Majesty's government " that the west coast of Africa from 26 S. latitude to Cape Frio, excepting Walfish Bay, had been placed under the protection of the German emperor." Thus, before the end of the year 1884, the foundations of Germany's colonial empire had been laid in South- West Africa.

In April of that year Prince Bismarck intimated to the British government, through the German charge d'affaires in London, Nachtigai's that " the imperial consul-general, Dr Nachtigal, has mission to been commissioned by my government to visit the west coast of Africa in the course of the next few months, in order to complete the information now in the posses- sion of the Foreign Office at Berlin, on the state of German com- merce on that coast. With this object Dr Nachtigal will shortly embark at Lisbon, on board the gunboat ' Mowe.' He will put himself into communication with the authorities in the British possessions on the said coast, and is authorized to conduct, on behalf of the imperial government, negotiations connected with certain questions. I venture," the official communication proceeds, " in accordance with my instructions, to beg your excellency to be so good as to cause the authorities in the British possessions in West Africa to be furnished with suitable recommendations." Although at the date of this communication it must have been apparent, from what was happening in South Africa, that Germany was prepared to enter on a policy of colonial expansion, and although the wording of the letter was studiously vague, it does not seem to have occurred to the British government that the real object of Gustav Nachtigai's journey was to make other annexations on the west coast. Yet such was indeed his mission. German traders and missionaries had been particularly active of late years on the coast of the Gulf of Guinea. German factories were dotted all along the coast in districts under British'protec- tion, under French protection and under the definite protection of no European power at all. It was to these latter places that Nachtigal turned his attention. The net result of his operations was that on the 5 th of July 1884 a treaty was signed with the king of Togo, placing his country under German protection, and that just one week later a German protectorate was proclaimed over the

Cameroon district. Before either of these events had occurred Great Britain had become alive to the fact that she could no longer dally with the subject, if she desired to consolidate her possessions in West Africa. The British government had again and again refused to accord native chiefs the protection they demanded. The Cameroon chiefs had several times asked for British protection, and always in vain. But at last it became apparent, even to the official mind, that rapid changes were being effected in Africa, and on the 16th of May Edward Hyde Hewett, British consul, received instructions to return to the west coast and to make arrangements for extending British protection over certain regions. He arrived too late to save either Togoland or Cameroon, in the latter case arriving five days after King Bell and the other chiefs on the river had signed treaties with Nachtigal. But the British consul was in time to secure the delta of the river Niger and the Oil Rivers District, extending from Rio del Rey to the Lagos frontier, where for a long period British traders had held almost a monopoly of the trade.

Meanwhile France, too, had been busy treaty-making. While the British government still remained under the spell of the Preach and ^^ resolution of 1865, the French government was British strenuously endeavouring to extend France's influence rivalry la i n West Africa, in the countries lying behind the coast- AMca ^ ne ' -During the year 1884 no fewer than forty-two treaties were concluded with native chiefs, an even larger number having been concluded in the previous twelve

months. In this fashion France was pushing on towards Timbuktu, in steady pursuance of the policy which resulted in surrounding all the old British possessions in West Africa with a continuous band of French territory. There was, however, one region on the west coast where, notwithstanding the lethargy of the British government, British interests were being vigorously pushed, protected and consolidated. . This was on the lower Niger, and the leading spirit in the enterprise was Mr Goldie Taubman (afterwards Sir George Taubman Goldie). In 1877 Sir George Goldie visited the Niger and conceived the idea of establishing a settled government in that region. Through his efforts the various trading firms en the lower Niger formed themselves in 1879 into the " United African Company," and the foundations were laid of something like settled administra- tion. An application was made to the British government for a charter in 1881, and the capital of the company increased to a million sterling. Henceforth the company was known as the " National

African Company," and it was acknowledged that its object was not only to develop the trade of the lower Niger, but to extend its operations to the middle reaches of the river, and to open up direct relations with the great Fula empire of Sokoto and the smaller states associated with Sokoto under a somewhat loosely defined suzerainty. The great development of trade which followed the combination of British interests carried out under Goldie's skilful guidance did not pass unnoticed in France, and, encouraged by Gambetta, French traders made a bold bid for a position on the river. Two French companies, with ample capital, were formed, and various stations were established on the lower Niger. Goldie realized at once the seriousness of the situation, and lost no time in declaring com- mercial war on the newcomers. His bold tactics were entirely successful, and a few days before the meeting of the Berlin conference he had the satisfaction of announcing that he had bought out the whole of the French interests on the river, and that Great Britain alone possessed any interests on the lower Niger.

To complete the survey of the political situation in Africa at the time the plenipotentiaries met at Berlin, it is necessary to refer briefly to the course of events in North and East jheposi- Africa since 1875. In 1881 a French army entered Hon in Tunisia, and compelled the bey to sign a treaty placing ' ru " 1 ^ ,a that country under French protection. The sultan of Turkey formally protested against this invasion of Ottoman rights, but the great powers took no action, and France was left in undisturbed possession of her newly acquired territory. In Egypt the extravagance of Ismail Pasha had led to .he establishment in 1879, in the interests of European bond- holders, of a Dual Control exercised by France and Great Britain. France had, however, in 1882 refused to take part in the suppres- sion of a revolt under Arabi Pasha, which England accomplished unaided. As a consequence the Dual Control had been abolished in January 1883, since when Great Britain, with an army quartered in the country, had assumed a predominant position in Egyptian affairs (see Egypt). In East Africa, north of the Portuguese possessions, where the sultan of Zanzibar was the most considerable native potentate, Germany was secretly preparing the foundations of her present colony of German East Africa. But no overt act had warned Europe of what was impending. The story of the foundation of German East Africa is one of the romances of the continent. Early in 1884 the Society for German Colonization was founded, with the avowed object of furthering

the newly awakened colonial aspirations of the German people. 1 It was a society inspired and controlled by young men, and on the 4th of November 1884, eleven days before the conference assembled at Berlin, three young Germans arrived as deck passengers at Zanzibar. They were disguised as mechanics, but were in fact Dr Karl Peters, the president of the Colonization Society, Joachim Count Pfeil, and Dr Jiihlke, and their stock-in-trade consisted of a number

1 In 1887 this society united with the German Colonial Society, an organization founded in 1882. The united society took the title of the German Colonial Company.

Associa- tion.

of German flags and a supply of blank treaty forms. They proposed to land on the mainland opposite Zanzibar, and The to conclude treaties in the back country with native

German chiefs placing their territories under German pro- nag raised tection. The enterprise was frowned upon by the ‘?ˆ? st German government; but, encouraged by German residents at Zanzibar, the three young pioneers crossed to the mainland, and on the 19th of November, while the diplo- matists assembled at Berlin were solemnly discussing the rules which were to govern the game of partition, the first ” treaty ” was signed at Mbuzini, and the German flag raised for the first time in East Africa.

Italy had also obtained a footing on the African continent before the meeting of the Berlin conference. The Rubattino Steamship Company as far back as 1870 had bought the port of Assab as a coaling station, but it was not until 1882 that it was declared an Italian colony. This was followed by the conclusion of a treaty with the sultan of Assab, chief of the Danakil, signed on the 15th of March 1883, and subsequently approved by the king of Shoa, whereby Italy obtained the cession of part of Ablis (Aussa) on the Red Sea, Italy undertaking to protect with her fleet the Danakil littoral.

One other event must be recorded as happening before the

meeting of the Berlin conference. The king of the Belgians had

been driven to the conclusion that, if his African Recogal- > . . . ,

tioaoftbe enterprise was to obtain any measure of permanent

inter- success, its international status must be recognized.

national

The conference assembled at Berlin on the 15th of November 1884, and after protracted deliberations the ” General Act of .. the Berlin Conference ” was signed by the representa

Beriin tives of all the powers attending the conference, on Confer- the 26th of February 1885. The powers represented “?” °* were Germany, Austria-Hungary, Belgium, Denmark, Spain, the United States, France, Great Britain, Italy, Holland, Portugal, Russia, Sweden and Norway, and Turkey, to name them in the alphabetical order adopted in the preamble to the French text of the General Act. Ratifications were deposited by all the signatory powers with the exception of the United States. It is unnecessary to examine in detail the results of the labours of the conference. The General Act dealt with six specific subjects: (1) freedom of trade in the basin of the Congo, (2) the slave trade, (3) neutrality of territories in the basin of the Congo, (4) navigation of the Congo, (5) navigation of the Niger, (6) rules for future occupation on the coasts of the African continent. It will be seen that the act dealt with other matters than the political partition of Africa; but, so far as they concern the present purpose, the results effected by the Berlin Act may be summed up as follows. The signatory powers undertook that any fresh act of taking possession on any portion of the African coast must be notified by the power taking posses- sion, or assuming a protectorate, to the other signatory powers. It was further provided that any such occupation to be valid

must be effective. It is also noteworthy that the first reference in an international act to the obligations attaching to ” spheres of influence ” is contained in the Berlin Act.

It will be remembered that when the conference assembled, the International Association of the Congo had only been recog- nized as a sovereign state by the United States and Germany. But King Leopold and his agents had floTottbe taken full advantage

of the opportunity which the §ate° conference afforded, and before the General Act was signed the Association had been recognized by all the signatory powers, with the not very important exception of Turkey, and the fact communicated to the conference by Colonel Strauch. It was not, however, until two months later, in April 1885, that King Leopold, with the sanction of the Belgian legislature, formally assumed the headship of the new state; and on the 1st of August in the same year His Majesty notified the powers that from that date the ” Independent State of the Congo ” declared that ” it shall be perpetually neutral ” in conformity with the provisions of the Berlin Act. Thus was finally consti- tuted the Congo Free State, under the sovereignty of King Leopold, though the boundaries claimed for it at that time were considerably modified by subsequent agreements.

From 1885 the scramble among the powers went on with renewed vigour, and in the fifteen years that remained of the century the work of partition, so far as international The agreements were concerned, was practically completed. c /,; e / To attempt to follow the process of acquisition year partition by year would involve a constant shifting of attention treses. from one part of the continent to another, inasmuch as the scramble was proceeding simultaneously all over Africa. It will therefore be the most convenient plan to deal with the continent in sections. Before doing so, however, the international agree- ments which determined in the main the limits of the possessions of the various powers may be set forth. They are : —

I. The agreement of the 1st of July 1890 between Great Britain and Germany defining their spheres of influence in East, West and South- West Africa. This agreement was the most comprehensive of all the ” deals ” in African territory, and in- cluded in return for the recognition of a British protectorate over Zanzibar the cession of Heligoland to Germany.

II. The Anglo-French declaration of the 5th of August 1890, which recognized a French protectorate over Madagascar, French influence in the Sahara, and British influence between the Niger and Lake Chad.

III. The Anglo-Portuguese treaty of the nth of June 1891, whereby the Portuguese possessions on the west and east coasts were separated by a broad belt of British territory, extending north to Lake Tanganyika.

IV. The Franco-German convention of the 15th of March 1894, by which the Central Sudan was left to France (this region by an Anglo-German agreement of the 15th of November 1893 having been recognized as in the German sphere). By this convention France was able to effect a territorial junction of her possessions in North and West Africa with those in the Congo region.

V. Protocols of the 24th of March and the 15th of April 1891, for the demarcation of the Anglo-Italian spheres. in East Africa.

VI. The Anglo-French convention of the 14th of June 1898, for the delimitation of the possessions of the two countries west of Lake Chad, with the supplementary declaration of the 21st of March 1899 whereby France recognized the upper Nile valley as in the British sphere of influence.

Coming now to a more detailed consideration of the operations of the powers, the growth of the Congo Free State, which occupied, geographically, a central position, may serve as The the starting-point for the story of the partition after growth of the Berlin conference. In the notification to the theCoogo powers of the 1st of August 1885, the boundaries of the e ‘

Free State were set out in considerable detail. The limits thus determined resulted partly from agreements made with France, Germany and Portugal, and partly from treaties with native chiefs. The state acquired the north bank of the Congo from

its mouth to a point in the unnavigable reaches, and in the interior the major part of the Congo basin. In the north-east the northern limit was 4 N. up to 30 E., which formed the eastern boundary of the state. The south-eastern frontier claimed by King Leopold extended to Lakes Tanganyika, Mweru and Bangweulu, but it was not until some years later that it was recognized and defined by the agreement of May 1894 with Great Britain. The international character of King Leopold’s enterprise had not long been maintained, and his recognition as sovereign of the Free State confirmed the distinctive character which the Association had assumed, even before that event.

In April 1887 France was informed that the right of pre- emption accorded to her in 1884 had not been intended by King Leopold to prejudice Belgium's right to acquire the Congo State, and in reply the French minister at Brussels took note of the explanation, " in so far as this interpretation is not contrary to pre-existing international engagements." By his will, dated the 2nd of August 1889, King Leopold made Belgium formally heir to the sovereign rights of the Congo Free State. In 1895 an annexa- tion bill was introduced into the Belgian parliament, but at that time Belgium had no desire to assume responsibility for the Congo State, and the bill was withdrawn. In 1901, by the terms of a loan granted in 1890, Belgium had again an opportunity of annexing the Congo State, but a bill in favour of annexation was opposed by the government and was withdrawn after King Leopold had declared that the time was not ripe for the transfer. Concessionaire companies and a Domaine de la Couronne had been created in the state, from which the sovereign derived consider- able revenues — facts which helped to explain the altered attitude of Leopold II. The agitation in Great Britain and America against the Congo system of government, and the admissions of an official commission of inquiry concerning its maladministra- tion, strengthened, however, the movement in favour of transfer. Nevertheless in June 1906 the king again declared himself opposed to immediate annexation. But under pressure of public opinion the Congo government concluded, 28th of November 1907, a new annexation treaty. As it stipulated for the continued existence of the crown domain the treaty provoked vehement opposition. Leopold II. was forced to yield, and an additional act was signed, sth of March 1908, providing for the suppression of the domain in return for financial subsidies. The treaty, as amended, was approved by the Belgian parliament in the session of 1908. Thus the Congo state, after an existence of 24 years as an independent power, became a Belgian colony. (See Congo Free State.)

The area of the Free State, vast as it was, did not surfice to satisfy the ambition of its sovereign. King Leopold maintained that the Free State enjoyed equally with any other state the right to extend its frontiers. His ambition involved the state in the struggle between Great Britain and France for the upper Nile. To understand the situation it is necessary to remember the condition of the Egyptian Sudan at that time. The mahdi, Mahommed Ahmed, had preached a holy war against the Egyptians, and, after the capture of Khartum and the death of

General C. G. Gordon, the Sudan was abandoned to the dervishes. The Egyptian frontier was withdrawn to Wadi Haifa, and the vast provinces of Kordofan, Darfur and the Bahr-el-Ghazal were given over to dervish tyranny and misrule. It was obvious that Egypt would sooner or later seek to recover her position in the Sudan, as the command of the upper Nile was recognized as essential to her continued prosperity. But the international position of the abandoned provinces was by no means clear. The British government, by the Anglo-German agreement of July 1890, had secured the assent of Germany to the statement that the British sphere of influence in East Africa was bounded on the west by the Congo Free State and by ” the western water- shed of the basin of the upper Nile “; but this claim was not recognized either by France or by the Congo Free State. From her base on the Congo, France was busily engaged pushing forward along the northern tributaries of the great river. On the 27th of April 1887 an agreement was signed with the Congo Free State by which the right bank of, the Ubangi river was

secured to French influence, and the left bank to the Congo Free State. The desire of France to secure a footing in the upper Nile valley was partly due, as has been seen, to her anxiety to extend a French zone across Africa, but it was also and to a large extent attributable to the belief, widely entertained The in France, that by establishing herself on the upper contest Nile France could regain the position in Egyptian forth ˆ affairs which she had sacrificed in 1882. With these “P” erN ” e – strong inducements France set steadily to work to consolidate her position on the tributary streams of the upper Congo basin, preparatory to crossing into the valley of the upper Nile. Mean- while a similar advance was being made from the Congo Free State northwards and eastwards. King Leopold had two objects in view — to obtain control of the rich province of the Bahr-el- Ghazal and to secure an outlet on the Nile. Stations were established on the Welle river, and in February 1891 Captain van Kerckhoven left Leopold ville for the upper Welle with the most powerful expedition which had, up to that time, been organized by the Free State. After some heavy fighting the expedition reached the Nile in September 1892, and opened up communications with the remains of the old Egyptian garrison at Wadelai. Other expeditions under Belgian officers penetrated into the Bahr-el-Ghazal, and it was apparent that King Leopold proposed to rely on effective occupation as an answer to any claims which might be advanced by either Great Britain or France. The news of what

was happening in this remote region of Africa filtered through to Europe very slowly, but King Leopold was warned on several occasions that Great Britain would not recognize any claims by the Congo Free State on the Bahr-el-Ghazal. The difficulty was, however, that neither from Egypt, whence the road was barred by the khalifa (the successor of the mahdi), nor from Uganda, which was far too remote from the coast to serve as the base of a large expedition, could a British force be despatched to take effective occupation of the upper Nile valley. There was, therefore, danger lest the French should succeed in establishing themselves on the upper Nile before the preparations which were being made in Egypt for " smashing " the khalifa were completed.

In these circumstances Lord Rosebery, who was then British foreign minister, began, and his successor, the 1st earl of Kimberley , completed, negotiations with King Leopold Tbe Aa gi . which resulted in the conclusion of the Anglo- Congolese Congolese agreement of 1 2th May 1894. By this agreement King agreement Leopold recognized the British sphere of influence °*' 894 – as laid down in the Anglo- German agreement of July 1890, and Great Britain granted a lease to King Leopold of certain territories in the western basin of the upper Nile, extending on the Nile from a point on Lake Albert to Fashoda, and westwards to the Congo-Nile watershed. The practical effect of this agree – ment was to give the Congo Free State a lease, during its sovereign's lifetime, of the old Bahr-el-Ghazal province, and to secure after His Majesty's death as much of that territory as lay west of the 30th meridian, together with access to a port on Lake Albert, to his successor. At the same time the Congo Free State leased to Great Britain a strip of territory, 155 m. in breadth, between the north end of Lake Tanganyika and the south end of Lake Albert Edward. This agreement was hailed as a notable triumph for British diplomacy. But the triumph was short-lived. By the agreement of July 1890 with Germany, Great Britain had been reluctantly compelled to abandon her hopes of through communication between the British spheres in the northern and southern parts of the continent, and to consent to the boundary of German East Africa marching with the eastern frontier of the Congo Free State. Germany frankly avowed that she did not wish to have a powerful neighbour interposed between herself and the Congo Free State. It was obvious that the new agreement would effect precisely what Germany had declined to agree to in 1 890. Accordingly Germany protested in such vigorous terms that, on

the 22nd of June 1894, the offending article was withdrawn by an exchange of notes between Great Britain and the Congo Free State. Opinion in France was equally excited by the new agreement. It was

obvious that the lease to the Congo Free State was intended to exclude France from the Nile by placing the Congo Free State as a barrier across her path. Pressure was brought to bear on King Leopold, from Paris, to renounce the rights acquired under the agreement, and on the 14th of August 1894 King Leopold signed an agreement with France by which, in exchange for France's acknowledgment of the Mbomu river as his northern frontier, His Majesty renounced all occupation and all exercise of political influence west of 30 E., and north of a line drawn from that meridian to the Nile along 5 30′ N.

This left the way still open for France to the Nile, and in June 1896 Captain J. Marchand left France with secret instruc- tions to lead an expedition into the Nile valley. On the 1st of March in the following year he left Brazzaville, and began a journey which all but plunged Great Britain and France into war. The difficulties which Captain Marchand had to overcome were mainly those connected with transport. In October 1897 the expedition reached the banks of the Sue, the waters of which eventually flow into the Nile. Here a post was established and the " Faidherbe," a steamer which had been carried across the Congo-Nile watershed in sections, was put together and launched. On the 1st of May 1898 Marchand started on the final stage of his journey, and reached Fashoda on the 10th of July, having established a chain of posts en route. At Fashoda the French flag was at once raised, and a " treaty " made with the local chief. Meanwhile other expeditions had been concentrating on

Fashoda — a mud-flat situated in a swamp, round French at which for many months raged the angry passions of Fashoda. two great peoples. French expeditions, with a certain

amount of assistance from the emperor Menelek of Abyssinia, had been striving to reach the Nile from the east, so as to join

hands with Marchand and complete the line of posts into the Abyssinian frontier. In this, however, they were un- successful. No better success attended the expedition under Colonel (afterwards Sir) Ronald Macdonald, R.E., sent by the British government from Uganda to anticipate the French in the occupation of the upper Nile. It was from the north that claimants arrived to dispute with the French their right to Fashoda, and all that the occupation of that dismal post implied. In 1896 an Anglo-Egyptian army, under the direction of Sir Herbert (afterwards Lord) Kitchener, had begun to advance southwards for the reconquest of the Egyptian Sudan. On the 2nd of September 1898 Khartum was captured, and the khalifa's army dispersed. It was then that news reached the Anglo- Egyptian commander, from native sources, that there were white men flying a strange flag at Fashoda. The sirdar at once proceeded in a steamer up the Nile, and courteously but firmly requested Captain Marchand to remove the French flag. On his refusal the Egyptian flag was raised close to the French flag, and the dispute was referred to Europe for adjustment between the British and French governments. A critical situation ensued. Neither government was inclined to give way, and for a time war seemed imminent. Happily Lord Salisbury was able to announce, on the 4th of November, that France was willing to recognize the British claims, and the incident was finally closed on the 21st of March 1899, when an Anglo-French declaration was signed, by the terms of which France withdrew from the Nile valley and accepted a boundary line which satisfied her earlier ambition by uniting the whole of her territories in North, West and Central Africa into a homogeneous whole, while effectu- ally preventing the realization of her dream of a transcontinental empire from west to east. By this declaration it was agreed that the dividing line between the British and French spheres, north of the Congo Free State, should follow the Congo-Nile water-parting up to its intersection with the nth parallel of north latitude, from which point it was to be " drawn as far as the 1 5th parallel in such a manner as to separate in principle the kingdom of Wadai from what constituted in 1882 the province of Darfur," but in no case was it to be drawn west of the 21st degree of east longitude, or east of the 23rd degree. From the 15th parallel the line was continued north and north-west to the intersection of the Tropic of Cancer with 16 E. French influence

was to prevail west of this line, British influence to the east. Wadai was thus definitely assigned to France.

When, by the declaration of the 21st of March 1899, France renounced all territorial ambitions in the upper Nile basin, King Leopold revived his claims to the Bahr-el-Ghazal province under the terms of the lease granted by theBahr- Article 2 of the Anglo-Congolese agreement of 1894. ei-ahazal. This step he was encouraged to take by the assertion of Lord Salisbury, in his capacity as secretary of state for foreign affairs during the negotiations with France concerning Fashoda, that the lease to King Leopold was still in full force. But the assertion was made simply as a declaration of British right to dispose of the territory, and the sovereign of the Congo State found that there was no disposition in Great Britain to allow the Bahr-el-Ghazal to fall into his hands. Long and fruitless negotiations ensued. The king at length (1904) sought to force a settlement by sending armed forces into the province. Diplo- matic representations having failed to secure the withdrawal of these forces, the Sudan government issued a proclamation which had the effect of cutting off the Congo stations from communication with the Nile, and finally King Leopold con- sented to an agreement, signed in London on the 9th of May 1906, whereby the 1894 lease was formally annulled. The Bahr-el-Ghazal thenceforth became undisputedly an integral part of the Anglo-Egyptian Sudan. King Leopold had, however, by virtue of the 1894 agreement administered the comparatively small portion of the leased area in which his presence was not resented by France. This territory, including part of the west bank of the Nile and known as the Lado Enclave, the 1906 agreement allowed King Leopold to " continue during his reign to occupy." Provision was made that within six months of the termination of His Majesty's reign the enclave should be handed over to the Sudan government (see Congo Free State). In this manner ended the long struggle for supremacy on the upper Nile, Great Britain securing the withdrawal of all European rivals.

The course of events in the southern half of the continent may now be traced. By the convention of the 14th of February 1885, in which Portugal recognized the sovereignty of PortugaTs the Congo Free State, and by a further convention trans- concluded with France in 1886, Portugal secured AMean recognition of her claim to the territory known as the Kabinda enclave, lying north of the Congo, but not to the northern bank of the river. By the same convention of 1885 Portugal's claim to the southern bank of the river as far as Noki (the limit of navigation from the sea) had been admitted. Thus Portuguese possessions on the west coast

extended from the Congo to the mouth of the Kunene river. In the interior the boundary with the Free State was settled as far as the Kwango river, but disputes arose as to the right to the country of Lunda, otherwise known as the territory of the Muato Yanvo. On the 25th of May 1891 a treaty was signed at Lisbon, by which this large territory was divided between Portugal and the Free State. The interior limits of the Portuguese possessions in Africa south of the equator gave rise, however, to much more serious discussions than were involved in the dispute as to the Muato Yanvo's kingdom. Portugal, as has been stated, claimed all the territories between Angola and Mozambique, and she succeeded in inducing both France and Germany, in 1886, to recognize the king of Portugal's " right to exercise his sovereign and civilizing influence in the territories which separate the Portuguese possessions of Angola and Mozambique." The publication of the treaties containing this declaration, together with a map showing Portuguese claims extending over the whole of the Zambezi valley, and over Matabeleland to the south and the greater part of Lake Nyasa to the north, immediately provoked a formal protest from the British government. On the 13th of August 1887 the British charg6 d'affaires at Lisbon transmitted to the Portuguese minister for foreign affairs a memorandum from Lord Salisbury, in which the latter formally protested " against any claims not founded on occupation," and contended that the doctrine of effective occupation had been admitted in principle

by all the parties to the Act of Berlin. Lord Salisbury further stated that " Her Majesty's government cannot recognize Portuguese sovereignty in territory not occupied by her in sufficient strength to enable her to maintain order, protect foreigners and control the natives." To this Portugal replied that the doctrine of effective occupation was expressly confined by the Berlin Act to the African coast, but at the same time expeditions were hastily despatched up the Zambezi and some of its tributaries to discover traces of former Portuguese occupation. Matabeleland and the districts of Lake Nyasa were specially mentioned in the British protest as countries in which Her Majesty's government took a special interest. As a matter of fact the extension of British influence northwards to the Zambezi

had engaged the attention of the British authorities ever since the appearance of Germany in South- West Africa and the declaration of a British protectorate over Bechuanaland. There were rumours of German activity in Matabeleland, and Rhodesia °f a Boer trek north of the Limpopo. Hunters and secured for explorers had reported in eulogistic terms on the rich Oreat goldfields and healthy plateau lands of Matabeleland

and Mashonaland, ever both of which countries a powerful chief, Lobengula, claimed authority. There were many suitors for Lobengula's favours; but on the nth of February 1888 he signed a treaty with J. S. Moffat, the assistant commis- sioner in Bechuanaland, the effect of which was to place all his territory under British protection. Both the Portuguese and the Transvaal Boers were chagrined at this extension of British influence. A number of Boers attempted unsuccessfully to trek into the country, and Portugal opposed her ancient claims to the new treaty. She contended that Lobengula's authority did not extend over Mashonaland, which she claimed as part of the Portuguese province of Sofala.

Meanwhile preparations were being actively made by British capitalists for the exploitation of the mineral and other resources of Lobengula's territories. Two rival syndicates obtained, or claimed to have obtained, concessions from Lobengula; but in the summer of 1889 Cecil Rhodes succeeded in amalgamating the conflicting interests, and on the 29th of October of that year the British government granted a charter to the British South Africa Company (see Rhodesia). The first article of the charter declared that " the principal field of the operations " of the company " shall be the region of South Africa lying immediately to the north of British Bechuanaland, and to the north and west of the South African Republic, and to the west of the Portuguese dominions." No time was lost in making preparations for effective occupation. On the advice of F. C. Selous it was deter- mined to despatch an expedition to eastern Mashonaland by a new route, which would avoid the Matabele country. This plan was carried out in the summer of 1890, and, thanks to the rapidity with which the column moved and Selous's intimate knowledge of the country, the British flag was, on the nth of September, hoisted at a spot on the Makubusi river, where the town of Salisbury now stands, and the country taken possession of in the name of Queen Victoria. Disputes with the Portuguese ensued, and there were several frontier incidents which for a time embittered the relations between the two countries.

Meanwhile, north of the Zambezi, the Portuguese were making desperate but futile attempts to repair the neglect of centuries by hastily organized expeditions and the p or t u . hoisting of flags. In 1888 an attempt to close the guese dis- Zambezi to British vessels was frustrated by the firm- putes In ness f L or o! Salisbury. In a despatch to the British Africa. minister at Lisbon, dated the 25th of June 1888, Lord Salisbury, after brushing aside the Portuguese claims founded on doubtful discoveries three centuries old, stated the British case in a few sentences: —

It is (he wrote) an undisputed point that the recent discoveries of the English traveller, Livingstone, were followed by organized attempts on the part of English religious and commercial bodies to open up and civilize the districts surrounding and adjoining the lake. Many British settlements have been established, the access to which from the sea is by the rivers Zambesi and Shire. Her Majesty's government and the British public are much interested in the welfare

of these settlements. Portugal does not occupy, and has never occu- pied, any portion of the lake, nor of the Shire; she has neithei authority nor influence beyond the confluence of the Shire and Zambesi, where her interior custom-house, now withdrawn, was placed by the terms of the Mozambique Tariff of 1877.

In 1889 it became known to the British government that a considerable Portuguese expedition was being organized under the command of Major Serpa Pinto, for operating in the Zambezi region. In answer to inquiries addressed to the Portuguese government, the foreign minister stated that the object of the expedition was to visit the Portuguese settlements on the upper Zambezi. The British government was, even so late as 1889, averse from declaring a formal protectorate over the Nyasa region; but early in that year H. H. (afterwards Sir Harry) Johnston was sent out to Mozambique as British consul, with instructions to travel in the interior and report on the troubles that had arisen with the Arabs on Lake Nyasa and with the Portuguese. The discovery by D. J. Rankin in 1889 of a navi- gable mouth of the Zambezi — the Chinde — and the offer by Cecil Rhodes of a subsidy of £10,000 a year from the British South Africa Company, removed some of the objections to a protectorate entertained by the British government; but Johnston's instructions were not to proclaim a protectorate unless circumstances compelled him to take that course. To his

surprise Johnston learnt on his arrival at the Zambezi that Major Serpa Pinto's expedition had been suddenly deflected to the north. Hurrying forward, Johnston overtook the Portu- guese expedition and warned its leader that any attempt to establish political influence north of the Ruo river would compel him to take steps to protect British interests. On arrival at the Ruo, Major Serpa Pinto returned to Mozambique for instruc- tions, and in his absence Lieutenant Coutinho crossed the river, attacked the Makololo chiefs and sought to obtain possession of the Shire highlands by a coup de main. John Buchanan, the British vice-consul, lost no time in declaring the country under British protection, and his action was subsequently confirmed by Johnston on his return from a treaty-making expedition on Lake Nyasa. On the news of these events reaching Europe the British government addressed an ultimatum to Portugal, as the result of which Lieutenant Coutinho's action was disavowed, and he was ordered to withdraw the Portuguese forces south of the Ruo. After prolonged negotiations, a convention was signed between Great Britain and Portugal on the 20th of August 1890, by which Great Britain obtained a broad belt of territory north of the Zambezi, stretching from Lake Nyasa on the east, the southern end of Tanganyika on the north, and the Kabompo tributary of the Zambezi on the west; while south of the Zambezi Portugal retained the right bank of the river from a point ten miles above Zumbo, and the western boundary of her territory south of the river was made to coincide roughly with the 33rd degree of east longitude. The publication of the convention aroused deep resentment in Portugal, and the government, unable to obtain its ratification by the chamber of deputies, resigned. In October the abandonment of the convention was accepted by the new Portuguese ministry as a. fait accompli; but on the 14th of November the two governments signed an agreement for a modus vivendi, by which they engaged to recog- nize the territorial limits indicated in the convention of 20th August " in so far that from the date of the present agreement to the termination thereof neither Power will make Britlsb treaties, accept protectorates, nor exercise any act of and Porta- sovereignty within the spheres of influence assigned guese to the other party by the said convention." The !f« er *f breathing-space thus gained enabled feeling in Portugal to cool down, and on the nth of June 1891 another treaty was signed, the ratifications being exchanged on the 3rd of July, As already stated, this is the main treaty defining the British and Portuguese spheres both south and north of the Zambezi. It contained many other provisions relating to trade

and naviga- tion, providing, inter alia, a maximum transit duty of 3% on imports and exports crossing Portuguese territories on the east coast to the British sphere, freedom of navigation of the

Zambezi and Shir6 for the ships of all nations, and stipula- tions as to the making of railways, roads and telegraphs. The territorial readjustment effected was slightly more favourable to Portugal than that agreed upon by the 1890 convention. Portugal was given both banks of the Zambezi to a point ten miles west of Zumbo — the farthest settlement of the Portuguese on the river. South of the Zambezi the frontier takes a south and then an east course till it reaches the edge of the continental plateau, thence running, roughly, along the line of 33 E. south- ward to the north-eastern frontier of the Transvaal. Thus by this treaty Portugal was left in the possession of the coast-lands, while Great Britain maintained her right to Matabele and Mashona lands. The boundary between the Portuguese sphere of influence on the west coast and the British sphere of influence north of the Zambezi was only vaguely indicated; but it was to be drawn in such a manner as to leave the Barotse country within the British sphere, Lewanika, the paramount chief of the Marotse, claiming that his territory extended much farther to the west than was admitted by the Portuguese. In August 1903 the question what were the limits of the Barotse kingdom was referred to the arbitration of the king of Italy. By his award, delivered in June 1965, the western limit of the British sphere runs from the northern frontier of German South-West Africa up the Kwando river to 22 E., follows that meridian north to 13° S., then runs due east to 24° E., and then north again to the frontier of the Congo State.

Before the conclusion of the treaty of June 1891 with Portugal," the British government had made certain arrangements for the administration of the large area north of the Zambezi reserved to British influence. On the 1st of February Sir Harry Johnston was appointed imperial commissioner in Nyasaland, and a fort- night later the British South Africa Company intimated a desire to extend its operations north of the Zambezi. Negotia- tions followed, and the field of operations of the Chartered Company

was, on the 2nd of April 1891, extended so as to cover (with the exception of Nyasaland) the whole of the British sphere of influence north of the Zambezi (now known as Northern Rhodesia). On the 14th of May a formal protectorate was declared over Nyasaland, including the Shire highlands and a belt of territory extending along the whole of the western shore of Lake Nyasa. The name was changed in 1893 to that of the British Central Africa Protectorate, for which designation was substituted in 1907 the more appropriate title of Nyasaland Protectorate.

At the date of the assembling of the Berlin conference the German government had notified that the coast-line on the Germany's south-west of the continent, from the Orange river to share of Cape Frio, had been placed under German protection. South On the 13 th of April 1885 the German South-West

Africa Company was constituted under an order of the imperial cabinet with the rights of state sovereignty, including mining royalties and rights, and a railway and telegraph mono- poly. In that and the following years the Germans vigorously pursued the business of treaty-making with the native chiefs in the interior; and when, in July 1890, the British and German governments came to, an agreement as to the limits of their respective spheres of influence in various parts of Africa, the boundaries of German South-West Africa were fixed in their present position. By Article III. of this agreement the north bank of the Orange river up to the point of its intersection by the 20th degree of east longitude was made the southern boundary of the German sphere of influence. The eastern boundary fol- lowed the 20th degree of east longitude to its intersection by the 22nd parallel of south latitude, then ran eastwards along that parallel to the point of its intersection by the 21st degree of east longitude. From that point it ran northwards along the last- named meridian to the point of its intersection by the 18th parallel of south latitude, thence eastwards along that parallel to the river Chobe or Kwando, and along the main channel of that river to its junction with the Zambezi, where it terminated. The northern frontier marched with the southern boundary of Portu- guese West Africa. The object of deflecting the eastern boundary

near its northern termination was to give Germany access by her own territory to the upper waters of the Zambezi, and it was declared that this strip of territory was at no part to be less than 20 English miles in width.

To complete the survey of the political partition of Africa south of the Zambezi, it is necessary briefly to refer to the events connected with the South African Republic and the Orange Free State. In October 1886 the British government the Dutch made an agreement with the New Republic, a small Republics. community of Boer farmers who had in 1884-85 seized part of Zululand and set up a government of their own, defining the frontier between the New Republic and Zululand; but in July 1888 the New Republic was incorporated in the South African Republic. In a convention of July-August 1890 the British government and the government of the South African Republic confirmed the independence of Swaziland, and on the 8th of November 1893 another convention was signed with the same object; but on the 19th of December 1894 the British government agreed to the South African Republic exercising " all rights and powers of protection, legislation, jurisdiction and administration over Swaziland and the inhabitants thereof," subject to certain conditions and provisions, and to the non- incorporation of Swaziland in the Republic. In the previous September Pondoland had been annexed to Cape Colony; on the 23rd of April 1895 Tongaland was declared by proclamation to be added to the dominions of Queen Victoria, and in December 1897 Zululand and Tongaland, or Amatongaland, were incor- porated with the colony of Natal. The history of the events that led up to the Boer War of 1 890-1 902 cannot be recounted here (see Transvaal, History), but in October 1899 the South African Republic and the Orange Free State addressed an ultimatum to Great Britain and invaded Natal and Cape Colony. As a result of the military operations that followed, the Orange Free State was, on the 28th of May 1900, proclaimed by Lord Roberts a British colony under the name " Orange River Colony," and the South African Republic was on the 25th of October 1900 incor- porated in the British empire as the "Transvaal Colony." In January 1903 the districts of Vryheid (formerly the New Re- public), Utrecht and part of the Wakkerstroom district, a tract of territory comprising in all about 7000 sq. m., were transferred from the Transvaal colony to Natal. In 1907 both the Transvaal and Orange River Colony were granted responsible government.

On the east coast the two great rivals were Germany and Great Britain. Germany on the 30th of December 1886, and Great Britain on the nth of June 1891, formally recognized Aogto . the Rovuma river as the northern boundary of the German Portuguese sphere of influence on that coast; but it rivalry la was

to the north of that river, over the vast area of jˆ£ a East or East Central Africa in which the sultan of Zanzibar claimed to exercise suzerainty, that the struggle be- tween the two rival powers was most acute. The independence of the sultans of Zanzibar had been recognized by the govern- ments of Great Britain and France in 1862, and the sultan's authority extended almost uninterruptedly along the coast of the mainland, from Cape Delgado in the south to Warsheik on the north — a stretch of coast more than a thousand miles long — though to the north the sultan's authority was confined to certain ports. In Zanzibar itself, where Sir John Kirk, Livingstone's companion in his second expedition, was British consul-general, British influence was, when the Berlin conference met, practically supreme, though German traders had established themselves on the island and created considerable commercial interests. Away from the coasts the limits and extent of the sultan's authority were far from being clearly defined. The sultan himself claimed that it extended as far as Lake Tanganyika, but the claim did not rest on any very solid ground of effective occupation. The little- known region of the Great Lakes had for some time attracted the attention of the men who were directing the colonial movement in Germany; and, as has been stated, a small band of pioneers actually landed on the mainland opposite Zanzibar in November 1884, and made their first " treaty " with the chief of Mbuzini on the 19th of that month. Pushing up the Wami river the three

adventurers reached the Usagara country, and concluded more " treaties," the net result being that when, in the middle of December, Karl Peters returned to the coast he brought back with him documents which were claimed to concede some 6o,ooo sq. m. of country to the German Colonization Society. Peters hurried back to Berlin, and on the 17th of February 1885 the German emperor issued a " Charter of Protection " by which His Majesty accepted the suzerainty of the newly-acquired territory, and " placed under our Imperial protection the territories in question." The conclusion of these treaties was, on the 6th of March, notified to the British government and to the sultan of Zanzibar. Immediately on receipt of the notifica- tion the sultan telegraphed an energetic protest to Berlin, alleging that the

places placed under German protection had belonged to the sultanate of Zanzibar from the time of his fathers. The German consul-general refused to admit the sultan's claims, and meanwhile agents of the German society were energetically pursuing the task of treaty-making. The sultan (Seyyid Bargash) despatched a small force to the disputed territory, which was subsequently withdrawn, and in May sent a more imposing expedition under the command of General Lloyd Mathews, the commander-in-chief of the Zanzibar army, to the Kilimanjaro district, in order to anticipate the action of German agents. Meanwhile Lord Granville, then at the British Foreign Office, had taken up an extremely friendly attitude towards the araa-German claims. Before these events the sultan of vine's Zanzibar had, on more than one occasion, practically compiais- invited Great Britain to assume a protectorate over

f 000 . his dominions. But the invitations had been declined. towards ˆ . „ . . . , „

Germany. Egyptian affairs were, in the year 1885, causing considerable anxiety to the British government, and the fact was not without influence on the attitude of the British foreign secretary. On the 25th of May 1885, in a despatch to the British ambassador at Berlin, Lord Granville instructed Sir E. Malet to communicate the views of the British cabinet to Prince Bismarck: —

I have to request your Excellency to state that the supposition that Her Majesty's Government have no intention of opposing the German scheme of colonization in the neighbourhood of Zanzibar is absolutely correct. Her Majesty's Government, on the contrary, view with favour these schemes, the realization of which will entaii the civilization of large tracts over which hitherto no European influence has been exercised, the co-operation of Germany with Great Britain in the work of the suppression of the slave gangs, and the encouragement of the efforts of the Sultan both in the extinc- tion of the slave trade and in the commercial development of his dominions.

In the same despatch Lord Granville instructed Sir E. Malet to intimate to the German government that some prominent capitalists had originated a plan for a British settlement in the country between the coast and the lakes, which are the sources of the White Nile, " and for its connexion with the coast by a railway." But Her Majesty's government would not accord to these prominent capitalists the support they had called for, "

unless they were fully satisfied that every precaution was taken to ensure that it should in no way conflict with the interests of the territory that has been taken under German protectorate," and Prince Bismarck was practically invited to say whether British capitalists were or were not to receive the protection of the British government. The reference in Lord Granville's despatch was to a proposal made by a number of British merchants and others who had long been interested in Zanzibar, and who saw in the rapid advance of Germany a menace to the interests which had hitherto been regarded as paramount in the sultanate. In 1884 H. H. Johnston had concluded treaties with the chief of Taveta in the Kilimanjaro district, and had transferred these treaties to John Hutton of Manchester. Hutton, with Mr (afterwards Sir William) Mackinnon, was one of the founders of what subsequently became the Imperial British East Africa Company. But in the early stages the champions of British interests in East Africa received no support from their own government, while Germany was pushing her advantage with the energy of a recent convert to colonial expansion, and had even, on the coast, opened negotiations with the sultan of Witu, a small territory situated

north of the Tana river, whose ruler claimed to be independent of Zanzibar. On the 5th of May 1885 the sultan of Witu executed a deed of sale and cession to a German subject of certain tracts of land on the coast, and later in the same year other treaties or sales of territory were effected, by which German subjects acquired rights on the coast-line claimed by the sultan. Inland, treaties had been concluded on behalf of Germany with the chiefs of the Kilimanjaro region, and an intimation to that effect made to the British government. But before this occurred the German government had succeeded in extracting an acknowledgment of the validity of the earlier treaties from the sultan of Zanzibar. Early in August a powerful German squadron appeared off Zanzibar, and on the 14th of that month the sultan yielded to the inevitable, acknowledged the German protectorate over Usagara and Witu, and undertook to withdraw his soldiers.

Meanwhile negotiations had been opened for the appointment of an international commission, " for the purpose of inquiring into the claims of the sultans of Zanzibar to sovereignty p artft/ – on over certain territories on the east coast of Africa, of the and of ascertaining their precise limits." The govern- sultanate ments to be represented were Great Britain, France ˆ anzlbar and Germany, and towards the end of 1885 commis- sioners were

appointed. The commissioners reported on the 9th of June 188.6, and assigned to the sultan the islands of Zan- zibar, Pemba, Lamu, Mafia and a number of other small islands. On the mainland they recognized as belonging- to the sultan a continuous strip of territory, 10 sea-miles in depth, from the south bank of the Minengani river, a stream a short distance south of the Rovuma, to Kipini, at the mouth of the Tana river, some 600 m. in length. North of Kipini the commissioners recognized as belonging to the sultan the stations of Kismayu, Brava, Marka and Mukdishu, with radii landwards of 10 sea-miles, and of Warsheik with a radius of 5 sea-miles. By an exchange of notes in October-November 1886 the governments of Great Britain and Germany accepted the reports of the de-limitation commissioners, to which the sultan adhered on the 4th of the following December. But the British and German governments did more than determine what territories were to be assigned to the sultanate of Zanzibar. They agreed to a delimitation of their respective spheres of influence in East Africa. The territory to be affected by this arrangement was to be bounded on the south by the Rovuma river, ” and on the north by a line which, starting from the mouth of the Tana river, follows the course of that river or its affluents to the point of intersection of the equator and the 38th degree of east longitude, thence strikes direct to the point of intersection of the 1st degree of north latitude with the 37 th degree of east longitude, where the line terminates.” The line of demarcation between the British and the German spheres of influence was to start from the mouth of the river Wanga or Umba (which enters the ocean opposite Pemba Island to the north of Zanzibar), and running north-west was to skirt the northern base of the Kilimanjaro range, and thence to be drawn direct to the point on the eastern side of Victoria Nyanza intersected by the 1st degree of south latitude. South of this line German influence was to prevail; north of the line was the British sphere. The sultan’s dominions having been thus truncated, Germany associated herself with the recognition of the ” independence ” of Zanzibar in which France and Great Britain had joined in 1862. The effect of this agreement was to define the spheres of influence of the two countries as far as Victoria Nyanza, but it provided no limit westwards, and left the country north of the Tana river, in which Germany had already acquired some interests near the coast, open for fresh annexations. The conclusion of the agreement immediately stimulated the enterprise both of the German East African Company, to which Peters’s earlier treaties had been transferred,

and of the British capitalists to whom reference had been made in Lord Granville's despatch. The German East African Company was incorporated by imperial charter in March 1887, and the British capitalists formed themselves into the British East Africa Association, and on the 24th of May 1887 obtained, through the good offices of Sir William Mackinnon,

a concession of the 10- miles strip of coast from the Umba river in the south to Kipini in the north. The British association further sought to extend its rights in the sphere reserved to British influence by making treaties with the native chiefs be- hind the coast strip, and for this purpose various expeditions were sent into the interior. When they had obtained conces- sions over the country for some 200 m. inland the associated Formation capitalists applied to the British government for a of British charter, which was granted on the 3rd of September 1888, and the association became the Imperial British East Africa Company (see British East Africa). The example set by the British company in obtaining a lease of the coast strip between the British sphere of influence and the sea was quickly followed by the German association, which, on the 28th of April 1888, concluded an agreement with the sultan Khalifa, who had succeeded his brother Bargash, by which the association leased the strip of Zanzibar territory between the German sphere and the sea. It was not, however, until August that the German officials took over the administration, and their want of tact and ignorance of native administration almost immediately provoked a rebellion of so serious a character that it was not suppressed until' the imperial authorities had taken the matter in hand. Shortly after its suppression the administra- tion was entrusted to an imperial officer, and the sultan's rights on the mainland strip were bought outright by Germany for four millions of marks (£200,000).

Events of great importance had been happening, meanwhile, in the country to the west and north of the British sphere of influence. The British company had sent caravans into the interior to survey the country, to make treaties with the native

chiefs and to report on the commercial and agricultural possibilities. One of these had gone up the Tana river. But another and a rival expedition was proceeding along the northern bank of this same river. Karl Peters, whose energy cannot be denied, whatever may be thought of his methods, set out with an armed caravan up the Tana on the pretext of leading an expedition to the relief of Emin Pasha, the governor of the equatorial province of the Egyptian Sudan, then reported to be hemmed in by the dervishes at Wadelai. His expedition was not sanctioned by the German government, and the British naval commander had orders to prevent his landing. But Peters succeeded in evading the British vessels and proceeded up the river, planting German flags and fighting the natives who opposed his progress. Early in 1890 he reached Kavirondo, and there found letters from Mwanga, king of Uganda, addressed to F. J. Jackson, the leader of an expedition sent out by the British East Africa Uganda Company, imploring the company's representative secured by to come to his assistance and offering to accept the British flag. To previous letters, less plainly couched, from the king, Jackson had returned the answer that his instructions were not to enter Uganda, but that he would do so in case of need. The letters that fell into Peters's hands were in reply to those from Jackson. Peters did not hesitate to open the letters, and on reading them he at once proceeded to Uganda, where, with the assistance of the French Roman Catholic priests, he succeeded in inducing Mwanga to sign a loosely worded treaty intended to place him under German protection. On hearing of this Jackson at once set out for Uganda, but Peters did not wait for his arrival, leaving for the south of Victoria Nyanza some days before Jackson arrived at Mengo, Mwanga's capital. As Mwanga would not agree to Jackson's proposals, Jackson returned to the coast, leaving a representative at Mengo to protect the company's interests. Captain (afterwards Sir) F. D. Lugard, who had recently entered the company's employment, was at once ordered to proceed to Uganda. But in the meantime an event of great importance had taken place, the conclusion of the agreement between Great Britain and Germany with reference to their different spheres of influence in various parts of Africa.

The Anglo-German agreement of the 1st of July 1890 has already been referred to and its importance insisted upon. Here we have to deal with the provisions in reference to East

Great Britain,

Africa. In return for the cession of Heligoland, Lord Salisbury obtained from Germany the recognition of a British protectorate over the – dominions of the sultan of Zanzibar, including the islands of Zanzibar and Pemba, but excluding the strip leased to Germany, which was subsequently ceded absolutely to Germany. Germany further agreed to withdraw the protectorate declared over Witu and the adjoining coast up to Kismayu in favour of Great Britain, and to recognize as within the British sphere of influence the vast area bounded, on the south by the frontier line laid down in the agreement of 1886, which was to be extended along the first parallel of south latitude across Victoria Nyanza to the frontiers of the Congo Free State, on the west by the Congo Free State and the western watershed of the Nile, and on the north by a line commencing on the coast at the north bank of the mouth of the river Juba, then ascending that bank of the river until it reached the territory at that time regarded as reserved to the influence of Italy 1 in Gallaland and Abyssinia, when it followed the frontier of the Italian sphere to the confines of Egypt. To the south-west of the German sphere in East Africa the boundary was formed by the eastern and northern shore of Lake Nyasa, and round the western shore to the mouth of the Songwe river, from which point it crossed the Nyasa- Tanganyika plateau to the southern end of the last-named lake, leaving the Stevenson Road on the British side of the i,i m itsot boundary. The effect of this treaty was to remove German all serious causes of dispute about territory between Bast Germany and Great Britain in East Africa. It ren- ˆ r f . ca . dered quite valueless Peters's treaty with Mwanga and his promenade along the Tana; it freed Great Britain from any fear of German competition to the northwards, and recog- nized that her influence extended to the western limits of the Nile valley. But, on the other hand, Great Britain had to relin- quish the ambition of connecting her sphere of influence in the Nile valley with her possessions in Central and South Africa. On this point Germany was quite obdurate; and, as already stated, an attempt subsequently made (May 1894) to secure this object by the lease of a strip of territory from the Congo Free State was frustrated by German opposition.

Uganda having thus been assigned to the British sphere of influence by the only European power in a position to contest its possession with her, the subsequent history of that region, and of the country between the Victoria Nyanza and the coast, must be traced in the articles on British East Africa and Uganda, but it may be well briefly to record here the following facts: — The

Imperial British East Africa Company, finding the burden of administration too heavy for its financial resources, and not receiving the assistance it felt itself entitled to receive from the imperial authorities, intimated that it would be com- pelled to withdraw at the end of the year 1892. Funds were raised to enable the company to continue its administration until the end of March 1893, and a strong public protest against evacuation compelled the government to determine in favour of the retention of the country. In January 1893 Sir Gerald Portal left the coast as a special commissioner to inquire into the ” best means of dealing with the country, whether through Zanzibar or otherwise.” On the 31st of March the union jack was raised, and on the 29th of May a fresh treaty was concluded with King Mwanga placing his country under British protection. A formal protectorate was declared over Uganda proper on the 19th of June 1894, which was subsequently extended so as to include the countries westwards towards the Congo Free State, eastwards to the British East Africa protectorate and Abyssinia, and northwards to the Anglo-Egyptian Sudan. The British East Africa protectorate was constituted in June 1895, when the Imperial British East Africa Company relinquished all its rights in exchange for a money payment, and the administration was assumed by the imperial authorities. On the 1st of April 1902 the eastern province of the Uganda protectorate was transferred to the British East Africa protectorate, which thus secured control of the whole length of the so-called Uganda

1 At this period negotiations between Great Britain and Italy had begun but were not concluded.

railway, and at the same time obtained access to the Victoria Nyanza.

Early in the ‘eighties, as already seen, Italy had obtained her first formal footing on the African coast at the Bay of Assab

(Aussa) on the Red Sea. In 1885 the troubles in & “£ ” which Egypt found herself involved compelled the Africa. khedive and his advisers to loosen their hold on

the Red Sea littoral, and, with the tacit approval of Great Britain, Italy took possession of Massawa and other ports on that coast. By 1888 Italian influence had been extended from Ras Kasar on the north to the northern frontier of the French colony of Obok on the south, a distance of some 650 m. The interior limits of Italian influence were but ill defined, and the negus Johannes (King John) of Abyssinia viewed with anything but a favourable eye the approach of the Italians towards the Abyssinian highlands. In January 1887 an Italian force was almost annihilated at Dogali, but the check only served to spur on the Italian government to fresh efforts. The Italians occupied Keren and Asmara in the highlands, and eventually, in May 1889, concluded a treaty of peace and friend- ship with the negus Menelek, who had seized the throne on the death of Johannes, killed in battle with the dervishes in March of the same year. This agreement, known as the treaty of Uccialli, settled the frontiers between Abyssinia and the Italian sphere, and contained the following article: —

XVII. His Majesty the King of Kings of Ethiopia consents to avail himself of the Italian government for any negotiations which he may enter into with the other powers or governments.

In Italy and by other European governments this article was generally regarded as establishing an Italian protectorate over Abyssinia; but this interpretation was never accepted by the emperor Menelek, and at no time did Italy succeed in establishing any very effective control over Abyssinian affairs. North of the Italian coast sphere the Red Sea littoral was still under Egyptian rule, while immediately to the south a small stretch of coast on the Gulf of Tajura constituted the sole French possession on the East African mainland (see Somali- land). Moreover, when Egyptian claims to the Somali coast were withdrawn, Great Britain took the opportunity to establish her influence on the northern Somali coast, opposite Aden. Between the 1st of May 1884 and the 15th of March 1886 ten treaties were concluded, placing under British influence the northern Somali coast from Ras Jibuti on the west to Bandar Ziada on the east. In the meantime Italy, not content with her acquisitions on the Red Sea, had been concluding treaties with the Somali chiefs on the east coast. The first treaty was made with the sultan of Obbia on the 8th of February 1889. Later in the same year the British East Africa Company transferred to Italy — the transference being subsequently approved by the sultan of Zanzibar — the ports of Brava, Marka, Mukdishu and Warsheik, leased from Zanzibar. On

the 24th of March 1891 an agreement between Italy and Great Britain fixed the northern bank of the Juba up to latitude 6° N. as the southern boundary of Italian influence in Somaliland, the boundary being provision- ally prolonged along lines of latitude and longitude to the inter- section of the Blue Nile with 35° E. longitude. On the 15th of April 1 89 1 a further agreement fixed the northern limit of the Italian sphere from Ras Kasar on the Red Sea to the point on the Blue Nile just mentioned. By this agreement Italy was to have the right temporarily to occupy Kassala, which was left in the Anglo-Egyptian sphere, in trust for Egypt — a right of which she availed herself in 1894. To complete the work of delimitation the British and Italian governments, on the 5th of May 1894, fixed the boundary of the British sphere of influence in Somaliland from the Anglo-French boundary, which had been settled in February 1.888.

But while Great Britain was thus lending her sanction to Italy's ambitious schemes, the Abyssinian emperor was becoming more and more incensed at Italy's pretensions to exercise a protectorate over Ethiopia. In 1893 Menelek denounced the treaty of Uccialli, and eventually, in a great battle, fought at Adowa on the 1st of March 1896, the Italians were disastrously

defeated. By the subsequent treaty of Adis Ababa, concluded on the 26th of October 1896, the whole of the country to the south of the Mareb, Belesa and Muna rivers was restored to Abyssinia, and Italy acknowledged the pea deoce absolute independence of Abyssinia. The effect of of this was practically to destroy the value of the Abyssinia Anglo-Italian agreement as to the boundaries to the 2*25″ south and west of Abyssinia; and negotiations were afterwards set on foot between the emperor Menelek and his European neighbours with the object of determining the Abyssinian frontiers. Italian Somaliland, bordering on the south-eastern frontier of Abyssinia, became limited to & belt of territory with a depth inland from the Indian Ocean of from 180 to 250 m. The negotiations concerning the frontier lasted until 1908, being protracted over the question as to the possession of Lugh, a town on the Juba, which eventually fell to Italy. After the battle of Adowa the Italian government handed over the administration of the southern part of the country to the Benadir Company, but in January 1905 the government resumed control and at the same time transformed the leasehold rights it held from the sultan of Zanzibar into sovereign rights by the payment to the sultan of £144,000. To facilitate her communications with the interior, Italy also

secured from the British government the lease of a small area of land immediately to the north of Kismayu. In British Somaliland the frontier fixed by agreement with Italy in 1894 was modified, in so far as it marched with Abyssinian terri- tory, by an agreement which Sir Rennell Rodd concluded with the emperor Menelek in 1897. The effect of this agreement was to reduce the area of British Somaljland from 75,000 to 68,000 sq. m. In the same year France concluded an agreement with the emperor, which is known to have fixed the frontier of the French Somali Coast protectorate at a distance of 90 kilometres (56 m.) from the coast. The determination of the northern, western and southern limits of Abyssinia proved a more difficult matter. A treaty of July 1900 followed by an agreement of November 1901 defined the boundaries of Eritrea on the side of Abyssinia and the Sudan respectively. In certain details the boundaries thus laid down were modified by an Anglo- Italian- Abyssinian treaty signed at Adis Ababa on the 15th of May 1902. On the same day another treaty was signed at the Abyssinian capital by Sir John Harrington, the British minister plenipotentiary, and the emperor Menelek, whereby the western, or Sudan-Abyssinian, frontier was defined as far south as the intersection of 6° N. and 35 E. Within the British sphere were left the Atbara up to Gallabat, the Blue Nile up to Famaka and the Sobat up to the junction of the Baro and Pibor. While not satisfying Abyssinian claims to their full extent, the frontier laid down was on the whole more favourable to Abyssinia than was the line fixed in the Anglo-Italian agreement of 1891. On the other hand, Menelek gave important economic guarantees and concessions to the Sudan government.

In Egypt the result of the abolition of the Dual Control was to make British influence virtually predominant, though theo- retically Turkey remained the suzerain power; and after the reconquest of the Sudan by the Anglo-Egyptian army a con- vention between the British and Egyptian governments was signed at Cairo on the 19th of January 1899, which, inter alia, provided for the joint use of the British and Egyptian flags in the territories south of the 22nd parallel of north latitude. From the international point of view the British position in Egypt was strengthened by the Anglo-French declaration of the 8th of April 1904. For some time previously there had been a movement on both sides of the Channel in favour" of the settlement of a number of important questions /w/o- in which British and French interests were involved. French The movement was no

doubt strengthened by the «*«■ desire to reduce to their least dimensions the possible ˆtˆjggj causes of trouble between the two .countries at a time when the outbreak of hostilities between Russia (the ally of France) and Japan (the ally of Great Britain) rendered the European situation peculiarly delicate. On the 8th of April

1904 there was signed in London by the British foreign secretary, the marquess of Lansdowne, and the French ambassador, M. Paul Cambon, a series of agreements relating to several parts of the globe. Here we are concerned only with the joint declaration respecting Egypt and Morocco and a convention relating, in part, to British and French frontiers in West Africa. The latter we shall have occasion to refer to later. The former, notwithstand- ing the declarations embodied in it that there was " no intention of altering the political status " either of Egypt or of Morocco, cannot be ignored in any account of the partition in Africa. With regard to Egypt the French government declared " that they will not obstruct the action of Great Britain in that country by asking that a limit of time be fixed for the British occupation or in any other manner." France also assented — as did sub- sequently the other powers interested — to a khedivial decree simplifying the international control exercised by the Caisse de la Dette over the finances of Egypt.

In order to appreciate aright that portion of the declaration relating to Morocco it is necessary to say a few words about the course of French policy in North- West Africa. In Tunisia the work of strengthening the protectorate established in 1881 had gone steadily forward; but it was in Algeria that the extension of French influence had been most marked. The movement of expansion southwards was inevitable. With the progress of exploration it became increasingly evident that the Sahara con- stituted no insurmountable barrier between the French posses- sions in North and West Central Africa. But France had not only the hope of placing Algeria in touch with the Sudan to spur her forward. To consolidate her position in North- West Africa she desired to make French influence supreme in Morocco. The re- lations between the two countries did not favour the realization of that ambition. The advance southwards of the French forces of occupation evoked loud protests from the Moorish government, particularly with regard to the occupation in 1900-1901 of the Tuat Oases. Under the Franco-Moorish treaty of 1845 the frontier between Algeria and Morocco was defined from the Mediterranean coast as far south as the pass of Teniet el Sassi, in

about 34 N. ; beyond that came a zone in which no frontier was defined, but in which the tribes and desert villages (ksurs) belonging to the respective spheres of influence were named; while south of the desert villages the treaty stated that in view of the character of the country ” the delimitation of it would be superfluous.” Though the frontier was thus left undefined, the sultan main- tained that in her advance southwards France had trespassed on territories that unmistakably belonged to Morocco. After some negotiation, however, a protocol was signed in Paris on Prance’s tne 2 ° tn of July 1901, and commissioners appointed to privileged devise measures for the co-operation of the French and position in] \ioorish authorities in the maintenance of peaceful conditions in the frontier region. It was reported that in April 1902 the commissioners signed an agreement whereby the Sharifan government undertook to consolidate its authority on the Moorish side of the frontier as far south as Figig. The agreement continued: ” Le Gouvernement frangais, en raison de son voisinage, lui pretera son appui, en cas de besoin. Le Gouverne- ment franqais etablira son autoriti et la paix dans les regions du Sahara, et le Gouvernement marocain, son voisin, lui aidera de tout son pouvoir.” Meanwhile in the northern districts of Morocco the conditions of unrest under the rule of the young sultan, Abd el Aziz IV., were attracting an increasing amount of attention in Europe and were calling forth demands for their suppression. It was in these circumstances that in the Anglo-French declara- tion of April 1904 the British government recognized ” that it appertains to France, more particularly as a power whose dominions are conterminous for a great distance with those of Morocco, to preserve order in that country, and to provide assistance for the purpose of all administrative, economic, financial and military reforms which it may require.” Both parties to the declaration, ” inspired by their feeling of sincere friendship for Spain, take into special consideration the interests which that country derives from her geographical position and from her territorial possessions on the Moorish coast of the

Mediterranean. In regard to these interests the French govern- ment will come to an understanding with the Spanish govern- ment.” The understanding thus foreshadowed was reached later in the same year, Spain securing a sphere of interest on the Mediterranean coast. In pursuance of the policy marked out in the Anglo-French declaration, France was seeking to strengthen her influence in Morocco when in 1905 the attitude of Germany

seriously affected her position. On the 8th of July France secured from the German government formal ” recognition of the situation created for France in Morocco by the contiguity of a vast extent of territory of Algeria and the Sharifan empire, and by the special relations resulting therefrom between the two adjacent countries, as well as by the special interest for France, due to this fact, that order should reign in the Sharifan Empire.” Finally, in January- April 1906, a conference of the powers was held at Algeciras to devise, by invitation of the sultan, a scheme of reforms to be introduced into Morocco (q.v.). French capital was allotted a larger share than that of any other power in the Moorish state bank which it was decided to institute, and French and Spanish officers were entrusted with the organization of a police force for the maintenance of order in the principal coast towns. The new regime had not been fully inaugurated, however, when a series of outrages led, in 1907, to the military occupation by France of Udja, a town near the Algerian frontier, and of the port of Casablanca on the Atlantic coast of Morocco.

It only remains to be noted, in connexion with the story of French activity in North- West Africa, that with such energy was the penetration of the Sahara pursued that in April 1904 flying columns from Insalah and Timbuktu met by arrangement in mid-desert, and in the following year it was deemed advisable to indicate on the maps the boundary between the Algerian and French West African territories.

Brief reference must be made to the position of Tripoli. While Egypt was brought under British control and Tunisia became a French protectorate, Tripoli remained a province of the Turkish empire with undefined frontiers in the hinterland, a state of affairs which more than once threatened to lead to trouble with France during the expansion of the latter’s influence in the Sahara. As already stated, Italy early gave evidence that it was her ambition to succeed to the province, and, not only by the sultan of Turkey but in Italy also, the Anglo-French declaration of March 1899, respecting the limits of the British and French spheres of influence in north Central Africa, was viewed with some concern. By means of a series of public utterances on the part of French and Italian statesmen in the winter 1901-1902 it was made known that the two powers had come to an understanding with regard to their interests in North Uteres* /a Africa, and in May 1902 Signor Prinetti, then Italian Tripoli. minister for foreign affairs, speaking in parliament in reply to an interpellation on the subject of Tripoli, declared that if ” the

status quo in the Mediterranean were ever disturbed, Italy would be sure of finding no one to bar the way to her legitimate aspirations."

At the opening of the Berlin conference Spain had established no formal claim to any part of the coast to the south of Morocco; but while the conference was sitting, on the 9th of January 1885, the Spanish government intimated that in view of the importance of the Spanish settlements on the Rio de Oro, at Angra de Cintra, and at Western Bay (Cape Blanco), and of the docu- ments signed with the independent tribes on that colonies. coast, the king of Spain had taken under his protection " the territories of the western coast of Africa comprised between the fore-mentioned Western Bay and Cape Bojador." The in- terior limits of the Spanish sphere were defined by an agreement concluded in 1900 with France. By this document some 70,000 sq. m. of the western Sahara were recognized as Spanish.

The same agreement settled a long-standing dispute between Spain and France as to the ownership of the district around the Muni river to be south of Cameroon, Spain securing a block of territory with a coast-line from the Campo river on the north to the Muni river on the south. The northern frontier is formed by the German Cameroon colony, the eastern by 11° 20′ E., and the

southern by the first parallel of north latitude to its point of inter- section with the Muni river.

Apart from this small block of Spanish territory south of Cameroon, the stretch of coast between Cape Blanco and the

mouth of the Congo is partitioned among four European ?h V ' S a"n°a P owers — Great Britain, France, Germany and Portugal coast. — an d the negro republic of Liberia. Following the

coast southwards from Cape Blanco is first the French colony of Senegal, which is indented, along the Gambia river, by the small British colony of that name, and then the comparatively small territory of Portuguese Guinea, all that remains on this coast to represent Portugal's share in the scramble in a region where she

once played so conspicuous a part. To the south of Portuguese Guinea is the French Guinea colony, and still going south and east are the British colony of Sierra Leone, the republic of Liberia, the French colony of the Ivory coast, the British Gold Coast, German Togoland, French Dahomey, the British colony (formerly known as the Lagos colony) and protectorate of Southern Nigeria, the German colony of Cameroon, the Spanish settlements on the Muni river, the French Congo colony, and the small Portuguese enclave north of the Congo to which reference has already been made, which is administratively part of the Angola colony. When the General Act of the Berlin conference was signed the whole of this coast-line had not been formally claimed; but no time was lost by the powers interested in notifying claims to the unappropriated sections, and the conflicting claims put forward necessitated frequent adjustments by international agreements. By a Franco-Portuguese agreement of the 1 2th of May 1886 the limits of Portuguese Guinea — surrounded landwards by French territory — were defined, and by agreements with Great Britain in 1885 and France in 1892 and 1907 the Liberian republic was confined to an area of about 43,000 sq. m.

The real struggle in West Africa was between France and Great Britain, and France played the dominant part, the ex- haustion of Portugal, the apathy of the British government and the late appearance of Germany in the field being all element* that favoured the success of French policy. Before tracing the steps in the historic contest between France and Great Britain it is necessary, however, to deal briefly with the part played by Germany. She naturally could not be disposed of by the chief rivals as easily as were Portugal and Liberia. It will be remembered that Dr Nachtigal, while the proposals for the Berlin conference were under discussion, had planted the German flag on the coast of Togo and in Cameroon in the month of July 1884. In Cameroon Germany found herself with Great Britain for a neighbour to the north, and with France as her southern neighbour on the Gabun river. The utmost activity was displayed in making treaties with native chiefs, and in securing as wide a range of coast for German enterprise as was possible. After various provisional agreements had been concluded between Great Britain and Germany, a ” provisional line of demarcation ” was adopted in the famous agreement of the 1st of July 1890, starting from the head of the Rio del Rey creek and going to the point, about 9 8′ E., marked “rapids” on the British

Admiralty chart. By a further agreement of the 14th of April 1 893 , the right bank of the Rio del Rey was made the boundary between the Oil Rivers Protectorate (now Southern Nigeria) and Cameroon. In the following November (1893) the boundary was continued from the ” rapids ” before mentioned, on the Calabar or Cross river, in a straight line towards the centre of the town of Yola, on the Benue river. Yola itself, with a radius Qermany °^ some 3 m -> was Ifift m tne British sphere, and the in west German boundary followed the circle eastwards from Centra/ the point of intersection as it neared Yola until it AMca – met the Benue river. From that point it crossed the river to the intersection of the 13th degree of longitude with the 10th degree of north latitude, and then made direct for a point on the southern shore of Lake Chad ” situated 35 minutes east of the meridian of Kuka.” By this agreement the British government withdrew from a considerable section of the upper waters of the Benue with which the Royal Niger Company had

entered into relations. The limit of Germany’s possible extension eastwards was fixed at the basin of the river Shari, and Darfur, Kordofan and the Bahr-el-Ghazal were to be excluded from her sphere of influence. The object of Great Britain in making the sacrifice she did was two-fold. By satisfying Germany’s desire for a part of Lake Chad a check was put on French designs on the Benue region, while by recognizing the central Sudan (Wadai, &c.) in the German sphere, a barrier was interposed to the advance of France from the Congo to the Nile. This last object was not attained, inasmuch as Germany in coming to terms with France as to the southern and eastern limits of Cameroon abandoned her claims to the central Sudan. She had already, on the 24th of December 1885, signed a protocol with France fixing her southern frontier, where it was coterminous with the French Congo colony. But to the east German explorers

were crossing the track of French explorers from the northern bank of the Ubangi, and the need for an agreement was obvious. Accordingly, on the 4th of February 1894, a protocol — which, some weeks later, was confirmed by a convention — was signed at Berlin, by which France accepted the presence of Germany on Lake Chad as a fait accompli and effected the best bargain she could by making the left bank of the Shari river, from its outlet into Lake Chad to the 10th parallel of north latitude, the eastern limit of German extension. From this point the boundary line went due west some 230 m., then turned south, and with various indentations joined the south-eastern frontier, which had been slightly extended so as to give Germany access to the Sanga river — a tributary of the Congo. Thus, early in 1894, the German Cameroon colony had reached fairly definite limits. In 1908 another convention, modifying the frontier, gave Germany a larger share of the Sanga, while France, among other advantages, gained the left bank of the Shari to io° 40′ N. The German Togoland settlements occupy a narrow strip of the Guinea coast, some 35 m. only in length, wedged in between the British Gold Coast and French Dahomey. At first France was inclined to dispute Germany's claims to Little Popo and Porto Seguro; but in December 1885 the French government acknowledged the German protectorate over these places, and the boundary between French and German „ , , . ■ ,-i , t ■ , 1 Exclusion

territory, which runs north from the coast to the nth f

degree of latitude, was laid down by the Franco- Germany German convention of the 12th of July 1897. The %£" t0e fixing of the nth parallel as the northern boundary '

of German expansion towards the interior was not accomplished without some sacrifice of German ambitions. Having secured an opening on Lake Chad for her Cameroon colony, Germany was anxious to obtain a footing on the middle Niger for Togoland. German expeditions reached Gando, one of the tributary states of the Sokoto empire on the middle Niger, and, notwithstanding the existence of prior treaties with Great Britain, sought to con- clude agreements with the sultan of that country. But this German ambition conflicted both with the British and the French designs in West Africa, and eventually Germany had to be content with the nth parallel as her northern frontier. On the west the Togoland frontier on the coast was fixed in July 1886 by British and German commissioners at 1® 10′ E. longitude, and its extension towards the interior laid down for a short distance. A curious feature in the history of its prolongation was the establishment in 1888 of a neutral zone wherein neither power was to seek to acquire protectorates nor exclusive influence. It was not until November 1899 that, as part of the Samoa settlement, this neutral zone was partitioned between the two powers and the frontier extended to the nth parallel.

The story of the struggle between France and Great Britain in West Africa may roughly be divided into two sections, the first dealing with the Coast colonies, the second deal- . -. ing with the struggle for the middle Niger and Lake French Chad. As regards the Coast colonies, France was rivalry in wholly successful in her design of. isolating all Great YmL Britain's separate possessions in that region, and of securing for herself undisputed possession of the upper Niger and of the countries lying within the great bend of that river.

When the British government awoke to the consciousness of what was at stake France had obtained too great a start. French

governors of the Senegal had succeeded, before the Berlin conference, in establishing forts on the upper Niger, and the advantage thus gained was steadily pursued. Every winter season French posts were pushed farther and farther along the river, or in the vast regions watered by the southern tributaries of the Sene- gal and Niger rivers. This ceaseless activity met with its reward. Great Britain found herself compelled to acknowledge accom- plished facts and to conclude agreements with France, which left her colonies mere coast patches, with a very limited extension towards the interior. On the 10th of August 1889 an agreement was signed by which the Gambia colony and protectorate was confined to a narrow strip of territory on both banks of the river for about 200 m. from the sea. In June 1882 and in August 1889 provisional agreements were made with France fixing the western and northern limits of Sierra Leone, and commissioners were appointed to trace the line of demarcation agreed upon by the two governments. But the commissioners failed to agree, and on the 21st of January 1895 a fresh agreement was made, the boundary being subsequently traced by a mixed commission. Sierra Leone, as now definitely constituted, has a coast-line of about 180 m. and a maximum extension towards the interior of some 200 m.

At the date of the Berlin conference the present colonies of Southern Nigeria and the Gold Coast constituted a single colony under the title of the Gold Coast colony, but on the 13th of January 1886 the territory comprised under that title was erected into two separate colonies — Lagos and the Gold Coast (the name of the former being changed in February 1906 to the colony of Southern Nigeria). The coast limits of the new Gold Coast colony were declared to extend from 5 W. to 2° E., but these limits were subsequently curtailed by agreements with France and Germany. The arrangements that fixed the eastern frontier of the Gold Coast colony and its hinterland have already been stated in connexion with German Togoland. On the western frontier it marches with the French colony of the Ivory Coast, and in July 1893, after an unsuccessful attempt to achieve the same end by an agreement concluded in 1889, the frontier was defined from the neighbourhood of the Tano lagoon and river of the same name, to the 9th degree of north latitude. In August 1896, following the destruction of the Ashanti power and the deportation of King Prempeh, as a result of the second Ashanti campaign, a British protectorate was declared over the whole of the Ashanti territories and a resident was installed at Kumasi.

But no northern limit had been fixed by the 1893 agreement beyond the 9th parallel, and the countries to the north — Gurunsi (Grusi), Mossi and Gurma — were entered from all sides by rival British, French and German expeditions. The conflicting claims established by these rival expeditions may, however, best be considered in connexion with the struggle for supremacy on the middle Niger and in the Chad region, to which it is now necessary to turn.

A few days before the meeting of the Berlin conference Sir George Goldie had succeeded in buying up all the French interests on the lower Niger. The British company's influence had at that date been extended by treaties with the native chiefs up the main Niger stream to its junction with the Benue, and some distance along this latter river. But the great Fula states of the central Sudan were still outside European influence, and this fact did not escape attention in Germany. German merchants had been settled for some years on the coast, and one of them, E. R. Flegel, had displayed great interest in, and activity on, the river. He recognized that in the densely populated states of the middle Niger, Sokoto and Gando, and in Bornu to the west of Lake Chad, there was a magnificent field for Germany's new- born eolonizing zeal. The German African Company 1 and the German Colonial Society listened eagerly to Flegel's proposals, and in April 1885 he left Berlin on a mission to the Fula states

'This association, formed in 1878 by a union of associations primarily intended for the exploration of Africa, ceased to exist in

1 891.

of Sokoto and Gando. But it was impossible to keep his intentions entirely secret, and the (British) National African Company had no desire to see the French rivals, whom they had with so much difficulty dislodged from the river, replaced by the even more troublesome German. Accordingly Joseph Thomson, the young Scottish explorer, was sent out to the Niger, and had the satisfaction of concluding on the 1st of June 1885 a treaty with " Umoru, King of the Mussulmans of the Sudan and Sultan of Sokoto," which practically secured the whole of the trading rights and the control of the sultan's foreign relations to the British company. Thomson concluded a similar treaty with the sultan of Gando, so as to provide against the possibility of its being alleged that Gando was an independent state and not

subject to the suzerainty of the sultan of Sokoto. As Thomson descended the river with his treaties, he met Flegel going up the river, with bundles of German flags and presents for the chiefs. The German government continued its efforts to secure a footing on the lower Niger until the fall of Prince Bismarck from power in March 1890, when opposition ceased, and on the failure of the half-hearted attempt made later to establish relations with Gando from Togoland, Germany dropped out of the competition for the western Sudan and left the field to France and Great Tne Nlger Britain. After its first great success the National Company African Company renewed its efforts to obtain a granted a charter from the British government, and on the 10th c er ‘ of July 1886 the charter was granted, and the company became ” The Royal Niger Company, chartered and limited.” In June of the previous year a British protectorate had been proclaimed over the whole of the coast from the Rio del Rey to the Lagos frontier, and as already stated, on the 13th of January 1886 the Lagos settlements had been separated from the Gold Coast and erected into a separate colony. It may be convenient to state here that the western boundary of Lagos with French territory (Dahomey) was determined in the Anglo-French agreement of the 10th of August 1889, ” as far as the 9th degree of north latitude, where it shall stop.” Thus both in the Gold Coast hinterland and in the Lagos hinterland a door was left wide open to the north of the 9th parallel.

Notwithstanding her strenuous efforts, France, in her advance down the Niger from Senegal, did not succeed in reaching Sego on the upper Niger, a considerable distance above Timbuktu, until the winter of 1890-1891, and the rapid advance of British influence up the river raised serious fears lest the Royal Niger Company should reach Timbuktu before France could forestall her. It was, no doubt, this consideration that induced the French government to consent to the insertion in the agreement of the 5th of August 1890, by which Great Britain recognized France’s protectorate over Madagascar, of the following article:

The Government of Her Britannic Majesty recognizes the sphere of influence of France to the south of her Mediterranean possessions up to a line from Say on the Niger to Barrua on Lake Chad, drawn in such a manner as to comprise in the sphere of action of the Niger Company all that fairly belongs to the kingdom of Sokoto ; the line to be determined by the commissioners to be appointed.

The commissioners never were in fact appointed, and the proper meaning to be attached to this article subsequently became a subject of bitter controversy between the two countries. An examination of the map of West Africa will show what possibilities of trouble were left open at the end of 1890 by the various agreements concluded up to that date. From Say on the Niger to where the Lagos frontier came to an abrupt stop in 9° N. there was no boundary line between the French and British spheres of influence. To the north of the Gold Coast and of the French Ivory Coast colony the way was equally open to Great Britain and to France, while the vagueness of the Say-Barrua line left an opening of which France was quick to avail herself. Captain P. L. Monteil, who was despatched by the French government to West' Africa in 1890, immediately after the conclusion of the August agreement, did not hesitate to pass well to the south of the Say-Barrua line, and to attempt to conclude treaties with chiefs who were, beyond all question/ within the British sphere. Still farther south, on the Benue river, the two expeditions of Lieutenant Miaon — in 1890 and 1892 — failed to do any real

harm to British interests. In 1892 an event happened which had an important bearing on the future course of the dispute.

After a troublesome war with Behanzin, king of advance to ˆ e nat i ve state of Dahomey, France annexed some Timbuktu, portion of Dahomeyan territory on the coast, and

declared a protectorate over the rest of the kingdom. Thus was removed the barrier which had up to that time prevented France from pushing her way Nigerwards from her possessions on the Slave Coast, as well as from the upper Niger and the Ivory Coast. Henceforth her progress from all these directions was rapid, and in particular Timbuktu was occupied in the last days of 1893.

In 1894 it appears to have been suddenly realized in France that, for the development of the vast regions which she was placing under her protection in West Africa, it was extremely desirable that she should obtain free access to the navigable portions of the Niger, if not on the left bank, from which she was excluded by

the Say-Barrua agreement, then on the right bank, where the frontier had still to be fixed by international agreement. In the neighbourhood of Bussa there is a long stretch of the river so impeded by rapids that navigation is practically im- possible, except in small boats and at considerable risk. Below these rapids France had no foothold on the river, both banks from Bussa to the sea being within the»British sphere. In 1890 the Royal Niger Company had concluded a treaty with the emir and chiefs of Bussa (or Borgu); but the French declared that the real paramount chief of Borgu was not the king of Bussa, but the king of Nikki, and three expeditions were despatched in hot haste to Nikki to take the king under French protection. Sir George Goldie, however, was not to be baffled. While maintaining the validity of the earlier treaty with Bussa, he despatched Captain (afterwards General Sir) F. D. Lugard to Nikki, and Lugard was successful in distancing all his French competitors by several days, reaching Nikki on the 5 th of November 1894 and concluding a treaty with the king and chiefs. The French expeditions, which were in great strength, did not hesitate on their arrival to compel the king to execute fresh treaties with France, and with these in their possession they returned to Dahomey. Shortly afterwards a fresh act of aggression was committed. On the 13th of February 1895 a French officer, Commandant Toutee, arrived on the right bank of the Niger opposite Bajibo and built a fort. His presence there was notified to the Royal Niger Company, who protested to the British government against this invasion of their territory. Lord Rosebery, who was then foreign minister, at once made inquiries in Paris, and received the assurance that Commandant Toutee was ” a private traveller.” Eventually Commandant Toutee was ordered to withdraw, and the fort was occupied by the Royal Niger Company’s troops. Commandant Toutee subsequently published the official instructions from the French government under which he had acted. It was thought that the recognition of the British claims, involved in the withdrawal of Commandant Toutee, had marked the final abandonment by France of the attempt to establish herself on the navigable portions of the Niger below Bussa, but in 1897 the attempt was renewed in the most determined manner. In February of that year a French force suddenly occupied Bussa, and this act was quickly followed by the occupation of Gomba and Illo higher up the river. In November 1897 Nikki was occupied. The situation on the Niger had so obviously been outgrowing the capacity of a chartered company that for some time before these occurrences the

assumption of responsibility for the whole of the Niger region _. by the imperial authorities had been practically de-

Franco- cided on; and early in 1898 Lugard was sent out to British the Niger with a number of imperial officers to raise a '// aft?" 1 ' * oca ' f° rce * n preparation for the contemplated change.

The advance of the French forces from the south and west was the signal for an advance of British troops from the Niger, from Lagos and from the Gold Coast protectorate. The situation thus created was extremely serious. The British and French flags were flying in close proximity, in some cases in the same village. Meanwhile the diplomatists were busy in London

and in Paris, and in the latter capital a commission sat for many months to adjust the conflicting claims. Fortunately, by the tact and forbearance of the officers on both sides, no local incident occurred to precipitate a collision, and on the 14th of June 1898 a convention was signed by Sir Edmund Monson and M. G. Hanotaux which practically completed the partition of this part of the continent.

The settlement effected was in the nature of a compromise. France withdrew from Bussa, Gomba and Illo, the frontier line west of the Niger being drawn from the 9th parallel to a point ten miles, as the crow flies, above Giri, the port of Illo. France was thus shut out from the navigable portion of the middle and lower Niger; but for purely commercial purposes Great Britain agreed to lease to France two small plots of land on the river — the one on the right bank between Leaba and the mouth of the Moshi river, the other at one of the mouths of the Niger. By accepting this line Great Britain abandoned Nikki and a great part of Borgu as well as some part of Gando to France. East of the Niger the Say-Barrua line was modified in favour of France, which gained parts of both Sokoto and Bornu where they meet the southern edge of the Sahara. In the Gold Coast hinterland the French withdrew from Wa, and Great Britain abandoned all claim to Mossi, though the capital of the latter country, together with a further extensive area in the territory assigned to both powers, was declared to be equally free, so far as trade and navigation were concerned, to the subjects and protected persons of both nationalities. The western boundary of the Gold Coast was prolonged along the Black Volta as far as latitude ir° N., and this parallel was followed with slight de- flexions to the Togoland

frontier. In consequence of the acute crisis which shortly afterwards occurred between France and Great Britain on the upper Nile, the ratification of this agreement was delayed until after the conclusion of the Fashoda agreement of March 1899 already referred to. In 1900 the two patches on the Niger leased to France were selected by commissioners representing the two countries, and in the same year the Anglo- French frontier from Lagos to the west bank of the Niger was delimited.

East of the Niger the frontier, even as modified in 1898, failed to satisfy the French need for a practicable route to Lake Chad, and in the convention of the 8th of April 1904, to which reference has been made under Egypt and Morocco, it was agreed, as part of the settlement of the French shore Further question in Newfoundland, to deflect the frontier line con- more to the south. The new boundary was described <* s s lons at some length, but provision was made for its modifica- tion in points of detail on the return of the commissioners engaged in surveying the frontier region. In 1906 an agreement was reached on all points, and the frontier at last definitely settled, sixteen years after the Say-Barrua line had been fixed. This revision of the Niger-Chad frontier did not, however, represent the only territorial compensation received by France in West Africa in connexion with the settlement of the Newfoundland question. By the same convention of April 1904 the British government consented to modify the frontier between Senegal and the Gambia colony " so as to give to France Yarbutenda and the lands and lar.ding-places belonging to that locality," and further agreed to cede to France the tiny group of islands off the coast of French Guinea known as the Los Islands.

Meantime the conclusion of the 1898 convention had left both the British and the French governments free to devote increased attention to the subdivision and control of their West African possessions. On the 1st of January 1900 the imperial authorities assumed direct responsibility for the whole of the territories of the Royal Niger Company, which became henceforth a purely commercial undertaking. The Lagos protectorate was extended northwards; the Niger Coast protectorate, likewise with extended frontiers, became Southern Nigeria; while the greater part of the territories formerly administered by the company were constituted into the protectorate of Northern Nigeria — all three administrations being directly under the Colonial Office. In February J906 the administration of the

Organiza- tion of the British and French pro- tectorate*.

African Wanda.

Southern Nigerian protectorate was placed under that of Lagos at the same time as the name of the latter was changed to the Colony of Southern Nigeria, this being a step towards the eventual amalgamation of all three dependencies under one governor or governor-general. In French West Africa changes in the internal frontiers have been numerous and important. The coast colonies have all been in- creased in size at the expense of the French Sudan, which has vanished from the maps as an administrative entity. There are carved out of the territories com- prised in what is officially known as French West Africa five colonies — Senegal, French Guinea, the Ivory Coast, Dahomey and the Upper Senegal and Niger, this last being entirely cut off from the sea — and the civil territory of Mauritania. To the col- ony of the Upper Senegal and Niger is attached the military territory of the Niger, embracing the French Sahara up to the limit of the Algerian sphere of influence. Not only are all these divisions of French West Africa connected territorially, but administra- tively they are united under a governor-general. Similarly the French Congo territories have been divided into three colonies — the Gabun, the Middle Congo and the Ubangi-Shari-Chad — all united administratively under a commissioner-general.

There are, around the coast, numerous islands or groups of islands, which are regarded by geographers as outliers of the Ownership African mainland. The majority of these African of the islands ‘were occupied by one or other of the European powers long before the period of continental partition. The Madeira Islands to the west of Morocco, the Bissagos Islands, off the Guinea coast, and Prince’s Island and St Thomas’ Island, in the Gulf of Guinea, are Portuguese posses- sions of old standing; while in the Canary Islands and Fernando Po Spain possesses remnants of her ancient colonial empire which are a more valuable asset than any she has acquired in recent times on the mainland. St Helena in the Atlantic, Mauritius and some small

groups north of Madagascar in the Indian Ocean, are British possessions acquired long before the opening of the last quarter of the 19th century. Zanzibar, Pemba and some smaller islands which the sultan was allowed to retain were, as has already been stated, placed under British protection in 1890, and the island of Sokotra was placed under the " gracious favour and protection " of Great Britain on the 23rd of April 1886. France's ownership of Reunion dates back to the 17th century, but the Comoro archipelago was not placed under French protec- tion until April 1886. None of these islands, with the exception of the Zanzibar group, have, however, materially affected the partition of the continent, and they need not be enumerated in the table which follows. But the important island of Madagascar stands in a different category, both on account of its size and because it was during the period under review that it passed through the various stages which led to its becoming a French colony. The first step was the placing of the foreign relations of the island under French control, which was effected by the treaty of the 17th of December 1885, after the Franco-Malagasy war that had broken out in 1883. In 1890 Great Britain and Germany recognized a French protectorate over the island, but the Hova government declined to acquiesce in this view, and in May 1895 France sent an expedition to enforce her claims. The capital was . occupied on the 30th of September in the same year, and on the day following Queen Ranavalona signed a convention recognizing the French protectorate. In January 1896 the island was declared a French possession, and on the 6th of August was declared to be a French colony. In February 1897 the last vestige of ancient rule was swept away by the deportation of the queen.

Thus in its broad outlines the partition of Africa was begun and ended in the short space of a quarter of a century. There are still many finishing touches to be put to the structure. The southern frontiers of Morocco and Tripoli remain undefined, while the mathematical lines by which the spheres of influence of the powers were separated one from the other are being variously modified on the do ut des principle as they come to be surveyed and as the effective occupation of the continent pro-

gresses. Much labour is necessary before the actual area of Africa and its subdivisions can be accurately determined, but in the following table the figures are at least approximately correct. Large areas of the spheres assigned to different European powers have still to be brought under European control; but this work is advancing by rapid strides.

British— Sq. m.

Cape Colony 276,995

Natal and Zt'luland 35,371

Basutoland 10,293

Bechuanaland Protectorate 225,000

Transvaal and Swaziland 117,732

Orange River Colony 50,392

Rhodesia

450,000

Nyasaland Protectorate 43,608

British East Africa Protectorate 240,000

Uganda Protectorate 125,000

Zanzibar Protectorate 1,020

Somaliland 68,000

Northern Nigeria 258,000

Southern Nigeria (colony and protectorate) . . 80,000

Gold Coast and hinterland 82,000

Sierre Leone (colony and protectorate)

Gambia

Total British Africa

34,000 4,000

2,101,411

Egypt and Libyan Desert 650,000

Anglo-Egyptian Sudan 950,000

1,600,000

945.O00

51,000

French —

Algeria and Algerian Sahara

Tunisia

French West Africa —

Senegal

French Guinea

Ivory Coast

Dahomey .

Upper Senegal and Niger, and Maur- itania (including French West African Sahara) . . . 1,581,000 1,931,000

French Congo 700,000

French Somaliland 12,000

Madagascar . , 227,950

74,000 107,000 129,000

40,000

Total French Africa

3,866,950

German —

East Africa 364,000

South-West Africa 322,450

Cameroon 190,000

Togoland 33,700

Total German Africa

910,150

Italian —

Eritrea 60,000

Italian Somaliland 140,000

Total Italian Africa 200,000

Portuguese—

Guinea 14,000

West Africa 480,000

East Africa 293,500

Total Portuguese Africa

Spanish —

Rio de Oro . . . Muni River Settlements

Total Spanish Africa

787,500

70,000 9,800

79,800

Belgian—

Congo State 900,000

Turkish —

Tripoli and Benghazi 400,000

Separate States —

Liberia 43,000

Morocco 220,000

Abyssinia 350,000

Total Independent Africa

613,000

Thus, collecting the totals, the result of the ” scramble ” has been to divide Africa among the powers as follows: —

Sq. m.

British Africa 2,101,411

Egyptian Africa 1,600,000

French Africa 3,866,950

German Africa 910,150

Italian Africa 200,000

Portuguese Africa 787,500

Spanish Africa 79, 800

Belgian Africa 900,000

Turkish Africa 400,000

Independent Africa 613,000

11,458,811

Q. S. K.) VI. Exploration and Survey since 1875

In giving the history of the partition of the continent, the later work of exploration, except where, as in the case of de Brazza’s expeditions, it had direct political consequences, has of necessity not been told. The results achieved during and after the period of partition may now be indicated. Stanley’s great journey down the Congo in 1875-1876 initiated a new era in African explora- tion. The numbers of travellers soon became so great that the once

marvellous feat of crossing the continent from sea to sea became common. With increased knowledge and much ampler means of communication trans-African travel now presents few difficulties. While d'Anville and other cartographers of the 18th century, by omitting all that was uncertain, had left a great blank on the map, the work accomplished since 1875 has filled it with authentic topographical details. Moreover surveys of high accuracy have been made at several points. As the work of exploration and survey progressed journeys of startling novelty became impossible — save in the eastern Sahara, where the absence of water and boundless wastes of sand render exploration more difficult, perhaps, than in any other region of the globe. Within their respective spheres of influence each power undertook detailed surveys, and the most solid of the latest accessions to knowledge have resulted from the labours of hard-working colonial officials toiling individually in obscurity. Their work it is impossible here to recognize adequately; the following lines record only the more obvious achievements.

The relations of the Congo basin to the neighbouring river systems was brought out by the journeys of many travellers. In 1877 an important expedition was sent out by the Portu- guese government under Serpa Pinto, Brito Capello and Roberto Ivens for the exploration of the interior of Angola. jy*"* '" The first named made his way by the head-streams of basin. the Kubango to the upper Zambezi, which he descended to the Victoria Falls, proceeding thence to Pretoria and Durban. Capello and Ivens confined their attention to the south-west Congo basin, where they disproved the existence of Lake Aquilunda, which had figured on the maps of that region since the 16th century. In a later journey (i884-i885)Capelloand Ivens crossed the continent from Mossamedes to the mouth of the Zambezi, adding considerably to the knowledge of the border- lands between the upper Congo and the upper Zambezi. More important results were obtained by the German travellers Paul Pogge and Hermann von Wissmann, who (1880-1882) passed through previously unknown regions beyond Muata Yanvo's kingdom, and reached the upper Congo at Nyangwe, whence Wissmann made his way to the east coast. In 1884-1885 a German expedition under Wissmann solved the most important geographical problem relating to the southern Congo basin by descending the Kasai, the largest southern tributary, which, con- trary to expectation, proved to unite with the Kwango and other streams before joining the main river. Further additions to the knowledge of the

Congo tributaries were made at the same time by the Rev. George Grenfell, a Baptist missionary, who (accompanied in 1885 by K. von Francois) made several voyages in the steamer " Peace," especially up the great Ubangi, ultimately proved to be the lower course of the Welle, discovered in i87obySchweinfurth.

In East as in West Africa operations were started by agents of the Belgian committee, but with less success than on the Congo. The first new journey of importance on this side was made (1878-1880) on behalf of the British African Ex- "^"f plo ration Committee by Joseph Thomson, who after the Africa. death of his leader, Keith Johnston, made his way from the coast to the north end of Nyasa, thence to Tanganyika, on both sides of which he broke new ground, sighting the north end of Lake Rukwa on the east. In 1882-1884 the French naval lieutenant Victor Giraud proceeded by the north of Nyasa to Lake Bangweulu, of which he made the first fairly correct map. North of the Zanzibar-Tanganyika route a large area of new ground was opened in 1 883-1 884 by Joseph Thomson, who traversed the whole length of the Masai country to Lake Baringo and Victoria Nyanza, shedding the first clear light on the great East African rift- valley and neighbouring highlands, including Mounts Kenya and Elgon. A great advance in the region between Victoria Nyanza and Abyssinia was made in 1887-1889 by the Austrians, Count Samuel Teleki and Lieut. Ludwig von Hohnel, who discovered the large Basso Norok, now known as Lake Rudolf, till then only vaguely indicated on the map as Samburu. At this time Somaliland was being opened up by English and Italian travellers. In 1883 the brothers F. L, and W. D. James penetrated from Berbera to the Webi Shebeli; in 1892 Vittorio Bottego (afterwards murdered in the Abyssinian highlands) started from Berbera and reached the upper Juba, which he explored to its source. The first person, however, to cross from the Gulf of Aden to the Indian Ocean was an American, A. Donaldson Smith, who in 1 894-1 895 explored the head- streams of the Webi Shebeli and also explored the Omo, the feeder of Lake Rudolf.

In the region north-west of Victoria Nyanza the greatest additions to geographical knowledge were made by H. M. Stanley in his last expedition, undertaken for the relief of Emin Pasha. The expedition set out in 1887 by way of the Congo to carry supplies to the governor of the old Egyptian Equatorial province. The route lay up the Aruwimi, the principal tributary of the Congo from the north-east, by which the expedition made its way, encountering immense difficulties, through the great equatorial

forest, the character and extent of which were thus for the first time brought to light. The return was made to the east coast, and resulted in the discovery of the great snowy range of Ruwen- zori or Runsoro, and the confirmation of the existence of a third Nile lake discharging its waters into the Albert Nyanza by the Semliki river. A further discovery was that of a large bay, hitherto unsuspected, forming the south-west corner of the Victoria Nyanza.

Great activity was also displayed in completing the work of earlier explorers in North and West Africa. Morocco was in 1883-1884 the scene of important explorations by de Foucauld, a Frenchman who, disguised as a Jew, tioasln crossed and re-crossed the Atlas and supplied the North and first trustworthy information as to the orography of YfJ* many parts of the chain. In 1887-1889 Louis Gustave Binger, a French officer, made a great journey through the countries enclosed in the Niger bend, and in 1890-1892 Col. P. F. Monteil went from St Louis to Say, on the Niger, thence through Sokoto to Bornu and Lake Chad, whence he crossed the Sahara to Tripoli. Meantime explorers had been busy in the region between Lake Chad, the Gulf of Guinea and the Congo. The Sanga, one of the principal northern tributaries of the Congo, was reached from the north by Lieut. Louis Mizon, a French naval officer, who drew the first line of communication between the Benue and the Congo (1890-1892). In 1890 Paul Crampel, who in the previous year had explored north of the Ogowe, undertook a great expedition from the Ubangi to the Shari, but was attacked and killed, with several of his companions, on the borders of the Bagirmi. Several other expeditions followed, and in 1896 Emile Gentil reached the Shari, launched a steamer on its waters and pushed on to Lake Chad. Early in 1900 Lake Chad was also reached by F. Foureau, a French traveller, who had already devoted twelve years to the exploration of the

torial Africa.

Sahara and who on this occasion had crossed the desert from Algeria and had reached the lake via Air and Zinder.

The last ten years of the 19th century also witnessed many interesting expeditions in east Central Africa. In 1891 Emin Lakes and I >as ‘ la > accompanied by Dr F. Stuhlmann, made his mountains way south of Victoria Nyanza to the western Nile ofEqua- lakes, visiting for the first time the southern and western shores of Albert Edward. Stuhlmann also ascended the Ruwenzori range to a height of over 13,000 ft. Inthe same year Dr O. Baumann, who had already done good work in Usambara, near the coast, started on a more extended journey through the region of steppes between Kili- manjaro and Victoria Nyanza, afterwards exploring the head- streams of the Kagera, the ultimate sources of the Nile. In the steppe region referred to he discovered two new lakes, Manyara and Eiassi, occupying parts of the East African valley system. This region was again traversed in 1893-1894 by Count von Gotzen, who continued his route westwards to Lake Kivu, north of Tanganyika, which, though heard of by Speke over thirty years before, had never yet been visited. He also reached for the first time the line of volcanic peaks north of Kivu, one of which he ascended, afterwards crossing the great equatorial forest by a new route to the Congo and the west coast. Valuable scientific work was done in 1893 by Dr J. W. Gregory, who ascended Mount Kenya to a height of 16,000 ft. In 1893ˆ1894 Scott Elliot reached Rnwenzori by way of Uganda, returning by Tanganyika and Nyasa, and in 1896 C. W. Hobley made the circuit of the great mountain Elgon, north-east of Victoria Nyanza. In 1899 Mount Kenya was ascended to its summit by a party under H. J. Mackinder. The exploration of Mount Kilimanjaro has been the special work of Dr Hans Meyer, who first directed his attention to it in 1887.

The region south of Abyssinia proper and north of Lake Rudolf, being largely the basin of the Sobat tributary of the Nile, was traversed by several explorers, among whom maybe men- tioned Capt. M. S. Wellby, who in 1898-1899 explored the chain of small lakes in south-east Abyssinia, pushed on to Lake Rudolf, and thence traversed hitherto unknown country to the lower Sobat. Donaldson Smith crossed from Berbera to the Nile by Lake Rudolf in 1899-1900, and Major H. H. Austin com- manded two survey parties between the Anglo-Egyptian Sudan and Lake Rudolf during 1899-1901. Meantime in south Central Africa the Barotse country had been partly made known by the missionary F. Coillard, who settled there in 1884, while the middle and upper Zambezi basin were scientifically explored and mapped by Major A. St H. Gibbons and his assistants in 1S95-1896 and 1898-1900.

In the same period the Congo- Zambezi watershed was traced by a Belgian officer, Capt. C. Lemaire, who had ascended one of the upper tributaries of the Kasai.

In the early years of the 19th century the first recorded crossing of Africa took place. That crossing and all subsequent crossings had been made either from west to east or east to west. The first journey through the whole length of the continent was accomplished in the two last years of the century when a young Englishman, E. S. Grogan, starting from Cape Town reached the Mediterranean by way of the Zambezi, the central line of lakes and the Nile. Other travellers followed in Grogan's footsteps, among the first, Major Gibbons.

Additions to topographical knowledge were made from about 1890 onwards by the international commissions which traced the frontiers of the protectorates of the European On several occasions the labours of the

Work or

inter- powers.

national commissions disclosed errors of importance in the

commis- maps upon which international agreements had been

slonsand

surveying

based. Among those which yielded valuable results parties. were the Anglo-French commission which in 1903

traced the Nigerian frontier from the Niger to Lake Chad, and the Anglo-German commission which in 1903-1904 fixed the Cameroon boundary between Yola, on the Benue, and Lake Chad. These expeditions and French surveys in the same region during 190 2-1903 resulted in the discovery that Lake Chad

had greatly decreased in area since the middle of the 19th century. In 1903 a French officer, Capt. E. Lenfant, succeeded in establishing the fact of a connexion between the Niger and Chad basins. Subsequently Lenfant explored the western basin of the

Shari, determining (1907) the true upper branch of that river. .....

In East Africa a German-Congolese commission surveyed (1901-1902) Lake Kivu and the volcanic region north of the lake, R. Kandt making a special study of Kivu and the Kagera sources, while the Anglo-German boundary commission of 1 902-1904 surveyed the valley of the lower Kagera, and fixed the exact position of Albert Edward Nyanza. Much new information concerning the border Jands of British East Africa and Abyssinia between Lake Rudolf and the lower Juba was obtained by the survey executed in 1902-1903 by a British officer, Captain P. Maud.

While political requirements led to the exact determination of frontiers, administrative needs forced the governments concerned to take in hand the survey of the countries under their protection. Before the close of the first decade of the 20th century tolerably accurate maps had been made of the German colonies, of a considerable part of West Africa, the Algerian Sahara and the Anglo-Egyptian Sudan, mainly by military officers. A British naval officer, Commander B. Whitehouse, mapped the entire coastline of Victoria Nyanza. Government and railway surveys apart, the chief points of interest for explorers during 1 904-1906 were the Ruwenzori range and the connexion of the basin of Lake Chad with the Niger and Congo systems. Lieut. Boyd Alexander was the leader of a party which during the years named surveyed Lake Chad and a considerable part of eastern Nigeria, returning to England via the Shari, the Ubangi and the Nile. Two members of the party, Capt. Claud Alexander and Capt. G. B. Gosling, died during the expedition. The Ruwenzori Mountains proved a great source of attraction. Sir H. H. Johnston had in 1900 ascended beyond the snow-line to 14,800 ft.; in 1903 Dr J. J. David had reached from the west to a height he believed to exceed 16,000 ft. ; and in the same year Capt. T. T. Behrens, of the Anglo-German Uganda boundary commission, fixed the highest summit at 16,619 ft. During 1904-1906 some half-dozen expeditions were at work in the region. That of the duke of the Abruzzi was the most successful. In the summer of 1906 the duke or members of his party climbed all the highest peaks, none of which reaches 17,000 ft., and determined the main lines of the watershed. Major Powell-Cotton, a British officer who had previously done good work in Abyssinia and British East Africa, spent 1905- 1906 in a detailed examination of the Ladp enclave and the country west of

Ruwenzori and Albert and Albert Edward lakes. This expedition was specially fruitful in additions to zoological knowledge.

Archaeological research, stimulated by the reports of Thomas Shaw, British consular chaplain at Algiers in 1719-1731, by James Bruce's exploration; 1765-1767, of the ruins in Barbary, and by the French conquest of Egypt in 1798, has been systematically carried out in North Africa since the middle of the 19th century (see Egypt and Africa, Roman). In South Africa the first thorough examination of the ruins in Rhodesia was made in 1905, when Randall-Maclver demonstrated that the great Zimbabwe and similar buildings were of medieval or post-medieval origin. (F. R. C.)

VII. Social and Economic Conditions The eagerness with which the nations of western Europe partitioned Africa between them was due, as has been seen, more to the necessities of commerce than to mere land hunger. Yet, except in the north and south temperate regions, the commercial intercourse of the continent with the rest of the world had been until the closing years of the 19th century of insignificant pro- portions. In addition to slaves, furnished by the continent from the earliest times, a certain amount of gold and ivory was ex- ported from the tropical regions, but no other product supplied the material for a flourishing trade with those parts. To their

Asiatic and European invaders the Africans indeed owed many-creature comforts — the introduction of maize, rice, the sugar cane, the orange, the lemon and the lime, cloves, tobacco and many other vegetable products, the camel, the horse and other animals — but invaluable to Africa as were these gifts they led to little development of commerce. The continent- continued in virtual isolation from the great trade movements of the world, an isolation due not so much to its poverty in Isolation. na tural resources, as to the special circumstances which likewise caused so large a part of the continent to remain so long a terra incognita. The principal drawbacks may be summarized as: (i)

the absence of means of communication with the interior; (2) the unheal thiness of the coast-lands;' (3) the small productive activity of the natives; (4) the effects of the slave trade in discouraging legitimate commerce. None of these causes is necessarily permanent, that most difficult to remove being the third; the negro races finding the means of existence easy have little incentive to toil. The first drawback has almost disappeared, and the building of railways and the placing of steamers on the rivers and lakes — a work continually progressing —renders it year by year easier for producer and consumer to come together. As to the second drawback, while the coast-lands in the tropics will always remain comparatively unhealthy, improved sanitation' and the destruction of the malarial mosquito have rendered tolerable to Europeans regions formerly notorious for their deadly climate.

At various periods since the. partition of the continent began, united action has been taken by the powers of Europe in the interests of African trade. The Berlin conference of 1884-1885 decreed freedom of navigation and trade on the Congo and the Niger, and the Anglo-Portuguese treaty of 1891 secured like privileges for the Zambezi. The Berlin conference likewise enacted that over a wide area of Central Africa — the conventional basin of the Congo — there should be complete freedom of trade, a freedom which later on was held to be infringed in the Congo State and French Congo by the granting to various companies proprietary rights in the disposal of the product of the soil. More important in their effect on the economic condition of the con- tinent than the steps taken to ensure freedom of trade were the measures concerted by the powers for the suppression of the slave trade. The British government had for long borne the greater part of the burden of combating the slave trade on the east coast of Africa and in the Indian Ocean, but the changed conditions which resulted from the appearance of other European powers in Africa induced Lord Salisbury, then foreign secretary, to address, in the autumn of 1888, an invitation to the king of the Belgians to take the initiative in inviting a conference of the powers at Brussels to concert measures for " the gradual suppression of the Suppres- s l ave trade on the continent of Africa, and the im- sioaof mediate closing of all the external markets which it the slave still supplies." The conference assembled in November trade – 1889, and on the 2nd of July 1890 a general act was

signed subject to the ratification of the various governments

represented, ratification taking place subsequently at different dates, and in the case of France with certain reservations. The general act began with a declaration of the means which the powers were of opinion might be most effectually adopted for " putting an end to the crimes and devastations engendered by the traffic in African slaves, protecting effectively the aboriginal populations of Africa, and ensuring for that vast continent the benefits of peace and civilization." It proceeded to lay down certain rules and regulations of a practical character on the lines suggested. The act covers a wide field, and includes no fewer than a hundred separate articles. It established a zone "between the 20th parallel of north latitude, and the 22nd parallel of south latitude, and extending westward to the Atlantic and eastward to the Indian Ocean and its dependencies, comprising the islands adjacent to the coast as far as 100 nautical miles from the shore," within which the importation of firearms and ammunition was forbidden except in certain specified cases, and within which also the powers undertook either to prohibit altogether the importa- tion and manufacture of spirituous liquors, or to impose duties

not below an agreed-on minimum. 1 An elaborate series of rules was framed for the prevention of the transit of slaves by sea, the conditions on which European powers were to grant to natives the right to fly the flag of the protecting power, and regulating the procedure connected with the right of search on vessels flying a foreign flag. The Brussels Act was in effect a joint declaration by the signatory powers of their joint and several responsibility towards the African native, and notwithstanding the fact that many of its articles have proved difficult, if not impossible, of enforcement, the solemn engagement taken by Europe in the face of the world has undoubtedly exercised a material influence on the action of several of the powers. Moreover, with the increase of means of communication and the extension of effective European control, slave-raiding in the interior was largely checked and inter-tribal wars prevented, the natives being thus given security in the pursuit of trade and agriculture.

Other important factors in the economic as well as the social conditions of Africa are the advance in civilization made by the natives in several regions and the increase of the areas found suitable for white colonization. The advance in civilization among the natives, exemplified by the granting to them of political rights in such countries as Algeria and Cape Colony,

leads directly to increased commercial activity; and commerce increases in a much greater degree when new countries— e.g. Rhodesia and British East Africa — become the homes of Europeans. Finally, in reviewing the chief factors which govern the commercial development of the continent, note must be taken of the sparsity of the population over the greater part of Africa, and the efforts made to supplement the insufficient and often ineffective native labour by the introduction of Asiatic labourers in various districts — of Indian coolies in Natal and elsewhere, and of Chinese for the gold mines of the Transvaal.

The resources of Africa may be considered under the head of: (1) jungle products; (2) cultivated products; (3) animal pro- ducts; (4) minerals. Of the first named the most important are india-rubber and palm-oil, which in chlef ,

■ 1 a r • 1 1 ~ r . 1 • • 1 economic

tropical Africa supply by far the largest items in the resources.

export list. The rubber-producing plants are found

throughout the Whole tropical belt, and the most important are

creepers of the order Apocynaceae, especially various species of

Landolphia (with which genus Vakea is now united). In East

Africa Landolphia kirkii (Dyer) supplies the largest amount,

though various other species are known. Forms of apparently

wider distribution are!,, hendelotii, which is found in the Bahr-el-

Ghazal, and extends right across the continent to Senegambia;

and L. (formerly Vahea) comorensis, which, including its variety

L. florida, has the widest distribution of all the species, occurring

in Upper and Lower Guinea, the whole of Central Africa, the

east coast, the Comoro Islands and Madagascar. In parts of

East Africa Clitandra orientalis is a valuable rubber vine. In

Lagos and elsewhere rubber is produced by the apocynaceous tree, Funtumia elastica, and in West Africa generally by various species of Ficus, some species of which are also found in East Africa. The rubber produced is somewhat inferior to that of South America, but this is largely due to careless methods of preparation. The great destruction of vines brought about by native methods of collection much reduced the supply in some districts, and rendered it necessary to take steps to preserve and cultivate the rubber-yielding plants. This has been done in many districts with usually encouraging results. Experiments have been made in the introduction of South American rubber plants, but opinions differ as to the prospects of success, as the plants in question seem to demand very definite conditions of soil and climate. The second product, palm-oil, is derived from a much more limited area than rubber, for although the oil palm is found throughout the greater part of West Africa, from io° N. to 10° S., the great bulk of the export comes from the coast districts at the head of the Gulf of Guinea. A larger supply,

1 Further conferences respecting the liquor traffic in Africa were held in Brussels in 1899 and 1906. In both instances conventions were signed by the powers, raising the minimum duty on imported spirituous liquors.

equal to any market demand, could easily be obtained. A third

valuable product is the timber supplied by the forest regions, principally in West Africa. It includes African teak or oak (Oldfieldia africana), excellent for shipbuilding; the durable odum of the Gold Coast (Chlorophora excelsa) ; African mahogany (Khaya senegalensis) ; ebony (Diospyros ebenum); camwood (Baphia nitida) ; and many other ornamental and dye woods. The timber industry on the west coast was long neglected, but since 1898 there have been large exports to Europe. In parts of East Africa the Podocarpus milanjianus, a conifer, is economically important. Valuable timber grows too in South Africa, including the yellow wood {Podocarpus), stinkwood (Oco(ea), sneezewood or Cape ebony (Euclea) and ironwood.

Other vegetable products of importance are: Gum arabic, obtained from various species of acacia (especially A. Senegal), the chief supplies of which are obtained from Senegambia and the steppe regions of North Africa (Kordofan, &c); gum copal, a valuable resin produced by trees of the leguminous order, the best, known as Zanzibar or Mozambique copal, coming from the East African Trachylobium hornemannianum, and also found in a fossil state under the soil; kola nuts, produced chiefly in the coast-lands of Upper Guinea by a tree of the order Sterculiaceae (Kola acuminata); archil or orchilla, a dye-yielding lichen (Rocella tinctoria and triciformis) growing on trees and rocks in East Africa, the Congo basin, &c; cork, the bark of the cork oak, which flourishes in Algeria; and alfa, a grass used in paper manufacture (Machrochloa tenacissima), growing in great abundance on the dry steppes of Algeria, Tripoli, &c. A product to which attention has been paid in Angola is the Almeidina gum or resin, derived from the juice of Euphorbia tirucalli.

The cultivated products include those of the tropical and warm temperate zones. Of the former, coffee is perhaps the most valuable indigenous plant. It grows wild in many parts, the home of one species being in Kaffa and other Galla countries south of Abyssinia, and of another in Liberia. The Abyssinian coffee is equal to the best produced in any other part of the world. Cultivation is, however, necessary to ensure the best results, and attention has been given to this in various European colonies. Plantations have been established in Angola, Nyasaland, German East Africa, Cameroon, the Congo Free State, &c.

Copra, the produce of the cocoa-nut palm, is supplied chiefly by Zanzibar and neighbouring parts of the east coast. Ground- nuts,

produced by the leguminous plant, Arachis hypogaea, are grown chiefly in West Africa, and the largest export is from Senegal and the Gambia; while Bambarra ground-nuts (Voand- zeia subterranea) are very generally cultivated from Guinea to Natal. Cloves are extensively grown on Zanzibar and Pemba islands, Pemba being the chief source of the world's supply of cloves. The chief drawbacks to the industry are the fluctuations of the yield of the trees, and the risk of over-production in good seasons.

Cotton grows wild in many parts of tropical Africa, and is exported in small quantities in the raw state; but the main export is from Egypt, which comes third among the world's sources of supply of the article. It is also cultivated in West Africa — the industry in the Guinea coast colonies having been developed since the beginning of the 20th century — and in the Anglo-Egyptian Sudan, whence came the plants from which Egyptian cotton is grown. Sugar, which is the staple crop of Mauritius, and in a lesser degree of Reunion, is also produced in Natal, Egypt, and, to a certain extent, in Mozambique. Dates are grown in Tunisia and the Saharan oases, especially Tafilet; maize in Egypt, South Africa and parts of the tropical zone; wheat in Egypt, Algeria and the higher regions of Abyssinia; rice in Madagascar. Wine is largely exported from Algeria, and in a much smaller quantity from Cape Colony; fruit and vegetables from Algeria. Tobacco is widely grown on a small scale, but, except perhaps from Algeria, has not become an important article of export, though plantations have been established in various tropical colonies. The cultivation of cocoa has proved successful in the Gold Coast, Cameroon and other colonies, and in various districts the tea plant is cultivated.

Indigo, though not originally an African product, has become naturalized and grows wild in many parts, while it is also cultivated on a small scale. The main difficulty in the way of tropical cultivation is the labour question, which lias already been referred to.

Of animal products one of the most important is ivory, the largest export of which is from the Congo Free State. The diminution in the number of elephants with the opening up of the remoter districts must in time cause a falling-off in this export. Beeswax is obtained from various parts of the interior of West Africa, and from Madagascar. Raw hides are exported in large quantities from South Africa, as are also the wool and hair of the merino sheep and Angora goat. Both hides and wool are also exported

from Algeria and Morocco, and hides from Abyssinia and Somaliland. Ostrich feathers are produced chiefly by the ostrich farms of Cape Colony, but some are also obtained from the steppes to the north of the Central Sudan. Live stock, principally sheep, is exported from Algeria and cattle from Morocco.

The exploited minerals of Africa are confined to a few districts, the resources of the continent in this respect being largely undeveloped. Since the discovery of gold in the Transvaal, particularly in the district known as the wealth. Rand (1885), the output has grown enormously, so that in 1898 the output of gold from South Africa was greater than from any other gold-field in the world. The Anglo-Boer War of 1899-1902 lost the Rand the leading position, but by 1905 the output — in that year over £20,800,000 — was greater than it had ever been. The supply of gold from South Africa is roughly 25% of the world's output. The gold-yielding formations extend northwards through Rhodesia. The Gold Coast is so named from the quantity of gold obtained there, and since the close of the 19th century the industry has developed largely in the hands of Europeans. In the Galla countries gold has long been an article of native commerce. It is also found in various parts of the Anglo-Egyptian Sudan and along the western shore of the Red Sea. Diamonds are found in large quantities in a series of beds known as the Kimberley shales, the principal mines being at Kimberley, Cape Colony. Diamonds are also found in Orange River Colony, while one of the richest diamond mines in the world — the Premier — is situated in the Transvaal near Pretoria. Some 80% of the world's pro- duction of diamonds comes from South Africa. Copper is found in the west of Cape Colony, in German South- West Africa, and in the Katanga country in the southern Congo basin, where vast beds of copper ore exist. There are also extensive deposits of copper in the Broken Hill district of Northern Rhodesia. It also occurs in Morocco, Algeria, the Bahr-el-Ghazal, &c. Rich tin deposits have been found in the southern Congo basin and in Northern Rhodesia. Iron is found, in Morocco, Algeria (whence there is an export trade), and is widely diffused, and worked by the natives, in the tropical zone. But the deposits are generally not rich. Coal is worked, principally for home con- sumption, in Cape Colony, Natal, the Transvaal, Orange River Colony, and in Rhodesia in the neighbourhood of the Zambezi. Coal deposits also exist in the German territory north of Lake Nyasa. Phosphates are exported from Algeria and Tunisia. Of other minerals which occur, but are little worked, zinc, lead and

antimony are found in Algeria, lead and manganese in Cape Colony, plumbago in Sierra Leone.

The imports from foreign countries into Africa consist chiefly of manufactured goods, varying in character according to the development of the different countries in civilization. In Egypt, Algeria and South Africa they include most of the necessaries and luxuries of civilized life, manufactured cotton and woollen goods, especially the former, taking the first place, but various food stuffs, metal goods, coal and miscellaneous articles being also included. In tropical Africa, and generally where few Europeans have settled, the great bulk of the imports consists as a rule of cotton goods, articles for which there is a constant native demand.

No continent has in the past been so lacking in means of

communication as Africa, and it was only in the last decade . m of the 19th century that decided steps were taken to meat of remedy these defects. The African rivers, with the means of exception of the middle Congo and its affluents, and communi-tne middle course of the three other chief rivers, are ” on ‘ generally unfavourable to navigation, and throughout the tropical region almost the sole routes have been native foot-paths, admitting the passage of a single file of porters, on whose heads all goods have been carried from place to place. Certain of these native trade routes are, however, much frequented, and lead for hundreds of miles from the coast to the interior. In the desert regions of the north transport is by caravans of camels, and in the south ox-wagons, before the advent of railways, supplied the general means of locomotion. The native trade routes led generally from the centres of greatest population or production to the seaports by the nearest route, but to this rule”there was a striking exception. The dense forests of Upper Guinea and the upper Congo proved a barrier which kept the peoples of the Sudan from direct access to the sea, and from Timbuktu to Darfur the great trade routes were either west to east or south to north across the Sahara. The principal caravan routes across the desert lead from different points in Morocco

and Algeria to Timbuktu; from Tripoli to Timbuktu, Kano and other great marts of the western and central Sudan; from Bengazi to Wadai; and from Assiut on the Nile through the Great Oasis and the Libyan desert to Darfur. South of the equator the principal long-established routes are those from Loanda to the Lunda and Baluba countries; from Benguella via Bihe to Urua and the upper Zambezi; from Mossamedes across the Kunene to the upper Zambezi; and from Bagamoyo, opposite Zanzibar, to Tanganyika. Many of the native routes have been superseded by the improved communications introduced by Europeans in the utilization of waterways and the construction of roads and railways. Steamers have been conveyed overland in sections and launched on the interior waterways above the obstructions to navigation. On the upper Nile and Albert Nyanza their introduction was due to Sir S. Baker and General C. G. Gordon (1871-1876) ; on the middle Congo and its affluents to Sir H. M. Stanley and the officials of the Congo Free State, as well as to the Baptist missionaries on the river; and oh Lake Nyasa to the supporters of the Scottish mission. A small vessel was launched on Victoria Nyanza in 1896 by a British mercantile firm, and a British government steamer made its first trip in November 1900. On the other great lakes and on most of the navigable rivers steamers were plying regularly before the close of the 19th century. However, the shallowness of the water in the Niger and Zambezi renders their navigation possible only to light-draught steamers. Roads suitable for wheeled traffic are few. The first attempt at road-making in Central Africa on a large scale was that of Sir T. Fowell Buxton and Mr (after- wards Sir W.) Mackinnon, who completed the first section of a track leading into the interior from Dar-es-Salaam (1879). A still more important undertaking was the ” Stevenson road,” begun in 1881 from the head of Lake Nyasa to the south end of Tanganyika, and constructed mainly at the expense of Mr James Stevenson, a director of the African Lakes Company — a company which helped materially in the opening up of Nyasaland. The Stevenson road forms a link in the “Lakes route” into the heart of the continent. In British East Africa a road connecting Mombasa with Victoria Nyanza was completed in 1897, but has since been in great measure superseded by the railway. Good roads have also been made in German East Africa and Cameroon and in Madagascar.

Railways, the chief means of affording easy access to the interior of the continent, were for many years after their first

introduction to Africa almost entirely confined to the extreme north and south (Egypt, Algeria, Cape Colony and Natal). Apart from short fines in Senegal, Angola and at Lourenco Marques, the rest of the continent was in 1890 without a railway system. In Egypt the Alexandria and Cairo railway dates from 1855, while in 1877 the lines open reached about 1100 miles, and in 1890, in addition to the lines traversing the delta, the

Nile had been ascended to Assiut. In Algeria the construction of an inter-provincial railway was decreed in 1857, but was still incomplete twenty years later, when the total length of the lines open hardly exceeded 300 miles. Before 1890 an extension to Tunis had been opened, while the plateau had been crossed by the lines to Ain Sefra in the west and Biskra in the east. In Senegal the railway from Dakar to St Louis had been commenced and completed during the 'eighties, while the first section of the Senegal-Niger railway, that from Kayes to Bafulabe, was also constructed during the same decade. In Cape Colony, where in about 1880 the railways were limited to the neighbourhood of Cape Town, Port Elizabeth and East London, the next decade saw the completion of the trunk-line from Cape Town to Kimberley, with a junction at De Aar with that from Port Elizabeth. The northern frontier had, however, nowhere been crossed. In Natal, also, the main line had not advanced beyond Ladysmith. The settlement, c. 1890, of the main lines of the partition of the continent was followed by many projects for the opening up of the possessions and spheres of influence of the various powers by the building of railways; several of these schemes being carried through in a comparatively short time. The building of railways was undertaken by the governments concerned, nearly all the African lines being state-owned. In the Congo Free State a railway, which took some ten years to build, connecting the navigable waters of the lower and middle Congo, was completed in 1898, while in 1906 the middle and upper courses of the river were linked by the opening of a line past Stanley Falls. Thus the vast basin of the Congo was rendered easily accessible to commercial enterprise. In North Africa the Algerian and Tunisian railways were largely extended, and proposals were made for a great trunk-line from Tangier to Alexandria. The railway from Ain Sefra was continued south- ward towards Tuat, the project of a trans-Saharan line having occupied the attention of French engineers since 1 880. In French West Africa railway communication between the upper Senegal and the upper Niger was completed in 1904; from the Guinea coast at Konakry

another line runs north-east to the upper Niger, while from Dahomey a third line goes to the Niger at Garu. In the British colonies on the same coast the building of railways was begun in 1896. A line to Kumasi was completed in 1903, and the line from Lagos to the lower Niger had reached Illorin in 1908. Thence the railway was continued to the Niger at Jebba. From Baro, a port on the lower Niger which can be reached by steamers all the year round, another railway, begun in 1907, goes via Bida, Zungeru and Zaria to Kano, a total distance of 400 miles. A line from Jebba to Zungeru affords connexion with the Lagos railway.

But the greatest development of the railway systems was in the south and east of the continent. In British East Africa a survey for a railway from Mombasa to Victoria Nyanza was made in 1892. The first rails were laid in 1896 and the line reached the lake in December 1901. Meanwhile, there had been a great extension of railways in South Africa. Lines from Cape Town, Port Elizabeth, East London, Durban and Delagoa Bay all converged on the newly risen city of Johannesburg, the centre of the Rand gold mines. A more ambitious project was that identified with the name of Cecil Rhodes, namely, the extension northward of the railway from Kimberley with the object of effecting a continuous railway connexion from Cape Town to Cairo. The line from Kimberley reached Bulawayo in 1897. (Bulawayo is also reached from Beira on the east coast by another line, completed in 1902, which goes through Portuguese territory and Mashonaland.) The extension of the line north- ward from Bulawayo was begun in 1899, the Zambezi being bridged, immediately below the Victoria Falls, in 1905. From this point the railway goes north to the Katanga district of the Congo State. In the north of the continent a step towards the completion of the Cape to Cairo route was taken in the opening in 1899 of the railway from Wadi Haifa to Khartum. A fine of greater economic importance than the last named is the railway (completed in 1905) from Port Sudan on the Red Sea to the Nile a little south of Berber, thus placing the Anglo-

Egyptian Sudan within easy reach of the markets of the world. A west to east connexion across the continent by rail and steamer,

from the molith of the Congo to Port Sudan, was arranged in 1006 when an agreement was entered into by the Congo and Sudan governments for the building of a railway from Lado, on the Nile, to the Congo frontier, there to meet a railway starting from the river Congo near Stanley Falls. A railway of considerable importance is that from Jibuti in the Gulf of Aden to Harrar, giving access to the markets of southern Abyssinia.

Besides the railways mentioned there are several others of less importance. Lines run from Loanda and other ports of Angola towards the Congo State frontier, and from Tanga and Dar-es-Salaam on the coast of German East Africa towards the great lakes. In British Central Africa a railway connects Lake Nyasa with the navigable waters of the Shire, and various lines have been built by the French in Madagascar.

All the main railways in South Africa, the lines in British West Africa, in the Anglo-Egyptian Sudan and in Egypt south of Luxor are of 3 ft. 6 in. gauge. The main lines in Lower Egypt and in Algeria and Tunisia are of 4 ft. 8% in. gauge. Elsewhere as in French West and British East Africa the lines are of metre (3-28 ft.) gauge.

The telegraphic system of Africa is on the whole older than that of the railways, the newer European possessions having in most cases been provided with telegraph lines before railway projects had been set on foot. In Algeria, Egypt and Cape Colony the systems date back to the middle of the 19th century, before the end of which the lines had in each country reached some thousands of miles. In tropical Africa the systems of French West Africa, where the line from Dakar to St Louis was begun in 1862, were the first to be fully developed, lines having been carried from different points on the coast of Senegal and Guinea towards the Niger, the main line being prolonged north- west to Timbuktu, and west and south to the coast of Dahomey. The route for a telegraph line to connect Timbuktu with Algeria was surveyed in 1905. The Congo region is furnished with several telegraphic systems, the longest going from the mouth of the river to Lake Tanganyika. From Ujiji on the east coast of that lake there is telegraphic communication via Tabora with Dar-es-Salaam and via Nyasa and Rhodesia with Cape Town. The last-named line is the longest link in the trans-continental line first suggested in 1876 by Sir (then Mr) Edwin Arnold and afterwards taken up by Cecil Rhodes. The northern link from Egypt to Khartum has been continued southward to Uganda, while

another line connects Uganda with Mombasa. At the principal seaports the inland systems are connected with sub- marine cables which place Africa in telegraphic communication with the rest of the world.

Numerous steamship lines run from Great Britain, Germany, France and other countries to the African seaports, the journey from any place in western Europe to any port on the African coast occupying, by the shortest route, not more than three weeks. (E. He., F. R. C.)

Bibliography. — Authoritative works dealing with Africa as a whole in any of its aspects are comparatively rare. Besides such volumes the following list includes therefore books containing valuable information concerning large or typical sections of the continent : —

§ I. General Descriptions. — (a) Ancient and Medieval. Herodotus, ed. G. Rawlinson, 4 vols. 1 (1880); Ptolemy's Geographic, ed. C. Miiller, vol. i. (Paris, 1883-1901); Ibn Haukal, " Description de 1 Afnque " (transl. McG. de Slane), Nouv. Journal asiatique, 1842; Edrisi, " Geographie " (transl. Jaubert), Rec. de voyages . . . Soc. de Geogr. vol. v. (Paris, 1836); Abulfeda, Geographie (transl. Reinaud and Guyard, Paris, 1848-1883) ; M. A. P. d'Avezac, Description de lAfrique ancienne (Paris, 1845); L. de Marmol, Description general de Africa (Granada, 1573) ; L. Sanuto, Geografia dell' Africa (Venice, 1588); F. Pigafetta, A Report of the Kingdom of Congo, &c. (1597); Leo Africanus, The History and Description of Africa (transl. J. Pory, ed. R. Brown), 3 vols. (1896); O. Dapper, Naukeurige beschrijvinge der afrikaensche gewesten, &c. (Amsterdam, 1668) (also English version by Ogilvy, 1670, and French version, Amsterdam, 1686); B. Tellez, " Travels of the Jesuits in Ethiopia," A New Collection of Voyages, vol. vii. (17 10) ; G. A. Cav azzi da Montecuccolo, Istorica

1 Where no place of publication is given, London is to be understood.

Descrittione de tre Regni Congo, Matamba, et Angola (Milan, 1690) (account of the labours of the Capuchin missionaries and their observations on the country and people) ; J. Barbot, " Description of the Coasts of North and South Guinea and of Ethiopia Inferior," Churchill's Voyages, vol. v. (1707); W. Bosman, A New . . . Description of the Coasts of Guinea, &c, 2nd

ed. (1721); J. B. Labat, Nouvelle relation del'Afrique occidentals, 5 vols. (Paris, 1728); Idem,' Relation historique de l'£thiopie occidentale, 5 vols. (Paris, 1732). (b) Modern. B. d'Anville, Memoire cone, les rivieres de I'interieur de I'Afrique (Paris, n.d.) ; M. Vollkommer, Die Quellen B. d'Anville' s fur seine kritische Karte von Afrika (Munich, 1904) ; C. Ritter, Die Erdkunde, i. Theil, 1. Buch, " Afrika " (Berlin, 1822); J. M'Qiieen, Geographical and Commercial View of Northern and Central Africa (Edinburgh, 1821) ; Idem, Geographical Survey of Africa (1840) ; W- D. Cooley, Inner Africa laid open (1852); E. Reclus, Nouvelle geo- graphie universale, vols, x.-xiii. (1885-1888); A. H. Keane, Africa (in Stanford's Compendium), 2 vols., 2nd ed. (1904-1907) ; F. Hahn and I W. Sievers, Afrika, 2. Aufl. (Leipzig, 1901); M. Fallex and A. Mairey, L'Afrique au debut du XX' siecle (Paris, 1906) ; Sir C. P. Lucas, Historical Geography of the British Colonies, volsJ iii. and iv. (Oxford, 1894, 1904); F. D. and A. J. Herbertson, Descriptive Geographies from Original Sources: Africa (1902) ; British Africa {The British Empire Series, vol. ii., 1899); Journal of the African Society; Comite de I'Afrique francaise, Bulletin, Paris; Mitteilungentfder afrikan. Gesellschaft in Deutschland (Berlin, 1 879-1 889); Mittei- lungen . . . aus den deutschen Schutzegebieten (Berlin) ; H. Schirmer, Le Sahara (Paris, 1893) ; Mary H. Kingsley, West African Studies, 2nd ed. (1901); J. Bryce, Impressions of South Africa (1897); Sir Harry Johnston, The Uganda Protectorate, 2 vols. (1902) (vol. ii. is devoted to anthropology) ; E. D. Morel, Affairs of West Africa (1902). § II. Geography {Physical), Geology, Climate, Flora and Fauna. — (For Descriptive Geogr. see § I.)— G. Giirich, " Uberblick iiber den geolog. Bau des afr. Kontinents," Peterm. Mitt., 1887; A. Knox, Notes on the Geology of the Continent of Africa (1906) (includes a bibliography) ; L. von Hohnel, A. Rosiwal, F. Toula and E. Suess, Beitrage zur geologischen Kenntniss des ostlichen Afrika (Vienna, 1891) ; E. Stromer, Die Geologie der deutschen Schutzgebieten in Afrika (Munich, 1896); J. Chavanne, Afrika im Lichte unserer Tage: Bodengestalt, &c. (Vienna, 1881); F. Heidrich, " Die mittlere Hohe Afrikas," Peterm. Mitt., 1888; J. W. Gregory, The Great Rift- Valley (1896); H. G. Lyons, The Physiography of the River Nile and its Basin (Cairo, 1906) ; S. Passarage, Die Kalahari: Versuch einer physischgeogr. Darstellung . . . des sildafr. Beckens (Berlin. 1904) ; Idem, " Inselberglandschaften im tropischen Afrika," Naturw. Wochenschrift, 1904. 654-665; J. E. S. Moore, The Tanganyihc Problem (1903) ; W. H. Hudleston, " On the Origin of the Marine (Halolimnic) Fauna of Lake Tanganyika," Journ. of Trans.

Victoria Inst., 1904, 300-351 (discusses the whole question of the geological history of equatorial Africa); E. Stromer, ” 1st der Tanganyika eir, Relikten-See?” Peterm. Mitt., 1901, 275-278; E. Kohlschutter ” Die . . . Arbeiten der Pendelexpedition ... in Deutsch-Ost- Afrika,’ Verh. Deuts. Geographentages Breslau, 1901, 133-153; J. Cornet “La geologie du bassin du Congo,” Bull. Soc. Beige geol., 1898 E. G. Ravenstein, “The Climatology of Africa ” (ten reports)! Reports Brit. Association, 1892-1901; Idem, ” Climatologica Observations ... I. Tropical Africa ” (1904) ; H. G. Lyons, ” Oi: the Relations between Variations of Atmospheric Pressure . . . anc 1 the Nile Flood,” Proc. Roy. Soc, Ser. A, vol. lxxvi., 1905; P. Reichard, ” Zur Frage der Austrocknung Afrikas,” Geogr. Zeitschrift, 1895; J. Hoffmann, “Die tiefsten Temperaturen auf den Hoch- landern,” &c, Peterm. Mitt., 1905; G. Fraunberger, ” Studien iiber die jahrlichen Niederschlagsmengen des afrik. Kontinents,” Peterm. Mitt., 1906; D. Oliver and Sir W. T. Thiselton-Dyer, Flora 0] Tropical Africa, 10 vols. (1888-1906); K. Oschatz, Anordnung der Vegetation in Afrika (Erlangen, 1900) ; A. Engler, Hochgebirgs- flora des tropischen Afrika (Berlin, 1892); Idem, Die Pfllanzenwelt Ostafrikas und der Nachbargebiete, 3 vols. (Berlin, 1895) ; Idem, Beitrage zur Flora von Afrika (Engler’s Botan. Jahrbucher, 14 vols. &c.) ; W. P. Hiern, Catalogue of the African Plants collected by Dr Friedrich Welwitschin 1853-1861, 2 vols. (1896-1901) ; R. Schlechter, Westafrikanische Kautschuk- Expedition (Berlin, 1900) ; H. Baum’ Kunene-Sambesi-Expedition (Berlin, 1903) (largely concerned with botany) ; W. L. Sclater, ” Geography of Mammals, No. iv. The Ethiopian Region,” Geog. Journal, March 1896; H. A. Bryden and others, Great and Small Game of Africa (1899); F. C. Selous, African Nature Notes and Reminiscences (1908) ; E. N. Buxton, Two African Trips: with Notes and Suggestions on Big-Game Preservation in Africa (1902) (contains photographs of living animals); G. Schillings, With Flash-light and Rifle in Equatorial East Africa (1906) : Idem, In Wildest Africa (1907) (striking collection of photographs of living wild animals); Exploration scientifique de I’Algerie: Histoire naturelle, 14 vols, and 4 atlases, Paris (1 846-1 850); Annates du Musee du Congo: Botanique, Zoologie (Brussels, 1898, &c). The latest results of geographical research and a bibliography of current literature are given in the Geographical Journal, published monthly by the Royal Geographical Society.

§ III. Ethnology. — H. Hartmann, Die Volker Afrikas (Leipzig, 1879); B. Ankermann, “. Kulturkreise in Afrika, Zeit. f. Eth., vol.

xxxvii. p. 54 ; Idem, ” Uber den gegenwartigen Stand der Ethnographie der Sudhalfte Afrikas,” Arch.f. Anth. n.f. iv. p. 24;G.Ser. i.

Antropologw. delta stirpe camitica (Turin, 1897); J- Deniker, ” Dis- tribution geogr. et caracteres physiques des Pygmees africains,” La Geographic Paris, vol. viii. pp. 213-220; G. W. Stow and G. M. Theal, The Native Races of South Africa (1905) ; K. Barthel, Vblker- bewegungen auf der Sudhalfte des afrik. Kontinents (Leipzig, 1893); A. B. Ellis, The Tshi-speaking Peoples of the Gold Coast (1887) ; Idem, The Ewe-speaking Peoples of the Slave Coast (1890); Idem, The Yoruba-speaking Peoples of the Slave Coast (1894); H. Ling Roth, Great Benin, Us Customs, &c. (Halifax, 1903); H. Frobenius, Die Ileiden-Neger des agyptischen .Sudan (Berlin, 1893) ; Herbert Spencer and D. Duncan, Descriptive Sociology, vol. iv. African Races (1875); A. de Preville, Les Societes africaines (Paris, 1894); D. Macdonald, Africana; or, the Heart of Heathen Africa, 2 vols. (1882); L. Frobenius, Der Ursprung der afrikanischen Kulturen (Der Ursprung der Kuitur, Band i.) (Berlin, 1898) ; Idem, ” Die Masken und Geheim- bunde Afrikas,” Abhandl. Kaiserl. Leopoldin.-Carolin. Deuts. Akad. Naturforscher, 1899, 1-278; G. Schweinfurth, Aries africanae: Illustrations and Descriptions of . . . industrial Arts, &c. (in German and English) (Leipzig, 1875) ; F. Ratzel, Die afrikanischen Bbgen . . . eine anthrop.-geographische Studie (Leipzig, 1891); K. Weule, Der afrikanische Pfeil (Leipzig, 1899); H. Frobenius, Afrikanische Bautypen (Dauchau bei Munchen, 1894); H. Schurtz, Die afrikan. Gewerbe (Leipzig, 1900) ; E. W. Blyden, Christianity, Islam and the Negro Race (1887); James Stewart, Dawn in the Dark Continent, or Africa and its Missions (Edinburgh and London, 1903); W. H. J. Bleek, Comparative Grammar of South African Languages, 2 parts (1862-1869) ; Idem, Vocabularies of the Districts of Lourenzo Marques, fife, cfc. (1900) ; R. N. Cust, Sketch of the Modern Languages of Africa, 2 vols. (1883) ; F. W. Kolbe, A Language Study based on Bantu (1888) ; J. T. Last, Polyglotta Africana orientalis (1885) ; J. Torrend, Comparative Granimar of the South African Bantu Languages (1891) ; S. \V. Koelle, Polyglotta Africana (1854); C. Velten, Schilderungen der Suaheli von Expeditionen v. Wissmanns, &c, &c. (1901) (narra- tives taken down from the mouths of natives); A. Vierkandt, lotksgedichte im westlichen

Central- Afrika (Leipzig, 1895). For latest information the following periodicals should be consulted: — Journal of the Anthropological Institute of Great Britain and Ireland; Man (same publishers) ; Zeitschrift f. Ethnologie; Archiv f. Anthropologie; L'Anthropologie.

§ IV. Archaeology and Art. — Publications of the Egyptian Exploration Fund; A. Mariette-Bey, The Monuments of Upper Egypt (1890); H. Brugsch, Die Agyptologie (Leipzig, 1891); G. Maspero, V Archeologie egyptienne (Paris, 1890?); R. Lepsius, Denkmaler aus Agypten und Athiopien . . ., 6 vols. (Berlin, 1849-1859); G. A. Hoskins, Travels in Ethiopia . . . illustrating the Antiquities of the Ancient Kingdom of Meroe (1835); Records of the Past: being English Translations of . . . Egyptian Monuments, vols. 2, 4, 6, 8, 10, 12(1873-1881); Ditto, new series, 6 vols. (1890-1892); D. Randall- Maclver and A. Wilkin, Libyan Notes (1901) (archaeology and ethnology of North Africa); G. Boissier, L'Afrique romaine: Pro- menades archeologiques en Algerie et en Tunisie, 2nd ed. (Paris, 1 901) ; D. Randall-Maclver, Mediaeval Rhodesia (1906) ; Prisse d'Avennes, Histoire de I'art egyptien d'apres les monuments, &c. with atlas (Paris, 1879); G. Perrot and C. Chipiez, History of Art in Ancient Egypt, 2 vols. (1883); H. Wallis, Egyptian Ceramic Art (1900); C. H. Read and O. M. Dalton, Antiquities from the City of Benin and from other parts of West Africa (1899).

§ V. Travel and Exploration. — Dean W. Vincent, The Commerce and Navigation of the Ancients, vol. 2, The Periplus of the Erythraean Sea (1807) ; G. E. de Azurara, Chronicle of the Discovery and Conquest of Guinea (Eng. trans., 2 vols., 1896, 1899); R – H. Major, Life of Prince Henry the Navigator (1868) ; E. G. Ravenstein, " The Voyages of Diogo Cao and Barth. Diaz," Geogr. Journ., Dec. 1900; O. Hartig, " Altere Entdeckungsgeschichte und Kartographie Afrikas," Mitt. Geogr. Gesells. Wien, 1905; J. Leyden and H. Murray, Historical Account of Discoveries, &c, 2 vols., 2nd ed. (1818); T. E. Bowditch, Account of the Discoveries of the Portuguese in the Interior of Angola and Mozambique (1824); P. Paulitschke, Die geogr. Forschung des afrikan. Continents (Vienna, 1880); A. Supan, " Ein Jahrhundert der Afrika-Forschung," Peterm. Mitt., 1888; R. Brown, The Story of Africa and its Explorers, 4 vols. (1892-1895); Sir Harry Johnston, The Nile Quest (1903) ; James Bruce, Travels to discover the Source of the Nile in 1768-1773, 5 vols., Edinburgh (1790); Proceedings of the Association for . . . Discovery of the Interior Parts of Africa, 1790- 1810; Mungo Park,

Travels into the Interior Districts of Africa (‘799) ;. Idem, Journal of a Mission, &c. (1815) ; Capt. J. K. Tuckey, Narrative of an Expedition to explore the River Zaire or Congo in 1816 (1818); D. Denham and H. Clapperton, Narrative of Travels and Discoveries in N. and Cent. Africa (1826) ; R. Caillie, Journal d’un voyage d Temboctu et d, Jenne, 3 vols., Paris (1830); D. Livingstone, Missionary Travels . . . in South Africa (1857); The Last Journals of David. Livingstone in Central Africa, ed. H. Waller (1874); H. Barth, Travels and Discoveries in North and Central Africa, 5 vols. (1857); J- L. Krapf, Travels, Researches, &c, in Eastern Africa (i860) ; Sir R. F. Burton, The Lake Regions of Central Africa, 2 vols. (i860); J. H. Speke, Journal of the Discovery of the Source of the Nile (1863); Sir S. W. Baker, The Albert Nyanza, 2 vols. (1866); G. Schweinfurth, The Heart of Africa, 2 vols. (1873); V. L. Cameron, Across Africa, 2 vols. (1877); T. Baines, The Gold Regions of South- Eastern Africa (1877) ; Sir H. M. Stanley, Through the Dark Continent,

2 vols. (1878) ; Idem, In Darkest Africa, 2, vols. (1890) ; G. Nachtjgal, Sahara und Sudan, 3 vols. (Berlin, 1 879-1 889); P. S. de Brazza, Les Voyages de . . . (1875-1882), Paris, 1884; J- Thomson, Through Masai Land (1885); H. von Wissmann, Unter Deutscher Flagge quer durch Afrika, &c. (Berlin, 1889); Idem, My Second Journey through Equatorial Africa (1891); W. Junker, Travels in Africa 1875-1886, 3 vols. (1890-1892); L. G, Binger, Du Niger an. Golfe de Guinee, &c. (Paris, 1892); O. Baumann, Durch Masaiiand zur Nilquelle (Berlin, 1894) ; R. Kandt, Caput Nili (Berlin, 1904) ; C. A. von Gotzen, Durch Afrika von Ost nach West (Berlin, 1896) ; L. Vanu- telli and C. Citerni, Seconda spedizione Bdttego: LOmo (Milan, 1899) ;

F. Foureau, D ‘Alger au Congo parte Tchad (Paris, 1902); C. Lemaire,’ Mission scientifique du Ka-Tanga: Journal de route, I vol., Resultals des observations, 16 parts (Brussels, 1902); A. St. H. Gibbons, Africa from South to North through Marotseland, 2 vols. (1904) ; E. Lenfant, La Grande Route du Tchad (Paris, 1905) ; Boyd Alexander, From the Niger to the Nile, 2 vols.. (1907).

§ VI. Historical and Political. — H. Schurtz, Africa(World’s History, vol. 3, part 3) (1903) ; Sir H. H. Johnston, History of the Colonization of Africa by Alien Races (Cambridge, 1899) (reprint with additional chapter “Latest Developments,” 1905); A. H. L. Heeren, Reflec- tions on the Politics, Intercourse and Trade of the Ancient Nations of Africa, 2 vols. (Oxford, 1832); G. Rawlinson, History of Ancient Egypt (1881) ; A. Graham, Roman Africa

(1902) ; J. de Barros, Asia: Ira Decada, Lisbon (1552 and 1777-1778); J. Strandes, Die Pdrtu- giesenzeitvon . . . Ostafrika (Berlin, 1899) ; R. Schiick, Brandenburg- Preussens Kolonial-Politik . . . 1641-1721, 2 vols. (Leipzig, 1889);

G. M'Call Theal, History and Ethnography of Africa south of the Zambesi . . . to 1705, 3 vols. (1908-), and History of South Africa since September 179$ (to 1872) 5 vols. (1908); Idem, Records of South-Eastern Africa, 9 vols., 1898-1903; Lady Lugard, A Tropical Dependency: Outline of the History of the Western Sudan, &c. (1905) • ? ir c. E TVˆ e . rts fef' T Jt e Ma P °f A f rica b y Treaty, 3 vols. (3rd ed., 1909) ; J. b. Keltie, The Partition of Africa, 2nd ed. (1895) ; F. Van Ortroy, Conventions international ' definissant les limites . . . en Afrique (Brussels, 1898); General Act of the Conference of Berlin, 1885; The Surveys and Explorations of British Africa (Colonial Reports, No. 500) (1906), and annual reports thereafter; Sir F. D. Lugard! The Rise of our East African Empire, 2 vols. (1893); E. Petit, -Les colonies francaises, 2 vols. (Paris, 1902-1904); E. Rouard de Card. Les Traites de protector at conclus par la France en Afrique, 1870-189=; (Paris, 1897); A. J. de Araujo, Colonies portuguaises a" Afrique (Lisbon, 1900) ; B.Trognitz, " Ne'ue Arealbestimmung des Continents Afrika," Petermanns Mitt., 1893', 220-221; A. Supan, "Die Be- velkerung der Erde," xii., Peterm. Milt. Erganzungsh. 146 (Gotha, 1904) (deals with areas as well as population).

§ VII. Commerce and Economics.— A. Silva White, The Develop ment of Africa, 2nd ed. (1892); K. Dove, " Grundziige einer Wirt-schaftsgeographie Afrikas, Geographische Zeitschrift, 1905, 1-18; E. Hahn, ' Die Stellung Afrikas in der Geschichte des Welthandels," Verhandl. 11. Deutsch. Geographentags zu Bremen (Berlin, 1896); L. de Launay, Les Richesses minerales de I Afrique (Paris, 1903) ; K. Futterer, Afrika in seiner Bedeutung fur die Goldproduktion (Berlin, 1894); P. Reichard, "Das afrikan. Elfenbein und sein Handel," Deutsche geogr. Blatter (Bremen, 1889); Sir A. Moloney, Sketch of the Forestry of West Africa (1887); Dewevre, "Les Caoutchoucs africains," Ann. Soc. Set. Bruxelles, 1895; Sir T. F. Buxton, The African Slave Trade and its Remedy (1840); C. M. A. Lavigerie, L'Esclavage africain (Paris, 1888); E. de Renty, Les Chemins de fer coloniaux en Afrique, 3 vols. (Paris', 1 903-1 905); H. Meyer, Die Eisenbahnen im tropischen Afrika (Leipzig, 1902); G. Grenfell, " The Upper Congo as a Waterway," Geogr. Journ., Nov. 1902; A. St. H. Gibbons, " The Nile and Zambezi Systems as Waterways," Journ. R. Colon. Inst., 1901 ; K. Lent, " Verkehrs- mittel in Ostafrika," Deutsches

Kolonialblatt, 1 894; ” Trade of the United Kingdom with the African Continent in 1 898-1902,” Board of T. Journ., 1903; Diplomatic and Consular Reports, Annual Series; Colonial Reports; T. H. Parke, Guide to Health in Africa (1893); R. W. Felkin, Geographical Distribution of Tropical Diseases in Africa (1895).

The following bibliographies may also be consulted: J. Gay, Bibliographic des ouvrages relatifs a I’ Afrique, &c. (San Remo, 1875); P. Paulitschke, Die Afrika-Literatur von 1500 bis 1750 (Vienne, 1882); Catalogue of the Colonial . Office Library, vol. 3, Africa (specially for government publications). (E. He.)

AFRICA, ROMAN. The Romans gave the name of Africa to that part of the world which the Greeks called Libya (Aiˆuij). It comprised the whole of the portion of the African continent known to the ancients, except Egypt and Ethiopia. But besides this general sense, which occurs in Pliny (iii. 3), Pomponius Mela (i. 8) and other authors, the official and administrative language used the word Africa in .a narrower sense, which is noticed below. The term was certainly borrowed by the Romans from the language of the natives’. In Latin literature it was employed for the first time by the poet Ennius, who wrote in the interval between the First and Second Punic Wars {Ann. vi.; Sat. iii.). By him the term was confined to the territory of

Carthage and the regions composing the eastern group of the Atlas. Among the numerous conjectures which have been made as to the etymology of the term Africa (‘ ApiKr]) may be quoted that which derives it from the Semitic radical “hb (” separate “), Africa being considered, in this connexion, as a Phoenician settlement ” separated ” from the mother country, Asiatic Phoenicia. It has also been held that the word Africa comes from friqi, farikia (the country of fruit). The best hypothesis in the writer’s opinion is that maintained by Charles Tissot, who sees in the word ” Africa ” the name of the great Berber tribe, the Aourigha (whose name would have been pronounced Afarika), the modern Aouraghen, now driven back into the Sahara, but in ancient times the principal indigenous element of the African empire of Carthage (Tissot, Geogr. comp. i. 389). Thus Africa was originally, in the eyes of the Romans and Carthaginians alike, the

country inhabited by the great tribe of Berbers or Numidians called Afarik. Cyrenaica, on the east, attached to Egypt, was then excluded from it, and, similarly, Mauretania, on the west.

At the time of the Third Punic War the Africa of the Carthaginians was but a fragment of their ancient native empire. It comprised the territory bounded by a vague line running from the mouth of the Tusca (Wad el Kebir), opposite the island of Tabraca (Tabarca), as far as the town of Thenae (Tina), at the mouth of the Gulf of Gabes. The rest of Africa had passed into the hands of the kings of Numidia, who were allies of the Romans.

After the capture of Carthage by Scipio (146 B.C.) this territory was erected into a Roman province, and a trench, the fossa, regia, was dug to mark the boundary of the Roman province of Africa and the dominions of the Numidian princes. There have been discovered (1907) the remains of this ditch protected by a low wall or a stone dyke; some of the boundary stones which marked its course, and inscriptions mentioning it, have also been found. From Testur on the Mejerda the fossa regia can be followed by these indications for several miles along the Jebel esh-Sheid. The ditch ran northward to Tabarca and southward to Tina. The importance of the discoveries lies in the fact that the ditch which in later times divided the provinces of Africa vetus and Africa nova was at the time of the Third Punic War the boundary of Carthaginian territory (R. Cagnat, " Le fosse des frontieres romaines " in Melanges Boissier, 1905, p. 227; L. Poinssot in Comptes rendus de I' Acad, des Inscript. et Belles Lettres, 1907, p. 466; Classical Review, 1907, December, p. 255). The govern- ment of the Roman province thus delimited was entrusted to a praetor or propraetor, of whom several are now known, e.g. P. Sextilius, propraetor Africae, according to coins of Hadrumetum of the year 94 B.C. The towns which had fought on the side of the Romans during the Third Punic War were declared civitates liberae, and became exceedingly prosperous. They were Utica (Bu Shatir), Hadrumetum (Susa), Thapsus (Dimas), Leptis Minor (Lemta), Achulla (Badria), Uzalis (about n m. from Utica) and Theudalis. Those towns, however, which had remained faithful to Carthage were destroyed, like Carthage itself.

After the Jugurthine war in 106, the whole of the regio Tripolitana, comprising Leptis Magna (Lebda), Oea (Tripoli), Sabrata, and the other towns on the littoral of the two Syrtes, appears to have been annexed to the Roman province in a more or less regular manner (Tissot ii. 21). The battle of Thapsus in 46 made

the Romans definitely masters of Numidia, and the spheres of administration were clearly marked out. Numidia was converted into a new province called " Africa Nova," and of this province the historian Sallust was appointed proconsul and hv vested with the imperium. From that time the old province of Africa was known as " Africa Vetus " or " Africa Propria."

This state of affairs, however, lasted but a short time. In 31 B.C. Octavius gave up Numidia, or Africa Nova, to King Juba II. Five years later Augustus gave Mauretania and some Gaetulian districts to Juba, and received in exchange Numidia, which thus reverted to direct Roman control. Numidia, how- ever, no longer formed a distinct government, but was attached to the old province of Africa. From 25 B.C. the Roman province of Africa comprised the whole of the region between the mouth

of the Ampsaga (Wad Rummel, Wad el Kebir) on the west, and the two tumuli called the altars of the Philaeni, the immutable boundary between Tripolitana and Cyrenaica, on the east (Tissot ii. 261). In the partition of the government of the provinces of the Roman empire between the senate and the emperor, Africa fell to the senate, and was henceforth ad- ministered by a proconsul. Subordinate to him were the legati pro consule, who were placed at the head of districts called dioceses. At first there were only three dioceses: Cartha- giniensis, Hipponiensis (headquarters Hippo Diarrhytus, now Bizerta), and Numidica (headquarters Cirta, now Constantine). At a later date the diocesis Hadrumetina was formed, and perhaps at some date unknown the diocesis Tripolitana.

The province of Africa was the only senatorial province whose governor had originally been invested with military powers. The proconsul of Africa, in fact, had command of the legio III. Augusta and the auxiliary corps. But in a.d. 37 Caligula de- prived the proconsul of his military powers and gave them to the imperial legate (legatus Augusti pro praetore provinciae Africae), who was nominated directly by the emperor, and whose special duty it was to guard the frontier zone (Tacitus, Hist. iv. 48; Dio Cass. lix. 20). The headquarters of the imperial legate were originally at Cirta and afterwards at Lambaesa (Lambessa). The military posts were drawn up in echelon along the frontier of the desert, especially along the southern slopes of the Aures, as far as Ad Majores (Besseriani), and on the Tripoli tan frontier as far as Cydamus (Ghadames), forming an immense arc extend- ing from Cyrenaica to Mauretania. A network of military routes,

constructed and kept in repair by the soldiers, led from Lambaesa in all directions, and stretched along the frontier as far as Leptis Magna, passing Theveste (Tebessa), Thenae and Tacape (Gabes). The powers of the proconsul, however, extended scarcely beyond the ancient Africa Vetus and the towns on the littoral. Towards 194 Septimius Severus completed the reform of Caligula by detaching from the province of Africa the greater partof Numidia to constitute a special province governed by a procurator, subordinate to the imperial legate and resident at Cirta (Tissot ii. 34). This province was called Numidia Cirtensis, as opposed to Numidia Inferior or proconsular Numidia.

In Diocletian's great reform of the administrative system of the empire, the whole of Roman Africa, with the exception of Mauretania Tingitana (which was attached to the province of Spain), constituted a single diocese subdivided into six provinces: Zeugi tana (Carthage), Byzacium (Hadrumetum, now Susa), Numidia Cirtensis (Cirta, Constantine), Tripolitana (Tripolis), Mauretania Sitifensis (Sitifis, Setif), and Mauretania Caesariensis (Caesarea, now Cherchel). These provinces were administered, according to circumstances, by a praeses of sena- torial rank, a legatus pro praetore, or a vir clarissimus consularis. Some changes were eventually necessitated by the wars with the Moors and the Vandals. By a treaty concluded in 476, the emperor Zeno recognized Genseric as master of all Africa. Re- conquered by Belisarius in 534, Africa formed, under the name of praefectura Africae, one of the great administrative districts of the Byzantine empire. It was subdivided into six provinces, which were placed under the authority of the praetorian prefect of Africa. These provinces were Zeugitana (the former Pro- consularis), Carthage, Byzacium, Tripolitana, Numidia and Mauretania. The civil government was carried on by consulares or praesides, while the military government was in the hands of four duces militum, who made strenuous efforts to drive out the barbarians. The country was studded thickly with burgi(small forts) and clausurae (long walls) , the ruins of which still subsist. In 647 the Arabs penetrated into Ifrikia, which was destined to fall for ever out of the grasp of the Romans. In 697 Carthage was taken.

The bulk of the population of Roman Africa was invariably composed of three chief elements: the indigenous Berber tribes, the ancient Carthaginians of Phoenician origin and the Roman colonists. The Berber tribes, whose racial unity is attested by their common spoken language and by the comparatively numerous Berber inscriptions that have come down to us, bore

in ancient times the generic names of Numidians, Gaetulians and Moors or Maurusiani. Herodotus mentions a great number of these tribes. During the Roman period, according to Pliny, there were settlements of 26 indigenous tribes extending from the Ampsaga as far as Cyrenaica. The much more detailed list of Ptolemy enumerates 39 indigenous tribes in the province of Africa and 25 in Mauretania Caesariensis. Ammianus Marcellinus, Procopius and Flavius Cresconius Corippus give still further names. Besides the Afri (Aourigha) of the territory of Carthage, the principal tribes that took part in the wars against the Romans were the Lotophagi, the Garamantes, the Maces, the Nasamones in the regions of the S.E., the Misulani or Musulamii (whence the name Mussulman) , the Massyli and the Massaesyli in the E., who were neighbours of the Moors. The non-nomads of these Libyan tribes dwelt in huts made of stakes supporting plaited mats of rush or asphodel. These dwellings, which were called mapalia, are the modern gourbis. African epigraphy has revealed the names of some of their deities: deus invictus Aulisva; the god Motmanius, associated with Mercury; the god Lilleus; Baldir Augustus; Kautus paler; the goddess Gilva, identified with Tellus, and Ifru Augustus (Tissot i. 486). The Johannis of Corippus mentions three native divinities: Sinifere, Mastiman and Gurzil. There were also local divinities in all the principal districts. The rock bas-reliefs and other monuments showing native divinities^.re rare, and give only very summary representa- tions. Dolmens, however, occur in great numbers in Tunisia and the province of Constantine. Tumuli, too, are found through- out northern Africa, thejmost celebrated being that near Cherchel, the Kubr-er-Rumia (” tomb of the Christian lady “), which was regarded by Pomponius Mela as the royal burying-place of the kings of Numidia.

During the Roman period the ancient Carthaginians of Phoenician origin and the bastard population termed by ancient authors Libyo-Phoenicians, like the modern Maltese, invariably formed the predominant population of the towns on the littoral, and retained the Punic language until the 6th century of the Christian era. The municipal magistrates took the title of suffetes in place of that of duumvirs, and in certain towns the Christian bishops were obliged to know the lingua Punica, since it was the only language that the people understood. Neverthe- less, the

Roman functionaries, the army and the colonists from Italy soon brought the Latin element into Africa, where it flourished with such vigour that, in the 3rd century, Carthage became the centre of a Romano-African civilization of extra- ordinary literary brilliancy, which numbered among its leaders such men as Apuleius, Tertullian, Arnobius, Cyprian, Augustine and many others.

Carthage regained its rank of capital of Africa under Augustus, when thousands of Roman colonists flocked to the town. Utica became a Roman colony under Hadrian, and the civitates liberae, municipia, castella, pagi and tunes were peopled with Latins. The towns of the ancient province of Africa which received coloniae were very numerous: Abitensis (civitas Avittensis Bibba) , Bisica Lucana (Tastour), Byzacium, Capsa (Gafsa), Carthage, Cuina, Curubis (Kurba), Hadrumetum (Susa), Hippo Diarrhytus or Zarytus (Bizerta), Leptis Magna (Lebda), Maxula (Ghades, Rades or Gades) , Neapolis (Nabel, Nebeul) , Oea (Tripoli) , Sab rata (Zoara), colonia Scillitana (Ghasrin), Sufes (Sbiba), Tacape (Gabes) , Thaenae or Thenae (Tina) , Thelepte (Medinet Kedima) , Thugga (Dugga), Thuburbo maius (Kasbat), Thysdrus (El Jem), Uthina (Wadna) and Vallis (Median). Of the municipia may be mentioned Gigthis or Gigthi (Bu Grara), Thibussicensium Bure (Tebursuk), Zita and the turris Tamalleni (Telmin).

The province of Numidia was at first colonized principally by the military settlements of the Romans. Cirta (Constantine) and Bulla Regia (Hammam Darraj), its chief towns, received coloniae of soldiers and veterans, as well as Theveste (Tebessa) and Thamugas (Timgad). The fine ruins which have been discovered at the last-mentioned place have earned for it the surname of the African Pompeii (see below).

Archaeology. — Roman Africa has been the subject of innumer- able historical and archaeological researches, especially since the

conquest of Algeria and Tunisia by the French. The country is covered with Roman and Byzantine remains. Each of these ruins has been visited by archaeologists who have copied in- scriptions, described the temples, triumphal arches, porticos, mausoleums and the other monuments which are still standing, collected statues or other antiquities; and in many cases they have actually excavated. The results of all these labours have been published, from about 1850 onwards, annually, and, indeed, almost from day to day, in various scientific periodicals.

Among the principal of these are: — Memoires de la SpciStS archiologique de Constantine, Bulletin de la SociUS giographique et arcMologique d'Oran, Revue africaine of Algiers, to which we should add the Revue archeologique of Paris, the Archives des missions scien- tifiques and the Bulletin arcMologique du Comite" des travaux historiques and the Milanges of the French School at Rome. In all the towns of Algeria and Tunisia museums have been founded for storing the antiquities of the region; the most important of these are the museums of St Louis, Carthage and the palace of Bardo (musee Alaoui) near Tunis, those of Susa, Constantine, Lambessa, Timgad, Tebessa, Philippeville, Cherchel and Oran. Under the title of MusSes et collections arcMologiques de I' Algerie et de la Tunisie, the Ministry of Public Instruction publishes from time to time illustrated descriptions of all these archaeological treasures. In this collection have already appeared descriptions of the museums of Algiers by G. Doublet; of Constantine by G. Doublet and P. Gauckler; of Oran by R. de La Blanchere; of Cherchel by P. Gauckler; of Lambessa by R. Cagnat; of Philippeville by S. Gsell and Bertrand; of the Bardo by R. de La Blanchere and P. Gauckler; of Carthage by R. P. Delattre; of Tebessa by S. Gsell; of Susa by P. Gauckler; of Timgad by R. Cagnat and A. Ballu.

The archaeological exploration of Algeria has kept pace with the expansion of French dominion. From 1846 to 1854 Delamarre published his Exploration archeologique de V Algerie, in collabora- tion with the French officers. In 1850 Leon Renier was officially instructed to collect all the inscriptions in Algeria which should be found by the military expeditionary columns. This scholar examined first the ruins of Lambessa, an account of which he published in 1854 in his Melanges d'ipigraphie; subsequently he made his important collection of Inscriptions romaines de l' Algirie (1855-1858) which formed the groundwork of the volume of the Corpus Inscr. Lot. of the Academy of Berlin, devoted to Roman Africa. A little later General Faidherbe published his Collection complete des inscriptions numidiques (1870). Apart from the province of Constantine, Algeria is less rich in Roman remains than Tunisia; mention must, however, be made of the excava- tions of Victor Waille at Cherchel, where were found fine statues in the Greek style of the time of King Juba II. ; of P. Gavault at Tigzirt (Rusuccuru), and finally of those of Stephane Gsell at Tipasa (basilica of St Salsa) and throughout the district of Setif and at Khamissa (Thuburticum Numidarum). In the depart- ment of Constantine, which is peculiarly rich in

Roman remains, Tebessa has been most carefully explored by M. Heron de Villefosse. who has laid bare a beautiful temple of Jupiter, a triumphal arch of Caracalla, a Byzantine basilica and the gate of the Byzantine general Solomon. But all these ruins fade into insignificance in comparison with the majestic grandeur of those of Timgad which are almost entirely laid bare; they are de- scribed in Timgad, une cite africaine sous V empire romain, by R. Cagnat, G. Boeswillwald and A. Ballu.

In Tunisia, Carthage early became the object of archaeo- logical investigation. Major Humbert was sent there by Napoleon in 1808 and his notes are still preserved in the museum of Leiden. Chateaubriand visited and described the ruins; the Dane Falbe, the Englishman Nathan Davis, Beule, P. de Sainte-Marie and others also have carried out researches; for more than twenty years Pere Delattre has explored the ruins of Carthage (q.v.) with extraordinary success. For the rest of Tunisia, the first explorer interested in archaeology was Victor Gu6rin in i860; his results are contained in his remarkable Voyage archiologique dans la R&gence de Tunis (1862, 2 vols.). A. Daux, in the years preceding 1869, explored the sites of the

ancient harbours of Utica, Hadrumetum, Thapsus (Dimas) . But it was the occupation of Tunisia by the French in 1881 which really gave the, impetus to modern investigations in this district of ruined cities. They were put on a solid foundation by the publication of the Geographie comparee of Charles Tissot (1884). Trained scholars were sent there annually by the French govern- ment: Cagnat, Saladin, Poinssot, La Blanchere, S. Reinach, E. Babelon, Carton, Audollent, Steph. Gsell, J. Toutain, Espe- randieu, Gauckler, Merlin, Homo and many others, to say nothing of German scholars, such as Willmans and Schulten, and especially of a great number of enthusiastic officers of the army of occupation, who explored all the ancient sites, and in many cases excavated with great success (for their results see the works quoted above). It would be impossible to enumerate here all the monographs describing, for example, the ruins of Carthage, those of the temple of the waters at Mount Zaghuan, the amphitheatre of El Jem (Thysdrus), the temple of Saturn, the royal tomb and the theatre of Dugga (Thugga), the bridge of Chemtu (Simitthu), the ruins and cemeteries of Tebursuk and Medeina (Althiburus) ,

the rich villa of the Laberii at Wadna {Uthina), the sanctuary of Saturn Balcara- nensis on the hill called Bu-Kornain, the ruins of the district of Enfida (Aphrodisium, Uppenna, Segermes), those of Leptis minor (Lemta), of Thenae (near Sfax), those of the island of Meninx (Jerba), of the peninsula of Zarzis, of Mactar, Sbeitla (Sufetula), Gigthis (Bu-Grara), Gafsa (Capsa), Kef (Sicca Veneria), Bulla Regia, &c.

From this accumulation of results most valuable evidence as to the history and more especially the internal administration of Africa under the Romans has been derived. In particular we know how rural life was there developed, and with what care the water necessary for the growing of cereals was everywhere provided. Sculpture throughout the district is very provincial and of minor importance; the only exceptions are certain statues found at Carthage and Cherchel, the capital of the Mauretanian kings.

Authorities. — Among general works on the subject may be mentioned: Morcelli, Africa Christiana (1816); Gustave Boissiere, L'Algerie romaine (2nd ed., 1883) ; E. Mercier, Histoire de I'Afrique septentrionale (1888) ; Charles Tissot, Geographie comparee de la province romaine d'Afrique (1884-1888), with atlas; Vivien de Saint- Martin, LeNord de I Afrique dans Vantiquite grecque et romaine (1883) ; Gaston Boissier, LAfrique romaine (1895); CI. Pallu de Lessert, Fastes des provinces africaines {Proconsulate, Numidie, Mauretanie) sous la domination romaine (1896-1901); R. Cagnat, L'Armee romaine d'Afrique (1892) ; A. Daux, Les Emporia pheniciens dais h Zeugis el le Byzacium (1869) ; Ludwig Muller, Numismaticue de I'ancienne Afrique (1860-1862; Supplement, 1874); Ch. Diehl, V Afrique byzantine (1896); Stephane Gsell, Recherches arckeo-logiques en Afrique (1893) ; Paul Monceaux, Histoire litteraire de I'Afrique chretienne (1901-1905) ; J. Toutain, Les Cites romaines de la Tunisie (1895); Adas archeologique de la Tunisie, published by the Ministry of Public Instruction (1895 foil.); Atlas archeologique de I'Algerie, published by Stephane Gsell (1900 foil.); Toulotte, GSographie de I'Afrique chretienne (1 892-1 894) ; Corpus inscriptionum latinarum, vol. viii. and Supplement (1881). Cf. also articles Carthage,Numidia, &c, JuGURTHA,and articles relating to Roman History. (E. B.*)

AFRICAN LILY (Agapanthus umbellatus), a member of the natural order Liliaceae, a native of the Cape of Good Hope, whence it was introduced at the close of the 17th century. It is a handsome

greenhouse plant, which is hardy in the south of England and Ireland if protected from severe frosts. It has a short stem bearing a tuft of long, narrow, arching leaves, 5 to 2 ft. long, and a central flower-stalk, 2 to 3 ft. high, ending in an umbel of bright blue, funnel-shaped flowers. The plants are easy to cultivate, and are generally grown in large pots or tubs which can be protected from frost in winter. During the summer they require plenty of water, and are very effective on the margins of lakes or running streams, where they thrive admirably. They increase by offsets, or may be propagated by dividing the root-stock in early spring or autumn. A number of forms are known in cultivation; such are albidus, with white flowers, aureus, with leaves striped with yellow, and variegatus, with leaves almost entirely white with a few green bands. There are also double-flowered and larger and smaller flowered forms.

AFRICANUS, SEXTUS JULIUS, a Christian traveUer and historian of the 3rd century, was probably born in Libya, and may have served under Septimius Severus against the Osrhoenians in a.d. 195. Little is known of his personal history, except that he lived at Emmaus, and that he went on an embassy to the emperor Heliogabalus 1 to ask for the restoration of the town, which had fallen into ruins. His mission succeeded, and Emmaus was henceforward known as Nicopolis. Dionysius bar-Salibi makes him a bishop, but probably he was not even a presbyter. He wrote a history oitheyfOild{Xpovoypa(j>iaL, in five books)from the creation to the year a.d. 221, a period, according to his computation, of 5723 years. He calculated the period between the creation and the birth of Christ as 5499 years, and ante-dated the latter event by three years. This method of reckoning became known as the Alexandrian era, and was adopted by almost all the eastern churches. The history, which had an apologetic aim, is no longer extant, but copious extracts from it are to be found in the Chronicon of Eusebius, who used it ex- tensively in compiling the early episcopal lists. There are also fragments in Syncellus, Cedrenus and the Paschale Chronicon. Eusebius {Hist. Ecc. i. 7, cf. vi. 31) gives some extracts from his letter to one Aristides, reconciling the apparent discrepancy between Matthew and Luke in the genealogy of Christ by a reference to the Jewish law, which compelled a man to marry the widow of his deceased brother, if the latter died without issue. His terse and pertinent letter to Origen, impugning the authority of the apocryphal book of Susanna, and Origen's wordy and uncritical answer, are both extant. The ascription to Africanus of an eacyclopaedic work

entitled Ketrroi (em- broidered girdles), treating of agriculture, natural history, military science, &c, has been needlessly disputed on account of its secular and often credulous character. Neander suggests that it was written by Africanus before he had devoted himself to religious subjects. For a new fragment of this work see Oxyrhynchus Papyri (Grenfell and Hunt), iii. 36 ff.

Authorities. — Edition in M. J. Routh, Rel. Sac. ii. 219-509; translation in Ante-Nicene Fathers (S. D. F. Salmond) vi. 125-140. See H. Gelzer, Sex. Jul. Africanus und die byzant. Chronographie, 2 vols. (Leipzig, 1 880-1 885); G. Kriiger, Early Christian Literature, 248-253; A. Harnack, Altchristl. Litt. Gesch. i. 507, ii. 70.

AFRIDI, a Pathan tribe inhabiting the mountains on the Peshawar border of the North-West Frontier province of India. The Afridis are the most powerful and independent tribe on the border, and the largest with the exception of the Waziris. Their special country is the lower and easternmost spurs of the Safed Koh range, to the west and south of the Peshawar district, in- cluding the Bazar and Bara valleys. On their east they are bounded by British districts, on the north by the Mohmands, on the west by the Shinwaris and on the south by the Orakzai and Bangash tribes. Their origin is obscure, but they are said to have Israelitish blood in their veins, and they have a decidedly Semitic cast of features. They are possibly the Aparytai of Herodotus, the names and positions being identical. If this theory is correct, they were then a powerful people, and held a large tract of country, but have been gradually driven back by the encroachments of other tribes. The tribe is divided into the following eight clans: — Kuki Khel, Malikdin Khel, Kambar Khel, Kamar Khel, Zakka Khel (the most numerous and the most turbulent), Sipah, Aka Khel and Adam Khel. The first seven clans live in the vicinity of the Khyber Pass, and migrate to Tirah in the summer months. The Adam Khel (5900 fighting men) live round the Kohat Pass, and are more settled and less migratory in their habits. In appearance the Afridi is a fine, tall, athletic highlander with a long, gaunt face, high nose and cheek-bones, and a fair complexion. On his own hillside he is one of the finest skirmishers in the world, and in the Indian army makes a first-rate soldier, but he is apt to be home-sick when removed from the air of his native mountains. In character the Afridi has obtained an evil name for ferocity, craft and treachery, but Colonel Sir Robert Warburton, who lived eighteen years in charge of the Khyber Pass and knew the Afridi better than any other Englishman, says: — ” The Afridi lad from

his 1 So Eusebius, Syncellus says Alexander Severus,

earliest childhood is taught by the circumstances of his existence and life to distrust all mankind, and very often his near relations, heirs to his small plot of land by right of inheritance, are his deadliest enemies. Distrust of all mankind, and readiness to strike the first blow for the safety of his own life, have therefore become the maxims of the Afridi. If you can overcome this mistrust, and be kind in words to him, he will repay you by a great devotion, and he will put up with any treatment you like to give him except abuse." In short the Afridi has the vices and virtues of all Pathans in an enhanced degree. The fighting strength of the Afridis is said to be 27,000, but this estimate is excessive, judged by the number and size of their villages. They derive their importance from their geographical position, which gives them command of the Khyber and Kohat roads, and the history of the British connexion with them has been almost entirely with reference to these two passes.

There have been several British expeditions against the separate clans: —

(1) Expedition against the Kohat Pass Afridis under Sir Colin Campbell in 1850. The British connexion with the Adam Khel Afridis commenced immediately after the annexation of the Peshawar and Kohat districts. Following the example of all previous rulers of the country, the British agreed to pay the tribe a subsidy to protect the pass. But in 1850 a thousand Afridis attacked a body of sappers engaged in making the road, killing twelve and wounding six. It was supposed that they disliked the making of a road which would lay open their fast- nesses to regular troops. An expedition of 3200 British troops was despatched, which traversed the country and punished them.

(2) Expedition against the Jowaki Afridis of the Bori villages in 1853. When the Afridis of the Kohat Pass misbehaved in 1850, the Jowaki Afridis offered the use of their route instead; but they turned out worse than the others, and in 1853 a force of 1700 British traversed their country and destroyed their stronghold at Bori. The Jowaki Afridis are a clan of the Adam Khel, who inhabit the country lying between the Kohat Pass and the river

Indus.

(3) Expedition against the Aka Khel Afridis under Colonel Craigie in 1855. In 1854 the Aka Khels, not finding themselves admitted to a share of the allowances of the Kohat Pass, com- menced a series of raids on the Peshawar border and attacked a British camp. An expedition of 1500 troops entered the country and inflicted severe punishment on the tribe, who made their submission and paid a fine.

(4) Expedition against the Jowaki Afridis under Colonel Mocatta in 1877. In that year the government proposed to reduce the Jowaki allowance for guarding the Kohat Pass, and the tribesmen resented this by cutting the telegraph wire and. raiding into British territory. A force of 1500 troops penetrated their country in three columns, and did considerable damage by way of punishment.

(5) Expedition against the Jowaki Afridis under Brigadier-General Keyes in 1877-78. The punishment inflicted by the previous expedition did not prove sufficiently severe, the attitude of the Jowakis continued the same and their raids into British territory went on. A much stronger force, therefore, of 7400 British troops, divided into three columns, destroyed their principal villages and occupied their country for some time, until the tribe submitted and accepted government terms. The Kohat Pass was afterwards practically undisturbed.

(6) Expedition against the Zakka Khel Afridis of the Bazar Valley under Brigadier- General Tytler in 1878. At the time of the British advance into Afghanistan, during the second Afghan War, the Zakka Khel opposed the British advance and attacked their outposts. A force of 2500 British troops traversed their country, and the tribesmen made their submission.

(7) Expedition against the Zakka Khel Afridis of the Bazar Valley under Lieutenant-General Maude in 1879. After the previous expedition the Afridis of the Khyber Pass continued to give trouble during the progress of the second Afghan War, so another force of 3750 British troops traversed their country, and after suffering some loss the tribesmen made their submission.

After this both the Khyber and Kohat Passes were put on a stable footing, and no further trouble of any consequence occurred in either down to the time of the frontier risings of 1897, when the

Afridis attacked the Khyber Pass, which was defended by Afridi levies.

(8) For the Tirah Campaign of 1897 see Tirah Campaign.

(9) In the February of 1908 the restlessness of the Zakka Khel again made a British expedition necessary, under Sir James Willcocks; but the campaign was speedily ended, though in the following April he had again to proceed against the Mohmands, the situation being complicated by an incursion from Afghanistan.

See also Paget and Mason's Frontier Expeditions (1884) ; Warburton's Eighteen Y.ears in the Khyber (1900). (C. L.) , r

AFTERGLOW, a broad high arch of whitish or rosy light appearing occasionally in the sky above the highest clouds in the hour of deepening twilight, or reflected from the high snow-fields in mountain regions long after sunset. The phenomenon is due to very fine particles of dust suspended in the high regions of the atmosphere that produce a scattering effect upon the component parts of white light. After the eruption of Krakatoa in 1883, a remarkable series of red sunsets appeared all over the world. These were due to an enormous amount of exceedingly fine dust blown to a great height by that terrific explosion, and then universally diffused by the high atmospheric currents.

AFZELIUS, ADAM (1750-1837), Swedish botanist, was born at Larf, Vestergotland, in 1750. He was appointed teacher of oriental languages at Upsala in 1777, and in 1785 demonstrator of botany. From 1792 he spent some years on the west coast of Africa, and in 1 797-1 798 acted as secretary of the Swedish embassy in London. Returning to Sweden, he founded the Linnaean institute at Upsala in 1802, and in 181 2 became professor of materia medica at the university. He died at Upsala in 1837. In addition to various botanical writings, he published the autobiography of Linnaeus in 1823.

His brother, Johan Afzelius (i753-i837),known as Arvtdson, was professor of chemistry at Upsala; and another brother, Per af (1 760-1843), who became professor of medicine at Upsala in 1801, was distinguished as a medical teacher and practitioner.

AFZELIUS, ARVID AUGUST (1785-1871), Swedish pastor, poet, historian and mythologist, was born on the 8th of October 1785.

From 1828 till his death on the 25th of September 1871 he was parish priest of Enkoping. He is mainly known as a collaborator with the learned historian, Erik Gustaf Geijer, in the great collection of Swedish folk-songs, Svenske folkirsor jran forntiden, 3 vols. (Stockholm, 1814-1816). He published also translations of the Samunder Edda and Herwara-Saga, and a history of Sweden to Charles XII. (of which a German transla- tion was published in 1842), as well as original poems.

AGA, or Agha, a word, said to be of Tatar origin, signifying a dignitary or lord. Among the Turks it is applied to the chief of the janissaries, to the commanders of the artillery, cavalry and infantry, and to the eunuchs in charge of the seraglio. It is also employed generally as a term of respect in addressing wealthy men of leisure, landowners, &c.

AGAIAMBO, or Agaumbu, a race of dwarf marsh-dwellers in British New Guinea, now almost extinct. In his annual report for 1904 the acting administrator of British New Guinea stated that on a visit he paid to their district he saw six males and four females. The Agaiambo five in huts erected on piles in the lakes and marshes. Dwarfish in stature but broadly built, they are remarkable for the shortness of their legs. They live almost entirely in their ” dug-outs ” or canoes, or actually wading in the water. Their food consists of sago, the roots of the water- lily and fish. The Agaiambo are believed to have been formerly numerous, but within the last few years have suffered from the raids of their cannibalistic Papuan neighbours. In features, colour and hair they closely resemble the true Papuans.

AGA KHAN I., His Highness the (1800-1881), the title accorded by general consent to Hasan Ali Shah (born in Persia, 1800), when, in early life, he first settled in Bombay under the protection of the British government. He was believed to have descended in direct line from Ali by his wife Fatima, the daughter

•of the Prophet Mahomet. Ali’s son, Hosain, having married a daughter of one of the rulers of Persia before the time of Mahomet, the Aga Khan traced his descent from the royal house of Persia from the most remote, almost prehistoric, times. His ancestors had also ruled in Egypt as caliphs of the Beni- Fatimites

for a number of years, at a period coeval with the Crusades. Before the Aga Khan emigrated from Persia, he was appointed by the emperor Fateh Ali Shah to be governor-general of the extensive and important province of Kerman. His rule was noted for firmness, moderation and high political sagacity, and he succeeded for a long time in retaining the friendship and confidence of his master the shah, although his career was beset with political intrigues and jealousy on the part of rival and court favourites, and with internal turbulence. At last, however, the fate usual to statesmen in oriental countries overtook him, and he incurred the mortal displeasure of Fateh Ali Shah. He fled from Persia and sought protection in British territory, preferring to settle down eventually in India, making Bombay his headquarters. At that period the first Afghan War was at its height, and in crossing over from Persia through Afghanistan the Aga Khan found opportunities of rendering valuable services to the British army, and thus cast in his lot for ever with the British. A few years later he rendered similar conspicuous services in the course of the Sind campaign, when his help was • utilized by Napier in the process of subduing the frontier tribes, a large number of whom acknowledged the Aga's authority as their spiritual head. Napier held his Moslem ally in great esteem, and entertained a very high opinion of his political acumen and chivalry as a leader and soldier. The Aga Khan reciprocated the British commander's confidence and friendship by giving Tepeated proofs of his devotion and attachment to the British government, and when he finally settled down in India, his position as the leader of the large Ismailiah section of Mahommedan British subjects was recognized by the government, and the title of His Highness was conferred on him, with a large pension. From that time until his death in 1881 the Aga Khan, while leading the life of a peaceful and peacemaking citizen, under the protection of British rule, continued to discharge his sacerdotal functions, not only among his followers in India, but towards the more numerous communities which acknowledged his religious sway in distant countries, such as Afghanistan, Khorasan, Persia, Arabia, Central Asia, and even distant Syria and Morocco. He remained throughout unflinchingly loyal to the British Raj, and by his vast and unquestioned influence among the frontier tribes on the northern borders of India he exercised a control over their unruly passions in times of trouble, which proved of invaluable service in the several expeditions led by British arms on the north-west frontier of India. He was also the means of checking the fanaticism of the

more turbulent Mahommedans in British India, which in times of internal troubles and misunderstandings finds vent in the shape of religious or political riots.

He was succeeded by his eldest son, Aga Khan II. This prince continued the traditions and work of his father in a manner that won the approbation of the local government, and earned for him the distinction of a knighthood of the Order of the Indian Empire and a seat in the legislative council of Bombay.

Aga Khan III. (Sultan Mahommed Shah), only son of the foregoing, succeeded him on his death in 1885, and became the head of the family and its devotees. He was born in 1877, and, under the care of his mother, a daughter of the ruling house of Persia, was given not only that religious and oriental education which his position as the religious leader of the Ismailiahs made indispensable, but a sound European training, a boon denied to his father and grandfather. This blending of the two systems of education produced the happy result of fitting this Moslem chief in an eminent degree both for the sacerdotal functions which appertain to his spiritual position, and for those social duties of a great and enlightened leader which he was called upon to discharge by virtue of that position. He travelled in distant parts of the world to receive the homage of his followers, and with the pbject either of settling differences or of advancing their welfare

by pecuniary help and personal advice and guidance. The distinction of a knight commander of the Indian Empire was conferred upon him by Queen Victoria in 1897, and he received like recognition for his public services from the German emperor, the sultan of Turkey, the shah of Persia and other potentates.

See Naoroji M. Dumasia, A Brief History of the Aga Khan (1903). (M. M. Bh.)

AGALMATOLITE (from Gr. &ya\/ia, statue, and Xt0os, stone), a soft species of mineral, also called pagodite, used by the Chinese for carving, especially into grotesque figures (whence called ” figure-stone “).

AGAMKDES, in Greek legend, son of Erginus, king of Orchomenus in Boeotia. He is always associated with his brother Trophonius as a wonderful architect, the constructor of underground shrines and grottos for the reception of hidden treasure. When building a treasure-house for Hyrieus, the brothers fixed

one of the stones in the wall so that they could remove it whenever they pleased, and from time to time carried off some of the treasure. Hyrieus thereupon set a trap in which Agamedes was caught; Trophonius, to prevent discovery, cut off his brother's head and fled with it. He was pursued by Hyrieus, and swal- lowed up by the earth in the grove of Lebadeia. On this spot was the oracle of Trophonius in an underground cave; those who wished to consult it first offered the sacrifice of a ram and called upon the name of Agamedes. A similar story is told of Rhampsinitus by Herodotus (ii. 121). According to Pindar (apud Plutarch), the brothers built the temple of Apollo at Delphi; when they asked for a reward, the god promised them one in seven days; on the seventh day they died.

Pausanias ix. 37; Plutarch, Consolatio ad Apollonium, 14; Cicero, Tusc. Disp. i. 47.

AGAMEMNON, one of the most distinguished of the Greek heroes, was the son of Atreus (king of Mycenae) and Aerope, grandson of Pelops, great-grandson of Tantalus and brother of Menelaus. Another account makes him the son of Pleisthenes (the son or father of Atreus), who is said to have been Aerope's first husband. Atreus was murdered by Aegisthus (q.v.), who took possession of the throne of Mycenae and ruled jointly with his father Thyestes. During this period Agamemnon and Menelaus took refuge with Tyndareus, king of Sparta, whose daughters Clytaemnestra (more correctly Clytaemestra) and Helen they respectively married. By Clytaemnestra, Agamemnon had three daughters, Iphigeneia (Iphianassa), Electra (Laodice), Chrysothemis, and a son, Orestes. Menelaus succeededTyndareus, and Agamemnon, with his brother's assistance, droveout Aegisthus and Thyestes, and recovered his father's kingdom. He extended his dominion by conquest and became the most powerful prince in Greece. When Paris (Alexander), son of Priam, had carried off his brother's wife, he went round to the princes of the country and called upon them to unite in a war of revenge against the Trojans. He himself furnished 100 ships, and was chosen commander-in- chief of the combined forces. The fleet, numbering 1200 ships, assembled at the port of Aulis in Boeotia. But Agamemnon had offended the goddess Artemis by slaying a hind sacred to her, and boasting himself a better hunter. The army was visited by a plague, and the fleet was prevented from sailing by the total absence of wind. Calchas announced that the wrath of the goddess could only be appeased by the sacrifice of Iphigeneia (q.v.). The fleet then set sail. Little is heard of

Agamemnon until his quarrel with Achilles (q.v.). After the capture of Troy, Cassandra, the daughter of Priam, fell to his lot in the distribution of the prizes of war. On his return, after a stormy voyage, he landed in Argolis. His kinsman, Aegisthus, who in the interval had seduced his wife Clytaemnestra, invited him to a banquet at which he was treacherously slain, Cassandra also being put to death by Clytaemnestra. According to the account given by Pindar and the tragedians, Agamemnon was slain by his wife alone in a bath, a piece of cloth or a net having first been thrown over him to prevent resistance. Her wrath at the sacrifice of Iphigeneia, and her jealousy of Cassandra, are said to have been the motives of her Crime, The murder of Agamemnon was avenged by his son Orestes (q.v.). Although not the equal of

Achilles in bravery, Agamemnon is a dignified representative of kingly authority. As commander-in-chief, he summons the princes to the council and leads the army in battle. He takes the field himself, and performs many heroic deeds until he is wounded and forced to withdraw to his tent. His chief fault is his over- weening haughtiness, due to an over-exalted opinion of his position, which leads him to insult Chryses and Achilles, thereby bringing great disaster upon the Greeks. But his family had been marked out for misfortune from the outset. His kingly office had come to him from Pelops through the blood-stained hands of Atreus and Thyestes, and had brought with it a certain fatality which explained the hostile destiny which pursued him. The fortunes of Agamemnon have formed the subject of numerous tragedies, ancient and modern, the most famous being the Oresteia of Aeschylus. In the legends of Peloponnesus, Agamemnon was regarded as the highest type of a powerful monarch, and in Sparta he was worshipped under the title of Zeus Agamemnon. His tomb was pointed out among the ruins of Mycenae and at Amyclae.

In works of art there is considerable resemblance between the representations of Zeus, king of the gods, and Agamemnon, king of men. He is generally characterized by the sceptre and diadem, the usual attributes of kings.

See articles in Pauly-Wissowa's Realencydopadie and Roscher's

AGAPE (Gr. 070×77, ” Love “), the early Christian love- feast. The word seems to be used in this sense in the epistle of Jude 12: ” These are they who are hidden rocks in your love- feasts when they banquet with you.” But this is not certain, for in 2 Pet. ii. 13 the verse is cited, but reading axdrais (” deceits “) for 070×01$, and the oldest MSS. hesitate. The history of the agape coincides, until the end of the 2nd century, with that of the eucharist (q.v.), and it is doubtful whether the following detailed account of the agape given in Tertullian’s Apology (c. 39) is to be regarded as exclusive of an accompanying eucharist: ” It is the banquet (triclinium) alone of the Christians that is criticised. Our supper (coena) shows its character by its name. It is called by a word which in Greek signifies love {i.e. agape) . Whatever it costs, it is anyhow a clear gain that it is incurred on the score of piety, seeing that we succour the poorest by such entertainments (refrigerio) . We do not lie down at table until prayer has been offered to God, as it were a first taste. We eat only to appease our hunger, we drink only so much as it is good for temperate persons to do. If we satisfy our appetites, we do so without forgetting that throughout the night we must say our prayers to God. If we converse, it is with the knowledge that the Lord is listening. After washing our hands and lighting the lamps, each is invited to sing a hymn before all to God, either taken from holy writ or of his own composition. So we prove him, and see how well he has drunk. Prayer ends, as it began, the banquet; and we break up not in bands of brigands, nor in groups of vagabonds, nor do we burst out into debauchery. . . . This meeting of Christians we admit deserves to be made illicit, if it resembles illicit acts; it deserves to be condemned, if any complain of it on the same score on which complaints are levelled at factious meetings. But to do harm to whom do we ever thus come together ? ”

The evidence of Tertullian is good for Africa. But in Egypt about the same time (180-210), Clement of Alexandria in his Pedagogus (ii. 1) condemns the ” little suppers which were called, not without presumption, agape.” This word, he complains, should denote the heavenly food, the reasonable feast alone, and the Lord never used it of mere junketings. Clement wished the name to be reserved for the eucharist, because the love-feasts of the church had degenerated, as Tertullian too discovered, as soon as he turned Montanist. For in his tract on fasting (ch. xvii.) he complains that the young men misbehaved with the sisters after

the agape.

Among the spurious works of Athanasius is printed a tract entitled About Virginity, ch. xiii. of which directs how the sisters after the synaxis of the ninth hour (3 p.m.) are to dine: ” When you sit down at a table and come to break bread, seal it thrice

with the sign of the cross and thus give thanks : ‘ We thank thee, our Father, for thy holy resurrection; for through Jesus thy Servant thou hast shewn it unto us. And as this bread on this table was scattered, but has been brought together and become one, so may thy church be brought together into thy kingdom. For thine is the power and the glory, for ever and ever, Amen.’ This prayer as you break the bread, and are about to eat, you must say. And when you lay it on the table and desire to eat it, repeat the ‘ Gur Father ‘ entire. But after dinner (or breakfast), and when we rise from table, we use the prayer given above, viz. ‘ Blessed be God, who hath pity and nourisheth us from our infancy, who giveth food to all flesh. Fill pur hearts with joy and gladness, that ever having of all things a sufficiency, we may superabound in all good works, in Christ Jesus our Lord, &c.’ ” The writer then enjoins that, ” if two or three other virgins are present, they also shall give thanks over the bread set out, and join in the prayers. But if a catechumen be found at the table, she shall not be suffered to join with the full believers in their prayers, nor shall the latter sit with her to eat the morsel ” (ˆoj/ i6c, used specially of the sanctified bread). ” Nor shall they sit with frivolous and joking women, if they can help it, for they are sanctified to God, and their food and drink have been hallowed by the prayers and holy words used over them. ... If a rich woman sits down with them at table, and they see a poor woman, they shall invite her also to eat with them, and not put her to shame because of the rich one.” The last words echo 1 Cor. x., and the prayer is nearly the same as that which the teaching of the Apostles assigns for the eucharistic rite. Here, then, we have pictured as late as the 4th century a Lord’s supper, which like the one described in 1 Cor. x. is agape and eucharist in one, and it is held in a private house and not in church, and the celebrants are holy women!

The historian Socrates {Hist. Eccl. v. 22) testifies to the survival in Egypt of such Lord’s suppers as were love-feasts and eueharists in one. Around Alexandria and in the Thebaid, he says, they hold services on the sabbath, and unlike other Christians partake of the mysteries (i.e. sacrament): For after holding good cheer and

filling themselves with meats of all kinds, they at eventide make the offering (xpewˆopo) and partake of it. So Basil of Cappadocia (Epistle 93), about the year 350; records that in Egypt the laity, as a rule, celebrated the communion in their own houses, and partook of the sacrament by themselves whenever they chose. In the old Egyptian church order, known as the Canons of Hippolytus, there are numerous directions for the service of the agape, held on Sundays, ‘ saints’ days or at commemorations of the dead. The 74th canon of the council of Trullo (a.d. 692) forbade the holding of symposia known as agapes in church. In his 54th homily (torn. v. p. 365) Chrysos- tom describes how after the eucharistic synaxis was over, the faithful remained in church, while the rich’ brought out meats and drink from their houses, and invited the poor, and furnished ” common tables, common banquets, common symposia in the church itself.” The council of Gangra (a.d. 355) anathematized the over-ascetic people who despised ” the agapes based on faith.” Only a few years later, however, the council of Laodicea forbade the holding of agapes in churches. The 42nd canon of the council of Carthage under Aurelius likewise forbade them, but these were only local councils. In the age of Chrysostom and Augustine the agape was frequent.

In the east Syrian, the Armenian and the Georgian churches, respectively Nestorian, Monophysite and Greek Orthodox in their tenets, the agape was from the first a survival, under Christian and Jewish forms, of the old sacrificial systems of a pre-Christian age. Sheep, rams, bullocks, fowls are given sacrificial salt to lick, and then sacrificed by the priest and deacon, who has the levitical portions of the victim as his per- quisite. In Armenia the Greek word agape has been used ever since the 4th century to indicate these sacrificial meals, which either began or ended with a • eucharistic celebration. The earlier usage of the Armenians is expressed in the two following rules recorded against them by a renegade Armenian prelate named Isaac, who in the 8th century went over to the Byzantine

church: “Christ did not hand down to us the teaching to celebrate the mystery of the offering of the bread in church, but in an ordinary house, and sitting at a common table. So then let them not sacrifice the offering of bread in churches. It was after

supper, when his disciples were thoroughly sated, that Christ gave them of his own body to eat. Therefore let them first eat meats and be sated, and then let them partake of the mysteries." These old canons are adduced by way of ridiculing the Armenians, yet they reflect old usage. They are given in the Historia M onothelitarum of Combefisius, col. 317. Older MSS. of the Greek Euchologion contain numerous prayers to be offered over animals sacrificed; and in the form of agape such sacrifices were common in Italy and Gaul on the natalis dies of a saint, and Paulinus' of Nola, the friend of Augustine, in his Latin poems, describes them (c. 400) in detail. Gregory the Great sent to Mellitus, bishop of London, a written rite of sacrificing bulls for use in the English church of the early 7th century. In Augustine's work against Faustus the Manichean (xx. 4); the latter taxes the Catholics with having turned the sacrifices of the heathen into agapis, their idols into martyrs, whom they worship with similar rites. " You appease," he says, " the shades of the dead with wines and banquets, you celebrate the feast-days of the heathen along with them ... in their way of living you have certainly changed nothing." This was true enough, but there is truth also in the remark of Prof. Sanday (" Eucha rist " in Hastings' Dictionary of the Bible) that Providence even in its revolutions is conservative. The world could only be christianized on condition that old holy days and customs were continued. The early Christian agape admitted of adaptation to the older funeral and sacrificial feasts, and was so adapted. The association in the synoptics of the earliest eucharist with the paschal sacrifice provided a model, and long after the eucharist was separated with the agape on other days of the year, we still find celebrated on the evening of Maundy Thursday the sacrifice of the paschal lamb, immediately followed by an eucharist. The 41st canon of the council of Carthage enacted that the sacraments of the altar should be received fasting, except on the anniversary of the Lord's supper. It is clear that at an earlier date the agapS preceded the eucharist.

Pagan Analogues. — In ancient states common meals called sussitia {avaoiria) were instituted, particularly in the Doric states, e.g. in Lacaedemon and in Crete. Plato advocated them, and perhaps the later Jews imitated the Spartan community. Trade and other gilds in antiquity held subscription suppers or ipavoi, similar to those of the early Corinthian church, usually to support the needs of the poorer members. These hetairiae or clubs were forbidden (except in cities formally allied to Rome) by

Trajan and other emperors, as being likely to be centres of disaffection; and on this ground Pliny forbade the agape of the Bithynian churches, Christianity not being a lawful religion licensed for such gatherings. The custom which most resembles the eucharist and agape was that known as charistia described by Valerius Maximus ii. 1. 8. It was a solemn feast attended only by members of one clan, at which those who had quarrelled were at the sacrament of the table (apud sacra mensae) reconciled. It was held on the 20th of February. Ovid in his Fasti, ii. 617, alludes to it —

Proximo cognati dixere charistia cari, Et venit ad socios turba propinqua deos.

Authorities. — " The Canons of Hippolytus," in Duchesne's Origines du culte Chretien (Paris, 1898)ˆ A. Allen, Christian Institutions (London, 1898); P. Batiffol, Etudes d'histoire (Paris, 1902 and 1905) ; F. X. Funk, " L'Agape," in the Revue de I'histoire ecclesi- astique (Louvain, Jan. 1903) ; Ad. Harnack, " Brod und Wasser " (Texte und Untersuch. vii. 2, Leipzig, 1891); J. F. Keating, The Agape and the Eucharist (London, 1901); F. X. Kraus, arts. " Agapen " and " Mahle " in the Realencykhp. d. christl. Altertiimer ; P. Ladeuze, " L'Eucharistie et les repas communs " in the Revue de F orient Chretien, No. 3, 1902; Sir W. M. Ramsay, The Church in the Roman Empire (London, 1894); A. Spitta, Zur Geschichte und Litteratur (Gottingen, 1893) ; E. von der Goltz, Das Gebet in dltesten Christianheit (Leipzig, I 901); F. E. Warren, The Liturgy and Ritual of the Antenicene Church (London, 1897) ; T. 2ahn, art. " Agapen " in Hauck's Realencyklop.; F. C. Conybeare, Rituale Armenorum (Oxford, 1905; it contains the oldest Latin and Greek forms), The

Key of Truth (Oxford, 1898), and art. on "The Survival of Animal Sacrifices " in the American Journal of Theology (Chicago, Jan. 1903) ; F. X. Funk, Didascalia et Constitutiones Apostolorum (Paderborn, 1906) ; V. Ermohi, L'Agape (Paris, 1904) ; G. Horner, The Statutes of the Apostles, translated from Ethiopic and Arabic MSS. (London, 1904) ; Thefr. Drescher, Diss, de vet. Chrisiianorum Agapis (Giesse, 1824); L. A. Muratori, Anecdota Graeca, " De agapis sublatis " (Patavii, 1709); I. A. Fabricius, Bibliogr. Ant. p. 587; Muenter, Primord. Eccl. Afr. p. in ; Walafrid Strabo, De Rebus Eccles. capita 18, 19; Gregory of Tours, De miraculis S. Juliani, xxxi. ; Paulini Nolani Carmen xii. in S. Felicem. (F. C. C.)

AGAPEMONITES, or Community of the Son of Man. This sect, based upon the theories of various German religious mystics, and having for its primary object the spiritualization of the matrimonial state, was founded in 1846 by the Rev. Henry James Prince, a clergyman of the Church of England (181 1-1899). He studied medicine, obtained his qualifications in 1832 and was appointed medical officer to the General Hospital in Bath, his native city. Compelled by ill-health to abandon his profession, he entered himself in 1837 as a student at St. David's Theo- logical College, Lampeter, where he gathered about him a band of earnest religious enthusiasts, known as the Lampeter Brethren, and was eventually ordained to the curacy of Charlinch in Somerset, where he had sole charge in the illness and absence of the rector, the Rev. Samuel Starkey. By that time he had contracted his first " spiritual marriage," and had persuaded hirnself that he had been absorbed into the personality of God and had become a visible embodiment of the Holy Spirit. During his illness Mr. Starkey read one of his curate's sermons, and was not only " cured " forthwith, but embraced his strange doctrines, and together they procured many conversions in the countryside and the neighbouring towns. In the end the rector was deprived of his living and Prince's licence withdrawn, and together with a few disciples they started the Charlinch Free Church, which had a very brief existence. Prince shortly afterwards became curate of Stoke in Suffolk, where, however, the character of his revivalist zeal caused his departure at the end of twelve months. It was now decided that Prince, Starkey (whose sister Prince had married as his second wife) and the Rev. Lewis Prince should leave the Church of England and preach their own gospel; Prince opened Adullam Chapel, Brighton, and Starkey established himself at Weymouth. The chief success lay in the latter town, and thither Prince soon migrated. A number of followers, estimated by Prince at 500, but by his critics at one-fifth of the number, were got together, and it was given out by " Beloved " or " The Lamb " — the names by which the Agapemonites designated their leader — that his disciples must divest themselves of their possessions and throw them into the common stock. This was done, even by the poor or ill furnished, all of whom looked forward to the speedy end of the present dispensation, and were content, for the short remainder of this world, to live in common, and, while not repudiating earthly ties, to treat them as purely spiritual. With the money thus obtained the house at Spaxton, which was to become the " Abode of Love," was enlarged and furnished luxuriously, and three

sisters, who contributed £6000 each, were immediately married to three of Prince's nearest disciples. Despite the purely spiritual ideas which underlay the Agapemonite view of marriage, a son was born to one of these couples, and when the father endeavoured to carry it away an action was brought which resulted in the affirmation of the mother's right to its custody. The circumstance in which a fourth sister who joined the community was abducted by her brothers led to an inquiry in lunacy and to her final settlement at Spaxton. A few years after the establishment of the " Abode of Love," a peculiarly gross scandal, in which Prince and one of his female followers were involved, led to the secession of some of his most faithful friends, who were unable any longer to endure what they regarded as the amazing mixture of blasphemy and immorality offered for their acceptance. The most prominent of those who remained received such titles as the " Anointed Ones," the " Angel of the Last Trumpet," the " Seven Witnesses " and so forth. In 1862 " Brother Prince " sent " to the kings and people of the earth " letters " making known to all men that flesh is saved

from death." At that period the Agapemonites counted their adherents at 600, and it was no doubt a grievous shock to them when their deathless founder died on the 8th of March 1899, four years after he had opened a branch church at Clapton, London, which is said to have cost £20,000. This church, decorated with elaborate symbolism, was styled the " Ark of the Covenant," and in it the elect were to await the coming of the Lord.

On the death of " Brother " Prince, the Rev. T. H. Smyth- Pigott, pastor of the " Ark," became the acknowledged head of the sect. He was born in 1852, of an old Somersetshire county family, and, after a varied career as university man, sailor before the mast, soldier, coffee-planter, curate in the Church of England and evangelist in the Salvation Army, was converted about 1897 to the views of Prince. For five years after this he was not heard of outside his own sect. On the 7 th of September 1902, however, the congregation, assembled at the Ark of the Covenant for service, found ihe communion table replaced by a chair. In this Pigott presently seated himself and proclaimed himself as the Messiah with the words, " God is no longer there," pointing upwards, " but here," pointing to himself. This aston- ishing

announcement was followed by an excellent sermon on Christian love. Pigott's claim was at once admitted by the members of his sect, including even his own wife, as the ful- filment of the promise of Christ to appear in due time in the "Ark." By the outside world the affair was greeted with mingled ridicule and indignation, and the new Messiah had to be pro- tected by the police from the violence of an angry mob. After providing " copy " for the newspapers for a few days, however, the whole thing was forgotten. Pigott retired to the head- quarters of the sect, the " Abode of Love " in Somerset, and all efforts to interview him or to obtain details of the life of the community were abortive. At last, in August 1905, the long and mysterious silence was broken by the announcement that a son had been born to Pigott by his " spiritual wife," Miss Ruth Preece, an inmate of the Agapemone. This event by no means disconcerted the believers, who saw in it only another manifesta- tion of Pigott's divinity, and proclaimed it as " an earnest of the total redemption of man." The child was registered as " Glory," and, at the christening service in the chapel of the Abode, hymns were sung in its honour as it lay in a jewelled cradle in the chancel. Another child by Miss Preece, christened " Power," was born on the 20th of August 1908. The publicity given to this event renewed the scandal, and in November an attempt to " tar and feather " Mr Pigott resulted in two men being sent to prison. Later in the month proceedings were instituted against him by the bishop of Bath and Wells under the Clergy Discipline Act.

One outcome of the disclosures connected with the Agapemone deserves passing mention, as throwing some light on the origin of the wealth of the community. Mr Charles Stokes Read, a resident at the Agapemone and director of the V. V. Bread Company, was requested by his fellow-directors to resign, on the ground that his connexion with the sect was damaging the business of the company. He denied this to be the case and refused to resign, pleading religious liberty and the large interests of Agapemonites in the coricern. On the 13th of September 1905, a meeting of the shareholders of the company was held, and Read " asked them to believe that it was not in the interests of the company, but because he knew that the Lord Jesus Christ had come again and was now dwelling at the Agapemone, that he was thus cast out by his colleagues." The motion calling on him to resign was carried on a poll being taken by 46,770 votes to 2 953- (See The Times, 14th of September 1905.)

AGAPETAE, a class of " virgins " who, in the church of the early

middle ages, lived with professedly celibate monks to whom they were said to be united by spiritual love. The practice was suppressed by the Lateran Council of 1139.

AGAPETUS, the name of two popes; —

Agapetxji I., pope from 535 to 536. He was an enlightened pontiff and collaborated with Cassiodorus in founding at Rome a library of ecclesiastical authors. King Theodahad sent him on an embassy to Constantinople, where he died, after having deposed.;

Agapetus II., pope from 946 to 95s* at the time when Alberic,

son of Marozia, was governing the independent republic of Rome under the title of " prince and senator of the Romans." Agapetus, a man of some force of character, did his best to put a stop to the degradation into which the papacy had fallen, the so-called " Pornocracy," which lasted from the accession of Sergius III. in 004 to the deposition of John XII. in 963. His appeal to Otto the Great to intervene in.Rome remained without immediate effect, since Alberic's position was too strong to be attacked, but it bore fruit after his death. Agapetus died on the 8th of November 955. –

AGAPETUS, a deacon of the church of St Sophia at Constantinople. He presented to the emperor Justinian, on his ac- cession in 527, a work entitled Scheda regia sive de officio regis, which contained advice on the duties of a Christian prince. The work was often reprinted and is included in Dom Anselme Banduri's Imperium Orientate (Paris, 1711). There is an English translation by Thomas Paynell (1550) and a French trans- lation, executed in 1612 from a Latin version by Louis XIII., with the assistance of his tutor, David Rivault.

AGARPE, ARTHUR (1540-1615), English antiquary,, was born at Foston, Derbyshire, in 1540. He was trained as a lawyer, but entered the exchequer as a clerk. – On the authority of Anthony a. Wood it has been stated that he was appointed by Sir Nicholas Throckmorton to be deputy-chamberlain in. 1570, and that he held this office for forty-five years. His patent of appointment, however, preserved in the Rolls Office, proves that he succeeded one Thomas Reve in the post on the nth of July 1603. With his friends, Sir Robert Cotton and Camden, he was one of the original members of the Society of Antiquaries. He spent much labour in cataloguing the records and state papers, and made a special study of the Domesday Book, preparing an explanation of

its more obscure terms. Thomas Hearne, in his Collection of Curious Discourses written by Eminent Antiquaries; (Oxford, 1720), includes six by Agarde on such subjects as the origin of parliament, the antiquity of shires, the authority and privileges of heralds, &c. Agarde died on the 22nd of August 161 5 and was buried in the cloister of Westminster Abbey, on his tomb being inscribed "Recordorum regiorum hie prope depositorum diligens scrutator." He bequeathed to the exchequer all his papers relating to that court, and to his friend Sir Robert Cotton his other manuscripts, amounting to twenty volumes, most of which are now in the British Museum.

AGAS, RADULPH, or Ralph (c. 1 540-1621), English land-surveyor, was born at Stoke-by-Nayland, Suffolk, about 1540, and entered upon the practice of his profession in 1566. Letters which he wrote to Lord Burghley, describing the methods of surveying, are extant, and a kind of advertising prospectus of his abilities, in which he describes himself as clever at arithmetic and "skilled in writing smaule, after the skantelinge & pro- portion of copiynge the Oulde & New Testamentes seven tymes in one skinne of partchmente without anie woorde abreviate or contracted, which maie also serve for drawinge discriptions of contries into volumes portable in verie little cases." He is best known for his maps of Oxford (1578), Cambridge (1592) and London. Copies of the first two are preserved in the Bodleian Library. Of the map of London and Westminster, which was probably prepared about 1591, two copies have been preserved, one by the Corporation of London and the other in the Pepysian collection at Magdalene College, Cambridge. The map is over six feet long, printed from wooden blocks, and gives a valuable picture of the London of Elizabeth's time. Agas died on the * 26th of November 1621.

AGASIAS. There were two Greek sculptors of this name. Agasias, son of Dositheus, has signed the remarkable statue called the Borghese Warrior, in the Louvre. Agasias, son of Menophilus, is the author of another striking figure of a v;airior in the museum of Athens. Both belonged to the school of Ephesus and flourished about 100 B.C.

See E. A. Gardner, Handbook of Greek Sculpture, ii. p. 475.

AGASSIZ, ALEXANDER EMANUEL (1835-1910), American man of science, son of J. L. R. Agassiz, was born in Neuchatel, Switzerland, on the 17th of December 1835. He came to the

United States with his father in 1846; graduated at Harvard in 1855, subsequently studying engineering and chemistry, and taking the degree of bachelor of science at the Lawrence scientific school of the same institution in 1857; and in 1859 became an assistant in the United States Coast Survey. Thenceforward he became a specialist in marine ichthyology, but devoted much time to the investigation, superintendence and exploitation of mines, being superintendent of the Calumet and Hecla copper mines, Lake Superior, from 1866 to 1869, and afterwards, as a stockholder, acquiring a fortune, out of which he gave to Harvard, for the museum of comparative zoology and other purposes, some $500,000. In 1875 he surveyed Lake Titicaca, Peru, examined the copper mines of Peru and Chile, and made a collection of Peruvian antiquities for that museum, of which he was curator from 1874 to 1885. He assisted Sir Wyville Thomson in the examination and classification of the collections of the " Challenger " exploring expedition, and wrote the Review of the Echini (2 vols., 1872-1874) in the reports. Between 1877 and 1880 he took part in the three dredging expeditions of the steamer " Blake," of the United States Coast Survey, and presented a full account of them in two volumes (1888). Of his' other writings on marine zoology, most are contained in the bulletins and memoirs of the museum of comparative zoology; but he published in 1865 (with Elizabeth Cary Agassiz, his stepmother) Seaside Studies in Natural History, a work at once exact and stimulating/ and in 1871 Marine Animals of Massachusetts Bay.

AGASSIZ, JEAN LOUIS RODOLPHE (1807-1873), Swiss naturalist and geologist, was the son of the Protestant pastor of the parish of Motier, on the north-eastern shore of the Lake of Morat (Murten See), and not far from the eastern extremity of the Lake of Neuchatel. Agassiz was born at this retired place on the 28th of May 1807. Educated first at home, then spending four years at the gymnasium of Bienne, he completed his ele- mentary studies at the academy of Lausanne. Having adopted medicine as his profession, he studied successively at the uni- versities of Zurich, Heidelberg and Munich; and he availed himself of the advantages afforded by these universities for extending his knowledge of natural history, especially of botany. After completing his academical course, he took in 1829 his degree of doctor of

philosophy at Erlangen, and in 1830 that of doctor of medicine at Munich.

Up to this time he had paid no special attention to the study of ichthyology, which soon afterwards became the great occupation of his life. Agassiz always declared that he was led into ichthyological pursuits through the following circumstances:— In 1819-1820, J. B. Spix and C. F. P. von Martius were engaged in their celebrated Brazilian tour, and on their return to Europe, amongst other collections of natural objects they brought home an important set of the freshwater fishes of Brazil, and especially of the Amazon river. Spix, who died in 1826, did not live long enough to work out the history of these fishes; and Agassiz, though little more than a youth just liberated from his academic studies, was selected by Prof. Martius for this purpose. He at once threw himself into the work with that earnestness of spirit which characterized him to the end of his busy life, and the task of describing and figuring the Brazilian fishes was completed and published in 1829. This was followed by an elaborate re- search into the history of the fishes found in the Lake of Neuchatel. Enlarging his plans, he issued in 1830 a prospectus of a History of the Freshwater Fishes of Central Europe. It was only in 1839, however, that the first part of this publication appeared, and it was completed in 1842. In 1832 he was appointed professor of natural history in the university of Neuchatel. Having become a professed ichthyologist, it was impossible that the fossil fishes should fail to attract his attention. The rich stores furnished by the slates of Glarus and the limestones of Monte Bolca were already well known; but very little had been accom- plished in the way of scientific study of them. Agassiz, as early as 1829, with his wonted enthusiasm, planned the publication of the work which, more than any other, laid the foundation of his world-wide fame. Five volumes of his Recherches sur les poissons

fossiles appeared at intervals from 1833 to 1843 [1844] . They were magnificently illustrated, chiefly through the labours of Joseph Dinkel, an artist of remarkable power in delineating natural objects. In gathering materials for this great work Agassiz visited the principal museums in Europe, and meeting Cuvier in Paris, he received much encouragement and assistance from him.

Agassiz found that his palaeontological labours rendered necessary a new basis of ichthyological classification. The fossils rarely exhibited any traces of the soft tissues of fishes. They consisted chiefly of the teeth, scales and fins, even the bones

being perfectly preserved in comparatively few instances. He therefore adopted his well-known classification, which divided fishes into four groups— viz. Ganoids, Placoidsj Cycloids and Ctenoids, based on the nature of the scales and other dermal appendages. While Agassiz did much to place the subject on, a scientific basis, his classification has not been found to meet the requirements of modern research. As remarked by Dr A. Smith ■ Woodward, he sought to interpret the past structures by too rigorous a comparison with those of living forms. (See Catalogue of Fossil Fishes in the British Natural History Museum.)

As the important descriptive work of Agassiz proceeded, it became obvious that it would over-tax his resources, unless assistance could be afforded. The British Association came to his aid, and the earl of EUesrnere— then Lord Francis Egerton — gave him yet more efficient help. The original drawings made for the work, chiefly by Dinkel, amounted to 1 290 in number. These were purchased by the Earl, and presented by him to the Geological Society of London. In 1836 the Wollaston medal was awarded by the council of that society to Agassiz for his work on fossil ichthyology; and in 1838 he was elected a foreign member of the Royal Society. Meanwhile the invertebrate animals engaged his attention. In 1837 he issued the "Pro- drome " of a monograph on the recent and fossil Echinodermata, the first part of which appeared in 1838; in 1839-1840 he published two quarto volumes on the fossil Echinoderms of Switzerland; and in 1840-1845 he issued his Etudes critiques sur les mollusques fossiles.

Subsequently to his'first visit to England in 1834, the labours of Hugh Miller and other geologists brought to light the remarkable fishes of the Old Red Sandstone of the north-east of Scotland. The strange forms of the Pterichthys, the Coccosteus and other genera were then made known to geologists for the first time. They naturally were of intense interest to Agassiz, and formed the subject of a special monograph by him published in 1844-1845: Monographic des poissons fossiles du Vieux Gres Rouge, ou Systeme Dfroonien {Old Red Sandstone) des lies Britanniques et de Russie.

The year 1836 witnessed the inauguration of a new investigation, which proved to be of the utmost importance to geological science. Previously to this date de Saussure, Venetz, Char- pentier and others had made the glaciers of the Alps the subjects of special study, and Charpentier had even arrived at the conclusion

that the erratic blocks of alpine rocks scattered over the slopes and summits of the Jura mountains had been conveyed thither by glaciers. The question having attracted the attention of Agassiz, he not only made successive journeys to the alpine regions in company with Charpentier, but he had a hut con- structed upon one of the Aar glaciers, which for a time he made his home, in order to investigate thoroughly the structure and movements of the ice. These labours resulted in the publication of his grand work in two volumes entitled Jitudes sur les glaciers, 1840. Therein he discussed the movements of the glaciers, their moraines, their influence in grooving and rounding the rocks over which they travelled, and in producing the striations and roches moutonnies with which we are now so familiar. He not only accepted Charpen tier's idea that some of the alpine glaciers had extended across the wide plains and valleys drained by the Aar and the Rhone, and thus landed parts of their remains upon the uplands of the Jura, but he went still farther. He concluded that, at a period geologically recent, Switzerland had been another Greenland; that instead of a few glaciers stretching across th*

areas referred to, one vast sheet of ice, originating in the higher Alps, had extended over the entire valley of north-western Switzerland until it reached the southern slopes of the Jura, which, though they checked and deflected its further extension, did not prevent the ice from reaching in many places the summit of the range. The publication of this work gave a fresh impetus to the study of glacial phenomena in all parts of the world.

Thus familiarized with the phenomena attendant on the move- ments of recent glaciers, Agassiz was prepared for a discovery which he made in 1840, in conjunction with William Buckland. These two savants visited the mountains of Scotland together, and found in different localities clear evidence of ancient glacial action. The discovery was announced to the Geological Society of London in successive communications from the two distin- guished observers. The mountainous districts of England and Wales and Ireland were also considered to constitute centres for the dispersion of glacial debris; and Agassiz remarked " that great sheets of ice, resembling those now existing in Greenland, once covered all the countries in which unstratified gravel

(boulder drift) is found; that this gravel was in general produced by the trituration of the sheets of ice upon the subjacent surface, &c."

In 1 84 2- 1 846 he issued his Nomenclator Zoologicus, a classified list, with references, of all names employed in zoology for genera and groups — a work of great labour and research. With the aid of a grant of money from the king of Prussia, Agassiz, in the autumn of 1846, crossed the Atlantic, with the twofold design of investigating the natural history and geology of the United States and delivering a course of lectures on zoology, by invitation from J. A. Lowell, at the Lowell Institute at Boston; the tempting advantages, pecuniary and scientific, presented to him in the New World induced him to settle in the United States, where he remained to the end of his life. He was ap- pointed professor of zoology and geology in Harvard University, Cambridge, U.S., in 1847. In 1852 he accepted a medical professorship of comparative anatomy at Charlestown, but this he resigned in two years.

The transfer to a new field and the association w'th fresh objects of interest gave his energies an increased stimulus. Volume after volume now proceeded from his pen: some of his writings were popular, but most of them dealt with the higher departments of scientific research. His work on Lake Superior, and his four volumes of Contributions to the Natural History of the United Stales, 1857-1862, were of this latter character. We must hot overlook the valuable service he rendered to science by the formation, for his own use, of a catalogue of scientific memoirs — an extraordinary work for a man whose hands were already so full. This catalogue, edited and materially enlarged by the late Hugh E. Strickland, wis published by the Ray Society under the title of Bibliographia Zoologiae et Geologiae, in 4 vols., 1848-1854. Nor must we forget that he was building up another magnificent monument of his industry in the Museum of Natural History, which rose under his fostering care, at Cambridge. But at length the great strain on his physical powers began to tell. His early labours among the fishes of Brazil had often caused him to cast a longing glance towards that country, and he now resolved to combine the pursuit of health with the gratification of his long- cherished desires. In April 1865 he started for Brazil, with his wife and class of qualified assistants. An interesting account of this expedition, entitled A Journey in Brazil (1868), was published by Mrs Agassiz and himself after they returned home in August 1866.

In 187 1 he made a second excursion, visiting the southern shores of the North American continent, both on its Atlantic and its Pacific sea-boards. He had for many years yearned after the establishment of a permanent school where zoological science could be pursued amidst the haunts of the living , subjects of study. The last, and possibly the most influential, of the labours of his life was the establishment of such an institution, which he was enabled to effect through the liberality of Mr John Anderson, a citizen of New York. That gentleman, in 1873, not

only handed over to Agassiz the island of Penikese, in Buzzard's Bay, on the east coast, but also presented him with $50,000 wherewith permanently to endow it as a practical school of natural science, especially devoted to the study of marine zoology. Unfortunately he did not long survive the establishment of this institution. The disease with which he had struggled for some years proved fatal on the 14th of December 1873. He was buried at Mount Auburn. His monument is a boulder selected from the moraine of the glacier of the Aar near the site of the old H6tel des Neuchatelois, not far from the spot where his hut once stood; and the pine-trees which shelter his grave were sent from his old home in Switzerland. His extensive knowledge of natural history makes it somewhat remarkable to find that from first to last he steadily rejected the doctrine of evolution, and affirmed his belief in independent creations. When studying the superficial deposits of the Brazilian plains in 1865, his vivid imagination covered even that wide tropical area, as it had covered Switzerland before, with one vast glacier, extending from the Andes to the sea. This view, however, has not been generally accepted. His daring conceptions were only equalled by the unwearied industry and genuine en- thusiasm with which he worked them out; and if in details his labours were somewhat defective, it was only because he had ventured to attempt what was too much for any one man to accomplish.

It may be interesting to mention that the charming verses written by Longfellow on " The fiftieth birthday of Agassiz " were read by the author at a dinner given to Agassiz by the Saturday Club in Cambridge, Mass., in 1857.

Louis Agassiz was twice married, and by his first wife he had an only son, Alexander Agassiz (q.v.), born in 1835; in 1850, after her death, he married his second wife, Elizabeth Cabot Gary of Boston, Mass., afterwards well known as a writer and as an active promoter of educational work in connexion with Radcliffe

College (see an article on Radcliffe College, by Helen Leah Reed in the New England Magazine for January 1895).

Authorities. — L.Agassiz,His Life and Correspondence ,‘2vols., by E.C (Mrs)Agassiz (London, 1885) ; Louis Agassiz, His Life and Work, by C. F. Holder (New York and London, 1893). (H. B. Wo.)

AGATE, a term applied not to a distinct mineral species, but to an aggregate of various forms of silica, chiefly Chalcedony (q.v.). According to Theophrastus the agate (dxarijs) was named from the river Achates, now the Drillo, in Sicily, where the stone was originally found. Most agates occur as nodules in erupcive rocks, or ancient lavas, where they represent cavities originally produced by the disengagement of vapour in the molten mass, and since filled, wholly or partially, by siliceous matter deposited in regular layers upon the walls. Such agates, when cut transversely, exhibit a succession of parallel lines, often of extreme tenuity, giving a banded appearance to the section, whence such stones are known as banded agate, riband agate and striped agate. Certain agates also occur, to a limited extent, in veins, of which a notable example is the beautiful brecciated agate of Schlottwitz, near Wesenstein in Saxony — a stone mostly composed of angular fragments of agate cemented with amethystine quartz.

In the formation of an ordinary agate, it is probable that waters containing silica in solution — derived, perhaps, from the decomposition of some of the silicates in the lava itself — percolated through the rock, and deposited a siliceous coating on the interior of the vapour-vesicles. Variations in the character of the solution, or in the conditions of deposit, may have caused corresponding variation in the successive layers, so that bands of chalcedony often alternate with layers of crystalline quartz, and occasionally of opaline silica. By movement of the lava, when originally viscous, the vesicles were in many cases drawn out and compressed, whence the mineral matter with which they became filled assumed an elongated form, having the longer axis in the direction in which the magma flowed. From the fact that these kernels are more or less almond-shaped they are called amygdales, whilst the rock which encloses them is known as an amygdaloid. ˆSeveral vapour-vesicles may unite while the

rock is viscous, and thus form a large cavity which may become the home of an agate of exceptional size; thus a Brazilian geode, lined with amethyst, of the weight of 35 tons, was exhibited at the Dusseldorf Exhibition of 1902.

The first deposit on the wall of a cavity, forming the ” skin ” of the agate, is generally a dark greenish mineral substance, like celadonite, delessite or ” green earth,” which are hydrous silicates rich in iron, derived probably from the decomposition of the augite in the mother-rock. ‘ This green silicate may give rise by alteration to a brown oxide of iron (limonite), producing a rusty appearance on the outside of the agate-nodule. The outer surface of an agate, freed from its matrix,’ is often pitted and rough, apparently in consequence of the removal of the original coating. The first layer spread over the wall of the cavity has been called the ” priming,” and upon this basis zeolitic minerals may be deposited, as was pointed out by Dr M. F. Heddle. Chalcedony is generally one of the earlier deposits and crystallized quartz one of later formation. Tubular channels, usually choked with siliceous deposits, are often visible in sections of agate, and were formerly regarded, especially by L. von Buch and J. Noggerath, as inlets of infiltration, by which the siliceous solutions gained access to the interior of the amygdaloidal cavity. It seems likely, however, that the solution transuded through the walls generally, penetrating the chalcedonic layers, as Heddle maintained, by osmotic action. Much of the chalcedony in an agate is known, from the method of artificially staining the stone, to be readily permeable. It was argued by E. Reusch that the cavities were alternately filled and emptied by means of intermittent hot springs carrying silica; while G. Lange, of Idar, suggested that the tension of the confined steam might pierce an outlet through some weak point in the coating of gelatinous silica, deposited on the walls, so that the tubes would be channels of egress rather than of ingress — a view supported by Heddle, who described them as ” tubes of escape.”

It sometimes happens that horizontal deposits, or strata usually opaline in character, are formed on the floor of a cavity after the walls have been lined with successive layers of chalce- dony. Many agates are hollow, since deposition has not pro- ceeded far enough to fill the cavity, and in such cases the last deposit commonly consists of quartz, often amethystine, having the apices of the crystals directed towards the free space, so as to form a crystal-lined cavity or geode.

When the deposits in an agate have been formed on a crop of crystals, or on a rugose base, the cross-section presents a zigzag pattern, rather like the plan of a fortress with salient and retiring angles, whence the stone is termed fortification agate. If the section shows concentric circles, due either to stalactitic growth or to deposition in the form of. bosses and beads on the floor, the stone is known as ring agate or eye agate. A Mexican agate, showing only a single eye, has received the name of " cyclops." Included matter of a green colour, like fragments of " green earth," embedded in the chalcedony and disposed in filaments and other forms suggestive of vegetable growth, gives rise to moss agate. These inorganic enclosures in the agate have been sometimes described, even after microscopic examina- tion, as true vegetable structures. Dendritic markings of black or brown colour, due to infiltration of oxides of manganese and iron, produce the variety of agate known as Mocha stone. Agates of exceptional beauty often pass in trade under the name of Oriental agate. Certain stones, when examined in thin sections by transmitted light, show a diffraction spectrum, due to ths extreme delicacy of the successive bands, whence they are termed rainbow agates.

On the disintegration of the matrix in which the agates are embedded, they are set free, and, being by their siliceous nature extremely resistant to the action of air and water, remain as n«J«les in the soil and gravel, or become rolled as pebbles in the streams. Such is the origin of the " Scotch pebbles," used as ornamental stones. They are agates derived from the andesitic Jlavas of Old Red Sandstone age, chiefly in the Ochils and the SUdkws. In like manner, the South American agates, so largely

cut and polished at the present time, are found mostly as boulders in the beds of rivers.

An enormous trade in agate- working is carried on in a small district in Germany, around Oberstein on the Nahe, a tributary of the Rhine at Bingen. Here the industry was located many centuries ago, in consequence of the abundant occurrence of agates in the amygdaloidal melaphyre of the district, notably in the Galgenberg, or Steinkaulenberg, overlooking the village of Idar, on the Idar Bach, about two miles from Oberstein. The abundant water-power in the neighbourhood had also a share in the determination of the industrial site. At the present time, however, steam power and even electricity are employed in the mills of the Oberstein district. Although the agate- industry is

still carried on there, especially at Idar, the stones operated on are not of indigenous origin, but are imported mostly from Brazil (Rio Grande do Sul) and from Uruguay, where they were discovered in 1827. Agate- working is also carried on to a limited extent at Waldkirch in the Black Forest.

Most commercial agate is artificially stained, so that stones naturally unattractive by their dull grey tints come to be valuable for ornamental purposes. The art of staining the stone is believed to be very ancient. Possibly referred to by Pliny (bk. xxxvii. cap. 75), it was certainly practised at an early date by the Italian cameo-workers, and from Italy a knowledge of the art — long kept secret and practised traditionally — passed in the early part of the 19th century to the agate- workers in Germany, by whom it has since been greatly developed. The colouring matter is absorbed by the porosity of the stone, but different stones and even different layers in the same stone exhibit great variation in absorptive power. The Brazilian agates lend them- selves readily to coloration, while the German agates are much less receptive.

To produce a dark brown or black colour, the stone is kept perhaps for two or three weeks in a saccharine solution, or in olive oil, at a moderate temperature. After removal from this medium, the agate is well washed and then digested for a short time in sulphuric acid, which entering the pores chars or carbonizes the absorbed sugar or oil. Certain layers of chalcedony are practically impermeable, and these consequently remain un- coloured, so that an alternation of dark and white bands is obtained, thus giving rise to an onyx. If stained too dark, the colour may be ” drawn,” or lightened, by the action of nitric acid.

Agate is stained red, so as to form carnelian and sardonyx, by means of ferric oxide. This may be derived from any iron compound naturally present in the stone, especially from limonite by dehydration on baking. Some stones are ” burnt ” by mere exposure to the heat of the sun, whereby the brown colour passes to red. Usually, however, an iron-salt, like ferrous sulphate, is artificially introduced in solution and then decom- posed by heat, so as to form in the pores a rich red pigment.

A blue colour, supposed to render the agate rather like lapis lazuli, is produced by using first an iron salt and then a solution of ferrocyanide or ferricyauide of potassium; a green colour, like that of chrysoprase, is obtained by means of salts of nickel or of

chromium; and a yellow tint is developed by the action of hydrochloric acid.

Among the uses to which agate is applied may be mentioned the formation of knife-edges of delicate balances, small mortars and pestles for chemical work, burnishers and writing styles, umbrella-handles, paper-knives, seals, brooches and other trivial ornaments. Most of these are cut and polished in the Oberstein district, at a very cheap rate, from South American stones.

Numerous localities in the United States and Canada yield agates, as described by Dr G. F. Kunz. They are abundant in the trap rocks of the Lake Superior region, some of the finest coming from Michipicoten Island, Ontario. A locality on the shore of the lake is called Agate Bay. Wood agate, or agatized wood, is not infrequently found in Colorado, California and elsewhere in the West, the most notable locality being the famous ” silicified forest ” known as Chalcedony Park, in Apache county,

Arizona. Here there are vast numbers of water-rolled logs of silicified wood, in rocks of Triassic age, but only a small quantity of the wood is fine enough for ornamental purposes. The cellular tissue of the vegetable matter is filled, or even replaced, by various siliceous minerals like chalcedony, jasper, crystalline quartz and semi-opal, the silica having probably been introduced by thermal waters. Some of the agate shows the microscopic structure of araucarian wood. The agatized wood is sometimes known by the Indian name of shinarump.

In India agates occur abundantly in the amygdaloidal varieties of the Deccan and Rajmaha.1 traps, and as pebbles in the detritus derived from these rocks. Some of the finest are found in the agate-gravels near Ratanpur, in Rajpipla. The trade in agates has been carried on from early times at Cambay, where the stones are cut and polished. Agates are also worked at Jubbulpore.

In many parts of New South Wales, agates, resulting from the disintegration of trap rocks, are common in the river-beds and old drifts. They occur also in Queensland, as at Agate Creek, running into the Gilbert river. South Africa likewise yields numerous agates, especially in the gravels of the Orange and Vaal rivers.

It should be noted that in England agates are found not only in old lavas, like the andesites of the Cheviots, but also to a limited extent in the Dolomitic Conglomerate, an old beach- deposit of Triassic age in the Mendips and the neighbourhood of Bristol. They are also found as weathered pebbles in the drift of Lichfield in Staffordshire.

For Scottish agates see M. F. Heddle, ” On the Structure of Agates,” Trans. Geolog. Soc. Glasgow, vol. xi. part ii., 1900, p. 153; and Mineralogy of Scotland (1901), vol. i. p. 58; J. G. Goodchild, Proc. Phys. Soc. Edinburgh, vol. xiv., 1899, p. 191. For the agate-industry see G. Lange, Die Halbedelsteine (Kreuznach, 1868). For American agates, G. F. . Kunz, Gems and Precious Stones of North America (1890), p. 128. For agates in general see Max Bauer’s Precious Stones, translated by L. J. Spencer (London, 1904). (F. W. R.*)

AGATHA, SAINT, the patron saint of Catania, Sicily, where her festival is celebrated on the 5 th of February. The legend is that she was a native of Sicily (probably of Catania, though Palermo

also claims her), of noble birth and great beauty. She repelled the advances of the Roman prefect sent by the emperor Decius to govern Sicily, and was by his orders brutally tortured and finally sent to the stake. As soon as the fire was lighted, an earthquake occurred, and the people insisted on her release. She died in prison on the 5th of February 251. The rescue of Catania from fire during an eruption of Mount Etna was later attributed to St Agatha's veil.

AGATHANGELUS, Agathange or Akathankelos, Armenian historian, lived during the 4th century, and wrote a History of the Reign of Dertad, or Tiridates, and of the Preaching of St Gregory the Illuminator. The text of this history has been considerably altered, but it has always been in high favour with the Armenians. It has been translated into several languages, and Greek and Latin translations are found in the Acta Sanctorum Bollandistarum, tome viii. As known to us the history consists of three parts, a history of St Gregory and his companions, the doctrine of Gregory, and the conversion of Armenia to Christianity.

See V. Langlois, Collection des historiens anciens et modernes de VArmenie (Paris, 1868).

AGATHARCHIDES, or Agatharchus, of Cnidus, Greek his- torian and geographer, lived in the time of Ptolemy Philometor (181-146 B.C.) and his successors. Amongst other works,, he wrote treatises on Asia, Europe and The Red Sea. Interesting extracts from the last, of some length, are preserved in Photius (cod. 213), who praises the style of the author, which was modelled on that of Thucydides.

See H. Leopoldi, De Agatharchide Cnidio Dissertatio (1892) ; C. W. Miiller, Fragmenta Historicorum Graecorum, iii., and Geographi Graeci Minores, i. ; E. H. Bunbury, Hist, of Ancient Geography, ii. (1879).

AGATHARCHUS, an Athenian painter of the 5th century B.C. He is said by Vitruvius to have been the first to paint a scene for the acting of tragedies. Hence some writers, such as Karl Woermann, have supposed that he introduced perspective and illusion into painting. This is a mistaken view, for ancient

writers know nothing of canvas scenes; the background painted by Agatharchus was the wooden front of the stage building, and it was painted, not with reference to any particular play, but as a

permanent decorative background, representing no doubt a palace or temple. Agatharchus is said to have been seized by Alcibiades and compelled by him to paint the interior of his house, which shows that at the time (about 435 B.C.) decorative painting of rooms was the fashion.

AGATHIAS (c. a.d. 536-582), of Myrina in Aeolis, Greek poet and historian. He studied law at Alexandria, completed his training at Constantinople and practised as an advocate (scholas- ticus) in the courts. Literature, however, was his favourite pursuit. He wrote a number of short love-poems in epic metre, tailed Daphniaca. He next put together a kind of anthology, containing epigrams by earlier and contemporary poets and him- self, under the title of a Cycle of New Epigrams. About a hundred epigrams by Agathias have been preserved in the Greek Antho- logy and show considerable taste and elegance. After the death of Justinian (565), some of Agathias's friends persuaded him to write the history of his own times. This work, in five books, begins where Procopius ends,. and is the chief authority for the period 552-558. It deals chiefly with the struggles of the Byzan- tine army, under the command of the eunuch Narses, against the Goths, Vandals; Franks and Persians. The author prides himself on his honesty and impartiality, but he is lacking in judgment and knowledge of facts; the work, however, is valuable from the importance of the events of which it treats. Gibbon contrasts Agathias as " a poet and rhetorician "with Procopius " a statesman and soldier."

Authorities. — Editio princeps, by B. Vulcanius (1594); in the Bonn Corpus Scriptorum Byz. Hist., by B. G. Niebuhr (1828) ; in Migne, Patrologia Graeca, lxxxviii. ; L. Dindorf, Historici Graeci Minores (1871); W. S. Teuffel, " Agathias von Myrine," in Philo- logus (i. 1846); C. Krumbacher, Geschichte der byzantinischen Littefatur (2nd ed. 1897).

AGATHO, pope from 678 to 681, was born in Sicily. He is noteworthy as the pope who ordered St Wilfrid to be restored to his bishopric at York in 679, and as the first to cease payment of the tribute hitherto paid on election to the emperor at Con- stantinople. It was during his pontificate that the 6th oecumenical council was held at Constantinople, to which he sent his legates and those from a Roman council held in 679. Agatho died on the 10th of January 681.

AGATHOCLES (361-289 B.C.), tyrant of Syracuse, was born at

Thermae Himeraeae (mod. Termini Imerese) in Sicily. The son of a potter who had removed to Syracuse, he learned his father's trade, but afterwards entered the army. In 333 he married the widow of his patron Damas, a distinguished and wealthy citizen. He was twice banished for attempting to overthrow the oligarchical party in Syracuse (q.v.); in 317 he returned with an army of mercenaries under a solemn oath to observe the democratic constitution which was then set up. Having banished or murdered some 10,000 citizens, and thus made himself master of Syracuse, he created a strong army and fleet and subdued the greater part of Sicily. War with Carthage followed. In 310 Agathocles, defeated and besieged in Syracuse, took the desperate resolve of breaking through the blockade and attacking the enemy in Africa. After several victories he was at last completely defeated (306) and fled secretly to Sicily. After concluding peace with Carthage, Agathocles styled himself king of Sicily, and established his rule over the Greek cities of the island more firmly than ever. Even in his old age he displayed the same restless energy, and is said to have been meditating a fresh attack on Carthage at the time of his death. His last years were harassed by ill-health and the turbulence of his grandson Archagathus, at whose instigation he is said to have been poisoned; according to others, he died a natural death. He was a born leader of mercen- aries, and, although he did not shrink from cruelty to gain his ends, he afterwards showed himself a mild and popular "tyrant."

See Justin xxii., xxiii. ; Diodorus Siculus xix., xxi., xxii. (follows

feherally Timaeus who had a special grudge against Agathocles) ; 'olybius ix. 23 ; Schubert, Geschichte des Agathokles (1887); Grote, History of Greece, ch. 97; also Sicily, History.

AGATHODAEMON, in Greek mythology, the " good spirit " of cornfields and vineyards. It was the custom of the Greeks to drink a cup of pure wine in his honour at the end of each meal (Aristophanes, Equites,io6). He was also regarded as the protecting spirit of the state and of individuals. He was often accompanied by 'AyaOy Tvxv (good fortune), and in this aspect may be compared' with the Roman Bonus Eventus (Pliny, Nat Hist. xxxvi. 23), and Genius. He is represented in works of art in the form of

a serpent, or of a young man with a cornucopia and a bowl in one hand, and a poppy and ears of corn in the other.

See Gerhard, Uber Agathodamon und Bona Dea (Berlin, 1849).

AGATHODAEMON, of Alexandria, map designer, probably lived in the 2nd century a.d. Some MSS. of the Geography of Ptolemy contain twenty-seven maps, which are stated to have been drawn by Agathodaemon of Alexandria, who " delineated the whole world according to the eight books of Ptolemy's geography." As Ptolemy speaks of Ulvaxei to accompany his treatise, these maps were probably the work of a contemporary acting under his instructions. About 1470 Nicolaus Doris, a Benedictine monk, brought out a revised edition of them, the names being inserted in Latin instead of Greek.

See Bunbury, History of Ancient Geography, ii.

AGATHON (c. 448-400 B.C.), Athenian tragic poet, friend of Euripides and Plato, best known from his mention by Aristophanes (Thesmophoriazusae) and in Plato's Symposium, which describes the banquet given to celebrate his obtaining a prize for a tragedy (416). He probably died at the court of Archelaus, king of Macedonia. He introduced certain innovations, and Aristotle (Poetica, 9) tells us that the plot of his "Avdos was original, not, as usually, borrowed from mythological subjects.

See Aristophanes, Thesmoph. 59, 106, Eccles. 100; Plato, Symp. 198 c; Plutarch, Symp. 3; Aelian, Var. Hist. xiv. 13; Ritsch, Opuscula, i. ; fragments in Nauck, Tragicorum Graecorum Fragmenta.

AGATHYRSI, a peopie of Thracian origin, who in the earliest historical times occupied the plain of the Maris (Maros), in the region now known as Transylvania. Thyrsi is supposed to be a Scythian form of Tpavo-ol (Trausi), a Thracian tribe mentioned by Stephanus of Byzantium. They are described by Herodotus (iv. 104) as of luxurious habits, wearing gold ornaments (the district is still auriferous) and having wives in common. They tattooed their bodies (picti, Aeneid iv. 136), degrees of rank being indicated by the manner in which this was done, and coloured their hair dark blue. Like the Gallic Druids, they recited their laws in a kind of sing-song to prevent their being forgotten, a practice still in existence in the days of Aristotle {Problemata, xix. 28). Valerius Flaccus (Argonautica, vi. 135) calls them

Thyrsagetae, probably in reference to their cele- bration of orgiastic rites in honour of some divinity akin to the Thracian Dionysus. In later times the Agathyrsi were driven farther north, and their name was unknown to the Romans in their original home.

See Ammianus Marcellinus xxxi. 2. 17; Pliny, Nat. Hist. iv. 1.2 [26] . 88; Pomponius Mela ii. 1. 10; W. Tomaschek, ” Die alten Thraker,” in Sitzungsber. der philosophisch-historischen Klasse der kaiserl. Akad. der Wiss. cxxviii. (Vienna, 1893).

AGAVE, a large botanical genus of the natural order Amaryllidaceae, chiefly Mexican, but occurring also in the southern and western United States and in central and tropical South America. The plants have a large rosette of thick fleshy leaves generally ending in a sharp point and with a spiny margin; the stout stem is usually short, the leaves apparently springing from the root. They grow slowly and flower but once after a number of years, when a tall stem or ” mast ” grows from the centre of the leaf-rosette and bears a large number of shortly tubular flowers. After development of fruit the plant dies down, but suckers are frequently produced from the base of the stem which become new plants. The most familiar species is Agave americana (see fig.), a native of tropical America, the so-called century plant or American aloe (the maguey of Mexico). The number of years before flowering occurs depends on the vigour of the individual, the richness of the soil and the climate; during these years the plant is storing in its fleshy leaves the nourishment required for the effort of flowering. During the development of the inflor-

escence there is a rush of sap to the base of the young flower-stalk. In the case of A. americana and other species this is used by the Mexicans to make their national beverage, pulque; the flower shoot is cut out and the sap collected and subsequently fermented. By distillation a spirit called mescal is prepared. The leaves of several species yield fibre, as for instance, A . rigida var. sisalana, sisal hemp (q.v.), A. decipiens, false sisal hemp; A. americana is the source of pita fibre, and is used as a fibre plant in Mexico, the West Indies and southern Europe. The flowering stem of the last named, dried and cut in slices, forms

Agave americana, Century plant or American aloe. About /„ nat. size. I, Flower; 2, same flower split open above the ovary; 3, ovary cut across; 1, 2, and 3, about J nat. size.

From the Botanical Magazine, by permission of Lovell Reeve and Co.

natural razor strops, and the expressed juice of the leaves will lather in water like soap. In the Madras Presidency the plant is extensively used for hedges along railroads. Agave americana, century plant, was introduced into Europe about the middle of the 1 6th century and is now widely cultivated for its handsome appearance; in the variegated forms the leaf has a white or yellow marginal or central stripe from base to apex. As the leaves unfold from the centre of the rosette the impression of the marginal spines is Very conspicuous on the still erect younger leaves. The plants are usually grown in tubs and put out in the summer months, but in the winter require to be protected from frost. They mature very slowly and die after flowering, but are easily propagated by the offsets from the base of the stem.

AGDE, a town of southern France, in the department of Herault, on the left bank of the river of that name, 25 m. from the Mediterranean Sea and 32 m. S.W. of Montpellier on the Southern railway. Pop. (1906) 7146. The town lies at the foot of an extinct volcano, the Montagne St Loup, and is built of black volcanic basalt, which gives it a gloomy appearance. Overlooking the river is the church of St Andre, which dates partly from the 12th century, and, till the Revolution, was a cathedral. It is a plain and massive structure with crenelated walls, and has the aspect of a fortress rather than of a church. The exterior is diversified by arched recesses forming machicola- tions, and the same architectural -feature is reproduced in the square tower which rises like a donjon above the building. The Canal du Midi, or Languedoc canal, uniting the Garonne with the Mediterranean, passes under the walls of the town,

and the mouth of the Herault forms a harbour which is protected by a fort. The maritime commerce of the town has declined, owing partly to the neighbourhood of Cette, partly to the shallow- ness of the Herault. The fishing industry is, however, still active. The chief public institutions are the tribunal of commerce and the communal college.

Agde is a place of great antiquity and is said to have been

founded under the name of a/yadfi xoXis (Good City) by the Phocaeans. The bishopric was established about the year 400 and was suppressed in 1 790.

Synod of Agde (Concilium Agathense). — With the permission of the West Goth Alaric II. thirty-five bishops of southern Gaul assembled in person or sent deputies to Agde on the nth of September 506. Caesarius, bishop of Aries, presided. The forty-seven genuine canons of the synod deal with discipline, church life, the alienation of ecclesiastical property and the treatment of Jews. While favouring sacerdotal celibacy the council laid rather rigid restrictions on monasticism. It com- manded that the laity communicate at Christmas, Easter and Whitsuntide. The canons of Agde are based in part on earlier Gallic, African and Spanish legislation; and some of them were re-enacted by later councils, and found their way into collections such as the Hispana,! Pseudo-Isidore and Gratian-.

See Mansi viii. 319 ff. ; Hefele, Conciliengeschichte, 2nd edition, ii. 649 ff. (English translation, iv. 76 ff.) ; Herzog-Hauck, Real-encyklopadie, i. 243.

AGE (Fr. dge, through late Lat. aelalicum, from aetas), a term used (1) of the divisions into which it is suggested that human history may be divided, whether regarded from the geological, cultural or moral aspects, e.g. the palaeolithic age, the bronze age, the dark ages; (2) of an historic epoch or generation; (3) of any period or stage in the physical life of a person, animal or thing; (4) of that time of life at which the law attributes full responsibility for his or her acts to the individual.

(1) From the earliest times there would appear to have been the belief that the history of the earth and of mankind falls naturally into periods or ages. Classical mythology popularized the idea. Hesiod, for example, in his poem Works and Days, describes minutely five successive ages, during each of which the earth was peopled by an entirely distinct race. The first or golden race lived in perfect happiness on the fruits of the untilled eaiih, suffered from no bodily infirmity, passed away in a gentle sleep, and became after death guardian daemons of this world. The second or silver race was degenerate, and refusing to worship the immortal gods, was buried by Jove in the earth. The third or brazen race, still more degraded, was warlike and cruel, and perished at last by internal violence. The fourth or heroic race was a marked advance upon the preceding, its members being

the heroes or demi-gods who fought at Troy and Thebes, and who were rewarded after death by being permitted to reap thrice a year the free produce of the earth. The fifth or iron race, to which the poet supposes himself to belong, is the most degenerate of all, sunk so low in every vice that any new change must be for the better. Ovid, in his Metamorphoses, follows Hesiod exactly as to nomenclature and very closely as to substance. He makes the degeneracy continuous, however, by omitting the heroic race or age, which, as Grote points out, was probably introduced by Hesiod, not as part of his didactic plan, but from a desire to conciliate popular feeling by including in his poem the chief myths that were already current among the Greeks. Varro recognized three ages: (1) from the beginning of mankind to the Deluge, a quite indefinite period; (2) from the Deluge to the First Olym- piad, called the Mythical Period; (3) from the First Olympiad to his own time, called the Historic Period. Lucretius divided man's history into three cultural periods: (1) the Age of Stone; (2) the Age of Bronze; (3) the Age of Iron. He thus anticipated the conclusions of some of the greatest of modern archaeologists.

(?) A definite period in history, distinguished by some special characteristic, such as great literary activity, is generally styled, with some appropriate epithet, an age. It is usual, for example, to speak of the Age of Pericles, the Augustan, the Elizabethan or the Victorian Ages; of the Age of the Crusades, the Dark Ages,

the Middle Ages, the Age of Steam. Such isolated periods, with no continuity or necessary connexion of any kind, are obyiously quite distinct from the ages or organically related periods into which philosophers have divided the whole course of human history. Auguste Comte, for instance, distinguishes three ages according to the state of knowledge in each, and he supposes that we are now entering upon the third of these. In the first age of his scheme knowledge is supernatural or fictitious; in the second it is metaphysical or abstract; in the third it is positive or scientific. Schemes somewhat similar have been proposed by other philosophers, chiefly of France and Germany, and seem to be regarded by them as essential to any complete science of history.

(3) The subject of the duration of human and animal life does not fall within the scope of this article, and the reader is referred to Longevity. But the word " age " has been used by physio- logists to express certain natural divisions in human development and

decay. These are usually regarded as numbering five, viz. infancy, lasting to the seventh year; childhood to the fourteenth; youth to the twenty-first; adult life till fifty; and old age.

(4) The division of human life into periods for legal purposes is naturally more sharp and definite than in physiology. It would be unscientific in the physiologist to name any precise year for the transition from one of his stages to another, inasmuch as that differs very considerably among different nations, and even to some extent among different individuals of the same nation. But the law must necessarily be fixed and uniform, and even where it professes to proceed according to nature, must be more precise than nature. The Roman law divided human life for its purposes into four chief periods, which had their subdivisions — (1) infantia, lasting till the close of the seventh year; (2) the period between infantia and pubertas, males becoming puberes at fourteen and females at twelve; (3) adolescentia, the period between puberty and majority; and (4) the period after the twenty-fifth year, when males became majores. The first period was one of total legal incapacity; in the second period a person could lawfully do certain specified acts, but only with the sanction of his tutor or guardian; in the third the restrictions were fewer, males being permitted to manage their own property, contract marriage and make a will; but majority was not reached until the age of twenty-five. By English law there are two great periods into which life is divided — infancy, which lasts in both sexes until the twenty-first year, and manhood or womanhood The period of infancy, again, is divided into several stages, marked by the growing development both of rights and obligations. Thus at twelve years of age a male may take the oath of allegiance ; at fourteen both sexes are held to have arrived at years of discretion, and may therefore choose guardians, give evidence and consent or disagree to a marriage. A female has the last privilege from the twelfth year, but the marriage cannot be celebrated until the majority of the parties without the consent of parents or guardians. At fourteen, too, both sexes are fully responsible to the criminal law. Between seven and fourteen there is responsi- bility only if the accused be proved doli capax, capable of discern- ing between right and wrong, the principle in that case being that malitia supplet aetatem. At twenty-one both males and females obtain their full legal rights, and become liable to all legal obligations. A seat in the British parliament may be taken at twenty-one. Certain professions, however, demand as a qualifi- cation in entrants a more advanced age than

that of legal man- hood. In the Church of England a candidate for deacon's orders must be twenty-three (in the Roman Catholic Church, twenty- two) and for priest's orders twenty-four years of age; and no clergyman is eligible for a bishopric under thirty. In Scotland infancy is not a legal term. The time previous to majority, which, as in England, is reached by both sexes at twenty-one, is divided into two stages: pupilage lasts until the attainment of puberty, which the law fixes at fourteen in males and twelve in females; minority lasts from these ages respectively until twenty- one. Minority obviously corresponds in some degree to the English years of discretion, but a Scottish minor has more persona) rights than an English infant in the last stage of his infancy, e.g

he may dispose by will of movable property, make contracts, carry on trade, and, as a necessary consequence, is 1 able to be declared a bankrupt. In France the year of majority is twenty-one, and the nubile age eighteen for males and fifteen for females, with a restriction as to the consent of guardians. Age qualifica- tion for the chamber of deputies is twenty-five and for the senate forty years. In Germany, majority is reached at twenty-one, the nubile age is twenty for males and sixteen for females, subject to the consent of parents. Without the consent of parents, the age is twenty-five for males and twenty-four for females. The age qualification for the Reichstag is twenty-five. In Austria the age of majority is twenty-four, and the nubile age fourteen for either sex, subject to the consent of the parents. In Denmark, qualified majority is reached at eighteen and full majority at twenty-five. The nubile age is twenty for males and sixteen for females. In Spain, majority is reached at twenty-three; the nubile age is eighteen for males and sixteen for females. In Greece the age of majority is twenty-one, and the nubile age sixteen for males and fourteen for females. In Holland the age of majority is twenty-one, and the nubile age eighteen for males and sixteen for females. In Italy, majority is reached at twenty-one; the nubile age is eighteen for males and fifteen for females. In Switzerland the age of majority is twenty, and. the nubile age is eighteen for males and sixteen for females. In the United States the age qualification for a president is thirty-five, for a senator thirty and for a representative twenty-five.

AGELADAS, or (as the name is spelt in an inscription) Hagelaidas, a great Argive sculptor, who flourished in the latter part of the 6th and the early part of the 5th century B.C. He was specially noted for his statues of Olympic victors (of 520, 516, 508 B.C.); also for a statue at Messene of Zeus, copied on the coins of that city. Ageladas was said to have been the teacher of Myron, Phidias and Polyclitus; this tradition is a testimony to his wide fame, though historically doubtful. We have no work of Ageladas surviving; but we have an inscription which contains the name of his son Argeiadas.

AGEN, a city of south-western France, capital of the depart- ment of Lot-et-Garonne, 84 m. S.E. of Bordeaux by the Southern railway between Bordeaux and Toulouse. Pop. (1906) 18,640. It is skirted on the west by the Garonne itself, and on the north by its lateral canal. The river is crossed by a stone bridge, by a suspension bridge for foot-passengers, and by a fine canal-bridge, carrying the lateral canal. Pleasant promenades scretch for some distance along the right bank. The town is a medley of old narrow streets contrasting with the wide modern boule-vards which cross it at intervals. The chief building in Agen is the cathedral of St Caprais, the most interesting portion of which is the apse of the 12th century with its three apse-chapels; the transept dates from the 12th and 13th centuries, the nave from the 14th to the 16th centuries; the tower flanking the south fagade is modern. The interior is decorated with modern paintings and frescoes. There are several other churches, among them the church of the Jacobins, a brick building of the 13th century, and the church of St Hilaire of the 16th century, which has a modern tower. In the prefecture, a building of the 18th century, once the bishop's palace, is a collection of historical portraits. The hotel de ville occupies the former Hotel du Presidial, an obsolete tribunal, and contains the municipal library. Two houses of the 16th century, the Hotel d'Estrades and the Hotel de Vaurs, are used as the museum, which has a rich collection of fossils, prehistoric and Roman remains, and other antiquities and curiosities. The poet Jacques Jasmin was a native of the town, which has erected a statue to him. Through its excellent water communication it affords an outlet for the agricultural produce of the district, and forms an entrepot of trade between Bordeaux and Toulouse. Agen is the seat of a bishop. It is the seat of a court of appeal and a court of assizes, and has tribunals of first instance and of commerce and a chamber of commerce. There are also ecclesiastical seminaries,

lycees for boys and girls, training-colleges, a school of commerce and industry, and a branch of the Bank of France. Agen is the market for a rich agricultural region. The chief articles of

commerce are fattened poultry, prunes {pruneaux d'Agen) and other fruit, cork, wine, vegetables and cattle. Manufactures include flour, dried plums, pate de foie gras and other delicacies, hardware, manures, brooms, drugs, woven goods tiles.

Agen (Aginnum) was the capital of the Celtic tribe of the Nitiobroges, and the discovery of extensive ruins attests its importance under the Romans. In later times it was the capital of the Agenais. Its bishopric was founded in the 4th century. Agen changed hands more than once in the course of the Albi- gensian wars, and at their close a tribunal of inquisition was established in the town and inflicted cruel persecution on the heretics. During the religious wars of the 16 th century Agen took the part of the Catholics and openly joined the League in

ˆSo- ■ ...

See Labenazie, Histoire de la ville d'Agen et pays d'Agenois, ed. by A.-G. de Dampierre (1888) ; A. Ducom, La Commune d'Agen: essai sur son histoire et son organisation depuis son origihe jusqu'au traite de Bretigny (1892).

AGENAIS, or Agenois, a former province of France. In ancient Gaul it was the country of the Nitiobroges with Aginnum for its capital, and in the 4th century it was the Civitas Agennen- siutn which was a part of Aquitania Secunda and which formed the diocese of Agen. Having in general shared the fortunes of Aquitaine during the Merovingian and Carolingian periods, Agenais next became an hereditary countship in the part of the country now called Gascony (Vasconia). In 1038 this count- ship was purchased by the dukes of Aquitaine and counts of Poitiers. The marriage of Eleanor of Aquitaine with Henry Plantagenet in 1152 brought it under the sway of England; but when Richard Cceur-de-Lion married his sister Joan to Raymund VI., count of Toulouse, in 1196, Agenais formed part of the princess's dowry; and with the other estates of the last independent count of Toulouse it lapsed to the crown of France in 1271. This, however, was not for long; the king of France had to recognize the prior rights of the king of England to the possession of the countship, and restored it to him in 1279. During the wars between the English and the French in the 14th and 15th centuries, Agenais

was frequently taken and retaken, the final retreat of the English in 1453 at last leaving the king of France in peaceable possession. Thenceforth Agenais was no more than an administrative term. At the end of the ancien regime it formed part of the " Gouvernement " of Guienne, and at the Revolution it was incorporated in the department of Lot- et-Garonne, of which it constitutes nearly the whole. The title of count of Agenais, which the kings of England had allowed to fall into desuetude, was revived by the kings of France, and in 1789 was held by the family of the dukes of Richelieu.

There is no good history of Agenais; that published by Jules Andrieu in 1893 (Histoire de V Agenais, 2 vols.) being quite inade- quate. The Bibliographie generate de V Agenais, by the same author (1886-189 1, 3 vols.), may be found useful. (C. B.*)

AGENT (from Lat. agere, to act), a name applied generally to any person who acts for another. It has probably been adopted from France, as its function in modern civil law was otherwise expressed in Roman jurisprudence. Ducange (s.v. Agentes) tells us that in the later Roman empire the officers who collected the grain in the provinces for the troops and the household, and afterwards extended their functions so as to include those of government postmasters or spies, came to be called agentes in rebus, their earlier name having been jrumentarii. In law an agent is a person authorized, expressedly or impliedly, to act for another, who is thence called the principal, and who is, in consequence of, and to the extent of, the authority delegated by him, bound by the acts of his agent. (See Principal and Agent; Factor, &c.)

In Scotland the procurators or solicitors who act in the pre- paration of cases in the various law-courts are called agents. (See Solicitor.)

In France the agents de change were formerly the class gener- ally'licensed for conducting all negotiations, as they were termed, whether in commerce or the money market. The term has, however, become practically limited to those who conduct transactions in public stock. The laws and regulations as to

tourtiers, or those whose functions were more distinctly confined to transactions in merchandise, have'been mixed up with those applicable to agents de change. Down to the year 1572 both functions were free; but at that period, partly for financial reasons, a system of licensing was adopted at the suggestion of the chancellor, l'Hopital. Among the other revolutionary measures of the year 1791, the professions of agent and courtier were again opened to the public. Many of the financial convulsions of the ensuing years, which were due to more serious causes, were attributed to this indiscriminate removal of restrictions, and they were reimposed in 1801. From that period regulations have been made from time to time as to the qualifications of agents, the security to be found by them and the like. They are now regarded as public officers, appointed, with certain privileges and duties, by the government to act as intermediaries in negotiating transfers of public funds and com- mercial stocks and for dealing in metallic currency. (See Stock Exchange: France.)

In diplomacy the term " agent " was originally applied to all " diplomatic agents," including ambassadors. With the evolu- tion of the diplomatic hierarchy, however, the term gradually sank until it was technically applied only to the lowest class of " diplomatic agents," without a' representative character and of a status and character so dubious that, by the regulation of the congress of Vienna, they were wholly excluded from the immunities of the diplomatic service. (See Diplomacy.)

AGENT-GENERAL, the term given to a representative in England of one of the self-governing British colonies. Agents- general may be said to hold a position mid-way between agents of provinces and ambassadors of foreign countries. They are appointed, and their expenses and salaries provided, by the governments of the colonies they represent, viz. Cape of Good Hope, Natal, the Transvaal, New South Wales, Queensland, South Australia, Tasmania, Victoria, Western Australia, New Zealand and Canada (whose representatives are termed high commissioners). Their duties are to look after the political and economic interests of their colonies in London, to assist in all financial and commercial matters in which their colonies may be concerned, such as shipping arrangements and rates of freight, cable communications and rates, tenders for public works, &c, and to make known the products of their colonies. Those colonies which are not under responsible government are represented in London by crown agents.

AGESANDER, a Rhodian sculptor, whose title to fame is that he is mentioned by Pliny {Nat. Hist, xxxvi. 37) as author (with Polydorus and Athenodorus) of the group of the Laocoon. Inscriptions recently found at Lindus in Rhodes date Agesander and Athenodorus to the period 42-21 B.C. The date of the Laocoon seems thus finally settled, after long controversy. It represents the culmination of a sentimental or pathetic tendency in art, which is prominent in the somewhat earlier sculpture of Pergamum. (See Greek Art.)

AGESILAUS II., king of Sparta, of the Eurypontid family, was the son of Archidamus II. and Eupolia, and younger step- brother of Agis II., whom he succeeded about 401 B.C. Agis had, indeed, a son Leotychides, but he was set aside as illegitimate, current rumour representing him as the son of Alcibiades. Agesilaus' success was largely due to Lysander, who hoped to find in him a willing tool for the furtherance of his political designs; in this hope, however, Lysander war disappointed, and the increasing power of Agesilaus soon led to his downfall. In 396 Agesilaus was sent to Asia with a force of 2000 Neoda- modes (enfranchized Helots) and 6000 allies to secure the Greek cities against a Persian attack. On the eve of sailing from Aulis he attempted to offer a sacrifice, as Agamemnon had done before the Trojan expedition, but the Thebans intervened to prevent it, an insult for which he never forgave them. On his arrival at Ephesus a three months' truce was concluded with Tissa- phernes, the satrap of Lydia and Caria, but negotiations con- ducted during that time proved fruitless, and on its termination Agesilaus raided Phrygia, where he easily won immense booty since Tissaphernes had concentrated his troops in Caria. After

spending the winter in organizing a cavalry force, he made a successful incursion into Lydia in the spring of 395. Tithraustes was thereupon sent to replace Tissaphernes, who paid with his life for his continued failure. An armistice was concluded between Tithraustes and Agesilaus, who left the southern satrapy and again invaded Phrygia, which he ravaged until the following spring. He then came to an agreement with the satrap Pharna- bazus and once more turned southward. It was said that he was planning a campaign in the interior, or even an attack on Artaxerxes himself, when he was recalled to Greece owing to the war between Sparta and the combined forces of Athens, Thebes, Corinth, Argos and several minor states. A rapid march through Thrace and Macedonia brought him to Thessaly, where he repulsed the Thessalian cavalry who tried to impede him.

Reinforced by Phocian and Orchomenian troops and a Spartan army, he met the confederate forces at Coronea in Boeotia, and in a hotly contested battle was technically victorious, but the success was a barren one and he had to retire by way of Delphi to the Peloponnese. Shortly before this battle the Spartan navy, of which he had received the supreme command, was totally defeated off Cnidus by a powerful Persian fleet under Conon and Pharnabazus.

Subsequently Agesilaus took a prominent part in the Corinthian war, making several successful expeditions into Corinthian territory and capturing Lechaeum and Piraeum. The loss, however, of a mora, which was destroyed by Iphicrates, neutralized these successes, and Agesilaus returned to Sparta. In 389 he conducted a campaign in Acarnania, but two years later the Peace of Antalcidas, which was warmly supported by Agesilaus, put an end to hostilities. When war broke out afresh with Thebes the king twice invaded Boeotia (378, 377), and it was on his advice that Cleombrotus was ordered to march against Thebes in 371. Cleombrotus was defeated at Leuctra and the Spartan supremacy overthrown. In 370 Agesilaus tried to restore Spartan prestige by an invasion of Mantinean territory, and his prudence and heroism saved Sparta when her enemies, led by Epaminondas, penetrated Laconia that same year, and again in 362 when they all but succeeded in seizing the city by a rapid and unexpected march. The battle of Mantinea (362), in which Agesilaus took no part, was followed by a general peace: Sparta, however, stood aloof, hoping even yet to recover her supremacy. In order to gain money for prosecuting the war Agesilaus had supported the revolted satraps, and in 361 he went to Egypt at the head of a mercenary force to aid Tachos against Persia. He soon transferred his services to Tachos's cousin and rival Nectanabis, who, in return for his help, gave him a sum of over 200 talents. On his way home Agesilaus died at the age of 84, after a reign of some 41 years.

A man of small stature and unimpressive appearance, he was somewhat lame from birth, a fact which was used as an argument against his succession, an oracle having warned Sparta against a " lame reign." He was a successful leader in guerilla warfare, alert and quick, yet cautious — a man, moreover, whose personal bravery was unquestioned. As a statesman he won himself both enthusiastic adherents and bitter enemies, but of his patriotism there can be no doubt. He lived in the most frugal style alike at home and in the field, and though his campaigns were

undertaken largely to secure booty, he was content to enrich the state and his friends and to return as poor as he had set forth. The worst trait in his character is his implacable hatred of Thebes, which led directly to the battle of Leuctra and Sparta's fall from her position of supremacy.

See lives of Agesilaus by Xenophon (the panegyric of a friend), Cornelius Nepos and Plutarch ; Xenophon's Hellenica and Diodorus xiv., xv. Among modern authorities, besides the general histories of Greece, J. C. F. Manso, Sparta, iii. 39 ff. ; G. F. Hertzberg, Das Leben des Konigs Agesilaos II. von Sparta (1856); Buttmann, Agesilaus Sohn des Archidamus (1872); C. Haupt, Agesilaus in Asien (1874); E. von Stern, Geschichte der spartanischen und thebanischen Hege- monie (1884). . (M. N. T.)

AGGLOMERATE (from the Lat. agglomerare, to form into a ball, glomus, glomeris), a term used in botany, meaning crowded in a close cluster or head, and, in geology, applied to the

accumulations of coarse volcanic ejectamenta such as frequently occur near extinct or active volcanoes. Agglomerates in the geological sense, with which this article is concerned, consist typically of blocks of various igneous rocks, mixed often with more or less material of rudimentary origin and embedded in a finer-grained matrix, similar in nature to the coarser fragments. As distinguished from ordinary ash beds or tuffs, they are essentially coarser, less frequently well-bedded; they are less persistent and tend to occur locally, but may attain a very great thickness. Showers of fine ash may be distributed over a wide area of country and will form thin layers of great extent. Coarser accumulations gather only near the actual foci of eruption (craters, fissures, &c). When the activity of a volcanic vent comes to an end, the orifice is often choked by masses of debris, which will in time become compacted into firm agglomer- ates. Hence rocks of this type very commonly mark the sites of necks, the remains of once-active volcanic craters. In this connexion they are of especial interest to geologists, as it is always important to be able tc locate the exact points at which volcanic products, such as lavas and ash-beds, were emitted.

The blocks in agglomerates vary greatly in size. Some are thirty

or forty feet in diameter, and weigh many tons; these are usually pieces of the strata through which the volcano has forced an outlet. They are never far from the crater; most of them, in fact, lie within its boundaries, and cases are known in which enormous masses of this kind (half an acre in area) have been found in such situations. They are masses which have been dislodged, by fissures and landslides, from the crater's walls and have tumbled into the cavity. Pieces of sandstone, limestone and shale occur in the agglomerates mixed with volcanic materials, and very often have been baked and partly recrystallized by contact with the hot igneous rocks and the gases discharged by the volcano. At Vesuvius such blocks of altered limestone are rich in new minerals and are well known to collectors.

Agglomerates also are usually full of volcanic bombs. These are spongy globular masses of lava which have been shot from the crater at a time when liquid molten lava was exposed in it, and was frequently shattered by the sudden outbursts of steam. These bombs were more or less viscous at the moment of ejection and by rotation in the air acquired their spheroidal form. They are commonly one or two feet in diameter, but specimens as large as nine or twelve feet have been observed. There is less variety in their composition at any volcanic centre than in the case of the foreign blocks above described. They correspond in nature to the lava which at the time fills the crater of the volcano, and as this varies only very slowly the bombs belong mostly to only a few kinds of rock and are similar in composition to the lava flows.

Crystalline masses of a different kind occur in some numbers in certain agglomerates. They consist of volcanic minerals very much the same as those formed in the lavas, but exhibiting certain peculiarities which indicate that they have formed slowly under pressure at considerable depths. Hence they bear a resemblance to plutonic igneous rocks, but are more correctly to be regarded as agglomerations of crystals formed within the liquid lava as it slowly rose towards the surface, and at a subsequent period cast out by violent steam explosions. The sanidinites of the Eifel belong to this group. At Vesuvius, Ascension, St Vincent and many other volcanoes, they form a not inconsiderable part of the coarser ash-beds. Their commonest minerals are olivine, anorthite, hornblende, augite, biotite and leucite.

Agglomerates occur wherever volcanoes are known. In many parts of Britain they attain a great development either in beds

alternating with lavas or as the material occupying necks. In the latter case they are often penetrated by dikes. They also show a steep, angular, funnel-shaped dip (e.g. Arthur's Seat, Edinburgh), and may contain thin layers of clay or ashy sand-stone, which gathered in the crater during intervals of repose. (J. S. F.)

AGGLUTINATION (Lat. ad, and gluten, glutinare, literally to fasten together with glue), a term used technically in philology

for the method of word-formation by which two significant words or roots are joined together in a single word to express a combination of the two meanings each of which retains its force. This juxtaposition or conjoining of roots is characteristic of languages such as the Turkish and Japanese, which are therefore known as agglutinative, as opposed to others, known generically as inflexional, in which differences of termination or combinations in which all separate identity disappears are predominant.

The term was also formerly used by associationist philosophers for those mental associations which were regarded as peculiarly close. Combination in its simplest form has been called Agglutination by W. Wundt.

AGGRAVATION (from Lat. ad, increasing, and gravis, heavy), the making anything graver or more serious, especially of offences; also used as synonymous with " irritation." In the canon law " aggravation " was a form 01 ecclesiastical censure, threatening excommunication after three disregarded admonitions.

AGGREGATION (from the Lat. ad, to, gregare, to collect together), in physics, a collective term for the forms or states in which matter exists. Three primary " states of aggregation " are recognized — gaseous, liquid and solid. Generally, if a solid be heated to a certain temperature, it melts or fuses, assuming the liquid condition (see P'usion); if the heating be continued the liquid boils and becomes a vapour (see Vaporization). On the other hand, if a gas be sufficiently cooled and compressed, it liquefies; this transition is treated theoretically in the article Condensation of Gases, and experimentally in the article Liquid Gases.

AGGTELEK, a village of Hungary, in the county of Gomor, situated to the south of Rozsnyo, on the road from Budapest to Dobsina. Pop. (1900) 557. In the neighbourhood is the celebrated

Aggtelek or Baradla cavern, one of the largest and most remarkable stalactite grottos in Europe. It has a length, together with its ramifications, of over 5 miles, and is formed of two caverns — one known for several centuries, and another discovered by the naturalist Adolf Schmidl in 1856. Two entrances give access to the grotto, an old one extremely narrow, and a new one, made in 1890, through which the exploration of the cavern can be made in about 8 hours, half the time it took before. The cavern is composed of a l'abyrinth of passages and large and small halls, and is traversed by a stream. In these caverns there are numerous stalactite structures, which, from their curious and fantastic shapes, have received such names as the Image of the Virgin, the Mosaic Altar, &c. The principal parts are the Paradies with the finest stalactites, the Astro- nomical Tower and the Beinhaus. Rats, frogs and bats form actually the only animal life in the caves, but a great number of antediluvian animal bones have been found here, as well as human bones and numerous remains of prehistoric human settlements.

AGINCOURT (Azincourt), a village of northern France in the department of Pas de Calais, 14 m. N.W. of St Pol by road, famous on account of the victory, on the 25th of October 1415, of Henry V. of England over the French. The battle was fought in the defile formed by the wood of Agincourt and that of Trame- court, at the northern exit of which the army under d'Albret, constable of France, had placed itself so as to bar the way to Calais against the English forces which had been campaigning on the Somme. The night of the 24th of October was spent by the two armies on the ground, and the English had but little shelter from the heavy rain which fell. Early on the 25th, St Crispin's day, Henry arrayed his little army (about 1000 men-at-arms, 6000 archers, and a few thousands of other foot). It is probable that the usual three " battles " were drawn up in line, each with its archers on the flanks and the dismounted men-at-arms in the centre; the archers being thrown forward in wedge-shaped salients, almost exactly as at Crecy (q.v.). The French, on the other hand, were drawn up in three lines, each line formed in deep masses. They were at least four times more numerous than the English, but restricted by the nature of the ground to the same

extent of front, they were unable to use their full weight (cf.

Bannockbum) ; further, the deep mud prevented their artillery from taking part, and the crossbowmen were as usual relegated to the rear of the knights and men-at-arms. All were dismounted save a few knights and men-at-arms on the flanks, who were intended to charge the archers of the enemy. For three hours after sunrise there was no fighting; then Henry, finding that the French would not advance, moved his army farther into the defile. The archers fixed the pointed stakes, which they carried to ward off cavalry charges, and opened the engagement with flights of arrows. The chivalry of France, undisciplined and careless of the lesson of Crecy and Poitiers, was quickly stung into action, and the French mounted men charged, only to be driven back in confusion. The constable himself headed the leading line of dismounted men-at-arms; weighted with their armour, and sinking deep into the mud with every step, they yet reached and engaged the English men-at-arms; for a time the fighting was severe. The thin line of the defenders was borne back and King Henry was almost beaten to the ground. But at this moment the archers, taking their hatchets, swords or other weapons, penetrated the gaps in the now disordered French, who could not move to cope with their unarmoured assailants, and were slaughtered or taken prisoners to a man. The second line of the French came on, only to be engulfed in the milee; its leaders, like those of the first line, were killed or taken, and the commanders of the third sought and found their death in the battle, while their men rode off to safety. The closing scene of the battle was a half-hearted attack made by a body of fugitives, which led merely to the slaughter of the French prisoners, which was ordered by Henry because he had not enough men both to guard them and to meet the attack. The slaughter ceased when the assailants drew off. The total loss of the English is stated at thirteen men-at-arms (including the duke of York, grandson of Edward III.) and about ioo of the foot. The French lost 5000 of noble birth killed, including the constable, 3 dukes, 5 counts and 90 barons; 1000 more were taken prisoners, amongst them the duke of Orleans (the Charles d'Orleans of literature).

See Sir Harris Nicolas, Battle of Agincourt; Fortescue, History of the British Army, vol. i.; and H. B. George, Battles of English History.

AGIO (Ital. aggio, exchange, discount, premium), a term used in commerce in three slightly different connexions, (a) The variations from fixed pars or rates of exchange in the currencies of different countries. For example, in most of the gold-standard

countries, the standard coin is kept up to a uniform point of fineness, so that an English sovereign fresh from the mint will bear the following constant relation to coins of other countries in a similar condition: — £i = frcs. 25-221 = mks. 20-429 = $4-867, &c. This is what is known as the mint par of exchange. But the mint par of exchange, say, between France and England is not necessarily the market value of French currency in England, or English currency in France. The balance of trade between the various countries is the factor determining the rate of exchange. Should the balance of trade (q.v.) be against England, money must be remitted to France in payment of the indebtedness, but owing to the cost for /the transmission of specie there will be a demand for bills drawn on Paris as a cheaper and more expeditious method of sending money, and it therefore will be necessary, in order to procure the one of the higher current value, to pay a premium for it, called the agio. (b) The term is also used to denote the difference in exchange between two currencies in the same country; where silver coinage is the legal tender, agio is sometimes allowed for payment in the more convenient form of gold, or where the paper currency of a country is reduced below the bullion which it professes to represent, an agio is payable on the appreciated currency, (c) Lastly, in some states the coinage is so debased, owing to the wear of circulation, that the real is greatly reduced below the nominal value. Supposing that this reduction amounts to 5%, then if 100 sovereigns were offered as payment of a debt in England while such sovereigns were current there at their nominal value, they would be received as just payment; but if they were offered as payment of the same

amount of debt in a foreign state, they would be received only at their intrinsic value of £95, the additional £5 constituting the agio. Where the state keeps its coinage up to a standard value no agio is required.

AGIRA (formerly San Filippo d'Argiro), a town of the province of Catania, Sicily, with a railway station 4ˆ m. to the south of the town, 35 m. W. of Catania. Pop. (1901) 17,738. It occupies the site of Agyrion, an ancient Sicel city*which was ruled by tyrants, one of whom, Agyris, was the most powerful ruler in the centre of Sicily. He was a contemporary of Dionysius I. , and with him successfully resisted the Carthaginians when they invaded the territory of Agyrium in 392 B.C. Agira was not colonized by the Greeks until Timoleon drove out the last tyrant in 339 b.c. and erected various splendid buildings of which no traces remain.

Agyrion was the birthplace of the historian Diodorus Siculus.

AGIS, the name of four Spartan kings: —

(1) Son of Eurysthenes, founder of the royal house of the Agiadae (Pausanias iii. 2.1). His genealogy was traced through Aristodemus, Aristomachus, Cleodaeus and Hyllus to Heracles (Herodotus vii. 204), and he belongs rather to mythology than to history. Tradition ascribed to him the capture of the maritime town of Helos, which resisted his attempt to curtail its guaranteed rights, and the institution of the class of serfs called Helots (q.v.).

Ephorus ap. Strabo, viii. p. 365.

(2) Son of Archidamus II., Eurypontid, commonly called Agis I. He succeeded his father, probably in 427 B.C., and from his first invasion of Attica in 425 down to the close of the Pelopon- nesian war was the chief leader of the Spartan operations on land. After the conclusion of the peace of Nicias (421 B.C.) he marched against the Argives in defence of Epidaurus, and after skilful manoeuvring surrounded the Argive army, and seemed to have victory within his grasp when he unaccountably concluded a four months' truce and withdrew his forces. The Spartans were indignant, and when the Argives and their allies, in flagrant disregard of the truce, took Arcadian Orchomenus and prepared to march on Tegea, their fury knew no bounds, and Agis escaped having his house razed and a fine of 100,000 drachmae imposed only by promising to atone for his error by a signal victory. This promise he brilliantly fulfilled by routing the forces of the Argive confederacy at the battle of Mantinea (418), the moral effect of which was out of all proportion to the 1 losses inflicted on the enemy. In the winter 417-416 a further expedition to Argos resulted in the destruction of the half- finished Long Walls and the capture of Hysiae. In 413, on the suggestion of Alcibiades, he fortified Decelea in Attica, where he remained directing operations until, after the battle of Aegospo- tami (405), he took the leading part in the blockade of Athens, which was ended in spring 404 by the surrender of the city. Subsequently he invaded and ravaged Elis, forcing the Eleans to acknowledge the freedom of their perioeci and to allow Spartans to take part in the Olympic games and sacrifices. He fell ill on his return from Delphi, where he had gone to dedicate a tithe of the spoils, and, probably in 401, died at Sparta, where he was buried with unparalleled solemnity and pomp.

Thuc. iii. 89, iv. 2. 6, v., vii. 19. 27, viii.; Xenophon, Hellenica, i. I, ii. 2. 3, iii. 2. 3; Diodorus xii. 35, xiii. 72, 73, 107; Pausanias iii. 8. 3-8; Plutarch, Lysander ix. 14. 22, Alcibiades 23-25, Lycurgus 12, Agesilaus i. 3, de Tranquill.Anim. 6. (See Peloponnesian War.)

(3) Son of Archidamus III., of the Eurypontid line, commonly called Agis II. He succeeded his father in 338 b.c, on the very day of the battle of Chaeronea. During Alexander's Asiatic campaign he revolted against Macedonia (333 B.C.) and, with the aid of Persian money and ships and a force of 8000 Greek mercenaries, gained considerable successes in Crete. In the Peloponnese he routed a force under Corragus and, although Athens held aloof, he was joined by Elis, Achaea (except Pellene) and Arcadia, with the exception of Megalopolis, which the allies besieged. Antipater marched rapidly to its relief at the head of a large army, and the allied force was defeated after a desperate struggle (331) and Agis was slain.

Pausanias iii. 10. 5; Diodorus xvii. 48, 62, 63; Justin xii. 1; Quintus Curtius iv. I, 39, vi. 1 ; Arrian, Anabasis, ii. 13.

(4) Son of Eudamidas II., of the Eurypontid family, commonly called Agis III. He succeeded his father probably in 245 B.C., in his twentieth year. At this time the state had been brought to the brink of ruin by the growth of avarice and luxury; there was a glaring inequality in the distribution of land and wealth, and the number of full citizens had sunk to 700, of whom about 100 practically monopolized the land. Though reared in the height of luxury he at once determined to restore the traditional institutions of Lycurgus, with the aid of Lysander, a descendant of the victor of Aegospotami, and Mandrocleidas, a man of noted prudence and courage; even his mother, the wealthy Agesistrata, threw herself heartily into the cause. A powerful but not disinterested ally was found in the king's uncle, Agesilaus, who hoped to rid himself of his debts without losing his vast estates. Lysander as ephor proposed on behalf of Agis that all debts should be cancelled and that Laconia should be divided into 19,500 lots, of which 4500 should be given to Spartiates, whose number was to be recruited from the best of the perioeci and foreigners, and the remaining 15,000 to perioeci who could bear

arms. The Agiad king Leonidas having prevailed on the council to reject this measure, though by a majority of only one, was deposed in favour of his son-in-law Cleombrotus, who assisted Agis in bearing down opposition by the threat of force. The abolition of debts was carried into effect, but the land distribution was put qff by Agesilaus ou various pretexts. At this point Aratus appealed to Sparta to help the Achaeans in repelling an expected Aetolian attack, and Agis was sent to the Isthmus at the head of an army. In his absence the open violence and extortion of Agesilaus, combined with the popular disappoint- ment at the failure of the agrarian scheme, brought about the restoration of Leonidas and the deposition of Cleombrotus, who took refuge at the temple of Apollo at Taenarum and escaped death only at the entreaty of his wife, Leonidas's daughter Chilonis. On his return Agis fled to the temple of Athene Chalcioecus at Sparta, but soon afterwards he was treacherously induced to leave his asylum and, after a mockery of a trial, was strangled in prison, his mother and grandmother sharing the same fate (241). Though too weak and good-natured to cope with the problem which confronted him, Agis was characterized by a sincerity of purpose and a blend of youthful modesty with royal dignity, which render him perhaps the most attractive figure in the whole of Spartan history.

See Plutarch's biography. Pausanias' accounts (ii. 8. 5, vii. 7. 3, viii. 10. 5-8, 27. 13) of his attack on Megalopolis, his seizure of Pcllene and his death at Mantinea fighting against the Arcadians, Achaeans and Sicyonians are without foundation (J. C. F. Manso, Sparta, iii. 2. 123-127). See also Manso, op. cit. iii. I. 276-302; B. Niese, Geschichte der griechischen und makedonischen Staaten, ii. 299-303. (M.N.T.)

AGISTMENT. To " agist " (from O. Fr. agister, derived from gesir — Lat. jacere — to lie) is, in law, to take cattle to graze, for a remuneration. " Agistment," in the first instance, referred more particularly to the proceeds of pasturage in the king's forests, but now means either (a) the contract for taking in and feeding horses or other cattle on pasture land, for the considera- tion of a weekly payment of money, or (b) the profit derived from such pasturing. Agistment is a contract of bailment, and the bailer is bound to take reasonable care of the animals entrusted to him; he is responsible for damages and injury which result from ordinary casualties, if it be proved that such might have been prevented by the exercise of great care. There is no lien on the cattle for the price of the agistment, unless by express agreement.

Under the Agricultural Holdings Act 1883, agisted cattle cannot be distrained on for rent if there be other sufficient distress to be found, and if such other distress be not found, and the cattle be distrained, the owner may redeem them on pay- ing the price of their agistment. The tithe of agistment or " tithe of cattle and other produce of grass lands," was formally abolished by the act of union in 1707, on a motion submitted with a view to defeat that measure.

AGITATORS, or Adjutators, the name given to representa- tives elected in 1647 by the different regiments of the English Parliamentary army. The word really means an agent, but it

was confused with " adjutant," often called " agitant," a title familiar to the soldiers, and thus the form " adjutator " came into use. Early in 1647 the Long Parliament wished either to disband many of the regiments or to send them to Ireland. The soldiers, whose pay was largely in arrear, refused to accept either alternative, and eight of the cavalry regiments elected agitators, called at first commissioners, who laid their grievances before the three generals, and whose letter was read in the House of Commons on the 30th of April 1647. The other regiments followed the example of the cavalry, and the agitators, who belonged to the lower ranks of the army, were supported by many of the officers, who showed their sympathy by signing the Declaration of the army. Cromwell and other generals suc- ceeded to some extent in pacifying the troops by promising the payment of arrears for eight weeks at once ; but before the return of the generals to London parliament had again decided to disband the army, and soon afterwards fixed the 1st of June as the date on which this process was to begin. Again alarmed, the agitators decided to resist; a mutiny occurred in one regiment and the attempt at disbandment failed. Then followed the seizure of the king by Cornet Joyce, Cromwell's definite adherence to the policy of the army, the signing of the manifestoes, a Humble Representation and a Solemn Engagement and the establishment of the army council composed of officers and agitators. Having, at an assembly on Thriplow Heath, near Royston, virtually refused the offers made by parliament, the agitators demanded a march towards London and the " purging " of the House of Commons. Subsequent events are part of the general history of England. Gradually the agitators ceased to exist, but many of their ideas were adopted by the Levellers (q.v.), who may perhaps be regarded as their successors. Gardiner says of them, " Little as it was intended at the time, nothing was more calculated

than the existence of this elected body of agitators to give to the army that distinctive political and religious character which it ultimately bore."

See S. R. Gardiner, History of the Great Civil War, vols. iii. and iv. (London, 1905).

AGLIARDI, ANTONIO (1832-), papal diplomatist, was born at Cologno (Bergamo), Italy, on the 4th of September 1832. He studied theology and canon law, and, after acting as parish priest in his native diocese for twelve years, was sent by the pope to Canada as a bishop's chaplain. On his return he was ap- pointed secretary to the Propaganda. In 1884 he was created by Leo XIII. archbishop of Caesarea in partibus and sent to India to report on the establishment of the hierarchy there. In 1887 he again visited India, to carry out the terms of the con- cordat arranged with Portugal. The same year he was appointed secretary to the Congregation super negotiis ecclesiae extraordi- nariis, in 1889 became papal nuncio at Munich and in 1892 at Vienna. Allowing himself to be involved in the ecclesiastical disputes by which Hungary was divided in 1895, he was made the subject of formal complaint by the Hungarian government and in 1896 was recalled. His services were rewarded by a cardinalate and the archbishopric of Ferrara. In 1903 he was named vice-chancellor of the Roman Church.

AGNANO, LAGO DI, a circular lake, 5 m. W. of Naples, Italy. It was apparently not formed until the middle ages, as it is not mentioned by ancient writers; it was drained in 1870. It occupied the crater of an extinct volcano, 4 m. in circumference. On the south bank are the Stufe di S. Germano, natural sul- phureous vapour baths, and close by is the Grotta del Cane, from the floor of which warm carbonic acid gas constantly rises to a height of 18 in., the fumes of which render a dog insensible in a few seconds. It is mentioned by Pliny (Nat. Hist. ii. 93). Remains of an extensive Roman building and some statues have been discovered close by.

AGNATES (Agnati), in Roman law, persons related through males only, as opposed to cognates. Agnation was founded on the idea of the family held together by the patria potestas; cognatio involves simply the modern idea of kindred.

AGNES, SAINT, a virgin martyr of the Catholic Church. The legend of St Agnes is that she was a Roman maid, by birth a

Christian, who suffered martyrdom when but thirteen during the reign of the emperor Diocletian, on the 21st of January 304. The prefect Sempronius wished her to marry his son, and on her refusal condemned her to be outraged before her execution, but her honour was miraculously preserved. When led out to die she was tied to a stake, but the faggots would not burn, where- upon the officer in charge of the troops drew his sword and struck off her head. St Agnes is the patron saint of young girls, who, in rural districts, formerly indulged in all sorts of quaint country magic on St Agnes' Eve (2oth-2ist January) with a view to discovering their future husbands. This superstition has been immortalized in Keats's poem, " The Eve of St Agnes." St Agnes's bones are supposed to rest in the church of her name at Rome, originally built by Constantine and repaired by Pope Honorius in the 7th century. Here on her festival (21st of January) two lambs are specially blessed after pontifical high mass, and their wool is later woven into pallia (see Pallium).

AGNES OF MERAN (d. 1201), queen of France, was the daughter of Bertold IV., duke of Meran in Tirol. She is called Marie by some of the chroniclers. In June 1106 she married Philip II., king of France,, who had repudiated Ingeborg of Denmark in 1193. The pope espoused the cause of Ingeborg; but Philip did not submit until 1200, when, interdict having been added to excommunication, he consented to a separation from Agnes. She died in July of the next year, at the castle of Poissy, and was buried in the church of St Corentin, near Nantes. Her two children by Philip II., Philip, count of Cler- mont (d. 1234), and Mary, who married Philip, count of Namur, were legitimized by Innocent III. in 1201 on the demand of the king. Little is known of the personality of Agnes, beyond the remarkable influence which she exercised over Philip II. She has been made the heroine of a tragedy by Francois Ponsard, Agnes de Meranie.

See the notes of Robert Davidsohn in Philipp. II. August von Frankreich und Ingeborg (Stuttgart, 1888). A genealogical notice is furnished by the Chronicon of the monk Alberic (Aubry) of Trois- Fontaines, (Albericus Trium Fontium) in Pertz, Scriptores, vol. xxiii. pp. 872 f., and by the Genealogia Wettinensis, ibid. p. 229.

AGNESI, MARIA GAETANA (17 18-1799), Italian mathe- matician, linguist and philosopher, was born at Milan on the 16th of May 1 7 18, her father being professor of mathematics in the university of Bologna. When only nine years old she had such command of Latin as to be able to publish an elaborate address in that language, maintaining that the pursuit of liberal studies was not improper for her sex. By her thirteenth year she had acquired Greek, Hebrew, French, Spanish, German and other languages. Two years later her father began to assemble in his house at stated intervals a circle of the most learned men in Bologna, before whom she read and maintained a series of theses on the most abstruse philosophical questions. Records of these meetings are given in de Brosse's Leltres sur I'ltalie and in the Propositiones Philosophicae, which her father caused to be published in 1738. These displays, being probably not alto- gether congenial to Maria, who was of a retiring disposition, ceased in her twentieth year, and it is even said that she had at that age a strong desire to enter a convent. Though the wish was not gratified, she lived from that time in a. retirement almost conventual, avoiding all society and devoting herself entirely to the study of mathematics. The most valuable result of her labours was the Instituzioni analitiche ad uso della gioventu italia-na, a work of great merit, which was published at Milan in 1748. The first volume treats of the analysis of finite quantities, and the second of the analysis of infinitesimals. A French translation of the second volume by P. T. d'Antelmy, with additions by Charles Bossut (1730-1814), appeared at Paris in 1775; and an English translation of the whole work by John Colson (1680- 17 60), the Lucasian professor of mathe- matics at Cambridge, was published in 1801 at the expense of Baron Maseres. Madame Agnesi also wrote a commentary on the Traite analytique des sections coniques of the marquis de l'Hopital, which, though highly praised by those who saw it in manuscript, was never published. She invented and discussed the curve known as the " witch of Agnesi " (q.v.) or versiera.

In 1750, on the illness of her father, she was appointed by Pope Benedict XIV. to the chair of mathematics and natural philo- sophy at Bologna. After the death of her father in 1752 she carried out a long-cherished purpose by giving herself to the study of theology, and especially of the Fathers. After holding for some years the office of directress of the Hospice Trivulzio for Blue Nuns at Milan, she herself joined the sisterhood, and in this austere order ended her days on the 9th of January 1 799.

Her sister, Maria Teresa Agnesi (1724-1780), a well-known Italian pianist and composer, was born at Milan in 1724. She composed several cantatas, two pianoforte concertos and five operas, Sofonisbe, Ciro in Armenia, Nitocri, II Re Pastor e and Insubria consolata.

See Antonio Francesco Frisi, liloge historique de Mademoiselle Agnesi, translated by Boulard (Paris, 1807) ; Milesi-Mojon, Vita di M._G. Agnesi (Milan, 1836)'; J. Boyer, "La Mathematicienne Agnesi," in the Revue Catholique des revues francaises et etrangeres (Paris, 1897).

AGNEW, DAVID HAYES (1818-1892), American surgeon, was born in Lancaster county, Pennsylvania, on the 24th of November 1818. He graduated from the medical department of the university of Pennsylvania in 1838, and a few years later set up in practice at Philadelphia and became a lecturer at the Philadelphia School of Anatomy. He was appointed surgeon at the Philadelphia Hospital in 1854 and was the founder of its pathological museum. For twenty-six years (1863-1889) he was connected with the medical faculty of the university of Pennsylvania, being elected professor of operative surgery in 1870 and professor of the principles and practice of surgery in the following year. From 1865 to 1884 — except for a brief interval — he was a surgeon at the Pennsylvania Hospital. During the American Civil War he was consulting surgeon in the Mower Army Hospital, near Philadelphia, and acquired considerable reputation for his operations in cases of gun-shot wounds. He attended as operating surgeon when President Garfield was fatally wounded by the bullet of an assassin in 188 1. He was the author of several works, the most important being The Principles and Practice of Surgery (1878-1883). He died at Philadelphia on the 22nd of March 1892.

AGNI, the Hindu God of Fire, second only to Indra in the power and importance attributed to him in Vedic mythology. His name is the first word of the first hymn of the Rig-veda: " Agni, I entreat, divine appointed priest of sacrifice." The sacrifices made to Agni pass to the gods, for Agni is a messenger from and to the gods; but, at the same time, he is more than a mere messenger, he is an immortal, for another hymn runs: " No god indeed, no mortal is beyond the might of thee, the mighty One. ..." He is a god who lives among men, mira- culously reborn each day by the fire-drill, by the friction of the two sticks which are regarded as his parents; he is the supreme director of religious ceremonies

and duties,and even has the power of influencing the lot Of man in the future world. He is wor- shipped under a threefold form, fire on earth, lightning and the sun. His cult survived the metamorphosis of the ancient Vedic nature-worship into modern Hinduism, and there still are in India fire-priests (agniholri) whose duty is to superintend his worship. The sacred fire-drill for procuring the temple-fire by friction — symbolic of Agni's daily miraculous birth — is still used. In pictorial art Agni is always represented as red, two-faced, suggesting his destructive and beneficent qualities, and with three legs and seven arms.

See W. J. Wilkins, Hindu Mythology (London, 1900) ; A. A. Macdonell, Vedic Mythology (Strassburg, 1897).

AGNOETAE (Gr. ayvoeco, to be ignorant of), a monophysite sect who maintained that Christ's human nature was like other men's in all respects, including limited knowledge. Its founder was Themistius, a deacon in Alexandria in the 6th century. The sect was anathematized by Gregory the Great.

AGNOIOLOGY (from Gr. &yvoi-a, ignorance), the science or study of ignorance, which determines its quality and conditions.

AGNOSTICISM. The term " agnostic " was invented by Huxley in 1869 to describe the philosophical and religious attitude of those who hold that we can have scientific or real

knowledge of phenomena only, and that so far as what may lie behind phenomena is concerned — God, immortality, &c— there is no evidence which entitles us either to deny or affirm anything. The attitude itself is as old as Scepticism (q.v.) ; but the expres- sions " agnostic " and " agnosticism " were applied by Huxley to sum up his deductions from those contemporary developments of metaphysics with which the names of Hamilton (" the Un- conditioned ") and Herbert Spencer (" the Unknowable ") were associated; and it is important, therefore, to fix precisely his own intellectual standpoint in the matter. Though Huxley only began to use the term " agnostic " in 1869, his opinions had taken shape some time before that date. In a letter to Charles Kingsley (September 23, i860) he wrote very fully concerning his beliefs: —

” I neither affirm nordenythe immortality of man. I see no reason for believing it, but, on the other hand, I have no means of disprov- ing it. I have no a priori objections to the doctrine. No man who has to deal daily and hourly with nature can trouble himself about a priori difficulties. Give me such evidence as would justify me in believing in anything else, and I will believe that. Why should I not? It is not half so wonderful as the conservation of force or the inde- structibility of matter. . . .

” It is no use to talk to me of analogies and probabilities. I know what I mean when I say I believe in the law of the inverse squares, and I will not rest my life and my hopes upon weaker convictions. . . .

” That my personality is the surest thing I know may be true. But the attempt to conceive what it is leads me into mere verbal subtleties. I have champed up all that chaff about the ego and the non-ego, noumena and phenomena, and all the rest of it, too often not to know that in attempting even to think of these questions, the human in- tellect flounders at once out of its depth.”

And again, to the same correspondent, the 5th of May 1863:— ” I have never had the least sympathy with the a priori reasons against orthodoxy, and I have by nature and disposition the greatest possible antipathy to all the atheistic and infidel school. Neverthe- ; less I know that I am, in spite of myself, exactly what the Christian would call, and, so far as I can see, is justified in calling, atheist and infidel. I cannot see one shadow or tittle of evidence that the great unknown underlying the phenomenon of the universe stands to us in the relation of a Father — loves us and cares for us as Christianity asserts. So with regard to the other great Christian dogmas, im- mortality of soul and future state of rewards and punishments, what possible objection can I — who am compelled perforce to believe in the immortality of what we call Matter and Force, and in a very un- mistakable present state of rewards and punishments for our deeds — have to these doctrines? Give me a scintilla of evidence, and I am ready to jump at them.”

Of the origin of the name ” agnostic ” to cover this attitude, Huxley gave (Coll. Ess. v. pp. 237-239) the following account: —

” When I reached intellectual maturity, and began to ask myself whether I was an atheist, a theist or a pantheist, a materialist or

an idealist, a Christian or a freethinker, I found that the more I learned and reflected, the less ready was the answer. The one thing on which most of these good people were agreed was the one thing in which I differed from them. They were quite sure they had attained a certain ‘ gnosis ‘ — had more or less successfully, solved the problem of existence ; while I was quite sure that I had not, and had a pretty 1 strong conviction that the problem was insoluble. This was my situation when I had the good fortune to find a place among the members of that remarkable confraternity of antagonists, the Meta- physical Society. Every variety of philosophical and theological opinion was represented there; most of my colleagues were isls of one sort or another; and I, the man without a rag of a belief to cover himself with, could not fail to have some of the uneasy feelings which must have beset the historical fox when, after leaving the trap in which his tail remained, he presented himself to his normally elon gated companions. So I took thought, andinvented what I conceived to be the appropriate title of ‘ agnostic’ It came into my head as suggestively antithetic to the ‘ gnostic ‘ of Church history, who professed to know so much about the very things of which I was ignorant. To my great satisfaction the term took.”

This account is confirmed by R. H. Hutton, who in 1881 wrote that the word ” was suggested by Huxley at a meeting held previous to the formation of the now defunct Metaphysical Society at Mr Knowles’s house on Clapham Common in 1869, in my hearing. He took it from St Paul’s mention of the altar to the Unknown God.” Hutton here gives a variant etymology for the word, which may be therefore taken as partly derived from iyvoxTTOs (the “unknown” God), and partly from an antithesis to ” gnostic “; but the meaning remains the same in either case. The name, as Huxley said, ” took “; it was constantly used by

Hutton in the Spectator and became a fashionable label for contemporary unbelief in Christian dogma. Hutton himself frequently misrepresented the doctrine by describing it as ” belief in an unknown and unknowable God “; but agnosticism as defined by Huxley meant not belief, but absence of belief, as much distinct from belief on the one hand as from disbelief on the other; it was the half-way house between the two, where all questions were ” open.” All that Huxley asked for was evidence, either for or against; but this he believed it impossible to get. Occa- sionally he too mis-stated the meaning of the word he had invented, and described agnosticism as meaning “that a man

shall not say he knows or believes , what he has no scientific ground for professing to know or believe." But as the late Rev* A. W. Momerie remarked, this would merely be " a definition of honesty; in that sense we ought all to be agnostics."

Agnosticism really rests on the doctrine of the Unknowable, the assertion that concerning certain objects — among them the Deity — we never can have any " scientific " ground for belief. This way of solving, or passing over, the ultimate problems of thought has had many followers in cultured circles imbued with the new physical science of the day, and with disgust for the dogmatic creeds of contemporary orthodoxy; and its outspoken and even aggressive vindication by physicists of the eminence of Huxley had a potent influence upon the attitude taken towards metaphysics, and upon the form which subsequent Christian apologetics adopted. As a nickname the term " agnostic " was soon misused to cover any and every variation of scepticism, and just as popular preachers confused it with atheism (q.v.) in their denunciations, so the callow freethinker — following Tennyson's path of " honest doubt " — classed himself with the agnostics, even while he combined an instinctively Christian theism with a facile rejection of the historical evidences for Christianity.

The term is now less fashionable, though the state of mind persists. Huxley's agnosticism was a natural consequence of the intellectual and philosophical conditions of the 'sixties, when clerical intolerance was trying to excommunicate scientific discovery because it appeared to clash, with the book of Genesis. But as the theory of evolution was accepted, a new spirit was gradually introduced into Christian theology, which has turned the controversies between religion and science into other channels and removed the temptation to flaunt a disagreement. A similar effect has been produced by the philosophical reaction against Herbert SpenCer, and by the perception that the canon? of evidence required in physical science must not be exalted into universal rules of thought. It does not follow that justification by faith must be eliminated in spiritual matters where sight cannot follow, because the physicist's duty and success He in pinning belief solely on verification by physical phenomena, when they alone are in question; and for mankind generally, though possibly not for an exceptional man like Huxley, an impotent suspension of judgment on such issues as a future life or the Being of God is both unsatisfying and demoralizing.

It is impossible here to do more than indicate the path out of the

difficulties raised by Huxley in the letter to Kingsley quoted above. They involve an elaborate discussion, not only of Christian evidences, but of the entire subject-matter alike of Ethics and Metaphysics, of Philosophy as a whole, and of the philosophies of individual writers whohave dealt in their different ways with the problems of existence and epistemology. It is, however, permissible to point out that, as has been exhaustively argued by Professor J. Ward in his Gifford lectures for 1896-1898 (Naturalism and Agnosticism, 1899), Huxley's challenge ("I know what I mean when I say I believe in the law of the inverse squares, and I will not rest my life and my hopes upon weaker convictions ") is one which a spiritualistic philosophy need not shrink from accepting at the hands of naturalistic agnosticism. If, as Huxley admits, even putting it with unnecessary force against himself," the immortality of man is not half so wonderful as the conservation of force or the indestructibility of matter," the question then is, how far a critical analysis of our belief in the last-named doctrines will leave us in a position to regard them as the last stage in systematic thinking. It is the pitfall

of physical science, immersed as its students are apt to tje in problems dealing with tangible facts in the world of experience, that there is a tendency among them to claim a superior status of objective reality and finality for the laws to which their data are found to conform. But these generalizations are not ultimate truths, when we have to consider the nature of experience itself. " Because reference to the Deity will not serve for a physical explanation in physics, or a chemical explanation in chemistry, it does not therefore follow," as Professor Ward says (op. cit. vol. i. p. 24), " that the sum total of scientific knowledge is equally intelligible whether we accept the theistic hypothesis or not. It is true that every item of scientific knowledge is con- cerned with some definite relation of definite phenomena, and with nothing else; but, for all that, the systematic organization of such items may quite well yield further knowledge, which transcends the special relations of definite phenomena."

At the opening of the era of modern scientific discovery, with all its fruitful new generalizations, the still more highly generalized laws of epistemology and of the spiritual constitution of man

might well baffle the physicist and lead his intellect to ” flounder.” It is fundamentally necessary, in order to avoid such floundering, that the ” knowledge ” of things sensible should be kept distinct from the ” knowledge ” of things spiritual; yet in practice they are constantly confused. When the physicist limits the term ” knowledge ” to the conclusions from physical apprehensions, his refusal to extend it to conclusions from moral and spiritual apprehensions is merely the consequence of an’ illegitimate definition. He relies on the validity of his perceptions of physical facts; but the saint and the theologian are no less entitled to rely on the validity of their moral and spiritual experiences. In each case the data rest on an ultimate basis, undemonstrable, indeed, to any one who denies them (even if he be called mad for doing so), except by the continuous process of working out their own proofs, and showing their consistency with, or necessity in, the scheme of things terrestrial on the one hand, or the mind and happiness of man on the other. The tests in each case differ; and it is as irrelevant for the theologian to dispute the ” know- ledge ” of the physicist, by arguments from faith and religion, as it is for the physicist to deny the ” knowledge ” of the theo- logian from the point of view of one who ignores the possibility of spiritual apprehension altogether. On the ground of secular history and secular evidence both might reasonably meet, as regards the facts, though not perhaps as to their interpretation; but the reason why they ultimately differ is to be found simply in the difference of their mental attitude towards the nature of ” knowledge ” — itself a difference of opinion as to the nature of man.

In addition to the literature cited above, see L. Stephen, An Agnostic’s Apology (1893); R. Flint, Agnosticism (1903); T. Bailey Saunders, The Quest of Faith, chap. ii. (1899) ; A. W. Benn, English Rationalism in the XlXth Century (London, 1906). (H. Ch.)

AGNUS DEI, the figure of a lamb bearing a cross, symbolical of the Saviour as the ” Lamb of God.” The device is common in ecclesiastical art, but the name is especially given in the Church of Rome to a small cake made of the wax of the Easter candles and impressed with this figure. Since the gth century it has been customary for the popes to bless these cakes, and distribute them on the Sunday after Easter among the faithful, by whom they are highly prized as having the power to avert evil. In modern times the distribution has been limited to persons of distinction, and is made by the pope on his accession and every seven years

thereafter.

Agnus Dei is also the popular name for the anthem beginning with these words, which is said to have been introduced into the missal by Pope Sergius I. (687-701). Based upon John i. 29, the Latin form is Agnus Dei, qui tollis peccata mundi, miserere nobis. In the celebration of the mass it is repeated three times before the communion, and it is also appended to many of the litanies. By the judgment in the case of " Read and others v. The Bishop of Lincoln " it was decided in 1890 that the singing of the Agnus Dei in English by the choir during the administra- tion of the Holy Communion, provided that the reception of

the elements be not delayed till its conclusion, is not illegal in the Church of England.

For the various ceremonies in the blessing of the Agnus Dei see A. Vacant, Diet, de thSologie (cols. 605-613).

AGOBARD (c. 770-840), Carolingian prelate and reformer, became coadjutor to Leidrad, archbishop of Lyons, in 813, and on the death of the latter succeeded him in the see (816). We know nothing of his early life nor of his descent. He pursued the same vigorous policy as his predecessor, who had been one of Charlemagne's most active agents in the reformation of the Church. He was strongly opposed to the schemes of the empress Judith for a redivision of the empire in favour of her son Charles the Bald, which he regarded as the cause of all the subsequent evils, and supported Lothair and Pippin against their father the emperor Louis I. Deposed in 835 by the council of Thionville, he made his peace with the emperor and was reinstated in 837. Agobard occupies an important place in the Carolingian re- naissance. He wrote extensively not only theological works but also political pamphlets and dissertations directed against popular superstitions. These last works are unique in the literature of the time. He denounced the trial by ordeal of fire and water, the belief in witchcraft, and the ascription of tempests to magic,maintainedthe Carolingian opposition to image- worship, but carried his logic farther and opposed the adoration of the saints. The basis for this crusade was theological, not scientific; but it reveals a clear intellect and independent judgment. In his purely theological works Agobard was strictly orthodox, except that he denied the verbal inspiration of the Scriptures. Agobard was reverenced as a saint in Lyons, and although his canonization is disputed his life is given by the

Bollandists, Acta Sanctorum, Jun. ii. 748.

Bibliography. — Agobard's works were lost until 1605, when a manuscript was discovered in Lyons and published by Papirius Masson, again by Baluze in 1666. For later editions see Potthast, Bibliotheca Historica Medii Aevi. The life of Agobard in Ebert's Geschichte der Litteratur des Mittelalters (1880), Band ii., is still one of the best to consult. For further indications see A. Molinier, Sources de I'histoire de France, i. p. 235.

AGONALIA, in ancient Rome, festivals celebrated on the 9th of January, 1 7 th of March, 2 1 st of May, and 1 1 th of December in each year in honour of various divinities (Ovid, Fasti, i. 319-332). The word is derived either from agonia, " a victim," or from agonium, " a festival."

AGONIC LINES (from Gr. a-, privative, and ycovla, an angle), the term given to the imaginary lines on the earth's surface connecting points at which the magnetic needle points to the geographical north and south. (See Magnetism, Terrestrial.)

AGONOTHETES, in ancient Greece, the president or superintendent of the sacred games. At first the person who instituted the games and defrayed the expenses was the Agonothetes; but in the great public games, such as the Olympic and Pythian, these presidents were the representatives of different states, or were chosen from the people in whose country the games were celebrated; thus at the Panathenaic festival at Athens ten athlothetae were elected for four years to superintend the various contests. They were variously called aiovfivrJTCu,, /Spa/Seurai, asywvapx

AGORA, originally, in primitive times, the assembly of the Greek people, convoked by the king or one of his nobles. The right of speech and vote was restricted to the nobles, the people being permitted to express their opinion only by signs of applause or disapproval. The word then came to be used for the place where assemblies were held, and thus from its convenience as a meeting-place the agora became in most of the cities of Greece the general resort for public and especially commercial intercourse, corresponding in general with the Roman forum. At Athens, with the increase of commerce and political interest, it was found advisable to call public meetings at the Pnyx or the temple of Dionysus; but the important assemblies, such as meetings for ostracism, were held in the agora. In the best days

of Greece the agora was the place where nearly all public traffic

was conducted. It was most frequented in the forenoon, and then only by men. Slaves did the greater part of the purchasing, though even the noblest citizens of Athens did not scruple to buy and sell there. Citizens were allowed a free market; foreigners and metics had to pay a toll. Public festivals also were celebrated in the open area of the agora. At Athens the agora of classical times was adorned with trees planted by Cimon; around it" numerous public buildings were erected, such as the council chamber and the law courts (for its topography, see Athens). Pausanias (especially vi. 24) is the great architectural authority on the agorae of various Greek cities, and details are also given by Vitruvius (v. 1).

AGORACRITUS, a Parian and Athenian sculptor of the age of Phidias, and said to have been his favourite pupil. His most noted work was the statue at Rhamnus of Nemesis, by some attributed to Phidias himself. Of this statue part of the head is in the British Museum; some fragments of the reliefs which adorned the pedestal are in the museum at Athens.

AGORANOMI, magistrates in the republics of Greece, whose position and duties were in many respects similar to those of the aediles of Rome. In Athens there were ten, chosen annually by lot, five of whom took charge of the city and five of the Peiraeus. They maintained order in the markets, settled disputes, examined the quality of the articles exposed for sale, tested weights and measures, collected the harbour dues and enforced the shipping regulations.

AGORDAT, a town of Eritrea, N.E. Africa, on the route between Massawa and Kassala. At Agordat on the 21st of December 1893 the Italian troops under Colonel Arimondi inflicted a severe defeat on the followers of the khalifa. Agordat is protected by a strong fort. (See Eritrea and Sudan, History.)

AGOSTINI, LEONARDO, Italian antiquary of the. 17th cen- tury, was born at Siena. After being employed for some time to collect works of art for the Barberini palace, he was appointed by Pope Alexander VII. superintendent of antiquities in the Roman states.

He issued a new edition of Paruta's Sicilian Medals, with engravings of 400 additional specimens; and in conjunction with Giovanni Bellori (1615-1606) he also published a work on antique sculptured gems, which was translated into Latin by Jakob Gronovius (Amsterdam, 1685).

AGOSTINO, or Agostini [Augustinus], PAOLO (1393-1629), Italian musician, was born at Valerano, and studied under G. B. Nanini, as we learn from the dedication in the third and fourth books of his masses, subsequently becoming the son-in- iaw of his master. He succeeded Ugolini as conductor of the pope's orchestra in St. Peter's. His musical compositions are numerous and of great merit, an Agnus Dei for eight voices being specially admired.

AGOSTINO and AGNOLO (or Angelo) DA SIENA, Italian architects and sculptors in the first half of the 14th century. Delia Valle and other commentators deny that they were brothers. They certainly studied together under Giovanni Pisano, and in 13 17 were jointly appointed architects of thftir native town, for which they designed the Porto Romana, the church and convent of St Francis, and other buildings. On the recommendation of the celebrated Giotto, who styled them the best sculptors of the time, they executed in 1330 the tomb of Bishop Guido Tarlati in the cathedral of Arezzo, which Giotto had designed. It was esteemed one of the finest artistic works of the 14th century, but unfortunately was destroyed by the French under the duke of Anjou.

AGOULT, MARIE CATHERINE SOPHIE DE FLAVIGNY, Comtesse d'(i8o5-i876), French author, whose nomde plume was " Daniel Stern," was born at Frankfort-on-Main on the 31st of December 1805. Her father was a French officer who had served in the army of the emigrant princes, and her mother was the daughter of a Frankfort banker. She was married in 1827 to the comte Charles d'Agoult. In Paris she gathered round her a brilliant society which included Alfred de Vigny, Sainte-Beuve, Ingres, Chopin, Meyerbeer, Heine and others. She was separated from her husband, and became the mistress of Franz Liszt. During her frequent travels in Switzerland, France and Italy she

made the acquaintance* of George Sand, and figures in the Lettres d'un voyageur as " Arabella." By Liszt she had three children — a son who died young; Blandine, who married M. Emile Ollivier; and Cosima, who married first Hans von Bulow

and later Richard Wagner. The story of her breach with Liszt is told under a very slight disguise in her novel NMida (1845). On her return to Paris in 1 84 1 she began to write art criticisms for the Presse, and in 1844 she contributed to the Revue des deux Mondes articles on B ettina von Arnim and on Heinrich Heine , but her views were not acceptable to the editor, and Daniel Stern withdrew to become a contributor to the Revue independante. Mme. d'Agoult was an ardent apostle of the ideas of '48, and from this date her salon, which had been literary and artistic, took on a more political tone; revolutionists of various nationalities were welcomed by her, and she had an especial friendship and sympathy for Daniele Manin. In 1857 she produced a national drama, Jeanne Dare, which was translated into Italian and presented with brilliant success at Turin. The most important section of Daniel Stern's work is her political and historical essays: Lettres rtpubUcaines (1848), Esquisses morales et politiques (1849), Histoire de la Re- volution de 1848 (3 vols., 1850-1853), Histoire des commencements de la RSpublique aux Pays-Bas (1872). Mme. d'Agoult died in Paris on the 5th of March 1876. Her daughter Claire Christine (b. 1830), who married Guy de Charnace, is known as a writer.

See Mme. d'Agoult, Mes Souvenirs (1806-1833), 1877; A. Cuvillier Fleury, Portraits rhiolutionnaires, vol. i. (1889) ; J. Mazzini, Lettres de Joseph Mazzini a Daniel Stern (1872); A. Pommier, Madame la comtesse d' Agoult (Daniel Stern), 1876; A. Ungherini, " Daniel Stern" in the Revista repubblicana (1880, No. 9) ; S. Rocheblave, line Amitii ramanesgue, George Sand et Madame d Agoult (1895).

AGOUTI, or Aguti, the West Indian name of Dasyprocta aguli, a terrestrial rodent of the size of a rabbit, common to Trinidad and Guiana, and classed in the family Caviidae. Under the same term may be included the other species of Dasyprocta, of which there are about half a score in tropical America. Agoutis are slender-limbed rodents, with five front and three hind toes (the first front toe very minute), and very short tails. The hair, especially on the hind-quarters, is coarse and somewhat rough; the colour being generally rufous brown. The molar teeth have cylindrical crowns, with several islands and a single lateral fold of enamel when worn. In habits agoutis are nocturnal, dwelling in forests, where they conceal themselves during the day in hollow tree-trunks, or in burrows among roots. Active and graceful in their movements, their pace is either a kind of trot or a series of springs following one another so rapidly as to look like a gallop. They take readily

to water, in which they swim well. Their food comprises leaves, roots, nuts and other fruits. They do much harm to plantations of sugar-cane and bananas. In captivity the females produce only one or two young at a birth.

AGRA, an ancient city of India, which gives its name to a district and division in the United Provinces. It is famous for containing the most perfect specimens of Mogul architecture. Agra, like Delhi, owes much of its importance in both historical and modern times to the commercial and strategical advantages of its position. The river Jumna, which washes the walls of its fort, was the natural highway for the traffic of the rich delta of Bengal to the heart of India, and it formed, moreover, from very ancient times, the frontier defence of the Aryan stock settled in the plain between the Ganges and the Jumna against their western neighbours, hereditary freebooters who occupied the highlands of Central India. No place was better fitted for both an emporium and a frontier fortress. The river formed an unf ordable barrier and also a useful means of communication. Jehangir tells us in his autobiography that before his father Akbar built the present fort, the town was defended by a citadel of great antiquity. For three hundred years the Afghans and other tribes came down from the north and founded kingdoms; and their power radiated from Delhi and Agra. It was Sikandar, of the house of Lodi (a.d. 1500), the last of the Afghan dynasties, who realized the strategic importance of Agra as a point for keeping in check his rebellious vassals to the. south. He removed his court there, and Agra from being " a mere village of old standing," says a Persian chronicler, became the capital of a kingdom. In 1 5 2 6 the city was

Taj Mahal.

captured by the emperor Baber, the famous Koh-i-noor diamond being part of the loot; and it was here that Baber announced that his invasion was to be a permanent conquest, aDd not a mere temporary inroad. It was Saber's grandson Akbar that built the present fort, whose strong and lofty walls of red sandstone are a mile and a. half in circumference. The building was completed in 1665, when Charles II. was on the throne of England and the plague was devastating London. Another building of much the same date is the red stone palace generally attributed to Akbar,

but probably of an earlier time, which is the finest example of pure Hindu architecture; while the Moti Masjid, or Pearl Mosque, is an equally perfect example of the Mahommedan style.

But the glory of Agra, the most splendidly poetic building in the world, is the Taj Mahal, the mausoleum built (a.d. 1632) by the emperor Shah Jahan for the remains of his favourite wife, Mumtaz Mahal, in which he himself also lies buried. The building is built of white marble throughout, crowned with a great white dome in the centre, and with a smaller dome at each of its four corners. From the marble terrace which surrounds it rise four tall minarets of the same material, one at each corner. The Taj has been modelled and painted more frequently than any other building in the world, and the word pictures of it are numberless. But it can only be described as a dream in marble. It amply justifies the saying that the Moguls designed like Titans and finished like jewellers. In regard to colour and design the Taj ranks first in the world for purely decorative workmanship; while the perfect symmetry of its exterior once seen can never be forgotten, nor the aerial grace of its domes, rising like marble bubbles into the azure sky. In his History of Architecture, Fergusson says of it:—

" This building is an early example of that system of inlaying with precious stones which became the great characteristic of the style of the Moghals after the death of Akbar. All the spandrils of the Taj, all the angles and more important architectural details, are heightened by being inlaid with precious stones such as agates, bloodstones, jaspers and the like. These are combined in wreaths, scrolls and frets, as exquisite in design as they are beautiful in colour, and relieved by the pure white marble in which they are inlaid, they form the most beautiful and precious style of ornament ever adopted in architecture. It is lavishly bestowed on the tombs themselves and the screens which surround them, but more sparingly introduced on the mosque that forms one wing of the Taj, and on the fountains and surrounding buildings. The judgment, indeed, with which this style of ornament is apportioned to the various parts, is almost as remarkable as the ornament itself, and conveys a high idea of the taste and skill of the architects of this age."

Of the Taj as a whole Lord Roberts says in his Forty-one Years in India: —

" Neither words nor pencil could give to the most imaginative

reader the slightest idea of the all-satisfying beauty and purity of this glorious conception. To those who have not already seen it I would say, ‘ Go to India. The Taj alone is well worth the journey.’ ”

The Taj was designed by Ustad Isa, variously described as a Byzantine Turk and a native of Shiraz in Persia. The pielra dura work belongs to the Persian school; and the common belief that it was designed by Austin ,de Bordeaux, a French architect in the service of Shah Jahan, is probably incorrect.

Agra was formerly the capital of the North-West Provinces, but after the Mutiny the seat of government was removed to Allahabad. Situated 841 m. from Calcutta it is now an important railway centre, whence two main lines diverge southwards towards Bombay. In 1901 the population was 188,022, showing an increase of 1 2 % during the decade. The city contains cotton mills, factories for ginning and pressing cotton, a tannery and boot factory and flour mill. There are also two missionary colleges.

The district of Agra has an area of 1856 sq. m. Its general appearance is that common to the Doab, a level plain intersected by watercourses and ravines. Its general elevation is estimated at from 650 to 700 ft. above the level of the sea. The district is intersected by the Jumna, and is also watered by the Agra canal. The principal crops are millets, pulses, barley, wheat, cotton and a little indigo. The population in 1 001 was 1,060,528, showing an increase of 6 % during the decade. .

The division of Agra has an area of 10,154 sq. m. In

1901 the population was 5,249,542, showing an increase of 10% during the decade, attributed to the extension of irrigation from canals. It comprises the six districts of Muttra, Agra, Farukhabad, Mainpuri, Etawah and Etah.

For an account of the architecture of Agra see Fergusson’s History of Architecture; Cities of India (1903), by G. W. Forrest; Enchanted India (1899), by Prince Bojidar Karageorgevitch ; and E. B. Havell, Handbook to Agra and the Taj (1904). (C. L.)

AGRA CANAL, an important Indian irrigation work, available also for navigation, in Delhi, Gurgaon, Muttra and Agra districts, and Bharatpur state. The canal receives its water from the Jumna

river at Okla, about 10 m. below Delhi. The weir across the Jumna was the first attempted in Upper India upon a foundation of fine sand; it is about 800 yds. long, and rises 7 ft. above the summer level of the river. From Okla the canal follows the high land between the Khari-nadi and the Jumna, and finally joins the Banganga river about 20 m. below Agra. Navigable branches connect the canal with Muttra and Agra. It was opened in 1874.

AGRAM (Hungarian Zdgrdb, Croatian Zagreb) , the capital of Croatia-Slavonia, and a royal free town of Hungary; pleas- antly situated between the north bank of the Save and the mountains which culminate in Sljeme (3396 ft.); 187 m. by rail S. of Vienna. Pop. (1890) 38,742; (1900) 57,930, or with garrison 61,002. Agram is the seat of the ban, or viceroy, of Croatia-Slavonia, of the Banal and Septemviral courts, the highest in the land, and of a chamber of commerce.' It is also the meeting-place of the parliament; but local affairs are con- ducted by a municipal council. The city is divided into three districts. The Kapitel-Stadt, sometimes called the Bishop's Town, with the palace of the Roman Catholic archbishop, and his late Gothic cathedral, dating from the 15th century, lies eastward of the Medvesfiak, a brook which flows into the Save. The Upper Town, on high ground west of the Medvesdak, contains the palace of the ban and the natural history museum. On the south, the Lower Town is separated from the other districts by the Ilica, a long street traversed by a cable tramway. In it are the business and industrial quarters; the palace of justice; the academy of science, with picture-galleries, a library and a collection of antiquities; the theatre; the Franz Josef Univer- sity, founded in 1874 to teach theology, law and philosophy; the synagogue; and the only Protestant church existing in the country at the beginning of the 20th century. Roman Catholic churches and schools are numerous. Besides the large Maximir park and botanical gardens, many of the squares are planted with trees and adorned with statues; while the whole city is surrounded by vineyards and country houses. Tobacco, leather, linen, carpets and war-material are manufactured in Agram, which also contains the works of the Hungarian state railways, and has a brisk trade in grain, wine, potash, honey, silk and porcelain.

In 1094 Agram was founded by Ladislaus I. of Hungary, as the seat of a bishop; and on the expulsion of its Mongol colony, in 1242, it was raised to the rank of a royal free city. For cen- turies a bitter feud raged between the Kapitel-Stadt and the Upper

Town, until these rivals were forced to join hands against the Turks. Agram, already the political centre of Croatia— Slavonia, was selected as the capital in 1867. It suffered severely from earthquake in 1880 and 1,901.

AGRAPHA (i.e. “unwritten”), the name given to certain utterances ascribed, with some degree of certainty, to Jesus, which have been preserved in documents other than the Gospels, e.g. Acts xx. 35; 1 Tim. v. 18; 1 Cor. vii. 10-12, and the Logia (q.v.) discovered in 1897 and 1903 at Oxyrhyncus. Two interesting examples of such sayings may be quoted: (1) ” That which is weak shall be saved by that which- is strong”; (2) ” Jesus, on whom be peace, has said: ‘The world is merely a bridge; ye are to pass over it, and not to build your dwellings upon it.’ ” The first of these is from the Apostolic Canons (c. A.d. 300), the second was found by the missionary Alexander Duff inscribed in Arabic on the gateway of the mosque at Fateh- pur Sikri.

The earliest modern collection of such sayings was by Cotelerius, Ecclesiae Graecae Monumenta (1677-1688), followed by J. E. Grabe, Spicelegium (1698 and 1700), and J. B. Fabricius, Codex Apocryph. N. T. (2nd ed., 1719). See also A. Resch, Agrapha (Leipzig, 1889) ; J. H. Ropes, Die Sprilche Jesu (Leipzig, 1896) ; and the article ” Sayings ” in J. Hastings’ Dictionary of Christ and the Gospels.

AGRARIAN LAWS (Lat. ager, land). Under this heading we deal with the disposal of the public land {ager publicus) of ancient Rome. It was a principle of the Republican constitution that no gratuitous disposition of state property should be made without the consent of the people. Hence many of the ordinances affecting the public land were laws (leges) in the strictest sense of that word. It is, however, both justifiable and convenient to consider in this article all the regulations that were made for the administration of the public land by the executive authorities, as well as by the people during the Republic, and by the commands of the emperor, which had the force of law during the Principate.

The existence of public land, first in Italy, and then in the Mediterranean world, was the outcome of two ideas which are

very familiar to students of antiquity. This land was the prize of conquest and was one of the means of defraying the current expenses of state-administration. For the latter purpose land is often leased or allowed to be occupied on the condition of the payment of dues. But it may be made to fufil another purpose as well — this purpose being the satisfaction of the individual needs of poorer citizens. To meet this object the land is usually assigned, and on assignment generally ceases to be the property of the state. But it often happens that the state is not wholly disinterested in undertaking such acts of assignment. It gains security and territorial control by planting garrisons in conquered country, and it relieves itself of the necessity of providing for its poorer classes whether by state-aid or by a hazardous tamper- ing with the rights of private property. In this use to which public land could be turned we see at once the connexion between agrarian legislation and colonization — a connexion which was so close that when a Roman spoke of an agrarian law he seems generally to have understood by it a law establishing a colony — and also the two aspects of colonization, the military and the social. These two objects were indissolubly connected throughout the whole of the earlier period of Roman agrarian assignation. They only became separated in the period subse- quent to the Gracchi in so far as social motives still continued to be operative when military precautions had ceased to be necessary. It is probable that one of the chief motives which prompted infant Rome to war with her neighbours was the land-hunger of her citizens. This hunger she satisfied after conquest by annexing a portion of the enemy's territory. The amount thus confiscated varied from time to time. It was usually a third, but sometimes a half or even two-thirds, and after the fall of Capua in the Second Punic War the whole terri- tory of the state was annexed. It is possible that by the close of the 2nd century B.C. one-half of the land of Italy belonged to Rome whether in private ownership or as the property of the state. Annexation was carried on in the provinces on a relatively smaller scale: but Rome retained as domain-land much of the territory of communities which had been destroyed, such as Carthage and Corinth, and the estates of former kings, such as the lands of the Attalids in the Chersonese. Other domains in Sicily and Greece, such as the territory of Leontini in the former, or Oropus in the latter case, are also found. This peculiar prop- erty of the Roman state in the provinces must be carefully distinguished from the general overlordship which Rome was supposed to hold over all provincial soil, expressed in the state- ment that provincials had

only possession or usufruct of their land (Gaius ii. 7; Gromatici, p. 36, Lachmann). This overlord- ship was probably merely a legal fiction by which the juristic mind assigned a reason for the fact that the provincials paid a land tax from which Italians fcere exempt.

Such portions of the territories of conquered cities as were not claimed by Rome were as a matter of course left in the un- disturbed possession of these cities. If the city was a federate state (civiias foederata) his possession was guaranteed by a treaty ;

if it was a free city, the guarantee was made by charter; if it was neither federate nor free, the abandonment of the territory by Rome must have been taken as a sufficient guarantee of the city's right to possess, although statements relative to the sur- render may have been contained in the charter of the province (lex provinciae) to which the city belonged. But, whether the states were federate, free or stipendiary, there was only one case in which it was important to specify precisely that land had been restored (redditus) to its former occupants. This was the case where Rome had marked out a territory for assignment to her own citizens, but where in or near the limits of the assignment some of the land had been left in the hands of its former pro- prietors. Such land was noted in the state registers as redditus veteri possessori. Sometimes it was found that such an ancient possessor owned pieces of land separated from one another. In such cases an exchange might be effected between him and some other possessor, so that his possessions might be continuous. The fact of such an exchange was symbolized in the registers by the entry of land redditus et commutatus pro suo.

When the claims of earlier owners had been satisfied, the state proceeded to deal with such land as it retained. It dealt with it in two ways. It either alienated it, whether in exchange for a price or gratuitously; or it kept it as a source of revenue, whether on a system of lease or on some system of remunerative occupation. We may first consider the cases in which the state decided to alienate. The land might be sold for the benefit of the treasury. Typical instances of this treatment are furnished by the sale of some Campanian land during the Second Punic War (Livy xxviii. 46, xxxii. 7). The censors may have directed the sale, but it was executed by the quaestors as the regular officials of the treasury. Hence such land was described as ager quaes- torius. The land was sold in definitely marked out plots, and we must suppose

that, as a rule, when this sale had been effected, the lots fell under the absolute ownership of their purchasers. Yet there was some period of Roman history when this ownership was (at least in certain cases) conditioned. The Roman writers on agriculture speak of conditions and their neglect (Gromatici, p. 115). The conditions were probably those of military service or frontier defence. The epoch of history at which this con- ditioned ownership was recognized cannot be determined. It is a form of tenure that would be equally appropriate to the needs of the earliest period of Roman history and to those of imperial times.

The second mode of alienation was that by assignation. Lands thus assigned were known as agri dati assignati. The gift on the part of the state was gratuitous, and ownership passed wholly to the assignee. The land so given was definitely surveyed, marked out and registered. Such an assignment might take one of two possible forms. It might be the means of establishing a new " plantation " (colonia), with some independent political organization of its own, however slight — a settlement, therefore, which could be thought of as an entity separate from the city of Rome and from any other municipality. Or it might be the means of providing allotments for individuals who remained domiciled at Rome or continued to be members of some already existing municipality. It has been frequently held in modern times that this latter method of assignment is the one which our ancient authorities describe as assignment to individuals (viritim), and that the antithesis lies between the " colonial " and the " viritane " method of distribution. It is true that the passages which speak of the latter mode of assignation need not, and perhaps cannot, be interpreted as presenting the antithesis (Varro, de Re Rustica, i. 2. 7, i. 10. 2; Livy iv. 48, v. 24; Festus, p. 373; Gromatici, pp. 154, 160); yet it is not improb- able that the antithesis is latent in this specific use of the term. It seems clear that the idea of assignation to, and, therefore, of ownership by, individuals must originally have been developed in contrast to the idea of ownership by some larger group (see Roman Law). When the stage of individual ownership was reached, all assignation was " viritane," but only .some assigna- tion was " colonial." " Viritane " was, therefore, the wider term which would cover, and may sometimes have been used

specially to denote, the system of non-colonial assignment. The amount granted to individuals in assignments of both types varied from time to time. It was reckoned in terms of the jugerum, which was approximately f of an English acre. The earliest and smallest assignment was 2 jugera — an amount so small that it seems to presuppose on the part of the recipient some share in common or gentile property or some additional private property of his own. Other quotas were 3, 3ˆ, 7, 10+14 jugera. The last was the maximum amount granted before the time of Ti. Gracchus (133 B.C.), and it was held by representatives of the old school that 7 jugera were as much as any frugal Roman should want (Pliny, Historia Naturalis, xviii. 18). The division was carried out by commissions of 3, 5 or 10 men appointed by the people (Cicero, de Lege Agraria ii. 7. 17). The land which the state retained as ager publicus was always placed in the hands of individuals, who occupied it in some manner remunerative to the state. These individuals (possessores) were never regarded as owners of the land thus occupied. It remained the property of the state, was held without a contract (precario) and could be resumed by the state at will. But though the possessors had no claim against the state, their ownership could be defended against all other individual claimants; and it seems probable that from an early date the praetor's possessory interdict was used to protect all occupiers, provided their tenure had been acquired neither by force (vi) nor by seizure of land in its occupiers' absence (clam), nor by mere permission of the previous holder to occupy (precario alter ab alter 0). Moreover, Appian says that possessors of this type could transfer their land by inheritance, and that the land was accepted as security by creditors. This kind of occupation, therefore, though clearly distinguished from ownership (dominium), was yet regarded as a perfectly secure form of tenure. All occupiers of public land paid dues to the state through a state contractor (publicanus) . These dues varied in amount, and in the method of their collection. We learn from Appian that the ordinary dues paid by occupiers of arable land in Italy were ˆ of seed crops and £ of plant produce. Owners who turned cattle or sheep on pasture land belonging to the state also paid fixed dues to the treasury. The occupiers of the Roman public land in Campania paid a large rent (Cic. de leg. Agr. i. 7. 21). Appian's account of the public land (Bell. Civ. i. 7) would lead us to suppose that the amount of tax paid by the occupier, and the method adopted by the state for the collection of the revenues, depended upon the nature of the land at the time when it first passed to a possessor.

He says that some of the public land which was in a good state of cultivation was let on lease; but that with regard to the poor or devastated land proclamation was made that anyone might squat on it and till it in return for the small payment in kind mentioned above. It has been questioned whether the land described by Appian and by Cicero as let on lease, of which the Campanian land and some lands in Sicily are typical, represents a legally distinct class. It seems probable that the distinction is one of practice rather than of law, and that the difference lay not in the relation between the state and the possessor (as would be the case if the leased land were really let to individuals by the censor, while the occupied land was held by mere permission of the state without any contract) but in the details of the contract between the censor and the publicanus with regard to the collection of the dues. The conditions of the tenure of the Roman public land in Africa are known to us from the Lex Agraria of in B.C. (Bruns, Fontes, i. 3. n, vv. 85 foil.). Here the publicanus is the middleman between the state and the possessor, and purchases from the censor the right of collecting dues. The law places no restriction on bargaining between the censor and the publicanus, but enacts that no possessor or pastor shall ever be required by the publicanus to pay more than the amount prescribed by the censors of 115 B.C. These conditions may be regarded as typical for the occupation of public lands. And when Cicero speaks of public land as let on lease (locaius) by the censor, he no doubt refers to the farming of the taxes to a publicanus for a fixed period, and not to the letting of the land. This seems clear from a passage (in Verr. iii. 6. 12) where he

speaks of land in Sicily which had been restored by Rome to former owners as being leased. The land itself could not be leased by Rome if it belonged not to Rome but to the Sicilian inhabitants; but the collection of the revenues due to Rome could be so leased to Publicani (q.v.) . And the same explanation would apply to Cicero's statements that the Campanian land was let on lease by the censors (cf. Festus, s.v. venditiones) . The view that there was a distinct class of the public land which was let out for a fixed teim of years to tenants on a definite lease, unlike the ordinary public land which was always held in occupa- tion merely at will (precario), has been maintained by W. A. Becker, and seems to be supported, with the help of conjecture, by a few passages in Cicero and by Hyginus (Gromatici, p. 116). But the passage of Hyginus is barely intelligible even on this supposition; and Cicero's repeated statement that the Campanian land was

expressly exempted from the legislation of the Gracchi (cf. Lex Agraria, Bruns, loc. cit. v. 6) shows that there was not sufficient distinction between the Campanian tenure and that of other public land in Italy to make this definite exception by name superfluous. The Sempronian law could obviously not touch land which the state had leased to occupiers on the basis of a definite contract. Moreover, we have absolutely no evidence for such a contract, even in Cicero's speeches against Rullus, when he might be expected to mention it as an objection to Rullus's bill. That there were some distinctive characteristics about the tenure of certain lands, of which the Campanian land is typical, seems proved by the repeated association of these lands with certain special lands in the provinces, especially at Leontini in Sicily, and by some passages in the Gromatici where agri vectigales are spoken of as a distinct class. But what these characteristics were cannot be clearly determined. It seems certain that in every case the possessor occupied precario, and that only in the bargain between the censor and the middleman was there room for contract. Thus the state was justified in the claim to resume public land which it made in many of the Agrarian laws.

The earliest agrarian measures of which we have any record are the distributions of land conquered in war to poor citizens, which later authorities attribute to Numa and Seirvius Tullius. Such assignments, however, are not the result of legislative acts, but of a voluntary surrender on the king's part of his own portion of the spoils. It is probable that the agrarian law which resulted from the proposals of Spurius Cassius (consul 486 B.C.) was the first attempt made by the Roman people to exercise its control over the occupation of state territory. According to the traditional account, Cassius proposed that such portion oi lands lately conquered from the Hernici as fell to the Roman state should be divided in equal shares between the Roman plebs and the Latins; and further that poor citizens should receive allotments of land previously conquered, and occupied without any legal right by the Patricians. The inclusion of the Latins in the distribution was afterwards dropped; but the law in its final form certainly asserted the right of the Plebeians to take their share in the public land. The accounts given of it by Livy and Dionysius are no doubt coloured by their know- ledge of later agrarian legislation, and it seems hardly likely that the proposal to resume and redistribute public land already occupied was made at this early stage; but it probably challenged the exclusive claim of Patricians to occupy. We hear of another agrarian- law

proposed by the tribune Lucius Icilius in 456 B.C. (Lex Icilia de Aventino publicando) which regulated in some way the tenure of public land on the Aventine. In 376 B.C. the tribunes Licinius and Sextius introduced into their laws, for the promotion of the privileges of the plebs, a clause enacting that no more than 500 jugera of land should be occupied by a single cultivator. It seems almost certain from Livy's account that this measure referred only to the occupation of ager publicus, though some modern authorities have upheld the view that it dealt with land held on any kind of tenure, others again that it dealt only with private property in land. According to Appian, the law also enacted that only 100 cattle and 500 sheep might be turned by one owner on the public pastures. But it failed

of its object because it did not provide any adequate machinery for the resumption by the state of land held in excess of the prescribed amount, and was therefore easily evaded. The next agrarian law we hear of was a more special measure dealing with lands conquered from the Senones and Picentines. In 232 B.C. C. Flaminius, then tribune of the plebs, proposed to resume these lands for the state, although they were already occupied by large landholders, and to distribute them in allotments to poor citizens. The measure met with much opposition from the richer classes, and did not gain the sanction of the senate; but C. Flaminius ignored constitutional usage and brought it direct before the council of the plebs, by which it was made law. In 133 B.C. the tribune Tiberius Gracchus (q.v.) re-enacted the earlier measure of Licinius and Sextius, with the additional provisions that each owner might occupy 2 50 jugera for each son, in addition to the original 500, and that a commission of three (Hi. viri agris dandis adsignandis) should be appointed to carry out the terms of the law. He also enacted that the land occupied in excess of the prescribed amount, and on that account resumed for the state by the land commission, should be dis- tributed in inalienable lots to poor citizens. Subsequent modi- fications of those provisions which dealt with the powers of the land commission led to a re-enactment of the whole by C. Gracchus, the brother of Tiberius, tribune in 123 B.C. But within 1 5 years from the tribunate of C. Gracchus the whole of his law had been rendered null by three further enactments. The first of these permitted the sale of land allotted under the law, which thus

tended to return into the hands of its former occupiers as private property, which the state had no longer any right to resume. The second abolished the commission appointed to carry out the terms of the law, thus putting a stop to further resumption and distribution, and also transformed existing occupiers into owners of the land they occupied, paying only a small due to the treasury. The third (probably the sur- viving Lex Agraria, Bruns, loc. cit.) abolished the payment. This law belongs to the year in B.C. The dates of the two former laws are uncertain, but it is probable that the first was passed in 121, the second in 119 or 118. From this time forward a change comes over land legislation. The ordinary public land in Italy, in the hands of occupiers, which had given rise to all the agrarian legislation between 376 and in, had practically ceased to exist. The Campanian land still remained, but the same reasons which led to its exemption from the Gracchan legislation seem to have continued to protect its holders until 63 B.C. In the meantime several agrarian laws were passed which provided for the distribution of land placed in some other way at the disposal of the state. In 100 B.C. Appuleius Satur- ninus (q.v.), tribune of the plebs, proposed the allotment of lands recently taken from the Cimbri in Gaul. This law was passed, but eventually declared null by the senate, with the rest of Saturninus's laws. A more dangerous precedent was set by Sulla in his dictatorship (82-81 B.C.). He was the first to con- fiscate the lands of his political foes, and of communities which had resisted him, and treating them as ager publicus, assign them to his veterans as a prize. This example was followed by Octavian (Augustus) and Antony (M. Antonius) after their proscriptions in 43 B.C. A third method of providing land for distribution was that adopted by Servilius Rullus (q.v.) in 63 B.C. His bill enacted that land should be purchased in Italy with money gained by the sale of Roman territories abroad, and allotted to citizens. A commission of ten (x. viri agris dandis adsignandis) , annually elected by 9 out of the 35 tribes, was to carry out the terms of the law. Rullus also ventured to propose the distribution of the Campanian land, which had hitherto been respected by all agrarian reformers. It was chiefly on this ground that Cicero in his three speeches on the Agrarian law succeeded in exciting such a general feeling against it that it was eventually withdrawn. In 60 B.C. the tribune L; Flavius brought forward a bill for the distribution of lands to Pompey's veterans. The Campanian land was certainly to be included in the dis- tribution, and it is clear from Cicero that the bill in some way dealt violently with the rights of private

owners. It also, how- US

ever, enacted that land should be purchased by the state with the wealth which Pompey's conquests had brought into the treasury. The last proposal was supported by Cicero, but the bill seems to have been dropped, only to reappear in more moderate form in the following year. A consular bill, the lex Julia Campana, was passed by Julius Caesar in 59 B.C., which provided for the settlement of Pompey's veterans on the Cam- panian land, and other lands purchased by the state from private owners in Italy with the full consent of the latter. In its original form, the bill omitted all reference to the Campanian land, which seems to have been included by Caesar in the dis- tribution only when the continued and unreasoning opposition of the senate had goaded him to extreme measures. A commission of twenty was to be appointed to carry out the law, from which Caesar himself was expressly excluded. This measure finally settled the question of the Campanian land, which now passed out of the category of ager publicus. The last agrarian law of the republic was that passed in 44 B.C. on the proposal of the consul M. Antonius, or of his brother L. Antonius. We have no detailed account of the measure, but it seems to have pro- vided grants of land for veterans, and was to be administered by seven commissioners. The law was afterwards cancelled by decree of the senate, probably on the ground of some technical flaw. The emperor Vespasian attempted to reclaim for the state small oddments of land (subseciva) which were held by neighbouring owners to whom they had never been definitely assigned. The attempt met with violent opposition, and though resumed by Titus, was finally crushed by Domitian, who issued an edict re- cognizing all oddments of land thus held to be private property.

Authorities. — Niebuhr, History of Rome (English translation), ii. p. 129 foil. (Cambridge, 1832); B'ecker, Handbuch der rbmischen Alterthiimer, iii. 2, p. 142 (Leipzig, 1843); Marquardt, Romische Staatsvenvaltung, i. p. 96 foil. (Leipzig, 1881); Madvig, Verjassung und Verwaltung des romischen Staates, ii. p. 364 foil. (Leipzig, 1882), (See also Rome, History.) (A. H. J. G.; A. M. Cl.)

AGREDA, MARIA FERNANDEZ CORONEL, Abbess or, known in religion as Sor (Sister) Maria de Jesus (1602-1665), was the daughter of Don Francisco Coronel and of his wife Catalina de Arana. She was born at Agreda, on the borders of Navarre and Aragon, on the 2nd of April 1602. All her family were power- fully influenced by the ecstatic piety of Spain in that age. Her

biographer, Samaniego, records that even as an infant in arms she was filled with divine knowledge. Her stupidity as a child is piously accounted for by extreme humility. From childhood she was favoured by ecstasies and visions. When she was fifteen the whole family entered religion. The father, now an old man, and the two sons entered the Franciscan house of San Antonio de Nalda. Maria, her mother and sister established a Franciscan nunnery in the family house at Agreda, which, when Maria's reputation had extended, was replaced by the existing building. She began it with one hundred reals (one pound sterling) lent her by a devotee, and it was completed in fourteen years by voluntary gifts. Much against her own wish, we are told, she was appointed abbess at the age of twenty-five. In 1668, four years after her death, the Franciscans published a story that at the age of twenty-two she had been miraculously conveyed to Mexico, to convert a native people, and had made five hundred journeys through the air for that purpose in one year. Though the rule required the abbess to be changed every three years, Maria remained the effective ruler of Agreda till her death. The Virgin was declared abbess, and Maria acted as her locum tenens. In her later years she inclined to the " internal prayer," and neglect of the outward offices of the church, which was usual with the " alumbrados " or Quietists. The Inquisition took notice of her, but she was not proceeded against with severity. Maria's importance in religion and Spanish history is based on two grounds. In the earlier part of her life, while the Franciscan, Francisco Andres de la Torre, was her confessor, she wrote an Introduction to the History of the Most Blessed Virgin. It was destroyed by the direction of another confessor. Later on, by the order of her superiors, and under the guidance of her Franciscan confessor, Andres de Fuen Mayor, she wrote The Mystic City oj God. It is an extraordinary book, full of apocryphal history,

visions and scholasticism, which professes to have been written by divine inspiration, and is devoted to praise of the Virgin. In 1642 she sent to Philip IV. an account of a vision she had had, of a council of the infernal powers for the destruction of Catholicism and Spain. The king visited her when on his way to Aragon to suppress the rebellion of Catalonia. A long correspondence, which lasted till her death on the 29th of March 1665, was begun. The king folded a sheet of paper down the

middle and wrote on the one side of the division. The answers were to be written on the other and the sheet returned. By a pious fraud copies were kept at Agreda. How far Maria was only the mouthpiece of the Franciscans must of course be a matter of doubt. Her corre- spondence was apparently suspended whenever her confessor was absent. She must, however, have co-operated at least, and it is certain that the Franciscans, who were very unfortunate in some of their pious women, owed not a little to her. The letters are in excellent Spanish, are curious reading, and are invaluable as illustrations for the second part of the reign of Philip IV.

The correspondence of Sor Maria with the king has been published in full by Don F. Siluela, Cartas de la Venerable Madre Sor Maria de Agreda y del Senor Rey Don Filipe IV. (Madrid, 1885). The Mystic City of God is one of the most characteristic monuments of Mariolatry, and has continued to be much in favour with supporters of the dogma of the Immaculate Conception. It appeared in Madrid in 1668, with a biographical introduction by Samaniego, has been often reprinted, and was translated into French and Italian. It was for a time reserved by the Index, both Spanish and Papal, but was taken off by the influence t>f the Franciscans and of Spain, the chief supporters of the Immaculate Conception. An account of Maria de Agreda will be found in the Tracts of Michael Geddes (London, 1706), vol. iii., written by a competent critic and Anglican divine of the 18th century who detested " enthusiasm." (D. H.)

AGRICOLA, CHRISTOPH LUDWIG (1667-1719), German landscape painter, was born and died at Regensburg (Ratisbon). He spent a great part of his life in travel, visiting England, Holland and France, and residing for a considerable period at Naples. His numerous landscapes, chiefly cabinet pictures, are remarkable for fidelity to nature, and especially for their skilful representation of varied phases of climate. In composition his style shows the influence of Caspar Poussin, while in light and colour he imitates Claude Lorraine. His pictures are to be found in Dresden, Brunswick, Vienna, Florence, Naples and- many other towns of both Germany and Italy.

AGRICOLA (the Latinized form of the name Bauer), GEORG (1490-1 555), German scholar and man of science, known as " the father of mineralogy," was born at Glauchau in Saxony on the 24th of March 1490. Gifted with a precocious intellect, he early threw himself into the pursuit of the " new learning," with such

effect that at the age of twenty he was appointed Rector extraordinarily of Greek at the so-called Great School of Zwickau, and made his appearance as a writer on philology. After two years he gave up his appointment in order to pursue his studies at Leipzig, where, as rector, he received the powerful support of the professor of classics, Peter Mosellanus (1493-1524), a celebrated humanist of the time, with whom he had already been in correspondence. Here he also devoted himself to the study of medicine, physics and chemistry. After the death of Mosellanus he went for a short time to Italy, where he took his doctor's degree. On his return he settled as practising physician in the Joachimstal, a centre of mining and smelting works, his object being partly " to fill in the gaps in the art of healing," partly to test what had been written about mineralogy by careful observation of ores and the methods of their treatment. His thorough grounding in philology and philosophy had accustomed him to systematic thinking, and this enabled him to construct out of his studies and observations of minerals a logical system which he began to publish in 1528. Bermannus, she de re metallica dialogus, the first attempt to reduce to scientific order the knowledge won by practical work, brought Agricola into notice. In 1 530 Prince Maurice of Saxony appointed him historiographer with an annual allowance, and he migrated to Chemnitz, the centre of the mining industry, in order to widen the range of his observations. The citizens showed their appreciation of his learning by appointing him town physician and electing him burgomaster. His popularity was,

however, short-lived. Chemnitz was a violent centre of the Protestant movement, while Agricola never wavered in his allegiance to the old religion; and he was forced to resign his office. He now lived apart from the contentious movements of the time, devoting himself wholly to learning. His chief interest was still in mineralogy; but he occupied himself also with medical, mathematical, theological and historical subjects, his chief historical work being the Dominatores Saxonici a prima origine ad hanc aetatem, published at Freiberg. In 1544 he published the De ortu et causis subterraneorum, in which he laid the first foundations of a physical geology, and criticized the theories of the ancients. In 1545 followed the De natura eorum quae effluunt e terra; in 1546 the De veteribus et novis metallis, a comprehensive account of the discovery and occurrence of minerals; in 1548 the De animantibus subterraneis; and in the two following years a number of smaller works on the metals. His

most famous work, the De re metallica, libri xii., was pub- lished in 1556, though apparently finished several years before, since the dedication to the elector and his brother is dated 1550. It is a complete and systematic treatise on mining and metallurgy, illustrated with many fine and interesting woodcuts and contain- ing, in an appendix, the German equivalents for the technical terms used in the Latin text. It long remained a standard work, and marks its author as one of the most accomplished chemists of his time. Believing the black rock of the Schlossberg at Stolpen to be the same as Pliny's basalt, he applied this name to it, and thus originated a petrological term which has been per- manently incorporated in the vocabulary of science.

In spite of the early proof that Agricola had given of the tolerance of his own religious attitude, he was not suffered to end his days in peace. He remained to the end a staunch Catholic, though all Chemnitz had gone over to the Lutheran creed; and it is said that his life was ended by a fit of apoplexy brought on by a heated discussion with a Protestant diyine. He died at Chemnitz on the 21st of November 1555, and so violent was the theological feeling against him, that he was not suffered to rest in the town to which he had added lustre. Amidst hostile demon- strations he was carried to Zeitz, seven miles from Chemnitz, and there buried.

See article by Gumbel in Allgem. Deutsche Biog. (1875) ; F. L. Becher, Georg Agricola und Werner (Freiberg, 1819); F. A. Schmidt, Georg Agricola's Bermannus mit Einleitung (Freiberg, 1806); Poggendorff, Biographisches Handworterbuch; Agricola s works passim.

AGRICOLA, GNAEUS JULIUS (a.d. 37-93), Roman states- man and general, father-in-law of the historian Tacitus, was born on the 13th of June a.d. 37 (according to others, 39) at Forum Julii (Frejus) in Gallia Narbonensis. His father, Julius Graecinus, having been put to death by Caligula, Agricola was brought up by his mother Julia Procilla. After studying philo- sophy at Massilia, he entered the army and served (59) under Suetonius Paulinus in Britain. In 61 he returned to Rome, where he married Domitia Decidiana, a Roman lady of dis- tinction. In 63 he was quaestor in Asia, in 65 tribune, in 68 praetor, and when Vespasian was proclaimed emperor, he immediately declared himself his supporter. In 70 he was appointed to the command of the 20th legion in Britain, then stationed at Deva (Chester). On his return to Rome at the end of three years he was made censor, raised to

the rank of patrician, and appointed governor of Aquitania (74-78) . Appointed consul suffectus in the following year, he was admitted into the college of pontiffs and made governor of Britain. In the same year he betrothed his daughter to Tacitus. Although the legation of Britain lasted as a rule only three years, Agricola held the post for at least seven and succeeded in reconciling the inhabitants to Roman rule and inducing them to adopt the customs and civil- ization of their conquerors. His military achievements were equally brilliant. After conquering the Ordovices in North Wales and the island of Mona (Anglesey), during the next two years he carried his victorious arms to the Taiis (Tay; others read Tanaus, perhaps the north Tyne), and in his fourth cam- paign fortified the country between Clota and Bodotria (the firths of Clyde and Forth) as a protection against the attacks of

the Caledonians. Having explored the coasts of Fife and Forfar, he gained a decisive victory over the Caledonians under Galgacus at the Graupian hill (see Britain, Roman). His successes, however, had aroused the envy and suspicion of Domitian. He was recalled to Rome, ‘where he lived a life of studied retirement, to avoid the possibility of giving offence to the tyrant. He died in 93, poisoned, it was rumoured, by the emperor’s orders. The Life of Agricola by his son-in-law Tacitus is practically a panegyric or funeral oration.

See Urlichs, De Vita et Honoribus Agricolae (1868); Dio Cassius xxxix. 50, lxvi. 20; Mommsen, Provinces of the Roman Empire (Eng. trans., 1886), i. 183-184, 194.

AGRICOLA, JOHANN FRIEDRICH (1720-1774), German musician, was born at Dobitschen in Saxe-Altenburg, on the 4th of January 1720. While a student of law at Leipzig he studied music under Johann Sebastian Bach. In 1741 he went to Berlin, where he studied musical composition. He was soon generally recognized as one of the most skilful organists of his time; and in 1751, as the result of a comic opera, 77 Filosofo convinto in amore, performed at Potsdam, he was made court composer to Frederick the Great. He died in Berlin on the 1st of December 1774. In 1759, on the death of Karl Heinrich Graun, he was appointed conductor of the royal orchestra. Besides several operas of merit, he composed instrumental pieces and church music. His reputation chiefly rests, however, on his theoretical v and critical writings on musical subjects. He wrote under the pseudonym of Flavio Anicio Olibrio.

AGRICOLA (originally Schneider, then Schnitter), JOHANNES (1494-1566), German Protestant reformer, was born on the 20th of April 1494, at Eisleben, whence he is sometimes called Magister Islebius. He studied at Wittenberg, where he soon gained the friendship of Luther. In 1519 he accompanied Luther to the great assembly of German divines at Leipzig, and acted as recording secretary. After teaching for some time in Wittenberg, he went to Frankfort in 1525 to establish the re- formed mode of worship. He had resided there only a month when he was called to Eisleben, where he remained till 1526 as teacher in the school of St Andrew, and preacher in the Nicolai church. In 1536 he was recalled to teach in Wittenberg, and was welcomed by Luther. Almost immediately, however, a controversy, which had been begun ten years before and been temporarily silenced, broke out more violently than ever. Agricola was the first to teach the views which Luther was the first to stigmatize by the now well-known name Antinomian (q.v.), maintaining that while the unregenerate were still under the Mosaic law, Christians were entirely free from it, being under the gospel alone. In consequence of the bitter controversy with Luther that resulted, Agricola in 1540 left Wittenberg secretly for Berlin, where he published a letter addressed to the elector of Saxony, which was generally interpreted as a recantation of his obnoxious views. Luther, however, seems not to have so accepted it, and Agricola remained at Berlin. The elector Joachim II. of Brandenburg, having taken him into his favour, appointed him court preacher and general superintendent. He held both offices until his death in 1566, and his career in Brandenburg was one of great activity

and influence. Along with Julius von Pflug, bishop of Naumburg-Zeitz, and Michael Helding, titular bishop of Sidon, he prepared the Augsburg Interim of 1548. He endeavoured in vain to appease the Adi- aphoristic controversy (see Adiaphorists). He died during an epidemic of plague on the 22nd of September 1566. Agricola wrote a number of theological works which are now of little interest. He was the first to make a collection of German proverbs which he illustrated with a commentary. The most complete edition, which contains seven hundred and fifty pro-verbs, is that published at Wittenberg in 1592; a modern one is that of Latendorf, 1862.

See Cordes, Joh. Agricola's Schriften mbglichst verzeichnet (Altona, 1817); Life by G. Kawerau (1881), who also wrote the notice in Hauck-Herzog, Realencyk. fur prot. TheoL, where other literature is cited.

AGRICOLA, MARTIN (c. 1500-1556), German musician, was born about 1500 in Lower Silesia. His German name was Sohr

or Sore. From 1524 till his death he lived at Magdeburg, where he occupied the post of teacher or cantor in the Protestant school. The senator and music-printer Rhau, of Wittenberg, was a close friend of Agricola, whose theoretical works, providing valuable material concerning the change from the old to the new system of notation, he published. Agricola was also the first to harmonize in four parts Luther's chorale, Em' feste Burg.

Four other Agricolas 1 are known as composers between the end of the 15 th century and the middle of the 17 th.

In the 18th century we find Burney, in the course of his tour in Germany (1772), much impressed by Johann Friedrich Agricola (1720-1774), court composer and director of the royal chapel to Frederick the Great. This Agricola was a pupil of Bach, and a fine organist and clever writer on music, especially on operatic style, the problems of which were beginning to be raised by French writersˆatvd composers in preparation for the work of Gluck.

AGRICOLA, RODOLPHUS (properly Roelof Huysmann) (1443-1485), Dutch scholar, was born at Baflo, near, Groningen, in 1443. He was educated at Louvain, where he graduated as master of arts. After residing for some time in Paris, he went in 1476 to Ferrara in Italy, and attended the lectures of the celebrated Theodorus Gaza (1400-1478) on the Greek language.

Having visited Pavia and Rome, he returned to his native country about 1479, and was soon afterwards appointed syndic of Groningen. In 1482, on the invitation of Johann von Dalberg, bishop of Worms (1445-1503), whose friendship he haˆ gained in Italy, he accepted a professorship at Heidelberg, and for three years delivered lectures there and at Worms on the litera- ture of Greece and Rome. By his personal influence much more than by his writings he did much for the promotion of learning in Germany; and Erasmus and other critics of the generation immediately succeeding his own are full of his praises. In his opposition to the scholastic philosophy he in some degree antici- pated the great intellectual revolution in which many of his pupils were conspicuous actors. He died at Heidelberg on the 28th of October 1485. His principal work is De inventione dialectica, libri Hi., in which he attempts to change the scholastic philosophy of the day. .

See T. F. Tresling, Vita et Merita Rudolphi Agricolae (Groningen, 1830); v. Bezold, R. Agricola (Miinchen, 1884); and Ihm, Der Humanist R. Agricola, sein Leben und seine Schriften (Paderb., 1893).

AGRICULTURAL GANGS, groups of women, girls and boys organized by an independent gang-master, under whose super- vision they execute agricultural piece-work for farmers in certain parts of England. They are sometimes called ” public gangs ” to distinguish them from ” private gangs ” consisting of workers engaged by the farmer himself, and undertaking work solely for him, under his own supervision or under that of one of his men. The system was for long prevalent in the counties of Cambridge- shire, Huntingdonshire, Lincolnshire, Nottinghamshire, Norfolk and Suffolk, and is still to be found in a much modified form in the fen district. The practice dates from the latter years of the reign of George III., when the low-lying, marshy lands surround- ing the basin of the Wash were being rapidly drained and con- verted into rich alluvial districts. The unreformed condition of the poor-law, under which the support of the poor fell upon each individual parish, instead of a union of parishes, made landlords reluctant to erect cottages on the reclaimed land for the benefit of their tenants. Labour had to be obtained for the cultivation of these new lands, and that of women, girls and boys, being cheaper than the labour of men, was consequently very largely employed. The tendency to moral and physical ruin which resulted from this nomadic life was so great that an inquiry into the condition of agricultural child-labour was included in the

reference to the commission on child-labour appointed in 1862, and the results were so startling that the Agricultural Gangs Act was passed in 1867, forbidding the employment of any child under eight years old, and of any female under a male gang-master unless a female licensed to act as gang-mistress were also

1 Alexander, died 1506; Johann, flor. 1600; Wolfgang Christoph, flor. 1630; and George Ludwig, 1643-1676.

present. Gang-masters must be licensed by two justices, and may not hold a liquor license. The distance to be traversed on foot is fixed by the justices, and the licenses must be renewed every six months. Later legislation made more stringent the regulations under which children are employed in agricultural gangs. By the Elementary Education Act 1876, repealing and re-enacting the principal provisions of the Agricultural (Children) Act 1873, no child shall be employed under the age of eleven years, and none between eleven years and thirteen years before the child has obtained a certificate of having reached the standard of education fixed by a by-law in force in the district.

AGRICULTURE (from Lat. ager, field, and colere, to cultivate), the science, art and industry of utilizing the soil so as to produce the means of human subsistence, embracing in its widest sense the rearing of live-stock as well as the raising of crops. The history of agriculture is the history of man in his most primitive, and most permanent aspect. Hence the nations of antiquity ascribed to it a divine origin; Brahma in Hindustan, Isis in Egypt, Demeter in Greece, and Ceres in Italy, were its founders. The simplest form of agriculture is that in which crops are raised from one patch of ground till it is exhausted, when it is allowed to go wild and abandoned for another. This ” extensive ” husbandry is found in combination with a nomadic or semi- nomadic and pastoral organization, such as that of the German tribes described by Caesar and Tacitus (see especially Germania, 26). The discovery of the uses of the bare fallow and of manure, by making it possible to raise crops from the same area for an indefinite period, marks a stage of progress. This ” intensive ” culture in a more or less developed form was practised by the great nations of

antiquity, and little decided advance was made till after the middle ages. The introduction of new plants, which made it possible to dispense with the bare fallow, and still later the application to husbandry of scientific discoveries as to soils, plant constituents and manures, brought about a revolution in farming. But the progress of husbandry, evidenced by the production of larger and better crops with more certainty, is due to that rationalizing of agricultural practices which is the work of modern times. What before was done in the light of experience is nowadays done in the light of knowledge. Even the earliest forms of intensive cultivation demand the practice of the fundamental processes of husbandry — ploughing, manur- ing, sowing, weeding, reaping. It is the improvements in methods, implements and materials, brought about by the application of science, that distinguish the husbandry of the 20th century from that of medieval and ancient times.

Ancient Husbandry. — The monumental records of Egypt are the source of the earliest information on farming. The Egypt g_,- t of the Pharaohs was a country of great estates farmed either by tenants or by slaves or labourers under the superintendence of stewards. It owed its fertility to the Nile, which, inundating the land near its banks, was distributed by means of canals over more distant portions of its valley. The autumnal subsidence of the river was followed by shallow ploughing performed by oxen yoked to clumsy wooden ploughs, the clods being afterwards levelled with wooden hoes by hand. Next came the sowing, the seed being pressed into the soil by the feet of sheep which were driven over the fields. At harvest the corn was cut high on the stalk with short sickles and put up in sheaves, after which it was carried to the threshing-floor and there trodden out by the hoofs of oxen. Winnowing was done by women, who tossed the grain into the air with small wooden boards, the chaff being blown away by the winds. Wheat and barley were the chief crops, and another plant, perhaps identical with the durra, i.e. millet, of modern Egypt, was also cultivated. The latter, when ripe, was pulled up by the roots, and the grain was separated by means of an implement re- sembling a comb. To these crops may be added peas, beans and many herbs and esculent roots. Oxen were much prized, and breeding was carried on with a careful eye to selection. Immense numbers of ducks and geese were reared.

Diodorus Siculus, writing of later times, says that cattle were sent during a portion of each year to the marshy pastures of

the delta, where they roamed under the care of herdsmen. They were fed with hay during the annual inundation, and at other times tethered in meadows of green clover. The flocks were shorn twice annually (a practice common to several Asiatic countries), and the ewes yeaned twice a year. (See also Egypt.)

The agriculture of the region bordering the Tigris and Euphrates, like that of Egypt, depended largely on irrigation, and traces of ancient canals are still to be seen in Babylonia. But beyond the fact that both Babylonia and Assyria were large producers of cereals, little is known of their husbandry.

The nomads of the patriarchal ages, whilst mainly dependent upon their flocks and herds, practised also agriculture proper. The tracts over which they roamed were in ordinary „.. .. . circumstances common to all shepherds alike. During accounts the summer they frequented the mountainous districts, among and retired to the valleys to winter. Vast flocks of the sheep and of goat constituted their wealth, although they also possessed oxen. When the last were abundant, it seems to be an indication that tillage was practised. Job, besides immense possessions in flocks and herds, had 500 yoke of oxen, which he employed in ploughing, and a ” very great husbandry.” Isaac, too, conjoined tillage with pastoral husbandry, and that with success, for ” he sowed in the land Gerar, and reaped an hundred-fold ” — a return which, it would appear, in some favoured regions, occasionally rewarded the labour of the husbandman. In the parable of the sower, Jesus Christ mentions an increase of thirty, sixty and an hundred fold.

Along with the Babylonians, Egyptians and Romans, the Israelites are classed as one of the great agricultural nations of antiquity. The Mosaic Institute contained an agrarian law, based upon an equal division of the soil amongst the adult males, a census of whom was taken just before their entrance into Canaan. Provision was thus made for 600,000 yeomen, assigning (according to different calculations) from sixteen to twenty five acres of land to each. This land, held in direct tenure from Jehovah, their sovereign, was in theory inalienable. The accumulation of debt upon it was prevented by the prohibition of interest, the release of debts every seventh year, and the reversion of the land to the proprietor, or his heirs, at each return of the year of jubilee. The owners of these small farms cultivated them with much care, and rendered them highly productive. They were favoured with a soil extremely fertile, and

one which their skill and diligence kept in good condition. The stones were carefully cleared from the fields, which were also watered from canals and conduits, communicating with the brooks and streams with which the country " was well watered everywhere," and enriched by the application of manures. The seventh year's fallow prevented the exhaustion of the soil, which was further enriched by the burning of the weeds and spontaneous growth of the Sabbatical year. The crops chiefly cultivated were wheat, millet, barley, beans and lentils; to which it is supposed, on grounds not improbable, may be added rice and cotton. The chief implements were a wooden plough of simple and light construction, a hoe or mattock, and a light harrow. The ox and the ass were used for labour. The word " oxen," which occurs in our version of the Scriptures, as well as in the Septua gint and Vulgate, denotes the species, rather than the sex. As the Hebrews did not mutilate any of their animals, bulls were in common use. The quantity of land ploughed by a yoke of oxen in one day was called a yoke or acre. Towards the end of October, with which month the rainy season begins, seed- time commenced, and of course does so still. The seedtime, begun in October, extends, for wheat and some other white crops, through November and December; and barley continues to be sown until about the middle of February. The seed appears to have been sometimes ploughed in, and at other times to have been covered by harrowing. The cold winds which prevail in January and February frequently injured the crops in the more exposed and higher districts. The rainy season extends from October to April, during which time refreshing showers fall, chiefly during the night, and generally at intervals of a few days. The harvest was earjier or later as

Greece.

the rains towards the end of the season were more or less copious. It, however, generally began in April, and continued through May for the different crops in succession. In the south, and in the plains, the harvest, as might be expected, commenced some weeks earlier than in the northern and mountainous districts. The slopes of the hills were carefully terraced and

irrigated wherever practicable, and on these slopes the vine and olive were cultivated with great success. At the same time the hill districts and neighbouring deserts afforded pasturage for numerous flocks and herds, and thus admitted of the benefits of a mixed husbandry. Not by a figure of speech but literally, every Israelite sat under the shadow of his own vine and fig-tree; whilst the country as a whole is described (2 Kings xviii. 32) as " a land of corn and wine, a land of bread and vineyards, a land of oil olive and of honey."

The earliest known forms of intensive husbandry were based chiefly upon the proximity of rivers and irrigation. The agri- culture of classical ages was slightly more developed in so far as the husbandman of Greece and Rome was less able to leave to nature the fertilization of the soil. Greece being a mountainous land was favourable to the culture of the vine rather than to that of cereals. Scanty information on its agri- culture is to be derived from the Works and Days of Hesiod (about the 8th century B.C.), the Oeconomicus of Xenophon (4th century B.C.), the History of Plants and the Origin of Plants of Theo- phrastus (4th century B.C.). The latter is the first writer on botany, and his works also contain interesting remarks on manures, the mixing of soils and other agricultural topics (see also Geoponici). Greek husbandry had no salient character- istics. The summer fallow with repeated ploughing was its basis. The young crop was hoed, reaping was performed with a sickle, and a high stubble left on the ground as manure. The methods of threshing and winnowing were the same as those in use in ancient Egypt. Wheat, barley and spelt were the leading crops. Meadows were pastured rather than mown. Attica was famous for its olives and figs, but general agriculture excelled in Pelo- ponnesus, where, by means of irrigation and drainage, all the available land was utilized.

In the early days of the Roman republic land in Italy was held largely by small proprietors, and agriculture was highly esteemed Rome an(ˆ c l asse d with war as an occupation becoming a free man. The story of Cincinnatus, twice summoned from the plough to the highest offices in the state, illustrates the status of the Roman husbandman. The later tendency was towards the absorption of smaller holdings into large estates. As wealth increased the peasant-farmer gave way before the large land- owner, who cultivated his property by means of slave-labour, superintended by slave-bailiffs. The low price of grain, which was imported in huge quantities from Sicily and other Roman provinces, operated to crush the small holder, at the same time

as it made arable farming unremunerative. Sheep-raising, involving larger holdings, less supervision and less labour, was preferred by the capitalist land-holder to the cultivation of the wheat, spelt, vines or olives which were the chief crops of the country. Lupine, beans, peas and vetches were grown for fodder, and meadows, often artificially watered, supplied hay. Swine and poultry were used for food to a greater extent than oxen, which were bred chiefly for ploughing. The following epitome of Virgil's advice to the husbandman in the first book of the Georgics suggests the outline of Roman husbandry: " First learn the peculiarities of your soil and climate. Plough the fallow in early spring, and plough frequently— twice in winter, twice in summer unless your land is poor, when a light ploughing in September will do. Either let the land lie fallow every other year or else let spelt follow pulse, vetches or lupine. Repetition of one crop exhausts the ground; rotation will lighten the strain, only the exhausted soil must be copiously dressed with manure or ashes. It often does good to burn the stubble on the ground. Harrow down the clods, level the ridges by cross ploughing, work the land thoroughly. Irrigation benefits a sandy soil, draining a marshy soil. It is well to feed down a luxuriant crop when the plants are level with the ridge tops. Geese and

Cranes, chicory, mildew, thistles, cleavers, caltrops, darnel and shade are farmer's enemies. Scare off the birds, harrow up the weeds, cut down all that shades the crop. Ploughs, waggons, threshing-sledges, harrows, baskets, hurdles, winnowing-fans are the farmer's implements. The plough consists of several parts made of seasoned wood. The threshing-floor must be smooth and rammed hard to leave no crevices for weeds and small animals to get through. Some steep seed in soda and oil lees to get a larger produce. Careful annual selection by hand of the best seed is the only way to prevent degeneration. , It is best to mow stubble and hay at night when they are moist."

In addition to the use of several kinds of animal and other manures,, green crops were sometimes ploughed in by the Romans. The shrewdness which, more than inventiveness, characterized their husbandry comes out well in the following quotation from the 1 8th book of the Natural History of Pliny: — " Cato would have this point especially to be considered, that the soil of a farm be good and fertile; also, that near it there be plenty of labourers and that it be not far from a large town; moreover, that it have sufficient means for transporting its produce, either by water or land. Also that the house be well

built, and the land about it as well managed. They are in error who hold the opinion that the negligence and bad husbandry of the former owner is good for his successor. Now, I say there is nothing more dangerous and disadvantageous to the buyer than land so left waste and out of heart; and therefore Cato counsels well to purchase land of one who has managed it well, and not rashly to despise and make light of the skill and knowledge of another."

Roman writers on agriculture (see Geoponici) are mpre numerous than those of Greece. The earliest important treatises are the De re Rustica of Cato (234-149 B.C.) and the Rerum Rusticarum Libri of Varro. More famous than either are the Georgics oi Virgil, published about 30 B.C., and treating of tillage, horticulture, cattle-breeding and bee-keeping. The works of Columella (1st century a.d.) and of Palladius (4th century a.d.) are exhaustive treatises, and the Natural History of the elder Pliny (a.d. 23-70) contains considerable information on hus- bandry. Under the later empire agriculture sank into a condition of neglect, in which it remained throughout the Dark Ages. In Spain its revival was due to the Saracens, and by them, and their successors the Moors, agriculture was carried to a high pitch of excellence. The work on agriculture 1 of Ibn-al-Awam, who lived in the 12th century a.d., treats of the varieties of soils, manuring, irrigation, ploughing, sowing, harvesting, stock, horticulture, arboriculture and plant diseases, and is a lasting record of their skill and industry.

The subsequent history of agriculture is treated in the following pages primarily from the British standpoint. Doubtless Flanders may claim to be the pioneer of " high farming " in medieval times, other countries following her lead in many respects. It is not, however, necessary to deal with the agricultural evolution of continental Europe, the gradual progress of agriculture as a whole being well enough typified in the story of its development in England, which indeed has led the way in modern times. After sections on the history and chief modern features of British agriculture, a separate account is given of the general features of American agriculture.

History of English Agriculture

The " combined " or " common-field " system of husbandry practised by the village community or township (see Village Communities) may be taken as the starting-point of English

agriculture, in which, till the end of the 18th century, it is a dominant influence. The territory of the ” township ” consisted of arable land, meadow, pasture and waste. The arable land was divided into two or, more usually, three fields, which were cut up into strips bounded by balks and allotted to the villagers in such a way that one holding might include several discon- nected strips in each field — a measure designed to prevent the whole of the best land falling to one man. The fields were fenced in from seed-time to harvest, after which the fences were taken 1 Translation by Clement-Mullet (Paris, 1864).

down and the cattle turned in to feed on the stubble. Accord- ing to early methods of cropping, which were destined to prevail for centuries, wheat, the chief article of food, was sown in one autumn, reaped the next August; the following spring, oats or barley were sown, and the year following the harvest was a period of fallow. This procedure was followed on each of the three fields so that in every year one of them was fallow. In addition to the cereals, beans, peas and vetches were grown to some extent. The meadow-land was also divided into strips from which the various holders drew their supply of hay. The pasture-land was common to all, though the number of beasts which one man might turn into it was sometimes limited. Rough grazing could also be had on the outlying waste lands. In the absence of artificial grasses and roots, hay was very valuable; it constituted almost the only winter food for live stock, which were consequently in poor condition in spring.

Under the manorial system, the rise of which preceded the Norman Conquest, communal methods of husbandry remained, but the position of the cultivator was radically altered. ” Villeins,” instead of free-holders, formed the most numerous class of the population. They were bound to the soil and occu- pied holdings of scattered strips (amounting usually to a virgate or 30 acres) in return for a payment partly in labour and partly in kind. A portion of the manor, generally about a third, con- stituted the lord’s demesne, which, though sometimes separate, usually consisted of strips intermingled with those of his villeins. It thus formed part of the common farm and was cultivated by

the villeins and their oxen under the superintendence of a bailiff. Below the villeins in the social scale came the cottiers possessing smaller holdings, sometimes only a garden, and no oxen. Free tenants and, after the Norman Conquest, slaves formed small proportions of the population. During the middle ages cattle and sheep were the chief farm animals, but the inter- mixture of stock consequent on the common-field system was a barrier to improvement in the breed and conduced to the propagation of disease. Oxen, usually yoked in teams of eight, were used for ploughing. Sheep were small and their fleeces light, nevertheless, owing to the meagreness of the yields of cereals 1 and the demand for wool for export, sheep-farming was looked to, as early as the 12th century, as the chief source of profit. Pigs and poultry were universally kept. The treatise on husbandry of Walter of Henley, dating from the early 13th century, is very valuable as describing the management of the demesne under the two- or three-field system. The following are typical passages: —

" April is a good season for fallowing, if the earth breaks up behind the plough ; for second fallowing after St John's Day when the dust rises behind the plough; for seed-ploughing when the earth is well settled and not too cracked ; however, the busy man cannot be always waiting on the seasons." " At sowing do not plough large furrows, but little and well laid together, that the seed may fall evenly."

" Know that an acre sown with wheat takes three ploughings, except lands that are sown each year, and that each ploughing costs 6d. more or less and the harrowing id. It is well to sow at least two bushels to the acre."

" Change your seed every year at Michaelmas, for the seed grown on other land will bring you more than that grown on your own."

" Neither sell your stubble nor move it from the ground unless you need it for thatching. Have manure put up in heaps and mixed with earth."

" Ridge marshy ground so as to let the water run off."

During the 13th century there arose a tendency to commute labour-rents for money payments. This change led to the gradual disappearance of tenants in villeinage — the villeins and cottiers — and the rise on the one hand of the small independent farmer, on the other of the hired labourer. The plague of 1348 marks an

epoch in English agriculture. The diminution of the population by one-half led to a scarcity of labour and an increase of wages which deprived the landowner of his narrow margin of profit. To meet this situation, the Statute of Labourers (1351) enacted that no man should refuse to work at the same rate of wages as prevailed before the plague. In addition the

1 Walter of Henley mentions six bushels per acre as a satisfactory crop.

landowners attempted to revive the disappearing system of labour-rents. The bitter feelings engendered between em- ployer and employed culminated in the peasants' revolt of 1381. Meanwhile large numbers of landowners were forced to adopt one of two alternatives. In some cases they ceased to farm their own land and let it out on lease often together with the stock upon it; or else they abandoned arable culture, laid down their demesnes to pasture, enclosed the waste lands and devoted them- selves to sheep-farming. In the latter course they were en- couraged by the high prices of wool during the 14th century, and by Edward III.'s policy of fostering both the export of wool and the home manufacture of woollen goods. The 15th century, barren of progress in methods of husbandry, was in its early years moderately prosperous. Later on the increasing abandon- ment of arable husbandry for sheep-farming brought about a less demand for labour, and rural depopulation was accelerated as the peasant was deprived of his grazing-ground by the en- closure of more and more of the waste land. 2

From the beginning of the reign of Henry VII. to the end of Elizabeth's, a number of statutes were made for the encourage- ment of tillage, though probably to little purpose. Aer] cut . " Where in some towns," says the statute 4th tun under Henry VII. (1488), " two hundred persons were occu- the Tudors pied and lived of their lawful labours, now there are *" d occupied two or three herdsmen, and the residue fall into idleness"; therefore it is ordained that houses which within three years have been let for farms, with twenty acres of land lying in tillage or husbandry, shall be upheld, under the penalty of half the profits, to be forfeited to the king or the lord of the fee. Almost half a century afterwards the practice had become still more alarming; and in 1534 a new act was tried, apparently with as little success. " Some have 24,000 sheep, some 20,000 sheep, some 10,000, some 6000, some 4000, and some more and some less "; and yet it is alleged the price of wool had nearly doubled, " sheep being come

to a few persons' hands." A penalty was therefore imposed on all who kept above 2000 sheep; and no person was to take in farm more than two tenements of husbandry. By the 39th Elizabeth (1597) arable land made pasture since the 1st Elizabeth shall be again converted into tillage, and what is arable shall not be converted into pasture.

The literature of agriculture, in abeyance since the treatise of Walter of Henley, makes another beginning in the 16th century. The best of the early works is the Book of Husbandry (1st ed. 1523), commonly ascribed to Sir Anthony Fitzherbert, a judge of the Common Pleas in the reign of Henry VIII., but more probably written by his elder brother John. This was followed by the Book of Surveying and Improvements (1523), by the same author, In the former treatise we have a clear and minute description of the rural practices of that period, and from the latter may be learned a good deal of the economy of the feudal system in its decline.

The Book of Husbandry begins with a description of the plough and other implements, after which about a third part of it is occupied with the several operations as they succeed one another throughout the year. Among other passages in this part of the work, the following deserve notice: —

"Somme (ploughs) wyll tournthe sheld bredith at every landsende, and plowe all one way "; the same kind of plough that is now found so useful on hilly grounds. Of wheel-ploughs he observes, that " they be good on even grounde that lyeth lyghte "; and on such lands they are still most commonly employed. Cart-wheels were sometimes bound with iron, of which he greatly approves. On the much agitated question about the employment of horses or oxen in labour, the most important arguments are distinctly stated.

" In some places," he says, "a horse plough is better," and in others an oxen plough, to which, upon the whole, he gives the pre- ference. Beans and peas seem to have been common crops. He mentions the different kinds of wheat, barley and oats; and after describing the method of harrowing " all maner of cornnes," we find the roller employed. "They used to role their barley grounde

1 This process of enclosure must be distinguished from that of enclosing the arable common fields which, though advocated by Fitzherbert in a passage quoted below proceeded slowly till the 1

after a showr of rayne, to make the grounde even to mowe." Under the article " To falowe," he observes, " the greater clottes (clods) the better wheate, for the clottes kepe the wheat warme all wynter ; and at March they will melte and breake and fal in manye small peces, the whiche is a new dongynge and refreshynge of the corne." This is agreeable to the present practice, founded on the very same reasons. "In May, the shepe folde is to be set out " ; but Fitzherbert does not much approve of folding, and points out its disadvantages in a very judicious manner. " In the latter end of May and the begynnynge of June, is tyme to wede the corne " ; and then we have an accurate description of the different weeds, and the instruments and mode of weeding. Next comes a second ploughing of the fallow ; and afterwards, in the latter end of June, the mowing of the meadows begins. Of this operation, and of the forks and rakes and the hay-making there is a very good account. The corn harvest naturally follows: rye and wheat were usually shorn, and barley and oats cut with the scythe. The writer does not approve of the common practice of cutting wheat high and then mowing the stubbles. " In Somersetshire," he says, " they do shere theyr wheat very lowe; and the wheate strawe that they purpose to make thacke of, they do not threshe it, but cut off the ears, and bynd it in sheves, and call it rede, and therewith they thacke theyr houses." He recommends the practice of setting up corn in shocks, with two sheaves to cover eight, instead of ten sheaves as at present — probably owing to the straw being then shorter. The corn was commonly housed; but if there be a want of room, he advises that the ricks be built on a scaffold and not upon the ground. The fallow received a third ploughing in September, and was sown about Michaelmas. " Wheat is moost commonlye sowne under the forowe, that is to say, cast it uppon the falowe, and then plowe it under "; and this branch of his subject is concluded with directions about threshing, winnowing and other kinds of barn-work/

Fitzherbert next proceeds to live stock. " An housbande," he says, " can not well thryue by his corne without he have other cattell,

nor by his cattcll without corne. And bycause that shepe, in myne opynyon, is the mooste profytablest cattell that any man can haue, therefore I pourpose to speake fyrst of shepe." His remarks on this subject are so accurate that one might imagine they came from a storemaster of the present day.

In some places at present "they neuerseuertheir lambesfrom their dammes " ; " and the poore of the peeke (high) countreye, and such other places, where, as they vse to mylke theyr ewes, they vse to wayne theyr lambes at 12 weekes olde, and to mylke their ewes fiue or syxe weekes " ; but that, he observes, " is greate hurte to the ewes, and wyll cause them that they wyll not take the ramme at the tyme of the yere for pouertye, but goo barreyne." " In June is tyme to shere shepe ; and ere they be shorne, they must be verye well washen, the which shall be to the owner greate profyte in the sale of his wool, and also to the clothe-maker."

His remarks on horses, cattle, &c, are not less interesting; and there is a very good account of the diseases of each species, and some just observations on the advantage of mixing different kinds on the same pasture. Swine and bees conclude this branch of the work.

The author then points out the great advantages of enclosure; recommends " quycksettynge, dychynge and hedgeyng "; and gives particular directions about settes, and the method of training a hedge, as well as concerning the planting and management of trees. Fitz- herbert throws some light on the position of women in the agri- culture of his day. "It is a wyues occupation," he says, " to wynowe all maner of cornes, to make malte, to washe and wrynge, to make heye, shere corne, and, in time of nede, to helpe her husbande to fyll the mucke wayne or dounge carte, dryue the ploughe, to loode heye, corne and suche other; and to go or ride to the market to sel butter, chese, mylke, egges, chekyns, capons, hennes, pygges, gese, and all maner of cornes."

The Book of Surveying adds considerably to our knowledge of the rural economy of that age. " Four maner of commens " are described; several kinds of mills for corn and other purposes, and also " quernes that goo with hand"; different orders of tenants, down to the " boundmen," who " in some places con- tynue as yet "; " and many tymes, by colour thereof, there be many freemen taken as boundmen, and their lands and goods is taken

from them." Lime and marl are mentioned as common manures, and the former was sometimes spread on the surface to destroy heath. Both draining and irrigation are noticed, though the latter but slightly. And the work concludes with an inquiry " how to make a township that is worth XX. marke a yere, worth XX. li. a year," advocating the transition from communal or open field to individual or enclosure farming.

"It is undoubted, that to every townshyppe that standeth in tyllage in the playne countrey, there be errable landes to plowe and sowe, and leyse to tye or tedder theyr horses and mares upon, and common pasture to kepe and pasture their catell, beestes and shepe upon; and also they have medowe grounde to get theyr hey upon. Than to let it De known how many acres of errable lande euery man hath in tyllage, and of the same acres in euery felde to chaunge with

his neyghbours, and to. leve them toguyther, and to make hym one seuerall close in euery felde for his errable lands; and his leyse .in euery felde to leve them togyther in one felde, and to makeone seuerall close for them all. And also another seuerall close for his portion of his common pasture, and also his porcion of his medowe in a seuerall close by itselfe, and al kept in seureall both in wynter and somer; and euery cottage shall haue his portion assigned hym accordynge to his rent, and than shall nat the ryche man ouerpresse the poore man with his cattell; and euery man may eate his oun close at his pleasure. And vndoubted, that hay and strawe that will find one beest in the house wyll finde two beestes in the close, and better they shall lyke. For those beestis in the house have short heare and thynne, and towards March they will pylle and be bare; and therefore they may nat abyde in the fylde before the heerdmen in wintertyme for colde. And those that lyein a close undera hedge haue longe heare and thyck, and they will neuer pylle nor be bare; and by this reason the husbande maye kepe twyse so many catell as he did before.

" This is the cause of this approwment. Nowe euery husbande hath sixe seuerall closes, whereof iii. be for corne, the fourthe for his leyse, the fyfte for his commen pastures, and the sixte for his haye; and in wynter time there is but one occupied with corne, and than hath the husbande other fyue to occupy tyll lente come, and that he hath his falowe felde, his ley felde, and his pasture felde al sommer. And when he hath mowen his medowe, then he hath his medowe grounde, soo that if he hath any weyke catell

that wold be amended, or dyvers maner of catell, he may put them in any close he wyll, the which is a great advantage; and if all shulde lye commen, than wolde the edyche of the corne feldes and the aftermath of all the medowes be eaten in X. or XII. dayes. And the rych men that hath moche catell wold have the advantage, and the poore man can have no help nor relefe in wynter when he hath moste nede ; and if an acre of lande be worthe sixe pens, or it be enclosed, it will be worth VIII. pens, when it is enclosed by reason of the compostying and dongyng of the catell that shall go and lye upon it both day and nighte; and if any of his thre closes that he hath for his corne be worne or ware bare, than he may breke and plowe up his close that he hadde for his layse, or the close that he hadde for his Commen pasture, or bothe, and sowe them with corne, and let the other lye for a time, and so shall he have always reist grounde, the which will bear moche corne with lytel donge; and also he shall have a great profyte of the wod in the hedges whan it is growen; and not only these profytes and advantages beforesaid, but he shall save moche more than al these, for by reason of these closes he shall save meate, drinke and wages of a shepherde, the wages of the heerdmen, and the wages of the swine herde, the which may fortune to be as charge- able as all his nolle rente; and also his corne shall be better saved from eatinge or destroying with catel. For dout ye nat but heerde- men with their catell, shepeherdes with their shepe, and tieng of horses and mares, destroyeth moch corne, the which the hedges wold save. Paraduenture some men would say that this shuld be against the common weale, bicause the shepeherdes, heerdmen and swyne- herdes shuld than be put out of wages. To that it may be answered, though these occupations be not used, there be as many newe occupations that were not used before; as getting of quicke settes, diching, hedging and plashing, the which the same men may use and occupye."

The next author who writes professedly on agriculture is Thomas Tusser, whose Five Hundred Points of Husbandry, published in 1562, enjoyed such lasting repute that in 1723 Lord Molesworth recommended that it should be taught in schools. In it the book of husbandry consists of 118 pages, and then follows the Points of Housewifrie, occupying 42 pages more. It is written in verse. Amidst much that is valueless there are some useful notices concerning the state of agriculture at the time in different parts of England. Hops, which had been intro- duced in the early part of the 16th century, and on the culture of which a treatise was

published in 1574 by Reginald Scott, are mentioned as a well-known crop. Buckwheat was sown after barley. Hemp and flax are mentioned as common crops. En- closures must have been numerous in some counties; and there is a very good comparison between " champion (open fields) country and several," which Blith afterwards transcribed into his Improver Improved. Carrots, cabbages, turnips and rape, not yet cultivated in the fields, are mentioned among the herbs and roots for the kitchen. There is nothing to be found in Tusser about serfs or bondmen, as in Fitzherbert's works.

In 1577 appeared the Foure Bookes of Husbandry, translated, with augmentation, from the work of Conrad Heresbach. Much stress is laid on the value of manure, and mention is made of clover.

Fitzherbert, in deploring the gradual discontinuance of the practice of marling land, had alluded to the grievance familiar

in modern times of tenants " who, if they should marl and make their holdings much better, fear lest they should be put out, or make a great fine or else pay more rent." This subject is treated at length in Sir John Norden's Surveyor's Dialogue (ist ed. 1607), the next agricultural work demanding notice. The author, writing from the landowner's point of view, ascribes the rise in rents and the rise in the price of corn 1 to the " emulation " of tenants in competing for holdings, a practice implying that the agriculture of the period was prosperous. Norden's work contains many judicious observations on the " different natures of grounds, how they may be employed, how they may be bettered, reformed and amended." The famous meadows near Salisbury are mentioned, where, when cattle have fed their fill, hogs, it is said, " are made fat with the remnant — namely, with the knots and sappe of the grasse." " Clouer grasse, or the grasse honey suckle " (white clover), is directed to be sown with other hay seeds. " Carrot rootes " were then raised in several parts of England, and sometimes by farmers. London street and stable dung was carried to a distance by water, and appears from later writers to have been got for the trouble of removing. Leases of 21 years are

recommended for persons of small capital as better than employing it in purchasing land. The works of Gervase Markham, Leonard Mascall, Gabriel Plattes and other authors of the first half of the 1 7th century may be passed over, the best part jof them being preserved by Blith and Hartlib, who are referred to below.

Sir Richard Weston's Discourse on the Husbandry of Brabant and Flanders was published by Hartlib in 1645, and its title indicates the source to which England owed much of its sub- sequent agricultural advancement. Weston was ambassador from England to the elector palatine in 1619, and had the merit of being the first who introduced the great clover, as it was then called, into English agriculture, about 1652, and probably turnips also. Clover thrives best, he says, when you sow it on the barrenest ground, such as the worst heath ground in England. The ground is to be pared and burnt, and unslacked lime must be added to the ashes. It is next to be well ploughed and harrowed; and about 10 lb of clover seed must be sown on an acre in April or the end of March. If you intend to preserve seed, then the second crop must be let stand till it come to a full and dead ripeness, and you shall have at the least five bushels per acre. Being once sown, it will last five years; the land, when ploughed, will yield, three or four years together, rich crops of wheat, and after that a crop of oats, with which clover seed is to be sown again. It is in itself an excellent manure, Sir Richard adds; and so it should be, to enable land to bear this treatment. Before 1655 the culture of clover, exactly according to the present method, seems to have been well known in England, and it had also made its way to Ireland.

A great many works on agriculture appeared during the time of the Commonwealth, of which Walter Blith's Improver Improved and Samuel Hartlib's Legacie are the most valuable. The first edition of the former was published in 1649, an< i 0I the latter in 1651; and both of them were enlarged in subsequent editions. In the first edition of the Improver Improved no mention is made of clover, nor in the second of turnips, but in the third, clover is treated of at some length, and turnips are recom- mended as an excellent cattle crop, the culture of which should be extended from the kitchen garden to the field. Sir Richard Weston must have cultivated turnips before this; for Blith says that Sir Richard affirmed to himself that he fed his swine with them. They were first given boiled, but afterwards the swine came to eat them raw, and would run after the carts, and pull them forth as they gathered them — an expression which conveys an idea of their

being cultivated in the fields.

Blith's book is the first systematic work in which there are some traces of alternate husbandry or the practice of interposing clover and turnip between culmiferous crops. He is a great enemy to commons and common fields, and to retaining land in

1 During the 16th century wheat had risen in price, and between 1606 and 161 8 never fell below 30s. a quarter. At the same time wages remained low.

old pasture, unless it be of the best quality. His description of the different kinds of ploughs is interesting; and he justly recommends such as were drawn by two horses (some even by one horse) in preference to the weighty and clumsy machines which required four or more horses or oxen. The following passage indicates the contemporary theory of manuring: — " In thy tillage are these special opportunities to improve it, either by liming, marling, sanding, earthing, mudding, snayl-codding, mucking, chalking, pidgeons-dung, hens-dung, hogs-dung or by any other means as some by rags, some by coarse wool, by pitch marks, and tarry stuff, any oyly stuff, salt and many things more, yea indeed any thing almost that hath any liquid- ness, foulness, saltness or good moysture in it, is very naturall inrichment to almost any sort of land." Blith speaks of an instrument which ploughed, sowed and harrowed at the same time; and the setting of corn was then a subject of much dis- cussion. Blith was a zealous advocate of drainage and holds that drains to be efficient must be laid 3 or 4 ft. deep. The drainage of the Great Level of the Fens was prosecuted during the 17th century, but lack of engineering skill and the opposition of the fen-men hindered the reclamation of a now fertile region.

Hartlib's Legacie contains, among some very judicious direc- tions, a great deal of rash speculation. Several of the deficiencies which the writer complains of in English agriculture must be placed to the account of climate, and never have been or can be supplied. Some of his recommendations are quite unsuitable to the state of the country, and display more of general knowledge and good intention than of either the theory or practice of agriculture. Among the subjects deserving notice may be mentioned the practice of steeping and liming seed corn as a preventive of smut; changing every year the species of grain, and bringing seed corn from a distance; ploughing down green crops as manure; and feeding horses with broken oats and chaff. This

writer seems to differ a good deal from Blith about the advantage of interchanging tillage and pasture. ” It were no losse to this island,” he says, ” if that we should not plough at all, if so be that we could certainly have corn at a reasonable rate, and likewise vent for all our manufactures of wool ” ; and one reason for this is, that pasture employs more hands than tillage, instead of depopulating the country, as was commonly imagined. The grout, which he mentions as ” coming over to us in Holland ships,” about which he desires information, was probably the same as shelled barley; and mills for manufac- turing it were introduced into Scotland from Holland towards the beginning of the 18th century.

Among the other writers previous to the Revolution mention must be made of John Ray the botanist and of John Evelyn, both men of great talent and research, whose works are still in high estimation.

The first half of the 17th century was a period of agricultural activity, partly due, no doubt, to the increase of enclosed farms. Marling and liming are again practised, new agricultural imple- ments and manures introduced, and the new crops more widely used. But the Civil War and the subsequent political disturb- ances intervened to prevent the continuance of this progress, and the agriculture of the end of the century seems to have relapsed into stagnation.

Of the state of agriculture in Scotland in the 1 6 th and the greater part of the 17th century very little is known; no professed treatise on the subject appeared till after the Revolution. Scottish The south-eastern counties were the earliest improved, agri- and yet in 1660 their condition seems to have been very culture oi wretched. Ray, who made a tour along the eastern c J’ Btury coast in that year, says, ” We observed little or no fallow ground in Scotland; some ley ground we saw, which they manured with sea wreck. The men seemed to be very lazy, and may be frequently observed to plough in their cloaks. It is the fashion of them to wear cloaks when they go abroad, but especi- ally on Sundays. They have neither good bread, cheese nor drink. They cannot make them, nor will they learn. Their butter is very indifferent, and one would wonder how they could

contrive to make it so bad. They use much pottage made of coal-wort, which they call kail, sometimes broth of decorticated barley. The ordinary country-houses are pitiful cots, built of stone and covered with turfs, having in them but one room, many of them no chimneys, the windows very small holes and not glazed. The ground in the valleys and plains bear very good corn, but especially bears barley or bigge, and oats, but rarely wheat and rye."

It is probable that no great change had taken place in Scotland from the end of the 15th century, except that tenants gradually became possessed of a little stock of their own, instead of having their farm stocked by the landlord. " The minority of James V., the reign of Mary Stuart, the infancy of her son, and the civil wars of her grandson Charles I., were all periods of lasting waste. The very laws which were made during successive reigns for protecting the tillers of the soil from spoil are the best proofs of the deplor- able state of the husbandman." 1

In the 17th century those laws were made which paved the way for an improved system of agriculture in Scotland. By a statute of 1633 landholders were enabled to have their tithes valued, and to buy them either at nine or six years' purchase, according to the nature of the property. The statute of 1685, conferring on landlords a power to entail their estates, was indeed of a very different tendency in regard to its effects on agriculture. But the two Acts in 1695, for the division of commons and separation of intermixed properties, facilitated improvements.

From the Revolution to the accession of George III. the progress of agriculture was by no means so considerable as might Progress ˆ e imagined from the great exportation of corn. It ofagricul- is probable that very little improvement had taken turetrom place, either in the cultivation of the soil or in the management of live stock, from the Restoration down to the middle of the 18th century. Clover and turnips were confined to a few districts, and at the latter period were scarcely cultivated at all by common farmers in the northern part of the island. Of the writers of this period, therefore, it is necessary to notice only such as describe

some improvement in the modes of culture, or some extension of the practices that were formerly little known.

In John Houghton's Collections on Husbandry and Trade, a periodical work begun in 1681', there is one of the earliest notices of turnips being eaten by sheep: — " Some in Essex have their fallow after turnips, which feed their sheep in winter, by which means the turnips are scooped, and so made capable to hold dews and rain water, which, by corrupting, imbibes the nitre of the air, and when the shell breaks it runs about and fertilizes. By feeding the sheep, the land is dunged as if it had been folded; and those turnips, though few or none be carried off for human use, are a very excellent improvement, nay, some reckon it so, though they only plough the turnips in without feeding." This was written in February 1694. Ten years before, John Worlidge, one of his correspondents, and the author of the Sy sterna A griculturae (1669) , observes, " Sheep fatten very well on turnips, which prove an excellent nourishment for them in hard winters when fodder is scarce; for they will not only eat the greens, but feed on the roots in the ground, and scoop them hollow even to the very skin. Ten acres (he adds) sown with clover, turnips, &c, will feed as many sheep as one hundred acres thereof would before have done."

The next writer of note is John Mortimer, whose Whole Art of Husbandry, a regular, systematic work of considerable merit, was published in 1707.

From the third edition of Hartlib's Legacie we learn that clover was cut green and given to cattle; and it appears that this practice of soiling, as it is now called, had become very common about the beginning of the 18th century, wherever clover was cultivated. Rye-grass was now sown along with it. Turnips were hand-hoed and extensively employed in feeding sheep and cattle.

The first considerable improvement in the practice of that period was introduced by Jethro Tull, a gentleman of Berkshire, who about the year 1701 invented the drill, and whose Horse- 1 Chalmers' Caledonia, vol. ii. p. 732.

hoeing Husbandry, published in 1731, exhibits the first decided step in advance upon the principles and practices of his pre- decessors. Not contented with a careful attention to details, Tull set himself* with admirable skill and perseverance, to investigate the growth of plants, and thus to arrive at a know- ledge of the

principles by which the cultivation of field-crops should be regulated. Having arrived at the conclusion that the food of plants consists of minute particles of earth taken up by their rootlets, it followed that the more thoroughly the soil in which they grew was disintegrated, the more abundant would be the ” pasture ” (as he called it) to which their fibres would have access. He was thus led to adopt that system of sowing his crops in rows or drills, so wide apart as to admit of tillage of the intervals, both by ploughing and hoeing, being continued until they had well-nigh arrived at maturity. Such reliance did he place in the pulverization of the soil that he grew as many as thirteen crops of wheat on the same field without manure.

As the distance between his rows appeared much greater than was necessary for the range of the roots of the plants, he begins by showing that these roots extend much farther than is commonly believed, and then proceeds to inquire into the nature of their food. After examining several hypotheses, he decides this to be fine particles of earth. The chief and almost the only use of dung, he thinks, is to divide the earth, to dissolve ” this terrestrial matter, which affords nutriment to the mouths of vegetable roots”; and this can be done more completely by tillage. It is therefore necessary not only to pulverize the soil by repeated ploughings before it be seeded, but, as it becomes gradually more and more compressed afterwards, recourse must be had to tillage while the plants are growing; and this is hoeing, which also destroys the weeds that would deprive the plants of their nourishment.

The leading features of Tull’s husbandry are his practice of laying the land into narrow ridges of 5 or 6 ft., and upon the middle of «hese drilling one, two, or three rows, distant from cne another about 7 in. when there were three, and 10 in. when only two. The distance of the plants on one ridge from those on the contiguous one he called an interval; the distance between the rows on the same ridge, a space or partition; the former was stirred repeatedly by the horse-hoe, the latter by the hand-hoe.

” Hoeing,” he says, ” may be divided into deep, which is our horse-hoeing; and shallow, which is the English hand-hoeing; and also the sh

Contemporary with Tull was Charles, 2nd Viscount To wnshend, a typical representative of the large landowners to whom the strides made by agriculture in the 18th century were due. The

class to which he belonged was the only one which could afford to initiate improvements. The bulk of the land was still farmed by small tenants on the old common-field system, which made it impossible for the individual to adopt a new crop rotation and hindered innovation of every kind. On the other hand, the small farmers who occupied separated holdings were deterred from improving by the fear of a rise in rent. Townshend's belief in the growing of turnips gained him the nickname of " Turnip Townshend." In their cultivation he adopted Tull's practice – of drilling and horse-hoeing, and he was also the founder of the Norfolk or four-course system, the first of those rotations which dispense with the necessity of a summer-fallow and provide winter-keep for live-stock (see below, Rotation of Crops). The spread of these principles in Norfolk made it, according to Arthur Young (writing in 1770), one of the best cultivated counties in England. In the latter half of the century another Norfolk farmer, Thomas William Coke of Holkham, earl of Leicester,

(1752-1842), figures as a pioneer of high-farming. He was one of the. first to use oil-cake and bone-manure, to distinguish the feeding values of grasses, to appreciate to the full the beneficial effects of stock on light lands and to realize the value of long leases as an incentive to good farming.

Of the progress of the art in Scotland, till towards the end of the 17th century, we are almost entirely ignorant. The first .. work, written by James Donaldson, was printed in

culture in 1697, under the title of Husbandry Anatomized; or, Scotland a n Inquiry into the Present Manner of Tilling and ,atb " 18tn Manuring the Ground in Scotland. It appears from this treatise that the state of the art was not more advanced at that time in North Britain than it had been in England in the time of Fitzherbert. Farms were divided into infield and outfield; corn crops followed one another with- out the intervention of fallow, cultivated herbage or turnips, though something is said about fallowing the outfield; en- closures were very rare; the tenantry had not begun to emerge from a state of great poverty and depression; and the wages of labour, compared with the price of

corn, were much lower than at present, though that price, at least in ordinary years, must appear extremely moderate in our times. Leases for a term of years, however, were not uncommon; but the want of capital rendered it impossible for the tenantry to attempt any spirited improvements.

The next work on the husbandry of Scotland is The Country-man's Rudiments, or an Advice to the Farmers in East Lothian, how to labour and improve their Grounds, said to have been written by John Hamilton, 2nd Lord Belhaven about the time of the Union, and reprinted in 1723. The author bespeaks the favour of those to whom he addresses himself in the following significant terms: — " Neither shall I affright you with hedging, ditching, marling, chalking, paring and burning, draining, watering and such like, which are all very good improvements indeed, and very agreeable with the soil and situation of East Lothian, but I know ye cannot bear as yet a crowd of improvements, this being only intended to initiate you in the true method and principles of husbandry." The farm-rooms in East Lothian, as in other districts, were divided into infield and outfield.

" The infield (where wheat is sown) is generally divided by the tenant into four divisions or breaks, as they call them, viz. one of wheat, one of barley, one of pease and one of oats, so that the wheat is sowd after the pease, the barley after the wheat and the oats after the barley. The outfield land is ordinarily made use of promiscuously for feeding of their cows, horse, sheep and oxen; 'tis also dunged by their sheep who lay in earthen folds; and sometimes, when they have much of it, they fauch or fallow a part of it yearly."

Under this management the produce seems to have been three times the seed; and yet, says the writer, "if in East Lothian they did not leave a higher stubble than in other places of the kingdom, their grounds would be in a much worse con- dition than at present they are, though bad enough." " A good crop of corn makes a good stubble, and a good stubble is the equalest mucking that is." Among the advantages of enclosures, he observes, " you will gain much more labour from your ser- vants, a great part of whose time was taken up in gathering thistles and other garbage for their horses to feed upon in their stables; and thereby the great trampling and pulling up and other destruction of the corns while they are yet tender will be prevented." Potatoes and turnips are recommended to be sown i n the yard

(kitchen-garden) . Clover does not seem to have been in use. Rents were paid in corn; and for the largest farm, which he thinks should employ no more than two ploughs, the rent was about six chalders of victual " when the ground is very good, and four in that which is not so good. But I am most fully convinced they should take long leases or tacks, that they may not be straitened with time in the improvement of their rooms; and this is profitable both for master and tenant."

Such was the state of the husbandry of Scotland in the early part of the 18th century. The first attempts at improvement cannot be traced farther back than 1723, when a number of landholders formed themselves into a society, under the title of the Society of Improvers in the Knowledge of Agriculture, in

Scotland. John, 2nd earl of Stair, one of their most active members, is said to have been the first who cultivated turnips in that country. The Select Transactions of this society were collected and published in 1743 by Robert Maxwell, who took a large part in its proceedings. It is evident from this book that the society had exerted itself with success in intro- ducing cultivated herbage and turnips, as well as in improving the former methods of culture. But there is reason to believe that the influence of the example of its numerous members did not extend to the common tenantry, who not unnaturally were reluctant to adopt the practices of those by whom farming was perhaps regarded as primarily a source of pleasure rather than of profit. Though this society, the earliest probably in the United Kingdom, soon counted upwards of 300 members, it existed little more than 20 years.

In the introductory paper in Maxwell's collection we are told that —

" The practice of draining, enclosing, summer fallowing, sowing flax, hemp, rape, turnip and grass seeds, planting cabbages after, and potatoes with, the plough, in fields of great extent, is introduced ; and that, according to the general opinion, more corn grows now yearly where it was never known to grow before, these twenty years last past, than perhaps a sixth of all that the kingdom was in use to produce at any time before."

In 1757 Maxwell issued another work entitled The Practical Husbandman; being a collection of Miscellaneous papers on Husbandry, &c. In it the greater part of the'Select Transactions is

republished, with a number of new papers, among which an Essay on the Husbandry of Scotland, with a proposal for the improvement of it, is the most valuable. In this he lays it down as a rule that it is bad husbandry to take two crops of grain successively, which marks a considerable progress in the knowledge of modern husbandry; though he adds that in Scotland the best husbandmen after a fallow take a crop of wheat; after the wheat, peas; then barley, and then oats; and after that they fallow again. The want of enclosures was still a matter of complaint. The ground continued to be cropped so long as it produced two seeds; the best farmers were contented with four seeds, which was more than the general produce.

The gradual advance in the price of farm produce soon after the year 1760, occasioned by the increase of popula- tion and of wealth derived from manufactures and ms commerce, gave a powerful stimulus to rural industry, augmented agricultural capital and called forth a more skilful and enterprising race of farmers.

A more rational system of cropping now began to take the place of the thriftless and barbarous practice of sowing succes- sive crops of corn until the land was utterly exhausted, and then leaving it foul with weeds to recover its power by an indefinite period of rest. Green crops, such as turnips, clover and rye grass, began to be alternated with grain crops, whence the name alternate husbandry.

The writings of Arthur Young (q.v.), secretary to the Board of Agriculture, describe the transition from the old to the new agriculture. In many places turnips and clover were still unknown or ignored. Large districts still clung to the old common-field system, to the old habits of ploughing with teams of four or eight, and to slovenly methods of cultivation. Young's condemnation of these survivals was as pronounced as his support of the methods of the large farmers to whom he ascribed the excellence of the husbandry of Kent, Norfolk and Essex. He realized that with the enclosure of the waste lands and the absorption of small into large holdings, the common- field farmer must migrate to the town or become a hired labourer; but he also realized that to feed a rapidly growing industrial population, the land must be improved by draining, marling, manuring and the use of better implements, in short by the investment of the capital which the yeoman farmer, content to feed himself and his own family, did not possess. The enlarge- ment of farms, and in

Scotland the letting of them under leases for a considerable term of years, continued to be a marked feature in the agricultural progress of the country until the end of the century, and is to be regarded both as a cause and a consequence

of that progress. The passing of some 3500 enclosure bills, affecting between 5 and s| million acres, during the reign of George III., before which the whole number was between 200 and 250, shows how rapidly the break-up of the common-field husbandry and the cultivation of new land now proceeded. The disastrous American War for a time interfered with the national prosperity; but with the return of peace in 1783 the cultivation of the country made more rapid progress. The quarter of a century immediately following 1760 is memorable for the introduction of various important improvements. It was during this period that the genius of Robert Bakewell produced an extraordinary change in the character of our more important breeds of live stock, more especially by the perfecting of a new race of sheep — the well-known Leicesters. BakewelPs fame as a breeder was for a time enhanced by the improvement which he effected on the Long-homed cattle, then the prevailing breed of the midland counties of England. These, however, were ere long rivalled and afterwards superseded by the Shorthorn or Durham breed, which the brothers Charles and Robert Colling obtained from the useful race of cattle that had long existed in the valley of the Tees, by applying to them the principle of breeding which Bakewell had already established. To this period also belong George and Matthew Culley — the former a pupil of Bakewell — who left their paternal property on the bank of the Tees and settled on the Northumbrian side of the Tweed, bringing with them the valuable breeds of live stock and improved husbandry of their native district. The improvements introduced by these energetic and skilful farmers spread rapidly, and exerted a most beneficial influence upon the border counties.

From 1784 to 1795 improvements advanced with steady steps. This period was distinguished for the adoption and working out of ascertained improvements. Small's swing plough and Andrew Meikle's threshing-machine, although invented some years before

this, were now perfected and brought into general use, to the great furtherance of agriculture. Two important additions were about this time made to the field crops, viz. the Swedish turnip and potato oat. The latter was accidentally discovered in 1788, and both soon came into general cultivation. In the same year Merino sheep were introduced by George III., who was a zealous farmer. For a time this breed attracted much attention, and sanguine expectations were entertained that it would prove of national importance. Its unfitness for the pro- duction of mutton, and increasing supplies of fine clothing wool from other countries, soon led to its total rejection.

In Scotland the opening up of the country by the construction of practicable roads, and the enclosing and subdividing of farms by hedge and ditch, was now in active progress. The former admitted of the general use of wheel-carriages, of the ready con- veyance of produce to markets, and in particular of the extended use of lime, the application of which was immediately followed by a great increase of produce. The latter, besides its more obvious advantages, speedily freed large tracts of country from stagnant water and their inhabitants from ague, and prepared the way for the underground draining which soon after began to be practised. Dawson of Frogden in Roxburghshire is believed to have been the first who grew turnips as a field crop to any extent. It is on record that as early as 1764 he had 100 acres of drilled turnips on his farm in one year. An Act passed in 1770, which relaxed the rigour of strict entails and afforded power to landlords to grant leases and otherwise improve their estates, had a beneficial effect on Scottish agriculture.

The husbandry of the country was thus steadily improving, when suddenly the whole of Europe became involved in the wars of the French Revolution. In 1795, under the joint operation of a deficient harvest and the diminution in foreign supplies of grain owing to outbreak of war, the price of wheat, which, for the twenty preceding years, had been under 50s. a quarter, suddenly rose to 81s. 6d., and in the following year reached 96s. In 1797 the fear of foreign invasion led to a panic and run upon the banks, in which emergency the Bank Restriction Act, suspending cash payment, was passed, and ushered in a system of unlimited credit transactions. Under the unnatural stimulus of these extra-

ordinary events, every branch of industry extended with un- exampled rapidity. But in nothing was this so apparent as in agriculture; the high prices of produce holding out a great

inducement to improve lands then arable, to reclaim others that had previously lain waste, and to bring much pasture-land under the plough. Nor did this increased tillage interfere with the increase of live stock, as the green crops of the alternate husbandry more than compensated for the diminished pasturage. This extraordinary state of matters lasted from 1795 to 1814, the prices of produce even increasing towards the close of that period. The average price of wheat for the whole period was 89s. 7d. per quarter; but for the last five years it was 107s., and in 1812 it reached 126s. 6d. The agriculture of Great Britain, as a whole, advanced with rapid strides during this period; but nowhere was the change so great as in Scotland. Indeed, its progress there, during these twenty years, is probably without parallel in the history of any other country. This is accounted for by a concurrence of circumstances. Previous to this period the husbandry of Scotland was still in a backward state as compared with the best districts of England, where many practices, only of recent introduction in the north, had been in general use for generations. This disparity made the subsequent contrast the more striking. The land in Scotland was now, with trifling exceptions, let on leases for terms varying from twenty to thirty years, and in farms of sufficient size to employ at the least two or three ploughs. The unlimited issues of government paper and the security afforded by these leases induced the Scottish banks to afford every facility to landlords and tenants to embark capital in the improvement of the land. The substantial educa- tion supplied by the parish schools, of which nearly the whole population could then avail themselves, had diffused through all ranks such a measure of intelligence as enabled them promptly to discern and skilfully and energetically to take advantage of this spring-tide of prosperity, and to profit by the agricultural information now plentifully furnished by means of the Bath and West of England Society, established in 1777; the Highland Society, instituted in 1784; and the National Board of Agriculture, in 1793.

The restoration of peace to Europe, and the re-enactment of the Corn Laws in 181 5, mark the beginning of another era in the history of agriculture. The sudden return to peace- taigt prices was followed by a time of severe depression, low 18 fs. wages, diminished rents and bad farming. The fall in prices was aggravated, first by the unpropitious weather and deficient harvest of the years 1816, 1817, and still more by the passing in 18 19 of the bill restoring cash payments, which, coming into

operation in 1821, caused serious embarrassment to all persons who had entered into engagements at a depreciated currency, which had now to be met with the lower prices of an enhanced one. The frequency of select-committees and commis- sions, which sat in 1814, 1821 and 1822, 1833 and 1836, testifies to the gravity of the crisis. The years 1830-1833 are especially memorable for a disastrous outbreak of sheep-rot and for agrarian outrages, caused partly by the dislike of the labourers to the introduction of agricultural machines.

During this period of depression, which lasted till the 'forties, want of confidence prevented any general improvement in agricultural methods. At the same time, certain developments destined to exercise considerable influence in later times are to be noted. Before the close of the 18th century, and during the first quarter of the 19th, a good deal had been done in the way of draining the land, either by open ditches or by James Elkington's system of deep covered drains. In 1834 James Smith of Deanston promulgated his system of thorough draining and deep ploughing, the adoption of which immeasurably im- proved the clay lands of the country. The early years of the reign of Queen Victoria witnessed the strengthening of the union between agriculture and chemistry. The Board of Agriculture in 1803 had commissioned Sir Humphry Davy to deliver a course of lectures on the connexion of chemistry with vegetable physiology. In 1840 the appearance of Chemistry in its Appli- cation to Agriculture and Physiology by Justus von Liebig set

on foot a movement in favour of scientific husbandry, the most notable outcome of which was the establishment by Sir John Bennet Lawes in 1843 of the experimental station of Rotham- sted. Since Blith's time bone was the one new fertilizer that had come into use. Nitrate of soda, Peruvian guano and superphosphate of lime in the form of bones dissolved by sulphuric acid were now added to the list of manures, and the practice of analysing soils became more general. Manual labour in farming operations began to be superseded by the use of drills, hay-makers and horse-rakes, chaff-cutters and root-pulpers. The reaping-machine, invented in 181 2 by John Common, improved

upon by the Rev. Patrick Bell in England and by Cyrus H. McCormick and others in America, and finally perfected about 1879 by the addition of an efficient self-binding apparatus, is the most striking example of the application of mechanics to agriculture. Improvements in the plough, harrow and roller were introduced, adapting those implements to different soils and purposes. The steam-engine first took the place of horses as a threshing power in 1803, but it was not until after 1850 that it was applied to the plough and cultivator. The employment of agricultural machines received considerable impetus from the Great Exhibition of 1851. The much-debated Corn Laws, after undergoing various modifications, and proving the fruitful source of business uncertainty, social discontent and angry partisanship, were finally abolished in 1846, although the act was not consummated until three years later. Several other acts of the legislature passed during this period exerted a bene- ficial influence on agriculture. Of these, the first in date and importance is the Tithe Commutation Act of 1836. Improve- ment was also stimulated by the Public Money Drainage Acts 1846-1856, under which government was empowered to advance money on certain conditions for the improvement of estates. Additional facilities were granted by the act passed in 1848 for disentailing estates, and for burdening such as are entailed with the share of the cost of certain specified im- provements.

Meanwhile much had been done in the organization of agri- cultural knowledge. Mention has already been made of the institution of the Highland Society and the National Board of Agriculture. These institutions were the means of collecting a vast amount of statistical and general information connected with agriculture, and by their publications and premiums made known the practices of the best-farmed districts «nd encouraged their adoption elsewhere. These associations were soon aided in their important labours by numerous local societies which sprang up in all parts of the kingdom. After a highly useful career, under the presidency till 1813 of Sir John Sinclair, the Board of Agriculture was dissolved in 1819, but left in its statis- tical account, county surveys and other documents much interesting and valuable information regarding the agriculture of the period. In 1800 the original Farmers' Magazine came into existence under the editorship of Robert Brown of Markle, the author of the well-known treatise on Rural Affairs. The Highland Society having early extended its operations to the whole of Scotland, by and by made a corresponding addition to its title, and as the

Highland and Agricultural Society of Scotland gradually extended its operations. In 1828, shortly after the discontinuance of the Farmers' Magazine, its Prize Essays and Transactions began to be issued statedly in connexion with the Quarterly Journal of Agriculture. This society early began to hold a great show of live stock, implements, &c. In 1842 certain Midlothian tenant-farmers had the merit of originating an Agricultural Chemistry Association (the first of its kind), by which funds were raised for the purpose of conduct- ing such investigations as the title of the society implies. After a successful trial of a few years this association was dissolved, transferring its functions to the Highland and Agricultural Society.

In England the Agricultural Society was founded in 1838, with the motto " Practice with Science," and shortly afterwards incorporated by royal charter. In 1845 the Royal Agricultural College at Cirencester was incorporated. This era of revival

was not, however, without its calamities. The foot-and-mouth disease first appeared about 1840, having been introduced, as is supposed, by foreign cattle. It spread rapidly over the country, affecting all domesticated animals except horses, and although seldom attended by fatal results, caused everywhere great alarm and loss. It was soon followed by the more terrible lung-disease, or pleuro-pneumonia. In 1 86 5 the rinderpest, or steppe murrain, originating amongst the vast herds of the Russian steppes, had spread westward over Europe, until it was brought to London by foreign cattle. Several weeks elapsed before the true char- acter of the disease was known, and in this brief space it had already been carried by animals purchased in Smithfield market to all parts of the country. After causing the most frightful losses, it was at last stamped out by the resolute slaughter of all affected animals and of all that had been in contact with them. Severe as were the losses in flocks and herds from these imported diseases, they were eclipsed by the ravages of the mysterious potato blight, which, first appearing in 1845, pervaded the whole of Europe, and in Ireland especially proved the precursor of famine and pestilence.

A short period of low prices followed the repeal of the Corn Laws, wheat averaging only 38s. 6d. a quarter in 1851, but the years from 1852 to 1875 were the most prosperous of the century. The letters written by Sir James Caird to The Times during 1850, and republished in 1852 under the title English Agriculture in 1850-1851, give a general review of English agriculture at the

time. The scientific and mechanical improvements of the first half of the century were widely adopted, while the prices of the protectionist period showed little decline. Amelioration in all breeds of domesticated animals was manifested, not so much in the production of individual specimens of high merit as in the diffusion of these and other good breeds over the country, and in the improved quality of live stock as a whole. The fattening of animals was conducted on more scientific principles. Increased attention was successfully bestowed on the improvement of field crops. Improved varieties, obtained by cross-impregnation either naturally or artificially brought about, were carefully propagated and generally adopted, and in- creased attention was bestowed on the cultivation of the natural grasses. The most important additions to the list of field crops were Italian rye-grass, winter beans, white Belgian carrot and alsike clover.

The last quarter of the 19th century proved, however, a fateful period for British agriculture. The great future that seemed to await the application of steam power to the tillage of the soil proved illusory. The clay soils of England, A«»*n/- , the latent fertility of which was to be brought into js7S. play in a fashion that should mightily augment the home-grown supplies of food, remained intractable, and the extent of land devoted to the cultivation of corn crops, instead of expanding, diminished in a marked degree. British farmers of long experience look back to 1874 as the last of the really good years, and consider that the palmy days of British agri- culture began to dwindle at about that time. The shadow of the approaching depression had already fallen upon the land before the year 1875 had run its course, and the outlook became ominous as the decade of the ‘seventies neared its close. One memorable feature was associated with 1877 in that this was the last year in which the dreaded cattle plague (rinderpest) made its appear- ance in England. The same year, 1877, was the last also in which the annual average price of English wheat (then 56s. 9d.) exceeded 50s. a quarter. With declining prices for farm produce came that year of unhappy memory, 1879, when persistent rains and an almost sunless summer ruined the crops and reduced many farmers to a state of destitution. Much of the grain was never harvested, whilst owing mainly to the excessive floods there commenced an outbreak of liver-rot in sheep, due to the ravages of the fluke parasite. This continued for several years, and the mortality was so great that its adverse effects upon the ovine population of the country were still perceptible ten years afterwards. A fall in rents was the

necessary sequel of the agricultural distress, to inquire into which a royal commission

was appointed in 1879, under the chairmanship of the duke of Richmond and Gordon. Its report, published in 1882, testified to ” the great extent and intensity of the distress which has fallen upon the agricultural community. Owners and occupiers have alike suffered from it. No description of estate or tenure has been exempted. The owner in fee and life tenant, the occupier, whether of large or of small holding, whether under lease, or custom, or agreement, or the provisions of the Agricul- tural Holdings Act — all without distinction have been involved in a general calamity.” The two most prominent causes assigned for the depression were bad seasons and foreign competition, aggravated by the increased cost of production and the heavy losses of live stock. Abundant evidence was forthcoming as to the extent to which agriculture had been injuriously affected “by an unprecedented succession of bad seasons.” As regards the pressure of foreign competition, it was stated to be greatly in excess of the anticipations of the supporters, and of the apprehensions of the opponents of the repeal of the Corn Laws. Whereas formerly the farmer was to some extent compensated by a higher price for a smaller yield, in recent years he had had to compete with an unusually large supply at greatly reduced prices. On the other hand, he had enjoyed the advantage of an extended supply of feeding-stuffs — such as maize, linseed- cake and cotton-cake — and of artificial manures imported from abroad. The low price ofagriculturalproduce, beneficial though it might be to the general community, had lessened the ability of the land to bear the proportion of taxation which had hereto- fore been imposed upon it. The legislative outcome of the findings of this royal commission was the Agricultural Holdings Act 1883, a measure which continued in force in its entirety till iqoi, when a new act came into operation.

The apparently hopeless outlook for corn-growing compelled farmers to cast about for some other means of subsistence, and to rely more than they had hitherto done upon the possibilities of stock-breeding. It was in particular the misfortunes of the later

‘seventies that gave the needed fillip to that branch of stock-farming concerned with the production of milk, butter and cheese, and from this period may be said to date the revival of the dairying industry, which received a powerful impetus through the introduction of the centrifugal cream separator, and was fostered by the British Dairy Farmers’ Association (formed in 1875). The generally wet character of the seasons in 1879 and the two or three years following was mainly respon- sible for the high prices of meat, so that the supplies of fresh beef and mutton from Australia which now began to arrive found a ready market, and the trade in imported fresh meat which was thus commenced has practically continued to expand ever since. The great losses arising from spoilt hay crops served to stimulate experimental inquiry into the method of preserving green fodder known as ensilage, with the result that the system eventually became successfully incorporated in the ordinary routine of agricultural practice. A contemporaneous effort in the direction of drying hay by artificial means led to nothing of practical importance. By 1882 the cry as to land going out of cultivation became loud and general, and the migration of the rural popula- tion into the towns in search of work continued unchecked (see below, Agricultural Population). In 1883 foot-and-mouth disease was terribly rampant amongst the herds and flocks of Great Britain, and was far more prevalent than it has ever been since. It was about this time that the first experiments were made (in Germany) with basic slag, a material which had hitherto been regarded as a worthless by-product of steel manufacture. A year or two later field trials were begun in England, with the final result that basic slag has become recognized as a valuable source of phosphorus for growing crops, and is now in constant demand for application to the soil as a fertilizer.

In 1883 the veterinary department of the Privy Council — which had been constituted in 1865 when the country was ravaged by cattle plague — was abolished by order in council, and the ” Agricultural Department ” was substituted, but no alteration was effected in the work of the department, so far as it relattd to animals. In 1889 the Board of Agriculture (for

Great Britain) was formed under an act of parliament of that year (see Agriculture, Board or). The election took place in the same year (1889) of the first county councils, and the allotment to them of various sums of money under the Local Taxation (Customs and Excise) Act 1890 enabled local provision to be made for the promotion of technical instruction in agri- culture

(see below, Agricultural Education). It was about this time that the value of a mixture of lime and sulphate of copper (bouillie bordelaise), sprayed in solution upon the growing plants, came to be recognized as a check upon the ravages of potato disease.

The general experience of the decade of the 'eighties was that of disappointing summers, harsh winters, falling prices, declining rents and the shrinkage of land values. It is true that one season of the series, that of 1887, was hot and droughty, but the following summer was exceedingly wet. Nevertheless, the decade closed more hopefully than it opened, and found farmers taking a keener interest in grass land, in live stock and in dairying. Cattle-breeders did well in 1889, but sheep-breeders fared better; on the other hand, owing to receding prices, corn- growers were more disheartened than ever. With the incoming of the last decade of the century there seemed to be some justifiable hopes of the dawn, of better times, but they were speedily doomed to disappointment. In 1891 excessively heavy autumn rains washed the arable soils to such an extent that the next season's corn crops were below average. Wheat in parti- cular was a poor crop in 1892, and the low yield was associated with falling prices due to large imports. The hay crop was very inferior, and in some cases it was practically ruined. This gave a stimulus to the trade in imported hay, which rose from 61,237 tons in 1892 to 263,050 tons in 1893, and despite some large home-grown crops in certain subsequent years (1897 and 1898) this expansion has never since been wholly lost.

The misfortunes of 1892 proved to be merely a preparation for the disasters of 1893, in which year occurred the most de- structive drought within living memory. Its worst effects were seen upon the light land farms of England, and so deplorable was the position that a royal commission on agricultural de- pression was appointed in September of that year under the chairmanship of Mr Shaw Lefevre (afterwards Lord Eversley). Thus, within the last quarter of the 19th century — and, as a matter of fact, only fourteen years apart — two royal commissions on agriculture were appointed, the one in a year of memorable flood, 1879, and the other in a year of disastrous drought, 1893. The report of the commission of 1893 was issued in March 1896. Amongst its chief recommendations were those relating to amendments in the Agricultural Holdings Acts, and to tithe rent- charge, railway rates, damage by game, sale of adulterated products, and sale of imported goods (meat, for example) as home produce. Two legislative enactments arose out of the work of this commission.

In the majority report it was stated ” that, in order to place agricultural lands in their right position as compared with other ratable properties, it is essential that they should be assessed to all local rates in a reduced propor- tion of their ratable value.” The Agricultural Rates Act 1896 gave effect to this recommendation. Its objects were to relieve agricultural land from half the local rates, and to provide the means of making good out of imperial funds the deficiency in local taxation caused thereby. It was provided that the act should continue in force only till the 31st of March 1902, but a further act in 1901 extended the period by four years, and in 1905 its operation was extended to the 31st of March 1910. The other measure arising out of the report of the royal commission of 1893 was the Agricultural Holdings Act 1900. This was an amending act and not a consolidating act; consequently it had to be read as if incorporated into the already existing acts. As affecting agricultural practice there were three noteworthy improvements in respect of the making of which, without the consent of or notice to his landlord, a tenant might claim compensation — (1) the consumption on the holding “by horses, other than those regularly employed on the holding,” of corn, cake or other feeding-stuff not produced on the holding; (2) the ” consumption

on the holding by cattle, sheep, or pigs, or by horses other than those regularly employed on the holding, of corn proved by satisfactory evidence to have been produced and consumed on the holding “; (3) ” laying down temporary pasture with clover, grass, lucerne, sainfoin or other seeds sown more than two years prior to the determination of the tenancy.” A further act was passed in 1906 (the Agricultural Holdings Act 1906) which im- proved the tenant’s position in respect of freedom of cropping, disposal of produce and compensation for disturbance.

After 1894, in which year the brilliant prospects of a bountiful harvest were ultimately extinguished by untimely and heavy rains, all the remaining seasons of the closing decade of the 19th century were dominated by drought. A fact that was amply illustrated, moreover, is that the period of incidence of a drought is not less important than its duration, and the same is true of

abnormal rainfall. A spring drought, a summer drought, an autumn drought, each has its distinctive characteristics in so far as the effect upon the crops is concerned. The hot drought of 1893 extended over the spring and summer months, but there was an abundant rainfall in the autumn; correspondingly there was an unprecedentedly bad yield of corn and hay crops, but a moderately fair yield of the main root crops (turnips and swedes). In 1899 the drought became most intense in the autumn after the corn crops had been harvested, but during the chief period, of growth of the root crops; correspondingly the corn crops of that year rank'Very well amongst the crops of the decade, but the yield of turnips and swedes was the worst on record. It is quite possible for a hot dry season to be associated with a large yield of corn, provided the drought is confined to a suitable period, as was the case in 1896 and still more so in 1898; the English wheat crops in those years were probably the biggest in yield per acre that had been harvested since 1868, which is always looked back upon as a remarkable year for wheat. The drought of 1898 was interrupted by copious rains in June, and these falling onNa warm soil led to a rapid growth of grass and, as measured by yield per acre, an exceedingly heavy crop of hay.

With the exceptions of 1891 and 1894, every year in the period 1 891-1900 was stricken by drought. The two meteorological events of the decade which will probably live longest in the recollection were, however, the terrible drought of 1893, resulting in a fodder famine in the succeeding winter, and the severe frost of ten weeks' duration at the beginning of 1895. Between these two occurrences came the disastrous decline in the value of grain in the autumn of 1894, when the weekly average price of English wheat fell to the record minimum of 17s. 6d. per imperial quarter. As a consequence, the extent of land devoted to wheat in the British Isles receded in 1895 to less than 15 million acres. The year 1903 was memorable for a very heavy rainfall, comparable though not equal in its disastrous effects to that of 1879. Successful trials of sulphate of copper solution as a means of destroying charlock in corn crops took place in the years 1 898-1 900. Charlock is a most persistent cruciferous weed, but if sprayed when young with the solution named it is killed, the corn plants being uninjured. In 1901 the formation of the Agricultural Organization Society marked the first sys- tematic attempt to organize co-operation among the farmers of Great Britain. In the subsequent years the principle, which had already made great progress in Ireland, began to obtain a hold in

England and Wales, where, in 1906, there were 145 local co-operative societies with a turn-over of £350,000.

Amongst legislative measures of importance to agriculturists mention should be made, in addition to those that have been referred to, of the Tithe Rent-charge Recovery Act 1891, which transfers the liability for payment of tithe from the occupier to the owner. In the same year was passed the Markets and Fairs (Weighing of Cattle) Act. The object of the Small Holdings Act 1892 was to facilitate the acquisition of small agricultural holdings. It provided that a county council might acquire any suitable land, with the object of allotting from one to fifty acres, or, if more than fifty acres, of an annual value not exceeding £50, to persons who desired to buy, and would themselves cultivate, the holdings. If, owing to proximity to a town or otherwise, the

prospective value were too high, the council might hire such land for the purpose of letting it. (See Allotments and Small Hold- ings for this and other acts.) The Fertilizers and Feeding Stuffs Act 1893 compelled sellers of fertilizers {i.e. manures), manufactured or imported, to state the percentage of the nitrogen, of the soluble and insoluble phosphates, and of the potash in each article sold, and this statement was to have the effect of a warranty. Similar stringent conditions applied as regards the sale of feeding-stuffs for live stock. The Fertilizers and Feeding Stuffs Act 1906, amending and re-enacting the act of 1893, provided for the compulsory appointment by county councils of official samplers. It also provides penalties for breaches of duty by the seller, but grants him protection in cases where he is not morally responsible. The Finance Act of 1894, with its great changes in the death duties, overshadowed all other acts of that year both in its immediate effects and in its far-reaching consequences. The Copyhold Consolidation Act 1894 supersedes six previous copyhold statutes, but does not effect any alteration in the law concern- ing enfranchisement. The Diseases of Animals Act 1 896 provided for the compulsory slaughter of imported live stock at the place of landing. The Light Railways Act and the Locomotives on Highways Act were added to the statute book in 1896, and various clauses in the Finance Act effected reforms in respect of the death duties, the land-tax, farmers' income-tax and the beer duty. The Chaff-cutting Machines (Accidents) Act 1897 is a measure very similar in its intention to the Threshing Machines Act 1878, and provides for the automatic prevention of accidents to persons in charge of chaff-cutting machines. The Sale of Food and Drugs Act 1899 has special reference in its earlier sections to

the trade in dairy produce and margarine. In 1899 was also passed the act establishing the Department of Agriculture and Technical Instruction in Ireland.

The year 1900 saw the passing of a Workmen's Compensation Act, which extended the benefits of the act of 1897 to agricultural labourers.

Acreage and Yields of British Crops.

The most notable feature in connexion with the cropping of the land of the United .Kingdom between 1875 and 1905 was the lessened cultivation of the cereal crops associated with an expansion in the area of grass land. At the beginning of the period the aggregate area under wheat, barley and oats was nearly 10J million acres; at the close it did not amount to 8 million acres. There was thus a withdrawal during the period of over 2 5 million acres from cereal cultivation. From Table I., showing the acreages at intervals of five years, it will be learnt that the loss fell chiefly upon the wheat crop, which at the close of the period

Table I. — Areas of Cereal Crops in the United Kingdom — Acres.

Year.	Wheat.	Barley.	Oats.	Total.
1875	3.5H.088	2,751.362	4.176,177	10,441,627
1880	3.o65.895			

2,695,000

4,191,716

9.952,6n

1885

2,553.092

2,447,169

4,282,594

9,282,855

1890

2,483.595

2,300,994

4.137,790

8,922,379

1895

1,456,042

2.346,367

4.527,899

8,330,308

1900

1,901,014

2,172,140

4.145.633

8,218,787

1905

1.836,598

1,872,305

4,i37.4 6

7,846,309

occupied barely more than half the area assigned to it at the beginning. If the land taken from wheat had been cropped with one or both of the other cereals, the aggregate area would have remained about the same. This, however, was not the case, for a fairly uniform decrease in the barley area was accompanied by somewhat irregular fluctuations in the acreage of oats. To the decline in prices of home-grown cereals the decrease in area is largely attributable. The extent of this decline is seen in Table II., wherein are given the annual average prices from 1875 to 1905, calculated upon returns from the 190 statutory markets of England and Wales (Corn Returns Act 1882). These prices are per imperial quarter, — that is, 480 lb of wheat, 400 ft> of barley and 312 lb of oats, representing 60 lb, soft and 39 ft) per bushel respectively. After 1883 the annual average price of English wheat was never so high as 40s. per quarter, and only twice after

1892 did it exceed 30s. In one of these exceptional years, 1898, the average rose to 34s., but this was due entirely to a couple of months of inflated prices in the early half of the year, when the outbreak of war between Spain and the United States of America coincided with a huge speculative deal in the latter country. The

Table II. — Gazette Annual Average Prices per Imperial Quarter of British Cereals in England and Wales, 1875-1905.

Year.

Wheat.

Barley.

Oats.

s.

d.

s.

d.

s. d.

1875

45

2

38

5

28 8

1876

46

2

35

2

26 3

1877

56

9

39

8

25 11

1878

46

5

40

2

24 4

1879

43

10

34

21 9

1880

44

4

33

1

23 1

1881

45

4

3i

11

21 9

1882

45

1

31

2

21 10

1883

41

7

31

10

21 5

1884

35

8

30

8

20 3

1885

32

10

30

1

20 7

1886

31

26

7

19

1887

32

6

25

4

16 3

1888

31

IO

27

10

16 9

1889

29

9

25

10

17 9

1890

3i

11

28

8

18 7.

1891

37

28

2

26

1892

30

3

26

2

•19 10

1893

26

4

25

7

18 9

1894

22

10

24

6

17 1

1895

23

1

21

II

14 6

1896

26

2

22

II

14 9

1897

30

2

23

6

16 11

1898

34

27

2

18 5

1899

25

8

25

7

17

1900

26

II

24

11

17 7

1901

26

9

25

2

18 5

1902

28

1

25

8

20 2

1903

26

9

22

8

17 2

1904

28

4

22

4

16 4

1905

29

8

24

4

17 4

weekly avetage prices of English wheat in 1898 fluctuated between 48s. id. and 25s. sd. per quarter, the former being the highest weekly average since 1882. The minimum annual average was 22s. iod. in 1894, in the autumn of which year the weekly average sank to 17s. 6d. per quarter, the lowest on record. Wheat was so great a glut in the market that various methods were devised for feeding it to stock, a purpose for which it is not specially suited; in thus utilizing the grain, however, a smaller loss was often incurred than in sending it to market. In 1894 the monthly average price for October, the chief month for wheat-sowing in England, was only 17s. 8d. per quarter, and farmers naturally shrank from seeding the land freely with a crop which could not be grown except at a heavy loss. The result was that in the following year the wheat crop of the United Kingdom was harvested upon the smallest area on record — less than 15 million acres. In only one year, 1878, did the annual average price of English barley touch 40s. per quarter; it never reached 30s. after 1885, whilst in 1895 it fell to so low a level as 21s. nd. The same story of declining prices applies to oats. An average of 20s. per quarter was touched in 189 1 and 1902, but with those excep- tions this useful feeding grain did not reach that figure after 1885. In 1895 the average price of 480 lb of wheat, at 23s. id., was identical with that of 312 lb of oats in 1880, and it was less in the preceding year. The declining prices that have operated against the growers of wheat should be studied in conjunction with Table III., which shows, at intervals of five years, the imports of Table III. — Imports into the United Kingdom of Wheat Grain, and of Wheat Meal and Flour — Cwt.

Year.

Wheat Grain.

Meal and Flour.

Total.

1875

51.876,517

6,136,083

58,012,600

1880

55,261,924

10,558,312

65,820,236

1885

61 ,498,864

15.832,843

77.33i.707

1890

60,474,180

15.773.336

76,247,516

1895

81,749,955

18,368,410

100,118,365

1900

68,669,490

2i,548;i3i

90,217,621

1905

97,622,752

n.954.763

I09.577.5i5

wheat grain and of wheat meal and flour into the United Kingdom. The import of the manufactured product from 1875 to 1900 increased -at a much greater ratio than that of the raw grain, for whilst in 1875 the former represented less than one-ninth of the total, by 1900 the proportion had risen to nearly one-fourth. The offal, which is quite as valuable as the flour itself, was thus retained abroad instead of being utilized for stock-feeding purposes in the United Kingdom. In the five subsequent years the proportion was fundamentally altered, so that with a greatly increased importation of grain, that of meal and flour was in the proportion of about one-ninth. The highest and lowest areas of wheat, barley and oats in the United Kingdom during the period 1875-1905 were the following:—

Wheat . 3,514,088 acres in 1875; 1,407,618 acres in 1904. Barley . 2,931,809 „ ,,1879:1,872,305 „ ,,1905. Oats . 4,527,899 „ „ 189513,998,200 „ ,,1879.

These show differences amounting to 2,106,470 acres for wheat, 1,659,504 acres for barley, and 529,699 acres for Oats. The acreage of wheat, therefore, fluctuated the most, and that of oats the least. Going back to 1869, it is found that the extent of wheat in that year was 3,981,989 acres or very little short of four million acres.

The acreage of rye grown in the United Kingdom as a grain crop is small, the respective maximum and minimum areas during the period 1875-1905 having been 102,676 acres in 1894 and 47,937 acres in 1880. Rye is perhaps more largely grown as a green crop to be fed off by sheep, or cut green for soiling, in the spring months.

Of corn crops other than cereals, beans and peas are both less cultivated than formerly. In the period 1875-1905 the area of beans in the United Kingdom fluctuated between 574,414 acres in 1875 and 230,429 acres in 1897, and that of peas between 318,410 acres in 1875 and 155,668 acres in 1901. The area of peas (175,624 acres in 1905) shrank by nearly one-half, and that

of beans (256,383 acres in 1905) by more than one-half. Taking cereals and pulse corn together, the aggregate areas of wheat, barley, oats, rye, beans and peas in the United Kingdom varied as follows over the six quinquennial intervals embraced in the period 1875-1905: — ■

Year.

Acres.

Year.

Acres.

1875 •

1880 1885 .

• n,399,030

10,672,086 10,014,625

1890

1895 •

1900 1905 .

• 9,574.249

. 8,865,338

8,707,602

• 8,333,770

Disregarding minor fluctuations, there was thus a loss of corn land over the 30 years of 3,065,260 acres, or 27%.

The area, withdrawn from corn-growing is not to be found under the head of what are termed ” green crops.” In 1905 the total area of these crops in the United Kingdom was 4,144,374 acres, made up thus: —

Crop. Acres.

Potatoes 1,236,768

Turnips and swedes 1,879,384

Mangel 477,54°

Cabbage, kohl-rabi and rape 225,315

Vetches or tares 139,285

Other green crops . . . . – . . . 186,082

The extreme aggregate areas of these crops during the thirty years were 5,057,029 acres in 1875 and 4,109,394 acres in 1904. At five-year intervals the areas were: —

Year.

Acres.

Year.

Acres.

1875 1880 1885

• 5,057,029

• 4.746,293

• 4.765,195

1890

1895 1900

I9°5

• 4.534.145

• 4.399.949

• 4.301.774

• 4.144.374

These crops, therefore, which, except potatoes, are used mainly for stock-feeding, have like the corn crops been grown on gradually diminishing areas.

The land that has been lost to the plough is found to be still further augmented when an inquiry is instituted into the area devoted to clover, sainfoin and grasses under rotation. The areas of five-year intervals are given in Table IV. Under the old Norfolk or four-course rotation (roots, barley, clover, wheat) land thus seeded with clover or grass seeds was intended to be

ploughed up at the end of a year. Labour difficulties, low prices of produce, bad seasons and similar causes provided inducements for leaving the land in grass for two years, or over three years or more, before breaking it up for wheat. In many cases it would be decided to let such land remain under grass indefinitely, and thus it would no longer be enumerated in the Agricultural Returns as temporary grass land, but would pass into the category of permanent grass land, or what is often spoken of as " permanent pasture." Whilst much grass land has been laid down with the intention from the outset that it should be permanent, at the same time some considerable areas have through stress of circumstances been allowed to drift from the temporary or rotation grass area to the permanent list, and have thus still further diminished the area formerly under the dominion of the plough. The column relating to permanent grass in Table IV. shows clearly enough how the British Isles became

Table IV. — Areas of Grass Land (excluding Heath and Mountain Land) in the United Kingdom — Acres.

Permanent

Year.

Temporary (i.e.

(i.e. not broken up

Total.

under rotation) .

in rotation).

1875

6,337.953

23,772,602

. 30.no,555

1880

6,389,232

24,717,092

31,106,324

1885

6,738,206

25,616,071

32,354.277

1890

6,097,210

27,115,425

33,212,635

1895

6 J ,o6i,i39

27,831,117

33,892,256

1900

6,025,025

28,266,712

34,291,737

1905

5.779.323

28,865,373

34,644,696

more pastoral, while the figures already given demonstrate the extent to which they became less arable. In the period 1875-1905 the extreme areas returned as ” permanent pasture ” — a term which, it should be clearly understood, does not include heath or mountain land, of which there are in Great Britain alone about 13 million acres used for grazing — were 23,772,602 acres in 1875, and 28,865,373 acres in 1905. Comparing 1905 with 1875 the increase in permanent grass land amounted to over five million acres, or about 21 %.

On account of the greater humidity and mildness of its climate, Ireland is more essentially a pastoral country than ˆSreat Britain. The distribution between the two islands of such important crops of arable land as cereals and potatoes is indicated in Table V. The figures are those for 1905, but, though the absolute acreages

Table V.— Areas of Cereal and Potato Crops in Great Britain and Ireland in 1905.

Great Britain Ireland

Total .

Wheat.

Barley.

Acres.

1.796,993 37.860

Acres.

1,713,664 154,645

1,834,853

1,868,309

Great Britain Ireland

Total

Oats.

Potatoes.

3.051,376 1,066,806

608,473

6i6,755

4,118,182

1,225,228

vary somewhat from year to year, there is not much variation in the proportions. The comparative insignificance of Ireland in the case of the wheat and barley crops, represented by 2 and 8% respectively, receives some compensation when oats and potatoes are considered, about one-fourth of the area of the former and more than half that of the latter being claimed by Ireland. It is noteworthy, however, that Ireland year by year places less reliance upon the potato crop. In 1888 the area of potatoes in Ireland was 804,566 acres, but it continuously contracted each year, until in 1905 it was only 616,755 acres, or 187,811 acres less than 17 years previously.

A similar comparison for the several sections of Great Britain, as set forth in Table VI., shows that to England belong about 95 % of the wheat area, over 80 % of the barley area, over 60 % of the oats area, and over 70 % of the potato area, and these

proportions do not vary much from year to year. The figures for cereals are important, as they indicate that it is the farmers of England who are the chief sufferers through the diminishing prices of corn; and particularly is this true of East Anglia, where corn-growing is more largely pursued than in any other part of the

Table VI.— Areas of Cereal and Potato Crops in England, Wales and Scotland, and in Great Britain, in 1905.

England

Wales

Scotland

Wheat.

Barley.

Acres.

1,704,281

44,073 48,641

Acres.

1,410,287

91.243 212,134

Great Britain

1.796,995

1,713,664

England

Wales

Scotland

Oats.

Potatoes.

1,880,475 207,929 962,972

434.773 29,435

144.265

Great Britain

3.051,376

608,473

country. Scotland possesses nearly one-third of the area of oats and nearly one-fourth of that of potatoes. Beans are almost entirely confined to England, and this is even more the case with peas. The mangel crop also is mainly English, the summer in most parts of Scotland being neither long enough nor warm enough to bring it to maturity.

The Produce of British Crops. Whilst the returns relating to the acreage of crops and the number of live stock in Great Britain have been officially collected in each year since 1866, the annual official estimates of the produce of the crops in the several sections 1 of the kingdom do not extend back beyond 1885. The practice is for the Board of Agriculture to appoint local estimators, who report in the autumn as to the total production of the crops in the localities respectively assigned to them. By dividing the total production, say of wheat, in each county by the number of acres of wheat as returned by the occupiers on June 4, the estimated average yield per acre is obtained. It is important to notice that the figures relating to total production and yield per acre are only estimates, and it is not claimed for them that they are anything more. The fact that much of the wheat to which the figures apply is still in the stack after the publication of the figures shows that the latter are essentially estimates. The total produce of any crop in a given year must depend mainly upon the acreage grown, whilst the average yield per acre will be determined chiefly by the character of the season. In Table VII. are shown, in thousands

Table VII.' — Estimated Annual Total Produce of Corn Crops in the United Kingdom, 1890-1905 — Thousands of Bushels.

Year.

Wheat.

Barley.

Oats.

Beans.

Peas.

1890

75.994

80,794

171.295

11,860

6313

1891

74.743

79,555

166,472

10,694

5777

1892

60,775

76,939

168,181

7,054

5028

1893

50,913

65,746

168,588

4,863

4756:

1894

60,704

78,601

190,863

7,198

6229

1895

38,285

75,028

174476

5,626

4732

1896

58,247

77,825

162,860

6,491

4979

1897

56,296

72,613

163,556

6,650

5250

1898

74.885

74,731

172,578

7,267

4858

1899

67,261

74,532

166,140

7,566

4431

1906

54.322

68,546

165,137

7,469

4072

1901

53.928

67.643

161,175

6,154

4017

1902

58,278

74,439

184,184

7,704

5106

1903

48,819

65,310

172,941

7.535

4812

1904

37.920

62,453

176,755

5.901

4446

1905

60,333

65,004

166.286

8,262

4446

of bushels, the estimated produce of the corn crops of the United Kingdom in the years 1890-1905. The largest area of whe&t in the period was that of 1890, and the smallest was that bf 1904; the same two years are seen to have been respectively those of highest and lowest total produce. It is noteworthy that in 1895 the country produced about half as much wheat

BRITISH]

AGRICULTURE

401

as in any one of the years 1800, 1801 and 1898. The produce of barley, like that of oats, is less irregular than that of wheat, the extremes for barley being 80,794,000 bushels (1890) and 62,453,000 bushels (1904), and those for oats 190,863,000 bushels (1894) and 161,175,000 bushels (1001). Similar details for potatoes, roots and hay, brought together in Table VIII., show that the

Table VIII. — Estimated Annual Total Produce of Potatoes, Roots and Hay in the United Kingdom, 1890-71905 — Thousands of Tons.

Year.

Potatoes.

Turnips.

Mangels.

Hay.

1890

4622

32,002

6709

14,466

1891

6090

29,742

7558

12,671

1892

5634

3L4I9

7428

n,567

1893

6541

31,110

5225

9,082

1894

4662

30,678

73io

15,699

1895

7065

29,221

6376

12,238

1896

6263

28,037

5875

11,416

1897

4107

29,785

7379

14,043

1898

6225

26,499

7228

15,916

1899

5837

20,370

7604

12,898

1900

4577

28,387

9650

13.742

1901

7043

25,298

9224

11,358

1902

5920

29,116

10,809

15,246

1903

5277

23,523

8212

H,955

1904

6230

28,033

8813

• 14,860

1905

7186

26,563

9493

13,554

production of potatoes varies much from year to year. The imports of potatoes into the United Kingdom vary, to some extent inversely; thus, the low production in 1897 was accom- panied by an increase of imports from 3,921,205 cwt. in 1897 to 6,751,728 cwt. in 1898. No very/great reliance can be placed upon the figures relating to turnips (which include swedes), as these are mostly fed to sheep on the ground, so that the estimates as to yield are necessarily vague. Mangels are probably more closely estimated, as these valuable roots are carted and stored for subsequent use for feeding stock. Under hay are included the produce of clover, sainfoin and rotation grasses, and also that of permanent meadow. The extent to which the annual production of the leading fodder crop may vary is shown in the table by the two consecutive years 1893 and 1894; from only nine million tons in the former year the production rose to up- wards of fifteen million tons in the latter, an increase of over

70%.

Turning to the average yialds per acre, as ascertained by dividing the number of acres into the total produce, the results of a decade are collected in Table IX. The effects of a prolonged

Table IX.* — Estimated Annual Average Yield per Acre of Crops in

drought, as distinguished from spring and summer drought, are shown in the very low yield of turnips in 1899. Mangels are sown

earlier and have a longer period of growth than turnips; if they become well established in the summer they are less sus- ceptible to autumn drought. The hay made from clover, sain- foin and grasses under rotation generally gives a bigger average yield than that from permanent grass land. The mean values at the foot of the table — they are not, strictly speaking, exact averages — indicate the average yields per acre in the United Kingdom to be about 31 bushels of wheat, 33 bushels of barley, 40 bushels of oats, 28 bushels of beans, 26 bushels of peas, 4! tons of potatoes, 131 tons of turnips and swedes, 185 tons of mangels, 32 cwt. of hay from temporary grass, and 29 cwt. of hay from permanent grass. Although enormous single crops of mangels

Table X. — Decennial Average Yields in Great Britain of Wheat, Barley and Oats — Bushels per acre.

10- Year Periods.

Wheat.

Barley.

»

Oats.

1885-1894

29-32

33-02

38-21

1 886-1895

28-81

32-68

38-23

1887-1896

29-49

32-82

38-13

1 888-1 897

29-19

32-97

38-51

1889-1898

29-86

33-26

38-86

1890T1899

30-15

33-50

38-81

1891-1900

29-92

33-13

38-46

1 892- 1 90 1

29-88

32-80

38-26

1893-1902

30-53

32-83

38-64

1894-1903

3o-95

33-i6

39-05

1895-1904

30-56

32-82

38-81

1 896- 1 905

31-21

33-04

38-92

are spmetimes grown, amounting occasionally to 100 tons per acre, the general average yield of i8j tons is about 5 tons more than that of turnips and swedes. Again, although from the richest old permanent meadow-lands very heavy crops of hay are taken season after season, the general average yield of permanent grass is about 3 cwt. of hay per acre less than that from clover, sainfoin and grasses under rotation. The general average yields of the corn crops are not fairly comparable one with the other, because they are given by measure and not by weight, whereas the weight per bushel varies considerably. For purposes of comparison it would be much better if the yields of corn crops were estimated in cwt. per acre. This, indeed, is the practice in Ireland, and in order to incorporate the Irish figures with those for Great Britain so as to obtain average values for the United Kingdom, the Irish yields are calculated into bushels at

United Kingdom, 1 895-1904.

Year.

Wheat.

Barley.

Oats.

Beans.

Peas.

Pota- toes.

Turnips

and Swedes.

Mangels.

Hay.

Rota- tion.

Perman- ent.

Bush.

Bush.

Bush.

Bush.

Bush.

Tons.

Tons.

Tons.

Cwt.

Cwt.

1895

26-33

32-09

38-67

22:98

22-62

5-64

I3-”

16-44

29-08

25-21

1896

33-63

34-16

37-97

25-69

25-34

4-93 ,

12-79

14-99

27-95

24-14

1897

29-07

32-91

38-84

28-91

27-55

3-47

13-90

18-03

32-53

30-71

1898

34-75

36-24

42-27

3I-I3

27-60

5-23

12-74

17-71

36-49

34-27

1899

32-76

34-64

40-57

30-19

27-22

4-82

9-97

17-41

31-04

29-11

1900

28-61

3I-67

39-97

28-18

25-89

3-77

14-29

19-97

32-42

30-9.8

1901

30-93

31-70

39-35

24-29

25-97

5-81

12-95

19-37

28-98

23-85

1902

3291

35-83

44-5o

31-49

28-51.

4-92

15-35

20-85

35-29

32-57

1903

30-15

32-38

40-81

31-27

26-56

4-45

12-44

17-19

33-07

31-27

1904

26-97

31-25

40-80

23-23

25-75

5-24

14-83

18-57

33-43

31-04

Mean,

10

years

30-85

33-28

40-35

27-68

26-24

4-84

13-21

18-18

32-06

29-32

1905

32-88

34-79

40-38

32-33

25-71

5-86

14-19

19-91

32-24

28-37

spring and summer drought, like that of 1893, are exemplified in the circumstance that four corn crops and the two hay crops all registered very low average yields that year, viz. wheat 26-08 bushels, barley 29-30 bushels, oats 38-14 bushels, beans 19-61 bushels, rotation hay 23-55 cwt., permanent hay 20-41 cwt. On the other hand, the season of 1898 was exceptionally favour- able to cereals and to hay. The effects of a prolonged autumn

the rate of 60 lb to the bushel of wheat, of beans and of peas, 50 lb to the bushel of barley and 39 lb to the bushel of oats. The figure denoting the general average yield per acre of any class of crop needs re- adjustment after every succes- sive harvest. If a decennial period be taken, then — for the purpose of the new calculation — the earliest year is omitted and the latest year added, the number of years continuing at ten. Adopting this course in the case of the cereal crops of Great Britain the decennial averages recorded in Table X. are obtained, the period 1885- 1894 being the earliest decade for which the official figures are available. It thus appears that the average yield of wheat in Great Britain, as calcu- lated upon the crops harvested during the ten years (1896- 1905), exceeded 31 bushels to the acre, whereas, for the ten years ended 1895, it fell below 29 bushels. A large expansion in the acreage of the wheat crop would probably be at- tended by a decline in the average yield per acre, for when a

crop is shrinking in area the tendency is to withdraw from it first the land least suited to its growth. The general average for the United Kingdom might then recede to rather less than 28 bushels of 60 lb per bushel, which was for a long time the accepted average — unless, of course, improved methods of cultivating and manuring the soil were to increase its general wheat-yielding capacity. 1

Crops and Cropping.

The greater freedom of cropping and the less close adherence to the formal system of rotation of crops, which characterize the early years of the 20th century, rest upon a scientific basis. Experimental inquiry has done much to enlighten the farmer as to the requirements of plant-life, and to enable him to see how best to meet these requirements in the case of field crops. He cannot afford to ignore the results that have been gradually accumulated — the truths that have been slowly established — at the agricultural experiment stations in various parts of the world. Of these stationˆthe greatest, and the oldest now existing, is that at Rothamsted, Harpenden, Herts, England, which was founded in 1843 by Sir John Bennet Lawes (q.v.). The results of more than half a century of sustained experimental inquiry were communicated to the world by Lawes and his collaborator, Sir J. H. Gilbert, in about 130 separate papers or’reports, many of which were published, from 1847 onwards, in the Journal of the Royal Agricultpral Society of England?

In the case of plants the method of procedure was to grow some of the most important crops of rotation, each separately year after year, for many years in succession on the same land, (a) without manure, (6) with farmyard manure and © with a great variety of chemical manures; the same description of manure being, as a rule, applied year after year on the same plot. Experiments on an actual course of rotation, without manure, and with different manures, have also been made. Wheat, barley, oats, beans, clover and other leguminous plants, turnips, sugar beet, mangels, potatoes and grass crops have thus been experimented upon. Incidentally there have been extensive sampling and

analysing of soils, investigations into rainfall and the composition of drainage waters, inquiries into the amount of water transpired by plantsˆand experiments on the assimilation of free nitrogen.

Cereals. — Amongst the field experiments there is, perhaps, not one of more universal interest than that in which wheat was grown for fifty-seven years in succession, (a) without manure, (6) with farmyard manure and © with various artificial manures. The results show that, unlike leguminous crops such as beans or clover, wheat may be successfully grown for many years in succession on ordinary arable land, provided suitable manures be applied and the land be kept clean. Even without manure the average produce over forty-six years, 1852-1897, was nearly thirteen bushels per acre, or about the average yield per acre of

1 The higher yield of wheat in the later years of the 19th century appears to be largely attributable to better grain-growing seasons. The yields in the experimental wheat-field at Rothamsted — where there is no change either of land or of treatment — indicate this. The following figures show the average yields per acre of theselected plots at Rothamsted over six 8-yearly periods from 1852 to 1899, and afford evidence that the higher yield of later years is due to the seasons : —

Bushels (of 60 lb) Average of — per acre.

8 years 1 852-1 859 28f

8 „ 1860-1867 28I

8 „ 1868-1875 27$

8 „ 1876-1883 25i

8 „ 1884-1891 29I

8 „ 1892-1899 30

32 „ 1852-1883 27I

16 „ 1884-1899 30

48 „ 1852-1899 28ˆ

The average of the first thirty-two years was thus 27I bushels per

acre, of the last sixteen years 30 bushels, and of the whole forty-eight years 28} bushels.

1 See J. B. Lawes and J. H. Gilbert, Rothamsted Memoirs on Agricultural Chemistry and Physiology, 7 vols. (1893-1899); A. D. Hall, Book of the Rothamsted Experiments (1905).

the wheat lands of the whole world. Mineral manures alone give very little increase, nitrogenous manures alone considerably more than mineral manures alone, but the mixture of the two con- siderably more than either separately. In one case, indeed, the average produce by mixed minerals and nitrogenous manure was more than that by the annual application of farmyard manure; and in seven out of the ten cases in which such mixtures were used the average yield per acre was from over two to over eight bushels more than the average yield of the United Kingdom (assuming this to be about twenty-eight bushels of 60 lb per bushel) under ordinary rotation. It is estimated that the reduction in yield of the unmanured plot over the forty years, 1852-1891, after the growth of the crops without manure during the eight preceding years, was, provided it had been uniform throughout, equivalent to a decline of one-sixth of a bushel from year to year due to exhaustion — that is, irrespectively of fluctuations due to season. It is related that a visitor from the United States, talking to Sir John Lawes, said, ” Americans have learnt more from this field than from any other agricultural experiment in the world.”

Experiments upon the growth of barley for fifty years in succession on rather heavy ordinary arable soil resulted in showing that the produce by mineral manures alone is larger than that without manure; that nitrogenous manures alone give more produce than mineral manures alone; and that mixtures of mineral and nitrogenous manure give much more than, either used alone — generally twice, or more than twice, as much as mineral manures alone. Of mineral constituents, whether used alone or in mixture with nitrogenous manures, phosphates are much more effective than mixtures of salts of potash, soda and magnesia. The average results show that, under all conditions of manuring — excepting with farmyard manure— the produce was less over the later than over the earlier periods of the experiments, an effect partly due to the seasons. But the average produce over forty years of continuous growth of barley was, in all cases where nitrogenous and mineral manures (containing phosphates) were used together, much higher than the average

produce of the crop grown in ordinary rotation in the United Kingdom, and very much higher than the average in most other countries when so grown. The requirements of barley within the soil, and its susceptibility to the external influences of season,, are very similar to those of its near ally, wheat. Nevertheless there are distinctions of result dependent on differences in the habits of the two plants, and in the conditions of their cultivation accord- ingly. In the British Isles wheat is, as a rule, sown in the autumn on a heavier soil, and has four or five months in which to- dis- tribute its roots, and so it gets possession of a wide range of soil and subsoil before barley is sown in the spring. Barley, on the other hand, is sown in a lighter surface soil, and, with its short period for root-development, relies in a much greater degree on the stores of plant-food within the surface soil. Accordingly it is more susceptible to exhaustion of surface soil as to its nitro- genous, and especially as to its mineral supplies; and in the common practice of agriculture it is found to be more benefited by direct mineral manures, especially phosphatic manures, than is wheat when sown under equal soil conditions. The exhaustion of the soil induced by both barley and wheat is, however, char- acteristically that of available nitrogen; and when, under the ordinary conditions of manuring and cropping, artificial manure is still required, nitrogenous manures are, as a rule, necessary for both crops, and, for the spring-sown barley, superphosphate also. Although barley is appropriately grown on lighter soils than wheat, good crops, of fair quality, may be grown on the heavier soils after another grain crop by the aid of artificial manures, provided that the land is sufficiently clean. Experiments similar to the foregoing were carried on for many years in succession at Rothamsted upon oats, and gave results which were in general accordance with those on the other cereal crops.

Additional significance to the value of the above experiments on wheat and barley is afforded by the fact that the same series, with but slight modifications, has also been carried out since 1876 at the Woburn (Bedfordshire) experimental farm of the

Royal Agricultural Society of England, the soil here being of light

sandy character, and thus very different from the heavy soil of Rothamsted. The results for the thirty years, 1877-1906, are in their general features entirely confirmatory of those obtained at Rothamsted.

Root-Crops. — Experiments upon root-crops — chiefly white turnips, Swedish turnips (swedes) and mangels— have resulted in the establishment of the following conclusions. Both the quantity and the quality of the produce, and consequently its feeding value, must depend greatly upon the selection of the best description of roots to be grown, and on the character and the amount of the manures, and especially on the amount of nitrogenous manure employed. At the same time, no hard- and-fast rules can be laid down concerning these points. Independently of the necessary consideration of the general economy of the farm, the choice must be influenced partly by the character of the soil, but very much more by that of the climate. Judgment founded on knowledge and aided by careful observation; both in the field and in the feeding-shed, must be relied upon as the guide of the practical farmer. Over and above the great advanˆ tage arising from the opportunity which the growth of root-crops affords for the cleaning of the land, the benefits of growing the root-crop in rotation are due (1) to the large amount of manure applied for its growth, (2) to the large residue of the manure left in the soil for future crops, (3) to the large amount of matter at once returned as manure again in the leaves, (4) to the large amount of food produced, and (5) to the small proportion of the most important manurial constituents of the roots which is retained by store or fattening animals consuming them, the rest returning as manure again; though, when the roots are consumed for the production of milk, a much larger proportion of the constituents is lost to the manure.

Leguminous Crops and the Acquisition of Nitrogen. — The fact that the growth of a leguminous crop, such as red clover, leaves the soil in a higher condition for the subsequent growth of a grain crop — that, indeed, the growth of such a leguminous crop is to a great extent equivalent to • the application of a nitrogenous manure for the cereal crop — was in effect known ages ago. Nevertheless it was not till near the approach of the closing decade of the 19th century that the explanation of this long- established point of agricultural practice was forthcoming. It was in the year 1886 that Hellriegel and Wilfarth first published in Germany the results of investigations in which they demon- strated that, through the agency of micro-organisms

dwelling in nodular outgrowths on the roots of ordinary leguminous plants, the latter are enabled to assimilate the free nitrogen of the air. The existence of the root nodules had long been recog- nized, but hitherto no adequate explanation had been afforded as to their function.

Since Hellriegel's striking discovery farm crops have been conveniently classified as nitrogen-accumulating and nitrogen-consuming. To the former belong the ordinary leguminous crops — the clovers, beans, peas, vetches or tares, sainfoin, lucerne, for example — which obtain their nitrogen from the air, and are independent of the application of nitrogenous manures, whilst in their roots they accumulate a store of nitrogen which will ultimately become available for future crops of other kinds. It is, in fact, fully established that these leguminous crops acquire a considerable amount of nitrogen by the fixation of the free nitrogen of the atmosphere under the influence of the symbiotic growth of their root-nodule-microbes and the higher plant. The cereal crops (wheat, barley, oats, rye, maize) ; the cruciferous crops (turnips, cabbage, kale, rape, mustard); the solanaceous crops (potatoes); the chenopodiaceous crops (mangels, sugar-beets), and other non-leguminous crops have, so far as is known, no such power, and are therefore more or less benefited by the direct application of nitrogenous manures. The field experiments on leguminous plants at Rothamsted have shown that land which is, so to speak, exhausted so far as the growth of one leguminous crop is concerned, may still grow very luxuriant crops of another plant of the same natural order, but of different habits of growth, and especially of different

character and range of roots. This result is doubtless largely dependent on the existence, the distribution and the condition of the appropriate microbes for the due infection of the different descriptions of plant, for the micro-organism that dwells sym- bio tically with one species is not identical with that whicb similarly dwells with another. It seems certain that success h? any system involving a more extended growth of leguminous crops in rotations must be dependent on a considerable variation in the description grown. Other essential conditions of success will commonly include the liberal application of potash and phosphatic manures, and sometimes chalking or liming for the leguminous crop. As to how long theˆ leguminous crop should occupy the land, the extent to which it should be consumed on the land, or the manure from its consumption be returned, and under what conditions the whole or part of it should be ploughed

in — these are points which must be decided as they arise in practice. It seems obvious that the lighter and poorer soils would benefit more than the heavier or richer soils by the extended growth of leguminous crops.

Remarkable as Hellriegel's discovery was, it merely furnished the explanation of a fact which had been empirically established by the husbandman long before, and had received most intelligent application when the old four-course (or Norfolk) rotation was devised. But it gave some impetus to the practice of green manuring with leguminous crops, which are equally capable with such a crop as mustard of enriching the soil in humus, whilst in addition they bring into the soil from the atmosphere a quantity of nitrogen available for the use of subsequent crops of any kind. In Canada and the United States this rational employment of a leguminous crop for ploughing in green is largely resorted to for the amelioration of worn-out wheat lands and other soils, the condition of which has been lowered to an unremunerative level by the repeated growth year after year of a cereal crop. The well-known paper of Lawes, Gilbert and Pugh (1861), " On the Sources of the Nitrogen of Vegetationˆ with special reference to the Question whether Plants assimilate free or uncombined Nitrogen," answered the question referred to in the negative. The attitude taken up later on with regard to this problem is set forth in the following words, which are quoted from the Memoranda of the Rothamsted Experiments, 1900 (p. 7):— >

" Experiments were commenced in 1857, and conducted for several years in succession, to determine whether plants assimilate free or uncombined nitrogen, and also various collateral points. Plants of the : gramineous, the leguminous and of other families were operated upon. The late Dr Pugh took a prominent part in this inquiry. The conclusion arrivedat wasthatouragriculturalplarits do not themselves directly assimilate the free nitrogen of the air by their leaves.

" In recent years, however, the question has assumed quite a new aspect. It now is — whether the free nitrogen of the atmosphere is brought into combination under the influence of micro-organisms, or other low forms, either within the soil or in symbiosis with a higher plant, thus serving indirectly as a source of nitrogen to plants of a higher order., Considering that the results of Hellriegel and Wilfarth on this point were, if confirmed, of great significance and importance, it was decided to make experiments at Rothamsted on somewhat similar lines.

Accordingly, a preliminary series was undertaken in 1888; more extended series were conducted in 1889 and in 1890; and the investigation was continued up to the. com- mencement of the year 1895. Further experiments relating to certain aspects of the subject were begun in 1898. The results have shown that, when a soil growing leguminous plants is infected with appropriate organisms, there is a development Of the so-called leguminous nodules on the roots of the plants, and, coincidently, increased growth and gain of nitrogen."

The conclusions of Hellriegel and Wilfarth have thus been confirmed by the later experiences of : Rothamsted, and since that time efforts have been directed energetically to the practical application of the discovery. This has taken the form of in- oculating the soil with the particular organism required by the particular kind of leguminous crop. To this end the endeavour has been made to produce preparations which shall contain in portable form the organisms required by the several plants, and though, as yet, it can hardly be claimed that they have been generally successful, the work done justifies hopes

that the problem will eventually be solved in a practical direction.

Grass. — Another field experiment of singular interest is that relating to the mixed herbage of permanent meadow, for which seven acres of old grass land were set apart in Rothamsted Park in 1856. Of the twenty plots into which this land is divided, two were left without manure from the outset, two received ordinary farmyard manure for a series of years, whilst the remainder each received a different description of artificial or chemical manure, the same being, except in special cases, applied year after year on the same plot. During the growing season the field affords striking evidence of the influence of different manurial dressings. So much, indeed, does the character of the herbage vary from plot to plot that the effect may fairly be described as kaleidoscopic. Repeated analyses have shown how greatly both the botanical constitution and the chemical composition of the mixed herbage vary according to the descrip- tion of manure

applied. They have further shown how dominant is the influence of season. Such, moreover, is the effect of different manures that the gross produce of the mixed herbage is totally different on the respective plots according to the manure employed, both as to the proportion of the various species composing it and as to their condition of development and maturity.

The Rotation of Crops.

The growth, year after year, on the same soil of one kind of plant unfits it for bearing further crops of the kind which has exhausted it, and renders themjless vigorous and more liable to disease. The farmer therefore arranges his cropping in such a way that roots, or leguminous crops, succeed the cereal crops.

It is not only the conditions of growth, but the uses to which the different crops are put, that have to be considered in the case of rotation. Thus the cereal crops, when grown in rotation, yield more produce for sale in the season of growth than when grown continuously. Moreover, the crops alternated with the cereals accumulate very much more of mineral constituents and of nitrogen in their produce than do the cereals themselves. By far the greater proportion of those constituents remains in circulation in the manure of the farm, whilst the remainder yields highly valuable products for sale in the forms of meat and milk. For this reason these crops are known as ” restora- tive,” cereals the produce of which is sold off the farm being classed as ” exhaustive.” With a variety of crops, again, the mechanical operations of the farm, involving horse and hand labour, are better distributed over the year, and are therefore more economically performed. The opportunities which rotation cropping affords for the cleaning of the land from weeds is another distinct element of advantage. Although many different rotations of crops are practised, they may for the most part be considered as little more than local adaptations of the system of alternating root-crops and leguminous crops with cereal crops, as exemplified in the old four-course rotation— roots, barley, clover, wheat.

Under this system the clover is ploughed up in the autumn, the nitrogen stored up in its roots being left in the soil for the nourishment of the cereal crop. The following summer the wheat crop is harvested, and an opportunity is afforded for extirpating weeds which in the three previous years have re- ceived little check. Or, where the climate is warm and the soil light, a ” catch-

crop," i.e. rye, vetches, winter-oats or some other rapidly-growing crop may be sown in autumn and fed off or otherwise disposed of prior to the root-sowing. On heavy soils, however, the farmer cannot afford to curtail the time necessary for thorough cultivation of the land. The cleaning process is carried on through the next summer by means of successive hoeings of the spring-sown root-crop. As turnips or swedes may occupy the ground till after Christmas little time is left for the preparation of a seed-bed for barley, but as the latter is a shallow-rooted crop only surface-stirring is required. Clover is sown at the same time or shortly after the cereˆaj a,nd thus occupies the land for two years.

The rotations extending to five, six; seven or more years are, in most cases, only adaptations of the principle to variations of soil, altitude, aspect, climate, markets and other local conditions. They are effected chiefly by some alteration in the description of the root-crop, and perhaps by the introduction of the potato crop; by growing a different cereal, or it may be more than one cereal consecutively; by the growth of some other leguminous crop than clover, since " clover-sickness " may result if that crop is grown at too short intervals, or the intermixture of grass seeds with the clover, and perhaps by the extension by one or more years of the period allotted to this member of the rotation. Whatever the specific rotation, there may in practice be devia- tions from the plan of retaining on the farm the whole of the root-crops, the straw of the grain crops and the leguminous fodder crops (clover, vetches, sainfoin, &c.) for the production of meat or milk, and, coincidently, for that of manure to be returned to the land. It is equally true that, when under the influence of special local or other demand — proximity to towns, easy railway or other communication, for example — the products which would otherwise be retained on the farm are exported from it, the import of town or other manures is generally an essential condition of such practice. This system of free sale, indeed, frequently involves full compensation by purchased manures of some kind. Such deviations from the practice of merely selling grain and meat off the farm have much extended in recent years, and will probably continue to do so under the altered conditions of British agriculture, determined by very large imports of grain, increasing imports of meat and of other products of stock-feeding, and very large imports of cattle-food and other agricultural produce. More attention is thus being devoted to dairy produce, not only on grass farms, but on those that are

mainly arable.

The benefits that accrue from the practice of rotation are well illustrated in the results obtained from the investigations at Rothamsted into the simple four-course system, which may fairly be regarded as a self-supporting system. Reference may first be made to the important mineral constituents of different crops of the four-course rotation. Of phosphoric acid, the cereal crops take up as much as, or more than, any other crops of the rotation, excepting clover; and the greater portion thus taken up is lost to the farm in the saleable product — the grain. The remainder, that in the straw, as well as that in the roots and the leguminous crops, is supposed to be retained on the farm, excepting the small amount exported in meat and milk. Of potash, each of the rotation crops takes up very much more, than of phosphoric acid. But much less potash than phosphoric acid is exported in the cereal grains, much more being retained in the straw, whilst the other products of the rotation— the root and leguminous crops — which are also supposed to be retained on the farm, contain very much more potash than the cereals, and comparatively little of it is exported in meat and milk. Thus the whole of the crops of rotation take up very much more of potash than of phosphoric acid, whilst probably even less of it is ultimately lost to the land. Of lime, very little is taken up by the cereal crops, and by the root-crops much less than of potash; more by the leguminous than by the other crops, and, by the clover especially, sometimes much more than by all the other crops of the rotation put together. Very little of the lime of the crops, however, goes off in the saleable products of the farm in the case of the self-supporting rotation under considera- tion. Although, therefore, different, and sometimes very large, amounts of these typical mineral constituents are taken up by the various crops of rotation, there is no material export of any in the saleable products, excepting of phosphoric acid and of potash; and, so far at least as phosphoric acid is concerned, experience has shown that it may be advantageously supplied in purchased manures.

Of nitrogen, the cereal crops take up and retain much less than any of the crops alternated with them, notwithstanding the circumstance that the cereals are very characteristically benefited by nitrogenous manures. The root-crops, indeed, may contain two or more times as much nitrogen as either pf the cereals,,

and the leguminous crops, especially the clover, much more than the root-crops. The greater part of the nitrogen of the cereals is, however, sold off the farm; but perhaps not more than 10 or 15 % of that of either the root-crop or the clover (or other forage leguminous crop) is sold off in animal increase or in milk. Most of the nitrogen in the straw of the cereals, and a very- large proportion of that of the much more highly nitrogen- yielding crops, returns to the land as manure, for the benefit of future cereals and other crops. As to the source of the nitrogen of the root-crops — the so-called ” restorative crops ” — these are as dependent as any crop that is grown on available nitrogen within the soil, which is generally supplied by the direct appli-

cation of nitrogenous manures, natural or artificial. Under such conditions of supply, however, the root-crops, gross feeders as they are, and distributing a very large extent of fibrous feeding root within the soil, avail themselves of a much larger quantity of the nitrogen supplied than the cereal crops would do in similar circumstances. This result is partly due to their period of accumulation and growth extending even months after the period of collection by the ripening cereals has terminated, and at the season when nitrification within the soil is most active, and the accumulation of nitrates in it is the greatest. When a full supply of both mineral constituents and nitrogen is at command* these root-crops assimilate a very large amount of

Table X

. — The Weight and Average Composition of Ordinary Crops

, in lb. per Acre

Crop.

Weight of Crop.

Total Pure Ash.

Nitro- gen.

Sul- phur.

Potash.

Soda.

Lime.

Mag- nesia.

Phos- phoric Acid.

Chlor- ine.

Silica.

At Harvest.

Dry.

Wheat, grain, 30 bushels ,, straw

Total crop

1,800 3,158

1530 2653

30 142

34 16

2-7

5-i

9-3 19-5

o-6

2-0

1-0 8-2

3-6 3-5

14-2 69

0-1

2-4

o-6

96-3

4,958

4! 83

172

50

7-8

28-8

2-6

9-2

7-1

2I-I

2-5

96-9 (

Barley, grain, 40 bushels „ straw

Total crop

2,080

2,447

1747 2080

46

in

35

2-9 3-2

9-8 25-9

I-I

3-9

1-2

8-o

4-0 29

16-0 4-7

05

3-6

n-8

56-8

4,527

3827

157

49

6-1

357

5-°

9-2

6-9

20-7

4-1

68-6

Oats, grain, 45 bushels ,, straw

Total crop

1,890 3,835

1625 2353

51. 140

34 18

3-2 4-8

9-1 37-0

o-8

4-6

1-8 9-8

3-6 5-1

13-0 6-4

0-5 6-1

19.9 65-4

4,725

3978

191

52

8-0

46-1

5-4

n-6

8-7

19-4

6-6

85-3

Maize, grain, 30 bushels ,, stalks, &c.

Total crop

1,680 2,208

1500

1877

22 99

28 15

1-8

6-5 29-8

0-2

o-5

3-4

IO-O

8-0

0-2

0-5

3,888

3377

121

43

36-3

i-8-o

—

Meadow hay, i| ton .

3,36o

2822

203

49

5-7

50-9

9-2

32-1

14-4

123

14-6

56-9

Red Clover hay, 2 tons

4,480

3763

258

98

9.4

83-4

5-i

90-1

28-2

24-9

9-8

7-0

Beans, grain, 30 bushels ,, straw

Total crop

1,920 2,240

1613 1848

58 99

78 29

4.4 4.9

24-3 42-8

o-6

1-7-

2-9 26-3

4-2 57

22-8

6-3

i-i

4-3

0-4 6-9

4,160

346i

157

107

9-3

6 7 -I

2-3

29-2

9-9

29-1

5-4

7-3

Turnips, root, 17 tons leaf .

Total crop

38,080 11,424

3126 1531

218 146

61 49

15-2

5-7

108-6 40-2

17-0

7-5

25-5 48-5

5-7 3-8

22-4 10-7

10-9

1 1 -2

2-6

5-1

49,504

4657

364

no

20-9

148-8

24-5

74-0

9-5

33-i

22-1

7-7

Swedes, root, 14 tons „ leaf

Total crop

31,360 4,704

3349 706

163

75

70 28

14-6 3-2

63-3 16-4

22-8

92

19-7

22-7

6-8 2-4

16-9 4-8

6-8 8-3

3-1 3-6

36,064

4055

238

98

17-8*

79-7

32-0

42-4

9-2

21-7

I5-I

6-7

Mangels, root, 22 tons leaf .

Total crop

49,280 18,233

59H

1654

426 254

98 51

4.9 91

222-8

77-9

69-4 49-3

15-9 27-0

18-3 24-2

36-4 16-5

42-5 40-6

8-7 9-2

67,513

7568

680

149

14-0

300-7

118-7

42-9

42-5

52-9

8 3 “i

179

Potatoes, tubers, 6 tons

13,440

336o

127

46

27

76-5

3-8

3-4

6-3

21-5

4.4

2-6

*Calculated from a single analysis only.

carbon from the atmosphere, and produce, besides nitrogenous food materials, a very large amount of the carbohydrate sugar, as respiratory and fat-forming food for the live stock of the farm. The still more highly nitrogenous leguminous crops, although not characteristically benefited by nitrogenous manures, never- theless contribute much more nitrogen to the total produce of the rotation than any of the other crops comprised in it. It is the leguminous fodder crops — especially clover, which has a much more extended period of growth, and much wider range of collection within the soil and subsoil, than any of the other crops of the rotation — that yield in their produce the largest amount of nitrogen per acre. Much of this is doubtless taken up as nitrate, yet the direct application of nitrate of soda has comparatively little beneficial influence on their growth. The nitric acid is most likely taken up chiefly as nitrate of lime, but probably as nitrate of potash also, arid

it is significant that the high nitrogen-yielding clover takes up, or at least retains, very little soda. Table XL, from War- ington's

Chemistry of the Farm, 19th edition (Vinton and Co.), will serve to illustrate the subjects that have been discussed in this section.

For further information on the routine and details of farming, reference may be made to the articles under the headings of the various crops and implements.

British Live Stock.

The numbers of live stock in the United Kingdom are shown at five-yearly intervals in Table XII. Under horses are em- braced only unbroken horses and horses used solely for agri- culture (including mares kept for breeding). The highest and lowest annual totals for the United Kingdom in the period 1875- 1905 were the following*

Highest.

Lowest.

Difference.

Horses . Cattle . . Sheep . Pigs. . .

2,116,800 in 1905 n r 674,oi9 ,, 1905

33,642,808 ,, 1892

4,362,040 ,, 1890

1,819,687 in 1875

9-73L537 „ 1877

27,448,220 ,, 1882

2,863,488 „ 1880

295,113 1,942,482 6,194-588 1,498,552

After 1892 cattle, which in that year numbered 11,519,417, and

sheep declined continuously for three years to the totals of 1895, the diminution being mainly the result of the memorable drought of 1893. Sheep, which numbered 32,571,018 in 1878, declined continuously to 27,448,220 in 1882 — a loss of over five million head in five years. This was chiefly attributable to the ravages of the liver fluke which began in the disastrously wet season of 1879. Pigs, being prolific breeders, fluctuate more widely in numbers than cattle or sheep, for the difference of 1,498,552 in their case represents one-third of the highest total, whereas the difference is less than one-seventh for horses, less than one-sixth for cattle, and less than one-fifth for sheep. The

Table XII. — Numbers of Horses, Cattle, Sheep and Pigs in the United Kingdom.

j Year.

Horses.

Cattle.

Sheep.

Pigs.

‘ J875

1,819,687

10.162,787

33,491,948

3.495.167

1880

1,929,680

9-871,153

30,239,620

2,863,488

1885

1,909,200

10,868,760

30,086,200

3,686,628

1890

1-1964,911

10,789,858

31,667,195

4,362,040

1895

2,112,207

10,753.314

29,774,853

4,238,870

j 1900

2,000,402

11,454,902

31,054,547

3,663,669

J 905

2,116,806

11,674,019

29,076,777

3,601,659

relative proportions — as distinguished from the actual numbers — in which stock are distributed over the several sections of the United Kingdom do not vary greatly from year to year. Table XIII., in which the totals for the United Kingdom include those for the Channel Islands and Isle of Man, illustrates the preponderance of the sheep-breeding industry in the drier climate of

■ Great Britain, and of the cattle-breeding industry in the more humid atmosphere of Ireland. In Great Britain in 1905, for

• every head of cattle there were about four head of sheep, whereas in Ireland the cattle outnumbered the sheep. Again,' whilst

■ Great Britain possessed Only half as many cattle more than

Table XIII. — Numbers of Horses, Cattle, Sheep and Pigs in the United Kingdom in 1905.

1905.

Horses.

Cattle.

Sheep.

Pigs.

England .

Wales Scotland .

1,204,124 161,923 206,386

5,020,936

738,789 1,227,295

14,698,018

3,534,967 7,024,211

2,083,226

211,479 130,214

Great Britain .

1,572,433

6,987,020

25,257,196

2,424,919

Ireland

534,875

4,645,215

3.749,352

1,164,316

United / Kingdom 1)

2,116,800

11,674,019

29,076,777

3,601,659

Ireland, she possessed six times as many sheep. The cattle population of England alone slightly exceeded that of Ireland, but cattle are more at home on the broad plains of England than amongst the hills and mountains of Wales and Scotland, which are suitable for sheep. Hence, whilst in England sheep were not three times as numerous as cattle, in Wales they were nearly five times, and in Scotland nearly six times as many. Great Britain had twice as many pigs as Ireland, but the swine industry is mainly English and Irish, and England possessed more than six times as many pigs as Wales and Scotland together, the number in the last-named country being particularly small, 'One English county alone, Suffolk, maintained more pigs than ,the whole of Scotland.

British Imports of Live A nimals and Meat. The stock-breeders and graziers of the United Kingdom have, '

1 Including Channel Islands and Isle of Man.

Up to 1896 store Cattle were admitted into the United King- dom for the purpose of being fattened, but under the Diseases of Animals Act of that year animals imported since then have to be slaughtered at the place of landing. The dimensions of this trade are shown in Table XIV,

Table XI V. — Numbers of Cattle, Sheep and Pigs imported into, the United Kingdom, 1891-1905.

Year.

Cattle.

Sheep.

Pigs.

1 89 1

507,407

■ 344,504

542

1892

502,237

.’ 79,048

3826

1893

340,045 ;

62,682

138

1894

475.440

484,597

8

1895

415.565

1,065,470

321

1896

562,553

769,592

4

1897

618,321

611,504

1898

569,066

663,747

450

1899

503,504

607,755

1900

495,645

382,833

1901

495.635

383,594

1902

419,488

293,203

1903

522,546

354-241

1904

549,532

382,240

1905

565,139

183,084

150

The ariimals come mainly from the United States of America, Canada and Argentina, and the traffic in cattle is more uniform than that in sheep, whilst that in pigs seems practically to have reached extinction. The quantities of dead meat imported increased with great rapidity from 1891 to 1905, a circumstance largely due to the rise of the trade in chilled and frozen meat. Fresh, beef in this form is imported chiefly from the United States and Australasia, fresh mutton from Australasia and Argentina.

Table XV. shows how rapidly this trade expanded during the decade of the ‘nineties. The column headed bacon and hams indicates clearly enough that the imports of fresh meat did not displace those of preserved pig meat, for the latter expanded from 4,715,000 cwt. to 7,784,000 cwt. during the decade. The column for all dead meat includes not only the items tabulated, but also

Table XV. -^-Quantities of Dead Meat imported into the United Kingdom, 1891-1905 — Thousands of Cwt.

Year.

Fresh.

Fresh

Fresh

Bacon

All

Beef.

Mutton.

Pork.

and Hams.

Dead Meat.

1891

192 1

1663

128

4715

9,790

1892

2080

1700

132

5135

10,500

1893

1808

1971

182

4187

9,305

1894

2104

2295

180

4819

10,610

1895

2191

261.1

288

5353

11,977

1896

2660

2895

299

6609

13,347

1897

3010

3193

348

6731

14,729

1898

3101

33H

558

7684

16,445

1899

3803

3446

669

7784

17,658 !

1900

4128

3393

695

7444

17,912

1901

4509

3608

792

7633

18,764

1902

3707

3660

655

6572

16,971

1903

4160

4017

706

6298

17,498

1904

4350

3495

610

6696

17.517

1905

5038

3811

506

6817

18,680

the following, the quantities stated being those for 1905: — Beef, salted, 142,806 cwt.; beef, otherwise preserved,, 598,030 cwt.; preserved mutton, 30,111 cwt.; salted pork, 205,965 cwt.; dead rabbits, 656,078 cwt.; meat, unenumerated, 875,032 cwt. The quantities of these are relatively small, and, excepting rabbits from Australia, they show no general tendency to increase. The extent, to which these growing imports were associated with a decline in value is shown in Table XVI.

The trend of the import trade in meat, live and dead (exclusive of rabbits) , may be gathered from Table XVII. , in which are given the annual average imports from the eight quinquennial periods embraced between 1866 and 1905. An increase in live cattle accompanied a decrease in live sheep and pigs, but the imports of dead meat expanded fifteen-fold over the period.

The rate at which the trade in imported frozen mutton increased as compared with the industry in home-grown mutton is illustrated in the figures published annually by Messrs W.

Weddel and Company, from which those for 1885 and 1890 and

for each year from 1895 to 1906 are given in Table XVIII. The home-grown is the estimated dead weight of sheep and lambs slaughtered, which is taken at 40 % of the total number of sheep and lambs returned each year in the United Kingdom. In the

Table XVI. — Average Values of Fresh Meat, Bacon and Hams imported into the United Kingdom, 1891-1905 — per Cwt.

Year.

Fresh Beef.

Fresh Mutton.

Fresh Pork.

Bacon.

Hams.

s. d.

s. d.

s. d.

s. d.

s. d.

1891

42 1

39 6

47 6

37 11

46 4

1892

42 5

40 6

46 11

40 10

47 4

1893

42 4

39 3

50

53

58 5

1894

40

37 10

48 5

43 10

49 1

1895

39

35 2

46 1

39

44 11

1896

37 10

32 7

45 ”

34 6

43 °

1897

38 5

3° 3

44

35 5

42 8

1898

38 2

29 7

41 10

36 2

39 6

1899

38 8

31 7

41 11

35 10

41 5

1900

39 7

34 5

43

41 9

46 10

1901

39 6

36 7

43 4

47 1

48 8

1902

42 8

37 9

44 2

52 9

52 1

1903

40 3

39

44 1

52 10

55 1

1904

37 1

39 3

45 2

47 1

49 11

1905

35 6

38 6

46

46 6

47 4

imported column is given the weight of fresh (frozen) mutton and lamb imported, r3lus the estimated dead weight of the sheep imported on the hoof for slaughter. The quantity imported in 1899 was double that in 1890, and quadruple that in 1885. Moreover, in 1885 the imported product was only about one-seventh

Table XVII. — Average Annual Imports of Cattle, Sheep and Pigs, and of Dead Meat, into the United Kingdom over eight ˆ-yearly Periods.

Period.

Cattle.

Sheep.

Pigs.

Dead Meat.

No.

No.

No.

Cwt.

1866-1870

194.947

610,300

64,827

1,155,867

1871-1875

215,990

864,516

74,040

3,134,175

1876-1880

272,745

938,704

44,6i3

5,841,913

1881-1885

387.282

974,316

24,355

6,012,495

1 886-1 890

438,098

800,599

19,437

7,681,729

1891-1895

448,139

407,260

967

10,436,549

1 896- 1 900

549,818

607,086

91

15,785,354

1901-1905

510,468

319,272

30

17,384,366

as much as the home-grown, whereas in 1890 it was more than one-fourth, and in 1906 close on two-thirds. This large import trade in fresh meat, which sprang up entirely within the last quarter of the 19th century, has placed an abundance of cheap and wholesome food well within the reach of the great industrial

Table XVIII. — Home Product and Imports of Sheep and Mutton into the United Kingdom — Thousands of Tons.

Year.

Home- grown.

Imported.

Year.

Home- grown.

Imported.

1885

322

47

1900

332

179

1890

339

92

1901

330

191

1895

319

157

1902

322

191

1896

329

164

1903

318

210 1

1897

327

175

1904

3″

185

1898

333

182

1905

312

195

1899

339

187

1906

313

207

populations of the United Kingdom. At the same time it cannot be gainsaid that it has opened the way to fraud. Butchers have palmed off upon their customers imported fresh meat as home-grown, and secured a dishonest profit by charging for it the prices of the latter, which are considerably in excess of those of the imported product.

Sale of Cattle by Live Weight. In connexion with the internal live stock trade of Great Britain attention must be directed to the Markets and Fairs (Weighing of Cattle) Act 1891. The object of

this measure is to replace the

1 In 1903 two of the principal sources of supply of mutton shipped in excess of their exportable surplus, for which they suffered severely in 1904 — hence the somewhat irregular movements after 1903.

old-fashioned system of guessing at the weight of an animal by the sounder method of obtaining the exact weight by means of the weighbridge. The grazier buys and sells cattle much less frequently than the butcher buys them, so that the latter is naturally more skilled in estimating the weight of a beast through the use of the eye and the hand. The resort to the weighbridge should put both on an equality, and its use tends to increase. Under the act, as supplemented by an Order of the Board of Agriculture in 1905, there were in that year 26 scheduled places in England and 10′ in Scotland-, or 36 altogether, from which returns were obtained. The numbers of cattle (both fat and store) weighed at scheduled places in 1893 and 1905 2 were respectively 7-59 and 18 % of those entering those markets. The numbers for Scotland are greater throughout than those for England, 72 % of the fat cattle entering the scheduled markets "In Scotland in 1905 2 having been weighed, while in England the proportion was only 20 %. Little use is made of the weighbridge in selling store-cattle, sheep or swine. As the main object of the act is to obtain records of prices, it follows that only in so far as statements of the prices realized, together with the descripv tion of the animals involved, are obtained, is the full advan- tage of the statute secured. In 1905 the average price per cwt. for fat cattle in Great Britain was 32s. nd. as compared with 35s. 2d. in 1900.

Food-values and Early Maturity.

In the feeding experiments which have been carried on at Rothamsted it has been shown that the amount consumed both for a given live weight of animal within a given time, and for the production of a given amount of increase, is, as current foodstuffs go, measurable more by the amounts they contain of digestible and available non-nitrogenous constituents than by the amounts of the digestible and available nitrogenous constituents they supply. The non-nitrogenous substance (the fat) in the increase in live weight of an animal is, at any rate in great part, if not entirely, derived from the non-nitrogenous constituents of the food. Of the nitrogenous compounds in food, on the other

hand, only a small proportion of the whole consumed is finally stored up in the increase of the animal— in other words, a very large amount of nitrogen passes through the body beyond .that which is finally retained in the increase, and so remains for manure. Hence it is that the amount of food consumed to produce a given amount of increase in live weight, as well as that required for the sustentation of a given live weight for a given time, should — provided the food be not abnormally deficient in nitrogenous substance — be characteristically dependent on its supplies of digestible and available non-nitrogenous constituents. It has further been shown that, in the exercise of force by animals, there is a greatly increased expenditure of the non-nitrogenous constituents of food, but little, if any, of the nitrogenous. Thus, then, alike for maintenance, for increase, and for the exercise of force, the exigencies of the system are characterized more by the demand for the digestible non-nitrogerious or more specially respiratory and fat-forming constituents than by that for the nitrogenous or more specially flesh-forming ones. Hence, as current fattening food-stuffs go-ˆ-assuming, of course, that they are not abnormally low in the nitrogenous constituents — they are, as foods, more valuable in proportion to their richness in digestible and available non-nitrogenous than to that of their. nitrogenous constituents. As, however, the manure of the animals of the farm is valuable largely in proportion to the nitrogen it contains, there is, so far, an advantage in giving a food somewhat rich in nitrogen, provided it is in other respects a good one, and, weight for weight, not much more costly.

The quantity of digestible nutritive matter in 1000 lb of ordinary feeding-stuffs when supplied to sheep or oxen is shown in Table XIX. This table is taken from Warington's Chemistry of the Farm, 19th edition (Vinton and Co.) , to which reference may be made for a detailed discussion of the feeding of animals.

In the . fattening of animals for the butcher the principle of J Returns for only ten months were available for this year.

early maturity has received full recognition. If the sole purpose

for which an animal is reared is to prepare it for the block- — and this is the case with steers amongst cattle and with wethers amongst sheep — the sooner it is ready for slaughter the less should be the outlay involved. During the whole time the animal is living the feeder has to pay what has been termed the ” life tax ” — that is, so much of the food has to go to the main- tenance of the animal as a living organism, independently of that which may be undergoing conversion into what will sub- sequently be available in the form of beef or mutton. If a bullock can be rendered fit for the butcher at the age of two or three years, will the animal repay another year’s feeding? It has been proved at the Christmas fat stock shows that the older a bullock gets the less will he gain in weight per day as a result of the feeding. With regard to this point the work of the Smith- field Club deserves recognition. This body was instituted in 1798 as the Smithfield Cattle and Sheep Society, the title being

Table XIX. — Digestible Matter in 1000 lb. of various Foods.

i

Total

Nitrogenous Substances.

Soluble

Organic Matter.

Fat.

Carbo- hydrates.

Fibre.

Albu-

Amides,

1

minoids.

etc.

Cotton cake (decorticated) .

691

374

18

128

158

13

i ,, (undecorticated)

422

150

13

5°

177

32

Linseed cake ....

655

230

11

103

266

45

. Peas

747

175

25

12

499

36

Beans

, 733

196

28

12

446

5 1

Wheat 1 .

786

92

13

15

656

10

Oats

600

81

7

45

441

26

Barley

715

70

4

19

607

15

Maize

.

786

73

6

44

651

12

Rice meal

612

67

10

102

411

22

Wheat bran

585

90

20

27 ‘

426

22

Malt sprouts

681

114

71

11

379

106

Brewers’ grains

137

34

2

14

67

20

(dried) .

529

136

8

57

266

62

Pasture grass

156

19

11

6

84

36

Clover (bloom beginning) .

123

17

8

5

63

30

Clover hay (medium) .

440

47

25

13

242

113

Meadow hay (best)

5ii

60

18

J 3

269

151

„ (medium)

485

40

12

12

269

152

„ (poor) .

460

29

5

10

242

174

Maize silage ....

124

1

V

7

7

75

34

Bean straw ....

412

4

6

211

155

Oat straw . .

38i

7

5

7

163

199

Barley straw ....

426

4

3

6

211

202

Wheat straw ....

35i'

t

1

4

150

193

Potatoes ....

213

5

9

1

195

3

Mangels (large)

89

1

8

i

74

6

„ (small)

109

2

6

1 2

96

5

Swedes ....

87

2

7

1

71

6

Turnips . ....

68

1

5

1

56

s

changed to that of the Smithfield Club in 1802. The original object — the supply'of the cattle markets of Smithfield and other places with the cheapest and best meat — is still kept strictly in view. The judges, in making their awards at the show held annually in December, at Islington, North London (since 1862), are instructed to decide according to quality of flesh, lightness of offal, age and early maturity, with no restrictions as to feeding, and thus to promote the primary aim of the club in encouraging the selection and breeding of the best and most useful animals for the production of meat, and testing their capabilities in respect of early maturity. At the first show, held at Smithfield in

1799, two classes were provided for cattle and two for sheep, the prizes offered amounting to £52 : 10s. In 1839 the classes comprised seven for cattle, six for sheep, and one for pigs, with prizes to the amount of £300. By 1862 the classes had risen to 29 for cattle, 17 for sheep and 4 for pigs, and the prize money to £2072. At the centenary show in 1898 provision was made for 40 classes for cattle, 29 for sheep, 18 for pigs, and 7 for animals to be slaughtered, whilst to mark the importance of the occasion the prizes offered amounted to close upon £5000 m value. In

1 In the absence of experiments it is assumed that wheat is digested like other foods of the same class.

1907 there were 38 classes for cattle, 29 for sheep, 20 for pigs, and 1 2 for carcase competitors, and the value of the prizes was £4113. The sections provided for cattle are properly restricted to what may be termed the beef breeds; in the catalogue order they are Devon, South Devon, Hereford, Shorthorn, Sussex, Red Polled, Aberdeen-Angus, Galloway, Welsh, Highland, Cross-bred, Kerry and Dexter, and Small Cross-bred.

It will be noticed that such characteristically milking breeds as the Ayrshire, Jersey and Guernsey have no place here. Provision is made, however, for all the well-known breeds of sheep and swine. In the cattle classes, aged beasts of huge size and of considerably over a ton in weight used to be common, but in recent years the tendency has been to reduce the upper limit of age, and thus to bring out animals ripe for the butcher in a shorter time than was formerly the case. An important step in this direction was taken in 1896, when the senior class for steers, viz. animals three to four years old, was abolished, the maximum age at which steers were allowed to compete for prizes being reduced. to three years. The cow classes were abolished in 1897, and in the schedule of the 1905 exhibition the classes for each breed of cattle were (1) for steers not exceeding two years old, (2) for steers above two years and not exceeding three years old, and (3) for heifers not exceeding three years old. The single exception is provided by the slowly-maturing Highland breed of cattle, for which classes were allotted to (1) steers not exceeding three years old, (2) steers or oxen above three years old (with no maximum limit), and (3) heifers not exceeding four years old. As illustrating heavy weights, there were in the 1893 show, out of 310 entries of cattle, four beasts which weighed over a ton. They were all steers of three to four years old, one being a Hereford weighing 20 cwt. 2 qr. 4 lb, and the others Shorthorns weighing

respectively 20 cwt. 2 qr., 20 cwt. 3 qr. 21 lb, and 22 cwt. 2 qr. 18 lb. In the 1895 show, out of 356 entries of cattle, there were seven beasts of more than a ton in weight. They were all three to four years old, and comprised four Shorthorns (top weight 21 cwt. 1 qr. 18 lb), one Sussex (22 cwt. 3 qr. 7 lb), and two cross-breds (top weight 20 cwt. 3 qr. 24 lb). In the 1899 show, with 311 entries of cattle, and the age limited to three years, no beast reached the weight of a ton, the heaviest animal being a cross-bred(Aberdeen-Angus and Shorthorn) which,at three years old, turned the scale at 19 cwt. 1 qr. 5 lb. Out of 301 entries in 1905 the top weight was 19 cwt. 1 qr. 25 lb in the case of a Shorthorn steer. Useful figures for purposes of com- parison are obtained by dividing the weight of a fat beast by the number of days in its age, the weight at birth being thrown in. The average daily gain in live weight is thus arrived at, and as the animal increases in age this average gradually diminishes, until the daily gain reaches a stage at which it does not afford any profitable return upon the food consumed. At the centenary show of the Smithfield Club in 1898 the highest average daily gains in weight amongst prize-winning cattle were provided by a Shorthorn- Aberdeen cross-bred steer (age, one year seven months; daily gain 2-47 lb); a Shorthorn steer (age, one year seven months; daily gain, 2-44 lb); and an Aberdeen-Shorthorn cross-bred steer (age, one year ten months; daily gain, 2-33ˆ)). These beasts, it will be observed, were all under two years old. Amongst prize steers of two and a half to three years old, on the same occasion, the three highest daily average gains in live weight were 2-07 lb for an Aberdeen-Angus, 1-99 ft for a Short- horn-Aberdeen cross-bred and 1-97 lb for a Sussex. In the sheep section of the Smithfield show the classes for ewes were finally abolished in 1898, and the classes restricted to wethers and

wether lambs, whose function is exclusively the production of meat. At the 1 905 show, sheep of each breed, and also cross-breds, competed as (1) wether lambs under twelve months old, and (2) wether sheep above twelve and under twenty-four months old. The only exception was in the case of the slowly-maturing Cheviot and mountain breeds, for which the second class was for wether sheep of any age above twelve months. Of

prize sheep at the centenary show the largest average daily gain was 0-77 lb per head given by Oxford-Hampshire cross-bred wether lambs, aged nine months two weeks. In the case of wether sheep, twelve to twenty-four months old, the highest daily increase was o- 56 lb per head as yielded by Lincolns, aged twenty-one months. Within the last quarter of the 19th century the stock-feeding practices of the country were much modified in accordance with these ideas of early maturity. The three-year-old wethers and older oxen that used to be common in the fat stock markets are now rarely seen, excepting perhaps in the case of mountain breeds of sheep and Highland cattle. It was in 1875 that the Smithfield Club first provided the competitive classes for lambs, and in 1883 the champion plate offered for the best pen of sheep of any age in the show was for the first time won by lambs, a pen of Hampshire Downs. The young classes for bullocks were established in 1880. The time-honoured notion that an animal must have completed its growth before it could be profitably fattened is no longer held, and the improved breeds which now exist rival one another as regards the early period at which they may be made ready for the butcher by appropriate feeding and management.

In 1895 the Smithfield Club instituted a carcase competition in association with its annual show of fat stock, and it has been continued each year since. The cattle and sheep entered for this competition are shown alive on the first day, at the close of which they are slaughtered and the carcases hung up for exhibition, with details of live and dead weights. The competition thus constitutes what is termed a " block test," and it is instructive in affording the opportunity of seeing the quality of the carcases furnished by the several animals, and in particular the relative proportion and distribution of fat and lean meat. The live animals are judged and subsequently the carcases, and, though the results sometimes agree, more often they do not. Tables are con- structed showing the fasted live weight, the carcase weight, and the weight of the various parts that are separated from and not included with the carcase. An abundance of lean meat and a moderate amount of fat well distributed constitutes a better carcase, and a more economical one for the consumer, than a carcase in which gross accumulations of fat are prominent. To add to the educational value of the display, information as to the methods of feeding would be desirable, as it would then be possible to correlate the quality of the meat with the mode of its manufacture. A point of high practical interest is

the ratio of carcase weight to fasted live weight, and in the case of prize- winning carcases these ratios usually fluctuate within very narrow limits. At the 1899 show, for example, the highest proportion of the carcase weight to live weight was 68 % in the case of an Aberdeen- Angus steer and of a Cheviot wether, whilst the lowest was 61 %, afforded alike by a Shorthorn-Sussex cross-bred heifer and a mountain lamb. A familiar practical method of estimating carcase weight from live weight is to reckon one Smithfield stone (8 lb) of carcase for each imperial stone (14 lb) of live weight. This gives carcase weight as equal to 57 % of live weight, a ratio much inferior to the best results obtained at the carcase' competition promoted by the Smithfield Club.

Breed Societies.

A noteworthy feature of the closing decades of the 19th century was the formation of voluntary associations of stockbreeders, with the object of promoting the interests of the respective breeds of live stock. As a typical example of these organizations the Shire Horse Society may be mentioned. It was incorporated in 1878 to improve and promote the breeding of the Shire or old English race of cart-horses, and to effect the distribution of sound and healthy sires throughout the country. The society holds

annual shows, publishes annually the Shire Horse Stud Book and offers r gold and silver medals for competition amongst Shire horses at agricultural shows in different parts of the country. The society has carried on a work of high national importance, and has effected a marked improvement in the character and quality of the Shire horse. What has thus voluntarily been done in England would in most other countries be left to the state, or would not be attempted at all. It is hardly necessary to say that the Shire Horse Society has never received a penny of public money, nor has any other of the voluntary breeders' societies. The Hackney Horse Society and the Hunters' Improvement Society are conducted on much the same lines as the Shire Horse Society, and, like it, they each hold a show in London in the spring of the year and publish an annual volume. Other horse-breeders' associations, all doing useful work in the interests of their respective breeds, are the Suffolk Horse Society, the Clydesdale Horse Society, the Yorkshire Coach Horse Society, the Cleveland Bay Horse Society, the Polo Pony Society, the Shetland Pony Stud Book Society, the Welsh Pony and Cob Society and the New Forest Pony Association. Thoroughbred race-horses are registered in the General Stud Book. The Royal Commission on

Horse Breeding, which dates from 1887, is, as its name implies, not a voluntary organization. Through the com- mission the money previously spent upon Queen's Plates is offered in the form of " King's Premiums " (to the number of twenty-eight in 1907) of £150 each for thoroughbred stallions, on condition that each stallion winning a premium shall serve not less than fifty half-bred mares, if required. The winning stallions are distributed in districts throughout Great Britain, and the use of these selected sires has resulted in a decided improvement in the quality of half-bred horses. The annual show of the Royal Commission on Horse Breeding is held in London jointly and concurrently with that of the Hunters' Improvement Society.

Of organizations of cattle-breeders the English Jersey Cattle Society, established in 1878, may be taken as a type. It offers prizes in butter-test competitions and milking trials at various agricultural shows, and publishes the English Herd Book and Register of Pure-bred Jersey Cattle. This volume records the births in the herds of members of the society, and gives the pedigrees of cows and bulls, besides furnishing lists of prize-winners at the principal shows and butter-test awards, and reports of sales by auction of Jersey cattle. Other cattle societies, all well caring for the interest of their respective breeds, are the Shorthorn Society of Great Britain and Ireland, the Lincolnshire Red Shorthorn Association, the Hereford Herd Book Society, the Devon Cattle Breeders' Society, the South Devon Herd Book Society, the Sussex Herd Book Society, the Long- horned Cattle Society, the Red Polled Society, the English Guernsey Cattle Society, the English Kerry and Dexter Cattle Society, the Welsh Black Cattle Society, the Polled Cattle Society (for the Aberdeen-Angus breed), the English Aberdeen- Angus Cattle Association, the Galloway Cattle Society, the Ayr- shire Cattle Herd Book Society, the Highland Cattle Society of Scotland and the Dairy Shorthorn Association.

In the case of sheep the National Sheep Breeders' Association looks after the interests of flockmasters in general, whilst most of the pure breeds are represented also by separate organizations. The Hampshire Down Sheep Breeders' Association may be taken as a type of the latter, its principal object being to encourage the breeding of Hampshire Down sheep at heme and abroad, and to maintain the purity of the breed. It publishes an annual Flock Book, the first volume of which appeared in 1890. In this book are named the recognized and pure-bred sires which have been used, and ewes which have been bred from, whilst there are also

registered the pedigrees of such sheep as are proved to be eligible for entry. Prizes are offered by the society at various agricultural shows where Hampshire Down sheep are exhibited. Other sheep societies include the Leicester Sheep Breeders' Association, the Cotswold Sheep Society, the Lincoln Longwool Sheep Breeders' Association, the Oxford Down Sheep Breeders' Association, the Shropshire Sheep Breeders' Association and Flock Book Society, the Southdown Sheep Society, the Suffolk

Sheep Society, the Border Leicester Sheep Breeders' Society, the Wensleydale Longwool Sheep Breeders' Association and Flock Book Society, the Incorporated Wensleydale Blue-faced Sheep Breeders' Association and Flock Book Society, the Kent Sheep Breeders' Association, the Devon Longwool Sheep Breeders' Society, the Dorset Horn Sheep Breeders' Association, the Cheviot Sheep Society and the Roscommon Sheep Breeders' Association.

The interests of pig-breeders are the care of the National Pig-Breeders' Association, in addition to which there exist the British Berkshire, the Large Black Pig, and the Lincoln Curly- Coated White Pig Societies, and the Incorporated Tamworth Pig Breeders' Association.

The addresses of the secretaries of the various live-stock societies in the United Kingdom are published annually in the Live Stock Journal Almanac.

The Maintenance of the Health of Live Stock.

It was not till the closing decade of the 19th century that the stock-breeders of the United Kingdom found themselves in a position to prosecute their industry free from the fear of the introduction of contagious, disease through the medium of store animals imported from abroad for fattening on the native pastures. By the Diseases of Animals Act 1896 (59′ & 60 Vict. c. 15) it was provided that cattle, sheep and pigs imported into the United Kingdppi should be slaughtered at the place of landing. The effect was to reduce to a minimum the risk of the introduction of disease amongst the herds and flocks of the country, and at the same time to confine the trade in store stock exclusively to the

breeders of Great Britain and Ireland. This arrangement makes no difference to the food-supply of the people, for dead meat continues to arrive at British ports in ever-increasing quantity. Moreover, live animals are admitted freely from certain countries, provided such animals are slaughtered at the place of landing. At Deptford, for example, large numbers of cattle and sheep which thus arrive — mainly from Argentina, Canada and the United States — are at once slaughtered, and so furnish a steady supply of fresh-killed beef and mutton. The animals which are shipped in this way are necessarily of the best quality, because the freight on a superior beast is no more costly than on an inferior one, and the proportion of freight to sale price is there- fore less With this superior description of butchers' stock all classes of home-grown stock — good, bad and indifferent — have, of course, to compete. The Board of Agriculture has the power to close the ports of the United Kingdom against live animals from any country in which contagious disease is known to exist. This accounts for the circumstance that so few countries — none of them in Europe — enjoy the privilege of sending live animals to British ports. In 1900 the discovery early in the year of the existence of foot-and-mouth disease amongst cattle and sheep shipped from Argentina to the United Kingdom led to the issue of an order by which all British ports were closed against live animals from the country named. This order came into force on the 30th of April, and the result was a marked decline in the shipments of live cattle and sheep from the River Plate, but a decided increase in the quantity of frozen meat sent thence to the United Kingdom.

The last quarter of the 19th century witnessed an important change in the attitude of "public opinion towards legislative control over the contagious diseases of animals. When, after the introduction of cattle plague or rinderpest in 1865, the proposal was made to resort to the extreme remedy of slaughter in order to check the ravages of a disease which was pursuing its course with ruinous results, the idea was received with public indignation and denounced as barbarous. Views have undergone profound modification since, then, and the most drastic remedy has come to be regarded as the most effective, and in the long run the least costly. The Cattle Diseases Prevention Act 1866 (29 & 30 Vict. c. 2) made compulsory the slaughter of diseased cattle, and permitted the slaughter of cattle which had been exposed to infection, compensation being provided out of the rates. The Act 30 & 31 Vict. c. 125, 1867, is of historical interest,

in that it contains the first mention of pleuro-pneumonia, and the exposure in any market of cattle suffering from that disease was made an offence. The Contagious Diseases (Animals) Act 1869 (32 & 33 Vict. c. 70) revoked all former acts, and defined disease to mean cattle plague, pleuro-pneumonia, foot-and-mouth disease, sheep-pox, sheep-scab and glanders, together with any disease which the Privy Council might by order specify. The principle of this act in regard to foreign animals was that of free importation, with power for the Privy Council to prohibit or subject to quarantine and slaughter, as circumstances seemed to require. The act of 1869 was at that time the most complete measure that had ever, been passed for dealing with diseases of animals. The re-introduction of cattle plague into England in 1877 led to the passing of the Act 41 & 42 Vict. c. 74, 1878, which repealed the act of 1869, and affirmed as a principle the landing of foreign animals for slaughter only, though free im- portation or quarantine on the one hand and prohibition on the other were provided for in ■ exceptional circumstances. By an order of council which came into operation in December 1878, swine fever was declared to be a disease for the purposes of the act of that year. It was not, however, till October 1886 that anthrax and rabies were officially declared to be contagious diseases for the purposes of certain sections of the act of 1878. In 1884 the Act 47 & 48 Vict. c. 13 empowered the Privy Council to prohibit the landing of animals from any country in respect of which the circumstances were not such as to afford reason- able security against the introduction of foot-and-mouth disease. After one or two other measures of minor importance came the Act 53 & 54 Vict. c. 14, known as the Pleuro-pneumonia Act 1890, which transferred the powers of local authorities to slaughter and pay compensation in cases of pleuro-pneumonia to the Board of Agriculture, and provided further for the payment of such compensation out of money specifically voted by parliament. This measure was regarded at the time as a marked step in advance, and was only carried after a vigorous campaign in its favour. In 1892 by the Act 55 & 56 Vict. c. 47 power was given to the Board of Agriculture to use the sums voted on account of pleuro-pneumonia for paying the costs involved in dealing with foot-and-mouth disease; under this act the board could order the slaughter of diseased animals and of animals in contact with these, and could pay compensation for animals so slaughtered. Under the provisions of the Contagious Diseases (Animals) Act 1893 (56 & 57 Vict. c. 43) swine fever in Great Britain was, from the 1st of November in that year, dealt with by the Board of

Agriculture in the same way as pleuro-pneumonia, the slaughter of infected swine being carried out under directions from the central authority, and compensation allowed from the imperial exchequer. In 1894 was passed the Diseases of Animals Act (57 & 58 Vict. c. 57), the word "contagious" being omitted from the title. This was a measure to consolidate the Contagious Diseases (Animals) Acts 1878-1893. In it "the expression ' disease ' means cattle plague (that is to say, rinderpest, or the disease commonly called cattle plague), contagious pleuro- pneumonia of cattle (in this act called pleuro-pneumonia), foot-and-mouth disease, sheep-pox, sheep-scab, or swine fever (that is to say, the disease known as typhoid fever of swine, soldier purples, red disease, hog cholera or swine plague)." The Diseases of Animals Act 1896 (59 & 60 Vict. c. 15) rendered compulsory the slaughter of imported live stock at the place of landing, a boon for which British stock-breeders had striven for many years. The ports in Great Britain at which foreign animals may be landed are Bristol, Cardiff, Glasgow, Hull, Livers- pool, London,\ Manchester and Newcastle-upon-Tyne. Animals from the Channel Islands may be landed at Southampton.

The Diseases of Animals.

Under the Diseases of Animals Acts 1894 and 1896 weekly returns are issued by the Board of Agriculture of outbreaks of anthrax, foot-and-mouth disease, glanders (including farcy), pleuro-pneumonia, rabies and swine fever in the counties of Great Britain; also monthly returns of outbreaks of sheep-scab.

Cattle plague, or rinderpest, has not been recorded in Great

Britain since 1877. In that year there were 47 outbreaks distributed over five counties and involving 263 head of cattle.

The course of foot-and-mouth disease in Great Britain between 1877 and 1905 inclusive is told in Table XX., from which the

Table XX. — Outbreaks of Foot-and- Mouth Disease in Great Britain,

1877-1905.

Out-

Animals attacked.

Year.

Counties.

breaks.

Cattle.

Sheep.

Swine.

Other Animals.

1877

55

858

5.640

7.405

2,099

1878

45

235

912

8,609

245

1879

29

137

261

15.681

5

1880

38

1,461

20,918

9,572

1,886

2

1881

49

4,833

59.484

117. !52

6,330

80

1882

49

1.97°

23.973

11,412

2,564

1

1883

75

18,732

219,289

217,492

24.332

32

1884

55

949

12,186

14,174

1,860

1

1885

10

30

354

34

30

1886

1

1

10

1892

15

95

1,248

3.412

107

1893

2

2

30

1894

3

3

7

261

1900

9

21

. 214

50

2

1901

3

12

43

626

1902

1

1

2

118

years 1887 to 1891, 1895 to 1899 an d 1003 to 1905 inclusive are omitted, because there was no outbreak during those periods. The disease is seen to have attained its maximum virulence in

1883.

Sheep-scab is a loathsome skin disease due to an acarian parasite. Table XXI. shows the number of outbreaks and the number of counties over which they were distributed from 1877 to 1905. The recorded outbreaks were more numerous in the decade of the ‘nineties than in that of the ‘eighties, though possibly this may have been due to greater official activity in the later period. The largest number of sheep attacked was

Table XXI. — Outbreaks of Sheep-Scab in Great Britain,

1877-1905.

Year.

Counties.

Outbreaks. J Year.

Counties.

Outbreaks.

1877 1880 1885

77 70 69

3214 1556 1512

1890

1895 1900

1905

75 88

78 73

1506 3092

1939 918

68,715 (in 1877). It is compulsory on owners to notify the authorities as to the existence of scab amongst their sheep. By the Diseases of Animals Act (1003) powers to prescribe the dipping of sheep, irrespective of the presence or otherwise of sheep scab, were conferred upon the Board of Agriculture. An inspector of the board or of the local authority was by the same act authorized to enter premises and examine sheep. Each year the disorder runs a similar course, the outbreaks dwindling to a minimum in the summer months, June to August, and attaining a maximum in the winter months, December to February. It is chiefly in the ” flying ” flocks and not in the breeding flocks that the disease is rife, and it is so easily communicable that a drove of scab-infested sheep passing along a road may leave behind them traces sufficient to set up the disorder in a drove – of healthy sheep that may follow. For its size and in relation to its sheep population Wales harbours the disease to a far greater extent than the other divisions of Great Britain.

The fatal disease known as anthrax did not form the subject of official returns previous to the passing of the Anthrax Order of 1886. Isolated outbreaks are of common occurrence, and from the totals for Great Britain given in Table XXII. it would appear that there is little prospect of the eradication of this bacterial disorder.

Glanders (including farcy) was the subject during the twenty-four years 1877-1900 of outbreaks in Great Britain ranging between a minimum of 518 in 1877 and a maximum of 1657 in 1892; in the former year 758 horses were attacked, and in the latter 3001. A recrudescence of the disease marked the closing

years of the 19th century, the outbreaks having been 748 in 1898,

853 in 1899 and 1119 in 1900. The counties of Great Britain over which the annual outbreaks have been distributed have ranged between 24 in 1890 and 52 in 1879. As a matter of fact,

Table XXII. — Outbreaks of Anthrax in Great Britain,

1895-1905.

Year.

Counties.

Outbreaks.

Animals attacked.

Cattle.

Sheep.

Swine.

Horses.

1895 1896

1897 1898 1899 1900 1901 1902 1903 1904 1905

66 64 67 73 67 74 63

7i

78 77 84

434 488

433 556 534 571 651 678 767 1049 970

604 632 521 634 634 668 708 746 809

III5

IOOI

158 34 39 22 69 40 76 50 48 62

53 :

140 200 284 161

253 204

152 192

234 365 210

32 38 38 39 30 44 35 44 51 47 53

however, the disease is strongly centred upon the metropolitan area, more than half of the outbreaks being reported from the county of London alone.

The Rabies order was passed in 1886, and the number of counties in Great Britain in which cases of rabies in dogs were reported in each subsequent year is shown in Table XXIII. In addition there have been some cases of rabies in animals other, than dogs. The disease was very rife in 1895, but the extensive application of the muzzling restrictions of the Board of Agri- culture was accompanied by so steady a diminution in the

Table XXIII. — Cases of Rabies in Dogs in Great Britain,

1887-1902.

Year.

Counties.

Cases.

Year.

Counties.

Cases.

1887

28

217

1895

29

672

1888

19

160

1896

41

438

1889

20

312

1897

30

151

1890

20

129

1898

10

17

1891

17

79

1899

4

9

1892

12

38

1900

2

6

1893

18

93

1901

1

1

1894

17

248

1902

4

13

prevalence of the disease, that it was thought the latter had been extirpated. The entire revocation of the muzzling order, which accordingly followed, proved, however, to be premature, and it became necessary to reimpose it in the districts where it had last been operative, namely, certain parts of South Wales. No cases were reported in 1903, 1904 or 1905.

Pleuro-pneumonia in Great Britain was dealt with by the local

authorities up to the year 1890. Between 1870 and 1889 the annual outbreaks had ranged between a minimum of 312 in 1884 and a maximum of 3262 in 1874, the largest number of cattle attacked in any one year being 7983 in 1872. The largest number of counties over which the outbreaks were distributed was 72 in 1873. On the 1st of September 1890 the Board of Agriculture assumed powers with respect to pleuro-pneumonia under the Diseases of Animals Act of that year. Their adminis- tration was attended by success, for from 192 outbreaks in Great Britain in 1891 the total fell to 35 in 1892 and to 9 in 1893. In the four subsequent years, 1894-1897, the outbreaks numbered 2, 1, 2. and 7 respectively. In January 1898 an outbreak was discovered in a London cow-shed. This proved to be the last case in the 19th century of what at one time had been a veritable scourge to cattle-owners and a source of heavy financial loss.

Between 1879 and 1892 inclusive, administration with regard to swine-fever was entrusted to local authorities. The largest number of outbreaks reported in any one of those years was 7926 in 1885, and the smallest 1717 in 1881. In 1893 the Board of Agriculture took over the management, and Table XXIV. shows the number of counties in which swine-fever existed, the number of outbreaks confirmed and the number of swine slaughtered by order of the board in each year since. The trouble with this disease has been mainly in England, the outbreaks in

Wales and Scotland being comparatively few. What are termed

” swine-fever infected areas ” are scheduled by the board when

and where circumstances seem to require, and the movement

Table XXIV. — Outbreaks of Swine Fever in Great Britain,

1894-1905.

Outbreaks confirmed .

Swine slaughtered as

Year.

Counties.

diseased, or as having been exposed to infection.

1894

73

.5682

56,296

1895

73

6305

69,931

1896

77

5166 ,

79,586

1897

74

2155

40,432

1898

72

25H

43,756

1899

7i

2322

30,797

1900

62

1940

17,933

1901

71

3HO

15,237

1902

67

1688

8,263

1903

63

1478

7,933

1 9O4

64

1 196

5,603

1905

58

817

3,876

of swine within such areas is prohibited, much inconvenience to trade resulting from restrictions of this kind. Frequently, more-over, the exhibition of pigs at agricultural shows has to be abandoned in consequence of these swine-fever, regulations.

The Trade in Live Stock between Ireland and Great Britain.

The compulsory slaughter at the place of landing does not extend to animals shipped from Ireland into Great Britain, and this is a matter of the highest importance to Irish stock-breeders, who find their best market close at hand on the east of St George's Channel. Table XXV. shows the number of cattle, sheep and pigs shipped from Ireland into Great Britain in each of the fifteen years 1891-1905, the numbers of horses similarly shipped being also indicated. On the average rather more than half the total of cattle is made up of store animals for fattening or breeding purposes, the fattening of Irish stores being a busi- ness of considerable magnitude in Norfolk and other counties. Calves constitute about one-twelfth of the total number of cattle.

Table XXV. — Imports of Live Stock from Ireland into Great Britain, 1 891-1905.

Year.

Cattle.

Sheep.

Pigs.

Horses.

1891

630,802

893,175

503,584

33,396

1892

624,457

1,080,202

500,951

32,481

1893

688,669

1,107,960

456,571

30,390

1894

826,954

957,ioi

584,967

33,589

1895

791,607

652,578

547,220

34,560

1896

681,560

737-3o6

610,589

39,856

1897

746,012

804,515

695,307

38,422

1898

803,362

833,458

588,785

38,804

1899

772,272

871,953

688,553

42,087

1900

745,519

862,263

715,202

35,606

1901

642,638

843,325

596,129

25,607

1902

959.241

1,055,802

637,972

25,260

1903

897,645

825,679

569,920

27,719

1904

772,363

739,266

505,080

27,500

1905

749,131

700,626

363,823

30,723

Most of the pigs sent from Ireland into Great Britain are fat, the store pigs accounting for less than one-tenth of the total number.

The returns from Ireland under the Diseases of Animals Acts 1894 and 1896 are less significant than those of Great Britain. Thus, in the year ending June 1903, they included 4 outbreaks of anthrax, 219 of swine-fever and 343 of sheep- scab, while there were no cases of rabies. Compared with the export trade in live stock from Ireland to Great Britain the reciprocal trade from Great Britain to Ireland is small, and is largely restricted to animals for breeding purposes. Owing to the reappearance of foot-and-mouth disease in Great Britain early in 1900 the importation of cattle, sheep, goats and swine therefrom into Ireland was temporarily suspended by the authorities in the latter country.

Exports of Animals from the United Kingdom. The general export trade of the United Kingdom in living animals represented an aggregate average annual value over the

five years 1896-1900 of £1,017,000 as against £935,801 over the five years 1901-1905. To these sums the value of horses alone contributed about three-fourths, Belgium taking more than half the number of exported horses. The export trade in cattle, sheep and pigs is practically restricted to pedigree animals required for breeding purposes, and though its aggregate value

Table XXVI. — Quantities and Value of Home-bred Live Stock exported from the United Kingdom, 1900-1905.

Year.

Horses.

Cattle.

Sheep.

Pigs.

Other Animals.

1900 1901 1902

1903 1904

1905

30,038 27,612 30,032 34,798 32,955

47,7o8

2,742 1,648 2,428 2,736 3,3″ 3,938

4,934 2,761

3,596 5,579 8,142

8,378

435 378 515 776

732

93i

75,642 68,012 60,941

52,095 50,873

50,307

1900 1901 1902 1903 1904 1905

£

681,927 605,699 635,661 734,598 581,339 875,647

£

“8,337

61,812

96,153 140,244 146,210 190,406

£

53,306

25,727 29,069 67,758 88,421 133,413

£

3032 3437 5053 7053 7850 8024

£

45,241 45,476 56,691 48,335

43,868 41,061

is not large it is of considerable importance to stock-breeders, as it is a frequent occurrence for buyers for export — to Argentina, Australasia, Canada, the United States and elsewhere — to bid freely at the sale rings, and often to pay the highest prices, thus stimulating the sales and encouraging the breeding of the best types of native stock. Details for the six years 1 900-1 905 are summarized in Table XXVI.

.Implements and Machinery.

It is the custom of the Royal Agricultural Society of England to invite competitions at its annual shows in specified classes of implements, and an enumeration of these will indicate the character of the appliances which were thus brought into prominence in the latter years of the 19th and the early years of the 20th century. These trials taking place, with few intermissions, year after year serve to direct the public mind to the development, which is continually in progress, of the mechanical aids to agriculture. The awards here summarized are quite distinct from those of silver medals which are given by the society in the case of articles possessing sufficient merit, which are entered as ” new implements for agricultural or estate purposes.”

In 1875, at Taunton, special prizes were awarded for one- horse and two-horse mowing-machines, hay-making machines, horse-rakes (self-acting and not self-acting), guards to the drums of threshing-machines, and combined guards and feeders to the drums of threshing-machines. In 1876, at Birmingham, the competitions were of self -delivery reapers, one-horse ■ reapers and combined mowers and reapers without self-delivery. In

1878, at Bristol, the special awards were all for dairy appliances —milk-can for conveying milk long distances, churn for milk, churn for cream, butter-worker for large dairies, butter- worker for small dairies, cheese-tub, curd knife, curd mill, cheese-turning apparatus, automatic means of preventing rising of cream, milk-cooler and cooling vat. A gold medal was awarded for a harvester and self-binder (McCormick’s). In

1879, at Kilburn, the competition was of railway waggons to convey perishable goods long distances at low temperatures. In 1880 at Carlisle, and in 1881 at Derby, the special awards were for broadside steam-diggers and string sheaf-binders re-

spectively. In 1882, at Reading, a gold medal was given for a cream separator for horse power, whilst a prize of 100 guineas offered for the most efficient and most economical method of drying hay or corn crops artificially, either before or after being stacked, was not awarded. In 1883, at York, a prize of £50 was given for a butter dairy suitable for not more than twenty cows. In 1884, at Shrewsbury, a prize of £100 was awarded for a sheaf-binding reaper, and one of £50 for a similar machine. In 1885, at Preston, the competitions were concerned with two-horse, three-horse and four-horse whipple-trees, and packages for

conveying fresh butter by rail. In 1886, at Norwich, a prize of £25 was awarded for a thatch-making machine. In 1887, at Newcastle-on-Tyne, a prize of £200 went to a compound portable agricultural engine, one of £100 to a simple portable agricultural engine, and lesser prizes to a weighing-machine for horses and cattle, a weighing-machine for sheep and pigs, potato-raisers and one-man-power cream separators. In 1888, at Nottingham, hay and straw presses for steam-power, horse-power and hand-power were the subjects of competition. In 1889, at Windsor, prizes were awarded for a fruit and vegetable evaporator, a paring and coring machine, a dairy thermometer, parcel post butter-boxes to carry different weights, and a vessel to contain preserved butter. In 1890, at Plymouth, competitions took place of light portable engines (a) using solid fuel, (6) using liquid or gaseous fuel, grist mills for use on a farm, disintegrators, and cider-making plant for use on a farm. In 1891, at Doncaster, jpecial prizes were given for combined portable threshing and Snishing machines, and cream separators (hand and power). In 1892, at Warwick, the competitions related to ploughs- single furrow (a) for light land, (b) for strong land, (c) for press drill and broad-cast sowing; two-furrow; three-furrow; digging (a) for light land, (b) for heavy land; and one-way ploughs. In 1893, at Chester, self-binding harvesters and sheep-shearing machines (power) were the appliances respec- tively in competition. In 1894, at Cambridge, the awards were for fixed atnd portable oil engines, potato-spraying and tree-spraying machines, sheep-dipping apparatus and churns. In 1895, at Darlington, the competitions were confined to hay-making machines and clover-

making machines. In 1896, at Leicester, prizes were awarded after trial to potato- planting machines, potato-raising machines and butter-drying machines. In 1897, at Manchester, special awards were made for fruit baskets and milk- testers. In 1898, at Birmingham, a prize of £ioo was given for a self-moving vehicle for light loads, £100 and £50 for self-moving vehicles for heavy loads, and £10 for safety feeder to chaff-cutter, in accordance with the Chaff- cutting Machines (Accidents) Act 1897. In 1899, at Maidstone, special prizes were offered for machines for washing hops with liquid insecticides, cream separators (power and hand) , machines for the evaporation of fruit and vegetables, and packages for the carriage of (a) soft fruit, (b) hard fruit. In 1900, at York, the competitions were concerned with horse-power cultivators, self-moving steam diggers, milking machines and sheep-shearing machine*' (power and hand). In 1901, at Cardiff, competition was invited in portable oil engines, agricultural locomotive oil engines and small ice-making plant suitable for a dairy. In the years 1903 and 1904 petrol motors adapted for ploughing and other agricultural operations formed a prominent feature of the exhibits.

The progress of steam cultivation has not justified the hopes that were once entertained in the United Kingdom concerning this method of working implements in the field. It was about the year 1870 that its advantages first came into prominent notice. At that time, owing to labour disputes, the supply of hands was short and horses were dear. The wet seasons that set in at the end of the 'seventies led to so much hindrance in the work on the land that the aid of steam was further called for, and it seemed probable that there would be a lessened demand for horse power. It was found, however, that the steam work was done with less care than had been bestowed upon the horse tillage, and the result was that steam came to be regarded as an auxiliary to horse labour rather than as a substitute for it. In this capacity it is capable of rendering most valuable assistance, for it can be utilized in moving extensive areas of land in a very short time. Accordingly, when a few days occur early in the season favourable to the working of the land, much of it can be got into a forward condition, whilst horses are set free for the lighter operations. The crops can then be sown in due time, which in wet years, and with the usual teams of horses kept on a farm, is not always practicable. Much advantage arises from the steam working of bastard fallows in summer, and after harvest a considerable amount of autumn cultivation can be

done by steam power, thus materially lightening the work in the succeeding spring. On farms of moderate size it is usual to hire steam tackle as required, the outlay involved in the purchase of a set being justifiable only in the case of estates or of very big farms where, when not engaged in ploughing, or in culti- vating, or in other work upon the land, the steam-engine may be employed in threshing, chaff-cutting, sawing and many similar operations which require power. The labour question again became acute in the early years of the 20th century, when, owing to the scarcity of hands and the high rate of wages, self- binding harvesters were resorted to in England for the ingather- ing of the corn crops to a greater extent than ever before. For the same reason potato-planting and potato-lifting machines were also in greater requisition.

Agricultural Population and Wages.

The last half of the 19th century witnessed a remarkable diminution of the British rural population. The decrease has assumed serious proportions since 187 1, as before that date the supply of rural labour exceeded the demand. A large number of agricultural labourers were thus only in partial employment, and their withdrawal from the land was of minor importance as com- pared with the shrinkage in the number of those permanently employed. The following tables indicate the extent of rural depopulation: —

Number of ” Persons engaged in Agriculture ” in the United Kingdom, 1851-1901.

1851.

1861.

1871.

1881.

1891.

1901.

3.453.500

3,080,500

2,744,000

2,573.9°°

2.394.5°°

2,262,600

The number of ” agricultural labourers and shepherds,” which affords a more precise index, declined in a still more marked degree.

1 85 1.

186I.

1871.

1881.

1891.

1901.

1,110,311

‘ 1,098,261

923,332 | 830,452

756,557

609,105

The decrease in the demand for labour is attributable chiefly to the reduction of the cultivated area and the laying down to pasture of land” once under the plough, and to the increasing use of agri- cultural machinery. It may, however, be noticed that the period 1850-1903 was marked by a steady increase of the cash wages of the farm labourer, as indicated in the following table from the Report on the Earnings of Agricultural Labourers issued by the Board of Trade in 1905.

Average Weekly Cash Wages of ordinary Agricultural Labourers employed on certain Farms in England and Wales.

England and Wales,

Eastern counties,

Year.

69 farms.

12 farms.

s. d.

s. d.

1850

9 3i

8 8

1855

10 11J

11 5

i860

10 11

10 8

1865

11 3,

10 5,

1870

11 io|

11 ii

1875

13 7

12 iij

1880

13 2}

12 1

1885

13 1

11 5 ,

1890

13 o|

11 o\

1895

13 2j

11

1900

14 5*

13 ii

1903

14 7

13 2!

(See also Allotments and Small Holdings.) Agricultural Education.

In Great Britain agricultural education as a whole lacks the scope and co-ordination which it has in some continental countries. Centres at which higher agricultural education is given are, however, numerous. The chief are: — The Royal Agricultural College, Cirencester. Aspatria Agricultural College, Carlisle. Tamworth Agricultural College. ♦Agricultural and Horticultural-College, Uckfield, Sussex. ♦Agricultural and Horticultural College, Holme Chapel, Cheshire.

♦Midland Agricultural and Dairy College, Kingston, Derby.

‘Harper- Adams Agricultural College, Newport, Salop.

‘Lancashire County School, Harris Institute, Preston.

♦University College of North Wales, Bangor.

♦University of Leeds.

♦Armstrong College, Newcastle-on-Tyne.

♦Cambridge University.

♦University College, Reading.

♦South-Eastern Agricultural College, Wye.

♦University College of Wales, Aberystwyth.

♦Agricultural Institute, Ridgmont (Bedfordshire County Council) .

♦Essex County Technical Laboratories, Chelmsford.

In the year 1904-1905 £10,600 was devoted by the Board of Agriculture to agricultural instruction and experiments. Of this sum the greater part was divided amongst the institutions marked with an asterisk in the above list. The first three named are private establishments. The county councils also expend sums varying at their own discretion on instruction in dairy-work, poultry-keeping, farriery and veterinary science, horticulture, agricultural experiments, agricultural lectures at various centres, scholarships at, and grants to, agricultural colleges and schools; the whole amount in 1904-1905 reaching £87,472.! The sum spent by individual counties varies considerably. In 1904-1905 Lancashire (£8510), Kent (£5922) and Cheshire (£4310) spent most in this “direction. In some instances colleges are supported entirely by one county, as is the Holmes Chapel College, Cheshire; in others a college is supported by several affiliated counties, as in the case of the agricultural department of the University College, Reading, which acts in connexion with the counties of Berks, Oxon, Hants and Buckingham. The organization and supply of county agricultural instruction is

often carried out through the medium of the institution to which the county is affiliated. In Scotland higher agricultural instruction is given at: —

Edinburgh and East of Scotland Agricultural College. Edinburgh University, Agriculture Department. West of Scotland Agricultural College, Glasgow. Aberdeen and North of Scotland Agricultural College. University of St. Andrews.

A typical course at one of the higher colleges lasts for two years and includes instruction under the heads of soils and manure, crops and pasture, live stock, foods and feeding, dairy work, farm and estate management and farm bookkeeping, surveying, agricultural buildings and machinery, agricultural chemistry, agricultural botany, veterinary science and agricultural entomology. Experimental farms are attached to the colleges.

The facilities for intermediate are far inferior to those for higher agricultural education. Schools for farmers' sons and daughters, and others, answering to the icoles pratiques d' agriculture (see France), are few, the principal being the Dauntsey Agricultural School, Wiltshire, the Hampshire Farm School, Basing, and the Farm School at Newton Rigg, Penrith, Cumberland, maintained by the county councils of Cumberland and Westmorland. Occasionally grammar schools have agricultural sides, and in evening continuation schools agricultural classes are sometimes held. Both elementary day schools and continuation schools are in many cases provided with gardens in which horticultural teaching is given.

In Ireland agricultural education is under the supervision of the Department of Agriculture and Technical Instruction for Ireland, founded in 1899. Higher education is given at the Royal College of Science, Dublin; the Albert Agricultural College, Glasnevin; and the Munster Institute, Cork, for female students, where dairying and poultry-keeping are prominent subjects. Winter classes for boys over sixteen years of age are held at centres in some counties, and there are winter schools of agri- culture at Downpatrick, Monaghan and Mount Bellew (Co. Galway); while lectures are given at farmers' meetings by

1 This sum was furnished out of a total of £693,851, forming the residue grant allocated for the purposes of education to the various county councils of England and Wales under the Local Taxation (customs and Excise) Act 1 890.

itinerant instructors. The Department carries on agricultural experiment-stations at Athenry (Co. Galway), Ballyhaise (Co. Cavan) and Clonakilty (Co. Cork), where farm apprentices are received and instructed.

Agriculture in the United States

Agriculture has been the chief and most characteristic work of the American people, that in which they have achieved the greatest results in proportion to the resources at command, that in which their economic superiority has been most strikingly manifest. In ten years from 1790, the mean population of the period being 4,500,000, 65,000 sq. m. were for the first time brought within the limits of settlement, crossed with roads and bridges, covered with dwellings, both public and private, much of it also cleared of primeval forest; and this in addition to keeping up and improving the whole extent of previous settlements, and building towns and cities, at a score of favoured points. In the next decade, the mean number of inhabitants' being about 6,500,000, population extended itself over 98,000 sq. m. of absolutely new territory, an area eight times as large as Holland. Between 1810 and 1820, besides increasing the density of population on almost every league of the older territory, besides increasing their manufacturing capital twofold, in spite of a three years' war, the people of the United States advanced their frontier to occupy 101,000 sq. m., the mean population being 8,250,000. Between 1820 and 1830, 124,000 sq. m. were brought within the frontier and made the seat of habitation and cultivation; between 1830 and 1840, 175,000 sq. m.; between 1840 and 1850, 215,000 sq. m. The Civil War, indeed, checked the westward flow of population, though it caused no refluence, but after 1870 great progress was made in the creation of new farms and the development of old.

That which has allowed this great work to be done so rapidly and fortunately has been, first, the popular tenure Of the soil, and, secondly, the character of the agricultural class. At no time have the cultivators of the soil north of the Potomac and Ohio constituted a peasantry in the ordinary sense of that term. They have been the same kind of men, out of precisely the same homes, generally with the same early training, as those who filled the learned professions or who were engaged in manufacturing or commercial pursuits. Switzerland and Scotland have, in a degree, approached the United States in this particular; but there is no other considerable country where as much mental

activity and alertness has been applied to the cultivation of the soil as to trade and manufactures.

But even the causes which have been adduced would have failed to produce such effects but for the exceptional inventive ingenuity of the American. The mechanical genius which has entered into manufacturing in the United States, the engineering skill which has guided the construction of the greatest works of the continent, have been far exceeded in the hurried " improvements " of the pioneer farm; in the housing of women, children and live stock and gathered crops against the storms of the first few winters; in the rough-and-ready reconnaissances which determined the " lay of the land " and the capabilities of the soil; in the preparation for the thousand exigencies of primitive agriculture. It is no exaggeration to say that the chief manufacture of the United States, prior to 1900, was the manufacture of 5,740,000 farms, comprising 841,200,000 acres.

The people of the United States, finding themselves on a continent containing an almost limitless extent of land of fair average fertility, having at the start but little accumulated capital and urgent occasions for the economy of labour, have elected to regard the land in the earliest stages of occupation as practically of no value, and to regard labour as of high value. In pursuance of this view they have freely sacrificed the land, so far as was necessary, in order to save labour, systematically cropping the fields on the principle of obtaining the largest results with the least expenditure, limiting improvements ; to what was demanded for immediate uses, and caring little about returning to the soil an equivalent for the properties taken from it in the harvests of successive years. But, so far as the northern

states are concerned, the enormous profits of this alleged wasteful cultivation have in the main been applied, not to personal con- sumption, but to permanent improvements, — not indeed to improvements of the land, but to what were still more needed in the situation, namely, improvements upon the land. The first-fruits of a virgin soil have been expended in forms which have vastly enhanced the productive power of the country.

The land, doubtless, as one factor of that productive power, became temporarily less efficient than it would have been under a conservative European treatment; but the joint product of the three factors — land, labour and capital — was for the time enormously increased. Under this regimen the fertility of the land, of course, in time necessarily declined, sooner or later, according to the nature of the crops grown and to the degree of original strength in the soil. Resort was then had to new fields farther west. The granary of the continent moved first to western New York, thence into the Ohio valley, and then, again, to the banks of the Mississippi. The north and south line dividing the wheat product of the United States into two equal parts was in 1850 drawn along the 82nd meridian (8i° 58′ 49”). In i860 that line was drawa along the 86th (86° 1′ 38”), in 1870 along the 89th (88° 48′ 40”), in 1880 along the 90th (00° 30′ 46’), in 1890 along the 93rd (93° 9′ 18”), and in 1900’along the 95th (94 59′ 23”). Meanwhile one portion of the inhabitants of the earlier settlements joined in the movement across the face of the continent. As the grain centre passed on to the west they followed it, too restless by character and habit to find pleasure in the work of stable communities. A second portion of the inhabitants became engaged in raising, upon limited areas, small crops, garden vegetables and orchard fruits, and in pro- ducing butter, milk, poultry and eggs, for the supply of the cities and manufacturing towns which had been built up out of the abundant profits of the primitive agriculture. Still another portion of the agricultural population gradually became occupied in the more careful and intense culture of the cereal crops upon the better lands, the less eligible fields being allowed to spring up in brush and wood. Deep ploughing and thorough drainage were resorted to; fertilizers were employed to bring up and to keep up the soil; and thus began the serious systematic agricul- ture of the older states. Something continued to be done in wheat, but not much. New York raised 13 million bushels in 1850; thirty years later she raised 115 million bushels; and fifty years later 105 million bushels. Pennsylvania raised 153 million bushels in 1850; in 1880 she raised 192 million bushels; and in 1900 20J million bushels. More is done in Indian corn (maize), that most prolific cereal, the backbone of American agriculture; still more is done relatively in buckwheat, barley and rye. Pennsylvania, though the eleventh state in wheat production in 1905, stood first in rye and second in buckwheat (ninth in oats). New York was only twenty-first in wheat, but first in buckwheat (tenth in barley), fourth in rye. We do not, however, reach the

full significance of the situation until we account for the fourth portion of the former agricultural population, in noting how naturally and fortunately commercial and manufacturing cities spring up in the sites which have been prepared for them by the lavish expenditure of the enormous profits of a primitive agriculture upon permanently useful im- provements of a constructive character. These towns are the gifts of agriculture.

Besides the extension of cultivated area, very little was accomplished in the way of agricultural improvement before 1850. With some few exceptions the methods of cultivation were substantially the same as those of colonial days, and were marked by crudeness, waste and a general adherence to rule-of-thumb principles. The year 1850 roughly marks the beginning of a period of improvement and development. The Irish famine of 1846 and the German political troubles of 1848 were followed by an unprecedented emigration to America of highly desirable European labourers, for whom there were cheap and abundant lands. The period from 1850 to 1870 was marked by a steady growth, which, in the western states, was highly stimulated by the Civil War. While this conflict withdrew a certain amount

of productive energy from agricultural pursuits, it tended at the same time to increase the value of farm labour and of farm products and to extend the use of machinery in order to offset the deficient labour supply. Agricultural machinery had been employed before the war, but only to a very small extent. In 1864, 70,000 reapers and mowers were manufactured, twice as many as in 1862, and manufacturers were unable to supply the demand. Moreover, in the years i860, 1861 and 1862 the wheat crops of Great Britain and the European continent were failures, while those of the United States, far removed from the theatre of military operations, were unusually large. The wheat exports to Great Britain in 1861 were three times as great as those of any previous year, and the strong demand from abroad was an additional stimulus to higher prices. In 1864 agricultural prices were from 100 to 200 % higher than in 186 1, while transportation charges had only slightly advanced and in some instances had actually decreased. In the middle of the war the farmers' profits were normal; toward the end they had increased enormously. This marvellous agricultural prosperity of a nation engaged in one of the world's most formidable wars has no counterpart in modern history. In the decade from i860 to 1870 there was a steady increase in cultivated area, in agricultural products and in population. The value of the farm lands in the

northern states in 1870 exceeded that of i860 by five dollars an acre. On the other hand, the farm lands of the southern states had declined in value to an almost equal amount; but after 1870 these states also made substantial progress, and in 1880 they produced more cotton than in i860, when the greatest crop under the slave system was grown.

Since 1870 the most important factors in this development have been the employment of more scientific methods of pro- duction and the more extensive use of machinery. The study of soils with a view of adapting to them the most suitable crops and fertilizers; the increased attention given to diversified farming and crop rotation; the introduction and successful growth of new plants (e.g. the date palm in Arizona and Cali- fornia, and tea in South Carolina); tile drainage; the ensilage of forage; more careful selection in breeding; the use of inoculation to prevent Texas fever in cattle and cholera in swine, of tuberculin to discover the presence of tuberculosis in cows, of organic ferments to hasten the progress of butter-making, of the " Babcock test " for ascertaining the amount of fat in milk, of fungicides and insecticides to destroy fruit and vegetable pests, — such are but a few manifestations of the spread of scien- tific knowledge among the farming population of the United States. Nearly every county has some sort of agricultural society; in 1899 there were about 1500 of these organizations, some of which, especially those holding annual fairs, received state aid.

With the improvement in technical processes of production came the conquest of the arid regions of the western states. Irrigation was first employed in the west by the Mormons in 1847; but as late as 1870 only about 20,000 acres had been irrigated. In 1880 the irrigated area was approximately 1,000,000 acres, and in the decade from 1889 to 1899 it increased from 3,631,381 to 7,539,545 acres, a gain of 107-6 %. By 1902 there had been a still further increase to 9,478,852 acres, a gain of 2 5 • 7 % in three years. As many of the streams available for irrigation purposes lie within more than one state, the control of water supply is a proper matter for federal jurisdiction, and in June 1902 Congress provided for an extensive system of irrigation works in thirteen states and three territories. The cost of the work is defrayed from the proceeds of the sales of government lands within the states and territories affected by the act. The measure is not paternalistic; the settlers on the lands, which are divided into farms of not less than 40 nor more than 160 acres, are required to make annual payments to the government in proportion to the

water service they have received, until the original cost of the works has been met. The first of these works, the so-called Truckee- Carson project, of Nevada, was completed in June 1905, and at the end of that year eight projects, in as many different states, were under

construction; bids had been received for three more, and the seven others had received the approval of the secretary of the interior. With these initial undertakings it was estimated that i ,000,859 acres could be reclaimed. In addition to supplying the soils with water, means have been found of ridding them of their alkali, or of rendering it harmless; and this is an element of reclamation hardly less important than irrigation itself. A third step in the reclamation of desert lands is arid farming — that is, the adapting to the soils of crops that require a minimum amount of moisture, and the utilization, to the fullest possible extent, of the meagre amount of rainfall in the region. Experiments conducted in this direction in Utah produced promising results.

The development of farming machinery has kept pace with the general progress in scientific agriculture. Although numer- ous patents were issued for such machinery before 1850, its use, with the exception of the cotton gin, was very restricted before that date. Even iron ploughs were not in general use until 1842, and a really scientific plough was practically unknown before 1870. Thirty years later the large farms of the Pacific states were ploughed, harrowed and sowed with wheat in a single operation by fifty-horse-power traction engines drawing ploughs, harrows and press drills. Since 1850 there has been a transition from the sickle and the scythe to a machine that in one operation mows, threshes, cleans and sacks the wheat, and in five minutes after touching the standing grain has it ready for the market. Hay-stackers, potato planters and diggers, feed choopers and grinders, manure-spreaders, check-row corn planters and ditch-digging machines are some of the common labour-saving devices. By the 28th of August 1907 the United States Patent Office had issued patents for 13,212 harvesting machines, 6352 threshers, 6680 harrows and diggers, 9649 seeders and planters, and 13,171 ploughs. In the manufacture of agricultural machinery the United

States leads the world. The total value of the implements and machinery used by farmers of the United States in 1880 was $406,520,055; in 1890 $494,247,467; in 1900 $761,261,550, a gain in this last decade *}f 54%- The total value of the implements and machinery manufactured in 1850 was $6,842,611; in 1880 $68,640,486; in 1890 $81,271,651; in 1900 $101,207,428. These figures, however, are a very poor indication of the actual use of machinery, on account of the rapid decrease in prices following its manufacture on a more extensive scale and by improved methods.

The effects of the new agriculture are apparent from the following figures: By the methods of 1830 it required 64 hours and 15 minutes of man-labour and cost $3-71 to produce an acre of wheat; by the methods employed in 1896 it required 2 hours and 58 minutes of man-labour and cost 72 cents. To produce an acre of barley in 1830 required 63 hours of man-labour and cost $3-59; in 1896 it required 2 hours and 43 minutes and cost 60 cents. An acre of oats produced by the methods of 1830 required 66 hours and 15 minutes of man-labour and cost $3-73; the methods of 1893 required only 7 hours and 6 minutes and cost $107. With the same unit of labour the average quantity of all leading crops produced by modern methods is about five times as great as that produced by the methods employed in 1850, and the cost of production is reduced by one half. From 1 880 to 1900 the average number of acres of leading crops per male worker increased from 23-3 to 31-0, or 34%; the number of horses per worker from 1-7 to 2-3, or 35%; and the value of agricultural product per person employed from $286-82 to $454-37, or 58-4%.

There are numerous other factors that have operated to the benefit of the agriculturist. Increased transportation facilities and lower freight charges have widened his market. The pro- cesses of canning, packing, preserving and refrigerating have produced a similar effect, and have also provided a means for the disposal of surplus perishable products that otherwise would be lost. The utilization of by-products, as, for example, the conversion of cotton seed into oil, fertilizers and food for live stock, has become another source of profit.

Great economic and social changes have resulted from this

progress. There has been a great division of labour in agri- culture. Makers of agricultural implements, of butter and cheese, cotton ginners, grist and wheat millers, are now classed in the

United States census reports as manufacturers, but all their work was once done on the farm. The farmer is now more of a specialist and more dependent on other industries than formerly. He has changed from a producer for home con- sumption or a local market to a producer for a world market. Unfortunately, his knowledge of economic laws has lagged behind his progress in scientific agriculture. The farming class at times have experienced periods of great depression, largely on account of their inability to adjust their crops to changing conditions in the world's markets, and in such cases have been prone to seek a remedy in radical legislation. Periods of agri- cultural discontent at different times have been marked by the political activity of the " Grangers " and of the " Farmers' Alliance," and even by the formation of new political parties such as the Greenback party in 1874 and the Populist or People's party in 1892 — whose strength lay mainly in the agricultural states. The new industrial conditions that produced com- binations among manufacturers were much slower in their effect upon the farming element, but gradually led to increasing co-operation and to the organization of the growers of various commodities for marketing their crops. The fruit growers of California and the tobacco growers of Kentucky have furnished interesting examples of such organizations. Under the improved conditions there is less drudgery on the farm; the farmer does more work, produces more, and yet has more leisure than formerly. Better roads, rural free mail delivery, telephone and electric lines are removing the isolation of country life, and to some extent are diminishing the attractions of the cities for thf rural population.

Covering as it does the breadth of the North American con- tinent, with 3,000,000 sq. m. of land surface, not including Alaska and the islands, of which over 800,000,000 acres are in farms and over 400,000,000 in actual cultivation, representing every variety of soil and all the climatic life zones of the world, except the extreme boreal and the hottest tropical, the United States affords an important subject of study in respect of agri- culture. Its cotton, wheat and meat are large factors in all markets, and its many other agricultural products are distributed throughout the civilized world. To the student the equipment and methods of agriculture in the United States form as interest- ing a subject of examination as do its resources and production. In quantity, distribution and inter-relation of heat and moisture — the chief factors in agricultural production — the United States is greatly blessed. We find in this vast territory all the agricul- tural

belts mapped by the biologist, producing all varieties of cereals, fruits and breeds of live stock, whilst all kinds of soils, adapted to different crops, are spread out at all altitudes from 1 8000 ft. down to sea-level.

The story of the vast and varied agriculture of the United States can be outlined by extracts from the figures published by the Census, the Agricultural and other government departments.

As a result of the great supply of available land the number of farms in the United States increased between 1 850 and 1900 from 1,449,073 to 5.739.657; their total acreage p increased from 293,560,614 to 841,201,546 acres; their improved acreage increased from 113,032,614 to 414,793,191 acres; and their unimproved 1 acreage from 180,528,000 to 426,408,355 acres. Table XXVII. exhibits the increases of number of farms, total and improved acreage by decades.

The largest percentage of increase of improved land was 50-7, from 1870 to 1880; the lowest was in the decade i860 to 1870, the period of the Civil War, and was 15-8. The chief cause of this wonderful development of agriculture is the large area of cheap public lands which has been available for immigrants and natives alike. Up to 1906, under the Homestead Act of the 20th of May 1862, the number of entries, both final and pending, covered 185,385,000 acres. Between 1875 and 1905 the public and Indian lands sold for cash and under homestead and timber culture laws, as well as those allotted by scrip, granted to the colleges of agriculture

1 ” Unimproved ” land includes land which has never been ploughed, mown or cropped, and also land once cultivated but now overgrown with trees or shrubs.

and mechanic arts and other institutions, and by military bounty land warrants, and selected by states and railroad corporations, covered about 430,000,000 acres. In addition to this, the states and railroad corporations sold a large amount of land to farmers of which we have no accurate record. This vast territory, greater

Table XXVII-

-Percentage of Increase of Number and Acreage of Farms by Census Decades.

The United States.

Number of Farms.

Acreage.

Total.

Improved.

1850 to i860 i860 ,, 1870 1870 „ 1880 1880 „ 1890

1890 ,, 1900

41-1 30-1 50-7 13-9

25-7

38-7

0-1

3i-5

16-2

35-0

44-3 15-8

5°-7

25-6

i6-o

1850 to 1900

296-0

186-5

267-1

Year.

Number of Farms.

1880 1890 1900

4,008,907 4,564,641 5.737,372

in extent than Germany and France combined, was added to the farms of the country in thirty years. In many cases railroad building has made the settlement of the public lands possible for the first time, and the building of branch lines, by providing means for transporting products to market, has greatly facilitated the acquisition of other lands. The mileage of railways increased 310-7 % between 1870 and 1905. The in- teresting fact is that this increase corresponds geographically to the increase in farms.

The agricultural statistics do not include any farm of less than three acres unless it produced at least $500 worth of prqducts in the preceding year. The census of 1900 showed that the average size of farms was 146 acres, or nine acres more than in 1890 and 57 acres less than in 1850. This fact, however, does not indicate a general tendency toward the con- solidation of holdings. The increase in the average size of farms in the whole country is due to the extension of grazing lands in the Rocky Mountain region and in Texas, and to the enlarge- ment of the wheat fields in the Mississippi valley. On the other hand, in the southern states there has been a steady breaking up of holdings and decrease in the average size of farms since the close of the Civil War. In the New England states, where dairying has become the leading agricultural industry, there was an increase of 2-2 acres in the size of farms during the decade 1890-1900. This increase was more than offset by the decrease in the Atlantic states from New York to Maryland inclusive (2-8 acres), where there has been a subdivision of farms following the increased attention given to the growing of fruits and vegetables for cities. The same tendency is noted in the states of Ohio, Indiana and Illinois. As will be seen from Table XXVIII., the average farm, which steadily diminished in size from 1850 to 1880, increased between 1880 and 1900.

Table XXVIII. — Average Acreage of Farms and Proportion of Improved Land therein.

Statisticians usually put it at 40 %, and this is probably more nearly correct (Table XXX.).

The wages paid farm labourers, as ascertained by the Department of Agriculture, are rather low compared with the average wages of labour, but not lower than the wages of other unskilled labour. The average monthly wage of the agricultural labourer, without board, was #19-50 in 1870, $16-42 in 1880, $18-33 in l8 90, $17-70 in 1895, and $20-23 m 1899, when the maximum for any state was $45-10 in Nevada, the minimum $10-06 in South Carolina. The wages of the American farm labourer were at this last date named (1899) higher than for any other farm labourer save in Canada and the British colonies of Australasia; though lower than wages paid in American cities, they have greater purchasing power. J. R. Dodge, in " Farm Labour in the United States " (vol. xi., Report of Industrial Commission on Agriculture, &c, 1901), says: " In addition to wages the married labourer has a house free of rent, a garden, firewood, pasturage and other perquisites. The enterprising labourer usually becomes a tenant and afterwards a farm-owner."

The figures for farm capital and the value of agricultural products are so vast that it is extremely difficult to put them in an intelligible form. The farm capital of the United States reported by yatue ot the census of 1900 reached $20,514,002,000, a sum more f arms ant / than four times the capital invested in manufactures, products. the main classes being, in round numbers :— Land, fences and buildings, $16,674,690,000; machines and implements.

Table XXIX. — Number of Farms of Specified Tenure.

Number of farms operated by

Owners. 1

2,984,306 3,269,728 3,712,408

Cash Tenants.

322,357 454.659 751,665

Share Tenants.'

702,244

840,254

1.273,299

Percentage of farms operated by

Owners.

74-5 71-6 64-7

Cash Tenants.

8-0

IO-O

131

Share Tenants.

17-5 18-4

22-2

Whole Farm.

Proportion of Improved Land.

1850

i860

1870 1880 1890 1900

202-6

199-2 153-3 133-7

I36-5

1466

38-5 40-1

46-3

53-i

57-4 49-3

The acreage of North Atlantic farms decreased from 112-6 in 1850 to 95-3 in 1890, and increased in 1890-1900 to 96-5 acres.

In the South Atlantic states the average was 376-4 acres in 1850, and there has been steady decrease, so that in 1900 it was 108-4, or one-third less than the average for the entire country. In the north central states the averages of 1850 and 1900 were nearly the same (143-3 and 144-5 respectively), with the minimum (121-9 acres) in 1880. The south central states averaged 291 acres in 1850, 321-3 in i860, 144 in 1890, and 155-4 m 1900. The maximum decade for the western states was that ending in 1850 (694-9 acres), and the mini- mum 1880 (312-9); and the average in 1900 was 386-1 acres.

Table XXlX. gives the number of farms, together with their distribution, under different forms of tenure in the years 1880, 1890 and 1900.

The steady drift towards farm tenancy of late is believed to be

injurious to production; but it is impossible to prove this, so great

has been the aggregate increase in products.

The number of persons engaged in agriculture as a business in

1900 was 10,381,765, or 36 % of all persons in gainful

occupations. It is interesting to note that 977,336 of these

were women. This is an increase of 2,667,890 persons over

1880. Thus, if the farm family is the same size as that of

the remainder of the population — it is probably slightly

larger — the agricultural population would be 36 % of the whole.

I- 14

Agri- cultural occupa- tions.

$761,262,000; live stock $3,078,050,000. The products of the farms in the census year 1899 were valued at $4,739,119,000. Between 1850 and 1900 the aggregate farm capital increased 416 %. The greatest increase of farm capital was between 1850 and i860, 101 %; the next was the decade 1880-1890, when the increase was 32 . Between 1890 and 1900 the increase was 28.

Table XXX. — Number of Persons of Ten Years of Age and over in the different Agricultural Pursuits in 1900.

Occupation.

Total Persons.

Dairymen and women ..... Farmers and farm superintendents .

Gardeners, nurserymen and viticulturists Lumbermen and raftsmen .... Stock-raisers, herders, &c. .... Turpentine-farmers and labourers .

Total

10,875

5,674.875

4,410,877

61,788

72,020

84,988

24.737

36,075

5.530

10,381,765

The growth of farm area and of capital invested in agriculture was followed by a proportionate increase in the chief crops (TableXXXI.) .

The distinguishing feature of the period 1 870-1 880 was the rate of increase of barley, Indian corn, wheat and oats. Since 1870 the production of nearly all of the farm crops increased more rapidly than the population, the most absolute proof of the substantial prosperity of the people. The increase in population for the fifty years from 1840 to 1890 was 267 %; from 1870 to 1880, 30 %; from 1880 to 1890, 25 %; from 1890 to 1900, 21 %; but the food and other supplies far exceeded the demands of even this great

population.

Table XXXI. — Production of certain Farm Crops from 1870 to 1905 — Millions of Bushels.

Indian Corn.

Wheat.

Oats.

Barley.

1870

1094

235

247

26

1880

1717

498

418

45

1890

1489

399

523

67

1900

2105

522

809

58

1905

2707

693

953

136

Table XXXII. gives important facts with regard to the cereal production of the United States between 1870 and 1905.

The average farm price of wheat declined, as is shown in that table, from $1-05 per bushel for the decade 1870-1880 to 65-3 cents for the period 1 890-1 899. The farm prices of the other

1 Includes farms operated by owners, part-owners, owners and tenants, and managers.

2 Tenants of farms rented for a share of the products.

cereals declined less during the thirty years. Corn declined from an average farm price of 42-6 cents per bushel for 1870-1880 to 34-4 cents in 1890-1899. The average production per acre shows nothing conclusive with regard to the fertility of the soil of the country. The expansion of the crop area usually causes a lowering of the average yield per acre by distributing the culture, fertilizers, &c, over more surface. Likewise the contraction of crop area will usually increase the average yield per acre of the entire country.

Table XXXII. — Average Yield and Value of Cereal Crops in the United States, by Periods

of Years, 1 870-1905.

Period.

Indian Corn.

Wheat.

Oats.

Average

Average

Average

Average

Average

Average

Farm Price

Yield per

Farm Price

Yield per

Farm Price

Yield per

per Bushel.

Acre.

per Bushel.

Acre.

per Bushel.

Acre.

Dollars.

Bushels.

Dollars.

Bushels.

Dollars.

Bushels.

1870 to 1880 . .

0-426

27-1

1-05

12-4

o-353

28-4

1880 „ 1889. .

•393

24-1

•827

I2-I

•309

266

1890 „ 1899 .

•344

24-1

•653

131

•277

26-2

1906 „ 1905 . .

.440

24-9

•706

13-6

•318

30-7

Barley

Rye

Buckwheat

1870 „ 1880 . .

0738

22-1

0-701

14- 1

0-715

17-7

1880 „ 1889 . .

•589

21-7

•622

n-9

•642

12-8

1890 ,, 1899 .

•433

23-3

•522

14-0

•507

16-8

1900 ,, 1905 . .

•433

25-9

•570

15-7

•588

17-9

The average yield of wheat per acre was 12-4 bushels in the decade 1870-1880, and 13-1 in the period 1890-1899; of Indian corn, 27-1 in 1870-1880, and 24-1 in 1880-1899 continuously. Oats fell off from 58-4 in 1870-1880 to 26-2 bushels per acre in 1890- 1899. The averages for the years 1900-1905 show an increase over the previous decade both in yields and (with the exception of the price of barley) in prices of all the cereals.

The agricultural returns for 1890-1905 may be taken as an

illustration of the cereal production of the United States. The figures for wheat, oats and Indian corn are presented in Tables XXXIII., XXXIV. and XXXV.

The acreage and production of wheat have steadily increased.

The acreage in Indian corn, the great American crop, reached its highest in 1902, 94,043,613 acres, and its production its highest figure in 1905, 2,707,993,540 bushels.

Producing as the United States does so much more than its people can consume, its exports form a large per- centage of some of the crops, as Table XXXVI. shows.

Large portions of some of these crops, like Indian corn and oats, are exported in the form of animals and animal products (meats, lard, hides, &c). The hay crop is almost entirely used in this way, and the tendency is to convert more and more of these crops into these higher-priced products. Still, the time is far distant when domestic consump- tion will come anywhere near overtaking domestic production, especially of wheat and the other cereals. The certain extension of acreage with the growth of demand and price, the increased use of agricultural im- plements, and the improvement of methods will be sure to keep up a large surplus for export for many years to come. The Depart- ment of Agriculture has found that for home use there were required per head 5-5 bushels of wheat, 28-6 bushels of Indian corn, and 10-7 bushels of oats, the computations being made from the figures for population, production and exports for 1888-1892; in 1905, 6-15 bushels of wheat and wheat-flour, 28-59 bushels of Indian corn and corn-meal. The following number of acres in these crops was required, therefore, to supply the home demand for I 888-1892: — 0-43 of an acre in wheat, 1-15 acre in corn, and 0-43 acre in oats per head of the population. Taking the year

Table XXXIII. — Acreage, Production, Value, Prices and Exports of Wheat in the

United States in 1 890-1 905.

Average

Yield per

Acre.

Average

Domestic Exports,

Year.

Acreage.

Production.

Farm Price per Bushel,

Farm Value, 1st Dec.

including Flour, Fiscal Years

1st Dec.

beginning 1st July.

Acres.

Bushels.

Bushels.

Cents.

Dollars.

Bushels.

1890

36,087,154

ii-i

399,262,000

83-8

334,773,678

106,181,316

1891

39,916,897

15-3

611,780,000

83-9

513,472,711

225,665,812

1892

38,554.430

13-4

515,949,000

62-4

322,111,881

191,912,635

1893

34,629,418

n-4

396,131,725

53-8

213,171,381

164,283,129

1894

34,882,436

132

460,267,416

49-1

225,902,025

144,812,718

1895

34,047,332

137

467,102,947

50-9

237,938,998

126,443,968

1896

34,618,646

12-4

427,684,346

72-6

310,602,539

145,124,972

1897

39,465,066

13-4

530,149,168

8o-8

428,547,121

217,306,005

1898

44,055,278

15-3

675,148,705

58-2

392,770,320

222,694,920

1899

44,592,516

12-3

547,303.846

58-4

319,545,259

186,096,762

1900

42,495,385

12-3

522,229,505

61 -9

323,515,177

215,990,073

1901

49,895.514

150

748,460,218

62-4

467,350,156

234,772,516

1902

46,202,424

H-5

670,063,008

63-0

422,224,117

202,905,598

1903

49,464,967

12-9

637,821,835

69-5

443,024,826

120,727,613

1904

44,074,875

12-5

552,399.517

92-4

510,489,874

44,112,910

1905

47,854,079

H-5

692,979,489

74-8

518,372,727

Table XXXIV. — Acreage, Production, Value, Prices, Exports and Imports of Oats in the United States

in 1890-1905.

Year.

Acreage.

Average

Yield per

Acre.

Production.

Average Farm Price per Bushel,

1st Dec.

Farm Value, 1st Dec.

Domestic Exports, including Oatmeal,

Fiscal Years beginning 1st July.

Imports during

Fiscal Years

beginning 1st July.

Acres.

Bushels.

Bushels.

Cents.

Dollars.

Bushels.

Bushels.

1890

26,431,369

19-8

523,621,000

42-4

222,048,486

1,382,836

41,848

1891

25,581,861

28-9

738,394.000

31-5

232,312,267

10,586,644

47,782

1892

27.063,835

24-4

661,035,000

31-7

209,253,611

2,700,793

49.433

1893

27,273,033

23-4

638,854,850

29-4

187,576,092

6,290,229

3L759

1894

27.023,553-

24-5

662,036,928

32-4

214,816,920

1,708,824

330,317

1895

27,878,406

29-6

824,443,537

19-9

163,655,068

15,156,618

66,602

1896

27,565,985

25-7

707,346,404

18-7

132,485,033

37,725,083

893.908

1897

25,730,375

27-2

698,767,809

21-2

147,974,719

73,880,307

25,093

1898

25.777.iio

28-4

720,906,643

25-5

186,405,364

33.534.264

28,098

1899

26,341,380

30-2

796,177,713

24-9

198,167,975

45,048,857

54,576

1900

27.364.795

29-6

809,125,989

25-8

208,669,233

42,268,931

32,107

1901

28,541,476

25-8

736,808,724

39-9

293,658,777

13,277,612

38,978

1902

28,653,144

34-5

987,842,712

30-7

303,584,852

8,381,805

150,065

1903

27,638,126

28-4

784,094,199

34-1

267,661,665

1,960,740

183,983

1904

27,842,669

32-1

894.395,552

3i-3

279,900,013

8,394,692

55,699

1905

28,046,746

34-o

953,216,197

29-1

277,047,537

_.. —

AMERICAN]

AGRICULTURE

Table XXXV. — Acreage, Production, Value, Prices and Exports of Indian Corn in the United Stales in 1890-1905.

419

Year.

Acreage.

Average

Yield per

Acre.

Production.

Average Farm Price per Bushel,

Farm Value, 1st Dec.

Domestic Exports, including Corn- Meal, Fiscal Years

1st Dec.

beginning 1st July.

Acres.

Bushels.

Bushels.

Cents.

Dollars.

Bushels.

1890

71,970,763

20-7

1,489,970,000

50-6

754,433,451

32,041,529

1891

76,204,515

27-0

2,060,154,000

40-6

836,439,228

76,602,285

1892

70,626,658

23-1

1,628,464,000

39-4

642,146,630

47,121,894

1893

72,036,465

22-5

1,619,496,131

36-5

591,625,627

66,489,529

1894

62,582,269

19-4

1,212,770,052

45-7

554,719,162

28,585,405

1895

82,075,830

26-2

2,151,138,580

25-3

544,985,534

IOI,IOO;375

1896

81,027,156

28-2

2,283,875,165

2i-5

491,006,967

178,817,417

1897

80,095,051

23-8

1,902,967,933

26-3

501,072,952

2I2 ,055,543

1898

77,721,781

24-8

1,924,184,660

28-7

552,023,428

117,255,046

1899

82,108,587

25-3

2,078,143,933

30-3

629,210,110

213,123,412

1900

83,320,872

253

2,105,102,516

35-7

751,220,324

181,405,473

1901

91,349,928

16-7

1,522,519,891

60-5

921,555,768

28,028,688

1902.

94,043,613

26-8

2,523,648,312

4°-3

1,017,017,349

76,639,261

1903

88,091,993

25-5

2,244,176,925

42-5

952,868,801

58,222,061

1904

92,231,581

26-8

2,467,480,934

44-1

1,087,461,440

90,293,483

1905

94,011,369

28-8

2,707,993,540

4i-2 1

1,116,696,738)

1890 as an illustration, this gave a surplus area in wheat of 11,264,478

acres, of 2,648,404 acres in Indian corn, and of 238,162 acres in

oats.

Tables XXXVII. and XXXVIII. give the number, total value

and average price of farm animals in 1880, 1890, 1900 and 1906.

Table,XXXVI. — Percentage of Crops Exported. Averages for Period

1878-1905.

Annual Average.

1905.

Crop.

1878-1882.

1888-1892.

1894-1896.

I896-I9O4.

Wheat

Indian con

Rye

Oats

Barley

Potatoes

Cotton

1

27-84

4-82

10-30

•37

1-55

•37

72-80

17-68 3-49

•80

66-79

15-96 5-39

12-21

2-22

12-96

•30

73-60

299

6-4 19-5

37 12-15

0-31 66-31

7-99 3-66

6i-55 |

Table XXXVII. — Number and Value of Farm Animals in the

United States, 1880-1906.

January 1.

Horses.

Mules.

Milch Cows.

Number.

Value.

Number.

Value.

Number.

Value.

1880 1890 1900 1906

11,201,800 14,213,837

13.537.524 18,718,578

$613,296,611 978,516,562 603,969,442

1,510,889,906

1,729,500 2,331,027 2,086,027 3,404,061

$105,948,319 182,394,099 111,717,092 334,680,520

12,027,000 15,952,883 16,292,360 19,793,866

$279,899,420 352,152,133 514,812,106

582,788,592

January 1.

1880 1890 1900 1906

Other Cattle.

Number.

21,231,000 36,849,024 27,610,054 47,067,656

Value.

5341,761,154 560,625,137 689,486,260 746,171,709

Sheep.

Number.

40,765,900 44,336,072 41,883,065 50,631,619

Value.

$90,230,537 100,659,761 122,665,913 179,056,144

Table XXXVIII. — Average Value of Farm Animals United States on 1st January, 1 880-1906.

in the

Year.

Horses.

Mules.

Milch Cows.

Other Cattle.

Sheep.

Swine.

1880 1890 1900 1906

154-75 68-84 4461 80-72

$61-26 78-25 53 56 98-31

$23-27 22-14

. 31-60 29-44

$16-10 15-21 24-97

i5‘85

$2-21 2-27

2-93

3-54

$4.28 4-72

5-oo 6-i8

After the Civil War the number of horses increased and prices gradually declined. In 1893 the number of horses reached 16,206,802 (an increase of over 5,005,002 or 44-6 % over the number in 1880}, and in 1906, 18,718,578. The average farm price of horses increased from $54-75 in 1880 to $74-64 in 1884, after which there was a decrease to $31-51 in 1896, followed by a rise to $80-72 in 1906. The extension of street-car lines, and the substitution of cable and electric power for that of horses, the use of bicycles and, later, of automobiles, and the improvement of farm-machinery, in which horses are less and less used as power-producers and steam is more common, have been factors in decreasing the demand for these

1

For 1899-

1900 to 1

904-1905

animals. The fluctuation in prices of mules has been parallel to

that for horses.

The returns for milch cows show an increase throughout the

period 1880-1899 in every year, with the exception of 1895-1899, after which there was a steady rise in numbers. For the first ten

years the numbers increased 32-6 %, and from 1890 to 1899, -2 %. The, total value of milch cows increased each year until , 1884, then decreased until 1 89 1, with a gradual increase until the end of the period. The farm price of milch cows rose from $23-27 in 1880 to $31-37 in 1884, then fell to $21-40 in 1892, after which there was a steady increase to $31-60 in 1899, and afterwards a slight fall, $29-44 being the average farm value on the 1st of Tanuary 1906. . J y

No marked changes in the numbers of sheep have taken place. During the period 1880-1890 there was an increase in numbers amounting to about 8-8 %. After 1893 there was a rather steady decrease, with

fluctuations amount- ing to a marked de- pression after 1894. This industry is very susceptible to adverse influences, and felt keenly a depression in the price of wool. The increase began again in 1898, and in 1903 the

figure of 63,964,876

was reached; in 1906

it was 50,631,619.

The numbers

values of swine

stantly fluctuate

the movement

value of the Indian

The returns

(51,602,780)

Swine.

Number.

34,034,100 51,602,780 37,079,356 52,102,847

Value..

$145,781,515 243,418,336 185,472,321 321,802,571

Total Value of Farm Animals.

fi,576,917,556

2,418,766,028 2,228,123,134 3,675,389,442

and con- with

and

corn crops for 1890

showed a numerical increase of 51-6% over those of 1880; then followed a steady decrease in numbers down to 1900 (37,079,356), since which time there has been considerable increase, so that in 1906 there were 52,102,847 — the maximum excepting 1901, when there were 56,982,142 swine on farms. The movement in values was similar to that in numbers. From $4-28 in 1880, the average farm price of hogs increased steadily to $6-75 in 1883. The lowest figure, $4-15, was reached in 1891, and after numerous fluctuations it became $4-40 in 1899 and $778 in 1903; in 1906 it was $6- 18.

The total value of farm animals showed a steady increase from 1880 to 1890, with slight variations in 1885 and 1886. Following 1890 there was a steady decrease with the exception of slight increases in 1892 and 1893. In 1880 the total value of farm animals in the United States was $1,576,917,556. In 1890 it had increased to $2,418,766,028, or 53-4 %. In 1896 the value had diminished to $1,727,926,084 — a decrease of 28-6 % from the 1890 values, and an increase of 9-6 % over those of 1880. The value in 1906 showed an increase of 133 % over that of 1880.

The exports of live stock and its products have increased enormously in recent years, both in quantity and value. This is especially true of the exportation of beef, cattle and meat products. The exports ot cattle increased from 182,750 in 1880 to 331,720 in 1895, or 81 J %, and to 567,806 in 1905 or 210 % over 1880, and values

from $13,340,000 in 1880 to $30,600,000 in 1895, an increase of 129 %, and to $40,590,000 in 1905 or 204 %. The average value of cattle exported increased from $19 in 1870 to $73 in 1880 and $92 in 1895, decreasing to $71-50 in 1905. Only the best and heaviest cattle are exported, these, of course, commanding a much higher price than the average of the country.

The total value of farm animals exported from the United States has fluctuated greatly. On the whole, however, the value increased from $16,000,000 in round numbers in 1880 to $46,500,000 in 1905, or 190 %. Table XXXIX. shows the number and value of live animals exported between 1880 and 1905.

Since 1890 there has been a great development in the production

vicinity of all cities, and highly specialized ” truck gardening,” that is, the growing of early fruits and vegetables for transportation to distant markets where the seasons are later, has made rapid progress in the South Atlantic states. The census reports of 1900 use the potato acreage in these states as an index of the rate of development of truck gardening; the southern potato being largely a truck garden crop. In seven counties of Virginia the increase in acreage from 1889 to 1899 was 100%; in eleven counties of North Carolina, 314 %; in five counties of South Carolina, 134 %; in nine counties of Georgia, in % ; in six counties of Florida, 309 % ; in five counties of Alabama, 277 %. Irish and sweet potatoes are the most important vegetables raised; the North Central states leading in the production of the former and the South Atlantic states in

of fruit and vegetables. Local market gardens are numerous in the

Table XXXIX. — Number and Value of Farm Animals exported from the United States, 1880-1905

Year

ending

30th

June.

1880 1885 1890 1894

1895 1900′ 1901 1 1902 1 1903 1904 1905

Horses.

Number.

3,o6o

1,947

3,501

5,246

13.984

64,722

82,250

103,020

34,007

42,001

34.832

Value.

$675,139 377,692 680,410 1,108,995 2,209,298 7, 612,616

8,873,845 10,048,046

3.152,159 3,189,100

3,175.259

Mules.

Number.

5,198, 1,028

3,544 2,063

2,515 43,369 34.405 27.586

4.294 3,658 5,826

Value.

$532,362

127,580

447,108

240,961

186,452

3,919,478

3,210,267

2,692,298

521,725

412,971

645.464

Cattle.

Number.

182,756 135.890 394.836 359.278 331,722 397,286 459,218 392,884 402,178

593.409 567,806

Value.

$13,344,195 12,906,690 31,261,131 33,461,922 30,603,796

30,635,153 37,566,980 29,902,212 29,848,936 42,256,291 40,598,048

Sheep.

Number. Value

209,137 234.509 67,521

132,370]

405,748 125,772

297,925 358,720 176,961

301,313 268,365

$892,647 512,568 243,077 832,763

2,630,686

733,477

I.933.0O0

1 ,940,060 1,067,860 1,954,604 1,687,321

Swine.

Number. Value.

83,434

55,025

91,148

1.553

7.130

51,180

22,318

8,368

4,031

6,345

44.496

$421,089

579,183 909,042

14,753

72,424

394,813

238,465

88,330

40,923

53.780

414,692

Total Value.

$15,865,432 14,503,713 33,540,768 35,659,394 35,702,656 43,295,537 51,822,557 44,670,946 34,631,603 47,866,746 46,520,784

the production of the latter. The growth of the Irish potato industry is shown by the following table: —

Year.

Acreage.

Yield (bushels).

1870 1880 1890 1900 1905

l,325,“9

1,842,510

2,651,579 2,611,054

2,996,757

114,775,000 167,659,570 148,289,696 210,926,897 260,741,294

The production of sweet potatoes, as reported in census years, was as follows : —

Year.

Acreage.

Yield (bushels).

1869 1879 1889 1899

444,8i7

524,588 537,447

21,709,824

33.378,693

43,95o,26i

42,526,696

The total acreage in vegetables reported in 1899 was 5,753, 191 or 2 % of the acreage in all crops ; the value of the yield was $242,170,148 or 8-3 % of the value of all crops.

The value of the fruit crop of 1899 was $131,423,517; the value of orchard fruits was $83,751,840; of grapes, $14,090,937; of small fruits, $25,030,877 ; of sub-tropical fruits, $8,549,863. The develop- ment of fruit-growing during the decade 1 889-1 899 appears from the following table : —

Crop.

Yield (bushels).

1889.

1899.

Apples .... Apricots .... Cherries .... Peaches .... Pears .... Plums and Prunes

143,105,689 1,001,482 1,476,719 36,367.747 3,064,375 2,554,392

175,397.626 2,642,128 2,873.499

I5.433.623 2

6,625,417 8,764,032

In 1899 California contributed 21.5 % of the fruit crop; New York, 12-1%; Pennsylvania, 7-5%; Ohio, 6-8%; and Michigan

4-5 %•

Agricultural Education.

The agricultural schools of the United States owe their origin to the movement against the old classical school and in favour of technical education which began in most civilized nations about the middle of the 19th century. A rapidly growing country with great natural resources needed men educated in the sciences and arts of life, and this want was first manifested

1 The demand for horses for the British troops in South Africa affected these years.

8 Decrease due to a severe frost in the winter of 1898-1899, which destroyed the peach crop in most of the states.

in the United States by a popular agitation on behalf of agri- cultural schools. A number of so-called agricultural schools were started between 1850 and i860 in the eastern and middle states, where the movement made itself most felt, but without trained teachers and suitable methods they accomplished very little. They were only ordinary schools with farms attached. The second constitution of the state of Michigan, adopted in 1850, provided for an agricultural school, and this was the first one established in the United States. The General Assembly of the state of Pennsylvania incorporated the Farmers' High School, now the State College, in 1854. Maryland incorporated her agricultural college in 1856, and Massachusetts chartered a school of agriculture in the same year. The agitation, which finally reached Congress, led to the establishment of the so-called "land-grant" or agricultural colleges. The establishment of these colleges was due chiefly to the wisdom and foresight of Justin S. Morrill, who introduced the first bill for their endow- ment in the House of Representatives on the 14th of December 1857, saw the latest one approved by the president on the 30th of August 1890, and is justly known, therefore, as the father of the American agricultural colleges. The first act for the benefit of these colleges, passed in 1862, was entitled " An Act donating public lands to the several states and territories which may provide

colleges for the benefit of agriculture and the mechanic arts," and granted to each state an amount of land equal to 30,000 acres for each senator and representative in Congress to which the state was entitled at that time. The object of the grant was stated to be " the endowment, support and main- tenance of at least one college " (in each state), " where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts ... in order to promote the liberal and practical educa- tion of the industrial classes in the several pursuits and pro- fessions in life." The total number of acres of land granted to the states under this act was 10,320,843, of which by far the greater part is sold. This grant has produced an endowment fund amounting to $12,045,629. The land still unsold in 1905 amounted to 844,164 acres, valued at $4,168,746. The invested land-grant funds yielded these colleges a total annual income of $855,083 in 1905. Including the United States appropriation under a supplementary act of 1890, commonly known as the Second Morrill Act, which now gives each college $25,000 a year, the interest on the land-grant and all other invested funds, all state appropriations and other sources of revenue, these colleges had in 1904-1905 a total income of $11,659,955- Sixty-six

institutions had been organized under this act up to 1905, of which sixty- three maintain courses in agriculture; twenty-one are departments of agriculture and engineering in state univer- sities; twenty-seven are separate colleges of agriculture and mechanic arts; and the remainder are organized in various other ways. Separate schools for persons of African descent had been established under this act in sixteen southern states. These colleges take students prepared in the common schools and give them a course of from two to four years in the sciences pertaining to agriculture. Many of them offer short courses, varying from four to twelve weeks in length, in agriculture, horticulture, forestry and dairying, which are largely attended. Agricultural experiment stations are connected with all the colleges, and many of them conduct farmers' institutes, farmers' reading clubs and correspondence classes.

The agricultural experiment stations of the United States grew up

in connexion with the agricultural colleges. Several of the colleges early attempted to establish separate departments for research and practical experiments, on the plan of the German stations. The act establishing the Agricultural College of Maryland required it to conduct " a series of experiments upon the cultivation of cereals and other plants adapted to the latitude and climate of the state of Maryland." This was the first suggestion of an experiment station in America, but resulted in little. The first experiment station was established at Middle- town, Connecticut, in 1875, partly under state aid, partly through a gift from Orange Judd, partly in connexion with the Sheffield Scientific School, which from 1863 to 1892 was the College of Agriculture and Mechanic Arts for the state of Con- necticut, and partly under control of Wesleyan University, which contributed the use of its chemical laboratory; in 1877 it was removed to New Haven. The state of Connecticut made in 1875 an appropriation of $2800 (and in 1877 $5°°o per annum) for this school — the first state appropriation of the kind. The state of North Carolina established, on the 12th of March 1877, an agricultural experiment and fertilizer control station in connexion with its state university. The Cornell University experiment station was organized by that institution in 1879. The New Jersey station was organized in 1880 and the station of the University of Tennessee in 1882. From these beginnings the experiment stations multiplied until, when Congress passed the National (or Hatch) Experiment Station Act in 1887, there were seventeen already in existence. The Hatch Experiment Station Act, so called from the fact that its leading advocate was William Henry Hatch (1833-1896) of Missouri, appropriated $15,000 a year to each agricultural college for the purpose of conducting an agricultural experiment station. The object of the stations was declared to be, " to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclima- tion; the analysis of soils and water; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the com- position and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and

such other re- searches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective states or territories." The stations were authorized to publish annual reports and also bulletins of pro- gress for free distribution to farmers. The franking privilege was given to these publications. The office of experiment stations, in the Department of Agriculture, was established in 1888 to be the head office and clearing-house of these stations. Agricultural experiment stations are now in operation in all the states and territories, including Alaska, Hawaii, Porto Rico and

the Philippines. Alabama, Hawaii, Connecticut, New Jersey and New York each maintain separate stations, supported wholly or in part by state funds; Louisiana has a station for sugar, and Missouri for fruit experiments. Excluding all branch stations, the total number of experiment stations in the United States is sixty, and of these fifty-five receive the national appro- priation. The total income of the stations during 1904 was $1,508,820, of which $720,000 was received from the national government and the remainder was derived from societies, fees for analyses of fertilizers, sale of products, &c. The stations employed 795 persons in the work of administration and re- search; the chief classes being — directors, 71; chemists, 163; agriculturists, 47; agronomists, 41; besides numerous horti- culturists, botanists, entomologists, physicists, bacteriologists, dairymen, weather observers and irrigation experts. The stations publish annual reports and bulletins, besides a large number of " press " bulletins, which are reproduced in the agricultural and county papers. They act as bureaus of informa- tion on all farm questions, and carry on an extensive corre- spondence covering all conceivable questions. Their mailing lists aggregate half a million names. In addition to the experi- ment stations there is in nearly every state an officer or a special board whose duty is to look after its agricultural interests. Eighteen states, . one territory, Porto Rico and the Philippine Islands have a single official, usually called the Commissioner of Agriculture. Twenty-six states, one territory and Hawaii, have Boards of Agriculture. Information concerning the Agricultural Department of the United States will be found under Agriculture, Board or.

See the articles on the various sorts of crops; also Cattle, Horse, Pig, Sheep, &c; Dairy and Dairy-Farming, Horti- culture, Fruit and Flower-Farming, Poultry and Poultry- Farming; Soil, Grass and Grassland, Manure, Drainage of Land, Irrigation, Sowing,

Reaping, Hay and Hay- Making, Plough, Harrow, Threshing.

Literature. — Besides the contemporary works cited in the text, see the article " Agricultura " in Smith's Dictionary of Greek and Roman Antiquities (1890), and the article " Agriculture " in J. A. Barrel's Dictionnaire d Agriculture (1885-1892); R. E. Prothero, Pioneers and Progress of English Farming (1888) ; sections on agri- culture by W. J. Corbett, R. E. Prothero and W. E. Bear in Traill's Social England (1 901-1904); J. E. T. Rogers, History of Agriculture and Prices in England from 1259 to 1793 (7 vols., 1 866-1902); W. Cunningham, Growth of English Industry and Commerce during the Early and Middle Ages (2 vols., 1905 and 1907); D. M'Donald, Agricultural Writers from Sir Walter of Henley to Arthur Young, 1200-1800 (London, 1908) ; H. Rider Haggard, Rural England, 2 vols. (1902) ; Encyclopaedia of Agriculture, ed. by C E. Green and D. Young (Edinburgh, 1907-1908); Cyclopaedia of American Agriculture, ed. by L. H. Bailey (New York and London, 1907-1908) ; W. S. Harwood, The New Earth (New York, 1906) ; T. B. Collins, The New Agriculture (New York, 1906); Journals of the Royal Agricultural Society of England and other agricultural societies. Amongst general works on practical agriculture the following may be mentioned: — Stephens's Book of the Farm, 3 vols., revised by J. Macdonald (Edinburgh, 1908) ; William Fream, Elements of Agriculture (London, 1905); Rural Science Series, ed. by L. H. Bailey (New York and London, 1895, &c.) ; Morton's Handbooks of the Farm (London); R. Wallace, Farm Livestock of Great Britain (Edinburgh, 1907); Youatt's Complete Grazier, rewritten by W. Fream (London, 1900); E. V. Wilcox, Farm Animals (New York, 1907). (W. Fr.; R. Tr.)

AGRICULTURE, BOARD OF. The Board of Agriculture and Fisheries, in England, owes' its foundation to the establishment of a veterinary department of the privy council in 1865, when the country was ravaged by cattle plague. An order in council abolished the name " veterinary department " in 1883 and sub- stituted that of " agricultural department," but no alteration was effected in the work of the department, so far as it related to animals. In 1889 the Board of Agriculture (for Great Britain) was formed under an act of parliament of that year, and the immediate control of the agricultural department was transferred from the clerk of the privy council to the secretary of the Board of Agriculture, where it remains.

A minister of agriculture had for years been asked for in the

interests of the agricultural community, and the functions of this office are discharged by the president of the Board of Agriculture

and Fisheries, whose appointment is a political one, and may or may not carry with it a seat in the cabinet. The board consists of the lord president of the council, the five principal secretaries of state, the first lord of the treasury, the chancellor of the exchequer, the chancellor of the duchy of Lancaster and the secretary for Scotland. The establishment consists of a president, secretary, assistant secretaries, &c. The salary of the president is £2000 a year, and that of the secretary £1 500 a year.

The Board of Agriculture on its establishment took over from the privy council the responsibilities of the Contagious Diseases (Animals) Acts, besides the comprehensive duties of the Land Commission. The board, through its intelligence division, collects and prepares statistics relating to agriculture and forestry, and in 1904 appointed a number of honorary agricultural correspondents throughout the country for the purpose of bringing to the notice of the board any special circumstances affecting the practice of agriculture, horticulture and forestry, or the transport of farm, garden and forest produce in their districts. The land division of the board prepares the annual agricultural and produce returns, and the three divisions, the animals, intelligence and land, take proceedings under the following acts: — the Diseases of Animals Acts, the Markets and Fairs (Weighing of Cattle) Acts, the Sale of Food and Drugs Acts 1875 to 1899, the Merchandise Marks Acts 1887 to 1905, the Fertilizers and Feeding Stuffs Act 1893, the Tithe Acts 1836 to 1891, the Copyhold Act 1894, the Inclosure Acts 1845 to 1899, the Agricultural Holdings Acts 1883 to 1900, the Drainage and Improvement of Land Acts, the Universities and College Estates Acts 1858 to 1898, the Glebe Lands Act 1888, &c. The board also has charge of the inspection of schools (not being public elementary schools) in which technical instruction is given in agriculture or forestry, and institutes such experimental investigations as may be deemed conducive to the progress of agriculture and forestry.

The Ordnance Survey of the United Kingdom is under the control of the board, as well as the arrangements for the advert- isement

and sale of the publications of the Geological Survey. In 1903 the powers and duties formerly vested in the commis- sioners of the Office of Works, relating to the Royal Botanic Gardens, Kew, were transferred to the board. The various departments of the board are (1) chief clerk's branch and indoor branch of animals division; (2) outdoor branch of the animals division; (3) veterinary department; (4) fisheries branch; (5) intelligence department; (6) educational branch; (7) accounts branch; (8) inclosure and common branch; (9) copyhold and tithe branch; (10) statistical branch; (n) law branch; (12) survey, land improvement and land drainage branch.

In 1903, in pursuance of the Board of Agriculture and Fisheries Act 1903, the powers and duties of the Board of Trade under the Salmon and Freshwater Fisheries Acts, the Sea Fisheries Regula- tion Acts and other acts relating to the industry of fishing, were transferred from that department to the Board of Agriculture, and its name was changed to its present form. The Department of Agriculture and Technical Instruction for Ireland covers much the same ground. The Annual Report of the Proceedings of the Board of Agriculture under the Tithe and other Acts for igo2 contains a full account of its powers and duties.

In the British colonies the interests of agriculture are looked after — in New South Wales, by an under-secretary for mines and agriculture; in Victoria, by a member of the executive council who holds the portfolio of lands and agriculture; in Queensland, by an under-secretary for agriculture; in New Zealand, by a minister for lands and agriculture; in Canada (see, for more detail, the article Canada, Canadian Agriculture), by a minister for agriculture (the various provinces have also depart- ments of agriculture). The government of India has a secretary of revenue and agriculture. Cape Colony has a secretary for agriculture, a member of the cabinet; in the Transvaal Colony the director of agriculture is a departmental secretary; in Natal, the minister for agriculture is a member of the executive council, and the establishment consists, in addition, of a secretary, a director of agriculture, an entomologist, a dairy expert and a conservator of forests. Cyprus has a director of agriculture.

United States. — The Department of Agriculture dates its rank as an executive department from 1889. It was first established as a department in 1862, ranking as a bureau, with a commis- sioner in charge. In addition to the commissioner there were appointed a statistician, chemist, entomologist and superintend- ent of a

propagatory and experimental farm. Its scope was then somewhat limited, but its work was gradually enlarged by the appointment of a botanist in 1868, a microscopist in 1871, the creation of a forestry department in 1877, a bureau of animal industry in 1884 and the establishment of agricultural experiment stations throughout the country in 1887. In 1889 the department became an executive department, the principal official being designated Secretary of Agriculture, with a seat in the president's cabinet. His salary is $8000 a year. The secretary is now charged with the supervision of all business relating to the agri- cultural and productive industries. The fisheries have a separate bureau, and the public lands and mining interests are cared for in the Department of the Interior; but with these exceptions, all the productive interests are looked after by the Department of Agriculture. The department now comprises (1) the weather bureau, which has charge of the forecasting of weather; the issue of storm warnings; the display of weather and flood signals for the benefit of agriculture, commerce and navigation; the gauging and reporting of rivers; the reporting of temperature and rain- fall conditions for the cotton, rice, sugar and other interests; the display of frost and cold waves signals; and the distribution of meteorological information in the interest of agriculture and commerce; (2) the bureau of animal industry, which makes investigations as to the existence of contagious pleuro-pneumonia and other dangerous and communicable diseases of live stock, superintends the measures for their extirpation, makes original investigations as to the nature and prevention of such diseases, and reports on the conditions and means of improving the animal industries of the country; (3) the bureau of plant industry, which studies plant life in all its relations to agriculture. Its work is classified under the general subjects of pathological investigations, physiological investigations, taxonomic investiga- tions, agronomic investigations, horticultural investigations and seed and plant introduction investigations; (4) the forest service, which is occupied with experiments, investigations and reports dealing with the subject of forestry, and with the dissemination of information upon forestry matters; (5) the bureau of chemistry, which investigates methods proposed for the analysis of plants, fertilizers and agricultural products, and makes such analyses as pertain in general to the interests of agriculture; (6) the bureau of soils, which is entrusted with the investigation, survey and map- ping of soils; the investigation of the cause and prevention of the rise of alkali in the soil and the drainage of soils; and the

investi- gation of the methods of growing, curing and fermentation of tobacco in the different tobacco districts; (7) the bureau of entomology, which obtains and disseminates information regard- ing insects injurious to vegetation; (8) the bureau of biological survey, which studies the geographic distribution of animals and plants, and maps the natural life zones of the country; it also investigates the economic relations of birds and mammals, and recommends measures for the preservation of beneficial, and the destruction of injurious, species; (9) the division of accounts and disbursements; (10) the division of publications; (n) the bureau of statistics, which collects information as to the condition, prospects and harvests of the principal crops, and of the number and status of farm animals. It records, tabulates and co- ordinates statistics of agricultural production, distribution and consumption, and issues monthly and annual crop reports for the information of producers and consumers. The section of foreign markets makes investigations and disseminates information concerning the feasibility of extending the demands of foreign markets for the agricultural products of the United States; the bureau also makes investigations of land tenures, cost of pro- ducing farm products, country life education, transportation and other lines of rural economies; (12) the library; (13) the office of experiment stations which represents the department in its relations to the experiment stations which are now in operation

in all the states; it collects and disseminates general information regarding agricultural schools, colleges, stations, and publishes accounts of agricultural investigations at home and abroad; it also indicates lines of inquiry for the stations, aids in the conduct of co-operative experiments, reports upon their expenditures and work, and in general furnishes them with such advice and assist- ance as will best promote the purposes for which they were established; it conducts investigations relative to irrigation and drainage; (14) the office of public roads, which collects information concerning systems of road management, conducts investigations regarding the best method of road-making, and prepares publications on this subject.

In the following countries there are state departments of agri- culture: — Argentina, Belgium, Brazil, (industry, agriculture and

public works), Bulgaria (commerce and agriculture), Denmark, France, Norway (agriculture and public accounts), Italy, Japan (agriculture and commerce), Prussia (agriculture, woods and forests) , Russia (agriculture and crown domains), Sweden.

AGRIGENTUM (Gr. ‘Axpayas, mod. Girgenti (q.v.)), an ancient city on the south coast of Sicily, 25m. from the sea. It was founded (perhaps on the site of an early Sicanian settle- ment) by colonists from Gela about 582 B.C., and, though the lastest city of importance founded by the Greeks in Sicily, soon acquired a position second to that of Syracuse alone!, owing to its favourable situation for trade with Carthage and to the fertility of its territory. Pindar (Pyth. xii. 2) calls it KaXKurra Pporeau iroKlwv. The buildings for which it is famous all belong to the first two centuries of its existence. Phalaris, who is said to have roasted his enemies to death in a brazen bull (Pindar, Pylh. i. 184), ruled as tyrant from 570 to 554. What form of government was established after his fall is uncertain; we know only that, after a long interval, Theron became tyrant (488-473); but his son Thrasydaeus was expelled after an unsuccessful war with Hiero in 472 and a democracy established. In the struggle between Syracuse and Athens (415-413) the city remained absolutely neutral. Its prosperity continued to increase (its population is given at over 200,000) until in 405 B.C., despite the help of the Siceliot cities, it was captured and plundered by the Carthaginians, a blow from which it never entirely re- covered. It was colonized by Timoleon in 338 B.C. with settlers from Velia in Lucania, and in the time of the tyrant Phintias (289-279) it had regained some of its power. In the First Punic War, however, it was sacked by the Romans (261) and the Carthaginians (255), and finally in the Second Punic War by the Romans (210). But it still retained its importance as a trading and agricultural centre, even in the Roman period, exporting not only agricultural products but textile fabrics and sulphur. In the local museum are tiles used for stamping cakes of sulphur, which show that the mines, at any rate from the 3rd century, were imperial property leased to contractors.

The site is one of great natural strength and remarkable beauty, though quite unlike that of other Greek cities in Sicily. The northern portion of it consists of a lofty ridge with two summits, the westernmost of which is occupied by the modern town (985 ft.), while the easternmost, which is slightly higher, bears the name of Rock of Athena, owing to its identification in modern days with the acropolis of Acragas as described by Polybius, who

places upon it the temple of Zeus Atabyrius (the erection of which was attributed to the half mythical Phalaris) and that of Athena. 1 It must be confessed that the available space (about 70X20 yds.) on the eastern summit (where there are some remains of ancient buildings) is so small that there would be only room for a single temple, which must have been occupied by the two deities jointly, if the new theory is correct (see Notizie degli scavi, 1902, 387 and reff.). In the modern town, on the other hand, the remains of one temple are to be seen in the church of S. Maria dei Greci, while the other is generally supposed to have occupied the site of the cathedral, though no

1 E. A. Freeman, History of Sicily (Oxford, 1891), i. 433, accepts the name "Rock of Athena " and yet puts the acropolis on the site of the modern town, arguing further that the cathedral hill was an acropolis within an acropolis (II. and XVII.).

Reference to buildings In Girgenti.

1.. Santa Maria delGrtcl 2. Cathedral

Wall..

Contours at intervals of

10 metres = 32 '8 feet.

Emery Walker «c

traces of it are visible. But whichever of these two summits was the acropolis proper, 2 it is certain that both were included in the circuit of the city walls. On the north both summits are defended by cliffs; on the south the ground slopes away somewhat abruptly from the eastern summit towards the plateau on which the town stood, while the western summit is separated from this plateau by a valley traversed by a branch of the Hypsas [mod. Drago], the deep ravine of which forms the western boundary and defence of the city. On the east of the city is the valley of the Acragas [Fiume S. Biagio], from which the city took its name and which, though shallower than that of the Hypsas, still affords a sufficient obstacle to attack, and the two unite a little way to the south of the town; at the mouth was the ancient harbour, small and now abandoned.

The most famous remains of the ancient city are the temples, the most important of which form a row along the low cliffs at the

south end of the city. All are built in the Doric style, of the local porous stone, which is of a warm red brown colour, full of fossil shells and easily corroded when exposed to the air. It should be noted that their traditional names, with the exception of that of Zeus and that of Asclepius, have no foundation in fact, while the attribution of the temple in antis, into the cella of which the church of S. Biagio has been built, is uncertain; 3 They are described in R. Koldewey and O. Puchstein, Die griechischen Tempel in Unteritalien und Sicilien (Berlin, 1899), 138-184. Of all these temples the oldest is probably that of Heracles, while the best preserved are those of Hera and Con- cordia, which are very similar in dimensions; the latter, indeed,

2 Some writers place Kamikos, the city of the mythical Sican Kokalos, on the site of Acragas or its acropolis; but it appears to have lain to the north-west, possiblyat Caltabellqtta, 10m. north-east of Sciacca. We hear of it even in the Punic Wars as a fortified post of Acragas (E. A. Freeman, Hist, of Sic. i. 495). ■

5 The attribution to Demeter is supported by the discovery of votive terra-cottas, representing Demeter and Kore in the neigh-bourhood, while the conjecture that it was dedicated to the river-god Acragas rests on its position above the river, in the valley of which, indeed, a statue which may represent the deity has been discovered.

lacks nothing but its roof, owing its preservation to its conversion into the cathedral in 597 by Gregory II., bishop of Girgenti. Both temples belong to the best period of the Doric style and are among the finest in existence. In front of the former, as in front of those of Heracles and Zeus, stood a huge altar for burnt offerings, as long as the facade of the temple itself. The cetta of the temple of Heracles underwent considerable modifica-tions in Roman times, and the discovery in it of a statue of Asclepius seems to show that the cult of this deity superseded the original one.

In the colossal temple of Zeus the huge Atlantes (figures of Atlas) , 2 s ft. in height, are noticeable. They seem to have stood in the intercolumniations half-way up the outside wall and to have supported the epistyle. The collapse both of this temple and of

that of Heracles must be attributed to an earthquake; many fallen blocks of the former were removed in 1756 for the

construction of the harbour of Porto Empedocle. The four columns erected on the site of the temple of Castor and Pollux are a modern (and incorrect) restoration in which portions of two buildings have been used. Of that of Hephaestus only two columns remain, while of that of Asclepius, a mile to the south of the town, an anta and two pillars are preserved. It was in the latter temple that the statue of the god by Myron stood; it had probably been carried off to Carthage, was given to the temple by P. Scipio Africanus from the spoils of that city and aroused the cupidity of Verres.

The other remains within the city walls are of surprisingly small importance; near the picturesque church of S. Nicolo is the so-called Oratory of Phalaris, a shrine of the 2nd century B.C., 27ˆ ft. long (including the porch) by 23J ft. wide; and not far off on the east is a large private house with white tesselated pave- I ments, probably pre-Roman in origin but slightly altered in

Unnamed

Demeter (Acragas?).

Hera Lacinia.

Con- cordia.

Heracles.

Zeus.

Castor

and Pollux.

near Castor

and Pollux.

Hephae- stus.

Asclepius.

Athena.

Length excluding

steps l Breadth

90?

125

1291

220

36i

4°i

55i

55i

83

173*

671

5i'l

3°l

45

Length of ˆella

93

96I

156

332

91

Breadth of cella .

32I

31*

45l

H4l

33

Height of columns

with capitals .

21

22

33

62i?

I9i

Diameter of

columns at

bottom

4*

4i

6§

14

4

5

3i

4?

Original number of

columns

34

34

3 8

3 8 ,

34

Class

In antis.

Perip-

Penp-

Peripteros

Pseudo

Peripteros

Peripteros

Prostylos

Perip-

teros

teros

hexastylos.

peripteros

hexastylos.

hexastylos.

pseudo-

teros.

hexa-

hexa-

hepta-

peripteros;

stylos.

stylos.

stylos.

Approximate date

450 B.C.

480-440

440-420

500 B.C.

450 B.C.

338-210

after 338

before 210

488-472

B.C.

B.C.

B.C.

B.C.

B.C.

B.C.

the Roman period (R. P. Jones and E. A. Gardner in Journal of Hellenic Studies, xxvi., 1906, 207). Foundations of other buildings are to be seen in other parts of the site, but of little interest. The huge fishpond, spoken of by Diodorus as being 7

stadia in circumference (xi. 25), is to be seen at the south-west comer of the city; it is an enormous excavation in the rock with drains in its sides, at the bottom of which there is now a flourishing orange garden.

The line of the city walls can be distinctly traced for most of the circuit, but the actual remains of them are inconsiderable. On the east and west the ravines already mentioned afforded, in the main, a sufficient protection, so that a massive wall was unnecessary, while near the south-eastern angle a breastwork was formed by the excavation of the natural rock, 2 which in later times was honeycombed with tombs. E. A. Freeman attributes the southern portion of the walls to Theron (Hist, of Sic. ii. 224), but the question depends upon the date of the temple of Heracles; and if Koldewey and Puchstein are right in dating it so early as 500 B.C., it is probable that the wall was in existence by that time. Close to this temple on the west is the site of the gate known in later times as the Porta Aurea, through which the modern road passes, so that no traces now remain.

Tombs of the Greek period have mainly been found on the west of the town, outside the probable line of the walls, between the Hypsas and a small tributary, the latter having been spanned by a bridge, now called Ponte dei Morti, of which one massive pier, 45 ft. in width, still exists. Just outside the south wall is a Roman necropolis, with massive tombs in masonry, and a Christian catacomb, and a little farther south a tomb in two stories, a mixture of Doric and Ionic architecture, belonging probably to the 2nd century B.C., though groundlessly called

1 Dimensions in English feet.

1 Polybius ix. 27 xetrai tA rtixos irl rirpai inpordnov ko! irtpippuyos , f lAv airroˆvovt j U x**P°*oi4 TOU –

the Tomb of Theron. A village of the Byzantine period has been explored at Balatizzo, immediately to the south of the modern town (Notizie degli Scavi, 1900, 511-520). The walls of the dwellings are entirely cut out of the natural rock.

See J. Schubring, Historische Topographie von Akragas (Leipzig, 1870); R. Koldewey and O. Puchstein, op. cit.; C. Hiilsen in Pauly- Wissowa, Encyclopadie, i. 1187. (T. As.)

AGRIMONY (from the Lat. agrimonia, a transformation of

apyenowri, a word of unknown etymology), a slender perennial herb (botanical name, Agrimonia Eupatoria, natural order Rosaceae), 15 to 3 ft. high, growing in hedge-banks, copses and borders of fields. The leafy stem ends in spikes of small yellow flowers. The flower-stalk becomes recurved in the fruiting stage, and the fruit bears a number of hooks which enable it to cling to rough objects, such as the coat of an animal, thus ensur- ing distribution of the seed. The plant is common in Britain and widely spread through the north temperate region. The underground woody stem is astringent and yields a yellow dye.

The name has been unsystematically given to several other plants; for instance: bastard, Dutch, hemp or water agrimony (Eupatorium cannabinum); noble or three-leaved agrimony (Anemone hepatica); water agrimony (Bidens); and wild agrimony (Potentilla anserina).

AGRIONIA, an ancient Greek festival, which was celebrated annually at Orchomenus in Boeotia and elsewhere, in honour of Dionysus Agrionius, by women and priests at night. The women, after playfully pretending for some time to search for the god, desisted, saying that he had hidden himself among the Muses. The tradition is that the daughters of Minyas, king of Orchomenus, having despised the rites of the god, were seized with frenzy and ate the flesh of one of their children. At this festival it was originally the custom for the priest of the god to pursue a woman of the Minyan family with a drawn sword and kill her. (Plutarch, Quaest. Rom. 102, Quaest. Graecae 38.)

AGRIPPA, a sceptical philosopher, whose date cannot be

accurately determined. He must have lived later than Aenesidemus, who is generally said to have been a contemporary of Cicero. To him are ascribed the five tropes (irevre Tpowoi) which, according to Sextus Empiricus, summarize the attitude of the later ancient sceptics. The first trope emphasizes the disagreement of philosophers on all fundamental points; knowledge comes either from the senses or from reason. Some thinkers hold that nothing is known but the things of sense; others that the things of reason alone are known; and so on. It follows that the only wise course is to be content with an attitude of

indifference, neither to affirm nor to deny. The second trope deals with the validity of proof; the proof of one so-called fact depends on another fact which itself needs demon- stration, and so on ad infinitum. The third points out that the data of sense are relative to the sentient being, those of reason to the intelligent mind; that in different conditions things themselves are seen or thought to be different. Where, then, is the absolute criterion? Fourthly, if we examine things fairly, we see that in point of fact all knowledge depends on certain hypotheses, or facts taken for granted. Such knowledge is fundamentally hypothetical, and might well be accepted as such without the labour of a demonstration which is logically invalid. The fifth trope points out the impossibility of proving the sensible by the intelligible inasmuch as it remains to estab- lish the intelligible in its turn by the sensible. Such a process is a vicious circle and has no logical validity. A comparison of these tropes with the ten tropes enumerated in the article Aenesidemus shows that scepticism has made an advance into the more abtruse questions of metaphysics. The first and the third include all the ideas expressed in the ten tropes, and the other three systematize the more profound difficulties which new thinkers had developed. Aenesidemus was content to attack the validity of sense-given knowledge; Agrippa goes further and impugns the possibility of all truth whatever. His reasons are those of modern scepticism, the reasons which by their very nature are not susceptible of disproof.

See Diogenes Laertius x. 88, and Zeller's Greek Philosophy. Also the articles Scepticism; Aenesidemus.

AGRIPPA, HEROD, I. (c. 10 b.c.a.d. 44), king of Judea, the son of Aristobulus and Berenice, and grandson of Herod the Great, was born about 10 B.C. His original name was Marcus Julius Agrippa. Josephus informs us that, after the murder of his father, Herod the Great sent him to Rome to the court of Tiberius, who conceived a great affection for him, and placed him near his son Drusus, whose favour he very soon won. On the death of Drusus, Agrippa, who had been recklessly extrava gant, was obliged to leave Rome, overwhelmed with debt. After a brief seclusion, Herod the Tetrarch, his uncle, who had married Herodias, his sister, made him Agoranomos (Overseer of Markets) of Tiberias, and presented him with a large sum of money; but his uncle being unwilling to continue his support, Agrippa left Judea for Antioch and soon after returned to Rome, where he was welcomed by Tiberius and became the constant campanion of the

emperor Gaius (Caligula), then a popular favourite. Agrippa being one day overheard by Eutyches, a slave whom he had made free, to express a wish for Tiberius' death and the advancement of Gaius, was betrayed to the emperor and cast into prison. In a.d. 37 Caligula, having ascended the throne, heaped wealth and favours upon Agrippa, set a royal diadem upon his head and gave him the tetrarchy of Batanaea and Trachonitis, which Philip, the son of Herod the Great, had formerly possessed. To this he added that held by Lysanias; and Agrippa returned very soon into Judea to take possession of his new kingdom. In a.d. 39 he returned to Rome and brought about the banishment of Herod Antipas, to whose tetrarchy he succeeded. On the assassination of Cali- gula (a.d. 41) Agrippa contributed much by his advice to main- tain Claudius in possession of the imperial dignity, while he made a show of being in the interest of the senate. The emperor, in acknowledgment, gave him the government of Judea, while the kingdom of Chalcis in Lebanon was at his request given to his brother Herod . Thus Agrippa became one of the greatest princes

of the east, the territory he possessed equalling in extent that held by Herod the Great. He returned to Judea and governed it to the great satisfaction of the Jews. His zeal, private and public, for Judaism is celebrated by Josephus and the rabbis; and the narrative of Acts xii. gives a typical example of it. About the feast of the Passover a.d. 44, James the elder, the son of Zebedee and brother of John the evangelist, was seized by his order and put to death. He proceeded also to lay hands on Peter and imprisoned him. After the Passover he went to Caesarea, where he had games performed in honour of Claudius, and the inhabitants of Tyre and Sidon waited on him to sue for peace. According to the story in Acts xii., Agrippa, gor- geously arrayed, received them in the theatre, and addressed them from a throne, while the audience cried out that his was the voice of a god. But " the angel of the Lord smote him," and shortly afterwards he died " eaten of worms." The story in Acts differs slightly from that in Josephus, who describes how in the midst of his elation he saw an owl perched over his head. During his confinement by Tiberius a like omen had been interpreted as portending his speedy release, with the warning that should he behold the same sight again he would die within five days. He was immediately smitten with violent pains, and after a few days died. Josephus says nothing of his being " eaten of worms," but the discrepancies between the two stories are of slight moment. A third account omits all the apocryphal elements in the story and says that Agrippa was

assassinated by the Romans, who objected to his growing power. See articles in Ency. Bibl. (W. J. Woodhouse), Jewish Ency. (M. Brann), with further references; N. S. Libowitz, Herod and Agrippa (New York, 2nd ed., 1898); Gratz, Geschichte d. Juden, iii. 318-361.

AGRIPPA, HEROD, II. (27-100), son of the preceding, and like him originally Marcus Julius Agrippa, was born about a.d. 27, and received the tetrarchy of Chalcis and the oversight of the Temple on the death of his uncle Herod, a.d. 48. In a.d. 53 he was deprived of that kingdom by Claudius, who gave him other provinces instead of it. In the war which Vespasian carried on against the Jews Herod sent him 2000 men, by which it appears that, though a Jew in religion, he was yet entirely devoted to the Romans, whose assistance indeed he required to secure the peace of his own kingdom. He died at Rome in the third year of Trajan, a.d. 100. He was the seventh and last king of the-family of Herod the Great. It was before him and his sister Berenice (q.v., B.2) that St Paul pleaded his cause at Caesarea (Acts xxvi.). He supplied Josephus with information for his history.

AGRIPPA, MARCUS VIPSANIUS (63-12 B.C.), Roman states- man and general, son-in-law and minister of the emperor Augus- tus, was of humble origin. He was of the same age as Octavian (as the emperor was then called), and was studying with him at Apollonia when news of Julius Caesar's assassination (44) arrived. By his advice Octavian at once set out for Rome. Agrippa played a conspicuous part in the war against Lucius, brother of Mark Antony, which ended in the capture of Perusia (40). Two years later he put down a rising of the Aquitanians in Gaul, and crossed the Rhine to punish the aggressions of the Germans. On his return he refused a triumph but accepted the consulship (37). At this time Sextus Pompeius, with whom war was imminent, had command of the sea on the coasts of Italy. Agrippa's first care was to provide a safe harbour for his ships, which he accomplished by cutting through the strips of land which separated the Lacus Lucrinus from the sea, thus forming an outer harbour; an inner one was also made by joining the lake Avernus to the Lucrinus (Dio Cassius xlviii. 49 ; Pliny, Nat. Hist, xxxvi. 24). About this time Agrippa married Pomponia, daughter of Cicero's friend Pomponius Atticus. Having been appointed naval commander-in-chief he put his crews through a course of training, until he felt in a position to meet the fleet of Pompeius. In 36 he was victorious at Mylae and Naulochus, and received the honour of a naval crown for his services. In 33 he was chosen

aedile and signalized his tenure of office by effecting great improvements in the city of Rome, restoring and building aqueducts, enlarging and cleansing the sewers, and constructing baths and porticos, and laying out gardens, He also first gave

a stimulus to the public exhibition of works of art. The emperor's boast that he had found the city of brick but left it of marble ("marmoream se relinquere, quam latericiam accepisset," Suet. Aug. 29) might with greater propriety have been uttered by Agrippa. He was again called away to take command of the fleet when the war with Antony broke out. The victory at Actium (31), which gave the mastery of Rome and the empire of the world to Octavian, was mainly due to Agrippa. As a token of signal regard Octavian bestowed upon him the hand of his niece Marcella (28). We must suppose that his wife Pomponia was either dead or divorced. In 27 Agrippa was consul for the third time, and in the following year the senate bestowed upon Octavian the emperial title of Augustus. Probably in com- memoration of the battle- of Actium, Agrippa built and dedicated the Pantheum still in existence as La Rotonda. The inscription on the portico states that it was erected by him during his third consulship. His friendship with Augustus seems to have been clouded by the jealousy of his father-in-law Marcellus, which was probably fomented by the intrigues of Livia, the second wife of Augustus, who feared his influence with her husband. The result was that Agrippa left Rome, ostensibly to take over the governor- ship of Syria — a sort of honourable exile; but as a matter of fact he only sent his legate to the East, while he himself remained at Lesbos. On the death of Marcellus, which took place within a year, he was recalled to Rome by Augustus, who found he could not dispense with his services. It is said that by the advice of Maecenas he resolved to attach Agrippa still more closely to him by making him his son-in-lawi He accordingly induced him to divorce Marcella and marry his daughter Julia (21), the widow of Marcellus, equally celebrated for her beauty and abilities and her shameless profligacy. In 19 Agrippa was employed in putting down a rising of the Cantabrians in Spain. He was appointed governor of Syria a second time (17), where his just and prudent administration won him the respect and good-will of the provincials, especially the Hebrew population. His last public service was the bloodless suppression of an insurrection in Pannonia

(13). He died at Campania in March of the year following his fifty-first year. Augustus honoured his memory by a magnificent funeral.

Agrippa was also known as a writer, especially on geography. Under his supervision Julius Caesar's design of having a complete survey of the empire made was carried out. From the materials at hand he constructed a circular chart, which was engraved on marble by Augustus and afterwards placed in the colonnade built by his sister Polla. Amongst his writings an autobiography, now lost, is referred to. Agrippa left several children; by Pomponia, a daughter Vipsania, who became the wife of the emperor Tiberius; by Julia three sons, Gaius and Lucius Caesar and Agrippa Postumus, and two daughters, Agrippina the elder, afterwards the wife of Germanicus, and Julia, who married Lucius Aemilius Paullus.

See Dio Cassius xlix.liv. ; Suetonius, Augustus; Velleius Pater culus ii. ; Josephus, Antiq. Jud. xv. 10, xvi. 2; Turnbull, Three Dissertations, one of the.characters of Horace, Augustus and Agrippa (1740); Frandsen, Marcus Vipsanius Agrippa (1836); Motte, Etude sur Marcus Agrippa (1872) ; Nispi-Landi, Marcus Agrippa e i suoi tempi (1901) ; D. Detlefsen, Ursprung, Einrichtung und Bedeutung der Erdkarte Agrippas (1906) ; V. Gardthausen, Augustus und seine Zeit, vol. i. 762 foil., ii. 432 foil.

AGRIPPA VON NETTESHEIM, HENRY CORNELIUS (1486- 1535), German writer, soldier, physician, and by common reputation a magician, belonged to a family many members of which had been in the service of the house of Habsburg, and was born at Cologne on the 14th of September i486. The details of his early life are somewhat obscure, but he appears to have obtained a knowledge of eight languages, to have studied at the university of Cologne and to have passed some time in France. When quite young he entered the service of the German king, Maximilian I., and in 1 508 was engaged in an adventurous enter- prise in Catalonia. He probably served Maximilian both as soldier and as secretary, but his wonderful and varied genius was not satisfied with these occupations, and he soon began to take a lively interest in theosophy and magic. In 1 509 he went to the

university of Dole, where he lectured on John Reuchliri's De Verbo mirifico, but his teaching soon caused charges of heresy to be brought against him, and he was denounced by a monk named

John Catilinet in lectures delivered at Ghent. As a result Agrippa was compelled to leave Dole; proceeding to the Netherlands he took service again with Maximilian. In 15 10 the king sent him on a diplomatic mission to England, where he was the guest of Colet, dean of St Paul's, and where he replied to the accusations brought against him by Catilinet. Returning to Cologne he followed Maximilian to Italy in 1 5 1 1 , and as a theologian attended the council of Pisa, which was called by some cardinals in opposi- tion to a council called by Pope Julius II. He remained in Italy for seven years, partly in the service of William VI., marquis of Monferrato, and partly in that of Charles III., duke of Savoy, probably occupied in teaching theology and practising medicine. In 1515 he lectured at the university of Pavia on the Pimander of Hermes Trismegistus, but these lectures were abruptly ter- minated owing to the victories of Francis I., king of France. In 1 518 the efforts of one or other of his patrons secured for Agrippa the position of town advocate and orator, or syndic, at Metz. Here, as at Dole, his opinions soon brought him into collision with the monks, and his defence of a woman accused of witchcraft involved him in a dispute with the inquisitor, Nicholas Savin.- The consequence of this was that in 1526 he resigned his office and returned to Cologne, where he stayed about two years. He then practised for a short time as a physician at Geneva and Freiburg, but in 1524 went to Lyons on being appointed physician to Louise of Savoy, mother of Francis I. In 1528 he gave up this position, and about this time was invited to take part in the dispute over the legality of the divorce of Catherine of Aragon' by Henry VIII. ; but he pre- ferred an offer made by Margaret, duchess of Savoy and regent of the Netherlands, and became archivist and historiographer to the emperor Charles V. Margaret's death in 1 530 weakened his position, and the publication of some of his writings about the same time aroused anew the hatred of his enemies; but after suffering a short imprisonment for debt at Brussels he lived at Cologne and Bonn, under the protection of Hermann of Wied, archbishop of Cologne. By publishing his works he brought him- self into antagonism with the Inquisition, which sought to stop the printing of De occulta philosophia. He then went to France, where he was arrested by order of Francis I. for some disparaging words about the queen-mother; but he was soon released, and on the 18th of February 1 535 died at Grenoble. He was married three times and had a large family. Agrippa was a man of great ability and undoubted courage, but he lacked perseverance and was himself responsible for many of his misfortunes. In spite of his inquiring

nature and his delight in novelty, he re- mained a Catholic, and had scant sympathy with the teaching of the reformers. His memory was nevertheless long defamed in the writings of the monks, who placed a malignant inscrip- tion over his grave. Agrippa's work, De occulta philosophia, was written about 1510, partly under the influence of the author's friend, John Trithemius, abbot of Wurzburg, but its publication was delayed until 1531, when it appeared at Antwerp. It is a defence of magic, by means of which men may come to a knowledge of nature and of God, and contains Agrippa's idea of the universe with its three worlds or spheres. His other principal work, Delncertitudine et Vanitate Scientiarum et Artium atque Excellentia Verbi Dei Declamatio, was written about 1527 and published at Antwerp in 1531. This is a sarcastic attack on the existing sciences and on the pretensions of learned men. In it Agrippa denounces the accretions which had grown up around the simple doctrines of Christianity, and wishes for a return to the primitive belief of the early Christian church. He also wrote De Nobilitate et Praecellentia Feminei Sexus, dedicated to Margaret of Burgundy, De matrimonii Sacramento and other smaller works. An edition of his works was published at Leiden in 1550 and they have been republished several times.

See H. Morley, Life of H. C. Agrippa (London, 1856); A. Prost, Les Sciences et les arts occultes au X VI. siicle: Corneille Agrippa, sa vie et ses mwires (Paris, 1881) ; A. Daguet, Cornelius Agrippa (Paris, 1856).

AGRIPPINA, the "elder," daughter of Marcus Vipsanius Agrippa by his third wife Julia, was the grand-daughter of Augustus and the wife of Germanicus. She accompanied her husband to Germany, when the legions on the Rhine revolted after the death of Augustus (a.d. 14). Three years later she was in the East with Germanicus (q.v.), who died at Antioch in 19, poisoned, it was said, by order of Cn. Calpurnius Piso, governor of Syria. Eager to avenge his death, she returned to Rome and boldly accused Piso of the murder of Germanicus. To avoid public infamy Piso committed suicide. Tiberius and his favourite Sejanus feared that her ambition might lead her to attempt to secure the throne for her children, and she was banished to the island of Pandataria off the coast of Campania, where she died on the iSth of October 33,

starved to death by herself, or, according to some, by order of Tiberius. Two of her sons, Nero and Drusus, had already fallen victims to the machinations of Sejanus. Agrippina had a large family by Germanicus, several of whom died young, while only two are of importance — Agrippina the ” younger ” and Gaius Caesar, who succeeded Tiberius under the name of Caligula. It is remarkable that, although Tiberius had ordered the execution of his elder brothers, by his will he left Caligula one of the heirs of the Empire. Agrippina was a woman of the highest character and exemplary morality. There is a portrait of her in the Capitoline Museum at Rome, and a bronze medal in the British Museum representing the bringing back of her ashes to Rome by order of Caligula.

See Tac. Ann. i.-vi.; Suetonius, Tiberius, 53; Dio Cassius lvii. 6, lviii. 22, lix. 3; Elizabeth Hamilton, Memoirs of the Life of Agrippina (1804); Burkhard, Agrippina, des Agrippa Tochter (1846) ; Stahr, Romische Kaiserfrauen (1880).

AGRIPPINA, the “younger” (a.d. 16-59), daughter of Germanicus and Agrippina the elder, sister of Caligula and mother of Nero, was born at Oppidum Ubiorum on the Rhine, afterwards named in her honour Colonia Agrippinae (mod. Cologne). Her life was notorious for intrigue and perfidy. By her first husband, Gnaeus Domitius Ahenobarbus, she was the mother of the emperor Nero; her second husband was Passienus Crispus, whom she was accused of poisoning. Assisted by the influential freedman Pallas, she induced her unCle the emperor Claudius to marry her after the death of Messalina, and adopt the future Nero as heir to the throne in place of Britan- nicus. Soon afterwards she poisoned Claudius and secured the throne for her son, with the intention of practically ruling on his behalf. Being alarmed at the influence of the freedwoman Acte over Nero, she threatened to support the claims of the rightful heir Britannicus. Nero thereupon murdered the young prince and decided to get rid of his mother. Pretending a re- conciliation, he invited her to Baiae, where an attempt was made to drown her on a vessel especially constructed to founder. As this proved a failure, he had her put to death at her country house. Agrippina wrote memoirs of her times, referred to by Tacitus (Ann. iv. 53). Her character is set forth in Racine’s Britannicus.

See Tac. Ann. xii., xiii., xiv. ; Dio Cassius lix.-lxi. ; Suetonius, Nero, 34; Stahr, Agrippina, die Mutter Neros (1880); RafFay, Die Memoiren der Kaiserin Agrippina (1884) r B. W. Henderson, The

Life and Principate of the Emperor Nero (1903) ; also article Nero.

AGROTERAS THUSIA, an annual festival held at Agrae near Athens, in honour of Artemis Agrotera, in fulfilment of a vow made by the city, before the battle of Marathon, to offer in sacrifice a number of goats equal to that of the Persians slain in the conflict. The number being so great, it was decided to offer 500 goats yearly.

See Plutarch, De Malignitate Herodoti, 26; Xenophon, Anab. iii. 2. 12; Aelian, Var. Hist. ii. 25; Schol. on Aristophanes, Equites,

660.

AGUADILLA, a town and port near the northern extremity of the W. coast of Porto Rico. Pop. (1899) 6425. It has a fairly good and safe anchorage, and is the commercial outlet for a very fertile agricultural district. The town is attractively situated and well built, and is connected by railway with Maya- guez, 20 m. distant, and also with Ponce and San Juan. The

neighbouring district produces sugar-cane, tobacco, cattle, cocoanuts, oranges and lemons. The bay is supposed to have been first visited by Columbus (November 1493), though the town was not founded until 1775.

AGUADO, ALEXANDRE MARIE, marquis de Las Marismas del Guadalquivir, viscount de Monte Ricco (1 784-1842), Spanish banker, was born of Jewish parentage at Seville, on the 29th of June 1784. He began life as a soldier, fighting with distinction in the Spanish war of independence on the side of Joseph Bonaparte. After the battle of Baylen (1808) he entered the French army, in which he rose to be colonel and aide-de-camp to Marshal Soult. He was exiled in 181 5, and immediately started business as a commission-agent in Paris, where, chiefly through his family connexions in Havana and Mexico, he acquired in a few years enough wealth to enable him to undertake banking. The Spanish government gave him full powers to negotiate the loans of 1823, 1828, 1830 and 1831; and Ferdinand VII. rewarded him with the title of marquis, the decorations of several orders and valuable mining concessions in Spain. Aguado also negotiated the Greek loan of 1834. In 1828, having become possessed of large estates in France, including the chateau Margaux, famous for its wine, he was naturalized as a French

citizen. He died at Gijon in Spain on the 14th of April 1842, leaving a fortune computed at 60,000,000 francs, and a splendid collection of pictures which at his death was bought by the French government.

AGUASCALIENTES, an inland state of Mexico, bounded N., E. and W. by the state of Zacatecas, and S. by Jalisco. Pop. (est. 1900) 102,416, a gradual decrease since the census years of 1895 and 1879; Efrea, 2970 sq. m. The state occupies an elevated plateau, extending from two spurs of the Sierra Madre, called the Sierra Fria and Sierra de Laurel, eastward to the rolling fertile plains of its eastern and south-eastern districts. It is well watered by numerous small streams and one larger river, the Aguascalientes or Rio Grande, and has a mild healthy climate with a moderate rainfall. The fertile valleys of the north and west are devoted to agriculture and the plains to stock- raising. Indian corn, flour, cattle, horses, mules and hides are exported to the neighbouring states. Mining industries are still undeveloped, but considerable progress has been made in manufactures, especially of textile fabrics. The state has good railway communications and a prosperous trade. The capital, Aguascalientes, named from the medicinal hot springs near it, is a flourishing commercial and manufacturing city. Pop. (est. 1900) 35,052. It has cotton factories, smelting works, potteries, tanneries, distilleries, and wagon and tobacco factories. It is a station on the Mexican Central railway, 364 m. by rail north- west of the city of Mexico, and is connected by rail with Tampico on the Gulf of Mexico. The city is well built, has many fine churches and good public buildings, street cars and electric lights. The surrounding district is well cultivated and produces an abundance of fruit and vegetables. Other prominent towns of the state are Rincon de Romos (or Victoria de Calpulalpam), Asientos de Ibarra and Calvillo, the first having more and the others less than 5000 inhabitants.

AGUE (from Lat. acuta, sharp; sc. febris, fever), the common name given to a form or stage of malarial disease; the ague fit is the cold, shivering stage, and hence the word is also loosely used for any such paroxysm. Simple ague is of much the same type whether in temperate or tropical climates, and may take various forms (quotidian, tertian, quartan), passing into ” re- mittent fever.” The symptoms are discussed, together with causation, &c, in the article Malaria. For ” brow-ague ” see Neuralgia.

AGUESSEAU, HENRI FRANCOIS D’ (1668-1751), chancellor of

France, illustrious for his virtues, learning and talents, was born at Limoges, of a family of the magistrature. His father, Henri d' Aguesseau, a hereditary councillor of the parlement of Metz, was a man of singular ability and breadth of view who, after holding successively the posts of intendant of Limousin, Guyenne and Languedoc, was in 1685 called to Paris as coun- cillor of state, appointed director-general of commerce and

manufactures in 1695, president of the council of commerce in 1 700 and a member of the council of the regency for finance. By him Francois d'Aguesseau was early initiated into affairs and brought up in religious principles deeply tinged with Jansenism. He studied law under Jean Domat, whose influence is apparent in both the legal writings and legislative work of the chancellor. When little more than twenty-one years of age he was, through his father's influence with the king, appointed one of the three advocates-general to the parlement of Paris; and the eloquence and learning which he displayed in his first speech gained him a very high reputation. D'Aguesseau was in fact the first great master of forensic eloquence in France.

In 1700 he was appointed procurator-general; and in this office, which he filled for seventeen years, he gained the greatest popularity by his defence of the rights of the Gallican Church in the Quietist troubles and in those connected with the bull Unigenitus (see Jansenism). In February 1717 he was made chancellor by the regent Orleans; but was deprived of the seals in January of the following year and exiled to his estate of Fresnes in Brie, on account of his steady opposition to the projects of the famous John Law, which had been adopted by the regent and his ministers. In June 1720 he was recalled to satisfy public opinion; and he contributed not' a little by the firmness and sagacity of his counsels to calm the public dis- turbance and repair the mischief which had been done. Law himself had acted as the messenger of his recall; and it is said that d'Aguesseau's consent to accept the seals from his hand greatly diminished his popularity. The parlement continuing its opposition to the registering of the bull Unigenitus, d'Aguesseau, fearing a schism and a religious war in 'France, assisted Guillaume Dubois, the favourite of the regent, in his endeavour to force the parlement to register the bull, acquiesced in the exile of the magistrates and

allowed the Great Council to assume the power of registration, which legally belonged to the parlement alone. The people unjustly attributed his conduct to a base compliance with the favourite. He certainly opposed Dubois in other matters; and when Dubois became chief minister d'Aguesseau was deprived of his office (March 1, 1722).

He retired to his estate, where he passed five years of which he always spoke with delight. The Scriptures, which he read and compared in various languages, and the jurisprudence of his own and other countries, formed the subjects of his more serious studies; the rest of his time was devoted to philosophy, literature and gardening. From these occupations he was recalled to court by the advice of Cardinal Fleury in 1727, and on the 15th of August was named chancellor for the third time, but the seals were not restored to him till ten years later. During these years he endeavoured to mediate in the disputes between the court and the parlement. When he was at last reinstated in office, he completely withdrew from all political affairs, and devoted himself entirely to his duties as chancellor and to the achievement of those reforms which had long occupied his thoughts. He aimed, as others had tried before him, to draw up in a single code all the laws of France, but was unable to accomplish his task. Besides some important enactments regarding donations, testaments and successions, he introduced various regulations for improving the forms of procedure, for ascertaining the limits of jurisdictions and for effecting a greater uniformity in the execution of the laws throughout the several provinces. These reforms constitute an epoch in the history of French jurisprudence, and have placed the name of d'Aguesseau in the same rank with those of L'H6pital and Lamoignon. As a magistrate also he was so conscientious that the due de Saint-Simon in his Memoirs complained that he spent too much time over the cases that came before him.

In 1750, when upwards of eighty-two years of age, d'Aguesseau retired from the duties without giving up the rank of chancellor. He died on the 9th of February of the following year.

His grandson, Henri Cardin Jean Baptiste, Marquis d'Aguesseau (1746-18 26), was advocate-general in the parle- ment of Paris and deputy in the Estates-General. Under the Consulate he became president of the court of appeal and later

minister at Copenhagen. He was elected to the French Academy

in 1787.

Of d'Aguesseau's works the most complete edition is that of the eminent lawyer Jean Marie Pardessus, published in 16 vols. (1818- 1820); his letters were edited separately by Rives (1823); a selec- tion of his works, CEuvres choisies, was issued, with a biographical notice, by E. Falconnet in 2 vols. (Paris, 1865). The far greater part of his works relate to matters connected with his profession, but they also contain an elaborate treatise on money ; several theological essays; a life of his father, which is interesting from the account which it gives of his own early education ; and Metaphysical Meditations, written to prove that, independently of all revelation and all positive law, there is that in the constitution of the human mind which renders man a law to himself.

See Boullee, Histoire de la vie et des ouvrages du chancelier d'Aguesseau (Paris, 1835) ; Fr. Monnier, Le Chancelier d'Aguesseau (Paris, i860; 2nd ed., 1863); Charles Butler, Mem. of Life of H. F. d'Aguesseau, &c. (1830).

AGUILAR, GRACE (1816-1847), English writer, the daughter of a Jewish merchant in London, was born in June 1816. Her works consist chiefly of religious fiction, such as The Vale of Cedars (1850) and Home Influence (1847). She also wrote, in defence of her faith and its professors, The Spirit of Judaism (1842) and other works. Her services were acknowledged gratefully by the " women of Israel " in a testimonial which they presented shortly before her death, which took place at Frank- fort-on-the-Main on the 16th of September 1847. *•-'

AGUILAR, or Aguilar de la Frontera, a town of southern Spain, in the province of Cordova; near the small river Cabra, and on the Cordova-Malaga railway. Pop. (1900) 13,236. Aguilar " of the Frontier " was so named in the middle ages from its position on the border of the Moorish territories, which were defended by the castle of Anzur, now a ruin; but the spacious squares and modern houses of the existing town retain few vestiges of Moorish dominion. The olives and white wine of Aguilar are celebrated in Spain, although the wine, which somewhat resembles sherry, is known as Montilla, from the adjacent town of that name. Salt springs exist in the neigh- bourhood, and to the south there are two small lakes, Zofiar and Rincon, which abound in fish.

AGUILAS, a seaport of south-eastern Spain, in the province of Murcia, on the Mediterranean Sea, at the terminus of a railway from Huercal-Overa. Pop. (1900) 15,868. Aguilas is built on the landward side of a small peninsula, between two bays — the Puerto Ponente, a good harbour, on the south-west,, and the Puerto Levanto, which is somewhat dangerous to shipping in rough weather, on the north-east. It is the chief outlet for the Spanish trade in esparto grass, and for the iron ore and other mineral products of the neighbourhood. It has also some trade in fruit and grain. The imports consist chiefly of coal. In 1904, 296 vessels, of 238,274 tons, cleared at this port.

AGUILERA, VENTURA RUIZ (1820-1881), Spanish poet, was born in 1820 at Salamanca, where he graduated in medicine. He removed to Madrid in 1844, engaged in journalism and won considerable popularity with a collection of poems entitled Ecos nacionales (1849). His Eleglas y Armonias (1863) was no less successful, but his Sdliras (1874) and Estaciones del afio (1879) showed that his powers were declining. He wrote under the obvious influence of Lamartine, preaching the gospel of liberalism and Christianity in verses which, though deficient in force, leave the impression of a sincere devotion and a charming personality. He became director of the national archaeological museum at Madrid, where he died on the 1st of July 1881.

AGUILLON (Aguilonius), FRANCOIS D' (1566-1617), Flemish mathematician. Having entered the Society of Jesus in 1586, he was successively professor of philosophy at Douai and rector of the Jesuit College at Antwerp. He wrote a treatise on optics in six books (Antwerp, 1613), notable for containing the principles of stereographic projection.

AHAB (in Heb. 'ah'ab, " father's brother "), king of Israel, the son and successor of Omri, ■ ascended the throne about 875 B.C. (1 Kings xvi. 29-34). He married Jezebel, the daughter of the king of Sidon, and the alliance was doubtless the means of procuring him great riches, which brought pomp and luxury

in their train. We read of his building an ivory palace and founding new cities, the effect perhaps of a share in the flourishing commerce of Phoenicia. 1 The material prosperity of his

reign, which is comparable with that of Solomon a century before, was overshadowed by the religious changes which his marriage involved. Although he was a worshipper of Yahweh, as the names of his children prove (cp. also xxii. 5 seq.), his wife was firmly attached to the worship of the Tyrian Baal, Melkart, and led by her he gave a great impulse to this cult by building a temple in honour of Baal in Samaria. This roused the indignation of those prophets whose aim it was to purify the worship of Yahweh (see Elijah). During Ahab's reign Moab, which had been conquered by his father, remained tributary; Judah, with whose king, Jehoshaphat, he was allied by marriage, was probably bis vassal; only with Damascus is he said to have had strained relations. The one event mentioned by external sources is the battle at Karkar (perhaps Apamea), where Shalmaneser II. of Assyria fought a great confederation of princes from Cilicia, N. Syria, Israel, Ammon and the tribes of the Syrian desert (854 B.C.). Here Akabbu Sir'lai (Ahab the Israelite) with Baasha, son of Ruhub (Rehob) of Ammon and nine others are allied with Bir-'idri (Ben-hadad), Ahab's contribution being reckoned at 2000 chariots and 10,000 men. The numbers are comparatively large and possibly include forces from Tyre, Judah, Edom and Moab. The Assyrian king claimed a victory, but his immediate return and subsequent expeditions in 849 and 846 against a similar but unspecified coalition seem to show that he met with no lasting success. According to the Old Testament narratives, however, Ahab with 7000 troops had previously overthrown Ben-hadad and his thirty-two kings, who had come to lay siege to Samaria, and in the following year obtained a remarkable victory over him at Aphek, probably in the plain of Sharon (1 Kings xx.) . A treaty was made whereby Ben-hadad restored the cities which his father had taken from Ahab's father {i.e. Omri, but see xv. 20, 2 Kings xiii. 25), and trading facilities between Damascus and Samaria were granted. A late popular story (xx. 35-42, akin in tone to xii. 33— xiii. 34) condemned Ahab for his leniency and foretold the destruction of the king and his land. Three years later, war broke out on the east of Jordan, and Ahab with Jehoshaphat of Judah went to recover Ramoth-Gilead and was mortally wounded (xxii.). He was succeeded by his sons (Ahaziah and Jehoram).

It is very difficult to obtain any clear idea of the order of these events (LXX. places 1 Kings xxi. immediately after xix.). How the hostile kings of Israel and Syria came to fight a common enemy, and how to correlate the Assyrian and Biblical records, are

questions which have perplexed all recent writers. The reality of the difficulties will be apparent from the fact that it has been suggested that the Assyrian scribe wrote " Ahab " for his son " Jehoram " (Kamphausen, Chronol. d. hebr. Kon., Kittel), and that the very identification of the name with Ahab of Israel has been questioned (Horner, Proc. Soc. Bibl. Arch., 1898, p. 244) . 2 Whilst the above passages in 1 Kings view Ahab not unfavourably, there are others which give a less friendly picture. The tragic murder of Naboth (see Jezebel), an act of royal encroachment, stirred up popular resentment just as the new cult aroused the opposition of certain of the prophets. The latter found their champion in Elijah, whose history reflects the prophetic teaching of more than one age. (See Kings.) His denunciation of the royal dynasty, and his emphatic insistence on the worship of Yahweh and Yahweh alone, form the keynote to a period which culminated in the accession of Jehu, an event in which Elijah's chosen disciple Elisha was the leading figure.

The allusions to the statutes and works of Omri and Ahab in Mic. vi. 16 may point to legislative measures of these kings, and the reference to the incidents at the building of Jericho (1 Kings xvi. 34) may be taken to show that foundation sacrifices, familiar

•Ahab's ivory palace found its imitators (1 Kings xxii. 39; Am. iii. 15). The ivory was probably brought by the Phoenicians from Cyprus or from one of the works on the coast of Asia Minor.

1 See the discussions by Cheyne, Ency. Bib. col. 91 seq., and by Whitehouse, Diet. Bib. i. 53.

in nearly all parts of the world, were not unknown in Israel at this period. 3 This has in fact been confirmed by excavation in Palestine.

Another Ahab is known only as an impious prophet in the time of the Babylonian exile (Jer. xxix. 21). (S. A. C.)

'AHAI, of Sabha, an 8th-century Talmudist of high renown. He was author of Quaestiones (Sheiltoth), a collection of homilies (at once learned and popular) on Jewish law and ethics. This is recorded to have been the first work written by a Jewish scholar after the completion of the Talmud.

AHASUERUS (the Latinized form of the Hebrew tfbifpst; in LXX. 'Accrofojpos, once in Tobit 'Aavripos), a royal Persian or Median

name occurring in three of the books of the Old Testament and in orie of the books of the Apocrypha. In every case the identification of the person named is a matter of controversy.

In Dan. ix. 1 Ahasuerus is the father of Darius the Mede, who " was made king over the realm of the Chaldeans " after the conquest of Babylon and death of Belshazzar. Who this Darius was is one of the most difficult questions in ancient history. Nabonidos (Nabunaid, Nabu-nahid) was immediately succeeded by Cyrus, who ruled the whole Persian empire. Darius may possibly have acted under Cyrus as governor of Babylon, but this view is not favoured by Dan. vi. 1, vi. 25, for Darius (v. 31) is said to have been sixty-two years old at the time (638 B.C.) . This would make him contemporary with Nebuchadrezzar, which agrees with Tob. xiv. 15, where we read " of the destruction of Nineveh, which Nebuchadnezzar and Ahasuerus took captive." As a matter of fact, however, Cyaxares and Nabopolassar were the conquerors of Nineveh, and the latter was the father of Nebuchadrezzar. Cyrus did, on ascending the throne of Babylon, appoint a governor of the province, but his name was Gobryas, the son of Mardonius. The truth is, no doubt, as Prof. Sayce points out, that the book of Daniel was not meant to be strictly historical. As Prof. Driver says, " tradition, it can hardly be doubted, has here confused persons and events in reality distinct " (Literature of the Old Test. (6) p. 500).

In Ezra iv. 6 Ahasuerus is mentioned as a king of Persia, to whom the enemies of the Jews sent representations opposing the rebuilding of the temple at Jerusalem. Here the sequence of the reigns in the Biblical writer and.in the profane historians — in the one, Cyrus, Ahasuerus, Artaxerxes, Darius; in the other, Cyrus, Cambyses, Smerdis, Darius — led in the past (Ewald, &c.) to the identification of Ahasuerus with Cambyses (529-522 B.C.), son of Cyrus. The name Khshayarsha, however, has been found in Persian inscriptions, and has been thought to be equivalent to the Xerxes (485-465 B.C.) of the Greeks. On Babylonian tablets both the forms Khishiarshu and Akkashiarshi occur amongst others. Modern scholars, therefore, identify the Ahasuerus of Ezra with Xerxes.

In the book of Esther the king of Persia is called Ahasuerus (rendered in LXX. " Artaxerxes " throughout). The identification of Ahasuerus with Artaxerxes I. Longimanus, the son and successor of Xerxes, though countenanced by Josephus, deserves little consideration. Most students are agreed that he must be a

monarch of the Achaemenian dynasty, earlier than Artaxerxes I. ; and opinion is divided between Darius Hystaspes and Xerxes. In support of the former view it is alleged, among other things, that Darius was the first Persian king of whom it could be said, as in Esther i. 1, that he ” reigned from India even unto Ethiopia, over an hundred and seven and twenty pro- vinces”; and that it was also the distinction of Darius that (Esther x. 1) he laid ” a tribute upon the land and upon the isles of the sea ” (cf. Herod, iii. 89). In support of the identification with Xerxes it is alleged (1) that the Hebrew ‘Ahashverosh is the natural equivalent of the old Persian Khshayarsha, the true name of Xerxes; (2) that there is a striking similarity of character between the Xerxes of Herodotus and the Ahasuerus of Esther; (3) that certain coincidences in dates and events

•See Trumbull, Threshold Covenant, pp. 46 sqq. ; Haddon, Study of Man, pp. 347 sqq.; P. Sartori, Zettschr. fur Ethnologic, 1898, pp. 1 seq.

corroborate this identity, as, e.g., the feast in the king’s third year (cf. Esther i. 3 with Herod, vii. 8), the return of Xerxes to Susa in the seventh year of his reign and the marriage of Ahasuerus at Shushan in the same year of his. To this it may be added that the interval of four years between the divorce of Vashti and the marriage of Esther is well accounted for by the intervention of an important series of events fully occupying the monarch’s thoughts, such as the invasion of Greece.

See articles ” Ahasuerus ” in the Encyclopaedia Biblica, Hastings’ Dictionary, the Jewish Encyclopaedia; S. R. Driver, Introd. to the Lit. of the Old Test. ; Friedrich Delitzsch in the Calwer Bibellexikon (1893).

AHAZ (Heb. for “ [Yahweh] holds “), son of Jotham, grand- son of Uzziah or Azariah and king of Judah. After the death of Menahem, Pekah, king of Israel, and Rezin (rather Rasun), king of Syria, allied against Assyria, invaded Judah, and laid siege to Jerusalem in the hope of setting up one of their puppets upon the. throne. At the same time the Edomites recovered Elath on the Gulf of Akabah (so read in 2 Kings xvi. 6; cp. also 2 Chron. xxviii. 16 sqq.) and Judah was isolated. Notwith- standing the

counsel of Isaiah (Is. vii. 1-17), Ahaz lost heart and used the temple funds to call in the aid of Tiglath-pileser IV., who after attacking the Philistines destroyed the power of Syria, taking care to exact heavy tribute from Judah, which led to further despoliation of the temple. It was as a vassal that Ahaz presented himself to the Assyrian king at Damascus, and he brought back religious innovations (2 Kings xvi. 10 sqq.; for the priest Urijah see Is. viii. 2) and new ideas to which he pro- ceeded to give effect. His buildings are referred to in 2 Kings xx. 11, xxiii. 12; cf. perhaps Jer. xxii. 15: " art thou a true king because thou viest with Ahaz " (see the LXX.). Ahaz was succeeded by his son Hezekiah.

On the ritual changes which he introduced see W. R. Smith, Relig. of Semites (2), pp. 485 sqq. ; and on his reign, idem, Prophets of Israel (2), pp. 415 sqq. On 2 Kings xvi. 3 (cf. 2 Chron. xxviii. 3) see Moloch. See further Isaiah and Jews.

AHAZIAH (" he whom Yahweh sustains "), the name of two kings in the Bible, one of Israel, the other of Judah. (1) Ahaziah, 8th king of Israel, was the son and successor of Ahab, and reigned for less than two years. On his accession the Moabites refused any longer to pay tribute. Ahaziah lost his life through a fall from the lattice of an upper room in his palace, and it is stated that in his illness he sent to consult the oracle of Baal-zebub at Ekron; his messengers, however, were met by Elijah, who bade them return and tell the king he must die (2 Kings i. 2-17; cf. Luke ix. 54-56). (2) Ahaziah, 6th king of Judah, was the son of Jehoram and Ahab's daughter Athaliah, and reigned one year. He is described as a wicked and idolatrous king, and was slain by Jehu, son of Nimshi. He is variously called Jehoahaz and Azariah.

AHENOBARBUS (" brazen-bearded "), the name of a plebeian Roman family of the gens Domitia. The name was derived from the red beard and hair by which many of the family were dis- tinguished. Amongst its members the following may be mentioned: —

Gnaeus Domitius Ahenobarbus, tribune of the people 104 B.C., brought forward a law (lex Domitia de Sacerdotiis) by which the priests of the superior colleges were to be elected by the people in the comitia tributa (seventeen of the tribes voting) instead of by co-optation; the law was repealed by Sulla, re- vived by Julius Caesar and (perhaps) again repealed by Marcus Antonius, the triumvir (Cicero, De Lege Agraria, ii. 7; Suetonius, Nero, 2).

Ahenobarbus was elected pontifex maximus in 103, consul in 96 and censor in 92 with Lucius Licinius Crassus the orator, with whom he was frequently at variance. They took joint action, however, in suppressing the recently established Latin rhetorical schools, which they regarded as injurious to public morality (Aulus Gellius xv. 11).

Lucius Domitius Ahenobarbus, son of the above, husband of Porcia the sister of Cato Uticensis, friend of Cicero and enemy of Caesar, and a strong supporter of the aristocratical party. At first strongly opposed to Pompey, he afterwards sided with him against Caesar. He was consul in 54 B.C., and in 49 he was appointed by the senate to succeed Caesar as governor of Gaul.

After the outbreak of the civil war he commanded the Pompeian troops at Corfinium, but was obliged to surrender. Although treated with great generosity by Caesar, he stirred up Massilia (Marseilles) to an unsuccessful resistance against him. After its surrender, he joined Pompey in Greece and was slain in the flight after the battle of Pharsalus, in which he commanded the right wing against Antony (Caesar, Bellum Civile, i., ii., iii.; Dio Cassius xxxix., xli.; Appian, B.C. ii. 82).

Gnaeus Domitius Ahenobarbus, son of the above, accom- panied his father at Corfinium and Pharsalus, and, having been pardoned by Caesar, returned to Rome in 46. After Caesar's assassination he attached himself to Brutus and Cassius, and in 43 was condemned by the lex Pedia as having been implicated in the plot. He obtained considerable naval successes in the Ionian Sea against the triumvirate, but finally, through the mediation of Asinius Pollio, became reconciled to Antony, who made him governor of Bithynia. He took part in Antony's Parthian campaigns, and was consul in 32. When war broke out between Antony and Octavian, he at first supported Antony, but, disgusted with his intrigue with Cleopatra, went over to Octavian shortly before the battle of Actium (31). He died soon afterwards(Dio Cassius xlviii.-l; Appian, Bell. Civ. iv., v.). His son was married to Antonia, daughter of Antony, and became the grandfather of the emperor Nero.

See Drumann, Geschichte Rom., 2nd ed. by Groebe.vol. iii. pp.14 ff.

AHITHOPHEL (Heb. for " brother of foolishness, " i.e. foolish!), a man of Judah whose son was a member of David's bodyguard. He

was possibly the grandfather of Bathsheba (see 2 Sam. xi. 3, xxiii. 34), a view which has been thought to have some bearing on his policy. He was one of David's most trusted advisers, and his counsel was as though one inquired of the word of God." He took a leading part in Absalom's revolt, and his defection was a severe blow to the king, who prayed that God would bring his counsel to " foolishness."

The subsequent events are rather obscure. At Ahithophel's advice Absalom first took the precaution of asserting his claim to the throne by seizing his father's concubines (cf. Abner).- The immediate pursuit of David was then suggested; the advice was accepted, and the sequence of events shows that the king, being warned of this, fled across the Jordan (2 Sam. xvi. 20-23, xvii. 1-4, 22). Inconsistent with this is the account of the intervention of Hushai, whose counsel of delay (in order to gather all Israel " from Dan to Beersheba "), in spite of popular approbation, was not adopted, and with this episode is con- nected the tradition that the sagacious counsellor returned to his home and, having disposed of his estate, hanged himself. Instances of suicide are rare in the Old Testament (cf. Saul), and it is noteworthy that in this case, at least, a burial was not refused. (See further Absalom; David; Samuel, Books or.)

AHMAD IBN HANBAL (780-855), the founder, involuntarily and after his death, of the Hanbalite school of canon law, was born at Bagdad in a.h. 164 (a.d. 780) of parents from Merv but of Arab stock. He studied the Koran and its traditions (hadUh, sunna) there and on a student journey through Mesopotamia, Arabia and Syria. After his return to Bagdad he studied under ash-Shafi'i between 195 and 198, and became, for his life, a devoted Shafi-'ite. But his position in both theology and law was more narrowly traditional than that of ash-Shafi'1; he rejected all reasoning, whether orthodox or heretical in its conclusions, and stood for acceptance on tradition (naql). only from the Fathers. (See further on this, Mahommedan Religion and Mahommedan Law.) In consequence, when al-Ma'mun and, after him, al-Mo'tasim and al-Wathiq tried to force upon the people the rationalistic Mo'tazilite doctrine that the Koran was created, Ibn Hanbal, the most prominent and popular theologian who stood for the old view, suffered with others grievous imprisonment and scourging. In 234, under al-Mota- wakkil, the Koran was finally decreed uncreated, and Ibn Hanbal, who had come through this trial better than any of the other theologians, enjoyed an immense popularity with the mass of the people as a saint,

confessor and ascetic. He died at Bagdad in 241 (a.d. 855) and was buried there. There was

much popular excitement at his funeral, and his tomb was known and visited until at least the 14th century a.d,

On his great work, the Musnad, a collection of some thirty thousand selected traditions, see Goldziher in ZDMG, 1. 4< >5 ff. For his life and works generally see W. M. Patten, Ahmed vbn Hanbal and the Mihna; C. Brockelmann, Geschichte der Arab. Lit. i. 181 ff . ; F. Wiistenfeld, Schafi'iten, 55 ff. ; M'G. de Slaiie's transl. of Ibn Khallikan, i. 44 ff. ; Macdonald, Development of Muslim Theology, no, 157, index. . (D. B. Ma.)

AHMAD SHAH (1724-1773), founder of the Durani dynasty in Afghanistan, was the son of Sammaun : Khan, hereditary chief of the Abdali tribe. While still a boy Ahmad fell into the hands of the hostile tribe of Ghilzais, by whom he was kept prisoner at Kandahar. In March 1738 he was rescued by Nadir Shah, who soon afterwards gave him the command of a body of cavalry composed chiefly of Abdalis. On the assassination of Nadir in 1747, Ahmad, having failed in an attempt to seize the Persian treasures, retreated to Afghanistan, where he easily persuaded the native tribes to assert their independence and accept him as their sovereign. He was crowned at Kandahar in October 1747, and about the same time he changed the name of his tribe to Durani. Two things may be said to have con- tributed greatly to the consolidation of his power. He inter- fered as little as possible with the independence of the different tribes, demanding from each only its due proportion of tribute and military service; and he kept his army constantly engaged in brilliant schemes of foreign conquest. Being possessed of the Koh-i-noor diamond, and being fortunate enough to intercept a consignment of treasure on its way to the shah of Persia, he had all the advantages which great wealth can give. He first crossed the Indus in 1748, when he took Lahore; and in 1751, after, a feeble resistance on the part of the Mahommedan viceroy, he became master of the entire Punjab. In 1750 he took Nishapur, and in 1752 subdued Kashmir. His great expedition to Delhi was undertaken in 1756 in order to avenge himself on the Great: Mogul for the recapture of Lahore. Ahmad entered Delhi with his

army in triumph, and for more than a month the city was given over to pillage. The shah himself added to his wives a princess of the imperial family, and bestowed another upon his son Timur Shah, whom he made governor of the.Punjab and Sirhind. As his viceroy in Delhi he left a Rohilla chief in whom he had all confidence, but scarcely had he crossed the Indus when the Mahommedan wazir drove the chief from the city, killed the Great Mogul and set another prince of the family, a tool of his own, upon the throne. The Mahratta chiefs availed themselves of these circumstances to endeavour to possess them- selves of the whole country, and Ahmad was compelled more than once to cross the Indus in order to protect his territory from them and the Sikhs, who were constantly attacking his garrisons. In 1758 the Mahrattas obtained possession of the Punjab, but on the 6th of January 1761 they were totally routed by Ahmad in the great battle of Panipat. In a later expedition he inflicted a severe defeat upon the Sikhs, but had to hasten westwards immediately afterwards in order to quell an insur- rection in Afghanistan. Meanwhile the Sikhs again rose, and Ahmad was now forced to abandon all hope of retaining the command of the Punjab. After lengthened suffering from a terrible disease, said to have been cancer in the face, he died in 1773, leaving to his son Timur the kingdom he had founded.

AHMED I. (1589-1617), sultan of Turkey, was the son of Mahommed III., whom he succeeded in 1603, being the first Ottoman sultan who reached the throne before attaining his majority. He was of kindly and humane disposition, as he showed by refusing to put to death his brother Mustafa, who eventually succeeded him. In the earlier part of his reign he gave proofs of decision and vigour, which were belied by his subsequent conduct. The wars which attended his accession both in Hungary and in Persia terminated unfavourably for Turkey, and her prestige received its first check in the peace of SitvatSrok, signed in 1606, whereby the annual tribute paid by Austria was abolished. Ahmed gave himself up to pleasure during the remainder of his reign, which ended in 1617, and

demoralization and corruption became as general throughout the public service as indiscipline in the ranks of the army. The use of tobacco is said to have been introduced into Turkey during Ahmed I.'s reign.

AHMED II. (1643-1605), sultan of Turkey, son of Sultan Ibrahim, succeeded his brother Suleiman II. in 1691. His chief merit was to confirm Mustafa Kuprili as grand vizier. But a few weeks after his accession Turkey sustained a crushing defeat at Slankamen from the Austrians under Prince Louis of Baden and was driven from Hungary; during the four years of his reign disaster followed on disaster, and in 1695 Ahmed died, worn out by disease and sorrow.

AHMED III. (1637-1736), sultan of Turkey, son of Mahommed IV>, succeeded to the throne in 1703 on the abdication of his brother Mustafa II. He cultivated good relations with England, in view doubtless of Russia's menacing attitude. He afforded a refuge in Turkey to Charles XII, of Sweden, after his defeat at Poltava (1 709) . Forced against his will into war with Russia, he came nearer than any Turkish sovereign before or since to breaking the power of his northern rival, whom his Grand Vizier Baltaji Mahommed Pasha succeeded in completely surrounding near the Pruth (1 7 1 1) . In the treaty which Russia was compelled to sign Turkey obtained the restitution of Azov, the destruction of the forts built by Russia and the undertaking that the tsar should abstain from future interference in the affairs of the Poles or the Cossacks. Discontent at the leniency of these terms was so strong at Constantinople that it nearly brought on a renewal of the war. In 1713 the Morea was taken from the

Venetians. This led to hostilities with Austria, in which Turkey was unsuccessful, and Belgrade fell into the hands of Austria (171 7). Through the mediation of England and Holland the peace of Passarowitz was concluded (17 18), by which Turkey retained her conquests from the Venetians, but lost Hungary. A war with Persia terminated in disaster, leading to a revolt of the janissaries, who deposed Ahmed in September 1730. He died in captivity some years later.

AHMEDABAD, or Ahmadabad, a city and district of British India in the northern division of Bombay. The city was once the handsomest and most flourishing in western India, and it .still ranks next to Agra and Delhi for the beauty and extent of its architectural remains. It was founded by Ahmad Shah in a.d. 141 1 on the site of several Hindu towns, which had pre- ceded it, and was embellished by him with fine buildings of marble, brought from a distance. The Portuguese traveller Barbosa, who visited Gujarat in a.d. 1511 and 1514, described Ahmedabad as " very rich and well embellished with good streets and squares supplied with houses of stone and cement." In Sir Thomas Roe's time, a.d. 1615, " it was a goodly city as large a$ London." During the course of its history it has passed through two periods of greatness, two of decay and one of revival. From 14 1 1 to 1511 it grew in size and wealth; from 1512 to 1572 it declined with the decay of the dynasty of Gujarat; from 1572 to 1709 it renewed its greatness under the Mogul emperors; from 1709 to 1809 it dwindled with their decline; and from 1818 onwards it has again increased under British rule.

The consequence of all these changes of dynasty was that Ahmedabad became the meeting-place of Hindu, Mahommedan and Jain architecture. Ahmad Shah pulled down Hindu temples in order to build his mosques with the material. The Jama Masjid itself, which he built in a.d. 1424, with its three hundred pillars fantastically carved, is a Hindu temple converted into a mosque (see Indian Architecture, Plate III., fig. 15). One of the finest buildings is the modern Jain temple of Hathi Singh out- side the Delhi gate, which was built only in 1848, and is a stand- ing monument to the endurance of Jain architectural art The external porch, between two circular towers, is of great magnifi- cence, most elaborately ornamented, and leads to an outer court, with sixteen cells on either side. In the centre of this court is a domed porch of the usual form with twenty pillars. The court leads to an inner porch of twenty-two pillars, two stories in height. This inner porch conducts to a triple sanctuary. James

Fergusson wrote of this temple that " each part increases

in dignity to the sanctuary; and whether looked at from its courts or from outside, it possesses variety without confusion, and an appropriateness of every part to the purpose for which it was intended." But perhaps the most unique sight in Ahmedabad is the two windows in Sidi Said's mosque of filigree marble work. The design is an imitation of twining and inter- laced branches, a marvel of delicacy and grace, and finer than anything of the kind to be found in Agra or Delhi.

The modern city of Ahmedabad is situated on the left bank of the river Sabarmati, and is still surrounded by walls en- closing an area of about 2 sq. m. Its population in 1901 was 185,889. It has a station on the Bombay and Baroda railway, 309 m. from Bombay, whence branch lines diverge into Kathiawar and Mahi Kantha, and is a great centre for both trade and manufacture. Its native bankers, shopkeepers and workers are all strongly organized in gilds. It has cotton mills for spinning and weaving, besides many handlooms, and factories for ginning and pressing cotton. Other industries include the manufacture of gold and silver thread, silk brocades, pottery, paper and shoes. The prosperity of Ahmedabad, says a native proverb, hangs on three threads — silk, gold and cotton; and though its manufactures are on a smaller scale than formerly, they are still moderately flourishing. The military cantonment, 3 m. north of the native town, is the headquarters of the northern dhrision of the Bombay command, with an arsenal.

The district of Ahmedabad lies at the head of the Gulf of Cambay, between Baroda and Kathiawar. Area 3816 sq. m. The river Sabarmati and its tributaries, flowing from north-east to south-west into the Gulf of Cambay, are the principal streams that water the district. The north-eastern portion is slightly elevated, and dotted with low hills, which gradually sink into a vast plain, subject to inundation on its western extremity. With the exception of this latter portion, the soil is very fertile, and some parts of the district are beautifully wooded. The population in 1901 was 795,967, showing a decrease of 14 % in the decade, due to the effects of famine. The principal crops are millets, cotton, wheat and pulse. The district is traversed by the Bombay arid

Baroda railway, and has' two seaports, Dholera and Gogo, the former of which has given its name to a mark of raw cotton in the Liverpool' market. It suffered severely in the famine of 1 899-1 900.

AHMEDNAGAR, or Ahmadnagar, a city and district of British India in the Central division of Bombay on the left bank of the river S'"na. The town is of considerable antiquity, having been founded in 1494 by Ahmad Nizam Shah, on the site of a more ancient city, Bhingar. This Ahmad established a new monarchy, which lasted till its overthrow by Shah Jahan in 1636. In 1759 the Peshwa obtained possession of the place by bribing the Mahommedan commander, and in 1797 it was ceded by the Peshwa to the Mahratta chief Daulat Rao Sindhia. During the war with the Mahrattas in 1803 Ahmednagar was invested by a British force under General Wellesley and captured. It was afterwards restored to the Mahrattas, but again came into the possession of the British in 181 7, according to the terms of the treaty of Poona. The town has rapidly advanced in prosperity under British rule. Several mosques and tombs have been converted to the use of British administration. The old industries of carpet-weaving and paper-making have died out; but there is a large trade in cotton and silk goods, and in copper and brass pots, and there are factories for ginning and pressing cotton. Ahmednagar is p. station on the loop line of the Great Indian Peninsula railway, 218 m. from Bombay, and a military cantonment, being the headquarters of a brigade in the 6th division of the western army corps. The population in 1901 was 43,032.

The district of Ahmednagar is a comparatively barren tract with a small rainfall. The area is 6586 sq. m. The popula- tion in 1901 was 837,695, showing a decrease of 6 % in the decade, due to the results of famine. The bulk of the population consists of Mahrattas and Kunbis, the latter being the agricul- turists. On the north the district is watered by the Godavari and its tributaries the Prawara and the Mula; on the north-east

by the Dor, another tributary of the Godavari; on the east by the Sephani, which flows through the valley below the Balaghat range; and in the extreme south by the Bhima and its tributary the Gor. The Sina river, another tributary of the Bhima, flows through the Nagar and Karjat talukas. The principal crops are millet, pulse, oil-seeds and wheat. The district suffered from drought in 1896-1897, and again in 1899-1900.

AHMED TEWFIK, Pasha (1845-), Turkish diplomatist, was the son of Ismail Hakki Pasha. He was at first in the army, but left the service in 1862; four years later he entered the diplomatic service, being employed at various European capitals. He became minister at Athens in 1883 and ambassador in Berlin in 1884. He was appointed minister for foreign affairs {Kharijie Naziri) in 1896.

AHMED VEFIK, Pasha (1819-1891), Turkish statesman and man of letters, was born in Stambul in 1819. He was the son of Rouheddin Effendi, at one time charge d'affaires in Paris, an accomplished French scholar, who was, therefore, attached, in the capacity of secretary-interpreter, to Reshid Pasha's diplomatic mission to Paris in 1834. Reshid took Ahmed with him and placed him at school, where he remained about five years and completed his studies. He then returned to Constantinople, and was appointed to a post in the bureau de traduction of the ministry for foreign affairs. While thus employed he devoted his leisure to the translation of Moliere's plays into Turkish and to the compilation of educational books — dictionaries, historical and geographical manuals, &c. — for use in Turkish schools, with the object of promoting cultivation of the French language among the rising generation. In 1847 he brought out the first edition of the Salnameh, the official annual of the Ottoman empire. Two years later he was appointed imperial commissioner in the Danubian principalities, and held that office till early in 1851 when he was sent to Persia as ambassador — a post which suited his temperament, and in which he rendered good service to his goverment for more than four years. Recalled in 1855, he was sent on a mission to inspect the eastern frontiers, and on his return was appointed member of the Grand Council of Justice, and was entrusted with the revision of the penal code and the code of procedure. This Work occupied him until the begin- ning of i860, when he was sent as ambassador to Paris, for the special purpose of averting the much-dreaded intervention of France in the affairs of Syria. But Ahmed Vefik's abrupt frank- ness, irascibility and abhorrence of compromise unfitted him for European diplomacy. He offended the French government; his mission failed, and he was recalled in January, 1861. None the less his integrity of purpose was fully understood and appreciated in Paris. On his return he was appointed minister of the Evkaf, but he only retained his seat in the cabinet for a few months. He was then for a brief period president of the Board of Audit, and subsequently inspector of

the Anatolian provinces, where he was engaged for more than three years. His next appointment was that of director-general of customs, whence he was removed to the office of musteshar of the grand vizierate, and in the following year entered the cabinet of Midhat Pasha as minister of public instruction, but very soon retired to his seat in the Council of State and remained out of office until 1875, when he represented Turkey at the International Telegraphic Conference in St Peters- burg. He was president of the short-lived Turkish parliament during its first session — March 19 to June 28, 1877 — and at its close was appointed vali of Adrianople, where he rendered invaluable aid to the Rˆd Cross Society. On his recall, at the beginning of 1878, he accepted the ministry of public instruction in the cabinet of Ahmed Hamdi Pasha, and on the abolition of the grand vizierate (February 5, 1878) he became prime minister and held office till about the middle of April, when he resigned. Early in the following year he was appointed vali of Brusa, where he remained nearly four years, and rendered admirable services to the province. The drainage of the pestilent marshes, the water-supply from the mountains, the numerous roads, the suppression of brigandage, the multiplication of schools, the vast development of the silk industry through the substitution of mulberry plantations for rice-fields, the opening out of the mineral

springs of Chitli, the introduction of rose-trees and the production of otto of roses — all these were Ahmed Vefik's work; and he became so popular that when in 1882 he was recalled, it was thought advisable that he should be taken away secretly by night from the konak in Brusa and brought to his private residence on the Bosporus. A few days after his return he was again appointed prime minister (December 1, 1882), but Ahmed Vefik demanded, as the condition of his acceptance of office, that he should choose the other members of the cabinet, and that a number of persons in the sultan's entourage should be dismissed. Upon this, the sultan, on the 3rd of December, revoked the irade of the 1 st of December, and appointed Said Pasha prime minister. For the rest of his life Ahmed Vefik, by the sultan's orders, was practically a prisoner in his own house; and eventually he died, on the 1 st of April 1891, of a renal complaint from which he had long been a sufferer. Ahmed Vefik was a great linguist. He spoke and wrote

French perfectly, and thoroughly understood English, German, Italian, Greek, Arabic and Persian. From all these languages he translated many books into Turkish, but wrote no original work. His splendid library of 15,000 volumes contained priceless manuscripts in many languages. In his lifetime he appreciably aided the progress of education; but, as he had no following, the effects of his labour and influence in a great measure faded away after his death. In all his social and family relations Ahmed Vefik was most exemplary. His charity knew no bounds. He was devoted to his aged mother and to his one wife and children. To his friends and acquaintances he was hospitable, courteous and obliging; his conversation was intellectual and refined, and in every act of his private life he manifested the spirit of a true gentleman. At home his habits, attire and mode of life were quite Turkish, but he was perfectly at his ease in European society; he had strong English proclivities, and numbered many English men and women amongst his intimate friends. In public life his gifts were almost sterilized by pecu- liarities of temperament and incompatibility with official sur- roundings; and his mission as ambassador to Persia and his administration of Brusa were his only thorough successes. But his intellectual powers, literary erudition and noble character made him for the last forty years of his life a conspicuous figure in eastern Europe. (E. W.*)

AHOM, or Aham, a tribe of Shan descent inhabiting the Assam valley, and, prior to the invasion of the Burmese at the com- mencement of the 19th century, the dominant race in that country. The Ahoms, together with the Shans of Burma and Eastern China and the Siamese, were members of the Tai race. The namejs believed to be a corruption of the word ” A-sam,” the latter part of which is identical with ” Shan ” (properly ” Sham “) and with ” Siam.” Under their king Su-ka-pha they invaded Assam (q.v.) from the East in the year a.d. 1228, giving their name to the country. For a century and a half from 1228 the successors of Su-ka-pha appear to have ruled un- disturbed over a small territory in Lakkimpur and Sibsagar districts. The extension of their power westward down the valley of the Brahmaputra was very gradual, and its success was by no means uniform. In the time of Aurangzeb the Ahom kings held sway over the entire Brahmaputra valley from Sadiya to near Goalpara, and from the skirts of the southern hills to the Bhutia frontier on the north. The dynasty attained the height of its power under Rudra Singh, who is said to have ascended the throne in 1695. In the following century the power of the Ahoms began to decay, alike from

internal dissensions and the pressure of outside invaders. The Burmese were called in to the assistance of one of the contending factions in 1810. Having once obtained a foothold in the country, they established their power over the entire valley and ruled with merciless bar- barity, until they were expelled by the British in 1824-1825. In the census of 1901 the total Ahom population in Assam was returned at 178,049.

The Ahoms retained the form of government in Assam peculiar

to the Shan tribes, which may be briefly described as an organ-

_ ized system of personal service in lieu of taxation. Their

religion was pagan, being quite distinct from Buddhism; but

in Assam they gradually became Hinduized, and their kings finally adopted Hindu names and titles. They believed that there were in the beginning no heavenly bodies, air or earth, only water everywhere, over which at first hovered a formless Supreme Being called Pha. He took corporeal shape as a huge crab that lay floating, face upwards, upon the waters. In turn other animals took shape, the last being two golden spiders from whose excrement the earth gradually rose above the surrounding ocean. Pha then formed a female counterpart of himself, who laid four eggs, from which were hatched four sons. One of these was appointed to rule the earth, but died and became a spirit. His son also died and became the national household deity of the Ahoms. The origin of mankind is connected with a flood- legend. The only survivors of the flood, and of the conflagra- tion that followed it, were an old man and a pumpkin-seed. From the latter there grew a gigantic gourd. This was split open by a thunderbolt, the old man sacrificing himself to save the lives of those who were inside, and from it there issued the progenitors of the present races of men, beasts, birds, fishes and plants. The kings claimed independent divine origin.

The religion and language have both died out being only preserved by a few priests of the old cult; but even among them the tradition of the pronunciation of the language has been lost. The Ahoms had a considerable literature, much of which is still in existence. Their historic sense was very fully developed, and many priests and nobles maintained bu-ran-jis (i.e. ” stores of instruction for the ignorant “), or chronicles, which were carefully written up from time to time. A few of these have been

translated, but aa yet no European scholar possesses knowledge sufficient to enable him to study these valuable documents at first hand.

The Ahom language is the oldest member of the Tai branch of the Siamese-Chinese linguistic family of which we have any record. It bears much the same relationship to Siamese and Shan that Latin does to Italian. It is more nearly related to modern Siamese than to modern Shan, but possesses many groups of consonants which have become simplified in both. It is a language of the isolating class, in which every word is a monosyllable, and may be employed either as a noun or as a verb according to its context and its position in a sentence. In the order of words, the genitive follows the noun it governs, and, as usual in such cases, the relations of time and place are indicated by prefixes, not by suffixes. The meanings of the monosyllables were differentiated, as in the other Tai languages and in Chinese, by a system of tones, but these were rarely indicated in writing, and the tradition regarding them is lost. The language had an alphabet of its own, whicn was clearly related to that of Burmese.

See E. A. Gait, A History of Assam (Calcutta, 1906). For the language see The Linguistic Survey of India, vol. ii. (Calcutta, 1906) (contains grammar and vocabulary) ; G. A. Grierson, ” Notes on Ahom,” in the Zeitschrifl der deutschen morgenlandischen Gesell- schaft, vol. lvi., 1902, pp. I ff. (contains grammar and vocabulary, with specimens), and ” An Ahom Cosmogony, witn a translation and a vocabulary of the Ahom language,” in tht Journal of the Royal Asiatic Society for 1904, pp. 181 ff. (G. A. Gr.)

AHR, a river of Germany. It is a left-bank tributary of the Rhine, into which it falls at Sinzig, rising in the Eifel mountains, and having a total length of 55 m. It flows at first through rather monotonous country, but the latter portion of its course, from the village of Altenahr, over which tower tie ruins of the castle of Ahr, or Are (10th century), is full of romantic beauty. It is well stocked with trout, and the steep declivities of the lower valley furnish red wines of excellent quality.

AHRENS, FRANZ HEINRICH LUDOLF (1809-1881), German philologist, was born at Helmstedt on the 6th of June 1809. After studying at Gottingen (1826-1829) under K. O. Miiller and Ludolf Dissen, and holding several educational appoint- ments, in 1849 he succeeded G. F. Grotefend a& director of the Lyceum at

Hanover, a post which .he filled with great success for thirty years. He died on the 25th of September 1881. His most important work is De Graecae Linguae Dialectis (1839-1843, new ed. by Meister, 1882-1889), which, although unfortunately

incomplete, dealing only with Aeolic and Doric, and in some respects superseded by modern research, will always remain a standard treatise on the subject. He also published Bucalicorum Graecorum Reliquiae (1855-1859); studies on the dialects of Homer and the Greek lyrists; on Aeschylus; and some excellent school-books. A volume of his minor works (ed. Haberlin) was published in 1891, which also contains a complete list of his writings.

AHRIMAN (Gr. ‘Apei/iawos in Aristotle, or ‘Apei/tapijs in Agathias; in the Avesta, Angrt Mainyush) — ” the Destructive Spirit “), the name of the principle of evil in the dualistic doctrine of Zoroaster. The name does not occur in the Old Persian inscriptions. In the Avesta he is called the twin-brother of the Holy Spirits, and contrasted either with the Holy Spirit of Ormazd or with Ormazd himself. He is the all-destroying’ Satan, the source of all evil in the world and, like Ormazd, exists since the beginning of the world. Eventually, in. the great world catastrophe, he will be defeated by Ormazd and disappear. The later sect of the Zervanites held that both were visible manifestations of the primeval principle Zrnvan akarana (Infinite Time). (See Zoroaster.)

AHRWEILER, a town of Germany, in the Prussian Rhine province, on the river Ahr and the Remagen-Adenau line of railway. Pop. 5000. It is a town of medieval aspect and is surrounded by ancient walls, with battlements and four gates in good repair/ There is a Gothic church (dating from 1245). A convent school of the Ursuline nuns is a prominent feature on a hill to the south. The trade is almost exclusively confined to the manufacture and export of the wines of the district.

AHT, a confederacy of twenty-two tribes of North American Indians of the Wakashan stock. They are settled on the west coast of Vancouver, British Columbia. The chief tribes included are the Nitinaht, Tlaasaht or Makah, Tlaokiwaht or Clahoquaht,

Ahansaht and Ehatishaht. The confederacy numbers some 35oo.

AHTENA ("ice people"), the name of an Athapascan tribe of North American Indians, in the basin of Copper River, Alaska.

See Handbook of American Indians, ed. F. W. Hodge (Washington,

1907).

AHVAZ, a town of Persia, in the province of Arabistan, on the left bank of the river Karun, 48 m. S. of Shushter, in 31 18′ N., 49 E. It has been identified with the Aginis of Nearchus, 500 stadia from Susa, and occupies the site of what was once an extensive and important city. Of this ancient city vast remains are left, extending several miles along the bank of the river. Among the most remarkable are the ruins of a bridge and a citadel, or palace, besides vestiges of canals and water- mills, which tell of former commercial activity. There are also the ruins of a band, or stone dam of great strength, which was thrown across the river for the purposes of irrigation. The band was 1150 yds. in length and had a diameter of 24 ft. at its base. Remains of massive structure are still visible, and many single blocks in it measure from 8 to 10 ft. in thickness. Ahvaz reached the height of its prosperity in the 12th and 13th centuries and is now a collection of wretched hovels, with a small rectangular fort in a state of ruin, and an Arab population of about 400. Since the opening of the Karun to foreign commerce in October 1888, another settlement called Benderi N&ssiri, in compliment to the Shah Nassir ed din (d. 1896), has been established on a slight elevation overlooking the river at the point below the rapids where steamers come to anchor, about one mile below Ahvaz. It has post and telegraph offices; and agencies of some mercantile firms, a British vice-consul (since 1904) and a Russian consular agent (since 1902) are established there. The new caravan road to Isfahan, opened for traffic in 1000, promised, if successful, to give Ahvaz greater commercial importance.

AI [Sept. 'A77CU, 'Ayyat and Tat; Vulg. ■ Hai] , a small royal city of the Canaanites, E. of Bethel. The meaning of the name may be " the stone heap "; but it is not necessarily a Hebrew word. Abraham pitched his tent between Ai and Bethel (Gen. xii. 8, xiii. 3) ; but it is chiefly noted for its capture

and destruction by Joshua (vii. 2-5, viii. 1-29), who made it " a

heap for ever, even a desolation." It is mentioned by Isaiah (x. 28), and also after the captivity (Ezra ii. 28; Neh. vii. 32), bat then probably was not more than a village. In the later Hebrew writings the name sometimes has a feminine form, Aiath (Is. x. 28), Aija (Neh. xi. 31). The definite article is usually prefixed to the name in Hebrew. The site was known, and some scanty ruins still existed, in the time of Eusebius and Jerome (Onomast., s.v. 'Ayyai). Dr E. Robinson was unable to discover any certain traces of either name or ruins. He remarks, however -{Bib. Researches, ed. 1856, i. p. 443), that it must have been close to Bethel on account of Biblical narrative (Josh. viii. 1 7) . A little to the south of a village called Deir Diwan, and one hour's journey south-east from Bethel, is the site of an ancient place called Khir.bet.Haiy in, indicated by reservoirs hewn in the rock, excavated tombs; and foundations of hewn stone. This may possibly be the site of Ai; it agrees with all the in- timations as to its position. It has also been identified with amoundnowcalled;rf-Te#(" the heap "), but though the name of a neighbouring village, Tur-mus Aya, is suggestive, it is in the wrong direction from Bethel. In this view recent authorities, such as G. A. Smith, generally coincide.

See Palestine Exploration Fund Quarterly Statement, 1869, p. 123; 1.874,. p. 62 ; l8 7 8 > PP- IO > x 3 2 > J 94: l88l > P- 2 54- (R – A. S. M.)

AIBONITO, an inland town of the electoral district of Guayama, Porto Rico, on the highway between San Juan and Ponce, 25 m. E-N.E. of the latter. It is the, capital of a municipal district of the same name. Pop. .(1899) of the town, 2085; of the district, 8596. The town is about 2200 ft. above sea level, and owing to its cool climate and freedom from malaria it has been chosen as an acclimatizing station and sanatorium for foreigners. It is surrounded by coffee plantations, and tobacco of excellent quality is raised in the vicinity. The town was considerably damaged by the great hurricane of the 8th of August 1899. '

AICARD, JEAN FRANCOIS VICTOR (1848-), French poet and dramatist, was born at Toulon on the 4th of February 1848. His father, Jean Aicard, was a journalist of some dis- tinction,: and the son early began his career in 1867 with Les Jeunes Croyances, followed in 1870 by a one-act play produced at the Marseilles theatre. His poems include:, Les Rebellions et les apaisements (1871); Poemes de Provence (1874),' and La Chanson del' enfant (1876), both of which were crowned by the Academy; Miette et Nori (1880), a Provencal idyll; Le Livre

d'heures de I'amour (1887); JSsus (1896), &c. Of his plays the most suc- cessful was Le Pire Lebonnard (1890), which was _ originally produced at the Theatre Libre. Among his other works are the novels, LeReideCamargue (1890), U Anted' un enfant (1898) and Tatas (1901), Behjamine (1906) and La Venus de Milo (1874); an account of the discovery of the statue from unpublished, documents.

AICHINGER, GREGOR (c. 1565-1628), one of the greatest German composers of the Golden Age. He was organist to the Fugger family of Augsburg in 1584. In 1599 he went for a two years' visit to Rome. This was for musical and not for ecclesi- astical reasons, though he had taken orders before his appointment under Fugger. Proske, in the preface to vol. ii. of his Musica Divina, calls him a priest of Regensburg, and is inclined to give him the palm for the devout and ingenuous mastery of his style. Certainly this impression is fully borne out by the beautiful and somewhat quaint works included in that great anthology.

AICKIN, FRANCIS (d. 1805), Irish actor, first appeared in London in 1765 as Dick Amlet in Vanbrugh's The- Confederacy at Drury Lane. He acted there, and at Covent Garden, until 1 792. His repertory consisted of over eighty characters, and among his best parts were the Ghost in Hamlet and Jaques in As You Like It. His success in impassioned declamatory roles obtained for him the nickname of " Tyrant."

His younger brother James AicxiN(d. 1803) was playing lead- ing parts in both comedy and tragedy at the Edinburgh theatre, when he gave offence to his public by his protest against the discharge of a fellow-actor. He therefore went to London, and

from 1767 to 1800 was: a member of the Drury Lane Company and for some years a deputy manager. He quarrelled with John Philip Kemble, with whom, in 1792, he fought a bloodless duel.

AIDAN (d. 606), king of the Scottish kingdom of Dalriada, was the son of Gabran, king of Dalriada, and became king after the death of his kinsman King Cpnall, when he was crowned at Iona by St Columba. He refused to allow his kingdom to remain in dependence on the Irish Dalriada, but coming into collision with

his southern neighbours he led a large force against ˆEthelfrith, king of the Northumbrians, and was defeated at a place called Daegsanstane, probably in Liddesdale.

See Bede, Historiae Ecclesiasticae gentis Anglorum, edited by C. Plummer (Oxford, 1896); Adamnan, Vita S. Columbae, edited by J. T. Fowler (Oxford, 1894).

AIDAN, or .

See Bede, Hist. Eccl. (ed. Plummer), iii. 3, 5, 17, 25.

AIDE-DE-CAMP (Fr. for camp-assistant or, perhaps, field-assistant), an officer of the personal staff of a general, who acts as his confidential secretary in routine matters. In Great Britain the office of aide-de-camp to the king is given as a reward or an honorary distinction. In many foreign armies the word adjutant is used for an aide-de-camp, and adjutant general for a royal aide-de-camp. The common abbreviation for aide-de-camp in the British service is ” a.d.c,” and in the United States ” aid.” Civil governors, such as the lord lieutenant of Ireland, have also, as a rule, officers on their staffs with the title and functions of aides-de-camp.

AIDIN. (1) A vilayet in the S.W. of Asia Minor including the ancient Lydia, Ionia, Caria and western Lycia. It derives its name from the Seljuk emir who took Tralles, and is the richest and most productive province of Asiatic Turkey. The seat of government is Smyrna. (2) The principal town of the valley of the Menderes or Maeander, about 70 m. E.S.E. of Smyrna. It is called also Giizel Hissar from the beauty of its situation on the lower slopes of Mons Messogis and along the course of the ancient Eudon. It is the capital of a sanjak. It was taken by the Seljuks, Aidin and Mentesh, late in the 13th century, and about 1390, when ruled by Isa Bey, a descendant of the first-named, acknowledged Ottoman suzerainty. In the Seljuk period it was a secondary city under the provincial capital, Tireh (q.v.). In the 17 th century it came under the power of the Karasmans of Manisa and remained so till about 1820. Aidin is on the Smyrna-Dineir railway, has large tanneries and sweetmeat manufactories, and exports figs, cotton and raisins. It was greatly damaged by an earthquake in 1899. On a neighbouring height are to be seen the ruins of the ancient Tralles {q.v.), the site to which the name Giizel Hissar was particularly given by the Seljuks. Aidin is the seat of a British consular agent. As there are

considerable numbers of Greeks, Armenians and Jews among the inhabitants, there are a Greek cathedral, several churches and synagogues in addition to the fine Turkish mosques. (D. G. H.)

AIDONE, a town of Sicily, in the province of Caltanisetta. From the town of Caltanisetta it is 22 m. E.S.E. direct (18 m. S.S.W. of the railway station of Raddusa, which is 41 m. W. of Catania). Pop. (1901) 8548. There are some interesting churches of the 14th century (see E. Mauceri in L' Arte, 1906, 17). On the Serra Orlando, a mountain not far off, are the extensive remains of an unknown city, the finest in eastern Sicily, but rapidly suffering destruction from the spread of cultivation and unauthorized excavations.

See P. Orsi in Atti del Congresso di Scienze Storiche, vol. v. 178 (Rome, 1904).

AIDS, a term of medieval finance, were part of the service due to a lord from his men, and appear to have been based upon the

principle that they ought to assist him in special emergency or need. The occasions for demanding them and the amount to be demanded would thus be matters of dispute, while the loose use of the term to denote many different payments in- creases the difficulty of the subject.

Both in Normandy and in England, in the 12th century, the two recognized occasions on which, by custom, the lord could demand " aid," were (1) the knighting of his eldest son, (2) the marriage of his eldest daughter; but while in England the third occasion was, according to Glanvill, as in Normandy, his pay- ment of " relief " on his succession, it was, according to the Great Charter (1215), the lord's ransom from captivity. By its provisions, the king covenanted to exact an " aid " from his barons on these three occasions alone — and then only a " reason- able " one — except by " the common counsel " of his realm. Enormous importance has been attached to this provision, as establishing the principle of taxation by consent, but its scope was limited to the barons (and the city of London), and the word " aids " was omitted from subsequent issues of the charter. The barons, on their part, covenanted to claim from their feudal tenants only the above three customary aids. The last levy by the crown was that of James I. on the knighting of his eldest son (1609) and the marriage of his daughter (1613).

From at least the days of Henry I. the term ” aid ” was also applied (1) to the special contributions of boroughs to the king’s revenue, (2) to a payment in lieu of the military service due from the crown’s knights. Both these occur on the pipe roll of 1130, the latter as auxilium militum (and possibly as auxilium comitatus). The borough ” aids ” were alternatively known as ” gifts ” (dona), resembling in this the ” benevolences ” of later days. When first met with, under Henry I., they are fixed round sums, but under Henry II. (as the Dialogue on the Exchequer explains) they were either assessed on a population basis by crown officers or were sums offered by the towns and accepted by them as sufficient. In the latter case the townsfolk were collectively responsible for the amount. The Great Charter, as stated above, extended specially to London the limitation on baronial ” aids,” but left untouched its liability to tallage, a lower and more arbitrary form of taxation, which the towns shared with the crown’s demesne manors, and which London resisted in vain. The two exactions, although distinct, have to be studied together, and when in 1 296-1 297 Edward I. was forced to his great surrender, he was formerly supposed by historians to have pledged himself, under De tallagio non conce- dendo, to levy no tallage or aid except by common consent of his people. It is now held, however, that he limited this con- cession to ” aides, mises,” and ” prises,” retaining the right to tallage. Eventually, by a statute of 1340, it was provided that the nation should not be called upon ” to make any common aid or sustain charge ” except by consent of parliament. The aids spoken of at this period are of yet another character, namely, the grant of a certain proportion of all ” movables ” {i.e. personal property), a form of taxation introduced about 1 1 88 and now rapidly increasing in importance. These sub- sidies were conveniently classed under the vague term ” aids,” as were also the grants made by the clergy in convocation, the term covering both feudal and non-feudal levies from the higher clergy and proportions not only of ” movables ” but of ecclesiastical revenues as well.

The “knight’s aid” of 1130 spoken of above is probably identical with auxilium exercitus spoken of in the oldest cus- tumals of Normandy, where the phrase appears to represent what was known in England as ” scutage.” Even in England the phrase ” quando Rex accipit auxilium de mtiitibus ” occurs in 1 166 and appears to be loosely used for scutage.

The same loose use enabled the early barons to demand “aid” from their tenants on various grounds, such as their indebtedness

to the Jews, as is well seen in the Norfolk fragments of returns to the Inquest of Sheriffs {1170).

Sheriff's aid was a local payment of a fixed nature paid in early days to the sheriff for his service. It was the subject ol a hot dispute between Henry II. and Becket in 1163.

Authorities. — Stubbs" Constitutional History and Select Charters ; M'Kechnie's Magna Carta; Pollock and Maitland's History of English Law ; Maitland's Domesday Book and Beyond ; Dialpgus de Scaccario (Oxford, 1892); Madox's History of the Exchequer; Round's Feudal England and The Commune of London; The Pipe Rolls (Record Commission and Pipe Roll Society). (J. H. R.)

AIGRETTE (from the Fr. for egret, or lesser white heron), the tufted crest, or head-plumes of the egret, used for adorning a woman's head-dress, the term being also given to any similar ornament, in gems, &c. An aigrette is also worn by certain ranks of officers in the French army. By analogy the word is used in various sciences for feathery excrescences of like appear- ance, as for the tufts on the heads of insects, the feathery down of the dandelion, the luminous rays at the end of electrified bodies, or the luminous rays seen in solar eclipses, diverging from, the moon's edge.

AIGUES-MORTES, a town of south-eastern France, in the department of Gard 25 m. S.S.W. of Nimes, on a branch line of the Paris-Lyon-Mediterranee railway. Pop. (1906) 3577. Aigues-Mortes occupies an isolated position in the marshy plain at the western extremity of the Rhone delta, 25 m. from the Golfe du Lion. It owes its celebrity to the medieval fortifications of remarkable completeness with which it is surrounded. They form a parallelogram 596 yds. long by 149 yds. broad, and con- sist of crenellated walls from 25 to 36 ft. in height, dominated at intervals by towers. Of these, the Tour de Constance, built by Louis IX., is the most interesting; it commands the north- western angle of the ramparts, and contains two circular, vaulted chambers, used as prisons for Protestants after the revocation of the edict of Nantes. The remainder of the fortifications were built in the reign of Philip III. Aigues- Mortes is the meeting-place of several canals connecting it with Beaucaire, with Cette, with the

Lesser Rhone and with the Mediterranean, on which it has a small port. Fishing and the manufacture of soda are the chief industries with which the town is connected. It has trade in coal, oranges and other fruits, and in wine. In the surrounding country there are important vineyards, which are preserved from disease by periodical sub- mersion. There is a statuein the town in memory of Louis IX. who embarked from Aigues-Mortes in 1248 and 1270 for the seventh and eighth crusades. To further the prosperity of the town a most liberal charter was granted to it, and in addition the trade of the port was artificially fostered by a decree re- quiring that every vessel navigating within sight of its lights should put in there. This ordinance remained in force till the reign of Louis XIV.

AIGUILLE (Fr. for needle), the sharp jagged points above the snow-line, standing upon the massif of a mountain split by frost action along joints or planes of cleavage with sides too steep for snow to rest upon them. Aiguilles are thus the forms remaining from the splitting up of the high ridges with house- roof structure into detached pinnacles.

AIGUILLETTE (Fr. diminutive of aiguille, a needle; the obsolete English form is ” aglet “), originally a tag of metal, often made of precious metals and richly chased, attached to the end of a lace or ribbon, and pointed, so as to pass more easily through eyelet holes. The term was, in time, applied to any bright ornament or pendant for the dress made of metal, and is now specially used of ornamental cords and tags of gold and silver lace, worn on naval and military uniforms. The aiguillette is fastened to the shoulder, the various cords hanging down therefrom being fastened at their other end on the front of the coat.

AIGUILLON, EMMANUEL ARMAND DE WIGNEROD DU PLESSIS DE RICHELIEU, Due d’ (1720-1782), French states- man, nephew of the marechal de Richelieu, was born on the 31st of July 1720. He entered the army at the age of seventeen, and at the age of nineteen was made colonel of the regiment of Brie. He served in the campaigns in Italy during the War of the Austrian Succession, was seriously wounded at the siege of Chateau-Dauphin (1744), was taken prisoner (1746) and was made marichal de camp in 1748. His marriage in 1740 with Louise F61icit6 de Br6han, daughter of the comte de P161o,

coupled with his connexion with the Richelieu family, gave him an important place at court. He was a member of the so-called

parti devot, the faction opposed to Madame de Pompa- dour, to the Jansenists and to the parlement, and his hostility to the new ideas drew upon him the anger of the pamphleteers. In 1753 he was appointed commandant (governor) of Brittany and soon became unpopular in that province, which had retained a large number of privileges called " liberties." He first came into collision with the provincial estates on the question of the royal imposts (1758), but was then blamed for his inertia in the preparation of a squadron against England (1759), and finally alienated the parlement of Brittany by violating the privileges of the province (1762). In June 1764 the king, at the instance of d'Aiguillon, quashed a decree of the parlement for- bidding the levying of new imposts without the consent of the estates, and refused to receive the remonstrances of the parlement against the duke. On the nth of November 1765 La Chalotais, the procureur of the parlement, was arrested, but whether at the instigation of d'Aiguillon is not certain. The conflict between d'Aiguillon and the Bretons lasted two years. In the place of the parlement, which had resigned, d'Aiguillon organized a tribunal of more or less competent judges, who were ridiculed by the pamphleteers and ironically termed the bailliage d' Aiguillon. In 1768 the duke was forced to suppress this tribunal, and returned to court, where he resumed his intrigue with the parti devot and finally obtained the dismissal of the minister Choiseul (December 24, 1770). When Louis XV., acting on the advice of Madame Dubarry, reorganized the government with a view to suppressing the resistance of the parlements, d'Aiguillon was made minister of foreign affairs, Maupeou and the Abbe Terray (1715-1778) also obtaining places in the ministry. The new ministry, albeit one of reform, was very unpopular, and was styled the " triumvirate." All the failures of the government were attributed to the mistakes of the ministers. Thus d'Aiguillon was blamed for having provoked the coup d'etat of Gustavus III., king of Sweden, in 1772, although the instructions of the comte de Vergennes, the French ambassador in Sweden, had been written by the minister, the due de la Vrilliere. D'Aiguillon, however, could do nothing to rehabilitate French diplomacy; he acquiesced in the first division of Poland, re- newed the Family Compact, and, although a supporter of the Jesuits, sanctioned the suppression of the society. After the death of Louis XV. he quarrelled with Maupeou and with the young queen, Marie Antoinette, who demanded his dismissal from the ministry (1774). He died, forgotten, in 1782. In no circumstances had he shown any special ability. He was more fitted for intrigue than for government, and his attempts to

restore the status of French diplomacy met with scant success. See Memoires du ministere du due d'Aiguillon (3rd ed., Paris and Lyons, 1792), probably written by J. L. Soulavie. On d'Aiguillon's governorship of Brittany see Carre, La Chalotais et le due d 'Aiguillon (Paris, 1893) ; Marion, La Bretagne el le due d'Aiguillon (Paris, 1898); and Barthelemy Pocquet, Le Due d'Aiguillon et La Chalotais (Paris, 1901-1902). The three last have full bibliographies. See also Flammermont, Le Chancelier Maupeou et les parlements (Paris, 1883) ; Frederic Masson, Le Cardinal de Bernis (Paris, 1884).

AIGUILLON, MARIE MADELEINE DE WIGNEROD DU PONT DE COURLAY, Duchesse d' (1604-1675), daughter of Cardinal Richelieu's sister. In 1620 she married a nephew of the constable de Luynes, Antoine de Beauvoir du Roure, sieur de Combalet, who died in 1622. In 1625, through her uncle's influence, she was made a lady-in-waiting (dame d'alour) to the queen-mother, and in 1638 was created duchess of Aiguillon. She did not marry a second time, although Richelieu wished to marry her to a prince — either to the comte de Soissons or to the king's brother. After the death of the cardinal (1642) she retained her honours and titles, but withdrew from the court, and devoted herself entirely to works of charity. She entered into relations with Saint Vincent de Paul and helped him to establish the hospital for foundlings. She also took part in organizing the General Hospital and several others in the provinces. She died on the 17 th of April 1675. She was the patroness of Corneille, who in 1636 dedicated to her his tragedy of The Cid.

See E. Flechier, Oraison funlbre de Mme. Marie de Winner od, duchesse d'Aiguillon; Bonneau-Avenant, La duchesse d'Aiguillon (1879); Memoires de Saint-Simon, ed. by A. de Boislisle (1879 el seq.).

AIGUN, or Aihun (also Sakhalyan-ida-khoto) , a town of China, province Hei-lung-kiang, in northern Manchuria, situated on the right bank of the Amur, in a fertile and populous region, 20 m. below Blagovyeshchensk, where it occupies nearly 2 m. on the bank of the river. There is a palisaded fort in the middle of the town, inside of which is the house of the fu-tu (governor). Its merchants carry on an active local trade in grain, mustard, oil

and tobacco, and some of its firms supply the Russian administration with grain and flour. During the " Boxer " rising of 1900 it was, for a few weeks, the centre of military action directed against the Russians. The population, of some 20,000, includes a few hundred Mussulmans. The town was founded first on the left bank of the Amur, below the mouth of the Zeya, but was abandoned, and the present town was founded in 1684. It was here that Count Muraviev concluded, in May 1857, the Aihun treaty, according to which the left bank of the Amur was conceded to Russia.

AIKEN, a city and the county-seat of Aiken county, South Carolina, U.S.A., 17 m. E.N.E. of Augusta, Georgia. Pop. (1890) 2362; (1900) 3414 (2131 of negro descent); (1910) 3911. It is served by the Southern railway, and by an electric line connecting with Augusta. Aiken is a fashionable winter resort, chiefly frequented by Northerners, and is pleasantly situated about 500 ft. above sea level in the heart of the famous sand-hill and pine-forest region of the state. The dry and unusually equable temperature (mean for winter 50 F., for spring 57° F., and for autumn 64 F.) and the balmy air laden with the fragrance of the pine forests have combined to make Aiken a health and pleasure resort; its climate is said to be especially bene- ficial for those afflicted with pulmonary diseases. There are fine hotels, club houses and cottages, and the Palmetto Golf Links near the city are probably the finest in the southern states; fox-hunting, polo, tennis and shooting are among the popular sports. There are some excellent drives in the vicinity. The city is the seat of the Aiken Institute (for whites) and the Schofield Normal and Industrial School (for negroes). There are lumber mills, cotton mills and cotton-gins; and cotton, farm products and artificial stone are exported. Considerable quantities of aluminium are obtained from the kaolin deposits in the vicinity. The city's water supply is obtained from artesian wells. Aiken was settled in the early part of the 19th century, but was not incorporated until 1835, when it was named in honour of William Aiken (1806-1887), governor of the state in 1844- 1847, and a representative in Congress in

1851-1857.

AIKIN, ARTHUR (1773-1854), English chemist and mineralo- gist, was born on the 19th of May 1773, at Warrington in Lanca- shire. He studied chemistry under Priestley and gave attention to the practical applications of the science. To mineralogy he was

likewise attracted, and he was one of the founders of the Geological Society of London, 1807, and honorary secretary, 1812-1817. To the transactions of that society he contributed papers on the Wrekin and the Shropshire coalfield, &c. Later he became secretary of the Society of Arts, and in 1841 treasurer of the Chemical Society. In early life he had been for a short time a Unitarian minister. He was highly esteemed as a man of sound judgment and wide knowledge. He died in London on the 15th of April 1854.

Publications. — Journal of a Tour through North Wales and part of Shropshire; with observations in Mineralogy and other branches of Natural History (London, 1797); A Manual of Mineralogy (1814; ed. 2, 1815); A Dictionary of Chemistry and Mineralogy (with his brother C. R. Aikin), 2 vols. (London, 1807, 1814).

AIKIN, JOHN (1747-1822), English doctor and writer, was born at Kibworth-Harcourt, and received his elementary education at the Noncomformist academy at Warrington, where his father was tutor. He studied medicine in the univer- sity of Edinburgh, and in London under Dr William Hunter. He practised as a surgeon at Chester and Warrington. Finally,

he went to Leyden, took the degree of M.D. (1780), and in 1784 established himself as a doctor in Yarmouth. In 1792 he re- moved to London, where he practised as a consulting physician. But he concerned himself more with the advocacy of liberty of conscience than with his professional duties, and he began at an early period to devote himself to literary pursuits. In con- junction with his sister, Mrs Barbauld (q.v.), he published a popular series of volumes entitled Evenings at Home (6 vols., 1792-1795), excellently adapted for elementary family reading, which were translated into almost every European language. In 1798 Dr Aikin retired from professional life and devoted himself with great industry to various literary undertakings, among which his General Biography (10 vols., 1799-1815) holds a conspicuous place. Besides these, he published Biog. Memoirs of Medicine (1780); Lives of John Selden and Archbishop Usher (1812) and other works. He edited the Monthly Magazine from 1796 to 1807, and conducted a paper called the Athenaeum from 1807 to 1809, when it was discontinued. Aikin died in 1822.

His daughter, Lucy Aikin (1781-1864), born at Warrington on the 6th of November 1781, had some repute as a historical writer.

After producing various books for the young, and a novel, Lorimer (1814), she published in 181 8 her Memoirs of the Court of Queen Elizabeth, which passed through several editions. This was followed by Memoirs of the Court of James I. (1822), Memoirs of the Court of Charles I. (1833) and a Life of Addison (1843). Miss Aikin died at Hampstead, where she had lived for forty years, on the 29th of January 1864.

See a Memoir of John Aikin, with selections of his miscellaneous pieces (1823), by his daughter; and the Memoirs, Miscellanies and Letters of Lucy Aikin (1864), including her correspondence (1826- 1842) with William Ellery Channing, edited by P. H. Le Breton.

AIRMAN, WILLIAM (1682-1731), British portrait-painter, was born at Cairney, Forfarshire. He was intended by his father for the bar, but followed his natural bent by becoming a pupil under Sir John Medina, the leading painter of the day in Scotland. In 1707 he went to Italy, resided in Rome for three years, afterwards travelled to Constantinople and Smyrna, and in 171 2 returned home. In Edinburgh, where he practised as a portrait-painter for some years, he enjoyed the patronage of the duke of Argyll; and on his removal to London in 1723 he soon obtained many important commissions. Perhaps his most successful work was the portrait of the poet Gay. He also painted por- traits of himself, Fletcher of Saltoun, William Carstares and Thomson the poet. The likenesses were generally truthful and the style was modelled very closely upon that of Sir Godfrey Kneller. Aikman held a good position in literary society and counted among his personal friends Swift, Pope, Thomson, Allan Ramsay, Somervile and Mallet.

AILANTHUS (more correctly ailantus, from ailanto, an Amboyna word probably meaning ” Tree of the Gods,” or ” Tree of Heaven “), a genus of trees belonging to the natural order Simarubaceae. The best known species, A. glandulosa, Chinese sumach or tree of heaven, is a handsome, quick-growing tree with spreading branches and large compound leaves, re- sembling those of the ash, and bearing numerous pairs of long pointed leaflets. The small greenish flowers are borne on branched panicles; and the male ones are characterized by having a disgusting odour. The fruits are free in clusters, and each is drawn out into a long wing with the seed in the middle. The wood is fine grained and satiny. The tree, which is a native of China and Japan, was introduced into England in 1751 and is a favourite in parks and gardens. A

silk spinning moth, the ailanthus moth (Bombyx or Philosamia cynthia), lives on its leaves, and yields a silk more durable and cheaper than mulberry silk, but inferior to it in fineness and gloss. This moth is common near many towns in the eastern United States; it is about 5 in. across, with angulated wings, and in colour olive brown, with white markings. Other species of ailanthus are: A. imberbiflora and A. punctata, important Australian timber- trees; and A. excelsa, common in India.

AILLY, PIERRE D' (1350-1420), French theologian, was born at Compiegne in 1350 of a bourgeois family, and studied in Paris

at the celebrated college of Navarre. He became a licentiate of arts in 1367, procurator of the French " nation " in 1372, bachelor of theology in 1372, and licentiate and doctor in that faculty in 1381.

Since 1378 Western Christendom, in consequence of the election of the two popes Urban VI. and Clement VII., had been divided into two obediences. In the spring of 1379 Pierre d'Ailly, in anticipation even of the decision of the university of Paris, had carried to the pope of Avignon the " role " of the French nation, but notwithstanding this prompt adhesion he was firm in his desire to put an end to the schism, and when, on the 20th of May 1 38 1, the university decreed that the best means to this end was to try to gather together a general council, Pierre d'Ailly supported this motion before the king's council in the presence of the duke of Anjou. The dissatisfaction displayed shortly after by the government obliged the university to give up this scheme, and was probably the cause of Pierre d'Ailly's temporary retirement to Noyon, where he held a canonry. There he continued the struggle for his side in a humorous work, in which the parti- sans of the council are amusingly taken to task by the demon Leviathan.

After his return to Paris, where from 1384 onwards he filled the position of master of the college of Navarre, and took part in a violent campaign against the chancellor of Notre-Dame, he was twice entrusted with a mission to Clement VII. in 1388 to defend the doctrines of the university, and especially those concerning the Immaculate Conception of the Virgin, against the preaching

friar Jean de Montson, and in 1389 to petition in the name of the king for the canonization of the young cardinal Peter of Luxemburg. The success which attended his efforts on these two occasions, and the eloquence which he displayed, perhaps contributed to his choice as the king's almoner and confessor. At the same time, by means of an exchange, he obtained to the highest dignity in the university, becoming chancellor of Notre-Dame de Paris.

When in 1394 Benedict XIII. succeeded Clement VII. at Avignon, Pierre d'Ailly was entrusted by the king with a mission of congratulation to the new pontiff. His obsequious language on this occasion, and the favours with which it was rewarded, formed a too violent contrast to the determined attitude of the university of Paris, which, tired of the schism, was even then demanding the resignation of the two pontiffs. Pierre d'Ailly himself had not long before taken part in the drawing up of a letter to the king in which the advantages of this double abdication were set forth, but since then his zeal had seemed to cool a little. None the less, on his return from Avignon, he again in the presence of the king enlarged upon the advantages offered by the way which the university commended. But the suspicions aroused by his conduct found further confirmation when he caused himself — or allowed himself — to be nominated bishop of Le Puy by Benedict XIII. (April 2, 1395). The great number of benefices which he held left room for some doubt as to his disinterestedness. Henceforward he was under suspicion at the university, and was excluded from the assemblies where the union' was discussed.

Some time afterwards Pierre d'Ailly became bishop of Cambrai (March 19, 1397) by the favour of the pope, who had yielded no whit, and, by virtue of this position, became also a prince of the empire. In order to take possession of his new see, he had to brave the wrath of the duke of Burgundy, override the resistance of the clergy and bourgeoisie, and even withstand an armed attack on the part of several lords; but his protector, the duke of Orleans, had his investiture performed by Wenceslaus, king of the Romans. The latter, though a partisan of the pope of Rome, took the opportunity of enjoining on Pierre d'Ailly to go in his name and argue with the pope of Avignon, a move which had as its object to persuade Benedict XIII. to an abdication, the necessity of which was becoming more and more evident. However, the language of the bishop of Cambrai seems on this occasion to have been lacking in decision; however that may be,

it led to no felicitous result.

France next tried to bring violent pressure to bear to conquer

the obstinacy of Benedict XIII. by threatening a formal with drawal from his obedience. Pierre d'Ailly, who, in spite of his attachment to the pope, had been carried away by the example of the kingdom, was among the first who, in 1403, after experience of what had happened, counselled and celebrated the restoration of obedience. He was sent by Charles VI. on an embassy to Benedict XIII. and seized this opportunity of lavishing on the pontiff friendly congratulations mingled with useful advice. Two years later, before the same pontiff, he preached in the city of Genoa a sermon which led to the general institution, in the countries of the obedience of Avignon, of the festival of the Holy Trinity.

At the ecclesiastical council which took place at Paris in 1406 Pierre d'Ailly made every effort to avert a new withdrawal from the obedience and, by order of the king, took the part of defender of Benedict XIII. , a course which yet again exposed him to attacks from the university party. The following year he and his disciple Gerson formed part of the great embassy sent by the princes to the two pontiffs, and while in Italy he was occupied in praise- worthy but vain efforts to induce the pope of Rome to remove himself to a town on the Italian coast, in the neighbourhood of his rival, where it was hoped that the double abdication would take place. Discouraged by his failure to effect this, he returned to his diocese of Cambrai at the beginning of 1408. At this time he was still faithful to Benedict XIII., and the disinclination he felt to joining the members of the French clergy who were on the point of ratifying the royal declaration of neutrality excited the anger of Charles VI. 's government, and a mandate, which was however not executed, ordered the arrest of the bishop of Cambrai.

It was not till after the cardinals of the two colleges had led to the convocation of the general council of Pisa that Pierre d'Ailly renounced the support of Benedict XIII., and, for want of a better policy, again allied himself with the cause which he had championed in his youth. In the council lay now, to judge from his words, the only chance of salvation; and, in view of the requirements of the case, he began to argue that, in case of schism, a council could be convoked by any one of the faithful, and would have the right to judge and even to depose the rival pontiffs. This

was, in fact, the procedure of the council of Pisa, in which Pierre d'Ailly took part. Afterˆthe declaration of the deposition of Gregory XII. and Benedict XIII. it went on to the election of Alexander V. (June 26th, 1409). This pope reigned; only ten months; his successor, John XXIII. , raised Pierre d'Ailly to the rank of cardinal (June 6, 141 1), and further, to indemnify him for the loss of the bishopric of Cambrai, conferred upon him the administration of that of Limoges (November 3, 141 2), which was shortly after exchanged for the bishopric of Orange. He also nominated Pierre d'Ailly as his legate in Germany (March 18,

1413). '■'.■'■'

Forgetting these benefits, the cardinal of Cambrai was one of the most formidable adversaries of John XXIII. at the council of Constance. Convinced as he was of the necessity for union and reform, he contributed more than any one to the adoption of the principle that, since the schism had survived the council of Pisa, it was necessary again to take up the work for a fundamental union, without considering the rights of John XXIII. any more than they had those of Gregory XII. and Benedict XIII. From this point of view Pierre d'Ailly, together with his compatriot Cardinal Fillastre, took the preponderating, part during the first few months. Afterwards, seeing the trend of events, he showed some uneasiness and hesitation. He refused, however, to undertake the defence of John XXIII. , and Only appeared in the trial of this pope to make depositions against him, which were sometimes of an overwhelming character.

Among the important matters which claimed his attention at Constance may be mentioned also the condemnation of the errors of Wycliffe and the trial of John Huss. The reading in public of his two treatises De Potestate eccl'esiastica and De Refortrtatione " Ecclesiae revealed, besides ideas very peculiar to himself on the reform and constitution of the church, his design of reducing thˆ power of the English in the council by denying them the right of

forming a separate nation (October i-November i, 1416). By this campaign, which exposed him to the worst retaliation of the English, he inaugurated his role of " procurator and defender of the king of France."

When at last the question arose of giving the Christian world a new pope, this time sole and uncontested, Pierre d'Ailly defended the right of the cardinals, if not to keep the election entirely in their own hands, at any rate to share in the election, and he brought forward an ingenious system for reconciling the pretensions of the council with the rights of the Sacred College. In this way was elected Pope Martin V. (November n, 1417), and the task of Pierre d'Ailly was at last finished.

The predominance of the Anglo-Burgundians in France having made it impossible for him to stay there, he went to Avignon to end his days in melancholy calculations arising from the calamities of which he had been the witness, and the astrological reckonings, in which he found pleasure, of the chances for and against the world coming to an end in the near future. He died on the 9th of August 1420.

Pierre d'Ailly's written works are numerous. A great part of them was published with the works of Gerson (by Ellies du Pin, Antwerp, 1706); another part appeared in the 15th century, probably at Brussels, and there are many treatises and sermons still unpublished. In philosophy he was a nominalist. Many questions in science and astrology, such as the reform of the calendar, attracted his attention. His other works consisted of theological essays, ascetic or exegetic, questions of ecclesiastical discipline and reform, and of various polemical writings called forth for the most part by the schism.

Whatever reservations may be made as to a certain interested or ambitious side of his character, Pierre d'Ailly, whose devotion to the cause of union and reform is incontestable, remains one of the leading spirits of the end of the 14th and beginning of the 15 th centuries.

Bibliography. — P. Tschackert, Peter von Ailli (Gotha, 1877); L. Salembier, Petrus de Alliaco (Lille, 1886); H. Denifle et Em. Chatelain, Charlularium Universitatis Parisiensis, t. iii. (Paris, 1894) ; N. Valois, La France et le grand schisme d'Occident (Paris, 4 vols., 1896-1902) ; and Bibliotheque de Vecole des chartes, vol. lxv., 1904, pp. 557-574- (N. V.)

AILSA CRAIG, an island rock at the mouth of the Firth of Clyde, 10 m. W. of Girvan, Ayrshire, Scotland. It is of conoidai form, with an irregular elliptic base, and rises abruptly to a height of 1 1 14 ft. The only side from which the rock can be ascended is the

east; the other sides being for the most part perpendicular, and generally presenting lofty columnar forms, though not so regular as those of Staffa. This island is composed of micro-granite with riebeckite, of great interest on account of the rare occurrence of this type in Britain. It is comparatively fine-grained' and of a greyish colour. Its essential constituents are felspar, quartz and riebeckite — a soda amphibole. The last of these minerals occurs in small irregular patches between the idiomorphic felspars which Dr J. J. H. Teall has found to be a soda orthoclase. The rock is allied to paisanite described by C. A. Osann and has been termed ailsite by Professor M. F. Heddle. It forms part of an intrusive mass which, on the south and west cliffs of the island, has a columnar arrangement and is traversed by dykes of dolerite, most of which run in a north- west direction. The age of this mass is uncertain, as its relations to other rocks are not visible in the island. As riebeckite- granophyre has been found in Skye it may be of Tertiary age. The rock is a favourite material for curling-stones, about three- fourths (according to estimate) of those in use in the countries where the game obtains being made of it. On this account curling-stones are popularly known as " Ailsas " or " Ailsa Craigs." A columnar cave exists towards the northern side of the island, and on the eastern are the remains of a tower, with several vaulted rooms. Two springs occur and some scanty grass affords subsistence to rabbits, and, on the higher levels, to goats. The precipitous parts are frequented by large flocks of solan geese and other sea birds. The lighthouse on the southern side shows a flashing light visible for 13 m. In 1831 the twelfth earl of Cassillis became first marquis of Ailsa, taking

the title from the Craig, which was his property. When John Keats was in Girvan during his Scottish tour in 1818 he apostrophized the rock in a fine sonnet.

AIMAK, or Eimak (Mongolian for " clan," or section of a tribe), the name given to certain nomadic or semi-nomadic tribes of Mongolian stock inhabiting the north and north-west Afghan highlands immediately to the north of Herat. They were originally known as " chahar (the four) Eimaks," because there were four principal tribes: the Taimani (the predominating element in the population of Ghur), the Ferozkhoi, the Jamshidi and, according to some authorities, the Hazara. The Aimak peoples number upwards of a quarter of a million, and speak a dialect said to be closely related to the Kalmuck. They are Sunnite Mahommedans in distinction from the Hazara who are Shiites. They are predominantly of Iranian or quasi-Iranian

blood, while the Hazara are Turanian. They are a bold, wild people and renowned fighters.

AIMARD, GUSTAVE, the pen-name of Olivier Gloux (1818- 1883), French novelist, who was born in Paris on the 13th of September 1818. He made use of the materials collected in a roving and adventurous youth and early manhood in numerous romances in the style of J. Fenimore Cooper. Among the best of them are: Les Trappeurs de I' Arkansas (1858); La Grande flibuste (i860); Nuits mexicaines (1863); La Fortt merge (1870). He died in Paris on the 20th of June 1883. Many of his novels have been translated into English.

AIMOIN (c. 960-c. 1010), French chronicler, was born at Villefranche de Longchapt about 960, and in early life entered the monastery of Fleury, where he became a monk and passed the greater part of his life. His chief work is a Historia Francorum, or Libri V. de gestis Francorum, which deals with the history of the Franks from the earliest times to 653, and was continued by other writers until the middle of the 12 th century. It was much in vogue during the middle ages, but its historical value is now regarded as slight. It has been edited by G. Waitz and published in the Monumenta Germaniae historica : Scriptores, Band xxvi. (Hanover and Berlin, 1826-1892). He also wrote a Vita Abbonis, abbatis Floriacensis, the last of a series of lives of the abbots of Fleury, all of which, except the life of Abbo, have been lost. This has been published by J. Mabillon in the Acta sanctorum ordinis sancti Benedicti (Paris, 1668-1701). Aimoin's third work was the composition of books ii. and iii. of the Miracula Sancti Benedicti, the first book of which was written by another monk of Fleury named Adrevald. This also appears in the Acta sanctorum ordinis sancti Benedicti.

Aimoin, who died about 1010, must be distinguished from Aimoin, a monk of St Germain-des-Pres, who wrote De miraculis sancti Germani, and a fragment De Normanorum gestis circa Parisiacam urbem et de divina in eos ultione tempore Caroli calvi. Both of these are published in the Historiae Francorum Scriptores, Tome ii. (Paris, 1639-1649).

See Histoire litteraire de la France, tome vii. (Paris, 1865-1869).

AIN, a department on the eastern frontier of France, formed in 1790 from Bresse, the Pays de Gex, Bugey, Dombes and Valromey, districts of Burgundy. It is bounded N. by the

departments of Jura and Saone-et-Loire, W. by Saone-et-Loire and Rh6ne, S. by Isere, and E. by the departments of Sayoie and Haute-Savoie and the Swiss cantons Geneva and Vaud. Pop. (1906) 345,856. Area 2248 sq. m. The department takes its name from the river Ain, which traverses its centre in a southerly direction and separates it roughly into two well- marked physical divisions — a region of mountains to the east, and of plains to the west. The mountainous region is occupied by the southern portion of the Jura, which is divided into parallel chains running north and south and decreasing in height from east to west. The most easterly of these chains, that forming the Pays de Gex in the extreme north-east of the department, contains the Cret de la Neige (6653 ft.) and other of the highest ‘ summits in the whole range. The district of Bugey occupies the triangle formed by the Rhone in the south-east of the depart- ment. West of the Ain, with the exception of the district covered by the Revermont, the westernmost chain of the Jura, the country

is flat, consisting in the north of the south portion of the Bresse, in the south of the marshy Dombes. The chief rivers of the eastern region are the Valserine and the Seran, right-hand tributaries of the Rhone, which forms the eastern and southern boundary of the department; and the Albarine and Oignin, left-hand affluents of the Ain. The Bresse is watered by the Veyle and the Reyssouze, both flowing into the Saone, which washes the western limit of the department. The climate is cold in the eastern and central districts of Ain, but it is on the whole healthy, except in the Dombes. The average rainfall is about 38 in. The soil in the valleys and plains of the depart- ment, especially in the Bresse, is fertile, producing large quantities of wheat, as well as oats, buckwheat and maize. East of the Ain, forests of fir and oak abound on the mountains, the lower slopes of which give excellent pasture for sheep and cattle, and much cheese is produced. Horse-raising is carried on in the Dombes. The pigs and fowls of the Bresse and the geese and turkeys of the Dombes are largely exported. The vineyards of Bugey and Reyermont yield good wines. The chief mineral product is the asphalt of the mines of Seyssel on the eastern frontier, besides which potter’s clay, building stone, hydraulic lime and cement are produced in the department. There are many corn and saw mills and the wood-working industry is important. Silk fabrics,

coarse woollen cloth, paper and clocks are manufactured. Live-stock and agricultural products are exported ; the chief imports are wood and raw silk. The depart- ment is within the judicial circumscription of the appeal court of Lyons and the educational circumscription (academie) of Lyons. It forms part of the archiepiscopal province of Besancon. The Rhone and the Sa6ne are navigable for considerable distances in the department; the chief railway is that of the Paris-Lyon- Mediterranee Company, whose line from Macon to Culoz traverses the department. Ain is divided into five arrondissements — those of Bourg and Trevoux in the west, and those of Gex, Nantua and Belley in the east; containing in all 36 cantons and 4SS communes. Bourg is the capital and Belley is the seat of a bishop. Jujurieux, in the arrondissement of Nantua, has the most important silk factory in the department, occupying over Aoo workpeople. Bellegarde on the eastern frontier is an industrial centre; it has a manufactory of wood-pulp, and saw and flour mills, power for which is obtained from the waters of the Rhone. Oyonnax and its environs, north of Nantua, are noted for the production of articles in wood and horn, especially combs. St Rambert, in the arrondissement of Belley, besides being of industrial importance for its manufactures of silk and paper, possesses the remains of a Benedictine abbey, powerful in the nth, 12th and 13th centuries. The Gothic church of Ambronay in the arrondissement of Belley, the church of St Paul de Varax (about 9 m. S.W. of Bourg), a building in the Romanesque style of Burgundy, and that of Nantua (12th century), are of architectural interest. Ferney, 4 m. S.W. of Gex, is famous as the residence of Voltaire from 17 58-1 778.

AINGER, ALFRED (1837-1904), English divine and man of letters, was born in London on the 9th of February 1837, the son of an architect. He was educated at King's College, London, and at Trinity College, Cambridge, and was ordained in i860 to a curacy at Alrewas, near Rugeley. There he remained until 1864, when he became an assistant master at the Sheffield Collegiate School. His connexion with the Temple church, in London, began in 1866, when he was appointed reader; and in 1894 he succeeded Dr Vaughan as master. In 1887 he was presented to a canonry in Bristol cathedral, and he was chaplain- in-ordinary to Queen Victoria and King Edward VII. He died on the 8th of February 1904. Canon Ainger's gentle wit and humour, his generosity and lovable disposition, endeared him to a wide circle. In literature his name is chiefly associated with his sympathetic appreciation

of Charles Lamb and Thomas Hood. His works include: Charles Lamb (1882) and Crabbe (1903) in the " English Men of Letters " series; editions of Lamb's Essays of Elia (1883) and of his Letters (1888; 2nd ed., 1904), of the Poems (1897) of Thomas Hood, with a biographical introduction; The Life and Works of Charles Lamb (12 vols.,

1899-1900); articles on Tennyson and Du Maurier in the Dictionary of National Biography; The Gospel and Human Life (1904), sermons; Lectures and Essays (2 vols., 1905), edited by the Rev. H. C. Beeching.

See also Edith Sichel, The Life and Letters of Canon Ainger (1906).

AINMULLER, MAXIMILIAN EMMANUEL (1807-1870), German artist and glass-painter, was born at Munich on the 14th of February 1807. By the advice of Gartner, director of the royal porcelain manufactory, he devoted himself to the study of glass-painting, both as a mechanical process and as an art, and in 1828 he was appointed director of the newly-founded royal painted-glass manufactory at Munich. The method which he gradually perfected there was a development of the enamel process adopted in the Renaissance, and consisted in actually painting the design upon the glass, which was sub- jected, as each colour was laid on, to carefully-adjusted heating. The earliest specimens of Ainmuller's work are to be found in the cathedral of Regensburg. With a few exceptions, all the windows in Glasgow cathedral are from his hand. Specimens may also be seen in St Paul's cathedral, and Peterhouse, Cam- bridge, and Cologne cathedral contains some of his finest productions. Ainmuller had considerable skill as an oil-painter, especially in interiors, his pictures of the Chapel Royal at Windsor and of Westminster Abbey being much admired. He died on the 9th of December 1870.

AINSWORTH, HENRY (1571-1622), English Nonconformist divine and scholar, was born of yeoman stock in 1570/1 at Swanton Morley, Norfolk. He was for four years from December 1 587 a scholar of Caius College, Cambridge, and, after associat- ing with the Puritan party in the Church, eventually joined the Separatists. Driven abroad about the year 1593, he found a home in " a blind lane at Amsterdam." He acted as " porter " to a scholarly bookseller in that city, who, on discovering his skill in the Hebrew language, made him known to his country- men.

When part of the London church, of which Francis Johnson (then in prison) was pastor, reassembled in Amsterdam, Ainsworth was chosen as their doctor or teacher. In 1596 he took the lead in drawing up a confession of their faith, which he reissued in Latin in 1 598 and dedicated to the various univer- sities of Europe (including St Andrews, Scotland). Johnson joined his flock in 1597, and in 1,604 he and Ainsworth composed An Apology or Defence of such true Christians as are commonly but unjustly called Brownists. The task of organizing the church was not easy and dissension was rife. Of Ainsworth it may be said that, though often embroiled in controversy, he never put himself forward; yet he was the most steadfast and cultured champion of the principles represented by the early Congre- gationalists. Amid all the strife of controversy, he steadily pursued his rabbinical studies. The combination was so unique that many, like the encyclopaedists L. Moreri and J. H. Zedler, have made two Henry Ainsworths — one Dr Henry Ainsworth, a learned biblical commentator; the other H. Ainsworth, an arch-heretic and ” the ringleader of the Separatists at Amster- dam.” Some confusion has also been occasioned through his not unfriendly controversy with one John Ainsworth, who abjured the Anglican for the Roman church. In 1608 Ainsworth answered Richard Bernard’s The Separatist Schisme. But his ablest and most arduous minor work in controversy was his reply to John Smyth (commonly called ” the Se-Baptist “), entitled a Defence of Holy Scripture, Worship and Ministry used in the Christian Churches separated from Antichrist, against the Challenges, Cavils and Contradictions of Mr Smyth (1609). In 1610 he was forced reluctantly to withdraw, with a large part of their church, from F. Johnson and those who adhered to him. For some time a difference of principle, as to the church’s right to revise its officers’ decisions, had been growing between them, Ainsworth taking the more Congregational view. (See Congre- gationalism.) But in spirit he remained a man of peace. His memory abides through his rabbinical learning. The ripe fruit of many years’ labour appeared in his Annotations — on Genesis (1616); Exodus (1617); Leviticus (1618); Numbers (1619); Deuteronomy (1619) ; Psalms (including a metrical version, 1612);

Song of Solomon (1623). These were collected in folio in 1627, and again in 1639, and later in various forms. From the outset

the Annotations took a commanding place, especially among continental scholars, and he established for English nonconformity a tradition of culture and scholarship. There is no probability about the narrative given by Neal in his History of the Puritans (ii. 47) that he was poisoned by certain Jews. He died in 1622, or early in 1623, for in that year was published his Seasonable Discourse, or a Censure upon a Dialogue of the Anabaptists, in which the editor speaks of him as a departed worthy.

Literature. — John Worthington's Diary (Chetham Society), by Crossley, i. 263-266; works of John Robinson (1851); H. M. Dexter, Congregationalism of the Last Three Hundred Years (1880) ; W. E. A. Axon, H. Ainsworth, the Puritan Commentator (1889); F. J. Powicke, Henry Barrow and the Exiled Church of Amsterdam (1900); J. H. Shakespeare, Baptist and Congregational Pioneers (1906).

AINSWORTH, ROBERT (1660-1743), English schoolmaster and author, was born at Eccles, near Manchester, in September 1660. After teaching for some time at Lever's Grammar School in Bolton, he removed to London, where he conducted a boarding-school, first at Bethnal Green and then at Hackney. He soon made a moderate fortune which gave him leisure to pursue his classical studies. Ainsworth's name is associated with his Latin- English Dictionary, begun in 1714, and published in 1736 as Thesaurus linguae Latinae compendiarius. It was long ex- tensively used in schools, and often reprinted, the later editions being revised and enlarged by other hands, but it is now super- seded. Ainsworth was also the author of some useful works on classical antiquities, and a sensible treatise on education, en- titled The most Natural and Easy Way of Institution (1698), in which he advocates the teaching of Latin by conversational methods and deprecates punishment of any sort. He died in London on the 4th of April 1743.

AINSWORTH, WILLIAM HARRISON (1805-1882), English novelist, son of Thomas Ainsworth, solicitor, was born at Man- chester on the 4th of February 1805. He was educated at Manchester Grammar School and articled to the firm of which his father was a member, proceeding to London in 1824 to complete his legal training at the Inner Temple. At the age of twenty-one he married a daughter of John Ebers the publisher, and started in his father-in-law's line of business. This, however, soon proved unprofitable and he decided to attempt literary work. A novel called Sir John Chiverton, in which he appears to have had a share, had

attracted the praise of Sir Walter Scott, and this encouragement decided him to take up fiction as a career. In 1834 he published Rookwood, which had an immediate success, and thenceforth he was always occupied with the com- pilation of ” historical ” novels. He published about forty such stories, of which the best-known are Jack Sheppard (1839), The Tower of London (1840), Guy Fawkes (1841), Old St Paul’s (1841) and Windsor Castle (1843). He edited Bentley’s Miscellany, in which Jack Sheppard was published as a serial, and in 1842 he became proprietor of Ainsworth’s Magazine. In 1853 it ceased to appear, and Ainsworth bought the New Monthly Magazine. He continued his literary activity until his death, but his later stories were less striking than the earlier ones. He died at Reigate on the 3rd of January 1882 and was buried at Kensal Green. Ainsworth had a lively talent for plot, and his books have many attractive qualities. The glorification of Dick Turpin in Rookwood, and of Jack Sheppard in the novel that bears his name, caused considerable outcry among straitlaced elders. In his later novels Ainsworth confined himself to heroes less open to criticism. His style was not without archaic affectation and awkwardness, but when his energies were aroused by a striking situation he could be brisk, vigorous and impressive. He did a great deal to interest the less educated classes in the historical romances of their country, and his tales were invariably in- structive, clean and manly.

AINTAB (anc. Dolichi), a town in the vilayet of Aleppo and ancient Cyrrhestica district of N. Syria. Pop. 45,000, two-thirds Moslem. The site of Doliche, famous for its worship of Baal (Zeus Dolichenus), adopted by the Seleucids and eventually spread all over the Roman empire, lies at Duluk, two hours N. W. ;

but nothing is to be seen there except a mound. The place was probably of Hittite origin and does not appear to have been settled by Greeks. The bazaars of Aintab are a great centre for ” Hittite ” antiquities, found at various sites from Sakchegozu on the west to Jerablus on the east. The modern town lies in the open treeless valley of the Sajur, a tributary of the Euphrates, and on the right bank, 65 m. north-east of Aleppo, with which it is connected by a chaussle, passing through Killis. This road pro- ceeds east to the great crossing of Euphrates at Birejik, and thus Aintab lies on the highway between N. Syria and Urfa-Mosul and has much transit trade and numerous khans. In the middle ages its strong castle (Hamtab) was an important strategic point, taken by Saladin about a.d. 1183; and it supplied the last base

from which Ibrahim Pasha marched in 1839 to win his decisive victory over the Turks at Nezib, about 25 m. distant north-east. Lying high (3500 ft.) and swept by purifying winds, Aintab is a comparatively clean and healthy spot, though not free from ophthalmia and the ” Aleppo button,” and it has been selected by the American Mission Board as its centre for N. Syria. ” Central Turkey College,” educational and medical, lies on high ground west. It was burnt down in 1891, but rebuilt; it has a dependency for girls within the town. Thanks to its presence the Armenian protestants are a large and rich community, which suffered less in the massacre of 1895 than the Gregorians. There is a small Episcopalian body, which has a large unfinished church, and a schismatic ” catholicos,” who has vainly tried to gain acceptance into the Anglican communion. There is also a flourishing Franciscan mission. Striped cloths and pekmez, a sweet paste made from grapes, are the principal manufactures; and tobacco and cereals the principal cultures. The town is unusually well and solidly built, good stone being obtained near at hand. The Moslem inhabitants are mainly of Turko- man origin, and used to owe fealty to chieftains of the family of Chapan Oglu, whose headquarters were at Yuzgat in Cappadocia. (D. G. H.)

AINU (” man “), a race inhabiting the northernmost islands of Japan. Little definite is known about their earliest history, but it is improbable that they are, as has been urged, the aborigines of Japan. The most accurate researches go to prove that they were immigrants, who reached Yezo from the Kuriles, and sub-sequently crossing Tsugaru strait, colonized a great part of the main island of Japan, exterminating a race of pit-dwellers to whom they gave the name of koro-pok-guru (men with sunken places). These koro-pok-guru were of such small stature as to be considered dwarfs. They wore skins of animals for clothing, and that they understood the potter’s art and used flint arrow-heads is clearly proved by excavations at the sites of their pits. The Ainu, on the contrary, never had any knowledge of pottery. Ultimately the Ainu, coming into contact with the Japanese, who had immigrated from the south and west, were driven northward into the island of Yezo, where, as well as in the Kuriles and in the southern part of Sakhalin, they are still found in some numbers. When, at the close of the 18th and the beginning of the 19th century, Russian enterprises drew the attention of the Japanese government to the northern districts of the empire, the Tokugawa shoguns adopted towards the Ainu a policy of liberality and leniency consistent with the best principles of

modern coloniza- tion. But the doom of unfitness appears to have begun to overtake the race long ago. History indicates that in ancient times they were fierce fighters, able to offer a stout resistance to the incomparably better armed and more civilized Japanese. To-day they are drunken, dirty, spiritless folk, whom it is difficult to suppose capable of the warlike rdle they once played. Their number, between 16,000 and 17,000, is virtually stationary. The Ainu are somewhat taller than the Japanese, stoutly built, well proportioned, with dark-brown eyes, high cheek-bones, short broad noses and faces lacking length. The hairiness of the Ainu has been much exaggerated. They are not more hairy than many Europeans. Never shaving after a certain age, the men have full beards and moustaches, but the stories of Ainu covered with hair like a bear are quite unjustified by facts. Men and women alike cut their hair level with the shoulders at the sides of

the head, but trim it semicircularly behind. The women tattoo their mouths, arms, and sometimes their foreheads, using for colour the smut deposited on a pot hung, over a fire of birch bark. Their original dress is a robe spun from the bark of the elm tree. It has long sleeves, reaches nearly to the feet, is folded round the body and tied with a girdle of the same material. Females wear also an undergarment of Japanese cloth. In winter the skins of animals are worn, with leggings of deerskin and boots made from the skin of dogs or salmon. Both sexes are fond of ear-rings, which are said to have been made of grape-vine in former times, but are now purchased from the Japanese, as also are bead neck- laces, which the women prize highly. Their food is meat, when- ever they can procure it — the flesh of the bear, the fox, the wolf, the badger, the ox or the horse — fish, fowl, millet, vegetables, herbs and roots. They never eat raw fish or flesh, but always either boil or roast it. Their habitations are reed-thatched huts, the largest 20 ft. square, without partitions and having a fireplace in the centre. There is no chimney, but only a hole at the angle of the roof; there is one window on the eastern side and there are two doors. Public buildings do not exist, whether in the shape of inn, meeting-place or temple. The furniture of their dwellings is exceedingly scanty. They have no chairs, stools or tables, but sit on the floor, which is covered with two layers -of mats, one of rush, the other of flag; and for beds they spread

planks, hanging mats around them on poles, and employing skins for coverlets. The men use chop-sticks and moustache-lifters when eating; the women have wooden spoons. Uncleanliness is characteristic of the Ainu, and all their intercourse with the Japanese has not improved them in that respect. The Rev. John Batehelor, in his Notes on the Ainu, says that he lived in one Ainu habitation for six weeks on one occasion, and for two months on another, and that he never once saw personal ablutions performed, or cooking or eating utensils washed. -‘

Not having been at any. period acquainted with the art of writing, they have no literature and are profoundly ignorant. But at schools established for them by the Japanese in recent times, they have shown that their intellectual capacity is not deficient. No distinct conception of a universe enters into their cosmology. They picture to themselves many floating worlds, yet they deduce the idea of rotundity from the course of the sun, and they imagine that the ” Ainu world ” rests on the back of a fish whose movements cause earthquakes. It is scarcely possible to doubt that this fancy is derived from the Japanese, who used to hold an identical theory. The Ainu believe in a supreme Creator, but also in a sun-god, a moon-god, a water-god and a mountain-god, deities whose river is the Milky Way, whose voices are heard in the thunder and whose glory is reflected in the lightning. Their chief object of actual worship appears to be the bear. Miss Isabella, Bird (Mrs Bishop) writes: ” The peculiarity which distinguishes their rude mythology is the worship of the bear, the Yezo bear, being one of the finest of his species. But it is impossible to understand the feelings by which this cult is prompted, for although they worship the animal after their fashion and set up its head in their villages, yet they trap it, kill it, eat it and sell its skin. There is no doubt that this wild beast inspires more of the feeling which prompts worship than’ the inanimate forces of nature, and the Ainos may be distinguished as bear-worshippers, and their greatest religious festival or saturnalia as the Festival of the Bear. . . . Some of their rude chants are in praise of the bear, and their highest eulogy on a man is to compare him to a bear.” They have no priests by profession. The village chief performs whatever religious ceremonies are necessary; ceremonies confined to making libations of wine, uttering short prayers and offering willow sticks with wooden shavings attached to them, much as the Japanese set up the well- known gohei (sacred offerings) at certain spots. The Ainu gives thanks to the gods before eating,

and prays to the deity of fire in time of sickness. He thinks that his spirit is immortal, and that it will be rewarded hereafter in heaven or punished in hell, both of which places are beneath the earth, hell being the land of volcanoes; but he has no theory as to a resurrection of the body or metempsychosis. He preserves a tradition about a flood which

seems to be the counterpart of the Biblical deluge, and about an earthquake which lasted a hundred days, produced the three volcanoes of Yezo and created the island by bridging the waters that had previously separated it into two parts.

The Ainu are now governed by Japanese laws and judged by Japanese tribunals, but in former times their affairs were administered by hereditary chiefs, three in each village, and for administrative purposes the country was divided into three districts, Saru, Usu and IshiKari, which were under the ultimate control of Saru, though the relations between their respective inhabitants were not close and intermarriages were avoided. The functions of judge were not entrusted to these chiefs; an indefinite number of a community's members sat in judgment upon its criminals. Capital punishment did not exist, nor was imprisonment resorted to, beating being considered a sufficient and final penalty, except in the case of murder, when the nose and ears of the assassin were cut off or the tendons of his feet severed. Little as the Japanese and the Ainu have in common, intermarriages are not infrequent, and at Sambutsu especially, on the eastern coast, many children of such marriages may be seen. Doenitz, Hilgendorf and Dr B. Scheube, arguing from a minute investigation of the physical traits of the Ainu, have concluded that they are Mongolians; according to Professor A. H. Keane the Ainu " are quite distinct from the surrounding Mongolic peoples, and present several remarkable physical characters which seem to point to a remote connexion with the Caucasic races. Such are a very full beard, shaggy or wavy black or dark-brown hair, sometimes covering the back and chest; a somewhat fair or even white complexion, large nose, straight eyes and regular features, often quite hand- some and of European type. They seem to be a last remnant of the Neolithic peoples, who ranged in prehistoric times across the northern hemisphere from the' British Isles to Manchuria and Japan. They are bear-worshippers, and have other customs in common with the Manchurian aborigines, but the language is entirely different, and they have traditions of a time when they were the dominant people in the surrounding lands." It should be noted finally that the Ainu are altogether

free from ferocity or exclusiveness, and that they treat strangers with gentle kindness.

See Rev. John Batehelor, The Ainu and their Folk-lore(London,igoi) ; Romyn Hitchcock, The Ainos of Japan (Washington, 1892) ; H. von Siebold, Vber die Aino (Berlin, 1881); Isabella Bird (Mrs Bishop), Korea and her Neighbours (1898) ; Basil Hall Chamberlain, Language, Mythology and Geographical Nomenclature of Japan viewed in the Light of Aino Studies and Aino Fairy-tales (1895).

AIR, or Asben, a country of West Africa, lying between 15° and 19° N. and 6° and 10° E. It is within the Sahara, of which it forms one of the most fertile regions. The northern portion of the country is mountainous, some of the peaks rising to a height of 5000 ft. Richly wooded hollows and extensive plains are interspersed between the hills. The mimosa, the dum palm and the date are abundant. Some of the plains afford good pasturage for camels, asses, goats and cattle; others are desert tablelands. In the less frequented districts wild animals abound, notably the lion and the gazelle. The country generally is of sandstone or granite formation, with occasional trachyte and basaltic ranges. There are no permanent rivers; but during the rainy season, from August to October, heavy floods convert the water-courses in the hollows of the mountains into broad and rapid streams. Numerous wells supply the wants of the people and their cattle. To the south of this variegated region lies a desert plateau, 2000 ft. above sea-level, destitute of water, and tenanted only by the wild ox, the ostrich and the giraffe. Still farther south is the fairly fertile district of Damerghu, of which Zinder is the chief town. Little of the soil is under culti- vation except in the neighbourhood of the villages. Millet, dates, indigo and senna are the principal productions. The great bulk of the food supplies is brought from Damerghu, and the materials for clothing are also imported. A great caravan annually passes through Air, consisting of several thousand camels, carrying salt from Bilma to the Hausa states.

Air was called Asben by the native tribes until they were conquered by the Berbers. The present inhabitants are for the moit part of a mixed race, combining the finer traits of the

Berbers with negro characteristics. The sultan of Air is to a great extent dependent on the chiefs of the Tuareg tribes in- habiting a vast tract of the Sahara to the north-west. A large part of his revenue is derived from tribute exacted from the salt caravans. Since 1890 Air has been included in the French sphere of influence in West Africa.

Agades, the capital of the country, which has a circuit of 3ˆ m., is built on the edge of a plateau 2500 ft. high, and is supposed to have been founded by the Berbers to serve as a secure magazine for their extensive trade with the Songhoi empire. The language of the people is a dialect of Songhoi. In former times Agades was a place of great traffic, and had a population of about 50,000. Since the beginning of the 16th century the prosperity of the town has, however, gradually de- clined. F. Foureau, who visited Agades in 1899, stated that more than half the total area was deserted and ruinous. The houses, which are built of clay, are low and flat-roofed; and the only buildings of importance are the chief mosque, which is surmounted by a tower 95 ft. high, and the sultan's residence, a massive two-storied structure pierced with small windows. The chief trade is grain. The great salt caravans pass through it, as well as pilgrims on their way to Mecca.

AIR (from an Indo-European root meaning " breathe," "blow"), the atmosphere that surrounds the earth; Gr. avp, the lower thick air, being distinguished fromaWiˆp, the upper pure air. ' With the development of analytical and especi- ally of pneumatic chemistry, the air was recognized not to be one homogeneous substance, as was long supposed, and different "airs," or gases, came to be distinguished. Thus oxygen gas, at the end of the 18th century, was known as dephlogisticated air, nitrogen or azote as phlogisticated air, hydrogen as inflammable air, carbonic acid gas as fixed air. The name is now ordinarily restricted to what is more accurately called atmospheric air — – the air we breathe — the invisible elastic fluid which surrounds the earth (see Atmosphere). Probably the sense of atmosphere or environment led (though this is disputed by etymologists) to the further use of the word " air " to mean " manner " or " appearance "; and so to its employment (cf. Lat. modus) in music for " melody." (See Aria.)

AIRAY, HENRY (i56o?i6i6), English Puritan divine, was born at Kentmere, Westmorland, but no record remains of the date of either birth or baptism. He was the son of William Airay, the

favourite servant of Bernard Gilpin, ” the apostle of the North,” whose bounty showed itself in sending Henry and his brother Evan (or Ewan) to his own endowed school, where they were educated ” in grammatical learning,” and were in attendance at Oxford when Gilpin died. From Wood’s Athenae we glean the details of Airay’s college attendance. ” He was sent to St Edmund’s hall in 1579, aged nineteen or thereabouts. Soon after he was translated to Queen’s College, where he became pauper puer serviens; that is, a poor serving child that waits on the fellows in the common hall at meals, and in their chambers, and does other servile work about the college.” His transference to Queen’s is perhaps explained by its having been Gilpin’s college, and by his Westmorland origin giving him a claim on Eaglesfield’s foundation. He graduated B.A. on the 19th of June 1583, MA. on the 15th of June 1586, B.D. in 1594 and D.D. on the 17th of June 1600 — all in Queen’s College. ” About the time he was master ” (1586) ” he entered holy orders, and became a frequent and zealous preacher in the university.” His Commentary on the Epistle to the Philippians (1618, reprinted 1864) is a specimen of his preach ing before his college, and of his fiery denunciation of popery and his fearless enunciation of that Calvinism which Oxford in common with all England then prized. In 1598 he was chosen provost of his college, and in 1606 was vice-chancellor of the university. In the discharge of his vice-chancellor’s duties he came into conflict with Laud, who even thus early was manifesting his antagonism to the prevailing Puritanism.

He was also rector of Otmore (or Otmoor), near Oxford, a living which involved him in a trying but successful litigation, whereof later incumbents reaped the benefit. He died on the

6th of October 1616. His character as a man, preacher, divine, and as an important ruler in the university, will be found portrayed in the Epistle by John Potter, prefixed to the Commentary. He must have been a fine specimen of the more cultured Puritans — possessed of a robust common-sense in admirable contrast with some of his contemporaries.

AIRD, THOMAS (1802-1876), Scottish poet, was born at Bowden, Roxburghshire, on the 28th of August 1802. He was educated at Edinburgh University, where he made the acquaint- ance of Carlyle and James Hogg, and he decided to devote himself to literary work. He published Martzoufle, a Tragedy, with other Poems (1826), a volume of essays, and a long narrative poem in

several cantos, The Captive of Fez (1830). For a year he edited the Edinburgh Weekly Journal, and for twenty-eight years the Dumfriesshire and Galloway Herald. In 1848 he published a collected edition of his poems, which met with much favour. Carlyle said that he found in them " a healthy breath as of mountain breezes." Among Aird's other friends were De Quincey, Lockhart, Stanley (afterwards dean of Westminster) and Motherwell. He died at Dumfries on the 25th of April 1876.

AIRDRIE, a municipal and police burgh of Lanarkshire, Scotland. Pop. (1901) 22,228. It is situated n m. E. of Glasgow by the North British railway, and also communicates with Glasgow by the Monkland Canal (which passes within 1 m. of the town), as well as by the Caledonian railway via Coatbridge and Whifflet. The canal was constructed between 1761 and 1790, and connects with the Forth and Clyde Canal near Mary- hill. Airdrie was a market town in 1695, but owes its prosperity to the great coal and iron beds in its vicinity. Other industries include iron and brass foundries, engineering, manufactures of woollens and calicoes, silk- weaving, paper-making, oil and fireclay. The public buildings comprise the town hall, county buildings, mechanics' institute, academy, two fever hospitals and free library, the burgh having been the first town in Scotland to adopt the Free Library Act. Airdrie unites with. Falkirk, Hamilton, Lanark and Linlithgow in sending one member to parliament. The parish of New Monkland, in which Airdrie lies, was formed (with Old Monkland)in 1640 out of the ancient barony of Monkland, so named from the fact that it was part of the lands granted by Malcolm IV. to the monks of Newbattle.

AIRE, a town of south-western France, in the department of Landes, on the left bank of the Adour, 22 m. S.E. of Mont-de-Marsan on the Southern railway between Morcenx and Tarbes. Pop. (1906) 2283. It is the seat of a bishopric, and has a cathedral of the 12th century and an episcopal palace of the nth, 17th and 18th centuries. Both have undergone frequent restoration. They are surpassed in interest by the church of St Quitterie in Mas d'Aire, the suburb south-west of the town. The latter is a brick building of the 13th and 14th centuries, with a choir in the Romanesque style, and a fine western portal which has been much disfigured. The crypt contains several Gallo- Roman tombs and the sarcophagus (5th century) of St Quitterie. Aire has two ecclesiastical seminaries.

Aire (Atura, Vicus Julii) was the residence of the kings of the

Visigoths, one of whom, Alaric II. (q.v.), there drew up his famous code. The bishopric dates from the 5th century.

AIRE, a town of northern France, on the river Lys, in the department of Pas-de-Calais, 12 m. S.S.E. of St Omer by rail. Pop. (1906) 4258. The town lies in a low and marshy situation at the junction of three canals. The chief buildings are the church of St Pierre (15th and 16th centuries), which has an imposing tower and rich interior decoration; a h6tel de ville of the 18th century; and the Bailliage (16th century), a small building in the Renaissance style. Aire has flour-mills, leather and oil works, and nail manufactories, and trade in agricultural produce.

In the middle ages Aire belonged to the counts of Flanders, from whom in 1188 it received a charter, which is still extant. It was given to France by the peace- of Utrecht 17 13.

AIR-ENGINE, the name given to heat-engines which use air for their working substance, that is to say for the substance which is caused alternately to expand and contract by application

and removal of heat, this process enabling a portion of the applied heat to be tiansformed into mechanical work. Just as the working substance which alternately takes in and gives out heat in the steam-engine is water (converted during a part of the action into steam), so in the air-engine it is air. The practical drawbacks to employing air as the working substance of a heat-engine are so great that its use has been very limited. Such attempts as have been made to design air-engines on a large scale have been practical failures, and are now interesting only as steps in the historical development of applied thermo- dynamics. In the form of motors for producing very small amounts of power air-engines have been found convenient, and within a restricted field they are still, met with. But even in this field the competition of the oil-engine and the gas-engine is too formidable to leave to the air-engine more than a very narrow chance of employment.

One of the chief practical objections to air-engines is the great bulk of the working substance in relation to the amount of heat that is utilized in the working of the engine. To some extent this

objection may be reduced by using the air in a state of compression, and therefore of greater density, throughout its operation. Even then, however, the amount of operative heat is very small in comparison with that which passes through the steam-engine, per cubic foot swept through by the piston, for the change of state which water undergoes in its transformation into steam involves the taking in of much more heat than can be communicated to air in changing its temperature within such a range as is practicable. Another and not less serious objection is the practical difficulty of getting heat into the working air through the walls of the containing vessel. The air receives heat from an external furnace just as water does in the boiler of a steam-engine, by contact with a heated metallic surface, but it takes up heat from such a surface with much less readiness than does water. The waste of heat in the chimney gases is accordingly greater; and further, the metallic shell is liable to be quickly burned away as a result of its contact at a high temperature with free oxygen. The temperature of the shell is much higher than that of a steam boiler, for in order to secure that the working air will take up a fair amount of heat, the upper limit to which its temperature is raised greatly exceeds that of even high-pressure steam. This objection to the air-engine arises from the fact that the heat comes to it from external, combustion; it disappears when internal combustion is resorted to; that is to say, when the heat is generated within the envelope containing the working air, by the combustion there of gaseous or other fuel. Gas-engines and oil-engines and other types of engine employing internal combustion may be regarded as closely related to the air-engine. They differ from it, however, in the fact that their working substance is not air, but a mixture of gases — a necessary consequence of internal combustion. It is to internal combustion that they owe their success, for it enables them to get all the heat of combustion into the working substance, to use a relatively very high temperature at the top of the range, and at the same time to escape entirely the draw- backs that arise in the air-engine proper through the need of conveying heat to the air through a metallic shell.

A form of air-engine which was invented in 1816 by the Rev. R. Stirling is of special interest as embodying the earliest application of what is known as the ” regenerative ” principle, the principle namely that heat may be deposited by a substance at one stage of its action and taken up again at another stage with but little loss, and with a great resulting change in the

substance's temperature at each of the two stages in the operation. The principle has since found wide application in metallurgical and other operations. In any heat-engine it is essential that the working substance should be at a high temperature while it is taking in heat, and at a relatively low temperature when it is rejecting heat. The highest thermodynamic efficiency will be reached when the working substance is at the top of its temperature range while any heat is being received and at the bottom while any heat is being rejected — as is the case in the cycle of operations of the theoretically imagined engine of Carnot.

(See Thermodynamics and Steam-Enoine.) In Carnot's cycle the substance takes in heat at its highest temperature, then passes by adiabatic expansion from the top to the bottom of its temperature range, then rejects heat at the bottom of the range, and is finally brought back by adiabatic compression to the highest temperature at which it again takes in heat, and so on. An air-engine working on this cycle would be intolerably bulky and mechanically inefficient. Stirling substituted for the two stages of adiabatic expansion and compression the passage of the air to and fro through a " regenerator," in which the air was alternately cooled by storing its heat in the material of the regenerator and reheated by picking the stored heat up again on the return journey. The essential parts of one form of Stirling's engine are shown in fig. 1. There A is the externally- fired heating vessel, the lower part of which contains hot air which is taking in heat from the furnace beneath. A pipe from the top of A leads to the working cylinder (B). At the top of A is a cooler © consisting of pipes through which cold water is made to circulate. In A there is a di'splacer (D) which is connected (by parts not shown) with the piston in such a manner that it moves down when the piston has moved up. The air-pressure is practically the same above and below D, for these spaces are in free communication with one another through the regenerator (E), which is an annular space stacked loosely with wire-gauze. When D moves down, the hot air is driven up through the re- generator to the upper part of the containing vessel. It deposits its heat in the wire- gauze, becoming lowered in temperature and conse- quently reduced in pressure. The piston (B) descends, and the air, now in contact with the cooling pipes © , gives up heat to them. Then the dis-placer (D) is raised. The air passes down through its regenerator, picking up the heat deposited there, and thereby having its temperature restored and its pressure raised. It then takes in heat

from the furnace, expanding in volume and forcing the piston (B) to rise, which completes the cycle. The engine was double-acting, another heating vessel like A being connected with the upper end of the working cylinder at F. The stages at which heat is taken from the fur- nace and rejected to the cooler © are approximately isothermal at the upper and lower limits of temperature respectively, and the cycle accordingly is approximately ” perfect ” in the thermo- dynamic sense. The theoretical indicator diagram is made up of two isothermal fines for the taking in and rejection of heat, and two lines of constant volume for the two passages through the regenerator. This engine was the subject of two patents (by R. and S. Stirling) in 1827 and 1840. A double-acting Stirling engine of 50 horse-power, using air which was maintained by a pump at a fairly high pressure throughout the operations, was used for some years in the Dundee Foundry, where it is credited with having consumed only 1-7 lb of coal per hour per indicated horse-power. The coal consumption per brake-horse-power was no doubt much greater. It was finally abandoned on account of the failure of the heating vessels.

The type survives in some small domestic motors, an example of which, manufactured under the patent of H. Robinson, is shown in fig. 2. In this there is no compressing pump, and the main pressure of the working air is simply that of the atmo- sphere. The whole range of pressure is so slight that no packing is required. Here A is the vessel in which the air is heated and within which the displacer works. It is heated by a small coke-fire or by a gas flame in C. It communicates through a passage

Fig. 1. — Stirling’s Air-Engine.

Fig. 2. — Robinson’s form of Stirling’s Engine.

(D) with the working cylinder (B) . The displacer (E) , which takes its motion through a rod (I) from a rocking lever (F) connected by a sbort link to the crank-pin, is itself the regenerator, its con- struction being such that the air passes up and down through it as in one of the original Stirling forms. The cooler is a water vessel (G) through which water circulates from a tank (H). Messrs. Hayward and Tyler’s ” Rider ” engine may be mentioned as another small hot-air motor which follows nearly

the Stirling cycle of operations.

An attempt to develop a powerful air-engine was made in America about 1833 by John Ericsson, who applied it to marine propulsion in the ship ” Caloric,” but without permanent success. Like Stirling, Ericsson used a regenerator, but with this difference that the pressure instead of the volume of , the

air remained constant while it passed in each direction through the regenerator. Cold air was compressed by a pump into a receiver, where it was kept cool during compression and from which it passed through a regenerator into the work- ing cylinder. In so passing it took up heat and ex- panded. It was then allowed to expand further, taking in heat from a furnace under the cylinder and, falling in pressure. This expansion was continued till the pressure of the working air fell nearly to that of the atmosphere. It was then discharged through the regenerator, depositing heat for the next charge of air in turn to take up. The indicator diagram approximated “to a ‘ form made up of two isothermal lines and two lines of constant pressure.

In the transmission of power by compressed air (see Power Transmission) the air-driven motors are for the most part machines resembling steam-engines in the general features of their pistons, cylinders, valves and so forth. Such machines are not properly described as air-engines since their function is not the conversion of heat into work. Incidentally, however, they do in some cases partially discharge that function, namely, when what is called a ” preheater ” is used to warm up the compressed air before it enters in the motor cylinder. The object of this device is not, primarily, to produce work from heat, but to escape the inconveniences that would otherwise arise through extreme cooling of the air during its expansion. Without preheating the expanding air becomes so cold as to be liable to deposit snow from the moisture held in suspension, and thereby to clog the valves. With preheating this is avoided, and the amount of work done by a given quantity of air is increased by the conversion into work of a part of the sup- plementary energy which the preheater supplies in the form of heat. (J. A. E.)

AIREY, RICHARD AIREY, Baron (1803-1881), British general, was the son of Lieutenant-General Sir George Airey (1761-1833) and was born in 1803. He entered the army in 1821, became captain in 1825, and served on the staff of Sir Frederick Adam in the Ionian Islands (1827-1830) and on that of Lord Aylmer in North

America (1830-1832). In 1838 Airey, then a lieutenant-colonel, went to the Horse Guards, where in 1852 he became military secretary to the commander-in-chief, Lord Hardinge. In 1854 he was given a brigade command in the army sent out to the East; from which, however, he was immediately transferred to the onerous and difficult post of quartermaster-general to Lord Raglan, in which capacity he served through the campaign in the Crimea. He was made a major-general in December 1854, and it was universally recog-

nized in the army that he was the best soldier on Lord Raglan's staff. He was made a K.C.B., and was reported upon most favourably by his superiors, Lord Raglan and Sir J. Simpson. Airey was a quartermaster-general in the older sense of the word, i.e. a chief of the general staff, but a different view of the duties of the office was then becoming recognized. Public opinion held him and his department responsible for the failures and mismanagement of the commissariat. Airey demanded an inquiry on his return to England and cleared himself completely, but he never recovered from the effects of the unjust persecution of which he had been made the victim, though the popular view was not shared by his military superiors. He gave up his post at the front to become quartermaster-general to the forces at home. In 1862 he was promoted lieutenant-general, and from 1865 to 1870 he was governor of Gibraltar, receiving the G.C.B. in 1867. In 1870 he became adjutant-general at headquarters, and in 1871 attained the full rank of general. In 1876, on his retirement, he was created a peer, and in 1879-1880 he presided over the celebrated Airey commission on army reform. He died at the house of Lord Wolseley, at Leatherhead, on the 14th of September 1881.

AIR-GUN, a gun in which the force employed to propel the bullet is the elasticity of compressed atmospheric air. It has attached to it, or constructed in it, a reservoir of compressed air, a portion of which, liberated into the space behind the bullet when the trigger is pulled, propels the bullet from the barrel by its expansion. The common forms of air-gun, which are merely toys, are charged by compressing a spiral spring, one end of which forms a piston working in a cylinder; when released by a pull on the trigger, this spring expands, and the air forced out in front of it propels the bullet. Air-guns of this kind are some- times made to resemble walking-sticks and are then known as air-canes.

AIRY, SIR GEORGE BIDDELL (1801-1892), British Astro- nomer

Royal, was born at Alnwick on the 27th of July 1801. He . came of a long line of Airys who traced their descent back to a family of the same name residing at Kentmere, in Westmorland, in the 14th century; but the branch to which he belonged, having suffered in the civil wars, removed to Lincolnshire, where for several generations they lived as farmers. George Airy was educated first at elementary schools in Hereford, and afterwards at Colchester Grammar School. In 1819 he entered Trinity College, Cambridge, as a sizar. Here he had a brilliant career, and seems to have been almost immediately recognized as the leading man of his year. In 1822 he was elected scholar of Trinity, and in the following year he graduated as senior wrangler and obtained first Smith's prize. On the 1st of October 1824 he was elected fellow of Trinity, and in December 1826 was ap- pointed Lucasian professor of mathematics in succession to Thomas Turton. This chair he held for little more than a year, being elected in February 1828 Plumian professor of astronomy and director of the new Cambridge observatory. Some idea of his activity as a writer on mathematical and physical subjects during these early years may be gathered from the fact that previous to this appointment he had contributed no less than three important memoirs to the Philosophical Transactions of the Royal Society, and eight to the Cambridge Philosophical Society. At the Cambridge observatory Airy soon gave evidence of his remarkable power of organization. The only telescope erected in the establishment when he took it in charge was the transit instrument, and to this he vigorously devoted himself. By the adoption of a regular system of work, and a careful plan of reduction, he was able to keep his observations reduced practically up to date, and published them annually with a degree of punctuality which astonished his contemporaries. Before long a mural circle was installed, and regular observations were instituted with it in 1833. In the same year the duke of Northumberland pre- sented the Cambridge observatory with a fine object-glass of 12 in. aperture, which was mounted according to Airy's designs and under his superintendence, although the erection was not completed until after his removal to Greenwich in 1835. Airy's writings during this time are divided between mathematical

physics and astronomy. The former are for the m6st part concerned with questions relating to the theory of lights arising

out of his professorial lectures, among which may be specially mentioned his paper " On the Diffraction of an Object-Glass with Circular Aperture." In 1831 the Copley medal of the Royal Society was awarded to him for these researches. Of his astronomical writings during this period the most important are his investigation of the mass of Jupiter, his report to the British Association on the progress of astronomy during the 19th century, and his memoir On an Inequality of Long Period in the Motions of the Earth and Venus.

One of the sections of his able and instructive report was devoted to " A Comparison of the Progress of Astronomy in England with that in other Countries," very much to the dis- advantage of England. This reproach was subsequently to a great extent removed by his own labours.

Airy's discovery of a new inequality in the motions of Venus and the earth is in some respects his most remarkable achieve- ment. In correcting the elements of Delambre's solar tables he had been led to suspect an inequality overlooked by their con- structor. The cause of this he did not long seek in vain; Eight times the mean motion of Venus is so nearly equal to thirteen times that of the earth that the difference amounts to only the i-J-jth of the earth's mean motion, and from the fact that the term depending on this difference, although very small in itself, receives in the integration of the differential equations a multi- plier of about 2,200,000, Airy was led to infer the existence of a sensible inequality extending over 240 years (Phil. Trans, cxxii. 67). The investigation that brought about this result was probably the most laborious that had been made up to Airy's time in planetary theory, and represented the first specific improvement in the solar tables effected in England since the establishment of the theory of gravitation. In recognition of this work the medal of the Royal Astronomical Society was awarded to him in 1833.

In June 1835 Airy was appointed Astronomer Royal in succes- sion to John Pond, and thus commenced that long career of wisely directed and vigorously sustained industry at the national observatory which, even more perhaps than his investigations in abstract science or theoretical astronomy, constitutes his chief title to fame. The condition of the observatory at the time of his appointment was such that Lord Auckland, the first lord of the Admiralty, considered that " it ought to be cleared out," while Airy admitted that " it was in a queer state." With his usual energy he set to work at once to reorganize the whole manage-

ment. He remodelled the volumes of observations, put the library on a proper footing, mounted the new (Sheepshanks) equatorial and organized a new magnetic observatory. In 1847 an altazimuth was erected, designed by Airy to enable observa- tions of the moon to be made not only on the meridian, but whenever she might be visible. In 1848 Airy invented the reflex zenith tube to replace the zenith sector previously employed. At the end of 1850 the great transit circle of 8 in. aperture and n ft. 6 in. focal length was erected, and is still the principal instrument of its class at the observatory. The mounting in 1850 of an equatorial of 13 in. aperture evoked the comment in his journal for that year, " There is not now a single person employed or instrument used in the observatory which was there in Mr Pond's time"; and the transformation was completed by the inauguration of spectroscopic work in 1868 and of the photo- graphic registration of sun-spots in 1873.

The formidable undertaking of reducing the accumulated planetary observations made at Greenwich from 1750 to 1830 was already in progress under Airy's supervision when he became Astronomer Royal. Shortly afterwards he undertook the further laborious task of reducing the enormous mass of observations of the moon made at Greenwich during the same period under the direction, successively, of J. Bradley, N. Bliss, N. Maskelyne and John Pond, to defray the expense of which a large sum of money was allotted by the Treasury. As the result, no less than 8000 lunar observations were rescued from oblivion, and were, in 1846, placed at the disposal of astronomers in such a form that

they could be used directly for comparison with the theory and for the improvement of the tables of the moon's motion. For this work Airy received in 1848 a testimonial from the Royal Astronomical Society, and it at once led to the discovery by P. A. Hansen of two new inequalities in the moon's motion. After completing these reductions, Airy made inquiries, before engaging in any theoretical investigation in connexion with them, whether any other mathematician was pursuing the subject, and learning that Hansen had taken it in hand under the patronage of the king of Denmark, but that, owing to the death of the king and the consequent lack of funds, there was danger of his being compelled to abandon it, he applied to the admiralty on Hansen's behalf for the necessary sum. His request was immediately granted, and thus it came about that Hansen's famous Tables de la Lune were dedicated to La Haute Amirauti de

sa MajestS la Peine de la Grande Bretagne et d'Irlande.

One of the most remarkable of Airy's researches was his determination of the mean density of the earth. In 1826 the idea occurred to him of attacking this problem by means of pendulum experiments at the top and bottom of a deep mine. His first attempt, made in the same year, at the Dolcoath mine in Cornwall, failed in consequence of an accident to one of the pendulums; a second attempt in 1828 was defeated by a flooding of the mine, and many years elapsed before another opportunity presented itself. The experiments eventually took place at the Harton pit near South Shields in 1854. Their immediate result was to show that gravity at the bottom of the mine exceeded that at the top by 19 | 86 th of its amount, the depth being 1256 ft. From this he was led to the final value of 6-566 for the mean density of the earth as compared with that of water (Phil. Trans, cxlvi. 342). This value, although considerably in excess of that previously found by different methods, was held by Airy, from the care and completeness with which the observations Were carried out and discussed, to be " entitled to compete with the others on, at least, equal terms."

In 1872 Airy conceived the idea of treating the lunar theory in a new way, and at the age of seventy-one he embarked on the prodigious toil which this scheme entailed. A general description of his method will be found in the Monthly Notices of the Royal Astronomical Society, vol. xxxiv. No. 3. It consisted essentially in the adoption of Delauny's final numerical expressions for longitude, latitude and parallax, with a symbolic term attached to each number, the value of which was to be determined by substitution in the equations of motion. In this mode of treat- ing the question the order of the terms is numerical, and though ■ the amount of labour is such as might well have deterred a younger man, yet the details were easy, and a great part of it might be entrusted to a mere computer. The work was published in 1886, when its author was eighty-five years of age. For some little time previously he had been harassed by a suspicion that certain errors had crept into the computations, and accordingly he addressed himself to the task of revision. But his powers were no longer what they had been, and he was never able to examine sufficiently into the matter. In 1890 he tells us how a grievous error had been committed in one of the first steps, and pathetically adds, " My spirit in the work was broken, and I have never heartily proceeded with it since." In 'i88r : Sir George 1 Airy resigned the office of Astronomer Royal and resided at the

White House, Greenwich, not far from the i Royal Observatory, until his death, which took place on the. 2nd of January 1802.'

A complete list of Airy's printed papers, numbering no less than 518, will be found in his Autobiography, edited in 1896 by his son, Wilfrid : Airy, B. A., M. Inst.C.E. Amongst the most important of his works not already mentioned may be named the following: — Mathematical Tracts (1826) on the Lunar Theory, Figure of the Earth, Precession and Nutation, and Calculus of Variations, to which, in the second edition of 1828, were added tracts on the Planetary Theory and the Undulatory Theory of Light; Experiments on Iron-built Ships, instituted for the purpose of discovering a correction for the deviation of the Compass produced- by the Iron of the Ships (1839); On the Theoretical Explanation of

(1842).

He was elected a fellow of the Royal Society in 1836, its president in 1871, and received both the Copley and Royal medals. He was five times president of the Royal Astronomical Society, was correspondent of the French Academy and belonged to many other foreign and American societies. He was D.C.L. of Oxford and LL.D. of Cambridge and Edinburgh. In 1872 he was made K.C.B. In the same year he was nominated a Grand Cross in the Imperial Order of the Rose of Brazil; he also held the Prussian Order " Pour le Merite," and belonged to the Legion of Honour of France and to the Order of the North Star of Sweden and Norway.

See also Proc. Roy. Society, li. 1 (E. J. Routh) ; Month. Notices Roy. Astr. Society, lii. 212; Observatory, xv. 74 (E. Dunkin) ; Nature, 31st of Oct. 1878 (A. Winnecke), 7th of Jan. 1892; The Times, 5th of Jan. 1892; R. Grant's Hist, of Phys. Astronomy; R. P. Graves's Life of Sir W. Rowan Hamilton. (A. A. R.*)

AISLABIE, JOHN (1670-1742), English politician, was born at Goodramgate, York, on the 7th of December 1670. He was the fourth son of George Aislabie, principal registrar of the archiepiscopal court of York. In 1695 he was elected member of parliament for Ripon. In 1 71 2 he was appointed one of the commissioners for executing the office of lord high admiral, and

in 1714 became treasurer of the navy, being sworn in two years later as a member of the privy council. In March 171 8 he became chancellor of the exchequer. The proposal of the South Sea Company to pay off the national debt was strenuously supported by Aislabie, and finally accepted in an amended form by the House of Commons. After the collapse of that company a secret committee of inquiry was appointed by the Commons, and Aislabie, who had in the meantime resigned the seals of his office, was declared guilty of having encouraged and promoted the South Sea scheme with a view to his own ex- orbitant profit, and was expelled the House. Though committed to the Tower he was soon released, and was allowed to retain the property he possessed before 1718, including his country estate, to which he retired to pass the rest of his days. He died in 1742.

AISLE (from Lat. ala, a wing), a term which in its primary sense means the wing of a house, but is generally applied in architecture to the lateral divisions of a church or large building. The earliest example is that found in the basilica of Trajan, which had double aisles on either side of the central area; the same number existed in the original church of St Peter's at Rome, in the basilica at Bethlehem, and according to Eusebius in the church of the Holy Sepulchre at Jerusalem. The aisles are divided from the nave or central area by colonnades or arcades, and may flank also the transept or choir, being dis- tinguished as nave-aisles, transept-aisles or choir-aisles. If the choir is semi-circular, and the aisles, carried round, give access to a series of chapels, the whole arrangement is known as the chevet. As a rule in Great Britain there is only one aisle on each side of the nave, the only exceptions being Chichester and Elgin cathedrals, where there are two. Many European cathedrals have two aisles on each side, as those of Paris, Bourges, Amiens, Troyes, St Sernin, Toulouse, Cologne, Milan, Seville, Toledo; and in those of Paris, Chartres, Amiens and Bourges, Seville and Toledo, double aisles flank the choir on each side. The cathedral at Antwerp has three aisles on each side. In some of the churches in Germany the aisles are of the same height as the nave. These churches are known as Hallenkirchen, the principal examples being St Stephen's, Vienna, the Weisse- kirche at Soest, St Martin's, Landshut, Munich cathedral, and the Marienkirche at Danzig. (R. P. S.)

AISNE, a frontier department in the north-east of France, formed in 1790 from portions of the old provinces of Ile-de- France and Picardy. Area 2866 sq. m. Pop. (1906) 534,495. It is bounded N. by the department of Nord and the kingdom of Belgium, E. by the

department of Ardennes, S.E. by that of Marne, S. by that of Seine-et-Marne, and W. by those of Oise Mid Somme. The surface of the department consists of un- dulating and well-wooded plains, intersected by numerous

valleys, and diversified in the north-east by hilly ground which forms a part of the mountain system of the Ardennes. Its general slope is from north-east, where the culminating point (930 ft.) is found, to south-west, though altitudes exceeding 750 ft. are also found in the south. The chief rivers are the Somme, the Escaut and the Sambre, which have their sources in the north of the department; the Oise, traversing the north- west, with its tributaries the Serre and the Aisne, the latter of which joins it beyond the limits of the department; and the Marne and the Ourcq in the south. The climate is in general cold and humid, especially in the north-east. Agriculture is highly developed; cereals, principally wheat and oats, and beetroot are the chief crops; potatoes, flax, hemp, rape and hops are also grown. Pasturage is good, particularly in the north-east, where dairy-farming flourishes. Wine of medium quality is grown on the banks of the Marne and the Aisne. Bee-farming is of some importance. Large tracts of the depart- ment are under wood; the chief forests are those of Nouvion and St Michel in the north, Coucy and St Gobain in the centre, and Villers-Cotterets in the south. The osiers grown in the vicinity of St Quentin supply an active basket-making industry.

Though destitute of metals Aisne furnishes abundance of freestone, gypsum and clay. There are numerous tile and brick works in the department. Its most important industrial estab- lishments are the mirror manufactory of St Gobain and the chemical works at Chauny, and the workshops and foundries of Guise, the property of an association of workpeople organized on socialistic lines and producing iron goods of various kinds. The manufacture of sugar is very important; brewing, distilling, flour-milling, iron-founding, the weaving and spinning of cotton, wool and silk, and the manufacture of iron goods, especially agricultural implements, are actively carried on. Aisne imports coal, iron, cotton and other raw material and machinery; it exports cereals, live-stock and agricultural products generally, and manufactured goods. The department is served chiefly by the lines of the Northern railway; in addition, the main line of the Eastern railway to Strassburg traverses the extreme south. The Oise, Aisne and Marne are navigable, and canals furnish 170 m. of waterway. Aisne is divided into five arrondissements — St

Quentin and Vervins in the north, Laon in the centre, and Soissons and Chateau-Thierry in the south — and contains 3 7 cantons and 841 communes. It forms part of the educational division (academie) of Douai and of the region of the second army corps, its military centre being at Amiens, where also is its court of appeal. Laon is the capital, and Soissons the seat of a bishopric of the province of Reims. Other important places are Chateau- Thierry, St Quentin and Coucy-le-Chateau. La Ferte-Milon has remains of an imposing chateau of the 14th and 15th centuries with interesting fortifications. The ruined church at Longpont (13th century) is the relic of an import- ant Cistercian abbey; Urcel and Mont-Notre-Dame have fine churches, the first entirely in the Romanesque style, the second dating from the 12th and 13th centuries, to which period the church at Braisne also belongs. At Premontre the buildings of the abbey, which was the cradle of the Premonstratensian order, are occupied by a lunatic asylum.

AlSSfi [a corruption of Haidee] , Mademoiselle (c. 1694- 1733); French letter-writer, was the daughter of a Circassian chief, and was born about 1694. Her father's palace was pillaged by the Turks, and as a child of four years old she was sold to the comte de Ferriol, the French ambassador at Constanti- nople. She was brought up in Paris by Ferriol's sister-in-law with her own sons, MM. d'Argental and Pont de Veyle. Her great beauty and romantic history made her the fashion, and she attracted the notice of the regent, Philip, duke of Orleans, whose offers she had the strength of mind to refuse. She formed a deep and lasting attachment to the Chevalier d'Aydie, by whom she had a daughter. She died in Paris on the 13 th of March 1733. Her letters to her friend Madame Calandrini contain much interesting information with regard to con- temporary celebrities, especially on Mme. du Deffand and Mme. de Tencin, but they are above all of interest in the picture they

afford of the writer's own tenderness and fidelity. Her Lettres were edited by Voltaire (1787), by J. Ravenel, with a notice by Sainte-Beuve (1846) and by Eugene Asse (1873). Mile. Aisse has been the subject of three plays: by A. de Lavergne and P. Woucher (1854), by Louis Bouilhet (1872) and by Dejoux

(1898).

See also Courteault, Une Idylle au XVIII' siecle, Mile. Aisse et le Chevalier d'Aydie (Macon, 1900); and notices prefixed to the editions of 1846 and 1873. There is an interesting essay by E. Gosse in his French Profiles (1905).

AITON, WILLIAM (1 731-1793), Scottish botanist, was born near Hamilton in 1731. Having been regularly trained to the profession of a gardener, he travelled to London in 1754, and became assistant to Philip Miller, then superintendent of the Physic Garden at Chelsea. In 1759 he was appointed director of the newly established botanical garden at Kew, where he remained until his death on the 2nd of February 1793. He effected many improvements at the gardens, and in 1789 he published Horlus Keivensis, a catalogue of the plants there cultivated. A second and enlarged edition of the Horlus was brought out in 1810-1813 by his eldest son, William Townsend Aiton (1766-1849), who succeeded him at Kew and was commissioned by George IV. to lay out the gardens at the Pavilion, Brighton.

AITZEMA, LIEUWE (Leo) VAN (1 600-1 669), Dutch historian and statesman, was born at Doccum, in Friesland, on the 19th of November 1600. In 161 7 he published a volume of Latin poems under the title of Poemala Juvenilia, of which a copy is preserved in the British Museum. He made a special study of politics and political science and was ior thirty years resident for the towns of the Hanseatic League at the Hague, where he died on the 23rd of February 1669. His most important work was the Saken van Stael in Oorlogh in ende omtrent de Vereenigte Nederlanden (14 vols. 4to, 1655-1671), embracing the period from 1621 to 1668. It contains a large number of state documents, and is an invaluable authority on one of the most eventful periods of Dutch history.

Four continuations of the history, by the poet and historian Lambert van den Bos, were published successively at Amsterdam in 1685, 1688, 1698 and 1699. The Derde Vervolg Zijnde het vierde Stuck van het Vervolgh op de Historie, &c, brings the history down to 1697.

AIVALI (Gr. Kydonia), a prosperous town on the W. coast of Asia Minor, opposite the island of Mitylene. Pop. 21,000. It stands near the site of the Aeolian Heraclea, on rising ground at the end of a bay which is separated from the Gulf of Adramyt- tium, and

protected from the prevailing winds by the Moschonisi Islands (Hecatonnesoi). In 1821 it was burned to the ground during a fight between the Turks and the Greeks, and a large number of its Greek population killed or enslaved. It is one of the most thriving towns in the Levant, with a purely Greek population distinguished for its commercial, industrial and maritime enterprise. The exports are olive oil, grain and wood, and a fleet of fishing-boats supplies Constantinople and Smyrna with fish; the exports in 1902 were valued at £987,070, and the imports at £336,693.

AIWAN, the reception-hall or throne-room of a Parthian or Sassanian palace.

AIX, a city of south-eastern France, capital of an arrondisse- ment in the department of Bouches-du- Rh6ne, 18 m. N. of Marseilles by rail. Pop. (1906) 19,433. It is situated in a plain overlooking the Arc, about a mile from the right bank of the river. The Cours Mirabeau, a wide thoroughfare, planted with double rows of plane-trees, bordered by fine houses and decorated by three fountains, divides the town into two portions. The new town extends to the south, the old town with its wide but irregular streets and its old mansions dating from the i6th, 17 th and 1 8th centuries lies to the north. Aix is an important educational centre, being the seat of the faculties of law and letters of the university, of Aix-Marseille, and the north and east quarter of the town, where the schools and university buildings are situated, is comparable to the Latin Quarter of Paris. The cathedral of St Sauveur, which dates from the nth, 12th and 13th centuries, is situated in this portion of Aix. It is preceded by a

rich portal in the Gothic style with elaborately carved doors, and is flanked on the north by an uncompleted tower. The interior contains tapestry of the 16th century and other works of art. The archbishop's palace and a Romanesque cloister adjoin the cathedral on its south side. The church of St Jean de Malte, dating from the 13th century, contains some valuable pictures. The hotel de ville, a building in the classical style of the middle of the 1 7th century, looks on to a picturesque square. It contains some fine wood-work and a large library which includes many valuable MSS. At its side rises a handsome clock-tower erected in 1505. Aix possesses many beautiful fountains, one of which in the Cours Mirabeau is surmounted by a statue of Rene, count of Provence, who held a brilliant court at Aix in the 15th century. Aix has thermal springs, remarkable for their heat and containing

lime and carbonic acid. The bathing establishment was built in 1705 near the site of the ancient baths of Sextius, of which vestiges still remain. The town, which is the seat of an archbishop and court of appeal, and the centre of an acadimie (educational circumscription), numbers among its public institutions a court of assizes, tribunals of first instance and of commerce, and a chamber of arts and manufactures. It also has training-colleges, a lycee, a school of art and technics, museums of antiquities, natural history and painting, and several learned societies. The industries include flour-milling, the manufacture of confectionery, iron-ware and hats, and the distillation of olive-oil. Trade is in olive-oil, almonds and stone from the neighbouring quarries.

Aix (Aquae Sextiae) was founded in 123 B.C. by the Roman consul Sextius Calvinus, who gave his name to its springs. In 102 B.C. its neighbourhood was the scene of the defeat inflicted on the Cimbri and Teutones by Marius. In the 4th century it became the metropolis of Narbonensis Secunda. It was occupied by the Visigoths in 477, in the succeeding century was repeatedly plundered by the Franks and Lombards, and was occupied by the Saracens in 731. Aix, which during the middle ages was the capital of the county of Provence, did not reach its zenith until after the 12 th century, when, under the houses of Aragon and Anjou, it became an artistic centre and seat of learning. With the rest of Provence, it passed to the crown of France in 1487, and in 1 501 Louis XII. established there the parlement of Provence which existed till 1789. In the 17th and 18th centuries the town was the seat of the intendance of Provence.

AIX-LA-CHAPELLE (Ger. Aachen, Dutch Aken), a city and spa of Germany, in the kingdom of Prussia, situated in a pleasant valley, 44 m. W. of Cologne and contiguous to the Belgian and Dutch frontiers, to which its municipal boundaries extend. Pop. (1885) 95,725; (1905) including Burtscheid, 143,906. Its position, at the centre of direct railway communications with Cologne and Diisseldorf respectively on the E. and LiSge-Brussels and Maestri cht- Antwerp on the W., has favoured its rise to one of the most prosperous commerical towns of Germany. The city consists of the old inner town, the former ramparts of which have been converted into promenades, and the newer outer town and suburbs. Of the ancient gates but two remain, the Ponttor on the N. W. and the Marschiertor on the S. Its general appearance is that rather of a spacious modern, than of a medieval city full of historical associations.

Of the cluster of buildings in the centre, which are conspicuous from afar, the town hall (Rathaus) and the cathedral are specially noteworthy. The former, standing on the south side of the market square, is a Gothic structure, erected in 1353-1370 on the ruins of Charlemagne's palace. It contains the magnificent coronation hall of the emperors (143 ft. by 61 ft.), in which thirty-five German kings and eleven queens have banqueted after the coronation ceremony in the cathedral. The two ancient towers, the Granusturm to the W. and the Glockenturm to the E., both of which to a large extent had formed part of the Carolingian palace, were all but destroyed in the fire by which the Rathaus was seriously damaged in 1883. Their restoration was completed in 1902. Behind the Rathaus is the Grashaus, in which Richard of Cornwall, king of the Romans, is said to have held his court. It was restored in 1 889 to accommodate the municipal archives. The cathedral is of great historic and architectural interest. Apart

from the spire, which was rebuilt in 1884, it consists of two parts of different styles and date. The older portion, the capella in palatio, an octagonal building surmounted by a dome, was designed on the model of San Vitale at Ravenna by Udo of Metz, was begun under Charlemagne's auspices in 796 and consecrated by Pope Leo III. in 805. After being almost entirely wrecked by Norman raiders it was rebuilt, on the original lines, in 983, by the emperor Otto III. It is surrounded on the first story by a sixteen- sided gallery (the Hochmunster) adorned by antique marble and granite columns, of various sizes, brought by Charlemagne's orders from Rome, Ravenna and Trier. These were removed by Napoleon to Paris, but restored to their original positions after the peace of 181 5. The mosaic representing Christ surrounded by "the four-and-twenty elders," which originally lined the cupola, had almost entirely perished by the 19th century, but was re- stored in 1882 from a copy made in the 1 7th century. Interesting too are the magnificent west doors, cast in bronze by native workmen in 804. Underneath the dome, according to tradition, was the tomb of Charlemagne, which, on being opened by Otto III. in 1000, disclosed the body of the emperor, vested in white coronation robes and seated on a marble chair. This chair, now placed in the gallery referred to, was used for centuries in the imperial coronation ceremonies. The site of the tomb is marked by a stone slab, with the inscription Carlo Magno, and above it hangs the famous bronze chandelier presented by the emperor Frederick I. (Barbarossa) in 1168. Charlemagne's bones are preserved in an ornate shrine in the Hungarian Chapel, lying to the north of the octagon. The casket was opened in 1906, at the instance of the emperor William II., and the draperies enclosing the body were temporarily removed to Berlin, with a view to the reproduction of similar cloth. The Gothic choir, forming the more modern portion of the cathedral, was added during the latter half of the 14th and the, beginning of the 15th century, and contains the tomb of the emperor Otto III. The cathedral possesses many relics, the more sacred of which are exhibited only once every seven years, when they attract large crowds of worshippers.

Of the other thirty-three churches in the city those of St Foillan (founded in the 12th century, but twice rebuilt, in the 15th and 17th centuries, and restored in 1883) and St Paul, with its beautiful stained-glass windows, are remarkable. In addition to those already mentioned, Aix-la-Chapelle possesses several fine secular buildings: the Suermondt museum, con- taining besides

other miscellaneous exhibits the fine collection of pictures by early German, Dutch and Flemish masters, presented to the town by Bartholomaus Suermondt (d. 1887); the public library; the theatre; the post-office; and the fine new central railway station. Among the schools may be men- tioned the magnificently equipped Rhenish-Westphalian Poly- technic School (built 1865-1870) and the school of mining and electricity, founded in 1897.

There are many fine streets and squares and some handsome public monuments, notably among the last the fountain on the market square surmounted by a statue of Charlemagne, the bronze equestrian statue of the emperor William I. facing the theatre, the Kriegerdenkmal (a memorial to those who fell in the war of 1870) and the Kongress-Denkmal, a marble hall in antique style erected in 1844 on the Adalberts-Steinweg to commemorate the famous congress of 1818 (see below). Of the squares, the principal is the Friedrich-Wilhelmplatz, on which lies the Elisenbrunnen with its colonnade and garden, the chief resort of visitors taking the baths and waters.

The hot sulphur springs of Aix-la-Chapelle were known to the Romans and have been celebrated for centuries as specific in the cure of rheumatism, gout and scrofulous disorders. There are six in all, of which the Kaiserquelle, with a temperature of 136° F., is the chief. In the neighbouring Burtscheid (in- corporated in 1897 with Aix-la-Chapelle) are also springs of far higher temperature, and this suburb, which has also a Kurgarten, is largely frequented during the season.

In respect of trade and industry Aix-la-Chapelle occupies a high place. Its cloth and silk manufactures are important, and

1. 15

owing to the opening up of extensive coalfields in the district almost every branch of iron industry is carried on. It has some large breweries and manufactories of chemicals, and does a considerable trade in cereals, leather, timber and wine. It is also an important banking centre and has several insurance societies of reputation.

The country immediately surrounding Aix-la-Chapelle presents many attractive features. From the Lousberg and the Salvator-berg to the north, the latter crowned by a chapel, magnificent

views of the city are obtained; while covering the hills 2 m. west stretches the Stadtwald, a forest with charming walks and drives.

History. — Aix-la-Chapelle is the Aquisgranum of the Romans, named after Apollo Granus, who was worshipped in connexion with hot springs. As early as a.d. 765 King Pippin had a ” palace ” here, in which it is probable that Charlemagne was born. The greatness of Aix was due to the latter, who between 777 and 786 built a magnificent palace on the site of that of his father, raised the place to the rank of the second city of the empire, and made it for a while the centre of Western culture and learning. From the coronation of Louis the Pious in 813 until that of Ferdinand I. in 1 53 1 the sacring of the German kings took place at Aix, and as many as thirty-two emperors and kings were here crowned. In 851, and again in 882, the place was ravaged by the Northmen in their raids up the Rhine. It was not, however, till late in the 12th century (1172-1176) that the city was surrounded with walls by order of the emperor Frederick I., to whom (in 1 166) and to his grandson Frederick II. (in 1 215) it owed its first important civic rights. These were still further extended in 1250 by the anti-Caesar William of Holland, who had made himself master of the place and of the imperial regalia, after a long siege, in 1248. The liberties of the burghers were, however, still restrained by the presence of a royal advocatus (Vogt) and bailiff. In 1300 the outer ring of walls was completed, the earlier circumvallation being marked by the limit of the Altstadt (old city). In the 14th century Aix, now a free city of the Holy Roman Empire, played a conspicuous part, especially in the league which, between 1351 and 1387, kept the peace between the Meuse and the Rhine. In 1450 an in- surrection led to the admission of the gilds to a share in the municipal government. In the 16th century Aix began to decline in importance and prosperity. It lay too near the French frontier to be safe, and too remote from the centre of Germany to be convenient, as a capital; and in 1562 the election and coronation of Maximilian II. took place at Frankfort-on- Main, a precedent followed till the extinction of the Empire. The Reformation, too, brought its troubles. In 1580 Pro- testantism got the upper hand; the ban of the empire followed and was executed by Ernest of Bavaria, archbishop-elector of Cologne in 1598. A relapse of the city led to a new ban of the emperor Matthias in 1613, and in the following year Spinola’s Spanish troops brought back the recalcitrant city to the Catholic fold. In 1656 a great fire completed the ruin wrought by the religious wars. By the treaty of Luneville (1801) Aix was in- corporated

with France as chief town of the department of the Roer. By the congress of Vienna it was given to Prussia. The contrast between the new regime and the ancient tradition of the city was curiously illustrated in 1818 by a scene described in Metternich's Memoirs, when, before the opening of the congress, Francis I., emperor of Austria, regarded by all Ger- many as the successor of the Holy Roman emperors, knelt at the tomb of Charlemagne amid a worshipping crowd, while the Protestant Frederick William III. of Prussia, the new sovereign of the place, stood in the midst, "looking very uncomfortable." See Quix, Geschichte der Stadt Aachen (1841); Pick, Aus Aachens Vergangenheit (Aachen, 1895); Bock, Karls des grossen Pjalzkapelle (Cologne, 1867); and Beissel, Aachen als Kurort (1889).

AIX-LA-CHAPELLE, CONGRESSES OF. Three congresses have been held at Aix-la-ChapeUe: the first in 1668, the second in 1748, the third in 1818.

1. The treaty of the 2nd of May 1668, which put an end to the War of Devolution, was the outcome of that of St Germain

signed on the 15th of April by France and the representatives of the powers of the Triple Alliance. The treaty of Aix-la- Chapelle left to France all the conquests made in Flanders during the campaign of 1667, with all their " appartenances, dipendances el annexes." a vague provision of which, after the peace of Nijrawegen (1680), Louis XIV. took advantage to occupy a number of villages and towns adjudged to him by his Chambres de reunion as dependencies of the cities and territories acquired in 1668. On the other hand, France restored to Spain the cities of Cambrai, Aire and Saint-Omer, as well as the pro- vince of Franche Comte. The treaty of Aix-la-Chapelle was placed under the guarantee of Great Britain, Sweden and Holland, by a convention signed at the Hague on the 7th of May 1669, to which Spain acceded.

See Jean du Mont, baron de Carlscroon, Corps universel diplo- matique (Artist., 1726-1731).

2. On the 24th of April 1748 a congress assembled at Aix-Ia-

Chapelle for the purpose of bringing to a conclusion the struggle known as the War of Austrian Succession. Between the 30th of April and the 21st of May the preliminaries were agreed to between Great Britain, France and Holland, and to these Maria Theresa, queen of Bohemia and Hungary, the kings of Sardinia and Spain, the duke of Modena, and the republic of Genoa successively gave their adhesion. The definitive treaty was signed on the 18th of October, Sardinia alone refusing to accede, because the treaty of Worms was not guaranteed. Of the provisions of the treaty of Aix-la-Chapelle the most important were those stipulating for (1) a general restitution of conquests, including Cape Breton to France, Madras to England and the barrier towns to the Dutch; (2) the assignment to Don Philip of the duchies of Parma, Piacenza and Guastalla; (3) the restoration of the duke of Modena and the republic of Genoa to their former positions; (4) the renewal in favour of Great Britain of the Asiento contract of the 16th of March 1713, and of the right to send an annual vessel to the Spanish colonies; (5) the renewal of the article of the treaty of 1718 recognizing the Protestant succession in the English throne; (6) the recog- nition of the emperor Francis and the confirmation of the pragmatic sanction, i.e. of the right of Maria Theresa to the Habsburg succession; (7) the guarantee to Prussia of the duchy of Silesia and the county of Glatz.

Spain having raised objections to the Asiento clauses, the treaty of Aix-la-Chapelle was supplemented by that of Madrid (5th of October 1750), by which Great Britain surrendered her claims under those clauses in return for a sum of £100,000.

See A. J. H. de Clercq, Recueil des traites de la France; F. A. Wenk, Corpus juris gentium recentissimi, 1735-1772, vol. ii. (Leipzig, 1786), p. 337; Comte G. de Garden, Hist, des traites de paix, 1848- 1887, iii. p. 373.

3. The congress or conference of Aix-la-Chapelle, held in the autumn of 1818, was primarily a meeting of the four allied powers — Great Britain, Austria, Prussia and Russia — to decide the question of the withdrawal of the army of occupation from France and the nature of the modifications to be introduced in consequence into the relations of the four powers towards each other, and collectively towards France. The congress, of which the first session was held on the 1st of October, was attended by the emperor Alexander I. of Russia, the emperor Francis I. of Austria, and Frederick William III. of Prussia, in person. Great

Britain was represented by Lord Castlereagh and the duke of Wellington, Austria by Prince Metternich, Russia by Counts Capo d'Istria and Nesselrode, Prussia by Prince Harden- berg and Count Bernstorff. The due de Richelieu, by favour of the allies, was present on behalf of France. The evacuation of France was agreed to in principle at the first session, the consequent treaty being signed on the 9th of October. The immediate object of the conference being thus readily disposed of, the time of the congress was mainly occupied in discussing the form to be taken by the European alliance, and the " military measures," if any, to be adopted as a precaution against a fresh outburst on the part of France. The proposal of the emperor Alexander I. to establish a " universal union of guarantee " on the broad basis of the Holy Alliance, after much debate, broke

down on the uncompromising opposition of Great Britain; and the main outcome of the congress was the signature, on the 15th of November, of two instruments: (1) a secret protocol confirming and renewing the quadruple alliance established by the treaties of Chaumont and Paris (of the 20th of November 1815) against France; (2) a public "declaration" of the in- tention of the powers to maintain their intimate union, " strengthened by the ties of Christian brotherhood," of which the object was the preservation of peace on the basis of respect for treaties. The secret protocol was communicated in confi- dence to Richelieu; to the declaration France was invited publicly to adhere.

Besides these questions of general policy, the congress con- cerned itself with a number of subjects left unsettled in the hurried winding up of the congress of Vienna, or which had arisen since. Of these the most important were the questions as to the methods to be adopted for the suppression of the slave- trade and the Barbary pirates. In neither case was any decision arrived at, owing (1) to the refusal of the other powers to agree with the British proposal for a reciprocal right of search on the high seas; (2) to the objection of Great Britain to inter- national action which would have involved the presence of a Russian squadron in the Mediterranean. In matters of less importance the congress was more unanimous. Thus, on the urgent appeal of the king of Denmark, the king of Sweden (Bernadotte) received a peremptory summons to carry out the terms of the treaty of Kiel; the petition of the elector of Hesse to be recognized as king was unanimously rejected; and measures were taken to redress the grievances of the German mediatized princes. The more important outstanding questions in Germany, e.g. the Baden

succession, were after consideration reserved for a further conference to be called at Frankfort. In addition to these a great variety ef questions were considered! from that of the treatment of Napoleon at St Helena, to the grievances of the people of Monaco against their prince and the position of the Jews in Austria and Prussia. An attempt made to introduce the subject of the Spanish colonies was defeated by the opposition of Great Britain. Lastly, certain vexatious questions of diplomatic etiquette were settled once for all (see Diplomacy). The congress, which broke up at the end of November, is of historical importance mainly as marking the highest point reached in the attempt to govern Europe by an international committee of the powers. The detailed study of its proceedings is highly instructive in revealing the almost insurmountable obstacles to any really effective international system.

Authorities. — F.O. Records (the volumes marked Continent, Aix-la-Chapelle, To and from Viscount Castlereagh); State Papers; G. F. de Martens, Nouveau recueil de traites, &c. (Gottingen, 1817-1842); F. de Martens, Recueil des traites conclus par la Russie, &c. (1874 in progr.); F. von Gentz, Depiches inedites, &c, ed. Baron Prokesch-Osten, 3 vols. (1876-1877);

Metter- nich, Memoirs; Wellington, Suppl. Despatches; Castlereagh, Correspondence, &c. (W. A. P.)

AIX-LES-BAINS, a town of France, in the department of Savoie, near the Lac du Bourget, and 9 m. by rail N. of Chamb6ry. Pop. (1901) 4741. It is 846 ft. above the level of the sea. It was a celebrated bathing-place, under the name of Aquae Gratianae, in the time of the Romans, and possesses numerous ancient remains. The hot springs, which are of sulphureous quality, and have a temperature of from 109 to 113° F., are still much frequented, attracting annually many thousands of visitors. They are used for drinking as well as for bathing purposes.

AIYAR, SIR SHESHADRI (1845-1901), native statesman of Mysore, India, was the son of a Brahman of Palghat in the district of Malabar. He was educated at the provincial schodl at Calicut and the presidency college in Madras, and entered the government service' as a translator. In 1868 he was transferred to Mysore under Runga Charlu; and for thirteen years filled various offices in that state; but when Mysore was restored to native rule in 1 88 1 , he became personal assistant to Runga Charlu, whom he succeeded as di wan in 1 88 3 . For the next seventeen years

he laboured assiduously to promote the economic and industrial development of the state, and proved an able assistant to the Maharaja Chamarajendra. By means of railway, irrigation and mining works, he added greatly to the wealth of the state, and put it on a sound financial footing. He retired in 1900, was made K. C.S.I, in 1893 and died on the 13th of September 1901.

AIYAR, SIR TIRUVARUR MUTUSWAMY (1832-1895), native Indian judge of the high court of Madras, was born of poor parents in the village of Vuchuwadi, near Tanjore, on the 28th of January 1832. His widowed mother was forced by poverty to remove with Mutuswamy and his brother to Tiruvarar, where the former learnt Tamil, and soon set to work under the village accountant at a monthly salary of one rupee. About this time he lost his mother, whose memory he cherished with reverence and affection to the last. His duty took him to the court-house of the tehsildar, Mr Naiken, who soon remarked his extraordinary intelligence and industry. There was an English school at Tiruvarar, where Mutuswamy managed to pick up an elementary knowledge of the English language. Mr Naiken then sent him to Sir Henry Montgomery's school at Madras, as a companion to his nephew, and there he won prizes and scholarships year after year. In 1854 he won a prize of 500 rupees offered to the students of the Madras presidency by the council of education for the best English essay. This success brought him to the notice of Sir Alexander Arbuthnot and Mr Justice Holloway. He was offered help to proceed to England and compete for the civil service, but being a Brahman and married, he declined to cross the ocean. Instead he entered the subordinate government service, and was employed in such various posts as school-teacher, record-keeper in Tanjore, and in 1856 deputy-inspector of schools. At this time the Madras authorities instituted the examination for the office of pleaders, and Mutuswamy came out first in the first examination, even beating Sir T. Madhavarao, his senior by many years. Mutuswamy was then appointed in succession district munsiff at Tranquebar, deputy-collector in Tanjore in 1859, sub-judge of south Kanara in 1865, and a magistrate of police at Madras in 1 868 . While serving in the last post he passed the examination for the degree of bachelor of laws of the local university. He was next employed as a judge of the Madras small causes court, until in 1878 he was raised to the bench of the high court, which office

he occupied with ability and distinction for over fifteen years, sometimes acting as the chief justice. He attended by invitation of the viceroy the imperial assemblage at Delhi in 1877. In 1878 he received the honour of CLE. and in 1893 the K.C.I.E. was conferred on him. But he did not live long to enjoy this dignity, dying suddenly in 1895. Mutuswamy was too devoted to his offical work to give much time to other pursuits. Still he took his full share in the affairs of the Madras university, of which he was nominated a fellow in 1872 and a syndic in 1877, and was well acquainted with English law, literature and philosophy. He was through life a staunch Brahman, devout and amiable in character, with a taste for the ancient music of India and the study of the Vedas and other departments of Sanskrit literature.

AJACCIO, the capital of Corsica, on the west coast of the bland, 210 m. S.E. of Marseilles. Pop. (1906) 19,021. Ajaccio occupies a sheltered position at the foot of wooded hills on the northern shore of the Gulf of Ajaccio. The harbour, lying to the east of the town, is protected on the south by a peninsula which carries the citadel and terminates in the Citadel jetty; to the south-west of this peninsula lies the Place Bonaparte, a quarter frequented chiefly by winter visitors attracted by the mild climate of the town. Apart from one or two fine thorough- fares converging to the Place Bonaparte, the streets are mean and narrow and the town has a deserted appearance. The house in which Napoleon I, was born in 1769 is preserved, and his associations with the town are everywhere emphasized by street-names and statues. The other buildings, including the cathedral of the 16th century, are of little interest. The town is the seat of a bishopric dating at least from the 7th century and of a prefect. It has tribunals of first instance and of com-

merce, training colleges, a communal college, a museum and a library; the three latter are established in the Palais Fesch, founded by Cardinal Fesch, who was born at Ajaccio in 1763. Ajaccio has small manufactures of cigars and macaroni and similar products, and carries on shipbuilding, sardine-fishing and coral-fishing. Its exports include timber, citrons, skins, chestnuts and gallic acid. The port is accessible by the largest ships, but its accommodation is indifferent. In 1904 there entered 603 vessels with a tonnage of 202,980, and cleared 608 vessels with a tonnage of 202,502. The present town of Ajaccio lies about two miles to the south of its original site, from which it was transferred by the Genoese in 1492. Occupied from 1553 to 1559 by the French, it again fell to the Genoese after the treaty of

Cateau Cambrfeis in the latter year. The town finally passed to the French in 1768. Since 1810 it has been capital of the department of Corsica.

AJAIGARH, or Adjygurh, a native state of India, in Bundelkhand, under the Central India agency. It has an area of 771 sq. m., and a population in 1901 of 78,236. The chief, who is a Bundela Rajput, bears the title of sawai maharaja. He has an estimated revenue of about £15,000, and pays a tribute of £460. He resides at the town of Naushahr, at the foot of the hill-fortress of Ajaigarh, from which the state takes its name. This fort is situated on a very steep hill, more than 800 ft. above the town of the same name; and contains the mips of temples adorned with elaborately carved sculptures. It was captured by the British in 1809. The town is subject to malaria. The state suffered severely from famine in 1868-1869, and again in 1896-1897.

AJANTA (more properly Ajuntha) , a village in the dominions of the Nizam of Hyderabad in India (N. lat. 20 32′ by E. long. 75° 48’), celebrated for its cave hermitages and halls. The caves are in a wooded and rugged ravine about 3 J m. from the village. Along the bottom of the ravine runs the river Wagura, a mountain stream, which forces its way into the valley over a bluff on the east, and forms in its descent a beautiful waterfall, or rather series of waterfalls, 200 ft. high, the sound of which must have been constantly audible to the dwellers in the caves. These are about thirty in number, excavated in the south side of the precipitous bank of the ravine, and vary from 35 to 1 10 ft. in elevation above the bed of the torrent. The caves are of two kinds — dwelling-halls and meeting-halls. The former, as one enters from the pathway along the sides of the cliff, have a broad verandah, its roof supported by pillars, and giving towards the interior on to a hall averaging in size about 35 ft. by 20 ft. To left and right, and at the back, dormitories are excavated opening on to this hall, and in the centre of the back, facing the entrance, an image of the Buddha usually stands in a niche. The number of dormitories varies according to the size of the hall, and in the larger ones pillars support the roof on all three sides, forming a sort of cloister running round the hall. The meeting-halls go back into the rock about twice as far as the dwelling-halls; the largest of them being 94J ft. from the verandah to the back, and 411 ft. across, including tI-;= cloister. They were used as chapter-houses for the meetings of the Buddhist Order. The caves are in three groups, the oldest group being of various dates from 200 B.C. to A.D.200, the second, group belonging, approximately, to the 6th,

and the third group to the 7 th century a.d. Most of the interior walls of the caves were covered with fresco paintings, of a considerable degree of merit, and somewhat in the style of the early Italian painters. When first discovered, in 181 7, these frescoes were in a fair state of preservation, but they have since been allowed to go hopelessly to ruin. Fortunately, the school of art in Bombay, especially under the supervision of J. Griffiths, had copied in colours a number of them before the last vestiges had disappeared, and other copies of certain of the paintings have also been made. These copies are invaluable as being the only evidence we now have of pictorial art in India before the rise of Hinduism. The expression " Cave Temples " used by Anglo-Indians of such halls is inaccurate. Ajanta was a kind of college monastery. I Hsuan Tsang informs us that Dlnnaga, the celebrated Buddhist

philosopher and controversialist, author of well-known books on logic, resided there. In its prime the settlement must have afforded accommodation for several hundreds, teachers and pupils combined. Very few of the frescoes have been identified, but two are illustrations of stories in Arya Sura's Jataka Mala, as appears from verses in Buddhist Sanskrit painted beneath them.

See J. Burgess and Bhagwanlal Indraji, Inscriptions from the Cave Temples of Western India (Bombay, 1881); J. Fergusson and J. Burgess, Cave Temples of India, (London, 1880) ; J. Griffiths, Paintings in the Buddhist Cave Temples of Ajanta (London, 2 vols., 1896-1897). (T. W. R. D.)

AJAX (Gr. Atas), a Greek hero, son of Olleus, king of Locris, called the " lesser " or Locrian Ajax, to distinguish him from Ajax, son of Telamon. In spite of his small stature, he held his own amongst the other heroes before Troy; he was brave, next to Achilles in swiftness of foot and famous for throwing the spear. But he was boastful, arrogant and quarrelsome; like the Tela-monian Ajax, he was the enemy of Odysseus, and in the end the victim of the vengeance of Athene, who wrecked his ship on his homeward voyage {Odyssey, iv. 499). A later story gives a more definite account of the offence of which he was guilty. It is said that, after the fall of Troy, he dragged Cassandra away by force from the statue of the goddess at which she had taken refuge as a

suppliant, and even violated her (Lycophron, 360, Quintus Smymaeus xiii. 422). For this, his ship was wrecked in a storm on the coast of Euboea, and he himself was struck by lightning (Virgil, Aen. i. 40). He was said to have lived after his death in the island of Leuke. He was worshipped as a national hero by the Opuntian Locrians (on whose coins he appears), who always left a vacant place for him in the ranks of their army when drawn up in battle array. He was the subject of a lost tragedy by Sophocles. The rape of Cassandra by Ajax was frequently represented in Greek works of art, for instance on the chest of Cypselus described by Pausanias (v. 17) and in extant works.

AJAX, son of Telamon, king of Cyprus, a legendary hero of ancient Greece. To distinguish him from Ajax, son of Olleus, he was called the " great " or Telamonian Ajax. In Homer's Iliad he is described as of great stature and colossal frame, second only to Achilles in strength and bravery, and the " bulwark of the Achaeans." He engaged Hector in single combat and, with the aid of Athene, rescued the body of Achilles from the hands of the Trojans. In the competition between him and Odysseus for the armour of Achilles, Agamemnon, at the instigation of Athene, awarded the prize to Odysseus. This so enraged Ajax that it caused his death {Odyssey, xi. 541). According to a later and more definite story, his disappointment drove him mad; he rushed out of his tent and fell upon the flocks of sheep in the camp under the impression that they were the enemy; on coming to his senses, he slew himself with the sword which he had received as a present from Hector. This is the account of his death given in the Ajax of Sophocles (Pindar, Nemea, 7; Ovid, Met. xiii. 1). From his blood sprang a red flower, as at the death of Hyacinthus, which bore on its leaves the initial letters of his name AI, also expressive of lament (Pausanias i. 35. 4). His ashes were de- posited in a golden urn on the Rhoetean promontory at the entrance of the Hellespont. Like Achilles, he is represented as living after his death in the island of Leuke at the mouth of the Danube (Pausanias iii. 19. n). Ajax, who in the post-Homeric legend is described as the grandson of Aeacus and the great-grandson of Zeus, was the tutelary hero of the island of Salamis, where he had a temple and an image, and where a festival called Aianleia was celebrated in his honour (Pausanias i. 35). At this festival a couch was set up, on which the panoply of the hero was placed, a practice which recalls the Roman lectisternium. The identification of Ajax with the family of Aeacus was chiefly a matter which concerned the Athenians, after

Salamishadcomeinto their possession, on which occasion Solon is said to have inserted a line in the Iliad (ii. 557 or 558), for the purpose of supporting the Athenian idaim to the island. Ajax then became an Attic hero; he was worshipped at Athens, where he had a statue in the market-place, and the tribe Aiantis was called after his same.

Many illustrious Athenians — Cimon, Miltiades, Alcibiades, the historian Thucydides — traced their descent from Ajax.

See D. Bassi, La Leggenda di Aiace Telamonio (1890) ; P. Girard, " Ajax, fils de Telamon," 1905, in Revue des itudes grecques, tome 18; J. Vurtheim, De Ajacis Origine, Cultu, Patria (Leiden, 1907), accord- ing to whom he and Ajax Oileus, as depicted in epos, were originally one, a Locrian daemon somewhat resembling the giants. When this spirit put on human form and became known at the Saronic Gulf, he developed into the " greater " Ajax, while among the Locrians he remained the " lesser." In the article Greek Art, fig. 13 (from a black-figured Corinthian vase) represents the suicide of Ajax.

AJMERE, or Ajmer, a city of British India in Rajputana, which gives its name to a district and also to a petty province called Ajmere-Meirwara. It is situated in 26° 27′ N. lat. and 74 44′ E. long., on the lower slopes of Taragarh hill, in the Aravalli mountains. To the north of the city is a large artificial lake called the Anasagar, whence the water supply of the place is derived.

The chief object of interest is the darga, or tomb of a famous Mahommedan saint named Mayud-uddin. It is situated at the foot of the Taragarh mountain, and consists of a block of white marble buildings without much pretension to architectural beauty. To this place the emperor Akbar, with his empress, performed a pilgrimage on foot from Agra in accordance with the terms of a vow he had made when praying for a son. The large pillars erected at intervals of two miles the whole way, to mark the daily halting-place of the imperial pilgrim, are still extant. An ancient Jain temple, now converted into a Mahom- medan mosque, is situated on the lower slope of the Taragarh hill. With the exception of that part used as a mosque, nearly the whole of the ancient temple has fallen into ruins, but the relics are not excelled in beauty of architecture and sculpture by any remains of Hindu art. Forty columns support the roof, but no two are alike, and great fertility of invention is manifested in the execution of the ornaments. The summit of Taragarh hill, over-

hanging Ajmere, is crowned by a fort, the lofty thick battlements of which run along its brow and enclose the table-land. The walls are 2 m. in circumference, and the fort can only be approached by steep and very roughly paved planes, commanded by the fort and the outworks, and by the hill to the west. On coming into the hands of the English, the fort was dismantled by order of Lord William Bentinck, and is now converted into a sanatorium for the troops at Nasirabad. Ajmere was founded about the year 145 a.d. by Aji, a Chauhan, who established the dynasty which continued to rule the country (with many vicissitudes of fortune) while the repeated waves of Mahommedan invasion swept over India, until it eventually became an appanage of the crown of Delhi in 1193. Its internal government, however, was handed over to its ancient rulers upon the payment of a heavy tribute to the conquerors. It then remained feudatory to Delhi till 1365, when it was captured by the ruler of Mewar. In 1509 the place became a source of contention between the chiefs of Mewar and Marwar, and was ultimately conquered in 1532 by the latter prince, who in his turn in 1559 had to give way before the emperor Akbar. It continued in the hands of the Moguls, with occasional revolts, till 1770, when it was ceded to the Mahrattas, from which time up to 18 18 the unhappy district was the scene of a continual struggle, being seized at different times by the Mewar and Marwar rajas, from whom it was as often retaken by the Mahrattas. In 1818 the latter ceded it to the British in return for a payment of 50,000 rupees. Since then the country has enjoyed unbroken peace and a stable government.

The modern city is an important station on the Rajputana railway, 615 m. from Bombay and 275 m. from Delhi, with a branch running due south to the Great Indian Peninsula main line. The city is well laid out with wide streets and handsome houses. The city trade chiefly consists of salt and opium. The former is imported in large quantities from the Sambar lake and Ramsur. Oil-making is also a profitable branch of trade. Cotton cloths are manufactured to some- extent, for the dyeing of which the city has attained a high reputation. The educational institutions include the Mayo Rajkumar college, opened in 1875, f.o\ training the sons of the nobles of Rajputana, on the lines of an

English public school. Population (1901) 73,839, showing an

increase of 10 % in the decade.

The district of Ajmere, which forms the largest part of the province of Ajmere-Merwara, has an area of 2069 sq. m. The eastern portion of the district is generally flat, broken only by gentle undulations, but the western parts, from north-west to south-west, are intersected by the great Aravalli range. Many of the valleys in this region are mere sandy deserts, with an occasional oasis of cultivation, but there are also some very fertile tracts; among these is the plain on which lies the town of Ajmere. This valley, however, is not only fortunate in possessing a noble artificial lake, but is protected by the massive walls of the Nagpathar range or Serpent rock, which forms a barrier against the sand. The only hills in the district are the Aravalli range and its offshoots. Ajmere is almost totally devoid of rivers, the Banas being the only stream which can be dignified with that name, and it only touches the south-eastern boundary of the district so as to irrigate the pargana of Samur. Four small streams — the Sagarmati, Saraswati, Khari and Dai — also intersect the district. In the dry weather they are little more than brooks. The population in 1901 was 7453, showing a decrease of 13 % in the decade. Besides the city of Ajmere, the district contains the military station of Nasirabad, with a population of 22,494.

AJMERE-MERWARA, a division or petty province of British India, in Rajpufcana, consisting of the two districts of Ajmere and Merwara, separated from each other and isolated amid native states. The administration is in the hands of a commis- sioner, subordinate to the governor-general's agent for Rajputana. The capital is Ajmere city. The area is 2710 sq. m. The plateau, on whose centre stands the town of Ajmere, may be considered as the highest point in the plains of Hindustan; from the circle of hills which hem it in, the country slopes away on every side — towards river valleys on the east, south, west and towards the desert region on the north. The Aravalli range is the distinguishing feature of the district. The range of hills which runs between Ajmere and Nasirabad marks the watershed of the continent of India. The rain which falls on one side drains into the Chambal, and so into the Bay of Bengal; that which falls on the other side into the Luni, which discharges itself into the Runn of Cutch. The province is on the border of what may be called the arid " zone " ; it is the debatable land between the north-eastern and south-western monsoons, and beyond the influence of either. The south-west monsoon sweeps up the Nerbudda valley from Bombay and crossing the table- land at Neemuch gives copious

supplies to Malwa, Jhalawar and Kotah and the countries which lie in the course of the Chambai river. The clouds which strike Kathiawar and Cutch are de- prived of a great deal of their moisture by the hills in those countries, and the greater part of the remainder is deposited on Mount Abu and the higher slopes of the Aravalli mountains, leaving but little for Merwara, where the hills are lower, and still less for Ajmere. It is only when the monsoon is in con- siderable force that Merwara gets a plentiful supply from it. The north-eastern monsoon sweeps up the valley of the Ganges from the Bay of Bengal and waters the northern part of Raj- putana, but hardly penetrates farther west than the longitude of Ajmere. On the varying strength of these two monsoons the rainfall of the district depends. The agriculturist in Ajmere- Merwara can never rely upon two good harvests in succession. A province subject to such conditions can hardly be free from famine or scarcity for any length of time; accordingly it was visited by two famines, one of unprecedented severity, and one scarcity, in the decade 1891-1901. In June 1900 the number of persons in receipt of relief was 143,000, being more than one-fourth of the total population.

In 1901 the population was 476,912, showing a decrease of 12% in the decade, due to the results of famine. Among Hindus, the Rajputs are land-holders, and the Jats and Gujars are cultivators. The Jains are traders and money-lenders. The aboriginal tribe of Mers are divided between Hindus and Mahom- medans. The chief crops are millet, wheat, cotton and oil-

seeds. There are several factories for ginning and pressing cotton, the chief trading centres being Beawar and Kekri.

AJODHYA, an ancient city of India, the prehistoric capital of Oudh, in the Fyzabad district of the United Provinces. It is situated on the right bank of the Gogra. In the present day the old city has almost entirely disappeared, and its site is marked only by a heap of ruins; but in remote antiquity Ajodhya was one of the largest and most magnificent of Indian cities. . It is said to have covered an area of 56 m., and was the capital of the kingdom of Kosala, the court of the great king Dasaratha, the fifty-sixth monarch of the Solar line in descent from Raja Manu. The opening chapters of the Ramayana recount the magnificence of the city, the glories of the monarch and the virtues, wealth and loyalty of his people. Dasaratha was the father of Rama Chandra, the hero of the epic. A period of Buddhist supremacy followed the death of the last king of the Solar dynasty. On the

revival of Brahmanism Ajodhya was restored by King Vikramaditya (c. 57 B.C.). Kosala is also famous as the early home of Buddhism, and of the kindred religion of Jainism, and claims to be the birthplace of the founders of both these faiths. The Chinese traveller, Hsiian Tsang, in the 7th century, found 20 Buddhist temples with 3000 monks at Ajodhya among a large Brahmanical popu- lation. The modern town of Ajodhya contains 96 Hindu temples and 36 Mussulman mosques. Little local trade is carried on, but the great fair of Ramnami held every year is attended by about 500,000 people.

AKABA, Gulf of, the Sinus Aelaniticus of antiquity, the eastern of the two divisions into which the Red Sea bifurcates near its northern extremity. It penetrates into Arabia Petraea in a N.N.E. direction, from 28 to 29 32′ N., a distance of 100 m., and its breadth varies from 12 to 17 m. The entrance is contracted by Tiran and other islands, so that the passage is rendered somewhat difficult; and its navigation is dangerous on account of the numerous coral reefs, and the sudden squalls which sweep down from the adjacent mountains, many of which rise perpendicularly to a height of 2000 ft. The gulf is a con- tinuation southward of the Jordan-‘ Araba depression. Raised beaches on the coast- show that there has been a considerable elevation of the sea-bed. The only well-sheltered harbour is that of Dahab (the Golden Port) on its western shore, about 33 m. from the entrance and 29 m. E. of Mount Sinai. Near the head of the gulf is Jeziret Faraun (medieval Graye), a rocky islet with the nuns of a castle built by Baldwin I. (c. ins).

About 25 m. from the head of the gulf and on its eastern side is the town of Akaba, with a picturesque medieval castle, built for the protection of pilgrims on their way from Egypt to Mecca. In the neighbourhood are extensive groves of date palms, and there is an ample supply of good water. Akaba is of considerable historical interest and of great antiquity, being the Elath or Eloth of the Bible, and one of the ports whence Solomon’s fleet sailed to Ophir. By the Romans, who made it a military post, it was called Aelana. It continued to be the seat of great commercial activity under the early Moslem caliphs, who corrupted the name to Haila or Ailat. In the 10th century an Arab geographer described it as the great port of Palestine and the emporium of the Hejaz. In the 12 th century the town suffered at the hands of Saladin and thereafter fell into decay. In 1841 the town was recognized by Turkey, together with the Sinai peninsula, as part of Egypt. At that time Egyptian pilgrims frequented Akaba in

large numbers. In 1892, on the accession of the khedive Abbas II., Turkey resumed possession of Akaba, the Egyptian pilgrims having deserted the land route to Mecca in favour of a sea passage. In 1906 the construction was begun of a branch line joining Akaba to the Mecca railway and thus giving through communication with Beirut. Early in the same year the Turks occupied Taba, a village at the mouth of a small stream 8 m. by land W. by S. of Akaba, near which is the site, not identified, of the Ezion-Geber of Scripture, another of the ports whence the argosies of the Israelites sailed. Taba being on the Egyptian side of the frontier; Great Britain

intervened on behalf of Egypt, and in May 1906 secured the withdrawal of the Turks.

AKA HILLS, a tract of country on the north-east frontier of India, occupied by an independent tribe called the Akas. It lies north of the Darrang district of Eastern Bengal and Assam, and is bounded on the east by the Daphla Hills and on the west by independent Bhutia tribes. The Aka country is very difficult of access, the direct road from the plains leading along the precipitous channel of the Bhareli river, which divides the Aka from the Daphla country. The Akas are a brave people, and the men are strong and well-made. Their reputation as raiders is sufficiently shown in the division of the tribe into two clans, the Hazari-khoas or " eaters of a thousand hearths," and the Kapah-chors or " thieves that lurk in the cotton fields." In the early years of British occupation, about 1829, they gave much trouble; and in 1883 they broke out once more into their old habits. They raided into the British district of Darrang and carried off several native forest officers as hostages. An expedition was sent against them under General Sale Hill with 860 troops, which was completely successful. All its objects were satisfactorily accomplished, namely, the recovery of the captives, the surrender of all firearms, the payment of the fine inflicted by government, the complete submission of the tribe and the survey of the country.

AKALKOT, a native state of India, in the Deccan division of Bombay, ranging as one of the Satara Jagirs, situated between the British district of Sholapur and the nizam's dominions. It forms part of the Deccan table-land, and has a cool and agree-

able climate. Area 498 sq. m.; pop. (1901) 82,047, showing an increase of 8% in the decade. Estimated revenue, £26,586; the tribute is £1000. The chief, who is a Mahratta of the Bhonsla family, resides at Poona on a pension, while the state is under British management.

The town of Akalkot is situated near the Great Indian Penin- sula railway, which traverses the state. Pop. 8348.

AKBAR, Akhbar or Akber, JELLALADIN MAHOMMED (1 542-1605), one of the greatest and wisest of the Mogul emperors. He was born at Umarkot in Sind on the 14th of October 1542, his father, Humayun, having been driven from the throne a short time before by the usurper Sher Khan. After more than twelve years' exile, Humayun regained his sovereignty, which, however, he had held only for a few months when he died. Akbar succeeded his father in 1556 under the regency of Bairam Khan, a Turkoman noble, whose energy in repelling pretenders to the throne, and severity in maintaining the discipline of the army, tended greatly to the consolidation of the newly recovered empire. Bairam, however, was naturally despotic and cruel; and when order was somewhat restored, Akbar found it necessary to take the reins of government into his own hands, which he did by a proclamation issued in March 1 560. The discarded regent lived for some time in rebellion, endeavouring to establish an independent principality in Malwa, but at last he was forced to cast himself on Akbar's mercy. The emperor not only freely pardoned him, but magnanimously offered him the choice of a high place in the army or a suitable escort for a pilgrimage to Mecca, and Bairam preferred the latter alternative. When Akbar ascended the throne, only a small portion of what had formerly been comprised within the Mogul empire owned his authority, and he devoted himself with great determination and success to the recovery of the revolted provinces. Over each of these, as it was restored, he placed a governor, whom he superintended with vigilance and wisdom. He tried by every means to develop and encourage commerce; he had the land accurately measured for the purpose of rightly adjusting taxation; he gave the strictest instructions to prevent extortion on the part of the taxgatherers, and in many other respects displayed an enlightened and equitable policy. Thus it happened that, in the fortieth year of Akbar's reign, the empire had more than regained all that it had lost, the recovered provinces being reduced, not to subjection only as before, but to a great degree of peace, order and content- ment. Akbar's method of dealing with what must always be the chief

difficulty of one who has to rule widely diverse races, affords

perhaps the crowning evidence of his wisdom and moderation. In religion he was at first a Mussulman, but the intolerant exclusiveness of that creed was quite foreign to his character. Scepticism as to the divine origin of the Koran led him to seek the true religion in an eclectic system. He accordingly set himself to obtain information about other religions, sent to Goa, requesting that the Portuguese missionaries there should visit him, and listened to them with intelligent attention when they came. As the result of these inquiries, he adopted the creed of pure deism and a ritual based upon the system of Zoroaster. The religion thus founded, however, having no vital force, never spread beyond the limits of the court, and died with Akbar himself. But though his eclectic system failed, the spirit of toleration which originated it produced in other ways many important results, and, indeed, may be said to have done more to establish Akbar's power on a secure basis than all his economic and social reforms. He con- ciliated the Hindus by giving them freedom of worship; while at the same time he strictly prohibited certain barbarous Brah- manical practices, such as trial by ordeal and the burning of widows against their will. He also abolished all taxes upon pilgrims as an interference with the liberty of worship, and the capitation tax upon Hindus, probably upon similar grounds. Measures like these gained for him during his lifetime the title of " Guardian of Mankind," and caused him to be held up as a model to Indian princes of later times, who in the matter of religious toleration have only too seldom followed his example.

Akbar was a munificent patron of literature. He established schools throughout his empire for the education of both Hindus and Moslems, and he gathered round him many men of literary talent, among whom may be mentioned the brothers Feizi and Abul Fazl. The former was commissioned by Akbar to translate a number of Sanskrit scientific works into Persian; and the latter (see Abul Fazl) has left, in the Akbar-Nameh, an enduring record of the emperor's reign. It is also said that Akbar em- ployed Jerome Xavier, a Jesuit missionary, to translate the four Gospels into Persian.

The closing years of Akbar's reign were rendered very unhappy by the misconduct of his sons. Two of them died in youth, the victims of intemperance; and the third, Salim, afterwards the emperor Jahangir, was frequently in rebellion against his father. These calamities were keenly felt by Akbar, and may even have

tended to hasten his death, which occurred at Agra on the 15th of October 1605. His body was deposited in a magnificent mausoleum at Sikandra, near Agra.

See G. B. Malleson, Akbar (" Rulers of India" series), 1890.

AKCHA, a town and khanate of Afghan Turkestan. The town lies 42 m. westward of Balkh on the road to Andkhui. It is protected by a mud wall and a citadel. Estimated population 8000, chiefly Uzbegs. The khanate is small, but well watered and populous. The rivers rising in the southern mountains, which no longer reach the Oxus, terminate in vast swamps near Akcha, and into these the debris of such vegetation as yearly springs up on the slopes of the southern hills is washed down in time of flood.

AKEN, a town of Germany, in the kingdom of Prussia, on the Elbe, 25 m. E. S. E. of Magdeburg, with a branch line to Co then (8 m.). Pop. (1900) 7358. It has manufactures of cloth, leather, chemicals and optical instruments; large quantities of beetroot sugar are produced in the neighbourhood; and there is a considerable transit trade on the Elbe.

AKENSIDE, MARK (1721-1770), English poet and physician, was born at Newcastle-on-Tyne on the gth of November 1721. He was the son of a butcher, and was slightly lame all his life from a wound he received as a child from his father's cleaver. All his relations were dissenters, and, after attending the free school of Newcastle, and a dissenting academy in the town, he was sent (1739) to Edinburgh to study theology with a view to becoming a minister, his expenses being paid from a special fund set aside by the dissenting community for the education of their pastors. He had already contributed " The Virtuoso, in imitation of Spenser's style and stanza " (1737) to the Gentle- man's Magazine, and in 1738 " A British Philippic, occasioned by the Insults of the Spaniards, and the present Preparations

for War" (also published separately). After he had spent one winter as a student of theology, he entered his name as .a student of medicine. He repaid the money that had been advanced for his theological studies, and with this change of mind he seems to have drifted to a mild deism. His politics, says Dr Johnson, were

characterized by an ” impetuous eager- ness to subvert and confound, with very little care what shall be established,” and he is caricatured in the republican doctor of Smollett’s Peregrine Pickle. He was elected a member of the Medical Society of Edinburgh in 1740. His ambitions already lay outside his profession, and his gifts as a speaker made him hope one day to enter parliament. In 1740 he printed his ” Ode on the Winter Solstice ” in a small volume of poems. In 1 741 he left Edinburgh for Newcastle and began to call himself surgeon, though it is doubtful whether he practised, and from the next year dates his life-long friendship with Jere- miah Dyson (1722-1776). During a visit to Morpeth in 1738 he had conceived the idea of his didactic poem, ” The Pleasures of the Imagination.” He had already acquired a considerable literary reputation when he came to London about the end of

1 743 , and offered the work to Dodsley for £1 20. Dodsley thought the price exorbitant, and only accepted the terms after submitting the MS. to Pope, who assured him that this was- ” no everyday writer.” The three books of this poem appeared in January

1744. His aimˆAkenside tells us in the preface, was ” not so much to give formal precepts, or enter into the way of direct argumentation, as, by exhibiting the most engaging prospects of nature, to enlarge and harmonize the imagination, and by that means insensibly dispose the minds of men to a similar taste and habit of thinking in religion, morals and civil life.” Akenside’s powers fell short of this lofty design; his imagination was not brilliant enough to surmount the difficulties inherent in a poem dealing so largely with abstractions; but the work was well received by the general public. Bis success was not unchallenged. Gray wrote to Thomas Wharton that it was ” above the middling,” but ” often obscure and unintelligible and too much infected with the Hutchinson 1 jargon.”

Into a note added by Akenside to the passage in the third book dealing with ridicule, William Warburton chose to read a reflexion on himself. Accordingly he attacked the author of the Pleasures of the Imagination — which was published anonymously — in a scathing preface to his Remarks on Several Occasional Reflections, in answer to Dr Middleton . . . (1744). This was answered, nominally by Dyson, in An Epistle to the Rev. Mr Warburton, in which Akenside no doubt had a hand. It was in the press when he left England in 1744 to secure a medical

degree at Leiden. In little more than a month he had completed the necessary dissertation, De ortu et incremento foetus humani, and received his diploma. Returning to England he attempted without success to establish a practice in North- ampton. In 1744 he published his Epistle to Curio, attacking William Pulteney (afterwards earl of Bath) for having abandoned his liberal principles to become a supporter of the government, and in the next year he produced a small volume of Odes on Several Subjects, in the preface to which he lays claim to correct- ness and a careful study of the best models. His friend Dyson had meanwhile left the bar, and had become, by purchase, clerk to the House of Commons. Akenside had come to London and was trying to make a practice at Hampstead. Dyson took a house there, and did all he could to further his friend's interest in the neighbourhood. But Akenside's arrogance and pedantry frustrated these efforts, and Dyson then took a house for him in Bloomsbury Square, making him independent of his profession by an allowance stated to have been £300 a year, but probably greater, for it is asserted that this income enabled him to " keep a chariot," and to live " incomparably well." In 1746 he wrote his much-praised "Hymn to the Naiads," and he also became a contributor to Dodsley's Museum, or Literary and Historical Register. He was now twenty-five years old, and began to devote

1 The reference is to Francis Hutcheson (1694-1746), author of an Inquiry into the Original oj our Ideas of Beauty and Virtue

(1725)-

himself almost exclusively to his profession. He was an acute and learned physician. He was admitted M.D. at Cambridge in 1753, fellow of the Royal College of Physicians in 1754, and fourth censor in 1755. In June 1755 he read the Gulstonian lectures before the College, in September 1756 the Croonian lectures, and in 1759 the Harveian oration. In January 1759 he was appointed assistant physician, and two months later principal physician to Christ's Hospital, but he was charged with harsh treatment of the poorer patients, and his unsym- pathetic character prevented the success to which his undeniable learning and ability entitled him. At the accession of George III. both Dyson and Akenside changed their political opinions, and Akenside's conversion to Tory principles was rewarded by the appointment of physician to the queen. Dyson became secretary to the treasury, lord of the treasury, and in 1774 privy councillor and cofferer to the household.

Akenside died on the 23rd of June 1770, at his house in Burlington Street, where the last ten years of his life had been spent. His friendship with Dyson puts his character in the most amiable light. Writing to his friend so early as 1 744, Akenside said that the intimacy had " the force of an additional conscience, of a new principle of religion," and there seems to have been no break in their affection. . He left all his effects and his literary remains to Dyson, who issued an edition of his poems in 1772. This included the revised version of the Pleasures of Imagination, on which the author was engaged at his death. The first book of this work defines the powers of imagination and discusses the various kinds of pleasure to be derived from the perception of beauty; the second distinguishes works of imagination from philosophy; the third describes the pleasure to be found in the study of man, the sources of ridicule, the operations of the mind, in producing works of imagination, and the influence of imagination on morals. The ideas were largely borrowed from Addison's essays on the imagination and from Lord Shaftesbury. Professor Dowden complains that " his tone is too high-pitched; his ideas are too much in the air; they do not nourish them- selves in the common heart, the common life of man." Dr Johnson praised the blank verse of the poems, but found fault with the long and complicated periods. Akenside's verse was better when it was subjected to severer metrical rules. His odes are very few of them lyrical in the strict sense, but they are dignified and often musical, while the few " inscriptions " he has left are felicitous in the extreme.

The best edition of Akenside's Poetical Works is that prepared (1834) by Alexander Dyce for the Aldine Edition of the BritishPoets, and reprinted with small additions in subsequent issues of the series. See Dyce's Life of Akenside prefixed to his edition, also Johnson's Lives of the Poets, and the Life, Writings and Genius of Akenside (1832) by Charles Bucke.

AKERMAN, JOHN YONGE (1806-1873), English antiquarian, distinguished chiefly in the department of numismatics, was born in Wiltshire. He became early known in connexion with his favourite study, having initiated the Numismatic Journal in 1836. In the following year he became the secretary of the newly established Numismatic Society. In 1848 he was elected secretary to the Society of Antiquaries, an office which he was compelled to resign in i860 on account of failing health. Akerman published a considerable number of works on his special subject, the more important being a Catalogue of Roman Coins (1839); a

Numismatic Manual (1840); Roman Coins relating to Britain (1844); Ancient Coins — Hispania, Gallia, Britannia (1846); and Numismatic Illustrations of the New Testament (1846). He wrote also a Glossary of Words used in Wiltshire (1842); Wiltshire Tales, illustrative of the Dialect (1853); and Remains of Pagan Saxondom (1855).

AKHALTSIKH (Georgian Akhaltsikhe, "new fortress"), a fortified town of Russian Transcaucasia, government of Tiths, 68 m. E. of Batum, in 41 40′ N. lat., 43 1′ E. long., on a tribu- tary of the Kura, at an altitude of 3375 ft. The new town is on the right bank of the river, while the old town and the fortress are on the opposite bank. There is trade in silk, honey and wax, and brown coal is found in the neighbourhood. The silver filigree work is famous. Pop. (1897) 15,387, of whom many

were Armenians, as against 15,977 in 1867. From 1579 to 1828 Akhaltsikh was the capital of Turkish Armenia. In the last-mentioned year it was captured by the Russians. The Turks invested it in 1853.

AK-HISSAR (anc. Thyateira, the " town of Thya "), a town situated in a fertile plain on. the Gurdiik Chai (Lycus), in the Aidin vilayet, 58 m. N.E. of Smyrna. Pop. about 20,000, Mussulmans forming two-thirds. Thyateira was an ancient town re-peopled with Macedonians by Seleucus about 290 B.C. It became an important station on the Roman road from Per-gamum to Laodicea, and one of the "Seven Churches" of Asia (Rev. ii. 18), but was never a metropolis or honoured with a neocorate, though made the centre of a conventus by Caracalla. The modern town is connected with Smyrna by railway, and exports cotton, wool, opium, cocoons and cereals. The in-habitants are Greeks, Armenians and Turks. The Greeks are of an especially fine type, physical and moral, and noted all through Anatolia for energy and stability. W. M. Ramsay believes them to be direct descendants of the ancient Christian population; but there is reason to think they are partly sprung from more recent immigrants who moved in the 18th century from western Greece into the domain of the Karasmans of Manisa and Bergama, as recorded by W. M. Leake. Cotton of excellent quality is grown in the neighbourhood, and the place is cele- brated for its scarlet

dyes.

See W. M. RaYnsay, Letters to the Seven Churches (1904) ; M. Clerc, De rebus Thyatirenorum (1893).

AKHMIM, or Ekhmim, a town of Upper Egypt, on the right bank of the Nile, 67 m. by river S. of Assiut, and 4 m. above Suhag, on the opposite side of the river, whence there is railway communication with Cairo and Assuan. It is the largest town on the east side of the Nile in Upper Egypt, having a population in 1907 of 23,795, of whom about a third were Copts. Akhmim has several mosques and two Coptic churches, maintains a weekly market, and manufactures cotton goods, notably the blue shirts and check shawls with silk fringes worn by the poorer classes of Egypt. Outside the walls are the scanty ruins of two ancient temples. In Abulfeda's days (13th century A.p.) a very imposing temple still stood here. Akhmim was the Egyptian Apu or Khen-min, in Coptic Shmin, known to the Greeks as Chemmis or Panopolis, capital of the 9th or Chemmite nome of Upper Egypt. The ithyphallic Min (Pan) was here worshipped as " the strong Horus." Herodotus mentions the temple dedicated to " Perseus " and asserts that Chemmis was remark- able for the celebration of games in honour of that hero, after the manner of the Greeks, at which prizes were given; as a matter of fact some representations are known of Nubians and people of Puoni (Somalic coast) clambering up poles before the god Min. Min was especially a god of the desert routes on the east of Egypt, and the trading tribes are likely to have gathered to his festivals for business and pleasure, at Coptos (which was really near to Neapolis, Kena) even more than at Akhmim. Herodotus perhaps confused Coptos with Chemmis. Strabo mentions linen-weaving as an ancient industry of Panopolis, and it is not altogether a coincidence that the cemetery of Akhmim is one of the chief sources of the beautiful textiles of Roman and Coptic age that are brought from Egypt. Monas- teries abounded in this neighbourhood from a very early date; Shenout (Sinuthius), the fiery apostle and prophet of the Coptic national church, was a monk of Atrepe (now Suhag), and led the populace to the destruction of the pagan edifices. He died in 451; some years earlier Nestorius, the ex-patriarch, had suc- cumbed perhaps to his persecution and to old age, in the neigh- bourhood of Akhmim. Nonnus, the Greek poet, was born at Panopolis at the end of the 4th century. (F. Ll. G.)

AKHTAL [Ghiyath ibn Harith] (c . 640-710), one of the most famous Arabian poets of the Omayyad period, belonged to the

tribe of Taghlib in Mesopotamia, and was, like his fellow-tribesmen, a Christian, enjoying the freedom of his religion, while not taking its duties very seriously. Of his private life few details are known, save that he was married and divorced, and that he spent part of his time in Damascus, part with his

tribe in Mesopotamia. In the wars of the Taghlibites with the Qjisites he took part in the field, and by his satires. In the literary strife between his contemporaries Jarlr and Ferazdaq he was induced to support the latter poet. Akhtal, Jarir and Ferazdaq form a trio celebrated among the Arabs, but as to relative superiority there is dispute. In the "Abbasid period there is no doubt that Akhtal's Christianity told against his reputation, but Abu 'Ubaida placed him highest of the three on the ground that amongst his poems there were ten flawless qasidas (elegies), and ten more nearly so, and that this could not be said of the other two. The chief material of his poems consists of panegyric of patrons and satire of rivals, the latter being, however, more restrained than was usual at the time.

The Poetry of al- Akhtal has been published at the Jesuit press in Beirut, 1 891. A full account of the poet and his times is given in H. Lammens' Le chantre des Omiades (Paris, 1895) (a reprint from the Journal Asiatique for 1894). (G. W. T.)

AKHTYRKA, a town of Russia, in the government of Kharkov, near the Vorskla river, connected by a branch (n m.) with the railway from Kiev to Kharkov. It has a beautiful cathedral, built after a plan by Rastrelli in 1753, to which pilgrims resort to venerate an ikon of the Virgin. There are manufactures of light woollen stuffs and a trade in corn, cattle and the produce of domestic industries. The environs are fertile, the orchards producing excellent fruit. A fair is held on the 9th of May. The place was founded by the Poles in 1642. Pop. (1867) 17,411;

(1900) 25,965.

AKKA (Tikki-Tikki), a race of African pygmies first seen by the traveller G. A. Schweinfurth in 1870, when he was in the Mangbettu country, N.W. of Albert Nyanza. The home of the Akka is the dense forest zone of the Aruwimi district of the Congo State. They form a branch of the primitive pygmy negroid race, and appear to be divided into groups, each with its own chief. Of all African " dwarfs " the Akka are believed the best representatives of the " little people " mentioned by Herodotus. Giovanni

Miani, the Italian explorer who followed Schweinfurth, obtained two young Akka in exchange for a dog and a calf. These, sent to Italy in 1873, were ■ respectively 4 ft. 4 in. and 4 ft. 8 in. high, while the tallest seen by Schweinfurth did not reach 5 ft. None of the four Akka brought to Europe in 1874 and 1876 exceeded 3 ft. 4 in. The average height of the race would seem to be some.- what under 4 ft., but sufficient measurements have not been taken to allow of a conclusive statement. Schweinfurth says the Akka have very large and almost spherical skulls (this last detail proves to be an exaggeration). They are of the colour of coffee slightly roasted, with hair almost the same colour, woolly and tufted; they have very projecting jaws, flat noses and protrud- ing lips, which give them an " ape-like " appearance. Marked physical features are an abdominal protuberance which makes all Akka look like pot-bellied children, and a remarkable hollowing of the spine into a curve like an S. Investigation has shown that these are not true racial characteristics, but tend to disappear, the abdominal enlargement subsiding after some weeks of regular and wholesome diet. The upper limbs are long, and the hands, according to Schweinfurth, are singularly delicate. The lower limbs are short, relatively to the trunk, and curve in somewhat, the feet being bent in too, which gives the Akka a topheavy, tottering gait. There is a tendency to steatopygia among the women. The Akka are nomads, living in the forests, where they hunt game with poisoned arrows, with pitfalls and springs set everywhere, and with traps built like huts, the roofs of which, hung by tendrils only, fall in on the animal. They collect ivory and honey, manufacture poison, and bring these to market to exchange for cereals, tobacco and iron weapons. They are courageous hunters, and do not hesitate to attack even elephants, both sexes joining in the chase. They are very agile, and are said by the neighbouring negroes to leap about in the high grass like grasshoppers. They are timid, as children before strangers, but are declared to be malevolent and treacherous fighters. In dress, weapons and utensils they are as the surrounding negroes. They build round huts of branches and leaves in the forest

clearings. They seem in no way a degenerate race, but rather a people arrested in development by the forest environment.

Bibliography. — A. de Quatrefages, The Pygmies (1895); G. A. Schweinfurth, Heart of Africa (London, 1873); Dr W. Pleyte, Chapitres supplementaires du Livre des Morts, traduction et commen- taire (Leiden, 1883); Sir H. H. Johnston, Uganda Protectorate (London, 1902).

AKKAD (Gr. versions apxaS and dxa5), a Hebrew name, mentioned only once in the Old Testament (Gen. x. 10), for one of the four chief cities, Akkad, Babel, Erech and Calneh, which constituted the nucleus of the kingdom of Nimrod in the land of Shinar or Babylonia. This Biblical city, Akkad, was most probably identical with the northern Babylonian city known to us as Agade (not Agane, as formerly read), which was the principal seat of the early Babylonian king Sargon I. (Sargani-Sarali), whose date is given by Nabonidus, the last Semitic king of Babylonia (555-537 B.C.), as 3800 B.C., which is perhaps too old by 700 or 1000 years. 1 The probably non-Semitic name Agade occurs in a number of inscriptions 2 and is now well attested as having been the name of an important ancient capital. The later Assyro-Babylonian Semitic form Akkadu ("of or belonging to Akkad ") is, in all likelihood, a Semitic loan form from the non-Semitic name Agade, and seems to be an additional demonstration of the identity of Agade and Akkad. The usual signs denoting Akkadu in the Semitic narrative inscriptions were read in the non-Semitic idiom uri-ki or ur-ki, " land of the city," which simply meant that Akkadu was the land of the city par excellence, i.e. of the city of Agade of Sargon I., which remained for a long period the leading city of Babylonia. 3

It is quite probable that the non-Semitic name Agade may mean "crown (ago) of fire (de)" 4 in allusion to Istar, "the brilliant goddess," the tutelar deity of the morning and evening star and the goddess of war and love, whose cult was observed in very early times in Agade. This fact is again attested by Nabonidus, whose record 5 mentions that the Istar worship of Agade was later superseded by that of the goddess Anunit, another personification of the Istar idea, whose shrine was at Sippar. It is significant in this connexion that there were two cities named Sippar, one under the protection of Shamash, the sun-gcd, and one under this Anunit, a fact which points strongly to the probable proximity of Sippar and Agade. In fact, it has been thought that Agade-Akkad was situated opposite Sippar on the left bank of the Euphrates, and was probably the oldest part of the city of Sippar.

In the Assyro-Babylonian literature the name Akkadu appears as part of the royal title in connexion with Sumer; viz. non- Semitic: lugal Kengi (ki) Uru (ki)-sar mdt Sumeri u Akkadi, ” king of Sumer and Akkad,” which appears to have meant simply ” king of Babylonia.” It is not likely, as many scholars have thought, that Akkad was ever used geographically as a distinctive appellation for northern Babylonia, or that the name Sumer (q.v.) denoted the southern part of the land, because kings who ruled only over Southern Babylonia used the double title ” king of Sumer and Akkad,” which was also employed by northern rulers who never established their sway farther south than Nippur, notably the great Assyrian conqueror Tiglath- pileser III. (745-727 B.C.). Professor McCurdy has very reason- ably suggested 6 that the title “king of Sumer and Akkad” indicated merely a claim to the ancient territory and city of Akkad together with certain additional territory, but not neces- sarily all Babylonia, as was formerly believed.

A discussion of the interesting question relating to the non-Semitic so-called Sumero-Akkadian language and race will be found in the article Sumer.

1 Prince, Nabonidus, p. v.

2 In the Sargon inscriptions; Bab. Exped. of the Univ. of Penn. i. pi. 1, nr. 1, line 6; pi. 2, nr. 2, line 5; pi. 3, nr. 3, line 3b; also xi. pi. 49, nr. 119 and in Nebuchadnezzar, col. ii. line 50 (Hilprecht, Freibrief Neb.); Cun. Texts from Bab. Tablets, pi. I, nr. 91 146, line 3.

3 Rogers, History of Babylonia and Assyria, i. pp. 365, 373-374.

4 Prince, ” Materials for a Sumerian Lexicon,” pp. 23, 73, Journal of Biblical Literature, 1906.

- I. Rawl. 69, col. ii. 48 and iii. 28.

- History, Prophecy and the Monuments, i. § 1 10.

Literature. — Schrader, Zur Frage n. d. Ursprung d. altbah- Kultur (1883); Keilinschriften und Geschichtsforschung, pp. 533 f.; Fried. Delitzsch, Wo lag das Parodies? (1881), p. 198; Paul Haupt, Akkadische und Sumerische Keilschrifttexte (1881), pp. 133 ff. ; Die Sumerische Akkadische Sprache, Verh. $-ten Orient. Cong. ii. pp. 249-287; Die sumerischen Familiengesetze (1879); Zimmern, Babylonische Busspsalmen (1885), pp. 71 f. ; Hommel, Gesch.

Bab. Assyr. (1885), pp. 240 ff.; Tiele, Bab. Assyr. Gesch. (1888), p. 68; W. H. Ward, Hebraica (1886), pp. 79-86; McCurdy, Presb. and Ref. Review, Jan. 1891, pp. 58-81; History, Prophecy and the Monuments (1894), §§ 79-85, 94-110; Hugo Winckler, Untersuchungen zur altorientalischen Geschichte (1886), pp. 65 ff. In Rabbinical literature, Louis Ginzberg, in Monatschrift, xliii. 486 ; and Jewish Encyclopaedia, i. p. 149. (J- D. PR.)

AKKERMAN (in old Slav. Byelgorod, "white town"), a town, formerly a fortress, of south-west Russia, in the government of Bessarabia, situated on the right bank of the estuary (liman) of the Dniester, 12 m. from the Black Sea. The town stands on the site of the ancient Milesian colony of Tyras. Centuries later it was rebuilt by the Genoese, who called it Mauro Castro. The Turks first acquired possession of it in 1484. It was taken by the Russians in 1770, 1774 and 1806, but each time returned to the Turks, and not definitely annexed to Russia until 1 88 1 . A treaty concluded here in 1826 between Russia and the Porte secured considerable advantages to the former. It was the non-observ- ance of this treaty that led to the war of 1828. The harbour is too shallow to admit vessels of large size, but the proximity of the town to Odessa secures for it a thriving business in wine, salt, fish wool and tallow. The salt is obtained from the saline lakes (limans) in the neighbourhood. The town, with its suburbs, contains beautiful gardens and vineyards. It is surrounded by ramparts, and commanded by a citadel. Pop. (1900) 32,470.

AKMOLINSK, one of the governments belonging to the governor-generalship of the Steppes in Asiatic Russia, formerly known as the Kirghiz Steppe; bounded by the government of Turgai on the W., by that of Tobolsk on the N., of Semi-pala- tinsk on the E., and of Syr-darya on the S. Area 229,544 sq. m., of which 4535 are lakes. In the north the government is low and dotted with salt lakes, and is sandy on the banks of the Irtysh in the north-east. An undulating plateau stretches through the middle, watered by the Ishim and its tributary the Nura. The plains gradually rise southwards, where a broad spur of the Tarbagatai mountains stretches north-westwards, containing gold, copper and coal. Many lakes, of which the largest is Teniz, are scattered along the northern slope of these hills. Farther south, towards Lake Balkash, on the south- eastern frontier, is a wide waterless desert, Bek-pak-dala, or Famine Steppe. This section of the government is drained by the Sary-su and Chu, the latter on the southern boundary- line. The climate is continental and dry, the average tempera- tures at the town of Akmolinsk being for the

year 35 , January 1-5°, July 70 ; rainfall, only 9 in. The population, which was 686,863 in 1897 (324,587 women), consists chiefly of Russians in the northern and middle portions, and of Kirghiz (about 350,000), who breed cattle, horses and sheep. The urban population was only 74,069. Agriculture is successfully carried on in the north, the Siberian railway running between Petro- pavlovsk and Omsk through a very fertile, well-populated region. Steamers ply on the Irtysh. The government is divided into five districts, the chief towns of which are: Omsk (pop. 53,050 in 1900), formerly capital of West Siberia, now capital of this government and also of the governor-generalship of the Steppes; Akmolinsk, or Akmolly (9560 in 1897), on the Ishim, 260 m. S.S.W. of Omsk, and chief centre for the caravans coming from Tashkent and Bokhara; Atbasar (3030);- Kokchetav (5000); and Petropavlovsk (21,769 in 1901).

AKOLA, a town and district of India, in Berar, otherwise known as the Hyderabad Assigned Districts. The town is on the Murna tributary of the Purna river, 930 ft. above the sea, Akola proper being on the west bank, and Tajnapeth, containing the government buildings and European residences, on the east bank. It is a station on the Nagpur branch of the Great Indian Peninsula railway and is 383 m. E.N.E. of Bombay. It had a population (1901) of 29,289. It is walled, and has a citadel built in the early years of the 19th century. Akola is one of

the chief centres of the cotton trade in Berar, and has numerous ginning factories and cotton presses. Among the educational establishments are a government high school, and an industrial school supported by a Protestant mission.

The district or Akola as reconstituted in 1905 has an area of 41 1 1 sq. m., the population of this area in 1001 being 754,804. (Before the alteration of the boundaries the area of the district was 2678 sq. m., and the population 582,540.) The surface of the country is generally flat, the greater part being situated in the central valley of Berar. On the north it is bounded by the Melghat hills. By the addition of Basim and Mangrul taluks in 1005, the district includes the eastern part of the Ajanta hills, with peaks rising to 2000 ft., and the tableland of Basim (q.v.). North of the Ajanta hills the country is drained eastward by the Puma affluent

of the Tapti and its tributaries. None of the rivers is navigable. The climate resembles that of Berar generally, but the heat during April to mid-June, when the rains begin, is very great, the average temperature at the town of Akola in May for the twenty-five years ending 1901 being 94-4° F- But even during the hot season the nights are cool. The annual rainfall averages 34 in. In the Puma valley the soil is every- where a rich black loam, and nearly the whole of the land is cultivated. Very little land is under irrigation. The principal crop is cotton, and the staple grain millet. Wheat and pulses are also grown. The history of Akola is not distinguished from that of the other portions of Berar. In 131 7-1.3 18 it was added to the Delhi empire, became independent under the Bahmani dynasty in 1348, and in 1596 again fell under the sway of the Moguls. In 1724 it came, with the rest of Berar, under the dominion of the nizam, being assigned to the British in 1853.

AKRON, a city and the county-seat of Summit county, Ohio, U.S.A., on the Little Cuyahoga river, about 35 m. S. by E. of Cleveland. Pop. (1890) 27,601; (1900) 42,728, of whom 7127 were foreign-born (3227 being German, 1104 English, and 641 Irish) ; (1910) 69,067. It is served by the Baltimore & Ohio, the Erie, the Northern Ohio, and the Cleveland, Akron & Columbus railways, by inter-urban electric lines and by the Ohio Canal. The city is situated in a region abound- ing in lakes, springs and hills; it is about 1000 ft. above sea-level, whence its name (from Gr. aicpov, height); and attracts many summer visitors. It is the seat of Buchtel College (co-educa- tional; non-sectarian), which was founded by the Ohio Univer- salist Convention in 1870, was opened in 1872, and was named in honour of its most liberal benefactor, John R. Buchtel (1822- 1892), a successful business man who did much to promote the industrial development of Akron. Buchtel College provides three courses leading to the degrees of A.B., Ph.B. and S.B.; it has a school of music, a school of art and an academy; in 1908 there were 267 students. Coal is mined in the neigh- bourhood. The river furnishes considerable water-power; and among the city's most important manufactures are rubber and elastic goods (value, 1905,113,396,974; 83-9 % of the total of this industry in the state and 21-3% of the total for the United States, Akron ranking first among the cities of the country in this industry), printing and publishing product (value, 1905, $2,834,639), foundry and machine-shop product (value, 1905, $2,367,764), and pottery, terra-cotta and fire-clay (value, 1905, $1,718,033; nearly twice the value of the output in 1900,

Akron ranking fourth among the cities of the United States in this industry in 1905). Other important manufactures are food preparations (especially of oats) and flour and grist mill products. The value of the total manufactured products (under the " factory " system) in 1905 was $34,004,243, an increase in five yearsof 54-5%. Akron was settled about 1825, was incorporated as a village in 1836, was made the county-seat in 1842, and in 1865 was chartered as a city.

See S. A. Lane, Fifty Years and over of Akron and Summit County (Akron, 1892).

AK-SHEHR (anc. Philomelion) , a town in Asia Minor, in the Konia vilayet, situated at the edge of a fertile plain, on the north side of the Sultan Dagh. Philomelion was probably a Perga-menian foundation on the great Graeco-Roman highway from

Ephesus to the east, and to its townsmen the Smyrniotes wrote the letter that describes the martyrdom of Polycarp. Cicero, on his way to Cilicia, dated some of his extant correspondence there; and the place played a Considerable part in the frontier wars between the Byzantine emperors and the sultanate of Rum. It became an important Seljuk town, and late in the 14th century passed into Ottoman hands. There Bayezid Yilderim is said by Ali of Yezd to have died after his defeat at Angora. The place still enjoys much repute among Turks, as the burial- place of Nur-ed-din Khoja. The town has a station on the Anatolian railway, about 60 rn. from Afium-Kara-Hissar and 100 m. from Konia.

AKSU (White Water), a town of the Chinese empire, Eastern Turkestan, in 41 7′ N. and 79 7′ E. of Uch-Turfan and 270 m. N.E. of Yarkand, near the left bank of the Aksu river, which takes its origin in the T'ien-shan (Tian-shan) mountains and joins the Tarim. It. belongs to the series of oases (Uch-Turfan, Bai, Koucha, &c.) situated at the southern foot of the eastern T'ien-shan mountains. The town, which is supposed to have about 6000 houses, is enclosed by a wall. It is an important centre for caravan routes and has a considerable trade. There are some cotton manufactures; and the place is celebrated for its richly ornamented saddlery made from deerskin. A Chinese garrison is stationed here, and copper and iron are wrought in the neighbourhood by exiled Chinese criminals. Extensive cattle-breeding is carried on by the inhabitants.

AKYAB, a city and district in the Arakan division of Burma. The

city is situated at the confluence of the three large rivers Myu, Koladaing and Lemyu, and is the most flourishing city in the Arakan division. Originally it was a mere fishing village, but when the British government in 1826 removed the restric- tions on trade imposed by the Burmese, Akyab quickly grew into an important seat of maritime commerce. After the cession of Arakan by the treaty of Yandaboo in that year the old capital of Myohaung was abandoned as the seat of government, and Akyab on the sea-coast selected instead. During the first forty years of British rule it increased from a village to a town of 15,536 inhabitants, and now it is the third port of Burma, with a population in 1901 of 31,687. It contains the usual public buildings and Several large rice mills. The chief exports are rice and oil.

The district lies along the north-eastern shores of the Bay of Bengal, with an area of 5136 sq. m. and a population in 1901 of 481,666. It forms the northernmost district of Lower Burma, and consists of the level tract lying between the sea and the Arakan Yoma mountains, and of the broken country formed by a portion of their western spurs and valleys. The forests form a most important feature of Akyab district and contain a valuable supply of timber of many kinds. The central part of the district consists of three fertile valleys, watered by the Myu, Koladaing and Lemyu These rivers approach each other at their mouths, and form a vast network of tidal channels, creeks and islands. Their alluvial valleys yield inexhaustible supplies of rice, which the abundant water carriage brings down to the port of Akyab at a very cheap rate. The four chief towns are Khumgchu in the extreme north-east of the district; Kola- daing in the centre; Arakan, farther down the rivers; and Akyab on the coast, where their mouths converge. This dis- trict passed into the hands of the British, together with the rest of Arakan division, at. the close of the first Burmese war of 1825-1826.

Akyab was the metropolitan province of the native kingdom of Arakan, and the history of that country centres in it. In 1 87 1 the frontier or hill tracts of the district were placed under a special administration, with a view to the better government of the wild tribes which inhabit them. (J. G. Sc.)

ALA (from Lat. ala, a wing), a word used technically by analogy with its meaning of ” wing.” In physiology, it means any wing-like process, such as one’ of the lateral cartilages of the nose. In botany, one of the side petals of a papilionaceous corolla, &c. In

architecture, a side apartment or recess of a Roman house (the origin of ” aisle “).

ALABAMA, a southern state of the American Union, situated between 84° 51′ and 88° 31′ W. long, and about 30° 13′ and 35° N. lat., bounded N. by Tennessee, E. by Georgia, S. by Florida and the Gulf of Mexico, and W. by Mississippi. Its total area is 51,998 sq. m., of which 719 are water surface.

Physical Features. — The surface of Alabama in the N. and N.E., embracing about two-fifths of its area, is diversified and picturesque; the remaining portion is occupied by a gently undulating plain having a general incline south-westward toward the Mississippi and the Gulf. Extending entirely across the state of Alabama for about 20 m. S. of its N. boundary, and in the middle stretching 60 m. farther S., is the Cumberland Plateau, or Tennessee Valley region, broken into broad table-lands by the dissection of rivers. In the N. part of this plateau, W. of Jackson county, there are about 1000 sq. m. of level highlands from 700 to 800 ft. above the sea. South of these highlands, occupying a narrow strip on each side of the Tennessee river, is a delightful country of gentle rolling lowlands varying in elevation from 500 to 800 ft. To the N.E. of these highlands and lowlands is a rugged section with steep mountain-sides, deep narrow coves and valleys, and flat mountain-tops. Its elevations range from 400 to 1800 ft. In the remainder of this region, the S. portion, the most prominent feature is Little Mountain, extending about 80 m. from E. to W. between two valleys, and rising precipitously on the N. side 500 ft. above them or 1000 ft. above the sea. Adjoining the Cumberland Plateau region on the S.E. is the Appalachian Valley (locally known as Coosa Valley) region, which is the S. extremity of the great Appalachian Mountain system, and occupies an area within the state of about 8000 sq. m. This is a limestone belt with parallel hard rock ridges left standing by erosion to form mountains. Although the general direction of the mountains, ridges and valleys is N.E. and S.W., irregularity is one of the most prominent characteristics. In the N.E. are several flat-topped mountains, of which Raccoon and Lookout are the most prominent, having a maximum elevation near the Georgia line of little more than 1800 ft. and gradually decreasing in height toward the S.W., where Sand Mountain is a continuation of

Raccoon. South of these the mountains are marked by steep N.W. sides, sharp crests and gently sloping S.E. sides. South-east of the Appa- lachian Valley region, the Piedmont Plateau also crosses the Alabama border from the N.E. and occupies a small triangular- shaped section of which Randolph and Clay counties, together with the N. part of Tallapoosa and Chambers, form the principal portion. Its surface is gently undulating and has an elevation – of about 1000 ft. above the sea. The Piedmont Plateau is a lowland worn down by erosion on hard crystalline rocks, then uplifted to form a plateau. The remainder of the state is occupied by the coastal plain. This is crossed by foot-hills and rolling prairies in the central part of the state, where it has a mean elevation of about 600 ft., becomes lower and more level toward the S.W.,and in the extreme S. is flat and but slightly elevated above the sea. The Cumberland Plateau region is drained to the W.N.W. by the Tennessee river and its tributaries; all other parts of the state are drained to the S.W. In the Appa- lachian Valley region the Coosa is the principal river; and in the Piedmont Plateau, the Tallapoosa. In the Coastal Plain are the Tombigbee in the W., the Alabama (formed by the Coosa and Tallapoosa) in the W. central, and in the E. the Chatta- hoochee, which forms almost half of the Georgia boundary. The Tombigbee and Alabama unite near the S.W. corner of the state, their waters discharging into Mobile Bay by the Mobile and Tensas rivers. The Black Warrior is a considerable stream which joins the Tombigbee from the E. The valleys in the N. and N.E. are usually deep and narrow, but in the Coastal Plain they are broad and in most cases rise in three successive terraces above the stream. The harbour of Mobile was formed by the drowning of the lower part of the valley of the Alabama and Tombigbee rivers as a result of the sinking of the land here, such sinking having occurred on other parts of the Gulf coast.

The fauna and flora of Alabama are similar to those of the Gulf states in general and have no distinctive characteristics.

Climate and Soil. — The climate of Alabama is temperate and fairly uniform. The heat of summer is tempered in the S. by the winds from the Gulf of Mexico, and in the N. by the elevation above the sea. The average annual temperature is highest in the S.W. along the coast, and lowest in the N.E. among the highlands. Thus at Mobile the annual mean is 67° F., the mean for the summer 81°, and for the winter 52°; and at Valley Head, in De Kalb county, the annual mean is 59°, the mean for the summer 75°, and for the winter 41°. At Montgomery, in the central region,

the average annual temperature is 66°, with a winter average of 49°, and a summer average of 81°. The average winter minimum for the entire state is 35°, and there is an average of 35 days in each year in which the thermometer falls below the freezing-point. At extremely rare intervals the thermometer has fallen below zero, as was the case in the remarkable cold wave of the i2th-i3th of February 1899, when an absolute minimum of 17° was registered at Valley Head. The highest temperature ever recorded was 109° in Talladega county in 1902. The amount of precipitation is greatest along the coast (62 in.) and evenly distributed through the rest of the state (about 52 in.). During each winter there is usually one fall of snow in the S. and two in the N.; but the snow quickly dis- appears, and sometimes, during an entire winter, the ground is not covered with snow. Hail-storms occur in the spring and summer, but are seldom destructive. Heavy fogs are rare, and are confined chiefly to the coast. Thunderstorms occur through- out the year, but are most common in the summer. The prevail- ing winds are from the S. As regards its soil, Alabama may be divided into four regions. Extending from the Gulf northward for one hundred and fifty miles is the outer belt of the Coastal Plain, also called the " Timber Belt," whose soil is sandy and poor, but responds well to fertilization. North of this is the inner lowland of the Coastal Plain, or the " Black Prairie," which includes some 13,000 sq. m. and seventeen counties. It receives its name from its soil (weathered from the weak under- lying limestone), which is black in colour, almost destitute of sand and loam, and rich in limestone and marl formations, especially adapted to the production of cotton; hence the region is also called the " Cotton Belt." Between the " Cotton Belt " and the Tennessee Valley is the mineral region, the " Old Land " area — " a region of resistant rocks " — whose soils, also derived from weathering in situ, are of varied fertility, the best coming from the granites, sandstones and limestones, the poorest from the gneisses, schists and slates. North of the mineral region is the " Cereal Belt," embracing the Tennessee Valley and the counties beyond, whose richest soils are the red clays and dark loams of the river valley; north of which are less fertile soils, produced by siliceous and sandstone formations.

Agriculture. — Agriculture is the principal occupation in Alabama, giving employment to 64-5% of the population. The farm acreage in 1900 was 20,685,427 acres (62% of the entire surface of the state), of which 8,654,991 acres (41-8%) were

improved. Under the system of slave labour which existed before i860, the average size of the plantations tended to increase, but since i860 the reverse has been true, the average plantation in i860 being 346 acres, and in 1900 92-7 acres. The average value per acre of farm land was $n-S6 in i860 and $8*67 in 1900. As to method of cultivation, 36-3 percent of the farms were in 1900 managed by the owners, 33-3% by cash renters, 24-4% by share tenants, and the remaining 6% by other methods. The chief product is cotton, cultivated extensively in the ” Black Belt ” and less extensively in the other portions of the state. Cotton has always been the principal source of wealth, the amount of its exports at Mobile increasing from 7000 bales in 181 8 to 25,000 bales in 1821, and the total product of the state in 1840 being double that of 1830. This was accompanied by an ex- tensive employment of slave labour, and from 1820 until i860 the rate of increase of the blacks was greater than that of the whites. The success of the economic system was such that in i860 the cotton crop of Alabama was nearly 1,000,000 bales (989,955 bales), being 18-4% of the entire cotton product of the United States. The disorganization of labour resulting from the

Civil War and the emancipation of slaves, was the cause of a temporary decline in the cotton crop. In 1889 the crop again approximated to 1,000,000 bales (915,210 bales, being 12-2% of the entire crop of the United States), and in 1899 it exceeded that amount, Alabama being fourth among the states of the entire country. The total value of the farm products of Alabama in 1899 was $91,387,409; in 1889, $66,240,190; and in 1879, $56,87 2,994. The average yield per acre has also increased under the system of free labour. In recent years there has been a tendency to diversify crops, Indian corn, wheat and oats being raised extensively in the ” Cereal Belt.” In 1906, according to the Year-Book of the Department of Agriculture, the following were the acreages, yields and values of Alabama’s more import- ant crops (excepting cotton): — Indian corn, 2,990,387 acres, 47,849,392 bushels, $30,623,611; wheat, 98,639 acres, 1,085,029 bushels, $1,019,927; oats, 184,179 acres, 3,167,879 bushels, $1,615,618; hay, 56,350 acres, 109,882 tons, $1,461,431.

Minerals. — The chief feature of Alabama’s industrial life since 1880 has been the exploitation of her iron and coal resources.

The iron ore (found chiefly in the region of which Birmingham is the centre) is primarily red haematite and (much less important) brown haematite; though as regards the latter Alabama ranked first among the states of the Union in 1905 (with 781,561 tons). The total production of all classes of iron ores was 3,782,831 tons in 1905, Alabama ranking third in the Union in this respect. The production of bituminous coal has also increased very rapidly. Coal was first discovered in the state in 1834, and in 1840 the total production was 946 tons; in 1870 it was 13,200 short tons. The real development of the mines began in 1881 and 1882, and the product increased from 420,000 tons in 1881 to 1,568,000 in 1883. By 1890 it had increased to 4,090,409 tons, by 1900 to 8,394,275 tons, and by 1905 to 11,866,069 tons, valued at $14,387,721, making Alabama sixth of the coal- producing states. Nearly 85 % of the coal is produced in three counties (Jefferson, Walker and Bibb), though the coal-bearing formations cover about 40 % of the northern half of the state. Gold, silver, lead, copper, tin and bauxite have also been discovered, but the greater richness of the iron and coal deposits has prevented their development.

Manufactures. — The growth of manufactures in Alabama has beer, as remarkable as the revelation of mineral wealth. In 1880 the capital invested in manufactures was $9,668,008, little more than that ($9,098,181) in i860; by 1890 it had increased to $46,122,571, or377-i %;and in 1900 it amounted to $70,370,081, or 52-6 % more than in 1890. 1 On account of the proximity of coal, iron and limestone, the manufactures of iron and steel are the most extensive. In 1895 it was demonstrated that Alabama pig-iron could be sent to Liverpool and sold cheaper than the English product, and Birmingham (Alabama) came consequently t6 rank next to Middlesborough and Glasgow among the world centres of the pig-iron trade. The pig-iron produced in the state in i860 was valued at $64,590, in 1870 at $210,258, in 1880 at $1,405,356, in 1900 at $13,487,769, and in 1905 at $16,614,577. In the production of foundry pig-iron Alabama held first rank both in 1900 and in 1905. The manufacture of steel, though in its infancy, gave promise of equalling that of iron, and the coke industry is also of growing importance, the product of Alabama during the five years from 1896 to 1901 showing a greater increase, relatively, than that of the other states. In 1 900 the state ranked sixth and in 1905 fifth among the states of the United States in the manufactures of iron and steel. In 1905 the value of the product was 2-7 % of the value of the total iron and

steel product of the country, and 22-6 % of the value of all the state's factory products. In 1900 and in 1905 Alabama ranked second among

1 The special census of manufactures taken in 1905 was confined to manufacturing establishments conducted under the so-called " factory system." According to this census the capital invested was $105,382,859, and the value of products was $109,169,922. The corresponding figures for 1900, if the same standard be taken for purposes of comparison, would be $60,165,904 and $72,109,929. During the five years, therefore, the capital invested in establishments under the factory system increased 75-2 %, and the value of products 51-4 %.

the states of the Union in the production of coke, its product being more than one-tenth of that for the whole country, and more than one-twentieth (5-2 % in 1900; 5-7 % in 1905) of all the factory products of the state. The demand for coke is due to the rapidly growing iron and steel industry. Great possibilities were also shown for the production of lumber and naval stores. Approximately three-fourths of the total area of the state is woodland. In the " Timber Belt " the forests of long leaf pine have an estimated stand of 21,192 million ft.; and in 1905 the product of sawed lumber was valued at $13,563,815. Of this, yellow pine represented $11,320,909, oak $886,746, and poplar $627,686. In the decade 1 890-1 900 the number of turpentine factories increased from 7 to 152, and their product in 1900 and in 1905 ranked Alabama third among the states in that industry. The value of the turpentine and rosin products in 1905 was $2,434,365.

The manufacture of cotton goods has also developed rapidly. As late as 1890 there were only 13 cotton mills in Alabama, one more than the number in 1850; in 1900 there were 31, representing a capital of $11,638,757 and an annual product valued at $8,153,136, an increase of 272-2 % over the product ($2,190,771) of 1890; in 1905 there were 46 establishments, representing a capital of $24,758,049 (an increase of 112-7 % over that of 1900), and having a product (for the year) of $16,760,332, an increase of 105-6 % over that for 1900. To encourage the establishment of cotton mills the legislature of 1896-1897 exempted from taxation during the succeeding ten years all capital that should be invested in the manufacture of cotton, provided that $50,000 or more be invested in buildings and machinery. Other industries of less importance are flour, fertilizers and tanned leather.

Communications. — The navigable mileage of the Alabama rivers is 2000 m., but obstructions often prevent the formation of a continuous route, notably the ” Muscle Shoals ” of the Tennessee, extending from a point 10 m. below Decatur to Florence, a distance of 38 m. To remove or circumvent these impediments, and to improve the Mobile harbour, the United States government spent, between 1870 and 1904, approximately $12,000,000. As the streams in the mineral region are not navigable, the railways are the carriers of its products. 2 Here all the large systems of the southern states find an entrance, the Mobile & Ohio, the Southern (Queen & Crescent Route), the Louisville & Nashville, and the ‘Frisco system affording communication with the Mississippi and the west, and the Southern, Seaboard Air Line, Atlantic Coast Line, and the Central of Georgia forming connexions with northern and Atlantic states. Mobile, the only seaport of the state, has a channel 30 ft. deep, on which the national government spends large sums of money; yet an increasing amount of Alabama cotton is sent to New Orleans for shipment, and Pensacola, Florida, receives much of the lumber.

Population. — In 1880 the inhabitants of Alabama numbered 1,262,505; in 1890, 1,513,017, an increase of 17%; in 1900, 1,828,697, a further increase of 20 . This population is notable for its large proportion of negroes (45-23), its insignificant foreign element (08%), and the small percentage of urban in habitants (10 %). As regards church membership, the Baptists are much the most numerous, followed by the Methodists, the. Roman Catholics and the Presbyterians. In 1900 there were 201 incorporated cities, towns and villages in the state, but of these only nine had a population in excess of 5000, and only three a population in excess of 25,000. These three were Mobile (38,469), Birmingham (38,415), and Montgomery (30,346), the capital of the state. Other important cities, with their populations, were Selma (8713), Anniston (9695), Huntsville (8068), Bessemer (6358), Tuscaloosa (5094), Talladega (5056), Eufaula (4532) and Tuskegee (2170). In 1910 the population was 2,138,093.

Government. — Alabama has been governed under five constitutions, the original constitution of 1819, the revision of 1865, the constitutions of 1868 and 1875, and the present (Constitution, which was framed in 1901. The last has a number of notable provisions. It lengthened the term of service of executive and legislative officials from two to four years, made that of the

2 The railway mileage of the state on the 31st of December 1906 was 4805-58 m.

A

B

87

C

D

85° E

■ /r™.

$y|*>’

SSs

West Poitii

Ipl

°““Sr e ‘T *SvKec

Hˆ

;w3

SfflSsnw

ffteHr ‘

Picker

#*?’ ••’■ 5-Macon fg;’ lmo

f 5 K&tK a “> u:

St?;,

MS

/ˆ

»/”*”

f Gainesville

oHamner£

ˆGeorg.

V.: Irioo ° f NˆLefle,«t 2 \

ˆ Pe <\

Railways..

ALABAMA

Scale, 1:2,100,000

English Miles o 5 10 20 30 40 50

County Seats County Boundaries..

MIssteslpfiiMSMk

Longitude West 86 of Greenwich D

85° B'

GOLF

F

MEXICO

ALABAMA

judiciary six years, provided for quadrennial sessions of the legislature, and introduced the office of lieutenant-governor. The passage of local or special bills by the legislature was prohibited. A provision intended to prevent lobbying is that no one except legislators and the representatives of the press may be admitted to the floor of the House except by unanimous vote. No executive official can succeed himself in office, and the governor cannot be elected or appointed to the United States Senate, or to any state office during his term as governor, or within one year thereafter. Sheriffs whose prisoners suffer mob violence may be impeached. The constitution eliminated the negro from politics

by a suffrage clause which went into effect in 1903. This limits the right to vote to those who can read and write any article of the constitution of the United States, and have worked or been regularly engaged in some lawful employ- ment, business or occupation, trade or calling for the greater part of the twelve months next preceding the time they offer to register, unless prevented from labour or ability to read and write by physical disability, or who own property assessed at $300 upon which the taxes have been paid; but those who have served in the army or navy of the United States or of the Con- federate States in time of war, their lawful descendants in every degree, and persons of good character " who understand the duties and obligations of citizenship under a republican form of government," are relieved from the operation of this law provided they registered prior to the 20th of December 1902. The second of these exceptions is known as the " Grandfather Clause." No man may vote in any election who has not by the 1st of February next preceding that election paid all poll taxes due from bim to the state. In 1902 nine-tenths of the negroes in the state were disqualified from voting. 1 The constitution of 1901 (like that of 1867) and special statutes require separate schools for white and negro children. A " Jim Crow " law was enacted in 1891. Buying, selling or offering to buy or sell a vote has for penalty disfranchisement, and since 1891 the Australian ballot system has been used. The governor, auditor and attorney-general are required to prepare and present to each legislature a general revenue bill, and the secretary of state, with the last two officers, constitute a board of pardons who make recommendations to the governor, who, however, is not bound to follow their advice in the exercise of his pardoning power. State officials are forbidden to accept railway passes from rail- way companies, and individuals are forbidden to receive freight rebates. The constitution of 1901 exempted a homestead of 80 acres of farm land, or of a house and lot not exceeding $2000 in value, from liability for any debt contracted since the 30th of July 1868 except for a mortage on it to which the wife con- sented; personal property to the value of $1000 is exempted. Under the civil code of 1897 the earnings of a wife are her separate property, and it is provided that " no woman, nor any boy under age of twelve years, shall be employed to work or labour in or about any mine in this state." By acts of 1903 child labour under 12 years is forbidden in any factory unless for support of " a widowed mother or aged or disabled father," or unless the child is an indigent orphan; " no child under the age of ten years shall be so employed under any circumstances."

Certificates of children's ages are necessary before a child is employed; false certification is forbidden under penalty of a fine of from $5 to $100 or hard labour not exceeding three months. No child under 13 may do night work at all. No child

1 In Giles v. Harris, 189 U.S. 474, a negro asked that the defendant board of registry be required to enrol his name and the names of other negroes on the registration lists, and that certain sections of the constitution of Alabama be declared void as being contrary to the fourteenth and fifteenth amendments to the federal constitution. The Supreme Court dismissed the bill on the grounds that equity has no jurisdiction over political matters; that, assuming the fraudulent character of the objectionable constitutional provisions, the court was in effect asked to assist in administering a fraud; and that relief " must be given by them [the people of the state] or by the legislative and political departments of the government of the United States." The case attracted much attention; and it is often erroneously said that the court upheld the disfranchising clauses of the Alabama constitution.

under 16 may do more than 48 hours a week of night work. No child of less than 12 is allowed to work more than 66 hours in any one week. An able-bodied parent who does not work when he has the opportunity, unless " idle under strike orders, or lock-outs," and who hires out his minor children, is declared a vagrant and may be fined $500 and imprisoned or sentenced to hard labour for not more than six months.

All amendments to the constitution must be approved by a three-fifths vote of each house of the legislature and then ratified by the people. The legislature of 1900-1901 established a department of archives and history whose aim is to preserve documents and historical records.

Education. — Public education for Mobile was authorized by the legislature of 1826, but it was not provided until 1852. Two years later (1854) a school system for the entire state was in-augurated. Its support was derived from public land given by the United States to the state of Alabama for educational pur- poses in 1819, and special taxes or tuition fixed by each township. The Civil War demoralized the nascent system. An important step in its revival seemed to be made in the constitution of 1868, which forbade any private recompense for instruction in the public schools and appropriated one-fifth of the state's revenue to

common schools. But the attempt to teach whites and blacks in the same schools, and the corruption in the administration of funds, made the results unsatisfactory. The constitution of 1875 abolished the one-fifth revenue provision, made the support of the schools, except that derived from the land grant of 1819, and poll taxes, depend upon the appropriation of the legislature, and established separate schools for whites and black's. Progress has been slow but steady. According to the constitution of 1901 the legislature is required to levy, in addition to the poll tax, an annual tax for education at the rate of 30 to 65 cents on the hundred dollars' worth of property, and practically every county in the state had made in 1906 an appropriation for its schools of a one mill tax on $100. The school fund in 1900 amounted to $1,000,000, an increase of 37 % over the average annual fund of the preceding decade; for the year ending the 30th of September 1907 the amount certified for apportionment by the state was $i',i5o,26i-40, and the total annual expendi- ture was about $1,600,000; in 1906 the school census showed 697,465 children of school age. The legislature of 1907 voted an increase of $300,000 in the appropriation for the common school fund, and granted state-aid for rural school-houses; but its most important work probably was the establishment of county high schools. The rural schools have an annual term of five to seven months only. The percentage of illiterates declined from 50-97 % in. 1880 to 41 % in 1890, and 34%in 1900, when Alabama ranked third among the states in illiteracy.

There are also a number of institutions for higher education in Alabama. The most important of these are the university of Alabama (co-educational — opened in 183 1), at Tuscaloosa, the institution being part of the public school system main- tained by the state; the Alabama Polytechnic Institute at Auburn, a " state college for the benefit of agriculture and the mechanic arts," organized in 1872 according to the United States land grant act for the promotion of industrial education; the Southern University (incorporated 185(1 — Methodist Epis- copal, South), at Greensboro; Howard College (Baptist), at East Lake (Birmingham); Spring Hill College (1830 — Roman Catholic), near Mobile; Talladega College (for negroes), at Talladega; the Tuskegee Normal and Industrial Institute (for negroes), at Tuskegee; and state normal schools at Florence, Jacksonville, Troy and Livingston, and, for negroes, at Mont- gomery, Tuskegee and Normal.

Public Institutions. — Alabama supports various philanthropic

and penal institutions: a home for Confederate veterans, at Mountain Creek; an institution for the deaf, an academy for the blind, and a school for the negro deaf, dumb and blind, all at Talladega; a hospital for the insane, opened in 186c, at Tuscaloosa; a penitentiary, established in 1839, at Wetumpka; and a state industrial school for white boys, at East Lake (Birmingham), and a state industrial school for white girls at Montevallo.

These institutions are managed by trustees who are appointed by the governor. In addition to the usual method of employing convicts in the penitentiary or on state farms, Alabama, like other southern states, also hires its convicts to labour for private individuals. Reports of abuses under this system caused the legislature in 1901 to order a special investigation, the results of which led in 1903 to a new system of leasing to contractors, whereby the prisoners are kept under the direct supervision of state officials. In this same year a system of peonage that had grown up in the state attracted wide attention, and a Federal grand jury at a single term of court indicted a number of men for holding persons as ” peons.” Many similar cases were found later in other southern states, but those in Alabama being the first discovered attracted the most attention. The system came into existence in isolated communities through the connivance of justices of the peace with white farmers. The justices have jurisdiction over petty offences, of which negroes are usually the guilty parties, and the fines imposed would sometimes be paid by a white farmer, who would thus save the accused from imprisonment, but at the same time would require him to sign a contract to repay by his labour the sum advanced. By various devices the labourer would then be kept constantly in debt to his employer and be held in involuntary servitude for an in- definite time. The ” peons ” as a rule were negroes, but a few white ones were found; and in several instances negroes were found holding members of their own race in peonage. A law forbidding under severe penalties a labourer from hiring himself to a second employer without giving notice of a prior contract, and an employer from hiring a labourer known by him to be bound by such a contract, had aided in the development of the system, though it had been enacted for a different purpose. The Federal authorities, as soon as the existence of peonage became known, took active measures to stamp it out, and were supported by the

press and by the leading citizens of the state. Up to 1907 the state licensed the sale of liquor, and liquor licence fees were partly turned over to the public school fund; there was a dispensary system in some counties; and in 1907 one-third of the counties of the state (22 out of 67) were " dry." Besides, saloons had been forbidden within 5 m. of certain churches and school-houses, so that liquor was sold scarcely at all except in incorporated towns, where in many cases local dispensaries were established. In the 1907 state legislature a county local option bill was passed in February, and immediately afterward the Sherrod anti-shipping bill was enacted forbidding the acceptance of liquors for shipment, transportation or delivery to prohibition districts, and penalising the soliciting of orders for liquor in " dry " districts with a punishment of $500 fine and six months' imprisonment with hard labour. In a special session of the legislature in November 1907 a law was passed forbidding the sale of liquor within the state, this prohibition to come into effect on the 1st of January 1909.

Finance. — One-half of the income of the state is derived from general taxes, the other sources of revenue being licences, a special school tax, poll tax and the lease of the convicts. The state debt, for which legislative corruption in the years 1868-1872 was largely responsible, amounte v d on the 1st of October 1906 to $9,057,000. Measures for its refunding, but not for its extinc- tion, have been taken. The constitution of 1901 prohibits the increase of the debt for any other purposes than the suppression of insurrection or resistance to invasion, and the assumption of corporate debts by cities and towns is also restricted. All banks, except national banks, are subject to examination by a public official, and their charters expire within twenty years of their issue.

History. — The first Europeans to enter the limits of the present state of Alabama were Spaniards, who claimed this region as a part of Florida. It is possible that a member of Panfilo de Narvaez's expedition of 1528 entered what is now southern Alabama, but the first fully authenticated visit was that of Hernando de Soto, who made an arduous but fruitless journey along the Coosa, Alabama and Tombigbee rivers in 1539. The English, too, claimed the region north of the Gulf of Mexico, and

the territory of modern Alabama was included in the province of Carolina, granted by Charles II. to certain of his favourites by the charters of 1663 and 1665. English traders of Carolina were

frequenting the valley of the Alabama river as early as 1687. Disregarding these claims, however^the French in 1703 settled on the Mobile river and there erected Fort Louis, which for the next nine years was the seat of government of Louisiana. In 1 71 1 Fort Louis was abandoned to the floods of the river, and on higher ground was built Fort Conde, the germ of the present city of Mobile, and the first permanent white settlement in Alabama. Later, on account of the intrigues of the English traders with the Indians, the French as a means of defence established the military posts of Fort Toulouse, near the junction of the Coosa and Tallapoosa rivers, and Fort Tombecbe on the Tombigbee river. The grant of Georgia to Oglethorpe and his associates in 1732 included a portion of what is now northern Alabama, and in 1739 Oglethorpe himself visited the Creek Indians west of the Chattahoochee river and made a treaty. with them. The peace of Paris, in 1763, terminated the French occupation, and England came into undisputed possession of the region between the Chattahoochee and the Mississippi. The portion of Alabama below the 31st parallel then became a part of West Florida, and the portion north of this fine a part of the " Illinois country," set apart, by royal proclamation, for the use of the Indians. In 1767 the province of West Florida was extended northward to 32 28′ N. lat., and a few years later, during the War for Independence, this region fell into the hands of Spain. By the treaty of Versailles, on the 3rd of September 1783, England ceded West Florida to Spain; but by the treaty of Paris, signed the same day, she ceded to the United States all of this province north of 3 1°, and thus laid the foundation for a long controversy. By the treaty of Madrid, in 1 795, Spain ceded to the United States her claims to the lands east of the Mississippi between 31° and 32° 28′ ; and three years later (1798) this dis- trict was organized by Congress as the Mississippi Territory. A strip of land 12 or 14 m. wide near the present northern bound- ary of Alabama and Mississippi was claimed by South Carolina; but in 1 787 that state ceded this claim to the general government Georgia likewise claimed all the lands between the 31st and 35th parallels from its present western boundary to the Mississippi river, and did not surrender its claim until 1802; two years later the boundaries of the Mississippi Territory were extended so as to include all of the Georgia cession. In 181 2 Congress annexed to the Mississippi Territory the Mobile District of West Florida, claiming that it was included in the Louisiana Purchase; and in the following year General James Wilkinson occupied this district with a military force, the Spanish com- mandant offering no resistance. The

whole area of the present state of Alabama then for the first time became subject to the jurisdiction of the United States. In 181 7 the Mississippi Territory was divided; the western portion became- the state of Mississippi, and the eastern the territory of Alabama, with St Stephens, on the Tombigbee river, as the temporary seat of government. In 1819 Alabama was regularly admitted to the Union as a state.

One of the first problems of the new commonwealth was that of finance. Since the amount of money in circulation was not sufficient to meet the demands of the increasing population, a system of state banks was instituted. State bonds were issued and public lands were sold to secure capital, and the notes of the banks, loaned on security, became a medium of exchange. Prospects of an income from the banks led the legislature of 1836 to abolish all taxation for state purposes. This was hardly done, however, before the panic of 1837 wiped out a large portion of the banks' assets; next came revelations of grossly careless and even of corrupt management, and in 1843 the banks were placed in liquidation. After disposing of all their available assets, the state assumed the remaining liabilities, for which it had pledged its faith and credit, and these form a part ($3,445,000) of its present indebtedness.

The Indian problem was important. With the encroachment of the white settlers upon their hunting-grounds the Creek

Indians began to grow restless, and the great Shawnee chief Tecumseh, who visited them in 1811, fomented their discontent. When the outbreak of the second war with Great Britain in 181 2 gave the Creeks assurance of British aid they rose in arms, massacred several hundred settlers who had taken refuge in Fort Mims, near the junction of the Alabama and Tombigbee rivers, and in a short time no white family in the Creek country was safe outside a palisade. The Chickasaw and Choctaw Indians, however, remained the faithful allies of the whites, and volunteers from Georgia, South Carolina and Tennessee, and later United States troops, marched to the rescue of the threatened settlements. In the campaign that followed the most distinguished services were rendered by General Andrew Jackson, whose vigorous measures broke for ever the power of

the Creek Confederacy. By the treaty of Fort Jackson (9th of August 1 8 14) the Creeks ceded their claims to about one-half of the present state; and cessions by the Cherokees, Chickasaws and Choctaws in 1816 left only about one-fourth of Alabama tc the Indians. In 1832 the national government provided for the removal of the Creeks ; but before the terms of the contract were effected, the state legislature formed the Indian lands into counties, and settlers flocked in. This caused a disagreement between Alabama and the United States authorities; although it was amicably settled, it engendered a feeling that the policy of the national government might not be in harmony with the interests of the state — a feeling which, intensified by the slavery agitation, did much to cause secession in 1861.

The political history of Alabama may be divided into three periods, that prior to i860, the years from i860 to 1876, and the period from 1876 onwards.

The first of these is the only period of altogether healthy political life. Until 1832 there was only one party in the state, the Democratic, but the question of nullification caused a division that year into the (Jackson) Democratic party and the State's Rights (Calhoun Democratic) party; about the same time, also, there arose, chiefly in those counties where the proportion of slaves to freemen was greater and the freemen were most aristocratic, the Whig party. For some time the Whigs were nearly as numerous as the Democrats, but they never secured control of the state government. The State's Rights men were in a minority; nevertheless under their active and persistent leader, William L. Yancey (1814-1863), they prevailed upon the Democrats in 1848 to adopt their most radical views. During the agitation over the introduction of slavery into the territory acquired from Mexico, Yancey induced the Democratic State Convention of 1848 to adopt what is known as the " Alabama Platform," which declared in substance that neither Congress nor the government of a territory had the right to interfere with slavery in a territory, that those who held opposite views were not Democrats, and that the Democrats of Alabama would not support a candidate for the presidency if he did not agree with them on these questions. This platform was endorsed by conventions in Florida and Virginia and by the legislatures of Georgia and Alabama. Old party lines were broken by the Compromise of 1850. The State's Rights party, joined by many Democrats, founded the Southern Rights party, which demanded the repeal of the Compromise, advocated resistance to future

encroachments and prepared for secession, while the Whigs, joined by the remaining Democrats, formed the party known as the " Unionists," which unwillingly accepted the Compromise and denied the " constitutional " right of secession. The " Unionists " were successful in the elections of 1851 and 1852, but the feeling of uncertainty engendered in the south by the passage of the Kansas-Nebraska Bill and the course of the slavery agitation after 1852 led the State Democratic convention of 1856 to revive the " Alabama Platform "; and when the " Alabama Platform " failed to secure the formal approval of the Democratic National convention at Charleston, South Carolina, in i860, the Alabama delegates, followed by those of the other cotton " states," withdrew. Upon the election of Abraham Lincoln, Governor Andrew B. Moore, according to previous instructions of the legislature, called a state convention on the 7th of January

1 86 1. After long debate this convention adopted on the nth of January an ordinance of secession, and Alabama became one of the Confederate states of America, whose government was organized at Montgomery on the 4th of February 1861. Yet secession was opposed by many prominent men, and in North Alabama an attempt was made to organize a neutral state to be called Nickajack; but with President Lincoln's call to arms all opposition to secession ended.

In the early part of the Civil War Alabama was not the scene of military operations, yet the state contributed about 120,000 men to the Confederate service, practically all her white popula- tion capable of bearing arms, and thirty-nine of these attained the rank of general. In 1863 the Federal forces secured a foothold in northern Alabama in spite of the opposition of General Nathan B. Forrest, one of the ablest Confederate cavalry leaders. In 1864 the defences of Mobile were taken by a Federal fleet, but the city held out until April 1865; in the same month Selma also fell.

According to the presidential plan of reorganization, a provi- sional governor for Alabama was appointed in June 1865; a state convention met in September of the same year, and declared the ordinance of secession null and void and slavery abolished; a legislature and a governor were elected in November, the legislature was at once recognized by the National government, and the inauguration of the governor-elect was permitted after the legislature had, in December, ratified the thirteenth amend- ment. But the passage, by the legislature, of vagrancy and apprenticeship laws designed to control the negroes who were

flocking from the plantations to the cities, and its rejection of the fourteenth amendment, so intensified the congressional hostility to the presidential plan that the Alabama senators and representatives were denied their seats in Congress. In 1867 the congressional plan of reconstruction was completed and Alabama was placed under military government. The negroes were now enrolled as voters and large numbers of white citizens were disfranchised. 1 A Black Man's Party, composed of negroes, and political adventurers known as "carpet-baggers," was formed, which co-operated with the Republican party. A constitutional convention, controlled by this element, met in November 1867, and framed a constitution which conferred suffrage on negroes and disfranchised a large class of whites. The Reconstruction Acts of Congress required every new constitution to be ratified by a majority of the legal voters of the state. The whites of Alabama therefore stayed away from the polls, and, after five days of voting, the constitution wanted 13,550 to secure a majority. Congress then enacted that a majority of the votes cast should be sufficient, and thus the constitution went into effect, the state was admitted to the Union in June 1868, and a new governor and legislature were elected.

The next two years are notable for legislative extravagance and corruption. The state endorsed railway bonds at the rate of $12, 000 and $16, 000 a mile until the state debt had increased from eight millions to seventeen millions of dollars, and similar corruption characterized local government. The native white people united, formed a Conservative party and elected a governor and a majority of the lower house of the legislature in 1870; but, as the new administration was largely a failure, in 1872 there was a reaction in favour of the Radicals, a local term applied to the Republican party, and affairs went from bad to worse. In 1874, however, the power of the Radicals was finally broken, the Conservative Democrats electing all state officials. A commission appointed to examine the state debt found it to be $25,503,000; by compromise it was reduced to $15,000,000. A new constitution was adopted in 1875, which omitted the guaranty of the previous constitution that no one should be denied suffrage on account of race, colour or previous condition of servitude, and forbade the state to engage in internal improvements or to give its credit to any private enterprise.

Since 1874 the Democratic party has had constant control of the state administration, the Republicans failing to make nominations for office in 1878 and 1880 and endorsing the ticket

1 The enrolment was 104,518 blacks and 61,295 whites.

of the Greenback party in 1882. The development of mining and manufacturing was accompanied by economic distress among the farming classes, which found expression in the Jeffersonian Democratic party, organized in 1892. The regular Democratic ticket was elected and the new party was then merged into the Populist party. In 1894 the Republicans united with the Populists, elected three congressional repre- sentatives, secured control of many of the counties, but failed to carry the state, and continued their opposition with less success in the next campaigns. Partisanship became intense, and charges of corruption of the ignorant negro electorate were made. Consequently after division on the subject among the Democrats themselves, as well as opposition of Republicans and Populists, a new constitution with restrictions on suffrage was adopted in 1901.

The following is a list of the territorial and state governors of Alabama : —

Governor of the Territory. William Wyatt Bibb . . .1 1817-1819 I Governors of the State.

William Wyatt Bibb . . . 1819-1820 Democrat.

Thomas Bibb 1

Israel Pickens

John Murphy

Gabriel Moore^

Samuel B. Moore

John Gayle

Clement C. Clay

Hugh M'Vay 2

Arthur P. Bagby

Benjamin Fitzpatrick 3

Joshua L. Martin .

Reuben Chapman

Henry W. Collier

John A. Winston

Andrew B. Moore

John Gill Shorter

Thomas H. Watts

Lewis E. Parsons

Robert M. Patton Wager Swayne

William H. Smith Robert B. Lindsay David P. Lewis George S. Houston Rufus W. Cobb . Edward A. O'Neal Thomas Seay Thomas G. Jones William C. Oates . Joseph F. Johnston William J. Samford William D. Jelks . B. B. Comer

1819-1820 1820-1821 1821-1825 1825-1829 1 829-1 83 1

1831 1831-1835 1835-1837

1837 1837-1841 1841-1845 1845-1847 1847-1849 1849-1853

1853-1857 1857-1861 1861-1863 1 863-1 865 1865

1 865-1 867 1867-1868

1868-1870 1870-1872 1872-1874 1874-1878 1878-1882 1882-1886 1886-1890 1 890- 1 894 1894-1896 1 896- 1 900 1900-1901 1901-1907 1907

Provisional

Governor.

Republican.

Military

Governor. Republican.

Democrat. Republican.

Democrat.

Bibliography. — For an elaborate bibliography of Alabama (by Thomas M. Owen) see the Annual Report of the American Historical Association for 1897 (Washington, 1898).

Information regarding the resources, climate, population and industries of Alabama may be found in the reports of the United States Census, and in the publications of the United States Depart- ment of Agriculture, the United States Geological Survey, the Bulletins of the Alabama Agricultural Experiment Station (published at Auburn, from 1888), the Bulletins and Reports of the Alabama Geological Survey (published at Tuscaloosa and Montgomery), and in the following works: — B. F. Riley's Alabama As It Is (Mont- gomery, 1893), and Saffold Berney's Handbook of Alabama (2nd ed., Birmingham, 1892).

Information concerning the history of the state may be obtained in William G. Brown's History of Alabama (New York, 1900) ; Newton W. Bates's History and Civil Government of Alabama (Flor- ence, Ala., 1892) ; Willis Brewer's Alabama: Her History, Resources, War Record and Public Men (Montgomery, 1872) ; A. Davis Smith's and T. A. Deland's Northern Alabama, Historical and Biographical

1 William Wyatt Bibb died in 1820, and Thomas Bibb, then president of the state senate, filled the unexpired term of one year

(1820).

' In 1837 Governor Clay was elected United States Senator, and Hugh M'Vay, the president of the state senate, filled the unexpired term.

- Until 1845 the term of state officials was one year; from then until 1 90 1 it was two years; since 1 90 1 it has been four years.

(Birmingham, 1888); Albert J. Pickett's History of Alabama (5th ed., 2 vols., Birmingham-, Ala., 1900), which contains a valuable compilation of the " Annals of Alabama from 1819 to 1900," by Thomas M. Owen; and Walter L. Fleming's Civil War and Reconstruction in Alabama (New York, 1905).

In addition, W. G. Clark's History of Education in Alabama (Washington, 1889) ; W. E. Martin's Internal Improvements in Alabama (Baltimore, 1902 ; Johns Hopkins University Studies, series 20, No. 4) ; and W. L. Martin's Code of Alabama (2 vols., Atlanta, Ga., 1897) may be consulted.

Information concerning the aboriginal remains in the state may be found in two papers by Clarence B. Moore, " Certain Aboriginal Remains of the Tombigbee River ' ' and ' ' Certain Aboriginal Remains of the Alabama River," published in the Journal of the Academy of Natural Sciences, series 2, vol. ii. (Philadelphia, 1900).

"ALABAMA" ARBITRATION.— This is one of those arbi- trations on pecuniary claims, made by one state, on behalf of its subjects, against another state, which are referred to in the article Arbitration, International. The case is important, both from a historical and a juridical point of view, and affords a conspicuous example of the value of arbitration as a means of averting war. The facts are as follows: —

In 1 86 1 the Southern States of North America seceded from the rest on the slavery question and set up a separate government under President Jefferson Davis. Hostilities began with the capture of Fort Sumter by the Confederates on the 13th of April 1861. On the 19th of April President Abraham Lincoln declared a blockade of the southern ports. On the 14th of May the British government issued a proclamation of neutrality, by which the Confederates were recognized as belligerents. This example was followed shortly afterwards by France and other nations. The blockade of the southern ports was not at first effective, and blockade-running soon became an active industry. The Confederates established agencies in England for the purchase of arms, which they despatched in ordinary merchant vessels to the Bahamas, whence they were transhipped into fast steamers especially constructed for the purpose.

In June 1862 the vessel, the " Alabama," originally known as " No. 290," was being built by Messrs. Laird at Birkenhead. She

was then hearly completed and was obviously intended for a man-of-war. On the 23rd of June Mr C. F. Adams forwarded, to Earl Russell a letter from the United States consul at Liverpool giving certain particulars as to her character. This letter was laid before the law officers, who advised that, if these particulars were correct, the vessel ought to be detained. On the 21st of July sworn evidence, which was supplemented on the 23rd of Juiy, was obtained and laid before the commissioners of customs (who were the proper authorities to enforce the provisions of the Foreign Enlistment Act of 1819), but they declined to move. On the 23rd of July the same evidence was laid before the law officers, who advised that there was sufficient ground for detention. By some accident, which has never been satisfactorily explained, but was probably connected with the severe illness of Sir John Harding, the queen's advocate, the papers were not returned till the 29th of July. Instructions were then issued to seize the vessel, but she had already sailed on the evening of the 28th. Although she remained for two days off the coast of Anglesey, there was no serious attempt at pursuit. She afterwards made her way to the Azores, where she received her armament, which was brought from Liverpool in two British ships. Captain Semmes there took command of her under a commission from the Confederate government. After a most destructive career she was sunk off Cherbourg by the " Kearsarge " on the 19th of June 1864.

On these facts the United States government alleged against Great Britain two grievances, or sets of grievances. The first was the recognition of the Southern States as belligerents and a general manifestation of unfriendliness in other ways. The second was in respect of breaches of neutrality in allowing the " Alabama," the " Florida " (originally the " Oreto "), the " Shenandoah " and other Confederate vessels to be built and equipped on British territory. Correspondence ensued extending over several years. At length in February 187 1 a commission was appointed to sit at Washington in order, if possible, to arrive at some common understanding as to the mode in which the

questions at issue might be settled. With respect to the "Alabama" claims the British commissioners suggested that they should be submitted to arbitration. The American commissioners

refused ” unless the principles which should govern the arbitrators in the consideration of the facts could be first agreed upon.” After some discussion the British commissioners consented that the three following rules should apply. A neutral government is bound — (1) to use due diligence to prevent the fitting out, arming or equipping within its jurisdiction of any vessel, which it has reasonable ground to believe is intended to cruise or to carry on war against a power with which it is at peace, and also to use like diligence to prevent the departure from its jurisdiction of any vessel intended to cruise or carry on war as above, such vessel having been specially adapted, in whole or in part, within such jurisdiction, to warlike use; (2) not to permit or suffer either belligerent to make use of its ports or waters as the base of naval operations against the other, or for the purpose of the renewal or augmentation of military supplies or arms or the recruitment of men; (3) to exercise due diligence in its own ports and waters, and as to all persons within its jurisdiction to prevent any violation of the foregoing obligation and duties. The ar- rangements made by the commission were embodied in the treaty of Washington, which was signed on the 8th of May 1871, and approved by the Senate on the 24th of May. Article 1, after expressing the regret felt by Her Majesty’s government for the escape, in whatever circumstances, of the “Alabama” and other vessels from British ports, and for the depredations committed by these vessels, provided that ” the claims growing out of the acts of the said vessels, and generically known as the ‘ Alabama ‘ claims ” should be referred to a tribunal composed of five arbi- trators, one to be named by each of the contracting parties and the remaining three by the king of Italy, the president of the Swiss Confederation and the emperor of Brazil respectively. By Article 2 all questions submitted were to be decided by a majority of the arbitrators, and each of the contracting parties was to name one person to attend as agent. Article 6 provided that the arbitrators should be governed by the three rules quoted above, and by such principles of international law not inconsistent therewith as the arbitrators should determine to be applicable to the case. By the same article the parties agreed to observe these rules as between themselves in future, and to bring them to the knowledge of other maritime powers. Article 7 provided that the decision should be made within three months from the close of the argument, and gave power to the arbitrators to award a sum in gross in the event of Great Britain being adjudged to be in the wrong.

The treaty was, on the whole, welcomed in England. The United States appointed Mr C. F. Adams as arbitrator and Mr J. C. Bancroft Davis as agent. The British government appointed Sir Alexander Cockburn as arbitrator and Lord Tenterden as agent. The arbitrators appointed by the three neutral powers were Count Sclopis (Italy), M. Staempfli (Switzerland), Baron d'ltajuba (Brazil). The first meeting of the tribunal took place' on the 15th of December 1871 in the Hotel de Ville, Geneva. As soon as the cases had been formally presented, the tribunal adjourned till the following June. There followed immediately a controversy which threatened the collapse of the arbitration. It was found that in the American case damages were claimed not only for the property destroyed by the Confederate cruisers, but in respect of certain other matters known as " indirect losses," viz. the transference of the American marine to the British flag, the enhanced payments of insurance, the expenses of pursuit and the prolongation of the war. But this was not all. The American case revived the charges of " insincere neutrality "and " veiled hostility " which had figured in the diplomatic correspondence, and had been repudiated by Great Britain. It dwelt at length upon such topics as the premature recognition of belligerency, the unfriendly utterances of British politicians and the material assistance afforded to the Confederates by British traders. The inclusion of the indirect losses and the other matters just referred to caused great excitement in England. That they were within the treaty was disputed, and it was argued that, if they were, the

treaty should be amended or denounced. In October 1872 Lord Granville notified to General Schenck, the United States minister, that the British government did not consider that the indirect losses were within the submission, and in April the British counter-case was filed without prejudice to this contention. On the 15th of June the tribunal reassembled and the American argument was filed. The British agent then applied for an adjournment of eight months, ostensibly in order that the two governments might conclude a supplemental convention, it having been meanwhile privately arranged between the arbitrators that an extra-judicial declaration should be obtained from the arbitrators on the subject of the direct claims. On the 19th of June Count Sclopis intimated on behalf of all his colleagues that, without intending to express any opinion upon the interpretation of the treaty, they had arrived at the conclusion that " the indirect claims did not constitute upon the principles of international law applicable to such cases a good foundation for

an award or computation of damages between nations." In consequence of this intimation Mr Bancroft Davis informed the tribunal on the 25th of June that he was instructed not to press those claims; and accordingly on the 27th of June Lord Tenterden withdrew his application for an adjournment, and the arbitration was allowed to proceed. The discussion turned mainly on the question of the measure of " due diligence." The United States contended that it must be a diligence commen- surate with the emergency or with the magnitude of the results of negligence. The British government maintained that while the measure of care which a government is bound to use in such cases must be dependent more or less upon circumstances, it would be unreasonable to require that it should exceed that which the governments of civilized states were accustomed to employ in matters concerning their own security or that of their citizens.

The tribunal adopted the view suggested by the United States. It found that Great Britain was legally responsible for all the depredations of the " Alabama " and " Florida " and for those committed by the " Shenandoah " after she left Melbourne. In the case of the " Alabama " the court was unanimous; in the case of the " Florida " Sir A. Cockburn alone, in that of the " Shenandoah " he and Baron d'ltajuba, dissented from the majority. In the cases of the other vessels the judgment was in favour of Great Britain. The tribunal decided to award a sum in gross, and (Sir A. Cockburn again dissenting) fixed the damage's at $15,500,000 in gold. On the 14th of September the award was formally published, and signed by all the arbi- trators except Sir A. Cockburn, who filed a lengthy statement of his reasons.

The stipulation that the three rules should be jointly sub- mitted by the two powers to foreign nations has never been carried out. For this the British government has been blamed by some. But the general view of continental publicists is, that the language of the rules was not sufficiently precise to admit of their being generally accepted as a canon of neutral obligations. (M. H. C.)

ALABAMA RIVER, a river of Alabama, U.S.A., formed by the Tallapoosa and Coosa rivers, which unite about 6 m. above Montgomery. It flows W. as far as Selma, then S.W. until, about 45 m. from Mobile, it unites with the Tombigbee to form the Mobile and Tensas rivers, which discharge into Mobile Bay. The course of the Alabama is tortuous; its width varies from 200 to 300 yds., its depth from 3 to 7 ft.; its length by the United States

Survey is 312 m., by steamboat measurement, 420 m. The river crosses the richest agricultural and timber districts of the state, and railways connect it with the mineral regions of north central Alabama. The principal tributary of the Alabama is the Cahaba (about 200 m. long), which enters it about 10 m. below Selma. Of the rivers which form the Ala- bama, the Coosa crosses the mineral region of Alabama, and is navigable for light-draft boats from Rome, Georgia (where it is formed by the junction of the Oostenaula and Etowah rivers), to about 117 m. above Wetumpka (about 192 m. below Rome and 26 m. below Greensport), and from Wetumpka to its junction

with the Tallapoosa; the channel of the river has been consider- ably improved by the Federal government. The navigation of the Tallapoosa river (which has its source in Paulding county, Georgia, and is about 250 m. long) is prevented by shoals and a 60-ft. fall at Tallassee, a few miles N. of its junction with the Coosa. The Alabama is navigable throughout the year. In 1878 the Federal government undertook to make a channel the length of the Alabama 200 ft. wide and 4 ft. deep; an amend- ment in 1891 provided for a 6-ft. channel at low water, and in June 1007 this work was reported as ” 10% completed” at an expenditure of $303,659. The Mobile river is navigable for vessels of about 14 ft. draft. The Alabama is an important carrier of cotton, cotton seed, fertilizer, cereals, lumber, naval stores, &c; and in the fiscal year 1906-1907 the freight tonnage was 417,(ˆ1 tons.

ALABASTER, or Arblastier, WILLIAM (1567-1640), English Latin poet and scholar, was born at Hadleigh, Suffolk, in 1567. He was, so Fuller states, a nephew by marriage of Dr John Still, bishop of Bath and Wells. His surname, some- times written Arblastier, is one of the many variants of arbalester, a cross-bowman. Alabaster was educated at Westminster school, and entered Trinity College, Cambridge, in 1583. He became a fellow, and in 1592 was incorporated of the university of Oxford. About 1 592 he produced at Trinity College his Latin tragedy of Roxana. 1 It is modelled on the tragedies of Seneca, and is a stiff and spiritless work. Fuller and Anthony a. Wood bestowed exaggerated praise on it,while Samuel Johnson regarded it as the only Latin verse worthy of notice produced in England before Milton’s elegies. Roxana is founded on the La Dalida (Venice, 1567) of Luigi Groto,

known as Cieco di Hadria, and Hallam asserts that it is a plagiarism {Literature of Europe, iii. 54). A surreptitious edition in 1632 was followed by an author- ized version a plagiarii unguibus vindicata, aucta et agnita ab Authore, Gulielmo Alabastro. . One book of an epic poem in Latin hexameters, in honour of Queen Elizabeth, is preserved in MS. in the library of Emmanuel College, Cambridge. This poem, Elisaeis, Apotheosis poetica, Spenser highly esteemed. " Who lives that can match that heroick song?" he says in Colin Clout's come home againe, and begs " Cynthia " to withdraw the poet from his obscurity. In June 1596 Alabaster sailed with Robert Devereux, earl of Essex, on the expedition to Cadiz in the capacity of chaplain, and, while he was in Spain, he became a Roman Catholic. An account of his change of faith is given in an obscurely worded sonnet contained in a MS. copy of Divine Meditations, by Mr Alabaster (see J. P. Collier, Hist, of Eng. Dram. Poetry, ii. 341). He defended his conversion in a pamphlet, Seven Motives, of which no copy is extant. The proof of its publication only remains in two tracts, A Booke of the Seuen Planets, or Seuen wandring motives of William Alablaster's (sic) wit . . . , by John Racster (1598), and An Answer to William Alabaster, his Motives, by Roger Fen ton (1599). From these it appears that Alabaster was imprisoned for his change of faith in the Tower of London during 1598 and 1599. In 1607 he published at Antwerp Apparatus in Revelationem Jesu Christi, in which his study of the Kabbalah was turned to account in a mystical interpretation of scripture which drew down the censure alike of Protestants and Catholics. The book was placed on the Index librorum prohibitorum at Rome early in 1610. Alabaster says in the preface to his Ecce sponsus venit (1633), a treatise on the time of the second advent of Christ, that he went to Rome and was there imprisoned by the Inquisition, but succeeded in escaping to England and again embraced the Protestant faith. He received a prebend in St Paul's cathedral, London, and the living of Therfield, Hertfordshire. He died in 1640. Alabaster's other cabalistic writings are Commentarius de Bestia Apoca- lyptica (1621) and Spiraculum tubarum . . . . (1633), a mystical interpretation of the Pentateuch. It was by these theological writings that he won the praise of Robert Herrick, who calls him " the triumph of the day " and the "one only glory of a million"

1 For an analysis of the play see an article on the Latin university plays in the Jahrbuch der Deutschen Shakespeare Gesellschaft (Weimar

1898).

(” To Doctor Alabaster ” in Hesperides, 1648). He also published (1637) Lexicon Pentaglotton, Hebraicum, Chaldaicum, Syriacum, Talmudico-Rabbinicon et Arabicum.

See T. Fuller, Worthies of England (ii. 343) ; J. P. Collier, Bibl. and Crit. Account of the Rarest Books in the English Language (vol. i. 1865) ; Pierre Bayle, Dictionary, Historical and Critical (ed. London, 1734) ; also the Athenaeum (December 26, 1903), where Mr Bertram Dobell describes a MS. in his possessioncontaining forty-three sonnets by Alabaster.

ALABASTER, a name applied to two distinct mineral sub- stances, the one a hydrous sulphate of lime and the other a carbonate of lime. The former is the alabaster of the present day, the latter is generally the alabaster of the ancients. The two kinds are readily distinguished from each other by their relative hardness. The modern alabaster is so soft as to be readily scratched even by the finger-nail (hardness = 1 • 5 to 2), whilst the stone called alabaster by the ancients is too hard to be scratched in this way (hardness = 3), though it yields readily to a knife. Moreover, the ancient alabaster, being a carbonate, effervesces on being touched with hydrochloric acid, whereas tht modern alabaster when so treated remains practically unaffected.

Ancient Alabaster. — This substance, the ” alabaster ” of scrip- ture, is often termed Oriental alabaster, since the early examples came from the East. The Greek name aKafiacrTpLTris is said to be derived from the town of Alabastron, in Egypt, where the stone was quarried, but the locality probably owed its name to the mineral; the origin of the mineral-name is obscure, and it has been suggested that it may have had an Arabic origin. The Oriental alabaster was highly esteemed for making small perfume-bottles or ointment vases called alabastra; and this has been conjectured to be a possible source of the name. Ala- baster was also employed in Egypt for Canopic jars and various other sacred and sepulchral objects. A splendid sarcophagus, sculptured in a single block of translucent Oriental alabaster from Alabastron, is in the Soane Museum, London. This was discovered by Giovanni Belzoni, in 1817, in the tomb of Seti I., near Thebes, and was purchased by Sir John Soane, having previously been offered to the British Museum for £2000.

Oriental alabaster is either a stalagmitic deposit, from the floor

and walls of limestone-caverns, or a kind of travertine, deposited from springs of calcareous water. Its deposition in successive layers gives rise to the banded appearance which the marble often shows on cross-section, whence it is known as onyx-marble or alabaster-onyx, or sometimes simply as onyx — a term which should, however, be restricted to a siliceous mineral. The Egyptian alabaster has been extensively worked near Suef and near Assiut; there are many ancient quarries in the hills overlooking the plain of Tell el Amarna. The Algerian onyx-marble has been largely quarried in the province of Oran. In Mexico there are famous deposits of a delicate green variety at La Pedrara, in the district of Tecali, near Puebla. Onyx-marble occurs also in the district of Tehuacan and at several localities in California, Arizona, Utah, Colorado and Virginia.

Modern Alabaster. — When the term “alabaster” is used without any qualification it invariably means, at the present day, a finely granular variety of gypsum (q.v.). This mineral, or alabaster proper, occurs in England in the Keuper marls of the Midlands, especially at Chellaston in Derbyshire, at Fauld in Staffordshire and near Newark in Nottinghamshire. At all these localities it has been extensively worked. It is also found, though in subordinate quantity, at Watchet in Somersetshire, near Penarth in Glamorganshire, and elsewhere. In Cumberland and Westmorland it occurs largely in the New Red rocks, but at a lower geological horizon. The alabaster of Nottingham- shire and Derbyshire is found in thick nodular beds or ” floors,” in spheroidal masses known as ” balls ” or ” bowls,” and in smaller lenticular masses termed ” cakes.” At Chellaston, where the alabaster is known as ” Patrick,” it has been worked into ornaments under the name of ” Derbyshire spar ” — a term applied also to fluor-spar. The finer kinds of alabaster are largely employed as an ornamental stone, especially for ecclesi- astical decoration, and for the walls of staircases and halls. Its softness enables it to be readily carved into elaborate forms,

but its solubility in water renders it inapplicable to outdoor work. The purest alabaster is a snow-white material of fine uniform grain, but it is often associated with oxide of iron, which produces brown clouding and veining in the stone. The coarser varieties of alabaster are converted by calcination into plaster of

Paris, whence they are sometimes known as ” plaster stone.”

On the continent of Europe the centre of the alabaster trade is Florence. The Tuscan alabaster occurs in nodular masses, embedded in limestone, interstratified with marls of Miocene and Pliocene age. The mineral is largely worked, by means of underground galleries, in the district of Volterra. Several varieties are recognized— veined, spotted, clouded, agatiform, &c. The finest kind, obtained principally from Castelliria, is sent to Florence for figure-sculpture, whilst the common kinds are carved locally, at a very cheap rate, into vases, clock-cases and various ornamental objects, in which a large trade is carried on, especially in Florence, Pisa and Leghorn. In order to diminish the translucency of the alabaster and to produce an opacity suggestive of true marble, the statues are immersed in a bath of water and gradually heated nearly to the boiling- point — an operation requiring great care, for if the temperature be not carefully regulated, the stone acquires a dead-white chalky appearance. The effect of heating appears to be a partial dehydration of the gypsum. If properly treated, it very closely resembles true marble, and is known as marmo di Castellina. It should be noted that sulphate of lime (gypsum) was used also by the ancients, and was employed, for instance, in Assyrian sculpture, so that some of the ancient alabaster is identical with the modern stone.

Alabaster may be stained by digesting it, after being heated, in various pigmentary solutions; and in this way a good imita- tion of coral has been produced (alabaster coral).

See M. Carmichael, Report on the Volterra Alabaster Industry, Foreign Office, Miscellaneous Series, No. 352 (London, 189O ; A. T. Metcalfe, ” The Gypsum Deposits of Nottingham and Derbyshire,” Transactions of the Federated Institution, vol. xii. (1896), p. 107; J. G. Goodchild, ” The Natural History of Gypsum,”, Proceedings of the Geologists’ Association, vol. x. (1888), p. 425; George P. Merrill, ” The Onyx Marbles,” Report of the U. S. National Museum for 1893, p. 539- (F.W. R.*)

ALACOQDE, or Al Coq, MARGUERITE MARIE (1647-1600), French nun and mystic, was born at Lauthecourt, a village in the diocese of Autun, on the 22nd of July 1647. She would seem to have been from the first of a morbid and unhealthy temperament, and before “the age of thirteen was the subject of a paralytic seizure. Having been cured of this, as. she believed, by the intercession of

the Holy Virgin, she changed her name to Marie and vowed to devote her life to her service. In May 1671 she entered the Visitation convent at Paray-le-Monial, in the diocese of Autun, and took the final vows in November 1672. Though her reading was confined to the lives of the saints, she taught in the school kept by the nuns for the girls of the neighbourhood, to whom she endeared herself by her kindly disposition. The appalling austerities, however, to which she was allowed to subject herself quickly affected her mental and bodily health. Hallucinations, to which she had been always subject, became more and more frequent. She conceived herself to be specially favoured by Christ, who appeared to her in the most extravagant forms. At last, by dint of fasting and lacerating her flesh, she succeeded in reducing herself to such a state of ecstatic suffer- ing that she believed herself to be undergoing in her own person the Passion of the Lord. Her reward was the; supreme vision in which Christ revealed to her His heart burning with divine love, and even, so she affirmed, exchanged it with hers, at the same time bidding her establish, on the Friday following, the feast of Corpus Christi, a festival in honour of His Sacred Heart. It was not till ten years later, in 1685, that the festival was first cele- brated at Paray, and not till after the death of Marguerite, on the 17th of October 1690, that the cult of the Sacred Heart, fostered by the Jesuits and the subject of violent controversies within the church, spread throughout France and Christendom. (See Sacred Heart.)

Marguerite Alacoque was beatified by Pius IX. in 1864. Her

short devotional writing, La DSvotion au Sacri-Cceur de Jisus, was published by J. Croiset in 1698, and is now very popular among Roman Catholics.

See Bishop Languet, Vie de la venerable Marguerite- Marie (Paris, 1724), translated and edited by F. W. Faber (1847) ; Mgr. Bougaud, Histoire de la bienheureuse Marguerite-Marie (Paris, 1874); G. Tickell, S.J., The Life of Blessed Margaret Mary Alacoque, with some account of the devotion to the Sacred Heart (London, 1869) ; J. B. H. R. Capefigue, Marie Marguerite Al-Coq (Paris, 1866).

ALAGOAS, a maritime state of Brazil, bounded N. and W. by the state of Pernambuco, S. and W. by the state of Sergipe, and E. by the Atlantic. It has an area of 22,584 sq. m. A dry, semi- barren plateau, fit for grazing only, extends across the W. part of the state, breaking down into long fertile valleys and wooded ridges

towards the coast, giving the country a mountainous character. The coastal plain is filled with lakes (lagoas), in some cases formed by the blocking up of river outlets by beach sands. The valleys and slopes are highly fertile and produce sugar, cotton, tobacco, Indian corn, rice, mandioca and fruits. Hides and skins, mangabeira rubber, cabinet woods, castor beans and rum are also exported. Cattle-raising was formerly a prominent industry, but it has greatly declined. Manufactures have been developed to a limited extent only, though protective tariff laws have been adopted for their encouragement. The climate is hot and humid, and fevers are prevalent in the hot season. The capital, Maceio, is the chief commercial city of the state, and its port (Jaragua) has a large foreign and coastwise trade. The principal towns are Alagoas, formerly the capital, picturesquely situated on Lake Manguaba, 15 m. S.W. of Maceio, and Penedo, a small port on the lower Sao Francisco, 26 m. above the river's mouth. Before 1817 Alagoas formed part of the capitania of Pernambuco, but in that year the district was rewarded with a separate government for refusing to join a revolution, and in 1823 became a province of the empire. The advent of the republic in 1889 changed the province into a state.

ALAIN DE LILLE [Alanus de Insults] (c. 1128-1202), French theologian and poet, was born, probably at Lille, some years before 1 1 28. Little is known of his life. He seems to have taught in the schools of Paris,, and he attended the Lateran Council in 1 179. He afterwards inhabited Montpellier (he is sometimes called Alanus de Montepessulano) , lived for a time outside the walls of any cloister, and finally retired to Citeaux, where he died in 1 202. He had a very widespread reputation during his lifetime and his knowledge, more varied than profound, caused him to be called Doctor universalis. Among his very numerous works two poems entitle him to a distinguished place in the Latin literature of the middle ages; one of these, the De planclu naturae, is an ingenious satire on the vices of humanity; the other, the Anti-claudianus, a treatise on morals, the form of which recalls the pamphlet of Claudian against Rufinus, is agreeably versified and relatively pure in its latinity. As a theologian Alain de Lille shared in the mystic reaction of the second half of the 12th century against the scholastic philosophy. His mysticism, how-ever, is far from being as absolute as that of the Victorines. In the Anticlaudianus he sums up as follows: Reason, guided by prudence, can unaided discover most of the truths of the physical order; for the apprehension of religious truths it must trust to

faith. This rule is completed in his treatise, Ars catholicae fidei, as follows: Theology itself may be demonstrated by reason. Alain even ventures an immediate application of this principle, and tries to prove geometrically the dogmas defined in the Creed. This bold attempt is entirely factitious and verbal, and it is only his employment of various terms not generally used in such a connexion (axiom, theorem, corollary, etc.) that gives his treatise its apparent originality. Alain de Lille has often been confounded with other persons named Alain, in particular with Alain, archbishop of Auxerre; Alan, abbot of Tewkesbury, Alain de Podio, etc. Certain facts of their lives have been attributed to him, as well as some of their works: thus the Life of St Bernard should be ascribed to Alain of Auxerre and the Commentary upon Merlin to Alan of Tewkesbury. Neither is the philosopher of Lille the author of a Memoriale rerunt difficilium, published under his name; and it is exceedingly doubtful whether the Dicta

Alani de lapide philosophico really issued from his pen. On the other hand, it now seems practically demonstrated that Alain de Lille was the author of the Ars catholicae fidei and the treatise Contra haereticos.

The works of Alain de Lille have been published by Migne, Patrologia latina, vol. ccx. A critical edition of the Anticlaudianus and of the De planctu naturae is given by Th. Wright in vol. ii. of the Anglo-Latin Satirical Poets and Epigrammatists of the Twelfth Century (London, 1872). See Haureau, Mimoire sur la vie et quelques ozuvres a" Alain de Lille (Paris, 1885); M. Baumgartner, Die Philosophie des Alanus de Insulis (Miinster, 1896). • (P. A.)

ALMS, a town of southern France, capital of an arrondisse- ment in the department of Gard, 25 m. N.N.W. of Nimes on the Paris-Lyon railway, on which it is an important junction. Pop. (1906) 18,987. The town is situated at the foot of the Cevennes, on the left bank of the Gardon, which half surrounds it. The streets are wide and its promenades and fine plane-trees make the town attractive; but the public buildings, the chief of which are the church of St Jean, a heavy building of the 18th century, and the citadel, which serves as barracks and prison, are of small interest. Pasteur prosecuted his investigations into the silk- worm disease at Alais, and the town has dedicated a bust to his

memory. There is also a statue of the chemist J. B. Dumas. Alais has tribunals of first instance and of commerce, a board of trade-arbitrators, a lycee and a school of mines. The town is one of the most important markets for raw silk and cocoons in the south of France, and the Gardon supplies power to numerous silk- mills. It is also the centre of a mineral field, which yields large quantities of coal, iron, zinc and lead; its blast-furnaces, foundries, glass-works and engineering works afford employment to many workmen.

In the 16th century Alais was an important Huguenot centre. In 1629 the town was taken by Louis XIII. , and by the peace of Alais the Huguenots gave up their right to places de surete (garrison towns) and other privileges. A bishopric was established there in 1694 but suppressed in 1790.

ALAJUELA, the capital of the province of Alajuela, in Costa Rica, Central America, on the transcontinental railway, 15 m. W. of San Jose. Pop. (1904) 4860. Alajuela is built at the southern base of the volcano of Poas (8895 ft.) and overlooks the fertile plateau of San Jose. Its central square, adorned with a handsome bronze fountain, contains the municipal buildings, and a large but unattractive cathedral. The town covers a considerable area; the detached white houses of its suburbs are surrounded by trees and flowering shrubs. Alajuela is the centre of the Costa Rican sugar trade, and an important market for coffee. Its products are exported from Puntarenas, on the Pacific Ocean, 32 m. W. The province of Alajuela includes the territory of the Guatusos Indians, along the northern frontier; the towns of Atenas, Grecia, Naranjo and San Ramon (all with less than 5000 inhabitants), and the gold-mines of Aguacate, a little north of Atenas.

ALAMANNI, or Allemanni, a German tribe, first mentioned by Dio Cassius, under the year 213. They apparently dwelt in the basin of the Maine, to the south of the Chatti. According to Asinius Quadratus their name indicates that they were a conglomeration of various tribes. There can be little doubt, however, that the ancient Hermunduri formed the preponder- ating element in the nation. Among the other elements may be mentioned the Juthungi, Bucinobantes, Lentienses, and perhaps the Armalausi. From the 4th century onwards we hear also of the Suebi or Suabi. The Hermunduri had apparently be- longed to the Suebi, but it is likely enough that reinforcements from new Suebic tribes had now moved westward. In later times the names Alamanni and Suebi seem to be synonymous. The tribe was continually engaged

in conflicts with the Romans, the most famous encounter being that at Strassburg, in which they were defeated by Julian, afterwards emperor, in the year 3S7, when their king Chonodomarius was taken prisoner. Early in the 5th century the Alamanni appear to have crossed the Rhine and conquered and settled Alsace and a large part of Switzerland. Their kingdom lasted until the year 495, when they were conquered by Clovis, from which time they formed

part of the Frankish dominions. The Alamannic and Swabian dialects are now spoken in German Switzerland, the southern parts of Baden and Alsace, Wurttemberg and a small portion of Bavaria.

See Dio Cassius lxvii. ff. ; Ammianus Marcellinus, passim ; Gregory of Tours, Historia Francorum, book ii. ; C. Zeuss, Die Deutschen und die Nachbarstdmme (Munich, 1837), pp. 303 ff. ; O. Bremer in H. Paul, Grundriss der germanischen Philologie (2nd ed., Strassburg, 1900), vol. iii. pp. 930 ff. (F. G. M. B.)

ALAMANNI, or Alemanni, LUIGI (1495-1556), Italian states- man and poet, was born at Florence. His father was a devoted adherent of the Medici party, but Luigi, smarting under a sup- posed injustice, joined with others in an unsuccessful conspiracy against Giulio de' Medici, afterwards Pope Clement VII. He was obliged in consequence to take refuge in Venice, and, on the accession of Clement, to flee to France. When Florence shook off the papal yoke in 1527, Alamanni returned, and took a prominent part in the management of the affairs of the republic. On the restoration of the Medici in 1 530 he had again to take refuge in France, where he composed the greater part of his works. He was a favourite with Francis I., who sent him as ambassador to Charles V. after the peace of Crepy in 1544. As an instance of his tact in this capacity, it is related that, when Charles interrupted a complimentary address by quoting from a satirical poem of Alamanni's the words —

" 1′ aquila grifagna, Che per piu devorar, duoi rostri porta " (Two crooked bills the ravenous eagle bears, The better to devour),

the latter at once replied that he spoke them as a poet, who was permitted to use fictions, but that he spoke now as an ambassador, who was obliged to tell the truth. The ready reply pleased Charles, who added some complimentary words. After the death of Francis, Alamanni enjoyed the confidence of his

successor Henry II., and in 1551 was sent by him as his ambassador to Genoa. He died at Amboise on the 18th of April 1556. He wrote a large number of poems, distinguished by the purity and excellence of their style. The best is a didactic poem, La Coltivazione (Paris, 1546), written in imitation of Virgil's Georgics. His Opere Toscane (Lyons, 1532) consists of satirical pieces written in blank verse. An unfinished poem, Avarchide, in imitation of the Iliad, was the work of his old age and has lit'tle merit. It has been said by some that Alamanni was the first to use blank verse in Italian poetry, but the distinction belongs rather to his contemporary Giangiorgio Trissino. He also wrote a poetical romance, Girone il Cortese (Paris, 1548); a tragedy, Antigone; a comedy, Flora; and other poems. His works were published, with a biography by P. Raffaelli, as Versi e prose di Luigi A'lamanni (Florence, 1859).

See G. Naro, Luigi Alamanni e la coltivazione (Syracuse, 1897), and C. Corso, Un decennio di patriottismo di Luigi Alamanni (Palermo,

1898).

ALAMBAGH, or Alumbagh, the name of a large park or walled enclosure, containing a palace, a mc«que and other buildings, as well as a beautiful garden, situated about 4 m. from Lucknow, near the Cawnpore road, in the United Provinces of India. It was converted into a fort by the mutineers in 1857, and after its capture by the British was of importance in con- nexion with the military operations around Lucknow. (See Indian Mutiny and Outram, Sir James.)

ALAMEDA, a residential city of Alameda county, California, U.S.A., on an artificial island about 5 m. long and 1 m. wide, on the E. side of San Francisco bay, opposite to and about 6 m. from San Francisco, and directly S. of Oakland, from which it is separated by a drainage canal, spanned by bridges. Included within the limits of the city is Bay Farm island, with an area of about 3 sq. m. Pop. (1870) 1557; (1880) 5708; (1890) 11,165; (1900) 16,464, of whom 4175 were foreign-born; (1910, census) 23,383. Alameda is served by the Southern Pacific railway, and is connected by an electric line with Oakland and Berkeley. Its site is low and level and its plan fairly regular. Among the city's manufactures are terra-cotta tiles, pottery, rugs,

refrigerators and salt. The city owns and operates the electric-lighting plant; the water- works system is privately owned, and the water supply is obtained from deep wells at San Leandro. A settlement existed here before the end of the Mexican period. In 1854 it was incorporated as a town and in 1885 was chartered as a city. In 1906 the city adopted a freehold charter, centralizing power in the mayor and providing for a referendum. The county was organized in 1853.

ALAMOS DE BARRIENTOS, BALTASAR (1555-1640), Spanish scholar, was born at Medina del Campo in 1555. His friendship with Antonio Perez caused him to be arrested in 1590 and imprisoned for nearly thirteen years. His Tdcito espanol ilustrado con aforismos (Madrid, 1614) is the only work which bears his name, but he is probably the author of the Discurso del gobiemo ascribed to Perez. Through the influence of Lerma (to whom the Tdcito is dedicated) and of Olivares, he subsequently attained high official position.

See L'Art de gouverner, ed. J. M. Guardia (Paris, 1867); P. J. Pidal, Historia delas alteraciones de Aragon en el reinado de Felipe I J. (Madrid, 1862), vol. iii. pp. 29-30; A. Perez, Relaciones (Geneva, 1654), PP- 86-88.

ALAND ISLANDS, an archipelago at the entrance to the Gulf of Bothnia, about 25 m. from the coast of Sweden; and 15 from that of Finland. The group, which forms part of the Finnish province of Abo-Bjorneborg, consists of nearly three hundred islands, of which "about eighty are inhabited, the remainder being desolate rocks. These islands form a continuation of a dangerous granite reef extending along the south coast of Finland. They formerly belonged to Sweden, and in the neigh- bourhood the first victory of the Russian fleet over the Swedes was gained by Peter the Great in 17 14. They, were ceded to Russia in 1809. They occupy a total area of 1426 sq. km., and their present population is estimated at about 19,000. The majority of these occupy the island of Aland, upon which is situated the town of Mariehamn with a population of 1171. The inhabitants are mostly of Swedish descent, and are hardy seamen and fishermen. The surface of the islands is generally sandy, the soil thin and the climate keen; yet Scotch fir, spruce and birch are grown; and rye, barley, flax and vegetables are produced in sufficient quantity for the wants of the people. Great numbers of cattle are reared; and cheese, butter

and hides, as well as salted meat and fish, are exported. There are several excellent harbours (notably that of Ytternas), which were at one time of great importance to Russia from the fact that they are frozen up for a much briefer period than those on the coast of Finland.

The Aland Islands occupy a position of the greatest strategic importance, commanding as they do both the entrance to the port of Stockholm and the approaches to the Gulf of Bothnia, through which the greater part of the trade of Sweden is carried on. When, by the 4th article of the treaty of Fredrikshavn (Friedrichshamn), 5/17 September 1809, the islands were ceded to Russia, together with the territories forming the grand-duchy of Finland on the mainland, the Swedes were unable to secure a provision that the islands should not be fortified. The question was, however, a vital one not only for Sweden but for Great Britain, whose trade in the Baltic was threatened. In 1854, accordingly, during the Crimean War, an Anglo-French force attacked and destroyed the fortress of Bomersund, against the erection of which Palmerston had protested without effect some twenty years previously. By the " Aland Convention," con- cluded between Great Britain, France and Russia on the 30th of March 1856, it was stipulated that " the Aland Islands shall not be fortified, and that no military or naval establishments shall be maintained or created on them." By the 33rd article of the treaty of Paris (1856) this convention, annexed to the final act, was given " the same force and validity as if it formed part thereof," Palmerston declaring in the House of Commons (May 6) that it had " placed a barrier between Russia and the north of Europe." Some attention was attracted to this arrange- ment when in 1906 it was asserted that Russia, under pretext of stopping the smuggling of arms into Finland, was massing

considerable naval and military forces at the islands. The question of the Aland Islands created some discussion in 1907 and 1908 in connexion with the new North Sea agreements, and undoubtedly Russia considered the convention of 1856 as rather humiliating. But it was plainly shown by other powers that they did not propose to regard it as modified or open to question, and the point was not definitely and officially raised.

See the article by Dr Verner Soderberg in the National Review, No. 392, for April 1908.

ALANI (Gr. 'A\avoi, 'AXavvoi ; Chinese 'O-lan-na; since the 9th

century a.d. they have been called As, Russ. Jasy, Georgian Ossi), the easternmost division of the Sarmatians (see Scythia), Iranian nomads with some Altaic admixture. First met with north of the Caspian, and later (c. 1st century a.d.) spreading into the steppes of Russia, the Alans made incursions into both the Danubian and the Caucasian provinces of the Roman empire. By the Huns they were cut into two portions, of which the western joined the Germanic nations in their invasion of southern Europe, and, following the fortunes of the Vandals, disappeared in North Africa. Those of the eastern division, though dispersed about the steppes until late medieval times, were by fresh invading hordes forced into the Caucasus, where they remain as the Ossetes. At one time partially Christianized by Byzantine missionaries, they had almost relapsed into heathenism, but are now under Russian influence returning to Christianity. (E. H. M.)

ALARC6N, HERNANDO DE, Spanish navigator of the 16th century, is known only in connexion with the expedition to the coast of California, of which he was leader. He set sail on the 9th of May 1540 with orders from the Spanish court to await at a certain point on the coast the arrival of an expedition by land under the command of Vasquez de Coronado. The junction was not effected, though Alarcon reached the appointed place and left letters, which were afterwards found by Diaz, another explorer. Alarc6n was the first to determine with certainty that California was a peninsula and not an island, as had been supposed. He made a careful survey of the coast, ascended the Rio del Tizon or Rio de Buena Guia (Colorado) for 85 Spanish m., and was thus able on his return to New Spain in 1541 to construct an excellent map of California.

See H«rrera, Decade VI. book ix. ch. 15 ; vol. vi. fol. 212 of Madrid edition of 1730.

ALARC6N, JUAN RUIZ DE (isi8?i6 3 9), Spanish dramatist, was born about 1581 at Tlacho (Mexico), where his father was superintendent of mines. He came to Europe in 1600, studied law at Salamanca, and in 1608 \vent back to Mexico to compete for a professorial chair. Returning to Spain in 161 1, he entered the household of the marquis de Salinas, became a successful dramatist, and was nominated a member of the council of the Indies in 1623. He died at Madrid on the 4th of August 1639. His plays were published in 1628 and 1634; the most famous of these is La Verdad sospechosa, which was adapted by Corneille as the Menleur. Alarcon had the misfortune to be a hunchback, to be

embittered by his deformity, and to be constantly engaged in personal quarrels with his rivals; but his attitude in these polemics is always dignified, and his crushing retort to Lope de Vega in Los pechos privilegiados is an unsurpassable example of cold, scornful invective. More than any other Spanish dramatist, Alarc6n is preoccupied with ethical aims, and his gift of dramatic presentation is as brilliant as his dialogue is natural and vivacious. It has been alleged that his foreign origin is noticeable in his plays, and there is some foundation for the criticism; but his workmanship is exceptionally con scientious, and in El Tejedor de Segovia he had produced a masterpiece of national art, national sentiment and national expression. (J. F.-K.)

ALARC6N, PEDRO ANTONIO DE (1833-1891), Spanish writer, was born on the 10th of March 1833 at Guadix. He graduated at the university of Granada, studied law and theology privately, and made his first appearance as a dramatist before he was of age. Deciding to follow literature as a profession, he joined with Torcuato Tarrago y Mateos in editing a Cadiz news- paper entitled El Eco de Occidente. In 1853 he travelled to

Madrid in the hope of finding a publisher for his continuation of Espronceda's celebrated poem, El Diablo Mundo. Dis- appointed in his object, and finding no opening at the capital, he settled at Granada, became a radical journalist in that city, and showed so much ability that in 1854 he was appointed editor of a republican journal, El Ldtigo, published at Madrid. The extreme violence of his polemics led to a duel between him and the Byronic poet, Jose Heriberto Garcia Quevedo. The earliest of his novels, El Final de Norma, was published in 1855, and though its construction is feeble it brought the writer into notice as a master of elegant prose. A small anthology, called Mananas de Abril y Mayo (1856), proves that Alarcon was re- cognized as a leader by young men of promise, for among the contributors were Castelar, Manuel del Palacio and Lopez de Ayala. A dramatic piece, El Hijo prodigo, was hissed off the stage in 1857, and the failure so stung Alarc6n that he enlisted under O'Donnell's command as a volunteer for the war in Morocco. His Diario de un tesligo de la guerra de Africa (1850) is a brilliant account of the expedition. The first edition, amounting to fifty thousand copies, was sold within a fortnight, and Alarcon's name

became famous throughout the peninsula. The book is not in any sense a formal history; it is a series of picturesque impressions rendered with remarkable force. On his return from Africa Alarcon did the Liberal party much good service as editor of La Politica, but after his marriage in 1866 to a devout lady, Paulina Contrera y Reyes, he modified his political views considerably. On the overthrow of the monarchy in 1868, Alarcon advocated the claims of the due de Montpensier, was neutral during the period of the republic, and declared himself a Conservative upon the restoration of the dynasty in December 1874. These political variations alienated Alarc6n's old allies and failed to conciliate the royalists. But though his political influence was ruined, his success as a writer was greater than ever. The publication in the Revista Europea (1874) of a short story, El Sombrero de tres picos, a most ingenious resetting of an old popular tale, made him almost as well known out of Spain as in it. This remarkable triumph in the picturesque vein encouraged him to produce other works of the same kind; yet though his Cuenlos amatorios (1881), his Historietas nacionales (1881) and his Narraciones inverosimiles (1882) are pleasing, they have not the delightf ul gaiety and charm of their pre- decessor. In a longer novel, El Escdndalo (1875), Alarc6n had appeared as a partisan of the neo-Catholic reaction, and this change of opinion brought upon him many attacks, mostly unjust. His usual bad fortune followed him, for while the Radicals denounced him as an apostate, the neo-Catholics alleged that El Escdndalo was tainted with Jansenism. Of his later volumes, written in failing health and spirits, it is only necessary to mention El Capitan Veneno and the Historia de mis libros, both issued in 1881. Alarc6n was elected a member of the Spanish Academy in 1875. He died at Madrid on the 20th of July 1 89 1. His later novels and tales are disfigured by their didactic tendency, by feeble drawing of character, and even by certain gallicisms of style. But, at his best, Alarc6n may be read with great pleasure. The Diario de un testigo is still unsurpassed as a picture of campaigning life, while El Sombrero de tres picos is a very perfect example of malicious wit and minute observation. (J. F.-K.)

ALARD, JEAN DELPHIN (1815-1888), French violinist and teacher, was born at Bayonne on the 8th of May 1815. From 1827 he was a pupil of F. A. Habeneck at the Paris Conservatoire, where he succeeded P. de Sales Baillot as professor in 1843, retaining the post till 1875. His playing was full of fire and point, and his compositions had a great success in France, while his

violin school had a wider vogue and considerably greater value. Mention should also be made of his edition in 40 parts of a selection of violin compositions by the most eminent masters of the 1 8th century, Les Maltres classiques du violon (Schott). Alard died in Paris on the 22nd of February 1888. –

ALARIC (Ala-reiks, ” All-ruler “), (c. 370-410), Gothic con- queror, the first Teutonic leader who stood as a conqueror in the city of Rome, was probably born about 370 in an island

named Peuce (the Fir) at the mouth of the Danube. He was of noble descent, his father being a scion of the family of the Balthi or Bold-men, next in dignity among Gothic warriors to the Amals. He was a Goth and belonged to the western branch of that nation — sometimes called the Visigoths — who at the time of his birth were quartered in the region now known as Bulgaria, having taken refuge on the southern shore of the Danube from the pursuit of their enemies the Huns.

In the year 394 he served as a general of foederati (Gothic irregulars) under the emperor Theodosius in the campaign in which he crushed the usurper Eugenius. As the battle which terminated this campaign, the battle of the Frigidus, was fought near the passes of the Julian Alps, Alaric probably learnt at this time the weakness of the natural defences of Italy on her north-eastern frontier. The employment of barbarians as foederati, which became a common practice with the emperors in the 4th century, was both a symptom of disease in the body politic of the empire and a hastener of its impending ruin. The provincial population, crushed under a load of unjust taxation, could no longer furnish soldiers in the numbers required for the defence of the empire; and on the other hand, the emperors, ever fearful that a brilliantly successful general of Roman extraction might be proclaimed Augustus by his followers, preferred that high military command should be in the hands of a man to whom such an accession of dignity was as yet impossible. But there was obviously a danger that one day a barbarian leader of barbarian troops in the service of the empire might turn his armed force and the skill in war, which he had acquired in that service, against his trembling masters, and without caring to assume the, title of Augustus might ravage and ruin the countries which he had undertaken to defend. This danger became a reality when in the year 395 the able and valiant Theodosius died, leaving the empire to be divided between his imbecile sons Arcadius and Honorius, the former taking the eastern and the latter the

western portion, and each under the control of a minister who bitterly hated the minister of the other.

In the shifting of offices which took place at the beginning of the new reigns, Alaric apparently hoped that he would receive one of the great war ministries of the empire, and thus instead of being a mere commander of irregulars would have under his orders a large part of the imperial legions. This, however, was denied him, and he found that he was doomed to remain an officer of foederati. His disappointed ambition prompted him to take the step for which his countrymen were longing, for they too were grumbling at the withdrawal of the " presents," in other words the veiled ransom-money, which for many years they had been accustomed to receive. They raised him on a shield and acclaimed him as a king; leader and followers both resolving (says; Jordanes the Gothic historian) " rather to seek new kingdoms by their own labour, than to slumber in peaceful subjection to the rule of others."

Alaric struck first at the eastern empire. He marched to the neighbourhood of Constantinople, but finding himself unable to undertake the siege of that superbly strong city, he retraced his steps westward and then marched southward through Thessaly and the unguarded pass of Thermopylae into Greece. The details of his campaign are not very clearly stated, and the story is further complicated by the plots and counterplots of Rufinus, chief minister of the eastern, and Stilicho, the virtual regent of the western empire, and the murder of the former by his rebellious soldiers. With these we have no present concern; it is sufficient to say that Alaric's invasion of Greece lasted two years (395-396), that he ravaged Attica but spared Athens, which at once capitulated to the conqueror, that he penetrated into Peloponnesus and captured its most famous cities, Corinth, Argos and Sparta, selling many of their inhabitants into slavery. Here, however, his victorious career ended. Stilicho, who had come a second time to the assistance of Arcadius and who was undoubtedly a skilful general, succeeded in shutting up the Goths in the mountains of Pholoe on the borders of Elis and Arcadia. From thence Alaric escaped with difficulty, and not without some suspicion of connivance on the part of Stilicho. He crossed th$

Corinthian Gulf and marched with the plunder of Greece northwards to Epirus. Next came an astounding transformation. For some mysterious reason, probably connected with the increasing estrangement between the two sections of the empire, the ministers of Arcadius conferred upon Alaric the government of some part — it can hardly have been the whole — of the important prefecture of Illyricum. Here, ruling the Danubian provinces, he was on the confines of the two empires, and, in the words of the poet Claudian, he " sold his alternate oaths to either throne," and made the imperial arsenals prepare the weapons with which to arm his Gothic followers for the next campaign. It was probably in the year 400 (but the dates of these events are rather uncertain) that Alaric made his first invasion of Italy, co-operating with another Gothic chieftain named Radagaisus. Supernatural influences were not wanting to urge him to this great enterprise. Some lines of the Roman poet inform us that he heard a voice proceeding from a sacred grove, " Break off all delays, Alaric. This very year thou shalt force the Alpine barrier of Italy; thou shalt penetrate to the city." The prophecy was not at this time fulfilled. After spreading desolation through North Italy and striking terror into the citizens of Rome, Alaric was met by Stilicho at Pollentia (a Roman municipality in what is now Piedmont), and the battle which then followed on the 6th of April 402 (Easter-day) was a victory, though a costly one for Rome, and effectually barred the further progress of the barbarians. Alaric was an Arian Christian who trusted to the sanctity of Easter for immunity from attack, and the enemies of Stilicho reproached him for having gained his victory by taking an unfair advantage of the great Christian festival. The wife of Alaric is said to have been taken prisoner after this battle; and there is some reason to suppose that he was hampered in his movements by the presence with his forces of large numbers of women and children, having given to his invasion of Italy the character of a national migration. After another defeat before Verona, Alaric quitted Italy, probably in 403. He had not indeed " penetrated to the city," but his invasion of Italy had produced important results; it had caused the imperial residence to be transferred from Milan to Ravenna, it had necessitated the withdrawal of the Twentieth Legion from Britain, and it had probably facilitated the great invasion of Vandals, Suevi and Alani into Gaul, by which that province and Spain were lost to the empire. We next hear of Alaric as the friend and ally of his late opponent Stilicho. The estrangement between the eastern and western courts had in 407 become so bitter as to threaten civil war, and Stilicho was

actually proposing to use the arms of Alaric in order to enforce the claims of Honorius to the prefecture of Illyricum. The death of Arcadius in May 408 caused milder counsels to prevail in the western cabinet, but Alaric, who had actually entered Epirus, demanded in a somewhat threatening manner that if he were thus suddenly bidden to desist from war, he should be paid handsomely for what in modern language would be called the expenses of mobilization. The sum which he named was a large one, 4000 pounds of gold (about £160,000 sterling), but under strong pressure from Stilicho the Roman senate consented to promise its payment.

Three months later Stilicho himself and the chief ministers of his party were treacherously slain in pursuance of an order extracted from the timid and jealous Honorius; and in the disturbances which followed the wives and children of the barbarian foederati throughout Italy were slain. The natural consequence was that these men to the number of 30,000 flocked to the camp of Alaric, clamouring to be led against their cowardly enemies. He accordingly crossed the Julian Alps, and in September 408 stood before the walls of Rome (now with no capable general like Stilicho to defend her) and began a strict blockade.

No blood was shed this time; hunger was the weapon on which Alaric relied. When the ambassadors of the senate in treating for peace tried to terrify him with their hints of what the despair- ing citizens might accomplish, he gave with a laugh his celebrated answer, " The thicker the hay, the easier mowed!" After much bargaining, the famine-stricken citizens agreed to pay a ransom

of more than a quarter of a million sterling, besides precious garments of silk and leather and three thousand pounds of pepper. Thus ended Alaric's first siege of Rome.

At this time, and indeed throughout his career, the one dominant idea of Alaric was not to pull down the fabric of the empire but to secure for himself, by negotiation with its rulers, a regular and recognized position within its borders. His demands were certainly large — the concession of a block of territory 200 m. long by 150 wide between the Danube and the Gulf of Venice (to be held probably on some terms of nominal dependence on the empire), and the title of commander-in-chief of the imperial army. Yet large as the terms were, the emperor would probably have been well advised to grant them; but Honorius was one of those timid and feeble folk who are equally unable to make war

or peace, and refused to look beyond the question of his own personal safety, guaranteed as it was by the dikes and marshes of Ravenna. As all attempts to conduct a satisfactory negotiation with this emperor failed before his impenetrable stupidity, Alaric, after instituting a second siege and blockade of Rome in 409, came to terms with the senate, and with their consent set up a rival emperor and invested the prefect of the city, a Greek named Attalus, with the diadem and the purple robe. He, however, proved quite unfit for his high position; he rejected. the advice of Alaric and lost in consequence the province of Africa, the granary of Rome, which was defended by the partisans of Honorius. The weapon of famine, formerly in the hand of Alaric, was thus turned against him, and loud in con- sequence were the murmurs of the Roman populace. Honorius was also greatly strengthened by the arrival of six legions sent from Constantinople to his assistance by his nephew Theodosius II. Alaric therefore cashiered his puppet emperor Attalus after eleven months of ineffectual rule, and once more tried to reopen negotiations with Honorius. These negotiations would probably have succeeded but for the malign influence of another Goth, Sarus, the hereditary enemy of Alaric and his house. When Alaric found himself once more outwitted by the machinations of such a foe, he marched southward and began in deadly earnest his third, his ever-memorable siege of Rome. No defence apparently was possible; there are hints, not well substantiated, of treachery; there is greater probability of surprise. However this may be — for our information at this point of the story is miserably meagre — on the 24th of August 410 Alaric and his Goths burst in by the Salarian gate on the north-east of the city, and she who was of late the mistress of the world lay at the feet of the barbarians. The Goths showed themselves not absolutely ruthless conquerors. The contemporary ecclesiastics recorded with wonder many instances of their clemency: the Christian churches saved from ravage; protection granted to vast multitudes both of pagans and Christians who took refuge therein; vessels of gold and silver which were found in a private dwelling, spared because they “belonged to St. Peter”; at least one case in which a beautiful Roman matron appealed, not in vain, to the better feelings of the Gothic soldier who attempted her dishonour; but even these exceptional instances show that Rome was not entirely spared those scenes of horror which usually accompany the storming of a besieged city. We do not, however, hear of any damage wrought by fire, save in the case of Sallust’s palace, which was situated close to the gate by which

the Goths had made their entrance; nor is there any reason to attribute any extensive destruction of the buildings of the city to Alaric and his followers.

His work being done, his fated task, and Alaric having penetrated to the city, nothing remained for him but to die. He marched southwards into Calabria. He desired to invade Africa, which on account of its corn crops was now the key of the position; but his ships were dashed to pieces by a storm in which many of his soldiers perished. He died soon after, probably of fever, and his body was buried under the river-bed of the Busento, the stream being temporarily turned aside from its course while the grave was dug wherein the Gothic chief and some of his most precious spoils were interred. When .the work was finished the river was turned back into its usual channel, and

the captives by whose hands the labour had been accomplished were put to death that none might learn their secret. He was succeeded in the command of the Gothic army by his brother- in-law, Ataulphus.

Our chief authorities for the career of Alaric are the historian Orosius and the poet Claudian, both strictly contemporary ; Zosimus, a somewhat prejudiced heathen historian, who lived probably about half a century after the death of Alaric ; and Jordanes, a Goth who wrote the history of his nation in the year 551, basing his work on the earlier history of Cassiodorus (now lost), which was written about 520. (T. H.)

ALARIC- II. (d. 507), eighth king of the Goths in Spain, succeeded his father Euric or Evaric in 485. His dominions not only included the whole of Spain except its north-western corner, but also Aquitaine and the greater part of Provence. In religion Alaric was an Arian, but he greatly mitigated the persecuting policy of his father Euric towards the Catholics and authorized them to hold in 506 the council of Agde. He displayed similar wisdom and liberality in political affairs by appointing a commission to prepare an abstract of the Roman laws and imperial decrees, which should form the authoritative code for his Roman subjects. This is generally known as the Breviarium Alaricianum, or'

Breviary of Alaric (q.v.). Alaric was of a peaceful disposition, and endeavoured strictly to main- tain the treaty which his father had concluded with the Franks, whose king Clovis, however, desiring to obtain the Gothic province in Gaul, found a pretext for war in the Arianism of Alaric. The intervention of Theodoric, king of the Ostrogoths and father-in-law of Alaric, proved unavailing. The two armies met in 507 at the Campus Vogladensis, near Poitiers, where the Goths were defeated, and their king, who took to flight, was overtaken and slain, it is said, by Clovis himself.

ALA-SHEHR (anc. Philadelphia), a town of Asia Minor, in the Aidin vilayet, situated in the valley of the Kuzu Chai (Cogamus), at the foot of the Boz Dagh (Mt. Tmolus) 83 m. E. of Smyrna (105 by railway). Pop. 22,000 (Moslems, 17,000; Christians, 5000). Philadelphia was founded by Attalus II. of Pergarnum about 150 B.C., became one of the " Seven Churches " of Asia, and was called " Little Athens " on account of its festivals and temples. It was subject to frequent earth- quakes. Philadelphia was an independent neutral city,- under the influence of the Latin Knights of Rhodes, when taken in 1390 by Sultan Bayezid I. and an auxiliary Christian force under the emperor Manuel II. after a prolonged resistance, when all the other cities of Asia Minor had surrendered. Twelve years later it was captured by Timur, who built a wall with the corpses of his prisoners. A fragment of the ghastly structure is in the library of Lincoln cathedral. The town is connected by railway with Afium-Kara-Hissar and Smyrna. It is dirty and ill-built; but, standing on elevated ground and commanding the extensive and fertile plain of the Hermus, presents at a distance an imposing appearance. It is the seat of an archbishop and has several mosques and Christian churches. There are small industries and a fair trade. From one of the mineral springs comes a heavily charged water known in commerce as " Eau de Vals," and in great request in Smyrna.

See W. M. Ramsay, Letters to the Seven Churches (1904).

ALASKA, formerly called Russian America, a district of the United States of America, occupying the extreme north- western part of North America and the adjacent islands. The name is a corruption of a native word possibly meaning " main- land " or " peninsula." The district of Alaska comprises, first, all that part of the continent W. of the 141st meridian of W. longitude from Greenwich; secondly, the eastern Diomede island in Bering Strait, and all islands in Bering Sea and the Aleutian chain lying E. of a line drawn from the Diomedes to pass midway between Copper

Island, off Kamchatka, and Attu Island of the Aleutians; thirdly, a narrow strip of coast and adjacent islands N. of a line drawn from Cape Muzon, in lat. 54 40′ N., E. and N. up Portland Canal to its head, and thence, as defined in the treaty of cession to the United States, quoting a boundary treaty of 1825 between Great Britain and Russia, following "the summit of the mountains situated parallel to the coast " to the

141st meridian, provided that when such line runs more than ten marine leagues from the ocean the limit " shall be formed by a line parallel to the windings of the coast and which shall never exceed the distance of ten marine leagues therefrom." The international disputes connected with this description are referred to below.

Physical Features. — Alaska is bounded on the N. by the Arctic Ocean, on the W. by the Arctic Ocean and Bering Strait, on the S. and S.W. by the Gulf of Alaska and the Pacific Ocean, and on the E. by Yukon Territory and British Columbia. It consists of a compact central mass and two straggling appendages running from its S.W. and S.E. corners, and sweeping in a vast arc over 16 degrees of latitude and 58 degrees of longitude. These three parts will be referred to hereafter respectively, as Continental Alaska, Aleutian Alaska and the " Panhandle." The range of latitude from Point Barrow in the Arctic Ocean to Cape Muzon is almost 17 degrees — as great as from New Orleans to Duluth; the range of longitude from Attu Island to the head of Portland Canal is 58 degrees — considerably greater than from New York to San Francisco. The total area is about 586,400 sq. m. The general ocean-coast line is about 4750 m., and, including the islands, bays, inlets and rivers to the head of tide water, is about 26,000 m. in length (U.S. Coast Survey 1889). The entire southern coast is very irregular in outline; it is precipitous, with only very slight stretches of beach or plain. Its elevation gradually decreases as one travels W. toward the Aleutians. A great submarine platform extends throughout a large part of Bering Sea. The western and northern coasts are regular in outline with long straight beaches; and shallows are common in the seas that wash them. On the Arctic there is a broad coastal plain. Of the islands of Alaska the more important are: at the S.E. extremity and lying close inland, the Alexander Archipelago, whose principal islands from N.W. to S.E. are Chicagof, Baranof, Admiralty, Kupreanof, Kuiu, Prince of Wales (the largest of the archipelago and of all the islands about Alaska, measuring about 140 m. in length and 40 m. in width), Etolin and Revillagigedo; S.W. of the mainland, two groups — (1)

Kodiak, whose largest island, of the same name, is 40 m. by 100 m., and may be considered a continuation of the Kenai Peninsula, and whose W. continuation, S. of Alaska Peninsula, consists of the Semidi, Shumagin and Sannak clusters; (2) the Aleutian Islands (q.v.) sweeping 1200 m. W.S.W. from the end of Alaska Peninsula, W. of the mainland, in Bering Sea, the Pribilof Islands, about 500 m. S. of Cape Prince of Wales, the small Hall and St Matthew Islands, about 170 m. S.W. of the same cape, St Lawrence Island (100 m. and 10 to 30 m. wide), which is about half way between the last men- tioned pair of islets and Cape Prince of Wales and Nunivak Island, near the mainland and due E. of St Matthew; and in the middle of Bering Strait the Diomede Islands, which belong in part to Russia.

Very little was known about Alaska previous to 1896, when the gold discoveries in the Klondike stimulated public interest regarding it. Since 1895, however, the explorations of the United States Geological Survey and the Department of War, and other departments of the government, have fully established the main features of its physiography. It has mountains, plateaus and lowlands on a grand scale. " In a broad way, the larger features of topography correspond with those of the western states. There is a Pacific Mountain system, a Central Plateau region, a Rocky Mountain system, and a Great Plains region. These four divisions are well marked, and show the close geographic relation of this area to the southern part of the continent." The orographic features of the Pacific Mountain system trend parallel to the coast-line of the Gulf of Alaska, changing with this at the great bend beyond the N., and of the Panhandle from S.E. and N.W. to N.E. and S.W. and running through the Alaska Peninsula. The Pacific Mountain system includes four ranges. The Coast Range of the Panhandle attains a width of 100 m., but has no well-defined crest line. The range is characterized by the uniformity of summit levels between 5000 and 6000 ft. Continuing the Coast Range, with

which it is closely associated — the Chilkat river lies between them — is the St Elias Range (a term now used to include not only the mountains between Cross Sound and Mt. St Elias, but the Chugach, Kenai, Skolai and Nutzotin mountains) ; among its peaks are: Mt. Crillon (15,900 ft), Mt. Fairweather (15,290 ft),

Mt. Vancouver (15,666 ft.), Mt. Wrangell (17,500 ft., an active volcano) in the Nutzotin Mountains, Mt. St Elias (18,024 ft.) and, in Canadian territory, Mt. Logan (19,539 ft.). The Aleutian Range, of whose crest the Aleutian Islands are remnants, fills out the system near the coast. The Alaskan Range, connecting with the Nutzotin and Skolai branches of the St Elias Range, lies a little farther inland; it is splendidly marked by many snowy peaks, including Mt. Foraker (17,000 ft.) and Mt. McKinley. The latter, which on the W. rises abruptly out of a marshy country, offers the obstacles of magnificent, inaccessible granite cliffs and large glaciers to the mountaineer; it is the loftiest peak in North America (ca. 20,300 ft.). In the Alaskan Range and the Aleutian Range there are more than a dozen live vol- canoes, several of them remarkable; the latter range is composed largely of volcanic material. Evidences of very recent volcanic activity are abundant about Cook Inlet. The Rocky Mountain system extends from Canada (the Yukon territory) into N.E. Alaska, which it crosses near the Arctic coast in- a broad belt composed of several ranges about 6000 ft. in altitude. There is no well-defined crest line; the axis of the system is roughly parallel to the Pacific Mountain system, but runs more nearly E. and W. in Alaska. Between the Pacific Mountain and the Rocky Mountain systems lies the vast Central Plateau region, or Yukon plateau, Finally, between the Rocky Mountains and the Arctic Ocean is the Arctic Slope region, a sloping plain corresponding to the interior plains of the United States.

First Physiographic Region. — The Panhandle is remarkably picturesque. The maze of islands, hundreds in number, of the Alexander Archipelago (area about 13,000 sq. m.) are remnants of a submerged mountain system; the islands rise 3000 to 5000 ft. above the sea, with luxuriantly wooded tops and bald, sheer sides scarred with marks of glacial action; the beachless coast is only a narrow ledge between the mountains and the sea, and unlike the coast of Norway, to which in outline it is not dissimilar, is bold, steep and craggy. Through the inner channels, shel- tered from the Pacific by the island rampart, runs the ” inland passage,” the tourist route northward from Seattle, Washington. The inter-insular straits are carried up into the shore as fjords heading in rivers and glaciers. Thus the Stikine river continues Sumner Strait and the Taku continues Cross Sound. The Stikine, Taku and Alsek rivers all cross the mountains in deep- cut canyons. Everywhere the evidences of glacial action abound. Most remarkable are the inlets known as Portland Canal

and Lynn Canal (continuing Chatham Strait). The first is very deep, with precipitous shores and bordering mountains 5000 to 6000 ft. high; the second is a noble fjord 100 m. long and on an average 6 m. wide, with magnificent Alpine scenery. It is subject in winter to storms of extraordinary violence, but is never closed by ice. Both Portland Canal and Lynn Canal are of historical importance, as the question of the true location of the first and the commercial importance to Canada or to the United States of the possession of the second, were the crucial contentions in the disputes over the Alaska- Canadian boundary. At the head of Lynn Canal, the only place on the whole extent of the south-eastern Alaskan coast where a clear-cut water- parting is exhibited between the sea-board and interior drainage, the summits of the highest peaks in the Coast Range are 8000 to 9000 ft. above the sea. White Pass (2888 ft.) and Chilkoot Pass (3500 ft.), at the head of the Lynn Canal, are the gateway to the mining country of the Klondike and Upper Yukon. They are the highest points that one meets in travelling from Skagway along the course of the Yukon to Bering Sea.

Prior to the opening (in August 1900) of the railway between Skagway and White Horse, Canada (no m.), by way of the White Pass, all transportation to the interior was effected by men and pack-animals (and for a time by a system of telpherage) over these passes and the Chilkat or Dal ton trail; the building

of the railway reduced carriage rates to less than a tenth of their former value, and the Chilkat and Chilkoot Passes were no longer used. The coast region above the Panhandle shows on a smaller and diminishing scale the same characteristic features, gradually running into those of the Aleutians. Out of the Alaska and Nutzotin mountains two great rivers flow southward: the Copper, practically unnavigable except for small boats, because of its turbulence and the discharge of glaciers into its waters; and the Susitna, also practically unnavigable. Both of these rivers have their sources in lofty mountain masses, and are swift and powerful streams carrying with them much silt; their passes over the water-parting N. of the Kenai Peninsula are through gorges from 4000 to 10,000 ft. in depth. The Copper, the Susitna and its tributary, the Yentna, as well as the Skwentna, a tributary of the Yentna from the west, all run through picturesque canyons, and their upper courses are characterized by glacial and torrential feeders. Their valleys are well timbered.

The glaciers of the Panhandle and throughout the rest of the

Pacific region are most remarkable— extraordinary alike for their number and their size. They lie mainly between 56° and 6i° N. lat, in a belt 1000 m. long, of which the central part, some 350 or 500 m. long and 80 m. to 100 m. wide, has been described as one great confluent neve field. Thousands of Alpine glaciers from one to fifteen miles long fill the upper valleys and canyons of the mountains. More than a hundred almost reach the sea, from which they are separated by detrital lowland or terminal moraines. Other glaciers are of the Piedmont type. Greatest of these and of Alaskan glaciers is the Malaspina, a vast elevated plateau of wasting ice, 1500 sq. m. in area (nearly a tenth the area of all Switzerland), touching the sea at only one point, though fronting it for 50 m. behind a fringing foreland of glacial debris. It is fed by Alpine glaciers, among them one of the grandest in Alaska, the Seward, which descends from Mt. Logan. It is more than 50 m. long, and more than 3 m. broad at its narrowest point, and several times in its course flows over cascades, falling hundreds of feet. Of tide- water glaciers the most remarkable is probably the Muir. It has an area of 350 sq. m.; the main trunk, which is 30 to 40 m. broad, is fed by 26 tributaries, 20 of which are each greater than the Mer de Glace, and pushes its bergs into the sea from ice cliffs almost 2 m. wide, standing 100 to 200 ft. above the water, and extending probably 700 to 1000 ft. beneath its surface. It has been calculated that the average daily discharge of the Muir in summer is 30,000,000 cubic ft. Its course, which is only about 13 m., has a slope of 100 ft. per mile, and the main current moves 7 ft. daily. The character of the Muir was greatly altered by an earthquake in 1899. There are some 30 tide-water glaciers — a considerable number of them very noteworthy. The Valdez is 30 m. long and 5000 ft. in altitude. Most of the Alaskan glaciers are re- ceding, but not all of them; and at times there is a general advance. The Muir receded i-6 m. from 1879-1890, the Childs about 600 yards in 17 years; others over 4, 7 or 10 m. in 20 years.

The Aleutian Islands (q.v.), like the Alexander Archipelago, are remnants of a submerged mountain system. Their only remarkable features are the volcanoes on the easterly islands, already mentioned.

Continental Alaska. — Continental Alaska in the interior is essentially a vast plateau. ” The traveller between the main drainage areas of the interior is struck by the uniform elevation of the interfluminal areas. Rounded hills, level meads and persistent flat-topped ridges, composed of rocks of varying

structure, rise to about the same level and give the impression that they are the remnants of a former continuous surface. Occasional limited areas of rugged mountains rise above this level, and innumerable stream valleys have been incised below it; but from the northern base of the St Elias and Alaskan ranges to the southern foothills of the Rocky Mountain system, and throughout their length, the remnants of this ancient level are to be seen. In height it varies from about 5000 ft. close to the bases of the mountain systems to less' than 3000 ft. in the vicinity of the

main lines of drainage, and slopes gradually towards the north." The Seward Peninsula is particularly rugged. This great plateau drains westward through broad, gently flowing streams, the network of whose tributary waters penetrates every corner of the interior and offers easy means of communication. Both the main streams and the smaller tributaries often flow through deep canyons. The Yukon is one of the great drainage systems of the world. The Yukon itself has a length of more than 2000 m. and bisects the country from E. to W. Behind the bluffs that form in large part its immediate border its basin is a rolling country, at times sinking into great dead levels like the Yukon flats between Circle City and the Lower Ramparts, some 30,000 sq. m. in area. Of the two great affluents of the Yukon, the Tanana is for the most part unnavigable, while the Koyukuk is navigable for more than 450 m. by river steamers, and for more than 500 m. above its mouth shows no appreciable diminution in volume. A low water-parting divides the Yukon valley from the Kuskokwim, the second river of Alaska in size, navigable by steamers for 600 m. Torrential near its source, it is already a broad, sluggish stream at its confluence with the East Kuskokwim. The tides rise 50 ft. near its mouth and the tide-head is 100 m. above the mouth.

Rocky Mountains. — The Rocky Mountain system in Alaska is higher and more complex than in Canada. About 100 m. wide at the international boundary, where the peaks of the British Mountains on the N. and of the Davidson Mountains on the S. are 7000 to 8000 ft. high, the system runs W.S.W. as the Endicott Mountains, two contiguous ranges of about 5000 to 6000 ft., and as these ranges separate, the northern becomes the De Long, the southern the Baird Mountains, whose elevation rapidly decreases

toward the coast-line. The system is sharply defined on the north and less so on the south.

Arctic Slope Region. — The Arctic Slope region is divided into the Anuktuvuk Plateau about 80 m. wide, with a maximum altitude to the S. of 2500 ft., and between the plateau and the Arctic Ocean the Coastal Plain. Very little is known of either part of the region.

Climate. — From the foregoing description of the country it is evident that the range of climate must be considerable. That of the coast and that of the Yukon plateau are quite distinct. The Panhandle, along with the lisiere (foreland), westward to Cook Inlet might be called temperate Alaska, its climate being similar to that of the N.W. coast of the United States; while to the westward and northward the winters become longer and more severe. The cause of the mild climate of the Panhandle, formerly supposed to be the Japanese current, or Kuro Shiwo, is now held to be the general eastward drift of the waters of the North Pacific in the direction of the prevalent winds. To the warmth and moisture brought by this means the coastal region owes its high equable temperature, its heavy rainfall (80-110 in.) and its superb vegetation. The mean annual temperature is from 54 to 6o ° F. Winter sets in about the 1st of December and the snow is gone save in the mountains by the 1st of May. The thermometer rarely registers below zero F. or above 75° F.; the difference between the midwinter and midsummer averages is seldom more than 25°. The summer is relatively dry, the autumn and winter wet. The vapour-laden sea air blowing landward against the girdle of snow and glaciers on the mountain barriers a few miles inland drains its moisture in excessive rain and snow upon the lisiere, shrouding it in well-nigh unbroken fog and cloud-bank. Only some 60 to 100 days in the year are clear. In passing from the Sitkan district westward toward Kodiak and the Aleutians (q.v.) the climate becomes even more equable, the temperature a little lower and the rainfall somewhat less; 1 the fogs at first less dense, especially near Cook Inlet, where the climate is extremely local, but more and more persistent along the Aleutians. The clear days of a year at Unalaska can be counted on the fingers; five days in seven it actually rains or snows. Bering Sea is covered with almost eternal fog. Along

1 At Kodiak, the monthly means range from 28 to 55 with a total range from -io° to 82 F., as against -3 to 87 F. at Sitka; the average temperature is 40-6° F., rainfall 59 in.

the coast N. of Alaska Peninsula the rainfall diminishes to 10 in. or less within the Arctic circle; the summer temperature is quite endurable but the winters are exceedingly rigorous. 2 East of the mountains in south-eastern Alaska the atmosphere is dry and bracing, the temperature ranging from 14 to 92 F In the farther interior, in the valleys of the Yukon, the Tanana, the Copper and the Sushitna the summers are much the same in character, the winters much more severe. On the Yukon at the international boundary the mean of the warmest month is higher than that of the warmest month at Sitka, 500 m. southward. At some points in the Upper Yukon valley the range of extreme temperatures is as great as from -75 to 90 F. 3 The mean heat of summer in the upper valley is about 6o° to 70 F., and at some points in the middle and lower valley even higher. 4 By the middle of September snow flurries have announced the imminence of winter, the smaller streams congeal, the earth freezes, the miner perforce abandons his diggings, and navigation ceases even on the Yukon in October. All winter snows fall heavily. The air is dry and quiet, and the cold relatively uniform. In midwinter in the upper valley the sun rises only a few degrees above the horizon for from four to six hours a day, though very often quite obscured. In December, January, February and March the thermometer often registers lower than -50° F., and the mean temperature is 20°. In May the rivers open, the cleared land thaws out, and by June the miner is again at work. Summer is quickly in full ascendancy. In May and June the sun shines from eighteen to twenty hours and diffused twilight fills the rest of the day. The rainfall is light, from 10 to 25 in. according to the year or the locality. Dull weather is unknown. All nature responds in rich and rapid growth to the garish light and intense heat of the long, splendid days. But the Alaska summer is the uncertain season; at times the nights are cold into July, at times snow falls and there are frosts in mid August; sometimes rain is heavy, or again there is a veritable drought. In the great river valleys S. of the Yukon basin climatic conditions are much less uniform.

Fauna and F'ora. — The fauna of Alaska, is very rich and surprisingly varied. The lists of insects, birds and mammals are especially noteworthy. 5 Of these three classes, and of other than purely zoological interest, are mosquitoes, which swarm in summer in the interior in vast numbers; sea fowl, which are remarkably abundant near the Aleutians; moose, and especially caribou, which in the past were very numerous in the interior and of extreme economic importance to the natives. The

destruction of the wild caribou has threatened to expose the Indians to wholesale starvation, hence the effort which the United States government has made to stock the country with domestic reindeer from Siberia. This effort made under the direction of the Bureau of Education has been eminently successful, and in the future the reindeer seems certain to contribute very greatly to the food, clothing, means of shelter and miscellaneous industries of the natives; and not less to the solution of the problems of com- munication and transportation throughout the interior. It is, however, the fish and the fur-bearing animals of its rivers and surrounding seas that are economically most distinctive of and ijnportant to Alaska. The fishing grounds extend along the coast from the extreme south-east past the Aleutians into Bristol Bay. Herring are abundant, and cod especially so. There are probably more than 100,000 sq. m. of cod-banks from 22 to 90

2 At St Michael the mean annual temperature is about 26 , the monthly means run from about -2° to 54 , and the extreme recorded temperatures from about -55° to 77° F. ; at Port Clarence the annual mean is 22°, monthly means -7 to 51 F. ; extreme range of temperature, -38° to 77 F.; at Point Barrow the annual mean is 7-7° F., monthly means -18-6° to 38-i°F., extreme range of tempera- ture -55 to 65 F.

3 The mean annual temperature on the Yukon at the international line is about 21° F., the monthly means run from -17° to 6o° F:, the range of extreme temperatures from -8o° to 90 F.

4 At Fort Yukon five years' records showed mean seasonal tempera- tures of 14 , 6o°, 17 , and -23-8° F. for spring, summer, autumn and winter respectively; at Holy Cross Mission 20 , 59 , 36 and 0-95°, at Nulato 29 , 6o°, 36° and -14 .

6 The Harriman expedition collected in two months 1000 species of insects, of which 344 species (and 6 genera) were new to science.

fathoms deep in Bering Sea and E. of the Alaska Peninsula. Salmon are to be found in almost incredible numbers. Of marine

mammals, whales are hunted far to the N. in Bering Sea and the Arctic Ocean, but are much less common than formerly, as are also the walrus, the sea otter and the fur seal. All these are disappearing before commercial greed. The walrus is now found mainly far N. ; the sea otter, once fairly common throughout the Aleutian district, is now rarely found even on the remoter islands; the fur seal, whose habitat is the Pribilof Islands in Bering Sea, has been considerably reduced in numbers by pelagic hunting. There are half-a-dozen species of hair seals and sea-lions. The number of fur-bearing land animals is equally large. Sables, ermine, wolverines, minks, land otters, beavers and musk-rats have always been important items in the fur trade. There are black, grizzly and polar bears, and also two exclusively Alaskan species, the Kodiak and the glacier bear. The grey wolf is common; it is the basal stock of the Alaskan sledge-dog. The red fox is widely distributed, and the white or Arctic fox is very common along the eastern coast of Bering Sea; a blue fox, once wild, is now domesticated on Kodiak and the Aleutians, and on the southern continental coast, and a black fox, very rare, occurs in south-eastern Alaska; the silver fox is very rare.

The Alaskan flora is less varied than the fauna. The forests of the coastal region eastward from Cook Inlet, and particularly in south-eastern Alaska, are of fair variety, and of great richness and value. The balsam fir and in the south the red cedar occur in scant quantities; more widely distributed, but growing only under marked local conditions, is the yellow or Alaska cedar, a very hard and durable wood of fine grain and pleasant odour. The Oregon alder is fairly common. Far the most abundant are coast and Alpine hemlocks and the tide-land or Sitka spruce. The last is not confined to this part of Alaska, but is the characteristic and universal tree. It is of primary economic importance to the natives, who use it for the most various purposes. On the islands of the Alexander Archipelago and on Prince William Sound it grows to gigantic size; even on the Koyukuk and the middle Yukon it attains in places a diameter of 2 ft. In 1902 a forest reservation comprising the largest part of the Alexander Archipelago was created by the United States government. The separation of the coast and interior floras is almost complete; only along the mountain passes and river valleys, and rarely there, is there an exchange of species. Timber, how- ever, is fairly abundant along the entire course of the Yukon above Anvik (about 400 m. from the mouth), along the great tributaries of the Yukon, and, so far as explorations have re- vealed, along

every stream in central Alaska; and the woods of the interior consist almost entirely of spruce. On the Yukon flats it grows in a vast forest impenetrably dense. 1 The timber line, which in the Panhandle and along the southern coast of the continental mass runs from 1800 to 2400 ft., frequently rises in the interior plateau even to 4000 ft. Next in importance after spruce, in the interior, is birch, and then balsam poplar. Thickets of alders and willows in wet places and new-made land, aspens and large cottonwoods west of the characteristic spruce area (as on Seward Peninsula), are also common. Toward the Arctic circle, the timber becomes, of course, sparse, low, gnarled and distorted. The willows in the Arctic drainage basin shrink to shrubs scarcely knee-high. Bushes are common in western Alaska, but undergrowth is very scanty in the forests. Grasses grow luxuriantly in the river bottoms and wherever the tundra moss is destroyed to give them footing. Most distinctive is the ubiquitous carpeting of mosses, varying in colours from the pure white and cream of the reindeer moss to the deep green and brown of the peat moss, all conspicuously spangled in the brief summer with bright flowers of the higher orders, heavy blossoms on stunted stalks. The thick peat moss or tundra of the undrained lowlands covers probably at least a quarter of Alaska; the

1 The trees here grow as large as 10 in. in diameter and 40 or 50 ft. high; the branches do not spread, even where there is room, so that the tallest tree has a top only four or five feet broad ; the roots, which cannot penetrate the shaded and frozen soil, spread over the ice or shallowly into the tundra carpeting, and often only by their matted network prevent the fall of the trees.

reindeer moss grows both on the lowlands and the hills. 2 Sedges available for forage grow in the tundra. In August berries are fairly abundant over the interior; one of them, the salmon or cloud berry, preserved in seal oil for the winter, is an important food of the natives. The grasses are killed by the frosts in September. The western timber limit is on Kodiak Island. The Aleutian Islands (g.v.) are almost destitute of trees, but are covered with a luxuriant growth of herbage. Climatic differences cannot account for the treeless condition of the country W. of this point, and the true explanation lies probably in the fact that in winter, when the seeds of the coastal forests ripen and are released, the prevalent winds W. of Kodiak are damp and blow from the S. and S.W., while the spread of the seeds requires dry winds blowing from the N. and N.W. Such favour- able conditions occur only rarely.

The Soil of Alaska seems to be in itself rich, and quite capable of agricultural development; the great impediment to this is in the briefness of the summer. Contrary, however, to the once universal belief, the experiments of the department of agriculture of the United States have definitely proved that hardy vegetables in great variety can readily be produced in the coastal region and at various stations in the Yukon valley; and presumably, therefore, all over the interior S. of the Arctic circle, save along Bering Sea; also that there is little doubt of the practicability of successfully cultivating buckwheat, barley and oats, and possibly also rye and wheat; that grasses for grazing grow generally and often in abundance; and in general that the possibilities of interior Alaska as a live-stock country are very considerable. It is calculated that a twentieth of south-eastern Alaska is available for agriculture, and that of the entire country 100,000 sq. m. are pasturable or tillable.

Industry. — The fur and fish resources of Alaska have until recently held first place in her industries. Herrings furnish oil and guano, and the young fish are packed as "sardines" at Juneau. Cod can be taken with comparatively little danger or hardship. During the Russian occupation a small amount was shipped to California and the Sandwich Islands. The take since 1879 h as been practically constant. The take of halibut is increasing steadily. The salmon industry dates from 1878. The total output (in 1901, 100,000,000 lb; in ! 1906, about 72,000ˆ000 lb), which since 1900 has been more than half the total salmon product of the United States, is more than ten times the product of all other fish. 3 On the Karluk river, Kodiak Island, is the greatest salmon fishery in the world. More than 3,000,000 salmon have been canned here in one season. The second salmon stream is the Nushagak, flowing into Bristol Bay; this bay is the richest fishing field of Alaska, furnishing in 1901, 35 % of the total production. The recklessly wasteful manner in which these fisheries are conducted, and the inadequate measures taken by the United States government for their protection, threaten the entire industry with destruc- tion. From 1867 to 1902 the value of the total fishery product was estimated at $60,000,000. The fur-seal industry has been better protected but still unavailingly. (See Seal Fisheries and Bering Sea Arbitration.) The value of the fur seals taken from 1868 to 1902 was estimated at $35,000,000 and that of other furs at $17,000,000. The walrus, hunted for its ivory tusks, and the sea otter, rarest and most valuable of Alaskan fur animals, are near extermination; the blue fox is now

bred for its pelt on the Aleutians and the southern continental coast; the skins of the black and silver fox are extremely rare, and in general the whole fur industry is discouragingly decadent. The whale fishery also has greatly fallen off; there is no profit on the oil and the whales are sought for the baleen alone; they are much less numerous too than they once were, and have to be sought farther and farther north.

Minerals. — The timber resources of Alaska are untouched

2 280 species of mosses proper, of which 46 were new to science, and 16 varieties of peat moss (Sphagnum) were listed by the Harriman expedition ; and 74 species or varieties of ferns.

3 The value of the totalproduct of Alaska's fish canneries was in 1905 $7,735,782, or 29-3% of the total for the United States; in 1900 it was 17-4 % of the country's total.

and the serious exploitation of her minerals is very recent. As early as 1861 gold discoveries were made on the Stikine river; repeated discoveries, culminating in the Cassiar district "boom," were made in British Columbia from 1857 to 1874; colourings along the Yukon were reported in 1866-1867 and systematic prospecting of the upper river began about 1873. Juneau was founded in 1880; the same year the opposition of the Indians was withdrawn that had prevented the crossing of the mountain passes to the interior, and after 1880 repeated and scattered discoveries were made on the Lewes, Pelly, Stewart and other streams of the Upper Yukon country in Canada. As early as 1 883-1 88 5 there was a considerable mining excitement due to these discoveries, and a much greater one in 1887 after the dis- covery of coarse gold on Forty Mile Creek in American terri- tory; but these were as nothing to the picturesque and feverish rush that followed the location of the first Klondike claim in Canadian territory in August 1806. (See Klondike.) The mines in American territory were temporarily deserted for the new diggings. Other gold districts are scattered over the whole interior of Alaska. Nome (q.v.) was the scene of a great gold mining stampede in 1900. The quartz mines near Juneau are among the greatest stamp mills of the world (See Juneau). The product of gold and silver (of the latter some 1.3 % of the total) from 1895 to 1901

was more than $32,000,000 from Alaska proper (not including that from the Canadian Yukon fields) as agaitist a production of $5,000,000 in 1880-1896. The gold product of the Canadian Yukon territory from 1 896-1 903 was about $96,000,000, as estimated by the Canadian Geological Survey. In 1905 the product of gold from Alaska was valued at $15,630,000 (mines report); and from 1880 to 1906 the production of gold, according to the estimate of A. H. Brooks, was more than $100,000,000. The gravest problem of mining in the interior country, even graver than that presented by the climate, is transportation; in 1900 the Tanana fields, for example, were provisioned from Circle City, about 125 m. distant, at the rate of a cent per lb mile (i.e. $2000 for moving a ton 100 m.) . Even higher rates prevailed in the copper country in 1902. Various other minerals in addition to gold have been discovered, and several of them, notably copper and silver (the latter appearing with the gold deposits), may probably be profitably exploited. In 1905 the product of copper was valued at $759,634, that of silver at $80,165 (mines report). Coal, and in much larger quantities lignite, have been found in many parts of Alaska. Most important, because of their location, are deposits along the Alaska Peninsula and between Circle City and Dawson. The latter furnishes fuel to the river steam- boats, and it is hoped may eventually supply the surrounding mining region. There are valuable deposits of gypsum on Chicagof Island, and marble quarries are being developed on Prince of Wales Island.

As against $7,200,000 paid for Alaska in 1867, the revenues returned to the United States in the years 1867-1903 totalled $9, S5S.909 (namely, rental for the Fox and Pribilof Islands, $999,200; special revenue tax on seal-skins, $7, 597, 351; Alaskan customs, $528,558; public lands, $28,928; other sources $401,872). It has been estimated that in the same period the United States drew from Alaska fish, furs and gold to the value of about $150,000,000; that up to 1903 the imports from the states aggregated $100,000,000; and that $25,000,000 of United States capital was invested in Alaska.

Since 1896 communication with the outer world has been greatly increased. Alaskan mails leave the states daily, many post-offices are maintained, mail is regularly delivered beyond the Arctic circle, all the more important towns have telegraphic communication with the states, 1 there is one railway in the interior through Canadian territory from Skagway, and other railways are planned. The total mileage in 1906 was 136 m. In

that year the Alaskan Central Railroad (from Seward to Fairbanks, 463 m.) was chartered; 45 m. of this road were in

1 Seattle, Sitka and Valdez are connected by cable ; telegraph lines run from the Panhandle inland to the Yukon and down its valley to Fort St Michael.

operation in 1905. One long military road as an “All American ” route from Valdez has long been built.

Population. — The population in 1867 at the time of the cession from Russia is estimated at 30,000, of which two-thirds were Eskimo and other Indians. Population returned in 1880, 33,426; in 1890, 32,052; in 1900, 63,592, of whom approximately 48 % were whites, 46 % natives and 6 % Japanese and Chinese; (1910 census) 64,356. The Asiatics are employed in the salmon canneries. The natives of Alaska fall under four ethnologic races: the Eskimo or Innuit — of these the Aleuts are an off- shoot; the Haidas or Kaigani, found principally on Prince of Wales Island and thereabouts; the Thlinkits, rather widely distributed in the “Panhandle”; and the Tinnehs or Atha- pascans, the stock” race of the great interior country. In 1890 the pure-blooded natives numbered 23,531, of whom 6000 were Haidas, Thlinkits or other natives of the coastal region, 1000 Aleuts, 3400 Athapascans and 13,100 Eskimo. The natives have adopted many customs of white civilization, and on the Aleutians, and in coastal Alaska, and in scattered regions in the interior acknowledge Christianity under the forms of the Orthodox Greek or other churches. The rapid exhaustion in late years of the caribou, seals and other animals, once the food or stock- in-trade of the Aleuts and other races, threatens more and more the swift depletion of the natives. They have also felt the fatal influence of the liquor traffic. From 1893 to 1895 the United States expended $55,000 to support the natives of the Fur Seal Islands. This policy threatens to become a continued necessity throughout much of Alaska. There is a small government Indian reservation on Afognak Island, near Kodiak. The white population is extremely mobile, and few towns have an assured or definite future. The prosperity of the mining towns of the interior is dependent on the fickle fortune of the gold-fields, for which they are the distributing points. Sitka, Juneau (the capital) and Douglas, both centres of a rich mining district, Skagway, shipping point for freight for the Klondike country (see these titles), and St Michael, the ocean port for freighting up the Yukon, are the only towns apparently assured of a prosperous future. Wrangell (formerly Fort St Dionysius, Fort Stikine and

Fort Wrangell), founded in 1833, is a dilapidated and torpid little village, of some interest in Alaskan history, and of temporary importance from 1874 to 1877 as the gateway to the Cassiar mines in British Columbia. Its inhabitants are chiefly Thlinkit Indians.

Government. — Alaska, by an act of Congress approved the 7th of May 1906, received the power to elect a delegate to Congress. Before • this act and the elections of August 1906 Alaska was a governmental district of the United States without a delegate in Congress. Its administration rests in the hands of the various executive departments, and is partly exercised by a governor and other resident officials appointed by the president. It is a military district, a customs district (since 1868), is organ- ized into a land district, and constitutes three judicial divisions. In 1867-1877 the government was in the hands of the depart- ment of war, although the customs were from the beginning collected by the department of the treasury, with which the effective control rested from 1877 until the passage of the so- called Organic Act of 17th May 1884. This act extended over Alaska the laws of the state of Oregon so far as they should be applicable, created the judicial district and a land district, put in force the mining laws of the United States, and in general gave the administrative system the organization it retained up to the reforms of 1 899-1 900. The history of government and political agitation has centred since then in the demand for general land legislation and for an adequate civil and criminal law, in protests against the enforcement of a liquor prohibition law, and in agitation for an efficiently centralized administration. As the general land laws of the United States were not extended to Alaska in 1884, there was no means, generally speaking, of gaining title to any land other than a mining claim, and so far as any method did exist its cost was . absolutely prohibitive. After partial and inadequate legislation in 1891 and 1898, the regular system of land surveys was made applicable to Alaska in 1899, and a generous homestead law was provided in 1903. An

adequate code of civil and criminal law and provisions for civil government under improved conditions were provided by Con- gress in 1899 and 1900. The agitation over prohibition dates from 1868; the act of that year organizing a customs district

forbade the importation and sale of firearms, ammunition and distilled spirits; the Organic Act of 1884 extended this prohibition to all intoxicating liquors. The coast of Alaska offers exceptional facilities for smuggling, and liquor has always been very plentiful; juries have steadily refused to convict offenders, and treasury officials have regularly collected revenue from saloons existing in defiance of law. The prohibition law is still upon the statute-books. The chief weaknesses in the colonial administration of the territory, particularly prior to 1900 — but only to a slightly less extent since — have been decentralization and a lax civil service. The concomitants of these have been irresponsibility and inefficiency. The governor has represented the president without possessing much power; the department of war has had ill-defined duties; the department of justice has, in theory, had charge of the general law; the department of the interior has administered the land law; the agents of the bureau of education have superintended the stocking of Alaska with reindeer; the United States Fish Commission has investigated the condition of marine life without having powers. to protect it. The treasury department has charted the coasts, sought to enforce the prohibition law, controlled and protected the fur seals and fisheries, and incidentally collected the customs. Since the creation of the department of commerce and labour (1903), it has taken over from other departments some of these scattered functions. All in all, the government has proved itself without power to protect the most valuable industries of the district, and for many years there has been talk of a regular territorial government. The paucity of permanent residents and the poverty of the local treasury seem to make such a solution an impossible one.

History. — The region now known as Alaska was first explored by the Russian officers Captain Vitus Bering and Chirikov in 174 1. They visited parts of the coast between Dixon Entrance and Cape St Elias, and returned along the line of the Aleutians. Their expedition was followed by many private vessels manned by traders and trappers. Kodiak was discovered in 1763 and a settlement effected in 1784. Spanish expeditions in 1774 and 1775 visited the south-eastern coast and laid a foundation for subsequent territorial claims, one incident of which were the Nootka Sound seizures of 1789. Captain James Cook in 1778 made surveys from which the first approximately accurate chart of the coast was published; but it was reserved for Vancouver in 1 793-1 794 to make the first charts in the modern sense of the intricate south-eastern coast, which only in recent years have been superseded by new surveys. Owing to excesses committed

by private traders and companies, who robbed, massacred and hideously abused the native Indians, the trade and regulation of the Russian possessions were in 1799 confided to a semi-official corporation called the Russian-American Company for a term of twenty years, afterwards twice renewed for similar periods. A monopoly of the American trade had previously been granted in 1788 to another private company, the Sholikof. Alexander Baranov (1 747-1819); chief resident director of the American companies (1790-1819), one of the early administrators of the new company, became famous through the successes he achieved as governor. He founded Sitka (q.v.) in 1804 after the massacre by the natives of the inhabitants of an earlier settlement (1799) at an adjacent point. The headquarters of the company were at Kodiak until 1805, and thereafter at Sitka. In 1821 Russia attempted by ukase to exclude navigators from Bering Sea and the Pacific coast of her possessions, which led to immediate protest from the United States and Great Britain. This led to a treaty with the United States in 1824 and one with Great Britain in 1825, by which the excessive demands of Russia were relinquished and the boundaries of the Russian possessions were permanently fixed. The last charter of the Russian- American Company expired on the 31st of December 1861, and Prince Maksutov, an imperial governor, was appointed to administer the affairs of the territory. In 1864 authority was

granted to an American company to make explorations for a proposed Russo-American company's telegraph line overland from the Amur river in Siberia to Bering Strait, and through Alaska to British Columbia. Work was begun on this scheme in 1865 and continued for nearly three years, when the success of the Atlantic cable rendered the construction of the line unnecessary and it was given up, but not until important explorations had been made. In i854.a Californian company began importing ice from Alaska. Very soon thereafter the first official overtures by the United States for the purchase of Russian America were made during the presidency of James Buchanan. In 1867, by a treaty signed on the 30th of March, the purchase was consum- mated for the sum of $7,200,000, and on the 18th of October 1867 the formal transfer of the territory was made at Sitka.

Since its acquisition by the United States the history of Alaska has been mainly that of the evolution of its administrative system described above, and the varying fortunes of its fisheries and sealing industries. Since the gold discoveries a wonderful

advance has been made in the exploration of the country. A military reservation has been created with Fort Michael as a centre. The two events of greatest general interest have been the Fur Seal Arbitration of 1893 (see Bering Sea Arbitration), and the Alaska- Canadian boundary dispute, settled by an international tribunal of British and American jurists in London in 1903. The boundary dispute involved the interpretation of the words, quoted above, in the treaties of 1825 and 1867 defining the boundary of the Russian (later American) possessions, and also the determining of the location of Portland Canal, and the question whether the coastal girdle should cross or pass around the heads of the fjords of the coast. The tribunal was an adjudication board and not an actual court of arbitration, since its function was not to decide the boundary but to settle the meaning of the Anglo- Russian treaty, which provided for an ideal (and not a physical) boundary. This boundary did not fit in with geo- graphical facts; hence the adjudication was based upon the motive of the treaty and not upon the literal interpretation of such elastic terms as " ocean," " shore " and " coast-line." The award of the tribunal made in October 1903 was arrived at by the favourable vote of the three commissioners of the United States and of Lord Alverstone, whose action was bitterly resented by the two Canadian commissioners; it sustained in the main the claims of the United States.

Authorities. — W. H. Dall and M. Baker, " List of Charts, Maps, and Publications relating to Alaska," in United States Pacific Coast Pilot, 1879; Monthly Catalogue United States Public Documents, No. 37 (1898), and Bulletin 227, United States Geological Survey (1904), for official documents; H. H. Bancroft, Alaska 1730-1885, PP- 595 _ 6o9; and various other bibliographies in titles mentioned below, especially in Brooke's The Geography and Geology of Alaska.

General. — United States Monthly Summary of Commerce and Finance, July 1903, "Commercial Alaska, 1867-1903. Area, Popula- tion, Productions, Commerce ... "; W. H. Dall, Alaska and its Resources (Boston, 1870); C. Sumner, Speech on "Cession of Russian- America to the United States," in Works, vol. xi. (Boston, 1875) ; C. H. Merriam, editor, Harriman Alaska Expedition (New York, 1901-1904, 3 vols.).

Physiography and Climate. — United States Department of War, Explorations in Alaska, 1869-1900 (Washington, 1901); United States Geological Survey, Annual Reports since 1897- — "The

Geography and Geology of Alaska : A Summary of Existing Knowledge," by Alfred H. Brooks (Washington, 1906; Professional Paper, No. 45), with various maps (see National Geographic Mag., May 1904, for a map embodying all knowledge then known) ; " Altitudes in Alaska " (Bulletin 169, by H. Gannett) ; " Geographic Dictionary of Alaksa " (Bulletin 299, Washington, 1906), by M. Baker; United States Post Office, " Map of Alaska " (1901); United States Coast and Geodet.ic Survey, Bulletins and maps; Bulletin American Geographical Society, February 1902, F. S. Schrader, " Work of the United States Geological Survey in Alaska "; Journal of Franklin Institute, October and November 1904, W. R. Abercrombie — " The Copper River Country of Alaska "; I. C. Russell, Glaciers of North America.

Industries. — United States Census, 1880, Ivan Petroff, Report on the Population, Industries and Resources of Alaska; United States Census, 1890 and 1900; on reindeer, Fifteenth Annual Report on Introduction of Domestic Reindeer into Alaska, by Sheldon Jackson (Washington, 1906) ; on agriculture, United States Department of Agriculture, Experiment Stations, Bulletin Nos. 48, 62, 82 . . . (1898-1900) ; Seal and Salmon Fisheries and General Industries of

Alaska, 1868-1895 (Washington, 1898) (United States Treasury, also 55 Congress, I Session, House Document 92, vols, vi.-x.), 4 vols. ; D. S. Jordan et al., The Fur Seals and Fur Seal Islands (or Report of the Fur Seal Investigation, 1896-1897 (Washington, 1898), 4 vols. ; also many special reports on the seals published by the United States Treasury; for Report of British seal experts, Great Britain, Foreign Office Correspondence, United States, No. 3 (1897), No. 1 (1898).

History and Government. — H. H. Bancroft, Alaska, 1730-ˆ188$ (San Francisco, 1886); W. H. Dall, "Alaska as it was and is, 1865-1895," in Bulletin of the Philadelphia Society of Washington, xiii.; Governor of Alaska, Annual Report to the Secretary of 4he Interior; Fur Seal Arbitration, Proceedings (Washington, 1895, 16 vols.) ; also Great Britain, Foreign Office Correspondence, United States, Nos. 6, 7, 8 (1893), No. 1 (1895) ; Alaskan Boundary Tribunal, Cases, Counter-cases, Arguments, Atlases of United States and Great Britain (Washington, 1903

seq.) ; and a rich periodical literature.

Population, Natives. — United States National Museum, Ann. Report (1896); W. Hough, ” Lamp of the Eskimo ” (long, and of general interest) ; F. Knapp and R. L. Childe, The Thlinkeets of South-Eastern Alaska (Chicago, 1896).

ALASSIO, a town of Liguria, Italy, on the N.W. coast of the Gulf of Genoa, in the province of Genoa, 57 m. S.W. of the town of the same name by rail. Pop. (1901) 5630. It is mainly noticeable as a health resort in winter and a bathing-place in summer, and has many hotels. The anchorage is safe, and the bay full of fish; the harbour has a certain amount of trade. The old town contains one or two interesting churches, and commands a fine view.

ALASTOR, in Greek mythology, the spirit of revenge, which prompts the members of a family to commit fresh crimes to obtain satisfaction. These crimes necessitate further acts of vengeance, and the curse is thus transmitted from generation to generation. The word is also used for a man’s evil genius, which drives him to sin without any provocation; a man so driven is sometimes called Alastor. The epithet is applied to Zeus and the Erinyes as the deities of revenge and punishment.

ALA-TAU (” Variegated Mountains “) , the name of six mountain ranges in Asiatic Russia. Three of these are in the government of Semiryechensk in Central Asia, all belonging to the Tian- shan system: — (1) the Terskei Ala-tau, south of and parallel to the lake of Issyk-kul; (2) the Kunghei Ala-tau, and (3) the Trans-Ili Ala-tau, both N. of and parallel to the same lake; and (4) the Dzungarian Ala-tau, lying N. of the Hi depression. The first three link together the Tian-shan and the Alexander Range. Their mean elevation is 6000-7000 ft. ; their culminating point, Talgar, on a transverse ridge between (2) and (3), reaches 15,000 ft.; the limits of perpetual snow run at 11,000-11,700 ft. The Dzungarian Ala-tau reach a maximum altitude of 11,000 ft. and have a mean altitude of 6250 ft. From the middle of the Alexander Range another range (5) called Ala-tau, or Talastau, strikes west by south. The name Ala-tau also enters into the designation of (6), a range between the upper Yenisei and the upper Ob, in the government of Tomsk, namely, the Kuznetsk Ala-tau, forming an outlier of the Altai Mountains, and reaching 6000-7000 ft. in altitude.

ALAUNA, ALAUNUS, the Celtic names of two rivers, &c, in Roman

Britain. Hence the modern Allan Water, river Alyn, &c.

ALAVA, DON MIGUEL RICARDO DE (1770-1843), Spanish general and statesman, was born at Vittoria in 1770. He served first in the navy, and had risen to be captain of a frigate when he exchanged into the army, receiving corresponding rank. He was present as a marine at the battle of Trafalgar on board the flagship of his uncle Admiral Alava. In politics he followed a very devious course. At the assembly of Bayonne in 1808 he was one of the most prominent of those who accepted the new constitution from Joseph Bonaparte as king of Spain. After the national rising against French aggression, and the defeat of General Dupont at Bailen in 1808, Alava joined the national independent party, who were fighting in alliance with the English. The Spanish Cortes appointed him commissary at the English headquarters, and the duke of Wellington, who regarded him with great favour, made him one of his aides-de- camp. Before the close of the campaign he had risen to the rank of brigadier-general. On the restoration of Ferdinand, Alava was cast into prison, but the influence of his uncle Ethenard,

the inquisitor, and of Wellington secured his speedy release. He soon contrived to gain the favour of the king, who appointed him in 181 5 ambassador to the Hague. It was therefore his remarkable fortune to be present at the battle of Waterloo with Wellington's staff. He is supposed to have been the only man who was present at both Waterloo and Trafalgar. Four years later he was recalled owing, it is said, to the marked kindness he had shown to his banished fellow-countrymen. On the breaking out of the revolution of 1820 he was chosen by the province of Alava to represent it in the Cortes, where he became conspicuous in the party of the Exaltados, and in 1822 was made president. In the latter year he fought with the militia under Francisco Ballesteros and Pablo Murillo to maintain the authority of the Cortes against, the rebels. When the French invested Cadiz, Alava was commissioned by the Cortes to treat with the due d'AngoulSme, and the negotiations resulted in the restoration of Ferdinand, who pledged himself to a liberal policy. No sooner had he regained power, however, than he ceased to hold himself bound by his promises, and Alava found it necessary to retire first to Gibraltar and then to England. On the death of Ferdi- nand he returned to Spain, and espousing the cause of Maria Christina against Don Carlos was appointed ambassador to London in 1834 and to Paris in 1835. After the insurrection of La Granja he refused to sign the constitution of 181 2, declar- ing himself tired

of taking new oaths, and was consequently obliged to retire to France, where he died at Bareges in 1843. Frequent and honourable mention of Alava is made in Napier's History of the Peninsular War, and his name is often met both in lives of the duke of Wellington and in his correspondence.

ALAVA, one of the Basque Provinces of northern Spain; bounded on the N. by Biscay and Guipuzcoa, E. by Navarre, S. by Logrofio, and W. by Burgos. Pop. (1900) 96,38s; area 1 1 75 sq. m. The countship of Trevino (190 sq. m.) in the centre of Alava belongs to the province of Burgos. The surface of Alava is very mountainous, especially on the north, where a part of the Pyrenees forms its natural boundary. It is separated from Logrofio by the river Ebro, and its other rivers are the Zadorra and the Ayuda. The climate is mild in summer, fitful in autumn and spring, and very cold in winter, as even the plains are high and shut in on three sides by mountains snow-clad during several months. The soil in the valleys is fertile, yielding wheat, barley, maize, flax, hemp and fruits. Oil and a poor kind of wine called chacoli are also produced. Many of the mountains are clothed with forests of oak, chestnuts, beeches and other trees, and contain iron, copper, lead and marble. Salt is also found in large quantities; but mining and quarrying are not practised on a large scale; only lead, lignite and asphalt being worked. There are mineral waters in many places. Other local industries of some importance include smelting, and manufactures of beds, furniture, railway carriages, matches, paper, sweets and woollen and cotton goods. .Bread-stuffs, colonial products and machinery are largely imported. Few provinces in Spain are inhabited by so laborious, active and well-to-do a population. The primary schools are numerously attended, and there are very good normal schools for teachers of both sexes, and a model agricultural farm. The public roads and other works of the province are excellent, and, like those of the rest of the Basque provinces, entirely kept up by local initiative and taxes. Railways from Madrid to the French frontier, and from Saragossa to Bilbao, cross the province. The capital is Vitoria (pop. 1900, 30,701), which is the only town with more than 3500 inhabitants.

For a fuller account of the history, people and customs of Alava, see Basques and Basque Provinces, with the works there cited. A very elaborate bibliography is given in the Cdtalogo de las obras referentes d las provincias de Alava y Navarra, by A. A. Salazar (Madrid, 1887.) The following books by J.J. Landazuri y Romarate contain much material for a provincial history: —

Historia ecclest- astica, &c. (Pamplona, 1797); Historia civil, &c. (Vitoria, 1798); Compendios historicos de la ciudad y villas de . . . Alava, &c. (Pamplona, 1798); Suplemento a los cuatro libros de la historia de

. . . Alava (Vitoria, 1799); and Los varones illustres Alavenses (Vitoria, 1798). See also M. Risco in vol. 33 of Hispania Sagrada, by H. Florez, &c. (Madrid, 1754-1879).

ALB (Lat. alba, from albus, white), a liturgical vestment of the Catholic Church. It is a sack-like tunic of white linen, with narrow sleeves and a hole for the head to pass through, and when gathered up round the waist by the girdle {cingtdum) just clears the ground. Albs were originally quite plain, but about the ioth century the custom arose of ornamenting the borders and the cuffs of the sleeves with strips of embroidery, and this became common in the 12th century. These at first encircled the whole border; but soon it became customary to substitute for them square patches of embroidery or precious fabrics. These ” parures ” ” apparels ” or ” orphreys ” (Lat. parurae, grammata, aurifrisia, &c), were usually four in number, one being sewn on the back and another on the front of the vestment just above the lower hem, and one on each cuff. When, as occasionally happened, a fifth was added, this was placed on the breast just below the neck opening. These ” apparelled albs ” (albae paratae) continued in general use in the Western Church till the 1 6th century, when a tendency to dispense with the parures began, Rome itself setting the example.

The growth of the lace industry in the 17th century hastened the process by leading to the substitution of broad bands of lace as decoration; occasionally, as in a magnificent specimen preserved at South Kensington, nearly half the vestment is thus

TV

i.e-s-tf.M.JI.ROy!«oi

>£.’,:& ■■l.v.tflOiyX

1 ‘I

***$B**

1.

,

‘

“

^^■^

_^~ < ~^

^r

y

****

1

1

/

****

l

/

‘

‘

i

‘

1

l

Vn

****

k

1 11

W

/’

- **1**

W

1

**• **

/

‘

****

/

|

****

/

1

****

/

;

\

!|?1^5|2

3

Apparelled Alb in the South Kensington Museum.

From Eraun's Liturgische Gewandung.

composed of lace. ,At the present time, so far as the Roman Catholic Church is concerned, apparelled albs are only in regular use at Milan (Ambrosian Rite) , and, partially, in certain churches in Spain. The decree of the Congregation of Rites (May 18, 1819) says nothing about apparels, but only lays down that the alb must be of white linen or hemp cloth. There is no definite rule as to the material or character of the ornamentation, and attempts have been made, especially in England, to revive the use of the apparelled alb.

In the Roman Church the alb is now reckoned as one of the vestments proper to the sacrifice of the Mass. It is worn by bishops, priests, deacons and subdeacons under the other eucharistic vestments, either at Mass or at functions connected with it. It is sometimes also worn by clerics in minor orders, whose proper vestment is, however, the surplice — itself a modification of the alb (see Surplice). The alb is supposed to be symbolical of purity, and the priest, when putting it on, prays: " Make me white and purify my heart, O Lord," &c. In the middle ages the parures, which originally had no mystic intention whatever, were taken to symbolize the wounds of Christ; whence probably is derived the custom surviving at the cathedral of Toledo, of the singers of the Passion on Good Friday being vested in apparelled albs.

In England at the Reformation the alb went out of use with the other " Mass vestments," and remained out of use in the Church of England until the ritual revival of the 19th century. It is now worn in a considerable number of churches not only

by the clergy but by acolytes and servers at the Communion. Where the ritual, as in most cases, is a revival of pre-Reformation uses and not modelled on that of modern Rome, these albs are frequently apparelled. For the question of its legality see Vestments.

Both the alb and its name are derived ultimately from the tunica alba, the white tunic, which formed part of the ordinary dress of Roman citizens under the Empire. As such it was worn both in and out of church, the few notices remaining which suggest a special tunic for ministers at the Eucharist merely implying that it was not fitting to use for so sacred a function a garment soiled by everyday wear. The date of its definite adoption as a liturgical vestment is uncertain; at Rome — where until the 13th century it was known as the linea or camisia (cf. the modern Italian camice for alb)— it seems to have been thus used as early as the 5th century. But as late as the 9th and ioth centuries the alba is still an everyday as well as a liturgical garment, and we find bishops and synods forbidding priests to sing mass in the alba worn by them in ordinary life (see Braun, p. 62). Throughout the middle ages, moreover, the word alba was somewhat loosely used. In the medieval inventories are sometimes fouifd albae, described as red, blue or black; which has led to the belief that albs were sometimes not only made of stuffs other than linen, but were coloured. It is clear, however, from the descriptions of these vestments that in some cases they were actually tunicles, the confusion of terms arising from the similarity of shape (see Dalmatic); in other cases the colour applied to the parures, not to the albs as a whole. Silk albs appear in the inventories, but only very exceptionally.

The equivalent of the alb in the ancient Churches of the East is the sticharion {anxapvov) of the Orthodox Church (Armenian shapik, Syrian Kutina, Coptic stoicharion or tuniah). It is worn girdled by bishops and priests in all rites, by subdeacons in the Greek and Coptic rites. By deacons and lectors it is worn un-girdled in all the rites. The colour of the vestment is usually white for bishops and priests (this is the rule in the Coptic Church); for the other orders there is no rule, and all colours, except black, may be used. Its material may be linen, wool, cotgm or silk; but silk only is the rule for deacons. In the Armenian and Coptic rites the vestment is often elaborately embroidered; in the other rites the only ornament is a cross high in the middle of the back, save in the Case of bishops of the Orthodox Church, whose sticharia are ornamented with two vertical red stripes (irorajuoi, “rivers”). In the East as in the West the vestment is specially associated with the ritual of the Eucharist.

The whole subject is exhaustively treated by Father Joseph Braun in Die liturgische Gewandung (Freiburg im Breisgau, 1907). See

also bibliography to the article Vestments.

ALBA, a town and episcopal see of Piedmont, Italy, on the river Tanaro, in the province of Cuneo. From the town of the same name it is 33 m. N.E. direct; it is 42 m. S.S.E. of Turin by rail. Pop. (1901) 13,900. It contains a fine cathedral, with a Gothic facade, reconstructed in i486, and is an important commercial centre. It occupies the site of the ancient Alba Pompeia, probably founded by Pompeius Strabo (consul 89 B.C.) when he constructed the road from Aquae Statiellae (Acqui) to Augusta Taurinorum (Turin). Probably this was the road taken by Decimus Brutus when he succeeded, after the raising of the siege of Mutina in 43 B.C., in occupying Pollentia just before Mark Antony's cavalry came in sight. Alba was the birthplace of the emperor Pertinax. It became an episcopal see dependent on Milan in the 4th century. A small museum of local antiquities was established in 1897.

See F. Eusebio in AM del Congresso Internazionale di Scienze Storiche (Rome, 1904), vol. v. p. 485.

ALBACETE, an inland province of south-eastern Spain, formed in 1833 out of the northern half of Murcia, and bounded on 'the N. by Cuenca, E. by Valencia and Alicante, S. by Murcia, and W. by Granada and Jaen. Fop. (1900) 237,877; area 5737 sq. m. The northern part of Albacete belongs to the high plains of New Castile, the southern is generally mountainous,

traversed by low ranges or isolated groups of hills, which culminate in the Sierra de Alcaraz on the borders of Granada, where several summits reach 5000 ft. Besides many smaller streams, two large rivers water the province, the Segura in the souths west, and the Jucar in the north-east; both rising beyond the borders of Albacete, and ultimately flowing into the Mediterranean. The fertile glens of the Alcaraz district are richly wooded, and often, from their multitude of fruit trees, resemble the huertas or gardens of Alicante; but broad tracts of land are destitute of trees, and suitable only for pasture. These barren regions are thinly peopled; and for the whole of Albacete the density of population (41-3 per sq. m. in igoo) is lower than in any other Spanish province, except Soria.

The climate is generally mild and healthy, although, among the higher mountains, the snow lies for several months. Wheat and other cereals are cultivated, with fruits of many kinds, olives, and vines which yield a wine of fair quality; while saffron is largely produced, and some attention is given to the keeping of bees and silkworms. Stock-farming, for which the wide plains afford excellent opportunities, employs many of the peasantry; the bulls of Albacete are in demand for bull-fighting, and the horses for mounting the Spanish cavalry> There is also a good breed of mules. Sulphurous and other mineral springs, both hot and cold, exist in several districts, arid deposits of silver, iron, copper, sulphur, coal and other minerals have been dis- covered ; but' the exploitation of these is retarded by lack of communications, and, apart from building materials, sulphur and salt, the actual output is insignificant. Manufactures are almost confined to the spinning of hemp, and the making of coarse cloth, porcelain, earthenware and cutlery. Brandy distilleries are numerous, and there is some trade in wdodj but no local industry can rival agriculture and stock-breeding, which furnish the bulk of the exports. Albacete (pop. 1900,: 2i,5r2), the capital, and the other important towns of Almansa ; (11,180) and Hellfn (12,558), are described under separate headings. Alcaraz, which gives its name to the mountain range already mentioned, is a picturesque old town with the ruins of a Moorish castle, and a fine Roman aqueduct; pop.! (1900) 4501. Caudete (5913), Chinchilla, or Chinchilla de Monte-Arˆgon (6680), La Roda (7066), Tobarra (7787), Villarrobledo (10,125) and Yeste (6591) are important markets for the sale of agri- cultural produce. The railway from Madrid to Albacete passes' south-westward to Chinchilla, where it bifurcates, one line going to Murcia, and the other to Alicante. A large part of the province is only accessible by road, and even the main highways maintained by the state are ill kept. Education is very back- ward even in the towns; many of the inhabitants carry arms; and crimes of violence are not infrequent. ••-"

ALBACETE, the capital of the above province, on the Madrid-Alicante railway, and at the confluence of the river Balazote with the canal of Maria Christina, which flows into the river Jucar, 16 m. N. Pop. (1900) 21,512. Albacete comprises the pictur- esque old upper town and the new or lower town, with law- courts, schools, barracks, hospitals, a council-hall, a bull-ring and other modern buildings, mostly erected after the city became a provincial capital in 1833. It is surrounded by a fertile plain; and

has considerable trade in saffron and agricultural produce. A great market, chiefly for the sale of cattle, is held annually in September, and extends over several days. The manufacture of matches is aided by the existence of sulphur workings in the vicinity; and Albacete formerly had an extensive trade in cutlery, from which it was named the Sheffield of Spain. De- spite the importation of cutlery from England and Germany, Albacete is still famous for its daggers, which arc held in high repute by Spaniards. They are formidable weapons, of coarse manufacture, but with richly ornamented handles; and they frequently bear proverbial inscriptions suitable to their murder- ous appearance.

ALBA FUCENS (mod. Albe), an ancient Italian town occupy- ing a lofty situation (3347 ft.) at the foot of the Monte Velino, 4 m. N. of Avezzano. It was originally a town of the Aequi, though on the frontier of the Marsi, but was occupied by a

Roman colony (304 B.C.) owing to its strategic importance,,; it lay on a hill just to the north of the Via Valeria, which was probably prolonged beyond Tibur at this very period, : In the Second Punic war Alba at first remained faithful, but after- 4 wards refused to send contingents and was punished. After this it became: a regular place of detention for important state, prisoners, such as Syphax of Numidia, Perseus of Macedonia, Bituitus, king of the Arverni. It was attacked by the allies in the Social War, but remained faithful to Rome; and its strong position rendered it a place of some importance in the civil wars. Its prosperity, in the imperial period, can only be inferred from the number of inscriptions found there. It is chiefly remarkable for its finely preserved fortifications. The external walls, which > have a circuit of about 2 m., are constructed of polygonal masonry; the blocks are carefully jointed, and the faces smoothed. With our present knowledge of such constructions/ their date cannot' certainly be determined. They are not pre- served to any very considerable height; but the arrangement of the gates is dearly traceable; as a rule they come at the; end of a long, straight stretch of wall, and are placed so as ;to leave the right side of any attacking force exposed.. On the < north there is, for a length of about 150 yds. a triple line of defences of later date (possibly added by the Rotnan colonists), inasmuch as both the city wall proper* and the double wall thrown out in front of it 'are partly constructed of concrete, and facet! with finer polygonal masonry (in which horizontal joints i.seem to be purposely avoided). A mile to the north of the city a huge mound with a ditch on each side of it (but at a considerable distance

from it) }nay be traced .for a couple of miles. Within the walls there are hardly any;1buildings of a later date. Ex- cavations have only been made casually, though remains of buildings and ofjxoads can be itraced, and also an extensive system of underground passages perhaps connected with the defences of the 1 pTjace. The hill; at the western extremity was occupied by a teniple of the Tuspan order, into, which was built the church of S.> ; ‘ Pietro; this contains ancient columns, and some remarkably fine specimens of Cosmatesque vork. It is the only mohastip church in the Abruzzi in which the nave is separated from the aisles by antient columns.; Th collegiate church of S; Nicojta in the village contains a remarkable stauro- theca of the nth (?) century, and a warden triptych iri imitation of the Byzantine style with ‘enamels of the i3tK century.

A very good description of the site, with’ plans, is given by C. Promis, L’Antichita di Alba Fueense (Rome/ i#£$j. (T. As.)

ALBA LONGA, an ancient city of Latiuin, situated on the western edge of the Albanus Lacus, about 12 m. S.E< of Rome,, It was/ according to tradition, founded by Ascaiiius’, and wists’thei oldest of all Latin cities— the mother indeed of Rome, bjt/ whicflji however; it was destroyed, it is said under Tullus Hostilius; ,Byi this act Rome succeeded to the hegemony of the Latin league. It has by many topographers been placed between the Albanusi Mans and the Albanus Lacus, according to the indication: ;given. by DionysiUs (i. 66), at the monastery of Palazzolo; but tie: position is quite unsuitable for an ancient city, and does’ not at. all answer to Livyf’s description, ab situ porreclae in dorso itrbis- Alba longa appdlata; and it is much more probable that its site is to be sought on the western side of the lake, where the modern! Castel Gandolfo stands, immediately to the north of which the, most important part of the archaic necropolis was situated. Confirmation of this may be found in Cicero’s description {Pro Milone, 85) of the destruction of the shrines and sacred groves of Alba by the construction of Clodius’s villa, in the local applica- tion of the adjective Albanus, and in the position of Castel Gandolfo itself, which exactly suits Livy’s description. JNI0 traces of the ancient city, except of its necropolis, the tombs of which are overlaid with a stratum of peperino 3 ft. thick, are. preserved. The view that the modern Albano occupies the site of Alba Longa was commonly held in the 15th and 16th centuries, but was disproved by P: Cluver (1624). But it is certain that no city took the place of Alba Longa until comparatively late times. The name Albanum, from about 150

B.C. till the time of .Colli stan tine, meant a villa in the Alban territory. The emperort

formed a single estate out of a considerable part of this district, including apparently the whole of the lake, and Domitian was especially fond of residing here. The imperial villa occupied the site of the present Villa Barberini at Castel Gandolfo, and considerable remains of it still exist. To the south was a camp for the imperial bodyguard, with baths, an amphitheatre, a large water reservoir, &c. The first legion known to have been quartered there is the 77. Parthica, founded by Septimius Severus; but it was probably constructed earlier. In some of the tombs of these legionaries coins of Maxentius have been found, while the Liber Pontificalis records that Constantine gave to the church of Albano " omnia scheneca deserta vel domos intra urbem Albanensem," which has generally been taken to refer to the abandoned camp. It was at this period, then, that the civitas Albanensis arose. The lapis Albanus is a green grey volcanic stone with black and white grains in it (hence the modern name, peperino), much used for building material. See T. Ashby in Journal of Philology, xxvii., 1901, 37. (T. As.) ALBAN, SAINT, usually styled the protomartyr of Britain, is said to have been born at Verulamium (the modern St Albans in Hertfordshire) towards the close of the 3rd century, and to have served for seven years in Rome in the army of the emperor Diocletian. Qn his return to Britain he settled at his native place and was put to death as a Christian during the persecution of Diocletian (c. 286-303) . According to tradition, when peace was restored, great honours were paid to his tomb. A church was built on the spot, c. 793, by King Offa of Mercia. A monastery was subsequently added, and around it the present town of St Albans gradually grew up. Pope Adrian I.V., who was born in the neighbourhood, conferred on the abbot of St Alban's the. right of precedence over his fellow abbots, a right hitherto attached to the abbey of Glastonbury. St Alban is commemorated in the Roman martyrology on the 22nd of June; but it is impossible to determine with certainty whether he ever existed, as no mention of him occurs till the middle of the 6th century. 1 ,

See U. Chevalier, Repertoire des sources historiques (1905) , i,' 95; D. Hardy, Descriptive Catalogue (1862) , I. i. 3-34, ii. 688- ,■'

ALBANI, or Albano, FRANCESCO , Italian painter, was born at Bologna. His father was a silk merchant, and intended to bring up his son to the same occupation; but Albani was already, at the age of twelve, filled with sostrong an inclination for painting, that on the: death of his father he devoted himself entirely, to ait. His first master. was Denis Cplyert, rwith whom Guido Reni was at the same time a pupil. He was soon left by Calvert entirely to the care of Guido, and contracted with him a close friendship. He followed Guido to, the school of the Caracci; but after this, owing to mutual rivalry, their .friendship began gradually to cool. They kept up for a. long time a keen competition, and their mutual emulation called forth some of their best productions. Notwithstanding this rivalry, they still spoke of each other with the highest esteem. Albani: after having greatly improved himself in the school of the Caracci, went to Rome, where he opened an academy and resided for many years. Here he painted, after the designs of Annibal Caracci, the whole of the frescoes in the chapel of San Diego in the church of San Giacomo degli Spagnuoli. His best frescoes are those on mytho logical subjects, of which there is a large number in the Verospi, now Torlonia Palace. On the death of his wife he returned to Bologna, where he married a second time and resided till his death. His wife and children, were very beautiful and served him for models. The learning displayed in the composition of his pictures, and their minute elaboration and exquisite finish, gave them great celebrity and entitle them to a , distinctive place among the products of the Bolognese school. A number of his works are at Bologna, and others at Florence, the. Louvre, Dresden and St Petersburg. Among the best of his sacred subjects are a “St Sebastian” and an “Assumption, of the Virgin,” both in the church of St Sebastian at Rome. He was among the first of the Italian painters to devote himself to the painting of cabinet pictures. A rare etching, the’ “Death of Dido,” is attributed to him.

ALBANI, the stage name of Marie Louise Emma Cecile

1. i

Lajeunesse (1847-), Canadian singer, who was born at Chambly, in the province of Quebec, on the 27th of September 1847. She made her first public appearance in Montreal, at the age of seven, and afterwards studied in the United States, Paris and Italy. In 1870 she made her first appearance atMessina, and after two successful seasons appeared in London in 1872 with the

Royal Italian Opera. Later she abandoned opera for oratorio, and sang at all the principal festivals. She has made several tours of Canada and of the United States, and in 1886 sang at the opening of the Colonial and Indian Exhibition in London the ode written by Tennyson for the occasion. She frequently sang before Queen Victoria, the German emperor and others of the crowned heads of Europe, and received numerous marks of their esteem: In 1897 she was awarded the gold Beethoven medal by the London Philharmonic Society, " as a mark of appreciation of her exceptional genius and musical attainments, and of her generous and artistic nature." She married in 1878 Ernest Gye, the theatrical manager. Her stage name of Madame Albani was taken from that of an extinct Italian family. • See Morgan, Canadian Men and Women of the Time (1898).

ALBANIA, the ancient name of a district in the eastern Caucasus, consisting, according to Stfabo (xi. 4. 1-8), of the valiej of the Cyrus (Kur) and the land lying between it and the Caucasus range from Iberia to. the Caspian Sea, i. e. the modern Shirvan. In reality the Albani inhabited also the mountain valleys and the land to the north towards Sarmatia, the modern Daghestan (Pliny ,vi. 39). Dionysius of Halicarnassus quotes a tradition that the name arose from the alleged fact that the people were the descendants of emigrants from Alba in Italy, but it would seem that the race was of Lesghian (not Georgian) descent. Strabo describes them as tall, well made, and in character simple and honest; he says that payment was in kind and that the people could not count beyond a hundred. They worshipped the sun, and more particularly the moon, the latter being perhaps identical with the great Nature Goddess of Asia Minor (see Great Mother OS the Gods), and believed in soothsaying and the virtue of human. sacrifice. Old age was held in high honour, but it was sacrilege to speak, or .even to think, of the dead. The race was nomadic, and lived on the abundant natural fruits of the land. In Strabo's time they appear to have been ruled by a single king, though previously there were twenty-six, each one ruling over a community distinct only in point of language. The Albani became known to the Romans during Pompey's pursuit of Mithradates the Great (65 B.C.), against which they are said to have opposed a force of 60,000 foot and 20,000 cavalry. Pompey exacted from them a nominal submission, but their independence was not seriously affected by the Romans. In the reign of Hadrian their territory was invaded by the Alani (Th. Mommsen, Provinces of the Roman Empire, Eng. trans., 1886), and later they fell under

the Sassanid rule* They were driven finally into Armenia by the Khazars, and ceased to exist as a separate people. The district subsequently suffered under the successive invasions of Huns, Varangians (who captured the chief town Barda in the 10th century) and Mongols. (See Caucasia, History; Armenia.)

ALBANIA, a portion of the Turkish empire extending along the western littoral of the Balkan Peninsula from the southern frontier of Montenegro to the northern confines of Greece. Albania is perhaps the least-known region in Europe; and though more than a hundred years have passed since Gibbon described it as “a country within sight of Italy, which is less known than the interior of America,” but little progress has yet been made towards a scientific knowledge of this interesting land and its inhabitants. The wild and inaccessible character of the country, the fierce and lawless disposition of the people, the difficulties presented by their language and their complex social institutions, and the inability of the Turkish authorities to afford a safe conduct in the remoter districts, combine to render Albania almost unknown to the foreign traveller, arid many of its geographical problems still remain unsolved. A portion of the Mirdite region, the Mat district, the neighbourhood of Dibra, Jakova and Ipek and other localities have never been

thoroughly explored. The northern boundary of Albania underwent some alteration in consequence of the enlargement of Montenegro, sanctioned by the Berlin Treaty (July 13, 1878); owing to subsequent arrangements providing for the cession of Dulcigno to Montenegro (November 25, 1880) in exchange for the districts of Plava and Gusinye, restored to Turkey, the frontier-line (finally settled December 1884) now ascends the Boyana from its mouth to Lake Sass (Shas), thence passes north- ward, and crossing Lake Scutari separates the district of Kutch Kralna on the N. from the territories of the Gruda, Hot and Klement tribes on the S.; leaving Gusinye and Plava to the S.E., it turns to the N.W. on reaching the Mokra Planina, arid then follows the course of the Tara river. On the S., Albanian territory was curtailed owing to the acquisition of the Arta district by Greece (May 1881), the river Arta now forming the frontier. On the E. the chains of Shar, Grammos and Pindus constitute a kind of natural boundary, which does not, however, coincide with

ethnical limits nor with the Turkish administrative divisions. North-eastern Albania forms part of the Turkish vilayet of Kossovo; the northern highlands are included in the vilayet of Shkodra (Scutari), the eastern portion of central Albania belongs to the vilayet of Monastir, and the southern distri cts are comprised in the vilayet of Iannina. The boundaries of the three last-named vilayets meet near Elbassan. The name Albania (in the Tosk dialect Arberia, in the Gheg Arbenia), like Albania in the Caucasus, Armenia, Albany in Britain, and Auvergne {Arvenia) in France, is probably connected with the root alb, alp, and signifies " the white or snowy uplands."

Physical Features. — The mountain system is extremely complex, especially that of the northern region. On the E. the great Shar range, extending in a south-westerly direction from the neighbourhood of Prishtina to that of Dibra, is continued towards the S. by the ranges of Grammos and Pindus; the entire chain, a prolongation of the Alpine systems of Bosnia and Dalmatia, may be described as the backbone of the peninsula; 1 it forms , the watershed between the Aegean and the Adriatic, and cul- minates in the lofty peak of Liubotrn, near Kalkandele, one of the highest summits in south-eastern Europe (8858 ft.). The country to the west of this natural barrier may be divided , geographically into three districts — northern, centfal and southern Albania. The river Shkumb separates the northern from the central district, the Viossa the central from the southern. The highland region of northern Albania is divided into two portions by the lower course of the Drin; the mountains of the northern portion, the Bieska Malziis, extend in a confused and broken series of ridges from Scutari to the valleys of the Ibar and White Drin; they comprise the rocky group of the Prokletia, or Accursed Mountains, with their numerous ramifica- tions, including Mount Velechik, inhabited by the Kastrat and Shkrel tribes, Bukovik by the Hot, Golesh by the Klement, Skulsen (7533 ft.), Baba Vrkh (about 7306 ft.), Maranay near Scutari, and the Bastrik range to the east. South of the Drin is another complex mountain system, including the highlands inhabited by the Mirdites and the Mat tribe; among the principal summits are Deia Mazzuklit, Mal-i Vels, Kraba, Toli and Mnela. Central Albania differs from the northern and southern regions in the more undulating and less rugged character of its surface; it contains considerable lowland tracts, such as the wide and fertile plain of Musseki, traversed by the river Simen. The principal summit is Tomor (7916 ft), overhanging the town of Berat. Southern Albania, again, is

almost wholly mountainous, with the exception of the plains of Iannina and Arta; the most noteworthy feature is the rugged range of the Tchika, or Khimara mountains, which skirt the sea-coast from south-west to north- east, terminating in the lofty promontory of Glossa (ancient Acroceraunia) . Farther inland the Mishkeli range to the north- east of Lake Iannina and the Nemertzika mountains run in a parallel direction. In the extreme south, beyond the basin of the Kalamas, the mountains of Suli and Olyzika form a separate group. The rivers, as a rule, flow from east to west; owing to the rapidity of their descent none are navigable except the Boyana and Arta in their lower courses. The principal rivers

are the Boyana, issuing from Lake Scutari, and consequently regarded as a continuation of the Montenegrin Moratcha, the Drin, formed by the confluence of the White and Black Drin, which, flowing respectively to the south and north through a long valley at the foot of the Shar range, take a westerly direction after their junction, the Matia, the Arzen, the Shkumb (ancient Genusos), the Simen {A psos), formed by the junction of the Devol and Ergene, the Viossa (Adus), which owing to the trend of the Khimara range takes a north-westerly direction, the Kalamas (Thyamis) and the Arta (Arachthos), flowing south into the Ambracian Gulf. A portion of the stream of the Drin has found its way into the Boyana channel; the result has been a rise in the level of Lake Scutari and the inundation of the adjacent lowlands. A proposal to confine the Drin to its former course by means of a dyke, and to ease the downflow of the Boyana by a canal opening navigation to Lake Scutari, has long been considered by the • Turkish authorities. The great lakes of Scutari (135 sq. m.) and Ochrida (107 sq. m.) are among the most beautiful in Europe; the waters of Ochrida, which find an outlet in the Black Drin, are of marvellous clearness. Lake Malik, south by east of Ochrida, is drained by the Devol. The waters of the picturesque Lake Iannina (24 sq. m.) find an issue by katabothra', or underground channels, into the Ambracian, Gulf. The lake of Butrinto (Buthrotum) is near the sea-coast opposite Corfu.

Climate. — The climate is healthy in the uplands, though subject to violent changes; in the valleys fever is very prevalent, especially in the basins of the Boyana, the lower Drin and the Simen. The winter is short, but exceedingly cold; snow remains on the Prokletia and other mountains till August, and sometimes throughout the year. The summer temperature in the plains is that of southern Italy; in the mountain districts it is high during

the day, but falls almost to freezing-point at night. The sea-coast is exposed to the fierce bora, or north wind, during the spring.

Natural. Products. — ;The mountains of Albania are said to be rich in minerals, but this source of wealth remains practically unexplored. Iron and coal are probably abundant, and silver-lead, copper and antimony are believed to exist. Gold mines were worked in antiquity in the Drin valley, and silver mines in the Mirdite region were known to the Venetians in the middle ages. At Selinitza, near Avlona, there is a remarkable deposit of mineral pitch which was extensively worked in Roman times; mining operations are still carried on here, but in a somewhat primitive fashion. The splendid forests, of which there are 70,000 acres in the vilayet of Scutari alone, are undergoing a rapid process! of destruction, as in other lands under Turkish rule. The principal trees are the oak, the valonia oak, the beech, ash, elm, plane, celtis, poplar and walnut, which give way in the higher regions to the pine and fir. The oak forests near Dibra, where charcoal-making is a considerable industry, and the beech-woods of the Prishtina district, are especially remark- able.- The sumach is largely grown in the Mirdite district; its leaves are exported to Trieste for use in tanneries and dyeworks. In 1898 the export of valonia was estimated at £n,200j of sumach at £2400. Of fruit-trees the white mulberry, cherry and wild pear are plentiful; the chestnut and walnut are some- times met with, and the olive is grown in the lowland and maritime districts. The exportation of olive oil in 1808 was valued at £24,000. The greater part of the country is admirably suited to viticulture, and wine of tolerable quality is produced. Tobacco is grown extensively in southern Albania, especially near Berat and in the upper valley of the Viossa, but the quantity exported is small. The means of subsistence are mainly provided by the cultivation of grain and cattle-rearing. Notwithstanding the primitive condition of agriculture, the deficiency of com- munications and the damage caused by frequent inundations, Albania furnishes almost the entire corn supply of the Dalmatian coast and islands. Maize is the favourite grain for home con- sumption, but considerable quantities of this cereal, as well as barley, rye and oats are exported. The total export of cereals in 1898 was valued at £70,800. Sheep and goats form almost

the only wealth, of the .mcpuntˆinstfrsi of ,; jiprthern Albania; large cattle ,are found only on the'plahiSvj.The slopes of Pindus afford, excellent pasture for the flocks, i.of; the r Vlaeh shepherds. The export of raw hides and wool is considerable \ in 1898 these commodities were valued. respectively, at £90,400 and £24,000. The lakes and rivers of Albania abound in fish. The scoranze (Alb. seraga), a kind of sardine, is taken in great quantities in Lake Scutari; it is salted and smpfeed for 1 home consump- tion and exportation. : Seaˆfishing is ; almost wholly neglected. There are salines at Avlona and other places on the coast. ,. i Commerce and Industries. — The exports in i8g& were estimated at £480,000, the imports at, £1,36:0,000,; the .former comprising agricultural produce,, live stock, hides, ; wpol, cheese, eggs, poultry, olive oil, valonia, smmachˆ leases, timber,,, skins jO,f: wild animals, silk, tobacco and salted fish, the latter manufactured articles, cloth, hardware, furnjjtyre, .firearms, gunpowder;, sugar, coffee, , &c. ; . The , monopoly, : of., A'lbanijan: commerce t ; fprm«rly possessed by Venice has descended to Austria-Hungary;- the trade with-.. other countries, except Jttajy, is inconsiderable. Owing to, the poverty of the people, cheap Austrian, goods ; find a readier sale than the more expensive, an,d-solid British manu- factures. The maritime traffic isndajrgely conducted by the steamers of, the subsidized ./ Austrian-LloydrCompany, Trieste being the principal commercial centre; the coasting trade is carried on by small Greek .and T.urkisii sailing vessels, i.The trade of the northern and western districts has tq ; some., extent been diverted to Salonica since the:openjng p.itJie.Tailwaysjfro-m that town to Mitrovitza and Monastir. /EThe; development of commerce is retarded by lack of communications i , the country possesses no railways and few roads. , Several; railway lines have been projected, but there is no great, probability of their con- struction under existing political conditions. , The Via Egnatia; the great Roman highway to the east, is still used;, it runs from Durazzo. (Dyrrhachium) to Elbassan and Ochrida. Iannina is connected by carriage-roads, with Monastir, Agii Saranta, and Preveza. As a rule, however, bridle-paths supply the only means of communication. The, native, industries are inconsiderable, and many of them are in a, languishing [Condition. ; The manu facture of highly ornate firearms, yataghans and, ether weapons at Scutari, Jakova and Prizren has- declined, owing to; the im- portation of modern rifles and revolvers. Gold and silk em- broidery, filigree work, morocco, and richly-braided jackets are, produced for home use and for sale in. Bosnia, Macedonia and Montenegro.

Population. — The population of Albania may be estimated at between 1,600,000 and 1,500,000,. ,9f,,whom 1,290,000 or 1,100,000 are Albanians. Of the other < races , the Slays .(Serbs and B.ulgars) are the most numerous, possibjy, numbering 250,000. Servian settlements exist in various parts pf, northern Albania; there is a strong Bulgarian colony in the neighbourhood of I)ibra and Ochrida; farther south, ..Mˆunt.Zygos and the Pindus range— the "Great Walachia " of the niiddle ages— are inhabited by Vlachs' or Tzintzars, who possibly number 70,000. Some Turkish colonies are- also found in: the south-eastern districts. There is a considerable Greek-speaking .population in Epiros (including many Mahommedan Albanians), which must, however, be distinguished from the genuine Greeks of Iannina, Preveza and the extreme south; these may be esti- mated at 100,000. The population of the , vilayet of Scutari is given as 237,000, that of the vilayet of Iannina as 552,000. The principal towns are Scutari (Albanian Shkoder, with the definite article Shkodr-a), the capital of the vilayet of that name, pop. 32,009; Prizren, 30,000; Iannjna (often incorrectly written Ioannina), capital of the southern vilayet, 22,000; Jakova, r2,ooo; Dibra, 15,000; Prishtina, 11,000; Ipek (Slav. Fetch), 15,000; Berat, 15,000; Ochrida, 11,000; Tirana, 12,000; Argyrokastro, 11,000; Kprtcha-i ,(Slav, Goritza)., io ; ,ooo; Elbassan (perhaps ancient Albanopolis) , 8000; Metfpvo, 7500; Preveza, 6500; Avlona, 6000; Durazzp, 5000; Parga, 5000; Butrinto, 2000; and Kroi'a, the ancient fortress of Scanderbeg, 5000. All these, except Elbassan, Mˆefzovo and Kroi'a, are described in separate articles. ,

The. Albanians are apparently the most ancient race in south-eastern Europe. History and legend afford no record of their arrival in the Balkan Peninsula. They are probably the descendants of the earliest Aryan immigrants, who were represented in historical times by the kindred Illyrians, Macedonians and Epirots; the Macedonians and Epirots are believed by Hahn to have formed the core of the pre- Hellenic Tyrrheno-Pelasgian population which inhabited the southern portion of the peninsula and extended its limits to Thrace and Italy. The Illyrians Were also ” Pelasgian,” but in a wider sense. Of these cognate races, which are described by the Greek writers as barbarous or. non-Hellenic, the Illyrians and Epirots, he thinks, were respectively the progenitors of the Ghegs, or northern, and the Tosks, or southern, Albanians. The Via Egnatia, which Strabo (vji. fragment 3) describes as forming the boundary between the Illyrians and Epirots, practically corresponds with the course of

the Shkumb, which now separates the Ghegs and the Tosks. The same geographer (v. 2. 221) states that the Epirots were also called Pelasgians; the Pelasgian Zeus was worshipped at Dodona (Homer, II. xvi. 234), and the neighbourhood of the sanctuary was called Pelasgia (Herodotus ii. 56). The meaning of the term ” Pelasgian ” is, however, too obscure to furnish a basis for ethnographical speculation; in the time of Herodotus it may, have already come to denote a period rather than a race. The name Task is possibly identical with Tuscus, Etruscus, while the form Tyrrhenus perhaps survives in Tirana. The large number of Slavonic local names in Albania, even in districts where no trace of a Slavonic population exists, bears witness to, the extensive Servian and Bulgarian immigrations in the eˆfly middle ages, but the original inhabitants gradually ousted or assimilated the invaders. The determination with which this remarkable race has maintained its mountain stronghold through a long, series of ages has hitherto met with scant ap- preciation , in the outside world. While the heroism* of the Montenegrins has been lauded by Writers of all countries, the Albanians — if we except Byron’s eulogy of the Suloits — still remain unsung. Not less noticeable is the tenacity with which isolated fragments of the nationhavepreservedtheirpeculiarchar- acteristics, language, customs and traditions. The Albanians in Greece and Italy, though separated for six centuries from the parent stock, have not yet been absorbed by the surrounding populations.

Tfie Albanians, both Ghegs and Tosks, call themselves Shkil-petar, and their land Shkupenia or Shkuperia, the former being the Gheg, the latter the Tosk form of the word. Shkiipetar has been variously interpreted. According to Hahn it is a parti- cipial from shkyipoij, ” I understand,” signifying ” he who knows ” the native language; others interpret it with less probability as “the rock-dweller,” from shkep, shkip, N. Alb. slikamp, “rock.” The designations Arber (Gr. ‘Apfiavlrris, Turk. Arnaout), denoting the people, and Arbenia or Arberia, the land, are also, though less frequently, used by the Albanians. A district near Kro’ia is locally known as Arbenia; the Tosk form Arberia strictly applies only to the mountain region near Avlona. The region inhabited by a more or less homogeneous Albanian population may be roughly marked out by a line drawn from the Montenegrin frontier at Berane to Mitrovitza and the Servian frontier near Vranya; thence to Usktib, Prilep, Monastir, Fiorina, Kastoria, Iannina and Parga. These limits, however, are far from including all the members of a widely scattered race. The Albanians in Greece,

whose settlements extend over Attica, Boeotia, the district of Corinth and the Argolid peninsula, as well as southern Euboea and the islands of Hydra, Spetzae, Poros and Salamis, descend from Tosk immigrants in the 14th century. They played a brilliant part in the War of Independence ˆ821-1829), and to-day supply the Greek army with its best soldiers. They were estimated by ■ Leake at 200,000. A large number still speak the Albanian language; many of the older men, and a considerable proportion of the women, even in the neighbourhood of Athens, are ignorant of Greek. The Albanian settlements in southern Italy and, Sicily were founded in 1444, 1464 and 1468; minor immigrations

followed in the three succeeding centuries. In southern Italy there are 72 Albanian communes, with 154,674 inhabitants; in Sicily 7 communes, with 52,141 inhabitants. The Italian and Sicilian Albanians are of Tosk descent, and many of them still speak a variation of the Tosk dialect. There are also several Albanian settlements in European Turkey and Asia Minor, some founded by military colonists who received grants of land from successive sultans, others owing their origin to enforced migrations after insurrections in Albania. The only genuine division of the Albanian race is that of Ghegs and Tosks; the Liaps, who inhabit the district between the Viossa and the sea, and the Tshams or Chams, who occupy the coast-land south-of the Kalamas, are subdivisions of the Tosk family. The name Gheg {Glgl-a) is not adopted by the Ghegs themselves, being regarded as a nickname; the designation Tosk (ToskS-a) is restricted by the Tosks to the inhabitants of a small region north of the lower Viossa (Toskeria).

National Characteristics. — While the other primitive populations of the peninsula were either hellenized or latinized, or subsequently absorbed by the Slavonic immigration, the Albanians to a great extent remained unaffected by foreign influences. Retaining their original language and preserving the customs and institutions of remote antiquity, they present a distinct type, and differ in many essential particulars-from the other nations of the peninsula. The Ghegs especially, notwithstanding their fierce and lawless character, their superstition, ignorance and predatory propensities, possess some

noteworthy qualities rarely found in eastern Europe: simple, brave, faithful, and sometimes capable of devoted attachment, these wild mountaineers make excellent soldiers and trustworthy retainers; they have long furnished a bodyguard to the sultan and, like the Tosks, are much employed as kavasses and attendants at foreign embassies and consulates in the East. The native disposition of the Tosks has been modified by intercourse with the Greeks and Vlachs; while the Gheg devotes his attention exclusively to fighting, robbery and pastoral pursuits, the Tosk occasionally occupies himself with commercial, industrial or agricultural employments; the Gheg is stern, morose and haughty, the Tosk lively, talkative and affable. The natural antipathy between the two sections of the race, though less evident than in former times, is far from extinct. In all parts of Albania the vendetta (gytik, j&k) or blood-feud, the primitive lex ialionis, is an established usage; the duty of revenge is a sacred tradition handed down to successive generations in the family, the village and the tribe. A single case of homicide often leads to a series of similar crimes or to protracted warfare between neighbouring families and communities; the murderer, as a rule, takes refuge in the mountains from the avenger of blood, or remains for years shut up in his house. It is estimated that in consequence of these feuds scarcely 75 % of the population in certain mountainous districts die a natural death. A truce (bessa, literally ” faith,” ” pledge “), either temporary or per- manent, is sometimes arranged by mediation, or among the Ghegs, by the intervention of the clergy; a general bessa has occasionally been proclaimed by special irade of the sultan, the restoration of peace being celebrated with elaborate ceremonies. So stringent are the obligations of hospitality that a household is bound to exact reparation for any injury done to a guest as though he were a member of the family. No traveller can venture into the mountain districts without the bessa of one of the inhabitants; once this has been obtained he will be hospitably welcomed. In some districts there is a fixed price of blood; at Argyrokastro, for instance, the compensation paid by the homicide to the relatives of his victim is 1200 piastres (about £10), at Khimara 2000 piastres; once the debt has been acquitted amicable relations are restored. Notwithstanding their complete subjection, women are treated with a certain respect, and are often employed’ as intermediaries in the settle- ment of feuds; a woman may traverse a hostile district without fear of injury, and her bessa will protect the traveller or the stranger. Women accompany their male relatives to the battle- field for the purpose of tending

the wounded and carrying away

the dead. The bride brings rib dowry to her husband; she 4 is purchased at a stipulated price, and earnest-money is' paid at the betrothal, which usually takes place while the contracting parties are still children. It is customary for young men whb are attached to each other to swear eternal brotherhood (com- pare the Slavonic pobratimstvo) ; the contract is regarded as sacred, and no instance has been known of its violation. The costume of the Tosks differs from that of the Ghegs; its dis- tinctive feature is the white plaited linen fustanella or petticoat, which has been adopted by the Greeks; the Ghegs weal: trews of white or crimson native cloth adorned with black braid, and a short, close-fitting jacket, which ur the case of wealthy persons is embellished with gold lace. The fez is worn 'by both races, and in the northern highlands yataghans and firearms are almost invariably carried. The costume of the Mirdite and Mat tribes is peculiar. It consists of a white felt cap, a long white tunic bound with a red girdle, white linen trousers and opinki, or sandals.

Tribal System. — The' tribal organization in northern Albania is an interesting survival of the earliest form of social combina- tion; it may be compared in many respects with that which existed in the Scottish highlands in the time of the Stuart kings. The practical autonomy which the Gheg mountaineers enjoy has been won by a prolonged and successful resistance to Turkish domination; as a rule they pay no taxes, they are exempt from the conscription, they know nothing of the Ottoman law, and the few Turkish officials established amongst them possess no real authority. Their only obligation to the Turkish government is to furnish a contingent in time of war; the only law they recognize is either traditional custom(adet) or the unwritten Kanun-i Leks Dukajinit, a civil and criminal code, so called from its author, Leka Dukajini, who is supposed to have lived in the 13th or 14th Century. The tribe or mal (" mountain ") is often composed of several clans (phis-i, phdrea)oi baryaks (literally " standards ") each under a chief or baryaktar (standard-bearer) , who is, strictly speaking, a military leader; there are in each clan a certaih number of elders or voi'vodes (Albanian kru-ye, pi. hrene- te) who form a council and, like the baryaktar, hold their office by hereditary right; they preside over the assemblies of the tribes- men, which exercise the supreme legislative power. The clan is generally subdivided into smaller communities (mahale), each administered by a local notable or jobar. The jobars superintend the execution of the laws, collect fines and

administer capital punishment; they are in contact with the buluk-bashi, or resident representative of the tribe at Scutari, who forms the only link between the mountaineers and the Turkish government. He communicates to the tribesmen the orders of the vali, which must' be framed in accordance with their customs and institutions. The tribes of northern Albania, or Ghegeria, may be classified in seven groups as follows:— (i) The Mirdites, who inhabit the alpine region around Orosh to the south-east of Scutari--the most important of all in respect of numbers (about 17,000) and political independence. A Roman Catholic tribe, occupying an inaccess- ible district, they have hitherto defeated every effort of the Turks to encroach on their autonomy. Their hereditary chiefs, or capidans, belong to the family known as Dera e Jon Markttt (the house of John Marco), which has ruled for 200 years and is supposed to be descended from Scanderbeg. In 1868 the reigning chief, Bib Doda, died, and his son and successor Prenk was detained as a hostage by the Turks. The Mirdites consequently refused to contribute their customary contingent to the Turkish army, and eventually Prenk was restored. His ambiguous conduct, however, led to the despatch of two expeditions against the Mirdites and the devastation of their territory. In 1880 Prenk was kidnapped by the Turkish authorities and exiled to Anatolia; another member of the ruling family was appointed kaimakam, but the Mirdites refused to obey him, and their district has ever since been in a state of anarchy. No Moslem is allowed to remain in Mirdite territory. (2) The Mi-shkodrak (Upper Scutari) group or confederation, also known as the Malsia-Madhe (Great Highlands), is composed of the Klement, Grud-a, Hot, Kastrat and Shkrel tribes, which Occupy the

mountainous district north-east of Scutari. . Owing to the proximity of the capital this group is comparatively subject to the Turkish power, and pays a small annual tribute,; the chiefs, who assess and collect the tribute, form a kind of, administrative council; the confederation has also an 'official representative council at Scutari, called the Jibal, under the presidency of a Serkarde or Moslem official. ., (3) The Dukajin, whose territory lies between that of the last-named group and the district of Jakova, include the Pulati, Shalla, Shoshi and other, tribes; they are more independent and more savage than the Mi-shkodr.ak, and have never paid tribute from time immemorial. (4) The Puka

group, known as ” the Seven Baryaks of Puka,” dwell on the south side of the river Drin; they are nominally administered by a Turkish kaimakam, who is a mere spectator of their proceedings. (5) The Malsia Jakpvs, a group of two Catholic and three Moslem tribes, extend in the direction of Jakova, where they maintain an official representative; they are entirely exempt from taxation. (6,7) The Malsia-Lezhs, who occupy the Alessio highlands, and the Malsia Krues, who inhabit the region north of Kroia, live in a state of extreme poverty and pay no tribute; the Malsia Krues are much addicted to brigandage. To these seven groups, which are included under the general appellation of Malissori, or ” highlanders,” may be added the Malsia of Dibra, who extend to the west and north of that town, and form a large separate group; they are notorious for their fierce lawless character, and maintain themselves by plundering the Bulgarian peasants in their neighbourhood. In general the attitude of the Albanians in the north-eastern districts towards the Slavonic peasantry may be compared with that of the Kurds towards the Armenians. In the region east of Kroiia the Mat tribe, which occupies the upper valley of the Matia, presents an entirely different organization; their district is governed by four wealthy families, possessing hereditary rank an,d influence, Towards the south the tribal organization becomes looser- and is gradually supplanted by a kind of feudal system; among the. powerful aristocratic houses may be mentioned the Viiores af Aviqna, who are stated to own over 150’sq. m. of land, and the Toptans at Tirana. The principal landowners, who reside in fortified houses, are all Moslems; their estates are cultivated on the mStayer system. Since the time of Ali Pasha, who broke the power’ of the local chieftains, southern Albania has been subject to the central Turkish power; before that period the mountaineers of Suli and Khimara erijoyed an independence similar to that of the Gheg tribes.

Religions. — The’ great majority of the Albanians, probably more than three-fifths, are Moslems. The conversion of the Christian population to Islam appears to have taken place during the iGth and 17th centuries. Like the Cretan Moslems and the Bulgarian Pomaks, the Albanian Mahommedans retain many Christian traditions and customs; it is said that many thousands of them secretly adhere to their original faith. In the vilayet of Scutari they form about 55% of the population; central Albania is almost entirely Moslem; in southern Albania, however, there is a considerable Christian population, whose limits practically

coincide with those of the Greek-speaking 1 districts. Of the Christian population (about 600,000), some 110,000 are Roman Catholic Ghegs, some 90,000 are Orthodox Tosks, and some 400,000 are Orthodox Slavs, Greeks and Vlachs. The Roman Catholic Ghegs appear to have abandoned the Eastern for the Western Church in riie middle of the i3thcentury. Their bishops and priests, who wear the moustache in deference to popular prejudice, are typical specimens of the church militant. Some of the Gheg tribes, such as the Puka, Malsia Jakovs and Malsia Krues, are partly Roman Catholic, partly Moslem; among fellow-tribesmen the difference of religion counts for little. , The Mirdites are exclusively Roman .Catholic, the Mat-i exclusively Moslem. At the'head of the Roman Catholic hierarchy are the archbishops of Scutari (with three suffragans) , Prizren and Durazzo ; the mitred abbot of St Alexander is the spiritual chief of the Mirdites. The Orthodox Church has metropolitans at Prizren, Durazzo, Berat, Iannina and Kortcha; the Bulgarian exarchate maintains a bishop at Dibra. Of the Albanians in, Sicily the great majority

(44,791) remain faithful to the Greek Church; in Italy 116,482 follow the Latin ritual, and 38,192 the Greek. All the Albanians in Greece belong to the Orthodox Church.

Education. — Education is almost non-existent, and the vast majority of the population, both Christian and Moslem, are totally illiterate. Instruction in the Albanian language is prohibited by the Turkish government for political reasons; a single exception has been made in the case of an American school for girls at Kortcha. There are Turkish primary and secondary schools in some of the towns; in the village mosques instruction in the Koran is given by the imams, but neither reading nor writing is taught. The aristocratic Moslem families send their sons to be educated in Constantinople or Vienna. At Scutari a college and a seminary are maintained by the Jesuits, with the aid of the Austrian government; the Franciscans have several primary schools, and three lay schools are supported by the Italian government; in all these institutions Italian is the language of instruction. There are two Servian seminaries at Prizren. In southern Albania there are Greek schools in the towns and a large Greek gymnasium at Iannina. The priests of the Greek Church, on whom the rural population depend for instruction, are often deplorably ignorant. The merchant families of Iannina are well educated; the dialect spoken in that town is the purest specimen of colloquial Greek.

Language. — Albanian is peculiarly interesting as the only surviving representative of the so-called Thraco-Illyrian group of languages which formed the primitive speech of the peninsula. It has afforded an attractive study to philologists, amongst whom may be mentioned Malte-Brun, Leake, Xylander, Hahn, Miklosich and G. Meyer. The analysis of the language presents great difficulties, as, owing to the absence of literary monuments, no certainty can be arrived at with regard to its earlier forms and later development. The groundwork, so far as it can be ascertained, and the grammar are Indo-European, but a large number of words have been borrowed from the La tin or Italian and Greek, and it is not always easy to decide whether the mutilated and curtailed forms now in use represent adopted words or belong to the original vocabulary. There is also a considerable admixture of Turkish and Slavonic words. Not-withstanding . certain points of resemblance in structure and phonetics, Albanian is entirely distinct from the neighbouring languages; in its relation to early Latin and Greek it may be regarded as a co-ordinate member of the Aryan stock. It possesses seven vowels; among the consonants are the aspirated d and t, as in Greek, and many other sounds, such as b, d, sh, zh (French j), and hard g, which are wanting in Greek, but exist in the Slavonic languages. There are three declensions, each with a definite and indefinite form; the genitive, dative and ablative are usually represented by a single termination; the vocative is formed by a final 0, as memmo from memme, "mother." The neuter gender is absent. There are two conjugations; the passive formation, nowwanting inmostlndo-European languages, has been retained, as in Greek; thus kerko-iy, " I seek," forms kerko-n-em, " I am sought." The infinitive is not found; as in Greek, Rumanian and Bulgarian, it is replaced by the sub- junctive with a particle. The two auxiliary verbs are Mm, " I have," and y&m, "I am." An interesting and characteristic feature of the language is the definite article, which is attached to the end of the word: e.g. mik (" friend," amicus), mik-u ("the friend"); kien ("dog"), kien-i; Shkumb, Shkumb-i. The suffix-article likewise appears in Rumanian and Bulgarian, but in no other Latin or Slavonic language; it is in each case a 'form of the demonstrative pronoun. Another remarkable analogy between the Albanian and the neighbouring languages is found in the formation of the future; the Albanian do (3rd pers. sing, of dova, "I will"), like the Greek da, is prefixed without change to all persons of the verb: a similar usage in Servian and Bulgarian, as well as in Rumanian (especially the Macedonian dialect) , is peculiar to these

languages in the Slavonic and Latin groups. These and other points of similarity, possibly only accidental, have led to the conjecture that the primitive Illyrian language may have exerted some kind of influence on

the other idioms of the peninsula. In the absence Of literary, culture the Albanian dialects, as might be expected, are widely divergent; the limits of the two principal dialects correspond with the racial boundaries of the Ghegs and Tosks, who under-, stand each other with difficulty; the Albanians in Greece and Italy have also separate dialects. In writing Albanian the Latin character is employed by the Ghegs, the Greek by the Tosks;: neither alphabet suffices to represent the manifold sounds of the language, and various supplementary letters or distinguishing, signs are necessary. In the use of these no uniform system has- yet been adopted. An alphabet of fifty-two letters, some pre-, senting ancient Phoenician and Cretan forms, was found by Hahn in partial use at Elbassan and Tirana; its antiquity, however, has not been established. The Tosks generally use the Greek language for written communications. The native folk- lore and poetry of the Albanians can hardly compare with that of the neighbouring nations in originality and beauty. The earliest printed works in Albanian are those of the Catholic missionaries ; the first book containing specimens of the language was the Dictionarium Latino- Epiroticum of Bianchi, printed in 1635. The literature of the last two centuries consists mainly of translations and religious works written by ecclesiastics, some of whom were natives of the Albanian colonies in Italy. The most noteworthy Albanian writer was Gifolamo di Rada (b. 1815), a poet, philologist and collector of national folklore. Among his successors may be mentioned Vincenzo Dorsa and Demetrio Camarda.

A ntiquities. — Albania abounds in ancient remains, which as yet have been little explored. Fragments of ” Cyclopean ” structures were discovered by Hahn at Kretzunista, Arinista, and other sites in the district of Argyrokastro; the walls, partly ” Cyclopean,” of an ancient city (perhaps Biillis) are visible at Gradisti on the Viossa. Masonry of this type, however, occurring in Illyria and Dalmatia (e.g. at Spalato and on the island of Lesina) has been shown by modern archaeologists to belong to the Roman period.

In general, the remains of the classical epoch attest the influence of Roman rather than of Greek civilization. At Pollina, the ancient Apollonia, are the remnants of a Doric temple, of which a single column is still standing. A little north of Preveza are the considerable ruins of Nikopolis, founded by Octavian to commemorate the victory of Actium. At Khimara (anc. Chimaera) the remains of an old Greek city may still be seen; at Santi Quaranta (anc. Onchesmos) the walls and towers of a later town are in good preservation. Few traces remain of the once celebrated Dyr- rhachium. The ruins of Pandosia, Ephyra, Elatea, Phoenike, Buthrotum, Akrolissos and other towns may be identified. , The most important and interesting remains, however, are those of Dodona (q.v.). Of the medieval ruins those of Kroi'a, the ', stronghold of Scanderbeg, are the most interesting.

Medieval History. — After the division of the Roman empire, the lands inhabited by the Albanian race became provinces of the Byzantine empire; northern Albania from Scutari to Berat 1 formed the Ihema or province of Dyrrachium {Durazzo, Albanian 1 ■ Dourtz), southern Albania and Epirus the thema of Nikopolis. The country was overrun by the Goths in the 4th and 5th cen- . turies, but reconquered by Justinian in 535. In 640 northern : Albania was invaded by the Serbo-Croats; it continued with interruptions under Servian rule till 1360. In 861 the Bulgarians conquered the southern portion of the country and Epirus as far as Khimara; under their powerful tsar Simeon (893-927), who defeated the Servians, they established their rule on the Adriatic littoral, except at Durazzo, which remained Byzantine, and colonized these regions in great numbers. A new Bulgarian dynasty, that of Shishman, was founded at Ochrida after the death of Simeon. Shishman's son Samuel (976-1014) cap- tured Durazzo; he extended his sway over a great part of the Balkan Peninsula, but was eventually defeated in 1014 by the emperor Basil II., who put out the eyes of 15,000 Bulgarian prisoners. Southern Albania and Epirus fell once more under Byzantine rule, which, however, was shaken by numerous revolts. In 1081 the Normans under Robert Guiscard possessed

themselves of Durazzo; 'Gtu'sfcaM's' son Bohelnund defeated the Greeks in several tiattlei r ahd agaiti'(iio7) laid' siege tt> T)\itdkzb, which tod been' surrender-fed to them by treachery ; ; failing to take the'dty, hfcretired to Italy in i 109. Southern Albania ahd Epirus remained' iihder Byzantine domination' 'till; 1204, when, after the ! capture 1 of Constantinople by the

crug'aclers, Michel Comrienus, a member- '6f the imperial family; withdrew to'EpIhjs and founded an independent sovereignty known as the. "Bespqfoje of'Epir'u's at Iatiriifla; his realm included the whole 'tif southern Albania, Acarnania aid : Aetolia; The despo'tate of' Epirus. was held by the Cornnenus family till 131S, and by princes of tjˆe house Of Orsini till 1358. Meanwhile Diirazzo, with iBerat and Central Albania, had passed ihr,o : the hailds of the'SIciliaˆi kings of thehouse of Anjou, whti ruled these regions,. which tn'ey styled the "'Kingdom of Albania," ftijiti xiji to 1368, maintaining a constant warfare with the Byzaitlne emperors. The Servians again installed thernselves ii Upper' Albania about 11 86, and the provinces of Scutari and' Prizreh, were ruled by kings of, the house of Nemahya ' till 1360; Stefan. ' Dushan (1331-1358), the greatest of these' monafchs, included all Albania iij his extensivebut short-lived' empire, aid, took' the title. of Imperalor Romaniae Slavo'niae 'et [Albaniae (erhperof of the Greeks, Slays and Albanians). ' ; . .

Period of Native, 2?W/e.— After 1 the death of' Dushan arid the break-Jup of the Serviai empire, a new epoch began when Albania fell under the rule of chieftains mOre of less, of native origin'. ' A portion of tapper Albania Was ruled by 'the Balsha dynasty (13ˆ6- 1 4 i i) , which,, though apparently . Servian by descent, assimilated itself with Its Albanian subjects arid embraced the faith of Rome. Alessio and a tract of the interior in the direction of Tpek was governed' by the, Dukajin. The northern portion of the "king- dom of Alhariia," including Durazzo and Krdia, was ruled %y the family of Thopia (1359-1392) and after wards, ty that of Kas- triota, to which Scariderbeg belonged; the southern portion, with Berat, by the Mukajd ' (1368-1476). In the midclle of the 14th century a great migration of Albanians from the mountainous districts of the north took place, under the chiefs, Jin Bua Spafa arid Peter Lidsha; they advanced southwards as far, as Acarnania and Aetolia (1358), occupied the greater portion of the despotate of Epirus, and took Iarinina and' Arta. In ! 'the latt'erjhalf of the century large colonies of Tosks were plaited in, .t] |e_Mprea. by .the despots of Mistfa, and iri Attica and B'oebtia by Duke .Jfeno of Athens. As the power of the Balshas'decliried/the Venetians towards the close of the 14th century established themselves at Scutari, Budua, Antivari and elsewhere in northern Albania, u

Period of Turkish Rule. — The advance of the Turks i»tp Albania began with the capture of Iarinina in 143 1., For once in the history of the country the Albanian chiefs, corohineˆˆgaijist the

invader under a single leader, the celetratefˆpeorge Kˆftioˆ (see SqANDERBjjG), who fought thirteen campaigns in, the, period 1444-1466,. In 147& Krola, which the Venetians; had .occupied after Scanderbeg's death, surrendered to Slˆhommed ,11,,, ,and in 1479 Scutari, after a, memorable defence by the Venetians and their Montenegrin allies, was reduced by blockade. J}ffny pf its native Christian defenders emigrated to Dalmatia and Italy; others took refuge in the mountains with .the Roman Catholic Ghegs. In 1502, the Turks capturecl. Durazzo, an.fl in.. 157,1 Antivari and Dulqigrio, the last Venetian possessions ip AJbaniˆ Notwithstanding the abandonment' of Christianity by. a large section of the population after the Turkish conquest,, 'the authority of the sultaris was never effectively established,; antf succeeding centuries present a record of interminable cqnnictjs between the tribesmen ,.'arid the r Turks, between the Christians and the converts to Islam, or between all combined and jthje traditional Montenegrin ene#iy. The .decline jof the Ottoman power, which began towards the end of.the 17th century, was marked by increasing anarchy, and lawlessness , in, the outlying portions of the empire. About .1760 ,, a Mpsfem chieftain, ftlehemet of Bushat, after obtaining the pashahl;; pf Scutari from the Porte, succeeded in establishing, an almost independent sovereignty in Upper Albania, which remained hereditary in his family for some- generations. In southern

Albania Alj Pasha of ,Tepelen.(b. abou$ 1.750), an ableˆuel and unscrupulous man, subdued the neighbouring pashaf;and .chief & crushed the Suliotes and Khimarrhotes, and exercised a: practically, independent sovereignty from the, Adriatic to the. Aegean. He introduced comparative civilization aˆ Iannina, . his . capital, and maintained direct relations with foreign ppwers. Eventually he renounced his allegiance %o the sultanˆbut was, overthrown by a Turkish,. army in 1822. Shortly afterwards; the dynasty of Scutari came to an end with,the'surrendˆr of MustafaPasha, the last of. the house ,pf Bushat,, to the grand vizier Reshjd Pasha, in

, iThe opposition of , the Albanians, Christian, as well as Moslem, to the refoims introduced by the sultan, Mahmud II, led to the devastation of the country and the expatriation of thousands of its inhabitants, , During the , next half-century , several local revolts occurred, but no movement of a strictly political

character took place till after the Berlin Treaty (July 13, ,1878), when some of the Moslems and Catholics combined to resist the stipulated (jransf erence of ˆAlbanian territory, to AustriaˆHungary, Servia an-d. Montenegro, and the Albanian league ,was formed by an assemblage of chiefs at Prizren. , The movement, which was instigated by the Porte with the object of evading the provisions of the treaty, was so far successful that the restoration) of' Playa and Gusinye to Albania, was sanctioned by. the .powers, , Monte negro receiving an exchange the town arid, distriqt of Pulcigno. The, Albanian, Jeaders, however, soou displayed a, spirit of inde- pendence, which provpd embarrassing to Turkish diplomacy and caused alarm at Constantinople; their forces came into, con- flict with a Turkish army under Dervish Pasha near Dulcigno (November 1880), and eventually the league was suppressed. A similar agitation on a smaller scale was organized in southern Albania to resist the territorial concessions awarded by the powers- to Greece. In the spring of 1903 serious disturbances took place in north-western Albania, but the Turks succeeded in pacifying the revolted 1 tribesmen, partly by force and partly by concessions. These movements , were far from displaying a genuinely national, character, In receut years attempts have been made by. Albanians – resides t abroad to propagate the national idea- among their compatriots at ipme; committees haye been formed at Brussels, Bucharest, Athens and elsewhere, and bpoks, pamphlets and newspapers are, surreptitiously sent into the country. ,, Unity of aim, and effort, however* seems foreign to the Albanians,: except in defence of local or tribal privileges.. The growth of- a wider patriotic sentiment must depend on , the spread of popular, education; certainly up to 1908 no appreciable progress had been made in this direction.

Authorities.— F. C. H. : Pouqueyille, Voyage de la Grece (Paris, 1820); W. M. Leake,' Travels in Northern Greece (London, 1835); J. G. von Hahn, Albanesische Studien (Jena, 1854), Reise durch die Gebiete des Drin und: Vardar (Vienna, 1867s); F. Bopp, Uber das Albanesische (Berlin, 1854); J. P. Falhperayer, Das albanesische Element in Griechenland , (Munich, 1864) ; N r Camarda, Saggio di trammatoldgia comparata sulla lingua albanese (Leghorn, 1865) ; Viscountess StraH&fofd, The Eastern Shores of the Adriatic (London, 1865); H. F. Tdzer, Researches in the; Highlands of Turkey (London, 1ˆ69) ;F. Mik \osich,_Albdnes,..For?chungen (Vienna, 1870); C. Hopf, Chroniques greco-romaines infdite.s, ou peu connues (Berlin,

1873); H. Hecqiiard, Hisloire et description de Id Haute Albdnie-ou Guegarie (Paris, undated) ; S. Gopchevidh, ‘Oberalbanien und seine L i gv, in the ‘KxcttjpIs toD Tlapvapaov (Athens, 1896); Theodore Ippen,

Bertnige zur mnereri Geschichte der Turkei Ini 19. “Jahrhundert Sfpeaell Albamens,” in the Osterreickisch-Ungarische Retue vol S*vm,; A. PhUippson, Thessalia und Epiitis (BerluV 1897). See also ffl«W>”.s G ^^e. ed.. 1900, pp. 720-73; and 760-814, and Blue-hook Turkey, No. 15, Part 11., 188S. . ‘ , : Q. JJ. 3.)

ALBANUS LACUS (mod,- Lago,4i Mbaˆa.’.hˆahoˆ 12 m. p:., of Rome. It is generally considered, to have been formed fea Wanic explosion at the margin of the great crater of the AJbanus Mons; it ˆas, the shape of a crater, (he banks’ of which aje over 400 ft. in height from the .water-level, while the water is asˆmuch as 560 ft. deep hi riie S. portion,. It is fed by subter- ^^P T m s – A ccord in§;tothelegerid,the,p«isj:ar»«w.(ouUet) yiichstiU -drains it was made in 398-397 B.cˆthe.belphic, oracle

having declared that Veii could only be taken when the waters of the lake reached the sea. It is over a mile in length, hewn in the rock, and about 6 ft, high and 4 ft. broad; it has vertical shafts at intervals, and a sluice chamber at its egress from the lake. In the. time of Domitian the whole lake belonged to the imperial domain. (See Alba Longa.)

ALBANUS MONS (mod. Monte Cavo, from an early city of the name of Cabum? J), the highest point of the volcanic Alban hills, about 13 m. S.E. of Rome, 3115 ft. above sea-level. It is upon the line of the rim of the inner crater of the great volcano, while Tusculum and Algidus Mons mark the edge of the earlier outer crater, which was about 7 m. wide. The lakes of Albano and Nemi were probably formed by volcanic explosions at the margin of the great crater; though a view has also been expressed that the basins are the result of subsidence. The name Albanus Mons is also used generally of the Alban group of hills in which there seem to have been some remains of volcanic activity in early Roman times, which covered the early necropolis of Alba Longa, and occasionally produced showers of stones, e.g. in the time of Tullus Hostilius (Liv. i. 31), and perhaps much later. In 193 B.C. it is recorded (ib. xxxv. 9) that such a shower occurred at Aricia, Lanuvium and on the Aventine. Upon the Mons Albanus stood the temple of Jupiter Latiaris, where the annual festival of the Latin League was held. The foundations and some of the architectural

fragments of the temple were still in existence until 1777, when they were used to build the Passionist monastery by Cardinal York. The road which ascended to the temple from the rim of the lake is still well preserved.

ALBANY, DUKES OF. The territorial designation of Albany was formerly given to those parts of Scotland to the north of the firths of Clyde and Forth. The title of duke of Albany was first bestowed in 1398 by King Robert III. on his brother, Robert Stewart, earl of Fife (see I. below); but in 1425 it became extinct. The dukedom was re-created, c, 1458, in favour of Alexander Stewart, ” lord of Annandale and earl of March ” (see II. below), whose son and successor (see III. below) left no legitimate heir. The title of duke of Albany was next bestowed upon Henry Stuart, commonly known as Lord Darnley, by Mary, queen of Scots, in 1565. From him the title passed to his son, James VI. of Scotland and I. of England. The title was by him given, at his birth, to Charles, his second son, after- wards King Charles I. By Charles II. it Was again bestowed, in 1660, on James, duke of York, afterwards King James II. On the 5th of July 1716 Ernest Augustus, bishop of Osnaburgh [Osnabriick] (1715-1728), youngest brother of King George I., was created duke of York and Albany, the title becoming extinct on his death without heirs in 1728. On the 1st of April 1760 Prince Edward Augustus, younger brother of King George III., was created duke of York and Albany; he died without heirs on the 17th of September 1767. On the 29th of November 1784 the title of duke of York and Albany was again created in favour of Frederick, second son of George III., who died without heirs on the 5th of January 1827. The title of duke of Albany was bestowed on the 24th of May 1881 on Prince Leopold, youngest son of Queen Victoria (see IV. below).

I. Robert Stewart, duke of Albany (c. 1345-1420), regent of Scotland, was a son of King Robert XI. by bis mistress, Elizabeth Mure, and was legitimatized when his parents were’ married about 1349. In 1361 he married Margaret, countess of Menteith, and after his widowed sister-in-law, Isabel, countess of Fife, had recognized him as her heir, he was known as the earl of Fife and Menteith. Taking an active part in the government of the kingdom, the earl was made high chamberlain of Scotland in 1382, and gained military reputation by leading several plundering expeditions into England. In 1389 after his elder brother John, earl of Carrick, had been incapacitated by an accident, and when his father the king was old and infirm, he was chosen governor of Scotland by the estates; and he retained

the control of affairs after his brother. John became king as Robert III. in 1390. In April 1398 he was created duke of Albany;

'SeeTh. Mommsen in Bulletino dell' Istituto (1861), 206; Corpus Inscrip. Lat. (Berlin, 1887), xiv. 2228.

but in the following year his nephew David, duke of Rothesay, the heir to the crown, succeeded him as governor, although the duke himself was a prominent member of the advising council. Uncle and nephew soon differed, and in March 1402 the latter died in prison at Falkland. It is not certain that Albany was responsible for the imprisonment and death of Rothesay, whom the parliament declared to have died from natural causes; but the scanty evidence points in the direction of his guilt. Restored to the office of governor, the duke was chosen regent of the kingdom after the death of Robert III. in 1406, as the new king, James I., was a prisoner in London; and he took vigorous steps to prosecute the war with England, which had been renewed a few years before. He was unable, or as some say unwilling, to effect the release of his royal nephew, and was soon faced by a formidable revolt led by Donald Macdonald, second lord of the Isles, who claimed the earldom of Ross and was in alliance with Henry IV. of England; but the defeat of Donald at Harlaw near Aberdeen in July 141 1 freed him from this danger. Con- tinuing alternately to fight and to negotiate with England, the duke died at Stirling Castle in September 1420, and was buried in Dunfermline Abbey. Albany, who was the ablest prince of his house, left by his first wife one son, Murdac (or Murdoch) Stewart, who succeeded him as duke of Albany and regent, but at whose execution in 1425 the dukedom became extinct.

See Andrew pf Wyntoun, The Orygynale Cronykil of Scotland, edited by D. Laing (Edinburgh, 1872-1879) ; John of Fordun, Scotichronicon, continued by Walter Bower, edited by T. Hearne (Oxford, 1722); and P. F. Tytler, History of Scotland (Edinburgh, 1850). See also Sir W. Scott's Fair Maid of Perth.

II.' Alexander Stewart, duke of Albany (c. 1454-1485), was the second son of James II., king of Scotland, by his wife, Mary, daughter of Arnold, duke of Gelderland. Created duke of Albany before 1458, he also received the lordship of the Isle of Man, and

was afterwards captured by an English ship when journeying to Gelderland in 1468. He was soon released, and as he grew to manhood began to take part in the government and defence of Scotland, being appointed in quick succession high admiral, warden of the marches, governor of Berwick and lieutenant of the kingdom. Soon, however, he quarrelled with his brother, King James III. Some of his actions on the marches aroused suspicion, and in 1479 he was seized and imprisoned in Edinburgh Castle; but he soon made his escape, and reaching Paris in September 1479 was welcomed by King Louis XI. Louis, however, would not assist him to attack his brother the king, and crossing to England he made a treaty with King Edward IV. at Fotheringhay in June 1482. Like Edward Baliol, he promised to hold Scotland under English suzerainty in return for Edward's assistance, and with Richard, duke of Gloucester, afterwards King Richard III., he marched at the head of the English forces to Edinburgh. Meanwhile his sup- porters in Scotland had seized James, and professed their readiness to recognize Albany, declaring at the same time their distrust of Gloucester. A compromise, however, was arranged, and the restoration of his lands and offices was promised to Albany, who in turn agreed to be faithful to James; but about the same time the duke with remarkable duplicity had'sworn he would keep the treaty with Edward. Again he was appointed lieutenant of the kingdom, a truce was made with the English, and James, released from custody, restored his brother and created him earl of Mar and Garioch. The fraternal peace was soon disturbed. Failing to obtain possession of the king's person, Albany renewed negotiations with Edward, and in February 1483 made a new treaty at Westminster on the lines of that of Fotheringhay. A fresh reconciliation followed between the brothers, but in July 1483, during Albany's absence in England, he was sentenced to death for treason. After making a raid on Lochmaben he went to France, where in 1485 he was accidentally killed. Albany's first wife was Catherine, daughter of William, third earl of Orkney and first earl of Caithness, who bore him three sons and a daughter. This marriage was dissolved in 1478, and as its issue was regarded as illegitimate the title of duke of Albany descended to John (see below), his only son by

his second wife,' Anne de la Tour d'Auvergne, daughter df Bertrand II., count of Auvergne and of Bouillon, whom he married in 1480.

III. John Stewart, duke of Albany (c: 1481-1536), regent of

Scotland, was borri about 1481. He was brought' -up in France, where he owned large estatesˆ and held the office of admiral of France. In 151 '■$, at the request of the Scottish parliament, and in spite of Henry VIII.'s Efforts to prevent him, Albany came to Scotland, was inaugurated regent'ih July,ahd proceeded to organize resistance to- the influence of England and of Margaret Tudor, the queen dowager, sister of Henry VIII. In August he seized the latter and her children at Stirling, and subsequently was occupied in, suppressing the rebellion of the Homes, Angus (the second husband of Margaret), and James Hamilton, earl of Arran; Alexander, third Lord' Home, being beheaded in October 15 16. Albany was declared on the r 2th of November heir to the throile, 1 ahd on the '6th of June 151 7 he returned to France. In August he concluded the treaty of Rouen, by which the alliance between France and Scotland was renewed and a daughter of Francis I. was to marry James V., and next year he obtained the relaxation of certain dues on Scottish imports into France. Meanwhile Margaret had returned immediately on Albany's departure, and disorders had broken out owing to the rivalry between Angus and Arran. . Francisl. had secretly engaged himself to Henry VIII. riot' to alio 1 !* Albany's- departure from France, but he returned '"it the close of 1 521 and immediately became the object of Henry VHL's and Wolsey's attacks. He reconciled himself terripbrarily with Margaret, supported her divorce from Angus, and was now accused by the English government, in all probability unjustly, of having seduced her and of harbouring schemes of marrying her himself, together with designs against the life of' the y6ur/g king. These accusations were repudiated by the Scots, and Henry's demand for the regent's dismissal refused. ; War broke out in 1522, and in September Albany advanced to within foilf miles of Carlisle with a large army. The Scots, however, showed unwillingness to fight outside their owtl frontiers; and Albafiy agreed to a truce and disbanded 'his troops.' On the 25th of October he departed hastily to France, leaving the borders exposed to the enemy. On the 25th of September 1523 he once more landed in Scotland, bringing with him supplies from France and a considerable body of troops, and.on the 3rd of November; after an unsuccessful attack on Wark, retreated hastily, arid quitted Scotland finally on the 20th of May 1524. On the 30th of July his regency was teririinated by the declaration of James V. as king. He accompanied Francis I. in his disastrous Italian campaign' of 1525, being detached to make a diversion in Naples against the Spanish. Between 1530 and 1535 he acted as French ambassador

in Rome, conducted Catherine de' Medici, his wife's niece, to Paris on her marriage to Henry (afterwards Henry II.) in 1534, and negotiated the marriage of James V.

The regent Albany was a singularly unfortunate commander in the field, but a successful ruler and administrator, and the Scottish court of session owed to him its institution. But' he regarded himself more the subject of the king of France than of the king of Scotland, subordinated the interests of the latter state to the former, and disliked his official duties in Scotland; where the benefits of his administration were largely diminished by his want of perseverance and frequent absence. ˆ He appeals to have been a man of honourable arid straightforward conduct, whose character must be cleared from the aspersions of Wolsey and the English authorities. He married his cousin Anne de la Tour d'Auvergne, but left no legal issue, and all his honours became extinct at his death.

IV. Leopold Ge6rge Duncan Albert, duke 6f Aibahy, eighth child and youngest son of Queen Victoria, was born on the 7th of April 1853. The delicacy of his health seemed to mark him out for a life of retirement, and as he grew older he evinced much of the love of knowledge, the capacity for study and the interest in philanthropic and ecclesiastical movements which had characterized his father, the prince consort. He .matricu- lated at Christ Church, Oxford, in November 1872, living with

his tutor at Wykeham House, St Giles's, and diligently pursued his favourite studies of science, art and the modern languages. In 1876 he left the university with the honorary degree of D.C.L., and resided at Boyton House, Wiltshire, and afterwards at Claremont. On coming of age in 1874, he had been made a privy councillor and granted an annuity of £15,000. He travelled on the continent, and in 1880 visited the United States and Canada. He was a trustee of the British Museum, a bencher ' of Lincoln's Inn, and continued to take an active part in the promotion of education and knowledge generally. Like his father and other members of his family he was an excellent public speaker. On the 24th of May 1881 he was created duke of Albany, earl of Clarence and Baron Arklow. On the 27th of April 1882 he married Helene Frederica Augusta, princess of Waldeck-Pyrmont, and his income

was raised by parliament to £25,000. Having gone to the south of France for his health in the spring of 1884, he was attacked by a fit, the cause or the consequence of a fall in a club-house at Cannes, on the 27th of March, and died very unexpectedly on the fallowing morning. His death was universally regretted, from the gentleness and graciousness of his character, and the desire and ability he had shown to promote intellectual interests of every kind. He left a daughter, born in February 1883, and a posthumous son, Arthur Charles Edward, born on the 19th of July 1884, who succeeded to the dukedom of Albany, and who on the 30th of July 1000 became duke of Saxe-Coburg on the death of his uncle.

ALBANY, LOUISE MAXIMILIENNE CAROLINE, Countess or (1752-1824), eldest daughter of Prince Gustavus Adolphus of Stolberg-Gedern, was born at Mons on the 20th of September 1752. In her youth she was a canoness of Ste. Wandru at Mons, but in her twentieth year she was affianced, at the instigation of the duke of Berwick and with the secret connivance of the French Court, to Prince Charles Edward Stuart, ” the Young Pretender,” self-styled count of Albany. She was wedded to the prince at Macerata, near Ancona, on Good Friday 1774, and the married pair for over two years resided in the old Stuart palace at Rome. Pretty, intelligent, charming and witty, Louise fascinated Roman society, wherein she gained the nick- name of ” Queen of Hearts.” The union, however, which was obviously intended to give an heir to the Stuart prince, proved childless, and Louise’s married life became far from happy. In 1774 the pair moved to Florence, where in December 1780 Louise, terrified at her husband’s violence and fearing for the safety of her life, fled to a neighbouring convent and threw herself on the protection of her brother-in-law, Henry Stuart, Cardinal York, who invited her to Rome. Louise had already in Florence formed the acquaintance of the great Italian tragic poet, Vittorio Alfieri, who had been captivated by her .engaging manners, her youthful beauty and her literary powers. The poet now followed her to Rome, but the friendship between Alfieri and his sister-in-law does not seem to have aroused any suspicion in the mind of Cardinal York until 1783, when, after a visit to his brother in Florence, he suddenly requested Pope Pius VI. to banish Alfieri from papal territory. In 1784, however, a legal separation between the count and countess of Albany was arranged, and by Charles’s death in 1788 Louise found herself freed from matrimonial bonds. In company with Alfieri (to whom rumour said she had been secretly

married) she now visited Paris and London, and was cordially received at the English court, George III. granting her an annual pension of £1600 from the privy purse. Returning to Italy, Alfieri and the countess settled at Florence, where the poet died on the 9th of October 1803, and was buried in the church of Santa Croce beneath Canpva's vast monument erected at Louise's expense. The countess continued to reside in the house on the Lung' Arno at Florence, patronising men of science and letters and holding nightly receptions, at which all visitors were expected to treat their hostess with the etiquette due to reigning royalty. She died on the 29th of January 1824 and was buried in Santa Croce, where in the south transept a marble monument by Giovannozzi and Santarelli commemorates her. Bv her will

the countess bequeathed all her property, including many historic objects of art and documents, to the companion of her old age, the French painter, Francois Xavier Fabre, who ultimately gave the greater part of his legacy to the museum of his native town of Montpellier. Two excellent portraits of the countess of Albany and of Alfieri, painted by this artist, now hang in the Uffizi Gallery at Florence.

See Vernon Lee, The Countess of Albany (1884) ; Marchesa Vkelleschi, A Court in Exile. (H. M. V.)

ALBANY, a river of Canada, forming part of the boundary between the province of Ontario and the district of Keewatin. It rises in Lake St Joseph in 91 25′ W. and 50° 55′ N., and flows E.N.E. into James Bay, its total length being over 400 m. It is navigable for nearly half its length, to Martin's Falls. There are four Hudson's Bay Company's posts on its banks, including Fort Albany at its mouth. The Ogoki and Kenogami rivers are the principal tributaries.

ALBANY, a city and the county-seat of Dougherty county, Georgia, U.S.A., at the mouth of the Kinchafoona Creek, and at the head of navigation on the Flint river, about 100 m. S.S.W. of Macon, about 200 m. S.W. of Savannah and about 203 m. N.E. of Pensacola. Pop. (1890) 4008; (1900) 4606 (2903 of negro descent); (1910) 8190. It is served by the Central of Georgia, the Georgia Northern, the Seaboard Air Line, the Albany & Northern and the Atlantic Coast Line railways, and by steam- boats connecting it with Apalachicola at the mouth of the Apalachicola river. Its importance is largely due to these transportation facilities and to the resources of the surround- ing country, which

produces timber, lime, cotton, Indian corn, sugar-cane, wheat, oats, fruit, melons, hay and vegetables. Albany ships much cotton, and has a cotton compress, a cotton mill, cotton-seed oil and guano factories, brick yards, lumber mills and ice factories. It is a summer and winter resort and is the home of the Georgia Chautauqua. The city owns and operates the electric-lighting plant and artesian water-works. It was settled in 1836, was incorporated in 1838 and received its present city charter in 1907.

ALBANY, a city and the county-seat of Albany county, New York, U.S.A., and the capital of the state. It is situated on the W. bank of the Hudson river, just below the mouth of the Mohawk, 145 m. N. 6f New York City and 165 m. W. of Boston. Pop. (1880) 90,758; (1890) 94,923; (1900) 94,1s 1 , o f whom 17,718 were foreign-born (6612 being Irish, 5903 German, 1361 English and 740 Russian) and 1178 were negroes; (1910) 100,253. Albany is a terminus of the New York Central & Hudson River, the Delaware & Hudson and the West Shore railways, and is also served by the Boston & Maine railway, by the Erie and Champlain canals (being a terminus of each), by steamboat lines on the Hudson river and by several inter-urban electric railways connecting with neighbouring cities.

Albany is attractively situated on a series of hills rising sharply from the river. The older portions of the city are reminiscent of Dutch colonial days, and some fine specimens of the Dutch and later colonial architecture are still standing. Perhaps the most famous of these is the Schuyler mansion (now St Francis de Sales Orphan Asylum), built in 1760-1761. The Van Rensselaer manor-house, built in 1765, was pulled down in 1893 and was reconstructed on the campus of Williams College, Williamstown, Massachusetts, where it is used as a fraternity club-house. Among the public buildings, the finest is the new State Capitol, one of the largest and most imposing in America. It occupies a commanding position in Capitol Square (7-84 acres), one of the highest points in the city. It is built of white Maine granite, and cost about $2 5,000,000. Its dimensions are 300 X 400 ft. The corner-stone was laid in 1 8 7 1 , and the build- ing was completed, with the exception of the central rtower and dome, in 1904. The legislature first met in it in 1879. The original designs were by Thomas Fuller, who also designed the parliamentary buildings at Ottawa; but the plans underwent many changes, Isaac Gale Perry, Leopold Eidlitz and H. H. Richardson being associated with the work before its completion.

The beautiful ” ■western staircase “of red sandstone (from plans by Perry) and the senate chamber (designed by Richardson) are perhaps the most notable parts of the structure. The build- ing houses the various executive departments, the legislature and the court of appeals. A large and handsome building of white granite was begun in 1908 directly opposite the Capitol to accommodate the department of education and the magni- ficent state library (about 450,000 volumes). Other important buildings are the old state hall, a handsome white marble building erected in 1842; the city hall, a beautiful French Gothic building of pink granite trimmed with red sandstone, designed by H. H. Richardson; the Federal Building; the State Museum of Natural History; the galleries of the Albany Institute 1 and Historical and Art Society, in State Street, opposite the Capitol; Harmanus Bleecker Hall, a theatre since 1898; and the Ten Eyck and Kenmore hotels. Among the finest office buildings are the structures of the Albany City Savings Institution, National Commerical Bank, Union Trust Company, Albany Trust Company, the National Savings Bank, First National Bank, the New York State National Bank (1803, probably the oldest building in the United States used con- tinuously for banking purposes) and the Albany Savings Bank. The Fort Orange Club, the Catholic Union, the Albany Club, the University Club, the City Club of Albany, the Country Club, the German Hall Association and the Adelphi Club are the chief social organizations. The principal church buildings are the Cathedral of the Immaculate Conception (Roman Catholic), a fine specimen of Gothic architecture, built of brown- stone, with spires 210 ft. high; the cathedral of All Saints (Protestant Episcopal), an English Gothic structure of pink sandstone designed by R. W. Gibson and begun in 1883; St Peter’s Episcopal Church (French Gothic), of Hudson River bluestone; Emmanuel Baptist Church, of white granite; the Madison Avenue Reformed Church; and St Joseph’s (Roman Catholic), of bluestone and Caen stone with marble trimmings. Among the educational institutions are the Albany Medical College (1839) and the Albany Law School (1851), both incor- porated since 1873 with the Union University, the Collegiate Department of which is at Schenectady; the Albany College of Pharmacy (1881), also part of Union University; the Albany Academy (1813), in which Joseph Henry, while a member of the faculty, perfected in 1826-1832 the electro-magnet and began his work on the electric telegraph; the

Albany Academy for Girls, founded in 1814 as the Albany Female Academy (name changed in 1906); and a State Normal College (1890), with a Model School. The hospitals and charitable institutions include St Vincent's Orphan Asylum, the Lathrop Memorial (for children of working mothers), Albany City Hospital, the Homeopathic Hospital, St Peter's Hospital, the Albany City Orphan Asylum and the House of the Good Shepherd. There are a county penitentiary and a State armoury. The city has 95 acres of boulevards and avenues under park supervision and several fine parks (17, with 307 acres in 1907), notably Washington (containing Calverley's bronze statue of Robert Burns, • and Rhind's "Moses at the Rock of Horeb"), Beaver and Dudley, in which is the old Dudley Observatory — the present Observatory building is in Lake Avenue, south-west of Washington Park, where is also the Albany Hospital. In the beautiful rural cemetery, north of the city, are the tombs of President Chester A. Arthur and General Philip Schuyler. The city owns a fine water-supply and a filtration plant covering 20 acres, with a capacity of 30,000,000 gallons daily and storage reservoirs with a capacity of 227,000,000 gallons.

The first newspaper in Albany was the Gazette, founded in 1771. The Argus, founded in 1813 by Jesse Buel (1778-1839) and edited from 1824 to 1854 by Edwin Croswell (1797-1871), was long the organ of the coterie of New York politicians known as the " Albany Regency," and was one of the most influential Democratic papers in the United States. Previously to their holding office, Daniel Manning (1831-1887), secretary of the treasury in President Cleveland's cabinet, was president of the Argus company, and Daniel Scott Lamont (1851-1905), secretary

of war during -President Cleveland's sbeond 'administratfori, was managing editor of the newspaper. The Evening Journal, founded in 1830 asah anti-Masonic 'organ; and for thirty-five years edited by Thurlow Weed, was eqtially influential as an organ of the Whig and later of thie Republican party; '"

Albany is an important railway arid coirifilercial centre, - particularly as a distributing point for New England markets, as a lumber market and— though to a much 'less extent than formerly — as a depot for transhipment to the south and west. Among the city's manufactories are breweries, iron and brass foundries, stove factories, knitting mills, cotton mills; clothing factories, slaughtering' and ' meat-packing establishments, cigar and cigarette factories, and manufactories of adhesive pastes, court

plaster, spring beds, • ribbed underwear, aniline dyes, chemicals, gas meters;" fire-brick, and glazed paper and card- board. The value of the total factory product in 1905 was $20,208,715, which was 17 % greater than that fot 1900.— ' '-]

History.— Albany Was probably- the second Mace to be pejN ■manently settled witnin the borders of tne- original Thirteefi Colonies. It seems likely that French traders ascended the river as far as the site of the present city in the? first half of the 1 sixteenth century, and according to some writers a'tempbtary trading post was established here about 1 540. Albany's authentic history, however, may be dated from 1614, when DiStbn traders built on Castle Island, opposite the city, a post Which they named Fdrt Nassau. Three years later the fort was removed to the mainland, and near here in 161 8 the Dutch made their frrst treaty with the Iroquois.' In '1624 arrived' ergnteeii' families of Dutch Walloons', the first' actual permanent Settlerˆ/ as dis- tinguished from traders. In that year, on a'hill near the site of the present Capitol; Fort Orange was built"; arid arbund itj as a centre, the new town grew. At first it waS known by the Dutch simply as the "'fuyck hi (hodp), from the curve 1 in the? river at this point, whence was soon derived the name Bevet- fuyck or Beverwyck. In 1629 'theDutch government granted to Eilliaen van" Rensselaer; an' Amsterdam diamond merchant, land (ultimately 1093 sq. m:') centering' at Fort'Orange.' Over this tract, the first patroonship granted in the colony,- he had the usual poWers arid rights 01 a patroon.' The grant "was named Rensselaerwyck in his" honour, became a "'manor'" in 1685* and remained; in the family until' 1853. The colonists whoni' he settled npon his ' grant (loj'oˆ were industrious 1 , arid "Bever- 1 wyck " became increasingly prosperous. From this'time the town, on account of its favourable commercial and strategic position at'ttie gateway of 'the Iroquois courit¥y and at the head of navigation dn the Hudson river; Was for aeentury and a half one of the most iiriportarA plates' in the colonies. Tn 1664*, witli the transfer of New' Netherlands td English ; control, the rfaihe 1 " Beverwyck " was Changed to • " Albstriy "— one' of 'the title's of the duke of York (afterward JamesTI.). In 1673 the toWri was again for a 'short i time 1 under Dutch control. " In 1686 Governor Dongan granted -to Albany a city chatter, which proˆ vided for an elected cduncil. The first mayor appointed by the governor Was Peter Sfc'huyler (1657-1724). In 1689 was held here the first inter-colonial convention in Americaˆ when delegates from Massachusetts Bay, Plymouth, Connecticut and'

New York met to treat' with representatives of the Five Naticins and to plan a system of Colonial defence. During the 1 8th century there Was a great influx of English colonists, andini7i4 the first English church was erected. During the French aild Indian wars Albany was a starting-point for expeditions agaiiist Canada and the Lake Chariiplain country. "In June 1754, in pursuance of a recommendation of the Lords of Trade; a con* vention of representatives of Massachusetts, Rhode ' Island; New Hampshire, Connecticut, New York, Pennsylvania and Maryland met here for the purpose of confirming and establishing a closer league' of frieridship with the Iroquois and of 'arranging for a permanent uni6nof the colonies. The Indian affairs having been satisfactorily adjusted, 'the' convention, after ' considerable debate, in which Benjamin Franklin, Stephen ; Hopkins aid Thornas -Hutchinson took a' leading part, adopted (July it) a plan for a union of the cdlonies; 'Which was in great part Similar

to one submitted to the convention by Franklin. This plan provided for a representative governing body to be known as the Grand Council, to which each colony should elect delegates (not more than seven or less than two) for a term of three years. This body was to have control of Indian affairs, impose taxes, nominate all civil officers, authorize the opening of new lands to settlement, and in general have charge of colonial defence, and of the enlistment, equipment and maintenance of an army. An executive or viceroy, to be known as the president-general, was to have the veto power over the acts of the Grand Council and the right of appointment of military officers. Finally, it was provided that the acts of the Grand Council should be valid unless vetoed by the crown within a period of three years. Neither the British government nor the growing party in the colonies which was clamouring for colonial rights received the plan with favour — the former holding that it gave the colonies too much independence, and the latter that it gave them too little. The strategic importance of Albany was fully recog- nized during the War of Independence, and it was against Albany that Burgoyne's expedition was directed. Albany became the permanent state capital in 1797. In 1839 it became the centre of the " Anti-Rent War," which was precipitated by the death of Stephen van Rensselaer (1764-1839), the last of the patroons; the attempt of his heirs to collect overdue rents resulting in

disturbances which necessitated the calling out of the militia, spread into several counties where there were large landed estates, and were not entirely settled until 1847.

See William Barnes, The Settlement and Early History of Albany (Albany, 1864); J. Munsell, The Annals of Albany (10 vols., Albany, 1850-1859; 2nd ed., 4 vols., 1869-1871); E. B. Q'Callaghan, Documentary History of the State of New York, vol. iii. (Albany, 1850); A. J. Weise, The History of the City of Albany (Albany, 1884) ; G. R. Howell and J. Tenney, Bi-Centennial History of Albany (New York, 1886); Amasa J. Parker, Landmarks of Albany County (Syracuse, 1897); and Cuyler Reynolds, Albany Chronicles; or Albany Mayors and Contemporaneous Chronology (Albany, 1907).

ALBANY, a municipal town in the county of Plantagenet, West Australia, on Princess Royal Harbour, a branch of King George Sound, 352 m. by rail and 254 m. directly S.S.E. of Perth. Pop. (1001) 3650. It is the chief health resort of the state, and its climate is one of the finest in Australia; it has a mean annual temperature of 58-6° F., and the summer heat is never excessive. One of the features of the town is the Marine Drive, some 55 m. in circuit around the hills overlooking the harbour. Albany has several nourishing industries, of which the chief are brewing, coach-building, printing and tanning. In addition it has the finest harbour in West Australia. A pier extends for 1 700 ft. into the sea, giving safe accommodation to the large steamers which call at the port. The Great Southern railway has a line to the seaward end of the pier, and affords direct communication with the interior of the colony. The harbour is protected by forts and there is a garrison in the town. King George Sound, of which Albany is the township, was first occupied in 1826 and a penal settlement was established. No attempt was made to colonize the locality until after this settlement was given up in 183 1. Albany became a municipality in 187 1.

ALBATEGNIUS (c. 830-929), an Arab prince and astronomer, correctly designated Mahommed ben Gebir al Batani, his surname being derived from his native town, Batan in Mesopotamia. From his observations at Aracte and Damascus, where he died, he was able to correct some of Ptolemy's results, previously taken on trust. He compiled new tables of the sun and moon, long accepted as authoritative, discovered the movement of the sun's apogee, and assigned to annual precession the improved value of 55'. Perhaps independently of Aryabhatta

(born at Patali- putra on the Ganges 476 a.d.), he introduced the use of sines in calculation, and partially that of tangents. His principal work, De Motu Stellarum, was published at Nuremberg in 1 S3 7 by Melanchthon, in a blundering Latin translation by Plato Tiburtinus (fl. n 16), annotated by Regiomontanus. A reprint appeared at Bologna in 1645. The original MS. is preserved at the Vatican; and the Escorial library possesses in MS. a treatise of some value by him on astronomical

chronology. Albategnius takes the highest rank among Arab astronomers.

See Houzeau, Bibliographie astronomique, i. 467; M. Marie, Histoire des sciences, ii. 113; R. Wolf, Geschichte der Astronomie, p. 67; Delambre, Hist, de I'astr. au moyen age, ch. ii. ; Phil. Trans., J 693 (913), where E. Halley supplies corrections to some of the observations recorded in De Motu Stellarum.

ALBATROSS (from the Port. Alcatraz, a pelican), the name of a genus of aquatic birds {Diomedea), closely allied to the petrels, and belonging, like them, to the order Tubinares. In the name Diomedea, assigned to them by Linnaeus, there is a reference to the mythical metamorphosis of the companions of the Greek warrior Diomedes into birds. The beak is large, strong and sharp-edged, the upper mandible terminating in a large hook; the wings are narrow and very long; the feet have no hind toe, and the three anterior toes are completely webbed. The best known is the common or wandering albatross (D. exulans), which occurs in all parts of the Southern Ocean. It is the largest and strongest of all sea-birds. The length of the body is stated at 4 ft., and the weight at from 15 to 25 lb. It sometimes measures as much as 17 ft. between the tips of the extended wings, averaging probably from 10 to 12 ft. Its strength of wing is very great. It often accompanies a ship for days — not merely following it, but wheeling in wide circles round it — without ever being observed to alight on the water, and continues its flight, apparently untjred, in tempestuous as well as in moderate weather. It has even been said to sleep on the wing, and Moore alludes to this fanciful " cloud- rocked slumbering " in his Fire Worshippers. It feeds on small fish and on the animal refuse that floats on the sea, eating to such excess at times that it is unable to fly and rests helplessly on the water. The colour of the bird is white, the back being streaked trans- versely with black or brown bands, and the wings dark. Sailors capture the bird for its long wing-bones, which they manu- facture into tobacco-pipe stems. The albatross lays one

egg; it is white, with a few spots, and is about 4 in. long. In breeding-time the bird resorts to solitary island groups, like the Crozet Islands and the elevated Tristan da Cunha, where it has its nest — a natural hollow or a circle of earth roughly scraped together — on the open ground. The early explorers of the great Southern Sea cheered themselves with the companion- ship of the albatross in its dreary solitudes; and the evil hap of him who shot with his cross-bow the bird of good omen is familiar to readers of Coleridge's Rime of the Ancient Mariner. Several species of albatross are known; for the smaller forms see Mallemuck.

ALBAY, a city and the capital of the province of Albay, Luzon, Philippine Islands, near an inlet on the W. shore of the Gulf of Albay, 215 m. by wagon-road S.E. of Manila. Pop. (1903) 14,049; in October 1907 the towns of Daraga (pop. 1903, 18,695) and Legaspi (pop. 1903, 9206) were merged with Albay, making its total population, on the basis of the 1903 census, 41,950. Albay is one of the most important cities of the Philippine Islands. It is built on level ground near the S. base of Mount May on, a beautiful volcanic peak, 7916 ft. high, from which it is sheltered by the Linguin hills. The surrounding country is one of the most important hemp-producing districts in the Philip- pines; sinamay is woven here, and large quantities of hemp are shipped from here to Manila. Cocoa, copra, sugar and sweet potatoes are other important products of the district. The language is Bicol. The old town, called Cagsaua, which stood a sh6rt distance E.N.E. of the new, was completely destroyed by

an eruption of the volcano in 1814 (about 1200 people being killed), and the new town was almost entirely destroyed by the insurgents in February 1900, an ancient stone church of much beauty (in what was formerly Daraga) being left standing on ah elevated site commanding a view of the surrounding country. The town was rebuilt on a larger scale by Americans.

ALBEDO (from Lat. albus, white), " whiteness," a word used principally in astronomy for the degree of reflected light; the light of the sun which is reflected from the moon is called the albedo of the moon.

ALBEMARLE, EARLS AND DUKES OF. The name Albeˆ marie,

which now forms the title of the earldom held by the English family of Keppel, is an early variant of the French Aumale (Lat. Alba Maria), other forms being Aubemarle and Aumerle, and is described in the patent of nobility granted in 1696-1697 by William III. to Arnold Joost van Keppel as ” a town and territory in the dukedom of Normandy.”

The fief of Aumale (q. v.) was granted by the archbishop of Rouen to Odo of Champagne, brother-in-law :of William the Conqueror, who erected it into a countship. On Odo’s death his son Stephen succeeded not only to the countship of Aumale, but to the lordships of Holderness, of Bytham in Lincolnshire, &c, which were subsequently known as the ” Fee and Honor of Albemarle.” Stephen, who as a crusader had fought valiantly at Antioch, died about 1127, leaving by his wife Ha wise, daughter of Ralph de Mortimer, a son — William of Blois, known as ” le, Gros.” William, who distinguished himself at the battle of the Standard (1138), and shared with King Stephen in the defeat of Lincoln (1141), married Cicely, daughter of William Fitz- Duncan, grandson of Malcolm, king of Scotland, who as ” lady of Harewood ” brought him vast estates. He founded abbeys at Meaux in Holderness and at Thornton, and died in 1179. His elder daughter and heiress Ha wise married (1) William de Mandeville, 3rd earl of Essex (d. 1189), (2) William de Fortibus (de Fors, de Fortz or des Forts 1), (3) Baldwin de Betun or Bethune, all of whom bore the title of earls of Albemarle.

Soon after the death of Baldwin (October 13, 1213), William de Fortibus, Hawise’s son by her second husband, was established by King John in the territories of the countship of Albemarle, and in 121 5 the whole of his mother’s estates were formally confirmed to him. He is described by Bishop Stubbs as ” a feudal adventurer of the worst type,” and for some time was actively engaged in the struggles of the Norman barons against John and Henry III. He was one of the twenty-five executors of the Great Charter; but in the war that followed sided with John, subsequently changing sides as often as it suited his policy. His object was to revive the independent power of the feudal barons, and he co-operated to this end with Falkes de Breaute (g.v.) and other foreign adventurers established in the country by John. This brought him into conflict with the great justiciar, Hubert de Burgh, and in 1219 he was declared a rebel and ex-communicated for attending a forbidden tournament. In 1220 matters were brought to a crisis by his refusal to surrender the two royal castles of Rockingham and Sauvey of which he had

been made constable in 1216. Henry III. marched against them in person, the garrisons fled, and they fell without a blow. In the following year, however, Albemarle, in face of further efforts to reduce his power, rose in revolt. He was now again excommunicated by the legate Pandulph at a solemn council held in St Paul's, and the whole force of the kingdom was set in motion against him, a special scutage — the " scutagium de Bihan " — being voted for this purpose by the Great Council. The capture of his castle of Bytham broke his power; he sought sanctuary and, at Pandulph's intercession, was pardoned ori condition of going for six years to the Holy Land. He remained in England, however, and in 1223 was once more in revolt with Falkes de Breaute, the earl of Chester and other turbulent spirits. A reconciliation was once more patched up; but it was not

1 The name was derived from Fors, a commune in the canton of Prahecq in Poitou. It is spelt Forz in a deed of 1233, and the best vernacular form is, according to Thomas Stapleton (Preface to the Liber de Antiquitate, Camden Soc, 1846, p. xxxiv. note), de Fortz. .,

until the fall of Falkes de Breaute that Albemarle finally settled down as an English noble. In 1225 he witnessed Henry's third re-issue of the Great Charter; in 1227 he went as, ambassador to Antwerp; and in 1230 he accompanied Henry on his expedi- tion to Brittany. In 1 241 he set out for the Holy Land, but died at sea, on his way there, on the 26th of March 1242. By his wife Avelina of Montfichet, William left a son, also named William, who married (1) Christina (d. 1246), daughter and co-heiress of Alan, lard of Galloway, (2) in 1248 Isabella de Redvers (1237-!! 292-3), daughter of Baldwin de Redvers, earl of Devon and lord of the Isle of Wight. He played a Conspicuous part in the reign of Henry III:, notably in the: Mad Parliament of 1258, and died at Amiens in 1260. His widow, Isabella, on the death of her brother! Baldwin, 8th earl of Devon, in 1261, called herself countess of Devon. She had two children, Thomas, who died in 1269 unmarried, and Avelina, who married (1269) Edmund Plantagenet, earl of Lancaster, and died without issue in 1274. ■■' The ". Hondr'of Albemarle " was claimed, in 1278, by John'de Eston, or Aston, as heir of Am-icia, younger daughter of William le. Gros,; but he released his right to the earldom of Albemarle to the crown in exchange for certain lands in Thornton.

The title of Albemarle, thus extinguished, was several times

revived before iit >became attached to the family of its present holders. In 1585, Thomas of Woodstock, duke of Gloucester, was ‘Summoned to. parliament as ” duke of Albemarle,” but he seems never subsequently to have used the; title. In any ease this creation became extinct with the death of bis son Humphrey, duke of Gloucester, . in 1399. In 141 1 Thomas Plantagenet, second son of Henry IV:, was created earl of Albemarle and duke of Clarence, but at his death at the battle of Beauge (March 22, 1421) these honours became extinct. That of Albemarle was, however, soon revived (c. 1423) in favour of Richard de Beauchamp, earl of Warwick, whose title of earl of Aumerle, however, died with him. ° :.-•.■• ;

In 1660 Charles II. bestowed the title of duke of Albemarle on General Monk (q.v.). Monk’s hereditary claim to this v semi-royal peerage was a very shadowy one, being based — as was also his subordinate style of Baron Beauchamp — on, his descent from the youngest of the three co-heiresses of Richard, earl of Warwick, and, with yet more remote applicability, on that from Arthur Plantagenet, a natural son of Edward IV. The title became extinct in 1688, on the death of Christopher, 2nd duke of Albemarle.

Finally, as mentioned above, the title of earl of Albemarle was bestowed by William III., without any shadow of hereditary claim, on his Dutch favourite Arnold Joost van Keppel (see below), by whose descendants it is still held. The motive for choosing this title was probably that, apart from its dignified traditions, it avoided the difficulty created by the fact that the Keppels had as yet no territorial possessions in the British Islands.

Arnold Joost van Keppel, 1st earl of Albemarle, and lord of Voorst in Gelderland (c. 1670-1718), son of Oswald van Keppel and his wife Anna Geertruid van Lintello, was born in Holland about 1670. He became page to William III.,, accom- panied him to England in 1688, and was made groom of the bed- chamber and master of the robes in 1695. On the 10th of February, 1696/7 he was created earl of Albemarle, Viscount Bury and Baron Ashford. In 1700 William gave him lands of enormous extent in Ireland, but parliament obliged the king to cancel this grant, and William then bestowed on him £50,000. The same year he was made a knight of the Garter. Meanwhile he had served both with the English and Dutch troops, was major-general in 1697, colonel of several regiments and governor of Bois-le-Duc. Of handsome

person and engaging disposition,, he rivalled Portland, whose jealousy he aroused in the royal favour, possessed William's full confidence and accompanied him everywhere. In February 1702 he was sent by William, then prostrated with his last illness, to Holland to arrange the; coming campaign, and only returned in time to receive William's last commissions on his deathbed. After the death of the latter,- who bequeathed to him 200,000 guilders and some lands^ he.

returned to Holland, took his seat as a noble in the states-general, and was made a general of horse in the Dutch army. He joined the forces of the allies in 1703, was present at Ramillies in 1706 ; and at Oudenarde in 1708, and distinguished himself at the I siege of Lille. He commanded at the siege of Aire in 17 10, led Marlborough's second line in 1711, and was general of the Dutch '■ forces in 17 12, being defeated at Denain after the withdrawal of Ormonde and the English forces and taken prisoner. He died on the 30th of May 1718, aged 48. He married Geertruid, daughter of Adam van der Denijn, by whom, besides a daughter, he had a son, William Anne, who succeeded him as 2nd earl of Albemarle.

Of the later earls mention need only be made of the sixth, Geokge Thomas Keppel (1799-1891), British general, second son of the fourth earl, born on- the 13th of June 1799. ' Educated at Westminster School he entered the army as ensign, 14th Foot, in 1815. He ; joined his regiment in Belgium and took part in the Waterloo campaign and the march to Paris, joined the second battalion in Corfu, and was transferred to the '22nd Foot, with which he served in Mauritius and at the Cape, returning home in 18 19, when he was appointed equerry to the duke of Sussex. Promoted to a lieutenancy iii the 24th Foot, he was transferred to the 20th Foot, and went to India, where he was aide-de-camp to the marquess of Hastings until his resignation in 1823, when Keppel returned to England, travelling overland through Persia, Moscow and St'Petersburg. He published in 1825 an account of his travels, entitled Journey from India to England. He was aide-de-camp to the Marquess Wellesley, lord-lieutenant of Ireland, for two years, was promoted captain in the 62nd Foot, studied in the senior department of the Royal Military College at Sandhurst, and in 1827 obtained a half-pay unattached majority. He did not

again serve On full pay, but rose to be a general. In 1829 he visited the seat of the Russoˆ Tirrkish war and was with the British fleet in Turkish waters. In 1832 he was returned in the Whig interest to the first reformed parliament as member for East Norfolk and sat until- 1835. He was' private secretary to the premier, Lord John Russell, in 1846, and M.P. for Lymington from 1 1847 to 1849. He succeeded to the title on the death of his brother in 1851. He died in 1891 andwas buried at Quidenham, Norfolk. He wrote an account of a Journey across the Balkans, '■ Memoirs of the Marquis oj Rockingham, and ah 1 autobigraphy entitled Fifty Years of My Life.

See G. E. C(ockayne), Complete Peerage, 8 vols. (London, 1887). For the two Williams de Fortibus, see s.v. Prof. T. F. Tout's articles in the Diet, of Nat. Biog.

ALBENGA, a town and episcopal see of Liguria, Italy, on the N.W. coast of the Gulf of Genoa, in the province of Genoa, 52 J m. S.W. of Genoa by rail. Pop. (1961) 6248. Albenga is the ancient Album Ingaunum or Albingaunum, the chief town of the In- gauni, one of the most important of the Ligurian tribes, whose : territory reached as far as Genoa. Under the empire it was a; municpium; an inscription records the restoration of the walls, forum, harbour, &c, by Constantius a.d. 354. A little way out- side the town to the E. is a well-preserved Roman bridge nearly 500 ft. long and 115 ft. wide, with 10 arches, each. with a span of 37 ft. It belonged to the coast road and is now known as Ponte Lungo. To the S. of the town is a conspicuous monument, 27 ft. high, in the form of a rectangular pillar, resembling a tomb; but as there is no trace of a door to a sepulchral chamber it may be. a shrine. In the town itself there are no Roman remains; but there is a good Gothic cathedral in brick, and an interesting octagonal baptistery, attributed to the 8th or 9th century, the arches being supported by ancient columns, and the vaulting decorated with mosaics. Some of the medieval palaces of; Albenga have lofty brick towers.

See A. d'Andrade in Relazione dell' Ufficio Regionale per la Con- ,servazione dei monumenti del Piemonte e delta Liguria (Turin, 1899), 114 seq.

ALBERONI, GIULIO (1664-1752), Spanish-Italian cardinal and statesman, was born near Piacenza, probably at the village of Fiorenzuola, on the 31st of May 1664. His father was a gardener, and he himself became first connected with the church in the

humble position of verger in the cathedral of Piacenza.

Having gained the favour of Bishop Barni he took priest's orders, and afterwards accompanied the son of his patron to Rome. During the war of the Spanish succession Alberoni laid the foundation of his political success by the services he rendered to the duke of Vendome, commander of the French forces in Italy; and when these forces were recalled in 1 706 he accompanied the duke to Paris, where he was favourably received by Louis XIV. In 1 7 1 1 he followed Vendome into Spain as his secretary. Two years later, the duke having died in the interval, Alberoni was appointed consular agent for Parma at the court of Philip V. of Spain, being raised at the same time to the dignity of count. On his arrival at Madrid he found the princesse des Ursins all but omnipotent with the king, and for a time he judged it expedient to use her influence in carrying out his plans. In concert with her he arranged the king's marriage with Elizabeth Farnese of Parma. The influence of the new queen being actively exerted on Alberoni's behalf, he speedily rose to high position. He was made a member of the king's council, bishop of Malaga, and in r 713 prime minister and was raised to the dignity of cardinal in 1 71 7. His internal policy was exceedingly vigorous. The main purpose he put before himself was to produce an economic revival in Spain by abolishing internal custom-houses, throwing open the trade of the Indies and reorganizing the finances. With the resources thus gained he undertook to enable King Philip V. to carry out an ambitious policy both in Italy and in France. The impatience of the king and his wife gave the minister no time to mature his plans. By provoking England, France, Holland and the Empire at once it brought a flood of disaster on Spain for which Alberoni was held responsible. On the 5th of December 1 7 19 he was ordered to leave Spain, Elizabeth herself having taken an active part in procuring the decree of banishment. He went to Italy, and there had to take refuge among the Apennines, Pope Clement XL, who was his bitter enemy, having given strict orders for his arrest, On the death of Clement, Alberoni boldly appeared at the Conclave, and took part in the election of Innocent XIII. (1721), after which he was for a short time im- prisoned by the pontiff on the demand of Spain. At the next election (1724) he was himself proposed for the papal chair, and secured ten votes at the Conclave which elected Benedict XIII. Benedict's successor, Clement XII. (elected 1730), named him legate of Ravenna, in which capacity he incurred the pope's displeasure by the strong and unwarrantable measures he adopted to reduce the little

republic of San Marino to subjection to Rome. He was consequently replaced by another legate in 1 740, and soon after he retired to Piacenza. Clement XII. appointed him administrator of the hospital of San Lazzaro at Piacenza in 1 730. The* hospital was a medieval foundation for the benefit of lepers. The disease having disappeared from Italy, Alberoni obtained the consent of the pope to the suppression of the hospital, which had fallen into great disorder, and replaced it by a college for the education of Seventy poor boys for the priesthood, under the name of the Collegio Alberoni, which it still bears. He died on the 1 6th of June 1752, leaving a sum of 600,000 ducats to endow the seminary he had founded, and the residue of the immense wealth he had acquired in Spain to his nephew. Alberoni left a large quantity of manuscripts; but the genuineness of the Political Testament, published in his name at Lausanne in 1753, has been questioned.

An Histoire du Cardinal Alberoni up to 1719 was published by Jean Rousset de Missy at the Hague in 1719, A laudatory life, Storia del Cardinale Giulio Alberoni, was published by Stefano Bersani, a priest educated at his college, at Piacenza, in 1861. Giulio Albergni e il suo secolo, by Giovanni Bianchi (1901), is briefer and more critical. See also Lettres intimes de J. Alberoni, edited by M. E. Bourgeois (1892).

ALBERT (1522-1557), prince of Bayreuth, surnamed the Warlike, and also Alcibiades, was a son of Casimir, prince of Bayreuth, and a member of the Franconian branch of the Hohenzollern family. Born at Ansbach on the 28th of March 1522, he lost his father in 1527 and came under the guardianship of his uncle George,' prince of Ansbach, a strong adherent of the reformed doctrines. In 1541 he received Bayreuth as his share of the family, lands, and as the chief town of his principality

was Kulmbach he is sometimes referred to as the margrave of Brandenburg-Kulmbach. His restless and turbulent nature marked him out for a military career; and having collected a small band of soldiers, he assisted the emperor Charles V. in his war with France in 1543. The peace of Crepy in September 1544 deprived him of this employment, but he had won a considerable reputation, and when Charles was preparing to attack

the league of Schmalkalden, he took pains to win Albert's assistance. Sharing in the attack on the Saxon electorate, Albert was taken prisoner at Rochlitz in March 1547 by John Frederick, elector of Saxony, but was released as a result of the emperor's victory at Miihiberg in the succeeding April. He then followed the fortunes of his friend Maurice, the new elector of Saxony, deserted Charles, and joined the league which pror- posed to overthrow the emperor by an alliance with Henry II. of France. He took part in the subsequent campaign, but when the treaty of Passau was signed in August 1552 he separated himself from his allies and began a crusade of plunder in Fran- conia. Having extorted a large sum of money from the burghers of Nuremberg, he quarrelled with his supporter, the French king, and offered his services to the emperor. Charles, anxious to secure such a famous fighter, gladly assented to Albert's demands and gave the imperial sanction to his possession of the lands taken from the bishops of Wurzburg and Bamberg; and his conspicuous bravery was of great value to the emperor on the retreat from Metz in January 1553. When Charles left Germany a few weeks later, Albert renewed his depredations in Franconia. These soon became so serious that a league was formed to crush him, and Maurice of Saxony led an army against his former comrade. The rival forces met at Sievershausen on the 9th of July 1553, and after a combat of unusual ferocity Albert was put to flight. Henry II., duke of Brunswick, then took command of the troops of the league, and after Albert had been placed under the imperial ban in December 1553 he was defeated by Duke Henry, and compelled to fly to France. He there entered the service of Henry II., and had undertaken a campaign to regain his lands when he died at Pforzheim on the 8th of January 1557.

See J. Voigt, Markgraf Albrecht Alcibiades von Brandenburg-Kulmbach (Berlin, 1852).

ALBERT I. (c. 1100-1170), margrave of Brandenburg, sur- named the Bear, was the only son of Otto the Rich, count of Ballenstedt, and Eilika, daughter of Magnus Billung, duke of Saxony. He inherited the valuable Saxon estates of his father in 1 1 23, and on his mother's death, in 1142, succeeded to one- half of the lands of the Billungs. About 11 23 he received from Lothair, duke of Saxony, the margraviate of Lusatia, and, after Lothair became German king, accompanied him on the disastrous expedition to Bohemia in 1 1 26, when he suffered a short imprison- ment. In 1 1 28 his brother-in-law, Henry II., margrave of the Saxon north mark, died, and Albert, disappointed at not receiving this fief,

attacked Udo, the succeeding margrave, and was con- sequently deprived of Lusatia by Lothair. In spite of this, he went to Italy in 113 2 in the train of the king, and his services there were rewarded, in 1 134, by the investiture of the north mark, which was again without a ruler. For three years he was occupied in campaigns against the Wends, and by an arrange- ment made with Pribislaus, duke of Brandenburg, Albert secured this district when the duke died in 1150. Taking the title margrave of Brandenburg, he pressed the warfare against the Wends, extended the area of his mark, did much for the spread of Christianity and civilization therein, and so became the founder of the margraviate of Brandenburg. In 113 7 his cousin, Henry the Proud, had been deprived by King Conrad III. of his Saxon duchy, which was given to Albert. After meeting with some success in his efforts to take possession, he .was driven' from : Saxony, and also from his mark by Henry, and. compelled to take refuge in South Germany, and when peace was made in 1 142 he renounced the Saxon dukedom and received the counties of Weimar and Orlamunde. It was possibly at this time that Albert was made arch-chamberlain of the Empire, an office which afterwards gave the margraves of Brandenburg the.

rights of an elector. A feud with Henry the Lion, duke of Saxony, was followed, in 1158, by a pilgrimage to the Holy Land, and in 1 162 Albert accompanied the emperor Frederick I. to Italy, and distinguished himself at the storming of Milan. In 1164 he joined a league of princes, formed against Henry the Lion, and peace being made in 1169, Albert divided his territories among his six sons, and died on the 13th of November n 70, and was •buried at Ballenstadt. His personal qualities won for him the surname of " the Bear," and he is also called by later writers " the Handsome."

See L. von Heinemann, Albrecht der Bar (Darmstadt, 1864).

ALBERT III. (1414-1486), elector of Brandenburg, surnamed Achilles because of his knightly qualities, was the third son of Frederick I. of Hohenzollern, elector of Brandenburg, and ,was born at Tangermunde on the 9th of November 1414-. After passing some time at the court of the emperor Sigismund, he took part in the war against the Hussites, and afterwards dis- tinguished himself whilst assisting the German king, Albert II, , against the Poles. On the division of territory which followed his father's death in 1440, Albert received the principality of Ansbach; and although his resources were very meagre he soon took a leading place among the German princes, and was

especially prominent in resisting the attempts of the towns to obtain self- government. In 1443 he formeda league directed mainly against Nuremberg, over which town members of his family had formerly exercised the rights of burgrave. . : It was not until 1448, hpwever, that he found a pretext for attack, and the war which lasted until 1453 ended in a victory for the Nurembergers, and the recognition of their independence. He supported the emperor Frederick III. in his struggle with the princes who desired re- forms in Germany, and in return for this loyalty received many marks of favour from Frederick, including extensive judicial rights which aroused considerable irritation among neighbouring rulers. In 1457 he arranged a marriage between his eldest son John, and Margaret, daughter of William III., landgrave of Thuringia, who inherited the claims upon Hungary and Bohemia of her niother, a granddaughter of the emperor Sigismund. The attempt to secure these thrones for the Hohenzollerns through this marriage failed, and a similar fate befell Albert's efforts to revive in his own favour the disused title of duke of Franconia. The sharp dissensions which existed among the princes over the question of reform culminated in open warfare in 1460, when Albert was confronted with a league under the leadership of the elector palatine, Frederick I.; and Louis IX. (the Rich), duke of Bavaria-Landshut. Worsted in this struggle, whkh was concluded in 1462, Albert made an alliance win! his former enemy, George Podebrad, king of Bohemia, a step which caused Pope Paul II. to place him under the ban.

In 1470 Albert, who had inherited Bayreuth on the death of his brother John in 1464, became elector of Brandenburg owing to the abdication of his remaining brother, the elector Frederick II. He Was soon actively engaged in its administration, and by the treaty of Prenzlau in 1472 he brought Pomerania also under his supremacy. Having established his right to levy a tonnage on wines in the mark, he issued in February 1473 the important dispositio Achillea, which decreed that the mark of Brandenburg should descend in its entirety to the eldest son, while the younger sons should receive the Franconian possessions of the family. After treating in vain for a marriage between one of his sons and Mary, daughter and heiress of Charles the Bold, duke of Burgundy, Albert handed over the government of Brandenburg to his eldest son John, and returned to his Franconian possessions. In 1474 he married his daughter Barbara to Henry XL, duke of Glogau, who left his possessions on his death in 1476 to his widow with reversion to her family, an arrangement which was

resisted by Henry's kinsman, John II., duke of Sagan. Aided by Matthias Corvinus, king of Hungary, John invaded Brandenburg, and the Pomeranians seized the opportunity to revolt. Uader these circumstances Albert returned to .Brandenburg in 1478, Com- pelled the Pomeranians to own his supremacy, and after a stubborn struggle secured a part of Duke Henry's lands for his daughter in 1482, His main attention was afterwards claimed

by the business of the Empire, and soon after taking part in the election of Maximilian as king of the Romans he died at Frankfort on the nth of March i486. He left a considerable amount of treasure. His first wife was Margaret of Baden, by whom he had six children; and his second was Anne of Saxony, by whom he had thirteen.

Albert was a man of relentless energy and boundless ambition, who by reason of his physical and intellectual qualities was one of the most prominent princes of the 15th century.

See Das kaiserliche Buck des Markgrafen Albrecht Achilles, Vorkurjurstliche Periode, 1440-1470, edited by C. Hofler (Bayreuth, 1850); Kurfiirstliche Periode, edited by J. von Minutoli (Berlin, 1850); Quellensammlung zur Geschichte des Hauses Hohenzollern, Band I., edited by C. A. H. Burkhardt (Jena, 1S57) ; O. Franklin, Albrecht Achilles und die Nuremberger, 1440-1453 (Berlin, 1866); Politische Korrespondenz des Kurfiirsten Albrecht Achilles, 147&- 1486, edited by F. Priebatsch (Leipzig, 1894-1898) ; J. G. Droysen, Geschichte der preussischen Politik (Berlin, 1855-1886).

ALBERT (FRANCIS CHARLES AUGUSTUS ALBERT EM- MANUEL) (1819-1861), prince-consort of England, was born at Rosenau on the 26th of August 1819. He was the second son of the hereditary duke of Saxe-Coburg-Gotha (belonging to the Ernestine or elder branch of the royal family of Saxony) by his first wife, the princess Louise of Saxe-Gotha-Altenburg (d. 1831), from whom the duke was separated in 1S24. His father's sister married the duke of Kent, and her daughter, afterwards Queen Victoria of England, Prince Albert's wife, was thus his first cousin. They were born in the same year. Albert and his elder brother, Ernest, were close companions in youth, and were educated under the

care of Consistorialrath Florschutz, sub- sequently proceeding to the university of Bonn. There Prince Albert devoted himself especially to natural science, political economy and philosophy, having for teachers such men as Fichte, Schlegel and Perthes; he diligently cultivated music and paint- ing, and excelled in gymnastic exercises, especially in fencing. The idea of a marriage between him and his cousin Victoria had always been cherished by their uncle, King Leopold I. of Belgium) and in May 1 836 the duke of Saxe-Coburg-Gotha and his two sons paid a visit to Kensington Palace, where Princess Victoria,,as she then was, lived, for the purpose of making acquaintance for the first time. The visit was by no means to the taste of King William IV., who disapproved of the match and favoured Prince Alexander of Orange. But Leopold's plan was known to Princess Victoria, and William's objections were fruitless. Princess Victoria, writing to her uncle Leopold (May 23, 1836), said that Albert was " extremely handsome "; and (June 7) thanked him for the " prospect of great happiness you have contributed to give me in the person of dear Albert. He possesses every quality that could be desired to render me perfectly happy." No formal engagement was entered into, but the situation was privately understood as one which in time would naturally develop. After the queen came to the throne, her letters show her interest in Albert's being educated for the part he would have to play. In the winter of 1838-1839 the prince travelled in Italy, accompanied by Baron Stockmar, formerly Leopold's doctor and private secretary, and now the queen's confidential adviser. On the 10th of October 1839 he and Ernest went again to England to visit the queen, with the object of finally settling the marriage. Mutual inclination and affection at once brought about the desired result. They became definitely engaged on the 15th of October, and on the 10th of February 1840 the marriage was celebrated at the chapel-royal, St James's.

The position in which the prince was placed by his marriage, while it was one of distinguished honour, was also one of consider- able difficulty; and during his lifetime the tactful way in which he filled it was very inadequately appreciated. The public life of the prince-consort cannot be separated from that of the queen, and it is unnecessary here to repeat such details as are given in the article on her (see Victoria, Queen) . The prejudice against him, on account of what was regarded as undue influence in politics, was never fully dissipated till after his death. His co-operation with the queen in dealing with the political responsi-

bilities which devolved upon the sovereign represented an amount

of conscientious and self-sacrificing labour which cannot easily be exaggerated; and his wisdom in council could only be realized, outside a very small circle, when in later years the materials for the history of that time became accessible. He was indeed a man of cultured and liberal ideas, well qualified to take the lead in many reforms which the England of that day sorely needed. He was specially interested in endeavours to secure the more perfect application of science and art to manufacturing industry. The Great Exhibition of 185 1 originated in a suggestion he made at a meeting of the Society of Arts, and owed the greater part of its success to his intelligent and unwearied efforts. He had to work for its realization against an extraordinary outburst of angry expostulations. Every stage in his project was combated. In the House of Peers, Lord Brougham denied the right of the crown to hold the exhibition in Hyde Park; in the Commons, Colonel Sibthorp prophesied that England would be overrun with foreign rogues and revolutionists, who would subvert the morals of the people, filch their trade secrets from them, and destroy their faith and loyalty towards their religion and their sovereign. Prince Albert was president of the exhibition commission, and every post brought him abusive letters, accusing him, as a foreigner, of being intent upon the corruption of England. He was not the man to be balked by talk of this kind, but quietly persevered, looking always to the probability that the manufacturing power of Great Britain would be quickened by bringing the best manufactured products of foreign countries under the eyes of the mechanics and artisans. A sense of the artistic was at this time almost wholly wanting among the English people. One day the prince had a conversation with a great manufacturer of crockery, and sought to convert him to the idea of issuing something better than the eternal willow-pattern in white with gold, red or blue, which formed the staple of middle and lower class domestic china. The manufacturer held out that new shapes and designs would not be saleable; but he was induced to try, and he did so with such a rapid success that a, revolution in the china cupboards of England was accomplished from that time. The exhibition was opened by the queen on the 1st of May 1851, and was a colossal success; and the realized surplus of £150,000 went to establish and endow the South Kensington Museum (afterwards renamed “Victoria and Albert”) and to purchase land in that neighbourhood. Similar

institu- tions, on a smaller scale but with a kindred aim, always found in him warm advocacy and substantial support. It was chiefly at meetings in connexion with these that he found occasion for the delivery of addresses characterized by profound thought and comprehensiveness of view, a collection of which was published in 1857. One of the most favourable specimens of his powers as a speaker is the inaugural address which he delivered as president of the British Association for the Advancement of Science when it met at Aberdeen in 1859. The education of his family and the management of his domestic affairs furnished the prince with another very important sphere of action, in which he employed himself with cohscientious devotedness.

The estates of the duchy of Cornwall, the hereditary appanage of the prince of Wales, were i so greatly improved under his father's management that the rent-roll rose from £11,000 to £50,000 a year. Prince Albert, indeed, had a peculiar talent for the management of landed estates. His model farm at Windsor was in every way worthy of the name; and the grounds at Balmoral and Osborne were laid out entirely in conformity with his designs.

A character so pure, and a life so useful and well-directed in all its aims, could scarcely fail to win respect among those who were acquainted with the facts. As the prince became better known, public mistrust began to give way. In 1847, but only after a significantly keen contest with Earl Powis, he was elected chancellor of the university of Cambridge; and he was after- wards appointed master of the Trinity House. In June 1857 the formal title of prince-consort was conferred upon him by, letters patent, in order to settle certain difficulties as to precedence that had been raised at foreign courts.

But in the full career of his usefulness he was cut off. During

the autumn of 1861 he was busy with the arrangements for the projected international exhibition, and it was just after returning from one of the meetings in connexion with it that he was seized with his last illness. Beginning at the end of November with what appeared to be influenza, it proved to be an attack of typhoid fever, and, congestion of the lungs supervening, he died on the

14th of December. The grief of the queen was over- whelming and the sympathy of the whole nation marked a revulsion of feeling about the prince himself which was not devoid of compunction for earlier want of appreciation. The magnificent mausoleum at Frogmore, in which his remains were finally deposited, was erected at the expense of the queen and the royal family; and many public monuments to " Albert the Good " were erected all over the country, the most notable being the Albert Hall (1867) and the Albert Memorial (1876) in London. His name was also commemorated in the queen's institution of the Albert medal (1866) in reward for gallantry in saving life, and of the order of Victoria and Albert (1862).

By the queen's authority, her secretary, General Grey, compiled The Early Days of the Prince Consort, published in 1867; and The Life and Letters of the Prince Consort (1st vol., 1874; 2nd, 1880) was similarly edited by Sir Theodore Martin. A volume of the Principal Speeches and Addresses of Prince Albert, with an introduction by Sir Arthur Helps, was published in 1862. See also the Letters of Queen Victoria (1907). (H. Ch.)

ALBERT I. (c. 1250-1308), German king, and duke of Austria, eldest son of King Rudolph I., the founder of the greatness of the house of Habsburg, was invested with the duchies of Austria and Styria, together with his brother Rudolph, in 1282. In 1283 his father entrusted him with their sole government, and he appears to have ruled them with conspicuous success. Rudolph was unable to secure the succession to the German throne for his son, and on his death in 1291, the princes, fearing Albert's power, chose Adolph of Nassau as king. A rising among his Swabiandependants compelled Albert to recognize the sovereignty of his rival, and to confine himself to the government of the Habsburg territories. He did not abandon his hopes of the throne, and, in 1298, was chosen German king by some of the princes, who were dissatisfied with Adolph. The armies of the rival kings met at Gollheim near Worms, where Adolph was defeated and slain, and Albert submitted to a fresh election. Having secured the support of several influential princes by extensive promises, he was chosen at Frankfort on the 27th of July 1298, and crowned at Aix-la-Chapelle on the 24th of August following. Albert sought to play an important part in European affairs. He seemed at first inclined to press a quarrel with France over the Burgundian frontier, but the refusal of Pope Boniface VIII. to recognize his election led him to change his policy, and, in 1299, a treaty was made between Albert and Philip IV., king of

France, by which Rudolph, the son of the German king, was to marry Blanche, a daughter of the French king. He afterwards became estranged from Philip, and, in 1303, was recognized as German king and future emperor by Boniface, and, in return, admitted the right of the pope alone to bestow the imperial crown, and promised that none of his sons should be elected German king without the papal consent. Albert had failed in his attempt to seize Holland and Zealand, as vacant fiefs of the Empire, on the death of Count John I. in 1299, but in 1306 he secured the crown of Bohemia for his son Rudolph on the death of King Wenceslaus III. He also renewed the claim which had been made by his predecessor, Adolf, on Thuringia, and interfered in a quarrel over the succession to the Hungarian throne. His attack on Thuringia ended in his defeat at Lucka in 1307, and, in the same year, the death of his son Rudolph weakened his position in eastern Europe. His action in abolishing all tolls established on the Rhine since 1250, led to the formation of a league against him by the Rhenish archbishops and the count palatine of the Rhine; but aided by the towns, he soon crushed the rising. He was on the way to suppress a revolt in Swabia when he was murdered on the 1st of May 1308, at Windisch on the Reuss, by his nephew John, afterwards called " the Parricide," whom he had deprived of his inheritance. Albert married Elizabeth, daughter of Meinhard IV. ,

count of Gorz and Tirol, who bore him six sons and five daughters. Although a hard, stern man, he had a keen sense of justice when his selfish interests were not involved, and few of the German kings possessed so practical an intelligence. He encouraged the cities, and not content with issuing proclamations against private war, formed alliances with the princes in order to enforce his decrees. The serfs, whose wrongs seldom attracted notice in an age indifferent to the claims of common humanity, found a friend in this severe monarch, and he protected even the despised and persecuted Jews. The stories of his cruelty and oppression in the Swiss cantons first appear in the 16th century, and are now regarded as legendary.

See G. Droysen, Albrechts I. Bemuhungen um die Nachfolge im Reich (Leipzig, 1862); J. F. A. Miicke, Albrecht I. von Habsburg (Gotha, 1866); A. L. J. Michelsen, Die Landgrafschajt Thuringen unter den Konigen Adolf, Albrecht, und Heinrich VII. (Jena, i860).

ALBERT II. (1397-1439), German king, king of Bohemia and

Hungary, and (as Albert V.) duke of Austria, was born on the 10th of August 1397, the son of Albert IV. of Habsburg, duke of Austria. He succeeded to the duchy of Austria on his father's death in 1404. After receiving a good education, he undertook the government of Austria in 141 1, and succeeded, with the aid of his advisers, in ridding the duchy of the evils which had arisen during his minority. He assisted the German king, Sigismund, in his campaigns against the Hussites, and in 1422 married Elizabeth, daughter and heiress of Sigismund, who designated him as his successor. When the German king died in 1437, Albert was crowned king of Hungary on the 1st of January 1438, and although crowned king of Bohemia six months later, he was unable to obtain possession of the country. He was engaged in warfare with the Bohemians and their Polish allies, when on the 18th of March 1438 he was chosen German king at Frankfort, an honour which he does not appear to have sought. Afterwards , engaged in defending Hungary against the attacks of the Turks, he died on the 27th of October 1439 at Langendorf, and was buried at Stuhlweissenburg. Albert was an energetic and war-like prince, whose short reign gave great promise of usefulness for Germany.

. See W. Altmann, Die Wahl Albrecht II. zum romischen Konige (Berlin, 1886).

ALBERT (1490-1545), elector and archbishop of Mainz, and archbishop of Magdeburg, was the younger son of John Cicero, elector of Brandenburg, and was born on the 28th of June 1490. Having studied at the university of Frankfort-on-the-Oder, he entered the ecclesiastical profession, and in 1513 became arch-bishop of Magdeburg and administrator of the diocese of Halberstadt. In 1514 he obtained the electorate of Mainz, and in 15 18 was made a cardinal. Meanwhile to pay for the pallium of the see of Mainz and to discharge the other expenses of his elevation, Albert had borrowed a large sum of money from the Fuggers, and had obtained permission from Pope Leo X. to conduct the sale of indulgences in his diocese to obtain funds to repay this loan. For this work he procured the services of John Tetzel, and so indirectly exercised a potent influence on the course of the Reformation. When the imperial election of 1 519 drew near, the elector's vote was eagerly solicited by the partisans of Charles (afterwards the emperor Charles V.) and by those of Francis I., king of France, and he appears to have received a large amount of money for the vote which, he cast eventually for Charles. Albert's large and liberal ideas, his

friendship with Ulrich von Hutten, and his political ambi- tions, appear to have raised hopes that he would be won over to the reformed faith; but after the Peasants' War of 1525 he ranged himself definitely among the supporters of Catholicism, and was among the princes who met to concert measures for its defence at Dessau in July 1525. His hostility towards the reformers, however, was not so extreme as that of his brother Joachim I., elector of Brandenburg; and he appears to have exerted himself in the interests of peace, although he was a member of the league of Nuremberg, which was formed in 1538′ as a counterpoise to the league of Schmalkalden. The new doctrines nevertheless made considerable progress in his dominions, and he was compelled to grant religious liberty

to the inhabitants of Magdeburg in return for 500,000 florins. During his latter years indeed he showed more intolerance towards the Protestants, and favoured the teaching of the Jesuits in his dominions. Albert adorned the Stiftskirche at Halle and the cathedral at Mainz in sumptuous fashion, and took as his motto the words Domine, dilexi decorem domus tuae. A generous patron of art and learning, he counted Erasmus among his friends. He died at Aschaffenburg on the 24th of September 1545.

See J. H. Hennes, Albrecht von Brandenburg, Erzbischof von Mainz und Magdeburg (Mainz, 1858); J. May, Der ' Kurfiirst, Kardinal, und Erzbischof Albrecht II. von Mainz und Magdeburg (Munich, 1865-1875); W. Schum, Kardinal Albrecht von Mainz und die Erfurter Kirchenreformation (Halle, 1878) ; P. Redlich, Kardinal Albrecht von Brandenburg, und das neue Stift zu Halle (Mainz, 1900).

ALBERT (1490-1568), Grand Master of the Teutonic Order, and first duke of Prussia, was the third son of Frederick of Hohenzollern, prince of Ansbach and Bayreuth, and Sophia, daughter of Casimir IV., king of Poland. Born at Ansbach on the 16th of May 1490, he was intended for the church, and passed some time at the court of Hermann, elector of Cologne, who appointed him to a canonry in his cathedral. Turning to a more active life, he accompanied the emperor Maximilian I. to Italy in 1 508, and after his return spent some time in Hungary. In December, Frederick, grand master of the Teutonic Order, died,

and Albert, joining the order, was chosen as his successor early in 1511 in the hope that his relationship to Sigismund I., king of Poland, would facilitate a settlement of the disputes over east Prussia, which had been held by the order under Polish suzerainty since 1466. The new master, however, showed no desire to be conciliatory, and as war appeared inevitable, he made strenuous efforts to secure allies, and carried on tedious negotiations with the emperor Maximilian I. The ill-feeling, influenced by the ravages of members of the order in Poland, culminated in a struggle which began in December 1519. During the ensuing year Prussia was devastated, and Albert consented early in 1521 to a truce for four years. The dispute was referred to the emperor Charles V. and other princes, but as no settlement was reached the master continued his efforts to obtain help in view of a renewal of the war. For this purpose he visited Nuremberg in 1522, where he made the acquaintance of the reformer, Andreas Osiander, by whose influence he was won over to the side of the new faith. He then journeyed to Witten- berg, where he was advised by Martin Luther to cast aside the senseless rules of his order, to marry, and to convert Prussia into an hereditary duchy for himself. This proposal, which commended itself to Albert, had already been discussed by some of his relatives; but it was necessary to proceed cautiously, and lie assured Pope Adrian VI. that he was anxious to reform the order and punish the knights who had adopted Lutheran doctrines. Luther for his part did not stop at the suggestion, but in order to facilitate the change made special efforts to spread his teaching among the Prussians, while Albert's brother, George, prince of Ansbach, laid the scheme before Sigismund of Poland. After some delay the king assented to it provided that Prussia were held as a Polish fief; and after this arrange- ment had been confirmed by a treaty made at Cracow, Albert was invested with the duchy by Sigismund for himself and his heirs on the 10th of February 1525. The estates of the land then met at Konigsberg and took the oath of allegiance to the new duke, who used his full powers to forward the doctrines of Luther. This transition did not, however, take place without protest. Summoned before the imperial court of justice, Albert refused to appear and was placed under the ban; while the order, having deposed the grand master, made a feeble effort to recover Prussia. But as the German princes were either too busy or too indifferent to attack the duke, the agitation against him soon died away. In imperial politics Albert was fairly active. Joining the league of Torgau in 1526, he acted in unison with the Protestants, and was among

the princes who banded themselves together to overthrow Charles V. after the issue of the Interim in May 1 548. For various reasons, however, poverty and personal inclination among others, he did not take a

prominent part in the military operations of this period. The early years of Albert's rule in Prussia were fairly prosperous. Although he had some trouble with the peasantry, the lands and treasures of the church enabled him to propitiate the nobles and for a time to provide for the expenses of the court. He did something for the furtherance of learning by establishing schools in every town and by giving privileges to serfs who adopted a scholastic life. In 1 544, in spite of some opposition, he founded a university at Konigsberg, where he appointed his friend Osiander to a professorship in 1 549. This step was the beginning of the troubles which clouded the closing years of Albert's reign. Osiander's divergence from Luther's doctrine of justification by faith involved him in a violent quarrel with Melanchthon, who had adherents in Konigsberg, and these theological disputes soon created an uproar in the town. The duke strenuously supported Osiander, and the area of the quarrel soon broadened. There were no longer church lands available with which to conciliate the nobles, the burden of taxation was heavy, and Albert's rule became unpopular. After Osiander's death in 1552 he favoured a preacher named John Funck, who, with an adventurer named Paul Scalich, exercised great influence over him and obtained considerable wealth at the public expense. The state of turmoil caused by these religious and political disputes was increased by the possibility of Albert's early death and the necessity in that event for a regency owing to the youth of his only son, Albert Frederick. The duke was consequently obliged to consent to a condemnation of the teaching of Osiander, and the climax came in 1566 when the estates appealed to Sigismund II., king of Poland, who sent a commission to Konigs- berg. Scalich saved his life by flight, but Funck was executed; the question of the regency was settled; and a form of Lutheran- ism was adopted, and declared binding on all teachers and preachers. Virtually deprived of power, the duke lived for two years longer, and died at Tapiau on the 20th of March 1568. In 1526 he had married Dorothea, daughter of Frederick I., king of Denmark, and after her death in 1547, Anna Maria, daughter of Eric I., duke of Brunswick. Albert was a voluminous letter- writer, and corresponded with many of the leading personages of the time. In 1891 a statue was erected to his memory at Konigsberg.

See J. Voigt, Briefwechsel der beriihmtesten Gelehrten des Zeitalters der Reformation mit Herzog Albrecht von Preussen (Konigsberg, 1 841); E. Joachim, Die Politik des letzten Hochmeisters in Preussen, Albrecht von Brandenburg (Leipzig, 1892) ; K. Lohmeyer, Herzog Albrecht von Preussen (Danzig, 1890).

ALBERT III. (1443- 1 500) , duke of Saxony, surnamed Animosus or the Courageous, younger son of Frederick II., the Mild, elector and duke of Saxony, was born on the 27 th of January 1443, and after escaping from the hands of Kunz von Kaufungen, who had abducted him together with his brother Ernest, passed some time at the court of the emperor Frederick III. in Vienna. In 1464 he married Zedena, or Sidonia, daughter of George Podebrad, king of Bohemia, but failed to obtain the Bohemian crown on the death of George in 1471. After the death of the elector Frederick in 1464, Albert and Ernest ruled their lands together, but in 1485 a division was made by the treaty of Leipzig, and Albert received Meissen, together with some adjoining districts, and founded the Albertine branch of the family of Wettin. Regarded as a capable soldier by the emperor, Albert, in 1475, took a prominent part in the campaign against Charles the Bold, duke of Burgundy, and in 1487 led an expedition against Matthias Corvinus, king of Hungary, which failed owing to lack of support on the part of the emperor. In 1488 he marched with the imperial forces to free the Roman king Maximilian from his imprisonment at Bruges, and when, in 1489, the king returned to Germany, Albert was left as his repre- sentative to prosecute the war against the rebels. He was successful in restoring the authority of Maximilian in Holland, Flanders and Brabant, but failed to obtain any repayment of the large sums of money which he had spent in these campaigns. His services were rewarded in 1498 when Maximilian bestowed upon him the title of hereditary governor (potestat) of Friesland, but he had to make good his claim by force of arms. He had

to a great extent succeeded, and was paying a visit to Saxony, when be was recalled by news of a fresh rising. Groningen was captured, but soon afterwards the duke died at Emden, on the 1 2th of September 1500. He was buried at Meissen. Albert, who was a man of great strength and considerable skill in feats of

arms, delighted in tournaments and knightly exercises. His loyalty to the emperor Frederick, and the expenses incurred in this connexion, aroused some irritation among his subjects, but his rule was a period of prosperity in Saxony.

See F. A. von Langenn, Herzog Albrecht der Beherzte, Statnmvater des koniglichen Hauses Sachsen (Leipzig, 1838) ; O. Sperling, Herzog Albrecht der Beherzte von Sachsen als Gubernalor Frieslands (Leipzig,

1892).

ALBERT, FREDERICK AUGUSTUS, king of Saxony (1828- 1902), was born on the 23rd of April 1828, being the eldest son of Prince John, who succeeded to the throne in 1854. His educa- tion was, as is usual with German princes, to a great extent military, but he attended lectures at the university of Bonn. His first experience of warfare was in 1849, when he served as a captain in the campaign of Schleswig-Holstein against the Danes. When the war of 1866 broke out, the crown-prince was placed in command of the Saxon forces opposing the Prussian army of Prince Frederick Charles. No attempt was made to defend Saxony; the Saxons fell back into Bohemia and effected a junction with the Austrians. They took a prominent part in the battles by which the Prussians forced the line of the Iser and in the battle of Gitchin. The crown-prince, however, succeeded in effecting the retreat in good order, and in the decisive battle of Koniggratz (see Seven Weeks' War) he held the extreme left of the Austrian position. The Saxons maintained their post with great tenacity, but were involved in the disastrous defeat of their allies. During these operations the crown-prince won the reputation of a thorough soldier; after peace was made and Saxony had entered the North German confederation, he was placed in command of the Saxon army, which had now become the XII. army corps of the North German army, and in this position carried out the necessary reorganization. He was a firm adherent of the Prussian alliance. On the outbreak of war in 1870 he again commanded the Saxons, who were included in the 2nd army under Prince Frederick Charles, his old opponent. At the battle of Gravelotte they formed the extreme left of the German army, and with the Prussian Guard carried out the attack on St Privat, the final and decisive action in the battle. In the reorganization of the army which accompanied the march towards Paris the crown-prince was given a separate command over the 4th army (army of the Meuse) consisting of the Saxons, the Prussian Guard corps and

the IV. (Prussian Saxony) corps. He was succeeded in command of the XII. corps by his brother Prince George, who had served under him in Bohemia. He took a leading part in the operations which preceded the battle of Sedan, the 4th army being the pivot on which the whole army wheeled round in pursuit of MacMahon ; and the actions of Buzancy and Beaumont on the 29th and 30th of August were fought under his direction; in the battle of Sedan itself, with the troops under his orders, he carried out the envelopment of the French on the east and north. His conduct in these engage- ments won for him the complete confidence of the army, and during the siege of Paris his troops formed the north-east section' of the investing force. After the conclusion of the armistice he was left in command of the German army of occupation, a position which he held till the fall of the Commune. On the conclusion of peace he was made an inspector-general of the army and field-marshal. On the death of his father on the 29th of October 1873 ne succeeded to the throne. His reign was un- eventful, and he took little public part in politics, devoting himself to military affairs, in which his advice and experience were of the greatest value, not only to the Saxon corps but to the German army in general. In 1897 he was appointed arbi- trator between the claimants for the principality of Lippe. King Albert married in 1853 Carola, daughter of Prince Gustavus of Vasa, and granddaughter of the last king of Sweden of the house of Holstein. He died on the 19th of June 1902.

ALBERT, surnamed the Degenerate (c. 1240-1314), land- grave of Thuringia, was the eldest son of Henry III., the Illus- trious, margrave of Meissen. He married Margaret, daughter of the emperor Frederick II., in 1254, and in 1265 received from his father Thuringia and the Saxon palatinate. His infatuation for Kunigunde of Eisenberg caused his wife to leave him, and after her death in 1270 he married Kunigunde, who had already borne him a son, Apitz or Albert. He wished, to make Apitz his successor in Thuringia, a plan which was resisted by his two elder sons, and a war broke out which lasted until 1307, when he abandoned Thuringia, in return for a yearly payment, but retained the title of landgrave (see Thuringia). Albert, who had married Elizabeth, daughter of Hermann III., count of Qriamunde, after the death of his second wife in 1286, died on the 13th of November 1314.

See F. X. Wegele, Friedrich der Friedige, Markgraf von Meissen, und die Wettiner seiner Zeii (Nordlingen, 1820); F. W. Tittmann, Geschichte Heinrich des Erlauchten Markgraven zu Meissen

(Leipzig,

1863).

ALBERT (FRIEDRICH RUDOLF ALBRECHT), Archduke

(1817-1895), Austrian field-marshal, was the eldest son of the archduke Charles (Karl Friedrich), and was born on the 3rd of August 181 7 at Vienna. After being educated under the careful superintendence of his father, he entered the Austrian (K.K.) army as a colonel of infantry in 1837, and was transferred to the cavalry arm in 1839, becoming a major-general in 1840. A brief period of leave in this year he spent at the great manoeuvres in Italy, to learn the art of troop-leading from the first soldier in Europe, Radetzky. He then took over the command of a brigade of all arms at Graz. In 1844 he married Princess Hildegarde of Bavaria. He had been made a lieutenant field- marshal in the previous year, and was now placed in command of the forces in Upper and Lower Austria. In this position he did much to maintain and improve the efficiency of the troops under his command, at a time when nearly all armies in Europe, with the exception of Radetzky's in Italy, had sunk to the lowest level. The influence of Radetzky over the young archduke was indeed remarkable. At this time the Austrian generals and staff officers had committed themselves blindly to the strategical method of the archduke Charles, the tradition of whose practical soldiership survived only in Radetzky and a few others! Albert chose to follow the latter, and was thus saved from the pseudo- scientific pedantry which brought defeat to the Austrian afms in 1859 and in 1866. His first serious service came in March 1848, when it became his duty, as district commander, to maintain order in Vienna by force, and at the outbreak of revolution in Vienna during the month of March he was in command of the troops who came into collision with the rioters. Owing to the collapse of the government it was impossible to repress the disturbances, and he was relieved from a post which brought much unpopularity and was not suitable to be held by a member of the imperial family. He went at once to the seat of war in Italy, and fought under Radetzky as a volunteer throughout the campaign of 1848, being present at the action of Pastrengo and the battles of Santa Lucia and Custozza. In the following campaign he applied for and obtained the command of a division in the II. corps (FZM. d'Aspre), though his previous grade had been that of a general commanding-in-chief. The splendid fighting of the corps at Novara was decisive of the war, and Radetzky named

d'Aspre, Count Thurn, and the archduke as the general officers worthy of the greatest rewards. The field-marshal indeed recommended, and almost insisted, that Albert should receive the much-prized order of Maria Theresa. In 1850 he became a general of cavalry, and in 1851 military and civil governor of Hungary. In this important and diffi- cult position he remained until i860, when he was relieved at his own request. Shortly afterwards he was appointed to succeed Radetzky as commander-in-chief in Italy, and in 1863 he Was promoted field-marshal. In the following year the archduke lost his wife, soon after the marriage of their elder daughter to Duke Philip of Wiirttemberg. In 1859 and 1864 he was sent on important military and diplomatic missions to Berlin. When

war became imminent in 1866, the archduke took command of the field army in Italy. The story of the campaign of 1866 in Italy will be found under Italian Wars (1848-1870); the operations of the archduke, who disposed of greatly inferior forces, were crowned with success in the brilliant victory of Custozza (June 23), and his reputation as a general-in-chief was firmly established by only eight days of field operations, though it is possible that his chief of staff, Lieut. Field-Marshal von John, contributed not a little to the success of the Austrian arms. The result of Custozza was the retreat and complete immobilization of the whole Italian army, so that Albert was able to despatch the greater part of his troops to reinforce the Bohemian army, when, after being defeated by the Prussians, it fell back on Vienna. On the 10th of July the archduke was summoned to Vienna to take supreme command of the forces which were being collected to defend the capital, but peace was made before further hostilities took place. From this time, under various titles, he acted as inspector-general of the army. Like his father, and with better fortune, he was called upon to reorganize the military systemˆof his country on an entirely new plan, learned, as before, by defeat. The principle of universal short service, and the theory of the armed nation, were necessarily the groundwork of the reforms, and the consequent preparation of all the national resources for their task in war, by the super- intendence of peace administration, by the skilful conduct of manoeuvres, was thenceforward the task of his lifetime. In 1870 he conducted the military negotiations preparatory to an alliance with France,

which, however, was not concluded. The tragic death of his daughter, Princess Mathilde, in 1867, and the death of his brother, Archduke Karl Ferdinand, in 1874, narrowed still further his family circle, and impelled him to even greater activity in his military duties, and to effective par- ticipation in the work of many military charities. He retained personal control of the army until his last illness, which he contracted at the funeral of his nephew Francis, ex-king of Naples. His only remaining brother, the archduke Wilhelm, had died a few months before, as the result of an accident. He himself died on the 18th of February 1895. His only son died in childhood, and his nephew Archduke Frederick (born 1856) inherited his great possessions, including the Albertina, a famous collection of books, manuscripts, engravings and maps, founded by Duke Albert of Saxe-Teschen.

Amongst the military works of the Archduke Albert may be named Uber die Verantwortlichkeit im Kriege (a work which created a great sensation, and was translated into English and French) , Gedanken uber dem Militdrgeist, Uber die hbhere Leitung im Kriege, and Kritische Belrachtungen uber den Feldzug 1866 in Italien. He also was the principal editor of the military works of his father.

See Duncker, F. M. Erzherzog Albrecht (Vienna and Prague, 1897) ; Mathes v. Bilabriick, ” Gedenkrede auf Weiland Sr. K. u.-K. H. Erzh. Albrecht,” Mil.-Wissenschaftl. Verein, 1895; Teuber, F. M. Erzh. Albrecht, ein Lebensbild (Vienna, 1895).

ALBERT, Madame (c. 1805-1846), French actress, whose maiden name was Therese Vernet, was born of a family of players. She first appeared in children’s and ingenue parts, and in comic opera, and it was not until 1827, two years after her Paris debut, that her great talents were, seen and appreciated. In Caleb Valentine, Henry V., Madame Dubarry, Catherine II., Leontine, Un duel sous le cardinal de Richelieu, and many other plays, her grace, beauty and distinction of manner made her the idol of Paris, and her circle of admirers was widened by long tours of the provinces and abroad. Ill-health compelled her to retire in 1846. She was twice married, about 1825 to Albert Rodrigues, an actor who played under his Christian name, and in 1846 to Eugene Bignon (1812-1858), the actor and playwright.

ALBERT OF AIX (fl. c. a.d. iioo), historian of the first crusade, was born during the later part of the nth century, and afterwards became canon and custos of the church of Aix-la- Chapelle.

Nothing else is known of his life except that he was the author of a Historia Hierosolymitanae expeditionis, or Chroni- con Hierosolymilanum de bello sacro, a work in twelve books,

written between 11 25 and 1150. This history begins at the time of the council of Clermont, deals with the fortunes of the first crusade and the earlier history of the Latin kingdom of Jerusalem, and ends somewhat abruptly in 1121. It was well known during the middle ages, and was largely used by William, archbishop of Tyre, for the first six books of his Belli sacri historia. In modern times its historical value has been seriously impugned, but the , verdict of the best scholarship seems to be that in general it forms a true record of the events of the first crusade, although contain- ing some legendary matter. Albert never visited the Holy Land, but he appears to have had a considerable amount of intercourse with returned crusaders, and to have had access to valuable correspondence. The first edition of the history was published at Helmstadt in 1584, and a good edition is in the Recueil des hisloriens des croisades, tome iv. (Paris, 1841-1887).

See F. Krebs, Zur Kritik Alberts von Aachen (Munster, 1881); B. Kugler, Albert von Aachen (Stuttgart, 1885); M. Pigeonneau, Le Cycle de la croisade et de lafamille de Bouillon (Paris, 1877) ;H. von Sybel, Geschichte des ersten Kreuzzuges (Leipzig, 1881) ; F. Vercruysse, Essai critique sur la chronique a" Albert d'Aix (Liege, 1889).

ALBERTA, a province of western Canada, established in 1905. Area 260,000 sq. m. It is bounded S. by the United States boundary line, 49° N.; E. by no° W., which divides it from the province of Saskatchewan; N. by 6o° N., which separates it from the North-West Territories; and W. by the line of peaks of the Rocky Mountains range, which runs north- westerly, and divides it from British Columbia. A fertile province, in the eastern and southern portions its surface con- sists chiefly of plains almost entirely treeless. As the slopes of the Rocky Mountains to the west are reached more trees are found, until in the foot-hills of the mountains bodies of forest timber occur. Trees become more numerous also northward in the province, until in the region north of the North Saskat- chewan river forests are again met with. From the southern boundary line for two and a half degrees north the prairie is dry, but of good soil, which grows excellent crops when irrigated. North of this region the surface of the province is of most fertile soil, the ordinary rainfall sufficing for agriculture. The appear- ance of the prairie section of the province is thkt of undulating meadows, with rounded sloping ridges covered with shorter grasses, which serve for the support of great herds of cattle and horses. The wooded portions of the terrain are dotted with clumps and belts of trees of moderate size, giving them a park- like appearance. In winter the snowfall is very light, and even this is frequently removed by warm win4s from the west. Within a hundred miles of the mountains there is constantly in view, in clear weather, the beautiful line of snowy peaks along the western horizon. This continues for hundreds of miles north-westward. The Rocky Mountains, which give its charm to Alberta, are ascended by a gradual approach from the east, but are exceedingly abrupt on their transalpine slope in British Columbia. The peaks of these mountains are majestic, many of them reaching a height of more than two miles above the sea. Among the more notable of these are Robson peak, 13,700 ft.; Athabasca, 13,700; Assiniboine, 11,830; Lyell, 12,000; Mummery, 12,000; Temple, 11,658; and Geikie, 11,000. Mt. Brown reaches 9050.

Through these Rocky Mountains the explorers and fur- traders, by ascending the streams running down the eastern declivities of the mountains, and crossing by short portages to the streams of the western slope, have succeeded in discovering passes by which the mountain chain can be crossed, the range rarely exceeding 60 m. in breadth. The most noted of the Alberta passes are (1) the Crow's Nest Pass, near the southern boundary line,

through which a branch of the Canadian Pacific railway runs; (2) the Kicking Horse Pass, through which the main line of the Canadian Pacific railway is built; 40 m. from the eastern end of this pass is the Rocky Mountains Park, with the famous watering-place of Banff as its centre; (3) the Yellow Head Pass, running west from the northern branch of the Saskatchewan river; this pass was discovered by Capt. Falliser (1858), was crossed by Lord Milton and Dr W. B. Cheadle(i86i), and by Sandford Fleming (1871-1872) in the Ocean to Ocean

expedition; (4) Peace River Pass. By this pass Alexander Mackenzie made his celebrated voyage. There are other minor passes, and no doubt more to be discovered.

With the exception of the southern section, the province of Alberta may be said to be well watered. Rising from numerous valleys on the Alberta declivity of the Rocky Mountains between the international boundary line and 52 N. are streams which unite to form the Belly river, and farther north the Bow river. Running eastward these two rivers unite about 112 W., and

Railways. ~ .^**-*- Canals

Grand Trunk Pacific Ry .SJifift

flow on under the name of the South Saskatchewan river. North of 5 2 N. many small streams unite to form the Red Deer river, which flowing south-eastward joins the South Saskat- chewan near no° W. Between 52° and 53 N. rises the great river, the North Saskatchewan. It receives a southern tributary, the Battle river, which joins it about 108 W. Pursuing their courses eastward the North and South- Saskatchewan rivers unite in the Saskatchewan (Cree, rapid-flowing river), which finds its way to Lake Winnipeg, and thence by way of Nelson river to Hudson Bay. It is one of the mightiest rivers of the continent.

Between 53 and 54 N. begins the height of land running north-easterly, north of which all the waters of Alberta flow toward the Arctic Sea. In northern Alberta, on the northern

slope, gathering its tributaries from rills in the Rocky Mountains, the river Athabasca runs north and empties into Lake Athabasca

near 58° N. North of 56° N. flows through and from the Rocky Mountains the Peace river. After descending north-eastward to within a few miles of Lake Athabasca, it is met by a stream emerging from that lake. The united river carrying down the waters of the Athabasca slope is called the Slave river, which, passing through Great Slave Lake, emerges as the great Mackenzie river, which falls into the Arctic Sea. Alberta thus gives rise to the two great rivers Saskatchewan and Mackenzie. While a number of fresh-water, or in some cases brackish, lakes each less than 100 sq. m. in extent are situated in Alberta, two of more considerable size are found. These are Lake Athabasca, 3085 sq. m. in extent, of which a part is in the province of Saskatchewan, and the other Lesser Slave Lake some 600 sq. m. in area.

Climate. — As Alberta extends for 750 m. from north to south— as great a distance as from Land's End in England to the north of the Shetland Isles — it is natural that the climate should vary considerably between parallels of 49 and 6o° N., and also between no° and 120 W. It is also further influenced by the different altitudes above the sea of the several parts of the province. Dividing the province into three equal parts of 250 m. each ; from north to south, these may be called (A) the south, (B) the centre, (C) the north. The following data may be considered: —

Climatic TAfttE

Climate.

Places.

Above the Sea.

Mean Winter Temp.

(A) Moderate and changeable

Medicine Hat, lat. ■ 50° N. Calgary, lat. 51 ° Banff, lat. 51*°

2171 ft.

3421 „

4515 .-

14-3° F.

15-4° .,” 15-9° „

(B) Steady .

Edmonton, lat. 535°

2210 ,,

10-3° „

(C) Severe

Fort Chipewyan, lat. 59° N.

600 ,,

7-2° ‘„

Climate (A) allows, in what is a great ranching district, cattle and horses to run at large through the whole winter. Through the mountain passes come at times dry winds from the Pacific coast, which lick up the snow in a few hours. These winds are known as Chinook winds. While elevating the tem- perature they bring more moisture into the air and produce a change not entirely desirable. *.•■■•

Climate (B) is the steady winter climate of Edmonton district. This while averaging a lower temperature than (A) is not so subject to change; it retains the snow for sleighing, which is a boon to the farmer. This climate is much less influenced by •the Pacific winds than (A).

Climate ©, that of Fort Chipewyan, having a mean winter temperature of 22-6° lower than Calgary, is a decidedly sub-arctic climate. It is the region in winter of constant ice and snow, but its lower altitude gives it a summer climate with a mean tem- perature of only i-6° less than Calgary, and i-8° less than Ed- monton. It will thus be seen that the agricultural capabilities of the Athabasca and Peace river districts, not yet fully known, are full of promise.

Fauna. — The three climatic regions of Alberta have naturally a varying fauna. The south and central region was the land of the bison, its grasses affording a great pasture ground for tens of

thousands of " buffaloes." They were destroyed by whites and Indians in 1879-1882 on the approach of the Canadian Pacific railway. Grizzly, black and cinnamon bears are found in the mountains and wooded districts. The coyote or small wolf,' here and there the grey wolf, the fox and the mountain lion (panther) occur. The moose and red deer are found in the wooded regions, and the jumping deer and antelope on the prairies. Wild sheep and goats live in the Rocky Mountains. The lynx, wolverine, porcupine, skunk, hare, squirrel and mouse are met. The gopher is a resident of the dry plains. District © is the fur- trader's

paradise. The buffalo is replaced by the mountain buffaloes, of which a few survive. The musk-ox comes in thousands every year to the great northern lakes, while the mink, marten, beaver, otter, ermine and musk-rat are sought by the fur-trader. Fort Chipewyan was long known in Hudson's Bay Company history as the great depot of the Mackenzie river district. Northern Alberta and the region farther north is the nesting-ground of the migratory birds. Here vast numbers of ducks, geese, swans and pelicans resort every year. Cranes, partridges and varieties of singing birds abound. The eagle, hawk, owl and crow are plentiful. Mosquitoes and flies are everywhere, and the wasp and wild bee also. In the rivers and lakes pike, pickerel, white fish and sturgeon supply food for the natives, and the brook trout is found in the small mountain streams. The turtle and frog also appear.

Flora. — In central and northern Alberta the opening spring brings in the prairie anemone, the avens and other early flowers. The advancing summer introduces many flowers of the sunflower family, until in August the plains are one blaze of .yellow and purple. The southern part of Alberta is covered by a short grass, very nutritive, but drying up in the middle of summer until the whole prairie is brown and unattractive. The trees in the wooded sections of the province are seen in clumps and belts on the hillsides. These are largely deciduous. On the north side of the Saskatchewan river forests prevail for scores and even hundreds of miles. They contain the poplar or aspen (Populus tremuloides) , balsam poplar (Populus balsamifera) , and paper or canoe birch (Betula papyrifera). The Coniferae are found northward and in the mountain valleys. Some of these are: Jack pine (Pinus Banksiana) , Rocky Mountain pine (Pinus flexilis), black pine

(Pinus Murrayana), white spruce (Picea alba), black spruce (Picea nigra), Engelman's spruce (Picea Engelmanni) , mountain balsam (Abies subalpina), Douglas fir (Pseudotsuga Douglasii), mountain larch (Larix Lyallis).

Population. — By the census of 1906 the population of Alberta was found to be 185,412. It has grown from 73,022 in 1901 (the area of Alberta being then slightly different). The basis of the population is Canadian, and the immigration has been chiefly from (1) the British Isles, (2) .United States, (3) continent of Europe (chiefly Austria, Hungary and Russia). Of the popula- tion in 1901, 17,245 had immigrated thither from the three mentioned sources. The following table shows the percentages of origins : —

1901.

Canadian and native born

The British Isles ....

Continent of Europe

54 %

6-8%

16-6 %

24-4 %

Of the Indian and Indian half-breed population there were in 1901, 14,669 of the former and 11,635 of the latter. The Indians of central Alberta are chiefly plain Crees, a tribe of Algonquin stock. In southern Alberta are several thousands of Indians on reserves south and west of Calgary, consisting of the Blackfoots of Algonquin stock, Sarcees, Piegans and a few Assiniboins.

The chief cities and towns of Alberta are Edmonton (11,167), Calgary (11,967), Medicine Hat (3020), Lethbridge (2948) and Strathcona (2927).

Industries. — The chief industries of the people are farming and ranching. Cattle, horses and sheep are largely reared in the southern prairie region on ranches or smaller holdings. In this region irrigation is widely used. Red winter wheat is now pro-

duced to a considerable degree. In the town of Raymond is a large beet sugar manufactory, and in the vicinity great quantities of beets are grown by irrigation. In central Alberta coarse grains — oats and barley — and some wheat are grown, in conjunc- tion with mixed farming. While washing out the sands of the North Saskatchewan for gold is still somewhat resorted to, the only real mining in Alberta is that for coal. Vast beds of coal are found extending for hundreds of miles, a short distance below the surface of the plains. The coal belongs to the Cretaceous beds, and while not so heavy as that of the Coal Measures is of excellent quality. In the valley of the Bow river, alongside the Canadian

Pacific railway, valuable beds of anthracite coal are worked, and the coal is carried by railway as far east as Winnipeg. The usual coal deposits of Alberta are of bituminous or semi-bituminous coal. These are largely worked at Lethbridge in southern Alberta and Edmonton in the centre of the province. Many other parts of the province have pits for private use. The Athabasca river region, as well as localities far north on the Mackenzie river, has decided indications of petroleum, though it is not yet de- veloped. Natural gas has been found at several points. The most notable gas discovery is that at Medicine Hat, which has wells with unlimited quantities. The gas is excellent, is used for lighting the town, supplies light and fuel for the people, and a number of industries are using the gas for manufacturing.

Communications. — For transportation the North Saskatchewan is to some extent depended on for carrying freight by steamboats, but railways are widespread in the province. The Canadian Pacific railway has its main line running from east to west chiefly between 50 and 51 N. Over this line passes an enormous trade from the Atlantic to the Pacific Ocean — the railway with its "Empress" steamers on the Pacific and also on the Atlantic Ocean claiming to have as its termini Liverpool and Yokohama. A branch line of the Canadian Pacific railway runs from Medicine Hat between 49 and 50 N., passing through the Crow's Nest Pass of the Rocky Mountains and carrying on trade with British Columbia. Another branch from Calgary runs southward to Macleod, and to Lethbridge there comes from the south a branch cf the Great Northern railway of the United States, connecting with the state of Montana. From Calgary to Edmonton north- ward runs a line under the control of the Canadian Pacific railway. From this railway also run, eastward from Lacombe and; Wetaskiwin, branch lines to complete the system. In 1906 the

new line of the Canadian Northern railway was opened, connecting Winnipeg, 1000 m. to the east, along the North Saskatchewan river, with Edmonton. The Grand Trunk Pacific railway, backed by the Canadian government, forms a new transcontinental line; the prairie section from Winnipeg to Edmonton was in 1908 under contract.

A dministration, &*

Education is given by a public-school system, which, while; nominally providing for separate schools for Catholics $,nd Prof testants, makes it practically impossible at most points to carry on such schools. A normal school is situated at Calgary. There is a college for secondary education in Calgary and another in Edmonton.

The following are the leading denominations in Alberta: — ;

1901.

12,957

10,655

9.623

Roman Catholics Presbyterians .... Methodists ....

Church of England ...

Lutherans 5,810

Greek Church 4,618

Mormons 3,212

Baptists , 2,722

The Mormons of Alberta are in the most southerly part of the province, and are a colony from the Mormon settlements in Utah, U.S. On coming to Canada they were given lands by. the Dominion of Canada. The organization adopted in Utah among the Mormons is found also in Alberta, but the Canadian Mormons profess to have received a later revelation condemning polygamy.

History. — The present province of Alberta as far north as the

height of land (53° N.) was from the time of the. incorporation of the Hudson's Bay Company (1670) a part of Rupert's Land. After the discovery of the north-west by the French in 1731 and succeeding years the prairies of the west were occupied byi

them, and Fort La Jonquiere was established near the present city of Calgary (1752). The North-West Company of Montreal occupied the northern part of Alberta district before the Hudson's Bay Company succeeded in coming from Hudson Bay to take possession of it. The first hold of the Athabasca region was gained by Peter Pond, who, on behalf of the North- West Company of Montreal, built Fort Athabasca on river La Biche in 1778. Roderick Mackenzie, cousin of Sir Alexander Mackenzie, built Fort Chipewyan on Lake Athabasca in 1788. By way of the North Saskatchewan river Alexander Mackenzie crossed the height of land, and proceeding northward discovered the river which bears his name, and also the Arctic Sea. Afterward going westward from Lake Athabasca and through the Peace river, he reached the Pacific Ocean, being the first white man to cross the North American continent, north of Mexico.

As part of the North-West Territories the district of Alberta was organized in 1875. Additional privileges and a local legis- lature were added from time to time. At length in 1905 the district of Alberta was enlarged and the present province formed by the Dominion parliament. (G. Br.)

ALBERT EDWARD NYANZA, a lake of Central Africa, the southern of the two western reservoirs of the Nile. It lies in the Albertine rift-valley between 0° 8′ and 0° 40′ S. and 29 28′ and 29 52′ E., at an elevation of 3004 ft. above the sea. It is roughly oval in shape and has no deep indentations. On its N.E. side it is connected by a winding channel, 25 m. long and from a quarter of a mile to a mile wide, flowing between high banks, with a smaller sheet of water, Lake Dweru, which extends north of the equator. Albert Edward Nyanza has a length of 44 m. and a breadth of 32 m. (maximum measurement). Dweru is about 20 m. long and 10 across at its widest part. The area of the two lakes is approximately 820 sq. m., or about the size of Leicestershire, England. A swampy plain, traversed by the Ruchuru and other rivers, extends south of the Nyanza and was once covered by its

waters. The plain contains several salt-pans, and at the S.E. corner are numerous geysers. Along the eastern shore the low land extends to Kamarangu, a point about midway between the south and north ends of the lake, a considerable stretch of ground intervening between the wall of the rift-valley and the water, two terraces being clearly defined. The euphorbia trees and other vegetation on the lower terrace are of small size and apparently of recent origin. At sohie distance from the lake runs a belt of forest. North of Kamarangu the wall of the valley approaches the water in a series of bluffs some 300 to 350 ft. high. At the N.E. end the hills again recede and the plain widens to include Dweru. On the west side 'of the Nyanza the wall of the rift-valley runs close to the lake shore and at the N. W. corner the mountains close in on the water. North of the lake a high alluvial plain stretches to the southern slopes of the Ruwenzori mountains. From Ruwenzori a sub- sidiary range, known as the Kipura mountains, runs due south to the lake shore, where it ends in a low rounded hill. In general, the plain rises above the lake in a series of bold bluffs, a wide margin of swamp separating them from the water. The Semliki, the only outlet of the lake, issues from its N.W. endˆ Round the north-eastern shore of the lake are numerous crater lakes, many salt, the most remarkable being that of Katwe. This lake lies west of the Dweru channel and is separated from Albert Edward Nyanza by a ridge of land, not more than 160 ft. in breadth. The sides of this ridge run down steeply to the water on either side. The waters of the Katwe lake have a beautiful rose colour which becomes crimson in the shadows. The salt is highly prized and is exported to great distances.

The main feeder of Albert Edward Nyanza, and western head-stream of the Nile, the Ruchuru, rises on the north side of the volcanoes north of Lake Kivu (see Mjumbiro) . On reaching the level plain 15 m. from the lake its waters become brackish, and the vegetation on its banks is scanty. The reedy marshes near its mouth form a retreat for a primitive race of fishermen. Lake Dweru, the shores of which are generally high, is fed by the streams from the eastern slopes of the Ruwenzori range. One of these, the Mpango, is a larger river than the Ruchuru.

The outlet of the Nyanza, the Semliki, and the part played by the lake in the Nile system are described under Albert Nyanza.

A feature of Lake Albert Edward Nyanza is the thick haze which overhangs the water during the dry season, blotting out from

view the mountains. In the rains, when the sky is clear, the magnificent panorama of hills encircling the lake on the west and north-west is revealed. The lake water is clear of a light green colour, and distinctly brackish. Fish abound, as do waterfowl, crocodiles and, in the southern swamps, hippo- potami. In the rainy season the lake is subject to violent storms.

The entire area of Albert Edward Nyanza was found, by the work of the Anglo-German Boundary Commission of 1002-1004, to lie within the limits of the sphere of influence of the Congo Free State as defined in the agreement of the 12th of May 1894 between that state and Great Britain. Dweru was discovered in 1875 by H. M. Stanley, then travelling westward from Uganda, and by him was named Beatrice Gulf in the belief that it was part of Albert Nyanza. In 1888-1889 Stanley, approaching the Nile region from the west, traced the Semliki to its source in Albert Edward Nyanza, which lake he discovered, naming it after Albert Edward, prince of Wales, afterwards Edward VII. Stanley also discovered the connecting channel between the larger lake and Dweru. The accurate mapping of the lake was mainly the work of British officials and travellers, such as Scott Elliott, Sir F. D. Lugard, Ewart Grogan, J. E. Moore and Sir H. Johnston; while Emin Pasha and Franz Stuhlmann, deputy- governor (1891) of German East Africa, explored its southern shores. (See Albert Nyanza and Nile, and the authorities there quoted.) (W. E. G.; F. R. C.)

ALBERTI, DOMENICO (c. 1710-1740), Italian musician, is known in musical history as the writer of dozens of sonatas in which the melody is supported from beginning to end by an extremely familiar formula of arpeggio accompaniment, conse- quently known as the Alberti bass. He thus shows how advanced was the decay of polyphonic sensibility (as a negative preparation for the advent of the sonata-style) already during the lifetime of Bach. His works have no other special qualities, though it is probable that Mozart's first violin sonatas, written -at the age of seven, were modelled on Alberti in spite of their superior cleverness.

ALBERTI, LEONE BATTISTA (1404-1472), Italian painter, poet, philosopher, musician and architect, was born in Venice on the 18th of February 1404. He was so skilled in Latin verse that a comedy he wrote in his twentieth year, entitled Philo- doxius, deceived the younger Aldus, who edited and published it as the genuine work of Lepidus. In music he was reputed dne of the first organists of'the age. He held the appointment of canon in the

metropolitan church of Florence, and thus had leisure to devote himself to his favourite art. He is generally regarded as one of" the restorers of the ancient style of archi- tecture. At Rome he was employed by Pope Nicholas V. in the restoration of the papal palace and of the foundation of Acqua Vergine; and in the ornamentation of the magnificent fountain of Trevi. At Mantua he designed the church of Sant" Andrea and at Rimini the celebrated church- of San Francesco, which is generally esteemed his finest work. On a commission from Rucellai he designed the principal facade of the church of Santa Maria Novella in Florence, as well as the family palace in the Via della Scala, now known as the Palazzo Strozzi. Alberti wrote works on sculpture, Della Statua, and on painting, De Pictura, which are highly esteemed; but his most celebrated treatise is that on architecture, De Re Aedificatoria, which has been translated into Italian, French, Spanish and English. Alberti died at Rome in the April of 1472.

See Passerini, Gli Alberti di Firenze (1869, 1870); Mancini, Vita di A Iberti (Firenze, 1882); V. Hoffmann, Studien zu Leon Battista Alberti's zehn Biichern: De Re Aedificatoria (Frankenberg, 1883).

ALBERTINELLI, MARIOTTO (1474-1515), Italian painter, was born in Florence, and was a fellow-pupil and partner of Fra Bartolommeo, with wh6m he painted many works, ffls

chief paintings are in Florence, notably his masterpiece, the " Visitation of the Virgin " (1503) at the Uffizi.

ALBERTITE, a variety of asphalt found in Albert county, New Brunswick. It is of jet-black colour and brilliant pitch-like lustre. Its percentage chemical composition is: — •

c.

H.

0.

N.

s.

Ash.

86-04

8-96

1-97

2-93

trace

O-IO

It softens slightly in boiling water, but only fuses imperfectly when further heated, and it is less soluble than ordinary asphalt in oil of turpentine.

ALBERT LEA, a city and the county-seat of Freeborn county, Minnesota, U.S.A., about 97 m. S. of St Paul. Pop. (1890) 3305; (1900) 4500; Ci9°S, state census) 5657, 1206 being for- eign-born (461 Norwegians, 411 Danes, 98 Swedes); (1910, U.S. census) 6192. It is served by two branches of the Chicago, Milwaukee & St Paul, by the main line and one branch of the Chicago, Rock Island & Pacific, by the Illinois Central, by the Iowa Central, and by the Minneapolis & St Louis railways. It is attractively situated between Fountain Lake and Albert Lea Lake, and is a summer resort. It has a public library and the Freeborn County Court House, and is the seat of Albert Lea College (Presbyterian, for women), founded in 1 884, and of Luther Academy (Norwegian Evangelical Lutheran), founded in 1888. Albert Lea is a railway and manufacturing centre of considerable importance, has grain elevators and foundries and machine shops, and manufactures bricks, tiles, carriages, wagons, flour, corsets, refrigerators and woollen goods. The city is also the centre of large dairy interests, and there are many creameries in the county. Numerous artesian wells furnish the city with an ample supply of water of unusual excellence. Albert Lea was settled in 1855 and received a city charter in 1878. The city and the lake were named in honour of Lieutenant Albert Miller Lea (1 808-1 891), a West Point graduate (1831) who, on behalf of the United States government, first surveyed the region and described it in a report published in 1836. He was a lieutenant-colonel of engineers in the Con- federate army during the Civil War.

ALBERT NYANZA, a lake of Central Africa, the northern of the

two western reservoirs of the Nile, lying in the western (Albertine) rift-valley, near its north end. The southern reservoir is Albert Edward Nyanza (q.v.). Lake Albert lies between 1° 9′ and 2 17′ N. and 30° 30′ and 31 35′ E., at an elevation of about 2000 ft. above the sea. Its greatest length is about 100 m., its greatest width 22 m., its area being approximately 1640 sq. m., about the size of Lancashire, England. South of the lake is a wide plain, traversed by the Semliki river, which enters the Nyanza through a swamp of tall weeds, chiefly ambach and papyrus. Both east and west the walls of the rift-valley are close to the lake, the water in many places washing the base of the cliffs. Elsewhere the narrow foreshore is thickly wooded. The ascent to the plateaus is generally by three tiers of hills rising one behind the other. On the west side the mountains present many pointed and conical summits; on the east the cliffs rise abruptly 1000 to 2000 ft. On either coast wild gorges and ravines, densely wooded, break the outline of the mountains. Through these gorges dash magnificent cascades, others leaping the escarpments of the plateaus in waterfalls of great volume and depth. Towards the north the hills recede from the coast and on both sides flats extend for distances varying from 5 to 15 m. On the eastern side, 92 m. from the southern end of the Nyanza, the Victoria Nile enters the lake, here not more than 6 m. across, through a wilderness of woods, the delta of the Nile extending over 4 m. The mouth of the main stream is obstructed by a bar of its own formation; the current is sluggish; there are many side channels, and the appear- ance of the lake gives no hint that a great river has joined its waters. For 5 or 6 m. north of the junction of the Victoria Nile the lake suffers no material diminution in width. Then, however, the eastern and western shores approach each other, and a current is perceptible flowing north. The lake has become

the Bahr-el-Jebel, or Mountain river, as this section of the Nile is called. Throughout its extent Albert Nyanza is shallow; at its southern end the water for a considerable distance is not more than 3 ft. deep. The deepest soundings give only 50 to SS ft., the average depth being 30 to 40 ft.

The Albertine Basin of the Nile. — Albert Nyanza receives the whole of the drainage of Albert Edward Nyanza and the Semliki river, and with them and its own basin forms the ” Albertine ” Nile system. Its waters, as stated above, mingle with those of the Victoria Nile, their united volume flowing north towards the Mediterranean. A study of the changes going on in the rift- valley

in which the lakes lie leads, however, to the belief that the Albert Edward and Albert Nyanzas are drying up, a process which the nature of the drainage areas is helping to bring about. That the Albert Edward Nyanza once covered a much larger area than it does at present is certain. At that time, recent from a geological standpoint, the valley to the north, through which now flows the Semliki river, was blocked. The removal of the block led to the shrinkage of the lake and the formation of the Semliki, which found its way to the more northern lake — Albert Nyanza. Gradually the Semliki eroded its bed, and consequently the level of Albert Edward Nyanza continued to fall. The process continues but is checked by the existence of the rock barrier which stretches across the Semliki. This stream leaves Albert Edward Nyanza at its N-W. end in 0° 8′ 30″ S., and after a course of about 160 m. enters Albert Nyanza in i° 9′ N. In its upper and in its lower course the, river flows either through high alluvial plains, in which it has scored a deep channel, or acrpss swamp land. In the middle section, which has a length of some 75m., the river runs in a deep narrow valley covered with the densest forest. On the west this valley is bounded by the Congo mountains, which form the wall of the rift-valley, on the east by the mighty range of Ruwenzori, whose heights tower over 16,000 ft. above sea-level. In this length of 7 s m. the river falls in cataracts and rapids over 800 ft. This rocky barrier acts as a regulator for the water received from Albert Edward Nyanza and, by checking the erosion of the river bed, tends to maintain the level of the lake. When this bar wears away Albert Edward Nyanza will, in all probability, disappear as a lake and will become a river, a continuation of its present most southern affluent, the Ruchuru.

Albert Nyanza, on the other hand, is threatened in the distant future with destruction from another cause — the filling of its bed by the alluvium poured into it by the Semliki, the Victoria Nile and, in a lesser degree, by other streams. The Semliki receives directly or indirectly the whole of the drainage of Ruwenzori, and also that of the eastern face of the Congo mountains as well as the drainage basin of Albert Edward Nyanza. The amount of alluvial matter carried is enormous; from Ruwenzori alone the detritus is very great. Charged with all this matter, the Semliki, as it emerges from the region of forest and cataracts (in which, often closely confined by its mountain barriers, the stream is deep and rapid), becomes sluggish, its slope flattens out, and its waters, unable to carry their burden, deposit much of it upon the land. This process, continually going

on, has formed a large plain at the south end of Albert Nyanza, which has seriously encroached upon the lake. At the northern end of the lake the sediment brought down by the Victoria Nile is producing a similar effect. Albert Nyanza has indeed shrunk in its dimensions during the com- paratively few years it has been known to Europeans. Thus at the S.W. end, Nyamsasi, which was an island in 1889, has become a peninsula. Islands which in 1876 were on the east coast no longer exist; they now form part of the foreshore. On the other hand, the shrinkage of the lake level caused the appearance in 1885 of an island where in 1879 there had been an expanse of shallow water. It seems probable that, in a period geologically not very remote, the " Albertine " system will consist of one great river, extending from the northern slopes of the Kivu range, where the Ruchuru has its rise, to. the existing junction of the Victoria Nile with Albert Nyanza.

The combined drainage area, including the water surface of Albert Edward Nyanza, the Semliki and Albert Nyanza, is some

16,600 sq. m. Throughout this area the rainfall is heavy (40 to 60 in. or more per annum), the volume of water entering Albert Nyanza by the Semliki when in flood being not less than 700 cubic metres per second. Of the water received by Albert Nyanza annually (omitting the Victoria Nile from the calculation) between 50 and 60% is lost by evaporation, whilst 24,265,000,000 cubic metres are annually withdrawn by the Bahr-el-Jebel. The " Albertine " system plays a comparatively insignificant part in the annual flood rise' of the White Nile, but to its waters are due the maintenance of a constant supply to this river throughout the year.

Discovery and Exploration. — Albert Nyanza was first reached by Sir Samuel Baker on the 14th of March 1864 near Vacovia, a small village of fishermen and salt-makers on the east coast. From a granitic cliff 1 500 ft. above the water he looked out over a boundless horizon on the south and south-west, and towards the west descried at a distance of 50 or 60 m. mountains about 7000 ft. high. Albert Nyanza was consequently entered on his map as a vast lake extending about 380 m. But the circumnavigation of the lake by Gessi Pasha (1876), and by Emin Pasha in 1884, showed that Baker had been deceived as to the

size of the lake. By the end of the 19th century the topography of the lake region was known with fair accuracy. The lake forms part of the (British) Uganda Protectorate, but the north-west shores were leased in 1804 to the Congo Free State during the sovereignty of king Leopold II. of Belgium. Of this leased area a strip 15 m. wide, giving the Congo State a passage way to the lake, was to remain in its possession after the determination of the lease.

See Nile ; Sir W. Garstin's Report upon the Basin of the Upper Nile (Egypt, No. 2, 1904); Capt. H. G. Lyons' The Physiography of the River Nile and its Basin (Cairo, 1906), and the authorities quoted in those works. (W. E. G. ; F. R. C.)

ALBERTUS MAGNUS (Albert of Cologne, ?i 206-1 280), count of Bollstadt, scholastic philosopher, was born of the noble family of Bollstadt at Lauingen in Suabia. The date of his birth, generally given as 1 193, is more probably 1 206. He was educated principally at Padua, where he received instruction in Aristotle's writings. In 1223 (or 1 221) he became a member of the Dominican order, and studied theology under its rules at Bologna and elsewhere. Selected to fill the position of lecturer at Cologne, where the order had a house, he taught for several years there, at Regensburg, Freiburg, Strassburg and Hildesheim. In 1245 he went to Paris, received his doctorate and taught for some time, in accordance with the regulations, with great success. In 1254 he was made provincial of his order, and fulfilled the arduous duties of the office with great care and efficiency. During the time he held this office he publicly defended the Dominicans against the university of Paris, commented on St John, and answered the errors of the Arabian philosopher, Averroes. In 1260 the pope made him bishop of Regensburg, which office he resigned after three years. The remainder of his life he spent partly in preaching throughout Bavaria and the adjoining districts, partly in retirement in the various houses of his order; in 1270 he preached the eighth Crusade in Austria; almost the last of his labours was the defence of the orthodoxy of his former pupil, Thomas Aquinas. He died in 1 280, aged seventy-four. He was beatified in 1622, and he is commemorated on the 16th of November. Albert's works (published in twenty-one folios by the Dominican Pierre Jammy in 1.651, and reproduced by the Abbe Borgnet, Paris, 1890, 36 vols.) sufficiently attest his great activity. He was the most widely read and most learned man of his time. The whole of Aristotle's works, presented in the Latin translations and notes of the Arabian commentators, were by him

digested, interpreted and systematized in accordance with church doctrine. Albert's activity, however, was rather philosophical than theo- logical (see Scholasticism). The philosophical works> occupying the first six and the last of the twenty-one volumes, are generally divided according to the Aristotelian scheme of the sciences, and consist of interpretations and condensations of Aristotle's relative works, with supplementary discussions depending on the questions then agitated, and occasionally divergences from the

opinions of the master. His principal theological works are a commentary in three volumes on the Books of the Sentences of Peter Lombard {M agister Sententiarum) , and the Summa Theo- logiae in two volumes. This last is in substance a repetition of the first in a more didactic form. Albert's knowledge of physical science was considerable and for the age accurate. His industry in every department was great, and though we find in his system many of those gaps which are characteristic of scholastic philo- sophy, yet the protracted study of Aristotle gave him a great power of systematic thought and exposition, and the results of that study, as left to us, by no means warrant the contemptuous title sometimes given him — the "Ape of Aristotle." They rather lead us to appreciate the motives which caused his contempo- raries to bestow on him the honourable surnames " The Great " and " Doctor Universalis." It must, however, be admitted that much of his knowledge was ill digested; it even appears that he regarded Plato and Speusippus as Stoics. Albertus is frequently mentioned by Dante, who made his doctrine of free-will the basis of his ethical system. Dante places him with his pupil Aquinas among the great lovers of wisdom (Spiriti Sapienli) in the Heaven of the Sun.

See Paget Toynbee, " Some Obligations of Dante to Albertus Magnus " in Romania, xxiv. 400-412, and the Dante Dictionary by the same author. For Albert's life see J. Sighart, Albertus Magnus, sein Leben und. seine Wissenschaft (Regensburg, 1857; Eng. trans., Dixon, London, 1876); H. Finke, Ungedriickte Dominikanerbriefe des 13. Jahrh. (Paderborn, 1891). For his philosophy A. Stockl, Geschichte d. scholastischen Philosophie; J. E. Erdmann, Crundriss d. Ges. d. Phil. vol. i. 8. The histories of Haureau, Ritter, Prantl and Windelband may also be consulted. See also W.' Feiler, Die Moral d. A. M. (Leipzig, 1891); M. Weiss, Ueber mariologische Schriften des A. M. (Paris, 1898); Jos. Bach, Des A. M. Verhdltniss zu d. Erkenntnisslehre d. Griechen, Romer, Araber u. Juden (Vienna, 1881); Herzog-Hauck, Realencyk.

(1897); Vacant, Diet. Theol. Cathol. {s.v.) ; Ch. Jourdain in Diet. d. sciences philos. (s.v.) ; M. Joel, Das Verhdltniss A. d. G. zu Moses Maimonides (Breslau, 1863).

ALBERUS, ERASMUS (c. 1500-1553), German humanist, reformer and poet, was a native of the village of Sprendlingen near Frankfort-on-Main, where he was born about the year 1500. Although his father was a schoolmaster, his early education was neglected. Ultimately in 1518 he found his way to the university of Wittenberg, where he studied theology. He had here the good fortune to attract the attention of Luther and Melanchthon, and subsequently became one of Luther's most active helpers in the Reformation. Not merely did he fight for the Protestant cause as a preacher and theologian, but he was almost the only member of Luther's party who was able to confront the Roman Catholics with the weapon of literary satire. In 1542 he pub- lished a prose satire to which Luther wrote the preface, Der Barfiisser Monche Eulenspiegel und Alkoran, an adaptation of the Liber conformitatum of the Franciscan Bartolommeo Albizzi of Pisa (Pisanus, d. 1401), in which the Franciscan order is held up to ridicule. Of higher literary value is the didactic and satirical Buck von der Tugend und Weisheit (1550), a collection of forty- nine fables in which Alberus embodies his views on the relations of Church and State. His satire is incisive, but in a scholarly and humanistic way; it does not appeal to popular passions with the fierce directness which enabled the master of Catholic satire, Thomas Murner, to inflict such telling blows. Several of Alberus's hymns, all of which show the influence of his master Luther, have been retained in the German Protestant hymnal. After Luther's death, Alberus was for a time Diakonus in Witten- berg; he became involved, however, in the political conflicts of the time, and was in Magdeburg in 15 50- 15 51, while that town was besieged by Maurice of Saxony. In 1552 he was appointed Generalsuperintendent at Neubrandenburg in Mecklenburg, where he died on the 5th of May 1553.

Das Buck von der Tugend und Weisheit has been edited by W, Braune (1892); the sixteen Geistliche Lieder by C. W. Stromberger (1857). Alberus's prose writings have not been reprinted in recent times. See F. Schnorr von Carolsfeld, Erasmus Alberus (1894).

ALBERY, JAMES (1838-1889),. English dramatist, was bom in London on the 4th of May 1838. On leaving school he entered an architect's office, and started to write plays. After many failures

he at last succeeded in getting an adaptation— Dr Davy

ALBI— ALBIGENSES

S05

— produced at the Lyceum (1866). His most successful piece, Two Roses, a comedy, was produced at the Vaudeville in 1870, in which Sir Henry Irving made one of his earliest London successes as Digby Grant. He was the author of a large number of other plays and adaptations, including Jingle (a version of Pickwick), produced at the Lyceum in 1878, and Pink Dominoes, the latter being one of a series of adaptations from the French which he made for the Criterion theatre. At that house his wife, the well-known actress, Miss Mary Moore, played the leading parts. He died on the 15th of August 1889.

ALBI, a city of south-western France, capital of the depart- ment of Tarn, 48 m. N. E. of Toulouse, on – branch line of the Southern railway. Pop. (1906) 14,956. Albi occupies a com- manding position on the left bank of the Tarn; it is united to its suburb of La Madeleine on the right bank by a medieval and a modern bridge. The old town forms a nucleus of narrow, winding streets surrounded by boulevards, beyond which lie modern quarters with regular thoroughfares and public gardens. The cathedral of Sainte Cecile, a fine fortress-church in the Gothic style, begun in 1277, finished in 1512, rises high above the rest of the town. The exterior, flanked at the western end by a lofty tower and pierced by high, narrow windows, is devoid of ornament. Its general plainness contrasts with the elaborate carving of the stone canopy which shelters the southern portal. In the interior, which is without transepts or aisles, the rood- screen and the choir-enclosure, which date from about 1500, are masterpieces of delicate sculpture; the vaulting and the walls are covered with paintings of the 15th and 16th centuries. The archbishop's palace to the north-east of the cathedral is a fortified building of the 14th century. St Sal vi, the chief of the other churches of Albi, belongs to the 13th and 15th centuries. A statue of the sailor La P6rouse (1741-1788) stands in the square named after him.

Albi is the seat of an archbishop, a prefect and a court of assizes. It has tribunals of first instance and of commerce, a board of trade-arbitrators, a chamber of commerce, a lycie and training colleges. The industrial establishments of the town include dye-works, distilleries, tanneries, glass-works 'and important flour-

mills. It is also a centre for hat-making, and produces cloth-fabrics, lace, umbrellas, casks, chairs, wooden shoes, candles and pastries. Trade is in wine and anise.

Albi (Albiga) was, in the Gallo-Roman period, capital of the Albigenses, and later of the viscounty of Albigeois, which was a fief of the counts of Toulouse. From the 12th century onwards, its bishops, the first of whom appears to have lived about the 3rd century, began to encroach on the authority of the viscounts; the latter, after the Albigensian war, lost their estates, which passed to Simon de Montfort and then to the crow.n of France. By a convention concluded in 1264 the chief temporal power in the city was granted to the bishops. The archbishopric dates from 1678.

ALBIAN (Fr. Albien, from Alba = Aube in France), in geology the term proposed in 1842 by A. d'Orbigny for that stage of the Cretaceous System which comes above the Aptian and below the Cenomanian {Pal. France. Crit. ii.). The precise limits of this stage are placed somewhat differently by English and continental geologists. In England it is usual to regard the Albian stage as equivalent to the Upper Greensand plus Gault, that is, to the " Selbornian " of Jukes-Browne. But A. de Lapparent would place most of the Upper Greensand in the Cenomanian. The English practice is to commence the upper Cretaceous with the Albian; on the other hand, this stage closes the lower Cretaceous according to continental usage. It is necessary therefore, when using the term Albian, to bear these differences in mind, and to ascertain the exact position of the strata by reference to the zonal fossils. These are, in descending order, Pecten asper and Cardiaster fossarius, Schloen- bachia rostrata, Hoplites lautus and H. interruptus, Douvilleiceras mammillatum. In addition to the formations mentioned above, the following representatives of the Albian stage are worthy of notice: the gaize and phosphatic beds of Argonne and Bray in France; the Flammenmergel of North Germany; the lignites df

Utrillas in Spain; the Upper Sandstones of Nubia, and the Fredericksburg beds of North America. See Gault, Greensand, and Cretaceous. (J. A. H.)

ALBIGENSES, the usual designation of the heretics — and more especially the Catharist heretics — of the south of France in the 12th and 13th centuries. This name appears to have been given to them at the end of the 12 th century, and was used in 1 181 by

the chronicler Geoff roy de Vigeois. The designation is hardly exact, for the heretical centre was at Toulouse and in the neighbouring districts rather than at Albi (the ancient Albiga). The heresy, which had. penetrated into these regions probably by trade routes, came originally from eastern Europe. The name of Bulgarians (Bougres) was often applied to the Albigenses, and they always kept up intercourse with the Bogomil sectaries of Thrace. Their dualist doctrines, as described by controversialists, present numerous resemblances to those of the Bogomils, and still more to those of the Paulicians, with whom they are sometimes connected. It is exceedingly difficult, how- ever, to form any very precise idea of the Albigensian doctrines, as our knowledge of them is derived from their opponents, and the very rare texts emanating from the Albigenses which have come down to us (e.g. the Rituel cathare de Lyon and the Nouveau Testament en Provencal) contain very inadequate information, concerning their metaphysical principles and moral practice. What is certain is that, above all, they formed an anti-sacerdotal party in permanent opposition to the Roman church, and raised a continued protest against the corruption of *■' ,, clergy of their time. The Albigensian theologians and ascetics, the Cathari or perjecti, known in the south of France as bons hommes or bonsˆ chretiens, were few in number; the mass of believers (credentes) were perhaps not initiated into the Catharist doctrine; at all events, they were free from all moral prohibition and all religious obligation, on condition that they promised by an act called convenenza to become " hereticized " by receiving the consolar menlum, the baptism of the Spirit, before their death or even in extremis. , . .

,The first Catharist heretics appeared in Limousin between 1012 and 1020. Several were discovered and put to death at Toulouse in 1022 ; and the synod of Charroux (dep. of Vienne) in 1028, and that of Toulouse in 1056, condemned the growing sect. The preachers Raoul Ardent in 1101 and Robert of Arbrissel in 1 1 14 were summoned to the districts of the Agenais and, the Toulousain to combat the heretical propaganda. But, protected by William IX., duke of Aquitaine, and soon by a great part of the southern nobility, the heretics gained ground in the south, and in n 19 the council of Toulouse in vain ordered the secular powers to assist the ecclesiastical authority in quelling the heresy. The people were attached, to the bons hommes, whose asceticism imposed upon the masses, and the . anti-sacerdotal preaching of Peter of Bruys and Henry of Lausanne in Perigord,, Languedoc

and Provence, only facilitated the progress of Catharism in those regions. In 1 147 Pope Eugenius III. sent the legate Alheric of Ostia.and St Bernard to the affected district. The few isolated successes of the abbot of Clairvaux could not obscure the real results of this mission, and the meeting at Lombers in 1 165 of a synod, where Catholic ; priests had to submit to a discussion with Catharist doctors, well shows the power of the sect in the south of France at that period. Moreover,, two years afterwards a Catharist synod, in which heretics from Languedoc, Bulgaria and Italy took part, was held at St Felix de Caraman, near Toulouse, and their deliberations were un- disturbed, The missions of Cardinal Peter (of St Chrysogonus) ;, formerly bishop of Meaux, to Toulouse and the Toulousain in 1178, and of Henry, cardinal-bishop of Albano (formerly abbot of Clairvaux), in 1180-1181, obtained merely momentary successes. Henry of Albano attempted an armed expedition against th£ stronghold of heretics at Lavaur and against Raymond Roger,, viscount of Beziers, their acknowledged protector. The taking, of Lavaur and the submission of Raymond Roger in no way arrested the progress of the heresy. The persistent decisions of the councils against the heretics at this period — in particular, those of the council of Tours (1163) and of the oecumenical

Lateran council (1179) — had scarcely more effect. But on ascending the papal throne, Innocent III. resolved to suppress the Albigenses. At first he tried pacific conversion, and in 1 1 98 and 1 1 99 sent into the affected regions two Cistercian monks, Regnier and Guy, and in 1 203 two monks of Fontfroide, Peter of Castelnau and Raoul (Ralph), with whom in 1204 he even associated the Cistercian abbot, Arnaud (Arnold). They had to contend not only with the heretics, the nobles who protected them, and the people who listened to them and venerated them, but also with the bishops of the district, who rejected the extraordinary authority which the pope had con- ferred upon his legates, the monks. In 1204 Innocent III. suspended the authority of the bishops of the south of France. Peter of Castelnau retaliated by excommunicating Raymond VI., count of Toulouse, as an abettor of heresy (1207), and kindled in the nobles of the south that animosity of which he was the first victim (1209). As soon as he heard of the murder of Peter of Castelnau, the pope ordered the Cistercians to preach the crusade against the

Albigenses. This implacable war, which threw the whole of the nobility of the north of France against that of the south, and destroyed the brilliant Provencal civiliza- tion, ended, politically, in the treaty of Paris (1229), by which the king of France dispossessed the house of Toulouse of the greater part of its fiefs, and that of Beziers of the whole of its fiefs. The independence of the princes of the south was at an end, but, so far as the heresy was concerned, Albigensianism was not extinguished, in spite of the wholesale massacres of heretics during the war. Raymond VII. of Toulouse and the count of Foix gave asylum to the ” faidits ” (proscribed), and the people were averse from handing over the bons hommes. The Inquisition, however, operating unremittingly in the south at Toulouse, Albi, Carcassonne and other towns during the whole of the 13 th century and a great part of the 14th, succeeded in crushing the heresy. There were indeed some outbursts of rebellion, some fomented by the nobles of Languedoc (1240- 1242), and others emanating from the people of the towns, who were embittered by confiscations and religious persecutions (e.g. at Narbonhe in 1 234 and Toulouse in 1235), but the repress- ive measures were terrible. In 1245 the royal officers assisting the Inquisition seized the heretical citadel of Montsegur, and 200 Cathari were burned in one day. Moreover, the church decreed severe chastisement against all laymen suspected of sympathy with the heretics (council of Narbonne, 1235; Bull Ad extirpanda, 1252).

Hunted down by the Inquisition and quickly abandoned by the nobles of the district, the Albigenses became more and more scattered, hiding in the forests and mountains, and only meeting surreptitiously. There were some recrudescences of heresy, such as that produced by the preaching (1 298-1 309) of the Catharist minister, Pierre Authier; the people, too, made some attempts to throw off the yoke of the Inquisition and the French, 1 and insurrections broke out under the leadership of Bernard of Foix, Aimery of Narbonne, and, especially, Bernard Delicieux at the beginning of the 14th century. But at this point vast inquests were set on foot by the Inquisition, which terrorized the district. Precise indications of these are found in the registers of the Inquisitors, Bernard of Caux, Jean de St Pierre, Geoffroy d’ Ablis, and others. The sect, moreover, was exhausted and could find no more adepts in a district which, by fair means or foul, had arrived at a state of peace and political and religious unity. After 1330 the records of the Inquisition contain but few proceedings against Catharists. (See also under Cathahs.)

Authorities.— See C Schmidt's Histoire de la secte des Cathares ou Albigeois (Paris, 1849), which is still the most important work on the subject. The following will be found useful : D. Vaissete, Histoire de Languedoc, vols. iii. iv. vii. viii. (new edition) ; Ch. Molinier, L' Inquisition dans le Midi de la France (Paris, 1880), and the other works by the same author ; L. Tanon, Histoire des tribunaux de V Inquisition en France (Paris, 1893). Les Albigeois, leurs origines (Paris, 1878) , by Douais, should be read with caution. Of the sources, which are very numerous, may be mentioned : the Liber Sententiarum

1 These they often confounded, and a heretic is described as saving: " Clergy and French, they are one and the same thing."

of the Inquisition of Carcassonne, published by Ph. van Limborch at the end of his Historia Inquisitionis (Amsterdam, 1692); other registers of the Inquisition analysed at length by Ch. Molinier, op. cit., some published in vol. ii. of the Documents pour I'histoire de V Inquisition (Paris, 1900), by C Douais; numerous texts con- cerning the last days of Albigensianism, collected by M. Vidal, " Les derniejs ministres albigeois,' in Rev. de quest, histor. (1906) . See also the Rituel cathare, ed. by Cunitz (Jena, 1852); the Nouveau Testa- ment en provencal, ed. by Cledat (Paris, 1887) ; and the very curious Dibat d'Yzarn et de Sicart de Figueiras, ed. by P. Meyer (1880). On the ethics of the Catharists, see Jean Guiraud, Questions d' histoire et d'archiologie chretienne (Paris, 1906); and P. Alphandery, Les idees morales chez les heterodoxes latins au debut du XIII e siecle (Paris, 1963). (P. A.)

ALBINO, a biological term (Lat. albus, white), in the usual acceptation, for a pigmentless individual of a normally pigmented race. Among some flowering plants, however, the character has become one of specific rank, and among animals we have in the polar bear and the Greenland hare instances where partial albinism — for in them the eyes are black and other parts may be pigmented — has also become a specific character.

A true or complete albino is altogether devoid of pigment. One result of this among the Vertebrata is that the eyeball is pink in colour, since the cornea, iris and retina being transparent, the red blood contained in the capillaries is unmasked by the absence of pigmentary material. In man, and doubtless also in lower forms, the absence of this pigment produces the well-

marked albinotic f aciesi This is a condition in which the eyelids are brought into a. nearly closed position accompanied by blinking movements and a general wrinkling of the skin around the immediate neighbourhood of the eyes. It is the result of the too great intensity of the light incident ,upon the retina, and which in normal eyeballs is adequately diminished by the absorptive power of the pigmentary material.

In a complete albino not only is all pigment absent in the skin, but also that which is normally present in deeper organs, such as the sympathetic nervous system and in the substantia nigra of the brain. There is some reason to beb'eve that a peculiar condition found in the majority of human albinoes, and known as nystagmus, is correlated with the absence of pigment in the central nervous system. This condition is one marked by un-steadiness— a sort of flickering rolling — of the eyeballs, and it becomes more marked as they endeavour to adjust their ac-commodation to near objects. It is thought to depend upon some connexion, not yet anatomically demonstrated, between the third cranial nerve and its nucleus in the floor of the iter and the substantia nigra.

In addition to complete albinism, there exist, however, various albinotic conditions in which more or less pigment may be present. Familiar instances of this partial albinism is seen in the domestic breed of Himalayan rabbits. In these animals the eyeball and the fur of the body are unpigmented, but the tips of the ear pinnae and extremities of the fore and hind limbs, together with the tail, are marked by more or less well defined colour. One remarkable feature of these animals is that for a few months after birth they are complete albinoes. Occasion- ally, however, some are born with a grey colour and a few may be quite black, but ultimately they attain their characteristic coat. There is some reason to believe, as we shall see later, that in spite of the presence of a little pigment and of occasional wholly pigmented young ones, Himalayans must be regarded as true albinoes. Other individual rabbits, but belonging to no particular breed, are similarly marked, but in addition thf eyeballs are black. Some domesticated mice are entirely white with the exception that they have black eyeballs; and in- dividuals of this type are known in which there is a reduction of pigmerit in the eyeballs, and since the colour of the blood is then partially visible these appear of a reddish-black colour. Such cases are interesting as representing the last step in the graded series through which the condition of complete pigmenta- tion passes

into that of complete albinism.

There is evidence, as shown by G. M. Allen, that partial albinism is a condition in which pigment is reduced around definite body centres, so that unpigmented areas occur between

the pigment patches or at their borders. In the mouse, ten such centres may be distinguished, arranged symmetrically five on either side of the median plane— a cheek patch, neck patch, shoulder patch, side patch and rump patch. Various degrees in the reduction of the pigment patches up to that of complete elimination may be traced.

Some animals are wholly pigmented during the summer and autumn, but through the winter and spring they are in the condition of extreme partial albinism and become almost complete albinoes. Such instances are found in the Scotch blue hare {Lepus timidus), in the Norway hare, in the North American hare {L. americanus) , in the arctic fox (Canis lagopus), in the stoat and ermine, and among birds, in the ptarmigan, and some other species of Lagopus. How the change from the autumnal to the winter condition takes place appears not to be definitely settled in all cases, and accurate observations are much to be desired. In the case of the Norway hare, it has been stated that a general moult, including all the hairs and under fur, takes place and new white hairs are substituted. The process of moulting is said to begin in the middle of autumn and is completed before the end of December, by which time the fur is in its winter condition, and is closer, fuller and longer than in summer {Naturalists' Library, vol. vii.) . On the other hand, it has been stated that during the whole of the transformation in the fur no hairs fall from the animal, and it is attributed to an actual change in the colour of the hair {Edinburgh Philosophical Journal, vol. xi. p. 191). In the case of the American hare, however, some very careful observations have been made by F. H; Welch. In this animal the long hairs (which form the pile) become white at their extremities, and in some of them this whiteness extends through their whole length. At the same time, new hairs begin to develop and to grow rapidly, and soon outstrip the hairs of the autumn pile. From their first appearance these hew hairs are white and stiff, and they are confined to the sides and back of the body. It is

not clear from Welch's account what is the cause of the whiteness of the tips of the hairs of the autumn coat, but his figures suggest that it is due to the development of gas in the interspaces between the keratin bridges and trabeculae of the hairs. There is nothing to show whether the pigment persists or is absorbed. Probably it persists. In this event, the whiteness of the tips will be due to the scattering or irregular reflexion of the incident rays of light from the surface of the numerous gas bubbles. In the case of the ptarmigan the evidence is clear that the existing autumnal feathers do change, more or less completely, to white. But the evidence is not conclusive as to whether any part of the winter condition is additionally produced by moulting.

The condition of albinism thus assumed as a seasonal variation is never complete, for the eyes at least retain their pigmented state. The reason of this is readily understood when it is borne in mind how disadvantageous to the function of sight is the unpigmented condition of an albino's eyeball; a disadvantage which would be probably much accentuated, in the cases now under consideration, by the bright glare from the surface of the snow, which forms the natural environment of these animals at the particular period of the year when the winter change occurs. In some cases, as in all the varying hares, in addition to the eyes retaining their normal pigmentation, areas similar in extent and situation to those on the Himalayan rabbits also retain their pigmentation; and in the ptarmigan there is a black band on each side of the head stretching forwards and backwards from the eyeball, and the outer tail feathers are black.

Albinism is restricted to no particular class of the animal kingdom; for partial albinism at least is known to occur in Coelentera, worms, Crustacea, Myriapoda, Coleoptera,Arachnida and fishes. The individuals in which this diminished pigmentation is found are for the most part those living in caves, and it is probable that their condition is not truly albinotic, but only temporary and due to the absence of the stimulus of light. This may be also true of some of those instances' that have occurred among frogs, in Proteus, and with an axoldtl

once possessed by the present writer. This latter animal was quite white, with the exception of the black eyeballs. At the end of four weeks after it was first purchased the dorsal cr upper surface of its external gills developed a small amount of dark pigment. Within the next few weeks this increased in quantity and the dorsal surface of the head and of the front end of the

trunk began to be pigmented. The animal died at the end of the eighth week, but it is possible that had it lived it would have become wholly pigmented. But, apart from these instances, albinism is known, according to W. E. Castle, who cites it on the authority of Hugh M. Smith, to occur among a breed of albino trout, which breed true and are reared in the State fish-hatcheries of America. With birds and mammals, however, there is no doubt that complete albino individuals do ‘occur; and among species which, like the jackdaw, certain deer and rabbits, are normally deeply pigmented.

Albinism occurs in all races of mankind, among mountainous as well as lowland dwellers. And, with man, as with other animals, it may be complete or partial. Instances of the latter condition. are very common among the negroes of the United States and of South America, and in them assumes a piebald character, irregular white patches being scattered over the general black surface of the body. Occasionally the piebald patches tend to be symmetrically arranged, and sometimes the eyeballs are pigmentless (pink) and sometimes pigmented (black).

According to A. R. Gunn, of Edinburgh University, who has recently been investigating the subject of albinism in man, there is reason to believe that a condition of piebald albinism occurs also in Europeans (Scotsmen). He has examined subjects in which the whole of the hair of the body is white, but the eyeballs are pigmented, often deeply; and, conversely, he has seen cases in which the eyes are pink but the hair is pigmented. The hair and the eyes may be regarded as skin patches, in which some- times the one and sometimes the other is pigmentless. He believes that, were it not for the generally very pale colour of white-skinned races, this piebald condition would be as manifest in them as in negroes, over the whole surface of the body.

In complete human albinoes, albinism is correlated, in addition to nystagmus, with a peculiar roughness of the skin, making it harsh to the touch. The skin is also milky- white in appearance;

According to C. J. Seligmann, there exists among the Papuans an albinotic race whose skin varies in colour from a pink-white to that of cafe au lait; the eyes are generally greenish, hazel or brown, and the hair is tow-coloured. The skin where unexposed is pinker than that of a normal North European. Like complete albinoes, this race suffers from photophobia, and is characterized by the albinotic facies.

Before we can inquire into the cause and meaning of albinism it will be necessary first to consider the nature of pigmentation. It has recently been ascertained that the coloration of certain sponges is due to the interaction of an oxydizing ferment, tyrosinase, upon certain colourless chromogenic substances. In 1901, Otto v. Furth and Hugo Schneider showed that a tyrosinase could be obtained from the blood of certain insects, and, acting upon a chromogen present in the blood, converted it into a pigmentary substance of melanin-like nature. Hans Przibram also extracted a tyrosinase from the ink-sac of Sepia, and, causing it to act upon a watery solution of tyrosin, obtained a black pigment. From the blood of Bombyx mori, V. von Ducceshi has also obtained a tyrosinase.

Subsequently (1903) L. Cuenot, in order to explain certain features in the hereditary transmission of coat colour in mice, postulated the hypothesis that the grey colour of the wild mouse (which is known to be a compound of black, chocolate and yellow pigments) may be due either to the interaction of a single ferment and three chromogens, or vice versa, to one chromogenic substance and three ferments.

Since then (1904) Miss Florence Durham has shown that if the skins of young or embryonic mammals (rats, rabbits and guinea-pigs) 1 be ground up and extracted in water, and the ex- pressed juice be then incubated with solid tyrosin for twenty- four hours, with the addition of a very small amount of ferrous

sulphate to act as an activator, a pigmentary substance is thrown down. The colour of this substance is that of the pigment in the skin or hairs of the animal used. Miss Durham interprets her results as indicating that the skin of these pigmented animals normally secretes one or more tyrosinases. The same result was obtained from the skins of some unhatched chickens. The skins of albinoes gave no results.

Not only have such results been obtained w'ltft sponges, insects, cephalopods, birds and mammals, but Em. Bourquelot and G. Bertrand have shown that certain fungi, the tissues of which, when exposed to the air by injury, become immediately coloured, do so owing to the action of tyrosinase upon one or more

chromo- genous substances present in the plant. We may conceive, then, that a pigmented animal owes its colour to the power that certain tissues of its body possess to secrete both tyrosinases and chromo- genic substances. And the period at which this process is most active is at birth, or preceding it or immediately succeeding it. In spite of the inquiry being only in its initial stages, there is already good evidence to believe that Cuenot's theory is correct, and that an albino is an individual whose skin lacks the power to secrete either the ferment or the chromogen. It forms one but not both of these substances.

A moment's consideration, however, will show that, while an albino may be an individual in which one or more of the complementary bodies of pigmentation are absent, a pigmented animal is something more than an individual which carries all the factors necessary for the development of colour. For it must be borne in mind that animals are not only coloured but the colour is arranged in a more or less definite pattern. The wild mouse, rat and rabbit are self-coloured, but the domesticated forms include various piebald patterns, such as spotted forms among mice, and the familiar black and white hooded and dorsal-striped pattern of some tame rats.

Colour, therefore, must be correlated with some determinant (determining factor) for pattern, and it cannot, therefore, exist alone in an animal's coat. And we must conceive that each kind of pattern — the self, the spotted, the striped, the hooded and all others — has its own special determinant. Given the presence of all the necessary determinants for the development of pigment in a mammal's coat, some or all of the hairs may bear this pigment according to the pattern determinants, or absence of pattern determinants, which the cells of the hair papillae carry. And this brings us to the question as to whether in a piebald animal the pigmented hairs are in any way different from the pigmentless or white hairs. No adequate investigation of this subject has yet been made, but some observations made by the author of this article, on the piebald black and white rat, show that differences connected with the microscopic structure exist.

There is thus evidence that colour is correlated with other factors which determine pattern. And this leads to the inquiry as to whether albinoes ever exhibit evidence that they carry the pattern determinants in the absence of those for pigmentation. For it is to be expected a priori that, since albinoes were derived from pigmented progenitors and may at any time appear, side by

side with pigmented brothers, in a litter from pigmented parents, they would be carrying the pattern determinants of some one or other of their pigmented ancestors. Now we know, from the numerous experiments in heredity which have resulted since the rediscovery of Mendel's principles, that an individual may carry a character in one of two conditions. It may be carried as a somatic character, when it will be visible in the body tissues, or it may be carried as a gametic character, and its presence can only then be detected in subsequent generations, by adequately devised breeding tests.

With regard to pattern, the evidence is now clear that albinoes may carry the determinants in both these ways. So far as they are carried gametically, i.e. by the sex-cells, it has been shown by Cuenot and G. M. Allen for mice, by C. C. Hurst for rabbits, and by L. Doncaster and G. P. Mudge for rats, that in a cross between a coloured individual of known gametic purity and an albino, the individuals of the progeny in either the first or second, or both generations, may differ, and that the difference in some

cases wholly depends upon the albino used. It has been shown that the individuals in such an offspring may bear patterns which never occurred in the ancestry of the coloured parent, but did in that of the albino; and, moreover, if the same coloured parent be mated with another individual, either albino or coloured, that their offspring may never contain members bearing such patterns. The particular pattern will only appear when the coloured parent is mated with the particular albino. And yet the albino itself shows no somatic pattern or pigment. So clear is the evidence on this point that any one adequately acquainted at first hand with the phenomena, by employing an albino of known gametic structure and mating it with a coloured individual, also of known gametic constitution, could predict the result.

With respect to albinoes carrying pattern as a visible somati'c character, i.e. in the body cells, no definite evidence has as yet been published. But W. Haacke has described a single albino rat, in which he states that the hairs of the shoulder and mid-dorsal regions were of a different texture from those of the rest of the body. And it is possible that this albino, had it developed colour, would have been of the piebald pattern. But the author of this article has quite recently reared some albinoes in which the familiar shoulder hood and dorsal stripe of the piebald rat is perfectly obvious, in spite of the absence of the slightest pig-

mentation. The hairs which occupy the region which in the pigmented individual is black, are longer, thinner and more widely separated than those in the regions which are white. As a result of this, the pink skin is quite visible where these hairs occur, but elsewhere it is invisible. Thus these albinoes exhibit a pattern of pink skin similar in form with the black pattern of the piebald rat. Moreover, some of the albinoes possess these particular " pattern " hairs all over the body and obviously such individuals are carrying the self pattern. There are other details into which we cannot here enter, but which support the interpretation put upon these facts, i.e. that these particular albinoes are carrying in the soma the pattern determinants simultaneously with the absence of some of the factors for pigmentation.

Not only do albinoes thus carry the determinants for pattern, but it has been known for some time that they also carry gametically, but never visible somatically, the determinants for either the ferment or the chromogen for one or more colours. L. Cuenot was the first to show this for albino mice. He was able by appropriate experiments to demonstrate that when an albino is derived (extracted) from a coloured ancestry, and is then crossed with a coloured individual, both the colour of the pigmented parent and of the pigmented ancestry of the albino may appear among the individuals of the offspring.

Immediately subsequent to Cuenot, G. M. Allen in America demonstrated the same fact upon the same species of rodents. C. C. Hurst, more recently, has shown that albino rabbits, whether pure bred for eight generations at least, or extracted from pigmented parents, may carry the determinants for black or for black and grey. In this latter case the determinants for black are carried by separate gametes from those carrying grey, and the two kinds of sex-cells exist in approximately equal numbers. This is likewise true of albino mice when they carry the determinants for more than one colour.

Since Hurst's work, L., Doncaster and G. P. Mudge have both shown that albino rats also carry in a latent condition the determinants for black or grey. The experiments of the latter author show that, if a gametically pure black rat be crossed with an albino derived from a piebald black and white ancestry, all the offspring in successive litters will be black; but if the same black parent be crossed with albinoes extracted from parents of which one or both are grey, then both grey and black members

will appear in the successive litters.

The proportions in which the various coloured individuals appear are approximately those demanded by the Mendelian principle of gametic purity and segregation. Cuenot and Hurst have also shown that when albinoes of one colour extraction are crossed with albinoes of another colour extraction the segrega-* tion of the colour determinants in the gametogenesis of the albinoes takes place in precisely the same way that it does in the

gameto genesis of a pigmented individual; that is, in Mendelian fashion. Or, to express it otherwise, an albino extracted from yellow parents, bred with an albino extracted from black parents, will give an albino offspring whose gametes in equal numbers are bearers of the black and yellow determinants. And when one of these albinoes is bred with a pure coloured individual, a mixed offspring will appear in the first generation. Some of the individuals will be one or other of the two colours, the determinants of which were borne by the albino, and others the colour of the pigmented parent. But in such albino crosses the colour characters are latent because albinoes do not carry the whole of the complements for colour production. They carry only some determinant or determinants which are capable of developing colour when they interact with some other determinant or determinants carried alone by pigmented individuals. Whether albinoes carry the tyrosinase or other ferment, or whether they carry the chromogen or chromogens, is not yet settled. Miss Durham's work suggests that they carry the latter. But that they never bear both is proved by the. fact that, when albinoes are crossed with each other, none but albinoes ever result in the offspring. One apparent exception to this rule only is known, and this almost certainly was due to error.

It is not only among albino animals that colour factors are carried in a latent condition, but also in white flowers. W. Bateson has shown this to be the case for the sweet-pea (Lathyrus odoratus), var. Emily Henderson, and for certain white and cream stocks (Matthiola). When white Emily Henderson (the race having round pollen grains) is crossed with a blue-flowered pea, purple offspring result. Similarly, when white Emily Henderson (long pollen grains) is crossed with white Emily Henderson

(round pollen grains), the offspring wholly consists of the reversionary purple type, and sometimes wholly of a red bicolor form known as " Painted Lady." ■ These two types never appear in the same family. With the stocks, when a white- flowered and hairless form is crossed with a cream-flowered and hairless one, all the offspring are purple and hairy. Bateson considers that the purple colour is due to the simultaneous existence in the plant of two colour factors which may be desig- nated by C and R. If either one of these two is absent the plant is colourless. Cream-coloured flowers are regarded as white because cream is due to yellow plastids and not to sap colour. Thus the cream plant may carry C and the white one R. When they are crossed the two factors for colour production are brought together. Obviously, we may regard C as a tyrosinase and R as a chromogen, or vice versa; and in the case of the white sweet- pea crossed with a blue-flowered one, and producing purple offspring, we may imagine that the white flower brought in an additional tyrosinase or a chromogen not present in the blue- flower, which, when combined or mixed with the chromogen or tyrosinase for blue, gave purple. A similar explanation may apply to C. Correns's experiment, in which he crossed white Mirabilis jalapa with a yellow form, and always obtained red- flowered offspring.

In heredity, complete albinism among animals is always recessive; and partial albinism (piebald) is always recessive to complete pigmentation (self-coloured). When an albino mouse, rat, guinea-pig or rabbit is crossed with either a pure self or pure pied-coloured form, the offspring are similar to, though not always exactly like, the coloured parent; provided, of course, that the albino is pure and is not carrying some colour or pattern determinant which is dominant to that of the coloured parent used. No albinoes, in such a case, will appear among the first generation, but if the individuals of this (F.i) generation are crossed inter se or back crossed with the albino parent, then albino individuals reappear among the offspring. In the former case they would form one-quarter of the individuals of this second (F.2) generation, and in the latter, one-half.

The recessive nature of albinism and its distribution in Mendelian fashion is almost certainly as true for man as for lower forms. This has been shown by W. C. Farabee for negroes in Coanoma county, Mississippi. The facts are as follows. An albino negro married a normal negress. They had three children,

all males. All three sons married, and two of them had only

normal children, judged of course by somatic characters. But the third son married twice, and by the first wife had five normal and one albino children, and by the second, six normal and three albino children. If we assume that the two negresses which the third son married were themselves carrying albinism recessive — an exceedingly probable condition considering that albino negroes are not uncommon — the result is accurately in accordance, as W. E. Castle has shown, with Mendelian expectation. For there is expected in the offspring of this third son coloured individuals and albinoes in the proportion of 3:1. There is actually 11:4, which is the nearest possible approximation with the number 15. '

The operation of Mendelian processes in human heredity is further shown by the close relationship that exists between the appearance of albinoes and cousin marriages. An albino is a homozygote; that is, all its gametes are carrying the char- acter of albinism and none of them bear the alternative character — the allelomorph — of pigmentation. By pigmentation is here meant all those factors which go to its production. Now such a gametic (egg or sperm) constitution can only result when two individuals, all or some of whose gametes are pure with regard to the character albinism, meet in fertilization. Hence it is readily seen that it is among cousin marriages that the greater probabilities exist that two individuals bearing identical char- acters will meet, than in the population at large. This can be illustrated in the following scheme. Let A stand for a pure albino and (A)N for a normal person, who nevertheless carries the character albinism (A) recessive. Then, in the scheme below, if A b and (A)N b are two brothers who both marry normal wives N, their children N(A) in the first case will be all normal in appearance but will be carrying albinism recessive; and in the second case some will be pure normal individuals N, and some will be like the children of the first brother, i.e. N(A). Now, if one of these latter children of the second brother marries a cousin — a child of the first brother, — their offspring, if large enough, will consist of some pure normals N, impure normals N(A), and of albinoes A.

AˆXN (A)NbXN

N(A)

N(A) + N

N + 2N(A) + A

No other rational explanation of the close relationship between albinism and cousin marriages is at present forthcoming. And, when the whole facts are borne in mind, there can be no reasonable doubt that the Mendelian principles offer an intelligible solution of the problem.

A popular conception exists that albinoes are less constitutionally strong than the pigmented individuals of the same species. In support of this belief there is more or less scientifically ascertained evidence. Conversely, there is, however, conclusive evidence that in some instances and in respect of certain qualities the opposite belief is true.

To deal with the former belief first, we have the remarkable case cited by Charles Darwin on the authority of Professor I. J. Wyman. In Virginia the paint-root plant {Lachnanthes tinctoria) occurs abundantly, and Professor Wyman noticed that all the pigs in this district were black. Upon inquiry of the farmers he found that all the white pigs born in a litter were destroyed, because they could not be reared to maturity. The root of this plant, when eaten by white pigs, caused their bones to turn to a pink colour and their hoofs to fall off, but the black pigs could eat the same plant with impunity. Partial albinism in this case was undoubtedly correlated with some inherent constitutional defect, in virtue of which the individuals characterized by it were injuriously affected by the juices of a plant quite innocuous to their pigmented brethren. Heusinger has shown that white sheep and pigs are injured by the ingestion

of certain plants, while the pigmented individuals may eat them without harm. In Devonshire and in parts of Kent the farmers entertain a marked prejudice against white pigs, because ” the sun blisters their skin.” More remarkable is the case of certain cattle, whose skin is piebald,, marked by a general ground colour over which are scattered patches of unpigmented coat, In these animals, in certain inflammatory skin eruptions, caused by the ingestion of harmful plants, the albinotic areas are alone affected. And with certain cutaneous diseases accompanied by constitutional disturbances which affiict cattle, the affection in the skin appears on the patches bearing white hairs, the other parts remaining apparently healthy. Such cases suggest that we

should be more correct in regarding, not albinism as correlated with constitutional defects, but rather pigmentation as correlated with powers of immunity oc increased resistance against certain injurious processes. In the West Indies “the only horned cattle fit for work are those which have a Igood deal of black in them; the white are terribly tormented by the insects and they are weak and sluggish in proportion to tie black.”

Coming to man, it is known that some albino negroes are peculiarly sensitive to the bites of insects; and with Europeans it is a generally observed fact that the fairer individuals are more seriously affected by the bites of fleas and bugs than are darker ones. Dr Twining, in the British. Association Reports for 184ˆ, p. 79, cites some instances described by Humboldt, who says that the copper-coloured natives of the high plain of Bogoto, and at a lower level on the Magdalena river, were generally free from goitre. Professor Poffig, also cited by Dr Twining, states that on the east side of the Andes in Chile, in some of the races which live there, he did not see a single case of goitre, and yet in the white inhabitants, who live exactly as the natives, it prevails in a great degree.

Turning now to instances of the opposite kind, it is known that silkworms which spin colourless cocoons are more resistant to the attacks of a certain deadly fungus than are those which spin the yellow ones. In some parts of North America it is found that the white peaches are much less liable to the attack of a disease known as the “yellows” than are the yellow-fleshed ones. In the region of the Mississippi, Farabee has observed that the albino negroes are taller and broader than the black- skinned individuals. We may assume that increased stature and breadth imply some sort of inherent physical superiority, and if such an assumption is valid we have in man evidence that albinism is correlated not with constitutional defectiveness but with greater perfectness.

But the question as to whether albinoes are more or less constitutionally vigorous than pigmented individuals, of the same species may be tested by exact measurement. In 1893 W. D. Halliburton and T. G. Brodie, in ascertaining the physio- logical properties of nucleo-proteids, found that when they were intravascularly injected into pigmented rabbits, coagulation of the blood resulted, but of the eight albinoes which they used, none clotted. At a subsequent period (1897) Halliburton and J. W. Pickering showed that the three synthesized colloids of

Grimaux in the same Way produced coagulation in pigmented animals, but failed to do so in albinoes. Pickering, still later, showed, in the case of four Norway hares, two of which were injected while in their pigmented or summer coat, and two while in their albino or winter coat, that coagulation occurred in the former cases but not in the latter. '

Quite recently, however, the author of this article has made a more detailed examination of the question, operating upon several hundreds of rabbits. And he found that all albinoes do not fail to clot when intravascularly injected with nucleo-proteids. Only about 9% of them thus failed absolutely to manifest any trace of coagulation. But about 7 % showed an exceedingly limited coagulation, in which the clot was colourless and flocculent, and confined to the heart. The rest gave a typical and more or less wide-spread coagulation. Moreover, it was found that all the failures of coagulation occurred when the nucleo-proteid used was obtained from pigmented animals. Whenf it was derived from albinoes no failures occurred. All

pigmented animals clotted when the nucleo-proteid was, derived from either source. The Himalayan rabbits reacted like complete albinoes, and 12% of them failed to clot when injected with nucleo-proteid extracted from pigmented animals.

The interesting fact was thus ascertained that all, albinoes are not alike. To students of heredity this is precisely what would have been expected. For, as the facts above described show, albinoes, though apparently identical externally, are yet the carriers of different hereditary characters. Among albino rats, for instance, the author of this article has reason to believe, upon theoretical grounds resting on an experimental basis, that probably no less than thirteen types exist. With rabbits and mice there must be a still larger number.

In the intravascular coagulation experiments above described, all the rabbits were carefully weighed, and the amount of nucleo-proteid injected until coagulation occurred was measured. This would give for albinoes and pigmented individuals the amount per kilogramme of body-weight required to kill in each case, and would afford a measurement of the relative resistance of the two races. It was found that the resistance of albinoes towards the coagulative effects of injected nucleo-proteids was to that of pigmented individuals as 1-5 to i-o. In this case, the greater constitutional vigour of the albino is thus accurately

demonstrated. But it does not necessarily follow that with other materials and with other constitutional qualities the state of things would not be reversed.

One other feature reiaains to be mentioned. Albinism appears, in the processes of heredity, to be sometimes indissolubly correlated with certain peculiar traits. It is well known that the long-haired albino rabbit, called Angora, when at rest, has the habit of swaying its head sideways in a peculiar fashion. C. C. Hurst has shown that the long-haired and albino characters are always accompanied in heredity with the swaying habit. The Angora character never occurs without it.

Bibliography. — G. M. Allen, “Heredity of Coat Colour in Mice,” Proc. Amer. Acad. Arts and Set. vol. xl. No. 2; W. Bateson, Mendel’s Principles of Heredity, a Defence (Cambridge, 1902) ; W. Bateson and E. R. Saunders, ” Experimental Studies in the Physiology of Heredity, ” Reports to the Evolution Committee of the Royal Society, Report I. (London, 1901); W. Bateson, E. R. Saunders, R. C. Punnett and C. C. Hurst, Reports to the Evolution Committee of the Royal Society, Report II. (London, 1905); W. Bateson, E. R. Saunders and R. C. Punnett, ” Further Experiments on Inheritance in Sweet- Peas and Stocks, ” Proc. Roy. Soc. B. vol. lxxvii. ; W. E. Castle, ” Note on Mr Farabee’s Observations, ” Science, N.S. vol. xvii. (New York); ” Mendel’s Law of Heredity,” Science, N.S. vol. xviii. (New York); W. E. Castle and G. M. Allen, ” Mendel’s Law and the Heredity of Albinism,” Proc. Amer. Acad. Arts and Sci. vol. xxxviii. ; L. Cuenot, ” L heredite de la pigmentation chez les souris,” Arch. d. Zool. Exper. et Gen. Notes et Revue, ser. 3, torn. 10, and ser. 4, torn. I and 2; Charles Darwin, Variation of Animals and Plants under Domestication, vols. i. and ii., 2nd ed. (London, 1899); L. Doncaster, ” Inheritance of Coat Colour in Rats,” Proc. Camb. Phil. Soc. vol. xiii. (Camb., 1906) ; V. von Ducceschi, Rendiconti delta R. Accad. dei Lincei, vol. ii. ; Arckivio di Fisiologia, vol. i. ; Florence M. Durham, ” Tyrosinases in the Skins of Pigmented Vertebrates,” Proc. Roy. Soc. vol. lxxiv.; W. C. Farabee, “Notes on Negro Albinism,” Science, N.S. vol. xvii. (New York) ; Furth v. Schneider, Beitr. z. Chem. Phys. u. Path. Bd. 1 ; W. Haacke, ” Ueber Wesen, Ursachen und Vererbung von Albinismus und Scheckung, &c./’ Biol. Centralbl. Bd. 15; Halliburton and Brodie, Journ. Phys. Camb. andLond. vols, xiv., xvi., xvii., xviii. ; Halliburton and Pickering, Journ. Phys. vpl. xviii. ; C. C. Hurst, ” Experimental Studies on Heredity in Rabbits,” Journ. Lin. Soc. Zool. vol. xxix. ; Geo. P. Mudge, ” Intravascular Coagulation and

Albinism, Pre- liminary Note," Proc. Phys. Soc., 1905; Packard, Memoirs of National Academy of Sciences (1888) ; Pickering, Journ. Phys. vols, xviii. and xx. ; E. B. Poulton, Colour of Animals (Lond., 1890); Twining, Brit. Assoc. Reports, 1845; H. M. Vernon, Variation in Animals and Plants (London, 1903) ; F. H. Welch, " Winter Coat in Lepus americanus, " Proc. Zool. Soc, 1869. (G. P. M.)

ALBINONI, TOMASSO (c. 1674-e. 174s), Italian musician, was born at Venice. He was a prolific composer of operas attracting contemporary attention for their originality, but is more remarkable as a composer of instrumental music, which greatly attracted the attention of Bach, who wrote at least two fugues on Albinoni's themes and constantly used his basses for harmony exercises for his pupils.

ALBINOVANUS PEDO, Roman poet, flourished during the Augustan age. He wrote a Theseis, referred to in a letter from his intimate friend Ovid (Ex Ponto, iv. 10), epigrams which are commended by Martial (ii. 77, v. 5) and an epic poem on the exploits of Germanicus. He had the reputation of being an excellent raconteur, and Quintilian (x. i. 00) awards him qualified praise as a writer of epics. All that remains of his works is a beautiful fragment, preserved in the Suasoriae (i. 15) of the rhetorician Seneca,from a description of the voyage of Germanicus (a.d. 16) through the river Ems to the Northern Ocean, when he was overtaken by the storm described by Tacitus (Ann. ii. 23). The cavalry commander spoken of by the historian is probably identical with the poet. Three elegies were formerly attributed to Pedo by Scaliger; two on the death of Maecenas (In Obitum Maecenatis and De Verbis Maecenatis tnoribundi), and one addressed to Livia to console her for the death of her son Drusus (Consolatio ad Liviam de Morte Drusi or Epicedion Drusi, usually printed with Ovid's works); but it is now generally agreed that they are not by Pedo. The Consolatio has been put down as late as the 15th century as the work of an Italian imitator, there being no MSS. and no trace of the poem before the publica- tion of the editio princeps of Ovid in 147 1. There is an English verse translation of the elegies by Plumptre (1907).

See Bahrens, Poetae Latini Minores (1879) and Fragmenta

Poetarum Latinorum (1886); Haupt, Opuscula, i. (1875); Haube, Beitrag zur Kenntnis des Albtnovanus Pedo (1880).

ALBINDS (originally Weiss), BERNHARD SIEGFRIED

(1697-1770), German anatomist, wasborn on the 24th of February 1697, at Frankfort-on-Oder, where his father, Bernhard Albinus (1653-1721), was professor of the practice of medicine. In 1702 the latter was transferred to the chair of medicine at Leiden, and it was there that Bernhard Siegfried began his studies, having for his teachers such men as H. Boerhaave and Nikolaus Bidloo. Having finished his studies at Leiden, he went to Paris, where, under the instruction of Sebastien Vaillant (1669-1722), J. B. Winslow (1669-1760) and others, he devoted himself especially to anatomy and botany. After a year's absence he was, on the recommendation of Boerhaave, recalled in 1 7 19 to Leiden to be a lecturer on anatomy and surgery. Two years later he succeeded his father in the professorship of these subjects, and speedily became one of the most famous teachers of anatomy in Europe, his class-room being resorted to not only by students but by many practising physicians. In 1745 Albinus was appointed professor of the practice of medicine, being succeeded in the anatomical chair by his brother Frederick Bernhard (1715-1778), who,as well asanother brother, Christian Bernhard (1700-1752), attained considerable distinc- tion. Bernhard Siegfried, who was twice rector of his university, died on the 9th of September 1770 at Leiden.

ALBION (in Ptolemy 'AXoviaw; Lat. Albion, Pliny 4. 16(30] , 102), the most ancient name of the British Islands, though generally restricted to England. The name is perhaps of Celtic origin, but the Romans took it as connected with albus, white, in refer- ence to the chalk-cliffs of Dover, and A. Holder (Alt-Keltischer Sprachschatz, 1 896) unhesitatingly translates it Weissland, " white- land." The early writer (6th cent. B.C.) whose periplus is translated by Avienus (end of 4th cent, a.d.) does not use the name Britannia; he speaks of vrjcros 'Itpvcav kox 'A\f}u>vcav (" island of the Ierni and the Albiones ") . So Pytheas of Massilia (4th cent. B.C.) speaks of "AXfiiov and 'Ikpvq. From the fact that there was a tribe called the Albiones on the north coast of Spain in Asturia, some scholars have placed Albion in that neighbourhood (see G. F. Unger, Rhein. Mus. xxxviii., 1883, pp. 156-196). The name Albion was taken by medieval writers from Pliny and Ptolemy.

ALBION, a city of Calhoun county, Michigan, U.S.A., on the Kalamazoo river, 21 m. W. of Jackson. Pop. (1890) 3763; {19'co) 4519, of whom 622 were foreign-born; (1904) 4943; (1910) 5833. Albion is served by the Michigan Central and the Jackson division of the Lake Shore and Michigan Southern railways, and by an inter-urban electric line. The city has a public park and a public library. The W. part of the city has most of the

factories; the principal manufactures are flour, agricultural implements, windmills, gasolene engines, harness and proprietary medicines. On a commanding site in the E. part of the city is Albion College (Methodist Episcopal; co-educational) , embracing a College of Liberal Arts, a preparatory department, a con- servatory of music, a school of art, a school of oratory, a normal course, and a commercial department. The college was incorporated in 1835 as Spring Arbor Seminary, and in 1839 by an amended charter was located at Albion, where it was first opened in 1843 under the name of the Wesleyan Seminary of Albion; in 1849 it became the Wesleyan Seminary and Female Collegiate Institute, with power to grant degrees to women only; but in 1861 the present name was adopted and the college was permitted to grant degrees to men and women. In 1906 it had a library of 16,500 volumes, a faculty of 19, and an enrolment of 483 (211 being women). The municipality owns and operates the water-works, the water-supply being obtained from artesian wells. Albion was settled in 1831, was incorporated as a village in 1866 and was chartered as a city in 1885.

ALBION, a village and the county-seat of Orleans county, New York, U.S.A., about 30 m. W.N.W. of Rochester. Pop. (1890) 4586; (1900) 4477, (984 being foreign-born and 43 negroes) ; (1905, state census) 5174 ; (1910) 5016. The village is served by the New York Central & Hudson River railway, by the Buffalo, Lockport & Rochester electric railway, and by the Erie Canal. In Albion are the Western House of Refuge for Women (a state institution established in 1890), a public park, the Swan Library, and the county buildings, including the court house, the jail and the surrogate's office; and about 2 m. to the S.E. is the beautiful Mount Albion Cemetery. Albion is the centre of the Medina sandstone industry, and lies in the midst of a good farming region, of which it is the principal shipping point, especially for apples, cabbages and beans. The village manufactures agricultural implements, vinegar, evaporated fruit, and canned fruit and vegetables, and has two large cold- storage houses. Albion was settled in 181 2, was incorporated in 1823 and

became the county-seat in 1825.

ALBITE, a mineral of the felspar group, belonging to the division of the plagioclases (q.v.). It is a sodium and aluminium silicate, NaAlSiaOs, and crystallizes in the anorthic system. Like all the felspars it possesses two cleavages, one perfect and the other less so, which are here inclined at an angle of 86° 24'. On the more perfect cleavage, which is parallel to the basal plane (P), is a system of fine striations, parallel to the second cleavage (M), due to twinning according to the •" albite law " (figs. 1 and 2) . The hard- ness is 6, and the specific gravity 2.63. The colour is usually pure white, hence the name (from the Lat. albus) for the species.

Albite forms an essential con- stituent of many

acidic igneous and Fig. 1. Fig. 2.

crystalline rocks; Twinned crystals of Albite.

in granites, diorites, andesites, &c, it occurs as a primary mineral, whilst in crystalline schists, phyllites and crystalline limestones it is of secondary (metamorphic) origin. The beautifully developed crystals so abundant in crystal-lined crevices of Alpine granites and gneisses have been deposited, with other minerals, from solution; the crystals lining veins in the slates of Tintagel in Cornwall have the same origin.

Several varieties of albite are distinguished, of which the following may be here specially mentioned. Pericline (from the Gr. 7r«pocXtPˆs, " sloping ") is the name given to large opaque white crystals from the chlorite-schists of the Alps; they are tabular parallel to the direction of perfect cleavage and are twinned according to the " pericline law." Peristerite

(from the Gr. vepuTrepd, a dove) is characterized by a beautiful bluish sheen, somewhat resembling that seen on the neck of a pigeon; it is found mainly in Ontario. Aventurine and moonstone varieties occur, though these special appearances are more usually displayed by the oligoclase and orthoclase felspars respectively. (L. J. S.)

‘ALBO, JOSEPH, a Spanish Jewish theologian of the 15 th century. He was author of a very popular book on the philosophy of Judaism, entitled ‘Iqqarim or Fundamentals. Maimonides in the 1 2 th century had formulated the principles of Judaism in thirteen articles; Albo reduced them to three: (i) The Existence of God, (ii) Revelation and (iii) Divine Retribution. Albo set the example of minimizing Messianism in the formulation of Jewish beliefs. Though he fully maintained the Mosaic author- ship of the Law and the binding force of tradition, he dis- criminated between the essential and the non-essential in the practices and beliefs of Judaism. An English translation of the ‘Iqqarim appeared in the Hebrew Review, vols, i.-iii.

ALBOIN (d. 572 or 573), king of the Lombards, and conqueror of Italy, succeeded his father Audoin about 565. The Lombards were at that time dwelling in Noricum and Pannonia (archduchy of Austria, Styria and Hungary, west of the Danube). In alliance with the Avars, and Asiatic people who had invaded central Europe, Alboin defeated the Gepidae, a powerful nation on his eastern frontier, slew their king Cunimund, whose skull he fashioned into a drinking-cup, and whose daughter Rosamund he carried off and made his wife. Three years later (in 568), on the alleged invitation of Narses (q.v.), who was irritated by the treatment he had received from the emperor Justin II., Alboin invaded Italy, probably marching over the pass of the Predil. He overran Venetia and the wide district which we now call Lombardy, meeting with but feeble resistance till he came to the city of Ticinum (Pavia), which for three years (569-572) kept the Lombards at bay. While this siege was in progress Alboin was also engaged in other parts of Italy, and at its close he was probably master of Lombardy, Piedmont and Tuscany, as well as of the regions which afterwards went by the name of the duchies of Spoleto and Benevento. In 572 or 573, how- ever, he was assassinated by his chamberlain Peredeo at the instigation of Queen Rosamund, whom Albpin had grievously insulted by forcing her to drink wine out of her father’s skull. After his death and the short reign of his successor Cleph the Lombards remained for more than ten years in a state of anarchy.

The authorities for the history of Alboin are Procopius, Paulus Diaconus and Agnellus (in his history of the church of Ravenna).

ALBONI, MARIETTA (1823-1894), Italian opera-singer, was born at Cesena, Romagna, and was trained in music at Bologna, where she became a pupil of Rossini. She had a magnificent contralto

voice, and in 1843 made her first appearance at La Scala, Milan, being recognized at once as a public favourite. In England her reputation was established by her appearance at Covent Garden in 1847, an d she had brilliant success all over Europe in the leading operatic roles; in 1853 she repeated these triumphs in the United States. Indeed, with the exception of Malibran,she had no compeer among the contraltos of thecentury, the old Italian school of singing finding in her a really great representative. She married first Count A. Pepoli, who died in 1866, and secondly (1877) a French officer, M. Zieger; she lived in Paris after her first marriage, and died at Ville d'Avray in 1894.

ALBORNOZ, GIL ALVAREZ DE, Spanish cardinal, was born at Cuenca early in the 14th century. He was the son of Gil Alvarez de Albornoz and of Dona Teresa de Luna, sister of Kimeno de Luna, archbishop of Toledo. He was educated at Saragosa, while his uncle was bishop of that see, and studied law at Toulouse. The powerful influence of his family opened him a public career early in life. He was made archdeacon of Calatrava, and became a member of the king's council while young. In 1337 he was chosen archbishop of Toledo in succession to his uncle by the favour of the king, Alphonso XI. At the battle of Tarifa he fought against a great invasion from Africa in 1340, and at the

taking of Algeciras in 1344 he led the armed levy of ; his archbishopric. In 1343 he had been sent to Pope Clement VI. at Avignon to negotiate a grant of a tax on the revenues of, the Church for the Crusade. His military and diplomatic ability became known to the pope, who made him a pardinalin 1350, Albornoz left Spain on the death of the king Alphonso XL in that year, and never returned. It has been said, but not on contemporary evidence, that he fled from fear of Peter the Cruel. In 1353 Innocent VI. sent him as a legate into Italy, with a view to the restoration of the papal authority in the states of the Church. He was recalled in 1357, but was sent again to Italy after a brief interval, and in 1362 had paved the way for the return of Urban V.. to Rome. As legate, Albqrnoz showed: himself to be an astute manager of men and effective fighter. , He began by making use of Rienzi, whose release from prison at Avignon he secured. After the murder of the tribune in 1354 Albornoz pursued his task of restoring the pope's authority by intrigue and force with remarkable success.; As a mark of gratitude the pope appointed him legate at Bologna in 1367, but he died at Viterbo the same year. According to his own desire his remains were carried to Toledo, where Henry of Castile caused them, to be entombed

with almost royal honours.' A work by Albornoz on the constitution of the Church of Rome, first printed at, Jesi in 1473, is now very rare. The college of St Clement at Bologna was founded, by Albornoz for the benefit of Spanish students*

See " De Vita et Rebus Gestis Aegidii Albornotii," in Sepulveda's Opera Omnia, vol. iv. (1780); Cardenal. Albornoz der zweii&,Begriiv,der des Kirchenstaates, by Dr H. J. W'urm (1892).

ALBRECHTSBERGER, JOHANN GEORG (1736-1809), Austrian musician, was born at Kloster-Neuburg, near Vienna, on the 3rd of February 1736. He studied musical composition under the court organist, Mann, and became one of the most learned and skilful contrapuntists of his age. After .being employed as organist at Raab and Maria-Taf erl, he was appointed in 1772 organist to the court of Vienna,; and in 1792 Kapellmeister of St Stephen's cathedral. His fame as a theorist attracted, to him in the Austrian capital a large* number of pupils, some of whom afterwards became eminent musicians. Among these were Beethoven, Hummel, Moscheles and Josef Weigl . (17.66-1846). Albrechtsberger died in Vienna on the 7th of March 1809. JIjs published compositions consist of preludes, fugues and sonatas for the piano and organ, string quartets, &c; but the greater proportion of his works, vocal and instrumental, exists only in manuscript. They are in the library of the Vienna Gesellschaft der Musikfreunde. Probably the most valuable service he rendered to music was in his theoretical works. In- 1790 .he published at Leipzig a treatise on composition, of which ;a third edition appeared in 1821. A collection of his writings on har- mony, in three volumes, was published under the care of his pupil Ignaz von Seyfried (1770-1841) in 1826. There is an English version of this published by Novello in 1855. Beethoven knew his own needs when he put himself under Albrechtsberger on finding that Haydn was not thoroughly disposed for the trouble of training him; and though Albrechtsberger could see nothing in him; and warned his other pupils against " that young ma 11 who would never, turn out anything in good style," he justified Beethoven's, confidence. ; * >

ALBRET,, The lordship, (seigneurie) of , Albret (Labrit, Lebret), situated in the Landes, gave its name to one of the most powerful feudal families of France in the middle, ages. Its members distinguished themselves in .the local wars of that epoch; and during the 14th century they espqused the English cause for some time, afterwards transferring .their, support to the side of

France. Arnaud Amanieu, lord of Albret, helped to take Guienne from the English. His son Charles became constable of France, and was killed at the battle of Agineourt in 1415. Alain the Great, lord of Albret (d. 1522), wished to marry Anne of Brittany, and to that end fought against Charles VIII.; but his hopes being defeated by the betrothal of Anne to Maximilian of Austria, he surrendered Nantes to the French in i486, At that time the house of Albret had attained consider able territorial importance, due in great part to the liberal grants

which it had obtained from successive kings of France. John of Albret, son of Alain, became king of Navarre by his marriage with Catherine of Foix. Their son Henry, king of Navarre, was created duke of Albret and peer of France in 1550. By his wife Margaret, sister of the French king, Francis I., he had a daughter, Jeanne d'Albret, queen of Navarre, who married Anthony de Bourbon, duke of Vendome, and became the mother of Henry IV., king of France. The dukedom of Albret, united to the crown of France by the accession of this prince, was granted to the family of La Tour d'Auvergne in 165 1, in exchange for Sedan and Raucourt.

To a younger branch of this house belonged Jean d'Albret, seigneur of Orval, count of Dreux and of Rethel, governor of Champagne (d. 1524), who was employed by Francis I. in many diplomatic negotiations, more particularly in his intrigues to get himself elected emperor in 1519. (M. P.*)

ALBRIGHT, JACOB (1759-1808), American clergyman, was born near Pottstown, Pennsylvania, on the 1st of May 1750. He was of " Pennsylvania-German " parentage, his name being originally Albrecht, and was educated in the Lutheran faith. At an early age he became a tile-burner. In 1790 he was con- verted to Methodism, and in 1796 determined to devote himself to preaching that faith among the Pennsylvania Germans. His efforts met with great success, and in 1800 he founded what was virtually a new and independent church organization on the Methodist system, of which he became the presiding elder, and eventually (1807) bishop. This church is officially the Evangelical Association, but its adherents have been vari- ously known as " New Methodists." "Albrights," and " Albright Brethren." Albright died on the 18th of May 1808, atMuhlbach, Pennsylvania.

ALBUERA, or Albuhera, LA, a small village of Spain, in the province of Badajoz, 13 m. S.E. of the town of that name. Pop. (1900) 820. Albuera is celebrated on account of the victory gained there on the 16th of May 181 1 by the British, Portuguese and Spaniards, under Marshal Beresford, over the French army commanded by Marshal Soult. (See Peninsular War.)

ALBUFERA DE VALENCIA, a lagoon, 7 m. S. of Valencia in Spain, about 12 m. in length and 4 in breadth, 12 ft. being its greatest depth. It communicates with the sea by a narrow outlet, which can be opened or closed at pleasure. The lake is crown property, and is of great value from the fish and wild- fowl with which it abounds. Rice is grown in large quantities by the inhabitants of the adjoining villages. In 181 2 Marshal Suchet was created duke of Albufera by Napoleon for his con- quest of Valencia, and invested with the domain; but the battle of Vittoria in 18 13 deprived him of his possession, though he still retained the title. Subsequently the revenues of Albufera were conferred upon the duke of Wellington in token of the gratitude of the Spanish nation. (See Peninsular War.)

ALBULAE AQUAE, a group of springs, 4 m. W. of Tibur, the water of which is bluish, strongly impregnated with sulphur and carbonate of lime, and rises at a temperature of about 75° F. Remains of a Roman thermal establishment exist near the principal spring, the so-called Lago della Regina (which is continually diminishing in size owing to the deposit left by the water) , and dedicatory inscriptions in honour of the waters have been found. The baths are still frequented by the Romans, though the modern establishment is about 1 m. S. on the high road.

See T. Ashby in Papers of the British School at Rome, iii. 117.

ALBULA PASS, now the principal route from the N. to the Upper Engadine in the Swiss canton of the Grisons. It was already frequented in the 13th century, while a carriage road (highest point, 7595 ft.) was constructed across it in 1865, but for a long time it was not as much used as the easier and more direct Julier Pass (7504 ft.), until the opening of the railway in 1903, which has vastly increased its practical importance. Starting from Coire the Rhine valley is followed to Reichenau (6j m.), and then that of the Hinter Rhine to Thusis (iof m.). The line then runs through the grand Schyn gorge (cut by the Albula torrent) to Tiefenkastell (75 m.), where it leaves the Julier road on the right

(S.) and continues to follow the course of the Albula gast Filisui and Bergiin (12J m.) to the mouth (5879 ft.) of the great tunnel (3J m. in length; highest point, 5987 ft.) which has been pierced below the pass. The descent lies through the Bevers glen to Bevers (25 m.), where the Upper Engadine is reached, about S m. below St. Moritz, which is 56 m. from Coire by this route. (W. A. B. C.)

ALBUM (Lat. alius, white) , in ancient Rome, a board chalked or painted white, on which decrees, edicts and other public notices were inscribed in black. The Annales Maximi of the Pontifex Maximus, the annual edicts of the praetor, the lists of Roman and municipal senators (decuriones) and jurors (album indicum) were exhibited in this manner. In medieval and modern times album denotes a book of blank pages in which verses, autographs, sketches, photographs and the like are collected. It is also applied to the official list of matriculated students in a university, and to the roll in which a bishop inscribes the names of his clergy. In law, the word is the equivalent of mailles blanches, for rent paid in silver (" white ") money.

ALBUMAZAR, more properly Abu-maaschar (805-885), Arab astronomer, was born at Balkh, flourished at Bagdad, and died at Wasid in Central Asia. His principal works are: De Magnis Conjunctionibus (Augsburg, 1489); Introductorium in Astronomiam (Venice, 1506); and Flores Astrologici (Augsburg, 1488). He maintained in the first that the world, created when the seven planets were in conjunction in the first degree of Aries, will come to an end at a like conjunction in the last degree of Pisces.

See Biog. Universelle (Jourdain); Lalande, Bibliographie Astronomique; Poggendorff, Biog. literarisches Handworterbuch; Houzeau, Bibl. Astronomique.

ALBUMIN, or Albumen (Lat. albus, white), an organic sub- stance typical of a group of bodies (albumins or albuminates) of very complicated chemical composition. They are sometimes called the histogenetic bodies or proteids, because they are essential to the building up of the animal organism. The vegetable kingdom is the original source of albuminous sub- stances, the albumins being found in greatest quantity in the seed. They also occur in the fluids of the living organism. The chemistry of the albumins

is one of the most complicated and difficult in the whole domain of organic chemistry. It has attracted the attention of many workers, and has formed the subject of a huge literature. In this field Bechamp, Cohnheim, Albrecht Kossel, and, especially, Emil Fischer and his pupils have been extremely active. The general trend of these researches lies in the study of the decomposition or ” breaking down” products of the albumin molecules; once these are accurately determined, the synthesis of an albumin is but a matter of time. Already we have proceeded far in our knowledge of the decomposition products, and certain simple proteids have been synthesized.

The albumins contain in all cases the elements carbon, hydrogen, nitrogen, sulphur and oxygen; their composition, however, varies within certain limits: C = 50-55 , H = 6-9-7-3,N = is-iQ %,S = o-3-2-4%,0 = i9-24%) TaT crystallized albumin is C = 5i-48 %, H = 6-76 , N = acters. 18-14, S = o-96%, 0 = 22-66%, which points to the formula C720H1134N218S5O248, corresponding to the molecular weight 16,954. A high molecular weight characterizes these substances, but so far no definite value has been determined by either physical or chemical means; A. P. Sabanezhev obtained the value 15,000 by Raoult’s method for purified egg albumin. All albumins are laevo-rotatory; and on incineration a small amount of inorganic ash is invariably left. They are usually insoluble in water, alcohol and ether; and their presence as solutes in vegetable and animal fluids is not yet perfectly under- stood, but it is probably to be connected with the presence of salts or other substances. A remarkable change occurs when many albumins are boiled with water, or treated with certain acids, their solubility and general characters being entirely altered, and the fluid becoming coagulated. This change is seen

in the trajisformation of the ” white ” of an egg on boiling.

Albumins are generally detected by taking advantage of this

property, or of certain colour changes. The reagents in common use are: Millon’s reagent, a solution of mercuric nitrate contain-

ing nitrous acid, this gives a violet-red coloration; nitric acid,, which gives a yellow colour, turning to gold when treated with ammonia (xanthoproteic reaction); fuming sulphuric acid, which gives violet solutions; and caustic potash and copper sulphate, which, on warming, gives a red to violet coloration (biuret reaction).

Boiling with dilute mineral acids, or baryta water, decomposes albumins into carbon dioxide, ammonia and fatty amino- arid

other acids. These decomposition products include: De< siUoa glycocoll or aminoacetic acid, NH 2 CH 2 COOH, alanine products. oraminopropionicacid,CH 3 -CH(NH 2)-COOH,a-amino-

butyric acid, a-aminovalerianic acid, leucin or isobutyl- a-aminoacetic acid, (CH 3) 2 CH-CH 2 -CH(NH 2)-COOH, isoleucin, probably /3-aminocaproic acid, serin or a-amino-/3-hydroxy-propionic acid, HO-CH 2 -CH(NH 2)-COOH, aspartic acid or aminosuccinic acid, HOOC-CH 2 -CH(NH 2)-COOH, glutaminic acid or a-amino-«-glutaric acid,HOOC-(CH 2) 2 CH(NH 2) COOH, diaminoacetic acid, a-/3-diaminopropionic acid, lysin. or a-e-diamino-M-caproic acid, NH 2 (CH 2) 4 – CH(NH 2) -COOH, arginin or guanidine-a-amino-n-valerianic acid, (NH)(NH 2)C-NH- (CH 2) 3 -CH(NH 2)-COOH, ornithin or a5-diamino valerianic acid, NH 2 – (CH 2) 3 – CH(NH 2) • COOH, histi din or a-amino- ff-imidazol-

I I

propionic acid, HOOC- CH(NH 2) • CH 2 – C : CH-N:CH-NH, pr oline

i I

or a-pyrrolidin carboxylic acid, HOOCCHNH-CH 2 -CH 2 CH 2 ,

hydroxyproline, phenyl alanine or phenyl-a-aminopropionic acid,C 6 H 6 CH 2 CH(NH 2)-COOH,tyrosineorp-hydroxyphenyl-a-aminopropionic acid, . phenyl ethylamine, p-hydroxyphenyl ethylamine, tryptophane or indol aminopropionic acid, A. cystin (protein-cystin) or a-amino-/3-thioglyceric acid ” disul- phide,” (S-CH 2 -CH(NH 2)-COOH) 2 , B. cystin (stone-cystin), or a-thio-/3-aminoglyceric acid ” disulphide,” (NH 2 -CH 2 CH : S COOH) 2 . This list is not exhaustive; other products are given in Gustav Mann, Chemistry of the Proteids (1906), to which reference should be made for a complete account of this, class of

compounds.

The complexity of composition militates in a great measure against a rational classification of albumins by purely chemical considerations. Such classifications have been at- n™**!- tempted by A. Kossel and by W. Kiihne and E. P. Pick; albumins. but m ˆ e P resen t state of our knowledge, however, the older classification of E. Dreschel and F. Hoppe- Seyler, based primarily on solubilities and distribution, may be conveniently retained. This classification is with certain modi- fications as follows: —

I. Albumins proper: characterized by having colloidal solutions.

(1) Albumins: serum-albumin, egg-albumin, lact-

albumin.

(2) Globulins: serum-globulin, egg-globulin, lacto-

globulin, cell-globulins.

(3) Plant-globulins and plantˆvitellines.

(4) Fibrinogen.

(5) Myosin.

(6) Phosphorus containing albumins (nucleo-albumins) ,

caseins, vitellines, nucleo-albumins of the cell- protoplasm, mucoid nucleo-albumins.

(7) Histones.

(8) Protamines.

II. Transformation products of the albumins proper.

(1) Acid-albumins, alkali albuminates.

(2) Albumoses, peptones and peptides.

(3) Halogen-albumins, oxyprotein, oxyprotsulphonic

acid, &c. III. Proteids.

(1) Nucleo-proteids.

(2) Haemoglobin and allied substances.

(3) Glyco-proteids, mucins, mucoids, helico-proteid.

IV. Albuminoids.

(1) Collagen.

(2) Keratin.

(3) Elastin.

(4) Fibroin.

(5) Spongin, &c.

(6) Amyloid.

(7) Albumoid.

(8) Colouring matters derived from albumin. Albumins proper. — Albumins (as classified above) are

soluble in water, dilute acids and alkalies, and in saturated neutral salt solutions; they are coagulated by heat. ” Serum-albumin,” or ” blood-albumin,” possibly C45oH7 2 oNii 6 S 6 Oi4o, occurs in blood-serum, lymph, chyle, milk, &c; its coagulation temperature is about 67 . It differs from egg-albumin in its specific rotation (-57° to -64°), and in being slowly coagulated by alcohol and ether. Egg-albumin is the chief constituent of the white of egg; this fluid also contains a globulin and a; mucoid. It coagulates at about 56°, and its specific rotation is -30-70°. ” Lact-albumin ” occurs in all kinds of milk. The globulins are insoluble in water and in dilute acids, but soluble in alkalies’ and in neutral salt solutions; these solutions are coagulated on boiling. ” Serum-globulin,” also termed globulin or fibrino-plastic globulin, paraglobulin and paraglobin, occurs in blood serum; ” cell-globulins ” occur in many organs— liver, kidneys, pancreas and the tnyroid gland, also in muscle-plasma; ” crystalline,” a globulin occurring in two forms a and /3, is found in the lens of the eye; “egg-globulin” and ” lacto- globulin ” occur respectively in the white of. egg and in milk. * Plant albumins or phyto-albumins have been chiefly investigated in the case of those occurring in seeds; most are globulins, insoluble in pure water, but soluble in salt solutions; ” edesfin,” a globulin of this class, is very widely distributed. Other varieties or classes of

these compounds are: plant caseins, phyto-vitellines, legumins and conglutins. Fibrinogen occurs in the blood plasma, and is changed by a ferment in.to fibrin, to which the clotting of blood is due. Fibrinogen is insoluble in water, but soluble in salt solutions; it has three different coagu- lation temperatures, 56°, 67°, 75°. Fibrin, produced from fibrinogen by a ferment, is a jelly-like substance, coagulable by heat, alcohol, &c. The muscle-albumins include ” myosin “or paramyosinogen, a globulin, which by coagulation induces rigor mortis, and the closely related ” myosinogen ” or myogen; myoglobulin and myoalbumin are also found in muscles. The nucleo-albumins or phospho-globulins aire insoluble in water and acids, but soluble in alkalies, and have an acid reaction: ” Caseinogen ” (after W. D. Halliburton) is trie chief albumin of milk; its composition varies with the animal. It is insoluble in water, while its salts are readily soluble, ’” Eucasein ” ‘ isV the ammonium salt; ” nutrose ” and ” plasmon ” are sodium salts. By the rennet ferment caseinogen is converted into casein, a substance resembling caseinogen in being soluble 1 ‘in water, but differing in having an insoluble calcium salt: ‘The formation of casein involves the curdling of milk. .Other phosphoglobulins are vitelline, found in the yolk of ‘hen’s’ eggs, and ichthulin, found in the eggs of fish. Histone’s%ih% class of albumins soluble in water and acids, but essentially basic in character; hence they are precipitated by alkalieˆ: It is remarkable that many histones are soluble in an excess 8f alkali. They do not exist in a free state, but in combination* with a ” prosthetic group ” (after A. Kossel) they give rise to important cell constituents — haemoglobin, nucleo-proteids; &c, ” Thymus histone ” occurs in the thymus gland; globin occurs in combination as haemoglobin; other histones have been extracted from the red blood corpuscles of the goose and tlie testes of fishes and other animals. The protamines are a Well characterized class of albumins found in the ripe spermatozoa’ of fishes.

Albumoses and Peptones.— The primary products of the dis-sociation of albumins are the albumoses,. characterized by not being coagulable by heat, more soluble than the albumins, havrnfg a far less complex composition, arid Capable of being ” salted

out ” by certain salts, and the peptones, similar to albumoses but not capable of being ” salted out “; moreover, peptones are less complex than albumoses. By further decomposition peptones yield peptides, a certain number of which have been synthesized by Emil Fischer and his collaborators. Albumoses and peptones are white powders, readily soluble in water, with the exception of the hetero-albumoses — a subdivision of primary albumoses. They give the biuret and xanthoproteic reactions, and form salts with both acids and bases. Albumoses and peptones are obtained by peptic digestion, the latter being termed peptic- peptones; tryptic digestion also produces peptones. Acids and moist heat induce similar changes.

Prokids. — These substances are combinations of one or more albumins with a radical of an essentially different nature, termed by Kossel a ” prosthetic group.” It is convenient to classify proteids by those groups. ” Nucleo-proteids,” constituents of the cell-nucleus, are combinations of albumins and nucleic acid; they always contain iron. They are loose, white, non-hygroscopic powders, soluble in water and salt solutions, and have an acid reaction; they give the colour reactions of albumins. Nucleic acid is at present of unknown constitution; decomposition products are: phosphoric acid, uracil or 2. 6-dioxy -pyrimidin, 1 cytosin or 2-oxy-6-amino-pyrimidin, thymin. (nucleosin) or 2.6-dioxy-5-methyl pyrimidin hypoxanthin 1 or 6-oxypurin, xanthin or 2.6-dioxypurin, adenine or 6 amino-purin, guanine or 2-amino-6-oxypurin, pentoses (1-xylose), laevulinic acid, am- monia, etc. The nucleic acids vary with the source of the pro- teids, there being considerable differences in chemical composi- tion. In general they are white, loose powders, slightly soluble in cold water, more soluble in hot water; they are precipitated by mineral acids, but dissolve in an excess. They are dextro-rotatory, and the specific rotation is numerically greater than that of albumin; hence the proteids are, in general, dextro-rotatory.

An important nucleo-proteid is haemoglobulin or haemoglobin, the colouring matter of the red blood corpuscles of vertebrates; a related substance, haemocyanin, in which the iron of haemo-globin is replaced by copper, occurs in the blood of cephalopods and crayfish. Haemoglobin is composed of a basic albumin and an acid substance haematin; it combines readily with oxygen, carbon dioxide and carbon monoxide to form loose compounds (see Nutrition). It coagulates at 64°. By a dilute acid haemoglobin is decomposed into globin, and ” haematin,” a ferri -pyrrol

derivative of the probable formula CsiHttNiFeOs; under certain conditions the iron-free ” haematoporphyrin ” is obtained. This last substance may be reduced to mesopor- phyrin, CMH38O4N4, which by further reduction gives haemo- pyrrol, CsHi 3 N, possibly methyl-propyl-pyrrol or butyl-pyrrol. Other derivatives are haemin, haemochromogen and the haematinic acids.

” Glyco-proteids ” differ from nucleo-proteids in containing a carbohydrate radical, which is liberated only by boiling with mineral acids or alkalies. The mucins and mucoids belong to this group; they are acid and contain no phosphorus; they give the albumin colour reactions but are not coagulated by heat. Mucins occur in most of the slimy fluids of the body; they vary in composition with their source. Mucoids resemble mucins in their composition and reactions, but differ, in general, in their physical properties. They occur in tendons, bones and cartilage. The ” phospho-glyco-proteids ” resemble the mucins and mucoids in containing a carbohydrate residue, but differ in containing phosphorus. Ichthulin (see above) maybe placed in this group; ” helico-proteid,” found in the serous gland of Helix pomatia, the vineyard snail, also belongs here.

Albuminoids is the anatomical name given to albuminous substances forming the connective tissues. Chemically they resemble the albumins, being split up by acids or ferments into albumoses, peptones and amino-acids, forming salts, and giving

1 The pyrimidin ring is numbered 2C ring, see Purin.

N = C>.

\

\n-cˆ

Cs- For the purin

the same colour reactions. They are quite insoluble in water and in salt solutions, and difficultly soluble in dilute acids and alkalies. Typical albuminoids are gelatin, keratin, elastin, fibroin, spongin and conchiolin.

” Collagen ” (Gr. /c6XXa, glue, and root yev- of •yewdtu’, to produce, ylyveadai, to become), the ground-substance of bones and tissues, is decomposed by boiling water or on warming with acids into substances named gelatin, glutin or glue. Gelatin forms

a white amorphous powder; the commercial product, however, generally forms glassy plates. The decomposition products are generally the same as with the general albumin; it gives the biuret reaction; forms salts with acids and alkalies, but is essentially acid in nature. Immersed in cold water gelatin does not dissolve but swells up; it dissolves readily in hot water, forming, according to the quantity present, a thick jelly which solidifies to a hard mass on cooling (the " glue " of the Wood-worker), or a thin jelly (used in cookery). Gelatin occurs also in the cornea and the sclerotic coat of the eye; and in fish scales, the latter containing 80% of collagen, and 20% of ichthylepidin, a substance differing from gelatin in giving a well- marked Millon's reaction. Keratin (Gr. /cepas, a horn), the chief constituent of horny material, occurs in hair, nails, hoofs and feathers. It is quite insoluble in water, dilute acids and alkalies. Related to this substance are "neuro-keratin," found in the medullary sheath of nerves, and " gorgonin," the matrix of the axial skeleton of the coral Gorgonia Cavolinii. Elastin occurs either as thick strands or as membranes; it constitutes the " elastic tissue " of the anatomist. Its insolubility is much the same as keratin. " Fibroin " and silk-glue or sericin occur in natural silk fibres. Fibroin is insoluble in water, acids and alkalies; silk-glue resembles gelatin in its solubility, but it is less readily gelatinized. " Spongin," the matrix of bath-sponge, is insoluble in water and dilute acids, but soluble in concentrated mineral acids. " Conchiolin," the matrix of shells of the mol- lusca, is only slightly soluble in acids. " Cornein " forms the framework of corals. " Amyloid " occurs as a pathological product, and also in the healthy aorta and in old cartilage. It is an albumin, and not a carbohydrate as was formerly held; and gives most of the colour reactions of albumins. It forms shiny, homogeneous masses, quite insoluble in cold water and in salt solutions, but soluble in alkalies. The albumoids include, accord- ing to Cohnheim, substances which possess certain properties in common, but differ from the preceding groups. In general they resemble coagulated albumin, and also the gelatin-yielding tissues, but they themselves do not yield gelatin.

Colouring matters derived from albumins include the " melanins " (Gr. /ˆeXas, black), substances which differ very considerably in composition, the sulphur and iron content being by no means constant; they do not give the reactions of albumins. The black colouring matter of hair, the skin of negroes, and of the ink bag of Sepia have been examined. Melanins obtained from tumours

form black, shiny masses; they are insoluble in water, neutral salt solutions, dilute acids and in the common organic solvents.

ALBUMINURIA (Physiological or Functional), a term in- dicating the presence of albumin in the urine. This may depend on a number of morbid conditions, of which kidney troubles, acute illnesses and venous congestion are some of the commoner. But after exclusion of all known pathological causes, there still remains a large class of cases among subjects who appear to be in perfect health. This form has been called functional or physiological albuminuria, intermittent albuminuria, &c. Its recognition is of extreme importance, as it must be distinguished from the albuminuria due to Bright's disease and other troubles. The following are the main forms that have been described: — (1) Dietetic Albuminuria. This form affects some people after partaking of a meal consisting largely of albuminous foods, such as eggs. In others any extra indulgence in the pleasures of the table may give rise to it. (2) Cyclic Albuminuria. This name was first used by the physiologist Pavy, but other observers have called the same condition " postural albuminuria." It occurs in people enjoying perfect health, and is characterized bv

the presence of albumin in the urine at certain times of the day. It has been shown to depend entirely on the assumption of the erect position, and it disappears as a result of the recumbent position at night. (3) Albuminuria from exercise. This form affects some people after any unusual muscular exertion. (4) Prolonged mental strain or worry may give rise to a transient form of albuminuria. (5) Adolescent albuminuria is met with in some subjects, especially boys. The question of the real significance of " physiological " albuminuria is one about which there is much difference of opinion. But its importance and recognition — especially in questions of life insurance — admits of no question.

ALBUQUERQUE, ALPHONSO D' (in Old Port. Affonso d'Alboquerque) (1453-1515), surnamed the Great, and the Portuguese Mars, was born in 1453 at Alexandria, near Lisbon. Through his father; Gonzalvo, who held an important position at court, he was connected by illegitimate descent with the royal family of Portugal. He was educated at the court of Alphonso V.,

and after the death of that monarch seems to have served for some time in Africa. On his return he was appointed estribeiro-mor (chief equerry) to John II. In 1503 he set out on his first expedition to the East, which was to be the scene of his future triumphs. In company with his kinsman Francisco he sailed round the Cape of Good Hope to India, and succeeded in establishing the king of Cochin securely on his throne, obtaining in return for this service permission to build a Portuguese fort at Cochin, and thus laying the foundation of his country's empire in the East. He returned home jp July 1504, and was well received by King Emmanuel, who entrusted him with the com- mand of a squadron of five vessels in the fleet of sixteen which sailed for India in 1506 under Tristan da Cunha. After a series of successful attacks on the Arab cities on the east coast of Africa, Albuquerque separated from Da Cunha, and sailed with his squadron against the island of Ormuz, in the Persian Gulf, which was then one of the chief centres of commerce in the East. He arrived on the 25th of September 1507, and soon obtained possession of the island, though he was unable long to maintain his position. With his squadron increased by three vessels, he reached the Malabar coast at the close of the year 1 508, and immediately made known the commission he had received from the king empowering him to supersede the governor Francisco de Almeida. The latter, however, refused to recognize Albu-querque's credentials and cast him into prison, from which he was only released, after three months' confinement, on the arrival of the grand-marshal of Portugal with a large fleet. Almeida having returned home, Albuquerque speedily showed the energy and determination of his character. An unsuccessful attack upon Calicut in January 15 10, in which the commander-in-chief received a severe wound, was immediately followed by the investment and capture of Goa. Albuquerque, finding himself unable to hold the town on his first occupation, abandoned it in August, to return with the reinforcements in November, when he obtained undisputed possession. He next directed his forces against Malacca, which he subdued after a severe struggle. He remained in the town nearly a year in order to strengthen the position of the Portuguese power. In 151 2 he sailed for the coast of Malabar. On the voyage a violent storm arose, Albuquerque's vessel, the " Flor de la Mar," which carried the treasure he had amassed in his conquests, was wrecked, and he himself barely escaped with his life. In September of the same year he arrived at Goa, where he quickly suppressed a serious revolt headed by Idalcan, and took such measures for the security and peace of the

town that it became the most flourishing of the Portuguese settlements in India. Albuquerque had been for some time under orders from the home government to undertake an expedition to the Red Sea, in order to secure that channel of communication exclusively to Portugal. He accordingly laid siege to Aden in 1513, but was repulsed; and a voyage into the Red Sea, the first ever made by a European fleet, led to no substantial results. In order to destroy the power of Egypt, he is said to have entertained the idea of divert- ing the course of the Nile and so rendering the whole country

barren. His last warlike undertaking was a second attack upon Ormuz in 1515. The island yielded to him without resistance, and it remained in the possession of the Portuguese until 1622. Albuquerque's great career had a painful and ignominious close. He had several enemies at the Portuguese court who lost no opportunity of stirring up the jealousy of the king-against him, and his own injudicious and arbitrary conduct on several occasions served their end only too well. On his return from Ormuz, at the entrance of the harbour of Goa, he met a vessel from Europe bearing despatches announcing that he was superseded by his personal enemy Soarez. The blow was too much for him and he died at sea on the 16th of December 1515. Before his death he wrote a letter to the king in dignified and affecting terms, vindicating his conduct and claiming for his son the honours and rewards that were justly due to himself. His body was buried at Goa in the Church of our Lady, and it is perhaps the most convincing proof possible of the justice of his administra- tion that, many years after, Mussulmans and Hindus used to go to his tomb to invoke protection against the injustice of his successors. The king of Portugal was convinced too late of his fidelity, and endeavoured to atone for the ingratitude with which he had treated him by heaping honours upon his natural son Affonso. The latter published a selection from his father's papers under the title Commentaries do Grande AJfonso d' Alboquerque.

See the Cartas de Albuquerque, published by the Lisbon Academy (vol. i., 1884); also Morse Stephens' Life of Albuquerque; an article in the Bolitim of che Lisbon Geographical Society (January to June 1902) on " O antigo Imperialismo portuguez, &c," has especial reference to Albuquerque.

ALBUQUERQUE, a city and the county-seat of Bernalillo county, New Mexico, U. S. A., situated in the central part of the state,

about 325 m. S. by W. of Denver, on the E. bank of the Rio Grande, at an altitude of 4950 ft. Pop. (1890) 3785; (1900) 6238(956 foreign-born and 226 negroes); (1910 census) 11,020. In 1900 Albuquerque was the largest city in New Mexico. It is the connecting point of two main lines of the Atchison, Topeka & Santa Fe railway system. A short distance E. of the city is the university of New Mexico, under state control, founded in 1889 and opened in 1892; in 1908 it had a college of letters and science, a school of engineering, a school of education, a preparatory school and a commercial school. Albuquerque is also the seat of the Harwood Industrial School (Methodist) for Mexican girls, of the Menaul Mission School (Presbyterian) for Mexican boys, and of a government Indian training school (1881) for boys and girls. The city has a public library. The excellent climate has given Albuquerque and the surrounding country a reputation as a health resort. The city is an important railway centre, has extensive railway repair shops and stock-yards, and exports large quantities of live-stock, hides and wool. The largest industrial establishment is the American Lumber Company's plant, including a saw-mill, a sash, door and blind factory and a box factory. The timber used, chiefly white pine, is obtained from the Zufii mountains. The city-has also flour and woollen mills, breweries and ice factories. The old Spanish town of Albuquerque (pop. in 1900 about 1200) lies about 1 m. W. of the present city; it was founded in 1706, and was named in honour of the duke of Albuquerque, viceroy of New Spain from 1702 to 1710. During the Civil War it was occupied, late in February 1862, by Confederate troops under General Henry Hopkins Sibley (1816-1886), who soon afterwards advanced with his main body into northern New Mexico. In his retreat back into Texas he made a stand on the 8th of April 1862 at Albuquerque, where during the whole day there was a fight at long range and with few casualties against a detachment of Union soldiers commanded, by Colonel Edward R. S. Canby (1819-1873). The modern city dates its origin from the completion of the first railway to Albuquerque in 1880.

ALBURNUM (sapwood), the outermost and youngest part of the wood of a tree, through which the sap rises. It is distin- guished from the harder inner and older wood, the duramen or heart-wood.

ALBURY, a town in Goulburn county, New South Wa,les, Australia, 386 m. by rail W.S.W. of Sydney. Pop. (1901) 58.21. It stands near the border of Victoria, on the right bank of the Murray river, here crossed by two bridges, one built of wood carrying a road, the other of iron bearing the railway. The Murray is navigable for small steamers from this town to its mouth, a distance of 1800 miles. Albury is the centre of a sheep-rearing and agricultural district; grapes, cereals and tobacco are largely grown, and the wine produced here is held in high repute throughout Australia. The tree under which the first explorers encamped here in November 1824 is still standing in an enclosed space. Albury became a municipality in 1859.

ALCAEUS (Alkaios), Greek lyric poet, an older contemporary of Sappho, was a native of Mytilene in Lesbos and flourished about 600 B.C. His life was greatly mixed up with the political disputes and internal feuds of his native city. He belonged to one of the noble families, and sided with his class against the ” tyrants ” who at that time set themselves up in Mytilene. He was in consequence obliged to leave his native country, and spent a considerable time in exile. He is said to have become reconciled to Pittacus, the ruler set up by the popular party, and to have returned to Lesbos. The date of his death is unknown. The subjects of his poems, which were composed in the Aeolic dialect, were of various kinds: some were hymns to the gods; others were of a martial or political character; others breathed an ardent love of liberty and hatred of tyrants; lastly, some were love-songs. Alcaeus was allotted the second place among the nine lyric poets in the Alexandrian canon. The considerable number of fragments extant, and the well-known imitations of Horace, who regarded Alcaeus as his great model, enable us to form a fair idea of the character of his poems. A new fragment has’ recently been discovered, together with some fragments of Sappho (Classical Review, May 1902).

See Bergk, Poetae Lyrici Graeci (1882) ; also The Songs of Alcaeus, ‘ by J. Easby-Smith (Washington, 1901); Plehn, Lesbiacorum Liber (1826) ; Flach, Geschichte der griechischen Lyrii (1883-1884) ; Farriell, Creek Lyric Poets (1891).

ALCAICS, in ancient poetry, a name given to several kinds of verse, from Alcaeus, their reputed inventor. The first kind consists of five feet, viz. a spondee or iambic, an iambic, a long syllable and two dactyles; the second of two dactyles and two trochees. Besides these, which are called dactylic Alcaics, there is

another, simply styled Alcaic, consisting of an epitrite, two choriambi and a bacchius; thus —

Cur timet flajvum Tiberim | tangere, cur | olivum?

The Alcaic ode is composed of several strophes, each consisting of four verses, the first two of which are always eleven-syllable alcaics of the first kind; the third verse is an iambic dimeter hypercatalectic consisting of nine syllables; and the fourth verse is a ten-syllable alcaic of the second kind. The following strophe is of this species, which Horace calls Alcaei minaces camenae —

Non possidentem multa vocaveris

Recte beatum ; rectius occupat Nomen beati, qui deorum Muneribus sapienter uti.

There is also a decasyllabic variety of the Alcaic metre.

The Alcaic measure was one of the most splendid inventions of Greek metrical art. In its best examples it gives an impression of wonderful vigour and spontaneity. Tennyson has attempted to reproduce it in English in his

O mighty-mouthed inventor of harmonies, O skilled to sing of time or eternity, God-gifted organ-voice of England, Milton, a name to resound for ages.

German is, however, the only modern literature in which alcaics have been written with much success. They were intro- duced by Klopstock, and used by Holderlin, by Voss in his translations of Horace, by A. Kopisch and other modern German poets.

ALCALA (Moorish al Kola, the ” Fortress ” or ” Castle “), the name of thirteen Spanish towns, all founded or named by the Moors. Alcala de Henares (pop. (1900) 11,206) is • separately

described on account of its historical importance. Alcala la Real (,15,973), a picturesque town with a fine abbey, is situated in mountainous country in the extreme south-west of Jaen. Its distinctive name.Za Real, ” the Royal,” was conferred in memory of its capture by Alphonso XL of Leon in 1340. In 1810 the French under Count Sebastiani here defeated the Spaniards. Alcala delos Gazules (8877), on tne river Barbate, in the province of Cadiz, has a thriving trade in cork and agricultural produce. Alcala de Guadaira (8198), on the river Guadaira, near Seville, is popularly

called Alcala de los Panadores, or " Alcala of the Bakers," because it supplies Seville with large quantities of bread. Alcala de Chisbert (6293) is situated on the coast of Castellon de la Plana; Alcala del Rio (3006), on the Guadalquivir, 6 m. N. of Seville; Alcala del Jucar (2968), on the Jucar, in Albacete; Alcala de la Selva (1490), on the southern slopes of the Sierra del Giidar, in Teruel; Alcala de la Vega (712), on the river Cabriel, in Cuenca; Alcala de Gurrea (632), on the river Seton, in Huesca; Alcala del Obispo (432), in the same province; Alcala de Ebro (388) and Alcala de Moncayo (367), both in Saragossa.

ALCALA DE HENARES, a town of Spain, in the province of Madrid, 17 m. E.N.E, of Madrid, on the river Henares, and the Madrid-Saragossa railway. Pop. (1900) 11,206. Alcala de Henares contains a military academy and various public institu- tions, but its commercial importance is slight and its main interest is historical. The town has been identified with the Roman Complutum, which was destroyed about the year 1000, and was rebuilt by the Moors in 1083. In later times it was renowned for its richly endowed university, founded by Cardinal Jimenes de Cisneros in 15 10, which at the height of its prosperity numbered 12,000 students, and was second only to that of Salamanca. Here the famous edition of the Bible known as the Complutensian Polyglot was prepared from 1514 to 151 7. The college of San Ildefonso, completed in 1583, was the chief university building. Its modernized Gothic church, the Colegiata, contains the 1 6th century marble monument of Jimenes (d. 1517) and a fine reredos. The greatest of Spanish writers, Cervantes, was born at Alcala de Henares, and baptized in the otherwise insignificant church of S. Maria on the 9th of October 1547. A tablet, set up in 1840, marks the house in which he is said to have been born. Other illustrious natives of the town were the emperor Ferdinand I. (1503-1564) and the Spanish dramatist and historian Antonio de Solis (1610-1686). After the removal of the university to Madrid in 1836 the town rapidly declined, and the government turned most of the principal buildings erected by Cardinal Jimenes in the 16th century into a depot for the archives of various state departments. Here are kept very complete and curious documents of the Inquisition, showing all its workings from the 15th to the 19th century. One of the principal libraries is the former palace of the archbishops of Toledo.

For a fuller description of Alcala see the Guia del viajero en Alcala de Henares, by L. A. de la Torre (Alcala, 1882). The following works are mainly of historical interest : — M. de Ayala

and F. Sastre, Alcald de Henares (Madrid, 1890); J. C. Garcia, Ensayo de una Tipografla Complutense (Madrid, 1889) ; M. Portilla y Esquivel, Historia de la ciudad de Compluto (Alcala, 1725-1728); and the ” Annales Complutense9 ” and ” Chronicon Complutense ” in Espana Sagrada, by H. Florez and others (Madrid, 1 754-1 879).

ALCALDE (from the Arab, al-quadi, the ” Cadi ” or •” judge “), the title in Spanish for officials of somewhat varied functions, in; which, however, there is always a judicial element. Alcalde de corte was a judge of the palace court, having jurisdiction in and about the residence of the king. But the mayor of a town or village who discharged the functions of a justice of the peace was also an alcalde. It is in this sense that the title is now exclusively used. He is subject to yearly election and the post has often been an undesirable one in Spain. The title of alcalde must be carefully distinguished from alcaide, which is derived from the Arabic al-qudid, a general, and means the governor of a fortress.

ALCAMENES, a Greek sculptor of Lemnos and Athens. He was a younger contemporary of Pheidias and noted for the delicacy and finish of his works, among which a Hephaestus

and an Aphrodite ” of the Gardens ” were conspicuous. Pausanias says (v. 10. 8) that he was the author of one of the pediments of the temple of Zeus at Olympia (see Greek Art), but this seems a chronological and stylistic impossibility. At Pergamum there was discovered in 1903 a copy of the head of the Hermes ” Propylaeus ” of Alcamenes {Athenische Mittheil- ungen, 1904, p. 180). As, however, the deity is represented in an archaistic and conventional character, this copy cannot be relied on as giving us much information as to the usual style of Alcamenes, who was almost certainly a progressive and original artist. It is safer to judge him by the sculptural decoration of the Parthenon, in which he must almost certainly have taken a share under the direction of Pheidias.

ALCAMO, a town of Sicily, in the province of Trapani, 24 m. W.S.W. of Palermo direct (51ˆ m. by rail). Pop. (1881) 37,497; (1901) 51,809. It was founded in a.d. 828 by the Saracenic chief Al-Kamuk, who erected the castle (which still stands, though

considerably altered), but was christianized by the emperor Frederick II. in 1233, who removed the site lower down. It possesses some medieval buildings of interest. The surrounding district is very fertile and the trade in agricultural proMucts is considerable.

ALCANTARA, a small seaport of Brazil, – in the state of Maranhao, on the W. shore of the bay of Sao Marcos, 16 m. from the city of Maranhao by water. It has a fairly good harbour, and excellent cotton and rice are grown in the vicinity and shipped thence.

ALCANTARA, a town of western Spain, in the province of Caceres, situated on a rocky height on the left bank of the river Tagus, 7 m. from the Portuguese frontier. Pop. (1900) 3248. Alcantara (in Arab, "the bridge") owes its name to the magnificent Roman bridge which spans the Tagus on the north-west. This was originally built about a.d. 105, in honour of the Roman emperor Trajan and at the cost of eleven Lusitanian communities. It is entirely constructed of granite blocks, without cement, and consists of six arches of various sizes, with a total length of 616 feet and a height of about 190 ft. in the middle piers, which are surmounted by a fortified gateway. One of the arches was broken down in 1213 and rebuilt in 1553; another was blown up by the British troops in 1809, and, though temporarily reconstructed, was again destroyed in 1836, to prevent the passage of the Carlist forces. But in i860 the whole was restored. A small Roman temple, dedicated to Trajan and other deified emperors, stood on the left bank, adjoining the bridge. It is doubtful, however, if Alcantara marks the site of any Roman town, though archaeologists have sometimes identified it either with Norba Caesarea or with Interamnium. It first became famous about 1215 as the stronghold of the knightly Order of Alcantara. Many of the grand masters of this order lie buried in the 13th-century Gothic church. The town possesses another interesting church built in 1506.

See Antiguedades y santos de la muy noble villa de Alcdntara, by J. Arias de Quintanaduenas (Madrid, 1661); and Retrato politico de Alcdntara, by L. Santibanez (Madrid, 1779).

ALCAVALA (Spanish, from Arab, al-quabalah, " ta.x,"quabala, " to receive "; cf. Fr. gabelle), a duty formerly charged in Spain and its colonies on all transfers of property, wkether public or private. Originally imposed in 1341 by Alphonso XI. to secure

freedom from the Moors, it was an ad valorem tax of 10, increased afterwards to 14%, on the selling price of all commodities, whether raw or manufactured, chargeable as often as they were sold or exchanged. It subjected every farmer, manufacturer, merchant and shopkeeper to the continual visits and examination of the tax-gatherers, whose number was necessarily very great. This monstrous impost was permitted to ruin the industry and commerce of the greater part of the kingdom up to the time of the invasion of Napoleon. Catalonia and Aragon purchased from Philip V. an exemption from the alcavala, and, though still burdened with other heavy taxes, were in consequence in a comparatively flourishing state.

ALCAZAR DE SAN JUAN, or Alcazar, a town of Spain, in the province of Ciudad Real, in the plain of La Mancha, at

the junction of the Madrid-Manzanares and Madrid-Albacete railways. Pop. (1900) 11,499. Owing to its position on two important railways, Alcazar has a flourishing transit-trade in the wines of EstremadUra and Andalusia; the soda and alkali of La Mancha are used in the manufacture of soap; and gun- powder, chocolate and inlaid daggers are also made here. Alc&zar is sometimes identified with the Roman Alee, captured by Tiberius Sempronius Gracchus in 180 s.c. It derives its existing name from its medieval Moorish castle (al-kasr), which was afterwards garrisoned by the knights of St John. The townsfolk contend that the great Cervantes was a native of Alcazar; and, although this claim must be disallowed, much of the action of his masterpiece, Don Quixote, takes place in the neighbourhood. El Toboso, for instance, a village 12 m. E.N.E. [pop. (1900) 1895] , was the home of the Lady Dulcinea del Toboso; Argamasilla de Alba (3505), 22 m. S.E., is declared by tradition to be the birthplace of Don Quixote himself. Localantiquaries even identify the knight with Don Rodrigo de Pacheco, whose portrait adorns the parish church; and the same authorities hold that part of the romance was written while Cervantes was a prisoner in their town. An edition of Don Quixote was published at Argamasilla in 1864.

ALCESTER, FREDERICK BEAUCHAMP PAGET SEYMOUR, Baron (1821-1895), British admiral, son of Colonel Sir Horace Beauchamp Seymour and cousin of Francis George Hugh Seymour, 5th marquess of Hertford, was born on the 12th of April 1821. Entering the navy in 1834, he served in the Mediterranean and the Pacific, was for three years flag-lieutenant to his uncle Sir George Seymour, and was promoted to be

commander in 1847. He served in Burma as a volunteer in 1852, was made a captain in 1854, took the “Meteor” iron- clad battery out to the Black Sea and home again in 1856, was captain of the ” Pelorus ” on the Australian station from 1857 to 1863, and commanded the naval brigade in New Zealand during the Maori War, 1860-61, for which he was made a C.B. He became a rear-admiral in 1870; in 1871-1872 he commanded the flying squadron, was a lord of the admiralty in 1872-1874, and commanded the Channel fleet, 1874-1876. On the 31st of December 1876 he was made a vice-admiral, a K.C.B. on the 2nd of June 1877. In 1880-1883 he was commander-in-chief of the fleet in the Mediterranean, and in 1880 had also the chief command of the European squadron sent to the coast of Albania as a demonstration to compel the Porte to cede Dulcigno to Montenegro. On the 24th of May 1881 he was made a G.C.B., and on the 6th of May 1882 was promoted to the rank of admiral. In July 1882 he commanded at the bombardment of Alexandria and in the subsequent operations on the coast of Egypt, for which service he was raised to the peerage as Baron Alcester of Alcester in the county of Warwick, received a parliamentary grant of £25,000, the freedom of the city of London and a sword of honour. On his return from the Mediterranean he was for a couple of years again at the admiralty, and in 1886 he was placed on the retired list. For the next nine years he lived chiefly in London, but latterly his health was much broken, and he died on the 30th of March 1895. He was unmarried and the peerage became extinct.

ALCESTER [pronounced Auster] , a market-town in the Stratford-on-Avon parliamentary division of Warwickshire, England, 16 m. W.S.W. from Warwick by the Great Western railway, served also by the Birmingham-Evesham branch of the Midland railway: Pop. (1901) 2303. It is pleasantly situated among low wooded hills at the junction of the small stream Alne with the Arrow, a northern tributary of the Avon. The church of St Nicholas, with the exception of the Decorated tower, is a reconstruction of 1734; among several monuments is a fine example of Chantrey’s work, to the 2nd marquess of Hertford (d. 1822). There are a picturesque town hall (1641), raised on stone columns, and a free grammar school. The manufacture of needles is less important than formerly, having been absorbed into the Centre of the industry at Redditch in the neighbouring county of Worcestershire. There are imple- ment works and cycle works, and brewing is prosecuted.

The name (Alnecestre, Alyncester) signifies “the camp on the Alne.” A small Romano-British town or village was situated here, on the road which runs from Derby and Wall, near Lichfield, to join the Fosse Way near Cirencester. Its name is not known. A relief figure in stone, some pavements, potsherds, coins and burials have been found, but nothing to indicate an important station. No written document relating to Alcester exists before the reign of Henry I. No mention occurs in Domesday, but it is given in a list of serjeanties of the reign of Henry III. as having been a royal borough in the time of Henry I., and in T177 it rendered four marks’ aid with the other boroughs of the county. However, there is no evidence of the grant of a royal charter, and the title of borough soon lapsed. In the reign of Henry III. a moiety of the manor was purchased by Sir Walter Beauchamp, who granted a charter to the inhabitants of the town establishing a Tuesday market for corn, cattle, and all kinds of merchandise, and also obtained grants of fairs at the feasts of St Giles (afterwards transferred to the feast of St Faith) and St Barnabas. In 1444 Sir John Beauchamp pur- chased the remaining moiety of the manor, and was granted an additional fair at the feast of St Dunstan. From this date the Beauchamps were lords of the whole manor until it passed by female descent to the Grevilles in the reign of Henry VIII. In 1140 a Benedictine monastery was founded here by Ralph Boteler of Oversley, and received the name of the Church of Our Lady of the Isle, owing to its insulation by a moat meeting the river Arrow. The monastery was suppressed among the smaller houses in 1536. Traces of the moat and the foundations are still to be seen in Priory Close. The ancient fairs survived to the end of the 19th century. Jn 1830 the needle-manufacture employed nearly a thousand hands.

ALCESTIS (Alkestis), in Greek legend the daughter of Pelias and Anaxibia, and wife of Admetus, king of Pherae in Thessaly. She consented to die in place of her husband, and was afterwards rescued by Heracles. This beautiful story of conjugal devotion forms the subject of the Alcestis of Euripides, which furnished the basis of Robert Browning’s Balaustion’s Adventure. Sophocles also wrote an Alceslis, of which only fragments remain;

See Dissel, Der Mythos von Admetus und Alkestis, 1882.

ALCHEMY. In the narrow sense of the word, alchemy is the pretended art of making gold and silver, or transmuting the base metals into the noble ones. The idea of Such trans- mutation probably arose among the Alexandrian Greeks in the early centuries of the Christian era; thence it passed to the Arabs, by whom it was transmitted to western Europe, and its realization was a leading aim of chemical workers down to the time of Paracelsus and even later. But "alchemy" was some- thing more than a particularly vain and deluded manifestation of the thirst for gold, as it is sometimes represented; in its wider and truer significance it stands for the chemistry of the middle ages. The idea of transmutation, in the country of its origin, had a philosophical basis, and was linked up with the Greek theories of matter there current; thus, by supplying a central philosophical principle, it to some extent unified and focussed chemical effort, which previously, so far as it existed at all, had been expended on acquiring empirical acquaintance with a mass of disconnected technical processes. Alchemy in this sense is merely an early phase of the development of syste- matic chemistry; in Liebig's words, it was " never at any time anything different from chemistry."

Regarding the derivation of the word, there are two main views which agree in holding that it has an Arabic descent, the prefix al being the Arabic article. But according to one, the second part of the word comes from the Greek x v ˆ a , pouring, infusion, used in connexion with the study of the juices of plants, and thence extended to chemical manipulations in general; this derivation accounts for the old-fashioned spellings " chymist " and " chymistry." The other view traces it to khem or khami, hieroglyph khmi, which denotes black earth as opposed to barren sand, and occurs in Plutarch as x v V e ' M 'y on this derivation alchemy is explained as meaning the " Egyptian art." The first occurrence of the word is said to be in a treatise of Julius Firmicus, an astrological writer of the 4th century, but the prefix al there must be the addition of a later copyist. Among the Alexandrian writers alchemy was designated as ˆ T W Xpwrov t€ Kal apyvpov iroiˆcecos T'exvr) dtia Kal Upa or fi hn

"alkenemye" and "alknamye." The prefix al begins to be dropped about the middle of the 16th century.

Origins of Alchemy. — Numerous legends cluster round the origin of alchemy. According to one story, it was founded by the Egyptian god Hermes (Thoth), the reputed inventor of the arts

and sciences, to whom, under the appellation Hermes Trismegistus, Tertullian refers as the master of those who occupy themselves with nature; after him later alchemists called their work the " hermetic art," and the seal of Hermes, which they placed upon their vessels, is the origin of the common phrase " hermetically sealed." Another legend, given by Zosimus of Panopolis, an alchemistical writer said to date from the 3rd century, asserts that the fallen angels taught the arts to the women they married (cf. Genesis vi. 2), their instruction being recorded in a book called Chetna. A similar story appears in the Book of Enoch, and Tertullian has much to say about the wicked angels who revealed to men the knowledge of gold and silver, of lustrous stones, and of the power of herbs, and who introduced the arts of astrology and magic upon the earth. Again, the Arabic Kitdb-al-Fihrist, written by al-Nadim towards the end of the toth century, says that the " people who practise alchemy, that is, who fabricate gold and silver from strange metals, state that the first to speak of the science of the work was Hermes the Wise, who was originally of Babylon, but who established him- self in Egypt after the dispersion of the peoples from Babel." Another legend, also to be found in Arabic sources, asserts that alchemy was revealed by God to Moses and Aaron. But there is some evidence that, in accordance with the strong and constant tradition among the alchemists, the idea of transmutation did originate in Egypt with the Greeks of Alexandria. In the Leiden museum there are a number of papyri which were found in a tomb at Thebes, written probably in the 3rd century A.D., though their matter is older. Some are in Greek and demotic, and one, of peculiar interest from the chemical point of view, gives a number of receipts, in Greek, for the manipulation of base metals to form alloys which simulate gold and are intended to be used in the manufacture of imitation jewellery. Possibly this is one of the books about gold and silver of which Diocletian decreed the de- struction about a.d. 290 — an act which Gibbon styles the first authentic event in the history of alchemy (Decline and Fall, chap. xiii.). The author of these receipts is not under any delusion that he is transmuting metals; the MS. is merely a workshop manual in which are described processes in daily use for preparing metals for false jewellery, but it argues considerable knowledge of methods of making alloys and colouring metals. It has been suggested by M. P. E. Berthelot that the workers in these pro- cesses, which were a monopoly of the priestly caste and were kept strictly secret, though fully aware that their products were not truly gold, Were in time led by their success in deceiving the

public to deceive themselves also, and to come to believe that they actually had the power of making gold from substances which were not gold. Philosophical sanction and explanation of this belief was then found by bringing it into relation with the theory of the prima materia, which was identical in all bodies but received its actual form by the adjunction of qualities expressed by the Aristotelian elements — earth, air, fire and water. Some support for this view is gained from study of the alchemistical writings of the period. Thus, in the treatise known as Physica et Mystica and falsely ascribed to Democritus (such false attributions are a constant feature of the literature of alchemy), various receipts are given for colouring and gilding metals, but the conception of transmutation does not occur. This treatise was probably composed at a date not very different from that of the Leiden papyrus. Later, however, as in the Commentary on this work written by Synesius to Dioscorus, priest of Serapis at Alexandria, which probably dates from the end of the 4th century, a changed attitude becomes apparent; the more practical parts of the receipts are obscured or omitted, and the processes for preparing alloys and colouring metals, described in the older treatise, are by a mystical interpretation represented as resulting in real transmutation.

But while there are thus some grounds for supposing that the

idea of transmutation grew out of the practical receipts of Alexandrian Egypt, the alchemy which embraced it as a .lead- ing principle was also strongly affected by Eastern influences such as magic and astrology. The earliest Greek alchemistical writings abound with references to Oriental authorities and traditions. Thus the pseudo-Democritus, who was reputed the author of the Physica et Mystica, which itself concludes each of its receipts with” a magical formula, was believed to have travelled in Chaldaea, and to have had as his master Ostanes 1 the Mede, a name mentioned several times in the Leiden papyrus, and often by early Christian writers such as Tertullian, St Cyprian and St Augustine. The practices of the Persian adepts also are appealed to in the writings of the pseudo-Democritus, Zosimus and Synesius. The philosopher’s egg, as a symbol of creation,, is both Egyptian and Babylonian. In the Greek alchemists it appears as the symbol at once of the art and of the universe, enclosing

within itself the four elements; and there is sometimes a play of words between to ov and to cpdv. The conception of man, the microcosm, containing in himself all the parts of the universe or macrocosm, is also Babylonian, as again probably is the famous identification of the metals with the planets. Even in the Leiden papyrus the astronomical symbols for the sun and moon are used to denote gold and silver, and in the Meteorologica of Olympiodorus lead is attributed to Saturn, iron to Mars, copper to Venus, tin to Hermes (Mercury) and electrum to Jupiter. Similar systems of symbols, but elaborated to include compounds,' appear in Greek MSS. of. the ioth century, preserved in the library of St Mark's at Venice. Subsequently electrum (an alloy of gold and silver) disappeared as a specific metal, and tin was ascribed to Jupiter instead, the sign of mercury becoming common to the metal and the planet. Thus we read in Chaucer (Chanouns Yemannes Tale): —

The bodies sevene eek, lo! hem heer anoon: Sol gold is, and Luna silver we threpe, Mars yren, Mercurie quik-silver we clepe, Saturnus leed and Jupiter is tin, And Venus coper, by my fader kin!

Literature of Alchemy. — A considerable body of Greek chemical writings is contained in MSS. belonging to the various great libraries of Europe, the oldest being that at St Mark's, just mentioned. The contents of these MSS. are all of similar composition, and in Berthelot's opinion represent a collection of treatises made at Constantinople in the 8th or 9th century. The treatises are nearly all anterior to the 7th century, and most appear to belong to the 3rd and 4th centuries; some are the work of authentic authors like Zosimus and Synesius, while of others, such as profess to be written by Moses, Democritus, Ostanes, &c, the authorship is clearly fictitious. Some of the same names and the same works can be identified in the lists of. the Kit4b-al-Fihrist. But the Arabs did not acquire their knowledge of this literature at first hand. The earliest Hellenic culture in the East was Syrian, and the Arabs made their first acquaintance with Greek chemistry, as with Greek philosophy, mathematics, medicine, &c, by the intermediary of Syriac translations. (See Arabian Philosophy and Syriac Literature.) Examples of such translations are preserved in MSS. at the British Museum, partly written in Syriac, partly in Arabic with Syriac characters, In Berthelot's opinion, the Syriac portions represent a compila- tion of receipts and processes undertaken in the Syrian school of medicine at Bagdad under the Abbasids in the 9th or ioth

century, and to a large extent constituted by the earlier translations made by Sergius of Resaena in the 6th century. They contain, under the title Doctrine of Democritus, a fairly methodical treatise in ten books comprising the Argyropoeia and Chrysopoeia of the pseudo-Democritus, with many receipts for colouring metals, making artificial precious stones, effecting the diplosis or doubling of metals, &c. They give illustrations of the apparatus employed, and their close relationship to the Greek is attested by the frequent occurrence of Greek words and the fact that the

1 An alchemistical work bearing the name of Ostanes speaks of a divine water which cures all maladies — an early appearance of the universal panacea or elixir of life.

signs and symbols of the. Greek alchemists appear almost unchanged. The other portion seems of somewhat later date. Another Syriac MS., in the library of Cambridge University, contains a translation of a work by Zosimus which is so far unknown in the original Greek. Berthelot gives reproductions of the British Museum MSS. in vol. ii. of La Chimie au moyen dge.

Several alchemistical treatises, written in Arabic, exist in manuscript in the National Library at Paris and in the library of the university of Leiden, and have been reproduced by Berthelot, with translations, in vol. iii. of La Chimie au moyen Age. They fall into two groups: those in one are largely composed of compilations from Greek sources, while those in the other have rather the character of original compositions. Of the first group the most interesting and possibly the oldest is the Book of Crates; it is remarkable for containing some of the signs used for the metals by the Greek alchemists, and for giving figures of four pieces of apparatus which closely resemble those depicted in Greek MSS., the former being never, and the latter rarely, found in other Arabic MSS. Its concluding words suggest that its production was due to Khalid ben Yezid (died in 708), who was a pupil of the Syrian monk Marianus, and according to the Kitdb-al-Fihrist w as the first Mussulman writer on alchemy. The second group consists of a number of treatises professing to be written by Jaber, celebrated in Latin alchemy as Geber (q.v.). Internal evidence suggests that they are not all from the same hand or of the same date, but probably they are not earlier than the 9th' nor later than the 12 th century. The Arabic chroniclers record the names of many other writers on alchemy, among the most famous being Rhazes and Avicenna.

But the further development of alchemy took place in the West rather than in the East. With the spread of their empire to Spain the Arabs took with them their knowledge of Greek medicine and science, including alchemy, and thence it passed, strengthened by the infusion of a certain Jewish element, to the nations of western Europe, through the medium of Latin translations. The making of these began about the 1 ith century, one of the earliest of the translators, Constantinus Africanus, wrote about 1075, and another, Gerard of Cremona, lived from 1 1 14 to 1 187. The Liber de compositione alchemiae, which professes to be by Morienus — perhaps the same as the Marianus who was the teacher of Khalid— was translated by Robertus, Castrensis, who states that he finished the work in 1182, and speaks as if he were making a revelation — " Quid sit alchemia nondum cognovit vestra Latinitas." The earlier translations, such as the Turba Philosophorum and other works printed in collections like the Artis auriferae quam chemiam vocant (1572), Theatrum chemicum (1602), and J. J. Manget's Bibliotheca- chemica curiosa (1702), are confused productions, written in an allegorical style, but full of phrases and even pages taken literally from the Greek alchemists, and citing by name various authorities of Greek alchemy. They were followed by treatises of a different character, clearer in matter, more systematic in arrangement, and reflecting the methods of the scholastic logic; these are farther from the Greek tradition, for although they contain sufficient traces of their ultimate Greek ancestry, their authors do not know the Greeks as masters and cite no Greek names. , So far as they are Latin versions of Arabico- Greek treatises, they must have been much remodelled in the course of transla- tion; but there is reason to suppose that many of them, even when pretending to be translations, are really original composi- tions. It is curious that although we possess a certain number of works on alchemy written in Arabic, and also many Latin treatises that profess] to be translated from Arabic, yet in no case is the existence known of both the Arabic and the Latin version. The Arabic works of Jaber, as contained in MSS. at Paris and Leiden, are quite dissimilar from the Latin works attributed to Geber, and show few if any traces of the positive chemical knowledge, as of nitric acid {aqua dissolutiva or fortis) or of the mixture of nitric and hydrochloric acids known as aqua regis or regia, that appears in the latter.' The treatises attributed to Geber, in fact, appear to be original works composed not earlier than the 13th century and fathered on Jaber in order to enhance.

their authority. If this view be accepted, an entirely new light is thrown on the achievements of the Arabs in the history of chemistry. Gibbon asserts that the Greeks were inattentive either to the use or to the abuse of chemistry (Decline and Fall, chap, xiii.), and gives the Arabs the credit of the origin and improvement of the science (chap. Hi.). 1 But the chemical knowledge attributed to the Arabs has been so attributed largely on the basis of the contents of the Latin Geber, regarded as a translation from the Arabic Jaber. If, then, those contents do not represent the knowledge of Jaber, and if the contents of other Latin translations which there is reason to believe are really made from the Arabic, show little, if any, advance on the knowledge of the Alexandrian Greeks, evidently the part played by the Arabs must be less, and that of the Westerns greater, than Gibbon is prepared to admit.

The descent of alchemistical doctrine can thus be traced with fair continuity for a thousand years, from the Greeks of Alex- andria down to the time when Latin alchemy was firmly estab- lished in the West, and began to be written of by historical authors like Albertus Magnus, Roger Bacon and Arnoldus Villanovanus in the 13th century. But side by side with this literary transmission Berthelot insists that there was another mode of transmission, by means of the knowledge of practical receipts and processes traditional among jewellers, painters, workers in glass and pottery, and other handicraftsmen. The chemical knowledge of Egyptian metallurgists and jewellers, he holds, was early transmitted to the artisans of Rome, and was preserved throughout the dark ages in the workshops of Italy and France until about the 13th century, when it was mingled with the theories of the Greek alchemists which reached the West by way of the Arabs. Receipts given in the Leiden papyrus reappear in the Compositiones ad Tingenda and the Mappae Clavicula, both workshop receipt books, one known in an 8th-century MS. at Lucca, and the other in a 10th-century MS. in the library of Schlettstadt; and again in such works as the De Artibus Romanorum of Eraclius and the Schedula Diversarum A rtium of Theophilus, belonging to the 1 ith or 1 2th century.

Theory of Transmutation. — The fundamental theory of the transmutation of metals is to be found in the Greek alchemists,

although in details it was modified and elaborated by the Arabs and the Latin alchemists. Regarding all substances as being composed of one primitive matter — the prima materia, and as owing their specific differences to the presence of different qualities imposed upon it, the alchemist hoped, by taking away these qualities, to obtain the prima materia itself, and then to get from it the particular substance he desired by the addition of the appropriate qualities. The prima materia was early identified with mercury, not ordinary mercury, but the ” mercury of the philosophers,” which was the essence or soul of mercury, freed from the four Aristotelian elements — earth, air, fire and water — or rather from the qualities which they represent. Thus the operator had to remove from ordinary mercury, earth or an earthy principle or quality, and water or a liquid principle, and to fix it by taking away air or a volatile principle. The prima materia thus obtained had to be treated with sulphur (or with sulphur and arsenic) to confer upon it the desired qualities that were missing. This sulphur again was not ordinary sulphur, but some principle derived from it, which constituted the philosopher’s stone or elixir — white for silver and yellow or

1 ” Some traditionary knowledge might be secreted in the temples and monasteries of Egypt: much useful experience might have been acquired in the practice of arts and manufactures, but the science of chemistry owes its origin and improvement to the industry of the Saracens. They first invented and named the alembic for the purposes of distillation, analyzed the substances of the three kingdoms of nature, tried the distinction and affinities of alkalis and acids, and converted the poisonous minerals into soft and salutary remedies. But the most eager search of Arabian chemistry was the transmutation of metals, and the elixir of immortal health : the reason and the fortunes of thousands were evaporated in the crucibles of alchemy, and the consummation of the great work was promoted by the worthy aid of mystery, fable and superstition.” It may be noted that the word ” alembic ” is derived from the Greek «jk/3i£, “cup,” with the Arabic article prefixed, and that the instru- ment is figured in the MSS. of some of the Greek alchemists.

red for gold. This is briefly the doctrine that the metals are composed of mercury and sulphur, which persisted in one form or another down to the 17 th century. Of course there were numerous variations and refinements. Thus in the Speculum Naturale of Vincent of Beauvais (c. 1250) it is said that there are four spirits — mercury, sulphur, arsenic and sal ammoniac —

and six bodies— gold, silver, copper, tin, lead and iron. 2 Of these bodies the two first are pure, the four last impure. Pure white mercury, fixed by the virtue of white non-corrosive sulphur, engenders in mines a matter which fusion changes into silver, and united to pure clear red sulphur it fo ms gold, while with various kinds of impure mercury and sulphur the other bodies are produced. Vincent attributes to Rhazes the state- ment that copper is potentially silver, and any one who can eliminate the red colour will bring it to the state of silver, for it is copper in outward appearance, but in its inmost nature silver. This statement represents a doctrine widely held in the 13th century, and also to be found in the Greek alchemists, that everything endowed with a particular apparent quality possesses a hidden opposite quality, which can be rendered apparent by fire. Later, as in the works attributed to Basil Valentine, sulphur, mercury and salt are held to be the constituents of the metals.

It must be noted that the processes described by the alchemists of the 13th century are not put forward as being miraculous or supernatural; they rather represent the methods employed by nature, which it is the end of the alchemist's art to reproduce artificially in the laboratory. But even among the late Arabian alchemists it was doubted whether the resources of the art were adequate to the task; and in the West, Vincent of Beauvais remarks that success had not been achieved in making artificial metals identical with the natural ones. Thus he says that the silver which has been changed into gold by the projection of the red elixir is not rendered 'resistant to the agents which affect silver but not gold, and Albertus Magnus in his De Mineralibus — the De A Ichemia attributed to him is spurious — states that alchemy cannot change species but merely imitates them — for instance, colours a metal white to make it resemble silver or yellow to give it the appearance of gold. He has, he adds, tested gold made by alchemists, and found that it will not withstand six or seven exposures to fire. But scepticism of this kind was not universal. Roger Bacon — or more probably some one who usurped his name — declared that with a certain amount of the philosopher's stone he could transmute a million times as nrucTi base metal into gold, and on Raimon Lull was fathered the boast, " Mare tingerem si mercurius esset." Numerous less dis- tinguished adepts also practised the art, and sometimes were so successful in their deceptions that they gained the ear of kings, whose desire to profit by the achievements of science was in several instances rewarded by an abundant crop of counter- feit

coins.

Later History of Alchemy. — In the earlier part of the 16th century Paracelsus gave a new direction to alchemy by declaring that its true object was not the making of gold but the preparation of medicines, and this union of chemistry with medicine was one characteristic of the iatrochemical school of which he was the precursor. Increasing attention was paid to the in- vestigation of the properties of substances and of their effects on the human body, and chemistry profited by the fact that it passed into the hands of men who possessed the highest scientific culture of the time, Still, belief in the possibility of transmuta- tion long remained orthodox, even among the most distinguished men of science. Thus it was accepted, at least academically, by Andreas Libavius (d. 1616); by F. de la Boe Sylvius (1614- 1672), though not by his pupil Otto Tachenius, and by J. R. Glauber (1 603-1 668); by Robert Boyle (1627-1691) and, for a time at least, by Sir Isaac Newton and his rival and

8 Cf. Chaucer, Chanouns Yemannes Tale, where, however, mercury figures both as a spirit and a body :—

" The firste spirit quik-silver called is, The second orpiment, the thridde ywis Sal armoniak, and the ferthe brimstoon."

contemporary, G. W. Leibnitz (1646-1716); and by G. E. Stahl (1660-1734) and Hermann Boerhaave (1668-1738). Though an alchemist, Boyle, in his Sceptical Chemist (1661), cast doubts on the " experiments whereby vulgar Spagyrists are wont to endeavour to evince their salt, sulphur and mercury to be the true principles of things," and advanced towards the conception of chemical elements as those constituents of matter which cannot be further decomposed. With J. J. Becher (1635-1682) and G. E. Stahl, however, there was a reversion to earlier ideas. The former substituted for the salt, sulphur and mercury of Basil Valentine and Paracelsus three earths — the mercurial, the vitreous and the combustible — and he explained combustion as depending on the escape of this last combustible element; while Stahl's conception of phlogiston — not fire itself, but the principle of fire — -by virtue of which combustible bodies burned, was a near relative of the mercury of the philosophers,

the soul or essence of ordinary mercury.

Perhaps J. B. van Helmont (1577-1644) was the last distinguished investigator who professed actually to have changed mercury into gold, though impostors and mystics of various kinds continued to claim knowledge of the art long after his time. So late as 1782, James Price, an English physician, showed experiments with white and red powders, by the aid of which he was supposed to be able to transform fifty and sixty times as much mercury into silver and gold. The metals he produced are said to have proved genuine on assay; when, however, in the following year he was challenged to repeat the experiments he was unable to do so and committed suicide. In the course of the 19th century the idea that the different elements are constituted by different groupings or condensations of one primal matter — a speculation which, if proved to be well grounded, would imply the possibility of changing one element into another — found favour with more than one responsible chemist; but experimental research failed to yield any evidence that was generally regarded as offering any support to this hypothesis. About the beginning of the 20th century, however, the view was promulgated that the spontaneous production of helium from radium may be an instance of the transforma- tion of one element into another. (See Radioactivity; also Element and Matter.)

See M. P. E. Berthelot, Les Origines de Valchimie (1885) ; Collection des anciens alchimistes grecs (text and translation, 3 vols., 1887- 1888) ; Introduction d. Vetude de la chimie des anciens et du moyen Age (1889) ; La Chimie au moyen dge (text and translation of Syriac and Arabic treatises on alchemy, 3 vols., 1893). Much bibliographical and other information about the later writers on alchemy is contained in Bibliotheca Chemica (2 vols., Glasgow, 1906), a catalogue by John Ferguson of the books in the collection of James Young of Kelly (printed for private distribution). (H. M. R.)

ALCIATI, ANDREA (1492-1550), Italian jurist, was born at Alzano, near Milan, on the 12th of January 1492. He displayed great literary skill in his exposition of the laws, and was one of the first to interpret the civil law by the history, languages and literature of antiquity, and to substitute original research for the servile interpretations of the glossators. He published many legal works, and some annotations on Tacitus. His Emblems, a collection of moral sayings in Latin verse, has been greatly admired, and translated into French, Italian and Spanish. Alciati's history of

Milan, under the title Rerum Patriae, sen Historiae Mediolanensis, Libri IV., was published posthumously at Milan in 1625. He died at Pavia in 1550.

ALCIBIADES (c. 450-404 B.C.) , Athenian general and politician, was born at Athens. He was the son of Cleinias and Deinomache, who belonged to the family of the Alcmaeonidae. He was a near relative of Pericles, who, after the death of Cleinias at the battle of Coroneia (447), became his guardian. Thus early deprived of his father's control, possessed of great personal beauty and the heir to great wealth, which was increased by his marriage, he showed himself self-willed, capricious and passionate, and indulged in the wildest freaks and most insolent behaviour. Nor did the instructors of his early manhood supply the corrective which his boyhood lacked. From Protagoras, Prodicus and others he learnt to laugh at the common ideas of justice,

temperance, holiness and patriotism. The laborious thought, the ascetic life of his master Socrates, he was able to admire, but not to imitate or practise. On the contrary, his ostentatious vanity, his amours, his debaucheries and his impious revels became notorious. But great as were his vices, his abilities were even greater.

He took part in the battle of Potidaea (432), where his life was saved by Socrates, a service which he repaid at the battle of Delium (424). As the reward of his bravery, the wealthy Hipponicus bestowed upon him the hand of his daughter. From this time he took a prominent part in Athenian politics during the Peloponnesian war. Originally friendly to Sparta, he subsequently became the leader of the war party in opposition to Nicias, and after the peace of 421 he succeeded by an unscrupulous trick in duping the Spartan ambassadors, and persuading the Athenians to conclude an alliance (420) with Argos, Elis and Mantineia (Thuc. v. 56, 76). On the failure of Nicias in Thrace (418-417) he became the chief advocate of the Sicilian expedition, seeing an opportunity for the realization of his ambitious projects, which included the conquest of Sicily, to be followed by that of Peloponnesus and possibly of Carthage (though this seems to have been an afterthought). The expedition was decided upon with great enthusiasm, and Alcibiades, Nicias and Lamachus were appointed joint commanders. But, on the day before the expedition sailed, there occurred the mysterious mutilation of the Hermae, and Alcibiades was accused not only of being the ori- ginator of the crime, but also of having profaned

the Eleusinian mysteries. His request for an immediate investigation being refused, he was obliged to set sail with the charge still hanging over him. Almost as soon as he reached Sicily he was recalled to stand his trial, but he escaped on the journey home and made his way to Sparta. Learning that he had been condemned to death in his absence and his property confiscated, he openly joined the Spartans, and persuaded them to send Gylippus to assist the Syracusans and to fortify Decelea in Attica. He then passed over to Asia Minor, prevailed upon many of the Ionic allies of Athens to revolt, and concluded an alliance with the Persian satrap Tissaphernes. But in a few months he had lost the confidence of the Spartans, and at the instigation of Agis II., whose personal hostility he had excited, an order was sent for his execution. Receiving timely information of this order he crossed over to Tissaphernes (412), and persuaded him to adopt the negative policy of leaving Athens and Sparta to wear thent-selves out by their mutual struggles. Alcibiades was now bent on returning to Athens, and he used his supposed influence with Tissaphernes to effect his purpose. He entered into negotiations with the oligarch Peisander, but when these led to no result he attached himself to the fleet at Samos which remained loyal to the democracy, and was subsequently recalled by Thrasybulus, although he did not at once return to Athens. , Being appointed commander in the neighbourhood of the Hellespont, he defeated the Spartan fleet at Abydos (411) and Cyzicus (410), and re-covered Chalcedon and Byzantium. On his return to Athens after these successes he was welcomed with unexpected enthu- siasm (407) ; all the proceedings against him were cancelled, and he was appointed general with full powers. His ill success, however, at Andros, and the defeat at Notium (407) of his lieutenant Antiochus, led the Athenians to dismiss him from his command. He thereupon retired to the Thracian Chersonesus. After the battle of Aegospotami, and the final defeat of Athens, he crossed the Hellespont and took refuge with Pharnabazus in Phrygia, with the object of securing the aid of Artaxerxes against Sparta. But the Spartans induced Pharnabazus to put him out of the way; as he was about to set out for the Persian court his residence was set on fire, and on rushing out on his assassins, dagger in hand, he was killed by a shower of arrows (404) . There can be no doubt that his advice to Sparta in connexion with Syracuse and the fortification of Decelea was the real cause oi his country's downfall, though it is only fair to him to add that had he been allowed to continue in command of the Sicilian expedi- tion he would undoubtedly have overruled the fatal policy of Nicias and

prevented the catastrophe of 413. His belated

attempt to repair his fatal treachery only exposed the essential selfishness of his character. Though he must have known that his influence over the Persian satraps was slender in the extreme, he used it with the most flagrant dishonesty as a bait first to Sparta, then to the Athenian oligarchs, and finally to the de- mocracy. Superficial and opportunist to the last, he owed the successes of his meteoric career purely to personal magnetism and an almost incredible capacity for deception.

There are lives of Alcibiades by Plutarch and Cornelius Nepos, and monographs by Hertzberg, A. der Staalsmann und Feldherr (1853), and Houssaye, Histoire d'Alcibiade (1873); but the best accounts will be found in the histories of Greece by G. Grote (also notes in abridged ed., 1907), Ed. Meyer, and works quoted under Greece, Ancient History, sect. " Authorities " ; also Peloponnesian War.

ALCIDAMAS, of Elaea, in Aeolis, Greek sophist and rhetori- cian, flourished in the 4th century B.C. He was the pupil and successor of Gorgias and taught at Athens at the same time as Isocrates, whose rival and opponent he was. We possess two declamations under his name : Ilepi Soˆiotwp, directed against Isocrates and setting forth the superiority of extempore over written speeches (a recently discovered fragment of another speech against Isocrates is probably of later date) ; 'Odvercrevs, in which Odysseus accuses Palamedes of treachery during the siege of Troy (this is generally considered spurious). According to Alcidamas, the highest aim of the orator was the power of speak- ing extempore on every conceivable subject. Aristotle (Rhet. iii. 3) criticizes his writings as characterized by pomposity of style and an extravagant use of poetical epithets and compounds and far-fetched metaphors. Of other works only fragments and the titles have survived: Meo-o-riviaicds, advocating the freedom of the Messenians and containing the sentiment that " all are by nature free "; a Eulogy of Death, in consideration of the wide extent of human sufferings; a Tex 1 ' 1 / ° r instruction-book in the art of rhetoric; and a 4 > wtik6s \6yos. Lastly, his Movo-eiov (a word of doubtful meaning) contained the narrative of the contest between Homer and Hesiod, two fragments of which are found in

the ‘kyiiv ‘O/iijpov tcai ‘H

See the edition by Blass, 1881; fragments in Miiller, Oratores Attici, ii. (1858); Vahlen, Der Rhetor Alkidamas (1864); Blass, Die attische Beredsamkeit.

ALCINOUS (Alkinoos), in ancient Greek legend, king of the fabulous Phaeacians, in the island of Scheria, was the son of Nausithous and grandson of Poseidon. His reception and entertainment of Odysseus, who when cast by a storm on the shore of the island was relieved by the king’s daughter, Nausicaa, is described in the Odyssey (vi.-xiii.). The gardens and palace of Alcinous and the wonderful ships of the Phaeacian mariners were famous in antiquity. Scheria was identified in very early times with Corcyra, where Alcinous was reverenced as a hero. In the Argonautic legend, his abode was the island of Drepane (Apoll. Rhodius iv. 990).

ALCINOUS, the Platonic philosopher, lived probably in the time of the Caesars. He was the author of an ‘EiriTOfifi tSjv HXaroivos boyiiaroiv, an analysis of Plato’s philosophy accord- ing to later writers. It is rather in the manner of Aristotle, and freely attributes to Plato any ideas of other philosophers which appeared to contribute to the system. He produced in the end a synthesis of Plato and Aristotle with an admixture of Pythagorean or Oriental mysticism, and is closely allied to the Alexandrian school of thought. He recognized a God who is unknowable, and a series of beings (Sai/tora) who hold intercourse with men. He recognized also Ideas and Matter, and borrowed largely from Aristotle and the Stoics.

The ‘ExiTo/if has been translated by Pierre Balbi (Rome, 1469) and by Marsiiio Ficino; into French by J. I. Combes-Dounous (Paris, 1800), and into English by Thomas Stanley in his History of Philosophy. Editions: Heinsius (Leiden, 1630); Fischer (Leipzig, 1783) ; in Aldine Edition of Apuleius (Venice, 1521 ; Paris, IS32) ; Fell (Oxford, 1667). See Ritter, Geschichte der Philosophic, iv. 249

ALCIONIO, PIETRO, or Petrus Alcyonitjs (c. 1487-1527), Italian classical scholar, was born at Venice. After having studied Greek under Marcus Musurus of Candia, he was employed for some time by Aldus Manutius as a corrector of the press, and in 1522 was appointed professor of Greek at Florence through the influence of Giulio de’ Medici. When his patron became pope in

1323 under the title of Clement VII., Alcionio followed him to Rome and remained there until his death. Alcionio published at Venice, in 1521, a Latin translation of several of the works of Aristotle, which was shown by the Spanish scholar Sepulveda to be very incorrect. He wrote a dialogue entitled Medices Legatus, sive de Exilio (1522), in connexion with which he was charged with plagiarism by his personal enemy, Paulus Manutius. The accusation^ which Tiraboschi has shown to be groundless, was that he had taken the finest passages in the work from Cicero's lost treatise De Gloria, and had then destroyed the only existing copy of the original in order to escape detection. His contemporaries speak very unfavourably of Alcionio, and accuse him of haughtiness, uncouth manners, vanity and licentiousness.

ALCIPHRON, Greek rhetorician, was probably a contemporary of Lucian (2nd century a.d.). He was the author of a collection of fictitious letters, of which 124 (118 complete and 6 fragments) have been published; they are written in the purest Attic dialect and are considered models of style. The scene is throughout at Athens; the imaginary writers are country people, fishermen, parasites and courtesans, who express their sentiments and opinions on familiar subjects in elegant language. The " courtesan " letters are especially valuable, the information contained in them being chiefly derived from the writers of the New Comedy, especially Menander.

Editions. — Editio princeps (44 letters), 1499; Bergler (1715); Seiler (1856) ; Hercher (1873) ; Schepers (1905). English translation by Monro and Beloe (1791).

ALCIRA, a town of eastern Spain, in the province of Valencia; on the left bank of the river Jucar, and on the Valencia- Alicante railway. Pop. (1900) 20,572. Alcira is a walled town, surrounded by palm, orange and mulberry groves, and by low-lying rice-swamps, which render its neighbour- hood somewhat unhealthy. Silk, fruit and rice are its chief products. It is sometimes identified with the Roman Saetabicula. In the middle ages it was a prosperous Moorish trading-station.

ALCMAEON, of Argos, in Greek legend, was the son of Arhphiaraus and Eriphyle. When his father set out with the expedition of the Seven against Thebes, which he knew would be fatal to him, he enjoined upon his sons to avenge his death by slaying Eriphyle and undertaking a second expedition against Thebes. After the destruction of Thebes by the Epigoni, Alcmaeon

carried out his father's injunctions by killing his mother, as a punishment for which he was driven mad and pursued by the Erinyes from place to place. On his arrival at Psophis in Arcadia, he was purified by its king Phegeus, whose daughter Arsinoe (or Alphesiboea) he married, making her a present of the fatal necklace and the peplus of Harmonia. But the land was cursed with barrenness, and the oracle declared that Alcmaeon would never find rest until he reached a spot on which the sun had never shone at the time he slew his mother. Such a spot he found at the mouth of the river Achelous, where an island had recently been formed by the alluvial deposit; here he settled and, forgetting his wife Arsinoe, married Callirrhoe, the daughter of the river-god. His new wife longed for the necklace and peplus, and Alcmaeon, returning to Psophis, obtained possession of them, on the pretence that he desired to dedicate them at Delphi. When the truth became known he was pursued and slain by Phegeus and his sons. After his death Alcmaeon was worshipped at Thebes; his tomb was at Psophis in a grove of cypresses. His story was the subject of an old epic and of several tragedies, but none of these has been preserved.

Homer, Odyssey xv. 248; Apollodorus iii. 7; Thucydides ii. 68, 102; Pausanias viii. 24, x. 10; Ovid, Metam. ix. 400 et seq.

ALCMAEONIDAE, a noble Athenian family, claiming descent from Alcmaeon, the great-grandson of Nestor, who emigrated from Pylos to Athens at the time of the Dorian invasion of Peloponnesus. During the archonship of an Alcmaeonid Megacles (?632 B.C.), Cylon, who had unsuccessfully attempted to make himself " tyrant," was treacherously murdered with his followers. The curse or pollution thus incurred was frequently in later years raked up for political reasons; the Spartans even demanded that Pericles should be expelled as accursed at the beginning of the Peloponnesian war. All the members of the family went into banishment, and having returned in the time of Solon (594) were again expelled (538) by Peisistratus (q.v.). Their great wealth enabled them during their exile to enhance their reputation and secure the favour of the Delphian Apollo by rebuilding the temple after its destruction by fire in 548. Their importance is shown by the fact that Cleisthenes, tyrant of Sicyon, gave his daughter Agariste in marriage to the Alcmaeonid

Megacles in preference to all the assembled suitors after the undignified behaviour of Hippocleides. Under the statesman Cleisthenes (q.v.), the issue of this union, the Alcmaeonids became supreme in Athens about 510 B.C. To them was generally attributed (though Herodotus disbelieves the story — see Greece, Ancient History, sect. " Authorities," II.) the treacherous raising of the shield as a signal to the Persians at Marathon, but, whatever the truth of this may be, there can be little doubt that they were not the only one of the great Athenian families to make treasonable overtures to Persia. Pericles and Alcibiades were both connected with the Alcmaeonidae. Nothing is heard of them after the Peloponnesian war.

See Herodotus vi. 121-131.

ALCMAN, or Alcmaeon (the former being the Doric form of the name), the founder of Doric lyric poetry, to whom was assigned the first place among the nine lyric poets of Greece in the Alexandrian canon, flourished in the latter half of the 7th century B.C. He was a Lydian of Sardis, who came as a slave to Sparta, where he lived in the family of Agesidas, by whom he was emancipated. His mastery of Greek shows that he must have come very early to Sparta, where, after the close of the Messenian wars, the people were able to bestow their attention upon the "arts of peace. Alcman composed various kinds of poems in various metres; Parthenia (maidens' songs), hymns, paeans, prosodia (processionals), and love-songs, of which he was considered the inventor. He was evidently fond of good living, and traces of Asiatic sensuousness seem out of place amidst Spartan simplicity. The fragments are scanty, the most considerable being part of a Parthenion found in 1855 on an Egyptian papyrus; some recently discovered hexameters are attributed to Alcman or Erinna (Oxyrhynchus papyri, i. 1898).

For general authorities see Alcaeus.

ALCMENE, in ancient Greek mythology, the daughter of Electryon, king of Mycenae, and wife of Amphitryon. She was the mother of Heracles by Zeus, who assumed the likeness of her husband during his absence, and of Iphicles by Amphitryon. She was regarded as the ancestress of the Heracleidae, and worshipped at Thebes and Athens.

See Winter, Alkmene und Amphitryon (1876).

ALCOBAQA, a town of Portugal, in the district of Leiria, formerly included in the province of Estremadura, on the Alcoa and Baca rivers, from which it derives its name. Pop. (1900) 2309. Alcobaca is chiefly interesting for its Cistercian convent, now partly converted into schools and barracks. The monastic buildings, which form a square 725 ft. in diameter, with a huge conical chimney rising above them, were founded in 1148 and completed in 1222. During the middle ages it rivalled the greatest European abbeys in size and wealth. It was supplied with water by an affluent of the Alcoa, which still flows through the kitchen; its abbot ranked with the highest Portuguese nobles, and, according to tradition, 999 monks continued the celebration of mass without intermission through- out the year. The convent was partly burned by the French in 1810, secularized in 1834 and afterwards gradually restored. Portions of the library, which comprised over 100,000 volumes,

including many precious MSS., were saved in 1810, and are preserved in the public libraries of Lisbon and Braga. The monastic church (1222) is a good example of early Gothic, somewhat defaced by Moorish and other additions. It contains a fine cloister and the tombs of Peter I. (1357-1367) and his wife, Inez'de Castro.

ALCOCK, JOHN (c. 1430-1500), English divine, was born at Beverley in Yorkshire and educated at Cambridge. In 1461 he was made dean of Westminster, and henceforward his promotion was rapid in church and state. In the following year he was made master of the rolls, and in 1470 was sent as ambassador to the court of Castile. He was consecrated bishop of Rochester in 1472 and was successively translated to the sees of Worcester (1476) and Ely (i486). He twice held the office of lord chancellor, and exhibited great ability in the negotia- tions with James III. of Scotland. He died at Wisbech Castle on the 1st of October 1500. Alcock was one of the most eminent pre-Reformation divines; he was a man of deep learning and also of great proficiency as an architect. Besides founding a charity at Beverley and a grammar school at Kingston-upon-Hull, he restored many churches and colleges; but his greatest enterprise was the erection of Jesus College, Cambridge, which he established on the site of the former convent of St Radigund.

Alcock's published writings, most of which are extremely rare, are: Mons Perfectionis, or the Hill of Perfection (London, 1497); Gallicontus Jokannis Alcock episcopi Eliensis ad f rates suos

curates in sinodo apud Barnwell (1498), a good specimen of early English printing and quaint illustrations ; The Castle of Labour, translated from the French (1536), and various other tracts and homilies. See J. Bass Mullinger's Hist, of the University of Cambridge, .■■vol. i.

ALCOCK, SIR RUTHERFORD (1809-1897), British consul and diplomatist, was the son of Dr Thomas Alcock, who practised at Ealing, near London, and himself followed the medical, profession. In 1836 he became a surgeon in the marine brigade which took part in the Carlist war, and gaining distinction by his services was made deputy inspector-general of hospitals. He retired from this service in 1837, and seven, years later was appointed consul at Fuchow in China, where, after a short official stay at Amoy, he performed the functions, as he himself expressed it, " of everything from a lord chancellor to a sheriff's officer." Fuchow was one of the ports opened to trade by the treaty of 1842, and Mr Alcock, as he then was, had to maintain an entirely new position with the Chinese authorities. In so doing he was eminently successful, and earned for himself promotion to the consulate at Shanghai. Thither he went in 1846 and made it an especial part of his duties to superintend the establishment and laying out of the British settlement, which has developed into such an important feature of British commercial life in China. In 1858 he was appointed consul-general in the newly opened empire of Japan, and in the following year was promoted to be minister plenipotentiary. In those days residence in Japan was surrounded with many dangers, and the peoplewere intensely hostile to foreigners. In i860 Mr Alcock's native interpreter was murdered at the gate of the legation, and in the following year the legation was stormed by a body of Ronins, whose attack was repulsed by Mr Alcock and his staff. Shortly after this event he returned to England on leave. Already he had been made a C.B. (i860); in 1862 he was made a K.C.B., and in 1863 hon. D.C.L. Oxon. In 1864 he returned to Japan, and after a year's further residence he was transferred to Pekin, where he represented the British government until 1871, when he retired. But though no longer in official life his leisure was fully occupied. He was for some years president of the Royal Geographical Society, and he served on many commissions. He was twice married, first in May 1841 to Henrietta Mary, daughter of Charles Bacon, who died in 1853, and secondly (July 8, 1862) to the widow of the Rev. John Lowder, who died on the 13th of March 1899. He was the author of several works, and was one of

the first to awaken in England an interest in Japanese art; his best-known book is The Capital of the Tycoon, which appeared in 1863. He died in London on the. 2nd of November 1897. (R- K. D.)

ALCOFORADO, MARIANNA (1640-1723), Portuguese author- ess, writer of the Letters of a Portuguese Nun, was the daughter of a landed proprietor in Alemtejo. Beja, her birthplace, was the chief garrison town of that province, itself the prin- cipal theatre of the twenty-eight years' war with Spain that followed the Portuguese revolution of 1640, and her widowed father, occupied with administrative and military commissions, placed Marianna in her childhood in the wealthy convent of the Conception for security and education. She made her profession as a Franciscan nun at sixteen or earlier, without any real vocation, and lived a routine life in that somewhat relaxed house until her twenty-fifth year, when she met Noel Bouton. This man, afterwards marquis de Chamilly, and marshal of France, was one of the French officers who came to Portugal to serve under the great captain, Frederick, Count Schomberg, the re-organizer of the Portuguese army. During the years 1665- 1667 Chamilly spent much of his time in and about Beja, and probably became acquainted with the Alcoforado family through Marianna's brother, who was a soldier. Custom then permitted religious to receive and entertain visitors, and Chamilly, aided by his military prestige and some flattery, found small diffi- culty in betraying the trustful nun. Before long their intrigue became known and caused a scandal, and to avoid the conse- quences Chamilly deserted Marianna and withdrew clandes- tinely to France. The letters to her lover which have earned her renown in literature were written between December 1667 and June 1668, and they described the successive stages of faith, doubt and despair through which she passed. As a piece of unconscious psychological self-analysis, they are unsurpassed; as a product of the Peninsular heart they are unrivalled. These five short letters written by Marianna to " expostulate her desertion " form one of the few documents of extreme human experience, and reveal a passion which in the course of two centuries has lost nothing of its heat. Perhaps their dominant note is reality, and, sad reading as they are from the moral standpoint, their absolute candour, exquisite tenderness and entire self-abandonment have excited the wonder and

admiration of great men and women in every age, from Madame de Sevigne to W. E. Gladstone. There are signs in the fifth letter that Marianna had begun to conquer her passion, and after a life of rigid penance, accompanied by much suffering, she died at the age of eighty-three. The letters came into the possession of the comte de Guilleragues, director of the Gazette de France, who turned them into French, and they were published anony- mously in Paris in January 1669. A Cologne edition of the same year stated that Chamilly was their addressee, which is confirmed by St Simon and Duclos, but the name of their authoress remained undivulged. In 1810, however, Boissonade discovered Marianna's name written in a copy of the first edition by a contemporary hand, and the veracity of this ascription has been placed beyond doubt by the recent investigations of Luciano Cordeiro, who found a tradition in Beja connecting the French captain and the Portuguese nun. The letters created a sensation on their first appearance, running through five editions in a year, and, to exploit their popularity, second parts, replies and new replies were issued from the press in quick succession. Notwithstanding that the Portuguese original of the five letters is lost, their genuineness is as patent as the spuriousness of their followers, and though Rousseau was ready to wager they were written by a man, the principal critics of Portugal and France have decided against him. It is now generally recognized that the letters are a verbatim translation from the Portuguese.

The foreign bibliography of the Letters, containing almost one hundred numbers, will be found in Cordeiro's admirable study, Soror Marianna, A Friera Fortugueza, 2nd ed. (Lisbon, 1891). Besides the French editions, versions exist in Dutch, Danish, Italian and German; and the English bibliography is given by Edgar Prestage in his translation The Letters of a Portuguese Nun (Marianna Alcoforado), 3rd ed. (London, 1903). The French text of the editio princeps was printed in the first edition (1893) of this book. Edmund Gosse in the Fortnightly Review, vol. xlix. (old series) p. 506, shows the considerable influence exercised by the Letters on the sentimental literature of France and England. (E. Pr.)

ALCOHOL, in commerce, the name generally given to " spirits of wine "; in systematic organic chemistry it has a wider mean- ing, being the generic name of a class of compounds (hydroxy hydrocarbons) of which ordinary alcohol (specifically ethyl alcohol) is a typical member (see Alcohols).

The word ” alcohol ” is of Arabic origin, being derived from the particle al and the word kohl, an impalpable powder used in the East for painting the eyebrows. For many centuries the word was used to designate any fine moi’ogy. powder; its present-day application to the product of the distillation of wine is of comparatively recent date. Thus Paracelsus and Libavius both used the term to denote a fine powder, the latter speaking of an alcohol derived from antimony. At the same time Paracelsus uses the word for a volatile liquid; alcool or alcool vini occurs often in his writings, and once he adds ” id est vino ardente.” Other names have been in use among the earlier chemists for this same liquid. Eau de vie (” elixir of life “) was in use during the 13th and 14th centuries; Arnoldus Villanovanus applied it to the product of distilled wine, though not as a specific name.

Ordinary alcohol, which we shall frequently refer to by its specific name, ethyl alcohol, seldom occurs in the vegetable kingdom; the unripe seeds of Heracleum giganteum and H. Sphondylium contain it mixed with ethyl alcohol. butyrate. In the animal kingdom it occurs in the urine of diabetic patients and of persons addicted to alcohol. Its important source lies in its formation by the ” spirituous ” or ” alcoholic fermentation ” of saccharine juices. The mechanism of alcoholic fermentation is discussed in the article Fermenta- tion, and the manufacture of alcohol from fermented liquors in the article Spirits.

The qualitative composition of ethyl alcohol was ascertained by A. L. Lavoisier, and the quantitative by N. T. de Saussure in 1808. Sir Edward Frankland showed how it could be derived from, and converted into, ethane; and thus determined it to be ethane in which one hydrogen atom was replaced by a hydroxyl group. Its constitutional formula is therefore CH 3 -CH2-OH. It may be synthetically prepared by any of the general methods described in the article Alcohols.

Pure ethyl alcohol is a colourless, mobile liquid of an agreeable odour. It boils at 78-3° C. (760 mm.) ; at -90° C. it is a thick liquid, and at -130 it solidifies to a white mass. Its high coefficient of thermal expansion, coupled with its low freezing point, renders it a valuable thermometric fluid, especially when the temperatures to be measured are below 39 C, for which the mercury thermometer cannot be used. It readily inflames, burning with a blue smokeless flame, and producing water and carbon dioxide, with the evolution of great heat; hence it receives considerable application as a fuel. It mixes with water in

all proportions, the mixing being attended by a con traction in volume and a rise in temperature; the maximum contraction corresponds to a mixture of 3 molecules of alcohol and 1 of water. Commercial alcohol or ” spirits of wine ” contains about 00 % of pure ethyl alcohol, the remainder being water. This water cannot be entirely removed by fractional distillation, and to prepare anhydrous or ” absolute ” alcohol the commercial product must be allowed to stand over some dehydrating agent, such as caustic lime, baryta, anhydrous copper sulphate, &c, and then distilled. Calcium, chloride must not be used, since it forms a crystalline compound with alcohol. The quantity of alcohol present in an aqueous solu- tion is determined by a comparison of its specific gravity with standard tables, or directly by the use of an alcoholometer, which is a hydrometer graduated so as to read per cents by weight (degrees according to Richter) or volume per cents (degrees according to Tralles). Other methods consist in deter- mining the vapour tension by means of the vaporimeter of Geissler, or the boiling point by the ebullioscope. In the United Kingdom ” proof spirit ” is defined as having a specific gravity at 51° of 12/13 (‘92308) compared with water at the same tempera- ture. The “quantity at proof” is given by the formula: —

Reactions.

quantity of sample X (degrees over or under proof + ioo) divided by ioo.

The presence of water in alcohol may be detected in several ways. Aqueous alcohol becomes turbid when mixed with benzene, carbon disulphide or paraffin oil; when added to a solution of barium oxide in absolute alcohol, a white precipitate of barium hydroxide is formed. A more delicate method consists in adding a very little anthraquinone and sodium amalgam; absolute alcohol gives a green coloration, but in the presence of minute traces of water a red coloration appears. Traces of ethyl alcohol in solutions are detected and estimated by oxidation to acetaldehyde, or by conversion into iodoform by warming with iodine and potassium hydroxide. An alternative method consists in converting it into ethyl benzoate by shaking with benzoyl chloride and caustic soda.

Alcohol is extensively employed as a solvent; in fact, this constitutes one of its most important industrial applications. It dissolves most organic compounds, resins, hydrocarbons, fatty acids and many metallic salts, sometimes forming, in the latter case, crystalline compounds in which the ethyl alcohol plays a role similar to that of water of crystallization. This fact was first noticed by T. Graham, and, although it was at first contradicted, its truth was subsequently confirmed. In general, gases dissolve in it more readily than in water; ioo volumes of alcohol dissolve 7 volumes of hydrogen, 25 volumes of oxygen and 16 volumes of nitrogen.

Potassium and sodium readily dissolve in ethyl alcohol with the production of alcoholates of the formula C 2 H 5 OK(Na) . These are voluminous white powders. Sulphuric acid converts it into ethyl sulphuric acid (see Ether), and sulphur trioxide gives carbyl sulphate. The phos- phorous haloids give the corresponding ethyl haloid. Ethyl chloride (from the phosphorus chlorides and alcohol) is an ethereal liquid boiling at 12-5° C, soluble in alcohol, but spar- ingly so in water. Oxidation of ethyl alcohol gives acetaldehyde and acetic acid. Chlorine oxidizes it to acetaldehyde, and under certain conditions chloral (q.v.) is formed.

In almost all countries heavy taxes are levied on manufactured alcohol mainly as a source of revenue. In the United Kingdom the excise duty is eleven shillings per proof gallon of alcohol. alcohol, while the customs duty is eleven shillings and fivepence; the magnitude of these imposts may be more readily understood when one remembers that the proof gallon costs only about sevenpence to manufacture. The great importance of alcohol in the arts has necessitated the intro- duction of a duty-free product which is suitable for most in- dustrial purposes, and at the same time is perfectly unfit for beverages or internal application.

In the United Kingdom this ” denaturized” alcohol is known as methylated spirit as a distinction from pure alcohol or ” spirits of wine.” It was first enacted in 1855 that methylated spirit * ” spirit, a specific mixture of pure alcohol and wood- naphtha, should be duty-free; the present law is to be found in the Customs and Inland Revenue Act of 1890, and the Finance Act (sect. 8) of 1902. From 1858 to 1861 methylated spirit was duty-free when it was required for manu- facturing processes, and the methylation or ” denaturizing ” was carried out in accordance with a prescribed process. During the next three decades

(1861-1891) the law was extended, and methylated spirit was duty-free for all purposes except for use as beverages and internal medicinal applications. This spirit (" unmineralized methylated spirit ") consisted of 90 parts of alcohol of 60-66 over-proof (91-95 % of pure alcohol) and 10 parts of wood-naphtha. It was found, however, that certain classes were addicted to drinking this mixture, and since 1891 the sale of such spirit has been confined to manu- facturers who must purchase it in bulk from the " methylators." For retail purposes the " ordinary " methylated spirit is mixed with 357 % of mineral naphtha, which has the effect of rendering it quite undrinkable. The Finance Act of 1902 allows a manu facturer to obtain a license which permits the use of duty-free alcohol, if he can show that such alcohol is absolutely essential

for the success of his business, and that methylated spirit" is unsuitable. Notwithstanding- this permission there have been many agitations on the part of chemical manufacturers to obtain a less restricted use of absolute alcohol, and in 1905 an Industrial Alcohol Committee was appointed to receive evidence and report as to whether any modification of the present law was advisable.: In the United States the same question was considered in 1896 by a Joint Select Committee on the use of alcohol in the manu-factures and arts. Reference should be made to the reports of these committees for a full account of the use, manufacture and statistics of " denaturized " spirits in various European countries.

In Germany, the use of duty-free spirit is only allowed to state and municipal hospitals, and state scientific institutions, and for the manufacture of fulminates, fuzes and smokeless powders. The duty-free " denaturized " spirits may be divided into two groups — " completely denaturized "and " incompletely denatur- ized." In the first category there are two varieties: — (1) A mixture of 100 litres of spirit and 25 litres of a mixture of 4 parts of wood-naphtha and 1 of pyridine bases; this spirit, the use of which is practically limited to heating and lighting purposes, may be mixed with 50 grs. of lavender or rosemary, in order to destroy the noxious odour of the pyridine bases. (2) A mixture of 100 litres of spirit, ij litres of the naphtha-pyridine mixture described above, | litre of methyl violet solution, and from 2 to 20 litres of benzol; this fluid is limited to combustion in motors and agricultural engines. The second category, or " incompletely denaturized " spirits, include numerous mixtures. The "' general " mixture consists of 100 litres of spirit, and 5 litres of wood spirit or J litre of pyridine. Of the "particular" varieties, we can

only notice those used in the colour industry. These consist of 100 litres of spirit mixed with either 10 litres of sulphuric ether, or 1 litre of benzol, or £ litre of turpentine, or -025 litre of animal oil.

The German regulations are apparently based on a keen appreciation of the fact that while one particular denaturizing agent may have little or no effect on one industry, yet it would be quite fatal to the success of another; there is consequently a great choice of denaturizing agents, and in certain cases it is sufficient to mix the alcohol with a reagent necessary for the purpose in hand, or even with a certain amount of the final product, it being only necessary to satisfy the state that the spirit is not available as a beverage.

In France, the general denaturizing agent is wood-spirit of at least 58 over-proof, and containing 25 % of acetone and 2-5 % of "impurites pyrogene'es"; 10 litres of this spirit denaturizes 100 litres of alcohol. This mixture is supplied to manufacturers and corresponds to the British unmineralized methylated spirit; but the regulations are more stringent. When sold for lighting and heating purposes, it is further admixed with 0-5 % of heavy benzene boiling at i5o°-2oo° C. Provisions are also made for special denaturizing processes as in Germany.

In America the internal revenue tax on denaturized alcohol (formerly duty-free only to scientific institutions) was removed by Congress in 1906 (act of June 7th).

Pharmacology, Toxicology and Therapeutics of Alcohol. — Alcohol is of great medicinal value as a solvent) being used to form solutions of alkaloids, resins, volatile oils, iodoform, &c. In strength of about 10 % and upwards it is an antiseptic. If applied to the skin it rapidly evaporates, thereby cooling the skin and diminishing the amount of sweat excreted. This refrigerant and anhidrotic action is employed to soothe many forms of headache by bathing the forehead with eau de Cologne. If, on the other hand, the alcohol be rubbed into the skin, or if its evaporation be prevented — as by a watch-glass — it absorbs water from the tissues and thus hardens them.

Thoroughly rubbed into the skin alcohol dilates the blood-vessels and produces a mild counter-irritant effect. Many alcoholic liniments are therefore employed for the relief of pain, especially muscular pains, as in lumbago and other forms of so-

called ” muscular rheumatism.” Given internally in small quantities and in sufficient dilution, alcohol causes dilatation of

the gastric blood-vessels, increased secretion of gastric juice, and greater activity in the movements of the muscular layers in the wall of the stomach. It also tends to lessen the sensibility of the stomach and so may relieve gastric pain. In a 50 % solution or stronger — as when neat whisky is taken — alcohol precipitates the pepsin which is an essential of gastric digestion, and thereby arrests this process. The desirable effects produced by alcohol on the stomach are worth obtaining only in cases of acute diseases. In chronic disease and in health the use of alcohol as an aid to digestion is without the support of clinical or labora- tory experience, the beneficial action being at least neutralized by undesirable effects produced elsewhere. The continued use of large doses of alcohol produces chronic gastritis, in which the continued irritation has led to overgrowth of connective tissue, atrophy of the gastric glands and permanent cessation of the gastric functions.

A single dose of concentrated alcohol (e.g. brandy) produces very valuable reflex effects, the heart beating more; rapidly and forcibly, and the blood-pressure rising. Hence the immediately beneficial effect produced in the cases of ” fainting ” or syncope. After absorption, which is very rapid, alcohol exerts a marked action upon the blood. The oxygen contained in that fluid, and destined for consumption by the tissues, is retained by the influence of alcohol in its combination with the haemoglobin or colouring matter of the red blood corpuscles. Hence the diminished oxidation of the tissues, which leads to the accumula- tion of unused fat and so to the obesity which is so often seen in those who habitually take much alcohol. The drug exerts a noteworthy action upon the body-temperature. As it dilates the blood-vessels of the skin it increases the subjective sensation of warmth. The actual consequence, however, is that more heat than before is necessarily lost from the surface of the body. Alcohol also diminishes the oxidation which is the main source of the body-heat. It follows that the drug is an antipyretic, and it is hence largely used in fevers as a means of reducing the temperature. This reduction of the temperature, carried to an undesirable extreme, is the reason why the man who has

copiously consumed spirits " to keep out the cold " is often visited with pneumonia. The largest amount of alcohol that can be burnt up within the healthy body in twenty-four hours is iˆf oz., but it must be consumed in great dilution and divided into small doses taken every four hours. Otherwise the alcohol will for the most part leave the body unused in the urine and the expired air. In fever the case is different. The raised temperature appears to facilitate the oxidation of the substance, so that quantities may be taken and completely utilized which would completely intoxicate the individual had his temperature been normal. It follows that alcohol is a food in fever, and its value in this regard is greatly increased by the fact, that it requires no primary digestion, but passes without changes, and without needing change, to the tissues which are to use it. According to Sir Thomas Fraser nothing else can compete with alcohol as a food in desperate febrile cases, and to this use must be added its antipyretic power already explained and its action as a soporific. During its administration in febrile cases the druj must be most carefully watched, as its action may prove deleterious to the nervous system and the circulation in certain classes of patient. The state of the pulse is the best criterion of the action of alcohol in any given case of fever. The toxicology of alcohol is treated in other articles. It includes acute alcoholism (i.e. intoxication), chronic alcoholism, delirium tremens, and all the countless pathological changes— extending to every tissue but the bones, and especially marked in the nervous system — which alcohol produces. (See Drunkenness; Delirium).

After death the presence of alcohol can be detected in all the body fluids. Its especial affinity for the nervous system is indicated by the fact that, when all traces of it have disappeared elsewhere, it can still be detected with ease in the cerebro-spinal fluid.

ALCOHOLS, in organic chemistry, a class of compounds which may be considered as derived from hydrocarbons by the replaceˆment of one or more hydrogen atoms by hydroxyl groups. It is

convenient to restrict the term to compounds in which the hydroxyl group is attached to an aliphatic residue; this excludes such compounds as the hydroxy-benzenes, naphthalenes, &c, which exhibit many differences from the compounds derived from the aliphatic alkyls.

Alcohols are classified on two distinct principles, one depend- ing

upon the number of hydroxyl groups present, the other on the nature of the remaining groups attached to the carbon atom which carries the hydroxyl group. Monatomic or monohydric alcohols contain only one hydroxyl group; diatomic, two, known as glycols (q.v.) ; triatomic, three, known as glycerols (q.v.) ; and so on.

The second principle leads tp alcohols of three distinct types, known as primary, secondary and tertiary. The genesis and formulation of these types may be readily understood by considering the relation which exists between the alcohols and the parent hydrocarbon. In methane, CH 4 , the hydrogen atoms are of equal value, and hence only one alcohol, viz. CH 3 OH, can be derived from it. This compound, methyl alcohol, is the simplest primary alcohol, and it is characterized by the grouping •CH 2 OH. Ethane, C 2 H 6 , in a similar manner, can only give rise to one alcohol, namely ethyl alcohol, CH3CH2OH, which is also primary. Propane, CH3CH2.CH3, can give rise to twq alcohols — a primary alcohol, CH 3 CH 2 CH 2 OH (normal propyl alcohol), formed by replacing a hydrogen atom attached to a terminal carbon atom, and a secondary alcohol, CH3-CH(OH) > CH3. (isopropyl alcohol), when the substitution is effected on the middle carbonatom. The grouping CH-OH characterizes the secondary alcohols; isopropyl alcohol is the simplest member of this class. Butane, C4H10, exists in the two isomeric forms — normal butane, CH 3

C-OH, in which the residual valencies of the carbon atom are attached to alkyl groups.

In i860 Hermann Kolbe predicted the existence of secondary and tertiary alcohols from theoretical considerations. Regarding methyl alcohol, for which he proposed the name c'arbinol, as the simplest alcohol, he showed that by replacing one hydrogen atom of the methyl group by an alkyl residue, compounds of the general formula R-CH 2 -OH would result. These are the primary alcohols. By replacing two, of the hydrogen atoms, either by the same or different alkyls, compounds of the formula (R-Ri)CH-OH (i.e. secondary alcohols) would result; while the replacement of the three hydrogen atoms would generate alcohols of the general formula (R-RrR 2)C-QH, i.e. tertiary alcohols. Furthermore, he exhibited a comparison between these three types of alcohols and the amines. Thus:—

R-NH 2 (R,R 2)NH (RˆRˆN

R-CH 2 OH (RiRsOCH-OH (RiR 2 R 8)C-OH

Primary. Secondary. Tertiary.

To distinguish Primary, Secondary and Tertiary Alcohols. — Many reactions serve to distinguish these three types of alcohols. Of chief importance is their behaviour on oxidation. The primary alcohols are first oxidized to aldehydes (q.v.), which, on further oxidation, yield acids containing the same number of carbon atoms as in the original alcohol. Secondary alcohols yield ketones (q.v.), which are subsequently oxidized to a mixture of two acids., ; Tertiary alcohols yield neither aldehydes nor ketones, but, a mixture of two or more acids. Another method is based upon the different behaviour of the corresponding nitro-alkyl with nitrous acid. The alcohol is first acted upon with phosphorus and iodine, and the resulting alkyl iodide if treated with silver nitrite, which gives the corresponding nitro- alkyl. The nitro-alkyl is then treated with potassium nitrite dissolved in concentrated potash, and sulphuric acid is added. By this treatment a primary nitro-alkyl yields a nitrolic acid the potassium salt of which forms an intense red solution; a secondary nitro-alkyl forms a pseudo nitrol, which gives an

intense blue solution, while the tertiary compound does not act with nitrous acid. The reactions outlined above may be thus represented: —

R-CH 2 OH - > R-CH 2 I - > R-CH 2 -N0 2 - > R,Cˆˆ H ,

Primary alcohol. Nitrolic acid.

R > CH.OH -»£ > CH.I -»R > CH-N0 2 ˆ{ˆCˆg 2

Secondary alcohol. Pseudo nitrol.

(R 1 R 2 Rs)C-OH-ˆ(R 1 R 2 R s)C-I-ˆ(RiR 2 R 3)C-N0 2 . Tertiary alcohol.

By heating to the boiling point of naphthalene (218) tertiary alcohols are decomposed, while heating to the boiling point of anthracene (360°) suffices to decompose secondary alcohols, the primary remaining unaffected. These changes can be followed out by determinations of the vapour density, and so provide a method for characterizing alcohols (see Compt. Rend. 1904, 138, p. 984).

Alcohols may be readily prepared from the corresponding alkyl haloid by the action of moist silver oxide (which behaves as silver hydroxide) ; by the saponification of their tVon!”*” esters; or by the reduction of polyhydric alcohols with hydriodic acid, and the subsequent conversion of the resulting alkyl iodide into the alcohol by moist silver oxide. Primary alcohols are obtained by decomposing their sulphuric acid esters (from sulphuric acid and the olefines) with boiling water; by the action of nitrous acid on primary amines; or by the reduction of aldehydes, acid chloride!? or acid anhydrides. Secondary alcohols result from the reduction of ketones; and from the reaction of zinc alkyls on aldehydes or formic acid esters.

■CH.CHO - > CH 3 -CH

Acetaldehyde.

OZnCH, - > HCf-CH 3 - > HC < -CH 3

X CH

jj£ ± -ur/

Methyl ethyl carbinol. /OZnCH, /OH

\

CH 8

“\OC 2 H 5 ‘ llv ‘\oc 2 H 1

Formic ester. Isopropyl alcohol.

Tertiary alcohols may be synthesized by a method devised by A. Butlerow in 1864, who thus discovered the tertiary alcohols. By reacting with a zinc alkyl (methyl or ethyl) on an acid chloride, an addition compound is first formed, which decomposes with water to give a ketone. If, however, a second molecule of a zinc alkyl be allowed to react, a compound is formed which gives a tertiary alcohol when decomposed with water.

y

CH 3

V

CH 3

■y.

ch 3

R-c/S.R-C-OZnCHs-ˆR-Cˆ-OZnCHa-ˆR-CˆOH XL1 ˆCl X CH 3 X CH 3

Acid chloride. Tertiary alcohol.

It is interesting to note that, whereas zinc methyl and ethyl give tertiary alcohols, zinc propyl only gives secondary alcohols. During recent years (1900 onwards) many brilliant syntheses have been effected by the aid of magnesium-alkyl-haloids.

The alcohols are neutral in reaction, and the lower members possess the property of entering into combination with salts, in which the alcohol plays the role of water of crystal- pertles. lization. Sodium or potassium dissolves in them with the formation of alcoholates, the hydrogen of the hydroxyl group being replaced by the metal. With strong acids water is split off and esters are formed. The haloid esters of the paraffin alcohols formed by heating the alcohols with the halogen acids are the

monohaloid derivatives of the paraffins, and are more conveniently prepared by the action of the phosphorous haloid on the alcohol. Energetic dehydration gives the define hydrocarbons, but under certain conditions ethers (see Ether) are obtained.

The physical properties of the alcohols exhibit a gradation with the increase of molecular weight. The lower members are colourless mobile liquids, readily soluble in water and exhibiting a characteristic odour and taste. The solubility decreases as the carbon content rises. The normal alcohols containing 1 to 16 carbon atoms are liquids at the ordinary temperatures 1 ; the higher members are crystalline, odourless and tasteless solids, closely resembling the fats in appearance. The boiling

points of the normal alcohols increase regularly about io° for each CH 2 increment; this is characteristic of all homologous series of organic compounds: Of the primary, secondary and tertiary alcohols having the same empirical formula, the primary have the highest, and the tertiary the lowest boiling point; this is in accordance with the fairly general rule that a gain in symmetry is attended by a fall in the boiling point.

The following mbnatomic alcohols receive special treatment Under their own headings :— Alcohol (Ethyl), Allyl Alcohol, A»iyl Alcohols, Benzyl Alcohol, Butyl Alcohols, Methyl Alcohol, and Propyl Alcohols.

ALCOTT, AMOS BRONSON (1799-1888), American education-alist and writer, born on Spindle Hill, in the town of Wolcott, New Haven county, Connecticut, ©in the 29th of November 1799. His father; Joseph Ghatfield Alcox, was a farmer and mechanic whose ancestors, then bearing the name of Alcocke, had settled in eastern ‘Massachusetts in colonial daysj The son adopted the spelling “Alcott” in his early youth. Self-educated and early thrown upon his own resources, he began in 1814 to earn his living by working in a clock factory in Plymouth, Conn., and for many years after 181 5 he peddled books and merchandise, chiefly iii the southern states. He began teaching in Bristol, Conn., iii 1823, and subsequently conducted schoolsin Cheshire, Conn., in 1825-1827, again in Bristol in 1827-1828, in Boston in 1828-1830, in Germantown, now part of Philadelphia, in 1831-1833, arid in Philadelphia in 1833. In 1830 he had married Abby May, the sister of Samuel J. May (1797-1871), the reformer and abolitionist. Iii 1834 he opened in Boston a School which became

famous because of his original methods ; his plan being to develop self -instruction on the basis of self-analysis, with an ever-present desire on his own part to stimulate the child's personality. The feature of his school which attracted most attention, perhaps, was his scheme for the teacher's receiving punishment, in certain circitrristances, at the hands of an offending pupil, whereby the sense of shame might beiquickened in the < mind of the errant child. The school wˆs denounced in the press, was not pecuniarily successful, and in 1839 was given up, # although Alcott had won the affection of his pupils, and his educational experiments had challenged the attention of students of pedagogy. The school is perhaps best described in Miss E. P. Peabody's A Record oi Mr Alcott' s School (1835). In 1840 Alcott removed to Concord, Massachusetts. After a visit to England, in 1842, he started with two English associates, Charles Lane and Henry C. Wright, at " Fruitlands," in the town of Harvard, Massachusetts, a communistic experiment at farmˆliving and nature-meditation as tending to develop the best powers of body and soul. This speedily came to naught, and Alcott returned (1844) to his home near that of Emerson in Concord, removing to Boston four years later, and again living in Concord after 1857. He spoke, as opportunity offered, before the " lyceums " then common in various parts of the United States, or addressed groups of hearers as they invited him. These " conversations," as he called them, were more or less informal talks on a great range of topics, spiritual, aesthetic and practical, in which he emphasized the ideas of the school of American Transcenden talis ts fed by Emerson, who was always his supporter and discreet admirer. He dwelt upon the illumination of the mind and soul by direct communion with the Creative Spirit; upon the spiritual and poetic monitions of external nature; and upon the benefit to man of a seretie mood and a simple way of life. As regards the trend and results of Alcott's philosophic teaching, it must be said that,- like' Emerson, he was sometimes inconsistent; hazy or abrupt. But though he formulated no system of philosophy, and seemed to show the influence now of Plate; now of Kant, or of German thought 'as filtered through the brain of Coleridge, he was, like his American master, associate and friend, steadily optimistic, idealistic, individualistic. •■ The teachings of William EHeiry Charming a little before, as to the sacred inviolability of the human conscience — anticipating the later conclusions of Martineau— really lay at the basis of the work of most of the Concord transcendentalists and contributors to The Dial, of whom Alcott was one. : In his last years, living in a serene and

beautiful old age in his ConCord home, the Orchard House,where every comfort was provided by his daughter Louisa (q.v.), Alcott was gratified at being able to become the nominal, and at times the actual, head of a Concord "Summer School of Philosophy and Literature," which had its first session in 1879, and in which — in a rudely fashioned building next his house — thoughtful listeners were addressed during a part of several successive summer seasons on many themes in philosophy, religion and ietters. Of Alcott's published works the most important is Tablets (1868); next in order of merit is Concord Days (1872). His Sonnets and Canzonets (1882) are chiefly interesting as an old man's experiments in verse. He left a large collection of personal jottings and memorabilia, most of which remain un- published. He died in Boston on the 4th of March 1888. Alcott was a Garrisonian abolitionist. ;

See A. Bronson Alcott, His Life and Philosophy (2 vols., Boston, 1893), by F. B. Sanborn and William T. Harris; New Connecticut: an Autobiographical Poem (Boston, 1887), edited by F. B. Sanborn; and Lowell's criticism in his Fable for Critics. (C. F. R.)

ALCOTT, LOUISA MAY (1832-1888), American author; was the daughter of Amos Bronson Alcott, arid though of New England parentage and residence, was born in Germantown, now part of Philadelphia, Pennsylvania, on the 29th of November 1832. She began work at ah early age as ah occasional teacher and as a writer — her first book was Flower Fable's (1854), tales originally written for Ellen, daughter of ~R. W. Emerson. In i860 she began writing for the Atlantic Monthly, arid she. was nurse in the Union Hospital at Georgetown, D.C., far six weeks m 1862-1863. Her home letters, revised and published, in the Commonwealth and collected as Hospital Sketches (1863, re-published with additions in 1869), displaced some power of observation and record; and Moods, a novel (1864), despite its uncertainty of method and of touch, gave considerable promise. She soon turned, however, to the rapid production of stories for girls, and, with the exception of the cheery tale entitled Work (1873), and the anonymous novelette A Modem Mephis- tophcles (1877), which attracted little notice, she did not return to the more ambitious fields of the novelist. Her success dated from the appearance of the first series of Little' Women: or Meg, Jo, Beth

and Amy (1868), in which, with unfailing humour,' freshness and lifelikeness, she put into story form rriariy of the sayings and doings of herself and sisters. 'Little Men (1871) similarly treated the character and ways of her nephews in the Orchard House in Concord, Massachusetts, in which Miss Alcott's industry had now established her parents and other members of the Alcott family; but most of her later volumes, An Old-Fashioned Girl (1870), Aunt Jo's Scrap Bag (6 vols., 1871-1879), Rose in Bloom (1876), &c, followed in the line of Little Women, of which the author's large and lpyal public never wearied. Her natural love of labour, her wide-reaching generosity, her quick perception and her fondness for sharing with her many readers that cheery humour which radiated from her personality and her books, led her to produce stories of a diminishing value, and at last she succumbed td overwork, dying in Boston on the 6th of March 1888, two days after the death of her father in the same city. Miss Alcott's early educa- tion had partly been given by the naturalist Thoreau, but had chiefly been in the hands of her father; and in her girlhood qnd early womanhood she had fully shared the trials and poverty incident to the life of a peripatetic idealist. In a newspaper sketch entitled " Transcendental Wild Oats," afterwards re- printed in the volume Silver Pitchers (1876), she narrated, with a delicate humour, which showed what her literary powers might have been if freed from drudgery, the experiences of her family during an experiment towards communistic " plain living and high thinking " at " Fruitlands," in the town of Harvard, Massachusetts, in 1843.

The story of her career has been fully and frankly told in Mrs Ednah D. Cheney's Louisa May Alcott: Her Life, Letters and Journals (Boston, 1889). (C. F. R.)

ALCOVE (through the Span, alcova, from the Arab, al-, the, and quobbah, a vault), an architectural term for a recess in a room. usually screened off by pillars, balustrade or drapery.

ALCOY, a town of south-eastern Spain, in the province of Alicante, on the small river Serpis, and at the terminus of a branch railway connected with the Barcelona- Valencia-Alicante line. Pop. (1900) 32,053. Alcoy is built on high ground at the entrance to a gorge in the Moncabrer range (4547 ft.). It is a thriving industrial town, devoid of any great antiquarian or architectural interest, though founded by the Moors. It owes its prosperity to its manufacture of linen, woolen goods and paper, especially cigarette paper. Many of the factories derive their

motive power from the falls of a mountain torrent known as the Sal to de las Aguas. Labour disturbances are frequent, for, like Barcelona, Alcoy has become one of the centres of socialistic and revolutionary agitation, while preserv- ing many old-fashioned customs and traditions, such as the curious festival held annually in April in honour of St George, the patron saint of the town.

Cocentaina (pop. 1900, 7093) is a picturesque and ancient town, 4 m. N.E. by rail. It is surrounded by Roman walls, which were partly rebuilt by the Moors, and it contains an interesting fortified palace, owned by the dukes of Medinaceli.

For an account of the festival of St George of Alcoy, see Apuntes historicos acerca de las fiestas que celebra coda ano la ciudad de Alcoy a su patron San Jorge, by J. A. Llobet y Vallosera (Alcoy, 1853).

ALCUIN (Alchuine), a celebrated ecclesiastic and man of learning in the 8th century, who liked to be called by the Latin name of Albinus, and at, the Academy of the palace took the surname of Flaccus, was born at Eboracum (York) in 735. He was related to Willibrord, the first bishop of Utrecht, whose biography he afterwards wrote. He was educated at the cathedral school of York, under the celebrated master ˆElbert, with whom he also went to Rome in search of manuscripts. When ˆElbert was appointed archbishop of York in 766, Alcuin succeeded him in the headship of the episcopal school. He again went to Rome in 780, to fetch the pallium for Archbishop Eanbald, and at Parma met Charlemagne, who persuaded him to come to his court, and gave him the possession of the great abbeys of Ferrieres and of Saint-Loup at Troyes. The king counted on him to accomplish the great work which was his dream, namely, to make the Franks familiar with the rules of the Latin language, to create schools and to revive learning. From 781 to 790 Alcuin was his sovereign's principal helper in this enterprise. He had as pupils the king of the Franks, the members of his family and the young clerics attached to the palace chapel; he was the life and soul of the Academy of the palace, and we have still, in the Dialogue of Pepin (son of Charle- magne) and Alcuin, a sample of the intellectual exercises in which they indulged. It was under his inspiration that Charles wrote his famous letter de litteris colendis (Boretius, Capitularia, i.'p. 78), and it was he who founded a fine library in the palace. In 790 Alcuin returned to his own country, to which he had always been greatly attached, and stayed there some time; but Charlemagne needed him to combat

the Adoptianist heresy, which was at that time making great progress in the marches of Spain. At the council of Frankfort in 794 Alcuin upheld the orthodox doctrine, and obtained the condemnation of the heresiarch Felix of Urgel. After this victory he again returned to his own land, but on account of the disturbances which broke out there, and which led to the death of King ˆEthelred (796), he bade farewell to it for ever. Charlemagne had just given him the great abbey of St Martin at Tours, and there, far from the disturbed life of the court, he passed his last years. He made the abbey school into a model of excellence, and many students flocked to it; he had numerous manuscripts copied, the calli- graphy of which is of extraordinary beauty (v. Leopold Delisle in the Memoires de I'AcadSmie des Inscriptions, vol. xxxii., 1st part, 1885) . He wrote numerous letters to his friends in England, to ArnOj bishop of Salzburg, and above all to Charlemagne, These letters, of which 311 are extant, are filled chiefly with pious meditations, but they further form a mine of information as to the literary and social conditions of the time, and are the most reliable authority for the history of humanism in the Carolingiaaa age. He also trained the numerous monks of the

abbey in piety, and it was in the midst of these pursuits that he was struck down by death on the 19th of May 804.

Alcuin is the most prominent figure of the Carolingian Re- naissance, in which have been distinguished three main periods: in the first of these, up to the arrival of Alcuin at the court, the Italians occupy the chief place; in the second, Alcuin and the Anglo-Saxons are dominant; in the third, which begins in 804, the influence of the Goth Theodulf is preponderant. Alcuin transmitted to the ignorant Franks the knowledge of Latin culture which had existed in England since the time of Bede. We still have a number of his works. His letters have already been mentioned; his poetry is equally interesting. Besides some graceful epistles in the style of Fortunatus, he wrote some long poems, and notably a whole history in verse of the church at York: Versus de patribus, regibus et Sanctis Eboracensis ecclesiae. We owe to him, too, some manuals used in his educa- tional work; a grammar and works on rhetoric and dialectics. They are written in the form of dialogues, and in the two last the

interlocutors are King Charles and Alcuin. He wrote, finally, several theological treatises: a treatise de Fide Trinitatis, commentaries on the Bible, &c. The complete works of Alcuin have been edited by Froben: Alcuini opera, 1 vol. in 4 parts (Regensburg, 1777); this edition is reproduced in Migne's Patrolog. lat. vols. c. and ci. The letters have been published by Jaffe and Dummler in Jaffe's Bibliotheca rerum germanicarum, vol. vi. pp. 132-897 (1873). E. Dummler has also published an authoritative edition, Epistolae aevi Carolini, vol. ii. pp. 1-481, in the Monumenta Germaniae, and has edited the poems in the same collection: Poetae latini aevi Carolini, vol. i. pp. 169-341.

Authorities. — Monnier, Alcuin et Charlemagne (Paris, 1863); K. Werner, Alkuin und sein Jahrhundert (Paderborn, 1876) ; J. Bass Mullinger, The Schools of Charles the Great and the Restoration of Education in the pth Century (London, 1877); Aug. Molinier, Les Sources de I'histoire de France, vol. i. p. 191; G. Monod, Etudes critiques sur les sources de I'histoire carolingienne, part i. (Paris, 1898); C. J. B. Gaskoin, Alcuin: His Life and his Work (London, 1903). See further U. Chevalier, Repertoire des sources, &c, bio- bibliographie, s.v. Alcuin; Wattenbach, Deutschlands Geschichts- queUen (Stuttgart and Berlin, 1904), i. p. 186. (C. Pf.)

ALCYONE, or Halcyone, in Greek mythology, daughter of Aeolus and wife of Ceyx. For their presumption in calling themselves Zeus and Hera they were changed into birds — Alcyone into a diver, Ceyx into a kingfisher. According to another story, Ceyx was drowned and his body cast on the shore. His wife found the body, and the gods, out of compassion, changed both her and her husband into kingfishers. By com- mand of Zeus (or Aeolus) the winds ceased to blow during their brooding-time, for seven days before and after the shortest day, that their eggs might not be carried away by the sea. Hence the expression " halcyon days," used in ancient and modern times to denote a period of calm and tranquillity.

Apollonius Rhodius i. 1087; Ovid, Metam. xi. 410 et seq.; Hyginus, Fabulae, 65.

ALDABRA, the collective name of a group of islands in the Indian Ocean, forming part of the British colony of Seychelles. They lie in 9° 30′ S., 46 E., are 265 m. N.W. of the northern point of Madagascar and 690 m. S.W. of Mahe, the principal island of the Seychelles archipelago. The Comoro Islands lie 220 m. S. by W. of Aldabra. The Aldabra Islands 1 constitute an atoll consisting of

an oval ring of land, some 40 m. in circum- ference and about 1ˆ m. broad, enclosing a shallow lagoon. Channels divide the ring into four islands. Grande Terre or South Island forms three-fifths of the circumference. The other islands are West Island or He Picard, Polymnie and Middle Island. There are in addition several islets in the lagoon, the most im-. portant being He Michel. The total land area is estimated at about 60 sq. m., the lagoon, 16 m. long and 4 m. wide, covering a somewhat larger area. Pop. (1906) 127. The islands rise from 26 to 80 ft. above the sea, and consist of rugged coral rock and limestone, there being very little soil. The sea-face is generally overhanging cliff, but in a few places are sandy beaches and low sandhills. Dense scrub covers most of the land, but the inner {lagoon) shore is everywhere bounded by mangrove swamps:

The flora and fauna of the islands present features of unusual interest. They are chiefly noted as the habitat of the gigantic land tortoise (Testudo elephantina) , now carefully preserved, and of several rare and peculiar birds, including a rail (Dryolimnas aldabranus) , an ibis (ibis abbottii) and a dove {Alectroenas sganzini). Crustacea are abundant. They include oysters, crabs of great size, and a small mussel, found in enormous numbers. The flora includes mangroves, Rubiaceae, Sapotaceae and other forms requiring more than pure coralline material for their growth. Writing of the fauna and flora generally, Mr R. Dupont, curator of the Botanic station at Mahe, who visited Aldabra in 1906, says: ” The specimens represented, besides being partly peculiar, mostly belong to the Mascarenes, Madagascar and Comoros species. Many species are also common to East Africa and to India. . . . The predominant species are Madagascar plants and birds, which are carried by the currents and the winds. . . . There are comparatively few (10) species of plants which are endemic as far as the flora has been investigated, and it is probable that most of them are also existing in the Comoros, where the flora is not well known. . . . Endemic inferior animals and mammals are practically non-existent, except two bats and one scorpion, which are allied to Madagascar species or introduced. The reptiles (tortoises) are also nearly allied to the Mascarenes and Madagascar species which orjce existed/ With regard to birds and land shells the relation is much closer to the Comoros species, and the latter, of which I have collected seven species besides Rachis aldabrae, may serve to point out more than the birds the , land connexion of Aldabra with the neighbouring countries.” Aldabra, however, although situated in that region of the Indian

Ocean which forms part of the site of the Indo- Madagascar continent of the Secondary period, is riot a peak of the submerged land. It has been built up from the sunken remains of the old continent by a deposit, in the opinion of Pro- fessor A. Voeltzkow, of foraminiferal remains (mostly coccoliths and rhabdoliths). In any case, however Aldabra was formed, there can be no suggestion of its ever having been jojned to any other land (Stanley Gardiner). Dupont states that at Aldabra the coral foundation is totally above water. The coral limestone of the atoll has a peculiar vitrified appearance and gives out a ringing sound when struck or simply walked on. The coral is generally reddish, but the colouring ranges from light yellow tc chocolate-brown.

Aldabra was visited by Portuguese navigators in 1511. The islands were already known to the Arabs, from whom they get their name. They became in the middle of the 18th century dependencies of the French establishments at Bourbon (Reunion), whence expeditions were made for the capture of the giant tortoises. In 1810 with Mauritius, Bourbon, the Seychelles and other islands, Aldabra passed into the possession of Great Britain. The inhabitants are emigrants from the Seychelles. Goats are bred and coco-nuts cultivated, but fishing is the chief industry. With other outlying islands Aldabra is held under lease from the Seychelles government, the lessees having exclusive trading privileges.

See R. Dupont, Report on a Visit of Investigation to … the Aldabra Group of the Seychelles Islands (Seychelles, 1907); Dr Abbott in Proceedings, United States National Museum (Washington', 1894) ; A. Voeltzkow in A b h. der Senckenbergischen Naturforschenden Ges. vol. xxvi. part iv. (1901); J. S. Gardiner, "The Indian Ocean," Geo. Journ. Oct. 1906.

ALDBOROUGH, a village in the Ripon parliamentary division of the West Riding of Yorkshire, England, 16 m. W.N.W. of York, and 1 m. E. of the market town of Boroughbridge, which has a station on a branch of the North-Eastern railway. Aid- borough formerly returned two members to parliament, but was disfranchised by the Reform Act of 1832. The place is remarkable from its numerous ancient remains. It was the Isurium Brigan- tum of the Romans, originally perhaps a capital of the Brigantes tribe, and afterwards a RomanOrBritish town of considerable size. Inscriptions, beautiful mosaics and other traces of com- fortable houses have been found, with many potsherds, coins and

bronze, iron and other objects; and a large part of the town walls, several mosaics and parts of buildings, can be seen. 1 A

fine collection is kept in the Museum Isurianum in the grounds of the manor-house.

ALDEBURGH [Aldborough], a market town and municipal borough in the Eye parliamentary division of Suffolk, England, the terminus of a branch of the Great Eastern railway, oo§ m. N.E. by E. from London. Area, 1629 acres. Pop. (1001) 2405. The surr6undirig district is open and Somewhat bleak, but a fine stretch of sand fringes the shallow inlet of the North Sea known as Aldeburgh Bay, To the W. the river Aide broadens as if into an estuary, but its outflow is here prevented by the sand, and it runs south for nearly 10 m. parallel with the shore. The sand- banks have arrested the encroachments of the sea, which sub- merged a former site of Aldeburgh. The church of St Peter and St Paul is Perpendicular, largely restored, and contains a monument to the poet George Crabbe, born here on the 24th of December 1754. A small picturesque Moot Hall of the 16th century is used for corporation meetings. Slaughden Quay on the Aide admits small vessels, and fishing is carried on. Alde- burgh is governed by a mayor, 4 aldermen and 12 councillors.

Aldeburgh (Aldburc) takes its name from the river Aide on which it stands. It is not mentioned in pre-Conquest records, but at the Domesday survey most of the land was held by Robert Malet, a Norman. In 11 55 the manor was granted to the abbey of St John of Colchester, later to Cardinal Wolsey, and on his disgrace, to Thomas Howard, duke of Norfolk, to whom Elizabeth in 1567 granted a market on Saturday. In the 16th ceacury Aldeburgh was a place of considerable commercial importance, due, no doubt, to its position on the sea-coast. Aldeburgh claims to be a borough by prescription: the earliest charter is that granted by Henry VIII. in 1529. Edward VI. in 1548 raised it to the rank of a free borough, granting a charter of incorporation and a market on Wednesday. Later charters were granted by Philip and Mary in 1553, by Elizabeth in 1558 and 1567, by James I. (who granted two annual fairs) in 1606, and by Charles I. in 163 1 and 1637. The corporation included 2 bailiffs, 10 capital and 24 inferior burgesses, until the Municipal Corporations Act 1883. The fairs

and markets became so unimportant that they were discontinued about the middle of the 19th century. The town returned two members to Elizabeth's parliament of 1572, and continued to be so represented till the Reform Bill of 1832 disfranchised it. Frequent disastrous incur- sions of the sea in the 18th century reduced Aldeburgh to a mere fishing village. In recent years it has grown as a seaside resort, with excellent golf-links.

See John Kirby, The Suffolk Traveller (2nd ed., 1764) ; N. F. Hele, Notes about Aldeburgh (1870); Victoria County History — Suffolk.

ALDEGREVER, or Aldegraf, HEINRICH (1502-1538), German painter and engraver, was born at Paderborn, from which he removed in early life to Soest, where he died. From the close resemblance of his style to that of Albrecht Diirer he has sometimes been called the Albert of Westphalia. His numerous engravings, chiefly from his own designs, are delicate and minute, though somewhat hard in style, and entitle him to a place in the front rank of the so-called " Little Masters." There is a good collection in the British Museum. Specimens of his painting are exceedingly rare. Five pictures are in continental galleries, but the genuineness of the works in the Vienna and Munich collections attributed to him is at least doubtful, the only unchallenged example being a portrait of Engelbert Therlaen (1551) in the Berlin Museum.

ALDEHYDES, a class of chemical compounds 6f the general formula R-CHO (R = an alkyloran aryl group). The name is derived from alcohol dehydrogenatum in allusion to the fact that they may be prepared by the oxidation of alcohols. The lower members of the series are neutral liquids possessing a character- istic smell; they are soluble in water and are readily volatile (formaldehyde, however, is a gas at ordinary temperatures). As the carbon content of the molecule increases', they become less soluble in water, and their smell becomes less marked with the increase in boiling point, the highest members of the series being odourless solids, which can only be distilled without decomposition in vacuo.

The aldehydes may be prepared by the careful oxidation of primary alcohols With a mixture of potassium dichromate and sulphuric acid— 3R•CH 2 OH-ˆ-K 2 Cr ? 07 + 4H 2 S04 = K 2 SO«ˆ-Cr 2 (S04)3 + 7H 2 0 + 3R•CHO; by distilling the calcium salts of the fatty acids with calcium formate; and by hydrolysis of the

acetals. L. Bouveault {Bull. soc. chim., 1904 [3], 31, pi 1306) prepares aldehydes by the gradual addition of disubstituted formamides (dissolved in anhydrous ether) to magnesium alkyl haloids, the best yields being obtained by the use of diethyl formamide. Secondary reactions take place at the same time, yielding more particularly hydrocarbons of the paraffin series. G. Darzens (Comptes Rendus, 1904, 139, p. 1214) prepares, esters of disubstituted glycidic acids, by condensing the corresponding ketone with monochloracetic ester, in the presence of sodium ethylate. These esters on hydrolysis yield the free acids, which readily decompose, with loss of carbon dioxide and formation of an aldehyde,

p /CRR 1 /CRR 1 ■■„■

OC<£+Cl-CH2-COOC 2 H 6 ˆ0< \ . 0<. I ...-

Kl \CH-COOC 2 H 6 \CH-COOH

-> Cft+CHRR'-CHO.

In the German Patent 157573 (1904) it is shown that by the action of at least two molecular proportions of an alkyl formate on two molecular proportions of a magnesium alkyl or aryl haloid, a complex addition compound is formed, which readily decomposes into a basic magnesium salt and an aldehyde, C 6 H5MgBr+HCOOR->RO-CH.C 6 H 6 OMgBr>MgBr-OR+

C 6 H 5 CHO.

The aldehydes are characterized* by their great chemical re-activity. They act as reducing agents, silver nitrate in the; presence of ammonia being rapidly reduced to the condition of metallic silver. They are easily oxidized to the corresponding fatty acid, in many cases simply by exposure to air. Nascent hydrogen reduces them to primary alcohols, and phosphorus pentachloride replaces the carbonyl oxygen by chlorine. : They form many addition compounds, combining with ammonia to form aldehyde ammonias of the type R-CH(OH)-NH 2 . These are colourless crystalline compounds, which are most readily prepared by passing ammonia gas into an ethereal solution of the aldehyde. With sodium bisulphite they form the so-called bisulphite compounds R-CH(OH)-SOsNa, which are readily resolved into their components by distillation with dilute acids, and are frequently used for the preparation of the pure aldehyde.

With hydrocyanic acid aldehydes form the cyanhydrins R-CH(OH)-CN. They react with hydroxylamine and phenylhydrazine, with the formation of aldoximes and hydrazones. (For the isomerism of the aldoximes see Oximes). The hydrazones are crystalline substances which are of value in the characterization of the aldehydes. Both oximes and hydrazones, on boiling with dilute acid, regenerate the parent aldehyde. The hydrazones are best prepared by mixing the aldehyde with phenylhydrazine in dilute acetic acid solution, in the absence of any free mineral acid. Semioxamazid, NH 2 -CO-CO-NH-NH 2 , has also been employed for the identification of aldehydes (W. Kerp and K. linger, Berichte, 1897, 30. p. 585). Aldehydes are converted into resins by the action of caustic alkalies. On heating with alcohols to ioo° C. they form acetals, and they also form Condensation products with para-amido-di-methyl-aniline (A. Calm, Berichte, 1884, 17, p. 2939). They react with the zinc alkyls to form addition products, which are decomposed by water with for- mation of secondary alcohols (K. Thurnlach, Annalen, 1882, 213, p. 369) thus: —

Zn(C 2 H 6) 2 _; u H 2 _

CHa-CHO -> CH s -CH

ZhO + C 2 H,.

The reaction is a general one for all aldehydes with zinc ; methyl and zinc ethyl, but not with the higher zinc alkyls. V. Grignard (Comptes Rendus, 1900 et seq.) showed that aldehydes combine with magnesium alkyl iodides (in absolute ether solution) to form addition products, which are decomposed by water with the

formation of secondary alcohols, thus from acetaldehyde and magnesium methyl iodide, isopropyl alcohol is obtained.

CH 3 -CHO + CH 3 MgIˆCH 3 -CH < §ˆ 3 gI 4(CH 3)2CH-OH + MgI-OH.

The lower members of the aliphatic series are characterized by their power of polymerization (see Formalin, and the account of Acetaldehyde below), and also by the so-called ” aldol ” condensation, acetaldehyde in this way forming aldol, CH 3 -

CHOH-CH 2 CHO. These aldols generally lose the elements of water readily and pass into unsaturated com pounds; aldol itself on distillation at ordinary atmospheric pressure gives crotonaldehyde, CH 3 -CH : CH-CHO.

Aldehydes are characterized by the reddish-violet colour which they give with a solution of fuchsine that has been de- colorized by sulphurous acid (H. Schiff, Ann., 1866, 140, p. 131). With diazobenzene sulphonic acid in the presence of alkali and a trace of sodium amalgam, a reddish-violet coloration is formed on standing (E. Fischer, Ber., 1883, 16, p. 657). A. Angeli (Gazz. chim. Ital., 1896, 22, ii, 17) has shown that aldehydes in the presence of nitrohydroxylaminic acid form hydroxamic acid. The aldehydes condense readily with acetoacetic ester in the presence of ammonia, to pyridines (see Pyridine), whilst O. Doebner and W. v. Miller {Ber., 1892, 25,- p. 2864; 1896, 29, p. 59) have shown that in the presence of aniline and sulphuric acid they give substituted quinolines. (See also C. Beyer, Ber., 1887, 20, p. 1908). The chief aldehydes are shown in the following table:—

Name.

Formula.

Boiling Point.

Melting Point.

Formaldehyde Acetaldehyde Propyl aldehyde n-Butyl ,,

iso- ,, „ n-Valeryl „

iso- „ ,, Oenanthyl „ Capric ,, Laurie „ Myristic „ Palmitic „ Stearic „

H-CHO

CH 3 -CHO

CH 3 -CH 2 -CHO

CH 3 -(CH 2) 2 -CHO

(CH 3) 2 CH-CHO

CHr(CH 2) 3 -CHO

C 4 H 9 -CHO

CH 3 -(CH 2) 6 -CHO

CH 3 -(CH 2) a CHO

CH 3 -(CH 2) 10 CHO

CH 3 .(CH 2), 2 -CHO

CH 3 -(CH 2) I4 -CHO

CH 3 -(CH 2) 16 -CHO

-21° 20-8°

<

K 61°

103 ° 92 °

I55 o 121°

44-5°

. 52-5°

58-5°

63-5°

Acrolein,

allyl aldehyde Crotonic ,, Tiglic ,,

(guaiacol)

CH 2 : CH-CHO CH 3 -CH : CH-CHO

CH 3 -CH:C-CH 3 -CHO

52 :

104°

116

Propargylic A.

CH :C-CHO

59°

Benzaldehyde

r°

Toluicaldehyde^ m

“-P Cumic

Cinnamic „

CH 6 -CHO C 6 H 4 -CH 3 -CHO

C6H4*C3ri7*CHO

C 6 H 6 -CH : CH-CHO

179°

200

199° 204 °

235° 247°

For formaldehyde see Formalin. Acetaldehyde, CH 3 CHO, was first noticed by C. Scheele in 1774 and isolated and investi gated by J. v. Liebig (Annalen, 1835, 14, p. 133). It is prepared by oxidizing ethyl alcohol with dilute sulphuric acid and potassium bichromate, and is a colourless liquid of boiling point 20-8° C, possessing a peculiar characteristic smell. Its specific gravity is 0-8009 (0° C). It is miscible in all proportions with alcohol, ether and water. It is readily polymerized, small quantities of hydro-chloric acid, zinc chloride, carbonyl chloride, &c. converting it, at ordinary temperatures, into paraldehyde, (C 2 H 4 0) 3 , a liquid boiling at 124 C. and of specific gravity 0-998 (15° C). Paralde- hyde is moderately soluble in water, < and when distilled with sulphuric acid is reconverted into the ordinary form. Metalde- hyde, (C 2 H 4 0) 3 , is produced in a similar way to paraldehyde, but at lower temperatures (e.g. in presence of a freezing mixture). It is a crystalline solid, which sublimes at ii2°-ii5° C. It is insoluble in water, and is only slightly soluble in

alcohol and ether. When heated in a sealed tube at 120° C. it is completely

converted into the ordinary form. Paraldehyde is oxidized by dilute nitric acid, with formation of much glyoxal, (CH0)2. (For trichloracetaldehyde see Chloral.)

By the action of acetaldehyde on alcohol at ioo° C, acetal, CH 3 .CH(OC2H 5)2, is produced. It may also be prepared by oxidizing ethyl alcohol with manganese dioxide and sulphuric acid (A. Wurtz) . It is a colourless liquid of specific gravity 0-8314 (20°/4°) (J. W. Briihty and boiling point 104 C. Dilute acids readily transform it into alcohol and aldehyde, and chromic acid oxidizes it to acetic acid. Chlor- and brom-acetals have been described.

Thioaldehydes are also known, and are obtained by leading sulphuretted hydrogen into an aqueous solution of acetaldehyde. By this means a mixture is obtained which by distillation or the action of hydrochloric acid yields trithioaldehyde, (C2H 4 S) 3 . For the constitution of these substances see E. Baumann and E. Fromm (Berichte, 1891, 24, p. 1426). Aldehyde ammonia, CH 3 -CH(OH)-NH 2 , is formed when dry ammonia gas is passed into an ethereal solution of acetaldehyde. It crystallizes in glistening rhombohedra, melting at 7o°-8o° C, and boiling at ioo° C. It is completely resolved into its components when warmed with dilute acids.

The higher aldehydes of the series resemble acetaldehyde in their general behaviour. Unsaturated aldehydes are also known, corresponding to the define alcohols; they show the characteristic properties of the saturated aldehydes and can form additive compounds in virtue of their unsaturated nature. The simplest member of the series is acrolein, C3H4O or CH 2 : CH-CHO, which can be prepared by the oxidation of allyl alcohol, or by the abstraction of the elements of water from glycerin by heating it with anhydrous potassium bisulphate. It is also produced by the action of sodium on a mixture of epichlorhydrin and methyl iodide, C 3 H 6 OCl + CH 3 I + 2Na = C 3 H40 + NaI + NaCl + CH 4 . It is a colourless liquid, with a very pungent smell, and attacks the mucous membrane very rapidly. It boils at 52-4° C. and is soluble in water. It oxidizes readily: exposure to air giving acrylic acid, nitric acid giving oxalic acid, bichromate of potash and sulphuric acid giving carbon dioxide and formic acid. It combines with bromine to form a dibromide, from which E. Fischer, by the

action of baryta water, obtained the synthetic sugars a- and /3-acrose (Berichte, 1889, 22, p. 360). Metacrolein, (C 3 H 4 0) 3 , is a polymer of acrolein. By passing acrolein vapour into ammonia, acrolein ammonia, C 6 H 9 NO, is obtained. It is a reddish amorphous mass, insoluble in alcohol, and when distilled yields picoline (methyl pyridine) (A. Baeyer, Ann., 1870, 155, p. 283). Citronellal, rhodinal and geranial are also unsaturated aldehydes (see Terpenes).

The aromatic aldehydes resemble the aliphatic aldehydes in most respects, but in certain reactions they exhibit an entirely different behaviour. They do not polymerize, and in the presence of caustic alkalies do not resinify, but oxidize to alcohols and acids (see Benzaldehyde for Cannizzaro's reaction). When heated with alcoholic potassium cyanide they are converted into benzoins (q.v.). Vanillin does not give the Cannizzarp reaction, butwithalcoholicpotashformsvanillicacid,HOOC-C6H 3 -OCH 3 (3) OH (4), and vanilloin. With ammonia, benzaldehyde does not form an aldehyde ammonia, but condenses to hydrobenz amide, (C6H 5 CH)jN2, with elimination of water. Cumic aldehyde (cuminol),(CH 3)2CH(i)C 6 H4-CHO,isfoundin Roman caraway oil and in oil of the water hemlock. It is a liquid, boiling at 235 C, and has a specific gravity of 0-973. On distillation with zinc dust it forms cymene (1-4 methyl isopropylbenzene).

Salicylic aldehyde (ortho-hydroxybenzaldehyde), HO(i)- C6H 4 -CHO, an aromatic oxyaldehyde, is a colourless liquid of boiling point 196° C. and specific gravity 1-172, (15°). It is found in the volatile oils of Spiraea, and can be obtained by the oxidation of the glucoside salicin, (CisHisO?), which is found in willow bark. It is usually prepared by the so-called " Reimer " reaction (Ber., 1876, 9, p. 1 268) , in which chloroform acts on phenol in the presence of a caustic alkali,

C,H s QH + CHCl 3 + 4KHO = 3KCl + 3H 2 0 + KO-C,H 4 -CHO, some para-oxybenaldehyde being formed at the same timei It

is volatile (para-oxybenzaldehyde is not) and gives a violet coloration with ferric chloride. For dioxybenzaldehydes and their derivatives see Piperonal and Vanillin.

Cinnamic aldehyde (/3-phenyl acrolein), CeHsCHrCHCHO, an unsaturated aromatic aldehyde, is the chief constituent of cinnamon oil. It is prepared by oxidizing cinnamyl alcohol, or by the action of sodium ethylate on a mixture of benzaldehyde and acetaldehyde. It is a colourless aromatic-smelling oily liquid, which boils at 247 C. and readily oxidizes on exposure.

By condensation of aldehydes with pyruvic acid and naph-thylamines, the a-alkyl-naphthoquinoline-7-carboxylic acids are produced; the same reaction takes place with the aromatic amines generally (O. Doebner, Ann. 1894, 281, p. i),

COOH

a

COOH + I +R-CHO =

NH, CO-CH,

NAR

+2H 2 0+2H.

ALDEN, JOHN (i5oo?i687), one of the “Pilgrims” who in 1620 emigrated to America on the ” Mayflower ” and founded the Plymouth Colony. According to William Bradford’s History of the Plimoth Plantation, he washired as a cooper at Southampton, ” where the ship victuled,” just before the voyage., “and being a hopfull yong man, was much desired.” He was one of the first settlers of Duxbury, Massachusetts, where he lived during the greater part of his life, and from 1633 until 1675 he was an ” Assistant “to the governor of the colony, frequently serving as acting governor. At the time of his death, at Duxbury, on the 1 2th of September 1687, he was the last male survivor of the signers of the ” Mayflower Compact ” of 1620, and with the exception of Mary Allerton was the last survivor of the “May flower ” company. He is remembered chiefly because of a popular legend, put into verse as The Courtship of Miles Standish by Henry W. Longfellow, concerning his courtship of Priscilla Mullins, whom he married in 1623, after having wooed her first on behalf of his friend, Miles Standish.

ALDER, a genus of plants (Alnus) belonging to the order Betulaceae, the best-known of which is the common alder (A. glutinosa). The genus comprises a few species of shrubs or trees,

seldom reaching a large size, distributed through the North Temperate zone, and in the New World passing along the Andes southwards to Chile. The British species A. glutinosa is confined to the Old World. This tree thrives best in moist soils, has a shrubby appearance, and grows under favourable circumstances to a height of 40 or 50 ft. It is characterized by its short-stalked roundish leaves, becoming wedge-shaped at the base and with a slightly toothed margin. When young they are somewhat glutinous, whence the specific name, becoming later a dark olive green. As with other plants growing near water it keeps its leaves longer than do trees in drier situations, and the glossy green foliage lasting after other trees have put on the red or brown of autumn renders it valuable for landscape effect. The stout cylindrical male catkins are pendulous, red- dish in colour and 2 to 4 in. long; the female are smaller, less than an inch in length and reddish-brown in colour, suggesting young fir-cones. When the small winged fruits have been scattered the ripe, woody, blackish cones remain, often lasting through the winter. The alder is readily propagated by seeds, but throws up root-suckers abundantly. It is important as coppice-wood on marshy ground. The wood is soft, white when first cut and turning to pale red; the knots are beautifully mottled. Under water the wood is very durable, and it is there- fore used for piles. The supports of the Rialto at Venice; and many buildings at Amsterdam, are of alder-wood. Furniture is sometimes made from the wood, and it supplies excellent charcoal for gunpowder. The bark is astringent; it is used for tanning and dyeing.

ALDER-FLY, the name given to neuropterous insects of the family Sialidae, related to the ant-lions, with long filamentous antennae and four large wings, of which the anterior pair is rather longer than the posterior. The females lay a vast number of eggs upon grass stems near water. The larvae are aquatic,

active, armed with strong sharp mandibles, and breathe by means of seven pairs of abdominal branchial filaments. When full- sized they leave the water and spend a quiescent pupal stage on the land before metamorphosis into the sexually mature insect. Sialis lutaria is a well-known British example. In America there are two genera, Corydalis and Chauliodes, which are remarkable for their relatively gigantic size and fo* the immense length and sabre-like shape of the mandibles.

ALDERMAN (from A.S. ealdorman, compounded of the com parative degree of the adjective eald, old, and man), a term

implying the possession of an office of rank or dignity, and, in modern times, applied to an office-bearer in the municipal corporations and county councilsof England and Wales, and in the municipal corporations of Ireland and the United States. Among the Anglo-Saxons, earls, governors of provinces and other persons of distinction received this title. Thus we read of the alder- mannus totius Angliae, who seems to have corresponded to the officer afterwards styled capitalis justiciarius Angliae, or chief – justice of England; the aldermannus regis, probably an occasional magistrate, answering to the modern justice of assize, or perhaps an officer whose duty it was to prosecute for the crown; and aldermannus comitatus, a magistrate with a middle rank between what was afterwards called the earl and the sheriff, who sat at the trial of causes with the bishop and declared the common law, while the bishop proceeded according to ecclesiastical law. Besides these, we meet with the titles of .aldermannus civitatis, burgi, castelli, humdredi sive wapentachii, &c. In England, before the passing of the Municipal Corporations Act, their functions varied according to the charters of the different boroughs. By the Municipal Corporations Act 1835, and other acts, consoli-ˆ dated by the Municipal Corporations Act 1882, the aldermen are elected by the .councillors for six years, one-half going out every three years. The number of councillors in each borough varies according to its magnitude. One-fourth of the municipal council consists of aldermen and three-fourths of councillois. In the counties,, too, the number of aldermen is one- third of the number of councillors, except in London, where it is one-sixth. In the municipal corporations of Scotland there is .no such title as alderman, the office-bearers of corresponding rank there being termed bailies. The corporation of the city of London was not included in the Borough Reform Act, and the antiquated system remains there in full force. The court of aldermen consists, of twenty-six, twenty-five of whom are elected for life by the free-, toen of the respective wards, who return two persons, one of whom the court of aldermen elect to supply the vacancy*:’ The city is divided into twenty-six wards; twenty four of these: send up one alderman each, the other two combine to choose a twenty fifth. ; The twenty-sixth alderman serves for the independent borough of Southwark (q.v.) and is appointed by the other aldermen, who generally select the senior from among themselves when a vacancy occurs. The lord mayor is: elected from such of the aldermen as have served the office of sheriff; of these the Common Hall, which consists of the freemen of the

different wards, select two, and the aldermen elect one of these to the mayoralty. The court of aldermen has the power of appoint- ment to certain offices, exercises judicial functions in regard. to licensing and in disputes connected with the ward election, has some power of disposal over the city cash and possesses magis— terial control over the city, each alderman being a judge and magistrate for the whole city, and by virtue of his office exercising the functions of a justice of the peace. The aldermen are members of the Court of common council, the legislative body of: the Corporation, which consists in all of 232 members, the remainder being elected annually by the freemen. In the United States aldermen form as a rule a legislative rather than a judicial body, although in some cities they hold courts and possess very con- siderable magisterial powers.

ALDERNEY (Fr. Aurigny), one of the Channel Islands, the northernmost of the principal members of the group, belong- ing to England. It lies in 49 43′ N. and 2° 12′ W., 9 m; W. of Cape La Hague on the coast of Normandy; The. harbour, on the north coast in the bay of Braye, is 23 m. from > St Peter

Port, Guernsey, by -way of which outer communications are principally carried on, and 55 m. S. by E. of Portland Bill, the, nearest point of England. The length of the island from N. E. to S. W. is 3ˆ m., its average breadth 1 m., its area 1962 acres, and its population (1001) 2062.

The strait between the island and Cape La Hague, called the Race of Alderney (French Raz Blanchard), confined by numerous rocks and reefs off either coast, is rendered very dangerous in stormy weather by conflicting currents. 7 Through this difficult channel the scattered remnant of the Ffench fleet under Tourville escaped after the defeat of La Hogue in 1692. To the west is the narrower and also dangerous channel &i ; the Swinge (Singe), between Alderney and the uninhabited islets of Burhou, Ortach and others. West of these again are! the Casquets, a group of rocks to which attaches a long record- of shipwreck. Rocks and reefs fringe all the. coasts of Alderney. The island itself is a level open tableland, which on the south- west and south falls abruptly to the sea in a majestic series of cliffs. The greatest elevation of the land is about 300 ft. Towards the north-west, north and;east the

less rocky coast is indented by several bays, with open sandy shores, of which those of Crabby, Braye, Corblets and Longy are the most noteworthy. South-west of Longy Bay, where the coast rises boldly, there is a remarkable projecting block of sandstone, called La Roche Pendante (Hanging Rock) overhanging the cliff. Sandstone (mainly along the north-east coast), granite and porphyry are the chief geological formations. There are a few streams, but water is obtained mainly from wells. Trees are scarce. . The town of St Anne stands almost in the centre of the island over- looking and extending towards the harbour. Here are the Court- house, a gateway commemorating Albert, 'prihce-consort, the, clock tower, which belonged to the ancient parish church, and the modern church (1850), in Early English style, an excellent example of the work of Sir Gilbert Scott. The church is a memorial to the family of Le Mesurier, in which the hereditary governorship of the island was vested until the abolition of the office in 1825. There is a chain of forts round the north .coast from Clanque Fort on the west to Fort Essex on the east; the largest is Fort Albert, above Braye Bay. In 1847 work was begun on a great breakwater west of the harbour, the intention being to provide a harbour of refuge, but although ai sum exceed- ing one and a half million sterling was spent the scheme, was unsuccessful. The soil of Alderney is light, fertile and; well cultivated; grain and vegetables are grown and early potatoes are exported. A large part of the island is under grass, affording pasture for cattle. The well-known term " Alderney cattle," however, has lost in great measure its former signification of a distinctive breed. Alderney is included in the bailiwick of Guernsey. It has a court consisting of a judge and six jurats^ attorney-general, prevot, grefiero and sergent; but as a judicial court it is subordinate to that of Guernsey, and its administrative powers are limited to such matters as the upkeep of roads.

For its relations to the constitution of the bailiwick, and for the history of the island, see Channel Islands.

ALDERSHOT, an urban district in the Basingstoke parlia- mentary division of Hampshire, England, 34 m. S.W. by W. of London, on the London & South- Western and the South- Eastern & Chatham railways. It was a mere village till 1855, when Aldershot camp was established. Pop. (1891) 25,595; (1901) 30,974. Its germ is to be found in the temporary camp on Chobham Ridges, formed in 1853 by Lord Hardinge, the commander-in-chief, the success of which convinced him of the necessity of giving troops practical instruction in the field and affording the generals opportunities

of manoeuvring large bodies of the three arms. He therefore ad vised, the purchase of a tract of waste land whereon a permanent camp might be established. His choice fell on Aldershot, a spot also recommended by strategic reasons, being situated on the flank of any army advancing upon London from the south. Nothing came of Lord Hardinge's proposal till the experience of the Crimean campaign fully endorsed his opinion. The lands at Aldershot, an extensive open heath country, sparsely dotted by fir-woods and intersected

by the Basingstoke canal, were then acquired by the crpwn. Wooden huts were erected in 1855, and permanent buildings to replace them were begun j'n 1881. Under the Barracks Act 1890, and the Military Works Act of 1897 and 1899, large sums were provided for ; completing the work. The former division of North and South camps and, permanent barracks no longer oh tains. North camp is now named' Marlborough Lipes, with a field artillery barrack and five infantry barracks Galled after Marlborough's victories.; South camp is now named Stanhope Lines, after Mr Stanhope, who was secretary of state for ; war when the Barracks Act 1890 was passed and. the, reconstruction commenced in earnest. They contain barracks for tjieˆRoyal Engineers and Army Service Corps, the general; parade, which stretches east and west, and five infantry barracks called after battles (other than those of Wellington) , of the wars with France, 1793-1815. There are also barracks for the Royal Army Judical Corps; The old permanent barracks (which were built fojr the most part about 1857) have been renamed Wellington Lines, with cavalry' and artillery barracks; and three in;fantry; barracks called after Wellington's victories in, the Peninsula. .For the sick there are the Conrtaught Hospital in the Marlborough Line«!, the Cambridge Hospital in Stanhope Lines, and the Union Hospital in Wellington Lines, besides the Louise Margaret Hospital for women and children and the isolated infection hospital. , ,

, The drainagei of the station is all modern, and the sewage, i§ disposed of on a sewage farm under the direction of the war department. The water supply is partly from the Aldershot Water Company, and partly from springs and reservoirs collecting water from a reserved area of war department property. , ;

Most of the barracks can accommodate not only the units they are constructed for, but also detachments going through courses of instruction. The total of men, women and children for, whom quarters are provided is at times a,s nigh as 24,000. ;

Besides the regimental, buildings there are a large number of buildings for garrison purposes, such as; quarters and offices for general, staff and departmental officers, with -the warrant and non-commissioned officers ˆemployed under them; the supply depot with abattoir and bakery; the ordnance stores; barrack stores for furniture and bedding, shops, and stores for R. Ei services; the balloon establishment; the detention barracks; fire brigade stations; five churches; recreation grpundsfoT officers and men; schools; and especially the military technical schools of army cooking, gymnastics, signalling, ballooning and of mounted infantry, Army Service Corps, Royal Army Medical Corps and veterinary duties. The wprk of these schools is; however, only a small part of :the military" training afforded at Aldershot; of greater importance is the field and musketry training, for the carrying out of which a considerable extent of land is essential. The land required for these purposes extends at present over an area about 95 m. in extreme length by 7 J m. in extreme width. In addition to this there is the land at Sandhurst and the Staff College; (Camberley) : about 6$ m, distant, and at Woolmer Forest, um. distant. The musketry practice of the troops at Aldershot is carried put at the Ash ranges, 2 m. east of the. barracks, while the Pirhright ranges, alongside those of the National Rifle Association at Bisley, are utilized by the Household Cavalry and Guards, who are en- camped there in succession. Suitable grounds in the vicinity of the barracks, of which Caesar's Camp, the Long Valley and Laffan's Plain are best known, are utilized for company, bat- talion and brigade training of infantry,, while the mounted branches work over a wider area, and the engineers carry out their practices where most, convenient. For the field-days of the combined arms, the whole of the war department property is available. Aldershot is the headquarters of the "Aldershot Army Corps," which is the largest organized force maintained in the United Kingdom.

Besides the troops in barracks, during fhe ; drill season there is often, a considerable force in camp, both regular troops from other stations; and militia and volunteer units, so that, including the regular garrison, sometimes as many as 40,000

troop's have been concentrated at the station for training and manoeuvres.

ALDHELM (c. 640-709), bishop of Sherborne, English scholar, was born before the middle of the 7th century. He is said to have been the son of Ken ten, who was of the royal house of Wessex, but who was certainly not, as Aldhelm's early biographer Faritius asserts, the brother of King Ine. He received his first education in the school of an Irish scholar and monk, Maildulf , Msldubh or Meldun (d. c. 675), who had settled in the British stronghold of Bladon or Bladow on the site of the town called Mailduberi, Maldubesburg, Meldunesburg, &c, and finally Malmesbury, 1 after him. In 668 Pope Vitalian sent Theodore of Tarsus to be archbishop of Canterbury, and about the same time came the African scholar Hadrian, who became abbot of St Augustine's at Canterbury. Aldhelm was one of his disciples, for he addresses him as the " venerable preceptor of my rude childhood." He must, nevertheless, have been thirty years of age when he began to study with Hadrian. His studies included Roman law, astronomy, astrology, the art of reckoning and the difficulties of the calendar. He learned, according to the doubtful statements of the early lives, both Greek and Hebrew. He certainly introduces many Latinized Greek words into his works. Ill-health compelled him to leave Canterbury, and he returned to Malmesbury, where he was a monk under Maildulf for fourteen years, dating probably from 661, and including the period of his studies with Hadrian. When Maildulf died, Aldhelm was appointed in 675, according to a charter of doubtful authenticity cited by William of Malmesbury, by Leutherius, bishop of Dorchester from 671 to 676, to succeed to the direction of the monastery, of which he became the first abbot. He introduced the Benedictine rule, and secured the right of the election of the abbot to the monks themselves. The community at Malmes- bury increased, and Aldhelm was able to found two other monasteries to be centres of learning at Frome and at Bradford on Avon. The little church of St Lawrence at Bradford dates back to his time and may safely be regarded ashis. At Malmes- bury he built a new church to replace Maildulf's modest building, and obtained considerable grants of land for the monastery. His fame as a scholar rapidly spread into other countries. Artwil, the son of an Irish king, submitted his writings for Aldhelm's approval, and Cellanus, an Irish monk from Peronne, was one of his correspondents. Aldhelm was ' the first Englishman, so far as we know, to write in Latin verse, and his letter to Acircius (Aldfrith or Eadfrith, king of Northumbria) is a treatise on Latin prosody for the use of his countrymen. In this work he included his most famous productions, 101 riddles in Latin hexarneters. Each of them is a complete picture, and one

of them runs to 83 lines. That his merits as a scholar were early recognized in his own country is shown by the encomium of Bede (Ecd. Hist. v. 18), who speaks of him as a wonder of erudition. His fame reached Italy, and at the request of Pope Sergius I. (687-701) he paid a visit to Rome, of which, however, there is no notice in his extant writings. On his return, bringing with him privileges for his monastery and a magnificent altar, he received a popular ovation. He was deputed by a synod of the church in Wessex to remonstrate with the Britons of Domnonia (Devon and Cornwall) on their differences from the Roman practice in the shape of the tonsure and the date of Easter. This he did in a long and rather acrimonious letter to their king Geraint (Geruntius), and their ultimate agreement with Rome is referred by William of Malmesbury to his efforts. In 705, or perhaps earlier, Haeddi, bishop of Winchester, died, and the diocese was divided into two parts. Sherborne was the new see, of which Aldhelm reluctantly became the first bishop. He wished to resign the abbey of Malmesbury which he had governed for thirty years, but yielding to the remonstrances of the monks he continued to direct it until his death. He was now an old man, but he showed great activity in his new functions. The cathedral church which he built at Sherborne, though replaced later by a

_' For the disputed etymology of Malmesbury, which some connect with Aldhelm's name, see Bishop Browne, St Aldhelm: his Life and Times, p. 73.

Norman church, is described by William of Malmesbury. He was on his rounds in his diocese when he died in the church of Doulting on the 25th of May 709. The body was taken to Malmesbury, and crosses were set up by the pious care of his friend, Bishop Ecgwine of Worcester, at the various halting-places. He was buried in the church of St Michael. His biographers relate miracles due to his sanctity worked during his lifetime and at his shrine.

Aldhelm wrote poetry in Anglo-Saxon also, and set his own compositions to music, but none of his songs, which were still popular in the time of Alfred, have come down to us. Finding his people slow to come to church, he is said to have stood at the end of a bridge singing songs in the vernacular, thus collecting a crowd to listen to exhortations on sacred subjects. Aldhelm wrote in elaborate and grandiloquent Latin, which soon came to be regarded as barbarous. Much admired as he was by his contemporaries, his fame as a scholar therefore soon declined,

but his reputation as a pioneer in Latin scholarship in England and as a teacher remains.

Aldhelm's works were collected in J. A. Giles's Patres ecd. Angl. (Oxford, 1844), and reprinted by J. P. Migne in his Patrologiae Cursus, vol. 89 (1850). The letter to Geraint, king of Domnonia, was supposed to have been destroyed by the Britons (W. of Malmesbury, Gesta Pontificum, p. 361), but was discovered with others of Aldhelm's in the correspondence of St Boniface, archbishop of Mainz. A long letter to Eahf rid, a scholar just returned from Ireland (first printed in Usserii Veterum Epistt. Hiber. Sylloge, 1632), is of interest as casting light on the relations between English and Irish scholars. Next to the riddles, Aldhelm's best-known work is De Laude Virginitatis sive de Virginitate Sanctorum, a Latin treatise addressed about 705 to the nuns of Barking, 2 in which he commemorates a great number of saints. This was afterwards turned by Aldhelm into Latin verse (printed by Delrio, Mainz, 1601). The chief source of his Epistola ad Acircium sive liber de septenario, et de metris, aenigmatibus ac pedum regulis (ed. A. Mai, Class. Auct. vol. v.) is > Priscian. For the riddles included in it, his model was the collection known as Symposii aenigmata. The acrostic intro- duction gives the sentence, " Aldhelmus cecinit millenis versibus odas," whether read from the initial or final letters of the lines. His Latin poems include one on the dedication of a basilica built by Bugge (or Eadburga), a royal lady of the house of Wessex.

Authorities. — Faritius (d. 1 1 1 7) , an Italian monk of Malmesbury, afterwards abbot of Abingdon, wrote a Fito S. Aldhelmi (MS. Cotton, Faustina, B. 4), printed by Giles and Migne, also in Original Lives of Anglo-Saxons (Caxton Soc, 1854) : but the best authority is William of Malmesbury, who in the fifth book, devoted to St Aldhelm, of the Gesta Pontificum proposes to fill up the outline of Faritius, using the church records, the traditions of Aldhelm's miracles preserved by the monks of Malmesbury, and the lost " Handboc " or commonplace book of King Alfred. His narrative is divided into four parts : the birth and attainments of Aldhelm, the religious houses he had established and endowed, the miracles recorded of him, and the history of the abbey down to the writer's own time (see De Gestis Pontificum, ed. N. E. S. A. Hamilton, 1870, for the Rolls Series, PP- 330-443)- The life by John Capgrave in his Legenda Nova (1516) is chiefly an abridgment of Malmesbury's narrative. Consult also L. Bonhoff, Aldhelm von Malmesbury (Dresden, 1894) ; T. D. Hardy, Descriptive Catalogue (1862), vol. i. pp.

389-396; T. Wright, Biog. Brit. Lit. (A.-S. Period, 1842); G. F. Browne, bishop of Bristol, St Aldhelm; his Life and Times (1903); and W. B. Wildman, Life of S. Ealdhelm, first Bishop of Sherborne (1905), containing many interesting local details. For some poems attributed to Aldhelm, and printed in Diimmler's edition of the letters of St Boniface and Lul in Monumenta Germaniae Historica (epistt. torn, iii.), see H. Bradley in Eng. Hist. Review, xv. p. 291 (1900), where they are attributed to Aldhelm's disciple ˆEthilwald. The very varied sources and the chronology of Aldhelm's work are discussed in " Zu Aldhelm und Baeda," by Max Manitius, in Sitzungsberichte der kaiserlichen Akad. der Wissenschaften (Vienna, 1886).

An excellent account of his ecclesiastical importance is given by W. Bright in Chapters on Early English Church History (Oxford, 1878). For his position as a writer of Latin verse consult A. Ebert, Allgemeine Geschichte d. Literatur des Mittelalters im Abendlande,

2 Cuthburga, sister of King Ine of Wessex, and therefore related to Aldhelm, left her husband Aldfrith, king of Northumbria, to enter the nunnery at Barking. She afterwards founded the nunnery of Wimborne, of which she became abbess.

vol. i. new edition (1889); M. Manitius, Geschichte der christlich-lateinischen Poesie &c. (Stuttgart, 1891), pp. 487-496; also H. Hahn, Bonifaz und Lul ihre angelsdchsischen Korrespondenten, chap. i. (Leipzig, 1883). The two last-named works contain many further bibliographical references.

ALDINE PRESS, the printing office started by Aldus Manutius at the end of the 1 5th century in Venice, from which were issued the celebrated Aldine editions of the classics of that time. (See Manutius.) The Aldine Press is famous in the history of typography (q.v.), among other things, for the introduction of italics.

ALDINI, GIOVANNI (1762-1834), Italian physicist, born at Bologna on the 10th of April 1762, was a brother of the statesman Count Antonio Aldini (1756-1826) and nephew of L. Galvani, whose treatise on muscular electricity he edited with

notes in 1791. He became professor of physics at Bologna in 1798, in succession to his teacher Sebastiano Canterzani (1734-1819). His scientific work was chiefly concerned with galvanism and its medical applications, with the construction and illumination of lighthouses, and with experiments for preserving human life and material objects from destruction by fire. He wrote in French and English in addition to his native Italian. In recogni- tion of his. merits, the emperor of Austria made him a knight of the Iron Crown and a councillor of state at Milan, where he died on the 17 th of January 1834. He left by will a considerable sum to found a school of natural science for artisans at Bologna.

ALDRED, or Ealdred (d. 1069), English ecclesiastic, became abbot of Tavistock about 1027, in 1044 was made bishop of Worcester, and in 1060 archbishop of York. He had considerable influence over King Edward the Confessor, and as his interests were secular rather than religious he took a prominent part in affairs of state, and in 1046 led an unsuccessful expedition against the Welsh. In 1050 he was largely instrumental in restoring Sweyn, the son of Earl Godwin, to his earldom, and about the same time went to Rome " on the king's errand." In 1054 he was sent to the emperor Henry III. to obtain that mon- arch's influence in securing the return to England of Edward, son of Edmund Ironside, who was in Hungary with King Andrew I. In this mission he was successful and obtained some insight into the working of the German church during a stay of a year with Hermann II. , archbishop of Cologne. After his return to England he took charge of the sees of Hereford and Ramsbury, although not appointed to these bishoprics; and in 1058 made a pilgrimage to Jerusalem, being the first English bishop to take this journey. Having previously given up Hereford and Ramsbury, Aldred was elected archbishop of York in 1060, and in 1061 he proceeded to Rome to receive the pallium. On his arrival there, however, various charges were brought against him by a synod, and Pope Nicholas II. not only refused his request but degraded him from the episcopate. The sentence was, however, subsequently reversed, and Aldred received the pallium and was restored to his former station. It is stated by Florence of Worcester that Aldred crowned King Harold II. in 1066, although the Norman authorities mention Stigand as the officiating prelate. After the battle of Hastings Aldred joined the party who sought to bestow the throne upon Edgar the ˆEtheling, but when these efforts appeared hopeless he was among those who submitted to William the Conqueror at

Berkhampstead. Selected to crown the new king he performed the ceremony on Christmas Day 1066, and in 1068 performed the same office at the coronation of Matilda, the Conqueror's wife. But though ofter^at court, he seems to have been no sympathiser with Norman oppression, and is even said to have bearded the king himself. He died at York on the nth of September 1069 and was buried in his own cathedral. Aldred did much for the restoration of discipline in the monasteries and churches under his authority, and was liberal in his gifts for ecclesiastical purposes. He built the monastic church of St Peter at Gloucester, and rebuilt a large part of that of St John at Beverley. At his instigation, Folcard, a monk of Canterbury, wrote the Life of St John of Beverley.

See The Anglo-Saxon Chronicle, edited by C. Plummer (Oxford, 1892-1899); Florence of Worcester, Chronicon ex Chronicis, edited by B. Thorpe (London, 1 848-1 849); William of Malmesbury, De

Gestis Pontificum Anglorum, edited by N. E. S. A. Hamilton (London, 1870); W. H. Dixon, Fasti Eboracenses, vol. i., edited by J. Raine (London, 1863); T. Stubbs, Chronica Pontificum Ecclesiae Ebora- censis, edited by J. Raine (London, 1879-1894); E. A. Freeman, History of the Norman Conquest, vols, ii., iii., iv. (Oxford, 1867-1879).

ALDRICH, HENRY (1647-1710), English theologian and philosopher, was born in 1647 a t Westminster, and was educated at the collegiate school there, under Dr Busby. ' In 1662 he entered Christ Church, Oxford, and in 1689 was made dean in succession to the Roman Catholic, John Massey, who had fled to the continent. In 1692 he was vice-chancellor of the Uni- versity. In 1702 he was appointed rector of Wem in Shropshire, but continued to reside at Oxford, where he died on the 14th of December 17 10. He was buried in the cathedral without any memorial at his own desire. Aldrich was a man of unusually varied gifts. A classical scholar of fair merits, he is best known as the author of a little book on logic (Compendium A rtis Logicae) , a work of little value in itself, but used at Oxford (in Mansel's revised edition) till long past the middle of the 19th century. Aldrich also composed a number of anthems and church services of high merit, and adapted much of the music of Palestrina and Carissimi to English words with great skill and judgment. To him we owe the well-known catch, " Hark, the bOnny Christ Church bells." Evidence of his skill as an architect may be seen in the

church and catapanile of All Saints, Oxford, and in three sides of the so-called Peckwater Quadrangle of Christ Church, which were erected after his designs. He bore a great reputation for conviviality, and wrote a humorous Latin version of the popular ballad —

A soldier and a sailor, A tinker and a tailor, &c.

Another specimen of his wit is furnished by the following epigram

of the five reasons for drinking: — ■

Si bene quid memini, causae sunt quinque bibendi; Hospitis adventus, pr'aesens sitis atque futura, Aut vini bonitas, aut quaelibet altera causa.

The translation runs: —

If on my theme I rightly think,

There are five reasons why men drink : —

Good wine; a friend; because I'm dry;

Or lest I should be by and by; .

Or — any other reason why.

ALDRICH, NELSON WILMARTH (1841-), American politician, was born at Foster, Rhode Island, on the 6th of November 1841. His first political service was as a member (1869-187 5) and president (1871-1872) of the Providence, common council. He was a member of the lower house of the Rhode Island legislature in 1875 and 1876, and speaker in the, latter year. By this time he had become a power in Republicanˆ state politics, and in 1878 and 1880 was elected . to Congress/ Early in his second term he was chosen United States senator, and was re-elected in 1886, 1892, 1898 and 1905. In the Senate he was looked upon as the special representative of the high protective industries and moneyed interests, and he took a prominent part in all legislation dealing with the tariff, banking, and the merchant marine.

ALDRICH, THOMAS BAILEY (1836-1907), American author, was born in Portsmouth, New Hampshire, on the 11th of November

1836. When he was but a child his father moved to New Orleans, but after ten years the boy was sent back to/ Portsmouth — the " Rivermouth " of several of his stories— to prepare for college. This period of his life is partly described in his Story of a Bad Boy (1870), of which " Tom Bailey " is the juvenile hero. 1 His father's death in 1852 compelled Aldrich to abandon the idea of college and enter a business office in New York. Here he soon became a constant contributor to the news- papers and magazines, and the intimate friend of the young poets, artists and wits of the metropolitan Bohemia of the early 'sixties,, among whom were E. C. Stedman, R. H. Stoddard, Bayard. Taylor and Walt Whitman. From 1856 to 1859 he was on the staff of the Home Journal, then edited by N. P. Willis, while

1 This book has been translated into French as Education et rScriation, and into German as a specimen of American humour. '.

during the Civil War he was himself editor of the New York Illustrated News. In 1865 he moved to Boston and was editor for ten years for Ticknor and Fields — then at the height of their prestige — of the eclectic weekly Every Saturday, discontinued in 1875. From 1881 to 1890 he was editor of the Atlantic Monthly. Meanwhile Aldrich had written much, both in prose and verse. His genius was many-sided, and it is surprising that so busy an editor and so prolific a writer should have attained the perfection of form for which he was remarkable. His successive volumes of verse, chiefly The Ballad of Babie Bell (1856), Pampinea, and Other Poems (1861), Cloth of Gold (1874), Flower and Thorn (1876), Friar Jerome's Beautiful Book (1881), Mercedes and Later Lyrics (1883) ,Wyndham Towers (1889), and the collected editions of 1865, 1882, 1897 and 1900, showed him to be a poet of lyrical skill, dainty touch and felicitous conceit, the influence of Herrick being constantly apparent. He repeatedly essayed the long narrative or dramatic poem, but seldom with success, save in such earlier work as Garnaut Hall. But no American poet has shown more skill in describing some single picture, mood, conceit or episode. His best things are such lyrics as " Hesperides," " When the Sultan goes to Ispahan," " Before the Rain," "Name- less Pain," " The Tragedy," " Seadrift," " Tiger Lilies," " The One White Rose," " Palabras Carinosas," " Destiny,"

or the eight-line poem " Identity," which did more to spread Aldrich's reputation than any of his writing after Babie Bell. Begin- ning with the collection of stories entitled Marjorie Daw and Other People (1873), Aldrich applied to his later prose work that minute care in composition which had previously characterized his verse — taking a near, new or salient situation, and setting it before the reader in a pretty combination of kindly realism and reticent humour. In the novels, Prudence Palfrey (1874), The Queen of Sheba (1877), and The Stillwater Tragedy (1880), there is more rapid action; but the Portsmouth pictures in the first' are elaborated with the affectionate touch shown in the shorter humourous tale, A Rivermouth Romance (1877). In An Old Town by the Sea (1893) the author's birthplace was once more com- memorated, while travel and description are the theme of From Ponkapog to Pesth (1883). Aldrich died at Boston on the 19th of March 1907.

His Life was written by Ferris Greenslet (1908).

ALDRINGER (Altringer, Aldringen), JOHANN, Count von (1 588-1634), Austrian soldier, was born at Diedenhofen (Thionville) in Lorraine. After travelling as page to a nobleman in France, Italy and the Netherlands, he went to the university of Paris. In 1606 he entered the service of Spain, in which he remained until 1618, when he joined the imperial army. Here he distinguished himself in the field and in the cabinet. Made a colonel in 1622, two years later he was employed on the council of war and on diplomatic missions. At the bridge of Dessau in 1626 he performed very distinguished service against Ernst von Mansfeld. He and his constant comrade Matthias Gallas (q.v.) were ennobled on the same day, and in the course of the Italian campaign of 1630 the two officers married the two daughters of Count d'Arco. Aldringer served as Count Rambold Collalto's major-general in this campaign and was present at the taking of Mantua. The plunder of the duke of Mantua's treasures made Gallas and Aldringer wealthy men. Back in Germany in] 63i, he served after Breitenfeld as Tilly's artillery commander, and, elevated to the dignity of count of the Empire, he was present at the battle of the Lech, where he was wounded. When Tilly died of his wounds Aldringer succeeded to the command. Made field-marshal after the assault of the Alte Veste near Nuremberg, at which he had been second in command under Wallenstein, duke of Friedland (with whom he was a great favourite), he was next placed at the head of the corps formed by Maximilian I. of Bavaria to support Wallenstein. In this post his tact and

diplomatic ability were put to a severe test in the preservation of harmony between the two dukes. Finally Count Aldringer was won over by the court party which sought to displace the too successful duke of Friedland. After Wallenstein's death Aldringer commanded against the Swedes on the Danube, and at the defence of Landshut he fell (July 22, 1634). His great

possessions descended to his sister, and thence to the family of Clary and Aldringen.

See Brohm, Johann von Aldringen (Halle, 1882), and Hermann Hallwich, Johann von Aldringen (Leipzig, 1885) ; also Allgemeine Deutsche Biographie, s.v. Gallas, correcting earlier biography of Aldringer in the same work.

ALDROVANDI, ULISSI (1522-1605), Italian naturalist, was born of noble parentage at Bologna on the nth of September 1522. He was apprenticed to a merchant in Brescia, but a commercial career being distasteful to him, he turned' his atten- tion to law and medicine, studying first in his native town and afterwards at Padua. In 1550 he was accused of heresy, but succeeded in clearing himself before the Inquisition. In 1553 he took his doctor's degree in medicine at Bologna, and in' the following year was appointed professor of philosophy and also lecturer on botany at the university. In 1 560 he was transferred to the chair of natural history. At his instance the senate of Bologna established in 1568 a botanical garden, of which he was appointed the first director. About the same time he became inspector of drugs, and in that capacity published in 1 574 a work entitled Antidotarii Bononiensis Epitome, which formed the model for many subsequent pharmacopoeias. He was also instrumental in founding the public museum of Bologna, which contains, especially in the natural history department, a large number of specimens collected by him. The results of his various researches were embodied in a magnum opus, which was designed to include everything that was known about natural history. The first three volumes, comprising his ornithology, were pub- lished in 1 599, and a fourth, treating of insects, appeared in 1602. After his death a number of other volumes were compiled from his manuscript materials, under the editorship of several of his pupils, to whom the task was entrusted by the senate of Bologna. The work was enriched by a large number of illustrations pre- pared at great expense, the author having, it is said, employed several celebrated artists for thirty years. Among these were Lorenzo Benini of Florence and

Christopher Coriolanus of Nuremberg. It has been said, indeed, that the cost of the under- taking was so great as to exhaust its author's means, and that he died penniless and blind in the public hospital of Bologna. This, however, is probably incorrect, at least as regards the allegation of poverty. Published records of the senate of Bologna show that it liberally supported Aldrovandi in his undertaking, doubling his salary soon after his appointment as professor, and bestowing on him from time to time sums amounting in all to 40,000 crowns. If, therefore, he died in the public hospital, he probably went there for the better treatment of his disease. His death occurred on the 10th of May 1605. Aldrovandi was chiefly remarkable for laborious and patient research. He seems to have been totally destitute of the critical faculty, and hardly any attempt is made in his great work to classify facts or to distinguish between the true and the fabulous, the important and the trivial. . Much is thus included that is of no scientific value, but it also contains much information of very great interest to the naturalist.

ALE, an old word for a fermented liquor obtained chiefly from malt. In England " ale " is nowadays practically synony- mous with " beer." Before the introduction of hops into England from Flanders in the 16th century ale was the name exclusively applied to malt liquor, the term beer being gradually introduced to describe liquor brewed with an infusion of hops. This distinction does not apply at the present time, except in so far as the term ale is not applied to black beers (stout and porter) nor to lager beer. In the United States, however, it is customary to confine the designation beer to the article obtained by the bottom fermentation process. In former times the Welsh and Scots had two distinct kinds of ale, called common and spiced ales, the relative values of which were appraised by law in the following terms: " If a farmer have no mead, he shallpay two casks of spiced ale, or four casks of common ale, for one cask of mead." There are numerous varieties of English alesˆ such as mild ale, which is a full, sweetish beer, of a dark colour and with relatively little hop; pale ale,, which is relatively dry, of light colour and of a more pronounced hop flavour than the mild ale;

and bitter and stock ales, the latter term being generally reserved for superior beers, such as are used for bottling. The terms pale,

bitter, stock, light, &c, are to be regarded as trade distinc- tions and not as exact definitions of quality or type. (See Beer and Brewing.)

Parish Ales. — In old England an ” ale ” was synonymous with a parish festival or merry-making at which ale was the chief drink. The word was generally used in composition. Thus there were leet-ales (that held on leet or manorial court day) ; lamb-ales (that held at lamb-shearing) ; Whitsun-ales, clerk-ales, church-ales and so on. The word bridal is really bride-ale, the wedding feast. Bid-ales, once very common throughout England, were ” benefit ” feasts to which a general invitation was given, and all the neighbours attending were expected to make some contribution to help the object of the “benefit.” (See “Bidding-Weddings” under Bride.) These parish festivals were of much ecclesiastical and social importance in medieval England. The chief purpose of church-ales and clerk-ales, at least, was to facilitate the collection of parish-dues, or to make an actual profit for the church from the sale of the liquor by the church wardens. These profits kept the parish church in repair, or were distributed as alms to the poor. At Sygate, Norfolk, on the gallery of the church, is inscribed-^

God speed the plough

And give us good ale enow . . .

Be merry and glade,

With good ale was this work made.

On the beam of a screen in the church of Thorpe-le-Soken, Essex, is the following inscription in raised Gothic letters, on a scroll held by two angels — ” This cost is the bachelers made by ales thesn be ther med.” The date is about 1480. The feast was usually held in a barn near the church or in the churchyard. In Tudor times church-ales were held on Sundays. Gradually the parish-ales were limited to the Whitsun season, and these still have local survivals. The colleges of the universities used formerly to brew their own ales and hold festivals known as college-ales. Some of these ales are still brewed and famous, like ” chancellor ” at Queen’s College, and ” archdeacon ” at Merton College, Oxford, and ” audit ale ” at Trinity, Cambridge. See Brand’s Popular Antiquities of Great Britain (Wrh. Carew Hazlitt’s edition, 1905).

ALEANDRO, GIROLAMO (Hieronymcs Aleander) (1480- 1542), Italian cardinal, was born at Motta, near Venice, on the 13th of February 1480. He studied at Venice, where he became acquainted with Erasmus and Aldus Manutius, and at an early age was reputed one of the most learned men of the time. In 1508 he went to Paris on the invitation of Louis XII. as pro- fessor of belles lettres, and held for a time the position of rector in the university. Entering the service of Eberhard, prince- bishop of Liege, he was sent by that prelate on a mission to Rome, where Pope Leo X. retained him, giving him (1519) the office of librarian of the Vatican. In the following year he went to Germany to be present as papal nuncio at the coronation of Charles V., and was also present at the diet of Worms, where he headed the opposition to Luther, advocating the most extreme measures to repress the doctrines of the reformer. His conduct evoked the fiercest denunciations of Luther, but it also displeased more moderate men and especially Erasmus. The edict against the reformer, which was finally adopted by the emperor and the diet, was drawn up and proposed by Aleandro. After the close of the diet the papal nuncio went to the Netherlands, where he kindled the flames of persecution, two monks of Antwerp, the first martyrs of the Reformation, being burnt in Brussels at his instigation. In 1523 Clement VII., having appointed him archbishop of Brindisi and Oria, sent him as nuncio to the court of Francis I. He was taken prisoner along with that monarch at the battle of Pavia (1525), and was released only on payment of a heavy ransom. He was subsequently employed on various papal missions, especially to Germany, but was unsuccessful in preventing the German princes from making a truce with the reformers, or in checking to any extent the progress of the new doctrines. He was created cardinal in 1536 by Paul III. (at the

same time as Reginald Pole) and died at Rome on the 1st of February 1542. .-:,.•.

Aleandro compiled a Lexicon Graeco-Latinum (Paris, 1514), and wrote Latin verse of considerable merit inserted in M. Tuscanus's Carmina Illustrium. Poetarum Italiorum. The Vatican library contains a volume of manuscript letters and other documents written by him in connexion with his various missions against Luther. They were utilized by PallavicinO in his Istoria del Concilia Tridentino (i. 23-28), whogives a very partial account of the Worms conference.

Aleandro, who is sometimes called "the elder," must be distin-

guished from his grand-nephew, also called Girolamo Aleandro (1574-1629). The younger Aleandro was a very distinguished scholar, and wrote Psalmi poenitentiales versibus elegiacis expressi (Treves, 1593), Gaii, veteris. juris consulti Institutionum fragtnenta, cum commentario (Venice, 1600), Explicatio veteris tabulae marmorcae solis effigie symbolisque exculptae (Rome, 1616).

ALEARDI, ALEARDO, Count (1812-1878), Italian poet; was born at Verona on the 4th of November 181 2, and thus soon after his birth became an Austrian subject. Inspired from his cradle with a hatred of the foreigner, he found himself disqualified for the position in the public service to which his rank would have entitled him, and unable to publish his patriotic verses. Arnaldo da Rocca, a narrative poem, nevertheless appeared in 1842, and the revolutionary year 1848 made an opening for his Lettere a. Maria. He took an active part in the popular uprising, and was for some time imprisoned. In 1856 he produced ,the finest of his pieces, an ode to the maritime cities of Italy; and in 1858 a poem on his own misfortunes. After the expulsion of the Austrians from Lombardy he returned to Verona, published his poems in a collected edition (1862), became professor at the Academy of Fine Art, member of the Italian parliament and eventually senator. He died on the 17th of July 1878. Aleardi's warmth of patriotic feeling hardly finds adequate expression in his poetry; it is his merit to excel in description, but his fault to substitute description for action.

ALE-CONNER, an officer appointed yearly at the.court-leet 0$ ancient English manors for the assize of ale and ale-measures; The gustatores cemMae— -called in different localities by the different names "ale-tasters," " ale-founders, '\ and "ale- conners " — were sworn to examine beer and ale, to take care that they were good and wholesome and were sold at proper prices. In London four ale-conners, whose duty it is to examine the measures used by beer and liquor sellers to guard against fraud, are still chosen annually* by the liverymen in common hall assembled on Midsummer Day. Since ale and beer have become excisable commodities the custom of appointing ale-tasters has in most places fallen into disuse. (See also Adulteration.)

ALECSANDRI, or Alexandri, VASILE (i82i-f89o), ! Rumanian lyric poet, was born at Bacau in Moldavia on the 21st of July 1 82 1. His father was the Spatar Alecsandri, of Jewish and Italian origin, who had settled in Moldavia in the 18th century, Vasile was

educated first in Jassy and afterwards (1834ˆ-1839) in Paris. In 1839 he started on a long journey through the Carpathian Mountains, and was the first to collect Rumanian popular songs, no doubt influenced by Western examples. He first published his collection in 1844. His Dmne si Lacrimioard, lyrical poems, appeared at Paris in 1852, and in 1852ˆ-1853 he produced at Jassy a fuller collection of popular ballads and songs! He then adapted some French plays for the newly founded Rumanian theatre, and wrote some original pieces. His con- nexion with the revolutionary movement of 1848 compelled him to seek shelter in the west of Europe, and he visited England, where a beautifully illuminated edition of his poems was' printed in the original Rumanian language. In 1867 he published some fugitive pieces, written in a lighter vein, and entitled Pastele; these were followed in 1871 by the Legends of similar character; More serious are his dramatic writings which begah with Despot Voda and culminated in Ovid. In later life Alecsandri took an active part in politics; he became minister for foreign affairs from 1859 to i860, and in 1885 was appointed Rumanian minister in Paris. He died on the 26th of August 1890 at his country seat, Mirce§ti. His best tide to fame consists in the fact that he

gave the first impetus to the collection of Rumanian popular songs and first drew attention to their inimitable charm.

See L. Sainsanu, Autorii Romdni moderni (1891), pp. 90 and 318. A complete edition of Alecsandri's writings in nine volumes was published at Bucharest in 1875 seq. (M. G.)

ALEMAN, LOUIS (c. 1390-1450), French cardinal, was born of a noble family at the castle of Arbent near Bugey about the year 1390. He was successively bishop of Maguelonne (1418), arch- bishop of Aries (1423) and cardinal priest of St Cecilia (1426). He was a prominent member of the council of Basel, and, together with Cardinal Julian, led the party which maintained the supremacy of general councils over the pope's authority. In 1440 Aleman obtained the support of the emperor Sigismund and of the duke of Milan to his views, and proclaiming the deposition of Pope Eugenius IV., placed the tiara upon the head of Amadeus VIII., duke of Savoy (henceforward known as antipope Felix V.). Eugenius retorted by excommunicating the antipope and

depriving Aleman of all his ecclesiastical dignities. In order to make an end of the schism, Felix V. finally abdicated on Aleman's advice, and Nicholas V. ,who had succeeded in 1447, restored the cardinal to all his honours and employed him as legate to Germany in 1449. On his return he retired to his diocese of Aries, where he devoted himself zealously to the instruction of his people. He died on the 16th of September 1450, and was beatified by Pope Clement VII. in 1527.

See U. Chevalier, Repert. des sources hist. (Paris, 1905), p. 130.

ALEMAN, MATEO (1547-1609?), Spanish novelist and man of letters, was born at Seville in 1547. He graduated at Seville University in 1564, studied later at Salamanca and Alcala, and from 1571 to 1588 held a post in the treasury; in 1594 he was arrested on suspicion of malversation, but was speedily released. In 1599 he published the first part of Guzmdn de Alfarache, a celebrated picaresque novel which passed through not less than sixteen editions in five years; a spurious sequel was issued in 1602, but the authentic continuation did not appear till 1604. In 1608 Aleman emigrated to America, and is said to have carried on business as a printer in Mexico; his Ortografia castellana (1609), published in that city, contains ingenious and practical proposals for the reform of Spanish spelling. Nothing is recorded of Aleman after 1609, but it is sometimes asserted that he was still living in 1617. He married, unhappily, Catalina de Es- pinosa in 1571, and was constantly in money difficulties, being imprisoned for debt at Seville at the end of 1602. He is the author of a life (1604) of St Antony of Padua, and versions of two odes of Horace bear witness to his taste and metrical accom- plishment. His chief title to remembrance, however, is Guzmdn de Alfaracke, which was translated into French in 1600, into English in 1623 and into Latin in 1623.

See J. Hazanas y la Rua, Discursos leidos en la Real Academia Sevillana de Buenas letras el 2$ de marzo de i8q2 (Sevilla, 1892); J. Gestoso y Perez, Nuevos datos para 'iluslrar las biografias del Maestro Juan de Malara y de Mateo Aleman (Sevilla, 1896). (J. F.-K.)

ALEMBERT, JEAN LE ROND D' (1717-1783), French mathe- matician and philosopher, was born at Paris in November 17 17. He was a foundling, having been exposed near the church of St Jean le Rond, Paris, where he was discovered on the 17th of November. It afterwards became known that he was the

illegitimate son of the chevalier Destouches and Madame de Tencin. The infant was entrusted to the wife of a glazier named Rousseau who lived close by. He was called Jean le Rond from the church near which he was found; the surname Alembert was added by himself at a later period. His father, without disclosing himself, having settled an annuity on him, he was sent at four years of age to a boarding-school. In 1 730 he entered the Mazarin College under the Jansenists, who soon perceived lis exceptional talent, and, prompted perhaps by a commentary on the Epistle to the Romans which he produced in the first year of his philosophical course, sought to direct it to theology. His knowledge of the higher mathematics was acquired by his own unaided efforts after he had left the college. This fact naturally led to his crediting himself with many discoveries which he afterwards found had been already established, often by more direct and elegant processes than his own.

On leaving college he returned to the house of his foster-mother, where he continued to live for thirty years. Having studied law, he was admitted as an advocate in 1738, but did not enter upon practice. He next devoted himself to medicine, but his natural inclination proved too strong for him, and within a year he resolved to give his whole time to mathematics. In 1741 he received his first public distinction in being admitted a member of the Academy of Sciences, to which he had previously presented several papers, including a Memoire sur le calcul integral- (17 39). In his Mimoire sur le rijr action des corps solides (1741) he was the first to give a theoretical explanation of the phenomenon which is witnessed when a body passes from one fluid to another more dense in a direction not perpendicular to the surface which separates the two fluids. In 1743 he published his Traite" de dynamique, a work famous as developing the mechanical principle, known as "Alembert's Principle," first enunciated in 1742 (see Mechanics). In 1744 Alembert applied this principle to the theory of the equilibrium and the motion of fluids (Traite" de I'iquUibr'e et du mouvement desfluides), and all the problems before solved by geometricians became in some measure its corollaries. This discovery was followed by that of the calculus of partial differences, the first trials of which were published in his Reflexion sur la cause gSnerale des vents (1747). This work was crowned by the Academy of Berlin, and was dedicated to Frederick the Great, who made several unsuccessful attempts to induce him to settle in Berlin. In 1763 he visited Berlin, and on that occasion finally

refused the office of president of the Academy of Berlin, which had been already offered to him more than once. In 1747 he applied his new calculus to the problem of vibrating chords, the solution of which, as well as the theory of the oscillation of the air and the propagation of sound, had been given but incompletely by the geometricians who preceded him. In 1749 he furnished a method of applying his principles to the motion of any body of a given figure; and in 1754 he solved the problem of the precession of the equinoxes, determined its quantity and explained the phenomenon of the nutation of the earth's axis. In 1752 he published an Essai d'une nouvelle theorie sur la resistance des fluides, which contains a large number of original ideas and new observations. In 1746 and 1748 he published in the Memoirs of the Academy of Berlin " Recherches sur le calcul integral," a branch of mathematical science which is greatly indebted to him. In his Recherches sur diffirents points importants du systeme du monde (1754-1756) he perfected the solution of the problem of the perturbations of the planets, which he had presented to the academy some years before.

Alembert's association with Diderot in the preparation of the Dictionnaire EncyclopBdique led him to take a somewhat wider range than that to which he had previously confined himself. He wrote for that work the Discours prUiminaire on the rise, progress and affinities of the various sciences, which he read to the French Academy on the day of his admission as a member, the 18th of December 1754. He also wrote several literary articles for the first two volumes of the Encyclopaedia, and to the remaining volumes he contributed mathematical articles chiefly. One of the few exceptions was the article on " Geneva," which involved him in a somewhat keen controversy in regard to Calvinism and the suppression of theatrical perform- ances within the town. During the time he was engaged on the Encyclopaedia he wrote a number of literary and philosophical works which extended his reputation and also exposed him to criticism and controversy, as in the case of his Melanges de Philosophic, d'Histoire, el de Literature. His Essai sur la societe des gens de lettres avec les grands was a worthy vindication of the independence of literary men, and a thorough exposure of the evils of the system of patronage. He broke new ground and showed great skill as a translator in his Traduction de quelques morceaux choisis de Tacite. One of his most important works was the Elements de Philosophie published in 1759, in which he discussed the principles and methods of the different sciences. He

maintained that the laws of motion were necessary, not contingent. A treatise, Sur la destruction des Jesuites (1765). involved him in a fresh controversy, his own share in which was

rendered very easy by the violence and extravagance of his adversaries. The list of his more noteworthy literary works is completed by the mention of the Histoire des membres de I'Academie francaise, containing biographical notices of all the members of the Academy who died between 1700 and 1772, the year in which he himself became secretary. Alembert was much interested in music both as a science and as an art, and wrote Elements de musique theorique et pratique (1779), which was based upon the system of J. P. Rameau with important modifications and differences.

Alembert's fame spread rapidly throughout Europe and procured for him more than one opportunity of quitting the comparative retirement in which he lived in Paris for more lucrative and prominent positions. The offer of Frederick the Great has already been mentioned. In 1 762 he was invited by , Catherine of Russia to become tutor to her son at a yearly salary of 100,000 francs. On his refusal the offer was repeated with the additional inducement of accommodation for as many of his friends as he chose to bring with him to the Russian Capital. Alembert persisted in his refusal, and the letter of Catherine was ordered to be engrossed in the minutes of the French Academy. In 175s, on the recommendation of Pope Benedict XIV., he was admitted a member of the Institute of Bologna. A legacy of £200 from David Hume showed the esteem in which he was held by that philosopher.

Alembert continued to the end to lead the quiet and frugal life dictated by his limited means as well as his simple tastes. His later years were saddened by circumstances connected with a romantic attachment he had formed for Mademoiselle de Lespinasse, whose acquaintance he made at the house of Madame du Deffand, a noted resort of literary men and savants. She nursed him assiduously during an illness he had in 1765, and from that period till her death in 1776 they lived in the same house without any scandal. On her part there seems to have been from first to last nothing more than warm friendship, but his

feelings towards her were of a stronger kind and her death deeply affected him. He never recovered his elasticity of spirits, though he continued to occupy himself with his favourite pursuits, and to frequent the society of his brother philosophers. After the death of Voltaire (1778), whose friend and correspondent he had been for more than thirty years, he was regarded as the ‘eader of the philosophical party in the Academy. He died at Paris on the 29th of October 1783.

The chief features of Alembert’s character were benevolence, simplicity and independence. Though his income was never large, and during the greater part of his life was very meagre, he contrived to find means to support his foster-mother in her old age, to educate the children of his first teacher, and to help various deserving students during their college career. His cheerful conversation, his smart and lively sallies, a singular mixture of malice of speech with goodness of heart, and of delicacy of wit with simplicity of manners, rendered him a pleasing and interesting companion; and if his manner was sometimes plain almost to the extent of rudeness, it probably set all the better an example of a much-needed reform to the class to which he belonged. The controversy as to the nature of his religious opinions, arising as it did chiefly out of his con- nexion with the Encyclopaedia, has no longer any living interest now that the Encyclopaedists generally have ceased to be regarded with unqualified suspicion by those who count them- selves orthodox. It is to be observed, moreover, that as Alembert confined himself chiefly to mathematical articles, his work laid him less open to charges of heresy and infidelity than that of some of his associates. The fullest revelation of his religious convictions is given in his correspondence with Voltaire, which was published along with that with Frederick the Great in Bossange’s edition of his works.

The scientific works of Alembert have never been published in a collected form. The most important of them have been mentioned above, with the exception of the Opuscules maihematiques (1761- 1780), 8 vols. 4to. His literary and philosophical works were collected and edited by Bastien (Paris, 1805, 18 vols. 8vo). A better edition by Bossange was published at Paris in 1821 (5, vols. 8vo).

The best account of the life and writings of Alembert is contained in Condorcet’s £,loge, presented to the Academy and published in

ALEMBIC (Arab, al, definite article, anbiq, a still; cognate to the Gr. a/i/3i£ , a cup) , an apparatus for distillation, used chiefly by the alchemists, and now superseded by the retort and the worm-still. It varied considerably in form and construction, but consisted essentially of three parts: — a vessel containing the material to be distilled and called, from its gourd-like shape, the cucurbit or mattrass; a vessel to receive and condense the vapour, called the head or capital; and a receiver for the spirit, connected by a pipe with the capital. The entire apparatus was sometimes constructed of glass, but it was more usual to make the Cucurbit of copper or earthenware; and the capital alone of glass.

ALEMTEJO {i.e. "Beyond the Tagus "), an ancient province of central and southern Portugal; bounded on the N. by Beira, E. by Spanish- Estremadura and Andalusia, S. by Algarve and W. by the Atlantic Ocean and Portuguese Estremadura. Pop. (1900) 4163165; area 9219 sq. m. Alemtejo is traversed by several mountain ranges, whose height does not generally rise much above' 2000 ft. The low and sandy coast has a length of less than 25 m. and includes no harbour, except at the unim- portant town of Villa Nova'de Milfontes (pop. 1900, 825), which overlooks the Mira estuary. The principal rivers are the Tagus, which divides Alemtejo from Beira; its tributary the Zatas, or Sorraia, fed by a whole system of lesser affluents; the Guadiana, which, crossing the Spanish frontier, flows southwards through the province; the Sado, which rises in the Serra de Monchique, and flows' to the north; and the Mira, which waters the valley between the Caldeirao and Monchique ranges. There are several extensive 'plains, notably those of Alemtejo, lying south-west of the Serra de Portalegre; of Beja, between the Sado and Guadiana; and of Ourique, farther south between the same rivers. Some portions of' these plains are fruitful, others marshy, while large tracts are mere desolate wastes. «

The climate in the lower parts of the country is exceedingly hot and is rendered unhealthy in summer by the stagnant marshes. Towards the Spanish frontier the soil is fertile, and in the south the country is covered by extensive forests of oak, pine, chestnut, cork and ilex, ■ especially on the sides of the Mezquita and Caldeirao ranges. In the more fertile parts, grapes, figs, citrons, pomegranates and other fruits are produced. Wheat, maize arid rice are grown, arid some attention is given to the rearing of

mules, asses, goat&, cattle and sheep; while the Alter breed of horses, named after the villages of Alter do Chao and Alter Pedroso (3971), near Portalegre, is often accounted the best in the kingdom. Agriculture, however, is in a backward state, the sparse population being mostly concentrated in the towns, leaving extensive districts uncultivated and almost uninhabited. Droves of swine are fed on the waste lands, growing to a great size and affording excellent, hams. The mineral wealth of AlemteJQ is little exploited, although there are copper, and iron mines and marble quarries. Medicinal springs exist at Aljustrel (3790), Castello de Vide (5192), Mertola (3873), Portalegre, VimieirQ (1838) and elsewhere. Chief among the local industries are the preparation of exceptionally fine olive oil, and the manufacture of cloth, pottery and leather. Alemtejo is traversed by three very important main lines of railway, the Madrid-Caceres-Lisbon, Madrid-Badajoz-Lisbon and Lisbon-Faro; while the two last are connected by a branch line from Casa Branca to Evora and Elvas. For administrative purposes the province is divided into the districts of Portalegre in the north, Evora in the central region and Beja in the south; but the titles of these new districts have not superseded the ancient name of Alemtejo in ordinary usage. The ■ chief towns Beja (8885), Elvas (13,981), Estremoz (7920), Evora (16,020) and Portalegre (11,820) are described in separate articles.

ALENQON, COUNTS ANP DUKES OF. The first line of the counts of Alencon, was founded by Yves, lord of Bellesme, who in the middle of the. 10th century possessed and fortified the town of Alencon. His successors, involved in all the wars of the kings of England in Normandy, were alternately deprived and

repossessed of their domains, according to the fluctuations of fortune between the rival parties. Mabille, countess of Alencon and heiress of this family (d. 1082), married Roger of Montgomery, and from them descended a second house of Alencon which became extinct in the person of Robert IV. ; the county of Alencon was then joined to the royal domain. It was successively granted as an appanage to Peter, son of St Louis (1268), and to Charles, count of Valois, brother of Philip the Fair (1293). The third house of Alencon sprang from Charles, second son of the count of Valois, who was killed at the battle of Crecy

in 1346. The countship of Alencon was raised to a peerage in 1367 and into a dukedom in 1414. John, 1st duke of Alencon, was killed at Agincourt on the 25th of October 141 5, after having with his own hand slain the duke of York. His son,, also named John, was dispossessed of his duchy by the king of England, but reconquered it in 1449. In 1524 the dukedom of Alencon reverted to the crown, in consequence of the death of the duke Charles IV. without issue of his marriage with Margaret, sister of Francis I. It was given as a jointure to Catherine de'Medici in 1 559, and as an appanage to her son Francis in 1566. It was pawned by Henry IV. to the duke of Wiirttemberg, and sub- sequently it passed to Gaston, duke of Orleans, by grant of Louis XIII.; to Elizabeth of Orleans, duchess of Guise; to Charles, duke of Berry, grandson of Louis XIV. C1710); and to Monsieur (Louis XVIII.) , brother of Louis XVI.

The title of due d'Alencon was given to Ferdinand of Orleans, son of the due de Nemours, and grandson of Louis- Philippe. . (M. P.*)

ALEN£ON, a town of north-western France, capital of the department of Orne, 36 m. N. of Le Mans, on a branch line of the Western railway. Pop (1906) 14,378. Alencon, a clean, regularly built town with broad handsome streets, is situated in a wide and fertile plain, on the Sarthe at its confluence with the Briante. The only remains of the ancient castle of Alencon are two towers of the 15th century, which serve as a prison, and: a third of the 14th century known as the Tour Couronnee, to which they are united. Notre-Dame, the chief church, dates from the 15th century. It is remarkable for a porch ornamented in the richest Gothic style, and for its stained windows of the 16th century. Alencon has a large circular corn-market and a cloth- market. The manufacture of the point d'Alencon lace has greatly diminished. The weaving and bleaching of cloth, which is of less importance than formerly, the manufacture of vehicles, and tanning are carried on; there is a large trade in the horses of the district, and granite is worked in the neighbourhood. Alencon is the seat of a prefect and a court of assizes. It has tribunals of first instance and of commerce, a board of trade-arbitrators, a lycee, training-colleges and ' a chamber of arts and manu- factures.

ALENIO, GIULIO (1582-1640J, Italian Jesuit missionary, was born at Brescia. He entered the Society of Jesus and was sent to the East. He landed at Macao in 1610, and while waiting a favourable opportunity to penetrate into China busied himself for three

years in teaching mathematics. His thirty years' residence in China was marked by unceasing zeal and considerable success. He adopted the dress and manners , of the country, was the first Christian missionary in Kiang-si, and built several churches in Fo-Kien. He wrote in Chinese a Life of Christ (Pekin, 1635-1637, 8 vols.; often reprinted, e.g. in 18S7 in 3 vols., and used even by Protestant missionaries) and a cosmography {Iche fang wai ki Hang-chow, 1623, 6 vols.), which was translated into Manchu under the title The True Origin of 10,000 Things, a copy of which was sent from Pekin to Paris in 1789. Alenio died at Fu-chow in 1649.

For bibliography see de Backer and Sommervogel, Bibl.de la Cie. de Jesus, i. 158-160.

ALEPPO (native Haleb). (1) A vilayet of Asiatic Turkey, comprising N. Syria and N.W.Mesopotamia, with an extension N. of Taurus to the neighbourhood of Gorun. It comprises three sanjaks, Aleppo, Marash and Urfa. About half is moun- tain, but there are fertile plains of great extent N. of Antakia, S. of Marash and around the city of Aleppo (see below). The

only seaport of importance is Alexandretta (q.v.). The exports are, on the average, over one million sterling, and imports about double in value. The settled population is barely a million; but there is a considerable unsettled element in the S:E. which cannot well .be estimated. The Christians, mainly Jacobite Syrian, but including also Armenians of several denominations (e.g. those of Marash and Zeitun), Maronites and Greeks, form about one-fifth. There are some 20,000 Jews, resident chiefly in the provincial capital; and of the Moslem majority the bulk is Arab, Turkoman and Ansarieh. In the N.W. and N. is a considerable Kurdish population.

(2) The provincial capital (anc. Khalep; Gr. Chalybon- Beroea), situated on a plateau in the valley of the Kuwaik (anc. Chains) about 10 m. above its dissipation in the great salt-marsh of Matkh. Pop. about 130,000, three-quarters Moslem. Aleppo is about midway between the sea and the Euphrates, a little nearer the latter.

The modern city stands on both banks of the Kuwaik, and the older portions are contained within a Saracenic wall, 3ˆ m. in circuit with seven gates. The European residents and Christians live outside in the Kitab and new Azizieh quarters, and the Jews

in that of Bahsita. A modern citadel occupies the N.W., the medieval castle on its mound (partly artificial and not a strong position, according to Istakhri) being almost deserted but still forbidden to visitors. There are two mosques of special interest — the Umawi (or Zakaria) on the site of a church ascribed to the empress Helena and containing a tomb reputed to be that of the Baptist's father, and the Kakun. Many minor ones serve the needs of a population traditionally fanatical. Gardens extend for miles along the river, and the bazaars and khans are unusually large. The climate is cold, dry and healthy, despite the prevalence of the famous " Aleppo button," a swelling which appears either on the face or on the hands, and breaks into an ulcer which lasts a year and leaves a permanent scar. It has been ascribed to a fly, to the water and to other causes; but it is not peculiar to Aleppo, being rife also at Aintab, Bagdad, &c.

The attempt made by the British Euphrates expedition in 1 84 1 to connect Aleppo with the sea by steamer through the nearest point on the Euphrates, Meskin6, failed owing to the obstructed state of the stream and the insecurity of the riparian districts. The latter drawback has been minimized by the continued success of the Aleppo administration in inducing the Anazeh Bedouins to become Jellahin; but river traffic has not been resumed. A railway, however, connects southward with the Beirut-Damascus line at Rayak. Aleppo is an important consular, station for all European powers, the residence of the Greek and Armenian Patriarchs of Antioch, and of Jacobite and Maronite bishops, and a station of Roman Catholic and Protestant missions. It is the emporium of N. Syria, and manufactures textiles in silk, cotton and wool, carpets and leather commodities, besides . being the centre of a large district growing cereals, pistachios and fruit. The Turks regard it as one of the strong- holds of their dominion and faith, and a future capital of their empire should they be forced into Asia. As a centre from which good natural roads lead N.,N.E.,W. and S., Aleppo would make a good capital.

History and Remains.-. — The site lies high (1400 ft.) on eight hillocks in a fertile oasis plain, beyond which stretch on the S. and S.E. grassy steppes merging ere long into desert, and on the other quarters rather sterile downs. It has superseded Antioch as the economic centre of N. Syria, and Palmyra as the great , road-station for eastern caravans. But it is rather a revived than a new capital; Khalep was a very ancient Syrian and probably "Hittite" city of importance, known from Babylonian, Assyrian and

Egyptian records. Seleucus Nicator gave it a Macedonian name, Beroea; but Chalcis, some distance S., was the capital of the province, Chalcidice (later, Kinnasrin), in which it lay, and the centre of that hellenized region, now a vast field of ruins, which stretches W. to the Orontes. Khalep- Beroea, we may infer, remained a native town and a focus of Aramaic influence, a fact which will explain the speedy oblivion

of its Macedonian name and the permanent revival of its ancient title, even by Greeks.

As Beroea we hear of the place in Seleucid wars and dissensions. There Menelaus, the fomenter of war with the Asmoneans, was put to death by Lysias in 164 b. c, " as the manner is in that place " (Mace. ii. 13. 4), being thrown into a lofty tower full of cinders. There Heracleon, the court favourite and murderer of Antiochus Grypus, was born and made himself a principality (96 B.C.); and there the son of the latter king besieged his brother Philip in the last struggle for the heritage of Seleucus. As Chalybon, the town is called by Ptolemy head of a district, Chalybonitis; but we continue to hear of it as Beroea up to the Arab conquest, e.g. in the history of Julian's eastward march in a.d. 363, and in that of the Persian raid of 540. It was occupied in 61 1 by Chosroes II. Overwhelmed by the Saracen flood in a.d. 638, Beroea disappears, and as Moslem society settles down Halep emerges again as the great gathering-place of caravans passing from Asia Minor and Syria to Mesopotamia, Bagdad and the Persian and Indian kingdoms. Like Antioch it suffered from earthquakes, and late in the 12th century, after a terrible shock, had to be rebuilt by Nur ed-Din. But neither earthquakes nor the plague, to which it was also peculiarly liable, could divert trade and prosperity from it. It belonged to the Eastern Caliphate (the Hamdanids) until temporarily reoccupied by John Zimisces, emperor of Byzantium and a native of neighbouring Hierapolis (q.v.), a.d. 974, after an abortive attempt by Nicephorus thirteen years earlier. Thirteen years later it recognized and received the Fatimites, and passed under various Moslem dynasties, forming part of the Seljuk dominion from 1090 to n 17. The crusading princes of Antioch never held the place, though they attacked it in 11 24; and Saladin, who took it in n 83, made it a stronghold against them and the northern capital of himself and his

successors until the Tatar invasion of 1260. Thereafter the Mamelukes took and kept possession, despite the renewed Tatar inroad of 1401, until the final conquest by the Ottomans in 1517. Under the strong hand of the latter the trade of Aleppo with the East revived. One of the first provincial factories and consulates of the British Turkey (Levant) Company was established there in the reign of James I.; and a British agent had been in residence there even in Elizabeth's time. As the eastern outpost of the company's operations, it was connected with the Western outpost of the East India Company in Bagdad by a private postal service, and its name became very familiar in England from the part that its merchants (largely Jewish) bore in the transmission of Eastern products to Europe (cf., e.g. Shakespeare, Macb.i. 3.. 7; Oth. v. 2. 352). Through it passed the silks of Bambyce, called bombazines, the light textiles 'of Mosul (mosulines — muslins) and many other commodities for the wealthy and luxurious. The first blow was struck at this trade by the discovery of the Cape route to India; the second by the opening of a land route through Egypt to the Red Sea; the third and final one by the making of the Suez Canal. Long ere this last event, however, Aleppo had been declining from internal causes. In the latter part of the 18th century and the first years of the 19th it was constantly the scene of bloody dissensions between two rival parties, one led by the local janissaries, the other by the sherifs (religious); and the Ottoman governors took the. side, now of one, now of the other, in order to plunder a distracted city, too far removed from the centre to be controlled by the sultans, and' too near the rebellious pashalik of Acre and the unsettled district of Lebanon not to be affected by the disorders natural to a frontier province. This state of things led to the suspension of the British consulate by the Turkey Company in 1791; and it was not revived till 1800, after which date till 1825 it was maintained jointly by the East India Company. In 1803 Jezzar of Acre advanced as near as Hamah; but his death occurred in the following year; and after a sanguinary rising in 1805, Aleppo settled down, but was not at peace, even after a local janissary massacre in 1814, till Mahmud II. had dealt finally with the corps at headquarters (1826). Meanwhile there had been a frightful earthquake in 1822, and a visitation of cholera

in the following year. More cholera in 1827 and 1832 and another earthquake in 1830 had left the place a wreck, with only half its former population, when Mehemet Ali of Cairo invaded and took Syria. Aleppo shared, and to some extent headed, the

Syrian discontent with Egyptian rule, and was strongly held by troops whose huge barracks are still one of the sights of the city. Ready to rise behind Ibrahim Pasha in 1839, it was only prevented by the news of Nezib. Tumults and massacres of Christians occurred in 1850 and 1862, accompanied by great destruction of property; but on the whole, since the consolidation of Ottoman rule over Syria by Abdul Mejid's ministers, Aleppo has been reviving, although its trade is more local than of old.

Bibliography. — F.R. Chesney , The. Euphrates Expedition(i8so); H. Guys, Slatistique du Pachalik d'Alep (1853), and Esquissede Vital de la Syrie (1862) ; E. B. B. Barker, Syria and Egypt (1876) ; W. F. Ainsworth, Personal Narrative of the Euphrates Expedition (1888); E. R. Bevan, House of Sfileucus (1902) ; G. le Strange, Palestine under the Moslems (1890). (D. G. H.)

ALES (Alesius), ALEXANDER (1500-1565), Scottish divine of the school of Augsburg, whose family name was Alane, was born at Edinburgh on the 23rd of April 1500. He studied at St Andrews in the newly-founded college of St Leonard's, where he graduated in 151 5. Some time afterwards he was appointed a canon of the collegiate church, and at first contended vigor- ously for the scholastic theology as against the doctrines of the Reformers. His views were entirely changed, however, on the execution of Patrick Hamilton, abbot of Fern, in 1528. He had been chosen to meet Hamilton in controversy, with a view to convincing him of his errors, but the arguments, of the Scottish proto-martyr, and above all the spectacle of his heroism at the stake, impressed Alesius so powerfully that he was entirely won over to the cause of the Reformers. A sermon which he preached before the Synod at St Andrews against the dissoluteness of the clergy gave great offence to the provost, who cast him into prison, and might have carried his resentment to the extremest limit had not Alesius contrived to escape to Germany in 1532. After travelling in various countries of northern Europe, he settled down at Wittenberg, where he made the acquaintance of Luther and Melanchthon, and signed the Augsburg, confession. Meanwhile he was tried in Scotland for heresy and condemned without a hearing. In 1533 a decree of the Scottish clergy, prohibiting the reading of the New Testament by the laity ; drew from Alesius a defence of the right of the people, in the (form of a letter to James V. A reply to this by John Cochlaeus,; also addressed to the Scottish king, occasioned a second letter from Alesius, in which he not only amplifies his argument with great force, but enters into more general questions connected with the

Reformation. In August 1 534 he and a few others were exqom- municated at Holyrood by the deputy of the archbishop of St Andrews. When Henry VIII. “broke with the church of Rome Alesius was induced to go to England, where he was very cordially received (August 1535) by the king and his advisers Cranmer and Thomas Cromwell. After a short residence at Lambeth he was appointed, through the influence of Cromwell, then chancellor of the university, to lecture on theology at Cambridge; but when he had delivered a few expositions of the Hebrew psalms, he ;was compelled by the opposition of the papal party to desist. Returning to London he supported himself for some time by practising as a physician. In 1537 he attended a convocation of the clergy, and at the request of Cromwell conducted a con- troversy with, Stokesley, bishop of London, on the nature of the sacraments. His argument was afterwards published under the title Of ike Auctorile of the Word of God concerning the number oj the Sacraments: In 1539 Alesius was compelled to flee for the second time to Germany, in consequence of the enactment of the statute of the Six Articles. He was appointed to a theological chair in the university of Frankfort-on-Oder, where he was the first professor who taught the reformed doctrines. In 1543 he quitted Frankfort for a similar, position at Leipzig, his conten- tion that it was the duty of the civil magistrate to punish fornica- tion, and his sudden departure, having given offence to the authorities of the former university. He was in England again

for a short time during Edward VI. ‘s reign, and was commissioned by Cranmer to make a Latin version of the First Prayer-Book U549) for the information of Bucer, whose opinion was desired. He died at Leipzig on the 17th of March 1565.

Alesius was the author of a large number of exegetical, dog- matic and polemical works, of which over twenty are mentioned by Bale in his List of English Writers. (See also the British Museum catalogue.) In his controversial works he upholds the synergistic views of the Scottish theologian John Major. He displayed his interest in his native land by the publication of a Cohortatio ad Concordiam Pietatis, missa in Patriam suam (1544), which had the express approval of Luther, and a Cohortatio ad Pietatis Concordiam ineundam (1559).

The best early account of Alesius is the Oratio de Alexahdro Alesio of Jacob Thomasius (April 1661), printed in the latter's Orationes (No. XIV., Leipzig, 1683) : the best modern account is by Dr A. W. Ward in the Dictionary of National Biography. See also A. F. Mitchell's introduction to Gau's Richt Vay (Scottish Text Society,

ALESIA, the ancient name for a hill in central France, now Alise-Ste-Reine (department Cote d'Or), where in 52 B.C. Caesar besieged the Gaulish national leader Vercingetorix within enormous entrenchments, forced him to surrender, and thus practically ended his conquest of Gaul. The siege-works have been excavated by Napoleon III. and others, down to the present day. The site seems to have been inhabited also during the Roman empire, but its importance is limited to Caesar's siege.

ALESSANDRI, ALESSANDRO (Alexander ab Alexandro) (1461-1523), Italian jurist, was born at Naples about the year 1461. He studied law at Naples and Rome, and afterwards practised for a time as advocate in both cities. He is said to have been royal proto-notary at Naples in 1490. Dissatisfied, according to his own account, with the corrupt administration of justice, he at length quitted the bar and devoted himself entirely to literary pursuits, especially to the study of philology and antiquities. A sinecure appointment, which he owed to the favour of the pope, enabled him to lead a life of learned leisure at Rome, where he died on the 2nd of October 1523. His work entitled Dies Gcniales appeared at Rome in 1522, and was con- structed after the model of the Nodes Atticae of Aulus Gellius, and the Saturnalia of Macrobius. It consists of a confused mass of heterogeneous materials relating to philology, antiquities, law, dreams, spectres, &c, and is characterized by considerable credulity.

ALESSANDRIA, a city and episcopal see of Piedmont, Italy, capital of a province which bears its name, situated on the river Tanaro, 57 m. E. by S. of Turin by rail. Pop. (1901) 71,298, of which about half reside in the actual town: the rest are dis- tributed over the suburbs. Alessandria was founded in n 68 by the inhabitants of the district in order to defend themselves against the marquis of Monferrato and the town of Pavia, at whose request it was besieged in 11 74 by Frederick Barbarossa for six months, but without success. The Lombard League now included it among the allied cities and named it Alessandria, after Pope Alexander III. The traditional account of its founda- tion by the

Lombard League has been disproved by F. Graf, Die Griindung Alcssandrias: ein Britrag zur Geschichtc des Lom- bardenbund.es (1888). After falling into various hands, it was ceded to Savoy by the peace of Utrecht in 17 13, and its /citadel was begun in 1728. During the French occupation (1800-1814), which began after the battle of Marengo, it was still more strongly fortified; the works were entirely destroyed by the Austrians in 181 5, but were afterwards reconstructed, and Alessandria is still an impoitant fortress and the headquarters of the second army corps. The citadel is on the left bank of the Tanaro, the town being on the right bank. It is regularly built and contains few buildings of architectural interest, but is a flourishing and important commercial town, not merely owing to its own manu- factures (which are miscellaneous) but for the products of the district, and one of the greatest railway centres in Italy. Lines diverge from it to Turin via Asti, to Valenza (and thence to Vercelli, Mortara — for Novara or Milan — and Pavia), toTortona, to Novi, ; o Acqui and to Bra.

ALESSI, GALEAZZO (1512-1572), Italian architect, was born at Perugia, and was probably a pupil of Caporali. He was an enthusiastic student of ancient architecture, and his style gained for him a European reputation. Genoa is indebted to him for a number of its most magnificent palaces, and specimens of his skill may be seen in the churches of San Paolo and Santa Vittoria at Milan, in certain parts of the Escurial, and in numerous churches and palaces throughout Sicily, Flanders and Germany.

See Rossi, DiGaleazzo Alessi memorie (Perugia, 1873).

ALETHIOLOGY (from the Gr. a\i] dtia, truth), an uncommon expression for the doctrine of truth, used by Sir William Hamilton in his philosophic writings when treating of the rules for the discrimination of truth and error.

ALETRIUM (mod. Alatri), a town of the Hernici, about 6 m. due N. of Frusino, Italy, mentioned in 306 B.C. for its fidelity to Rome. In Cicero's time it was a municipium, and continued in this position throughout the imperial period. It is chiefly remarkable for its finely preserved fortifications constructed of tetrahedral and polygonal blocks of local limestone well jointed, with maximum dimensions of about 3 by iˆ ft.; the outer circuit of the city wall measures about 2§ m. It is almost entirely an embanking wall, as is the rule in the cities of this part of Italy, with a maximum height, probably, of about 30 ft. Two of the

gates (of which there were perhaps five) are still to some extent preserved, and three posterns are to be found. In the centre of the city rises a hill (1647 ft.) which was adopted as the citadel. Remains of the fortifications of three successive periods can be traced, of 'which the last, perhaps a little more recent than that of the city wall, is the best preserved. In the first two periods the construction is rough, while in the third the blocks are very well and finely jointed, and the faces smoothed; they are mostly polygonal in form and are much larger (the maximum about 10 by 6 ft.) than those of the city wall. A flat surface was formed partly by smoothing off the rock and partly by the erection of huge terrace walls which rise to a height of over 50 ft., enclosing a roughly rectangular area of 235 by 115 yds. Two approaches to the citadel were con- structed, both passing through the wall; the openings of both are rectangular. The architrave of the larger, known as Porta di Civita, measures about 17 ft. in length, 5 ft. in height, 6 ft. in thickness; while that of the smaller is decorated with three phalli in relief. Later, though probably in ancient times, a ramp was added on the northern side. In the centre of the arx was a building on the site of the present cathedral, of which only a small portion is preserved. Remains of a high-pressure aqueduct, which supplied the town with water and was con- structed with other public buildings {Corp. Inscr. Lat. x., Berlin, 1883, p. 5807) by L. Betilienus Varus, may still be traced. A temple was excavated in 1889 a.bout | m. to the north of the town, and many fragments of the painted terra-cottas with which it was decorated were found. A reconstruction of it has been erected in the Museo di Villa Giulia at Rome. The present town (pop. in 1901, 15,322) has a picturesque aspect, and contains many buildings in the Gothic style.

See R. Bassel, Centralblatt der Bauverwaltung, 1881, 121, p. 134; H. Winnefeld, Romische Mitteilungen, 1889, 126; G. Fiorelli in Notizie degli Scavi, 1882, 417. (T. As.)

ALEURITES (Gr. dXeuptrrjs, pertaining to a\evpov, ground meal, from aKelv, to grind), a genus of trees belonging to the natural order Euphorbiaceae. Aleurites moluccana, or triloba, is widely cultivated throughout the tropical and sub-tropical parts of the world for its fruit, which is about the size of a walnut, and contains several seeds which are rich in oil. The oil is extracted and used for food and light; it is known in India as kekuna, and the tree as the " candle-nut." In the Sandwich Islands the nuts are strung upon strips of wood and used as torches. The oil is exported to Europe for candle-making. A. cordata flourishes in

China, where it is known as the varnish- tree, on account of the lac contained in its seeds.

ALEUTIAN ISLANDS (possibly from Chukchi aliat, ” island “), a chain of small islands situated in the Northern Pacific Ocean, and extending about 1 200 m. westward from the extremity of

the Alaskan peninsula toward the peninsula of Kamchatka; they constitute part of the District of Alaska, U.S.A. The islands, of which an alternative collective name is the Catherine Archipelago, comprise four groups — the Fox, Andreanof, Rat and Near Islands. They are all included between 52 and 55 N. lat. and 172° E. and 163 W. long.

The axis of the archipelago near the mainland of Alaska has a S.W. trend, but near the 129th meridian its direction changes to the N.W. This change of direction corresponds to a curve in the line of volcanic fissures which have contributed their products to the building of the islands. Such curved chains are repeated about the Pacific Ocean in the Kurile Islands, the Japanese chain, the Philippines, &c. The general elevation is greatest in the eastern islands and least in the western. The island chain is really a western continuation of the Aleutian Range on the mainland.

The great majority of the islands bear evident marks of volcanic origin, and there are numerous volcanic cones on the north side of the chain, some of them active; many of the islands, however, are not wholly volcanic, but contain crystalline or sedimentary rocks, and also amber and beds of lignite. The coasts are rocky and surf-worn and the approaches are exceed- ingly dangerous, the land rising immediately from the coasts to steep, bold mountains.

The climate of the islands is oceanic, with moderate and fairly uniform temperatures and heavy rainfall. Fogs are almost constant. The summers are much cooler than on the mainland at Sitka (g.v.), but the winter temperature of the islands and of south-eastern Alaska is very nearly the same. The mean annual temperature for Unalaska, the most important island of the group, is about 38 F. ; being about 30° for January and about 5 2°

for August. The highest and lowest temperatures recorded on the islands are 78° and 5 . The average annual amount of rainfall is about 80 in., and Unalaska, with about 250 rainy days per year, is said to be the rainiest place within the territory of the United States. The growing season lasts about 135 days, from early in May till late in September, but agriculture is limited to the raising of a few vegetables. With the exception of some stunted willows the islands are practically destitute of trees, but are covered with a luxuriant growth of herbage, including grasses, sedges and many flowering plants. On the less mountainous islands the raising of sheep and reindeer is believed to be practicable. The principal occupations of the natives have always been fishing and hunting, and the women weave basketry of exquisite fineness. From the end of the 1 8th century the Russian fur traders had settlements here for the capture of the seal and the sea otter and the blue and the Arctic fox. Under the American regime seal fishing off the Aleutians save by the natives has never been legal, but the deple- tion of the Pribilof herd, the almost complete extinction of the sea otter, and the rapid decrease of the foxes and other fur animals, have threatened the Aleuts (as the natives are commonly called) with starvation. In recent years enterprising traders have raised foxes by culture and by especially protecting certain small islands, and this has furnished employment to whole com- munities of natives. Fish and sea-fowl are extremely abundant.

The natives are rather low in stature, but plump and well shaped, with short necks, swarthy faces, black eyes and long black hair. They are a branch of the Esquimauan family, but differ greatly from the Eskimo of the mainland in language, habits, disposition and mental ability. They were good fighters until they were cowed by the treatment of the Russians, who practically reduced them to slavery. Sporadic efforts to Chris- tianize the Aleuts were made in the latter half of the 18th century, but little impression was made before the arrival in 1824 of Father Ivan Venyaminov, who in 1840 became the first Greek bishop of Alaska. While the missionaries of the Greek Church have nominally converted the natives to Christianity, white adventurers have more effectually converted them to various bad habits. In dress and mode of life they have adopted outwardly civilized customs. From the position of the Aleutian islands, stretching like a broken bridge from Asia to America,

some ethnologists have supposed that by means of them America was first peopled. Raised shore-lines, occasional earthquakes,

and slow measurable elevation of the land about active volcanoes, indicate that elevation is now in progress, but the geological evidence shows no sign of former submergence of a connecting isthmus. There is granite at the core of the Shaler range of mountains in southern Unalaska.

It is stated that before the advent of the Russians there were 25,000 Aleuts on the archipelago, but that the barbarities of the traders eventually reduced the population to one-tenth of this number. The number of Aleuts in 1890 was reported as 968; the total population of the archipelago in 1900 was 2000.

The principal settlements are on the Unalaska Island. Of these Iliuliuk (also called Unalaska), the oldest, settled in 1760- 1775, has a custom house, a Russian-Greek Church, and a Methodist Mission and orphanage, and is the headquarters for a considerable fleet of United States revenue cutters which patrol the sealing grounds of the Pribilof s; adjacent is Dutch Harbor (so named, it is said, because a Dutch vessel was the first to enter it), which is an important port for Bering Sea commerce. The volcano Makushin (5691 ft.) is visible from Iliuliuk, and the volcanic islets Bogoslof and Grewingk, which rose from the sea in 1796 and 1883 respectively, lie about 30 m. W. of the bay. The latter is still active; in 1906 a new cone rose between the two earlier islets, and in 1907 still another: these were nearly demolished by an explosive eruption on the 1st of September 1907. The population of Unalaska Island in 1900 was 575 Aleuts and 66 whites. The Commander Islands group near the Asiatic coast is geographically, but since the acquisition of the Russian possessions in America not politically, a part of the Aleutian system.

In 1 741 the Russian government sent out Vitus Bering, a Dane, and Alexei Chirikov, a Russian, in the ships ” Saint Peter ” and ” Saint Paul ” on a voyage of discovery in the Northern Pacific. After the ships were separated by a storm, Chirikov discovered several eastern islands of the Aleutian group, and Bering discovered several of the western islands, finally being wrecked and losing his life on the island of the Commander, group that now bears his name. The survivors of Bering’s party reached Kamchatka in a boat constructed from the wreckage of their ship, and reported that the islands were rich in fur-bearing animals. Siberian fur hunters at once flocked to the Commander Islands and gradually moved eastward across the Aleutian Islands to the mainland. In this manner Russia gained a foothold on the north-

western coast of North America. The Aleutian Islands consequently belonged to Russia, until that country in 1867 transferred to the United States all its possessions in America. During his third and last voyage, in 1778, Captain James Cook surveyed the eastern portion of the Aleutian archipelago, accurately determined the position of some of the more important islands and corrected many errors of former navigators. Some preliminary surveys have been made by the United States government with a view to establish- ing a naval station on the island Kiska, in the western part of the Aleutian Chain.

ALEXANDER (Alexander of Battenberg) (1857-1893), first prince of Bulgaria, was the second son of Prince Alexander of Hesse and the Rhine by his morganatic marriage with Julia, countess von Hauke. The title of princess of Battenberg, derived from an old residence of the grand-dukes of Hesse, was con- ferred, with the prefix Durchlaucht or " Serene Highness," on the countess and her descendants in 1858. Prince Alexander, who was born on the 5th of April 1857, was nephew of the tsar Alexander II., who had married a sister of Prince Alexander of Hesse; his mother, a daughter of Count Moritz von Hauke, had been lady-in-waiting to the tsaritsa. In his boyhood and early youth he was frequently at St Petersburg, and he accom- panied his uncle, who was much attached to him, during the Bulgarian campaign of 1877. When Bulgaria under the Berlin Treaty was constituted an autonomous principality under the suzerainty of Turkey, the tsar recommended his nephew to the Bulgarians as a candidate for the newly created throne, and

Prince Alexander was elected prince of Bulgaria by unanimous vote of the Grand Sobranye (April 29, 1879). He was at that time serving as a lieutenant in the Prussian life-guards at Potsdam. Before proceeding to Bulgaria, Prince Alexander paid visits to the tsar at Livadia, to the courts of the great powers and to the sultan; he was then conveyed on a Russian warship to Varna, and after taking the oath to the new con- stitution at Tirnova (July 8, 1879) h e repaired to Sofia, being everywhere greeted with immense enthusiasm by the people. (For the political history of Prince Alexander's reign, see Bul- garia.) Without any previous training in the art of government, the young prince from the outset found himself confronted with difficulties which would have tried the sagacity of an experienced ruler. On the one hand he was exposed to numberless humilia- tions on the part of the representatives of official Russia, who made it clear to him that he was expected to play the part of a roi faineant; on the other he was compelled to make terms with the Bulgarian politicians, who, intoxicated with newly won liberty, prosecuted their quarrels with a crude violence which threatened to subvert his authority and to plunge the nation in anarchy. After attempting to govern under these conditions for nearly two years, the prince, with the consent of the tsar Alexander III., assumed absolute power (May 9, 1881), and a suspension of the ultra-democratic constitution for a period of seven years was voted by a specially convened assembly (July 13). The experiment, however, proved un- successful; the Bulgarian Liberal and Radical politicians were infuriated, and the real power fell into the hands of two Russian generals, Sobolev and Kaulbars, who had been specially despatched from St Petersburg. The prince, after vainly endeavouring to obtain the recall of the generals, restored the constitution with the concurrence of all the Bulgarian political parties (September 18, 1883). A serious breach with Russia followed, which was widened by the part which the prince subsequently played in encouraging the national aspirations of the Bulgarians. The revolution of Philippopolis (September 18, 1885), which brought about the union of Eastern Rumelia with Bulgaria, was carried out with his consent, and he at once assumed the government of the revolted province. In the anxious year which followed, the prince gave evidence of con- siderable military and diplomatic ability. He rallied the Bulgarian army, now deprived of its Russian officers, to resist the Servian invasion, and after a brilliant victory at Slivnitza (November 19)

pursued King Milan into Servian territory as far as Pirot. which he captured (November 27). Although Servia was protected from the consequences of defeat by the intervention of Austria, Prince Alexander's success sealed the union with Eastern Rumelia, and after long negotiations he was nominated governor-general of that province for five years by the sultan (April 5, 1886). This arrangement, however, cost him much of his popularity in Bulgaria, while discontent pre- vailed among a certain number of his officers, who considered themselves slighted in the distribution of rewards at the close of the campaign. A military conspiracy was formed, and on the night of the 20th of August the prince was seized in the palace at Sofia, and compelled to sign his abdication; he was then hurried to the Danube at Rakhovo, transported on his yacht to Reni, and handed over to Russian authorities, by whom he was allowed to proceed to Lemberg. He soon, how- ever, returned to Bulgaria, owing to the success of the counter- revolution led by Stamboloff, which overthrew the provisional government set up by the Russian party at Sofia. But his position had become untenable, partly owing to an ill-considered telegram which he addressed to the tsar on his return; partly in consequence of the attitude of Prince Bismarck, who, in con- junction with the Russian and Austrian governments, forbade him to punish the leaders of the military conspiracy. He therefore issued a manifesto resigning the throne, and left Bulgaria on the 8th of September 1886. He now retired into private life. A few years later he married Fraulein Loisinger, an actress, and assumed the style of Count Hartenau (Feb- ruary 6, 1889). The last years of his life were spent principally

at Gratz, where he held a local command in the Austrian army. Here, after a short illness, he died on the 23rd of October 1893. His remains were brought to Sofia, where they received a public funeral, and were eventually deposited in a mausoleum erected in his memory. Prince Alexander possessed much charm and amiability of manner; he was tall, dignified and strikingly handsome. His capabilities as a soldier have been generally recognized by competent authorities. As a ruler he committed some errors, but his youth and inexperience and the extreme difficulty of his position must be taken into consideration. -He was not without aptitude for diplomacy, and his intuitive insight and perception of character sometimes enabled him to outwit the crafty politicians by whom he was surrounded. His principal fault was a want of tenacity and resolution; his tendency to

unguarded language undoubtedly increased the number of his enemies.

See Drandar, Le Prince Alexandre de Battenberg en Bulgarie (Paris, 1884); Koch, Furst Alexander von Bulgarien (Darmstadt, 1887) ; Matveyev, Bulgarien nach dem Berliner Congress (Petersburg, 1887); Bourchier, " Prince Alexander of Battenberg," in Fortnightly Review, January 1894. (J. D. B.)

ALEXANDER I., king of Epirus about 342 B.C., brother of Olympias the mother of Alexander the Great, and son-in-law of Philip of Macedon, whose daughter Cleopatra he married (336). In 332 he crossed over to Italy to assist the Taren tines against the Lucanians, Bruttians and Samnites. He gained considerable successes and made an arrangement with the Romans for a joint attack upon the Samnites ; but the Taren- tines, suspecting him of the design of founding an independent kingdom, turned against him. Although the advantage at first rested with Alexander, he gradually lost it, and his supporters dwindled away. In 330 (or earlier) he was defeated at Pandosia and slain by a Lucanian emigrant.

See Justin viii. 6, ix. 6, xii. 2; Livy viii. 3, 17, 24; Aulus Gellius xvii. 21 ; and article Macedonian Empire.

ALEXANDER II., king of Epirus, succeeded his father Pyrrhus, 272 B.C. He attacked Antigonus Gonatas and con- quered the greater part of Macedonia, but was in turn driven out of both Epirus arid Macedonia by Demetrius the son of Antigonus. He subsequently recovered his kingdom by the aid of the Acarnanians and Aetolians. He died about 260 (Polybius ii. 45, ix. 34; Plutarch, Pyrrhus, 9; Justin xviii. 1, xxvi. 2, xx viii. 1).

See Thirlwall, History of Greece, vol. viii. ; Droysen, Hellenismus ; B. Niese, Gesch. d. griech. u. maked. Staaten; J. Beloch, Griech. Gesch. vol. iii.

ALEXANDER III., known as The Great 1 (356-323 B.C.), king of Macedon, was the son of Philip II. of Macedon, and Olympias, an Epirote princess. His father was pre-eminent for practical genius, his mother a woman of half-wild blood, weird, visionary and terrible; and Alexander himself is singular among men of action for the imaginative splendours which guided him, and among romantic dreamers for the things he achieved. He was born in 356 B.C., probably about October (Hogarth, pp. 284 ff.). The

court at which he grew up was the focus of great activities, for Philip, by war and diplomacy, was raising Macedon to the headship of the Greek states, and the air was charged with great ideas. To unite the Greek race in a war against the Persian empire was set up as the ultimate mark for ambition, the theme of idealists. The great literary achievements of the Greeks in the 5th century lay already far enough' behind to have become invested with a classical dignity; the meaning of Hellenic civilization had been made concrete in a way which might sustain enthusiasm for a body of ideal values, authori- tative by tradition. And upon Alexander in his fourteenth year this sum of tradition was brought to bear through the person of the man who beyond all others had gathered it up into an organic whole: in 343-342 Aristotle (q.v.) came to Pella at Philip's bidding to direct the education of his son. We do not know what faculty the master-thinker may have had for captivating this ardent spirit; at any rate Alexander carried with him through life a

1 The use of the surnamejs proved as far back as the 1st century b.c. (Nepos, De Reg. 2).

Youth.

passion for Homer, however he may have been disposed to greyer philosophic theory. But his education was not all from books. The coming and going of envoys from many states, Greek and Oriental, taught him something of the actual conditions of the world. He was early schooled in war. At the age of sixteen he commanded in Macedonia during Philip's absence and quelled a rising of the hill-tribes on the northern border; in the following year (338) he headed the charge which broke the Sacred Band at Chaeronea. Then came family dissensions such as usually vex the polygamous courts of the East. In 337 Philip repudiated Olympias for another wife, Cleopatra, Alexander went with his mother to her home in Epirus, and, though he soon returned and an outward reconciliation between father and son was contrived, their hearts were estranged. The king's new wife was with child;

her kinsmen were in the ascendant; the succession of Alexander was imperilled. Some negotiations which Pixodarus, the satrap of Caria, opened with the Macedonian court with a view to effecting a marriage alliance between his house and Philip's, brought Alexander into fresh broils. In 336 Philip was suddenly assassinated whilst celebrating at Aegae the marriage of his daughter to Alexander I. of Epirus in the presence of a great concourse from all the Greek world. It is certain that the hand of the assassin was prompted by some one in the background; suspicion could not fail to fall upon Alexander among others. But guilt of that sort would hardly be consistent with his character as it appears in those early days.

Alexander was not the only claimant to the vacant throne, but, recognized by the army, he soon swept all rivals from his path. Access/ n ˆ e new ty born son of Philip by Cleopatra, and

Alexander's cousin Amyntas, were put to death, and Alexander took up the interrupted work of his father. That work was on the point of opening its most brilliant chapter by an invasion of the great king's dominions; the army was concentrated and certain forces had already been sent on to occupy the opposite shore of the Hellespont. The assassination of Philip delayed the blow, for it immediately made the base, Macedonia, insecure, and in such an enterprise, plunging into the vast territories of the Persian empire, a secure base was every- thing. Philip's removal had made all the hill-peoples of the north and west raise their heads and set the Greek states free from their fears. A demonstration in Greece, led by the new king of Macedonia, momentarily checked the agitation, and at the diet at Corinth Alexander was recognized as captain-general {riyen&v avTOKparosp) of the Hellenes against the barbarians,

in the place of his father Philip. In the spring of 335 ofthV ne went out from Macedonia northwards, struck across Hellenes, the Balkans, probably by the Shipka Pass, frustrating

the mountain warfare of its tribes by a precision of discipline which, probably, no other army of the time could have approached, and traversed the land of the Triballians (Rumelia) to the Danube. To gratify his own imagination or strike the imagination of the world he took his army over the Danube and burnt a settlement of the Getae upon the other side. Meanwhile the Ulyrians had seized Pelion (Pliassa), which commanded the passes on the west of Macedonia, and from the Danube Alexander

marched straight thither over the hills. He had hardly restored Macedonian prestige in this quarter when he heard that Greece was aflame. Thebes had taken up arms. By a forced march he took the Thebans completely by surprise, and in a few days the city, which a generation before had won the headship of Greece, was taken. There were to be no half-measures now; the city was wiped out of existence with the exception of its temples and the house which had been Pindar's. Greece might now be trusted to lie quiet for some time to come. The Panfiellenic alliance (from which Sparta still stood aloof) against the barbarians was renewed. Athens, although known to be hostile at heart to the cities of Macedonian power, Alexander treated all through with eager courtesy.

In the spring of 334, Alexander crossed with an army of between 30,000 and 40,000 men, Macedonians, Ulyrians, Thracians and the contingents of the Greek states, into Asia. The place of concentration was Arisbe or the Hellespont.

Alexander himself first visited the site of Troy and there went through those dramatic acts of sacrifice to the Ilian Athena, assumption of the shield believed to be that of Achilles and offerings to the great Homeric dead, which are ˆf˜la" significant of the poetic glamour shed, in the young Minor. king's mind, over the whole enterprise, and which men will estimate differently according to the part they assign to imagination in human affairs. To meet the invader the great king had in Asia Minor an army slightly larger, it would seem, than Alexander's, gathered under the satraps of the western provinces at Zeleia. He had also, what was more serious, command of the Aegean. Alexander could communicate with his base only by the narrow line of the Hellespont, and ran the risk, if he went far from it, of being cut off altogether. To draw him after them, while avoiding a conflict, was sound strategy for the Persian generals. It was urged upon them by their colleague the Rhodian Memnon. But strategic considerations were cancelled by the Persian barons' code of chivalry, and Alexander found them waiting for him on the banks of the Granicus. It was a cavalry melee, in which the common code of honour caused Macedonian and Qranicus. Persian chieftains to engage hand to hand, and at the end of the day the relics of the Persian army were in flight, leaving the high-roads of Asia Minor clear for the invader. Alexander could now accomplish the first part of the task belonging to him as captain-general to the Hellenes, that liberation of the Greek cities of Asia Minor, for which Panhellenic enthusiasts had cried out so

long. He first went to take possession of the old Lydian capital Sardis, the headquarters of the Persian government on this side of the Taurus, and the strong city surrendered without a blow. And now in all the Greek cities of Aeolis and Ionia the oligarchies or tyrants friendly to Persia fell, and democracies were established under the eye of Alexander's officers. Only where the cities were held by garrisons in the Persian service, garrisons composed mainly of Greek mercenaries, was the liberator likely to meet with any resistance. From Ephesus indeed the garrison fled upon the news of Granicus, but Miletus required a siege. The Persian fleet in vain endeavoured to relieve it, and Miletus did not long hold out against Alexander's attack. It was at Halicarnassus that Alexander first encountered stubborn resistance, at Halicarnassus where Memnon and the satraps of Caria had rallied what land-forces yet belonged to Persia in the west. When winter fell, Alexander had captured indeed the city itself, but the two citadels still held out against his blockade.

Meanwhile Alexander was making it plain that he had come not merely as captain-general for a war of reprisals, but to take the Persian's place as king of the land. The conquered provinces were organized under Macedonian governors and in Caria a dethroned princess of the native dynasty, Ada, was restored to power. In the winter, whilst Parmenio advanced upon the central plateau to make the occupation of Phrygia effective, Alexander himself passed along the coast to receive the sub- mission of the Lycians and the adherence of the Greek cities of the Pamphylian sea-board. The hills inland were the domain of fighting tribes which the Persian government had never been able to subdue. To conquer them, indeed, Alexander had no time, but he stormed some of their fortresses to hold them in check, and marched through their territory when he turned north from Pamphylia into the interior. The point of concentration for next year's campaign had been fixed at Gordium, a meeting-place of roads in Northern Phrygia. The story of Alexander's cutting the fatal " Gordian knot " on the chariot of the ancient Phrygian king Gordius is connected with his stay in this place.

Whilst Alexander had been grounding his power in Asia Minor, he had run a narrow risk of losing his base in Europe. He had after the siege of Miletus disbanded the Graeco- Extension Macedonian fleet, surrendering for the time all attempts of Alex- to challenge the command of the Aegean. Memnon anders the Rhodian, now in supreme command of the Persian P° wer ' fleet, saw the European coasts exposed and set out to raise Greece,

where discontent always smouldered in Alexander's rear. But Memnon died at the critical moment whilst laying siege tc

Battle of Issus.

Mytilene and the great plan collapsed. A Persian fleet still held the sea, but it effected little, and presently fresh Graeco-Macedonian squadrons began to hold it in check. It was, however, the need to ensure command of the sea and free all lines of communication behind him that determined Alexander's plan for the next campaign. If he mastered the whole coast-line of the Levant, the enemy's fleet would find itself left in the air. The Syrian coast was accordingly his immediate objective when he broke up from Gordium for the campaign of 333. He was through the Cicilian Gates before the Persian king, Darius III., had sent up a force adequate to hold them. His passage through Cilicia was marked by a violent fever that arrested him for a while in Tarsus, and meantime a great Persian army was waiting for him in northern Syria under the command of Darius himself. In the knot of mountains which close in about the head of the Gulf of Alexandretta, Alexander, following hard by the coast, marched past the Persian army encamped on the plains to the east. To cut Alexander's communications with the rear, Darius now committed the error of entangling his large force in the mountain defiles. Alexander turned, and near the town of Issus fought his second pitched battle, sending Darius and the relic of his army in wild flight back to the east. 1 It was an incident which did not modify Alexander's plan. He did not press the pursuit far, although the great king's camp with his harem fell into his hands. The chivalrous courtesy which he showed to the captive princesses was a favourite theme for later rhetoricians. He went on his way to occupy Syria and Phoenicia. It is now that we get definite evidence as to the reach of Alexander's designs; for Darius opened negotiations in which he ultimately went so far as to offer a partition of the empire, all west of the Euphrates, to be Alexander's. Alexander refused the bargain and definitely claimed the whole. 2 The conquest of the Phoenician coast was not to be altogether easy, for Tyre shut its gates and for seven months Alexander had to sit before it — one of those obstinate

sieges which mark the history of the Semitic races. When it fell, Alexander had the old Tyrian people scattered to the winds, 30,000 sold as slaves. Gaza offered a resistance equally heroic, lasting two months, and here too the old population was dispersed. The occupation of the rest of Syria and Palestine proceeded smoothly, and after the fall of Gaza Alexander's way lay open into Egypt. 3 Egypt was the last of the Mediterranean provinces to be won, and here no defence was made. To the native Egyptians Alexander appeared as a deliverer from the Persian tyranny, and he sacrificed piously to the gods of Memphis. The winter (332-331) which Alexander spent in Egypt saw two memorable actions on his part. One was the expedition (problematic in its motive and details) to the oracle of Zeus Ammon (Oasis of Siwa), where Alexander was hailed by the priest as son of the god, a belief which the circle of Alexander, and perhaps Alexander himself, seem hereafter to have liked to play with in that sort of semi-serious vein which still allowed him in the moments of every-day commonplace to be the son of Philip. The other action was the foundation of Alexandria at the Canopic mouth of the Nile, the place destined to be a new commercial centre for the eastern Mediterranean world which Alexander had now taken in possession, to rise to an importance which the founder, although obviously acting with intention, can hardly have foreseen (E. Keller, Alex. d. Grosse nach der Schlacht bei Issus, 1904).

In the spring of 331 Alexander could at last leave the Mediterranean to strike into the heart of the Persian empire, for by his occupation of the coasts the Persian command of of V plX"a. tne sea had inevitably collapsed. Returning through Syria, and stopping at Tyre to make final arrangements for the conquered provinces, he traversed Mesopotamia and

1 See Bauer,"' Die Schlacht bei Issus" in Jahreshefte d.oslerr. archaol. Instit. ii. pp. 105 f. ; A. Janke. Auf Alex. d. grossen Pfaden; Gruhn, Das Schlachtfeld von Issus; Lammert in Berl. Philol. Wochenschr. (1905), col. 1596 f.

2 Pridik, De Alex. Mag. epist. commercio (Dorpat, 1893) ; Schwartz, art. " Curtius " in Pauly-Wissowa, col. 1884.

8 The story of Alexander's visit to Jerusalem rests on no better authority than a later Jewish romance.

struck the Tigris some four marches above the site of Nineveh. It

was near Nineveh that Darius was waiting with the immense host which a supreme effort could muster from all parts of the empire. The happy coincidence of a lunar eclipse gives us the 20th of September 331 as the exact day upon which the Mace- donian army crossed the Tigris. Alexander came within sight of the Persian host without having met with any opposition since he quitted Tyre. He had now to settle the most serious problem which had yet faced him, for in the plains the Persian army was formidable by sheer bulk. But the day showed the Macedonian army equal to the task. The last army Arbeia. gathered by an Achaemenian king was shattered in the battle called popularly after the city of Arbeia some 60 m. distant, or more precisely after the village of Gaugamela hard by. Darius fled eastwards into Media and again Alexander waited till he had secured the provinces to the south. He followed the Tigris into Babylonia, the central seat of the empire and its richest region, and from Babylon went on to seize the fabulous riches which the Persian kings had amassed in their spring residence, Susa. Thence he at last ascended upon the Iranian plateau. The mountain tribes on the road (the Oxii, Pers, Huzha), accustomed to exact blackmail even from the king's train, learnt by a bitter lesson that a stronger hand had come to wield the empire. Alexander entered Persis, the cradle of the Achaemenian house, and came upon fresh masses of treasure in the royal city, Persepolis. He destroyed the royal palace by fire, an act which has been variously estimated by historians. Ostensibly a solemn revenge for the burning of Greek temples by Xerxes, it has been justified as a symbolical act calculated to impress usefully the imagination of the East, and condemned as a senseless and vainglorious work of destruction.

With the spring of 330 Alexander was prepared for further pursuit. Darius fled northwards from Ecbatana upon his approach. At Ecbatana new masses of treasure were seized, but when once the necessary measures which its disposal and the occupation of the Median capital entailed were taken, Alexander continued the pursuit. It was an exciting chase of king by king, in which each covered the ground by incredible exertions, shedding their slower-going followers as they went, past Rhagae (Rai) and the Caspian gates, till early one morning Alexander came in sight of the broken train which still clung to the fallen king. He had become a puppet in the hands of his cousin Bessus and the Persian magnates with him (see Darius III.), and at this extremity they stabbed him and allowed Alexander to become master only

of his corpse (summer 330).

The pursuit had brought Alexander into that region of mountains to the south of the Caspian which connects western Iran with the provinces to the east of the great central desert. To conquer this remaining portion of the empire, Alexander now went on through the mountain belt, teaching the power of his arms to the hillsmen, Tapyri and Mardi, till he came, passing through Zadracarta (Asterabad), to Parthia and thence to Aria. In these further provinces of Iran the Macedonian invader had for the first time to encounter a serious national opposition, for in the west the Iranian rule had been merely the supremacy of an alien power over native populations indifferent or hostile. Here the ruling race was at home. In Asia Alexander learnt that Bessus had taken the diadem as Darius' successor in Bactria, but so soon as he marched against him Aria rose in his rear, and Alexander had to return in all haste to bring the revolt under. Nor did he, when this was accomplished, again strike directly at Bactria, but made a wide turning movement through Seistan over Kandahar into the Kabul valley. It was on the way, in Seistan at Prophthasia (mod. Farrah ?), that the alienation between Alexander and his Macedonian followers, which becomes sensible in the latter part of his career, first showed itself in an ugly form. Alexander had come to merge the characters of Macedonian king and Hellenic captain-general, with which he had set out, in that of Oriental despot (Spieker. Hofu. Hofordnung Al. d. Gr., 1904). He wore on occasions of state the Persian dress. (According to pseudo-Plutarch, de fort. Al. i. 8, it was the simpler Persian dress, not the Median.) A discontent began to work among the

Macedonians, and at Prophthasia the commander of the Macedonian cavalry Philofcas, the son of Parmenio, and certain others were arraigned before the army on the charge of conspiring against the king's life. They were condemned and put to death. Not satisfied with procuring this, Alexander had Parmenio himself, who had been left in command in Media, put to death by secret orders. It is perhaps the worst crime, because the most cold-blooded and ungenerous, which can be laid to his charge. By

the winter of 329-328 Alexander had reached the Kabul valley at the foot of the Paropamisadae (Hindu Kush).

The ordinarily received chronology makes Alexander reach the Kabul valley in the winter of 330-329. That to fit the actions and distances covered by Alexander into such a scheme, assuming that Be went by Seistan and Kandahar, would involve physical impossibilities has been pointed out by Count Yorck v. Wartenburg and Mr D. G. Hogarth. Kaerst and Beloch continue to give the ordinary chronology untroubled.

In the spring of 328 Alexander crossed the Hindu Kush into Bactria and followed the retreat of Bessus across the Oxus and invasion ‘ nt0 Sogdiana (Bokhara). Here Bessus was at last of caught and treated with the barbaric cruelty which

Northern the rule of the old Persian monarchy prescribed for India. rebels. Till the spring of 327 Alexander was moving

to and fro in Bactria and Sogdiana, beating down the recurrent rebellions and planting Greek cities. Just as in 335 he had crossed the Danube, so he now made one raid across the frontier river, the Jaxartes (Sir Daria), to teach the fear of his name to the outlying peoples of the steppe (summer 328). And mean- while the rift between Alexander and his European followers continued to show itself in dark incidents — the murder of Clitus at Maracanda (Samarkand) , when Alexander struck down an old friend, both being hot with wine; the claim that Alexander should be approached with prostration (proskynesis) , urged in the spring of 327, and opposed boldly by the philosopher Callisthenes, Aristotle’s nephew, who had come in the king’s train; the conspiracy of the pages at Bactria, which was made an occasion for putting Callisthenes to death. It was now that Alexander completed the conquest of the provinces north of the Hindu Kush by the reduction of the last mountain strongholds of the native princes. In one of them he captured Roxana, the daughter of Oxyartes, whom he made his wife. Before the summer of 327 he had once more crossed the Hindu Kush on his way to India (for the campaigns in the N.E. see F. von Schwarz, Alex. d. Grossen Feldzuge in Turke- stan, 1893, v.).

Whilst the heavier troops moved down the Kabul valley to Pencelaotis (Charsadda) under Perdiccas and Hephaestion, Alexander with a body of lighter-armed troops and cavalry pushed up the valleys which join the Kabul from the north —

through the regions now known as Bajour, Swat and Buner, inhabited by Indian hill peoples, as fierce then against the western intruder as their Pathan successors are against the British columns. The books give a number of their " cities " reduced by Alexander — walled mountain villages which can in some cases be identified more or less certainly with places where the clans are established to-day. The crowning exploit was the reduction of Aornus, 1 a stronghold perched on a precipitous summit above the Indus, which it was said that Heracles had failed to take. How much of the story of Alexander's discovery of the sacred mountain of the Nysa and the traces of Dionysus is due to the invention of Aristobulus and Clitarchus (Arrian did not find it in Ptolemy) we cannot say. Meantime Perdiccas and Hephaestion had built a bridge over the Indus, and by this in the spring of 326 Alexander passed into the Punjab (at Ohind, 16 m. above Attock, according to Foucher, Notes. sur la giogr. anc. in Gandhara, 1902). The country into which he came was dominated by three principalities, that of Ambhi (Gr. Omphis, Curt. viii. 12. 6) between the Indus and the Hydaspes (Jhelum,

1 The best opinion now confirms Abbott's identification of Aornus with Mahaban — Deane, Journ. R. Asiat. Soc. (Oct. 1896), p. 673; Stein, Report of an Archaeological Tour with the Buner Field Force (Lahore, 1898), pp. 45-48.

Jehlam), centred in the great city of Takkasila (Gr. Taxila)., that of the Paurara rajah (Gr. Porus) between the Hydaspes and Acesines (Chenab), and that of Abhisara (Gr. Abisares) between the same two rivers higher up, on the confines of Kashmir (Stein, Rajatarangini, transl. bk. i. 180, v. 217), The kings of Taxila and Porus were at enmity, and for this cause the invader could reckon upon Omphis as a firm ally. Porus was prepared to contest the passage of the Hydaspes with all his strength. Abisares preferred to play a double game and wait upon events. Alexander reached the Hydaspes just as the rains broke, when the river was already swollen. Porus held the opposite bank with a powerful army, including 200 elephants. Alexander succeeded in taking a part of his forces across the river higher up during a night of torrential rain, and then he fought the fourth and last of his pitched battles in Asia, the one which put to proof more shrewdly than any of the others the quality of the Macedonian army as an instrument of war, and yet again emerged victorious. Porus fell sorely wounded into his hands. 2 Porus had saved his honour, and now Alexander tried, and not in vain, to gain him as a friend. When he con- tinued his progress eastwards across the

Acesines, Porus was an active ally. Alexander moved along close under the hills. After crossing the Hydraotes (Ravi) he once more came into contact with hostile tribes, and the work of storming petty towns began again. Then the Hyphasis (Beas) was reached, and here the Macedonian army refused to go any farther. ‘ It was a bitter mortification to Alexander, before whose imagina- tion new vistas had just opened out eastwards, where there beckoned the unknown world of the Ganges and its splendid kings. For three days the will of king and people were locked in antagonism; then Alexander gave way; the long eastward movement was ended; the return began.

Alexander left the conquered portion of India east of the Indus to be governed under Porus, Omphis of Taxila, and Abisares, the country west of the Indus under Macedonian

The

governors, and set out to explore the great river return. to its mouth (for the organization of the Indian provinces, see especially Niese, vol. i. pp. 500 f.). The fleet prepared on the Hydaspes sailed in October, while a land army moved along the bank. The confluence of the Hydaspes and Acesines passed, the Macedonians were once more in a. region of hostile tribes with towns to be stormed. It was at one of these, a town of the Malli, that a memorable incident occurred, such as characterized the personality of Alexander for all suc- ceeding time. He leapt from the wall with only three companions into the hostile town, and, before the army behind him could effect an entrance, lay wounded almost to death. 3 He recovered and beat down the resistance of the tribes, leaving them annexed to the Macedonian satrapy west of the Indus. Below the con- fluence of the Punjab rivers into the single stream of the Indus the territory of loose tribes was succeeded by another group of regular principalities, under the rajahs called by the Greeks Musicanus, Oxycanus and Sambus. These oppfosed a national resistance to the Macedonians, the fires of which were fanned by the Brahmins, but still the strong arm of the western people prevailed. The rajah of Patala at the apex of the Indus delta abandoned his country and fled. It was the high summer of 325 when Alexander reached Patala. From here he explored! both arms of the delta to the ocean, now seen by the Macedonians for the first time. He had determined that the Indus fleet should be used to explore this new world and try to find a water* way between the Indus and the Persian Gulf . A great part of. the land-forces had been

already sent off under Craterus in the earlier summer to return west by Kandahar and Seistan; the fleet was to sail under the Greek Nearchus from the Indus mouth with the winter monsoon; Alexander himself with the rest of the land-forces set out in October to go by the

2 Beside V. Smith (cited below) see Schubert, ” Die Porusschlacht,” in Rhein. Mus. lvi., 1901, p. 543.’ _ ■

3 There seems nothing to fix the exact spot of this town; the common identification with Multan is, according to Raverty and V. Smith, certainly wrong.

coast of Baluchistan, through the appalling sand-wastes of the Mekran. 1

He would seem to have kept down to the coast until the headland of Ras Malan was reached, scattering before him the bands of Arabitae and Oritae who were the inhabitants of this well - provisioned tract. For the 150 miles between Ras Malan and Pasni Alexander was compelled by the natural barriers to march inland, and it was here that his troops sank under the horrors of heat and thirst and sand. The coast once regained, the way was easy; no such desert had to be traversed, when Alexander again struck inland for the chief city of the Gedrosians (Pura) , and thence made his way into Carmania. Here the spent troops rested; here the army of Craterus joined them, and Nearchus came to announce his safe arrival at the entrance of the Persian Gulf. 2

The machine of empire had not functioned altogether smoothly while the king had been absent, and on Alexander’s re-appearance many incapables and rogues in high office had to be replaced by better men. In Carmania, in Persis, complaints from the pro- vinces continued to reach him, as well as the news of disorders in Macedonia and Greece. New orders and appointments served to bring the empire into hand again, and at Susa in the spring of 324 Alexander rested, the task of conquering and compassing the Achaemenian realm achieved. The task of its internal re- organization now began to occupy him

— changes, for instance, in the military system which tended to assimilate Macedonians and Orientals. The same policy of fusion was furthered by the great marriage festival at Susa, when Alexander took two more wives from the Persian royal house, married a number of his generals to Oriental princesses, and even induced as many as he could of the rank-and-file to take Asiatic wives. This policy did not allay the discontent of the Macedonian army, and when Alexander in the summer of 324 moved to the cooler region of Media, an actual mutiny of the Macedonians broke out on the way at Opis on the Tigris. It was occasioned by the discharge of the Macedonian veterans, and only the personal magnetism of Alexander and his threat to entrust himself altogether to the Orientals availed to quell it. At Ecbatana the death of Hephaes- tion for a time plunged Alexander into a passion of mourning. But by the winter (3 24-323) he was again active, bringing the hill- tribes on the S.W. border of Media, the Cossaei, into subjection. In the spring of 323 he moved down to Babylon, receiving on the way embassies from lands as far as the confines of the known world, for the eyes of all nations were now turned with fear or wonder to the figure which had appeared with so superhuman an effect upon the world's stage. The embassy from Rome, however, is almost certainly a later, and an inevitable, invention. The exploration of the waterways round about the empire was Alexander's immediate concern, the discovery of the presumed connexion of the Caspian with the Northern Ocean, the opening of a maritime route from Babylon to Egypt round Arabia. The latter enterprise Alexander designed to conduct in person; under his supervision was prepared in Babylon an immense fleet, a great basin dug out to contain 1000 ships, and the water- communications of Babylonia taken in hand. Innovations were carried out in the tactical system of the army which were to modify considerably the methods of future battle-fields. At last all was ready; the 20th of the month Daesius (? June 5) was fixed for the king's setting forth. On the 15th and 16th Alexander caroused deep into the night at the house

illness o{ ˆ f avour j te Medius. On the 17th he developed ana . ‘ r

death. fever; for a time he treated it as a momentary impedi-

ment to the expedition; but on the 27th his speech was gone, and the Macedonian army were suffered to pass man

1 For the Indian campaigns of Alexander see especially

McCrindle, Invasion of India by Alexander the Great (1896); Vincent A. Smith, Early History of India (1904), and the references there given to the researches of Sir T. H. Holdich, Raverty and Foucher; A. Anspach, De Alex. Magni exped. ind. (1903).

2 Tomaschek, ” Topographische Erlauterung der Kustenfahrt Nearchs ” in the Sitzungsberichte der kaiserl. Akad. d. Wissensch. of Vienna (Philosoph.-histor . Klasse, vol. exxi.) ; Major P. M. Sykes, Ten Thousand Miles in Persia (1902), pp. 166 f.

by man through his chamber to bid him farewell. On the 28th (? June 13) Alexander died. 3

His son by Roxana, the so-called Alexander “Aegus,” was born a few months later. He and his uncle Philip, as joint kings, AAAOT.

Alexander the Great is one of the instances of the vanity of appealing from contemporary disputes to ” the verdict of posterity “; his character and his policy are estimated to-day as variously as ever. Certain features — the Ch ˆ racier high physical courage, the impulsive energy, the policy. fervid imagination — stand out clear; beyond that disagreement begins. That he was a great master of war is admitted by most of those who judge his character unfavourably, but even this has been seriously questioned (e.g. by Beloch, Griech. Gesch. iii. (i.), p. 66). There is a dispute as to his real designs. That he aimed at conquering the whole world and demanded to be worshipped as a god is the traditional view. Droysen denies the former, and Niese maintains that his ambition was limited by the bounds of the Persian empire and that the claim to divine honours is fabulous (Historische Zeitschr. Lxxix., 1897, 1 f.). It is true that our best authority, Arrian, fails to substantiate the traditional view satisfactorily; on the other hand those who maintain it urge that Arrian’s interests were mainly military, and that the other authorities, if inferior in trustworthiness, are completer in range of vision. Of those, again, who maintain the traditional view, some, like Niebuhr and Grote, regard it as convicting Alexander of mad ambition and vainglory, whilst to Kaerst Alexander only incorporates ideas which were the timely fruit of a long historical development. The policy of fusing Greeks and Orientals again is diversely judged. To Droysen and Kaerst it accords with the historical conditions; to Grote and to Beloch it is a betrayal of the pre- rogative of Hellenism.

Some notion of the personal appearance of Alexander may be got from the literature and the surviving monuments. He is described as of an athletic frame, though not taller than the common, and a white and ruddy complexion. The expression of his eyes had something ” liquid and melting” (tuiv ofjLfiaTWV rrjir Scaxvaiv nal vy poTtira), and the hair which stood up over his forehead gave the suggestion of a lion. He had a way of carrying his head somewhat aslant. (See especially Plut. Alex. 4; de Alex. fort. ii. 2.) The greatest masters of the time executed portraits of him, Lysippus in sculpture, Apelles in painting and Pyrgoteles in graven gems. Among surviving monuments, we have no completely certified portraits except the Tivoli herm (now in the Louvre) and the coins struck by his successors. The herm is a dry work and the head upon the coins shows various degrees of idealization. There are, however, a considerable number of works which can make out a better or worse claim either to be portraits of Alexander or to reproduce his type, and a large field of discussion is therefore open as to their values and classification (F. Kopp, Tiber das Bildnis Alexanders d. Grossen (1892); K. J. Ujfalvy, Le Type physique d’ Alexandre le Grand (1902); T. Schreiber, Studien iiber das Bildnis Alexanders d. Grossen (1903); J. J. Bernoulli, Die erhaltenen Darstellungen Alexanders d. Grossen (1905). Alexander shaved clean, and set the fashion in this respect for the Graeco-Roman world for the next 500 years.

Bibliography. — The campaigns and life of Alexander did not lack contemporary historians, some of them eye-witnesses and even associates. They included the philosopher Callisthenes, put to

s For Alexander’s funeral, see F. Jacoby in Rhein. Mus. (1903), pp. 461 f.

death by Alexander in 327, whose history went up to the death of Darius, Alexander’s general Ptolemy, afterwards king in Egypt, Nearchus who commanded the fleet that sailed from the Indus to the Persian Gulf, Onesicritus who served as pilot in the same fleet, Aristobulus who was with Alexander in India, Clitarchus, a con- temporary, if not an eye-witness, important from the fact

that his highly coloured version of the life of Alexander became the popular authority for the succeeding centuries. Besides the historical narrative, there were works mainly geographical or topographical left by persons like Baeton and Diognetus, whom Alexander had employed (as (IripaTurTaX) to survey the roads over which he passed. All such original sources have now perished. The fragments are collected in the Didot edition of Arrian by Karl Miiller. Not reckon- ing scattered notices, we depend principally upon five later com- positions, Diodorus, book xvii. (c. 20 B.C.), the work of Quintus Curtius (c. a.d. 42), Plutarch's (c. 45-125 A.D.) Life of Alexander, Arrian's Anabasis and Indica (c. A.D. 150), and the relevant books of Justin's abridgment (2nd cent. A.D.) of the history of Tragus (c. 10 B.C.?). To these we may add the Latin Itinerarium Alex- andra, a skeleton outline of Alexander's campaigns dedicated to the emperor Constantius (a.d. 324-361), printed at the end of the Didot edition of Arrian, and the Epitome Rerum Geslarum Alexandri magni, an abridgment made in the 4th or 5th century of a lost Latin work of uncertain date, combining history with elements taken from the Romance (edited by O. Wagner, Leipzig, 1900). The relation of these works to the various original sources constitutes the critical problem before the modern historian in reference to the history of Alexander. See Droysen vol. i. appendix i. ; A. Schoene, De rerum Alexandri Magni scriptorum imprimis Arriani & Plutarchi fontibus (1870); Fraenkel, Die Geschichlschreiber Alex. d. Grossen (1883); O. Maas, Kleitarch und Diodor (Petersburg, 1894) ; Kaerst, For- schungen zur Gesch. Alex. d. Grossen (1887), and Gesch. d. Hellenist. Zeitalters (vol.i., I90i),pp-42l f. ; F. L. Schocnle, Diodorstudien (1891) ; E. Schwartz, articles "Aristobulos (14)," "Arrianus," "Quintus Curtius," " Diodorus " in Pauly-Wissowa's Realencyclopddie.

For modern views of Alexander see Thirlwall, History of Greece ; Niebuhr, Lectures on Ancient History (Eng. trans, rev. by author, 1852); Grote, History of Greece; Droysen, Histoire de I'Hcllcnisme (translation by Bouche-Leclerq) ; Ad. Holm, History of Greece (Eng. trans., 1898); B. Niese, Gesch. der griech. u. maked. Staaten (vol. i.); Kaerst, Gesch. des hellenist. Zeitalters (1901); J. Beloch, Griechische Gesch. (vol. hi., 1904); J. B. Bury, History of Greece (1902) ; A. von Gutschmid, Geschichte Irans (1888). Among the mass of monographs and special articles, reference may be made to Freeman, Historical Essays, 2nd series, pp. 182 f. ; Dodge, Alexander (in a series called Great Captains) 1890; Mahaffy, Problems in Greek History (1892), ch. viii. ; D. G. Hogarth,

Philip_ and Alexander of Macedon (1897), a striking effort of historical imagination to reconstruct Alexander as a man of the real world; Benjamin I. Wheeler, Alexander the Great (1900) in the " Heroes of the Nations Series." The purely military aspect of Alexander's campaigns is treated in general histories of warfare (Rustow-Kochly, Bauer, Delbriick, Verdy du Vernois), and in special monographs by Hogarth, Journ. of Philol. vol. xvii., 1888, pp. 1 foil.; H. Droysen, Untersuchungen iiber A. des Gr. Heerwesen (1885), and Graf Yorck von Wartenburg, Kurze Vbersicht der Feldziige A . de Gr. (1 897). For further references to the literature on Alexander, see Kaerst's article in Pauly-Wissowa's Realencyclopddie (1894). (E. R. B.)

The Romance of Alexander.

The figure of Alexander naturally impressed itself upon the imagination of the world which his career had shaken. Even in India we are told that he was held in honour by the native kings who took his farthest provinces in possession. But Eastern tradition, so tenacious of the old myths of primitive man, has a short memory for actual history, and five centuries later Alexander was only remembered in Iran as the accursed destroyer of the sacred books, whose wisdom he had at the same time pilfered by causing translations to be made into " Roman." That the East to-day has so much to tell about Alexander is only due to the fact that old mythical stories of gods or heroes who go travelling through lands of monsters and darkness, of magical fountains and unearthly oceans, became attached to his name in the popular literature of the Roman empire, and this mythical Alexander was reintroduced in the 7th century a.d. into the farther East, where the historical Alexander was almost forgotten. The romance of Alexander is found written in the languages of nearly all peoples from the Indian Ocean to the Atlantic, but all these versions are derived, mediately or immediately, from the Greek original which circulated under the false name of Callisthenes. The Greek pseudo-Callisthenes (otherwise Aisopos we possess in three recensions, based all upon a book produced in Egypt in the 2nd century a.d. But this book itself was a

farrago of heterogeneous elements — pieces of genuine history, ancient stories once told in Babylon of Gilgamesh or Etanna, literary forgeries of the days soon after Alexander, like the oldest part of the " Testament of Alexander," variations due to Egyptian patriotic sentiment, like that which made Alexander the son of

the last Pharaoh, Nectanebus. As the story was reproduced, variations were freely introduced according to the bent of different times and peoples; in the Persian version Alexander (Iskander) became a son of Darius; among the Mahommedans he turned into a prophet, hot against idols; the pen of Christian monks made him an ascetic saint.

The Alexander romance found its way into Europe through the medium of Latin, but originated mainly from the versions of the pseudo-Callisthenes, not from the more sober narrative of Quintus Curtius. The pseudo-Callisthenes, in a recension which has not been preserved, was translated into Latin by Julius Valerius about the end of the 3rd century, and an epitome of this translation, also in Latin, was made some time before the 9th century, and is introduced by Vincent de Beauvais into his Speculum historiale. Much of the legend is a running travesty of the true history of the conqueror. The first book deals with his birth and early exploits. The trace of Alexandrian influence is to be found in the pretence that his actual father was Nectanebus, a fugitive king of Egypt. The latter was a great magician, able, by operating upon waxen figures of the armies and ships of his enemies, to obtain complete power over their real actions. Obliged, however, to flee to Pella in Macedonia, he established himself as an astrologer, and as such was consulted by the childless Olympias. Having promised that Zeus Ammon would visit her in the form of a dragon, he himself assumed the disguise. In due course Alexander was born, and Philip's suspicions were overcome by a second appearance of the dragon, which was held to prove the divine fatherhood. The child was small and somewhat deformed, but of great courage and intelligence. When he was twelve years old he was instructed in starcraft by Nectanebus, who was killed by a fall into a pit, into which he had been playfully pushed by Alexander. The first book also relates his conquests in Italy, Africa, Syria and Asia Minor; his return to Macedonia and the submission of Greece. The second book continues the history of his conquests, and the third contains the victory over Poms, the relations with the Brahmins, the letter to Aristotle on the wonders of India, the histories of Candace and the Amazons, the letter to Olympias on the marvels of Farther Asia, and lastly the account of Alexander's death in Babylon.

The most wide-spread Latin version of the story, however, was the Historia de proeliis, 1 printed at Strassburg in i486, which began to supersede the Epitome of Julius Valerius in general

favour about the end of the 13 th century. It is said to have been written by the Neapolitan arch-presbyter Leo, who was sent by Johannes and Marinus, dukes of Campania (941-965) to Constantinople, where he found his Greek original. Auxiliary sources for the medieval romance-writers were: — the opuscule (4th century) known as Alexandri magni iter ad Paradisum, a fable of Eastern origin directed against ambition; the Itinerarium Alexandri (340), based partly on Julius Valerius and dedicated to Constans, son of the emperor Constantine; the letter of Alexander to Aristotle (Epist. de situ et mirabilibus Indiae), and the correspondence between Alexander and the king of the Brahmins, Dindimus, both of which are often contained in MSS. of the Epitome; and the treatise (based on a lost history of Alexander by Onesicritus), De gentibus Indiae et Bragmanibus, ascribed without certainty to Palladius (d. c. 430), successively bishop of Helenopolis and Aspona.

The Ethiopic versions are of great interest as a striking example of literary "accommodation. " Not only is the whole atmosphere Christian in colouring, but we actually find the Greek gods in the guise of Enoch, Elijah, &c, while Philip is a Christian martyr, and Alexander himself a great apostle, even a saint; quotations from the Bible are frequent. Syriac and Armenian versions were made in the 5th century. Persians and Arabs told the

1 Nativita-s et victoriae Alexandri magni regis was the original title. l

deeds of Iskander; and Firdousi made use of the story in the Skdhndma. Another early Persian poet, Nizami; made the story specially his own. The crusaders brought back fresh developments; Gog and Magog (partly Arab and partly Greek) and some Jewish stories were then added. In the nth. century Simeon Seth, protovestiarius at the Byzantine court, translated the fabulous history from the Persian back into Greek.

The Alexander legend was the theme of poetry in all European languages; six or seven German poets dealt with the subject, and it may be read in French, English, Spanish, Danish, Swedish,

Icelandic, Flemish and Bohemian.

French. — The earliest known French romance of Alexander, by Alberic of Besancon (or more properly Briancon), was, until the discovery of a fragment of 100 lines at Florence in 1852, known only through the German adaptation by Lamprecht the preacher, who wrote towards the end of the 12th century, and by the version made by a Poitevin poet named Simon in deca- syllabic lines. Alberic followed the epitome of Julius Valerius. He had some knowledge of authentic history, and rejected the more marvellous elements of the story. The French feudal romance, Li Romans d' Alexandre, was written in the 12th century by Lambert li Tors of Chateaudun, Alexandre de Bernai, sur- named de Paris, and others. It contained 20,000 lines, and was written in twelve-syllabled lines, whence the term " alexandrine " verse. The authors endowed Alexander with the fashionable virtues of the chivalric hero, making him especially the type of lavish generosity. They used as their sources Valerius, the letter to Aristotle and the Iter ad Paradisum, adding much of their own. Pierre de Saint Cloud, the writer of the fourth section of the romance, was evidently acquainted with the Historia de procliis. The incident of the Fuerre de Gadres (Foray of Gaza), interpolated in the second section, is assigned to a certain Eustache. The redaction of the whole work is due to Alexandre de Bernai, who replaced the original assonance by rhyme. According to all the traditions of romance it was necessary to avenge the death of Alexander. At the end of the 12 th century Gui de Cambrai and Jean le Nevelon (or Nevelaux or Venelais) , each wrote a Vengeance a" Alexandre. Jean le Nevelon relates how Alior, the son of Alexander and Candace, avenged his father's death on Antipater and others. Between 1310 and 1315 Jacques de Longuyon (or Langhion) introduced into the account of the Indian war Les Vceux du paon, a romanesque and fantastic episode very loosely connected with Alexander. It is interesting for its connexion with the 15th-century romance of Perceforest, since in it Alexander visits Britain, where he bestows Scotland onGadiferand England on Betis (otherwise Perceforest). Les Vceux du paon enjoyed great popularity, and had two sequels, Le Restor du paon, written before 1338 by Jean Brisebarre de Douai, and Le Parfait du paon, written in 1340 by Jean de la Mote. Florimont, a 12th-century poem by Aimon de Varenne, relates to a fictitious personage said to have been the grandfather of Alexander. This poem gave rise to two prose romances — La Conqueste de Grece faicte par Philippe de Madien, by Perrinet du

Pin, first printed in 1527, and Histoire du roi Florimond (1528). Quintus Curtius was largely used for the Alexandreis (c. n 80) of Gaultier de Lille or de Chatillon (Galtherus ab Insulis or de Castellione). It is a Latin poem in ten books of hexameters, and contains a curious admixture of Biblical history. It was translated at the end of the next century into Flemish by J. van Maerlant and into German by Ulrich von Eschenbach.

Of the French prose versions of the Historia de proeliis may be noticed the late romance, L'Hisioire du noble et vaillant roy Alixandre le Grant (1506). After an account of the ancient history of Macedonia and of the intrigue of Nectanebus we are told how Philip dies, and how Alexander subdues Rome and receives tribute from all European nations. He then makes his Persian expedition; the Indian campaign gives occasion for descriptions of all kinds of wonders. The conqueror visits a cannibal kingdom and finds many marvels in the palace of Porus, among them a vine with golden branches, emerald leaves and fruit of other precious stones. In one country he meets with women who, after the burial in the winter, become

alive again in the spring full of youth and beauty. Having reached the ends of the earth and conquered all nations, he aspires to the dominion of the air. He obtains a magic glass cage, yoked with eight griffins, flies through the clouds, and, thanks to enchanters who know the language of birds, geti information as to their manners and customs, and ultimately receives their submission. The excessive heat of the upper regions compels him to descend, and he next visits the bottom of the sea in a kind of diving-bell. The fish crowd round him and pay homage. Alexander returns to Babylon, is crowned with much pomp and mass is celebrated. He dies by poison soon afterwards.

English Versions. — The Alexander cycle was no less popular in Great Britain. The letter from Alexander to Aristotle and his correspondence with Dindimus are found in Early English versions dating from the nth century. These are printed by O. Cockayne in his N arratiunculae Anglice conscriptae (1861). The Monk {De Cas. ill. vir.) in Chaucer's Canterbury Tales prefaces his account of Alexander with the statement that his story is so common

That every wight that hath discrecioun Hath herd somewhat or all of his fortune.

There are two considerable fragments of an English alliterative romance on the subject written in the west midland dialect, and dating from the second half of the 14th century. The first, The Gestes of the Worthy King and Emperor Alisaunder of Macedoine (ed. W. W. Skeat, E.E.T.S., 1877, with William of Palerme) contains an account of the wars of Philip, of Nectanebus and of the education of Alexander. A second fragment (ed. Skeat, E.E.T.S., 1878) contains Alexander's visit to the Gymnosophists and his correspondence with Dindimus. Another alliterative poem in the northern dialect, of 15th-century origin, is based on the Historia de proeliis, and was edited by Skeat for the E.E.T-S. (1886) as The Wars of Alexander. Earlier than any of these is the rhyming Lyfe of Alisaunder (c. 1330) which is printed in H. Weber's Metrical Romances (vol. i., 1810). It is written in unusually picturesque and vigorous language, and is based on the Roman de toute chevalerie, a French compilation made about 1250 by a certain Eustace or Thomas of Kent. Fragments of another rhyming poem (pr. c. 1550) are preserved in the British Museum. The Scots Buih of the most noble and vailyzeand Conqueror Alexander the Great, printed by Alexander Arbuthnot (d. 1585) about 1580, reprinted in 1831 for the Bannatyne Club, is not really a life. It contains three episodes of the cycle, the " Forray of Gadderis " (not taken from the Fuerre de Gadres but from the Assaut de Tyr in the Romans d' Alixandre) , " The Avowes of Alexander," and " The Great Battel of Effesoun," taken from the Vozux du paon. Many passages in John Barbour's Bruce are almost identical with this book, and it is suggested by G. Neilson {John Barbour, Poet and Translator, London, 1900) that Barbour was the author, although the colophon states that it was written in 1438. Bruce at Bannockburn makes the same oration as Alexander at " Effesoun." A Buke of the Conqueror Alexander the Great by Sir Gilbert Hay (fl. 1456) is in MS. at Taymouth Castle.

Bibliography. — The best sketch of the Alexander romance literature is by Paul Meyer, Alexandre le grand dans la litterature francaise au moyen age (2 vols., Paris, 1886). The first volume contains some French texts, and the second a detailed discussion of the various versions from the pseudo-Callisthenes downwards. See also J, Zacher, Pseudo-Callisthenes, Forschungen zur .... Alexandersage (Halle, 1867), and for Oriental versions, T. Noldeke, " Beitrage zur Geschichte des Alexanderromans " (Denkschriften der ksl. Akad. d.Wissenschaften, Phil.-hist. Klasse, vol.38: Vienna, 1890). For early printed versions see Brunet,

Manuel du libraire, s.v. ” Alexandre.”

The text of the pseudo-Callisthenes was edited by C. W. Muller from three MSS. in the Bibl. Nat. and printed in the Arrian of the Coll. Didot (Paris, 1846), and by H. Meusel (Leipzig, 1871) from a Leiden MS. A. Mai edited Julius Valerius (Milan, 1817) and the Itinerarium Alexandri (Class. Auct. vol. vii. ; Milan, 1835); J. Zacher, the Epitome (Halle, 1867) and Alex, iter ad Paradisum (Regensburg, 1859); the Oxford MS. of the Epitome was edited by G. Cilli (Strassburg, 1905); G. Landgraf, Die ” Vita Alex- andri” . . ■ des Archpresbyter Leo (Historia de proeliis) , (Erlangen,

1885) ; Alexander’s letter to Aristotle and his correspondence with Dindimus are included in the Teubner edition of Julius Valerius (ed. B. Kiibler, Leipzig, 1888). A newly discovered anonymous Epitome was edited by O. Wagner (Leipzig, 1900).

Tfce fragment by Alberic was edited by P. Heyse (Berlin, 1856); Lamprecht’s German text by H. Weismann (Frankfort, 1850) and by C. Kinzel (Halle, 1884) ; the Alexandreis of Gaultier de Lille, by F. A. W. Muldener (Leipzig, 1863); an Icelandic prose version (c. 1250) of the same, Alexanders Saga, by C. R. Unger (Christiania, 1848); Li Romans d’Alixandre, by H. Michelant (Stuttgart, 1846); the Ethiopic version by E. A. T. Wallis Budge (1896, 2 vols., with English translation) ; the Syriac text of pseudo-Callisthenes by Budge (Cambridge, 1889); cp. K. F. Weymann, Die dthiopische tend arabische Vbersetzungen des Pseudo-Kallisthenes (Kirchhain,

1901).

Besides the English editions quoted in the text, the alliterative English poems were partially edited by I. Stevenson for the Roxburghe Club (1849). There is a great deal of information on the various texts in H. L. Wood’s Catalogue of Romances in the British Museum (1883, vol. i. pp. 94 et seq.). See also A. Hermann, Unter- suchungen uber das Scottische Alexanderbuch (1893); and Unters. iiber das med. Gedicht, The Wars of Alexander (Berlin, 1889). Among other works see E. Rohde, Der griechische Roman (2nd ed. Leipzig, 1900) ; B. Meissner,

Alexander u. Gilgamos (Leipzig, 1894) ; F. Xampers, ” Alex. d. Grosse und die Idee des Weltimperiums in Propnetie und Sage ” (in H. Granert’s Studien, &c, Freiburg, 1901) ; Adolf Ausfeld, Der griechische Alexanderroman (Leipzig, 1907), edited after the author’s death by W. Kroll; Wilhelm Hertz, ” Aristoteles in den Alex. Dichtungen d. Mittelalters ” (Kgl. Acad. d. Wissenschaften, Munich, 1891); H. Becker, Die Brahtnanen in d. Alex. Sage (Konigsberg, 1889). (M. Br.)

ALEXANDER, tagus or despot of Pherae in Thessaly, ruled from 369 to 358 B.C. His tyranny caused the Aleuadae of Larissa to invoke the aid of Alexander II. of Macedon, whose intervention was successful, but after his withdrawal Alexander treated his subjects as cruelly as before. The Thessalians now applied to Thebes; Pelopidas, who was sent to their assistance, was treacherously seized and thrown into prison (368), and it was necessary to send Epaminondas with a large army to secure his release. Alexander’s conduct caused renewed intervention; in 364 he was defeated at Cynoscephalae by the TheBans, although the victory was dearly bought by the loss of Pelopidas, who fell in the battle. Alexander was at last crushed by the Thebans, Compelled to acknowledge the freedom of the Thessalian cities and to limit his rule to Pherae, and forced to join the Boeotian league. He was murdered by his wife’s brother at her instigation. Ancient accounts agree in describing Alexander as a typically cruel and suspicious tyrant.

ALEXANDER (1461-1506), king of Poland and grand- duke of Lithuania, fourth son of Casimir IV., king of Poland, was elected grand-duke of Lithuania on the death of his father in 1492, and king of Poland on the death of his brother John Albert in 1501. His extreme impecuniosity made him from the first subservient to the Polish senate and nobles (szlachta), who deprived him of the control of the mint — then one of the most lucrative sources of revenue of the Polish kings — curtailed his prerogative, and generally endeavoured to reduce him to a subordinate position. This ill-timed parsimony reacted injuri- ously upon Polish politics. Thus, for want of funds, Alexander was unable to assist the Grand Master of the Order of the Sword against Muscovite aggression, or prevent Tsar Ivan III. from ravaging Lithuania with the Tatars. The utmost the king could do was to garrison Smolensk and other fortresses and employ his wife Helena, the tsar’s daughter, to mediate a truce between his father-in-law and himself. During his reign Poland suffered much humiliation from the attempts of her subject principalities, Prussia and Moldavia,

to throw off her yoke. Only the death of Stephen, the great hospodar of Moldavia, enabled Poland still to hold her own on the Danube; while the liberality of Pope Julius II., who issued no fewer than 29 bulls in favour of Poland and granted Alexander Peter's Pence and other financial help, enabled the Polish king to restrain somewhat the arrogance of the Teutonic Order. In Alexander the char- acteristic virtues of the Jagiellos, patience and generosity, degenerated into slothfulness and extravagance. Frequently he was too poor to pay the expenses of his own table. But he never felt at home in Poland, and bestowed his favour principally

upon his fellow-countrymen, the most notable of whom was the wealthy Lithuanian magnate Michael Glinsky, who justified his master's confidence by his great victory over the Tatars at Kleck (August 5, 1506), the news of which was brought to Alexander on his deathbed.

See V. Czerny, The Reigns of John Albert and Alexander Jagiello (Pol.) (Cracow, 1882).

ALEXANDER, the name of eight popes: —

Alexander I. was bishop of Rome from about 106 to 1 1 5. He has been identified, without any foundation, with Alexander, a martyr of the Via Nomentana, whose day is the 3rd of May.

Alexander II. (Anselmo Baggio), pope from 106 1 to 1073, was a native of Milan. As bishop of Lucca he had been an energetic coadjutor with Hildebrand in endeavouring to suppress simony, and to enforce the celibacy of the clergy. His election, which Hildebrand had arranged in conformity with the decree of 1059 (see Nicholas II.), was not sanctioned by the 'imperial court of Germany. This court, faithful to the practice observed by it in the preceding elections, nominated another candidate, Cadalus, bishop of Parma, who was proclaimed at the council of Basel under the name of Honorius II., marched to Rome, and for a long time jeopardized his rival's position. At length, however, he was abandoned by the Germanic court and deposed by a council held at Mantua; and Alexander's position re- mained unchallenged. Alexander was succeeded by his associate Hildebrand, who took the title of Gregory VII. (L. D.*)

Alexander III. (Orlando Bandinelli), pope from 1159 to 1 181, was a Siennese, and as a teacher of canon law in Bologna

composed the Stroma or the Summa Magistri Rolandi, one of the earliest commentaries on the Decretum Gratiani. In October 11 50 Eugenius III. created him cardinal deacon SS. Cosmae and Damiani; later he became cardinal priest of St Mark's. Probably about this time he composed his Sentences, based on the Introductio ad theologiam of Abelard. In 1153 he became papal chancellor, and was the leader of the cardinals opposed to Frederick Barbarossa. On the 7 th of September 1159 he was chosen the successor of Adrian IV., a minority of the cardinals, however, electing the cardinal priest Octavian, who assumed the name of Victor IV. This antipope, and his successors Paschal III. (1164-1168) and Calixtus III. (1168- 1 1 78) , had the imperial support ; but after the defeat of Legnanoˆ Barbarossa finally (in the peace of Venice, 11 77) recognized Alexander as pope. On the 12th of March 1178 Alexander returned to Rome, which he had been compelled to leave twice, namely, from 1162 until the 23rd of November 1165, and again in 1 167. The first period he spent in France, the latter chiefly in Gaeta, Benevento, Anagni and Venice. In March 11 79 Alexander held the third Lateran synod, a brilliant assemblage, reckoned by the Roman church as the eleventh oecumenical council; its acts embody several of the pope's proposals for the betterment of the condition of the church, among them the present law requiring that no one may be elected pope without the votes of two-thirds of the cardinals. This synod marks the summit of Alexander's power. Besides checkmating Barbarossa, he had humbled Henry II. of England in the affair of Thomas Becket, he had confirmed the right of Alphonso I. of Portugal to the crown, and even as a fugitive had enjoyed the favour and protection of Louis VII. of France. Nevertheless, soon after the close of the synod the Roman republic forced Alexander to leave the city, which he never re-entered; and on the 29th of September 11 79 some nobles set up the antipope Innocent III. By the judicious use of money, however, Alexander got him into his power, so that he was deposed in January 11 80. In 1 181 Alexander excommunicated William the Lion of Scotland and put the kingdom under the interdict. The great pope died at Civita Castellana on the 30th of August 1181.

See Herzog-Hauck, Realencyklopadie, 3rd ed., i. 340-344; Wetzer and Welte, Kirchenlexikon, 2nd ed., 1481. The most elabo- rate biography is H. Reuter, Geschichte Alexanders III. und der Kirche seiner Zeit (3 vols., 2nd ed., Leipzig, i860). (W. W. R.*)

Alexander IV. (Rinaldo), pope from 1234 to 1261, was, like

counts of Segni. His uncle Gregory IX. made him cardinal deacon in 1227 and cardinal bishop of Ostia in 1231. On the death of Innocent IV. he was elected pope at Naples on the 12th of December 1254. He is described as a stout man, kindly, cheerful, but of no great brilliancy. He succeeded Innocent IV. as guardian of Conradin, the last of the Hohenstaufen, promising him his benevolent protection; but in less than a fortnight he conspired against him and bitterly opposed Conradin's uncle Manfred. Alexander fulminated with excommunication and interdict against the party of Manfred, but in vain; nor could he enlist the kings of England and Norway in a crusade against the Hohenstaufen. Rome itself became too Ghibelline for the pope, who withdrew to Viterbo, where he died on the 25th of May 1 26 1. His pontificate was signalized by efforts to unite the Greek and Latin churches, by the establishment of the Inquisition in France, by favours shown to the mendicant orders, and by an attempt to organize a crusade against the Tatars.

The registers of Alexander IV. are published by Bourel de la Ronciere and others in the Bibliotheque des ILcoles francaises d'Alhenes et de Rome, Paris, 1895 ff. (W. W. R.*)

Alexander V. (Peter Philarges), pope 1409-1410, was born in Crete of unknown parents and entered the order of St Francis, for which, as for the other mendicant orders, he later manifested his affection in a striking manner. He was a member in turn of the universities of Oxford and Paris, and finally settled in Lombardy, where, thanks to the favour of Gian Galeazzo Yisconti, he became bishop, first of Piacenza, then of Vincenza, then of Novara, and afterwards archbishop of Milan. On being created cardinal by Innocent VII. he devoted all his energies from 1408 onwards to the realization of the union of the church, in spite of the two rival popes. He was one of the promoters of the council of Pisa, and after that assembly had declared Gregory XII. and Benedict XIII. deposed, the cardinals assembled in conclave thought they could not do better than crown with the tiara this cosmopolitan prelate, who had an equal mastery of the Latin and Greek

languages, and was re- nowned not only for his learning in theology but for his affability (June 26, 1409). As a matter of fact, the only effect of this election was to aggravate the schism by adding a third to the number of rival pontiffs. During his short reign of ten months Alexander V.‘s aim was to extend his obedience with the assist- ance of France, and, notably, of the duke Louis II. of Anjou, upon whom he conferred the investiture of the kingdom of Sicily, together with the title of gonfalonier of the church. He proclaimed and promised rather than effected a certain number of reforms: the abandonment of the rights of “spoils” and ” procurations,” the re-establishment of the system of canonical election in the cathedral churches and principal monasteries, &c. But death came upon him almost without warning at Bologna, in the night of the 3rd-4th May 1410. A rumour went about that he had been poisoned by the cardinal Baldassare Cossa, impatient to be his successor, who succeeded him in fact under the name of John XXIII. The crime has, however, never been proved, though a Milanese physician, who performed the task of dissecting the corpse of Peter Philarges, seems to have thought that he found traces of poison. (N. V.)

Alexander VI. (Rodrigo Borgia) (1431-1503), pope from 1492 to his death, is the most memorable of the corrupt and secular popes of the Renaissance. He was born (January 1, 143 1) at Xativa, near Valencia in Spain, and his father’s surname was Lanzol or Llancol; that of his mother’s family, Borgia or Borja, was assumed by him on the elevation of his maternal uncle to the papacy as Calixtus III. (April 8, 1455). He studied law at Bologna, and after his uncle’s election he was created successively bishop, cardinal and vice-chancellor of the church, an act of nepotism characteristic of the age. He served in the Curia under five popes and acquired much administrative experience, in- fluence and wealth, although no great power; he was economical in his habits; on occasion he displayed great splendour and lived in a fine palace. His manners were agreeable and his appearance fascinating, but, like many other prelates of the day, his morals were far from blameless, his two dominant passions being greed

of gold and love of women, and he was devotedly fond of the children whom his mistresses bore him. Although ecclesiastical corruption was then at its height, his riotous mode of life called down upon him a very severe reprimand from Pope Pius II., who succeeded Calixtus III. in 1458. Of his many mistresses the one for whom his passion lasted longest was a certain Vannozza (Giovanna) dei Cattani, born in 1442, and wife of three

successive husbands. The connexion began in 1470, and she bore him many children whom be openly acknowledged as his own: Giovanni, afterwards duke of Gandia (born 1474), Cesare (born 1476), Lucrezia (born 1480), and Goffredo or Giuffre (born 1481 or 1482). His other children — Girolamo, Isabella and Pier Luigi — were of uncertain parentage. Before his elevation to the papacy Cardinal Borgia's passion for Vannozza somewhat diminished, and she subsequently led a very retired life. Her place in his affections was filled by the beautiful Giulia Farnese (Giulia Bella), wife of an Orsini, but his love for his children by Vannozza remained as strong as ever and proved, indeed, the determining factor of his whole career. He lavished vast sums on them and loaded them with every honour. A characteristic instance of the corruption of the papal court is the fact that Borgia's daughter Lucrezia (see Borgia, Lucrezia) lived with his mistress Giulia, who bore him a daughter Laura in 1492.

On the death of Pope Innocent VIII. the three likely can- didates for the Holy See were Cardinals Borgia, Ascanio Sforza and Giuliano della Rovere; at no previous or subsequent election were such immense sums of money spent on bribery, and Borgia by his great wealth succeeded in buying the largest number of votes, including that of Sforza, and to his intense joy he was elected on the 10th of August 1492, assuming the name of Alexander VI. Borgia's elevation did not at the time excite much alarm, except in some of the cardinals who knew him, and at first his reign was marked by a strict administration of justice and an orderly method of government in satisfactory contrast with the anarchy of the previous pontificate, as well as by great outward splendour. But it was not long before his unbridled passion for endowing his relatives at the expense of the church and of his neighbours became manifest. For this object he was ready to commit any crime and to plunge all Italy into war. Cesare, then a youth of sixteen and a student at Pisa, was made archbishop of Valencia, his nephew Giovanni received a cardinal's hat, and for the duke of Gandia and Giuffre the pope proposed to carve fiefs out of the papal states and the kingdom of Naples. Among the fiefs destined for the duke of Gandia were Cervetri and Anguillara, lately acquired by Virginio Orsini, head of that powerful and turbulent house, with the pecuniary help of Ferdinand of Aragon, king of Naples (Don Ferrante). This brought the latter into conflict with Alexander, who determined to revenge himself by making an alliance with the king's enemies, especially the Sforza family, lords of Milan. In this he was

opposed by Cardinal della Rovere, whose candidature for the papacy had been backed by Ferdinand. Delia Rovere, feeling that Rome was a dangerous place for him, fortified himself in his bishopric of Ostia at the Tiber's mouth, while Ferdinand allied himself with Florence, Milan, Venice, and the pope formed a league against Naples (April 25, 1493) and prepared for war. Ferdinand appealed to Spain for help; but Spain was anxious to be on good terms with the pope to obtain a title over the newly discovered continent of America and could not afford to quarrel with him.

Alexander meditated great marriages for his children. Lucrezia had been married to the Spaniard Don Gasparo de Procida, but on her father's elevation to the papacy the union was annulled, and in 1493 she was married to Giovanni Sforza, lord of Pesaro, the ceremony being celebrated at the Vatican with unparalleled magnificence. But in spite of the splendours of the court, the condition of Rome became every day more deplorable. The city swarmed with Spanish adventurers, assassins, prostitutes and informers; murder and robbery were committed with impunity, heretics and Jews were admitted to the city on payment of bribes, and the pope himself shamelessly cast aside all show of decorum, living a purely secular and

immoral life, and indulging in the chase, dancing, stage plays and indecent orgies. One of his boon companions was Jem, the brother of the sultan Bayezid, detained as a hostage.

The general political outlook in Italy was of the gloomiest, and the country was on the eve of the catastrophe of foreign invasion. At Milan Lodovico Sforza (il Moro) ruled, nominally as regent for the youthful duke Gian Galeazzo, but really with a view to making himself master of the state. He made many alliances to secure his position, but fearing himself isolated he sought help from Charles VIII. of France, and as the king of Naples threatened to come to the aid of Gian Galeazzo, who had married his grand-daughter, he encouraged the French king in his schemes for the conquest of Naples. Alexander carried on a double policy, always ready to seize opportunities to aggrandize his family. But

through the intervention of the Spanish ambassador he made peace with Naples in July 1493 and also with the Orsini; the peace was cemented by a marriage between the pope's son Giuffre and Dona Sancha, Ferdinand's grand-daughter. In order to dominate the Sacred College more completely he created twelve new cardinals, among them his own son Cesare, then only eighteen years old, and Alessandro Farnese, the brother of Giulia Bella, one of the pope's mistresses, creations which caused much scandal. On the 25th of January 1494 Ferdinand died and was succeeded by his son Alphonso II. Charles of France now advanced formal claims on the kingdom, and Alexander drew him to his side and authorized him to pass through Rome ostensibly on a crusade against the Turks, without mentioning Naples. But when the French invasion became a reality he was alarmed, recognized Alphonso as king, and concluded an alliance with him in exchange for various fiefs to his sons (July 1494). Preparations for defence were made; a Neapolitan army was to advance through the Romagna and attack Milan, while the fleet was to seize Genoa; but both expeditions were badly conducted and failed, and on the 8th of September Charles crossed the Alps and joined Lodovico il Moro at Milan. The papal states were in a turmoil, and the powerful Colonna faction seized Ostia in the name of France. Charles rapidly advanced southward, and after a short stay in Florence set out for Rome (November 1494). Alexander appealed to Ascanio Sforza for help, and even to the sultan. He tried to collect troops and put Rome in a state of defence, but his position was most insecure, and the Orsini offered to admit the French to their castles. This defection decided the pope to come to terms, and on the 31st of December Charles entered Rome with his troops and the cardinals of the French faction. Alexander now feared that the king might depose him for simony and summon a council, but he won over the bishop of St Malo, who had much influence over the king, with a cardinal's hat, and agreed to send Cesare, as legate, to Naples with the French army, to deliver Jem to Charles and to give him Civitavecchia (January 16, 1495). On the 28th Charles departed for Naples with Jem and Cesare, but the latter escaped to Spoleto. Neapolitan resist- ance collapsed; Alphonso fled and abdicated in favour of his son Ferdinand II. , who also had to fly abandoned by all, and the kingdom was conquered with surprising ease. But a reaction against Charles soon set in, for all the powers were alarmed at his success, and on the 31st of March a league between the pope, the emperor, Venice, Lodovico il Moro and Ferdinand of Spain was formed, ostensibly against the

Turks, but in reality to expel the French from Italy. Charles had himself crowned king of Naples on the 1 2th of May, but a few days later began his retreat northward. He encountered the allies at Fornovo, and after a drawn battle cut his way through them and was back in France by November; Ferdinand II. with Spanish help was reinstated at Naples soon afterwards. The expedition, if it produced no material results, laid bare the weakness of the Italian political system and the country's incapacity for resistance.

Alexander availed himself of the defeat of the French to break the power of the Orsini, following the general tendency of all the princes of the day to crush the great feudatories and establish a centralized despotism. Virginio Orsini, who had been captured by the Spaniards, died a prisoner at Naples, and the pope confiscated his property. But the rest of the clan still held out,

and the papal troops sent against them under Guidobaldo duke of Urbino and the duke of Gandia were defeated at Soriano (January 1497). Peace was made through Venetian mediation, the Orsini paying 50,000 ducats in exchange for their confiscated lands; the duke of Urbino, whom they had captured, was left by the pope to pay his own ransom. The Orsini still remained very powerful, and Alexander could count on none but his 3000 Spaniards. His only success had been the capture of Ostia and the submission of the Francophile cardinals Colonna and Savelli. Now occurred the first of those ugly domestic tragedies for which the house of Borgia remained famous. On the 14th of June the duke of Gandia, lately created duke of Benevento, disappeared; the next day his corpse was found in the Tiber. Alexander, overwhelmed with grief, shut himself up in Castle St Angelo, and then declared that the reform of the church would be the sole object of his life henceforth — a resolution which he did not keep. Every effort was made to discover the assassin, and suspicion fell on various highly placed personages. Suddenly the rumour spread about that Cesare, the pope's second son, was the author of the deed, and although, the inquiries then ceased and no conclusive evidence has yet come to light, there is every probability that the charge was well founded. No doubt Cesare, who contemplated quitting the church, was inspired by jealousy of Gandia's influence with the pope. Violent and revengeful, he now became the most powerful man in Rome, and even his father quailed before him. As he needed funds to carry out his various schemes, the pope began a series of confiscations, of which one of the victims was his own secretary, in order to enrich him. The

process was a simple one: any cardinal, nobleman or official who was known to be rich would be accused of some offence; imprisonment and perhaps murder followed at once, and then the confiscation of his property. The disorganization of the Curia was appalling, the sale of offices became a veritable scandal, the least opposition to the Borgia was punished with death, and even in that corrupt age the state of things shocked public opinion. The story of Alexander's relations with Savona- rola is narrated under the latter heading; it is sufficient to say here that the pope's hostility was due to the friar's outspoken invectives against papal corruption and to his appeals for a General Council. Alexander, although he could not get Savona- rola into his own hands, browbeat the Florentine government into condemning the reformer to death (May 23, 1498). The pope was unable to maintain order in his own dominions; the houses of Colonna and Orsini were at open war with each other, but after much fighting they made peace on a basis of alliance against the pope. Thus further weakened, he felt more than ever that he had only his own kin to rely upon, and his thoughts were ever turned on family aggrandizement. He had annulled Lucrezia's marriage with Sforza in 1497, and, unable to arrange a union between Cesare and the daughter of Frederick, king of Naples (who had succeeded Ferdinand II. the previous year), he induced the latter by threats to agree to a marriage between the duke of Bisceglie, a natural son of Alphonso II. , and Lucrezia. Cesare, who renounced his cardinalate, was sent on a mission to France at the end of the year, bearing a bull of divorce for the new king Louis XII., in exchange for which he obtained the duchy of Valentinois (hence his title of Duca Valentino) and a promise of material assistance in his schemes to subjugate the feudal princelings of Romagna ; he married a princess of Navarre. Alexander hoped that Louis's help would be more profitable to his house than that of Charles had been and, in spite of the remonstrances of Spain and of the Sforza, he allied himself with France in January 1499 and was joined by Venice. By the autumn Louis was in Italy and expelled Lodovico Sforza from the Milanese. In order to consolidate his possessions still further, now that French success seemed assured, the pope determined to deal drastically with Romagna, which although nominally under papal rule was divided up into a number of practically independent lordships on which Venice, Milan and Florence cast hungry eyes. Cesare, nominated gonjaloniere of the Church, and strong in French favour, proceeded to attack the turbulent cities one by one (for detail see Borgia, Cesare). But the

expulsion of the French from Milan and the return of Lodovico Sforza interrupted his conquests, and he returned to Rome early in 1 500. This year was a jubilee year, and crowds of pilgrims flocked to the city from all parts of the world bringing money for the purchase of indulgences, so that Alexander was able to furnish Cesare with funds for his enterprise. In the north the pendulum swung back once more and the French reoccupied Milan in April, causing the downfall of the Sforzas, much to Alexander's gratification. But there was no end to the Vatican tragedies, and in July the duke of Bisceglie, whose existence was no longer advantageous, was murdered by Cesare's orders; this left Lucrezia free to contract another marriage. The pope, ever in need of money, now created twelve new cardinals, from whom he received 1 20,000 ducats, and fresh conquests for Cesare were considered. But while a crusade was talked of, the real object was central Italy, and in the autumn Cesare, favoured by France and Venice, set forth with 10,000 men to complete his interrupted enterprise. The local despots of Romagna were dispossessed and an administration was set up, which, if tyrannical and cruel, was at least orderly and strong, and aroused the admiration of Machiavelli (q.v.). On his return to Rome (June 1501) he was created duke of Romagna. Louis XII., having succeeded in the north, determined to conquer southern Italy as well, and concluded a treaty with Spain for the division of the Neapolitan kingdom, which was ratified by the pope on the 2 5th of June, Frederick being formally deposed. The French army proceeded to invade Naples, and Alexander took the opportunity, with the help of the Orsini, to reduce the Colonna to obedience. In his absence he left Lucrezia as regent, offering the astounding spectacle of a pope's natural daughter in charge of the Holy See. Shortly afterwards he induced Alphonso d'Este, son of the duke of Ferrara, to marry her, thus establishing her as heiress to one of the most important principalities in Italy (January 1502). About this time a Borgia of doubtful parentage was born, Giovanni, described in some papal documents as Alexander's son and in others as Cesare's.

As France and Spain were quarrelling over the division of Naples and the Campagna barons were quiet, Cesare set out once more

in search of conquests. In June he seized Camerino and Urbino, the news of which capture filled the pope' with childish joy. But his military force was uncertain, for the condottieri were not to be trusted. His attempt to draw Florence into an alliance failed, but in July Louis of France again invaded Italy and was at once bombarded with complaints from the Borgia's enemies. Alexander's diplomacy, however, turned the tide, and Cesare, in exchange for promising to assist the French in the south, was given a free hand in central Italy. A new danger now arose in the shape of a conspiracy against him on the part of the deposed despots, the Orsini and some of his own condottieri. At first the papal troops were defeated and things looked black for the house of Borgia. But a promise of French help at once forced the confederates to come to terms, and Cesare by an act of treachery seized the ringleaders at Senigallia, and put Oliverotto da Fermo and Vitellozzo Vitelli to death (Dec. 31, 1 502) . As soon as Alexander heard the news he decoyed Cardinal Orsini to the Vatican and cast him into a dungeon, where he died. His goods were confiscated, his aged mother turned into the street and numbers of other members of the clan in Rome were arrested, while Giuffre Borgia led an expedition into the Campagna and seized their castles. Thus the two great houses of Orsini and Colonna, who had long fought for predominance in Rome and often flouted the pope's authority, were subjugated, and a great step achieved towards consolidating the Borgia's power. Cesare then returned to Rome, where his father wished him to assist Giuffre in reducing the last Orsini strongholds; this for some reason he was unwilling to do, much to Alexander's annoyance, but he eventually marched "out, captured Ceri and made peace with Giulio Orsini, who surrendered Bracciano. Three more high personages fell victims to the Borgia's greed this year, viz. Cardinal Michiel, who was poisoned in April, J. da Santa Croce, who had helped to seize Cardinal Orsini, and Troches or Troccio, one of the family's most faithful assassins;

all these murders brought immense sums to the pope. About Cardinal Ferrari's death there is more doubt; he probably died of fever, but the pope immediately confiscated his goods.

The war between France and Spain for the possession of Naples dragged on, and Alexander was ever intriguing, ready to ally himself with whichever power promised at the moment most advantageous terms. He offered to help Louis on condition that Sicily be given to Cesare; and then offered to help Spain in exchange for Siena, Pisa and Bologna. Cesare was preparing for

another expedition into central Italy in July 1503, when, in the midst of all these projects and negotiations, both he and his father were taken ill with fever. The occurrence was of course attributed to poison, although quite without foundation, being merely due to malaria, at that time very prevalent in Rome. On the 18th of August Alexander died at the age of 72. His death was followed by scenes of wild disorder, and Cesare, being himself ill, could not attend to business, but sent Don Michelotto, his chief bravo, to seize the pope's treasures before the demise was publicly announced. When the body was exhibited to the people the next day it was in a shocking state of decomposition, which of course strengthened the suspicion of poison. At the funeral a brawl occurred between the soldiers and the priests, and the coffin having been made too short the body without the mitre was driven into it by main force and covered with an oil-cloth. Alexander's successor on the chair of St Peter was Francesco Todeschini-Piccolomini, who assumed the name of Pius III.

Alexander VI. has become almost a mythical character, and countless legends and traditions are attached to his name. As a matter of fact he cannot be regarded in any sense as a great man. His career shows no great political ideas, and none of his actions indicate genius. His one thought was family aggrandize- ment, and while it is unlikely that he meditated making the papacy hereditary in the house of Borgia, he certainly gave away its temporal estates to his children as. though they belonged to him. The secularization of the church was carried to a pitch never before dreamed of, and it was clear to all Italy that he regarded the papacy as an instrument of worldly schemes with no thought of its religious aspect. During his pontificate the church was brought to its lowest level of degradation. The condition of his subjects was deplorable, and if Cesare's rule in Romagna was an improvement on that of the local tyrants, the people of Rome have seldom been more oppressed than under the Borgia. Alexander was not the only person responsible for the general unrest in Italy and the foreign invasions, but he was ever ready to profit by them. Even if we do not accept all the stories of his murders and poisonings and immoralities as true, there is no doubt that his greed for money and his essentially vicious nature led him to commit a great number of crimes. For many of his misdeeds his terrible son Cesare was responsible, but of others the pope cannot be acquitted. The one pleas- ing aspect of his life is his patronage of the arts, and in his days a new architectural era was initiated in Rome with the coming of Bramante. Raphael,

Michelangelo and Pinturicchio all worked for him, and a curious contrast, characteristic of the age, is afforded by the fact that a family so steeped in vice and crime could take pleasure in the most exquisite works of art.

Bibliography. — The chief contemporary authorities for this reign are: the diary of Alexander's master of ceremonies, Johannes Burchardus, edited by L. Th'uasne (Paris, 1883-1884), which is characterized by accuracy and extraordinary candour often amount- ing to gross indecency; the despatches of Giustiniani, the Venetian ambassador, edited by P. Villari (Florence, 1876), which show great insight and are based on the most accurate information; and Paolo Cappelli's " Diarii " in E. Albert's Relazioni, series ii., iii. Among modern works the most important are: F. Gregorovius's Geschichte der Stadt Rom (3rd ed., Stuttgart, 1881), a work of immense research and admirable synthesis, giving a very unfavourable view of the Borgia; A. von Reumont's Geschichte der Stadt Rom (Berlin, 1867- 1870), also a' valuable book; M. Creighton's History of the Papacy (London, 1897) is very learned and accurate, but the author is more lenient towards Alexander; F. Gregorovius's Lucrezia Borgia (Stuttgart, 1874) contains a great deal of information on the Borgia family; P. Villari's Machiavelli (English translation, new ed., 1892) deals with the subject at some length. Of the Catholic writers

L. Pastor, Geschichte der Papste (Freiburg i. B, 1886) should be con- sulted, for although the author tries to extenuate the pope to some extent, on the whole he is fair. (L. V.*)

Alexander VII. (Fabio Chigi), pope from 1655 to 1667, was born at Siena on the 13th of February 1 599. He was successively inquisitor at Malta, vice-legate at Ferrara and nuncio in Cologne (1639-1651). Though expected to take part in the negotiations which led in 1648 to the peace of Westphalia, he refused to deliberate with heretics, and protested against the treaties when completed. Innocent X. subsequently made him cardinal secretary of state. When Innocent died, Chigi, the candidate favoured by Spain, was elected pope on the 7th of April 1655.

The conclave believed he was strongly opposed to the nepotism then prevalent. In the first year of his reign Alexander VII. forbade his relations even to visit Rome; but in 1656 he gave them the best-paid civil and ecclesiastical offices, also palaces and princely estates. Alexander disliked business of state, preferring literature and philosophy; a collection of his Latin poems appeared at Paris in 1656 under the title Philomathi Labores Juveniles. He also encouraged architecture, and in particular constructed the beautiful colonnade in the piazza of St Peter's. He favoured the Jesuits, especially in their conflict with the Jansenists, forbade in 1661 the translation of the Roman Missal into French, and in 1665 canonized Francis of Sales. His pontificate was marked by protracted controversies with France and Portugal. He died on the 22nd of May 1667. (W. W. R.*)

Alexander VIII. (Pietro Ottoboni), pope from 1689 to 1691, was born in 161 o of a noble Venetian family, was created cardinal, and then successively bishop of Brescia and datary. The ambassador of Louis XIV. succeeded in procuring his election on the 6th of October 1689 as successor to Innocent XL; never-theless, after months of negotiation Alexander finally condemned the declaration made in 1682 by the French clergy concerning the liberties of the Gallican church. Charities on a large scale and unbounded nepotism exhausted the papal treasury. He bought the books and manuscripts of Queen Christina of Sweden for the Vatican library. Alexander condemned in 1690 the doctrines of so-called philosophic sin, taught in the Jesuit schools. He died on the 1st of February 1691. (W. W. R.*)

ALEXANDER I. (Aleksander Pavlovich) (1777-1825), emperor of Russia, son of the grand-duke Paul Petrovich, after- wards Paul L, and Maria Fedorovna, daughter of Frederick Eugene of Wiirttemberg, was born on the 28th of December 1777. The strange contradictions of his character make Alexander one of the most interesting as he is one of the most important figures in the history of the 19th century. Autocrat and "Jacobin," man of the world and mystic, he was to his contemporaries a riddle which each read according to his own temperament. Napoleon thought him a " shifty Byzantine," and called him the Talma of the North, as ready to play any conspicuous part. To Metternich he was a madman to be humoured. Castlereagh, writing of him to Lord Liverpool, gives him credit for " grand qualities," but adds that he is " suspicious and undecided." His complex nature was, in truth, the outcome of the complex character of his early environment and education. Reared in the free-thinking

atmosphere of the court of Catherine II. he had imbibed from his Swiss tutor, Frederic Cesar de Laharpe, the principles of Rousseau's gospel of humanity; from his military governor, General Soltikov, the traditions of Russian autocracy; while his father had inspired him with his own passion of military parade, and taught him to combine a theo- retical love of mankind with a practical contempt for men. These contradictory tendencies remained with him through life, revealed in the fluctuations of his policy and influencing through him the fate of the world. Another element in his character discovered itself when in 1801 he mounted the throne over the body of his murdered father: a mystic melancholy liable at any moment to issue in extravagant action. At first, indeed, this exercised but little influence on the emperor's life. Young, emotional, impressionable, well-meaning and egotistic, Alexander displayed from the first an intention of playing a great part on

the world's stage, and plunged with all the ardour of youth into the task of realizing his political ideals. While retaining for a time the old ministers who had served and overthrown the emperor Paul, one of the first acts of his reign was to appoint a secret committee, called ironically the " Comite du salut public," consisting of young and enthusiastic friends of his own — Victor Gavovich Kochubey, Nikolai Nikolaevich Novosiltsov, Paul Alexandrovich Strogonov and Adam Czartoryski — to draw up a scheme of internal reform. Their aims, inspired by their admiration for English institutions, were far in advance of the possibilities of the time, and even after they had been raised to regular ministerial positions but little of their programme could be realized. For Russia was not ripe for liberty; and Alexander, the disciple of the revolutionist Laharpe, was — as he himself said — but "a happy accident" on the throne of the tsars. He spoke, indeed, bitterly of " the state of barbarism in which the country had been left by the traffic in men." " Under Paul," he said, " three thousand peasants had been given away like a bag of diamonds. If civilization were more advanced, I would abolish this slavery, if it cost me my head." 1 But the universal corruption, he complained, had left him no men; and the filling up of the government offices with Germans and other foreigners merely accentuated the sullen resistance of the " old Russians " to his reforms. That Alexander's reign, which began with so large a promise of amelioration, ended by riveting still tighter the chains of the Russian people was, however, due less to the corruption and backwardness of Russian life than to the defects

of the tsar himself. His love of liberty, though sincere, was in fact unreal. It flattered his vanity to pose before the world as the dispenser of benefits; but his theoretical liberalism was mated with an autocratic will which brooked no contradiction. ” You always want to instruct me!” he exlaimed to Derzhavin, the minister of justice, ” but I am the autocratic emperor, and I will this, and nothing else!” “He would gladly have agreed,” wrote Adam Czartoryski, ” that every one should be free, if every one had freely done only what he wished.” Moreover, with this masterful temper was joined an infirmity of purpose which ever let ” I dare not wait upon I would,” and which seized upon any excuse for postponing measures the principles of which he had publicly approved. The codification of the laws initiated in 1801 was never carried out during his reign; nothing was done to improve the intolerable status of the Russian peasantry; the constitution drawn up by Speranski, and passed by the emperor, remained unsigned. Alexander, in fact, who, without being consciously tyrannical, possessed in full measure the tyrant’s characteristic distrust of men of ability and independent judgment, lacked also the first requisite for a reforming sovereign: confidence in his people; and it was this want that vitiated such reforms as were actually realized. He experimented in the outlying provinces of his empire; and the Russians noted with open murmurs that, not content with governing through foreign instruments, he was conferring on Poland, Finland and the Baltic provinces benefits denied to themselves. In Russia, too, certain reforms were carried out; but they could not survive the suspicious interference of the autocrat and his officials. The newly created council of ministers, and the senate, endowed for the first time with certain theoretical powers, became in the end but the slavish instruments of the tsar and his favourites of the moment. The elaborate system of education, culminating in the reconstituted, or new-founded, universities of Dorpat, Vilna, Kazan and Kharkov, was strangled in the supposed interests of ” order ” and of orthodox piety; while the military colonies which Alexander proclaimed as a blessing to both soldiers and state were forced on the unwilling peasantry and army with pitiless cruelty. Even the Bible Society, through which the emperor in his later mood of evangelical zeal proposed to bless his people, was conducted on the same ruthless lines. The Roman archbishop and the Orthodox metropolitans were forced to serve on its committee side by side with Protestant pastors; and village popes, trained to regard any tampering with the letter of 1 Savary to Napoleon, Nov. 4, 1807. Tatischeff, p. 226.

the traditional documents of the church as mortal sin, became the unwilling instruments for the propagation of what they regarded as works of the devil.

Alexander's grandiose imagination was, however, more strongly attracted by the great questions of European politics than by attempts at domestic reform which, on the whole, wounded his pride by proving to him the narrow limits of absolute power. On the morrow of his accession he had reversed the policy of Paul, denounced the League of Neutrals, and made peace with England (April .1801), at the same time opening negotiations with Austria. Soon afterwards at Memel he entered into a close alliance with Prussia, not as he boasted from motives of policy, but in the spirit of true chivalry, out of friendship for the young king Frederick William and his beautiful wife. The develop- ment of this alliance was interrupted by the short-lived peace of October 1801; and for a while it seemed as though France and Russia might come to an understanding. Carried away by the enthusiasm of Laharpe, who had returned to Russia from Paris, Alexander began openly to proclaim his admiration for French institutions and for the person of Bonaparte. Soon, however, came a change. Laharpe, after a new visit to Paris, presented to the tsar his Reflexions on the True Nature of the Consulship for Life, which, as Alexander said, tore the veil from his eyes, and revealed Bonaparte " as not a true patriot," but only as " the most famous tyrant the world has produced." His disillusion- ment was completed by the murder of the due d'Enghien. The Russian court went into mourning for the last of the Condes, and diplomatic relations with Paris were broken off.

The events of the war that followed belong to the general history of Europe; but the tsar's attitude throughout is personal to himself, though pregnant with issues momentous for the world. In opposing Napoleon, " the oppressor of Europe and the disturber of the world's peace," Alexander in fact already believed himself to be fulfilling a divine mission. In his instruc- tions to Novosiltsov, his special envoy in London, the tsar elaborated the motives of his policy in language which appealed as little to the common sense of Pitt as did later the treaty of the

Holy Alliance to that of Castlereagh. Yet the document is of great interest, as in it we find formulated for the first time in an official despatch those exalted ideals of international policy which were to play so conspicuous a part in the affairs of the world at the close of the revolutionary epoch, and issued at the end of the 19th century in the Rescript of Nicholas II. 1 and the conference of the Hague. The outcome of the- war, Alexander argued, was not to be only the liberation of France, but the uni- versal triumph of ” the sacred rights of humanity.” To attain this it would be necessary ” after having attached the nations to their government by making these incapable of acting save in the greatest interests of their subjects, to fix the relations of the states amongst each other on more precise rules, and such as it is to their interest to respect.” A general treaty was to become the basis of the relations of the states forming ” the European Confederation “; and this, though ” it was no question of realiz- ing the dream of universal peace, would attain some of its results, if, at the conclusion of the general war, it were possible to establish on clear principles the prescriptions of the rights of nations.” ” Why could not one submit to it,” the tsar continued, ” the positive rights of nations, assure the privilege of neutrality, insert the obligation of never beginning war until all the resources which the mediation of a third party could offer have been exhausted, having by this means brought to light the respective grievances, and tried to remove them? It is on such principles as these that one could proceed to a general pacification, and give birth to a league of which the stipulations would form, so to speak, a new code of the law of nations, which, sanctioned by the greater part of the nations of Europe, would without difficulty become the immutable rule of the cabinets, while those who should try to infringe it would risk bringing upon themselves the forces of the new union.” 2

1 Circular of Count Muraviev, Aug. 24, 1898. 1 Instructions to M. Novosiltsov, Sept. 11, 1804. Tatischeff, p. 82.

Meanwhile Napoleon, little deterred by the Russian autocrat’s youthful idealogy, never gave up hope of detaching him from the coalition. He had no sooner entered Vienna in triumph than he opened negotiations with him; he resumed them after Austerlitz. Russia and France, he urged, were ” geographical allies “; there was, and could be, between them no true conflict of interests; together they might rule the world. But Alexander was still determined ‘.’ to persist in the system of disinterestedness in respect of all the states of Europe which he had thus far

followed," and he again allied himself with Prussia. The campaign of Jena and the battle of Eylau followed; and Napoleon, though still intent on the Russian alliance, stirred up Poles, Turks and Persians to break the obstinacy of the tsar. A party too in Russia itself, headed by the tsar's brother the grand-duke Constantine, was clamorous for peace; but Alexander, after a vain attempt to form a new coalition, summoned the Russian nation to a holy war against Napoleon as the enemy of the orthodox faith. The outcome was the rout of Friedland (June 13 and 14, 1807). Napoleon saw his chance and seized it. Instead of making heavy terms, he offered to the chastened autocrat his alliance, and a partnership in his glory.

The two emperors met at Tilsit on the 25th of June. Alex- ander, dazzled by Napoleon's genius and overwhelmed by his apparent generosity, was completely won. Napoleon knew well how to appeal to the exuberant imagination of his new-found friend. He would divide with Alexander the empire of the, world; as a first step he would leave him in possession of the Danubian principalities and give him a free hand to deal with Finland; and, afterwards, the emperors of the East and West, when the time should be ripe, would drive the Turks from Europe and march across Asia to the conquest of India. A programme so stupendous awoke in Alexander's impressionable mind an ambition to which he had hitherto been a stranger. The interests of Europe were forgotten. "What is Europe?" he exclaimed to the French ambassador. " Where is it, if it is not you and we?" 3

The brilliance of these new visions did not, however, blind Alexander to the obligations of friendship; and he refused to retain the Danubian principalities as the price for suffering a further dismemberment of Prussia. " We have made loyal war," he said, " we must make a loyal peace." It was not long before the first enthusiasm of Tilsit began to wane. Napoleon was prodigal of promises, but niggard of their fulfilment. The French remained in Prussia, the Russians on the Danube; and each accused the other of breach of faith. Meanwhile, however, the personal relations of Alexander and Napoleon were of the most cordial character; and it was hoped that a fresh meeting might adjust all differences between them. The meeting took place at Erfurt in October 1808, and resulted in a treaty which defined the common policy of the two emperors. But Alexander's relations with Napoleon none the less suffered a change. He realized that in Napoleon sentiment never got the better of reason, that as a matter of fact he had never intended his pro-

posed ” grand enterprise ” seriously, and had only used it to preoccupy the mind of the tsar while he consolidated his own power in central Europe. From this moment the French alliance was for Alexander also not a fraternal agreement to rule the world, but an affair of pure policy. He used it, in the first instance, to remove ” the geographical enemy ” from the gates of St Petersburg by wresting Finland from the Swedes (1809); and he hoped by means of it to make the Danube the southern frontier of Russia. Events were in fact rapidly tending to the rupture of the Franco-Russian alliance. Alexander, indeed, assisted Napoleon in the war of 1809, but he declared plainly that he would not allow Austria to be crushed out of existence; and Napoleon complained bitterly of the inactivity of the Russian troops during the campaign. The tsar in his turn protested against Napoleon’s encouragement of the Poles. In the matter of the French alliance he knew himself to be practically isolated in Russia, and he declared that he could not sacrifice the interest of his people and empire to his affection for Napoleon. ” I don’t 3 Savary to Napoleon, Nov. 18, 1807. Tatischeff, p. 232.

want anything for myself,” he said to the French ambassador, ” therefore the world is not large enough to come to an understanding on the affairs of Poland, if it is a question of its restoration.” 1 The treaty of Vienna, which added largely to the grand-duchy of Warsaw, he complained had “ill requited him for his loyalty,” and he was only mollified for the time by Napoleon’s public declaration that he had no intention of restoring Poland, and by a convention, signed on the 4th of January 1810 but not ratified, abolishing the Polish name and orders of chivalry.

But if Alexander suspected Napoleon, Napoleon was no less suspicious of Alexander; and, partly to test his sincerity, he sent an almost peremptory request for the hand of the grand- duchess Anne, the tsar’s youngest sister. After some little delay Alexander returned a polite refusal, on the plea of the princess’s tender age and the objection of the dowager empress to the marriage. Napoleon’s answer was to refuse to ratify the conven- tion of the 4th of January, and to announce his engagement to the archduchess Marie Louise in such a way as to lead Alexander to

suppose that the two marriage treaties had been negotiated simultaneously. From this time the relation between the two emperors gradually became more and more strained. The annexation of Oldenburg, of which the duke was the tsar's uncle, to France in December 1810, added another to the personal grievances of Alexander against Napoleon; while the ruinous reaction of " the continental system " on Russian trade made it impossible for the tsar to maintain a policy which was Napoleon's chief motive for the alliance. An acid correspondence followed, and ill-concealed armaments, which culminated in the summer of 1812 in Napoleon's invasion of Russia. Yet, even after the French had passed the frontier, Alexander still protested that his personal sentiments towards the emperor were unaltered; " but," he added, " God Himself cannot undo the past." It was the occupation of Moscow and the desecration of the Kremlin, the sacred centre of Holy Russia, that changed his sentiment for Napoleon into passionate hatred. In vain the French emperor, within eight days of his entry into Moscow, wrote to the tsar a letter, which was one long cry of distress, reveal- ing the desperate straits of the Grand Army, and appealed to " any remnant of his former sentiments." Alexander returned no answer to these " fanfaronnades." " No more peace with Napoleon!" he cried, "He or I, I or He: we cannot longer reign together! "-

The campaign of 1812 was the turning-point of Alexander's life; and its horrors, for which his sensitive nature felt much of the responsibility, overset still more a mind never too well balanced. At the burning of Moscow, he declared afterwards, his own soul had found illumination, and he had realized once for all the divine revelation to him of his mission as the peace- maker of Europe. He tried to calm the unrest of his conscience by correspondence with the leaders of the evangelical revival on the continent, and sought for omens and supernatural guidance in texts and passages of scripture. It was not,, however, accord- ing to his own account, till he met the Baroness de Kriidener — a religious adventuress who made the conversion of princes her special mission — at Basel, in the autumn of 1813, that his soul found peace. From this time a mystic pietism became the avowed force of his political, as of his private actions. Madame de Kriidener, and her colleague, the evangelist Empaytaz, became the confidants of the emperor's most secret thoughts; and during the campaign that ended in the occupation of Paris the imperial prayer-meetings were the oracle on whose revelations hung the

fate of the world.

Such was Alexander's mood when the downfall of Napoleon left him the most powerful sovereign in Europe. With the memory of T'lsit still fresh in men's minds, it was not unnatural that to cynical men of the world like Metternich he merely seemed to be disguising " under the language of evangelical abnegation " vast and perilous schemes of ambition. The

1 Coulaincourt to Napoleon, 4th report, Aug. 3, 1S09. Tatischeff, p. 496.

1 Alexander speaking to Colonel Michaud. Tatischeff, p. 612.

puzzled powers were, in fact, the more inclined to be suspicious in view of other, and seemingly inconsistent, tendencies of the emperor, which yet seemed all to point to a like disquieting conclusion. For Madame de Kriidener was not the only influence behind the throne; and, though Alexander had declared war against .the Revolution, Laharpe was once more at his elbow, and the catchwords of the gospel of humanity were still on his lips. The very proclamations which denounced Napoleon as " the genius of evil," denounced him in the name of " liberty," and of "enlightenment." A monstrous intrigue was suspected for the alliance of the eastern autocrat with the Jacobinism of all Europe, which would have issued in the substitution of an all-powerful Russia for an all-powerful France. At the congress of Vienna Alexander's attitude accentuated this distrust. Castlereagh, whose single-minded aim was the restoration of "a just equilibrium" in Europe, reproached the tsar to his face for a "conscience" which suffered him to imperil the concert of the powers by keeping his hold on Poland in violation of his treaty obligation. 3

Yet Alexander was sincere. Even the Holy Alliance, the pet offspring of his pietism, does not deserve the sinister reputation it has since obtained. To the other powers it seemed, at best " verbiage " and " exalted nonsense," at worst an effort of the tsar to establish the hegemony of Russia on the goodwill of the smaller signatory powers. To the Liberals, then and afterwards it was clearly a hypocritical conspiracy against freedom. Yet to Alexander himself it seemed the only means of placing the "confederation of Europe" on a firm basis of principle 4 and, so far from its being directed against liberty he declared roundly to all the signatory powers that " free constitutions were the logical

outcome of its doctrines." Europe, in fact, owed much at this time to Alexander's exalted temper. During the period when his influence was supreme, the fateful years, that is, between the Moscow campaign and the close of the congress of Aix-la-Chapelle, it had been used largely in the interests of moderation and liberty. To him mainly it was due that France was saved from dismemberment, and received a constitution which, to use his own words, "united crown and representatives of the people in a sense of common interests." 5 By his wise inter : vention Switzerland was saved from violent reaction, and suffered to preserve the essential gains of the Revolution. To his pro- tection it was due that the weak beginnings of constitutional freedom in Germany were able for a while to defy the hatred of Austria. Lastly, whatever its ultimate outcome, the constitution of Poland was, in its inception, a genuine effort to respond to the appeal of the Poles for a national existence.

From the end of the year 1818 Alexander's views began to change. A revolutionary conspiracy among the officers of the guard, and a foolish plot to kidnap him on his way to the congress of Aix-la-Chapelle (q.v.), are said to have shaken the foundations of his Liberalism. At Aix he came for the first time into intimate contact with Metternich, and the astute Austrian was swift to take advantage of the psychological moment. From this time dates the ascendancy of Metternich over the mind of the Russian emperor and in the councils of Europe. It was, however, no case of sudden conversion. Though alarmed by the revolutionary agitation in Germany, which culminated in the murder of his agent, the dramatist Kotzebue (q.v.), Alexander approved of Castlereagh's protest against Metternich's policy of " the govern- ments contracting an alliance against the peoples," as formulated in the Carlsbad decrees, 1819, and deprecated any intervention of Europe to support " a league of which the sole object is the absurd pretensions of absolute power." 6 He still declared his belief in " free institutions, though not in such as are forced from; feebleness, nor contracts ordered by popular leaders from their

3 Castlereagh to Liverpool, Oct. 2, 1814. F.O. Papers. Vienna

4 Martens IV. part i. p. 49.

5 Eiat des negotiations actuelles, &c, mem. prepared by order of the Tsar, July 16, 1815, enclosed in Castlereagh to Liverpool, F.O. Cont. papers. Congress Paris, Castlereagh, 22.

6 Despatch of Lieven, Nov. 30 (Dec. 12), 1819, and Russ. Circular of Jan. 27, 1820. Martens IV. part i. p. 270.

sovereigns, nor constitutions granted in difficult circumstances to tide over a crisis. ” Liberty,” he maintained, ” should be confined within just limits. And the limits of liberty are the principles of order.” 1

It was the apparent triumph of the principles of disorder in the revolutions of Naples and Piedmont, combined with increasingly disquieting symptoms of discontent in France, Germany and among his own people, that completed Alexander’s conversion. In the seclusion of the little town of Troppau, where in October of 1820 the powers met in conference, Metternich found an opportunity for cementing his influence over Alexander which had been wanting amid the turmoil and feminine intrigues of Vienna and Aix. Here, in confidence begotten of friendly chats over afternoon tea, the disillusioned autocrat confessed his mistake. ” You have nothing to regret,” he said sadly to the exultant chancellor, “but I have!” 2 The issue was momentous. In January Alexander had still upheld the ideal of a free confederation of the European states, symbolized by the Holy Alliance, against the policy of a dictatorship of the great powers, symbolized by the Quadruple Treaty; he had still protested against the claims of collective Europe to interfere in the internal concerns of the sovereign states. On the 19th of November he signed the Troppau Protocol, which consecrated the principle of intervention and wrecked the harmony of the concert. (See Troppau, Congress of.)

At Laibach, whither in the spring of 1821 the congress had been adjourned, Alexander first heard of the revolt of the Greeks. From this time until his death his mind was torn between his anxiety to realize his dream of a confederation of Europe and his Ua(VvuoYia\ mission as ‘\eariei o 1 ! trie Cvr&ioikex crusaAe agavusX ˆ the Turks. At first, under the careful nursing of Metternich, the former motive prevailed. He struck the name of Alexander Ypsilanti from the Russian army list, and directed his foreign minister, Count Capo d’Istria, himself a Greek, to disavow

all sympathy of Russia with his enterprise; and, next year, a deputation of the Greeks of the Morea on its way to the congress of Verona was turned back by his orders on the road. He made, indeed, some effort to reconcile the principles at conflict in his mind. He offered to surrender the claim, successfully asserted when the sultan had been excluded from the Holy Alliance and the affairs of the Ottoman empire from the deliberations of Vienna, that the affairs of the East were the "domestic concerns of Russia," and to march into Turkey, as Austria had marched into Naples, "as the mandatory of Europe." 3 Metternich's opposition to this, illogical, but natural from the Austrian point of view, first opened his eyes to the true character of Austria's attitude towards his ideals. Once more in Russia, far from the fascination of Metternich's personality, the immemorial spirit of his people drew him back into itself; and when, in the autumn of 1825, he took his dying empress for change of air to the south of Russia, in order — as all Europe supposed — to place himself at the head of the great army concentrated near the Ottoman frontiers, his language was no longer that of " the peace-maker of Europe," but of the Orthodox tsar determined to take the interests of his people and of his religion "into his own hands." Before the momentous issue could be decided, however, Alexander died at Taganrog on the 1st of December (November 18, O.S.) 1825, "crushed," to use his own words, "beneath the terrible burden of a crown " which he had more than once declared his intention of resigning. A report, current at the time and often revived, affirmed that he did not in fact die. By some it is sup- posed that a mysterious hermit named Fomich, who lived at Tomsk until 1870 and was treated with peculiar deference by successive tsars, was none other than Alexander. 4

Modern history knows no more tragic figure than that of Alexander. The brilliant promise of his early years; the haunting memory of the crime by which he had obtained the power to realize his ideals; and, in the end, the terrible

1 Apercu des idees de VEmpereur, Martens IV. part i. p. 269.

2 Metternich Mem. 3 Martens IV. part i. pp. 307, &c. 4 See W. Gasiorowski, Tragic Russia, translated by Viscount de

Busancy (I.ondon, 1908).

legacy he left to Russia: a principle of government which, under lofty pretensions, veiled a tyranny supported by spies and secret

police; an uncertain succession; an army permeated by organized disaffection; an armed Poland, whose hunger for liberty the tsar had whetted but not satisfied; the quarrel with Turkey, with its alternative of war or humiliation for Russia; an educational system rotten with official hypocrisy; a Church in which conduct counted for nothing, orthodoxy and ceremonial observance for everything; economical and financial conditions scarce recovering from the verge of ruin; and lastly, that curse of Russia, — serfdom.

In private life Alexander displayed many lovable qualities. All authorities combine in praising his handsome presence and the affability and charm of his address, together with a certain simplicity of personal tastes, which led him in his intercourse with his friends or with the representatives of friendly powers to dispense with ceremonial and etiquette. His personal friendship, too, once bestowed, was never lightly withdrawn. By nature he was sociable and pleasure-loving, he proved himself a notable patron of the arts and he took a conspicuous part in all the gaieties of the congress of Vienna. In his later years, however, he fell fnto a mood of settled melancholy; and, though still accessible to all who chose to approach him with complaints or petitions, he withdrew from all but the most essential social functions, and lived a life of strenuous work and of Spartan simplicity. His gloom had been increased by domestic misfortune. He had been married, in 1793, without his wishes being consulted, to the beautiful and amiable Princess Maria Louisa of Baden (Elizabeth Feodorovna), a political match which, as

had proved the misfortune of both; and he consoled himself in the traditional manner. The only child of the marriage, a little grand-duchess, died on the 12 th of May 1808; and their common sorrow drew husband and wife closer together. Towards the close of his life their reconciliation was completed by the wise charity of the empress in sympathizing deeply with him over the death of his beloved daughter by Madame Narishkine.

See also Europe ; Russia ; France ; Turkey ; Vienna, Congress of; Napoleon; Metternich; Capo d'Istria.

Authorities. — F. de Martens, Recueil des traites conclus par la Russie, &c. (St Petersb., 1874, &c.) ; Wellington Despatches; Castle- reagh Correspondence; Prince Adam Czartoryski, Memoires et correspondance avec Vempereur Alexandre I. (Paris, 1887, -2 vols.). P. Bailleu (ed). Briefwechsel Konig Friedrich

Wilhelm's III. und der Konigin Luise mil Kaiser Alexander I. (Leipzig, 1900) ; Laharpe, Le Gouverneur d'un Prince (F. C. de Laharpe et Alexandre I. de Russie) 1902; Serge Tatischeff, Alexandre I. et Napoleon d'apres leur correspondance inedite (Paris, 1901); Joseph de Maistre, Memoires historiques et correspondance diplomatique, ed. A. Blanc (2nd ed., !^59); Comtesse de Choiseul-Gouffier, Memoires historiques sur Vempereur Alexandre (1829), and Reminiscences sur Vempereur Alexandre I., &c. (Paris, 1862); Rulemann Friedrich Eylert, Charakterziige und historische Fragmente aus dem Leben Konig Friedrich Wilhelm's III. (1846) ; H. L. Empaytaz, Notice sur Alexandre Empereur de Russie (2nd ed., Paris, 1840) ; Comte A. de la Garde- Chambonas, Souvenirs du Congres de Vienne; publ. avec introd. et notes par le Cte. Fleury (1901).

Lives. — The principal life of Alexander I. is that, in Russian, by Nikolai Karlovich Schilder, Imperator Aleksander, &c. (4 vols., St Petersb., 1897, 1898). See also Bogdanovich, History of the Government of the Emperor Alexander I. (St Petersburg, 1869-1871, 6 vols.) ; Theodor Schiemann, Geschichte Russlands unter Kaiser Nikolaus I. Band i. Kaiser Alexander I. und die Ergebnisse seiner Lebensarbeit (Berl., 1904), a valuable study based upon much new material from the state archives of St Petersburg, Paris, Berlin and Vienna; A. Vandal, Napoleon et Alexandre I. : V alliance Russe sous le premier empire (3 vols., Paris, 1 891-1896); A. N. Pypin, Political and Literary Movements under Alexander I. (Russian, 2nd ed. St Peters- burg, 1885; German, Berlin, 1894). Among the numerous less authoritative biographies may be mentioned Ivan Golovin, Histoire d' Alexandre I. (Leipzig, 1859), and C. Joyneville, Life and Times of Alexander I. (3 vols., 1875). This last contains much valuable information, but the references in footnotes are often wanting in precision, and it has no index. (W. A. P.)

ALEXANDER II. (1818-1881), emperor of Russia, eldest son of Nicholas I., was born on the 29th of April 1818. His early life gave little indication of his subsequent activity, and up to the moment of his accession in 1855 no one ever imagined that he would be known to posterity as a great reformer. In so fa*

as he had any decided political convictions, he seemed to be animated with that reactionary spirit which was predominant in Europe at the time of his birth, and continued in Russia to the end of his father's reign. In the period of thirty years during which he was heir-apparent, the moral atmosphere of St Petersburg was very unfavourable to the development of any originality of thought or character. It was a time of government on martinet principles, under which all freedom of thought and all private initiative were as far as possible suppressed vigorously by the administration. Political topics were studiously avoided in general conversation, and books or newspapers in which the most keen-scented press-censor could detect the least odour of political or religious free-thinking were strictly prohibited. Criticism of existing authorities was regarded as a serious offence. The common policeman, the insignificant scribe in a public office, and even the actors in the " imperial " theatres, were protected against public censure as effectually as the government itself; for the whole administration was considered as one and indivisible, and an attack on the humblest representative of the imperial authority was looked on as an indirect attack on the fountain from which that authority flowed. Such was the moral atmosphere in which young Alexander Nicolaevich grew up to manhood. He received the education commonly given to young Russians of good family at that time — a smattering of a great many subjects, and a good practical acquaintance with the chief modern European languages. Like so many of his countryman he displayed great linguistic ability, and his quick ear caught up even peculiarities of dialect. His ordinary life was that of an officer of the Guards, modified by the ceremonial duties incum- bent on him as heir to the throne. Nominally he held the post of director of the military schools, but he took little personal interest in military affairs. To the disappointment of his father, in whom the military instinct was ever predominant, he showed no love of soldiering, and gave evidence of a kindliness of dis- position and a tender-heartedness which were considered out of place in one destined to become a military autocrat. These tendencies had been fostered by his tutor Zhukovsky, the amiable humanitarian poet, who had made the Russian public acquainted with the literature of the German romantic school, and they remained. with him all through life, though they did not prevent him from being severe in his official position when he believed severity to be necessary. In 1841 he married the daughter of the grand-duke Louis II. of Hesse, Maximilienne Wilhelmine Marie, thenceforward known as Maria

Alexandrovna, who bore him six sons and two daughters. He did not travel much abroad, for his father, in his desire to exclude from Holy Russia the subversive ideas current in Western Europe, dis- approved foreign tours, and could not consistently encourage in his own family what he tried to prevent among the rest of his subjects. He visited England, however, in 1839, and in the years immediately preceding his accession he was entrusted with several missions to the courts of Berlin and Vienna. On the 2nd of March 1855, during the Crimean War, he succeeded to the throne on the death of his father.

The first year of the new reign was devoted to the prosecution of the war, and after the fall of Sevastopol, to negotiations for peace. Then began a period of radical reforms, recommended by public opinion and carried out by the autocratic power. The rule of Nicholas, which had sacrificed all other interests to that of making Russia an irresistibly strong military power, had been tried by the Crimean War and found wanting. A new system must, therefore, be adopted. All who had any pretensions to enlightenment declared loudly that the country had been exhausted and humiliated by the war, and that the only way of restoring it to its proper position in Europe was to develop its natural resources and to reform thoroughly all branches of the administration. The government found, therefore, in the educated classes a new-born public spirit, anxious to assist it in any work of reform that it might think fit to undertake. Fortunately for Russia the autocratic power was now in the hands of a man who was impressionable enough to be deeply influenced by the spirit of the time, and who had sufficient

prudence and practical common-sense to prevent his being carried away by the prevailing excitement into the dangerous region of Utopian dreaming. Unlike some of his predecessors, he had no grand, original schemes of his own to impose by force on unwilling subjects, and no pet crotchets to lead his judgment astray; and he instinctively looked with a suspicious, critical eye on the panaceas which more imaginative and less cautious people recommended. These traits of character, together with the peculiar circumstances in which he was placed, determined the part which he was to play. He moderated, guided and in great measure realized the reform aspirations of the educated classes. Though he carefully guarded his autocratic rights and privileges, and obstinately resisted all efforts to push him farther than he felt inclined to go he acted for several years somewhat like a constitutional sovereign of the continental type. At first he

moved so slowly that many of the impatient, would-be reformers began to murmur at the unnecessary delay. In reality not much time was lost. Soon after the conclusion of peace important changes were made in the legislation concerning industry and commerce, and the new freedom thus accorded produced a large number of limited liability companies. At the same time plans were formed for constructing a great net- work of railways, partly for the purpose of developing the natural resources of the country, and partly for the purpose of increasing its powers of defence and attack. Then it was found that further progress was blocked by a great obstacle, the existence of serfage; and Alexander II. showed that, unlike his father, he meant to grapple boldly with the patloa „f difficult and dangerous problem. Taking advantage the serfs. of a petition presented by the Polish landed proprietors of the Lithuanian provinces, praying that their relations with the serfs might be regulated in a more satisfactory way — meaning in a way more satisfactory for the proprietors — he authorized the formation of committees " for ameliorating the condition of the peasants," and laid down the principles on which the amelioration was to be effected. This was a decided step and it was followed by one still more significant. Without consulting his ordinary advisers, his majesty ordered the minister of the interior to send a circular to the provincial governors of European Russia, containing a copy of the instructions forwarded to the governor-general of Lithuania, praising the supposed generous, patriotic intentions of the Lithuanian landed proprietors, and suggesting that perhaps the landed proprietors of other provinces might express a similar desire. The hint was taken, of course, and in all provinces where serfage existed emancipation com- mittees were formed. The deliberations at once raised a host of important, thorny questions. The emancipation was not merely a humanitarian question capable of being solved instan- taneously by imperial ukaz. It contained very complicated problems affecting deeply the economic, social and political future of the nation. Alexander II. had little of the special knowledge required for dealing successfully with such problems, and he had to restrict himself to choosing between the different measures recommended to him. The main point at issue was whether the serfs should become agricultural labourers dependent economically and administratively on the landlords, or should be transformed into a class of independent communal proprietors. The emperor gave his support to the latter project, and the Russian peasantry accordingly acquired rights and privileges such as are enjoyed by no other peasantry in Europe.

In the numerous other questions submitted to him be began by con- sulting carefully the conflicting authorities, and while leaning as a rule rather to the side of those who were known as " Liberals," he never went so far as they desired, and always sought some middle course by which conflicting interests might be reconciled. On the 3rd of March 1861, the sixth anniversary of his accession, the emancipation law was signed and published. Other reforms followed in quick succession during the next five or six years: army and navy organization, a new judicial administration on the French model, a new penal code and a greatly simplified system of civil and criminal procedure, an elaborate scheme of local self-government for the rural districts and the large

towns, with elective assemblies possessing a restricted right of taxation, and a new rural and municipal police under the direc- tion of the minister of the interior. These new institutions were incomparably better than the old ones which they replaced, but they did not work such miracles as inexperienced enthusiasts expected. Comparisons were made, not with the past, but with an ideal state of things which never existed in Russia or elsewhere. Hence arose a general feeling of disappointment, which acted on different natures in different ways. Some of the enthusiasts sank into a sceptical, reactionary frame of mind; while others, with deeper convictions or capable of more lasting excitement, attributed the failure to the fact that only half- measures and compromises had been adopted by the government. Thus appeared in the educated classes two extreme groups: on the one hand, the discontented Conservatives, who recom- mended a return to a more severe disciplinarian regime; and on the other, the discontented Radicals, who would have been satisfied with nothing less than the adoption of a throughgoing socialistic programme. Between the two extremes stood the discontented Moderates, who indulged freely in grumbling without knowing how the unsatisfactory state of things was to be remedied. For some years the emperor, with his sound common-sense and dislike of exaggeration, held the balance fairly between the two extremes; but long years of uninterrupted labour, anxiety and disappointment weakened his zeal for reform, and when

radicalism assumed more and more the form of secret societies and revolutionary agitation, he felt constrained to adopt severe repressive measures.

The revolutionary agitation was of a very peculiar kind. It was confined to a section of the educated classes, and emanated Nihilism. irom tne universities and higher technical schools.

At the beginning of the reform period there had been much enthusiasm for scientific as opposed to classical education. Russia required, it was said, not classical scholars, but practical, scientific men, capable of developing her natural resources. The government, in accordance with this view, had encouraged scientific studies until it discovered to its astonishment that there was some mysterious connexion between natural science and revolutionary tendencies. Many of the young men and women, who were supposed to be qualifying as specialists in the various spheres of industrial and commercial enterprise, were in reality devoting their time to considering how human society in general, and Russian society in particular, could be reconstructed in accordance with the latest physiological, biological and socio- logical principles. Some of these young people wished to put their crude notions immediately into practice, and as their desire to make gigantic socialist experiments naturally alarmed the govern- ment, their activity was opposed by the police. Many of them were arrested and imprisoned or exiled to distant provinces, but the revolutionary work was continued with unabated zeal. Thus arose a struggle between the youthful, hot- headed partisans of revolutionary physical science and the zealous official guardians of political order — a struggle which has made the strange term Nihilism (q.v.) a familiar word not only in Russia but also in west- ern Europe. The movement gradually assumed the form of ter- rorism, and aimed at the assassination of prominent officials, ind even of the emperor himself, and the natural result was that the reactionary tendencies of the government were strengthened. In foreign policy Alexander II. showed the same qualities of character as in internal affairs, ever trying prudently to steer a

middle course. When he came to the throne a peace policy. policy was imposed on him by circumstances. The

Crimean War was still going on, but as there was no doubt as to the final issue, and the country was showing symptoms of exhaustion, he concluded peace with the allies as soon as he

thought the national honour had been satisfied. Prince Gorchakov could then declare to Europe, ” La Russie ne boude pas; die se recueille “; and for fifteen years he avoided foreign complications, so that the internal strength of the country might be developed, while the national pride and ambition received a certain satisfaction by the expansion of Russian influence and domination in Asia. Twice, indeed, during that period the

chancellor ran the risk of provoking war. The first occasion was in 1863, when the Western powers seemed inclined to interfere in the Polish question, and the Russian chancery declared categorically that no interference would be tolerated. The second occasion was during the Franco-German War of 1870-71, when the cabinet of St Petersburg boldly declared that it considered itself no longer bound by the Black Sea clause of the treaty of Paris. On both these occasions hostilities were averted. Not so on the next occasion, when Russia abandoned her attitude of recueillement. When the Eastern question was raised in 1875 by the insurrection of Herzegovina, Alexander II. had no intention or wish to provoke a great European war. No doubt he was waiting for an opportunity of recovering the portion of Bessarabia which had been ceded by the treaty of Paris, and he perceived in the disturbed state of Eastern Europe a possibility of obtaining the desired rectification of frontier, but he hoped to effect his purpose by diplomatic means in conjunction with Austria. At the same time he was anxious to obtain for the Christians of Turkey some amelioration of their condition, and to give thereby some satisfaction to his own subjects. As autocratic ruler of the nation which had long considered itself the defender of the Eastern Orthodox faith and the protector of the Slav nationalities, he could not remain inactive at such a crisis, and he gradually allowed himself to drift into a position from which he could not retreat without obtaining some tangible result. Supposing that the Porte would yield to diplomatic pressure and menace so far as to make some reasonable concessions, he delivered his famous Moscow speech, in which he declared that if Europe would not secure a better position for the oppressed Slavs he would act alone. The diplomatic pressure failed and war became inevit- able. During the campaign he displayed the same perseverance and the same moderation that he had shown in the emancipation of the serfs. To those who began to despair of success, and advised him to conclude peace on almost any terms so as to avoid greater disasters, he turned a deaf ear, and brought the campaign to a successful conclusion; but when his more

headstrong advisers urged him to insist on terms which would probably have produced a conflict with Great Britain and Austria, he resolved, after some hesitation, to make the requisite concessions. In this resolution he was influenced by the discovery that he could not rely on the expected support of Germany, and the discovery made him waver in his devotion to the German alliance, which had been the main pivot of his foreign policy; but his personal attachment to the emperor William prevented him from adopting a hostile attitude towards the empire he had helped to create.

The patriotic excitement produced by the war did not weaken the revolutionary agitation. The struggle between the Terrorists and the police authorities became more and more intense, and attempts at assassination became more and more frequent. Alexander II. succumbed by degrees to the mental depression produced originally by the disappointments which he experienced in his home and foreign policy; and in 1880, when he had reigned twenty-five years, he entrusted to Count Loris-Melikov a large share of the executive power. In that year the empress died, and a few weeks afterwards he married secretly a Princess Dolgoruki, with whom he had already entertained intimate relations for some years. Early in 1881 , on the advice of Count Loris-Melikov, he determined to try the effect of some moderate liberal reforms on the revolutionary agitation, and for this purpose he caused a ukaz to be prepared creating special commissions, composed of high officials and private personages who should prepare reforms in various branches of the administration. On the very day on which this ukaz was signed — 13th of March 1881— he fell a victim to a Nihilist plot. When driving in one of the central streets of St Petersburg, near the Winter Palace, he was mortally wounded by the explosion of some small bombs and died a few hours afterwards. (D. M. W.)

ALEXANDER III. (1845-1894), emperor of Russia, second son of Alexander II., was born on the 10th of March 1845. In natural disposition he bore little resemblance to his soft-hearted, liberal-minded father, and still less to his refined, philosophic, sentimental, chivalrous, yet cunning grand-uncle Alexander I., who

coveted the title of " the first gentleman of Europe." With high culture, exquisite refinement and studied elegance he had no sympathy and never affected to have any. Indeed, he rather gloried in the idea of being of the same rough texture as the great majority of his subjects. His straightforward, abrupt manner savoured sometimes of gruffness, while his direct, unadorned method of expressing himself harmonized well with his rough-hewn, immobile features and somewhat sluggish movements. His education was not fitted to soften these peculiarities. During the first twenty years of his life he had no prospect of succeeding to the throne, because he had an elder brother, Nicholas, who seemed of a fairly robust constitution. Even when this elder brother showed symptoms of delicate health it was believed that his life might be indefinitely prolonged by proper care and attention, and precautions had been taken for the succession by his betrothal with Princess Dagmar of Denmark. Under these circumstances the greatest solicitude was devoted to the education of Nicholas as cesarevich, whereas Alexander received only the perfunctory and inadequate training of an ordinary grand-duke of that period, which did not go much beyond primary and secondary instruction, practical acquaintance with French, English and German, and a certain amount of drill. When he became heir-apparent by the death of his elder brother in 1865, he began to study the principles of law and administration under Professor Pobedonostsef, who did not succeed in awakening in his pupil a love of abstract studies or prolonged intellectual exertion, but who influenced the character of his reign by instilling into his mind the belief that zeal for Eastern Orthodoxy ought, as an essential factor of Russian patriotism, to be specially cultivated by every right-minded tsar. His elder brother when on his deathbed had expressed a wish that his affianced bride, Princess Dagmar of Denmark, should marry his successor, and this wish was realized on the 9th of November 1866. The union proved a most happy one and remained unclouded to the end. During those years when he was heir-apparent — 1865 to 1881 — he did not play a prominent part in public affairs, but he allowed it to become known that he had certain ideas of his own which did not coincide with the principles of the existing government. He deprecated what he considered undue foreign influence in general, and German influence in particular, and he longed to see the adoption of genuine national principles in all spheres of official activity, with a view to realizing his ideal of a homogeneous Russia — homogeneous in language, administration and religion. With such ideas and aspirations he

could hardly remain per- manently in cordial agreement with his father, who, though a good patriot according to his lights, had strong German sym- pathies, often used the German language in his private relations, occasionally ridiculed the exaggerations and eccentricities of the Slavophils and based his foreign policy on the Prussian alliance. The antagonism first appeared publicly during the Franco- German War, when the tsar supported the cabinet of Berlin and the cesarevich did not conceal his sympathies with the French. It reappeared in an intermittent fashion during the years 1875- 1879, when the Eastern question produced so much excitement in all ranks of Russian society. At first the cesarevich was more Slavophil than the government, but his phlegmatic nature pre- served him from many of the exaggerations indulged in by others, and any of the prevalent popular illusions he may have imbibed were soon dispelled by personal observation in Bulgaria, where he commanded the left wing of the invading army. The Bul- garians had been represented in St Petersburg and Moscow not only as martyrs but also as saints, and a very little personal experience sufficed to correct the error. Like most of his brother officers he could not feel any very great affection for the " little brothers," as the Bulgarians were then commonly called, and he was constrained to admit that the Turks were by no means so black as they had been painted. He did not, however, scandalize the believers by any public expression of his opinions, and did not indeed make himself conspicuous in any way during the campaign. Never consulted on political questions, he confined himself to his military duties and fulfilled them in a conscientious and unobtrusive manner. After many mistakes and disappoint-

ments, the army reached Constantinople and the treaty of San Stefano was signed, but much that had been obtained by that important document had to be sacrificed at the congress of Berlin. Prince Bismarck failed to do what was confidently expected of him. In return for the Russian support, which had enabled him to create the German empire, it was thought that he would help Russia to solve the Eastern question in accordance with her own interests, but to the surprise and indignation of the cabinet of St Petersburg he confined himself to acting the part of " honest broker " at the congress, and shortly afterwards he ostentatiously contracted an alliance with Austria for the express purpose of counteracting Russian designs in Eastern Europe. The cesarevich could point to these results as confirming the views he had expressed during the Franco-German War, and he drew from

them the practical conclusion that for Russia the best thing to do was to recover as quickly as possible from her tem- porary exhaustion and to prepare for future contingencies by a radical scheme of military and naval reorganization. In accord- ance with this conviction, he suggested that certain reforms should be introduced. During the campaign in Bulgaria he had found by painful experience that grave disorders and gross corruption existed in the military administration, and after his return to St Petersburg he had discovered that similar abuses existed in the naval department. For these abuses, several high-placed personages — among others two of the grand-dukes — were believed to be responsible, and he called his father's attention to the subject. His representations were not favourably received. Alexander II. had lost much of the reforming zeal which distin- guished the first decade of his reign, and had no longer the energy required to undertake the task suggested to him. The con- sequence was that the relations between father and son became more strained. The latter must have felt that there would be no important reforms until he himself succeeded to the direction of affairs. That change was much nearer at hand than was com- monly supposed. On the 13th of March 1881 Alexander II. was assassinated by a band of Nihilists, and the autocratic power passed to the hands of his son.

In the last years of his reign, Alexander II. had been much exercised by the spread of Nihilist doctrines and the increasing number of anarchist conspiracies, and for some time he had hesitated between strengthening the hands of the executive and making concessions to the widespread political aspirations of the educated classes. Finally he decided in favour of the latter course, and on the very day of his death he signed a ukaz, creating a number of consultative commissions which might have been easily transformed into an assembly of notables. Alexander III. determined to adopt the opposite policy. He at once cancelled the ukaz before it was published, and in the manifesto announcing his accession to the throne he let it be very clearly understood that he had no intention of limiting or weakening the autocratic power which he had inherited from his ancestors. Nor did he afterwards show any inclination to change his mind. All the internal reforms which he initiated were intended to correct what he considered as the too liberal tendencies of the previous reign, so that he left behind him the reputation of a sovereign of the retrograde type. In his opinion Russia was to be saved from anarchical disorders and revolu- tionary agitation, not by the

parliamentary institutions and so-called liberalism of western Europe, but by the three prin- ciples which the elder generation of the Slavophils systematically recommended — nationality, Eastern Orthodoxy and autocracy. His political ideal was a nation containing only one nationality, one language, one religion and one form of administration; and he did his utmost to prepare for the realization of this ideal by imposing the Russian language and Russian schools on his German, Polish and Finnish subjects, by fostering Eastern Orthodoxy at the expense of other confessions, by persecuting the Jews and by destroying the remnants of German, Polish and Swedish institutions in the outlying provinces. In the other provinces he sought to counteract what he considered the excessive liberalism of his father's reign. For this purpose he clipped the feeble wings of the zemstvo, an elective local

administration resembling the county and parish councils in England, and placed the autonomous administration of the peasant communes under the supervision of landed proprietors appointed by the government. At the same time he sought to strengthen and centralize the imperial administration, and to bring it more under his personal control. In foreign affairs he was emphatically a man of peace, but not at all a partisan of the doctrine of peace at any price, and he followed the principle that the best means of averting war is to be well prepared for it. Though indignant at the conduct of Prince Bismarck towards Russia, he avoided an open rupture with Germany, and even revived for a time the Three Emperors' Alliance. It was only in the last years of his reign, when M. Katkov had acquired a certain influence over him, that he adopted towards the cabinet of Berlin a more hostile attitude, and even then he confined himself to keeping a large quantity of troops near the German frontier, and establishing cordial relations with France. .With regard to Bulgaria he exercised similar self-control. The efforts of Prince Alexander and afterwards of Stamboloff to destroy Russian influence in the principality excited his indignation, but he persistently vetoed all proposals to intervene by force of arms. In Central Asian affairs he followed the traditional policy of gradually extending Russian domination without provoking a

conflict with Great Britain, and he never allowed the bellicose partisans of a forward policy to get out of hand. As a whole his reign cannot be regarded as one of the eventful periods of Russian history; but it must be admitted that under his hard unsympathetic rule the country made consider- able progress. He died at Livadia on the ist of November 1894, and was succeeded by his eldest son, Nicholas II. (D. M. W.)

ALEXANDER I. (c. 1078-1124), king of Scotland, was the fourth son of Malcoim Canmore by his wife (St) Margaret, grand-niece of Edward the Confessor. On the death of his brother Edgar in 1107 he succeeded to the Scottish crown; but, in accordance with Edgar's instructions, he inherited only a part of its possessions. By a partition, the motive of which is not quite certain, the districts south of the Forth and Clyde were erected into an earldom for Alexander's younger brother, David. Alexander, dissatisfied, sought to obtain the whole, but without success. A curious combination of the fierce warrior and the pious churchman, he manifested the one aspect of his character in his ruthless suppression of an insurrection in his northern dominion (thus gaining for himself the title of " the Fierce "), the other in his munificent foundation of bishoprics and abbeys. Among the latter were those of Scone and Inchcolm. His strong championship of the independence of the Scottish church involved him in struggles with both the English metropolitan sees. He died on the 27th of April 1124, and was succeeded by his brother, David I.

ALEXANDER II. (1108-1240), king of Scotland, son of William the Lion and Ermengarde of Beaumont, was born at Haddington in 1 198, and succeeded to the kingdom on the death of his father in 1 2 14. The year after his accession the clans MacWilliam and MacHeth, inveterate enemies of the Scottish crown, broke into revolt; but the insurrection was speedily quelled. In the same year Alexander joined the English barons in their struggle against John, and led an army into England in support of their cause; but on the conclusion of peace after John's death between his youthful son Henry III. and the French prince Louis, the Scottish king was included in the pacification. The reconcilia- tion thus effected was further strengthened by the marriage of Alexander to Henry's sister Joanna in 1221. The next year was marked by the subjection of the hitherto semi-independent district of Argyll. A revolt in Galloway in 1235 was crushed without difficulty; nor did an invasion attempted soon after- wards by its exiled leaders meet with any better fortune. Soon afterwards a claim for

homage from Henry of England drew forth from Alexander a counter-claim to the northern English counties. The dispute, however, was settled by a compromise in 1237. A threat of invasion by Henry in 1243 for a time interrupted the friendly relations between the two countries; but the prompt action of Alexander in anticipating his attack,

and the disinclination of the English barons for war, compelled him to make peace next year at Newcastle. Alexander now turned his attention to securing the Western Isles, which still owned a nominal dependence on Norway. Negotiations and purchase were successively tried but without success. Alexander next attempted to seduce Ewen, the son of Duncan, lord of Argyll, from his allegiance to the Norwegian king. Ewen refused his overtures, and Alexander sailed forth to compel him. But on the way he was seized with fever at Kerrera, and died there on the 8th of July 1249.

ALEXANDER III. (1 241-1285), king of Scotland, son of Alexander II. by his second wife Mary de Coucy, was born in 1 241. At the age of eight years the death of his father called him to the throne. The years of his minority were marked by an embittered struggle for the control of affairs between two rival parties, the one led by Walter Comyn, earl of Menteith, the other by Alan Durward, the' justiciar. The former was in the ascendant during the early years of the reign. At the marriage of Alexander to Margaret of England in 1 25 1 , Henry III. seized the opportunity to demand from his son-in-law homage for the Scottish kingdom, but the claim was refused. In 1255 an interview between the English and Scottish kings at Kelso resulted in the deposition of Menteith and his party in favour of their opponents. But though disgraced, they still retained great influence; and two years later, seizing the person of the king, they compelled their rivals to consent to the erection of a regency representative of both parties. On attaining his majority in 1262, Alexander declared his intention of resuming the projects on the Western Isles which had been cut short by the death of his father thirteen years before. A formal claim was laid before the Norwegian king Haakon. Not only was this unsuccessful, but next year Haakon replied by a formidable invasion. Sailing round the west coast of Scotland he halted off Arran, where negotiations were opened. These were artfully prolonged by Alexander until the autumn storms should begin. At length Haakon, weary of delay, attacked, only to encounter a terrific storm which greatly damaged his ships. The battle of Largs, fought next day, was indecisive. But even so Haakon's

position was hopeless. Baffled he turned homewards, but died on the way. The Isles now lay at Alexander's feet, and in 1266 Haakon's successor concluded a treaty by which the Isle of Man and the Western Isles were ceded to Scotland in return for a money payment, Orkney and Shetland alone being retained. Towards the end of Alexander's reign, the death of all his three children within a few years made the question of the succession one of pressing importance. In 1 284 he induced the Estates to recognize as his heir-presumptive his grand-daughter Margaret, the " Maid of Norway "; and next year the desire for a male heir led him to contract a second marriage. But all such hopes were defeated by the sudden death pf the king, who was killed by a fall from his horse in the dark while riding to visit the queen at Kinghorn on the 16th of March 1285.

ALEXANDER (Alexander Obrenovich) (1876-1903), king of Servia, was born on the 14th of August 1876. On the 6th of March 1889 his father, King Milan, abdicated and proclaimed him king of Servia under a regency until he should attain his majority at eighteen years of age. King Alexander, on the 13th of April 1893, being then in his seventeenth year, made his notable first coup d'etat, proclaimed himself of full age, dismissed the regents and their government, and took the royal authority into his own hands. His action was popular, and was rendered still more so by his appointment of a radical ministry. In May 1894 King Alexander, by another coup d'etat, abolished the liberal constitution of 1889 and restored the conservative one of 1869. His attitude during the Turco-Greek war of 1897 was one of strict neutrality. In 1898 he appointed his father commander-in-chief of the Servian army, and from that time, or rather from his return to Servia in 1894 until 1900, ex-king Milan was regarded as the de facto ruler of the country. But while, during the summer of 1900, Milan was away from Servia taking waters in Carlsbad/ and making arrangements to secure the hand of a German princess for his son, and while the

premier, Dr Vladan Dyorevich, was visiting the Paris Universal Exhibition, King Alexander suddenly announced to the people of Servia his engagement to Mme Draga Mashin, a widow, formerly a lady-in-waiting to Queen Natalie. The projected union aroused great opposition at first. Ex-King Milan resigned his post; so did

the government; and King Alexander had great difficulty in forming a new cabinet. But the opposition subsided some- what on the publication of Tsar Nicholas's congratulations to the king on his engagement and of his acceptance to act as the principal witness at the wedding. The marriage was then duly celebrated on the 5th of August 1900. Still this union was unpopular and weakened the position of King Alexander in the army and the country. He tried to reconcile political parties by granting from his own initiative a liberal constitution (April 6, 1901), introducing for the first time in the constitutional history of Servia the system of two chambers (skupshtina and senate). This did in a certain measure reconcile the political parties, but did not reconcile the army, which, already dissatisfied with the king's marriage, became still more so at the rumours that one of the two unpopular brothers of Queen Draga, Lieutenant Nicodiye, was to be proclaimed heir- apparent to the throne. Meanwhile the independence of the senate and of the council of state caused growing irritation to King Alexander, which led him to another coup d'itat. He suspended (March 1903) the constitution for half an hour, time enough to publish the decrees by which the old senators and councillors of state were dismissed and replaced by new ones. This arbitrary act naturally increased the dissatisfaction in the country. The general impression was that inasmuch as the senate was packed with men devoted to the royal couple, and inasmuch as the government obtained a large majority at the general elections, King Alexander would not hesitate any longer to proclaim Queen Draga's brother as the heir to the throne. Apparently to prevent this, but in reality to replace Alexander Obrenovich by Peter Karageorgevich, a military conspiracy was organized. The conspirators penetrated into the palace and savagely murdered King Alexander and Queen Draga in the early morning of the nth of June 1903. (C. Mi.)

ALEXANDER, son of Numenius, Greek rhetorician, flourished in the first half of the second century a.d. In addition to general treatises on rhetoric, he wrote a special work Tlepl t&v tt}s diavoias koX ttjs \e£«6js axvˆTWV, of which only an abridgment is extant ; later epitomes were made in Latin by Aquila Romanus and Julius Rufinianus under the title De Figuris Sententiarum el Elocutionis. Another epitome was made in the fourth century by a Christian for use in Christian schools, containing additional examples from Gregory of Nazianzus.

Text in Spengel, Rhetores Graeci (1856).

ALEXANDER, ARCHIBALD (1772-1851), American Presby- terian divine, was born, of Scottish-Irish descent, in that part of Augusta county which is now Rockbridge county, Virginia, on the 17th of April 1772. After completing his preliminary education in the little school at Lexington, Virginia, which later developed into Washington and Lee University, he came under the influence of the religious movement known as the " great revival" (1 780-1 790) and devoted himself to the study of theology. Licensed to preach in 1791, he was engaged for several years as an itinerant Presbyterian preacher in his native state, and acquired during this period the facility in extemporaneous speaking for which he was remarkable. He was president of Hampden-Sidney College from 1796 to 1807, with a short inter- mission (in 1801-1802), and in 1807 became pastor of Pine Street Church, Philadelphia. In 181 2 he became first professor in the newly established Presbyterian Theological Seminary at Prince- ton, New Jersey, where he remained until his death at Princeton on the 22nd of October 1831, filling successively the chairs of didactic and polemic theology (1812-1840), and pastoral and polemic theology (1840-1851). He married, in 1802, Janetta Waddel, the daughter of the celebrated blind preacher, James Waddel (1 739-1805), whose eloquence was described in William Wirt's Letters of a British Spy (1803). Dr Alexander wrote a considerable number of theological works, which had a large

circulation. Among these may be mentioned his Brief Outline of the Evidences of the Christian Religion (1825), which passed through several editions, and was translated into various languages; The Canon of the Old and New Testament Ascertained; or the Bible Complete without the Apocrypha and Unwritten Tradi- tions (1826); A History of the Israelitish Nation (1852), and Outlines of Moral Science (1852), the last two being published posthumously.

See the biography (New York, 1854) by his son James W. Alexander.

ALEXANDER, FRANCIS (1800-1881), American portrait- painter, was born in Windham county, Connecticut, in February 1800. Brought up on a farm, he taught himself the use of colours, and in 1820 went to New York City and studied painting with Alexander Robertson. He spent the winters of 183 1 and 1832 in Rome, and then for nearly a decade he lived in Boston, Massachusetts, where he had considerable vogue, and where in 1842 he painted a portrait of Charles Dickens. One of his best

portraits is that of Mrs Fletcher Webster in the Boston Museum of Fine Arts. He died in 1881 in Florence.

ALEXANDER, GEORGE (1858-), English actor, whose family name was Samson, was born in Reading on the 19th of June 1858, the son of a Scottish manufacturer. He went into business in London after leaving school, but having acted as an amateur he determined to make the stage his profession. His first appearance was at Nottingham in 1879, an(l after some seasons of provincial experience he made his first London appearance as Caleb Deecie in Two Roses in 1881 with Irving at the Lyceum. He was selected by W. S. Gilbert to support Mary Anderson in Comedy and Tragedy, returned for a time to the Lyceum, where he was Irving's principal associate, especially as Faust (1886) and Macduff (1888); and, after starting success- fully under his own management at the Avenue Theatre in 1890 with Dr Bill, in 1891 became manager of the St James's Theatre. There he produced a number of successful plays, notably Oscar Wilde's Lady Windermere's Fan and The Im- portance of being Earnest, Pinero's Second Mrs Tanqueray, The Princess and the Butterfly, His HouseinOrder and The Thunderbolt; C. Haddon Chambers's The Idler; H. A. Jones's Masqueraders; Alfred Sutro's John Glayde's Honour and The Builder of Bridges; Carton's Liberty Hall and The Tree of Knowledge; Anthony Hope's Prisoner of Zenda and Rupert of Hentzau; and Stephen Phillips's Paolo and Francesco, himself playing the leading parts with great distinction. In 1907 he was elected a member of the London County Council as a municipal reformer, but continued to act regularly at the St James's.

ALEXANDER, SIR JAMES EDWARD (1803-188 5), British soldier and traveller, was born on the 16th of October 1803. He joined the East India Company's army in 1820, transferring into the British army in 1825. As aide-de-camp to the British envoy to Persia, he was an eye-witness of the fighting in the war between Persia and Russia (1826), and in 1829 was present in the Balkans during the Russo-Turkish war. In 1832-1834 he was in Portugal during the Miguelete war, and in 1835 served in the Kaffir war in South Africa as aide-de-camp to Sir Benjamin D'Urban. Subsequently he conducted an exploring expedition into Namaqualand and Damaraland, and was knighted for his services (1838). From 1841 to 185 5 he served in Canada, proceed- ing thence to the Crimea, and in 1862 held an important command in New Zealand during the Maori war. He retired from the service in 1877, and in 1881 was given the honorary rank of general. He

was largely responsible for the preservation and transfer to England of Cleopatra's Needle in 1877. His varied experiences provided material for a large number of books, among which were Travels from India to England (1827); Trans- atlantic Sketches (1833); An Expedition of Discovery into the Interior of Africa (1838); Passages in the Life of a Soldier (1857); Incidents of the Maori War (1863). He was also the author of a Life of Field-Marshal the Duke of Wellington (1840). He died on the 2nd of April 1885.

ALEXANDER, JOHN WHITE (1856-), American painter, was born in Allegheny, Pennsylvania, on the 7 th of October

1856. He was left an orphan when very young, became an illustrator for Harper's Magazine, studied in Europe, became a pupil of the Royal Academy at Munich, and also worked in Venice, in Holland and in Paris, where he attracted much attention by his exhibition at the Salon of two female portraits entitled " Gris " and " Noir." He became a member of the Societe Nationale des Beaux Arts (Paris), of the National Academy of Design (New York), of the International Society (London), and of the Vienna and Munich Societies of Painters. In 1 90 1 he was made a Chevalier of the Legion of Honour. He executed decorative panels for the Congressional Library, Washington, D.C., and a large decoration for the Carnegie Institute, Pittsburg, Pennsylvania; and his works include numerous portraits and subject pictures.

ALEXANDER, JOSEPH ADDISON (1800-1860), American biblical scholar, the third son of Archibald Alexander, was born in Philadelphia, Pennsylvania, on the 24th of April 1809. He graduated at. the College of New Jersey (now Princeton University) in 1826, having devoted himself especially to the study of Hebrew and other oriental languages, and from 1830 to 1833 was adjunct professor of ancient languages and literature there. In 1834 he became an assistant to Dr Charles Hodge, professor of oriental and biblical literature in the Princeton Theological Seminary, and in 1838 became associate professor of oriental and biblical literature there, succeeding Dr Hodge in that chair in 1840 and being transferred in 1851 to the chair of biblical and ecclesiastical history, and in 1859 to that of

Hellenistic and New Testament literature, which he occupied until his death at Princeton on the 28th of January i860. Alexander was a remarkable linquist and exegete. He had been ordained as a Presbyterian minister in 1839, and was well known for his pulpit eloquence. He was the author of The Earlier Prophecies of Isaiah (1846), The Later Prophecies of Isaiah (1847), and an abbreviation of these two volumes, Isaiah Illustrated and Explained (2 vols., 1851), The Psalms Translated and Explained (3 vols., 1850), commentaries on Acts (2 vols., 1857), Mark (1858) and Matthew (i860), and two volumes of Sermons (i860).

See The Life of Joseph A. Alexander (2 vols., 2nd ed., New York, 1875) by his nephew, Henry C. Alexander.

His brother, James Waddel Alexander (1804-1859), born in Louisa county, Virginia, on the 13th of March 1804, was a famous Presbyterian preacher. He graduated at the College of New Jersey in 1820, studied theology in the Princeton Seminary, and was pastor of a Presbyterian church in Charlotte county, Virginia, from 1826 to 1828, and of the First Presbyterian church in Trenton, New Jersey, in 1829-1832. From 1833 to 1844 he was professor of belles-lettres and Latin language and literature in the College of New Jersey, from 1844 to 1849 was pastor of the Duane Street Presbyterian church in New York City, from 1849 to 1851 was professor of ecclesiastical history, church government and sacred rhetoric in the Princeton Theological Seminary, and from 1851 until his death, at Red Sweet Springs, Virginia, on the 31st of July 1859, was pastor of the Fifth Avenue Presbyterian church in New York City. He wrote numerous magazine articles and published a number of books, including The American Mechanic and Working- man (2 vols., 1847, a collection of papers to mechanics first Drinted under the pseudonym of ” Charles Quill “), Thoughts on Family Worship (1847), Sacramental Addresses (1854), The Revival and its Lessons (1859), Thoughts on Preaching (1861), Faith (1862), and many juvenile books for Sunday-school libraries.

See Forty Years’ Familiar Letters of James W. A lexander (2 vols. , New York, i860), edited by Dr John Hall (1806-1894) of Trenton, N. J.

ALEXANDER, WILLIAM (1824-), Protestant archbishop of Armagh and primate of all Ireland, was born at Londonderry on the 13th of April 1824 and educated at Tonbridge Grammar School and

Brasenose College, Oxford. After holding several livings in the north of Ireland he was made bishop of Derry and Raphoe in 1867, and was elevated to the primacy in 1896. He

was Bampton lecturer in 1876. An eloquent preacher and the author of numerous theological works, he is best known to literature as a master of dignified and animated verse. His poems were collected in 1887 under the title of St Augustine's Holiday, and other Poems. His wife, Cecil Francis Humphreys (1818-1895), wrote some tracts in connexion with the Oxford movement, but is famous as the author of " Jesus calls us o'er the tumult," " There is a green hill far away " and other well- known hymns (nearly four hundred in all). A collection of her verse was published in 1896.

ALEXANDER, WILLIAM LINDSAY (1808-1884), Scottish divine, was born at Leith on the 24th of August 1808. He was educated at the universities of St Andrews and Edinburgh, where he gained a lasting reputation for classical scholarship. He entered Glasgow Theological Academy under Ralph Wardlaw in September 1827, but in December of the same year he left to become classical tutor at the Blackburn Theological Academy (afterwards the Lancashire Independent College) . At Blackburn he stayed till 1831, lecturing on biblical literature, metaphysics, Greek and Latin. After short visits to Germany and London he was invited in November 1834 to become minister of North College Street church (afterwards Argyle Square), Edinburgh, an independent church which had arisen out of the evangelical movement associated with the Haldanes. He deliberately put aside the ambition to become a pulpit orator in favour of the practice of biblical exposition, which he invested with a singular charm and impressiveness. In 1836 he became one of the editors of the Congregational Magazine, to which he contributed articles on biblical literature and theology and on the " voluntary " controversy. In 1840 he delivered the Congregational Lecture in London on the " Connexion and Harmony of the Old and New Testaments."

Alexander took an active part in the " voluntary " controversy which ended in the Disruption, but he also maintained broad and catholic views of the spiritual relations between different sections of the Christian church. In 1845 he visited Switzerland with the special object of inquiring into the religious life of the churches there. He published an account of his journey in a book, Switzerland and the- Swiss Churches, which led to an inter-

change of correspondence between the Swiss and Scottish churches. In 1845 he received the degree of D.D. from the university of St Andrews. In 1861 he undertook the editorship of the third edition of Kitto's Biblical Encyclopaedia with the understanding that the whole work should be thoroughly revised and brought up to date. In January 1870 he became one of the committee of Old Testament revisers, and by his thorough biblical scholarship rendered exceptional service to the board; he enjoyed the work and devoted much time to it for the next fourteen years. In 1877 he became principal of the Edinburgh Theological Hall, a position which he held, in spite of many tempting offers of preferment elsewhere, until his death on the 20th of December 1884.

See his Life and Work by James Ross (1887). (D. Mn.)

ALEXANDER AETOLUS, of Pleuron in Aetolia, Greek poet and man of letters, the only representative of Aetolian poetry, flourished about 280 B.C. When living in Alexandria he was commissioned by Ptolemy Philadelphus to arrange the tragedies and satyric dramas in the library; some ten years later he took up his residence at the court of Antigonus Gonatas, king of Macedonia. His reputation as a tragic poet was so high that he was allotted a place in the Alexandrian tragic Pleiad; we only know the title of one play (Astragalistae). He also wrote short epics, epigrams and elegies, the considerable fragments of which show learning and eloquence.

Meineke, Analecta Alexandrina (1853); Bergk, Poetae Lyrici Craeci; Couat, La Poesie alexandrine (1882).

ALEXANDER BALAS (i.e. " lord "), ruler of the Greek king- dom of Syria 150-146 B.C., was a native of Smyrna of humble origin, but gave himself out to be the son of Antiochus IV. Epiphanes and heir to the Syrian throne. His claims were recognized by the Roman senate, Ptolemy Philometor of Egypt and others. At first unsuccessful, he finally defeated the reigning

king Demetrius Soter m 1 50 B.C. Being now undisputed master of Syria, he abandoned himself to a life of debauchery. Demetrius Soter's son profited by the opportunity to regain the throne. Ptolemy Philometor, who was Alexander's father-in-law, went over to his side, and Alexander was defeated in a pitched battle

near Antioch in Syria. He fled for refuge to a Nabataean prince, who murdered him and sent his head to Ptolemy, who had been mortally wounded in the engagement.

See 1 Maccab. 10 ff. ; Justin xxxv. I and 2 ; Josephus, Antiq. xiii. 2 ; Appian, Syr. 67 ; Polybius xxxiii. 14.

ALEXANDER CORNELIUS, Greek grammarian, surnamed Polyhistor from his great learning, born at Miletus or Myndus in Caria, flourished about 70 B.C. He was taken prisoner in the Mithridatic war by Sulla, from whom (or from Cornelius Lentulus) he received his freedom and assumed the name Cornelius. He accompanied Crassus on his Parthian campaigns, and perished at the destruction by fire of his house at Laurentum. He is said to have written " books without number," chiefly on historical and geographical subjects. Of the extant fragments (Muller, Fragmcnta Historicorum Graecorum, iii.) those relating to the Jews are important as containing quotations from lost Jewish authors.

ALEXANDER JANNAEUS, king of the Jews; succeeded his brother Aristobulus in 103 .B.C. and died in 76 B.C. His first act was the murder of one of his brothers who claimed the throne, and his reign was disgraced by the cruelties that he perpetrated in order to retain his position. (See Jews and Pharisees.)

ALEXANDER NEVSKY, SAINT (1220-1263), grand-duke of Vladimir, was the second son of the grand-duke Yaroslav. His childhood and youth were spent at Great Novgorod, whither his father sent him to rule (1228) with some guardian boyars. In 1239 he married Alexandra, daughter of Prince Bryachislav of Polotsk. At an early age he distinguished himself in constant warfare with the Germans, Swedes and Lithuanians, who tried to wrest Novgorod and Pskov from Russia while she was still suffering from the effects of the terrible Tatar invasion. The most notable of these battles, whereby he won his honorific epithet of Nevsky (i.e. of the Neva) , was fought on the banks of the Neva (July 15,1 240) against the famous Swedish statesman, Birger Jarl, whom he utterly defeated, besides wounding him with his lance. In the following year the Teutonic Order, in conjunction with the Order of the Sword, succeeded in capturing Pskov; but Alexander recovered it in 1242, advanced into Livonia, and on the 5th of April defeated the knights on the ice of Lake Peipus and compelled them in the ensuing peace to renounce all their conquests. He also prevented the Swedes (in 1256) from settling

in South Finland. On the death of his father (1246) Alexander and his younger brother Andrew went on a two years' journey into Mongolia to obtain their yarhiiki, or letters of investiture, from the Grand Khan, who then disposed of the fate of all the Russian princes. He returned (1250) as grand-duke of Kiev and Novgorod, while to Andrew was given the far more important grand-duchy of Vladimir. In 1252, however, the Tatars themselves expelled Andrew and placed Alexander on the throne of Vladimir. Alexander henceforth did his best for his country by humbling himself before the Tatars so as to give them no pretext for ravaging the land again. Most of his spare money he devoted to the ransoming of the numerous Russian captives detained at the Golden Horde. But the men of Novgorod, in their semi-independent republic, continued (1255-1257) to give the grand-duke trouble, their chief grievance being the imposition of a Tatar tribute, which they only submitted to in 1 2 59 on the rumour of an impending Tatar invasion. In 1262 the Tatar tribute was felt so grievously all over Russia that preparations were made for a general insurrection, and Alexander, who knew that an abortive rebellion would make the yoke heavier, was obliged to go to the Horde in person to prevent the Tatars from again attacking Russia. He stayed at Sarai, their Volgan capital, all the winter, and not only succeeded in obtaining a mitigation of the tribute, but also the abolition of the military service previously rendered by the Russians to the Tatars. This was his last service to his

country. He died on his way home from the Horde, aiid in the words of his contemporary, the metropolitan Cyril, " with him the sun of Russia set." The Orthodox Church has canonized the ruler who gave his whole life for Russia and the Orthodox faith. His relics, discovered in 1380, were in 1724 translated by Peter the Great from Vladimir to St Petersburg.

See Sergyei Mikhailovich Solovev, History of Russia (Rus., 2nd ed., St Petersburg, 1897, vol. 3). (R. N. B.)

ALEXANDER OF APHRODISIAS, pupil of Aristocles of Messene, the most celebrated of the Greek commentators on the writings of Aristotle, and styled, by way of pre-eminence, 6 e%qyy}ri] s ("the expositor"), was a native of Aphrodisias in Caria. He came to Athens towards the end of the 2nd century a.d., became head of the Lyceum and lectured on peripatetic philosophy. The object of his work was to free the doctrine from the syncretism of Ammonius and to reproduce the pure doctrine of Aristotle. Commentaries by Alexander on the following works of Aristotle

are still extant: — the Analytica, Priora, i. ; the Topica; the Meteor ologica; the De Sensu; and the Metapkysica, i.-v., together with an abridgment of what he wrote on the remaining books of the Metapkysica. His commentaries were greatly esteemed among the Arabians, who translated many of them. There are also several original writings by Alexander still extant. The most important of these are a work On Fate, in which he argues against the Stoic doctrine of necessity; and one On the Soul, in which he contends that the undeveloped reason in man is material (vdCs uXikos) and inseparable from the body. He argued strongly ■ against the doctrine of immortality. He identified the active intellect (vovs xotT/rt/cos), through whose agency the potential intellect in man becomes actual, with God. Several of Alexander's works were published in the Aldine edition of Aristotle, Venice, 1495-1498; his De Fata and De Anima were printed along with the works of Themistius at Venice (1534); the former work, which has been translated into Latin by Grotius and also by Schulthess, was edited by J. C. Orelli, Zurich, 1824; and his commentaries on the Metapkysica by H. Bonitz, Berlin, 1847. J. Nourisson has treated of his doctrine of fate (De la liberlS et du hazard, Paris, 1870). In the early Renaissance his doctrine of. the soul's mortality was adopted by P. Pomponazzi against the Thomists and the Averroists.

SeepERIPATETICS((K/_/f».);ALEXANDRISTS;POMPONAZZI, PlETRO;

also A. Apelt, " Die Schrift d. Alex.v. Aphr.," Philologus, xly., 1886; C. Ruelle, " Alex. dAphr. et le pretendu Alex. dAlexandrie," Rev. des etudes grecques, v., 1892; E. Zeller's Outlines of Ck. Phil. (Eng. trans., ed. 1905, p. 296).

ALEXANDER OF HALES (Alexander Halensis), surnamed Doctor Irrefragabilis, Theologorum Monarcha and Fons Vitae, a celebrated English theologian of the 13th century, was born in Gloucestershire. Trained in the monastery of Hales he was early raised to an archdeaconry. He went, like most of the scholars of his day, to study at Paris, where he took the degree of doctor and became celebrated as a teacher. It is generally held that he taught Bonaventura, Duns Scotus and Thomas Aquinas, but a comparison of dates makes it clear that the two latter could nothavebeenhis pupils and that the statementaboutBonaventura is open to doubt. In 1 2 2 2 (or 1 23 1 , see Denifle, Chartul. Univers. Paris, Paris, 1889, i. 135) Alexander entered the order of Minorite Friars and thenceforward lived in strict seclusion. He

refused, however, to renounce his degree of doctor, and was the first of his order who continued to bear that title after initiation. He died in 1245 and was buried in the convent of the Cordeliers at Paris. His most celebrated work was the Sumtna Theologiae (Nuremberg, 1452; Venice, 1576; Cologne, 1611), undertaken by the orders of Pope Innocent IV. and approved by Alexander IV., on the report of seventy learned theologians, as a system of instruction for all the schools in Christendom. The form is that of question and answer, and the method is rigidly scholastic. Of small intrinsic value, it is interesting partly as the first philosophical contribution of the Franciscans who were afterwards to take a prominent paft in medieval thought (see Scholasticism), and partly as the first work based on a knowledge of the whole Aristotelian corpus and the Arabian commentators.

See Wadding, Script, ord. minor. (Rome, 1650) ; for his method

B. Haureau, Hist, de philos. scholast. (Paris, 1880); F. Picavet, " Abelard ct A. de H." in the Bibliotheque de I'ecole des hautes-etudes (2nd series, Paris, 1896, pp. 222-230); Schwane, Dogmengesch. (Freiburg, 1882) ; A. Harnack, Dogmengesch. (1890) ; J. Fndres, " Des A. von H. Leben und psychol. Lehre " in Philos. Jahrb. (i. Fulda, 1888, pp. 24-55, 203-296) ; also Vacant's Diet, de theologie catholique, vol. i.

ALEXANDER OF TRALLES (Alexander Trallianus), Greek physician, born at Tralles in Lydia, lived probably about the middle of the 6th century and practised medicine with success at Rome. The Greek text of his Btj3Xict larpiKa was printed at Paris in 1548 andhis De Lumbricis at Venice in 1570.

See E. Milward, Trallianus Reviviscens (London, 1734).

ALEXANDER SEVERUS (Marcus Aurelius Severus Alexander) (208-235), Roman emperor from a.d. 222 to 235, was born at Area Caesarea in Palestine on the 1st of October 208. His father, Gessius Marcianus, held office more than once as an imperial procurator; his mother, Julia Mamaea, was the daughter of Julia Maesa and the aunt of Heliogabalus. His original name was Bassianus, but he changed it in 221 when his grandmother, Maesa, persuaded the emperor Heliogabalus to adopt his cousin

as successor and create him Caesar. In the next year, on the irth of March, Heliogabalus was murdered, and Alexander was proclaimed emperor by the Praetorians and accepted by the senate. He was then a mere lad, amiable, well-meaning, but entirely under the dominion of his mother, a woman of many virtues, who surrounded him with wise counsellors, watched over the development of his character and improved the tone of the administration, but on the other hand was inordinately jealous, and alienated the army by extreme parsimony, while neither she nor her son had a strong enough hand to keep tight the reins of military discipline. Mutinies became frequent in all parts of the empire; to ore of them the life of the jurist and praetorian praefect Ulpian was sacrificed; another compelled the retirement of Dio Cassius from his command. On the whole, however, the reign of Alexander was prosperous till he was summoned to the East to face the new power of the Sassanians (see Persia: History). Of the war that followed we have very various accounts; Mommsen leans to that which is least favourable to the Romans. According to Alexander's own despatch to the senate he gained great victories. At all events, though the Persians were checked for the time, the conduct of the Roman army showed an extraordinary lack of discipline. The emperor returned to Rome and celebrated a triumph (233), but next year he was called to face German invaders in Gaul, where he was slain (on the 18th or 19th of March 235), together with his mother, in a mutiny which was probably led by Maxi- minus, a Thracian legionary, and at any rate secured him the throne. Alexander was the last of the Syrian princes. During his reign, acting, as he did in most things, under the influence of his mother, he did much to improve the morals and condition of the people. His advisers were men like the famous jurist Ulpian, the historian Dio Cassius and a select board of sixteen senators; a municipal council of fourteen assisted the city praefect in administering the affairs of the fourteen districts of Rome. The luxury and extravagance that had formerly been so prevalent at the court were put down; the standard of the coinage was raised; taxes were lightened; literature, art and science were encouraged; the lot of tb« soldiers was improved; and, for the convenience of the people, loan offices were instituted for lending money at a moderate rate of interest. Jn religious matters Alexander preserved an open mind. In his private chapel he had busts of Orpheus, Abraham, Apollonius of Tyana and Jesus Christ. It is said that he was desirous of erecting a temple to the founder of Christianity, but was dissuaded by the pagan priests.

There is no doubt that, had Alexander's many excellent qualities been supported by the energy and strength of will necessary for the government of a military empire, he would have been one of the greatest of the Roman emperors.

See Lampridius, Alexander Severus; Dio Cassius lxxviii. 30, Ixxix. 17, lxxx. 1; Herodian vi. 1-18; Porrath, Der Kaiser Alex. Sev. (1876) ; Pauly-Wissowa, Realencyclopddie, ii. 2526 foil. (Grbebe) ; monograph by R. V. Nind Hopkins, Cambridge Historical Essays, No, xiv. (1907).

ALEXANDER THE PAPHLAGONIAN, a celebrated impostor and worker of false oracles, was born at Abonouteichos (see Ineboli) in Paphlagonia in the early part of the 2nd century a.d. The vivid narrative of his career given by Lucian might be taken as fictitious but for the corroboration of certain coins of the emperors Lucius Verus and Marcus Aurelius (J.H. Eckhel, Doctrvna Nummorum veterum, ii. pp. 383, 384) and of a statue of Alexander, said by Athenagoras (Apology, c. 26) to have stood in the forum of Parium. After a period of instruction in medicine by a doctor who also, according to Lucian, was an impostor, he succeeded in establishing an oracle of Aesculapius at his native town. Having circulated a prophecy that the son of Apollo was to be born again, he contrived that there should be found in the foundations of the temple to Aesculapius, then in course of construction at Abonouteichos, an egg in which a small live snake had been placed. In an age of superstition no people had so great a reputation for credulity as the Paphlagonians, and Alexander had little difficulty in convincing them of the second coming of the god under the name of Glycon. A large tame snake with a false human head, wound round Alexander's body as he sat in a shrine in the temple, gave " autophones " or oracles unasked, but the usual methods practised were those of the numerous oracle-mongers of the time, of which Lucian gives a* detailed account, the opening of sealed inquiries by heated needles, a neat plan of forging broken seals, and the giving of vague or meaningless replies to difficult questions, coupled with a lucrative blackmailing of those whose inquiries were compromising. The reputation of the oracle, which was in origin medical, spread, and with it grew Alexander's skilled plans of organized deception. He set up an " intelligence bureau " in Rome, instituted mysteries like those of Eleusis, from which his particular enemies the Christians and Epicureans were alike excluded as " profane," and celebrated a mystic marriage between himself and the moon. During the plague of a.d. 166 a

verse from the oracle was used as an amulet and was inscribed over' the doors of houses as a protection, and an oracle was sent, at Marcus Aurelius' request, by Alexander to the Roman army on the Danube during the war with the Marcomanni, declaring that victory would follow on the throwing of two lions alive into the river. The result was a great disaster, and Alexander had recourse to the old quibble of the Delphic oracle to Croesus for an explanation. Lucian's own close in- vestigations into Alexander's methods of fraud led to a serious attempt on his life. The whole account gives a graphic descrip- tion of the inner working of one among the many new oracles that were springing up at this period. Alexander had remarkable beauty and the striking personality of the successful charlatan, and must have been a man o'f considerable intellectual abilities and power of organization. His income is said by Lucian to have reached an enormous figure. He died of gangrene of the leg in his seventieth year.

See Lucian, 'AXe£&c5pos fj 4 , &>S6ij.o.vtis ; Samuel Dill, Roman Society from Nero to Marcus Aurelius (1904); and F. Gregorovius, The Emperor Hadrian, trans, by M. E. Robinson (1898).

ALEXANDERS (botanical name, Smyrnium Olusatrum, natural order Umbellif erae) , a stout herbaceous plant with a furrowed, much-branched stem 1-3 ft. high, and large compound leaves with broad sheathing stalks, and broad, cut or lobed segments. The small yellow flowers are borne in compound umbels. The plant is a native of the Mediterranean region, and was formerly cultivated as a pot-herb. It is now found apparently wild in Great Britain and Ireland, growing in waste places, especially near the sea and amongst ruins.

In England the plant is sometimes popularly termed " alis- ander "; in North America Thaspium aureum is sometimes called " alexanders." " Alexander's foot," botanical name Anacyclus Pyrˆthrum, is the pellitory of Spain.

ALEXANDERSBAD, a watering-place of Germany, in the kingdom of Bavaria, romantically situated in the Fichtelgebirge, near Wunsiedel, at a height of 1900 ft. above the sea. Pop. 1200. Its waters, which are ferruginous and largely charged with carbonic acid gas, are of use in nervous and rheumatic

disorders. In the neighbourhood is the Luisenburg (or Lux- burg) , so called after a visit paid by Queen Louise of Prussia in 1805, a hill covered by majestic granite rocks, commanding a grand view of the whole range of the Fichtelgebirge.

ALEXANDRE, NOEL (Natalis Alexander) (1639-1724), French theologian and ecclesiastical historian, was born at Rouen on the 19th of January 1639. In his 15th year he joined the Dominicans, and shortly after his ordination was appointed professor of philosophy at the convent of Saint-Jacques in Paris. The success of his subsequent lectures at the Sorbonne led to his selection by Colbert as tutor to his son, Jacques Nicolas Colbert, afterwards archbishop of Rouen. Alexandre obtained the degree of doctor in divinity from the Sorbonne in 1675 and for twelve years taught philosophy, theology and ecclesiastical law to the members of the Saint-Jacques community. He played a prominent part in ecclesiastical affairs and preached several times before Louis XIV., who granted him an annual pension of 800 livres, and in the general assemblies of the French bishops. He became provincial of his order in 1706, but was banished to Chatellerault in 1709 for having subscribed to the Cas de conscience (1703), and was deprived of his pension in 1 7 13 on account of his opposition to the bull Unigenitus. He died in Paris on the 21st of August 1724, having lost his sight some time before owing to his strenuous literary activity. His numerous works are still much valued by ecclesiastical students.

His best-known work, the Selecta historiae ecclesiasticae capita, et in loca ejusdem insignia dissertationes historicae, chronologicae, dogmaticae (26 vols., Paris, 1676-1686), was placed on the Index by Innocent XL, on account of his bold defence of the Gallican claims. In 1689 he brought out at Paris his history of the Old Testament: Selecta historiae Veteris Testamenti capita, &°c, in 6 vols. Of the numerous editions of Alexandre's ecclesiastical history the best is that of P. J. D. Mansi, which contains many valuable notes and additions (n vols., Lucca, 1749) and has been frequently reprinted. Alexandre's principal contribution to theological literature is his Theologia dogmatica et moralis secundum ordinem catechismi concilii Tridentini (10 vols., Paris, 1694), in which he clearly shows himself a disciple of the Thomist school. His Conformity des cfr&monies chinoises avec I'idoldtrie grecque et romaine and Sept lettres sur les ceremonies de la Chine (both published at

Cologne in 1700) are interesting as they mark him out as a pioneer in the study of comparative religion.

See Catalogue complet des cBuvres du Pere Alexandre (Paris, 17 16) ; Quetif-Echard, Scriptores ordinis praedicatorum (Paris, 1719-1721), t. ii. p. 810; and full bibliography in A. Vacant, Diet, de theologie (scholarly article by P. Mandounet, cols. 769-772).

ALEXANDRETTA, or Iskanderun (med. Scanderoon), a town of N. Syria, situated in the N.E. angle of the Levantine Mediterranean on the S.E. of the gulf to which it gives a title. Pop., about 10,000, two-thirds Moslem. Iskanderun preserves the name, but probably not the exact site, of Alexandria ad Issum, founded by Alexander in 333 B.C., about 23 m. S. of the scene of his victory, to supersede Myriandrus as key of the Syrian Gates (Beilan Pass). The importance of the place ever since has been derived from its relation to this pass, the easiest approach to the open ground of N. Syria of which Antioch and Aleppo have been the successive capitals; and this relation has prevailed over the extreme unhealthiness of the site, which lies on marshy deltaic ground, screened by the horseshoe of Elma Dagh from all purifying influences of N. and E. winds. As the main outlet for the overland trade from Bagdad and India, whose importance was great until the establishment of the Egyptian overland route, the place was a great resort, first of Genoese and Venetian merchants, then of those of West and North European nations. The British Levant (Turkey) Company maintained an agency and factory here for 200 years, till 1825, in spite of appalling mortality among its employes. Alexan- dretta is still the main port for the Aleppo district, to which a good chaussee leads over the Beilan Pass, and it has a considerable export trade in tobacco, silk, cereals, liquorice, textiles. The health of the place has improved with the draining of the marshes and the provision of a better supply of water, but still leaves

much to be desired. The wealthier inhabitants have summer residences at Beilan near the summit of the pass, long a stronghold of freebooting Dere Beys and the scene of the victory won by Ibrahim Pasha in 1832, which opened Cilicia to his advance. There are resident consuls of all the principal powers, and the port is well served by coasting steamers under European and Ottoman flags. The distance by road to Aleppo has been shortened to about 70 m., and Antakia (Antioch) is about 45 m. distant by a branch of the same chaussee. (D. G. H.)

ALEXANDRIA (Arab. Iskenderia), a city and chief seaport of Egypt, and for over a thousand years from its foundation the capital of the country, situated on the Mediterranean in 31° 12′ N., 29 15′ E., and 129 m. by rail N.W. of Cairo The ancient Canopic mouth of the Nile (now dry) was 1 2 m. E.

I. The Modern City. — The city is built on the strip of land which separates the Mediterranean from Lake Mareotis (Mariut) , and on a T-shaped peninsula which forms harbours east and west. The stem of the T was originally a mole leading to an island (Pharos) which formed the cross-piece. In the course of centuries this mole has been silted up and is now an isthmus half a mile wide. On it a part of the modern city is built. The cape at the western end of the peninsula is Ras et-Tin (Cape of Figs) ; the eastern cape is known as Pharos or Kait Bey. South of the town — between it and LakeMareotis — runs theMahmudiya canal, which enters the western harbour by a series of locks.

The customs house and chief warehouses are by the western harbour, but the principal buildings of the city are in the east and south-east quarters. From the landing-stage, by the customs house, roads lead to the Place Mehemet Ali, the centre of the life of the city and the starting-point of the electric tram- ways. The place, usually called the Grand Square, is an oblong open space, tree-lined, in the centre of which there is an equestrian statue of the prince after whom it is named. The square is faced with handsome buildings mainly in the Italian style. The most important are the law courts, exchange, Ottoman bank, English church and the Abbas Hilmi theatre. A number of short streets lead from the square to the eastern harbour. Here a sea wall, completed in 1905, provides a magnificent drive and promenade along the shore for a distance of about 3 m. In building this quay a considerable area of foreshore was re- claimed and an evil-smelling beach done away with. From the south end of the square the rue Sherif Pasha — in which are the principal shops — and the rue Tewfik Pasha lead to the boulevard, or rue, de Rosette, a long straight road with a general E. and W. direction. In it are the Zizinia theatre and the municipal palace (containing the public library); the museum lies up a short street to the N. Opened in 1895 this museum possesses an important collection of Egyptian, Greek and Roman anti- quities, found not only in the city but in all Lower Egypt and the Fayum. The western end of the boulevard leads to the Place Ibrahim, often called Place Ste Catherine, from the Roman Catholic church at its S.E. side. In a street running S. from the boulevard to the railway station is the

mosque of Nebi Daniel, containing the tombs of Said Pasha and other members of the khedivial family. Immediately E. of the mosque is Kom ed- Dik, garrisoned by British troops, one of several forts built for the protection of the city. Except Kom ed-Dik the forts have not been repaired since the bombardment of 1882. Equally obsolete is the old line of fortifications which formerly marked the limits of the city south and east and has now been partly demolished. Throughout the central part of Alexandria the streets are paved with blocks of lava and lighted by electricity.

The north quarter is mainly occupied by natives and Levan- tines. The narrow winding streets and the Arab bazaars present an Oriental scene contrasting with the European aspect of the district already described. This Arab quarter is traversed by the rue Ras et-Tin, leading to the promontory of that name. Here, overlooking the harbour, is the khedivial yacht club (built 1903) and the palace, also called Ras et-Tin, built by Mehemet Ali, a large but not otherwise noteworthy building. In the district between the Grand Square and the western harbour, one of the poorest quarters of the city, is an open space

with Fort Caffareli or Napoleon in the centre. This quarter has been pierced by several straight roads, one of which, crossing the Mahmudiya canal by the Pont Neuf, leads to Gabbari, the most westerly part of the city and an industrial and manufactur- ing region, possessing asphalt works and oil, rice and paper mills. On either side of the canal are the warehouses of whole- sale dealers in cotton, wool, sugar, grain and other commodities. In the southern part of the city are the Arab cemetery, ” Pompey’s Pillar” and the catacombs. “Pompey’s Pillar,” which stands on the highest spot in Alexandria, is nearly 99 ft. high, including the pedestal. The shaft is of red granite and is beautifully polished. Nine feet in diameter at the base, it tapers to eight feet at the top. The catacombs, a short distance S.W. of the pillar, are hewn out of the rocky slope of a hill, and are an elaborate series of chambers adorned with pillars, statues, religious symbols and traces of painting (see below, Ancient City). Along the northern side of the Mahmudiya canal, which here passes a little S. of the catacombs, are many fine houses and gardens (Moharrem Bey quarter), stretching eastward for a considerable distance,

favourite residences of wealthy citizens. A similar residential quarter has also grown up on the N.E., where the line of the old fortifications has become a boulevard. The district extending outside the E. fortifications, in the direction of Hadra, has been laid out with fine avenues, and contains numerous garden-cafes and pleasure resorts. Thence roads lead to the E. suburb known generally as Ramleh, which stretches along the coast, and is served by a local railway. It begins E. of the racecourse with Sidi Gabr, and does not end till the khedivial estates E. of San Stefano are reached, some S m. E. All this space is filled with villas, gardens and hotels, and is a favourite summer resort not only of Alexandrians but also of Cairenes.

The eastern bay is rocky, shallow and exposed, and is now used only by native craft. The harbour is on the W. of Pharos and partly formed by a breakwater (built 1871-1873 and prolonged 1906-1907), 2 m. long. The breakwater starts opposite the promontory of Ras et-Tin, on which is a lighthouse, 180 ft. above the sea, built by Mehemet Ali. Another breakwater starts from the Gabbari side, the opening between the two works being about half a mile. A number of scattered rocks lie across the entrance, but through them two fairways have been made, one 600 ft. wide and 35 ft. deep, the other 300 ft. wide and 30 ft. deep. The enclosed water is divided into an outer and inner harbour by a mole, 1000 yds. long, projecting N.W. from the southern shore. The inner harbour covers 464 acres. It is lined for 25 m. by quays, affording accommodation for ships drawing up to 28 ft. The outer harbour (1400 acres water area) is furnished with a graving dock, completed in 1905, 520 ft. long, and with quays and jetties along the Gabbari foreshore. Their construction was begun in 1906.

Alexandria is linked by a network of railway and telegraph lines to the other towns of Egypt, and there is a trunk telephone line to Cairo. The city secured in 1906 a new and adequate water-supply, modern drainage works having been completed the previous year. Being the great entrepot for the trade of Egypt, the city is the headquarters of the British chamber of commerce and of most of the merchants and companies engaged in the development of the Delta. About 90 % of the total exports and imports of the country pass through the port, though the completion, in 1904, of a broad-gauge railway connecting Cairo and Port Said deflected some of the cotton exports to the Suez Canal route. The staple export is raw cotton, the value of which is about 80 % of all the exports. The principal imports are manu-

factured cotton goods and other textiles, machinery, timber and coal. The value of the trade of the port increased from £30,000,000 in 1900 to £46,000,000 in 1906. In the same period the tonnage of the ships entering the harbour rose from 2,375,000 to 3,695,000. Of the total trade Great Britain supplies from 35 to 40 % of the imports and takes over 50 % of the exports. Among the exports sent to England are the great majority of the 80,000,000 eggs annually shipped (see also Egypt: Commerce).

The population of the city (1907) was 332,246 or including the

suburbs, about 400,000. The foreigners numbered over 90,000. The majority of these were Greeks, Italians, Syrians, Armenians and other Levantines, though almost every European and Oriental nation is represented. The predominant languages spoken, besides the Arabic of the natives, are Greek, French, English and Italian. The labouring population is mainly Egyptian; the Greeks and Levantines are usually shopkeepers or petty traders. In its social life Alexandria is the most progressive and occidental of all the cities of North Africa, with the possible ex- ception of Algiers. (F. R. C.)

II. The Ancient City. — The Greek Alexandria was divided into three regions: (1) the Jews' quarter, forming the north-east portion of the city; (2) Rhacotis, on the west, occupied chiefly by Egyptians; (3) Brucheum, the Royal or Greek quarter, forming the most magnificent portion of the city. In Roman times Brucheum was enlarged by the addition of an official quarter, making up the number of four regimes in all. The city was laid out as a gridiron of parallel streets, each of which had an attendant subterranean canal. Two main streets, lined with colonnades and said to have been each about 200 ft. wide, inter- sected in the centre of the city, close to the point where rose the Sema (or Soma) of Alexander {i.e. his Mausoleum). This point is very near the present mosque of Nebi Daniel; and the line of the great east-west " Canopic " street only slightly diverged from that of the modern Boulevard de Rosette. Traces of its pave- ment and canal have been found near the Rosetta Gate; but better remains still of streets and canals were exposed in 1899 by the German excavators outside the E. fortifications, which lie well within the area of the ancient city.

Alexandria consisted originally of little more than the island of Pharos, which was joined to the mainland by a mole nearly a

mile long and called the H eptastadium. The end of this abutted on the land at the head of the present Grand Square, where rose the ” Moon Gate.” All that now lies between that point and the modern Ras et-Tin quarter is built on the silt which gradually widened and obliterated this mole. The Ras et-Tin quarter represents all that is left of the island of Pharos, the site of the actual lighthouse having been weathered away by the sea. On the east of the mole was the Great Harbour, now an open bay ; on the west lay the port of Eunostos, with its inner basin Kibotos, now vastly enlarged to form the modern harbour.

In Strabo’s time, (latter half of 1st century B.C.) the principal buildings were as follows, enumerated as they were to be seen from a ship entering the Great Harbour. (1) The Royal Palaces, filling the N.E. angle of the town and occupying the promontory of Lochias, which shut in the Great Harbour oh the east. Lochias, the modern Pharillon, has almost entirely disappeared into the sea, together with the palaces, the ” Private Port ” and the island of Antirrhodus. There has been a land subsidence here, as throughout the N. Delta and indeed all the N.E. coast of Africa; and on calm days the foundations of buildings may be seen, running out far under sea, near the Pharillon. Search was made for relics of these palaces by German explorers in 1898- 1899, but without much success. (2) The Great Theatre, on the modern Hospital Hill near the Ramleh station. This was used by Caesar as a fortress, where he stood a siege from the city mob after the battle of Pharsalus. (3) The Poseideion or Temple of the Sea God, close to the theatre and in front of it. (4) The Timonium built by Antony. (5, 6, 7) The Emporium (Exchange), Apostases (Magazines) and Navalia (Docks), lying west of (4), along the sea-front as far as the mole. Behind the Emporium rose (8) the Great Caesareum, by which stood the two great obelisks, later known as ” Cleopatra’s Needles,” and now removed to New York and London. This temple became in time the Patriarchal Church, some remains of which have been discovered: but the actual Caesareum, so far as not eroded by the waves, lies under the houses lining the new sea-wall. (9) The Gymnasium and (10) the Palaestra are both inland, near the great Canopic street (Boulevard de Rosette) in the eastern half of -the town, but on sites not determined, (n) The Temple of Saturn: site unknown. (12) The Mausolea of Alexander (Soma) and the Ptolemies in one ring-fence, near the point of intersection of

the two main streets. (13) The Museum with its library and theatre in the same region; but on a site not identified. (14) The Serapeum, the most famous of all Alexandrian temples. Strabo tells us that this stood in the west of the city; and recent discoveries go far to place it near ” Pompey’s Pillar” (see above), which, however, was an independent monument erected to commemorate Diocletian’s siege of the city. We know the names of a few other public buildings on the mainland, but nothing as to their position. On the eastern point of the Pharos island stood the Great Lighthouse, one of the ” Seven Wonders,” reputed to be 400 ft. high. The first Ptolemy began it, and the second completed it, at a total cost of 800 talents. It is the prototype of all lighthouses (q.v.) in the world. A temple of Hephaestus also stood on Pharos at the head of the mole. In the Augustan age the population of Alexandria was estimated at 300,000 free folk, in addition to an immense number of slaves.

III. History. — Founded in 332 B.C. by Alexander the Great, Alexandria was intended to supersede Naucratis (q.v.) as a Greek Ancient centre in Egypt, and to be the link between Macedonia and and the rich Nile Valley. If such a city was to be on

medieval the Egyptian coast, there was only one possible site, pe ° ‘ behind the screen of the Pharos island and removed from the silt thrown out by Nile mouths. An Egyptian townlet, Rhacotis, already stood on the shore and was a resort of fishermen and pirates. Behind it (according to the Alexandrian treatise, known as pseudo-Callisthenes) were five native villages scattered along the strip between Lake Mareotis and the sea. Alexander occupied Pharos, and had a walled city marked out by Deinocrates on the mainland to include Rhacotis. A few months later he left Egypt for the East and never returned to his city; but his corpse was ultimately entombed there. His viceroy, Cleomenes, continued the creation of Alexandria. The Heptastadium, however, and the mainland quarters seem to have been mainly Ptolemaic work. Inheriting the trade of ruined Tyre and becoming the centre of the new commerce between Europe and the Arabian and Indian East, the city grew in less than a century to be larger than Carthage; and for some centuries more it had to acknowledge no superior but Rome. It was a centre not only of Hellenism but of Semitism, and the greatest Jewish city in the world. There the Septuagint was produced. The early Ptolemies kept it in order and fostered the development of its museum into the leading

Greek university; but they were careful to maintain the distinction of its population into three nations, ” Macedonian ” {i.e. Greek), Jew and Egyptian. From this division arose much of the later turbulence which began to manifest itself under Ptolemy Philopater. Nominally a free Greek city, Alexandria retained its senate to Roman times; and indeed the judicial functions of that body were restored by Septimius Severus, after temporary abolition by Augustus. The city passed formally under Roman jurisdiction in 80 B.C., according to the will of Ptolemy Alexander; but it had been under Roman influence for more than a hundred years previously. There Julius Caesar dallied with Cleopatra in 47 B.C. and was mobbed by the rabble; there his example was followed by Antony, for whose favour the city paid dear to Octavian, who placed over it a prefect from the imperial household. Alexandria seems from this time to have regained its old prosperity, commanding, as it did, an important granary of Rome. This latter fact, doubtless, was one of the chief reasons which induced Augustus to place it directly under the imperial power. In a.d. 215 the emperor Caracalla visited the city ; and, in order to repay some insulting satires that the inhabitants had made upon him, he commanded his troops to put to death all youths capable of bearing arms. This brutal order seems to have been carried out even beyond the letter, for a general massacre was the result. Notwith- standing this terrible disaster, Alexandria soon recovered its former splendour, and for some time longer was esteemed the first city’ of the world after Rome. Even as its main historical importance had formerly sprung from pagan learning, so now it acquired fresh importance as a centre of Christian theology and church government. There Arianism was formulated and there

Athanasius, the great opponent of both heresy and pagan reaction, worked and triumphed. As native influences, however, began to reassert themselves in the Nile valley, Alexandria gradually became an alien city, more and more detached from Egypt; and, losing much of its commerce as the peace of the empire broke up during the 3rd century a.d., it declined fast in population and splendour. The Brucheum and Jewish quarters were desolate in the 3th century, and the central monuments, the Soma and Museum, fallen to ruin. On the mainland life seems to have centred in the vicinity of the Serapeum and Caesareum, both become Christian churches: but the Pharos and Heptastadium quarters remained populous and intact. In 616 it was taken by Chosroes, king of Persia; and in 640 by the

Arabians, under ‘Amr, after a siege that lasted fourteen months, during which Heraclius, the emperor of Constantinople, did not send a single ship to its , assistance. Notwithstanding the losses that the city had sustained, ‘Amr was able to write to his master, the caliph Omar, that he had taken a city containing ” 4000 palaces, 4000 baths, 12,000 dealers in fresh oil, 12,000 gardeners, 40,000 Jews who pay tribute, 400 theatres or places of amusement.”

The story of the destruction of the library by the Arabs is first told by Bar-hebraeus (Abulfaragius), a Christian writer who lived six centuries later; and it is of very doubtful authority. It is highly improbable that many of the 700,000 volumes col- lected by the Ptolemies remained at the time of the Arab con- quest, when the various calamities of Alexandria from the time of Caesar to that of Diocletian are considered, together with the disgraceful pillage of the library in a.d. 389 under the rule of the Christian bishop, Theophilus, acting on Theodosius’ decree con- cerning pagan monuments (see Libraries: Ancient History). The story of Abulfaragius runs as follows: —

John the Grammarian, a famous Peripatetic philosopher, being in Alexandria at the time of its capture, and in high favour with ‘Amr, begged that he would give him the royal library. Amr told him that it was not-in his power to grant such a request, but promised to write to the caliph for his consent. Omar, on hearing the request of his general, is said- to have replied that if those books contained the same doctrine with the Koran, they could be of no use, since the Koran contained all necessary truths; but if they contained anything contrary to that book, they ought to be destroyed; and therefore, whatever their contents were, he ordered them to be burnt. Pursuant to this order, they were distributed among the public baths, of which there was a large number in the city, where, for six months, they served to supply the fires.

Shortly after its capture Alexandria again fell into the hands of the Greeks, who took advantage of ‘Amr’s absence with the greater portion of his army. On hearing what had happened, however, ‘Amr returned, and quickly regained possession of the city. About the year 646 ‘Amr was deprived of his government by the caliph Othman. The Egyptians, by whom ‘Amr was greatly beloved, were so much dissatisfied by this act, and even showed such a tendency to revolt, that the Greek emperor determined to make an effort to reduce Alexandria. The attempt proved

perfectly successful. The caliph, perceiving his mistake, immediately restored ‘Amr, who, on his arrival in Egypt, drove the Greeks within the walls of Alexandria, but was only able to capture the city after a most obstinate resistance by the defenders. This so exasperated him that he completely demolished its fortifications, although he seems to have spared the lives of the inhabitants as far as lay in his power. Alexandria now rapidly declined in importance. The building of Cairo in 969, and, above all, the discovery of the route to the East by the Cape of Good Hope in 1498, nearly ruined its commerce; the canal, which supplied it with Nile water, became blocked; and although it remained a principal Egyptian port, at which most European visitors in the Mameluke and Ottoman periods landed, we hear little of it until about the beginning of the 19th century.

[Alexandria figured prominently in the military operations of Napoleon’s Egyptian expedition of 1798. The French troops stormed the city on the 2nd of July 1798, and it remained in their hands until the arrival of the British expedition of 1801. The battle of Alexandria, fought on the 21st of March of that

year, between the French army under General Menou and the British expeditionary corps under Sir Ralph Abercromby, took place near the ruins of Nicopolis, on the narrow spit of land between the sea and Lake Aboukir, along which the British

troops had advanced towards Alexandria after the 1801. actions of Aboukir on the 8th and Mandora on the

13th. The British position on the night of the 20th extended across the isthmus, the right resting upon the ruins of Nicopolis and the sea, the left on the lake of Aboukir and the Alexandria canal. The line faced generally south-west towards the city, the reserve division under Major-General (Sir) John Moore on the right, the Guards brigade in the centre, and three other brigades on the left. In second line were two brigades and the cavalry (dismounted). On the 21st the troops were under arms at 3 a.m., and at 3.30 the French attacked and drove in the outposts. The French army now moved forward with great rapidity in their usual formation of columns. The brunt of the attack fell upon the command of Moore, and in particular upon the 28th

(Gloucestershire Regiment). The first shock was repulsed, but a French column penetrated in the dark between two regiments of the British and a confused fight ensued in the ruins, in which the 42nd (Black Watch) captured a colour. The front and rear ranks of the 28th were simultaneously engaged, and the conduct of the regiment won for it the distinction of wearing badges both at the front and at the back of their head-dress. Other regiments which assisted in the overthrow of the French column were the 23rd, 40th and 58th. In a second attack the enemy's cavalry inflicted severe losses on the 42nd. Sir Ralph Abercromby was here engaged in personal conflict with some French dragoons, and about this time received a mortal wound, though he remained on the field and in command to the end. The attack on the centre was repulsed by the cool and steady fire of the Guards, and the left wing maintained its position with ease, but the French cavalry for the second time came to close quarters with the reserve. About half-past eight the combat began to wane, and the last shots were fired at ten. The real attack had been pressed home on the British right, and the History of the Queen's Royal West Surrey Regiment gives no undue praise to the regiments of the reserve in saying that " the determined attack would have been successful against almost any other troops." Technically, the details of the action show that, while not markedly better in a melee than the war-seasoned French, the British infantry had in its volleys a power which no other troops then existing possessed, and it was these volleys that decided the day even more than the individual stubbornness of the men. The 42nd, twice charged by cavalry, had but thirteen men wounded by the sabre. Part of the French losses, which were disproportion- ately heavy, were caused by the gunboats which lay close inshore and cannonaded the left flank of the French columns, and by a heavy naval gun which was placed in battery near the position of the 28th. The forces engaged on this day were approximately 14,000 British to about 20,000 French, and the losses were: — British, 1468 killed, wounded and missing, including Abercromby (who died on the 28th), Moore and three other generals wounded; French, 1160 killed and (?) 3000 wounded. The British sub- sequently advanced upon Alexandria, which surrendered on the 31st of August. (C. F. A.).]

During the anarchy which accompanied Ottoman rule in Egypt from first to last, Alexandria sank to a small town of

about 4000 inhabitants; and it owed its modern citym renascence solely to Mehemet Ali, who wanted a deep

port and naval station for his viceregal domain. He restored its water communication with the Nile by making the Mahmudiya canal, finished in 1820; and he established at Ras et-Tin his favourite residence. The old Eunostus harbour became the port, and a flourishing city arose on the old Pharos island and the Heptastadium district, with out- lying suburbs and villa residences along the coast eastwards and the Mareotic shore. Being the starting-point of the ” over- land route ” to India, and the residence of the chief foreign consuls, it quickly acquired a European character and attracted

not only Frank residents, but great numbers of Greeks, Jews and Syrians. There most of the negotiations between the powers and Mehemet Ali were conducted; thence started the Egyptian naval expeditions to Crete, the Morea and Syria; and thither sailed the betrayed Ottoman fleet in 1839. It was twice threatened by hostile fleets, the Greek in 1827 and the combined British, French and Russian squadrons in 1828. The latter withdrew on the viceroy’s promise that Ibrahim should evacuate the Morea. The fortifications were strengthened in 1841, and remained in an antiquated condition until 1882, when they were renovated by Arabi Pasha. Alexandria was connected with Cairo by railway in 1856. Much favoured by the earlier viceroys of Mehemet Ali’s house, and removed from the Mameluke troubles, Alexandria was the real capital of Egypt till Said Pasha died there in 1863 and Ismail came into power. Though this prince continued to develop the city, giving it a municipality in 1866 1 and new harbour works in 1871-1878, he developed Cairo still more; and the centre of gravity definitely shifted to the inland capital. Fate, however, again brought Alexandria to the front. After a mutiny of soldiers „„””*„/ ” there in 1881, the town was greatly excited by the 1882. arrival of an Anglo-French fleet in May 1882, and on the nth of June a terrible riot and massacre took place, resulting in the death of four hundred Europeans. Since satis- faction was not given for this and the forts were being strengthened at the instigation of Arabi Pasha, the war minister, the British admiral, Sir Beauchamp Seymour (afterwards Lord Alcester), sent an ultimatum on the 10th of July and opened fire on the forts the

next day. They were demolished, but as no troops were landed immediately a fresh riot and massacre ensued. As Arabi did not submit, a British military expedition landed at Alexandria on the roth of August, the sequel being the British occupation of the whole country, the history of which is set forth under Egypt.

Since the restoration of tranquillity and the establishment of sound political and economic conditions in the Nile valley, Alexandria has greatly expanded. As the British consular report for 1904 says, ” Building … for residential and other purposes proceeds with almost feverish rapidity. The cost of living has doubled and the price of land has risen enormously.” On the E. and S.E. a new town of handsome houses, gardens and boulevards has been called into existence, in the arrange- ment of which the controlling influence of the municipality is evident (see Modem City above).

IV. Antiquities. — Persistent efforts have been made to explore the antiquities of Alexandria. Encouragement and help have been given by the local Archaeological Society, and by many individuals, notably Greeks justly proud of a city which is one of the glories of their national story. The past and present directors of the museum have been enabled from time to time to carry out systematic excavations when opportunity offered; Mr D. G. Hogarth made tentative researches on behalf of the Egypt Exploration Fund and the Society for the Promotion of Hellenic Studies in 1895; and a German expedition worked for two years (1 898-1 899). But two difficulties face the would- be excavator in Alexandria. First, since the great and growing modern city stands right over the ancient one, it is almost impossible to find any considerable space in which to dig, except at enormous cost. Second, the general subsidence of the coast has sunk the lower-lying parts of the ancient town under water. Unfortunately the spaces still most open are the low grounds to N.E. and S.W., where it is practically impossible to get below the Roman strata.

The most important results were those achieved by Dr G. Botti, late director of the museum, in the neighbourhood of ” Pompey’s Pillar,” where there is a good deal of open ground. Here substructures of a large building or group of buildings have been exposed, which are perhaps part of the Serapeum. Hard by immense catacombs and columbaria have been opened which may have been appendages of the temple. These contain one

1 This municipality was superseded by a new municipal body,

with extensive powers, created in 1890.

very remarkable vault with curious painted reliefs, now lighted by electricity and shown to visitors. The objects found in these researches are in the museum, the most notable being a great basalt bull, probably once an object of cult in the Serapeum. Other catacombs and tombs have been opened in Kom es-Shugafa Hadra (Roman) and Ras et-Tin (painted). The Germans found remains of a Ptolemaic colonnade and streets in the north-east of the city, but little else. Mr Hogarth explored part of an immense brick structure under the mound of Kom ed-Dik, which may have been part of the Paneum, the Mausolea or a Roman fortress. The making of the new foreshore led to the dredging up of remains of the Patriarchal Church; and the foundations of modern buildings are seldom laid without some objects of antiquity being discovered. The wealth underground is doubtless immense; but, despite all efforts, there is not much for antiquarians to see in Alexandria outside the museum and the neighbourhood of " Pompey's Pillar." The native tomb- robbers, well-sinkers, dredgers and the like, however, come upon valuable objects from time to time, which find their way into private collections.

Bibliography. — (i) Modern City. See latest editions of guide-books to Lower Egypt (Baedeker, Murray, Macmillan). (2) History. See authorities for history of Egypt. (3) Ancient City and Anti- quities. Mahmud Bey el Fallaki, Memoire sur V antique Alexandrie (l87»| ; T. D. Neroutsos, U Ancienne Alexandrie (1888) ; D.G. Hogarth and E. F. Benson, Report on Prospects of Research in Alexandria (Egypt Expl. Fund Archaeological Report, 1 894-1 895); Bulletin de la SocieS Archeologique a" Alexandrie (1898 foil.) ; O. Puchstein in Pauly- Wissowa, Realencydopadie, s.v. " Alexandria "; U. Wilcken, Observa- tiones ad historiam Egypti Provinciae Romanae (1885) ; G. Lumbroso, L'Egitto al tempo dei Greci e dei Romani (1882); H. Kiepert, Zur Topographic des alten Alexandria (1872). (D. G. H.)

ALEXANDRIA, a city of Madison county, Indiana, U.S.A., about 46 m. N.E. of Indianapolis. Pop. (1890) 715; (1900) 7221 (1002 foreign-born); (1910) 5096. Alexandria is served by the Cleveland, Cincinnati, Chicago & St Louis, and the Lake Erie & Western railways, and by the Indiana Union Traction System

(electric). In the city are a Carnegie library and Beulah Park (24 acres), the latter belonging to the Northern Indiana Holiness Association, which there holds summer camp-meetings. The city is in a rich farming country, which produces Indian corn, oats and wheat; and is in the Indiana natural gas region, to which fact it owes its rapid growth as a manufacturing centre. It is one of the principal seats of the glass industry in Indiana — • plate glass, lamp chimneys, 'mirrors, &c, being manufactured here — and also has mineral wool factories and paper mills. The municipality owns and operates the water-works and the gas-lighting plant. Alexandria was founded in 1836 and was chartered as a city in 1893.

ALEXANDRIA, a city of Louisiana, U.S.A., capital of Rapides Parish, jn the S. bank of the Red river in almost the exact geogra,. lical centre of the state. Pop. (1890) 2861; (1900) 5648 (3142 negroes); (1910) 11,213. The city is served by the Louisiana Railway & Navigation Company, the St Louis, Watkins & Gulf, the Texas & Pacific, the Louisiana & Arkansas, the Southern Pacific, the Chicago, Rock Island & Pacific, and the Missouri Pacific railways. The Red river is navigable to Alexandria during the entire year. Alexandria is on a level plain in the centre of the Louisiana long-leaf pine forests, in which pine is interspersed with various hardwoods. The forests stretch on all sides within a radius of 75 m. In the immediate vicinity of the city, on the Red river, cotton, sugar, alfalfa and garden vegetables are cultivated; south of the Red river is a peculiarly rich farming country watered by Bayou Rapides and Bayou Bceuf. Near the city is the Louisiana Asylum for the Insane. The principal industries are cotton- pressing and the manufacture of lumber and of cotton-seed products; sugar and molasses, artificial ice, mineral waters and brick are other manufactures. The city owns and operates the water- works and electric-lighting plant; the water-supply is derived from artesian wells. Alexandria was named in honour of Alexander Fulton, on whose grant from Spain the first settlement was made in J785; it was first incorporated as a town in 18 1 8 and received a city charter in 1882. In the spring

of 1863 a Union fleet under Admiral David D. Porter, operating on the Red river, co-operated with land forces under General N. P. Banks in pushing the Confederates westward. Alexandria was occupied on the 7 th of May 1863, but the troops were soon withdrawn for the Port Hudson attack. On the 19th of March 1864 it was again occupied by the Union forces, who made it the

point of concentration for another land and naval expedition against E. Kirby Smith and Shreveport. After the check of this expedition and its abandonment, Alexandria was again vacated on the i2th-i3th of May, when the city was almost entirely burned. The Union gunboats, which had passed up the river toward Shreveport at high water, were caught in its decline above the fall; »t Alexandria, but they were saved by a splendid piece of engir ;ering (a dam at the falls), constructed by Lieutenant-Colonel Joseph Bailey (1827-1867), who for this service received the thanks of Congress and the brevet of brigadier-general of volunteers.

ALEXANDRIA, a town of Rumania, situated among the rich corn-lands of the Teleorman department, on the right bank of the river Vedea. Pop. (1900) 13,675. Its chief trade is in grain, despatched by rail to the Danubian port of Zimnicea, or by river to Giurgevo. Alexandria was named after its founder, Alexander John Cuza, prince of Rumania from 1859 to 1866.

ALEXANDRIA, a manufacturing town of Dumbartonshire, Scotland, situated on the right bank of the Leven about 3 m. north of Dumbarton, on the North British and Caledonian railways. It owes its origin almost entirely to the cotton printing and bleaching works of the vicinity, for which there is an abundant supply of excellent water, and contains one of the largest of the Turkey-red dyeing establishments in the Vale of Leven. The public buildings include a public hall, the mechanics' institute with library and lecture-hall, an institute for men, with library and recreation rooms, a similar institu- tion for women, banks and other important commercial offices. Pop. (1891) 7796; (1901) 8007. Alexandria is connected with Bonhill, on the opposite bank of the river, by a bridge which replaced in 1898 one bought three years earlier by the county council from the Smollett family, who have been closely associated with the district since the time of Sir James Smollett, the novelist's grandfather. The industries of Bonhill centre in the calico printing, dyeing and bleaching which find their head- quarters in the valley. Population (1891) 3843; (1901) 3333. Jamestown, about 1 m. to the north-east of Alexandria, with a station on the Forth & Clyde railway from Balloch to Stirling (North British), contains some of the largest cotton-printing works in Scotland. Population (1891) 1668; (1901) 2080.

ALEXANDRIA, a city and a port of entry of Alexandria county, • Virginia, U.S.A., on the W. bank of the Potomac river, 6 m. below

Washington, D.C., with which it is connected by a ferry. Pop. (1890) 14,339; (1900) 14,528, of whom 4533 were negroes; (1910, census), 15,329. Alexandria is served by the Baltimore & Ohio, the Chesapeake & Ohio, the Southern and the Washington Southern railways; by the Washington, Alexandria & Mount Vernon electric railway; and by several lines of river and coasting steamboats. It is a quaint, old-fashioned city, with quiet, shady streets, and a number of buildings dating back to the 18th century; of these the most interesting is the old Christ Church in which George Washington and Robert E. Lee worshipped. The city has a public library. About 25 m. W. of Alexandria is the Protestant Episcopal Theological Seminary in Virginia, opened here in 1823 and chartered in 1854; in 1906-1907 the Seminary had a faculty of 7 and 46 students. Alexandria is a distributing and jobbing centre for the north-east counties of Virginia. Among its manufactures are fertilizers, bottles, carbonated beverages, flour, beer, shoes, silk thread, aprons, brooms, leather, bricks, and tiling and structural iron. The total value of its. factory product in 1905 was $2,186,658. The municipality owns and operates its gas-lighting plant. Alexandria, first known as Belhaven, was named in honour of John Alexander, who in the last quarter of the 17 th century had bought the land on which

the city now stands from Robert Howison; the first settlement here was made in 1695. Alexandria was laid out in 1749 and was incorporated in 1779. From 1790 until 1846 Alexandria county was a part of the District of Columbia; at present the city, although within the limits of Alexandria county, is not administratively a part of it. The city was re-chartered in 1852. For some time Alexandria seemed destined to become an important commercial centre, but the rise of Washington created a rival that soon outstripped it, and since the Civil War the city's growth has been comparatively slight. At Alexandria in 1755 General Edward Braddock organized his fatal expedition against Fort Duquesne, and here, in April of the same year, the governors of Virginia, Massachusetts, New York, Pennsylvania and Maryland met (in a house still standing) to determine upon concerted action against the French in America. In March 1785 commissioners from Virginia and Maryland met here to discuss the commercial relations of the two states, finishing their business at Mount Vernon on the 28th with an agreement for

freedom of trade and freedom of navigation of the Potomac. The Maryland legislature in ratifying this agreement on the 22nd of November proposed a conference between representatives from all the states to consider the adoption of definite com- mercial regulations. This led to the calling of the Annapolis convention of 1786, which in turn led to the calling of the Federal convention of 1787. In 1814 Alexandria was threatened by a British fleet, but bought immunity from attack by paying about $100,000. At the opening of the Civil War the city was occupied by Federal troops, and great excitement throughout the North was caused by the killing (May 24, 1861) of Colonel E. E. Ellsworth (1837-1861) by Captain James W. Jackson, a hotel proprietor, from whose building Ellsworth had removed a Confederate flag. After the erection of the state of West Virginia (1863), and until the close of the war, Alexandria was the seat of what was known as the " Alexandria Government " (see Virginia).

ALEXANDRIAN SCHOOL. Under this title are generally included certain strongly marked tendencies in literature, science and art, which took their rise in the ancient Egyptian city of Alexandria. That city, founded by Alexander the Great about the time when Greece, in losing her national independence, lost also her intellectual supremacy, was in every way admirably adapted for becoming the new centre of the world's activity and thought. Its situation brought it into commercial relations with all the nations lying around the Mediterranean, and at the same time rendered it the one communicating link with the wealth and civilization of the East. The great natural advantages it thus enjoyed were artificially increased to an enormous extent by the care of the sovereigns of Egypt. Ptolemy Soter (reigned 323-285 B.C.), to whom, in the general distribution of Alexander's con- quests, this kingdom had fallen, began to draw around him from various parts of Greece a circle of men eminent in literature and philosophy. To these he gave every facility for the prosecution of their learned researches. Under the inspiration of his friend Demetrius of Phalerum, the Athenian orator, statesman and philosopher, this Ptolemy laid the foundations of the great Alexandrian library and originated the keen search for all written works, which resulted in the formation of a collection such as the world has seldom seen. He also built, for the con- venience of his men of letters, the Museum, in which, maintained by the royal bounty, they resided, studied and taught. This Museum, or academy of science, was in many respects not unlike a modern university. The work thus begun by Ptolemy Soter was carried on

vigorously by his descendants, in particular by his two immediate successors, Ptolemy Philadelphus and Ptolemy Euergetes. Philadelphus (285-247), whose librarian was the celebrated Callimachus, bought up all Aristotle's collection of books, and also introduced a number of Jewish and Egyptian works. Among these appears to have been a portion of the Septuagint. Euergetes (247-222) largely increased the library by seizing on the original editions of the dramatists laid up in the Athenian archives, and by compelling all travellers who arrived in Alexandria to leave a copy of any work they possessed.

The intellectual movement so originated extended over a long period of years. If we date its rise from the 4th century B.C., at the time of the fall of Greece and the foundation of the Graeco-Macedonian empire, we must look for its final dissolution in the 7 th century of the Christian era, at the time of the fall of Alexandria and the rise of the Mahommedan power. But this very long period falls into two divisions. The first, extending from about 306 to 30, includes the time from the foundation of the Ptolemaic dynasty to its final subjugation by the Romans; the second extends from 30 to a.d. 642, when Alexandria was destroyed by the Arabs. The characteristic features of these divisions are very clearly marked, and their difference affords an explanation of the variety and vagueness of meaning attaching to the term " Alexandrian School." In the first of the two periods the intellectual activity was of a purely literary and scientific nature. It was an attempt to continue and develop, under new conditions, the old Hellenic culture. This direction of effort was particularly noticeable under the early Ptolemies, Alexandria being then almost the only home in the world for pure literature. During the last century and a half before the Christian era, the school, as it might be called, began to break up and to lose its individuality. This was due partly to the state of government under some of the later Ptolemies, partly to the formation of new literary circles in Rhodes, Syria and elsewhere, whose supporters, though retaining the Alexandrian peculiarities, could scarcely be included in the Alexandrian school. The loss of active life, consequent on this gradual dissolution, was much increased when Alexandria fell under Roman sway. Then the influence of the school was extended over the whole known world, but men of letters began to concentrate at Rome rather than at Alexandria. In that city, however, there were new forces in operation which produced a second grand outburst of intellectual life. The new movement was not in the old direction — had,

indeed, nothing in common with it. With its character largely determined by Jewish elements, and even more by contact with the dogmas of Christianity, this second Alexandrian school resulted in the speculative philosophy of the Neo-Platonists and the religious philosophy of the Gnostics and early church fathers.

There appear, therefore, to be at least two definite significations of the title Alexandrian School; or rather, there are two Alexandrian schools, distinct both chronologically and in substance. The one is the Alexandrian school of poetry and science, the other the Alexandrian school of philosophy. The term " school," however, has not the same meanine as when applied to the Academics or Peripatetics, the Stoics or Epicureans. These consisted of a company united by holding in common certain speculative principles, by having the same theory of things. There was nothing at all corresponding to this among the Alexandrians. In literature their activities were directed to the most diverse objects; they have only in common a certain spirit or form. There was among them no definite system of philosophy . Even in the later schools of philosophy proper there is found a community rather of tendency than of definite result or of fixed principles.

I. Literature. — The general character of the literature of the school appears as the necessary consequence of the state of affairs brought about by the fall of Greek nationality and independence. The great works of the Greek mind had formerly been the pro- ducts of a fresh life of nature and perfect freedom of thought. All their hymns, epics and histories were bound up with their individuality as a free people. But the Macedonian conquest at Chaeroneia brought about a complete dissolution of this Greek life in all its relations, private and political. The full, genial spirit of Greek thought vanished when freedom, with which it was inseparably united, was lost. A substitute for this originality was found at Alexandria in learned research, extended and multifarious knowledge. Amply provided with means for acquiring information, and under the watchful care of a great monarch, the Alexandrians readily took this new direction in literature. With all the great objects removed which could excite a true spirit of poetry, they devoted themselves to minute researches in all sciences subordinate to literature proper. They

studied criticism, grammar, prosody and metre, antiquities and mythology. The results of this study constantly appear in their productions. Their works are never national, never addressed to a people, but to a circle of learned men. Moreover, the very fact of being under the protection and, as it were, in the pey of an absolute monarch was damaging to the character of their literature. There was introduced into it a courtly element, clear traces of which, with all its accompaniments, are found in the extant works of the school. One other fact, not to be forgotten in forming a general estimate of the literary value of their productions, is, that the same writer was frequently or almost always distinguished in several special sciences. The most renowned poets were at the same time men of culture and science, critics, archaeologists, astronomers or physicians. To such writers the poetical form was merely a convenient vehicle for the exposition of science.

The forms of poetical composition chiefly cultivated by the Alexandrians were epic and lyric, or elegiac. Great epics are wanting; but in their place, as might almost have been expected, are found the historical and the didactic or expository epics. The subjects of the historical epics were generally some of the well-known myths, in the exposition of which the writer could exhibit the full extent of his learning and his perfect command of verse. These poems are in a sense valuable as repertoires of antiquities; but their style is on the whole bad, and infinite patience is required to clear up their numerous and obscure allusions. The best extant specimen is the Argonautica of Apollonius Rhodius; the most characteristic is the Alexandra or Cassandra of Lycophron, the obscurity of which is almost proverbial.

The subjects of didactic epics were very numerous; they seem to have depended on the special knowledge possessed by the writers, who used verse as a form for unfolding their information. Some, e.g. the lost poem of Callimachus, called Atria, were on the origin of myths and religious observances; others were on special sciences. Thus we have two poems of Aratus, who, though not resident at Alexandria, was so thoroughly imbued with the Alexandrian spirit as to be with reason included in the school; the one is an essay on astronomy, the other an account of the signs of the weather. Nicander of Colophon has also left us two epics, one on remedies for poisons, the other on the bites of venomous beasts. Euphorion and Rhianus wrote mythological epics. The spirit of all their productions is the same, that of learned research. They are distinguished by artistic form,

purity of expression and strict attention to the laws of metre and prosody, qualities which, however good in themselves, do not compensate for want of originality, freshness and power.

In their lyric and elegiac poetry there is much worthy of admiration. The specimens we possess are not devoid of talent or of a certain happy art of expression. Yet, for the most part, they either relate to objects thoroughly incapable of poetic treatment, where the writer's endeavour is rather to expound the matter fully than to render it poetically beautiful, or else expend themselves on short isolated subjects, generally myths, and are erotic in character. The earliest of the elegiac poets was Philetas, the sweet singer of Cos. But the most distinguished was Callimachus, undoubtedly the greatest of the Alexandrian poets. Of his numerous works there remain to us only a few hymns, epigrams and fragments of elegies. 1 Other lyric poets were Phanocles, Hermesianax, Alexander of Aetolia and Lycophron.

Some of the best productions of the school were their epigrams. Of these we have several specimens, and the art of composing them seems to have been assiduously cultivated, as might naturally be expected from the court life of the poets, and their constant endeavours after terseness and neatness of expression. Of kindred character were the parodies and satirical poems, of which the best examples were the Silli of Timon and the Cinaedi of Sotades.

1 A considerable fragment of his epic Hecale has been discovered in the Rainer papyrus.

Dramatic poetry appears to have flourished to some extent. There are still extant three or four varying lists of the seven great dramatists who composed the Pleiad of Alexandria. Their works, perhaps not unfortunately, have perished. A ruder kind of drama, the amoebafian verse, or bucolic mime, developed into the only pure stream of genial poetry found in the Alexandrian School, the Idylls of Theocritus. The name of these poems preserves their original idea; they were pictures of fresh country life.

The most interesting fact connected with this Alexandrian poetry is the powerful influence it exercised on Roman literature. That literature, especially in the Augustan age, is not to be thoroughly understood without due appreciation of the character of the Alexandrian school. The historians of this period were numerous and prolific. Many of them, e.g. Cleitarchus, devoted themselves

to the life and achievements of Alexander the Great. The best-known names are those of Timaeus and Polybius.

Before the Alexandrians had begun to produce original works, their researches were directed towards' the masterpieces of ancient Greek literature. If that literature was to be a power in the world, it must be handed down to posterity in a form capable of being understood. This was the task begun and carried out by the Alexandrian critics. These men did not merely collect works, but sought to arrange them, to subject the texts to criticism, and to explain any allusion or reference in them which at a later date might become obscure. The complete philo- logical examination of any work consisted, according to them, of the following processes: — SiopQaxris, arrangement of the text; avayvoxns, settlement of accents; Ttx v V, theory of forms, syntax; kˆyrjcns, explanation either of words or things; and finally, Kp'uns, judgment on the author and his work, including all questions as to authenticity and integrity. To perform their task adequately required from the critics a wide circle of knowledge; and from this requirement sprang the sciences of grammar, prosody, lexicography, mythology and archaeology. The service rendered by these critics is invaluable. To them we owe not merely the possession of the greatest works of Greek intellect, but the possession of them in a readable state. The most celebrated critics were Zenodotus; Aristophanes of Byzan- tium, to whom we owe the theory of Greek accents; Crates of Mallus; and Aristarchus of Samothrace, confessedly the cory- phaeus of criticism. Others were Lycophron, Callimachus, Eratosthenes and many of a later age, for the critical school long survived the literary. Dionysius Thrax, the author of the first scientific Greek grammar, may also be mentioned. These philological labours were of great indirect importance, for they led immediately to the study of the natural sciences, and in particular to a more accurate knowledge of geography andhistbry. Considerable attention began to be paid to the ancient history of Greece, and to all the myths relating to the foundation of states and cities. A large collection of such curious information is con- tained in the Bibliotheca of ApoUodorus, a pupil of Aristarchus who flourished in the 2nd century B.C. Eratosthenes was the first to write on mathematical and physical geography; he also first attempted to draw up a chronological table of the Egyptian kings and of , the historical events of Greece. The sciences of mathematics, astronomy and medicine were also cultivated with assiduity and success at Alexandria, but they can scarcely be said to have their

origin there, or in any strict sense to form a part of the peculiarly Alexandrian literature. The founder of the mathematical school was the celebrated Euclid (Eucleides); among its scholars were Archimedes; Apollonius of Perga, author of a treatise on Conic Sections; Eratosthenes, to whom we owe the first measurement of the earth; and Hipparchus, the founder of the epicyclical theory of the heavens, afterwards called the Ptolemaic system, from its most famous expositor, Claudius Ptolemaeus. Alexandria continued to be celebrated as a school of mathematics and science long after the Christian era. The science of medicine had distinguished representatives in Herophilus and Erasistratus, the two first great anatomists.

Authorities. — Miiller and Donaldson, History of the Literature of Ancient Greece; W. Christ, Geschichte der griechischen LiHeratur \

Mahaffy, Greek Life and Thought from the Age of Alexander to the Roman Empire; Couat, La Poesie alexandrine; and especially Susemihl, Geschichte der griechischen Litteratur in der Alexandrinerzeit. Nicolai's Griechische Liter alur geschichte, though somewhat out of date, is useful for bibliography.

II. Philosophy. — Although it is not possible to divide literatures with absolute rigidity by centuries, and although the intellectual life of Alexandria, particularly as applied to science, long survived the Roman conquest, yet at that period the school, which for some time had been gradually breaking up, seems finally to have succumbed. The later productions in the field of pure literature bear the stamp of Rome rather than of Alexandria. But in that city for some time past there had been various forces secretly working, and these, coming in contact with great spiritual changes in the world around, produced a second outburst of intellectual activity, which is generally known as the Alexandrian school of philosophy. The doctrines of this school were a fusion of Eastern and Western thought, and combined in varying proportions the elements of Hellenistic and Jewish philosophy. Traces of this eclectic tendency are discoverable as far back as 280 B.C., but for practical purposes the dates of the school may be given as from about 30 B.C. to a.d. 529. The city of Alexandria had gradually become the neutral ground of Europe,

Asia and Africa. Its population, then as at the present day, was a heterogeneous collection of all races. Alexander had planted a colony of Jews who had increased in number until at the beginning of the Christian era they occupied two-fifths of the city and held some of the highest offices. The contact of Jewish theology with Greek speculation became the great problem of thought. The Jewish ideas of divine authority and their transcendental theories of conduct were peculiarly attractive to the Greek thinkers who found no inspiration in the dry intellectualism into which they had fallen (see Neo-Pythagoreanism) . At the same time the Jews of the Dispersion had to some extent shaken off the exclusiveness of their old political relations and were prepared to compare and contrast their old territorial theology with cosmopolitan culture. Further, when the two sides came to consider the results of their intellectual inheritance they found that they had sufficient common ground for the initial compromise. Thus the Hellenistic doctrine of personal revelation could be combined with the Jewish tradition of a complete theology revealed to a special people. The result was the application of a purely philosophical system to the somewhat vague and unorganized corpus of Jewish theology. The matter was Jewish, the arrangement Greek. According to the relative predominance of these two elements arose Gnosticism, the Patristic theology, and the philosophical schools of Neo-Pythagoreanism, Neo-Platonism and eclectic Platonism.

The members of the school may be enumerated under three heads. (1) The beginnings of the eclectic spirit are, according to some authorities, discernible in the Septuagint (280 B.C.) (see Frankel, Historisch-kritische Studienzur Septuaginta, 1841), but the first concrete exemplification is found in Aristobulus (c. 160 b.c). So far as the Jewish succession is concerned, the great name is that of Philo in the first century of our era. He took Greek metaphysical theories, and, by the allegorical method, interpreted them in accordance with the Jewish Revelation. He dealt with (a) human life as explained by the relative nature of Man and God, (6) the Divine nature and the existence of God, and, (c) the great Logos doctrine as the explanation of the relation between God and the material universe. From these three arguments he developed an elaborate theosophy which was a syncretism of oriental mysticism and pure Greek metaphysic, and may be regarded as, representing the climax of Jewish philosophy. (2) The first purely philosophical phenomenon of the Alexandrian school was Neo-Pythagoreanism, the second and last

Neo-Platonism. Leaving all detailed descriptions of these schools to special articles.devoted to them, it is sufficient here to say that their doctrines were a synthesis of Platonism, Stoicism and the later Aristotelianism with a leaven of oriental mysticism which gradually became more and more important. The world to which they spoke had begun to demand a doctrine of salvation to satisfy the human soul. They endeavoured to deal with the

problem of good and evil. They therefore devoted themselves to examining the nature of the soul, and taught that its freedom consists in communion with God, to be achieved by absorption in a sort of ecstatic trance. This doctrine reaches its height in Plotinus, after whom it degenerated into magic and theurgy in its unsuccessful combat with the victorious Christianity. Finally this pagan theosophy was driven from Alexandria back to Athens under Plutarch and Proclus, and occupied itself largely in purely historical work based mainly on the attempt to re-organize ancient philosophy in conformity with the system of Plotinus. This school ended under Damascius when Justinian closed the Athenian schools (a.d. 529). (3) The eddies of Neo-Platonism had a considerable effect on certain Christian thinkers about the beginning of the 3rd century. Among these the most important were Clement of Alexandria and Origen. Clement, as a scholar arid a theologian, proposed to unite the mysticism of Neo-Platonism with the practical spirit of Christianity. He combined the principle of pure living with that of free thinking, and held that instruction must have regard to the mental capacity of the hearer. The compatibility of Christian and later Neo-Platonic ideas is evidenced by the writings of Synesius, bishop of Ptolemais, and though Neo-Platonism eventually succumbed to Christianity, it had the effect, through the writings of Clement and Origen, of modifying the tyrannical fanaticism and ultra-dogmatism of the early Christian writers.

Authorities. — Matter, Histoire de I'ecole d'Alexandrie, 2nd ed. (3 vols., 1840-1844); Simon, Histoire de I'ecole d'Alexandrie (2 vols., 1844-1845); Vacherot, Histoire critique de I'ecole d'Alexandrie (3 vols., 1846-1851); Kingsley, Alexandria and her Schools (1854); Gfrorer, Philo und die Alexandrinische Theosqphie (1835); Dahne, Geschicht. Darstellung der Judisch-Alexandrinischen Religionsphilo- sophie (1834); Histories of Philosophy by Zeller, Ueberweg, Windel- band, &c, and Bibliography of Church History, &c.

ALEXANDRIA TROAS (mod. Eski Stambul) , an ancient Greek city

of the Troad, situated on the west coast at nearly its middle point, a little south of Tenedos. It was built by Antigonus, perhaps about 310 B.C., and was called by him Antigonia Troas. Early in the next century the name was changed by Lysimachus to Alexandria Troas, in honour of Alexander's memory. As the chief port of north-west Asia Minor, the place prospered greatly in Roman times, and the existing remains sufficiently attest its former importance. Thence St Paul sailed for Europe for the first time, and there occurred later the episode of the raising of Eutychus (Acts xx. 5-12). The site is now covered with valonia oaks, and has been much plundered, e.g by Mahommed IV., who took columns to adorn his new Valideh mosque in Stambul; but the circuit of the old walls can be traced, and in several places they are fairly well preserved. They had a circumference of about six English miles, and were fortified with towers at regular intervals. Remains of some ancient buildings, including a bath and gymnasium, can be traced within this area. Trajan built an aqueduct which can still be traced. The harbour had two large basins, now almost choked with sand. A Roman colony was sent to the place, as Strabo mentions, in the reign of Augustus. The abridged name "Troas" (Acts xvi. 8) was probably the current one in later Roman times. (D. G. H.)

ALEXANDRINE VERSE, a name given to the leading measure in French poetry. It is the heroic French verse, used in epic narrative, in tragedy and in the higher comedy. There is some doubt as to the origin of the name; but most probably it is derived from a collection of romances, collected in the 12 th century, of which Alexander of Macedon was the hero, and in which he was represented, somewhat like the British Arthur, as the pride and crown of chivalry. Before the publication of this work most of the trouvere romances appeared in octosyllabic verse. There is also a theory that the form was invented by a poet named Alexander. The new work, which was henceforth to set the fashion to French literature, was written in lines of twelve syllables,' but with a freedom of pause which was after- wards greatly curtailed. The new fashion, however, was not adopted all at once. The metre' fell into disuse until the reign of Francis I., when it was revived by Jean Antoine de Baif, one of the seven poets known as the Pleiades. Jodelle mingled

episodical Alexandrines with the vers communs of his tragedies and so introduced them into drama. It wa,s Ronsard, however, who made the verse popular, and gave it vogue in France. From his time it became the recognized vehicle for all great poetry, and the regulation of its pauses became more and more strict. The following is an example of the verse as used by Racine —

Ou suis-je ? qu'ai-je fait ? || que dois-je faire encore ?

Quel transport me saisit ? I! quel chagrin me devore ?

Two inexorable laws came to be established with regard to the pauses. The first is, that each line should be divided into two equal parts, the sixth, syllable always ending with a word. In the earlier use of this metre, on the contrary, it frequently happened that the sixth and seventh syllables belonged to the same word. The other is that, except under the most stringent conditions, there should be none of what the French critics call enjambement, that is, the overlapping of the sense from one line on to the next. Ronsard completely ignored this rule, which was after his time settled by the authority of Malherbe. The latest school of French prosody has given great attention to the breaking up of the Alexandrine, which no longer possesses the rigidity of authoritative form which it held until about 1880, but is often used with a licence no less than when Ronsard wrote. Michael Drayton, who was twenty-two years of age when Ronsard died, seemed to think that the Alexandrine might be as pleasing to English as it was to French ears, and in this metre he wrote a long poem in twenty-four books called the Polyolbion. The metre, however, failed to catch the English ear. The principal English measure is a line of ten syllables, and the Alexandrine is used only occasionally to give it variety and weight. In ordinary English heroic verse it is but rarely intro- duced; but in the favourite narrative metre, known as the Spenserian, it comes in regularly as the concluding line of each stanza. In English usage, moreover, it is to be observed that there is no fixed rule as to the position of the pause, though it is true that most commonly the pause occurs at the end of the sixth syllable. Spenser is very free in shifting the pause about; and though the later poets who have used this stanza are not so free, yet, with the exception of Shenstone and of Byron, they do not scruple to obliterate all pause between the sixth and seventh syllables. Thus Thomson {Castle of Indolence, i. 42) : — And music lent new gladness to the morning air.

The danger in the use of the Alexandrine is that, in attempting to give dignity to his line, the poet may only produce heaviness, incurring the sneer of Pope —

A needless Alexandrine ends the song,

That, like a wounded snake, drags its slow length along.

The Alexandrine was the dominant metre in Dutch poetry from the 16th to the middle of the 10th century, and about the time of its introduction to Holland it was accepted in Germany by the school of Opitz. In the course of the 17th century, after being used without rhyme by Seckendorf and others, it formed a transitional station on the route to German blank verse, and has since then been rarely employed, except occasionally in rhymed comedy.

ALEXANDRISTS, the name given to those philosophers of the Renaissance, who, in the great controversy on the subject of personal immortality, adopted the explanation of the De Anitna given by Alexander of Aphrodisias. According to the orthodox Thomism of the Roman Catholic Church, Aristotle rightly regarded reason as a faculty of the individual soul. Against this, the Averroists, led by Agostino Nifo (q.v.), introduced the modifying theory that universal reason in a sense individualizes itself in each soul and then absorbs the active reason into itself again. These two theories respectively evolved the doctrine of individual and universal immortality, or the absorption of the individual into the eternal One. The Alexandrists, led by Pietro Pomponazzi, boldly assailed these beliefs and denied that either was rightly attributed to Aristotle. They held that Aristotle considered the soul as a material and therefore a mortal entity which operates during life only under the authority of universal reason. Hence the Alexandrists denied the possi-

bility of immortality in every shape or form. Since the soul is organically connected with the body, the dissolution of the latter involves the extinction of the former.

ALEXANDRITE, a variety of chrysoberyl (q.v.) discovered in the Urals in 1833, on the day set apart for celebrating the majority of the cesarevich, afterwards the tsar, Alexander II., in whose honour the stone was named by Nils Gustaf Nordenskiold, of Helsingfors. It is remarkable for being strongly dichroic, generally appearing dark green by daylight and raspberry-red by

candle-light, or by daylight transmitted through the stone. As red and green are the military colours of Russia, the mineral became highly popular as a gem-stone. The dark green crystals are usually cloudy and cracked, and grouped in triplets presenting a pseudo-hexagonal form. Alexandrite was found originally in the emerald- mine of Takovaya, east of Ekaterinburg in the Urals, and afterwards in the gold-bearing sands of the Sanarka in the southern Urals. Subsequently it was discovered in greater abundance in the gem-gravels of Ceylon. It has been found also in Tasmania. Some, of the Ceylon alexandrite exhibits, when suitably cut, the Cat's-eye chatoyance, whence it has been called alexandrite cat's-eye. (F. W. R.*)

ALEXANDROPOL, or Alexandrapol. (Turk. Gumri), a Russian town and fortified camp in Transcaucasia, government of Erivan, near the junction of the Arpa-chai with the Aras, 48 m. by rail E.N.E. of Kars. Altitude 5080 ft. It has a trade in silk. Here the Russians defeated the Turks in 1853. Pop.

(1885) 22,670; (1897)32,735.

ALEXANDROVSK. (1) A town of N. Russia, in the govern- ment of Archangel, on the harbour of Catherine (Ekaterininsk) , on the Murman coast, 5 m. from the mouth of Kola Bay. It was opened in 1.890 and is a naval station, being free from ice all the year round. It is also, called Port Catherine. Pop. (1901) 300. (2) A town of S. Russia, 83 m. S. of Ekaterinoslav, on the railway to the Crimea, near the left bank of the Dnieper, below its rapids. Pop. (1897) 16,393. Opposite it is the island of Khortitsa, upon which was the sick (or syeck) or camp of theZaporozhianCossacks. All its neighbourhood is strewn with kurgans (tumuli).

ALEXIS, Greek 'comic poet of the Middle Comedy, was born about 394 B.C. at Thurii and taken early to Athens, where he became a citizen. Plutarch says that he lived to the age of 106, and that he died on the stage while being crowned. According to Suidas, who calls him Menander's uncle, he wrote 245 comedies, of which some 130 titles are preserved. The fragments (about 1000 lines) attest the wit and refinement of the author (Koch, Comicorum Atticorum Fragmenta).

ALEXIS, WILLIBALD, the pseudonym of Georg Wilhelm Heinrich Haring (1798-1871), German historical novelist. He was born on the 29th of June 1798 at Breslau, where his father, who came of a French refugee family, named Hareng, held a high position in the

war department. He attended the Werdersche Gymnasium in Berlin, and then, serving as a volunteer in the campaign of 1815, took part in the siege of the Ardenne fortresses. On his return he studied law at the universities of Berlin and Breslau and entered the legal profession, but he soon abandoned this career and devoted himself to literature. Settling in Berlin he edited, 1827-1835, the Berliner Konversa- tionsblatt, in which for the first two years he was assisted by Friedrich Christoph porster (1791-1868); and in 1828 was created a doctor of philosophy by the university of Halle. In 1852 he retired to Arnstadt in Thuringia, where after many years of broken health he died on the 16th of December 1871.

Haring made his name first known as a writer by an idyll in hexameters, Die Treibjagd (1820), and several short stories in which the influence of Tieck is observable; but his literary reputation was first established by the historical romance Walladmor (1823), which, published.as being " freely translated from the English of Sir Walter Scott, with a preface by Willibald Alexis," so closely imitated the style of the famous Scotsman as really to deceive even Scott's admirers. The work became

immediately popular and was translated into several languages, including English. It was followed by Sckloss Avalon (1827), with regard to which the author adopted the same tactics and with equal success. These historical novels, however, were of considerable literary merit, and would doubtless have achieved popularity even without the borrowed plumage. Soon after- wards Haring published a number of successful short stories {Gesammelte Novellen, 4 vols., 1830-1831), some books of travel, and in the novels Das Haus Dusterweg (1835) and Zwolf Ndchte (1838) showed for a while a leaning towards the " Young German " school. In Cabanis (1832), however, a story of the time of Frederick the Great, he entered the field of patriotic- historical romance, in which he so far excelled as to have earned the name of " der Markische Walter Scott " (Walter Scott of the Mark). From 1840 onwards he published at short intervals a series of romances, each dealing with some epoch in the history of Brandenburg. Among them may be especially noted Der Roland von Berlin (1840), Der falsche Woldemar (1842), Die Hosen des Herm von Bredow (1846-1848), Ruhe ist die erste BUrgerpflicht

(1852), Isegrimm (1854) and Dorothe (1856). In all these the author shows himself as a keen observer of men and things; the characters, situations and natural surroundings are excellently delineated, and the patriotic feeling which per- vades them is not overdone. Haring also made a name for himself in the field of criminology by commencing in 1842, in conjunction with the publicist, Julius Eduard Hitzig (1780- 1849), the publication of Der neue Pitaval (continued by A. Vollert, 36 vols., Leipzig, 1842-1865; new edition, 24 vols., Leipzig, 1866-1891), a collection of criminal anecdotes culled from all nations and all times. This publication attained great popularity, and is to-day of psychological interest and value.

His Gesammelte Werke were published in 20 volumes (Berlin, 1874) ; the Vaierldndische Romane separately in 8 volumes (Berlin, 1881, 1884), and, since the expiry of the copyright in 1901, in many cheap reprints. Cp. W. Alexis' Erinnerungen, edited by M. Ewert (1900), and essays by Julian Schmidt {Neue Bilder aus dem geistigen Leben unsrer Zeit, 1873), G. Freytag {Werke, vols. 16 and 23), A. Stern {Zur Literatur der Gegenwart, 1880) and T. Fontane (in Bayreuther Blatter, vi., 1883).

ALEXISBAD, a spa of Germany, in the duchy of Anhalt, lying under the Harz mountains, 1000 ft. above the sea, on the railway from Gernrode to Harzgerode. Pop. 1000. It is cele- brated for its medicinal waters, of which the Alexisbrunnen, a ferruginous spring, is used for drinking, while the Selkebrunnen supplies the baths, which are of use in feminine disorders. The place was founded in 18 10 by Duke Alexius of Anhalt-Bemburg.

ALEXIUS I. (1048-1118), emperor of the East, was the third son of John Comnenus, nephew of Isaac Comnenus, emperor 1057-1059. His father declined the throne on the abdication of Isaac, who was accordingly succeeded by four emperors of other families between that date and 108 1. Under one of these emperors, Romanus Diogenes (1067-1071), he served with dis- tinction against the Seljuk Turks. Under Michael Parapinaces (1071-1078) and Nicephorus Botaniates (1078-1081) he was also employed, along with his elder brother Isaac, against rebels in Asia Minor, Thrace and in Epirus (1071). The success of the Comneni roused the jealousy of Botaniates and his ministers, and the Comneni were almost compelled to take up arms in self- defence. Botaniates was forced to abdicate and retire to a monastery, and Isaac declined the crown in favour of his- younger brother Alexius, who then became emperor in the 33rd year of his age.

His long reign of nearly 37 years was full of difficulties (see Roman Empire, Later). At the very outset he had to meet the formidable attack of the Normans (Robert Guiscard and his son Bohemund), who took Dyrrhachium and Corfu, and laid siege to Larissa in Thessaly. The Norman danger ended for the time with Robert Guiscard's death (1085) and the conquests were recovered. He had next to repel the invasions of Patzinaks (Petchenegs) and Kumans in Thrace, with whom the Manichaean sects of the Paulicians and Bogomilians made common cause; and thirdly, he had to cope with the fast-growing power of the Turks in Asia Minor. Above all he had to meet the difficulties caused by the arrival of the warriors of the First Crusade, which

had been in a gr-eat degree initiated owing to the representations of his own ambassadors, though the help which he wanted from the West was simply mercenary forces and not the immense hosts which arrived to his consternation and embarrassment. The first part, under Peter the Hermit, he got rid of by sending them on to Asia Minor, where they were massacred by the Turks (1096). The second and much more serious host of warriors, led by Godfrey of Bouillon, he conducted also into Asia, promising to supply them with provisions in return for an oath of homage, and by their victories recovered for the Empire a number of important cities and islands — Nicaea, Chios', Rhodes, Smyrna, Ephesus, Philadelphia, Sardis, and in fact most of Asia Minor (1097-1099). This is ascribed as a credit to his policy and diplomacy by his daughter, by the Latin historians of the crusade to his treachery and falseness, but during the last twenty years of his life he lost much of his popularity. They were marked by persecution of the followers of the Paulician and Bogomilian heresies (one of his last acts was to burn Basilius, a Bogomilian leader, with whom he had engaged in a theological controversy), by renewed struggles with the Turks (1110-1117), by anxieties as to the succession, which his wife Irene wished to alter in favour of her daughter Anne's husband, Nicephorus Bryennius for whose benefit the special title panhypersebastos {i.e. as it were augustissimus si quis alius) was created. This intrigue disturbed even his dying hours. He deserves the credit of having raised the Empire from a condition of anarchy and decay at a time when it was threatened on all sides by new dangers. No emperor devoted himself more laboriously or with a greater sense of duty to the task of ruling.

Authorities. — Zonaras xviii. 27-29; Anna Comnena's Life; see also Du Cange, Familiae Byzantinae; Friedrich Wilken, Rerum ab Alexia I., Joanne, Manuele et Alexio II. Comnenis Romanorum, Byzantinorum imperatoribus gestarum, libri iv. Commentatio (Heidel- berg, 181 1); Finlay, History of Greece (vol. iii., Oxford, 1877); Gibbon, Decline and Fall of the Roman Empire, edited with notes, &c, by Prof. J. B. Bury (London, 1898), where further authorities are cited; F. Chalandon, Essai sur le regne d' Alexis I" Comnene (1900). (J. B. B.)

ALEXIUS II. (Comnenus) (1167-1183), emperor of the East, was the son of Manuel Comnenus and Maria, daughter of Raymund, prince of Antioch, and was born at Constantinople on the 10th of September 1 167. On Manuel's death, Maria, who had been immured in a convent under the name of Xene, had herself proclaimed regent (1179-1180), and handing over her son to evil counsellors, who encouraged him in every vice, supported the government of Alexius the protosebastos (nephew of Manuel) , who was supposed to be her lover. The young Alexius and his friends now tried to form a party against the empress mother and the protosebastos; and his sister Maria, wife of Caesar John, stirred up riots in the streets of the capital. Their party was defeated(May 2,1182) ,but Andronicus Comnenus took advantage of these disorders to aim at the crown, entered Constantinople, where he was received with almost divine honours, and overthrew the regents. His arrival was celebrated by a barbarous massacre of the Latins in Constantinople, which he made no attempt to stop. He allowed Alexius to be crowned, but forced him to consent to the death of all his friends, including his mother, his sister and the Caesar, and refused to allow him the smallest voice in public affairs. The betrothal in 1 180 of Alexius with Agnes, daughter of Louis VII. of France, a child of nine, was quashed, and he was married to Irene, daughter of Andronicus. The latter was now formally pro- claimed as co-emperor, and not long afterwards, on the pretext that divided rule was injurious to the Empire, he caused Alexius to be strangled with a bow-string (October 1183). (J. B. B.)

ALEXIUS III. (Angelus), emperor of the East, was the second son of Andronicus Angelus, nephew of Alexius I. In 1195, while his brother Isaac II. was away hunting in Thrace, he was pro- claimed emperor by the troops; he captured Isaac at Stagira in Macedonia, put out his eyes, and kept him henceforth a close prisoner, though he had been redeemed by him from captivity at Antioch and loaded with honours. To compensate for this crime

and to confirm his position as emperor, he had to scatter money

so lavishly as to empty his treasury, and to allow such, licence to the officers of the army as to leave the Empire practically defenceless. He consummated the financial ruin of the state. The empress Euphrosyne tried in vain to sustain his credit and his court; Vatatzes, the favourite instrument of her attempts at reform, was assassinated by the emperor's orders. Eastward the Empire was overrun by the Turks; from the north Bulgarians and Vlachs descended unchecked to ravage the plains of Macedonia and Thrace; while Alexius squandered the public treasure on his palaces and gardens. Soon he was threatened by a new and yet more formidable danger. In 1202 the Western princes assembled at Venice, bent on a new crusade. To them Alexius, son of the deposed Isaac, made appeal, promising as a crowning bribe to heal the schism of East and West if they would help him to depose his uncle. The crusaders, whose objective had been Egypt, were persuaded to set their course for Constanti- nople, before which they appeared in June 1203, proclaiming the emperor Alexius IV. and summoning the capital to depose his uncle. Alexius III., sunk in debauchery, took no efficient measures to resist. His son-in-law, Lascaris, who was the only one to do anything, was defeated at Scutari, and the siege of Constantinople began. On the 17 th of July the crusaders, the aged doge Dandolo at their head, scaled the walls and took the city by storm. During the fighting and carnage that followed Alexius hid in the palace, and finally, with one of his daughters, Irene, and such treasures as he could collect, got into a boat and escaped to Develton in Thrace, leaving his wife, his other daughters and his Empire to the victors. Isaac, drawn from his prison and robed once more in the imperial purple, received his son in state.

Shortly afterwards Alexius made an effort in conjunction with Murtzuphlos (Alexius V.) to recover the throne. The attempt was unsuccessful and, after wandering about Greece, he sur- rendered with Euphrosyne, who had meanwhile joined him, to Boniface of Montferrat, then master of a great part of the Balkan peninsula. Leaving his protection he sought shelter with Michael, despot of Epirus, and then repaired to Asia Minor, where his son-in-law Lascaris was holding his own against the Latins. Alexius, joined

by the sultan of Iconium (Konieh), now demanded the crown of Lascaris, and on his refusal marched against him. Lascaris, however, defeated and took him prisoner. Alexius was relegated to a monastery at Nicaea, where he died on some date unknown.

Authorities. — Nicetas Acominatus, George Acropolites, Nicephorus Gregoras; and the sources for the Fourth Crusade (see Crusades). (J. B. B.)

ALEXIUS V., eastern Roman emperor, was proclaimed emperor on the 5th of February 1204, during the siege of Constantinople by the Latins (Fourth Crusade). His name was Alexius Ducas Murtzuphlos, and he was a connexion of the imperial house of the Angeli. His elevation was the result of a revolution in the city against Isaac II. and Alexius IV. He conducted the defence with great bravery till it became hope- less (April 12), whereupon he fled. He would then have made common cause with Alexius III. against the Latins, but was blinded by that ex-monarch and fell into the hands of the crusaders, who put him to death by casting him from the top of the Pillar of Theodosius as the murderer of Alexius IV.

ALEXIUS MIKHAILOVICH (1629-1676), tsar of Muscovy, the son of Tsar Michael Romanov and Eudoxia Stryeshnevaya, was born on the oth of March 1629. A youth at his father's death (1645), he was committed to the care of the boyarin Boris Ivanovich Morozov, a shrewd and sensible guardian, sufficiently enlightened to recognize the needs of his country, and by no means inaccessible to Western ideas. Morozov's foreign policy was pacificatory. He secured the truce with Poland and carefully avoided complications with the Porte. His domestic policy was severely equitable, and aimed at relieving the public burdens by limiting the privileges of foreign traders and abolishing a great many useless and expensive court offices. On the 1 7th of January 1648 he procured the marriage of the tsar with Maria Miloslav- skaya, himself marrying her sister, Anna, ten days later. The

Miloslavskis were typical self-seeking 17th century boyars, whose extortions made them generally detested. In May 1648 the people of Moscow rose against them, and the young tsar was compelled to dismiss both them and their patron Morozov. The successful issue of the Moscow riots was the occasion of disquiet- ing disturbances all over the tsardom culminating in dangerous rebellions at Pskov and Great Novgorod, with which the govern-

ment was so unable to cope that they surrendered, practically granting the malcontents their own terms. One man only had displayed equal tact and courage at Great Novgorod, the metropolitan Nikon (q.v.), who in consequence became in 1651 the tsar's chief minister. In 1653 the weakness and disorder of Poland, which had just emerged, bleeding at every pore, from the savage Cossack war, encouraged Alexius to attempt to recover from her secular rival the old Russian lands. On the 1st of October 1653 a national assembly met at Moscow to sanction the war and find the means of carrying it on, and in April 1654 the army was blessed by Nikon (now patriarch) . The campaign of 1654 was an uninterrupted triumph, and scores of towns, including the important fortress of Smolensk, fell into the hands of the Muscovites. In January 1655 the rout of Ochmatov arrested their progress; but in the summer of the same year, the sudden invasion by Charles X. of Sweden for the moment swept the Polish state out of existence; the Muscovites, unopposed, quickly appropriated nearly everything which was not already occupied by the Swedes, and when at last the Poles offered to negotiate, the whole grand-duchy of Lithuania was the least of the demands of Alexius. Fortunately for Poland, the tsar and the king of Sweden now quarrelled over the apportionment of the spoil, and at the end of May 1656 Alexius, stimulated by the emperor and the other enemies of Sweden, declared war against her. Great things were expected of the Swedish war, but nothing came of it. Dorpat was taken, but countless multitudes were lost in vain before Riga. In the meantime Poland had so far recovered herself as to become a much more dangerous foe than Sweden, and, as it was impossible to wage war with both simultaneously, the tsar resolved to rid himself of the Swedes first. This he did by the peace of Kardis (July 2, 1661), whereby Muscovy retroceded all her conquests. The Polish war dragged on for six years longer and was then concluded by a truce, nominally for thirteen years, which proved the most durable of treaties. By the truce of Andrussowo (February n, 1667) Vitebsk, Polotsk and Polish Livonia were restored to Poland, but the infinitely more important Smolensk and Kiev remained in the hands of the Muscovite together with the whole eastern bank of the Dnieper. This truce was the achievement of Athanasy Orduin-Nashchokin, the first Russian chancellor and diplomatist in the modern sense, who after the disgrace of Nikon became the tsar's first minister till 1670, when he was super- seded by the equally able Artamon Matvyeev, whose beneficent influence prevailed to the end of the reign. It is the crowning merit of the ever amiable and courteous

tsar Alexius that he discovered so many great men (like Nikon, Orduin, Matvyeev, the best of Peter's precursors) and suitably employed them. He was not a man of superior strength of character, or he would never have submitted to the dictation of Nikon. But, on the other hand, he was naturally, if timorously, progressive, or he would never have encouraged the great reforming boyarin Matvyeev. His education was necessarily narrow; yet he was learned in his way, wrote verses, and even began a history of his own times. His last years, notwithstanding the terrible rebellion of Stenka Razin, were deservedly tranquil. By his first consort he had thirteen children, of whom two sickly sons and eight healthy daughters survived him. By his second consort, Natalia Naruishkina, he had two children, the tsarevich Peter and the tsarevna Natalia. See Robert Nisbet Bain, The First Romanovs (London, i9°5);

ALEXIUS PETROVICH (1690-1718), Russian tsarevich, the sole surviving son of Peter I. and Eudoxia Lopukhina, was born on the 19th of February 1690. The young tsar married the boyarinya Lopukhina at his mother's command. We know

nothing of the bride except that she was beautiful, modest and " brought up in the fear of the Lord." She would, doubtless, have made a model tsaritsa of the pre-Petrine period, but, unfortunately, she was no fit wife for such a vagabond of genius as Peter the Great. From the first her society bored Peter unspeakably, and, after the birth of their second short-lived son Alexander, on the 3rd of October 1691, he practically deserted her. The young Alexius was ignored by his father till he was nine years old. Peter was a rare and unwelcome guest in his own family, and a son who loved his mother could have little affection for a father who had ever been that mother's worst persecutor. From his sixth to his ninth year Alexius was educated by the diffuse and pedantic Vyazemsky, but after the removal of his mother to the Suzdal Prokovsky Monastery he was confided to the care of learned foreigners, who taught him history, geography, mathematics and French. In 1703 Alexius was ordered to follow the army to the field as a private in a bombardier regiment. In 1704 he was present at the capture of Narva. At this period the preceptors of the tsarevich had the highest opinion of his ability; but, unfortunately, it was not the

sort of ability that his father could make use of. He was essentially a student, with strong leanings towards archaeology and ecclesiology. A monastic library was the proper place for this gentle emotional dreamer, who clung so fondly to the ancient traditions. To a prince of his temperament the vehement activity of his ab- normally energetic father was very offensive. He liked neither the labour itself nor its object. Yet Peter, not unnaturally, wished his heir to dedicate himself to the service of new Russia, and demanded from him unceasing labour in order to maintain the brand-new state at the high level of greatness to which it had been raised. Painful relations between father and son, quite apart from the personal antipathies already existing, were there- fore inevitable. It was an additional misfortune for Alexius that his father should have been too busy to attend to him just as he was growing up from boyhood to manhood. He was left in the hands of reactionary boyars and priests, who encouraged him to hate his father and wish for the death of the tsar-antichrist. His confessor, Yakov Ignatiev, whom he promised to obey as ” an angel and apostle of God,” was his chief counsellor in these days. In 1708 Peter sent Alexius to Smolensk to collect provenderand recruits, and thence to Moscow to fortify it against Charles XII. At the end of 1709 he went to Dresden for twelve months for finishing lessons in French and German, mathematics and fortification, and, his education completed, he was married, greatly against his will, to the princess Charlotte of Brunswick – Wolfenbiittel, whose sister espoused, almost simultaneously, the heir to the Austrian throne, the archduke Charles. The wedding was celebrated at Torgau on the 14th of October 171 1, in the house of the queen ; of Poland, and three weeks later the bridegroom was hurried away by his father to Thorn to super- intend the provisioning of the Russian troops in Poland. For the next twelve months Alexius was kept constantly on the move. His wife joined him at Thorn in December, but in April 17 12 a peremptory ukaz ordered him off to the army inPomerania, and in the autumn of the same year he was forced to accompany his father on a tour of inspection through Finland. Evidently Peter was determined to tear his son away from a life of indolent ease. Immediately on his return from Finland Alexius was despatched by his father to Staraya Rusya and Ladoga to see to the building of new ships. This was the last commission entrusted to him. On his return to the capital Peter, in order to see what progress his son had made in mechanics and mathe- matics, asked him to draw something of a technical nature for his inspection. Alexius, in order to escape such an ordeal, resorted to the abject

expedient of disabling his right hand by a pistol-shot. In no other way could the tsarevich have offended his father so deeply. He had behaved like a cowardly recruit who mutilates himself to escape military service. After this, Peter seemed for a time to take no further interest in Alexius. He left him entirely to himself. He employed him no more. He no longer pressed him to attend public functions. Alexius rejoiced at this welcome change, but he had cause rather to fear

it. It marked the deepening of a hatred which might have been overcome. Alexius was evidently consoling himself with the reflexion that the future belonged to him. He was well aware that the mass of the Russian nation was on his side. ‘ Nearly all the prelates were devoted to him. Equally friendly were the great boyar families. All Alexius had to do was to sit still, keep out of his father’s way as much as possible and await the natural course of events. But with Peter the present was every- thing. He could not afford to leave anything to chance. AH his life long he had been working incessantly with a single object — the regeneration of Russia. What if his successor refused to tread in his father’s footsteps or, still worse, tried to destroy his father’s work? By some such process of reasoning as this must the idea of changing the succession to the throne, by setting aside Alexius-, have first occurred to the mind of Peter the Great. Nevertheless he made one last effort to reclaim his son. On the 22nd of October 17 15 Alexius’ consort, the princess Charlotte, died, after giving birth to a son, the grand-duke Peter, afterwards Peter II. On the day of the funeral Peter addressed to Alexius a stern letter of warning and remonstrance, urging him no longer to resemble the slothful servant in the parable, and threatening to cut him off, as though he were a gangrenous swelling, if he did not acquiesce in his father’s plans. But it was now that Alexius showed what a poor creature he really was. He wrote a pitiful reply to his father, offering to renounce the succession in favour of his baby half-brother Peter, who had been born the day after the princess Charlotte’s funeral. As if this were not enough, in January 1716 he wrote to his father for permission to become a monk. Still Peter did not despair. On the 26th of August 17 16 he wrote to Alexius from abroad urging him, if he desired to remain tsarevich, to join him and the army without delay. Rather than face this ordeal Alexius fled to Vienna and placed himself under the protection of his brother-in-law, the emperor Charles VI., who sent him for safety first to the Tirolean fortress of Ahrenberg, and finally to the castle of San Elmo at Naples. He

was accompanied throughout his journey by his mistress, the Finnish girl Afrosina. That the emperor sincerely sympathized with Alexius, and suspected Peter of harbouring murderous designs against his son, is plain from his confidential letter to George I. of England, whom he consulted on this delicate affair. Peter's agitation was extreme. The flight of the tsarevich to a foreign potentate was a reproach and a scandal. He must be recovered and brought back to Russia at all hazards. This difficult task was accomplished by Count Peter Tolstoi, the most subtle and unscrupulous of Peter's servants; but terrorized though he was, Alexius would only consent to return on his father solemnly swearing, " before God and His judgment seat," that if he came back he should not be punished in the least, but cherished as a son and allowed to live quietly on his estates and marry Afrosina. On the 31st of January 17 18 the tsarevich reached Moscow. Peter had already determined to institute a most searching inquisition in order to get at the bottom of the mystery of the flight. On the 18th of February a " confession " was extorted from Alexius which implicated most of his friends, and he then publicly renounced the succession to the throne in favour of the baby grand-duke Peter Petrovich. A horrible reign of terror ensued, in the course of which the ex-tsaritsa Eudoxia was dragged from her monastery and publicly tried for alleged adultery, while all who had in any way befriended Alexius were impaled, broken on the wheel and otherwise lingeringly done to death. All this was done to terrorize the reactionaries and isolate the tsarevich. In April 1718 fresh confessions were extorted from Alexius, now utterly broken and half idiotic with fright. Yet even now there were no actual facts to go upon. Alexius' " evil designs " were still in foro conscientiae, and had not been, perhaps never would be, translated into practice. The worst that could be brought against him was that he had wished his father's death. In the eyes of Peter, his son was now a self -convicted and most dangerous traitor, whose life was forfeit. But there was no getting over the fact that his father had sworn " before the Almighty and His judgment seat " to pardon him and let him live in peace if he returned to Russia. From Peter's

point of view the question was, did the enormity of the tsarevich's crime absolve the tsar from the oath which he had taken to spare the life of this prodigal son? This question was solemnly

submitted to a grand council of prelates, senators, ministers and other dignitaries on the 13 th of June 17 18. The clergy left the matter to the tsar's own decision. The temporal dignitaries declared the evidence to be insufficient and suggested that Alexius should be examined by torture. Accordingly, on the 19th of June, the weak and ailing tsarevich received twenty- five strokes with the knout (as then administered nobody ever survived thirty), and on the 24th fifteen more. It was hardly possible that he could survive such treatment; the natural inference is that he was not intended to survive it. Anyway, he expired two days later in the guardhouse of the citadel of St Petersburg, two days after the senate had condemned him to death for imagining rebellion against his father, and for hoping for the co-operation of the common people and the armed intervention of his brother-in-law, the emperor. This shameful sentence was the outcome of mingled terror and obsequiousness. Abominable, unnatural as Peter's conduct to hi's unhappy and innocent son undoubtedly was, there is no reason to suppose that he ever regretted it. He argued that a single worthless life stood in Russia's way, and he therefore removed it. See R. N. Bain, The First Ramonovs (London, 1905). (R. N. B.)

ALFALFA, the name in America for the leguminous plant Medicago saliva, known elsewhere as lucerne (see Lucerne).

ALFANI, DOMENICO, Italian painter, was born at Perugia towards the close of the 15 th century. He was a contemporary of Raphael, with whom he studied in the school of Perugino. The two artists lived on terms of intimate friendship, and the influence of the more distinguished of the two is so clearly traceable in the works of the other, that these have frequently been attributed to Raphael. Towards the close of his life Alfani gradually changed his style and approximated to that of the later Florentine school. The date of his death, according to some, was 1540, while others say he was alive in 1553. Pictures by Alfani may be seen in collections at Florence and in several churches in Perugia.

ALFELD, a town of Germany, in the Prussian province of Hanover, 10 m. W. of Hildesheim, on the river Leine and the Hanover-Cassel main line of railway. Pop. (1900) 4900. It has a handsome church with twin spires, and training colleges for schoolmasters and theological candidates. Its industries are flourishing, and embrace paper-making, agricultural machine-works, iron-founding and flax-spinning.

ALFIERI, VITTORIO, Count (i 749-1803), Italian dramatist, was born on the 17 th of January 1749 at Asti in Piedmont. He lost his father in early infancy; but he continued to reside with his mother, who married a second time, till his tenth year, when he was placed at the academy of Turin. After he had passed a twelvemonth at the academy, he went on a short visit to a relation who dwelt at Coni; and during his stay there he made his first poetical attempt in a sonnet chiefly borrowed from lines in Ariosto and Metastasio, the only poets he had at that time read. When thirteen years of age he was induced to begin the study of civil and canonical law; but the attempt only served to disgust him with every species of application and to increase his relish for the perusal of French romances. By the death of his uncle, who had hitherto taken some charge of his education and conduct, he was left, at the age of fourteen, to enjoy without control his vast paternal inheritance, augmented by the recent accession of his uncle's fortune. He now began to attend the riding-school, where he acquired that rage for horses and equestrian exercise which continued to be pne of his strongest passions till the close of his existence.

After some time spent in alternate fits of extravagant dissipa- tion and ill-directed study, he was seized with a desire of travel- ling; and having obtained permission from the king, he departed in 1766, under the care of an English preceptor. Restless and unquiet, he posted with the utmost rapidity through the towns of Italy; and his improvement was such as was to be expected from his mode of travelling and his previous habits. Hoping to

find in foreign countries some relief from the tedium and ennui with which he was oppressed, and being anxious to become acquainted with the French theatre, he proceeded to Paris. But he appears to have been completely dissatisfied with everything he witnessed in France and contracted a dislike to its people, which his intercourse in future years rather contributed to augment than diminish. In Holland he became deeply enamoured of a married lady, who returned his attachment, but who was soon obliged to accompany her husband to Switzerland. Alfieri, whose feelings were of the most impetuous description, was in despair at this separation, and returned to his own country in the utmost anguish and despondency of mind. While under this depression of spirits he was induced to seek alleviation from works of literature; and the perusal of Plutarch's Lives, which he read with profound emotion, inspired him with an enthusiastic passion for freedom and independence. Under the influence of

this rage for liberty he recommenced his travels; and his only gratification, in the absence of freedom among the continental states, appears to have been derived from contemplating the wild and sterile regions of the north of Sweden, where gloomy forests, lakes and precipices conspired to excite those sublime and melancholy ideas which were congenial to his disposition. Everywhere his soul felt as if confined by the bonds of society; he panted for something more free in government, more elevated in sentiment, more devoted in love and more perfect in friendship. In search of this ideal world he posted through various countries more with the rapidity of a courier than of one who travels for amusement or instruction. During a journey to London he engaged in an intrigue with a married lady of high rank; and having been detected, the publicity of a rencounter with the injured husband, and of a divorce which followed, rendered it expedient and desirable for him to quit England. He then visited Spain and Portugal, where he became acquainted with the Abbe Caluso, who remained through life the most attached and estimable friend he ever possessed. In 1772 Alfieri returned to Turin. This time he became enamoured of the Marchesa Turinetti di Prie, whom he loved with his usual ardour, and who seems to have been as . undeserving of a sincere attachment as those he had hitherto adored. In the course of a long attendance on his mistress, during a malady with which she was afflicted, he one day wrote a dialogue or scene of a drama, which he left at her house. On a difference taking place between them the piece was returned to him, and being retouched and extended to five acts, it was'performed at Turin in 1775, under the title' of Cleopatra.

From this moment Alfieri was seized with an insatiable thirst for theatrical fame, and the remainder of his life was devoted to its attainment. His first two tragedies, Filippo and Polinice, were originally written in French prose; and when he came to versify them in Italian, he found that, from his Lombard origin and long intercourse with foreigners, he expressed himself with feebleness and inaccuracy. Accordingly, with the view of improving his Italian style, he went to Tuscany and, during an alternate residence at Florence and Siena, he completed his Filippo and Polinice, and conceived the plan of various other dramas. While thus employed he became acquainted with the countess of Albany, who then resided with her husband at Florence. For her he formed an attachment which, if less violent than his former loves, appears to have been more permanent. With this motive to remain at Florence, he could not endure the chains by which his

vast possessions bound him to Piedmont. He therefore resigned his whole property to his sister, the countess Cumiana, reserving an annuity which scarcely amounted to a half of his original revenues. At this period the countess of Albany, urged by the ill-treatment she received from her husband, sought refuge in Rome, where she at length received permission from the pope to live apart from her tormentor. Alfieri followed the countess to that capital, where he completed fourteen tragedies, four of which were now for the first time printed at Sienna.

At length, however, it was thought proper that, by leaving Rome, he should remove the aspersions which had been thrown on the object of his affections. During the year 1783 he

therefore travelled through different states of Italy, and published six additional tragedies. The interests of his love and literary glory had not diminished his rage for horses, which seems to have been at least the third passion of his soul. He came to England solely for the purpose of purchasing a number of these animals, which he carried with him to Italy. On his return he learned that the countess of Albany had gone to Colmar in Alsace, where he joined her, and resided with her under the same roof during the rest of his life. They chiefly passed their time between Alsace and Paris, but at length took up their abode entirely in that metropolis. While here, Alfieri made arrangements with Didot for an edition of his tragedies, but was soon after forced to quit Paris by the storms of the Revolution. He recrossed the Alps with the countess, and finally settled at Florence. The last ten years of his life, which he spent in that city, seem to have been the happiest of his existence. During that long period his tranquillity was only interrupted by the entrance of the Revolutionary armies into Florence in 1799. Though an enemy of kings, the aristocratic feeling of Alfieri rendered him also a decided foe to the principles and leaders of the French Revolution; and he rejected with the utmost con- tempt those advances which were made with a view to bring him over to their cause. The concluding years of his life were laudably employed in the study of the Greek literature and in perfecting a series of comedies. His assiduous labour on this subject, which he pursued with his characteristic impetuosity, exhausted his strength, and brought on a malady for which he would not adopt

the prescriptions of his physicians, but obsti- nately persisted in employing remedies of his own. His disorder rapidly increased, and he died on the 8th of October 1803.

The character of Alfieri may be best appreciated from the portrait which he has drawn of himself in his own Memoirs of his Life. He was evidently of an irritable, impetuous and almost ungovernable temper. Pride, which seems to have been a ruling sentiment, may account for many apparent Inconsist- encies of his character. But his less amiable qualities were greatly softened by the cultivation of literature. His application to study gradually tranquillized his temper and softened his manners, leaving him at the same time in perfect possession of those good qualities which he had inherited from nature — a warm and disinterested attachment to his family and friends, united to a generosity, vigour and elevation of character, which rendered him not unworthy to embody in his dramas the actions and sentiments of Grecian heroes.

It is to his dramas that Alfieri is chiefly indebted for the high reputation he has attained. Before his time the Italian language, so harmonious in the Sonnets of Petrarch and so energetic in the Commedia of Dante, had been invariably languid and prosaic in dramatic dialogue. The pedantic and inanimate tragedies of the 1 6th century were followed, during the iron age of Italian litera- ture, by dramas of which extravagance in the sentiments and improbability in the action were the chief characteristics. The prodigious success of the Merope of Maffei, which appeared in the commencement of the 18th century, may be attributed more to a comparison with such productions than to intrinsic merit. In this degradation of tragic taste the appearance of the tragedies of Alfieri was perhaps the most important literary event that had occurred in Italy during the 1 8th century. On these tragedies it is difficult to pronounce a judgment, as the taste and system of the author underwent considerable change and modification during the intervals which elapsed between the three periods of their publication. An excessive harshness of style, an asperity of sentiment and total want of poetical ornament are the characteristics of his first four tragedies, Filippo, Polinice, Antigone and Virginia. These faults were in some measure corrected in the six tragedies which he gave to the world some years after, and in those which he published along with Saul, the drama which enjoyed the greatest success of all his produc- tions — a popularity which may be partly attributed to the severe and unadorned manner of Alfieri being well adapted to the

patriarchal simplicity of the age in which the scene of the tragedy is placed. But though there be a considerable difference in his

dramas, there are certain observations applicable to them all. None of the plots are of his own invention. They are founded either on mythological fable or history; most of them had been previously treated by the Greek dramatists or by Seneca. Rosmunda, the only one which could be supposed of his own contrivance, and which is certainly the least happy effusion of his genius, is partly founded on the eighteenth novel of the third part of Bandello and partly on Prevost's Memoires d'un homme de qualite. But whatever subject he chooses, his dramas are always formed on the Grecian model and breathe a freedom and inde- pendence worthy of an Athenian poet. Indeed, his Agide and Bruto may rather be considered oratorical declamations and dialogues on liberty than tragedies. The unities of time and place are not so scrupulously observed in his as in the ancient dramas; but he has rigidly adhered to a unity of action and interest. He occupies his scene with one great action and one ruling passion, and removes from it every accessory event or feeling. In this excessive zeal for the observance of unity he seems to have forgotten that its charm consists in producing a common relation between multiplied feelings, and not in the bare exhibition of one, divested of those various accompaniments which give harmony to the whole. Consistently with that austere and simple manner which he considered the chief excellence of dramatic composition, he excluded from his scene all coups de thedtre, all philosophical reflexions, and that highly ornamented versification which had been so assiduously cultivated by his predecessors. In his anxiety, however, to avoid all superfluous ornament, he has stripped his dramas of the embellishments of imagination; and for the harmony and flow of poetical language he has substituted, even in his best performances, a style which, though correct and pure, is generally harsh, elaborate and abrupt; often strained into unnatural energy or condensed into factitious conciseness. The chief excellence of Alfieri con sists in powerful delineation of dramatic character. In his Filippo he has represented, almost with the masterly touches of Tacitus, the sombre character, the dark mysterious counsels, the suspensa semper et obscura verba, of the modern Tiberius. In Polinice, the characters of the rival brothers are beautifully con- trasted; in Maria Stuarda, that unfortunate queen is represented unsuspicious, impatient of contradiction and violent in her

attachments. In Mirra, the character of Ciniro is perfect as a father and king, and Cecri is a model of a wife and mother. In the representation of that species of mental alienation where the judgment has perished but traces of character still remain, he is peculiarly happy. The insanity of Saul is skilfully managed; and the horrid joy of Orestes in killing Aegisthus rises finely and naturally to madness in finding that, at the same time, he had inadvertently slain his mother.

Whatever may be the merits or defects of Alfieri, he may be considered as the founder of a new school in the Italian drama. His country hailed him as her sole tragic poet ; and his successors in the same path of literature have regarded his bold, austere and rapid manner as the genuine model of tragic composition.

Besides his tragedies, Alfieri published during his life many sonnets, five odes on American independence and the poem of Etruria, founded on the assassination of Alexander I., duke of Florence. Of his prose works the most distinguished for animation and eloquence is the Panegyric on Trajan, composed in a transport of indignation at the supposed feebleness of Pliny's eulogium. The two books entitled La Tirannide and the Essays on Literature and Government are remarkable for elegance and vigour of style, but are too evidently imitations of the manner of Machiavel. His Antigallican, which was written at the same time with his Defence of Louis XVI., comprehends an historical and satirical view of the French Revolution. The posthumous works of Alfieri consist of satires, six political comedies and the Memoirs of his Life — a work which will always be read with interest, in spite of the cold and languid gravity with which he delineates the most interesting adventures and the strongest passions of his agitated life.

See Mem. di Vit. Alfieri; Sismondi, De la lit. du midi de V Europe; Walker's Memoir on Italian Tragedy; Giorn. de Pisa, torn, lviii.;

Life of Alfieri, by Centofanti (Florence, 1842); Vita, Giornuli, Lettere di Alfieri, by Teza (Florence, 1861); Vittorio Alfieri, by Antonini and Cognetti (Turin, 1898).

ALFORD, HENRY (1810-1871), English divine and scholar, was

born in London on the 7th of October 1810. He came of a Somersetshire family, which had given five consecutive generations of clergymen to the Anglican church. Alford's early years were passed with his widowed father, who was curate of Steeple Ashton in Wiltshire. He was an extremely precocious lad, and before he was ten had written several Latin odes, a history of the Jews and a series of homiletic outlines. After a peripatetic school course he went up to Cambridge in 1827 as a scholar of Trinity. In 1832 he was 34th wrangler and 8th classic, and in 1834 was made fellow of Trinity. He had already taken orders, and in 1835 began his eighteen years' tenure of the vicarage of Wymeswold in Leicestershire, from which seclusion the twice- repeated offer of a colonial bishopric failed to draw him. He was Hulsean lecturer at Cambridge in 1841-1842, and steadily built up a reputation as scholar and preacher, which would have been enhanced but for his discursive ramblings in the fields of minor poetry and magazine editing. In September 1853 Alford removed to Quebec Chapel, London, where he had a large and cultured congregation. In March 1857 Viscount Palmerston advanced him to the deanery of Canterbury, where, till his death on the 12 th of January 1871, he lived the same strenuous and diversified life that had always characterized him. The inscrip- tion on his tomb, chosen by himself, is " Diversorium Viatoris Hierosolymam Proficiscenlis."

Alford was a not inconsiderable artist, as his picture-book, The Riviera (1870), shows, and he had abundant musical and mechanical talent. Besides editing the works of John Donne, he published several volumes of his own verse, The School of the Heart (1835), The Abbot of Muchelnaye (1841), and a number of hymns, the best-known of which are " Forward! be our watch-word," " Come, ye thankful people, come," and " Ten thousand times ten thousand." He translated the Odyssey, wrote a well-known manual of idiom, A Plea for the Queen's English (1863), and was the first editor of the Contemporary Review (1866-1870). His chief fame, however, rests upon his monumental edition of the New Testament in Greek (4 vols.), which occupied him from 1841 to 1861. In this work he first brought before English students a careful collation of the readings of the chief MSS. and the researches of the ripest continental scholarship of his day. Philological rather than theological in character, it marked an epochal change from the old homiletic commentary, and though more recent research, patristic and papyral, has largely changed the method of New Testament exegesis, Alford's work is still a quarry where the

student can dig with a good deal of profit.

His Life, written by his widow, appeared in 1873 (Rivington).

(A. J. G.)

ALFRED, or Alfred, known as The Great (848-? 900), king of England, was born in 848 at Wantage, and was the fourth son of King ˆEthelwulf and his first wife (Osburh). He seems to have been a child of singular attractiveness and promise, and stories of his boyhood were remembered. At the age of five (8 53) he was sent to Rome, where he was confirmed by Leo IV., who is also stated to have " hallowed him as king." Later writers interpreted this as an anticipatory crowning in preparation for his ultimate succession to the throne of Wessex. That, however, could not have been foreseen in 853, as Alfred had three elder brothers living. It is probably to be understood either of investiture with the consular insignia, or possibly with some titular royalty such as that of the under-kingdom of Kent. In 855 Alfred again went to Rome with his father yEthelwulf, returning towards the end of 856. About two years later his father died. During the short reigns of his two eldest brothers, /Ethelbald and /Ethelberht, nothing is heard of Alfred. But vvith the accession of the third brother ˆEthelred (866) the public life of Alfred begins, and he enters on his great work of delivering England from the Danes. It is in this reign that Asser applies to Alfred the unique title of secundarius, which seems to indicate a position analogous to that of the Celtic tanist, a recognized

successor, closely associated with the reigning prince. It is probable that this arrangement was definitely sanctioned by the witenagemot, to guard against the danger of a disputed succession should /Ethelred fall in battle. In 868 Alfred married Ealhswith, daughter of ˆEthelred Mucill, who is called ealdorman of the Gaini, an unidentified district. The same year the two brothers made an unsuccessful attempt to relieve Mercia from the pressure of the Danes. For nearly two years Wessex had a respite. But at the end of 870 the storm burst; and the year which followed has been rightly called " Alfred's year of battles." Nine general engagements were fought with varying fortunes, though the place and date of two of them have not been recorded. A successful skirmish at Englefield, Berks (December 31, 870), was followed by a severe defeat at Reading (January 4, 871), and this, four days later, by the brilliant victory of Ashdown, near Compton Beauchamp in Shrivenham Hundred. On the 22nd of

January the English were again defeated at Basing, and on the 22nd of March at Marton, Wilts, the two unidentified battles having perhaps occurred in the interval. In April ˆEthelred died, and Alfred succeeded to the whole burden of the contest. While he was busied with his brother's exequies, the Danes defeated the English in his absence at an unnamed spot, and once more in his presence at Wilton in May. After this peace was made, and for the next five years the Danes were occupied in other parts of England, Alfred merely keeping a force of observation on the frontier. But in 876 part of the Danes managed to slip past him and occupied Wareham; whence, early in 877, under cover of treacherous negotiations, they made a dash westwards and seized Exeter. Here Alfred blockaded them, and a relieving fleet having been scattered by a storm, the Danes had to submit and withdrew to Mercia. But in January 878 they made a sudden swoop on Chippenham, a royal vill in which Alfred had been keeping his Christmas, " and most of the people they reduced, except this King Alfred, and he with a little band made his way ... by wood and swamp, and after Easter he . . . made a fort at Athelney, and from that fort kept fighting against the foe " (Chron.). The idea that Alfred, during his retreat at Athelney, was a helpless fugitive rests upon the foolish legend of the cakes. In reality he was organizing victory. By the middle of May his preparations were complete and he moved out of Athelney, being joined on the way by the levies of Somerset, Wilts and Hants. The Danes on their side moved out of Chippenham, and the two armies met at Edington in Wiltshire. The result was a decisive victory for Alfred. The Danes submitted. Guthrum, the Danish king, and twenty-nine of his chief men accepted baptism. By the next year (879) not only Wessex, but Mercia 1 , west of Watling Street, was cleared of the invader. This is the arrangement knowri as the peace of Wedmore (878), though no document embodying its provisions is in existence. And though for the present the north-eastern half of England, including London, remained in the hands of the Danes, in reality the tide had turned, and western Europe was saved from the danger of becoming a heathen Scandinavian power. For the next few years there was peace, the Danes being kept busy on the continent. A landing in Kent in 884 or 885, 1 though successfully repelled, encouraged the East Anglian Danes to revolt. The measures taken by Alfred to repress this revolt culminated in the capture of London in 885 or 886, and the treaty known as Alfred and Guthrum's peace, whereby the boundaries of the treaty of Wedmore (with which this is often confused) were materially

modified in Alfred's favour. Once more for a time there was a lull; but in the autumn of 892 (893) the final storm burst. The Danes, finding their position on the continent becoming more and more precarious, crossed to England in two divisions, amounting in the aggregate to 330 sail, and entrenched themselves, the larger body at Appledore and the lesser under Haesten at Milton in Kdnt. The fact that the new invaders brought their wives and children with them shows that this was no mere raid, but a deliberate

1 Where alternative dates are given the later date is that of the Saxon Chronicle. But the evidence of the Continental Chronicles makes it probable that the Saxon Chronicle is a year in advance of the true chronology in this part.

attempt, in concert with the Northumbrian and East Anglian Danes, to conquer England. Alfred, 893 (804) , took up a position whence he could observe both forces. While he was negotiating with Haesten the Danes at Appledore broke out and struck north-westwards, but were overtaken by Alfred's eldest son, Edward, and defeated in a general engagement at Farnham, and driven to take refuge in Thorney Island in the Hertford- shire Colne, where they were blockaded and ultimately compelled to submit. They then fell back on Essex, and after suffering another defeat at Benfleet coalesced with Haesten's force at Shoebury. Alfred had been on his way to relieve his son at Thorney when he heard that the Northumbrian and East Anglian Danes were besieging Exeter and an unnamed fort on the coast of North Devon. Alfred at once hurried westwards and raised the siege of Exeter; the fate of the other place is not recorded. Meanwhile the force under Haesten set out to march up the Thames valley, possibly with the idea of assisting their friends in the west. But they were met by a large force under the three great ealdormen of Mercia, Wilts and Somerset, and forced to head off to the north-west, being finally overtaken and blockaded at Buttington, which some identify with Buttington Tump at the mouth of the Wye, others with Buttington near Welshpool. An attempt to break through the English lines was defeated with loss; those who escaped retreated to Shoebury. Then after collecting reinforcements they made a sudden dash across England and occupied the ruined Roman walls of Chester. The English did not attempt a winter blockade,

but contented themselves with destroying all the supplies in the neighbourhood. And early in 894 (895) want of food obliged the Danes to retire once more to Essex. At the end of this year and early in 895 (896) the Danes drew their ships up the Thames and Lea and fortified themselves twenty miles above London. A direct attack on the Danish lines failed, but later in the year Alfred saw a means of obstructing the river so as to prevent the egress of the Danish ships. The Danes realized that they were out-manceuvred. They struck off north-westwards and wintered at Bridgenorth. The next year, 896 (897), they abandoned the struggle. Some retired to Northumbria, some to East Anglia; those who had no connexions in England withdrew to the continent. The long campaign was over. The result testifies to the confidence inspired by Alfred's character and generalship, and to the efficacy of the military reforms initiated by him. These were (1) the division of the fyrd or national militia into two parts, relieving each other at fixed intervals, so as to ensure continuity in military operations; (2) the establishment of fortified posts (burgs) and garrisons at certain points; (3) the enforcement of the obligations of thane-hood on all owners of five hides of land, thus giving the king a nucleus of highly equipped troops. After the final dispersal of the Danish invaders Alfred turned his attention to the increase of the navy, and ships were built according to the king's own designs, partly to repress the ravages of the Northumbrian and East Anglian Danes on the coasts of Wessex, partly to pre- vent the landing of fresh hordes. This is not, as often asserted, the beginning of the English navy. There had been earlier naval operations under Alfred. One naval engagement was certainly fought under ˆEthelwulf (851), and earlier ones, possibly in 833 and 840. Nor were the new ships a great success, as we hear of them grounding in action and foundering in a storm. Much, too, was needed in the way of civil re-organization, especially in the districts ravaged by the Danes. In the parts of Mercia acquired by Alfred, the shire system seems now to have been introduced for the first time. This is the one grain of truth in the legend that Alfred was the inventor of shires, hundreds and tithings. The finances also would need careful attention; but the subject is obscure, and we cannot accept Asser's description of Alfred's appropriation of his revenue as more than an ideal sketch. Alfred's care for the administration of justice is testified both by history and legend; and the title " protector of the poor " was his by unquestioned right. Of the action of the witenagemot we do not hear very much under Alfred. That he was anxious to respect its rights is conclusively proved, but both the circum stances of

the time and the character of the king would tend to

throw more power into his hands. The legislation of Alfred probably belongs to the later part of the reign, after the pressure of the Danes had relaxed. The details of it cannot be discussed here. Asser speaks grandiosely of Alfred's relations with foreign powers, but little definite information is available. He certainly corresponded with Elias III., the patriarch of Jerusalem, and probably sent a mission to India. Embassies to Rome conveying the English alms to the pope were fairly frequent; while Alfred's interest in foreign countries is shown by the insertions which he made in his translation of Orosius. His relations to the Celtic princes in the southern half of the island are clearer. Comparatively early in his reign the South Welsh princes, owing to the pressure on them of North Wales and Mercia, commended themselves to Alfred. Later in the reign the North Welsh followed their example, and the latter co-operated with the English in the campaign of 893 (894). The Celtic principality in Cornwall, which seems to have survived at least till 926, must long have been practically dependent on Wessex. That Alfred sent alms to Irish as well as to continental monasteries may be accepted on Asser's authority; the visit of the three pilgrim " Scots " (i.e. Irish) to Alfred in 891 is undoubtedly authentic; the story that he himself in his childhood was sent to Ireland to be healed by St Modwenna, though mythical, may point to Alfred's interest in that island. The history of the church under Alfred is most obscure. The Danish inroads had told heavily upon it; the monasteries had been special points of attack, and though Alfred founded two or three monasteries and imported foreign monks, there was no general revival of monasticism under him. To the ruin of learning and education wrought by the Danes, and the practical extinction of the knowledge of Latin even among the clergy, the preface to Alfred's translation of Gregory's Pastoral Care bears eloquent testimony. It was to remedy these evils that he established a court school, after the example of Charles the Great; for this he imported scholars like Grimbald and John the Saxon from the continent and Asser from South Wales; for this, above all, he put himself to school, and made the series of translations for the instruction of his clergy and people, most of which still survive. These belong unquestionably to the later part of his reign, not improbably to the last four years of it, during which the chronicles are almost silent. Apart from the lost Handboc or Encheiridion, which seems to have been merely a commonplace-book kept by the king, the earliest work to be

translated was the Dialogues oj Gregory, a book enormously popular in the middle ages. In this case the translation was made by Alfred's great friend Werferth, bishop of Worcester, the king merely furnishing a preface. The next work to be undertaken was Gregory's Pastoral Care, especially for the benefit of the clergy. In this Alfred keeps very close to his original; but the introduction which he prefixed to it is one of the most interesting documents of the reign, or indeed of English history. The next two works taken in hand were historical, the Universal History of Orosius and Bede's Ecclesi- astical History oj the English People. The priority should probably be assigned to the Orosius, but the point has been much debated. In the Orosius, by omissions and additions, Alfred so remodels his original as to produce an almost new work; in the Bede the author's text is closely adhered to, no additions being made, though most of the documents and some other less inter- esting matters are omitted. Of late years doubts have been raised as to Alfred's authorship of the Bede translation. But the sceptics cannot be regarded as having proved their point. We come now to what is in many ways the most interesting of Alfred's works, his translation of Boethius' Consolation of Philosophy, the most popular philosophical manual of the middle ages. Here again Alfred deals very freely with his original and though the late Dr G. Schepss showed that many of the additions to the text are to be traced not to Alfred himself, but to the glosses and commentaries which he used, still there is much in the work which is solely Alfred's and highly characteristic of his genius. It is in the Boethius that the oft-quoted sentence occurs : " My will was to live worthily as long as I lived, and after my life to leave to them that should come after, my memory in good

works." The book has come down to us in two MSS. only. In one of these the poems with which the original is interspersed are rendered into prose, in the other into alliterating verse. The authorship of the latter has been much disputed; but probably they also are by Alfred. Of the authenticity of the work as a whole there has never been any doubt. The last of Alfred's works is one to which he gave the title Blostman, i. e. " Blooms" or Anthology. The first half is based mainly on the Soliloquies of St Augustine, the remainder is drawn from various sources, and contains much that is Alfred's own and highly characteristic of

him. The last words of it may be quoted; they form a fitting epitaph for the noblest of English kings. ” Therefore he seems to me a very foolish man, and very wretched, who will not increase his understanding while he is in the world, and ever wish and long to reach that endless life where all shall be made clear.” Besides these works of Alfred’s, the Saxon Chronicle almost certainly, and a Saxon Martyrology, of which fragments only exist, probably owe their inspiration to him. A prose version of the first fifty Psalms has been attributed to him; and the attri- bution, though not proved, is perfectly possible. How Alfred passed to ” the life where all things are made clear “we do not know. The very year is uncertain. The arguments on the whole are in favour of 900. The day was the 26th of October. Alike for what he did and for what he was, there is none to equal Alfred in the whole line of English sovereigns; and no monarch in history ever deserved more truly the epithet of Great.

Bibliography. — The chief original authorities for the reign of Alfred are the so-called Life by Asser (best edition by W. H. Steven- son, Clarendon Press, 1904) ; and the Saxon Chronicles (text and notes by Earle and Plummer, 2 vols., Clar. Press, 1892-1899; parallel texts and translation, Thorpe, 2 vols., 1861, Rolls Series; translation alone, Joseph Stevenson in Church Historians of England, vol. ii., 1853). The above sketch is based mainly on C. Plummer’s Life and Times of Alfred the Great (Clar. Press, 1902). Of earlier biographies that by Pauli is still of great value: Kdnig JLlfred (Berlin, 1851); Eng. trans, by Thorpe (Bohn, 1853). Of recent works mention may be made of Alfred the Great, Chapters on his Life and Times, by various authors, edited by Alfred Bowker (1899) ; Earle, The Alfred Jewel (Clar. Press, 1901).

For the bibliography of Alfred’s works in general see Wiilker, Grundriss zur Gesch. der angelsdchsischen Litteratur, pp. 386-451 (Leipzig, 1885). Only the more recent and accessible editions are mentioned here. Laws: The Legal Code of Alfred the Great (M. H. Turk, Halle, 1893). (For the Anglo-Saxon laws as a whole see Lieber- mann, Gesetze der Angelsachsen, Halle, 1 898-1903. Earlier editions, Schmid, 1858; Thorpe, 1840.) Gregory’s Dialogues: Hans Hecht, in Grein’s Bibliothek der angels. Prosa (1900). Gregory’s Pastoral Care : H. Sweet, for Early Eng.Text Society (1871-1872). (Dissertations by Wackand DeWitz,i88g.) Orosius: Thorpe (in his translation of Pauli, U. S. 1853); Bosworth (1859); Sweet, E.E.T.S. (1883). (Disserta- tion: Schelling, Kdnig Alfred’s . . . Orosius, Halle, 1886.) Bede: T.

Miner, for E.E.T.S. (1890); Prof. Schipper, in Grein's Bibliothek (U.S. 1899). Boethius: W. J. Sedgfield (Clar. Press, 1899) ; translation by the same (1900). (Dissertation: G. Schepss, Archiv fiir's Studium der neueren Sprachen, xciv. 14-160.) Blostman: First printed by Cockayne in the Shrine (1 868-1 869); reprinted, Englische Studien, xviii. ; new edition by Hargrove, Yale Studies in English, xiii. (1902); translation by the same, ib. xxii. (1904). (Dissertation: F. G. Hubbard, Modern Language Notes, ix. 322 ff.) Anglo-Saxon Chronicle: see above. Martyrology: Cockayne, in the Shrine, v.s. Psalter: Thorpe (Clar. Press, 1835). (Disserta- (ions : for Alfred's authorship, Wichmann, Anglia, xi. 19 ff. ; against, J. D. Bruce, The Anglo-Saxon Version of the Book of Psalms, Baltimore, 1894.) (C. Pl.)

ALFRED ERNEST ALBERT, duke of Saxe-Coburg and Gotha, and duke of Edinburgh (1844-1900), second son and fourth child of Queen Victoria, was born at Windsor Castle on the 6th of August 1844. In 1856 it was decided that the prince, in accordance with his own wishes, should enter the navy, and a separate establishment was accordingly assigned to him, with Lieutenant Sowell, R. E., as governor. He passed a most creditable examination for midshipman in August 1858, and being appointed to the " Euryalus," at once began to work hard at the practical part of his profession. In July i860, while on this ship, he paid an official visit to the Cape, and made a very favourable impression both on the colonials and on the native chiefs. On the abdication of Otto, king of Greece, in 1863, Prince Alfred was chosen by the whole people to succeed

him, but political conventions of long standing rendered it impossible for the British government to accede to their wishes. The prince therefore remained in the navy, and was promoted lieutenant on the 24th of February 1863 and captain on the 23rd of February 1866, being then appointed to the command of the " Galatea." On attaining his majority in 1865 the prince was created duke of Edinburgh and earl of Ulster, with an annuity of £15,000 granted by parliament. While still in com- mand of the " Galatea " the duke started from Plymouth on the 24th of January 1867 for his voyage round the world. On the nth of June 1867 he left Gibraltar and reached the Cape on the 24th of July, and landed at Glenelg, South Australia, on the 31st of October. Being the first English prince to visit Australia, the duke was received with the greatest enthusiasm. During his stay of nearly five months he visited Adelaide, Melbourne, Sydney, Brisbane and Tasmania; and it was on his second visit to Sydney that, while

attending a public picnic at Clonfert in aid of the Sailors' Home, an Irishman named O'Farrell shot him in the back with a revolver. The wound was fortunately not dangerous, and within a month the duke was able to resume command of his ship and return home. He reached Spithead on the 26th of June 1868, after an absence of seventeen months. The duke's next voyage was to India, where he arrived in December 1869. Both there and at Hong Kong, which he visited on the way, he was the first British prince to set foot in the country. The native rulers of India vied with one another in the magnificence of their entertainments during the duke's stay of three months. On the 23rd of January 1874 the marriage of the duke to the grand-duchess Marie Alexandrovna, only daughter of Alexander II., emperor of Russia, was celebrated at St Petersburg, and the bride and bridegroom made their public entry into London on the 12th of March. The duke still devoted himself to his profession, showing complete mastery of his duties and unusual skill in naval tactics. He was promoted rear-admiral on the 30th of December 1878; vice-admiral, 16th of November 1882; admiral, 18th of October 1887; and received his baton as admiral of the Fleet, 3rd of June 1893. He com- manded the Channel fleet, 1883-1884; the Mediterranean fleet, 1886-1889; and was commander-in-chief at Davenport, 1890- 1893. He always paid the greatest attention to his official duties and was most efficient as an admiral.

On the death of his uncle, Ernest II., duke of Saxe-Coburg and Gotha, on the 22nd of August 1893, the vacant duchy fell to the duke of Edinburgh, for the prince of Wales had renounced his right to the succession. At first regarded with some coldness as a " foreigner," he gradually gained popularity, and by the time of his death, on the 30th of July 1900, he had completely won the good opinion of his subjects. The duke was exceedingly fond of music and an excellent violinist, and took a prominent part in establishing the Royal College of Music. He was also a keen collector of glass and ceramic ware, and his collection, valued at half a million of marks, was presented by his widow to the " Veste Coburg," near Coburg. When he became duke of Saxe-Coburg he surrendered his English allowance Of £15,000 a year, but the £10,000 granted in addition by parliament on his marriage he retained in order to keep up Clarence House. The duke had one son, who died unmarried on the 6th of February 1899, and four daughters. The third daughter, Princess Alexandra Louisa Olga Victoria, married the hereditary prince Ernest of

Hohenlohe-Langenburg, who became regent of the duchy of Coburg during the minority of the deceased duke's nephew, the young duke of Albany, to whom the succession fell. (G. F. B.)

ALFRED, a village in the township of Alfred, Allegany county, New York, U.S.A., about 75 m. S.W. of Buffalo. Pop. of the township, including the village (1900), 1615; (1910 U. S. census) 1590. Pop. of the village (1900) 756; (1910U. S. census) 759. The township is served, at Alfred station, by the Erie railway. The village, which is connected by stage with the station, is situated at the junction of two valleys and com- mands delightful views of mountain scenery. On the west slope of Pine Hill is Alfred University (co-educational), which embraces

a college (non-sectarian), an academy (non-sectarian) and a theological seminary (Seventh-Day Baptist) . Closely associated with it also, and under the management of the university trustees, is the New York State School of Clay-Working and Ceramics (1900), one of the most efficient schools of the kind in the country. In 1908 the legislature of New York appropri- ated $80,000 for the establishment of a state school of agricul- ture in connexion with the university. The institution had its beginning in 1836 in a private school. This developed into an academy, which- in 1843 was incorporated as Alfred Academy and Teachers' Seminary; in 1857 the university was chartered under its present name. The principal industry of the village is the manufacture of roofing tiles. The township of Alfred lies within the territory purchased by Robert Morris in 1791. He sold it in the same year to a company resident in London, England. Their agent sold most of it to settlers and, it is said, named the township, when it was organized in 1806, in honour of Alfred the Great. The first settlement within its present limits was made in 1807. For several years most of the settlers were Seventh-Day Baptists, and in 181 2 they organized a church here. The village of Alfred was chartered in 1887.

J. S. Minard, Allegany County and its People (Alfred, 1896).

ALFRETON, a market town in the mid-parliamentary division of Derbyshire, England, 14 m. N. by E. of Derby, on the Midland railway. Pop. of urban district (1901) 17,505. It lies at a con-

siderable elevation above the valley of a small stream tributary to the Derwent. The church of St Martin is Early English and later. The neighbourhood abounds in ironworks, collieries, quarries and potteries, and is thickly populated. To the north-east of Alfreton are South Normanton (pop. 5170), Blackwell (4144) and Tibshelf (3432); to the north Shirland (3929), to the south Ironville and other busy industrial villages. The foundation of Alfreton is traditionally ascribed to King Alfred.

ALFUROS (Alfures, Horaeoras), a term of no ethnological value applied by the Malays to all the uncivilized non-Mahom- medan peoples in the eastern portion of the Malay Archipelago. Its origin is uncertain, but its meaning is ” wild ” or ” un- civilized.” The term is not restricted to the aborigines, but is far more frequently used to describe the tribes of Malayan blood.

ALGAE. The Latin word alga seems to have been the equivalent of the English word ” seaweed ” and probably stood for any or all of the species of plants which form the ” wrack ” of a seashore. When the word ” Algae ” came to be employed in botanical classification as the name of a class, an arbitrary limitation had to be set to its signification, and this was not always in keeping with its original meaning. The absence of differentiation into root, stem and leaf which prevails among seaweeds, seems, for example, to have led Linnaeus to employ the term in the Genera Plantarum for a sub-class of Cryptogamia, the members of which presented this character in a greater or less degree. Of the fifteen genera included by Linnaeus among algae, not more than six — viz. Chara, Fucus, Ulva and Conferva, and in part Tremella and Byssus — would to-day, in any sense in which the term is employed, be regarded as algae. The excluded genera are distributed among the liverworts, lichens and fungi; but notwithstanding the great advance in knowledge since the time of Linnaeus, the difficulty of deciding what limits to assign to the group to be designated Algae still remains. It arises from the fact that algae, as generally understood, do not constitute a homogeneous group, suggesting a descent from a common stock. Among them there exist, as will be seen hereafter, many well-marked but isolated natural groups, and their inclusion in the larger group is generally felt to be a matter of convenience rather than the expression of a belief in their close inter-relationship. Efforts are therefore continually being made by successive writers to exclude certain outlying sub-groups, and to reserve the term Algae for a central group reconstituted on a more natural basis within narrower limits.

It is perhaps desirable, in an article like this, to treat of algae in the widest possible sense in which the term may be used, an

Classifi- cation.

indication being at the same time given of the narrower senses in which it has been proposed to employ it. Interpreted in this way, the place of algae in the vegetable kingdom may be shown by means of a table: —

{f Myxomycetes Thallophyta X Fungi Bryophyta L Pteridophyta

Phanerogamia I Gymnosperms |ˆ Angiosperms

Algae in this wide sense may be briefly described as the aggregate of those simpler forms of plant life usually devoid, like the rest of the Thallophyta, of differentiation into root, stem and leaf; but, unlike other Thallophyta, possessed of a colouring matter; by means of which they are enabled, in the presence of sunlight, to make use of the carbonic acid gas of the atmosphere as a source of carbon. It is true that certain Bryophyta (Marchantiaceae, Anthoceroteae) possess a thalloid structure similar to that of Thallophyta, and are at the same time possessed of the colour- ing matter of the Green Algae. Their life-cycle, however, the structure of the reproductive organs and their whole organiza- tion proclaim them to be Bryophyta (q.v.). On the other hand, certain undoubted animals (Stentor, Hydra, Bonellia) are pro- vided with a green colouring matter by means of which they make use of atmospheric carbonic acid. A more important consideration is the occasional absence of this colour in species, fit groups of species, with, in other respects, algal affinities. Such aberrant forms are to be regarded in the same light as Cuscuta and Orobanchaceae, for example, among Phanerogams. As these non-green plants do not cease to be classed with other Phanerogams, so must the forms in question be retained among algae. In all cases the loss of the colouring matter is associated with an incapacity to take up carbon from so simple a compound as carbonic acid

It might be mentioned here that the whole group of the Fungi (q.v.) , with its many thousands of species, is now generally regarded as having been derived from algae, and the system of classifica- tion of fungi devised by Brefeld is based upon this belief. The similarity of the morphological characters of one group of fungi to those of certain algae has earned for it the name

Phycomycetes or alga-fungi.

Further discussion of the general characters of algae will be deferred in order to take a brief survey of the subdivisions of the group. For this purpose there will be adopted the classification of algae into four sub-groups, founded on the nature of the colouring matters present in the plant : —

I. Cyanophyceae, or Blue-green Algae.

II. Chlorophyceae, or Green Algae. III. Phaeophyceae, or Brown Algae.

IV. Rhodophyceae, or Red Algae. The merits and demerits of this system will appear during the description of the characters of the members of the several

subdivisions.

I. Cyanophyceae. — This group derives its name from the circumstance that the cells contain in addition to the green colouring matter, chlorophyll, a blue-greencolouringmatterto which the term phycocyanin has been applied. To the eye, ”

however, members of this group present a greater variety of colour than those of any other — yellow, brown, olive, red, purple, violet and variations of all these being known. They undoubtedly represent the lowest grade of algal life, and their distribution rivals that of the Green Algae. They occur in the sea, in fresh water, on moist earth, on damp rocks and on the bark of trees. Certain species are regularly found in the intercellular spaces of higher plants ; such are species of Nostoc in the thallus of Anthoceros, the leaves of Azolla and the roots of Cycads. Many of them enter into the structure of the lichen-thallus, as the so-called gonidia. It is remarkable that species belonging to the Oscillatoriaceae are known to flourish in hot springs, the temperature of which rises as high as 85 °C.

The thallus may be unicellular or multicellular. When unicellular, it may consist of isolated cells, but more commonly the cells are held together in a common jelly (Chroococcaceae) derived from the outer layers of the cell-wall. The multicellular species consist of filaments, branched or unbranched, which arise by the repeated divisions of the cells in parallel planes, no formation of mucilage occurring in the dividing walls. Such filaments may not give rise to mucilage on the

lateral suriace either, in which case they are said to be £ree ; when mucilage does occur on the lateral wall, it appears as the sheath surrounding either the single filament, or a sheaf of filaments of common origin. The mucilage may also form an embedding sub- stance similar to that of Chroococcaceae, in which the filaments lie parallel or radiate from a common centre (Rivulariaceae). The cells of the filament may be all alike, and growth may occur equally in all parts (Oscillatoriaceae) ; or certain cells (heterocysts) may become marked off by their larger size and the transparency of their contents ; in which case growth may still be distributed equally throughout (Nostoc), or the filament may be attached where the heterocyst arises, and grow out at the opposite extremity into a fine hair (Rivulariaceae). An African form (Camptothrix) , devoid of hetero- cysts and hair-like at both extremities, has recently been described. Branching has been described as ” false ” and ” true.” The former arises when a filament in a sheath, either in consequence of growth in length beyond the capacity of the sheath to accommodate it,

Fig. i. — Cyanophyceae, variously magnified.

A. Gloeocapsa sp. .colony in muci-

lage.

B. Phormidium sp., single fila-

ment with hormogonium.

C. Microcoleus sp., several fila-

ments in common sheath.

D. Nostoc sp., young colony-fila-

ment with heterocysts.

E. Scytonemasp., false branching.

F. Rivularia sp.

G. Stigonema sp., with hormo-

gonium and true branching. H. Spirulina sp.

(From Engler and Praatl, Pjianzeniamilien, by permission of Wilhelm Engeimann.)

or because of the decay of a cell, becomes interrupted by breaking, and the free ends slip past one another. ” True ” branching arises only by the longitudinal division of a cell of a filament and the lateral outgrowth of one of the cells resulting from the division (Sirosiphonaceae) .

The nature of the contents of the cells of Cyanophyceae has given rise to considerable controversy. The cells are for the most part exceedingly minute, and are not easy to free from their colouring matters, so that investigation has been attended with great difficulty. Occupying as these algae do perhaps the lowest grade of plant life, it is a matter of interest to ascertain whether a nucleus or chromato- phore is differentiated in their cells, or whether the functions and properties of these bodies are diffused through the whole protoplast. It is certain that the centre of the cell, which is usually non-vacuo- lated, is occupied by protoplasm of different properties from the peripheral region; and A. Fischer has further established the fact that the peripheral mass, which is a hollow sphere in spherical cells, and either a hollow cylinder or barrel-shaped body in filamentous forms, must be regarded as the single chromatophore of the Cyanophyceous cell. But what precisely is the nature of the central mass is still uncertain. Some investigators, such as R. Hegler, F. G. Kohl and E. W. Olive, claim that this body is a true nucleus Comparable

with that of the higher plants. It is said to undergo division by a mitosis essentially of the same character, with the formation of a spindle and the differentiation of chromosomes. It is further stated by Olive that the chromosomes undergo longitudinal fission, and that for the same species the same number of chromosomes appear at each division. H. Wager speaks with greater reserve, acknowledg- ing, however, the central body to be a nucleus of a rudimentary type, but devoid of nuclear membrane and nucleolus. He thinks it may possibly originate in the vacuolization of the central region, and the accumulation of chromatin granules therein. He finds no spindle fibres or true chromosomes, and considers the division direct, not indirect. With reference to the existence of .a chromatophore, he with others finds the colouring matter localized in granules in the

peripheral region, but does riot consider these individually or in the aggregate as chromatophores. Among other contents of the cell, fatty substances and tannin are known. A curious adaptation seems to occur in certain floating forms, in the presence of a gas-vacuole, which may be made to vary its volume with varying pressure. There is evidence that the dividing wall of filamentous forms is deeply pitted, as is found to be the Case in red algae. Reproduction is chiefly effected by the vegetative method. Asexual reproductive cells are not infrequent, but sexual reproduction even in its initial stages is unknown. Nor is motility by means of cilia known in the group. In the unicellular forms, cell-division involves multiplication of the plant. In all the multicellular plants of this group which have been adequately investigated, vegetative multiplication by means of what are known as hormogonia has been found to occur. These are short segments of filaments consisting of. a few cells which dis- engage themselves from the ambient jelly, if it be present, in virtue of a peculiar creeping movement which they possess at this stage. After a time they come to rest and give rise to new colonies, True reproduction of the asexual kind occurs, however, in the formation of sporangia, particularly in the Chamaesiphonaceae. Here the contents of certain cells break up endogenously into a great number of spores, which are distributed as a fine dust. Resting spores are also known. In these cases, certain cells of a colony of unicellular plants or of the filaments of multicellular plants enlarge greatly and thicken their wall. When unfavourable external conditions super vene and the ordinary cells become atrophied, these cells persist and reproduce the plant with the return of more favourable con- ditions. The Oscillatoriaceae are capable of a peculiar oscillatory movement, which has earned for them their name, and which enables them to move through considerable distances. It is not clear how the movement is effected, though it has frequently been the subject of careful investigation.

With the Cyanophyceae must be included, as their nearest allies, the Bacteriaceae (see Bacteriology). Notwithstanding the ab- sence of chlorophyll, and the consequent parasitic or saprophytic habit, Bacteriaceae agree in so many morphological features with Cyanophyceae that the affinity can hardly be doubted.

_ A census of the Cyanophyceae with their two main groups is given below : —

1. Coccogoneae — -2 families, 29 genera, 253 species.

2. Hormogoneae — 5 families, 59 genera, 701 species.

(Engler and Prantl's Pflanzenfamilien, 1900.) II. Chlorophyceae. — This group includes those algae in which the green colouring matter, chlorophyll, is not accompanied by a second colouring matter, as it is in other groups. It consists of three subdivisions— Conjugatae, Euchlorophyceae and Characeae. Of these the first and last are relatively small and sharply defined families, distinguished from the second family, which forms the bulk of the group, by characters so diverse that their inclusion with them in one larger group can only be justified on the ground of convenience. Chlorophyceae include both marine and freshwater plants.

Euchlorophyceae in their turn have been until recently regarded as made up of the three series of families — Protocoecales, Confervales and Siphonales. As, the result of recent investigations by two Swedish algologists, Bohlin and Luther, it has been proposed to make a re-classification of a far-reaching nature. Algae are with- drawn from each of the three series enumerated above and con- solidated into an entirely new group. In these algae, the colouring matter is said to be yellowish-green, not strictly green, and con- tained in numerous small discoid chromatophores which are devoid of pyrenoids. The products of assimilation are stored up in the form of a fatty substance and not starch. A certain inequality in the character of the two cilia of the zoospores of some of the members of the group has earned for it the title Heterokontae, from the Greek koctos, a punting-pole. In consonance with this name, its authors propose to re-name the Conjugatae ; Akontae and Oedogoniaceae with a chaplet of cilia become Stephanokontae, and the algae remaining over in the three series from which the Heterokontae and Stephano- kontae are withdrawn become Isokontae. Conjugatae, Protocoecales and Characeae are exclusively freshwater; Confervales and Siphon- ales are both freshwater and marine, but the latter group attains its greatest development in the sea. • Some Chlorophyceae are terres- trial in habit, usually growing on a damp substratum, however. Trentepohlia grows on rocks and can survive considerable desicca- tion. Phycopeltis grows on the surface of leaves, Phyllobium and Phyllosiphon in their tissues. Comontia is a shell-boririg alga,

Fig. 2. — Chlorophyceae, variously magnified. A.

Chlamydomonas sp., unicellular ; chr. ,chromatophore ; £.,pyrenoid ; H. Oedogonium sp., intercalated growth by insertion of new piece(o)

leaving caps.

«., nucleus; p.v., pulsating vacuoles; e.s., eycspot. Bi. Volvox sp., with a, antheridia, and o, oogonia. B2. Volvox sp., surface view of a single cell showing connexions.

C. Pandorina sp., a 16-celled colony.

D. Hydrodictyon, a single mesh surrounded by 6 cells.

E. Microspora sp., showing H-pieces in the wall.

F. Entoderma sp., endophytic in Kctocarpus.

G. Coleochaete sp., growing as a plate.

L, -M, M 2 from Engler and Prantl, Pfianzenlamilien.by permission of Wilhelm Engelmann; Bˆ N from Vines, Students' Text Book 0! Botany by on of Swan bonnenscnem and Co.; B 2 , I>. O from Oltmanns, Morphologie u. Biologie der Algen, by permission of Gustav Fischer.)

(A, C, E, F, G, H, K,

permission

Dermalophyton grows on the carapace of the tortoise and Trichophilus in the hairs of the sloth. Certain Protococcales and Confervales exist as the gonidia of the lichenthallus.

The thallus is of more varied structure in this group than in any other. In the simplest case it may consist of a single cell, which may remain free during the whole of the greater part of its existence, or be loosely aggregated together within a common mucilage, or be held together by the adhesion of the cell-walls at the surface of contact. These aggregations or colonies, as they are termed, may assume the form of a plate, a ring, a solid sphere, a hollow sphere, a perforate sphere, a closed net, or a simple or branched filament. It is not easy in all cases to draw a distinction between a colony of plants and a multicellular individual. In a Volvox sphere, for example, there is a marked protoplasmic continuity between all the cells of the colony. The Ulvaceae, the

thallus of which consists of laminae, one or more cells thick, or hollow tubes, probably represent a still more advanced stage in the passage of a colony into a multi- cellular pjant. Here there is some amount of localization of growth and distinction of parts. It is only in such cases as Volvox and Llvaceae that there is any pretension to the formation of a true parenchyma within the limits of the Chlorophyceae. In the whole series of the Confervales, the thallus consists of filaments branched or unbranched, attached at one extremity, and growing almost wholly at the free end. The branches end in fine hairs in Chaeto-phoraceae. In Coleochaetaceae the branches are often welded into a plate, simulating a parenchyma. In all Conjugatae and most Protococcales, and in the bulk of the Confervales, the thallus consists of a cell or cells, the protoplast of which contains a single nucleus. In Hydrodjctyaceae, Cladophoraceae, Sphaeropleaceae and Gomonti- aceae this is no longer the case. Instead of a single relatively large

K. Struvea sp., showing branches forming a net-work.

L. Caulerpa sp., showing portion ‘of axis with leaf-like and root-like appendages.

Mi. Chara sp., axis with leaf-like appendages and a branch.

M 2 . Chara sp., apical region.

N. Botrydium,a simple siphonaceous alga with root-like attachment.

O. Acetabularia Mediterranea, mushroom-like calcareous siphona- ceous alga.

nucleus, each cell is found to contain many small nuclei, and is spoken of as a coenocyte. This character becomes still more pro-nounced in the large group of the Siphonales. Valoniaceae and Dasycladaceae are partially septate, but elsewhere no cellulose parti- tions occur, and the thallus is more or less the continuous tube from which the group is named. Yet the siphonaceous algae may assume great variety of form and reach a high degree of differentiation. Protosiphon and Botrydium, on the one hand, are minute vesicles attached to muddy surfaces by rhizoids; Caulerpa, on the other, presents a remarkable instance of the way in which much the same external morphology as that of cormophytes has been reached by a totally different internal

structure. Many Siphonales are encrusted with lime like Corallina among Red Algae. Penicillus is brush-like, Halimeda and Cymopolia are jointed, Acetabularia has much the same external form as an expanded Coprinus, Neomeris simulates the fertile shoot of Equisetum with its densely packed whorled branches, and in Microdictyon, Anadyomene, Struvea and Boodlea the branches, spreading in one plane, become bound together in a more or less close network. Characeae are separated from other Chlorophyceae by a long interval, and present the highest degree of differentiation of parts known among Green Algae. Attached to the bottom of pools by means of rhizoids, the thallus of Characeae grows upwards by means of an apical cell, giving off whorled appendages at regular intervals. The appendages have a limited growth ; but in con- nexion with each whorl there arise, singly or in pairs, branches which have the same unlimited growth as the main axis. There is thus a close approach to the external morphology of the higher plants. The streaming of the protoplasm, known elsewhere among Chloro- phyceae, is a conspicuous feature of the cells of Characeae.

The Chlorophyceae excel all other groups of algae in the magnitude

and variety of form of the chlorophyll-bodies. In Viva, and Meso- carpus the chromatophore is a single plate, which in the latter genus places its edge towards the incident light ; in Spirogyra they are spiral bands embedded in the primordial utricle; In Zygnema they are a pair of stellate masses, the rays of which branch peri- pherally; in Oedogonium they are longitudinally-disposed anasto- mosing bands; in Desmids plates with irregular margins; in Clado- phora polyhedral plates; in Vaucheria minute elliptical bodies occurring in immense numbers. Embedded in the chromatophore, much in the same way as the nucleus is embedded in the cytoplasm, are the pyrenoids. Unknown in Cyanophyceae and Phoeophyceae, known only in Bangiaceae and Nemalion among Rhodophyceae, they are of frequent occurrence among Chlorophyceae, excepting Characeae. Sometimes several pyrenoids occur in each chloroplast, as in Mesocarpus and Spirogyra ; sometimes only an occasional chloroplast contains pyrenoid at all, as in Cladophora. The pyrenoid seems to be of proteid nature and gelatinous consistency, and to arise as a new

formation or by division of pre-existing pyrenoids. When carbon-assimilation is active, starch-granules crowd upon the surface of the pyrenoid and completely obscure it from view.

Special provision for vegetative multiplication is not common among Chlorophyceae. Valonia and Caulerpa among Siphonales detach portions of their thallus, which are capable of independent growth. In Caulerpa no other means of multiplication is as yet known. In Characeae no fewer than four methods of vegetative reproduction have been described, and the facility with which buds and branches are in these cases detached has been adduced as an evidence of affinity with Bryophyta, which, as a class, are distinguished by their ready resort to vegetative reproduction.

With regard to true reproduction, which is characterized by the formation of special cells, the group Euchlorophyceae is characterized by the production of zoospores (Gr. ftjjoc, animal, a-wopi., seed) ; that is to say, cells capable of motility through the agency of cilia. Such ciliary motion is known in the adult condition of the cells of Volvocaceae, but where this is not the case the reproductive cells are endowed with motility for a brief period. The zoospore is usually a pyriform mass of naked protoplasm, the beaked end of which where the cilia arise is devoid of colouring matter. A reddish-brown body, known as the eyespot, is usually situated near the limits of the hyaline portion, and in the protoplasm contractile vacuoles similar to those of lower animals have been occasionally detected. The movement of the zoospore is effected by the lashing of the cilia and is in the direction of the beak, while the zoospore slowly rotates on its long axis at the same time. Usually two cilia are present ; in Botrydium and Hydrodictyon only one is present ; in certain species of Cladophora four; in Dasycladus a chaplet, and in Oedogonium a ring of many cilia. The so-called zoospore of Vaucheria is a coenocyte covered over with paired cilia corresponding in position to nuclei lying below. In all other cases, zoospores are uninucleate bodies. Zoospores arise in cells of ordinary size and form termed zoosporangia. In unicellular forms (Sphaerella) the thallus becomes transformed into a zoosporangium at the reproductive stage. In the zoosporangia of Oedogonium, Tetraspora and Coleochaete the con- tents become transformed into a single zoospore. In most cases repeated division seems to take place, and the final number is re-presented by some power of two. In coenocytic forms the zoospores would seem to arise simultaneously, probably because

many nuclei are already present. The escape of zoospores is effected by the degeneration of the sporangial wall (Chaetophora) , or by a pore (Cladophora) , a slit (Pediastrum), or a circular fracture (Oedogonium) . Zoospores are of two kinds: (i) Those which come to rest and ger- minate to form a new plant; these are asexual and are zoospores proper. (2) Those which are unable to germinate of themselves, but fuse with another cell, the product giving rise to a new individual ; these are sexual and are zoogametes (Gr. £<$ov, animal, and yaiih-qt, yafxtTri, husband, wife). When two similar zoogametes fuse, the process is conjugation, and the product a zygospore (Gr. fvy6j<, yoke). Usually, however, only one of the fusing cells is a zoogamete, the other gamete being a much larger resting cell. In such a case the zoogamete is male, is called an antherozoid or spermatozoid, and arises in an antheridium ; the larger gamete is an oosphere and arises in an oogonium. The fusion is now known as fertilization, and the product is an oospore. Reproduction by conjugation is also known as isogamy, by fertilization as oogamy. When zoospores come to rest, a new cell is formed and germination ensues at once. When zygospores and oospores are produced a new cell-wall is also formed, but a long period of rest ensues. All investigation goes to show that an essential part of sexual union is the fusion of the two nuclei concerned. It is interesting to know, on the authority of Oltmanns, that when the oosphere is forming in the oogonium of Vaucheria, there is a retrocession of all the included nuclei but one. That the antherozoid of Vaucheria contains a single nucleus had been inferred before.

From a comparison of those Euchlorophyceae which have been most closely investigated, it appears probable that sexual repro- ductive cells have in the course of evolution arisen as the result of specialization among asexual reproductive cells, and that in turn oogamous reproduction has arisen as the result of differentiation of the two conjugating cells into the smaller male gamete and the larger male gamete. It would further appear that oogamous

reproduction has arisen independently in each of the three main groups of Euchlorophyceae, viz. Protococcales, Siphonales and Confervales. Thus among Volvocaceae, a family of Protococcales while in some of the genera (Chloraster , Sphondylomorum) no sexual union has as yet been observed, in others (Pandorina, Chlorogonium , Stephanosphaera, Sphaerella) conjugation of similar gametes takes place, in others still (Phacotus, Eudorina, Volvox) the union is of the nature of fertilization. No other family

of Protococcales has advanced beyond the stage of isogamous reproduction. Again, among Siphon- ales only one family (Vaucheriaceae)has reached the stage of oogamy, although an incipient heterogamy is said to occur in two other families (Codiaceae, Bryopsidaceae). Elsewhere among Siphonales, in those cases where reproductive cells are known, the reproduction is either isogamous or asexual. Among Confervales there is no family in which sexual reproduction — isogamy or oogamy — is not known to occur among some of the component species, and as many as four families (Cylindrocapsaceae, Sphaeropleaceae, Oedogoniaceae, Coleo- chaetaceae) are oogamous. On these, as well as other grounds. Confervales are regarded as having attained to the highest rank among Euchlorophyceae. Although the phenomena attending isogamous and oogamous reproduction respectively are essentially the same in all cases, slight variations in both instances appear in different families, attributable doubtless to the independent origin of the process in different groups. Thus, although isogamy consists in typical cases of a union of naked motile gametes by a fusion which begins at the beaked ends, and results in the formation of an im- motile spherical zygote surrounded by a cell-wall, in Leptosira it is noticeable that the fusion begins at the blunt end ; in a species of Chlamydomonas the two gametes are each included in a cell-wall before fusion; and in many cases the zygote retains for some time its motility with the double number of cilia. Again, in oogamous reproduction, while in general only one oosphere is differentiated in the oogonium, in Sphaeroplea several oospheres arise in each oogonium ; and while the oospheres usually contract away from the oogonial wall, acquiring for themselves a new cell-wall after fertilization, in Coleochaete the oosphere remains throughout in contact with the oogonial wall. The oosphere is in all cases fertilized while still within the oogonium, the antherozoids being admitted by means of a pore. There is usually distinguishable upon the surface of the oosphere an area free from chlorophyll, known as the receptive spot, at which the fusion with the antherozoid takes place ; and in many cases, before fertilization, a small mucilaginous mass has been observed to separate itself off from the oosphere at this point and to escape through the pore. In Coleochaete the oogonial wall is drawn out into a considerable tube, which is provided with an apical pore, and this tube has a somewhat similar appearance to the imperforate trichogyne of Florideae to be hereafter described. In certain species of Oedogonium minute male plantlets, known as dwarf males, become attached to the female plant in the

neighbour- hood of the oogonia, thus facilitating fertilization. Indeed the genus Oedogonium exhibits a high degree of specialization in its reproduc- tive system, considering that its thallus has not advanced beyond the stage of an unbranched filament.

Many Euchlorophyceae are endowed with both asexual and sexual reproduction. Such are Coleochaete, Oedogonium, Cylindrocapsa, Ulothrix, Vaucheria, Volvox, &c. In others only the asexual method is yet known. When a species resorts to both methods, it is gener- ally found that the asexual method prevails in the early part of the vegetative period and the sexual towards the close of that period. This is in consonance with the facts already mentioned that zoo- spores germinate forthwith, and that the sexually-produced cell or zygote enters upon a period of rest. It is known that zoogametes, which usually conjugate, may, when conjugation fails, germinate directly (Sphaerella). In rare cases the oosphere has been known to germinate without fertilization (Oedogonium, Cylindrocapsa). The germination of a zygospore or oospore is effected by the rupture of an outer cuticularized exosporium ; then the cell may protrude an inner wall, the endosporium, and grow out into the new plant (Vaucheria), or the contents may break up into a first brood of zoospores. It is held that in Coleochaete a parenchyma results from the division of the oospore, from each cell of which a zoospore arises.

Reproduction is also effected among Euchlorophyceae by means •of aplanospores and akinetes. Aplanospores would seem to repre- sent zoospores arrested in their development; without reaching the stage of motility, they germinate within the sporangium. Akinetes are ordinary thallus cells, which on account of their acquisition of a thick wall are capable of surviving unfavourable conditions. Both aplanospores and akinetes may germinate with or without the formation of zoospores at the initial stage.

Among Conjugatae reproduction is effected solely by means of conjugation of what are literally aplanospores. Among those Desmidiaceae which live a free life, two plants become surrounded by a common mucilage, in which they lie either parallel (Closterium) or crosswise (Cosmarium) . Gaps then appear in the apposed sur- faces, usually at the isthmus; the entire protoplasts either pass out to melt into one another cleai of the old walls, or partly pass out and fuse without complete

detachment from the old walls. Among colonial Desmidiaceae, the break-up of the filament is a preliminary to this conjugation; otherwise the process is the same. The zygospore becomes surrounded with its own wall, consisting finally

of three layers, the outer of which is furnished with spicular prominences of various forms. In Zygnemaceae there is no dissolution of the filaments, but the whole contents of one cell pass over by means of a conjugation-tube into the cavity of a cell of a neighbour- ing filament, where the zygospore is formed by the fusion of the two

Fig. 3. — Chlorophyceae, variously magnified.

A. Spirogyra sp., in conjugation.

B. Zoospore of Pandorina. B234,

stages of conjugation.

C. Ulothrix sp., zoospores escap-

ing. C2 it, stages of con- jugation.

Oedogonium sp., oogonium at moment of fertilization with dwarf male attached.

Oedogonium sp. , zoospore with crown of cilia.

Coleochaete sp., with anthe- ridia and an oogonium.

Coleochaete sp., fertilized egg

Dj

E 3 .

H,

H 2 . Ki.

K 2

Coleochaete sp., zoospore. 3. Protosiphon, conjugation of zoogametes.

Derbesia sp., zoospore with chaplet of cilia.

Chara sp., oogonium and antheridium at a node on a lateral appendage.

Chara sp., antherozoid.

Vaucheria sp., oogonium and antheridium before fertiliz- ation.

Vaucheria sp., after fertiliza- tion.

with investment of filaments. (A from Cooke, British Freshwater Algae, by permission of Kegan Paul, Trench, Triibner and Co. ;C, E, F, G,H, K from Engler and Prantl, by permission of WilhelmEngel- mann; Bi from Vines, by permission of Swan Sonnenschein and Co.; B2, D from Oltmanns, by permission of Gustav Fischer. J

protoplasts. In these cases the activity of one of the gametes, and the passivity of the other, is regarded as evidence of incipient sex. In Siroˆonium there is cell-division in the parent-cell prior

to conjugation; and as two segments are cut off in the case of the active gamete, and only one in the case of the passive gamete, there is a corresponding difference of size, marking another step in the sexual differentiation. In Zygogonium, although no cell-division takes place, the gametes consist of a portion only of the contents of a cell, and this is regularly the case in Mesocarpaceae, which occupy the highest grade among Conjugatae. Some Zygnemaceae and Mesocarpaceae form either a short conjugating tube, or none at all, but the filaments approach each other by a knee-like bend, and the zygospore is formed at the point of contact, often being partially contained within the walls of the parent-cell. It would seem that in some cases the nuclei of the gametes remain distinct in the zygo- spore for a considerable time after conjugation. It is probable that in all cases nuclear fusion takes place sooner or later. In Zyg- nemaceae and Mesocarpaceae the zygospore, after a period of rest, germinates, to form a new filamentous colony; in Desmidiaceae its contents divide on germination, and thus give rise to two or more Desmids. Gametes which fail to conjugate sometimes assume the appearance of zygospores and germinate in due course. They are known as azygospores.

The reproduction of Characeae is characterized by a pronounced oogamy, the reproductive organs being the most highly differentiated among Chlorophyceae. The antheridia and oogonia are formed at the nodes of the appendages. The oogonium, seated on a stalk cell, is surrounded by an investment consisting of five spirally- wound cells, from the projecting ends of which segments are cut off, constituting the so-called stigma. The oosphere is not differentiated within the wall of the oogonium, but certain cells known as wendungs- zellen, the significance of which has given rise to much speculation, are cut off from the basal portion of the parent-cell during its develop- ment. The antheridia are spherical orange-coloured bodies of very complex structure. The antherozoid is a spirally-coiled thread of protoplasm, furnished at one end with a pair of cilia. It much more resembles the antherozoids of Bryophyta and certain Pteridophyta than any known among other algae. The fertilized egg charged with food reserves rests for a considerable period, surrounded by its cortex, the whole having assumed a reddish-brown colour. On germination it gives rise to a row of cells in which short (nodal) and long (inter- nodal) cells alternate. From the first node arise rhizoids; from the second a lateral bud, which becomes the new plant. This peculiar product of germination, which intervenes between the oospore and the adult form, is the proembryo. It will be remembered that in Musci, the asexual spore somewhat similarly gives rise to a protonema, from which the adult plant is produced as a lateral bud. The pro- embryonic branches of Characeae, one of the means of vegetative reproduction already referred to, are so called because they repeat the characters of the proembryo.

Before leaving the Chlorophyceae, it should be mentioned that the genus Volvox has been included by some zoologists (Biitschli, for example) among Flagellata; on the other hand, certain green Flagellata, such as Euglena, are included by some botanists (for example, van Tieghem) among unicellular plants. A similar uncertainty exists with reference to certain groups of Phaeophyceae, and the matter will thus arise again.

A census of the Chlorophyceae is furnished below: —

1. Confervoideae — 12 families, 77 genera, 1021 species.

2. Siphoneae-ˆ-Q families, 26 genera, 271 species.

3. Protococcoideae — 2 families, 90 genera, 342 species.

4. Conjugateae — 2 families, 33 genera, 1296 species.

(De Toni's Sylloge Algarum, 1889.)

5. Characeae — 2 families, 6 genera, 181 species.

(Engler and Prantl's Pflanzenfamilien, 1897.) III. Phaeophyceae. — The Phaeophyceae are distinguished by the possession of a brown colouring matter, phycophaein, in addition to chlorophyll. They consist of the following groups: — Fucaceae, Phaeosporeae, Dictyotaceae, Cryptomonadaceae, Peridiniaceae and Diatomaceae. Of these the first three include multicellular plants, some of them of great size ; the last three are unicellular organisms, with little in common with the rest excepting the possession of a brown colouring matter. Fucaceae and Phaeosporeae are doubtless closely allied, and -to these Dictyotaceae may be joined, though the relationship is less close. They constitute the Euphaeophyceae, and will be dealt with in the first place.

Euphaeophyceae are almost exclusively marine, growing on rocks and stones on the coast, or epiphytic upon other algae. In tidal seas they range from the limits of high water to some distance beyond the low-water line. On the British coasts zones are observ- able in passing from high to low water mark, characterized by the prevalence of different species, thus: — Pelvetia canaliculata, Fucus platycarpus, Fucus vesiculosus, Ascophyllum nodosum, Fucus serratus, Laminaria digitata. Some species are minute filamentous plants, requiring the microscope for their detection; others, like Lessonia, are of considerable bulk, or, like Macrocystis, of enormous length. In Fucaceae, Dictyotacea, and in Laminariaceae and Sphacelariaceae, among Phaeosporeae, the thallus consists of a true parenchyma; elsewhere it consists of free filaments, or filaments so compacted together, as in Cutleriaceae and Desm'arestiaceae, as to form a false parenchyma. In Fucaceae and Laminariaceae the inner tissue is differentiated into a conducting system. In Laminariaceae the in- flation of the ends of conducting cells gives rise to the so-called

trumpet-hyphae. In Nereocystis and Macrocystis a zone of tubes

occurs, which present the appearance of sieve-tubes even, to the eventual obliteration of the perforations by a callus. While there is a general tendency in the group to mucilaginous degeneration of the cell-wall, in Laminaria digitata there are also glands secreting a plentiful mucilage. Secondary growth in thickness is effected by the tangential division of superficial cells. The most fundamental external differentiation is into holdfast and shoot. In Laminariaceae secondary cylindrical props arise obliquely from the base of the thallus. In epiphytic forms the rhizoids of the epiphyte often penetrate into the tissue of the host, and certain epiphytes are not known to occur excepting in connexion with a certain host; but tq what extent, if any, there is a partial parasitism in these cases has not been ascertained. In filamentous forms there is a differentiation into branches of limited and branches of unlimited growth {Sphace- laria). In Laminariaceae there is a distinction of stipe and blade. The blade is centrally-ribbed in Alaria and laterally-ribbed in Macrocystis. It is among the Sargassaceae that the greatest amount of external differentiation, rivalling that of the higher leafy plants, is reached. A characteristic feature of the more massive species is the occurrence of air-vesicles in their tissues. In Fucus vesieulosus they arise in lateral pairs; in Ascophyttum they are single and median ; in Macrocystis one vesicle arises at the base of each thallus segment; in Sargassum and Halidrys the vesicles arise on special branches. They serve to buoy up the plant when attached to the sea-bottom, and thus light is admitted into the forest-like growths of the gregarious species. When such plants are detached they are enabled to float for great distances, and the great Sargasso Sea of the North Atlantic Ocean is probably only renewed by the constant addition of plants detached from the shores of the Caribbean Sea and Gulf of Mexico.

Growth in length is effected in a variety of ways. In Dictyota, Sphacelariaceae and Fucaceae there is a definite apical cell. In the first it is a biconvex lens, from which segments are continually cut off parallel to the posterior surface; and in the second an elongated dome, from which segments are cut off by a transverse wall. While, however, in Dictyota the product of the subsequent division in the segment enlarges with each subdivision, the divisions in the cylin- drical segment of Sphacelariaceae are such that the whole product after subdivision, however many cells it may consist of, does not exceed in bulk the segment as cut off from the apical cell. In Dictyotaceae the apical cell occasionally divides longitudinally,

and thus the dichotomous branching is provided for. In some Sphace- lariaceae branches may appear at their inception as lateral pro- tuberances of the apical cell itself. In Fucaceae an apical cell is situate at the surface of the thallus in a slit-like depression at the apex. From this cell segments are cut off in three or four lateral oblique planes.

A peculiar manner of growth in length is that to which the term trichothallic has been applied. It may readily be observed. that in the hair-like branches of Ectocarpaceae, the point at which most rapid division occurs is situate near the base of the hair. In Des- marestia and Arthrocladia, for example, it is found that the thalius ends in a tuft of such hairs, each of them growing by means of an intercalated growing point. In these cases, however, the portions of the hairs behind the growing region become agglutinated together into a solid cylindrical pseudo- parenchymatous axis. In Cutleria the laminated thallus is formed in the same way. The intercalated growing region of Laminaria affords an example of another variety of growth in Phaeophyceae. While the laminated portion of the thallus is being gradually worn off in our latitudes during the autumnal storms, a vigorous new growth appears at the junction of the stipe and the blade, as the result of which a new piece is added to the stipe and the lamina entirely renovated.

Both asexual and sexual reproduction occur among Euphaeo- phyceae. Fucaceae are marked by an entire absence of the asexual method. The sexual organs — oogonia and antheridia — are borne on special portions of the thallus in cavities known as conceptacles. Both organs may occur in one conceptacle, as in Pelvetia,_ or each may be confined to one conceptacle or even one plant, as in Fucus vesieulosus. The oogonia arise on a stalk cell from the lining layer of the cavity, the contents dividing to form eight oospheres as in Fucus, four as in Ascophyllum, two as in Pelvetia, or one only as in Halidrys. It would seem that eight nuclei primarily arise in all Fucaceae, and that a number corresponding to the number of oospheres subse- quently formed is reserved, the rest being discharged to the periphery, where they may be detected at a late stage. On the maturation of the oospheres the outer layer of the oogonial wall ruptures, and the oospheres, still surrounded by a middle and inner layer, pass out through the mouth of the conceptacle. Then usually these layers successively give way, and the spherical naked oospheres float free in the water. The antheridia, which arise in the conceptacular cavity as special cells of branched filaments, are

similarly discharged whole, the antherozoids only escaping when the antheridia are clear of the conceptacle. The antherozoids are attracted to the oospheres , round each of which they swarm in great numbers. Suddenly the attraction ceases, and the oosphere is fertilized, probably at that moment, by the entry of a single antherozoid into the substance of the oosphere; a cell-wall is formed thereupon, in some cases in so short an interval as five minutes. Remarkable changes of size and

outline of the oosphere have recently been described as accompany- ing fertilization in Halidrys. Probably the act of fertilization in plants has nowhere been observed in such detail as in Fucaceae. Dictyo- taceae resemble Fucaceae in their pronounced oogamy. They differ, however, in being also asexually reproduced. The asexual cells are immotile spores arising in fours in sporangia from superficial cells of the thallus. In Dictyota the oospheres arise singly in oogonia, crowded together in sori on the surface of the female plant. The antheridia have a similar origin and grouping on the male plant. Until the recent discovery by Williams of motility, by means of a single cilium, of the antherozoids of Dictyota and Taonia, they were believed to be immotile bodies, like the male cells of red seaweeds. In Dictyota the unfertilized oosphere is found to be capable of under- going a limited number of divisions, but the body thus formed appears to atrophy sooner or later.

Of the small family of the Tilopteridaceae our knowledge is as yet inadequate, but they probably present the only case of pro- nounced oogamy among Phaeosporeae. They are filamentous forms, exhibiting, however, a tendency to division in more than one plane , even in the vegetative parts. The discovery by Brebner of the specific identity of Haplospora globosa and Scaphospora speciosa marks an important step in the advance of our knowledge of the group. Three kinds of reproductive organs are known: first, sporangia, which each give rise to a single tetra-, or multi-nucleate non-motile, probably asexual spore ; second, plurilocular sporangia, which are probably antheridia, generating antherozoids; and third, sporangia, which are probably oogonia, giving rise to single uni- nucleate non-motile oospheres. No process of fertilization has as yet been observed.

The Cutleriaceae exhibit a heterogamy in which the female sexual cell is not highly specialized, as it is in the groups already described. From each locule of a plurilocular sporangium there is set free an oosphere, which, being furnished with a pair of cilia,

swarms for a time. In similar organs on separate plants the much smaller anthero- zoids arise. Fertilization has been observed at Naples ; but it appar- ently depends on climatic conditions, as at Plymouth the oospheres have been observed to germinate parthenogenetically. The asexual organs in the case of Cutleria multifida arise on a crustaceous form, Aglaozonia reptans, formerly considered to be a distinct species. They are unilocular, each producing a small number of zoospores. _

The possession of two kinds of reproductive organs, unilocular and plurilocular sporangia, is general among the rest of the Phaeo- sporeae. Bornet, however, called attention in 1871 to the fact that two kinds of plurilocular sporangia occurred in certain species of the genus Ectocarpus — somewhat transparent organs of an orange tint producing small zoospores, and also more opaque organs of a darker colour producing relatively larger zoospores. On the dis- covery of another such species by F. H. Buffham, Batters in 1892 separated the three species, Ectocarpus secundus, E. fenestrates, E. Lebelii, together with the new species, into" a genus, Giffordia, characterized by the possession of two kinds of plurilocular sporangia. The suspicion that a distinction of sex accompanied this difference of structure has been justified by the discovery by Sauvageau of undoubted fertilization in Giffordia secunda and G. fenestrata. The conjugation of similar gametes, arising from distinct plurilocular sporangia, was observed by Berthold in Ectocarpus siliculosus and Scytosiphon lomentarius in 1880; and these observations have been recently confirmed in the case of the former species by Sauvageau, and in the case of the latter by Kuckuck. In these cases, however, the potential gametes may, failing conjugation, germinate directly, like the zoospores derived from unilocular sporangia. The assertion of Areschoug that conjugation occurs among zoospores derived from unilocular sporangia, in the case of Dictyosiphon hippuroides, is no doubt to be ascribed to error of observation. It would thus seem that the explanation of the existence of two kinds of sporangia, unilocular and plurilocular, among Phaeosporeae, lies in the fact that unilocular sporangia are for asexual reproduction, and that plurilocular sporangia are gametangia — potential or actual. It must, however, be remembered that so important a generalization is as yet supported upon a somewhat narrow base of observation. _ More- over, for the important family of the Laminariaceae only unilocular sporangia are known to occur; and for many species of other families, only one or other kind, and in some cases neither

kind, has hitherto been observed. . The four species — Ectocarpus siliculosus, Giffordia secunda, Cutleria multifida and Haplospora globosa — may be taken to represent, within the Phaeosporeae, successive steps in the advance from isogamy to oogamy.

The Peridiniaceae have been included among Flagellata under the title of Dinoflagellata. The majority of the species belong to the sea, but many are found in fresh water. The thallus is somewhat spherical and unicellular, exhibiting a distinction between anterior and posterior extremities, .and dorsal and ventral surfaces. The wall consists of a basis of cellulose, and in some cases readily breaks up into a definite number of plates, fitting into one another like the plates of the carapace of a tortoise ; it is, moreover, often finely sculptured or coarsely ridged and flanged. Two grooves are a constant feature of the family, one running transversely and another longitudinally. In these grooves lie two cilia, attached at the point of meeting on the dorsal surface. The protoplast is uninucleate and vacuolate, and contains chromatophores of a brownish colour. It is not clear that

Fig. 4.

A. Halopteris, apical region.

B. Chordaria sp., apical region showing so-called trichothallic growth.

C. Dictyota sp., apical cells immediately after dichotomy.

D. Cutleria sp., margin of thallus showing trichothallic growth.

E. Halidrys, apical depression with leading cell.

F. Macrocystis sp., tubular elements from the medulla, with sieve-like

transverse walls.

G. Laminaria sp., hyphae with trumpet-like ends also from medulla. H. Elachistea sp., plurilocular sporanges.

Phaeophyceae, variously magnified.

K. Ectocarpus sp., unilocular sporange.

L. Ectocarpus siliculosus, female gamete surrounded by male gametes.

a, b, c, d, e, stages of conjugation. M. Cutleria multifida. a, antherozoids, b, a female gamete. Ni. Fucus vesiculosus, young oogonium.

N2. Fucus vesiculosus, discharge of eight oospheres from oogonium. O. Laminaria sp., sporanges among paraphyses. P. Dictyota dichotoma, a sorus of oogonia. Q. Dictyota dichotoma, part of a sorus of antheridia.

(A, B, C, D, E, H, L, M, P, from Engler and PrantI, by permission of Wilhelm Engeimann; F, G, K, O, from Oltmanns, by permission of Gustav Fischer; , Q, from The Annals of Botany, by permission of the Clarendon Press; N lt N 3 , from Hauck, Meeresalgen, by permission of Eduard Kummer.)

the brown colouring matter which is added to chlorophyll is identical with phycophaein ; two varieties of it have been termed phycopyrrin and peridinine. Certain species, such as Gymnodinium spirale, are colourless and therefore saprophytic in their method of nutrition. Multiplication takes place in some cases by the endogenous formation of zoospores, the organism having come to rest ; in others by longi- tudinal division, when the organism is still motile. No method of sexual reproduction is known with certainty.

The Cryptomonadaceae also are unicellular, and live free or in colonies. Each cell contains a flattened chromatophore of a brown or yellow colour. Hydrurus forms a branched gelatinous colony attached to stones in mountain streams. Chromophyton forms an eight-celled colony. Both plants multiply solely by means of zoo- spores. The Cryptomonadeae and Chromulineae are motile through the greater part of their life. Cryplomonas,_ when dividing in a mucilage after encystment, recalls the condition in Gloeocyshs. In Synura and Chromulina the cells form a spherical motile colony, recalling Volvocaceae. Chromulina is uniciliate, and is contained in a hyaline capsule. Like the Peridiniaceae, the Cryptomonadaceae have been included among Flagellata. They have no close affinity with

Euphaeophyceae. Such colonial forms as ffydrurus and Phaeocystis are supposed, however, to indicate a stage in the passage to the multicellular condition.

Diatomaceae have long been recognized as plants. Together with Peridiniaceae they constitute the bulk of marine plankton, and thus play an important part in the support of marine animal life. They exhibit striking adaptations in these circumstances to the floating habit. (See Diatomaceae.)

A census of Phaeophyceae is given below: —

(1) Cyclosporinae (Fucaceae) — 4 families, 32 genera, 347 species.

(2) Tetrasporinae (Dictyotaceae)— I family, I7genera,i30 species.

(3) Phaeozoosporineae (Phaeosporeae) — 24 families, 143 genera,

571 species.

(De Toni's Syttoge Algarum.)

(4) Peridiniales — 3 families, 32 genera, 167 species.

(5) Cryptomonadaceae (including Chrysomonadaceae) — 2 families,

28 genera, 50-60 species.

(6) Bacillariales (Diatomaceae) — about 150 genera and 5000

species, fossil and recent.

(Engler and Prantl's Pflahzenfamilien.)

IV. Rhodophyceae, or Florideae. — The members of this group are characterized by the possession of a red colouring matter, phycoerythrin, in addition to chlorophyll. There is, however, a considerable amount of difference in the shades of red which mark different specie^. The brightest belongs to those species which grow near low-water mark, or under the shade of larger algae at higher levels; species which grow near high-water mark are usually of so dark a hue that they are easily mistaken for brown seaweeds. Rhodophyceae are mostly marine, but not exclusively so. Thorea, Lemanea, Tuomeya, Stenocladia,

Batrachospermum, Balbiania are genera belonging entirely to fresh water; and Bangia, Chantransia, Caloglossa, Bostrychia and Delesseria contain each one or more freshwater species. Most of the larger species of marine Rhodo- phyceae are attached by means of a disc to rocks, stones or shells. Many are epiphytic on other algae, more especially the larger Phaeo- phyceae and Rhodophyceae. As in the case of epiphytic brown seaweeds, the rhizoids of the epiphyte often penetrate the substance of the supporting alga. Some Red Algae find a home in the gela- tinous substance of Flustra, Alcyonidium and other polyzoai only emerging for the formation of the reproductive organs. Some are perforating algae and burrow into the substance of molluscan shells, in company with certain Green and Blue-green Algae. Some species belonging to the families Squamariaceae and CorallinaCeae grow attached through their whole length and breadth, and are often encrusted with lime. The forms which grow away from the sub- stratum vary greatly in external configuration. In point of size the largest cannot rival the larger Brown Algae, while the majority require the aid of the microscope for their investigation.

No unicellular Rhodophyceae are known, although a flagellate organism, Rhodomonas, has recently been described as possessed

of the same red colouring matter. If the sub-group, Bangiaceae, be excluded, they may be said to consist exclusively of branched filaments. Growth in these cases takes place by means of an apical cell, from which successive segments are cut off by means of a transverse wall. The segment so cut off does not usually divide again by means of a transverse wall, nor indeed by a longitudinal wall which passes through the organic axis of the cell. New cells may be cut off laterally, which become the apical cells of branches. When the new cells grow no further, but constitute a palisading round the central cell covering its whole length, the condition is reached which characterizes the species of Polysiphonia, the ” siphons “of which may be regarded as one-celled branches. To the law that no subsequent transverse division takes place in segments cut off from the apical cell, there seem to be two exceptions: first, the calcareous genus Corallina, in the pliable joints of which inter- calated division occurs; and, second, the Nitophylleae, in which, moreover, median

longitudinal division of axial cells is said to occur. Like the Fungi, therefore, the Red Algae consist for the most part of branched filaments, even where the thallus appears massive to the eye, and, as in the case of Fungi, this fact is not inconsistent with a great variety of external morphology. In the great majority the thallus is obviously filamentous, as in some species of Callitham- nion. In other species of that genus an apparent cortication arises by the downward growth of rhizoids, which are retained within the gelatinous wall of the axial cells. In Batrachospermum the whole system o/ branches are retained within a diffluent gelatinous sub- stance derived from the outer layers of the cell-walls. In other cases the mucilage is denser and the branches more closely compacted (Helminthora). In such cases as Lemanea, the terminal cells of the lateral branches form a superficial layer which has all the appearance of a parenchyma when viewed from the surface. In Champia and allied genera, the cylindrical axis is due not to the derivatives of one axial filament, but of several, the growth of which is co-ordinated to form a/ septated tube. The branching of the thallus, which meets the eye in all these cases, is due to the unlimited growth of a few branches. When such a lateral branch overtops the main axis whose growth has become limited, as in Plocamium and Dasya, a sympodium is formed. For the most part the branching is mono- podia!. Besides the differentiation into holdfast and shoot, and into branches of limited and branches of unlimited growth, there appear superficial structures of the nature of hairs. These are for the most part long, thin-walled, unicellular and colourless, and arise from the outer cells of the pseudo-cortex, or from the terminal cells of branches when the filaments are free. Among Rhodomelaceae , hair-like structures of a higher order are known. These arise from the axial cell, and are multicellular and branched. They soon fall off, and it is from the persistent basal cell that the branches of un- limited growth arise. Upon them also the reproductive organs arise in this family. It is not surprising, therefore, that they have been regarded as the rudiments of leaves. In Iridaea the thallus is an entire lamina; in Callophyllis a lobed lamina; in Delesseria it is provided with midrib and veins, simulating the appearance of a leaf of the higher plants; in Constantinea the axis remains cylindrical, and the lateral branches assume the form of leaves. In the compact thalli a secondary development often takes place by the growth of rhizoid-like internal filaments. They present a hypha-like appear- ance, running longitudinally for considerable distances. It is not difficult in such compact species to distinguish between

superficial cells, whose chief function is assimilation, subjacent cells charged with reserve material, and a core of tissue engaged in the convection of elaborated material from part to part.

An interesting feature of the minute anatomy of Euflorideae, as the Red Algae, exclusive of the Bangiaceae, have been termed, is the existence of the so-called Floridean pit. When a cell divides it is found that there remains in the middle of the new wall a single large circular pit, which persists throughout the 'life of the cells, becoming more and more conspicuous with the progress of the thickening of the wall. These pits serve to indicate the genetic relationship of adjacent cells, when they form a compact p&eudo-parenchyma, not- withstanding the fact that somewhat smaller secondary pits appear later between any contiguous cells. Protoplasmic continuity has been observed in the delicate membrane closing the pit.

Vegetative multiplication occurs only sparingly in Rhodophyceae. Melobesia callithamnioides gives rise to multicellular propagula; Griffithsia corallina is said to give rise to new individuals, by detach- ing portions of the thallus from the base of which new attachment organs have already arisen. The spores of Monospora are by some regarded as unicellular propagula. Reproduction is both asexual and sexual. It is noteworthy that although all the members of the group are aquatic no zoospores are produced, a negative character common to them and the Blue-green Algae. As a rule the asexual cells, and the male and female sexual cells arise upon different plants, so that the species may be said to be trioecious. Numerous exceptions, however, occur. Thus in Lemaneaceae asexual spores are unknown; in Batrachospermum, Bonnemaisonia and Polysiphonia byssoides both kinds of sexual cells appear on the same plant; and in some cases the asexual cells may occur in conjunction with either the male or female 9exual cells. The asexual cells are termed tetra- spores on account of the usual occurrence of four in each sporangium. What may be termed monospores, bispores and octospores, however,

are not unknown. The sporangia may be terminal or intercalated. When they are confined to special branches such branches are spoken of as stichidia. The tetraspores may arise by the simultane- ous division of the contents of a sporangium, when they are arranged tetrahedrally, or they may arise by two successive divisions, in which case the arrangement may be zonate when the spores are in a row, or cruciate when the second

divisions are at right angles to the first, or tetrahedral when the second divisions are at right angles to the first and also to one another. Tetraspores are at first naked, but soon acquire a cell-wall and germinate without a period of rest. The male sexual cells are produced singly in the terminal cells of branches. They are spoken of as spermatia. Great numbers of antheridia are usually crowded together, when the part is distinguishable by the absence of the usual red colour. In Polysiphonia they cover the joints of the so-called leaves; in Chondria they arise on flattened disks ; in the more massive forms they arise in patches on the ordinary surface; in a few cases (Gracilaria, Corallina, Galaxaura) they line the walls of conceptacle-like depressions. The female sexual cell is represented by the contents of a cell which is terminal on ordinary or specialized branches. This is the carpogonium; it consists of a ventral portion which contains a nucleus, but in which no oosphere is differentiated, and an elongated tubular portion known as the trichogyne, into which the cytoplasm extends. Fertilization is effected by the passive convection of a spermatium from the anthe- ridium to the trichogyne, to which it adheres, and to which it passes over its nucleus through an open communication set up at the point of contact. The nucleus then passes down the trichogyne and fuses with that of the egg. This fusion has been observed by Wille in Nemalion multifidim, and by Schmidle in Batrachospermum. It is singular that in the last-named species two nuclei occur regularly in the spermatium. The ventral portion of the carpogonium may be imbedded deep in the thallus in the massive species; the tricho- gyne, however, always reaches the surface. The first effect of fertilization is the occlusion of the trichogyne from the fertilized carpogonium. The subsequent course of development is character- istic of the Florideae. The carpogonium germinates forthwith, drawing its nourishment almost wholly from the parent plant. The ultimate product in all cases is a number of carpospores, but before this stage is reached the development is different in different sub- groups. In Batrachospermum filaments arise from the carpogonium on all sides; in Chantransia and Scinaia on one side only; in Helminthora the filaments are enclosed in a dense mucilage; in Nemalion, prior to the formation of the filaments, a sterile segment is cut off below. In all these cases, however, the end-cells of the filaments each give rise to a carpospore, and the aggregate of such sporiferous filaments is a cystocarp. Again, in the family of the Gelidiaceae, the single filament arising from the carpogonium grows back into the tissue and preys upon the cells of the axis and larger

branches, after which the end-cells give rise to carpospores and a diffused cystocarp is formed. In the whole group of the Cryptonemiales the parasitism becomes more marked still. The filaments arising from the carpogonia grow into long thin tubes, which fuse with special cells rich in protoplasm contents ; and from these points issue isolated tufts of sporogenous filaments, several of • which may form the product of one fertilized female cell. In Naccaria, one of the Gelidiaceae, it is observable that the ooblastema filament, as the tube arising from the fertilized carpogonium has been called, fuses completely with a cell contiguous to the carpogonium before giving rise to the foraging filaments already referred to. This is also the case among Cryptonemiales. In a whole series of Red Algae, the existence of a highly specialized auxiliary cell in the neighbourhood of the carpogonium is a characteristic feature. In the Gigartinales it is already differentiated previous to fertilization ; in Rhodymeniales it arises subsequent to fertilization. In the Gigartinales, the fila- ments which arise from the auxiliary cell may spread and give rise to isolated tufts of sporogenous filaments, as in the Cryptonemiales. In the Rhodymeniales a single tuft arises directly from the auxiliary cell. The carpospores are in all cases bright red naked masses of protoplasm when first discharged. They soon acquire a cell-wall, and germinate without a period of rest. When the cystocarps or segments of cystocarps are formed in the substance of a thallus, the site is marked merely by a swelling of the substance. When the cystocarp is produced externally, it may form a berry-like mass without an envelope, in which case it is known as a favella. In Rhodomelaceae there is a special urn-shaped envelope surrounding the sporogenous filaments. This is a ceramidium.

The attachment of the cell of an ooblastema filament to a cell of the thallus may be effected by means of a minute pore, or the two cells may fuse their contents into one protoplasmic mass. In the latter case, and especially where the union is with a special auxiliary cell, it is of importance to know what happens to the nuclei of the fusing cells. Schmitz was of opinion that in the cases of open union there occurred a fusion of nuclei similar to that which occurs in the sexual union of two cells. He founded his generalization to a large extent upon the observation that in Gloeosiphonia capillaris two cells completely fuse, and that only one nucleus can be detected in the fused mass. Oltmanns has recently re-investigated the phenomena in this plant, among others, and has shown that the nucleus of the cell which is being

preyed upon recedes to the wall and gradually atrophies. The nucleus of the ooblastema filament dominates the

c.

D. E. F. G.

Polysiphonia sp., apical region showing leading cell and cutting off of pericentral cell.

Polysiphonia sp., transverse section through a branch, and at a, mother-cell of tetraspores.

Lomentaria sp., apex showing growth in length through co-ordinated growth of many filaments.

Delesseria sp., showing apical region with leading cell.

Chrysymenia uvaria, axis with swollen leaf-like appendages.

Polyzonia sp., branch with leaf-like branches of limited growth.

Callithamnion sp., tetrasporangium with spores arranged in a tetrad. ,

Corallina sp., tetrasporangia with zonate arrangement ot tetra-spores.

Fig. 5. — Rhodophyceae, variously magnified.

K. Nemalion sp., carpogonial and antheridial branches.

L. Batrachospermum sp., trichogyne with spermatia attached ; carpo- spores arising from fertilized carpogonium.

M. Polysiphonia sp., antheridium.

N. Constantinea sp., with flattened leaf -like appendages.

O. Dudresnaya coccinea, fusion of ooblastema filaments with auxil- iary cells; a is an axial cell in transverse section with four appendages.

P. Callithamnion corymbosum, a joint cell with carpogonial branch and a, b, two auxiliary cells._

Q. Callithamnion corymbosum, fusion of products of fertilization with auxiliary cells, the nuclei of which a and b retire to the wall.

R. Polysiphonia sp., section through young cystocarp.

(\ C D E, F, G, H, K, L, M, P, Q, from Oltmanns, by permission of Gustav Fischer; B, N, O, R, from Engier and PrantI, by permission of W'ilhelm Engelmann,)

mass and from it all the nuclei of the carpospores are thus derived. There thus seems to be no justification for believing, as Schmitz taught, that a second sexual act occurs in the life-cycle of these Florideae. ...

The Bangiales are a relatively small group of Ked Algae, to which much of the description now given does not apply. Structurally they are either a plate of cells, as in Porphyra, or filaments, as in

Bangia. There is no exclusive apical growth, and the cells divide in all directions. The characteristic pit is also absent. Sexual and asexual reproduction prevail. The male cell is a spermatium, but the female cell bears no such receptive trichogyne as occurs in other Rhodophyceae. After fertilization the equivalent of the_ oospore divides directly to form a group of carpospores. There is thus a certain resemblance to Euflorideae, but sufficient difference to necessi- tate their being grouped apart. Fertilization by means of non-motile spermatia and a trichogyne are known among the Fungi in the families Collemaceae and Laboulbeniaceae.

A census of Rhodophyceae is furnished below. —

(1) Bangiaceae— 4 families, 9 genera, 58 species.

(2) Nemalioninae— 4 families, 33 genera, 343 species.

(3) Gigartininae — 3 families, 54 genera, 409 species.

(4) Rhodymeninae — 4 families, 92 genera, 602 species.

(De Toni's Sylloge Algarum, 1897.)

After this survey of the four groups comprised under Algae it is easier to indicate the variations in the limits of the class as defined by different authorities. To consider the Cyanophyceae

first, either the marked contrast in the method of nutrition of the generally colourless Bacteriaceae to that of the blue-green Cyanophyceae is regarded as sufficient ground for Limttsot excluding Bacteriaceae from algae altogether, notwith- the algae. standing their acknowledged morphological affinity with Cyanophyceae, or, in recognition of the incongruity of effecting such a separation, the whole group of the Schizophyta — that is to say, the Cyanophyceae in the narrow sense, together with Bacteriaceae, is included or excluded together. Again, while Conjugatae may be shut out from Chlorophyceae as an independent group co-ordina te with them in rank, the Characeae constitute so aberrant a group that it has even been proposed to raise them as Charophyta to the dignity of a main division co-ordinate with Thallophyta. Similarly, while Diatomaceae may be excluded from among Phaeophyceae, though retained among algae, the Cryptomonadaceae and Peridiniaceae, like Euglena and other Chlorophyceae, may be excluded from Thallophyta and ranged among the flagellate Protozoa. It is doubtful, however,

whether the conventional distinction between plants and animals will continue to be urged; and the suggestion of Haeckel that a class Protista should be established to receive the forms exhibiting both animal and plant affinities has much

to recommend it on phylogenetic grounds. To adopt a figure, it is probable that the sources from which the two streams of life — animal and vegetable — spring may not be separable by a well-defined watershed at all, but consist of a great level upland, in which the waterways anastomose. Finally, while Chloro- phyceae and Phaeophyceae exhibit important affinities, the Rhodophyceae are so distinct that the term ” algae ” cannot be made to include them, except when used in its widest sense.

It has been well said that the attempt to classify plants according to their natural affinities is an attempt to construct „. 7 for them the genealogical tree by which their relation-

ships can be traced. Algae are, however, so hetero- geneous a class, of which the constituent groups are so inadequately known, that it is at present futile to endeavour thus to exhibit their pedigree. A synoptical representation of the present state of knowledge would be expressed by a network rather than by a tree. The following table is an adaptation of a scheme devised by Klebs, and indicates the inter-relationships

Protozoa

Flagellata / protomastigina.

Eujrleneae

Peridiniaceae Diatomaceaa

I ˆCryptomonadaceae — Hydruraceae — Euphaeofhyoeak

.Bacteriaceae

C YANOPH YCEAK. . .

Thoreaceae

I .Bangiaceae — Euflokideae

Chloromonadinae

Yolvocaceae

Pleurococcaceae— Endosphaeraceae jhlorosphaeraceae"'Cox jugata E .Siphonales

Tetrasporaceaoˆ

Ulvaceae

-CONFERVALEH :'. .... CHARACEAE

of genera' tions.

Fuwdi Bryophyta

of the various constituent groups. The area included in the thick boundary line represents algae in the widest sense in which the term is used, and the four included areas the four main subdivisions. A continuous line indicates a, close affinity, and a dotted line a doubtful relationship.

In comparing algae with the great archegoniate series which has doubtless sprung from them, it is natural to inquire to what extent, if any, they present evidence of the existence Alternation Q f ˆ jerked alternation of generations which dominates the life-history of the higher plants. Turn- ing first to the Rhodophyceae, both on account of the high place which they occupy among algae and also the remark- able uniformity in their reproductive processes, it is clear that, as is the case among Archegoniatae, the product of the sexual act never germinates directly into a plant which gives rise to the sexual organs. Even among Bangiaceae the carpospores arise from the fertilized cell by division, while in all other Rhodo- phyceae the oospore, as it may be called, gives rise to a fila- mentous structure, varying greatly in its dimensions, epiphytic, and to a large extent parasitic upon the egg-bearing parent plant, and in the end giving rise to carpospores in the terminal cells of certain branches. There is here obviously a certain parallelism with the case of Bryophyta, where the sporogonium arising from the oospore is epiphytic and partially parasitic upon the female plant, and always culminates in the production of spores. Not even Riccia, with its rudimentary sporogonium, has so simple a corresponding stage as Bangia, for, while there is some amount of sterile tissue in Riccia, in Bangia the oospore completely divides to form

carpospores. Excluding Bangiaceae, however, from consideration, the Eufloridеae present in the product of the development of the oospore like Bryophyta a structure partly sterile and partly fertile. There is, nevertheless, this important difference between the two cases. While the spore of Bryophyta on germination gives rise to the sexual plant, the carpospore of the alga may give rise on germination to a plant bearing a second sort of asexual cells, viz. the tetra- spores, and the sexual plant may only be reached after a series

of such plants have been successively generated. It is possible, however, that the tetraspore formation should be regarded as comparable with the prolific vegetative reproduction of Bryo- phyta, and in favour of this view there is the fact that the tetraspores originate on the thallus in a different way from carpospores with which the spores of Bryophyta are in the first place to be compared; moreover, in certain Nemalionales the production of tetraspores does not occur, and the difficulty referred to does not arise in such cases. Altogether it is difficult on morphological grounds to resist the conclusion that Florideae present the same fundamental phenomenon of alternation of generations as prevails in the higher plants. It is by means of the cytological evidence, however, that this problem will finally be solved. As is well known, the dividing nuclei of the cells of the sporophyte generation of the higher plants exhibit a double number of chromosomes, while the dividing nuclei of the cells of the gametophyte generation exhibit the single number. In a fern-plant, for example, which is a sporophyte, every karyokinesis divulges the double number, while in the prothallium, which is the gametophyte generation, the single number appears. The doubling process is provided by the act of fertilization, where an antherozoid with the single number of chromosomes fuses with an oosphere also with the single number to provide a fertilized egg with the double number. The reduction stage, on the other hand, is the first division of the mother-cell of the spore. From egg to spore-mother-cell is sporophyte; from spore-mother-cell to egg is gametophyte. And since this rule has been found to hold good for all the archegoniate series and also for the flowering plants where, however, the gametophyte generation has become so extremely reduced as to be only with difficulty dis- cerned, it is natural that when alternation of generation is stated to occur in any group of Thallophyta it should be required that the cytological evidence should support the view. The genus Nemalion has been recently investigated by Wolfe with the object

of examining the cytological evidence. He finds that eight chromosomes appear in karyokinesis in the ordinary thallus cells, but sixteen in the gonimoblast filaments derived from the fertilized carpogonium. Eight chromosomes appear again in the ultimate divisions which give rise to the carpospores. Upon the evidence it would seem therefore that so far as Nemalion is concerned an alternation occurs comparable with that existing in the lower Bryophyta where the sporophyte is relatively small, being attached to and to some extent parasitic upon the gametophyte. Nemalion is, however, one of those Florideae in which tetraspores do not occur. What is the case with those Florideae which have been described as trioecious? If the sporophyte generation is confined to the cystocarp, is the tetrasporiferous plant, as has been suggested, merely a potential gametophyte reproducing by a process analogous to the bud-formation of the Bryophyta? In answer to this question a recent writer, Yamanouchi, states in a preliminary communica- tion that he has found that in Polysiphonia violacea the germinat- ing carpospores exhibit forty chromosomes, and the germinating tetraspores twenty chromosomes. From this it would seem that in this plant reduction takes place in the tetraspore mother- cell, and that the tetrasporiferous plants are sporophytes which alternate with sexual plants. Novel as this result may seem, the tetraspores of Florideae become hereby comparable with the tetraspores of Dictyota, to which reference will be made hereafter. But it is clear that it becomes on this view increas- ingly difficult to explain the occasional occurrence of tetraspores on male, female and monoecious plants or the role of the carpospores in the life-cycle of Florideae. The results of future research on the cytology of the group will be awaited with interest.

Among Phaeophyceae it is well known that the oospore of Fucaceae germinates directly into the sexual plant, and there is thus only one generation. Moreover, it is known that the re- duction in the number of chromosomes which occurs at the initiation of the gametophyte generation in Pteridophyta occurs

in the culminating stage of Fucus, where the oogonium is separated from the stalk-cell, so that unless it be contended that the Fucus is really a sporophyte which does not pro- duce spores, and that the gametophyte is represented merely by the oogonium and antheridium, there is no semblance of alternation of

generation in this case. The only case among Phaeophyceae which has been considered to point to the existence of such a phenomenon is Cutleria. Here the asexual cells are borne upon the so-called Aglaozonia replans and the sexiial cells upon the plants known as Cutleria. The spores of the A glaozonia form are known to give rise to sexual plants, and the oospore of Cutleria has been observed to grow into rudimentary Aglaozonia. Latterly, however, as the result of the cytological investigations of Mottier and Lloyd Williams, great advance has been made in our knowledge of the conditions existing in Diclyota. Mottier first observed that a reduction in the number takes place in the mother-cells of the tetraspore. It will be remembered that, as in most Florideae, the male, female and asexual plants are distinct in this genus. Mottier's observation has been confirmed by Lloyd Williams, who has shown, moreover, that the single number occurs in germlings from the tetraspore, and also in the adult stages of all sexual plants, while the double number occurs in germlings from the oospore, and in adult stages of all asexual plants. It is probable, therefore, that we have here a sharp alternation of generations, both generations being, however, precisely similar to the eye up to point of reproduction. Among Cblorophyceae it is often the case that the oospore on germination divides up directly to form a brood of zoospores. In Coleochaeie this seems to be preceded by the formation of a minute parenchymatous mass, in each cell of which a zoospore is produced. In Sphaeroplea it is only at this stage that zoospores are formed at all; but in most cases, such as Oedogonium, Ulothrix, Coleochaete, similar zoospores are pro- duced again and again upon the thallus, and the product of the oospore may be regarded as merely a first brood of a series. It has been held by some, however, that the first brood corre- sponds to the sporophyte generation of the higher plants, and that the rest of the cycle is the gametophyte generation. Were the case of Sphaeroplea to stand alone, the phenomenon might perhaps be regarded as an alternation of generations, but still only comparable with the case of Bangia, and not the case of the Florideae. But it is difficult to apply such a term at all to those cases in which there intervene between the oospore and the next sexual stage a series of generations, the zoospores of which are all precisely similar.

The difficulty of tracing the relationships of algae is largely due to the inadequacy of our knowledge of the conditions under

which they pass through the critical stages of their mor'phlsm

life-cycle. Of the thousands of species which have

been distinguished, relatively few have been traced from spore to spore, as the flowering plants have been observed from seed to seed. The aquatic habit of most of the species and the minute size of many of them are difficulties which do not exist in the case of most seed-plants. From the analogy of the higher plants observers have justly argued that when they have seen and marked the characters of the reproductive organs they have found the plant at the stage when it exhibits its most note-worthy features, and they have named and classified the species in accordance with these observations. While even in such cases it is obvious that interesting stages in the life of the plant may escape notice altogether, in the cases of those plants the reproduction of which is unknown, and which have been named and placed on the analogy of the vegetative parts alone, there is considerable danger that a plant may be named as a distinct species which is only a stage in the life of another distinct and perhaps already known species. To take an example, Lemanea and Batrachospermum are Florideae which bear densely-whorled branches, but which, on the germination of the carpospore, give rise to a laxly-filamentous, somewhat irregularly-branched plant, from which the ordinary sexual plants arise at a later stage. This filamentous structure has been attributed to the genus Chantransia, which it greatly resembles, especially when, as is

said to be the case in Batrachospermum, it bears similar mono-spores. The true Chantransia, however, bears its own sexual organs as well as monospores. To the specific identity of Haplospora globosa and Scaphospora speciosa, and of Cutleria multifida and Aglaozonia reptans, reference has already been made. Again, many Green Algae — some unicellular, like Sphaerella and Chlamydomonas; some colonial forms, like Volvox and Hormotila; some even filamentous forms, like Ulothrix and Sligeoclonium — are known to pass into a condition resembling that of a Palmella, and might escape identification on this account.

It is, on the other hand, a danger in the opposite sense to conclude that all Chantransia species are stages in the life-cycle of other plants, and, similarly, that all irregular colonial forms, like Palmella, represent phases in the life of other Green Algae. Long ago Kiitzing went so far as to express the belief that the lower algae were all capable of transformations into higher forms, even into moss-protonemata. Later writers have also

thought that in all four groups of algae transformations of a most far- reaching character occur. Thus Borzi finds that Protoderma viride passes through a series of changes so varied that at different times it presents the characters of twelve different genera. Chodat does not find so general a polymorphism, but neverthe- less holds that Raphidium passes through stages represented by Protococcus, Characium, Dactylococcus and Sciadium: ‘ Klebs has, however, recently canvassed the conclusions of both these in- vestigators; and as the result of his own observations declares that algae, so far from being as polymorphic as they have been described, vary only within relatively narrow limits, and present on the whole as great fixity as the higher plants. It certainly supports his view to discover, on subjecting to a careful investiga- tion Botrydium granulatum, a siphonaceous alga whose varied forms had been described by J. Rostafinski and M. Woronin, that these authors had included in the life-cycle stages of a second alga described previously by Kiitzing, and now described afresh by Klebs as Protosiphon botryoides. In Botrydium the chromatophores are small, without pyrenoids, and oil-drops are present; in Protosiphon the chromatophores form a net- work with pyrenoids, and the contents include starch. Klebs’ insists that the only solution of such problems is the subjection of the algae in question to a rigorous method of pure culture. It is interesting to learn that G. Senn, pursuing the methods described by Klebs, has confirmed Chodat’s observation of the passage of Raphidium into a Dactylococcus-st&ge, although he was unable to observe further metamorphosis. He has also seen Pleurococcus viridis dividing so as to form a filament, but has not succeeded in seeing the formation of zoospores as described by Chodat. While, therefore, there is much evidence of a negative character against the existence of an extensive polymorphism among algae, some amount of metamorphosis is known to occur. But until the conditions under which a particular transformation takes place have been ascertained and described, so that the observa- tion may be repeated by other investigators, scant credence is likely to be given to the more extreme polymorphistic views.

In comparison with the higher plants, algae exhibit so much simplicity of structure, while the conditions under which they grow are so much more readily controlled, that they have frequently been the subject of physiolbgical , ™ S °” investigation with a view chiefly to the application of the results to the study of the higher plants. (See Plants: Physiology of.) In the literature

of vegetable physiology there has thus accumulated a great body of facts relating not only to the phenomena of reproduction, but also to the nutrition of algae. With reference to their chemical physiology, the gelatiniza- tion of the cell-wall, which is so marked a feature, is doubtless attributable to the occurrence along with cellulose of pectic compounds. There is, however, considerable variation in the nature of the membrane in different species; thus the cell- wall of Oedogonium, treated with sulphuric acid and iodine, turns a bright blue, while the colour is very faint in the case of Spirogyra, the wall of which is said to consist for the most part of pectose. While starch occurs commonly as a cell-content in the majority of the Green Algae no trace of it occurs in Vaucheria and some of

its allies, nor is it known in the whole of the Phaeophyceae and Rhodophyceae. In certain Euphaeophyceae bodies built up of concentric layers, and attached to the chromatophores, were described by Schmitz as phaeophycean-starch ; they do not, however, give the ordinary starch reaction. Other granules, easily mistaken for the ” starch ” granules, are also found in the cells of Phaeophyceae; these possess a power of movement apart from the protoplasm, and are considered to be vesicles and to contain phloroglucin. The colourless granules of Florideae, which are supposed to constitute the carbohydrate reserve material, have been called floridean-starch. A white efflores- cence which appears on certain Brown Algae (Saccerhiza bulbosa, Laminaria saccharina), when they are dried in the air, is found to consist of mannite. Mucin is known in the cell-sap of Acetabularia. Some Siphonales (Codium) give rise to proteid crystalloids, and they are of constant occurrence among Florideae. The presence of tannin has been established in the case of a great number of freshwater algae.

By virtue of the possession of chlorophyll all algae are capable of utilizing carbonic acid gas as a source of carbon in the presence _ . . of sunlight. The presence of phycocyanin, phyco- matters. phaein and phycoerythrin considerably modifies the absorption spectra for the plants in which they occur. Thus in the case of phycoerythrin the maximum absorption, apart from the great absorption at the blue end of the spec- trum, is not, as in the case where chlorophyll occurs alone, near the Fraunhofer line B, but

farther to the right beyond the line D. By an ingenious method devised by Engelmann, it may be shown that the greatest liberation of oxygen, and consequently the greatest assimilation of carbon, occurs in that region of the spectrum represented by the absorption bands. In this connexion Pfeffer points out that the penetrating power of light into a clear sea varies for light of different colours. Thus red light is reduced to such an extent as to be insufficient for growth at a depth of 34 metres, yellow light at a depth of 177 metres and green light at 322 metres. It is thus an obvious advantage to Red Algae, which flourish at considerable depths, to be able to utilize yellow light rather than the red, which is extinguished so much sooner. The experiment of Engelmann referred to deserves to be mentioned here, if only in illustration of the use to which algae have been put in the study of physio- logical problems. Engelmann observed that certain bacteria were motile only in the presence of oxygen, and that they retained their motility in a microscopic preparation in the neighbourhood of an algal filament when they had come to rest elsewhere on account of the exhaustion of oxygen. After the bacteria had all been brought to rest by being placed in the dark, he threw a spectrum upon the filament, and observed in what region the bacteria first regained their motility, owing to the liberation of oxygen in the process of carbon-assimilation. He found that these places corresponded closely with the region of the absorption band for the algae under experiment.

Although algae generally are able to use carbonic acid gas as a source of carbon, some algae, like certain of the higher plants, are capable of utilizing organic compounds for this purpose. Thus Spirogyra filaments, which have been denuded of starch by being placed in the dark, form starch in one day if they are placed in a 10 to 20% solution of dextrose. According to T. Bokorny, moreover, it appears that such filaments will yield starch from formaldehyde when they are supplied with sodium oxymethyl sulphonate, a salt which readily decomposes into formaldehyde and hydrogen sodium sulphite, an observation which has been taken to mean that formaldehyde is always a stage in the synthesis of starch. With reference to the assimila- tion of nitrogen, it would seem that algae, like other green plants, can best use it when it is presented to them in the form of a nitrate. Some algae, however, seem to flourish better in the presence of organic compounds. In the case of Scenedesmus acutus it is said that the alga is unable to take up nitrogen in the form of a nitrate or ammoniacal salt, and requires some such substance as an

amide or a peptone. On the other hand, it has been held by Bernhard Frank and other observers that atmo-

Habitat.

spheric nitrogen is fixed by the agency of Green Algae in the soil. (For the remarkable symbiotism between algae and fungi see Fungi and Lichens.)

Most algae, particularly Phaeophyceae and Rhodophyceae, spend the whole of the life-cycle immersed in water. In the case of the freshwater algae, however, belonging to the Chlorophyceae and Cyanophyceae, although they required to be immersed during the vegetative period, the reproductive cells are often capable of resisting a considerable degree of desiccation, and in this condition are dispersed through great distances by various agencies. Again, as is well known, many species of marine algae growing in the region between the limits of high and low water are so constituted that they are exposed to the air twice a day without injury. The occurrence of characteristic algae at different levels constituting the zones to which reference has already been made, is probably in part an expression of the fact that different species vary in the capacity to resist desiccation from exposure. Thus Laminaria digitata, which characterizes the lowest zone, is only occasionally exposed at all, and then only for short periods of time. On the other hand, Pelvetia canaliculata, which marks the upper belt, is exposed for longer periods, and during neap tides may not be reached by the water for many days. Algae of more delicate texture than either Fucaceae or Laminariaceae also occur in the region exposed by the ebb of the tide, but these secure their exemption from desiccation either by retaining water in their meshes by capillary attraction, as in the case of Pilayella, or by growing among the tangles of the larger Fucaceae, as in the case of Polysipkonia fastigiata, or by growing in dense masses on rocks, as in the case of Laurencia pinnatifida. Such a species as Delesseria sanguinea or Callophyllis laciniata would on the contrary run great risk by exposure for even a short period. A few algae approach the ordinary terrestrial plants in their capacity to live in a sub -aerial habitat subject only to such occasional supplies of water as is afforded by the rainfall. Of this nature are some of the species of Vaucheria. A very few species, like Chroolepus, which grows on rock surfaces, are comparable with the land plants which have been termed xerophilous. ‘•

The great majority of the aquatic algae, both freshwater and

marine, are attached plants. Some, however, are wanderers, either swimming actively with the aid of cilia, or floating inertly as the result of a specific weight closely Plankton. approaching that of the medium. To the aggregate of such forms, both animal and vegetable, the term plankton has been applied, and the investigation of the vegetable plankton, both freshwater and marine, has been pursued in recent times with energy and success. The German Plankton Expedition of 1889 added greatly to our knowledge of the floating vegetable life of the North Atlantic Ocean, while many laboratories estab- lished on the shores of inland seas and lakes have rendered a similar service in the case of our freshwater phy to-plankton. The quantitative estimate of the amount of this flora has revealed its enormous aggregate amount and therefore its great import- ance in the economy of oceanic and lacustrine animal life. The organisms constituting this plankton are mostly unicellular, often aggregated together in colonies, and the remarkable structure which they exhibit has added a new chapter to the story of adaptation to environment. The families Diatomaceae, Peridiniaceae and Protococcaceae are best represented in the pelagic plankton, while in addition the Volvocaceae are an important element in freshwater plankton.

The great majority of algae, however, grow like land-plants attached to a substratum, and to these the term benthos is now generally applied. While the root of land-plants serves for the double purpose of attachment and the supply of water, it is attachment only that is usually sought in the case of algae. Immersed as they usually are in a medium containing in solution the inorganic substances which they require for their nutrition, the absorption of these takes place throughout their whole extent. The elaborate provision for the conduct of water from part to part which has played so important

a r&le in the morphological development of land plants is entirely wanting in algae, such conducting tissues as do exist in the larger Phaeophyceae and Rhodophyceae serving rather for the con- vection of elaborated organic substance, and being thus com- parable with the phloem of the higher plants. The attachment organ of algae is thus more properly called a holdfast, and is found to be of very varied structure. It generally

takes the form of a single flattened disc as in the Fucaceae, or a group of finger- like processes as in Laminariaceae, or a tuft of filaments as in many instances. When the attachment is in sand or mud, it often simulates the appearance of a true root as in Chara or Caulerpa. It is clear that where the bottom of a lake or sea consists of oozy mud or shifting sand, it is impossible for algae to secure a foothold. Thus a rock emerging from a sandy beach may often be observed to stand covered with vegetation like an oasis in a desert. The rapidity with which walls, piles and pontoons — stone, wood and iron — become covered with marine plants is well known, while the discovery of some effective means of preventing the fouling of the bottoms of ships by the growth of algae would be hailed as a boon by shipowners. While rocks and boulders are the favoured situation for the growth of marine algae, those which readily disintegrate, like the coarser sandstones, are naturally less favoured than the hard and resistant. A large numberˆ of algae again live as epiphytes or endophytes. In the case of the freshwater species the host-plants are mostly species of aquatic Graminaceae, Naiadaceae or Nymphaeaceae. In the case of marine algae, the hosts are chiefly the larger Phaeophyceae and Rhodo- phyceae. A bed of Zostera near the level of low water is, how- ever, on the British coast a favourite collecting ground for the smaller red and brown epiphytes. Of endophytes a distinction must be made between those which occupy the cell- wall only and those which perforate the cells, bringing about their destruc- tion. There can be little doubt that in some cases the epiphytism approaches parasitism. In one case described by Kuckuck the chromaphores of the infesting algae are absent, a circumstance which points to a complete parasitism. Allusion has already been made to the peculiar habit of the shell-boring algae.

In many algae certain branches of limited growth bear a remarkable resemblance to leaves. The Characeae among freshwater algae and the Sargassaceae among marine algae might be cited as examples. Surveying the whole range of algae life, Oltmanns distinguishes bush-forms, whip- forms, net-forms, leaf-forms, sack-forms, dorsi-ventral forms, and cushions, plates and crusts. The similarity of outline in many species to that of trees and shrubs will strike any one who examines algae mounted for the herbarium. Cladophora and Bryopsis among monosiphonous forms, Chara, Polysiphonia, Ceramium and Cystoseira among larger algae, are illustrations of this. The whip-forms are represented by Spiro- gyra, Chaetomorpha, Scytosiphon,

Nemalion, Himanthalia and Chorda . Net-forms are found in Hydrodictyon and Microdictyon. The leaf-forms are very varied and owe their existence to the advantage accruing from the exposure of a large surface to the influence of the light. In some cases such as Delesseria, Neury- menia, Fucus, Alaria, the leaf-like structure is provided with a strengthening mid-rib, and when as in Delesseria it is also richly veined the resemblance to the leaf of a flowering plant is striking. Laminaria, Padina, Cutleria, Punctaria, Iridaea, Ulva, Porphyra, are leaf-like with a rigidity varying from a fleshy lamina to the thin and pliable. Agarum, Claudea and Slruvea are leaf-forms which are perforated like Aldrovanda among flowering plants. Enleromorpha, Asperococcus and Adenocystis are sack-forms. Dorsi-ventral algae are rare. Leveillea jtengermanneoides bears a remarkable resemblance to a leafy liverwort. In the next group of forms the simplest are crusts attached to the substratum throughout their extent, and growing at the margin. Such are Myrionema, Ralfsia, Melobesia and Hildebrandtia. Others are attached throughout their ex- tent, but also grow vertical filaments so as to form a velvety pile. Such are Coleochaele, Ochlochaete, Elachistea, Ascocydus and Rhododermis. Peysonellia squamaria, Melfbesia lichenoides,

Habit

Ecology.

Leathesia diformis are forms which are not attached throughout but grow in plates like the foliaceous lichens.

When it is sought to consider algae with a view to the correla- tion of the external form to the conditions of life, a subject the study of which under the name of ecology has been latterly pursued with great success among land plants, it is difficult as yet to arrive at generalizations which are trustworthy. Among land plants, as is well known, similarity of environment has often called forth similar adaptations among plants of widely separated families. The similarity of certain xerophilous Euphorbiaceae to Cactaceae is a ready illustration of this phenomenon. From what has been already said it is evident that among algae also strikingly similar forms exist in widely different groups. Instances might be multiplied. Com- pare, for example, the blue-green Gloeocapsa with the green Gloeocystis, the red Batrachospermum with the green Drapaf- naldia, the red Corallina with the green Cymopolia, the green Enleromorpha

with the brown Asperococcus, the green Ulva with the red Porphyra, the red Nemalion with the brown Castagnea, and so on. But on the one hand similar forms seem to grow often under different conditions, while on the other hand different forms flourish under the same conditions. The conceivable varia- tions in the conditions which would count in algal life are variations in the chemical character of the water — whether fresh, brackish or salt; or in the rate of movement of the water, whether relatively quiet, or a stream or a surf; or in the degree of illumination with the depth and transparency of the water. But the laws which determine the associations of various algae under one environment are as yet little understood. The occurrence of a plentiful mucilage in many freshwater forms is, however, doubtless a provision against desiccation on exposure. The fine subdivision of filamentous and net-forms is similarly a provision for easy access of water and light to all parts. The calcareous deposits in Characeae, Corallinaceae and Siphonaceae are at once a protection against attack and a means of support. The whip-forms would seem to be designed to resist injury from surf or current. The vesicles of Fucaceae and Laminariaceae prevent the sinking of the bulkier forms. But why certain Fucaceae favour certain zones in the littoral region, why certain epiphytes are confined to certain hosts, why Red and Brown Algae are not better represented in fresh water or Green Algae in salt, — these are problems to which it is difficult to find a ready answer.

Algae cannot be regarded as directly important in the in- dustries. On the coasts of Europe marine algae detached by the autumnal gales are commonly carted on to the v

land as a convenient manure. Porphyra laciniata and Rhodymenia palmata are locally used as food, the latter being known as dulse. Agar-agar is a gelatinous substance derived from an eastern species of Gracilaria. The ash of sea- weeds, known in Scotland as kelp, and in Brittany as varec, was formerly used as a source of iodine to a greater extent than is at present the case.

Excepting where the thallus is impregnated with silica, as in Diatomaceae, or carbonate of lime, as in Corallinaceae, Characeae and some Siphonales, it is perhaps not surprising that algae should not have been extensively preserved in ° cc ” r ” the fossil form. Considering, however, that it is the rocks. generally believed that Bryophyta and vascular plants are descended from an algal ancestry, it is natural to suppose that, prior to the luxuriant vegetable growths of the Carboniferous period, there

must have existed an age of algae. It was doubtless this expectation that has led to the description of a number of Silurian and Devonian remains as algae upon what is now regarded as inadequate evidence. The geologic record is, as perhaps is to be expected, exceedingly poor, except as regards the calcareous Siphonales; which are well represented at various horizons, from the Silurian to the Tertiary; even the Diatomaceae, which are found in great quantities in the Tertiary deposits, do not occur at all earlier than the chalk. It is believed, however, that the Devonian fossil, Nematophycus, is a Laminarian alga, but it is not until the late Secondary and

the Tertiary formations that fossil remains of algae become frequent. (See Palaeobotany.)

The subjoined list includes the larger standard works on algae, together with a number of papers to which reference is made in this article. For a detailed catalogue of Algological literature, see the " Bibliotheca Phycologica " in de Toni's Syllope Algarum, vol. i. (1889), with the addendum thereto in vol. iv. (1897) of the same work.

General. — J. G. Agardh, Species, genera et ordines Algarum (vols, i.-iii., Lund, 1848-1898), Analecta Algologica (Lund, 1892-1896); Till Algernes Systematik (Lund, 1872-1899); J. E. Areschoug, " Observationes Phycologicae," Nova Acta reg. soc. sci. Upsaliensis (Upsala, 1866-1875); F. F. Blackman, "The Primitive Algae and the Flagellata," Ann. of Botany (vol. xiv., Oxford, 1900); E. Bornet and G. Thuret, Notes agologiques (fasc. i.-ii., Paris, 1876-1880) ; P. A. Dangeard, " Recherches sur les algues inferieures," Ann. des sci. naturelles, Bot. (vol. vii., Paris, 1888) ; A. Derbes and A. J. J. Solier, Memoire de la physiologie des algues (Paris, 1856); J. B. de Toni, Sylloge Algarum — vol. i. Chlorophyceae, vol. ii. Bacillariaceae, vol. iii. Fucoideae, vol. iv. Florideae (Padua, 1889-1900) ; P. Falkenberg, " Die Algen im weitesten Sinne," Schenk's Handbuch der Botanik (vol. ii., 1882); W. G. Farlow, Marine Algae of New England (Washington, 1881); W. H. Harvey, Phycologia Britannica (4 vols., London, 1846-1855); Nereis Boreali- Americana (3 pts., Washington, 1851-1858); Phycologia Australica (5 vols., London, 1858-1863); F. Hauck, " Die Meeresalgen Deutschlands und Oster- reichs,"

Rabenhort's Kryptogamen- Flora (Leipzig, 1885); F. R. Kjellman, The Algae of the Arctic Sea (Stockholm, 1883); F. T. Kiitzing, Tabulae Phycologicae (19 vols., Nordhausen, 1845-1869); P. Kuckuck, Beitrdge zur Kenntniss der Meeresalgen (Kiel and Leipzig, 1897-1899); G. Murray, Phycological Memoirs (London, 1892-1895); An Introduction to the Study of Seaweeds (London, ! 895); C. Naegeli, Die neueren Algensysteme (Zurich, 1847); F. Oltmanns, Morphologic und Biologie der Algen (Jena, Band 1. 1904, Band ii. 1905); N. Pringsheim, " Beitrage zur Morphologie der Meeresalgen," Abhand. Konigl. Akad. der Wissensch. (Berlin, 1862); J. Reinke, Atlas deutscher Meeresalgen (Berlin, 1 889-1892) ; F. Schiitt, Das Pflanzenleben der Hochsee (Leipzig, 1893); J. Stackhouse, Nereis Britannica (ed. i., Bath, 1801 ; ed. ii., Oxford, 1816) ; G. Thuret and E. Bornet, Etudes phycologiques (Paris, 1878); D. Turner, Historia Fucorum (4 vols., London, 1808-1819) ; G. Zanardini, Iconographia Phycologia Adriatica (Venice, i860- 1876).

1. Cyanophyceae. — E. Bornet and Ch. Flahault, " Revision des Nostocacees heterocystees," Ann. des sc. naturelles, 5o/.(vols. iii.-vii., Paris, 1887-1888); M. Gomont, " Monographie des Oscillariees," Ann. des sc. naturelles, Bot. (vols, xv.-xvi., Paris, 1893); Hegler, " tlber Kerntheilungserscheinungen," Ref. Botan. Centralbl. (vol. lxiv., Cassel, 1895); O. Kirchner, " Schizophyceae," in Englerand Prantl's Pflanzenfamilien (Leipzig, 1900).

2. Chlorophyceae. — A. Borzi, " Studi anamorfici di alcune alghe verdi," Bull. Soc. Bot. Ital. in N. Giorn. Bot. Ital. (vol. xxii., Pisa, 1890); F. F. Blackman and A. G. Tansley, A Revision of the Classification of the Green Algae, reprinted from the New Phytologist (vol. i., London, 1903); K. Bohlin, " Studier ofver nagra slagten af alggruppen confervales Borzi," Bihang till K. Svenska vel. akad. Handlinger (Bd. xxiii. afd. 3, 1897) ; — Utkasttill, De grona algernas och arkegomiaternas bylogeni (Upsala, 1901); R. Chodat, "On the Polymorphism of the Green Algae," Ann. of Botany (vol. xi., Oxford, 1 1897) ; M. C. Cooke, British Freshwater. Algae (2 vols., London, 1882 1884), British Desmids (London, 1887); G. Klebs, Die Bedingungen der Fortpflanzung bei einigen Algen und Pilzen (Jena, 1896); A. Luther, " tlber Chlorosaccus, n.g." Bihang till K. Svenska vel. akad. Handlinger (Bd. xxiv. afd. 3, 1899); H. Graf zu Solms-Laubach, " Monograph of the Acetabulariaceae," Trans. Linn. Soc. (Lond.) Bot. (London, 1895); N. Wille, "Chlorophyceae," in Engler and Prantl's Pflanzenfamilien (Leipzig, 1897).

3. Phaeophyceae. — E. A. L. Batters, “OnEctocarpussecundus,” Grevillea (vol. xxi., London, 1893); G. Berthold, ” Die geschlechtliche Fortpflanzung der eigentlichen Phaeosporeen,” Mitth. Zool. Stat. Neapel (vol. ii., Leipzig, 1881); G. Brebner, ” On the Classification of the Tilopteridaceae,” Proc. Bristol Nat. Soc. (vol. viii., Bristol, 1896-1897) ; A. H. Church, ” On the Polymorphy of Cutleria multifida,” Ann. of Botany (vol. xii., Oxford, 1898); J. B. Farmer and J. LI. Williams, ” Contributions to our Knowledge of the Life- history and Cytology of Fucaceae,” Phil. Trans. Roy. Soc. (vol. cxc, London, 1898); E. Janczewski, “Observations sur Taccroissement du thalle des Phaeosporees,” Mem. soc. nat. de sc. (Cherbourg, 1895) ; F. R. Kjellmann, ” Phaeophyceae,” in Englerand Prantl’s Pflanzen- familien (Leipzig, 1897); F. Oltmanns, ” Beitrage zur Kenntniss der Fucaceen,” Bibliotheca botanica, xiv. (Cassel, 1889); C. Sauvageau, ” Observations relatives a la sexualite des Phaeosporees,” Journal de botanique (vol. x., Paris, 1896); E. Strasburger, ” Kerntheilung und Befruchtung bei Fucus,” Cytologische Studien (Berlin, 1897); F. Schiitt, Die Peridinien der Plankton-Expedition (Kiel and Leipzig, 1895); R. Valiante, Le Cystoseirae del Golfo di Napoli (Leipzig, 1883); J. LI. Williams, “On the ‘ Ahtherozoids of Dictyota and Taonia,” Ann. of Botany (vol. xi., Oxford, 1897).

4. Rhodophyceae. — G. Berthold, ” Die Bangiacen des Gotfes von Neapel,” Mitth. Zool. Stat. Neapel (Naples, 1882) ; F. Oltmanns,

“Zur Entwickelungsgeschichte der Florideen,” Botanische Zeitung (1898); R. W. Phillips, ” The Development of the Cystocarp in Rhodymeniales,” i. and ii., Annals of Botany (vols. xi. xii., Oxford, 1897-1898) ; F. Schmitz, ” Untersuchungen iiber die Befruchtung der Florideen,” Sitzungsber. der konigl. Akad.der Wissensch, (Berlin, 1883); ” Kleinere Beitrage zur Kenntniss der Florideen,” La Nuova . Notarisia, 1 892-1 894; F. Schmitz, P. Falkenberg, P. Hauptfleisch, “Rhodophyceae,” in Engler and Prantl’s Pflanzenfamilien (1897); W. Schmidle, ” Die Befruchtung, Keimung und Haarinsertion von Batrachospermum,” Bot. Zeitung, .(1899) ; jSirodot r Les Batracho- spermes (Paris, 1884); N. Wille, ” Uber die Befruchtung bei Nemalion multifidum,” Ber. d. deutschen bot. Gesellsc. Band xii. (Berlin, 1894); J. J. Wolfe, ” Cytological Studies on Nemalion,” Annals of Botany (vol. xviii., Oxford, 1904); S. Yamanouchi, “The Life- History of Polysiphonia violacea,” Botanical Gazette (vol. xii., Chicago, 1906). (R. W. P.)

ALGARDI, ALESSANDRO (1602-1654), Italian sculptor, was born

at Bologna in 1602. While he was attending the school of the Caracci his preference for the plastic art became evident, and he placed himself under the instruction of the sculptor Conventi. At the age of twenty he was brought under the notice of Duke Ferdinand of Mantua, who gave him several commissions. He was also much employed about the same period by jewellers and others in modelling in gold, silver and ivory. After a short residence in Venice he went to Rome in 1 62 5 with an introduction from the duke of Mantua to the pope's nephew, Cardinal Ludovisi, who employed him for a time in the restoration of, ancient statues. The death of the duke of Mantua left him to his own resources, and for several years he earned a precarious mainten- ance from these restorations and the commissions of goldsmiths and jewellers. In 1640 he executed for Pietro Buoncompagni his first work in marble, a colossal statue of San Filippo Neri, with kneeling angels. Immediately after, he produced a similar group, representing the execution of St Paul, for the church of the Barnabite Fathers in Bologna. These works, displaying great technical skill, though with considerable exaggeration of ex- pression and attitude, at once established Algardi's reputation, and other commissions followed in rapid succession. The turning point in Algardi's fortune was the accession of Innocent X., of the Bolognese house of Panfili, to the papal throne in 1644. He was employed by Camillo Panfili, nephew of the pontiff, to design; the Villa Doria Panfili outside the San Pancrazio gate. The most important of Algardi's other works were the mpnument of Leo XI., a bronze statue of Innocent X. for the capitol, and, above all, La Fuega d'Attila, the largest alto-relievo in the world; the two principal figures being about 10 ft. high. In 1650 Algardi met Velasquez, who obtained some interesting orders for his Italian companion in Spain. Thus there are four chimneys by Algardi in the palace of Aranjuez, where also the figures on the fountain of Neptune were executed by him. The Augustine monastery at Salamanca contains the tomb of the count and, countess de Monterey, which was also the work of Algardi, From an artistic point of view, he was most successful in his portrait-statues and groups of children, where he was obliged to follow nature most closely. In his later years he became very avaricious and amassed a great fortune. He died in Rome on the 10th of June 1654.

See Le arti di Bologna disegnate da A. Caracci ed intagliati da S. Giulini, con' assistenza d' Alessandro A. Algardi (1740).

ALGAROTH, POWDER OF, a basic chloride pf antimony,. It was

known to Basil Valentine, and was used medicinally by the Veronese physician Victor Algarotus about the end of the 16th century. Its composition is probably SD4O5CI2, and it may be prepared by the addition of much water to a solution of antimony chloride; a bulky amorphous precipitate being formed, which, on standing, gradually becomes crystalline. It is soluble in hydrochloric acid and tartaric acid, but insoluble in alcohol.

On its composition and preparation see E. Peligot, Annalen, 1847, lxiv. 280; L. Schaffer, Annalen, 1869, clii. 314; and R. W. E. Maclvor, Chem. News, 1875, xxxii. 229.

ALGAROTTI, FRANCESCO, Count (1712-1764), Italian philosopher and writer on art, was born on the nth of December 1 7 1 2 at Venice, and died at Pisa in 1764. He studied at Rome, and Bologna, and at the age of twenty went to Paris, where he enjoyed the friendship of Voltaire and produced his great

work N eulonianismo per le dame, a work on optics. Voltaire called him his cher cygne de Padnue. Returning from a journey to Russia, he met Frederick the Great who made him a count of Prussia (1740) and court chamberlain (1747). Augustus III. of Poland honoured him with the title of councillor. In 1754, after seven years' residence partly in Berlin and partly in Dresden, he returned to Italy, living at Venice and then at Pisa, where he died on the 3rd of May 1764. Frederick the Great erected to his memory a monument on the Campo Santo at Pisa. He was a man of wide knowledge, a connoisseur in art and music, and the friend of most of the leading authors of his time. His chief work on art is the Saggi sopra le belle arti (" Essays on the Fine Arts ") . Among his other works may be mentioned Poems, Travels in Russia, Essay on Painting, Correspondence.

The best complete edition with biography was published by D. Michelessi (i79l- I 794)-

ALGARVE, or Algarves, an ancient kingdom and province in the extreme S. of Portugal, corresponding with the modern administrative district of Faro, and bounded on the N. by Alemtejo, E. by the Spanish province of Huelva, and S. and W. by the Atlantic Ocean. Pop. (1900) 255,191; area, 1937 sq. m. The

greatest length of the province is about 85 m. from E. to W. ; its average breadth is about 22 m. from N. to S. The Serra de Malhao and the Serra de Monchique extend in the form of a crescent across the northern part of the province, and, sweeping to the south-west, terminate in the lofty promontory of Cape St Vincent, the south-west extremity of Europe. This headland is famous as the scene of many sea-fights, notably the defeat inflicted on the Spanish fleet in February 1797 by the British under Admiral Jervis, afterwards Earl St Vincent. Between the mountainous tracts in the north and the southern coast stretches a narrow plain, watered by numerous rivers flowing southward from the hills. The coast is fringed for 30 m. from Quarteira to Tavira, with long sandy islands, through which there are six passages, the most important being the Barra Nova, between Faro and Olhao. The navigable estuary of the Guadiana divides Algarve from Huelva, and its tributaries water the western districts. From the Serra de Malhao flow two Streams, the Silves and Odelouca, which unite and enter the Atlantic below the town of Silves. In the hilly districts the roads are bad, the soil unsuited for cultivation, and the inhabitants few. Flocks of goats are reared on the mountain-sides. The level country along the southern coast is more fertile, and produces in abundance grapes, figs, oranges, lemons, olives, almonds, aloes, and even plantains and dates. The land is, however, not well suited for the production of cereals, which ire mostly imported from Spain. On the coast the people gain their living in great measure from the fisheries, tunny and sardines being caught in considerable quantities. Salt is also made from sea- water. There is no manufacturing or mining industry of any importance. The harbours are bad, and almost the whole foreign trade is carried on by ships of other nations, although the inhabitants of Algarve are reputed to be the best seamen and fishermen of Portugal. The chief exports are dried fruit, wine, salt, tunny, sardines and anchovies. The only railway is the Lisbon-Faro main line, which passes north-eastward from Faro, between the Monchique and Malhao ranges. Faro (11,789), Lagos (8291), Louie (22,478), Monchique (7345), Olhao (10,009), Silves (9687) and Tavira (12,175), the chief towns, are described in separate articles.

The name of Algarve is derived from the Arabic, and signifies a land lying to the west. The title ” king of Algarve,” held by the kings of Portugal, was first assumed by Alphonso III., who captured Algarve from the Moors in 1253.

ALGAU, or Allgau, the name now given to a comparatively small

district forming the south-western corner of Bavaria, and belonging to the province of Swabia and Neuburg, but formerly applied to a much larger territory, which extended as far as the Danube on the N., the Inn on the S. and the Lech on the W. The Algau Alps contain several lofty peaks, the highest of which is Madelegabel (8681 ft.). The district is celebrated for its cattle, milk, butter and cheese.

ALGEBRA (from the Arab, al-jebr wa'l-mugdbala, transposition and removal [of terms of an equation], the name of a treatise by Mahommed ben Musa al-Khwarizmi), a branch of mathematics which may be defined as the generalization and extension of arithmetic.

The subject-matter of algebra will be treated in the following article under three divisions :— A. Principles of ordinary algebra; B. Special kinds of algebra; C. History. Special phases of the subject are treated under their own headings, e.g. Algebraic Forms; Binomial; Combinatorial Analysis; Determin- ants; Equation; Continued Fraction; Function; Groups, Theory of; Logarithm; Number; Probability; Series.

A. Principles or Ordinary Algebra

1. The above definition gives only a partial view of the scope of algebra. It may be regarded as based on arithmetic, or as dealing in the first instance with formal results of the laws of arithmetical number; and in this sense Sir Isaac Newton gave the title Universal Arithmetic to a work on algebra. Any defini- tion, however, must have reference to the state of development of the subject at the time when the definition is given.

2. The earliest algebra consists in the solution of equations. The distinction between algebraical and arithmetical reasoning then lies mainly in the fact that the former is in a more condensed form than the latter; an unknown quantity being represented by a special symbol, and other symbols being used as a kind of shorthand for verbal expressions. This form of algebra was extensively studied in ancient Egypt; but, in accordance with the practical tendency of the Egyptian mind, the study consisted largely in the treatment of particular cases, very few general rules being obtained.

3. For many centuries algebra was confined almost entirely to the solution of equations; one of the most important steps being the

enunciation by Diophantus of Alexandria of the laws governing the use of the minus sign. The knowledge of these laws, however, does not imply the existence of a conception of negative quantities. The development of symbolic algebra by the use of general symbols to denote numbers is due to Frahciscus Vieta (Francois Viete, 1 540-1603) . This led to the idea of algebra as generalized arithmetic.

4. The principal step in the modern development Of algebra was the recognition of the meaning of negative quantities. This appears to have been due in the first instance to Albert Girard (1595-1632), who extended Vieta's results in various branches of mathematics. His work, however, was little known at the time, and later was overshadowed by the greater work of Descartes (1596-1650).

5. The main work of Descartes, so far as algebra was concerned, was the establishment of a relation between arithmetical and geometrical measurement. This involved not only the geometrical interpretation of negative quantities, but also the idea of continuity; this latter, which is the basis of modern analysis, leading to two separate but allied developments, viz. the theory of the function and the theory of limits.

6. The great development of all branches of mathematics in the two centuries following Descartes has led to the term algebra being used to cover a great variety of subjects, many of which are really only ramifications of arithmetic, dealt with by alge- braical 'methods, while others, such as the theory of numbers and the general theory of series, are outgrowths of the application of algebra to arithmetic, which involve such special ideas that they must properly be regarded as distinct subjects. Some writers have attempted unification by treating algebra as con- cerned with functions, and Comte accordingly defined algebra as the calculus of functions, arithmetic being regarded as the calculus of values.

7. These attempts at the unification of algebra, and its separation from other branches of mathematics, have usually been accompanied by an attempt to base it, as a deductive science, on certain fundamental laws or general rules; and this has tended to increase its difficulty. In reality, the variety of algebra corresponds to the variety of phenomena. Neither

mathematics itself, nor any branch or set of branches of mathematics, can be regarded as an isolated science. While, therefore, the logical development of algebraic reasoning must depend on certain fundamental relations, it is important that in the early study of the subject these relations should be introduced gradually, and not until there is some empirical acquaintance with the phenomena with which they are concerned.

8. The extension of the range of subjects to which mathe- matical methods can be applied, accompanied as it is by an extension of the range of study which is useful to the ordinary worker, has led in the latter part of the 19th century to an important reaction against the specialization mentioned in the preceding paragraph. This reaction has taken the form of a return to the alliance between algebra and geometry (§5), on which modern analytical geometry is based; the alliance, however, being concerned with the application of graphical methods to particular cases rather than to general expressions. These applications are sometimes treated under arithmetic, sometimes under algebra; but it is more convenient to regard graphics as a separate subject, closely allied to arithmetic, algebra, mensuration and analytical geometry.

9. The association of algebra with arithmetic on the one hand, and with geometry on the other, presents difficulties, in that geometrical measurement is based essentially on the idea of continuity, while arithmetical measurement is based essentially on the idea of discontinuity; both ideas being equally matters of intuition. The difficulty first arises in elementary mensura- tion, where it is partly met by associating arithmetical and geometrical measurement with the cardinal and the ordinal aspects of number respectively (see Arithmetic). Later, the difficulty recurs in an acute form in reference to the continuous variation of a function. Reference to a geometrical interpreta- tion seems at first sight to throw light on the meaning of a differential coefficient; but closer analysis reveals new difficulties, due to the geometrical interpretation itself. One of the most recent developments of algebra is the algebraic theory of number, which is devised with the view of removing these difficulties. The harmony between arithmetical and geometrical measure- ment, which was disturbed by the Greek geometers on the discovery of irrational numbers, is restored by an unlimited supply of the causes of disturbance.

10. Two other developments of algebra are of special importance. The theory of sequences and series is sometimes treated as a part of elementary algebra; but it is more convenient to regard the simpler cases as isolated examples, leading up to the general theory. The treatment of equations of the second and higher degrees introduces imaginary and complex numbers, the theory of which is a special subject.

n. One of the most difficult questions for the teacher of algebra is the stage at which, and the extent to which, the ideas of a negative number and of continuity may be introduced. On the one hand, the modern developments of algebra began with these ideas, and particularly with the idea of a negative number: On the other hand, the lateness of occurrence of any particular mathematical idea is usually closely correlated with its intrinsic difficulty. Moreover, the ideas which are usually formed on these points at an early stage are incomplete; and, if the incompleteness of an idea is not realized, operations in which it is implied are apt to be purely formal and mechanical. What are called negative numbers in arithmetic, for instance, are not really negative numbers but negative quantities (§ 27 (i.)); and the difficulties incident to the ideas of continuity have already been pointed out.

12. In the present article, therefore, the main portions of elementary algebra are treated in one section, without reference to these ideas, which are considered generally in two separate sections. These three sections may therefore be regarded as to a certain extent concurrent. They are preceded by two sections dealing with the introduction to algebra from the arithmetical and the graphical sides, and are followed by a section dealing briefly with the developments mentioned in §§ 9 and 10 above.

I. Arithmetical Introduction to Algebra.

13. Order of Arithmetical Operations. — It is important, before beginning the study of algebra, to have a clear idea as to the meanings of the symbols used to denote arithmetical operations.

(i.) Additions and subtractions are performed from left to right. Thus 3 lb + 5 lb— 7 lb + 2 lb means that 5 lb is to be added to 3 lb, 7 lb subtracted from the result, and 2 lb added to the new result.

(ii.) The above operation is performed with 1 lb as the unit of

counting, and the process would be the same with any other unit; e.g. we should perform the same process to find 3S. + 5S. — 7S. + 2S. Hence we can separate the numbers from the common unit, and replace 3 lb + 5 lb — 7ft + 2 ft by (3 + 5 — 7 + 2) lb, the additions and subtractions being then performed by means of an addition-table.

(iii.) Multiplications, represented by X, are performed from right to left. Thus SX3X7X1R) means 5 times 3 times 7 times 1 ft; i.e. it means that 1 lb is to be multiplied by 7, the result by 3, and the new result by 5. We may regard this as meaning the same as 5X3X7 ft, since 7 ft itself means 7X1 ft, and the ft is the unit in each case. But it does not mean the same as 5X21 ft, though the two are equal, i.e. give the same result (see § 23).

This rule as to the meaning of X is important. If it is intended that the first number is to be multiplied by the second, a special sign such as X should be used.

(iv.) The sign -5» means that the quantity or number preceding it is to be divided by the quantity or number following it.

(v.) The use of the solidus / separating two numbers is far convenience of printing fractions or fractional numbers. Thus 16/4 does not mean 16-ˆ4, but] T 8 .

(vi.) Any compound operation not coming under the above descriptions is to have its meaning made clear by brackets; the use of a pair of brackets indicating that the expression between them is to be treated as a whole. Thus we should not write 8X7 + 6, but (8X7) + 6, or 8X(7 + 6). The sign X coming immediately before, or immediately after, a bracket may be omitted; e.g. 8X(7 + 6) may be written 8(7 + 6).

This rule as to using brackets is not always observed, the convention sometimes adopted being that multiplications or divisions are to be performed before additions or subtractions. The convention is even pushed to such an extent as to make “4i + 3f of 7 + 5 ” mean ” 4 ! + (3f of 7) + 5”; though- it. is not clear what “Find the value of 42 + 3I times 7 + 5″ would then mean. There are grave objections to an arbitrary rule of this kind, the chief being the useless waste of mental energy in remembering it.

(vii.) The only exception that may be made to the above rule is that an expression involving multiplication-dots only, or a simple

fraction written -with the solidus, may have the brackets omitted for additions or subtractions, provided the figures are so spaced as to prevent misunderstanding. Thus 8+ (7 X 6) +3 may be written 8+7.6+3, and 8+I+3 may be written 8+7/6+3.

But |y| should be written (3-5)/(2.4), not 3.5/2.4.

14. Latent Equations. — The equation exists, without being shown as an equation, in all those elementary arithmetical processes which come under the head of inverse operations; i.e. processes which consist in obtaining an answer to the question " Upon what has a given operation to be performed in order to produce a given result?" or to the question " What operation of a given kind has to be performed on a given quantity or number in order to produce a given result?"

(i.) In the case of subtraction the second of these two questions is perhaps the simpler. Suppose, for instance, ;that we wish to know how much will be left out of 10s. after spending 3 s., or how much has been spent out of 10s. if 3s. is left. In either case we may put the question in two ways: — (a) What must be added to 3s. in order to produce 10s., or (6) To what must 3s. be added in order to produce 10s. If the answer to the question is X, we have either (a) 10s. =3s.+X, .\X = ios.-3s. or (b) ios. = X+33., . \X = ios.-3s.

(ii.) In the above case the two different kinds of statement lead to arithmetical formulae of the same kind. In the case of division we get two kinds of arithmetical formula, which, however, may be regarded as requiring a single kind of numerical process in order to determine the final result.

(a) If 24d. is divided into 4 equal portions, how much will each portion be ?

Let the answer be X; then

24d. =4XX, .-. X = i of 24d.

(b) Into how many equal portions of 6d. each may 24d. be divided ?

Let the answer be x; then

24c!. =»X6d., .'. x = 24d. -r-6d.

(iii.) Where the direct operation is evolution, for which there is no commutative law, the two inverse operations are different in kind.

(a) What would be the dimensions of a cubical vessel which would exactly hold 125 litres; a litre being a cubic decimetre?

Let the answer be X; then

125 c.dm. =X 3 , .'. X = -fi25 c.dm. = -tfl25 dm.

(b) To what power must 5 be raised to produce 125 ? Let the answer be x; then

125 =5*. •'• * = log 6 125. 15. With regard to the above, the following points should be noted.

(1) When what we require to know is a quantity, it is simplest to deal with this quantity as a whole. In (i.), for instance, we want to find the amount by which 10s. exceeds 3s., not the number of shillings in this amount. It is true that we obtain this result by subtracting 3 from 10 by means of a subtraction- table (concrete or ideal) ; but this table merely gives the generalized results of a number of operations of addition or subtraction performed with concrete units. We must count with something; and the successive somethings obtained by the addition of successive units are in fact numerical quantities, not numbers.

Whether this principle may legitimately be extended to the notation adopted in (iii.) (a) of § 14 is a moot point. But the present tendency is to regard the early association of arithmetic with linear measurement as important; and it seems to follow that we may properly (at any rate at an early stage of the subject) multiply a length by a length, and the product again by another length, the practice being dropped when it becomes necessary to give a strict definition of multiplication.

(2) The results may be stated briefly as follows, the more usual form being adopted under (iii.) (a) : —

(i.) If A = B+X, or = X+B, thenX = A-B. (ii.) (a) If A = m times X, then X= — of A.

(b) If A = x times M, then i=A + M. (iii.) (a) If » = x>>, then x = \/ n. (b) If n = a x , then x — log„ n.

The important thing to notice is that where, in any of these five cases, one statement is followed by another, the second is not to be regarded as obtained from the first by logical reasoning involving such general axioms as that ” if equals are taken from equals the remainders are equal “; the fact being that the two statements are merely different ways of expressing the same relation. To say, for instance, that X is equal to A – B, is the same thing as to say that X is a quantity such that X and B, when added, make up A; and the above five statements of necessary connexion between two statements of equality are in fact nothing more than definitions of the symbols – ,

— of, + , yj , andloga.

An apparent difficulty is that we use a single symbol – to denote the result of the two different statements in (i.) (a) and (i.) (b) of § 14. This is due to the fact that there are really two kinds of subtraction, respectively involving counting forwards (complementary addition) and counting backwards (ordinary subtraction) ; and it suggests that it may be wise not to use the one symbol – to represent the result of both operations until the commutative law for addition has been fully grasped.

*6. In the same way, a statement as to the result of an inverse operation is really, by the definition of the operation, a statement as to the result of a direct operation. If, for instance, we state that A = X-B, this is really a statement that X = A+B. Thus, corresponding to the results under § 15 (2), we have the following: —

(1) Where the inverse operation is performed on the unknown quantity or number: —

(i.) If A = X-B,thenX = A+B.

(ii.) (a) If M =— of X, then X = m times M. (b) If »t=X-j-M, then X = m times M. (iii.) (a) If = V*. then x=a». (b) If p = log a x, then x—a p .

(2) Where the inverse operation is performed with the un- known quantity or number : —

(i.) If B=A-X, then A = B+X. (ii.) (a) If »w = A-=-X, then A = m

times X.

(b) If M =| of A, then A = x times M. (iii.) (a) Hpˆ=log x n, then n = x".

(b) If a = V n, then n — a x . In each of these cases, however, the reasoning which enables us to replace one statement by another is of a different kind from the reasoning in the corresponding cases of § 15. There we proceeded from the direct to the inverse operations; i.e. so far as the nature of arithmetical operations is concerned, we launched out on the unknown. In the present section, however, we return from the inverse operation to the direct; i.e. we rearrange our statement in its simplest form. The statement, for instance, that 32-ˆ=25, is really a statement that 32 is the sum of * and 25.

17. The five equalities which stand first in the five pairs of equalities in § 1 5 (2) may therefore be taken as the main typesof a simple statement of equality. When we are familiar with the treat- ment of quantities by equations, we may ignore the units and deal solely with numbersˆ and (ii.) (a) and (ii.) (b) may then, by the commutative law for multiplication, be regarded as identical. The five processes of deduction then reduce to four, which may be described as (i.) subtraction, (ii.) division, (iii.) (a) taking a root, (iii.) (b) taking logarithms. It will be found that these (and particularly the first three) cover practically all the pro- cesses legitimately adopted in -the elementary theory of the solution of equations; other processes being sometimes liable to introduce roots which do not satisfy the original equation.

18. It should be noticed that we are still dealing with the elementary processes of arithmetic, and that all the numbers contemplated in §§ 14-17 are supposed to be positive integers. If, for instance, we are told that 15 = { of {x-2), what is meant is that (1) there is a number u such that x=u+2, (2) there is a number v such that u=a, times v, and (3) 15 = 3 times v. From these statements, working backwards, we find successively that »=S, w=2o, £=22. The deductions follow directly from the definitions, and such mechanical processes as "clearing of fractions " find no place (§ 21 (ii.)). The extension of the methods to fractional numbers is part of the establishment of the laws governing these numbers (§ 27 (ii.)).

19. Expressed Equations. — The simplest forms of arithmetical equation arise out of abbreviated solutions of particular prob-

lems. In accordance with § 15, it is desirable that our statements should be statements of equality of quantities rather than of numbers; and it is convenient in the early stages to have a distinctive notation, e.g. to represent the former by capital letters and the latter by small letters.

As an example, take the following. I buy 2 lb of tea, and have 6s. 8d. left out of 10s.; how much per ft did tea cost?

(1) In ordinary language we should say: Since 6s. 8d. was left, the amount spent was 10s. — 6s. 8d., i.e. was 3s. 4d. There- fore 2 lb of tea cost 3s. 4d. Therefore 1 lb of tea cost is. 8d.

(2) The first step towards arithmetical reasoning in such a case is the introduction of the sign of equality. Thus we say: —

Cost of 2 lb tea + 6s. 8d. = 10s. /. Cost of 2 lb tea = 10s. —6s. 8d. = 33. 4d. .'. Cost of 1 lb tea = is. 8d

(3) The next step is to show more distinctly the unit we are dealing with (in addition to the money unit), viz. the cost of 1 lb tea. We write: —

(2 Xcost of 1 lb tea) + 6s. 8d. = 10s. .". 2Xcost of i lb tea = ios.-6s. 8d. = 3s. 4d. .". Cost of 1 lb tea = is. 8d.

(4) The stage which is introductory to algebra consists merely in replacing the unit " cost of 1 lb tea " by a symbol, which may be a letter or a mark such as the mark of interrogation, the asterisk, &c. If we denote this unit by X, we have

(2XX) + 6s. 8d. = ios. .•. 2XX = ios.6s. 8d. = 3s. 4d. .. X = is. 8d.

20. Notation of Multiples. — The above is arithmetic. The only thing which it is necessary to import from algebra is the notation by which we write 2X instead of 2 X X or 2 . X. This is rendered possible by the fact that we can use a single letter to represent a single number or numerical quantity, however many digits are contained in the number.

It must be remembered that, if a is a number, 3a means 3 times a, not a times 3; the latter must be represented by aX3 or a . 3.

The number by which an algebraical expression is to. be multiplied is called its coefficient. Thus in 30 the coefficient of a is 3. But in 3 . 4a the coefficient of \a is 3, while the coefficient of a is 3 . 4.

21. Equations with Fractional Coefficients. — As an example of a special form of equation we may take

%x + \x = \o. (i.) There are two ways of proceeding.

(a) The statement is that (1) there is a number u such that x = 2u,(2) there is a number v such that x = $v, and (3) u--v — 10. We may therefore conveniently take as our unit, in place of x, a number y such that x = 6y.

We then have 3y + 2y = io,

whence $y = 10, y— 2, x = 6y = 12.

(b) We can collect coefficients, i.e. combine the separate quantities or numbers expressed in terms of x as unit into a single quantity or number so expressed, obtaining

I* = 10. By successive stages we obtain (§ 18) \x = 2, x = i2; or we

may write at once * =

of 10 = – of 10 = 12. The latter

“5/6 5

is the more advanced process, implying some knowledge of the laws of fractional numbers, as well as an application of the associative law (§ 26 (i.)).

(ii.) Perhaps the worst thing we can do, from the point of view of intelligibility, is to ” clear of fractions ” by multiplying both sides by 6. It is no doubt true that, if \x--\x = io, then 3* + 2* = 6o (and similarly if \x--\x--ˆx = 10, then $x-{-.2x-] -x = 6o); but the fact, however interesting it may be, is of no importance for our present purpose. In the method (a) above there is indeed a multiplication by 6; but it is a multiplication arising out of subdivision, not out of repetition (see Arithmetic), so that the total (viz. 10) is unaltered.

22. Arithmetical and Algebraical Treatment of Equations— The following will illustrate the passage from arithmetical to alge braical reasoning. ” Coal costs 3s. a ton more this year than last year. If 4 tons last year cost 104s., how much does a ton cost this year ? ”

If we write X for the cost per ton this year, we have 4(X-3s.) = io4s. From this we can deduce successively X~3s. = 26s., X=2as. But, if we transform the equation into 4X- lis. = 104s., we make an essential alteration. The original statement was with regard to X-3S. as the unit; and from this, by the applica- tion of the distributive law (§ 26 (i.)), we have passed to a state- ment with regard to X as the unit. This is an algebraical process.

In the same way, the transition from (* 2 +4X+4)-4=2i to * ! +4^+4=2S, or from (£+2) 2 = 25 to x J r2 = j2$, is arith metical; but the transition from x 2 +4*-)-4=2S to (*+2) 2 =2j is algebraical, since it involves a change of the number we are thinking about.

Generally, we may say that algebraic reasoning in reference to equations 1 consists in the alteration of the form of a statement rather than in the deduction of a new statement; i.e. it cannot be said that ” If A = B, then E = F ” is arithmetic, while ” If C = D, then E = F ” is algebra. Algebraic treatment consists in replacing; either of the terms A or B by an expression which we know from the laws of arithmetic to be equivalent to it. The subsequent reasoning is arithmetical.

23. Sign of Equality. — The various meanings of the sign of equality (=) must be distinguished.

(i.) 4X3 lb = 12 lb. This states that the result of the operation of multiplying 3 lb by 4 is 12 lb. (ii.) 4X3 lb = 3X4 lb.

This states that the two operations give the same result; i.e. that they are equivalent.

(iii.) A’s share = 5s., or

3 times A’s share = 15s.

Either of these is a statement of fact with regard to a particular quantity; it is usually called an equation, but sometimes a conditional equation, the term ” equation ” being then extended to cover (i.) and (ii.). (iv.) x s =xXxXx.

This is a definition of X s ; the sign = is in such cases usually replaced by =,. (v.) 24d. =2s.

This is usually regarded as being, like (ii.), a statement of equivalence. It is, however, only true if is. is equivalent to isd., and the correct statement is then

Iia -X2 4 d. = 2S.

If the operator rxg-X is omitted, the statement is really an

equation, giving is. in terms of id. or vice versa. The following statements should be compared: —

X = A'sshare = f of £io = 3X£5 = £i5- X = A's share = | of £10 = § of £30 = £15.

In each case, the first sign of equality comes under (iv.) above, the second under (iii.), and the fourth under (i.); but the third sign comes under (i.) in the first case (the statement being that I of £10 = £5) and under (ii.) in the second.

It will be seen from § 22 that the application of algebra to equations consists in the interchange of equivalent expressions, and therefore comes under (i.) and (ii.). We replace 4(#-3), for instance, by 4X-4. 3, because we know that, whatever the value of x may be, the result of subtracting 3 from it and multiplying the remainder by 4 is the same as the result of finding 4X and 4 . 3 separately and subtracting the latter from the former.

A statement such as (i.) or (ii.) is sometimes called an identity.

The two expressions whose equality is stated by an equation or an identity are its members. .

24. Use of Letters in General Reasoning.— It may be assumed that the use of letters to denote quantities or numbers will first arise in dealing with equations, so that the letter used will in each case represent a definite quantity or number y such general statements as those of §§ 15 and 16 being deferred to a later stage. In addition to these, there are cases, in which letters can use fully be employed for general arithmetical reasoning.

(i.) There are statements, such as A + B = B + A, which are particular cases of the laws of arithmetic, but ,need not be expressed as such. For multiplication, for instance, we have the

statement that, if P and Q are two quantities, containing respectively p and q of a particular unit, then pXQ = qXT; or the more abstract statement that pXq = qXp.

(ii.) The general theory of ratio and proportion requires the use of general symbols.

(iii.) The general statement of the laws of operation of fractions is perhaps best deferred until we come to fractional numbers, when letters can be used to express the laws of multiplication and division of such numbers.

(iv.) Variation is generally included in text-books on algebra, but apparently only because the reasoning is general. It is part of the general theory of quantitative relation, and in its elementary stages is a suitable subject for graphical treatment (§31)-

25. Preparation for Algebra. — The calculation of the values of simple algebraical expressions for particular values of letters involved is a useful exercise, but its tediousness is apt to make the subject repulsive.

What is more important is to verify particular examples of general formulae. These formulae are of two kinds: — (a) the general properties, such as m(a--b) = ma--mb, on which algebra is based, and (b) particular formulae such as (x-a)(x--a) = x 2 -a i . Such verifications are of value for two reasons. In the first place, they lead to an understanding of what is meant by the use of brackets and by such a statement as 3(7 + 2) = 3.7 + 3.2. This does not mean (cf. § 23) that the algebraic result of performing the operation 3(7 + 2) is 3 . 7 + 3 . 2; it means that if we convert 7 + 2 into the single number 9 and then multiply by 3 we get the same result as if we converted 3 . 7 and 3.2 into 21 and 6 respectively and added the results. In the second place, particular cases lay the foundation for the general formula.

Exercises in the collection of coefficients of various letters occurring in a complicated expression are usually performed mechanically, and are probably of very little value.

26. General Arithmetical Theorems.

(i.) The fundamental laws of arithmetic (q.v.) should be constantly borne in mind, though not necessarily stated. The following are some special points.

(

(b) The important form of the distributive law is w(A+B) = wA + raB. The form (m+n)A = mA+nA follows at once from the fact that A is the unit with which we are dealing.

(c) The fundamental properties of subtraction and of division

are that A-B+B = A and mX— of A = A, since in each case the

m

second operation restores the original quantity with which we

started.

(ii.) The elements of the theory of numbers belong to arithmetic. In particular, the theorem that if n is a factor of a and of b it is also a factor of pa=*=qb, where p and q are any integers, is important in reference to the determination of greatest common divisor and to the elementary treatment of continued fractions. Graphic methods are useful here (§ 34 (iv.)). The law of relation of successive convergents to a continued fraction involves more advanced methods (see § 42 (iii.) and Continued Fraction).

(iii.) There are important theorems as to the relative value of fractions; e.g.

(a) If x = 3 , then each =*+^.

(6)

b~d

a--n

j^ is nearer to 1 than r is; and, generally, if t=-j, then

lies between the two. (All the numbers are, of course,

pa + qc pb + qd supposed to be positive.)

27. Negative Quantities and Fractional Numbers. — (i.) Whatare

usually called ” negative numbers ” in arithmetic are in reality not negative numbers but negative quantities. If a person has to receive ;s. and pay 5s., with a net result of +2S., the order of the operations is immaterial. If he pays first, he then has -5s. This is sometimes treated as a debt of 5s. ; an alternative method is to recognize that our zero is really arbitrary, and that in fact we shift it with every operation of addition or subtraction. But when we say “5s.” we mean “(5s.),” not ” (~s)s.”; the idea of (-5) as a number with which we can perform such operations as multiplication comes later (§ 49).

(ii.) On the other hand, the conception of a. fractional number follows directly from the use of fractions, involving the sub-division of a unit. We find that fractions follow certain laws

corresponding exactly with those of integral multipliers, and we are therefore able to deal with the fractional numbers as if they were integers.

28. Miscellaneous Developments in Arithmetic. — The following are matters which really belong to arithmetic; they are usually placed under algebra, since the general formulae involve the use of letters.

(i.) Arithmetical Progressions such a,s 2, 5, 8, . . . — The formula for the rth term is easily obtained. The problem of finding the sum of r terms is aided by graphic representation, which shows that the terms may be taken in pairs, working from the outside to the middle; the two cases of an odd number of terms and an even number of terms may be treated separately at first, and then combined by the ordinary method, viz. writing the series backwards.

In this, as in almost all other cases, particular examples should be worked before obtaining a general formula.

(ii.) The law of indices (positive integral indices only) follows at once from the definition of a 2 , a 3 , a 4 , . . . as abbreviations of a.a, a.a.a, a.a.a.a, . . ., or (by analogy with the definitions of 2, 3, 4, . . . themselves) of a.a, a.a 2 , a.a 3 , . . . successively. The treatment of roots and of logarithms (all being positive integers) belongs to this subject; a = -\/n and p = log a n being the inverses of n = a v (cf. §§ 15, 16). The theory may be extended to the cases of p=i and p = o; so that a 3 means’ a.a.a. 1, a 2 means a.a. 1, a 1 means a.i, and a” means 1 (there being then none of

the multipliers a). j

The terminology is sometimes confused. In n = a p , a is the root or base, p is_ the index or logarithm, and n is the power or antilogarithm. Thus a, a 2 , a 3 , . . . are the first, second, third, . . . powers of a. But a" is sometimes incorrectly described as " a to the power p "; the power being thus 'confused with the index or logarithm.

(iii.) Scales of Notation lead, by considering, e.g. , how to express in the scale of 10 a number whose expression in the scale of 8 is 2222222, to

(iv.) Geometrical Progressions. — It should be observed that the radix of the scale is exactly the same thing as the root mentioned under (ii.) above; and it is better to use the term " root " throughout. Denoting the root by a, and the number 2222222 in this scale by N, we have

N= 2222222. aN =22222220. Thus by adding 2 to aN we can subtract N from aN+2, obtaining 20000000, which is =2 . a 7 ; and from this we easily pass to the general formula for the sum of a geometrical progression having a given number of terms.

(v.) Permutations and Combinations may be regarded as arithmetical recreations; they become important algebraically in reference to the binomial theorem (§§ 41, 44).

(vi.) Surds and Approximate Logarithms. — From the arithmetical point of view, surds present a greater difficulty than negative quantities and fractional numbers. We cannot solve the equation 7s.+X = 4s.; but we are accustomed to transactions of lending and borrowing, and we can therefore invent a negative quantity -3s. such that 3s.+3s. = o. We cannot solve the equation 7X = 4s.; but we are accustomed to subdivision of units, and we can therefore give a meaning to X by inventing a unit 4"S. such that 7X~s = is., and can thence pass to the idea of fractional numbers. When, however, we come to the equation * 2 = S> where we are dealing with numbers, not with quantities, we have no concrete facts to assist us. We can, however, find a number whose square shall be as nearly equal to 5 as we please, and it is this number that we treat arithmetically as VS We may take it to (say) 4 places of decimals; or we may suppose it to be taken to 1000 places. In actual practice, surds mainly arise out of mensuration; and we can then give an exact defini- tion by

graphical methods.

When, by practice with logarithms, we become familiar with the correspondence between additions of length on the log- arithmic scale (on a slide-rule) and multiplication of numbers in the natural scale (including fractional numbers), V5 acquires

a definite meaning as the number corresponding to the ex- tremity of a length x, on the logarithmic scale, such that 5 corresponds to the extremity of ix. Thus the concrete fact required to enable us to pass arithmetically from the concep- tion of a fractional number to the conception of a surd is the fact of performing calculations by means of logarithms.

In the same way we regard logm.2, not as a new kind of number, but as an approximation.

(vii.) The use of fractional indices follows directly from this parallelism. We find that the product a"'Xa'Xa' is equal to a 3m ; and, by definition, the product |sX-}aX y/a is equal to a, which is a 1 . This suggests that we should write $a as a 113 ; and we find that the use of fractional indices in this way satisfies the laws of integral indices. It should be observed that, by analogy with the definition of a fraction, a p l q mean (a 1/5) p , not (a") 1 /*.

II. Graphical Introduction to Algebra.

20. The science of graphics is closely related to that of mensura- tion. While mensuration is concerned with the representation of geometrical magnitudes by numbers, graphics is concerned with the representation of numerical quantities by geometrical figures, and particularly by lengths. An important development, covering such diverse matters as the equilibrium of forces and the algebraic theory of complex numbers (§ 66), has relation to cases where the numerical quantity has direction as well as magnitude. There are also cases in which graphics and mensura- tion are used jointly; a variable numerical quantity is repre- sented by a graph, and the principles of mensuration are then applied to determine related numerical quantities. General aspects of the subject are considered under Mensuration; Vector Analysis; Infinitesimal Calculus.

30. The elementary use of graphic methods is qualitative rather than quantitative; i.e. it is for purposes of, illustration and suggestion rather than for purposes of deduction and exact calculation. We start with related facts, and adopt a particular method of visualizing the relation. One of the relations most commonly illustrated in this way is the time-relation; the passage of time being associated with the passage of a point along a straight line, so that equal intervals of time are repre- sented by equal lengths.

31. It is important to begin the study of graphics with concrete cases rather than with tracing values of an algebraic function. Simple examples of the time-relation are — the number of scholars present in a class, the height of the barometer, and the reading of the thermometer, on successive days. Another useful set of graphs comprises those which give the relation between the expressions of a length, volume, &c, on different systems of measurement. Mechanical, commercial, economic and statis- tical facts (the latter usually involving the time-relation) afford numerous examples.

32. The ordinary method of representation is as follows. Let X and Y be the related quantities, their expressions in terms of selected units A and B being x and y, so that X = *.A, Y = y . B. For graphical representation we select units of length L and M, not necessarily identical. We take a fixed line OX, usually drawn horizontally; for each value of X we measure a length or abscissa ON equal to x.L,, and draw an ordinate NP at right angles to OX and equal to the corresponding value of y . M. The assemblage of ordinates NP is then the graph of Y.

The series of values of X will in general be discontinuous, and the graph will then be made up of a succession of parallel and (usually) equidistant ordinates. When the series is theoretically continuous, the theoretical graph will be a continuous figure of which the lines actually drawn are ordinates. The upper boundary of this figure will be a line of some sort; it is this line, rather than the figure, that is sometimes called the ” graph.” It is better, however, to treat this as a secondary meaning. In particular, the equality or inequality of values of two functions is more readily grasped by comparison of the lengths of the ordinates of the graphs than by inspection of the relative positions of their bounding lines.

33. The importance of the bounding line of the graph lies in the

fact that we cah keep it unaltered while we alter the graph as a whole by moving OX up or down. We might, for instance, read temperature from 60° instead of from 0°. Thus we form the conception, not only of a zero, but also of the arbitrari- ness of position of this zero (cf. § 27 (i.)); and we are assisted to the conception of negative quantities. On the other hand, the alteration in the direction of the bounding line, due to alteration in the unit of measurement of Y, is useful in relation to geometrical projection.

This, however, applies mainly to the representation of values of Y. Y is represented by the length of the ordinate NP, so that the representation is cardinal; but this ordinate really corresponds to the point N, so that the representation of X is ordinal. It is therefore only in certain special cases, such as those of simple time-relations (e.g. " J is aged 40, and K is aged 26; when will J be twice as old as K?"), that the graphic method leads without arithmetical reasoning to the properties of negative values. In other cases the continuation of the graph may constitute a dangerous extrapolation.

34. Graphic representation thus rests on the principle that equal numerical quantities may be represented by equal lengths, and that a quantity «A may be represented by a length wL, where A and L are the respective units; and the science of graphics rests on the converse property that the quantity represented by pL is pA, i.e. that pA is determined by finding the number of times that L is contained in pi,. The graphic method may therefore be used in arithmetic for comparing two particular magnitudes of the same kind by comparing the corre- sponding lengths P and Q measured along a single line OX from the same point O.

(i.) To divide P by Q, we cut off from P successive portions each equal to Q, till we have a piece R left which is less than Q. Thus P = £Q+R, where k is an integer.

(ii.) To continue the division we may take as our new unit a submultiple of Q, such as Q/r, where r is an integer, and repeat the process. We thus get P = &Q-r-w.Q/r-f-S = (&-t-w/r)Q-f-S, where S is less than Q/>. Proceeding in this way, we may be able to express P-=-Q as the sum of a finite number of terms k--mjr--nlr i \ . . . ; or, if r is not suitably chosen, we may not. If, e.g. r=io, we get the ordinary expression of P/Q as an integer and a decimal; but, if P/Q were equal to 1/3, we could not express it as a decimal with a finite number of figures.

(iii.) In the above method the choice of r is arbitrary. We can avoid this arbitrariness by a different procedure. Having obtained R, which is less than Q, we now repeat with Q and R the process that we adopted with P and Q; i.e. we cut off from Q successive portions each equal to R. Suppose we find Q = 5R+T, then we repeat the process with R and T; and so on. We thus express P-5-Q in the form of a continued fraction,

, which isusually written, for conciseness, k-\ — x 7X& C – >

k+

s+i

t+&c.

s+t+

or k-\ —

s + t +

&c.

(iv.) If P and Q can be expressed in the forms pL and qL, where p and q are integers, R will be equal to (p-kq)~L, which is both less than pL. and less than qL,. Hence the successive remainders are successively smaller multiples of L, but still integral multiples, so that the series of quotients k, s, t, . . . will ultimately come to an end. Moreover, if the last divisor is uh, then it follows from the theory of numbers (§ 26 (ii.)) that (a) u is a factor of p and of q, and (b) any number which is a factor of p and q is also a factor of u. Hence u is the greatest common measure of p and q.

35. In relation to algebra, the graphic method is mainly useful in connexion with the theory of limits (§§ 58, 61) and the functional treatment of equations (§ 60). As regards the latter, there are two classes of cases. In the first class come equations in a single unknown; here the function which is equated to zero is the Y whose values for different values of X are traced.

and the solution of the equation is the determination of the

points where the ordinates of the graph are zero. The second class of cases comprises equations involving two unknowns; here we have to deal with two graphs, and the solution of the equation is the determination of their common ordinates.

Graphic methods also enter into the consideration of irrational numbers (§ 65).

III. Elementary Algebra of Positive Numbers.

36. Monomials. — (i.) An expression such as a. 2.a.a.b.c.$.a. a. c, denoting that a series of multiplications is to be performed, is called a monomial; the numbers (arithmetical or algebraical) which are multiplied together being its factors. An expression denoting that two or more monomials are to be added or subtracted is a multinomial or polynomial, each of the monomials bfing a term of it. A multinomial consisting of two or of three terms is a binomial or a trinomial.

(ii.) By means of the commutative law we can collect like terms of a monomial, numbers being regarded as like terms. Thus the above expression is equal to 6a b bc 2 , which is, of course, equal to other expressions, such as 6ba h c 2 . The numerical factor 6 is called the coefficient of a 5 bc 2 (§20); and, generally, the coefficient of any factor or of the product of any factors is the product of the remaining factors.

(iii.) The multiplication and division of monomials is effected by means of the law of indices. Thus 6a i bc 2 i$a 2 bc = %u?c, since $b^{\circ} = 1$. It must, of course, be remembered (§ 23) that this is a statement of arithmetical equality; we call the statement an ” identity,” but we do not mean that the expressions are the same, but that, whatever the numerical values of a, b and c may be, the expressions give the same numerical result.

In order that a monomial containing a m as a factor may be divisible by a monomial containing a p as a factor, it is necessary that p should be not greater than m.

(iv.) In algebra we have a theory of highest common factor and lowest common multiple, but it is different from the arithmetical theory of greatest common divisor and least common multiple. We disregard numerical coefficients, so that by the H.C.F. or L.C.M. of 6o 5 6c 2 and i2a A b 2 cd we mean the H.C.F. or L.C.M. of a 5 6c 2 and a 4 b 2 cd. The H.C.F. is then an expression of the

form a p b q c r d a , where p, q, r, s have the greatest possible values consistent with the condition that each of the given expressions shall be divisible by a p b”c r d’. Similarly the L.C.M. is of the form aPbH’d’, where p, q, r, s have the least possible values consistent with the condition that a p b q c r d* shall be divisible by each of the given expressions. In the particular case it is clear that the H.C.F. is a l bc and the L.C.M. is a 5 b 2 c 2 d.

The extension to multinomials forms part of the theory of factors (§51).

37. Products of Multinomials. — (i.) Special arithmetical results may often be used to lead up to algebraical formulae. Thus a comparison of numbers occurring in a table of squares

i 2 = i

2 2 =4

3 2 =9

II’=I2I

I2 2 = i44 I3 2 = i6g

suggests the formula (A+a) 2 = A 2 +2Aa+a 2 . Similarly the equalities

99X101 =9999 = 10000 — 1

98 X 102 =9996 = 10000 — 4

97X103 = 9991 = 10000 — 9

lead up to (A-a) (A+a) = A 2 -o 2 . These, with (A-a) 2 = A 2 -2Aa+a 2 , are the most important in elementary work.

(ii.) These algebraical formulae involve not only the distributive law and the law of signs, but also the commutative law. Thus (A +a) ! = (A+a)(A+a)=A(A+a) +a(A+a)=AA+Aa+aA+aa; and the grouping of the second and third terms as 2Aa involves treating Aa and aA as identical. This is important when we come to the binomial theorem (§ 41, and cf. § 54 (i.)).

(iii.) By writing (A+a) 2 = A 2 +2Aa+a 2 in the form (A+a) 2 = A 2 f(2A+a)a, we obtain the rule for extracting the square root in arithmetic.

(iv.) When the terms of a multinomial contain various powers of x, and we are specially concerned with x, the terms are usually arranged in descending (or ascending) order of the indices; terms which contain the same power being grouped so as to give a single coefficient. Thus 2bx-4X 2 \(jab--?,ax would be written -4× 2 +(sa+2b)x+6ab. It is not necessary to regard -4 here as a negative number; all that is meant is that 43? has to be subtracted.

(v.) When we have to multiply two multinomials arranged according to powers of , the method of detached coefficients enables us to omit the powers of x during the multiplication. If any power is absent, we treat it as present, but with coefficient o. Thus, to multiply ˆ-2x+i by 2 2 +4, we write the process

+1+0 -2+ 1 +2+0+4

+2+0-4+2

+0+0—0+0

+4+0-8+4

+2+0+0+2—8+4 giving 2* 6 +2× 2 -8*+4 as the' result.

38. Construction and Transformation of Equations. — (i.) The statement of problems in equational form should precede the solution of equations.

(ii.) The solution of equations is effected by transformation, which may be either arithmetical or algebraical. The principles of arithmetical transformation follow from those stated in §§ 15-18 by replacing X, A, B, m, M, *, n, a and p by any ex- pressions involving or not involving the unknown quantity or number and representing positive numbers or (in the case of X, A, B and M) positive quantities. The principle of algebraic transformation has been stated in §22; it is that, if A=B is an equation (i.e. if either or both of the expressions A and B involves x, and A is arithmetically equal to B for the particular value of * which we require), and if B = C is an identity (i.e. if B and C are expressions involving * which are different in form but are arithmetically equal for all values of *), then the state- ment A=C is an equation which is true for the same value of x for which A=B is true.

(iii.) A special rule of transformation is that any expression may be transposed from one side of an equation to the other, provided its sign is changed. This is the rule of transposition. Suppose, for instance, that P+Q-R+S = T. This may be written (P+Q-R)+S = T; and this statement, by definition of the sign-, is the same as the statement that (P+Q-R) = T-S. Similarly the statements P +Q-R-S = T and P+ Q-R=T+S are the same. These transpositions are purely arithmetical. To transpose a term which is not the last term on either side we must first use the commutative law, which involves an algebraical transformation. Thus from the equation P+Q-R+S = T and the identity P+Q-R +S = P-R+S+Q we have the equation P-R+S+Q = T, which is the same statement as P-R+S = T-Q.

(iv.) The procedure is sometimes stated differently, the transposition being regarded as a corollary from a general theorem that the roots of an equation are not altered if the same expression is added to or subtracted from both members of the

equation. The objection to this (cf. § 21 (ii.)) is that we do not need the general theorem, and that it is unwise to cultivate the habit of laying down a general law as a justification for an isolated action.

(v.) An alternative method of obtaining the rule of trans- position is to change the zero from which we measure. Thus from P + Q-R + S = T we deduce P + (Q-R + S) = P + (T-P). If instead of measuring from zero we measure from P, we find Q-R + S = T-P. The difference between this and (iii.) is that we transpose the first term instead of the last; the two methods corresponding to the two cases under (i.) of

§ IS (2).

(vi.) In the same way, we do not lay down a general rule

that an equation is not altered by multiplying both members by the same number. Suppose, for instance, that $-(x + i) = ˆ(x-2). Here each member is a number, and the equation may, by the commutative law for multiplication, be written 2 ˆj~ _ 4l*— 2) .

This means that, whatever unit A we take, 2 l*j~v A and

4ˆ £ A are equal. We therefore take A to be 15, and find

that 6(x + i) = 20(ˆ-2). Thus, if we have an equation P = Q, where P and Q are numbers involving fractions, we can clear of fractions, not by multiplying P and Q by a number m, but by applying the equal multiples P and Q to a number m as unit. If the P and Q of our equation were quantities expressed in terms of a unit A, we should restate the equation in terms of a unit Ajm, as explained in §§ 18 and 21 (i.) (a).

(vii.) One result of the rule of transposition is that we can transpose all the terms in x to one side of equation, and all the terms not containing x to the other. An equation of the form ax = b, where a and b do not contain x, is the standard form of simple equation.

(viii.) The quadratic equation is the equation of two expres- sions, monomial or multinomial, none of the terms involving any

power of x except x and x 2 . The standard form is usually taken to be

ax 2 +bx+c = o,

from which we find, by transformation, ~ (2 ax + b) 2 = b 2 — \ac,

and thence

■l\b*-4ac-b

This only gives one root. As to the other root, see § 47 (iii.).

39. Fractional Expressions. — An equation may involve a

p fraction of the form 7 =;, where Q involves x.

(i.) If P and Q can (algebraically) be written in the forms

RA and SA respectively, where A may or may not involve x,

then j=r = -ˆx=-j, provided A is not =0.

P U (ii.) In an equation of the form q =t?' t ˆ e expressions P, Q,

P U

U, V are usually numerical. We then have 75. QV. = ˆ. QV, or

PV = UQ, as in § 38 (vi.). This is the rule of cross-multiplication. (iii.) The restriction in (i.) is important. Thus *_lT\ =

(.~]l tJill is e q ua l to £4ˆ, except when x—i. For this

latter value it becomes -j}, which has no direct meaning, and requires interpretation (§ 61).

40. Powers of a Binomial. — We know that (A+a) 2 = A 2 + 2Aa +a 2 . Continuing to develop the successive powers of A+a into multinomials, we find that (A+a) 3 = A 3 +3A 2 a+3Aa 2 +a 3 , &c; each power containing one more term than the preced- ing power, and the coefficients, when the terms are arranged in descending powers of A, being given by the following table:—

5 10 10 5

6 15 20 15

&c,

where the first line stands for (A + a)° = i. A°a°, and the successive numbers in the (» + i)th line are the coefficients of A”o°, A”” 1 ˆ, . . . A°o” in the « + i terms of the multinomial equivalent to (A + a)”.

In the same way we have (A-a) 2 = A 2 -2Aa + a 2 , (A-a) 3 = A 3 -3A 2 a + 3Aa 2 a 3 , . .. , so that the multinomial equivalent to (A-a)” has the same coefficients as the multinomial equivalent to (A + a)”, but with signs alternately + and -.

The multinomial which is equivalent to (A ± a)”, and has its terms arranged in ascending powers of a, is called the expansion of (A ± a)”.

41. The binomial theorem gives a formula for writing down the coefficient of any stated term in the expansion of any stated power of a given binomial.

(i.) For the general formula, we need only consider (A + a)”. It is clear that, since the numerical coefficients of A and of a are each 1, the coefficients in the expansions arise from the grouping and addition of like terms (§ 37 (ii.)). We therefore determine the coefficients by counting the grouped terms individually, instead of adding them. To individualize the terms, we replace (A + a) (A + a) (A + a) ... by (A + a) (B + 6) (C + c) . . ., so that no two terms are the same; the ” like ” -ness which determines the placing of two terms in one group being the fact that they become equal (by the commutative law) when B, C, . . . and b, c, ... are each replaced by A and a respectively.

Suppose, for instance, that « = 5, so that we take five factors (A + a) (B + 6) (C + c) (D + d) (E + e) and find their product. The coefficient of A 2 a 3 in the expansion of (A + a) 6 is then the number of terms such as ABcde, AbcDe, AbCde, . . . , in each of which there are two large and three small letters. The first term is ABCDE, in which all the letters are large; and the coefficient of A 2 a 3 is therefore the number of terms which can be obtained from ABCDE by changing three, and three only, of the large letters into small ones.

We can begin with any one of the 5 letters, so that the first change can be made in 5 ways. There are then 4 letters left, and we can change any one of these. Then 3 letters are left, and we can change any one of these. Hence the change can be made in 3. 4.5 ways.

If, however, the 3.4.5 results of making changes like this are written down, it will be seen that any one term in the required product is written down several times. Consider, for instance, the term AbcDe, in which the small letters are bee. Any one of these 3 might have appeared first, any one of the remaining 2 second, and the remaining 1 last. The term therefore occurs 1. 2. 3 times. This applies to each of the terms in which there are two large and three small letters. The total number of such terms in the multinomial equivalent to (A+a) (B+J) (C+c) (D+d) (E+e) is therefore (3. 4. 5) 5 (1. 2. 3) ; and this is therefore the coefficient of A 2 a 3 in the expansion of (A+a) 5 .

The reasoning is quite general; and, in the same way, the coefficient of A”~ r a r in the expansion of (A+a)” is {(n-r+i) (n-r+2) . . . («-i)w)-=-ii.2.3 ■ . ■ r. It is usual to write this as a fraction, inverting the order of the factors in the numerator. Then, if we denote it by ti(r), so that _n (n — i)...(w — r + l) 1.2. 3... r we have

(A+a)» = « (oA”«(i)A”- 1 o...« w A”- r a’-...+W(„„a” (2) ;

where «(o), introduced for consistency of notation, is defined by

»<0> =I (3).

This is the binomial theorem for a positive integral index.

(ii.) To verify this, let us denote the true coefficient of A n_r a r by (“), so that we have to prove that (“)=«()■), where w(r) is defined by (1); and let us inspect the actual process of multiplying the expansion of (A+ a) ” _I by A+a in order to obtain that of (A+a) “. Using detached coefficients (§37 (v.)), the multiplication is repre- sented by the following: —

i +(“7 i) + (“r) + ” + (“7 I) + “+ –

■ C , 7 1)- + ft=i)+-+ft=3+’ ‘+ © + ■■■ ® ••• (,-J+i.

so w ©=(v) +(:::)•

Now suppose that the formula (2) has been established for every power of A+a up to the (w-i)th inclusive, so that

(“7 1) =(n-i)(,),(*lj) = («- 1)0-0. Then (£) , the coefficient

of A n ~‘a r in the expansion of (A+a)”, is equal to (w-i)(r)+ (w-i)(r _i). But it may be shown that (r being >o)

■»w =

(1),

ALGEBRA

607

»(r) = (»-l)(r) + (»-l)(r-l) (4),

and therefore y r) = »(>■)■

Hence the formula (2) is also true for the »th power of A+a. But it is true for the 1st and the 2nd powers; therefore it is true for the 3rd; therefore for the 4th; and so on. Hence it is true for all positive integral powers of n.

(iii.) The product 1. 2. 3 ... r is denoted by IjL or rl, and is called factorial r. The form r\ is better for printing, but the form |_! is more convenient for ordinary use. If we denote «(n-i) . . . (n-r+i) (r factors) by » (r) , then « (r)=« (r> //’!.

(iv.) We can write «(.-> in the more symmetrical form

W(r > = (»-“)’! r ! (s) ‘

which shows that

»(r)=»

We should have arrived at this form in (i.) by considering the selection of terms in which there are to be two large and three small letters, the large letters being written down first. The terms can be built up in 5! ways; but each will appear 213! times.

(v.) Since «(r > is an integer, « is divisible by rl; i.e. the product of any r consecutive integers is divisible by r! (see § 42 (ii.)).

(vi.) The product r\ arose in (i.) by the successive multiplica- tion

of r, r- 1, r- 2, . . . 1. In practice the successive factorials 1!, 2!, 3! . . . are supposed to be obtained successively by introduction of new factors, so that

r [image] (7).

Thus in defining r! as 1. 2. 3 . . . r we regard the multiplications as taking place from left to right; and similarly in » (r> . A product in which multiplications are taken in this order is called a continued product.

(vii.) In order to make the formula (5) hold for the extreme values n we must adopt the convention that

o! = i (8).

This is consistent with (7), which gives i! = i.o!. It should be observed that, for r = o, (4) is replaced by

«(o) = (» — l)

and similarly, for the final terms, we should note that

P(«> = oif q > p (10).

(viii.) If u r denotes the term involving a" in the expansion of (A + o) n , then jtr/«r_i = |(»-r + i)/rJ.a/A. This decreases as r increases; its value ranging from na/A to a/(nA). If na A and «A > a, the terms will first increase up to a greatest term (or two consecutive equal greatest terms) and then decrease.

(ix.) The position of the greatest term will depend on the relative values of A and a; if a/A is small, it will be near the beginning. Advantage can be taken of this, when n is large, to make approximate calculations, by omitting terms that are negligible.

(a) Let S r denote the sum W0 + M1 + . . . «,, this sum being taken so as to include the greatest term (or terms); and let u r ilu r — B, so that0

(b) In the same way, for the expansion of (A – a) n , let . Then, provided a> includes the greatest term, it will be found that (A a)" lies between

For actual calculation it is most convenient to write the theorem in the form

(A ± a)”

= A”(l ± z)” = A n ±-.t:.A”

+ •■

1—1 ™ A.

—— X . r* . A” = 2 I

where x = a [A; thus the successive terms are obtained by successive multiplication. To apply the method to the calculation of N n , it is necessary that we should be able to express N in the form A + a or A -a, where a is small in comparison with A, A” is easy to calculate and a/A is convenient as a multiplier. 42. The reasoning adopted in § 41 (ii.) illustrates two general

methods of procedure. We know that (A-|-a) n is equal to a multinomial of «+i terms with unknown coefficients, and we require to find these coefficients. We therefore represent them by separate symbols, in the same way that we represent the unknown quantity in an equation by a symbol. This is the method of undetermined coefficients. We then obtain a set of equations, and by means of these equations we establish the required result by a process known as mathematical induction. This process consists in proving that a property involving p is true when p is any positive integer by proving (1) that it is true when p = i, and (2) that if it is true when p = n, where n is any positive integer, then it is true when p = n--x. The following are some further examples of mathematical induction.

(i.) By adding successively 1, 3, 5 . . . we obtain 1, 4, 9, . . . This suggests that, if u n is the sum of the first n odd numbers, then «„ = « 2 . Assume this true for «i, w 2 , • • , u n . Then M, 1 + i = « n + (2» + i) = « 2 + (2»|-i) = («-r-i) 2 , so that it is true for w„ + i. But it is true for U. Therefore it is true generally.

(ii.) We can prove the theorem of § 41 (v.) by a double application of the method.

(a) It is clear that every integer is divisible by 1!.

(b) Let us assume that the product of every set of p consecutive integers is divisible by pi, and let us try to prove that the product of every set of p + i consecutive integers is divisible by > (p + i)l. Denote the product n(n-j-i) . . . (w + r-i) by n M . Then the

assumption is that, whatever positive integral value n may have, » [pl is divisible by pi.

(1) n lp+i: —(n — i) ip+l] = n(n+i)...(n+p — i)(n+p) — (n-i)n . . . (n+p-i) = (p+i). n lp \ But, by hypothesis, « Cp] is divisible by p!. Therefore n lp+ll -(n-i) lp+l} is divisible by pi. Therefore, if («-i) Ip+l] is divisible by (p+i)l, n lp+1 ˆ is divisible by(£+i)!.

(2) But i l ‘ +lJ =(p+i)\, which is divisible by (p+i)l

(3) Therefore » 1 p+ i] is divisible by (p--i)l, whatever positive integral value n may have.

(c) Thus, if the theorem of § 41 (v.) is true for r=p, it is true for r=p--i. But it is true for r=i. Therefore it is true generally.

(iii.) Another application of the method is to proving the law of formation of consecutive convergents to a continued fraction (see Continued Fractions) .

43. Binomial Coefficients. — The numbers denoted by « (r) iii § 41 are the binomial coefficients shown in the table in § 40; w ® being the (r+i)th number in the («+i)th row. They have arisen as the coefficients in the expansion of (A+a) n ; but they may be considered independently as a system of numbers defined by (1) of § 41. The individual numbers are connected by various relations, some of whiclr are considered in this section.

(i.) From (4) of § 41 we have

»W-(»-l)(r) = (»-l)(,_l) (11).

Changing n into n — 1, n — 2, . . ., and adding the results,

»(r)-(»~.0® = (»-l)(r-l)+(«-2)(r _l) + ...|(tf-s)(,_l) (l 2).

In particular,

«(r) = (n-l)(,_i) + (n-2)(,_i)+... + (f-i) (r _i) (13). Similarly, by writing (4) in the form

»M-(»-i)(,_i) = (n-i)(,) (14),

changing n and r into n-i and r-i, repeating the process, and adding, we find, taking account of (9),

fl(,) = (»-i)(,)-Kn-2((r _i)-r-...-H»-r — 1)0 (15). (ii.) It is therefore

more convenient to rearrange the table of § 40 as shown below, on the left; the table on the right giving the key to the arrangement.

I O(o)

1 i(D

I I 1(0) 2(2)

2 I 2 (i) 3 (3)

J 3 I 2( ) 3(2) 4(4)

3 4 1 3d). 4(3) 5(6)

1 6 5 1 3(0) 4(2) 5(4) 6(6)

4 IO 6 1 4(D 5(3) 6(6) 7(7) J5 7 1 4«) 5(2) 6(4) 7(6) 8 (s ,

&c.

&c.

6o8

ALGEBRA

Here we have introduced a number 0(o> given by

0(o> = i t (16),

which is consistent with the relations in (i.). In this table any number is equal to the sum of the numbers which lie horizontally above it in the preceding column, and the difference of any two numbers in a column is equal to the sum of the numbers horizontally between them in the preceding column.

The coefficients in the expansion of (A+a) a for any particular value of n are obtained by reading diagonally upwards from left to right from the (w+i)th number in the first column.

(iii.) The table might be regarded as constructed by successive applications of (9) and (4); the initial data being (16) and (10). Alternatively, we might consider that we start with the first diagonal row (downwards from the left) and construct the remaining diagonal rows by successive applications of (15).

Constructed in this way, the successive diagonal rows, commencing with the first, give the figurate numbers of the first, second, third, . . . order. The (f+i)th figurate number of the nth order, i.e. the (r+i)th number in the wth diagonal row, is n(n+i) . . . (n+r-i) [rl = n ® lrl; this may, by analogy with the notation of §41, be denoted by «[r j. We then have

(n-t-i) tr] = (r+i) t „j = («+r)!/(n! r!) =(n+r)cr) = (n+r)oo (1?).

(iv.) By means of (17) the relations between the binomial coefficients in the form pˆ may be replaced by others with the coefficients expressed in the form /»[,> The table in (ii.) may be written

I0

2 [o: 'Hi

2 W r [3]

30 22 I4

31 2 [3] ![6]

40 32 2 [4] I[6l

41 3[»] 2 [6] I[7l

5»] 4[»] 3m 2 [6] l [8]

&c.

The most important relations are

«[r] =«[r-l] + (n-l)(,) d8);

Ofr] =0 (lg);

«[r] -(n-i)tr] =»[r-l] + («-l)tr_n-t-... + (n-i + l) [r _ 1] (20);

«[r] = n[r-l] + (w — I) [r_l] + ...+I [r-1] ' (21).

(v.) It should be mentioned that the notation of the binomial coefficients, and of the continued products such as n(n-i) . . . («-r +i), is not settled. Some writers, for instance, use the symbol n, in place, in some cases, of «(r), and, in other cases, of n (r> . It is

convenient to retain x, to denote x T \r\, so that we have the consistent notation

x T =x T lr\, n® = »(r Vr!, niriˆnˆ/rl The binomial theorem for positive integral index may then be written

(x+y)n=x„y x n .iyi...x„ T yr...+x<,y n . This must not be confused with the use of suffixes to denote particular terms of a series or a progression (as in § 41 (viii.) and (ix.)).

44. Permutations and Combinations. — The discussion, in §41 (i.), of the number of terms of a particular kind in a particular product, forms part of the theory of combinatorial analysis (q.v.), which deals with the grouping and arrangement of indi- viduals taken from a defined stock. The following are some particular cases; the proof usually follows the lines already indicated. Certain of the individuals may be distinguishable from the remainder of the stock, but not from each other; these may be called a type.

(i.) A permutation is a linear arrangement, read in a definite direction of the line. The number („Pr) of permutations of r individuals out of a stock of n, all being distinguishable, is n lr) . In particular, the number of permutations of the whole stock is »'.

If a of the stock are of one type, b of another, c of another, . . . the number of distinguishable permutations of the whole stock is n-i-{a\b\c\ . . .).

(ii.) A combination is a group of individuals without regard to arrangement. The number (n C r) of combinations of r indi-

viduals out of a stock of » has in effect been proved in § 41 (i.) to be «(r). This property enables us to establish, by simple reasoning, certain relations between binomial coefficients. Thus (4) of § 41 (ii.) follows from the fact that, if A is any one of the n individuals, the „C, groups of r consist of n _iC r _i which contain A and „_iC- which do not contain A. Similarly, con- sidering the various ways in which a group of r may be obtained from two stocks, one containing m and the other containing n, we find that

which gives

(m+i»)(r)=»»(r).W(0)+»»Cr_l).W(l)4-.:.4-m(0).»(r) (22).

This may also be written

(m+») (r) =m< r >.»(°>r (I) .TO< , - 1 >.re< 1 >...+r (r),m< >.«M (2 g). If r is greater than m or n (though of course not greater than m+n), some of the terms in (22) and (23) will be zero.

(iii.) If there are n types, the number of individuals in each type being unlimited (or at any rate not less than r), the number („H r) of distinguishable groups of r individuals out of the total stock is »[r] . This is sometimes called the number of homo- geneous products of r dimensions formed out of n letters; i.e. the number of products such as x r , £ r ~ 3 y 3 , x T ~V, . . . that can be formed with positive integral indices out of n letters x, y, z, . . ., the sum of the indices in each product being r.

(iv.) Other developments of the theory deal with distributions, partitions, &c. (see Combinatorial Analysis).

(v.) The theory of probability (q.v.) also comes under this head. Suppose that there are a number of arrangements of r terms or elements, the first of which a is always either A or not-A, the second b is B or not-B, the third c is C or not-C, and so on. If, out of every N cases, where N may be a very large number, a is A in pN cases and not-A in (1— p)N cases, where p is a fraction such that p~N is an integer, then p is the probability or frequency of occurrence of A. We may consider that we are dealing always with a single arrangement abc . . .. and that the number of times that a is made A bears to the number of times that a is made not-A the ratio of p to i-p; or we may consider that there are N individuals, for ˆN of which the attribute a is A, while for (i-/>)N it is not-A. If, in this latter case, the proportion of cases in which b is B to cases in which b is not-B is the same for the group of pN individuals in which a is A as for the group of (i-/>)N in which a is not-A, then the frequencies of A and of B are said to be independent; if this is not the case they are said to be correlated. The possi- bilities of a, instead of being A and not-A, may be Ai, A 2 , . . ., each of these having its own frequency; and similarly for b, c, . . . If the frequency of each A is independent of the frequency of each B, then the attributes a andJ are independent j otherwise they are correlated.

45. Application of Binomial Theorem to Rational Integral Functions. — An expression of the form Cox n --Cix n ~ i + . . . +c„, where Cq, c\, . . . do not involve x, and the indices of the

powers of * are all positive integers, is called a rational integral function of x of degree n.

If we represent this expression hyf(x), the expression obtained by changing x into x+h is f(x+h); and each term of this may be expanded by the binomial theorem. Thus we have

h h?

, f(x+)h = Cf,x n +nc v x n – 1 Y\+n(n — i)c x n ˆ 1 —] +.:.

h h 2

+cix n ~ 1 + (n – i)cix n -*ji+ (n – 1) (n -2)c 1 x n – 3 ˆ+...

h k 2

+c i x n – i c2X n ~ 3 ji(n-2) (n -3) W -4 jt+...

+ &c. ‘ ‘

= \c x n +cix n – 1 +c& n -v + ...\

+ \ nc x”- 1 + (n-l)c 1 x n -ˆ + (n-2)c2X n – 3 +... I jj

4- j n(n-i)c a x”- 2 + {n-l)(n-2)ciX n – 3 +... i||

+ &C. It will be seen that the expression in curled brackets in each line after the first is obtained from the corresponding expression in the preceding line by a definite process; viz. x’ is replaced by

ALGEBRA

609

rX~ l , except for r=*o, when x” is replaced by o. The expressions obtained in this way are called the first, second, . . . derived functions of f(x). If we denote these by fi{x),fi{x), . . ., so that f,(x) is obtained from f s -i(x) by the above process, we have

f(x+h)=f(x)+Mx).h+Mx)k 1 i2\+...Mx)h’frl... This is a particular case of Taylor’s theorem (see Infinitesimal Calculus).

46. Relation of Binomial Coefficients to Summation of Series. — (i.) The sum of the first n terms of an ordinary arithmetical progression (a+b), (a+2b), . . . (a+nb) is (§ 28 (i.)) \n ((a+6) +

(a--nb)\ = na+\n(n+i)b = n[\.a+n m .b. Comparing this with the table in §43 (iv.), and with formula (21), we see that the series expressing the sum may be regarded as consisting of two, viz. 0+0+ . . . and 6+26+36+ . . . ; for the first series we multiply the table (i.e. each number in the table) by a, and for the second series we multiply it by b, and the terms and their successive sums are given for the first series by the first and the second columns, and for the second series by the second and the third columns.

(ii.) In the same way, if we multiply the table bye, the sum of the first n numbers in any column is equal to the nth number in the next following column. Thus we get a formula for the sum of n terms of a series such as

2.4.6+4.6.8+..., or 6.8.10.12+8.10.12.14+...

(iii.) Suppose we have such a series as 2. 5+5. 8+8. 11+ . . . This cannot be summed directly by the above method. But the nth term is (3n— i)(3ra+2) = i8«[2]— 6w[i] — 2. The sum of n terms is therefore (§ 43 (iv.))

i8«[3] — 6» [2] — 2ti[i] =3» 3 +6n 2 +n.

(iv.) Generally, let N be any rational integral function of n of degree r. Then, since « [r] is also a rational integral function of n of degree r, we can find a coefficient c r , not containing n, and such as to make N— c r n [r] contain no power of n higher than n'~ l . Proceeding in this way, we can express N in the form c r .n 1r] + e,_i.W[r -ii+ . . ., where c T , c r -i, c r i, ... do not con tain n; and thence we can obtain the sum of the numbers found by putting « = i, 2, 3, . . . n successively m N. These numbers constitute an arithmetical progression of the rth order.

(v.) A particular case is that of the sum i r +2 r 3" . . . +n r , where r is a positive integer. It can be shown by the above reasoning that this can be expressed as a series of terms containing descending powers of n, the first term being n T+l ftr+i). The most important cases are

1 +2 +3 +...+n = J»(» + i),

I 2 +2 2 + 3 2 +...+K 2 = Mn + l)(2B+l),

i 3 +2 3 +3 3 + ...+» 3 = i» 2 (ra + i) 2 = (i+2+...+n) 2 . The general formula (which is established by more advanced

methods) is I .. 0′ + r 2’... + {n – 1)’+ \n’

= F+i| » r+1 + Bi(r+i)(2) n- 1 B 2 (r+i) (4) «’ 3 + . . . J>
where Bi, B 2 , . . . are certain numbers known as Bernoulli’ s numbers, and the terms within the bracket, after the first, have signs alternately + and — . The values of the first ten of Bernoulli’s numbers are B, = |, B 2 = „> , B s = ˆ, B 4 = J , B5 = e 6 8. B 6 = 2 %> B 7 = ?,

B 8 =ˆjV, B 9 =if|ˆ, Bˆ”ˆ

IV. Negative Numbers and Formal Algebra.

47. Negative quantities will have arisen in various ways, e.g. (i.) The logical result of the commutative law, applied to a

succession of additions and subtractions, is to produce a negative quantity— 3s. such that — 3S.+3S. = o(§ 28 (vi.)).

(ii.) Simple equations, especially equations in which the unknown quantity is an interval of time, can often only be satisfied by a negative solution (§ 33).

(iii.) In solving a quadratic equation by the method of § 38 (viii.) we may be led to a result which is apparently absurd. If, for instance, we inquire as to the time taken to reach a given height by a body thrown upwards with a given velocity, we find that the time increases as the height decreases. Graphical

1. 20

representation shows that there are two solutions, and that an equation X 2 =9a 2 may be taken to be satisfied not only by X=3

48. The occurrence of negative quantities does not, however, involve the conception of negative numbers. In (iii.) of § 47, for instance, ” —3a” does not mean that a is to be taken (— 3-) times, but that a is to be taken 3 times, and the result treated as subtractive; i.e.— 3a means —(30), not (— $)a (cf. § 27 (i.)).

In the graphic method of representation the sign — may be taken as denoting a reversal of direction, so that, if + 3 repre- sents a length of 3 units measured in one direction,— 3 represents a length of 3 units measured in the other direction. But even so there are two distinct operations concerned in the— 3, viz. the multiplication by 3 and the reversal of direction. The graphic

method, therefore, does not give any direct assistance towards the conception of negative numbers as operators, though it is useful for interpreting negative quantities as results.

49. In algebraical transformations, however, such as (x— a) 1 = x 2 — 2ax--a i , the arithmetical rule of signs enables us to combine the sign— with a number and to treat the result as a whole, subject to its own laws of operation. We see first that any operation with 4a— 36 can be regarded as an operation with ()4(—)3&, subject to the conditions (1) that the signs () and () obey the laws ()() = (),()() = ()() = (—), (—) (—) = (), and (2) that, when processes of multiplica tion are completed, a quantity is to be added or subtracted accord- ing as it has the sign () or (—) prefixed. We are then able to combine any number with the + or the — sign inside the bracket, and to deal with this constructed symbol according to special laws; i.e. we can replace pr or —pr by (+p)r or (-p)r, subject to the conditions that (p) (?) = (—/») (—?), (+P) (— q)~(—p) i+q) = {—pq), and that + (— s) means that s is to be subtracted.

These constructed symbols may be called positive and negative coefficients; or a symbol such as (—p) may be called a negative number, in the same way that we call f a fractional number.

This increases the extent of the numbers with which we have to deal; but it enables us to reduce the number of formulae. The binomial theorem may, for instance, be stated for (x+a) n alone; the formula for (x— a)" being obtained by writing it a;s \x+(-)a} n or U+(-a)}", so that

{x — a)"=x n — «(i)*" 1 a+-. + (—) r »o)X n-r a r +..., where + (—)' means — or + according as r is odd or even.

The result of the extension is that the number or quantity represented by any symbol, such as P, may be either positive or negative. The numerical value is then represented by |P|; thus " \x\< 1 " means that * is between — 1 and +1.

50. The use of negative coefficients leads to a difference between arithmetical division and algebraical division (by a multinomial), in that the latter may give rise to a quotient con- taining subtractive terms. The most important case is division by a binomial, as illustrated by the following examples: —

(1) (2)

2.10 + 1) 6.100+5.10+ 1(3.10 + 1 2.10+1) 6.100 + 1.10— 1 (3.10 — 1 6.100+3.10 6.ioo+3-io

2. 10+ 1

2.10 + 1

— 2.10 — 1

— 2.10 — 1

In (1) the division is both arithmetical and algebraical, while in (2) it is algebraical, the quotient for arithmetical division being

2.10+9.

It may be necessary to introduce terms with zero coefficients. Thus, to divide 1 by i+x algebraically, we may write it in the form i+o.«+o.x 2 +o.* 3 +o.a:', and we then obtain 1 i+o.a: +o.^ 2 +o.jc 3 +o.jc 4 _ , 2 _ , x* i+x~ i+x- ~ J – x+x x + i+x'

where the successive terms of the quotient are obtained by a process which is purely formal.

51. If we divide the sum of x 2 and a 2 by the sum of x and a, we get a quotient x—a and remainder 2a 2 , or a quotient a—x and remainder 2X 2 , according to the order in which we work. Algebraical division therefore has no definite meaning unless

dividend and divisor are rational integral functions of some expression such as x which we regard as the root of the notation (§ 28 (iv.)), and are arranged in descending or ascending powers of x. If P and M are rational integral functions of x, arranged in descending powers of x, the division of P by M is complete when we obtain a remainder R whose degree (§ 45) is less than that of M. If R = o, then M is said to be a factor of P.

The highest common factor (or common factor of highest degree) of two rational integral functions of * is therefore found in the same way as the G.C.M. in arithmetic; numerical coefficients of the factor as a whole being ignored (cf. § 36 (iv.)).

52. Relation between Roots and Factors. — (i.) If we divide the

multinomial

V = p x" + piX"~ 1 + ... + p n by x—a, according to algebraical division, the remainder is

REEpoa' + pia"- 1 + ... + p n . This is the remainder -theorem; it may be proved by induction.

(ii.) If x = a satisfies the equation P = o, then p a n --pia"~ 1 + ■ ■ ■ + pn — o; and therefore the remainder when P is divided by x—a is o, i.e. x—a is a factor of P.

(iii.) Conversely, if x—a is a factor of P, then p a"-{-pia"~ 1 + . . . + /> „ = o; i.e. x—a satisfies the equation P = o.

(iv.) Thus the problems of determining the roots of an equation P = o and of finding the factors of P, when P is a rational integral function of x, are the same.

(v.) In particular, the equation P = o, where P has the value in (i.), cannot have more than n different roots.

The consideration of cases where two roots are equal belongs to the theory of equations (see Equation).

(vi.) It follows that, if two multinomials of the wth degree in x have equal values for more than n values of x, the corresponding coefficients are equal, so that the multinomials are equal for all values of x.

53. Negative Indices and Logarithms. — (i.) Applying the general principles of §§ 47-49 to indices, we find that we can interpret X – "* as being such that

X-.X— = X" = 1 ; i.e. X"™ = i/X*». In the same way we interpret X _ p' < * as meaning i/X p/s . (ii.) This leads to negative logarithms (see Logarithm).

54. Laws of Algebraic Form. — (i.) The results of the addition, subtraction and multiplication of multinomials (including monomials as a particular case) are subject to certain laws which correspond with the laws of arithmetic (§ 26 (i.)) but differ from them in relating, not to arithmetical value, but to algebraic form. The commutative law in arithmetic, for instance, states that a--b and b--a, or ab and ba, are equal. The corresponding law of form regards a + b and b--a, or ab and ba, as being not only equal but

identical (cf. § 37 (ii.)), and then says that A+B and B+A, or AB and BA, are identical, where A and B are any multinomials. Thus a(b+c) and {b--c)a give the same result, though it may be written in various ways, such as ab+ac, ca+ab, &c. In the same way the associative law is that A(BC) and (AB)C give the same formal result.

These laws can be established either by tracing the individual terms in a sum or a product or by means of the general theorem in § 52 (vi.).

(ii.) One result of these laws is that, when we have obtained any formula involving a letter a, we can replace a by a multi- nomial. For instance, having found that (x--a) 2 = x 2 +2ax+a 2 , we can deduce that (x+b+c) 2 = {x+(b+c)\ 2 = x 2 +2(b+c)x+ (b +c)'.

(iii.) Another result is that we can equate coefficients of like powers of x in two multinomials obtained from the same expres- sion by different methods of expansion. For instance, by equating coefficients of x r in the expansions of (i+x) m+n and of (i+x) m . (i + .r)" we obtain (22) of § 44 (ii.).

(iv.) On the other hand, the method of equating coefficients often applies without the assumption of these laws. In § 41 (ii.), for instance, the coefficient of A n ~ T a r in the expansion of

(A+a) (A+a) n_1 has been called (J ; and it has then been

shown that (") = (n ~ x \ + /*~ l \ . This does not involve any

assumption of the identity of results obtained in different ways; for the expansions of (A+a) 2 , (A+a) 3 , . . . are there supposed to be obtained in one way only, viz. by successive multiplications by A+a.

55. Algebraical Division. — In order to extend these laws so as to include division, we need a definition of algebraical division. The divisions in §§ 50-52 have been supposed to be performed by a process similar to the process of arithmetical division, viz. by a series of subtractions. This latter process, however, is itself based on a definition of division in terms of multiplication (§§ 15, 16). If, moreover, we examine the process of algebraical division as illustrated in § 50, we shall find that, just as arith- metical division is really the solution of an equation (§ 14), and involves the tacit use of a symbol to denote an unknown quantity or

number, so algebraical division by a multinomial really implies the use of undetermined coefficients (§ 42). When, for instance, we, find that the quotient, when 6 5* “jx 2 13ˆ 5a; 4 is divided by 2+3Z+* 2 , is made up of three terms+3, — -2x, and 5# 2 , we are really obtaining successively the values of Co, £1, and c 2 which satisfy the identity 6 5*+ 7ˆ+ 133?+ 5s 4 = (c +ci* +C2ˆ) (2+3S+* 2); and we could equally obtain the result by expanding the right-hand side of this identity and equating coefficients in the first three terms, the coefficients in the remaining terms being then compared to see that there is no remainder. We therefore define algebraical division by means of algebraical multiplication, and say that, if P and M are multinomials, the statement ” P/M = Q ” means that. Q is a multinomial such that MQ (or QM) and P are identical. In this sense, the laws mentioned in § 54 apply also to algebraical division.

56. Extensions of the Binomial Theorem. — It has been mentioned in § 41 (ix.) that the binomial theorem can be used for obtaining an approximate value for a power of a number; the most important terms only being taken into account. There are extensions of the binomial theorem, by means of which approximate calculations can be made of fractions, surds, and powers of fractions and of surds; the main difference being that the number of terms which can be taken into account is unlimited, so that, although we may approach nearer and nearer to the true value, we never attain it exactly. The argument involves the theorem that, if 6 is a positive quantity less than 1, l can be made as small as we please by taking t large enough; this follows from the fact that I log 6 can be made as large (numeric- ally) as we please.

(i.) By algebraical division, 1 i+o.+o.+.-.+o.ˆ 1 i+x~ i+x

-I-X+3*-... + {-y*+(-)rH£L (24).

If, therefore, we take 1/(1+*) as equal to 1—*+ˆ—...+ (—) r x r , there is an error whose numerical magnitude is \x r+1) (1+*) I ; and, if |»|

This is the foundation of the use of recurring decimals; thus we can replace j\ !_ = l4 = i 8 ffV(I — rtir)} by -363636(= 36/10* +36/io 4 +36/io 6), with an error (in defect) of only 36/(io 6 .99).

(ii.) Repeated divisions of (24) by i+x, r being replaced by r+i

before each division, will give

(l+x)-* = l-2x+3X*-4 X s+... + (~y(r + l)x'-

+ ()r +1 ‘ + M(>l)(l)- 1 + (l +*)-*),

(1 +x)-* = I -3x+6x*-lox 3 +. .. + (-)'. i(r + l)(r+2)x'

+ (-)' +1 ‘ +1 (Mr+0 (r+2)(i +)-i + (r+i)(i +*)"* + (1 +*)-»}
,&c. Comparison with the table of binomial coefficients in § 43 suggests that, if m is any positive integer,

(1 +*)-» = S,+R r (2S) >

where Sr=i-m [ijx+m m x'... + (-ymi r }X r (26),

Rs() rtl * rtI («w(i+*)" 1 ALGEBRA

611

made as small as we please by taking r large enough, so that we can make S r approximate as closely as we please to i--x)~ m .

(iv.) To assimilate this to the binomial theorem, we extend the definition of « (r > in (i) of § 41 (i.) so as to cover negative integral values of n; and we then have

(~«)(r) =

(— m){—m — 1)~ .{ — m — r+i)

= (-)‘m l r] (28),

so that, if n=—m,

S r = 1 +n w x+n m x 1 +... +n{ r)X r (29).

(v.) The further extension to fractional values (positive or negative) of n depends in the first instance on the establishment of a method of algebraical evolution which bears the same relation to arithmetical evolution (calculation of a surd) that algebraical division bears to arithmetical division. In calculating V2, for instance, we proceed as if 2-0000 . . . were the exact square of some number of the form co+Ci/io+c 2 /io 2 +- . .

In the same way, to find X llq , where X= i+ai*+a 2 r ! + . . . and q is a positive integer, we assume that X J / 3 = i-j-bix+bix

2 . . ., and we then (cf. § 55) determine 61, & 2 , . . . in succession so that {i+b i x+bzx i + . . .)« shall be identical with X.

The application of the method to the calculation of (1+*)", when n = plq, q being a positive integer and p a positive or negative integer, involves, as in the case where n is a negative integer, the separate consideration of the form of the coefficients b\, bi, . . . and of the numerical value of i+6i*+ft 2 * 2 +. . . +b r x r .

(vi.) The definition of w (,i, which has already been extended in (iv.) above, has to be further extended so as to cover fractional values of n, positive or negative. Certain relations still hold, the most important being (22) of § 44 (ii.), which holds whatever the values of m and of n may be; r, of course, being a positive integer. This may be proved either by induction or by the method of § 52 (vi.). The relation, when written in the form (23), is known as Vandermonde's theorem. By means of this theorem it can be shown that, whatever the value of n may be,

{i + (p!q)wx + (p!q)mX i +.~ + {p!q)<.T)X'-)<'=l+p(l) x+Pu) x*+...+p w x'

+ terms in £ r+1 , x rn ,—x qr .

(vii.) The comparison of the numerical value of i+wa)* +«<2>* 2 +...«(r)*", when n is fractional, with that of (i*) n , involves advanced methods (§ 64). It is found that this expres- sion can be used for approximating to the value of (i+£) n , provided that |z|

(a) If n> —1, then, provided r>n,

(1) If I >x>0, (1 +x) n lies between S r and S r +i;

(2) If o>*> —1, (i+x)" lies between S, and S,u r ii(i+x).

(b) If n<— 1, the successive terms will either constantly decrease (numerically) from the beginning or else increase up to a greatest term (or two equal consecutive greatest terms) and then constantly decrease. If S r is taken so as to include the greatest term (or terms), then,

(1) If I >x>o, (1 *)» lies between S r and S r r,

(2) If o >* > — 1,(1 +x) n lies between S r and S r u r i/(i —u, + i/u r).

The results in (b) apply also if n is a negative integer.

(viii.) In applying the theorem to concrete cases, conversion of a number into a continued fraction is often useful. Suppose, for instance, that we require to calculate (23/13) 3 . We want to express (23/13) 3 in the form a 2 b, where b is nearly equal to 1. We find thatflogio (23/13) = -3716767 ˆlogu, (2-3533) =logio (40/17) nearly; and thence that (23/13)* = (40/17) (1 + 1063/3515200)*, which can be calculated without difficulty to a large number of significant figures.

(ix.) The extension of «< r) , and therefore of ny r y to negative and fractional values of n, enables us to extend the applicability of the binomial coefficients to the summation of series (§ 46 (ii.)). Thus the «th term of the series 2.5+5.8+8.11 + . . . in § 46 (iii.) is i8(« — i)m; formula (20) of § 43 (iv.) holds for the extended coefficients, and therefore the sum of n terms of this series is 18. (n — \)\i\— 18. (— s) [3i = 3w 3 +6» 2 +«. In this way we get the general rule that, to find the su m of n terms of a series, the rXh. term of which is (a+rb)(a+r+i-b) . . . (a+r+p— i-b), we

divide the product of the p--i factors which occur either in the «th or in the («+i)th term by p+i, and by the common difference of the factors, and add to a constant, whose value is found by putting n — o.

57. Generating Functions. — The series 1— mˆx-ˆ-mwp?— . . . obtained by dividing 1+0. x-j-o.x 2 \. . . by (i+*) n , or the series i--(plq)ˆyx--(p/q)ˆfx' l \ ■ ■ ■ obtained by taking the qth root of 1+ Ai)* + Pvy*?-\~ • . ■ , is an infinite series, i.e. a series whose successive terms correspond to the numbers 1, 2, 3, . . . It is often convenient, as in § 56 (ii.) and (vi.), to consider the mode of development of such a series, without regard to arithmetical calculation; i.e. to consider the relations between the coefficients of powers of x, rather than the values of the terms themselves. From this point of view, the function which, by algebraical operations on i+o.a;+o.x 2 . . . , produces the series, is called its generating function. The generating functions of the two series, mentioned above, for example, are (i*) _m and (1 --x) p l q . In the same way, the generating function of the series i + 2.T+x 2 +o.r' ! +o.x 4 +. . . is (1+x) 2 .

Considered in this way, the relations between the coefficients of the powers of x in a series may sometimes be expressed by a formal equality involving the series as a whole. Thus (4) of § 41

(ii.) may be written in the form

i+n w x+n m x' 1 +...+n ir –) x r +...y(i+x){i+(n-l) w x+(n-i) i 2)X*+...

+ (n-i)(r)x r +...}; the symbol " J " being used to indicate that the equality is only formal, not arithmetical.

This accounts for the fact that the same table of binomial coefficients serves for the expansions of positive powers of i+* and of negative powers of 1— x. For (4) may (§ 43 (iv.)) be written

(M-l) M =» M -»[r-l3,

and this leads to relations of the form

l+2x+3r ! +...7(l-x)(l+3*+6:s: 2 + lor> +...) (30) ; each set of coefficients being the numbers in a downward diagonal of the table. In the same way (21) of § 43 (iv.) leads to such relations as

1 +3*+6* 2 +...y (1 + x x*...) (1 +2*+3* ! +...) (31), the relation of which to (30) is obvious.

An application of the method is to the summation of a recurring series, i.e. a series c +cix+c 2 × 2 +. . . whose coefficients are con- nected by a relation of the form poC r --piC r i-...--pkCr-ic=o, where po,pi, ■ ■ -Pk are independent of * and of r.

58. Approach to a Limit. — There are two kinds of approach to a limit, which may be illustrated by the series forming the ex- pansion of (x+h) n , where n is a negative integer and i>h/x>o.

(i.) Denote nˆ r)X n ~ r h r by u„ and «o+Mi+. . . +«, by S f . Then (§ 56 (iii.)) {x--h) n lies between S r and S r i; and provided S r includes the numerically greatest term, | S r i — S,| constantly decreases as r increases, and can be made as small as we please by taking r large enough. Thus by taking r=o, 1, 2, ... we have a sequence So, Si, S 2 , . . . (i.e. a succession of numbers correspond- ing to the numbers 1, 2, 3, . . .) which possesses the property that, by starting far enough in the sequence, the range of varia- tion of all subsequent terms can be made as small as we please, but (x+h) n always lies between the two values determining the range. This is expressed by saying that the sequence converges to (x--h) n as its limit; it may be stated concisely in any of the three ways,

(x +h) n = \im(x n +n(i)X n – 1 h-\ -nˆ)X n ‘ T h T \—),{x+h) n = \im S ri

S,4 (x+h)’.

It will be noticed that, although the differences between successive terms of the sequence will ultimately become indefinitely small, there will always be intermediate numbers that do not occur in the sequence. The approach to the limit will therefore be by a series of jumps, each of which, however small, will be finite; i.e. the approach will be discontinuous.

(ii.) Instead of examining what happens as r increases, let us examine what happens as h/x decreases, r remaining unaltered. Denote h/x by 6, where i>0>o; and suppose further that 8<\ i/ n\, so that the first term of the series «o+«i+m 2 +. . -is

the greatest (numerically). Then {(x+A) B — S r (/A r+1 lies between n ir i->x n ~ r ~ l and » (r i) x” -r-1 (i+ˆ) n ; and the difference between these can be made as small as we please by taking h small enough. Thus we can say that the limit of \(x--h) n — S r \/h r+1 is n (r+i)» n_r_ 1 ; but the approach to this limit is of a different kind from that considered in (i.), and its investigation involves the idea of continuity.

V. Continuity.

59. The idea of continuity must in the first instance be introduced from the graphical point of view; arithmetical continuity being impossible without a considerable extension of the idea of number (§ 65). The idea is utilized in the elementary consideration .of a differential coefficient; and its importation into the treatment of certain functions as continuous is therefore properly associated with the infinitesimal calculus.

60. The first step consists in the functional treatment of equations. Thus, to solve the equation ax 2 +bx--c = o, we consider, not merely the value of * for which ax*+bx+c is o, but the value of ax 1 +bx+c for every possible value of x. By graphical treatment we are able, not merely to see why the equation has usually two roots, and also to understand why there is in certain cases only one root (i.e. two equal roots) and in

other cases no root, but also to see why there cannot be more than two roots.

Simultaneous equations in two unknowns x and y may be treated in the same way, except that each equation gives a functional relation between x and y. (" Indeterminate equations " belong properly to the theory of numbers.)

61. From treating an expression involving x as a function of x which may change continuously when x changes continuously, we are led to regard two functions x and y as changing together, so that (subject to certain qualifications) to any succession of values of * or of y there corresponds a succession of values of y or of x; and thence, if (x, y) and (x--h, y + k) are pairs of corresponding values, we are led to consider the limit (§ 58 (ii.)) of the ratio k/k when h and k are made indefinitely small. Thus we arrive at the differential coefficient oif(x) as the limit of the ratio of f(x--6) —f(x) to when 6 is made indefinitely small; and this gives an interpretation of nx"~ x as the derived function of x n

(§ 45). This conception of a limit enables us to deal with algebraical

expressions which assume such forms as – for particular values

of the variable (§ 39 (iii.)). We cannot, for instance, say that the

fraction ._ is arithmetically equal to z + i when x = 1, as well

as for other values of x; but we can say that the limit of the ratio of x 2 — 1 tox-i when x becomes indefinitely nearly equal to 1 is the same as the limit of £ + 1.

On the other hand, if }(y) has a definite and finite value for y = x, it must not be supposed that this is necessarily the same as the limit which /(y) approaches when y approaches the value x, though this is the case with the functions with which we are usually concerned.

62. The elementary idea of a differential coefficient is useful in reference to the logarithmic and exponential series. We know that logioN(i + 0) = logioN + logio(i + 0), and inspection of a table of logarithms shows that, when 8 is small, log lo (i + 0) ; s approximately equal to X0, where X is a certain constant, whose value is -434. . . If we took logarithms to base a, we should have

log„(i+0)=log„ioXX0, approximately. If therefore we choose a quantity e such that

log«ioXX = i, log, e=X, which gives (by more accurate calculation)

6 = 2-71828... ,

we shall have lim(log.(i+9))}/0 = i,

and conversely \im{e* + -e*\l=e x .

The deduction of the expansions

log«(i+z) =x — §X 2 +J* 8 — ... , e* = 1 +x+xV2\+x 3 l3\+... ,

is then more simply obtained by the differential calculus than by ordinary algebraic methods.

63. The theory of inequalities is closely connected with that of maxima and minima, and therefore seems to come properly under this head. The more simple properties, however, only require the use of elementary methods. Thus to show that the arithmetic mean of n positive numbers is greater than their geometric mean {i.e. than the »th root of their product) we show that if any two are unequal their product may be increased, without altering their sum, by making them equal, and that if all the numbers are equal their arithmetic mean is equal to their geometric mean.

VI. Special Developments.

64. One case of convergence of a sequence has already been considered in § 58 (i.). The successive terms of the sequence in that case were formed by successive additions of terms of a series; the series is then also said to converge to the limit which is the limit of the sequence.

Another example of a sequence is afforded by the successive

convergents to a continued fraction of the form a\,\ —] r — V • • ,

where ao t ai,a 2 , . . . are integers. Denoting these convergents by Po/Qo, P1/Q1, P2/Q2, • • . they may be regarded as obtained

from

a series rr+ (rr— rr) + \r£— rr) +• • • ; the successive terms of
Wo \Wi Wo/ \W2 Wi/

this series, after the first, are alternately positive and negative, and consist of fractions with numerators 1 and denominators continually increasing.

Another kind of sequence is that which is. formed by introducing the successive factors of a continued product; e.g. the successive factors on the right-hand side of Wallis's theorem ——
4*4 **.6

2 ~" 1. 3 '3-5 '57'"

A continued product of this kind can, by taking logarithms, be replaced by an infinite series.

In the particular case considered in § 58 (i.) we were able to examine the approach of the sequence S , Si, S 2 , . . . to its limit X by direct examination of the value of X— S r . In most cases this is not possible; and we have first to consider the convergence of the sequence or of the series which it represents, and then to determine its limit by indirect methods. This constitutes the general theory of convergence of series (see Series).

The word " sequence," as defined in § 58 (i.), includes progressions such as the arithmetical and geometrical progressions, and, generally, the succession of terms of a series. It is usual, however, to confine it to those sequences (e.g. the sequence formed by taking successive sums of a series) which have to be considered in respect of their convergence or non-convergence.

In order that numerical results obtained by summing the first few terms of a series may be of any value, it is usually necessary that the series should converge to a limit; but there are excep- tions to this rule. For instance, when n is large, »! is approxi- mately equal to ˆ(2im).(n/e) n ; the approximation may be improved by Stirling's theorem

l0g e 2 +l0g e 3 +... +loge(« –

- 1) -Hlog.n = §log e (2ir) +nlog«n — n

+ _B± Bˆ ()'B r

‘i.2.n 3.4.» 3 ” r “”’ r (2r — i).2r.re 2r_1 ~ t ~’ – ‘

where Bi, B 2 , . . . are Bernoulli’s numbers (§ 46 (v.)), although the series is not convergent.

65. Consideration of the binomial theorem for fractional index, or of the continued fraction representing a surd, or of theorems such as Wallis’s theorem (§ 64), shows that a sequence, every term of which is rational, may have as its limit an irrational number, i.e. a number which cannot be expressed as the ratio of two integers.

These are isolated cases of irrational numbers. Other cases arise when we consider the continuity of a function. Suppose, for instance, that y = x 2 ; then to. every rational value of a; there corresponds a rational value of y, but the converse does not hold. Thus there appear to be discontinuities in the values of y.

The difficulty is due to the fact that number is naturally not

continuous, so that continuity can only be achieved by an artificial development. The development is based on the necessity of being able to represent geometrical magnitude by arithmetical magnitude; and it may be regarded as consisting of three stages. Taking any number n to be represented by a point on a line at distance riL from a fixed point O, where L is a unit of length, we start with a series of points representing the integers 1, 2,3, . . . This series is of course discontinuous. The next step is to suppose that fractional numbers are repre sented in the same way. This extension produces a change of character in the series of numbers. In the original integral series each number had a definite number next to it, on each side, except 1, which began the series. But in the new series there is no first number, and no number can be said to be next to any other number, since, whatever two numbers we take, others can be inserted between them. On the other hand, this new series is not continuous; for we know that there are some points on the line which represent surds and other irrational numbers, and these numbers are not contained in our series. We therefore take a third step, and obtain theoretical continuity by considering that every point on the line, if it does not represent a rational number, represents

something which may be called an irrational number.

This insertion of irrational numbers (with corresponding negative numbers) requires for its exact treatment certain special methods, which form part of the algebraic theory of number, and are dealt with under Number.

66. The development of the theory of equations leads to the amplification of real numbers, rational and irrational, positive and negative, by imaginary and complex numbers. The quadratic equation x i +b 2 = o, for instance, has no real root; but we may treat the roots as being +6\ — 1, and — ft\— 1, if V — 1 is treated as something which obeys the laws of arithmetic and emerges into reality under the condition V – i.V — * = — *■ Expressions of the form JV — 1 and a+6V — 1, where a and b are real numbers, are then described as imaginary and complex numbers respectively; the former being a particular case of the latter.

Complex numbers are conveniently treated in connexion not only with the theory of equations but also with analytical trigonometry, which suggests the graphic representation of a+b

References.— W. K. Clifford, The Common Sense of the Exact Sciences (1885), chapters i. and iii., forms a good introduction to algebra. As to the teaching of algebra, see references under Arithmetic to works on the teaching of elementary mathematics. Among school-books may be mentioned those of W. M. Baker and A. A. Bourne, W. G. Borchardt, W. D. Eggar, F. Gorse, H. S. Hall and S. R. Knight, A. E. F. Layng, R. B. Morgan. G. Chrystal, Introduction to Algebra (1898) ; H. B. Fine, A College Algebra (1905) ; C. Smith, A Treatise on Algebra (1st ed. 1888, 3rd ed. 1892), are more suitable for revision purposes; the second of these deals rather fully with irrational numbers. For the algebraic theory of number, and the convergence of sequences and of series, see T. f . I'A. Bromwich, Introduction to the Theory of Infinite Series (1908); H. S. Carslaw, Introduction to the Theory of Fourier's Series (1906) ; H. B. Fine, The Number- System of Algebra (1891); H. P. Manning, Irrational Numbers (1906) ; J. Pierpont, Lectures on the Theory of Functions of Real Variables (1905). For general reference, G. Chrystal, Text- Book of Algebra (pt. i. 5th ed. 1904, pt. ii. 2nd ed. 1900) is indispensable; unfortunately, like many of the works here men- tioned, it lacks a proper index. Reference may also be made to the special articles mentioned at the commencement of the present article,

as well as to the articles on Differences, Calculus of; Infinitesimal Calculus; Interpolation; Vector Analysis. The following may also be consulted: — E. Borel and J. Drach, Introduction a V etude de la theorie des nombres et de I'algebre supe- rieure (1895); C. de Comberousse, Cours de mathematiques, vols. i. and iii. (1884-1887); H. Laurent, Traite d'analyse, vol. i. (1885); E. Netto, Vorlesungen iiber Algebra (vol. i. 1896, vol. ii. 1900); S. Pincherle, Algebra complementare (1893); G. Salmon, Lessons intro- ductory to the Modern Higher Algebra (4th ed., 1885); J. A. Serret, Cours d'algebre superieure (4th ed., 2 vols., 1877) ; O. Stolz and J. A. Gmeiner, Theorelische Arithmetic (pt. i. 1900, pt. ii. 1902) and Einleitung in die Funktionen-theorie (pt. i. 1904, pt. ii. 1905) — these being developments from O. Stolz, Vorlesungen uber aligemeine Arithmetik (pt. i. 1885, pt. ii. 1886); J. Tannery, Introduction a la

theorie des fonctions d'une variable (1st ed. 1886, 2nd ed. 1904); H. Weber, Lehrbuch der Algebra, 2 vols. (1st ed. 1895-1896, 2nd ed. 1898-1899; vol. i. of 2nd ed. transl. by Griess as Traite d'algebre superieure, 1898). For a fuller bibliography, see Encyclopddie der math. Wissenschaften (vol. i., 1898). A list of early works on algebra is given in Encyclopaedia Britannica, 9th ed., vol. i. p. 518.

(W. F. Sh.)

B. Special Kinds of Algebra

1. A special algebra is one which differs from ordinary algebra in the laws of equivalence which its symbols obey. Theoretically, no limit can be assigned to the number of possible algebras; the varieties actually known use, for the most part, the same signs of operation, and differ among themselves principally by their rules of multiplication.

2. Ordinary algebra developed very gradually as a kind of shorthand, devised to abbreviate the discussion of arithmetical problems and the statement of arithmetical facts. Although the distinction is one which cannot be ultimately maintained, it is convenient to classify the signs of algebra into symbols of quantity (usually figures or letters), symbols of operation, such as +, V, and symbols of distinction, such as brackets. Even when the formal evolution of the science was fairly complete, it was taken for granted that its symbols of quantity invariably stood for numbers, and that its symbols of operation were re- stricted to

their ordinary arithmetical meanings. It could not escape notice that one and the same symbol, such as j{a—b), or even {a—b), sometimes did and sometimes did not admit of arithmetical interpretation, according to the values attributed to the letters involved. This led to a prolonged controversy on the nature of negative and imaginary quantities, which was ultimately settled in a very curious way. The progress of analytical geometry led to a geometrical interpretation both of negative and also of imaginary quantities; and when a ” mean ing ” or, more properly, an interpretation, had thus been found for the symbols in question, a reconsideration of the old algebraic problem became inevitable, and the true solution, now so obvious, was eventually obtained. It was at last realized that the laws of algebra do not depend for their validity upon any particular interpretation, whether arithmetical, geometrical or other; the only question is whether these laws do or do not involve any logical contradiction. When this fundamental truth had been fully grasped, mathematicians began to inquire whether algebras might not be discovered which obeyed laws different from those obtained by the generalization of arithmetic. The answer to this question has been so manifold as to be almost embarrassing. All that can be done here is to give a sketch of the more important and independent special algebras at present known to exist.

3. Although the results of ordinary algebra will be taken for granted, it is convenient to give the principal rules upon which it is based. They are

(a+b)+c = a + {b+c) (a) (aXb)Xc = aX(bXc) (a’)

a+b = b+a © aXb=bXa (c’)

a(b+c) =ab+ac (d)

(a-b)--b=a (1) (a+b)Xb=a (1’)

These formulae express the associative and commutative laws of the operations + and X, the distributive law of X, and the definitions of the inverse symbols — and 5 , which are assumed to be unambiguous. The special symbols o and 1 are used to denote a— a and a-i-a. They behave exactly like the corre-sponding symbols in arithmetic; and it follows from this that whatever ” meaning ” is attached to the symbols of quantity, ordinary algebra includes arithmetic, or at least an image of it. Every ordinary algebraic quantity may be regarded as of the form

a+/3 V — 1, where a, |3 are ” real “; that is to say, every algebraic equivalence remains valid when its symbols of quantity are interpreted as complex numbers of the type a+j3V— 1 (cf . Number) . But the symbols of ordinary algebra do not necessarily denote numbers; they may, for instance, be interpreted as coplanar points or vectors. Evolution and involution are usually regarded as operations of ordinary algebra; this leads to a notation for powers and roots, and a theory of irrational algebraic quantities analogous to that of irrational numbers.

Son- numerical

4. The only known type of algebra which does not contain arithmetical elements is substantially due to George Boole.

Although originally suggested by formal logic, it is most simply interpreted as an algebra of regions in algebra. space. Let i denote a definite region of space; and let a, b, &c, stand for definite parts of i. Let a--b denote the region made up of a and b together (the common part, if any, being reckoned only once), and let aXb or ab mean the region common to a and b. Then a--a=aa — a; hence numerical coefficients and indices are not required. The inverse symbols — , - are ambiguous, and in fact are rarely used. Each symbol a is associated with its supplement a which satisfies the equivalences a-a=i, ad=o, the latter of which means that a and a have no region in common. Finally, there is a law of absorption expressed by a+ab = a. From every proposition in this algebra a reciprocal one may be deduced by interchang- ing + and X, and also the symbols o and i. For instance, x+y = x+xy and xy = x(x+y) are reciprocal. The operations + and X obey all the ordinary laws a, c, d (§ 3).

5. A point A in space may be associated with a (real, positive, or negative) numerical quantity a, called its weight, and denoted

by the symbol aA. The sum of two weighted points MSbias’s aA ˆB iSj by definition, the point (a+/3)G, where G centric divides AB so that AG: GB=/3 :a. It can be proved calculus. by geometry that

(aA+/3Bj+ T C = aA + (,8B+7C) = (a + ,?+7)P,

where P is in fact the centroid of masses a, /3, 7 placed at A, B, C respectively. So, in general, if we put

aA+/3B+ T C+... + XL = (a+/3+ 7 + ...+X)X.

X is, in general, a determinate point, the barycentre of ah, /3B, &c. (or of A, B, &c. for the weights a,)3, &c). If (a+0+. . . X) happens to be zero, X lies at infinity in a determinate direction; unless — oA is the barycentre of 0B, 7C, . . . XL, in which case aA/3B+ . . . +XL vanishes identically, and X is indeterminate. If ABCD is a tetrahedron of reference, any point P in space is determined by an equation of the form

(0+/3+7+8) P = aA +/3B +7C +«D :

o, /3, 7, 8 are, in fact, equivalent to a set of homogeneous co-ordinates of P. For constructions in a fixed plane three points of reference are sufficient. It is remarkable that Mobius employs the symbols AB, ABC, ABCD in their ordinary geometrical sense as lengths, areas and volumes, except that he distinguishes their sign; thus AB = -BA, ABC=-ACB, and so on. If be had happened to think of them as ” products,” he might have anticipated Grassmann’s discovery of the extensive calculus. From a merely formal point of view, we have in the barycentric calculus a set of ” special symbols of quantity ” or ” extra- ordinaries ” A, B, C, &c, which combine with each other by means of operations + and — which obey the ordinary rules, and with ordinary algebraic quantities by operations X and 4 , also according to the ordinary rules, except that division by an extraordinary is not used.

6. A quaternion is best defined as a symbol of the type

q = Za,e, = aoeo--a.iei = 02*2 + 0363, ˆ.fˆl’~ a ‘ s where eo. . ■ . e 3 are independent extraordinaries and

quater- ... , . ,

nlnns. do, . . . as ordinary algebraic quantities, which may

be called the co-ordinates of q. The sum and product jf two quaternions are defined by the formulae 2a,e,-f-2&e, = 2(a, +j8,)e, Xa r e r X 2/3,e, = ~S,OL,0,e r e,,

where the products e,e, are further reduced according to the following multiplication table, in which, for example, the

eo «1 «2 «3

e% second line is to be read eieo = ei, e?= — eo, e\c?. = ez t eie3 = —e 2 .

eo

Cl

ei

e-3

fi

-eo

e 3

— e 2

e 2

— e3

-eo

«i

«3

ei

— ei

— e

The effect of these definitions is that the sum and the pro- duct of two quaternions are also quaternions ; that addition is associative and commutative; and that multiplication is associative and distributive, but not commutative. Thus eie 2 = —eifix, and if q, q' are any two quaternions, qq' is generally different from q'q. The symbol eo behaves exactly like 1 in ordinary algebra; Hamilton writes 1, i, j, k instead of eo, «i, ei, eˆ and in this notation all the special rules of operation may be summed up by the equalities

; 2 =j 2 =£ 2 =;;£= -1.

Putting q—a+f3i+yj+8k, Hamilton calls a the scalar part of q, and denotes it by Sq; he also writes Vq for Pi+yj+&k, which is called the vector part of q. Thus every quaternion may be written in the form q=Sq+Vq, where either Sq or \q may separately vanish; so that ordinary algebraic quantities (or scalars, as we shall call them) and pure vectors may each be regarded as special cases of quaternions.

The equations q'+x = q and y+q' = q are satisfied by the same quaternion, which is denoted by q—q 1 . On the other hand, the equations q'x=q and yq'~q have, in general, different solutions. It is the value of y which is generally denoted by ?=

x = qiq/Nq', y=qqi/Nq',

which are free from ambiguity, since scalars are commutative with quaternions. The values of x and y are different, unless V(?? o)=o.

In the applications of the calculus the co-ordinates of a quaternion are usually assumed to be numerical; when they are complex, the quaternion is further distinguished by Hamilton as a biquaternion. Clifford's biquaterhions are quantities £q+W, where q, r are quaternions, and £, ij are symbols (com- mutative with quaternions) obeying the laws (■* = £, rf=Vt £f = r ;£ = o (cf. Quaternions).

7. In the extensive calculus of the wth category, we have, first of all, n independent " units," e\, ei, . . . e„. From these are derived symbols of the type

Ai = aiei + o 2 e2 +••• +ane» = Sae,

which we shall call extensive quantities of the first species "afcafas * (and, when necessary, of the wth category). The co-ordinates 01, . . . a n are scalars, and in particular applications may be restricted to real or complex numerical values.

If Bi = 2/3e, there is a law of addition expressed by Ai+Bi = 2(ai+ft)ft=Bi+Ai; this law of addition is associative as well as commutative. The inverse operation is free from ambiguity, and, in fact, Ai-Bi = 2(ai-ft)ei.

To multiply Ai by a scalar, we apply the rule

£Ai = Ai£ = 2(£o0ei,

and similarly for division by a scalar.

All this is analogous to the corresponding formulae in the barycentric calculus and in quaternions; it remains to consider the multiplication of two or more extensive quantities The binary products of the units et are taken to satisfy the equalities

ei 2 = o, eiei = —ejBi\ this reduces them to \n(n— 1) distinct values, exclusive of zero. These values are assumed to be independent, so we have \n{n—x) derived units of the second species or order. Associated with these new units there is a system of extensive quantities of the second species, represented by symbols of the type

As = 2a,-Ej < 2) [i = I,2,...in(n-l)] ,

where Ei' 2) ,E 2 (2 > , &c, are the derived units of the second species. If Ai = '2aie i , Bi = S/3«ei, the distributive law of multiplication is preserved by assuming

AiBi = S(

By assuming the truth of the associative law of multiplication, and taking account of the reducing formulae for binary products,

Grass- mann's

ALGEBRA

615

we may construct derived units of the third, fourth . . . rath species. Every unit of the rth species which does not vanish is the product of r different units of the first species; two such units are independent unless they are permutations of the same set of primary units e t , in which case they are equal or opposite according to the usual rule employed in determinants. Thus, for instance —

£i.e2es = eiei.e* = ei&ifii, = — e%e\ei = eifize\ ; and, in general, the number of distinct units of the rth species in the rath category (r^ra) is C n , r . Finally, it is assumed that (in the «th category) eie 2 e 3 . . . e„ = 1, the suffixes being in their natural order.

Let A r = 2aE ® and B, = Sj8E Cs) be two extensive quantities of species r and s; then if r+s^.11, they may be multiplied by the rule A,B. = Z(a/?)E<')E<«>

where the products E ® E (s) may be expressed as derived units of species (r+s). The product B s A r is equal or opposite to A r B s , according as rs is even or odd. This process may be extended to the product of three or more factors such as A r B 3 Q . . . provided that r+s+l-- . . . does not exceed ra. The law is associative; thus, for instance, (AB)C = A(BC). But the com- mutative law does not always hold; thus, indicating species, as before, by suffixes, A r B 3 Q= (— i) rs+s ‘ + ‘ r QB s A r , with analo- gous rules for other cases.

If r--s>n, a product such as E r E», worked out by the previous rules, comes out to be zero. A characteristic feature of the calculus is that a meaning can be attached to a symbol of this kind by adopting a new rule, called that of regressive multiplica- tion, as distinguished from the foregoing, which is progressive. The new rule requires some preliminary explanation. If E is any extensive unit, there is one other unit E’, and only one, such that the (progressive) product EE’ = 1. This unit is called the supplement of E, and denoted by |E. For example, when w = 4j \ei=ezeset, \eie s = e 3 e4, |e2«3«4=— d,

and so on. Now when r--s>n, the product E r E„ is defined to be that unit of which the supplement is the progressive product |E,| Ej. For instance, if » = 4, E r =eie 3 , E„ = e 2 «3C4, we have

|E r IE, = (— e 2 64)(— ei) = eie i e i = \e 3 , consequently, by the rule of regressive multiplication,

eie3-e2«3«4 = e3. Applying the distributive law, we obtain, when r--s>n,

A,B 5 = 2aE r Z0E 8 = 2(a/3)E r E„

where the regressive products E r E„ are to be reduced to units of species (r--s — n) by the foregoing rule.

If A = 2aE, then, by definition, |A=Sa|E, and hence A|(B+C)=A| B+A|C. Now this is formally analogous to the distributive law of multi- plication; and in fact we may look upon A|B as a particular way of multiplying A and B (not A and B). The symbol AB, from this point of view, is called the inner product of A and B, as distinguished from the outer product IAB. An inner product may

be either progressive or regressive. In the course of reducing such expressions as (AB)C, (AB)|C(DE)j and the like, where a chain of multiplications has to be performed in a certain order, the multiplications may be all progressive, or all regressive, or partly, one, partly the other. In the first two cases the product is said to be pure, in the third case mixed-. A pure product is associative; a mixed product, speaking generally, is not.

The outer and inner products of two extensive quantities A, B, are in many ways analogous to the quaternion symbols Yab and Sab respectively. As in quaternions, so in the extensive calculus, there'are numerous formulae of transformation which enable us to deal with extensive quantities without expressing them in terms of the primary units. Only a few illustrations can be given here, Let a, b, c, d, e, f be quantities of the first species in the fourth category; A, B, C . . . quantities of the third species in the same category. Then

{de) (abc) = (abde)c + (cade)b + (bcde)a

= (abce)d — (abcd)e,

(ab) (AB) = (aA) (6B) – (aB) (6A)

ab\c = (a\c)b-

These may be compared and contrasted with such quaternion formulae as

S(VabVcd) = SadSbc – SacSbd

dSabc = aSbcd — bScda-- cSadb

where a, b, c, d denote arbitrary vectors.

8. An ra-tuple linear algebra (also called a complex number system) deals with quantities of the type A = 'Za i e i

Linear algebras.

derived from ra special units e h e 2 . . . e„. The sum and product of two quantities are defined in the first instance by the formulae

Zae + Stfe = S(a + /3)e, 2o,ft X% = 2(a;ft)eie,, so that the laws A, c, d of § 3 are satisfied. The binary products e t ej, however, are expressible as linear functions of the units e t by means of a

“multiplication table” which defines the special characteristics of the algebra in question. Multiplication may or may not be commutative, and in the same way it may or may not be associative. The types of linear associative algebras, not assumed to be commutative, have been enumerated (with some omissions) up to sextuple algebras inclusive by B . Peirce. Quater nions afford an example of a quadruple algebra of this kind; ordinary algebra is a special case of a duplex linear algebra. If, in the extensive calculus of the rath category, all the units (in- cluding 1 and the derived units E) are taken to be homologous instead of being distributed into species, we may regard it as a (2″ — i)-tuple linear algebra, which, however, is not wholly associative. It should be observed that while the use of special units, or extraordinaries, in a linear algebra is convenient, especially in applications, it is not indispensable. Any linear quantity may be denoted by a symbol (

9. In ordinary algebra we have the disjunctive law that if ab = o, then either a = o or b — o. This applies also to quater- nions, but not to extensive quantities, nor is it true for linear algebras in general. One of the most important questions in investigating a linear algebra is to decide the necessary relations between a and b in order that this product may be zero.

10. The algebras discussed up to this point may be considered as independent in the sense that each of them deals with a class of symbols of quantity more or less homogeneous,

and a set of operations applying to them all. But when a iJˆi, ra a ˆ an algebra is used with a particular interpretation, or even in the course of its formal development, it frequently happens that new symbols of operation are, so to speak, super- posed upon the algebra, and are found to obey certain formal laws of combination of their own. For instance, there are the symbols A, D, E used in the calculus of finite differences; Aronhold’s symbolical method in the calculus of invariants; and the like. In most cases these subsidiary algebras, as they may be called, are inseparable from the applications in which they are used; but in any attempt at a natural classification of algebra (at present a hopeless task), they would have to be taken into account. Even in ordinary algebra the notation for powers and roots disturbs the symmetry of the rational theory; and when a schoolboy illegitimately extends the distributive law by writing V (a+&) = Va+V b, he is unconsciously emphasizing this want of complete harmony.

Authorities. — A. de Morgan, ” On the Foundation of Algebra,” Trans. Camb. P.S. (vii., viii., 1839-1844); G. Peacock, Symbolical Algebra (Cambridge, 1845) ; G. Boole, Laws of Thought (London, 1854) ; E. Schroder, Lehrbuch der Arithmetik u. Algebr a (Leipzig, 1873), Vorlesungen ilber die Algebra der Logik (ibid., 1890-1895); A. F. Mobius, Der barycentrische Calcul (Leipzig, 1827) (reprinted in his col- lected works, vol. i., Leipzig, 1885); W. R. Hamilton, Lectures on Quaternions (Dublin, 1853), Elements of Quaternions (ibid., 1866);

H. Grassmann, Die lineale Ausdehnungslehre (Leipzig, 1844), Die Ausdehnungslehre (Berlin, 1862) (these are reprinted with valuable emendations and notes in his Gesammelte math. u. phys. Werke, vol. i., Leipzig (2 parts), 1894, 1896), and papers in Grunert’s Arch, vi., Crelle, xlix. Ixxxiv., Math. Ann. vii. xii.; B. and C. S. Peirce, “Linear Associative Algebra,” Amer. Journ. Math. iv. (privately circulated, 1871) ; A. Cayley, on Matrices, Phil. Trans, cxlviii., on Multiple Algebra, Quart. M. Journ. xxii. ; J. J. Sylvester, on Universal Algebra (i.e. Matrices), Amer. Journ. Math. vi. ; H. J. S. Smith, on Linear Indeterminate Equations, Phil. Trans, cli. ; R. S. Ball, Theory of Screws (Dublin, 1876); and papers in Phil. Trans, clxiv., and Trans. R. Ir. Ac. xxv.; W. K. Clifford, on Biquaternions, Proc. L. M. S. iv.; A. Buchheim, on Extensive Calculus and its Applications, Proc. L. M. S. xv.xvii. ; H. Taber, on Matrices, Amer. J. M. xii.; K. Weierstrass, ” Zur Theorie der aus n Haupteinheiten gebildeten complexen Grossen,” Gbtting. Nachr. (1884) ; G. Frobenius, on Bilinear Forms, Crelle, Ixxxiv., and Berl. Ber. (1896) ; L. Kronecker.on Complex Numbers and Modular Systems, Berl. Ber. (1888) ; G. Scheffers, Complexe Zahlensysteme,” Math. Ann. xxxix. (this contains a bibliography up to 1890) ; S. Lie, Vorlesungen uber continuirliche Gruppen (Leipzig, 1893), ch. xxi. ; A. M’Aulay, ” Algebra after Hamilton, or Multenions,” Proc.R.S. E., 1908, 28, p. 503. For a more complete account see H. Hankel Theorie der complexen Zahlensysteme (Leipzig, 1867); O. Stolz, Vor lesungen uber allgemeine Arithmetik (ibid., 1883); A. N. Whitehead, A Treatise on Universal Algebra, with Applications (vol. i., Cambridge, 1898) (a very comprehensive work, to which the writer of this article is in many ways indebted) ; and the Encyclopddie d. math. Wissen- schaften (vol. i., Leipzig, 1898), &c, §§ A 1 (H. Schubert), A 4 (E. Study), and B I c (G. Landsberg). For the history of the develop-

ment of ordinary algebra M. Cantor's Vorlesungen uber Geschichte der Mathematik is the standard authority. (G. B. M.)

C. History

Various derivations of the word " algebra," which is of Arabian origin, have been given by different writers. The first mention of the word is to be found in the title aioiogy °^ a wor ˆ by Mahommed ben Musa al-Khwarizmi (Hovarezmi), who flourished about the beginning of the 9th century. The full title is ilm al-jebr wa'l-muqdbala, which contains the ideas of restitution and comparison, or opposition and comparison, or resolution and equation, jebr being derived from the verb jabara, to reunite, and muqdbala, from gabala, to make equal. (The foot jabara is also met with in the word algebrista, which means a " bone-setter," and is still in common use in Spain.) The same derivation is given by Lucas Paciolus (Luca Pacioli), who reproduces the phrase in the transliterated form alghebra e aimucabala, and ascribes the invention of the art to the Arabians.

Other writers have derived the word from the Arabic particle al (the definite article), and geber, meaning " man." Since, however, Geber happened to be the name of a celebrated Moorish philosopher who flourished in about the nth or 12th century, it has been supposed that he was the founder of algebra, which has since perpetuated his name. The evidence of Peter Ramus (1515-1572) on this point is interesting, but he gives no authority for his singular statements. In the preface to his Arithmeticae libri duo et totidem Algebrae (1560) he says: " The name Algebra is Syriac, signifying the art or doctrine of an excellent man. For Geber, in Syriac, is a name applied to men, and is sometimes a term of honour, as master or doctor among us. There was a certain learned mathematician who cent his algebra, written in the Syriac language, to Alexander the Great, and he named it aimucabala, that is, the book of dark or mysterious things, which others would rather call the doctrine of algebra. To this day the same book is in great estimation among the learned in the oriental nations, and by the Indians, who cultivate this art, it is called aljabra and alboret; though the name of the author himself is not known." The uncertain authority of these state- ments, and the plausibility of the preceding explanation, have caused philologists to accept the derivation from al and jabara. Robert Recorde in his Whetstone of Witle (1557) uses the variant algeber, while John Dee (1527-1608) affirms that algiebar, and not algebra, is the correct form, and appeals to the authority of

the Arabian Avicenna.

Although the term ” algebra ” is now in universal use, various other appellations were used by the Italian mathematicians during the Renaissance. Thus we find Paciolus calling it V ‘Arte

Magiore; dilta dal vulgo la Regula de la Cosa over Alghebra e A Imucabala. The name I’arte magiore, the greater art, is designed to distinguish it from I’arte minore, the lesser art, a term which he applied to the modern arithmetic. His second variant, la regula de la cosa, the rule of the thing or unknown quantity, appears to have been in common use in Italy, and the word cosa was preserved for several centuries in the forms coss or algebra, cossic or algebraic, cossist or algebraist, &c. Other Italian writers termed it the Regula rei et census, the rule of the thing and the product, or the root and the square. The principle underlying this expression is probably to be found in the fact that it measured the limits of their attainments in algebra, for they were unable to solve equations of a higher degree than the quadratic or square.

Franciscus Vieta (Francois Viete) named it Specious Arith- metic, on account of the species of the quantities involved, which he represented symbolically by the various letters of the alphabet. Sir Isaac Newton introduced the term Universal Arithmetic, since it is concerned with the doctrine of operations, not affected on numbers, but on general symbols.

Notwithstanding these and other idiosyncratic appellations, European mathematicians have adhered to the older name, by which the subject is now universally known.

It is difficult to assign the invention of any art or science definitely to any particular age or race. The few fragmentary records, which have come down to us from past civilizations, must not be regarded as representing the totality of their knowledge, and the omission of a science or art does not necessarily imply that the science or art was unknown. It was formerly the custom to assign the invention of algebra to the Greeks, but since the decipherment of the Rhind papyrus by Eisenlohr this view has changed, for in this work there are distinct signs of an algebraic analysis. The particular problem — a heap (hau) and its seventh makes 19 — is solved as we should now solve a simple equation; but Ahmes varies his methods in other similar problems. This discovery carries the invention of algebra back to about 1700 B.C., if not earlier.

It is probable that the algebra of the Egyptians was of a most rudimentary nature, for otherwise we should expect to find traces of it in the works of the Greek geometers, of whom Thales of Miletus (640-546 B.C.) was the first. a ig£bra. Notwithstanding the prolixity of writers and the number of the writings, all attempts at extracting an algebraic analysis from their geometrical theorems and problems have been fruitless, and it is generally conceded that their analysis was geometrical and had little or no affinity to algebra. The first extant work which approaches to a treatise on algebra is by Diophantus (q.v.), an Alexandrian mathematician, who flourished about a.d. 350. The original, which consisted of a preface and thirteen books, is now lost, but we have a Latin translation of the first six books and a fragment of another on polygonal numbers by Xylander of Augsburg (1575), and Latin and Greek translations by Gaspar Bachet de Merizac (162 1- 1670). Other editions have been published, of which we may mention Pierre Fermat's (1670), T. L. Heath's (1885) and P. Tannery's (1893-1895). In the preface to this work, which is dedicated to one Dionysius, Diophantus explains his notation, naming the square, cube and fourth powers, dynamis, cubus, dynamodinimus, and so on; according to the sum in the indices. The unknown he terms arithmos, the number, and in solutions he marks it by the final s; he explains the generation of powers, the rules for multiplication and division of simple quantities, but he does not treat of the addition, subtraction, multiplication and division of compound quantities. He then proceeds to discuss various artifices for the simplification of equations, giving methods which are still in common use. In the body of the work he displays considerable ingenuity in reducing his problems to simple equations, which admit either of direct solution, or fall into the class known as indeterminate equations. This latter class he discussed so assiduously that they are often known as Diophantine problems, and the methods of resolving them as the Diophantine analysis (see Equation, Indeterminate) . It is

difficult to believe that this work of Diophantus arose spontaneously in a period of general stagnation. It is more than likely that he was indebted to earlier writers, whom he omits to mention, and whose works are now lost; nevertheless, but for this work, we should be led to assume that algebra was almost, if not

entirely, unknown to the Greeks.

The Romans, who succeeded the Greeks as the chief civilized power in Europe, failed to set store on their literary and scientific treasures; mathematics was all but neglected; and beyond a few improvements in arithmetical computations, there are no material advances to be recorded.

In the chronological development of our subject we have now to turn to the Orient. Investigation of the writings of Indian mathematicians has exhibited a fundamental dis- alrebra. tinction between the Greek and Indian mind, the former being pre-eminently geometrical and specula- tive, the latter arithmetical and mainly practical. We find that geometry was neglected except in so far as it was of service to astronomy; trigonometry was advanced, and algebra improved far beyond the attainments of Diophantus.

The earliest Indian mathematician of whom we have certain knowledge is Aryabhatta, who flourished about the beginning of the 6th century of our era. The fame of this astronomer and mathematician rests on his work, the Aryabhattiyam, the third chapter of which is devoted to mathematics. Ganessa, an eminent astronomer, mathematician and scholiast of Bhaskara, quotes this work and makes separate mention of the cuttaca (" pulveriser "), a device for effecting the solution of indeter- minate equations. Henry Thomas Colebrooke, one of the earliest modern investigators of Hindu science, presumes that the treatise of Aryabhatta extended to determinate quadratic equations, indeterminate equations of the first degree, and probably of the second. An astronomical work, called the Surya-siddhanta (" knowledge of the Sun "), of uncertain authorship and probably belonging to the 4th or 5th century, was considered of great merit by the Hindus, who ranked it only second to the work of Brahmagupta, who flourished about a century later. It is of great interest to the historical student, for it exhibits the influence of Greek science upon Indian mathe- matics at a period prior to Aryabhatta. After an interval of about a century, during which mathematics attained its highest level, there flourished Brahmagupta (b. a.d. 598), whose work entitled Brahma-sphuta-siddhanta (" The revised system of Brahma ") contains several chapters devoted to mathematics. Of other Indian writers mention may be made of Cridhara, the author of a Ganita-sara (" Quintessence of Calculation "), and Padmanabha, the author of an algebra.

A period of mathematical stagnation then appears to have possessed the Indian mind for an interval of several centuries, for the works of the next author of any moment stand but little in advance of Brahmagupta. We refer to Bhaskara Acarya, whose work the Siddhanta-ciromani (" Diadem of an Astronomical System "), written in 1150, contains two important chapters, the Lilavati (" the beautiful [science or art] ") and Viga-ganita (" root-extraction "), which are given up to arithmetic and algebra.

English translations of the mathematical chapters of the Brahma-siddhanta and Siddhanta-ciromani by H. T. Colebrooke (1817), and of the Surya-siddhanta by E. Burgess, with annota- tions by W. D. Whitney (i860), may be consulted for details.

The question as to whether the Greeks borrowed their algebra from the Hindus or vice versa has been the subject of much discussion. There is no doubt that there was a constant traffic between Greece and India, and it is more than probable that an exchange of produce would be accompanied by a transference of ideas. Moritz Cantor suspects the influence of Diophantine methods, more particularly in the Hindu solutions of indeter- minate equations, where certain technical terms are, in all probability, of Greek origin. However this may be, it is certain that the Hindu algebraists were far in advance of Diophantus. ■ The deficiencies of the Greek symbolism were partially remedied ; subtraction was denoted by placing a dot over the subtrahend; multiplication, by placing bha (an abbreviation of bhavita, the

" product ") after the factors; division, by placing the divisor under the dividend; and square root, by inserting ka (an abbreviation of karana, irrational) before the quantity. The unknown was called yavattavat, and if there were several, the first took this appellation, and the others were designated by the names of colours; for instance, x was denoted by yd and y by ka (from kalaka, black).

A notable improvement on the ideas of Diophantus is to be found in the fact that the Hindus recognized the existence of two roots of a quadratic equation, but the negative roots were considered to be inadequate, since no interpreta- tion could be found for them. It is also supposed that they anticipated discoveries of the solutions of higher equations. Great advances were made in the study of indeterminate equa- tions, a branch of analysis in which Diophantus excelled. But whereas Diophantus aimed at obtaining a single solution, the Hindus strove for a general method by

which any indeterminate problem could be resolved. In this they were completely successful, for they obtained general solutions for the equations ax ± by = c, xy = ax--by + c (since rediscovered by Leonhard Euler) and cy 2 = ax 2 --b. A particular case of the last equation, namely, y 2 = ax i \\, sorely taxed the resources of modern alge- braists. It was proposed by Pierre de Fermat to Bernhard Frenicle de Bessy, and in 1657 to all mathematicians. John Wallis and Lord Brounker jointly obtained a tedious solution which was published in 1658, and afterwards in 1668 by John Pell in his Algebra. A solution was also given by Fermat in his Relation. Although Pell had nothing to do with the solution, posterity has termed the equation Pell's Equation, or Problem, when more rightly it should be the Hindu Problem, in recognition of the mathematical attainments of the Brahmans.

Hermann Hankel has pointed out the readiness with which the Hindus passed from number to magnitude and vice versa. Although this transition from the discontinuous to continuous is not truly scientific, yet it materially augmented the develop- ment of algebra, and Hankel affirms that if we define algebra as the application of arithmetical operations to both rational and irrational numbers or magnitudes, then the Brahmans are the real inventors of. algebra.

The integration of the scattered tribes of Arabia in the 7 th century by the stirring religious propaganda of Mahomet was accompanied by a meteoric rise in the intellectual powers of a hitherto obscure race. The Arabs became tj&ebra. the custodians of Indian and Greek science, whilst Europe was rent by internal dissensions. Under the rule of the Abbasids, Bagdad became the centre of scientific thought; physicians and astronomers from India and Syria flocked to their court; Greek and Indian manuscripts were translated (a work commenced by the Caliph Mamun (813-833) and ably continued by his successors) ; and in about a century the Arabs were placed in possession of the vast stores of Greek and Indian learning. Euclid's Elements were first translated in the reign of Harun-al-Rashid (786-809), and revised by the order of Mamun. But these translations were regarded as imperfect, and it remained for Tobit ben Korra (836-901) to produce a satisfactory edition. Ptolemy's Almagest, the works of Apol- lonius, Archimedes, Diophantus and portions of the Brahma- siddhanta, were also translated. The first notable Arabian mathematician was Mahommed ben Musa al-Khwarizmi, who flourished in the reign of Mamun. His treatise on algebra and arithmetic (the latter part of which is only extant in the form

of a Latin translation, discovered in 1857) contains nothing that was unknown to the Greeks and Hindus; it exhibits methods allied to those of both races, with the Greek element predominating. The part devoted to algebra has the title al-jebr wa'l-muqabala, and the arithmetic begins with " Spoken has Algoritmi," the name Khwarizmi or Hovarezmi having passed into the word Algoritmi, which has been further transformed into the more modern words algorism and algorithm, signifying a method of computing.

Tobit ben Korra (836-901), bom at Harran in Mesopotamia, an accomplished linguist, mathematician and astronomer,

rendered conspicuous service by his translations of various Greek authors. His investigation of the properties of amicable numbers (q.v.) and of the problem of trisecting an angle, are of importance. The Arabians more closely resembled the Hindus than the Greeks in the choice of studies; their philosophers blended speculative dissertations with the more progressive study of medicine; their mathematicians neglected the subtleties of the conic sections and Diophantine analysis, and applied themselves more particu- larly to perfect the system of numerals (see Numeral) , arithmetic and astronomy (q.v.). It thus came about that while some progress was made in algebra, the talents of the race were bestowed on astronomy and trigonometry (q.v.). Fahri des al Karhi, who flourished about the beginning of the nth century, is the author of the most important Arabian work on algebra. He follows the methods of Diophantus; his work on indeter- minate equations has no resemblance to the Indian methods, and contains nothing that cannot be gathered from Diophantus. He solved quadratic equations both geometrically and algebraic- ally, and also equations of the form x 2n --ax" + b = o; he also proved certain relations between the sum of the first n natural numbers, and the sums of their squares and cubes.

Cubic equations were solved geometrically by determining the intersections of conic sections. Archimedes' problem of dividing a sphere by a plane into two segments having a pre- scribed ratio, was first expressed as a cubic equation by Al Mahani, and the first solution was given by Abu Gafar al Hazin. The determination of the side of a regular heptagon which can be inscribed or

circumscribed to a given circle was reduced to a more complicated equation which was first successfully resolved by Abul Gud. The method of solving equations geometrically was considerably developed by Omar Khayyam of Khorassan, who flourished in the nth century. This author questioned the possibility of solving cubics by pure algebra, and biquadratics by geometry. His first contention was not disproved until the 15th century, but his second was disposed of by Abul Wefa (940-998), who succeeded in solving the forms x* = a and x 4 +ax 3 = b.

Although the foundations of the geometrical resolution of cubic equations are to be ascribed to the Greeks (for Eutocius assigns to Menaechmus two methods of solving the equation x 3 = a and x 3 = 2a 3) , yet the subsequent development by the Arabs must be regarded as one of their most important achievements. The Greeks had succeeded in solving an isolated example; the Arabs accomplished the general solution of numerical equations.

Considerable attention has been directed to the different styles in which the Arabian authors have treated their subject. Moritz Cantor has suggested that at one time there existed two schools, one in sympathy with the Greeks, the other with the Hindus; and that, although the writings of the latter were first studied, they were rapidly discarded for the more perspicuous Grecian methods, so that, among the later Arabian writers, the Indian methods were practically forgotten and their mathematics became essentially Greek in character.

Turning to the Arabs in the West we find the same enlightened spirit; Cordova, the capital of the Moorish empire in Spain, was as much a centre of learning as Bagdad. The earliest known Spanish mathematician is Al Madshritti (d. 1007), whose fame rests on a dissertation on amicable numbers, and on the schools which were founded by his pupils at Cordova, Dania and Granada. Gabir ben Aflah of Sevilla, commonly called Geber, was a cele- brated astronomer and apparently skilled in algebra, for it has been supposed that the word ” algebra ” is compounded from his name.

When the Moorish empire began to wane the brilliant in- tellectual gifts which they had so abundantly nourished during three or four centuries became enfeebled, and after that period they failed to produce an author comparable with those of the 7th to the nth centuries.

In Europe the decline of Rome was succeeded by a period, lasting several centuries, during which the sciences and arts were all but neglected. Political and ecclesiastical dissensions occupied the greatest intellects, and the only progress to be recorded is in the art of computing or arithmetic, and the trans-

lation of Arabic manuscripts. The first successful attempt to revive the study of algebra in Christendom was due to Leonardo of Pisa, an Italian merchant trading in the Mediter- ranean. His travels and mercantile experience had led jaa-ope. him to conclude that the Hindu methods of computing were in advance of those then in general use, and in 1202 he published his Liber Abaci, which treats of both algebra and arithmetic. In this work, which is of great historical interest, since it was published about two centuries before the art of printing was discovered, he adopts the Arabic notation for numbers, and solves many problems, both arithmetical and algebraical. But it contains little that is original, and although the work created a great sensation when it was first published, the effect soon passed away, and the book was practically forgotten. Mathematics was more or less ousted from the academic curricula by the philosophical inquiries of the school- men, and it was only after an interval of nearly three centuries that a worthy successor to Leonardo appeared. This was Lucas Paciolus (Lucas de Burgo), a Minorite friar, who, having pre- viously written works on algebra, arithmetic and geometry, published, in 1494, his principal work, entitled Summa de Arithmetica, Geotnetria, Proportioni et Proportionalita. In it he mentions many earlier writers from whom he had learnt the science, and although it contains very little that cannot be found in Leonardo's work, yet it is especially noteworthy for the systematic employment of symbols, and the manner in which it reflects the state of mathematics in Europe during this period. These works are the earliest printed books on mathematics. The renaissance of mathematics was thus effected in Italy, and it is to that country that the leading developments of the following century were due. The first difficulty to be overcome was the algebraical solution of cubic equations, the pons asinorum of the earlier mathematicians. The

Cubic equations.

first step in this direction was made by Scipio Ferro (d. 1526), who solved the equation x^ + ax—b. Of his discovery we know nothing except that he declared it to his pupil Antonio Marie Floridas. An imperfect solution of the equation x 3 --px i = q was

discovered by Nicholas Tartalea (Tartaglia) in 1530, and his pride in this achievement led him into conflict with Floridas, who proclaimed his own knowledge of the form resolved by Ferro. Mutual recriminations led to a public discussion in 1535, when Tartalea completely vindicated the general applicability of his methods and exhibited the inefficiencies of that of Floridas. This contest over, Tartalea redoubled his attempts to generalize his methods, and by 1541 he possessed the means for solving any form of cubic equation. His discoveries had made him famous all over Italy, and he was earnestly solicited to publish his methods; but he abstained from doing so, saying that he intended to embody them in a treatise on algebra which he was preparing. At last he succumbed to the repeated requests of Girolamo or Geronimo Cardano, who swore that he would regard them as an inviol- able secret. Cardan or Cardano, who was at that time writing his great work, the Ars Magna, could not restrain the temptation of crowning his treatise with such important discoveries, and in 1545 he broke his oath and gave to the world Tartalea's rules for solving cubic equations. Tartalea, thus robbed of his most cherished possession, was in despair. Recriminations ensued until his death in 1557, and although he sustained his claim for priority, posterity has not conceded to him the honour of his discovery, for his solution is now known as Cardan's Rule.

Cubic equations having been solved, biquadratics soon followed suit. As early as 1539 Cardan had solved certain particular cases, but it remained for his pupil, Lewis (Ludovici) Ferrari, to devise a general method. His B/ S s *'" solution, which is sometimes erroneously ascribed to equations. Rafael Bombelli, was published in the Ars Magna. In this work, which is one of the most valuable contributions to the literature of algebra, Cardan shows that he was familiar with both real positive and negative roots of equations whether – rational or irrational, but of imaginary roots he was quite ignorant, and he admits his inability to resolve the so-called

" irreducible case " (see Equation). Fundamental theorems in the theory of equations are to be found in the same work. Clearer ideas of imaginary quantities and the " irreducible case " were subsequently published by Bombelli, in a work of which the dedication is dated 1572, though the book was not published

until 1579.

Contemporaneously with the remarkable discoveries of the Italian mathematicians, algebra was increasing in popularity in Germany, France and England. Michael Stifel and Johann Scheubelius (Scheybl) (1494-1570) flourished in Germany, and although unacquainted with the work of Cardan and Tartalea, their writings are noteworthy for their perspicuity and the introduction of a more complete symbolism for quantities and operations. Stifel introduced the sign (f) for addition or a positive quantity, which was previously denoted by plus, piu, or the letter p. Subtraction, previously written as minus, mene or the letter m, was symbolized by the sign (—) which is still in use. The square root he denoted by (V), whereas Paciolus, Cardan and others used the letter R.

The first treatise on algebra written in English was by Robert Recorde, who published his arithmetic in 1552, and his algebra entitled The Whetstone of Witte, which is the second part of Arith- metik, in 1557. This work, which is written in the form of a dialogue, closely resembles the works of Stifel and Scheubelius, the latter of whom he often quotes. It includes the properties of numbers; extraction of roots of arithmetical and algebraical quantities, solutions of simple and quadratic equations, and a fairly complete account of surds. He introduced the sign (=) for equality, and the terms binomial and residual. Of other writers who published works about the end of the 16th century, we may mention Jacques Peletier, or Jacobus Peletarius (De occulta parte Numerorum, quam Algebram vocant, 1558); Petrus Ramus (Arithmeticae Libri duo et totidem Algebrae, 1560), and Christoph Clavius, who wrote on algebra in 1580, though it was not published until 1608. At this time also flourished Simon Stevinus (Stevin) of Bruges, who published an arithmetic in 1585 and an algebra shortly afterwards. These works possess considerable originality, and contain many new improvements in algebraic notation; the unknown (res) is denoted by a small circle, in which he places an integer corresponding to the power. He introduced the terms multinomial, trinomial, quadrinomial, &c, and considerably simplified the notation for decimals.

About the beginning of the 17th century various mathematical works by Franciscus Vieta were published, which were after- wards collected by Franz van Schooten and republished in 1646 at Leiden. These works exhibit great originality and mark an important epoch in the history of algebra. Vieta, who does not

avail himself of the discoveries of his predecessors — the negative roots of Cardan, the revised notation of Stifel and Stevin, &c— introduced or popularized many new terms and symbols, some of which are still in use. He denotes quantities by the letters of the alphabet, retaining the vowels for the unknown and the consonants for the knowns; he introduced the vinculum and among others the terms coefficient, affirmative, negative, pure and adfectcd equations. He improved the methods for solving equations, and devised geometrical constructions with the aid of the conic sections. His method for determining approximate values of the roots of equations is far in advance of the Hindu method as applied by Cardan, and is identical in principle with the methods of Sir Isaac Newton and W. G. Horner.

We have next to consider the works of Albert Girard, a Flemish mathematician. This writer, after having published an edition of Stevin's works in 1625, published in 1629 at Amsterdam a small tract on algebra which shows a considerable advance on the work of Vieta. Girard is inconsistent in his notation, some- times following Vieta, sometimes Stevin; he introduced the new symbols ff for greater than and § for less than ; he follows Vieta in using the plus (+) for addition, he denotes subtraction by Recorde's symbol for equality (=), and he had no sign for equality but wrote the word out. He possessed clear ideas of indices and the generation of powers, of the negative roots of equations and their geometrical interpretation, and was the

first to use the term imaginary roots. He also discovered how to sum the powers of the roots of an equation.

Passing over the invention of logarithms (q.v.) by John Napier, and their development by Henry Briggs and others, the next author of moment was an Englishman, Thomas Harriot, whose algebra (Artis analyticae praxis) was published posthumously by Walter Warner in 1631. Its great merit consists in the complete notation and symbolism, which avoided the cumber- some expressions of the earlier algebraists, and reduced the art to a form closely resembling that of to-day. He follows Vieta in assigning the vowels to the unknown quantities and the consonants to the knowns, but instead of using capitals, as with Vieta, he employed the small letters; equality he denoted by Recorde's symbol, and he introduced the signs > and < for greater than and less than. His principal discovery is concerned with equations, which he showed to be derived from the continued multiplication of as many simple factors as the highest

power of , the unknown, and he was thus enabled to deduce relations between the coefficients and various functions of the roots. Mention may also be made of his chapter on inequalities, in which he proves that the arithmetic mean is always greater than the geometric mean.

William Oughtred, a contemporary of Harriot, published an algebra, Clavis mathematicae, simultaneously with Harriot's treatise. His notation is based on that of Vieta, but he introduced the sign X for multiplication, 4f for continued proportion, : : for proportion, and denoted ratio by one dot. This last character has since been entirely restricted to multiplication, and ratio is now denoted by two dots (:). His symbols for greater than and less than (~3 and .Zl) have been completely superseded by Harriot's signs.

So far the development of algebra and geometry had oeen mutually independent, except for a few isolated applications of geometrical constructions to the solution of algebraical problems. Certain minds had long suspected the advantages which would accrue from the unrestricted application of algebra to geometry, but it was not until the advent of the philosopher Rene Descartes that the co-ordination was effected. In his famous Geometria (1637), which is really a treatise on the algebraic representation of geometric theorems, he founded the modern theory of analytical geometry (see Geometry), and at the same time he rendered signal service to algebra, more especially in the theory of equations. His notation is based primarily on that of Harriot; but he differs from that writer in retaining the first letters of the alphabet for the known quantities and the final letters for the unknowns.

The 17th century is a famous epoch in the progress of science, and the mathematics in no way lagged behind. The discoveries of Johann Kepler and Bonaventura Cavalieri were the foundation upon which Sir Isaac Newton and Gottfried Wilhelm Leibnitz erected that wonderful edifice, the Infinitesimal Calculus (q.v.). Many new fields were opened up, but there was still continual progress in pure algebra. Continued fractions, one of the earliest examples of which is Lord Brouncker's expression for the ratio of the circumference to the diameter of a circle (see Circle), were elaborately discussed by John Wallis and Leonhard Euler; the convergency of series treated by Newton, Euler and the Bernoullis; the binomial theorem, due originally to Newton and subsequently expanded by Euler and others, was used by Joseph

Louis Lagrange as the basis of his Calcul des Fonctions. Diophantine problems were revived by Caspar Bachet, Pierre Fermat and Euler; the modern theory of numbers Was founded by Fermat and developed by Euler, Lagrange and others; and the theory of probability was attacked by Blaise Pascal and Fermat, their work being subsequently expanded by James Bernoulli, Abraham de Moivre, Pierre Simon Laplace and others. The germs of the theory of determinants are to be found in the works of Leibnitz; Etienne Bezout utilized them in 1764 for expressing the result obtained by the process of elimination known by his name, and since restated by Arthur Cayley.

In recent times many mathematicians have formulated other kinds of algebras, in which the operators do not obey the laws of

ordinary algebra. This study was inaugurated by George Peacock, who was one of the earliest mathematicians to recognize the symbolic character of the fundamental principles of algebra. About the same time, D. F. Gregory published a paper " on the real nature of symbolical algebra." In Germany the work of Martin Ohm {System der Mathematik, 1822) marks a step forward. Notable service was also rendered by Augustus de Morgan, who applied logical analysis to the laws of mathematics.

The geometrical interpretation of imaginary quantities had a far-reaching influence on the development of symbolic algebras. The attempts to elucidate this question by H. Ktihn (1750-1751) and Jean Robert Argand (1806) were completed by Karl Friedrich Gauss, and the formulation of various systems of vector analysis by Sir William Rowan Hamilton, Hermann Grassmann and others, followed. These algebras were essentially geometrical, and it remained, more or less, for the American mathematician Benjamin Peirce to devise systems of pure symbolic algebras; in this work he was ably seconded by his son Charles S. Peirce. In England, multiple algebra was developed by James Joseph Sylvester, who, in company with Arthur Cayley, expanded the theory of matrices, the germs of which are to be found in the writings of Hamilton (see above, under (B); and Quaternions).

The preceding summary shows the specialized nature which algebra has assumed since the 17 th century. To attempt a history

of the development of the various topics in this article is inappropriate, and we refer the reader to the separate articles.

References. — The history of algebra is treated in all historical works on mathematics in general (see Mathematics: References). Greek algebra can be specially studied in T. L. Heath's Diophantus. See also John Wallis, Opera Malhematica (1693-1699), and Charles Hutton, Mathematical and Philosophical Dictionary (1815), article " Algebra." (C. E.*)

ALGEBRAIC FORMS. The subject-matter of algebraic forms is to a large extent connected with the linear transformation of algebraical polynomials which involve two or more variables. The theories of determinants and of symmetric functions and of the algebra of differential operations have an important bearing upon this comparatively new branch of mathematics. They are the chief instruments of research, and have themselves much benefited by being so employed. When a homogeneous polynomial is transformed by general linear substitutions as hereafter explained, and is then expressed in the original form with new coefficients affecting the new variables, certain functions of the new coefficients and variables are numerical multiples of the same functions of the original coefficients and variables. The investigation of the properties of these functions, as well for a single form as for a simultaneous set of forms, and as well for one as for many series of variables, is included in the theory of invariants. As far back as 1 773 Joseph Louis Lagrange, and later Carl Friedrich Gauss, had met with simple cases of such functions, George Boole, in 1841 (Camb. Math. J own. iii. pp. 1-20), made important steps, but it was not till 1845 that Arthur Cayley (Coll. Math. Papers, i. pp. 80-94, 95-112) showed by his calculus of hyper-determinants that an infinite series of such functions might be obtained systematically. The subject was carried on over a long series of years by himself, J. J. Sylvester, G. Salmon, L. O. Hesse, S. H. Aronhold, C. Hermite, Francesco Brioschi, R.F. A. Clebsch, P. Gordon, &c. The year 1868 saw a considerable enlargement of the field of operations. This arose from the study by Felix Klein and Sophus Lie of a new theory of groups of sub- stitutions; it was shown that there exists an invariant theory connected with every group of linear substitutions. The invariant theory then existing was classified by them as appertaining to " finite continuous groups." Other " Galois " groups were defined whose substitution coefficients have fixed numerical values, and are particularly associated with the theory of equa- tions. Arithmetical groups, connected with the

theory of quadratic forms and other branches of the theory of numbers, which are termed “discontinuous,” and infinite groups connected with differential forms and equations, came into existence, and also particular linear and higher transformations connected with analysis and geometry. The effect of this was to co-ordinate

many branches of mathematics and greatly to increase the number of workers. The subject of transformation in general has been treated by Sophus Lie in the classical work Theorie der Transformationsgruppen. The present article is merely con- cerned with algebraical linear transformation. Two methods of treatment have been carried on in parallel lines, the unsymbolic and the symbolic; both of these originated with Cayley, but he with Sylvester and the English school have in the main con- fined themselves to the former j whilst Aronhold, Clebsch, Gordan, and the continental schools have principally restricted themselves to the latter. The two methods have been conducted so as to be in constant touch, though the nature of the results obtained by the one differs much from those which flow naturally from the other. Each has been singularly successful in discovering new lines of advance and in encouraging the other to renewed efforts. P. Gordan first proved that for any system of forms there exists a finite number of covariants, in terms of which all others are expressible as rational and integral functions. This enabled David Hilbert to produce a very simple unsymbolic proof of the same theorem. So the theory of the forms apper- taining to a binary form of unrestricted order was first worked out by Cayley and P. A. MacMahon by unsymbolic methods, and later G. E. Stroh, from a knowledge of the results, was able to verify and extend the results by the symbolic method. The partition method of treating symmetrical algebra is one which has been singularly successful in indicating new paths of advance in the theory of invariants; the important theorem of expressibility is, directly we exclude unity from the partitions, a theorem con- cerning the expressibility of covariants, and involves the theory of the reducible forms and of the syzygies. The theory brought forward has not yet found a place in any systematic treatise in any language, so that it has been judged proper to give a fairly complete account of it. 1

I. The Theory of Determinants. 1 Let there be given n 2 quantities

an 012 013 ••■ ain

021 022 023 ••• 02n 031 ˆ32 033 ... 03n

■ a n l 0n2 On3 ... 0nn

and form from them a product of n quantities

Oi a a 2 £ a%y ... a nv , where the first suffixes are the natural numbers 1, 2, 3, . . .« taken in order, and o, (3, y, . . .v is some permutation of these n numbers. This permutation by a transposition of two numbers, say o, 0, becomes /S, o, 7, . . . v, and by successively transposing pairs of letters the permutation can be reduced to the form 1, 2, 3, . . .n. Let k such transpositions be necessary ; then the expression

the summation being for all permutations of the n numbers, is called the determinant of the n 2 quantities. The quantities a ia , o 2 « ... are called the elements of the determinant; the term (—) h am

011 012 013 ••• 01n

021 022 083 ••• 02»

A= 031 032 033 ••• 03it

0»10m2

the square array being termed the matrix of the determinant. A matrix has in many parts of mathematics a signification apart from its evaluation as a determinant. A theory of matrices has been constructed by Cayley in connexion particularly with the theory of linear transformation. The matrix consists of n rows and n columns. Each row as well as each column supplies one and only one element to each member of the determinant. Consideration of the definition of the determinant shows that the value is unaltered, when the suffixes in each element are transposed.

Theorem. — If the determinant is transformed so as to read by columns as it formerly did by rows its value is unchanged. The leading member of the determinant is 0n02203S".0n», and corresponds to the principal diagonal of the matrix.

We write frequently

A = S =”= 011022033- -0«» = (011022

If the first two columns of the determinant be transposed the ‘ The elementary theory is given in the article Determinant.

expression for the determinant becomes S(—)*fli/Sa 2 «o»y…o n i’, viz. a and are transposed, and it is clear that the number of trans- positions necessary to convert the permutation pay…v of the second suffixes to the natural order is changed by unity. Hence the trans- position of columns merely changes the sign of the determinant. Similarly it is shown that the transposition of any two columns or of any two rows merely changes the sign of the determinant.

Theorem. — Interchange of any two rows or of any two columns merely changes the sign of the determinant.

Corollary. — If any two rows or any two columns of a determinant be identical the value of the determinant is zero,

Minors of a Determinant. — From the value of A we may separate those members which contain a particular element o,t as a factor, and write the portion an, A,*; At, the cofactor of Oil, is called a minor of order n — 1 of the determinant.

Now ai l Au = r= t aii022

Hence aiiAii=a n S ± 022a33---ann, where the cofactor of On is clearly the determinant obtained by erasing the first row and the first column.

Hence An =

Similarly Ait, the cofactor of 0,4, is shown to be the product of (—)’ + * and the determinant obtained by erasing from A the i’ h row and k’ h column. No member of a determinant can involve more than one element from the first row. Hence we have the development

A = aiiAn-fai2Ai2+0i3Ai3+…+0ii.Ai„,

proceeding according to the elements of the first row and the corre- sponding minors.

Similarly we have a development proceeding according to the elements contained in any row or in any column, viz. A = aviA,i-|-Oi2A,-2-r-o < 3Ai3-r——-r'Oi n Ai n } ,.s A = ai*Au + -a2*A2i-l-03*A3t + ...-(-o„iA„t) *• "

This theory enables the evaluation of a determinant by successive reduction of the orders of the determinants involved.

(Its. dzz –

. a nn

Q > zi Q > %% •

■ dZn

Qtnl #n3 •

• CLnn

Ex. gr.

1

3

2 1

6

0-5

3

= 1

1 6 -5 3

°| 2 o S| + *|U.

= 113 I -6 I -5 I + 3.2 I – 5|-3.1 I 01

= 3 + 30-30-0 = 3.

Since the determinant

fl21 #22 Gt23 ■•• &2n

0-21 ©22 ©23 •-•

GE3I ©32 O33 •*• ©3n

CLni a n 2Cl n z ••• #nn

having two identical rows,

(*£*■); (k%i)

vanishes identically; we have by development according to the

elements of the first row

O2lAu-(022Al2(-O23A 1 3-l-... +02„Aln =0;

and, in general, since

aiiAji+Oi 2 A,-2+Oi3Ai3-f...+ainAin=A, if we suppose the t" and k' h rows identical

a*iAii-|-a*2Ai2-|-Ojt3Ai3-f-...-|-at„A,' n =0 and proceeding by columns instead of rows,

aiiAu+02iA2i+03>A3t-f-— +a„.-A„fc = identical relations always satisfied by these minors.

If in the first relation of (A) we write ai, = bi,+a,di,... we find that 2a„Ai a = Sft,.Ai,+2Ci,Ai.fSd„Ai,(.. .so that Abreaksupinto a sum of determinants, and we also obtain a theorem for the addition of determinants which have n — I rows in common. If we multiply the elements of the second row by an arbitrary magnitude X, and add to the corresponding elements of the first row, A becomes 2ai,Ai, + X2o 2 ,Ai, =2ai,Ai„ = A, showing that the value of the deter minant is unchanged. In general we can prove in the same way the —

Theorem. — The value of a determinant is unchanged if we add to the elements of any row or column the corresponding elements of the other rows or other columns respectively each multiplied by an arbitrary magnitude, such magnitude remaining constant in respect of the elements in a particular row or a particular column.

Observation. — Every factor common to all the elements of a row or of a column is obviously a factor of the determinant, and may be taken outside the determinant brackets.

Ex. gr.

1 o 2 P 2 7 2

a P 7

=

|l 1 1

P -a

Y — a’

y —a

I /3 s — a* y 2 — a? P — a y — a

= ((S-a)(7 a)|ˆ+ tt T+|=(/ 3- 7)(7 -«)|ˆ-T7+«| = (/9-a)(7 a)03 T).

The minor Aa is

3A do,t’

and is itself a determinant of order n — l.

We may therefore differentiate again’ in regard to any element a™

where r<», s

dA-fc d 2 A

minor also of A of order n— 2. It will be Aa=3— — =-= — 5 —

rs aa r s oaiuiar,

and will be obtained by erasing from the determinant A,t the row

and column containing the element Or, ; this was originally the

r’ h row and s’ h column of A; the r’ h row of A is the r th or (r — 1)”

row of Aa according as r§i and the s th column of A is the s’ h or (s — i)’ h

column of A,-» according as sˆk. Hence, if T ri denote the number

of transpositions necessary to bring the succession ri into ascending

order of magnitude, the sign to be attached to the determinant

arrived at by erasing the i' h and r' h rows and the k' h and s' h columns

from A in order produce A,t will be — 1 raised to the power of

T ri +T k , + i + k + r + s.

Similarly proceeding to the minors of order n — 3, we find that

Aa = 37- A <* = JT„— 57"^* = *„..a„ a„. A is obtained from A by eras-

do (i

da r sdat a dancda rs da, u

ing the i th , r' h , t th rows, the k lh , s ih , u th columns, and multiplying the resulting determinant by —I raised to the power T (r i +T«,t --i--k--r--s-{-t--u and the general law is clear.

Corresponding Minors. — In obtaining the minor Ait in the form

4 r«

of a determinant we erased certain rows and columns, and we would have erased in an exactly similar manner had we been forming the determinant associated with Ai„, since the deleting lines intersect

Tk

in two pairs of points. In the latter case the sign is determined by — 1 raised to the same power as before, with the exception that Tut. replaces T„,t ; but if one of these numbers be even the other must be uneven; hence

Ait = Ai 8 .

OitOrsAit + OisOrtAis = r« rt

Ail,

Moreover

‘ oa a.s

Oit Or, I

where the determinant factor is given by the four points in which the deleting lines intersect. This determinant and that associated with Ait are termed corresponding determinants. Similarly p lines

ra

of deletion intersecting in p* points yield corresponding determinants of orders p and n —p respectively. Recalling the formula

A = aiiAii4-oi2Ai2 + Oi 3 Ai3-|-... + Oi n Ai„. it will be seen that an, and An involve corresponding determinants. Since Aˆ is a determinant we similarly obtain Au =

= 02iAit + ... + a2,t-iAi,t + 02,t + iAi,t-l-... + c

2,t-l 2,t+1

nAl.i, 2,n

and thence

A = 2flii02tAii i,t 21

where i < k ;

and as before

A = 2

i,h !

Oli O2,

an, 024

an important expansion of A. Similarly

Oli 02,

A = S

i.k.r

*|a„

l&l 2t

i > k.

Aii i > k > r,

= 2

Ah.

. 2i

03i

On 021 ask

air 02r 03r 3?

and the general theorem is manifest, and yields ar development in a sum of products of corresponding determinants. If the j* column be identical with the i th the determinant A vanishes identi- cally ; hence if j be not equal to *, h, or r,

Oij O2/ 03j Olt 021 Oat Olr 02r 03r

Similarly, by putting one or more of the deleted rows or columns equal to rows or columns which are not deleted, we obtain, with Laplace, a number of identities between products of determinants of complementary orders.

Multiplication. — From the theorem given above for the expansion of a determinant as a sum of products of pairs of corresponding determinants it will be plain that the product of A = (a si , 022, ... a nn) and D = (6u, &b, b„„) may be written as a determinant of order 2», viz.

On O21 O31 ... o n i —1 ...

Ol2 022 O32 ... O n 2 —1 ...

On O23 033 ... a„f —1 ...

ABI CDl

for brevity.

...Q b ni brt &„.... b n . Multiply the 1”, 2”*, ... n’ h rows by bn, bn, ... Ji„ respectively, and

Oln «2n

«3» .

• • o„„

..

.-1

.

..

611

612

613 .

• bi„

.

..

621

622

623 •

■ bin

.

..0

&31

632

633 ..

■ b 3n

622

ALGEBRAIC FORMS

add to the (n + i)'row; by 621, 622 ••• 02», and add to the (ra +2)"'row; by bzi, 632, ••• hi and add to the (ra+3) r(i row,&c. C then becomes an&n +O12612 +••■ +Oi„oi„, ' anbn +O22&12 +••■ +ai n bi n ,

•■■o„i0ii+o,,20i2 + ...+o„„0i„ anbu+anbn- i r----ainbzn, o 2 i02i+O22022+...+O2 n 02,„

...a„i02i+o n 2022+—+o„„&2»

O:i031+ai2032 + ."+Oi n 03n, 021031 +022632 + — +02 n b in ,

■ ■■a„ib3i+a n 2b 3i +...+a n „b2n

ail6„l+ai20„2 + -..+Ol„&„„, O2l6„l+0226„2+...+02„6„n,

...a„i6„i+o„26„2+...+o n „6„„ and all the elements of D become zero. Now by the expansion theorem the determinant becomes

(–)i+2+'+-+2"B.C = (– i)"< 2n+ « + "C = C. We thus obtain for the product a determinant of order n. We may say that, in the resulting determinant, the element in the i th row and k' h column is obtained by multiplying the elements in the k' h row of the first determinant severally by the elements in the i lh row of the second, and has the expression

aki&ii +0*20.2 -hatibis... +a*„ bi n , and we obtain other expressions by transforming either or both determinants so as to read by columns as they formerly did by rows.

Remark. — In particular the square of a determinant is a determinant of the same order (011022033.. .0 n n) such that 0,4 = oh; it is for this reason termed symmetrical.

The A djoint or Reciprocal Determinant arises from A = (O11O22O33 . .o„„) by substituting for each element Aik the corresponding minor Aik so as to form D = (A11A22A33 ... A„„). If we form the product A.D by the theorem for the multiplication

of determinants we find that the element in the i lh row and k m column of the product is

OjfciA,i + ot2Ai2 + ... + atnA,,,, the value of which is zero when k is different from i, whilst it has the value A when k = i. Hence the product determinant has the principal diagonal elements each equal to A and the remaining elements zero. Its value is therefore A" and we have the identity

D.A = A"or D = A" _1 . It can now be proved that the first minor of the adjoint determinant, say B r , is equal to A" _2 o rs .

From the equations

011*1 + 012X2 + 013X3 + ... = Ji ,

021 × 1 + 022 × 2 + 023*3 + ... = &>

031X1 + 032X2 + 033X3 + ." = ˆ3,

we derive .

Axi = A u {i + A2i£2 + Asi£3 + — , AX 2 = Al2ˆ1 + A22J2 + A32J3 + ... ,

AX3 = An£l + A23?2 + A33f 3 + ... ,

A"- , £ l = BnAxi + Bi2AX2 + Bi S Ax3 + ... ,

A"- 1 £ 2 = B 2 lAXl + B22AX2 + B2 3 AX3 + ... , A"- 1 j3 = B 3 lAXl + B32AX2 + B33AX 3 + ... ,

and comparison of the first and third systems yields

B,, = A»- 1 a r .. In general it can be proved that any minor of order p of the adjoint is equal to the complementary of the corresponding minor of the original multiplied by the {p — i)' h power of the original determinant.

Theorem. — The adjoint determinant is the (« — i)" 1 power of the original determinant. The adjoint determinant will be seen sub- sequently to present itself in the theory of linear equations and in the theory of linear transformation.

Determinants of Special Forms. — It was observed above that the square of a determinant when expressed as a determinant of the same order is such that its elements have the property expressed

by aik = an. Such determinants are called symmetrical. It is easy to see that the adjoint determinant is also symmetrical, viz. such that Aii = Aii, for the determinant got by suppressing the i' h row and k' h column differs only by an interchange of rows and columns from that got by suppressing the k' h row and i th column. If any symmetrical determinant vanish and be bordered as shown below

Gil O12 O13 Xi

012 O22 O23 X2

013 O23 O33 X3 Xi X2 X3 .

it is a perfect square when considered as a function of Xi, X 2 , X 3 . For since A11A22 — A 2 2 = Ao 33 , with similar relations, we have a number of relations similar to A n A22 = A 2 2 , and either A„ = + V (A^A,,) or — V (AnA,,,) for all different values of r and s. Now the determinant has the value

!X5A 11 +X|A22 + X 2 3 A33+2X2X,A2 3 +2X3X 1 A 3 i+2X 1 X2A,2| = — SXJArr — 22X r X,A rs in general, and hence by substitution ± |X, V A„+X 2 V A22+...+XW A„„) 2 . A skew symmetric determinant has a rT = o and a,,— —a„ for all values of r and s. Such a determinant when of uneven degree Vanishes, for if we multiply each row by — I we multiply the deter minant by (— i) n =— I, and the effect of this is otherwise merely to transpose the determinant so that it reads by rows as it formerly

and thence

did by columns, an operation which we know leaves the determinant unaltered. Hence A=— A or A = o. When a skew symmetric determinant is of even degree it is a perfect square. This theorem is due to Cayley, and reference may be made to Salmon's Higher Algebra, 4th ed. Art. 39. In the case of the determinant of order 4 the square root is

Ai2A 3 4— A13A24 + A14A23.

A skew determinant is one which is skew symmetric in all respects,

except that the elements of the leading diagonal are not all zero.

Such a determinant is of importance in the theory of orthogonal

substitution. In the theory of surfaces we transform from one set

of three rectangular axes to another by the substitutions

X= ax + by+ cz,

Y= a'x+b'y+ c'z,

Z=a"x+b"y+c"z,

where X 2 +Y 2 +Z 2 = x 2 +;y 2 +z 2 . This relation implies six equations between the coefficients, so that only three of them are independent. Further we find

x=aX+o'Y+a*Z, . y = bX + b'Y + b"Z, ■ z = cX+c'Y + c"Z,

and the problem is to express the nine coefficients in terms of three independent quantities.

In general in space of n dimensions we have n substitutions similar to

Xl =OuXl+Ol2X2 + ...+Ol„X n ,

and we have to express the » 2 coefficients in terms of §n(» — 1) independent quantities ; which must be possible, because X?+Xi + ...+X* =xf +xi+x!+...+xH. Let there be 2re equations

Xl = 6llfl + 6i 2 f2 + 6l3j3 + ..., *S=02l£l + &!2fe + °2 «£» + ...,

Xi = on£i+62i£2+63i£3 + ..-,

X 2 = &12£l + &22£2 + Z> 3 2£ 3 + ...,

where b„ = i and b„ = —b, r for all values of r and s. There are then \n{n — 1) quantities b„. Let the determinant of the b's be A& and B™, the mihor corresponding to 6 rs . We can eliminate the quantities {1, &,...{« and obtain n relations

A 6 X 1 = (2B U -A 6)xi +2B 2 ,X2+2B 3I X3+...,

Ai,X 2 = 2Bi 2 i + (2B 22 -A&) 2 +2BiB*, + ...,

and from these another equivalent set

A !) x 1 = (2B,i-A(,)X 1 +2B12X2+2B13X3+...,

A(,x 2 = 2B2iX 1 + (2B22-At)X2+2B 23 X 3 +...,

and now writing

2B,j-At Aj,

2B, t

" Ao

= an,

we have a transformation which is orthogonal, because SX 2 = Sx 2 and the elements an, aik are functions of the \n(n — 1) independent quantities 6. We may therefore form an orthogonal transforma- tion in association with every skew determinant which has its leading diagonal elements unity, for the \n(n — 1) quantities tare clearly arbitrary.

For the second order we may take

1, X

A» =

-X, 1

= 1+X 2 ,

and the adjoint deter

(14

■(H Similarly, for the

minant is the -X 2)xi = (l-X 2 -X 2)x 2 = -2 rder 3, we tali

1 V — p

-v 1 X M-X 1

same; hence)X!+ 2XX 2> KX 1 + (1-ˆ)X 2 . e

A& = and the adjoint is

= l+X 2 + /t 2 +ˆ >

1+X 2 v+

-v + \n 1 +

M+X..-X +

Xjit — /i+Xv M 2 X+py IXV 1 + p 2

i

leading to the orthogonal substitution

Atxˆa+XS-ˆ-ˆXi +2(k+Xm)X2 +2(- M +X>.)X,

Ai,X2= 2(X r <-ˆ)X, + (l+ M 2 -X 2 – y 2)X2 +2(ˆ+X)X 3

A6X 3 =

2(Xˆ+ M)Xi

2(ˆ-X)X2(l + x')X 3 .

Functional determinants were first investigated by Jacobi in a work De Determinantibus Functionalibus. Suppose n dependent variables y\, yt,...y n , each of which is a function of n independent variables xi, x 2 ,..,x„, so that y, =/,(xj, xt,...x n). From the differential coefficients of the y's with regard to the x's we form the functional determinant

ALGEBRAIC FORMS

623

R =

3-Vi

8yi

ClXi

8*2

dv.

dy 2

dxi

5*2

8y n

3 > ’»

dxi 5*2

Syi

ox n

5*^

dy„ ,5*i,

_ A-i, ys.-y-A

*i, x 2 ,...x n / for brevity.

If we have new variables z such that z, = 0„(yi, y2,...y n)i we have also Zt = ^,(*i, *2,. ..*„), and we may consider the three determinants

(yi,yt,—yn\ /Zl, Z2,-Z»\ (Si, 22, -.Z„\

V*i, * 2 , ...*»/’ \yi,y2,—.yn/ ‘ *i, *2, — »/ ” Forming the product of the first two by the product theorem, we obtain for the element in the »’ row and k th column Sz.- dyi.dzi dyi, ,dzi dy„^

dz- which is 5T” 1 the partial differential coefficient of Zi with regard

to *t. Hence the product theorem

/*,, zi,...z„\ Hi, y2,...y„\ = hi, z 2 ,...z„\ .

\yi, y yj *i, x 2 ,...xj \x u xi,...x„/ ‘

and as a particular case

hi, yi,-y«\ (xi, Xi,...x n \ =1 *i, X2,...x n / \yi, y 2 ,...y„/ Theorem. — If the functions y\, yi,...y n be not independent of one another the functional determinant vanishes, and conversely if the determinant vanishes, yi, yi,...y n are not independent functions

Of Xi, Xi,...X n .

Linear Equations. — It is of importance to study the application of the theory of determinants to the solution of a system of linear equations. Suppose given the n equations

/1 =011*1+012*2 + . .. + Oi n *„ = 0,

/2=a21*l+O 2 2*2 + —.+O2„* n = 0, /» = a„i*l + fl„2*2 + • • • + a»n*n = 0.

Denote by A the determinant (an022..0»»)

Multiplying the equations by the minors Ain, A 2M ,...A„(i respectively, and adding, we obtain

*^(ainAi(i+a2(iA2n+...+a»fiA„M) =XiiA =0, since from results already given the remaining coefficients of *i, 2,... m-1, .t>+i, ■■■*>■ vanish identically.

Hence if A does not vanish *i = *2 = ... = * n =o is the only solution: but if A vanishes the equations can be satisfied by a system of values other than zeros. For in this case the n equations are not independ- ent since identically

Am/, + A21U/2 + . . . + A„ M /„ = 0, and assuming that the minors do not all vanish the satisfaction of n — 1 of the equations implies the satisfaction of the n" 1 .

Consider then the system of n — 1 equations

021*1 +a22*2 + ...+a2n*o=0

031*1 a 3 2*2...+Os„*„ =

a„i*i+a„2*2+—+a„ x,

= 0,

which becomes on writing zr = y>,

*n

O2iyi+O22y2+...+O2,„-iy„-i+o 2 »=0 O3iyi+a32y2 + ...+O3, n -iy»-i+a3 n =

o„iyi+o„2y2+—+o„„^iy„_i+o„„ = 0. We can solve these, assuming them independent, for the « — I ratios y u yi,...y„~i. Now

O2lAn + O22Ai2 + ... + O2„Al„ = 0

O3iAii + O32Ai2 + ... + a 3 „Ai„ =

a n iA n + a„2Ai2 + ... + a„„Ai„ = 0, and therefore, by comparison with the given equations, *; = pAk, where p is an arbitrary factor which remains constant as i varies.

Hence yi = i il where Aii and Ai„ are minors of the complete

Al n

determinant (on022...o„„).

021 O22 ...O2.1-I 02,t + l ...02i 031 O32 ...03,1-1 03,, + l ...03„

.■* = ()*

i + n lOnl Q,i2 ■■.Onii-

1021 O22 ...0 2 ,„-l 031 O32 ••■03,n-l

.,1 + 1 ...a n ,

|0„i 0„2 ...o„„„_i

or, in words, y,- is the quotient of the determinant obtained by erasing the t'* column by that obtained by erasing the »'* column, multiplied by (— i) i + *. For further information concerning the

compatibility and independence of a system of linear equations, see Gordon, Vorlesungen iiber Invariantentheorie, Bd. 1, § 8.

Resultants. — When we are given k homogeneous equations in k variables or k non-homogeneous equations in k — I variables, the equations being independent, it is always possible to derive from them a single equation R = o, where in R the variables do not appear. R is a function of the coefficients which is called the " resultant " or " eliminant " of the k equations, and the process by which it is obtained is termed " elimination." We cannot combine the equations so as to eliminate the variables unless on the supposi- tion that the equations are simultaneous, i.e. each of them satisfied by a common system of values; hence the equation R = o is derived on this supposition, and the vanishing of R expresses the condition that the equations can be satisfied by a common system of values assigned to the variables.

Consider two binary equations of orders hi and n respectively expressed in non-homogeneous form, viz.

/() =/ = ao m -Oi*” , – 1 +02X m-2 -... =0, <*>(*) = = b x n - b 1 x n – 1 +hx n – 2 — ... = 0.

If 01, a.?, ...a m be the roots of /=o, ft, ft, ...ft the roots of 4> = o, the condition thai some root of = o may cause / to vanish is clearly

R/,*=/(ft)/(ft)-/(&.)=0;

so that R/,ˆ is the resultant of / and , and expressed as a function of the roots, it is of degree m in each root ft and of degree n in each root a, and also a symmetric function alike of the roots a and of the roots P; hence, expressed in terms of the coefficients, it is homo- geneous and of degree n in the coefficients of /, and homogeneous and of degree m in the coefficients of cj>. Ex. gr. .

f=a x 2 — Oi*+o 2 =0, <£ = 6o* 2 — 6i*+&2- We have to multiply Ooft — Oift+o 2 by o ft — oift+o 2 and we obtain

03/3;ft?-Ooai(/3jft+ft/3|)+o c 02(ft+/3i)+o ; ftft

-oia 2 (ft + ft)+a3, where

ft +ft = Fo , ftft = Fo , ft: +ft – — 5j— . and clearing of fractions

R/,0 = (oo&2— fl2&o) 2 + (oi&o~ aj}i){aib 2 — 0261). We may equally express the result as

(ai)(ai)...{a m) = 0, or as

II(a.-ft)=0.

This expression of R shows that, as will afterwards appear, the resultant is a simultaneous invariant of the two forms.

The resultant being a product of tun root differences, is of degree mn in the roots, and hence is of weight mn in the coefficients of the forms; i.e. the sum of the suffixes in each term of the resultant is equal to mn.

Resultant Expressible as a Determinant. — From the theory of linear equations it can be gathered that the condition that p linear equations in p variables (homogeneous and independent) may be simultaneously satisfied is expressible as a determinant,

viz. if

ou*i + oi2*i + ... + aip*p = 0,

021*1 + 022*2 + ... + 02p*p = 0, Opl*l + Oj,2*2 + • • • + O y! ,*j > = 0,

be the system the condition is, in determinant form,

(on022...o P p) = 0 ; in fact the determinant is the resultant of the equations. Now, suppose / and to have a common factor * — y,

f(x) = /i()(-7) ; < «*) = i(x)(x-y), /1 and 0i being of degrees m — 1 and n — i respectively; we have the identity 0i()/() = /i()0() of degree m + n — l.

Assuming then

we may equate coefficients of like powers of * in the identity, and obtain m--n homogeneous linear equations satisfied by the m--n quantities Bi, B2,...B„, Aj, A 2 ,...A„. Forming the resultant of these equations we evidently obtain the resultant of /and .

Thus to obtain the resultant of

/ = Oo* 3 + Oi* 2 + 02* + a s , 4 > -box 2 + bix + b a we assume the identity

(B9* + B,)(oo* 3 + oi* 2 + 02* + 03) = (A„* 2 + A 1 * + A 2)(6 (l * 2 + 6 1 * + 6 2), and derive the linear equations

BqOo — A

BoOi + BiOo— A0&1 — A1&0 = 0,

B0O2 + Bi Oi — A062 — Aifei — A 2 6c = 0, Bo0 3 + Bi02 — A1&2 — A 2 &i = 0,

Bia 3 — A 2 &2 = 0,

a numerical factor being disregarded.

Sylvester's leads to the same expression,

and by elimination we obtain the resultant

o,0 M Oi Oo bi bo (H 0.1 6j bi bn o» Oj 62 bi a, 62 This is Euler's method, but in a simpler manner.

He forms n equations from / by separate multiplication by it" -1 , x" rJ% ,...x, 1, in succession, and similarly treats with m multipliers s"* -1 , z'" -2 ,...*, 1. From these m+n equations he eliminates the m+n powers i" 1 '" 1 , x m+ "~ i ,...x, 1, treating them as independent unknowns. Taking the same example as before the process leads to the system of equations

ac** + Oi3c s + 023c 2 + 03* = 0,

aoX s + aix i + a i x + a i = 0,

b x* + b 1 x < > + b i x t = 0,

boxt + brf + hx = 0,

hx t + b 1 x + b 2 = 0,

whence by elimination the resultant

On Oi Oi aj

Oo ai (h a-i

b„ ˆ bt

60 61 62

Mi 62

which reads by columns as the former determinant reads by rows, and is therefore identical with the former. E. Bezout's method gives the resultant in the form of a determinant of order m or n, according as » is J n. As modified by Cay ley it takes a very simple form. He forms the equation

/() < > (') -/(')*(*) = o, which can be satisfied when / and possess a common factor. He first divides by the factor x —x', reducing it to the degree m — 1 in both * and x' where m > n; he then forms m equations by equating to zero the coefficients of the various powers of x'; these equations involve the m powers x", x, x i ,...x

m ~ l of x, and regarding these as the unknowns of a system of linear equations the resultant is reached in the form of a determinant of order m. Ex. gr. Put

(a„x* + a l x i + a 1 x + a 3)(box' 2 + b l x' + b 1) – (oox' + a + chx' + ai)

(&o* 2 + 6i* + 6 2) = 0; after division by *— *' the three equations are formed OabcX' + OobiX + Chbi = 0,

Oo bix 2 + (0062 + iibi — aj > a) x -M162 — 03 bo = 0, aobix > \{aibi—aibo)x--(Hbi — a%bi = 0

and thence the resultant

aobo

Oobi 0062 + 1161 — 0260 O1&2— da6o

which is a symmetrical determinant.

Case of Three Variables. — In the next place we consider the resultants of three homogeneous polynomials in three variables. We can prove that if the three equations be satisfied by a system of values of the variable, the same system will also satisfy the Jacobian or functional determinant. For if «, v, w be the polynomials of orders m, n, p respectively, the Jacobian is («i v ± . a > a), and by Euler's theorem of homogeneous functions xui + yui + z«a = mu xvi + yvi + zv 3 = nv xwi--ywi + zw 3 —pw; denoting now the reciprocal determinant by (Ui V 2 W3) we obtain Jx = muUi + miVi + pu > Wi; Jy = ..., Jz = ..., and it appears that the vanishing of u, v, and w implies the vanishing of J. Further, if m = n = p, we obtain by differentiation

t, 3J_ / 8U, . 8Vi . 8Wi. TT . ... „.\ J + x^ = m «- S j + f + a^- + «iUi + fiVi + WiWij .

or

3J , st L / 3U, . av, . 3WA «g-(w -i)J + * [u w + Vw + w ^-j .

Hence the system of values also causes js*- to vanish in this case;

and by symmetry *~ and ** also vanish.

The proof being of general application we may state that a system of values which causes the vanishing of k polynomials in

k variables causes also the vanishing of the Jacobian, and in particular, when the forms are of the same degree, the vanishing also of the differential coefficients of the Jacobian in regard to each of the variables.

There is no difficulty in expressing the resultant by the method of symmetric functions. Taking two oi the equations ax m + (by +cz)x m ~ l +...=0, a'x" + {b'y+c'z) x"' 1 + . . . = 0, we find that, eliminating x, the resultant is a homogeneous function of y and z of degree mn; equating this to zero and solving for the ratio of y to z we obtain mn solutions; if values of y and z, given by any solution, be substituted in each of the two equations, they will possess a common factor which gives a value of * which, com-

bined with the chosen values of y and z, yields a system of values which satisfies both equations. Hence in all there are mn such systems. If, therefore, we have a third equation, and we substitute each system of values in it successively and form the product of the mn expressions thus formed, we obtain a function which vanishes if any one system of values, common to the first two equations, also satisfies the third. Hence this product is the required resultant of the three equations.

Now by the theory of symmetric functions, any symmetric functions of the mn values which satisfy the two equations, can be expressed in terms of the coefficient of those equations. Hence, finally, the resultant is expressed in terms of the coefficients of the three equations, and since it is at once seen to be of degree mn in the coefficient of the third equation, by symmetry it must be of degrees np and pm in the coefficients of the first and second equations respectively. Its weight will be mnp (see Salmon's Higher Algebra, 4th ed. § 77). The general theory of the resultant of k homogeneous equations in k variables presents no further difficulties when viewed in this manner. .

The expression in form of a determinant presents in general considerable difficulties. If three equations, each of the second degree, in three variables be given, we have merely to elimin- ate the six products x 2 , y 2 , z 2 , yz, zx, xy from the six equations

« = j; = a) = »i=J.=J=0; if we apply the same process [to these

equations each of degree three, we obtain similarly a

determinant ol order 21, but thereafter the process fails. Cayley, however, has shown that, whatever be the degrees of the three equations, it is possible to represent the resultant as the quotient of two deter- minants (Salmon, I.e. p. 89).

Discriminants.— The discriminant of a homogeneous polynomial in k variables is the resultant of the k polynomials formed by differentiations in regard to each of the variables.

It is the resultant of £ polynomials each of degree m — i, and thus contains the coefficients of each form to the degree (m— i)* -1 ; hence the total degrees in the coefficients of the k forms is, by addition, k(m — i)*~ l ; it may further be shown that the weight of each term of the resultant is constant and equal to m(m —l) k ~ l (Salmon, I.e. p. 100).

A binary form which has a square factor has its discriminant equal to zero. This can be seen at once because the factor in question being once repeated in both differentials, the resultant of the latter must vanish.

Similarly, if a form in k variables be expressible as a quadratic function of k — l, linear functions Xi, X 2 , ,..Xn, the coefficients being any polynomials, it is clear that the k differentials have, in common, the system of roots derived from Xi = Xi = ... = X»ji = o, and have in consequence a vanishing resultant. This implies the vanishing of the discriminant of the original form.

Expression in Terms of Roots.— Since x i.- 1 ryi. = m ft if we take any root Xi, yi, of^ »p , and substitute in mf we must obtain

yi(fi-) _2 ; hence the resultant of *£ and / is, disregarding

v-vi numerical factors, yiyi...yn-iX discriminant of / = OoXdisct. of/. Now

/ = (xyi – *i y) {xyi – x t y) . . . (xy^ — x m y) ,

1 = 2yi(xy i -x i y)...(xy m —x m y),

I-

and substituting in the latter any root of / and forming the product,

we find the resultant of / and J-, viz.

y C2. . .y m (xiyz – x 2 yiy(xiy 3 – x 3 yi) s . . . (x r y, – x,y r y.. . and, dividing by y\yi~.y m , the discriminant of / is seen to be equal to the product of the squares of all the differences of any two roots of the equation. The discriminant of the product of two forms is equal to the product of their discriminants multiplied by the square of their resultant. This follows at' once from the fact that the dis- criminant is

II(a r -o,) ! IIG8,-A)»{II(a r -A)} ! . References fortheTheoryof Determinants. — T.MuirV'List of Writings on Determinants," Quarterly Journal of Mathematics. vol. xviii. pp. 110-149, October l88l,is the most important biblio- graphical article on the subject in any language; it contains 589 entries, arranged in chronological order, the first date being 1693 and the last 1880. The bibliography has been continued, and pub- lished at various dates (vol. xxi. pp. 299-320; vol. xxxvi. pp. 171-267) in the same periodical. These lists contain 1740 entries. T. Muir, History of the Theory of Determinants (2nd ed., London, 1906). School treatises are those of Thomson, Mansion, Bartl, Mollame, in English, French, German and Italian respectively. — Advanced treatises are those of William Spottiswoode (1851), Francesco Brioschi (1854), Richard Baltzer' (1857), George Salmon (1859), ■Ni Trudi (1862), Giovanni Garbieri (1874), Siegmund Giinther, (1875), Georges J. Dostor (1877), Baraniecki (the most extensive of all) (1879), R. F. Scott (and ed., 1904), T. Muir (1881).

II. The Theory of Symmetric Functions

Consider n quantities oi, 02, oj,...o«.

Every rational integral function of these quantities, which does not alter its value however the n suffixes 1, 2, 3, ... n be permuted, is a rational integral symmetric function of the quantities. If we write (1 +aix)(i +a 2 x)...(i +a„x) = 1 +aix+a 2 × 2 +... +a n x n ,ai,

an = aia2

the summation being for all permutations of the indices which result in different terms. The function is written

for brevity, and repetitions of numbers in the bracket are

indicated by exponents, so that (pipipi) is written (ptpt). The weight of the function is the sum of the numbers in the bracket, and the degree the highest of those numbers.

Ex. gr. The elementary functions are denoted by (1), (V), (1*), ... (1»), are all of the first degree, and are of weights i, 2, 3,...n respectively.

Remark— In this notation (0) = SaJ = (“); (0 2) = Sa°a° = (“);... (0«) = (“), &c. The binomial coefficients appear, in fact, as symmetric functions, and this is frequently of importance.

The order of the numbers in the bracket (pipi.-pn) is immaterial; we may therefore always place them, as is most convenient, in descending order of magnitude; the numbers then constitute an ordered partition of the weight w, and the leading number denotes the degree.

The sum of the monomial functions of a given weight is called the homogeneous-product-sum or complete symmetric function of that weight; it is denoted by &»; it is connected with the elementary functions by the formula

i-a lX a,.x’-a s x>... = 1 + hlX + hiXl + h > x, +”> which remains true when the symbols a and h are interchanged, as is at once evident by writing — x for x. This proves, also, that in any formula connecting a u a 2 , a lt ... with hi, h\, hi,... the symbols a and h may be interchanged.

Ex. gr, from h-i = a\—at we derive a% = h\—h.

The function Sof’af 2 ...ˆ” being as above denoted by a partition

of the weight, viz. (pipi...pn), it is necessary to bring under view other functions associated with the same series of numbers: such, for example, as

Saˆ Zaf 2 ···- 2 = (p i p 3)(p*p i ...p n J).

The expression just written is in fact a partition of a partition, and to avoid confusion of language will be termed a separation of a partition. A partition is separated into separates so as to produce a separation of the partition by writing down a set of partitions, each separate partition in its own brackets, so that when all the parts of these partitions are reassembled in a single bracket the partition which is separated is reproduced. It is

convenient to write the distinct partitions or separates in descending order as regards weight. If the successive weights of the separates W\, w t , w>,... be enclosed in a bracket we obtain a partition of the weight w which appertains to the separated partition. This partition is termed the specification of the separation. The degree of the separation is the sum of the degrees of the component separates. A separation is the symbolic representation of a product of monomial symmetric functions. A partition, (pipipipifapi) = (p\plpi), can be separated in the manner (pipdipipˆipips) = (pipi) i (pip3), and we may take the general form of a partition to be ˆpˆp" 3 —) and that of a separation (JO'iQO'jQj)ˆ... when J It J 2 , J 3 ... denote the distinct separates involved.

Theorem. — The function symbolized by (n), viz. the sum of the n" 1 powers of the quantities, is expressible in terms of functions

which are symbolized by separations of any partition {n n n 2 n 3 ...ˆ of the number n. The expression is —

,-l+-2+-»+-. (yi + „ 2 + ,, 3 + ..,-l)! , ,

2r_>W'» + "- (;i+j«+./3+...-i)!

(Ji)' l (Ji) ;, (Ji)'»— being a separation of (m'W...) and the summa-

-rrrro W'ChVW 3 ...,

tion being in regard to all such separations. For the particular case (nW 3 ...) = (l») cL>> = ˆ (H ˆW--- (; 1 ˆ+...-l) ! (1)fl(12)M1>)/

To establish this write —

l+ l iX l +SXi+M 3 X> + .-. = II(l+l*aiX 1 +v?aix i +ti*e.* 1 X i +...),

a

the product on the right involving a factor for each of the quantities Oi, Oi, 03... , and /1 being arbitrary.

Multiplying out the right-hand side and comparing coefficients

Xi = (l)xi,

X, = (2>,+(1«)?,

X 3 = (3)x 3 +(21)x i x 1 + (V)xl

X 4 = (4)* 4 +(>l)z3*i-K2 2)*I + (21 2)z 2 s? + (l 4)s?,

v _, M M M , Ml n C3

X a =X(m 1 m 1 m 3 ...)**/,,,*„,..., the summation being for all partitions of m. Auxiliary Theorem. — The coefficient of xˆx£x t *... in the product

miWj.,1.1. 2v imˆ- where ai)' i a 2)"a 3)"...is a separ- ation of (I l l 2 l '...) of specification (w%»" 2 »t'"*...),andthesumisfor

it L 1 a • ' 2 8

all such separations.

To establish this observe the result.

ix*> = y (3)-.(2i)»»(ir. ». a-w

and remark that (3)"'i(2i)' r 2(i 3) ,r3 is a separation of (3" , i2"'2i' re+ ' 3 ' r 3) of specification ($•). A similar remark may be made in respect of

1 -y-w JLy'* 2 — v'* 3 jHrˆ"i' rtirW yu,!-*™*'— and therefore of the product of those expressions. Hence the theorem. Now

log (l+ /J X 1 +ˆX 2 + Al 3 X34-...) = 2 log (l+/iaiXi+yn 2 ofa: 2 M 3 a 3 *3...)

a

whence, expanding by the exponential and multinomial theorems, a comp ariso n of the coefficients of /j" gives

jLˆ viXvˆ.vzX... "1 "2 "3

' r _x"l+-2+ˆ+—l (y i-f y2 + y3 + ...l)! ˆ y lˆ 2 ˆ", I ' KlWl/,!... A »1 A »8 A »3-

and, by the auxiliary theorem, any term X£jx£ 2 x£!|... on the right-hand side is such that the coefficient of £ja£ 2 z*... in

1 yMl M8 f-i .

HiWm... SVw- 1S

■S’

2 !

=2<

t * iˆl M2 /*3

where sinceOˆ m 2 m 3 ...) is the specification of (Ji)‘i(Jj)’»(Jj)’»..., *J2+M3+...=ii-|-j 2 +i3 + ... Comparison of the coefficients of xˆxˆxˆ... therefore yields the result

, N V 1 .2- 3 +- (yi + y2 + y3 + ...-l)! , jlv 2 v3....

for the expression of Sa n in terms of products of symmetric functions symbolized by separations of (nˆnˆnˆ 3 ...).

Let (n) a , (n) x , {n) x denote the sums of the »’* powers of quantities whose elementary symmetric functions are a u Oj, a 3> ... ; ,, x 2 , x 3 ,..; Xi, X 2 , X 3l ... respectively: then the result arrived at above from the logarithmic expansion may be written (»)«,()* = (n)x, exhibiting (») x as an invariant of the transformation given by the expressions of Xi, X 2 , X 3 ... in terms of xi, Xi, x 3

The inverse question is the expression of any monomial symmetric function by means of the power functions ® =s r .

Theorem of Reciprocity. — If

■X» 1 A MJ X Mil ...=...e(j 1 ˆ s 3 ...)x h x h x h ....., where 6 is a numerical coefficient, then also

v

X„X,X, i ...=...8(« mˆ m } ...)x ll x h x h .....

We have found above that the coefficient of (z,, 1 ˆ,*...) in the product XjXˆpC 3 . is

A* ji!;j!;»!... the sum being for all separations of liltl*...) which have the specification {mˆmˆml 3 ...). We can multiply out this expression so as to obtain a series of monomials of the form eis’hps’’...). It can be shown that the number 6 enumerates distributions of a certain nature defined by the partitions (mˆ l

m^...), (j' 1 ^*...),

(/*'/*,.. .) and it is seen intuitively that the number 8 remains unaltered when the first two of these partitions are interchanged (see Combinatorial Analysis). Hence the theorem is established. Putting *i = i and Xi = x 3 = x t = ... = o, we find a particular law of reciprocity given by Cayley and Betti,

(l m l)M(r B 2)M(l m 3)M... = ...0(s" 7 lj o V r 3...)...,

(l'i)«(l* 2) <72 (l* 3)' r8 = e(»»J' 1 w^ 8 ...)...; and another by putting Xi = xi = x 3 = ... = i, for then X m becomes km, and we have

Cj^d... = ...e'(^X'...)...,

CXX 8 – = – + 0'K' < 2 < 3 -) + ...

Theorem of Expressibility. — " If a symmetric function be symboilized by (Xpv...) and (XiX 2 X 3 ...), (jtii/x 2 jU3—), {niwi...)... be any partitions of X, /*, v... respectively, the function (Kfiv ...) is expressible by means of functions symbolized by separation of

(XlX2X3-..MlW!3— VlViVZ...)."

For, writing as before,

P is a linear function of separations of (('/ 2 / 3 3 ...) of specification (m 1 "'w 2 f ' 2 m^...),and if X^Xf/X* 3 ... = ZP^ 1 ** 2 *^..., P' is a linear function of separations of (l^l t H^ 3 ...) of specification (s'h^s"'...).

Suppose the separations of (J* 1 /* 2 /* 3 ...) to involve k different specifica- tions and form the k identities

XftX^X:*..-ZP (, V 11 l *$*f, , ...(-l. 2, ...), where (m^'m^'m* 3 '...) is one of the k specifications. The law of reciprocity shows that

P -2M™ i(m u m u ...),

viz. : a linear function of symmetric functions symbolized by the k specifications ; and that 0,i = 0i,. A table may be formed

expressing the k expressions P (1) , P< 2) ,...P (*> as linear functions of the k expressions

(m'‘m'‘m 1 ^'...), 5 = 1, 2, ...k, and the numbers 6 tt occurring therein

possess row and column symmetry. By solving k linear equations we similarly express the latter functions as linear functions of the former, and this table will also be symmetrical.

Theorem. — " The symmetric function (m l * u m l * 1, m 1 * 3 ‘ ...) whose

is 2tf 3d

partition is a specification of a separation of the function symbolized by (/ ‘/ */ ,'...) is expressible as a linear function of sym-

AAA

metric functions symbolized by separations of (/.‘t'J *•••) and a symmetrical table may be thus formed." It is now to be remarked that the partition (/NV 3 ...) can be derived from {m^‘ml^m^ ‘...)

^ ^ 1 2 3 ‘ v It 2« 3« ‘

by substituting for the numbers m u , m 2 „ m 3 „... certain partitions of

those numbers (vide the definition of the specification of a separation).

Hence the theorem of expressibility enunciated above. A new

statement of the law of reciprocity can be arrived at as follows : —

since – p^Mj,,w...y (J^Jfp 3 --- .

Zw jiI/jW-

where (Ji)‘i(Jty*Q >)'*■•• is a separation of (J, 1 ‘, ‘,...) of specification

14 2* 3s

specification involved,

(mˆ‘mˆ‘m 1 * 3 ‘...), placing s under the summation sign to denote the

y qi)‘iqi)’«(j.y»...

Jlljlljtl:.

- 2ˆ V,t{ – m u m u m „ -> ■

i-i

m..!«.w... > • u ”” > -{y, , N’ˆ , – = Vgi.(iit w

ˆmˆmˆ...),

2a 3«

V (J.)’ > (J2)‘2(J3)‘3... jl\jl\ji...

where 6,t = 6 it . Theorem of Symmetry. — If we form the separation function

2 (Ji)”’(J«)MJ.)’»- jiljsl/j!- appertaining to the function (lˆ‘lˆHˆ 3 ...), each separation having a specification (m’ Ll ‘m lil ‘m*”...), multiply by /b u ! m,\ ju a ,!... and take therein the coefficient of the function (mˆ‘mˆ‘m 1 * 31 ...), we obtain the

- It 2i 3(/’

same result as if we formed the separation function in regard to the specification (m* u mf’m* “••■), multiplied by n lt \ iˆil ju»i!... and took therein the coefficient of the function (mˆ‘mˆ‘m* 3 ‘...).

£x.gf.,take(/\..) = (210;(m; i ‘ <ˆ..) = (32\) : (ˆ» W ˆ'...) = (31,);

we find

(21)(1 2)(1) + (1 3)(2)(1) = ... + 13(31’) + ..., (21)(1) 3 = ... + 13(321) + ...

*-A + fl «5 + 0 db + -‘

Write also -ia\ = D, so that

The Differential Operators. — Starting with the relation (1 + a t x) (1 + o 2 *)...(l + a n x) = 1 + a 1 x + a 2 x > + ... + a n x n multiply each side by i + fix, thus introducing a new quantity n\

we obtain

(l+a 1 *)(l+a J)...(l+a„)(l+ˆ)=l + (o 1 + M)x+(a 2 +ˆi 1)x 2 +... so that /(ai, a?, a 3 ,...a„) =/, a rational integral function of the ele- mentary functions, is converted into

/(Oi+M, o,°„...a,/ia n _ l) =/+/ i,/+fj/+|ˆ/+... where

_ i da~ i T “ˆdo7 3 ‘ T – +an – i db: n

and ij denotes, not J successive operations of d\, but the operator of order s obtained by raising d l to the s” 1 power symbolically as in Taylor’s theorem in the Differential Calculus.

1′

*T

/(ai+M, oi+ˆii, ...a B +/ia«_i) =/+hDi/+m 2 D 2 /+ m 3 D 3 / +.... The introduction of the quantity /a converts the symmetric function (XiX 2 Xj...) into

(X1X2X3+...) +M A i(X 2 Xa...) +nˆ(\i\ 3 ...) +ˆ3(X!X 2 ...) +.... Hence, if/(oi, a%, ...a n) =(XiX 2 X 3 ...),

(X,X 2 X3...)+m x i(X 2 X3...)+m A2 (XiX3...)+ˆs(XiXs-) + –

= (1 + „D 1 -rVD, + M , D, + ...) (X1X2X,...).

Comparing coefficients of like powers of p we obtain DX,(X 1 X 2 X3...) = (X2X 3 ...) > while D,(XiX 2 Xs...) =0 unless the partition (XiX 2 X3...) contains a part s. Further, if Da 1 Da 2 denote successive operations of Dˆ and Da 2 ,

DXiDX 2 (XiX 2 X2...) = (X3...), and the operations are evidently commutative.

Also Dp l Dˆ Dpl...(p” 1 p”*pl i ...) = 1, and the law of operation of the

operators D upon a monomial symmetric function is clear. We have obtained the equivalent operations

l+MD 1 + M 2 D 2 +yK 3 D 3 + ...=‘iˆ/Mfi

where exp denotes (by the rule over exp) that the multiplication of operators is symbolic as in Taylor’s theorem. d[denotes, in

fact, an operator of order 5, but we may transform the right-hand side so that we are only concerned with the successive performance of linear operations. For this purpose write

a, =3<. s +tti3<., +1 +a 2 9 (, 8+2 +.... It has been shown (vide " Memoir on Symmetric Functions of the Roots of Systems of Equations," Phil. Trans. 1890, p. 490) that

exp(midi+m 2 d2+m s d3+...) =exp(Midi+M2di+Msd 3 +...), where now the multiplications on the dexter denote successive operations, provided that

exp(M i £+M 2 l?M 3 e...)=l+m 1 t+m 2 l?m 3 e..., £ being an undetermined algebraic quantity. Hence we derive the particular cases

expdi = exp(di —2

expnd 1 = exp(jid 1 —2iJ?d2+gii 3 d 3 — ...),

and we can express D s in terms of di, d it dz,..., products denoting successive operations, by the same law which expresses the ele- mentary function a, in terms of the sums of powers Si, J 2 , s 3l ... Further, we can express d, in terms of Di, D 2 , E>3, ... by the same law which expresses the power function s, in terms of the elementary functions fli, 02, 03,...

Operation of D, upon a Product of Symmetric Functions. — Suppose /to be a product of symmetric functions fifc...f m . If in the identity /=/i f 2 .../ m we introduce a new root ju we change o, into o 8 +/ja a _i, and we obtain

(1+mD 1 +m 2 D 2 +...m s D,...)/

= (1+mD 1 +m 2 D 2 .:.ˆD„ + ...)/ 1

X(l+MD I +ˆD 2 .../i'D s +...)/2

X •

X(1+mD 1 +m 2 D 2 ...ˆD,+...)/„,

and now expanding and equating coefficients of like powers of p

D l f = 2(D l f i)f,f t ...f m ,

D 2 / = S(D 2 / 1)/ 2 / 3 .../ m +Z(D I / 1)(D 1 /2)/ 3 .../„,

D3/ = Z(D3/l)/ 2 /3.../»+Z(D 2 /,)(D 1 / 2)/3.../„ + Z(D3/x)/ 2 / 8 .../» l>

the summation in a term covering every distribution of the operators of the type presenting itself in the term. Writing these results

0,7 = 0(0/,

D 2 / = D m /+D (l2) /,

D,/ = D < «/+D (21)/+D a .)/ I

ALGEBRAIC FORMS

627

we may write in general

D„/ = 2D(PlP2 p 3 ...)/, the summation being for every partition ipiptpi-) of s, and D(p lP2 p 3 ...)/ being = X(Dp l f 1)(Dp i f 2) (.Dp 3 f 3)f i ...f m .

Ex. gr. To operate with D2 upon (21 3)(21 4)(1 5), we have D (2)/=(1 3)(21 4)(1 5) + (21 3)(1*)(P). D (lJ) /=(12 2)(21') (P)+(2P)(2P)(l*) + (2P)(21^)(l 4), and hence

D 2 /=(21*H1 6)(1 3) + (21 3)(1 3)(1 4)+(21 3)(21 2)(1<>) + (21 3) 2 (1 4)

+ (21<)(21 2)(1<).

Application. to Symmetric Function Multiplication. — An example will explain this. Suppose we wish to find the coefficient of (52 4 1 3) in the product (2i 3)(2i 4)(i 5).

(21')(21<)(15)=...A(52*)(13)...; then

D 6 D|D?(21 3)(21 4)(P)=A; every other term disappearing by the fundamental property of D,. Since

D 6 (2P)(21«)(1*) = (P)(1')(1<), we have : —

D 4 D?(1<)(1*)(1 3)=A DID? j(l') (l 3) (l 3) +2(1*) (l 3) (1 2)| = A DtD?i5(l 3)(l 2)(l 2)+2(l<)(l 2)(l)+2(l 3)(l 3)(l))=A D 2 D? |12(1 2) (l 2) (1) +7(1 3) (1) (1) +2(1*) (1) +6(1') (1 2)| = A D? 12(1) 3 = A, where ultimately disappearing terms have

been struck out. Finally A = 6-I2 =72.

The operator di = Ot>dai+ai3a 2 a 2 da3... which is satisfied by every symmetric fraction whose partition contains no unit (called by Cayley non-unitary symmetric functions), is of particular importance in algebraic theories. This arises from the circumstance that the general operator

"Kˆaa Sai + Xiai9aj+X 2 029o3+." is transformed into the operator d\ by the substitution

(*c, fli, a?, ...a„ ...) = (a , Xoii> XtXia 2 XcXi...X,_iOj,...),

so that the theory of the general operator is coincident with that of the particular operator di. For example, the theory of invariants may be regarded as depending upon the consideration of the sym- metric functions of the differences of the roots of the equation

o * B ai*" 1 + (;)o,a:"- !! -...=0; and such functions satisfy the differential equation

dodoi --2aidOi +3ax)a 3 +... +»a„_i\ˆha 2 , ... and f(a c , 01, 02, a 3 ,...) becomes

f+h(add ai +2a l d<, t +3a i das+—)f, and hence the functions satisfy the differential equation. The important result is that the theory of invariants is from a certain point of view coincident with the theory of non-unitary symmetric functions. On the one hand we may state that non-unitary sym- metric functions of the roots of a a x' > — aix" _1 +a 2 x" _2 — ... =0, are symmetric functions of differences of the roots of

aox" – 1 rffla^"- 1 +2 !(»)o 2 x"- 2 – ... = ; and on the other. hand that symmetric functions of the differences of the roots of

Oo*"-(?) aix"~ l + (?) Ojx" -2 – . . . = 0, are non-unitary symmetric functions of the roots of

a„x-»-ˆ»-' + !*»-'-...=0.

An important notion in the theory of linear operators in general is that of MacMahon's multilinear operator (" Theory of a Multi-linear partial Differential Operator with Applications to the Theories of Invariants and Reciprocants," Proc. Land. Math. Soc. t. xviii. (1886), pp. 61-88). It is defined as having four elements,

and is written

(p., v; m, n)

= i [<».n + 0. + ») {m -i) nˆ aid ˆ

+ (“+ 2 “) I (m -I) ! 1 ! a “”’ aa + (m -2) ! 2 ! “’ (a °»+ 8

1/ i Q \ (*” ! m-1 1 m ! m-2

+ { J t + 6v > \ (m -l)llfo a3 + (m-2)!i [image] a » aifl2

+

..] .

1 m : m

i “(w-3) [image] a «

3 3 I a

#0 t Uan+

the coefficient of afaˆa*... being , ™’ , — The operators

*jSo 1 +aid a2 + ..., aod al +2ait),, 2 +... are seen to be (1, o; I, 1) and (1, 1 ; 1, 1) respectively. Also the operator of the Theory of Pure

Reciprocants (see Sylvester Lectures on the New Theory of Reciprocants, Oxford, 1888) is

(4, 1 ;2, 1) =5 J 4afca l +10acaid. 2 +6(2aoa,aJ)ft,,... \ •

It will be noticed that

(p., v, m, n) =m(1, 0; m, »)+r(0, 1; m, n). The importance of the operator consists in the fact that taking any two operators of the system

(ji, v, m, n) ; (p. 1 , v 1 ; m 1 , n 1), the operator equivalent to

(p, v, m, »)(m’. v 1 ; m 1 , n 1) — (p, 1 , v 1 ; m 1 , n l)(n, v,m,n), known as the ” alternant ” of the two operators, is also an operator of the same system. We have the theorem

(jt,v,m,n)()i 1 ,i> 1 ;m 1 ,n v) — (jt 1 ,v’-; m 1 ,n 1)(ji,v;m,n) =

(jn,n; m u ni) ; where

vi = (n 1

\ 1 1 ™ — l ,

-1

m 1 m ˆ

mi = m 1 + m — i, «i = n x + w, and we conclude that qud ” alternation ” the operators of the system form a ” group.” It is thus possible to study simultane- ously all the theories which depend upon operations of the group. Symbolic Representation of Symmetric Functions. — Denote the

8 8 8

elementary symmetric function a, by -A , -A , jj, ...at pleasure; then,

taking « equal to 00 , we may write

1 + ai* + a 2 × 2 + ... = (1 + pi*)(l + P2*)... = e a i* = e a 2* where

= e a * x = .

-2

ai a.2 0-3 PiPt-P’-J] — p~ 71 = •

Si SI si

Further, let

1 + hx + b&* + ... + b m x?» = (1 +

l + ffliff 1 o 2 ... = (l’ + Pi

1 + aicr m a 2 ... = (1 + pio- m)(l + p 2 o- m)... = e ff » > a m . and, by multiplication,

n(l + o 1

= gO , l a l + t r 2 a 2 + . . + Cm a m #

Denote by brackets ( ) and [ ] symmetric functions of the quan-

tities p and a respectively. Then

l+Oi [l] +o? [l 2] +a 2 [2!+o? [l 3] +a 1 a 2 [21a 3 [3] ...

ap 1 a P2 a P3 ...a rm [p l p 1 p 3 ...p r J... = 1 +h(l) +6? (I 2) + h(2) +bl (I 3) +ˆ6,(21) + J,(3) +...

+bˆbfbf...b q j;(m qm m~'-

■ l 9m ~ 1 .. 2 92 1 51) +

= e"'l a l+

Expanding the right-hand side by the exponential theorem, and then expressing the symmetric functions of

6i=

e-VrKVˆ = e'i<- a r- a i> = ... + ˆa\ (0l – a 2) * +... ,

and since b* =

(2 2)=2i(a 1 -a 2) 4 =24(af+o|)-g(a?a 2 + o 1 a|)+jo?a|

= 2a 4 — 2a l a 3 --a% as is well known.

Again, if a 1: o- 2 , a 3 ...a m be the m, m'* roots of —I, 6i=6 2 = ...=fi m _i = and b m = 1, leading to

1 + (m) + (ot 2) + (m 3) ... = eˆi< I i -2»2+. .+< r m«m and

.*. (m') =— [(<7iai +

and we see further that (

1 + b 1 x+b 2 × 1 +... = (1 +oix) (1 +

£ j

and

((pift-r-Psftˆft-h..)"-

Instead of the above symbols we may use equivalent differential

operators. Thus let

and let a, b, c, ... be equivalent quantities. Any function of differences of 5 , h, 8 e> ... being formed, the expansion being carried out, an operand an or b or c ... being taken and b, c,... being subsequently put equal to a, a non-unitary symmetric function will be produced. Ex. gr. (a. -*»)»(«.-«,) = (S* -25„5 6 +5|) (a„ — 8„)

= 6o 3 — 40261 +2ai& 2 — 2

Symmetric Functions of Several Systems of Quantities. — It will suffice to consider two systems of quantities as the corresponding theory for three or more systems is obtainable by an obvious enlarge- ment of the nomenclature and notation. Taking the systems of quantities to be

ai, 012, 03,...

ft, ft, ft,—

we start with the fundamental relation

(1 + ai* + fty) (1 + a 2 x +fty) (1 +o 3 * +fty) • •• = 1 + a i0 x + am y + aˆox 1 +aux y + amy 2 + . . . +'a Tl X'y t + ■ ■ ■
As shown by L. Schlafli ' this equation may be directly formed and exhibited as the resultant of two given equations, and an arbitrary linear non-homogeneous equation in two variables. The right-hand side may be also written

l+ZaiZ + Sfty+ZaiOjz'+Zaiftry-r-Zftftji'h. The most general symmetric function to be considered is

ZBP/JliaV/STaV/J!"...

conveniently written in the symbolic form (piqi pzq? p3a 3 ...').

Observe that the summation is in regard to the expressions obtained by permuting the n suffixes I, 2, 3, ...n. The weight of the function is bipartite and consists of the two numbers ~Lp and "La; the sym- bolic expression of the symmetric function is a partiti on into biparts (multiparts) of the bipartite (multipartite) number ~Lp, S3. Each part of the partition is a bipartite number, and in representing the partition it is convenient to indicate repetitions of parts by power symbols. In this notation the fundamental relation is written

(1 + a i x+p 1 y)(l +a< t x+fay) (i+ojX+ftyˆ. = l + {lo)x + (Ol)y + (W)x* + (U)01)xy+JOV)y 2 + (W)x 3 + (Iwn.)x 2 y + (ni0l , >)xy* + (01s)y i +...

where in general a pq = (lCP" 01«).

All symmetric functions are expressible in terms of the quantities a M in a rational integral form ; from this property they are termed elementary functions; further they are said to be single-unitary since each part of the partition denoting a pq involves but a single unit.

The number of partitions of a biweight pq into exactly m biparts is given (after Euler) by the coefficient of a/ixvy* in the expansion of the generating function

1

1 ~ax. 1 — ay. 1 —ax 2 . 1 — axy. 1 — aj/ 2 . 1 — ax3. 1 — ox 2 j/. 1 — axyt. 1 — ayt...

The partitions with one bipart correspond to the sums of powers in the single system or unipartite theory ; they are readily expressed in terms of the elementary Junctions. For write (pq) = s pq and take logarithms of both sides of the fundamental relation ; we obtain

Siax+Smy = Z(ai* + /Siy) Sutx* +2s n xy+s m y i = 2(aiJ£ + fty) 2 , &c. , and

Siox+soiy-ˆismxˆ+zsuxy+swy 1) +.»

= log (l+a lo x+amy+...a pq x*y<...). From this formula we obtain by elementary algebra

p+r-i fr+g-l)!

(-)

p\q\

-2"

St-' (Zy -1)! t, r,

7Tl!x 2 !... Pi4i P2S2'"

corresponding to Thomas Waring's formula for the single system. The analogous formula appertaining to n systems of quantities which

1 Vienna Transactions, t. iv. 1852.-

expresses s pqr ... in terms of elementary functions can be at once written down.

Ex. gr. We can verify the relations

i 30 =O 1 „- 3 ° 2

S zi = a !„ a oi – a 2c a oi -°n a io+° M • The formula actually gives the expression of (Jg) by means of separations of

(iwF),

which is one of the partitions of (pq). This is the true standpoint from which the theorem should be regarded. It is but a particular case of a general theory of expressibihty. To invert the formula we may write

1 -r-aio +a M y + . .. +a pq x p y + .. .*

-exp {(siox+soiy) — ox+ ˆuxy+smy 1) +—},

and thence derive the formula —

()+ *>a Pq*

Xˆ j (fr+gi-1)!) " S (ft+gn-1)! I "» (-) Sr -' /i '«

(pi\qi\ ) I pt\q 2 [J •"nix,!... w«i "PtQ>-'

which expresses the elementary functions in terms of the single bipart functions. The similar theorem for n systems of quantities can be at once written down.

It will be shown later that every rational integral symmetric function is similarly expressible.

The Function hpq . — As the definition of h pq we take 1 + niox + n M y + ■ ■ ■ + n pq x p y q + . . .

■*ft?)-*

Further

(1 — mx — fty) (1 — a 2 x – and now expanding the right-hand side

the summation being for all partitions of the biweight. writing

l+hioX+hiy+—+h Pq x”y^+...

1

~l-au>x-aciy+... + (-) + <>a pq x“y<' + ...'*

we find that the effect of changing the signs of both x and y is merely to interchange the symbols a and h; hence in any relation connecting the quantities h pq with the quantities a pq we are at liberty to interchange the symbols a and h. By the exponential and multinomial theorems we obtain the results —

(—) h pq — > (—) —, — -r~ a a —

*‘ ** / f ‘ 7ri!7T2!... P181 P29»*

IT

and in this a and h are interchangeable.

(P+o-W , ,V

p\q

Xi! x 2 !.,, piqi ptqt

2S (j> 1 < ?1 -l)! ?M (fe<72-l)! p 1 .■ (^ilffi! J I pJ.qi'....) ""inljr,!...

!)»i ((,4-o, — 11! . _ ^_.*

•s s ‘

Pl9l PlQl

Differential Operations. — If, in the identity

(l+ai+fty)(l + a s +fty)...(l + an+/M = l+au S x+aoiy+amx 2 +a i ixy+a ai y 2 + ... ,*

we multiply each side by (1 +iiX+vy), the right-hand side becomes

l + (au> +ix)x + (.am. + v)y+... + (a pq +/juip-i, q + >'a P , q -i)x> , y+... ; hence any rational integral function of the coefficients Oio, am, ... a pq , ... say f(au, Ooi, ...) =/ is converted into*

expitidio+ydn^f

*where d m = W.»2 . *u = o™-*

The rule over exp will serve to denote that /idio + rdoi is to be raised to the various powers symbolically as in Taylor's theorem.

Writing D^jn^Xr'

Txpfjidw+pilm) = (1 MD I „^Doi-r-...-|-M , ''' 7 Dp«-r-...)/; now, since the introduction of the new quantities p., v results in the addition to the function {p^PtqiPiqi—) OI the new terms

^''(SS-) + ^» ,! (MM,..) +/ 3 » H (plqiM2) +-.. , we find

Dpi8i(^i3i^2?2^323-") = (PiiiPsqa-) ;

and thence

Dp 19l Dp2g2Dj)8a3"(Pl2i^222^32!..) = J ',

while D„f =0 unless the part is is involved in f. We may then state that D M is an operation which obliterates one part pq when such part is present, but in the contrary case causes the function to

ALGEBRAIC FORMS

629

vanish. From the above D M is an operator of order pq, but it is convenient for some purposes to obtain its expression in the form of a number of terms, each of which denotes pq successive linear operations; to accomplish this write

dpq = J> dr.-

and note the general result '

exp (micdLo+moidoi+...+m pq dp q +...)

= exp (Miadio+M<,idoi+...+Mp q d pq +...);

where the multiplications on the left- and right-hand, sides of the

equation are symbolic and unsymbolic respectively, provided that

nip,, M,, are quantities which satisfy the relation

exp (Mic£+Moii f +...+M M PY , +...)

*= l+m K Z+m f ,iTi+...m p ˆp'r l *...; where £, ij are undetermined algebraic quantities. In the present particular case putting mm = n, moi = v and m pq = o otherwise*

Mio{ + Moiij+...M i , (I £'y... =log (1+rt+vv) or

and the result is thus

expQidio+vdci)

= exp\ftd K +rdoi—^{ji'dtii+2iipdn+v i dm)+—)

= l+»D lo +vDoi + ...+n"> > '>Dp, + ...; and thence

1

ndio+vdm

log (1+mD 10 +j'D 0I +...+m !, >'«D ot +...).

-ybfdio+Zpvdu+^dia) +...

From these formulae we derive two important relations, viz.

ST-' (Sir-l)! D 'i D "2 _

(>~a±^=2 (–

(-y

p+j-i

d _ y \ (Pi+ai-iy. 1 "i 1 (ft+<7»-i)!) ■

*i^^: 1 .^*

1

-

7Tl!7T2!...

the last written relation having, in regard to each term on the right-hand side, to do with Sir successive linear operations. Recall- ing the formulae above which connect s pq and a pq , we see that d pq and Dp, are in co-relation with these quantities respectively, and may be said to be operations which correspond to the partitions (Pq), (iCoi') respectively. We might conjecture from this observation that every partition is in correspondence with some operation; this is found to be the case, and it has been shown (loc. cit. p. 493) that the operation

corresponds to the partition (piqfi piqi't-..). The partitions being taken as denoting symmetric functions we have complete correspondence between the algebras of quantity and operation, and from any algebraic formula we can at once write down an operation formula. This fact is of extreme importance in the theory of alge- braic forms, and is easily representable whatever be the number of the systems of quantities.

We may remark the particular result

■*-«-■ (j, +g – 1) 1

*■ ' p\q\

d pq causes every other single part function to vanish, and must cause any monomial function to vanish which does not comprise one of the partitions of the biweight £5 amongst its parts. Since

rUr+ lp +g i) | d

a ™~^ > p\q\ ds pq '

the solutions of the partial differential equation d pq = o are the

single bipart forms, omitting s pq , and we have seen that the solutions

of D OT = oare those monomial functions in which the part pq is absent.

One more relation is easily obtained, viz.

££— =-d pq — hi<4p+i, q — htnd p , q i... + (—) r+ 'h,dp +r,<,t....

References for Symmetric Functions. — Albert Girard, In- vention nouvelle en Valgebre (Amsterdam, 1629); Thomas Waring, Meditationes Algebraicae (London, 1782) ; Lagrange, Mem. de I'acad. de Berlin (1768); Meyer-Hirsch, Sammlung von Aufgaben aus der Theorie der algebraischen Gleichungen (Berlin, 1809) ; Serret, Cours d'aigebre superieure, t. iii. (Paris, 1885) ; Unferdinger, Silzungsber. 4. Acad. d. Wissensch. i. Wien, Bd. lx. (Vienna, 1869); L. Schlafli, " Ueber die Resultante eines Systemes mehrerer algebraischen Gleichungen," Vienna Transactions, t. iv. 1852;

MacMahon, " Memoirs on a New Theory of Symmetric Functions," American

1 Phil. Trans., 1890, p. 490.

Journal of Mathematics, Baltimore, Md. 1888-1890; " Memoir on Symmetric Functions of Roots of Systems of Equations," Phil. Trans. 1890.

III. The Theory of Binary Forms

A binary form of order n is a homogeneous polynomial of the nth degree in two variables. It may be written in the form

n n-1 n— 2 2

ax l +bx 1 Xi--cx x x 2 -r...; or in the form

n /n\ n-1 f n \ n— 2.-2

ax -Hi/0 a+UJra x +...,*

1 1 12

which Cayley denotes by

(a, b, c, ...)(x u xi)" ("),(£)... being a notation for the successive binomial coefficients n, \n{n — i) Other forms are

n n— 1 n— 2 2

ax +nbx x +n(n — l)cx x +...,

1 12 12

the binomial coefficients (*) being replaced by s\("j, and 1 n_1 1 n-2 2

*ax +TT^ * -hn\CX X +..., 1 Hi 2 M 1 2*

the special convenience of which will appear later. For present purposes the form will be written

***r + (r)^*r l *,£*r-'**-» +^<.*

the notation adopted by German writers; the literal coefficients have a rule placed over them to distinguish them from umbral coefficients

_which are introduced almost at once. The coefficients Oo, oi, 02,. ..a„, n + i in number are arbitrary. If the form, some- times termed a quantic, be equated to zero the M + i coefficients are equivalent to but n, since orie can be made unity by division and the equation is to be regarded as one for the determination of the ratio of the variables.

If the variables of the quantic f(xi, %) be subjected to the linear transformation

Xi = oufi + aiati,

X2 = 02lJlH- 022^2,

Ji, fc being new variables replacing Xi, Xz and the coefficients on, ai2, 021, 022, termed the coefficients of substitution (or of transformation), being constants, we arrive at a transformed quantic

' « fn\' »-l fn-' n-2 —'n

/(!i,6) = «i + U«f 1 f. + w**, S + —!-o„{2

01 1X2 2 I a

in the new variables which is of the same order as the original quantic; the new coefficients a , a , a ...a are linear functions

1 . 2 n

of the original coefficients, and also linear functions of products, of the coefficients of substitution, of the nth degree. By solving the equations of transformation we obtain

r£i = 022*1 — ai2#2,

r& = — a2i*i + au*2,

where r = J* 11 " 12 = a n au -a 12 a n ;

r is termed the determinant of substitution or modulus of trans- formation; we assure Xi, x 2 to be independents, so that r must differ from zero.

In the theory of forms we seek functions of the coefficients and variables of the original quantic which, save as to a power of the modulus of transformation, are equal to the like functions of the coefficients and variables of the transformed quantic. We may have such a function which does not involve the variables, viz.

F(o , a , a ,...a) =r x F(ao, ai, a 2 ,...o„),

12 n

the function F(a , 0i, a 2 ,...a n) is then said to be an invariant of the quantic- gwˆ linear transformation. If, however, F involve as well the variables, viz.

“-‘ A _ — —

F(a, a , a ,...;{i, £i)=r F(oo, a u 02,...; Xi, x 2),

the function F(oc, 01, 02,... x\, x 2) is said to be a covariant of the quantic. The expression ” invariantive forms ” includes both invariants and covariants, and frequently also other analogous forms which will be met with. Occasionally the word ” invariants ” includes covariants; when this is so it will be implied by the text. Invariantive forms will be found to be homogeneous functions alike of the coefficients and of the variables. Instead of a single quantic we may haveˆeveral _

/(a , a\, o 2 ...; Xi, #2), (bo, bi, 62,...; Xx, Xi), ... which have different coefficients, the same variables, and are of the same or different degrees in the variables; we may transform them all by the same substitution, so that they become _ / _/ _> —t -.1 —1

*/(«,, a , a t ,; fi, &)> *(6 Q i \, & 2 ,; ii, la)*

If then we find

F(a ,a,a ,...b , b , b , ; |i, &),

012012

»r x F(o6, 01, Oi,...b 6 , bx, h,.. .,...; xi, #2),

630

ALGEBRAIC FORMS

*the function F, on the right which multiplies r, is said to be a sinultaneous invariant or covariant of the system of quantics. This notion is fundamental in the present theory because we will find that one of the most valuable artifices for finding invariants of a single quantic is first to find simultaneous invariants of several different quantics, and subsequently to make all the quantics identical. Moreover, instead of having one pair of variables *i, * 2 we may*

have several pairs yi, y 2 ; Zi, z 2 ;... in addition, and transform each pair to a new pair by substitutions, having the same coefficients on, ai2, on, 022 and arrive at functions of the original coefficients and variables (of one or more quantics) which possess the above-defined invariant property. A particular quantic of the system may be of the same or different degrees in the pairs of variables which it involves, and these degrees may vary from quantic to quantic of the system. Such quantics have been termed by Cayley multipartite.

Symbolic Form. — Restricting consideration, for the present, to binary forms in a single pair of variables, we must introduce the symbolic form of Aronhold, Clebsch and Gordan; they write the form

/ . \n n n , /n\ n— 1 n— 1 . , n n n

*\aiXi+a,X2j =a 1 x l + (1)a l chXy * 2 +...+o 2 * 2 =a x wherein Oi, o 2 are umbrae, such that*

n n— 1 n— 1 n

a,, o x o 2 ,...Oi0 2 , o 2 are symbolical representations of the real coefficients a ,

o„-i, a n , and in general o" a is the symbol for a. If we restrict*

12

ourselves to this set of symbols we can uniquely pass from a product of real coefficients to the symbolic representations of such product, but we cannot, uniquely, from the symbols recover the real form. This is clear because we can write

01(12=0! 02. a l al=a r o|

while the same product of umbrae arises from

n n— 3 3 In— 3 3

Oo03=0 .0 do=0 o 2 . Ill

Hence it becomes necessary to have more than one set of umbrae, so that we may have more than one symbolical representation of the same real coefficients. We consider the quantic to have any

number of equivalent representations a x =^b n x =,c x =i.... So that

o" Oj — by 6 2 — q c 2 = ... = at; and if we wish to denote, by

umbrae, a product of coefficients of degree s we employ 5 sets of umbrae.

Ex.gr. We write 0ˆ = a a 2 .b" b\,*

o 3 = 0! al\ bid c\,

*and so on whenever we require to represent a product of real co-efficients symbolically ; we then have a one-to-one correspondence between the products of real coefficients and their symbolic forms. If we have a function of degree s in the coefficients, we may select any s sets of umbrae for use, and having made a selection we may when only one quantic is under consideration at any time permute the sets of umbrae in any manner without altering the real signi- ficance of the symbolism. Ex. gr. To express the function Ooa 2 — a? , which is the discriminant of the binary quadratic Oo*f +201*1*2+02*1 = a \=b\, in a symbolic form we have*

*2(oo0 2 — of) =0002+0102—201 . Oi=of6f+ol6J —201026162 = (0,62— o 2 6,) 2 . Such an expression as ajh-aj>\, which is da x db x da x db x dxi 3*2 6×2 dxi' is usually written (a6) for brevity; in the same notation the deter- minant, whose rows are Oi, 02, o 3 ; 61, 62, 63; Ci, c 2 , c 3 respectively, is written (06c) and so on. It should be noticed that the real function denoted by (06) 2 is not the square of a real function denoted by (06). For a single quantic of the first order (06) is the symbol of a function of the coefficients which vanishes identicallyˆ thus*

(06) = Oi6 2 — o 2 6i = Oofli — O1O0 = and, indeed, from a remark made above we see that (06) remains unchanged by interchange of a and 6; but (ab) = —(60), and these two facts necessitate (ab) = 0.

To find the effect of linear transformation on the symbolic form of quantic we will disuse the coefficients On, O12, o 2 i, O22, and employ Xi, Mil An M2- For the substitution

Xi = Xi£i +M1&, Xi = X 2 £i +M2&, I Xi Mi X 2 M2

the quadratic form a

of modulus

= (Xi/l 2 — X2M1) = (V) ,

*Aof! + 2A,£ifc + Ai€I = A\ = *(£),*

where _ _ _ ■

Ag = ooXf + 20lXiX 2 + 02XI ,

M = OpXiMi + 01 (Xi# 2 + X 2 fii) + 02X2ˆ2,

A 2 = OoMl + 20lMlM2 + 02Ml.

We pass to the symbolic forms

*al = (oi*i + o 2 *2) 2 , A| – (Aik + Ajfe) 2 ,*

by writing for

flo, Oi, 02 the symbols of, O1O2, a! Ao, Ai, A 2 ” ,, Af,AiA 2 , Al

and then

Ao = o?X5 + 20i02XiX2 + olXl = (01X1 + 02X2) = a\,

Ai = (O1X1 + O2X2) (OiMi + 02M 2) = a.)flˆ

A2 = (oimi + O2M2) 2 = oˆ ; so that

A I = ali + 2o A o | Ji£ 2 0ˆ2 = (a A &

<#>«) = Kˆ + ˆfc) 2 .

The practical result of the transformation is to change the umbrae Oi, 02 into the umbrae

A = 0iXi + O 2 X 2 , 0ˆ = OiMl + 0 2 |U 2 .

respectively.

By similarly transforming the binary n” form a x we find

A = (oiXi + O2X 2) = o A + A x>

Ai = (01X1 + 02X2) (01M1 + O2M2) = o A a)i = A 1 A 2 ,

A = (01X1 + 02X2) (oiMi + 02j[» 2) = o A a li = A 1 Aj, so that the umbrae Ai, A 2 are o x , o respectively. Theorem. — When the binary form*

*Oj = (Oi*i + 0 2 * 2)”*

is transformed to

A^ = (Aifc+A 2 fc)”

by the substitutions

**i = Xi Ji +M1J2, * 2 = X 2 £i +M2J2, the umbrae Ai, A 2 are expressed in terms of the umbrae Oi, 02 by the formulae*

*Ai = X1O1 +X2O2, A2 = M1O1 +M202. We gather that Ai, A 2 are transformed to Oi, o 2 in such wise that the determinant of transformation reads by rows as the original determinant reads by columns, and that the modulus of the trans- formation is, as before, (Xju). For this reason the umbrae Ai, A 2 are said to be contragredient to *i, * 2 . If we solve the equations connect- ing the original and transformed unbrae we find (Xm)(— Oi) =Xi(— A 2)+miAi, (Xm) Oi = X 2 (— A 2) + M2A1 , and we find that, except for the factor (X/»), —02 and +di are trans- formed to -A 2 and +Ai by the same substitutions as X\ and * 2 are transformed to £1 and j 2 . For this reason the umbrae a%, o t are said to be cogredient to *i and * 2 . We frequently meet with co gredient and contragedient quantities, and we have in general the following definitions: — (1) ” If two equally numerous sets of quan- tities *, y, z,... *’, y’, z’,... are such that whenever one set *, y, z,... is expressed in terms of new quantities X, Y, Z, ... the second set *’, y’, z’, ... is expressed in terms of other new quantities X’,Y’,Z’, ... , by the same scheme of linear substitution the two sets are said to be cogredient quantities.” (2) ” Two sets of quantities *, y, z, ...; £, 17, f, ... are said to be contragredient when the linear substitutions for the first set are*

k = XiX+ w Y+k,Z+...,

y = X2X+M2Y + ^2 Z+...,

z = X,X+m»Y+k,Z+...,

and these are associated with the following formulae appertaining to the second set,

E = Xi£+A s ij+X,r+...,

H =Ml£+M2i7+M3f +•••,

*Z = J>lj+ *S1J+F|f + ...,*

wherein it should be noticed that new quantities are expressed in terms of the old, as regards the latter set, and not vice versa."

*Ex. gr. The symbols -5— f t-j ji, ... are contragredient with the variables *, y, z, ... for when*

(, y, z, ...) = (Xi, w , xi,' ...) (X, Y, Z, ...), |X 2 , M2, n, ...|*

X 3 , /is, V3, ...{

ALGEBRAIC FORMS

631

we find

\dx' IV' !z' '") _(Xl ' Xz – Xa – -) (l

Ml, A > 2. M3,

ˆli »» > Hi

J., JL, A.,

,dx dy ' dz '

■)■

Observe the notation, which is that introduced by Cayley into the theory of matrices which he himself created.

Just as cogrediency leads to a theory of covariants, so contragrediency leads to a theory of contravariants. If «, a quantic in x, y, z, ..., be expressed in terms of new variables X, Y, Z ... ; and if i, V, f. •••. be quantities contragredient to x, y, z, ...; there are found to exist functions of {, tj, f, ..., and of the coefficients in u, which need, at most, be multiplied by powers of the modulus to be made equal to the same functions of H, H, Z, ... of the transformed coefficients of u ; such functions are called contravariants of u. There also exist functions, which involve both sets of variables as well as the coefficients of u, possessing a like property; such have been termed mixed concomitants, and they, like contravariants, may appertain as well to a system of forms as to a single form.

As between the original and transformed quantic we have the umbral relations

Ai = XiOi+X 2 02, Ai = niai-- ft^ai, and for a second form

Bj = X161 r^2^2: B 2 =/ilJl+M2&2.

The original forms are a x , b x , and we may regard them either as different forms or as equivalent representations of the same form. In other words, B, b may be regarded as different or alternative symbols to A, a. In either case

(AB)=A i B 2 A 2 B 1 = (Xm)(o6); and, from the definition, (ab) possesses the invariant property. We cannot, however, say that it is an invariant unless it is expressible in terms of the real coefficients. Since (ab) = Oii 2 — o 2 6i, that this may be the case each form must be linear; and if the forms be different (ab) is an invariant^ (simultaneous) of the two forms, its real expression being aj>i — aibo. This will be recognized as the re sultant of the two linear forms. If the two linear forms be identical, the umbral sets 01, a?; 61, b 2 are alternative, are ultimately put equal to one another and (ab) vanishes. A single linear form has, in fact, no invariant. When either of the forms is of an order higher than the first (ab), as not being expressible in terms of the actual co- efficients of the forms, is not an invariant and has no significance. Introducing now other sets of symbols C, D, ...; c, d, ... we may write

(AB)'(AQ'(BC)... = (\») i+ i k -(aby(acy(bc)K.., so that the symbolic product*

(a6)''(ac)''(6c)..., possesses the invariant property. If the forms be all linear and different, the function is an invariant, viz. the i' h power of that appertaining to a x and b x multiplied by the j th power of that apper- taining to Ox and c x multiplied by &c. If any two of the linear forms, say p x , q x , be supposed identical, any symbolic expression involving the factor (pa) is zero. Notice, therefore, that the symbolic product (ab) < (ac)'(bc)'... may be always viewed as a simultaneous invariant of a number of different linear forms a x , b x , c x , ... In order that (ab) i (ac)>(bc) t ... may be a simultaneous invariant of a number of*

different forms a" 1 , ££, c" 3 where »i, n 2 , n%, ... may be the same*

or different, it is necessary that every product of umbrae which arises in the expansion of the symbolic product be of degree «i in a I , 02 ; in the case of 61, b 2 of degree n 2 ; in the case of C\, c 2 of degree n 3 ; and so on. For these only will the symbolic product be

replaceable by a linear function of products of real coefficients. Hence the condition is

i+j +... =« u

- *+ £ + ... =TO 2 ,*

j+k + ... = n 3 ,

If the forms a x , b x , <;.,,. ..be identical the symbols are alternative, and provided that the form does not vanish it denotes an invariant of the single form a x .

There may be a number of forms a x ,b x ,c x ,... and we may suppose such identities between the symbols that on the whole only two, three, or more of the sets of umbrae are not equivalent; we will then obtain invariants of two, three, or more sets of binary forms. The symbolic expression of a covariant is equally simple, because we see at once that since A£, B£, C£,... are equal to a x , b, c x , ... respectively, the linear forms a x , & x , c x , ... possess the invariant property, and we may write*

(AB)'(AC) , '(BC) t ...A|B|q...

= (\ li) i+ '^-(ab) i (acy(bc) h ...^Xcl..., and assert that the symbolic product

(ab)\ac) i (bc) k ...a x blcl...

possesses the invariant property. It is always an invariant or co-variant appertaining to a number of different linear forms, and as before it may vanish if two such linear forms be identical. In general it will be simultaneous covariant of the different forms a" x \ 6?, c" x 3 , ... if

i+k+...+"-n 2 , j+k + ...+ = n s ,*

It will also be a covariant if the symbolic product be factorizable into portions each of which satisfies these conditions. If the forms be identical the sets of symbolsare ultimately equated, and the form, provided it does not vanish, is a covariant of the form a".

The expression (ab) properly appertains to a quartic; for a quadratic it may also be written (ab) 2 (cd) 2 , and would denote the square of the discriminant to a factor pres. For the quartic (aby = (a l b^a 1 b 1) i =a*bi-Aala i b i bl+&a\albJbl*

— 4oioJ6? h+a.bf =/(o04-~4o 1 03+6o! — 4oia3+Ooa~4 = 2(ao04 — 4oi0 3 +3ol), one of the well-known invariants of the quartic.*

For the cubic (ab) 2 a x b x is a covariant because each symbol a, b occurs three times; we can first of all find its real expression as a simultaneous covariant of two cubics,and then, by supposing the two cubics to merge into identity, find the expression of the quad- ratic covariant, of the single cubic, commonly known as the Hessian.

By simple multiplication

*(oJ6 1 6|-2a?a,5*6 2 +aiai5f)a;f + (o?6|— aia'ib'(b 2 — ala 2 b 1 bi+albl)x 1 × 2 + (ala i bl—2aialbibl+alblb i)xl; and transforming to the real form,*

*(a Q b 2 — 2oi6i-|-o 2 6o)*i-r-(oo&3— Oi6 2 — aJ>i+azb)xiX2 + (0163 — 2a 2 b 2 +a s bi)xl , the simultaneous covariant; and now, putting b = a, we obtain twice the Hessian*

(o o 2 — a\)xl + (a,fl,3— aia 2)tfiZ 2 t(aio 3 — a%)xl. It will be shown later that all invariants, single or simultaneous, are expressible in terms of symbolic products. The degree of the covariant in the coefficients is equal to the number of different symbols o, b, c, ... that occur in the symbolic expression ; the degree in the variables (i.e. the order of the covariant) is p +l r + T + ... and

the weight 1 of the coefficient of the leading term x?

is equal

to i+j+k+.... It will be apparent that there are four numbers associated with a covariant, viz. the orders of the quantic and covariant, and the degree and weight of the leading coefficient; calling these n, t, 0, w respectively we can see that they are not independent integers, but that they are invariably connected by a certain relation nd—2w = t. For, if (a ,...xi, xi) be a covariant of order e appertaining to a quantic of order n,

(Ao,...Zih) = (XM)"(ao,Xi£i+w&,Xj&+«fc) ; we find that the left and right-hand sides are of degrees nd and 2w--€ respectively in Xi, yui, X 2 , ix^, and thence n6=2w--t.*

Symbolic Identities. — For the purpose of manipulating symbolic expressions it is necessary to be in possession of certain simple

identities which connect certain symbolic products. From the three equations

a x (bc) + b x (ca) + c x (ab) = 0 . . . (I.) Introduce now new umbrae di, d\ and recall that --dz-di are cogredient with X\ and x%. We may in any relation substitute for any pair of quantities any other cogredient pair so that writing +

(ad)(bc) + (bd)(ca) + (cd)(ab) = 0 . . . (II.) Similarly in (I.), writing for c\, c 2 the cogredient pair — yj, + yi, we obtain

a x b y — ayb x = (ab)(xy). . ~ . . . (III.) Again in (I.) transposing a(bc) to the other side and squaring, we obtain*

2(ac)(bc)a x b x = (bcyal + (acyb x -(ab) 2 cl . (IV.) , and herein writing d 2 ,—di for Xi, x 2 ,

2(ac)(bc)(ad)(bd) = (bcy(ady + (acy(bdy-(aby(cd)K (V.) ‘ As an illustration multiply (IV.) throughout by o” -2 ^” -8 ^ -2 so that each term may denote a covariant of an n ic .

2(ac)(bc)aTX~ 1 c7 1

/■l \2 n.n— 2 n— 2 . / \2 n— 2 L n““n— 2 / i\2 n— 2 t »— 2 n

= (bc)a x b x c x + (ac)a x b x c x -(ab) a x b x c„,

1 The weight of a terra d % ...3„” is defined as being £i-f-2£ 2 |... + nk».

Each term on the right-hand side may be shown by permutation of a, b, c to be the symbolical representation of the same covariant ; they are equivalent symbolic products, and we may accordingly write

n— It »V— 1 71—2

\2_h-2l»i— 2 n

a relation which shows that the form on the left is the product of the two covariants

(ab) a x b x and c x – The identities are, in particular, of service in

reducing symbolic products to standard forms. Asymbolical expression may be always so transformed that the power of any determinant factor (.ab) is even. For we may in any product interchange a and b without altering its signification ; therefore

(a&) w, + Vi = -(ai) M, + 1 i becomes fa by the interchange, and hence

*(ai)""**, =\(ab)^\^-fa) ;*

and identity (I.) will always result in transforming 0i — 02 so as to make it divisible by (ab). Ex. gr.

(ab)(ac)b x c x = — (ab)(bc)a x c x

*= c x {(ac)b x — (bc)a x \ =-(ab)' l c x *

so that the covariant of the quadratic on the left is halfthe product of the quadratic itself and its only invariant. To obtain the corre- sponding theorem concerning the general form of even order we

multiply throughout by (aj) 2 " 1- ^™ -2 and obtain

/-lA 2 "— 1 /„.-M. 2m— l_/„j'\2m 2m*

(ab) (ac)b x c x =^(ab) c x .

Paying attention merely to the determinant factors there is no form with one factor since (ab) vanishes identically. For two factors the standard form is (ab) 1 ; for three factors (ab) 2 (ac) ; for four factors (ab)' and (ab) 2 (cd) 2 ; for five factors (ab)'(ac) and (o6) 2 (ac)(de) 2 ; for six factors (ab) 6 , (aby(bcf(caf, and (aby(cd)(e})\ It will be a useful exercise for the reader to interpret the corresponding covariants of the general quantic, to show that some of them are simple powers or products of other covariants of lower degrees and order.*

The Polar Process. — The p"> polar of a" x with regard to y is*

*i.e. ii of the symbolic factors of the form are replaced by 11 others in which new variables yi, yi replace the old variables x\, *». The operation of taking the polar results in a symbolic product, and the repetition of the process in regard to new cogredient sets of variables results in symbolic forms. It is therefore an invariant process. All the forms obtained are invariants in regard to linear trans- formations, in accordance with the same scheme of substitutions, of the several*

sets of variables.

An important associated operation is

dXidyi dx#)yi which, operating upon any polar, causes it to vanish. Moreover, its operation upon any invariant form produces an invariant form.

Every symbolic product, involving several sets of cogredient variables, can be exhibited as a sum of terms, each of which is a polar multiplied by a product of powers of the determinant factors

(xy), (xz), (yz),... Transvection. — We have seen that (ab) is a simultaneous invariant of the two different linear forms a x , b x , and we observe that (ab) is equivalent to

df d Sf 9_ dxi dx x dxi dxi where f = a x , = b x .

If / = o", = b" x be any two binary forms, we generalize by forming

the function

(m-k)\ (n-k)\ / df 30 dfdy

This is called the k" 1 transvectant of / over 0; it may be conveniently denoted by

(/. <>)*• Observing that*

a x , b x) =(ab) a b x ,

it is clear that the k lh transvectant is a simultaneous covariant of the two forms.

It has been shown by Gordan that every symbolic product is expressible as a sum of transvectants.

If m>_n there are n + i transvectants corresponding to the values o, i, 2,... n of k; if k = o we have the product of the two forms, and for all values of k>n the transvectants vanish. In general we may have any two forms

">? = (*

i, i, 1A2 being the umbrae, as usual, and for the k ,h transvectant we have

(#,«)'-(**)#rVr*

a simultaneous covariant of the two forms. We may suppose 0£, vAl to be any two covariants appertaining to a system, and the process of transvection supplies a means of proceeding from them to other covariants.

The two forms a", b n x , or 0j, #J, may be identical; we then have the k th transvectant of a form over itself which may, or may not, vanish identically; and, in the latter case, is a covariant of the single form. It is obvious that, when k is uneven, the k" 1 trans- vectant of a form over itself does vanish. We have seen that trans- vection is equivalent to the performance of partial differential operations upon the two forms, but, practically, we may regard the process as merely substituting (06), (0^)* for 0*6*, #£v£* respec- tively in the symbolic product subjected to transvection. It is essentially an operation performed upon the product of two forms. If, then, we require the transvectants of the two forms /{-X/', 04-jj0', we take their product*

/0-r-X/'0+M/0'-f-W'0',

and the k' h transvectant is simply obtained by operating upon each term separately, viz.

(J,)xCT.)#•(/. ')+W. <>0*;*

and, moreover, if we require to find the k th transvectant of one linear system of forms over another we have merely to multiply the two systems, and take the k' h transvectant of the separate products.

The process of transvection is connected with the operations Q; for .1

or tf (fib$ „_, = (/,);

so also is the polar process, for since

*/,, = <** °V< *»= 6 * b V<*

if we take the k tk transvectant of /£ oyer 0J, regarding yi, y^ as the variables, }

or the k' h transvectant of the k th polars, in regard to y, is equal to the k' h transvectant of the forms. Moreover, the k' h transvectant (abfa^K'" is derivable from the k"> polar of a" viz. aT k o$ by substituting for yi, y^ the cogredient quantities fo,—bi, and

*multiplying by 6£ – *

First and Second Transvectants. — A few words must be said about the first two transvectants as they are of exceptional interest. Since, if/ = o™, 0 = 6",

the first transvectant differs but by a numerical factor from thft Jacobian or functional determinant, of the two forms. We can find an expression for the first transvectant of (/, 0) 1 over another form c". For

(m +») (/,0) , v = »/.0j +w/i.0, and

*/. < *V -/». * = {axby-a v b x)a r x *~ l b n ~ l = (xy)(f,4 >) 1 ;*

Put m — 1 for m, n — 1 for n, and multiply through by (ab); then

■-(°-b) t

m-l,n-2, fit— I

*ˆiixyW, *) 2 –*

Multiply by c£ l and for y\, y 2 write d,— d; then the right-hand side becomes

(ab)(bc)aTX- 1 cr 1 +Z

m+n — 2" of which the first term, writing cf = ■/■, is*

cW,4 >)

a x ˆ 1 b x ˆ t c x y ˆ(ab) (bc)a x c x

= -JaTilTV J (bc)\l+ (ab)V x -(ac) t bl J

*- \ j aˆbcfbTcV +cl(aVfar*bV and.ifCf, *) 1 -^.*

■bKacfaVct 1]

*\(j, *)*

C 1 =C b "'V

p-1.

y- >*

and this, on writing c t ,—c\ for yi, y 2 , becomes

.•.{(/,) 1 ,ˆ 1 =|| S?7=2(/.) , . +(/.)*-#- (♦.*)»•/! ; and thence it appears that the first transvectant of (J, 4>) 1 over ˆ is always expressible by means of forms of lower degree in the coefficients wherever each of the forms/, 4>, ˆ is of higher degree than the first in Xi, x%.

The second transvectant of a form over itself is called the Hessian of the form. It is

(/ ,f)* = {abfaTX-* = KT* ” H ; unsymbolically it is a numerical multiple of the determinant

S(ˆ4- / v \ ‘ It is also the first transvectant of the differ- dx\ dx% \dxdx z)

ential coefficients of the form with regard to the variables, viz.

hrˆ-,4ˆ)- F° r the quadratic it is the discriminant (06) 2 and for \dxi dXi)

the cubic the quadratic covariant {aVf a x b x .

In general for a form in n variables the Hessian is

ay a 2 * a 2 /

dx\ dxidXi dx\dx n a 2 / d*f a 2 /

dXidXi dxl ‘“dxidx„

a 2 / d 2 f

dxl

= H”<-» = H;

dXidXndx?dx,

and there is a remarkable theorem which states that if H=o and n = 2, 3, or 4 the original form can be exhibited as a form in 1, 2, 3 variables respectively.

The Form / + X < £. — An important method for the formation of covariants is connected with the form f + \, where / and are of the same order in the variables and X is an arbitrary constant. If the invariants and covariants of this composite quantic be formed we obtain functions of X such that the coefficients of the various powers of X are simultaneous invariants of / and < £. In particular, when is a covariant of /, we obtain in this manner covariants of /.

The Partial Differential Equations. — It will be shown later that covariants may be studied by restricting attention to the leading

coefficient, viz. that affecting x where t is the order of the covariant. An important fact, discovered by Cayley, is that these coefficients, and also the complete covariants, satisfy certain partial differential equations which suffice to determine them, and to ascertain many of their properties. These equations can be arrived at in many ways; the method here given is due to Gordan. Xi, X 2 , m, /i 2 being as usual the coefficients of substitution, let

a

d\ t dA 2

= D X,J +Xi$- =D ,

AX' df! OfX^ A**. 1*

be linear operators. Then if j, J be the original and transformed forms of an invariant

.] = M)"j,

w being the weight of the invariant. Operation upon J results as follows : —

D^J-OjD^J-wJ.

The first and fourth of these indicate that (X^) 1 " is a homogeneous function of Xi, X 2 , and of m, M2 separately, and the second and third arise from the fact that (Xm) is caused to vanish by both D X(1 and D,

**v*

*Since J = F(Ao,Ai,...A t ,...), where Al = o^-*a*»*

we find that the results are equivalent to

k ‘ k

k k

X {D ˆik = 0; X (VWa j*

k k

According to the well-known law for the changes of independent variables. Now

DxA = (n-A)A 4 ;D X/1 A A =AA i: _ 1 ;

so we obtain

X in ~ k)Kk H =wJ; X kK ‘

X {n – k)K ˆik-

■0.2

\)A t

kA,

=0;

= wj;

equations which are valid when Xi, X 2 , in, n% have arbitrary values, and therefore when the values are such that J =j, Afc=a. Hence*

wo »a5; +(w –

-1JSˆ+(._2J3ˆ+…

“WJ,

„ˆ +(„_ 1) l +(„_ 2)0 – + .,

%f+ 2 ˆa|+ˆa|+-=ˆ

■=o,

?ˆ

the complete system of equations satisfied by an invariant. The

fourth shows that every term of the invariant is of the same weight. Moreover, if we add the first to the fourth we obtain

2w i n-

where is the degree of "the invariant ; this shows, as we have before observed, that for an invariant

«> = -»0.

The second and third are those upon the solution of which the theory of the invariant may be said to depend. An instantaneous deduction

from the relation w = -n$ is that forms of uneven orders possess only invariants of even degree in the coefficients. The two operators

fi=a 4 +2o 'a| + -'

■ J a a „

*0=na *dd-+(n –*

. 1)a _ + ... +0n _

have been much studied by Sylvester, Hammond, Hilbert and Elliott (Elliott, Algebra of Quantics, ch. vi.). An important refer- ence is "The Differential Equations satisfied by Concomitants of Quantics, by A. R. Forsyth, Proc. Lond. Math. Soc. vol. xix.

The Evectant Process. — If we have a symbolic product, which contains the symbol o only in determinant factors such as (06), we may write x 2 ,x 1 for a v a 2 , and thus obtain a product in which (a&) is replaced by b x , (ac) by c x and so on. In particular, when the product denotes an invariant we may transform each of the symbols a, 6,. ..to x in succession, and take the sum of the resultant products; we thus obtain a covariant which is called the first evectant of the original invariant. The second evectant is obtained by similarly operating upon all the symbols remaining which only occur in deter minant factors, and so on for the higher evectants.

Ex. gr. From (ac) 2 (bd) 2 (ad)(bc) we obtain

{bdy{bc)c x d x +{ac)Kad)c x dl -(bd)Kad)alb x -(ac)Kbc)a x bl = i(bd) i {bc)c x d x the first evectant; and thence \c\d\ the second evectant; in fact the two evectants are to numerical factors pres, the cubic covariant Q, and the square of the original cubic.

If be the degree of an invariant j

= a 1 ˆr+a 1 o,7= +. dan z dai

■ +a'

'da n

21

■da n

and, herein transforming from a to x, we obtain the first evectant

p>X { –

ˆk k nˆkdj .

Combinants. — An important class of invariants, of several binary forms of the same order, was discovered by Sylvester. The invariants in question are invariants qud linear transformation of the forms themselves as well as qud linear transformation of the variables. If the forms be a p x , IP, c r x ,... the Aronhold process, given by the operation S as between any two of the forms, causes such an invariant to vanish. Thus it has annihilators of the forms – d , – d . – d .

*a °W+ a *dbl a >dT-"*

and Gordan, in fact, takes the satisfaction of these conditions as defining those invariants which Sylvester termed " combinants." The existence of such forms seems to have been brought toSylvester's notice by observation of the fact that the resultant of a p % and b x must be a factor of the resultant of Xa£+/»&£ and X'aˆ+//6j| for a common factor of the first pair must be also a common factor

of the second pair; so that the condition for the existence of such common factor must be the same in the two cases. A leading proposition states that, if an invariant of Xa and lib" be considered as a form in the variables X and n, andanjnvariant of the latter be taken, the result will be a combinant of a? and b p . The idea can be*

generalized so as to have regard to ternary and higher forms each of

the same order and of the same number of variables.

For further information see Gordan, Vorlesungen fiber Invariantentheorie, Bd. ii. § 6 (Leipzig, 1887) ; E. B. Elliott, Algebra of Quantics, Art. 264 (Oxford, 1895).

Associated Forms. — A system of forms, such that every form appertaining to the binary form is expressible as a rational and integral function of the members of the system, is difficult to obtain. If, however, we specify that all forms are to be rational, but not necessarily integral functions, a new system of forms arises which is easily obtainable. A binary form of order n contains n independ ent constants, three of which by linear transformation can be given determinate values; the remaining n — 3 coefficients, together with the determinant of transformation, give us n — 2 parameters, and in consequence one relation must exist between any n — 1 invariants of the form, and fixing upon n — 2 invariants every other invariant is a rational function of its members. Similarly regarding xi, x 2 as additional parameters, we see that every covariant is expressible as a rational function of n fixed covariants. We can so determine these n covariants that every other covariant is expressed in terms of them by a fraction whose denominator is a power of the binary form.

First observe that with f x =a n x =bl = ...,f l =a 1 a n x -\f 2 = a 2 a z – 1 , fz -fiXi +f 2 × 2 , we find

Jx

and that thence every symbolic product is equal to a rational function of covariants in the form of a fraction whose denominator is a power of /,. Making the substitution in any symbolic product the only determinant factors that present themselves in the numera- tor are of the form (of), (bf), (<;/),.. .and every symbol a finally appears in the form.

<(>k has / as a factor, and may be written /. m ; for observing that &i=/- =/• «oJ ˆ1 = 0=/. Mi; where u = l, «i=o,*

assume that ˆ = {affa x ~ =/. « t =o;.«* (“- 2) .*

Taking the first polar with regard to y

\+k(af) k – i al- J ‘(ab) {n -\)b x ‘

(n-ˆCa/)ˆ-” 1 ”‘- k – 1 “ k ‘*

= k(n-2)a x u x u y +na x a y u x ” \

and, writing / 2 and — /i for y y and y 2 ,

\fc+l n-ft-l

(n-*)(o/) w or w +ft(»-l)(o*)(a/) t – 1 (V)ar‘4;

(a/)ˆ 2 ˆ]

= ft(*-2)/. {uj)u k r 2k – 1 . Moreover the second term on the left contains

It. „*-.£*_ (V) *-. a wJ.

if k be uneven, and

if k be even ; in either case the factor

(af)b x -(bf)a I = (ab)f, and therefore

(n-k)4’k +l + M.f = k(n~2)f.(uf)u x n – 2k – i :

and tpk+i i s seen to be of the form/. Ut+u We may write therefore

Uk-

These forms, n in number, are called ” associated forms ” of / (” Schwesterformen,” ” formes associees “).

Every covariant is rationally expressible by means of the forms /, u 2 , m 3 ,... m„ since, as we have seen «o = i, Mi = o. It is easy to find the relations

M 2 =g(/,/’) 2 ,

«3=((/,/’) 2 >r) «4=i(/./’) 4 -/ 2 -3i(/,/’) 2) 2 ,

and so on.

To exhibit any covariant as a function of Mo, Mi, Ms,... take a l = (ˆiVi+‘hyiTand transform it by the substitution

fiVi +/i>2 = £ where £ = a l a n x ~\ f 2 = a 2 a x ~ l l

x 3 yi-x i y i =v

/=/i*i+/«*« ;

thence

and

*/. yi = *i4 + /sij;/. y 2 = x 2 z-f lV , f.a» = a*t + (flf)v,*

/ B – 1 .^ = «or + (2 n)M 2 rv + Q)« 3 rv + ..

■ + U n rf.

Now a covariant of a" x = / is obtained from the similar covariant of ol by writing therein x it x 2 , for y lt y 2 , and, since y u y 2 have been linearly transformed to £ and 7j, it is merely necessary to form the covariants in respect of the form (mi£ + m 2 t;)", and then division, by the proper power of /, gives the covariant in question as a function

Of/, Mo = I, M 2 , «3,...M„.

Summary of Results. — We will now give a short account of the results to which the foregoing processes lead. Of any form a" there exists a finite number of invariants and covariants, in terms of which all other covariants are rational and integral functions (cf. Gordan, Bd. ii. § 21). This finite number of forms is said to constitute the complete system. Of two or more binary forms there are also complete systems containing a finite number of forms. There are also algebraic systems, as above mentioned, involving fewer covariants which are such that all other covariants are rationally expressible in terms of them; but these smaller systems do not possess the same mathematical interest as those first mentioned.

The Binary Quadratic. — The complete system consists of the form

itself, a 2 , and the discriminant, which is the second transvectant of the Jorm upon itself, viz.: (/, f') 2 = (ab) 2 ; or, in real coefficients, 2 (

° = io" (°o*i + 6i*j-* s J- -j) (a x l + a l x 2 + x 2 ■\/I~P) ■ If the form a 2 be written as the product of its linear factors p x q x , the discriminant takes the form — ^{pq) 2 . The vanishing of this invariant is the condition for equal roots. The simultaneous system of two quadratic forms oj, a 2 , say/ and <£, consists of six forms, viz.*

the two quadratic forms/, 0; the two discriminants (/, /') 2 ,(<£,0') 2 - and the first and second transvectants of / upon 4>, (/, 0) 1 and

(/, tf>) 2 , which may be written (ao)a«a, and (act) 2 . These fundamental or ground forms are connected by the relation

ˆl(MT=P(<_i>ʻy-2f(f,y+tf{f,fy.

If the covariant (Z,) 1 vanishes / and are clearly proportional, and if the second transvectant of (/, 0) 1 upon itself vanishes, / and possess a common linear factor; and the condition is both necessary and sufficient. In this case (/, 0) 1 is a perfect square, since its discriminant vanishes. If (frf) 1 be not a perfect square, and r x , s x be its linear factors, it is possible to express / and in the canonical forms Mrˆ+ˆsˆ, fii(r x) 2 in(s x) 2 respectively. In fact, if / and have these forms, it is easy to verify that (/, 4>) 1 = (V) {rs)r x s x . The fundamental system connected with n quadratic forms consists of (i.) the n forms themselves /i, / 2 , …/„, (ii.) the (2) functional determinants (fijk) 1 , (iii.) the (“ 1) in- variants (/i, /0 2 , (iv.) the (?) forms (/;, (/, f m))\ each such form remaining unaltered for any permutations of i, k, m. Between these forms various relations exist (cf. Gordan, § 134).

The Binary Cubic. — The complete system consists of

/ = «. • (/■/’)’ = MV, = A x’ (/■ A) ={ab)>{ca)b x cl -Q», and*

(A,A’) 2 = (aby(cdy(ad) (be) = R. To prove that this system is complete we have to consider (/,A) 2 , (A,A’)\ (/,Q)i, (/,Q)», (/,Q)i, (A,Q)S (A,Q)», and each of these can be shown either to be zero or to be a rational integral function of/, A Q and R. These forms are connected by the relation

2Q 2 +A»+R/ 2 =0. The discriminant of / is equal to the discriminant of A, and is therefore (A, A’) 2 = R ; if it vanishes both / and A have two roots equal, A is a rational factor of / and Q is a perfect cube ; the cube root being equal, to a numerical factor pres, to the square root of

A. The Hessian A = A a . is such that (/,A) 2 = o, and if/ isexpressible in the form Mpx) 3 +n(q x) 3 , that is as the sum of two perfect cubes, we find that A must be equal to p q for then

mp x) 3 +»(g)*,P*q*} 2 =o.*

Hence, if p x , q x be the linear factors of the Hessian A|, the cubic can be put into the form Hp x) 3 +ii(q x) 3 and immediately solved. This method of solution fails when the discrimiflajit R vanishes, for then the Hessian has equal roots, as also the cubic /.

The Hessian in that case is a factor of /, and Q is the third power of

the linear factor which occurs to the second power in /. If, moreover, A vanishes identically / is a perfect cube.

The Binary Quartic. — The fundamental system consists of five

forms a>/; (/,/')'= («)V,6*=Aii (/,/') 4 = (a&) 4 =i; (/, A)' =*

(oA)a#- (ab)\cb)a\b M cl=t;(fA)'= M' = (ab)\bc)\c a y=j, viz.

two invariants, two quartics and a sextic. They are connected by the relation

2/»=g«PA-A«-i7/».

The discriminant, whose vanishing is the condition that / may

possess two equal roots, has the expression J 1- s'*! it is nine*

times the discriminant of the cubic resolvent k—xik—zj, and has*

also the expression ˆ(t, t')'. The quartic has four equal roots, that is to say, is a perfect fourth power, when the Hessian vanishes identically ; and conversely. This can be verified by equating to zero the five coefficients of the Hessian (ab) a x b x . Gordan has also shown that the vanishing of the Hessian of the binary n" is the necessary and sufficient condition to ensure the form being a perfect n' power. The vanishing of the invariants i and j is the necessary and sufficient condition to ensure the quartic having three equal roots. On the one hand, assuming the quartic to have the form 4***,, we find i—j = o, and on the other hand, assuming 4=7=0, we find that the quartic must have the form a * 1 +4*

root o, and thence t~- and rjr must also vanish for the same root; which proves that a is a double root of /, and / therefore a perfect square. When f<=6xx it will be found that A= — /. The simplest form to which the quartic is in general reducible \sf=x l +6mx 1 x 2 +x 2 , involving one parameters; then A 4 x = 2m(x[+x 2) +2(l —3m i)x 1 xl; j = 2(i+3m 2) ;j = 6w(l -«);/= (1-9W 2) (*J-*jj) (!+!) *!*2- The sextic covariant / is seen to be factorizable into three quadratic factors (fi — XjXy ˆ = x[+x 2 , ip = x 1 —x 2 ,*

which are such that the three mutual second transvectants vanish identically; they are for this reason termed conjugate quadratic factors. It is on a consideration of these factors of t that Cayley bases his solution of the quartic

equation. For, since — 2ˆ = A 3 — oifA — oj(— f) 3 , he compares the

*right-hand side with the cubic resolvent k 3 — ˆiX 2 * — o/X 3 , of / =0,*

and notices that the)? become identical on substituting A for k, and — / for X ; hence, if h, fa, fa be the roots of the resolvent

2P = (A+k i f)(A+faf)(&+k i f) ; and now, if all the roots of / be different, so also are those of the resolvent, since the latter, and /, have practically the same dis criminant; consequently each of the three factors, of — 2P, must be perfect squares and taking the square, root

t—

S0.X-ˆ;

1.,.;

V=2′

*and it can be shown that , x, i> are the three conjugate quadratic factors of / above mentioned. We have A+fc/ = *‘i A+fe/=x 2 i A +kzf=ˆ, and Cayley shows that a root of the quartic can be expressed in the determinant form*

the remaining roots being obtained by varying

the signs which occur in the radicals y , x„> ˆ„.

The transformation to the normal form reduces

the quartic to a quadratic. The new variables

yi=0 are the linear factors of . If = r x .s I , the

yi = 1 normal form of a x , can be shown to be given by

(«)\b« = (ar)X+ˆnasy r y x +(as)Y x ;

is any one of the conj ugate quadratic factors of /, so that, in

determining r x , s x from V A+fci/ = o, fa is any root of the resolvent.

The transformation to the normal form, by the solution of a cubic

and a quadratic, therefore, supplies a solution of the quartic. If

(Xju) is the modulus of the transformation by which a x is reduced to

i 3 . the normal form, i becomes (Xp.) 4 t, and j, (Xp.) 3 /; hence jz is

absolutely unaltered by transformation, and is termed the absolute

j3 2 (1 +3m 2) 2 invariant. Since therefore ., = 5 ˆin_ m {y we have a cubic equation

for determining m 1 as a function of the absolute invariant.

Remark. — Hermite has shown (Crelle, Bd. Hi.) that the substitution, i=j ˆ.reduces ˆ -&*..*

2”\ 2*

to the form dz

\3 2 z + i z*

*The Binary Quintic. — The complete system consists of 23 forms, of which the simplest are /=a°; the Hessian H = (/,/’) 2 = (ab) 2 aV; the quadratic covariant * =(/,/’) 4 = (ab) i ajb x ; and the nonic co- variant T- (f,(f,f)*) 1 – (f,U) l = (aH)«X = (ab) 2 (ca) a\b\c x ; the remaining 19 are expressible as transvectants of compounds of these four.*

There are four invariants (»’, i’) 2 ; (i 3 , H) 6 ; (f, j’ 6) 10 ; (ft, i 7) 11

four linear forms (/,i 2) 4 ; (/,t’ 3) s ; (i\ T) 8 ; (i 6 ,T)»

three quadratic forms i; (H, i 2) 4 ; (H, i 3) 6

three cubic forms {f,if; (f,i 2) 3 ; (i 3 ,T) 6

two quartic forms (H,i) 2 ; (H,i 2) 3 .

three quintic forms /; (/, t') 1 ; (i 2 , T) 1

two sextic forms H ; (H, j') 1

one septic form (i, T) 2

one nonic form T. We will write the cubic covariant (/, i) s = ;', and then remark that the result, (f,j) 3 = o, can be readily established. The formj is com- pletely defined by the relation (/, j) 3 = o as no other covariant possesses this property.

Certain convariants of the quintic involve the same determinant factors as appeared in the system of the quartic; these are /, H, i, T and j, and are of special importance. Further, it is convenient to have before us two other quadratic covariants, viz. r = (j, jyjxjx] 6_ = (ir)i x T x ; four other linear covariants, viz. a= —(jiyj x ; i} = (ia)i x ˆy = (Ta)T X : S = (t@)t x . Further, in the case of invariants, we write A = (i, i') 2 and take three new forms B = (i, t) 2 ; C = (t ; t') 2 ; _R = (/9y). Hermite expresses the quintic in a forme-type in which the constants are invariants and the variables linear covariants. If a, f) be the linear forrns, above defined, he raises the identity a x (afi) = a x (a/3) — x (aa) to the fifth power (and in general to the power n) obtaining

M 6 /= MV-5(aˆW«X+...-Wˆ;'

and then expresses the coefficients, on the right, in terms of the fundamental invariants. On this principle the covariant j is ex- pressible in the form

R 2 i = S 3 |Ba 2 a|ACSa 2 +|C(3AB-4C)a'

when 8, are the above defined linear forms.

Hence, solving the cubic,

R 2 j = (5 — trtia) (S—mia) (8 — w 3 a) wherein mi mi, m s are invariants.

Sylvester showed that the quintic might, in general, be expressed as the sum of three fifth powers, viz. in the canonical form f=ki(p x) i +ki(q x) i --kz(r x) h . Now, evidently, the third transvectant of/, ex- pressed in this form, with the cubic p x q x r x is zero, and hence from a property of the covariant j we must have j = p x q x r x ; showing that the linear forms involved are the linear factors of _/'. We may there- fore write

f=h(S — mia) 6 -(-fe(S— OT 2 a) 6 +£ 3 (S — m 3 a) 6 ; and we have merely to determine the constants ki, fe, kz. To determine them notice that R = (ad) and then

*(/,a 6) 5 =-R 6 (ˆ + fe+ * 3), 0>V) 5 =-5R 6 (m 1 k l +m 2 k 2 +m 3 k 3), (f, aV) 6 = – 1 OR 5 (mA+m\k 2 +m\k 3) ,*

three equations for determining ki, fa, kz. This canonical form depends upon j having three unequal linear factors. When C vanishes j has the form j = p x q x , and (f,j) = (ap) (aq)a x =0. Hence, from the identity a x (pq)=p x (aq)—q x (ap), we obtain (pq) 6 f=(aq) i pl —5(ap)(aq) i p i q x — (ap) q x , the required canonical form. Now, when

C=o, clearly (seeante) R 2 _/=5 2 p where p = 8+jBa; and Gordan then

proves the relation

6R 4 ./=B8 6 +5B8 4 p-4A 2 p 6 , which is Bring's form of quintic at which we can always arrive, by linear transformation, whenever the invariant C vanishes.

Remark. — The invariant C is a numerical multiple of the resultant of the covariants i and j, and if C = o, p is the common factor of i and j.

The discriminant is the resultant of tr and t-r and. of

degree

8 in the coefficients; since it is a rational and integral function of the fundamental invariants it is expressible as a linear function of A 2 and B ; it is independent of C, and is therefore unaltered when C vanishes ; we may therefore take / in the canonical form 6R 4 / = B8 5 +5B8 4 p-4AV.

6 3 6

ALGEBRAIC FORMS

The two equations

|f=5B8+4B«'p)=0,*

dp

=5(B6 4 -4AV)=0,

yield by elimination of 6 and p the discriminant

*D = 64B-A 2 . The general equation of degree 5 cannot be solved algebraically, but the roots can be expressed by means of elliptic modular functions. For an algebraic solution the invariants must fulfil certain condi- tions. When R = o, and neither of the expressions AC — B 2 , 2 AB — 3C vanishes, the covariant a x is a linear factor of/; but, when R = AC — B 1 = 2 AB — 3C = o, a x also vanishes, and then / is the product of the form j' x and of the Hessian of f x . When a x and the invariants B and C all vanish, either A or j must vanish; in the former case j is a perfect cube, its Hessian vanishing, and further / contains j as a factor; in the latter case, if p x , ox be the linear factors of *,/ can be expressed as (po) i f=Cip\+c i*

The Binary Sextic. — The complete system consists of 26 forms, of which the simplest are /=a ; the Hessian H = (aJ) 2 a*&^; the quartic * = (a&)«a*6*; the covariants / = (oi)%*; T = (a6) 2 (c6)o*i'c'; and the invariants A = (abf ; B = (ii')*. There are*

5 invariants: (a,b)<, (i,i'Y, (/,!')», (f,l 3)\ ((f,i),l)>;*

6 of order 2: /, (i,l)\ (f,F)<, fr 2) 3 . C/.' 3) 6 . (tf.O. <•)*; 5 of order 4: i, (/,/)', (*,/), (/,?)', ((/,»), **)';*

5 of order 6 :/,/> = (<")V|£ (J, I), ((/,),)'. (/>.):*

3 of order 8: H, (/,), (H,/);*

1 of order 10: (H,i);

1 of order 12: T. For a further discussion of the binary sextic see Gordan, loc. cit., eiebsch, loc. cit. The complete systems of the quintic and sextic were first obtained by Gordan in 1868 (Journ. f. Math. lxix. 323- 354). August von Gall in 1880 obtained the complete system of the binary octavic {Math. Ann. xvii. 31-52, I39" I 5 2 . 45 6); and, in 1888, that of the binary septimic, which proved to be much more complicated (Math. Ann. xxxi. 3 l8 S3°)- Single binary forms of higher and finite order have not been studied with complete success, but the system of the binary form of infinite order has been completely determined by Sylvester, Cayley, MacMahon and Stroh, each of whom contributed to the theory.

As regards simultaneous binary forms, the system of two quad-

ratics, and of any number of quadratics, is^alluded to above and has long been known. The system of the quadratic and cubic, con- sisting of 15 forms, and that of two cubics, consisting of 26 forms, were obtained by Salmon and Clebsch ; that of the cubic and quartic we owe to Sigmund Gundelfinger (Programm Stuttgart, 1869, 1-43); that of the quadratic and quintic to Winter (Programm Darmstadt, 1880); that of the quadratic and sextic to von Gall (Programm Lemgo, 1873); that of two quartics to Gordan (Math. Ann. ii. 227-281, 1870); and to Eugenio Bertini (Bait. Giorn. xiv. 1-14, 1876; also Math. Ann. xi. 30-41, 1877). The system of four forms, of which two are linear and two quadratic, has been investigated by Perrin (S. M. F. Bull. xv. 45-61, 1887).

Ternary and Higher Forms. — The ternary form of order n is represented symbolically by

(aiXi +a 2 Xi +a i xs) n = a" ;

and, as usual, b, c, d,... are alternative symbols, so that

n in n ,n

"x X X X

To form an invariant or covariant we have merely to form a product of factors of two kinds, viz. determinant factors (abc), (abd), (bee), etc...., and other factors a x , b x , c x ,... in such manner, that each of the symbols a, b, c,... occurs n times. Such a symbolic product, if it does not vanish identically, denotes an invariant or a covariant, according as factors a x , b x , c x ,... do not or do appear. To obtain the real form we multiply out, and, in the result, sub- stitute for the products of symbols the real coefficients which they denote.

For example, take the ternary quadratic

(aix l a i xi a 3 × 3 y =a x , or in real form ax]+bxl+cx\+2fx& l +2gXiXi+2hxiXi. We can see that (abc)a x b x c x is not a covariant, because it vanishes iden- tically, the interchange of a and b changing its sign instead of leaving it unchanged ; but (abc) 1 is an invariant. If a x , b x , c x be different forms we obtain, after development of the squared deter- minant and conversion to the real form (employing single and double dashes to distinguish the real coefficients of b x and c x),

a(b'c'+b'c'-2f'f')+b(c'a'+c'a'-2g'g')
+c(a'b'+a'b'-2h'h')+2f(g'h'+g'h'-a'f'-a"f) +2g(h'f"+h"f-b'g"-

b'g')+2h(f'g'+f"g'-c'h"-c"h');

a simultaneous invariant of the three forms, and now suppressing the dashes we obtain

6(abc+2fgh-af-bg-ch*), the expression in brackets being the -well-known invariant of a\, the vanishing of which expresses the condition that the form may break up into two linear factors, or, geometrically, that the conic may represent two right lines. The complete system consists of the form itself and this invariant.*

The ternary cubic has been investigated by Cayley, Aronhold, Hermite, Brioschi and Gordan. The principal reference is to Gordan (Math. Ann. i. 90-128, 1869, and vi. 436-512, 1873). The complete covariant and contravariant system includes no fewer than 34 forms; from its complexity it is desirable to consider the cubic in a simple canonical form; that chosen by Cayley was ax 3 -ˆby 3 +cz 3 - j-6dxyz (Amer. J. Math. iv. 1-16, 1881). Another form, associated with the theory of elliptic functions, has been considered by Dingeldey (Math. Ann. xxxi; 157-176, 1888), viz. xy 2 — iU 3 +giX i y+gzx 3 , and also the special form orf— 4631 s of the cuspidal cubic. An investigation, . by non-symbolic methods, is due to F. C. J. Mertens (Wien. Ber. xcv. 942-991, 1887). Hesse showed independently that'the general ternary cubic can be reduced, by linear transformation, to the form

x 3 + y 3 +2 3 + 6 mxyz, a form which involves 9 independent constants, as should be the case; it must, however, be remarked that the counting of con- stants is not a sure guide to the existence of a conjectured canonical form. Thus the ternary quartic is not, in general, expressible as a sum of five 4th powers as the counting of constants might have led one to expect, a theorem due to Sylvester. Hesse's canonical form shows at once that there cannot be more than two independ- ent invariants; for if there were three we could, by elimination of the modulus of transformation, obtain two functions of the coefficients equal to functions of m, and thus, by elimination of m, obtain a relation between the coefficients, showing them not to be independent, which is contrary to the hypothesis.

The simplest invariant is S = (abc) (abd)(acd) (bed) cf degree 4, which for the canonical form of Hesse is m(l— m 3); its vanishing indicates that the form is expressible as a sum of three cubes. The Hessian is symbolically (a6c) 2 ai6iOi = H 3 , and for the canonical form (1 +2m i)xyz~m i (x 3 +y 3 --z 3). By the process of Aronhold we can form the invariant S for the cubic a x +)Jtl x , and

then the coefficient of X is the second invariant T. Its symbolic expression,, to a numerical factor pris, is

(Hbc)(md)(Hcd)(bcd), and it is clearly of degree 6.

One more covariant is requisite to make an algebraically complete set. This is of degree 8 in the coefficients, and degree 6 in the variables, and, for the canonical form, has the expression 9m e (x 3 +y 3 +z 3)(2m+5m l +20m')(x 3 +y 3 +z 3)xyz ~(15m 1 +78m i -12m s)x 1 y ,i z 2 + (l+8m 3 y(y 3 z 3 +z 3 × 3 +x 3 y 3).*

Passing on to the ternary quartic we find that the number of ground forms is apparently very great. Gordan (Math. Ann, xvii. 217-233), limiting himself to a particular case of the form, has determined 54 ground forms, and G. Maisano (Bait. G. xix. 198-237, 1 881) has determined all up to and including the 5th degree in the coefficients.

The system of two ternary quadratics consists of 20 forms ; it has been investigated by Gordan (Clebsch-Lindemann's Vorlesungen i. 288, also Math. Ann. xix. 529-552); Perrin (S. M. F. Bull, xviii. 1-80, 1890); Rosanes (Math. Ann. vi. 264); and Gerbaldi (Annali (2), xvii. 161-196).

Ciamberlini has found a system of 127 forms appertaining to three ternary quadratics (Ball. G. xxiv. 141-157).

A. R. Forsyth has discussed the algebraically complete sets of ground forms of ternary and quaternary forms (see Amer. J. xii. 1-60, 1 15-160, and Camb. Phil. Trans, xiv. 409-466, 1889). He proves, by means of the six linear partial differential equations satisfied by the concomitants, that, if any concomitant be expanded in powers of Xi, xz, x 3 , the point variables — and of « lF u%, w 3 , the contra-gredient line variables — it is completely determinate if its leading coefficient be known. For the unipartite ternary quantic of order

n he finds that the fundamental system contains -(«+4)(» — 1)

individuals. He successfully considers the systems of two and three simultaneous ternary quadratics. In Part III. of the Memoir he discusses bi-ternary quantics, and in particular those which are lineo-linear, quadrato-linear, cubo-linear, quadrato-qu'adratic, cubo-cubic, and the system of two lineo-linear quantics. He shows that the system of the bi-ternary n°m ic comprises

|(«+l)(re+2)(m + l)(w+2) -3 individuals.

Bibliographical references to ternary forms are given by Forsyth (Amer. J. xii. p. 16) and by Cayley (Amer. J. iv., 1881). Clebsch, in 1872, in papers in Abh. d. K. A%ad. d. U. zu Gbttingen, t. xvii. and Math. Ann. t. v., established the important result that in the case of a form in n variables, the concomitants of the form, or of a system of such forms, involve in the aggregate n—l classes of

variables. "For instance, those of a ternary form involve two classes which may be geometrically interpreted as point and line co-ordinates in a plane; those of a quaternary form involve three classes which may be geometrically interpreted as point, line and plane co-ordinates in space.

IV. Enumerating Generating Functions Professor Michael Roberts {Quart. Math. J. iv.) was the first to remark that the study of covariants may be reduced to the study of their leading coefficients, and that from any relations connect- ing the latter are immediately derivable the relations connecting the former. It has been shown above that a covariant, In general, satisfies four partial differential equations. Two of these show that the leading coefficient of any covariant is an isobaric and homo- geneous function of the coefficients of the form ; the remaining two may be regarded as operators which cause the vanishing of the covariant. These may be written, for the binary n ic ,

- *d n*

or in the form

where

i! L „ i, . d

Q=a,s da~ l +2a, d£ + – +" a "- 1 ^'

0= ^3ai + <"- 1) ^+---+ a "3aL 4 –

Let a covariant of degree « in the variables, and of degree in the coefficients (the weight of the leading coefficient being w and n8—2w=e), be

C^l+eC^^X... .

Operating with Q— Xj-t— we find£2Co = o; that is to say, C satisfies

one of the two partial differential equations satisfied by an in- variant. It is for this reason called a seminvariant, and every seminvariant is the leading coefficient of a covariant. The .whole theory of invariants of a binary form depends upon the solutions of the equation 12 = 0. Before discussing these it is best to trans- form the binary form by substituting I !oi, 2 !

*a (+na i x" 1 X2+n(n — l)o 2 *x xf+...+» ' a B *2' and 12 takes the simpler form*

a °da- l +ai dZ i +eh dT 3 + " + '/strong>&. One advantage we have obtained is that, if we now write Oo = o, and substitute a,_i for a„ when s>o, we obtain

d d d d

which is the form of 12 for a binary (re — 1)".

*Hence by merely diminishing each suffix in a seminvariant by unity, we obtain another seminvariant of the same degree, and of weight to — 0, appertaining to the (n — l) ic . Also, if we increase each suffix in a seminvariant, we obtain terms, free from a , of some seminvariant of degree and weight w+0. Ex. gr. from the in- variantˆ —2aia»+2ao< *4 of the quartic the diminishing process yields a\ -2a*

x»-a 1 x n – l +aiX"...(-)' , an = (x-a l)(x-a i)...(x-a„), the sums of powers So 2 , 2a 3 , 2a 4 , ...2a" all satisfy the equation 12 = o. Hence, excluding Oo, we may, in partition notation, write down the fundamental solutions of the equation, viz.—*

(2), (3), (4),...(n), and say that with 00, we have an algebraically complete system. Every symmetric function denoted by partitions, not involving the figure unity (say a non-unitary symmetric function), which remains unchanged by any increase of re, is also a seminvariant, and we may take if we please another fundamental system, viz. —

M2), (3), (22), (32),...(2i") or (32 n -»). Observe that, if we subject any symmetric function (pipzpi...) to the diminishing process, it becomes aˆ l ~ n (p 2 pt...).*

Next consider the solutions of 12 = which are of degree and weight

to. The general term in a solution involves the product d°a[rl a£ , ...a" n wherein27r=0, 2s7r, =a>;the number of such products that may appear depends upon the number of partitions of w into 8 or fewer parts limited not to exceed n in magnitude. Let this number be denoted by (w; 6, re). In order to obtain the seminvari-*

ants we would write down the (to; 6, n) terms each associated with a literal coefficient; if we now operate with 12 we obtain a linear function of (to — 1; 9, n) products, for the vanishing of which the literal coefficients must satisfy (to — I ; 9, n) linear equations; hence (to; 0, »)) — (to — 1; 6, n) of these coefficients may be assumed arbitrarily, and the number of linearly independent solutions of 12=o, of the given degree and weight, is precisely (to; 8, re) — (to — I; 8, re). This theory is due to Cayley ; its validity depends upon showing that the (to — 1; 8, re) linear equations satisfied by the literal coefficients are independent; this has only recently been established by E. B. Elliott. These seminvariants are said to form an asyzygetic system. It is shown in the article on Combinatorial Analysis that (to ; 8, re) is the coefficient of a%" in the ascending expansion of the fraction

1

*1 —a. X —az. 1 —az 2 . ...1 —az"' Hence (to; 0, re) — (to — 1; 8, re) is given by the coefficient of a*z» in the fraction*

1-z

1—a.l—az. l—az 2 ....l—az".' the enumerating generating function of asyzygetic seminvariants. We may, by a well-known theorem, write the result as a coefficient of z" in the expansion of

1 _ z»+l . I — gn-M ^ J _ z »+9 m

l-z 2 .l-z 3 ....l-z« ' and since this expression is unaltered by the interchange of re and 8 we prove Hermite's Law of Reciprocity, which states that the asyzygetic forms of degree for the n ic are equinumerous with those of degree « for the ic .

The degree of the covariant in the variables is e = n0—2w; consequently we are only concerned with positive terms in the developments and (to, 9, re) — (to — 1 ; 8, re) will be negative unless «0 — 210 s o. It is convenient to enumerate the seminvariants of degree and order «- = re0 — 2to by a generating function; so, in the first written

generating function for seminvariants, write -5 for„z and az for a;*

we obtain

1-2T 2

1 — az”. 1 —az”” 2 . 1 —az”-. ...1 —air n+i . 1 —az~*

-az~ n

*in which we have to take the coefficient of a e z n *~ i °’, the expansion being in ascending powers of a. As we have to do only with that part of the expansion which involves positive powers of z, we must try to isolate that portion, say A n (z). For » = 2 we can prove that the complete function may be written*

kM-\Ml

where

and this is the rednced generating function which tells us, by its denominator factors, that the complete system of the quadratic is composed of the form itself of degree order 1, 2 shown by az 2 , and of the Hessian of degree order 2, o shown by a 2 .

Again, for the cubic, we can find

*a (.) 1— a’z**

3W l-oz 3 .l-a 2 z 2 .l-o 3 z 3 .l-o 4 ‘ where the ground forms are indicated by the denominator factors, viz. : these are the cubic itself of degree order 1,3; the Hessian of degree order 2, 2 ; the cubi-covariant G of degree order 3, 3, and the quartic invariant of degree order 4, o. Further, the numera- tor factor establishes that these are not all algebraically independent, but are connected by a syzygy of degree order 6, 6.

Similarly for the quartic

A«(«) =,

1 -aV

1 -az. 1 -a 2 . 1 -a 2 z 4 . 1 -a 3 . 1 -a’*’ establishing the 5 ground forms and the syzygy which connects them.*

The process is not applicable with complete success to quintic and

higher ordered binary forms. This arises from the circum- stance that the simple syzygies between the ground forms are not all independent, but are connected by second syzygies, and these again by third syzygies, and so on; this introduces new difficulties which have not been completely overcome. As regards invariants a little further progress has been made by Cayley, who established the two generating functions for the quintic

l-o 36

l-a.l-a*.l-a a .l-*

Ji?

and for the sextic

1 -a 2 . 1 -a 4 . 1 -a 1 . 1 -a 1 “. 1 -a 1 ‘

Accounts of further attempts in this direction will be found in Cayley’s Memoirs on Quantics (Collected Papers), in the papers of Sylvester and Franklin {Amer. J. i.-iv.), and in Elliott’s Algebra of Quantics, chap. viii.

Perpetuants. — Many difficulties, connected with binary forms of finite order, disappear altogether when we come t» consider the

form of infinite order. In this case the ground forms, called also perpetuants, have been enumerated and actual representative seminvariant forms established. Putting n equal to oo , in a generat- ing function obtained above, we find that the function, which enumerates the asyzvgetic seminvariants of degree 0, is

1

l-z 2 .l-z 3 .l-z 4 ….l-z9 that is to say, of the weight w, we have one form corresponding to each non-unitary partition of iv into the parts 2, 3, 4,.. .0. The extraordinary advantage of the transformation of Q to association with non-unitary symmetric functions is now apparent; for we may take, as representative forms, the symmetric functions which are symbolically denoted by the partitions referred to. Ex. gr., of degree 3 weight 8, we have the two forms (3 2 2), o(2 4). If we wish merely to enumerate those whose partitions contain

the figure 0, and do not therefore contain any power of o as a factor, we have the generator

1 -z 2 .l -zU z 4 1

If = 2, every form is obviously a ground form or perpetuant, and the series of forms is denoted by (2), (2 2), (2 3),...(2 +1)....*
Similarly, if 9 = 3, every form (i K+i 2ˆ) is a perpetuant. For these two cases the perpetuants arc enumerated by

z 2 z 3

FˆF" and i-z 2 .i— z 3 respectively.

When 6 = 4 it is clear that no form, whose partition contains a part 3, can be reduced; but every form, whose partition is com- posed of the parts 4 and 2, is by elementary algebra reducible by means of perpetuants of degree 2. These latter forms are enumer-

z 4 ated by t_ 2 t.j > hence the generator of quartic perpetuants

must be

l-z 2 .l-z 3 .l-z 4 l-z 2 .l-z 4 l-zM-z 3 .l-z 4 ' and the general form of perpetuants is (4« +1 3 +1 2>»).*

When 0ˆ5, the reducible forms are connected by syzygies which there is some difficulty in enumerating. Sylvester, Cayley and MacMahon succeeded, by a laborious process, in establishing the generators for0 = 5, and 0=6, viz.:

z" zˆ .

l-z 2 .l-z 3 .l-z 4 .l-z 5 ' l-z 2 .l-z 3 .l-z 4 .l-z».l-z 6 ' but the true method of procedure is that of Stroh which we are about to explain.

Method of Stroh. — In the section on " Symmetric Functions," it was noted that Stroh considers

(

8 8 s

where r... +

the fundamental form of seminvariant of degree and weight w; he observes that every form of this degree and weight is a linear

function of such symbolic expressions. We may write

(1 +

ffl 7T2 1T3

sum of terms, such as w\ %%%-ˆTˆr— which in real

7Tl! 7T2I7T3!

form is w\ aˆoˆoˆ.-.Sˆafˆ 3 … ; and, if we express Sa 1 ˆ 2 ** 3 … in terms of A 2 , A 3 ,…, and arrange the whole as a linear function*

of products of A 2 , As each coefficient will be a seminvariant,

and the aggregate of the coefficients will give us the complete asyzygetic system of the given degree and weight. When the proper degree is < w a factor a°~ e must be of course understood. Ex. gr.

ˆ(ffiai +(7jo 2 +(T 3 as-)-

= Oj(-2Aj)+of A 2 = (of -2a 2)A 2 = (2)A 2 =o§(2)A 2 . In general the coefficient, of any product AˆA A WJ …, will have, as

coefficient, a seminvariant which, when expressed by partitions, will have as leading partition (preceding in dictionary order all others) the partitic-n (xi7r2JT3…). Now the symbolic expression of the seminvariant can be expanded by the binomial theorem so as to be exhibited as a sum of products of seminvariants, of lower degrees if oiai-|- \----

(ffiGi+

such that

ff«+i+ ”’»+2+… +

Stroh assumes that every reducible seminvariant can in this way be reduced. The existence of such a relation, as ai--

Ex. gr. for 6 = 2, (oiai-)- 17202)”’; either

I — z 2

For = 3, (

*The general form is (3*2 and the generating function 1 1 _ 3 –*

For = 4, (f

*Hence every product of Ai, A 2 , A 3 , A4, which contains the product A 4 A 3 disappears before reduction; this means that every seminvariant, whose partition contains the parts 4, 3, is a perpetuant. The general form of perpetuant is (4*3 A 2′ l)andthegeneratingfunction*

2?

l-z 2 .l-z 3 .l-z 4 ‘ In general when is even and =2, the condition is

Vl …ˆII(» 1 +ˆII(a l +» 1 +«T i)…II(» 1 +o- | …ˆ)-0;..-

and we can determine the lowest weight of a perpetuant ; the degree in the quantities a is

24, + ct) + cf) + … + lct) = ˆ~ 1 -i = 2 e – 1 -i.

Again, if is uneven =2ˆ+1, the condition is and the degree, in the quantities

2 + i + (! * 2 i)(2 * 3 1).-. + (T)*

*= 2 2 *-l = 2 s_1 -l.*

Hence the lowest weight of a perpetuant is 2 e_1 — 1, when is >2. The generating function is thus

(1 -z 2)(l -z 3)(l -z 4)... (1 -z»)

The actual form of a perpetuant of degree has been shown' by MacMahon to l?e

(0'

,""*

*'jrrˆ—i**ˆ*

,0-3

■ 3+1 ,...3" 3+29 ">),

*"«> *»_!.• ••■"» Dem g given any zero or positive integer values.*

Simultaneous Seminvariants of two Binary Forms. — Taking the two forms to be

a y i +pa 1 xˆx 2 p(p-l)a 2 xˆxl... +aX, bˆ+qb.xpx.qiq – D b,xpxl... +bˆc\,

every leading coefficient of a simultaneous covariant vanishes by the operation of

aa a b = a oˆ. ai ˆ+... + ap _ 1 ˆ+b £ l b l ˆ-... +b q ˆ

Observe that we may employ the principle of suffix diminution to obtain from any seminvariant one appertaining to a (p — 1)" and a q — i' c , and that suffix augmentation produces a portion of a higher seminvariant, the degree in each case remaining unaltered. Remark, too, that we are in association with non-unitary sym- metric functions of two systems of quantities which will be denoted by partitions in brackets ( ),,, ( ) 6 respectively. Solving the equation

(Q a +S2b)u = 0, by the ordinary theory of linear partial differential equations, we obtain p+q--l independent solutions, of which p appertain to QaU = 0, qto Q b u = ; the remaining one is J o6 = a 6i— ttiio, the leading coefficient of the Jacobian of the two forms. This constitutes an algebraically complete system, and, in terms of its members, all seminvariants can be rationally expressed. A similar theorem holds in the case of any number of binary forms,

the mixed seminvariants being derived from the Jacobians of the several pairs of forms. If the seminvariant be of degree 0, 0′ in the coefficients, the forms of orders p, q respectively, and the weight w, the degree of the covariant in the variables will be p6 +q8′ — 2w = e, an easy generaliza- tion of the theorem connected with a single form.

The general term of a seminvariant of degree 8, 0′ and weight w will be

W a Pl P2_ _ ˆPPˆOˆlb” 2 . . . b°v

012 #012 a p i p 9

where 2p, = , So-, = and 2sp s + 2i

11 11

The number of such terms is the number of partitions of w into 0+0′ parts, the part magnitudes, in the two portions, being limited not to exceed p and q respectively. Denote this number by (w; 8, p\ 8′ . q). The number of linearly independent seminvariants of the given type will then be denoted by

(w ; 8, p ; 8’, q) – (w – 1 ; 8, p ; 8’, q) ; and will be given by the coefficient of aWs? in

1-z .

1— a. 1— az.l — 02 2 . ... 1— az”. 1—6. \—bz. 1— to 2 ... 1— iz«’ that is, by the coefficient of 2™ in

1 — z”” 1 . 1 — z”ˆ. ... 1 — z p+9 . 1 — z« 1 . 1 — z« 2 . ... 1 — z«+»’. 1 -z. 1 -z 2 . 1 -z 3 . ... 1 -z». 1 -z 2 . 1 -z 3 . ... 1 z»’ ‘ which preserves its expression when 8 and p and 0′ and g are separ ately or simultaneously interchanged.*

Taking the first generating function, and writing az p , bz q , ~ 2 for

a, b and z respectively, we obtain the coefficient of 8JK’ z p‘ˆ. t hat is of a«b< >‘z>, in

l-z-2 .

1 — azP. 1— OJP-2....1- az-P+2. 1— az-P. 1— 6z«. 1— te«-2. ...1 — 6z-8+2. 1 — !»-« ‘

the unreduced generating function which enumerates the covariants of degrees 6, 8′ in the coefficients and order e in the variables. Thus, for two linear forms, p = q=i, we find

1-z^ 2

1—az. 1—az- 1 . 1- the positive part of which is

1-ftz-i’

1—az. 1—bz. 1—ab’

establishing the ground forms of degrees-order (i, o; i), (o, i; i),

(i, I ; o), viz: — the linear forms themselves and their Jacobian]„b.

Similarly, for a linear and a quadratic, p = i, 2 = 2, and the reduced

form is found to be

1 -q 2 & 2 z’

1-az. l-6z 2 . l-abz. 1-6 2 . l-o 2 6′

where the denominator factors indicate the forms themselves, their Jacobian, the invariant of the quadratic and their resultant; connected, as shown by the numerator, by a syzygy of degrees- order (2, 2 ; 2).

The complete theory of the perpetuants appertaining to two or more forms of infinite order has not yet been established. For two forms the seminvariants of degrees I, 1 are enumerated by

— _, and the only one which is reducible is aj> of weight zero ;

hence the perpetuants of degrees I , I are enumerated by

1 , z

-1 =

and the series is evidently

1-z'

«.v

A- fl A + a A, % b >- a A + a i b i- a A,

one for each of the weights 1,2, 3,.. ad infin.

For the degrees 1, 2, the asyzygetic forms are enumerated by

YZ 1 _ 2 i and the actual forms for the first three weights are

Hi

(a o 6 i- fl A) J o,

(a A- a A + a AA, (°,A- a A + a A- a AA,

« (ftA-36,6,)-ai(6»-26 (,6 1);

amongst these forms are included all the asyzygetic forms of degrees 1, 1, multiplied by 60, and also all the perpetuants of the second binary form multiplied by ao; hence we have to subtract from the

1

and obtain the generating

generating function yzTZ a "d 1 _ 2 , function of perpetuants of degrees I, 2.

1 1 zf z 3

1-z. 1-z 2 1-z l-z 2- l-z. 1-z 2- The first perpetuant is the last seminvariant written, viz. : —

ˆA-sW-aˆrˆA),

or, in partition notation,

Oo(21) 6 -(l),,(2) 6 ; and, in this form, it is at once seen to satisfy the partial differential equation. It is important to notice that the expression

(8) (e'i'>.(e'i' l) 6 + (ei s).(e'i'- ,)i-... ± (»i').(»')»

denotes a seminvariant, if 8, 8', be neither of them unity, for, after

operation, the terms destroy one another in pairs: when = o, (8)" must be taken to denote Oo and so for 0'. In general it is a seminvariant of degrees 8, ff ', and weight 0+0'+s; to this there is an exception, viz., when = 0, or when 0'=o, the corresponding partial degrees are 1 and 1. When 8 = 0'= o, we have the general perpetuant of degrees 1, 1. There is a still more general form of seminvariant ; we may have instead of 0, 0′ any collections of non-unitary integers not exceeding 0, 0′ in magnitude respectively, Ex. gr.

(2ˆi k3 ...0 h9)a(V2′ l2 T..e" ie ')i (l2 X2 3 3 ..0 x s) a (l s " 1 2′ l2 3′ i3 ...0"'< > ')&*

+ (l 2 2 A2 3 A3 ...0 × 9) a (l s ~ 2 2" 2 3 M3 ...0′ f, <, ')&

(-)"(l 8 2 A2 3 X3 ...0ˆ) a (2′ 1 23 f ' 3 ...0′ ftfl ')6.

is a seminvariant; and since these forms are clearly enumerated by

- *1*

1 -z. 1 -z 2 . ... 1 -z». 1 -z 2 . 1 -z 3 . ... 1 -z 8 ' ' an expression which also enumerates the asyzygetic seminvariants, we may regard the form, written, as denoting the general form of asyzygetic seminvariant; a very important conclusion. For the case in hand, from the simplest perpetuant of degrees 1, 2, we derive the perpetuants of weight w,

a (21′ rt)6-a 1 (21<ˆ 3) ˆ +a 2 (21ˆ)c -••• 1-2(2)1., 'ao(2 2 l<ˆ(»-a 1 (2 2 l<°- 6)6+a 2 (2nˆ) 6 -... ±a,ˆ4(2 2) (,, a (2 3 l"-«) i ,a 1 (2 3 l»') i) +a 2 (2 3 l»-8) ! ,-... =fca»-6(2 3) i „

a series of ~(w — 2) or of -(w—i) forms according as w is even or

uneven. Their number for any weight w is the number of ways of composing w— 3 with the parts 1, 2, and thus the generating function is verified. We cannot, by this method, easily discuss the perpetuants of degrees 2, 2, because a syzygy presents itself as early as weight 2. It is better now to proceed by the method of Stroh.

We have the symbolic expression of a seminvariant.

— (

i_2_ _ ;_ _i .

s\~sl~-~ a "s\~s\~~ 0s '

and r... +t 8 = 0.

Proceeding as we did in the case of the single binary form we find that for a given total degree 0+0', the condition which expresses reducibility is of total degree 2 8+s ' -1 — 1 in the coefficients a and "r; combining this with the knowledge of the generating function of asyzygetic forms of degrees 0, 0', we find that the perpetuants of these degrees are enumerated by

z 2 ^'- 1 -!

1 -z. 1 -z 2 . 1 -z 3 . ... 1 -s«. 1 -z 2 . 1 -z 3 . ... 1 -z»"

and this is true for 0+0′ = 2 as well as for other values of 0+0′ (com- pare the case of the single binary form).

Observe that, if there be more than two binary forms, the weight of the simplest perpetuant of degrees 0, 0', 0",... is 2 e+«'8"..l — i, as can be seen by reasoning of a similar kind. To obtain information concerning the actual forms of the per petuants, write

(l+

For the case 0=1, 0′ = l, the condition is

(titi =AiBi =0, which since Ai+Bi = o, is really a condition of weight unity. For w = l the form is Aiai + BA, which we may write a^bi— aib =

a„(i)i, — (i) o 6 ; the remaining perpetuants, enumerated by — — -,

have been set forth above.

For the case = 1, 0′ = 2, the condition is o-itiT2 = AiB 2 = 0; and the simplest perpetuant, derived directly from the product AiB 2 , is (1)0(2)4 — (21)1,; the remainder of those enumerated by

z 3 — — — — j may be represented by the form

(l Xl+1)„(2« +1) ! ,-(l A i)„(2 fl2+1 l)6+... ±(2"-2 +1 l A i +1)i,; Xi and Ma each assuming all integer (including zero) values. For the case = 0′ = 2, the condition is

•nwiTiCffi+oiXoi+nX^+h) = -AlBiBa-AiAaBl =0. To represent the simplest perpetuant, of weight 7, we may take as base either A|BiB 2

or AiA 2 B|, and since Ai + Bi=o the former is equivalent to AiAlB 2 and the latter to A 2 BiBf,; so that we have,

apparently, a choice of four products. 'A|BiB 2 gives (2 2),, (2i)& — (2 2 i),,(2) 6 , and AiAˆB 2 ,(2 !! l)a(2)!,-(2 2),,(2l)i > ; these two merely differ in sign; and similarly A 2 BiB| yields (2)a(2 2 l)i, — (2i),,(2 2)j, and that due to AiA 2 BjS merely differs from it in sign. We will choose from the forms in such manner that the product of letters A is either a power of Ai, or does not contain Ai; this rule leaves us with A|BiB 2 and A 2 BiB|; of these forms we will choose that one which in letters B is earliest in ascending dictionary order; this is AiBiB 2 , and our earliest perpetuant is

(2").(21)»-(2«1).(2)», and thence the general form enumerated by the generating function

(1- Z)(1-Z 2) 2

(2 s +2) (2w + llMi+i) 6 _ (2ˆ 2+2 l) (2" 2+1 l«) 6 + ... =K2 X2+ V* +1) a (2* 2+1) b . For the case 0= 1, 0'=3, the condition is*

< r 1 T 1 r 2 r3(ffl + r 1)(a 1 + r 2)(ˆ 1 + T 3)=A 1 BI+A 2 B 2 B3 = 0.

By the rules adopted we take AfB 2 B 3 , which gives

(l 2) a (32),,-(l) (321) i , +a,,(321 2) ! ,, the simplest perpetuant of weight 7; and thence the general form enumerated by the generating function

z 7

1-z. 1-z 2 . 1-z 3 '

viz: — (l 1+2),,(3"3 +1 2' Xi!+1)i) — — ±a o(3'* s+1 2' l2+1 i Al+2)&) For the case 9 = 2, 0' = 3, the condition is*

X(r 1 + r 2)(r 1 + r 3)(r 2 +r 3)=0.

The calculation results in

-AjBsB 2 B 2 +2A§B 3 BiB 2 -AtB 3 B£B 2 . +A3B!B 1 -2A»BiB 2 B

1 -A 2 ,BIB s B?+AlBIBlB 1 +A 2 BIBIB?+AlB3Bf-2A 2 B|B 2 B? +A 2 B|B! = 0.

By the rules we select the product A|B 3 B 2 B?, giving the simplest perpetuant of weight 15, viz: —

(2<) (321 2) 6 – (2n) a (321) b +(2n 2) <1 (32) i , ; and thence the general form

(2 X2+4) a (3" 3+1 2^ +1 l' i i +2)j-...±(2 ;i 2 +4 l' 1 i +2)a(3 At3+1 2^ +1)6) due to the generating function

(l-z)(l-Z 2) 2 (l-Z 3)

For the case 0=i, 0' = 4, the condition is

ff l T i r 2 T 3 T 4K+ T lX ff l+ T 2X ff l+ T 3K (T l+ T 4) II (T . + T |) =0:

the calculation gives

A 1 B 4 (A 2 B 2 +A,B3+B4)(-B!-A 1 B 2 B 3 -AfB 4)=0.
Selecting the product AJB4B3B 2 ., we find the simplest perpetuant (l 4)„(432 2) 6 -(l 3)4432 2 l) J -Kl 2)«(432 2 l 2) b -(l)

+o (432 2 l 4)6, and thence the general form

(l Al+4)o(4 f ' 4+1 3 U3+1 2 M2+2)6 — ... ± 0o(4 /X4+1 3" 3+:1 2'* 2+2 l Al+4)b due to the generating function

1-z. 1-z 2 . 1-z 3 . 1-z 4 "

The series may be continued, but the calculations soon become very laborious.

V. Restricted Substitutions

We may regard the factors of a binary n ic equated to zero as denoting n straight lines through the origin, the co-orrfinates being Cartesian and the axes inclined at any angle. Taking the variables to be x, y and effecting the linear transformation

z = XiX+miY,

y = X 2 X+ M2 Y, so that

y * 2 +^x y Xif-X*

y'

M2 — Mlv

x , YX

Ml x

it is seen that the two lines, on which lie (x, y), (X, Y), have a definite projective correspondence. The linear transformation replaces points on lines through the origin by corresponding points on protectively corresponding lines through the origin; it therefore replaces a pencil of lines by another pencil, which corresponds projectively, and harmonic and other properties of pencils which are unaltered by linear transformation we may expect to find indicated in the invariant system. Or, instead of looking upon a linear substitution as replacing a pencil of lines by a protectively corresponding pencil retaining the same axes of co-ordinates, we may look upon the substitution as changing the axes of co-ordinates retaining the same pencil. Then a binary n ic , equated to zero, represents «

straight lines through the origin, and the x, y of any line through the origin are given constant multiples of the sines of the angles which that line makes with two fixed lines, the axes of co-ordinates. As new axes of co-ordinates we may take any other pair of lines through the origin, and for the X, Y corresponding to x, y any new constant multiples of the sines of the angles which the line makes with the new axes. The substitution for x, y in terms of X, Y is the most general linear substitution in virtue of the four degrees of arbitrariness introduced, viz. two by the choice of axes, two by the choice of multiples. If now the n ic denote a given pencil of lines, an invariant is the criterion of the pencil possessing some particular property which is independent alike of the axes and of the multiples, and a covariant expresses that the pencil of lines which it denotes is a fixed pencil whatever be the axes or the multiples.

Besides the invariants and covariants, hitherto studied, there are others which appertain to particular cases of the general linear substitution. Thus what have been called seminvanants are not all of them invariants for the general substitution, but are invariants for the particular substitution

**i = Xi£i+/*

Again, in plane geometry, the most general equations of substitution which change from old axes inclined at 01 to new axes inclined

at »' = /3 — a, and inclined at angles a, to the old axis of x, without change of origin, are

sin(ci) — a),, , sin(« — S). T

*x= — *— — -X.4 % — Y,*

sin a sin 01 '

a transformation of modulus

J sin u

■ *sin ff sin to '*

The theory of invariants originated in the discussion, by George Boole, of this system so important in geometry. Of the quadratic

ax 2 -{-2bxy--cy 2 , he discovered the two invariants

ac — 6 2 , a — 26coso)-|-c,

and it may be verified that, if the transformed of the quadratic be

AX 2 ˆ2BXY+CY 2 ,

AC-B 2 –

/ sin \s

;)(«-!'),

A-2Bcosa>'+C= (SHLii') 2 (a -26cosai+c). \sin 01 ! '

The fundamental fact that he discovered was the invariance of

a 2 +2 cos u xy+y 2 , viz. —

x 2 +2 cos w Ky+y !! = X 2 +2 cos to'XY+Y 2 , from which it appears that the Boolian invariants of ax 2 --2bxy— y 2 are nothing more than the full invariants of the simultaneous quadratics

ox 2 +2 bxy+y, x 2 +2 cos a xy'+y 2 ,*

the word invariant including here covariant. In general the Boolian system, of the general it", is coincident with the simultaneous system of the n ic and the quadratic ac 2 -|-2 cos » xy+y 2 .

Orthogonal System. — In particular, if we consider the transformation from one pair of rectangular axes to another pair of rectangular axes we obtain an orthogonal system which we will now briefly inquire into. We have cos o>' = cos 01 = and the substitution

Xi = cos OX! —sin 0X 2 x 2 = sin 0Xi +cos 0X 2 ,

with modulus unity. This is called the direct orthogonal substitution, because the sense of rotation from the axis of Xi to the axis of X 2 is the same as that from that of Xi to that of x 2 . If the senses of rotation be opposite we have the skew orthogonal substitution j

Xi=cos0Xi+sin0X 2 , Xt = sin 0Xi — cos0X 2 ,

of modulus — 1. In both cases -7— and t— are cogredient with Xi

and Xi ; for, in the case of direct substitution,

A. – d dxi'

d ■ » d < „ d . dx- 2 = sia$ dXi+ cos0 dX ˆ • and for skew substitution

d „ d , . „ d

dx+ sin0 dXi'

- cose dxr s ' me dx 2

dxi~

— = • d ' dx 2 <2Xi

■COS0

dXi

Hence, in both cases, contragrediency and cogrediency are identical, and contravariants are included in covariants.

ALGECIRAS

641

Consider the binary «". (a\Xi--aiXt) n — a x , and the direct substitution

*i=XXi— /iXj,

*2 = mXi+XX 2i where X 2 -f-jii 2 = l; X, M replacing cos 8, sin respectively. In the notation

a x =diXi--a2X2, observe that

Suppose that

a x = b x = Cx~ .•• is transformed into

A X = B X = Cx = ... then of course (AB) = (ab) the fundamental fact which appertains to the theory of the general linear substitution; now here we have additional and equally fundamental facts ; for since

Ai — \ai--iiOi, A 2 = — /jOi+XOj, A A = Af+Ai = (X 2 + M 2) (a?+ai)=a«; A B = A 1 B 1 +A 2 B 2 = (X2+M 2)(ai*i+a262) =a b ; (XA) = XiA 2 — X 2 Ai = (X*i-|-m*2)(— WJi+Xoa).

- (-Mˆi+Xx2)(Xoi+Mas) = (X 2 +M 2)(3Ci0 2 -»2ai) = (xa) ;

showing that, in the present theory, a a , ab, and (xa) possess the invariant property. Since x\+x\ = x x we have six types of symbolic factors which may be used to form invariants and covariants, viz. —

(ah), Oa, a b , [xa), a x , *,. The general form of covariant is therefore

(ab) > (ac) »» (be) . M Wc.4aW...

X(xa) h (xbˆ(xc) k ..aˆc x ..x7

= (AB) h (AC) H (BC) * 3 ...A£BifC; ; 3 ...A£A , c 2 B) c '...

X(XA) tl (XB)* 2 (XC)* 3 ...AˆBˆCˆ...Xx- If this be of order t and appertain to an »*"

Xk+2l+2m = e, h+h+...+2ii+ji+ji+...+ki+l 1 = n, hi+h s +...+2i i +j l j,...+k 2 +l 2 = n, ■ h2+h 3 + ...+2i 3 +J2+j s +...+k 3 +h=*n;

viz., the symbols a, b, c,... must each occur n times. It may denote a simultaneous orthogonal invariant of forms of orders Wi, » 2 , »i,.... ; the symbols must then present themselves Hi, » 2 , 113... times respectively. The number of different symbols a, b, c,.. .denotes the degree 6 of the covariant in the coefficients. The coefficients of the

covariants are homogeneous, but not in generalisobaric functions, of the coefficients of the original form or forms. Of the above general form of covariant there are important transformations due to the symbolic identities: —

(aby = a a b b -al; (xa) J = o x x -o|;

as a consequence any even power of a determinant factor may be expressed in terms of the other symbolic factors, and any uneven power may be expressed as the product of its first power and a function of the other symbolic factors. Hence in the above general form of covariant we may suppose the exponents

hi, lh, hz,...k\, kz, kz,... if the determinant factors to be, each of them, either zero or unity. Or, if we please, we may leave the determinant factors untouched and consider the exponents j u j 2 , js,---h, h, h,— to be, each of them, either zero or unity. Or, lastly, we may leave the exponents h, k,j, I, untouched and consider the product

to be reduced either to the form g where g is a symbol of the series*

a, b, c,... or to a power of x x . To assist us in handling the symbolic products we have not only the identity

{ab) c x + (bc)a x + (ca) b x = 0, but also

(ab)x x + (bx)a x + (xa)b x = 0, (ab)a e + (bc)a a \ (ca)ab = 0, and many others which may be derived from these in the manner which will be familiar to students of the works of Aronhold, Clebsch and Gordan. Previous to continuing the general discussion it is useful to have before us the orthogonal invariants and covariants of the binary linear and quadratic forms.

For the linear forms a xi+a l X2 = a x = b x there are four fundamental forms

(i.) a I = a a x l +aiX i of degree-order (1, 1), (ii.) x x = x]+x_ „ (0,2),

(in.) (xa)=aiX ! —a X2 ,, (1,1),

(iv.) a b = al+a\ „ (2,0),

(iii.) and (iv.) being the linear covariant and the quadrinvariant

respectively. Every other concomitant is a rational integral function of these four forms. The linear covariant, obviously the Jacobian of a x and x x is the line perpendicular to a x , and the vanishing of the quadrinvariant aj is the condition that a x passes through one of the circular points at infinity. In general any pencil of lines, connected with the line a x by descriptive or metrical properties, has for its equation a rational integral function of the four forms equated to zero. _ _ _

For the quadratic Osfc-- 2a l #i*:2 +02*!, we have (i.) a\ =‘a l x\ +2’a\x l x i +aˆx\, (ii.) x x =x\+xi,

(iii.) (aS) 2 _=2(aoa 2 -a?),

(iv.) a«=a -|-a 2 ,

(v.) (xa)a x = aixl + (a 2 — a)»ix 2 — a\x. This is the fundamental system; we may, if we choose, replace (ab) 1 bya% = a’+2al+al since the identity a a bb—a% = (ab)’ t shows the syzygetic relation

(iio+iˆ) 2 — (ajj +2af +ai) =2(ao02 — a\).

There is no linear covariant, since it is impossible to form a symbolic product which will contain x once and at the same time appertain to a quadratic, (v.) is the Jacobian; geometrically it denotes the bisectors of the angles between the lines a 2 , or, as we may say, the common harmonic conjugates of the lines a| and the lines x x . The linear invariant do is such that, when equated to zero, it determines the lines a% as harmonically conjugate to the lines *« ; or, in other words, it is the condition that o 2 may denote lines at right angles.

References. — Cayley, ” Memoirs on Quantics,” in the Collected Mathematical Papers (Cambridge, 1898); Salmon, Lessons Introductory to the Modern Higher Algebra (Dublin, 1885).; E. B. Elliott, Algebra of Quantics (Oxford, 1895); F. Brioschi, Teoria dei Covarianti (Rome, 1861); W. Fiedler, Die Elemente der neueren Geometrie und der Algebra der binaren Formen (Leipzig, 1862); A. Clebsch, Theorie der binaren Algebraischen Formen (Leipzig, 1872); Vorlesungen uber Geometrie (Leipzig, 1875); Faa de Bruno, Theorie des formes binaires (Turin, 1876); P. Gordan, Vorlesungen uber Invariantentheorie, Bd. i. “Determinanten” (Leipzig, 1885); Bd. ii. ” Binare Formen ” (Leipzig, 1887) ; G. Rubini, Teoria delle forme in generate, e specialmente delle binarie (Leue, 1886) ; E. Study,

Methoden zur Theorie der Terndren Formen (Leipzig, 1889) ; Lie, Theorie der Transformationsgruppen (Leipzig, 1888-1890) ; Franz Meyer, Bericht uber den gegenwartigen Stand der Invarianientheorie; Jahresberichl der Deutschen Matkematiker-Vereinigung, Bd. i. (Berlin, 1892); Encyklopddie der mathematischen Wissenschaften, Bd. i., Heft 3, 4, by Heinrich Burkhardt and Franz Meyer (Leipzig, 1899) ; J. H. Grace and A. Young, The Algebra of Invariants (Cambridge, 1903). (P. A. M.)

ALGECIRAS, or Algeziras, a seaport of southern Spain in the province of Cadiz, 6 m. W. of Gibraltar, on the opposite side of the Bay of Algeciras. Pop. (1900) 13,302. Algeciras stands at the head of a railway from Granada, but its only means of access to Gibraltar is by water. Its name, which, signifies in Arabic the island, is derived from a small islet on one side of the harbour. It is supplied with water by means of a beautiful aqueduct. The fine winter climate of Algeciras attracts many invalid visitors, on whom the town largely depends for its prosperity. The harbour is bad, but at the beginning of the 20th century it became important as a fishing- station. Whiting, soles, bream, bass and other fish are caught in great quantities by the Algeciras steam-trawlers, which visit the Moroccan coast, as well as Spanish and neutral waters. There is also some trade in farm produce and building materials which supplies a fleet of small coasters with cargo.

Algeciras was perhaps the Tortus Albus of the Romans,, but it was probably refounded in 713 by the Moors, who retained possession of it until 1344. It was then taken by Alphonso XI. of Castile after a celebrated siege of twenty months, which attracted crusaders from all parts of Europe; among them being the English earl of Derby, grandson of Edward III. It is said that during this siege gunpowder was first used by the Moors in the wars of Europe. The Moorish city was destroyed by Alphonso; it was first reoccupied by Spanish colonists from Gibraltar in 1704; and the modern town was erected in 1760 by King Charles III. During the siege of Gibraltar in 1780-1782, Algeciras was the station of the Spanish fleet and floating batteries. On the 6th of July 1801 the English admiral Sir James Saumarez attacked a Franco-Spanish fleet off Algeciras,

and sustained a reverse; but on the 12th he again attacked the enemy, whose fleet was double his own strength, and inflicted on

them a complete defeat. The important international con- ference on Moroccan affairs, which resulted in an agreement between France and Germany, was held at Algeciras from the 16th of January to the 7th of April 1906. (See Morocco).

ALGER OF LIEGE (d c. 1131), known also as Alger of Cluny and Algerus Magister, a learned French priest who lived in the first half of the 1 2th century. He was first a deacon of the church of St Bartholomew at Liege, his native town, and was then appointed (c. 1100) to the cathedral church of St Lambert. He declined many offers from German bishops and finally retired to the monastery of Cluny, where he died about 1 131 at a great age and leaving a good reputation for piety and intelligence. His History of the Church of Liege, and many of his other works, are lost. The most important of those still extant are: 1. De Misericordia et Justilia, a collection of biblical and patristic extracts with a commentary (an important work for the history of church law and discipline), which is to be found in the Anecdota of Martene, vol. v. 2. De Sacramentis Corporis et Sanguinis Domini ; a treatise, in three books, against the Berengarian heresy, highly commended by Peter of Cluny and Erasmus. 3. De Gratia et Libero Arbitrio; given in B.. Pez's Anecdota, vol. iv. 4. De Sacrificio Missae; given in the Collectio Scriplor. Vet. of Angelo Mai, vol. ix. p. 371.

See Migne, Patrol Ser. Lat. vol. clxxx. pp. 739-972; Herzog- Hauck, Realencyk. fur prot. Theol., art. by S. M. Deutsch.

ALGER, RUSSELL ALEXANDER (1836-1907), American soldier and politician, was born in Lafayette township, Medina county, Ohio, on the 27th of February 1836. Left an orphan at an early age, he worked on a farm to pay his expenses at Richfield (Ohio) Academy, was a schoolmaster for two winters, and, having studied law in the meantime, was admitted to the bar in 1859. He began practice at Cleveland, Ohio, but early in i860 he removed to Michigan, where he abandoned his profes- sion and engaged in the lumber business. Enlisting in a Michigan cavalry regiment in September 1861, he rose from captain to colonel, distinguished himself in the Gettysburg campaign and under Sheridan in the Shenandoah Valley, and in 1864 and 1865 respectively received the brevets of brigadier-general and major-general of volunteers. After the war he invested exten- sively in pine lands in Michigan, and accumulated a large fortune in the lumber business. In 1884 he was elected governor of Michigan on the Republican ticket, serving from 1885 to 1887. In 1889-1890 he was commander-in-chief of the Grand Army of the Republic. From 1897 to 1899 he was secretary of war in President McKinley's

cabinet. His administration of the war department during the Spanish-American War was severely criticized for extravagance in army contracts, for unpreparedness, and for general inefficiency, charges which he answered in his The Spanish- American War (1901). The extent of his personal responsibility is at least uncertain. In 1902 he was appointed by the governor of Michigan, and in 1903 was elected by the state legislature, as United States senator to complete the unexpired term of James McMillan (1838-1902). He died at Washington, D.C., on the 24th of January 1907.

ALGERIA (Algerie), a country of North Africa belonging to France, bounded N. by the Mediterranean, W. by Morocco, S. by the Sahara and E. by Tunisia. The boundaries, however, are in part not accurately determined. Algeria extends for about 650 m. along the coast, and stretches inland from 320 to 380 m., lying between 2° 10′ W. and 8° 50′ E., and 32° and 37 N. It is divided, politically, into three departments, — Oran in the west, Algiers in the centre and Constantine in the east. Its area is 184,474 S Q- m v exclusive of the dependent Saharan regions, which have an area of some 750,000 sq. m. (see Sahara, Tuat, &c).

Physical Features. — The character of the Algerian coast is severe and inhospitable. The western half is bordered by a hilly rampart, broken only here and there, in the bays where the larger streams find their outlet, by fiat and sandy plains. Between Delb/s and Philippeville high mountains rise almost sheer from

the sea, leaving only a narrow strip of beach. East of Philippe- ville the mountains recede from the coast, and the rampart of hills reappears. Only between Bona and La Calle is the general character of the sea-board low and sandy. Save near the towns and in the cultivated district of Kabylia, the coast is bare and uninhabited; and in spite of numerous indentations, of which the most important going from west to east are the Gulf of Oran, the Gulf of Arzeu, the Bay of Algiers, and the gulfs of Bougie, Stora and Bona, there are few good harbours. From time immemorial, indeed, this coast has had an evil reputation among mariners, quite apart from the pirates who for centuries made it the base of their depredations. A violent current, starting from the Straits of Gibraltar, rushes eastward along the shore, and, hurled back from the headlands, is deflected to the west. In summer the east wind brings dense and sudden fogs; while in winter the northerly gales blow straight into the mouths of the harbours. In these circumstances navigation is especially perilous for sailing craft. The terrors of this "savage sea and inhospitable shore,"

once described by Sallust, have, however, been greatly mitigated by the introduction of steam, the im- provement of the harbours, and the establishment by the French government of an excellent system of lighthouses.

Southward from the sea the country falls naturally into three divisions, clearly distinguished by their broad physical character- istics. The healthy, and on the whole fertile coast region, from 50 to 100 m. in width, is known, as in Morocco and Tunisia, as the Tell (Arabic for " hill "). It is a mountainous country intersected with rocky canons and fertile valleys, which occasion- ally broaden out into alluvial plains like that of the Shelif, or the Metija near Algiers, or those in the neighbourhood of Oran and Bona. Behind the Tell is a lofty table-land with an average elevation of 3000 ft., consisting of vast plains, for the most part arid or covered with esparto grass, in the depressions of which are great salt lakes and swamps (Arabic, shats) fed by streams which can find no outlet to the sea through the encircling hills. To the south this region is divided by the Great Atlas from the deserts of the Sahara, with its oases, in which the boundary of Algeria is lost.

The country is traversed by lofty ranges of the Atlas system, which run nearly parallel to the coast, and rise in places over 7000 ft. These are commonly divided into two leading chains, distinguished as the Great 1 and Little Atlas. The Great, or Saharan Atlas contains some of the highest points in the country. The chief ranges are Ksur and Amur in the west and the Aures in the east. The peak of Shellia, the highest point in Algeria, in the Aures range, has a height of 761 1 ft. In the Amur are Jebel Ksel (6594 ft.) and Tuila Makna (6561 ft.). The Little Atlas, otherwise the Tell or Maritime Atlas, lies between the sea and the Saharan Atlas, and is composed of many distinct ranges, generally of no great elevation and connected by numerous transverse chains forming extensive table-lands and elevated valleys. The principal ranges of the Little Atlas — from west to east — are the Tlemcen (5500 ft.); the Warsenis (with Kef Sidi Omar, 6500 ft.) ; the Titeri (4900 ft.) ; the Jurjura, with the peak of Lalla Kedija (7542 ft.) and Mount Babor (6447 ft.); and the Mejerda (3700 ft.), which extends into Tunisia. The Jurjura range, forming the background of the plains between Algiers and Bougie, extends through the district of Kabylia, with which for grandeur of scenery no other part of Algeria can compare. South of the Jurjura and separated from it by the valley of the Sahel, is the Biban range with a famous double pass of the same name, through which alone access is gained to the highlands beyond. The Bibans or Portes de fer (Iron Gates) consist of two defiles with stupendous walls of rock,

which by erosion have assumed the most fantastic shapes. In the case of the Petite porte the walls in some places are not more than twelve feet apart. The Dahra range (see Mostaganem) overlooks the sea, and is separated from the Warsenis by the valley of the Shelif (see Atlas Mountains, Sahara and Tuat).

The rivers are numerous but the majority are short. Most

1 The name "Great" Atlas is more correctly applied to the main range in Morocco.

English Miles

010 20 40 60 80 100

Railways..

Principal routes.

eD iterbanean S\ E A

"? >h

Ca'ita Is.

Ggli

'tit

*J?**

[Enfidaville

JˆBos Kapudia ˆr ˆVj-i / Kucha

6rf// of Gates

(SyrtiS Minor)

— IS

'A i fn VS-eNf jva' ˆ , >r 5 i G » ft/ a f >-■

I T 1ˆ R

‘ˆJorfjd-Atful “..■ ;/*

../ .£’:

ElGoleacf

WarglaR

£ ifk”””” f/i .■::. , ■ V Vsˆ%C’

*.Q**ˆ—’” ■■■■”■ 9 ””«l M . e x.£L J|*

J

—v.

‘s

3′

Lang. W. of Greenwich o Longitude East of Greenwich J5

D

Emery Vtlktt sc

of them rise in the mountains near the coast, and rush down through deep and rocky channels. During the rainy season they render communication between different parts of the country extremely difficult. The most important river, both from its length and volume, is the Shelif . It rises on the northern slopes of the Amur mountains and flows N.E. across the high plateau, piercing the little Atlas between the Warsenis and Titeri ranges. It then turns W. and reaches the Mediterranean at the eastern end of the Gulf of Arzeu. The Shelif, which has many tributaries, is about 430 m. long. The Seybuse (about 150 m. long), formed by the union of several small streams in the department of Constantine, runs through a fertile valley and reaches the Mediterranean near Bona. The Sahel (about 100 m. long) , which contains the greatest body of water after the Shelif, rises in the department of Algiers near Aumale, and flows for the most part N.E. to its mouth near Bougie. The Kebir or Rummel — the river is known by both names — is formed by the union of several small streams south of Constantine, and flows past that town N.W. 140 m. to the sea. Among the less important rivers which empty into the Mediterranean are the Macta, the Tafna, the Harrach and the

Mazafran. The Macta, but 3 m. long, enters the sea in the Gulf of Arzeu, some 25 m. W. of the mouth of the Shelif. It is formed by the Habra (140 m.) and the Sig (130 m.), which rise in the Amur mountains and flowing north unite in a marshy plain, whence issues the Macta. On the lower courses of the Habra and the Sig, barrages have been built for irrigation purposes. The Habra barrage holds 38,000,000 cubic metres; that on the Sig 18,000,000. The Tafna (about 100 m.) rises in a large cavern in the mountains south of Tlemcen and flows N.E. to the sea at Rachgun. It has many affluents; the largest, the Isser (70 m.), joins it on the east bank about 30 m. above its mouth. The Harrach (40 m.), a picturesque stream, enters the Mediterranean in the Bay of Algiers. The Mazafran (50 m.) crosses the plains S.W of Algiers, reaching the sea N. of Kolea. The Mejerda and its affluent the Mellegue, rivers of

Tunisia (q.v.), have their rise in Algeria, in the mountainous country east of Constantine. None of these rivers is navigable. Besides these there are a number of streams in the interior, but they are usually dry except in the rainy season.

Algeria abounds in extensive salt lakes and marshes. Of the lakes in the northern part of the country near the coast the principal are, — the Fezara, 14 m. S.W. of Bona ; Sebkha and El Melah, south of Oran; and three small lakes in the immediate vicinity of La Calle. In the high plateaus are the Shat-el-Gharbi or Western Shat, the Shat-el-Shergui or Eastern Shat, the Zarhez- Gharbi and the Zarhez-Shergui, the Shat-el-Hodna and a number of others. South of the Jebel Aures is another series of salt lakes closely connected with the Shat-el-Jerid (of Tunisia) . The chief of these is the Shat Melrir. There are a number of warm mineral springs, containing principally salts of lime, used with success by both Arabs and Europeans in several kinds of disease.

One of the most remarkable groups of springs is near Guelma, in the department of Constantine. There are two principal sources. Their waters unite in one stream whose course is marked by gigantic limestone cones, some of which are 36 ft. high. The water, which is at boiling point, falls into natural basins of a creamy white colour, formed by the deposit of carbonate of lime. The springs are known to the Arabs as Hammam Meskutin (the " accursed baths "). The name and the cones are accounted for by a legend which represents that at this spot lived a sheikh who, finding his sister too beautiful to be married to anyone else, determined to espouse her himself. Whilst the marriage fes- tivities were being celebrated the judgment of Heaven descended on the guilty pair; fire came from below; the water

became hot and the sheikh and his sister were turned into stone. Within a mile of Hammam Meskutin are ferruginous and sulphureous springs.

[Geology. — The geology of Algeria has been worked out in considerable detail by French geologists. Rocks of Archean and Palaeozoic ages contribute only a small share, but there is a

very complete sequence of formations from the Lias to those of recent date. An interesting and orderly petrological sequence of Tertiary igneous rocks has been determined.

Archean rocks form the cores of the ancient crystalline masses within the littoral zone from Algiers to Bona. They consist of gneiss, mica-schist, quartzites, crystalline limestones and conglomerates. Primary deposits are doubtfully represented by the detached fragments of unfossiliferous strata of Traras, Blida and east of Orleansville. Carboniferous and Permian strata are possibly represented by some black and grey micaceous shales with beds of coal in the Jurjura. At Jebel-kahar and west of Traras, Pomel attributes certain conglomerates, red sandstones and purple and green shales to the Permian. The rocks of Secondary and Tertiary ages have been profoundly affected by the Alpine movements, and are thrown into a series of complex folds, so that in numerous instances their stratigraphy is imperfectly understood. The gypsiferous and sali- ferous marls of Shellata, Suk Ahras and Ain Nussi have yielded Triassic fossils. Triassic rocks are considered to be present in Constantine and in the Jurjura. Rhaetic beds (Infra Lias), consisting of dolomites and siliceous limestones, have been recognized at Saida. The lower and middle divisions of the Jurassic, composed of massive limestones more or less siliceous and overlain by the marls amd highly fossiliferous limestones of the Upper Lias, play an important part in the constitution of the chief mountains of the Tell. In south Oran they determine the principal axes of the mountain ranges. The Inferior Cre- taceous rocks include the Neocomian and Gault (Albian and Aptian) subdivisions, and form the flanks of the mountains in the Tell. In the south the Albian subdivision of the Gault is alone represented. Rocks of Upper Cretaceous age are repre- sented in all their stages. The Cenomanian presents two distinct facies. North of the Atlas it belongs to the European type, in the south it contains a fauna of oysters and sea-urchins belonging to the facies " africano-

syrian " of Zittel. There is a continuous transition between the Senonian and Danian, proving that the Algerian region did not participate in the immersion which occurred in Provence and in the Corbieres of southern France during the Danian epoch. The Lower Eocene rocks contain the chief phosphatic deposits of Algeria, those of the Tebessa region being the best known. Certain species of nummulites, which are very common, distinguish the various subdivisions of the Eocene. The highest beds, consisting of quartzites, shales, marls and sandstones with the remains of fucoids, are found in the Jurjura and Shellata. The Oligocene period consists of a marine phase confined to the littoral zone of Kabylia, and of a continental phase occupying vast areas composed of lacustrine, alluvial, gypsiferous marls, sandstones and conglomerates. The Miocene formation obtains its greatest development in Oran and is much expanded in the Tell. At the close of the Lower Miocene period (beds with Ostrea crassissima) great modifications in the relief and limits of the Algerian formations took place. Hitherto marine conditions were confined to the littoral; in Middle Miocene times (Helvetian) the sea broke in and spread in a south-east direction in the form t>f long ramified fjords but did not extend as far as the Sahara. To the Pliocene period the marine deposits of the Sahel of Algiers and of the Sahel Jijelli must be attributed; also the lacustrine marls and limestone of the basin of Constantine, and the ancient alluviums of the basins and depressions which bear no relation to the existing valleys. Among the Tertiary volcanic rocks those of acid types (granites, granulites) were the first to appear and are developed latitudinally; rocks of intermediate type (dacites, andesites) characterize the Miocene and early Pliocene periods; while the basic rocks (ophites, elaeolite syenites and basalts) attained their maximum in later Pliocene and Quaternary times. Their development, feeble as compared with the acid rocks, is meridional. The Quaternary period includes an older stage containing fragments of fossils from the underlying forma- tions; a later stage containing the bones of Hippopotamus, Elepkas, Rhinoceros, Camelus, Equus; and finally the vast accumulations of sand which began to be formed in prehistoric

times. The broad platforms of the hamada are covered with Quaternary deposits. (W. G.)]*

Climate. — Although Algeria enjoys a warm climate, the temperature varies considerably in different parts, according to the elevation and configuration of the country. Along the coast the weather is very mild, the thermometer rarely falling to freezing-point even in winter. The coldest month is January, the hottest August. The mean annual

temperature in the coast plains is 66° F. Heavy rains prevail from December to March, and rain is not uncommon during other months also, excepting June, July, August and September, which are very hot and rainless. The average annual fall is 29 in. On the mountains and the high plateaus the winter is often very severe; snow lies for six months on the higher peaks of the Kabyle mountains. On the plateaus the temperature passes from one extreme to the other, and rain seldom falls. (For the climate of the Saharan region see Sahara.) Throughout Algeria, especi- ally in the summer, there is a great difference between day and night temperature, notably in the inland districts. Between May and September the sirocco, or hot wind of the desert, sweeps at intervals over the country, impregnating the air with fine sand; but in general, with the exception of the vicinity of the m? .shes, the climate is healthy. Its salubrity has been incre'.ˆed by the draining of many marshes in the neighbourhood of the larger towns.

Fauna and Flora. — The fauna of Algeria resembles that of the Mediterranean system generally, though many animals once common to South Europe and North Africa — such as the lion, panther, hyena and jackal — are now extinct in Europe. Lions, formerly plentiful, have disappeared, and leopards and panthers are rare; but jackals, hyenas and Algerian apes are not un- common. Wild boars are found in the oak forests, and brown bears in the uplands. In the south are various species of ante- lope and wild goat. Red deer (Cervus elaphus barbarus), which differ from the typical European species only in the fact that the second tine is absent from their antlers, a peculiarity which they share with the red deer of Spain and Corsica, are still found in the forest of Beni Saleh in the department of Constantine, but are being exterminated by forest fires and poaching Arabs. Of domestic animals the camel and sheep are the most important. The chief wealth of the Arab tribes of the plateaus consists in their immense flocks of sheep. The horses and mules of Algeria are noted; and the native cattle are an excellent stock on which to graft the better European varieties. Of birds, eagles, vultures, hawks, owls and quails are common; snipe, curlews, plovers, storks and herons frequent the marshy parts; and the ostrich the desert. Partridges and woodcocks are fairly common. Among the reptiles are various species of serpents, tortoises, turtles, lizards, &c. Locusts are common and sometimes do great damage. Scorpions are numerous in the arid regions. Algerian prawns, especially those of Bona, are large and of a delicate flavour. Of the twenty-one species of freshwater fish, five are peculiar to the country, but none is of much economic value save the barbel and eel. A species of trout is found in the streams near

Collo, but in none of the other rivers.

The flora of Algeria consists of about 3000 species, of which some 450 are indigenous to the country, 100 being peculiar to the Sahara. The flora of the Tell is South European in character. The agave and prickly pear, the myrtle, the olive and the dwarf palm grow luxuriantly; and the fields are covered with nar- cissus, iris and other flowers of every hue. Roses, geraniums, and the like, bloom throughout the winter. The flora of the high plateaus consists chiefly of grasses, notably various kinds of alfa or esparto, and aromatic herbs. In the Saharan oases the characteristic tree is the date palm — " the king of the desert." Over 11,000 sq. m. of the mountainous country near the coast are covered with forests of various species of oak, pine, fir, cedar, elm, ash, maple, olive, many of them of gigantic size, and other trees; and on the slopes of the mountains up to 3800 ft. above the sea the fig is common. Its fruit forms one of the staple articles of food among the Kabyles. Cork and carob trees are also very common. A magnificent conifer, the Atlantic

pinsapo (Abies Pinsapo), is found on the heights round Bougie. The forests suffer great damage from fires, occasioned in part by the custom of burning up the grass every autumn, and in part by incendiarism. In 1902 alone, according to the British consular report, " at a moderate estimate the number of trees damaged or destroyed might be put down at 6,000,000." Forestry is a state-protected industry, the government owning over 500,000 acres of forest. The chief tree which has commercial value is the cork, and the stripping of the bark is under official supervision. The first cork harvest was gathered in 1890, when 1474 cwt. were sold for £1361. Since that date the yield has been very great. Another tree of great commercial value is the soap tree (Sapindus utilis), introduced into the country in 1845 an d grown extensively in low-lying lands near the coast.

Inhabitants. — Algeria had in 1906 a population of 5,231,850, consisting of a medley of European, Eastern and African races. The census showed that in addition to French settlers and their descendants (278,976) there were 117,475 Spaniards (most of whom are found in the department of Oran), 33,153 Italians (chiefly in the department of Constantine), 64,645 Jews, 6217 Maltese, and smaller communities of British, Germans, Levan- tines and Greeks.

There were, moreover, 170,444 naturalized French citizens, mainly of Spanish and Italian origin. (These figures are exclusive of 73,799 persons counted apart, as not enjoying municipal rights. In the 73,799 the troops, French and native, are included) . The total European population, in which category are reckoned the Jews, other than those of Mzab, was 680,263. Compared with the census of 1901 the figures of 1906 showed a decrease of 14,000 French, 36,000 Spaniards and 5000 Italians, but an increase of nearly 100,000 in the foreigners naturalized. Of other races: (1) The Berbers (g.v.) constitute 75 % of the entire population. The Kabyles (q.v.), a division of the Berbers, occupy chiefly the more mountainous parts of the Tell, but some live in the plains and valleys. (2) Arabs, a numerous class, are found principally in the south. (3) The so-called " Moors," generally of mixed blood, inhabit the towns and villages near the sea-coast. (4) Negroes, originally brought from the interior and sold as slaves, are now found chiefly in the towns, where they serve as labourers and domestic servants. (5) Mzabites (q.v.) or Beni-Mzab, a distinct branch of the Berber race, are for the most part engaged in petty trade, and are distinguished by their sleeveless coats of many colours. (6) A few Tuareg (q.v.), another division of the Berbers, are among the nomads found in the Algerian Sahara. The Kabyles, Mzabites, Tuareg, Arabs and Moors all profess Mahommedanism, though it is only among the Arabs that its tenets are held in any purity. The census of 1906 gave the number of the native population at 4,447,149. There were also 28,639 non-European foreigners in the country.

The Turks, though for a considerable period the dominant race, were never very numerous in Algeria. The majority of them were repatriated by the French. The Kuluglis,descendants of Turks by native women — once a distinct race noted for their energy, bravery and pride — have almost ceased to exist as a separate people, being merged in the Moors. Jews have long been settled in Algeria. Some are supposed to have fled thither when expelled from Cyrenaica in the reign of the emperor Hadrian, and others on their banishment from Italy in 1342. The purely " African " Jew is now found only in the oases in the extreme south of the country. In the towns the " native " Jews have intermarried with later arrivals from Europe. A remarkable feast is kept annually by the Algerian Jews to commemorate the defeat by the Turks of the emperor Charles V.'s attempt to capture Algiers (1541). The Jews, who enjoyed religious freedom under the Mahommedans, believed that the success of the Spaniards would but lead to their own persecution.

Chief Towns. — The chief towns are Algiers, the capital and

principal seaport, with a population (1906), including Mustapha and other suburbs, of 154,049; Oran (100,499),' a western

1 The figures given are not those of the communes, but of the towns proper, certain classes of persons (such as troops, lunatics, convicts) excluded from the municipal franchise not being counted.

seaport and capital of the department of the same name, and Constantine (46,806), an inland town, capital of the department of Constantine. Besides Algiers and Oran the principal seaports are Bona (36,004), Mostaganem (19,528), Philippeville (16,539), Bougie (10,419), Cherchel (4733) and La Calle (2774). Inland, besides Constantine, are the important towns of Tlemfen (24,060) , Sidi-bel-Abbes (24,494), Mascara (18,989) and Blida (16,866). In the Sahara are Biskra (4218), El Wad (7586), Tuggurt (2073) and Wargla (3579). All these places are separately noticed.

Nemours (1229) is a seaport near the Moroccan frontier, which formerly bore an Arabic name pregnant with its history — Jamaa-el-Ghazuat (" rendezvous of the pirates "). The surrounding country is rich in mineral wealth. Arzeu (3085) occupies a site on the western side of the gulf of the same name. It has a good harbour, is the outlet for the produce of several fertile valleys, and the starting-point of a railway which pene- trates into the Sahara. This railway passes Saida (6256), 106 m. south of Arzeu, one of the capitals of Abd-el-Kader, and serves to bring down from the high plateaus their rich crops of esparto grass. Four miles S.E. of Arzeu is a Berber village, where are interesting ruins of a Roman settlement, identified by some authorities as the Portus Magnus of Pliny; other authorities claim Oran as occupying the site of Portus Magnus. In the vicinity are the famous quarries of Numidian marbles. Tenes (3176) is a seaport situated about 100 m. east Of Arzeu on the site of the Phoenician town, afterwards the Roman colony, of Cartenna. Outside the town to the west is a public garden in which are several Roman tombs with inscriptions. Between Tenes and Algiers are Tipasa (q.v.) and Castiglione (1634), formerly called Bu-Ismail, both pleasant watering-places. Five miles inland west of Castiglione is Kolea (2932), a town dating from 1550 and originally peopled by Moslem refugees from Spain. It was destroyed by earthquake in 1825 and has been rebuilt largely in European style. It contains the kubba of a celebrated marabout, Sidi Embarek, who lived in the 17th century. Dellys (3275), 50 m. by sea E. of Algiers, has a small harbour sheltered from the W. and N.W. winds only. It is a walled town regularly laid out, built by the French on the site of the Roman Ruscurium, the western ramparts of which may still be seen. Jijelli

(4878), on the eastern side of the Gulf of Bougie, occupies the site of the Roman colony of Igilgilis. The old town, built on a rocky peninsula, was completely destroyed by earthquake in 1 8 56. A new town arose eastward of the former site, which is now restored as a citadel. Twenty miles by sea west of Philippeville is Collo (2258), a city of considerable importance during the Roman occupation. It was the Kollops Magnus of Ptolemy.

Twenty-three miles S.W. by rail from Algiers is Bufarik (the " hanging well "); pop. 5980. A thoroughly French town, it dates from 1835, when General Drouet d'Erlon established there an entrenched camp on a hillock in the midst of a pesti- lential swamp. Soon afterwards MarshalClausel began to build a regular city, which was at first called Medina Clausel in his honour. The draining of the site and neighbourhood was a costly undertaking, and was only accomplished by the sacrifice of many lives. The town, surrounded by vast orchards and farms, is now one of the most flourishing in the country; and the most important market in the colony for the sale of cattle and agri- cultural produce is held there. Sixty-three miles S.W. of Algiers is Medea (403o)ˆsupposed to stand on the site of a Roman town — finely situated on a plateau 3000 ft. above the sea. Ibis surrounded by a wall pierced by five gates. An ancient aqueduct is built into the eastern side of the wall. The town, which was chosen by the Turks as capital of the beylik of Titeri, is now French in character. Miliana (3991), which occupies the site of the Roman Milliana, lies about midway between Blida and Orleansville, is 2400 ft. above the sea, and is built on a plateau of the Zakkar mountains, commanding magnificent views of the valley of the Shelif. It possesses few remains of antiquity. An old Moorish minaret has been turned into a clock tower. The town, which is walled, has been rebuilt by the French. The chief streets are bordered by trees and have streams of water

running down either side. Hammam R'Irha to the N.E. of Miliana, noted from the time of the Romans for its thermal springs, occupies a picturesque position 1800 ft. above the sea. Being the only place within easy distance of western Europe where patients can take with safety a course of baths during the winter months, it has become a resort of invalids. Orleansville (3510), on the extensive plain of the Shelif, 130 m. S.W. by rail from Algiers, and 132 m. N.E. from Oran, is an important military station. The basilica of St Reparatus,

discovered in 1843, was allowed to be used as a public stable and' has been completely destroyed. There was in it a beautiful mosaic of which, fortu- nately, drawings exist. From this it appears that the church was built in a.d. 324, and that St Reparatus, bishop of the diocese, was buried in it in 475. Orleansville occupies the site of the Roman Castellum Tingitanum.

Ninety miles S.W. of Bougie is Aumale (2350), a town and military post established by the French in 1846 on the site of the ancient Auzia. The Roman town was founded in the reign of Augustus, and it flourished for two centuries before it disappeared from history. Out of the materials of the ancient city the Turks built a fort, which at the time of the French occupation was itself a heap of ruins. Setif (12,261), the Sitifis Colonia of the Romans, is 50 m. S.E. of Bougie and 97 m. by rail W. of Con- stantine. It stands 3573 ft. above the sea, and is the junction of ■several great lines of communication. Its market is attended by Kabyles, Arabs of the plateaus and people from the Sahara. The town has been entirely rebuilt in the French style. Most of the Roman ruins, even those existing at the time of the French occupation (1839), have disappeared. The walls of the Roman city, restored probably by the Byzantines, have been incorporated in the French walls, which are pierced by four gates. Batna (5279), a walled town 3350 ft. above the sea, 50 m. S. of Con- stantine by the railway to Biskra, commands the passage of the Aures mountains by which the nomads of the Sahara were wont to enter the Tell. Its importance rests on its strategic position. On the railway between Constantine and Bona and 76 m. from the latter, is Guelma (6584), the Roman Kalama, finely situated on the right bank of the Seybuse. The French occupied the place in 1836 and built their town out of the Roman ruins. Thirty miles S.E. of Guelma is Suk Ahras (7602), a station on the railway to Tunis, identified with the Roman city Tagaste, the birthplace of St Augustine.

Towns in the Sahara. — On the southern slopes of the Great Atlas, 2437 ft. above the sea, looking out on the Saharan desert, and 200 m. in a straight line S.W. of Algiers, is the ancient town of El Aghuat (erroneously written Laghouat); pop. 5660. It formerly belonged to Morocco, by whom it was ceded to the Turks towards the close of the 1 7th century. It was stormed on the 4th of December 1852 by the French, who almost entirely destroyed the Arab town. The modern town contains little of interest, but is an important military station. One hundred and twelve miles S. of El Aghuat, and 36 m. W.N.W. of Wargla, is Ghardaia (pop. 7868), the capital of the Mzab country, annexed by France in 1882. This country consists of seven oases, five in close proximity and two isolated. The town of Ghardaia (in

the local documents Taghardeit) is situated on a mosque^crowned hill in the middle of the Wadi Mzab, 1755 ft. above the sea. Ghardaia, which is divided by walls into three quarters, is built of limestone and the houses are in terraces one above the other. The central quarter is the home of the ruling tribe, the Beni-Mzab. The eastern quarter belongs to the Jews, of whom there are about 300 families; the western is occupied by the Medabia, Arabs from the Jebel Amur. The gardens belong exclusively to the Beni-Mzab. According to native accounts the town was founded about the middle of the 16th century. Aghrem Baba Saad, a small ruined town to the west of Ghardaia, is the fortified post in which the Beni-Mzab took refuge when the Turks under Salah Rais (about 1555) attempted unsuccessfully to subjugate the country. Next to Ghardaia the most important Mzabite town is Beni-Isguen (pop. 4916), an active trading centre. Guerrara, one of the two isolated oases, 37 m. N.E. of Ghardaia, contains a flourishing commercial town with 191 2 inhabitants.

The caravan route south from Ghardaia brings the traveller, after a journey of 130 m., to the oasis and town of El Golea (pop. about 2500). The town consists of three portions — the citadel on a limestone hill, the upper and the lower town — separated by irregular plantations of date trees. The place is an important station for the caravan trade between Algeria and the countries to the south. It was occupied by the French under General Gallifet in 1873. El Golea was originally a settlement of the Zenata Berbers, by whom it was known as Taorert, and there is still a considerable Berber element in its population. The full Arab name is El Golea'a el Menia'a, or the " little fortress well defended."

Archaeology. — Algeria is rich in prehistoric memorials of man, especially in megalithic remains, of which nearly every known kind has been found in the country. Numerous flints of palaeo- lithic type have been discovered, notably at Tlemcen and Kolea. Near Telfa, in the Great Atlas, and at Mechera-Sfa (" ford of the flat stones") , a peninsula in the valley of the river Mina not far from Tiaret in the department of Oran, are vast numbers of megalithic monuments. In the Kubr-er-Rumia — " grave of the Roman lady " {Roman being used by the Arabs to designate strangers of Christian origin) — the Medrassen and the Jedars, Algeria possesses a remarkable series of sepulchral monuments. The Kubr-er-Rumia — best known by its French name, Tombeau de la Chrelienne, tradition making it the burial-place of the beautiful and unfortunate daughter of Count Julian — is near Kolea, and is known to be the tomb of the Mauretanian king Juba II. and of his wife Cleopatra Selene, daughter

of Cleopatra, queen of Egypt, and Mark Antony. It is built on a hill 756 ft. above the sea. Resting on a lower platform, 209 ft. square, is a circular stone building surmounted by a pyramid. Originally the monument was about 130 ft. in height, but it has been wantonly damaged. Its height is now 100 ft. 8 in. : the cylindri- cal portion 36 ft. 6 in., the pyramid 64 ft. 2 in. The base, 198 ft. in diameter, is ornamented with 60 engaged Ionic columns. The capitals of the columns have disappeared, but their design is preserved among the drawings of James Bruce, the African traveller. In the centre of the tomb are two vaulted chambers, reached by a spiral passage or gallery 6 J ft. broad, about the same height and 489 ft. long. The sepulchral chambers are separated by a short passage, and are cut off from the gallery by stone doors made of a single slab which can be moved up and down by levers, like a portcullis. The larger of the two chambers is 14! ft. long by 1 1 ft. broad and 1 1 ft. high. The other chamber is somewhat smaller. The tomb was early violated, probably in search of treasure. In 1555 Salah Rais, pasha of Algiers, set men to work to pull it down, but the records say that the attempt was given up because big black wasps came from under the stones and stung them to death. At the end of the 18th century Baba Mahommed tried in vain to batter down the tomb with artillery. In 1866 it was explored by order of the emperor Napoleon III., the work being carried out by Adrian Berbrugger and Oscar MacCarthy.

The Medrassen is a monument similar to the Kubr-er-Rumia, but older. It was built about 150 B.C. as the burial-place of the Numidian kings, and is situated 35 m. S.W. of Constantine. The form is that of a truncated cone, placed on a cylindrical base, 196 ft. in diameter. It is 60 ft. high. The columns encircling the cylindrical portion are stunted and much broader at the base than the top; the capitals are Doric. Many of the columns, 60 in number, have been much damaged. When the sepulchral chamber was opened in 1873 by Bauchetet, a French engineer officer, clear evidence was found that at some remote period the tomb had been rifled and an attempt made to destroy it by fire.

The Jedars (Arab. " walls " or " buildings ") are in the depart- ment of Oran. The name is given to a number of sepulchral monuments placed on hill-tops. A rectangular or square podium is in each case surmounted by a pyramid. The tombs date from the 5th to the 7th century, of the Christian era, and lie in two distinct groups between Tiaret and Frenda, a distance 0/ 35 m. Tiaret (pop. 5778), an ancient town modernized by th'/ French, can be reached by railway from Mostaganem. Near

Frenda (2063), which has largely preserved its old Berber character, are numerous dolmens and prehistoric rock sculptures.

Algeria contains many Roman remains besides those mentioned and is also rich in monuments of Saracenic art. For a description of the chief antiquities see the separate town articles, including, besides those already cited, Lambessa, Tebessa, Tipasa and Tim gad.

Agriculture. — Ever since the time -of the Romans Algeria has been noted for the fertility of its soil. Over two-thirds of the inhabitants are engaged in agricultural pursuits. More than 7,500,000 acres are devoted to the cultivation of cereals. The Tell is the grain-growing land. Under French rule its productive- ness has been largely increased by the sinking of artesian wells in districts which only required water to make them fertile. Of the crops raised, wheat, barley and oats are the principal cereals. A great variety of vegetables and of fruits, especially the orange, is exported. A considerable amount of cotton was grown during the American Civil War, but the industry afterwards declined. In the early years of the 20th century efforts to extend the cultivation of the plant were renewed. A small amount of cotton is also grown in the southern oases. Large quantities of criti vegetal (vegetable horse-hair) an excellent fibre, are made from the leaves of the dwarf palm. The olive (both for its fruit and oil) and tobacco are cultivated with great success. The soil of Algeria everywhere favours the growth of the vine. The country, in the words of an expert sent to report on the subject by the French government, " can produce an infinite variety of wines suitable to every constitution and to every caprice of taste." The culture of the vine was early undertaken by the colonists, but it was not until vineyards in France were attacked by phylloxera that the export of wine from Algeria became con- siderable. Algerian vineyards were also attacked (1883) despite precautionary measures, but in the meantime the worth of their wines had been proved. In 1850 less than 2000 acres were devoted to the grape, but in 1878 this had increased to over 42,000 acres, which yielded 7,436,000 gallons of wine. Despite bad seasons and ravages of insects, cultivation extended, and in 1895 the vineyards covered 300,000 acres, the produce being 88,000,000 gallons. The area of cultivation in 1905 exceeded 400,000 acres, and in that year the amount of wine produced was 157,000,000 gallons. By that time the limits of profitable production had been reached in many parts of the

country. Practically the only foreign market for Algerian wine is France, which in 1905 imported about 110,000,000 gallons.

Fishery is a flourishing but not a large industry. The fish caught are principally sardines, bonito, smelts and sprats. Fresh 'ish are exported to France, dried and preserved fish to Spain md Italy. Coral fisheries exist along the coast from Bona to funis.

Minerals. — Algeria is rich in minerals, found chiefly in the department of Constantine, where iron, lead and zinc, copper, calamine, antimony and mercury mines are worked. The most productive are those of iron and zinc. Lignite is found in the department of Algiers and petroleum in that of Oran. Immense phosphate beds were discovered near Tebessa in 1891. Theˆ yielded 313,500 tons in 1905. Phosphate beds are also worked near Setif, Guelma and Ain Beida. There are more than 300 quarries which produce, amongst other stones, onyx and beautiful white and red marbles. Algerian onyx from Ain Tekbalet was used by the Romans, and many ancient quarries have been found near Kleber in the department of Oran, some being certainly those from which the long-lost Numidian marbles were taken. Salt is collected on the margins of the shats.

Shipping and Commerce. — The carrying trade between Algeria and France is confined, by a law passed in 1889, to French bottoms. The largest port is Algiers, after 'which follow Oran, Philippeville and Bona. There is a considerable coasting trade. The average number of vessels entering and clearing Algerian ports each year has been, since 1900, about 4000, with a total tonnage of some 6,500,000. In the coasting trade some 12,000 small vessels are engaged.

Under French administration the commerce of Algeria has

greatly developed. The total imports and exports at the time of the French occupation (1830) did not exceed £175,000. In 1850 the figures had reached £5,000,000; in 1868, £12,000,000; in 1880, £17,000,000; and in 1890, £20,000,000. From this point progress was slower and the figures varied considerably year by year. In 1905 the total value of the foreign trade was £24,500,000. About five-sixths of the trade is with or via France, into which country several Algerian goods have been admitted duty-free since 1851, and all since 1867, French goods, except sugar, have been admitted into Algeria without payment of duty since 1835. After the increase, in 1892, of the French minimum tariff, which applied to Algeria also, foreign trade greatly diminished.

The chief exports are sheep and oxen, most of which are raised in Morocco and Tunisia, and horses; animal products, such as wool and skins; wine, cereals (rye, barley, oats), vegetables, fruits (chiefly figs and grapes for the table) and seeds, esparto grass, oils and vegetable extracts (chiefly olive oil), iron ore, zinc, natural phosphates, timber, cork, crin vigltal and tobacco. Of these France takes fully three-quarters. The import of wool exceeds the export. Sugar, coffee, machinery, metal work of all kinds, clothing and pottery are largely imported. Of these by far the greater part comes from France. The British imports consist chiefly of coal, cotton fabrics and machinery.

Communications. — Algeria possesses a railway system covering over 2000 m. A decree of 1857 granted to the Paris-Lyons Company the right to construct a line linking Algiers with Oran (266 m.) and Constantine (290 m.) and shorter lines joining the seaports to the trunk line, notably Philippeville to Constantine (54 m.). These lines were opened between 1862 and 1871, but it was not until 1879 that a general scheme for railway construction was adopted. A trunk line runs from the frontier of Morocco at Lalla Maghnia, 44 m. W. of Tlemcen, across the Tell to the Tunisian frontier, whence it is continued to the city of Tunis; while traverse railways connect the seaports with the trunk line and with towns to the south, the Philippeville line being continued to Biskra. From Arzeu a line goes south across the plateaus and crossing the Ksur range at a height of 42 n ft. enters the Sahara. Passing Ain Sefra and Figig (372 m. from Arzeu) the line is continued towards Tuat. The normal gauge of the railways is 4ft. 8| in.; a few "light lines" have a gauge of 3 ft. 3 in. Algeria is also traversed by a network of roads constructed by the French, of which the routes nationales alone are 2000 m. in length. There are complete postal and telegraphic facilities in all parts of the colony save the Saharan Territories, and cable communication with France.

Central Government. — By the Turks the country was divided into four provinces — Algiers and Titeri in the centre and south, Constantine in the east and Mascara or Oran in the west. 1 The last three were governed by beys dependent upon the repre- sentative of the Porte resident at Algiers. The Turkish governors were in the 17th century replaced by deys (see below, History). The French rule was at first (1830) purely military. In 1834 the post of governor-general was created. Under the direction of the ministry of war that official exercised nearly all the executive power. At the same time a civil administration and consultative council were formed. The principle of unity of authority was set aside by the second republic in 1848, when many of the public services were attached to the corresponding

ministries in Paris, and the departments organized on the metropolitan model by division into arrondissements and communes and by placing a prefect at their head. Under Napoleon III. the governor- generalship was abolished, a minister of Algeria and the colonies created (24th of June 1858), and the whole administration conducted from Paris. At the same time the powers of the prefects were augmented and each department given a general council. This arrangement was not of long duration. By decree of the 24th of November r86o, the ministry of Algeria and the colonies was abolished and the office of governor-general re- established with increased powers. This regime, strongly military in its type, ended with the fall of the second empire. After a

'This western beylik corresponded roughly with the former sultanate of Tlemgen (q.v.).

brief transitional period, a decree of the 29th of March 1871 placed at the head of Algeria a civil governor-general and gave the control in Paris to the ministry of the interior. In 1876, on the initiative of General Chanzy, then governor-general, that official was accorded the right to correspond direct with all the ministers in Paris. This concession led, however, to the diminu- tion of the authority of the governor-general, whose powers were, step by step, absorbed by the various ministries in France. It had its logical end in the system adopted in 1881 and known as the rattachement. Under this system the plan of 1848 was carried out more completely, every department of state being placed under one or other of the ministries in Paris, whilst the governor- general became little more than an ornamental personage. After lasting fifteen years the rattachement was, with the approval of the legislature, abrogated by decree dated the3istof December 1896. The opposing principle, that of concentrating power in the hands of the governor-general, was re-affirmed, but in practice was modified by the retention of the direction from Paris of a few of the public services. The decree of 1896, which was of a provisional character, was replaced by another, dated the 23rd of August 1898, defining the powers of the governor-general under the new scheme. By a law of the 1 9th of December 1 900, Algeria was constituted a legal personality, with power to own goods, contract loans, &c, and a decree of 1901 placed the customs department, until then directed from Paris, under the control of the governor-general, whose hands were also strengthened in various minor matters.

It will be seen that the form of government is entirely dependent on the will of France. The French chambers alone possess the legislative power, though in the absence of express legislation decrees of the head of the state have the force of law. To the legislature in Paris Algeria elects three senators and six deputies (one senator and two deputies for each department). The franchise is confined to " citizens," in which category the native Jews are included by decree of the 24th of October 1870. The Mahommedans, who number nearly eight-ninths of the popula- tion, are not, however, " citizens " but " subjects," and con- sequently have not the vote. They can, however, acquire " citizenship " at their own request, by placing themselves absolutely under the civil and political laws of France (decree of 1865, confirmed in 1870). The number of Mahommedans who avail themselves of this rule is very small; naturalizations do not exceed an average of thirty persons a year. For certain specified objects, financial and municipal, Mahommedans are, however, permitted to exercise the franchise.

The actual form of government may be summarized thus:— At the head of the administration in Algeria is a governor- general, who exercises control over all branches, civil and military, of the administration, except the services of justice, public instruction and worship (as far as concerns Europeans) and the treasury. He corresponds directly with the other Barbary states; draws up the budget, and contracts loans on behalf of the colony. The governor-general is assisted by: —

(1) The Council of Government, a purely advisory body,

composed entirely of high officials;

(2) A Superior Council, composed partly of elected and partly

of nominated members, including representatives of the Mahommedans. Its duty is to deliberate upon all ad- ministrative matters, including the budget, and it possesses certain powers over the finances;

(3) The Financial Delegations (created by decree in 1898), an

elective body whose duty is to investigate all matters affecting taxation and to vote the budget. The delega- tions consist of representatives of (a) " colonists," i.e. the rural community; (b) taxpayers, being citizens other than " colonists," i.e. the urban community; (c) the Mahom- medan population. The last section is

partly elective and partly nominated. A proportion of the members of the delegations are elected to the superior council. Local Government. — The departments, presided over by pre- fects, are divided into territoires civils and territoires du com- mandant. In the regions under civil administration the local

organization closely resembles that of France. The country is divided into arrondissements and communes, with most of the apparatus of self-government enjoyed by the corresponding units in France. The canton (in France a judicial area) has, however, no existence in Algeria. In the territoires du com- mandant, which are the districts farthest from the coast, and in which the European population is small, the prefect is replaced by a high' military officer, who exercises all the functions of a prefect.

The prefect of each'department isassisted by a general council, consisting of members elected by the citizens and of nominated representatives of the Mahommedan population. The powers of the council correspond to those of the councils in France. Communes are of three kinds: (1) those with full powers, (2) mixed, (3) native. In those of the first kind, modelled on the French communes, the Mahommedans possess the municipal franchise. The " mixed " communes are under an administrator nominated by the governor-general and assisted by a municipal council composed of Europeans and natives. These communes are large areas, each containing several towns or villages. In the territoires du commandant the mixed commune is presided over by a military officer who fulfils the duties of mayor. Native com- munes are organized on the same plan as those last mentioned. It will be seen that communes do not correspond with any natural unit. The unit among the Mahommedans is the douar, a tribal division administered by a cadi. The communes with full powers have each for centre a town with a considerable European population.

By decree of the 14th of August 1005, the frontier between Saharan territory dependent on Algeria and that attached to French West Africa was laid down. The Algerian Sahara was divided into four territories, officially named Tuggurt, Ghardaia, Ain Sefra and the Saharan Oases (Tuat, Gurara and Tidikelt). The governor-general represents the territories in civil affairs; the budget is distinct from that of Algeria and an annual sub- vention is provided by France.

Finance. — Revenue is derived chiefly from direct taxation, customs and monopolies. The heaviest item of expenditure chargeable on the Algerian budget is on public works, posts and telegraphs and

agriculture. Algeria has had a budget distinct from that of France since 1901. This budget includes all the expenses of Algeria save the cost of the army (estimated at- £2,000,000 yearly) and the guarantee of interest on the railways open before 1901. Both these items are borne by France. The Algerian budget for 1906 showed revenue and expenditure balancing at £3,820,000. The country has a debt (1905), including capital, annuities and interest, of some £3,400,000.

Defence. — The military force constitutes the XIX. army corps of the French army. There are in addition a territorial army reserve and a special body of troops, largely Arab, for the defence of the Saharan territory. The troops quartered in Algeria exceed 50,000. The defence of the coast is provided by the French navy.

Land Tenure. — The colonization of Algeria by the French has been greatly hampered by the system of land tenure which they found in force. Except among the Kabyles, private property in land was unknown. Amongst the Arabs, lands were either held in common by a whole tribe, under a tenure known as the arch or sabegha, or sometimes, especially in the towns, under a modified form of freehold (melk) by the family. At the same time the boundaries of property were ill defined and difficult to determine. This system made it impossible for French immigrants to obtain land by lawful transfer. The only lands at the outset available for settlement were, in fact, the confiscated domains of the dey. The obvious solution of the difficulty was to encourage the free movement of real estate by substituting private ownership for the traditional system. Before doing this, however, it was necessary to define the limits of tribal properties already existing — a work of great difficulty — with a view to their ultimate division, and at the same time to guard against any premature traffic in the rights

of Arabs in the lands about to be divided. A sinatus-consulte of 1863 laid the basis for the change in the land system by providing (1) for the delimitation of the territory of each tribe, (2) for the repartition of the territory thus delimited among newly formed tribal divisions (douars or communes), and (3) for the recognition of private ownership by the issue of title deeds for such individual or family property (melk) as already existed. The purpose of this excellent law, which would have laid firmly the basis for gradual change, was

defeated by the impatience of the French colonists. At the instance of their representatives in the chambers it was abandoned in 1870, and was not revived till seventeen years later. A law was passed in 1873, and amended in 1887, legalizing the immediate con- version of tribal and family property into private freehold. The result has been disappointing. For the most part, the Arab tribes have been reluctant to avail themselves of their new powers, and where they have done so the hasty reversal of the traditions of centuries has proved demoralizing to the natives, without any sufficient equivalent in the way of healthy French colonization. The main profit has been reaped by Jewish usurers.

The state domains were exhausted by 1870, but were again replenished by the large confiscations which followed the Arab revolt of 1871. Government lands were originally given free to applicants, but with a provisional and insecure title, which made it impossible for poor colonists to borrow money on their land. This was modified by a law of 185 1. But ultimately, the results not being satisfactory, the precedent of Australia was followed, and by a law of i860 domain lands were sold publicly at a fixed price. This had the effect of attracting more and a better class of immigrants, but was none the less reversed in

1881.

In September 1904, a new scheme, intended to attract more European settlers, was adopted. The lands of the state — other than woods and forests— but especially the barren lands and brushwoods situated in the plains, were offered for coloniza- tion, to be disposed of (1) by sale at a fixed price, (2) by auction, and (3), in certain cases, by agreement. Purchasers were to be Frenchmen, or Europeans naturalized as French citizens, who had never held " colonization lands "; and they were obliged, under pain of forfeiture, either to take up residence themselves on their property within six months and to live on it and exploit it for a period of ten years, or else to place on the land another family fulfilling the same conditions. If the purchaser farmed the land himself and made satisfactory progress, the period of obligatory residence was reduced to five years. When the interests of colonization required it, free gifts of land might be made; in which case the grantee must himself exploit his concession. In no case might land acquired under this scheme be let to natives until after the expiration of ten years.

For the purpose of creating villages, land was put at the disposition of societies or individuals, who undertook to people them with

immigrants fulfilling the same conditions as inde- pendent settlers. Two-thirds of the villagers were to be French immigrants, the other third Frenchmen or naturalized French- men already settled in Algeria. To favour the establishment of special industries, the governor-general was given power to authorize the introduction of foreign instead of French immi- grants. The societies or individuals undertaking village settle- ments must do so from philanthropic motives, inasmuch as within two years of the founding of a village, the land, under pain of forfeiture to the state, must be transferred gratuitously to the villagers. As will be seen, settlement on the land by Europeans is hampered by official restrictions, especially by the stringent regulations as to residence.

Justice. — Two judicial systems exist in Algeria — native and French. Native courts decide suits between Mahommedans. From the decision of the cadis appeal lies to the French courts. The French system provides, for civil cases, a court of first instance in each of the sixteen arrondissements into which the country is divided. A court of appeal sits at Algiers. There are

also tribunals of commerce and justices of the peace with extensive jurisdiction. The criminal courts are organized as in France. Trial by jury has been introduced; but as natives are not allowed to act as jurymen this has often led to serious miscarriages of justice and to excessive severities.

Whilst modifications of the law require special legislation or decree, it has been legally decided that all laws in force in France before the conquest of the country (i.e. those anterior to the 22nd of July 1834) are in force in Algeria. In practice the courts allow themselves wide latitude in applying this principle.

Education. — The system of education is complicated by the co-existence of Mahommedan and . Christian communities. Before the arrival of the French two kinds of instruction were given, reading and writing being taught in the ordinary schools and higher education — largely theological— in medressas (colleges), usually attached to the chief mosques. Attempts by the French to improve the education of the natives were at first marked by hesitation and long periods in which little or nothing was done. The provision for the instruction of the European and Jewish population was also inadequate. In 1883 a law was passed for the reorganization of the systems in force, and primary instruction was made compulsory for Euro- peans and Jews, whilst in the case of Mahommedans discretion in the establishment of schools was vested in the governor- general.

Attempts are made to assimilate the Mahommedan population by means of Franco-Arab primary and secondary schools, which supplement the purely French and purely Arab establishments of the same character. These attempts meet with little success, owing in part to racial prejudice and in part to the indifference of the Arabs to education. Few Moslems attend the secondary schools. Purely Mahommedan higher schools exist at Algiers, Tlemcen and Constantine. From these establishments the ranks of native officials are recruited. There is one secondary school for Moslem girls. The education provided for Europeans resembles in most respects that given in France. (The lycSes at Algiers, Oran and Constantine are open to Mahommedans, but few take advantage of them.) Besides the government schools there are establishments conducted by clerics and laymen. The best girls' schools are generally those kept by nuns. At Algiers there is an establishment with faculties of law, medicine and pharmacy, science and letters. At Oran is a college for European girls. The scholars attending primary schools number about 150,000 (over 100,000 being Europeans and some 15,000 Jewish) and those at secondary schools about 6000. (F. R. C.)

History

From a geographical point of view Algeria, together with Morocco and Tunisia, from which it is separated only by artificial and purely political frontiers, forms a distinct country, which it is convenient to designate by the name of Minor. Africa Minor. Both historically and geographically, Africa Minor belongs much more to the Mediterranean world than to the African. All the foreign invaders who successively established their dominion over this country either crossed the Mediterranean or followed its shores. The Phoenicians, the Romans, the Vandals, the Byzantines, the Arabs, the Turks and the French, all came from the east or from the north. The history of Africa Minor is the history of all those foreigners who have successively endeavoured to exploit this land, the history of their divers civilizations struggling against an ever- renascent barbarism.

The political divisions of Africa Minor have changed many times, for, as the country has no natural centre, many towns have aspired to play the r61e of capital. The rivalry of these towns is intimately connected with the struggles and insurrections which have stained the land with blood. The existing division— viz. Morocco, Algeria and Tunisia — dates back to the time of the Turkish dominion. It is since that time only that the expression Algeria has been in use.

At the beginning of the 16th century the native dynasties

which divided Africa Minor between them — the Marinides at Fez, the Abd el-Wahid at Tlemcen, and the Hafsides at Tunis— were without strength and without authority. Two nations, wHb then at the height of their power, Spain and Turkey,

Spain. disputed the empire of the Mediterranean. The Spaniards took Mers-el-Kebir (1505), Oran (1509), and Bougie and Tripoli (1510). Two Turkish corsairs, Arouj and his brother, Khair-ed-Din (otherwise known as Barbarossa), at first established in the island of Jerba and afterwards at Jijelli, disputed with the Spaniards the dominion of the country. Arouj seized Algiers (1516); Khair-ed-Din, succeeding him in 1518, did homage for his conquest to the sultan at Constantinople, who named him beylerbey and sent him soldiers (1 510). Then began the struggle of the Turks with Spain. In 1541 the emperor Charles V. undertook a great expedition against Algiers. He succeeded in landing, and proceeded to attack the town. But during the night of the 26th of October a violent storm destroyed a great part of his fleet. His provisions and his ammunition were lost, his army was compelled to retreat with considerable loss, and the emperor had to re-embark with the remnant of his troops. This check completely discouraged the Spaniards and assured success to the Turks. The Spanish garrisons established in the coast towns, badly paid and left without reinforcements, had difficulty in defending themselves. In the end, the only towns the Spaniards retained on the Algerian coast were Oran and Mers-el-Kebir. These two towns, taken by the Turks in 1708 and retaken by the Spaniards in 1732, were finally abandoned in

1701.

Under the Turkish dominion Algeria had originally at its head a beylerbey resident at Algiers. He controlled three beys: — B rbarv ˆ e ˆey of Titeri in the south, the bey of the east at corsairs. Constantine, and the bey of the west who resided at Mascara and afterwards at Oran. These three beys existed till 1 830. The beylerbeys were replaced in 1 587 by pashas sent triennially by the Porte. But the authority of these pashas, strangers to the country, was always precarious. They found themselves, in fact, in conflict with two forces, which in principle were in their service, but which in reality held the power — the taiffe des reis, otherwise called the corporation of the corsairs (see Barbary Pirates), and the janissaries, a kind of

military democracy in which each member was promoted according to seniority. In 1669 the corsairs drove out the pasha, and put into his place a dey elected by themselves. After some fruitless attempts Turkey ceased to send pashas to Algiers — where they were not allowed even to land — and thus recognized the de facto independence of this singular republic. The authority of the deys, moreover, was scarcely more solid than that of the pashas. They trembled before the janissaries, who from the 18th century elected and deposed them at their pleasure.

The relations which the European powers were able to maintain with northern Africa were at that time difficult and uncertain. Ships trading in the Mediterranean were seized by the corsairs, who pillaged the coasts of Europe, carried off their captives to Algiers, and destroyed the fishing and commercial settlements founded by the Marseillais on the shores of Africa. The Christian governments either uttered useless and impotent complaints at Constantinople, or endeavoured to negotiate directly with Algiers, as in the case of the negotiations of Sanson Napollon during the ministry of Richelieu. More rarely their patience became exhausted, and ships were sent to bombard this nest of pirates. Two naval demonstrations were made by France during the reign of Louis XIV., one by Abraham Duquesne in 1682, and the other by Marshal Jean d'Estrees in 1688, but these repressive measures were too intermittent to produce a durable effect.

In 1815 at the congress of Vienna, and in 1818 at the congress of Aix-la-Chapelle, the powers endeavoured to concert measures to put an end to the Barbary piracy. Nevertheless the naval demonstrations made by Lord Exmouth in 1816, and by a com- bined English and French squadron in 1819, remained equally fruitless. But the result which the European powers in concert had been unable to achieve, was brought about by the accidental

circumstances which led France to undertake alone an expedi- tion against Algiers.

Some difficulties had arisen between France and the dey of Algiers with reference to the debts contracted to Bacri and Busnach, two Algerine Jews who had supplied corn to the French government under the Directory. This taterven- question of interest would not have been sufficient in tien. itself to bring about a rupture, but the situation became acute when the dey, Hussein, struck the French consul, Deval, on the face with his fly-flap (April 30, 1827). Thereupon the port of Algiers was blockaded. The minister of war, the due de

Clermont-Tonnerre, would have gone further, but the president of the council, the com'te de Villele, opposed the sending of an expedition, while in the Martignac ministry M. de la Ferronays, minister of foreign affairs, was bent upon negotiating. It needed a second insult — the firing on " La Provence," a vessel carrying a flag of truce, in the harbour of Algiers (August 3, 1829) — to spur the French government to further action than an in- effectual blockade. An expedition against Algiers was then decided upon, and Marshal de Bourmont, the minister of war, himself took the command. On the 14th of June 1830 the French troops landed at Sidi-Ferruch. On the 19th of June they beat the enemy at Staoueli. On the 4th of July the fort de I'Empereur was blown up. On the 5th of July Algiers capitulated. Some days later the dey was deported, as well as the greater part of the janissaries. Those who were not married were conveyed imme- diately to Asia Minor; the rest had permission to remain, but in fact they left the country soon afterwards.

Meanwhile the revolution of July 1830 had broken out in France. The new government found itself very much em- barrassed by the situation bequeathed by the Restoration. The more serious section in parliament were frankly opposed to the idea of conquering or of colonizing Algeria; on the other hand, popular sentiment was hostile to evacuation. The French government — fearing to displease the other powers by following up its conquest, and hampered in particular by its engagements towards England, yet conscious that the only means of putting an end to the piracy was to remain — decided provisionally in favour of that intermediate system, called restricted occupation, which consisted in occupying merely the principal seaports and awaiting events. The Algerians extricated the government from its difficulty by attacking the French troops, who were obliged to defend themselves. The natives gained some successes, and it became necessary to avenge the honour of the flag. In this gradual manner were the French led to conquer Algeria.

General Bertrand Clausel,who succeeded Marshal deBourmont, was one of the few men who at that period dreamed of conquering and colonizing Algeria. His enthusiastic confidence knew no obstacles. If the dey had left, the three beys remained. With the feeble resources at his disposal Clausel undertook an expedi- tion against Bu-Meyrag, the bey of Titeri, took from him Blida arid Medea, dismissed him, replaced him by a successor devoted to France, and returned to Algiers after having left a garrison in Medea. Then, not having the means of directly extending the rule of France to the east or west, Clausel devised a system of protectorates. He negotiated directly with the bey of Tunis with a view to installing as beys at Oran and

Constantine Tunisian princes who recognized the authority of France. But the events which were taking place in Europe made it imperative to send home a part of the army of Africa, and Medea had to be evacuated. At the same time the negotiations set on foot with the bey of Tunis were censured by the government, and General Clausel was recalled (February 1831).

The period of uncertainty was prolonged under his successors, General Pierre Berthezene (February to December 1831); A. J. M. R. Savary, due de Rovigo (December 1831 to March !833), General Avizard (March to April 1833), and General Voirol (April 1833 to September 1834). The French, not yet certain whether or not they would retain Algeria, remained on the defensive. At the time they occupied only the three towns of Algiers, Bona and Oran, with their suburbs, where their situation was moreover singularly precarious. The Arabs would pillage

the suburbs and run away. Sometimes they cut off supplies by ceasing to bring provisions to the market, but the French were not to be turned aside by such tactics.

At Algiers the energies of the French were devoted to protect- ing themselves against the incursions of the Hajutas. This was sufficient to absorb the attention of the general-in-chief , who left the guardianship of the east and west to the initiative of the generals established at Bona and Oran. At Bona, where General Monk d'Uzer was in command till 1836, things went fairly well. At once firm and conciliatory, he had been able to attach to the French cause the natives whom the cruelty of Ahmed, bey of Constantine, had alienated. The occupation of Bougie by General Camille Alphonse Trezel in October 1833 gave theFrench a footing at another point of this eastern province. But at Oran, where General Desmichels had succeeded General P: F. X. Boyer in the spring of 1833, their situation was much less favourable. There the French had found a redoubtable adversary in the young Abd-el-Kader, who had been proclaimed amir at Mascara in 1832.

A man of rare intelligence, a fearless horseman and an eloquent orator, Abd-el-Kader had acquired a great reputation by his piety. He reunited under his sway the tribes that had Kader. hitherto been divided, and infused a unique spirit into their resistance. For fifteen

years he held the French in check, treating on terms of equality with their government. Moreover, the treaty which General Desmichels had the weakness to sign with him on the 24th of February 1834 greatly improved his position. In pursuance of this treaty, French officers were to represent their country at the court of the amir; while the amir on his part was represented in the three French coast towns, Oran, Arzeu and Mostaganem, by vakils, who immediately began to act as masters of the natives. Such was the situation at the period when, the French having at last resolved to keep Algeria, the ordinance of the 22nd of July 1834 laid down the bases of the political and administrative organization of the " French possessions in the north of Africa," at the head of which was placed a governor-general. But this date (July 22, 1834), very important from a judicial point of view, is much less so from a historical point of view. The position of the first governor-general, Jean Baptiste Drouet d'Erlon (1765- 1844), remained fully as precarious as that of his predecessor. During this time the power of Abd-el-Kader increased. Master of the province of Oran, he crossed the Shelif at the appeal of the natives, the people flocking to witness his progress as that of an emperor. He entered Miliana and Medea, where he installed beys of his own choice. All the western part of Algeria belonged to him. General Trezel, who had succeeded General Desmichels at Oran, resolved to march against the amir, but was defeated on the banks of the Macta (June 1835). This defeat shook public opinion. Drouet d'Erlon was recalled and replaced by Marshal Clausel.

In short, five years after the capitulation of Algiers, the French dominion extended as yet over only six coast towns. Clausel, who returned with the same colonial ambitions as in 1830, resolved to conquer the interior of the country. He marched against the amir, defeated him and entered Mascara. Then he proceeded to deliver the inhabitants of Tlemcen, who had been attacked by Abd-el-Kader, and there he left a garrison. Turning towards the east, Clausel organized at Bona the first expedition against Constantine. This failed, and the only result of it was the occupation of Guelma. Clausel was recalled and replaced by General C. M. D. Damremont (February 1837). The task of maintaining the position of France was then divided between Thomas Robert Bugeaud (1784-1840), acting independently in the west, and Damremont, who directed all his efforts towards the east. By the signature of the celebrated treaty of the Tafna (June 1, 1837), Bugeaud made peace with Abd-el- Kader. In return for a vague recognition of the sovereignty of France in Africa, this treaty gave up to the amir the whole of western Algeria. France reserved to herself only Oran and its environs, Mazagran, Algiers and the

Metija; she gave up Tlemcen and the Titeri beylik. This was a triumph for Abd-el-

Kader, who regarded the peace as but a truce which would allow him time to gain strength to resume the war under more favour- able conditions.

Damremont, on his part, directed a second expedition on Constantine. The town was taken, but Damremont was killed (October 1837). Marshal Sylvain Charles Valee (1773-1846), who replaced him, founded Philippeville to serve as a seaport for the region of Constantine, occupied Jijelli, and at the head of the expeditionary column returned from Constantine to Algiers by the interior, passing through Setif and les Portes de fer. Abd-el-Kader maintained that the French had thus violated the treaty of the Tafna, and began the war again. For two years his power had been increasing. A whole hierarchy of khalifas, aghas and caids obeyed him. He had a regular army of 8000 infantry and 2000 cavalry, without counting 50,000 goums (bodies of Arab horsemen) brought by the khalifas. He was well furnished with war material, possessing magazines and arsenals in the heart of the Tell. He had attacked and subjugated all who were not willing to recognize his authority. Under his influence old rivalries were effaced; at his voice all the tribes joined in the holy war. On the 18th of November 1839 he sent his declaration of war to Marshal Valee, but the impatient Hajutas had already devastated the Metija. Marshal Valee marched against Abd-el-Kader, and at first gained some successes: the French occupied Cherchel, Medea and Miliana. But at the end of 1840 Valee was recalled and replaced by Bugeaud, who adopted totally different tactics. The system of Marshal Valee had been the defensive: he multiplied the forti- fied posts in order to draw the enemy to a spot chosen beforehand. Bugeaud resolutely adopted the offensive, reduced the weight carried by the soldiers in order to increase the mobility of his troops, and carried the war into the province of Oran, from which Abd-el-Kader drew his principal resources. One after the other, all the magazines of the amir — those at Takdempt, Boghar, Taza, Saida and Sebdu — were taken and destroyed. In the spring of 1843 the due d'Aumale had an opportunity of surprising the smala (camp) of Abd-el-Kader near Taguin. This was a serious blow for the amir, whose determination to continue the contest was, however, as strong as ever. He took refuge in Morocco, and induced that power to declare war on the French on the pretext that they would not give up the frontier post of Lalla-Maghnia. Morocco was soon vanquished. While Francois, prince de Joinville, was bombarding Tangier and Mogador, Bugeaud gained the victory of the Isly (August 1844).

Morocco signed a treaty of peace at Tangier on the 10th of September 1844. 1

The struggle, however, was not ended. Islam made a supreme effort in Algeria. The Dahra and the Warsenis rose at the voice of a fanatic called Bu-Maza (" the goat man "), a Khuan of the order of the Mouley-Taieb. Elsewhere other " masters of the hour," false Bu-Mazas, rose. Abd-el-Kader reappeared in Algeria, which he overran with a rapidity which baffled all pursuit. He beat the French at Sidi Brahim, raided the tribes of the Tell Oranais which had abandoned him, penetrated as far as the borders of the Metija, and reached the Jurjura, where he endeavoured to rouse the Kabyles. But his eloquence offended the narrow and cramped particularism of those little democratic cities, deaf to the sentiment of the common interest. From that time he played a losing game. He returned toward the west, penetrating farther and farther to the south. Badly received by the great aristocratic family of the Walid-sidi- Sheikh, he re-entered Morocco, but the emperor of that country, dreading his influence and fearing difficulties with the French, drove him out. This was the end. On the 23rd of December 1847 Abd-el-Kader surrendered to General Lamoriciere in the plains of Sidi-Brahim. His adversary, Bugeaud, was there no longer. Having failed to persuade the French government to adopt his plans of military colonization, he had retired in June 1847 and had been replaced by the due d'Aumale.

The surrender of Abd-el-Kader marks the end of the period of the conquest. It is true that Great Kabylia had to be subdued only ten years later, and that terrible insurrections still had to

French progress.

be quelled. But at the end of the reign of Louis Philippe the essential work was accomplished. All that remained was to complete and to secure it.

Under the second republic Algeria was governed successively by Generals L. E. Cavaignac (February to April 1848), N, A. T. Changarnier (April to September r848),V.Charon(Sep- tember 1848 to October 1850), and A. H. d'Hautpoul (October 1850 to December 1851). The policy followed at this period consisted in assimilating Algeria to France. Im- portant efforts were made to attract French

colonists to the country, the colonization of Algeria appearing as a means towards the extinction of pauperism in the mother-country. This point of view suggested numerous projects, as chimerical as they were generous; two millions sterling (50 million francs) were expended with a view to installing Parisian unemployed workmen as colonists, but this attempt failed miserably. The most remarkable military events of this period were (1) the siege and destruction of the oasis of Zaatcha, where the inhabitants, displeased by an alteration in the tax on palms, rose at the voice of a fanatic named Bu-Zian; (2) the ineffectual campaign of Marshal Saint Arnaud in Little Kabylia, where the tribes rose at the instigation of Bu-Magla (" the mule man ") in 1851.

Marshal J. L. C. A. Randon (1 795-1871), named governor- general of Algeria after the coup d'etat, had at first to repress in the south a rising of a new " master of the hour," Mahomet ben Abdallah, the sherif of Wargla. A column seized Laghouat (El Aghuat) in December 1852. Si-Hamza, leader of the Walid- sidi-Sheikh, an ally of France, indignant at the growing influence of a base-born agitator, pursued him and seized Wargla (1853). In 1854 General Desvaux entered Tuggurt. Henceforth matters remained quiet in the region of the Sahara, and Marshal Randon turned his efforts towards Kabylia. Neither the Romans nor th« Turks had been able to subdue this square mountainous tract, of which Bougie, Setif, Aumale and Dellys form the four corners. But in two months (May to June 1857) Marshal Randon made himself master of it, and built in the heart of this country Fort Napoleon (now Fort National), " the thorn in the side of Kabylia," whose batteries commanded all the Kabyle villages of the region.

In 1858 the creation of a " ministry of Algeria and of the colonies " brought about the resignation of Marshal Randon. The administrative headquarters of Algeria was then transferred from Algiers to Paris. The ministry of Algeria was entrusted first to Prince Napoleon, and afterwards to the marquis J. N. S. P. de Chasseloup-Laubat (1805-1873). But this office, created at the lˆast prematurely, soon disappeared without causing any regrets. This ephemeral regime lasted from the 24th of June 1858 to the 24th of November i860. The decree of the 24th of November i860 transferred the services from Paris back to Algiers, and re-established the functions of governor-general, which were exercised at the end of the second empire first by Marshal Pelissier, due de Malakoff (December i860 to September 1864) and then by Marshal MacMahon, due de Magenta (Sep- tember 1864 to July 1870). At this period the conception of the Arab kingdom was prevalent. The

emperor Napoleon III., in a celebrated letter, wrote that he was as much the emperor of the Arabs as the emperor of the French. Algeria was considered as a kind of great military fief, and the officers who ruled there commonly took the side of the native chieftains against the civil population. European colonization, hampered by the ill-will of the Arab bureaux, then made little progress.

It was at this period that the great insurrection of the Walid- sidi-Sheikh broke out in the Sud Oranais. This powerful family had lived up to that time on a good understanding with 1864-1871. France; Si-Hamza, chief of the elder branch, had re- mained until his death (1861) a faithful ally of France. Thanks to him, the security of the southern frontier was assured. But after his death his son, Si-Sliman, imbued with anti-French sentiments, revolted in 1864 and massacred the Beaupretre column. Several years were occupied in quelling the insurrection. Compelled to guard themselves on the south against the Walid-sidi-Sheikh,the French realized how much they

lost by not having the support of these great chieftains. They then accepted the services offered to them by Si-Sliman-ben- Kadour, chief of the younger branch Of the Walid-sidi-Sheikh, who maintained tranquillity in the Sud Oranais during the great insurrection of Kabylia ini87i.

The causes of this insurrection were manifold, and, moreover, interdependent: the injury done to the military prestige of France by its defeats in Europe; the fall of the imperial govern- ment, in which, in the eyes of the natives, the authority of France was incarnate; and the insults offered with impunity in the streets by the civil population to the officers, who were loved and respected by the Arabs, at the same time that the decree of Adolphe Cremieux accorded to the Algerine Jews the rights of French citizens. The great native chiefs, bewildered and dis- quieted, thought themselves menaced. The insurrection was inevitable. Mokrani, bach-agha of the Mejana, whom the imperial government had loaded with honours, gave the signal. He had an interview with El Haddad, the sheikh of the Khuans, the religious confraternity of Sidi-Abd-er-Rahman, whose in- fluence was great, and having secured his support in April 1871, Mokrani proclaimed the holy war. At the bidding of El Haddad the whole of Kabylia rose, and numbers of French colonists were massacred; the columns of Colonel Cerez and General F. G. Saussier had to engage in numerous fights. The death of the bach-agha at {he battle of Suflat, the submission of the Sheikh El Haddad, and finally the arrest of Bu-Meyrag, brother of Mokrani, mark the declining stages of the insurrection, which was com- pletely suppressed by

August 1871. A heavy war contribution was imposed upon the rebels and their lands were sequestrated. The Beni-Manassir, who rose almost at the same time in the Dahra, were subdued soon after. Subsequently the native population of the Algerine Tell remained quiet, the massacre of the colonists at Margueritte many years later being a local and isolated movement.

Under the third republic Algeria was governed successively by Admiral L. H. de Gueydon (March 1871 to June 1873), General A. E. A. Chanzy (June 1873 to February 1879), _

J. P. L. Albert Grevy (March 1879 to November 1881), iar ˆ

Tirman (November 1881 to April 1891), Jules Cambon (April 1891 to September 1897), Louis Lepine (September 1897 to August 1898), E.J. Laferriere (August 1898 to October 1900), Charles Jonnart (October 1900 to June 1901), A. J. P. Revoil (June 1901 to April 1903), and again Jonnart. During the first years of the new regime a keen reaction was produced against the political system of the imperial government in Africa. The civil territory was considerably enlarged at the expense of the military. An effort was made to attract French colonists to Algeria by gratuitous concessions of land. Some lands were granted in particular to natives of Alsace-Lorraine, who preferred to retain French nationality after the war. Peasants from the south of France, whose vines had been destroyed by the phylloxera, crossed the Mediterranean and established in Algeria an im- portant vineyard. This double current of immigration notably increased the French population of North Africa. The tendency then was to treat Algeria as a piece of France. This assimilative policy attained its culminating point in the so-called decrees of rattachement (1881), in pursuance of which each ministerial department in France was made responsible for Algerine affairs which came by their nature within its jurisdiction.

After a great inquiry held in 1892 by a senatorial committee a reaction was produced in France against this excessive assimila- tion. The system of rattachement was in great part abandoned, and decentralization was obtained by augmenting the powers of the governor-general, and by granting to Algeria legal personality and a special budget (see above, Central Government). These reforms appear to have given satisfaction to Algerian opinion. Profoundly troubled as Algeria was in the last years of the 19th century by the anti-Semitic agitation, which occasioned frequent changes of governors, it appears to-day to have turned aside from sterile political struggles to interest itself exclusively in the economic

development of the country. I The movement of expansion towards the south was continued

under the third republic. In 1873 General G. A. A. Gallifet entered El Golea. In 1882 the oasis of Mzab was annexed. In the Sud Oranais an insurrection, fomented by a marabout named Bu-Amama, broke out in 1881, and the insurgents massacred the European labourers engaged in the collection of alfa (or esparto) grass. But soon the French columns re-established peace, and Bu-Amama had to take refuge in Morocco. In 1883 Si-Hamza, chief of the elder branch of the Walid-sidi-Sheikh, made his submission, and since then that family has remained devoted to France.

The attempts at penetration into the extreme south, abandoned after the massacre by Tuareg of a mission sent in 1881, under Colonel Paul Flatters, to study the question of railway com- munication with Senegal, were begun again in 1890, in which year the British government recognized the western Sahara as within the French sphere. Since then military stations and scientific and commercial exploration have increased. But the results of these efforts remained inconsiderable until the spring of 1900, when the French authorities decided to occupy the oases of Gurara, Tuat and Tidikelt. This being accomplished by March 1901, the conquest of the Algerine Sahara was from that time completed, and nothing any longer hindered the attempts to join Algeria and the Sudan across the Sahara. (A. Gir.)

Bibliography.— For a general account of Algeria, see Maurice Wahl, VAlgirie (5th ed., Paris, 1908) ; P. Leroy-Beaulieu, Algerie et Tunisie (2nd ed., Paris, 1897); J. A. Battandier and L. Trabut, V Algerie; le sol et les habitants (Paris, 1898), specially valuable for agriculture and fauna; Arthur Girault, Principes de colonisa- tion et de legislation coloniale, Tome iii. ch. i.viii. (3rd ed., Paris, 1908), containing valuable bibliographies of works relating to legislation, jurisprudence, &c. ; Jules Duval, VAlgirie et les colonies franchises (Paris, 1877). The Statistique genirale de I 'Algerie is published periodically by the Algerian government. The British Foreign Office publishes annual Reports on the Trade of Algeria; Sir R. Lambert Playf air's Handbook for Travellers tn Algeria (Murray's Handbooks), corrected to 1902, is a capital guide to the country, as is also Algerie et Tunisie (Paris, 1906), in the Guides Joanne Series; the Bibliography of Algeria (London, 1888), and the Supplement to

the Bibliography of Algeria (London, 1898), by Sir Lambert Playfair, contain thousands of entries and many notes. J. A. Battandier and L. Trabut, Flore de VAlgirie (Algiers and Paris, 1884 and onwards), contains a scientific and descriptive catalogue, in several volumes, of the indigenous flora. . For the geology of Algeria, see M. A. Pomel, Description strdtigraphique tinirale de V Algerie (1889), and numerous papers by E. Ficheur, L. Gentil, G. Rolland, P. Thomas, and J. Welsch wilt "be found in the Bull. Soc. Giol. France, and Compt. Rend. Acad. Sci. The volumes of the International Geological Congress review Algerian geology. The French government publication, Exploration scien- tifique de V Algerie (20 vols., 1844-1853), gives the results of in- vestigations made in 1840-1842. O. Depont and X. Coppolani, Les Confreries religieuses musulmanes (Algiers, 1897), and Carte de VAlgirie . . . domaine giographique des confreries (Algiers, 1898), have special reference to the Islamic sects in Algeria. Stephane Gsell's Les monuments antiques de VAlgirie (2 vols., Paris, 1901), one of the publications of the Service des monuments historiques of the colony, is an authoritative and finely illustrated work On the an- tiquities of Algeria. For archaeology see also the bibliography in Africa, Roman.

The best elementary work on the history of Algeria is that of Cat, Petite histoire de VAlgirie (Algiers, 1889). For more profound re- searches consult : (a) for the Turkish period : H. D. de Gramont, Histoire d' Alger sous la domination lurque (1887) ; Mercier, Histoire de VAfrique septentrionale (1888-1891); Eugene Plantet, Correspon- dence des deys d' Alger avec la cour de France (1889-1892) ; Paul Masson, Histoire des itablissements et du commerce francais dans VAfrique barbaresque (1903) ; General Faure-Biguet, Histoire de VAfrique septentrionale sous la domination musulmane (1905) ; (b) for the French period: Camille Rousset, La Conquite d' Alger (8th ed., 1899), Les Commencements d'une conquite: VAlgirie de 1830 d. 1840, with atlas (1887), and La Conquite de VAlgirie, 1841- 1857, with atlas (1889); Pelissier, Annates algiriennes (1854) ; Leon Roches, Trente-deux ans d. travers V Islam (1884-1887): Colonel Trumelet, Histoire de V insurrection des Ouled-Sidi-Cheik (1887); Rinn, Histoire de V insurrection de 1871 (1891).

The best general maps are those of the Carte de VAlgirie, in numerous sheets, on the scale of 1 : 50,000 (published by the Service giographique de VArmie, Paris). (F. R. C.)

ALGHERO, a seaport and episcopal see on the W. coast of Sardinia, in the province of Sassari, 21 m. S.S.W. by rail from the town of

Sassari. Pop. (1901) 10,779. The see was founded in 1503, but the cathedral itself dates from the 12th century,

though it has been reconstructed. The town was strongly fortified by medieval walls, which have to some extent been demolished. It was originally founded by the Doria family of Genoa about 1102, but was occupied by the house of Aragon in 1354, who held it successfully against various attacks until it fell to the house of Savoy with the rest of Sardinia in 1720. Catalonian is still spoken here. Charles V. visited Alghero on his way to Africa in 1541. The coral and fishing industries are the most important in Alghero, but agriculture has made some progress in the district, which produces good wine. There is a large penal establishment containing over 700 convicts. Seven miles to the W.N.W. is the fine natural harbour of Porto Conte, secure in all weather, and on the W. of this harbour is the Capo Caccia, with two stalactite grottos, the finest of which, the Grotta di Nettuno, is accessible only from the sea. The important prehistoric necropolis of Anghelu Ruju was excavated in 1904 6| m. N. of Alghero (Notizie degli Scavi, 1904, 301 seq.).

ALGIDUS MONS, a portion of the ridge forming the rim of the larger crater of the Alban volcano (see Albanus Mons) and more especially the eastern portion, traversed by a narrow opening (now called the Cava d'Aglio) of which the Via Latina took advantage, and which frequently appears in the early military history of Rome. That a distinct town existed (Dion. Halic. x. 21, xi. 3) on the mountain is improbable; there must have been a fortified post, but the extensive castle on the hill (Maschio d'Ariano) to the south of the Via Latina is entirely medieval, a fact which has not been recognized by some topographers.

ALGIERS (Fr. Alger, Arab. Jezair, i.e. The Islands), capital and largest city of Algeria, North Africa, seat of the governor- general, of a court of appeal, and of an archbishop, and station of the French XIX. corps d'armSe. It is situated on the west side of a bay of the Mediterranean, to which it gives its name, in 36 47′ N., 3 4′ E., and is built on the slopes of the Sahel, a chain of hills parallel to the coast. The view of the city from the sea is one of great beauty. Seen from a distance it appears like a succession of dazzling white terraces rising from the water's edge. The houses being seemingly embowered in the luxuriant verdure of the Sahel, the effect is imposing and picturesque, and has given rise to the Arab comparison of the town to a diamond set in an emerald frame. The city consists of two parts; the modern French town, built on the level ground by the seashore, and the ancient city of the deys, which climbs the steep

hill behind the, modern town and is crowned by the kasbah or citadel, 400 ft. above the sea. The kasbah forms the apex of a triangle of which the quays form the base.

Extending along the front of the town is the boulevard de la Republique, a fine road built by Sir Morton Peto on a series of arches, with a frontage of 3700 ft., and bordered on one side by handsome buildings, whilst a wide promenade overlooking the harbour runs along the other. Two inclined roads lead from the centre of the boulevard to the quay 40 ft. below. On the quay are the landing-stages, the custom-house and the railway station. At the southern end of the boulevard de la R6publique is the square de la Republique, formerly the place Bresson, in which is the municipal theatre; at the other extremity of the boulevard is the place du Gouvernement, which is planted on three sides with a double row of plane trees and is the fashionable resort for evening promenade. The principal streets of the city meet in the place du Gouvernement: the rue Bab Azoun (Gate of Grief) which runs parallel to the boulevard de la Republique; the rue Bab-el-Oued (River Gate) which goes north to the site of the old arsenal demolished in 1900; the rue de la Marine which leads to the ancient harbour, and in which are the two principal mosques. A large part of the modern town lies south of the square de la Republique; in this quarter are the law courts, hotel de ville, post office and other public buildings. The streets in the modern town are regularly laid out; several are arcaded on both sides.

The old town presents a strong contrast to the new town. The streets are narrow,, tortuous and inaccessible to carriages. They often end in a cul-de-sac. The principal street is the rue de la Kasbah, which leads up to the citadel by 49 7 steps . The

streets are joined by alleys just wide enough to pass through. The houses, built of stone and whitewashed, are square, sub- stantial, fiat-topped buildings, presenting to the street bare walls, with a few slits protected by iron gratings in place of windows. Each house has a quadrangle in the centre, into which it looks, and which is entered by a low, narrow doorway. Shops in the native quarter are simply chambers in the walls of the houses, and open at the front. In these shops the few Moorish industries are carried on, such as embroidery in gold and silver thread, the making of kid slippers of every kind and colour, the manufacture of gold and silver ornaments. To

European eyes the native city, with its motley throng of Moors, Arabs, Jews and negroes, is the most interesting sight in Algiers. Various squares! are set apart for markets, and here are to be witnessed scenes of the greatest animation.

The public buildings of chief interest are the kasbah, the government offices (formerly the British consulate), the palaces of the governor-general and the archbishop — all these are fine Moorish houses; the " Grand " and the " New " Mosques, the Roman Catholic cathedral of St Philippe, the church of the Holy Trinity (Church of England), and the Bibliotheque Nationale d' Alger — a Turkish palace built in 1799ˆ1800. The kasbah was begun in 1516 on the site of an older building, and served as the palace of the deys until the French conquest. A road has been cut through the centre of the building, the mosque turned into barracks, and the hall of audience allowed to fall into ruin. There still remain a minaret and some marble arches and columns. Traces exist of the vaults in which were stored the treasures of the dey. The Grand Mosque (Jamaa-el-Kebir) is traditionally said to be the oldest mosque in Algiers. Thq pulpit (mimbar) bears an inscription showing that the building existed in 1018. The minaret was built by Abu Tachfin, sultan of Tlemcen, in 1324. The interior of the mosque is square and is divided into aisles by columns joined by Moorish arches. The principal facade, in the rue de la Marine, consists of a row of white marble columns supporting an arcade. The New Mosque (Jamaa-el-Jedid), dating from the 17th century, is in the form of a Greek cross, surmounted by a large white cupola, with four small cupolas at the corners. The minaret is 90 ft. high. The interior resembles that of the Grand Mosque. The church of the Holy Trinity (built in 1870) stands at the southern end of the rue dTsly near the site of the demolished Fort Bab Azoun. The interior is richly decorated with various coloured marbles. Many of these marbles contain memorial inscriptions relating to the English residents (voluntary and involuntary) of Algiers from the time of John Tipton, British consul in 1580. One tablet records that in 1631 two Algerine. pirate crews landed in Ireland, sacked Baltimore, and carried off its inhabitants to slavery; another recalls the romantic escape of Ida M'Donnell, daughter of Admiral Ulric, consul- general of Denmark, and wife of the British consul. When Lord Exmouth was about to bombard the city in 1816, the British consul was thrown into prison and loaded with chains. Mrs. M'Donnell — who was but sixteen — escaped to the British fleet disguised as a midshipman, carrying a basket of vegetables in which her baby was hidden. (Mrs. M'Donnell subsequently married the due de Talleyrand-Perigord and died at Florence in 1880). Among later residents commemorated is Edward

Lloyd, who was the first person to show the value of esparto grass for the manufacture of paper, and thus started an industry which is one of the most important in Algeria.

The cathedral of St Philippe, built on the site of a mosque, is in the place Malakoff, next to the governor-general's palace. In its construction an attempt has been made to produce a build- ing suitable for Christian worship whilst the architecture is Moorish in style. The principal entrance, reached by a flight of 23 steps, is ornamented with a portico supported by four black- veined marble columns. The roof of the nave is of Moorish plaster work. It rests on a series of arcades supported by white marble columns. Several of these columns belonged to the former mosque. In one of the chapels is a tomb containing the bones of San Geronimo. The finding of the remains of the saint in 1853

afforded striking confirmation of an incident recorded by a Spanish Benedictine named Haedo, who published a topography of Algeria in 161 2. Haedo sets forth that a young Arab who had embraced Christianity and had been baptized with the name of Geronimo was captured by a Moorish corsair in 1569 and taken to Algiers. The Arabs endeavoured to induce Geronimo to renounce Christianity, but as he steadfastly refused to do so he was condemned to death. Bound hand and foot he was thrown alive into a mould in which a block of concrete was about to be made. The block containing his body was built into an angle of the Fort of the Twenty-four Hours, then under construction. In 1853 the Fort of the Twenty-four Hours was demolished, and in the angle specified by Haedo the skeleton of Geronimo was found. The bones were interred at St Philippe. Into the mould left by the saint's body liquid plaster of Paris was run, and a perfect model obtained, showing the features of the youth, the cords which bound him, and even the texture of his clothing. This model is now in the museum at Mustapha (see below).

Algiers possesses a college with schools of law, medicine, science and letters. The college buildings are large and hand- some. There is also a lycee in which the instruction is similar to that, given in France, and in which Christians,: Jews and Mahommedans are educated together. The museum (a state institution), formerly housed in the same building as the library, was transferred in 1897 to a new building in the suburb of Mustapha Superieur. In the museum are some of the ancient sculptures and mosaics discovered in Algeria, together with medals and Algerian money. New buildings, to contain speci- mens of Moslem art, were added in 1903.

The port of Algiers is sheltered from all winds. There are two harbours, both artificial — the old or northern harbour and the southern or Agha harbour. The northern harbour covers an area of 235 acres. The depth at the entrance is 72 to 108 ft., and in port from 36 to 66 ft. Two government dry docks are available for merchant vessels. The quays cover 18,000 sq. yds. There are three jetties, north, east and south. Within this har- bour is the small harbour of the deys, now transformed into a wet dock. An opening in the south jetty affords an entrance into Agha harbour, constructed in Agha Bay. This harbour is formed by the projection of a mole, 2500 ft. in length, from the eastern jetty of the old harbour. It provides extensive quayage with a minimum depth of water of 28 ft. Agha harbour has also an independent entrance on its southern side. Algiers is the chief coaling station in the Mediterranean, having become so largely at the expense of Gibraltar. In other respects the trade resembles that of other Algerian ports. (For trade statistics see Algeria.) The inner harbour was begun in 1518 by Khajr-ed- Din (see History, below), who, to accommodate his pirate vessels, caused the island on which was Fort Penon to be connected with the mainland by a mole. The lighthouse which occupies the site of Fort Penon was built in 1 544. Work on the northern harbour was begun in 1836, on the southern in 1904. Algiers maintains communication with Marseilles by a quick service of steamers, which run the 497 miles across the Mediterranean in twenty-eight to thirty hours. The journey between Algiers and Paris, from which it is distant 1031 miles, is accomplished in about forty-five hours.

Algiers was a walled city from the time of the deys until the close of the 19th century. The French, after their occupation of the city (1830), built a rampart, parapet and ditch, with two terminal forts, Bab Azoun to the south and Bab-el-Oued to the north. The forts and part of the ramparts were demolished at the beginning of the 20th century, when a line of forts occupying the heights of Bu Zarea (at an elevation of 1300 ft. above the sea) took their place.

Owing to the mildness of its climate Algiers has become a favourite resort for those seeking to escape the rigours of a European winter. The city is well supplied with water and its sanitary state is good. The mistral of the Riviera is entirely absent from Algiers, but in summer the city occasionally suffers from the sirocco or desert wind. The environs of Algiers are noted for their beauty and healthiness. Of the suburbs the most

picturesque is Mustapha Superieur, about 2 m. from the centre of the city on the slopes of the hills to the south. Here are the summer palace of the governor-general, many fine Moorish and French villas and luxurious hotels, all surrounded by beautiful gardens. A numerous British colony resides at Mustapha, where there is an English club. Mustapha Inferieur is built on the lower slopes of the hills. Farther to the south is the large Jardin d'Essai, containing five avenues of palms, planes, bamboos and magnolias. Notre-Dame d'Afrique, a church built (1858- 1872) in a mixture of the Roman and Byzantine styles, is con- spicuously situated, overlooking the sea, on the shoulder of the Bu Zarea hills, 2 m. to the north of the city. Above the altar is a statue of the Virgin depicted as a black woman. The church also contains a solid silver statue of the archangel Michael, belonging to the confraternity of Neapolitan fishermen. Beyond Notre-Dame d'Afrique is the beautiful Valley of the Consuls, very little changed since the time of the deys. (The valley was in those days the favourite residence of the consuls.) At the Petit Seminaire, on the site of the old French consulate, Cardinal Lavigerie died (1892).

In 1906 the population of the commune of Algiers was 154,049; the population municipale, which excludes the garrison, prisoners, &c, was 145,280. Of this total 138,240 were living in the city proper or in Mustapha. Of the inhabitants 105,908 were Euro- peans. French residents numbered 50,996, naturalized French- men 23,305, Spaniards 12,354, Italians 7368, Maltese 865, and other Europeans (chiefly British and Germans) 1652, besides 12,490 Jews. The remainder of the population — all Mahom- medans — are Moors, Arabs, Berbers, Negroes, with a few Turks. The vast majority of the Europeans are Roman Catholics. Most of the naturalized French citizens are of Spanish or Italian origin.

History. — In Roman times a small town called Icosium existed on what is now the marine quarter of the city. The rue de la Marine follows the lines of a Roman street. Roman cemeteries existed near the rues Bab-el-Oued and Bab Azoun. Bishops of Icosium — which was created a Latin city by Vespasian — are mentioned as late as the 5th century. The present city was founded in 944 by Bulukkin b. Zeiri, the founder of the Zeirid-Sanhaja dynasty, which was overthrown by Roger II. of Sicily in 1148 (see Fatimites). The Zeirids had before that date lost Algiers, which in n 59 was occupied by the Almohades, and in the 13th century came under the dominion of the Abd-el- VVahid, sultans of Tlemcen. Nominally part of the sultanate

of Tlemcen, Algiers had a large measure of independence under amirs of its own, Oran being the chief seaport of the Abd-el- VVahid. The islet in front of the harbour, subsequently known as the Penon, had been occupied by the Spaniards as early as 1302. Thereafter a considerable trade grew up between Algiers and Spain. Algiers, however, continued of comparatively little importance until after the expulsion from Spain of the Moors, many of whom sought an asylum in the city. In 1510, following their occupation of Oran and other towns on the coast of Africa, the Spaniards fortified the Penon. In 15 16 the amir of Algiers, Selim b. Teumi, invited the brothers Arouj and Khair-ed-Din (Barbarossa) to expel the Spaniards. Arouj came to Algiers,' caused Selim to be assassinated, and seized the town. Khair- ed-Din, succeeding Arouj, drove the Spaniards from the Penon (1530) and was the founder of the pashalik, afterwards deylik, of Algeria. Algiers from this time became the chief seat of the Barbary pirates. In October 1541 the emperor Charles V. sought -to capture the city, but a storm destroyed a great number of his ships, and his army of some 30,000, chiefly Spaniards, was defeated by the Algerians under their pasha, Hassan. Repeated attempts were made by various European nations to subdue the pirates, and in 1816 the city was bombarded by a British squadron under Lord Exmouth, assisted by Dutch men-of-war, and the corsair fleet burned. The piracy of the Algerians was renewed and continued until 1830. On the 4th of July in that year a French army under General de Bourmont attacked the city, which capitulated on the following day (see Algeria, History).

ALGOA BAY, a wide, shallow bay of South Africa, 436 m. E. from the Cape of Good Hope, bounded W. by Cape Recife, E. by Cape Padrone. St Croix Island in the bay is in 33 47′ S. 2 5 46′ E. On this island Bartholomew Diaz made his second landing in South Africa some time after the 3rd of February 1488, and from the cross which he is thought to have erected on it the island gets its name. Algoa Bay was the first landing-place of the British emigrants to the eastern province of Cape Colony in 1820. At a spot 6 m. N.E. of Cape Recife these emigrants founded a town, Port Elizabeth (g.v.), its harbour being sheltered from all winds save the S.E. By seafarers " Algoa Bay " is used as synonymous with Port Elizabeth.

ALGOL, the Arabic name (signifying " the Demon ") of /3 Persei, a star of thˆ second magnitude, noticed by G. Montanari in 1669 to fluctuate in brightness. John Goodricke established in 1782 the periodicity of its change in about 2 d 21, and sug- gested their cause in recurring eclipses by a large dark satellite. Their intermittent character prompted the supposition. The light of Algol remains*

constant during close upon 56 hours; then declines in 6| hours (approximately) to nearly one-fourth its normal amount, and is restored by sensibly the same grada- tions. The amplitude of the phase is i-i magnitude; and the absence of any stationary interval at minimum proves the eclipse to be partial, not annular. Its conditions were investigated from photometric data, by Professor E. C. Pickering in 1880; 1 and Itheir realization was finally demonstrated by Dr H. C. Vogel's spectroscopic measures in 1889. 2 Previously to each obscuration, the star was found to be moving rapidly away from the earth; its velocity then diminished to zero pari passu wjjh the loss of light, and reversed its. direction during the process of recovery. Algol, in fact, travels at the rate of 26-3 miles a second round the centre of gravity of the system which it forms with an invisible companion, while the two together approach the sun with an unvarying speed of 2-3 miles per second. The elements of this disparate pair, calculated by Dr Vogel on the somewhat precarious assumption that its dark and bright members -are of equal mean density, are as follows: —

Diameter of Algol .... 1,061,000 English miles. Satellite . . . 834,300 ,, „

Distance from centre to centre . 3,230,000 ,, „

Mass of Algol . . . . f solar mass.

,, Satellite . . . . | ,, „

Mean density .... about \ solar.

The plane of the joint orbit, in which no deviation from circularity has yet been detected, nearly coincides with the line of sight. The period of Algol, as measured by its eclipses, is subject to complex irregularities. It shortened fitfully by eight seconds between 1790 and 1879; soon afterwards, restora- tion set in, and its exact length in 1903 was 2 d 20 48*" 56 s , being only two seconds short of its original value. By an ex- haustive discussion, Dr S. Chandler ascertained in 1888 the compensatory nature of these disturbances; 3 and he afterwards found the most important among several which probably conspire to produce the observed effects, to be comprised in a period of 15,000 light-cycles, equivalent to 118 years. 4 An explanatory hypothesis, propounded by him in 1892, 5 is still on its trial. The system of Algol, according to this view, is triple; it includes a large, obscure primary, round which the eclipsing pair revolves in an orbit somewhat smaller than that of Uranus, very slightly*

elliptical, and inclined 20 to the line of sight, the periodic time being 118 years. The alternate delay and accelera- tion of the eclipses are then merely apparent; they represent the changes in the length of the light-journey as the stars perform their wide circuit. If these suppositions have a basis of reality, the proper motion of Algol should be disturbed by a small, but measurable undulation, corresponding to the projection of its orbit upon the sky; and although certainty on the point cannot be attained for some years to come, Lewis Boss regarded the evidence available in 1895 as tending to confirm Dr Chandler's theory.

1 Proceedings Amer. Acad. vol. xvi. p. 27. 2 Astr. Nach. No. 2947. 3 Astr. Journal, No. 165.

- *Ibid. No. 509. 5 Ibid. Nos. 255-256. « Ibid. No. 343.*

A rival interpretation of the phenomena it dealt with was put forward by F. Tisserand in 189s. 1 It involved the action of no third mass, but depended solely upon the progression of the line of apsides in a moderately elliptical orbit due to the spheroidal shape of the globes traversing it. Inequalities of the required sort in the returns of the eclipses would ensue; moreover, their duration should concomitantly vary with the varying distance from periastron at the times of their occurrence. It is a moot question whether changes of the latter kind actually occur. When they are proved to do so, Tisserand's hypothesis will hold the field.

Algol gives a helium-spectrum which undergoes no alteration at minimum. Hence the light from the marginal and central portions of the disc is identical in quality, and the limb can be little, if at all, darkened by the " smoke-veil " absorption conspicuous in the sun. The rays of this star spend close upon a century in travelling hither. Dr Chase's measures with the Yale heliometer indicated for it, in 1894, a parallax of about °" 0 3S ; 2 an d it must, accordingly, be of nearly four times the total brightness of Sirius, while its aerial lustre exceeds seventy fold that of the solar photosphere. Variables of the Algol class are rendered difficult to discover by the incidental character of their fluctuations. At the end of 1905, however, about 37 had been certainly recognized, besides some outlying cases of in- determinate type, in which continuous occultations by two bright stars, revolving in virtual contact, are doubtfully supposed to be in

progress. (A. M. C.)

ALGONQUIN, or Algonkin (a word formerly regarded as a Stench contraction of Algomequin, " those on the other side " of the river, viz. the St Lawrence, but now believed to be from the Micmac algoomaking — " at the place of spearing fish "), a collective term for a number of tribes of North American Indians dwelling in the valley of the Ottawa river and around the northern tributaries of the St Lawrence. The Algonquins allied themselves with the French against the Iroquois. Many were driven west by the latter and later became known as Ottawa. The French missionaries at work among the Algonquins early in the 17 th century found their language to be the key to the many Indian dialects now included by philologists under the general term " Algonquian stock." The chief tribes included in this stock were the Algonquin, Malecite, Micmac, Nascapi, Pennacook, Fox, Kickapoo, Delaware, Cheyenne, Conoy, Cree, Mohican, Massachuset, Menominee, Miami, Misisaga, Mohegan, Nanticoke, Narraganset, Nipmuc, Ojibway, Ottawa, Pequot, Potawatami, Sac, Shawnee and Wampanoag. The Indians of Algonquian stock number between 80,000 and 90,000, of whom rather more than half are in the United States, the rest being in Canada. Of the Algonquins proper there remain about 1500 settled in the provinces of Quebec and Ontario.

For details see Handbook of American Indians, ed. F. W. Hodge, Washington, 1907.

ALGUAZIL, a Spanish title often to be met in stories and plays, derived from the Arabic " visit " and the article " al." The alguazil among the early Spaniards was a judge, and softie- times the governor of a town or fortress. In later times he has gradually sunk down to the rank of an officer of the court, who is trusted with the service of writs and certain police duties, but he is still of higher rank than the mere corchete or catch-poll. The title has also been given to inspectors of weights and measures in market-places, and similar officials.

ALGUM, or Almug Tree. The Hebrew words Algummim or Almuggim are translated Algum or Almug trees in the authorized version of the Bible (see 1 Bangs x. n, 12; 2 Chron. ii. 8, and ix. 10, 1 1) ; almug is an erroneous form (see Max Mtiller, Science of Language, vol. L). The wood of the tree was very precious, and was brought from Ophir (probably some part of India), along with gold and precious stones, by Hiram, and was used in the formation of pillars for the temple at Jerusalem, and for the king's house; also for the inlaying of stairs, as

well as for harps and psalteries. It is probably the red sanders or red

1 Comptes Rendus, t. cxx. p. 125.

'Astr. Jour. No. 318.

sandal-wood of India (Pterocarpus santalinus). This tree belongs to the natural order Leguminosae, sub-order Papilionaceae. The wood is hard, heavy, close-grained and of a fine red colour. It is different from the white fragrant sandal-wood, which is the produce of Santalum album, a tree belonging to a distinct natural order Santalaceae. •

ALHAMA DE GRANADA, a town of southern Spain, in the province of Granada, 24 m. S.W. of Granada. Pop. (1900) 7679. Alhama is finely situated on a ledge of rock which overlooks a deep gorge traversed by the river Marchan or Alhama; while the rugged peaks of the Sierra de Alhama rise behind it to a height of 6800 ft. The town is largely modern; for over one thousand of its picturesque old Moorish houses, which formerly rose in terraces up the mountain side, were destroyed, together with five churches, the hospital, the theatre, the prison, and 800 of the inhabitants, in an earthquake which took place in 1884. Sub- scriptions were received from all parts of Spain, and the present town was built at a little distance from its predecessor. Few vestiges of antiquity survived, except the baths from which Alhama (in Arabic " the Bath ") derives its name. These are situated near the river, and appear to have been used continu- ously since Roman times (c. 1 9 b .c. — a.d. 409) . The temperature of the hot sulphurous springs is about 112 F.; and, as the waters are considered beneficial in cases of rheumatism and dyspepsia, many visitors come to Alhama in spring and autumn, attracted also by the fine scenery of the district. In the 15th century Alhama, and the neighbouring fortress of Loja (q.v.), were generally regarded as the keys of the kingdom of Granada, and their capture went far to insure the overthrow of the Moorish power. Alhama was taken by the Spanish marquis of Cadiz in 1482; and its fall is celebrated in an ancient ballad, Ay de mi, Alhama, which Byron translated into English. t

ALHAMBRA, THE, an ancient palace and fortress of thei Moorish monarchs of Granada, in southern Spain, occupying a hilly terrace on the south-eastern border of the city of Granada. This terrace or plateau, which measures about 2430 ft. in length by 674 ft. at its greatest width, extends from W.N.W. to E.S.E., and covers an area of about 3 5 acres. It is enclosed by a strongly fortified wall, which is

flanked by thirteen towers. The river Darro, which foams through a deep ravine on the north, divides the plateau from the Albaicin district of Granada; the Assabica valley, containing the Alhambra Park, on the west and south, and beyond this valley the almost parallel ridge of Monte Mauror, separate it from the Antequeruela district.

The name Alhambra, signifying in Arabic " the red," is probably derived from the colour of the sun-dried tapia, or bricks made of fine gravel and clay, of which the outer walls are built. Some authorities, however, hold that it commemorates the red flare of the torches by whose light the work of construction was carried on nightly for many years; others associate it with the name of the founder, Mahomet Ibn Al Ahmar; and others derive it from the Arabic Dar al Amra, " House of the Master." (For an account of the period to which the Alhambra belongs, see Granada (city) .) The palace was built chiefly between 1248 and 1354, in the reigns of Al Ahmar and his successors; but even the "names of the principal artists employed are either unknown or doubtful. The splendid decorations of the interior are ascribed to Yusef I., who died in 1354. Immediately after the expulsion of the Moors in 1492, their conquerors began, by successive acts of vandalism, to spoil the marvellous beauty of the Alhambra. The open work was filled up with whitewash, the painting and gildirtg effaced, the furniture soiled, torn or removed. Charles V. (1516-1556) rebuilt portions in the modern style of the period, and destroyed the greater part of the winter palace to make room for a modern structure which has never been completed. Philip V. (1700-1746) Italianised the rooms, and completed the degrada- tion by running up partitions which blocked up whole apartments, gems of taste and patient ingenuity. In subsequent centuries the carelessness of the Spanish authorities permitted this masterpiece of Moorish art to be still further defaced; and in 181 2 some of the towers were blown up by the French under Count Sebastiani, while the whole buildings narrowly escaped the same fate. In

Plan of the Alhambra

Scale of Yards

50 100

1. Court of Myrtles 6. Modern Entrance

a. Hall of Ambassadors 7. Court of the Vestibule

3. Court of Lions 8. Baths

4. Hall of the Abencerrages 9. Court of the Council Chamber

*5. Room of the Two Sisters 10. Queen's Hobing Room *

Irani Baedekers Spain ft Portugal by permission of Karl Baedeker. .

1821 an earthquake caused further damage. The work of restoration undertaken in 1828 by the architect Jose Contreras was endowed in 1830 by Ferdinand VII.; and after the death of Contreras in 1847, it was continued with fair success by his son Rafael (d. 1890), and his grandson Mariano.

The situation of the Alhambra is one of rare natural beauty; the plateau commands a wide view of the city and plain of Granada, towards the west and north, and of the heights of the Sierra Nevada, towards the east and south. Moorish poets describe it as " a pearl set in emeralds," in allusion to the brilliant colour of its buildings, and the luxuriant woods round them. The park (Alameda de la Alhambra), which in spring is overgrown with wild-flowers and grass, was planted by the Moors with roses, oranges and myrtles; its most characteristic feature, however, is the dense wood of English elms brought hither in 181 2 by the duke of Wellington. The park is celebrated for the multitude of its nightingales, and is usually filled with the sound of running water from several fountains and cascades. These are supplied through a conduit 5 m. long, which is connected with the Darro at the monastery of Jesus del Valle, above Granada.

The Moorish portion of the Alhambra resembles many medieval Christian strongholds in its threefold arrangement as a castle, a palace and a residential annexe for subordinates. The Alcazaba or citadel, its oldest part, is built on the isolated and precipitous foreland which terminates the plateau on the north-west. Only its massive outer walls, towers and ramparts are left. On its watch-tower, the Torre de la Vela, 85 ft. high, the flag of Ferdinand and Isabella was first raised, in token of the Spanish conquest of Granada, on the 2nd of January 1492. A turret containing a huge bell was added in the 18th century, and restored after being injured by lightning in 1881. Beyond the Alcazaba

is the palace of the Moorish kings, or Alhambra properly so-called; and beyond this, again, is the Alhambra Alta (Upper Alhambra), originally tenanted by officials and courtiers.

In spite of the long neglect, wilful vandalism and ill-judged restoration which the Alhambra has endured, it remains the most perfect example of Moorish art in its final European development, – — freed from the direct Byzantine influences which can be traced in the cathedral of Cordova, more elaborate and fantastic than the Giralda at Seville. The majority of the palace buildings are, in ground-plan, quadrangular, with all the rooms opening on to a central court; and the whole reached its present size simply by the gradual addition of new quadrangles, designed on the same principle, though varying in dimensions, and connected with each other by smaller rooms and passages. In every case the exterior is left plain and austere, as if the architect intended thus to heighten by contrast the splendour of the interior. Within, the palace is unsurpassed for the exquisite detail of its marble pillars and arches, its fretted ceilings and the veil-like transparency of its filigree work in stucco. Sun and wind are freely admitted, and the whole effect is one of the most airy lightness and grace. Blue, red, and a golden yellow, all somewhat faded through lapse of time and exposure, are the colours chiefly employed. The decoration consists, as a rule, of stiff, conventional foliage, Arabic inscriptions, and geometrical patterns wrought into arabesques of almost incredible intricacy and ingenuity. Painted tiles are largely used as panelling for the walls.

Access from the city to the Alhambra Park is afforded by the Puerta de las Granadas (Gate of Pomegranates), a massive triumphal arch dating from the 1 5th century. A steep ascent leads past the Pillar of Charles V., a fountain erected in 1554, to the main entrance of the Alhambra. This is the Puerta Judiciaria

(Gate of Judgment), a massive horseshoe archway, surmounted by a square tower, and used by the Moors as an informal court of justice. A hand, with fingers outstretched as a talisman against the evil eye, is carved above this gate on the exterior; a key, the symbol of authority, occupies the corresponding place on the interior. A narrow passage leads inward to the Plaza de los Aljibes (Place of the

Cisterns), a broad open space which divides the Alcazaba from the Moorish palace. To the left of the passage rises the Torre del Vino (Wine Tower), built in 1345, and used in the 16th century as a cellar. On the right is the palace of Charles V., a cold-looking but majestic Renaissance building, out of harmony with its surroundings, which it tends somewhat to dwarf by its superior size. Its construction, begun in 1526, was abandoned about 1650.

The present entrance to the Palacio Arabe, or Casa Real (Moorish palace), is by a small door from which a corridor conducts to the Patio de los Arrayanes (Court of the Myrtles), also called the Patio de la Alberca (Court of the Blessing or Court of the Pond), from the Moorish birka, " pond," or berka, " bless- ing." This court is 140 ft. long by 74 ft. broad; and in the centre there is a large pond set in the marble pavement, full of goldfish, and with myrtles growing along its sides. There are galleries on the north and south sides; that on the south 27 ft. high, and supported by a marble colonnade. Underneath it, to the right, was the principal entrance, and over it are three elegant windows with arches and miniature pillars. From this court the walls of the Torre de Comares are seen rising over the roof to the north, and reflected in the pond.

The Sala de los Ambajadores (Hall of the Ambassadors) is the largest in the Alhambra, and occupies all the Torre de Comares. It is a square room, the sides being 37 ft. in length, while the centre of the dome is 7 5 ft. high. This was the grand reception room, and the throne of the sultan was placed opposite the entrance. The tiles are nearly 4 ft. high all round, and the colours vary at intervals. Over them is a series of oval medallions with inscriptions, interwoven with flowers and leaves. There are nine windows, three on each facade, and the ceiling is admirably diversified with inlaid-work of white, blue and gold, in the shape of circles, crowns and stars — a kind of imitation of the vault of heaven. The walls are covered with varied stucco-work of most delicate pattern, surrounding many ancient escutcheons.

The celebrated Patio de los Leones (Court of the Lions) is an oblong court, 116 ft. in length by 66 ft. in breadth, surrounded by a low gallery supported on 1 24 white marble columns. A pavilion projects into the court at each extremity, with filigree walls and light domed roof, elaborately ornamented. The square is paved with coloured tiles, and the colonnade with white marble; while the walls are covered 5 ft. up from the ground with blue and yellow tiles, with a border above and below enamelled blue and gold. The columns supporting the roof and gallery are irregularly placed, with a view to

artistic effect; and the general form of the piers, arches and pillars is most graceful. They are adorned by varieties of foliage, &c; about each arch there is a large square of arabesques; and over the pillars is another square of exquisite filigree work. In the centre of the court is the celebrated Fountain of Lions, a magnificent alabaster basin supported by the figures of twelve lions in white marble, not designed with sculptural accuracy, but as emblems of strength and courage.

The Sala de los Abencerrajes (Hall of the Abencerrages) derives its name from a legend according to which Boabdil, the last king of Granada, having invited the chiefs of that illustrious line to a banquet, massacred them here. This room is a perfect square, with a lofty dome and trellised windows at its base. The roof is exquisitely decorated in blue, brown, red and gold, and the columns supporting it spring out into the arch form in a re- markably beautiful manner. Opposite to this hall is the Sala de las dos Hermanas (Hall of the two Sisters), so-called from two very beautiful white marble slabs laid as part of the pavement. These slabs measure 1 5 ft. by 7! ft., and are without flaw or stain. There is a fountain in the middle of this hall, and the roof — a dome honeycombed with tiny cells, all different, and said to

number 5000 — is a magnificent example of the so-called " stalac- tite vaulting" of the Moors.

Among the other wonders of the Alhambra are the Sala de la Justicia (Hall of Justice), the Patio del Mexuar (Court of the Council Chamber), the Patio de Daraxa (Court of the Vestibule), and the Peinador de la Reina (Queen's Robing Room), in which are to be seen the same delicate and beautiful architecture, the same costly and elegant decorations. The palace and the Upper Alhambra also contain baths, ranges of bedrooms and summer- rooms, a whispering gallery and labyrinth, and vaulted sepulchres.

The original furniture of the palace is represented by the cele- brated vase of «the Alhambra, a splendid specimen of Moorish ceramic art, dating from 1320, and belonging to the first period of Moorish porcelain. It is 4 ft. 3 in. high; the ground is white, and the enamelling is blue, white and gold.

Of the outlying buildings in connexion with the Alhambra, the foremost in interest is the Palacio de Generalife or Gineralife (the Moorish Jennat al Arif, " Garden of Arif," or " Garden of the Architect"). This villa probably dates from the end of the 13th century, but has been several times restored. Its gardens, however,

with their clipped hedges, grottos, fountains, and cypress avenues, are said to retain their original Moorish character. The Villa de los Martires (Martyrs' Villa), on the summit of Monte Mauror,commemorates by its name the Christian slaves who were employed to build the Alhambra, and confined here in subterranean cells. The Torres Bermejas (Vermilion Towers), also on Monte Mauror, are a well-preserved Moorish fortification, with underground cisterns, stables, and accommoda- tion for a garrison of 200 men. Several Roman tombs were discovered in 1829 and 1857 at the base of Monte Mauror.

See Plans, Elevations, Sections and Details of the A lhambra; from drawings taken on the spot by J. Goury and Owen Jones; with a complete translation of the Arabic inscriptions and a historical notice of the Kings of Granada, by P. de Gayangos. These two magnificent folios, though first published in London between 1842 and 1845, give the best pictorial representation of the Alhambra. See also Rafael Contreras, La Alhambra, El Alcdzar, y la gran Mezquita de Occidents (Madrid, 1885); The Alhambra, by Washington Irving, was written in 1832, and rewritten in 1857, when it had already become widely celebrated for its picturesque and humorous descriptions. A well- illustrated edition was published in London in 1896.

ALHAZEN (Abu Ali Al-Hasan Ibn Alhasan), Arabian mathematician of the nth century, was born at Basra and died at Cairo in 1038. He is to be distinguished from another Alhazen who translated Ptolemy's Almagest in the 10th century. Having boasted that he could construct a machine for regulating the inundations of the Nile, he was summoned to Egypt by the caliph Hakim; but, aware of the impracticability of his scheme, and fearing the caliph's anger, he feigned madness until Hakim's death in 1021. Alhazen was, nevertheless, a diligent and success- ful student, being the first great discoverer in optics after the time of Ptolemy. According to Giovanni Battista della Porta, he first explained the apparent increase of heavenly bodies near the horizon, although Bacon gives the credit of this discovery to Ptolemy. He taught, previous to the Polish physicist Witelo, that vision does not result from the emission of rays from the eye, and wrote also on the refraction of light, especially on atmospheric refraction, showing, e.g. the cause of morning and evening twilight. He solved the problem of finding the point in a convex mirror at which a ray coming from one given point shall be reflected to another given point. His treatise on optics was translated into Latin by Witelo (1270), and afterwards published by F. Risner in 1572, with the title Opticae thesaurus Alhazeni libri VII., cum

ejusdem libro de crepusculis et nubium ascensionibus. This work enjoyed a great reputation during the middle ages. Works on geometrical subjects were found in the Bibliotheque nationale de Paris in 1834 by E. A. Sedillot; other manuscripts are pre- served in the Bodleian library at Oxford and in the library of Leiden.

See Casiri, Bibl. Arab. Hisp. Escur.; T. E. Montucla, Histoire des mathematiques (1758); and E. A. Sedillot, Materiaux pour I'histoire des sciences mathematiques.

ALI, in full, 'Ali ben Abu Talib (c. 600-661), the fourth of the caliphs or successors of Mahomet, was born at Mecca about

ALHAMBRA

Plate 1.

THE COURT OF THE MYRTLES.

i. 658.

From Gayangos and Owen Jones, The Aitiambra.

Plate II.

ALHAMBRA

uzm

h)'t r ^,•.

j

CAPITAL IN THE COURT OF THE LIONS.

- *ids M*

PRAYER NICHE.

CAPITAL IN THE COURT OF THE MYRTLES.

>f

I

. : ; – — fizzzL-^zr-i—^'

"•'> ' ■', A.'i" .1*

i

FOUNTAIN IN THE COURT OF THE LIONS.

”’ – / ■: r /-.;..■•. >

..;i\y-;,.j/j , ‘ v .

-■ o- . v^y •’ V ‘ J? . -‘ -‘■■■

DETAIL FROM THE FOUNTAIN (QUARTER-SIZE).

From Gayangos and Owen Jones, The Alhambra.

the year a.d. 600. His father, Abu Talib, was an uncle of the prophet, and Ali himself was adopted by Mahomet and educated under his care. As a mere boy he distinguished himself by being one of the first to declare his adhesion to the cause of Mahomet, who some years afterwards gave him his daughter Fatima in marriage. Ali proved himself to be a brave and faithful soldier, and when Mahomet died without male issue, a few emigrants thought him to have the best claim to succeed him. Abu Bekr, Omar and Othman, however, occupied this position before him, and it was not until 656, after the murder of Othman, that he assumed the title of caliph. The fact that he took no steps to prevent this murder is, perhaps, the only real blot upon his character. Almost the first act of his reign was the suppression of a rebellion under Talha and Zobair, who were instigated by Ayesha, Mahomet’s widow, a bitter enemy of Ali, and one of the chief hindrances to his advancement to the caliphate. The rebel army was defeated at the ” Battle of the Camel,” near Bassorah (Basra), the two generals being killed, and Ayesha taken prisoner. Ali soon afterwards made Kufa his capital. His next care was to get rid of the opposition of Moawiya, who had established himself in Syria at the head of a numerous army. A prolonged battle took place in July 657 in the plain of Siffin (Suffein), near the Euphrates; the fighting was at first, it is said, in favour of Ali, when suddenly a number of the enemy, fixing copies of the Koran to the points of their spears, exclaimed that ” the matter ought to be settled by reference to this book, which forbids Moslems to shed each other’s blood.” The superstitious soldiers of Ali refused to fight any longer, and demanded that the issue be referred to arbitration (see further Caliphate, section B. 1). Abu Musa was appointed umpire on the part

of Ali, and 'Amr-ibn-el-Ass, a veteran diplomatist, on the part of Moawiya. It is said that 'Amr persuaded Abu Musa that it would be for the advantage of Islam that neither candidate should reign, and asked him to give his decision first. Abu Musa having proclaimed that he deposed both Ali and Moawiya, 'Amr declared that he also deposed Ali, and .announced further that he invested Moawiya with the caliphate. This treacherous decision (but see Caliphate, ib.) greatly injured the cause of Ali, which was still further weakened by the loss of Egypt. After much indecisive fighting, Ali found his position so unsatis- factory that according to some historians he made an agreement with Moawiya by which each retained his own dominions un- molested. It chanced, however — according to a legend, the details of which are quite uncertain — that three of the fanatic sect of the Kharijites had made an agreement to assassinate Ali, Moawiya and 'Amr, as the authors of disastrous feuds among the faithful. The only victim of this plot was Ali, who died at Kufa in 661, of the wound inflicted by a poisoned weapon. A splendid mosque called Meshed Ali was afterwards erected near the city, but the place of his burial is unknown. He had eight wives after Fatima's death, and in all, it is said, thirty- three children, one of whom, Hassan, a son of Fatima, succeeded him in the caliphate. His descendants by Fatima are known as the Fatimites {q.v.; see also Egypt: History, Mahommedan period). The question of Ali's right to succeed to the caliphate is an article of faith which divided the Mahommedan world into two great sects, the Sunnites and the Shiites, the former denying, and the latter affirming, his right. The Turks, consequently, hold his memory in abhorrence; whereas the Persians, who are generally Shi'as, venerate him as second only to the prophet, call him the " Lion of God " (Sher-i-Khuda) , and celebrate the anniversary of his martyrdom. Ali is described as a bold, noble and generous man, " the last and worthiest of the primitive Moslems, who imbibed his religious enthusiasm from companion- ship with the prophet himself, and who followed to the last the simplicity of his example." It is maintained, on the other hand, that his motives were throughout those of ambition rather than piety, and that, apart from the tragedy of his death, he would have been an insignificant figure in history. (See further Caliphate.)

In the eyes of the later Moslems he was remarkable for learning and wisdom, and there are extant collections (almost all certainly

spurious) of proverbs and verses which bear his name : the Sentences of Ali (Eng. trans., William Yule, Edinburgh, 1832); H. L. Fleischer, Alis hundert Spriiche (Leipz. 1837); the Divan, by G. Kuypert (Leiden, 1745, and at Bulak, 1835); C Brockelmann, Gesch. d.

arabisch. Lit. (vol. i., Weimar, 1899).

ALI, known as Ali Bey (1766-1818), the assumed name of Domingo Badia y Leblich, a Spanish traveller, born in 1766. After receiving a liberal education he devoted particular attention to the Arabic language, and made a special study of the manners and customs of the East. Pretending to be a descendant of the Abbasids, Badia in 1803 set out on his travels. Under the name of Ali Bey el Abbassi, and in Mussulman costume, he visited Morocco, Tripoli, Egypt, Arabia and Syria, and was received as a person of high rank wherever he appeared. He made the pilgrimage to Mecca, at that time in the possession of the Waha- bites. On his return to Spain in 1807 he declared himself a Bonapartist, and was made intendant first of Segovia and afterwards of Cordova. When the French were driven from Spain, Badia was compelled to take refuge in France, and there in 1 8 14, published an account of his travels under the title of Voyage d' Ali Bey en Asie et en Afrique, &c. A few years later he set out again for Syria, under the assumed name of Ali Othman, and, it is said, accredited as a political agent by the French government. He reached Aleppo, and there died on the 30th of August 1818, not without suspicion of having been poisoned.

An account of his Eastern adventures was published in London in 1816, in two volumes, entitled Travels in Morocco, Tripoli, Cyprus, Egypt, Arabia, Syria and Turkey, between the years i8oj and 180/.

ALI, known as Ali Pasha (1741-1822), Turkish pasha of Iannina, surnamed Arslan, " the Lion," was born at Tepeleni, a village in Albania at the foot of the Klissura mountains. He was one of the Toske tribe, and his ancestors had for some time held the hereditary office of bey of Tepeleni. His father, a man of mild and peaceful disposition, was killed when Ali was fourteen years old by neighbouring chiefs who seized his terri- tories. His mother Khamko, a woman of extraordinary character, thereupon herself formed and led a brigand band, and studied to inspire the boy with her own fierce and indomitable temper, with a view to revenge and the recovery of the lost property. In this wild school Ali proved an apt pupil. A hundred tales, for the most part probably mythical, are told of his powers and cunning during the years he spent among the mountains as a brigand leader. At last, by a picturesque stratagem, he gained possession of Tepeleni and took vengeance on his enemies. To secure himself from rivals in his own family, he is said to have murdered his brother and imprisoned his mother on a charge of attempting to poison him. With a view to establishing his authority he now made overtures to the Porte and was com- missioned to

chastise the rebellious pasha of Scutari, whom he defeated and killed. He also, on pretext of his disloyalty, put to death Selim, pasha of Delvinon. Ali was now confirmed in the possession of all his father's territory and was also appointed lieutenant to the derwend-pasha of Rumelia, whose duty it was to suppress brigandage and highway robbery. This gave him an opportunity for amassing wealth by sharing the booty of the robbers in return for leaving them alone. The disgrace that fell in consequence on his superior, Ali escaped by the use of lavish bribes at Constantinople. In 1787 he took part in the war with Russia, and was rewarded by being made pasha of Trikala in Thessaly and derwend-pasha of Rumelia. It now suited his policy to suppress the brigands, which he did by enlisting most of them under his own banner. His power was now already considerable; and in 1788 he added to it by securing his nomination to the pashalik of Iannina by a characteristic trick.

The illiterate brigand, whose boyish ambition had not looked beyond the recovery of his father's beylick, was now established as one of the most powerful viziers under the Ottoman govern- ment. Success only stimulated his insatiable ambition. He earned the confidence of the Porte by the cruel discipline he maintained in his own sanjak, and the regular flow of tribute and bribes which he directed to Constantinople ; while he bent all his energies to extending his territories at the expense of his neigh- bours. The methods he adopted would have done credit to

Cesare Borgia; they may be studied in detail in the lurid pages of Pouqueville. Soon, by one means or another, his power was supreme in all central Albania. Two main barriers still obstructed the realization of his ambition,which now embraced Greece and Thessaly, as well as Albania, and the establishment in the Mediterranean of a sea-power which should rival that of the dey of Algiers. The first of these was the resistance of the little Christian hill community of Suli; the second the Venetian occupation of the coast, within a mile of which — by convention with the Porte — no Ottoman soldier might penetrate. It needed three several attacks before, in 1803, Ali conquered the Suliot stronghold. Events in western Europe gave him an earlier opportunity of becoming master of most of the coast towns. Ali had watched with interest the career of Bonaparte in Italy, and the treaty of Campo Formio (1797), which blotted the Venetian republic from the map of Europe, gave

him the opportunity he desired. In response to his advances commissaries of the French republic visited him at Iannina and, affecting a sudden zeal for republican principles, he easily obtained permission to suppress the " aristocratic " tribes on the coast. His plans in Albania were interrupted by the war against Pasvan Oglu, the rebellious pasha of Widdin, in which Ali once more did good service. Meanwhile international politics had developed in a way that necessitated a change in Ali's attitude. Napoleon's occupation of the Ionian Islands and his relations with Ali had alarmed Russia, which feared that French influence would be substituted for her own in the Balkan peninsula; and on the 5th of September 1 798 a formal alliance, to which Great Britain soon after acceded, was signed on behalf of the emperor Paul and the sultan. Once more Ali turned Turk and fought against his recent friends with such success that in the end he remained in possession of Butrinto, Prevesa and Vonitza on the coast, was created pasha " of three tails " by the sultan, and received the congratulations of Nelson. But the campaign of Austerlitz followed, then the peace of Pressburg which guaranteed to Napoleon the former dominions of Venice, and finally the treaty of Tilsit, which involved, among other things, the withdrawal of the Russians from the Ionian Islands and the Albanian coast.

Amid all the momentous changes the part of Ali was a difficult one. He had, moreover, to contend with domestic enemies, and with difficulty defeated a league formed against him by some Mussulman tribes, under Ibrahim of Berat and Mustapha of Delvinon, and the Suliots. He knew, however, how to retain the confidence of the sultan, who not only confirmed him in the possession of the whole of Albania from Epirus to Montenegro, but even in 1799 appointed him vali of Rumelia, an office which he held just long enough to enable him to return to Iannina laden with the spoils of Thessaly. He was now at the height of his power. In 1803 the Suliot stronghold fell; and. he was undis- puted master of Epirus, Albania and Thessaly, while the pashalik of the Morea was held by his son Veli, and that of Lepanto by his son Mukhtar. Only the little town of Parga held out against him on the coast; and in order to obtain this he once more in 1807 entered into an alliance with Napoleon. The French emperor, however, preferred to keep Parga, as a convenient gate into the Balkan peninsula, and it remained in French occupation until March 18 14, when the Pargiots rose against the gaixison and handed the fortress over to the British to save it from falling into the hands of Ali, who had bought the town from the French commander, Cozi Nikolo, and was closely investing it. The cordial relations between Napoleon and the pasha of Iannina had not long continued. Ali was

angered by the refusal to surrender Parga and justly suspicious of the ambitions which this refusal implied; he could not feel himself secure with the Ionian Islands and the Dalmatian coast in the hands of a power whose plans in the East were notorious, and he was glad enough to avail himself of Napoleon's reverses in 1812. to help to rid himself of so danger- ous a neighbor. His services to the allies received their reward. Still bent on obtaining Parga, he sent a special mission to London, backed by a letter from Sir Robert Liston, the British ambassador at Constantinople, calling the attention of the government to the pasha's supereminent qualities " and his services against the

French. After some hesitation it was decided to evacuate Parga and hand it over to the Ottoman government, i.e. Ali Pasha. The convention by which this was effected was ultimately signed on the 17th of May 1817, being ratified by the sultan on the 24th of April 1819. By its terms the Pargiots were to receive an asylum in the islands, the Ottoman government undertaking to pay compensation for their property. Ali had no difficulty in finding the money; the garrison, as soon as it was received, marched out with the bulk of the inhabitants; and the last citadel of freedom in the Balkans fell to the tyrant of Iannina. 1

Ali's authority in the great part of the peninsula subject to him now overshadowed that of the sultan; and Mahmud II., whose whole policy had been directed to destroying the overgrown power of the provincial pashas, began to seek a pretext for overthrowing the Lion of Iannina,whose all-devouring ambition seemed to threaten his own throne. The occasion came in 1820 when Ali, emboldened by impunity, violated the sanctity of Stamboul itself by attempting to procure the murder of his enemy Pacho Bey in the very precincts of the palace. A decree of disposition was now issued against the sacrilegious vali, who had dared " to fire shots in Constantinople, the residence of the caliph, and the centre of security." Its execution was entrusted to Khurshid Pasha, with the bulk of the Ottoman forces.

For two years Ali, now over eighty years of age, held his own, in spite of the defection of his vassals and even of his sons. At last, in the spring of 1822, after a prolonged siege in his island fortress at Iannina, which even the outbreak of the Greek revolt had not served to raise, the intrepid old man was forced to sue for terms. He asked and received an interview with Khurshid, was received courteously and dismissed with the most friendly assurances. As he turned to leave the grand vizier's tent he was stabbed in the back; his head was cut off and sent to Constantinople. Notwithstanding their treason to

their father, his sons met with the same fate.

In spite of the ferocious characteristics which have been sug- gested in the above sketch, Ali Pasha is undoubtedly one of the most remarkable, as he is one of the most picturesque, figures in modern history; and as such he was recognized in his own day. His court at Iannina was the centre of a sort of barbarous culture, in which astrologers, alchemists and Greek poets played their part, and was often visited by travellers. Amongst others, Byron came, and has left a record of his impressions in " Childe Harold's Pilgrimage," less interesting and vivid than the prose accounts of Pouqueville, T. S. Hughes and William M. Leake. Leake (iii. 259) reports a reproof addressed by Ali to the French renegade Ibrahim Effendi, who had ventured to remonstrate against some particular act of ferocity: " At present you are too young at my court to know how to comport yourself. . . . You are not yet acquainted with the Greeks and Albanians: when I hang up one of these wretches on the plane-tree, brother robs brother under the very branches: if I burn one of them alive, the son is ready to steal his father's ashes to sell them for money. They are destined to be ruled by me; and no one but Ali is able to restrain their evil propensities." This is perhaps as good an apology as could be made for his character and

1 In his report on the Ionian Treaty presented to Lord Castlereagh at the congress of Vienna in December 1814, Sir Richard Church strongly advocated, not only the retention of Parga, but that Vonitza, Prevesa and Butrinto also should be taken from Ali Pasha and placed under British protection, a measure he considered necessary for the safety of the Ionian Islands. " Ali Pasha," he wrote, " is now busy building forts along his coast and strengthening his castles in the interior. In January 1814 he had 14,000 peasants at work on the castle of Argiro Castro, and about 1500 erecting a fort at Porto Palermo, nearly opposite Corfu." In 1810 he had erected a fort directly opposite Santa Maura commanding the harbour.

The fate of Parga created intense feeling at the time in England, and was cited by Liberals as a crowning instance of the perfidy of the government and of Castlereagh's subservience to reactionary tendencies abroad. The step, however, was not lightly taken. In occupying the town the British general had expressly refrained from pledging Great Britain to remain there ; and the government held that any permanent occupation of a post on the mainland carried with it risks of complications out of all proportion to any possible benefit.

methods. To the wild people over whom he ruled none was needed. He had their respect, if not their love; he is the hero of a thousand ballads; and his portrait still hangs among the ikons in the cottages of the Greek mountaineers. All accounts agree in describing him in later life as a man of handsome presence, with a venerable white beard, piercing black eyes and a benevolent cast of countenance, the effect of which was heightened in conversation by a voice of singular sweetness.

Authorities. — Apart from the scattered references in the pub- lished and unpublished diplomatic correspondence of the period, contemporary journals and books of travel contain much interesting material for the life of AH. Of these may especially be mentioned Francois C. H. L. Pouqueville, Voyage en Moree, d, Constantinople, en Albanie, &c. (3 vols., Paris, 1805), of which an English version by A. Plumptre was published in 1815; ib. Voyage dans la Grece (5 vols., Paris, 1820, 1821). Pouqueville, who spent some time as French resident at Iannina, had special facilities for obtaining first-hand information, though his emotionalism makes his observations and deductions at times somewhat suspect. Very interesting also are Thomas Smart Hughes, Travels in Greece and Albania (2 vols., 2nd ed., Lond. 1830); John Cam Hobhouse (Lord Broughton), A Journey through Albania, &c. . . . during the years 1809 and 1810 (Lond., 4to, 1813, a new ed., 2 vols., 1855) ; William Martin Leake, Travels in Northern Greece (4 vols., Lond. 1845). See also Pouque- ville's Hist, de la regeneration de la Grece, 1740-1824 (4 vols., Paris, 1824, 3rd ed., Brussels, 1825); R. A. Davenport, Life of Ali Pasha, vizier of Epirus (1861). (W. A. P.)

ALIAGA, a town of the province of Nueva Ecija, Luzon, Philippine Islands, about 70 m. N. by W. of Manila. Pop. (1903) 11,950. It has a comparatively cool and healthful climate, and is pleasantly situated about midway between the Pampanga Grande and the Pampanga Chico rivers, and in a large and fertile valley of which the principal products are Indian corn, rice, sugar and tobacco. Tagalog is the most important language; Ilocano, Pampango and Pangasinan are also used.

ALIAS (Lat. for " at another time "), a term used to connect the different names of a person who has passed under more than one, in order to conceal his identity, or for other reasons; or,

compendiously, to describe the adopted name. The expres- sion alias dictus was formerly used in legal indictments, and pleadings where absolute precision was necessary in identifying the person to be charged, as "John Jones, alias dictus James Smith." The adoption of a name other than a man's baptismal or surname need not necessarily be for the purpose of deception or fraud; pseudonyms or nicknames fall thus under the descrip- tion of an alias. Where a person is married under an alias, the marriage is void when both parties have knowingly and wilfully connived at the adoption of the alias, with a fraudulent intention. But if one of the parties to a marriage has acquired a new name by use and reputation, or if the true name of any one of the parties is not known to the other, the use of an alias in these cases will not affect the validity of the marriage.

ALIBI (Lat. for "elsewhere"), in law, the defence resorted to in criminal prosecutions, where the person charged alleges that he was so far distant at the time from the place where the crime was committed that he could not have been guilty. An alibi, if substantiated, is the most conclusive proof of innocence.

ALICANTE, a province of south-eastern Spain; bounded on the N. by Valencia, W. by Albacete and Murcia, S. by Murcia, and S.E. and E. by the Mediterranean Sea. Pop. (1900) 470,149; area, 2096 sq. m. Alicante was formed in 1833 of districts taken from the ancient provinces of Valencia and Murcia, Valencia contributing by far the larger portion. The surface of the province is extremely diversified. In the north and west there are extensive mountain ranges of calcareous formation, inter- sected by deep ravines; while farther south the land is more level, and there are many fertile valleys. On the Mediterranean coast, unhealthy salt marshes alternate with rich plains of pleasant and productive huertas or gardens, such as those of Alicante and Denia. Apart from Segura, which flows from the highlands of Albacete through Murcia and Orihuela to the sea, there is no considerable river, but a few rivulets flow east into the Mediterranean. The climate is temperate, and the rainfall very slight. Despite the want of rivers and of rain, agriculture is in a flourishing condition. Many tracts, originally

rocky and sterile, have been irrigated and converted into vine- yards and plantations. Cereals are grown, but the inhabitants prefer to raise such articles of produce as are in demand for export, and consequently part of the grain supply has to be imported. Esparto grass, rice, olives, the sugar-cane, and tropical fruits and vegetables are largely produced. Great attention is given to the rearing of bees and silk- worms; and the wine of the province is held in high repute

throughout Spain, while some inferior kinds are sent to France to be mixed with . claret. There are iron and lignite mines, but the output is small. Mineral springs are found at various places. The manufactures consist of fine cloths, silk, cotton, woollen and linen fabrics, girdles and lace, paper, hats, leather, earthenware and soap. There are numerous oil mills and brandy distilleries. Many of the inhabitants are engaged in the carrying trade, while the fisheries on the coast are also actively prosecuted, tunny and anchovies being caught in great numbers. Barilla is obtained from the sea-weed on the shores, and some of the saline marshes, notably those near Torrevieja, yield large supplies of salt. The principal towns, which are separately described, include Alicante, the capital (pop. 1900, 50,142), Crevillente (10,726), Denia (12,431), Elche (27,308), Novelda (11,388), Orihuela (28,530), and Villena (14,099). Other towns, of less importance, are Aspe (7927), Cocentaina (7093), Monovar (10,601), Pinoso (7946), and Villajoyosa (8902).

ALICANTE, the capital of the Spanish province described above, and one of the principal seaports of the~country. Pop. (1900) 50,142. It is situated in 38 21′ N. and o° 26′ W., on the Bay of Alicante, an inlet of the Mediterranean Sea. It is the termini of railways from Madrid and Murcia. From its harbour, the town presents a striking picture. Along the shore extends the Paseo de los Martires, a double avenue of palms; behind this, the white flat-roofed houses rise in the form of a crescent towards the low hills which surround the city, and terminate, on the right, in a bare rock, 400 ft. high, surmounted by an ancient citadel. Its dry and equable climate renders Alicante a popular health-resort. The city is an episcopal see, and contains a modern cathedral.

The bay affords good anchorage, but only small vessels can come up to the two moles. The harbour is fortified, and there is a small lighthouse on the eastern mole ; important engineering works, subsidized by the state, were undertaken in 1902 to provide better accomodation. In the same year 1737 vessels of 939,789 tons entered the port. The trade of Alicante consists chiefly in the manufacture of cotton, linen and woollen goods, cigars and confectionery; the importation of coal, iron, machinery, manures, timber, oak staves and fish; and the exportation of lead, fruit, farm produce and red wines, which are sent to France for blending with better vintages. Fine marble is procured in the island of Plana near the coast.

Alicante was the Roman Lucentum; but, despite its antiquity, it has few Roman or Moorish remains. In 718, it was occupied by the

Moors, who were only expelled in 1304, and made an unsuccessful attempt to recapture the city in 1331. Alicante was besieged by the French in 1709, and by the Federalists of Cartagena in 1873. For an account of the events which led up to these two sieges, see Spain.

For further details of the local history, see J. Pastor de la Roca, Historia general de la ciudad y Castillo de Alicante, &c. (Alicante, 1854);, and the Ensayo biogrdfico bibliogrdfico de escritores de Alicante y de su provincia, by M. R. Garcia and A. Montero y Perez (Alicante, 1890).

ALICE MAUD MARY, Grand-Duchess of Hesse-Darmstadt (1843-1878), second daughter and third child of Queen Victoria, was born at Buckingham Palace, on the 25th of April 1843. A pretty, delicate-featured child — " cheerful, merry, full of fun and mischief," as her elder sister described her — fond of gymnastics, a good skater and an excellent horsewoman, she was a general favourite from her earliest days. Her first years were passed without particular incident in the home circle, where the training of their children was a matter of the greatest concern to the queen and the prince consort. Among other things, the royal children were encouraged to visit the poor, and the effect of this training

was very noticeable in the later life of Princess Alice. After the marriage of the Princess Royal in 1858, the new responsi- bilities devolving upon Princess Alice, as the eldest daughter at home, called forth the higher traits of her character, and brought her into still closer relationship with her parents, and especially with her father. In the summer of i860, at Windsor Castle, Princess Alice first met her future husband, Prince Louis of Hesse. An attachment quickly sprang up, and on the prince's second visit in November they were formally engaged. In the following year, on the announcement of the contemplated marriage, the House of Commons unanimously voted a dowry of £30,000 and an annuity of £6000 to the princess. In December 1 86 1, while preparations were being made for the marriage, the prince consort was struck down with typhoid fever, and died on the 14th. Princess Alice nursed her father during his short illness with the utmost care, and after his death devoted herself to comforting her mother under this terrible blow. Her marriage took place at Osborne, on the 1st of July 1862. The princess unconsciously wrote her own biography from this period in her

constant letters to Queen Victoria, a selection of which, edited by Dr. Carl Sell, were allowed to be printed in 1 883. These letters give a complete picture of the daily life of the duke and duchess, and they also show the intense love of the latter for her husband, her mother and her native land. She managed to visit England every year, and it was at her special request that when she died her husband laid an English flag upon her coffin.

In the war "between Austria and Prussia in 1 866, Hesse- Darmstadt was upon the side of the Austrians; Prince Louis accompanied his troops to the front, and was duly appointed by the grand-duke to the command of the Hessian division. This was a time of intense trial to the princess, whose husband and brother-in-law, the crown prince of Prussia, were necessarily fighting upon opposite sides. The duke of Hesse also took part in the principal battles of the Franco-Prussian war, while the duchess was actively engaged in organizing hospitals for the relief of the sick and wounded. The death of the duke's father, Prince Charles of Hesse, on the 20th of March 1877, was followed by that of the grand-duke on the 13th of June, and Prince Louis succeeded to the throne as Grand Duke Louis IV. In the summer of 1878 the grand-duke and duchess, with their family, came again to England, and went to Eastbourne, where the duchess remained for some time. She returned to Darmstadt in the autumn, and on the 8th of November 1878 her daughter, Princess Victoria, was attacked by diphtheria. Three more of her children, as well as her husband, quickly caught the disease, and the youngest, " May," succumbed on the 16th. On the 7th of December the princess was herself attacked, and, being weakened by nursing and anxiety, had not strength to resist the disease, which proved fatal on the 14th of December, the seventeenth anniversary of her father's death. She left one son and four daughters.

See Carl Sell, Alice: Mittheilungen aus ihrem Leben tend Briefen, &c. (Darmstadt, 1883), with English translation by the Princess Christian, Alice: biographical sketch and letters (1884). (G. F. B.)

ALIDADE (from the Arab.), the movable index of a graduated arc, used in the measurement of angles. The word is used also to designate the supporting frame or arms carrying the micro- scopes or verniers of a graduated circle.

ALIEN (Lat. alienus), the technical term applied by British constitutional law to anyone who does not enjoy the character of a British subject; in general, a foreigner who for the purposes of any state comes into certain domestic relations with it, other than those

applying to native-born or naturalized citizens, but owns allegiance to a foreign sovereign.

English law, save with the special exceptions mentioned, admits to the character of subjects all who are born within' the king's allegiance, that is, speaking generally, within the British dominions. In the celebrated question of the post-nati in the reign of James I. of England, it was found, after solemn trial, that natives of Scotland born before the union of the crowns were aliens in England, but that, since allegiance is to the person of the king, those born subsequently were English subjects. A child

born abroad, whose father or whose grandfather on the father's side was a British subject, may claim the same character unless at the time of his birth his father was an attainted traitor, or in the service of a state engaged in war against the British empire (4th Geo. II. c. 21). Owing to this exceptional provision some sons of Jacobite refugees born abroad, who joined in the rebellion of 1745, were admitted to the privilege of prisoners of war.

It has been enacted in the United Kingdom with regard to the national status of women and children that a married woman is to be deemed a subject of the state of which her husband is for the time being a subject; that a natural-born British woman, having become an alien by marriage, and thereafter being a widow, may be rehabilitated under conditions slightly more favourable than are required for naturalization; that where a father or a widow becomes an alien, the children in infancy becoming resident in the country where the parent is naturalized, and being naturalized by the local law, are held to be subjects of that country; that those of a father or of a widow readmitted to British nationality or who obtains a certificate of naturalization, becoming during infancy resident with such parent in the British dominions in the former case or in the United Kingdom in the latter, become readmitted or naturalized (Naturalization Act 1870, s. 10). The nationality of children not covered by these enactments is not affected by the change of their parents' nationality. The same statute provides that a declaration of alienage before a justice of peace or other competent judge, having the effect of divesting the declarant of the character of a British subject, may be made by a naturalized British subject desiring to resume the nationality of the country to which he originally belonged, if there be a convention to that effect with that country; by natural-born subjects who were also born subjects of another state according to its law; or by persons born abroad having British fathers.

Naturalization, which means conferring the character of a subject, may now, under the act of 1870, be obtained by applying to the home secretary and producing evidence of having resided for not less than five years in the United Kingdom, or of having been in the service of the crown for not less than five years, and of intention to reside in the United Kingdom or serve under the crown. Such a certificate may be granted by the secretary of state to one naturalized previously to the passing of the act, or to a British subject as to whose nationality a doubt exists, or to a statutory alien, i.e. one who has become an alien by declaration in pursuance of the act of 1870.

In the United States the separate state laws largely determine the status of an alien, but subject to Federal treaties. (For further particulars see Allegiance and Naturalization.)

Many of the disabilities to which aliens were subject in the United Kingdom, either by the common law or under various acts of parliament, have been repealed by the Naturalization Act 1870. It enables aliens to take, acquire, hold and dispose of real and personal property of every description, and to transmit a title to it, in all respects as natural-born British subjects. But the act expressly declares that this relaxation of the law does not qualify aliens for any office or any municipal, parliamentary or other franchise, or confer any right of a British subject other than those above expressed in regard to property, nor does it affect interests vested in possession or expectancy under dispositions made before the act, or by devolution of law on the death of any one dying before the act. A ship, any share in which is owned by an alien, shall not be deemed a British ship (Merchant Shipping Act 1894, s. 1). By the Juries Act 1870, s. 8, aliens who have been domiciled for ten years in England or Wales, if in other respects duly qualified, are liable to serve on juries or inquests in England or Wales; and by the Naturalization Act 1870, s. 5, the aliens' old privilege of being tried by a jury de medietate linguae (that is, of which half were foreigners), was abolished.

It seems to be a rule of general public law that an alien can be sent out of the realm by exercise of the crown's prerogative; but in modern English practice, whenever it seems necessary to expel foreigners (see Expulsion), a special act of parliament has to be obtained for the purpose, unless the case falls within the extradition acts or the Aliens Act 1905. The latter prohibits the

landing in the United Kingdom of undesirable alien steerage passengers, called in trie act " immigrants," from ships carrying more than twenty alien steerage passengers, called in the act " immigrant ships "; nor can alien immigrants be landed except at certain ports at which there is an " immigrant officer," to whom power of prohibiting the landing is given, subject to a right of appeal to the immigration board of the port. The act contains a number of qualifications, and among these empowers the secretary of state to exempt any immigrant ship from its provisions if he is satisfied that a proper system is maintained to prevent the immigration of undesirable persons. The principal test of undesirableness is not having or being in a position to obtain the means of supporting one's self and one's dependents, or appearing likely from disease or infirmity to become a charge on the rates, provided that the immigrant is not seeking to avoid prosecution or punishment on religious or political grounds, or persecution, involving danger of imprisonment or danger to life or limb, on account of religious belief. Lunatics, idiots, persons who from disease or infirmity appear likely to become a detriment to the public otherwise than through the rates, and persons sentenced in a foreign country for crimes for which they could be surrendered to that country, are also enumerated as undesir- able. Power is also given to the secretary of state to expel persons sentenced as just mentioned, or, if recommended by the court in which they have been convicted, persons convicted of felony or some offence for which the court has power to impose imprisonment without the option of a fine, or of certain offences against the police laws; and persons in receipt of any such parochial relief as disqualifies for the parliamentary franchise, or wandering without ostensible means'of subsistence, or living under insanitary conditions due to overcrowding. (Jno. W.)

ALIENATION (from Lat. alienus, belonging to another), the act or fact of being estranged, set apart or separated. In law the word is used for the act of transfer of property by voluntary deed and not by inheritance. In regard to church property the word has come to mean, since the Reformation, a transfer from religious to secular ownership. " Alienation " is also used to denote a state of insanity (q.v.).

ALIEN-HOUSES, religious houses in England belonging to foreign ecclesiastics, or under their control. They generally were built where property had been left by the donors to foreign orders to pray for their souls. They were frequently regular " priories," but sometimes

only " cells," and even " granges," with small chapels attached. Some, particularly in cities, seem to have been a sort of mission-houses. There were more than 100 in England. Many alien-houses were suppressed by Henry V. and the rest by Henry VIII.

ALIENIST (Lat. alienus, that which belongs to another, i.e. is external to one's self), one who specializes in the study of mental diseases, which are often included in the generic name " Aliena-tion." (See Insanity.)

ALIGARH, a city and district of British India in the Meerut division of the United Provinces. The city, also known as Koil, was a station on the East Indian railway, 876 m. from Calcutta. Sir Sayad Ahmad Khan, K.C.S.I., who died in 1898, founded in 1864 the Aligarh Institute and Scientific Society for the transla- tion into the vernacular of western literature; and afterwards the Mahommedan Anglo-Oriental college, under English pro- fessors, with an English school attached. The college meets with strong support from the enlightened portion of the Mussul- man community, whose aim is to raise it to the status of a university, with the power of conferring degrees. The population (iqoi) 70,434, showed an increase of 14% in the decade. There are several flour-mills, cotton-presses and a dairy farm. Aligarh Fort, situated on the Grand Trunk road, consists of a regular polygon, surrounded by a very broad and deep ditch. It became a fortress of great importance under Sindhia in 1759, and was the depot where he drilled and organized his battalions in the European fashion with the aid of De Boigne. It was captured from the Mahrattas under the leadership of Perron, another French officer, by Lord Lake's army, in September 1803, since which time it has been much strengthened and

improved. In the rebellion of 1857 the troops stationed at Aligarh mutinied, but abstained from murdering their officers, who, with the other residents and ladies and children, succeeded in reaching Hathras.

The district of Aligarh has an area of 1957 sq. m. It is nearly a level plain, but with a slight elevation in the centre, between the two great rivers the Ganges and Jumna. The only other important river is the Kali Nadi, which traverses the entire length of the district from north-east to south-west. The district is traversed by several railways and also by the Ganges canal, which is navigable. The chief trading centre is Hathras. In 1901 the population was 1,200,822, showing an increase of 15% in the decade, due to the extension of irrigation. There are several factories for ginning and pressing cotton.

ALIGNMENT (from Fr. a and ligne, the Lat. linea, a line), a setting in line, generally straight, or the way in which the line runs; an expression used in surveying, drawing, and in military arrangements, the alignment of a regiment or a camp meaning the situation when drawn up in line or the relative position of the tents. The alignment of a rifle has reference to the way of getting the sights into line with the object, so as to aim correctly.

ALIMENT (from Lat. aliment-um, from alere to nourish), a synonym for " food," literally or metaphorically. The word has also been used in the same legal sense as Alimony (q.v.). Aliment, in Scots law, is the sum paid or allowance given in respect of the reciprocal obligation of parents and children, husband and wife, grandparents and grandchildren, to contribute to each other's maintenance. The term is also used in regard to a similar obligation of other parties, as of creditors to im- prisoned debtors, the payments by parishes to paupers, &c. Alimentary funds, whether of the kind above mentioned, or set apart as such by the deed of a testator, are intended for the mere support of the recipient, and are not attachable by creditors.

ALIMENTARY CANAL, in anatomy. The alimentary canal, strictly speaking, is the whole digestive tract from the mouth to the anus. From the one orifice to the other the tube is some 25 to 30 ft. long, and the food, in its passage, passes through the following parts one after the other: — mouth, pharynx, oesophagus, stomach, small intestines, caecum, large intestines, rectum and anus. Into this tube at various points the salivary glands, liver and pancreas pour their secretions by special ducts. As the mouth (q.v.) and pharynx (q.v.) are separately described, the detailed description will here begin with the oesophagus or gullet.

The oesophagus (Gr. otaco, I will carry, and (fHtyeiv, to eat), a muscular tube lined with mucous membrane, stretches from the lower limit of the pharynx, at the level of the cricoid cartilage, to the cardiac orifice of the stomach. It is about 10 in. long (25 cm.) and half to one inch in diameter. At first it lies in the lower part of the neck, then in the thorax, and lastly, for about an inch, in the abdomen. As far as the level of the fourth or fifth thoracic vertebra it lies behind the trachea, but when that tube ends, it is in close contact with the pericardium, and, at the level of the tenth thoracic vertebra, passes through the oesophageal opening of the diaphragm (q.v.), accompanied by the two vagi nerves, the left being in front of it and the right behind. In the abdomen it lies just behind the left lobe of the liver. Both in the upper and lower parts of its course it lies a little to

the left of the mid line. Its mucous membrane is thrown into a number of longitudinal pleats to allow stretching.

The stomach (Gr. UTOjuaxos) is an irregularly pear-shaped bag, situated in the upper and left part of the abdomen. It is somewhat flattened from before backward and so has an anterior and posterior surface and an upper and lower border. When moderately distended the thick end of the pear or fundus bulges upward and to the left, while the narrow end is constricted to form the pylorus, by means of which the stomach communicates with the small intestine. The cardiac orifice, where the oeso- phagus enters, is placed about a third of the way along the upper border from the left end of the fundus, and, between it and the

pylorus, the upper border is concave and is known as the lesser curvature. From the cardiac to the pyloric orifice, round the lower border, is the greater curvature. The stomach has in front of it the liver (see fig. i), the diaphragm and the anterior abdominal wall, while behind it are the pancreas, left kidney, left adrenal, spleen, colon and mesocolon. These structures form what is known as the stomach chamber. When the stomach is empty it contracts into a tubular organ which is frequently sharply bent, and the transverse colon ascends to occupy the vacant part of the stomach chamber. The last inch of the stomach before reaching the pylorus is

Diaphragm

Attachment of falciform ligament

Right lobe of liver

Gall-bladder

Transverse colon Small intestine

Ascending colon

Anterior superior spine

Caecum

SCALE IN INCHES SCALE IN CENTIMETRES

From A. Birmingham; Cunningham's Text-Book of Anatomy.

FlG. I. — The Abdominal Viscera in situ, as seen when the abdomen is laid open and the great omentum removed (drawn to scale from a photograph of a male body aged 56, hardened by formalin injections).

The ribs on the right side are indicated by Roman numerals; it will be observed that the eighth costal cartilage articulated with the sternum on both sides. The subcostal, intertuber- cular, and right and left Poupart lines are drawn in black, and the mesial plane is indicated by a dotted line. The intercostal muscles and part of the diaphragm have been removed, to show the liver and stomach extending up beneath the ribs. The stomach is moderately distended, and the intestines are particularly regular in their arrangement.

usually tubular and is known as the pyloric canal. Before reach- ing this there is a bulging known as the pyloric vestibule (see D. J. Cunningham, Tr. R. Soc. of Edinb. vol. xlv. pt. 1, No. 2). The pylorus is an oval opening, averaging half an inch in its long axis but capable of considerable distension; it is formed by a special development of the circular muscle layer of the stomach, and during life is probably tightly closed. The mucous membrane of the stomach is thrown into pleats or rugae when the organ is not fully distended, while between these it has a mammillated appearance.

Superficial to the mucous coat is a sub-mucous, consisting of loose connective tissue, while superficial to this are three coats of unstriped muscle, the inner oblique, the middle circular and the

*outer longitudinal. The peritoneal coat is described in the article on the coelom and serous membranes. **

The small intestine is a tube, from 22 to 25 ft. long, beginning at the pylorus and ending at the ileo-caecal valve; it is divided into duodenum, jejunum and ileum.

The duodenum is from 9 to 1 1 in. long and forms a horseshoe or C-shaped curve, encircling the head of the pancreas. It differs from the rest of the gut in being retroperitoneal. Its first part is horizontal and lies behind the fundus of the gall-bladder, passing backward and to the right from the pylorus. The second part runs vertically downward in front of the hilum of the right kidney, and into this part the pancreatic and bile ducts open. The third part runs horizontally to the left in front of the aorta and vena cava, while the fourth part

ascends to the left side of the second lumbar vertebra, after which it bends sharply downward and forward to form the duodeno-jejunal flexure.

The jejunum forms the upper two-fifths of the rest of the small intestine; it, like the ileum, is thrown into numerous con- volutions and is attached by the mesen- tery to the posterior abdominal wall. (See Coelom and Serous Membranes.)

The ileum is the remaining three-fifths of the small intestine, though there is no absolute point at which the one ends and the other begins. Speaking broadly, the jejunum occupies the upper and left part of the abdomen below the subcostal plane (see Anatomy: Superficial and Artistic), the ileum the lower and right part. About 3 ft. from its termination a small pouch, known as Meckel's diverti- culum, is very occasionally found. At its termination the ileum opens into the large intestine at the ileo-caecal valve.

The caecum is a blind sac occupying the right iliac fossa and extending down some two or three inches below the ileo- caecal junction. From its posterior and left surface the vermiform appendix pro- trudes, and usually is directed upward and to the left, though it not infrequently hangs down into the true pelvis. This worm-like tube is blind at its end and is usually 3 or 4 in. long, though it has been seen as long as 10. in. Its internal opening into the caecum is about 1 in. below that of the ileum. On transverse section it is seen to be composed of (1) an external muscular coat, (2) a sub- mucous coat, (3) a mass of lymphoid tissue, which appears after birth, and (4) mucous membrane. In many cases its lumen is wholly or partly obliterated, though this is probably due to disease (see R. Berry and L. Lack, Journ. Anat. & Phys. vol. xl. p. 247). Guarding the opening of the ileum into the caecum is the ileo-caecal valve, which consists of two cusps projecting into the caecum; of these the upper forms a horizontal shelf, while the lower slopes up to it obliquely. Complete absence of the valve has been noticed, and in one such case the writer found that no abdominal inconvenience had been recorded during life. The caecum is usually com- pletely covered by peritoneum, three special pouches of which are often found in its neighbourhood; of these the ileo-colic is just above the point of junction of the ileum and caecum, the ileo- caecal just below that point, while the retro-caecal is behind the caecum. At birth the caecum is a cone, the apex of which is the appendix; it is bent upon itself to form a U, and sometimes

Outline of liver

Stomach

Great omentum (cut)

Transverse mesocolon

with jejunum

beneath it

Taenia of transverse

colon

External oblique

muscle

Internal oblique

Position of umbilicus

Part of iliac colon (sigmoid flexure)

Small intestine

this arrangement persists throughout life (see C. Toldt, " Die Formbildung d. menschl. Blinddarmes," Sitz. der Wiener Akad. Bd. ciii. Abteil. 3,-p. 41).

The ascending colon runs up from the caecum at the level of the ileo-caecal valve to the hepatic flexure beneath and behind the right lobe of the liver; it is about 8 in. long and posteriorly is in contact with the abdominal wall and right kidney. It is covered by peritoneum except on its posterior surface (see fig. 1).

The transverse colon is variable in position, depending largely on the distension of the stomach, but usually corresponding to the subcostal plane (see Anatomy: Superficial and Artistic). On the left side of the abdomen it ascends to the splenic flexure, which may make an impression on the spleen (see Ductless Glands), and is bound to the diaphragm opposite the eleventh rib by a fold of peritoneum called the phrenico-colic ligament. The peritoneal relations of this part are

discussed in the article on the coelom and serous membranes. I

The descending colon passes down in front of the left kidney and left side of the posterior abdominal wall to the crest of the ilium; it is about 6 in. long and is usually empty and contracted while the rest of the colon is dis- tended with gas; its peritoneal relations are the same as those of the ascending colon, but it is more likely to be completely surrounded.

The iliac colon stretches from the crest of the ilium to the inner border of the psoas muscle, lying in the left iliac fossa, just above and parallel to Poupart's ligament. Like the descending, it is usually uncovered by peritoneum on its posterior surface. It is about 6 in. in length.

The pelvic colon lies in the true pelvis and forms a loop, the two limbs of which are superior and inferior while the convexity reaches across to the right side of the pelvis. In the foetus this loop occupies the right iliac fossa, but, as the caecum descends and enlarges and the pelvis widens, it is usually driven out of this region. The distal end of the loop turns sharply downward to reach the third piece of the sacrum, where it becomes the rectum. To this pelvic colon Sir F. Treves {Anatomy of the Intestinal Canal, London, 1885) has given the name of the omega loop. Formerly the iliac and pelvic colons were spoken of as the sigmoid flexure, but Treves and T. Jonnesco (Le Colon pelvien pendant la vie intra-utSrine, Paris, 1892) have p 1 "™ pointed out the inapplicability of the term, and to the latter author the modern description is due.

The rectum, according to modern ideas, begins in front of the third piece of the sacrum; formerly the last part of the fi (or omega) loop was described as its first part. It ends in a dilata- tion or rectal ampulla, which is in contact with the back of the prostate in the male and of the vagina in the female and is in front of the tip of the coccyx. The rectum is not straight, as its name would imply, but has a concavity forward corresponding to that of the sacrum and coccyx.

When viewed hopa in front three bends are usually seen, the upper and lower of which are sharply concave to the left, the middle one to the right. At the end of the pelvic colon the mesocolon ceases, and the rectum is then only covered by peri- toneum at its sides and in front; lower down the lateral covering is gradually reflected off and then only the front is covered. About the junction of the middle and lower thirds of the tube the anterior peritoneal covering is also reflected off on to the bladder or vagina, forming the recto-vesical

*pouch in the male and the pouch of Douglas in the female. This reflexion is usually about*3 in. above the anal aperture, but may be a good deal lower.*

The anal canal is the termination of the alimentary tract, and runs downward and backward from the lower surface of the rectal ampulla between the levatores ani muscles. It is about an inch long and its lateral walls are in contact, so that in section it appears as an antero-posterior slit (see J. Symington, Journ. Anat. and Phys. vol. 23, 1888).

Structure of the Intestine. — The intestine has four coats: serous, muscular, submucous and mucous. The serous or

peritoneal coat has already been described wherever it is present. The muscular coat consists of unstriped fibres arranged in two layers, the outer longitudinal and the inner circular (see fig. 2). In the large intestine the longitudinal fibres, instead of being arranged evenly round the tube as they are in the small, are gathered into three longitudinal bands called taeniae (see fig. 1) ; by the contraction of these the large intestine is thrown into a series of sacculi or slight pouches. The taeniae in the caecum all lead to the vermiform appendix, and form a useful guide to this structure. In the rectum the three taeniae once more become evenly arranged over the whole surface of the bowel, but more thickly on the anterior and posterior parts. The circular layer is always thicker than the longitudinal; in the small intestine it decreases in thickness from the duodenum to the ileum, but in the large it gradually increases again," so that it is thickest in the duodenum and rectum.

Circular muscular fibres

Longitudinal

muscular fibres

Peritoneum

Villi

Lieberkuhn's

Eland

Museularis

mucosae

Brunner's

glands

Circular muscular fibres

Longitudinal muscular fibres Peritoneum

Blood-vessels forming: net- work in sub. mucosa

Longitudinal muscular fibres

SMALL INTESTINE X 20

From A. Birmingham; Cunningham's Text-Book of Anatomy,

2.-

-Diagram to show the structure of the small and large intestine and the duodenum.

The submucous coat is very strong and consists of loose areolar tissue in which the vessels break up.

The mucous coat is thick and vascular (see fig.2); it consists of an epithelial layer most internally which forms the intestinal glands (see Epithelial, Endothelial and Glandular Tissues). External to this is the basement membrane, outside which is a layer of retif orm tissue, and this is separated from the submucous coat by a very thin layer of unstriped muscle called the museu- laris mucosae. In the duodenum and jejunum the mucous membrane is thrown into a series of transverse pleats called vahulae conniventes (see fig. 3) ; these begin about an inch from the pylorus and gradually fade away as the ileum is reached. About 4 in. from the pylorus the common bile and pan-creatic ducts form a papilla, above which one of the valvulae conniventes makes a hood and below which a vertical fold, the frenulum, runs downward. The surface of the mucous membrane of the whole of the small intestine has a velvety appearance, due to the presence of closely-set, minute, thread-like elevations called villi (see fig. 2). Throughout the whole length of the intestinal tract are minute masses of lymphoid tissue called solitary glands (see fig. 2) ; these are especially numerous in the caecum and appendix, while in the ileum they are collected into large oval patches, known as agminated glands or Peyer's patches, the long axes of which, from half an inch

to 4 in. long, lie in the long axis of the bowel. They are always found in that part of the intestine which is farthest from the mesenteric attachment. In the interior of the rectum three shelf-like folds,

one above the other, project into the cavity and correspond to the lateral concavities or kinks of the tube. They are not in the same line and the largest is usually on the right side. They are known as the plicae recti or valves of Houston. In the anal canal are four or five longitudinal folds called the columns of Morgagni. (For further details, see Quain's Anatomy, London, 1806; Gray's A natomy, London, 1905; Cunningham's Anatomy, Edinburgh, 1906.)

Embryology. — The greater part of the alimentary canal is formed by the closing-in of the entoderm to make a longitudinal tube, ventral and parallel to the notochord. This tube is blind in front and behind (cephalad and caudad), but the middle part of its ventral wall is for some distance continuous with the wall of the yolk-sac, and this part of the canal, which at first opens into the yolk-sac by a very wide aperture, is called the mid gut. The part in front of it, which lies dorsal to the heart, is the fore gut, while the part behind the aperture of the yolk-sac is the kind gut.

The pharynx, oesophagus, stomach and part of the duodenum are developed from the fore gut, a good deal of the colon and the

From A. Birmingham; Cunningham's Text-Book oj Anatomy. Fig. 3. — Valvulae Conniventes.

A, As seen in a bit of jejunum which has been filled with alcohol and hardened.

B, A portion of fresh intestine spread out under water.

rectum from the hind gut, while the mid gut is responsible for the rest. The cephalic part of the fore gut forms the pharynx (q.v.), and about the fourth week the stomach appears as a fusiform dilatation in the straight tube. Between the two the oesophagus gradually forms as the embryo elongates. The opening into the yolk-sac, which at first is very wide, gradually narrows, as the ventral abdominal walls close in, until in the adult the only indication of the connexion between the gut and the yolk-sac is the very rare presence (about 2%) of Meckel's diverticulum already referred to. The stomach soon shows signs of the greater and lesser curvatures, the latter being ventral, but maintains its straight position. About the sixth week the caecum appears as a lateral diverticulum, and, until the third month, is of

uniform calibre; after this period the terminal part ceases to grow at the same rate as the proximal, and so the vermiform appendix is formed. The mid gut forms a loop with its convexity toward the diminishing vitelline duct, or remains of the yolk-sac, and until the third month it protrudes into the umbilical cord. The greater curvature of the stomach grows more rapidly than the lesser, and the whole stomach turns over and becomes bent at right angles, so that what was its left surface becomes ventral. This turning over of the stomach throws the succeeding part of the intestine into a duodenal loop, which at first has a dorsal and ventral mesentery (see Coelom

and Serous Membranes). The intestine now grows very rapidly and is thrown into a series of coils; the caecum ascends and passes to the right ventral to the duodenum, and presses it against the dorsal wall of the abdomen; then it descends toward its permanent position in the right iliac fossa.

From the ventral surface on the hinder (caudal) closed end of the intestinal tube the allantois grows to form the placenta and bladder (see Urinary System, Reproductive System and Placenta) , and this region is the cloaca into which the alimentary, urinary and generative canals or ducts all open, but later two lateral folds appear which, by their union, divide the cloaca into a ventral and a dorsal part, the former being genito-urinary and the latter alimentary or intestinal. In this way the rectum or dorsal compartment is shut off from the genito-urinary. Later an ectodermal invagination at the hind end of the embryo develops and forms the anal canal; this is the proctodaeum, and for some time it is separated from the hind (caudal) end of the rectal part of the mesodaeum (or part of the intestinal canal formed from the mesoderm) by a membrane called the anal membrane. This is eventually absorbed and the digestive tract now communicates with the surface by the anus.

F. Wood Jones {British Medical Journal, 17th of December 1904) has given a somewhat different description of the develop- ment of the cloaca and anus, which better explains the various abnormalities met with in this region but requires further confirmation before it is generally accepted. For the develop- ment of the mouth, pharynx, lungs, liver and pancreas from the primitive alimentary canal, the reader is referred to the special articles on those structures. (For further details, see W. His, Anatomic menschlicher Embryonen (Leipzig, 1880-1885); C. S. Minot's Embryology (New York, 1897) ; and J. P. M'Murrich, Development of the Human Body (London, 1906). (F. G. P.)

Comparative Anatomy. — The primitive condition of the verte- brate alimentary canal may be described as a straight, simple tube, consisting of an anterior portion, the stomodaeum, formed by an ectodermal invagination, the mesenteron, a long median portion lined by endoderm, and a short posterior portion, the proctodaeum, formed by ectodermal invagination. In the lower vertebrates the primitive tube subserved also the purpose of respiration, and traces of the double function remain in the adult structure of all vertebrates (see Mouth, Pharynx). In fish, the pharynx, or branchial region, suddenly becomes narrower, posterior to the gill-slits, to form the oesophagus; in higher animals the oesophagus, in the adult, is separated from the primitive pharyngeal region and lies dorsal to it. Probably, in the primitive vertebrata, the entire alimentary canal was lined with ciliated cells. Traces of this ciliation persist in many living forms. In the Ammocoete, the larval form of Petromyzon (see Cyclostomata), the whole canal is ciliated except the pharynx and the rectum; in the Dipnoi the epithelium of the stomach and the intestines is ciliated; in Selachii that of the posterior part oif the gullet, and the spiral valve, is ciliated; extensive ciliation may occur in almost any region of the gut of the lower teleos- tomes, but in the higher forms (Teleostei) it is generally absent. In the latter, however, and in higher groups of vertebrates, a peculiar striated border on the columnar cells lining the intes- tinal tract has been held to be a final trace of ancestral ciliation.

The alimentary canal may be conveniently described in three divisions, the oesophagus or gullet, the passage by which food reaches the stomach, the stomach, typically an expanded region in which the food remains for a considerable time and is mechani- cally pulped, mixed with mucus and certain digestive juices (see Nutrition) and partly macerated, the intestinal tract or gut, extending from the distal end of the stomach to the cloaca or anus, in which the food is subjected to further digestive action, but which is above all the region in which absorption of the products of digestion takes place, the refuse material together with quantities of waste matter entering the gut from the blood and liver being gradually passed towards the anus for discharge from the body.

The oesophagus is essentially merely a passage, as straight as

may be, from the pharynx to the stomach, varying in length with the

length of the neck and thoracic regions in different animals, and in calibre with the nature of the food. It is almost invariably lined with a many-layered epithelium, forming a tough coating, readily repaired and not easily damaged by hard food masses. It is occasionally separated from the stomach by a slight constriction which may be capable of contraction so as to prevent regurgitation. There are few exceptions to this structural and functional simplicity. In fishes (see Ichthyology, Anatomy) the swim-bladder is developed as a dorsal outgrowth of the oesophagus and may remain in open connexion with it. In certain Teleosteis (e.g. Lutodeira) it is longer than the length it has to traverse and is thrown into convolutions. In many other fish, particularly Selachiis, a set of processes of the lining wall project into the cavity near the stomach and have been supposed to aid in preventing food particles, or living creatures swallowed without injury, escaping backwards into the mouth. In some egg-eating snakes the sharp tips of the ventral spines (hypapo- physes) of the posterior cervical vertebrae penetrate the wall of the oesophagus and are used for breaking the shells of the eggs taken as food. In some aquatic Chelonians, the food of which consists chiefly of seaweeds, the lining membrane is produced into pointed processes backwardly directed. In birds this region frequently presents peculiarities. In Opisthocomus it forms an enormously wide double loop, hanging down over the breast-bone, which is peculiarly flattened and devoid of a keel in the anterior portion. In many birds part of the oesophagus may be temporarily dilated, forming a " crop," as for instance in birds of prey and humming birds. In the flamingo, many ducks, storks, and the cormorant the crop is a permanent although not a highly specialized enlargement. Finally, in the vast majority of seed- eating birds, in gallinaceous birds,, pigeons, sandgrouse, parrots and many Passeres, particularly the finches, the crop is a permanent globular dilatation, in which the food is retained for a considerable time, mixed with a slight mucous secretion, and softened and partly macerated by the heat of the body. Many birds feed their young from the soft contents of the crop, and in pigeons, at the breeding season, the cells lining the crop pro-liferate rapidly and are discharged as a soft cheesy mass into the cavity, forming the substance known as pigeon's milk. Amongst Mammalia, in Rodentia, Carnivora, elephants and ruminants, the wall of the oesophagus contains a layer of voluntarj muscle, by the contraction of which these animals induce anti- peristaltic movements and can so regurgitate food into the mouth.

Stomach. — Where the oesophagus passes into the stomach, the lining wall of the alimentary tract changes from a many-layered

epithelium to a mucous epithelium, consisting of a single layer of endodermal cells, frequently thrown into pits or projecting as processes; from being chiefly protective, it has become secretory and absorbing, and maintains this character to the distal extremity where it passes into the epiblast of the proctodaeum. In most cases the course of the alimentary canal from the distal end of the oesophagus to the cloaca or anus is longer than the corresponding region of the body, and the canal is therefore thrown into folds. The fundamental form of the stomach is a sac-like enlargement of the canal, the proximal portion of which is continuous with the line of the oesophagus, but the distal portion of which is bent in the proximal portion, the whole forming an enlarged bent tube. At the distal end of the tube the intestinal tract proper begins, and the two regions are separated by a muscular constriction. In fishes the stomach is generally in one of two forms; it may be a simple bent tube, the proximal limb of which is almost invariably much wider than the distal, anteriorly directed limb; or the oesophagus may pass directly into an expanded, globular or elongated sac, from the anterior lateral wall of which, not far from the oesophageal opening, the duodenum arises. In Batrachia and Reptilia the stomach is in most cases a simple sac, marked off from the oesophagus only by increased calibre. In the Crocodilia, however, the anterior portion of the stomach is much enlarged and very highly muscular, the muscles radiating from a central tendinous area on each of

the flattened sides. The cavity is lined by a hardened secretion and contains a quantity of pebbles and gravel which are used in the mechanical trituration of the food, so that the resemblance to the gizzard of birds is well marked. This muscular chamber leads by a small aperture into a distal, smaller and more glandular chamber. In birds the stomach exhibits two regions, an anterior glandular region, the proventriculus, the walls of which are relatively soft and contain enlarged digestive glands aggregated in patches (e.g. some Steganopodes) , in rows (e.g. most birds of prey) or in a more or less regular band. The distal region is larger and is lined in most cases by a more or less permanent lining which is thick and tough in birds with a muscular gizzard, very slight in the others. In many birds, specially those feeding on fish, the two regions of the stomach are of equal width, and are indistinguishable until, on opening the cavity, the difference in the character of the lining membrane becomes visible. In other birds the proventriculus is separated by a well marked constriction from the posterior and larger region. In graminiferous forms the latter becomes a thick-walled muscular gizzard, the muscles radiating from tendinous areas and the cavity

containing pebbles or gravel.

In mammals, the primitive form of the stomach consists of a more or less globular or elongated expansion of the oesophageal region, forming the cardiac portion, and a forwardly curved, narrower pyloric portion, from which the duodenum arises. The whole wall is muscular, and the lining membrane is richly glandular. In the Insectivora, Carnivora, Perissodactyla, and in most Edentata, Chiroptera, Rodentia and Primates, this primitive disposition is retained, the difference consisting chiefly in the degrees of elongation of the stomach and the sharpness of the distal curvature. In other cases the cardiac portion may be prolonged into a caecal sac, a condition most highly differenti- ated in the blood-sucking bat, Desmodeus, where it is longer than the entire length of the body. There are two cardiac extensions in the hippopotamus and in the peccary. In many other mammals one, two or three protrusions of the cardiac region occur, whilst in the manatee and in some rodents the cardiac region is constricted off from the pyloric portion. In the Artiodactyla the stomach is always complex, the complexity reaching a maximum in ruminating forms. In the Suidae a cardiac diverticulum is partly constricted from the general cavity, forming an incipient condition of the rumen of true ruminants; the general cavity of the stomach shows an approach to the ruminant condition by the different characters of the lining wall in different areas. In the chevrotains, which in many other respects show conditions intermediate between non- ruminant artiodactyles and true ruminants, the oesophagus opens into a wide cardiac portion, incompletely divided into four chambers. Three of these, towards the cardiac extremity, are lined with villi and correspond to the rumen or paunch; the fourth, which lies between the opening of the oesophagus and the pyloric portion of the stomach, is the ruminant reticulum and its wall is lined with very shallow " cells." A groove runs along its dorsal wall from the oesophageal aperture to a very small cavity lined with low, longitudinally disposed folds, and forming a narrow passage between the cardiac and pyloric divisions; this is an early stage in the development of the omasum, psalterium or manyplies of the ruminant stomach. The fourth or true pyloric chamber is an elongated sac with smooth glandular walls and is the abomasum, or rennet sack. In the camel the rumen forms an enormous globular paunch with villous walls and internally showing a trace of division into two regions. It is well marked off from the reticulum, the " cells" of which are extremely deep, forming the well-known water-chambers. The psalterium is sharply constricted off from the reticulum and is an elongated chamber showing little trace

of the longitudinal ridges characteristic of this region; it opens directly into the relatively small abomasum. In the true ruminants, the rumen forms a capacious, villous reservoir, nearly always partly sacculated, into which the food is passed rapidly as the animal grazes. The food is subjected to a rotary movement in the paunch, and is thus repeatedly subjected tc

moistening with the fluids secreted by the reticulum, as it is passed over the aperture of that cavity, and is formed into a rounded bolus. Most ruminants swallow masses of hairs, and these, by the rotary action of the paunch,. are aggregated into peculiar dense, rounded balls which are occasionally discharged from the mouth and are known as " hair-balls " or " bezoars." The food bolus, when the animal is lying down after grazing, is passed into the oesophagus and reaches the mouth by anti- peristaltic contractions of the oesophagus. After prolonged mastication and mixing with saliva, it is again swallowed, but is now passed into the psalterium, which, in true ruminants, is a small chamber with conspicuous longitudinal folds. Finally it reaches the large abomasum where the last stages of gastric digestion occur.

In the Cetacea the stomach is different from that found in any other group of mammals. The oesophagus opens directly into a very large cardiac sac the distal extremity of which forms a long caecal pouch. At nearly the first third of its length this communicates by a narrow aperture into the elongated, relatively narrow pyloric portion. The latter is convoluted and constricted into a series of chambers that differ in different groups of Cetacea. In the Sirenia the stomach is divided by a constric- tion into a cardiac and a pyloric portion, and the latter has a pair of caeca. In most of the Marsupialia the stomach is relatively simple, forming a globular sac with the oesophageal and pyloric apertures closely approximated; in the kangaroos, on the other hand, the stomach is divided into a relatively small, caecal cardiac portion and an enormously long sacculated and convoluted pyloric region, the general arrangement of which closely recalls the large caecum of many mammals.

Intestinal Tract. — It is not yet possible to discuss the general morphology of this region in vertebrates as a group, as, whilst the modifications displayed in birds and mammals have been com- pared and studied in detail, those in the lower groups have not yet been

systematically co-ordinated.

Fishes. — In the Cyclostomata, Holocephali and a few Teleostei the course of the gut is practically straight from the pyloric end of the stomach to the exterior, and there is no marked differentia- tion into regions. In the Dipnoi, a contracted sigmoid curve between the stomach and the dilated intestine is a simple beginning of the complexity found in other groups. In very many of the more specialized teleosteans, the gut is much convoluted, exhibiting a series of watchspring-like coils. In a number of different groups, increased surface for absorption is given, not by increase in length of the whole gut, but by the development of an internal fold known as the spiral valve. This was probably originally a longitudinal fold similar to the typhlosole of chaetopods. It forms a simple fold in the larval Ammocoete, and in its anterior region remains straight in some adult fish, e.g. Polypterus, but in the majority of cases it forms a complex spiral, wound round the inner wall of the expanded large intestine, the internal edge of the fold sometimes meeting to form a central column. It occurs in Cyclostomata, Selachii, Holocephali, Chondrostei, Crossopterygii, Amiidae, Lepidosteidae and Dipnoi. A set of organs peculiar to fish and known as the pyloric caeca are absent in Cyclostomata and Dipnoi, in most Selachii and in Amia, but present, in numbers ranging from one to nearly two hundred, in the vast majority of fish. These are outgrowths of the intestinal tract near the pyloric extremity of the stomach, and their function is partly glandular, partly absorbing. In a few Teleostei there is a single caecal diverticulum at the beginning of the " rectum," and in the same region a solid rectal gland occurs in most elasmobranchs, whilst, again, in the Dipnoi a similar structure opens into the cloaca. These caeca have been compared with the colic caeca of higher verte- brates, but there is yet no exact evidence for the homology.

In the Batrachia the course of the intestinal tract is nearly straight from the pyloric end of the stomach to the cloaca, in the case of the perennibranchiates there being no more than a few simple loops between the expanded " rectum " and the straight portion that leaves the stomach. In the Caducibranchiata the anterior end of the enlarged rectum lies very close to the distal

extremity of the stomach, and the gut, between these two regions, is greatly lengthened, forming a loop with many minor loops borne at the periphery of an expanse of mesentery, recalling the Meckelian tract of birds and mammals. In the tadpole this region is spirally coiled and is still longer relatively to the length of the whole tract. In Hyla and Pipa there is a small caecum comparable with the colic

caecum of birds and mammals.

In Reptilia the configuration of the intestinal tract does not differ much from that in Batrachia, the length and complexity of the minor coils apparently varying with the general configura- tion of the body, that is to say, in reptiles with a long, narrow, and snake-like body the minor loops of the gut are relatively short and unimportant, whilst in those with a more spacious cavity, such as chelonians, many lizards and crocodiles, the gut may be relatively long and disposed in many minor coils. There is comparatively little differentiation between the mid-gut and the gut in cases where the whole gut is long; in the others the hind-gut is generally marked by an increase of calibre. A short caecal diverticulum, comparable with the colic caecum of birds and mammals, is present in many snakes and lizards and in some chelonians.

In fishes, batrachians and reptiles the intestinal tract is swung from the dorsal wall of the abdominal cavity by a mesentery which is incomplete on account of secondary absorption in places, and which grows out with the minor loops of the gut. There are also traces, more abundant in the lower forms, of the still more primitive ventral mesentery.

Intestinal Tract in Birds and Mammals. — There is no doubt but that the similarity of the modes of disposition of the alimen- tary tract in birds and mammals points to the probability of the chief morphological features of this region in these animals having been laid down in some common ancestor, although we

Fig. 4. — Intestinal Tract of Chauna chavaria.

c.c. d.

e-

1.1.

Li.

Colic caeca. Duodenum. Glandular patch. Meckel's tract. Hind-gut.

p.v. Cut root of portal vein r.v. Rectal vein. s. Proventriculus. y. Meckel's diverticulum Yolk-sac vestige.

have not 1 yet sufficient exact knowledge of the gut in Pisces, Batrachia jind Reptilia to find amongst these with any certainty the

most orobable survival from the ancestral condition. The primitive gut must be supposed to have run backwards from the stomach to the cloaca suspended from the dorsal wall of the body-cavity by a dorsal mesentery. This tract, in the course of phylogeny of the common ancestors of birds and mammals, became longer than the straight length between its extreme points and, consequently, was thrown into a series of folds. The

mesentery grew out with these folds, but the presence of adjacent organs, the disturbance due to the outgrowth of the liver, and the secondary relations brought about between different portions of the gut, as the out-growing loops invaded each other's localities, disturbed the primitive simplicity. Three definite regions of outgrowth, however, became conspicuous and are to be recognized in the actual disposition of the gut in existing birds and mammals. The first of these is the duodenum. In the vast majority of birds,

and in some of the simpler mammals, the portion of the gut immediately distal of the stomach grows out into a long and narrow loop (fig. 4, d), the proximal and distal ends of which are close together, whilst the loop itself may re- main long and narrow, or may develop minor loops on its course. In mammals generally, how- ever, the duodenum is complex and is not so sharply marked off from the distal portion of the gut as in birds. The second portion is Meckel's tract. It consists of the part generally khown as the small intestines, the jejunum and ileum of human anatomy, and stretches from the distal end of the duodenum to the caecum or caeca. It is the chief absorbing portion of the gut, and in nearly all birds and mammals is the longest portion. It represents, however, only a very small part of the primitive straight gut, corresponding to not more than two or three somites of the embryo. This narrow portion grows out to form the greater part of what is called the pendent loop in mammalian embryology. Its anterior or proximal end lies close to the approximated

Fig. 5. — Intestinal Tract of Cams vulpes. S, cut end of duodenum; C, caecum; R, cut end of rectum.

C.L.

Fig. 6. — Intestinal Tract of Macropus bennetti. S, cut end of

duodenum; R, cut end of rectum; C, caecum; C2, accessory caecum; C.L, colic loop of hind-gut.

proximal and distal ends of the duodenal loop, whilst its distal end passes into the hind-gut at the colic caecum or caeca. In the embryos of all birds and mammals, the median point of Meckel's tract, the part of the loop which has grown out farthest from the dorsal edge of the mesentery, is marked by the diverti- culum caecum vitelli, the primitive connexion of the cavity of the gut with the narrowing stalk of the yolk-sac (fig. 4, y). Natur- ally, in birds where the yolk-sac is of great functional importance this diverticulum is large, and in a majority of the families of

birds persists throughout life, forming a convenient point of orientation. In mammals, no doubt in association with the functional reduction of the yolk-sac, this diverticulum, which is known as Meckel's diverticulum, has less importance, and whilst it has been observed in a small percentage of adult human subjects has not been recognized in the adult condition of any lower Mammalia.

In birds, Meckel's tract falls into minor folds or loops, the disposition of which forms a series of patterns remarkably different in appearance and characteristic of different groups. In fig. 4 an extremely primitive type is repre- sented. In mammals Meckel's tract remains much more uniform; it may be short, or in- crease enormously in length, but in either case it falls into a fairly symmetrical shape, sus- pended at the circum- ference of a nearly circular expanse of mesentery. Where it is short it is thrown into very simple minor loops (figs. 5, 6 and 7); where it is long, these minor loops form a con- voluted mass (figs. 8 and 9).

The third portion of the gut should be termed the hind-gut and lies between the caecum or caeca and the anus, corresponding to the large intestines, colon and rectum of human anatomy. It is formed from a much larger portion of the primitive straight gut than the duodenum and Meckel's tract together, and its proximal portion, in consequence, lies very close to the origin of the duodenum. In the vast majority of birds, the hind-gut in the adult is relatively extremely short, often being only from

Fig. 7. — Intestinal Tract of Tapir. S, cut end of duodenum; R, cut end of rectum; C, caecum; CL, colon.

Fig. 8.— Intestinal Tract of Giraffe. 5, cut end of duodenum; i?, cut end of rectum; C, caecum; P. C.L, post-caecal loop; S.P, spiral loop;

SF, third loop of hind-gut.

one-eighth to one-thirtieth of the whole length of the gut. A certain number of primitive birds, however, have retained a relatively long condition of the hind-gut (fig. 4), the greatest relative length occurring in struthious birds, and particularly in the ostrich, where the hind-gut exceeds in length the duodenum and Meckel's tract together. Mammals may be contrasted with birds as a group in which the hind-gut is always relatively long, sometimes extremely long, and in which, moreover, there is a strong tendency to differentiation of the hind-gut into regions

the characters of which are of systematic importance. The first region is the colon, which forms a very simple expansion in mammals such as Carnivora (fig. 5), where the whole hind-gut is relatively short, or a series of simple loops in mammals in which the whole gut has a primitive disposition (e.g. Marsupialia, fig. 6). In the odd-toed Ungulala, the colon (fig. 7) forms an enormously long loop, the two limbs of which are closely approximated and the calibre of which is very large. In Ruminantia (fig. 8) the colon is still more highly differentiated, displaying first a simple wide loop, then a complicated watchspring-like coil, and finally

a very long, irregular portion. In the higher Primates (fig. 9) it forms one enormous very wide loop, corre- sponding to the ascend- ing, transverse and descending colons of human anatomy, and a shorter distal loop, the omega loop of human anatomy. Other strik- ing patterns are dis- played in other mam- malian groups.

The second region of the hind-gut is usually known as the rectum, and although it is some- Fig. 9.— Intestinal Tract of Gorilla. S, t ; mes lengthened it is cut end of duodenum; R, cut end of rec- icaI1 little longer turn; C, vermitorm appendix 01 caecum; ; r J . °

X, X 2 , X 3 , cut ends of factors of the portal than tne portion of the vein. primitive straight gut

that it represents. Adaptations of the Intestinal Tract to Function. — The chief business of the gut is to provide a vascular surface to which the prepared food is applied so that the nutritive material may be absorbed into the system. Overlying and sometimes obscuring the morphological patterns of the gut, are many modifications correlated

with the nature of the food and producing homoplastic resemblances independent of genetic affinity. Thus in birds and mammals alike there is a direct association of herbivorous habit with great relative length of gut. The explanation of this, no doubt, is simply that the vegetable matter which such creatures devour is in a form which requires not only prolonged digestive action, but, from the intimate admixture of indigestible material, a very large absorbing surface. In piscivorous birds and mammals, the gut is very long, with a thick wall and a relatively small calibre, whilst there is a general tendency for the regions of the gut to be slightly or not at all defined. Fish, as it is eaten by wild animals, contains a large bulk of indigestible matter, and so requires an extended absorbing surface; the thick wall and relatively small calibre are protections against wounding by fish bones. In frugivorous birds the gut is strikingly short, wide and simple, whilst a similar change has not taken place in frugivorous mammals. Carnivorous birds and mammals have a relatively short gut. In birds, generally, the relation of the length and calibre of the gut to the size of the whole creature is striking. If two birds of similar habit and of the same group be compared, it will be found that the gut of the larger bird is relatively longer rather than relatively wider. The same general rule applies to Meckel's tract in mammals, whereas in the case of the hind-gut increase of capacity is given by increase of calibre rather than by increased length.

The Colic Caeca. — These organs lie at the junction of the hind- gut with Meckel's tract and are homologous in birds and mammals although it happens that their apparent position differs in the majority of cases in the two groups. In most birds, the hind-gut is relatively very short, and the caecal position, accordingly, is at a very short distance from the posterior end of the body, whereas in most mammals the hind-gut is very long and the position of the caecum or caeca is relatively very much farther

from the anus. Next, in most birds, the caeca when present are paired, whereas in most mammals there is only a single caecum. On the other hand, in certain birds (herons) as a normal occur- rence, and in many birds as an individual variation, only a single caecum occurs. In some mammals, e.g. many armadillos, in Hyrax and the manatee, the caeca are normally paired; in many other (e.g. some rodents and marsupials) in addition to the normal caecum there is a reduced second caecum, whilst in quite a number of forms the relation of the caecum, ileum and colon at their junction is readily intelligible on the assumption that the caeca were originally paired. The origin and many of the peculiarities of the ileo-caecal valve find their best explanation on this hypothesis.

The caeca are hollow outgrowths of the wall of the gut, the blind ends being directed forwards. The caecal wall is in most cases highly glandular and contains masses of lymphoid tissue. In birds and in mammals this tissue may be so greatly increased as to transform the caecum into a solid or nearly solid sac, the calibre of which is for the most part smaller than that of the unmodified caecum. In some birds, the whole area of the caecum may be modified in this way; in mammals, it is generally the terminal portion, which then becomes the vermiform appendix, familiar in the anthropoid apes, in man and in some rodents. It is difficult to see in this modification merely a degeneration; not improbably it is the formation of a new glandular organ.

The caeca exhibit almost every gradation of development, from relatively enormous size to complete absence, and there is no definite, invariable connexion between the nature of the food and the degree of their development. In the case of birds, it may be said that on the whole the caeca are generally large in herbi- vorous forms and generally small in insectivorous, frugivorous, carnivorous and piscivorous forms, but there are many excep- tions. Thus, owls and falcons have a diet that is closely similar, and yet owls have a pair of very long caeca, whilst in the Falconidae these organs are much reduced and apparently functionless. The insectivorous and omnivorous rollers, motmots and bee-eaters have a pair of large caeca, whilst in passerine birds of similar habit the caeca are vestigial glandular nipples. It is impossible to doubt that family history dominates in this matter. Certain families tend to retain the caeca, others to lose them, and direct adaptation to diet appears only to accelerate or retard these inherited tendencies. So also in mammals, no more than a general relation between diet and caecal develop- ment can be shown to exist, although the large size of the single caecum of mammals is more closely associated with a herbivorous as opposed to a carnivorous, frugivorous, piscivorous or omni- vorous diet than is the case in birds. There is no relationship between diet and the complete or partial presence of both members of the primi-pair of caeca in mammals, the occurrence of the pair being rather an " accident " of inheritance than in any direct relation to function.

Literature. — T. W. Bridge, in The Cambridge Natural History (vol. vii).; D. S. Jordan, A Guide to the Study of Fishes; R. Owen, Anatomy of Vertebrates; M. Weber, Die Saugeihiere; W. H. Flower, The Organs of Digestion in Mammalia; R. Wiedersheim, Lehrbuch der vergleichenden Anatomie der Wirbelthiere ; A. Oppel, Lehrbuch der vergleichenden mikroskopischen Anatomie der Wirbelthiere;

Chalmers Mitchell, " The Intestinal Tract of Birds," Transactions of the Linn. Soc. of London (vol. viii., 1901); and "On the In- testinal Tract of Mammals," Transactions of the Zool. Soc. of London (vol. xvii., 1905). (In the two latter memoirs a fuller list of litera- ture is given.) (P. C. M.)

ALIMONY (from Lat. alere, to nourish), in law the allowance for maintenance to which a wife is entitled out of her husband's estate for her support on a decree for judicial separation or for the dissolution of the marriage. Though, as a rule, payable to a wife, it may, if the circumstances of the case warrant it, be payable by the wife to the husband. Alimony is of two kinds, (a) temporary (pendente lite), and (b) permanent. Temporary alimony, or alimony pending suit, is the provision made by the husband for the wife in causes between them to enable her to live during the progress of the suit, and is allowed whether the suit is by or against the husband and whatever the nature of the suit may be. The usual English practice is to allot as temporary

alimony about one-fifth of the husband's net income; where it appears that the husband has no means or is in insolvent circum- stances, the court will refuse to allot temporary alimony. So where the wife is supporting herself by her own earnings, this fact will be taken into consideration. And where the wife and husband have lived apart for many years before the institution of the suit, and she has supported herself during the separation, no alimony will be allotted. Nor will the wife be entitled to alimony where she has sufficient means of support independent of her husband. Permanent alimony is that which is allotted to the wife after final decree. By the Matrimonial Causes Act 1907, the court may, if it think fit, on any decree for dissolution or nullity of marriage, order that the husband shall, to the satisfac- tion of the court, secure to the wife such a gross sum of money or such annual sum of money for any term not exceeding her life, as having regard to her fortune (if any), to the ability of her husband, and to the conduct of the parties, it may deem reaion- able. The court may suspend the pronouncing of its decree until a proper deed or instrument has been executed by all necessary parties. The court may also make an order on the husbandfor payment to the wife during their joint lives of a reasonable monthly or weekly sum for her maintenance; the court may also at any time discharge, modify, suspend or increase the order according to the

altered means of the husband; the court has also power to make provision for children. Alimony is paid direct to the wife or to a trustee or trustees on her behalf, but the court may impose any restrictions which seem expedient. We may also describe as a kind of alimony the allowance of a reason- able weekly sum not exceeding - £2 which in England, under the Summary Jurisdiction (Married Women) Act 1895, may be given to a married woman on applying to a court of summary jurisdiction if she has been forced by cruelty to leave her husband or has been deserted by him.

United States. — Alimony is granted by the courts of the several states on much the same principle as in England, though in many states the courts of equity as such may grant alimony without divorce or separation proceedings independently of any statute, on the ground that it is just that the husband should support his wife when she lives apart from him for his fault, and since the courts of common law provide no remedy the courts of equity will. This is so in Alabama (Brady v. Brady, 1005, 39 So. Rep. 237), Kentucky, North Carolina, Iowa, California, Ohio, Virginia, South Dakota and the District of Columbia. In other states alimony without such proceedings is allowed by statute, and such alimony is now very general throughout the United States. The usual grounds for the allowance of it are desertion and such conduct as would amount to legal cruelty. After divorce a vinculo, alimony or separate maintenance is sometimes granted on good reason. The marriage must be proven as a fact, but a " common law " marriage, i.e. one established by cohabitation and repute, is sufficient. In several states alimony or mainten- ance is by statute allowed to the husband in certain cases out of the wife's property. This is so in Massachusetts, Virginia, Rhode Island and Iowa. In Oregon he is entitled to one-third of his wife's real estate in addition to maintenance on divorce for her fault. The amount of alimony depends upon the circumstances of each case as in England. Permanent alimony is generally more than when pendente lite, and usually one-third the husband's income. It may generally be changed from time to time as the circumstances of the parties change. Judgment for alimony is considered a judgment in personam and not in rem, and can only be enforced outside the state where rendered in case the husband has been personally served with process within that state. The remarriage of the man is not sufficient ground for reducing the alimony (Smith v. Smith, 1905, 102 N.W. Rep. 631), but on remarriage of a woman to one able to support her, her former husband being in poor circumstances, it will be reduced (Kiralfy v. Kiralfy, 1901, 36 Wise. N.S. 407).

ALIN, OSCAR JOSEF (1846-1900), Swedish historian and politician, was born at Falun on the 22nd of December 1846. In 1872 he became docent, and in 1882 professor of political economy at Upsala, of which university he was afterwards

rector. In September 1888 he was elected a member of the first chamber of the Riksdag, where he attached himself to the conservative protectionist party, over which, from the first, he exercised great authority. But it is as a historian that Alin is most remarkable. Among his numerous works the following are ' especially worthy of note: Bidrag till svenska radets historia under medeltiden (Upsala, 1872); Sveriges Historia, 1 §11-1611 (Stock- holm, 1878) ; Bidrag till svenska statsrickets historia (Stockholm, 1884-1887); Den svensk-norsk Unionen (Stockholm, 1889-1891), the best book on the Norwego-Swedish Union question from the Swedish point of view; Fjerde Artiklen af Fredstraktaten i Kiel (Stockholm, 1899); Carl Johan och Sveriges yttre politik, 1810- 1815 (Stockholm, 1899); Carl XIV. och Rikets Slander, 1840- 1841 (Stockholm, 1893). He also edited Svenska Riksdagsakter, 1521-1554 (Stockholm, 1887), in conjunction with E. Hilde- brand, and Sveriges Grundlagar (Stockholm, 1892). He died at Upsala on the 31st of December 1900.

Obituary notice in Sv. Hist. Tidssk. (1901). (R. N. B.)

ALIPUR, a suburb of Calcutta, containing Belvedere House, the official residence of the lieutenant-governor of Bengal, and a number of handsome mansions. It lies within the limits of the south suburban municipality, and is a cantonment of native troops. On the Calcutta maidan, opposite Alipur Bridge, stood two trees under which duels were fought. It was here that the meeting in 1780 between Warren Hastings and Sir Philip Francis took place.

ALIQUOT (a Lat. word meaning " some," " so many "), a term generally occurring in the phrase " aliquot part," and meaning that one quantity is exactly divisible into another; thus 3 is an aliquot part of 6.

ALIRAJPUR, a native state of India, under the Bhopawar agency in Central India. It lies in Malwa, near the frontier of Bombay. It has an area of 836 sq. m. ; and a population (1901) of 50,185. The country is hilly, and many of the in- habitants are aboriginal Bhils. It has from time to time been under British administration. The chief, whose title is Rana, is a Rahtor Rajput. He has an estimated revenue of £8700, and pays a tribute of £700. The Victoria bridge at

Alirajpur was built to commemorate the Diamond Jubilee of 1897.

ALISMACEAE (from the Gr. aXicr/ia, a water-plant. mentioned by Dioscorides) , in botany, a natural order of monocotyledons belonging to the series Helobieae, and represented in Britain by the water plantain, Alisma Plantago, the arrow-head, Sagit- taria, the star-fruit, Damasonium, and flowering rush, Bu- tomus (from the Gr. /3ous, ox, jkp.vuv, to cut, in allusion to leaves cutting the tongues of oxen feeding on them). They are marsh- or water-plants with generally a stout stem (rhizome) creeping in the mud, radical leaves and a large, much branched inflorescence. The leaves show a great variety in shape, often

Fig. I. — Flowering Rush (Butomus umbellatus). 1, Flower in vertical section; 2, horizontal plan of arrangement of flower.

on the same plant, according to their position in, on or above the water. The submerged leaves are long and grass- like, the floating leaves oblong or rounded, while the aerial leaves are borne on long, thin stalks above the water, and are often heart- or arrow-shaped at the base. The flower-bearing stem is tall; the flowers are borne in whorls on the axis as in arrow-head, on whorled branchlets as in water plantain or in an umbel as in Butomus (fig. 1). The flowers are regular and rather showy, generally with three greenish sepals, followed in regular succession by three white or purplish petals, six to indefinite stamens and six to indefinite free carpels. The floral

arrangement thus recalls that of a buttercup, a resemblance which extends to the fruit, which is a head of achenes or follicles. The flowers contain honey, and attract flies, short-lipped bees or other small insects by the agency of which pollination is effected. The fruit of Butomus is of interest in having the seeds borne over the inner face of the wall of the leathery pod (follicle). Damasonium derives its popular name, star-fruit, from the fruits spreading when ripe in the form of a star. It is a western

Fig. 2. — Water Plantain (Alisma Plantago). Plant about 3 ft. high. I, Flower; 2, same in vertical section; 3, horizontal plan of flower; 4, mature fruit.

Mediterranean plant which spreads to the south of England, where it is sometimes found in gravelly ditches and pools. The order contains

about fifty species in fourteen genera, and is widely distributed in temperate and warm zones. Alisma Plantago (fig. 2), a common plant in Britain (except in the north) in ditches and edges of streams, is widely distributed in the north temperate zone, and is found in the Himalayas, on the mountains of tropical Africa and in Australia.

ALISON, ARCHIBALD (1757-1839), Scottish author, son of Patrick Alison, provost of Edinburgh, was born on the 13th of November 1757 at Edinburgh. After studying at the university of Glasgow and at Balliol College, Oxford, he took orders in the Church of England, and was appointed in 1778 to the curacy of Brancepeth, near Durham. In 1784 he married Dorothea, youngest daughter of Professor Gregory of Edinburgh. The next twenty years of his life were spent in Shropshire, where he held in succession the livings of High Ercall, Roddington and Kenley. In 1800 he removed to Edinburgh, having been appointed senior incumbent of St Paul's Chapel in the Cowgate. For thirty-four years he filled this position with much ability, his preaching attracting so many hearers that a new and larger church was built for him. His last years were spent at Colinton,

near Edinburgh, where he died on the 1 7th of May 1839. Alison published, besides a Life of Lord Woodkouselee, a volume of sermons, which passed through several editions, and a work entitled Essays on the Nature and Principles of Taste (1790), based on the principle of association (see under Aesthetics, p. 288). His elder son, Dr William Pulteney Alison (1790-1859), was a distinguished Edinburgh medical professor.

Sir Archibald Alison, Bart. (1792-1867), the historian, was the younger son, and was born at Kenley, Shropshire, on the 29th of December 1792. He studied at the university of Edinburgh, distinguishing himself especially in Greek and mathematics. In 1814 he passed at the Scottish bar, but he did not at once practise. The close of the war had opened up the continent, and Alison set out in the autumn of 1814 for a lengthened tour in France. It was during this period that the idea of writing his history first occurred to him. A more im- mediate result of the tour was his first literary work of any importance, Travels in France during the Years 1814-181$, written in collaboration with his brother and A. F. Tytler, which appeared in the latter year. On his return to Edinburgh he practised at the bar for some years with very fair success. In 1822 he became one of the four advocates-depute for Scotland. As a result of the experience gained in this office, which he held until 1830, he wrote his Principles of the Criminal Law of Scot- land (1832) and Practice of the Criminal Law

of Scotland (1833), which in 1834 led to his appointment by Sir Robert Peel to the office of sheriff of Lanarkshire, which ranks next to a judge- ship in the supreme court. The office, though by no means a sinecure, gave him time not only to make frequent contributions to periodical literature, but also to write the long-projected History of Europe, for which he had been collecting materials for more than fifteen years. The history of the period from the beginning of the French Revolution till the restoration of the Bourbons in 181 5 was completed in ten volumes in 1842, and met with a success almost unexampled in works of its class. Within a few years it ran through ten editions, and was translated into many of the languages of Europe, as well as into Arabic and Hindustani. At the time of the author's death it was stated that 108,000 volumes of the library edition and 439,000 volumes of the popular edition had been sold. A popularity so widespread must have had some basis of merit, and the good qualities of Alison's work he upon the surface. It brought together, though not always in a well-arranged form, an immense amount of in- formation that had before been practically inaccessible to the general public. It at least made an attempt to show the organic connexion in the policy and progress of the different nations of Europe; and its descriptions of what may be called external history — of battles, sieges and state pageants — are spirited and interesting. On the other hand the faults of the work are numerous and glaring. The general style is prolix, involved and vicious; mistakes of fact and false deductions are to be found in almost every page; and the constant repetition of trite moral reflections and egotistical references seriously detracts from its dignity. A more grave defect resulted from the author's strong political partisanship, which entirely unfitted him for dealing with the problems of history in a philosophical spirit. His unbending Toryism made it impossible for him to give any satisfactory explanation of so complex a fact as the French Revolution, or accurately to estimate the forces that were to shape the Europe of the 19th century. A continuation of the History, embracing the period from 1815 to 1852, which was completed in four volumes in 1856, did not meet with the same success as the earlier work. The period being so near as to be almost contemporary, there was a stronger temptation, which he seems to have found it impossible to resist, to yield to political pre- judice, while the materials necessary for a clear knowledge of the influences shaping European affairs were not as yet accessible. The book is now almost wholly out of date. In 1845 Alison was chosen rector of Marischal College, Aberdeen, and in 1851 of Glasgow University. In 1852 a baronetcy was conferred upon him, and in the following year he was made a D.C.L. of Oxford. His literary activity continued till

within a short time of his

death, the chief works he published in addition to his History- being the Principles of Population (1840), in answer to Malthus; a Life of Marlborough (1847, 2nd edition greatly enlarged, 1852); and the Lives of Lord Castlereagh and Sir C 'Stewart (1861.) This latter, based on MS. material preserved at Wynyard Park, is still of value, not only as the only available biography, but more especially because Alison's Tory sympathies enabled him to give a juster appreciation of the character and work of Castlereagh than the Liberal writers by whom for many years he was mis- judged and condemned (see Londonderry, Robert Stewart, 2nd marquess of). Three volumes of Alison's political, historical and miscellaneous essays were reprinted in 1850. He died at Possil House, Glasgow, on the 23rd of May 1867. His autobiography, Some Account of my Life and Writings, edited by his daughter- in-law, Lady Alison, was published in 1883 at Edinburgh. Sir Archibald Alison married in 1825 Elizabeth Glencairn, daughter of Colonel Tytler, by whom he had three children, Archibald, Frederick and Eliza Frances Catherine. Both sons became distinguished officers.

Sir Archibald Alison, Bart. (1826-1907), the elder of the sons, entered the 72nd Highlanders in 1846. He served at the siege of Sevastopol; and during the Indian Mutiny he was military secretary to Sir Colin Campbell and was severely wounded at the relief of Lucknow, losing an arm. From 1862 to 1873 he was assistant adjutant-general at headquarters, Portsmouth and Aldershot. He was second in command of the Ashanti expedition 1873-1874, and was made a K.C.B. For three years Alison was deputy adjutant-general in Ireland, and then, for a few months, commandant of the Staff College. He was promoted to be major-general in 1877, and was head of the intelligence branch of the war office (1878-1882). He com- manded the troops at Alexandria in 1882 until the arrival of Sir Garnet Wolseley, led the Highland brigade at the battle of Tel-el-Kebir, and remained in command of the army of occupa- tion until 1883. He commanded at Aldershot 1883-1888, was for some months adjutant-general to the forces during Lord Wolseley's absence in Egypt, was made G.C.B. in 1887, was promoted general, and became a military member of the Council of India in 1889. He retired in 1893 and died in 1907.

ALIWAL, a village of British India, in the Ludhiana district of the Punjab, situated on the left bank of the Sutlej, and famous as the scene of one of the great battles of the 1st Sikh War. Late in January 1846 it was held by Ranjur Singh, who had crossed the river in force and threatened Ludhiana. On the 28th Sir Harry Smith, with a view to clearing the left or British bank, attacked him, and after a desperate struggle thrice pierced the Sikh troops with his cavalry, and pushed them into the river, where large numbers perished, leaving 67 guns to the victors. The consequence of the victory was the submission of the whole territory east of the Sutlej to the British.

ALIWAL NORTH, a town of South Africa, on the south bank of the Orange River, 4300 ft. above the sea, and 282 m. by rail N.W. by N. of the port of East London. Pop. (1904) 5566, of whom 1758 were whites. The town, a trading and agricultural centre for the N.E. part of the Cape and the neighbouring regions of Basutoland and Orange Free State, presents a pleasing appearance. It contains many fine stone buildings. The streets are lined with trees, and water from the neighbouring sulphur springs flows along them in open channels. The river, here the boundary between the Cape province and Orange Free State, is crossed by a stone bridge 860 ft. long. The sulphur springs, 1 m. from the town, which yield over 500,000 gallons daily, are resorted to for the cure of rheumatism and skin diseases. By reason of its dry and bracing climate, Aliwal North is also a favourite residence of sufferers from chest complaints. In the neighbourhood are stone quarries. Aliwal North is the capital of a division of the province of the same name, with an area of 1330 sq. m. and a pop. (1904) of 14,857, of whom 40% are whites.

Aliwal North was so called to distinguish it from Aliwal South, now Mossel Bay, the seaport of the pastoral Grasveld district,

on the west side of Mossel Bay. Both places were named in honour of Sir Harry Smith, governor of Cape Colony 1847-1852, Aliwal (see above) being the village in the Punjab where in 1846 he gained a great victory over the Sikhs. Crossing the Orange River at this spot in September 1848, Sir Harry noted that it was ” a beautiful site for a town,” and in the May following the town was founded. In the early months of the Boer War of 1899-1902 Aliwal North was held by the Boers. It was reoccupied by the British in March 1900. ALIZARIN, or 1 • 2 Dioxyanthraquinone,

C 6 H 4 <£o> c

a vegetable dyestuff formerly prepared from madder root (Rubia

tinctorum) which contains a glucoside ruberythric acid (CˆHˆOu). This glucoside is readily hydrolysed by acids or ferments,breaking up into alizarin and glucose:

C M H, 8 14 +2H,0 = 2C 6 H 12 6 + C 14 H 8 4 Ruberythric acid = Glucose j Alizarin.

Alizarin was known to the ancients, and until 1868 was obtained entirely from madder root. The first step in the synthetical production of alizarin was the discovery in 1868 of C. Graebe and C. Liebermann that on heating with zinc dust, alizarin was converted into anthracene. In order to synthesize alizarin, they converted anthracene into anthraquinone and then bromi- nated the quinone. The dibrominated product so obtained was then fused with caustic potash, the melt dissolved in water, and on the addition of hydrochloric acid to the solution, alizarin was precipitated. This process, owing to its expensive nature, was not in use wry long, being superseded by another, discovered simultaneously by the above-named chemists and by Sir W. H. Perkin; the method being to sulphonate anthraquinone, and then to convert the sulphonic acid into its sodium salt and fuse this with caustic soda.

In practice, the crude anthracene is purified by solution in the higher pyridine bases, after which treatment it is frequently sublimed. It is then oxidized to anthraquinone by means of sodium dichromate and sulphuric acid in leaden vats, steam heated so that the mixture can be brought to the boil. When oxidation is complete the crude anthraquinone is separated in filter presses and heated with an excess of commercial oil of vitriol to 120° C, the various impurities present in the crude material being sulphonated and rendered soluble in water, whilst the anthraquinone is unaffected; it is then washed, to remove impurities, and dried. The anthraquinone so obtained is then heated for some hours at about 150-160 C. with fuming sulphuric acid (containing about 40-50 % S0 3), and by this treatment is converted into anthraquinone-/3-monosulphonic acid. The solution is poured into water and sodium carbonate is added to neutralize the excess of acid, when the sodium salt of the monosulphonic acid (known as silver salt) separates out. This is filtered, washed, and then fused with caustic soda, when the sulpho-group is replaced by a hydroxyl group, and a second hydroxyl group is simultaneously formed; in order to render the formation of this second group easier, a little potassium chlorate or sodium nitrate is added to the reaction mixture. The melt is dissolved in water and the dyestuff is liberated from the sodium salt by hydrochloric or sulphuric acid, or is con- verted into the calcium salt by digestion

with hot milk of lime, then filtered and the calcium salt decomposed by acid. The precipitated alizarin is then well washed and made into a paste with water, in which form it is put on to the market.

K. Lagodzinski {Berichte, 1895, 28, p. 1427) has synthesized alizarin by condensing hemipinic acid [(CHsOˆGjHˆCOOHˆ] with benzene in the presence of aluminium chloride. The product on acidification gives a compound Ci5H 12 05-H 2 which is probably an oxy-methoxy-benzoyl benzoic acid. This is dissolved in cold concentrated sulphuric acid, in which it forms a yellowish red solution, but on heating to 100 C. the colour changes to red and violet, and on pouring out upon ice, the monomethyl ether of alizarin is precipitated. This compound is hydrolysed by hydriodic acid and alizarin is obtained. It

can also be synthesized by heating catechol with phthalic anhydride and sulphuric acid at 150 C.

C 6 Hˆˆ O + C 6 H 4 (OH) 2 [i-2] = H 2 0 + C 6 H4ˆ3ˆ> C6H2 2 –
Pure alizarin crystallizes in red prisms melting at 290° C. It is insoluble in water, and not very soluble in alcohol. It dissolves readily in caustic alkalis on account of its phenolic character, and it forms a yellow-coloured di-a'cetate. Its value as a dyestuff depends on its power of forming insoluble compounds (lakes) with metallic oxides. It has no affinity for vegetable fibres, and consequently cotton goods must be mordanted before dyeing with it (see Dyeing).

Numerous derivatives of alizarin are known. On solution in glacial acetic acid and addition of nitric acid, /3-nitroalizarin OH a/CO x aOH (alizarin orange) | | | | is produced, and this on heating.

ˆ\CO/\/N02 with sulphuric acid and glycerin is converted into alizarin blue. The trioxyanthraquinones— purpurin, anthrapurpurin, anthra- gallol and flavopurpurin — are also very valuable dyestuffs. These compounds may be represented by the following formulae : OH oh oh . OH

,CO x /\OH HO/\/COs/\OH /\ /COs/\OH /\ / CO x /\OH

>/\/ ho\/\co/\/ \y

H:o /

OH

\/ N CO/

XX>/\/OH.

rurpurin. Anthrapurpurin. Flavopurpurin. Anthragallol.

Purpurin (1-2-4 trioxyanthraquinone) is found with alizarin in madder root; it is now prepared synthetically by oxidizing alizarin with manganese dioxide and sulphuric acid. After the separation of the silver salt (see above) obtaine'd on sulphonating anthraquinone, the remaining acid liquid gives on treatment with calcium carbonate the calcium salt of anthraquinone 2-6 disulphonic acid (anthraquinone-a-disulphonic acid). This is converted into the sodium salt by means of sodium carbonate, and on alkali fusion yields flavopurpurin. In a similar manner anthrapurpurin is prepared by alkali fusion of anthraquinone 2-8 disulphonic acid. Anthragallol is synthetically prepared by the condensation of benzoic and gallic acids with sulphuric acid OH OH

/\ COOH /\OH /\/CO\/\OH

I J + II =2H 2 0+(J I

\y hooc\/oh vAcoA/oh

or from pyrogallol and phthalic anhydride in the presence of sulphuric acid or zinc chloride.

A. Baeyer in 1890, by heating alizarin with fuming sulphuric acid for 24-48 hours at 35-40° C, obtained a product, which after treatment with caustic soda gave a sulphuric acid ester of quinalizarin, and this after acidification and boiling was converted into quinalizarin (Alizarin Bordeaux) or 1-2-6-9 tetra-o.xyanthraquinone. Penta-oxyanthraquinones have been obtained from purpurin and anthrapurpurin, while a hexa- oxyanthraquinone has been obtained from 1-5 dinitro-anthra- quinone.

ALKAHEST (a pseudo-Arabic word believed to have been invented by Paracelsus), a liquid, much sought after by the alchemists, having the power of dissolving gold and every other substance, which it was supposed would possess invaluable medicinal qualities.

ALKALI, an Arabic term originally applied to the ashes of plants, from which by lixivia tion carbonate of soda was obtained in the

case of sea-plants and carbonate of potash in that of land- plants. The method of making these " mild " alkalis into " caustic " alkalis by treatment with lime was practised in the time of Pliny in connexion with the manufacture of soap, and it was also known that the ashes of shore-plants yielded a hard soap and those of land-plants a soft one. But the two substances were generally confounded as " fixed alkali " (carbonate of ammonia being " volatile alkali "), till Duhamel du Monceau in 1736 established the fact that common salt and the ashes of sea- plants contain the same base as is found in natural deposits of soda salts (" mineral alkali "), and that this body is different from the " vegetable alkali " obtained by incinerating land-

plants or wood (pot-ashes). Later, Martin Heinrich Klaproth, finding vegetable alkali in certain minerals, such as leucite, proposed to distinguish it as potash, and. at the same time assigned to the mineral alkali the name natron, which survives in the symbol, Na, now used for sodium. The word alkali supplied the symbol for potassium, K (kalium). In modern chemistry alkali is a general term used for compounds which have the property of neutralizing acids, and is applied more particularly to the highly soluble hydrates of sodium and potassium and of the three rarer "alkali metals," caesium, rubidium and lithium, also to aqueous ammonia. In a smaller degree these alkaline properties are shared by the less soluble hydrates of the "metals of the alkaline earths," calcium, barium and strontium, and by thallium hydrate. An alkali is distinguished from an acid or neutral substance by its action on litmus, turmeric and other indicators.

ALKALI MANUFACTURE. The word " alkali " denotes both soda and potash, but by " alkali manufacture " we under- stand merely the manufacture of sodium sulphate, carbonate and hydrate. The corresponding potash compounds are not manu- factured in the United Kingdom, but exclusively in Germany (from potassium chloride and from the mother-liquor of the strontia process in the manufacture of beetroot sugar) and in France (from vinasse) . The term alkali is employed in a technical sense for the carbonate and hydrate (of sodium), but since in the Leblanc process the manufacture of sodium sulphate necessarily precedes that of the carbonate, we include this as well as the manufacture of hydrochloric acid which is inseparable from it. We also treat of the utilization of hydrochloric acid for the manufacture of chlorine and its derivatives, which are usually comprised within the meaning of the term " alkali manufacture." A great many processes have been proposed for the manufacture of alkali from various materials, but

none of these has become of any practical importance except those which start from sodium chloride (common salt) ; and among the latter again only three classes of processes are actually employed for manu- facturing purposes, viz. the Leblanc, the ammonia-soda, and the electrolytic processes.

I. The Leblanc Process

The Leblanc process, which was invented by Nicolas Leblanc (q.v.) about 1790, begins with the decomposition of sodium chloride by sulphuric acid, by which sodium sulphate and hydrochloric acid are produced. »The sodium sulphate is after- wards fluxed with calcium carbonate and coal, and a mixture is thus obtained from which sodium carbonate can be extracted by exhausting it with water.

Leblanc himself for a time carried out his process on a manu- facturing scale, but he was ruined in the political troubles of the time and died by his own hand in 1806. His invention was, however, at once utilized by others in France; and in Great Britain, after a few previous attempts on a small scale, it was definitely introduced by James Muspratt (q.v.) in 1823. From that time onward the Leblanc process spread more and more, and for a considerable period nearly all the alkali of commerce was made by it. The rise of the ammonia- soda process (since 1870) gradually told upon the Leblanc process, which in consequence has been greatly restricted in Great Britain and Germany, and has become practically extinct in all other countries, except as far as its first part, the manufacture of sodium sulphate and hydrochloric acid, is concerned.

The production of alkali in Great Britain, soon after the introduction of the Leblanc process, became the most extensive in the world, and outstripped that of all other countries put together. With the rise of the ammonia-soda process, for which the economic conditions are nearly as favourable in other countries, the predominance of Great Britain in that domain has become less, but even now that country produces more alkali than any other single country. Most of the British alkali works are situated in South Lancashire and the adjoining part of Cheshire, near the mouth of the Tyne and in the West of Scotland.

Various industries are carried on in Leblanc alkali works, as follows

: —

1. Manufacture of sodium sulphate.

2. Manufacture of hydrochloric acid.

3. Preparation of chlorine.

4. Employment of chlorine for the manufacture of bleaching-

powder and of chlorates.

5. Manufacture of ordinary alkali from sulphate of soda.

6. Manufacture of caustic soda.

7. Manufacture of soda crystals.

8. Recovery of sulphur from alkali waste.

1. Manufacture of Sodium Sulphate. — This is commercially known as salt-cake, and is made by decomposing common salt with sulphuric acid of about 80 %, the reaction being $2NaCl + H2S04 = Na2S04 + 2HCl$. *This reaction proceeds in two stages. At first principally acid sodium sulphate, NaHSQt, is formed together with some normal sulphate; later, when the temperature has risen, the NaHS0 4 acts with more NaCl so that nearly all of it is converted into Na 2 S0 4 . The gaseous hydrochloric acid evolved during all this time must be absorbed in water, unless it is directly converted into chlorine (see below, 2 and 3).*

The process is carried out either in hand-wrought fur- naces,or mechanical furnaces, both called ” decomposing ” or ” salt-cake furnaces.” In the former case, the first re- action is produced in cast-iron pans or ” pots,” very heavy castings of circular section, fired from below, either directly or by the waste heat from the muffle-furnace. The reaction is completed in a “roasting- furnace.” The latter was formerly often constructed as a reverberatory furnace, which is easy to build and to work, but the hydrochloric acid given off here, being mixed with the products of the combustion of the fuel, cannot be condensed to strong acid and is partly,

if not entirely, wasted. It is, therefore, decidedly prefer- able to employ ” muffle-furnaces ” in which the heating is performed from without, the fire-gases passing first over the arch and then under the bottom of the muffle. This requires more time and fuel than the work

in " open " furnaces, but in the muffles the gaseous hydrochloric acid is separated from the fire-gases, just like that evolved in the pot, and can therefore be condensed into strong hydrochloric acid, like the pot-acid. This roaster-acid is, however, of less value than the pot-acid, as it contains more impurities.

It is not easy to keep the muffles permanently tight, and as soon as any leakages occur, either hydrochloric acid must escape into the fire-flue, or some fire-gases must enter into the muffle. The former is decidedly more objectionable than the latter, as it means that uncondensed hydrochloric acid is sent into the air. This drawback has been overcome by the construction of " plus- pressure " furnaces (figs. 1 and 2), where the fire-grate is placed 11 ft. below the top of the muffle. In consequence the fire-gases, when arriving there by the chimney shaft {a), have

already a good upward draught, and when circulating round the muffle are at a lower pressure than the gases within the muffle, so that in case of any cracks being formed, no hydrochloric acid escapes into the fire-flues, but vice versa.

Since the work with ordinary hand-wrought salt-cake furnaces is disagreeable and costly, many attempts have been made to construct mechanical salt-cake furnaces. Of these J. Mactear's furnaces (fig. 3) have met with the greatest success. They consist of a horizontal pan, 17 ft. wide, which is made up of a central pan (e), and a series of concentric compartments (c 1), (c 2), (c3), and which is supported on a frame (d d), revolving round a perpendicular axis on the wheels (n n). It is covered with an arch and heated on the top from one side (I), either by an ordinary coal-grate or by a gas-producer. A set of stirring blades carried in the frame (b b), and driven by gearing,

Figs, i and 2. — Salt-cake Furnace. (Sectional Elevation and Plan.) Figs. 1-9 from Lunge's Handbuch der Soda-Industrie, by permission of Friedr. Vieweg u. Sohn.

passes through a gap in the arch in such a manner that the gases cannot escape outwards. The salt is conveyed to the furnace by a chain of buckets running on the pulley (g), and passing into the hopper (h), and through the pipe (i) is mixed with the proper amount of acid supplied by the pipe (/). The mixture is fed in continuously to the central pan (e), whence it overflows into the compartments (c 1), (c 2), (c 3) successively until it reaches the circumference, where it is discharged con- tinously by and p into the collecting-box (

Much was expected at one time from the " direct salt-cake process " of Hargreaves and Robinson, in which common salt is

subjected in a series of large cast-iron cylinders to the action of pyrites-burner gases and steam at a low red heat. The reaction going on here is: $2NaCl + SO_2 + O + H_2 = Na_2SO_4 + 2HCl$. This means that the previous manufacture of sulphuric acid in the vitriol-chambers is done away with, but this apparently great simplification is balanced by the great cost of the Hargreaves plant, and by the fact that the whole of the hydrochloric acid is mixed with nine or ten times its volume of inert gases. Owing to this, it is practically impossible to condense the gaseous hydrochloric acid into the commercial acid, although this acid may be obtained sufficiently strong to be worked up in the Weldon chlorine process (see below, 3) . Therefore the Hargreaves process has been introduced only in a few places.

Although the consumption of salt-cake for the manufacture of alkali is now much less than formerly, since the Leblanc alkali process has been greatly restricted, yet it is largely made and will continue to be made for the use of glassmakers, who use it for the ordinary description of glass in the place of soda-ash. Nor must it be overlooked that salt-cake must be made as long

Fig. 3. — ?»Iechanical Salt-cake Furnace. (Sectional Elevation

as there is a sale for hydrochloric acid, or a consumption of the latter for the manufacture of chlorine.

2. Manufacture of Hydrochloric Acid (commercially also known as " muriatic acid ")• This unavoidable gaseous bye-product of the manufacture of salt-cake was, during the first part of the 19th century, simply sent into the air. When its deleterious effects upon vegetation, building materials, &c, became better known, and when at the same time an outlet had been found for moderate quantities of hydrochloric acid, most factories made more or less successful attempts to " condense " the gas by absorption in water. But this was hardly anywhere done to the fullest possible extent, and in those districts where a number of alkali works were located at no great distance from one another, their aggregate escapes of hydrochloric and other acids created an intolerable nuisance. This was most

notably the case in South Lancashire, and it led to the passing of Lord Derby's " Alkali Act," in 1863, supplemented by further legislation in 1874, 1 88 1 and later. There is hardly another example in the annals of legislative efforts equal to this, in respect of the real benefit conferred by it both on the general public and on the manufacturers themselves. This is principally the consequence of the exemplary way in which the duties of inspector under these acts were carried out by Dr R. Angus Smith (181 7-1884) and his successors, who directed their efforts not merely to their

primary duty of preventing nuisance, but quite as much to showing manufacturers how to make the most of the acid formerly wasted in one shape or another. Not merely Great Britain but all mankind has been immensely benefited by the labours of the British alkali inspectors, which were, of course, supplemented by the work of technical men in all the countries concerned. The scientific and technical principles of the con- densation of hydrochloric acid are now thoroughly well under- stood, and it is possible to recover nearly the whole of it in the state of strong commercial acid, containing from 32. to 36% of pure hydrochloric acid, although probably the majority of the manufacturers are still content to obtain part of the acid in a weaker state, merely to satisfy the requirements of the law prescribing the prevention of nuisance. The principles of the condensation, that is of converting the gaseous hydrochloric acid given off during the decomposition of common salt into a strong solution of this gas in water, can be summarized in a few words. The hydrochloric acid gas, which is always diluted with air, sometimes to a very great extent, must be brought into the

most intimate contact possible with water, which greedily ab- sorbs it, forming ordinary hydrochloric acid, and this process must be carried so far that scarcely any hydrochloric acid remains in the escaping gases. The maximum escape allowed by the Alkali Acts, viz. 5 % of the total hydro- chloric acid, is far above that which is now practically at- tained. For a proper utiliza- tion of the condensed acid it is nearly always imperative that it should be as strong as possible, and this forms a second important considera- tion in the construction of the condensing apparatus. Since the solubility of hydro- chloric acid in water decreases with the increase of the temperature, it is necessary to keep the latter down — a task which is rendered somewhat difficult both by the original heat retained by the gases on their escape from the decom- posing apparatus, and by the heat given off through the reaction of hydrochloric acid upon water.

Very different methods have been employed to effect all the above

purposes. In Great Britain Gay-Lussac's coke-towers, adapted by W. Gossage to the condensation of hydrochloric acid, are still nearly everywhere in use, frequently combined with a number of stone tanks through which the gas from the furnaces travels before entering the towers, meeting on its way the acid condensed in the tower. This process is excellent for effecting a complete condensation of the hydrochloric acid as prescribed by the Alkali Acts, and for recovering the bulk of the acid in a tolerably strong state, but less so for recovering nearly the whole of it in the most concentrated state, although even this is occasionally attained. On the continent of Europe, where the last-named requirement has been for a long time more urgent than in Great Britain, another system has been generally preferred, namely, passing the gas through a long series of stoneware receivers, and ultimately through a small tower packed with stoneware or coke, making the acid flow in the opposite direction to the gas. . Great success has also been obtained by " plate-towers " made of stoneware, which allow both the coke-towers and most of the stoneware receivers to be dispensed with.

3. Preparation of Chlorine-

Tn this place we speak only of

the preparation of chlorine from hydrochloric acid by chemical processes; the electrolytic processes will be treated hereafter. It is clear that free chlorine must be prepared from hydrochloric acid by oxidizing the hydrogen. This can be done most easily by " active " oxygen, such as is present in the peroxides, in chromic or permanganic acid. Practically the only agent employed in this way, and that already by C. W. Scheele, the discoverer of chlorine, in 1774, is the peroxide of manganese (manganese dioxide), found in considerable quantities in nature as " manganese ore " (the purest of which is called pyrolusite), and also artificially regenerated from the waste liquors of a former operation. Even now, where chlorine is required for immediate use in some other chemical operations on a comparatively small scale, it is obtained by the action of hydrochloric acid on native manganese dioxide, according to the equation: $MnO_2 + 4HCl = MnCl_2 + Cl_2 + 2H_2O$. This action must be promoted by heating the mixture, but even then nothing like all of the hydrochloric acid employed is made to act as above, because the attack on the manganese ore requires a certain minimum

concentration of the acid. Formerly, instead of free hydrochloric acid a mixture of common salt and sulphuric acid was sometimes employed, but this is never done on a manufacturing scale now. Owing to the impossibility of employing any metal in contact with the acid, the " chlorine stills," where the above reaction is carried out, must be made of acid-proof stones or " chemical " stone- ware. This process is very costly, as much of the acid and all of the manganese is wasted. Moreover it is of a most disagreeable kind, as the waste "still-liquor," containing very much free hydrochloric acid and even some free chlorine, forms a most deleterious impurity when finding its way into drains or water- courses, apart from the intolerable nuisance caused by the escapes of chlorine from the stills and otherwise, which cannot be at all times avoided.

Many endeavours were made to avoid the loss of the manganese in this operation, but with only partial or no success. The difficulty was only overcome by the Weldon process, being the in- ventions of Walter Weldon from 1866 onwards, and his process up to this day furnishes the greater proportion of chlorine manufactured in the world. It begins with " still-liquor," obtained in the old way from native manganese ore and hydro- chloric acid. This liquor is first treated with carbonate of lime (ground chalk or limestone) in a " neutralizing-well," made of acid-proof material and provided with wooden stirring-gear. Here the free hydrochloric acid is converted into calcium chloride, and at the same time any ferric chloride present is converted into insoluble ferric hydroxide: $2FeCl3 + 3CaC03\text{-}f\text{-}3H\ 2 = 2Fe(OH)3 + 3CaCl2 + 3CO$*». The sulphuric acid present is mostly precipitated as calcium sulphate. The mud thus formed is settled out, and the clear liquor, which is now quite neutral and contains both manganese and calcium chlorides, is mixed with cream of lime and treated by a strong current of air, produced by a blowing-engine. This is done in a tall iron cylinder, say o ft. wide and 30 ft. high, called the " oxidizer." The air-pipe goes right to the bottom of the cylinder and there branches out into perforated side-pipes, so that the mass is thoroughly stirred up all the time. The first action of the lime is to convert the manganese chloride into manganous hydrate (Mn(OH) 2) and calcium chloride; then more lime is added which greatly pro- motes and hastens the oxidizing process. The object of the latter is to convert the manganous hydroxide by the atmospheric oxygen into manganese dioxide, but this would take place much too slowly if there was not an excess of lime present ready to combine with the manganese dioxide to form a calcium manganite. Only so much lime is used that an acid manganite is formed corresponding to one molecule of*

calcium oxide to two of manganous oxide. This additional lime, which is called the " basis," certainly takes up hydrochloric acid in the next stage of the process, but that causes no more waste of acid than the incomplete action on native manganese ore, mentioned before. The product obtained, called " Weldon mud," is of such fine texture that it acts immediately with hydrochloric acid when mixed with it in the " Weldon stills " (fig. 4), and that this acid

can be almost entirely neutralized thereby. The new still- liquor formed in this manner is treated as above, so that the manganese does its work over and over again. There is only a slight mechanical loss, which is reduced in the best managed works to about 2 parts of manganese dioxide to 100 of bleaching- powder. There are also other advantages of this process which explain its wide extension, in spite of the fact that only from 30 to 35 parts of the hydrochloric acid employed is converted into chlorine, the remainder ultimately leaving the factory in the shape of a harmless but useless solution of calcium chloride.

Weldon's later attempts at superseding his classical process by other inventions which utilize a larger proportion of the chlorine, introduced as hydrochloric acid, have not been successful in the long run, although some of them were aided by the great technical skill of A. R. Pechiney. But the Deacon process, the invention of Henry Deacon (who was greatly aided by his chemist Dr Ferdinand Hurter), carried out since 1868, has attained to better, although nothing like complete, success in that, direction.

The Deacon process, like the Weldon process, effects its object by the oxidizing action of atmospheric air, but in a very different manner. Weldon retained the principle of the Scheele

Fig. 4.— Weldon Chlorine Still. (Sectional Elevation.) C, Stone steam column resting in stone socket K.

process, by employing the active oxygen of manganese dioxide to convert hydrochloric acid into free chlorine, and he employed the atmospheric oxygen only indirectly, for the recovery of manganese dioxide from the manganese chloride formed. But Deacon worked on the direct reaction: 2HC1 + 0 = H 2 0-t-C1 2 . This reaction in ordinary circumstances is so slow as to be practically useless. If, however, a " contact-substance " is employed and that at the proper temperature, the process goes on at an immensely quickened rate and can even be carried out as a continuous operation. The only substance which possesses sufficiently strong catalytic properties for

the reaction is cupric chloride. If pieces of porous clay are soaked in a solution of this salt and dried and kept at a temperature of 450° C. (in practice it is necessary to go to a rather higher temperature), it is possible continuously to convert a united stream of hydro- chloric acid and atmospheric air, passed through the contact- substance in a "decomposer" (fig. 5), to a larger extent into chlorine and water, of course mixed with the excess of oxygen and all the nitrogen of the air. On a small scale it is possible to push the decomposition as far as 90% of the hydrochloric acid, but on the large scale only at most 60 % is reached. The mixture of hydrochloric acid and air is taken directly from the " decom- posing-pan " of an ordinary salt-cake furnace, is first cooled down I in pipes sufficiently to condense most of the moisture present

(together with about 8% of the hydrochloric acid), and then passed through a cast-iron superheater and from this into the " decomposer." The gaseous mixture, issuing from the latter, is washed with water in the usual condensing apparatus, to remove the 40 or 50 parts of hydrochloric acid left unchanged, and can then be immediately employed for the manufacture of chlorate of potash.

Where (as is the more usual case) the chlorine has to serve for the manufacture of bleaching-powder, it must first be deprived of the great amount of moisture which it contains, by means of

coke-towers fed with moderately strong sulphuric acid. As the gas issuing from these contains only about 5 volumes % of hydrochloric acid, it cannot be made to act upon lime in the ordinary bleaching-powder chambers, but specially constructed chambers must be provided (see fig. 4). The movement of the gases through all this complicated set of apparatus is produced by a Root's blower placed at the end of it all.

The Deacon process makes cheaper chlorine than the Weldon process, but the plant is complicated and costly and the working requires a great deal of attention. In skilled hands it has been proved to yield excellent results.

The hydrochloric acid from the calcining-furnaces or "roasters" cannot be employed immediately for the Deacon process, as the

sulphuric acid always contained in the roaster gases soon

" poisons " the contact-substance and renders it inoperative. This acid must, therefore, be condensed in the ordinary way into liquid hydrochloric acid and formerly could be worked up only by the Weldon process. R. Hasenclever has overcome this drawback by running this impure acid into moderately strong sulphuric acid (140° Twaddell), blowing in air at the same time. This produces a mixed current of pure hydrochloric acid gas and air, which is carried into a Deacon decomposer where it acts in the usual manner. The sulphuric acid, of which 6 or 7 parts are used to one of impure liquid hydrochloric acid, is always reserved for use in the same process, by driving off the excess of water in a lead pan, fired from the top, so that the principal expense of the process is that of the fuel required for the last operation.

4. Applications of Chlorine. — Some of the chlorine manufactured (practically only such as is obtained by the electrolysis of chlorides) is con- densed by cold and pressure into liquid chlorine. If this is anhydrous, as it must be in any case for this purpose, it does not act upon the metal of the compressors, nor upon the iron bottles in which it is sent out. It may even be sent out in tank wagons, similar to those which are employed for carrying sulphuric acid, holding 10 tons each.

Sometimes the chlorine is employed directly for bleaching purposes, especially for some kinds of paper. A number of organic chlorinated products are also produced on a large scale. But most of the chlorine is utilized for the production of bleach- ing-powder, of bleach-liquor, and of chlorate of potash.

Bleaching-powder is a compound obtained by the action of free chlorine on hydrated lime, containing a slight excess of water at

ordinary temperatures or slightly above these. Its composition approaches the formula CaOCl 2 , and it is regarded as a double salt of calcium chloride and hypochlorite, which by the action of water splits up into a mixture of these salts. It always contains a certain quantity of chemically combined water and also an excess of Mme. Usually this lime is regarded only as me- chanically mixed with the bleaching-compound, CaOCl 2 , but some chemists adopt formulae in which this lime is equally represented.

For the manufacture of bleaching-powder, lime- stone of high degree of purity (especially free from magnesia and iron) is carefully burned so as to drive out nearly all the carbon dioxide without overheating the lime. The quick-lime is then slaked with the requisite quantity of water; the product is passed through a fine-meshed wire sieve and is spread in layers of 2 or 3 in. at the bottom of large boxes, the " bleaching-powder (Sectional Elevation.) a, a, Upright cast-iron chambers," made of lead, or sometimes of cast-iron iron plates arranged like Venetian pro tected by paint, of slate or even of tarred

wood. Chlorine, generated in an ordinary or a Weldon still, is passed in and is rapidly absorbed. When the absorption becomes slow, the gas is cut off and the chamber is left to itself for twelve hours or more, when it will be found that all the chlorine has been taken up. Now the door of the chamber is opened, the powder lying at the bottom is turned over and the treatment with gas is repeated. Sometimes a third treatment is necessary in order to get the product up to the strength required in commerce, viz. 35% of " available " chlorine. The finished product is packed into wooden casks lined with brown paper. The work of packing is a most dis- agreeable and unhealthy operation which is best relieved by erecting the chambers at a higher level and placing the casks underneath, communication being made by means of traps in the chamber-bottom, so that the packers can do their work

Fig. 5. — Deacon " Decomposer cylinders; b, b, brick jacket; c, c, flues; d

blinds, between which the contact-substance is contained; /, charging hole; g, dis- charging hole; h, entrance pipe for gas; ;', exit pipe for gas.

outside the chambers. The bleaching-powder casks must be kept in a

dry place, as cool as possible, and never exposed to the direct rays of the sun, in order to prevent a decomposition which now and then has even led to explosions.

The weak chlorine from the Deacon process cannot be treated in this manner, as chambers of impossibly large dimensions would be required. Originally the absorption of the Deacon chlorine took place in a set of chambers, constructed of large slabs of stone, containing a great many horizontal shelves superposed over one another. About sixteen such chambers were combined in such manner that the fresh gas passed into that chamber which had been the longest time at work and in which the bleaching-powder was nearly finished, and so forth until the gas, now all but entirely exhausted, reached the last-filled chamber in which it met with fresh lime and there gave up the last of the chlorine. These " Deacon chambers " occupied a large space, besides being expensive to build and difficult to keep in repair.

They are now mostly replaced by an apparatus, the invention of R. Hasenclever, consisting of four horizontal cast-iron cylinders with internal stirring-gear. The fresh lime is continually charged into the top cylinder, is gradually moved towards the other end, falls down into the next lower cylinder and thus gradually makes its way to the lowest cylinder. The weak chlorine gas from the Deacon apparatus travels precisely the opposite way, from the bottom upwards, the result being that finished bleaching- powder is continually discharged at the bottom and air free from chlorine leaves the apparatus at the top.

Bleaching-powder is manufactured to the extent of several hundred thousands of tons annually, almost entirely for the use of papermakers and cotton bleachers. Smaller quantities are used for disinfection and other purposes. It is usually sold in " tierces," that is, casks containing about 10 cwt.

Bleach-liquors. — If the chlorine is made to act on cream of lime, care being taken that the temperature does not rise above 35° and that the chlorine is not in excess, a solution is obtained containing a mixture of calcium chloride and hypochlorite which is a very convenient agent for bleachers, but which does not bear the expense of carriage over long distances. Similar liquids are obtained with a basis of sodium (" eau de Javel "), by passing chlorine into solutions of sodium carbonate. The former kind of bleach-liquor is mostly used in the industry of cotton, the latter in that of linen.

Chlorate of Potash. — Formerly all chlorate of potash, as some is

still, was obtained by passing chlorine into milk of lime, allowing the temperature to rise almost to the boiling-point, and continuing until the bleaching-solution, originally formed, is converted into a mixture of calcium chlorate and chloride, the final reaction being $6Ca(OH)_2 + 2KCl = 5CaCl_2 + Ca(ClO_3)_2 + 6H_2O$. On adding to this solution, after settling out the mud, a quantity of potassium chloride equivalent to the calcium chlorate, the reaction $Ca(ClO_3)_2 + 2KCl = CaCl_2 + 2KClO_3$ is produced, the ultimate proportions thus being theoretically $2KClO_3$ to $6CaCl_2$, though in reality there is rather more calcium chloride present. When this solution is concentrated by evaporation and cooled down, about five-sixths of the chlorate of potash crystallizes out. It is purified by redissolving and crystallization, and is sold either in the state of crystals or finely ground. During these operations care must be taken lest a spark should produce the inflammation of the chlorate on contact with any organic sub- stance. Large quantities of potassium chlorate exposed to strong heat in contact with the wood of casks or the timber of a roof have produced violent explosions.

Most of the chlorate of potash is now prepared by electrolysis of potassium chloride (see below). It is employed for fire-works, for some descriptions of explosives, for safety matches and as an oxidizer in some operations, especially in dyeing and tissue printing. For the last-named purpose it is sometimes replaced by sodium chlorate. The chlorates are usually sold in wooden kegs containing icwt. each.

5. The Manufacture of Soda-ash from Salt-cake by the Leblanc process. — This process consists in heating a mixture of commercial

Fig. 6. — Black-ash Furnace and Boiling-down Pan.

sulphate of soda (salt-cake) with about the same weight of crushed limestone and half its weight of coal, until the materials are fluxed and a reaction has taken place, the principal phase of which is expressed by the equation $Na_2SO_4 + CaCO_3 + 2C = 2CO_2 + Na_2CO_3 + CaS$. A number of secondary reactions, how- ever, occur, owing partly to the excess of calcium carbonate and coal and partly to the impurities present, so that the solid product of the process, which is called "black-ash," has a somewhat complicated composition. Its principal constituents are always sodium carbonate

and calcium sulphide, which are separated by the action of water, the former being soluble and the latter insoluble.

The furnace in which the reaction takes place is shown in fig. 6 in a sectional plan. It is called a " black-ash " furnace, and belongs to the class of reverberatory furnaces. A large fire-grate {ab), having a cave © to facilitate stoking and stepped back at (d), is bounded on one side by a fire-bridge (e) ; on the other side of this, separated by an air-channel (g) , there is first the proper fluxing bed (h), and behind this the " back-bed "(J) for pre-heating the charge. The flame issuing from the furnace by (o) is always further utilized for boiling down the liquors obtained in a later stage, either in a pan (p) fired from the top and supported on pillars (qq) as shown in the drawing, or in pans heated from below. The charge of salt-cake (generally 3 cwt.), limestone and coal is roughly mixed and put upon the back-bed; when the front-

bed has become empty it is drawn forward and exposed to the full heat of the fire, with frequent stirring. After about three- quarters of an hour the substances are so far fluxed or softened that the reaction now sets in fully, as shown by the copious escape of gas. This is at first colourless carbon dioxide, but later on inflammable gases come out of the mass, which at this stage has turned into a thicker, pasty condition, showing that the end of the reaction is near. The inflammable gas is carbon monoxide, which, however, does not burn with its proper purple flame, but with a flame tinged bright yellow by the sodium present. This carbon monoxide is formed by the action of coal on the lime, formed at this stage from the original limestone. When the " candles " of carbon monoxide appear, the pasty mass is quickly drawn out of the furnace into iron " bogies," where it solidifies into a grey, porous mass, the " black-ash." Care must be taken to heat it no longer than necessary, as it otherwise turns red and yields bad soda.

The hand-wrought black-ash furnace has been mostly super- seded in the large factories by the revolving black-ash furnace, shown in fig. 7. These furnaces possess a large cylindrical shell (e) , lined with fire-bricks, and made to revolve round its horizontal axis by means of a toothed wheel fixed on its exterior; (ff) are tire-seats holding tires (gg) , which work in friction rollers (h). The flame of a fixed fireplace (a) enters through an " eye " (b) in the centre of the front end of the cylinder and issues in the centre of

Fig. 7. — Revolving Black-ash Furnace. (Elevation.)

the back end, first into a large dust-chamber (m) , and then over or under boiling-down pans (p). These mechanical furnaces do the work of from four to ten ordinary furnaces according to their size, with comparatively very little expense for labour, but they must be very carefully managed and the black-ash from them is more difficult to lixiviate than that from hand-wrought furnaces, because it is less porous. The lixiviation of the black- ash requires great care, as the calcium sulphide is liable to be changed into soluble calcium compounds, which immediately react with sodium carbonate and destroy a corresponding quantity of the latter, rendering the soda weaker, and impure. This change of the calcium sulphide may be brought about either by the oxidizing action of the air or by " hydrolysis," produced by prolonged contact with hot water, the use of which, on the other hand, cannot be avoided in order to extract the sodium carbonate itself. The apparatus which has been found most suitable for the purpose was devised by Professor H. Buff of Giessen, and first practically carried out by Charles Dunlop at St Rollox. It consists of a number of tanks or " vats," placed at the same level and connected by pipes which reach nearly to the bottom of one tank and open out at the top into the next tank. The vats are also provided with false bottoms, outlet cocks, steam pipes and so forth. Tepid water is run in at one end of the series, where nearly exhausted black-ash is present; the weak liquor takes up more soda from the intermediate tanks and at last gets up to full strength in the last tank, charged with fresh black-ash and kept at a higher temperature, viz. 60° C. When the first tank has been quite exhausted, the water is turned on to the next, the first tank is emptied by discharging the " alkali- waste," and is filled with fresh black-ash, whereupon it becomes the last of the series. In spite of all precautions a certain quantity

of impurities is always formed, but this should be kept down as much as possible by strictly watching the temperature in the vats and by taking care that the black-ash in the wet state is never exposed to the air. The unavoidable contamination with muddy particles of vat-waste is removed by allowing the vat- liquor to rest for some hours in a separate tank and settling out the mud.

The clear vat-liquor, if allowed to cool down to ordinary temperature, would separate out part of the sodium carbonate in the shape of decahydrated crystals. As these do not come out sufficiently pure, they would not be marketable and therefore they are not allowed to be formed, but the liquid, while still hot, is either run into the boiling-down pans, or submitted to one of the purifying operations to be described below. If it is boiled down without further

purification, the resulting soda-ash is not of the first quality, but it is sufficiently pure for many purposes. The boiling down is most economically performed by means of large iron pans covered with a brick arch and heated from the top by the waste flame issuing from the black-ash furnaces (see figs. 6 and 7). It is continued until the contents of the pan have been converted into a thick paste of small crystals of monohydrated sodium carbonate, permeated by a mother-liquor which is re- moved by draining on perforated plates or by a centrifugal machine, and is always returned to the pans. The drained crystals are dried and heated to redness in a reverberatory furnace; when " finished," the mass is of an impure white or light yellow colour and is sold as ordinary " soda-ash." It is not easy to make it stronger than 92 % of sodium carbonate, which is technically expressed as " 52 degrees of available soda " (see next page) . If purer and stronger soda-ash is wanted, the boiling down must be carried out in pans fired from below, and the

crystals of monohydrated sodium carbonate " fished " out as they are formed, but this is mostly done after submitting the liquor to the purifying operations which we shall now describe.

The dried or " finished " soda-ash is ground to a pretty fine powder and is packed into wooden casks or " tierces," holding from 10 to about 20 cwt. each, according to the way of filling them.

The principal impurities of crude vat-liquor are sodium hydrate and sulphide, the latter of which always leads to the formation of soluble double sulphur salts of sodium and iron. The other impurities are of minor importance. The sulphides can be removed by " oxidizing " them into thiosulphates by means of atmospheric air, with or without the assistance of other agents, such as manganese peroxide; or by " carbonating " them with lime-kiln or other gases containing carbon dioxide; or by precipitating them with lead or zinc oxide. The last mentioned is the best but costliest method, and is employed only in the manufacture of the highest strengths of caustic soda. The most usual process, where soda-ash is to be made, is the " carbonating." This is usually effected either by forcing lime-kiln gas through the liquor, contained in a closed iron vessel, or by passing the gases through an iron tower filled with coke or other materials, suitable for subdividing the stream of the gases and that of the vat-liquor which trickles down in the tower. The same apparatus is used for "

oxidizing " by means of atmospheric air passed through by means of an injector; sometimes both air and carbon dioxide are passed in at the same time. The operation is finished when all the sodium sulphide has been converted into normal sodium carbonate, partly also into acid sodium car- bonate (bicarbonate) NaHCOs; at the same time a precipitate is formed, consisting of ferrous sulphide, alumina and silica, which is removed by another settling tank, and the clear liquor is now ready either for boiling down in a "fishing-pan" for the manufacture of white soda-ash, or for the process of causticizing.

Soda-ash (as well as caustic soda) is sold by degrees of " avail- able soda.". This means that portion which neutralizes the acid employed for testing, and the degrees mean the percentage of Na 2 thus found, whether it be present as Na 2 C0 3 , NaOH, or sodium aluminate or silicate. The purest soda-ash, equal to 100 % Na2CC>3, would be 585 degrees of available soda. The ordinary commercial strength of Leblanc soda-ash is from 52 to 54 degrees (in former times much was sold in the state of

48 %).

6. Manufacture of Caustic Soda. — Most of the Leblanc liquor is nowadays converted into caustic soda, as white soda-ash is more easily and cheaply made by the ammonia-soda process. We shall therefore in this place describe the manufacture of caustic soda. This is always made from the carbonate by the action of slaked lime: Na 2 C0 3 +Ca(OH)2 = CaC0 3 +2NaOH. The calcium carbonate, being insoluble, is easily separated from the caustic liquor by filtration. But as this reaction is reversible, we must observe the conditions necessary for directing it in the right sense. These are: diluting with water so as not to exceed 10 % of sodium carbonate to 90 % of water; boiling this mixture; and keeping it well agitated. At the best about 92 % of ,the sodium carbonate can be converted into caustic soda, 8 % remaining unchanged.

The operation is performed in iron cylinders, provided with an agitating arrangement. This may consist of a steam injector by means of which air is made to bubble through the liquid, which produces both the required agitation and the heating, and at the same time oxidizes at least part of the sulphides; but this method of agitation causes a great waste of steam and at the same time a further dilution of the liquor. Many, there- fore, prefer mechanical stirring by means of paddles, fixed either to a vertical or to a horizontal shaft, and inject only sufficient steam to keep the mass at

the proper temperature. Some heat is also gained by the slaking of the caustic lime within the liquor. After from half an hour to a whole hour the conversion of sodium carbonate into sodium hydrate is brought about as far as is practicable. The whole mass is now run into the

filters, which are always constructed on the vacuum principle. They are iron boxes, in which a bed is made of bricks, above them gravel, and over this sand, covered on the top by iron grids. The space below the sieve thus formed is connected by means of an outlet tap with a closed tank, and this again com- municates with a vacuum pump. By this means the filtration is quickened by the atmospheric pressure, and goes on very rapidly, as also does the subsequent washing. The filtered caustic liquor passes to the concentration plants; the washings are employed for diluting fresh vat-liquor for the next operation, or for dissolving solid soda-ash for the same purpose. The washed-out calcium carbonate, which always contains much calcium hydrate and 2 or 3 % of soda in various forms, usually goes back to the black-ash furnaces, but it cannot be always used up in this way, and what remains is thrown upon a heap outside the works. Attempts have been made to use it in the manufacture of Portland cement, but without much success.

The clear caustic soda liquor must be concentrated in such a way that the caustic soda cannot to any great extent be re- converted into sodium carbonate, and that the " salts " which it contains, sodium carbonate, sulphate, chloride, &c, can be separated during the process. Formerly the most usual con- centrating apparatus was the " boat-pan " (fig. 8). This is an

ftttZS 2-498 – -*M3l*

Fig. 8.-

-Caustic Soda Concentration Boat-pan. Elevation.)

(Sectional

oblong iron pan, the bottom of which slopes from both sides to a narrow channel. The latter rests on a brick pillar; the remaining part of the sloping bottom is heated, either by the waste fire from a black-ash furnace or by a special fireplace. This arrange- ment has the effect that the salts, as they separate out, slide down the sloping part and arrive in the central channel, which is not exposed to the fire-gases, so that they quietly settle there, without caking to the pan,

until they are fished out by means of perforated ladles. These boat-pans were for many years almost everywhere employed, and did their work quite well, but rather expensively. At many works they have been replaced by either Thelen pans or vacuum pans.

The " Thelen pan " (thus named from its inventor, a foreman at the Rhenania works near Aachen) is a mechanically worked fishing-pan, which requires considerably less labour and coal than ordinary boat-pans. It is a long trough, of nearly semi- circular section, the whole bottom being exposed to the fire- gases. A horizontal shaft runs length-ways through the trough, and is provided with stirring blades, arranged in such a manner that they constantly scrape the bottom, so that the salts cannot burn fast upon it, and are at the same time moved forward towards one of the ends of the trough where they are auto- matically removed by means of a chain of buckets.

The most efficient evaporating apparatus, as far as economy of fuel is concerned, is the vacuum-pan, of which from two to five are combined to form a set, but it has the drawback that the removal of the salts is much more difficult than with the

older pans, described above. In this apparatus only the first of the pans is heated directly, usually by means of ordinary boiler- steam circulating round a number of pipes, containing the liquid to be concentrated. The steam rising from the latter is passed into a similar pan, in which it circulates round another set of pipes, but as it could not bring the liquid in the latter to boil under ordinary conditions, the second pan is connected with a vacuum-pump so that the boiling-point of the liquid in this pan is lowered. This pan may be followed by a third pan, in which a stronger vacuum is maintained, and so forth. By this means the latent heat of the steam, issuing from all pans but the last, is utilized for evaporating purposes, and from half to three-fourths of the fuel is saved.

After being concentrated up to a certain point, and after the separation of nearly all the salts, the caustic liquor is transferred to cast-iron " finishing-pots " (fig. 9), holding from ten to twenty tons. Here it is further boiled down until the greater part or nearly all of the water has been removed, and until the salts on cooling would set to a solid mass. This requires ultimately a good red heat. Before the mass has reached that point the sulphides still present have been

destroyed, either by the addition of solid nitrate of soda or by blowing air through the red-hot melt. Before finishing, the molten mass must be kept at a quiet

Fig. 9. — Caustic Soda "Finishing-pot." (Sectional Elevation.)

heat for some hours in order to settle out the ferric oxide which it always contains, and which becomes insoluble (through the destruction of the sodium ferrite) only at high temperatures. When it has completely cleared, the liquid caustic is ladled or pumped out into sheet-iron drums, holding about 6 cwt. each, where it solidifies and forms the caustic soda known to commerce.

The best caustic soda tests from 75 to 76 degrees of " available soda "; this is only a few per cent removed from the composition of pure NaOH, which would be =77-5 degrees Na 2 0. Most of the caustic soda is sold at a strength of 70 degrees, sometimes as low as 60 degrees.

Caustic soda is used in very large quantities in the manufacture of soap, paper, textile fabrics, alizarin and other colouring matters, and for many other purposes.

7. Soda-Crystals. — Another product made in alkali works is soda-crystals. Their formula in Na 2 C0 3 , 10H 2 O, corresponding t0 37 % OI dry sodium carbonate. They are made by dissolving ordinary soda-ash in hot water, adding a small quantity of chloride of lime for the destruction of colouring matter and the oxidation of any ferrous salts present, carefully settling the solution, without allowing its temperature to fall below the point of maximum solubility (34° C), and running the clarified liquid into cast-iron crystallizers or " cones," where, on cooling down, most of the sodium carbonate is separated in large crystals of the decahydrated form. This process lasts about a week in winter, and up to a fortnight in summer. In France the crystallization of soda is performed not in large tanks but in sheet-iron dishes

holding only about J cwt., and requires only from 27 to 48 hours in the cool season; it is not carried on at all in warmer climates during the summer months. The mother-liquor, drained from the soda - crystals, on boiling down to dryness yields a very white, but low-strength soda-ash, as the soluble impurities of the original soda-ash are nearly all collected here; it is called " mother-alkali."

Although the soda-crystals contain the alkali conbined with such a

large quantity of water, they are made in large quanti- ties, because their form, together with their complete freedom from caustic soda, makes them very suitable for domestic purposes. Hence they are best known as " washing-soda." Sometimes they are made, not from soda-ash, but from Leblanc soda-liquor before " finishing " the ash, or from the crude bicarbonate of the ammonia-soda process by prolonged boiling, until nearly half of the carbonic acid has been expelled.

Formerly bicarbonate of soda was made from Leblanc soda- crystals by the action of carbonic acid, but this article is now almost exclusively made in the ammonia-soda process.

8. The Recovery 0} Sulphur from Alkali-waste. — For many years all the sulphur used in the Leblanc process in the shape of sodium sulphate, and originally imported into the manufacture in the shape of brimstone or pyrites, was wasted in the crude calcium sulphide remaining from the lixiviation of black-ash. This " alkali-waste," also called tank-waste or vat- waste, was thrown into heaps where the calcium sulphide was gradually acted upon by the moisture and the oxygen of the air. The sulphur was by these converted partly into gaseous sulphuretted hydrogen, partly into soluble polysulphides, thiosulphates and other soluble compounds, and in all shapes caused a nuisance which became more and more intolerable as the number and size of alkali works increased. Both the air and the water in their neighbourhood were contaminated thereby.

Both this nuisance and the loss of the sulphur (whose cost sometimes amounted to more than . half of the total cost of the soda-ash) led to many attempts at extracting the sulphur from the alkali-waste. This was first done with a certain amount of success by the processes of M. Schaffner (1861) and L. Mond (1862), but as these required the use of hydrochloric acid, and as they only recovered about half of the sulphur, they were superseded by another — a process which had been originally proposed by W. Gossage but has been made practicable only by the in- ventions of C. F. Claus, in 1883, and from 1887 onward by the technical skill of Messrs Chance Brothers, of Oldbury. The Claus-Chance process, as it is called, comprises the following operations. The wet alkali-waste as it comes from the lixiviating vats, is transferred into upright iron cylinders in which it is systematically treated with lime -kiln gases until the whole of the calcium sulphide has been converted into calcium carbonate, the carbon dioxide of the lime-kiln gases being entirely exhausted. The sulphur issues as sulphuretted hydrogen, mixed with the nitrogen of the air. It is mixed with fresh air containing sufficient oxygen for the

combustion of the hydrogen, and the mixture is passed through red-hot iron oxide (burnt pyrites) which by its catalytic action causes the reaction $H_2S + O = H_2 + S$ to take place . By cooling the vapours the sulphur is con- densed in a very pure form, and about 85 % of the whole of it is recovered, the remaining 15% escaping in the shape of sulphur dioxide (SO_2) and H_2S. Unfortunately it has been hitherto found impossible to deal with these gases in any profitable way. It should be noted that this " recovered sulphur," which is equal in purity to the " refined brimstone " of commerce, has a far higher value than the sulphur contained in the originally employed pyrites, so that the recovery is a paying process, in spite of the somewhat considerable cost of the plant and of the working operations. It has been introduced at most large Leblanc alkali works, and has, so to say, given them a new lease of life.

in 1837,

II. The Ammonia-Soda Process

In spite of the great improvements effected during recent times the Leblanc process cannot economically compete with the ammonia-soda process, principally for two reasons. The sodium in the latter costs next to nothing, being obtained from natural or artificial brine in which the sodium chloride possesses an extremely slight value. The fuel required is less than half the amount used in the Leblanc process. Moreover, the ammonia process has been gradually elaborated into a very complicated but perfectly regularly working scheme, in which the cost of labour and the loss of ammonia are reduced to a minimum. The only way in which the Leblanc process could still hold its own was by being turned in the direction of making caustic soda, to which it lends itself more easily than the ammonia-soda process; but the latter has invaded even this field. One advantage, however, still remained to the Leblanc process. All endeavours to obtain either hydrochloric acid or free chlorine in the ammonia- ' soda process have proved commercial failures, all the chlorine of the sodium chloride being ultimately lost in the shape of worthless calcium chloride. The Leblanc process thus remained the sole purveyor of chlorine in its active forms, and in this way the fact is accounted for that, at least in Great Britain, the Leblanc process still furnishes nearly half of all the alkali made, though in other countries its proportional share is very much less. The profit made

upon the chlorine produced has to make up for the loss on the alkali.

The ammonia-soda process was first patented in 1838 by H. G. Dyar and J. Hemming, who carried it out on an experi- mental scale in Whitechapel. Many attempts were soon after made in the same direction, both in England and on the continent of Europe, the most remarkable of which was the ingenious combination of apparatus devised by J. J. T. Schloesing and E. Rolland. But a really economical solution of the problem was first definitely found in 1872 by Ernest Solvay, as the result of investigations begun about ten years previously. The greater portion of all the soda-ash of commerce is now made by Solvay's apparatus, which alone we shall describe in this place, although it should be borne in mind that the principles laid down by Dyar and Hemming have been and are still successfully carried out in a number of factories by an entirely different kind of apparatus.

The leading reaction of this process is the mutual decom- position of ammonium bicarbonate and sodium chloride: NaCl +NfLHCOˆNaHCOs+NKiCl. It begins, however, not with ready-made ammonium bicarbonate, but with the sub- stances from which it is formed — ammonia, water and carbon dioxide — which are made to act on sodium chloride. In practice the process is carried out as follows. A nearly saturated solution of sodium chloride is obtained by purifying natural or artificial brine, i.e. an impure solution of common salt, especially removing the alkaline earths and so forth by addition of sodium or ammonium carbonate and settling out the precipitate formed. This solution is saturated with ammonia, produced in the recovery plant (see below), in vessels provided with mechanical agitators and strongly cooled by coils of pipes through which cold water is made to flow. These vessels, as well as all others which are used in the process, are not open to the air. but communicate with it through washers in which fresh salt solution is employed for retaining any escaping vapours of ammonia. The ammoniacal salt solution is now saturated with carbon dioxide. This is employed in the shape of lime-kiln gases, obtained in a comparatively pure and strong form (up to 33 % CO2), in very large kilns, charged with lime- stone and coke. The kilns are closed at the top, and the gases are drawn out by powerful air-pumps, washers being interposed between the kilns and the pumps for the purpose of purifying and cooling the gas. The heat evolved by the com- pression in the air-pumps (which rises to four atmospheres or upwards) is again removed by cooling, and the gas is now passed upwards in the " Solvay tower " (fig. 10). This is a tall iron erection, built up from superposed cylinders, which are separated from one another by

perforated horizontal diaphragms, con-

«t5t

fep

structed in such a way that the gases are over and over again subdivided into many smaller streams and are thus thoroughly brought into contact with the ammoniacal salt solution with which the tower is about two-thirds filled. There the reaction men- tioned above takes place, and owing to the concentration of the liquid the sodium bicarbonate formed is to a great extent precipitated in the shape of small crystals, forming with the mother-liquor a thin magma. This takes place with considerable evolution of heat which is removed by internal and external cooling with water. The temperature must not be allowed to rise beyond a certain point, for the reaction NaCl+ NH 4 HCO s =. NaHC03+NH 4 Cl is reversible, and at a tempera- ture of about 60° or 70 C. it is in fact practically going the wrong way, viz. from right to left. On the other hand the cooling must not be carried too far, for in this case the crystals of sodium bicarbonate become so fine that the muddy mass is very difficult to filter. The best temperature seems to be about 30° C.

Either at certain intervals, or continu- ously, a portion of the contents of the tower is withdrawn and fresh ammoniacal salt solution is introduced higher up. The muddy liquid running out is passed on to the vacuum filters (Z, fig. 10). Here a separa- tion takes place be- tween the crystals of sodium bicarbonate and the mother-liquor. The former are washed with water until the chlorides are nearly removed, and are then carried into the drying apparatus. This must be con- structed in such a manner that the bi- carbonate, which always contains some ammonium salts, is first freed from these by moderate heating (of course taking care that the ammonia is completely recovered), and later on, by raising the temperature, it is decomposed into solid 'sodium carbonate and gaseous carbon dioxide. The former needs only grinding to constitute the final product, ammonia- soda ash; the latter is again employed in the process of treating the ammoniacal salt solution with carbon dioxide. Various forms of apparatus are employed for this treatment of the crude bicarbonate — sometimes semi-circular troughs with mechanical agitators on the principle of the Thelen pan (see above) — all acting on the principle that the escaping ammonia and carbon dioxide must be fully utilized over again. The soda-ash obtained in the end is of a high degree of purity, testing from 98 to 99% Na 2 C0 3 , the remaining 1 or 2% consisting principally of NaCl. A very

important part of the process has still to be described, viz. the recovery of the ammonia from the mother-liquor coming frpjn the vacuum filters and various washing liquors. Unless

From Thorpe's Dictionary of Applied Chemistry, by permission of Longmans, Green & Co.

Fig. 10. — Ammonia- soda Carbonating Towers and Filters. (Sectional Elevation.) AA. Tower: B, ammoniacal brine main; E, gas-inlet; Z, vacuum filter; V, pipe to air-pump.

this recovery is carried out in the most efficient manner, the process cannot possibly pay; but so much progress has been made in this direction that the loss of ammonia is very slight indeed, merely a fraction per cent. The ammonia is for the major part found in the mother-liquor as ammonium chloride. A smaller but still considerable portion exists here and in the washings in the shape of ammonium carbonates. These com- pounds differ in their behaviour to heat. The ammonium carbonates are driven out from their solutions by mere prolonged boiling, being thereby decomposed into ammonia, carbon dioxide and water, but the ammonium chloride is not volatile under these conditions, and must be decomposed by milk of lime: $2NH_4Cl + Ca(OH)_2 = 2NH_3 + CaCl_2 + 2H_2O$. The solution of calcium chloride is run to waste, the ammonia is re-introduced into the process.

Both these reactions are carried out in tall cylindrical columns or " stills," consisting of a number of superposed cylinders, having perforated horizontal partitions, and provided with a steam-heating arrangement in the enlarged bottom portion. The milk of lime is introduced at a certain distance from the bottom. The steam causes the action of the lime on the ammonium chloride to take place in this lower portion of the still, from which the steam, mixed with all the liberated ammonia, rises into the upper portion of the column where its heat serves to drive out the volatile ammonium carbonate. Just below the top there is a cooling arrangement, so that nearly all the water is condensed and runs back into the column, while the ammonia, with the carbon dioxide formerly combined with part of it, passes on first through an outside cooler where the remaining water is condensed, and afterwards into the vessels, already described, where the ammonia is absorbed by a solution of salt and thus again

introduced into the process.

The reversible character of the principal reaction has the consequence that a considerable portion of the sodium chloride (up to 33 %) is lost, being contained in the waste calcium chloride solution which issues from the ammonia stills. This is, however, not of much importance, as it had been introduced in the shape of a brine where its value is very slight (6d. per ton of NaCl). It is true that all the chlorine combined with the sodium is lost partly as NaCl and partly as CaCl 2 ; none of the innumerable attempts at recovering the chlorine from the waste liquor has been made to pay, and success is less likely than ever since the perfection of the electrolytic processes. (See Chlorine.) For all that, especially in consequence of the small amount of fuel required, and the total absence of the necessity of employing sulphur compounds as an intermediary, the ammonia-soda process has supplanted the Leblanc process almost entirely on the continent of Europe and to a great extent in Great Britain.

III. Electroutic Alkali Manufacture In theory by far the simplest process for making alkalis together with free chlorine is the electrolysis of sodium (or potassium) chloride. When this takes place in an aqueous solution, the alkaline metal at once reacts with the water, so that a solution of an alkaline hydrate is formed while hydrogen escapes. The reactions are therefore (we shall in this case speak only of the sodium compounds): (i) NaCl = Na+Cl, (2)Na-t-H 2 = NaOH+H.

The chlorine escapes at the anode, the hydrogen at the cathode. If the chlorine and the sodiun hydrate can act upon each other within the liquid, bleach-liquors are formed: 2NaOH-f-Cl 2 = NaOCl +NaCl+H 2 0. The production of these for the use of papermakers and bleachers of textile fabrics has become an important industry, but does not enter into our province.

If, however, the action of the chlorine on the sodium hydrate is prevented, which can be done in various ways, they can both be collected in the isolated state and utilized as has been previously described, viz. the chlorine can be used for the manu- facture of liquid chlorine, bleaching-powder or other bleaching compounds, or chlorates, and the solution of sodium hydrate can be sold as such, or converted into solid caustic soda.

Precisely the same can be done in the electrolysis of potassium chloride.

There is a third way of conducting the action, viz. so that the chlorine can act upon the caustic soda or potash at a higher concentration and temperature, in which case chlorates are directly formed in the liquid: KC1 + 3H 2 = KC10 3 + 3H 2 . This has indeed become the principal, because it is the cheapest, process for the manufacture of potassium and sodium chlorate. Perchlorates can also be made in this way.

In all these cases the chlorine, or the products made from it, really play "a greater part than the alkali. From 58.5 parts by weight of NaCl we obtain theoretically 23Na = 40NaOH = 53Na 2 C0 3 , together with 35.5 CI, or 100 bleaching-powder. As the weight of bleaching-powder consumed in the world is at most one-fifth of that of alkali, calculated as Na 2 C03, it follows that only about one-tenth of all the alkali required could be made by electrolysis, even supposing the Leblanc process to be entirely abolished. The remaining nine-tenths of alkali must be supplied from other sources, chiefly the ammonia-soda process. As long as the operation of the Leblanc process is continued, it will supply a certain share of both kinds of products. Trust- worthy statistics on this point cannot be obtained, because most firms withhold any information as to the extent of their production from the public.

The first patents for the electrolysis of alkaline chlorides were, taken out in 1851 and several others later on; but com- mercial success was utterly impossible until the invention of the dynamo machine allowed the production of the electric current at a sufficiently cheap rate. The first application of this machine for the present purpose seems to have been made in 1875 and the number of patents soon rapidly increased; but although a large amount of capital was invested and many very ingenious inventions made their appearance, it took nearly another twenty years before the manufacture of alkali in this way was carried out in a continuous way on a large scale and with profitable results. A little earlier the manufacture of potassium chlorate (on the large scale since 1890) had been brought to a definite success by H. Gall and the Vicomte A. de Montlaur; a few years later the processes worked out at the Griesheim alkali works (near Frankfort) for the manufacture of caustic potash and chlorine established definitely the success of electrolysis in the field of potash, but even then none of the various processes working with sodium chloride had emerged from the experimental stage. Only more recently the manu- facture of caustic soda by electrolysis has also been established as a permanent and paying industry, but as the greatest secrecy is maintained in everything belonging to this domain, and as neither patent specifications nor the sanguine

assertions and anticipations of interested persons throw much real light on the actual facts of the case, nothing certain can be said either in regard to the date at which the profitable manufacture of caustic soda was first carried out by electrolysis, or as to what extent this is the case at the present moment.

We shall here give merely an outline of those more important processes which are known to be at present working profitably on a large scale.

(1) The Diaphragm process is probably the only one employed at present for the decomposition of potassium chloride, and it is also used for sodium chloride. A hot, concentrated solution of the alkaline chloride is treated by the electric current in large iron tanks which at the same time serve as cathodes. The anodes are made of retort-carbon or other chlorine-resisting material, and they are mounted in cells which serve as diaphragms. The material of these cells is usually cement, mixed with certain soluble salts which impart sufficient porosity to the material. The electrolysis is carried on until about a quarter of the chloride has been transformed; it must be stopped at this stage lest the formation of hypochlorite and chlorate should set in. The alkaline liquid is now transferred to vacuum pans, constructed in such a manner that the unchanged chloride, which " salts out " during the concentration, can be removed without dis^ turbing the vacuum, and here at last a concentrated pure

solution of KOH or NaOH is obtained which is sold in this state, or " finished " as solid caustic in the manner described in the section treating of the Leblanc soda.

(2) The Cashier- Kellner process employs no diaphragm, but a mercurial cathode. The electrolysis takes place in the central compartment of a tripartite trough which can be made to rock slightly either to one side or the other. The bottom of the trough is covered with mercury. The sodium as it is formed at the cathode at once dissolves in the mercury which protects it against the action of the water as long as the percentage of sodium in the mercury does not exceed, say, 0-02%. When this percentage has been reached, the cell is rocked to the other side, so that the amalgam flows into one of the outer compartments where the sodium is converted by water into sodium hydrate. At the same time fresh mercury, from which the

sodium had been previously extracted, flows from the other outside compartment into the central one. After a certain time the whole is rocked towards the other side, and the process is continued until the outer compartments contain a strong solution of caustic soda, free from chloride and hypochlorite.

(3) Aussig process. — Here the anode is fixed in a bell, mounted in a larger iron tank where the cathodes are placed. The whole is filled with a solution of common salt. As the electrolysis goes on, NaOH is formed at the cathodes and remains at the bottom. The intermediate layer of the salt solution, floating over the caustic soda solution, plays the part of a diaphragm, by preventing the chlorine evolved in the bell from acting on the sodium hydrate formed outside, and this solution offers much less resistance to the electric current than the ordinary diaphragms. This process therefore consumes less power than most others.

(4) The Acker-Douglas process electrolyses sodium chloride in the molten state, employing a cathode consisting of molten lead. The latter dissolves the sodium as it is formed and carries it to an outer compartment where by the action of water the sodium is converted into caustic soda, while the lead returns to the inner compartment. This process is carried on at Niagara Falls, but it is uncertain to what extent.

(5) The Har greaves- Bird process avoids certain drawbacks attached to other processes, by employing a wire diaphragm and converting the caustic soda as it issues on the other side of this, by means of carbon dioxide, into a mixture of sodium carbonate and bicarbonate, which separates out in the solid state. This process is but little used.

It stands to reason that the electrolytic processes have been principally developed in localities where the electric current can be produced in the cheapest possible manner by means of water power, but this is not the only condition to be considered, as the question of freight to a centre of consumption and other circum- stances may also play an important part. Where coal is very cheap indeed and the other conditions are favourable, it is possible to establish such an industry with a prospect of com- mercial success, even when the electric current is produced by means of steam-engines.

Natural Soda. — This is the term applied to certain deposits of alkaline salts, or their solutions, which occur, sometimes in very large quantities, in various parts of the world. The oldest and best known of these are the Natron lakes in Lower Egypt. The largest

occurrence of natural soda hitherto known is that in Owen's Lake and other salt lakes situated in eastern California. The soda in all of these is present as " sesquicarbonate," in reality 4 '3 carbonate: NaHCOs-NaoCOaHiO, and is always mixed with large quantities of chloride and sulphate, which makes its extraction more difficult than would appear from the outset. Hence, although for many centuries (up to Leblanc's invention) hardly any soda was available except from this source, and although we now know that millions of tons of it exist, especially in the west of the United States, there is as yet very little of it practically employed, and that only locally.

References. — The principal work on the manufacture of alkali is G. Lunge's Sulphuric Acid and Alkali (2nd ed., vols. ii. and iii., 1895-1896). Th

of sodium and potassium compounds and on chlorine in Thorpe]s Dictionary of Applied Chemistry (3 vols., 1890-1893). The subject is also treated, very much more briefly, in Sorel's Industrie chimique minerale (1902), and of course in every other general treatise on chemical technology. A special treatise on the manufacture of ammonia soda ash has been published in German by H. Schreib. Consult also the official Annual Reports on Alkali, &c, and, from 1864 onwards, Journal of the Society of Chemical Industry, Fischers Jahres- berichte der chemischen Technologic, and Zeitschrift fur angewandte Chemie. (G. L.)

ALKALINE EARTHS. The so-called alkaline earth-metals are the elements beryllium, magnesium, calcium, strontium and barium. By the early chemists, the term earth was used to denote those non-metallic substances which were insoluble in water and were unaffected by strong heating; and as some of these substances {e.g. lime) were found to be very similar in properties to those of the alkalis, they were called alkaline earths. The alkaline earths were assumed to be elements until 1807, when Sir H. Davy showed that they were oxides of various metals. The metals comprising this group are never found in the uncombined condition, but occur most often in the form of carbonates and sulphates; they form oxides of the type RO, and in the case of calcium, strontium and barium, of the type R0 2 . The oxides of type RO are soluble in water, the solution possessing a strongly alkaline reaction and rapidly absorbing carbon dioxide on exposure; they are basic in character and dissolve readily in acids with the formation of the corresponding salts. As the atomic weight of the element increases, it is found that the solubility of the sulphates in water decreases.

Beryllium to a certain extent stands alone in many of its chemical properties, resembling to some extent the metal aluminium. Beryllium and magnesium are permanent in dry air; calcium, strontium and barium, however, oxidize rapidly on exposure. The salts of all the metals of this group usually crystallize well, the chlorides and nitrates dissolve readily in water, whilst the carbonates, phosphates and sulphates ate either very sparingly soluble or are insoluble in water.

ALKALOID, in chemistry, a term originally applied to any organic base, i.e. a nitrogenous substance which forms salts with acids; now, however, it is usual to restrict the term to bases of vegetable origin and characterized by remarkable toxico- logical effects. Such bases occur almost exclusively in the dicotyledons, generally in combination with malic, citric, tartaric or similar plant-acids. They may be extracted by exhausting the plant-tissues with a dilute acid, and precipitating the bases with potash, soda, lime or magnesia. The separation of the mixed bases so obtained is effected by repeated fractional crystallization, or by taking advantage of certain properties of the constituents.

A chemical classification of alkaloids is difficult on account of their complex constitution. I. A. Wyschnegradsky, and after- wards W. Konigs, expressed the opinion that the alkaloids were derivatives of pyridine or quinoline. This view has been fairly well supported by later discoveries; but, in addition to pyridine and quinoline nuclei, alkaloids derived from isoquinoline are known. The purely chemical literature on the alkaloids is especially voluminous; and from the assiduity with which the constitutions of these substances have been and are still being attacked, we may conclude that their synthesis is but a question of time. Piperine, conine, atropine, belladonine, cocaine, hyoscyamine and nicotine have been already synthesized; the constitution of several others requires confirmation, while there remain many important alkaloids — quinine, morphine, strych- nine, &c. — whose constitution remains unknown.

The following classification is simple and convenient; the list of alkaloids makes no pretence at being exhaustive.

(1) Pyridine group. Piperine; conine; trigonelline; arecai- dine; guvacine; ˆpilocarpine; cytisine; nicotine; sparteine.

(2) Tropine group. Alkaloids characterized by containing the tropine (q.v.) nucleus. Atropine; cocaine; hygrine; ecgonine; pelletierine.

(3) Quinoline group. The alkaloids of the quina-barks:

quinine, &c; the slrychnos bases: strychnine, brucine;

and the veralrum alkaloids: veratrine, cevadine, &c. (4) Isoquinoline group. ,The opium alkaloids: morphine,

codeine, thebaine, papaverine, narcotine, narceine, &c;

and the complicated substances hydrastine and berberine. In addition to the above series there are a considerable number of compounds derived from purin which are by some writers classed with the alkaloids. These are treated in the article Purin. There are also reasons for including such compounds as muscarine, choline, neurine and betaine in this group.

The greater number of these substances are of considerable medicinal value; this aspect is treated generally in the article Pharmacology. Reference should also be made to the articles on the individual alkaloids for further details as to their medicinal and chemical properties.

The chemistry of the alkaloids is treated in detail by Ame Pictet in his La Constitution chimiqne des alcaloides vegetaux (Paris, 1897); enlarged and translated by H. C. Biddle with the title The Vegetable Alkaloids (New York, 1904); and by J. W. Bruhl, E. Hjelt, and O. Aschan: Die Pflanzen-Alkaloide (1900). A pamphlet, Die Alkaloidchemie in den Jahren 1900-1904, by Julius Schmidt, may also be consulted.

ALKAN, CHARLES HENRI VALENTIN MORHANGE (1813- 1888), French musical composer, was born and died in Paris. Alkan was his nom de guerre. Admitted to the Conservatoire of Paris in his sixth year, he had a distinguished career there until 1830. He visited London in 1833, after which he settled in Paris as a pianoforte teacher till his death. He is important as the composer of a large number of pianoforte etudes, embodying the most extravagant technical difficulties. His invention was not modern enough to secure for these works that attention which they deserve as representing a pianoforte technique and sense of effect in some respects more advanced even than that of Liszt, though lacking Liszt's economy and tact.

ALKANET (dim. from Span, alcafia, Arab, al-henna = henna, Egyptian privet, or Lawsonia inermis), a plant, Alkanna or Anchusa tinctoria, of the order Boraginaceae, also known as jrchanct, dyer's bugloss, Spanish bugloss or bugloss of Languedoc, which is grown in the south of France and on the shores of the Levant. Its root yields a fine red colouring matter which has been used to tint tinctures, oils, wines, varnishes, &c.

AL KASR AL KEBIR (" the great castle," in Span. Alcazar Kebir, in Port. Alcacer Quibir), a town of Morocco, on the river Lekkus, 80 m. N.W. of Fez. Pop. about 10,000. Its mud and pantile dwellings are here and there relieved by a mosque tower, but the aspect of the town is far from inviting. It is frequently flooded in winter and in consequence fever is prevalent. The weekly market, held on Sundays in the centre of the town, gives to the place an appearance of bustle. A vice-governor is appointed for the town by the basha of Laraiche, one for the country round by the sultan of Morocco, a condition which causes much confusion on market-days. Al Kasr al Kebir was built, according to Leo Africanus, by Yakub el Mansur (1184-1199). Not far from the town, by the banks of the river Makhazan, is the site of the battle fought in 1578 between Dom Sebastian, king of Portugal, and the Moors under Abd el Malek, in which the Moors were victorious, though both kings perished, as well as the deposed Mahommed XL, who had called in the Portuguese to his aid against Abd el Malek.

ALKMAAR, a town in the province of North Holland, kingdom of Holland, 243 m. by rail N.N.W. of Amsterdam, connected by steam-tramway with Haarlem and Amsterdam, and on the North Holland canal. Pop. (1900) 18,373. Alkmaar is a typical North Holland town, with tree-lined canals and brightly coloured 17th-century houses. The old city walls have been replaced by pleasant gardens and walks, and there is a park in which stands a fine monument (1876) by J. T. Stracke (181 7- 1891), symbolizing Alcmaria victrix, to commemorate the siege by the Spaniards in 1573. The Groote Kerk (1470-1498), dedicated to St Lawrence, is a handsome building and contains the tomb of Floris V., count of Holland (d. 1296), a brass of 1546, and some paintings (1507). In the town hall (1507) are the library and a small museum with two pictures by the 17th-

century artist Caesar van Everdingen, who with his more celebrated brother Allart van Everdingen (q.v.) was a native of the town. The weigh-house (1 582) is a picturesque building with quaint gable and tower. Just outside the town lies the Alkmaar wood, at the entrance to which stands the military cadet school whichserves asapreparatoryschool for the royal militaryacademy at Breda. Alkmaar derives its chief importance from being the centre of the flourishing butter and cheese trade of this region of Holland. It is also a considerable market for horses, cattle and grain, and there is a little boat-building and salt and sail-cloth manufacture. Tramways connect Alkmaar with Egmond and with the pretty summer resort of Bergen, which lies sheltered by woods and dunes.

The name of Alkmaar, Which means " all sea," first occurs in the 10th century, and recalls its former situation in the midst of marsh-lands and lakes. It was probably originally a fishing-village, but with the reclamation of the surrounding morasses, e.g. that of the Schermer in 1685, and their conversion into rich meadow land, Alkmaar gradually acquired an important trade. In 1254 it re-ceived a charter from William II., count of Holland, similar to that of Haarlem, but in the 15th century duke Philip the Good of Bur-gundy made the impoverishment of the town, due to ill-government, the excuse for establishing an oligarchical regime, by charters of 1436 and 1437. As the capital of the ancient district of Kennemer-land between den Helder and Haarlem, Alkmaar frequently suffered in the early wars between the Hollanders and the Frisians, and in 1517 was captured by the united Gelderlanders and Frisians. In J 573 it successfully sustained a seven-weeks' siegeby 16,000 Spaniards under the duke of Alva. In 1799 Alkmaar gave its name to

a con- vention signed by the duke of York and the French general Brune, in accordance with which the Russo-British army of 23,000 men, which was defeated at Bergen, evacuated Holland. A monument was erected in 1901 to commemorate the Russians who fell.

ALLACCI, LEONE [Leo Allatius] (1586-1669), Greek scholar and theologian, was born in the island of Chios. His early years were passed in Calabria and at Rome, where he finally settled as teacher of Greek at the Greek college, at the same time devoting himself to the study of classics and theology. In 1622, after the capture of Heidelberg by Tilly, the elector Maximilian of Bavaria presented its splendid library composed of 196 cases of MSS. (bibliolheca Palatina) to Pope Gregory XV. Allacci was sent to superintend its removal to Rome, where it was incorporated with the Vatican library. On the death of Gregory, Allacci became librarian to Cardinal Berberini, and subsequently (1661) librarian of the Vatican, which post he held till his death on the 18th (or 19th) of January 1669. It is noteworthy that, although a Greek by birth, he became an ardent Roman Catholic and the bitter enemy of all heretics, including his own countrymen. Allacci was a very industrious and voluminous writer, but his works, although they bear ample testimony to his immense learning, show an absence of the true critical faculty, and are full of intolerance, especially on religious subjects. For a list of these, J. A. Fabricius's Bibliotheca Graeca (xi. 437) should be consulted, where they are divided into four classes: editions, translations and commentaries on ancient authors; works relating to the dogmas and institutions of the Greek and Roman Churches; historical works; miscellaneous' works. The number of his unpublished writings is also very large; the majority of them are included in the MSS. of the Vallicellian library.

The main source of our knowledge of Allatius is the incomplete life by Stephanus Gradi, Leonis Allatii vita, published by Cardinal Mai, in Nova Bibliotheca Patrum. A complete enumeration of his works^ is contained in E. Legrand, Bibliographie hellenique du XVlf' me siecle (Paris, 1895, iii. 435-471). The accounts of C. N. Sathas in NeocXXijj'no; 4>i\o\oyia (Athens, 1868), and of the pseudo- prince Demetrius Rhodokanakis, Leonis Allatii Hellas (Athens, 1872), are inaccurate and untrustworthy. For a special account of his share in the foundation of the Vatican Library, see Curzio Mazzi, Leone Allacci e la Palatina di Heidelberg (Bologna, 1893). The theological aspect of his works is best treated by the Assump- tionist Father L. Petit in A. Vacant's Dictionnaire de theologie (Paris, 1900, cols. 830-833).

ALLAH, the Arabic name used by Moslems of all nationalities for the one true God. It is compounded of al, the definite article, and ilah, meaning a god. The same word is found in Hebrew and Aramaic as well as in ancient Arabic (Sabaean) . The meaning of the root from which it is derived is very doubtful; cf. Lane's

Arabic-English Lexicon, p. 82, and the Oxford Hebrew and English Lexicon, pp. 61 fi.

ALLAHABAD, a city of British India, the capital of the United Provinces of Agra and Oudh, giving its name to a district and a division. The city is situated at the confluence of the Ganges and the Jumna in 25°26′ N. lat. and 8i°5o' E. long., 564 m. from Calcutta by rail. Its most conspicuous feature is the fort, which rises directly from the banks of the confluent rivers and completely commands the navigation of both streams. Within the fort are the remains of a splendid palace, erected by the Emperor Akbar, and once a favourite residence of his. A great portion of it has been destroyed, and its hall is converted into an arsenal. Outside the fort the places of most importance are the sarai and gardens of Khasru, the son of the Emperor Jehangir, and the Jama Masjid or Great Mosque. When the town first came into the hands of the English this mosque was used as a residence by the military officer commanding the station, and afterwards as an assembly room. Ultimately it was returned to its former owners, but the Mahommedans con- sidered it desecrated, and it has never since been used as a place of worship. Allahabad (Illahabad) was the name given to the city when Akbar built the great fort. To the Hindus it is still known by its ancient name of Prag or Prayag (" place of sacri- fice "), and it remains one of the most noted resorts of Hindu pilgrimage. It owes its sanctity to its being the reputed confluence of three sacred streams — the Ganges, the Jumna and the Saraswati. This last stream, however, actually loses itself in the sands of Sirhind, 400 m. north-west of Allahabad. The Hindus assert that the stream joins the other two rivers underground, and in a subterraneous temple below the fort a little moisture trickling from the rocky walls is pointed out as the waters of the Saraswati. An annual fair is held at Allahabad at the confluence of the streams on the occasion of the great bathing festival at the full moon of the Hindu month of Magh. It is known as the Magh-mela, lasts for a whole month, and is attended by as many as 250,000 persons in ordinary years, either for religious or commercial purposes. Every

twelfth year there is a special occasion called the Kumbh-mela, which is attended by a million of devotees at one time. Allahabad was taken by the British in 1 765 from the wazir of Oudh, and assigned as a residence to Shah Alam, the titular emperor of Delhi. Upon that prince throwing himself into the hands of the Mahrattas, the place was resumed by the British in 1771 and again trans- ferred to the nawab of Oudh, by whom it was finally ceded together with the district to the British in 1801, in commutation of the subsidy which the wazir had agreed to pay for British protection. During the Mutiny of 1857, Allahabad became the scene of one of the most serious outbreaks and massacres which occurred in the North-Western Provinces. The fort was held by a little garrison of Europeans and loyal Sikhs, until it was relieved by General Ncill on June nth of that year.

The modern buildings of Allahabad include Government House, the High Court, the Mayo memorial and town hall, the Muir central college, the Thornhill and Mayne memorial library and museum, the Naini central jail, and the Anglican and Roman Catholic cathedrals. The Jumna is crossed by a railway bridge and there are two bridges of boats over the Ganges. The military cantonments contain accommodation for all three arms and are the headquarters of a brigade in the 8th division of the eastern army corps. At Allahabad is published the Pioneer, perhaps the best known English paper in India. There is an American mission college. Here is the junction of the great railway system which unites Bengal with Central India and Bombay, and is developing into a great centre of inland and export trade. The population in 1901 was 172,032.

The district or Allahabad has an area of 281 1 sq. m. In shape it is an irregular oblong, and it is very difficult to define its boundaries, as at one extremity it wanders into Oudh, while on the south the villages of the state of Rewa and those of this district are hopelessly intermingled. The Jumna and the Ganges enclose within their angle a fertile tract well irrigated with tanks and wells. The East Indian railway and the Grand Trunk road

afford the principal means of land communication. In 1901 the population was 1,480,358, showing a decrease of 4% in the decade due to famine.

The division of Allahabad has an area of 17,270 sq. m. The population in 1901 was 5,540,702, showing a decrease of 4% in the decade due to the famine of 1896-1897, which was severely felt throughout the division. It comprises the seven districts of Cawnpore,

Fatehpur, Banda, Hamirpur, Allahabad, Jhansi and Jalaun.

ALLAMANDA, named after J. N. S. Allamand (1713-1787), of Leiden, a genus of shrubby, evergreen climbers, belonging to the natural order Apocynaceae, and a native of tropical America. Severalspeciesaregrowninhot-housesforthe beauty of theirfoliage and flowers; the latter, borne in many-flowered panicles, have a funnel-shaped corolla with a narrow tube, and often yellow in colour. The plants are of comparatively easy culture, and very effective when trained to wires beneath the roof of the house.

ALLAN, DAVID (1 744-1 796), Scottish historical painter, was born at Alloa. On leaving Foulis's academy of painting at Glasgow (1762), after seven years 'successful study, he obtained the patronage of Lord Cathcart and of Erskine of Mar, on whose estate he had been born. The latter furnished him with the means of proceeding to Rome (1764), where he remained for a number of years engaged principally in copying the old masters. Among the original works which he then painted was the " Origin of Portraiture " — representing a Corinthian maid drawing her lover's shadow — well known through Domenico Cunego's excellent engraving. This gained for him the gold medal given by the Academy of St Luke in the year 1773 for the best specimen of historical composition. Returning from Rome in 1777, he resided for a time in London, and occupied himself in portrait-painting. In 1 780 he removed to Edinburgh, where, on the death of Alexander Runciman in 1786, he was appointed director and master of the Academy of Arts. There he painted and etched in aquatint a variety of works, those by which he is best known — as the " Scotch Wedding," the "Highland Dance," the " Repentance Stool," and his " Illustrations of the Gentle Shepherd " — being remarkable for their comic humour. He was called the " Scottish Hogarth"; but his drolleries hardly entitle him to this comparison. Allan died at Edinburgh on the 6th of August 1 796.

ALLAN, SIR HUGH (1810-1882), Canadian financier, was born on the 29th of September 1810, at Saltcoats, Ayrshire, Scotland, the son of Captain Alexander Allan, a shipmaster. He emigrated to Canada in 1826, and in 1831 entered the employ of the chief shipbuilding and grain-shipping firm of Montreal, of which he became a junior partner in 1835. In 1853 he organ- ized the Allan Line of steamships, plying between Montreal, Liverpool and Glasgow; till his death he was closely associated with the commercial growth and prosperity of Canada, and in 1 87 1 was knighted in recognition of his services. In 1872- 1873 he obtained from the Canadian government a charter for building the Canadian Pacific railway, but

the disclosures made with reference to his contributions to the funds of the Conserva- tive party led to the Pacific scandal (see Canada, History), and that company was soon afterwards dissolved. He died in Edinburgh on the 9th of December 1882.

See J. C Dent, Canadian Portrait Gallery (1881).

ALLAN, SIR WILLIAM (1782-1850), Scottish painter, was born at Edinburgh, and at an early age entered as a pupil in the School of Design established in Edinburgh by the Board of Trustees for Arts and Manufactures, where he had as companions, John Wilkie, John Burnet the engraver, and others who afterward distinguished themselves as artists. Here Allan and Wilkie were placed at the same table, studied the same designs, and con- tracted a lifelong friendship. Allan continued his studies for some time in London; but his attempt to establish himself there was unsuccessful, and after exhibiting at the Royal Academy (1805) his first picture, " A Gipsy Boy and Ass," an imitation in style of Opie, he determined, in spite of his scanty resources, to seek his fortune abroad. He accordingly set out the same year for Russia, but was carried by stress-of weather to Memel,

where he remained for some time, supporting himself by his pencil. At last, however, he reached St Petersburg, where the kindness of Sir Alexander Crichton, the court physician, and other friends procured him abundant employment. By excursions into southern Russia, Turkey, the Crimea and Circassia, he filled his portfolio with vivid sketches, of which he made admirable use in his subsequent pictures. In 1814 he returned to Edinburgh, and in the two following years exhibited at the Royal Academy " The Circassian Captives " and " Bashkirs conducting Convicts to Siberia." The former picture remained so long unsold, that, thoroughly disheartened, he threatened to retire to Circassia when, through the kindness of Sir Walter Scott, a subscription of 1000 guineas was obtained for the picture, which fell by lot into the possession of the earl of Wemyss. About the same time the Grand Duke Nicholas, afterwards tsar of Russia, visited Edinburgh, and purchased his "Siberian Exiles" and "Haslan Gheray crossing the River Kuban," giving a very favourable turn to the fortunes of the painter, whose pictures were now sought for by collectors. From this time to 1834 he achieved his greatest success and firmly established his fame by the illustration of Scottish

history. His most important works of this class were " Archbishop Sharpe on Magus Moor "; " John Knox admonish- ing Mary Queen of Scots " (1823), engraved by Burnet; " Mary Queen of Scots signing her Abdication " (1824); and "Regent Murray shot by Hamilton of Bothwellhaugh. " The last procured his election as an associate of the Royal Academy (1825). Later Scottish subjects were " Lord Byron " (1831), portraits of Scott and " The Orphan " (1834), which represented Anne Scott seated near the chair of her deceased father. In 1830 he was compelled, on account of an attack of ophthalmia, to seek a milder climate, and visited Rome, Naples and Constantinople. He returned with a rich store of materials, of which he made excellent use in his " Constantinople Slave Market " and other productions. In 1834 he visited Spain and Morocco, and in 1841 went again to St Petersburg, when he undertook, at the request of the tsar, his " Peter the Great teaching his Subjects the Art of Ship-building," exhibited in London in 1845, and now in the Winter Palace of St Petersburg. His " Polish Exiles " and " Moorish Love-letter," &c, had secured his election as a Royal Acade- mician in 1835; he was appointed president of the Royal Scottish Academy (1838), and royal limner for Scotland, after Wilkie's death (1841); and in 1842 received the honour of knighthood. His later years were occupied with battle-pieces, the last he finished being the second of his two companion pictures of the " Battle of Waterloo." He died on the 22nd of February 1850, leaviqg a large unfinished picture — " Bruce at Bannockburn."

ALLAN-DESPREAUX, LOUISE ROSALIE (1810-1856), French actress, was " discovered " by Talma at Brussels in 1820, when she played Joas with him in Athalie. At his suggestion she changed her surname, Ross, for her mother's maiden name, and, as Mile. Despreaux, was engaged for children's parts at the Comedie Francaise. At the same time she studied at the Con- servatoire. By 1825 she had taken the second prize for comedy, and was engaged to play ingenue parts at the Comedie Francaise, where her first appearance in this capacity was as Jenny in L' Argent on the 8th of December 1826. In 1831 the director of the Gymnase succeeded in persuading her to join his company. Her six years at this theatre, during which she married Allan, an actor in the company, were a succession of triumphs. She was then engaged at the French theatre at St Petersburg. Re- turning to Paris, she brought with her, as Legouve says, a thing she had unearthed, through a Russian translation, a little comedy never acted till she took it up, a production half-forgotten, and esteemed by those who knew it as a pleasing piece of work in the Marivaux style — Un Caprice by Alfred

de Musset, which she had played with success in St Petersburg. Her selection of this piece for her reappearance at the Theatre Francaise (1847) laid the corner-stone of Musset's lasting fame as a dramatist. In the following year his comedy 77 ne fautjurer de rien was acted at the same theatre, and thus led to the production of his finer plays. Among plays by other authors in which Mme. Allan won special laurels at the Theatre Francaise, were Par droit de conqttile,

Piril en la demeure, Lajoiefait peur, and Lady Tartuffe. In the last, with a part of only fifty lines, and playing by the very side of the great Rachel, she yet held her own as an actress of the first rank. Mme. Allan died in Paris, in the height of her popularity, in March 1856.

/NH-CH-NH- ALLANTOIN, C 4 H 6 N 4 3 or CO< |

CO-NH 2

the

NH-CO

diureide of glyoxylic acid. It is found in the allantoic liquid of the cow, and in the urine of sucking calves. It can be obtained by the oxidation of uric acid by means of lead dioxide, manganese dioxide, ozone or potassium permanganate:

QILNA, + H 2 + 0-=C4H 6 N 4 3 + C0 2 . It has been synthesized by E. Grimaux by heating one part of glyoxylic acid with two parts of urea for ten hours at ioo c C: 2CO(NH 2) 2 + CH(OH) 2 COOH = 3H 2 + C 4 H 6 N 4 3 . It forms glancing prisms of neutral reaction slightly soluble in water. On standing with concentrated potassium hydroxide solution it gives potassium allantoate C4H7N4O4K. On heating with water it undergoes hydrolysis into urea and allanturic acid CsHi03N 2 . It is reduced by sodium amalgam to glycouril C4H6N4O2, whilst with hydriodic acid it yields urea and hydantoin C3H4N2O:!. Hot concentrated sulphuric acid also decomposes allantoin, with production of ammonia, and carbon monoxide and dioxide. By dry distillation it gives ammonium cyanide.

ALLEGHANY, or THE ALLEGHANIES (a spelling now more common than Allegheny), a name formerly used of all the Appalachian Mountains (q.v.), U.S.A., and now sometimes of all that system lying W. and S. of the Hudson river, being steep and narrow-crested in Pennsylvania (1500-1800 ft.), and in Maryland, Virginia and West

Virginia higher (3000 f 1.4473 ft) and with broader crests. Another usage applies to the ridges ("the Alleghany Ridges") parallel to the Blue Ridge; the north-western part of this region is sometimes called the Alleghany Front or the Front of the Alleghany Plateau. The Alleghany Plateau is the north- westernmost division of the Appalachian system ; it is an eroded mass of sedimentary rock sloping north-westward to the Prairie and Lake Plains and reaching south-west from the south-western part of New York state through Tennessee and into Alabama.

ALLEGHENY, formerly a city of Allegheny county, Pennsyl- vania, U.S.A., on the N. bank of the Allegheny and Ohio rivers, opposite Pittsburg; since 1907 a part of Pittsburg. Pop. (1890) 105,287; (1900) 129,896, of whom 30,216 were foreign-born and 3315 were negroes; of the foreign-born 12,022 were from Germany, 5070 from Ireland, 3929 from Austria, and 2177 from England; (1906, estimate) 145,240. Allegheny is served by the Baltimore & Ohio and the Pittsburg & Western railways, by the Pittsburg, Ft. Wayne & Cnicago, the Western Pennsylvania, the Buffalo & Allegheny Valley, the Cleveland & Pittsburg, the Erie & Pittsburg, the Pittsburg, Youngstown & Ashtabula, and the Chautauqua divisions of the Pennsylvania railway system, and by Ohio river freight and passenger boats. Extend- ing along the river fronts for about 65 m. are numerous large manufactories and the headquarters of the shipping interests; farther back are the mercantile quarters and public buildings; and on the hills beyond are the residence districts, commanding extensive views of the valley. Two of the principal thorough- fares, Federal and Ohio streets, intersect at a central square, in which are the city hall, public library, post office and the market- place; and surrounding the main business section on the E., N. and W. is City Park of 100 acres, with lakes and fountains, and monuments to the memory of Alexander von Humboldt, George Washington and T. A. Armstrong. Farther out is Riverview Park (219 acres), in which is the Allegheny Astronomical Observatory, and elsewhere are a soldiers' monument and a monument (erected by Andrew Carnegie) in memory of Colonel Johnes Anderson. In Allegheny are the following institutions of higher learning: — the Allegheny Theological Seminary (United Presbyterian), opened in 1825; the. Western Theological Seminary of the Presbyterian Church, opened in 1827; and the Theological Seminary of the Reformed Presbyterians, opened in 1856. There is a fine Carnegie library with a music-hall. Among penal

and charitable institutions are the Riverside State Penitentiary, three hospitals, three homes for orphans, a home for the friendless and an industrial school. Six bridges spanning the river and electric lines crossing them have brought Allegheny into close industrial and social relations with the main part of Pittsburg, and on the hills of Allegheny are beautiful homes of wealthy men. As a manufacturing centre Allegheny was outranked in 1905 by only two cities in the state — Philadelphia and Pittsburg; among the more important of its large variety of manufactures are the products of slaughtering and meat-packing establishments, iron and steel rolling mills, the products of foundries and machine- shops, pickles, preserves and sauces, the products of railway- construction and repair shops, locomotives, structural iron and plumbers' supplies. In 1905 the total value of Allegheny's factory products was $45,830,272; this showed an apparent decrease (exceeded by one city only) of $7,365,106, from the product-value of 1900, but the decrease was partly due to the more careful census of 1905, in which there were not the duplica- tions of certain items which occurred in the 1900 census. But in the five years there was a decrease of 3865 in the average number of wage-earners, and the iron and steel output was much less. In 1905 Allegheny ranked first among the cities of the United States in the manufacture of pickles, preserves and sauces, the product ($6,216,778) being 20-9% of that for the whole country. An important industry is the shipment of coal, especially on barges down the Ohio.

Allegheny was laid out in 1788 on a portion of a tract which the state had previously reserved opposite Pittsburg, with a view to bringing some valuable land into the market for the payment of its soldiers' claims. When ordered by the state to be laid out, it was also named as the site of the county-seat of the newly erected county of Allegheny, but the opposition of Pittsburg was so strong that by a supplementary act in the following year that town was made the county-seat. In 1828 Allegheny was incor- porated as a borough and in 1840 it was chartered as a city. The city suffered severely in 1874 from a fire started by a fire-cracker on the 4th of July and from a flood caused by a great rain-storm on the 26th of the same month, but these calamities were followed by years of great prosperity and rapid growth. In 1996 the question of uniting Allegheny with Pittsburg under one municipal government was submitted to a joint vote of the electorate of the two cities, in accordance with an act of the state legislature, which had been passed in February of that year, and a large majority voted for the union; but there was determined

opposi- tion in Allegheny, every ward of the city voting in the negative ; the constitutionality of the act was challenged; the supreme court of the state on the nth of March 1907 declared the act valid, and on the 18th of November 1907 this decision was affirmed by the Supreme Court of the United States.

See J. E. Parke, Recollections of Seventy Years and Historical Gleanings oj Allegheny, Pennsylvania (Boston, 1886).

ALLEGIANCE (Mid. Eng. ligeaunce; med. Lat. ligeantia, &c; the al- was probably added through confusion with another legal term, allegeance, an allegation; the Fr. alUgeance comes from the English; the word is formed from " liege," of which the derivation is given under that heading; the con- nexion with Lat. ligare, to bind, is erroneous), the duty which a subject or a citizen owes to the state or to the sovereign of the state to which he belongs. It is often used by English legal commentators in a larger sense, divided by them into natural and local, the latter applying to the deference which even a foreigner must pay to the institutions of the country in which he happens to live; but it is in its proper sense, in which it indicates national character and the subjection due to that character, that the word is important. In that sense it represents the feudal liege homage, which could be due only to one lord, while simple homage might, be due to every lord under whom the person in question held land. The English doctrine, which was at one time adopted in the United States, asserted that allegiance was indelible: — Nemo potest exuere patriam. Accordingly, as the law stood before 1870, every person who by birth or naturalization satisfied the conditions described in the article Alien, though he should be

removed in infancy to another country where his family resided, owed an allegiance to the British crown which he could never resign or lose, except by act of parliament or by the recognition of the independence or the cession of the portion of British territory in which he resided. By the Naturalization Act 1870, it was made possible for British subjects to renounce their nationality and allegiance, and the ways in which that nationality is lost are defined. So British subjects voluntarily naturalized in a foreign state are deemed aliens from the time of such naturalization, unless, in the case of persons naturalized before the passing of -the act, they have declared their desire to remain British subjects within two years from the passing of the act. Persons who from having been born within British territory are British subjects, but who at birth became under the law of any foreign state subjects of such state, and also persons who though born abroad are British subjects by reason of parentage,

may by declarations of alienage get rid of British nationality. Emigration to an uncivilized country leaves British nationality unaffected: indeed the right claimed by all states to follow with their authority their subjects so emigrating is one of the usual and recognized means of colonial expansion.

The doctrine that no man can cast off his native allegiance without the consent of his sovereign was early abandoned in the United States, and in 1868 congress declared that " the right of expatriation is a natural and inherent right of all people, in- dispensable to the enjoyment of the rights of life, liberty and the pursuit of happiness," and one of " the fundamental principles of the republic " {United States Revised Statutes, sec. 1999). Every citizen of a foreign state in America owes a double allegiance, one to it and one to the United States. He may be guilty of treason against one or both. If the demands of these two sovereigns upon his duty of allegiance come into conflict, those of the United States have the paramount authority in American law.

The oath of allegiance is an oath of fidelity to the sovereign taken by all persons holding important public office and as a condition of naturalization. By ancient common law it might be required of all persons above the age of twelve, and it was repeatedly used as a test for the disaffected. In England it was first imposed by statute in the reign of Elizabeth (1558) and its form has more than once been altered since. Up to the time of the revolution the promise was, "to be true and faithful to the king and his heirs, and truth and faith to bear of life and limb and terrene honour, and not to know or hear of any ill or damage intended him without defending him therefrom." This was thought to favour the doctrine of absolute non-resistance, and accordingly the convention parliament enacted the form that has been in use since that time — " I do sincerely promise and swear that I will be faithful and bear true allegiance to His Majesty . . ." (see Oath).

See also the articles Citizen, Naturalization : and Salmond on " Citizenship and Allegiance," in the Law Quarterly Review (July 1901, January 1902). (Jno. W.)

ALLEGORY (aXXos, other, and ayopeveiv, to speak), a figurative representation conveying a meaning other than and in addition to the literal. It is generally treated as a figure of rhetoric, but the medium of representation is not necessarily language. An allegory may be addressed to the eye, and is often embodied in painting, sculpture or some form of mimetic art. The etymological meaning of the word is

wider than that which it bears in actual use. An allegory is distinguished from a metaphor by being longer sustained and more fully carried out in its details, and from an analogy by the fact that the one appeals to the imagination and the other to the reason. The fable or parable is a short allegory with one definite moral. The allegory has been a favourite form in the literature of nearly every nation. The Hebrew scriptures present frequent instances of it, one of the most beautiful being the comparison of the history of Israel to the growth of a vine in the 80th psalm. In classical literature one of the best known allegories is the story of the stomach and its members in the speech of Menenius Agrippa (Livy ii. 32); and several occur in Ovid's Metamorphoses. Perhaps the most elaborate and the most successful specimens of allegory are to

be found in the works of English authors. Spenser's Faerie Queene, Swift's Tale of a Tub, Addison's Vision of Mirza, and, above all, Bunyan's Pilgrim's Progress, are examples that it would be impossible to match in elaboration, beauty and fitness, from the literature of any other nation.

ALLEGRI, GREGORIO, Italian priest and musical composer, probably of the Correggio family, was born at Rome either in 1560 or in 1585. He studied music under G. Maria Nanini, the intimate friend of Palestrina. Being intended for the church, he obtained a benefice in the cathedral of Fermo. Here he composed a large number of motets and sacred pieces, which, being brought under the notice of Pope Urban VIII., obtained for him an appointment in the choir of the Sistine Chapel at Rome. He held this from December 1629 till his death on the 18th of February 1652. His character seems to have been singularly pure and benevolent. Among the musical compositions of Allegri were two volumes of concerti, published in 1618 and 1 6 19; two volumes of motets, published in 1620 and 162 1; besides a number of works still in manuscript. He was one of the earliest composers for stringed instruments, and Kircher has given one specimen of this class of his works in the Musurgia. But the most celebrated composition of Allegri is the Miserere, still annually performed in the Sistine Chapel at Rome. It is written for two choirs, the one of five and the other of four voices, and has obtained a celebrity which, if not entirely factitious, is certainly not due to its intrinsic merits alone. The mystery in which the composition was long enshrouded, no single copy being allowed to reach the public,

the place and circumstances of the performance, and the added embellishments of the singers, account to a great degree for much of the impres- sive effect of which all who have heard the music speak. This view is confirmed by the fact that, when the music was performed at Venice by permission of the pope, it produced so little effect that the emperor Leopold I., at whose request the manuscript had been sent, thought that something else had been substituted. In spite of the precautions of the popes, the Miserere has long been public property. In 1769 Mozart (q.v.) heard it and wrote it down, and in 1771 a copy was procured and published in England by Dr Burney. The entire music performed at Rome in Holy Week, Allegri's Miserere included, has been issued at Leipzig by Breitkopf and Hartel. Interesting accounts of the impression produced by the performance at Rome may be found in the first volume of Mendelssohn's letters and in Miss Taylor's Letters from Italy.

ALLEGRO (an Italian word, meaning " cheerful," as in Milton's poem), a term in music to indicate quick or lively time, coming between andante and presto; it is frequently modified by the addition of qualifying words. It is also used of a separate piece of music, or of a movement in a sonata, symphony, &c.

ALLEINE, JOSEPH (1634-1668), English Nonconformist divine, belonged to a family originally settled in Suffolk. As early as 1430 some of them — sprung of Alan, lord of Buckenhall — settled in the neighbourhood of Calne and Devizes, whence descended the immediate ancestors of " worthy Mr Tobie Alleine of Devizes," father of Joseph, who, the fourth of a large family, was born at Devizes early in 1634. 1645 is marked in the title-page of a quaint old tractate, by an eye-witness, as the year of his setting forth in the Christian race. His elder brother Edward had been a clergyman, but in this year died; and Joseph entreated his father that he might be educated to succeed his brother in the ministry. In April 1649 he entered Lincoln College, Oxford, and on the 3rd of November 1651 he became scholar of Corpus Christi College. On the 6th of July 1653 he took the degree of B.D., and became a tutor and chaplain of Corpus Christi, preferring this to a fellowship. In 1654 he had offers of high preferment in the state, which he declined; but in 1655 George Newton, of the great church of St Mary Magdalene, Taunton, sought him for assistant and Alleine accepted the invitation. Almost coincident with his ordination as associate pastor came his marriage with Theodosia Alleine, daughter of Richard Alleine. Friendships among " gentle and simple " —

of the former, with Lady Farewell, grand-daughter of the protector

Somerset — bear witness to the attraction of Alleine's private life. His public life was a model of pastoral devotion. This is all the more remarkable as he found time to con- tinue his studies, one monument of which was his Theologia Philosophica (a lost MS.), a learned attempt to harmonize revelation and nature, which drew forth the wonder of Baxter. Alleine was no mere scholar or divine, but a man who associated on equal terms with the founders of the Royal Society. These scientific studies were, however, kept in subordination to his proper work. The extent of his influence was, in so young a man, unique, resting on the earnestness and force of his nature. The year 1662 found senior and junior pastors like-minded, and both were among the two thousand ejected ministers. Alleine, with John Wesley (grandfather of the celebrated John Wesley), also ejected, then travelled about, preaching wherever opportunity was found. For this he was cast into prison, indicted at sessions, bullied and fined. His Letters from Prison were an earlier Cardiphonia than John Newton's. He was re- leased on the 26th of May 1664; and in spite of the Conventicle, or Five Mile Act, he resumed his preaching. He found himself again in prison, and again and again a sufferer. His remaining years were full of troubles and persecutions nobly borne, till at last, worn out by them, he died on the 17th of November 1668; and the mourners, remembering their beloved minister's words while yet with them, " If I should die fifty miles away, let me be buried at Taunton," found a grave for him in St Mary's chancel. No Puritan nonconformist name is so affectionately cherished as is that of Joseph Alleine. His chief literary work was An Alarm to the Unconverted (1672), otherwise known as The Sure Guide to Heaven, which had an enormous circulation. His Remains appeared in 1674.

See Life, edited by Baxter; Joseph Alleine: his Companions and Times, by Charles Stanford (1861); Wood's Athenae, iii. 819; Palmer's None. Mem. iii. 208.

ALLEINE, RICHARD (1611-1681), English Puritan divine, was born at Ditcheat, Somerset, where his father was rector. He was a younger brother of William Alleine, the saintly vicar of Blandford. Richard was educated at St Alban's Hall, Oxford, where he was entered commoner in 1627, and whence, having taken the degree of B.A., he transferred himself to New Inn, continuing there until he proceeded M.A. On being ordained he became assistant to his father, and immediately stirred the entire county by his burning eloquence. In March 1641 he succeeded the many-sided Richard Bernard as rector of Batcomb (Somerset) . He declared himself on the side of the Puritans by subscribing " The testimony of the ministers in Somersetshire to the truth of Jesus Christ " and " The Solemn League

and Covenant," and assisted the commissioners of the parliament in their work of ejecting unsatisfactory ministers. Alleine continued for twenty years rector of Batcomb and was one of the two thousand ministers ejected in 1662. The Five Mile Act drove him to Frome Selwood, and in that neighbourhood he preached until his death on the 22nd of December 1681. His works are all of a deeply spiritual character. His Vindiciae Pieialis (which first appeared in 1660) was refused licence by Archbishop Sheldon, and was published, in common with other nonconformist books, without it. It was rapidly bought up and " did much to mend this bad world." Roger Norton, the king's printer, caused a large part of the first impression to be seized on the ground of its not being licensed and to be sent to the royal kitchen. Glancing over its pages, however, it seemed to him a sin that a book so holy — and so saleable — should be destroyed. He therefore bought back the sheets, says Calamy, for an old song, bound them and sold them in his own shop. This in turn was complained of, and he had to beg pardon on his knees before the council-table; and the remaining copies were sentenced to be " bisked," or rubbed over with an inky brush, and sent back to the kitchen for lighting fires. Such " bisked " copies occasionally occur still. The book was not killed. It was often reissued with additions, The Godly Man's Portion in 1663, Heaven Opened in 1666, The World Conquered in 1668. He also published a book of sermons.

Godly Fear, in 1664, and other less noticeable devotional compilations.

See Calamy, s.v . ; Palmer's Nonconf. Mem. iii. 167-168; C. Stanford's Joseph Alleine; Researches at Batcomb and Frome Selwood; Wood's A thenae (Bliss), iv. 13.

ALLEMANDE (Fr. for danse allemande, or German dance), a name for two kinds of dance, one a German national dance, in 2-4 time, the other somewhat resembling a waltz. The movement in a suite following the prelude, and preceding the courante (q.v.),v/hh which it is contrasted in rhythm, is also called an allemande, but has no connexion with the dance. The name, however, is given to pieces of music based on the dance movement, examples of which are found in Beethoven's German dances for the orchestra.

ALLEN, ETHAN (1739-1789), American soldier, was born at

Litchfield, Connecticut, on the 10th of January 1739. He removed, probably in 1769, to the "New Hampshire Grants," where he took up lands, and eventually became a leader of those who refused to recognize the jurisdiction of New York, and contended for the organization of the " Grants " into a separate province. About 1771 he was placed at the head of the " Green Mountain Boys," an irregular force organized for resistance to the " Yorkers." On the 10th of May 1775, soon after the out- break of the War of American Independence, in command of a force, which he had assisted some members of the Connecticut assembly to raise for the purpose, he captured Ticonderoga from its British garrison, calling upon its commanding officer — according to the unverified account of Allen himself — to surrender " in the name of the great Jehovah and the Continental Congress." Seth Warner being elected colonel of the " Green Mountain Boys" in July 1775, Allen, piqued, joined General Philip Schuyler, and later with a small command, but without rank, accompanied General Richard Montgomery's expedition against Canada. On the 25th of September 1775 near Montreal he. was captured by the British, and until exchanged on the 6th of May 1778 remained a prisoner at Falmouth, England, at Halifax, Nova Scotia, and in New York. Upon his release he was brevetted colonel by the Continental Congress. He then, as brigadier-general of the militia of Vermont, resumed his opposi- tion to New York, and from 1779 to 1783, acting with his brother, Ira Allen, and several others, carried on negotiations, indirectly, with Governor Frederick Haldimand of Canada, who hoped to win the Vermonters over to the British cause. He seems to have assured Haldimand's agent that " I shall do everything in my power to make this state a British province." In March 1781 he wrote to Congress, with characteristic bluster, " I am as resolutely determined to defend the independence of Vermont as congress that of the United States, and rather than fail will retire with the hardy Green Mountain Boys into the desolate caverns of the mountains and wage war with human nature at large." He removed to Burlington, Vermont, in 1787, and died there on the nth of February 1789. He was, says Tyler, "a blustering frontier hero — an able-minded ignoramus of rough and ready humour, of boundless self-confidence, and of a shrewdness in thought and action equal to almost any emergency." Allen wrote a Narrative of Colonel Ethan Allen's Captivity (1779), the most celebrated book in the " prison literature " of the American revolution; A Vindication of the Inhabitants of Vermont to the Government of New York and their Right to form an Independent Slate (1779); and Reason, the Only Oracle of Man; or A Com- pendious System of Natural Religion, Alternately adorned with Confutations of a Variety of Doctrines

incompatible with it (1784).

Ethan's youngest brother, Ira Allen (1751-1814), born on the 2 1 st of April 1 75 1 at Cornwall, Connecticut, also removed to the New Hampshire Grants, where he became one of the most influential political leaders. In 177s he took part in the capture of Ticonderoga and the invasion of Canada. He was a member of the convention which met at Winchester, Vermont, and in January 1777 declared the independence of the New Hampshire Grants; served (1 776-1 786) as a member of the Vermont council of safety; conducted negotiations, on behalf of Vermont, for a truce with the British and for an exchange of prisoners, in 1781; served for eight terms in the general assembly, and was state

treasurer from 1778 to 1786 and surveyor-general from 1778 to 1787. In 1789, by a gift of £4000, he made possible the establishment of the university of Vermont, of which institution, chartered in 1791 and built at Burlington in deference to his wishes, he was thus virtually the founder. In 179s, on behalf of the state, he purchased from the French government arms for the Vermont militia, of which he was then the ranking major- general, but he was captured by a British cruiser west of Ireland on his return journey, was charged with attempting to furnish insurrectionary Irish with arms, and after prolonged litigation in the British courts, the case not being finally decided until 1804, returned to Vermont in 1801. During his absence he had been dispossessed of his large holdings of land through the operation of tax laws, and to escape imprisonment for debt, he removed to Philadelphia, where on the 4th of January 18 14 he died. He published a dull and biassed, but useful Natural and Political History of Vermont (1798), reissued (1870) in vol. i. of the Collections of the Vermont Historical Society.

There is no adequate biography of Ethan Allen, but Henry Hall's Ethan Allen (New York, 1892) may be consulted. The best literary estimate may be found in M. C. Tyler's Literary History of the American Revolution (2 vols., New York, 1897).

ALLEN, GRANT [Charles Grant Blairfindie], (1848-1899), English author, son of a clergyman of Irish descent, was born at Kingston, Ontario, Canada, on the 24th of February 1848. He was educated partly in America and France, and in England at King Edward's School, Birmingham, and afterwards at Merton, Oxford. He was for a few years a schoolmaster in Jamaica, but then made his home in England, where he became prominent as a writer. He died at his house on Hindhead, Haslemere, on the 24th of October 1899. Grant

Allen was a voluminous author. He was full of interesting scientific knowledge and had a gift for expression both in biological exposition and in fiction. His more purely scientific books (such as Physiological Aesthetics, 1877; The Evolutionist at Large, 1881; The Evolution of the Idea of God, 1897) contain much original matter, popularly expressed, and he was a cultured exponent of the evolutionary idea in various aspects of biology and anthropology. He first attracted attention as a novelist with a sensational story, The Devil's Die (1888), though this was by no means his first attempt at fiction; and The Woman who Did (1895), which had a succhs de scandale on account of its treatment of the sexual problem, had for the moment a number of cheap imitators. Other volumes flowed from his pen, and his name became well known in contemporary literature. But his reputation was essentially contemporary and characteristic of the vogue peculiar to the journalistic type.

ALLEN, JAMES LANE (1850-), American novelist, was born near Lexington, Kentucky, on the 21st of December 1850. He graduated at Kentucky University, Lexington, in 1872, taught at Fort Spring, Kentucky, at Richmond and at Lexington, Missouri, and from 1877 to 1879 at the academy of Kentucky University, where he was principal and taught modern languages; in 1880 he was professor of Latin and English at Bethany College, Bethany, West Virginia; and then became head of a private school at Lexington, Kentucky. Subsequently he gave up teach- ing, went to New York City, where he secured commissions for sketches of the " Blue Grass " region, and thereafter devoted himself to literature. His Choir Invisible, coming after other successful stories, made his name well known in England as well as America. His published works include: With Flute and Violin (1891), The Blue Grass Region (1892), John Gray (1893), A Kentucky Cardinal (1894), Aftermath (1895), A Summer in A ready (1896), The Choir Invisible (1897), The Reign of Law (1 900) , TheMeltle oj thePasture (1903) , and TheBride oftheMistletoe (1909.)

ALLEN, JOHN (1476-1534), English divine, after studying at both Oxford and Cambridge, was sent by Archbishop Warham on an ecclesiastical mission to Rome. On his return he held a number of livings in succession, and in 1516 was rector of South Ockenden, Essex, and prebendary of Lincoln Cathedral. In the suppression of the minor monasteries in 1524-1525 he gave Wolsey much assistance, and became prebendary of Nottingham in 1526 and of St Paul's, London, in 1527. These prebends he resigned in 1528 on his election as archbishop of Dublin. For

four years he was chancellor of Ireland but his career was full of trouble. In 1531 he was fined under the Statutes of Provisors and Praemunire, and in 1534 met a violent death at the hands of Lord Thomas Fitzgerald's followers.

ALLEN, or Alleyn, THOMAS (1542-1632), English mathe-' matician, was born at Uttoxeter in Staffordshire on the 21st of December 1542. He was admitted scholar of Trinity College, Oxford, in 1561; and graduated as M.A. in 1567. In 1580 he quitted his college and fellowship, retired to Gloucester Hall, and became famous for his knowledge of antiquity, philosophy and mathematics. Having received an invitation from Henry Percy, earl of Northumberland, a great friend and patron of men of science, he spent some time at the earl's house, where he became acquainted with Thomas Harriot, John Dee and other famous mathematicians. He was also intimate with Sir Robert Cotton, William Camden, and their antiquarian associates. Robert Dudley, earl of Leicester, had a particular esteem for Allen, and would have conferred a bishopric upon him, but his love of solitude made him decline the offer. His great skill in mathematics and astrology earned him the credit of being a magician; and the author of Leicester's Commonwealth accuses him of employing the art of " figuring " to further the earl of Leicester's unlawful designs, and of endeavouring by the black art to bring about a match between his patron and Queen Elizabeth. Allen was indefatigable in collecting scattered manuscripts relating to history, antiquity, astronomy, philosophy and mathematics. A considerable part of his collection was presented to the Bodleian library by Sir Kenelm Digby. He died on the 30th of September 1632 at Gloucester Hall. He published in Latin the second and third books of Claudius Ptolemy of Pelusium, Concerning the Judgment of the Stars, or, as it is commonly called, of the Quadri- partite Construction, with an Exposition. He also wrote notes on John Bale's De Scriptoribus M. Britanniae.

ALLEN, WILLIAM (1532-1594), English cardinal, born at Rossall, Lancashire, went in 1547 to Oriel College, Oxford, and in 1556 became principal of St Mary Hall and proctor. According to Anthony Wood, he was appointed to a canonry at York in or about 1558; he therefore had already entered the clerical state by receiving the tonsure. On the accession of Elizabeth, he was deprived upon refusing the oath of supremacy, but remained in the university until

1561. His known opposition to the new learning in religion giving much offence, he escaped from England and went to Louvain, where were gathered many students who had left the English universities for conscience' sake. Here he continued his theological studies and began to write controversial treatises. In 1562, on account of health, he returned secretly to Lancashire and did much, by exhortation and private meetings, to restrain those Catholics who attended the new services in order to save their property from confiscation. His presence being known to the government, he left Lancashire and retired to the neighbourhood of Oxford, which he frequently visited, and where he influenced many of the students. After writing a treatise in defence of the priestly power to remit sins, he was obliged to leave and retired to Norfolk, leaving England soon after in 1565. He returned to Flanders, was ordained at Malines, and began to lecture in theology at the Benedictine college in that city. In 1567 he went to Rome for the first time, and there began his plan for establishing a college where English students could live together and finish their theological course. The idea subsequently developed into the establishing of a missionary college, or seminary, to keep up a supply of priests for England as long as the country remained separated from the Holy See. With the help of friends, and notably of the Bene- dictine abbots of the neighbouring monasteries, a college was established at Douai (September 29, 1568); and here Allen was joined by many of the English exiles. This college, the first of the seminaries ordered by the council of Trent, received the papal approval shortly after its establishment; the king of Spain took it under his protection and assigned it an annual grant. Allen continued his own theological studies and, after taking his doctorate, became regius professor at the university. Gregory XIII. in 1575 granted him a monthly pension of 100 golden

crowns, and, as the number of students had now risen to one hundred and twenty, summoned him to Rome to undertake the establishing of a similar college in the papal city. By Allen's advice, the old English hospice was turned into a seminary and Jesuits were placed there to help Dr Maurice Clennock, the rector. The pope appointed Allen to a canonry in Courtrai and sent him back to Douai (July 1576); but here he had to face a new difficulty. Besides the reported plots to assassinate him by agents of the English government, the insurgents against Spain, urged on by Elizabeth's emissaries, expelled the students from Douai as being partisans of the enemy (March 1578). Allen moved his establishment to Reims under the protection of the house of Guise; and it was here that the English translation of the Scriptures, known as the Douai Version, was begun

under his direction (see Bible, English). In 1577 he began a correspond- ence with Robert Parsons (q.v.), the Jesuit, an intimacy that was fraught with disaster. He was summoned again to Rome in 1579 to quell the first of the many disturbances that befell the English college under the Jesuit influence. Brought now into personal contact with Parsons, Allen fell completely under the dominating personality of the redoubtable Jesuit, and gave himself up entirely to his influence. He arranged that the Society should take over the English college at Rome and should begin the Jesuit mission to England (1580). This short-sighted policy was the cause of much grave trouble in the near future. Returning to Reims he began to take a part in all the political intrigues which Parsons' fertile brain had hatched for the pro- motion of the Spanish interest in England. Allen's political career dates from this period. Parsons had already intended to remove Allen from the seminary at Reims, and for this purpose, as far back as the 6th of April 1581, had recommended him to Philip II. to be promoted to the cardinalate. In furtherance of the intrigues, Allen and Parsons went to Rome again in 1585 and there Allen was kept for the rest of his life. In 1587, during the time that he was being skilfully played with by Philip's agents, he wrote, helped by Parsons, a shameless defence of a shameful deed. Sir William Stanley, an English officer, had surrendered Deventer to the Spaniards; and Allen wrote a book in defence of Stanley, saying that all Englishmen were bound, under pain of damnation, to fqllow the traitorous example, as Elizabeth was no lawful queen. He shared in all the projects for the invasion of England, and was to have been archbishop of Canterbury and lord chancellor had they succeeded. Representing in reality only his own party, Allen had on the continent the position of the head of the Roman Catholics of England; and as such, just after the death of Mary, queen of Scots, he wrote to Philip II. (March 19, 1587) to exhort him to undertake the enterprise against England, and declared that the Catholics there were clamour- ing for the king to come and punish " this woman, hated by God and man." After much negotiation, he was made cardinal by Sixtus V. on the 7th of August 1587, nominally to supply the loss of the queen of Scotland, but in reality to ensure the success of the Armada. On his promotion Allen wrote to Reims that he owed the hat, under God, to Parsons. One of his first acts was to issue, under his own name, two violent works for the purpose of inciting the Catholics of England to rise against Elizabeth: " The Declaration of the Sentence of Sixtus V." a broadside, and a book, An Admonition to the nobility and people of England (Antwerp, 1 588) . On the failure of the Armada, Philip, to get rid of the burthen of supporting Allen as a cardinal, nominated him to the archbishopric of Malines,

but the canonical appointment was never made. Gregory XIV. made him librarian at the Vatican; and he served on the commission for the revision of the Vulgate. He took part in four conclaves, but never had any real influence after the failure of the Armada. Before his death, which took place in Rome on the 16th of October 1594, he found reasons to change his mind concerning the wisdom of the Jesuit politics in Rome and England, and would have tried to curb their activities, had he been spared. The rift became so great that ten years after his death, Agazzari could write to Parsons: " So long as Allen walked in this matter (the scheme for England) in union with and fidelity to the Company, as he used to do, God preserved

him, prospered and exalted him; but when he began to leave this path, in a manner, the threads of his plans and life were cut short together." As a cardinal Allen had lived in poverty and he died in debt.

While we cannot withhold a tribute of respect from Allen for his zeal and earnestness, and recognize that his foundation at Douai survives to-day in the two Catholic colleges at Ushaw and Ware, it is impossible to deny that he injured the work with which his name will ever be associated, by his disastrous intercourse with Father Parsons. Known as a sharer in that plotter's schemes, he gave a reasonable pretext to Elizabeth's government for regarding the seminaries as hotbeds of sedition. That they were not so is abundantly proved. The superiors kept their political actions secret from the students, and would not allow such matters even to be talked about or treated as theoretical abstractions in the schools. Dr Barrett, writing (April 14, 1583) to Parsons, makes open complaint of Allen's secrecy and refusal to com- municate. How far Allen was really admitted to the full con- fidence of Parsons is a question; and his later attitude to the Society goes to prove that he at last realized that he had been tricked. Like James II. with Fr. Petre, Allen had been " be- witched " for a time and only recovered himself when too late.

Authorities. — T. F. Knox, Letters and Memorials of Cardinal Allen (London, 1882) ; A. Bellesheim, Wilhelm Cardinal Allen und die englischen Seminare auf dem Festlande (Mainz, 1885) ; First and Second Diaries of the English College, Douai (London, 1878) ; Nicholas Fitzherbert, De Antiquitate et continuatione religionis in Anglia et de Alani Cardinalis vita libellus (Rome, 1608) ; E.

Taunton, History of the Jesuits in England (London, 1901); Teulet, vol. v.; the Spanish State Papers (Simancas), vols. lii. and iv. ; a list of Allen's works is given in J. Gillow, Biographical Dictionary of English Catholics, vol. i., under his name. (E. Tn.)

ALLEN, WILLIAM FRANCIS (1830-1889), American classical scholar, was born at Northborough, Massachusetts, on the 5th of September 1830. He graduated at Harvard College in 1851 and subsequently devoted himself almost entirely to literary work and teaching. In 1867 he became professor of ancient languages and history (afterwards Latin language and Roman history) in the university of Wisconsin. He died in December 1889. His contributions to classical literature chiefly consist of schoolbooks published in the Allen (his brother) and Greenough series. The Collection of Slave Songs (1867), of which he was joint-editor, was the first work of the kind ever published.

ALLEN, BOG OF, the name given to a congeries of morasses in Kildare, King's County, Queen's County and Westmeath, Ireland. Clane Bog, the eastern extremity, is within 17 m. of Dublin, and the morasses extend westward almost to the Shannon. Their total area is about 238,500 acres. They do not form one continuous bog, the tract of the country to which the name is given being intersected by strips of dry cultivated land. The rivers Brosna, Barrow and Boyne take their rise in these morasses, and the Grand and Royal canals cross them. The Bog of Allen has a general elevation of 250 ft. above sea level, and the average thickness of the peat of which it consists is 25 ft. It rests on a subsoil of clay and marl.

ALLENSTEIN, a garrison town of Germany, in the province of East Prussia, on the river Alle, 100 m. by rail N.E. from Thorn, and 30 m. from the Russian frontier. Pop. (1900) 24,295. It has a medieval castle, several churches, a synagogue and various industries — iron-foundries, saw-mills, brick-works, and breweries ; also an extensive trade in cereals and timber.

ALLENTOWN, a city and the county-seat of Lehigh county, Pennsylvania, U.S.A., on the Lehigh river, about 62 m. N.N.W. of Philadelphia. Pop. (1890) 25,228; (1900) 35,416, of whom 2994 were foreign-born, 1065 being of German birth; (1910) 51,913. It is served by the Central of New Jersey, the Lehigh Valley, the Perkiomen (of the Reading system) and the Philadelphia & Reading railways. The city is situated on high ground sloping gently towards the river and commanding diversified views of the surrounding country. Hamilton Street, the principal business thoroughfare,

extends over 2 m. from E. to W. , and in what was once the centre of the city is Centre Square, in which there is a monument to the memory of the soldiers and sailors who fell in the Civil War. Allentown is the seat of a state

homoeopathic hospital for the insane, of the Allentown College for Women (Reformed Church, 1867), and of Muhlenberg College (1867), an Evangelical Lutheran institution which grew out of the Allentown Seminary (established in 1848 and incorporated as the " Allentown Collegiate Institute and Military Academy " in 1864); in 1907 the college had 191 students, of whom 109 were in the Allentown Preparatory School (1904), formerly the academic department of the college and still closely affiliated with it. The surrounding country is well adapted to agriculture, and slate, iron ore, cement rock and limestone are found in the vicinity. Allentown is an important manufacturing centre, and the value of its manufactured products increased 90-9 % from 1890 to 1900, and of its factory product 13-2 % between 1900 and 1905. In 1905 the city ranked sixth among the cities of the country in the manufacture of silk and silk goods, its most important industry. Other important manufactures are iron and steel, slaughtering and meat-packing products, boots and shoes, cigars, furniture, men's clothing, hosiery and knit goods, jute and jute goods, linen-thread, malt liquors, brick, cement, barbed wire, wire nails and planing-mill products. Allentown's total factory product in 1905 was valued at $16,966,550, of which $3,901,249, or 23 %, was the value of silk and silk goods. The municipality owns and operates its water-works. Allentown was first settled in 1751; in 1762 it was laid out as a town by James Allen, the son of a chief-justice of the province, in honour of whose family the city is named; in 181 1 it was incorporated as a borough and its name was changed to Northampton; in 181 2 it was made the county-seat; in 1838 the present name was again adopted; and in 1867 the first city charter was secured. The silk industry was introduced in 1881.

ALLEPPI, or Aulapalay, a seaport of southern India, in the state of Travancore, $^ m. south of Cochin, situated on a strip of coast between the sea and one of those backwaters that here form the chief means of inland communication. Pop. (1901) 24,918. There is a lighthouse, 85 ft. high, with a revolving white light visible 18 m. out at sea. Though the third town in the state in point of population, Alleppi is the first in commercial importance. It commands a fine harbour, affording safe anchorage for the greater part of the year. It was opened to foreign trade towards the latter end of the 18th century. The exports con- sist of coffee, pepper, cardamoms and

coco-nuts. There are factories for coir-matting. The raja has a palace, and Protestant missionaries have a church.

ALLESTREE, or Allestry, RICHARD (1619-1681), royalist divine and provost of Eton College, son of Robert Allestree, and a descendant of an ancient Derbyshire family, was born at Uppington in Shropshire. He was educated at Coventry and later at Christ Church, Oxford, under Richard Busby. He entered as a commoner in 1636, was made student shortly after- wards, and took the degree of B.A. in 1640 and of M.A. in 1643. In 1642 he took up arms for the king under Sir John Biron. On the arrival of the parliamentary forces soon afterwards in Oxford he secreted the Christ Church valuables, and the soldiers found nothing in the treasury " except a single groat and a halter in the bottom of a large iron chest." He escaped severe punishment only by the hasty retirement of the army from the town. He was present at the battle of Edgehill in October 1642, after which, while hastening to Oxford to prepare for the king's visit to Christ Church, he was captured by a troop of Lord Say's soldiers from Broughton House, being soon afterwards set free on the surrender of the place to the king's forces. In 1643 he was again under arms, performing " all duties of a common soldier " and " fre- quently holding his musket in one hand and his book in the other. " At the close of the Civil War, he returned to his studies, took holy orders, was made censor and became a " noted tutor." But he still remained an ardent royalist. He voted for the university decree against the Covenant, and, refusing submission to the parliamentary visitors in 1648, he was expelled. He found a retreat as chaplain in the house of the Hon. Francis Newport, afterwards Viscount Newport, in whose interests he undertook a journey to France. On hisreturn he joined two of his friends, Dolben and Fell, afterwards respectively archbishop of York

and bishop of Oxford, then resident at Oxford, and later joined the household of Sir Antony Cope of Hanwell, near Banbury. He was now frequently employed in carrying despatches between the king and the royalists in England. In May 1659 he brought a command from Charles in Brussels, directing the bishop of Salisbury to summon all those bishops, who were then alive, to consecrate clergymen to various sees " to secure a continuation of the order in the Church of England," then in danger of becom- ing extinct. 1 While returning from one of these missions, in the winter before the

Restoration, he was arrested at Dover and committed a prisoner to Lambeth Palace, then used as a gaol for apprehended royalists, but was liberated after confine- ment of a few weeks at the instance, among others, of Lord Shaftesbury. At the Restoration he became canon of Christ Church, D.D. and city lecturer at Oxford. In 1663 he was made chaplain to the king and regius professor of divinity. In 1665 he was appointed provost of Eton College, and proved himself a capable administrator. He introduced order into the dis- organized finances of the college and procured the confirmation of Laud's decree, which reserved five of the Eton fellowships for members of King's College. His additions to the college buildings were less successful; for the " Upper School," con- structed by him at his own expense, was falling into ruin almost in his lifetime, and was replaced by the present structure in 1689. Allestree died on the 28th of January 1681, and was buried in the chapel at Eton College, where there is a Latin inscription to his memory. His writings are:— The Privileges of the University of Oxford in point of Visitation (1647) — a tract answered by Prynne in the University of Oxford's Plea Rejected; 18 sermons whereof 15 preached before the king . . . (1669); 40 sermons whereof 21 are now first published ... (2 vols., 1684); sermons published separately including A Sermon on Acts xiii. 2, (1660); A Paraphrase and Annotations upon all the Epistles of St Paul (joint author with Abraham Woodhead and Obadiah Walker, 1675, see edition of 1853 ar >d preface by W. Jacobson). In the Cases of Conscience by J. Barlow, Bishop of Lincoln (1692), Allestree's judgment on Mr Coltington's Case of Divorce is in- cluded. A share in the composition, if not the sole authorship, of the books published under the name of the author of the Whole Duty of Man has been attributed to Allestree (Nichols's Anecdotes, ii. 603), and the tendency of modern criticism is to regard him as the author. His lectures, with which he was dissatisfied, were not published. Allestree was a man of extensive learning, of moderate views and a fine preacher. He was generous and charitable, of " a solid and masculine kindness," and of a temper hot, but completely under control.

Authorities. — Wood's Athenae Oxonienses (edited by Bliss), iii. 1269; Wood's Fasti, i. 480, 514, ii. 57, 241, 370; Richard Allestree, 40 sermons, with biographical preface by Dr John Fell (2 vols., 1684) ; Sufferings of the Clergy, by John Walker; Architectural History of Eton and Cambridge, by R. Willis, i. 420 ; Hist, of Eton College, by Sir H. C. Maxwell-Lyte ; Hist, of Eton College, by Lionel Cust (1899) ; Egerton MSS., Brit. Mus. 2807 f. 197 b. For Allestree's authorship of the Whole Duty of Man, see Rev. F. Barham, Journal of Sacred Literature, July 1864, and C. E. Doble's articles in the

Academy, November 1884. (P. C. Y.)

ALLEY (from the Fr. allee, a walk), a narrow passage- way between two buildings available only for foot passengers or hand-carts, sometimes entered only at one end and known as a " blind alley," or cul-de-sac. The name is also given to the long narrow enclosures where bowls or skittles are played.

ALLEYN, EDWARD (1566-1626), English actor and founder of Dulwich College, was born in London on the istof September 1 566, the son of an innkeeper. It is not known at what date he began to act, but he certainly gained distinction in his calling while a young man, for in 1586 his name was on the list of the earl of Worcester's players, and he was eventually rated by common consent as the foremost actor of his time. Ben Jonson, a critic little prone to exalt the merits of men of mark among his contemporaries, bestowed unstinted praise on Alleyn's acting {Epigrams, No. 89). Nash expresses in prose, in Pierce Penniless, his admiration of him, while Heywood calls him

1 Egerton MSS., Brit. Mus. 2807 f. 197 b; Life of Dr John Barwick, ed. by G. F. Barwick (1903), pp. 107, 129, 134.

" inimitable," " the best of actors," " Proteus for shapes and Roscius for a tongue." Alleyn inherited house property in Bishopsgate from his father. His marriage on the 22nd of October 1592 with Joan Woodward, stepdaughter of Philip Henslowe, brought him eventually more wealth. He became part owner in Henslowe's ventures, and in the end sole pro- prietor of several play-houses and other profitable pleasure resorts. Among these were the Rose Theatre at Bankside, the Paris Garden and the Fortune Theatre in St Luke's — the latter occupied by the earl of Nottingham's company, of which Alleyn was the head. He filled, too, in conjunction with Henslowe, the post of " master of the king's games of bears, bulls and dogs." On some occasions he directed the sport in person, and Stow in his Chronicles gives an account of how Alleyn baited a lion before James I. at the Tower.

Alleyn's connexion with Dulwich began in 1605, when he bought the manor of Dulwich from Sir Francis Calton. The landed property, of which the entire estate had not passed into Alleyn's hands earlier than 1614, stretched from the crest of that range of Surrey hills on whose summit now stands the Crystal Palace, to the crest of the parallel ridge, three miles nearer London, known in its several portions as Heme Hill, Denmark Hill and Champion Hill. Alleyn

acquired this large property for little more than £10,000. He had barely got full possession, however, before the question how to dispose of it began to occupy him. He was still childless, after twenty years of wedded life. Then it was that the prosperous player — the man " so acting to the life that he made any part to become him " (Fuller, Worthies) — began the task of building and endow- ing in his own lifetime the College of God's Gift at Dulwich. All was completed in 161 7 except the charter or deed of in- corporation for setting his lands in mortmain. Tedious delays occurred in the Star Chamber, where Lord Chancellor Bacon was scheming to bring the pressure of kingly authority to bear on Alleyn with the aim of securing a large portion of the proposed endowment for the maintenance of lectureships at Oxford and Cambridge. Alleyn finally carried his point and the College of God's Gift at Dulwich was founded, and endowed under letters patent of James I., dated the 21st of June 1619. The building had been already begun in 1613 (see Dulwich). Alleyn was never a member of his own foundation, but he continued to the close of his life to guide and control its affairs under powers reserved to himself in the letters patent. His diary shows that he mixed much and intimately in the life of the college. Many of the jottings in that curious record of daily doings and incidents favour the inference that he was a genial, kind, amiable and religious man. His fondness for his old profession is indicated by the fact that he engaged the boys in occasional theatrical performances. At a festive gathering on the 6th of January 1622 " the boyes play'd a playe."

Alleyn's first wife died in 1623. The same year he married Constance, daughter of John Donne, the poet and dean of St Paul's. Alleyn died in November 1626 and was buried in the chapel of the college which he had founded. His gravestone fixes the day of his death as the 21st, but there are grounds for the belief that it was the 25th. A portrait of the actor is preserved at Dulwich. Alleyn was a member of the corporation of wardens of St Saviour's, Southwark, in 1610, and there is a memorial window to him in the cathedral.

ALL FOURS, a card game (known also in America as Seven Up, Old Sledge or High-Low-Jack) usually played by two players, though four may play. A full pack is used and each player receives seven counters. Four points can be scored, one each for high, the highest trump out, for low, the lowest trump dealt, for Jack, the knave of trumps, and for game, the majority of pips in the cards of the tricks that a player has won. Ace counts 4, King 3, Queen 2, Knave 1, and ten 10 points. Low is scored by the person to whom it is dealt; High of course wins a trick; Jack is scored by the player who finally has it among his tricks. If Jack is turned up the dealer scores the point. A

player who plays a high or low trump is entitled to ask if they are High or Low. The game is 10 or n points. Six

cards are dealt to each, the thirteenth being turned up for trumps. The non-dealer may propose or beg if he does not like his hand. If the dealer refuses the elder hand scores a point; if he con- sents he gives and takes three more cards, the seventh being turned up for trumps, which must be of a different suit from the original trump card; otherwise six more cards are dealt out, and so on till a fresh trump suit appears. The non-dealer then leads; the other must trump or follow suit, or forfeit a point. Jack may be played to any trick. Each pair of cards is a trick, and is collected by the winner. A fresh deal may be claimed if the dealer exposes one of his adversary's cards, or if he gives himself or his adversary too few or too many. In that case the error must be discovered before a card is played (see also Auction Pitch).

ALLIA (mod. Fosso Bettina), a small tributary of the river Tiber, joining it on the left (east) bank, about 1 1 m. N. of Rome. It gave its name to the terrible defeat which the Romans suffered at the hands of the Gauls on the 18th of July 390 B.C. Livy (v. 37) and Diodorus (v. 114) differ with regard to the site of the battle, the former putting it on the left, the latter on the right bank of the Tiber. Mommsen and others support Diodorus, but the question still remains open.

See T. Ashby in Papers of the British School at Rome, iii. 24.

ALLIANCE, a city of Stark county, Ohio, U. S. A., on the Mahoning river, about 57 m. S.E. of Cleveland, about 1080 ft. above the sea, and about 505 ft. above the level of Lake Erie. Pop. (1890) 7607; (1900) 8974, of whom 1029 were foreign- born; (1910, census) 15,083. It is served by the Pennsylvania and the Lake Erie, Alliance & Wheeling railways, and by an electric line connecting with Canton and Salem. The city is the seat of Mount Union College (Methodist Episcopal), opened in 1846 as a preparatory school and having in 1907 a library of about 10,000 volumes, a collegiate department (opened in 1858), a normal department (1858), a school of music (1855), a com- mercial school (1868), a faculty of 29 teachers, and an enrolment of 524 students, of whom 274 were women. Among the manu- factures of Alliance are structural iron, steel castings, pressed sheet steel, gun carriages, boilers, travelling cranes, pipe organs,

street-car indicators, sashes and doors, and account registers and other material for file and cabinet-bookkeeping. The municipality owns and operates its water-works. Alliance was first settled in 1838, when it was laid out as a town and was named Freedom; it was named Alliance in 1851, was incorporated as a village in 1854, and became a city of the second class in 1888.

ALLIANCE, in international law, a league between independent states, defined by treaty, for the purpose of combined action, defensive or offensive, or both. Alliances have usually been directed to specific objects carefully defined in the treaties. Thus the Triple Alliance of 1688 between Great Britain, Sweden and the Netherlands, and the Grand Alliance of 1689 between the emperor, Holland, England, Spain and Saxony, were both directed against the power of Louis XIV. The Quadruple or Grand Alliance of 1814, defined in the treaty of Chaumont, between Great Britain, Austria, Russia and Prussia, had for its object the overthrow of Napoleon and his dynasty, and the confining of France within her traditional boundaries. The Triple Alliance of 1882 between Germany, Austria and Italy was ostensibly directed to the preservation of European peace against any possible aggressive action of France or Russia; and this led in turn, some ten years later, to the Dual Alliance between Russia and France, for mutual support in case of any hostile action of the other powers. Occasionally, however, attempts have been made to give alliances a more general character. Thus the " Holy Alliance " (q.v.) of the 26th of September 1815 was an attempt, inspired by the religious idealism of the emperor Alexander I. of Russia, to find in the " sacred precepts of the Gospel " a common basis for a general league of the European governments, its object being, primarily, the preservation of peace. So, too, by Article VI. of the Quadruple Treaty signed at Paris on the 20th of November 181 5 — which renewed that of Chaumont and was again renewed, in 1818, at Aix-la-Chapelle — the scope of the Grand Alliance was extended to objects of

common interest not specifically defined in the treaties. The article runs: — "In order to consolidate the intimate tie which unites the four sovereigns for the happiness of the world, the High Contracting Powers have agreed to renew at fixed intervals, either under their own auspices or by their respective ministers, meetings consecrated to great common objects and to the examination of such measures as at each one of these epochs shall be judged most salutary for the peace and prosperity of the nations and the maintenance of the tranquillity of Europe."

It was this article of the treaty of the 20th of November 181 5, rather than the " Holy Alliance," that formed the basis of the serious effort made by the great powers, between 181 5 and 1822, to govern Europe in concert, which will be found outlined in the article on the history of Europe. In general it proved that an alliance, to be effective, must be clearly defined as to its objects, and that in the long run the treaty in which these objects are defined must — to quote Bismarck's somewhat cynical dictum — " be reinforced by the interests " of the parties concerned. Yet the " moral alliance " of Europe, as Count Nesselrode called it, though it failed to secure the permanent harmony of the powers, was an effective instrument for peace during the years immediately following the downfall of Napoleon; and it set the precedent for those periodical meetings of the representatives of the powers, for the discussion and settlement of questions of international importance, which, though cumbrous and inefficient for constructive work, have contributed much to the preservation of the general peace (see Europe: History). (W. A. P.)

ALLIA RI A OFFICINALIS, also known botanically as Sisym- brium Alliaria, and popularly as garlic-mustard, Jack-by-the- hedge, or sauce-alone, a common hedge -bank plant belonging to the natural order Cruciferae. It is a rankly scented herb, 2 to 3 ft. high, with long-stalked, coarsely-toothed leaves, and small white flowers which are succeeded by stout long four-sided pods. It is widely spread through the north temperate region of the Old World.

ALLIBONE, SAMUEL AUSTIN (1816-1889), American author and bibliographer, was born in Philadelphia, Pennsylvania, on the 1 7th of April i8i6,of French Huguenot and Quaker ancestry. He was privately educated and for many years was engaged in mercantile business in his native city. He, however, devoted himself chiefly to reading and to bibliographical research; acquired a very unusual knowledge of English and American literature, and is remembered as the compiler of the well-known Critical Dictionary of English Literature and British and American Authors (3 vols.: vol. i. 1854, vols. ii. and iii. 1871). To this, two supplementary volumes, edited by John Foster Kirk, were added in 1891. From 1867 to 1873, and again in 1877-1879, Allibone was book editor and corresponding secretary of the American Sunday School Union; and from 1879 to 1888 he was librarian of the Lenox Library, New York City. He died at Lucerne, Switzerland, on the 2nd of September 1889. In addition to his Critical Dictionary he published three large anthologies and several religious tracts.

See the " Memoir " by S. D. M'Connell, an address delivered before

the Historical Society of Philadelphia (Philadelphia, 1890).

ALLIER (anc. Elaver), a river of central France flowing into the Loire. It rises in the department of Lozere, among the Margeride mountains, a few miles east of the town of Mende. The upper course of the Allier separates the mountains of the Margeride from those of the Velay and lies for the most part through deep gorges. The river then traverses the plains of Langeac and Brioude, and receives the waters of the Alagnon some miles above the town of Issoire. Swelled by torrents from the mountains of Dore and Dome, it unites with the river Dore at its entrance to the department to which it gives its name. It then flows through a wide but shallow channel, joining the Sioule some distance above Moulins, the chief town on its banks. It soon after becomes the boundary line between the departments of Cher and Nievre, and reaches the Loire 4 m. west of Nevers, after a course of 269 m. Its basin has an area' of 6755 sq. m. The Allier is classed as navigable for the last 154 m. of its course, but there is little traffic on it.

ALLIER, a department of central France, formed in 1790 from the old province of Bourbonnais. Pop. (1906) 417,961. Area, 2849 sq. m. It is bounded N. by the department of Nidvre, E. by Sa6ne-et-Loire,from which it is divided by the river Loire, S.E. by Loire, S. by Puy-de-D6me, S.W. by Creuse and N.W. by Cher. Situated on the northern border of the Central Plateau, the department slopes from south to north. Its highest altitudes are found in the south-east, in the Bois-Noirs, where one point reaches 4239 ft., and in the Monts de la Madeleine. Plains alternating with forests occupy the northern zone of the depart- ment, while the central and western regions form an undulating and well- watered plateau. Entering the department in the south, and, like the other chief rivers, flowing almost due north, the Allier drains the central district, receiving on its left the Sioule. East of the Allier is the Bebre, which joins the Loire within the limits of the department; and on the west the Cher, with its tributary the Aumance. Rigorous and rainy in the south-east, the climate elsewhere is milder though subject to sudden varia- tions. Agriculturally the department is flourishing, the valleys of the Allier and the Sioule known as the Limagne Bourbonnaise comprising its most fertile portion. Wheat, oats, barley and other cereals are grown and exported, and owing to the abundance of pasture and forage, sheep and cattle-rearing are actively carried on. Potatoes and

mangels yield good crops. Wines of fair quality are grown in the valley of the Sioule; walnuts, chestnuts, plums, apples and pears are principal fruits. Goats, from the milk of which choice cheese is made, and pigs are plenti- ful. A large area is under forests, the oak, beech, fir, birch and hornbeam being the principal trees. The mineral waters at Vichy (g.v.), Neris, Theneuille, Cusset and Bourbon l'Archam- bault are in much repute. The mineral wealth of the department is considerable, including coal as well as manganese and bitu- minous schist; plaster, building stone and hydraulic lime are also produced. Manufactories of porcelain, glass and earthen- ware are numerous. Montlucon and Commentry are iron- working centres. There are flour mills, breweries and saw-mills; and paper, chemicals, wooden shoes, wool and woollen goods are produced. Besides the products of the soil Allier exports coal, mineral waters and cattle for the Paris market. Building materials, brandy and coal are among the imports. The railways belong chiefly to the Orleans and Paris-Lyons-Mediterranean companies. The lateral canal of the Loire, the Berry Canal and the canal from Roanne to Digoin together traverse about 57 m. in the department. Allier is divided into the arrondissements of Moulins, Gannat, Lapalisse and Montlucon (29 cantons, 321 communes). It forms the diocese of Moulins and part of the ecclesiastical province of Bourges, and falls within the academie (educational division) of Clermont-Ferrand and the region of the XIII. army-corps. Its court of appeal is at Riom. Moulins, the capital, Montlucon and Vichy, are the principal towns. Souvigny possesses the church of a famous Cluniac priory dating from the nth-i2th and 15th centuries, and containing the splendid tombs (15th century) of Louis II. and Charles I. of Bourbon. At St Menoux, Ebreuil and Gannat there are fine Romanesque churches. Huriel has a church of the nth century and a well-preserved keep, the chief survival of a medieval castle. St Pourcain-sur-Sioule has a large church, dating from the nth to the 1 8th centuries. The castle of Bourbon l'Archambault, which belonged to the dukes of Bourbon, dates from the 13th and 15th centuries. The Romanesque churches of Veauce and Ygrande, and the chateaus of Veauce and Lapalisse, are also of interest, the latter belonging to the family of Chabannes.

ALLIES, THOMAS WILLIAM (1813-1903), English historical writer, was born at Midsomer Norton, near Bristol, on the 12th of February 1813. He was educated at Eton and at Wadham College, Oxford, of which he became a fellow in 1833. In 1840 Bishop Blomfield of London appointed him his examining chaplain and presented him to the rectory of Launton, Oxfordshire, which he resigned in 1850 on becoming a Roman Catholic. Allies was appointed secretary to the

Catholic poor school committee in 1853, a position which he occupied till 1890. He died in London on the 17th of June 1903. Allies was one of the ablest

of the English churchmen who joined the Church of Rome in the early period of the Oxford movement, his chief work, The Forma- tion of Christendom (London, 8 vols., 1865-1895) showing much originality of thought and historical knowledge. His other writings: St Peter, his Name and Office (1852); The See of St Peter, the Rock of the Church (1850); Per Crucem ad Lucem (2 vols., 1879), have gone through many editions and been trans- lated into several languages.

See his autobiography, A Life's Decision (1880) ; and the study by his daughter, Mary H. Allies, Thomas Allies, the Story of a Mind (London, 1906), which contains a full bibliography of his works.

ALLIFAE (mod. Alife), a town of the Samnites, 15 m. N.W. of Telesia, and 17 m. E.N.E. of Teanum. The site of the Samnite city, which in the 4th century B.C. had a coinage of its own, is not known; the Roman town lay in the valley of the Vulturnus, and its walls (4th century) enclose a circuit of 15 m., in which are preserved remains of large baths (Thermae Herctdis) and a theatre.

ALLIGATOR (Spanish el lagarto, " the lizard "), an animal so closely allied to the crocodile that some naturalists have classed them together as forming one genus. It differs from the true crocodile principally in having the head broader and shorter, and the snout more obtuse; in having the fourth, enlarged tooth of the under jaw received, not into an external notch, but into a pit formed for it within the upper one; in wanting a jagged fringe which appears on the hind legs and feet of the crocodile; and in having the toes of the hind feet webbed not more than half way to the tips. Alligators proper occur in the fluviatile deposits of the age of the Upper Chalk in -Europe, where they did not die out until the Pliocene age; they are now restricted to two species, A. mississippiensis or lucius in the southern states of North America up to 12 ft. in length, and the small A . sinensis in the Yang-tse-kiang. In Central and South America alligators are represented by five species of the genus Caiman, which differs from Alligator by the absence of a bony septum between the nostrils, and the ventral armour is composed of overlapping bony scutes, each of which is formed of two parts united by a suture. C. sclerops, the spectacled alligator, has the widest distribution, from southern Mexico to the northern half of Argentina, and grows to a bulky size. The largest, attaining an enormous bulk and a length of 20 ft., is the C. niger, the jacarS-assu or large caiman of the

Amazons. The names ” alligator ” and ” crocodile ” are often confounded in popular speech; and the structure and habits of the two animals are so similar that both are most conveniently considered under the heading Crocodile.

ALLINGHAM, WILLIAM (1824-1889), Irish man of letters and poet, was born at Ballyshannon, Donegal, on the 19th of March 1824 (or 1828, according to some authorities), and was the son of the manager of a local bank. He obtained a post in the custom-house of his native town and filled several similar situations in Ireland and England until 1870, when he had retired from the service, and became sub-editor of Fraser’s Magazine, which he edited from 1874 to 1879. He had published a volume of Poems in 1850, followed by Day and Night Songs, a volume containing many charming lyrics, in 1855. Allingham was on terms of close friendship with D. G. Rossetti, who contri- buted to the illustration of the Songs. His Letters to Allingham (1854-1870) were edited by Dr Birkbeck Hill in 1897. Lawrence Bloomfield, a narrative poem illustrative of Irish social questions, appeared in 1864. Allingham married in 1874 Helen Paterson, known under her married name as a water-colour painter. He died at Hampstead on the 18th of November 1889. Though working on an unostentatious scale, Allingham produced much excellent lyrical and descriptive poetry, and the best of his pieces are thoroughly national in spirit and local colouring.

WUliam Allingham: a Diary (1907), edited by Mrs Allingham and D. Radford, contains many interesting reminiscences of Tenny- son, Carlyle and other famous contemporaries.

ALLISON, WILLIAM BOYD (1829-1908), American legislator, was born at Perry, Ohio, on the 2nd of March 1829. Educated at Allegheny and Western Reserve Colleges, he studied law, and practised in Ohio until 1 8 5 7 . In that year he settled in D ubuque, Iowa, where he took a prominent part in Republican politics;

and in i860 he was a delegate to the national convention at Chicago which nominated Abraham Lincoln for the presidency. In 1 86 1 he was appointed a member of the staff of Governor Samuel J. Kirkwood (1813-1894), and was of great service in the work of equipping and organizing the Iowa volunteers. From 1863 until 187 1 he served with distinction in the House of Representatives;’ in 1873

he was elected to the United States Senate, and re-elected in 1878, 1884, 1890, 1896 and 1902. Here he became one of the highest authorities on questions connected with finance, and from 1877 he was a member of the Senate committee on finance. In 1881-1893, andagainfrom 1895, he was chairman of the committee on appropriations, in which position he had great influence. He declined offers of the secretaryship of the treasury made to him by Presidents Garfield and Harrison. He was a prominent candidate for the presidential nomination in the Republican national conventions of 1888 and 1896. In 1892 he was chairman of the American delegation to the International Monetary Conference at Brussels. He died at Dubuque, Iowa, on the 4th of August 1908.

ALLITERATION (from Lat. ad, to, and litter a, letter), the commencing of two or more words, in close juxtaposition, with the same sound. As Milton defined rhyme to be " the jingling sound of like endings," so alliteration is the jingle of like begin- nings. All language has a tendency to jingle in both ways, even in prose. Thus in prose we speak of " near and dear," " high and dry," " health and wealth;" But the initial form of jingle is much more common — " safe and sound," " thick and thin," " weal or woe," " fair or foul," " spick and span," " fish, flesh, or fowl," " kith and kin." The poets of nearly all times and tongues have not been slow to seize upon the emphasis which could thus be produced.

Although mainly Germanic in its character, alliteration was known to the Latins, especially in early times, and Cicero blames Ennius for writing " O Tite tute, Tati, tibi tanta, tyranne, tulisti." Lucretius did not disdain to employ it as an ornament. We read in Shakespeare: —

" Full fathom five thy father lies: Of his bones are corals made." In Pope: —

" Here files of pins extend their shining rows, Puffs, powders, patches, bibles, billet-doux." In Gray : —

" Weave the warp and weave the woof, The winding-sheet of Edward's race."

In Coleridge: —

" The fair breeze blew, the white foam flew, The furrow followed free; We were the first that ever burst Into that silent sea."

Churchill describes himself, in his Prophecy of Famine, as one " Who often, but without success, had prayed For apt alliteration's artful

aid," —

an example which is itself a proof of his failure; for alliteration is never effective unless it runs upon consonants.

As thus far considered, alliteration is a device wholly dependent on the poet's fancy. He may use it or not, or use it much or little, at his pleasure. But there is an extensive range of Teutonic poetry whose metrical laws are entirely based on alliteration. This, for example, is the principle on which Icelandic verse is founded; and we have a yet nearer interest in it, because it furnishes the key to Anglo-Saxon and a large portion of early English verse. For a specimen take the following lines, the spelling modernized, from the beginning of Piers the Plowman: — " But in a May morning I on .Malvern hills,

Me be/el a /erly | of /airy methought ;

I was weary of oiandering I and went me to rest

Under a oroad frank I by a 6urn-side ;

And as I lay and leaned I and /ooked on the waters,

I slumbered in a sleeping I it sounded so merry."

The rule of this verse is indifferent as to the number of syllables it may contain, but imperative as to the number of accented ones. The line is divided in the middle by a pause, and each half ought to contain two accented syllables. Of the four accented syllables, the first three should begin with the same

letter; the fourth is free and may start with any letter. Those who wish for a more minute analysis of the laws of alliterative verse, as practised by the Anglo-Saxon and early English poets, may consult an exhaustive essay on the subject by Professor W. W. Skeat, prefixed to vol. iii. of Bishop Percy's Folio Manu- script; only the reader must be on his guard against an error which pervades it, and which this able writer seems to have derived from Rask. The question arises — What is the nature of the cadence in alliterative verse ? Now all metrical movement is of two kinds, according as the beat or emphasis begins the movement or ends it. If the beat is initial, we say in classical language that the movement is trochaic or dactylic, according to the number of its syllables; and if the beat is final, we in like manner say that the movement is iambic or anapaestic. Skeat and many others object with some reason to use the classical terms, and therefore brushing them aside, let us put the question in the

simplest form — Has the movement of alliterative verse got the initial or the final beat ? In the middle of the 18th century Bishop Percy decided this question with sufficient accuracy, though he mixed up his statement with a blunder which it is not easy to account for. He points out how the poets began to introduce rhyme into alliterative verse, until at length rhyme came to predominate over alliteration, and " thus was this kind of metre at length swallowed up and lost in the common burlesque Alexandrine or anapaestic verse, as " A cobbler there was, and he lived in a stall." Percy made a serious mistake when he gave the name of Alex- andrine to anapaestic verse; but he is quite right in his general statement that alliterative verse became lost in a measure the movement of which had the final beat. Conybeare has stated the fact still more accurately. " In the Saxon poetry a trochaic character is predominant. In Piers the Plowman there is a prevailing tendency to an anapaestic cadence." It is the result of a change in the language — the loss of inflexion. Take the word man. The genitive in Saxon would be mannes, a trochee; in English, of man, an iambus. The tendency of the language was thus to pass from a metrical movement, in which the beat was initial, to one in which it was final. It may therefore be quite right to speak of Anglo-Saxon alliterative poetry as trochaic or dactylic, and quite wrong to apply the same terms to the cadence of our later alliterative verse. And this is precisely the error into which Skeat has fallen. He says — " Lines do not always begin with a loud syllable, but often one or two and sometimes (in early English especially) even three soft syllables precede it. These syllables are necessary to the sense, but not to the scansion of the line." That is just the point at issue. By leaving out of account the light syllable or syllables at the beginning of a line, and taking his start from the first syllable that has the alliterative beat, Skeat may certainly prove that all the later alliterative poetry has a movement of initial beat. But English ears will not submit to this rule. It is those light syllables of no account which have altered the rhythm of English descant from one of initial to one of final beat.

ALLIUM (Lat. for " garlic "), a genus of plants, natural order Liliaceae, with about 250 species (seven of which occur in Britain), found in Central and South Europe, North Africa, the dry country of West and Central Asia, and North and Central America. The plants are bulbous herbs, with flat or rounded radical leaves, and a central naked or leafy stem, bearing a head or umbel of small flowers, with a spreading or bell-shaped white, pink, red, yellow or blue perianth. Several species afford useful foods, such as onion {Allium Cepa), leek (A. Porrum), shallot or eschallot (ˆ4. ascalonicum) , garlic {A.

sativum), and chives {A. schoenoprasum). A few species are cultivated as border plants; such are A. Moly, an old garden plant with bright yellow flowers, and A. neapolitanum, the well-known white- flowered species, both natives of southern Europe.

ALLIX, PIERRE (1641-1717), French Protestant divine, was born at Alencon. He was pastor first at St Agobile in Champagne, and then at Charenton, near Paris. The revocation of the edict of Nantes in 1685 compelled him to take refuge in London, where, under the sanction of James II., he opened a

church for the French exiles. His reputation for learning was such as to obtain for him, soon after his arrival, the degree of doctor of divinity from both universities, and in 1690 he received from Bishop Burnet the more substantial honour of the treasurer- ship and a canonry in Salisbury Cathedral. He died at London in March 171 7. The works of Allix, which are numerous, are chiefly of a controversial and apologetic character, and must be used with caution. In opposition to Bossuet he published Some Remarks upon the Ecclesiastical History of the Ancient Churches of Piedmont (1690), and Remarks upon the Ecclesiastical History of the Ancient Churches of the Albigenses (1692), with the idea of showing that the Albigenses were not Manichaeans, but historically identical with the Waldenses.

ALLMAN, GEORGE JAMES (1812-1898), British biologist, was born in Cork, Ireland, in 181 2, and received his early educa- tion at the Royal Academical Institution, Belfast. For some time he studied for the Irish bar, but ultimately gave up law in favour of natural science. In 1843 he graduated in medicine at Dublin, and in the following year was appointed professor of botany in that university, succeeding his namesake, William Allman (1 776-1846). This position he held for about twelve years until he removed to Edinburgh as regius professor of natural history. There he remained till 1870, when considera- tions of health induced him to resign his professorship and retire to Dorsetshire, where he devoted himself to his favourite pastime of horticulture. The scientific papers which came from his pen are very numerous. His most important work was upon the gymnoblastic hydrozoa, on which he published in 1871-1872, through the Ray Society, an exhaustive monograph, based largely on his own researches and illustrated with drawings of remarkable

excellence from his own hand. Biological science is also indebted to him for several convenient terms which have come into daily use, e.g. endoderm, and ectoderm for the two cellular layers of the body-wall in Coelenterata. He became a fellow of the Royal Society in 1854, and received a Royal medal in 1873. For several years he occupied the presidential chair of the Linnaean society, and in 1879 he presided over the Sheffield meeting of the British Association. He died on the 24th of November 1898 at Parkstone, Dorsetshire.

ALLOA, a municipal and police burgh and seaport of Clack-mannanshire, Scotland. It is situated on the north bank of the Forth, 32 m. from Edinburgh by the North British railway via the Forth Bridge, and 28 m. from Leith by steamer. Pop. (1891) 12,643; (1901) 14,458. The Caledonian railway enters the town from the south-west by a bridge across the river, and also owns a ferry to South Alloa, on the opposite shore, in Stirling- shire. Between Alloa and Stirling the stream forms the famous " links," the course being so sinuous that whereas by road the two towns are but 65 m. apart, the distance between them by river is nearly 12 m.

For its size and population the town enjoys unusual prosperity, in consequence of its several flourishing industries. Its manu- factures of yarn are on the largest scale, the spinning mills often working night and day for many months together. There are also numerous breweries, and Alloa ale has always been famous. The great distillery at Carsebridge yields an immense supply of yeast as well as whisky. Other thriving trades include the glass-works on the shore, pottery-works in the " auld toon," dye-works and a factory for the making of electrical appliances. There is a good deal of shipbuilding, some ironfounding and a brass foundry. The chief article of export is coal from the neighbouring collieries, the other leading exports being ale, whisky, glass and manufactured goods. The imports comprise timber, grain, iron, linseed and flax. The docks, accessible only at high water, include a wet basin and a dry dock. Amongst the principal buildings are the fine Gothic parish church, with a spire 200 ft. high; the town hall, including the free public library, from designs by Alfred Waterhouse, R.A., the gift of Mr J. Thomson Paton; the county and municipal buildings; hand- some public baths and gymnasium, presented to the town by Mr David Thomson; the accident hospital; the fever hospital; the museum of the Natural Science and Archaeological Society;

the academy, the burgh school and a secondary school with the finest technical equipment in Scotland, given by Mr A. Forrester Paton. There is a public park, besides bowling-greens and cricket and

football fields. The old burying-ground was the kirkyard of the former parish church, the tower of which still exists, but a modern cemetery has been formed in Sunnyside. The town owns the water-supply, gas-works and electric-lighting.

Alloa Park, the seat of the earl of Mar and Kellie, is in the immediate vicinity, and in its grounds stand the ruins of Alloa Tower, an ancient structure 89 ft. high, with walls n ft. thick, which was built about 1315, and was once the residence of the powerful family of Erskine, descendants of the earl of Mar. The earl who promoted the Jacobite rising in 17 15 was born here. Many of the Scots princes received their education as wards of the Lords Erskine and the earls of Mar, the last to be thus educated being Henry, the eldest son of James VI.

ALLOBROGES (in Gr. usually 'AWofipiyes), a Celtic tribe in the north of Gallia Narbonensis, inhabiting the low ground called the "island" between the Rhodanus, the Isara and the Graian Alps, corresponding to the modern Dauphinfe and Savoy. If the name is rightly interpreted as meaning " aliens," they would seem to have driven out the original inhabitants. Their chief towns were Vienna (Vienne), Genava (Geneva) and Cularo (afterwards Gratianopolis, whence Grenoble). The Allobroges first occur in history as taking part with Hannibal in the invasion of Italy. After the subjugation of the Salluvii (Salyes) by the Romans in 123 B.C., having given shelter to their king Tuto- motulus and refused to surrender him, the Allobroges were attacked and finally defeated (August 8, 121) at the junction of the Rhodanus and Isara by Q. Fabius Maximus (afterwards Allobrogicus) . But they still remained hostile to Rome, as is shown by the conduct of their ambassadors in the Catilinarian conspiracy (63; see Catiline); two years later a revolt under Catugnatus was put down by Gaius Pomptinus at Solonium. Under Augustus they were included in Gallia Narbonensis; later, in the Viennensis.

See A. Desjardins, Geographie historique de la Gaule romaine, ii. (1 876-1893); E. Herzog, Galliae Narbonensis Historia (Leipzig. 1864); Mommsen, Hist, of Rome (Eng. trans.), bk. iii. ch. 4, iv. ch. 5; T. R. Holmes, Caesar's Conquest of Gaul (1899) ; G. Long in Smith's Diet, of Greek and Roman Geography; M. Ihm in Pauly- Wissowa's Realencyclopddie, i. 2 (1894) I A. Holder, Alt-celtischer Sprachschatz; and bibliography in La grande encyclopedic (s.v.).

ALLOCATUR (from med. Lat. allocatur, it is allowed), in law, a certificate given by a taxing master, at the termination of an action,

for the allowance of costs.

ALLOCUTION (Lat. allocutio, an address), a name given to the formal addresses made by the pope to the College of Cardinals and through them to the church generally. They are usually called forth by ecclesiastical or political circumstances, and aim at safeguarding papal principles and claims. They are published by being affixed to the door of St Peter's Church.

ALLODIUM, or Alodium, a legal term for lands which are the absolute property of their owner, and not subject to any service or acknowledgment to a superior. It is thus the opposite of fe-odum or fief. The proper derivation of the word has been much discussed and is still doubtful, though it is probably compounded of all, whole or entire, and odh, property. Allodial tenure seems to have been common throughout northern Europe. It exists in Orkney and Shetland, but is unknown in England, the feudal system having been made universal by William the Conqueror.

ALLOMEROUS (Gr. aXXos, other /xepos, part), the quality of bodies (e.g. mineral) by virtue of which they can change their elements and proportions while preserving their form.

ALLON, HENRY (1818-1892), English Nonconformist divine, was born on the 13th of October 1818 at Welton near Hull in Yorkshire. Under Methodist influence he decided to enter the ministry, but, developing Congregational ideas, was trained at Cheshunt College. In 1844 he became co-pastor with the Rev. Thomas Lewis of Union Chapel,.Islington. In 1852, on the death of Lewis, Allon became sole pastor, and this position he heM with increasing influence till his death in 1892. Union Chapely

originally founded by evangelical members of the Church of England and Nonconformists acting in harmony, became during Allon's co-pastorate definitely Congregational in principle and fellowship, and exercised an ever-expanding influence. His chief service to Nonconformity was in connexion with the improve- ment of congregational worship, and especially the service of praise. In 1852 Dr. H. J. Gauntlett became organist at Union Chapel and conductor of a psalmody class. To meet the wants of this class, Allon published the original edition of his well- known Congregational Psalmist. For

many years his collection of hymns, chants and anthems was used in hundreds of churches throughout England. In i860 Allon began to write, at first chiefly for the Patriot, then under the editorship of T. C. Turbeville. In 1864, at the age of forty-five, he was elected chairman of the Congregational Union, and in 1866 he under- took the editorship of the British Quarterly Review with H. R. Reynolds, the principal of Cheshunt. In 1877 he became sole editor, and in that capacity came into touch with such men as W. E. Gladstone, Matthew Arnold, F. D. Maurice and Dean Stanley. The magazine was discontinued in 1886. In 1871 he received the degree of D.D. from the university of Yale, U.S.A. In 1874 the congregation at Islington decided to erect new buildings. The church, which was built at a cost of £50,000, was specially adapted for congregational worship and was mentioned by an architectural journal as one of the hundred remarkable buildings of the century. The church had in its various departments about 300 teachers in charge of more than 3000 children, and was in its organization one of the earliest instances of the type known as the institutional church. In 1 88 1, on the occasion of the jubilee of the Congregational Union of England and Wales, Allon was again elected chairman. In March 1892 he died suddenly from heart failure. His books were A Memoir of James Sherman (1863); the Sermons of Thomas Binney, with a biographical and critical sketch (1869); The Vision of God and other sermons (1876); The Indwelling Christ (1892). Allon was a man of sound judgment, strong will, great moral courage and personal kindness. His acquaintance with literature was wide, his own style lucid and decisive. In social and political affairs he was a convinced individualist. Both as leader of Union Chapel and in denominational affairs his courage and discretion, his simple faith, combined with a broad minded sympathy with the intellectual movements of the time, made his ministry a widespread influence for good. (D. Mn.)

ALLONGE (from Fr. allongcr, to draw out), a slip of paper affixed to a negotiable instrument, as a bill of exchange, for the purpose of receiving additional indorsements for which there may not be sufficient space on the bill itself. An indorsement written on the allonge is deemed to be written on the bill itself. An allonge is more usually met with in those countries where the Code Napoleon is in force, as the code requires every indorse- ment to express the consideration. Under English law, as the simple signature of the indorser on the bill, without additional words, is sufficient to operate as a negotiation, an allonge is seldom necessary.

ALLOPHANE, one of the few minerals known only in the amorphous state. It is a glassy substance, usually occurring as thin encrustations

with a mammillary surface; occasionally, however, it is earthy and pulverulent. The colour varies con- siderably, from colourless to yellow, brown, blue or green. Specimens of a brilliant sky-blue colour, such as those found formerly in Wheal Hamblyn, near Bridestowe in Devonshire, and in Sardinia, are specially attractive in appearance; the colour is here due to the presence of the copper mineral chrysocolla. The hardness is 3, and the specific gravity 1-9. Chemically, it is a hydrous aluminium silicate, Al 2 Si0 6 . 5H 2 0. Allophane is always of secondary origin, resulting from the decomposition of various aluminous silicates, such as felspar. It is often found encrusting fissures and cavities in mines, especially those of copper and iron. It was first observed in 1ˆ09 in marl at Grafenthal, near Saalfield in Thuringia; and has been found in some quantity in the chalk pits at Charlton in Kent, where it lines fissures and funnel-shaped cavities. The name allophane

was given by F. Stromeyer in 1816, from the Gr. ciXXos, another, and a.ivw, to appear, in allusion to the fact that the mineral Crumbles and changes in appearance when heated before the blowpipe. Other names for the species are riemannite and elhuyarite, whilst closely allied minerals are carol athine, samoite and schrotterite (opal-allophane) .

ALLORI, ALESSANDRO (1535-1607), Italian painter of the Florentine school, was brought up and trained in art by his uncle, Angelo Bronzino (q.v.) whose name he sometimes assumed in his pictures. Visiting Rome in his nineteenth year, he carefully studied the works of Michelangelo; but the influence of that great master can only be traced in the anatomical correctness of his drawing of nude figures. He was successful as a portrait painter. His son Cristofano Allori (1 577-1621), born at Florence, received his first lessons in painting from his father, but becoming dissatisfied with the hard anatomical drawing and cold colouring of the latter, he entered the studio of Gregorio Pagani (1 558-1605) who was one of the leaders of that later Florentine school which endeavoured to unite the rich colouring of the Venetians with the correct drawing of Michelangelo's disciples. Allori became one of the foremost of this school. His pictures are distinguished by their close adherence to nature and the delicacy and technical perfection of their execution. His technical skill is proved by the fact that several copies he made after Correggio have been taken to be duplicates by Correggio himself. His extreme fastidiousness limited his power of production, though the number of his works is not so small as is sometimes asserted. Several specimens are to be seen at Florence and elsewhere. The finest of all his works is his " Judith and Holofernes," in the Pitti

Palace. The model for the Judith was his mistress, the beautiful Mazzafirra, who is also represented in his Magdalene; and the head of Holofernes is generally supposed to represent himself.

ALLOTMENT (from O. Fr. a and later, to divide by lot), the act of allotting; a share or portion assigned. In England, the term denotes a portion of land assigned on partition or under an inclosure award (see Commons); also a division of land into small portions for cultivation by a labourer or artisan at a small rent (see Allotments and Small Holdings). In company law, " allotment " is the appropriation to an applicant by a reso- lution of the directors of a certain number of shares in response to an application. The document sent to such an applicant, which announces the number of shares assigned and concludes the contract, is called a letter of allotment or allotment certificate. A letter of allotment in England requires a sixpenny stamp if the value of the shares amounts to £5 or over, and a penny stamp if less than £5. (See Company.)

Allotment note is a writing by aseaman authorizing his employers to make an allotment of part of his wages, while he is on a voyage, in favour either of a " near " relative (wife, father, mother, grandfather, grandmother, child, grandchild, brother or sister of the seaman), or of a savings bank. Every allotment note must be in a form sanctioned by the Board of Trade.

ALLOTMENTS AND SMALL HOLDINGS. As the meaning of these terms in agricultural tenure varies in different localities, it may be as well to say at once that for the present purpose they are definable as pieces of land detached from cottages, and hired or owned by labouring men to supplement their main income. We do not include any farm, however small, from which the occupier derives his entiresupport by dairying, market-gardening, or other form of la petite culture. So, also, no account is taken of the tiny garden plot, used for growing vegetables for the table and simple flowers, which is properly an appurtenance of the cottage. Clearing away what is extraneous, the essential point round which much controversy has raged is the labourer's share in the land. The claim advanced depends upon tradition. In agriculture, the oldest of all industries, a cash payment is not even now regarded as discharging the obligations between master and servant. Mr Wilson Fox, in reporting to the Board of Trade on the earnings of agricultural labourers in Great Britain, gives, as a typical survival of an old custom, the case of a shepherd whose total income was calculated at £60 a year, but who got

only £16 in money, the rest being made up by rights of grazing live-stock, growing crops on his master's land, and kindred privileges. That is exactly in the spirit that used to pervade agriculture, and doubtless had its origin in the manorial system. If we turn back to the 13 th century, from Walter of Henley's Husbandry it will be seen that practically there were only two classes engaged in agriculture, and corresponding with them were two kinds of land. There were, on the one hand, the employer, the lord, and his demesne land; on the other, the villeins and the land held in villenage. Putting aside for the moment any discussion of the exact degree of servitude, it will be seen that the essence of the bargain was that the villein should be permitted to cultivate a virgate of land for his own use in return for service rendered on the home farm. This is not altered by the fact that the conditions approached those of slavery, that the villeins were adscripti glebae, that in some cases their wives and sons were bequeathed by deed to the service of religious houses, and that in many other respects their freedom was limited. Out of this, in the course of centuries, was developed the system prevailing to-day. Lammas lands are indeed a sur- vival from it. There are in the valley of the Lea, and close to London, to take one example, lands allotted annually in little strips till the crops are carried, when, the day being fixed by a reeve, the land becomes a common pasture till the spring closing takes place once more. Perhaps the feature of this old system that bears most directly on the question of allotments was the treatment of the waste of the manor. The lord, like his tenants, was limited by custom as regards the number of beasts he could graze on it. After the havoc of the Black Death in 1349, many changes were necessitated by the scarcity and dearness of labour. It became less unusual for land to be let and for money payment to be accepted instead of services. There was a great demand for wool, and to conduct sheep-farming on a large scale necessi- tated a re-arrangement of the manor and the enclosure of many common fields under the statute of Merton and the statute of Westminster the Second. Nevertheless, up to the 18th century, a vast proportion of agricultural land was technically waste, on which rights of common were exercised by yeomen, some of whom had acquired holdings by the ordinary methods of purchase or inheritance, while others had merely squatted and built a house on the waste. It is to this period that belongs a certain injustice to which the peasantry were subject. No reasonable doubt can be entertained of the necessity of enclosure. Husbandry, after long stagnation, was making great advance; and

among others, Arthur Young raised his voice against the clumsy inconvenient common fields that were the first to be enclosed. Between 1700 and 1797 no fewer than 3 no acts, affecting, as far as can be calculated, about 3,000,000 acres, were put into operation. They seem mostly to have been directed to the common fields. In the first half of the 19th century the movement went on apace. In a single year, 1801, no fewer than 119 acts were passed; and between 1801 and 1842 close on 2000 acts were passed — many of them expressly directed to the enclosure of wastes and commons. The same thing continued till 1869. It touched the peasant directly and indirectly. The enclosure of the common fields proved most hurtful to the small farmer; the enclosure of the waste injured the labourer by depriving him, without adequate compensation, of such useful privileges as the right to graze a cow, a pig, geese or other small animals. It also discouraged him by tending to the extinction of small tenancies and freeholds that were no longer workable at a profit when common rights ceased to go with them. The industrious labourer could pre- viously nourish a hope of bettering his condition by obtaining a small holding. Yet though the labourer suffered, impartial study does not show any intentional injustice. He held a very weak position when those interested in a common affixed to the church door a notice that they intended to petition. As Mr Cowper (afterwards Lord Mount Temple) said in the House of Commons on the 13 th of March 1844, " the course adopted had been to compensate the owner of the cottage to whom the common right belonged, forgetting the claims of the occupier by whom they were enjoyed "; and in the same debate Sir Robert Peel pointed

out that not only the rights of the tenant, but those of hh successors ought to have been studied. The course adopted divorced the labourer from the soil.

Parliament, as a matter of fact, had from a very early period recognized the wisdom of contenting the peasant. In the 14th century the labourer lived in rude abundance. Next century a rural exodus began, owing to the practice of enclosing the holdings and turning them into sheep walks. In 1487 an act was passed enjoining landlords to " keep up houses of husbandry," and attach convenient land to them. Within the next hundred years a number of similar attempts were made to control what we may call the sheep fever of the time. Then we arrive at the reign of Elizabeth and the famous Small Holdings Act passed in 1597 — an anticipation of the three-acres-and-a-cow policy advocated towards the end of the 19th century. It required that no person shall " build, convert or ordain any cottage for habitation or dwelling for persons engaged in

husbandry" unless the owner " do assign or lay to the same cottage or building four acres of ground at the least." It also provided against any " inmate or under-sitter " being admitted to what was sacred to one family. This measure was not conceived in the spirit of modern political economy, but it had the effect of staying the rural exodus. It was repealed in 1775 on the ground that it restricted the building of cottages. By that time the modern feeling in favour of allotments had begun to ripen, and it was contended that some compensation should be made to the labourers for depriving them of the advantages of the waste. Up to then the English labouring rustic had been very well off. Food was abundant and cheap, so were clothes and boots; he could graze his cow or pig on the common, and also obtain fuel from it. Now he fell on evil days. Prices rose, wages fell, privileges were lost, and in many cases he had to sell the patch of land whose possession made all the difference between hardship and comfort. All this was seen plainly enough both by statesmen and private philanthropists. One of the first experiments was described by Sir John Sinclair in a note to the report of a select committee of the House of Commons on waste lands in 1795. About 1772 the lord of the manor of some commonable lands near Tewkesbury had with great success set out 25 acres in allotments for the use of some of the poor. Sir John was very much struck with the result, and so heartily applauded the idea that the committee recommended that any general enclosure bill should have a clause in it providing for "the accommodation of land." Sir Thomas Bernard and W. Wilberforce took an active part in advocating the principle of allotments, on the ground, to summarize their argument in language employed later by a witness before the House of Commons, that " it keeps the cottagers buoyant and makes them industrious." In 1806, at the suggestion of the rector, a clause assigning an allotment of half an acre to every cottage was inserted in an enclosure bill then under consideration for the parish of Broad Somerford in Wiltshire. This was done, " and the example was followed by nearly every adjoining parish in that part of Wiltshire." Passing over several praiseworthy establishments of allotments by private persons, we come to 1.819, when parliament passed an act akin in spirit to several that came into existence during the later portion of the Victorian era. It empowered the churchwardens and overseers of any parish, with the consent of the vestry, to pur- chase or hire land not exceeding 25 acres, and to let it in portions to " any poor and industrious inhabitant of the parish." This was amended in 1831 by an act extending the quantity of land to 50 acres, and also conveying an important new power to enable the same authorities to enclose from any waste or common, land not exceeding 50 acres to be devoted to the same purpose. This was

followed next year by an act relating to fuel, and in 1834 the Poor Law Commissioners reported favourably on the principle of granting allotments. In 1843 an important inquiry into the subject was made by a committee of the House of Commons, which produced a number of valuable suggestions. One consequence was the bill of 1845, brought into parliament by Mr Cowper. It passed the House of Commons; and there Mr Bright made a remark that probably summarized a general

opinion, since it never came to a third reading in the House of Lords. He said that " the voluntary system of arrangement would do all the good that was expected to accrue from the allotment system."

At this point in the history of the movement it may be as well to pause and ask what was the net result of so much legislation and benevolent action. Messrs Tremenheere and Tufnall, who prefixed an admirable epitome of what had been done to the report of the commission " appointed to inquire into the employ- ment of women, young persons and children in agriculture " (1867), expressed considerable disappointment. Between 1710 and 1867, 7,660,413 statute acres were added to the cultivated area of England and Wales, or about one-third of the area in cultivation at the latter date; and of this total, 484,893 acres were enclosed between 1845 and 1867. Of the latter, only 2119 acres were assigned as public allotments for gardens to the labouring poor. It was found to be the case, as it is now, that land was taken up more readily when offered privately and voluntarily than when it came through official sources. Mean- while competent and thoughtful men saw well that the sullen discontent of the peasantry continued, in Lord Bacon's phrase, to threaten " the might and manhood of the kingdom." It had existed since the beginning of the Napoleonic wars, and had become more articulate with the spread of education. We shall see a consciousness of its presence reflected in the minds of statesmen and politicians as we briefly examine the later phase of the movement. This found expression in the clauses against enclosure introduced by Lord Beaconsfield in 1876, and gave force to the three-acres-and-a-cow agitation, of which the more prominent leaders were Joseph Arch and Jesse Collings. In 1882 thef Allotments Extension Act was passed, the object of which was to let the parishioners have charity land in allotments, provided it or the revenue from it was not used for apprentice- ship, ecclesiastical or educational purposes. A

committee of the House of Commons, appointed in 1885 to inquire into the housing of the working classes, reported strongly in favour of allotments, and this was followed in 1887 by the Allotments Act — the first measure in which the principle of compulsory acquisition was admitted in regard to other than charity lands. Its administration was first given to the sanitary authority, but passed to the district councils when these bodies were established in 1894. The local body is empowered to hire or purchase suitable land, and if they do not find any in the market they are to petition the county council, which after due inquiry may issue a pro- visional order compelling owners to sell land, and the Local Government Board may introduce a bill into parliament to confirm the order. It was found that the sanitary authority did not carry out the scheme, and in 1890 another act was passed for the purpose of allowing applicants for allotments, when the sanitary authority failed to provide land, to appeal to the county council. Judging from the evidence laid before the commission on agricultural depression (1894), the act of 1887 was not a conspicuous success. Most of the witnesses reported in such terms as these — " the Allotments Act has been quite inoperative in Cornwall " ; " the act has been a dead letter in the district (Wigtownshire) " ; " the Allotments Act has not been in opera- tion in Flintshire " ; " nothing has been done in the district of Pembrokeshire under the act." No evidence whatever was adduced to show that in a single district a different state of things had to be recorded. From a return presented by the Local Government Board to parliament in 1&96 we l earn t hat eighty-three rural sanitary authorities had acquired land for allotment prior to the 28th of December 1894, the date at which these authorities ceased to exist under the provisions of the Local Government Act 1894. Land was acquired by compulsory purchase in only one parish; by purchase or agreement in eighteen parishes; by hire by agreement in 132 parishes. The total acreage dealt with was 1836 acres 1 rood 34 poles, and the total number of tenants 4711. The number of county councils that up to the same date had acquired land was twelve,

and they had done so by compulsory purchase in one parish, by purchase or agreement in five parishes, by hire by agreement in twenty-four parishes. The total area dealt with was only 413 acres 1 rood 5 poles, and the total number of tenants 825. The complete totals affected at the date of the return (August 21, 1895) by the acts, therefore, were 2249 acres 2 roods 29 poles, and 5536 tenants. A considerable extension has taken place since.

The Small Holdings Act introduced by Mr Henry Chaplin, and passed by parliament in 1892 was an attempt to appease the rural

discontent that had been seething for some time past and was silently but most eloquently expressed in a steady migration from the villages. The object of this measure was to help the deserving labouring man to acquire a small holding, that is to say, a portion of land not less than one acre or more than fifty acres in extent and of an annual value not exceeding £50. It is not necessary here to describe the legal steps by which this was to be accomplished. The essence of the bargain was that a fifth of the purchase money should be paid down, and the remainder in half-yearly instalments spread over a period not exceeding fifty years. But if the local authority thought fit a portion of the purchase money, not exceeding one-fourth, might remain unpaid, and be secured by a perpetual rent charge upon the holding. It cannot be said that this act has attained the object for which it was drawn up. From a return made to the House of Commons in 1895 it was shown that eight county councils had acquired land under the Small Holdings Act, which amounted in the aggregate to 483 acres. A further return was made in 1903, which showed that the total quantity of land acquired from the commencement of the act up to the end of 1902 was only 652 acres.

It is, however, an English characteristic to prefer private to public arrangements, and probably a very great majority of the allotments and small holdings cultivated in 1907 were due to individual initiative. There are no means of arriving at the exact figures, but data exist whereby it is at least possible to form some rough idea of them. It is not the custom to give in the annual agricultural returns any statement of the manner in which land is held, and the information is to be found in the returns presented to parliament from time to time. From the following table, which includes both the holdings owned and tenanted, it will be seen that between 1895 and 1904 the tendency was for the holdings to decrease in number; while the holdings of from 50 to 300 acres slightly increased, those from 5 to 50 acres were almost stationary, and there was a decrease in those between 1 and 5 acres.

1895-

1904.

1 to 5 acres 5 to 50 „ 50 to 300 „ Above 300 „

Number.

117,968

235.481

147,870

18,787

Per cent.

22-68

45-28

28-43

3-6i

Number.

110,974

232,476

150,050

18,084

Per cent.

21-69

45-44

29-33

3-54

Total .

520,106

100

5”.584

100

These figures become doubly instructive when considered in connexion with the decline of the strictly rural population. It will,

therefore, be useful to place beside them a summary published in a report on the decline of rural population in Great Britain issued by the Board of Agriculture and Fisheries in 1906.

Class.

I

1881.

I

1 891.

1901.

Increase (.-VI or I Decrease (—).

1881-1891.

1891-1901.

Farmers and Graziers

Farm Bailiffs and Foremen

Shepherds

Agricultural La- bourers

No.

279,126

22,895 33.125

983.919

No.

277.943

21,453 31.686

866,543

No.

277,694

27.317 35.022

689,292

No.

-1,183

-1,442 -1,439

-H7,376

No.

-249

+5,864 +3,336

-177,251

702

ALLOTMENTS AND SMALL HOLDINGS

These figures must of course be approximate. The effect of recent development in methods of travelling and the growing custom for townsmen either to live wholly in the country or to take week-end cottages, has made it impossible to draw a strict line of demarcation between rural and urban populations. Still they are near enough for practical purposes, and they amply justify the efforts of those who are trying to stay the rural exodus.

While legislation had not, up to 1908, achieved any noteworthy result in the creation of small holdings, and still left doubts as to the practicability of re-creating the English yeoman by act of parliament, many successful efforts have been made by individuals. One of the most interesting is that of the earl of Carrington at Sleaford in Lincolnshire. In this case the most noteworthy feature is that between the landlord and the tenants there is a body called the South Lincolnshire Small Holdings Association, which took 650 acres from Lord Carrington on a twenty years' lease. These acres used to be let to four or five tenants. They were in 1905 divided among one hundred and seventy tenants. The Small Holders' Association guaranteed the rent, which works out at about 33s. per acre, to Lord Carring- ton. They let the men on yearly tenancy have it at about

40s. an acre, the difference being used to meet the expenses of dividing the lands into small holdings, maintaining drains, fences and roads connected with them, and other unavoidable outlays. In this way the landlord is assured of his rent, and the association has lost nothing, as the men were very punctual in their payments. But very great care was bestowed in choosing the men for the holdings. They were in a sense picked men, but men must be picked to work the business satisfactorily. Lincolnshire is pre- eminently a county of small holdings, and the labouring residents in it have been accustomed to the management of them from their infancy onwards. Here as elsewhere the provision of suit- able houses formed a difficulty, some of the tenants having to walk several miles to their holdings. Lord Carrington availed himself as much as possible of the buildings that existed, dividing the old farm houses so as to make them suitable for the small tenants. At Cowbit farm, many of the ordinary labourers' cottages, which were put up at a cost of about £300 a pair, have by the addition of little dairies and other alterations been made suitable for the tenants. From facts collected on the spot we have come to the conclusion that on the small holdings a good tenant makes an average profit of about £4 an acre, but on an allotment cultivated by means of the spade it would probably be at the rate of over £6 an acre. Lord Carrington was also successful in establishing small holdings on the Humberston estate in North Lincolnshire and on his Buckinghamshire estate, near Aylesbury. At Newport Pagnell the attempt failed because the demand was artificial, the ground arable, and the men not capable of dealing with it.

Other examples of the establishment of small holdings can only receive brief reference. The Norfolk Small Holdings Association acquired three farms at Whissonsett, Wa'tton and Swaffham, which are broken up into small lots and let mostly to the village tradespeople. Sir Pearce Edgecumbe established small holdings at Rew, some of which have been purchased by the occupiers, and Mr A. B. Markham created similar ownerships at Twyford (Leicestershire) . At Cudworth in Surrey a group was formed, but the owners were actuated more by the desire to lead a simple life than to prove the remunerative value of small holdings. Mr W. J. Harris created small holdings in Devon, each of which is let on a life tenancy. There the rural exodus has been more than arrested. Mr James Tomkinson established in Cheshire a number of graduated holdings, so contrived as to offer the suc- cessful holders a chance of stepping upwards.

The earl of Harrowby made an interesting experiment on his Sandon

estate in Staffordshire in the midst of a pretty, broken and undulating country. The estate consists of about 6000 acres, one-third of which is laid out in small holdings. These fall naturally into three divisions. First, there are those which belong to men who have regular employment, and would therefore find it impossible to cultivate any great quantity of land. Many of that class are anxious to have a holding of some sort, as it lends

a certain elasticity to their incomes and provides them with a never-failing interest. One who may be taken as typical hired six acres with a good cottage and a large garden, paying a rent of £20 a year. When this holding was created it had already a suitable cottage, but £100 was needed to provide outbuildings, and Lord Harrowby's custom is to charge 5 % on outlay of this kind. This £5, however, is included in the total rent of £20 paid for cottage, land and garden. The man was not only content, but wished to get some more land. The next class consists of those who have not enough land to live on but eke out their livelihood by casual labour. Usually a man of this sort requires from 35 to 50 acres of land mostly pasture. He can attend to it and yet give a certain number of days to estate work. The third class is that of the small farmer who gains his entire livelihood from the land. The obstacle to breaking up large farms into small lies of course in the expense of providing the necessary equipment. It has been found here that a cottage suitable for a small farmer costs about £400 to build in a substantial manner, and the outbuildings about £200. This makes an addition therefore of about £30 to the rent of the land. The ardour with which these tenancies were sought when vacant formed the best testimony to the soundness of the principle applied by Lord Harrowby.

A nest of small holdings was created at Winterslow, near Salisbury, by Major R. M. Poore. The holders completed the purchase by 1906, and the work may be pronounced a complete success. Major Poore originally conceived the idea when land was cheap in 1892, owing to the depression in agriculture. He purchased an estate that came into the market at the time. The price came to an average of £10 an acre, and the men themselves made the average for selling it out again £15 on a principle of instalments. His object was not to make any profit from the transaction, and he formed what is termed a Landholders' Court, formed of the men themselves, every ten choosing one to represent them. This court was found to act well. It collected the instal- ments, which are paid in advance; and of course the members of it, down to the minutest detail, knew not only the circumstances but the character of every applicant for land. The result speaks for itself. The owners are, in the true sense of the word, peasants. They

do not depend on the land for a living, but work in various callings — many being woodmen — for wages that average about 1 5s. a week. The holdings vary in size from less than an acre to ten acres, and are technically held on a lease of 1999 years, practically freehold, though by the adoption of a leasehold form a saving was effected in the cost of transfer. On the holdings most of the men have erected houses, using for the purpose chalk dug up from their gardens, it lying only a few inches below the surface. It is not rock, but soft chalk, so that they are practically mud walls; but being as a rule at least 18 inches thick, the houses are very cool in summer and warm in winter. Major Poore calculated that in seven years these poor people — there are not thirty of them altogether — managed to produce for their houses and land a gross sum of not less than £5000. This he attributed to the loyal manner in which even distant members of the family have helped.

The class of holding which owes its existence to the act of 1892 may be illustrated by the history of the Worcestershire small holdings. The inception of the scheme was due to the decline 1 of the nail-making business, which caused a number of the inhabitants to be without occupation. Two candidates for election to the county council looking out for a popular cry found it in the demand for land. They promised to do their best in this direction, and thanks to the energetic action of Mr Willis Bund, the chairman, the act was put in force. Woodrow Farm, adjoining the village of Catshill in the neighbourhood of Birmingham, was purchased on terms that enabled the land to be sold to the peasant cultivator at £40 an acre. They were paying this back at the rate of 4 % on the purchase money, a rate that included both interest and -sinking fund, so that at the end of forty years they would own the small estates free from encumbrance. The huge population of Birmingham is close to the properties. The men turned their attention mostly to

strawberries, to which many acres were devoted. Costermongers would come out from Birmingham and buy the fruit on the spot, selling part of it to the villas on the way back, and part in the Birmingham market. The experience gained in working the act enabled the committee on small holdings to make a number of practical suggestions for future legislation.

It remains to note the passing in 1907 of a new English Small

Holdings and Allotments Act, experience of which is too recent for its provisions to be more than indicated here. The act transferred to the Board of Agriculture the duties generally of the Local Government Board, and transferred to parish councils or parish meetings the powers and duties of rural district councils; it required county councils to ascertain the demand for land without previous representation to them, and gave power for its compulsory acquisition; and the maximum holding of an allotment was raised from one acre to five. Both compulsory purchase and compulsory hiring (for not less than 14 nor more than 35 years) were authorized, value and compensation being decided by a single arbitrator. A coercive authority was applied to the county councils in the form of commissioners appointed by the Board of Agriculture, who were to hold inquiries inde- pendently and to take action themselves in case of a defaulting county council. They were to ascertain the local demand for small holdings, and to report to the Board, who might then require a county council to prepare a scheme, which, when approved, it was to carry out, the commissioners being em- powered to do so in the alternative.

Foreign Countries. — It remains to give a brief outline of what small holdings are like outside Great Britain. From the results of the Belgian Agricultural Inquiry of 1895 the following table has been compiled, assuming that one hectare = 2\ acres: —

Occupied by

Occupied by

Size of Holding.

Owner.

Tenant.

Total.

More

More

Whole.

than half.

than half.

Whole.

No.

No.

No.

No.

No.

1 \ acres and under

109,169

8,759

34,779

305,413

458,120

1 \ acres and under

5 acres

27,395

19,544

58,829

70,465

176,233

5 acres and under

10 acres .

12,089

13,873

30,340

25,006

81,308

10 acres and under

50 acres .

16,690

18,909

33,443

28,387

97,429

50 or 100 acres

2,021

1,497

3,315

4,517

n,35o

Over 100 ,,

903

470

1,417

2,395

5,185

Total

168,267

63,052

162,123

436,183

829,625

It will be seen from this table that Belgium is pre-eminently a country of small holdings, more than half of the total number being under 50 acres in extent. Of course it is largely a country of market gardens; but as the holdings are most numerous in Brabant, East and West Flanders and Hainault, the pro- vinces showing the largest number of milch cows, it would seem that dairying and la petite culture go together.

There is a slight tendency for the holdings to decrease in number. In Germany the number of small holdings is proportionately much larger than in Great Britain. The returns collected in 1895 showed that there were 3,235,169, or 58-22 % of the total number of holdings under 5 acres in area; and of these no fewer than 11 % are held by servants as part of their wages. The table below compiled for the Journal of the Board of Agriculture enables us to compare the other holdings with those of Great Britain. Great Britain, it will be seen, has over 40% of large farms of between 50 and 500 acres as compared with Germany's 12-6, while the latter has 86-8 of small holdings, compared with England's 58-6.

France also has a far larger proportion of small holdings than Great Britain; its cultivated area of 85,759,000 acres being

divided into 5,618,000 separate holdings, of which the size averages a little over 15 acres as against 63 in Great Britain. Of the whole number, 4,190,795 are farmed by the owners, 934,338 are in metayage, and 1,078,184 by tenants. The leading feature is the peasant proprietary. Half of the arable, more than half of the pasture, six-sevenths of the vineyards and two- thirds of the garden lands are farmed by their owners. Comparison with Great Britain is difficult; but it would appear that, whereas only 11 % of British 520,000 agricultural holdings are farmed by the owners, the proportion in France is 75%. A further point to be noted is that the average agricultural tenancy in France is just one-fourth of what it is in Great Britain, and the average owner-farmed estate only one-sixth.

Size of Holdings.

Germany.

Great Britain.

Number.

Per cent.

Number.

Per cent.

5 to 50 acres . 50 to 500 „ Over 500 „

2,014,940

292,982

13,809

86-8

12-6

o-6

235,481 161,438

5,219

• 58-6

40-1

i-3

Total

2,321,731

100

402,138

100

In France the tendency is for the very small holdings to increase in number owing to subdivision, with a consequent decrease of the size of the average holding. Between the years 1882 and 1892 there was a decrease of 138,237 in the total number of proprietors, the larger properties moving towards consolidation and those of the peasant proprietors towards subdivision.

Those interested in the formation of small holdings in Great Britain will find much to interest them in the history of Danish legislation. British policy for many generations was to preserve demesne land, and there are many devices for insuring that a spendthrift life-owner shall not be able to scatter the family inheritance; but as long ago as 1769 the Danish legislators set an exactly opposite example. They enacted that peasant land should not be incorporated or worked with estate land; it must always remain in the ownership and occupation of peasants. In this spirit all subsequent legislation was conceived, and the allotment law that came into force in October 1899 bears some resemblance to the English Small Holdings Act of 1892. It provides that labourers able to satisfy certain conditions as to character may obtain from the state a loan equal to nine-tenths of the purchase money of the land they wish to acquire. This land should be from 5 to 7 acres in extent and of medium quality, but the limits are from 2§ to lof acres in the case of better or poorer land. The total value should not exceed 4000 kr. (£222). The interest payable on the loan received from the state is 3 %. The loan itself is repayable after the first five years by annual instalments of 4 % until half is paid off; the remainder by instalments of 3! %, including interest. Provision is, however, made for cases where the borrower desired to pay off the loan in larger sums. Regulations are laid down regarding the transfer of such properties and also their testamentary disposition. The Treasury was empowered to devote a sum of 2,000,000 kr.

Number and Size of Holdings in Denmark in 1901.

Groups.

Percentage

Percentage

Average

Number.

of

Acreage.

of

size in

Tondeland.

Acres.

Number.

Area.

Acres.

Under 1 .

Under 1-36

68,380

27-3

23,455

•3

•34

1-3 • •

1-36-4

18,777

7-5

58,553

•7

3-12

3-27 • •

4-36-7

93,060

37-2

1,408,549

15-8

I5-H

27 — 108 .

36-7-147

60,872

24-4

4,459,077

50-1

73-25

108 — 216 .

147-294

6,502

2-6

1,272,398

H-3

!95-69

Over 216 .

Over 294

2,392

10

1,674,730

18-8

700-14

Total.

249,983

100-0

8,896,762

1000

35-59

(£111,000) to this purpose for five years; after that the land is subject to revision.

Even before this law was passed Denmark was a country of small holdings, the peasant farms amounting to 66 % of the

whole, and the number is bound to increase, since the incorporation of farms is illegal, while there is no obstacle to their division. Between 1835 and 1885, the number of small holdings of less than one tondekarthorn increased from 24,800 to 92,856. What gives point to these remarks is, that Denmark seems in the way to arrest its rural exodus, and was one of the first countries to escape from the agricultural depression due to the extraordinary fall in grain prices. The distribution of land in Denmark may be gathered from a glance at the preceding table for the compilation of which we are indebted to Major Craigie.

Authorities. — Walter of Henley's Husbandry; The English Village Community, by Frederic Seebohm; Annals of Agriculture, by Arthur Young; The Agricultural Labourer, by T. K". Kebbel; Report on the Employment of Women and Children in Agriculture, 1867 (historical sketch by Messrs Tremenheere and Tufnall) ; A Study of Small Holdings, by W. E. Bear; The Law and the Labourer, by C. W. Stubbs; " Agricultural Holdings in England and Abroad," by Major Craigie (Statistical Society's Journal, vol. i.) ; The Return to the Land, by Senator Jules Meline; Land Reform, by the Right Hon. Jesse

Collings, M.P.; Report on the Decline in the Agricultural Population of Great Britain, issued by the Board of Agriculture and Fisheries; Report of the Departmental Committee appointed by the Board of Agriculture and Fisheries to enquire into and report upon the subject of Small Holdings in Great Britain. (P. A. G.)

ALLOTROPY (Gr. ciXXos, other, and Tpo7ros, manner), a name applied by J. J. Berzelius to the property possessed by certain substances of existing in different modifications. Custom has to some extent restricted its use to inorganic chemistry; the corresponding property of organic compounds being generally termed isomerism (q.v.). Conspicuous examples are afforded by oxygen, carbon, boron, silicon, phosphorus, mercuric oxide and iodide.

ALLOWANCE (from "allow,' 5 derived through O. Fr. alouer from the two Lat. origins adlaudare, to praise, and allocare, to assign a place; so that the English word combined the general idea of "assigning with approval"), the action of allowing, or the thing allowed; particularly, a certain limited apportionment of money or food and diet (see Dietary).

In commercial usage "allowance" signifies the deduction made from the gross weight of goods to make up for the weight of the box or package, waste, breakages, &c. Allowance, which is customary in most industries, varies according to the trade, district or country; e.g. in the coal trade it is customary for the merchant to receive from the pit 21 cwts. of coal for every ton purchased by him, the difference of 1 cwt. being the allowance for the purpose of making good the waste caused through tran- shipment, screening and cartage (see Tare and Tret.)

ALLOXAN, or Mesoxalyl Urea, C 4 H 2 N 2 4 or CO \NHˆCO/ C0 ' an oration product of uric acid, being obtained from it by the action of cold nitric acid, CsHˆO, + H 2 + O = C 4 H 2 N 2 4 + CO(NH 2) 2 . It crystallizes from water in colourless rhombic prisms, containing four molecules of water of crystallization, and possesses a very acid reaction. It serves as the starting-point for the preparation of many related substances. Zinc and hydrochloric acid in the cold convert it into alloxantin (q.v.), hydroxylamine gives nitroso barbituric acid, C 4 H 2 N 2 3 : NOH, baryta water gives alloxanic acid, C4H4N0O5, hot dilute nitric acid oxidizes it to parabanic acid (q.v.), hot potassium hydroxide solution hydrolyses it to urea and mesoxalic acid (q.v.) and zinc and hot hydrochloric acid convert it into dialuric acid, GiHiNˆ. M. Nencki has shown that alloxan combines with thiourea in alcoholic solu tion, in the presence of

sulphur dioxide to form pseudothiouric acid, C 6 H6N 4 S0 3 . Methyl and dimethylalloxans are also known, the former being obtained on oxidation of methyl uric acid, and the latter on oxidation of caffeine (q.v.).

ALLOXANTIN, CrfLˆOj-SHjO, a product obtained by the combination of alloxan and dialuric acid, probably possessing the constitution

NH-CO CO— NH

II II

C(OH)— O— CH CO

CO NH— CO

A

O— NH

one of the three molecules of water being possibly constitutional. It forms small hard prisms which become red on exposure to air containing ammonia, owing to the formation of murexide (ammonium purpurate),C 6 H 4 (NH 4)N 5 6 . It may also be obtained by the action of sulphuretted hydrogen on alloxan. The tetra- methyl derivative, amalic acid, C 8 (CH3) 4 N 4 07, has been prepared by oxidizing caffeine (q.v.) with chlorine water, and forms colour- less crystals which are only slightly soluble in hot water. The formation of murexide is used as a test for the presence of uric acid, which on evaporation with dilute nitric acid gives alloxantin, and by the addition of ammonia to the residue the purple red colour of murexide becomes apparent.

ALLOYS (through the Fr. aloyer, from Lat. alligare, to combine), a term generally applied to the intimate mixtures obtained by melting together two or more metals, and allowing the mass to solidify. It may conveniently be extended to similar mixtures of sulphur and selenium or tellurium, of bismuth and sulphur, of copper and cuprous oxide, and of iron and carbon, in fact to all cases in which substances can be made to mix in varying proportions without very marked indication of chemical action. The term "alloy" does not necessarily imply obedience to the laws of definite and multiple proportion or even uniformity throughout the material; but some alloys are homogeneous and some are chemical compounds. In what follows we shall confine our attention principally to metallic alloys.

If we melt copper and add to it about 30 % of zinc, or 20 % of tin, we obtain uniform liquids which when solidified are the well-known substances brass and bell-metal. These substances are for all practical purposes new metals. The difference in the appearance of brass and copper is familiar to everyone; brass is also much harder than copper and much more suitable for being turned in a lathe. Similarly, bell-metal is harder, more sonorous and more brittle than either of its components. It is almost impossible by mechanical means to detect the separate in- gredients in such an alloy; we may cut or file or polish it without discovering any lack of homogeneousness. But it is not per- missible to call brass a chemical compound, for we can largely alter its percentage composition without the substance losing the properties characteristic of brass; the properties change more or less continuously, the colour, for example, becoming redder with decrease in the percentage of zinc, and a paler yellow when there is more zinc. The possibility of continuously varying the percentage composition suggests analogy between an alloy and a solution, and A. Matthiessen (Phil. Trans., i860) applied the term " solidified solutions " to alloys. Regarded as descriptive of the genesis of an alloy from a uniform liquid containing two or more metals, the term is not incorrect, and it may have acted as a signpost towards profitable methods of research. But modern work has shown that, although alloys sometimes contain solid solutions, the solid alloy as a whole is often far more like a conglomerate rock than a uniform solution. In fact the uniformity of brass and bell-metal is only superficial; if we adopt the methods described in the article Metallography, and if, after polishing a plane face on a bit of gun-metal, we etch away the surface layer and examine the new surface with a lens or a microscope, we find" a complex pattern of at least two materials. Fig. 1 (Plate) is from a photograph of a bronze containing 23-3 % by weight of tin. The acid used to etch the surface has darkened the parts richest in copper, while those richest in tin remained white. The two ingredients revealed by this process are not pure copper and pure tin, but each material contains both metals. In this case the white tin-rich portions are themselves a complex that can be resolved into two sub- stances by a higher magnification. The majority of alloys, when examined thus, prove to be complexes of two or more materials, and the patterns showing the distribution of these materials throughout the alloy are of a most varied character. It is certain that the structure existing in the alloy is closely connected with the mechanical properties, such as hardness, toughness, rigidity, and so on, that make particular alloys valuable in the arts, and many efforts have been made to trace this connexion. . These efforts have, in some cases, been very

ALLOYS

Plate

ALLOYS.

Frc. i.— (Heycock & Neville, Phil. Trans.) Bronze containing 23-3% of tin. Slowly cooled. Magnified 18 diameters. Dark parts are rich in copper, light parts in tin.

ALLOYS.

Fig. 4.— (Heycock & Neville, Phil. Trans.) Copper- tin [tin 27-7%] chilled at 731 C. before complete solidification. Magnified 18 diameters. Blacks rich, whites less rich in copper.

GUN-MAKING..

Fie. 7. — Gun steel, C.~ o-3°%. Topof ingot.forged magnified 29 diameters. Whites, ferrite;

GUN-MAKING.

.—Gun steel, C. = o-3°%. Oil hardenedand annealed, magnified 50 diameters.

IRON AND STEEL.

Fig. 13. — (Stoughton.) Meshes of pearlite in a network of ccmentite from hyper-eutectoid steel. Magnified 250 diameters.

ALLOYS.

Fig. 2. — (Ewmg& Rosenhain, Phil. Trans.) Lcad- Uneutectic. Magnified 750 diameters.

*&Mmf**

V£«~,,,ˆ

GUN-MAKING.

Fig. 5. — Gun steel, C. = o-3o%. From top of ingot as cast, magnified 29 diameters. Whites, ferrite; blacks, carbide.

GUN-MAKING.

Fig. 8. — Gun steel, C. = o-3o%. Bottom of ingot, forged and annealed, magnified 29 diameters. Whites, ferrite; blacks, carbide.

IRON AND STEEL.

Fig. it. — (Osmond.) Pearlite, steel (carbon about 1%) forged and annealed at 8oo° C. Magnified 1000 diameters.

IRON AND STEEL.

Fig. 14. — (Osmond & Cartaud.) Martensite. Magnified 250 diameters.

ALLOYS.

Fig. 3. — (F.Osmond.) Silver-copper [coppcr= 15%, silver = 85%] reheated to purple colour. Magnified 600 diameters.

GUN-MAKING.

Fig. 6. — Gun steel, C. = o.3o%. From bottom of ingot as cast, magnified 29 diameters. Whites, ferrite; blacks, carbide.

GUN-MAKING.

Flo. 9. — Gun steel, C. = o-;o%. Forced and annealed, magnified 1000 diameters, showing pearlite.

IRON AND STEEL.

Fig. 12. — (Stoughton.) Meshes of pearlite

work of ferrite, from hypo-eutectoid steel. 250 diameters.

a net- Magnified

IRON AND STEEL.

Fig. 1 ■;. — (Osmond.) Martensite (black) in austen- site (white). Steel (carbon about 1-5%) quenched at 1050 C. in ice-cold water. Magnified 250 diameters.

PHOTOMICROGRAPHS OF ALLOYS AND METALS. (See Articles Metallography, Alloys, Gun-makixg, Iron and Steel.)

ALLOYS

successful; for example, in the case of steel, which is an alloy of iron and carbon, a microscopical examination gives valuable information concerning the suitability of a sample of steel for special purposes.

Mixture by fusion is the general method of producing an alloy, but it is not the only method possible. It would seem, indeed, that any process by which the particles of two metals are intimately mingled and brought into close contact, so that diffusion of one metal into the other can take place, is likely to result in the formation of an alloy. For example, if vapours of the volatile metals cadmium, zinc and magnesium are allowed to act on platinum or palladium, alloys are produced. The methods of manufacture of steel by cementation, case-hardening and the Harvey process are important operations which appear to depend on the diffusion of the carburetting material into the solid metal. When a solution of silver nitrate is poured on to metallic mercury, the mercury replaces the silver in the solution, forming nitrate of mercury, and the silver is precipitated, it does not, however, appear as pure metallic silver, but in the form of crystalline needles of an alloy of silver and mercury. F. B. Mylius and O. Fromm have shown that alloys may be precipitated from dilute solutions by zinc, cadmium, tin, lead and copper. Thus a strip of zinc plunged into a solution of silver sulphate, containing not more than 0-03 gramme of silver in the litre, becomes covered with a flocculent precipitate which is a true alloy ol silver and zinc, and in the same way, when copper is precipitated from its sulphate by zinc, the alloy formed is brass. They have also formed in this way certain alloys of definite composition, such as AuCoV Cu 2 Cd, and, more interesting still, Cu 3 Sn. A very similar fact, that brass may be formed by electrodeposition from a solution containing zinc and copper, has long been known. W. V. Spring has shown that by com- pressing a finely divided mixture of 15 parts of bismuth, 8 parts of lead, 4 parts of tin and 3 parts of cadmium, an alloy is pro duced which melts at ioo° C, that is, much below the melting- point of any of the four metals. But these methods of forming alloys, although they suggest questions of great interest, cannot receive further discussion here.

Our knowledge of the nature of solid alloys has been much enlarged by a careful study of the process of solidification. Let us suppose that a molten mixture of two substances A and B, which at a sufficiently high temperature form a uniform liquid, and which do not combine to form definite compounds, is slowly cooled until it becomes wholly solid. The phenomena which succeed each other are then very similar, whether A and B are two metals, such as lead and tin or

silver and copper, or are a pair of fused salts, or are water and common salt. All these mixtures when solidified may fairly be termed alloys. 1 If a mixture of A and B be melted and then allowed to cool, a thermometer immersed in the mixture will indicate a gradually falling temperature. But when solidification commences, the thermometer will cease to fall, it may even rise slightly, and the temperature will remain almost constant for a short time. This halt in the cooling, due to the heat evolved in the solidification of the first crystals that form in the liquid, is called the freezing- point of the mixture; the freezing-point can generally be observed with considerable accuracy. In the case of a pure substance, and of a certain small class of mixtures, there is no further fall in temperature until the substance has become completely solid, but, in the case of most mixtures, after the freezing-point has been reached the temperature soon begins to fall again, and as the amount of solid increases the temperature becomes lower and lower. There may be other halts in the cooling, both before and after complete solidification, due to evolution of heat in the mixture. These halts in temperature that occur during the cooling of a mixture should be carefully noted, as they give valuable information concerning the physical and chemical changes that are taking place. If we determine the freezing-points of a number of mixtures varying in composi- tion from pure A to pure B, we can plot the freezing-point curve.

1 The instructive case of the solidification of a solution of common salt in water is discussed in the article Fusion.

300

T; a

1

• •

Aj

■

\ ? p

»

*i *

R;

|C

!V

ft

- *1*

B aoo?

W

In such a curve the percentage composition can be plotted horizontally and the temperature of the freezing-point vertically, as in fig. 5. In such a diagram, a point P defines a particular mixture, both as to percentage, composition and temperature; a vertical line through P corresponds to the mixture at all possible temperatures, the point Q being its freezing-point. In the case of two substances which neither form compounds nor dissolve each other in the solid state, the complete freezing-point curve takes theform shown infig. 5 . I tconsists of two branches AC and BC, which meet in a lowest point C. It will be seen that as we increase the percentage of B from nothing up to that of the mixture C, the freezing-point becomes lower and lower, but that if we further increase the percentage of B in the mixture, the freezing-point rises. This agrees with the well-known fact that the presence of an impurity in a substance depresses its melting-point. The mixture C has a lower freezing or melting point than that of any other mixture; it is called the eutectic mixture. All the mixtures whose composition lies between that of A and C deposit crystals of pure A when they begin to solidify, while mixtures between C and B in composition deposit crystals of pure B. Let us con- sider a little more closely the solidification of the mixture represented by the vertical line PQRS. As it cools from P to Q the mixture remains wholly liquid, but when the temperature Q is reached there is a halt in the cooling, due to the formation of crystals ioo°c.- of A. The cooling soon recommences and these crystals continue to form, but at lower and lower temperatures be- cause the still liquid part is becoming richer in B . This process goes on until the state of the remaining liquid is represented by the point C. Now crystals of B begin to form, simultaneously with the A crystals, and the composition of the remaining liquid does not alter as the solidification progresses. Consequently the temperature does not change and there is another well-marked halt in the cooling, and this halt lasts until the mixture has become wholly solid. The corresponding changes in the case of the mixture TUVW are easily

understood — the first halt at U, due to the crystallization of pure B, will probably occur at a different temperature, but the second halt, due to the simultaneous crystallization of A and B, will always occur at the same temperature whatever the composition of the mixture. It is evident that every mixture except the eutectic mixture C will have two halts in its cooling, and that its solidifica- tion will take place in two stages. Moreover, the three solids S,D and W will differ in minute structure and therefore, probably, in mechanical properties. All mixtures whose temperature lies above the line ACB are wholly liquid, hence this line is often called the " liquidus "; all mixtures at temperatures below that of the horizontal line through C are wholly solid, hence this line is sometimes called the " solidus," but in more complex cases the solidus is often curved. At temperatures between the solidus and the liquidus a mixture is partly solid and partly liquid. This general case has been discussed at length because a careful study of it will much facilitate the comprehension of the similar but more complicated cases that occur in the ex- amination of alloys. A great many mixtures of metals have been examined in the above-mentioned way.

Fig. 6 gives the freezing-point diagram for alloys of lead and tin. We see in it exactly the features described above. The two sloping lines cutting at the eutectic point are the freezing-point curves of alloys that, when they begin to solidify, deposit crystals of lead and tin respectively. The horizontal line through the

per cant of B Fig. 5.

,- -100 1 c.

oV

706

ALLOYS

Composition

Fig. 6.

eutectic point gives the second halt in cooling, due to the simul- taneous formation of lead crystals and tin crystals. In the case of this pair of metals, or indeed of any metallic alloy, we cannot see the crystals forming, nor can we easily filter them off and examine them apart from the liquid, although this has been done in a few cases. But if we polish the solid alloys, etch them if necessary, and examine

them microscopically, we shall find that alloys on the lead side of the diagram consist of comparatively large crystals of lead embedded in a minute complex, which is due to the simultaneous crystallization of the two metals during the solidification at the eutectic temperature. If we examine alloys on the tin side we shall find large crystals of tin embedded in the same complex. The eutectic alloy itself, fig. 2 (Plate), shows the minute complex of the tin-lead eutectic, photographed

by J. A. Ewing and W. Rosen- hain, and fig. 3 (Plate), photographed by F. Osmond, shows the structure of a silver-copper alloy containing considerably tore silver than the eutectic. Here, the large dark masses are the silver or silver-rich substance that crystallized above the eutectic temperature, and the more minute black and white complex represents the eutectic. It is not safe to assume that the two ingredients we see are pure silver and pure copper; on the contrary, there is reason to think that the crystals of silver contain some copper uniformly diffused through them, and vice versa. It is, however, not possible to detect the copper in the silver by means of the microscope. This uniform distribution of a solid substance throughout the mass of another, so as to form a homogeneous material, is called " solid solution," and we may say that solid silver can dissolve copper. Solid solutions are probably very common in alloys, so that when an alloy of two metals shows two constituents under the microscope it is never safe to infer, without further evidence, that these are the two pure metals. Sometimes the whole alloy is a uniform solid solution. This is the case with the copper-tin alloys containing less than 9% by weight of tin; a microscopic examination reveals only one material, a copper-like substance, the tin having disappeared, being in solution in the copper.

Much information as to the nature of an alloy can be obtained by placing several small ingots of the same alloy in a furnace which is above the melting-point of the alloy, and allowing the temperature to fall slowly and uniformly. We then extract one ingot after another at successively lower temperatures and chill each ingot by dropping it into water or by some other method of very rapid cooling. The chilling stereotypes the structure existing in the ingot at the moment it was withdrawn from the furnace, and we can afterwards study this structure by means of the microscope. We thus learn that the bronzes referred to above, although chemically uniform when solid, are not so when they begin to solidify, but that the liquid deposits crystals richer in copper than itself, and therefore that the residual liquid becomes richer in tin. Consequently, as the final solid is uniform, the crystals formed at first must change in composition at a later stage.

We learn also that solid solutions which exist at high temperatures often break up into two materials as they cool; for example, the bronze of fig. 1, which in that figure shows two materials so plainly, if chilled at a somewhat higher tempera- ture but when it was already solid, is found to consist of only one material; it is then a uniform solid solution. The difference between softness and hardness in ordinary steel is due to the permanence of a solid solution of carbon in iron if the steel has been chilled or very rapidly cooled, while if the steel is slowly cooled this solid solution breaks up into a minute complex of two substances which is called pearlite. The pearlite when highly magnified somewhat resembles the lead-tin eutectic of fig. 2 (Plate). In the case of steel (see Iron and Steel) the solid solution is very hard, while the pearlite complex is much softer. In the case of some bronzes, for example that with about 25% of tin, the solid solution is soft, and the complex into which it

breaks up by slow cooling is much harder, so that the same pro- cess of heating and chilling which hardens steel will soften this bronze.

If we melt an alloy and chill it before it has wholly solidified, we often get evidence of the crystalline character of the solid matter which first forms. Fig. 4 (Plate) is the pattern found in a bronze containing 27-7 % of tin when so treated. The dark, regularly oriented crystal skeletons were already solid at the moment of chilling; they are rich in copper. The lighter part surrounding them was liquid before the chill; it is rich in tin. This alloy, if allowed to solidify completely before chilling, turns into a uniform solid solution, and at still lower temperatures the solid solution breaks up into a pearlite complex. The analogy between the breaking up of a solid solution on cooling and the formation of a eutectic is obvious. Iron and phosphorus unite to form a solid solution which breaks up on cooling into a pearlite. Other cases could be quoted, but enough has been said to show the importance of solid solutions and their influence on the mechanical properties of alloys. These uniform solid solutions must not be mistaken for chemical compounds; they can, within limits, vary in composition like an ordinary liquid solution. But the occasional or indeed frequent existence of chemical compounds in alloys has now been placed beyond doubt.

*We can sometimes obtain definite compounds in a pure state by the action of appropriate solvents which dissolve the rest of the alloy and do not attack the crystals of the compound. Thus, a number of copper-tin alloys when digested with hydro- chloric acid leave the sr * crystalline residue, which on analysis proves to be the compound CujSn. The bodies SbNa3, BiNa3, SnNa4, compounds of iron and*

molybdenum and many other substances, have also been isolated in this way. The freezing- point curve sometimes indicates the existence of chemical com- pounds. The simple type of curve, such as that of lead and tin, fig. 6, consisting of two downward sloping branches meeting in the eutectic point, and that of thallium and tin, the upper curve of fig. 7, certainly give no indication of chemical combination. But the curves are not always so simple as the above. The lower curve of fig. 7 gives the freezing-point curve of mercury and thallium; here A and E are the melting-points of pure mercury and pure thallium, and the branches AB and ED do not cut each other, but cut an intermediate rounded branch BCD. There are thus two eutectic alloys B and D, and the alloys with compositions between B and D have higher melting-points. The summit C of the branch BCD occurs at a percentage exactly corresponding to the formula Hg 2 Tl. It is probable that all the alloys of compositions between B and D, when they begin to solidify, deposit crystals of the compound; the lower eutectic B probably corresponds to a solid complex of mercury and the compound. The point B is at – 6o° C, the lowest temperature at which any metallic substance is known to exist in the liquid state. The higher eutectic D may correspond to a complex of solid thallium and the compound; but the possible existence of solid solutions makes further investigation necessary here. The curves of fig. 7 were determined by N. S. Kurnakow and N. A. Puschin. Sometimes a freezing-point curve contains more than one intermediate summit, so that more than one compound is indicated. For example, in the curve for gold-aluminium, ignoring minor singularities, we find two intermediate summits, one at the percentage Au 2 Al, and another at the percentage AuAl 2 . Microscopic examination fully confirms the existence of these compounds. The substance AuAl 2 is the most remark- able compound of two metals that has so far been discovered; although it contains so much aluminium its melting-point is as high as that of gold, li also possesses a splendid purple

Fig.

colour, more remarkable than that of any other metal or alloy. Many other inter-metallic compounds have been indicated by summits in freezing-point curves. For example, the system sodium-mercury has a remarkable summit at the composition NaHg 2 . This compound melts at 350 C, a temperature far above the melting-point of either sodium or mercury. In the system potassium-mercury, the compound

KHg 2 is similarly indicated. In the curve for sodium-cadmium, the compound NaCd? is plainly shown. These three examples are taken from the work of N. S. Kurnakow. Various compounds of the alkali metals with bismuth, antimony, tin and lead have been prepared in a pure state. Such are the compounds SbNa 3 , BiNa 3 , PbNa 2 , SnNa 4 . Of these, the first three are well indicated on the freezing-point curves. The intermediate summits occurring in the freezing-point curves of alloys are usually rounded; this feature is believed to be due to the partial decomposition of the compound which takes place when it melts. The formulae of the group of substances last mentioned are in harmony with the ordinary views of chemists as to valency, but the formulae NaHgo. NaCd 2 , NaTl 2 , AuAl 2 are more surprising. They indicate the great gaps in our present knowledge of the subject of valency. We must not take it for granted, when the freezing-point curve gives no indication of the compound, that the compound does not exist in the solid alloy. For example, the compound CusSn is not indicated in the freezing-point curve, and indeed a liquid alloy of this percentage does not begin to solidify by the formation of crystals of CujSn; the liquid solidifies completely to a uniform solid solution, and only at a lower temperature does this change into crystals of the compound, the transformation being accom- panied by a considerable evolution of heat. Until recently the vast subject of inter-metallic compounds has been an unopened book to chemists. But the subject is now being vigorously studied, and, apart from its importance as a branch of descriptive chemistry, it is throwing light, and promises to throw more, on obscure parts of chemical theory.

The graphical representation of the properties of alloys can be extended so as to record all the changes, thermal and chemical, which the alloy undergoes after, as well as before, solidification, including the formation and breaking up of solid solutions and compounds. For an example of such a diagram, see the Bakerian Lecture, 1903, Phil. Trans., A. 346. The Phase Rule of Willard Gibbs, especially as developed by Bakhuis Roozeboom, is a most useful guide in such investigations.

So far we have been considering alloys containing two metals; the phenomena they present are by no means simple But when three or more metals are present, as is often the case in useful alloys, the phenomena are much more complicated. With three component metals the complete diagram giving the variations in any property must be in three dimensions, although by the use of contour lines the essential facts can be represented in a plane diagram. The following method, depend- ing on the constancy of the sum of the

perpendiculars from any point on to the sides of an equilateral triangle, can be adopted: — Let ABC (fig. 8) be an equi- lateral triangle, the angular points corre- sponding to the three pure metals A, B, C. Then the composition of any alloy can be represented by a point P, so chosen that the perpendicular Pa on to the side BC gives the percentage of A in the alloy, and the perpendiculars Pb and Pc give the percentages of B and C respectively. Points on the side AB will correspond to binary alloys containing only A and B, and so on. If now we wish to represent the variations in some property, such as fusibility, we determine the freezing-points of a number of alloys dis- tributed fairly uniformly over the area of the triangle, and, at each point corresponding to an alloy, we erect an ordinate at right angles to the plane of the paper and proportional in length to the freezing temperature of that alloy. We can then draw a continuous surface through the summits of all these ordinates, and so obtain a freezing-point surface, or liquidus; points above this surface will correspond to wholly

liquid alloys. The ternary alloys containing bismuth, tin and lead have been studied in this way by F. Charpy and by E. S. Shepherd. We have here a comparatively simple case, as the metals do not form compounds. The' solid alloy consists of crystals of pure tin in juxtaposition with crystals of almost pure lead and bismuth, these two metals dissolving each other in solid solution to the extent of a few per cent only. If now we cut the freezing-point surface by planes parallel to the base ABC we get curves giving us all the alloys whose freezing-point is the same; these isothermals can be projected on to the plane of the triangle and are seen as dotted lines in fig. 9. The freezing surface, in this case, consists of three sheets each starting from an angular point of the surface, that is, from the freezing-point of a pure metal. The sheets meet in pairs along three lines which them- selves meet in a point. In fig. 9, due to F. Charpy, these lines are

ee&

projected on to the plane of the triangle as Ee, E'e and E"e. The area of the triangle is thus divided into three regions. The region PbEeE' contains all the alloys that commence their solidification by the crystallization of lead; similarly, the other two regions correspond to the initial crystallization of bismuth and tin respectively; these areas are the projections of the three sheets of the- freezing-point surface. The points E, E', E" are the eutectics of binary alloys. Alloys represented by points on Ee, when they begin to solidify, deposit crystals of lead and bismuth simultaneously; Ee is a eutectic line, as

also are E'e and E"e. The alloy of the point e is the ternary eutectic; it deposits the three metals simultaneously during the whole period of its solidfication and solidifies at a constant temperature. As the lines of the surface which correspond to Ee, &c, slope downwards to their common intersection it follows that the alloy e has the lowest freezing-point of any mixture of the three metals; this freezing-point is 96 C, and the alloy e contains about 32% of lead, 15-5% of tin and 52-5% of bismuth.

It is evident that any other property can be represented by similar diagrams. For example, we can construct the curve of conductivity of alloys of two metals or the surface of conductivity of ternary alloys, and so on for any measurable property.

The electrical conductivity of a metal is often very much decreased by alloying with it even small quantities of another metal. This is so when gold and silver are alloyed with each other, and is true in the case of alloys of copper. When a pure metal is cooled to a very low temperature its electrical con- ductivity is greatly increased, but this is not the case with an alloy. Lord Rayleigh has pointed out that the difference may arise from the heterogeneity of alloys. When a current is passed through a solid alloy, a series of Peltier effects, proportional to the current, are set up between the particles of the different metals, and these create an opposing electromotive force which is indistinguishable experimentally from a resistance. If the alloy were a true chemical compound the counteracting electro-motive force should not occur; experiments in this direction are much needed.

Sir William Chandler Roberts-Austen has shown that in the case of molten alloys the conduction of electricity is apparently metallic, no transfer of matter attending the passage of the current. A group of bodies may, however, be yet discovered between alloys and electrolytes in which evidence may be found of some gradual change from wholly metallic to electrolytic conduction. A. P. Laurie has determined the electromotive force of a series of copper-zinc, copper-tin and gold-tin alloys, and as the result of his experiments he points to the existence of definite compounds. Explosive alloys have been formed by H. St Claire Deville and H. J. Debray in the case of rhodium, iridium and ruthenium, which evolve heat when they are dissolved in zinc. When the solution of the rhodium-zinc alloy is

treated with hydrochloric acid, a residue is left which under- goes a change with explosive violence if it be heated in vacuo to 400°. The alloy is then insoluble in " aqua regia." The metals have therefore passed into an insoluble form by a comparatively slight elevation of temperature.

Metals do not appear to have been studied from the point of view of surfusion until 1880, when A. D. van Riemsdijk showed Surtusloa. t ˆ lat 8°ld ar, d silver would both pass below their actual freezing-points without becoming solid. Roberts-Austen pointed out that surfusion might be easily measured in metals and in alloys by the sensitive method of recording pyromefry perfected by him. He also showed that the crossing of curves of solubility, which had already been observed by H. le Chatelier and by A. C. A. Dahms in the case of salts, could be measured in the lead-tin alloys. The investigation of the mutual relations of partially miscible liquids, due to P. Alexejew, D. P. Konovalow, and to P. E. Duclaux, was extended to alloys by Alder Wright. The addition of a third metal will sometimes render the mixture of two other metals homogeneous. C. T. Heyccck and F. H. Neville proved that when one metal is alloyed with a small quantity of some other metal, the solidification obeys the law of F. M. Raoult. Their experiments, although not con- clusive, appear to indicate that the molecule of a metal when in dilute solution often consists of one atom. There are, however, numerous exceptions to this rule. In the cases of aluminium dissolved in tin and of mercury or bismuth in lead, it is at least probable that the molecules in solution are Al 2 , Hg 2 and Bi 2 respectively, while tin in lead appears to form a molecule of the type Siu.

Since 1875 increased attention has been devoted to the applications of the rarer metals. Thus nickel, which was formerly used in the manufacture of " German silver " as a aooiica- substitute for silver, is now widely employed in naval dons. construction and in the manufacture of steel armour- plate and projectiles. Alloyed with copper, it is used for the envelopes of bullets. A nickel steel containing 36 % of nickel has the property of retaining an almost constant volume when heated or cooled through a considerable range of tempera- ture; it is therefore useful for the construction of pendulums and for measures of length. Another steel containing 45 % of nickel has, like platinum, the same coefficient of expansion as glass. It can therefore be employed, instead of that costly metal, in the construction of incandescent lamps where a wire has to be fused into the glass to establish electric connexion between the inside and the outside of the bulb. Manganese not only forms with iron several alloys of great interest, but alloyed with copper it is used for

electrical purposes, as an alloy can thus be obtained with an electrical resistance that does not alter with change of temperature; this alloy, called manganin, is used in the construction of resistance-boxes. Chromium also, in com- paratively small quantities, is taking its place as a constituent of steel axles and tires, and in the manufacture of tool-steel. Steels containing as much as 12 % of tungsten are now used as a material for tools intended for turning and planing iron and steel. The peculiarity of these steels is that no quenching or tempering is required. They are normally hard and remain so, even at a faint red heat; much deeper cuts can therefore be taken at a high speed without blunting the tool. Vanadium, molybdenum and titanium may be expected soon to play an important part in the

constitution of steel. Titanium is alloyed in small quantities with aluminium for use in naval architecture. Aluminium, when alloyed with a few per cent of magnesium, gains greatly in rigidity while remaining very light; this alloy, under the name of magnalium, is coming into use for small articles in which lightness and rigidity have to be combined. One of the most interesting amongst recent alloys is Conrad Heusler's alloy of copper, aluminium and manganese, which possesses magnetic properties far in excess of those of the constituent metals.

The importance is now widely recognized of considering the mechanical properties of alloys in connexion with the freezing-point curves to which reference has already been made, but the subject is a very complicated one, and all that need be said here, is that when considered in relation to their melting- points the pure metals are consistently weaker than alloys. The presence in an alloy of a eutectic which solidifies at a much lower temperature than the main mass, implies a great reduction in tenacity, especially if it is to be used above the ordinary tem- perature as in the case of pipes conveying super-heated steam. It has also been stated that alloys of metals with similar melting- points have higher tenacity when the atomic volumes of the constituent metals differ than when they are nearly the same.

References. — Alloys have formed a subject of reports to several scientific societies. Sir W. C. Roberts-Austen's six Reports (1891 to 1904) to the Alloys Research Committee of the Institution of Mechanical Engineers, London, the last report being concluded by William Gowland; the Cantor Lectures on Alloys delivered at the Society of Arts and the Contribution a I'etude des alliages (1901), published by the Societe a" encouragement pour I'industrie nationale

under the direction of the Commission des alliages (1896-1900), should be consulted. The theoretical aspect is discussed in Leon Guillet's £tude theorique des alliages metalliques (1904). W. T. Brannt's The Metallic Alloys (1896) ; Roberts-Austen's Introduction to the Study of Metallurgy (1902) ; and R. G. Thurston's Materials of Engineering, should be consulted for the more practical details.

Recent progress is reported in the scientific periodicals, especially in The Iron and Steel Metallurgist, formerly The Metallographist (Boston, Mass.), and Metallurgie (Halle). Important memoirs by Ewing and Rosenhain, and by C. T. Heycock and F. H. Neville in the Philosophical Transactions, by N. S. Kurnakow in the Zeitschrift fur anorganische Chemie, and by E. S. Shepherd in the Journal of Physical Chemistry, may also be consulted. (W. C. R.-A. ; F. H. Ne.)

ALLPORT, SIR JAMES JOSEPH (1811-1892), English railway manager, born on the 27th of February 181 1, was a son of William Allport, of Birmingham, and was associated with railways from an early period of his life. In 1843 he became general manager of the Birmingham and Derby railway, and in the following year succeeded to the same position on the Newcastle and Darlington line. Six years later he assumed the charge of the Manchester, Sheffield and Lincolnshire (now the Great Central) railway, and finally, in r853, was appointed to the general managership of the Midland railway — an office which he held continuously, with the exception of a few years between 1857 and i860, when he was managing director to Palmer's Shipbuilding Company at Jarrow, until his retirement in 1880, when he became a director. During these twenty-seven years the Midland grew to be one of the most important railway systems in England, partly by the absorption of smaller lines and partly by the construction of two main extensions — on the south to London and on the north to Carlisle — whereby it obtained an independent through-route between the metropolis and the north. In the railway world Sir James Allport was known as a keen tactician and a vigorous fighter, and he should be remembered as the pioneer of cheap and comfortable railway travelling. He was the first to appreciate the importance of the third-class passenger as a source of revenue, and accord- ingly, in 1872, he inaugurated the policy — subsequently adopted more or less completely by all the railways of Great Britain — of carrying third-class passengers in well-fitted carriages at the uniform rate of one penny a mile on all trains. The diminution in the receipts from second-class passengers, which was one of the results, was regarded by some authorities as a sign of the unwisdom of his action, but to. him it appeared a sufficient reason for the abolition of second-class carriages, which there- fore

disappeared from the Midland system in 1875, the first- class fares being at the same time substantially reduced.

He was also the first to introduce the Pullman car on British railways. Allport received the honour of knighthood in 1884. He died in London on the 25th of April 1892.

ALLPORT, SAMUEL (1816-1897), English petrologist, brother of the above, was born in Birmingham on the 23rd of January 1816, and educated in that city. Although occupied in business during the greater portion of his life, bis leisure was given to geological studies, and when residing for a short period in Bahia, S. America, he made observations on the geology, published by the Geological Society in i860. His chief work was in microscopic petrology, to the study of which he was attracted by the investiga- tions of Dr H. C. Sorby; and he became one of the pioneers of this branch of geology, preparing his own rock-sections with remarkable skill. The basalts of S. Staffordshire, the diorites of Warwickshire, the phonolite of the Wolf Rock (to which he first directed attention), the pitchstones of Arran and the altered igneous rocks near the Land's End wereinvestigated and described by him during the years 1869-1879 in the Quarterly Journal of the Geological Society and in the Geological Magazine. In 1880 he was appointed librarian in Mason College, a post which he relinquished on account of ill-health in 1887. In that year the Lyell medal was awarded to him by the Geological Society. A few years later he retired to Cheltenham, where he died on the 7th of July 1897.

ALL-ROUND ATHLETICS. Specialization in athletic sports, although always existent, is to a great extent a modern product. In ancient times athletes were encouraged to excel in several branches of sport, often quite opposite in character. Thus the athlete held in highest honour at the Olympic Games (see Games, Classical) was the winner of the pentathlon, which consisted of running, jumping, throwing the javelin and the discus, and wrestling. All-round championships have existed for many years both in Scotland and Ireland, and in America there are both national and sectional championships. The American national championship was instituted in 1884, the winner being the athlete who succeeds in obtaining the highest marks in the following eleven events; 100 yards run; putting 16 lb shot; running high jump; half-mile walk; throwing 16 lb hammer; 120 yards hurdle race; pole

vault; throwing 56 lb weight; one mile run; running broad jump; quarter-mile run. In each event 1000 points are allowed for equalling the " record," and an increasing number of points is taken off for performances below " record," down to a certain "standard," below which the competitor scores nothing. For example, in the 100 yards run the time of 9ˆ seconds represents 1000 points; that of 10 seconds scores 958, or 42 points less; io£ seconds scores 916, &c. ; and below 14ˆ seconds the competitor scores nothing. Should the record be broken 4.2 points are added for each £ second. (See also Athletic Sports.)

ALL SAINTS, FESTIVAL OF (Festum omnium sanctorum), also formerly known as All Hallows, or Hallowmas, a feast of the Catholic Church celebrated on the 1st of November in honour of all the saints, known or unknown. In the Roman Catholic Church it is a festival of the first rank, with a vigil and an octave. Common commemorations, by several churches, of the deaths of martyrs began to be celebrated in the 4th century. The first trace of a general celebration is in Antioch on the Sunday after Pentecost, and this custom is also referred to in the 74th homily of St Chrysostom (407). The origin of the festival of All Saints as celebrated in the West is, however, somewhat doubtful. In 609 or 610 Pope Boniface IV. conse- crated the Pantheon at Rome to the Blessed Virgin and all the martyrs, and the feast of the dedicatio Sanctae Mariae ad Martyres has been celebrated at Rome ever since on the 13th of May. The idea, based on the medieval liturgiologists, that this festival was the origin of that of All Saints has now been abandoned. The latter is possibly traceable to the foundation by Gregory III. (731-741) of an oratory in St Peter's for the relics " of the holy apostles and of all saints, martyrs and confessors, of all the just made perfect who are at rest throughout the world." So far as the Western Church generally is concerned, though the festival was already widely celebrated in the days of Charlemagne, it

was only made of obligation throughout the Frankish empire in 835 by a decree of Louis the Pious issued " at the instance of Pope Gregory IV. and with the assent of all the bishops," which fixed its celebration on the 1st of November. The festival was retained at the Reformation in the calendar, of the Church of England, and also in that of many of the Lutheran churches. In the latter, in spite of attempts at revival, it has fallen into complete disuse.

ALL SOULS' DAY (Commemoratio omnium fidelium defunc- torum), the day set apart in the Roman Catholic Church for the commemoration of the faithful departed. The celebration is based on

the doctrine that the souls of the faithful which at death have not been cleansed from venial sins, or have not atoned for past transgressions, cannot attain the Beatific Vision, and that they may be helped to do so by prayer and by the sacrifice of the mass. The feast falls on the 2nd of November; or on the 3rd if the 2nd is a Sunday or a festival of the first class. The practice of setting apart a special day Tor intercession for certain of the faithful departed is of great antiquity; but the establish- ment of a feast of general intercession was in the first instance due to Odilo, abbot of Cluny (d. 1048). The legend connected with its foundation is given by Peter Damiani in his Life of Si Odilo. According to this, a pilgrim returning from the Holy Land was cast by a storm on a desolate island where dwelt a ' hermit. From him he learned that amid the rocks was a chasm communicating with purgatory, from which rose perpetually the groans of tortured souls, the hermit asserting that he had also heard the demons complaining of the efficacy of the prayers of the faithful, and especially of the monks of Cluny, in rescuing their victims. On returning home the pilgrim hastened to inform the abbot of Cluny, who forthwith set apart the 2nd of November as a day of intercession on the part of his community for all the souls in purgatory. The decree ordaining the celebration is printed in the Bollandist Acta Sanctorum {Saec. VI., pt. i. p. 585). From Cluny the custom spread to the other houses of the Cluniac order, was soon adopted in several dioceses in France, and spread thence throughout the Western Church. At the Reformation the celebration of All Souls' Day was abolished in the Church of England, though it has been renewed in certain churches in connexion with the " Catholic revival." Among continental Protestants its tradition has been more tenaciously maintained. Even Luther's influence was not sufficient to abolish its celebra- tion in Saxony during his lifetime; and, though its ecclesiastical sanction lapsed before long even in the Lutheran Church, its memory survives strongly in popular custom. Just as it is the custom of French people, of all ranks and creeds, to decorate the graves of their dead on the jour des morls, so in Germany the people stream to the grave-yards once a year with offerings of flowers.

Certain popular beliefs connected with All Souls' Day are of pagan origin and immemorial antiquity. Thus the dead are believed by the peasantry of many Catholic countries to return to their former homes on All Souls' night and partake of the food of the living. In Tirol cakes are left for them on the table and the room kept warm for their comfort. In Brittany the people flock into the cemeteries at nightfall to kneel bare-headed at the graves of their loved ones, and to fill the hollow of the tombstone with holy water or to pour libations of milk

upon it, and at bedtime the supper is left on the table for the soul's refreshment.

ALLSTON, WASHINGTON (1770-1843), American historical painter and poet, was born on the 5th of November 1779 at Waccamaw, South Carolina, where his father was a planter. He graduated at Harvard in 1800, and for a short time pursued his artistic studies at Charleston with Edward Greene Malbone (1777-1807) the miniature painter, and Charles Fraser (1782-1860). With the former, in 1861, he went to London, and entered the Royal Academy as a student of Benjamin West, with whom he formed a lifelong friendship. In 1804 he went to. Paris, and, after a few months' residence there, to Rome, where he spent the greater part of the next four years. During this period he became intimate with Coleridge and Thorwaldsen. From 1809 to 1811 he resided in his native country, and from 181 1 to 181 7 he painted in England. After visiting Paris a

second time, he returned to the United States, and practised his profession at Boston (1818ˆ1830), and afterwards at Cam- bridge, Massachusetts, where he died on the gth of July 1843. He was elected an associate of the Royal Academy in 1810. In colour and the management of light and shade Allston closely imitated the Venetian school, and he has hence been styled the "American Titian." Many of his pictures have Biblical subjects, and Allston himself had a profoundly religious nature. His first considerable painting, " The Dead Man Revived," executed shortly after his second visit to England, and now at the Pennsyl- vania Academy of Fine Arts in Philadelphia, gained a prize of 200 guineas. In England he also painted his " St Peter Liberated by the Angel," " Uriel in the Sun " (at Stafford House), " Jacob's Dream " (at Petworth) and " Elijah in the Wilderness." To the period of his residence in America belong " The Prophet Jeremiah " (atYale), " Saul and the Witch of Endor," "Miriam," " Beatrice," "Rosalie," " Spalatro's Vision of the Bloody Hand," and the vast but unfinished " Belshazzar's Feast " (in the Boston Athenaeum), at which he was working at the time of his death. As a writer, Allston shows great facility of expression and imaginative power. His friend Coleridge (a portrait of whom by Allston is in the National Gallery) said of him that he was surpassed by no man of his age in artistic and poetic genius. His literary works are — The Sylphs of the Seasons and other Poems (18 1 3), where he

displays true sympathy with nature and deep knowledge of the human heart; Monaldi (1841), a tragical romance, the scene of which is laid in Italy; and Lectures on Art, edited by his brother-in-law, R. H. Dana the novelist (1850). See J. 15. Flagg's Life and Letters of Washington Allston (New York, 1892).

ALLUVION (Lat. alluvio, washing against), a word taken from Roman law, in which it was one of the examples of accessio, that is, acquisition of property without any act being done by the acquirer. It signifies the gradual accretion of land or formation of an island by imperceptible degrees. If the accretion or forma- tion be by a torrent or flood, the property in the severed portion or new island continues with the original owner until the trees, if any, swept away with it take root in the ground. Alluvion never attached at all in the case of agri limitati, that is, lands belonging to the state and leased or sold in plots. Dig. xli. 1,7, is the main authority. English law is in general agreement (except as to agri limitati) with Roman, as appears from the judgment in Foster v. Wright, 1878, 4 C.P.D. 438. The Scottish law, as laid down by the House of Lords in Earl of Zetland v. Glover Incorporation, 1872, L.R. 2 H.L., Sc, 70, is in accordance with the English. (See Water Rights.)

ALLUVIUM, soil or land deposited by running water. All streams, from the tiniest rill to the greatest river, are continually engaged in transporting downstream solid particles of rock, the product of weathering agencies in the area which they drain. Since the capacity of a stream to carry matter in suspension is proportional to its velocity, it follows that any circumstance tending to retard the rate of flow will induce deposition. Thus a fall in the gradient at any point in the course of a stream ; any snag, projection or dam, impeding the current; the reduced velocity caused by the overflowing of streams in flood and the dissipation of their energy where they enter a lake or the sea, are all contributing causes to alluviation, or the deposition of stream- borne sediment. It is evident from the foregoing remarks, that while even the smallest stream may make deposits of alluvial character it is in the flood-plains and deltas of large rivers that the great alluvial deposits are to be found. The finer material constituting alluvium, often described as " silt," is sand and mud. Although it may be exceedingly fine-grained, there is usually very little clay in alluvium. The larger materials include gravel of all degrees of coarseness; carbonaceous matter is often an important element. The amount of solid matter borne by large streams is enormous; many rivers derive their names from the colour thereby imparted to the water, e.g. Hwang Ho = Yellow river, Missouri = Big Muddy, the Red river, &c. It has been estimated that the

Mississippi annually carries 406ˆ million tons of sediment to the sea; the Hwang Ho 796 million tons; the Po

67 million tons. Many shallow lakes have been completely filled with alluvium and their sites are now occupied by fertile plains; this process may be seen in operation almost anywhere; a good illustration is the delta of the Rhone in Lake Geneva. Alluvial deposits may be of great size. The flood-plain of the Mississippi has an area of 50,000 sq. m.; the great delta of the Ganges and Brahmaputra has an area of about 60,000 sq. m.; that of the Hwang Ho reaches out 300 m. into the sea and has a coastal border of about 400 m. Old alluvial deposits are left high above the existing level of many rivers, in the form of " terraces " of gravel and loam, the streams to which these owe their existence having modified their courses and cut deeper channels; such are the alluvial gravels and brick-earths upon which much of " greater London " is built. In some regions alluvial deposits are the resting places of gemstones and gold, platinum, &c; it is from these deposits that the largest nuggets of gold have been obtained. Alluvial soils are almost invariably of great fertility; it is due to the alluvial mud annually deposited by the Nile that the dwellers in Egypt have been able to grow their crops for over 4000 years without artificial fertilization.

ALLYL ALCOHOL, C 3 H 5 OH or CH 2 :CH-CH 2 OH, a compound which occurs in very small quantities in wood spirit. It may be prepared from allyl iodide by the action of moist silver oxide ; by the reduction of acrolein; or by heating glycerin with oxalic acid and a little ammonium chloride to 260 C. In this last reaction glycerol monoformin is produced as an intermediate product, but is decomposed as the temperature rises : —

C 3 H s (OH) 3 +H 2 C 2 04 = C 3 H 5 (OH) 2 -0-CHO+C02-r-H 2
glycerol monoformin

C 3 H 6 (OH) 2 -O-CH0 = C 3 H 6 0H+CO 2 + H 2 O

It is a colourless mobile liquid of pungent smell, boiling at 97 C. Being an unsaturated compound it combines readily with the halogens. Oxidation by strong oxidizing agents converts it successively into its aldehyde, acrolein, and into acrylic acid. By gentle oxidation with potassium permanganate it may be converted into glycerin.

ALMA, a river of Russia, in the S. W. of the Crimea, entering the Black Sea 17 m. N. of Sevastopol. It gives its name to a famous

victory gained over the Russians, on the 20th of September 1854, by the allied armies in the Crimean War (q.v.). The south bank of the river is bordered by a long ridge, which becomes steeper as it approaches the sea, and upon this the Russians, under Prince Menshikov, were drawn up, to bar the Sevastopol road to the allies, who under General Lord Raglan and Marshal St Arnaud approached from the north over an open plain. The Russian commander massed his troops in heavy columns after the fashion of 1813, and drew in his left wing so that it should as far as possible be out of range of the allied men-of-war, which were sailing down the coast in line with their land forces. The allied generals decided that the French (right wing) and the Turks should attack Menshikov's left, while the British, further inland, were to assault the front of the Russian position. The forces engaged are stated by Hamley (War in the Crimea) as, French and Turks, 35,000 infantry, with 68 guns; British, 23,000 infantry, 1000 cavalry and 60 guns; Russians, 33,000 infantry, 3800 cavalry and 120 guns; by the Austrian writer Berndt (Zahl im Kriege) the allied forces are reckoned at 57,000 men with 108 guns, and the Russians at 33,600 men with 96 guns. The French advance met at first with little opposition, and several divisions scaled the cliffs of the lower Alma without difficulty. Menshikov relied apparently on being able to detach his reserves to cope with them, but the assailants moved with a rapidity which he had not counted upon, and the Russians only came into action piecemeal in this quarter. Opposite the British, who as usual deployed at a distance and then advanced in long continuous lines, the Russians were posted on the crest of a long glacis-like slope, which offered but little dead ground to an assailant. The village of Burliuk, and the vineyards which bordered the river, were quickly cleared by the British skir- mishers, and the line of battle behind them crossed, though with some difficulty. On emerging from the cover afforded by the river-bed the British divisions, now crowded together, but still

preserving their general line, came under a terrible fire from heavy guns and musketry. The enemy's artillery was three hundred yards away, yet the British pressed on in spite of their losses, and as some of the Light Division troops reached the "Great Battery" the Russians hurried their guns away to safety. In the meantime, on both sides of this battery, the assailants had come to close quarters with the Russian columns, which were aided by their field guns. A brave

*counter-attack was made by the Russian Vladimir regiment, 3000 strong, against the troops which had stormed the great battery, and for want of support the British were driven out again. But they soon rallied, and now the second line had crossed and formed for attack. The Guards brigade attacked the Vladimir regiment, and on the left the Highland brigade and the cavalry moved forward also. Some of the field artillery, which had now crossed *^e Alma, fired steadily into the closed masses of the Russian reserve, and the Vladimir regiment lost half of its numbers under the volleys of the Guards. The French were now severely pressing the Russian left, and one-third of Menshikov's forces was drawn into the fight in that quarter. The success of the frontal assault had dispirited the remainder of the defenders, and Menshikov drew off his forces southwards. He had lost 5700 men (Berndt and Hamley). The British had about 2000 killed and wounded; the French stated their losses at 1340 men.*

ALMACANTAR , an astronomical term for a small circle of the sphere parallel to the horizon; when two stars are in the same almacantar they have the same altitude. The term was also given (1880) to an instrument invented by S. C. Chandler to determine the latitude or correct the timepiece, of great value because of its freedom from instrumental errors.

ALMACK'S, formerly the name of a famous London club and assembly rooms. The founder, known as William Almack, is usually said to have been one Macall, or McCaul, of which name Almack is an anagram. In 1 764 he founded a gentlemen's club in Pall Mall, where the present Marlborough Club stands. It was famous for its high play. In 1778 it was taken over by one Brooks, and established as Brooks's Club in St James's Street, where it still exists. In 1765 Almack built a suite of assembly rooms in King's Street, St James's. Here for a ten-guinea subscription a series of weekly balls was given for twelve weeks. They were managed by a committee of ladies of rank, and admission was exceedingly difficult. At Almack's death in 1781 they were left to his niece Mrs Willis. As " Willis's Rooms " they lasted till 1890, when they became a restaurant, but as " Almack's " they ceased in 1863. Several clubs, including a mixed club for ladies and gentlemen, held meetings at Almack's duringthe iSthandbeginningof the 19th centuries. Anew London social club (1904) has also adopted the name of Almack's.

ALMADEN, or Almaden del Azogue, a town of Spain, in the province of Ciudad Real; situated in mountainous country 55 m. W.S.W. of the city of Ciudad Real. Pop. (1900) 7375. Almaden, the Sisapon of the Romans, is celebrated for its mercury mines, which were

extensively wrought by the Romans and Moors, and are still productive, the ore increasing in richness with the depth of the descent. The mines ranked with those of Adria, in South Austria, as the most valuable in the world, until the great development of the mercury deposits at New Almaden, in California, U.S.A., between 1853 and 1857. They were long worked by convict labour, owing to their unhealthy atmosphere; and exemption from military service is granted to miners who have worked at Almaden for two years. The annual yield is about 1,400,000 lb. Lead and sulphur are obtained in the neighbourhood. The nearest railway station is that of Chill6n, 3 m. S. on the Madrid-Badajoz-Lisbon line.

ALMAGRO, DIEGO DE (1475-1538), Spanish commander, the companion and rival of Pizarro (

ALMANAC, a book or table containing a calendar of the days, weeks and months of the year, a register.of ecclesiastical festivals and saints' days, and a record of various astronomical phenomena &c. The derivation of the word is doubtful. The word almanac was used by Roger Bacon (Opus Majus, 1 267) for tables of the apparent motions of the heavenly bodies. The Italian form is almanacco, French almanack, and the Spanish is almanaque; all of which, according to the New English Dictionary, are probably connected with the Arabic al-manakh, a combination of the definite article al, and manakh, a word of uncertain origin. An Arabic- Castilian vocabulary (1505) gives manakh, a calendar, and manah, a sun-dial; manakh has also been connected with the Latin manacus, a sun-dial.

The attention given to astronomy by Eastern nations probably led to the early construction of such tables as are comprised in our almanacs; of these we know little or nothing. The fasti (q.v.) of the Romans are far better known and were similar to modern almanacs. Almanacs of a rude kind, known as clogg almanacs, consisting of square blocks of hard wood, about 8 in. in length, with notches along the four angles corresponding to the days of the year, were in use in some parts of England as late as the end of the 17th century. Dr Robert Plot (1640- 1696), keeper of the Ashmolean Museum and professor of chem- istry at Oxford, describes one of these in his Natural History of Staffordshire (Oxford, 1686); and another is represented in Gough's edition of Camden's Britannia (1806, vol. iL p. 499).

The earliest almanac regarding which J. J. L. de Lalande (Bibliographic astronomique, Paris, 1803) could obtain any definite

information belongs to the 12 th century. Manuscript almanacs of considerable antiquity are preserved in the British Museum and in the libraries of Oxford and Cambridge. Of these the most remarkable are a calendar ascribed to Roger Bacon (T292), and those of Peter de Dacia (about 1300), Walter de Elvendene (1327) and John Somers (1380). It is to be remem- bered that early calendars (such as the Kalendarium Lincolniense of Bishop Robert Grosseteste) frequently bear the names, not of their compilers, but of the writers of the treatises on ecclesi- astical computation on which the calendars are based. The earliest English calendar in the British Museum is one for the year 143 1. The first printed almanac known was compiled by Purbach, and appeared between the years 1450 and i46r; the first of importance is that of Regiomontanus, which appears to have been printed at Nuremberg in 1472. In this work the almanacs for the different months embrace three Metonic cycles, or the 57 years from 1475 to 1 531 inclusive. The earliest almanac printed in England was The Kalendar of Shepardes, a translation from the French, printed by Richard Pynson about 1497.

Early almanacs had commonly the name of " prognostica- tions " in addition, and what they professed to show may be gathered from titles like the following, which is quoted by J. O. Halliwell: " Pronostycacyon of Mayster John Thybault, medycyner and astronomer of the Emperyall Majestie, of the year of our Lorde God MCCCCCXXXIJ., comprehending the iiij. partes of this yere, and of the influence of the mone, of peas and warre, and of the sykenesses of this yere, with the con- stellacions of them that be under the vij. pianettes, and the revoludons of kynges and princes, and of the eclipses and comets." Among almanacs of this class published in England, and principally by the Stationers' Company, are Leonard Digges's Prognostication Everlasting of Right Good Effect, for !553> 1-555, & c -! William Lilly's Merlinus Anglicus Junior for 1644, &c, and other almanacs and "prognostications"; John Booker's Bloody Almanac and Bloody Irish Almanac for 1643, 1647, &c. — the last attributed erroneously to Richard Napier; John Partridge's Mercurius Coelestis for 1681, Merlinus Redivivus, &c. The name of Partridge has been immortalized in Pope's Rape of the Lock; and his almanacs were very cleverly burlesqued by Swift, who predicted Partridge's own death, in genuine prognosticator's style. The most famous of all the Stationers' Company's predicting almanacs was the Vox Stellarum of Francis Moore (1657-1715 ?), the first number of which was completed in July 1700, and contained predictions for 1701.

Its publication has been continued under the title of Old Moore's Almanac. Of a different but not a better sort was Poor Robin, dating from 1663, and published by the company down to 1828, which abounded in coarse, sometimes extremely coarse, humour.

*The exclusive right to sell "almanacs and prognostications" in England, enjoyed in the time of Elizabeth by two members of the Company of Stationers, was extended by James I. to the two universities and the Stationers' Company jointly; but the universities commuted their privilege for an annuity from the company. This monopoly was challenged by Thomas Carnan, a bookseller, who published an almanac for three successive years, after having been thrice imprisoned on that account by the company. The case came, in 1775, before the court of common pleas, and was decided in Carnan's favour, the question argued being, " Whether almanacs were such public ordinances, such matters of state, as belonged t*o the king by his prerogative, so as to enable him to communicate an exclusive right of printing them to a grantee of the crown?" In 1779 Lord North attempted to reverse this decision by a parliamentary enactment, but the bill was thrown out. In consequence of this the universities lost their title to their annuity, and in lieu of it they received a parliamentary grant. The company, however, virtually retained its monopoly for many years, by buying up as much as possible all the almanacs issued by other publishers, but in more recent times this power has altogether ceased, although a considerable proportion of the almanacs published in England still issue from the hall of the Stationers' Company. A description of " Almanac Day " at Stationers' Hall will be found in Knight's Cyclopaedia of London (1851), p. 588.*

On the 1st of January 1828 the Society for the Diffusion of Useful Knowledge issued the British Almanac for that year — a publication greatly superior in every way to the almanacs of the time. The success of the British Almanac, with its valuable supplement, the Companion to the Almanac, led to a great improvement in this class of publications. The Stationers' Company issued the Englishman's Almanac, a work of a similar kind. The entire repeal in 1834, by the 3rd and 4th Will. IV. c.57, of the heavy stamp duty, first imposed in 17 10, on all almanacs of fifteenpence per copy, gave an additional stimulus to the publication of almanacs of a better class, and from that time the number has greatly increased. Since 1870, the British Almanac and Companion have been the principal almanacs published by the Stationers' Company. Whitaker's Almanac,

commenced in 1868 by Joseph Whitaker (1820-1805), is perhaps the best known of modern almanacs.

In Scotland, almanacs containing much astrological matter appeared to have been published at about the beginning of the 16th century; and about a century later those published at Aberdeen enjoyed considerable reputation. In 1683, the Edinburgh's True Almanack, or a New Prognostication, appeared; a publication which improved with years and was issued after 1837 as Oliver and Boyd's New Edinburgh Almanac, a standard book of reference for Scottish affairs. Thorn's Irish Almanac (since 1843) deals mainly with Ireland.

The earliest alm'anac published in the United States is probably to be ascribed to Bradford's press in Philadelphia, for the year 1687. Poor Richard's Almanac, commenced in 1732 by Benjamin Franklin under the pseudonym of " Richard Saunders," and continued by him for twenty-five years, gained a high reputa- tion for its wise and witty sayings; it may have been suggested by a somewhat similar publication by Thomas, of Dedham, Massachusetts. The American Almanac and Repository of Useful Knowledge was published at Boston from 1828 to 1861; a continuation, The National Almanac, was published only twice, for 1863 and 1864. The Old Farmer's Almanac enjoys considerable popularity and has been published for many years. At the present time nearly every religious denomination, trade and newspaper have almanacs or year-books.

In France prophetic almanacs circulated very freely among the poorer and rural classes, although an ordonnance of Charles IX. required the seal of a diocesan bishop on all almanacs. In 1579 Henry III. prohibited the publication of predictions

relating to political events, a prohibition renewed by Louis XIII. Of such almanacs, the most famous was the Almanack Lilgeois first published in 1625 at Liege by Matthieu Laensbergh, a person of very problematic existence. Publications of this class subsequently increased in number to such an extent that, in 1852, their circulation was forcibly checked by the government. The most important French almanac is the Almanack Royal, afterwards Imperial, and now National, first published in 1679.

A number of publications, issued in Germany, from the middle of the 1 8th to the middle of the 19th century, under such titles as Musenalmanach, modelled on the Almanack des Muses, a contemporary almanac published at Paris, contain some of the best

works of some of the most celebrated German poets. The Almanack de Gotha, which has existed since 1763, published since 1871 both in French and German, gives a particular account of all the royal and princely families of Europe, and ample details concerning the administration and the statistics of the different states of the world.

For the Nautical Almanac and similar publications, see Ephemeris.

ALMANDINE, or Almandite, a name applied to certain kinds of precious garnet, being apparently a corruption of alabandicus, which is the name applied by Pliny to a stone found or worked at Alabanda, a town in Caria in Asia Minor. Almandine is an iron alumina garnet, of deep red colour inclining to purple. It is frequently cut with a convex face, or en cabochon, and is then known as carbuncle. Viewed through the spectroscope in a strong light, it generally shows three characteristic absorp- tion bands, as first pointed out by Prof. A. H. Church.

Almandine occurs rather abundantly in the gem-gravels of Ceylon, whence it has sometimes been called Ceylon-ruby. When the colour inclines to a violet tint, the stone is often called Syrian garnet, a name said to be taken from Syriam, an ancient town of Pegu. Large deposits of fine almandine-garnets were found, some years ago, in the Northern Territory of South Australia, and were at first taken for rubies, whence they were known in trade for some time afterwards as Australian rubies.

Almandine is widely distributed. Fine rhombic dodecahedra occur in the schistose rocks of the Zillerthal, in Tyrol, and are sometimes cut and polished. An almandine in which the fer- rous oxide is replaced partly by magnesia is found at Luisenfeld in German East Africa. In the United States there are many localities which yield almandine. Dr G. F. Kunz has figured a crystal of coarse almandine weighing 9I lb. from New York city. Fine crystals of almandine embedded in mica-schist occur near Fort Wrangell in Alaska. The coarse varieties of almandine are often crushed for use as an abrasive agent. (See Garnet.)

ALMANSA, or Almanza, a town of eastern Spain, in the province of Albacete; 35 m. E.S.E. of Albacete, on the Madrid- Alicante railway. Pop. (1900) 11,180. Almansa is built at the foot of a white limestone crag, which is surmounted by a Moorish castle, and rises abruptly in the midst of a fertile and irri- gated plain. About 1 m. S. stands an obelisk commemorating the battle fought here on the 25th of April 1707, in which the French under the duke of Berwick, a

natural son of James II. of Great Britain, routed the allied British, Portuguese and Spanish troops. (See Spanish Succession, War of the.)

ALMA-TADEMA, SIR LAURENCE (Laurens) (1836-), British artist, was born on the 8th of January 1836, at Dronrijp, a Frisian village near Leeuwarden, the son of Pieter Tadema, a notary, who died when he was four years old. Alma was the name of his godfather. His mother (d. 1863) was his father's second wife, and was left with a large family. It was designed that the boy should follow his father's profession; but he had so great a leaning towards art that he was eventually sent to Antwerp, where in 1852 he entered the academy under Gustav Wappers. Thence he passed to the atelier of Henri (afterwards Baron) Leys. In 1859 he assisted Leys in the latter's frescoes in the hall of the h6tel de ville at Antwerp. In the exhibition of Alma-Tadema's collected works at the Grosvenor Gallery in London in the winter of 1882-1883 were two pictures which may be said to mark the beginning and end of his first period. These were a portrait of himself, dated 1852, and "A Bargain," painted

in i860. His first great success was a picture of " The Education of the Children of Clovis " (1861), which was exhibited at Antwerp. In the following year he received his first gold medal at Amsterdam. The " Education of the Children of Clovis " (three young children of Clovis and Clotilde practising the art of hurling the axe in the presence of their widowed mother, who is training them to avenge the murder of their own parent) was one of a series of Merovingian pictures, of which the finest was the " Fredegonda " of 1878 (exhibited in 1880), where the dejected wife or mistress is watching from behind her curtain window the marriage of Chilperic I. with Galeswintha. It is perhaps in this Series that we find the painter moved by the deepest feeling and the strongest spirit of romance. One of the most passionate of all is " Fredegonda at the Death-bed of Praetextatus," in which the bishop, stabbed by order of the queen, is cursing her from his dying bed. Another distinct series is designed to reproduce the life of ancient Egypt. One of the first of this series, " Egyptians 3000 Years Ago," was painted in 1863. A profound depth of pathos is sounded in " The Death of the Firstborn," painted in 1873. Among Alma-Tadema's other notable Egyptian pictures are " An Egyptian at his Door- way " (1865), "The Mummy" (1867), "The Chamberlain of Sesostris " (1869), " A Widow " (1873), and "

Joseph, Overseer of Pharaoh's Granaries " (1874). On these scenes from Frankish and Egyptian life Alma-Tadema spent great energy and research; but his strongest art-impulse was towards the presentation of the life of ancient Greece and Rome, especially the latter. Amongst the best known of his earlier pictures of scenes from classical times are " Tarquinius Superbus " (1867), " Phidias and the Elgin Marbles " (1868), and " The Pyrrhic Dance " and " The Wine Shop " (1869). " The Pyrrhic Dance," though one of the simplest of his compositions, stands out distinctly from them all by reason of its striking movement. " Phidias and the Elgin Marbles " is the first of those glimpses of the art-life of classical times, of which " Hadrian in England," " The Sculpture Gallery," and " The Picture Gallery " are later examples. "The Wine Shop " is one of his many pictures of historical genre, but marked with a more robust humour than usual. In 1863 Alma- Tadema married a French lady, and lived at Brussels till 1869, when she died, leaving him a widower with two daughters, Laurence and Anna, both of whom afterwards made reputations —the former in literature, the latter in art. In 1869 he sent from Brussels to the Royal Academy two pictures, " Un Amateur romain " and " Une Danse pyrrhique," which were followed by three pictures, including " Un Jongleur," in 1870, when he came to London. By this time, besides his Dutch and Belgian distinctions, he had been awarded medals at the Paris Salon of 1864 and the Exposition Universelle of 1867. In 1871 he married Miss Laura Epps, an English lady of a talented family, who, under her married name, also won a high reputation as an artist. After his arrival in England Alma-Tadema's career was one of continued success. Amongst the most important of his pictures during this period were " The Vintage Festival " (1870), " The Picture Gallery " and " The Sculpture Gallery " (1875), " An Audience at Agrippa's " (1876), " The Seasons " (1877), " Sappho " (1881), " The Way to the Temple " (1883), his diploma work, " Hadrian in Britain" (1884), " The Apodyterium (1886), "The Woman of Amphissa " (1887), "The Roses of Heliogabalus " (1888), "An Earthly Paradise" (1891), and " Spring " (1895). Most of his other pictures have been small canvasses of exquisite finish, like the " Gold-fish " of 1900. These, as well as all his works, are remarkable for the way in which flowers, textures and hard reflecting substances, like metals, pottery, and especially marble, are painted. His work shows much of the fine execution and brilliant colour of the old Dutch masters. By the human interest with which he imbues all his scenes from ancient life he brings them within the scope of modern feeling, and charms us with gentle sentiment and playful humour. He also painted some fine portraits. Alma- Tadema became'a naturalized British subject in

1873, and was knighted on the occasion of Queen Victoria's eighty-first birthday, 1899. He was made an associate of the Royal Academy in 1876,

and a Royal Academician in 1879. In 1907 he was included in the Order of Merit. He became a knight of the order Pour le Merite of Germany (Arts and Science Division); of Leopold, Belgium; of the Dutch Lion; of St Michael of Bavaria; of the Golden Lion of Nassau; and of the Crown of Prussia; an officer of the Legion of Honour, France; a member of the Royal Academies of Munich, Berlin, Madrid and Vienna. He received a goid medal at Berlin in 1872 and a grand medal at Berlin in 1874; a first class medal at the Paris International Exhibitions of 1889 and 1900. He also became a member of the Royal Society of Water-colours.

See also Georg Ebers, " Lorenz Alma-Tadema," Westermann's Monatshefte, November and December 1885, since republished in volume form; Helen Zimmern, " L. Alma-Tadema, his Life and Work," Art Annual, 1886; C. Monkhouse, British Contemporary Artists (London, 1899).

ALME or Almai (from alim, wise, learned), the name of a class of singing girls in Egypt who are present at festivals and entertainments, and act as hired mourners at funerals. They are to be distinguished from the ghawazee, or dancing girls, who perform in the public streets and are of a lower order.

ALMEIDA, DOM FRANCISCO DE (c. 1450-1510), the first viceroy of Portuguese India, was born at Lisbon about the middle of the 15th century. He was the seventh son of the second count of Abrantes, and thus belonged to one of the most distinguished families in Portugal. In his youth he took part under Ferdinand of Aragon in the wars against the Moors (1485- 1492). In March 1505, having received from Emmanuel I. the appointment of viceroy of the newly conquered territory in India, he set sail from Lisbon in command of a large and powerful fleet, and arrived in July at Quiloa (Kilwa), which yielded to him almost without a struggle. A much more vigorous resistance was offered by the Moors of Mombasa, but the town was taken and destroyed, and its large treasures went to strengthen the resources of Almeida. At other places on his way, such as the island of Angediva, near Goa, and Cannanore, he built forts, and adopted measures to secure the Portuguese supremacy. On his arrival in India he took up his residence at Cochin, where a Portuguese fort had been built by Alphonso d' Albuquerque in 1503. The most important events of Almeida's brief but vigorous administration were the conclusion of a

commercial treaty with Malacca, and the discoveries made by his son Lorenzo, who acted as his lieutenant. Lorenzo was probably the first Portuguese who visited Ceylon, where he established a settlement, and Fernando Soares, a captain commanding a squadron of his fleet, appears to have been the first European to sight Madagascar. In 1 508 he was killed at Dabul in a naval engagement with the Egyptians, who at this time endeavoured to dispute Portuguese supremacy in the Indian Ocean. His father was preparing to avenge his death when Albuquerque (q.v.) arrived in Cochin, and presented a commission empowering him to supersede Almeida in the government. It was probably Almeida's unwillingness to be thwarted in his scheme of vengeance that chiefly induced him to refuse to recognize Albuquerque's commission, and to cast him into prison. The punishment he inflicted on the Arabs and their Egyptian allies was speedy and terrible. Sailing along the coast he pillaged and burned various ports, including Goa and Dabul, and finally, encountering the enemy's combined fleet off Diu in February 1509, he completely destroyed it. Returning immediately to Cochin, he held out for a few months against the claims of Albuquerque, but in November 1509 he was compelled to yield. On the 1st of December he set sail for Europe with an escort of three vessels. On the voyage the fleet called at Table Bay, then known as Saldanha Bay, to procure water, and here Almeida was killed (on the 1st of March 1 510) in an attack upon the Hottentot natives, during which he showed great personal courage. In this fight, which took place on the site of Cape Town, 65 Portuguese perished, including 12 captains. Almeida's body was recovered on the following day and buried on the spot where he fell.

ALMEIDA, a town of north-eastern Portugal, in the district of Guarda and formerly included in the province of Beira; situated in hilly country between the river Coa, a tributary oi

the Douro, and the river Turones, a branch of the Agueda. Pop. (1900) 2330. Almeida was long one of the principal frontier fortresses of Portugal. It was captured by the Spaniards in 1762. During the Peninsular War (g.v.), the country between the C6a and the Spanish fortress of Ciudad Rodrigo, 25 m. E.S.E., was the scene of hard fighting. Almeida was taken by the French in 1810, and its recapture, by the allied British and Portuguese forces under Lord Wellington, was only effected after a relieving force under Marshal

Massena had been defeated at Fuentes d'Onor (or Fuentes de Onoro), 13 m. S.S.E. The battle was fought on the 5th of May 1811 and the fortress fell five. days later.

ALMELO, a town in the province of Ovarysel, Holland, 12 m. by rail N.W. of Hengelo, at the junction of the Overysel and Almelo canals. Pop. (1900) 9957. It is a place of considerable antiquity, having been the seat of an independent lordship before the 14th century. But it first rose into importance in the second half of the 19th century owing to its share in the extra- ordinary industrial development of the Twente district, and now possesses numerous cotton and damask factories. Among the public buildings are a town hall, court house, corn exchange, and churches of various denominations, as well as a synagogue.

The lordship of Almelo belonged to the lords of Heeckeren, who acquired the barony of Rechteren by marriage in 1350 and the countship of Limpourg in 1711. The elder branch of the mediatized house of Rechteren-Limpourg is still established at Almelo; the younger, German branch, at Markt Einersheim in Bavaria.

ALMENDRALEJO, a town of western Spain, in the province of Badajoz; situated 27 m. E.S.E. of Badajoz, on the Merida- Seville railway. Pop. (1900) 12,587. Almendralejo is a thriving town, with broad streets and good modern houses; including the palace of the marquesses of Monsalud, which contains a museum of Roman antiquities discovered in the neighbourhood. Local prosperity was greatly enhanced during the period 1875- 1905 by the improvement of communications, which enabled the grain, fruit and wine of the Guadiana valley, on the north, and of the upland known as the Tierra de Barros, on the south, to be readily exported by the Merida-Seville railway. Brandy is produced in large quantities.

ALMERIA, a maritime province of southern Spain, formed in 1833, and comprehending the eastern territories of the ancient kingdom of Granada. Pop. (1900) 359,013; area, 3360 sq. m. Almeria is bounded on the N. by Granada and Murcia, E. and S. by Murcia and the Mediterranean Sea, and W. by Granada. It is traversed by mountain ridges,- with peaks of 6000 to 8000 ft. in altitude; and it is seamed with valleys of great fertility. The chief sierras, or ranges, are those of Maria, in the north; Estancias and Oria, north of the Almanzora river; Filabres, in the middle of the province; Cabrera and Gata, along the south- east coast; Alhamilla, east of the city of Almeria; Gador in the south-west; and, in the west, some outlying ridges of the Sierra Nevada. Three small rivers, the Adra, or Rio

Grande de Adra, in the west, the Almeria in the centre, and the Almanzora in the north and east, flow down from the mountains to the sea. On the south coast is the Gulf of Almeria, 25 m. wide at its entrance, and terminating, on the east, in the Cabo de Gata, the southern- most point of eastern Spain. The climate is mild, except among the higher mountains. The valleys near the sea are well adapted for agriculture; oranges, lemons, almonds and other fruit trees thrive; silk is produced in the west; and the vine is extensively cultivated, less for the production of wine than to meet the foreign demand for white Almeria grapes. Although the cost of transport is very heavy, the exportation of grapes is a flourishing industry, and more than 2,000,000 barrels are annually sent abroad. The cattle of the central districts are celebrated for size and quality. Almeria is rich in minerals, especially iron and lead; silver, copper, mercury, zinc and sulphur are also obtained. At the beginning of the 20th century the mines at work numbered more than two hundred, and proved very attractive to foreign as well as native capitalists. Garnets are found in the Sierra de Gata and in the Sierra Nevada fine marble is quarried. The development

of mining was facilitated by the extension of the railway system between 1895 and 1905. The main line from Madrid to Almeria conveys much ore from Granada and Jaen to the sea; while the railway from Baza to Lorca skirts the Almanzora valley and transports the mineral products of eastern Almeria by a branch line from Huercal-Overa to the Murcian port of Aguilas. Light railways and aerial cables among the mountains supplement these lines. The chief imports comprise coal, timber, especially oak staves, and various manufactured goods. The exports are minerals, esparto, oil, grain, grapes and farm produce generally. The principal seaports are Almeria, the capital,pop.(i9oo)47,326, Adra (11,188), and Garrucha (4661), which, with Berja (13,224), Cuevas de Vera (20,562), Huercal-Overa (15,763) and Nijar (12,497), are described in separate articles. Other towns, important as mining or agricultural centres, are Albox (10,049), Dalias (7136), Lubrin (6593), Sorbas (7306), Tabernas (7629), Velez Blanco (6825), Velez Rubio (10,109) and Vera (8446). Education is backward and the standard of comfort low. A constant annual loss of 2000 or 3000 emigrants to Algeria and elsewhere prevents any rapid increase of population, despite the high birth-rate and low mortality.

ALMERi A, the capital of the province of Almeria, and one of the principal seaports on the Mediterranean coast of southern Spain; in 36 5′ N. and 2° 32′ W.,on the river Almeria, at its outflow into the Gulf of Almeria, and at the terminus of a railway from Madrid. Pop.

(1900) 47,326. The city occupies part of a rich alluvial valley enclosed by hills. It is an episcopal see, and possesses a Gothic cathedral, dating from 1524, and constructed with massive embattled walls and belfry so as to resemble a fortress. A dismantled castle, the Castillo de San Cristobal, overlooks the city, which contains four Moorish towers rising conspicuously above its modern streets. Two long piers shelter the harbour, and vessels drawing 25 ft. can lie against the quays. About 1400 ships, of nearly 1,000,000 tons, enter the port every year, bringing fuel and timber, and taking cargoes of iron, lead, esparto and fruit. White grapes are exported in very large quantities.

Under its ancient name of Urci, Almeria was one of the chief Spanish harbours after the final conquest of Spain by the Romans in 19 B.C. It reached the summit of its prosperity in the middle ages, as the foremost seaport of the Moorish kingdom of Granada. At this time its population numbered 150,000; its cruisers preyed upon the fleets of the neighbouring Christian states; and its merchant ships traded with countries as distant as Egypt and Syria. Almeria was captured in 1147 by King Alphonso VII. of Castile and his Genoese troops, but speedily retaken and held by the Moors until 1489, when it was finally secured by the Spaniards.

See D. F. Margall, Almeria, (Barcelona, 1886).

ALMERY, Attmery, Aumbrie, or Ambry (from the medieval form almarium, cf. Lat. armarium, a place for keeping tools; cf. O. Fr. aumoire and mod. armoire), in architecture, a recess in the wall of a church, sometimes square-headed, and sometimes arched over, and closed with a door like a cupboard — used to contain the chalices, basins, cruets, &c, for the use of the priest; many of them have stone shelves. They are sometimes near the piscina, but more often on the opposite side. The word also seems in medieval times to be used commonly for any closed cupboard and even bookcase.

ALM0D6VAR DEL CAMPO, or Almodovar, a town of Spain, in the province of Ciudad Real, 18 m. S.S.W. of Ciudad Real, on the northern side of the Sierra de Alcudia. Pop. (1900) 12,525. Almod6var was a Moorish fortress in the middle ages, but contains little of antiquarian interest. It owes its modern prosperity to the nearness of the valuable Puertollano coal-field, 3 m. S. by a branch of the Madrid-Badajoz-Lisbon railway. Its manufactures are lace and linen and it has a brisk trade in live-stock, oil and wine. South of the Sierra lies the Alcudia valley, owned by the crown, and- used as pasture for immense flocks of sheep. ”

ALMOGAVARES (from the Arab. Al-Mugavari, a scout), the name of a class of Spanish soldiers, well known during the

Christian reconquest of Spain, and much employed as mercenaries in Italy and the Levant, during the 13th and 14th centuries. The Almogavares (the plural of Almogavar) came originally from the Pyrenees, and were in later times recruited mainly in Navarre, Aragon and Catalonia. They were frontiersmen and foot-soldiers who wore no armour, dressed in skins, were shod with brogues (abarcas), and carried the same arms as the Roman legionaries — two heavy javelins (Spanish azagaya, the Roman pilum), a short stabbing sword and a shield. They served the king, the nobles, the church or the towns for pay, and were professional soldiers. When Peter III. of Aragon made war on Charles of Anjou after the Sicilian Vespers — 30th of March 1 282 — for the possession of Naples and Sicily, the Almogavares formed the most effective element of his army. Their discipline and ferocity, the force with which they hurled their javelins, and their activity, made them very formidable to the heavy cavalry of the Angevin armies. When the peace of Calatabellota in 1302 ended the war in southern Italy, the Almogavares followed Roger di Flor (Roger Blum) the unfrocked Templar, who entered the service of the emperor of the East, Andronicus, as condottieri to fight against the Turks. Their campaign in Asia Minor, 1303 and 1304, was a series of romantic victories, but their greed and violence made them intolerable to the Christian population. When Roger di Flor was assassinated by his Greek employer in 1305, they turned on the emperor, held Gallipoli and ravaged the neighbourhood of Constantinople. In 13 10 they marched against the duke of Athens, of the French house of Brienne. Walter of Brienne was defeated and slain by them with all his knights at the battle of Cephissus, or Orchomenus, in Boeotia in March. They then divided the wives and possessions of the Frenchmen by lot and summoned a prince of the house of Aragon to rule over them. The foundation of the Aragonese duchy of Athens was the culmination of the achievements of the Almo- gavares. In the 16th century the name died out. It was, however, revived for a short time as a party nickname in the civil wars of the reign of Ferdinand VII.

Authorities. — The Almogavares are admirably described by one who fought with them, Ramon de Muntaner, whose Chronicle has been

translated into French by J. A. Buchon, Chroniques etrangeres (Paris, i860). The original test was reprinted and edited by K. Lanz at Stuttgart, 1844. See also the Expedition des " Almu- gdvares " ou routiers Catalans en orient, de Van 1302 d Van 1311, by G. Schlumberger (Paris, 1902). (D. H.)

ALMOHADES (properly Muwahhadis, i.e. " Unitarians," the name being corrupted through the Spanish), a Mahommedan religious power which founded the fifth Moorish dynasty in the 1 2th century, and conquered all northern Africa as far as Egypt, together with Moslem Spain. It originated with Mahommed ibn Tumart, a member of the Masmuda, a Berber tribe of the Atlas. Ibn Tumart was the son of a lamplighter in a mosque and had been noted for his piety from his youth; he was small, ugly, and misshapen and lived the life of a devotee-beggar. As a youth he performed the pilgrimage to Mecca, whence he was expelled on account of his severe strictures on the laxity of others, and thence wandered to Bagdad, where he attached himself to the school of the orthodox doctor al Ashari. But he made a system of his own by combining the teaching of his master with parts of the doctrines of others, and with mysticism imbibed from the great teacher Ghazali. His main principle was a rigid unita- rianism which denied the independent existence of the attributes of God, as being incompatible with his unity, and therefore a polytheistic idea. Mahommed in fact represented a revolt against the anthropomorphism of commonplace Mahommedan orthodoxy, but he was a rigid predestinarian and a strict observer of the law. After his return to Morocco at the age of twenty- eight, he began preaching and agitating, heading riotous attacks on wine-shops and on other manifestations of laxity. He even went so far as to assault the sister of the Murabti (Almoravide) amir'Ali III., in the streets of Fez, because she was going about unveiled after the manner of Berber women. 'Ali, who was very deferential to any exhibition of piety, allowed him to escape unpunished.

Ibn Tumart, who had been driven from several other towns for

exhibitions of reforming zeal, now took refuge among his own people, the Masmuda, in the Atlas. It is highly probable that his influence would not have outlived him, if he had not found a lieutenant in 'Abd-el-Mumin el Kumi, another Berber, from Algeria, who was undoubtedly a soldier and statesman of a high order. When Ibn Tumart died in n 28 at the monastery or ribat which he had founded in the Atlas at Tinmal, after suffering a severe defeat by the Murabtis, 'Abd-el-Mumin kept his death secret for two years, till his own influence was established. He then came forward as the

lieutenant of the Mahdi Ibn Tumart. Between 1130 and his death in 1163, 'Abd-el-Mumin not only rooted out the Murabtis, but extended his power over all northern Africa as far as Egypt, becoming amir of Morocco in 1140. Mahommedan Spain followed the fate of Africa, and in n 70 the Muwahhadis transferred their capital to Seville, a step followed by the founding of the great mosque, now superseded by the cathedral, the tower of which they erected in 11 84 to mark the accession of Ya'kub el Mansur. From the time of Yusef II., however, they governed their co-religionists in Spain and Central North Africa through lieutenants, their dominions outside Morocco being treated as provinces. When their amirs crossed the Straits it was to lead a jehad against the Christians and to return to their capital, Marrakesh.

The Muwahhadi princes had a longer and a more distinguished career than the Murabtis or " Almoravides " (q.v.). Yusef II. or " Abu Ya'kub " (1163-1184), and Ya'kub I. or " El Mansur " (1184-1199), the successors of Abd-el-Mumin, were both able men. They were fanatical, and their tyranny drove numbers of their Jewish and Christian subjects to take refuge in the growing Christian states of Portugal, Castile and Aragon. But in the end they became less fanatical than the Murabtis, and Ya'kub el Mansur was a highly accomplished man, who wrote a good Arabic style and who protected the philosopher Averroes. His title of El Mansur, " The Victorious," was earned by the defeat he inflicted on Alphonso VIII. of Castile at Alarcos in 1195. But the Christian states in Spain were becoming too well organized to be overrun by the Mahommedans, and the Muwahhadis made no permanent advance against them. In 121 2 Mahommed III., " En-Nasir " (1199-1214), the successor of El Mansur, was utterly defeated by the allied five Christian princes of Spain, Navarre and Portugal, at Las Navas de Tolosa in the Sierra Morena. All the Moorish dominions in Spain were lost in the next few years, partly by the Christian conquest of Andalusia, and partly by the revolt of the Mahommedans of Granada, who put themselves under the protection of the Christian kings and became their vassals.

The fanaticism of the Muwahhadis did not prevent them from encouraging the establishment of Christians even in Fez, and after the battle of Las Navas de Tolosa they occasionally entered into alliances with the kings of Castile. In Africa they were successful in expelling the garrisons placed in some of the coast towns by the Norman kings of Sicily. The history of their decline differs from that of the Murabtis, whom they had dis- placed. They were not assailed by a great religious movement, but destroyed piecemeal by the revolt of tribes and districts. Their most effective enemies were the Beni

Marin (" Merinides ") who founded the next Moroccan dynasty, the sixth. The last representative of the line, Idrls IV., " El Wathik," was reduced to the possession of Marrakesh, where he was murdered by a slave in 1269.

The amirs of the Muwahhadi Dynasty were as follows: — 'Abd-el-Mumin (1145); Yusef II., "Abu Ya'kub" (1163); Ya'kub I., " Abu Yusef el Mansur " (1184); Mahommed III., " En-Nasir " (1199); Yusef III., " Abu Ya'kub el Mustansir " (1214); 'Abd-el-Wahid, "El Makhluwi" (1223); 'Abd-Allah II., "Abu Mahommed" (1224); Yahya V., "El Mu'tasifn " (1226); Idrls III., " El Mamun " (1229); Rashid I., " 'Abd-el- Wahid II." (1232); 'AH IV., "Es-Sa'id el Mu tadld " (1242); Omar I., "El Mortada " (1248); Idrls IV., "El Wathik" (1266-1269). (B. M.;D. H.)*

ALMON, JOHN (1737-1805), English political pamphleteer and publisher, was born at Liverpool on the 17 th of December

1737. In early life he was apprenticed to a printer in his native town, and he also spent two years at sea. He came to London in 1758 and at once began a career which, if not important in itself, had a very important influence on the political history of the country. The Whig opposition, hampered and harassed by the Government to an extent that threatened the total suppression of independent opinion, were in great need of a channel of communication with the public, and they found what they wanted in Almon. He had become personally known to the leaders through various publications of his own which had a great though transient popularity; the more important of these being The Conduct of a late Noble Commander [Lord George Sackville] Examined (1759); a Review of his late Majesty's Reign (1760); a Review of Mr Pitt's Administration (1761); and a number of letters on political subjects. The review of Pitt's administration passed through four editions, and secured for its author the friendship of Earl Temple, to whom it was dedicated. Brought thus into the counsels of the Whig party, he was persuaded in 1 763 to open a bookseller's shop in Piccadilly, chiefly for the publication and sale of political pamphlets. This involved considerable personal risk, and though he generally received with every pamphlet a sum sufficient to secure him against all contingencies, he deserves the credit of having done much to secure the freedom of the press. The government strengthened his influence by their repressive measures. In 1765 the

attorney-general moved to have him tried for the publication of the pamphlet entitled Juries and Libels, but the prosecution failed; and in 1770, for merely selling a copy of the London Museum containing Junius's celebrated " Letter to the King," he was sentenced by Lord Mansfield to pay a fine of ten marks and give security for his good behaviour. It was this trial that called forth the letter to Lord Mansfield, one of the bitterest of the Junius series. Almon himself published an account of the trial, and of course did not let slip the opportunity of reprinting the matter that had been the ground of indictment; but no further proceedings were taken against him. In 1774 Almon commenced the publication of his Parliamentary Register, a monthly report of the debates in parliament, and he also issued an abstract of the debates from 1742, when Richard Chandler's Reports ceased, to 1774. About the same time, having earned a competency, he retired to Boxmoor in Hertfordshire, though he still continued to write on political subjects. He became proprietor in 1784 of the General Advertiser, in the management of which he lost his fortune and was declared insolvent. To these calamities was added an imprisonment for libel. The claims of his creditors compelled him to leave the country, but after some years in France he was enabled to return to Boxmoor, where he continued a career of undiminished literary activity, publishing among other works an edition of Junius. His last work was an edition of Wilkes's correspondence, with a memoir (1805). He died on the 1 2th of December 1805. Almon 's works, most of which appeared anonymously, have no great literary merit, but they are of very considerable value to the student of the political history of the period.

ALMOND (from the O. Fr. almande or alemande, late Lat. amandola, derived through a form amingdola from the Gr. a/ xvydaX-n, an almond; the al- for a- is probably due to a confusion with the Arabic article al, the word having first dropped the a- as in the Italian form mandola; the English pronunciation a-mond and the modern French amande show the true form of the word). The almond is the fruit of Amygdalus communis, a plant belonging to the tribe Pruneae of the natural order Rosaceae. The genus Amygdalus is very closely allied to Prunus (Plum, Cherry), in which it is sometimes merged; the distinction lies in the fruit, the soft pulp attached to the stone in the plum being replaced by a leathery separable coat in the almond. The tree appears to be a native of western Asia, Barbary and Morocco; but it has been extensively distributed over the warm-temperate region of the Old World. It ripens its fruit in the south of England. It is a tree of moderate size; the leaves are lanceolate, and

serrated at the edges; and it flowers early in spring. The fruit is a drupe, having a downy outer coat, called

the epicarp, which encloses the reticulated hard stony shell or endocarp. The seed is the kernel which is contained within these coverings. The shell-almonds of trade consist of the endocarps enclosing the seeds. The tree grows in Syria and Palestine; and is referred to in the Bible under the name of Shaked, meaning " hasten." The word Luz, which occurs in Genesis xxx. 37, and which has been translated hazel, is supposed to be another name for the almond. In Palestine the tree flowers in January, and this hastening of the period of flowering seems to be alluded to in Jeremiah i. n, 12, where the Lord asks the prophet, "What seest thou?" and he replies, "The rod of an almond-tree "; and the Lord says, " Thou hast well seen, for I will hasten my word to perform it." In Ecclesiastes xii. 5 it is said the " almond-tree shall flourish." This has often been supposed to refer to the resemblance of the hoary locks of age to the flowers of the almond; but this exposition is not borne out by the facts of the case, inasmuch as the flowers of the almond are not white but pink. The passage is more probably intended to allude to the hastening or rapid approach of old age. The application of Shaked or hasten to the almond is similar to the use of the name " May " for the hawthorn, which usually flowers in that month in Britain. The rod of Aaron, mentioned in Numbers xvii., was taken from an almond-tree; and the Jews still carry rods of almond-blossom to the synagogues on great festival days. The fruit of the almond supplied a model for certain kinds of ornamental carved work (Exodus xxv. $$, 34; xxxvii. 19, 20).

There are two forms of the plant, the one (with pink flowers) producing sweet, the other (with white flowers) bitter almonds. The kernel of the former contains a fixed oil and emulsin. It is used internally in medicine, and must not be adulterated with the bitter almond. The Pulvis . Amygdalae Composilus of the British Pharmacopoeia consists of sweet almonds, sugar and gum acacia. It may be given in any dose. The Mistura Amygdalae contains one part of the above to eight of water; the dose is £ to 1 oz.

The bitter almond is rather broader and shorter than the sweet almond and has a bitter taste. It contains about 50% of the fixed oil which also occurs in sweet almonds. It also contains a ferment emulsin which, in the presence of water, acts on a soluble glucoside, amygdalin, yielding glucose, prussic acid and the essential oil of bitter almonds or benzaldehyde (q-v.), which is not used in medicine. Bitter almonds may yield from 6 to 8% of prussic acid.

Oleum Amygdalae, the fixed oil, is prepared from either variety of almond. If intended for internal use, it must, how- ever, be prepared only from sweet almonds. It is a glyceryl oleate, with slight odour and a nutty taste. It is almost insoluble in alcohol but readily soluble in chloroform or ether. It may be used as a pleasant substitute for olive oil. The pharmacopoeial preparations of the sweet almond are used only as vehicles for other drugs. The sweet almond itself, however, has a special dietetic value. It contains practically no starch and may therefore be made into flour for cakes and biscuits for patients suffering from diabetes mellitus or any other form of glycosuria. It is a nutritious and very pleasant food.

There are numerous commercial varieties of sweet almond, of which the most esteemed is the Jordan almond, imported from Malaga. Valentia almonds are also valued. Fresh sweet almonds are nutritive and demulcent, but as the outer brown skin sometimes causes irritation of the alimentary canal, they are blanched by removal of this skin when used at dessert.

ALMONER (from Lat. eleemosynarius, through med. Lat. almosynarius, almonarius, and Fr. almosnier, aumosnier, &c, mod. Fr. aumonier), in the primitive sense, an officer in religious houses to whom belonged the management and distribution of the alms of the house. By the ancient canons all monasteries were to spend at least a tenth part of their income in alms to the poor, and all bishops were . required to keep almoners. Almoners, as distinct from chaplains, appear early as attached to the court of the kings of France; but the title of granci almoner of France first appears in the reign of Charles VIII.

He was an important court official whose duties comprised the superintendence of the Chapel Royal and all the religious ceremonies of the court. He was a director of the great hospital for the blind (Quinze-Vingts), and nominated the regius pro- fessors and readers in the College de France. The office was revived by Napoleon I., was abolished in 1830, and again created by Napoleon III.; it existed till 1870. In England, the royal almonry still forms a part of the sovereign's household, the officers being the hereditary grand almoner (the marquess of Exeter) , the lord high almoner, the sub-almoner, and the secretary to the lord high almoner. The office of hereditary grand almoner is now merely titular. The lord high

almoner is an ecclesiastical officer, usually a bishop, who had the rights to the forfeiture of all deodands (q.v.) and the goods of a felo de se, for distribution among the poor. He had also, by virtue of an ancient custom, the power of giving the first dish from the king's table to whatever poor person he pleased, or, instead of it, alms in money, which custom is kept up by the lord high almoner distributing as many silver pennies as the sovereign has years of age to poor men and women on Maundy Thursday (q.v.).

ALMONRY (Lat. eleemosynarium, Fr. autnonerie, Ger. Almo-senhaus), the name for the place or chamber where alms were distributed to the poor in churches or other ecclesiastical buildings. At Bishopstone church, Wiltshire, it is a sort of covered porch attached to the south transept, but not com- municating with the interior of the church. At Worcester Cathedral the alms are said to have been distributed on stone tables, on each side, within the great porch. In large monastic establishments, as at Westminster, it seems to have been a separate building of some importance, either joining the gatehouse or near it, that the establishment might be disturbed as little as possible.

ALMORA, a town and district of British India, the chief town and administrative headquarters of the Kumaon division of the United Provinces, situated on a mountain-ridge of the Himalayas 5494 ft. above the' sea. Pop. (1901) 8596. The town has a college called after Sir Henry Ramsay; a government high school; a Christian girls' school; and a large cantonment. The town was captured by the Gurkhas in 1790, who constructed a fort on the eastern extremity of the ridge. Another citadel, Fort Moira, is situated on the other extremity of the ridge. Almora is also celebrated as the scene of the British victory which terminated the war with Nepal in April 181 5, and which resulted in the evacuation of Kumaon by the Gurkhas and the annexation of the province by the British.

The District or Almora was constituted in 1891, together with Naini Tal, by a redistribution of the two former districts of Kumaon and the Tarai. It lies among the mountains of Kumaon, between the upper waters of the Ganges and the Gogra, here called the Kali. Area, 5419 sq. m.; pop. (1901) 465,893, showing an increase of 13% during the decade. Tea is grown in the district, which includes the military sanatorium of Ranikhet. The nearest railway via Naini Tal is the extension of the Oudh and Rohilkhand line from near Bareilly to Kathgodam.

ALMORAVIDES (properly Murabtis, the name being corrupted

through the Spanish), a Berber horde from the Sahara which, in the nth century, founded the fourth dynasty in Morocco. By this dynasty the Moorish empire was extended over Tlemcen and a great part of Spain and Portugal. The name is derived from the Arab. Murdbit, a religious ascetic (see Marabout). The most powerful of the invading tribes was the Lamtuna (" veiled men ") from the upper Niger, whose best-known representatives now are the Tuareg. They had been converted to Mahommedanism in the early times of the Arab conquest, but their knowledge of Islam did not go much beyond the formula of the creed — " there is no god but God, and Mahomet is the apostle of God," — and they were ignorant of the law. About the year 1040 or a little earlier, one of their chiefs, Yahya ibn Ibrahim, made the pilgrimage to Mecca. On his way home he attended the teachers of the mosque at Kairawan, in Tunisia, who soon learnt from him that his people knew little of the religion they were supposed to profess, and that though his

will was good, his own ignorance was great. By the good offices of the theologians of Kairawan, one of whom was from Fez, Yahya was provided with a missionary, 'Abd-Allah ibn Yazin, a zealous partisan of the Malekis, one of the four orthodox sects of Islam. His preaching was for long rejected by the Lamtunas, so on the advice of his patron Yafyya, who accompanied him, he retired to an island in the Niger, where he founded a ribdt or Moslem monastery, from which as a centre his influence spread. There was no element of heresy in his creed, which was mainly distinguished by a rigid formalism and strict obedience to the letter of the Koran and the orthodox tradition or Sunna. 'Abd- Allah imposed a penitential scourging on all converts as a purifica- tion, and enforced a regular system of discipline for every breach of the law, even on the chiefs. Under such directions the Murabtis were brought to excellent order. Their first military leader, Yahya ibn Omar, gave them a good military organization. Their main force was infantry, armed with javelins in the front ranks and pikes behind, formed into a phalanx and supported by camelmen and horsemen on the flanks. From the year 1053 the Murabtis began to impose their orthodox and puritanical religion on the Berber tribes of the desert, and on the pagan negroes. Yahya was killed in battle in 1056, but 'Abd-Allah, whose influence as a religious teacher was paramount, named his brother Abu Bakr as chief. Under him the Murabtis soon began to spread their power beyond the desert, and subjected the tribes of the Atlas. They then came in contact with the Berghwata, a Berber people of central Morocco, who followed a heresy founded by Salah ibn Tarif 300 years previously. The Berghwata made a fierce resistance, and it was

in battle with them that 'Abd-Allah ibn Yazin won the crown of martyrdom. They were, however, completely conquered by Abu Bakr, who espoused the defeated chief's widow, Zainab.

In 106 1 Abu Bakr made a division of the power he had estab- lished, handing over the more settled parts to his cousin. Yusef ibn Tashfin, as viceroy, resigning to him also his favourite wife Zainab, who had the reputation of a sorceress. For himself he reserved the task of suppressing the revolts which had broken out in the desert, but when he returned to resume control he found his cousin too powerful to be superseded, so he had to go back to the Sahara, where in 1087 he too attained martyrdom, having been wounded with a poisoned arrow in battle with the pagan negroes.

Ibn Tashfin, who was largely guided by Zainab, had in the meantime brought what is now known as Morocco to complete subjection, and in 1062 had founded the city of Marrakesh (" Morocco City "). He is distinguished as Yusef I. In 1080 he conquered the kingdom of Tlemcen and founded the present city of that name, his rule extending as far east as Oran. In 1086 he was invited by the Mahommedan princes in Spain to defend them against Alphonso VI., king of Castile and Leon. In that year Yusef passed the straits to Algeciras, and on the 23rd of October inflicted a severe defeat on the Christians at Sacralias, or in Arabic, Zallaka, near Badajoz. He was debarred from following up his victory by trouble in Africa which he had to settle in person. When he returned to Spain in 1090 it was avowedly for the purpose of deposing the Mahommedan princes and annex- ing their states. He had in his favour the mass of the inhabitants, who were worn out by the oppressive taxation imposed by their spendthrift rulers. Their religious teachers detested the native Mahommedan princes for their religious indifference, and gave Yusef a fetwa — or legal opinion — to the effect that he had good moral and religious right to dethrone the heterodox rulers who did not scruple to seek help from the Christians whose bad habits they had adopted. By 1094 he had removed them all, and though he regained little from the Christians except Valencia, he reunited the Mahommedan power and gave a check to the reconquest of the country by the Christians. After friendly correspondence with the caliph at Bagdad, whom he acknow- ledged as Amir el Muminin, " Prince of the Faithful," Yusef in 1097 assumed the title of " Prince of the Resigned "• — Amir el Muslimin. He died in 1106, when he was reputed to have reached the age of 100.

The Murabti power was at its height at Yusef's death, and the

Moorish empire then included all North-West Africa as far as Algiers, and all Spain south of the Tagus, with the east coast as far as the mouth of the Ebro, and the Balearic Islands. Three years afterwards, under Yusef's son and successor, 'Ali III. of Morocco, Madrid, Lisbon and Oporto were added, and Spain was again invaded in 1119 and n 21, but the tide had turned, the French having assisted the Aragonese to recover Sara- gossa. In 1 1 3 8 'Ali III. was defeated by Alphonso VII. of Castileand Leon, and in 1-130 by Alphonso I. of Portugal, who thereby won his crown, and Lisbon was recovered by the Portuguese in 1 147. 'Ali III. was a pious nonentity, who fasted and prayed while his empire fell to pieces under the combined action of his Christian foes in Spain and the agitation of the Muwahhadis or " Almo- hades " (q.v.) in Morocco. After 'Ali's death in 1142, his son Tashfin lost ground rapidly before the Muwahhadis, and in 1 145 he was killed by a fall from a precipice while endeavouring to escape after a defeat near Oran. His two successors Ibrahim and Ishak are mere names. The conquest of the city of Marra- kesh by the Muwahhadis in 1 147 marked the fall of the dynasty, though fragments of the Murabtis continued to struggle in the Balearic Islands, and finally in Tunisia.

The amirs of the Murabti dynasty were as follows: — Ytisef I., bin Tashfin (1061); 'Ali III. (1106); Tashfin I. (1143); Ibrahim II. (1145); Ishak (1 146).

See Budgett Meakin, The Moorish Empire (London, 1899); the anonymous Radd el Karttis (Fez. 1326) .translated by Baymier as Roudh el-Kartas (Paris, i860) ; Ibn Khaldun, Kitab el 'Aibr . . . fi Axyam el Maghrib, &c. (dr. 1405), partly translated by de Slane as Histoire des Berbers, vol. ii. (Algiers, 1852-1856); Makkari, History of the Mahommedan Dynasties in Spain, translated by Gayangos (London, 1840); Histoire des Mussulmans d'Espagne, by R. Dozy, vol. iv. (Leiden, 1 86 1). (B. M.; D. H.)*

ALMQVIST, KARL JONAS LUDWIG (1793-1866), Swedish writer, was born at Stockholm in 1793. He became a student at Upsala, where his father was professor of theology, in 1808, and took his degree in 181 5. He began life under highly favour- able auspices; but becoming tired of a university career, in 1823 he threw up the position he held in the capital to lead a colony of friends to the wilds of Wermland. This ideal Scandi- navian life soon proved a failure; Almqvist found the pen easier to wield than the plough, and in 1828 he returned to Stockholm as a teacher in the new Elementary School there, of which he became rector in 1829. Now began his literary life; and after bringing out several educational works, he made

himself suddenly famous by the publication of his great series of novels, called The Book of the Thorn-Rose (1832-1835). The career so begun developed with extraordinary rapidity ; few writers have equalled Almqvist in productiveness and versatility; lyrical, epic and dramatic poems; romances; lectures; philosophical, aesthetical, moral, political and educational treatises; works of religious edification, studies in lexicography and history, in mathematics and philology, form the most prominent of his countless contributions to modern Swedish literature. So excellent was his style, that in this respect he has been con- sidered the first of Swedish writers. His life was as varied as his work. Unsettled, unstable in all his doings, he passed from one lucrative post to another, at last subsisting entirely on the proceeds of literary and journalistic labour. More and more vehemently he espoused the cause of socialism in his brilliant novels and pamphlets; friends were beginning to leave him, foes beginning to triumph, when suddenly all minor criticism was silenced by the astounding news that Almqvist, convicted of forgery and charged with murder, had fled from Sweden. This occurred in 1851. For many years no more was heard of him; but it is now known that he went over to America and settled in St Louis. During a journey through Texas he was robbed of all his manuscripts, among which are believed to have been several unprinted novels. He is said to have appealed in person to President Lincoln, but the robbers could not be traced. The American adventures of Almqvist remain exceedingly obscure, and some of the most remarkable have been proved to be fabulous. In 1865 he returned to Europe, and his strange

and sinister existence came to a close at Bremen on the 26th of September 1866. It is by his romances, undoubtedly the best in Swedish, that his literary fame will mainly be supported; but his singular history will always point him out as a remarkable figure even when his works are no longer read. He was another Eugene Aram, but of greater genius, and so far more successful that he escaped the judicial penalty of his crimes. (E. G.)

ALMS, the giving of relief, and the relief given, whether in goods or money, to the poor, particularly applied to the' charity bestowed under a sense of religious obligation (see Charity and Charities). The word in O. Eng. was aelmysse, and is derived through the Teutonic adaptation (cf. the modern Ger. almosen) of the Latinized form of the Gr. eXerjiuxrvvT], compassion or mercy, from eXeos, pity. The English word " eleemosynary," that which is given in the way of alms, charit- able, gratuitous, derives direct from the Greek. " Alms " is often, like " riches," wrongly taken as a plural word.

ALMSHOUSE, a house built and endowed by private charity for the residence of poor and usually aged people. The greater portion were built after the Reformation. Two interesting examples are the Hospital of St Cross, near Winchester, founded in 1136, and Coningsby Hospital at Hereford, founded in 16 14.

ALMUCE, or Amice (0. Fr. aumuce, 0. Eng. aumuce, amys, amess, &c, from late Lat. almucia, almucium, armucia, &c), a hooded cape of fur, or fur-lined, worn as a choir vestment by certain dignitaries of the Western Church. The origin of the word almucium is a philological mystery. The al- is probably the Arabic article, since the word originated in the south (Sicilian almuziu, Prov. almussa, Span, almucio, &c), but the derivation of the second part of the word from a supposed old Teutonic term for cap — Ger. Mtitze, Dutch Mutsche, Scot, mutch (New Eng. Did. s. " Amice " ; Diez, Worterbuch der rom. Sprachen) — is the exact reverse of the truth. The almuce was originally a head-covering only, worn by the clergy, but adopted also by the laity, and the German word Miitze, "cap," is later than the introduction of the almuce in church, and is derived from it (M. H. G., 13th century, almutz; 14th century, armuz, aremuz, &c; 15th century, mutz, miitze, &c). The word mutzen, to dock, cut off, which first appears in the 14th century, does not help much, though the name of another vestment akin to the almuce — the mozzetta — has been by some traced to it through the Ital. mozzare and mozzo (but see below).

In numerous documents from the 12th to the 15th century the almucium is mentioned, occasionally as identical with the hood, but more often as a sort of cap distinct from it, e.g. in the decrees of the council of Sens (1485) — non caputia, sed almucia vel bireta tenentes in capite. By the 14th century two types of almucium were distinguished: (1) a cap coming down just over the ears; (2) a hood-like cap falling over the back and shoulders. This latter was reserved for the more important canons, and was worn over surplice or rochet in choir. The introduction of the biretta (q.v.) in the 15th century tended to replace the use of the almuce as a head-covering, and the hood now became smaller, while the cape was enlarged till in some cases it fell below the elbows. Another form of almuce at this period covered the back, but was cut away at the shoulders so as to leave the arms free, while in front it was elongated into two stole-like ends. Almuces were occasionally made of silk or wool, but from the 13th century onward usually of fur, the hem being sometimes fringed with tails. Hence they were known in England as " grey amices " (from the ordinary colour of the fur), to distinguish them from the liturgical amice (q.v.). By the 16th century the almuce had become

definitely established as the distinctive choir vestment of canons; but it had ceased to have any practical use, and was often only carried over the left arm as a symbol of office. The almuce has now been almost entirely superseded by the mozzetta, but it is still worn at some cathedrals in France, e.g. Amiens and Chartres, at three churches in Rome, and in certain cathedrals elsewhere in Italy. The "grey amice" of the canons of St Paul's at London was put down in 1549, the academic hood being substituted. It was again put down in 1559, and was

finally forbidden to the clergy of the English Church by the unratified canons of 1571 {Report of the sub-committee of Convocation, 1908).

See du Cange, Glossarium, s. " Almucia " ; Joseph Braun, Die lititrgische Cewandung, p. 359, &c. (Freiburg im Breisgau, 1907) ; also the bibliography to the article Vestments.

ALNAGE, or Aulnage (from Fr. attne, ell), the official super- vision of the shape and quality of manufactured woollen cloth. It was first ordered in the reign of Richard I. that " woollen cloths, wherever they are made, shall be of the same width, to wit, of two ells within the lists, and of the same goodness in the middle and sides." This ordinance is usually known as the Assize of Measures or the Assize of Cloth. Article 35 of Magna Carta re-enacted the Assize of Cloth, and in the reign of Edward I. an official called an " alnager " was appointed to enforce it. His duty was to measure each piece of cloth, and to affix a stamp to show that it was of the necessary size and quality. As, how- ever, the diversity of the wool and the importation of cloths of various sizes from abroad made it impossible to maintain any specific standard of width, the rules as to size were repealed in 1353. The increased growth of the woollen trade, and the introduction of new and lighter drapery in the reign of Queen Elizabeth, compelled a revision of the old standards. A statute was passed in 1665 creating the office of alnager of the new drapery, and defining the sizes to which cloth should be woven. The object of the statute was to prevent people being deceived by buying spurious woollen cloth, and to provide against fraud and imposition. Owing to the introduction of the alternative standard, a distinction arose between " broadcloth " (cloth of two yards) and " streit " or "strait " (narrow cloth of one yard). The meaning now attached to

broadcloth, however, is merely that of material of superior quality. Alnage duties and the office of alnager were abolished in 1699.

See W. J. Ashley, Economic History; and W. Cunningham, Growth of English Industry and Commerce.

ALNWICK, a market-town and the county-town of Northumberland, England, in the Berwick-upon-Tweed parliamentary division, 309 m. N. by W. from London, on a branch of the North Eastern railway. Pop. of urban district (1901) 6716. It is beautifully situated on the small river Aln, in a hilly district. Its history has left many marks. Dominating the town frpm an eminence above the south bank of the river stands the castle, held by the Percys since 1309, and long before this an important border stronghold. A gateway of c. 1350, a fine Norman arch of the middle of the 12 th century, and the ancient well in the keep, are among noteworthy ancient portions; but the castle was extensively renovated and altered in the second half of the 18th century, while in 1854, when the lofty Prudhoe tower was built, a scheme of decoration in Italian style was adopted in the interior; so that the castle, though magnificent, has largely lost its historic character. It contains numerous fine examples of the works of Italian and other artists, and collections of British and Roman and Egyptian antiquities. In the beautiful park are a monument commemorating the capture of William the Lion of Scotland when besieging the town in n 74, two memorial towers, and a British stone chamber. Remains of the wall which formerly surrounded Alnwick are visible, and one of the four gates, the Bondgate, stands, dating from the early part of the 15th century. The church of St Michael has Norman remains, but is principally Perpendicular; it contains several ancient monuments and incised slabs. The modern church of St Paul has a fine east window of German stained glass. Within the confines of the park are ruins of two abbeys. Alnwick Abbey was a Premonstratensian foundation of 1147; only a gateway tower stands, but the ground-plan was excavated in 1884 and is outlined on the surface. At 3 m. from the town are more extensive remains of Hulne Abbey (1240), an early Carmelite monastery. The long narrow church remains unroofed; there are also a gateway tower, and portions of the chapter-house and cloisters. The Norman chapel of the hospital of St Leonard, which, as well as Alnwick Abbey, was founded by Eustace Fitz John, completes the series of antiquities in Alnwick. In this

interesting locality s however, there must be mentioned the mansion of Howick, built in the 18th century, in a fine situation near the coast to the N.E. Not far from this, overlooking the sea from a rocky

cliff pierced by deep gullies, are the ruins of Dunstanborough Castle; it dates from the 14th century, though the site was probably occupied as a stronghold from earlier times.

The chief industries are brewing, tobacco, snuff and fishing- tackle making, and corn milling. Alnwick is under an urban district council, but is a borough by prescription, and its freemen form a body corporate without authority over the affairs of the town. It is, however, required to pay, under an act of 1882, a sum not less than £500 out of the corporate property towards the upkeep of corporation schools. An ancient peculiar ceremony was attached until modern times to the making of freemen; those elected were required to ride in procession to a large pool called Freemen's Well and there rush through the water According to tradition the observance of this custom was enjoined by King John to punish the inhabitants, the king having lost his way and fallen into a bog owing to the neglected condition of the roads in the neighbourhood.

According to the Chronicle of Alnwick Abbey, the barony of Alnwick belonged before the Conquest to Gilbert Tyson, whose son and heir William was killed at Hastings, and whose estates with his daughter were granted by the king to Ivo de Vescy, although this theory does not seem probable since Gilbert Tyson was certainly not a Saxon. In 1297 William de Vescy, a descendant of Ivo, dying without issue, left the barony to the bishop of Durham, who in 1309 sold it to Sir Henry Percy, in whose family it still continues. The town evidently grew up round the castle, which is said to have been built by Eustace Fitz John about 1140. Tradition states that it received its borough charter from King John. However, Alnwick is first definitely mentioned as a borough in a charter given by William de Vescy in the reign of Henry II., by which the burgesses were to have common of pasture on Haydon Moor and to hold of him " as freely and quietly as the burgesses of Newcastle hold of the king." This charter was confirmed by his grandson, William de Vescy, in an undated charter, and again by William, son of the latter William, in 1290. According to an inquiry of 1291 a market and fair were held in Alnwick from time immemorial. In 1297 Edward I., in addition, granted the bishop of Durham a market on Saturday, and a fair on the 17th of March and six following days. By charters of Henry VI. the burgesses received licence to enclose their town with a wall, to have a free port at Alnmouth, a market on Wednesday as well as Saturday, and two new fairs on the feasts of SS Philip and James and St Lucy, and eight days following each. Tanning and weaving were formerly the principal industries carried on in Alnwick, and in 1646 there were twenty-two tanneries there. Alnwick has never been represented in

parliament.

See George Tate, The History of the Borough, Castle, and Barony of Alnwick, 2 vols. (Alnwick, 1866-1869) ; Victoria County History, Northumberland.

ALOE, a genus of plants belonging to the natural order Liliaceae, with about 90 species growing in the dry parts of Africa, especially Cape Colony, and in the mountains of tropical Africa. Members of the closely allied genera Gasteria and Haworthia, with a similar mode of growth, are also cultivated and popularly known as aloes. The plants are apparently stemless, bearing a rosette of large, thick, fleshy leaves, or have a shorter or longer (sometimes branched) stem, along winch, or towards the end of which and its branches, the generally fleshy leaves are borne. They are much cultivated as ornamental plants, especially in public buildings and gardens, for their stiff, rugged habit. The leaves are generally lance-shaped with a sharp apex and a spiny margin; but vary in colour from grey to bright green, and are sometimes striped or mottled. The rather small tubular yellow or red flowers are borne on simple or branched leafless stems, and are generally densely clustered. The juice of the leaves of certain species yields aloes (see below). In some cases, as in Aloe venenosa, the juice is poisonous. The plant called American

aloe, Agave americana (q.v.), belongs to a different order, viz. Amaryllidaceae.

Aloes is a medicinal substance used as a purgative and pro- duced from various species of aloe, such as A. vera, vulgaris, socotrina, chinensis, and Perryi. Several kinds of aloes are distinguished in commerce — Barbadoes, Socotrine, hepatic, Indian, and Cape aloes. The first two are those commonly used foi medicinal purposes. Aloes is the expressed juice of the leaves of the plant. When the leaves are cut the juice flows out, and is collected and evaporated. After the juice has been obtained, the leaves are sometimes boiled, so as to yield an inferior kind of aloes.

From these plants active principles termed aloins are extracted by water. According to W. A. Shenstone, two classes are to be recognized: (i) Nataloins, which yield picric and oxalic acids with nitric acid, and do not give a red coloration with nitric acid; and (2)

Barbaloins, which yield aloetic acid, C7H 2 N 2 05, chrysammic acid, C 7 H 2 N 2 06, picric and oxalic acids with nitric acid, being reddened by this reagent. This second group may be divided into a-Barbaloins, obtained from Barbadoes aloes, and reddened in the cold, and /3-Barbaloins, obtained from Socotrine and Zanzibar aloes, reddened by ordinary nitric acid only when warmed, or by fuming acid in the cold. Nataloin, 2C 17 Hi 8 07-H 2 0, forms bright yellow scales, melting at 2i2°-22 2°; barbaloin, C17H18O7, forms yellow prismatic crystals. Aloes also contain a trace of volatile oil, to which its odour is due.

The dose is 2 to 5 grains, that of aloin being 5 to 2 grains. Aloes can be absorbed from a broken surface and will then cause purging. When given internally it increases the actual amount as well as the rate of flow of the bile. It hardly affects the small intestine, but markedly stimulates the muscular coat of the large intestine, causing purging in about fifteen hours. There is hardly any increase in the intestinal secretion, the drug being emphatically not a hydragogue cathartic. There is no doubt that its habitual use may be a factor in the formation of haemor- rhoids; as in the case of all drugs that act powerfully on the lower part of the intestine, without simultaneously lowering the venous pressure by causing increase of secretion from the bowel. Aloes also tends to increase the menstrual flow and therefore belongs to the group of emmenagogues. Aloin is preferable to aloes for therapeutic purposes, as it causes less, if any, pain. It is a valuable drug in many forms of constipation, as its continual use does not, as a rule, lead to the necessity of enlarging the dose. Its combined action on the bowel and the uterus is of especial value in chlorosis, of which amenorrhoea is an almost constant symptom. The drug is obviously contra- indicated in pregnancy and when haemorrhoids are already present. Many well-known patent medicines consist essentially of aloes.

The lign-aloes is quite different from the medicinal aloes. The word is used in the Bible (Numb. xxiv. 6), but as the trees usually supposed to be meant by this word are not native in Syria, it has been suggested that the LXX. reading in which the word does not occur is to be preferred. Lign-aloe is a corrup- tion of the Lat. lignum-aloe, a wood, not a resin. Dioscorides refers to it as agallochon, a wood brought from Arabia or India, which was odoriferous but with an astringent and bitter taste. This may be Aquilaria agallochum, a native of East India and China, which supplies the so-called eagle-wood or aloes-wood, which contains much resin and oil.

ALOIDAE, or Aloadae, i.e. Otus and Ephialtes, in ancient Greek

legend, the twin-sons of Poseidon by Iphimedeia, wife of Aloeus. They were celebrated for their extraordinary stature and strength. According to Homer (Od. xi. 305), they made war upon the Olympian gods and endeavoured to pile Pelion upon Ossa in order to storm heaven itself; had they reached the age of manhood, their attempt would have been successful, but Apollo destroyed them before their beards began to grow. In the Iliad (v – 365) Ares is imprisoned by them, but delivered by Hermes. Apollodorus says that they succeeded in piling Pelion upon Ossa. Another story is that they were presumptuous enough to seek Artemis and Hera in marriage, and that Artemis caused them

to slay each other unintentionally on the island of Naxos, where they were afterwards worshipped as heroes. In punishment for their offences they were bound back to back with snakes to a pillar in the lower world (Hyginus, Fab. 28). The Aloldae (here connected with dXcor), threshing-floor) represent the spirits of the fertile earth and agriculture, conceived of by the Greeks as engaged in combat with the Olympian gods. In contrast to these legends, Pausanias tells us that they were regarded as the first to worship the Muses on Mt. Helicon, while Diodorus repre- sents them as historical personages, princes of Thessaly, who defeated the Thracians in Strongyle, i.e. Naxos, where they made themselves rulers, and subsequently slew one another in a quarrel.

ALOMPRA, ALOUNG P'HOURA (1711-1760), founder of the last Burmese dynasty, was born in 1711 at Motshobo, a small village 50 m. north-west of Ava. Of humble origin, he had risen to be chief of his native village when the invasion of Burma by the king of Pegu in 1752 gave him the opportunity of attain- ing to the highest distinction. The whole country had tamely submitted to the invader, and the leading chiefs had taken the oaths of allegiance. Alompra, however, with a more independent spirit, not only contrived to regain possession of his village, but was able to defeat a body of Peguan troops that had been sent to punish him. Upon this the Burmese, to the number of a thousand, rallied to his standard and marched with him upon Ava, which was recovered from the invaders before the close of 1753. For several years he prosecuted the war with uniform success. In 1754 the Peguans, to avenge themselves for a severe defeat at Keoum-nuoum, slew the king of Burma, who was their prisoner. The son of the latter claimed the throne, and was supported by the tribe of Quois; but Alompra resisted, being determined to maintain his own supremacy. In 1755 Alompra founded the city of Rangoon. In 1757 he had established his position as one of the most powerful monarchs of the East by the invasion and conquest of Pegu.

Before a year elapsed the Peguans revolted; but Alompra, with his usual promptitude, at once quelled the insurrection. The Europeans were suspected of having instigated the rising, and the massacre of the English at Negrais in October 1759 is supposed to have been approved by Alompra after the event, though there is no evidence that he ordered it. Against the Siamese, who were also suspected of having abetted the Peguan rebels, he proceeded more openly and severely. Entering their territory, he was just about to invest the capital when he was seized with an illness which proved fatal on the 15th of May 1760. Alompra is one of the most remarkable figures in modern Oriental history. To un- doubted military genius he added considerable political sagacity, and he deserves particular credit for his efforts to improve the administration of justice. His cruelty and deceitfulness were faults common to all Eastern despots.

ALONE. This adjective or adverb requires no definition for its meaning of " by oneself " or " solitary "; but its etymological history, as simply a combination of the words " all " and " one " is rather curious (compare the' Ger. allein). " Lone " is merely a clipped form of the word, and so " lonely." The New English Dictionary traces the English word back to the year 1300.

ALORA, a town of southern Spain in the province of Malaga; 17 m. W.N.W. of Malaga, on the right bank of the river Guadal- horce, and on the Cordova-Malaga railway. Pop. (1900) 10,525. Alora, which is an ancient and picturesque town, with several Moorish ruins, occupies an outlying hill of the Sierra de Tolox, and overlooks a fertile valley where maize, sugar-cane and date- palms are cultivated. There are hot sulphurous springs in the town, which has also a fine climate; and many of the wealthy families from Malaga reside here in summer. Brandy distilling is, after agriculture, the chief local industry.

ALOST (Flem. Aalst), a town of Belgium, in the province of East Flanders, situated on the left bank of the Dender; the ancient capital of what was called Imperial Flanders. Pop. (1897) 28,771; (1904) 31,655. Flanders in the feudal period was a fief of the king of France — the count of Flanders being the first of the twelve peers of France; but there was a small strip

extending from Alost to the isles of Zeeland, designated Imperial

Flanders, of which the count was the vassal of the Holy Roman emperor. Attached to the hotel de ville is a fine belfry of the 15th century, but unfortunately it was seriously damaged by fire in 1879. In the church of St Martin, dating from 1498 but unfinished, is a fine Rubens. The subject is St Roch, the patron saint of lepers, and the colouring of the scaly skin of the leper in the forefront of the picture is generally regarded as one of the master's most striking effects. The work was painted to the order of the Brewers' Gild in (it is said) eight days. It was outside Alost that William Clito, grandson of William the Conqueror, who was then endeavouring to establish his claims as count of Flanders, was mortally wounded in 11 28. Of all the claims Alost possesses to fame perhaps the most remarkable is that Thierry Maartens (c. 1474) set up there one of the first printing presses in Europe. Alost is famous to-day for its hop gardens and linen-bleaching establishments. The meadows south of Alost are often covered with the linen undergoing the process of bleaching, which makes them assume the aspect of a whitish-blue carpet.

ALP. To the Swiss dwellers in the plains the term " the Alps " (q.v.) signifies the high snowy mountains which they see on the horizon, but to the dwellers in the valleys which nature has carved in the sides of those high mountains, the word alp means exclusively the summer pastures situated on the slopes above the valley, though below the snow-line. In fact such pastures are essential to the inhabitants of pastoral alpine districts, for the fodder to be obtained in the valley itself would not suffice to support the number of cattle which are required to afford sustenance to the inhabitants. Such mountain pastures, made use of only during the summer months, are of almost immemorial antiquity, cases occurring in 739, 868 and 999, while they are found in all parts of the Alpine chain. In France and Italy the system is badly managed, as also in Tirol (where the local name is Almen), where, too, these pastures have in the course of years been largely alienated by the valley in- habitants, and belong to large villages or small towns almost in the plains. But in Switzerland, and especially in the German- speaking mountain districts, the alps are the centre round which the entire pastoral life of the inhabitants turns. It is reckoned that in that country there are now about 4778 alps in all, the capital value of which is put at rather over £3,000,000. Of these alps about 45% are owned by the communes (exclusively or jointly) and 54% by individuals, the remaining 1 % being the property of the state of a few great monasteries. In the case of the alps belonging to the Swiss communes, it must be borne in mind that " commune " here does not signify either Eitvwohnergemeinden or Biirgergemeinden, but a special class called

Alpgetneinden (for instance in the well-known valley of Grindelwald there is one Einwohnergemeinde, but seven Alpge- tneinden). These Alpgemeinden are composed of the persons who have a right to send cattle up to any particular alp in summer, this right being attached (in different places) either to certain plots of ground in the valley or certain houses in the village, or to certain persons. In any case the owners of an alp fix the greatest number of cows which it can support during the summer without being permanently damaged. The plot of ground which can support a single cow (or 2 heifers, 3 calves or sheep, 4 pigs or 8 goats) is called a Kuhstoss (of which there are 270,389 in Switzerland), and it is in these terms that the productiveness of the alp is reckoned. Sometimes a par- ticular alp, or a portion of it, is reserved exclusively to heifers and calves, or to goats (in this case it is the loftier portion). On each alp there are several sets of huts wherein live the cow-herds and cheese-makers (the latter are called Sennen or Fruitiers). the cattle being generally left in the open. The cattle, with their attendants, shift from one to the other of these sets of huts, between the end of June and the end of September, making but one sojourn at the highest huts, but two at the lower. The proper name for these nuts is SennhMten or chalets, but the latter term is incorrectly applied also to houses in the village below. The milk given each day by each

cow is entered in a book, and then made into butter and cheese, the cow-herds and cheese-makers having the right to a certain proportion of milk, butter and cheese for their own sustenance, and receiving a small sum per head of cattle for looking after them. At the end of the season the net amount of cheese produced by milk from each cow is handed over to the owner of that particular cow, and is carried down by him to his home in the valley from the hut (a small building on four stone legs to secure the contents from mice) wherein the cheeses have been stored since they were made — this hut is called a Speicher. As the owners of Kuhstbssen may exchange them provisionally for others on another alp, or may hire them out (they can only sell them with the plot or house to which they are attached), the persons who in any given summer actually send cows up to an alp (these form the Besetzerschaft) need not necessarily be absolutely identical with the true owners of these rights or Besitzerschaft. Hay is never mown on the true alps save in spots which are not easily accessible to cattle (in very high spots it belongs to the mower, and is then called Wildheu), but hay-crops are made on the Mayens or Voralpen, the lowest pastures, situated between the homesteads and the true alps; these Voralpen are individual (not communal) property, though probably in olden days cut out of the true Alpen. In

the winter the cattle consume the hay mown on these Voralpen (which, to a certain extent, are grazed in late spring and early autumn, that is, before and after the summer sojourn on the alps), either living in the huts on the Voralpen while they consume it, or in the stable attached to the dwelling-houses in the village; in the barn is stored the hay mown on the homestead and on the meadows near the village, which may belong to the owner of the cattle. The whole system is weil organized and is well understood by the natives, though not always by strangers who visit the Alps in summer.

See John Ball, Hints and Notes for Travellers in the Alps (article x., especially pp. lvii.lxv.); new edition, London, 1899; Felix Anderegg, Illustriertes Lehrbuch fur die gesamte schweiz. Alpwirt schaft (Bern, 1897-1898); the Schweiz-Alpstatistik (each volume devoted to the alps of a single Swiss canton) ; and A. v. Miaskowski's two books, Die schweiz. Allmend (Leipzig, 1879), and Die Verfassung der Land-, Alpen- und Forstwirtschaft der Schweiz (Basel, 1878). (W. A. B. C.)

ALPACA, one of two domesticated breeds of South American camel-like ungulates, derived from the wild huanaco or guanaco. Alpacas are kept in large flocks which graze on the level heights of the Andes of southern Peru and northern Bolivia, at an eleva- tion of from 14,000 to 16,000 ft. above the sea-level, throughout the year. They are not used as beasts of burden like llamas, but are valued only for their wool, of which the Indian blankets and ponchos are made. The colour is usually dark brown or black and the coat of great length, reaching nearly to the ground. In stature the alpaca {Lama huanacos pacos) is considerably inferior to the llama, but has the same unpleasant habit of spitting.

In the textile industries " alpaca " is a name given to two distinct things. It is primarily a term applied to the wool, or rather hair, obtained from the Peruvian alpaca. It is, however, more broadly applied to a style of fabric originally made from the alpaca wool but now frequently made from an allied type of wool, viz. mohair, Iceland, or even from lustrous English wool. In the trade, distinctions are made between alpacas and the several styles of mohairs and lustres, but so far as the general purchaser is concerned little or no distinction is made.

The four species of indigenous South American wool-bearing animals are the llama, the alpaca, the guanaco and the vicuna. The llama and the alpaca are domesticated; the guanaco and the vicuna run wild. Of the four the alpaca and the vicuna are the most valuable wool-bearing animals: the alpaca on account of the quality and

quantity, the vicuna on account of the softness, fineness and quality of its wool. In the early days of the 19th century, the usual length of alpaca staples appears to have been about 12 in., this being a three years' growth; but to-day the length is little more than about half this, i.e. a one to two years' growth, although from time to time longer staples are to be found. The fleeces are sorted for colour and quality

by skilled native women. The colour of the greater proportion of alpaca imported into the United Kingdom is black and brown, but there is also a fair proportion of white, grey and fawn. It is customary to mix these colours together, thus producing a curious ginger-coloured yarn, which upon being dyed black in the piece takes a fuller and deeper shade than can be obtained by piece- dyeing a solid-coloured wool. In physical structure alpaca is somewhat akin to hair, being very glossy, but its softness and fineness enable the spinner to produce satisfactory yarns with comparative ease.

The history of the manufacture of this wool into cloth is one of the . romances of commerce. Undoubtedly the Indians of Peru employed this fibre in the manufacture of many styles of fabrics for centuries before its introduction into Europe as a commercial product. The first European importations would naturally be into Spain. Spain, however, transferred the fibre to Germany and France. Apparently alpaca yarn was spun in England for the first time about the year 1808. It does not appear to have made any headway, however, and alpaca wool was condemned as an unworkable material. In 1830 Benjamin Outram, of Greetland, near Halifax, appears to have again attempted the spinning of this fibre, and for the second time alpaca was condemned. These two attempts to use alpaca were failures owing to the style of fabric into which the yarn was woven — a species of camlet. It was not until the introduction of cotton warps into the Bradford trade about 1836 that the true qualities of alpaca could be developed in the fabric. Where the cotton warp and mohair or alpaca weft plain-cloth came from is not known, but it was this simple yet ingenious structure which enabled Titus Salt (q.v.), then a young Bradford manufacturer, to utilize alpaca successfully. Bradford is still the great spinning and manufacturing centre for alpacas, large quantities of yarns and cloths being exported annually to the continent and to the United States, although the quantities naturally vary in accord- ance with the fashions in vogue, the typical

” alpaca-fabric ” being a very characteristic ” dress-fabric.”

The following statistics, taken from Hooper’s Statistics of the Woollen and Worsted Trades of the United Kingdom, give an idea of the extent of the trade in yarns and fabrics of the alpaca type; unfortunately statistics for alpaca alone are not published.

Alpaca, Vicuna, and Llama Wool imported into the United Kingdom.

Year.

Peru.

Chile.

1

lb

£

lb

£

1854

1,247,015

124,946

15,573

1,557

i860

2,334,048

263,635

520,402

58,443

1870

3,324,454

388,969

563,782

65,996

1880

1,412.365

98,644

890,627

64,621

1890

3.1 14.336

190,703

564,606

30,694

1900

4,236,566

205,839

1,148,694

5i,“6

1902

5,038,998

259,927

1,028,171

47,6io

1905

2,301,522

119,321

2,302,650

112,367

Note. — In 1840 the imports into, exports from, and consumed in the United Kingdom of mohair, alpaca, vicuna, &c., amounted to £50,000.

Exports of Mohair and Alpaca Yarns for 1905. Russia . . . 1,288,800 lb . £168,596

Germany . . . 9,851,200 ,, I , I 45,795

Belgium . 316,400 ,, 40,409

France . . . 2,006,700 ,, . 223,605

Exports of Alpaca from the United Kingdom to the United States. 1881 . . £1,256 1900 . . £30,631

1890 . . — 1905 . . 4,954

Owing to the success in the manufacture of the various styles of alpaca cloths attained by Sir Titus Salt and other Bradford manufacturers, a great demand for alpaca wool arose, and this demand could not be met by the native product, for there never seems to have been any appreciable increase in the number of alpacas available. Unsuccessful attempts were made to acclima- tize the alpaca goat in England, on the European continent and in Australia, and even to cross certain English breeds of sheep

1 Grown in Peru but shipped from Valparaiso.

with the alpaca. There is, however, a cross between the alpaca and the llama— a true hybrid in every sense — producing a material placed upon the Liverpool market under the name ” Huarizo.” Crosses between the alpaca and vicuna have not proved satisfactory.

The preparing, combing, spinning, weaving and finishing of alpacas and mohairs are dealt with under Wool. (A. F. B.)

ALP ARSLAN, or Axan, MAHOMMED BEN DA’UD (1020- 1072), the second sultan of the dynasty of Seljuk, in Persia, and great-

grandson of Seljuk, the founder of the dynasty, was bom in the year a.d. 1029 (421 of the Hegira). He assumed the name of Mahommed when he embraced the Mussulman faith; and on account of his military prowess he obtained the surname Alp Arslan, which signifies " a valiant lion." He succeeded his father Da'ud as ruler of Khorasan in 1059, and his uncle Togrul Bey as sultan of Oran in 1063, and thus became sole monarch of Persia from the river Oxus to the Tigris. In consolidating his empire and subduing contending factions he was ably assisted by Nizam ul-Mulk, his vizier, one of the most eminent statesmen in early Mahommedan history. Peace and security being estab- lished in his dominions, he convoked an assembly of the states and declared his son Malik Shah his heir and successor. With the hope of acquiring immense booty in the rich church of St Basil ir. Caesarea, the capital of Cappadocia, he placed himself at the head of the Turkish cavalry, crossed the Euphrates and entered and plundered that city. He then marched into Armenia and Georgia, which, in 1064, he finally subdued. In 1068 Alp Arslan invaded the Roman empire. The emperor Romanus Diogenes, assuming the command in person, met the invaders in Cilicia. In three arduous campaigns, the two first of which were conducted by the emperor himself while the third was directed by Manuel Comnenus, the Turks were defeated in detail and finally (1070) driven across the Euphrates. In 1071 Romanus again took the field and advanced with 100,000 men, including a contingent of the Turkish tribe of the Uzes and of the French and Normans, under Ursel of Baliol, into Armenia. At Manzikert, on the Murad Tchai, north of Lake Van, he was met by Alp Arslan; and the sultan having proposed terms of peace, which were scornfully rejected by the emperor, a battle took place in which the Greeks, after a terrible slaughter, were totally routed, a result due mainly to the rapid tactics of the Turkish cavalry. Romanus was taken prisoner and conducted into the presence of Alp Arslan, who treated him with generosity, and terms of peace having been agreed to, dismissed him, loaded with presents and respectfully attended by a military guard. The dominion of Alp Arslan now extended over the fairest part of Asia; 1200 princes or sons of princes surrounded his throne and 200,000 warriors were at his command. He now prepared to march to the conquest of Turkestan, the original seat of his ancestors. With a powerful army he advanced to the banks of the Oxus. Before he could pass the river with safety it was necessary to subdue certain fortresses, one of which was for several days vigorously defended by the governor, Yussuf Kothual, a Kharizmian. He was, however, obliged to surrender and was carried a prisoner before the sultan, who condemned him to a cruel death. Yussuf, in desperation, drew his dagger and rushed upon the sultan. Alp Arslan,

the most skilful archer, of his day, motioned to his guards not to interfere and drew his bow, but his foot slipped, the arrow glanced aside and he received the assassin's dagger in his breast. The wound proved mortal, and Alp Arslan expired a few hours after he received it, on the 15th of December 1072.

See Gibbon, Decline and Fall of the Roman Empire, edited by J. B. Bury (1898), vi. pp. 235 et seq., and authorities there cited.

ALPENA, a city and the county seat of Alpena county, Michigan, U.S.A., on Thunder Bay, a small arm of Lake Huron, at the mouth of Thunder Bay river, in the N.E. part of the lower peninsula. Pop. (1890) 11,283; (1900) 11,802, of whom 4193 were foreign-born; (1910 census) 12,706. It is served by the Detroit & Mackinac railway and by steamboat lines to Detroit and other ports. The city is built on sandy ground on both sides of the river and has a good harbour, which has been considerably

improved by the Federal government; in 1907 the maximum draft that could be carried over the shallowest part of the channel was 14 ft. There is good farming land in the vicinity and Alpena has lumber and shingle mills, pulp works, Portland cement manufactories and tanneries; in 1905 the city's factory products were valued at $2,905,263. In 1906 the commerce of the port, chiefly in lumber, cement, coal, cedar posts and ties, fodder and general merchandise, was valued at $3,018,894. Alpena occupies the site of an Indian burying-ground. A trading- post was established here in 1835, but the permanent settlement dates from 1858; in 1871 Alpena was chartered as a city.

ALPENHORN, ALPHORN, a musical instrument, consisting of a natural wooden horn of conical bore, havinga cup-shaped mouthpiece, used by mountaineers in Switzerland and elsewhere. The tube is made of thin strips of birchwood soaked in water until they have become quite pliable; they are then wound into a tube of conical form from 4 to 8 ft. long, and neatly covered with bark. A cup-shaped mouthpiece carved out of a block of hard wood is added and the instrument is complete. The alpenhorn has no lateral openings and therefore gives the pure natural harmonic series of the open pipe. The harmonics are the more readily obtained by reason of the small diameter of the bore in relation to the length. An alpenhorn

made at Rigi-Kulm, Schwytz, and now in the South Kensington Museum, measures 8 ft. in length and has a straight tube. The well-known Ranz des Vaches is the traditional melody of the alpenhorn, which has been immortalized by Beethoven in the finale of the Pastoral Symphony, where the music is generally rendered by a cor anglais (q.v.). Rossini has introduced the melody into his opera William Tell. Wagner, in the third act of Tristan and Isolde, was not entirely satisfied with the tone quality of the cor anglais for representing the natural pipe of the peasant. Having in his mind the timbre of the alpenhorn, he had a wooden horn made for him with one valve only and a small pear-shaped bell, which is used at Bayreuth (see Holztrompete). The Swiss alpenhorn varies in shape according to the locality, being curved near the bell in the Bernese Oberland. Michael Praetorius mentions the alpenhorn under the name of holzern trummet in Syntagma Musicum (Wittenberg, 1615-1619). (K. S.)

ALPES MARITIMES, a department in the S.E. of France, formed in i860 out of the county of Nice, to which were added the districts of Grasse (formerly in the department of the Var) and of Mentone (purchased from the prince of Monaco). Pop. (1906) 334,007. It is bounded N.E. and E. by Italy, S. by the Mediterranean Sea, and W. by the departments of the Var and the Basses Alpes, while its northern extremity forms a sharp angle between France and Italy. Its area is 1444 sq. m., its greatest length is 59 m. and its greatest breadth 48ˆ m. It is composed of the valley of the Var river (which is all but com- pletely within this department), together with those of its chief affluents, the Tinee and the Vesubie. The region of Grasse is hilly, but the rest of the department is mountainous, its loftiest point being the Mont Tinibras (9948 ft.) .at the head of the Tinee valley. Two singular features of the frontier of the department towards the east are only to be explained by historical reasons. One is that the central bit of the Roja valley is French, while the upper and lower bits of this valley are Italian; the reason is that those bits which are now Italian formed part of the county of Ventimiglia, and the central bit part of the county of Nice, which alone became French in i860. The result is that the Italians are now unable to build a railway from Cuneo by the Col de Tenda and down the Roja valley direct to Ventimiglia. The other strange feature is that from near Isola in the upper Tinee valley southwards the political frontier docs not coincide with the physical frontier, or the main watershed of the Alpine chain; the reason (it is said) is that in i860 all the higher valleys of the Maritime Alps (on both sides of the watershed) were expressly excepted from the treaty of cession, in order that Victor Emmanuel

II. might retain his right of chamois hunting in these parts. The department is divided into three arrondissements (Nice, Grasse and Puget Theniers), 27 cantons and 155 communes. It forms the bishopric of Nice (the first bishop certainly known

is mentioned at the end of the 4th century), which till 1792 was in the ecclesiastical province of Embrun, then (1802) in that of Aix en Provence, next in that of Genoa(i8i4),and finally (i860) in that of Aix again. Its chief town is Nice. The broad-gauge railways in the department cover 56 m., including the line along the coast, while there are also 82 m. of narrow-gauge railways. The chief industries are distilleries for perfumes and manufacture of olive oil, of pottery and of tiles, besides a great commerce in cut flowers. To foreigners the department is best known for its health resorts, Nice, Cannes, Mentone, Antibes and Beaulieu, while other important towns are Grasse and Puget Theniers. (W. A. B. C.)

ALPHA and OMEGA (A and fl), the first and last letters of the Greek alphabet, corresponding to the Aleph and Taw of the Hebrew. They are used as a designation of Himself by the speaker in Rev. i. 8; xxi.6; xxii. 13. The first and last letters of the Hebrew alphabet are used in Rabbinic writings in a similar way. We find also " the seal of God is Emeth," Emeth (truth) being composed of the first, middle and last letters of the Hebrew alphabet. God is thus represented as the beginning, middle and end of all things (see the Jewish Encyclopaedia, s.v.).

ALPHABET (see also Writing). By the word alphabet, derived from the Greek names for the first two letters — alpha and beta — of the Greek alphabet, is meant a series of conventional symbols each indicating a single sound or combination of sounds. The ideal alphabet would indicate one sound by one symbol, and not more than one sound by the same symbol. Symbols for a combination of sounds are not necessary, though they may be convenient as abbreviations. In the writing of some languages, e.g. Sanskrit, such abbreviations are carried to an extreme; in most Greek MSS. also they are of very frequent occurrence. These contractions, however, may prove too great a strain upon the eyesight or the memory, and thus become a. hindrance instead of a help. This was apparently the case in Greek, for though the early printers cast types for all the contractions of the Greek MSS. these have now with one consent been given up. A con- sonant like x can only be regarded as an abbreviation; it ex- presses nothing that cannot as well be expressed by ks or gz, both of which combinations in different situations it may repre' sent (see X) . No alphabet corresponds exactly to the ideal

which we have postulated, nor if it did, would it continue long so to do, as the sounds of most languages are continually changing. Hence in the case of dead languages or past forms of living languages, it is often very difficult to define with precision what the sounds of the past epoch were. The study of the history of English pronunciation occupied the late Dr A. J. Ellis for a large part of his life, and the results fill five large volumes. The sounds which are most difficult to define exactly are the vowels; a great variety may be indicated by the same symbol. In the New English Dictionary no fewer than thirteen different nuances of vowel sound are distinguished under the symbol A alone. In English, moreover, the vowel sounds tend to become diphthongs, so that the symbol for the simple sound tends to become the symbol for that combination which we call a diphthong. Thus the long I in ride, wine, &c, has become the diphthong ai, and the name of the symbol I is itself so pronounced. In familiar, if vulgar, dialects, A tends in the same direction. In the ‘ ‘ cockney ” dialect, really the dialect of Essex but now no less familiar in Cambridge and Middlesex, the ai sound of i is represented by oi as in toime, ” time,” while a has become ai in Kale, pane, &c. In all southern English 5 becomes more rounded while it is being pronounced, so that it ends with a slight u sound. In the vulgar dialect already mentioned, the sound begins as a more open sound than in the cultivated pronunciation, so that no is really pro- nounced as naou. It is clear, therefore, that the best alphabet would not long indicate very precisely the sounds which it was intended to represent. See Phonetics.

But the history of the alphabet shows that at no time has it represented any European language with much precision, because it was an importation adapted in a somewhat rough and ready fashion to represent sounds different from those which it represented outside Europe. Wherever the alphabet may have

originated, there seems no doubt that its first importation in a form closely resembl’ng that with which we are familiar in modern times was from the Phoenicians to the Greeks. The Phoenicians were certainly using it with freedom in the 9th century B.C.; with so much freedom, indeed, that they must have been in possession of it for a considerable time before we can trace it. With the materials available up to August 1910 it would be idle here to attempt to trace its earlier history. Great discoveries in Cappadocia, Assyria and

Egypt were then only at their beginning, and any statement washable tobequickly disproved by the appear- ance of new evidence. The prevalent theory, universally accepted till a few years ago, was that of Vicomte Emmanuel de Rouge, first propounded to the Academie des Inscriptions in 1859, but unnoticed by the world at large till republished, after de Rouge's death, by his son in 1874. According to this view the alphabet was borrowed by the Phoenicians from the cursive (hieratic) form of Egyptian hieroglyphics. The resemblances between some Egyptian symbols and some symbols of the Phoenician alphabet are striking; in other cases the differences are no less remarkable. As a matter of fact the Egyptians might have passed about thirty-five centuries B.C. from the picture writing of hieroglyphs to genuine alphabetic signs. 1 They did not, however, profit by their discovery, because, amongst the Egyptians, writing was clearly a mystery in both senses — only possible at that period for masters in the craft, and also something, like the writing of medical prescriptions at the present day in Latin, which was not to be made too easily intelligible to the common people. At all periods, moreover, hieroglyphic writing was a branch of decorative art, and it may have been that the ancient Egyptian, like the modern Turk, resented too much lucidity, and liked his literary compositions to be veiled in a certain obscurity. The alphabet devised by the Egyptians consisted of twenty-four letters. Egyptologists are at variance on the question whether this alphabet was the original, or had any influence upon the development of the Phoenician alphabet. " With the papyrus paper," says Professor Breasted, 2 " the hand customarily written upon it in Egypt now made its way into Phoenicia, where before the 10th century B.C. it developed into an alphabet of consonants, which was quickly transmitted to the Ionian Greeks and thence to Europe." On the other hand, Professor Spiegelberg, 3 writing soon after Professor Breasted, says that investigation has not as yet furnished proof that the Phoenician alphabet is of Egyptian origin, though he admits that in some respects the development of the two alphabets, both without vowel signs, is curiously parallel.

The most recent view is that of Dr A. J. Evans, who argues ingeniously that the alphabet was taken over from Crete by the " Cherethites and Pelethites " or Philistines, who established for themselves settlements on the coast of Palestine. 4 From them it passed to the Phoenicians, who were their near neighbours, if not their kinsfolk. Symbols like the letters of the alphabet have been found in European soil painted upon pebbles belonging to a stratum between the Palaeolithic and Neolithic age. 5 This was in France at Mas d'Azil on the left bank of the Arize. Else- where several series of

such symbols resembling inscriptions have been found scratched on bones of the same period. 6 For the history of writing these may be important, but for the history of the alphabet, as we know it, they are not in question. The alphabet may have originated as Dr Evans thinks, but at present the proof is not conclusive. The Greek names of the letters, their forms, and the order of the symbols show that the Greek alphabet as we know it must have been imported by or from a Semitic people, and there is no evidence to contradict ancient tradition that this people was the Phoenicians. The view pro-

1 Breasted, History of Egypt (1906), p. 45.

2 Op. cit. p. 484.

3 Die Schrift und Sprache der alien Agypter (1907), p. 24. ‘ Scripta Minoa, i. (1909), § 10, pp. 77 ff.

6 E. Piette, L’Anthropologie, vii. (1896) pp. 384 ff.

• E. Piette, L’Anthropologie, xvi. (1905) pp. 8-9. The apparent inscriptions of this period are conveniently collected and figured together in Dechelette’s Manuel a” ‘ archeologie prehistorifue celtique et gallo-romaine, i. (1908) p. 235.

pounded by Deecke 7 in 1877, that the Phoenician alphabet had developed out of the late Assyrian cuneiform, never met with much acceptance and has really no evidence in its favour.

The earliest alphabetic document which can be dated with comparative certainty is the famous Moabite stone, which was discovered in 1868, and after a controversy between rival claimants which led to its being broken in pieces by the Arabs, ultimately reached the Louvre, where in a restored form it re- mains. The long inscription upon i celebrates the achievements of Mesha, king of Moab, who had been a tributary of Ahab, king of Israel, and rebelled after his death (1 Kings hi. 4, 5). Though the chronology of the period is somewhat uncertain, the date must be in the first half of the 9th century B.C. It is to be remembered, however, that important as this monument is for the development of the alphabet, and because it can be dated with tolerable accuracy, the dialect and alphabet of Moab are not in themselves proof for the Phoenician forms which influenced the peoples of the Aegean, and through them Western Europe. The fragment of a bronze bowl discovered in Cyprus in 1876, which bears roundgits edge an inscription dedicating it to Baal- Lebanon as a gift from a servant of Hiram, king of the*

Sidonians, is probably the oldest Phoenician document which we possess. This bowl, though perhaps a little earlier than the Moabite stone, in all probability is not more than a century older, while some . authorities think it is even later. The earliest alphabet consisted of twenty-two letters, and bears a very close resemblance to the earliest Greek alphabet from A toT. The symbols in the Greek alphabet from Y to Q, or in the numerical alphabet to 3> , are not found in the Phoenician alphabet.

As already mentioned, the twenty-two symbols of the Phoe- nician alphabet indicate consonantal sounds only. Greek did not possess so many consonants. The Phoenician alphabet possessed many more aspirates than were required in Greek, which tended more and more to drop all its aspirates. Before history begins it had also lost, except sporadically in out-of-the-way dialects, the semi-vowel i (approximately English y). It therefore made the aspirates A, E, and the semi-vowel I into vowels, and apparently converted the semi-vowel Y = w mt0 the vowel, Y = u, which it placed at the end of the alphabet and substituted for it as the sixth symbol of the alphabet the letter F with the old value of w. The superfluous sibilants were also adapted in various ways (see below).

The discovery of a large number of very archaic inscriptions in the island of Thera, which was made by Freiherr Hiller von Gartringen in 1896, has shown that the earliest Greek p e / at /oo- alphabet was even more like the Phoenician than had ship of been heretofore believed. The symbol for /3 in Thera Greek to (Q) is nearer than any previously known to the Pboe- Semitic letter (ˆ) though, as not infrequently happens in the transference of a symbol from one people to another, its position is inverted — a fate which in this alphabet has befallen also X (Semitic U, Thera "|), and possibly

7 Der Ur sprung des alt-semilischen Alphabets aus der neu-assyri- schen Keilschrift (ZDMG. xxxi. pp. 102 ff.). A still more sweeping theory of the same nature is propounded by the Rev. C. J. Ball in the Proceeding of the Society of Biblical Archaeology, xv. (1893) pp. 392 ff.

from the very beginning of our records. Unfortunately, as yet no record is preserved which can with any probability be dated earlier than the 7th century B.C., and the Phoenician influence had by then

nearly ceased. How long this influence lasted we cannot tell. If in Crete a system of writing of an entirely different nature had been developed seven or eight centuries before, there must have been some very important reason for the entire abandonment of the old method and the adoption of a new. In Crete, at least, the excavations show that the old civilization must have ended in a social and political cataclysm. The magnifi- cent palace of Minos — there seems no reason to withhold from it the name of the great prince whom Thucydides recognized as the first to hold the empire of the sea — perished by the flames, and it evidently had been plundered beforehand of everything that a conqueror would regard as valuable. The only force in Greek history which we know that could have produced this change was that of the Dorian conquest. As everywhere in the Peloponnese, except at Argos, there seems to have been a sudden break with the earlier civilization, which can have been occasioned only by the semi-barbarous Dorian tribes, so the same result seems to have followed from the same cause in Thera. The Dorians apparently were without an alphabet, and consequently when Phoenician traders and pirates occupied the place left vacant by the downfall of Minos's empire, the people of the island, and of the sea coasts generally, adopted from them the Phoenician alphabet. 1 The Greeks who migrated to Cyprus, possibly as the result of the Dorian invasion, adopted a syllabary, not an alphabet (see Plate; also Writing). That the alphabet was borrowed and adapted independently by different places not widely separated, and that the earliest Greek alphabets did not spread from one or a few centres in Greek lands, seem clear (a) from the different Greek sounds for which the Phoenician symbols were utilized; (b) from the different symbols which were employed to represent sounds which the Phoenicians did not possess, and for which, therefore, they had no symbols. The Phoenician alphabet was an alphabet of consonants only, but all Greek alphabets as yet known agree in employing A, E, I, O, Y as vowels. On the other hand, a table of Greek alphabets 2 will show how widely different the symbols for the same sound were. Except for a single Attic inscription (see Plate) , the alphabets of Thera and of Corinth are the oldest Greek alphabets which we possess. Yet at Corinth alongside ^"^v, which is found for the so-called spurious diph- thong a (i.e. the Attic ei, which does not represent an Indo- European ei, but arises by contraction, as in $i.Xen-e, or through the lengthening of the vowel sound as the result of the loss of a consonant, as in tiprj/Avos for Fefpr)fievos) the short e sound is represented by B; t is found at Corinth in its oldest form ^ , and also as Z , while in Thera it is $• In Thera the w sound of digamma (F) was entirely lost, and therefore is not represented. Both

Thera and Corinth employ in the earliest inscriptions E$i for f , not £, though in both alphabets the ordinary use as £ is adopted, no doubt through the influence of trade with other

1 In an excellent summary of the different views held as to the origin of the alphabet (Journal of the American Oriental Society, vol. xxii., first half, 1901), Dr J. P. Petersagrees (pp. 191 ff.) that the best test is the etymology of the names of the letters. He shows that " twelve of the letter- names are words with meanings [in the northern dialects of Semitic], all of them indicating simple objects, six of the twelve being parts of the body. The objects denoted by the other six names — -ox, house, valve of a door, water, fish and mark or cross — clearly do not belong to any people in a nomadic state, but to a settled, town-abiding population. . . . Six of the letter-names are not words in any known tongue, and appear to be syllables only. Four letter-names are triliterals, and resemble in their form Semitic words." As n of the 12 which have meanings are to be found in the Assyrian-Babylonian syllabaries, he suggests a possible Babylonian origin. Different views with regard to some of these symbols are expressed by Lidzbarski, EphemerisfUr semitische Epigraphik, ii. pp. 125 ff. (1906). The earliest tradition of the names is discussed by Noldeke in his Beitrage zur semitischen Sprachwissenschaft (1904), pp. 124 ff.

2 See, for example, the tables at the end of Roberts's Introduction

states. On the other hand, at Cleonae, which is distant not more than 8 or 9 m. from Corinth, an ancient inscription written Povo-Tpo4>r)56v has recently been discovered, which shows that though Cleonae for B wrote rj~, like the Corinthian J 1 , and, as at Corinth, wrote & for a vowel sound, the vowel thus represented was not short and long e (e and ?/) as at Corinth, but 7] only, as in X££ A A, A*^ (x/>W«i A"7)- Here "^ repre- sents e, and the spurious diphthong is represented by «., as in [1] " M I 3l (e i(iev ' Doric infinitive = elvai) , a form which shows that 1 has at Cleonae the more modern form I as distinguished from the Corinthian ^. 3*

Regarding three other questions controversy still rages. These are: (a) how Greek utilized the four sibilants (Shin, Samech, Zain and Zade), which it took over from the Phoenician; (b) what was the history of development in the symbols for , x, ^, w (the history of £ belongs to both heads) ; (c) the history of the symbol for the digamma F.

In the Phoenician alphabet Zain was the seventh letter, occupying the

same position and having the same form approximately (1) as the early Greek Z, while in pronunciation it was a voiced s-sound; Samech (;£) followed the symbol for n areek and was the ordinary s-sound, though, as we have seen, Phoenician it is in different Greek states at the earliest period f as s n,u a ats. well as £; after the symbol for p came Zade (|v), which was a strong palatal s, though in name it corresponds to the Greek tiJTa; while lastly Shin (W) follows the symbol for r, and was an iA-sound. The Greek name for the sibilant (uiyiui) may simply mean the hissing letter and be a derivative from o-ifw ; many authorities, however, hold that it is a corruption of the Phoenician Samech. Unfortunately, it is not clear how many sibilants were distinguished in Greek pronunciation, nor over what areas a particular pronuncia- tion extended. There is, however, considerable evidence in support of the view that Greek aa representing the sound arising from

*On an inscription of Halicarnassus, a town which stood in ancient Carian territory, the sound of aa in 'AXucapvacrokuv is represented by T, as it is also in the Carian name Panyassis (nawaTios, genitive), though the ordinary $§ is also found in the same inscription. The same variation occurs at the neighbouring Teos and at Ephesus, while the coins of Mesembria in Thrace show regularly MET A and A \ETAA\BPI ANXlNi where f represents the sound which resulted from the fusion of By, and which appears in Homer as 00 in pkooos, while in later Greek it becomes ukaos. 6 This symbol *p is in all probability the early form of the letter which was known to the Greeks as San (aav) and in modern times as Sampi, and which is utilized as the numeral for 900 in the shape "Jf. According to Herodotus (i. 139), San was only the Dorian name for the letter which the Ionians called Sigma. This would bring it into connexion with the Phoenician W (Shin), which, turned through a right angle, is possibly the Greek X , though some forms of Zade on old Hebrew coins and gems (§ 2£.) equally resemble the Greek letter. From other forms of Sade, however, the other early form of*

For the history of the additional symbols which are not Phoenician, we must begin with Y- There is no Greek alphabet in which the symbol is not represented. But the Phoenician form corresponding to it is the consonant w, and occupies the /.?"' position of the Greek digamma as sixth in the series. °J Whence did the Greeks obtain the digamma? The <% amM – point is not clear, but probably the Greeks acted here as they did in the case of the vowel i and the consonant y, adopting the consonant symbol for the vowel sound. As, however, except in Cyprus, Pamphylia and Argos, the only y sound which survived in Greek —

3 Cp. Frankel, Corpus inscriptionum Graecarum Peloponnesi, 1., No. 1607.

1 See Witton, in American Journal of Philology, xix. pp. 420 ff., and Lagercrantz, Zur griechischen Lautgeschichte (Upsala, 1898).

6 See Foat, " Tsade and Sampi " (Journal of Hellenic Studies, xxv. pp. 338 ff., xxvi. p. 286). A number of ingenious points often uncertain are raised by A. Gercke, " Zur Geschichte des altesten griechischen Alphabets " (Hermes, xli., 1906, pp. 540 ff.).

ihe glide between i and another vowel as in Sui. = diya — is never represented, there was no occasion to use the Phoenician Jod in a double function. With Vau it was different; the K-sound existed in some form in all dialects, the a>-sound survived in many far into historical times. The Phoenician symbol having been adopted for the vowel sound, whence came the new symbol P or Z. for the digamma? Hitherto there have been two views. Most authorities have held that the new form was derived from E by dropping the lowermost crossbar; some have held that it developed out of the old Vau, a view which is not impossible in itself and has the similar development in Aramaic (Tema) in its favour. But as Dr Evans has found a form like the digamma among his most recent types of symbols, and as we have no intermediate forms which will prove the development of p" from Y , though the form found at Oaxos in Crete, viz. frJ, shows a form sufficiently unlike P , it is necessary to suspend judgment.

The Greek aspirates were not the sounds which we represent by ph, th, ch (Scotch), but corresponded rather to the sound of the final

consonants in such words as lip, bit, lick, the breath being Greek audible after the formation of the consonant. It is not

*aspirates, clear that Greek took over fil with this value, for in one Ac ***

Theran inscription Q g are found combined as equivalent

to T — H. while the regular representation of and x is fl Q and K £], or Cp (koppa) ˆ respectively. In the great Gortyn inscription from Crete and occasionally in Thera,]~\ (in Crete in the form c) and K are used alone for and x, just as conversely even in the 5th century

the name of Themistocles has been found upon an ostmkon spelt OejLuoˆoKXjjs. Such confusions show that even to Greek ears the distinction between the sounds was very small. To have re- corded it in writing at all shows considerable progress in the obser- vation of sounds. Such progress is more easily indicated by changes in the symbols among a people whose acquaintance with the art is not of long standing nor very familiar. English, though possessing sounds comparable to the Greek 6, , x, has never made any attempt to represent them in writing. On the other hand, no doubt Athens in 403 B.C. officially adopted the Ionic alphabet and gave up the old Attic alphabet. The political situation in Athens, however, at this time was as exceptional as the French Revolution, and offered an opportunity not likely to recur for the adoption of a system in widely extended use which private individuals had been employing for a long time.

The history of the symbols and x is altogether unknown. The very numerous theories on the subject have generally been founded on a principle which itself is in need of proof, viz. that these symbols must have arisen by differentiation from others already existing in the alphabet. The explanation is possible, but it is not easy to see why, for example, the symbol p or

, seeing that the sounds of 8 and 4> outside Aeolic (a dialect which is not here in question) are never confused. On the other hand, if we remember the large number of symbols belonging to the pre- historic script, it will seern at least as easy to believe that the persons who, by adding new letters to the Phoenician alphabet, attempted to bring the symbols more into accordance with the sounds of the Greek language, may have borrowed from this older script. It is now generally admitted that the improvements of the alphabet were made by traders in the interests of commerce, and that these improvements began from the great Greek emporia of Asia Minor, above all from Miletus. Symbols exactly like , x, and

CORA = 'AXe£a76oa, and similarly in Melos, . PAY I ifcVA I ECA\ = npaJiKuSeos. 2 This experiment, for it was no more, belongs apparently to the latter part of the 6th

1 See especially Proceedings of the Society of Biblical Archaeology for 1895, p. 40; cf. also Kalinka, Neue Jahrbucher fur Philologie, iii. (1899), p. 683. Similar forms are also found in the Safa in- scriptions (South Semitic) with similar values, and Praetorius argues (Z.D.M.G. lvi., 1902, pp. 677 ff., and again, lviii., 1904, pp. 725 f.) that these were somehow borrowed by Greek in the 8th century n.c, while in lxit. pp. 283 ff . he argues that the reason why the Greeks

borrowed 8 for the aspirated t was its form, the cross in ® being regarded as J and the surrounding circle as a variety of Dan occasional form of Q the aspirate. Here also (p. 287) as in his Ursprung des kanaanaischen Alphabets, pp. 13 f., he argues that the two forms of the digamma F and FJ, and also the South Semitic

2 Inscriptiones Graecae, xii., fasc. iii. Nos. 81 1 . 1 149.

f century, and was soon given up. As the Ionians kept the form 4; which the people of Thera used for f, in the same position in their alphabet as Samech occupied in the Phoenician alphabet, there can be no doubt as to its origin. The symbol + which the Chalcidian Greeks used in the 6th century B.C. for £ may be derived, according to the most widely accepted theory, from a primitive form of Samech |2, which is recorded only in the abecedaria of the Chalcidian colonies in Italy. In this case the borrowing of the Greek alphabet must long precede any Phoenician record we possess. But it is not probable that the Ionic and Phoenician ˆ developed independently from the closed form. Kretschmer, however, in several publications 3 takes a different view. He thinks that the guttural element in £ was a spirant, and therefore different from x, which is an aspirate. He points out that in Naxos, in a 6th-century inscription, 4 £ in Na£ £ou, e£oxos and the first element

in which he regards as a form of 0 = ˆ. As x is found in the same inscription (in the form x), the guttural element must have been different, else £ would have been spelt X2- Attica and most of the Cyclades kept x f° r the guttural element in £ (written X£ or + £) and for x as well. On the west of the Aegean a new symbol y was invented for the aspirate value, and this spread over the main- land and was carried by emigrants to Rhodes, Sicily and Italy. The sign x was kept in the western group for the guttural spirant in £, which was written X § ; but, as this spirant occurred nowhere else, the combination was often abbreviated, and X was used forX? precisely as in the Italic alphabets we shall find that F = / develops out of a combination FH.

The development of symbols for the long vowels i\ and a was also the work of the Ionians. The /z-sound ceased at a very early period to exist in Ionic, and by 800 B.C. was ignored in writing. The symbol or H was then employed for thelongopene-sound.ause suggested by the name of the letter, which, by the loss of the aspirate, had passed from Heta to Eta. About the same period, and probably as a sequel to this change, the Greeks of Miletus developed £2 for the long open o-sound, a form which in all probability is differentiated out of O.

Centuries passed, however, before this symbol was gener- ally adopted, Athens using only O for o, o> and ov, the spurious diphthong, until the adoption of the whole Ionic alphabet in 403 B.C. 6

The discoveries of the last quarter of the 19th century carried back our knowledge of the Latin alphabet by at least two centuries, although the monuments of an early age which have been discovered are only three, (a) In 1880 alphabet was discovered between the Quirinal and Viminal hills a little earthenware pot of a curious shape, being, as it were, three vessels radiating from a centre, each with a separate mouth at the top. 6 Round the sides of the triangle formed by the three vessels and under the mouths runs an inscription of considerable length. The use for which the pot was intended and the purport of the inscription have been much disputed, there being at least as many interpretations as there are words in the inscription. The date is probably the early part of the 4th century B.C. Though found in Rome, the vessel is small enough to be easily portable, and might therefore have been brought from elsewhere in Italy. It is equally possible that the potter who inscribed the words upon it was not a native of Rome. D y enos ln . One or two points in the inscription make it doubtful scriptioa. whether the Latin upon it is really the Latin of Rome. It is generally known as the Dvenos inscription, from the name of the maker who wrote on the vessel from right to left the in- scription, part of which is DVENOS MED FECED (= fecit). (6) The second of these early records is the inscription on a gold fibula found at Praeneste and published in 1887. The inscription runs from right to left, and is in letters which show more clearly than ever that the Roman alphabet is borrowed from the alphabets of the Chalcidian Greek colonies in Italy. Its date cannot be later than the 5th and is possibly as early as the 6th century b.c. The words are MANIOS MED FHEFHAKED NVMASIOI, " Manius made me for Numasius." The symbol for M

*has still five strokes, 5 has the angular form $, £• The V"**

... . , Praeneste

inscription is earlier than the Latin change of s between fibula.

vowels into r, for Numasioi is the dative of the older

form which corresponds to the later Numerius. The verb form

3 See especially Athenische Mitteilungen, xxi. p. 426.

4 Figured in Roberts's Introduction to Greek Epigraphy, p. 65.

6 Details of the history of the individual letters will be found in separate articles.

'.It is figured most accessibly in Egbert's Introduction to the Study of Latin Inscriptions, p. 16.

is remarkable. In the Dvenos inscription the perfect of facto is feced ; here it is a reduplicated form with the same vowel as the present. The spelling also is interesting. The symbol K is still in ordinary use, and not merely used for abbreviations as in the classical age. But most remarkable is the representation of Latin F by FH. The reason for this is clear. The value of F in the Greek alphabet is w and not / as in Latin. Greek had no sound corresponding to Latin F, consequently an attempt is made by combining F and H to indicate the difference of sound. Etruscan uses FH in the same way. As Latin, however, made the symbol V indicate not only the vowel sound 11, but also the consonant sound v (i.e. English w), the sign for the digamma F was left unemployed, and as FH was a cumbrous method of representing a sound which did not exist in Greek, the second element came to be left out in writing. Thus F came to be the representative of the unvoiced labiodental spirant instead of that for the bilabial voiced spirant. Whether the form fefaked was ever good Latin in Rome may be doubted, for the Romans, in spite of the few miles that separate Praeneste from Rome, were inclined to sneer at the pronunciation and idiom of the Praenestines (cf. Plautus, Trin. 609, True. 691 ; Quintilian i. 5, 56). (c) The last, and in some respects the most important, of these records was found in 1899 under an ancient pavement in the Comitium at the north-west corner of the Roman Forum. It is engraved upon the four sides and one bevelled edge of a

pillar, the top of which has been broken off. As the scriptlon.' "w-riting is fiovoTpo4yr\h6v, beginning at the bottom of

the pillar and running upwards and down again, no single line of the inscription is complete. Probably more than half the pillar is lost, so that it is not possible to make out the sense with certainty. The inscription is probably not older than that on the fibula from Praeneste, but has the addi- tional interest of being undoubtedly couched in the Latin of Rome. The surviving portion of the

inscription contains examples of all the letters of the early alphabet, though the forms of F and B are fragmentary and doubtful. As in the Praenestine inscription, the alphabet is still the western (Chalcidian) alphabet. K is still in use as an ordinary consonant, and not limited to a symbol for abbreviations as in the classical period. The rounded form of 7 is found with the value of G inRECEI.whichis probably the dative of rex. H has still the closed form g, M has the five- stroke form, S is the three-stroke^., tending to become rounded. R appears in the Greek form without a tail, and V and Y are both found for the same sound. The manner of writing up and down instead of backwards and forwards across the stone is obviously appropriate to a surface which is of considerable length, but com- paratively narrow, a connected sense being thus much easier to observe than in writing across a narrow surface where, as in the gravestones of Melos, three lines are required for a single word. The form of the monument corresponds to that which we are told was given to the revolving wooden pillars on which the laws of Solon were painted. That the writing of Solon's laws, which was @ovoTpoT)5bv, was also vertical is rendered probable by the phrase 6 KaruOtv vdfios in Demosthenes' speech Against Aristocrates, § 28, for which Harpocration is unable to supply a satisfactory explanation.

The differentiation of the Roman alphabet from the Greek is brought about (a) by utilizing the digamma for the unvoiced labio- dental spirant F; (b) by dropping out the aspirates 0, , Differea- x (V^ m the Chalcidian alphabet, whence the Roman is tuition of derived) from the alphabet proper and employing them fmm'areek ° n ' y as numera ' s > s (O) being gradually modified till it alphabet. was identified with C as though the initial of centum, 100. Similarly© became in time identified with M as though the initial of mille, 1000, and the side strokes of x m the above form were flattened out till it became J., and ultimately L, 50. (e) After 350 n.C, at latest, there was in Latin no sound corresponding to Z, which was therefore dropped. In the Chalcidian alphabet the symbol for x was placed after the symbols common to all Greek alphabets, a position which X retains in the Latin (and also in the Faliscan) alphabet. K in time passed out of use except as an abbreviation, its place being taken by C, which, as we have seen, U in the earliest inscription still g. Three points here require ex- planation: (1) Why K fell into disuse; (2) why C took the place of

K ; (3) why the new symbol G was put in the place of the lost Z. It is clear that C must have become an equivalent of K before the latter fell out of use. There is some evidence which seems to point to a pronunciation of the voiced mutes which, like the South German

pronunciation of g, d, b, but slightly differentiated them from the unvoiced mutes, so that confusion might easily arise. The Etruscans, who were separated from the Romans only by the Tiber, gradually lost the voiced mutes. But another cause was perhaps more potent. C and IC, as k was frequently written, would easily be con- fused in writing, and Professor Hempl {Transactions of the American Philological Association for 1899, pp. 24 ff .) shows that the Chalcidian form of f — I developed into shapes which might have partaken of the confusion. Owing to this confusion, the new symbol G, differ- entiated from C, took the place of the useless I. In abbreviations, however, C remained as before in the value of G, as in the names Gaius and Gnaeus. Y and Z were added in the last century of the republic for use 'in transliterating Greek words containing v and f. 1

The dialect which was most closely akin to Latin was Faliscan. The men of Falerii, however, regularly took the side of the Etrus- cans in wars with Rome, and it is clear that the civilization of the old Falerii, destroyed for its rebellion in 241 B.C., was Etruscan and not Roman in character. Peculiar to this alphabet is the form for/ — IV Much more important than the scanty remains of Faliscan is the Oscan alphabet. The history of this alphabet is different from that of Rome. It is certain from the symbols which they develop or drop that the people of Campania and Samnium borrowed their alphabet from the Etruscans, who held dominion in Campania from the 8th to the 5th century B.C. Previous to the Punic wars Campania had reached a higher stage of civilization than Rome. Unfortunately, the remains of that civilization arc very scanty, and our knowledge of the official alphabet outside Capua, and at a later period Pompeii, is practically confined to two important inscriptions, the tabula Agnonensis, now in the British Museum, and the Cippus Abellanus, which is now kept in the Episcopal Seminary at Nola. Of Etruscan origin also is the Umbrian alphabet, represented first and foremost in the bronze tablets from Gubbio (the ancient Iguvium). The Etruscan alphabet, like the Latin, was of Chalcidian origin. That it was borrowed at an early date is shown by the fact that most of its numerous inscriptions run from right to left, though some are written 0ovar poriS6y. That it took over the whole Chalcidian alphabet is rendered probable by the survival in Umbrian and Oscan, its daughter alphabets, of forms which are not found in Etruscan itself. This mysterious language, despite the existence of more than 6000 inscriptions, and the publication in 1892 of a book written in the language and handed down to us by the accident of its use to pack an Egyptian mummy, remains as obscure as ever, but apparently it underwent very great

phonetic changes at an early period, so that the voiced mutes B, D, G disappeared. Of the existence of the vowel O there is no evidence. If it ever existed in Etruscan, it had been lost before the Oscans and Umbrians borrowed their alphabets. On the other hand, both of their alphabets preserve B and Umbrian G in the form >. Etruscan also retained this symbol in the form 3, and utilized it exactly as Latin did to replace ˆJ. Oscan, in order to represent D, introduced later a form 9, thus creating confusion between the symbols for d and for r. This form was adopted for d because Q had already been borrowed from Etruscan as the symbol for r, although S is also found on Etruscan inscriptions. For the Greek digamma Etruscan used both ˆ and ‘, but the former only was borrowed by the other languages. Etruscan, like Latin, used 0-ˆ (from right to left) to represent the sound of Latin F, but, unlike Latin, adopted Q not <1 as the single symbol. This form it then wrote as two lozenges g, whence developed a later sign, 8. which is used also in Umbrian and Oscan. As the old digamma was kept, this new sign was placed after those borrowed from the Chalcidian'alphabet. Similarly it used ˆf" an d I for the Chalcidian f ; Umbrian borrowed the first, Oscan the second form. The form for h was still closed □, which Etruscan passed on to Oscan, while Umbrian modified it to ©. The form for m has five strokes ; from a later form p]/j the Oscan form was borrowed. Of the two sibilants, M and ˆ or S, Oscan adopted only ˆ, Umbrian both M and the rounded form S. 9 is found on Etruscan inscriptions, but not in the alphabet series preserved; neither Umbrian nor Oscan has this form. T appears in Etruscan as y, •/■, and X; of these Umbrian borrows the first two, while Oscan has a form T like Latin. Etruscan took over the three Greek aspirates, 0, , x, in their Chalcidian forms; survives in Umbrian as O. the others naturally disappear. Both Umbrian and Oscan devised two new symbols. Umbrian

1 Gardthausen, ” Ursprung und Entwickelung der griechisch-lateinischen Schrift ” (Germanisch-romanische Monatsschrift,i. (1909), PP- 337 ff-) argues for a ” proto-Tyrrhenian ” alphabet from which Etruscan, Umbrian and Oscan descended as one group, and Faliscan and Latin as the other. Evidence in favour of such a position for the Latin alphabet is not forthcoming.

took over from Etruscan perhaps the sign q, but gave it the new-value of a spirant which developed out of an earlier d-sound, but which is written in the Latin alphabet with rs. The second Umbrian

symbol was rj, which was the representative of an i-sound developed by palatalizing an earlier k. In Oscan, which had an o-sound, but no symbol for it, a new sign was invented by placing a dot between the legs of the symbol for u — V- This, however, is found only in the best-written documents, and on some materials the dot cannot be distinguished. The symbol I- was invented for the open ii-sound and close e-sound. 1 At a much later epoch it was introduced into the Latin alphabet by the emperor Claudius to represent y, and the sound which was written as i or u in maximus, maxumus, &c.

Besides the Italic alphabets already mentioned, which are all derived from the alphabet of the Chalcidian Greek colonists in Italy, there were at least four other alphabets in use in different Darts of Italy: (i) the Messapian of the south-east part of the penin- sula, in which the inscriptions of the Illyrian dialect in use there were written, an alphabet which, according to Pauli {AM-italische Forschungen, iii. chap, ii.) was borrowed from the Locrian alphabet ; (2) the Sabellic alphabet, derived from that of Corinth and Corcyra, and found in a few inscriptions of eastern-central Italy; (3) the alphabet of the Veneti of north-east Italy derived from the Elean; (4) the alphabet of Sondrio (between Lakes Como and Garda), which Pauli, on the insufficient ground that it possesses no symbols corresponding to <#> and x, derives from a source at the same stage of development as the oldest alphabets of Thera, Melos and Crete.

From the fact that upon the Galassi vase (unearthed at Cervetri, but probably a-product of Caere), which is now in the Gregorian Museum of the Vatican, a syllabary is found along with one of the most archaic Greek alphabets, and that a similar combination was found upon the wall of a tomb at Colle, near Siena, it has been argued that syllabic preceded alphabetic writing in Italy. But a syllabary where each syllable is made by the combinations of a symbol for a consonant with that for a vowel can furnish no proof of the existence of a syllabary in the strict sense, where each symbol represents a syllable; it is rather evidence against the existence of such writing. , The syllabary upon the Galassi vase indicates in all probability that the vase, which resembles an ink-bottle, be- longed to a child, for whose edification the syllables pa, pi, pe, pu and the rest Were intended. The evidence adduced from the Latin grammarians, and from abbreviations on Latin inscriptions like tubs for lubens, is not sufficient to establish the theory.

It has been argued that the runes of the Teutonic peoples have been derived from a form of the Etruscan alphabet, in-

scriptions in which are spread over a great part of runes. northern Italy, but of which the most characteristic

are found in the neighbourhood of Lugano, and in Tirol near Innsbruck, Botzen and Trent. The Danish scholar L. F. A. Wimmer, in his great work Die Runenschrijt (Berlin, 1887), contends that the resemblance, though striking, is superficial. Wimmer's own view is that the runes were developed from the Latin alphabet in use at the end of the 2nd century a.d. Wimmer supports his thesis with great learning and ingenuity, and when allowance is made for the fact that a script to be written upon wood, as the runes were, of necessity avoids horizontal lines which run along the fibres of the wood, and would therefore be indistinct, most of the runic signs thus receive a plausible explanation. The strongest argument for the derivation from the Latin alphabet is undoubtedly the value of /attaching to r "> for, as we have seen, the Greek value of this symbol is w, and its value as/ arises only by abbreviation from FH. On the other hand, several of Wimmer's equations are undoubtedly forced. Even if we grant that the Latin symbols were inverted or set at an angle (a proceeding which is paralleled by the treatment of the Phoenician signs in Greek hands), so that 1*1 represents Latin V, M Latin E, N Latin V, and {> Latin D; while the symbol for the voiced spirant 3 is f> doubled, ^<], [X] , it is diffi- cult to believe that the symbol for the spirant g, viz. X, repre- sents a Latin K (which was of rare occurrence), or again s fs, X a Latin N,orthatthesymbolfor»g, ^, represents < = c doubled. Moreover, the date of the borrowing seems too late. The runes are found in all Teutonic countries, and the Romans were inclose contact with the Germans on the Rhine before the beginning*

1 For further details of these alphabets, see Conway, The Italic Dialects, ii. pp. 458 ff. The recent discovery by Keil and Premerstein (Denkschriften der Wiener Akademie, liii., 1908) of Lydian inscriptions containing the symbol a suggests that the old derivation of the Etruscans from Lydia may be true and that they brought this symbol with them (see article on F). But the inscriptions are not yet deciphered, so that conclusive proof is still wanting.

of the Christian era. We hear of correspondence between the Romans and German chieftains in the early days of the empire. It is strange, therefore, if the Roman alphabet, which formed the model for the runes, was that of two whole centuries later, and even then the formal alphabet of inscriptions. By that time the Teutons were likely to have more convenient materials than wood whereon to write, so that the adaptation of the forms would not have been necessary.

That the Germans were familiar with some sort of marks on wood at a much earlier period is shown by Tacitus's Germania, chap. x. There we are told that for pur- poses of divination certain signs were scratched on slips of wood from a fruit-bearing tree (including, no doubt, the beech; cp. book, German Buck, and Buchstabe, a letter of the alphabet); the slips were thrown down promiscuously on a white cloth, whence the expert picked them up at random and by them interpreted fate. In these slips we have the origin of the Norse kefli, the Scots kaivel, which were and are still used as lots. The fisher- men of north-east Scotland, when they return after a successful haul, divide the spoil into as many shares as there are men in the boat, with one share more for the boat. Each man then pro- cures a piece of wood or stone, on which he puts a private mark. These lots are put in a heap, and an outsider is called in who throws one lot or kaivel upon each heap of fish. Each fisherman then finds his kaivel, and the heap on which it lies is his. This system of " casting kaivels," as it is called, is certainly of great antiquity. But its existence will not help to prove an early knowledge of reading or writing, for in order that everything may be fair, it is clear that the umpire should not be able to identify the lot as belonging to a particular individual. It has, however, been contended that a system of primitive runes existed whence some at least of the later runes were borrowed, and the ownership marks of the Lapps, who have no knowledge of reading and writing, have been regarded as borrowed from these early Teutonic runes. 2 Be this as it may, the resemblances between the runic and the Mediterranean alphabets are too great to admit of denial that it is from a Greek alphabet, whether directly or indirectly, that the runes are derived. That Wimmer postdates the introduction of the runic alphabet seems clear from the archaic forms and method of writing. It is very unlikely that a people borrowing an alphabet which was uniformly written from left to right should have used it in order to write from right to left, or f$ov

2 R. M. Meyer, Paul Braune und Sievers' Beitrage, xxi. (1896), pp. 162 ff.

3 In a paper published in the volume of Philologische Studien, pre- sented as a " Festgabe " to Professor Sievers in 1896, and in a second paper in the Journal of Germanic Philology, ii. (1899), pp. 370 ff.

4 See Literaturblatt fur germanische und romanische Philologie for 1897, col. 429 f.

Plate,

Inscribed Pebbles from Mas d'Azil.

L._

- — &&zmmmm$mM

Gold Fibula from Praeneste, with Early Latin Inscription. Right to left.

Vadstena Pendant, with Runic Alphabet; about a.d. 600.

Prehistoric Linear Script from Crete.

*£ **> * A-P ±-§1Yi f**

I ˆiKˆj/.tKqe JYdc'S O JCHfcT OTT $ OK I Of o\ £ • I ? tfK S *K-,f T /*A*

Cyprian Inscription (4th century B.C.) from Curium {British Museum Excavations, p. 64). Below are (1) the transliteration of the symbols; (2) the Greek words, both like the Cyprian reading from right to left.

iDc \aw owh«wˆ idnito iwAw-ur ir*

*C\ . \AW Opˆ«*ni»/*

Oldest Attic Inscription. From a Dipylon Vase probably of 8th century B.C. Right to left.

.sartRlPti-rˆSlff

-!■ . ■ -. ""WsHIR. ■ " V J*

*■,' . "... 'ˆii»".'...fc""-' ■ '.i,£-E.'-*v '«• y t*

r

T "' i. '» "' 'J

1 .•- ■■•.'■'

1 "

■ ■ i ".'-ˆi ˆ' ■■'■•'■■■■'■Kiliffl

mm

*K«5j**rf* fi*£*^«*T" •&KdHt* -^M^'llUriTlTTM|*

l -f vj^H

•••-■ H=3%>*

ailSjsi'Fi.'WI

Inscription on Buddha Vase, perhaps 4th century B.C.

ALPHABET

729

In one of the earliest runic records which we possess, the pendant found at Vadstena in Sweden in 1774. and dating from about Ogam A D – 6°° (see Plate). tne signs are divided up into three

writing. series of eight (the twenty fourth, ^<|, being omitted for want of room). Upon the basis of this division a system of cryptography (in the sense that the symbols are unintel- ligible without knowledge of the runic alphabet) was developed, wherein the series and the position within the series of the letter indicated, were each represented by straight strokes, the strokes for the series being shorter than those for the runes, or the series being represented by strokes to the left, the runes by strokes to the right, of a medial line. 1 From this system probably developed the ogam writing employed among the Celtic peoples of Britain and Ireland. The ogam inscriptions in Wales are frequently accom- panied by Latin legends, and they date probably as far back as the 5th and 6th centuries A D. Hence the connexion between Celt and Teuton as regards writing must go back to a period preceding the Viking inroads of the 8th century. Taylor, however, conjectures (The Alphabet, ii. p 227) that the ogams originated in Pembroke, " where there was a very ancient Teutonic settlement, possibly of Jutes, who, as is indicated by the evidence of runic inscriptions found in Kent, seem to have been the only Teutonic people of southern Britain who were acquainted with the Gothic Futhoro." However this may be, the ogam alphabet shows some knowledge of phonetics and some attempt to classify the sounds accordingly. The symbols are as follows 2 : —

much discussion authorities on Slavonic seem generally agreed that it was the Glagolitic (the name is derived from the Old Bulgarian, i.e old ecclesiastical Slavonic glagolu, " word "). According to Professor Leskien (Grammatik der altbulgarischen (altkirchenslavi- schen) Sprache, Heidelberg, 1909, p. xxi.), Cyril had probably made a

prolonged and careful study of Slavonic before proceeding on his missionary journey, and probably in the first instance with a view to preaching the Gospel to the Slavs of Macedonia and Bulgaria, who were much nearer his own home, Thessalonica, than were those of Moravia. The Glagolitic was founded upon the ordinary Greek minuscule writing of the period, as was shown by Dr Isaac Taylor, 8 though the writing of the letters separately without abbreviations and an obvious attempt at artistic effect has gradually differentiated it from Greek writing. This alphabet, which is much more difficult to read than the bolder Cyrillic founded on the Greek uncial, sur- vived for ordinaiy purposes in Croatia and in the islands of the Quarnero till the 17th century. The Servians and Russians ap- parently always used the Cyrillic, and its advantages gradually ousted the Glagolitic elsewhere, though the service book in the old ecclesiastical language which is used by the Roman Catholic Croats is in Glagolitic. 4

While the Carian and Lycian were probably independent of the Greek in origin, so, too, at the opposite end of the Mediterranean was the Iberian. On the other hand, the Phrygian was Phrygian very closely akin to the Greek in alphabet as well as in linguistic character. The Greek alphabet, with which it was most

d

I I

Symbols of Ogam Alphabet.

I I

7

I I I 1 I

m g ng fifz) T a 6 u

1 11 111 mi 1 11 11 1 11 111 1 1 1 1 1 11 1 1

1 1 1 1 1 11 1 1 1 1 11 in 1111 imi 1 11 1 1 1 1 1 -1 1 1 1 1 1 1

The form of the ogam alphabet made it easy to carve hastily; hence in the old sagas, when a hero is killed we find the common formula, ” His grave was dug and his stone was raised, and his name was written in ogam.” According to Sophus Miiller {Nordische Altertumskunde , ii. p. 264), it was from Britain that the use of runes upon gravestones was derived, a use which, to judge from the number

of bilingual inscriptions in Britain, the Celts derived from the Romans.

*The special forms of the alphabet — the Cyrillic and the Glagolitic — which have been adopted by certain of the Slavonic peoples are both sprung directly frrm the Greek alphabet of the ninth century a.d , with the considerable additions rendered necessary by the much greater variety of sounds in Slavonic as compared with Greek. Apart from other evidence, the use of B with the value of v, of H as well as I with the value of I, of * with the value of/, and X with that of the Scotch ch, would be proof that the alphabet was not borrowed till long after the Greek classical period, for not till later did /3, . x become spirants and ij become identified with 1. The confusion of /3 with v necessitated the invention of a new symbol g in the Cyrillic, C in the Glagolitic for b, while new symbols were also required for the sounds or combinations of sounds z (zh), dz, st (shl), c (ts) I (ch in church), i (sh), ii, %, y (u without protrusion of the lips), e (a close long e sound), for the combination of 0, a and e with consonantal I (English y) and for the nasalized vowels e, a (nasalized in pronunciation) and the combinations je and ja (English ye, yq). In all these matters Glagolitic differs very little from Cyrillic; it has only one symbol for ja (ya) and e because both in this dialect were pronounced the same. It has also only one symbol for e and je (ye) for the phonetic reason that je always appears in the old ecclesiastical Slavonic, for which the alphabets were fashioned, at the beginning of words and after vowels : cp. the English use of the symbol u in unspoken and uniform. Glagolitic has a symbol for the palatalized g (3), but it is used only in the transcription of Greek words, y having become y early between vowels in the popular dialects.*

Such an elaborate alphabet could hardly have been invented except by a scholar, and tradition, probably rightly, has attached the credit for its invention to Cyril (originally Constantine), who along with his brother Methodius proceeded in a.d. 863 to Moravia from Constantinople, for the purpose of converting the Slavonic inhabitants to Christianity. The only question which concerns us here is which of the two alphabets was the earlier in use, and after

1 A species of cryptography exactly like this, based upon the ” abjad ” order of the Arabic letters, is still in use among the Eastern Persians (E G. Browne, A Year amongst the Persians, p. 391 f.).

2 Cf. Rh£s, Outlines of Manx Phonology, p. 73 (Publications of the Manx Society, vol. xxxiii.) ; Rhys and Brynmor Jones, The Welsh

People, pp 3, 502. An interpretation of the oldest ogam inscrip- tions is given by Whitley Stokes in Bezzenberger's Beitrdge, xi (1886), p 143 ff Besides the collections of ogams by Brash (1879) and Ferguson (1887), a new collection by Mr R. A. S. Macalister is in course of publication (Studies in Irish Epigraphy, 1897, 1902, 1907). Professor Rhys, who at one time considered runes and ogam to be connected, now thinks that ogam was the invention of a grammarian in South Wales who was familiar with Latin letters.

closely connected, was the Western, for the evidence is strongly ia favour of the form ˆ having the value of x, not

To a much later era belongs the Armenian alphabet, which, according to tradition, was revealed to Bishop Mesrob in a dream. The land might have been Grecized had it not, about Armenian. A.D. 387, been divided between Persia and Byzantium, the greater part falling to the former, who discouraged Greek and favoured Syriac, which the Christian Armenians did not understand. As those within Persian territory were forbidden to learn Greek, an Armenian Christian literature became a necessity. Taylor contends that the alphabet is Iranian in origin, but the circum- stances justify Gardthausen and Hubschmann in claiming it for Greek. That some symbols are like Persian only shows that Mesrob was not able to rid himself of the influences under which he lived.

Of the later development of Phoenician amongst Phoenician people little need be said here. It can be traced in the graffiti of the mercenaries of Psammetichus at Abu Simbel in Upper Egypt, where Greeks, Carians and Phoenicians all cut their names upon the legs of the colossal statues. Still later it is found on the stele of Byblos, and on the sarcophagus of Eshmunazar (about 300 B.C.). The most numerous inscriptions come from the excavations in Carthage, the ancient colony of Sidon. One general feature char- acterizes them all, though they differ somewhat in detail. The symbols become longer and thinner; in fact, cease to be the script of monuments and become the script of a busy trading people. While the Phoenician alphabet was thus fertile in developing daughter alphabets in the West, the progress of writing was no less great in the East, first among the Semitic peoples, and through them among other peoples still more remote. The carrying of the alphabet to the Greeks by the Phoenicians at an early period affords no clue to the period when Semitic ingenuity constructed an alphabet out of a heterogeneous multitude of signs. If it be possible to assign to some of the monuments discovered in Arabia by Glaser a date not later than 1500 B.C., the origin of the alphabet and its dissemina- tion are

carried back to a much earlier period than had hitherto been supposed. Next in date amongst Semitic records of the Phoenician type to the bowl of Baal-Lebanon and the Moabite stone comes the Hebrew inscription found in the tunnel at the Pool of Siloam in 1881, which possibly dates back to the reign of Hezekiah (700 B.C.). The only other early records are seals with Hebrew inscriptions and potters' marks upon clay vessels found in Lachish and other towns. 5

8 Archiv filr slavische Philologie, v. 191 ff., where the Glagolitic and the cursive Greek, the Cyrillic and the Greek uncial are set side by side in facsimile.

4 For further details and references to literature see the introduction to Leskien's Grammatik (not to be confused with his Handbuch), from which this is abbreviated.

6 These are figured most accessibly in Lidzbarski's article on the alphabet in the Jewish Encyclopaedia, vol. i. (1901); see also his table of symbols added to the 27th edition of Gesenius' Hebrdischer Grammatik (1902).

Like the Phoenician, these Hebrew signs are distinctly cursive in character, but, as the legend on the coins of the Maccabees shows, became stereotyped for monumental use, while the Jews after the exile gradually adopted the Aramaic writing, whence the square Hebrew script is descended. The Samaritans alone stuck fast to the old Hebrew as part of their contention that they, and not the Jews, were the true Hebrews.

The oldest records in Aramaic were found at Sindjirli, in the north of Syria, in 1890, and date to about 800 B.C. At this epoch the Aramaic alphabet, or at any rate the alphabet of these Aramaic. recorc j S| j s but little different from that shown upon the Moabite stone. Either two sounds are confused under one symbol, or these records represent a dialect which, like Hebrew and Assyrian, shows sh, 2, and c, where the ordinary Aramaic repre- sentation is /, d, and t, the Arabic th, dk, and th. The Aramaic became in time by far the most important of the northern Semitic alphabets. Even while long and important documents in Assyria were still written on clay tablets, in cuneiform, a docket or precis of the contents was made upon the side in Aramaic, which thus became the alphabet of cursive

*writing — a fact which explains its later development. Two changes, the inception of which is early, but the completion of which belongs to the Persian period, gave the impulse which Aramaic obeyed in all its later developments. These were (a) the opening of the heads of letters, so that beth "^, daleth A, . andresk Q become respectively W, V*j, and IA , while O becomes first U and ultimately V. In the later development the heads tend to be reduced in size, and finally to disappear, (b) As was natural in cursive writing, angles tend to become rounded, and the tails of the letters, which in Phoenician are very long, are curved round in the middle of words so as to join on to the succeeding letter. These characteristics were naturally emphasized in the Aramaic writing on papyrus which, beginning about 500 B.C., during the Persian sovereignty in Egypt, lasted on there till about 200 B.C. The gradual development of this script into the square Hebrew, and the more ornamental writing of Palmyra, may be traced in the works of Berger and Lidzbarski. 1*

In the land of the Nabataeans, a people of Arabian origin, the Aramaic alphabet was employed in a form which ultimately de- veloped into the modern Arabic alphabet. Probably the Arabic. earliest example of the Aramaic script in Arabia is the stele of Tema, in north-western Arabia, whereon is commemorated the establishment of a worship of an Aramaic divinity. This monument, now in the Louvre, is not later than the 5th century B.C. In it the writing preserves its ancient form, the heads of the closed letters being only very slightly opened. The Nabataean inscriptions belong to a different epoch and a different style. They were first discovered by Charles Doughty in 1876-1877, who was followed between 1880 and 1884 by Hiiber and Euting, to whom a complete collection of these records is due. The records are fortunately dated, and belong to the period from 9 B.C. to a.d. 75. A further development can be traced in the graffiti with which pilgrims adorned the rocks of Mount Sinai down to the 2nd or 3rd century a.d. By the help of these inscriptions it is possible to trace the development of the modern Arabic where so many of the forms of the letters have become similar that diacritic points are essential to distinguish them, the original causes of confusion being the continuous development of cursive writing and the adoption of ligatures. Arabic writing, as known to us from documents of the early Mahommedan period, exhibits two principal types which are known respectively as the Cufic and the nashki. The former soon fell into disuse for ordinary purposes and was retained only for inscriptions, coins, &c; the latter, which is more cursive in char- acter, is the parent of the Arabic writing of the present day. Another form of the Aramaic alphabet, namely, the so-

called Estrangela writing which was in use amongst the Christians of northern Syria, was carried by Xestorian missionaries into Central Asia and became the ancestor of a multitude of alphabets spreading through the Turkomans as far east as Manchuria.

There still remains a branch of the Semitic languages which, except for one or two of the languages belonging to it, was practically unknown till recent years. This is the South Semitic. Till the 19th century the earliest form known of this alphabet was the Ethiopian or Geez, in which Christian documents have been preserved from the early centuries of our era, and which is still used by the Abyssinians for liturgical purposes. The travels of two English naval officers, Wellsted and Cruttenden, through Yemen in southern Arabia in 1835, first called attention to the earlier monuments of Arabia. Fulgence Fresnel first established the importance of the inscriptions discovered by these Englishmen, and in 1843, when French consul at Jeddah, obtained through a French traveller, Francois Arnaud, information about other monu- ments of the same kind. In 1869 Joseph Halevy brought back

1 See Berger's Histoire de I'ecriture dans I'antiquite, p. 252 ff . ; Lidzbarski, N ordsemitische Epigraphik, p. 186 ff., from whom this summary is taken. Lidzbarski's second volume and G. A. Cooke's Textbook of North-Semitic Inscriptions (Oxford, 1903) contain the most convenient collections of Northern Semitic inscriptions for the student's purposes.

nearly seven hundred inscriptions from Yemen, and this number has been increased from other quarters by several thousands, through the energy of several adventurous scholars, but chiefly by Eduard Glaser's repeated journeys. The south Arabian inscriptions to which the terms Himyaritic and Sabaean are applied fall into two groups, the Sabaean proper and the Minaean. These are distinguished by differences in grammar and phraseology rather than in alphabet. The relative age of the Minaean and Sabaean monuments is a matter of dispute amongst Semitic scholars. Inscriptions in a kindred dialect were brought from El-Ola, in the north of the Hedjaz, by Professor Euting. To these D. H. Muller 2 gave the title of Lihyanite, from the name of the tribe (Lihjan) to which they belong. Their date is supposed to be earlier than that of the Sabaean and Minaean. Minaean inscriptions were found at the same place, the Minaeans having had a trading station there. In l &93 }• Theodore Bent copied carefully at Yeha in Abyssinia a few inscriptions, some of which had

been already copied in 1814 by the English traveller Salt. These inscriptions are of the greatest importance, because they demonstrate, according to D. H. Muller, 3 that the Sabaeans had colonized Abyssinia as early as 1000 B.C. Other inscriptions copied by Bent at Aksum belong to the 4th century a.d. and later. Two of the earliest are written in Sabaean characters, but in the language which is known as Geez or Ethiopic. From about a.d. 500 Ethiopic was written in an alphabet which according to Muller was no gradual growth but an ingenious device of a Greek scholar of this period at the court of Abyssinia. The Sabaean, like other Semitic, inscriptions are generally written from right to left, but a few are Povar po

be older 4 than the Phoenician ˆX,. Similarly if Pi means mouth, Hommel is right in contending that the Sabaean ˆ is more like the object than the Phoenician ˆf, if we suppose the form, like > or the Phoenician \KI and jj for the Phoenician W . turned through an angle of 90 . So also if Kaf corresponds to the Babylonian Kappu, "hollow-hand," the Sabaean form y~[which Hommel 5 interprets as the outline of the hand with the fingers turned in and the thumb raised is a better pictograph than the various mean- ingless forms of & (2s|, &c).

The rock inscriptions in the wild district of Safah near Damascus which have been collected by Halevy are also written in an Arabic dialect, but, owing chiefly to their careless execution, they are to a large extent unintelligible. The character appears to be akin to the Sabaean. It has been suggested that they were the work of Arabs who had wandered thus far from the south.

There still remain for discussion the alphabets of the Indo-European peoples of Persia and India from which the other alphabets of the Farther East are descended. When Darius in 516 B.C. caused the great Behistun inscription to be engraved, it was Persia. the cuneiform writing, already long in use for the languages of Mesopotamia, that was adopted for this purpose. We have seen that at Babylon itself the Aramaic language and character were well known. It is probable therefore, a priori, that from the Aramaic alphabet the later writing of Persia should be developed. The con- clusion is confirmed by the coins, the only records with Iranian script which go back so far; but the special form of Aramaic from which the Iranian alphabet is derived must at present be left undecided. The later developments of the Iranian alphabet are the Pahlavi and the Zend, in which the MSS. of the Avesta are written. Of these manuscripts none is older than the 13th century a.d. The Pahlavi is

properly the alphabet of the Sassanid kings who ruled in Persia from a.d. 226 till the Arab conquest in the 7th century a.d. Under the Sassanids the old Persian worship, which had fallen with the Achaemenid dynasty in Alexander's time, and

2 Muller, Epigraphische Denkmdler aus Arabien (Vienna, 1889).

3 Epigraphische Denkmdler aus Abessinien (Vienna, 1894). Praetorius (Z.D.M.G. Iviii. p. 724) holds that the oldest Sabaean inscriptions may date from about 700 B.C., that the Lihyan inscriptions are at earliest of the Hellenistic period and the Safa inscriptions still later.

4 Praetorius {Z.D.M.G. Iviii. p. 461 f.) attempts to trace the development of the Sabaean form from the Phoenician.

6 Hommel, Siid-arabische Chrestomathie (Munich, 1893), p. 5.

had been neglected by the subsequent Arsacid line, was revived and the remains of its liturgical literature collected. The name is, however, also applied to the alphabet on the coins of the Parthian or Arsacid dynasty, which in its beginnings was clearly under Greek influence; while later, when a knowledge of Greek had disappeared, the attempts to imitate the old legends are as grotesque as those in western Europe to copy the inscriptions on Roman coins. The relationship between the Pahlavi and the Aramaic is clearest in the records written in the " Chaldaeo-Pahlavi " characters; the

a conclusion which is not invalidated by the fact that some important modifications are found beyond this area, nor by Dr Stein's discovery of a great mass of documents in this alphabet at Khotan in Turkestan, for, according to tradition, the ancient inhabitants of Khotan were emigrants banished in the time of King Acoka from the area to which Btihler assigns this alphabet (see Stein's Preliminary Report, 1901, p. 51). Rapson 2 has pointed out that both Kharosthi and Brahmi letters are found upon Persian silver sigloi, which were coined in the Punjab and belong to the period

Table I.

A

BRAHMI

WROSTHl

7

OLDEST

&TMOPIC 1

SABAAN Himyariha

NASHKI . y (ARABIC)

u

7FM/I . 500 SC

umxfiRU

800 BC

UOABITE 1 Stone

4

B

00

°?

n

n

JO

3>

9

$

G

/I

T

1

****z***

aa

A

“7-7

D

;

X

4

. > i

*H**

A

<\^

E

Llr

?

Y

Y

J> y

-A 7S

^

A

F(wi

7

ti o

711

IV

V

Z

ce

2

I

>/

^ l ^.

T

X

H

LL

n

**M*

TYX

iz<

.Hh

B-tf

T-H

A

m

IB %

v>

e

1.

I

vLO,

7>

T P

?

!<&

^

<

=|, =V

K

t +

7

•nfe

f

7?

11

*}**

L

si

H. t V

A

1

JJ

^L>

u

U

M N

X

1 &

s

Y

*W V*v*

*9 **

D

r

V

n

**£*

p

I

4

4

■ > *v* >

?7

7/

77

S

a

d4

11

**7*

r

Axe

4> t

*&B *

R

\ )

<7

L

j

*;^*

11

1

s

fcA

W.

•

A_r

v y/

lv W

W IV

T

kX finer

+

1 x S

_< — >

/>/>

n.

X

Bühler

A

fterˆEu

Hn$

CREEK OLDtSTUTM

f ˆ

V

t

BE

\y

h

00

w

It

4 A

1 r

A A

ˆ£

*1 **

B e @

>l ic

VI M V| |V

O ?

q PR

T YK

>

BO

a d

Be

1

-A

°o

1

3D

T VY

<«>

Value/(

*Cyrillic * X W IJJ U Glagoutic •& Jb O ti V*

c

T

ja, xV-),psW),e.

b

2

w

Table II. — Cyrillic and Glagolitic Symbols not given above, c, S, «, y, % ‘ ˆ, ju, ja, je, g(yg), ˆ, jg,

M UJ -K ˆJJˆH k % K) H l€ AAA X 1A 1ˆ § ˆ ˆ.

most important of these documents is the liturgical inscription of Hadji-abad, where the Arsacid and Sassanian alphabets are found side by side. Taylor (The Alphabet, ii. p. 248 f.) regards the former as probably derived from the ” ancient alphabet of Eastern Iran, a sister alphabet of the Aramaean of the satrapies,” while the Sassanian Ijciongs to a later stage of Aramaic.

The alphabets of India all spring from two sources: (a) the

Kharosthi, (b) the Brahmi alphabet. The history of the former is

lad/a. fairly clear. It was always a local alphabet, and never

attained the importance of its rival. According to

Biihler, 1 its range lay between 69 and 73 30′ E. and 33 to 35 N.,

1 Buhler, Indian Studies, iii. (2nd ed., 1898), p. 93. The account

of the Achaemenid kings of Persia. As Buhler shows in detail, the Kharosthi alphabet is derived from the alphabet of the Aramaic inscriptions which date from the earlier part of the Achaemenid period. The Aramaic alphabet passed into India with the staff of subordinate officials by whom Darius organized his conquests there. The people of India already possessed their Brahmi alphabet,

of these alphabets is drawn from this work and from the same author’s Indische Paldographie in the Grundriss der indo-arischen Philologie, to which is attached an atks of plates (Strassburg, 1896), and in which a full bibliography is given.

2 For a coin and a gild token with inscriptions see Rapsoil’s Indian Coins (in Grundriss d. ind.-ar. Phil.), Plate I.

but had this other alphabet forced upon them in their dealings with their rulers. The Kharosthi is then the gradual development under

local conditions of the Aramaic alphabet of the Persian period. As Stein's explorations show, both alphabets may be found on opposite sides of the same piece of wood.

The history of the Brahmi alphabet is more difficult. In its later forms it is so unlike other alphabets that many scholars have regarded it as an invention within India itself. The discovery of earlier inscriptions than were hitherto known has, however, caused this view to be discarded, and the problem is to decide from which form of the Semitic alphabet it is derived. Taylor (The Alphabet, ii. p. 314 ff.), following Weber, argues that it comes from the Sabaeans who were carrying on trade with India as early as 1000 B.C. Even if the alphabet had not reached India till the 6th century B.C., there would be time, he contends, for the peculiarities of the Indian form of it to develop before the period when records begin. The alphabet, according to Taylor, shows no resemblance to any northern Semitic script, while its stiff, straight lines and its forms seem like the Sabaean. Biihler, on the other hand, shows from literary evidence that writing was in common use in India in the 5th, possibly in the 6th, century B.C. The oldest alphabet must have been the Brakmi lipi, which is found all over India. But he rejects Taylor's derivation of this alphabet from the Sabaean script, and contends that it is borrowed from the North Semitic. To the pedantry of the Hindu he attributes its main characteristics, viz. (a) letters made as upright as possible, and with few exceptions equal in height ; (b) the majority of the letters constructed of vertical lines, with appendages attached mostly at the foot, occasionally at the foot and at the top, or (rarely) in the middle, but never at the top alone ; (c) at the tops of the characters the ends of vertical lines, less fre- quently straight horizontal lines, still more rarely curves or the points of angles opening downwards, and quite exceptionally, in the symbol ma, two lines rising upwards. A remarkable feature of the alphabet is that the letters are hung from and do not stand upon a line, a characteristic which, as Biihler notes {Indian Studies, iii. p. 57 n.), belongs even to the most ancient MSS., and to the Asoka inscriptions of the 3rd century B.C. When these specially Indian features have been allowed for, Biihler contends that the symbols borrowed from the Semitic alphabet can be carried back to the forms of the Phoenician and Moabite alphabets. The proof deals with each symbol separately; as might be expected of its author, it is both scholarly and ingenious, but, it must be admitted, not very convincing. Further evidence as to the early history of this alphabet must be discovered before we can definitely decide what its origin may be. That such evidence will be forthcoming there is little doubt. Even since Biihler wrote, the vase,

the top of which is reproduced (see Plate), has been discovered on the borders of Nepal in a stupa where some of the relics of Buddha were kept. The inscription is of the same type as the Asoka inscriptions, but, in Buhler's opinion (Journal of the Royal Asiatic Society, xxx., 1898, p. 389),' is older than Asoka's time. It reads as follows: iyam salilanidhane Budhasa bhagavate sakiyanam sukitibhatinam sabhaginikanarn saputadalanam. " This casket of relics of the blessed Buddha is the pious founda- tion (so Pischel, no doubt rightly, Zeitsch. d. deutsch. morg. Gesell. lvi. 158) of the Sakyas, their brothers and their sisters, together with children and wives."

How this alphabet was modified locally, and how it spread to other Eastern lands, must be sought in the specialist works to which reference has already been made. Its extension to new and hitherto unknown languages was in 1910 in process of being rapidly demon- strated by English and German expeditions in Chinese Turkestan.

Authorities. — Owing to the rapid increase of materials, all early ■ works are out of date. The best general accounts, though already somewhat antiquated, are: (1) The Alphabet (2 vols., with references to earlier works), by Canon Isaac Taylor (1883), reprinted from the stereotyped plates with small necessary corrections (1899); and (2) Hisloire de I'ecriture dans I'antiquite, by M. Philippe Berger (Paris, 1891, 2nd ed. 1892). An excellent popular account is The Story of the Alphabet, by E. Clodd (no date, about 1900). Faulmann's Illustrierle Geschichte der Schrift (1880) is a popular work with good illustrations. For the beginnings of the alphabet, Dr A. J. Evans's Scripta Minoa (vol. i., 1909) is indispensable, whether his theories hold their ground or not. The Semitic alphabet is excellently treated by Lidzbarski in the Jewish Encyclopaedia (1901) ; his Nordsemitische Epigraphik (1 898) has excellent facsimiles and tables of the alphabets, and there are many contributions to the history of the alphabet in the same writer's Ephemeris fur semitische Epigraphik (Giessen, since 1900). See also " Writing " (by A. A. Bevan) in the Encyclopaedia Biblica, and " Alphabet "(by Isaac Taylor) in Hastings' Dictionary of the Bible. A very good article, now somewhat antiquated, is Schlott- mann's " Schrift und Schriftzeichen " in Riehm's Handworterbuch des biblischen Altertums (1884, reprinted 1894). For Greek epigraphy the fullest and also most recent work is W. Larfeld's Handbuch der griechischen Epigraphik (vol. ii., 1902; vol. i., 1907) (see especially Herkunfl und Alter des griechischen Alphabets, i. 330 ff.). For the history of the Greek alphabet the fundamental work was A. Kirch- hoff's Studien zur Geschichte des griechischen Alphabets (4th ed., 1887) : his theories

were adopted and worked out on a much larger scale in E. S. Roberts's Introduction to Greek Epigraphy, pt. i. " The

Archaic Inscriptions and the Greek Alphabet " (1887), pt. ii. (with E. A. Gardner) " The Inscriptions of Attica " (1905). See also Salomon Reinach's Traiti d' epigraphie grecque (1885). In Iwan von Miiller's Handbuch der klassischen Allertumswissenschafl important articles on both Greek and Latin epigraphy and alphabets have appeared (Greek in edition 1 by G. Heinrichs, 1886; in edition 2 by W. Larfeld, 1892; Latin by Emil Hiibner). See also " Alphabet," by W. Deecke, in Baumeister's Denkmaler des klassischen Altertums (1884), and by Szanto (Greek) and Joh. Schmidt (Italic) in Pauly's Realencyclopadie edited by Wissowa (1894). Mommsen's Die unteritalischen Dialekte (1850) is not without value even now. Other literature and references to fuller bibliographies in separate departments have been given in the notes. Elsewhere in this edition of the Encyclopaedia Britannica the articles on the various languages and under the headings Inscriptions, Palaeography, Writing, &c, should be consulted, while separate articles are given on each letter of the English alphabet. The writer is indebted to Dr A. J. Evans for a photograph of the Cretan linear script, and to Pro- fessors A. A. Bevan and Rapson of Cambridge, and to Mr F. W. Thomas, librarian of the India Office, for help in their respective departments of Semitic and Indian languages. (P. Gl.)

'AL-PHASI, ISAAC (1013-1103), Jewish rabbi and codifier, known as Riph, was born near Fez in 1013 and died at Lucena in 1 103. 'Al-Phasi means the " man of Fez " (medieval Jews were often named after their birthplaces). He was forced to leave Fez when an old man of 75, being accused on some unknown political charge. He then settled in Spain where he was held in much esteem. His magnanimous character was illustrated by two incidents. When 'Al-phasi's opponent Isaac 'Albalia died, 'Al-phasi received 'Albalia's son with the greatest kindness and adopted him as a son. When, again, 'Al-phasi was himself on the point of death, he recommended as his successor in the Lucena rabbinate, not his own son, but his pupil Joseph ibn Migash. The latter became the teacher of Maimonides, and thus 'Al-phasi's teaching as well as his work must have directly influenced Maimonides. 'Al-phasi's fame rests on his Talmudical Digest called Halakhoth or Decisions. The Talmud was condensed by him with a special view to practical law. He omitted all the homiletical passages, and also excluded those parts of the Talmud which deal with religious duties practicable only in Palestine. 'Al-phasi thus occupies an important place in the development of the Spanish method of studying the Talmud. In contra- distinction to the

French rabbis, the Spanish sought to simplify the Talmud and free it from casuistical detail. 'Al-phasi suc- ceeded in producing a Digest, which became the object of close study, and led in its turn to the great Codes of Maimonides and of Joseph Qaro.

ALPHEGE [ˆElfheah], SAINT (954-1023), archbishop of Canterbury, came of a noble family, but in early life gave up everything for religion. Having assumed the monastic habit in the monastery of Deerhurst, he pased thence to Bath, where he became an anchorite and ultimately abbot, distinguishing himself by his piety and the austerity of his life. In 984 he was appointed through Dunstan's influence to the bishopric of Winchester, and in 1006 he succeeded ˆElfric as archbishop of Canterbury. At the sack of Canterbury by the Danes in 1011 ˆElfheah was captured and kept in prison for seven months. Refusing to pay a ransom he was barbarously murdered at Greenwich on the 19th of April 1012. He was buried in St Paul's, whence his body was removed by Canute to Canterbury with all the ceremony of a great act of state in 1023.

Lives of St. Alphege in prose (which survives) and in verse were written by command of Lanfranc by the Canterbury monk Osbern (d. c. 1090), who says that his account of the solemn translation to Canterbury in 1023 was received from the dean, Godric, one of Alphege's own scholars.

ALPHEUS ('AXˆetos; mod. Ruphia), the chief river of Pelo- ponnesus. Strictly Ruphia is the modern name for the ancient Ladon, a tributary which rises in N.E. Elis, but the name has been given to the whole river. The Alpheus proper rises near Asea; but its passage thither by 'subterranean channels from the Tegean plain and its union with the Eurotas are probably mythical (see W. Loring, in Journ. Hell. Studies, xv. p. 67). It consists for the most part of a shallow and rapid stream, occupying but a small part of its broad, stony bed. It empties itself into the Ionian sea. Pliny states that in ancient times it was navigable for six Roman miles from its mouth. Alpheus

was recognized in cult and myth as the chief or typical river-god in the Peloponnesus, as was Achelous in northern Greece. His waters were said to pass beneath the sea and rise again in the fountain Arethusa at Syracuse; such is the earlier version from which later

mythologists and poets evolved the familiar myth of the loves of Alpheus and Arethusa.

ALPHONSE I., Count of Toulouse (1103-1148), son of Count Raymond IV. by his third wife, Elvira of Castile, was born in 1 103, in the castle of Mont-Pelerin, Tripoli. He was surnamed Jourdain on account of his being baptized in the river Jordan. His father died when he was two years old and he remained under the guardianship of his cousin, Guillaume Jourdain, count of Cerdagne (d. 1109), until he was five. He was then taken to Europe and his brother Bertrand gave him the count- ship of Rouergue; in his tenth year, upon Bertrand's death (1 1 1 2) , he succeeded to the countship of Toulouse and marquisate of Provence, but Toulouse was taken from him by William IX., count of Poitiers, in n 14. He recovered a part in n 19, but continued to fight for his possessions until about 11 23. When at last successful, he was excommunicated by Pope Calixtus II. for having expelled the monks of Saint-Gilles, who had aided his enemies. He next fought for the sovereignty of Provence against Raymond Berenger I., and not till September 11 25 did the war end in an amicable agreement. Under it Jourdain became absolute master of the regions lying between the Pyrenees and the Alps, Auvergne and the sea. His ascendancy was an unmixed good to the country, for during a period of fourteen years art and industry flourished. About 1134 he seized the countship of Narbonne, only restoring it to the Viscountess Ermengarde (d. 1197) in 1143. Louis VII., for some reason which has not appeared, besieged Toulouse in 1141, but without result. Next year Jourdain again incurred the displeasure of the church by siding with the rebels of Montpellier against their lord. A second time he was excommunicated; but in 1146 he took the cross at the meeting of Vezelay called by Louis VII., and in August 1147 embarked for the East. He lingered on the way in Italy and probably in Constantinople; but in 1148 he had arrived at Acre. Among his companions he had made enemies and he was destined to take no share in the crusade he had joined. He was poisoned at Caesarea, either the wife of Louis or the mother of the king of Jerusalem suggesting the draught.

See the documentary Histoire generate de Languedoc by De Vie and Vaissette, vol. iii. (Toulouse, 1872).

ALPHONSE, Count of Toulouse and of Poitiers (1220- 1271), the son of Louis VIII., king of France, and brother of St Louis, was born on the nth of November 1220. He joined the county of Toulouse to his appanage of Poitou and Auvergne, on the death, in September 1249, of Raymond VII., whose daughter Jeanne he had married in

1237. He took the cross with his brother, St Louis, in 1248 and in 1270. In 1252, on the death of his mother, Blanche of Castile, he was joint regent with Charles of Anjou until the return of Louis IX., and took a great part in the negotiations which led to the treaties of Abbeville and of Paris (1258-1259). His main work was on his own estates. There he repaired the evils of the Albigensian war and made a first attempt at administrative centralization, thus preparing the way for union with the crown. The charter known as " Alphonsine," granted to the town of Riom, became the code of public law for Auvergne. Honest and moderate, protecting the middle classes against exactions of the nobles, he exercised a happy influence upon the south, in spite of his naturally despotic character and his continual and pressing need of money. He died without heirs on his return from the 8th crusade, in Italy, probably at Savona, on the 21st of August 1271.*

See B. Ledain, Histoire d' Alphonse, frere de S. Louis e,l du comle de Poitou sous son administration (1241-1271) (Poitou, 1869); E. Boutaric, Saint Louis el Alphonse de Poitiers (Paris, 1870); A. Molinier, Etude sur I' administration de S. Louis el d'Alphonse de Poitiers (Toulouse, 1880) ; and also his edition of the Correspondance administrative d' Alphonse de Poitiers in the Collection de documents inedils pour servir i I'histoire de France (Paris, 1894 and 1895).

ALPHONSO, the common English spelling of Aflonso, Alonso and Alfonso, which are respectively the Galician, the Leonese and the Castilian forms of Ildefonso (Ildefonsus), the name of a saint and archbishop of Toledo in the 7th century. The name has been borne by a number of Portuguese and Spanish kings, who are distinguished collectively below.

Portuguese Kings. — Alphonso I. (Affonso Henriques) , son of Henry of Burgundy, count of Portugal, and Teresa of Castile, was born at Guimaraes in 1094. He succeeded his father in in 2, and was placed under the tutelage of Portugal. his mother. When he came of age, he was obliged to wrest from her by force that power which her vices and incapacity had rendered disastrous to the state. Being proclaimed sole ruler of Portugal in 11 28, he defeated his mother's troops near Guimaraes, making her at the same time his prisoner. He also vanquished Alphonso Raymond of Castile, his mother's ally, and thus freed Portugal from dependence on the crown of Leon. Next turning his arms against the Moors, he obtained, on the 26th July 1 139, the famous victory of Ourique, and immediately after was proclaimed king by his soldiers. He assembled the Cortes of the

kingdom at Lamego, where he received the crown from the archbishop of Braganza; the assembly also declaring that Portugal was no longer a dependency of Leon. Alphonso continued to distinguish himself by his exploits against the Moors, from whom he wrested Santarem in 1146 and Lisbon in 1 147. Some years later he became involved in a war that had broken out among the kings of Spain; and in 1167, being disabled during an engagement near Badajoz by a fall from his horse, he was made prisoner by the soldiers of the king of Leon, and was obliged to surrender as his ransom almost all the conquests he had made in Galicia. In 1184, in spite of his great age, he had still sufficient energy to relieve his son Sancho, who was besieged in Santarem by the Moors. He died shortly after, in 1185. Alphonso was a man of gigantic stature, being 7 ft. high according to some authors. He is revered as a saint by the Portuguese, both on account of his personal character and as the founder of their kingdom.

Alphonso II., "the Fat," was born in 1185, and succeeded his father, Sancho I., in 1211. He was engaged in war with the Moors and gained a victory over them at Alcacer do Sal in 121 7. He also endeavoured to weaken the power of the clergy and to apply a portion of their enormous revenues to purposes of national utility. Having been excommunicated for this by the pope (Honorius III.), he promised to make amends to the church; but he died in 1 223 before doing anything to fulfil his engagement. He framed a code which introduced several beneficial changes into the laws of his kingdom.

Alphonso III., son of Alphonso II., was born in 1210, and succeeded his brother, Sancho II., in 1248. Besides making war upon the Moors, he was, like his father, frequently embroiled with the church. In his reign Algarve became part of Portugal. He died in 1279.

Alphonso IV. was born in 1290, and in 1325 succeeded his father, Dionis, whose death he had hastened by his intrigues and rebellions. Hostilities with the Castilians and with the Moors occupied many years of his reign, during which he gained some successes; but by consenting to the barbarous murder of Inez de Castro, who was secretly espoused to his son Peter, he has fixed an indelible stain on his character. Enraged at this barbarous act, Peter put himself at the head of an army and devastated the whole of the country between the Douro and the Minho before he was reconciled to his father. Alphonso died almost immediately after, on the 12th of May 1357.

Alphonso V., " Africano," was born in 1432, and succeeded his father Edward in 1438. During his minority he was placed under the

regency, first of his mother and latterly of his uncle, Dom Pedro. In 1448 he assumed the reins of government and at the same time married Isabella, Dom Pedro's daughter. In the following year, being led by what he afterwards discovered to be false representations, he declared Dom Pedro a rebel and defeated his army in a battle at Alfarrobeira, in which his uncle was slain. In 1458, and with more numerous forces in 1471,

he invaded the territories of the Moors in Africa and by his successes there acquired his surname of " the African." On his return to Portugal in 1475 his ambition led him into Castile, where two princesses were disputing his succession to the throne. Having been affianced to the Princess Juana, Alphonso caused himself to be proclaimed king of Castile and Leon; but in the following year he was defeated at Toro by Ferdinand, the husband of Isabella of Castile. He went to France to obtain the assistance of Louis XL, but finding himself deceived by the French monarch, he abdicated in favour of his son John. When he returned to Portugal, however, he was compelled by his son to resume the sceptre, which he continued to wield for two years longer. After that he fell into a deep melancholy and retired into a monastery at Cintra, where he died in 1481.

Alphonso VI., the second king of the house of Braganza, was born in 1643 and succeeded his father in 1656. In 1667 he was compelled by his wife and brother to abdicate the throne and was banished to the island of Terceira. These acts, which the vices of Alphonso had rendered necessary, were sanctioned by the Cortes in 1668. He died at Cintra in 1675.

Spanish Kings. — From Alphonso I. (730-757) to Alphonso V. (999-1028) the personal history of the Spanish kings of this Kings of name is unknown and their very dates are disputed. medieval Alphonso I. is said to have married Ormesinda, and mod- daughter f Pelayo, who was raised on the shield in Asturias as king of the Goths after the Arab conquest. He is also said to have been the son of Peter, duke of Can- tabria. It is not improbable that he was in fact an hereditary chief of the Basques, but no contemporary records exist. His title of" the Catholic " itself may very well have been the invention of later chronicles. Alphonso II. (789-842), his reputed grandson, bears the name of " the Chaste." The Arab writers who speak of the Spanish kings of the north-west as the Beni-Alfons,

appear to recognize them as a royal stock derived from Alphonso I. The events of his reign are in reality unknown. Poets of a later generation invented the story of the secret marriage of his sister Ximena with Sancho, count of Saldafia, and the feats of their son Bernardo del Carpio. Bernardo is the hero of a can/ar de gesta {chanson de geste) written to please the anarchical spirit of the nobles.

The first faint glimmerings of medieval Spanish history begin with Alphonso III. (866-914) surnamed " the Great." Of him also nothing is really known except the bare facts of his reign and of his comparative success in consolidating the kingdom known as " of Galicia " or " of Oviedo " during the weakness of the Omayyad princes of Cordova. Alphonso IV. (924-931) has a faint personality. He resigned the crown to his brother Ramiro and went into a religious house. A certain instability of character is revealed by the fact that he took up arms agains't Ramiro, having repented of his renunciation of the world. He was defeated, blinded and sent back to die in the cloister of Sahagun. It fell to Alphonso V. (999-1028) to begin the work of reorganizing the Christian kingdom of the north-west after a most disastrous period of civil war and Arab inroads. Enough is known of him to justify the belief that he had some of the qualities of a soldier and a statesman. His name, and that of his wife Geloria (Elvira), are associated with the grant of the first franchises of Leon. He was killed by an arrow while besieging the town of Viseu in northern Portugal, then held by the Mahommedans. (For all these kings see the article Spain: History.)

With Alphonso VI. (1065-1109) we come to a sovereign of strong personal character. Much romance has gathered round his name. In the cantar de gesta of the Cid he plays the part attributed by medieval poets to the greatest kings, to Charle- magne himself. He is alternately the oppressor and the victim of heroic and self-willed nobles — the idealized types of the patrons for whom the jongleurs and troubadours sang. (For the events of his reign see the article Spain: History.) He is the hero of a cantar de gesta which, like all but a very few of the early Spanish songs, like the cantar of Bernardo del Carpio and the Infantes of Lara, exists now only in the fragments incorporated in the

chronicle of Alphonso the Wise or in ballad form. His flight from the monastery of Sahagun, where his brother Sancho endeavoured to imprison him, his chivalrous friendship for his host Almamun of Toledo, caballero aunque mon, a gentleman although a Moor, the passionate loyalty of his vassal Peranzules and his brotherly love for

his sister Urraca of Zamora, may owe something to the poet who took him for hero. They are the answer to the poet of the nobles who represented the king as having submitted to take a degrading oath at the hands of Ruy Diaz of Bivar (the Cid), in the church of Santa Gadea at Burgos, and as having then persecuted the brave man who defied him. When every allowance is made, Alphonso VI. stands out as a strong man fighting for his own hand, which in his case was the hand of the king whose interest was law and order and who was the leader of the nation in the reconquest. On the Arabs he impressed himself as an enemy very fierce and astute, but as a keeper of his word. A story of Mahommedan origin, which is probably no more historical than the oath of Santa Gadea, tells of how he allowed himself to be tricked by Ibn Ammar, the favourite of Al Motamid, the king of Seville. They played chess for an extremely beautiful table and set of men, belonging to Ibn Ammar. Table and men were to go to the king if he won. If Ibn Ammar gained he was to name the stake. The latter did win and demanded that the Christian king should spare Seville. Alphonso kept his word. Whatever truth may lie behind the romantic tales of Christian and Mahommedan, we know that Alphonso represented in a remarkable way the two great influences then shaping the character and civilization of Spain. At the instigation, it is said, of his second wife, Constance of Burgundy, he brought the Cistercians into Spain, established them in Sahagun, chose a French Cistercian, Bernard, as the first archbishop of Toledo after the reconquest in 1085, married his daughters, legitimate and illegitimate, to French princes, and in every way forwarded the spread of French influence — then the greatest civilizing force in Europe, He also drew Spain nearer to the papacy, and it was his decision which established the Roman ritual in place of the old missal of Saint Isidore — the so-called Mozarabic. On the other hand he was very open to Arabic influence. He protected the Mahommedans among his subjects and struck coins with inscriptions in Arabic letters. After the death of Constance he perhaps married and he certainly lived with Zaida, said to have been a daughter of " Benabet " (Al Motamid), Mahommedan king of Seville. Zaida, who became a Christian under the name of Maria or Isabel, bore him the only son among his many children, Sancho, whom Alphonso designed to be his successor, but who was slain at the battle of Ucles in 1108. Women play a great part in Alphonso's life.

[Alphonso I., king of Aragon, " the Battler," who married Urraca, daughter of Alphonso VI. (1104-1134), is sometimes counted the VHth in the line of the kings of Leon and Castile, A passionate fighting-man (he fought twenty-nine battles against Christian or

Moor) , he was married to Urraca, widow of Raymond of Burgundy, a very dissolute and passionate woman. The marriage had been arranged by Alphonso VI. in 1106 to unite the two chief Christian states against the Almoravides, and to supply them with a capable military leader. But Urraca was tenacious of her right as proprietary queen and had not learnt chastity in the polygamous household of her father. Husband and wife quarrelled with the brutality of the age and came to open war. Alphonso had the support of one section of the nobles who found their account in the confusion. Being a much better soldier than any of his opponents he gained victories at Sepulveda and Fuente de la Culebra, but his only trustworthy supporters were his Aragonese, who were not numerous enough to keep down Castile and Leon. The marriage of Alphonso and Urraca was declared null by the pope, as they were third cousins. The king quarrelled with the church, and particularly the Cistercians, almost as violently as with his wife. As he beat her, so he drove Archbishop Bernard into exile and expelled the monks of Sahagun. He was finally compelled to give way in Castile and Leon to his stepson Alphonso, son of Urraca and her

first husband. The intervention of Pope Calixtus II. brought about an arrangement between the old man and the young. Alphonso the Battler won his great successes in the middle Ebro, where he expelled the Moors from Saragossa; in the great raid of 1 125, when he carried away a large part of the subject- Christians from Granada, and in the south-west of France, where he had rights as king of Navarre. Three years before his death he made a will leaving his kingdom to the Templars, the Hospitallers, and the Knights of the Sepulchre, which his subjects refused to carry out. He was a fierce, violent man, a soldier and nothing else, whose piety was wholly militant. Though he died in 1134 after an unsuccessful battle with the Moors at Braga, he has a great place in the reconquest.]

Alphonso VII., " the Emperor " (1126-1157), is a dignified and somewhat enigmatical figure. A vague tradition had always assigned the title of emperor to the sovereign who held Leon as the most direct representative of the Visigoth kings, who were themselves the representatives of the Roman empire. But though given in charters, and claimed by Alphonso VI. and the Battler, the title had been little more than a flourish of rhetoric. Alphonso VII. was crowned emperor in n 35 after the death of the Battler. The weakness of Aragon

enabled him to make his superiority effective. He appears to have striven for the forma- tion of a national unity, which Spain had never possessed since the fall of the Visigoth kingdom. The elements he had to deal with could not be welded together. Alphonso was at once a patron of the church, and a protector if not a favourer of the Mahommedans, who formed a large part of his subjects. His reign ended in an unsuccessful campaign against the rising power of the Almohades. Though he was not actually defeated, his death in the pass of Muradel in the Sierra Morena, while on his way back to Toledo, occurred in circumstances which showed that no man could be what he claimed to be — " king of the men of the two religions." His personal character does not stand out with the emphasis of those of Alphonso VI. or the Battler. Yet he was a great king, the type and to some extent the victim of the confusions of his age — Christian in creed and ambition, but more than half oriental in his household.

Alphonso VIII. (1158-1214), king of Castile only, and grand- son of Alphonso VII., is a great name in Spanish history, for he led the coalition of Christian princes and foreign crusaders who broke the power of the Almohades at the battle of the Navas de Tolosa in 1 2 1 2. The events of his reign are dealt with under Spain. His personal history is that of many medieval kings. He succeeded to the throne on the death of his father, Sancho, at the age of a year and a half. Though proclaimed king, he was regarded as a mere name by the unruly nobles to whom a minority was convenient. The devotion of a squire of his household, who carried him on the pommel of his saddle to the stronghold of San Esteban de Gormaz, saved him from falling into the hands of the contending factions of Castro and Lara, or of his uncle Ferdinand of Leon, who claimed the regency. The loyalty of the town of Avila protected his youth. He was barely fifteen when he came forth to do a man's work by restoring his kingdom to order. It was only by a surprise that he recovered his capital Toledo from the hands of the Laras. His marriage with Leonora of Aquitaine, daughter of Henry II. of England, brought him under the influence of the greatest governing intellect of his time. Alphonso VIII. was the founder of the first Spanish university, the studium generate of Palencia, which, however, did not survive him.

Alphonso IX. (1 188-1230) of Leon, first cousin of Alphonso VIII. of Castile, and numbered next to him as being a junior member of the family (see the article Spain for the division of the kingdom and the relationship), is said by Ibn Khaldun to have been called the " Baboso " or Slobberer, because he was subject to fits of rage during which he foamed at the mouth. Though he took a part in the work of the reconquest, this king is chiefly remembered by the difficulties into

which his successive marriages led him with the pope. He was first married to his cousin Teresa of Portugal, who bore him two daughters, and a son who died young. The marriage was declared null by the pope, to whom

Alphonso paid no attention till he was presumably tired of his wife. It cannot have been his conscience which constrained him to leave Teresa, for his next step was to marry Berengaria of Castile, who was his second cousin. For this act of contumacy the king and kingdom were placed under interdict. The pope was, however, compelled to modify his measures by the threat that if the people could not obtain the services of religion they would not support the clergy, and that heresy would spread. The king was left under interdict personally, but to that he showed himself indifferent, and he had the support of his clergy. Berengaria left him after the birth of five children, and the king then returned to Teresa, to whose daughters he left his kingdom by will.

Alphonso X., El Sabio, or the learned (1252-1284), is perhaps the most interesting, though he was far from being the most capable, of the Spanish kings of the middle ages. (His merits as a writer are dealt with in the article Spain : Literature) . His scientific fame is based mainly on his encouragement of astronomy. It may be pointed out, however, that the story which represents him as boasting of his ability to make a better world than this is of late authority. If he said so, he was speaking of the Ptolemaic cosmogony as known to him through the Arabs, and his vaunt was a humorous proof of his scientific instinct. As a ruler he showed legislative capacity, and a very commendable wish to provide his kingdoms with a code of laws and a consistent judicial system. The Fuero Real was undoubtedly his work, and he began the code called the Siete Partidas, which, however, was only promulgated by his great-grandson. Unhappily for himself and for Spain, he wanted the singleness of purpose required by a ruler who would devote himself to organization, and also the combination of firmness with temper needed for dealing with his nobles. His descent from the Hohenstaufen through his mother, a daughter of the emperor Philip, gave him claims to represent the Swabian line. The choice of the German electors, after the death of Conrad IV. in 1254, misled him into wild schemes which never took effect but caused immense expense. To obtain money he debased the coinage, and then endeavoured to prevent a rise in prices by an arbitrary tariff. The little trade of his dominions was ruined, and the burghers and peasants were deeply offended. His nobles, whom he tried to cow by sporadic acts of violence, rebelled against him. His second son, Sancho, enforced his claim to be heir, in preference to

the children of Ferdinand de la Cerda, the elder brother who died in Alphonso's life. Son and nobles alike supported the Moors, when he tried to unite the nation in a crusade; and when he allied himself with the rulers of Morocco they denounced him as an enemy of the faith. A reaction in his favour was beginning in his later days, but he died defeated and deserted at Seville, leaving a will by which he endeavoured to exclude Sancho and a heritage of civil war.

Alphonso XL (1312-1350) is variously known among Spanish kings as the Avenger or the Implacable, and as " he of the Rio Salado." The first two names he earned by the ferocity with which he repressed the disorder of the nobles after a long minority; the third by his victory over the last formidable African invasion of Spain in 1340. The chronicler who records his death prays that " God may be merciful to him, for he was a very great king." The mercy was needed. Alphonso XL never went to the insane lengths of his son Peter the Cruel, but he could be abundantly sultanesque in his methods. He killed ' for reasons of state without form of trial, while his open neglect of his wife, Maria of Portugal, and his ostentatious passion for Leonora de Guzman, who bore him a large family of sons-, set Peter an example which he did hot fail to better. It may be that his early death, during the great plague of 1350, at the siege of Gibraltar, only averted a desperate struggle with his legitimate son, though it was a misfortune in that it removed a ruler of eminent capacity, who understood his subjects well enough not to go too far.

[Four other kings of Aragon, besides the Battler, bore the name of Alphonso. All these princes held territory in the south- east of France, and had a close connexion with Italy. Alphonso II. of Aragon (1162-1106) was the son of Raymond Berenger,

count of Barcelona, and of Petronilla, niece of Alphonso the Battler, and daughter of Ramiro surnamed the Monk. He succeeded to the county of Barcelona in 1162 on the death of his father, at the age of eleven, and in 1164 his mother renounced her rights in Aragon in his favour. Though christened Ramon (Raymond) , the favourite name of his line, he reigned as Alphonso out of awish to please his Aragonese subjects, towhom thememory of the Battler was dear. As king of Aragon he took a share in the work of the reconquest, by helping his cousin Alphonso VIII. of Castile to conquer Cuenca, and to suppress one Pero Ruiz de Azagra, who was endeavouring to carve

out a kingdom for himself in the debatable land between Christian and Mahommedan. But his double position as ruler both north and south of the eastern Pyrenees distracted his policy. In character and interests he was rather Provencal than Spanish, a favourer of the trouba- dours, no enemy of the Albigensian heretics, and himself a poet in the southern French dialect. Alphonso III. of Aragon (1285-1291), the insignificant son of the notable Peter III., succeeded to the Spanish and Provencal possessions of his father, but his short reign did not give him time even to marry. His inability to resist the demands of his nobles left a heritage of trouble in Aragon. By recognising their right to rebel in the articles called the Union he helped to make anarchy permanent. Alphonso IV. of Aragon (1327-1336) was a weak man whose reign was in- significant. Alphonso V. of Aragon (1416-1458), surnamed the Magnanimous, who represented the old line of the counts of Barcelona only through women, and was on his father's side descended from the Castilian house of Trastamara, is one of the most conspicuous figures of the early Renaissance. No man of his time had a larger share of the quality called by the Italians of the day " virtue." By hereditary right king of Sicily, by the will of Joanna II. and his own sword king of Naples, he fought and triumphed amid the exuberant development of individuality which accompanied the revival of learning and the birth of the modern world. When a prisoner in the hands of Filipo Maria Visconti, duke of Milan, in 1435, Alphonso persuaded hisferocious and crafty captor to let him go by making it plain that it was the interest of Milan not to prevent the victory of the Aragonese party in Naples. Like a true prince of the Renaissance he favoured men of letters whom he trusted to preserve his reputa- tion to posterity. His devotion to the classics was exceptional even in that time. He halted his army in pious respect before the birthplace of a Latin writer, carried Livy or Caesar on his campaigns with him, and his panegyrist Panormita did not think it an incredible lie to say that the king was cured of an illness by having a few pages of Quintus Curtius read to him. The classics had not refined his taste, for he was amused by setting the wandering scholars, who swarmed to his court, to abuse one another in the indescribably filthy Latin scolding matches which were then the fashion. Alphonso founded nothing, and after his conquest of Naples in 1442 ruled by his mercenary soldiers, and no less mercenary men of letters. His Spanish possessions were ruled for him by his brother John. He left his conquest of Naples to his bastard son Ferdinand; his inherited lands, Sicily and Sardinia, going to his brother John who survived him.]

Alphonso XII. (1857-1885), king of modern Spain, son of Isabella II.

and Maria Fernando Francisco de Assisi, eldest son of the duke of Cadiz, was born on the 28th of November 1857. When Queen Isabella and her husband were forced to leave Spain by the revolution of 1868 he accompanied them to Paris, and from thence he was sent to the Theresianum at Vienna to continue his studies. On the 25th of June 1870 he was recalled to Paris, where his mother abdicated in his favour, in the presence of a number of Spanish nobles who had followed the fortunes of the exiled queen. He assumed the title of Alphonso XII.; for although no king of united Spain had previously borne the name, the Spanish monarchy was regarded as continuous with the more ancient monarchy, represented by the eleven kings of Leon and Castile already referred to. Shortly afterwards he proceeded to Sandhurst to continue his military studies, and while there he issued, on the 1st of December 1874, in reply to a birthday greeting from his followers, a manifesto proclaiming

himself the sole representative of the Spanish monarchy. At the end of the year, when Marshal Serrano left Madrid to take command of the northern army, General Martinez Campos, who had long been working more or less openly for the king, carried off some battalions of the central army to Sagunto, rallied to his own flag the troops sent against him, and entered Valencia in the king's name. Thereupon the president of the council resigned, and the power was transferred to the king's pleni- potentiary and adviser, Canovas del Castillo. In the course of a few days the king arrived at Madrid, passing through Barcelona and Valencia, and was received everywhere with acclamation (1875). In 1876 a vigorous campaign against the Carlists, in which the young king took part, resulted in the defeat of Don Carlos and his abandonment of the struggle. Early in 1878 Alphonso married his cousin, Princess Maria de las Mercedes, daughter of the due de Montpensier, but she died within six months of her marriage. Towards the end of the same year a young workman of Tarragona, Oliva Marcousi, fired at the king in Madrid. On the 29th of November 1879 he married a princess of Austria, Maria Christina, daughter of the Archduke Charles Ferdinand. During the honeymoon a pastrycook named Otero fired at the young sovereigns as they were driving in Madrid. The children of this marriage were Maria de las Mercedes, titular queen from the death of her father until the birth of her brother, born on the nth of September 1880, married on the 14th of February 1901 to Prince Carlos of Bourbon, died on the 17th of October 1904; Maria Teresa, born on the 12 th of November 1882, married to Prince Ferdinand of Bavaria on the 12th of January 1906; and Alphonso (see below). In 1881 the king

refused to sanction the law by which the ministers were to remain in office for a fixed term of eighteen months, and upon the con- sequent resignation of Canovas del Castillo, he summoned Sagasta, the Liberal leader, to form a cabinet. Alphonso died of phthisis on the 24th of November 1885. Coming to the throne at such an early age, he had served no apprenticeship in the art of ruling, but he possessed great natural tact and a sound judgment ripened by the trials of exile. Benevolent and sym- pathetic in disposition, he won the affection of his people by fearlessly visiting the districts ravaged by cholera or devastated by earthquake in 1885. His capacity for dealing with men was considerable, and he never allowed himself to become the instru- ment of any particular party. In his short reign peace was established both at home and abroad, the finances were well regulated, and the various administrative services were placed on a basis that afterwards enabled Spain to pass through the disastrous war with the United States without even the threat of a revolution.

Alphonso XIII. (1886-), king of Spain, son of Alphonso XII., was born, after his father's death, on the 1 7th of May 1886, His mother, Queen Maria Christina, was appointed regent during his minority (see Spain: History). In 1902, on attaining his 1 6th year, the king assumed control of the government. On the 31st of May 1906 he married Princess Victoria Eugenie Julia Ena Maria Christina of Battenberg, niece of Edward VII. of England. As the king and queen were returning from the wedding they narrowly escaped assassination in a bomb explosion, which killed and injured many bystanders and members of the royal procession. An heir to the throne was born on the 10th of May 1907, and received the name of Alphonso.

Authorities.— The lives of all the early kings of Spain will be found in the general histories (see the article Spain: Authorities), of which the most trustworthy is the Anales de la Corona de Aragon, by Geronimo Zurita (Saragossa, 1610). See also the Chronicles of the Kings of Castile in the Biblioteca de Autores Espanoles de RivQ deneyra (Madrid, 1846-1880, vols. 66, 68, 70). (D. H.)

ALPHONSUS A SANCTA MARIA, or Alphonso de Cartagena (1396-1456), Spanish historian, was born at Carthagena, and succeeded his father, Paulus, as bishop of Burgos. In 143 1 he was deputed by John II., king of Castile, to attend the council of Basel, in which he made himself conspicuous by his learning. He was the author of several works, the principal of which is entitled Rerum Hispanorum Romanorum imperatorum, sum- morum pontificum, nee

non regum Francorum anacephaleosis.

This is a history of Spain from the earliest times down to 1456, and was printed at Granada in 1545, and also in the Rerum Hispanicarum Scriptores aliquot, by R. Bel (Frankfort, 1579). Alphonsus died on the 12th of July 1456.

ALPINI, PROSPERO (Prosper Alpinus), 1553-1617, Italian physician and botanist, was born at Marostica, in the republic of Venice, on the 23rd of November 1553. In his youth he served for a time in the Milanese army, but in 1574 he went to study medicine at Padua. After taking his doctor's degree in 1578, he settled as a physician in Campo San Pietro, a small town in the Paduan territory. But his tastes were botanical, and to extend his knowledge of exotic plants he travelled to Egypt in 1580 as physician to George Emo or Hemi, the Venetian consul in Cairo. In Egypt he spent three years, and from a practice in the management of date-trees, which he observed in that country, he seems to have deduced the doctrine of the sexual difference of plants, which was adopted as the foundation of the Linnaean system. He says that " the female date-trees or palms do not bear fruit unless the branches of the male and female plants are mixed together; or, as is generally done, unless the dust found in the male sheath or male flowers is sprinkled over the female flowers." On his return, he resided for some time at Genoa as physician to Andrea Doria, and in 1593 he was appointed professor of botany at Padua, where he died on the 6th of February 1617. He was succeeded in the botanical chair by his son Alpino Alpini (d. 1637). His best-known work is De Plantis Aegypli liber (Venice, 1592). His De Medicina Egyptiorum (Venice, 1591) is said to contain the first account of the coffee plant published in Europe. The genus Alpinia, belonging to the order Zingiberaceae, was named after him by Linnaeus.

ALPS, the collective name for one of the great mountain systems of Europe.

1. Position and Name. — The continent of Europe is no more than a great peninsula extending westwards from the much vaster continent of Asia, while it is itself broken up by two inland seas into several smaUer peninsulas — the Mediterranean forming the Iberian, the Italian and the Greek peninsulas, while the Baltic forms that of

Scandinavia and the much smaller one of Denmark. Save the last-named, all these peninsulas of Europe are essentially mountain ranges. But in height and importance the ranges that rise therein are much surpassed by a great mountain-chain, stretching from south-eastern France to the borders of Hungary, as well as between the plains of northern Italy and of southern Germany. This chain is collectively known as the Alps, and is the most important physical feature of the European continent. The Alps, however, do not present so continuous a barrier as the Himalayas, the Andes or even the Pyrenees. They are formed of numerous ranges, divided by comparatively deep valleys, which, with many local exceptions, tend towards parallelism with the general direction of the whole mass. This, between the Dauphine and the borders of Hungary, forms a broad band convex towards the north, while most of the

, valleys lie between the directions west to east and south-west to north-east. But in many parts deep transverse valleys intersect the prevailing direction of the ridges, and facilitate the passage of man, plants and animals, as well as of currents of air which mitigate the contrast that would otherwise be found between the climates of the opposite slopes.

The derivation of the name Alps is still very uncertain, some writers connecting it with a Celtic root alb, said to mean height, while others suggest the Latin adjective albus (white), referring to the colour of the snowy peaks. But in all parts of the great chain itself, the term Alp (or Aim in the Eastern Alps) is exclu- sively applied to the high mountain pastures (see Alp), and not to the peaks and ridges of the chain.

2. Limits.— These will depend on the meaning we attach to the word Alps as referring to the great mountain-chain of central Europe. If we merely desire to distinguish it from certain minor ranges (e.g. the Cevennes, the Jura, the hills of central Germany, the Carpathians, the Apennines), which are really independent ranges rather than offshoots of the main chain, the

best limits are on the west (strictly speaking south), the Col d'Altareordi Cadibona (1624 ft), leading from Turin to Savona and Genoa, and on the east the line of the railway over the Semmering Pass (3215 ft.) from Vienna to Marburg in the Mur valley, and on by Laibach to Trieste. But if we confine the meaning of the term Alps to those parts of the chain that are what is commonly called " Alpine,"

where the height is sufficient to support a considerable mass of perpetual snow, our boundaries to the west and to the east must be placed at spots other than those mentioned above. To the west the limit will then be the Col de Tenda (6145 ft.), leading from Cuneo (Coni) to Ventimiglia, while on the east our line will be the route over the Radstadter Tauern (5702 ft.) and the Katschberg (5384 ft.) from Salzburg to Villach in Carinthia, and thence by Klagenfurt to Marburg and so past Laibach in Carniola on to Trieste; from Villach the direct route to Trieste would be over the Predil Pass (3813 ft.) or the Pontebba or Saifnitz Pass (2615 ft), more to the west, but in either case this would exclude the Terglou (9400 ft), the highest summit of the entire South-Eastern Alps, as well as its lower neighbours.

On the northern side the Alps (in whichever sense we take this term) are definitely bounded by the course of the Rhine from Basel to the Lake of Constance, the plain of Bavaria, and the low region of foot-hills that extend from Salzburg to the neighbourhood of Vienna. One result of this limit, marked out by Nature herself, is that the waters which flow down the northern slope of the Alps find their way either into the North Sea through the Rhine, or into the Black Sea by means of the Danube, not a drop reaching the Baltic Sea. On the southern side the mountains extending from near Turin to near Trieste subside into the great plain of Piedmont, Lombardy and Venetia. But what properly forms the western bit of the Alps runs, from near Turin to the Col de Tenda, in a southerly direc- tion, then bending eastwards- to the Col d'Altare that divides it from the Apennines.

It should be borne in mind that the limits adopted above refer purely to the topographical aspect of the Alps as they exist at the present day. Naturalists will of course prefer other limits according as they are geologists, botanists or zoologists.

*3. Climate. — It is well known that as we rise from the sea- level into the upper regions of the atmosphere the temperature decreases. The effect of mountain-chains on prevailing winds is to carry warm air belonging to the lower region into an upper zone, where it expands in volume at the cost of a proportionate loss of heat, often accompanied by the precipitation of moisture in the form of snow or rain. The position *of the Alps about the centre of the European continent has profoundly modified the climate of all the surrounding regions. The accumulation of vast masses of snow, which have gradually been converted into permanent glaciers, maintains a gradation of very different climates within the narrow space that intervenes between the foot of the mountains and their upper ridges; it cools the breezes*

that are wafted to the plains on either side, but its most important function is to regulate the water-supply of that large region which is traversed by the streams of the Alps. Nearly all the moisture that is precipitated during six or seven months is stored up in the form of snow, and is gradually diffused in the course of the succeeding summer; even in the hottest and driest seasons the reserves accumulated during a long preceding period of years in the form of glaciers are available to maintain the regular flow of the greater streams. Nor is this all; the lakes that fill several of the main valleys on the southern side of the Alps are somewhat above the level of the plains of Lombardy and Venetia, and afford an inexhaustible supply of water, which, from a remote period, has been used for that system of irrigation to which they owe their proverbial fertility. Six regions or zones, which are best distinguished by their characteristic vegetation, are found in the Alps. It is an error to suppose that these are indicated by absolute height above the sea-level. Local conditions of exposure to the sun, protection from cold winds, or the reverse, are of primary importance in determining the climate and the corresponding vegetation.

[CLIMATE

The great plain of Upper Italy has a winter climate colder than that of the British Islands. The olive and the characteristic

shrubs of the northern coasts of the Mediterranean do region. not thrive in the open air, but the former valuable

tree ripens its fruit in sheltered places at the foot of the mountains, and penetrates along the deeper valleys and the shores of the Italian lakes. The evergreen oak is wild on the rocks about the Lake of Garda, and lemons are cultivated on a large scale, with partial protection in winter. The olive has been known to survive severe cold when of short duration, but it can- not be cultivated with success where frosts are prolonged, or where the mean winter temperature falls below 42 F. ; and to produce fruit it requires a heat of at least 75 F. during the day, con- tinued through four or five months of the summer and autumn. The vine is far more tolerant of cold than the olive, but to produce tolerable wine it demands, at the season of ripening,

a degree of heat not much less than that needed by the region. more delicate tree. These conditions are satisfied in

the deeper valleys of the Alps, even in the interior of the chain, and up to a considerable height on slopes exposed to the sun. The protection afforded by winter snow enables the plant to resist severe and prolonged frosts, such as would be fatal in more exposed situations. Many wild plants character- istic of the warmer parts of middle Europe are seen to flourish along with the vine. A mean summer temperature of at least 68° F. is considered necessary to produce tolerable wine, but in ordinary seasons this is much exceeded in many of the great valleys of the Alps.

Many writers take the growth of grain as the characteristic of the mountain region; but so many varieties of all the common

>. 4.i- species are in cultivation, and these have such different mountain f. it, «. , .

region, or chmatal requirements, that they do not afford a satis-

region of factory criterion. A more natural limit is afforded by

deciduous ˆhe p resence f t ne c hief deciduous trees — oak, beech,

ash and sycamore. These do not reach exactly to the same elevation, nor are they often found growing together; but their upper limit corresponds accurately enough to the change from a temperate to a colder climate that is further proved by a change in the wild herbaceous vegetation. This limit usually lies about 4000 ft. above the sea on the north side of the Alps, but on the southern slopes it often rises to 5000 ft., sometimes even to 5 500 ft. It must not be supposed that this region is always marked by the presence of the characteristic trees. The interference of man has in many districts almost extirpated them, and, excepting the beech forests of the Austrian Alps, a considerable wood of deciduous trees is scarcely anywhere to be found. In many districts where such woods once existed, their place has been occupied by the Scottish pine and spruce, which suffer less from the ravages of goats, the worst enemies of tree vegetation. The mean annual temperature of this region differs little from that of the British Islands; but the climatal conditions are widely different. Here snow usually lies for several months, till it gives place to a spring and summer considerably warmer than the average of British seasons.

The Subalpine is the region which mainly determines the manner of

life of the population of the Alps. On a rough estimate subaMne we ma ˆ rec kon that, of the space lying between the region, or summits of the Alps and the low country on either region of side, one-quarter is available for cultivation, of which coniferous a bout one-half may be vineyards and corn-fields, while

the remainder produces forage and grass. About another quarter is utterly barren, consisting of snow-fields, glaciers, bare rock, lakes and the beds of streams. There remains about one-half, which is divided between forest and pasture, and it is the produce of this half which mainly supports the relatively large population. For a quarter of the year the flocks and herds are fed on the upper pastures; but the true limit of the wealth of a district is the number of animals that can be supported during the long winter, and while one part of the population is engaged in tending the beasts and in making cheese and butter, the remainder is busy cutting hay and storing up winter food for the cattle. The larger villages are mostly

in the mountain region, but in many parts of the Alps the villages stand in the subalpine region at heights varying from 4000 ft., to 5500 ft. above the sea, more rarely extending to about 6000 ft. The most characteristic feature of this region is the prevalence of coniferous trees, which, where they have not been artificially kept down, form vast forests that cover a large part of the surface. These play a most important part in the natural economy of the country. They protect the valleys from destructive avalanches, and, retaining the superficial soil by their roots, they mitigate the destructive effects of heavy rains. In valleys where they have been rashly cut away, and the waters pour down the slopes unchecked, every tiny rivulet becomes a raging torrent, that carries off the grassy slopes and devastates the floor of the valley, covering the soil with gravel and debris. ‘ In the pine forests of the Alps the prevailing species are the common spruce and the silver fir; on siliceous soil the larch flourishes, and surpasses every other European species in height. The Scottish pine is chiefly found at a lower level and rarely forms forests. The Siberian fir is found scattered at intervals throughout the Alps but is not common. The mughus, creeping pine, or Krummkolz of the Germans, is common in the Eastern Alps, and sometimes forms on the higher mountains a distinct zone above the level of its congeners. In the Northern Alps the pine forests rarely surpass the limit of 6000 ft. above the sea, but on the south side they commonly attain 7000 ft., while the larch, Siberian fir and mughus often extend above that elevation.

Throughout the Teutonic region of the Alps the word Alp is used

specifically for the upper pastures where cattle are fed in summer, but this region is held to include the whole •

space between the uppermost limit of trees and the first region. appearance of permanent masses of snow. It is here that the characteristic vegetation of the Alps is developed in its full beauty and variety. Shrubs are not wanting. Three species of rhododendron vie with each other in the brilliancy of their masses of red or pink flowers; the common juniper rises higher still, along with three species of bilberry; and several dwarf willows attain nearly to the utmost limit of vegetation. The upper limit of this region coincides with the so-called limit of perpetual snow.

On the higher parts of lofty mountains more snow falls in each year than is melted on the spot. A portion of this is carried away by the wind before it is consolidated; a larger .

portion accumulates in hollows and depressions of the region. surface, and is gradually converted into glacier-ice, which descends by a slow secular motion into the deeper valleys; where it goes to swell perennial streams. As on a mountain the snow does not lie in beds of uniform thickness, and some parts are more exposed to the sun and warm winds than others, we commonly find beds of snow alternating with exposed slopes covered with brilliant vegetation; and to the observer near at hand there is no appearance in the least corresponding to the term limit of perpetual snow, though the case is otherwise when a high mountain-chain is viewed from a distance. Similar conˆ ditions are repeated at many different points, so that the level at which large snow-beds show themselves along its flanks is approximately horizontal. But this holds good only so far as the conditions are similar. On the opposite sides of the same chain the exposure to the sun or to warm winds may cause a wide difference in the level of permanent snow; but in some cases the increased fall of snow on the side exposed to moist winds may more than compensate the increased influence of the sun's rays. Still, even with these reservations, the so-called line of perpetual snow is not fixed. The occurrence of favourable meteorological conditions during several successive seasons may and does increase the extent of the sncw-fields, and lower the limit of seemingly permanent snow; While an opposite state of things may cause the limit to rise higher on the flanks of the mountains. Hence all attempts to fix accurately the level of perpetual snow in the Alps are fallacious, and can at the best; approach only to local accuracy for a particular district. In some parts of the Alps the limit may be set at about 8000 ft. above the sea, while in others it cannot be placed much below 9500 ft.;

As very little snow can rest on rocks that lie at an angle exceeding 60°, and this is soon removed by the wind, some steep masses of rock remain bare even near the summits of the highest peaks, but as almost every spot offering the least hold for vegetation is covered with snow, few flowering plants are seen above 11,000 ft. There is reason to think, however, that it is the want of soil rather than climatal conditions that checks the upward extension of the alpine flora. Increased direct effect of solar radiation compensates for the cold of the nights, and in the few spots where plants have been found in flower up to a height of 12,000 ft., nothing has indicated that the processes of vegetation were arrested by the severe cold which they must sometimes endure. The climate of the glacial region has often been compared to that of the polar regions, but they are widely different. Here, intense solar radiation by day, which raises the surface when dry to a temperature approaching 8o° F., alternates with severe frost by night. There, a sun which never sets sends feeble rays that maintain a low equable temperature, rarely rising more than a few degrees above the freezing-point. Hence the upper region of the Alps sustains a far more varied and brilliant vegetation.

4. Main Chain. — In the case of every mountain system geographers are disposed to regard, as a general rule, the water- shed (or boundary dividing the waters flowing towards opposite slopes of the range) as marking the main chain, and this usage is justified in that the highest peaks often rise on or very near the watershed. Yet, as a matter of fact, several important mountain groups are situated on one or other side of the watershed of the Alps, and form almost independent ranges, being only connected with the main chain by a kind of peninsula: such are the Dauphine Alps, the Eastern and Western Graians, the entire Bernese Oberland, the Todi, Albula and Silvretta groups, the Ortler and Adamello ranges, and the Dolomites of south Tirol, not to speak of the lower Alps of the Vorarlberg, Bavaria and Salzburg. Of course each of these semi-detached ranges has a watershed of its own, like the lateral ridges that branch off from the main watershed. Thus there are lofty ranges parallel to that which forms the main watershed. The Alps, therefore, are not

composed of a single range (as shown on the old maps) but of a great " divide," flanked on either side by other important ranges, which, however, do not comprise such lofty peaks as the main watershed. In the following remarks we propose to follow the main watershed from one end of the Alps to the other.

Starting from the Col d' Altare or di Cadibona (west of Savona), the main chain extends first south-west, then north-west to the Col de Tenda, though nowhere rising much beyond the zone of coniferous trees. Beyond the Col de Tenda the direction is first roughly west, then north-west to the Rocher des Trois Evfiques (9390 ft.), just south of the Mont Enchastraye (9695 ft.), several peaks of about 10,000 ft/ rising on the watershed, though the highest of all, the Punta dell' Argentera (10,794 ft-) stands a little way to its north. From the Rocher des Trois Eveques the watershed runs due north for a long distance, though of the two loftiest peaks of this region one, the Aiguille de Chambeyron (11,155 ft.), is J ust to the west, and the other, the Monte Viso (12,609 ft), is just to the east of the watershed. From the head of the Val Pellice the main chain runs north-west, and diminishes much in average height till it reaches the Mont Thabor (10,440 ft.), which forms the apex of a salient angle which the main chain here presents towards the west. Hence the main watershed extends eastwards, culminating in the Aiguille de Scolette (11,500 ft.), but makes a great curve to the north-west and back to the south-east before rising in the Rochemelon (11,605 ft-)> which may be considered as a re-entering angle in the great rampart by which Italy is guarded from its neighbours. Thence the direction taken is north as far as the eastern summit (11,693 ft.) of the Levanna, the watershed rising in a series of snowy peaks, though the loftiest point of the region, the Pointe de Charbonel (12,336 ft.), stands a little to the west. Once more the chain bends to the north-west, rising in several lofty peaks (the highest is the Aiguille de la Grande Sassiere, 12,323 ft.), before attaining the considerable depression of the Little St Bernard Pass. Thence for a short way the direction is north to the Col de la Seigne, and then north-east along the crest of the Mont Blanc chain, which culminates in the peak of Mont Blanc (15,782 ft.), the loftiest in the Alps. A number of high peaks crown our

watershed before it attains the Mont Dolent (12,543 ft.). Thence after a short dip to the south-east, our chain takes near the Great St Bernard Pass the generally eastern direction that it maintains till it reaches Monte Rosa,whence it bends northwards, making one small dip to the east as far as the Simplon Pass. It is in the portion of the watershed between the Great St Bernard and the Simplon that the main chain maintains a greater average height than in any other part. But, though it rises in a number of lofty peaks, such as the Mont Velan (1 2,3 53 ft.) , the Matterhorn (14,782 ft.), the Lyskamm (14,889 ft.), the Nord End of Monte Rosa (15,132 ft.), and the Weissmies (13,226 ft.), yet many of the highest points of the region, such as the Grand Combin (14, 1 64 f t.) , the Dent Blanche (14,318 ft.), the Weisshorn (14,804 ft.), the true summit or Dufourspitze (15,217 ft.) of Monte Rosa itself, and the Dom (14,942 ft.), all rise on its northern slope and not on the main watershed. On the other hand the chain between the Great St Bernard and the Simplon sinks at barely half a dozen points below a level of 10,000 ft. The Simplon Pass corresponds to what may be called a dislocation of the main chain. Thence to the St Gotthard the divide runs north-east, all the higher summits (including the Monte Leone, 11,684 ft., and the Pizzo Rotondo, 10,489 ft.) rising on it, a curious contrast to the long stretch just described. From the St Gotthard to the Maloja the watershed between the basins of the Rhine and Po runs in an easterly direction as a whole, though making two great dips towards the south, first to near the Vogelberg (10,565 ft.) and again to near the Pizzo Gallegione (10,201 ft.), so that it presents a broken and irregular appearance. But all the loftiest peaks rise on it: Scopi (10,499 ft.), Piz Medel (10,509 ft.), the Rhein- waldhorn (11,149 ft.), the Tambohorn (10,749 ft.) and Piz Timun (10,502 ft.).

From the Maloja Pass the main watershed dips to the south- east for a short distance, and then runs eastwards and nearly over the highest summit of the Bernina group, the Piz Bernina (13,304 ft.), to the Bernina Pass. Thence to the Reschen Scheideck Pass the main chain is ill-defined, though on it rises the Corno di Campo (10,844 ft.), beyond which it runs slightly north-east past the sources of the Adda and the Fraele Pass, sinks to form the depression of the Ofen Pass, soon bends north and rises once more in the Piz Sesvenna (10,568 ft.).

The break in the continuity of the Alpine chain marked by the deep valley, the Vintschgau, of the upper Adige (Etsch) is one of the most remarkable features in the orography of the Alps. The little Reschen lake which forms the chief source of the Adige is only 13 ft. below the Reschen Scheideck Pass (4902 ft.), and by it is but 5 m. from the

Inn valley. Eastward of this pass, the main chain runs north-east to the Brenner Pass along the snowy crest of the Oetzthal and Stubai Alps, the loftiest point on it being the Weisskugel (1 2,291 ft., Oetzthal) , for the highest summits both of the Oetzthal and of the Stubai districts, the Wildspitze (12,382 ft.) and the Zuckerhutl (11,520 ft.) stand a little to the north.

The Brenner (4495 ft.) is almost the lowest of all the great carriage-road passes across the main chain, and has always been the chief means of communication between Germany and Italy. For some way beyond it the watershed runs eastwards over the highest crest of the Zillerthal Alps, which attains 11,559 ft. in the Hochfeiler. But, a little farther, at the Dreiherrenspitze (11,500 ft.) we have to choose between following the watershed south- wards, or keeping due east along the highest crest of the Greater Tauern Alps, (a) The latter course is adopted by many geographers and has much in its favour. The eastward direc- tion is maintained and the watershed (though not the chief Alpine watershed) continues through the Greater Tauern Alps, culminating in the Gross Venediger (12,008 ft.), for the Gross Glockner (12,461 ft.) rises to the south. Our chain bends north- east near the Radstadter Tauern Pass, and preserves that direction through the Lesser Tauern Alps to the Semmering Pass. (b) On the other hand, if from the Dreiherrenspitze we cleave to the true main watershed of the Alpine chain, we find that it dips south, passes over the Hochgall (11,287 ft.), the culminating point of the Rieserferner group, and then sinks to the Toblach Pass, but at a point a little east of the great Dolomite peak of

the Drei Zinnen it bends east again, and rises in the Monte Coglians (9128 ft., the monarch of the Carnic Alps). Soon after our watershed makes a last bend to the south-east and culminates in the Terglou (9400 ft.), the highest point of the Julie Alps, though the Grintovc (8429 ft., the culminating point of the Karawankas Alps) stands more to the east. Finally our water- shed turns south and ends near the great limestone plateau of the Birnbaumerwald, between Laibach and Gorz.

As might be expected, the main chain boasts of more glaciers and eternal snow than the independent or external ranges. Yet it is a curious fact that the three longest glaciers in the Alps (the Great Aletsch, i6§ m., and the Unteraar and the Fiescher, each 10 m.) are all in the Bernese Oberland. In the main chain the two longest are both g\ m., the Mer de Glace at Chamonix and the Gorner at Zermatt. In the Eastern Alps the longest glacier is the Pasterze (rather over 6j m.), which is not near the true main watershed,

though it, clings to the slope of the Greater Tauern range, east of the Dreiherrenspitze. But the next two longest glaciers in the Eastern Alps (the Hintereis, 6j m., and the Gepatsch, 6 m.) are both in the Oetzthal Alps, and so close to the true main watershed.

The so-called alpine lakes arc the sheets of water found at the foot of the Alps, on either slope, just where the rivers that form them issue into the plains. There are, however, alpine lakes higher up (e.g. the lake of Thu'n, and those in the Upper Engadine, in the heart of the mountains, though these are naturally smaller in extent, while the true lakes of the High Alps are represented by the glacier lakes of the Marjelensee (near the Great Aletsch glacier) and those on the northern slope of the Col de Fenetre, between Aosta and the Val de Bagnes. The most singular, and probably the loftiest, lake in the Alps is the ever-frozen tarn that forms the summit of the Roccia Viva (11,976 ft.) in the Eastern Graians.

Among the great alpine rivers we may distinguish two classes: those which spring directly from glaciers and those which rise in lakes, these being fed by eternal snows or glaciers. In the former class are the Isere, the Rhone, the Aar, the Ticino, the Tosa, the Hinter (or main) Rhine and the Linth; while in the latter class we have the Durance, the Po, the Reuss, the Vorder and middle branches of the Rhine, the Inn, the Adda, the Oglio and the Adige. The Piave and the Drave seem to be outside either class.

5. Principal Passes. — Though the Alps form a barrier they have never formed an impassable barrier, since, from the earliest days onwards, they have been traversed first, perhaps, for purposes of war or commerce, and later by pilgrims, students and tourists. The spots at which they were crossed are called passes (this word is sometimes though rarely applied to gorges only), and are the points at which the great chain sinks to form depressions, up to which deep-cut valleys lead from the plains. Hence the oldest name for such passes is Mont (still retained in cases of the Mont Cenis and the Monte Moro) , for it was many ages before this term was especially applied to the peaks of the Alps, which with a few very rare exceptions (e.g. the Monte Viso was known to the Romans as Vesulus) were long simply dis-regarded. The native inhabitants of the Alps were naturally the first to use the alpine passes. But to the outer world these passes first became known when the Romans traversed them in order to conquer the world beyond. In the one case we have no direct knowledge (though the Romans probably selected the passes pointed out to them by the natives as the easiest), while in the other we hear almost exclusively of the passes across the main chain or the principal

passes of the Alps. For obvious reasons the Romans, having once found an easy direct pass across the main chain, did not trouble to seek for harder and more devious routes. Hence the passes that can be shown U> have been certainly known to them are comparatively few in number: they are, in topographical order from west to east, the Col de l'Argentiere, the Mont Genevre, the two St Bernards, the Spliigen, the Septimer, the Brenner, the Radstadter Tauern, the Solkscharte, the Plocken and the Pontebba (or Saifnitz). Of these the Mont Genevre and the Brenner were the most frequented, while it will be noticed that in the Central Alps only

two passes (the Spliigen and the Septimer) were certainly known to the Romans. In fact the central portion of the Alps was by far the least Romanised and least known till the early middle ages. Thus the Simplon is first certainly mentioned in 1235, the St Gotthard (without name) in 1236, the Lukmanier in 965, the San Bernardino in 941; of course they may have been known before, but authentic history is silent as regards them till the dates specified. Even the Mont Cenis (from the 15th to the 19th century the favourite pass for travellers going from France to Italy) is first heard of in 756 only. In the 13th century many hitherto unknown passes came into prominence, even some of the easy glacier passes. It should always be borne in mind that in the Western and Central Alps there is but one ridge to cross, to which access is gained by a deep-cut valley, though often it would be shorter to cross a second pass in order to gain the plains, e.g. the Mont Genevre, that is most directly reached by the Col du Lautaret; and the Simplon, which is best gained by one of the lower passes over the western portion of the Bernese Oberland chain. On the other hand, in the Eastern Alps, it is generally necessary to cross three distinct ridges between the northern and southern plains, the central ridge being the highest and most difficult. Thus the passes which crossed a single ridge, and did not involve too great a detour through a long valley of approach, became the most important and the most popular, e.g. the Mont Cenis, the Great St Bernard, the St Gotthard, the Septimer and the Brenner. As time went on the travellers (with whatever object) who used the great alpine passes could not put up any longer with the bad old mule paths. A few passes (e.g. the Semmering, the Brenner, the Tenda and the Arlberg) can boast of carriage roads constructed before 1800,

while those over the Umbrail and the Great St Bernard were not completed till the early years of the 20th century. Most of the carriage roads across the great alpine passes were thus constructed in the 19th century (particularly its first half), largely owing to the impetus given by Napoleon. As late as 1905, the highest pass over the main chain that had a carriage road was the Great St Bernard (81 n ft.), but three still higher passes over side ridges have roads — the Stelvio (9055 ft.), the Col du Galibier (8721 ft.), in the Dauphine Alps, and the Umbrail Pass (8242 ft.). Still more recently the main alpine chain has been subjected to the further indignity of having railway lines carried over it or through it — the Brenner and the Pontebba lines being cases of the former, and the Col de Tenda, the Mont Cenis (though the tunnel is really 17 m. to the west), the Simplon and the St Gotthard, not to speak of the side passes of the Arlberg, Albula and Pyhrn of the latter. There are also schemes (more or less advanced) for piercing the Spliigen and the Hohe Tauern, both on the main ridge, and the Lotschen Pass, on one of the external ranges. The numerous mountain railways, chiefly in Switzerland, up various peaks (e.g. the Rigi and Pilatus) and over various side passes (e.g. the Briinig and the Little Scheidegg) do not concern us here.

6. Divisions. — The Alps, within the limits indicated under (2) above, form a great range, consisting of a main chain, with ramifications, and of several parallel minor chains. They thus form a single connected whole as contrasted with the plains at their base, and nature has made no breaks therein, save at the spots where they sink to comparatively low depressions or passes. But for the sake of practical convenience it has long been usual to select certain of the best marked of these passes to serve as limits within the range, whether to distinguish several great divisions from each other, or to further break up each of these great divisions into smaller groups. As these divisions, great or small, are so to speak artificial, several systems have been proposed according to which the Alps may be divided. We give below that which seems to us to be the most satisfactory (based very largely on personal acquaintance with most parts of the range), considering, as in the case of the limits of the chain, only its topographical aspect, as it exists at the present day, while leaving it to geo- logists, botanists and zoologists to elaborate special divisions as required by these various sciences. Our selected divisions relate only to the High Alps between the Col de Tenda and the

route over the Radstadter Tauern, while in each of the 18 sub-divisions the less elevated outlying peaks are regarded as append-

ages of the higher group within the topographical limits of which they rise. No attempt, of course, has been made to give a com- plete catalogue of the peaks and passes of the Alps, while in the case of the peaks the culminating point of a lower half- detached group has been included rather than the loftier spurs of the higher and main group; in the case of the passes, the villages or valleys they connect have been indicated, and also the general character of the route over each pass.

As regards the main divisions, three are generally distinguished; the Western Alps (chiefly French and Italian, with a small bit of the Swiss Valais) being held to extend from the Col de Tenda to the Simplon Pass, the Central Alps (all but wholly Swiss and Italian) thence to the Reschen Scheideck Pass, and the Eastern Alps (wholly Austrian and Italian, save the small Bavarian bit at the north-west angle) thence to the Radstadter Tauern route, with a bend outwards towards the south-east, as explained under (2) in order to include the higher summits of the South- Eastern Alps. Strictly speaking, we should follow the Reschen Scheideck route down the Adige valley, but as this would include in the Central Alps the Ortler and some other of the highest Tirolese summits, it is best (remembering the artificial character of the division) to draw a line from Mais southwards either over the Umbrail Pass (the old historical pass) or the Stelvio (well- known only since the carriage road was built over it in the first quarter of the 19th century) to the head of the Valtellina, and then over the Aprica Pass (as the Bergamasque Alps properly belong to the Central Alps) to the Oglio valley or the Val Camonica, and down that valley to the Lake of Iseo and Brescid.

Assuming these three main divisions, we must now consider in detail the 18 sub-divisions which we distinguish; the first 5 forming the Western Alps, the next 7 the Central Alps, and the rest the Eastern Alps, the heights throughout being, of course, given in English feet and representing the latest measurements.

I. Western Alps

1. Maritime Alps (from the Col de Tenda to the Col de 1' Argen- tine).

Chief Peaks of the Maritime Alps. Punta deir Argentera . 10,794
Mont Tinibras . . . 9,948

Cima dei Gelas Monte Matto Mont Pelat Mont Clapier

10,286 Mont Enchastraye .

10,128 Monte Bego

10,017 Mont Monnier .

9,994 Rocca dell' Abisso .

Chief Passes of the Maritime Alps. Passo del Pagarin (Vesubie Valley to Valdieri), snow . Col di Fremamorta (Tinee Valley to the Baths of Valdieri),

bridle path . . . . . .

Bassa di Druos (same to same), bridle path Passo di Collalunga (Tinee Valley to Vinadio), bridle path. Coll dell' Agnel (Tenda to Valdieri), foot path . . .

Col della Ciriegia (St Martin Vesubie to the Baths of Valdieri) ,

bridle path .....

Col des Granges Communes (St Etienne de Tinee to Barce- lonnette), bridle path . . . Col de Pourriac (Tinee Valley to Argentera), foot path Col della Finestre (St Martin de Vesubie to Valdieri), bridle

path . . . . . .

Col di Guercia (Tinee Valley to Vinadio), foot path .

Col della Lombarda (same to same), bridle path . .

Col de la Cayolle (Var Valley to Barcelonnette), carriage

road . . . . . .

Col di Santa Anna (Tinee Valley to Vinadio), bridle path

Col del Sabbione (Tenda to Valdieri), bridle path

Col d Alios or de Valgelaye (Verdon Valley to Barcelonnette),

carriage road .....

Col de lArgentiere (Barcelonnette to Cuneo), carriage road , Col de Tenda (Tenda to Cuneo), carriage road, railway

beneath .....

2. Cottian Alps (from the Col de TArgentiere to the Mont and westwards to the Col du Galibier).

9.695 9,426 9.246 9.039

9,236

8,688 8,629

8,531 8,426

8,370

8,242 8,222

8,107 8,042 7.858

7.717 7.605 7,428

7.382 6.545

6,145

Cenis

Monte Viso

Viso di Vallante . . . 12,048

Aiguille de Scolette . . 11,500 Aiguille de Chambeyron . It, 155

Grand Rubren . 11,142

Brec de Chambeyron 11,116

Rognosa d'Etache . . 11,106

Chief Peaks of the Cottian Alps. . 12,609 Dents dAmbin

Mont dAmbin Pointe de la Font Sancte Punta Ferrant . Visolotto .... Rochebrune .... Punta Sommeiller .

11,096 11,080

11,057 11,037 11,001 10,906 10,896

7 + 2

ALPS

[PEAKS AND PASSES

Brie Froid ....

10,860

Tlte des Toillies

10,430

Grand Glayza

10,781

Monte Granero

10,401

Rognosa di Sestrieres

10,758

Mont Chaberton

10,286

Panestrel

10,673

Te"te de Moyse .

10,204

Roche du Grand Galibier

10,637

Monte Meidassa

10,187

Peou Roc

10,601

Pelvo d'Elva

10,053

Pic du Pelvat

10,558

Mont Politri . .

10,009

Pointe Haute de Marv .

io,539

Mont Albergian

9.974

Pic du Thabor

10,516

Brie Bouchet

9,853

Mont Thabor

10,440

Punta Cournour

9,410

Pointe des Cerces

io,434

Chief Passes in the Cottian Alps. Col Sommeiller (Bardonneche to Bramans), snow Col de la Traversette (Crissolo to Abries), mainly bridle path

beneath pass tunnel made in 1478-1480 Col d'Ambin (Exilles to Bramans), snow .... Col de St Veran (Val Varaita to the Queyras Valley), foot

path .....

Col d'Etache (Bardonneche to Bramans), bridle path

Col dell' Agnello (Val Varaita to the Queyras Valley), bridle

path .....

Col Girardin (Ubaye Valley to the Queyras Valley), bridle

path .....

Col de Sautron (Val Maira to Barcelonnette), bridle path . Col de Longet (Ubaye Valley to Val Varaita), bridle path . Col de Mary or de Maurin (Ubaye Valley to Val Maira) , bridle

path .....

Col d'Abries or de Prali (Perosa to Abries), bridle path Col de la Roue (Bardonneche to Modane), bridle path Col de Frejus (same to same), carriage road, beneath which

is the so-called Mont Cenis railway tunnel. Col de Clapier (Bramans to Susa), bridle path . Col d'Izouard (Briancon to the Queyras Valley), carriage

road .....

Col de la Croix (Torre Pe'.licc to Abries), bridle path

Petit Mont Cenis (Bramans to the Mont Cenis Plateau), bridle

path .....

Col de Vars (Ubaye Valley to the Queyras Valley), carriage

road .....

Mont Cenis (Lanslebourg to Susa), carriage road Col de Sestrieres (Pignerol to Cesanne), carriage road Mont Genevre (Briancon to Cesanne), carriage road . Col des Echelles de Planpinet (Briancon to Bardonneche),

partly carriage road

3. Dauphine Alps (from the Col du Galibier southwards).

Chief Peaks of the Dauphins Alps Pointe des Ecrins . . 13,462 Pic Felix Neff

Meije 13,081

Ailefroide 12,989

Mont Pelvoux . . . 12,973 Pic Sans Norn . . . 12,845 Pic Gaspard .... 12,730 Pic Coolidge .... 12,323 Grande Ruine . . . 12,317

Rateau 12,317

Montagne des Agneaux . 12,008

Les Bans 1 1,979

Sommet des Rouies . .11 ,923 Aiguille du Plat . . . 11,818 Pic d' Ola n n, 735

Pic Bonvoisin .

Aiguilles d'Arves (highest

point)

Grandes Rousses . Roche de la Muzelle

11,680

Vieux Chaillol . Tlte de Vautisse Grand Pinier Pic de Parieres . Mourre Froid Belledonne (highest) Rocher Blanc (Sept Laux) Taillefer .... Pic du Frene T6te de l'Obiou . Grand Ferrand . Pic de Bure (Aurouse) Grand Veymont Mont Aiguille . Chamechaude . Dent de Crolles . Grand Som . Mont Granier . Dent du Chat . .

11,529 ",395

n,349 Sirac 11,280

Chief Passes of the Dauphine' Alps. Col de la Lauze (St Christophe to La Grave), snow . Col des Avalanches (La Berarde to Vallouise), snow . Col de la Casse Deserte (La Berarde to La Grave), snow Col Emile Pic (La Grave to Vallouise), snow . Col des Ecrins (La Berarde to Vallouise), snow Col du Glacier Blanc (La Grave to Vallouise), snow . Col du Sele (La Berarde to Vallouise), snow Breche de la Meije (La Berarde to la Grave), snow . Col de la Temple (La Berarde to Vallouise), snow Col des Aiguilles d'Arves (Valloire to St Jean

d'Arves), snow 10,335

Col du Says (La Berarde to the Val Gaudemar), snow Col du Clot des Ca vales (La Berarde to La Grave), snow Col du Loup du Valgaudemar (Vallouise to the Val Gaude

mar), snow .....

Col Lombard (La Grave to St Jean d'Arves), snow Breche des Grandes Rousses (Allemont to Clavans), snow Col du Sellar (Vallouise to the Val Gaudemar), snow Col de la Muande (St Christophe to the Val Gaudemar)

snow .....

Col des Quirlies (St Jean d'Arves to Clavans), snow .

io,57i

10,378

io,375

10,237 10,007 9,830

9,78i 9,6i7

9,387 9,219 9,164

9,059 8,898

7,697 6,880 6,847

6,779 6,670

6,358

4,593

11,625 11,520 11,516 1 1 ,490 11,205 10,854 10,834 10,827 10,772

10,289 10,263

10,210 10,171 10,171 10,063

10,037 9,679

Col du Goleon (La Grave to Valloire), foot path Pas de la Cavale (Vallouise to Champoleon), carriage road . Col d'Orcieres (Dormillouse to Orcieres), bridle path. Col de l'lnfernet (La Grave to St Jean d'Arves), foot path Col du Galibier (Lautaret Hospice to St Michel de Maurienne),

carriage road . . . .

Breche de Valsencstre (Bourg d'Oisans to Valsenestre), foot

path . . . . . .

Col de Vallonpierre (Val Gaudemar to Champoleon), foot

path .....

Col de Val Estrete (same to same), foot path .

Col de Vaurze (Val Gaudemar to Val Jouffrey), foot path .

Col de Martignare (La Grave to St Jean d'Arves), foot path

Col des Tourettes (Orcieres to Chateauroux), bridle path .

Col de la Muzelle (St Christophe to Valsenestre), foot path

Col de l'Eychauda (Vallouise to Monestier), bridle path

Col d'Arsine (La Grave to Monestier), bridle path

Col des Pres Nouveaux (Le Frcney to St Jean d'Arves),

bridle path .....

Col des Sept Laux (Allevard to Bourg d'Oisans), bridle path Col du Lautaret (Briancon to Bourg d'Oisans), carriage

road .....

Col dc la Croix de Fer (Bourg d'Oisans to St Jean d'Arves),

carriage road .....

Col du Glandon (Bourg d'Oisans to La Chambre), carriage

road .....

Col de l'Alpe de Venose (Venose to Le Freney), bridle path Col

d'Ornon (Bourg d'Oisans to La Mure), carriage road . Col Bayard (La Mure to Gap), carriage road Col de la Croix Haute (Grenoble to Veynes and Gap), rail- way line over . . . . . .

4. Graian Alps (from the Mont Cenis to the Little St Bernard Pass). These are usually divided into three groups, the Central (the watershed between the two passes named), the Western or French, and the Eastern or Italian; in the following lists the initials " C," " W," and " E " show to which group each peak and pass belongs.

Chief Peaks of the Graian Alps

9,449 8,990

8,859 8,826

8,721 8,642 8,642 8,596 8,596 8,596 8,531

8,53i

8,465 8,202 7,970 7,874

7,523 7,166

6,765

6,401

5,446 4,462 4,088

3,829

Grand Paradis (E) Grivola (E) Grande Casse (W) Mont Pourri (W) Mont Herbetet (E) Pointe de Charbonel © Aiguille de la Grande

Sassiere © Dent Parrachee (W) Tour du Grand St Pierre

.(E). .....

Uja di Ciamarella © Cima di Charforon (E) Grande Motte (W) . Albaron © . . . Roccia Viva (E) . Levanna © . Bessanese © . Punta di Gaij (E) Dome de l'Arpont (W) Pointe de Ronce © . Bee de l'lnvergnan © Tsanteleina © . Dome de ChasseforSt (W) Croce Rossa © . Aiguille de Peclet (W) Mont Emilius (E) . Punta d'Arnas © Aiguille de Polset (W) Rochemelon © . Mont Chalanson© . Tersiva (E)

Grande Traversiere © Tete du Rutor © .

13,324 Grande Aiguille Rousse

13,022 © 11,424

12,668 Granta Parey © . . 11,395

12,428 Roc du Mulinet © . 11,382

12,396 Aiguille Pers © . . 11,323

12,336 Pointe de la Sana (W) 11,319

Cima dell' Auille © . 11,306

12,323 Pointe de l'Echelle (W) 11,260

12,179 Punta Foura (E) . . 11,188

Pointe des Sengies (E) 11,182

Pointe de la Gliere (W) 11,109

Pointe de la Galise © 10,975 Pointe de la Traversiere

(C) 10,962

Pointe de Mean Martin

(W) 10,949

Punta Lavina (E) . . 10,854

Ormelune © . . . 10,771

Roche Chevriere (W) . 10,768

Signal du Mont Iseran© 10,634

Pointe de la Rechasse (W) 10,575

12,113 12,061 12,025 12,018 12,015 11,976

ii,943

11,917 11,887 11,874 11,871 11,838 11,831 11,802

11,703 11,700 11,677 11,615 11,608 11,605 11,582 11,526 11,467

n,438 Chief Passes of the Graian Alps, Grande Rousse (Rhemes Valley to

Grand Assaly © Roisebanque (£) Becca di Nona (E) . Torre d'Ovarda © Pointe du Pousset (E) D6me de Val d'Isere © Uja di Mondrone © . Bellagarda © . Monte Marzp (E) . . Petit Mont Blanc de

Pralognan (W) . Mont Jouvet (W) . . Monte Civrari © .

the Val

ley to Moutiers Tarentaise), snow

Col de la

Grisanche), snow © Col de Gebroulaz (Arc Val

(W)

Col de Monei (Cogne to Locana), snow (E)

Col du Grand Paradis (Ceresole to the Val Savaranche),

snow (E) .....

Col du Charforon (same to same), snow (E)

Col de Teleccio (Cogne to Locana), snow (E) .

Col de Lauzon (Cogne to the Val Savaranche) , bridle path (E)

Col du Bouquetin (Bonneval to Val d'Isere), snow ©

Col de St Grat (Val Grisanche to La Thiiille), snow ©

Col de 1'Herbetet (Cogne to the Val Savaranche), snow (E)

Col du Collerin (Bessans to Balme), snow © .

Col du Grand Etret (Ceresole to the Val Savaranche), snow

(E)

10,414

10,381

10,309

10,089

9,994

9,95i

9,725

9,643

9,° 2 3

8,409 7,553

11,483

11,385 11,247

10,988 10,929 10,913 10,831 10,827 10,827 10,686 10,506

10,361

PEAKS AND PASSES]

ALPS

743

Col de Bassac (Rhemes Valley to the Val Grisanche) , snow©

Col du Carro (Bonneval to Ceresole), snow ©

Col d'Arbole (Comboe to Brissogne), snow (E)

Col dela Goletta(Va ld'Isere to the Rhemes Valley) , snow ©

Col de Rhemes (same to same), snow ©

Col de la Grande Casse (Pralognan to the Premou Glen),

snow (\V) .....

Col de Sea (Bonneval to Forno Alpi Graie), snow © . Col de l'Autaret (Bessans to Usseglio), foot path © . Col de Girard (Bonneval to

Forno Alpi Graie), snow © . Col Rosset (Val Savaranche to the Rhemes Valley), bridle

path © .....

Col d'Arnas (Bessans to Balme), snow ©

Col de la Galise (Ceresole to Val d'Isere), snow © .

Col de Sort (Val Savaranche to the Rhemes Valley), partly

bridle path © .....

Quecees de Tignes (Val d'Isere to Termignon), snow (W) . Col della Nouva (Cogne to Pont Canavese), partly bridle

path (E)

Col de Garin (Aosta to Cogne), foot path (E) . Collarin d'Arnas (Balme to Usseglio), snow © Finestra del Torrent (Rhemes Valley to the Val Grisanche),

foot path ©

Fenetre de Champorcher (Cogne to Champorcher), bridle

path (E) . . .

Col de Vaudet (Isere Valley to the Val Grisanche), foot path

(C)

Col de Bardoney (Cogne to Pont Canavese), snow (E) Col de Chaviere (Modane to Pralognan), foot path (W) Col de la Leisse (Tignes to Termignon), snow (W) Col du Mont Iseran (Bonneval to Val d'Isere), bridle path

(C).

Ghicet di Sea (Balme to Forno Alpi Graie), foot path © . Col de la Sachette (Tignes to Bourg St Maurice), foot path

(W) . . ...

Col du Palet (Tignes to Moutiers Tarentaise or Bourg

St Maurice), bridle path (W) ..... Col du Mont (Ste Foy to the Val

Grisanche), bridle path © Col de la Croix de Nivolet (Ceresole to the Val Savaranche),

bridle path (E) . . ..

Col della Crocetta (Ceresole to Forno Alpi Graie), bridle

path ©

Col de la Platiere (St Jean de Maurienne to Moutiers Taren- taise), partly bridle path (W) ..... Col de la Vanoise (Pralognan to Termignon), bridle path (W) Col des Encombres (St Michel de Maurienne to MoQtiers

Tarentaise), bridle path (W) ..... Little St Bernard (Aosta to Moutiers Tarentaise), carriage

road © .....

Col de la Madeleine (La Chambre to Moutiers Tarentaise),

bridle path (W)

5. Pennine Alps (from the Little St Bernard to the Simplon Pass). This range contains all the highest peaks in the Alps, save the Finsteraarhorn (14,026) in the Bernese Oberland.

10,345 10,302 10,292 10,237 10,174

10,171

10,115

10,073

9.987

9,922 9,889 9.836

9.735 9,646

9.623 9,4" 9.351

9.341

9.3i 1

9.305 9.295 9,206 9,121

9.085 8.973

8.954

8,721 8,681

8,665

8,649

8,531 8,291

7,668

7.179

6,509

Chief Peaks Mont Blanc ■ 15,

Monte Rosa (Dufour-

spitze) 15,

Nord End (Monte Rosa) 15, Dom (Mischabelhorner) 14,

Lyskamm 14,

Weisshorn .... 14, Matterhorn 14,

Taschhorn 14,

Mont Maudit ... 14. Dent Blanche . .14

D6me du Goflter . 14

Grand Combin . . .14.

Castor 1.3

Zinal Rothhorn ... 13 Alphubel 13

Grandes Jorasses . . 13 Rimpfischhorn -13

Strahlhorn .... 13 Dent d'Herens . .13

Zermatt Breithorn . . 13 Aiguille Verte . 13

Ober Gabelhorn . 13

Aiguille de Bionnassay 13 Allalinhorn .... 13 Weissmies 13
Aiguille du Geant . 13

Laquinhorn .... 13 Rossbodenhorn -13

Grand Cornier . 13.

Aiguille de TrelatSte . 12 Aiguille d'Argentiere 12

Ruinette 12

Aiguille de Triolat . .12

of the Pennine Alps.

782 Mont Blanc de Seilon

Aiguille du Midi

217 Tour Noir

132 Aiguille des Glaciers

942 Mont Dolent

889 Aiguille du Chardonnet

804 Cima di Jazzi

782 Balfrin ....

758 Pigne d'Arolla .

,669 Mont Velan

,318 Aiguille du Dru

,210 Tete Blanche

164 L'Evgque

879 Mont Pleureur .

,856 D6medeMiage.

803 Lo Besso

,797 Aiguille de la Za

790 Mont Collon

751 Diablons

715 Aiguille de Tour

,685 Mont Gele . . .

541 Bee de Luseney

364 Aiguille de Grepon .

341 Chateau des Dames

,236 Aiguille des Charmoz

226 Aiguille du Tacul .

,170 Grand Tournalin

,140 Pointe de Rosa Blanche

128 Mont Avril . .

022 Grande Rochere

,832 Corno Bianco

,819 Grauhaupt .

,727 Pointe d'Orny .

,757 Dent du Midi .

12,700 12,609 12,586 12,579 12.543 12,540 12,527 12,474 12,471

12,353 12,320

12,304 12,264

12,159 12,100 12,058 12,051 11,956 11,828 11,615

H.539

11,503 11,489

u,447

11,293 11,280 11,086

10,985 10,962 10,913

10,893 10,876 10,742 10,696

Mont Favre 10,693

Sasseneire 10,693

Grand Golliaz . . . 10,630

Tour Sallieres . . . 10,588

Pizzo Bianco 10,552

Latelhorn 10,525

Schwarzhorn (Augstbord) 10,512

Gornergrat 10,289

Pointe de Lechaud . . 10,260

Buet 10,201

Mont Ruan 10,099

Mont Neri . 10,073

Bella Tola 9,935

Pointe de Tanneverge . 9,784

Belvedere (Aigs. Rouges) 9,731

Tagliaferro .... Riffelhorn .... Pointe Percee du Reposoir Crammont . Pointe des Fours Pointe du Colloney Catogne i

Monte Bo . . Mont Joly . . Brevent . Pointe de Salles Aiguille de Varens Mont Chetif . . M61e .... Saleve (highest point)

Chief Passes of the Pennine Alps. Sesiaioch (Zermatt to Alagna), snow Col de la Brenva (Courmayeur to Chamonix), snow Domjoch (Randa to Saas), snow . Lysjoch (Zermatt to Gressoney), snow Mischabeljoch (Zermatt to Saas), snow . Alphubel Pass (same to

same), snow Acller Pass (same to. same), snow Morning Pass (Zermatt to Zinal), snow Schwarzthor (Zermatt to Ayas), snow Col de Triolet (Chamonix to Courmayeur) , snow Ried Pass (St Niklaus to Saas), snow New Weissthor (Zermatt to Macugnaga), snow Allalin Pass (Zermatt to Saas), snow Col de Valpelline (Zermatt to Aosta), snow Biesjoch (Randa to Turtmann), snow Triftjoch (Zermatt to Zinal), snow . Col d'Argentiere (Chamonix to Orsieres), snow Col du Sonadon (Bourg St Pierre to the Val de Bagnes)

snow .....

Col de Talefre (Chamonix to Courmayeur), snow

Col d'Herens (Zermatt to Evolena), snow

Col Durand (Zermatt to Zinal), snow

Col des Maisons Blanches (Bourg St Pierre to the Val de

Bagnes), snow .....

Col de Bertol (Arolla to the Col d'Herens), snow Col de Miage (Contamines to Courmayeur), snow Col du Geant (Chamonix to Courmayeur), snow Col du Mont Rouge (Val de Bagnes to the Val d'Heremence)

snow .....

Col du Chardonnet (Chamonix to Orsieres), snow

Col de St Theodule (Zermatt to Chatillon), snow

Col du Tour (Chamonix to Orsieres), snow

FenStredeSaleinaz (Saleinaz Glacier to Trient Glacier), snow

Col de Tracuit (Zinal to Turtmann), snow

Zwischbergen Pass (Saas to Gondo), snow

Col d'Oren (Val de Bagnes to the Valpelline), snow

Col de Seilon (Val de Bagnes to the Val d'Heremence), snow

Col du Cret (Val de Bagnes to the Val d'Heremence), snow

Col de Valcournera (Val Tournanche to the Valpelline),

snow .....

Col de Collon (Arolla to Aosta), snow Col de Valsorey (Bourg St Pierre to Aosta), snow Col de Chermontane (Val de Bagnes to Arolla), snow Cimes Blanches (Val Tournanche to Ayas), bridle path Col de Torrent (Evolena to the Val de Torrent), bridle path Augstbord Pass (St Niklaus to Turtmann), bridle path Col de Crete Seche (Val de Bagnes to the Valpelline), snow Col de Breuil (Bourg St Maurice to La Thuille), snow Col d'Olen (Alagna to Gressoney), bridle path . Monte Moro (Saas to Macugnaga), partly bridle path Pas de Chevres (Arolla to the Val d'Heremence), foot path Antrona Pass (Saas to Antrona), partly bridle path . Col de Sorebois (Zinal to the Val de Torrent), bridle path Col de Vessona (Valpelline to the St Barthelemy Glen), foot

path .....

Col de FenStre (Val de Bagnes to Aosta), bridle path

Z'Meiden Pass (Zinal to Turtmann), bridle path

Turlo Pass (Alagna to Macugnaga), foot path .

Col de Fenetre (Great St Bernard to the Swiss Val Ferret)

bridle path . .

Bettafurka (Ayas to Gressoney), bridle path Col du Mont Tondu (Contamines to Courmayeur), snow Col Serena (Great St Bernard to Courmayeur). foot path Col Ferret (Courmayeur to Orsieres), carriage road i

progress .....

Col de la Seigne (Chapieux to Courmayeur) bridle path

Col de Susanfe (Champery to Salvan), foot path

Col du Bonhornme (Contamines to Chapieux), bridle path

Col de Valdobbia (Gressoney to the Val Sesia), bridle path

Great St Bernard (Martigny to Aosta), carriage road

Col de Sagerou (Sixt to Champery), foot path .

Col de Moud (Alagna to Rima and Varallo), bridle path

Col d'Anterne (Sixt to Servos), bridle path

Col d'Egua (Rima to the Val Anzasca), bridle path . . 7,336

Col de Balme (Chamonix to the Trient Valley), bridle path . 7,221
Simplon Pass (Brieg to Domo d'Ossola), carriage road over,

railway tunnel beneath 6,592

Col de Checouri (Courmayeur to the Lac de Combal), bridle

path . . 6,431

Baranca Pass (Varallo to the Val Anzasca), bridle path . 5,971

Col de Voza (Chamonix to Contamines), bridle path . . 5,496

Col de la Forclaz (Chamonix to St Gervais), bridle path 5,105

Col de la Forclaz (Trient Valley to Martigny), carriage road 4,987

II. Central Alps 6. Bernese Oberland (from the Lake of Geneva to the Furka, the Reuss Valley and the Lake of Lucerne). This general name seems best to describe the range in question, though, of course, portions of it are in Cantons other than that of Berne, viz. Vaud, Fribourg, the Valais, Lucerne, Uri and Unterwalden.

fi

Chief Peaks of the Bernese Oberland. 14,026 Wellhorn.

13,721

Finsteraarhorn Aletschhorn

ungfrau

"onch Gross Schreckhorn Gross Fiescherhorn Eiger .... Bietschhorn Gross Wannehorn Gross Nesthorn Lauterbrunnen Breithorn

Balmhorn 12,176

Wetterhorn (Mittelhorn) 12,166 Wetterhorn (Hasli Jung-

frau)

Wetterhorn (Rosenhorn)

Bliimlisalphorn

Gross Doldenhorn

Altels ....

Dammastock .

Galenstock

Sustenhorn

Gspaltenhorn .

Fleckistock

Gross Hiihnerstock

Ewigschneehorn .

Ritzlihorn

Wildhorn .

Wildstrubel . .

Diablerets

Titlis ....

Gross Spannort .

13,669 13,468 13,386 13.285

13,042 12,970 12,812 12,533 12,399

12,149 12,110 12,044 11,966

n,930

11,920 1 1 ,802 1 1,523 11,293 11,214

10,985 10,929 10,768 10,709 10,673 10,650 10,627

Mettenberg .

Loffelhorn

Grand Muveran

Gross Wendenstock

Sparrhorn . ...

Torrenthorn

Grande Dent de Morcles

Schilthorn

Eggishorn

Uri Rothstock

Schwarzhorn(Grindelwald)9,6i3

Gross Siedelhorn Albristhorn . Rothihorn Faulhorn Gummfluh . Sulegg .... Vanil Noir . Niesen .... Brienzer Rothhorn . Tour d'Ai Hohgant Stockhorn Kaiseregg

Pilatus (Tomlishorn) Chamossaire . Gemmenalphorn Rochers de Naye Moleson .... Dent de Jaman Napf

10,516

Chief Passes of the Bernese Oberland. Lauithor (Lauterbrunnen to the Eggishorn), snow Monchjoch (Grindelwald to the Eggishorn), snow Jungfraujoch (Wengern Alp to the Eggishorn) , snow . Strahlegg Pass (Grindelwald to the Grimsel), snow . Grunhornlticke (Great Aletsch Glacier to the Fiescher

Glacier), snow .....

Oberaarjoch (Grimsel to the Eggishorn), snow . Gauli Pass (Grimsel to Meiringen), snow . Petersgrat (Lauterbrunnen to the Lotschenthal), snow Lotschenliicke (Lotschenthal to the Eggishorn), snow Lauteraarsattel (Grindelwald to the Grimsel), snow . Beichgrat (Lotschenthal to the Bel Alp), snow . Lammernjoch (Lenk to the Gemmi), snow Triftlimmi (Rhone Glacier to the Gadmen Valley), snow Sustenlimmi (Stein Alp to Goeschenen), snow . Gamchiliicke (Kien Valley to Lauterbrunnen), snow Tschingel Pass (Lauterbrunnen to Kandersteg), snow Hohthiirli Pass (Kandersteg to the Kien Valley), foot path Lotschen Pass (Kandersteg to the Lotschenthal),

snow Sefinenfurka(Lauterbrunnen to the Kien Valley), foot path VVendenjoch (Engelberg to the Gadmen Valley), snow Furtwangsattel(Guttannen to the Gadmen Valley), foot

path .....

Furka Pass (Rhone Glacier to Andermatt), carriage road

Rawil Pass (Sion to Lenk), bridle path

Gemmi Pass (Kandersteg to Leukerbad), bridle path

Surenen Pass (Engelberg to Altdorf), foot path

Susten Pass (Meiringen to Wassen), partly carriage road

Sanetsch Pass (Sion to Saanen), bridle path

Joch Pass (Meiringen to Engelberg), bridle path

Grimsel Pass (Meiringen to the Rhone Glacier), carriage road 7,100

Kleine Scheidegg (Grindelwald to Lauterbrunnen), railway

over .....

Col de Cheville (Sion to Bex), bridle path

Grosse Scheidegg (Grindelwald to Meiringen), bridle path

Col de Jaman (Montreux to Montbovon), mule path over,

railway tunnel beneath 4,974

Briinig Pass (Meiringen to Lucerne), railway over . . 3,396

10,486 10,194 10,165 10,043

9,987 9,928

9,853 9,777 9,754 9,626 9,620

9,452 9,069 9,052 8,803 8,074

7,9H

7,858 7-763 7,714 7,658 7,225 7,192 7,182

6,995 6,943 6,772 6,710 6,582 6,165 4,629

12,140 11,680

n,385 io,995

10,844 10,607

10,519 10,516 10,512

io,355

10,289

10,276

10,200

10,181

9,295

9,265

8,882

8,842

8,583

8,544

8,393 7,992 7.924 7,641 7,563 7,422

7,331 7,267

6,772 6,723 6,434

[PEAKS AND PASSES

7. Lepontine Alps (from the Simplon to the Spliigen and south of the Furka and Oberalp Passes). The eastern portion of this range, from the St Gotthard Pass to the Spliigen, is sometimes named the Adula Alps.

Chief Peaks of the Lepontine Alps.

Monte Leone

Rheinwaldhorn

Giiferhorn

Blindenhorn .

Basodino .

Tambohorn

Helsenhorn

Wasenhorn

Ofenhorn .

Cherbadung .

Piz Medel

Scopi

Pizzo Rotondo

Pizzo dei Piani

Piz Terri .

Piz Aul

Pizzo di Pesciora

Wyttenwasserstock

Campo Tencia

Leckihorn

Bruschghorn .

Alperschellihorn .

11,684 Piz Bias

11,149 Monte Giove

11,132 Pizzo Centrale .

11,103 Pizzas d'Annarosa

10,749 Piz Beverin .

10,749 Weisshorn (Spliigen)

10,742 Pizzo Lucendro

10,680 Piz Tomiil .

10,637 P' z Cavel

10,542 Barenhorn .

10,509 Six Madun (Badus)

10,499 Piz Muraun

10,489 Zervreilerhorn .

10,361 Monte Cistella .

10,338 Piz Lukmanier .

10,250 Monte Prosa

10,247 Pizzo Columbe .

10,119 Monte Camoghe

10,089 Pi z Mundaun .

10,069 Monte Generoso

10,020 Monte San Salvatore

9,991

9,918 9,876 9,853 9,850 9,843 9,817 9,708 9,676 9,659 9,620 9,619 9,512 9,508 9,353 9,"5 8,983 8,363 7,303 6,775 5,591 3,004

Chief Passes of the Lepontine Alps.

Zapport Pass (Hinterrhein to Malvaglia and Biasca), snow. 10,105

Giiferlucke (Kanal Glen to the Lenta Glen), snow . . 9,777

Lentaliicke (Hinterrhein to Vals Platz), snow . . . 9,692

Hohsand Pass (Binn to Tosa Falls), snow . . . 9,603

Lecki Pass (Wyttenwasser Glen to the Mutten Glen), snow 9,554

Passo Rotondo (Airolo to Oberwald), snow . 9,449

Kaltwasser Pass (Simplon Hospice to Veglia Alp), snow . 9,351

Scaradra Pass (Vals Platz to Olivone), foot path . . 9,088

Sattelteliicke (Vals Platz to Vrin), foot path . . . 9,082

Ritter Pass (Binn to Veglia Alp), snow 8,832

Cavanna Pass (Realp to the Val Bedretto), snow . . 8,566

Scatta Minoja (Devero to the Val Formazza), bridle path . 8,521

Bocca di Cadlimo (Airolo to the Lukmanier Pass), foot path 8,340

Valserberg (Hinterrhein to Vals Platz), bridle: path . . 8,225

Safierberg (Spliigen to Safien Platz), bridle path . . 8,170

Geisspfad Pass (Binn to Devero), foot path . . . 8,120

Gries Pass (Ulrichen to Tosa Falls), bridle path . . 8,098

Passo di Naret (Fusio to Airolo), bridle path . . . 8,015

Nufenen Pass (Ulrichen to Airolo), bridle path . . 8,006

Diesrut Pass (Vrin to the Somvix Glen), bad bridle path . 7,953

Albrun Pass (Binn to Devero and Baceno), bridle path . 7,907

Greina Pass (Olivone to the Somvix Glen), bridle path . 7,743

San Giacomo Pass (Airolo to Tosa Falls), bridle path . 7,573 Passo di Buffalora(Val Mesocco to the Val Calanca),foot path 7,431

Passo dell' Uomo (Airolo to the Lukmanier Pass) .bridle path 7,258

Spliigen Pass (Thusis to Chiavenna), carriage road . . 6,946 St Gotthard Pass (Andermatt to Airolo), carriage road over,

railway tunnel beneath …… 6,936

San Bernardino Pass (Thusis to Bellinzona), carriage road 6,769

Lukmanier Pass (Disentis to Olivone), carriage road . . 6,289

8. The Range of the Todi (from the Oberalp Pass to the Klausen

Pass).

Todi . . Bifertenstock . Piz Urlaun Oberalpstock . Gross Scheerhorn Claridenstock Diissistock Ringelspitz Brigclserhorner (highest) Grosse Windgalle Hausstock Gross Ruchen.

Chief Peaks of the Range of the Todi. 11,887 PizSegnes .

11,241 Piz Giuf .

11,060 Crispalt .

10,926 Bristenstock

10,814 Selbsanft.

10,729 Vorab

10,703 Tschingelhorner (Elm)

10,667 P' z Sol (Grauehorner)

10,663 Calanda

10,473 Karpfstock .

10,342 Mageren

10,289 Murtschenstock.

Chief Passes of the Range of the Todi. Clariden Pass (Amsteg to Linththal), snow Planura Pass (same to same), snow Kammlilucke or Scheerjoch (Maderanerthal to Unter-

schachen), snow ….. Sardona Pass (Flims to Ragaz), snow Sand Alp Pass (Disentis to Linththal), snow Brunni Pass (Disentis to Amsteg), snow . Segues Pass (Elm to Flims), foot path Kisten Pass (Linththal to llanz), bad bridle path Panixer Pass (Elm to llanz), bad bridle path . Kriizli Pass (Amsteg to Sedrun), foot path Foo or Ramin Pass

(Elm to Weisstannen), bridle path Oberalp Pass (Andermatt to Disentis), carriage road Klausen Pass (Altdorf to Linththal), carriage road

10,178

10,165

10,105

10,086

9,938

9,925

9,351

9,348

9,213

9,177

8,294

8,012

9-741 9,646

9,344 9,318

9,I2f

8,977 8,613 8,203 7,897

7,7io

7,290 6,719 6,404

PEAKS AND PASSES]

ALPS

745

9. The Alps of North-Eastern Switzerland (north of the Klausen

Pass).

Chief Peaks of the North-Eastern Swiss Alps. Glarnisch (highest) . 9.580 Gross Mythen .

Boser Faulen 9,200

Santis 8,216

Altmann 7,999

Faulfirst 7,925

Alvier 7,753

Kurfiirsten (highest) . 7,576

Speer 6,411

Rigikulm Hoher Kasten . Rossberg .... Zugerberg (Hochwacht) Albis Hochwacht Uetliberg ....

6,240 5,906 5,899 5,194 3,255 2,887 2,864.

Chief Passes of the North-Eastern Swiss Alps.

Ruosalperkulm (Schachen Valley to the Muota Valley), foot

path 7,126

Karren Alp Pass (Muota Valley to Linththal), foot path . 6,877 Kinzigkulm Pass (Schachen Valley to the Muota Valley),

foot path 6,811

Saasberg Pass (Einsiedeln to Glarus), foot path . . . 6,227

Kamor Pass (Appenzell to Riiti), bridle path . . 5,512

Saxerliicke (Appenzell to Sax), foot path 5,417

Schwein Alp Pass (Waggithal to the Klon Glen), bridlepath. 5,158 Pragel Pass (Muotathal to Glarus), carriage road in progress 5,099 Hacken Pass (Schwyz to Einsiedeln), foot path . . 4,649

Holzegg Pass (same to same), bridle path . . . 4,616

Ibergeregg Pass (Schwyz to Iberg and Einsiedeln), carriage

road 4,613

Krazeren Pass (Nesslau to Urnasch), bridle path 3,993

10. Bernina Alps (from the Maloja to the Reschen Scheideck and the Stelvio, south and east of the Val Bregaglia and of the Engadine and north of the Valtellina).

Chief Peaks Piz Bernina 13

Piz Zupo 13

Monte di Scerscen 13

Piz Roseg 12

Piz Palii 12

Crast' Agiizza .12

Piz Morteratsch . . .12 Monte della Disgrazia 12

Pizzo di Verona . .11

Cima di Piazzi .11

Cima di Castello . . .II, Cima Viola II,

Pizzo Cengalo . n,

Cima di Rosso . . n,

Pizzo Scalino .... 10, Pizzo Badile .... 10, Corno di Campo . . .10, Pizzo di Dosde . 10,

Cima di Saoseo . . io,

0/ the Bernina Alps.

304 Piz Languard

131 Piz Sesvenna

116 Piz Pisoc.

934 Piz Murtarol

835 Piz Quatervals

704 Pizzo della Margna

317 Cima di Redasco

067 Piz Lischanna

359 Pizzo di Sena

283 Piz Casana .

155 Monte Foscagno

103 Pizzo del Teo

070 Pizzo del Ferro

060 Piz Umbrail

903 Zwei Schwestern

,863 Monte Braulio

844 Monte Spluga

762 Monte Massuccio

752 Mont la Schera

Chief Passes of the Bernina Alps. Fuorcla Bellavista (Pontresina to Chiesa, in Val Malenco),

snow .....

Fuorcla Crast' Agiizza (same to same), snow

Fuorcla Tschierva (same to same), snow .

Fuorcla Sella (same to same), snow

Passo di Bondo (Bondo to the Baths of Masino), snow

Passo di Castello (Maloja to Morbegno), snow .

Passo Tremoggia (Sils to Chiesa), snow

Passo di Mello (Chiareggio to Val Masino), snow

Diavolezza Pass(Bernina road to the Morteratsch Glen) , snow

Passo di Dosde (Val Grosina to Val Viola Bormina), foot

path .....

Passo di Sacco (Bernina road to Grosio), foot path Passo di Zocca (Vicosoprano to Val Masino), snow Casana Pass (Scanfs to Livigno), bridle path Muretto Pass (Maloja to Chiesa), partly snow . Umbrail Pass or Wormserjoch (Miinster Valley to the

Stelvio road), carriage road .... Passo di Val Viola (Bernina road to Bormio), bridle path Giufplan Pass (Ofen road to Fraele), bridle path Bernina Pass (Pontresina to Tirano), carriage road Forcola di Livigno (Bernina Pass to Livigno), small

carriage road .....

Cruschetta Pass (Schuls by Scarl to Taufers), bridle path

Passo di Verva (Bormio to Grosio), foot path .

Sursass or Schlinig Pass (Remus to Mais) foot path .

Foscagno Pass (Bormio to Trepalle), bridle path

Alpisella Pass (Livigno to Fraele), bridle path .

Scarl Pass (Scarl to Santa Maria Miinster), carriage road

Dossradond Pass (Santa Maria Miinster to Fraele), bridle

path .....

Passo Dhcira (Livigno to Trepalle) bridle path .

Ofen Pass (Zernez to Mais), carriage road

Fraele Pass (Bormio to the Ofen road), partly bridle path

Scale di Fraele (Bormio to Fraele), bridle path.

Maloja Pass (St Moritz to Chiavenna), carriage road

10,716

10,568

10,427

10,424

10,358

io,355

10,299

10,204

10,099

10,079

10,010

10,007

10,007

9,955

9,784

9,777

9,321

9,239

8,494

12,087

11,805

n,572

10,840

10,227

10,171

9,912

9,8i3

9,767

9,351 9,026 9 000

8,832 8,389

8,242 7,976 7,723 7,645

7,638 7 599 7,592 7,540 7,517 7,497 7,386

7,349 7,248 7,071 6,398 6,372 5,935

11. Albula Range (from the Spliigen Pass to the Fliiela Pass, north and west of the Val Bregaglia and of the Engadine).

Piz Kesch

Piz dellas Calderas

Piz Platta

Piz Julier

Piz d'Err

Piz d'Aela

Cima da Flex

Piz Uertsch

Piz Forbisch .

Piz Ot . . .

Gross Piz Vadret

Piz Timun or Emet

Tinzenhorn

Piz Michel . .

Chief

Peaks of

11,228 11,132 11,109 11,106 11,093

io,959

10,785

io,739

10,689 10,667 10,584 10,502 10,430 10,378

the Albula Range. Pizzo Stella . Fliiela Schwarzhorn Pizzo della Duana Pizzo Gallegione Gletscherhorn . Cima di Lago . Hoch Ducan Piz Grisch . Averser Weissberg Surettahorn . Arosa Rothhorn Piz Curver . Pizzo Lunghino Statzerhorn .

Chief Passes of the Albula Range.

Fuorcla Calderas (Molins to Severs), snow

Fuorcla d'Eschia (Madulein to Bergiin), snow .

Passo della Duana (Avers Valley to the Val Bregaglia), snow

Sertig Pass (Davos to Scanfs), foot path ....

Forcella di Prassignola (Avers Valley to Soglio), old paved cattle path

Tinzenthor (Bergiin to Savognino), foot path

Forcella di Lago or Madris Pass (Avers Valley to Chia- venna), footpath .....

Forcellina (Avers Valley to the Septimer Pass), foot path .

Ducan Pass (Davos to Bergiin), foot path

Passo di Lei (Avers Valley to Chiavenna), foot path .

Forcella di Lunghino (Maloja to the Septimer Pass), foot path . . . . . .

Scaletta Pass (Davos to Scanfs), -bridle path

Suvretta Pass (St Moritz to Bevers), bridlepath.

Fuorcla d'Alp Fontauna (Bergiin to Scanfs), foot path .

Stallerberg (Avers Valley to Bivio-Stalla), foot path .

Grialetsch Pass (Davos to Siis), foot path.

Fliiela Pass (Davos to Siis), carriage road.

Strela Pass (Davos to' Langwies) , bridle path . ...

Albula Pass (Bergiin to Ponte), carriage road over, rail- way tunnel beneath . . . . . .

Septimer Pass (Bivio-Stalla to Casaccia), bridle path.

Julier Pass (Thusis to Silvaplana), carriage road

Passo di Madesimo or d'Emet (Avers Valley to Madesimo), foot path .....

12. Silvretta and Rhatikon Ranges (from the Fliiela Pass

Reschen Scheideck and the Arlberg Pass).

Chief Peaks of the Silvretta and Rhatikon Ranges.

io,375

io,335

10,279

10,201

10,191

10,112

10,060

10,000

9,987

9,971

9,794

9,76i

9,121

8,450

10,270 9,869 9,187 9,062

8,924 8,918

8,793 8,770

8,763

8,724

8,645 8,593 8,590 8,580

8,478 8,353 7,838 7,799

7,595

7,582

7,504

7,48i to the

Vesulspitze Fliiela Weisshorn Piz Minschun Patteriol Piz Faschalba Hexenkopf . Gemsbleiskopf Pischahorn . Scesaplana . Rothbleiskopf Hohes Rad . Schiltfluh . Plattenpspitze Madrishorn . Drusenfluh . Sulzfluh . Zimbaspitze Naafkopf Falknis .

Piz Linard .... 11,201 Fluchthorn .... 11,165 Gross Piz Buin . . 10,880

Verstanklahorn . . . 10,831

Muttler , 10,821

Piz Fliana .... 10,775 Stammerspitze . . . 10,689 Silvrettahorn .... 10,657 Augstenberg .... 16,611 Plattenhorn . . . . 1.0,568 Dreilanderspitze . . . 10,539

Piz Tasna 10,443

Kuchenspitze .... 10,405 Hoher Riffler .... 10,368 Piz Mondin .... 10,325 Kiichelspitze .... 10,315 Gross Seehorn . . . 10,247 Vesilspitze. . . . . 10,220 Gross Litzner 10,207

Chief Passes of the Silvretta and Rhatikon Ranges. Jamjoch (Guarda to Galtiir), snow …. Fuorcla del Confin (Silvretta Pass to the Vermunt Glacier)

snow ……

Buinliicke (Guarda to Patenen), snow

Silvretta Pass (Klosters to Lavin), snow .

Zahnlucke (Jam Glen to the Fimber Glen),

Verstanklathor (Klosters to Lavin), snow

Fuorcla d'Urezzas (Ardez to Galtiir), snow

Fuorcla Tasna (Ardez to Ischgl), snow

Fuorcla Maisas (Remus to the Samnaun Glen), snow

Vermunt or Fermunt Pass (Guarda to Patenen), snow

Futschol Pass (Ardez to Galtiir), foot path

Fuorcla Zadfell or Vernela Pass (Klosters to Lavin), snow

Cuolm d Alp bella or Vignitz Pass (Samnaun Glen to Kappl)

foot path …….

Schafbiicheljoch (Mathon to St Anton), foot path Fimber Pass (Remus to Ischgl), bridle path Scheien Pass (Klosters to the See Glen), foot path Vereina Pass or Pass da Val Torta (Klosters to Lavin), foot

path ……

10,145

10,132

10,079

10,037

10,010

9,968

9,899

9.784

9,741

9,6ao

9,554 9,482 9,449 9,285 9,282 9,252 8,678

8,445 8,419

10,112

10,033 10,020 9,886 9,712 9,682 9,564 9,374 9,357 9,193 9,098 9,033

8,852 8,685 8,570 8,557

8,540

74-6

ALPS

[PEAKS AND PASSES

Zebles Pass (Ischgl to the Samnaun Glen), bridle path Garnerajoch (Klosters to Gaschurn), foot path Fless Pass (Klosters to Siis), foot path .... St Antonien or Gargellenjoch (St Antonien to St Gallen-.

kirch), foot path .....

Drusenthor (Schiers to Schruns), foot path Verrajochl (Liinersee to the Schweizerthor), foot path Ofen Pass (Schweizerthor to Schruns), foot path Cavelljoch (Bludenz and the Liinersee to Seewis), foot path Gruben Pass (St Antonien to Schruns), foot path Schlappinerjoch (Klosters to St Gallenkirch), bridle path . Schweizerthor (Schiers to Schruns), foot path . Bielerhohe (Patenen to Galtiir), bridle path Zeinisjoch (Patenen to Galtiir), bridle path Arlberg Pass (Landeck to Bludenz), carriage road over,

railway tunnel beneath .....

8,350 8,153 8,045

7.792 7,710

7,648 7.523 7.343 7,333 7,218

7,057 6,631 6,076

5,912

III. Eastern Alps 13. The Alps of Bavaria, the Vorarlberg and Salzburg (north of the Arlberg Pass, Innsbruck, the Pinzgau, and the Enns valley).

Chief Peaks of the Alps of Bavaria, the Vorarlberg and Salzburg. 9,968 Watzmann 8,901

Parseierspitze

Dachstein .... 9,83°

Zugspitze 9,738

Hochkonig 9,639

Valluga 9,223

Rockspitze 9,059

E. Hohe Griesspitze . . 9,°5 2

Stanskogel 9,052

Birkkarspitze (Karwendel) 9,042 gebirge) ....

Chief Passes of the Alps of Bavaria, the Vorarlberg and Salzburg. Gentschel Pass (Oberstdorf to Schrocken), bridle path Schrofen Pass (Oberstdorf to Warth), foot path Gerlos Pass (Zell to Mittersill), bridle path Pass Thurn (Kitzbuhel to Mittersill), carriage road . Fern Pass (Reutte to Nassereit), carriage road Scharnitz or Seefeld Pass (Partenkirchen to Zirl), carriage

road .....

Hirschbiihel Pass (Berchtesgaden to Saalfelden), carriage

road .....

Hochfilzen Pass (Saalfelden to Kitzbuhel), railway over Pyhrn Pass (Linz to Liezen), carriage road over, railway

tunnel beneath .....

Wagreinstattel (Radstadt to St Johann in Pongau), carriage

road . . • • • . ._

14. Central Tirol Alps (from the Brenner Pass to the Radstadter

Tauern Pass, north of the Drave Valley and south of the Pinzgau

and the Enns Valley). This division takes in the Zillerthal and

Tauern Ranges.

Chief Peaks of the. Central Tirol Alps,

Rothewandspitze . . 8,878 Gross Krottenkopf(Allgau)8,7l8 Selbhorn .... 8,711 HohesLicht . . . 8,701 Madelegabel. . . . 8,681 Hochvogel .... 8,511 Elmauer Haltsspitze (Kaiser-

... 7,691

6,480 5,538 4,876

4,i83

4,026

3,874

3,858 3,173

3,100 2,743

Ruthnerhorn (Rieser-

ferner) .... 11,024 Hochalmspitze . . . 11,008 Reichenspitze (Z) . . 10,844 Gross Rotherknopf

(Schober) . . . 10,814

Gross Morchner (Z) . . 10,785 Hochnarr (Goldberg) . 10,689

Ankogel 10,673

Hochschober ... Kitzsteinhorn Sonnblick .... Zsigmondyspitze Reckner (Tuxergebirge)

Gross Glockner . . 12,461

Gross Venediger . 12,008

Gross VViesbachhorn . 11,713 Hochfeiler (Zillerthal) . U,559 Dreiherrenspitze . . il,5°°

Mcisele (Z) .... 11,438 Olperer (Z) .... 11,418 Johannisberg .... 11,375 Hochgall (Rieserferner) . 11,287 Thurnerkamp (Z) . . 11,228 Gross Loffler (Z) . . . 11,096 Fussstein (Z) . . . . 11,090 Schwarzenstein (Z) . . 11,057 Gross Geiger . .11,041

Chief Passes of the Central Tirol Alps. Mitterbachjoch (Breitlahner to Taufers), snow (Z) . Trippachsattel (Floiten Valley to Taufers), snow (Z). Riffelthor (Kaprun to Heiligenblut), snow Bockkarscharte (Ferleiten to Heiligenblut), snow Sonnblickscharte (Rauris to Heiligenblut), snow Alpeinerscharte (Breitlahner to St Jodok am Brenner), foot

path (Z)

Vordcr Umbalthorl (Pragraten to Kasern), snow Ober Sulzbachthorl (Pragraten to Wald), snow Keilbachjoch (Mayrhofen to Steinhaus), foot path (Z) Unter Sulzbachthorl (Wald to Gschloss), snow Schwarzkopfscharte (Bramberg to Gschloss), snow . Pragraterthorl (Pragraten to the Defereggen Glen), foot path Glodisthorl (Lienz to Kals), snow .... Antholzerscharte (Rein Valley to the Antholz Valley)

snow (Z) .....

Krimmlerthorl (Krimml Glen to the Obersulzbach Glen)

snow .....

Goldzechscharte (Heiligenblut to Rauris), snow Kalserthorl (Kals to Lienz), snow .

10,663 10,512 10,196 10,122 9,485

10,270

10,020

10,010

9,994

9,774

9,712 9,607 9,600 9,410 9,400

9,351 9,338 9,292

9,252

9,233 9,220

9,197

Ober Tramerscharte (Rauris to Dollach), snow

Kleine Elendscharte (Gastein to Gmiind), snow

Kleine Zirknitzscharte (Dollach to Fragant or Rauris), snow

Dossener or Mallnitzerscharte (Mallnitz to Gmiind), snow

Grosse Elendscharte (Mallnitz to the Upper Malta Glen),

snow .....

Unter Pfandlscharte (Ferleiten to Heiligenblut), snow Heiliggeistjochl (Mayrhofen to Kasern), foot path (Z) Bergerthorl (Kals to Heiligenblut), foot path . Kaprunerthorl (upper Kaprun Glen to the upper Stubach

Glen), snow .....

Krimmler Tauern (Krimml to Kasern), foot path

Virgner or Defereggerthorl (Defereggen Glen to Virgen and

Pragraten), foot path . • . Backlenke or Trojerjoch (Pragraten to the Defereggen Glen),

foot path . . . . . .

Hochthor or Heiligenbluter Tauern (Heiligenblut to Rauris),

foot path .....

Horndljochl (Mayrhofen to Steinhaus), foot path (Z) Velber Tauern (Windisch Matrei to Mittersill), bridle path . Kaiser Tauern (Kals to Uttendorf), foot path Hohe or Korn Tauern (Mallnitz to Gastein), bridle path over,

railway tunnel beneath .....

Niedere or Mallnitzer Tauern (Mallnitz to Gastein), bridle

path . . . . . .

Fuscherthorl (Ferleiten to the Seidlwinkel Glen), foot path Lappacherjoch (Lappach to the Ahrn Valley), foot path (Z) . Tuxerjoch or Schmirnjoch (Mayrhofen to St Jodok am

Brenner), foot path (Z) . . . . . .

Klammljoch (Taufers to the Defereggen Valley), bridle path Arlscharte (St Johann in Pongau to Gmiind), foot path Pfitscherjoch (Mayrhofen to Sterzing), foot path (Z) . Kals Matreierthorl (Kals to Windisch Matrei), bridle path Die Stanz (Gastein to Rauris), foot path . .

Stallersattel (Defereggen Glen to the Antholz Glen), bridle

path ®

Radstadter Tauern (Radstadt to Mautendorf), carriage road

Chief Peaks of the

Order

Konigsspitze . . . . Monte Cevedale . Wildspitze (Oetzthal) . Weisskugel . . . . Monte Zebru . . . Palon della Mare Punta San Matteo . Thurwieserspitze Hintere Schwarze

Similaun

Pizzo Tresero . . . . Gross Ramolkogel Vertainspitze . . . . Hochvernagtspitze

Ortler, Oetzthal and Stubai Ranges.

12,802 Zuckerhu'tl (Stubai)

12,655 Schalfkogel .

12,382 Schrankogel

12,382 Hochwildspitze .

12,291 Sonklarspitze

12,254 Tuckettspitze

12,156 Wilder Freiger .

12,113 Veneziaspitze .

1 1 ,946 Tschengelser Hochwand

11,920 Monte Confinale

11,821 Glockthurm

11,818 Fernerkogel .

11,651 Monte Sobretta

11,618 Habicht ....

1 1 ,585 Pflerscher Tribulaun

Chief Passes of the Ortler, Oetzthal and Stubai Ranges.

Hochjoch (Sulden to the Zebru Glen), snow . . . 11,602

Vioz Pass (Santa Caterina to Pejo), snow . . . 10,949

Sonklarscharte (Solden to Sterzing), snow . . . 10,916

Konigsjoch (Sulden to Santa Caterina), snow . . . 10,811

Cevedale Pass (Santa Caterina to the Martell Glen), snow 10,732

Gepatschjoch (Vent to the Kauns Valley), snow . . 10,640

Ramoljoch (Vent to Gurgl), snow 10,479

Langtaufererjoch (Vent to the Reschen Scheideck Pass),

snow 10,391

Bildstockljoch (Solden to Ranalt), snow 10,296

Gurgler Eisjoch (Gurgl to the Pfossen Glen), snow . . 10,292

Eissee Pass (Sulden to the Martell Glen), snow . . 10,279

Langthalerjoch (Gurgl to Pfelders), snow . . . 10,033

Passo del Zebru (Santa Caterina to the Zebru Glen), snow . 9,925

Sallentjoch (Martell Glen to Rabbi), snow . . . 9,913

Niederjoch (Vent to the Schnals Valley), snow . . 9,899

Sforzellina Pass (Santa Caterina to Pejo), snow . . 9,859

Pitzthalerjochl (Mittelberg to Solden), snow . . . 9,826

Eisjochl am Bild (Pfelders to the Pfossen Glen), snow . 9,541

Venter Hochjoch (Vent to the Schnals Valley), snow. . 9,465

Tabarettascharte (Sulden to Trafoi), foot path . . 9,459

Stelvio Pass (Trafoi to Bormio), carriage road . . . 9,055

Gavia Pass (Santa Caterina to Ponte di Legno), foot path 8,651
Timmeljoch orTimblerjoch (Solden to the Passeierthal and

Meran), bridle path 8,232

Jaufen Pass (Sterzing to Meran), bridle path . . . 6,870

Reschen Scheideck Pass (Landeck to Meran), carriage road 4,902

Brenner Pass (Innsbruck to Verona), railway over . . 4,495

16. Lombard Alps (from the Lake of Como to the Adige Valley, south of the Valtellina and the Aprica and Tonale Passes. This

11,520 11,516 11,483 11,418

11,405

n,346

11,241 11,103 11,083

n,057

11,011 10,827 10,814

10,758 10,178

PEAKS AND PASSES]

ALPS

747

division includes the Adamello, Presanella, Brenta and Bergamasque

ranges.

Chief Peaks of the Lombard Alps.

694 Pizzo del Diavolo

Prcsanella ....

Adamello 11,661

Care Alto 11,369

Dosson di Genova . . 11,254 Crozzon di Lares . .11 ,004 Corno di Baitonc. . . 10,929

Busazza 10,922

I.obbia Alta .... 10,486 Cima Tosa (Brenta) . 10,420 Cima di Brenta . . 10,352

Crozzon di Brenta . . 10,247 Pizzo di Coca (Bergam- asque) .... Pizzo di Scais Pizzo di Redorta Pietra Grande

Re di Castello Recastello . . Monte Gleno Monte Tornello Corno Stella Monte Legnone Pizzo dei Tre Signori Pizzo di Presolana . Grigna .... Monte Baldo . . Monte Spinale . Monte Roen. Monte Gazza Monte Resegone

9,564 9,482

9475 9,459 8,819 8,596 8,563 8,380 8,239

7,9< >7

7,218

7,o94

6,939 6,529 6,155

. 10,014

■ *9,974*

■ *9,964 • 9,630*

Chief Passes of the Lombard Alps. Passo di Lares (Lares Glacier to the Lobbia Glacier), snow. Passo di Cercen (Val di Genova to Fucine), snow Passo della Lobbia Alta (Lobbia Glacier to the Mandron

Glacier), snow-. .....

Passo di Presena (Val di Genova to the Tonale Pass), snow. Pisgana Pass (Val di Genova to Ponte di Legno), snow Bocca di Tuckett (Campiglio to Molveno), snow Passo di Val Morta or del Diavolo (Val Seriana toSondrio),

foot path . . .

Bocca di Brenta (Pinzolo or Campiglio to Molveno), snow. Passo del Groste (Campiglio to Cles), foot path. Passo di Venina (Val Brembana to Sondrio), foot path Passo del Salto (Val Seriana to Sondrio), foot path . Passo del Vencrocolo (Val di Scalve to the Aprica road),

bridie path . . . . . .

Passo della Forcellina or di Campo (Cedegolo to the Val di

Fumo), foot path .....

Passo di Dordona (Val Brembana toSondrio), foot path Passo di San Marco (Bergamo to Morbegno), bridle path . Croce Domini Pass (Breno to Bagolino in Val Caffaro), bridle

path .....

Tonale Pass (Trent to Edolo), carriage road Passo di Zovetto (Val di Scalve to Edolo), bridle path Colle Maniva (Val Trompia to Bagolino), bridle path Campo or Ginevrie Pass (Dimaro by Campiglio

to Pinzolo),

carriage road .....

Gampenjoch (Cles to Meran), foot path ....

Mendel Pass (Botzen to Cles), railway on the E. slope Passo di Castione or Presolana Pass (Clusone to the Val di

Scalve), carriage road . Aprica Pass (Edolo to Tirano), carriage road . . .

17. The Dolomites of South Tirol (from the Brenner Pass to the Monte Croce Pass, and south of the Pusterthal).

10,483 9,984

9,961

9,879 9,626

8,7H

8,534 8,376 8,006 7,983 7,937

7,595

7,507 6,824

6,513

6,217 6,181 5,968 5,476

5-407 5,051 4,462

4,219

3,875

Chief Peaks of Marmolata ....

Antelao

Tofana di Mezzo

Sorapiss

Monte Civetta

Vernel

Monte Cristallo . Cima di Vezzana Cimon della Pala

Langkofel

Pelmo ……’

Dreischusterspitze

Botspitze

Croda Rossa (Hoher

Caisl)

Piz Popena ….

Elferkofel

Grohmannspitze . Zwolferkofel …. Sass Rigais(Geislerspitzen) Drei Zinnen …. Kesselkogel (Rosengarten) Funffingerspitze .

the Dolomites of South Tirol.

10,972 Pala di San Martino

10,706 Rosengartenspitze .

10,633 Marmarole ….

10,594 Cima di Fradusta .

10,564 Fermedathurm .

10,519 Cima d’Asta

10,496 Cima di Canali .

10,470 Croda Grande .

IO >453 Vajoletthurm (highest)

10,427 Sass Maor ….

10,397 Cima di Ball

IO >375 Cima della Madonna 10,342 (Sass Maor) .

Rosetta

10,329 Croda da Lago .

10,312 Central Grasleitcnspitze

10,220 Schlern

10,207 Sasso di Mur

10,142 Cima delle Dodici .

9,932 Monte Pavione .

9,853 Cima di Posta .

9,846 Monte Pasubio .

9,833

9,831

9,78i

9,715 9,649 9,407 9,344 9,338 9,315 9.256 9,239

9,i3i

9,026

8,993 8,911

8,875 8,406 8,380 7,671 7,664 7,333 7,323

Chief Passes of the Dolomites of South Tirol. .

Passo d' Ombretta (Campitello to Caprile), foot path . 8,983

Lungkofeljoch (Groden Valley to Campitello), foot path . 8,803

Tschagerjoch (Karersee to the Vajolet Glen), foot path . 8,675 Grasleiten Pass (Vajolet Glen to the Grasleiten Glen), foot path 8,521 Passo di Pravitale (Rosetta Plateau to the Pravitale Glen),

foot path 8,465

Passo delle Comelle (same to Cencenighe), foot path . 8,462 Passo della Rosetta (San Martino di Castrozza to the great

limestone Rosetta Plateau), foot path . . . 8,442

Vajolet Pass (Tiers to the Vajolet Glen), foot path . . 8,363

Passo di Canali (Primiero to Agordo), foot path . . 8,193

Tiersalpljochl (Campitello to Tiers), foot path . . . 8,055 Passo di Ball (San Martino di Castrozza to the Pravitale Glen),

foot path 8,038

Forcella di Giralba (Sexten to Auronzo), foot path . . 7.992 Col dei Bos (Falzarego Glen to the Travernanzes Glen), foot

path ... 7,579

Forcella Grande (San Vito to Auronzo), foot path . . 7,422

Pordoi Pass (Caprile to Campitello), carriage road . . 7,382

Sellajoch (Groden Glen to Campitello), bridle path . . 7,277

Tre Sassi Pass (Cortina to St Cassian), foot path . . 7,215 Mahlknechtjoch (Upper Duron Glen to the Seiser Alp), foot

path 7,113

Grodenerjoch (Groden Glen to Colfuschg), bridle path . 7,011

Falzarego Pass (Caprile to Cortina), small carriage road . 6,946

Fedaja Pass (Campitello to Caprile), bridle path . . 6,713

Passo di Valles (Paneveggio to Cenccnighe), foot path . 6,667 Rolle Pass (Predazzo to San Martino di Castrozza and

Primiero), carriage road 6,509

Forcella Forada (Caprile to San Vito), bridle path . . 6,480 Passo di San Pellegrino (Moena to Cenccnighe), small carriage

road 6,267

Forcella d'AUeghe (Alleghe to the Zoldo Glen), foot path . 5,971

Tre Croci Pass (Cortina to Auronzo), carriage road . . ,5,932 Karersee or Caressa Pass (Welschenofen to Vigo di Fassa),

carriage road . . . . , . 5,715 Monte Croce Pass (Innichen and Sexten to the Piave Valley

and Belluno), carriage road . 5,374 Ampezzo Pass (Toblach to Cortina and Belluno), carriage

road 5,066

Cereda Pass (Primiero to Agordo), bridle path . 4,501

Toblach Pass (Bruneck to Lienz), railway over. . . 3,967

18. South-Eastern Alps (east of the Monte Croce Pass). This division includes three small groups, the Julie, Carnicand Karawankas

Alps — each peak and pass being distinguished by one of the initial letters " J," " C " or " K."

Chief Peaks of the South-Eastern Alps.

Terglou or Triglav (J)

9,400

Monte Cridola ©

8,468

Monte Coglians © .

9,128

Grintovc (K)

8,429

Kellerwand © .

9,105

Prestrelenik (J)

8,202

Jof del Montasio (J) .

■ *9,039*

Monte Cavallo ©

7,386

Cima dei Preti © .

8,868

Krn (J)

7,369

Monte Paralba © .

8,829

Stou (K) ...

7,346

Manhart (J) .

8,786

Dobratsch © .

7,110

Jalouc (J) ...

8,711

Velka Kappa (K) .

5,059

Monte Camn (J)

8,471

Chief Passes of the South-Eastern Alps. Oefnerjoch (Forno Avoltri to St Lorenzen in the Gail Valley),

foot path ©

Wolayer Pass (same to Mauthen), foot path © . Loibl Pass (Klagenfurt to Laibach), carriage road (K) Plocken Pass (Tolmezzo to Mauthen), bridle path © Predil Pass (Villach by Tarvis and Flitsch

to Gorz), carriage

road (J)

Birnbaumerwald (Laibach to Gorz), carriage road (J) Saifnitz or Pontebba Pass (Villach by Tarvis and Pontebba

to Udine), railway .....

7,550 6,506

4,495 4,462

3,8i3

2,897

2,615

7. Political History and Modern State of the Inhabitants of the Alps. — We know practically nothing of the early dwellers in the Alps, save from the scanty accounts preserved to us by Roman and Greek historians and geographers. A few details have come down to us of the conquest of many of the Alpine tribes by Augustus, though not much more than their names. The suc- cessive emigrations and occupation of the Alpine region by divers Teutonic tribes from the 5th to the 6th centuries are, too, known to us only in outline, while to them, as to the Frankish kings and emperors, the Alps offered a route from one place to another rather than a permanent residence. It is not till the final break up of the Carolingian empire in the 10th and nth centuries that it becomes possible to trace out the local history of different parts of the Alps.

In the case of the Western Alps (minus the bit from the chain of Mont Blanc to the Simplon, which followed the fortunes of the Valais), a prolonged struggle for the Alpine region took place between the feudal lords of Savoy, the Dauphine and Provence. In 1349 the Dauphine fell to France, while in 1388 the county of Nice passed from Provence to the house of Savoy, which too held Piedmont as well as other lands on the Italian side of the Alps. The struggle henceforth was limited to France and the house of Savoy, but little by little France succeeded in pushing

back the house of Savoy across the Alps, thus forcing it to be- come a purely Italian power. One turning-point in the rivalry was the treaty of Utrecht (1713), by which France gave up to Savoy the districts (all forming part of the Dauphine, and lying on the Italian slope of the Alps) of Exilles, Bardonneche, Oulx, Fenestrelles, and Chateau Dauphin, while Savoy handed over to France the valley of Barcelonnette, situated on the western slope of the Alps and forming part of the county of Nice. The final act in the long-continued struggle took place in i860, when France obtained by cession the rest of the county of Nice and also Savoy, thus remaining sole mistress on the western slope of the Alps.

In the Central Alps the chief event, on the northern side of the chain, is the gradual formation from 1291 to 181 5 of the Swiss Confederation, at least so far as regards the mountain Cantons, and with especial reference to the independent confedera- tions of the Grisons and the Valais, which only became full members of the Confederation in 1803 and 1815 respectively. The attraction of the south was too strong for both the Forest Cantons and the Grisons, so that both tried to secure, and actually did secure, various bits of the Milanese. The former, in the 15th century, won the Val Leventina (down which the St Gotthard train now thunders) as well as Bellinzona and the Val Blenio (though the Ossola Valley was held for a time only), > while the latter added to the Val Bregaglia (which had been given to the bishop of Coire in 960 by the emperor Otto I.) the valleys of Mesocco and of Poschiavo. Further, in 1512, the Swiss Confederation as a whole won the valleys of Locarno with Lugano, which, combined with the 15th century conquests by the Forest Cantons, were formed in 1803 into the new Canton of Ticino or Tessin. On the other hand, the Grisons won in 151 2 the Valtellina, with Bormio and Chiavenna, but in 1797 these regions were finally lost to it as well as to the Swiss Con- federation, though the Grisons retained the valleys of Mesocco, Bregaglia and Poschiavo, while in 1762 it had bought the upper bit of the valley of Miinster that lies on the southern slope of the Alps.

In the Eastern Alps the political history is almost monotonous, for it relates simply to the advance or retreat of the house of Habsburg, which still holds all but the whole of the northern portion (the exception is the small bit in the north-west that belongs to Bavaria) of that region. The Habsburgers, whose original home was in the lower valley of the Aar, where still stand the ruins of their ancestral castle, lost that district to the Swiss in 1415, as they had previously

lost various other bits of what is now Switzerland. But they received a rich compensation in the Eastern Alps (not to speak of the imperial crown), for they there gathered in the harvest that numerous minor dynasties had prepared for them, albeit unconsciously. Thus they won the duchy of Austria with Styria in 1282, Carinthia and Carniola in ˆHSi Tirol in 1363, and the Vorarlberg in bits from 1375 to 1523, not to speak of minor " rectifications " of frontiers on the northern slope of the Alps. But on the other slope their progress was slower, and finally less successful. It is true that they early won Primiero (1373), as well as (1517) the Ampezzo Valley and several towns to the south of Trent. In 1797 they obtained Venetia proper, in 1803 the secularized bishoprics of Trent and Brixen (as well as that of Salzburg, more to the north), besides the Valtellina region, and in 1815 the Bergamasque valleys, while the Milanese had belonged to them since 1535. But, as is well known, in 1859 they lost to the house of Savoy both the Milanese and the Bergamasca, and in 1866 Venetia proper also, so that the Trentino is now their chief possession on the southern slope of the Alps. The gain of the Milanese in 1859 by the future king of Italy (1861) meant that Italy then won the valley of Livigno (between the Upper Engadine and Bormio), which is the only important bit it holds on the non- Italian slope of the Alps, besides the county of Tenda (obtained in 1575, and not lost in i860), with the heads of certain glens in the Maritime Alps, reserved in i860 for reasons connected with hunting. Thus the Alpine states (Italy, Switzerland and Austria), other than France and Bavaria, hold bits of territory

on the slope of the Alps where one would not expect to find them. Roughly speaking, in each of these five lands the Alpine population speaks the tongue of the country, though in Italy there are a few French-speaking districts (the Waldensian valleys as well as the Aosta and Oulx valleys) as well as some German-speaking and Ladin-speaking settlements. In Switzerland there are Italian-speaking regions, as well as some spots (in the Grisons) where the old Romance dialect of Romansch or Ladin survives; while in Austria, besides German, Italian and Ladin, we have a Slavonic-speaking population in the South-Eastern Alps. The highest permanently inhabited village in the Alps is Juf, 6998 ft. (Grisons); while in the French Alps, L'Ecot, 6713 ft; (Savoy), and St Veran, 6726 ft. (Dauphine), are rivals; the Italian Alps boast of Trepalle, 6788 ft. (between Livigno and Bormio), and the Tirolese Alps of Ober Gurgl, 6322 ft., and Fend, 621 1 ft. (both in the Oetzthal).

8. Exploration of the High Alps. — The higher region of the Alps were long left to the exclusive attention of the men of the adjoining

valleys, even when Alpine travellers (as distinguished from Alpine climbers) began to visit these valleys. It is reckoned that about 20 glacier passes were certainly known before 1600, about 25 more before 1700, and yet another score before 1800; but though the attempt of P. A. Arnod (an official of the duchy of Aosta) in 1689 to " re-open " the Col du Geant may be counted as made by a non-native, we do not come upon another case of the kind till the last quarter of the 18th century. Nor did it fare much better with the high peaks, though the two earliest recorded ascents were due to non-natives, that of the Rochemelon in 1358 having been undertaken in fulfilment of a vow, and that of the Mont Aiguille in 1492 by order of Charles VIII. of France', in order to destroy its immense reputation for inaccessibility— in 1555 Conrad Gesner did not climb Pilatus proper, but only the grassy mound of the Gnepf stein, the lowest and the most westerly of the seven summits. The two first men who really systematically explored the regions of ice and snow were H. B. de Saussure (1 740-1 799), as regards the Pennine Alps, and thf Benedictine monk of Disentis, Placidus a Spescha (1752-1833, most of whose ascents were made before 1 806) , in the valleys at the sources of the Rhine. In the early 19th century the Meyer family of Aarau conquered in person the Jungfrau (1811) and by deputy the Finsteraarhorn (1812), besides opening several glacier passes, their energy being entirely confined to the Bernese Oberland. Their pioneer work was continued in that district, as well as others, by a number of Swiss, pre-eminent among whom were Gottlieb Studer (1804-1890) of Bern, and Edouard Desor (1811-1882) of Neuchatel. The first-known English climber in the Alps was Colonel Mark Beaufoy (1764-1827), who in 1787 made an ascent (the fourth) of Mont Blanc, a mountain to which his fellow-countrymen long exclusively devoted themselves, with a few noteworthy exceptions, such as Principal J. D. Forbes (1809-1868), A. T. Malkin (1803-1888), John Ball (1818-1889), and Sir Alfred Wills (b. 1828). Around Monte Rosa the Vincent family, Josef Zumstein (1783-1861), and Giovanni Gnifetti (1801-1867) did good work during the half century between 1778 and 1842, while in the Eastern Alps the Archduke John (1782-1859), Prince F. J. C. von Schwarzenberg, archbishop of Salzburg (1800-1885), Valentine Stanig (1774-1847), Adolf Schaubach (1800-1850), above all, P.J. Thurwieser (1 789-1865), deserve to be recalled as pioneers in the first half of the 19th century. In the early fifties of the 19th century the taste for mountaineering rapidly developed for several very different reasons. A great stimulus was given to it by the foundation of the various Alpine clubs, each of which drew together the climbers who dwelt in the same country. The first was the English Alpine Club (founded in

the winter of 1857-1858), followed in 1862 by the Austrian Alpine Club (which in 1873 was fused, under the name of the German and Austrian Alpine Club, with the German Alpine Club, founded in 1869), in 1863 by the Italian and Swiss Alpine Clubs, and in 1874 by the French Alpine Ciub, not to mention numerous minor societies of more local character. It was by the members of these clubs (and a few others) that the minute exploration (now all but complete)

of the High Alps was carried out, while much has been done in the way of building club huts, organizing and training guides, &c, to smooth the way for later comers, who benefit too by the detailed information published in the periodicals (the first dates from 1863 only) issued by these clubs. Limits of space forbid us to trace out in detail the history of the exploration of the High Alps, but the two sub-joined lists give the dates of the conquest of about fifty of the greater peaks (apart from the two climbed in 1358 and in 1492, see above), achieved before and after 1st January 1858. As a proof of the rapidly-growing activity of Englishmen, it may be pointed out that while before 1858 only four summits (the Mittelhorn, or central peak of the Wetterhorner, the highest point of Monte Rosa, Laquinhorn and Pelmo) were first ascended by Englishmen, in the case of the second list only five (Grand Combin,Wildspitze,Marmolata, Langkofel and Meije) were not so conquered (if the present writer, an American, be included among the English pro hac vice).

(1) Before 1st January 1858:— Titlis (1744), Ankogel (1762), Mont Velan (1779), Mont Blanc (1786), Rheinwaldhorn (1789), Gross Glockner (1800), Ortler (1804), Jungfrau (1811), Fin- steraarhorn (1812), Zumsteinspitze (1820), T6di (1824), Altels (1834), Piz Linard (1835), Gross Venediger (184T), Signalkuppe (1842), Wetterhorner (1844-1845), Mont Pelvoux (1848), Diablerets and Piz Bernina (both in 1850), highest point of Monte Rosa (1855), Laquinhorn (1856) and Peimo (1857).

(2) After 1st January 1858:— Dom (1858), Aletschhorn, Bietschhorn and Grand Combin (all in 1859), Grand Paradis and Grande Casse (both in i860), Weisshorn, Monte Viso, Gross Schreckhorn, Lyskamm and Wildspitze (all in 1861), Dent Blanche,

Monte della Disgrazia and Taschhorn (all in 1862), Marmolata, Presanella, Pointe des Ecrins and Zinal Rothhorn (all in 1864), Matterhorn, Ober Gabelhorn, Aiguille Verte and Piz Roseg (all in 1865), Langkofel (1869), Cimon della Pala (1870), Rosengarten (1872), Meije (1877), Aiguilledu Dru (1878), Punta dell' Argentera (1879), Aiguille des Charmoz (1880), Aiguille de Grepon (1881) and Aiguille du Geant (1882).

9. General List of Books and Maps.— (i) Books. — For a longer list than we can give see John Ball's Hints and Notes for Travellers in the Alps (new ed., 1899) and also A. Waber's Landes- und Reise-beschreibungen der Schweiz (1899, supplement in 1907). In general see J. Ball's The Alpine Guide (3 vols., new ed. of vol. i., 1898; last ed. of vol. ii., 1876, and of vol. iii., 1879) ; H. A. Berlepsch, Die Alpen in Natur- und Lebensbildern (last ed., 1885, Eng. trans., 1861); T. G. Bonnev, The Alpine Regions of Switzerland and the Neighbouring Countries (1868); A. Civiale, Les Alpes au point de vue de la geo- graphie physique (1882); Sir Martin Conway, The Alps (1904); W. A. B. Coolidge, Swiss Travel and Swiss Guide-Boohs (1889) and The Alps (1908) ; R. von Lendenfeld, Aus den Alpen (2 vols., 1896) ; C. Lentheric, L'Homme devant les Alpes (1896); F. Umlauft, Die Alpen (1887, Eng. trans., 1889). On some special subjects see W. A. Baillie-Grohmann, Sport in the Alps (1896) ; A. Mosso. Fisio- logia dell' Uomo sulle Alpi (1897, English trans., 1898); N. Zuntz and others, Hohenklima und Bergwanderungen in ihrer Wirkungen auf den Menschen (1906); G. Berndt, Der Fbhn (1896, the south wind, so important in mountain districts) ; and the article on Glacier.

As to Alpine legends, consult Maria Savi-Lopez, Leggende delle Alpi (1889); M. Tscheinen, Walliser-Sagen (1872); Th. Vernaleken, Alpensagen (1858); and I. V. Zingerle, Sagen aus Tirol (1859); and as to Alpine poetry — J. Adam, Der Natursinn in der deutschen Dichtung (1906); E. A. Baker and F. E. Ross, The Voice of the Mountains (1905, an anthology in verse and prose) ; A. von Haller, Die Alpen (1732, best ed., 1882, illustrated ed., 1902); and H. E. Jenny, Die Alpendichtung in der deutschen Schweiz (1905).

As to Alpine dialects, consult J. Alton, Die ladinischen Idiome in Ladinien, Groden, Fassa, Buchenstein, Ampezzo (1879); J. A. Chabrand and A. de Rochas d'Aiglun, Patois des Alpes cottiennes (1877); Z. and E. Pallioppi, Dizionari dels Idioms Romauntschs d'Engiadina ota e bassa, &c. (1895); A – Socin, Schriftsprache und Dialekte im Deutschen (1888); F. J. Stalder, Die Landessprachen der Schweiz (18 19), and J. Zimmerli, Die deutsch-franzbsische Sprach-

grenze in der Schweiz (3 vols., 1891-1899); besides the great Swiss Dialect Dictionary (Schweiz. Idiolikon) in course of publication since

1881.

As to the history of the Alps, the following works touch on various aspects of the subject: — G. Allais, Le Alpi Occidentali nelV Antichitd (1891) ; \V. Brockedon, Illustrations of the Passes of the Alps (2 vols., 1828-1829); J. Grand-Carteret, La Montagne a travers Us ages (2 vols., 1902-1904); G. Oberziner, Le Guerre di Augusto conlro i populi alpini (1900); E. Oehlmann, Die Alpenpdsse im Mittelalter

(1878-1879) ; R. Reinhard, Passe und Strassen in den Schweizer Alpen (1903); and L. Vaccarone, Le Vie delle Alpi Occidentali negli antichi tempi (1884); while W. A. B. Coolidge's Josias Simler et les origines de l' alpinisms jusqu'en 1600 (1904) summarises our knowledge of the Alps up to 1600.

Among works of a more or less descriptive nature (based on actual travels), the following list includes all the standard works dated before 1855: — Le Alpi che cingono I' Italia (1845); J. G. Altmann, Versuch einer hist. u. phys. Beschreibung der helvetischen Eisbergen (1751); A. C. Bordier, Voyage pittoresque aux glacieres de Savoye (r 773); P- J- de Bourcet, Memoires militaires sur les frontieres de la France, du PUmont, et de la Savoie (1801) ; M. T. Bourrit, Description des glacieres, glaciers, et amas de glace du duche de Savoye (1773, Eng. trans., 1775), Description des Alpes pennines et rhetiennes (2 vols., 1781, 3rd vol., 1785), and Description des cols ou passages des Alpes (2 vols., 1803); W. Brockedon, Journals of Excursions in the Alps (1833) ; U. Campell, Raetiae alpestris topographica descriptio (finished in 1572, but publ. only in 1884, with a supplement in 1900); J. A. Deluc and P. G. Dentan, Relation de differents voyages' dans les Alpes du Faucigny (1776); E. Desor, Excursions et sejours dans les glaciers (2 series, 1844-1845) ; C. M. Engelhardt, Natur schilderungen aus den hbchsten Schweizer-Alpen (1840), and Das Monte-Rosa und Matterhorn-Gebirg (1852); J. D.-Forbes, Travels through the Alps of Savoy (1843, new ed., 1900); Sir John Forbes, A Physician's Holiday (1849); J. Frobel, Reise in die weniger bekannten Thaler auf der Nordseite der penninischen Alpen (1840) ; G. Gnifetti, Nozioni topografiche del Monte Rosa ed ascensioni su di esso (1845, 2nd ed., 1858); G. S. Gruner, Die Eisgebirgedes Schweizerlandes (3 vols., 1760) ; J. Hegetschweiier, Reisen in den Gebirgsstock zwischen Glarus und Graubiinden, 1819-1822 (1825); G. Hoffmann, Wanderungen in der

Gletschervielt (1843); F. J. Hugi, Naturkistorische Alpenreise (1830); C. J. Latrobe, The Alpenstock (1829) and The Pedestrian (1832); J. R. and H. Meyer, Reise auf den Jungfrau-Gletscher und Ersteigung seines Gipfels (1 8 1 1) ; De Montannel, La Topographie militaire de la frontiire des Alpes (written in 1777, but publ. in 1875 only); Operations giodisiques et astronomiques pour la mesure d'un arc du parallele moyen (2 vols., 1825-1827); H. R. Rebmann, Ein poetisch Gastmal und Gesprdch zweyer Bergen, nemlich des Niesens und Stockhorns (1606) ; C. Rohr- dorf, -Reise uber die Grindelwald-Viescher-Gletscher und Ersteigung des Gletschers des Jungfrau-Berges (1828) ; H. B. de Saussure, Voyages dans les Alpes (4 vols., 1 779-1 796) ; A. Schaubach, Deutsche Alpen (4 vols., 1845-1847); J. J. Scheuchzer, Helvetiae Stoicheio- graphia, Orographia, et Oreographia (1716), and Itinera per Helvetiae alpinas regiones facta annis 1702-1711 (4 vols., 1723); J. Simler, Vallesiae Descriptio et de Alpibus Commentarius (1574, new ed. in 1904, see Coolidge above) ; Albert Smith, The Story of Mont Blanc (!853); G. Studer, Topographische Mitteilungen aus dem Alpenge- birge (1843); R. TOpffer, Voyages en zigzag (2 series, 1844 and 1853); Aegid. Tschudi, De prised ac verd alpind Rhaelid (1538, also in German, same date) ; and L. von Welden, Der Monte Rosa (1824). As to works published alter 1855 we can only give a short, though carefully selected, list. C. Aeby and others, Das Hochgebirge von Grindelwald (1865); W. A. Baillie-Grohmann, Tyrol and the Tyrolese (1876), and Gaddings with a Primitive People (2 vols., 1878); H; von Barth, Aus den nordlichen Kalkalpen (1874); L. Barth and L. Pfaundler, Die Stubaiergebirgsgruppe (1865); G. F. Browne, Off the Mill (1895); Mrs H. W. Cole, A Lady's Tour round Monte Rosa (1859); E. T. Coleman, Scenes from the Snow Fields (1859); Sir Martin Conway, The Alps from End to End (1895); A. Daudet, Tartarin sur les Alpes (1885, Eng. trans., same date); C. T. Dent, Above the Snow Line (1885) ; Miss A. B. Edwards, Untrodden Peaks and Unfrequented Valleys (1873, Dolomites) ; Max Forderreuther, Die Allgauer Alpen (1906); D. W. Freshfield, Across Country from Thonon to Trent (1865), and Italian Alps (1875) ; Mrs Henry Fresh-field, Alpine Byways (1861), and A Summer Tour in the Grisons (1862); H. B. George, The Oberland and its Glaciers (1866); J. Gilbert and G. C. Churchill, The Dolomite Mountains (1864); A. G. Girdlestone, The High Alps without Guides (1870) ; P. Groh- mann, Wanderungen in den Dolomiten (1877) ; P. Giissfeldt, In den Hochalpen (1886), and Der Montblanc (1894); T. W. Hinchliff, Summer Months among the Alps (1857) ; C. Hudsonand E. S. Kennedy, Where there's a Will there's a Way (1856) ; E. Javelle, Souvenirs d' un Alpiniste (1886, Eng. trans., 1899); S. W. King, The

Italian Valleys of the Pennine Alps (1858) ; Le Valli di Lanzo (publ. by the Italian Alpine Club in 1899); A. Lorria and E. A. Martel, Le Massif de la Bernina (1894) ; J. Michelet, La Montagne (1868, Eng. trans., 1872) ; A. W. Moore, The Alps in 1864 (1867, publ. ed., 1902); A. F. Mummery, My Climbs in the Alps (1895); Norman-Neruda, The Climbs of (1899);. Peaks, Passes and Glaciers (3 vols., 1859-1862); L. Purtscheller, Uber Pels und Firn (1901); E. Rambert, Ascensions et ftdneries (2 vols., 1888); G. Rey, // Monte Cervino (1904); John Ruskin, vol. iv. (On Mountain Beauty) of Modern Painters (1856); A. von Ruthner, Aus den Tauern (1864) and Aus Tirol (1869)-; V. Sella and D. Vallino, Monte Rosa e Gressoney (1890) ; F. Simony, Das Dachsteingebiet (1889-1896); L. Sinigaglia, Climbing Reminis- cences of the Dolomites (1896); K.' von Sonklar, Die Oetzthaler Gebirgsgruppe (i860), and Die Gebirgsgruppe der Hohen-Tauern (1866) ; Sir L. Stephen, The Playground of Europe (1871) ; B. Studer, Geschichte der physischen Geographie der Schweiz bis 181s (1863);

G. Studer and others, Berg- und Gletscherfahrten (2 series, 1859 and 1863); G. Theobald, Naturbilder aus den rhatischen Alpen (i860), and Das Bundner Oberland (1861) ; F. F. Tuckett, Hochalpensludien (2 vols., 1873-1874); Miss L. Tuckett, How we Spent the Summer (1864), Pictures in Tyrol (1867), and Zigzagging amongst Dolomites (1871); J. Tyndall, The Glaciers of the Alps (i860), Mountaineering in 1861 (1862), and Hours of Exercise in the Alps (1871); J. J. Weilenraann, A us der Firnenwelt (3 vols., 1872-1877) ; E. Whymper, Scrambles amongst the Alps (1871); Sir A. Wills, Wanderings among the High Alps (1856), and The " Eagle's Nest " in the Valley of Sixt (i860); G. Yeld, Scrambles in the Eastern Graians (1900); H. Zschokke, Reise auf die Eisgebirge des Kantons Bern und Ersteigung ihrer hbchsten Gipfel im Sommer von 1812 (1813) ; E. Zsigmondy, Im Hochgebirge (1889); M. Zurbriggen, From the Alps to the Andes

(1899).

Many useful practical hints as to climbing are to be found in C. T. Dent and others, Mountaineering (1892, 3rd ed., 1900, " Badminton Library ") ; the Manuel d'Alpinisme (1904, publ. by the French

Alpine Club) ; J. Meurer, Handbuch der alpinen Sport (1882), Katechismus fur Bergsteiger (1892), and Der Bergsteiger im Hochgebirge (1893); and C. Wilson, Mountaineering (1893, "All England " series). As regards the dangers of Alpine climbing consult C. Fiorio and C. Ratti, / Pericoli dell' Alpinismo (1889), and E. Zsigmondy, Die Gefahren der Alpen (1885, Fr. trans., 1889). There are also special guide-books for the use of climbers in the Alps — the " Climbers' Guides " series, edited by Sir Martin Conway and W. A. B. Coolidge (10 vols., 1890-1904); W. A. B. Coolidge, H. Duhamel and F. Pcrrin, Guide du TIaut Dauphine (1887, with supplement in 1890, Eng. trans., 1892 and 1905) ; L. Purtscheller and H. Hess, Der Hochtourist in den Ostalpen (2 vols., 1894, 3 vols., 3rd ed., 1903) ; the 3 vols. publ. (1902-1905) by the Swiss Alpine Club under the name of Clubfuhrer to the Alps of Glarus and Uri, and V. Wolf von Glanvell, Dolomitenfiihrer (1898).

As regards the early history of Alpine exploration consult W. A. B. Coolidge, Josias Simler et les origines de Valpinisme jusqu'en 1600 (1904), and F. Gribble, The Early Mountaineers (1899). For the later period see, besides the more general works of travel mentioned above, the publications (that date from 1863) of the various Alpine Clubs — the Alpine Journal (English A. C.),theAnnuaire, Bulletin, La Montagne, and Revue alpine (French A. C), the Jahrbuch, Mitteilungen, Verhandlungen, and Zeilschrift (German and Austrian A. C), the Alpinista, Bollettino, and Rivista Mensile (Italian A. C), and the Alpina, Echo des Alpes, Jahrbuch, Schweizer Alpen-Zeitung (Swiss A. C), besides those of the smaller societies, such as the Osterreichische Alpen-Zeitung (Austrian A. C), the Annuaire (Societe des Touristes du Dauphine), and the Annuario (Societa degli Alpinisti Tridentini). Summaries of the Alpine history of the three great divisions of the Alps are given in (W. Alps) L. Vaccarone, Statistica delle Prime Ascensioni nelle Alpi Occidentali (3rd. ed., 1890 — this work omits the Dauphine Alps, as to which see the 1887 work or its Eng. version, 1905, mentioned above); (Central and Swiss Alps) G. Studer, Uber Eis und Schnee (2nd ed. 3 vols., 1896— 1899) ; and (E. Alps) G. Groger and J. Rabl, Die Entwickelung der Hochtouristik in den osterreichischen Alpen (1890), and E. Richter, Die Erschliessung der Ostalpen (3 vols., 1894). The detailed history of Mont Blanc has been written by Ch. Durier, Le Mont Blanc (1877, 4th ed., 1897), and C. E. Mathews, The Annals of Mont Blanc (1898). Lives of some of the most celebrated moun- tain guides have been written in C. D. Cunningham and W. de W. Abney, Pioneers of the Alps (2nd ed., 1888).

(2) Maps. — There is no good modern and fairly large-scale map of

the entire chain of the Alps. But L. Ravenstein's maps (scale 1 : 250,000) of the Swiss Alps (2 sheets) and of the Eastern Alps (8 sheets) include the whole chain, save that portion south of the range of Mont Blanc.

All the countries which include Alpine districts have now issued official Government maps. The French map on a scale of 1 : 80,000 is clearer and more accurate than that on a scale of 1 : 100,000. The Italian Government has published maps on scales of 1 : 50,000 and 1 : 100,000 the Austrian on a scale of 1 : 75,000, and the Bavarian on a scale of 1 : 50,000. But the most splendid Government map of all is that put forth by the Swiss Federal Topographical Bureau, under the title of Siegfried Atlas (scale 1 -.50,000 for the Alpine districts), which has quite superseded the Dufour Map (scale 1 : 100,000), the history of which was published in 1896. For maps of the Swiss Alps and their neighbours, see J. H. Graf, Literatur der Landesvermessung (1896, with a supplement).

A few of the best special maps of certain districts may be men- tioned — such as H. Duhamel's maps of the Dauphine Alps (4 sheets on a scale of 1 :i 00,000, 1889, 2nd ed., 1892), and that of the range of Mont Blanc (scale 1:50,000, 1896, 2nd ed., 1905), by X. Imfeld and L. Kurz. The German and Austrian Alpine Club is publishing a very fine set of maps (scale 1 : 50,000) of the Eastern Alps, which are clearer and better than the Austrian Government's Topo- graphische Detailkarten (11 sheets, scale 1 : 50,000).

(W. A. B. C.)

10. Geology. — The Alps form but a small portion of a great zone of crumpling which stretches, in a series of curves, from

crust of the earth has been ridged up into a complex system of creases or folds, out of which the great mountain chains of southern Europe and Asia have been carved by atmospheric agencies. Superficially, the continuity of the zone is broken at intervals by gaps of greater or less extent; but these are due, in part at least, to the subsidence of portions of the folded belt and their subsequent burial by more recent accumulations. Such a gap is that between the Alps and the Carpathians, but a glance at a geological map of the region will show that the folding was probably at one time continuous. Leaving, however, the larger question of the connexion between the great mountain ranges of Europe and Asia, we find that the Alps are formed cf a series of wrinkles or folds, one behind another, frequently arranged en echelon. The folds run, in general,

in the direction of the chain, and together they form an arc around the plain of Lombardy and Piedmont. Outside this arc lies a depression along which the waters of the upper Danube and the lower Rhone find their way towards the sea; and beyond rise the ancient crystalline masses of Bohemia, the Black Forest and the central plateau of France, together with the intervening Mesozoic beds of southern Germany and the Jura. The depres- sion is filled by Miocene and later beds, which for the most part lie flat and undisturbed as they were laid down. Beyond the depression also, excepting in the Jura Mountains, there is no sign of the folding which has raised the Alpine chain. Some of the older beds indeed are crumpled, but the folding is altogether different in age and in direction from that of the Alps.

To assist in forming a clear idea of the relations of the Alps to the surrounding regions, a simple illustration will suffice. Upon a table covered by a cloth lay two books in the relative positions shown in figure. The book A represents the central plateau of France and the book B represents the rocks of Bohemia and southern Germany. If the two hands be placed flat upon the table, in the angle between the two books, and the cloth pushed towards the corner, it will at once be rucked up into a fold which will follow a curve not unlike that of the Alps. The precise character and form of the folds pro- duced will depend upon the nature of

the cloth and other accidental circum- p IG l L 00 [d n „ down

stances; (but with a little adjustment on the table,

not only a representation of the chain

of the Alps, but even a subsidiary fold in front in the position of the Jura Mountains may be obtained. Imperfect though this illustration may be, it will serve to explain the modern conception of the forces concerned in the formation of the Alps. Within the crust of the earth, whether by the contrac- tion of the interior or in any other way, tangential pressures were set up. Since the crust is not of uniform strength through- out, only the weaker portions yielded to the pressure; and these were crumpled up against the more resisting portions and sometimes were pushed over them. In the case of the Alps it seems natural enough that the crystalline masses of Bohemia, the Black Forest and the central plateau of France should be firmer than the more modern sedimentary deposits; but it is not so easy to understand why the Mesozoic rocks of southern Germany resisted the folding, while those of the Jura yielded. It should, however, be borne

in mind that the resisting mass is not necessarily at the surface. Such is in outline the process by which the Alps were elevated; but when the chain is examined in detail, it is found that its history has not been uniform through- out; and it will be convenient, for purposes of description, to divide it into three portions, which may be called the Eastern Alps, the Swiss Alps, and the Western Alps.

The Eastern Alps consist of a central mass of crystalline and schistose rocks flanked on each side by a zone of Mesozoic beds and on the north by an outer band of Tertiary deposits. On the Italian side there is usually no zone of folded Tertiaries and the Mesozoic band forms the southern border of the chain. Each of these zones is folded within itself,

L_!

Eastern Alps.

and the folding is more intense on the Bavarian side than on the Italian, the folds often leaning over towards the north. The Tertiary zone of the northern border is of especial significance and is remarkable for its extent and uniformity. It is divided longitudinally into an outer zone of Molasse and an inner zone of Flysch. The line of separation is very clearly'defined; nowhere does the Molasse pass beyond it to the south and nowhere does the Flysch extend beyond it to the north. The Molasse, in the neighbourhood of the mountains, consists chiefly of conglomerates and sandstones, and the Flysch consists of sandstones and shales; but the Molasse is of Miocene and Oligocene age, while the Flysch is mainly Eocene. The relations of the two series are never normal. Along the line of contact, which is often a fault, the oldest beds of the Molasse crop out, and they are invariably overturned and plunge beneath the Flysch. A few miles farther north the.se same beds rise again to the surface at the summit of an anticlinal which runs parallel to the chain. Beyond this point all signs of folding gradually cease and the beds lie flat and un-disturbed.

The Flysch is an extraordinarily thick and uniform mass of sandstones and shales with scarcely any fossils excepting fucoids. It is intensely folded and is constantly separated from the Mesozoic

zone by a fault. Throughout the whole extent of the Eastern Alps it is strictly limited to the belt between this fault and the marginal zone of Molasse. Eocene beds, indeed, pene- trate farther within the chain, but these are limestones with nummulites or lignite-bearing shales and have nothing in common with the Flysch. But although the Flysch is so uniform in character, and although it forms so well-defined a zone, it is not everywhere of the same age. In the west it seems to be entirely Eocene, but towards the east intercalated beds with Inoceramus, &c, indicate that it is partly of Cretaceous age. It is, in fact, a facies and nothing more. The most probable explanation is that the Flysch consists of the detritus washed down from the hills upon the flanks of which it was formed. It bears, indeed, very much the same relation to the Alps that the Siwalik beds of India bear to the Himalayas.

The Mesozoic belt of the Bavarian and Austrian Alps consists mainly of the Trias, Jurassic and Cretaceous beds playing a comparatively subordinate part. But between the Trias of the Eastern Alps and the. Trias of the region beyond the Alpine folds there is a striking contrast. North of the Danube, in Germany as in England, red sandstones, shales and conglomerates pre- dominate, together with beds of gypsum and salt. It was a continental formation, such as is now being formed within the desert belt of the globe. Only the Muschelkalk, which does not reach so far as England, and the uppermost beds, the Rhaetic, contain fossils in any abundance. The Trias of the Eastern Alps, on the other hand, consists chiefly of great masses of limestone with an abundant fauna, and is clearly of marine origin. The Jurassic and Cretaceous beds also differ, though in a less degree, from those of northern Europe. They consist largely of lime- stone; but marls and sandstones are by no means rare, and there are considerable gaps in the succession indicating that the region was not continuously beneath the sea. Tithonian fossils, characteristic of southern Europe, occur in the upper Jurassic, while the Gosau beds, belonging to the upper Cretaceous, contain many of the forms of the Hippuritic sea. Nevertheless, the difference between the deposits on the two sides of the chain shows that the central ridge was dry land during at least a part of the period.

The central zone of crystalline rock consists chiefly of gneisses and schists, but folded within it is a band of Palaeozoic rocks which divides it longitudinally into two parts. Palaeozoic beds also occur along the northern and southern margins of the crystalline zone. The age of a great part of the Palaeozoic belts is somewhat uncertain, but Permian, Carboniferous, Devonian and Silurian fossils have been found in various parts of the chain, and it is not unlikely that even

the Cambrian may be represented.

The Mesozoic belt of the southern border of the chain extends from Lago Maggiore eastwards. Jurassic and Cretaceous beds

play a larger part than on the northern border, but the Trias still predominates. On the west the belt is narrow, but towards the east it gradually widens, and north of Lago di Garda its northern boundary is suddenly deflected to the north and the zone spreads out so as to include the whole of the Dolomite mountains of Tirol. The sudden widening is due to the great Judicaria fault, which runs from Lago dTdro to the neighbourhood of Meran, where it bends round to the east. The throw of this fault may be as much as 2000 metres, and the drop is on its south-east side, i.e. towards the Adriatic. It is probable, indeed, that the fault took a large share in the formation of the Adriatic depression. On the whole, the Mesozoic beds of the southern border of the Alps point to a deeper and less troubled sea than those of the north. Clastic sediments are less abundant and there are fewer breaks in the succession. The folding, moreover, is less intense; but in the Dolomites of Tirol there are great outbursts of igneous rock, and faulting has occurred on an extensive scale.

I Permian 1+ +1\ Plutonic Rocks

% Carboniferous, including

older Palaeozoic rooks in places I

I Volcanic Rocks

West of a line which runs from Lake Constance to Lago Maggiore the zones already described do not continue with the same simplicity. The zone of the Molasse is little changed, bmt the Flysch is partly folded in the Mesozoic ˆps.

belt and no longer forms an absolutely independent band. The Trias has almost disappeared, and what remains is not of the marine type characteristic of the Eastern Alps but belongs rather to the continental facies which occurs in Germany and France. Jurassic and Cretaceous beds form the greater part of the Mesozoic band. On the southern side of the chain the Mesozoic zone disappears entirely a little west of Lago Maggiore and the crystalline rocks rise directly from the plain.

Perhaps the strangest problem in the whole of Switzerland is that presented by the so-called Klippen. Within the Alps, when normally

developed, we may trace the individual folds for long distances and observe how they arise, increase and die out, to be replaced by others of similar direction. But at times, within or on the border of the northern Eocene trough, the continuity of the folds is suddenly broken by mountain masses of quite different constitution. These are the Klippen, and they are especially important in the Chablais and between the Lakes of Geneva and Thun. Not only is the folding of the Klippen wholly independent of that of the zone in which they lie, but the rocks which form them are of foreign facies. They consist chiefly of Jurassic and Triassic beds, but it is the Trias and the Jura of the Eastern Alps and not of Switzerland. Moreover, although they interrupt the folding of the zone in which they occur, they do not disturb it: they do not, in fact, rise through the zone, but lie upon it like unconformable masses — in other, words, they rest upon a thrust-plane. Whence they have come into their present position is by no means clear; but the character of the beds which form them indicates a distant origin. It is interesting to note, in this

N.

Subalpine Nagelfluh

Kigl

ALPS

Cretaceous & Eocene flange Eocene & Jurassic Range

Hlgt tfochfluh

Ri*menstatd«n Thai

Kt.Witidgalle Rostock y*'

Tertiary

Meuunorphic Rocks

'; Aar Massif

Gotthard Massif

Sr .■■taUedq/

Tessiner Mass

P. Torno

Vat Chjronioo

Basal Puata rfs/ r-MM j

Seegebirge

Southern Edge

*•Hal *o/»»*

s.

Plizo Ferraro

tf.S.Satuatore Lugano Tr I^q

Pedrinate

Plain of Lombard y

Metamorphlc Rocks

Ter.

Tertiary

Sc.

Cr.

Cretaceous

a.

Jr.

Jurassic

M.

Tr.

Triassic

Gn.

C.

Carboniferous A Verrucano

A-G

:B _

‘ ”” Serlcitic Schists

Amphiboliie

Marble

Gneiss & Mica Schist

rtn C Sctimidt C. Carboniferous A Verrucano A-G. Augen Gneiss

connexion, that the pebbles of the Swiss Molasse are not generally such as would be derived from the neighbouring mountains, but resemble the rocks of the Eastern Alps. The Klippen are, no doubt, the remains of a much larger mass brought into the region upon a thrust-plane, and much of the Molasse has been derived from its destruction. Although the explanation here given of the origin of the Swiss Klippen is that which now is usually accepted, it should be mentioned that other theories have been proposed to account for their peculiarities.

In the Western Alps the Outer border of Molasse persists; but it no longer forms so well-defined a zone, and strips are infolded Western amon g st tne older rocks. The Eocene haS altogether Alps. l° s t its independence as a band and occurs only in

patches within the Mesozoic zone. The latter, on the other hand, assumes a greater importance and forms nearly the whole of the subalpine ranges. It consists almost entirely of Jurassic and Cretaceous beds, the Trias in these outer ranges being of very limited extent. The main chain is formed chiefly of crystalline and schistose rocks, which on the Italian side rise directly from the plain without any intervening zone of Mesozoic beds. But it is divided longitudinally by a well-marked belt of stratified deposits, known as the zone of the Brianconnais, composed chiefly of Carboniferous, Triassic and Jurassic beds. The origin of the schistose rocks has long been under discussion, and controversy has centred more particularly around the schistes lustres, which are held by some to be of Triassic age and by others to be pre-Carboniferous and even,

perhaps, Archaean. Partly in consequence of the uncertainty as to the age of these and other rocks, there is considerable difference of opinion as to the structure of the Western Alps. According to the view most widely accepted in France the main chain as a whole forms a fan, the folds on the eastern side leaning towards Italy and those on the western side towards France. The zone of the Brianconnais lies in the middle of the fan.

From the above account it will at once appear that between the convex and the concave margins of the Alpine chain there is a striking difference. Upon the outer side of the arc the central zone of crystalline rocks is flanked by Mesozoic and Tertiary belts; towards the west, indeed, the individuality of these belts

Pq.

Pp. Gr. P.

Quartz Porphyry ‘ Porphyrite Granite Protogine t

is lost, to a large extent, but the rocks remain. Upon the inner

side the Tertiary band is found only in the eastern part of the

chain, while towards the west, first the Tertiary and

thˆn the Mesozoic band disappears against the modern metry of

deposits of the low land. The appearance is strongly the Alps.

suggestive of faulting; and probably the southern

margin of the chain lies buried beneath the plain of northern

Italy.

*The chain of the Alps was not raised by a -single movement nor in a single geological period. Its growth was gradual and has not been uniform throughout. In the Eastern Alps the central ridge seems to have been in existence at least Jft”. * as early as Triassic times, but it has since been subject to several oscillations. The most conspicuous folding, that of the Mesozoic and Tertiary belts, must have occurred in Tertiary times, and it was not completed till the Miocene period. The structure of the zones in the Bavarian Alps seems to suggest that the chain grew outwards in successive stages, each stage being marked by the formation of a boundary fault. A precisely similar*

structure is seen in the Himalayas.

Authorities. — The literature is very extensive. The following list includes a few selected works on each portion of the chain: — F. Freeh, " Die karnischen Alpen," Abh. naturf. Ges. Halle, vol. xviii. (1892 and 1894) ; A. Rothpletz, Ein geologischer Querschnitt durch die Ost-Alpen (Stuttgart, 1894) ; C. Diener, " Bau und Bild der Ostalpen und des Karstgebietes," in Bau und Bild Oslerreichs (Vienna and Leipzig, 1903) ; Livret-guide geologique dans le Jura et les Alpes de la Suisse (Paris and Lausanne, 1894) ; A. Heim, Mechanismus der Gebirgsbildung (Basel, 1878); D. Zaccagna, " Riassunto di osserva- zioni geologiche fatte sul versante occidentale delle Aipi Graie," Boll. R. Com. Geol. Ital. vol. xxiii. (1892), pp. 175-244;. C. Diener, Der Gebirgsbau der West-Alpen (1894); M. Bertrand, " Etudes dans les Alpes frangaises," Bull. Soc. Geol. France, ser. 3, vol. xxii (1894), pp. 69-162; S. Franchi, " Sull' eta mesozoica della zona delle pietri verdi nelle Alpi Occidentali," Boll. R. Geol. Ital. vol. xxix. (1898), PP- !73 _2 47. 325-482, pts. v.-ix. For the broader question of the relation of the Alps to other regions, E. Suess, Das Antlitz der Erde (Vienna, 1 885) (English translation, Oxford, i904)should be consulted. The Geologischer Fuhrer durch die Alpen, published by Borntraeger, Berlin, are handy guides (P. La.)

1 1 . Flora. — The Alps owe the richness and beauty of their plant life partly to their position as the natural boundary between the

"Baltic" flora on the north and the "Mediterranean" flora on the south, but chiefly to the presence on their heights of a third flora which has but little in common with either of the others. The stronghold of this last, the distinctively " Alpine " flora, is the region above the tree-limit. Its closest relationship is with the flora of the Pyrenees ; but an alpine flora is character- istic of all the lofty mountains of central Europe. According to J. Ball, 2010 well-marked species of flowering plants occur within the limits of the Alps. If now we confine our attention to the alpine and higher regions of the Alps and exclude from our list all those plants which, however abundant in these regions, are not less so in the adjacent lowlands, we have left some 700 species (693, according to Dr Christ). We must observe, as regards the plants of the lower alpine region, that it is the

actual presence of a forest vegetation, rather than the theoretical tree- limit, which affects their vertical distribution; so that, e.g. they overflow into the extensive clearings made by man in the primeval mountain forests. Indeed, an analysis of the composi- tion of the alpine flora as a whole leads to the conclusion that the chief bond of union between its members consists in the treeless character of their habitat.

We may broadly distinguish two main geographical elements in the alpine flora, namely, the northern element and the endemic element. This division (which is not, however, strictly ex- haustive) directs special attention to what is undoubtedly the most striking feature of the flora — namely, that of its 693 species no less than 271 reappear in the extreme north. This relation of the arctic to the alpine flora is all the more remarkable in view of the very important differences between the arctic and alpine climates. The following circumpolar species are common, and widely diffused throughout the whole of the Alps: Silene acatdis, Dryas oclopetala, Saxifraga oppositifolia, S. aizoides, S. stellaris, Erigeron alpinus, Azalea procumbens, Myosolis alpestris, Polygonum viviparum, Salix relusa, S. herbacea, Phleum alpinum, Juniperus nana. The proportion of northern forms, as regards both species and individuals, increases as we ascend to the higher regions. In the highest vegetation-zone, the snow-region— i.e. on islands of rock above the snow-line — they attain to an equality with the endemic forms. As examples of northern flowers which are characteristic of the snow-region, we may mention Silene acaulis, Eritrichium nanum and Arenaria ciliata. On the other hand, typical endemic species of this highest zone are Androsace helvetica, A. glacialis, Petrocallis pyrenaica and Cherleria sedoides. All the plants just named, we may observe, are " cushion-plants." Their compact, moss-like growth and general structural peculiarities are not an expression of mutual affinity, but are in adaptation to the combined cold and dryness of their habitat. It is noteworthy that among the northern plants of the alpine zone, in the narrower sense of the term (i.e. of the region between the tree-limit and the snow-line), there is a marked predominance of species that affect moist localities; and conversely, the majority of alpine flowers of wet habitat are found also in the north. For example, in the genus Primula, a. highly characteristic genus of the alpine flora, whose members are among the most striking ornaments of the rocks, the single northern species, P. farinosa, grows only in marshy meadows. On the whole, then, adaptation to cold and wet is the note of the northern element.

As for the explanation of the community between the alpine and arctic floras, all authorities are agreed that the key to the problem is

furnished by the occurrence of the glacial period. In the ice-free belt, between the northern ice-sheet and, the vastly extended glaciers of the Alps, the two floras must have found a common refuge and congenial conditions of existence; and this view is confirmed by direct palaeontological evidence. With the return of a milder climate, the so-called northern forms of the present alpine flora were split in two, one portion following close on the northern ice in its gradual retreat to the Arctic, the other following the shrinking glaciers till the plants were able to establish (or re-establish) themselves on the slopes of the Alps. The same explanation covers the case of the similarity of the flora (not merely as regards the northern element) on all the

high mountains of central Europe. So much seems to be beyond reasonable doubt. But at this point disagreement begins between the most eminent writers on the subject. While some (e.g. Sir J. D. Hooker, Heer) regard the Arctic, and some (e.g. Wettstein) the Alps, as the original home of at least the bulk of the "northern" element, others (e.g. Ball, Christ) locate this in the highlands of temperate Asia. For it is a remarkable fact that, of the 230 northern species which are most typical of the far north, 182 are found also in the Altai (taking this as a collec- tive name for the mountains that form the southern boundary of Siberia) . In any case, however, the migration of these plants to the Alps must for the most part have taken place via the Arctic. The possibility of any extensive east to west migration having taken place direct from the Altai to the Alps seems excluded by the fact that 50% of the arctico-altaic alpine plants are absent from the Caucasus. A score of species, it is true — not such a number, be it observed, as was formerly supposed — are common to the Alps and Altai, but absent from the Arctic. But the species composing this Altaic element are not so numerous as the arc ti co-alpine species that are absent from the Altai. On the whole, a common origin in the north for at least the arctico- altaic group of alpine plants seems to be the most reasonable hypothesis.

Side by side with the northern element (which in some respects, we may observe to point the contrast, would be better named the tundra-element) we find a group of species usually spoken of as the xerothermic or meridional element. These do not, how- ever, form an " element," in the strict geographical sense in which this term is otherwise used here. They are those species which, on general phyto-geographical grounds, must be regarded as having originated under steppe like conditions. Their affinities are chiefly, though not exclusively, with the present Mediter ranean flora — about fifty are of presumably Mediterranean origin — and a large proportion of

them are restricted to the southern slopes of the Alps. The following, however, among others, are distributed throughout the whole, or a great part, of the range: Colchicum alpinum, Crocus vernus, Orchis globosa, Petrocallis pyrenaica, Astragalus depressus, A. aristatus, Oxytropis Halleri, Eryngium alpinum, Erica carnea, Linaria alpina, Globularia nudicaulis, G. cprdifolia, Leontopodium alpinum. The last named (the well-known " edelweiss ") is at the present day character- istic of the Siberian steppes. The presence of these plants among the alpine flora is traceable to the steppe-like conditions which prevailed in central Europe both during the warmer inter-glacial periods and (probably) for a time after the close of the ice-age. Subsequently, as the climate of the plains assumed a colder and more humid character, they retired before the invading forests to the high mountains. Here, in the intenser insolation which they enjoy on the alpine slopes, they seem to find a compensation for the drawbacks incidental to the altitude of their present station.

As regards now the endemic element as a whole, the question as to the time and place of its origin is of a highly complicated and controversial nature. The question, too, in the case of this element, is necessarily of genetic rather than purely geo- graphical scope. It must suffice to say that the weight of scientific opinion inclines to the view that at least the majority of endemic species are of pre-glacial origin, and are either strictly indigenous or products of the neighbouring lowlands. About 40 % of the endemic element in the alpine flora are endemic also in the narrower sense, i.e. they are confined to the Alps. Many of them are restricted to some one small portion of the chain; these occur chiefly in the southern and eastern Alps. It is an interesting fact that the centrally situated Bernese Alps produce hardly a single peculiar species. The greater richness of certain districts in the matter of species is partly due to the variety of soils encountered therein; but in part may be explained by the fact that these districts were the first to be freed from the ice-sheet at the end of the glacial period.

The following is a list of the most thoroughly characteristic alpine plants — all of them ipso facto members of the endemic element — which are at once peculiar to the Alps (or practically

so) and widely distributed within the limits of the chain. These are: Fesitica pulchella, Carex tnicrostyla, Salix caesia, Rumex nivalis, Alsine aretioides, Aquilegia alpina, Thlaspi rotundifolium, Saxifraga Seguieri, S. aphylla, Astragalus leontinus, Daphne striata, Eryngium

alpinum, Bupleurum stellatum, Androsace helvetica, A. glacialis, Gentiana bavarica, Phyteuma humile, Campanula thyrsoidea, C. cenisia, Achillea atrata, Cirsium spina sis simum, Crepis Terglouensis.

Authorities. — Among the voluminous literature on alpine flora, the following works are particularly noteworthy: — Ball, " On the Origin of the Flora of the European Alps, " in Proceed, of the Roy. Geog. Soc, 1879; Bennett, The Flora of the Alps, 2 vols, with 120 coloured plates (1896); Briquet, " Les Colonies vegetales xerothermiques des alpes lemaniennes," in Bull. d. I. Murithienne, soc. valaisienne des sciences nat., xxvii. and xxviii. (1898-1899); Alph. de Candolle, " Sur les causes de l'inegale distribution des plantes rares dans la chaine des Alpes," Exlr. des Actes du Congres botan. internal, de Florence (1875); Chodat u. Pampanini, "Sur la distribution des plantes des alpes austro-orientales," Extr. du Globe, organe de la soc. de geographic de Geneve, tome xli. (1902) ; H. Christ, Das Pflanzenleben der Schweiz (1882) — the chief classic on the subject; Engler, Die Pflanzenformationen und die pflanzengeographische Gliederung der Alpenkette (1901); Heer, Ueber die nivale Flora der Schweiz (1885); Jerosch, Geschichte und Herkunft der schweizerischen Alpenflora; eine Ubersicht uber den gegenivdrtigen Stand der Frage (1903) ; Schroter, Das Pflanzenleben der Alpen (Zurich, 1908); R. von Wettstein, Die Geschichte unserer Alpenflora (1896). The best book of coloured plates is the Atlas der Alpenflora, in 5 vols., pub. by the Deutscher u. Oesterreichischer Alpenverein (2nd. ed., 1897).

12. Fauna. — The fauna of the lower zones in the Alps is, on the northern side of the chain, practically identical with that of central Europe, and on the southern side with that of the Mediterranean basin. But in the higher regions it presents many features of special interest alike to the zoologist and the traveller. It seems therefore best to treat here principally of the animal inhabitants of the high Alps.

Though among mammalia — as also in the case of the birds — there are but few forms peculiar to the Alps, many interesting animals have found in the high mountains at least a temporary refuge from man. The European bison, the urus, the elk and the wild swine have disappeared since Roman times. But the lynx (Lynx vulgaris) perhaps lingers in remote parts, and the brown bear (Ursus arctos) still survives in the dense forests of the Lower Engadine. The fox (Canis vulpes), the stonemarten (Martes foina) and the stoat or ermine (Putorius erminea) range in summer above the tree-limit. The

Ungulata are represented by the chamois (Rupicapra tragus) and the bouquetin or steinbock (Capra ibex). The former — the sole representative, in western Europe, of the antelopes — is found elsewhere only in the Pyrenees, Carpathians, Caucasus and the mountains of eastern Turkey; the latter survives only in the eastern Graian Alps. Of the Rodentia the most interesting and conspicuous is the marmot (Arctomys marmota), which lives in colonies close to the snow-line. The snow-mouse (Arvicola nivalis) is confined to the alpine and snow regions, and is abundant at these levels throughout the whole chain of the Alps. The mountain hare (Lepus variabilis or timidus) replaces the common hare (Lepus europaeus) in the higher regions; though absent from the intervening plains it again appears in the north of Europe and in Scotland. Among the Insectivora, the alpine shrew (Sorex alpinus) is restricted to the Alps. Of the Cheiroptera (bats) only Vesperugo maurus is characteristically alpine.

The birds of the Alps are proportionately very numerous. The lammergeyer (Gypaelus barbatus), once common, is now extremely rare, even if it has not already become extinct in the Alps; but the golden eagle (Aquila chrysaetos) still holds its own. Some of the smaller birds of prey are not uncommon, but there is none that can be regarded as specially characteristic either of the Alps as a whole or of the alpine region. As characteristic birds of the snow-region may be mentioned the alpine chough (Pyrrhocorax alpinus), which is frequently seen at the summits even of the loftiest mountains, the alpine swift (Cypselus melba), the wall- creeper (Tichodroma muraria) , snow-finch (Monlifringilla nivalis) and ptarmigan (Lagopus mutus); the geographical distribution of this last being similar to that of the mountain hare. The black redstart (Ruticilla tilys), though common in the lower regions, is

also met with in fair numbers almost up to the snow-line. The raven (Corvus corax) is fairly common in the alpine and sub-alpine regions. On the highest pastures we find, further, the alpine accentor (Accentor collaris) and the alpine pipit (Anthus spipo- letta) . The crag-martin (Cotyle rupestris) haunts lofty cliffs in the alpine region. On the upper verge of the pine forestsi, or in the scrubby vegetation just beyond, the following are not uncommon — black woodpecker (Picus martius), ring-ousel (Turdus lor- quatus), Bonelli's warbler (Phylloscopus Bonellii), crested tit (Parus cristatus), citril finch

(Citrinella alpina), siskin (Chryso- mitris spinus) , crossbill (Loxia curvirostra) , nutcracker (Nucifraga caryocalactes) , blackcock (Telrao tetrix), and the alpine varieties of the marsh-tit (Parus palustris, borealis) and tree-creeper (Certhia familiaris, costae).

The remaining classes of Vertebrata are very sparsely repre- sented in the high Alps; and what few species occur are mostly common to the plains as well. In fact, among the remaining land vertebrates, only the black salamander (Salamandra atra) is exclusively alpine. This interesting animal, though a member of the Amphibia, is terrestrial and viviparous.

The former connexion between the Arctic and the Alps, which has left such unmistakable traces in the present alpine flora, affords, as regards the fauna also, the only possible explanation of the present geographical distribution of many alpine forms; but it is chiefly among the Invertebrata that we find this collateral testimony to the influence of the glacial period. In this respect we may note that two small crustaceans, Diaptomus bacillifer and D. denticornis, swarm in the ice-cold waters of the highest alpine tarns throughout the entire chain; and the former of these is also a characteristic inhabitant of pools formed from melting snow in the extreme north. Among the remaining divisions of Inverte- brata special mention may be made of the air-breathing Arthropoda — on the whole the most important and interesting group. About one-third of the animals belonging thereto that occur in the higher regions are exclusively alpine (or alpine and northern) ; these characteristically alpine forms being furnished chiefly by the spiders, beetles and butterflies. Most numerous are the beetles. Those of the highest zone-are remarkable for the great predominance of predaceous species and of wingless forms. In this last respect they present a striking analogy with the endemic coleopterous fauna of oceanic islands. As for the butterflies, not more than one-third of the species found in the alpine region occur in the neighbouring lowlands. The relations between alpine butterflies and plants are especially interesting, as regards not only their bionomic interdependence but also the analogies of their geographical distribution. It should be noted that butterflies are the chief agents in securing the continued existence of such alpine flowers as depend on insect fertilization, the other insect fertilizers being mostly wanting at great heights.

The classic of alpine zoology is F. von Tschudi's DaS Tierleben der Alpenwelt (nth ed., 1890). See also zoological section, by K. W. v. Dalla Torre, of Anleitung zu wissenschaftlichen Beobachtungen auf Alpenreisen. For the Vertebrata, see V. Fatio's Faune des vertebres de

la Suisse (5 vols., 1 869-1 964). Die Tierwelt der Hochgebirgsseen, by F. Zschokke (1900) is an important treatise on an interesting department of alpine natural history. C. Zeller's Alpentiere im Wechsel der Zeit (1892) gives a reliable account of the gradual disr appearance of some of the larger forms of life from the Alps. For the inter-relations of alpine insects and flowers, see H. Muller's Alpenblumen, ihre Befruchtung durch Insekten, und ihre Anpassung an dieselben (1881). (H. V. K.)

ALPUJARRAS, or Alptjxarras, THE (Moorish al Busherat, " the grass-land "), a mountainous district of southern Spain, in the province of Granada, consisting principally of valleys which descend at right angles from the crest of the Sierra Nevada on the north, to the Sierras Almijara, Contraviesa and Gador, which sever it from the Mediterranean Sea, on the south. These valleys are among the most beautiful and fertile in Spain. They contain a rich abundance of fruit trees, especially vines, oranges, lemons and figs, and in some parts present scenes of almost Alpine grandeur. The inhabitants are the descendants of the Moors, who, after the Spanish conquest of Granada in 1492, vainly sought to preserve the last relics of their independence in their mountain fastnesses. Many of the names of places in the

Alpujarras are of Moorish origin. The district contains many villages of iooo to 4000 inhabitants, the four largest being Lanjaron, with its ruined castle and chalybeate baths, Orgiba, Trevelez and Ugijar; all situated at a considerable elevation. Trevelez, the highest, stands 5332 ft. above the sea.

'ALQAMA IBN 'ABADA, generally known as 'Alqama al- Fahl, an Arabian poet of the tribe Tamlm, who flourished in the second half of the 6th century. Of his life we know practically nothing except that his chief poem concerns an incident in the wars between the Lakhmids and the Ghassanids (see Arabia, History). Even the date of this is doubtful, but it is generally referred to the period after the middle of the 6th century. His poetic description of ostriches is said to have been famous among the Arabs. His diwan consists of three qasidas (elegies) and eleven fragments. Asma' i considered three of the poems genuine.

The poems were edited by A. Socin with Latin translation as Die

Gedichte des 'Alkama Alfahl (Leipzig, 1867), and are contained in W. Ahlwardt's The Diwans of the six ancient Arabic Poets (Lond., 1870); cf. W. Ahlwardt's Bemerkungen iiber die Aechtheit der alten arabischen Gedichte (Greifswald, 1872), pp. 65-71 and 146-168. (G. W. T.)

ALQUIFOU (etymologically the same word as " alcohol "), a lead ore found in Cornwall, used by potters for its green glaze.

ALREDUS, Alueed or Aluredus, OF BEVERLEY, was sacristan of the church of Beverley in the first half of the 12th century. He wrote, apparently about the year 1143, a chronicle entitled Annates sive Historia de gestis regum Britanniae, which begins with Brutus and carries the history of England down to 1 1 29. This work was edited by T. Hearne (Oxford, 1716), and at one time enjoyed some reputation as an authority. It is, however, a mere compilation and of no value. Geoffrey of Monmouth and Simeon of Durham are Alured's chief sources. Among the Cottonian MSS. there is a collection of records relating to Beverley, Libertales Ecclesiae S. Johannis de Beverlae, which is attributed to Alured, but on no good authority. (H. W. C. D.)

ALSACE (Ger. Elsass), a former province of France, divided after the Revolution into the departments of Haut-Rhin and Bas-Rhin, and incorporated since the war of 1870 with the German empire (see Alsace-Lorraine). It is bounded on the north by the Rhenish Palatinate, on the east by the Rhine, on the south by Switzerland and on the west by the Vosges Mountains; and it comprises an area of 3344 English sq. m. The district possesses many natural attractions, and is one of the most fertile in central Europe. There are several ranges of hills, but no point within the province attains a great elevation. The only river of importance is the 111, which falls into the Rhine after a course of more than 100 m., and is navi- gable below Colmar. The hills are generally richly wooded, chiefly with fir, beech and oak. The agricultural products are corn, flax, tobacco, grapes and various other fruits. The country has a great wealth of minerals, silver having been found, and copper, lead, iron, coal and rock-salt being wrought with profit. There are considerable manufactures, chiefly of cotton and linen. The chief towns are Miilhausen and Colmar in the upper district and Strassburg in the lower. The province is traversed from east to west by the railway from Strassburg to Nancy, and the main line north and south runs between Basel and Strassburg.

History. — From a very early period Alsace has been a disputed

territory, and has suffered in the contentions of rival races. Inhabited by the Rauraci and the Sequani, it formed part of ancient Gaul, and was therefore included in the Roman empire in the provinces of Germania Superior and Maxima Sequanorum. The Romans held it nearly five hundred years, and on the dis- solution of their power it passed under the sway of the Franks. In the Merovingian period it formed a duchy attached to the kingdom of Austrasia, and was governed by the descendants of duke Eticho, one of whom was St Odilia. After the death of Charlemagne, Alsace, like the rest of the empire, was divided into countships. But the duchy was re-established after the death of the German king Henry I., and became hereditary in the Hohenstaufen family, and then in the house of Austria,

which succeeded in 1273 to the imperial dignity. In the be- ginning of the 1 2th century the country was divided between the two landgraviates of Upper and Lower Alsace, but to counteract the power of the nobles the emperors established in Alsace a great number of free towns. This state of things continued until 1648, when a large part of Alsace, comprising the two landgraviates of Upper and Lower Alsace and the pre- fecture of the ten free imperial towns, was ceded to France by the treaty of Westphalia. In the war which preceded this peace (generally known as the Thirty Years' War) Alsace had been so terribly devastated by the Swedes and the French that the German emperor found himself unable to hold it. The population was greatly reduced in numbers, and much of the land was left uncultivated. In the war between France and the Empire, arising out of the attempt of Louis XIV. to seize Holland, that part of Alsace which remained to Germany was again overrun by the French. Although this war was terminated in 1678 by the treaty of Nijmwegen, the French monarch was desirous of incorporating a still larger amount of Rhine territory; and accordingly in 1680 he laid claim to a number of territories, belonging to princes of the Empire, which he alleged had been dismembered from Alsace. It was ordered that these territories should be at once restored to that province under the crown of France, and several independent sovereigns were cited to appear before two chambers of inquiry, called chambres de reunion, which Louis had established at Brisach and Metz. The princes appealed to the emperor and to the diet; but the previous wars had so exhausted the power of the former that nothing could be done to resist the aggression. In 1681 the French troops under Louvois seized Strassburg, aided by the treachery of the bishop and other great men of the city. A further war broke out, but by the treaty of Ratisbon (Regensburg) in 1684, Strassburg was secured to

France. The war was renewed in 1688 and con- tinued until 1697, when the peace of Ryswick confirmed defini- tively the annexation of Strassburg to France. Some remaining territories of small extent were acquired by the French after the revolution of 1789, including Miilhausen, which had been a republic allied to Switzerland.

Originally Celtic, the population was modified during the Roman period by the arrival of a Germanic people, the Triboci. In the 5th century came other German tribes, the Aiamanni, and then the Franks, who drove the Aiamanni into the south. Since that period the population has in the main been Teutonic; and the French conquests of the 17th century, while modifying this element, still left it predominant. The people continued to use a German dialect as their native tongue, though the educated classes also spoke French. Protestantism was professed by a large number of the inhabitants; and in many respects their characteristics identified them rather with the race to the east than that to the west of the Rhine. In process of time, however, they considered themselves French, and lost all desire for reannexation to any of the German states.

Alsace suffered a good deal in the war of 1870-71. The earlier battles of the campaign were fought there; Strassburg and other of its fortified towns were besieged and taken; and its people were compelled to submit to very severe exactions. The civil and military government of the province, as well as that of Lorraine, was assumed by the Germans as soon as they obtained possession of those parts of France, which was very shortly after the commencement of the war. The Alsatian rail- ways were reorganized and provided with a staff of German officials. German stamps were introduced from Berlin; the occupied towns were garrisoned by the Landwehr; and requisi- tions on a large scale were demanded, and paid for in cheques which, at the close of the war, were to be honoured by whichever side should stand in the unpleasant position of the conquered. The people, notwithstanding their German origin, showed a very strong feeling against the invaders, and in no part of France was the enemy resisted with greater stubbornness. It was evident from an early period of the war, however, that Prussia was resolved to reannex Alsace to German territory. When the preliminaries of peace came to be discussed at Versailles in

February 1871, the cession of Alsace, together with what is called

German Lorraine, was one of the earliest conditions laid down by Bismarck and accepted by Thiers. This sacrifice of territory was afterwards ratified by the National Assembly at Bordeaux, though not without a protest from the representatives of the departments about to be given up; and thus Alsace once more became German. By the bill for the incorporation of Alsace and German Lorraine, introduced into the German parliament in May 1871, it was provided that the sole and supreme control of the two provinces should be vested in the German emperor and the federal council until the 1st of January 1874, when the constitution of the German empire was established. Bismarck admitted the aversion of the population to Prussian rule, but said that everything would be done to conciliate the people. This policy appears really to have been carried out, and it was not long in bearing fruit. Many of the inhabitants of the conquered districts, however, still clung to the old connexion, and on the 30th of September 1872 — the day by which the people were required to determine whether they would consider themselves German subjects and remain, or French subjects and transfer their domicile to France — 45,000 elected to be still French, and sorrowfully took their departure. The German system of com pulsory education of every child above the age of six was introduced directly after the annexation.

ALSACE-LORRAINE (Ger. Elsass-Lothringen) , a German imperial territory (since 1871), consisting of the former French province Alsace (then divided into the departments of Haut- Rhin and Bas-Rhin), together with its capital Strassburg, and German Lorraine (which included the department of the Moselle and portions of the departments of Meurthe and Vosges), together with the capital and fortress of Metz. The imperial territory (Reichsland) is bounded S. by Switzerland; E. by Baden, from which it is separated by the Rhine; N.E. and N. by the Bavarian Palatinate, the Prussian Rhine Province and Luxemburg, and W. by France. Its area is '5601 sq. m. The maximum length from N. to S. is 145 m.; the maximum breadth E. to W. 105 m., and the minimum breadth, on a line drawn through Schlettstadt, 24 m. In respect of its physical features, Alsace-Lorraine falls into three parts — mountain land, plain and plateau. The first, practically co-extensive with the western half of Alsace, consists of the Vosges range, which running in a northerly direction from the deep gap or pass of Belfort (trouee de Belfori) forms in its highest ridges the natural frontier line between Germany and France. Between this mountain chain and its spurs, which fall steeply to the E., and the Rhine, stretches a fertile plain forming the eastern half of Alsace. In the N.W. a high and undulating plateau, which gently

descends in the W. to the valley of the Moselle, occupies nearly the whole area of Lorraine. The drainage of the Vosges valleys and of the Rhine valley is collected and carried into the Rhine about 10 m. below Strassburg by the 111, which has a. course of more than 100 m. and is navigable below Colmar. With the exception of a few streams which run to the Rhone, all the waters of Alsace flow into the Rhine. The climate is on the whole temperate— warmest in the lowest districts (460 ft. above sea-level) of N. Alsace, and coldest on the summits of the Vosges, where snow lies six months in the year. The mean annual temperature at Strassburg is 49-8° F., at Metz 48-2°; the rainfall at Strassburg 26J in., and at Metz 27ˆ in. The Rhine valley is in great part fertile, yielding good crops of potatoes, cereals (including maize), sugar beet, hops, tobacco, flax, hemp and products of oleaginous plants. But grapes and fruit are amongst the most valuable of the crops. The cereals chiefly grown are wheat, oats, barley and rye. Great quantities of hay are harvested. This description embraces also the production of Lorraine, where agriculture is less strenuously carried on, and the fertility of the soil is less. But Lorraine possesses, in com- pensation, greater riches in the earth, in coal and iron and salt mines. Cows are grazed on the S. Vosges in summer, and large quantities of cheese (Munster cheese) are made and exported. Total population (1905) 1,814,626.

The farms in Alsace are mostly small and are held partly as a

private possession, partly on the communal system; in Lorraine there are some larger occupations. The manufacture of cottons, and on a smaller scale of woollens, is special to Alsace, the chief centres of the industry being Miilhausen, Colmar and the valleys of the Vosges. The territory has always been the centre of an active commerce, owing to its situation on the confines of Germany, France and Switzerland, and alongside the great highway of the Rhine. The communications embraced some 1249 m. of railway (1903), of which 1108 m. belonged to the state, a good system of roads, and several canals (notably the Rhine- Rhone, the Rhine-Marie and the Saar Canals) , in addition to the rivers. Administratively the territory is divided into the following three districts, showing a density of population of about 316 to the sq. m.: —

Districts.

Area in sq. miles.

Population.

1885.

I9Q5-

Upper Alsace . Lower Alsace . Lorraine .

1354 1845 2402

462,549 612,077 489,729

512,709 686,359 615,558

On the sex division, 935,305 were in 1905 males, and 879,321 females. The percentage of illegitimacy is about 7. : .The.rUral population embraces 51% of the whole, the Urban population 48 %. The largest towns are Strassburg (the capital of the territory) , Miilhausen, Metz, Colmar, all above 20,000 inhabitants each. Classified according to religion there were, in 1904, 372,078 Protestants, 1,310,391 Roman Catholics, and 32,379 Jews. Education is provided for at the university of Strassburg, in 21 classical and pro-classical schools, in 18 modern schools, and in nearly 4000 elementary schools. Over 85 % of the people speak German as their mother-tongue, the rest French, or a patois of French. The annual revenue and expenditure are each somewhat in excess of £3,000,000. Customs and indirect taxes yield more than three-fifths of the total revenue, ' and direct taxes less than one-fourth. The state forests give about one-ninth of the whole. The higher administration of justice is devolved upon six provincial courts and a supreme court, sitting at Colmar. Moreover, there are purely industrial tribunals at Miilhausen, Thann, Markirch, Strassburg and Metz. The fish- breeding establishment at Huningen in Upper Alsace should be mentioned.

Constitution. — The sovereignty over the territory was by a law (Reichsgesetz) of the 9th of June 187 i vested in the German emperor, who, until the introduction of the imperial constitution on the 1st of January 1874, had, with the assent of the federal council (Bundesrat) and, in a few cases, that of the imperial diet (Reichstag), the sole right of initiating legislation. In October of this last year a committee (Landesausschuss) of the whole territory was appointed to deliberate on laws proposed to it before they received the final sanction of the emperor. On the 2nd of May 1877, the Landesausschuss was itself empowered to initiate legislation within the competence of the territory, and in 1879 the imperial viceroy (Statthalter) , representing the imperial chancellor, who had until

then been the responsible minister, took up his residence in Strassburg. He is assisted in the govern- ment by 4 ministers of departments, tinder the presidency of a. secretary of state, and, when occasion demands the extraordinary discussion of legislative proposals, by a council of state (Staatsrat), consisting of the secretary of state, under secretaries, the president of the supreme court of justice of the territory and, as a rule, of 12 nominees of the emperor. The Landesaus- schuss, a constitutional body with parliamentary privileges, consists of 58 members, 34 being appointed out of their number by the various district councils (Bezirkstage) , 4 by the large towns, and 20 by the rural districts. Alsace-Lorraine is represented in the Bundesrat by two commissioners, who have, however, but one voice; and the territory returns 15 members to the Reichstag.

See A. Schmidt, Elsass und Lothringen (Leip., 1859) ; Spach, Histoire de la basse Alsace el de la ville de Strasbourg (Stras., i860); von Miillenheim Rechberg, Die Annexion des Elsass durch

Frankreich und Riickblick auf die Verwaltung des Landes, 1648-1607 (Stras., 1897) ; Du Prel, Die deutsche Verwaltung in Elsass, 1870-187Q (Stras., 1879); L. Petersen, Das Deutschtum in Elsass – Lothringen (Munich, 1902). (P. A. A.)

ALSATIA (the old French province of Alsace), long a ” debatable ground ” between France and Germany, and hence a name applied in the 17th century to the district of Whitefriars, between the Thames and Fleet Street, in London, which afforded sanctuary (q.v.) to debtors and criminals. The privileges were abolished in 1697. The term is also used generally of any refuge for criminals.

ALSEN (Danish Als), an island in the Baltic, off the coast of Schleswig, in the Little Belt. It formerly belonged to Denmark, but, as a result of the Danish war of 1864, was incorporated with Germany. Its area is 105 sq. m.; the length nearly 20, and the breadth from 3 to 12 m. Pop. (1900) 25,000, most of whom speak Danish. The island is fertile, richly wooded, and yields grain and fruit. Sonderburg, the capital, with a good harbour and a considerable trade, is connected with the mainland by a pontoon bridge. Other places of note are Norburg and Augustenburg. On the peninsula Kekenis at the S.W. end of Alsen there is a lighthouse. Here, in 1848,

the Danes directed their main attack against Field-marshal Wrangel's army. In 1864 the Prussians under Herwarth von Bittenfeld took Alsen, which was occupied by 9000 Danish troops under Steinmann, thus bringing the Danish war to a close. Since 1870 Alsen has been fortified.

'ALSHEKH, MOSES, Jewish rabbi in Safed (Palestine) in the later part of the 16th century. He was the author of many homiletical commentaries on the Hebrew Bible. His works stiJl justly enjoy much popularity, largely because of their powerful influence as practical exhortations to virtuous life.

ALSIETINUS LACUS (mod. Lago di Martignano), a small lake in southern Etruria, 15 m. due N.N.W. of Rome, in an extinct crater. Augustus drew from it the Aqua Alsietina; the water was hardly fit to drink, and was mainly intended to supply his naumachia (lake made for a sham naval battle) at Rome, near 3. Francesco a Ripa, on the right bank of the Tiber, where some traces of the aqueduct were perhaps found in 1720. The course of the aqueduct, which was mainly subterranean, is practically unknown: Frontinus tells us that it received a branch from the lake of Bracciano near Careiae (Galera): and an inscription relating to it was found in this district in 1887 (F. Barnabei, Notizie dcgli Scam, 1887, 181).

ALSIUM (mod. Palo), an ancient town of Etruria, 29 m. W. by N. of Rome by rail, on the Via Aurelia, by which it is about 22 m. from Rome. It was one of the oldest cities of Etruria, but does not appear in history till the Roman colonization of 247 B.C., and was never of great importance, except as a resort of wealthy Romans, many of whom (Pompey, the Antonine emperors) had villas there. About 1ˆ m. N.E. of Palo is a row of large mounds called I Monteroni, which belong to tombs of the Etruscan cemetery. Considerable remains of ancient villas still exist along the low sandy coast, one of which, about 1 m. E. of Palo, occupies an area of some 400 by 250 yds. The medieval castle belongs to the Odescalchi family. Near Palo is the modern sea-bathing resort Ladispoli. founded by Prince Odescalchi.

See G. Dennis, Cities and Cemeteries of Etruria, i. 219.

ALSOP, VINCENT (c. 1630- 1703), English Nonconformist divine, was of Northamptonshire origin and was educated at St John's College, Cambridge. He received deacon's orders from a bishop, whereupon he settled as assistant-master in the free school of Oakham, Rutland. He was reclaimed from in- different courses and associates here by a very " painful " minister, the Rev. Benjamin

King. Subsequently he married Mr King's daughter, and " becoming a convert to his principles, received ordination in the Presbyterian way, not being satisfied with that which he had from the bishop." He was presented to the living of Wilby in Northamptonshire; but was thence ejected under the act of Uniformity in 1662. After his ejection he preached privately at Oakham and Wellingborough, sharing the common pains and penalties of nonconformists,— e.g. he was imprisoned six months for praying with a sick person. A book

against William Sherlock, dean of St Paul's, called Antisozzo (against Socinus), written in the vein of Andrew Marvell's Rehearsal Transprosed, procured him much celebrity as a wit. Dr Robert South, no friend to nonconformists, publicly pro- nounced that Alsop had the advantage of Sherlock in every way. Besides fame, Antisozzo procured for its author an invitation to succeed the venerable Thomas Cawton (the younger) as inde- pendent minister in Westminster. He accepted the call and drew great multitudes to his chapel. He published other books which showed a fecundity of wit, a playful strength of reasoning, and a provoking indomitableness of raillery. Even with Dr Goodman and Dr Stillingfleet for antagonists, he more than held his own. His Mischief of Impositions (1680) in answer to Stillingfleet's Mischief of Separation, and Melius Inquirendum (1679) in answer to Goodman's Compassionate Inquiry, remain historical landmarks in the history of nonconformity. Later on, from the entanglements of a son in alleged treasonable practices, he had to sue for and obtained pardon from King James II. This seems to have given a somewhat diplomatic character .to his closing years, inasmuch as, while remaining a nonconformist, he had a good deal to do with proposed political-ecclesiastical compromises. He died on the 8th of May 1703, having preserved his " spirits and smartness " to the last.

See "Wood' sAthenae (Bliss) iv. 106 ; Calamy's Life of Baxter, ii. 487 ; Wilson's History and Ant. of Dissenting Churches, iv. 63-66.

(A. J. G,)

ALSTED, JOHANN HEINRICH (1588-1638), German Pro- testant divine. He was some time professor of philosophy and theology at Herborn, in Nassau, and afterwards at Weissenburg in Transylvania, where he remained till his death in 1638. He was a marvellously prolific writer. His Encyclopaedia (1630), the most considerable of the earlier works of that class, was long held in high estimation.

ALSTON, CHARLES (1683-1760), Scottish botanist, was born at

Eddlewood, near Hamilton, in 1683, and became lecturer in materia medica and botany at Edinburgh and also superin- tendent of the botanical gardens, of the plants in which he published a catalogue in 1740. He was a critic of Linnaeus's system of plant-classification (see Botany). He died on the 22nd of November 1769 at Edinburgh. His Lectures on Materia Medica were published posthumously in 1770.

ALSTON, a market-town in the Penrith parliamentary division of Cumberland, England, 29 m. by road E.S.E. of Carlisle, on a branch of the North-Eastern railway from Haltwhistle. Pop. (1901) 3133. It lies in the uppermost part of the valley of the South Tyne, among the high bleak moors of the Pennines. Copper and blende are found, and there are limestone quarries. The mines of argentiferous lead, belonging to Greenwich Hospital, London, were formerly of great value, and it was in order that royalties on the Alston lead mines and on those elsewhere in the county might be jointly collected that the parish was first included within the borders of Cumberland, in the 18th century. As many as 119 lead mines were worked in the parish in 1768, but the supply of metal has been almost exhausted. Coal is worked chiefly for lime-burning, and umber is prepared for the manufacture of colours. Thread and flannels are also made. Whitley Castle, 2 m. N., was a Roman fort, the original name of which is not known, guarding the road which ran along the South Tyne valley and over the Pennines. It has no connexion with Alston itself.

ALSTROMER, JONAS (1685-1761), Swedish industrial re- former, was born at Alingsas in Vestergotland, on the 7th of January, 1685. He left his native village at an early age, and in 1707 became clerk to Alberg, a merchant of Stockholm, whom he accompanied to London. After carrying on business for three years, Alberg failed, and Alstrom (as his name was before his ennoblement) engaged in the business of shipbroker on his own account, and eventually proved very successful. After travel- ling for several years on the continent, he was seized with the patriotic desire to transplant to his native country some of the industries he had seen flourishing in Britain. He accordingly returned to Alingsas, and in 1724 established a woollen factorv in

the village. After preliminary difficulties it became a very- profitable business. He next established a sugar refinery at Gothenburg,

introduced improvements in the cultivation of potatoes and of plants suitable for dyeing, and directed atten- tion to improved methods in shipbuilding, tanning and the manufacture of cutlery. But his most successful undertaking was the importation of sheep from England, Spain and Angora. He received many marks of distinction, was created (1748) knight of the order of the North Star, and a few years later received letters of nobility, with permission to change his name to Alstromer. He died on the 2nd of June 1761, leaving several works on practical industrial subjects. A statue was erected in his honour in the exchange at Stockholm. One of his sons, Clas (Claude) (1736- 1794), was a naturalist of considerable eminence. During a voyage to Spain he noticed a native Peruvian plant known in Peru as the lily of the Incas, at the Swedish counsul's at Cadiz; he sent a few seeds to his master and friend, Linnaeus, who named the genus in his honour Alstromcria. He also wrote a work on sheep-breeding.

ALTAI (in Mongolian Altain-ula, the " Mountains of Gold "), a term used in Asiatic geography with various significations. The Altai region, in West Siberia and Mongolia, is similar in character to Switzerland, but covers a very much greater area. It extends from the river Irtysh and the Dzungarian depression (46°-47° N.) northwards to the Siberian railway and to the Sayan mountains. The backbone of the region is the Sailughem or Silyughema mountains, also known as Kolyvan Altai, which stretch north-eastwards from 40 N. and 86° E. towards the western extremity of the Sayan mountains in 51° 60′ N. and 89° E. Their mean elevation is 5000-5500 ft. The snow-line runs at 6700 ft. on the northern versant and at 7800 ft. on the southern, and above it the rugged peaks tower up some 3200 ft. more. Passes across the range are few and difficult, the chief being the Ulan-daban at 9275 ft. (9445 ft. according to Kozlov), and the Chapchan-daban, at 10,555 ft., in the south and north respectively. On the east and south-east this range is flanked by the great plateau of Mongolia, the transition being effected gradually by means of several minor plateaus, such as Ukok (7800 ft.), Chuya (6000 ft.), Kendykty (8200 ft.)', Kak (8270 ft.), Suok (8500 ft.), and Juvlu-kul (7900 ft.). This region, which is not accurately known, is studded with large lakes, i.e. Ubsa-nor (2370 ft. above sea-level), Kirghiz-nor, Durga-nor and Kobdo-nor (3840 ft.), and traversed by various mountain ranges, of which the principal are the Tannu-ola, running roughly parallel with the Sayan mountains as far east as the Kosso-gol (ioo c -ioi° E. long.), and the Khan-khu mountains, also stretching west and east.

The range of the Altai proper, known also as the Ek-tagh, Mongolian Altai, Great Altai and Southern Altai, likewise extend in two twin

parallel chains eastwards as far as 99 , if not farther. The Ek-tagh or Mongolian Altai, which separates the Kobdo basin on the north from the Irtysh basin on the south, is a true border-range, in that it rises in a steep and lofty escarpment from the Dzungarian depression (1550 to 3000 ft.), but descends on the north by a relatively short slope to the plateau (4000-5500 ft.) of north-western Mongolia. East of 94° the range is continued by a double series of mountain chains, all of which exhibit less sharply marked orographical features and are at considerably lower elevations. The southern chain bears the names of Kara- adzirga and Burkhan-ola, and terminates in about 99°; but the northern range, the principal names of which are Artsi-bogdo and Saikhat, extends probably most of the way to the great north- ward bend of the Hwang-ho or Yellow River round the desert of Ordos. Whereas the western Ek-tagh Altai rises above the snow- line and is destitute of timber, the eastern double ranges barely touch the snow-line and are clothed with thick forests up to an altitude of 6250 ft. The slopes of the constituent chains of the system are inhabited principally by nomad Kirghiz.

The north-western and northern slopes of the Sailughem mountains are extremely steep and very difficult of access. On this side lies the culminating summit of the range, the double- headed Byelukha (the Mont Blanc of the Altai), whose summits

reach 14,890 and 14,560 ft. respectively, 1 and give origin to several glaciers (30 sq. m. in aggregate area). Here also are the Kuitun (12,000 ft.) and several other lofty peaks. Numerous spurs, striking in all directions from the Sailughem mountains, fill up the space between that range and the lowlands of Tomsk, but their mutual relations are far from being well known. Such are the Chuya Alps, having an average altitude of 9000 ft., with summits from 11,500 to 12,000 ft., and at least ten glaciers on their northern slope; the Katun Alps, which have a mean elevation of about 10,000 ft. and are mostly snow-clad; the Kholzun range; the Korgon (6300 to 7600 ft.), Tali tsk and Selitsk ranges; the Tigeretsk Alps, and so on. Several secondary plateaus of lower altitude are also distinguished by geographers, The Katun valley begins as a wild gorge on the south-west slope of Byelukha; then, after a big bend, the river (400 m. long) pierces the Katun Alps, and enters a wider valley, lying at an altitude of from 2000 to 3500 ft., which it follows until it emerges from the Altai highlands to join the Biya in a most picturesque region. The Katun and the Biya together form the Ob. The next valley is that of the Charysh, which has the Korgon and Tigeretsk Alps on one side and the Tali tsk and Bashalatsk Alps on the other. This, too, is very fertile. The Altai, seen from this valley,

presents the most romantic scenes, including the small but deep Kolyvan lake (altitude, n 80 ft.), which is surrounded by fantastic granite domes and towers. Farther west the valleys of the Uba, the Ulba and the Bukhtarma open south-westwards towards the Irtysh. The lower part of the first, like the lower valley of the Charysh, is thickly populated; in the valley of the Ulba is the Riddersk mine, at the foot of the Ivanovsk peak (6770 ft.), clothed with beautiful alpine meadows. The valley of the Bukhtarma, which has a length of 200 m., also has its origin at the foot of the Byelukha and the Kuitun peaks, and as it falls some 5000 ft. in less than 200 m., from an alpine plateau at an elevation of 6200 ft. to the Bukhtarma fortress (1130 ft.), it offers the most striking contrasts of landscape and vegetation. Its upper parts abound in glaciers, the best known of which is the Berel, which comes down from the Byelukha. On the northern side of the range which separates the upper Bukhtarma from the upper Katun is the Katun glacier, which after two ice-falls widens out to 700ˆ900 yards. From a grotto in this glacier bursts tumultuously the Katun river. The middle and lower parts of the Bukhtarma valley have been colonized since the 18th century by runaway Russian peasants — serfs and nonconformists (Raskolniks) — who created there a free republic on Chinese territory; and after this part of the valley was annexed to Russia in 1869, it was rapidly colonized. The high valleys farther north, on the same western face of the Sailughem range, are but little known, their only visitors being Kirghiz shepherds. Those of Bashkaus, Chulyshman, and Chulcha, all three leading to the beautiful alpine lake of Teletskoye (length, 48 m.; maximum width, 3 m.; altitude, 1700 ft.; area, 87 sq. m„; maximum depth, 1020 ft. ; mean depth, 660 ft.) , are only inhabited by nomad Telenghites or Teleuts. The shores of the lake — reminding a visitor somewhat of the Swiss lake of Lucerneˆ rise almost sheer to over 6000 ft. and are too wild to accommodate a numerous population. From this lake issues the Biya, which joins the Katun at Biysk, and then meanders through the beautiful prairies of the north-west of the Altai. Farther north the Altai highlands are continued in the Kuznetsk district, which has a slightly different geological aspect, but still belongs to the Altai system. But the Abakan river, which rises on the western shoulder of the Sayan mountains, belongs to the system of the Yenisei. The Kuznetsk Ala-tau range, on the left bank of the Abakan, runs north-east into the government of Yeniseisk, while a complexus of imperfectly mapped mountains (Chukchut, Salair, Abakan) fills up the country northwards towards the Siberian railway and westwards towards the Ob. The Tom and its numerous tributaries rise on the northern slopes of the Kuznetsk Ala-tau, and their fertile valleys are occupied by a

1 Mr S. Turner estimates the culminating peak of Mt. Byelukha at 14,800 ft., but to Wilier' s Peak, a little to the N. W. of Byelukha, he assigns an altitude of 17,800 ft. (p. 205 of Siberia).

dense Russian population, the centre of which is Kuznetsk, on the Tom.

Geology. — Geologically the Altai mountains consist of two distinct elements which differ considerably from each other in composition and structure. The Russian Altai is composed mainly of mica and chlorite schists and slates, together with beds of limestone, and in the higher horizons Devonian and Carboniferous fossils occur in many places. There is no axial zone of gneiss, but intrusions of granite and other plutonic rocks occur, and the famous ore deposits are found chiefly near the contact of these intrusions with the schists. The strata are thrown into folds which run in the direction of the mountain ridges, forming a curve with the convexity facing the south-east. The Mongolian or Great Altai, on the other hand, consists mainly of gneiss and Archaean rocks. The strike of the rocks is independent of the direction of the chain, and the chain is bounded by faults. It is, in fact, a horst and not a zone of folding.

Flora. — The flora of the Altai, explored chiefly by Rarl F. von Ledebour (1785-1851), is rich and very beautiful. Up to a level of 1000 ft. on the northern and 2000 ft. on the southern slopes, plant life belongs to the European flora, which extends into Siberia as far as the Yenisei. The steppe flora penetrates into the mountains, ascending some 1 100-1200 ft., and in sheltered valleys even up to 5500 ft., when it of course comes into contact with the purely alpine flora. Tree vegetation, which reaches up as high as 6500 and 8150 ft., the latter limit on the north and west, consists of magnificent forests of birch, poplar, aspen, and Coniferae, such as Pinus cembra, Abies sibirica, Larix sibirica, Picea obovata, and so on, though the fir is not found above 2500 ft., while the meadows are abundantly clothed with brightly- coloured, typical assortments of herbaceous plants. The alpine meadows, which have many species in common with the' European Alps, have also a number of their own peculiar Altaian species.

Mineral wealth. — The Altai proper is rich in silver, copper, lead and zinc ores, while in the Kuznetsk Ala-tau, gold, iron and coal are the

chief mineral resources. The Kuznetsk Ala-tau mines are only now beginning to be explored, while the copper, and perhaps also the silver, ores of the Altai proper were worked by the mysterious prehistoric race of the Chudes at a time when the use of iron was not yet known. Russians began to mine in 1727 at Kolyvan, and in 1739 at Barnaul. Most of the Altai region, covering an area of some 170,000 sq. m. and including the Kuznetsk district, has since 1 746 formed a domain of the imperial family under the name of the Altai Mining District. The ores of the Altai proper nearly always appear in irregular veins, con- taining silver, lead, copper and gold — sometimes all together, — and they are, or were, worked chiefly by Zmeinogorsk (or Zmeiev) , Zyryanovsk, Ust-Kamenogorsk and Riddersk (abandoned in 1861). They offer, however, great difficulties, especially on account of their continually varying productivity and tempera- ture of fusion. The beautiful varieties of porphyry— green, red, striped — which are obtained, often in big monoliths, near Kolyvan, are cut at the imperial stone-cutting factory into vases and other ornaments, familiar in the art galleries and palaces of Europe. Aquamarines of mediocre quality but enormous size (up to 3 in. in diameter) are found in the Korgon mine. The northern, or Salair, mining region is rich in silver ores, and the mine of this name used formerly to yield up to 93,300 oz. of silver in the year. But the chief wealth of the northern Altai is in the Kuznetsk coal-basin, also containing iron-ores, which fills up a valley between the Kuznetsk Ala-tau and the Salair range for a length of about 270 m., with a width of about 65 m. The coal is considered equal to the best coal of England and south Russia. The country is also covered with thick diluvial and alluvial deposits containing gold. However, all the mining is now on the decline.

Population. — The Russian population has rapidly increased since the fertile valleys belonging to the imperial family have been thrown open to settlement, and it has been estimated that in 1908 the population of the region (Biysk, Barnaul and Kuznetsk districts) reached about 800,000. Their chief occupa- tions are agriculture (about 3,500,000 acres under culture), cattle-

breeding, bee-keeping, mining, gathering of cedar-nuts and hunting. All this produce is exported partly to Tomsk and partly to Kobdo in Mongolia. The natives may represent a population of about 45,000. They are Altaians in the west and Telenghites or Teleuts in the east, with a few Kalmucks and Tatars. Although all are called Kalmucks by the Russians, they speak a Turkish language. Both the Telenghites and the Altaians are Shamanists in religion, but many of the former are already quite Russified. The virgin forests of the Kuznetsk Ala-

tau — the Chern, or Black Forest of the Russians — are peopled by Tatars, who live in very small settlements, sometimes of the Russian type, but mostly in wooden yurts or huts of the Mongolian fashion. They can hardly keep any cattle, and lead the precarious life of forest-dwellers, living upon various wild roots when there is no grain in the spring. Hunting and fishing are resorted to, and the skins and furs are tanned.

Towns. — The capital of the Altai region is Barnaul, the centre of the mining administration and an animated commercial town; Biysk is the commercial centre; Kuznetsk, Ust-Kamenogorsk, and the mining towns of Kolyvan, Zmeinogorsk, Riddersk and Salairsk are the next largest places.

Authorities. — P. Semenov and G. N. Potanin, in supplementary vol. of Russian ed. of Ritter's Asien (1877); Ledebour, Reise durch das Altaigebirge (1829-1830); P. Chikhatchev, Voyage scientifique dans V Altai oriental (1845); Gebler, Ubersicht des katunischen Gebirges (1837) ; G. von Helmersen, Reise nach dem Altai Q5t Peters- burg, 1848); T. W. Atkinson, Oriental and Western Siberia (1858); and Cotta, "iJer Altai (1871), are still worth consulting. Of modern works see Adrianov, " Journey to the Altai," in Zapiski Russ. Geogr. Soc. xi. ; Yadrintsev, " Journey in West Siberia," in Zapiski West Sib. Geogr. Soc. ii. ; Golubev, Altai (1890, Russian); Schmurlo, " Passes in S. Altai " (Sailughem), in Izvestia Russ. Geogr. Soc. (1898); xXxiv. 5; V. Saposhnikov, various articles in same periodical (1897), xxxiii. and (1899) xxxv., and, by the same, Katun i yeya Istoki (Tomsk, 1901) ; S. Turner, Siberia (1905) ; Deniker, on Kozlov's explorations, in La Geographie (1901, pp. 41, &c.) ; and P. Ignatov, in Izvestia Russ. Geog. Soc. (1902, No. 2). (P. A. K. ; J. T. Be.)

ALTAMURA, a town of Apulia, Italy, in the province of Bari, 28 m. S.S.W. of the town of that name, and 56 m. by rail via Gioia del Colle. Pop. (1901) 22,729. It possesses a fine Roman- esque cathedral begun in 1232 and restored in 1330 and 1531, the portal being especially remarkable. It is one of the four Palatine churches of Apulia. The surrounding territory Is fertile. The medieval walls, erected by the emperor Frederick II., rest upon the walls of an ancient city of unknown name. These early walls are of rough blocks of stone without mortar. Ancient tombs with fragments of vases have also been found, and there are cases which have been used as primitive tombs or dwellings, and a group of some fifty tumuli near Altamura.

ALTAR (Lat. altare, from altus, high; some ancient etymo- logical guesses are recorded by St Isidore of Seville in Etymologiae xv. 4), strictly a base or pedestal used for supplication and sacrifice to gods' or to deified heroes. The necessity for such sacrificial furniture has been felt in most religions, and conse- quently we find its use widespread among races and nations which have no mutual connexion.

Mesopotamia. — Altars are found from the earliest times in the remains of Babylonian cities; the oldest are square erections of sun-dried bricks. In Assyrian mounds limestone and alabaster are the chief material. They are of varying form; an altar shown in a relief at Khorsabad is ornamented with stepped battlements, which are the equivalent of the familiar " altar- horns " in Hebrew ritual. An altar also from Khorsabad (now in the British Museum) has a circular table and a solid base triangular on plan, with pilasters ornamented with animals' paws at the angles. A third variety, of which an 8th century b (c. example from Nimrud exists in the British Museum, is a rectangular block ornamented at the ends by cylindrical rolls. These altars are in height from 2 to 3 ft. According to Herodotus (i. 183) the great altars of Babylonia were made of gold.

Egypt. — In Pˆgypt altars took the form of a truncated cone or of a cubical block of polished granite or of basalt, with one or more basin-like depressions in the upper surface for receiving fluid libations. These had channels whereby fluids poured into the receptacles could be drained off. The surface was plain,

inscribed with dedicatory or other legends, or adorned with symbolical carving.

Palestine. — Recent excavations, especially at Gezer, have shown that the earliest altars, or rather sacrifice hearths, in Palestine were circular spaces marked out by small stones set on end. At Gezer a pre-Semitic place of worship was found in which three such hearths stood together, and drained into a cave which may reasonably be supposed to have been regarded as the residence of the divinity. These circular hearths persisted into the Canaanite period, but were ultimately superseded by the Semitic developments. To the primitive nomadic Semite the presence of the divinity was indicated by springs, shady trees, remarkable rocks and other landmarks; and from this

earliest conception grew the theory that a numen might be induced to take up an abode in an artificial heap of stones, or a pillar set upright for the purpose. The blood of the victim was poured over the stone as an offering to the divinity dwelling within it; and from this conception of the stone arose the further and final view, that the stone was a table on which the victim was to be burned.

Very few specimens of early Palestinian altars remain. The megalithic structures common in the Hauran and Moab may be entirely sepulchral. At Gezer no definite altar was discovered in the great High Place; though it is possible that a bank of intensely hard compact earth, in which were embedded a large number of human skulls, took its place. A very remarkable altar, at present unique, was found at Taanach by the Austrian excavators. It is pyramidal in shape, and the surface is orna- mented with human-headed animals in relief. This, like the earliest Babylonian altars, is of baked earth.

The Old Testament conception of the altar varies with the stage of religious development. In the pre-Deuteronomic period altars are erected in any place where there had appeared to be a manifestation of deity, or under any circumstance in which the aid of deity was invoked; not by heretical individuals, but by the acknowledged religious leaders, such as Noah at Ararat, Abraham at Shechem, Bethel &c, Isaac at Beersheba, Jacob at Bethel, Moses at Rephidim, Joshua at Ebal, Gideon at Ophrah, Samuel at Ramah, Elijah at Carmel, and others. These primitive altars were of the simplest possible description — in fact they were required to be so by the regulation affecting them, preserved in Exodus xx. 24, which prescribes that in every place where Yahweh records his name an altar of earth or of unhewn stone, without steps or other extraneous ornamentation, shall be erected.

The priestly regulations affecting altars are of a very elaborate nature, and are framed with a single eye to the essential theory of later Hebrew worship — ;the centralization of all worship at one shrine. These recognize two altars, which by the authors of this portion of the Pentateuch are placed frofn the first in the tabernacle in the wilderness — a theory which is inconsistent with the other evidences of the nature of the earlier Hebrew worship, to which we have just alluded.

The first of these altars is that for burnt-offering. This altar was in the centre of the court of the tabernacle, of acacia wood, 3 cubits high and 5 square. It was covered with copper, was provided with " horns " at the corners (like those of Assyria), hollow in the middle,

and with rings on the sides into which the staves for its transportation could be run (Ex. xxvii. 1-8). The altar of the Solomonic temple is on similar lines, but much larger. It is now generally recognized that the description of the taber- nacle altar is intended to provide a precedent for this vast structure, which would otherwise be inconsistent with the traditional view of the simple Hebrew altars. In the second temple a new altar was built after die fashion of the former (1 Mace. iv. 47) of " whole stones from the mountain." In Herod's temple the altar was again built after the same model. It is described by Josephus (v. 5. 6) as 15 cubits high and 50 cubits square, with angle horns, and with an " insensible acclivity " leading up to it (a device to evade the pre-Deutero- nomic regulation about steps). It was made without any use of iron, and no iron tool was ever allowed to touch it. The blood

and refuse were discharged through a drain into the brook Kedron; this drain probably still remains, in the Blr el-Arwah, under the " Dome of the Rock " in the mosque which covers the site of the temple.

The second altar was the altar of incense, which was in the holy place of the tabernacle. It was of similar construction to the altar of burnt-offering, but smaller, being 2 cubits high and 1 cubit square (Ex. xxx. 1-5). It was overlaid with gold. Solomon's altar of incense (1 K. vi. 20) is referred to in a problematical passage from which it would appear to have been of cedar. But the authenticity of the passages describing the altar of incense in the tabernacle, and the historicity of the corresponding altar in Solomon's temple, are matters of keen dispute among critics. The incense altar in the second temple was removed by Antiochus Epiphanes (1 Mace. i. 21) and restored by Judas Maccabaeus (1 Mace. iv. 49). That in the temple of Herod is referred to in Luke i. 11.

The ritual uses of these altars are sufficiently explained by their names. On the first was a fire continually burning, in which the burnt-offerings were consumed. On the second an offering of incense was made twice a day.

In the pre-Deuteronomic passage, Exodus xxi. 14, the use of the altar as an asylum is postulated, though denied to the wilful murderer. This is a survival of the ancient belief that the deity resided in the pillar or stone-heap, and that the fugitive was placing himself under the protection of the local numen by seeking sanctuary. From 1 Kings i. 50 it would appear that the suppliant caught hold of the altar-horns (compare 1 Kings ii. 28) , as though special protective virtue

resided in this important though obscure part of the structure.

Greece and Rome. — According to the difference in the service for which they were employed, altars fell into two classes. Those of the first class were pedestals, so small and low that the suppliant could kneel upon them; these stood inside the temples, in front of the sacred image. The second class consisted of larger tables destined for burnt sacrifice; these were placed in the open air, and, if connected with a temple, in front of the entrance. Possibly altars of the former class were in historical times sub- stitutes for, and rendered the same service as, the bases of the sacred images within the temples in earlier ages. In this case the altar of Apollo at Delphi, upon which on the Greek vases Neoptolemus is frequently represented as taking refuge from Orestes, might be regarded as the pedestal of an invisible image of the god, and as fulfilling the same function as did the base of the actual image of Athene in Troy, towards which Cassandra fled from Ajax. The second class of altars, called /Scojuoi by the Greeks and altaria by the Romans, appears to have originated in temporary constructions such as heaps of earth, turf or stone, made for kindling a sacrificial fire as occasion required. But sacrifices to earth divinities were made on the earth itself, and those to the infernal deities in sunk hollows (Odyss. x. 25; Festus s. v. Altaria). The note of Eustathius (Odyss. xii. 252) perhaps indicates some customs reminiscent of a primitive antiquity in which the sacrifice was made without an altar at all. He says airo(}6>iua riva lepd. &v oiiK eirl (iufiov 6 KaOayurfids dXX' hcl e5a

-^.

.?.-■ . ;

r- p.

PIE."

jtBpj;

K^^fcli

J^jSpJ

jjiS

Ipll

Plate II.

ALTAR

of the horns of goats believed to have been slain by Diana; while at Miletus was an altar composed of the blood of victims sacrificed (Paus. v. 13. 6). The altar at Phorae in Achaea was of unhewn stones (Paus. vii. 22. 3). The altar used at the festival in honour of Daedalus on Mt. Cithaeron was of wood, and was consumed along with the sacrifice (Paus. ix. 3. 4). Others of bron2« are mentioned. But these were exceptional, the usual material of an altar was marble, and its form, both among the Greeks and Romans, was either square or round; polygonal altars, of which examples still exist, being exceptions. When sculptured decorations were added they frequently took the form of imitations of the actual festoons with which it was usual to ornament altars, or of symbols, such as crania and horns of oxen, referring to the victims sacrificed. As a rule, the altars which existed apart from temples bore the name of the person by whom they were dedicated and the names of the deities in whose service they were, or, if not the name, some obvious representation of the deity. Such, for example, is the purpose of the figures of the Muses on an altar dedicated to them, now to be seen in the British Museum. An altar was retained for the service of one particular god, except where through local tradition two or more deities had become intimately associated, as in the case of the altar at Olympia to Artemis, and Alpheus jointly, or that of Poseidon and Erechtheus in the Erechtheum at Athens. The most remarkable instance of multiple dedication was, however, at Oropus, where the altar was divided into five parts, one dedicated to Heracles, Zeus and Paean Apollo, a second to heroes and their wives, a third to Hestia, Hermes, Amphiaraus and the children of Amphilochus, a fourth to Aphrodite Panacea, Jason, Health, and Healing Athene, and the fifth to the Nymphs, Pan, and the rivers Archelous and Cephissus (Paus. i. 34. 2). Such deities were styled crvufko/iot, each having a separate part of the altar (Paus. i. 34. 2). Other terms are ay6>vtoi, or dˆoficouiou Deities of an inferior order, who were conceived as working together — e.g. the wind gods — had an altar in common. In the same way, the ‘ ‘ unknown gods ” were regarded as a unit, and had in Athens and at Olympia one altar for all (Paus. i. 1. 4; v. 14. 5; cf. Acts of Apostles, xvii. 18). An altar to all the gods is mentioned by Aeschylus (Suppl. 222). Among the exceptional classes of altars are also to be mentioned those on which fire could not be kindled ((Sdifioi iirvpoi), and those which were kept free from blood

(/3co/k>i ava.ina.KToi), of which in both respects the altar of Zeus Hypatos at Athens was an example. The iaria was a round altar; the ecxapa, one employed apparently for sacrifice to inferior deities or heroes (but taxa-pc &oif}ov, Aesch. Pers. 205). In Rome an altar erected in front of a statue of a god was always required to be lower than the statue itself (Vitruvius iv. 9). Altars were always places of refuge, and even criminals and slaves were there safe, violence offered to them being insults to the gods whose suppliants the refugees were for the time being. They were also taken hold of by the Greeks when making their most solemn oaths.

Ancient America. — As a single specimen of an altar, wholly unrelated to any of the foregoing, we may cite the ancient Mexican example described by W. Bullock (Six Months in Mexico, London, 1824, p. 335). This was cylindrical, 25 ft. in circum- ference, with sculpture representing the conquests of the national warriors in fifteen different groups round the side. 1

Portable altars and tables of offerings were used in pre-Christian as well as in Christian ritual. One such was discovered in the Gezer excavations, dating about 200 B.C. It was a slab of polished limestone about 6 in. square with five cups in its upper surface. Another from the same place was a small cubical block of limestone bearing a dedication to Heracles. They have also been found in Assyria. Pocket altars are still used in some forms of worship in India. See the Journal of the Royal Asiatic Society, 1852, p. 71.

1 Bullock also says (p. 354) that the altar in the church of the Indian village of S. Miguel de los Ranchos which he visited was " of the same nature as those in use before the introduction of Christianity."

Altars in the Christian Church

I. The Early Church.— The altar is spoken of by the early Greek and Latin ecclesiastical writers under a variety of names : — rpaireˆa, the principal name in the Greek fathers and the liturgies; dvenaa-rripiov (rarer; used in the Septuagint for Hebrew altars); iXcurnjpiop; (la>(ws (usually avoided, as it. is a word with heathen associations); mensa Domini; ara (avoided like /3wju6s, and for the same reason) ; and, most regularly, altare. After the 4th century other names or expressions come into use, such as mensa tremenda, sedes corporis el sanguinis Chrisli.

The earliest Christians had no altars, and were taunted by the pagans for this. It is admitted by Origen in Ids reply to Celsus (p.

389), who has charged the Christians with being a secret society "because they forbid to build temples, to raise altars." " The altars," says Origen, " are the heart of every Christian." The same appears from a passage in Lactantius, De Origine Err oris, ii. 2. We gather from these passages that down to about a.d. 250, or perhaps a little later, the communion was administered on a movable wooden table. In the Catacombs, the arcosolia or bench-like tombs are said (though the statement is doubtful) to have been used to serve this purpose. The earliest church altars were certainly made of wood; and it would appear from a passage in William of Malmesbury (De Gest. Pontif. Angl. in. 14) that English altars were of wood down to the middle of the nth century, at least in the diocese of Worcester.

The cessation of persecution, and consequent gradual elabora- tion of church furniture and ritual, led to the employment of more costly materials for the altar as for the other fittings of ecclesiastical buildings. Already in the 4th century we find reference to stone altars in the writings of Gregory of Nyssa. In 517 the council of Epaone in Burgundy forbade any but stone pillars to be consecrated with chrism; but of course the decrees of this provincial council would not necessarily be received throughout the church.

Pope Felix I. (a.d. 269-274) decreed that " mass should be celebrated above the tombs of martyrs " — an observance probably suggested by the passage in Revelation vi. 9, " I saw under the altar the soiils of them that were slain for the word of God." This practice developed into the medieval rule that no altar can be consecrated unless it contain a relic or relics.

The form of the altar was originally table-shaped, consisting of a plane surface supported by columns. There were usually four, but examples with one, two and five columns are also recorded. But the development of the relic-custom led to the adoption of another form, the square box shape of an " altar- tomb." Transitional examples, combining the box with the earlier table shape, are found dating about 450. Mention is made occasionally of silver and gold altars in the 5th to the 8th centuries. This means no doubt that gold and silver were copiously used in its decoration. Such an altar still remains in Sant' Ambrogio at Milan, dating from the 9th century (see fig. 1).

II. The Medieval Church. — It will be convenient now to pass to the fully-developed altar of the Western Church With its accessories, though the rudiments of most of the additional details are traceable in the earlier period.

In the Roman Catholic Church, which preserves in this respect the tradition that had become established during the middle ages, the component parts of a fixed altar in the liturgical sense are the table (mensa), or super-altar, consisting of a stone slab; the support (stipes), consisting either of a solid mass or of four or more columns; the sepulchrum, or altar-cavity, a small chamber for the reception of the relics of martyrs. The support, in the technical sense, must be of stone solidly joined to the table; but, if this support consist of columns, the intervals may be filled with other materials, e.g. brick or cements The altar- slab or " table " alone is consecrated, and in sign of this are cut in its upper surface five Greek crosses, one in the centre and one in each corner. These crosses must have been anointed by the bishop with chrism in the ritual of consecration before the altar can be used. Crosses appear on the portable altar buried with

St Cuthbert (a.d. 687), but the history of the origin and development of this practice is not fully worked out.

According to the Caeromoniale (i. 12. 13) a canopy (balda- chinum) should be suspended over the altar; this should be square, and of sufficient size to cover the altar and the preddla on which the officiating priest stands. This baldachin, called liturgically the ciborium, is sometimes hung from the roof by chains in such a way that it can be lowered or raised; sometimes it is fixed to the wall or reredos; sometimes it is a solid structure of wood covered with metal or of marble supported on four columns. The latter form is, however, usual only in large churches, more especially of the basilica type, e.g. St Peter's at Rome or the Roman Catholic cathedral at Westminster. The origin of the ciborium is not certain, but it is represented in a mosaic at Thessalonica of a date not later than a.d. 500. Even at the present day, in spite of a decree of the Congregation of Rites (27th of May 1697) ordering it to be placed over all altars, it is — even at Rome itself— usually only found over the high altar and the altar of the Blessed Sacrament.

Multiplication of altars is another medieval characteristic. This also is probably a result of the edict of Pope Felix already mentioned. In a vault where more than one martyr was buried an altar might be erected for each. It is in the 6th century that we begin to find traces of the multiplication of altars. In the church of St Gall, Switzerland,

in the 9th century there were seventeen. In the modern Latin Church almost every large church contains several altars — dedicated to certain saints, in private side chapels, established for masses for the repose of the founder's soul, &c. Archbishop Wulfred in 816 ordered that beside every altar there should be an inscription recording its dedication. This regulation fell into abeyance after the 12th century, and such inscriptions are very rare. One remains mutilated at Deerhurst (Archaeologia, vol. 1. p. 69).

Where there is in a cathedral or church more than one altar, the principal one is called a " high altar." Where there is a second high altar, it is generally at the end of the choir or chancel. In monastic churches (e.g. formerly at St Albans) it sometimes stands at the end of the nave ciose to the choir screen.

Beside the altar was a drain (piscina) for pouring away the water in which the communion vessels were rinsed. This seems originally to have been under the altar, as it is still in the Eastern Church.

That the primitive communion table was covered with a communion-cloth is highly probable, and is mentioned by Optatus (c. a.d. 370), bishop of Milevis. This had developed by the 14th or 15th century into a cerecloth, or waxed cloth, on the table itself; and three linen coverings one above the other, two of about the size of the table and one rather wider than the altar, and long enough to hang down at each end. Five crosses are worked upon it, four in the corners and one in the middle, and there is an embroidered edging. 1 In front was often a hanging panel of embroidered cloth (the frontal; but frontals of wood, ornamented with carving or enamel, &c, are also to be found). These embroidered frontals are changeable, so that the principal colour in the pattern can accord with the liturgical colour of the day. Speaking broadly, red is the colour for feasts of martyrs, white for virgins, violet for penitential seasons, &c. ; no less than sixty-three different uses differing in details have been enumerated. A similar panel of needlework (the dossal) is suspended behind the altar.

Portable altars have been used on occasion since the time of Bede. They are small slabs of hard stone, just large enough for the chalice and paten. They are consecrated and marked with the five incised crosses in the same way as the fixed altar, but they may be placed upon a support of any suitable material, whether wood or stone. They are used on a journey in a heretical or heathen country, or in private chapels. In the inventory of the field apparel of Henry, earl of Northumberland, a.d. 1513, is

1 In the Eastern Church four small pieces of cloth marked with the names of the Evangelists are placed on the four corners of the altar, and covered with three cloths, the uppermost (the corporal) being of smaller size.

included "A coffer wyth ij liddes to serue for an Awter and ned be" (Archaeologia, xuvi. 403).

On the altar are placed a cross and candlesticks — six in number, and seven when a bishop celebrates in his cathedral; and over it is suspended or fixed a tabernacle qj receptacle for the reservation of the Sacrament.

III. Post- Reformation Altars.— At the Reformation the altars in churches were looked upon as symbols of the unreforrhed doctrine, especially where the struggle lay between the Catholics and the Calvinists, who on this point were much more radical revolutionaries than the Lutherans. In England the name "altar" 2 was retained in the Communion Office in English, printed in 1 549, and in the complete English Prayer-book of the following year, known to students as the First Book of Edward VI. But orders were given soon after that the altars should be destroyed, and replaced by movable wooden tables; while from the revised Prayer-book of 1552 the word "altar" was carefully expunged, "God's board" or "the table" being substituted. The short reign of Mary produced a temporary reaction, but the work of reformation was resumed on the accession of Elizabeth.

The name " altar " has been all along retained in the Corona- tion Office of the kings of England, where it occurs frequently. It was also recognized in the canons of 1640, but with the reserva- tion that "it was an altar in the sense in which the primitive chutch called it an altar and in no other." In the same canons the rule for the position of the communion tables, which has been since regularly followed throughout the Church of England, was formulated. In the primitive church the altars seem to have been so placed that, like those of the Hebrews, they could be surrounded on all sides by the worshippers. The chair of the bishop or celebrant was on their east side, and the assistant clergy were ranged On each side of him. But in the middle ages the altars were placed against the east wall of the churches, or else against a reredos erected at the east side of the altar, so as to prevent all access to the table from that side; the celebrant was thus brought round to the west side and caused to stand between the people and the altar. On the north and south sides there were often curtains. When tables were substituted for altars in the English

churches, these were not merely movable, but at the administration of the Lord's Supper were actually moved into the body of the church, and placed table-wise — ˆthat is, with the long sides turned to the north and south, and the narrow ends to the east and west,— the officiating clergyman standing at the north side. In the time of Archbishop Laud, however, the present practice of the Church of England was introduced. The communion table, though still of wood and movable, is, as a matter of fact, never moved; it is placed altar-wise — that is, with its longer axis running north and south, and close against theeast wall. Often there is a reredos behind it ; it is also fenced in by rails to preserve it from profanation of various kinds.

In 1841 the ancient church of the Holy Sepulchre at Cambridge was robbed of most of its interest by a calamitous " restoration " carried out under the superintendence and partly at the charge of the Camden Society. On this occasion a stone altar, consisting of a flat slab resting upon three other upright slabs, was presented to the parish, and was set up in the church at the east wall of the chancel. This was brought to the notice of the Court of Arches in 1845, and Sir H. Jenner Fust (Faulkner v. Lichfield and Steam) ordered it to be removed, on the ground that a stone structure so weighty that it could not be carried about, and seeming to be a mass of solid masonry, was not a communion-table in the sense recognized by the Church of England.

Bibliography.— For altars in the ancient East see M. Jastrow, Religion of Assyria and Babylonia; Perrot and Chipiez, Art in Chaldea (i. 143, 255); Sir J. Gardiner Wilkinson, A Second Series of the Manners and Customs of the Ancient Egyptians, ii. 387 ; Benzinger's and Nowack's works on Hebraische Archdologie. For classical altars, much information can be obtained from the notes in J. G. Frazer's Pausanias. See also Schomann, Criechische Alterthumer, vol. ii. ; the volume on " Gottesdienstliche Alterthumer " in Hermann's Lehrbuch der griechischen Antiquitdten. On domestic altars and worship see Petersen, Hausgottesdienst der Griechen (Cassel, 1851).

2 Except in one place where the term used is " God's board."

On plural dedications consult Maurer, De aribus graecorum pluribus

deis in commune positis (Darmstadt, 1885). For Christian altars, reference is best made to the articles on the subject in the dictionaries of Christian and liturgical antiquities of Migne, Martigny, Smith and Cheetham, and Pugin, where practically all the available informa- tion is collected. See also Ciampinus, Vetera Monumenta (Rome, 1747), where numerous illustrations of altars are to be found; Martene, De antiquis Ecclesiae ritibus, iii. vi. (Rouen, 1700); Voigt, Thysiasteriologia sive de altaribus veterum Christianorum (Hamburg, 1709) ; and the liturgical works of Bona. Many articles on various sections of the subject have appeared in the journals of archaeo- logical societies; we may mention Nesbitt on the churches of Rome earlier than 1 150 (Archaeologia, xl. p. 210), Didron, " L'Autel chretien " (Annates archeologiques, iv. p. 238), and a paper by Texier on enamelled altars in the same volume. (R. A. S. M.)

ALTDORF, the capital of the Swiss canton of Uri. It is built at a height of 1516 ft. above sea-level, a little above the right bank of the Reuss, not far above the point where this river is joined on the right by the Schachen torrent. In 1900 the popula- tion was 31 1 7, all Romanists and German-speaking. Altdorf is 34 m. from Lucerne by the St Gotthard railway and 22 m. from Goeschenen. Its port on the Lake of Lucerne, Fliielen, is 2 m. distant. There is a stately parish church, while above the little town is the oldest Capuchin convent in Switzerland (1581). Altdorf is best known as the place where, according to the legend, William Tell shot the apple from his son's head. This act by tradition happened on the market-place, where in 1895, at the foot of an old tower (with rude frescoes commemorating the feat), there was set up a fine bronze statue (by Richard Kissling of Zurich) of Tell and his son. In 1899 a theatre was opened close to the town for the sole purpose of performing Schiller's play of Wilhelm Tell. The same year a new carriage-road was opened from Altdorf through the Schachen valley and over the Klausen Pass (6404 ft.) to the village of Linththal (30 m.) and so to Glarus. One and a half mile from Altdorf by the Klausen road is the village of Burglen, where by tradition Tell was born; while he is also said to have lost his life, while saving that of a child, in the Schachen torrent that flows past the village. On the left bank of the Reuss, immediately opposite Altdorf, is Attinghausen, where the ruined castle (which belonged to one of the real founders of the Swiss Confederation) now houses the cantonal museum of antiquities. (W. A. B. C.)

ALTDORFER, ALBRECHT (? 1480-1538), German painter and engraver, was born at Regensburg (Ratisbon), where in 1505 he was

enrolled a burgher, and described as " twenty-five years old." Soon afterwards he is known to have been prosperous, and as city architect he erected fortifications and a public slaughter- house. Altdorfer has been called the " Giorgione of the North." His paintings are remarkable for minute and careful finish, and for close study of nature. The most important of them are to be found in the Pinakothek at Munich. A representation of the battle of Arbela (1529), included in that collection, is usually considered his chief work. His engravings on wood and copper are very numerous, and rank next to those of Albrecht Diirer. The most important collection is at the Berlin museum. Albrecht's brother, Erhard Altdorfer, was also a painter and engraver, and a pupil of Lucas Cranach.

ALTEN, SIR CHARLES [Karl] (1764-1840), Hanoverian and British soldier, son of Baron Alten, a member of an old Hanoverian family, entered the service of the elector as a page at the age of twelve. In 1781 he received a commission in the Hanoverian guards, and as a captain took part in the campaigns of 1793- 1795 in the Low Countries, distinguishing himself particularly on the Lys in command of light infantry. In 1803 the Hanoverian army was disbanded, and Alten took service with the King's German Legion in British pay. In command of the light infantry of this famous corps he took part with Lord Cathcart in the Hanoverian expedition of 1805 and in the siege of Copenhagen in 1807, and was with Moore in Sweden and Spain, as well as in the disastrous Walcheren expedition. He was soon employed once more in the Peninsula, and at Albuera commanded a brigade. In April 1813 Wellington placed him at the head of the famous " Light Division " (43rd, 52nd, 95th, and Cacadores) , in which post he worthily continued the records of Moore and Robert Craufurd at Nivelle, Nive, Orthez and

Toulouse. His officers presented him with a sword of honour as a token of their esteem. In 1815 Alten commanded Wellington's 3rd division and was severely wounded at Waterloo. His conduct won for him the rank of Count von Alten. When the King's German Legion ceased to exist, Alten was given the command of the Hanoverians in France, and in 1818 he returned to Hanover, where he became subsequently minister of war and foreign affairs, and rose to be field-marshal, being retained on the British Army list at the same time as Major-General Sir Charles Alten, G. C. B. He died in 1840. A memorial to Alten has been erected at Hanover.

See Gentleman's Magazine, 1840; N. L. Beamish, Hist, of the King's German Legion, 2 vols. (1832-1837).

ALTENA, a town of Germany, in the Prussian province of Westphalia, on the river Lenne, 38 m. S.S.E. from Dortmund. Pop. (1900) 12,769. It consists of a single street, winding up a deep valley for about 3 m. There are three churches, a museum, high grade and popular schools. Its hardware in- dustries are important, and embrace iron rolling, the manufacture of fine wire, needles, springs and silver ornaments. On the neighbouring Schlossberg is the ancestral castle of the counts of La Marck, ancestors, on the female side, of the Prussian royal house.

ALTENBURG, a town of Germany, capital of the duchy of Saxe-Altenburg, situated near the river Pleisse, 23 m. S. of Leipzig, and at the junction of the Saxon state railways Leipzig- Hof and Altenburg-Zeitz. Pop. (1905) 38,811. The town from its hilly position is irregularly built, but many of its streets are wide, and contain a number of large and beautiful buildings. Its ancient castle is picturesquely situated on a lofty porphyry rock, and is memorable as the place from which, in 1455, Kunz von Kaufungen carried off the young princes Albert and Ernest, the founders of the present royal and ducal families of Saxony. Its beautiful picture gallery, containing portraits of several of the famous princes of the house of Wettin, was almost totally destroyed by fire in January 1905. Altenburg is th<5 seat of the higher courts of the Saxon duchies, and possesses a cathedral and several churches, schools, a library, a gallery of pictures and a school of art, an infirmary and various learned societies. There is also a museum, with natural history, archaeological, and art collections, and among other buildings may be mentioned St Bartholomew's church (1089), the town hall (1562-1564), a lunatic asylum, teachers' seminary and an agricultural academy. There is considerable traffic in grain and cattle brought from the surrounding districts; and twice a year there are large horse fairs. Cigars, woollen goods, gloves, hats and porcelain are among the chief manufactures. There are lignite mines in the vicinity.

ALTENSTEIN, a castle upon a rocky mountain in Saxe- Meiningen, on the south-western slope of the Thiiringerwald, not far from Eisenach. It is the summer residence of the dukes of Meiningen, and is surrounded by a noble park, which contains, among other objects of interest, a remarkable under- ground cavern, 500 ft. long, through which flows a large and rapid stream. Boniface, the apostle of the Germans, lived and preached at Altenstein in 724; and near by is the place where, in 1521, Luther was seized, by the order of the elector Frederick the Wise, to be carried off to the Wartburg. An old beech called ” Luther’s tree,” which tradition connected with the reformer,

was blown down in 1841, and a small monument now stands in its place.

ALTERNATION (from Lat. alternare, to do by turns), strictly, the process of " alternating," i.e. of two things following one another regularly by turns, as night alternates with day. A somewhat different sense is attached to some usages of the derivatives. Thus, in American political representative bodies and in the case of company directors, a substitute is sometimes called an " alternate." An " alternative " is that which is offered as a choice of two things, the acceptance of the one implying the rejection of the other. It is incorrect to speak of more than two alternatives, though Mr Gladstone wrote in 1857 of a fourth (Oxf. Essays, 26). When there is only one course open there is said to be no alternative.

ALTHAEA, in classical legend, daughter of Thestius, king of Aetolia, wife of Oeneus, king of Calydon, and mother of Meleager (q.v.).

ALTING, JOHANN HEINRICH (1583-1644), German divine, was born at Emden,where his father, Menso Alting (1541-1612), was minister. Johann studied with great success at the uni- versities of Groningen and Herborn. In 1608 he was appointed tutor of Frederick, afterwards elector-palatine, at Heidelberg, and in 161 2 accompanied him to England. Returning in 1 613 to Heidelberg, after the marriage of the elector with Princess Elizabeth of England, he was appointed professor of dogmatics, and in 16 16 director of the theological department in the Col- legium Sapientiae. In 1618, along with Abraham Scultetus, he represented the university in the synod of Dort. When Count Tilly took the city of Heidelberg (1622) and handed it over to plunder, Alting found great difficulty in escaping the fury of the soldiers. He first retired to Schorndorf; but, offended by the " semi-Pelagianism " of the Lutherans with whom he was brought in contact, he removed to Holland, where the unfortunate elector and " Winter King " Frederick, in exile after his brief reign in Bohemia, made him tutor to his eldest son. In 1627 Alting was appointed to the chair of theology at Groningen, where he continued to lecture, with increasing reputation, until his death in 1644. Though an orthodox Calvinist, Alting laid little stress on the sterner side of his creed and, when at Dort he opposed the Remonstrants, he did so mainly on the ground that they were " innovators." Among his works are: — Notae in Decadem Problematum Jacobi Behm

(Heidelberg, 1618); Scripta Theologica Heidelbergensia (Amst., 1662); Exegesis Augustanae Confessionis (Amst, 1647).

ALTINUM (mod. Altino), an ancient town of Venetia, 12 m. S.E. of Tarvisium (Treviso), on the edge of the lagoons. It was probably only a small fishing village until it became the point of junction of the Via Postumia and the Via Popillia (see Aquixeia). At the end of the republic it was a municipium. Augustus and his successors brought it into further importance as a point on the route between Italy and the north-eastern portions of the empire. After the foundation of the naval station at Ravenna, it became the practice to take ship from there to Altinum, instead of following the Via Popillia round the coast, and thence to continue the journey by land. A new road, the Via Claudia Augusta, was constructed by the emperor Claudius from Altinum to the Danube, a distance of 350 m., apparently by way of the Lake of Constance. The place thus became of considerable strategic and commercial importance, and the comparatively mild climate (considering its northerly situation) led to the erection of villas which Martial (Epigr. iv. 25) compares with those of Baiae. It was destroyed by Attila in a.d. 452, and its inhabitants took refuge in the islands of the lagoons, forming settlements from which Venice eventually sprang.

ALTITUDE (Lat. altitudo, from altus, high), height or eminence, and particularly the height above the ground or above sea-level. In geometry, the altitude of a triangle is the length of the perpendicular from the vertex to the base. In astronomy, the altitude of a heavenly body is the apparent angular elevation of the body above the plane of the horizon (see Astronomy: Splierical). Apparent altitude is the value which is directly observed; true altitude is deduced by correcting for astronomical refraction and dip of the horizon; geocentric altitude by correcting for parallax.

ALTMUHL, a river of Germany, in the kingdom of Bavaria. It is an important left bank tributary of the Danube, rising in the Franconian plateau (Frankische Terrasse), and after a tortuous course of 116 m., at times flowing through meadows and again in weird romantic gorges, joins the Danube at Kelheim. From its mouth it is navigable up to Dietfurt (18 m.), whence the Ludwigscanal (100 m. long) proceeds to Bamberg on the Regnitz, thus establishing communication between the Danube and the Rhine.

ALTO (Ital. for " high "), a musical term applied to the highest adult male voice or counter-tenor, and to the lower boy's or woman's (contralto) voice.

ALTON, a market-town in the Fareham parliamentary dfvision of Hampshire, England, 463 m. S.W. of London by the London & South-Western railway. Pop. of urban district (1901) 5479. It has a pleasant undulating site near the headwaters of the river Wey. Of the church of St Lawrence part, including the tower, is Norman; the building was the scene of a fierce conflict between the royalist and parliamentary troops in 1643. There is a museum of natural history; the collection is reminiscent of the famous naturalist Gilbert White, of Selborne in this vicinity. Large markets and fairs are held for corn, hops, cattle and sheep; and the town contains some highly reputed ale breweries, besides paper mills and iron foundries.

*ALTON, a city of Madison county, Illinois, U.S.A., in the W. part of the state, on the Mississippi river, about 10 m. above the mouth of the Missouri, and about 25 m. N. of St Louis, Missouri. Pop. (1890) 10,294; (*9°) *4> 2IO > of whom 1638 were foreign-born; (1910) 17,528. Alton is served by the Chicago & Alton, the Chicago, Peoria & St Louis, the Cleve- land, Cincinnati, Chicago & St Louis, and the Illinois Terminal railways. The river is here spanned by a bridge. The residential portion of the city lies on the river bluffs, some of which rise to a height of 250 ft. above the water level, and the business streets are on the bottom lands of the river. Alton has a public library and a public park. Upper Alton (pop. 2918 in 1910), about i| m. N.E. of Alton, is the seat of the Western Military Academy (founded in 1879 as Wyman Institute; chartered in 1892), and of Shurtleff College (Baptist, founded in 1827 at Rock Spring, removed to Upper Alton in 1831, and chartered in 1833), which has a college of liberal arts, a divinity school, an academy and a school of music; and the village of Godfrey, 5*

The first settlement on the site of Alton was made in 1807, when a trading post was established by the French. The town was laid out in 1817, was first incorporated in 1821, and in 1827 was made the seat of a state penitentiary, which was later removed to Joliet, the last prisoners being transferred in i860. Alton was first chartered as a city in 1837. In 1836 the Rev. Elijah P. Lovejoy (1802-1837), a native of Albion, Maine, removed the Observer, a religious (Presbyterian) periodical of which he was the editor, from St Louis to Alton. He had attracted considerable attention in St Louis by his criticisms of slavery, but though he believed in emancipation, he was not a radical abolitionist. After coming to Alton his anti-slavery views soon became more radical, and in a few months he was an avowed abolitionist. His views were shared by his brother, Owen Lovejoy (1811-1864), a Congregational minister, who also at that time lived in Alton, and who from 1857 until his death was an able

anti-slavery member of Congress. Most of the people of southern Illinois were in sympathy with slavery, and conse- quently the Lovejoys became very unpopular. The press of the Observer was three time destroyed, and on the 7 th of. November 1837 E. P. Lovejoy was killed while attempting to defend against a mob a fourth press which he had recently obtained and which was stored in a warehouse in Alton. His death caused intense excitement throughout the country, and he was everywhere regarded by abolitionists as a martyr to their cause. In 1897 a monument, a granite column surmounted by a bronze statue of Victory, was erected in his honour by the citizens of Alton and by the state.

See Henry Tanner, The Martyrdom of Lovejoy (Chicago, 1881), and "The Alton Tragedy " in S. J. May's Some Recollections 0} Our Anti-Slavery Conflict (Boston, 1869).

ALTONA, a town of Germany, in the Prussian province of Schleswig-Holstein, on the right bank of the Elbe immediately west of Hamburg. Though administratively distinct, the two cities so closely adjoin as virtually to form one whole. Lying

higher than Hamburg, Altona enjoys a purer and healthier atmosphere. It has spacious squares and streets, among the latter the Palmaille, a stately avenue ending on a terrace about 100 ft. above the Elbe, whence a fine view is obtained of the river and the lowlands beyond. Of the six Evangelical churches, the Hauptkirche (parish church), with a lofty steeple, is note- worthy. The main thoroughfares are embellished by several striking monuments, notably the memorials of the wars of 1864 and 1870, bronze statues of the emperor William I. and Bismarck and the column of Victory {Siegessdule). The museum (1901) is an imposing building in the German Renaissance style and contains, in addition to a valuable library, ethnographical and natural history collections. Its site is that formerly occupied by the terminus of the Schleswig-Holstein railways, but a hand- some central station lying somewhat farther to the N., connected with Hamburg by an elevated railway, now accommodates all the traffic and provides through communication with the main Prussian railway systems. There are also fine municipal and judicial buildings, a theatre (under the same management as the Stadttheater in Hamburg), a gymnasium, technical schools, a school of navigation and a hospital. In respect of

its local industries Altona has manufactures of tobacco and cigars, of machinery, woollens, cottons and chemicals. There are also extensive breweries, tanneries and soap and oil works. Altona carries on an extensive maritime trade with Great Britain, France and America, but it has by no means succeeded in depriving Hamburg of its commercial superiority — indeed, so dependent is it upon its rival that most of its business is trans- acted on the Hamburg exchange, while the magnificent ware- houses on the Altona river bank are to a large extent occupied by the goods of Hamburg merchants. Since 1888, when Altona joined the imperial Zollverein, approximately half a million sterling has been spent upon harbour improvement works. The exports and imports resemble those of Hamburg. In the ten years 1871-1880, the port was entered on an average annually by 737 vessels of 67,735 tons, in 1881-1890 by 608 vessels of 154,713 tons, and in 1891-1898 by 839 vessels of 253,384 tons.

In 1890 the populous suburbs of Ottensen to the W., where the poet Gottlieb Klopstock lies buried, Bahrenfeld, Othmarschen and Ovelgonne were incorporated. Without these suburbs the growth of the town may be seen from the following figures: — (1864, when it ceased to be Danish) 53,039; (1880) 91,049; (1885) 104,717; (1890) together with the four suburbs, 143,249; (1895) 148,944; (1900) 161,508; (1905) 168,301. Altona is the headquarters of the IX. German army corps.

The name Altona is said to be derived from allzu-nah ("all too near "), the Hamburgers' designation for an inn which in the middle of the 16th century lay too close to their territory. For a long time this was the only house in the locality. When in 1640 Altona passed to Denmark it was a small fishing village. Its rise to its present position is mainly due to the fostering care of the Danish kings who conferred certain customs privileges and exemptions upon it with a view to making it a formidable rival to Hamburg. In 17 13 it was burnt by the Swedes, but rapidly recovered from this disaster, and despite the trials of the Napoleonic wars, gradually increased in prosperity. In 1853, owing to the withdrawal by Denmark of its customs privileges, its trade waned. In 1864 Altona was occupied in the name of the German Confederation, passed to Prussia after the war of 1866, and 1888 together with Hamburg joined the Zollverein, while retaining certain free trade rights over the Freihafengebiet which it shares with Hamburg and Wandsbek.

See Wichmann, Geschichle Altonas (2 vols., Alt., 1896) ; Ehrenberg & Stahl, Altonas topographische Entwickelung (Alt., 1894).

ALTOONA, a city of Blair county, Pennsylvania, U.S.A., about 117 m. E. by N. of Pittsburg. Pop. (1890) 30,337; (1900) 38,973, of whom 3301 were foreign-born, 1518 being German; (1910) 52,127. It lies in the upper end of Logan Valley at the base of the Alleghany mountains, about 11 80 ft. above sea-level, and commands views of some of the • most picturesque mountain scenery in the state. A short distance to the W. is the famous Horseshoe Bend of the Pennsylvania

railway. Altoona is served by the Pennsylvania railway, and is one of the leading railway cities in the United States. Its freight yard is 7 m. long, and has 221 m. of tracks. Large numbers of eastbound coal trains from the mountains and westbound " empties " returning to the mines stop here; and the cars of these trains are classified here and new trains made up. Locomotives and cars are sent to Altoona to be repaired from all over the Pennsylvania railway system E. of Pittsburg, and cars and locomotives are built here; and in the south Altoona foundries car wheels and general castings for locomotives and cars are made. The several departments of railway work are used to give training in a sort of railway university. Gradu- ates of technical schools are received as special apprentices and are directed in a course of four years through the erecting shops, vice shop, blacksmith shop, boiler shop, roundhouse, test depart- ment, machine shop, air-brake shop, iron foundry, car shop, work of firing on the road, office work in the motive power accounting department, and drawing room; the most competent may be admitted through the grades of inspector, in the office of the master mechanic or of the road foreman of engines, assistant master mechanic, assistant engineer of motive power, master mechanic and superintendent of motive power. The Pennsyl- vania railway, co-operating with the public school authorities, established at Altoona, in 1907, a railway high school, the first institution of the kind in the country. It has a well-equipped drawing room, carpenter shop, forging room, foundry, science laboratories and machinery department, in which expert in- struction is given. In 1905 the city's factory products were valued at $14,349,963, and in this year the railway shops gave employment to 83-7 % of all wage-earners employed in manu- facturing establishments. The manufacture of silk is the only other important industry in the city. The site of the city (formerly farming land) was purchased in 1849 by the Pennsyl- vania Railroad Company and was laid out as a town. It was incorporated as a borough in 1854 and was chartered as a city in 1868.

ALTO-RELIEVO (Ital. for " high relief "), the term applied to sculpture that projects from the plane to which it is attached to the extent of more than one-half the outline of the principal figures,

which may be nearly or in parts entirely detached from the background. It is thus distinguished from basso-relievo (q.v.), in which there is a greater or less approximation in effect to the pictorial method, the figures being made to appear as projecting more than half their outline without actually doing so. At the same time it is not only the actual degree of relief which is implied by these two terms, but a resultant difference also of design and treatment necessitated by the contingent differences of light and shadow. (See Relief and Sculpture.)

ALTOTTING, a town of Germany, in the kingdom of Bavaria, on the Morren, not far from its junction with the Inn, and on the Muhldoff-Burghausen railway. Pop. (1900) 4344. It has long been a place of pilgrimage to which Roman Catholics, especially from Austria, Bavaria and Swabia resort in large numbers, on account of a celebrated image of the Virgin Mary in the Holy Chapel, which also contains the hearts of some Bavarian princes in silver caskets. In the church of St Peter and St Paul is the tomb of Tilly.

ALTRANSTADT, a village of Germany, in Prussian Saxony near Merseburg (q.v.), with (1900) 813 inhabitants. AltranstSdt is famous in history for two treaties concluded here: (1) the peace which Augustus II., king of Poland and elector of Saxony was forced to ratify, on the 24th of September 1706, with Charles XII. of Sweden, whereby the former renounced the throne of Poland in favour of Stanislaus Leszczynski — a treaty which Augustus declared null and void after Charles XII. 's defeat at Poltava (8th of July 1709); (2) the treaty of the 31st of August 1707, by which the emperor Joseph I. guaranteed to Charles XII. religious tolerance and liberty of conscience for the Silesian protestants.*

ALTRINCHAM, or Altringham (and so pronounced), a market-town in the Altrincham parliamentary division of Cheshire England, 8 m. S.W. by S. of Manchester, on the Londpn

& North-Western, Manchester, South Junction & Altrincham and Cheshire Lines railways. Pop. of urban district (1901) 16,831. Many residences in the locality are occupied by those whose business lies in Manchester, who are attracted by the healthy climate and the vicinity of Bowdon Downs and Dunham Massey Woods. Market gardening is carried on, large quantities of fruit and flowers being

grown for sale in Manchester. Cabinet-making is also practised; and there are sawmills, iron foundries, and manufactures of cotton, yarn and worsted.

Altrincham (Aldringham) was originally included in the barony of Dunham Massey, one of the eight baronies founded by Hugh, earl of Chester, after the Conquest. An undated charter from Hamc de Massey, lord of the barony, in the reign of Edward I., constituted Altrincham a free borough, with a gild merchant, the customs of Macclesfield, the right to elect reeves and bailiffs for the common council and other privileges. In 1290 the same Hamo obtained a grant of a Tuesday market and a three days' fair at the feast of the Assumption of the Virgin; but in 1319, by a charter from Edward II., the date of the fair was changed to the feast of St James the Apostle. A mayor of Altrincham is mentioned by name in 1452, but the office probably existed long before this date; it has now for centuries been a purely nominal appointment, the chief duty consisting in the opening of the annual fairs. The trade in worsted and woollen yarns, which formerly furnished employment to a large section of the popula- tion, has now completely declined, partly owing to the introduc- tion of Irish worsted.

See Victoria County History, Cheshire; Alfred Ingham, History of Altrincham and Bowdon (Altrincham, 1879).

ALTRUISM (Fr. autrui, from Lat. alter, the other of two), a philosophical term used in ethics for that theory of conduct which regards the good of others as the end of moral action. It was invented by Auguste Comte and adopted by the English positivists as a convenient antithesis to egoism. According to Comte the only practical methodof social regeneration is gradually to inculcate the true social feeling which subordinates itself to the welfare of others. The application to sociological problems of the physical theory of organic evolution further developed the altruistic theory. According to Herbert Spencer, the life of the individual in the perfect society is identical with that of the state: in other words, the first object of him who would live well must be to take his part in promoting the well-being of his fellows individually and collectively. Pure egoism and pure altruism are alike impracticable. For on the one hand unless the egoist's happiness is compatible to some«xtent with that of his fellows, their opposition will almost inevitably vitiate his perfect enjoy- ment; on the other hand, the altruist whose primary object is the good of others, must derive his own highest happiness — i.e. must realize himself most completely — in the fulfilment of this object. In fact, the altruistic idea, in itself and apart from a further definition

of the good, is rather a method than an end.

The self-love theory of Hobbes, with its subtle perversions of the motives of ordinary humanity, led to a reaction which culminated in the utilitarianism of Bentham and the two Mills ; but their theory, though superior to the extravagant egoism of Hobbes, had this main defect, according to Herbert Spencer, that it conceived the world as an aggregate of units, and was so far individualistic. Sir Leslie Stephen in his Science of Ethics insisted that the unit is the social organism, and therefore that the aim of moralists is not the " greatest happiness of the greatest number," but rather the " health of the organism." The socialistic tendencies of subsequent thinkers have emphasized the ethical importance of altruistic action, but it must be re- membered always that it is ultimately only a form of action, that it may be commended in all types of ethical theory, and that it is a practical guide only when it is applied in accordance with a definite theory of "the good." Finally, he who devotes himself on principle to furthering the good of others as his highest moral obligation is from the highest point of view realizing, not sacri- ficing, himself.

See works of Comte, Spencer, Stephen, and text-books of ethics (cf. bibliography at end of article Ethjcs).

ALTWASSER, a town of Germany, in the Prussian province of Silesia, 43 m. by rail S.W. from Breslau, and 3 m. N. from Waldenburg. It has factories for glass, porcelain, machinery, cotton-spinning, iron-foundries and coal-mines. Pop. (1900)

12,144.

ALTYN-TAGH, or Astyn-Tagh, one of the chief constituent ranges of the Kuen-lun (q.v.) in Central Asia, separating Tibet from east Turkestan and the Desert of Gobi.

ALUM, in chemistry, a term given to the crystallized double sulphates of the typical formula M 2 S04-M 1 2 11 324H 2 0, where M is the sign of an alkali metal (potassium, sodium, rubidium, caesium), silver or ammonium, and M m denotes one of the trivalent metals, aluminium, chromium or ferric iron. These salts are employed in dyeing and various other industrial processes. They are soluble in water, have an astringent, acid, and sweetish taste, react acid to litmus, and crystallize in regular octahedra. When heated they liquefy; and if the heat ing be continued, the water of crystallization is driven off, the salt froths and swells, and at last an amorphous powder remains.

Potash alum is the common alum of commerce, although both soda alum and ammonium alum are manufactured. The presence of sulphuric acid in potash alum was known to the alchemists. J. H. Pott and A. S. Marggraf demonstrated that alumina was another constituent. Pott in his Lithogeognosia showed that the precipitate obtained when an alkali is poured into a solution of alum is quite different from lime and chalk, with which it had been confounded by G. E. Stahl. Marggraf showed that alumina is one of the constituents of alum, but that this earth possesses peculiar properties, and is one of the ingredients in common clay {Experiences faites sur la terre de I'alun, Marggraf 's Opusc. ii. 1 1 1) . He also showed that crystals of alum cannot be obtained by dissolving alumina in sulphuric acid and evaporating the solutions, but when a solution of potash or ammonia is dropped into this liquid, it immediately deposits perfect crystals of alum (Sur la regeneration de I'alun, Marggraf 's Opusc. ii. 86).

T. O. Bergman also observed that the addition of potash or ammonia made the solution of alumina in sulphuric acid crystal- lize, but that the same effect was not produced by the addition of soda or of lime (De confectione aluminus, Bergman's Opusc. i. 225), and that potassium sulphate is frequently found in alum.

After M. H. Klaproth had discovered the presence of potassium in leucite and lepidolite, it occurred to h: N. Vauquelin that it was probably an ingredient likewise in many other minerals. Knowing that alum cannot be obtained in crystals -without the addition of potash, he began to suspect that this alkali constituted an essential ingredient in the salt, and in 1797 he published a dissertation demonstrating that alum is a double salt, composed of sulphuric acid, alumina and potash (Annates de chimie, xxii. 258). Soon after, J. A. Chaptal published the analysis of four different kinds of alum, namely, Roman alum, Levant alum, British alum and alum manufactured by himself. This analysis led to the same result as that of Vauquelin (Ann. de chim. xxii. 280).

The word alumen, which we translate alum, occurs in Pliny's Natural History. In the 15th chapter of his 35th book he gives a detailed description of it. By comparing this with the account of o-Tinrrrfpia given by Dioscorides in the 123rd chapter of his 5 th book, it is obvious that the two are identical. Pliny informs us that alumen was found naturally in the earth. He calls it salsugoterrae. Different substances were distinguished by the name of " alumen"; but they were all characterized by a certain degree of astringency, and were all employed in dyeing and medicine, the light-coloured alumen being

useful in brilliant dyes, the dark-coloured only in dyeing black or very dark colours. One species was a liquid, which was apt to be adulter- ated; but when pure it had the property of blackening when added to pomegranate juice. This property seems to characterize a solution of iron sulphate in water; a solution of ordinary (potash) alum would possess no such property. Pliny says that there is another kind of alum which the Greeks call schistos. It forms in white threads upon the surface of certain stones. From

the name schistos, and the mode of formation, there can be little doubt that this species was the salt which forms spontane- ously on certain slaty minerals, as alum slate and bituminous shale, and which consists chiefly of the sulphates of iron and aluminium. Possibly in certain places the iron sulphate may have been nearly wanting, and then the salt would be white, and would answer, as Pliny says it did, for dyeing bright colours. Several other species of alumen are described by Pliny, but we are unable to make out to what minerals he alludes.

The alumen of the ancients, then, was not the same with the alum of the moderns. It was most commonly an iron sulphate, sometimes probably an aluminium sulphate, and usually a mixture of the two. But the ancients were unacquainted with our alum. They were acquainted with a crystallized iron sulphate, and distinguished it by the names of misy, sory, chalcanthum (Pliny xxxiv. 12). As alum and green vitriol were applied to a variety of substances in common, and as both are distinguished by a sweetish and astringent taste, writers, even after the discovery of alum, do not seem to have discriminated the two salts accurately from each other. In the .writings of the alchemists we find the words misy, sory, chalcanthum applied to alum as well as to iron sulphate; and the name atramentum sutorium, which ought to belong, one would suppose, exclusively to green vitriol, applied indifferently to both. Various minerals are employed in the manufacture of alum, the most important being alunite (q.v.) or alum-stone, alum schist, bauxite and cryolite.

In order to obtain alum from alunite, it is calcined and then exposed to the action of air for a considerable time. During this exposure it is kept continually moistened with water, so that it ultimately falls to a very fine powder. This powder is then lixiviated with hot water, the

liquor decanted, and the alum

allowed to crystallize. The alum schists employed in the manufacture of alum are mixtures of iron pyrites, aluminium silicate and various bituminous substances, and are found in upper Bavaria, Bohemia, Belgium and Scotland. These are either roasted or exposed to the weathering action of the air. In the roasting process, sulphuric acid is formed and acts on the clay to form aluminium sulphate, a similar condition of affairs being produced during weathering. The mass is now systematically extracted with water, and a solution of aluminium sulphate of specific gravity 1-16 is prepared. This solution is allowed to stand for some time (in order that any calcium sulphate and basic ferric sulphate may separate), and is then evaporated until ferrous sulphate crystallizes on cooling; it is then drawn off and evaporated until it attains a specific gravity of 1-40. It is now allowed to stand for some time, decanted from any sediment, and finally mixed with the calculated quantity of potassium sulphate (or if ammonium alum is required, with ammonium sulphate), well agitated, and the alum is thrown down as a finely-divided precipitate of alum meal. If much iron should be present in the shale then it is preferable to use potassium chloride in place of potassium sulphate.

In the preparation of alum from clays or from bauxite, the material is gently calcined, then mixed with sulphuric acid and heated gradually to boiling; it is allowed to stand for some time, the clear solution drawn off and mixed with acid potassium sulphate and allowed to crystallize. When cryolite is used for the preparation of alum, it is mixed with calcium carbonate and heated. By this means, sodium aluminate is formed; it is then extracted with water and precipitated either by sodium bicarbonate or by passing a current of carbon dioxide through the solution. The precipitate is then dissolved in sulphuric acid, the requisite amount of potassium sulphate added and the solution allowed to crystallize.

Potash alum, K 2 SO4-AU(SO03-24HsO, crystallizes in regular

octahedra and is very soluble in water. The solution reddens litmus and is an astringent. When heated to nearly a red heat it gives a porous friable mass which is known as " burnt alum." It fuses at 92° C. in its own water of crystallization. " Neutral alum " is obtained by the addition of as much sodium carbonate to a solution of alum as will begin to cause the separation of alumina; it is much used in mordanting. Alum finds application as a mordant, in the preparation of lakes for sizing hand-made paper and in the clarifying of turbid

liquids.

Sodium alum, Na2S04-Al2(S04)3-24H 2 0, occurs in nature as the mineral mendozite. It is very soluble in water, and is extremely difficult to purify. In the preparation of this salt, it is preferable to mix the component solutions in the cold, and to evaporate them at a temperature not exceeding 60° C. 100 parts of water dissolve no parts of sodium alum at 0° C. (W. A. Tilden, Jour. Chcm. Soc, 1884, 45, p. 409), and 51 parts at 16° C. (E. Auge, Comptes rendus, 1890, no, p. 1139).

Chrome alum, KˆSOyCˆSCˆˆHsO, appears chiefly as a by-product in the manufacture of alizarin, and as a product of the reaction in bichromate batteries.

The solubility of the various alums in water varies greatly, sodium alum being readily soluble in water, whilst caesium and rubidium alums are only sparingly soluble. The various solu- bilities are shown in the following table: —

Ammonium Alum. ‘■

Caesium Alum.

Potash Alum.

Rubidium Alum.

t°C.

100 parts water dissolve.

t°C.

100 parts water dissolve.

t°C.

100 parts water dissolve.

t°C.

100 parts water dissolve.

10

50

80

100

2-62

4-5 15-9 35-2 70-83

10

50 80

0-19 0-29 1-235 5-29

10

50

80

100

3-9

9-52

44-n

134-47

357-48

10

5P

80

071

1-09

4-98

21 -6o

Poggiale

Ann. Chim. phys.

[3] 8, p. 467.

C. Setterberg Ann. 1882, 211, p. 104.

Poggiale

C. Setterberg

ALUMINIUM (symbol Al; atomic weight 27-0), a metallic chemical element. Although never met with in the free state, aluminium is very widely distributed in combination, principally as silicates. The word is derived from the Lat. alumen (see Axum), and is probably akin to the Gr. aXs (the root of salt, halogen, &c). In 1722 F. Hoffmann announced the base of alum to be an individual substance; L. B.Guyton de Morveau sug- gested that this base should be called alumine, after Sel alumineux, the French name for alum; and about 1820 the word was changed into alumina. In 1760 the French chemist, T. Baron de Henou- ville, unsuccessfully attempted " to reduce the base of alum " to a metal, and shortly afterwards various other investigators essayed the problem in vain. In 1808 Sir Humphry Davy, fresh from the electrolytic isolation of potassium and sodium, attempted to decompose alumina by heating it with potash in a platinum crucible and submitting the mixture to a current of electricity; in 1809, with a more powerful battery, he raised iron wire to a red heat in contact with alumina, and obtained distinct evidence of the production of an iron-aluminium alloy. Naming the new metal in anticipation of its actual birth, he called it alumium ; but for the sake of analogy he was soon persuaded to change the word to aluminum, in which form, alternately with aluminium, it occurs in chemical literature for some thirty years.

In the year 1824, endeavouring to prepare it by chemical means, H. C. Oersted heated its chloride with potassium amalgam, and failed in his object simply by reason of the mercury, so that when F. Wohler repeated the experiment at

properties, and prepared several compounds hitherto unknown. Early in 1854, H. St Claire Deville, accidentally and in ignorance of Wohler's later results, imitated the 1845 experiment. At once observing the reduction of the chloride, he realized the importance of

his discovery and immediately began to study the commercial production of the metal. His attention was at first divided between two processes — the chemical method of reducing the chloride with potassium, and an electrolytic method of decom posing it with a carbon anode and a platinum cathode, which was simultaneously imagined by himself and R. Bunsen. Both schemes appeared practically impossible; potassium cost about £17 per lb, gave a very small yield and was dangerous to mani- pulate, while on the other hand, the only source of electric current then available was the primary battery, and zinc as a store of industrial energy was utterly out of the question. Deville accordingly returned to pure chemistry and invented a practicable method of preparing sodium which, having a lower atomic weight than potassium, reduced a larger proportion. He next devised a plan for manufacturing pure alumina from the natural ores, and finally elaborated a process and plant which held the field for almost thirty years. Only the discovery of dynamo-electric machines and their application to metallurgical processes rendered it possible for E. H. and A. H. Cowles to remove the industry from the hands of chemists, till the time when P. T. L. Heroult and C. M. Hall, by devising the electrolytic method now in use, inaugurated the present era of industrial electrolysis.

The chief natural compounds of aluminium are four in number: oxide, hydroxide (hydrated oxide), silicate and fluoride. Corun- Oreˆ dum, the only important native oxide (A1 2 3), occurs

in large deposits in southern India and the United States. Although it contains a higher percentage of metal (52-9) than any other natural compound, it is not at present employed as an ore, not only because it is so hard as to be crushed with difficulty, but also because its very hardness makes it valuable as an abrasive. Cryolite (AlF 3 -5NaF) is a double fluoride of aluminium and sodium, which is scarcely known except on the west coast of Greenland. Formerly it was used for the preparation of the metal, but the inaccessibility of its source, and the fact that it is not sufficiently pure to be employed without some preliminary treatment, caused it to be abandoned in favour of other salts. When required in the Heroult-Hall process as a solvent, it is sometimes made artificially. Aluminium silicate is the chemical body of which all clays are nominally composed. Kaolin or China clay is essentially a pure disilicate (Al 2 03-2Si02-2H 2 0), occurring in large beds almost throughout the world, and containing in its anhydrous state 24-4 of the metal, which, however, in common clays is more or less replaced by calcium, magnesium, and the alkalis, the proportion of silica sometimes reaching 70 %. Kaolin thus seems to be the best ore, and it would undoubtedly be used were it not for the

fatal objection that no satisfactory process has yet been discovered for preparing pure alumina from any mineral silicate. If, according to the present method of winning the metal, a bath containing silica as well as alumina is submitted to electrolysis, both oxides are dissociated, and as silicon is a very undesirable impurity, an alumina contaminated with silica is not suited for reduction. Bauxite is a hydrated oxide of aluminium of the ideal composition, A1 2 3 -2H 2 0. It is a somewhat widely distributed mineral, being met with in Styria, Austria, Hesse, French Guiana, India and Italy; but the most important beds are in the south of France, the north of Ireland, and in Alabama, Georgia and Arkansas in North America. The chief Irish deposits are in the neighbourhood of Glenravel, Co. Antrim, and have the advantage of being near the coast, so that the alumina can be transported by water-carriage. After being dried at ioo° C, Antrim bauxite contains from 33 to 60 % of alumina, from 2 to 30% of ferric oxide, and from 7 to 24% of silica, the balance being titanic acid and water of combination. The American bauxites contain from 38 to 67 % of alumina, from 1 to 23 % of ferric oxide, and from 1 to 32 % of silica. The French bauxites are of fairly constant composition, containing usually from 58 to 70 % of alumina, 3 to 15 % of foreign matter, and 27 % made

up of silica, iron oxide and water in proportions that vary with the colour and the situation of the beds.

Before the application of electricity, only two compounds were found suitable for reduction to the metallic state. Alumina itself is so refractory that it cannot be melted save by the oxy- hydrogen blowpipe or the electric arc, and except in the molten state it is not susceptible of decomposition by any chemical reagent. Deville first selected the chloride as his raw material, but observing it to be volatile and extremely deliquescent, he soon substituted in its place a double chloride of aluminium and sodium. Early in 1855 John Percy suggested that cryolite should be more convenient, as it was a natural mineral and might not require purification, and at the end of March in that year, Faraday exhibited before the Royal Institution samples of the metal reduced from its fluoride by Dick and Smith. H. Rose also carried out experiments on the decomposition of cryolite, and expressed an opinion that it was the best of all compounds for reduction; but, finding the yield of metal to be low, receiving a report of the difficulties experienced in mining the ore, and fearing to cripple his new industry by basing it upon the employ- ment of a mineral of such uncertain supply, Deville decided to keep to his chlorides. With the advent of the dynamo, the position of affairs was wholly changed. The first successful idea of using electricity

depended on the enormous heating powers of the arc. The infusibility of alumina was no longer prohibitive, for the molten oxide is easily reduced by carbon. Nevertheless, it was found impracticable to smelt alumina electrically except in presence of copper, so that the Cowles furnace yielded, not the pure metal, but an alloy. So long as the metal was principally regarded as a necessary ingredient of aluminium-bronze, the Cowles process was popular, but when the advantages of alu- minium itself became more apparent, there arose a fresh demand for some chief method of obtaining it unalloyed. It was soon discovered that the faculty of inducing dissociation possessed by the current might now be utilized with some hope of pecuniary success, but as electrolytic currents are of lower voltage than those required in electric furnaces, molten alumina again became impossible. Many metals, of which copper, silver and nickel are types, can be readily won or purified by the electrolysis of aqueous solutions, and theoretically it may be feasible to treat aluminium in an identical manner. In practice, however, it cannot be thrown down electrolytically with a dissimilar anode so as to win the metal, and certain difficulties are still met with in the analogous operation of plating by means of a similar anode. Of the simple compounds, only the fluoride is amenable to electrolysis in the fused state, since the chloride begins to volatilize below its melting-point, and the latter is only 5° below its boiling-point. Cryolite is not' a safe body to electrolyse, because the minimum voltage needed to break up the aluminium fluoride is 4-0, whereas the sodium fluoride requires only 4-7 volts; if, therefore, the current rises in tension, the alkali is reduced, and the final product consists of an alloy with sodium. The corresponding double chloride is a far better material; first, because it melts at about 180 C, and does not volatilize below a red heat, and second; because the voltage of aluminium chloride is 2-3 and that of sodium chloride 4-3, so that there is a much wider margin of safety to cover irregularities in the electric pressure. It has been found, however, that molten cryolite and the analogous double fluoride represented by the formula Al2F 6 2NaF are very efficient solvents of alumina, and that these solutions can be easily electrolysed at about 8oo° C. by means of a current that completely decomposes the oxide but leaves the haloid salts unaffected. Molten cryolite dissolves roughly 30 % of its weight of pure alumina, so that when ready for treat ment the solution contains about the same proportion of what may be termed "available" aluminium as does the fused double chloride of aluminium and sodium. The advantages he with the oxide because of its easier preparation. Alumina dissolves readily enough in aqueous hydrochloric acid to yield a solution of the chloride, but neither this solution, nor that containing sodium chloride, can be

evaporated to dryness without decomposition: To obtain the anhydrous single or

double chloride, alumina must be ignited with carbon in a current of chlorine, and to exclude iron from the finished metal, either the alumina must be pure or the chloride be submitted to purification. This preparation of a chlorine compound suited for electrolysis becomes more costly and more troublesome than that of the oxide, and in addition four times as much raw material must be handled.

At different times propositions have been made to win the metal from its sulphide. This compound possesses a heat of formation so much lower that electrically it needs but a voltage of o-o to decompose it, and it is easily soluble in the fused sulphides of the alkali metals. It can also be reduced metal- lurgical^ by the action of molten iron. Various considerations, however, tend to show that there cannot be so much advantage in employing it as would appear at first sight. As it is easier to reduce than any other compound, so it is more difficult to produce Therefore while less energy is absorbed in its final reduction, more is needed in its initial preparation, and it is questionable whether the economy possible in the second stage would not be neutralized by the greater cost of the first stage in the whole operation of winning the metal from bauxite with the sulphide as the intermediary.*

The Deville process as gradually elaborated between 1855 and 1859 exhibited three distinct phases:— Production of metallic sodium, formation of the pure double chloride of sodium reduction. an d aluminium,and preparation of the metal by the inter- action of the two former substances. To produce the alkali metal, a calcined mixture of sodium carbonate, coal and chalk was strongly ignited in flat retorts made of boiler-plate; the sodium distilled over into condensers and was preserved under heavy petroleum. In order to prepare pure alumina, bauxite and sodium carbonate were heated in a furnace until the reaction was complete; the product was then extracted with water to dissolve the sodium aluminate, the solution treated with carbon dioxide, and the precipitate removed and dried. This purified oxide, mixed with sodium chloride and coal tar, was carbonized at a red heat, and ignited in a current of dry chlorine as long as vapours of the double chloride were given off, these being condensed in suitable chambers. For the production of the final

aluminium, 100 parts of the chloride and 45 parts of cryolite to serve as a flux were powdered together and mixed with 35 parts of sodium cut into small pieces. The whole was thrown in several portions on to the hearth of a furnace previously heated to low redness and was stirred at intervals for three hours. At length when the furnace was tapped a white slag was drawn off from the top, and the liquid metal beneath was received into a ladle and poured into cast-iron moulds. The process was worked out by Deville in his laboratory at the Ecole Normale in Paris. Early in 1855 he conducted large-scale experiments at Javel in a factory lent him for the purpose, where he produced sufficient to show at the French Exhibition of 1855. In the spring of 1856 a complete plant was erected at La Glaciere, a suburb of Paris, but becoming a nuisance to the neighbours, it was removed to Nanterre in the following year. Later it was again transferred to Salindres, where the manufacture was continued by Messrs. Pechiney till the advent of the present electrolytic process rendered it no longer profitable.

When Deville quitted the Javel works, two brothers G. and A. Tissier, formerly his assistants, who had devised an improved sodium furnace and had acquired a thorough knowledge of their leader's experiments, also left, and erected a factory at Amf reville, near Rouen, to work the cryolite process. It consisted simply in reducing cryolite with metallic sodium exactly as in Deville's chloride method, and it was claimed to possess various mythical advantages over its rival. Two grave disadvantages were soon obvious— the limited supply of ore, and, what was even more serious, the large proportion of silicon in the reduced metal. The Amfreville works existed some eight or ten years, but achieved no permanent prosperity. In 1858 or 1859 a small factory, the first in England, was built by F. W. Gerhard at Battersea, who also employed cryolite, made his own sodium, and was able to sell the product at 3 s. od. per oz. This enterprise

1. i{

only lasted about four years. Between i860 and 1874 Messrs Bell Brothers manufactured the metal at Washington, near Newcastle, under Deville's supervision, producing nearly 2 cwt. per year. They took part in the International Exhibition of 1862, quoting a price of 40s. per lb troy.

In 1 88 1 J. Webster patented an improved process for making alumina, and the following year he organized the Aluminium Crown Metal Co. of Hollywood to exploit it in conjunction with Deville's

method of reduction. Potash-alum and pitch were calcined together, and the mass was treated with hydrochloric acid; charcoal and water to form a paste were next added, and the whole was dried and ignited in a current of air and steam. The residue, consisting of alumina and potassium sulphate, was leached with water to separate the insoluble matter which was dried as usual. All the by-products, potassium sulphate, sulphur and aluminate of iron, were capable of recovery, and were claimed to reduce the cost of the oxide materially. From this alumina the double chloride was prepared in essentially the same manner as practised at Salindres, but sundry economies accrued in the process, Owing to the larger scale of working and to the adoption of W. Weldon's method of regenerating the spent chlorine liquors. In 1886 H. Y. Castner's sodium patents appeared, and The Aluminium Co. of Oldbury was promoted to combine the advantages of Webster's alumina and Castner's sodium. Castner had long been interested in aluminium, and was desirous of lowering its price. Seeing that sodium was the only possible reducing agent, he set himself to cheapen its cost, and deliberately rejecting sodium carbonate for the more ex- pensive sodium hydroxide (caustic soda), and replacing carbon by a mixture of iron and carbon — the so-called carbide of iron- he invented the highly scientific method of winning the alkali metal which has remained in existence almost to the present day. In 187 2 sodium prepared by Deville's process cost about 4s; per lb, the greater part of the expense being due to the constant failure of the retorts; in 1887 Castner's sodium cost less than is. per lb', for his cast-iron pots survived 125 distillations.

In the same year L. Grabau patented a method of reducing the simple fluoride of aluminium with sodium, and his process was operated at Trotha in Germany. It was distinguished by the unusual purity of the metal obtained, some of his samples contain^ ing oo- 5 to 99-8 %. In 1888 the Alliance Aluminium Co., organized to work certain patents for winning the metal from cryolite by means of sodium, erected plant in London, Hebburn and Wall- send, and by 1889 were selling the metal at ns. to 15s. per lb. The Aluminium Company's price in 1888 was 20s. per lb and the output about 250 lb per day. In 1889 the price was 16s., but by 1891 the electricians commenced to offer metal at 4s. per lb, and aluminium reduced with sodium became a thing of the past.

About 1879 dynamos began to be introduced into metallurgical practice, and from that date onwards numerous schemes for utilizing this cheaper source of energy were brought p/ . . , before the public. The first electrical method worthy reduction. of notice is that

patented by E. H. and A. H. Cowles in 1885, which was worked both at Lockport, New York, U.S.A., and at Milton, Staffordshire. The furnace consisted of a flat, rectangular, firebrick box, packed with a layer of finely-powdered charcoal 2 in. ; thick. Through stuffing-boxes at the ends passed the two electrodes, made after the fashion of arc-light carbons, and capable of being approached together according to the requirements of the operation. The central space of the furnace was filled with a mixture of corundum, coarsely-powdered charcoal and copper; and an iron lid lined with firebrick was luted in its place to exclude air. The charge was reduced by means of a 50- volt current from a 300-kilowatt dynamo, which was passed through the furnace for i| hours till decomposition was complete. About 100 lb of bronze, containing from 15 to 20 lb of aluminium, were obtained from each run, the yield of the alloy being reported at about 1 lb per 18 e.h.p.hours. The composition of the alloys thus produced could not be pre determined with exactitude; each batch was therefore analysed, a number of them were bulked together or mixed with copper in

n

77°

ALUMIMIUM

the necessary proportion, and melted in crucibles to give mer-chantable bronzes containing between ij and 10 % of aluminium^ Although the copper took no part in the reaction, its employment was found indispensable, as otherwise the aluminium partly volatilized, and partly combined with the carbon to form a carbide. It was also necessary to give the fine charcoal a thin coating of calcium oxide by soaking it in lime-water, for the temperature was so high that unless it was thus protected it was gradually converted into graphite, losing its insulating power and diffusing the current through the lining and walls of the furnace. That this process did not depend upon electrolysis, but was simply an instance of electrical smelting or the decomposition of an oxide by means of carbon at the temperature of the electric arc, is shown by the fact that the Cowles furnace would work with an alternating current.

In 1883 R. Criitzel patented a useless electrolytic process with fused cryolite or the double chloride as the raw material, and in 1886 Dr E. Kleiner propounded a cryolite method which was worked for a time by the Aluminium Syndicate at Tyldesley near Manchester, but was abandoned in 1800. In 1887 A. Minet took out patents for

electrolysing a mixture of sodium chloride with aluminium fluoride, or with natural or artificial cryolite. The operation was continuous, the metal being regularly run off from the bottom of the bath, while fresh alumina and fiouride were added as required. The process exhibited several disadvantages, the electrolyte had to be kept constant in composition lest either fluorine vapours should be evolved or sodium throwh:down, and the raw materials had accordingly to be prepared in a pure state. After prolonged experiments in a factory owned by Messrs Bernard Freres at St Michel in Savoy, Minet's process was given up, and at the close of the 19th century the Heroult-Hall method was alone being employed in the manufacture of aluminium throughout the world.

The original Deville process for obtaining pure alumina from bauxite was greatly simplified in 1889 by K. T. Bayer, whose improved process is exploited at Lame in Ireland and at Gardanne in France. New works on the same process have recently been erected near Marseilles. Crude bauxite is ground, lightly calcined to destroy organic matter, and agitated under a pressure of 70 or 80 lb per sq. in. with a solution of sodium hydroxide having the specific gravity 1-45. After two or three hours the liquid is diluted till its density falls to 1.23, when it is passed through filter-presses to remove the insoluble ferric oxide and silica. The solution of sodium aluminate, containing aluminium oxide and sodium oxide in the molecular proportion of 6 to 1, is next agitated for thirty-six hours with a small quantity of hydrated alumina previously obtained, which causes the liquor to decompose, and some 70 % of the aluminium hydroxide to be thrown down. The filtrate, now containing roughly two molecules of alumina to one of soda, is concentrated to the original gravity of 1-45, and employed instead of fresh caustic for the attack of more bauxite; the precipitate is then collected, washed till free from soda, dried and ignited at about 1000 C. to convert it into a crystalline oxide which is less hygroscopic than the former amorphous variety.

The process of manufacture which now remains to be described was patented during 1886 and 1887 in the name of C: M. Hall in America, in that of P. T. L. Heroult in England and France. It would be idle to discuss to whom the credit of first imagining the method rightfully belongs, for probably this is only one of the many occasions when new ideas have been bom in several brains at the same time. By 1888 Hall was at work on a com- mercial scale at Pittsburg, reducing German alumina; in 1891 the plant was removed to New Kensington for economy in fuel, and was gradually enlarged to 1500 h.p.; in 1894 a factory driven by water was erected at

Niagara Falls, and subsequently works were established at Shawenegan in Canada and at Massena in the United States. In 1890 also the Hall process operated by steam power was installed at Patricroft, Lancashire, where the plant had a capacity of 300 lb per day, but by 1894 the turbines of the Swiss and French works ruined the enterprise.' About 1897 the Bernard factory at St Michel passed into the hands of

Messrs Pechiney, the machinery soon being increased, and there, under the control of a firm that has been concerned in the industry almost from its inception, aluminium is being manu- factured by the Hall process on a large scale. In July 1888 the Society Metallurgique Suisse erected plant driven by a 500 h.p. turbine to carry out Heroult's alloy process, and at the end of that year the Allgemeine Eleklricitats Gesellschaft united with the Swiss firm in organizing the Aluminium Industrie Actien Gesell- schaft of Neuhasen, which has factories in Switzerland, Germany and Austria. The SocietS Electromltallurgique Francaise, started under the direction of Heroult in 1888 for the production of aluminium in France, began operations on a small scale at Froges in Isere; but soon after large works were erected in Savoy at La Praz, near Modane, and in 1905" another large factory was started in Savoy at St Michel. In 1895 the British Aluminium Company was founded to mine bauxite and manufacture alumina in Ireland, to prepare the necessary electrodes at Greenock, to reduce the aluminium by the aid of water-power at the Falls of Foyersˆ and to refine and work up the metal into marketable shapes at the old Milton factory of the Cowles Syndicate, re- modelled to suit modern requirements. In 1905 this company began works for the utilization of another water-power at Loch Leven.

In 1907 a new company, The Aluminium Corporation, was started in England to carry out the production of the metal by the Heroult process, and new factories were constructed near Conway 'in North Wales and at Wallsend-on-Tyne, quite close to where, twenty years before, the Alliance Aluminium Co. had their works.

The Heroult cell consists of a square iron or steel box lined with carbon rammed and baked into a solid mass; at the bottom is a cast-iron plate connected with the negative pole of the dynamo, but the actual working cathode is undoubtedly the layer of already reduced and molten metal that lies in the bath. The anode is formed of a bundle of carbon rods suspended from overhead so as to be capable of vertical adjustment. The cell is filled up with cryolite, and the current is turned on till this is melted; then the pure powdered

alumina is fed in continuously as long as the operation proceeds. The current is supplied at a tension of 3 to 5 volts per cell, passing through 10 or 12 in series; and it performs two distinct functions: — (1) it overcomes the chemical affinity of the aluminium oxide, (2) it overcomes the resistance of the electrolyte, heating the liquid at the same time. As a part of the voltage is consumed in the latter duty, only the residue can be converted into chemical work, and as the theoretical voltage of the aluminium fluoride in the cryolite is 4-0, provided the bath is kept properly supplied with alumina, the fluorides are not attacked. It follows, therefore, except for mechanical losses, that one charge of cryolite lasts indefinitely, that the sodium and other impurities in it are not liable to contaminate the product, and that only the alumina itself need be carefully purified. The operation is essentially a dissociation of alumina into aluminium, which collects at the cathode, and into oxygen, which combines with the anodes to form carbon monoxide, the latter escaping and being burnt to carbon dioxide outside. Theoretically $6 parts by weight of carbon are oxidized in the production of 54 parts of aluminium; practically the anodes waste at the same rate at which metal is deposited. The current density is about 700 amperes per sq. ft. of cathode surface, and the number of rods in the anode is such that each delivers 6 or 7 amperes per sq. in. of cross-sectional area. The working temperature lies between 750 and 850 C, and the actual yield is 1 lb of metal per 1 2 e.h.p. hours. The bath is heated internally with the current rather than by means of external fuel, because this arrangement permits the vessel itself to be kept comparatively cool; if it were fired from without, it would be hotter than the electrolyte, and no material suitable for the construction of the cell is competent to withstand the attack of nascent aluminium at high tempera- tures. Aluminium is so light that it is a matter requiring some ingenuity to select a convenient solvent through which it shall sink quickly, for if it does.not sink, it short-circuits the electrolyte. The molten hietal has a specific gravity of 2-54, that of molten

cryolite saturated with alumina is 2-35, and that of the fluoride AloF« 2NaF saturated with alumina 197. The latter therefore appears the better material, and was originally preferred by Hall; cryolite, however, dissolves more alumina, and has been finally adopted by both inventors.

Aluminium is a white metal with a characteristic tint which most nearly resembles that of tin; when impure, or after pro- longed exposure to air, it has a slight violet shade. Its

*pe *' es " atomic weight is 27 (2677, H=I, according to J. Thomsen). It is trivalent. The specific gravity of cast metal is 2- 583, and of rolled 2-088 at 4° C. It melts at 626° C. (freezing- point 654- 5 , Heycock and Neville). It is the third most malle- able and sixth most ductile metal, yielding sheets 0000025 in. in thickness, and wires 0004 in. in diameter. When quite pure it is somewhat harder than tin, and its hardness is considerably increased by rolling. It is not magnetic. It stands near the positive end of the list of elements arranged in electromotive scries, being exceeded only by the alkalis and metals of the alkaline earths; it therefore combines eagerly, under suitable conditions, with o::ygen and chlorine. Its coefficient of linear expansion by heat is 0-0000222 (Richards) or 0-0000231 (Roberts- Austen) per i° C. Its mean specific heat between 0° and ioo° is 0-227, and its latent heat of fusion 100 calories (Richards). Only silver, copper and gold surpass it as conductors of heat, its value being 31-33 (Ag=ioo, Roberts- Austen) . Its electrical conductivity, determined on 99-6 % metal, is 60-5 % that of copper for equal volumes, or double that of copper for equal weights, and when chemically pure it exhibits a somewhat higher relative efficiency. The average strength of 98 % metal is approximately shown by the fallowing table: —*

Cast Sheet Bars Wire

Elastic Limit, tons per sq. in.

*3 5**

7-13

Ultimate

Strength, tons

per sq. in.

7

11

12

13-29

Reduction of Area %

15

35 40 60

Weight for weight, therefore, aluminium is only exceeded in tensile strength by the best cast steel, and its own alloy; aluminium bronze. An absolutely clean surface becomes tarnished in damp air, an almost invisible coating of oxide being produced, just as happens with zinc; but this film is very permanent and prevents further attack. Exposure to air and rain also causes slight corrosion, but to nothing like the same extent as occurs with iron, copper or brass. Commercial electrolytic aluminium of the best quality contains as the average of a large number of tests, 0-48 % of silicon and 0-46 % of iron, the residue being essentially aluminium itself. The metal in mass is not affected by hot or cold water, the foil is very, slowly oxidized, while the amalgam decomposes rapidly. Sulphuretted hydrogen having no action upon it, articles made of it are not blackened in foggy weather or in rooms where crude coal gas is burnt. To inorganic acids, except hydrochloric, it is highly resistant, ranking well with tin in this respect; but alkalis dissolve it quickly. Organic acids such as vinegar, common salt, the natural ingredients of food, and the various extraneous substances used as food preservatives, alone or mixed together, dissolve traces of it if boiled for any length of time in a chemically- clean vessel; but when aluminium utensils are submitted to the ordinary routine of the kitchen, being used to heat or cook milk, coffee, vegetables, meat and even fruit, and are also cleaned frequently in the usual fashion, no appreciable quantity of metal passes into the food. Moreover, did it do so, the action upon the human system would be infinitely less harmful than similar doses of copper or of lead.

The highly electro-positive character of aluminium is most important. At elevated temperatures the metal decomposes nearly all other metallic oxides, wherefore it is most serviceable as a metallurgical reagent. In the casting of iron, steel and brass, the addition of a trifling proportion (0-005 %) removes oxide and renders the molten metal more fluid, causing the

finished products to be more homogeneous, free from blow-holes and solid all through. On the other hand, its electro-positive nature necessitates some care in its utilization. If it be exposed to damp, to

sea- water or to corrosive influences of any kind in contact with another metal, or if it be mixed with another metal so as to form an alloy which is not a true chemical compound, the other metal being highly negative to it, powerful galvanic action will be set up and the structure will quickly deteriorate. This explains the failure of boats built of commercially pure aluminium which have been put together with iron or copper rivets, and the decay of other boats built of a light alloy, in which the alloying metal (copper) has been injudiciously chosen. It also explains why aluminium is so difficult to join with low- temperature solders, for these mostly contain a large proportion of lead. This disadvantage, however, is often overestimated since in most cases other means of uniting two pieces are available.

The metal produces an enormous number of useful alloys, some : of which, containing only 1 or 2 % of other metals, combine the lightness of aluminium itself with far greater hardness and strength. Some with 90 to 99 % of other metals oys '

exhibit the general properties of those metals conspicuously improved. Among the heavy alloys, the aluminium bronzes (Cu, 90-97-5 %; Al, 10-2-5 %) occupy the most important position, showing mean tensile strengths increasing from 20 to 41 tons per sq. in. as the percentage of aluminium rises, and all strongly resisting corrosion in air or sea- water. The light copper alloys, in which the proportions just given are practically reversed, are of considerably less utility, for although they are fairly strong, they lack power to resist galvanic action. This subject is far from being exhausted, and it is not improbable that the alloy-producing capacity of aluminium may eventually prove its most valuable characteristic. In the meantime, ternary light alloys appear the most satisfactory, and tungsten and topper, or tungsten and nickel, seem to be the best substances to add.

The uses of aluminium are too numerous to mention. Probably the widest field is still in the purification of iron and steel. To the general public it appeals most strongly as a material for constructing cooking utensils. It is not brittle Uses '

like porcelain and cast iron, not poisonous like lead-glazed earthenware and. untinned copper, needs no enamel to chip off, does not rust and wear out like cheap tin-plate, and weighs but a fraction of other substances. It is largely replacing brass and copper in all departments of industry — especially where dead weight has to be moved about, and lightness is synonymous with economy — for

instance, in bed-plates for torpedo-boat engines, internal fittings for ships instead of wood, complete boats for portage, motor-car parts and boiling-pans for con T fectionery and in chemical works. The British Admiralty employ it to save weight in the Navy, and the war-offices of the European powers equip their soldiers with it wherever possible. As a substitute for Solenhof en stone it is used in a modified form of lithography, which can be performed on rotary printing-machines at a high speed. With the increasing price of copper, it is coming into vogue as an electrical conductor for uncovered mains; it is found that an aluminium wire 01 26 in. in diameter will carry as much current as a copper wire o- 100 in. in diameter, while the former weighs about 79 lb and the latter 162 lb per mile. Assuming the materials to be of equal tensile strength per unit of area — hard-drawn copper is stronger, but has a lower conductivity-— the adoption of aluminium thus leads to a reduction of, 52 % in the weight, a gain of 60% in the strength, and an increase of 26 % in the diameter of the conductor. Bare aluminium strip has recently been tried for winding-coils in electrical machines, the oxide of the metal acting as insulators between the layers. When the price of aluminium is less than double the priqe of copper aluminium is cheaper than copper per unit of electric current conveyed; but when insulation is necessary, the smaller size of the copper wire renders it more economical. Aluminium conductors have been employed on heavy work in many places, and for telegraphy and telephony

they are in frequent demand and give perfect satisfaction. Difficulties were at first encountered in making the necessary joints, but these have been overcome by practice and experience. Two points connected with this metal are of sufficient moment to demand a few words by way of conclusion. Its extraordinary lightness forms its chief claim to general adoption, yet is apt to cause mistakes when its price is mentioned. It is the weight of a mass of metal which governs its financial value ; its industrial value, in the vast majority of cases, depends on the volume of that mass. Provided it be rigid, the bed-plate of an engine is no better for weighing 30 cwt. than for weighing 10 cwt. A saucepan is required to have a certain diameter and a certain depth in order that it may hold a certain bulk of liquid: its weight is merely an encumbrance. Copper being 3J times as heavy as aluminium, whenever the latter costs less than 3! times as much as copper it is actually cheaper. It must be remembered, too, that electrolytic aluminium only became known during the last decade of

the 19th century. Samples dating from the old sodium days are still in existence, and when they exhibit unpleasant properties the defect is often ascribed to the metal instead of to the process by which it was won. Much has yet to be learnt about the practical qualities of the electrolytic product, aii'd although every day's experience serves to place the metal in a firmer industrial position, a final verdict can only be passed after the lapse of time. The individual and collective influence of the several impurities which occur in the product of the Heroult cell is still to seek, and the importance of this inquiry will be seen when we consider that if cast iron, wrought iron and steel, the three totally distinct metals included in the generic name of " iron " — which are only distinguished one from another chemically by minute differences in the proportion of certain non-metallic ingredients — had only been in use for a comparatively few years, attempts might occasionally be made to forge cast iron, or to employ wrought iron in the manufacture of edge-tools. (E. J. Rj).

Compounds of A luminium.

Aluminium oxide or alumina, AI2O3, occurs in nature as the mineral corundum (q.v.), notable for its hardness and abrasive power (see Estery), and in well-crystallized forms it constitutes, when coloured by various metallic oxides, the gem-stones, sapphire, oriental topaz, oriental amethyst and oriental emerald. Alumina is obtained as a white amorphous powder by heating aluminium hydroxide. This powder, provided that it has not been too strongly ignited, is soluble in strong acids; by ignition it becomes denser and nearly as hard as corundum; it fuses in the oxyhydrogen flame or electric arc, and on cooling it assumes a crystalline form closely resembling the mineral species. Crystallized alumina is also obtained by heating the fluoride with boron trioxide; by fusing aluminium phosphate with sodium sulphate; by heating alumina to a dull redness in hydrochloric acid gas under pressure; and by heating alumina with lead oxide to a bright red heat. These reactions are of special interest, for they culminate in the production of artificial ruby and sapphire (see Gems, Artificial).

Aluminium Hydrates. — Several hydrated forms of aluminium oxide are known. Of these hydrargillite or gibbsite, Al(OH) s , diaspore, AIO, and bauxite, Al 2 0(OH) 4 , occur in the mineral kingdom. Aluminium hydrate, A1(0H) 3 , is obtained as a gelatinous white precipitate, soluble in potassium or sodium hydrate, but insoluble in ammonium chloride, by adding ammonia to a cold solution of an aluminium salt; from boiling solutions the precipitate is opaque. By drying at ordinary temperatures, the hydrate Al(OH) 3 H 2 is

obtained; at 300° this yields AIO, which on ignition gives alumina, AI2O3. Precipitated aluminium hydrate finds considerable application in dyeing. Soluble modifications were obtained by Walter Crum (Journ. Chem. Soc, 1854, vi. 216), and Thomas Graham (Phil. Trans., 1861, p. 163); the first named decomposing aluminium acetate (from lead acetate and aluminium sulphate) with boiling water, the latter dialysing a solution of the basic chloride (obtained by dissolving the hydroxide in a solution of the normal chloride).

Both these soluble hydrates are readily coagulated by traces of a salt, acid or alkali; Crum's hydrate does not combine with dye-stuffs, neither is it soluble in excess of acid, while Graham's compound readily forms lakes, and readily dissolves when coagulated in acids.

In addition to behaving as a basic oxide, aluminium oxide (or hydrate) behaves as an acid oxide towards the strong bases with the formation of aluminates. Potassium aluminate, K.2AI2O4, is obtained in solution by dissolving aluminium hydrate in caustic potash; it is also obtained, as crystals containing three molecules of water, by fusing alumina with potash, ex- hausting with water, and crystallizing the solution in vacuo. Sodium aluminate is obtained in the manufacture of alumina; it is used as a mordant in dyeing, and has other commer- cial applications. Other aluminates (in particular, of iron and magnesium), are of frequent occurrence in the mineral kingdom, e.g. spinel, gahnite, &c.

Salts of Aluminium. — Aluminium forms one series of salts, derived from the trioxide, AI2O3. These exhibit, in certain cases, marked crystallographical and other analogies with the corre- sponding salts of chromium and ferric iron.

Aluminium fluoride, AIF3, obtained by dissolving the metal in hydrofluoric acid, and subliming the residue in a current of hydrogen, forms transparent, very obtuse rhombohedra, which are insoluble in water. It forms a series of double fluorides, the most important of which is cryolite (q.v.); this mineral has been applied to the commercial preparation, of the metal (see above). Aluminium chloride, AICI3, was first prepared by Oersted, who heated a mixture of carbon and alumina in a current of chlorine, a method subsequently improved by Wohler, Bunsen, Deville and others. A purer product is obtained by heating aluminium turnings in a current of dry chlorine, when the chloride distils over. So obtained, it is a white crystalline solid, which slowly sublimes just below its melting point (104). Its vapour density at temperatures above 750 corresponds to the formula AICI3; below this point the molecules are

associated. It is very hygroscopic, absorbing water with the evolution of hydro- chloric acid. It combines with ammonia to form AlCls-gNU; and forms double compounds with phosphorus pentachloride, phosphorus oxychloride, selenium and tellurium chlorides, as well as with many metallic chlorides; sodium aluminium chloride, AlCU-NaCl, is used in the production of the metal. As a syn- thetical agent in organic chemistry, aluminium chloride has rendered possible more reactions than any other substance; here we can only mention the classic syntheses of benzene homologues. Aluminium bromide, AlBr 3 , is prepared in the same manner as the chloride. It forms colourless crystals, melting at 90 , and boiling at 265°-27o°. Aluminium iodide, AII3, results from the interaction of iodine and aluminium. It forms colourless crystals, melting at 185 , and boiling at 360 , Aluminium sulphide, AI2S3, results from the direct union of the metal with sulphur, or when carbon disulphide vapour is passed over strongly heated alumina. It forms a yellow fusible mass, which is decomposed by water into alumina and sulphuretted hydrogen. Aluminium sulphate Al(SO,t)3, occurs in the mineral kingdom as keramohalite, A1 2 (S04)3-18H 2 0, found near volcanoes and in alum-shale; aluminite or websterite is a basic salt, Alj(S04)(OH)4-7H 2 0. Aluminium sulphate, known com- mercially as "concentrated alum " or " sulphate of alumina," is manufactured from kaolin or china clay, which, after roasting (in order to oxidize any iron present), is heated with sulphuric acid, the clear solution run off, and evaporated. " Alum cake " is an impure product. Aluminium sulphate crystallizes as Al 2 (S0 4)3-i8H 2 in tablets belonging to the monoclinic system. It has a sweet astringent taste, very soluble in water, but scarcely soluble in alcohol. On heating, the crystals lose water, swell up, and give the anhydrous sulphate, which, on further heating, gives alumina. It forms double salts with the sulphates of the metals of the alkalis, known as the alums (see Alum).

Aluminium nitride (A1N) is obtained as small yellow crystals when aluminium is, strongly heated in nitrogen. The nitrate, Al(NOs)3, is obtained as deliquescent crystals (with 8H 2 0)

by evaporating a solution of the hydroxide in nitric acid. Aluminium phosphates may be prepared by precipitating a soluble aluminium salt with sodium phosphate. Wavellite Al8(P04) 3 (OH)i5-9H 2 0, is a naturally occurring basic phosphate, while the gem-stone turquoise (q.v.) is Al (PO4) (OHVHjO, coloured by traces of copper.

Aluminium silicates are widely diffused in the mineral kingdom, being present in the commonest rock-forming minerals (felspars, &c), and in the gem-stones, topaz, beryl, garnet, &c. It also constitutes with sodium silicate the mineral lapis-lazuli and the pigment ultramarine (q.v.). Forming the basis of all clays, aluminium silicates play a prominent part in the manufacture of pottery and porcelain. Bibliography. — The metallurgy and uses of aluminium are treated in detail in P. Moissonnier, V Aluminium (Paris, 1903) ; in J. W. Richards, Aluminium (1896); and in A. Minet, Production of Aluminium, Eng. trans, by L. Waldo (1905) ; reference may also be made to treatises on general metallurgy, e.g. C. Schnabel, Handbook of Metallurgy, vol. ii. (1907). For the chemistry see Roscoe and Schlorlemmer, Treatise on Inorganic Chemistry, vol. ii. (1908) ; H. Moissan, Traite de chimie minerale; Abegg, Handbuch der anorganischen Chemie; and O. Dammer, Handbuch der anorganischen Chemie. Aluminium alloys have been studied in detail by Guillet. ALUNITE, or Alumstone, a mineral first observed in the 15th century at Tolfa, near Rome, where it is mined for the manufacture of alum. Extensive deposits are also worked in Tuscany and Hungary, and at Bulladelah in New South Wales. By repeatedly roasting and lixiviating the mineral, alum is obtained in solution, and this is crystallized out by evaporation. Alunite occurs as seams in trachytic and allied volcanic rocks, having been formed by the action of sulphureous vapours on

these rocks. The white, finely granular masses somewhat resemble limestone in appearance, and the more compact kinds from Hungary are so hard and tough that they are used for millstones. Distinct crystals of alunite are rarely met with in cavities in the massive material; these are rhombohedra with interfacial angles of 90 50', so that they resemble cubes in appearance. Minute glistening crystals have also been found loose in cavities in altered rhyolite. The hardness is 4 and the specific gravity 2 -6. The mineral is a hydrated basic aluminium and potassium sulphate, KAl3(S04) 2 (OH) 6 . It is insoluble in water, but soluble in sulphuric acid. First called aluminilite by J. C. Delametherie in 1797, this name was contracted by F. S. Beudant in 1824 to alunite. (L. J. S.)

ALUR (Lur, Luri, Lurem), a Negro people of the Nile valley, living on the north-west coast of Albert Nyanza. They are akin to the Acholi (q.v.), speaking practically the same language. ALURE (O. Fr., from alter, to walk), an architectural term for an alley, passage, the water-way or flat gutter behind a parapet, the galleries of a clerestory, sometimes even the aisle itself of a church. The term is sometimes written valure or valoring.

ALVA, or Alba, FERNANDO ALVAREZ DE TOLEDO, duke of, (1508-1583), Spanish soldier, descended from one of the most illustrious families in Spain, was born in 1508. His grand- father, Ferdinand of Toledo, educated him in military science and politics; and he was engaged with distinction at the battle of Pa via while still a youth. Selected for a military command by Charles V., he took part in the siege of Tunis (1535), and success- fully defended Perpignan against the dauphin of France. He was present at the battle of Muhlberg (1547), and the victory gained there over John of Saxony was due mainly to his exertions. He took part in the subsequent siege of Wittenberg, and presided at the court-martial which tried the elector and condemned him to death. In 1552 Alva was intrusted with the command of the army intended to invade France, and Was engaged for several months in an unsuccessful siege of Metz. In consequence of the success of the French arms in Piedmont, he was made commander-in-chief of all the emperor's forces in Italy, and at the same time invested with unlimited power. Success did not, however, attend his first attempts, and after several unfortunate attacks he was obliged to retire into winter quarters. After the

abdication of Charles he was continued in the command by Philip II., who, however, restrained him from extreme measures. Alva had subdued the whole Campagna and was at the gates of Rome, when he was compelled by Philip's orders to negotiate a peace. One of its terms was that the duke of Alva should in person ask forgiveness of the haughty pontiff whom he had conquered. Proud as the duke was by nature, and accustomed to treat with persons of the highest dignity, he confessed his voice failed him at the interview and his presence of mind forsook him. Not king after this (1 559) he was sent at the head of a splendid embassy to Paris to espouse, in the name of his master, Elizabeth, daughter of Henry, king of France. In 1567, Philip, who was a bigoted Catholic, sent Alva into the Netherlands at the head of an army of 10,000 men, with unlimited powers for the extirpation of heretics. When he arrived he soon showed how much he merited the confidence which his master reposed in him, and instantly erected a tribunal which soon became known to its victims as the " Court of Blood," to try all persons who had been engaged in the late commotions which the civil and religious tyranny of Philip had excited. He imprisoned the counts Egmont and Horn, the two popular leaders of the Protestants, brought them to an unjust trial and condemned them to death. In a short time he totally annihilated every privilege of the people, and with unrelenting cruelty put multitudes of them to death. The executioner was employed in removing all those friends of freedom

whom the sword had spared. In most of the considerable towns Alva built citadels. In the city of Antwerp he erected a statue of himself, which was a monument no less of his vanity than of his tyranny : he was figured trampling on the necks of two smaller statues, representing the two estates of the Low Countries. His attempt to raise money by imposing the Spanish alcabala, a tax of 5% on all sales, aroused the opposition of the Catholic Netherlands themselves. The exiles from the Low Countries, encouraged by the general resistance to his government, fitted out a fleet of privateers, and after strengthening themselves by successful depredations, ventured upon the bold expl6it of seizing the town of Brielle. Thus Alva by his cruelty became the unwitting instrument of the future independence of the seven Dutch provinces. The fleet of the exiles, having met the Spanish fleet, totally defeated it, and reduced North Holland and Mons. Many cities hastened to throw off the yoke; while the states-general, assembling at Dordrecht, openly declared against Alva's government, and marshalled under the banners of the prince of Orange. Alva's preparations to oppose the gathering storm were made with his usual vigour, and he succeeded in recovering Mons, Mechlin and Zutphen, under the conduct of his son Frederick. With the exception of Zealand and Holland, he regained all the provinces; and at last his son stormed Naarden, and massacring its inhabitants, proceeded to invest the city of Haarlem, which, after standing an obstinate siege, was taken and pillaged. Their next attack was upon Alkmaar; but the spirit of desperate resistance was raised to such a height in the breasts of the Hollanders that the Spanish veterans were repulsed with great loss and Frederick constrained reluctantly to retire. Alva's feeble state of health and continued disasters induced him to solicit his recall from the government of the Low Countries; a measure which, in all probability, was not displeasing to Philip, who was now resolved to make trial of a milder administration. In December 1573 the much-oppressed country was relieved from the presence of the duke of Alva, who, returning home accompanied by his son, made the infamous boast that during the course of six years, besides the multitudes destroyed in battle and massacred after victory, he had consigned 18,000 persons to the executioner. On his return he was treated for some time with great distinc- tion by Philip. A tardy and imperfect justice, however, overtook him, when he was banished from court and confined in the castle of Uzeda for complicity in certain disgraceful conduct of his son. Here he had remained two years, when the success of Don Antonio in assuming the crown of Portugal determined Philip to turn his eyes towards Alva as the person in whose fidelity and abilities he could most confide. A secretary was instantly

despatched to Alva to ascertain whether his health was suffi- ciently vigorous to enable him to undertake the command of an army. The aged chief returned an answer full of loyal zeal, and was immediately appointed to the supreme command in Portugal. It is a striking fact, however, that the liberation and elevation of Alva were not followed by forgiveness. In 1581 Alva entered Portugal, defeated Antonio, drove him from the kingdom, and soon reduced the whole under the subjection of Philip. Entering Lisbon he seized an immense treasure, 'and suffered his soldiers, with their accustomed violence and rapacity, to sack the suburbs and vicinity. It is reported that Alva, being requested to give an account of the money expended on that occasion, sternly replied, " If the king asks me for an account, I will make him a statement of kingdoms preserved or conquered, of signal victories, of successful sieges and of sixty years' ser- vice." Philip deemed it proper to make no further inquiries. Alva, however, did not enjoy the honours and rewards of his last expedition, for he died in January 1583 at the age of 74.

Authorities. — See the Life, by Rustant (Madrid, 1751). His correspondence during his Flemish government has been published by M. Gachard (Brussels, 1850). See also Coleccion de docu- mentos ineditos para la historia de Espana, vols, iv., vii., viii., xiv., xxxii. and xxxv. (Madrid) ; and Motley's Rise of the Dutch Republic

(1856).

ALVA, a police burgh of Clackmannanshire, Scotland, 31 m. N. of Alloa, terminus of a branch line of the North British railway. Pop. (1891) 5225; (1901) 4624. It is situated at the foot of three front peaks of the Ochils— West Hill (1682 ft.), Middle Hill' (1436 ft.) and Wood Hill (1723 ft.). There are spinning-mills, and manufactures of tweeds, tartans and other woollen goods. Silver, lead and other metals have been found in the hills, but not in paying quantities. The glen to the east of the town, in which are abandoned workings, is called the Silver Glen. Alva House is the seat of the Johnstones, a family which has been intimately connected with the district since the latter half of the 18th century.

ALVARADO, PEDRO DE (1495-1541), one of the Spanish leaders in the discovery and conquest of America, was born at Badajoz about 1495. He held a command in the expedition sent from Cuba against

Yucatan in the spring of 1518, and returned in a few months, bearing reports of the wealth and splendour of Montezuma's empire. In February 1519 he accompanied Hernando Cortes in the expedition for the conquest of Mexico, being appointed to the command of one of the eleven vessels of the fleet. He acted as Cortes's principal officer, and on the first occupation of the city of Mexico was left there in charge. When the Spaniards had temporarily to retire before the Mexican uprising, Alvarado led the rear-guard (1st of July 1520), and the Sal to de Alvarado — a long leap with the use. of his spear, by which he saved his life — became famous. He was engaged (1523-24) in the conquest of Guatemala, of which he was subsequently appointed governor by Charles V. In 1534 he attempted to bring the province of Quito under his power, but had to content himself with the exaction of a pecuniary indemnity for the expenses of the expedition. During a visit to Spain, three years later, he had the governorship of Honduras conferred upon him in addition to that of Guatemala. He died in Guatemala in 1541.

ALVAREZ, FRANCISCO (c. 1465-1541?), Portuguese mis- sionary and explorer, was born at Coimbra. He was a chaplain- priest and almoner to Dom Manuel, king of Portugal, and was sent in 1515 as secretary to Duarte Galvao and Rodrigo da Lima on an embassy to the negus of Abyssinia (Lebna Dengel Dawit (David) II.). The expedition having been delayed by the way, it was not until 1520 that he reached Abyssinia, where he remained six years, returning to Lisbon in 1 526-1 527. In 1533 he was sent to Rome on an embassy to Pope Clement VII. The precise date of his death, like that of his birth, is unknown, but it must have been later than 1540, in which year he published at Lisbon under the king's patronage an account of his travels in one volume folio, entitled Verdadera InformaQam das terras do Preste Joam, This curious work was translated into Italian (G. B. Ramusio, Navagationi, vol. i., Venice, 1550); into

Spanish {Historia de las Cosas de Etiopia, by Fray Thomas de Padilla, Antwerp, 1557); into French (Historiale Description de I'Ethiopie, Christ, Plantin, Antwerp, 1558); into German (Wahrhaf tiger Bericht von . . . Ethiapien, Eisleben, 1566); into English (Sam. Purchas, Pilgrimes, part ii., London, 1625). The information it coptains must, , however, be received with caution, as the author is prone to exaggerate, and does not confine himself to what came within his own observation.

ALVAREZ, DON JOSE' (1768-1827), Spanish sculptor, was born at Priego, in the province of Cordova, in 1768. His full name was Jose

Alvarez de Pereira y Cubero. Bred to his father's trade of a stone-mason, he devoted all his spare time to drawing and modelling. His education in art was due partly to the teaching of the French sculptor Verdiguier at Cordova, and partly to lessons at Madrid, where he attended the lectures of the academy of San Fernando. In 1799 he obtained from Charles IV. a pension of 12,000 reals to enable him to visit Paris and Rome. In the former city he executed in 1804 a statue of Ganymede, which placed him at once in the front rank of the sculptors, of his time, and which is now in the sculpture gallery of the Prado. Shortly afterwards his pension was more than doubled, and he left Paris for Rome, where he remained till within a year of his death. He had married in Paris Elizabeth Bougel, by whom he had a son in 1805. This son, known as Don Jose Alvarez y Bougel, also distinguished himself as a sculptor and a painter, but he died at Burgos before he had reached the age of twenty-five, a little more than two years after his father's death in Madrid in 1827. One of the most successful works of the elder Alvarez was a group representing Antilochus and Memnon, which was commissioned in marble (1818) by Ferdinand VII., and secured for the artist the appointment of court-sculptor. It is now in the museum of Madrid. He also modelled a few portrait busts (Ferdinand VII., Rossini, the duchess of Alba), which are remarkable 'for their vigour and fidelity.

ALVAREZ, DON MANUEL (1727-1797), Spanish sculptor, was born at Salamanca. He followed classical models so closely that he was styled by his countrymen El Criego, " The Greek." His works, which are very numerous, are chiefly to be found at Madrid. • .. ■

ALVARY, MAX (1858-1898), German singer, was born at Dusseldorf. Gifted with a fine tenor voice and handsome presence he speedily made a reputation in Germany in the leading roles in Wagnerian opera, and from 1885 onwards appeared also in America and England. He was at his best in 1892, when his performances as Tristan and Siegfried at Covent Garden aroused great enthusiasm.

ALVEARY (from the Lat. alvearium), a beehive; used, like apiarium in the same sense, figuratively for a collection of hard- working people, or a scholarly work (e.g. dictionary) involving bee-like industry. By analogy the term is used for the hollow of the ear, where the wax collects.

ALVENSLEBEN, CONSTANTIN VON (1809-1892), Prussian general, was born on the 26th of August 1809 at Eichenbarleben in Prussian Saxony, and entered the Prussian guards from the cadet corps in 1827. He became first lieutenant in 1842, captain in 1849, and

major on the Great General Staff in 1853, whence after seven years he went to the Ministry of War. He was soon afterwards promoted colonel, and commanded a regiment of Guard infantry up to 1864, when he became a major-general. In this rank he commanded a brigade of guards in the war of 1866. At the action of Soor (Burkersdorf) on the 28th of June he distinguished himself very greatly, and at K6niggratz > where he led the advanced guard of the Guard corps, his energy and initiative were still more conspicuous. Soon afterwards he suc- ceeded to the command of his division, General Hiller v. Gartringen having fallen in the battle; he was promoted lieutenant-general, and retained this command after the conclu- sion of peace, receiving in addition the order pour le tncrite for his services. In 1870, on the outbreak of war with France, von Alvensleben succeeded Prince Frederick Charles in command of the III army corps which formed part of the II German

Army commanded by the prince. Under their new general, the Brandenburg regiments forming the III corps proved them- selves collectively the best in the whole German army, with the possible exception of the Prussian guards, and, if Prince Frederick Charles is entitled to the chief credit in training the III corps, Alvensleben had contributed in almost equal degree to the efficiency of the Guard infantry, while his actual leadership of the III corps in the battles of 1870 and 1871 showed him afresh as a fighting general of the very first rank. The battle of Spicheren, on the 6th of August, was initiated and practically directed throughout by him, and in the confusion which followed this victory, for which the superior commanders were not pre- pared, Alvensleben showed his energy and determination by resuming the advance on his own responsibility. This led to the great battles of the 14th, 16th and 18th of August around Metz, and again the III corps was destined, under its resolute leader, to win the chief credit. Crossing the Moselle the instant that he received permission from his army commander to do so, Alvensleben struck the flank of Bazaine's whole army (August 16th) in movement westward from Metz. The III corps attacked at once, and for many hours bore the whole brunt of the battle at Yionville. By the most resolute leading, and at the cost of very heavy losses, Alvensleben held the whole French army at bay while other corps of the I and II German Armies gradually closed up. In the battle of Gravelotte, on the 18th, the corps took little part. Its work was done, and it remained with the II Army before Metz until the surrender of

Bazaine's army. Prince Frederick Charles then moved south-west to co-operate with the grand-duke of Mecklenburg on the Loire. At the battle of Beaune-la-Rolande, the corps, with its comrades of Yionville, the X corps under General v. Voigts-Rhetz, won new laurels, and it participated in the advance on Le Mans and the battle at that place on the 12th of January 1871. At the close of the war Alvensleben received the oak-leaves of the order pour le merite, the first class of the Iron Cross and a grant of 100,000 thalers. He became full general of infantry in 1873 and retired immediately afterwards. In 1889 the emperor William II. ordered that the 52nd infantry regiment (one of the distinguished regiments of Vionville) should thereafter bear Alvensleben's name, and in 1892, on the anniversary of the battle of Le Mans, the old general received the order of the Black Eagle. He died on the 28th of March 1892 at Berlin.

His brother, Gustav von Alvensleben (1803-1881), Prussian general of infantry, was born at Eichenbarleben on the 30th of September 1803, entered the Guard infantry in 1821, and took part as a general staff officer in the suppression of the Baden insurrection of 1849. He became a major-general in 1858, aide-de-camp to the king in 1861, and lieutenant-general in 1863, and in the campaign of 1866 performed valuable military and political services. He was promoted general of infantry in 1868. In the war of 1870 he commanded the IV army corps, which took a conspicuous part in the action of Beaumont and afterwards served in the siege of Paris. He received the Iron Cross, the order pour le merite, and a money grant, as a reward for his services, and retired in 1872. He died at Gernrode in the Harz on the 30th of June 1881.

Another brother, Albrecht, Count von Alvensleben (1794- 1858), was a distinguished Prussian statesman.

ALVEOLATE (from Lat. alveolus), honeycombed, a word used technically in biology, &c, to mean pitted like a honeycomb.

ALVERSTONE, RICHARD EVERARD WEBSTER, ist Baron (1842-), lord chief justice of England, was born on the 22nd of December 1842, being the second son of Thomas Webster, Q.C. He was educated at King's College and Charter- house schools, and Trinity College, Cambridge; was called to the bar in 1868, and became Q.C. only ten years afterwards. His practice was chiefly in commercial, railway and patent cases until (June 1885) he was appointed attorney-general in the Conservative Government in the exceptional circumstances of never having been solicitor-general, and not at the

time occupying a seat in parliament. He was elected for Launceston in the following month, and in November exchanged this seat

for the Isle of Wight, which he continued to represent until his elevation to the House of Lords. Except under the brief Glad- stone administration of 1886, and the Gladstone-Rosebery cabinet of 1892-1895, Sir Richard Webster was attorney-general from 1885 to 1900. In 1890 he was leading counsel for The Times in the Parnell inquiry; in 1893 he represented Great Britain in the Bering Sea arbitration; in 1898 he discharged the same function in the matter of the boundary between British Guiana and Venezuela; and in 1903 was one of the members of the Alaska Boundary Commission. He was well known as an athlete in his earlier years, having represented his university as a runner, and his interest in cricket and foot-racirg was kept up in later life. In the House of Commons, and outside it, he was throughout his political career prominently associated with church work; and his speeches were distinguished for gravity and earnestness. In 1900 he succeeded Sir Nathaniel Lindley as Master of the Rolls, being raised to the peerage as Baron Alverstone,' and in October of the same year he was elevated to the office of lord chief justice upon the death of Lord Russell of Killowen.

ALWAR, or Ulwar, a native state of India in the Rajputana agency. It is bounded on the E. by the state of Bharatpur and the British district of Gurgaon, on the N. by Gurgaon district and the state of Patiala, on the W. by the states of Nabha and Jaipur, and on the S. by the state of Jaipur. Its configuration is irregular, the greatest length from north to south being about 80 m., and breadth from east to west about 60 m., with a total area of 3141 sq. m. The eastern portion of the state is open and highly cultivated; the western is diversified by hills and peaks, which form a continuation of the Aravalli range, from 12 to 20 m. in breadth. These hills run in rocky and precipitous parallel ridges, in some places upwards of 2200 ft. in height. The Sabhi river flows through the north-western part of the state, the only other stream of importance being the Ruparel, which rises in the Alwar hills, and flows through the state into the Bharatpur territory. The population in 1901 was 828,487, showing an increase of 8 % during the decade. When compared with a heavy decrease elsewhere throughout Rajputana, this increase may be attributed to the successful administration of famine relief, under British officials. The revenue is £185,000. The maharaja Jai Singh, who succeeded in 1892 at the age of ten, was educated at the Mayo college, where he excelled both in sports and in knowledge of English. He came of age in 1903, when he was invested by the viceroy with full ruling powers. Alwar was the first native state to

accept a currency struck at the Calcutta mint, of the same weight and assay as the imperial rupee, with the head of the British sovereign on the obverse. Imperial service troops are maintained, consisting of both cavalry and infantry, with transport. The state is traversed by the Delhi branch of the Rajputana railway. A settlement of thelarid revenue has been carried out by an English civilian.

The state was founded by Pratap Singh (1740-1791), a Rajput of ancient lineage, and increased by his adopted son Bakhtawar Singh. The latter joined the British against the Mahrattas, and in 1803, after the battle of Laswari (Nov. 1), signed a treaty of offensive and defensive alliance with the British government. In 1811, owing to his armed intervention in Jaipur, a fresh engagement was made, prohibiting him from political intercourse with other states without British consent. In 1857 the raja Binni Singh sent a force of Mussulmans and Rajputs to relieve the British garrison in Agra; the Mussulmans, however, deserted, and the rest were defeated by the mutineers.

The Citv of Alwar has a railway station on the Rajputana line, 98 m. from Delhi; pop. (1901) 56,771, showing a steady increase. It stands in a valley overhung by a fortress 1O00 ft. above. It is surrounded by a rampart and moat, with five gates, and contains fine palaces, temples and tombs. The water-supply is brought from a lake 9 m. distant. It has a high school, affiliated to the Allahabad university; and a school for the sons of nobles, founded to commemorate the Diamond Jubilee of Queen Victoria. The Lady Dufferin hospital is under the charge of an English lady doctor, with two female assistants.

ALYATTES, king of Lydia (609ˆ560 B.C.), the real founder of the Lydian empire, was the son of Sadyattes, of the house of the Mermnadae. For several years he continued the war against Miletus begun by his father, but was obliged to turn his attention to the Medes and Babylonians. On the 28th of May 585, during a battle on the Halys between him and Cyaxares, king of Media, an eclipse of the sun took place; hostilities were suspended, peace concluded, and the Halys fixed as the boundary between the two kingdoms. Alyattes drove the Cimmerii (see Scythia) from Asia, subdued the Carians, and took several Ionian cities (Smyrna, Colophon). He was succeeded by his son Croesus. His tomb still exists on the plateau

between lake Gygaea and the river Hermus to the north of Sardis — a large mound of earth with a substructure of huge stones. It was excavated by Spiegelthal in 1854, who found that it covered a large vault of finely-cut marble blocks approached by a flat-roofed passage of the same stone from the south. The sarcophagus and its contents had been removed by early plunderers of the "tomb, all that was left being some broken alabaster vases, pottery and charcoal. On the summit of the mound were large phalli of stone.

See A. von Olfers, "fiber die lydischen Konigsgraber bei Sardes," Abh. Berl. Ak., 1858.

ALYPIUS, a Greek writer on music whose works, with those of six others, were collected and published with a commentary and explanatory notes {Antiquae Musicae Auctores Septem, Amstel., 1652), by Mark Meibomius (1630-1711). He is said to have written before Euclid and Ptolemy; and Cassiodorus arranges his Introduction to Music between those of Nicomachus and Gaudentius. The work consists solely of a list of symbols of the various scales and modes, and is probably only a fragment.

ALYPIUS or Antioch, a geographer of the 4th century, who was sent by the emperor Julian into Britain as first prefect, and was afterwards commissioned to rebuild the temple of Jerusalem. Among the letters of Julian are two (29 and 30) addressed to Alypius; one inviting him to Rome, the other thanking him for a geographical treatise, which no longer exists.

See also Ammianus Marcellinus xxiii. 1, § 2.

ALYTES, the midwife toad, first discovered by P. Demours in 1 741, on the border of a small pond in the Jardin des Plantes, in the very act of parturition which has rendered it famous, and described as Petit crapaud mdle accoucheur de sa femelle. Alytes obstetricans is of special interest as the first known example of paternal solicitude in Batrachians, and although many no less wonderful cases of nursing instinct have since been revealed to us, it remains the only one among European forms.

Alytes obstetricans is a small toad-like Batrachian, two inches in length, of dull greyish coloration, plump form with warty skin and large eyes with vertical pupils. Although toad like it is not really related to the toads proper, but belongs to the family Discoglossidae, characterized by a circular, adherent tongue, teeth in the upper jaw and on the palate, short but distinct ribs on the anterior vertebrae,

and convex-concave vertebrae. It inhabits France, Belgium, Switzerland, Western Germany (east- wards to the Weser), Spain and Portugal. A second species, A . cistemasii, occurs in Spain and Portugal.

A lytes is nocturnal and slow in its movements. It is thoroughly terrestrial, selecting for its retreat in the daytime holes made by small mammals, or interstices between stones. Towards evening it reveals its presence by a clear whistling note, which has often been compared to the sound of a little bell, or to a chime when produced by numerous individuals. The breeding season lasts throughout spring and summer, and the female is able to spawn two, three or even four times in the year. Pairing and oviposition take place on land; the male seizes the female round the waist. The eggs are large and yellow, and produced in two rosary-like strings, as if strung together by elastic filaments continuous with the gelatinous capsules. After impregnation, the male twists them round his legs and returns to his usual retreat, going about at night in order to feed himself and to keep up the moisture 'of the eggs, even resorting to a short immersion in the water during exceptionally dry nights. The development of the embryo within the egg takes about three weeks. When the time for

eclosion has come, the male enters the water with his burden; the larvae, in the full tadpole condition, measuring 14 to 17 millimetres, bite their way through their tough envelope, which is not abandoned by the father until all the young are liberated, and complete in the ordinary way their metamorphosis. The tadpoles grow to a large size considering that of the adult, the body equalling in size a sparrow's or even a small pigeon's egg, and they often remain more than a year in that condition.

See A. de l'lsle, " Memoire sur les mceurs et l'accouchement de l'Alytes obstetricans," Ann. Set. Nat. (6) iii. 1876; G. A. Boulenger. Tailless Batrachians of Europe (Ray Society, 1897). (G. A. Bj

ALZEY, a town of Germany, in the grand duchy of Hesse- Darmstadt, 18 m. S. of Mainz by rail. Pop. (1900) 6893. There are a Roman Catholic and two Protestant churches, several high- grade schools and a teachers' seminary. Alzey has industries of dyeing and weaving, breweries, and does a considerable trade in wine. It is immortalized in the Nibelungenlied in the person of " Volker von Alzeie," the warrior who in the last part of the epic plays a part second only to that of Hagen, and who " was called the minstrel (spilman) because he could fiddle." It became an imperial city in

1277. In 1620 it was sacked by the Spaniards and in 1689 burnt by the French. Annexed to France during the Napoleonic wars, it passed in 181 5 to the grand-duchy of Hesse-Darmstadt.

ALZOG, JOHANN BAPTIST (1808-1878), German theologian, was born at Ohlau, in Silesia, on the 29th of June 1808. He studied at Breslau and Bonn and was ordained priest at Cologne in 1834. In the following year he accepted the chairs of exegesis and church history at the seminary of Posen. He removed in 1844 to Hildesheim, where he had been appointed rector of the seminary. He became professor of church history at the university of Freiburg in the Breisgau in 1853 and held that post till his death on the 1st of March 1878. Together with Dollinger, Alzog was instrumental in convoking the famous Munich assembly of Catholic scholars in 1863. He also took part, with Bishops Hefele and Haseberg, in the preparatory work of the Vatican Council and voted in favour of the doctrine of papal infallibility but against the opportuneness of its promulgation. Alzog's fame rests mainly on his Handbuch der Universai-Kirchengeschichte (Mainz, 1841, often reprinted under various titles; Eng. trans, by Pabisch and Byrne, A Manual of Church History, 4 vols. Cincinnati, 1874). Based upon the foundations laid by Mohler, this manual was generally accepted as the best exposition of Catholic views, in opposition to the Protestant manual by C. A. Hase, and was translated into several languages. Besides a host of minor writings on ecclesi- astical subjects, and an active collaboration in the great Kirchen- lexiconoi Wetzer and Welte, Alzog was also the author of Grundriss der Patrologie (Freiburg, 1866, 4th ed. 1888), a scholarly work; though now superseded by that of O. Bardenhewer.

A full list of Alzog's writings is given in H. Hurter's Nomenclator literarius recentioris theologiae catholicae, vol. iii. For an account of his life see the funeral oration by F. X. Kraus, entitled: Gedachtnissrede auf Johannes Alzog (Freiburg, 1879).

AMADfS DE GAULA. This famous romance of chivalry survives only in a Castilian text, but it is claimed by Portugal as well as by Spain. The date of its composition, the name of its author, and the language in which it was originally written are not yet settled. It is not even certain when the romance was first printed, for though the oldest known edition (a unique copy of which is in the British Museum) appeared at Saragossa in 1508, it is highly probable that Amadis was in print before this date: an edition is reported to have been issued at Seville in 1496. As it exists in Spanish, Amadis de Gaula consists of four books, the last of which is generally believed to be by the regidor of Medina del Camp©, Garci Rodriguez de Montalvo

(whose name is given as Garci Ordonez de Montalvo in all editions of Amadis later than that of 1508, and as Garci Gutierrez de Montalvo in some editions of the Sergas de Esplandidn). Montalvo alleges that the first three books were arranged and corrected by him from " the ancient originals," and a reference in the prologue to the siege, of Granada points to the conclusion that the Spanish recast was made shortly after 1492; it is

possible, however, that the prologue alone was written after 1492, and that the text itself is older. The number of these " ancient originals " is not stated, nor is there any mention of the language in which they were composed; Montalvo's silence on the latter point might be taken to imply that they were in Castilian, but any such inference would be hazardous. Three books of Amadis de Gaida are mentioned by Pero Ferriis who was living in 1379, and there is evidence that the romance was current in Castile more than a quarter of a century earlier; but again there is no i nf ormation as to the language in which they were written. Gomes Eannes de Azurara, in his Chronica de Conde D. Pedro de Menezes {c. 1450), states that Amadis de Gaula was written by Vasco de Lobeira in the time of king Ferdinand of Portugal who died in 1383: as Vasco de Lobeira was knighted in 1385, it would follow that he wrote the elaborate romance in his earliest youth. This conclusion is untenable, and the suggestion that the author was Pedro de Lobeira (who flourished in the 1 5th century) involves a glaring anachronism. A further step was taken by the historian Joao de Barros, who maintained in an unpublished work dating between 1540 and 1550 that Vasco de Lobeira wrote Amadis de Gaula in Portuguese, and that his text was translated into Castilian; this is unsupported assertion. Towards the end of the 1 6th century Miguel Leite Ferreira, son of the Portuguese poet, Antonio Ferreira, declared that the original manuscript of Amadis de Gaula was then in the Aveiro archives, and an Amadis de Gaula in Portuguese, which is alleged to have existed in the conde de Vimeiro's library as late as 1586, had vanished before 1726. In the absence of corroboration, these dubious details must be received with extreme reserve. A stronger argument in favour of the Portuguese case is drawn from the existing Spanish text. In book I, chapters 40 and 42, it is recorded that the Infante Alphonso of Portugal suggested a radical change in the narrative of Briolanja's relations with Amadis. This prince has been identified as the Infante Alphonso who died in 1312, or as Alphonso IV. who ascended the Portuguese

throne in 1325. Were either of these identifications established, the date of com- position might be referred with certainty to the beginning of the 14th century or the end of the 13th. But both identifications are conjectural. Nevertheless the passage in the Spanish text undeniably lends some support to the Portuguese claim, and recent critics have inclined to the belief that Amadis de Gaula was written by Joao de Lobeira, a Galician knight who frequented the Portuguese court between 1258 and 1285, and to whom are ascribed two fragments of a poem in the Colocci-Brancuti Canzoniere (Nos. 240 and 240 b), which reappears with some unimportant variants in Amadis de Gaula (book II, chapter n). The coincidence may be held to account in some measure for the traditional association of a Lobeira with the authorship of Amadis de Gaula; but, though curious, it warrants no definite conclusion being drawn from it. Against the Portuguese claim it is argued that the VUlancico corresponding to Joao de Lobeiro's poem is an interpolation in the Spanish text, that Portuguese prose was in a rudimentary stage of development at the period when — ex hypothesi — the romance was composed, and that the book was very popular in Spain almost a century before it is even mentioned in Portugal. Lastly, there is the incontrovertible fact that A midis de Gaula exists in Castilian, while it remains to be proved that it ever existed in Portuguese. As to its substance, it is beyond dispute that much of the text derives from the French romances of the Round Table; but the evidence does not enable us to say

(1) whether it was pieced together from various French romances;

(2) whether it was more or less literally translated from a lost French original; or (3) whether the first Peninsular adapter or translator was a Castilian or a Portuguese. On these points judgment must be suspended. There can, however, be no hesitation in accepting Cervantes' verdict on Amadis de Gaula as the " best of all the books of this kind that have ever been written." It is the prose epic of feudalism, and its romantic spirit, its high ideals, its fantastic gallantry, its ingenious adventures, its mechanism of symbolic wonders, and its flowing style have entranced readers of such various types as Francis I. and Charles V:, Ariosto and Montaigne.

Bibliography. — Carolina Michaelis de Vasconcellos and Gottfried Baist in the Grundriss der romanischen PJiilologie (Strassburg, 1897), ii. Band, 2. Abteilung, pp. 216-226 and 440-442; Ludwig Braunfels, Kritischer Versuch iiber den Roman Amadis von Gallien (Leipzig, 1876) ; Theophilo Braga, Historia das novelas portuguezas de cavalleria (Porto, 1873), Curso de litieratura e arte portugueza

(Lisboa, 1881), and QuestBes de litteratura e arte portugueza (Lisboa, 1885) ; Marcelino Menendez y Pelayo, Origenes de la novela (Madrid, 1905) ; Eugene Baret, De V Amadis de Gaule et de son influence sur les mosurs et Id litterature au XVI' et au XVII' siecle (Paris, 1873). (J. F. -K.)

AMADOU, a soft tough substance used as tinder, derived from Polyporus fomentarius, a fungus belonging to the group Basidiomycetes and somewhat resembling a mushroom in manner of growth. It grows upon old trees, especially the oak, ash, fir and cherry. The fungus is cut into slices and then steeped in a solution of nitre. Amadou is prepared on the continent of Europe, chiefly in Germany, but the fungus is a native of Britain. Polyporus igniarius and other species are also used, but yield an inferior product.

AMAKUSA, an island belonging to Japan, 26ˆ m. long and 13ˆ in extreme width, situated about 32° 20′ N., and 130° E. long., on the west of the province of Higo (island of Kiushiu), from which it is separated by the Yatsushiro-kai. It has no high mountains, but its surface being very hilly — four of the peaks rise to a height over 1500 ft. — the natives resort to the terrace system of cultivation with remarkable success. A number of the heads of the Christians executed in connexion with the Shimabara rebellion in the first half of the 17th century were buried in this island. Amakusa produces a little coal and fine kaolin, which was largely used in former times by the potters of Hirado and Satsuma.

AMAL, the name of the noblest family among the Ostrogoths, and that from which nearly all their kings were chosen.

AMALARIC (d. 531), king of the Visigoths, son of Alaric II., was a child when his father fell in battle against Clovis, king of the Franks (507). He was carried for safety into Spain, which country and Provence were thenceforth ruled by his maternal grandfather, Theodoric the Ostrogoth, acting through his vice- gerent, an Ostrogothic nobleman named Theudis. In 522 the young Amalaric was proclaimed king, and four years later, on Theodoric's death, he assumed full royal power in Spain and a part of Languedoc, relinquishing Provence to his cousin Atha- laric. He married Clotilda, daughter of Clovis ; but his disputes with her, he being an Arian and she a Catholic, brought on him the penalty of a Frankish invasion, in which he lost his life in 53 1 .

AMALASUNTHA or Amalasuentha, queen of the Ostrogoths (d- S3 5), daughter of Theodoric, king of the Ostrogoths, was married in

515 to Eutharic, an Ostrogoth of the old Amal line, who had previously been living in Spain. Her husband died, apparently in the early years of her marriage, leaving her with two children, Athalaric and Matasuentha. On the death of her father in 526, she succeeded him, acting as regent for her son, but being herself deeply imbued with the old Roman culture, she gave to that son's education a more refined and literary turn than suited the ideas of her Gothic subjects. Conscious of her unpopularity she banished, and afterwards put to death, three Gothic nobles whom she suspected of intriguing against her rule, and at the same time opened negotiations with the emperor Justinian with the view of removing herself and the Gothic treasure to Constantinople. Her son's death in 534 made but little change in the posture of affairs. Amalasuntha, now queen; with a view of strengthening her position, made her cousin Theodahad partner of her throne (not, as sometimes stated, her husband, for his wife was still living). The choice was un- fortunate: Theodahad, notwithstanding a varnish of literary culture, was a coward and a scoundrel. He fostered the dis- affection of the Goths, and either by his orders or with his permission, Amalasuntha was imprisoned on an island in the Tuscan lake of Bolsena, where in the spring of 535 she was murdered in her bath.

The letters of CassiodorUs, chief minister and literary adviser of Amalasuntha, and the histories of Procopius and Jordanes, give us our chief information as to the character of Amalasuntha.

AMALEKITES, an ancient tribe, or collection of tribes, in the south and south-east of Palestine, often mentioned in the Old Testament as foes of the Israelites. They were regarded as a branch of the Edomites (Gen. xxxvi. 12, see Edom), and appear to have numbered among their divisions the Kenites. When the Israelites were journeying from Egypt to the land of Canaan, the Amalekites are said to have taken advantage of their weak condition to harry the stragglers in the rear, and as a judgment for their hostility it was ordained that their memory should be blotted out from under heaven (Deut. xxv. 17-19). An allusion to this appears in the account of Israel's defeat on the occasion of the attempt to force a passage from Kadesh through Hormah, evidently into Palestine (Num. xiv. 43-45, cp. Deut. i. 44-46). The statements are obscure, and elsewhere Hormah is the scene of a victory over the Canaanites by Israel (Num. xxi. 1-3), or by the tribes Judah and Simeon (Judg. i. 17). The

question is further complicated by the account of Joshua's overthrow of Amalek apparently in the Sinaitic peninsula. The event was commemorated by the erection of the altar " Yahweh- nissi " (" Yahweh my banner " or " memorial "), and rendered even more memorable by the utterance, "Yahweh hath sworn: Yahweh will have war with Amalek from generation to genera- tion " (Ex. xvii. 8-16, on its present position, see Exodus [Book]). The same sentiment recurs in Yahweh's command to Saul to destroy Amalek utterly for its hostility to Israel (1 Sam. xv.), and in David's retaliatory expedition when he distributed among his friends the spoil of the " enemies of Yahweh " (xxx. 26). Saul himself, according to one tradition, was slain by an Amalekite (2 Sam. i., contrast 1 Sam. xxxi.). A similar spirit appears among the prophecies ascribed to Balaam: " Amalek, first (or chief) of nations, his latter end [will be] destruction " (Num. xxiv. 20).

The district of Amalek lay to the south of Judah (cp. I Chron. iv. 42 seq), probably between Kadesh and Hormah (cp. Gen. xiv. 7; 1 Sam. xv. 7, xxvii. 8), and the interchange of the ethnic with " Canaanites " and " Amorites " suggests that the Amalekites are merely one of Israel's traditional enemies of the older period. Hence we find them taking part with Ammonites and Midianites (Judg. iii. 13, vi. 3), and their king Agag, slain by Samuel as a sacrificial offering (1 Sam. xv. 9), was a byword for old-time might and power (Num. xxiv. 7). Even in one of the Psalms (lxxxiii. 7) Amalek is mentioned among the enemies of Israel — just as Greek writers of the 6th century of this era applied the old term Scythians to the Goths (Noldeke),— and the traditional hostility between Saul and Amalek is reflected still later in the book of Esther where Haman the Agagite is pitted against Mordecai the Benjamite.

Twice Amalek seems to be mentioned as occupying central Palestine (Judg. v. 14, xii. 15), but the passages are textually un- certain. The name is celebrated in Arabian tradition, but the statements regarding them are confused and conflicting, and for historical purposes are practically worthless, as has been proved by Th. Noldeke {Veber die Amalekiter, Gottingen, 1864).' On the biblical data, see also E. Meyer, Die Israeliten (Index, s.v.). ,

(S. A. C.)

AM ALFI, a town and archiepiscopal see of Campania, Italy, in the province of Salerno, from the town of which name it is distant 12 m. W.S.W. by road, on the N. coast of the Gulf of Salerno. Pop. (1901) 6681. It lies at the mouth of a deep ravine, in a sheltered situation,

at the foot of Monte Cerreto (4314 ft.), in the centre of splendid coast scenery, and is in consequence much visited by foreigners. The cathedral of S. Andrea is a structure in the Lombard-Norman style, of the nth century; the facade in black and white stone was well restored in 189 1; the bronze doors were executed at Constantinople before 1066. The campanile dates from 1276. The interior is also fine, and contains ancient columns and sarcophagi. The conspicuous Capuchin monastery on the W. with fine cloisters (partly de- stroyed by a landslip in 1899) is now used as an hotel. Amalfi is first mentioned in the 6thcentury,and soon acquired importance as a naval power; in the 9th century it shared with Venice and Gaeta the Italian trade with the East, and in 848 its fleet went to the assistance of Pope Leo IV. against the Saracens.

It was then an independent republic with a population of some 70,000, but in 1131 it was reduced by King Roger of Sicily. In 1 13 5 and 1 137 it was taken by the Pisans, and rapidly declined in importance, though its maritime code, known as the Tavole Amalfitane, was recognized in the Mediterranean until 1570. In 1343 a large part of the town was destroyed by an inundation, and its harbour is now of little importance. Its industries too, have largely disappeared, and the paper manufacture has lost ground since 1861.

AMALGAM, the name applied to alloys which contain mercury. It is said by Andreas Libavius to be a corruption of /xaXayna; in the alchemists the form algamala is also found. Many amal- gams are formed by the direct contact of a metal with mercury, sometimes with absorption, sometimes with evolution, of heat. Other methods are to place the metal and mercury together in dilute acid, to add mercury to the solution of a metallic salt, to place a metal in a solution of mercuric nitrate, or to electrolyse a metallic salt using mercury as the negative electrode. Some amalgams are liquids, especially when contain- ing a large proportion of mercury; others assume a crystalline form. In some cases definite compounds have been isolated from amalgams which may be regarded as mixtures of one or more of such compounds with mercury in excess. In general these compounds are decomposable by heat, but some of them, such as those of gold, silver, copper and the alkali metals, even when heated above the boiling point of mercury retain mercury and leave residues of definite composition. Tin amalgam is used for " silvering " mirrors, gold and silver amalgam in gilding and silvering, cadmium and copper amalgam in dentistry, and an amalgam of zinc and tin for the rubbers of electrical machines ; the zinc plates of electric batteries are amalgamated in order to reduce polarization.

AMALRIC, the name of two kings of Jerusalem. Amalric I., king from 1162 to 1174, was the son of Fulk of Jerusalem, and the brother of Baldwin III. He was twice married: by his first wife, Agnes of Edessa, he had issue a son and a daughter, Baldwin IV. and Sibylla, while his second wife, Maria Comnena, bore him a daughter Isabella, who ultimately carried the crown of Jerusalem to her fourth husband, Amalric of Lusignan (Amalric II.). The reign of Amalric I. was occupied by the Egyptian problem. It became a question between Amalric and Nureddin, which of the two should control the discordant viziers, who vied with one another for the control of the decadent Caliphs of Egypt. The acquisition of Egypt had been an object of the Franks since the days of Baldwin I. (and indeed of Godfrey himself, who had promised to cede Jerusalem to the patriarch Dagobert as soon as he should himself acquire Cairo). The capture of Ascalon by Baldwin III. in 1153 made this object more feasible; and we find the Hospitallers preparing sketch-maps of the routes best suited for an invasion of Egypt, in the style of a modern war office. On the other hand, it was natural for Nureddin to attempt to secure Egypt, both because it was the terminus of the trading route which ran from Damascus and because the acquisition of Egypt would enable him to surround the Latin kingdom. For some five years a contest; was waged between Amalric and Shirguh (Shirkuh), the lieutenant of Nureddin, for the possession of Egypt. Thrice (1164,1167,1168) Amalric penetrated into Egypt: but the contest ended in the establishment of Saladin, the nephew of Shirguh, as vizier — a position which, on the death of the puppet caliph in 1171,' was turned into that of sovereign. The extinction of the Latin kingdom might now seem imminent; and envoys were sent to the West with anxious appeals for assistance in 1169, n 71 and 1 1 73. But though in n 70 Saladin attacked the kingdom, arid captured Aila On the Red Sea, the danger was not so great as it seemed. Nureddin was jealous of his over-mighty subject, and his jealousy bound Saladin's hands. This was the position of affairs when Amalric died, in 11 74; but, as Nureddin died in the same year, the position was soon altered and Saladin began the final attack on the kingdom. Amalric I., the second of the native kings of Jerusalem, had the qualities of his brother Baldwin III. (q.v.). He was something of a scholar, and it Was

he who set William of Tyre to work. He was perhaps still more of a lawyer: his delight was in knotty points of the law, and he knew the

Assises better than any of his subjects. The Church had some doubts of him, and he laid his hands on the Church. William of Tyre was once astonished to find him questioning, on a bed of sickness, the resurrection of the body; and his taxa- tion of clerical goods gave umbrage to the clergy generally. But he maintained the state of his kingdom with the resources which he owed to the Church; and he is the last in the fine list of the early kings of Jerusalem.

William of Tyre is our original authority: see xix. 2-3 for his sketch of Amalric. Rohricht narrates the reign of Amalric I., Ceschichte des Konigreichs Jerusalem, c. xvii.-xviii.

Amalric II., king from 1197 to 1205, was the brother of Guy of Lusignan. He had been constable of Jerusalem, but in 1.194, on the death of his brother, he became king of Cyprus, as Amalric I. He married Isabella, the daughter of Amalric I. by his second marriage, and became king of Jerusalem in right of his wife in 1197. In 1198 he was able to procure a five years' truce with the Mahommedans, owing to the struggle between Saladin's brothers and his sons for the inheritance of his territories. The truce was disturbed by raids on both sides, but in 1204 it was renewed for six years. Amalric died in 1205, just after his son and just before his wife. The kingdom of Cyprus passed to Hugh, his son by an earlier marriage, while that of Jerusalem passed to Maria, the daughter of Isabella by her previous marriage with Conrad of Montferrat. (E. Br.)

AMALRIC (Fr. Amaury) OF BENA, French theologian, was born in the latter part of the 12th century at Bena, a village in the diocese of Chartres. He taught philosophy and theology at the university of Paris and enjoyed a great reputation as a subtle dialectician; his lectures developing the philosophy of Aristotle attracted a large circle of hearers. In 1204 his doctrines were condemned by the university, and, on a personal appeal to Pope Innocent III., the sentence was ratified, Amalric being ordered to return to Paris and recant his errors. His death was caused, it is said, by grief at the humiliation to which he had been subjected. In 1 209 ten of his followers were burnt before the gates of Paris, and Amalric's own body was exhumed and burnt and the ashes given to the winds. The doctrines of his followers, known as the Amalricians, were formally condemned by the fourth Lateran Council in 121 5. Amalric appears to have derived his philosophical system from Erigena (q.v.), whose principles he developed in a one-sided and strongly pantheistic form. Three propositions only can with certainty be attributed to him: (1) that God is all; (2) that every Christian is bound to believe that he is a member of the body of Christ, and that this belief is necessary for

salvation: (3) that he who remains in love of God can commit no sin. These three propositions were further developed by his followers, who maintained that God revealed Himself in a threefold revelation, the first in Abraham, marking the epoch of the Father; the second in Christ, who began the epoch of the Son; and the third in Amalric and his disciples, who inaugurated the era of the Holy Ghost. Under the pretext that a true believer could cbmmit no sin, the Amalricians indulged in every excess, and the sect does not appear to have long survived the death of its founder.

See W. Preger, Geschichte der deutschen Mystik im Mittelalter (Leipzig, 1874, i. 167-173); Haureau, Hist, de la phil. scol. (Paris; 1872) ; C. Schmidt, Hist, de VlLglise d' Occident pendant le moyen dge (Paris, 1885); Hefele, Conciliengesch. (2nd ed., Freiburg, 1886).

AHALTEO, the name of an Italian family belonging to Oderzo, Treviso, several members of which were distinguished in literature. The best known are three brothers, Geronimo (1507-1574), Giambattista (j 525-1 573) and Cornelk)(i 530-1603), whose Latin poems were published in one collection under the title Trium Fratrum Amaltheorum Carmina (Venice, 1627; Amst., 1689). The eldest brother, Geronimo, was a celebrated physician; the second, Giambattista, accompanied a Venetian embassy to England in 1554, and was secretary to Pius IV. at the council of Trent; the third, Cornelio, was a physician and secretary to the republic of Ragusa.

AMALTEO, POMPONIO (1 505-1 584), Italian painter of the Venetian school, was born at San Vito in Friuli. He was a pupil and son-in-law of Pordenone, whose style he closely imitated. His works consist chiefly of frescoes and altar-pieces and many of them (e.g. in the church of Santa Maria de' Battisti, at San Vito) have suffered greatly from the ravages of time.

AMALTHEIA, in Greek mythology, the foster-mother of Zeus. She is sometimes represented as the goat which suckled the infant-god in a cave in Crete, sometimes as a nymph of uncertain parentage (daughter of Oceanus, Haemonius, Olen, Melisseus), who brought him up on the' milk of a goat. This goat having broken off one of its horns, Amaltheia filled it with flowers and fruits and presented it to Zeus, who placed it together with the goat amongst the stars. According to another story, Zeus himself broke off the horn and gave it to Amaltheia, promising that it would supply whatever she desired in abundance. Amaltheia gave it to Achelbus (her reputed brother), who exchanged it for his own horn which had been broken off in hfc contest with Heracles for the possession of Deianeira. According to

ancient mythology, the owners of the horn were many and various. Speaking generally, it was regarded as the symbol of inexhaustible riches and plenty, and became the attribute of various divinities (Hades, Gaea, Demeter, Cybele, Hermes) , and of rivers (the Nile) as fertilizers of the land. The term " horn of Amaltheia " is applied to a fertile district, and an estate belonging to Titus Pomponius Atticus was called Amaltheum. Cretan coins represent the infant Zeus being suckled by the goat; other Greek coins exhibit him suspended from its teats or carried in the arms of a nymph (Ovid, Fasti, v. 115; Metam. ix. 87).

AMANA, a township in Iowa county, Iowa, U.S.A., 19 m. S.W. (by rail) of Cedar Rapids. Pop. (1900) 1748; (1910) 1729. It is served by the Chicago, Milwaukee & St Paul, and the Chicago, Rock Island & Pacific railways. The town- ship is the home of a German religious communistic society, the Amana Society, formerly the True Inspiration Society (so called from its belief in the present inspiration of the truly godly and perfectly pious), whose members live in various villages near the Iowa river. These villages are named Amana, West Amana, South Amana, East Amana, Middle Amana, High Amana and Homestead. The houses are of brick or unpainted wood. The society has in all 26,000 acres of land, of which about 10,000 acres are covered with forests. The principal occupation of the members is farming, although they also have woollen mills (their woollens being of superior quality), a cotton print factory, flour mills, saw mills and dye shops. Each fan ily has its own dwelling-place and a small garden; each member of a family has an annual allowance of credit at the common store and a room in the dwelling-house ; and each group of families has a large garden, a common kitchen and a common dining-hall where men and women eat at separate tables. Between the ages of five and fourteen education is compulsory for the entire year. In the schools nature study and manual training are prominent; German is used throughout and English is taught in upper classes only. No man is permitted to marry until twenty-four years of age, and no woman until twenty. The society's views and practices are nearly related to the teachings of Schwenkfeld and Boehme. Baptism is not practised; the Lord's Supper is celebrated only once in two years; foot-washing is held as a sacrament. At an annual spiritual examination of the members, there are mutual criti- cisms and public confessions of sin. The Inspirationists are opposed to war and to taking of oaths. The Society became attached to the Separatist leader, Eberhard Ludwig Gruber (d. 1728) in Wetterau in 1714; in 1842-1844 about 600 members, led by Christian Metz, the " divine instrument " of the

Society, emigrated from Germany to the United States and settled in a colony called Ebenezer, in Erie county, near Buffalo, N.Y.; in 1855 the colony began to remove to its present home, which it named from the mountain mentipned in the Song of Solomon, iv. 8, the Hebrew word meaning " remain true " (or, more probably, " fixed "), and in 1859 it was incorporated under the t name of the Amana Society. Metz died in 1864 and was

succeeded by Barbara Landmann, since, whose death in 1884 the community has lacked an inspired leader. Amana was the strongest in numbers of the few sectarian communities in America which outlived the 19th century. A few new members have joined the community from Switzerland and Germany in recent years. In 1905 the community won a suit brought against it for its dissolution on the ground that, having been incorporated solely as a benevolent and religious body, it was illegally carrying on a general business.

See W. R. Perkins and B. L. Wick, History of the Amana Society or Community of True Inspiration, Historical Monograph, No. I, in State University of Iowa publications (Iowa City, 1891; ; R. T. Ely, " Amana: A Study of Religious Communism," in Harper's Maga- zine for October 1902; and Bertha M. H. Shambaugh, Amana, the Community of '. True Inspiration (Iowa City, 1908).

AMANITA. The amanitas include some of the most showy representatives of the Agaricineae or mushroom order of fungi (q.v.). In the first stages of growth, they are completely en- veloped by an outer covering called the veil. As the plant develops the veil is ruptured; the lower portion forms a sheath or volva round the base of the stem, while the upper portion persists as white patches or scales or warts on the surface of the cap. The stem usually bears an upper ring of tissue, the

B C

v

Amanita muscaria.

A, the young plant. g, the gills.

B, the mature plant. a, the annulus, or remnant of

C, longitudinal section of mature velum partiale.

plant. v, remains of volva or velum

p, the pileus. universale, s, the stalk,

remains of an inner veil, that stretched from the stem to the edge of the cap and broke away from the cap as the latter expanded. The presence of the volva, and the clear white gills and spores, distinguish this genus from all other agarics. They are beautiful objects in the autumn woods; Amanita muscaria, the fly fungus, formerly known as Agaricus muscarius, being especially remarkable by its bright red cap covered with white warts. Others are pure white or of varying shades of yellow or green. There are sixteen British species of Amanita; they grow on the ground in or near woods. Several of the species are very poisonous.

AMANUENSIS (a Latin word, derived from the phrase servus a manu, slave of the hand, a secretary), one who writes, from dictation or otherwise, on behalf of another.

AMAPALA, the only port on the Pacific coast of Honduras, on the northern shore of Tigre island, in the Bay of Fonseca (q.v.); in 13 3′ N., and 87° 9′ W. Pop. (1905) about 4000. Amapala was founded in 1838, and its port was opened and declared free in 1868. The roadstead is perfectly sheltered and so deep that the largest vessels can lie within a few yards of the shore. It is the natural outlet for the commerce of some of the richest parts of Honduras, Nicaragua and Salvador; and during the 19th century it exported large quantities of -gold, silver and other ores, although its progress was retarded by the delay in constructing a transcontinental railway from Puerto Cortes. Its depots on the mainland, both about 30 m. distant,

are La Brea, for the line to Puerto Cortes, and San Lorenzo, for Tegucigalpa. Silver is still exported, in addition to hides, timber, coffee and indigo, and there are valuable fisheries.

AMARANTH, or Amarant (from the Gr. a/x&pavros, un- withering), a name chiefly used in poetry, and applied to certain plants which, from not soon fading, typified immortality. Thus Milton (Paradise Lost, iii. 353) : —

” Immortal amarant, a flower which once In paradise, fast by the tree of life, Began to bloom ; but soon for man’s offence To heaven removed, where first it grew, there grows, And flowers aloft, shading the fount of life, And where the river of bliss through midst of heaven

Rolls o'er elysian flowers her amber stream : With these that never fade the spirits elect Bind their resplendent locks." It should be noted that the proper spelling of the word is amarant; the more common spelling seems to have come from a hazy notion that the final syllable is the Greek word avdcs, "flower," which enters into a vast number of botanical names. The plant genus Amaranlus (natural order Amarantaceae) contains several well-known garden plants, such as love-lies- bleeding (A. catidatus), a native of India, a vigorous hardy annual, with dark purplish flowers crowded in handsome droop- ing spikes. Another species A. hypochandriacus, is prince's feather, another Indian annual, with deeply-veined lance-shaped leaves, purple on' the under face, and deep crimson flowers densely packed oh erect spikes. " Globe amaranth " belongs to an allied genus, Gomphrena, and is also a native of India. It is an annual about 18 in. high, with solitary round heads of flowers; the heads are violet from the colour of the bracts which surround the small flowers.

In ancient Greece the amaranth (also called xp" anQl i\ixpvcos) was sacred to Ephesian Artemis. It was supposed to have special hiealing properties, and as a symbol of immor- tality was used to decorate images of the gods and tombs. In legend, Amarynthus (a form of Amarantus) was a hunter of Artemis and king of Euboea; in a village of Amarynthus, of which he was the eponymous hero, there was a famous temple of Artemis Amarynthia or Amarysia (Strabo x. 448; Pausan.

i- 3.1, P- S)-

See Lenz, Botanik der alt. Griech. u'nd Rom. (1859) ; J. Murr, Die Pflqnzenwelt itider griech. Mythol. (1890).

AMARAPURA ("the city of the gods"), formerly the capital of the Burmese kingdom, now a suburb of Mandalay, Burma, with a : population in 1901 of 9103. The town was founded in 1783 to form a new capital about 6 m. to the north-east of Ava. It increased rapidly in size and population, and in 1810 was estimated to contain 170,000 inhabitants; but in that year the town was destroyed by fire, and this disaster, together with' the: removal of the native court to Ava in 1823, caused a decline in the prosperity' of the place. In 1827 its population was estimated at Only 30,000. It suffered severe calamity from an earthquake, which in 1839 destroyed the greater part of the city. It was finally abandoned in i860, when king Mindon. occupied Mandalay, 5 or 6 m. farther north. Amarapura was laid out on much the same plan as Ava. The ruins of ,the city

wall, now overgrown with jungle, show it to have been a square with a side of about three-quarters of a mile in length. At each corner stood a solid brick.pagoda about looit. high. The most remarkable edifice was a celebrated temple, adorned with 250 lofty pillars of gilt wood, and containing a colossal bronze statue of Buddha. The remains of the former palace of the Burmese monarchs still survive in the centre of the town. During the time of its prosperity Amarapura was defended by a rampart and a large square citadel, with a broad moat, the walls being 7000 ft. long and 20 ft. high, with a bastion at each corner. The Burmans know it now as Myohaung, " the old city." It has a station on the Rangoon-Mandalay railway, and is the junction for the line to Maymyo and the Kunlong ferry and for the Sagaing-Myitkyina railway. The group of villages called Amarapura by Europeans is known to the Burmans as Taung-myo, ■'" the southern city," as distinguished from Mandalay, the Myauk-myo, or " northern city," 3 m. distant.' !

AMARAR, a tribe of African " Arabs " inhabiting the moun- tainous country on the west side of the Red Sea from Suakin northwards towards Kosseir. Between them and the Nile are the Ababda and Bisharin tribes and to their south dwell the Hadendoa. The country of the Amarar is called the Etbai. Their headquarters are in the Ariab district. The tribe is divided into four great families: (1) Weled Gwilei, (2) Weled Aliab, (3) Weled Kurbab Wagadab, and (4) the Amarar proper of the Ariab district. They claim to be of Koreish blood and to be the descendants of an invading Arab army. Possibly some small bands of Koreish Arabs may have made an inroad and converted some of the Amarar to Islam. ■ Further than this there is little to substantiate their claim.

See Anglo-Egyptian Sudan, edited by Count Gleichen (London; 1905) ; Sir F. R. Wingate, Mahdism and the Egyptian Sudan (London, 1891); A. H. Keane, Ethnology of Egyptian Sudan (London, 1884).

AMARA SINHA (c. a.d. 375), Sanskrit grammarian and poet, of whose personal history hardly anything is known. He is said to have been " one of the nine gems that adorned the throne of Vikramaditya," and according to the evidence of Hsiian Tsang, this is the Chandragupta Vikramaditya that flourished about a.d. 375. Amara seems to have been a Buddhist; and an early tradition asserts that his works, with one exception, were destroyed during the

persecution carried on by the orthodox Brahmins in the 5th century. The exception is the celebrated Amara- Kosha (Treasury of Amara), a vocabulary of Sanskrit roots, in three books, and hence sometimes called Trikanda or the " Tripartite." It contains 10,000 words, and is arranged, like other works of its class, in metre, to aid the memory. The first chapter of the Kosha was printed at Rome in Tamil character in 1798. An edition of the entire work, with English notes and an index by H. T. Colebrooke, appeared at Serampore in 1808. The Sanskrit text was printed at Calcutta in 1831. A French translation by A. L. A. Loiseleur-Deslongchamps as published at Paris in 1839.

AMARI, MICHELE (1806-1889), Italian orientalist and patriot, was born at Palermo. From his earliest youth he imbibed liberal principles from his relatives, especially from his grand- father, and although at the age of fourteen he was appointed clerk in the Bourbon civil service, he joined the Carbonari like many other young Sicilians and actively sympathized with the revolution of 1820. The movement, which was separatist in its tendencies, was quickly suppressed, but the conspiracies continued, and Amari's father, implicated in that of 1822, was arrested and condemned to death together with many others; but his sentence was commuted to imprisonment, and in 1834 he was liberated. Michele Amari still held his clerkship, but he regarded the Neapolitan government with increasing hatred, and he led a life of active physical exercise to train himself for the day of revolution. He devoted much of his time to the study of English and of history; his first literary essay was a translation of Sir Walter Scott's Marmion (1832), and in 1839 he published a work on the Sicilian Vespers, entitled Un Periodo dette storie Siciliane del XIII. secolo, filled with political allusions reflecting unfavourably on the government. The book had an immediate success and went through many editions, but it brought the author under the suspicion of the authorities, and in 1842 he escaped from a boat just as he was about to be arrested. He settled in Paris, where he came in contact with a number of literary men, such as Michelet and Thierry, as well as with the Italian exiles. Having no private means he had to earn a precarious livelihood by literature. He was much struck with certain French translations of Arabic works on Sicily, which awoke in him a desire to read the authors in the original. With the assistance of Prof. Reinaud and Baron de Slane he soon acquired great proficiency in Arabic, and his translations and editions of oriental texts, as well as his historical essays, made him a reputa- tion. In 1844 he began his great work La Storia del Mustdmani in Sicilia, but the revolution of 1848 plunged, him into politics ' once more. His pamphlet, Quelques

Observations sur le droit public de la Sicile, advocating the revival of the 181 2 constitution for the island, met with great success, and on arriving at Palermo,

whence the Bourbon government had been expelled, he was chosen member of the war committee and appointed professor of public law at the university. At the general elections Amari was returned for Palermo and became minister of finance in the Stabile cabinet. On ite fall he was sent to Paris and London to try to obtain help for the struggling island; having failed in his mission he returned to Sicily in 1849, hoping to fight. But the Neapolitan troops had re-occupied the island, the Liberals were in disagreement among themselves, and Amari with several other notables with difficulty escaped to Malta. Characteristic of his scholarly nature is the fact that he delayed his flight to take the impress of an important Arabic inscription. He returned to Paris, sad and dejected at the collapse of the movement, and devoted himself once more to his Arabic studies. He published a work on the chronology of the Koran, for which he received a prize from the Academie des Inscriptions, edited the Solwan el Mota by Ibn Zafer (a curious collection of philosophical thoughts) and Ibn Haukal's Description of Palermo, and in 1854 the first volume of his history of the Mahommedans in Sicily appeared. He received a meagre stipend for cataloguing the Arabic MSS. in the Bibliotheque Nationale, and he contributed many articles to the reviews. Although a firm friend of Mazzini, he discouraged the latter's premature conspiracies. In 1859, after the expulsion of the central Italian despots, Amari was appointed professor of Arabic at Pisa and afterwards at Florence. But when Garibaldi and his thousand had conquered Sicily, Amari returned to his native island, and was given an appointment in the government. Although intensely Sicilian in sentiment, he became one of the stauhchest advocates of the union of Sicily with Italy, and was subsequently made senator of the kingdom at Cavour's instanceˆ He was minister of education in the Farini and Minghetti cabinets, but on the fall of the latter in 1864, he resumed his professorship at Florence and spent the rest of his life in study. His circle of acquaintances, both in Italy and abroad, was very large, and his sound scholarship was appreciated in all countries. He died in 1889, loaded with honours. The last volume of his Storia dei Musulmani appeared in 1873, and in addition to the above-mentioned works he published many others on oriental and historical subjects. His work on the Sicilian Vespers was re-written as La Guerra del Vespro (9th ed., Milan, 1886). He was the pioneer of Arabic studies in modern Italy, and he still remains the standard authority on the Mussul- man domination in Sicily, though his

judgment on religious questions is sometimes warped by a violently anti-clerical bias.

See A. D'Ancona, Carteggio di Michele Amari coll' elogio di lui (Turin, 1896); and Oreste Tommasini's essay in his Scritti di storia e critica (Rome, 1891). (L. V.)*

AMARYLLIS (the name of a girl in classical pastoral poetry), in botany, a genus of the natural order Amaryllidaceae, containing the belladonna lily (Amaryllis Belladonna), a native of South Africa, which was introduced into cultivation at the beginning of the 18th century. This is a half-hardy bulbous plant, produc- ing in the spring a number of strap-shaped, dull green leaves, 1-15 ft. long, arranged in two rows, and in autumn a solid stem, bearing at the top a cluster of 6-12 funnel-shaped flowers, of a rose colour and very fragrant. Several forms are known in cultivation. Most of the so-called Amaryllis of gardens belong to the allied genus Hippeastrum (q.v.).

AMASIA (anc. Amasia), the chief town of a sanjak in the Sivas vilayet of Asia Minor and an important trade centre on the Samsun-Sivas road, beautifully situated on the Yeshil Irmak (Iris). Pop. 30,000; Moslems about 20,000, of whom a large proportion are Kizilbash (Shia); Christians (mostly Armenians), 10,000. It was one of the chief towns of the kingdom of Trebizond and of the Seljuks, one of whose sultans, Kaikobad I,, enriched it with fine buildings and restored the castle, which was thus enabled to stand a seven months' siege by Tinmr. It was also much favoured by the early Osmanli sultans, one of whom, Selim I., was born, there. Bayezid II. built a fine mosque. The place was modernized about a generation ago by Zia Pasha, the poet, when governor, and is now an unusually well built Turkish town with good, bazaar and khans and a fine clock-tower. The

Americans and the Jesuits have missionary schools for the Armenian population. Amasia has extensive orchards and fruit gardens still, as in Ibn Batuta's time, irrigated by water wheels turned by the current of the river; and there are steam flour- mills. Wheat, flour and silk are exported.

Ancient Amasia has left little trace of itself except on the castle rock, on the left of the river, where the acropolis walls and a number of

splendid rock-cut tombs, described by Strabo as those of the kings of Pontus, can be seen. The cliff is cut away all round these immense sepulchres so that they stand free. The finest, known from its polished surfaces as the " Mirror Tomb," is about 2 m. from the modern city. Amasia rose into historical importance after the time of Alexander as the cradle of the power of Pontus; but the last king to reign there was the father of Mithradates Eupator " The Great." The latter, however, made it the base of his operations against the Romans in 89, 72 and 67 B.C. Pompey made it a free city in 65, after Mithradates' fall. It was the birthplace of Strabo. (D. G. H.)

AMASIS, or Amosis (the Greek forms of the Egyptian name Ahmase, Ahmosi, " the moon is born," often written Aahmes or A times in modern works), the name of two kings of ancient Egypt.

Amasis I., the founder of the XVIIIth dynasty, is famous for his successful wars against the Hyksos princes who still ruled in the north-east of the Delta (see Egypt: History, sect. 1.)

Amasis II. was the last great ruler of Egypt before the Persian conquest, 570-526 B.C. Most of our information about him is derived from Herodotus (ii. 161 et seq.) and can only be imperfectly controlled by monumental evidence. According to the Greek historian he was of mean origin. A revolt of the native soldiers gave him his opportunity. These troops, returning home from a disastrous expedition to Cyrene, suspected that they had been betrayed in order that Apries, the reigning king, might rule more absolutely by means of his mercenaries, and their friends in Egypt fully sympathized with them. Amasis, sent to meet them and quell the revolt, was proclaimed king by the rebels, and Apries, who had now to rely entirely on his mercen- aries, was defeated and taken prisoner in the ensuing conflict at Momemphis; the usurper treated the captive prince with great lenity, but was eventually persuaded to give him up to the people, by whom he was strangled and buried in his ancestral tomb at Sais. An inscription confirms the fact of the struggle between the native and the foreign soldiery, and proves that Apries was killed and honourably buried in the 3rd year of Amasis. Although Amasis thus appears first as champion of the disparaged native, he had the good sense to cultivate the friendship of the Greek world, and brought Egypt into closer touch with it than ever before. Herodotus relates that under his prudent administration Egypt reached the highest pitch of prosperity; he adorned the temples of Lower Egypt especially with splendid monolithic shrines and other monuments (his activity here is proved by remains still existing). To the Greeks Amasis assigned the commercial colony of Naucratis on the Canopic

branch of the Nile, and when the temple of Delphi was burnt he contributed 1000 talents to the rebuilding. He also married a Greek princess named Ladice, the daughter of Battus, king of Cyrene, and he made alliances with Polycrates of Samos and Croesus of Lydia. His kingdom consisted probably of Egypt only, as far as the First Cataract, but to this he added Cyprus; and his influence was great in Cyrene. At the beginning of his long reign, before the death of Apries, he appears to have sustained an attack by Nebuchadrezzar (568 B.C.). Cyrus left Egypt unmolested; but the last years of Amasis were disturbed by the threatened invasion of Cambyses and by the rupture of the alliance with Polycrates of Samos. The blow fell upon his son Psam- metichus III., whom the Persian deprived of his kingdom after a reign of only six months.

See Naucratis; also W. M. Flinders Petrie, History, vol. iii.; Breasted, History and Historical Documents, vol. iv. p. 509; Maspero, Les Empires. (F. Lt. G.)

AMATEUR (Lat. amator, lover), a person who takes part in any art, craft, game or sport for the sake of the pleasure afforded

by the occupation itself and not for pecuniary gain. Being thus a person for whom the pursuit in question is a recreation and not a business, and who therefore presumably devotes to it a portion only of his leisure and not his working hours, the average amateur possesses less skill than the average professional, whose livelihood and reputation depend on his (proficiency, and who therefore concentrates all his energies on the task of attaining the greatest possible mastery in his chosen career. In the arts, such as music, painting and the drama, the best amateurs are outdistanced as executants not merely by the best professionals but by professionals far below the highest rank; and although the inferiority of the amateur is not perhaps so pronounced or so universal in the case of game,s and outdoor sports, the records of such pastimes as horse-racing, boxing, rowing, billiards, tennis and golf prove that here also the same contrast is gener- ally to be found. Hence it has come about that the term "amateur," and more especially the adjectival derivative " amateurish," has acquired a secondary meaning, usually employed somewhat contemptuously, signifying inefficiency, unskilfulness, superficial knowledge or training.

The immense increase in popularity of athletic contests and games of all kinds in modern times, and especially the keen competition for " records " and championships, often of an international character, have made it a matter of importance to arrive at a clear and formal

definition of the amateur as dis- tinguished from the professional. The simple, straightforward definition of the amateur given above has been proved to be easily evaded. Many leading cricketers, for example, preserve their amateur status who, although they are not paid wages for each match they play like their professional colleagues, are provided with an annual income by their county or club under the guise of salary for performing the duties of "secretary" or some other office, leaving them free to play the game six days a week. Similarly, " gentlemen riders " are often presented with a cash payment described as a bet, or under some other pretext. Nor is the dividing-line between " out-of-pocket expenses " allowed to the amateur and the remuneration payable to the professional always strictly drawn. The various associations controlling the different branches of sport have therefore devised working regulations to be observed so far as their jurisdiction extends. Thus the Amateur Athletic Association of Great Britain defines an amateur as "one who has never competed for a money prize or staked bet, or with or against a professional for any prize, jar who has never taught, pursued or assisted in the practice of athletic exercises as a means of obtaining a livelihood." The rules of the Amateur Rowing Association are stricter, denying amateur status to anyone who has ever steered or rowed in a race with a professional for any prize, or who is or has been by trade or employment for wages a mechanic, artisan or labourer, or engaged in any menial duty, besides insisting upon the usual restrictions in regard to ta'king money and competing with professionals. In association football the rules are much more lax, for although amateurs are clearly distinguished from professionals, an amateur may even become a regular member, though unsalaried, of a professional team without losing his amateur status. The Rugby game was, up to 1895, entirely controlled by the Rugby Football Union, which, by the strictness of its laws, effectually prevented the growth of professionalism, but there had been much dissatisfaction in the provinces with the Union's decision against reimbursing day- working players for " broken time," i.e. for that part of their wages which they lost by playing on working days, and this resulted in the formation (1895) of the Northern Union, which permits remuneration for "broken time," but allows no. person who works for his living to play football unless regularly employed at his particular trade.

In America the amateur 1 question is less complicated than in Great Britain; but the intensely business-like character of American ideas of sport has encouraged the modern spirit of professionalism-. All important sports in America, except baseball, football, cricket, golf

and rowing, are, however, under the control of the Amateur Athletic Union of the United States,

the rules of which, so far as they relate to professionalism, are as follows. No person shall be eligible to compete in any athletic meeting, game or entertainment, given or sanctioned by this Union, who has (1) received or competed for compensation or reward in any form for the display, exercise or example of his skill or knowledge of any athletic exercise, or for rendering personal service of any kind to any athletic organization, or for becoming or continuing a member of any athletic organization; or (2) has entered any competition under a name other than his own, or from a club of which he was not at that time a member in good standing; or (3) has knowingly entered any competition open to any professional or professionals, or has knowingly competed with any professional for any prize or token; or (4) has issued or allowed to be issued in his behalf any challenge to compete against any professional or for money; or (5) has pawned, bartered or sold any prize won in athletic competition. It will be seen that by rule 3 the American Union enacts a standard for all athletes not much different from that of the British Amateur Rowing Association. The rules for the sports not within the Union's jurisdiction are practically the same, except that in baseball, cricket and golf amateurs may compete with professionals, though not for cash prizes. In the case of open golf competitions professional prize-winners receive cash, while amateurs are given plate to the value of their prizes as in Great Britain. There are practically no professional football players in America.

On both sides of the Atlantic the question of the employment of professional coaches has occasioned much discussion. In America it has been accepted as legal. In England the same is almost universally true, but there are certain exceptions, such as the decision of the Henley Regatta Committee, that no crew entering may be coached by a professional within two months of the race-day. Whether such a regulation be wise or the reverse is a question that depends upon the spirit in which games are regarded. Nobody wants to disparage proficiency; but if a game is conducted on business methods, the " game " element tends to be minimized, and if its object is pecuniary it ceases to be " sport " in the old sense, and the old idea of the " amateur " who indulges in it for love of the mere enjoyment tends to disappear.

AMATHUS, an ancient city of Cyprus, on the S. coast, about 24 m. W. of Larnaka and 6 m. E. of Limassol, among sandy hills and sand-dunes, which perhaps explain its name in Greek (a/uaSos, sand). The earliest remains hitherto found on the site are tombs of the early Iron Age period of Graeco- Phoenician influences (1000-600 B.C.). Amathus is identified by some (E. Oberhummer, Die Insel Cypern, i., 1902, pp. 13-14; but see Citium) with Kartihadasti (Phoenician " New-Town ") in the Cypriote tribute-list of Esarhaddon of Assyria (668 B.C.). It certainly maintained strong Phoenician sympathies, for it was its refusal to join the phil-Hellene league of Onesilas of Salamis which provoked the revolt of Cyprus from Persia in 500-494 B.C. (Herod, v. 105), when Amathus was besieged unsuccessfully and avenged itself by the capture and execution of Onesilas. The phil-Hellene Evagoras of Salamis was similarly opposed by Amathus about 385-380 B.C. in conjunction with Citium and Soli (Diod. Sic. xiv. 98); and even after Alexander the city re- sisted annexation, and was bound over to give hostages to Seleucus (Diod. Sic. xix. 62). Its political importance now ended, but its temple of Adonis and Aphrodite {Venus Amathusia) remained famous in Roman time.

The wealth of Amathus was derived partly from its corn (Strabo 340, quoting Hipponax, fl. 540 B.C.), partly from its copper mines (Ovid, Met. x. 220, 531), of which traces can be seen inland (G. Mariti, i. 187; L. Ross, Inselreise, iv. 195; W. H. Engel, Kypros, i. 11 1 ff.). Ovid also mentions its sheep {Met. x. 227); the epithet Amathusia in Roman poetry often means little more than "Cypriote," attesting however the fame of the city.

Amathus still nourished and produced a distinguished patriarch of Alexandria (Johannes Eleemon), as late as 606-616, and a ruined Byzantine church marks the site; but it was already

almost deserted when Richard Cceur de Lion won Cyprus by a victory there over Isaac Comnenus in 1191. The rich necro- polis, already partly plundered then, has yielded valuable works of art to New York (L. P. di Cesnola, Cyprus, 1878 passim) and to the British Museum {Excavations in Cyprus, 1894 (1899) passim) ; but the city has vanished, except fragments of wall and of a great stone cistern on the acropolis. A similar vessel was transported to the Louvre in 1867. Two small sanctuaries, with terra-cotta votive offerings of Graeco-Phoenician age, lie not far off, but the great shrine of Adonis and Aphrodite has not been identified (M. Ohnefalsch-Richter, Kypros, i. ch.i). (J.L. M.)

AMATI, the name of a family of Italian violin-makers, who

flourished at Cremona from about 1550 to 1692. According to Fetis, Andrea and Nicolo Amati, two brothers, were the first Italians who made violins. They were succeeded by Antonio and Geronimo, sons of Nicolo. Another Nicolo, son of Geronimo, was born on the 3rd of September 1596 and died on the 12th of August 1684. He was the most eminent of the family. He im- proved the model adopted by the rest of the Amatis and produced instruments capable of yielding greater power of tone. His pattern was usually small, but he also made the so-called "Grand Amatis." Of his pupils the most famous were Andrea Enamieri and Antonio Stradivari.

AMATITLAN, or San Joan de Amatitlan, the capital of a department bearing the same name in Guatemala, on Lake Amatitlan, 15 m. S.W. of Guatemala city by the transcontinental railway from Puerto Barrios to San Jose. Pop. (1905) about 10,000. The town consists almost entirely of one-storeyed adobe huts inhabited by mulattoes and Indians, whose chief industry is the production of cochineal. In 1840 only a small Indian village marked its site, and its subsequent growth was due to the sugar plantations established by a Jesuit settlement. The wells of the town are strongly impregnated with salt and alum, and in the vicinity there are several hot springs. Lake Amatitlan, 9 m. long and 3 m. broad, lies on the northern side of the great Guatemalan Cordillera. Above it rises the four- cratered volcano of Pacaya (8390 ft.), which was in eruption in 1870. The outlet of the lake is a swift river 65 m. long, which cuts a way through the Cordillera, and enters the Pacific at Istapa, after forming at San Pedro a fine waterfall more than 200 ft. high.

AMAUROSIS (Gr. for " blinding,"), a term for " deprivation of sight," limited chiefly to those forms of defect or loss of vision which are caused by diseases not directly involving the eye.

AMAZON, the great river of South America. Before the con- quest of South America, the Rio de las Amazonas had no general name; for, according to a common custom, each savage tribe gave a name only to the section of the river which it occupied — such as Paranaguazu, Guyerma, Solimoes and others. In the year 1 500, Vicente Yanez Pinzon, in command of a Spanish expedition, discovered and ascended the Amazon to a point about 50 m. from the sea. He called it the Rio Santa Maria de la Mar Didce, which soon became abbreviated to Mar Duke, and for some years, after 1502, it was known as the Rio Grande. The principal com- panions of Pinzon, in giving evidence in 1515, mention it as El Ryo Maranon. There is much controversy about the origin of the word Maranon. Peter Martyr in a letter to Lope Hurtado de Mendoza in 1513 is the first to

state that it is of native origin. Ten years after the death of Pinzon, his friend Oviedo calls it the Maranon. Many writers believe that this was its Indian name. We are disposed to agree with the Brazilian historian Constancio that Maranon is derived from the Spanish word marana, a tangle, a snarl, which well represents the bewildering difficulties which the earlier explorers met in navigating not only the entrance to the Amazon, but the whole island-bordered, river-cut and indented coast of the now Brazilian province of Maranhao.

The first descent of the mighty artery from the Andes to the sea was made by Orellana in 1541, and the name Amazonas arises from the battle which he had with a tribe of Tapuya savages where the women of the tribe fought alongside. the men,

as was the custom among all of the Tapuyas, Orelana, no doubt, derived the name Amazonas from the ancient Amazons (q.v.) of Asia and Africa described by Herodotus and Diodorus.

The first ascent of the river was made in 1638 by Pedro Texiera, a Portuguese, who reversed the route of Orellana and reached Quito by way of the. Rio Napo. He returned in 1639 with the Jesuit fathers Acuna and Artieda, delegated by the viceroy of Peru to accompany him.

The river Amazon has a drainage area of 2,722,000 sq. m., if the Tocantins be included in its basin. It drains four-tenths of South America, and it gathers its waters from 5 N. to 20° S. latitude. Its most remote sources are found on the inter-Andean plateau, but a short distance from the Pacific Ocean; and, after a course of about 4000 m. through the interior of Peru and across Brazil, it enters the Atlantic Ocean on the equator. It is generally accepted by geographers that the Maranon, or Upper Amazon, rises in the little lake, Lauricocha, in io° 30′ S. latitude, and 100 m. N.N.E. of Lima. They appear to have followed the account given by Padre Fritz which has since been found incorrect. According to Antonio Raimondi, it is the Rio de Nupe branch of the small stream which issues from the lake that has the longer course and the greater volume of water. The Nupe rises in the Cordillera de Huayhuath and is the true source of the Maranon. There is a difference among geographers as to where the Maranon ends and the Amazon begins, or whether both names apply to the same river. The Pongo de Manseriche, at the base of the

Andes and the head of useful navigation, seems to be the natural terminus of the Maranon; and an examination of the hydrographic conditions of the great valley makes the convenience and accuracy of this apparent. Raimondi terminates the Maranon at the mouth of the Ucayali, Reclus the same, both following the missionary fathers of the colonial period. C. M. de la Condamine uses " Amazon " and " Maranon " indiscriminately and considers them one and the same. Smyth and Lowe give the mouth of the Javary as the eastern limit, as does d'Orbigny. Wolf, apparently uncertain, carries the " Maranon or Amazon " to the Peruvian frontier of Brazil at Tabatinga. Other travellers and explorers contribute to the confusion. This probably arises from the rivalry of the Spaniards and Portuguese. The former accepted the name Maranon in Peru, and as the missionaries penetrated the valley they extended the name until they reached the mouth of the Ucayali; while, as the Portuguese ascended the Amazon, they carried this name to the extent of their explora- tions. Beginning with the lower river we propose to notice, first, the great affluents which go to swell the volume of the main stream.

Tributaries.

The Tocantins is not really a branch of the Amazon, although usually so considered. It is the central fluvial artery of Brazil, running from south to north for a distance of about 1500 m. It rises in the mountainous district known as the Pyreneos; but its more ambitious western affluent, the Araguay, has its extreme southern headwaters on the slopes of the Serra Cayapo, and flows a distance of 1080 m. before its junction with the parent stream, which it appears almost to equal in volume. Besides its main tributary, the Rio das Mortes, it has twenty smaller branches, offering many miles of canoe navigation. In finding its way to the lowlands, it breaks frequently into falls and rapids, or winds violently through rocky gorges, until, at a point about 100 m. above its junction with the Tocantins, it saws its way across a rocky dyke for 12 m. in roaring cataracts. The tribu- taries of the Tocantins, called the Maranhao and Parana-tinga, collect an immense volume of water from the highlands which surround them, especially on the south and south-east. Between the latter and the confluence with the Araguay, the Tocantins is occasionally obstructed by rocky barriers which cross it almost at a right angle. Through these, the river carves its channel, broken into cataracts and rapids, or cachoeiras, as they are called throughout Brazil. Its lowest one, the Itaboca cataract, is about 130 m. above its estuarine port of Cameta, for which distance the river is navigable; but above that it is useless as a commer- cial avenue, except for laborious and very costly transportation.

The flat, broad valleys, composed of sand and clay, of both the Tocantins and its Araguay branch are overlooked by steep bluffs. They are the margins of the great sandstone plateaus, from 1000 to 2000 ft. elevation above sea-level, through which the rivers have eroded their deep beds. Around the estuary of the Tocantins the great plateau has disappeared, to give place to a part of the forest-covered, half submerged alluvial plain, which extends far to the north-east and west. The Pari river, generally called one of the mouths of the Amazon, is only the lower reach of the Tocantins. If any portion of the waters of the Amazon runs round the southern side of the large island of Marajo into the river Para, it is only through tortuous, natural canals, which are in no sense outflow channels of the Amazon.

The Xingu, the next large river west of the Tocantins, is a true tributary of the Amazon. It was but little known until it was explored in 1884-1887 by Karl von den Steinen from Cuyaba. Travelling east, 240 m., he found the river Tamita- toaba, 180 ft. wide, flowing from a lake 25 m. in diameter. He descended this torrential stream to the river Romero, 1300 ft. wide, entering from the west, which receives the river Colisu. These three streams form the Xingu, or Parana-xingu, which, from 73 m. lower down, bounds along a succession of rapids for 400 m. A little above the head of navigation, 105 m. from its mouth, the river makes a bend to the east to find its way across a rocky barrier. Here is the great cataract of Itamaraca, which rushes down an inclined plane for 3 m. and then gives a final leap, called the fall of Itamaraca. Near its mouth, the Xingu expands into an immense lake, and its waters then mingle with those of the Amazon through .a labyrinth of canos (natural canals), winding in countless directions through a wooded archipelago.

The Tapajos, running through a humid, hot and unhealthy valley, pours into the Amazon 500 m. above Para and is about 1200 m. long. It rises on the lofty Brazilian plateau near Diamantino in 14 25′ S. lat. Near this place a number of streams unite to form the river Arinos, which at latitude io° 25′ joins the Juruena to form the Alto Tapajos, so called as low down as the Rio Manoel, entering from the east. Thence to Santarem the stream is known as the Tapajos. The lower Arinos, the Alto Tapajos and the Tapajos to the last rapid, the Maranhao Grande, is a continuous series of formidable cataracts and rapids; but from the Maranhao Grande to its mouth, about 188 m., the river can be navigated by large vessels. For its last 100 m. it is from 4 to 9 m. wide and much of it very deep. The valley of the Tapajos is bordered on both sides by bluffs. They are from 300 to 400 ft. high along the lower river; but, a few miles

above Santarem, they retire from the eastern side and only approach the Amazon flood-plain some miles below Santarem.

The Madeira has its junction with the Amazon 870 m. by river above Para,, and almost rivals it in the volume of its waters. It rises more than 50 ft. during the rainy season, and the largest ocean steamers may ascend it to the Fall of San Antonio, 663 m. above its mouth; but in the dry months, from June to November, it is only navigable for the same distance for craft drawing from 5 to 6 ft. of water. According to the treaty of San Udefonso, the Madeira begins at the confluence of the Guapore with the Mamore. Both of these streams have their headwaters almost in contact with those of the river Paraguay. The idea of a connecting canal is based on ignorance of local conditions. San Antonio is the first of a formidable series of cataracts and rapids, nineteen in number, which, for a river distance of 263 m., obstruct the upper course of the Madeira until the last rapid called Guajara Merim (or Small Pebble), is reached, a little below the union of the Guapore with the Mamore. The junction of the great river Beni with the Madeira is at the Madeira Fall, a vast and grand display of reefs, whirl- pools and boiling torrents. Between Guajara-Merim and this fall, inclusive, the Madeira receives the drainage of the north- eastern slopes of the Andes, from Santa Cruz de la Sierra to Cuzco, the whole of the south-western slope of Brazilian Matto Grosso, and the northern one of the Chiquitos sierras, an area about

The AMAZON BASIN

English Miles o 50 100 200 100

Longitude West 70" of Greenwich

equal to that of France and Spain. The waters find their way to the falls of the Madeira by many great rivers, the principal of which, if we enumerate them from east to west, are the Guapor6 or Itenez, the Baures and Blanco, the Itonama or San Miguel, the Mamore, Beni, and Mayutata or Madre de Dios, all of which are reinforced by numerous secondary but powerful affluents. The Guapore presents many difficulties to continuous navigation; the Baures and Itonama offer hundreds of miles of navigable waters through beautiful plains; the Mamore has been sounded by the writer in the driest month of

the year for a distance of 500 m. above Guajara-Merim, who found never less than from 10 to 30 ft. of water, with a current of from i to 3 m. an hour. Its Rio Grande branch, explored under the writer's instructions, was found navigable for craft drawing 3 ft. of water to within 30 m. of Santa Cruz de la Sierra — a level sandy plain intervening. The Grande is a river of enormous length, rising in a great valley of the Andes between the important cities of Sucre and Cocha- bamba, and having its upper waters in close touch with those of the Pilcomayo branch of the river Paraguay. It makes a long curve through the mountains, and, after a course of about 800 m., joins the Mamore near 15° S. lat. The Chapare, Secure and Chimore, tributaries of the Mamore, are navigable for launches up to the base of the mountains, to within 130 m. of Cochabamba. The Beni has a 12-ft. fall 18 m. above its mouth called "La Esperanza"; beyond this, it is navigable for 217 m. to the port of Reyes for launches in the dry season and larger craft in the wet one. The extreme source of the Beni is the little river La Paz, which rises in the inter-Andean region, a few miles south- east of Lake Titicaca, and flows as a rivulet through the Bolivian city of La Paz. From this point to Reyes the river is a torrent. The principal affluent of the Beni, and one which exceeds it in volume, enters it 120 m. above its mouth, and is known to the Indians along its banks as the Mayutata, but the Peruvians

Emery Vftfetf |fr

call it the Madre de Dios. Its ramifications drain the slopes of the Andes between 12 and 15 of latitude. It is navigable in the wet season to within 180 m. of Cuzco. Its upper waters are separated by only a short transitable canoe portage of 7 m. in a straight line from those of the Ucayali. The portage on the eastern side terminates at the Cashpajali river 22 m. above its junction with the Manu. For the first 13 m. it is navigable all the year for craft drawing 18 in. of water, but the remaining o m. present many obstacles to navigation. At the Manu junc- tion the elevation above sea-level is 1070 ft., the river width 300ft., depth 8 ft., current ij m. per hour. The general direction of the Manu is south-east for 158 m. as far as the Pilcopata river, where under the name of Madre de Dios it continues with a flow of 22,000 cubic metres per minute. Here its elevation is 718 ft. above the sea and its width 500 ft. During the above course of 158 m. the Manu receives 135 large and small affluents. Although the inclination of its bed is not great, the obstacles to free navigation are abundant, and consist of enormous trees and masses of tree-trunks which have filled the river during the period of freshets.

From the time it receives the Manu, the Madre de Dios carries its

immense volume of waters 485 m. to the Beni over the extremely easy slope of a vast and fertile plain. Its banks are low, its bottom pebbly. A greater part of its course is filled with large and small islands some 63 in number. Its average width is about 1500 ft. Below the mouth of the Tambopata, the flow is estimated at 191,250 cubic metres per 1 minute. The average current is 25 m. per hour. There are two important rapids and one cataract on the lower 300 m. of the river.

The Mayutata receives three principal tributaries from the south— ^- the Tambopata, Inambari and Pilcopata.

The Peruvian government has sought to open a trade route between the Rio Ucayali and the rich rubber districts of the <

Mayutata. All of the upper branches of the river Madeira find their way to the falls across the open, almost level Mojos and Beni plains, 35,000 sq. m. of which are yearly flooded to an average depth of about 3 ft. for a period of from three to four months. They rival if they do not exceed in fertility the valley of the Nile, and are the healthiest and most inviting agricultural and grazing region of the basin of the Amazon.

The Purus, a very sluggish river, enters the Amazon west of the Madeira, which it parallels as far .south as the falls of the latter stream. It runs through a continuous forest at the bottom of the great depression lying between the Madeira river, which skirts the edge of the Brazilian sandstone plateau, and the Ucayali which hugs the base of the Andes. One of its marked features is the five parallel furos 1 which from the north-west at almost regular intervals the Amazon sends to the Purus; the most south-westerly one being about 150 m. above the mouth of the latter river. They cut a great area of very low-lying country into five islands. Farther down the Purus to the right three smaller furos also connect it with the Amazon. Chandless found its elevation above sea-level to be only 107 ft. 590 m. from its mouth. It is one of the most crooked streams in the world, and its length in a straight line is less than half that by its curves. It is practically only a drainage ditch for the half-submerged, lake-flooded district it traverses. Its width is very uniform for 1000 m. up, and for 800 m. its depth is never less than 45 ft. It is navigable by steamers for 1648 m. as far as the little stream, the Curumaha, but

only by light-draft craft. Chandless ascended it 1866 m. At 1792 m. it forks into two small streams. Occasionally a cliff touches the river, but in general the lands are subject to yearly inundations throughout its course, the river rising at times above 50 ft., the numerous lakes to the right and left serving as reservoirs. Its main tributary, the Aquiry or Acre, enters from the right about 1104 m. from the Amazon. Its sources are near those of the Mayu- tata. It is navigable for a period of about five months of the year, when the Purus valley is inundated; and, for the remaining seven months, only canoes can ascend it sufficiently high to communicate overland with the settlements in the great india- rubber districts of the Mayutata and lower Beni; thus these regions are forced to seek a canoe outlet for their rich products by the very dangerous, costly and laborious route of the falls of the Madeira.

The Juhua is the next great southern affluent of the Amazon west of the Purus, sharing with this the bottom of the immense inland Amazon depression, and having all the characteristics of the Purus as regards curvature, sluggishness and general features of the low, half-flooded forest country it traverses. It rises among the Ucayali highlands, and is navigable and un- obstructed for a distance of 1133 m. above its junction with the Amazon.

The Javary, the boundary line between Brazil and Peru, is another Amazon tributary of importance. It is supposed to be navigable by canoe for 900 m. above its mouth to its sources among the Ucayali highlands, but only 260 have been found suitable for steam navigation. The Brazilian Boundary Com- mission ascended it in 1866 to the junction of the Shino with its Jaquirana branch. The country it traverses in its extremely sinuous course is very level, similar in character to that of the Jurua, and is a fostered wilderness occupied by a few savage hordes.

The Ucayali, which rises only about 70 m. north of Lake Titicaca, is the most interesting branch of the Amazon next to the Madeira. The Ucayali was first called the San Miguel, then the Ucayali, Ucayare, Poro, Apu-Poro, Cocama and Rio de Cuzco. Peru has fitted out many costly and ably-conducted expeditions to explore it. One of them (1867) claimed to have reached within 240 m. of Lima, and the little steamer " Napo " forced its way up the violent currents for 77 m. above the junction with the Pachitea river as far as the river Tambo, 770 m. from

1 A Jure is a natural canal — sometimes merely a deviation from the main channel, which it ultimately rejoins, sometimes a connexion

across low flat country between two entirely separate streams.

the confluence of the Ucayali with the Amazon. The ‘ ‘Napo ” then succeeded in ascending the Urubamba branch of the Ucayali 35 m. above its union with the Tambo, to a point 200 m. north of Cuzco. The remainder of the Urubamba, as shown by Bosquet in 1806 and Castelnau in 1846, is interrupted by cascades, reefs and numberless other obstacles to navigation. Senor Torres, who explored the Alto Ucayali for the Peruvian government, gives it a length of 186 m., counting from the mouth of the Pachitea to the junction of the Tambo and Uru- bamba. Its width varies from 1300 to 4000 ft., due to the great number of islands. The current runs from 3 to 4 m. an hour, and a channel from 60 to 1 50 ft. wide can always be found with a minimum depth of 5 ft. There are five bad passes, due to the accumulation of trees and rafts of timber. Sometimes enormous rocks have fallen from the mountains and spread over the river-bed causing huge whirlpools. ” No greater difficulties present themselves to navigation by 10-knot steamers drawing 4 ft. of water.”

The Tambo, which rises in the Vilcanota knot of mountains south of Cuzco, is a torrential stream valueless for commercial purposes. The banks of the Ucayali for 500 m. up are low, and in the rainy season extensively inundated.

The Huallaga (also known as the Guallaga and Rio de Iqs Motilones), which joins the Amazon to the west of the Ucayah, rises high among the mountains, in about io° 40′ S. lat., on the northern slopes of the celebrated Cerro de Pasco. For nearly its. entire length it is an impetuous torrent running through a succession of gorges. It has forty-two rapids, its last obstruction being the Pongo de Aguirre, so called from the traitor Aguirre who passed there. To this point, 140 m. from the Amazon, the Huallaga can be ascended by large river steamers. Between the Huallaga and the Ucayali lies the famous ” Pampa del Sacra- mento,” a level region of stoneless alluvial lands covered with thick, dark forests, first entered by the missionaries in 1726. It is about 300 m. long, from north to south, and varies in width from 40 to 100 m. Many streams, navigable for canoes, penetrate this region from the Ucayali and the Huallaga. It is still occupied by savage tribes.

The river Maranon rises about 100 m. to the north-east of Lima. It flows through a deeply-eroded Andean valley in a north-west direction, along the eastern base of the Cordillera of the Andes, as far as 5° 36′ S. lat.; then it makes a great bend to the north-east, and with irresistible power cuts through the inland Andes, until at the

Pongo de Manseriche 2 it victoriously breaks away from the mountains to flow onwards through the plains under the name of the Amazon. Barred by reefs, and full of rapids and impetuous currents, it cannot become a commercial avenue. At the point where it makes its great bend the river Chinchipe pours into it from southern Ecuador. Just below this the mountains close in on either side of the Maranon, forming narrows or pongos for a length of 35 m., where, besides numerous whirlpools, there are no less than thirty-five formidable rapids, the series concluding with three cataracts just before reaching the river Imasa or Chunchunga, near the mouth of which La Condamine embarked in the 18th century to descend the Amazon. Here the general level of the country begins to decrease in elevation, with only a few mountain spurs, which from time to time push as far as the river and form pongos of minor importance and less dangerous to descend. Finally, after passing the narrows of Guaracayo, the cerros gradually disappear, and for a distance of about 20 m. the river is full of islands, and there is nothing visible from its low banks but an immense forest-covered plain. But the last barrier has yet to be passed, the Pongo de Manseriche, 3 m. long, just below the mouth of the Rio Santiago, and between it and the old abandoned missionary station of Borja, in 38° 30′ S. lat. and 77° 30′ 40″ W. long. According to Captain Carbajal, who descended it in the little

2 Pongo is a corruption of the Quichua puncu and the Aymara ponco, meaning a door. The Pongo' de Manseriche was first named' Maranon, then Santiago, and later Manseric, afterwards Mansariche and Manseriche, owing to the great numbers of parrakeets found on the rocks there.

steamer " Napo " in 1868, it is a vast rent in the Andes about 2000 ft. deep, narrowing in places to a width of only 100 ft., the precipices " seeming to close in at the top." Through this dark canon the Maranon leaps along, at times, at the rate of 12 m. an hour. 1 The Pongo de Manseriche was first discovered by the Adelantado Joan de Salinas. He fitted out an expedition at Loxa in Ecuador, descended the Rio Santiago to the Maranon, passed through the perilous Pongo in 1557 and invaded the country of the Maynas Indians. Later, the missionaries of Cuenca and Quito established many missions in the Pais de los Maynas, and made extensive use of the Pongo de Manseriche as an avenue of communication with their several

convents on the Andean plateau. According to their accounts, the huge rent in the Andes, the Pongo, is about five or six m. long, and in places not more than 80 ft. wide, and is a frightful series of torrents and whirlpools interspersed with rocks. There is an ancient tradition of the savages of the vicinity that one of their gods descending the Maranon and another ascending the Amazon to communicate with him, they opened the pass called the Pongo de Manseriche. From the northern slope of its basin the Amazon receives many tributaries, but their combined volume of water is not nearly so great as that contributed to the parent stream by its affluents from the south. That part of Brazil lying between the Amazon and French, Dutch and British Guiana, and bounded on the west by the Rio Negro, is known as Brazilian Guiana. It is the southern watershed of a tortuous, low chain of mountains running, roughly, east and west. Their northern slope, which is occupied by the three Guianas first named, is saturated and river-torn; but their southern one, Brazilian Guiana, is in general thirsty and semi-barren, and the driest region of the Amazon valley. It is an area which has been left almost in the undisturbed possession of nomadic Indian tribes, whose scanty numbers find it difficult to solve the food problem. From the divorlium aquarum between French Guiana and Brazil, known as the Tumuc-humac range of highlands, two minor streams, the Yary and the Parou, reach the Amazon across the intervening broken and barren tableland. They are full of rapids and reefs.

The Trombetas is the first river of importance we meet on the northern side as we ascend the Amazon. Its confluence with this is just above the town of Obidos. It has its sources in the Guiana highlands, but its long course is frequently interrupted by violent currents, rocky barriers, and rapids. The inferior zone of the river, as far up as the first fall, the Porteira, has but little broken water and is low and swampy; but above the long series of cataracts and rapids the character and aspect of the valley completely change, and the climate is much better. The river is navigable for 135 m. above its mouth.

The Negro, the great northern tributary of the Amazon, has its sources along the watershed between the Orinoco and the Amazon basins, and also connects with the Orinoco by way of the Casiquiare canal. Its main affluent is the Uaupes, which disputes with the headwaters of the Guaviari branch of the Orinoco the drainage of the eastern slope of the " oriental " Andes of Colombia. The Negro is navigable for 450 m. above its mouth for 4 ft. of water in the dry season, but it has many sandbanks and minor difficulties. In the wet season, it overflows the country far and wide, sometimes to a

breadth of 20 m., for long distances, and for 400 m. up, as far as Santa Isabella, is a succession of lagoons, full of long islands and intricate channels, and the slope of the country is so gentle that the river has almost no current. But just before reaching the Uaupes there is a long series of reefs, over which it violently flows in cataracts, rapids and whirlpools. The Uaupes is full of similar obstacles, some fifty rapids barring its navigation, although a long stretch of its upper course is said to be free from them, and to flow gently through a forested country. Despite the impediments, canoes ascend this stream to the Andes.

1 One of the most daring deeds of exploration ever known in South America was done by the engineer A. Wertheman: He fitted out three rafts, in August 1 870, and descended this whole series of rapids and cascades from the Rio Chinchipe to Borja.

The Branco is the principal affluent of the Negro from the north; it is enriched by many streams from the sierras which separate Venezuela and British Guiana from Brazil. Its two upper main tributaries are the Urariquira and the Takutu. The latter almost links its sources with those of the Essequibo. The Branco flows nearly south, and finds its way into the Negro through several channels and a chain of lagoons similar to those of the latter river. It is 350 m. long, up-to its Urariquira confluence. It has numerous islands, and, 235 m. above its mouth, it is broken by a bad series of rapids.

Casiquiare Canal. In 1744 the Jesuit Father Roman, while ascending the Orinoco river, met some Portuguese slave- traders from the settlements on the Rio Negro. He accompanied them on their return, by way of the Casiquiare canal, and after- wards retraced his route to the Orinoco. La Condamine, seven months later, was able to give to the French Academy an account of Father Roman's extraordinary voyage, and thus confirm the existence of this wonderful waterway first reported by Father Acuna in 1639. But little credence was given to Father Roman's statement until it was verified, in 1756, by the Spanish Boundary-line Commission of Yturriaga y Solano. The actual elevation of the canal above sea-level is not known, but is of primary importance to the study of the hydrography of South America. Travellers in general give it at from 400 to 900 ft., but, after much study of the question of altitudes throughout South America, the writer believes that it does not exceed 300 ft. The canal connects the upper Orinoco, 9 m. below the mission of Esmeraldas, with the Rio Negro affluent of the Amazon near the town of San Carlos. The general course is south-west, and its length, including windings, is about 200 m. Its width, at its bifurcation with the

Orinoco, is approximately 300 ft., with a cur- rent towards the Negro of three-quarters of a mile an hour; but as it gains in volume from the very numerous tributary streams, large and small, whicly t receives en route, its velocity increases, and in the wet season reaches 5 and even 8 m. an hour in certain stretches. It broadens considerably as it approaches its mouth, where it is about 1750 ft. in width. It will thus be seen that the volume of water it captures from the Orinoco is small in comparison to what it accumulates in its course. In flood-time it is said to have a second connexion with the Rio Negro by a branch which it throws off to the westward called the Itinivini, which leaves it at a point about 50 m. above its mouth. In the dry season it has shallows, and is obstructed by sandbanks, a few rapids and granite rocks. Its shores are densely wooded, and the soil more fertile than that along the Rio Negro. The general slope of the plains through which the canal runs is south-west, but those of the Rio Negro slope south-east. The whole line of the Casiquiare is infested with myriads of tormenting insects. A few miserable groups of Indians and half-breeds have their small villages along its southern portion. It is thus seen that this marvellous freak of nature is not, as is generally supposed, a sluggish canal on a flat tableland, but a great, rapid river which, if its upper waters had not found contact with the Orinoco, perhaps by cutting back, would belong entirely to the Negro branch of the Amazon. To the west of the Casiquiare there is a much shorter and more facile connexion between the Orinoco and Amazon basins, called the isthmus of Pimichin, which is reached by ascending the Terni branch of the Atabapo affluent of the Orinoco. Although the Terni is somewhat obstructed, it is believed that it could easily be made navigable for small craft. The isthmus is 10 m. across, with undulating ground, nowhere over 50 ft. high, with swamps and marshes. It is much used for the transit mi large canoes, which are hauled across it from the Terni river, and which reach the Negro by the little stream called the Pimichin.

The Yapura. West of the Negro the Amazon receives three more imposing streams from the north-west — the Yapura, the lea or Putumayo, and the Napo. The first was formerly known as the Hyapora, but its Brazilian part is now called the Yapura, and its Colombian portion the Caqueta. Barao de Marajo gives it 600 m. of navigable, stretches. Jules Crevaux, who descended it, describes it as full of obstacles to. navigation, the current very strong and the stream frequently interrupted by rapids and cataracts. It rises in the Colombian Andes, nearly in touch with the sources of the Magdalena, and augments its volume

from many branches as it courses through Colombia. It was long supposed to have eight mouths; but Ribeiro de Sampaio, in his voyage of 1774, determined that there was but one real mouth, and that the supposed others are all furos or cafios. 1 In 1 864- 1 868 the Brazilian government made a somewhat careful examination of the Brazilian part of the river, as far up as the rapid of Cupaty. Several very easy and almost complete water-routes exist between the Yapura and Negro across the low, flat intervening country. Barao de Mara jo says there are six of them, and one which connects the upper Yapura with the Uaupes branch of the Negro; thus the Indian tribes of the respective valleys have facile contact with each other.

The Ic;a or Putumayo, west of and parallel to the Yapura, was found more agreeable to navigate by Crevaux. He ascended it in a steamer drawing 6 ft. of water, and running day and night. He reached Cuemby, 800 m. above its mouth, without finding a single rapid. Cuemby is only 200 m. from the Pacific Ocean, in a straight line, passing through the town of Pasto in southern Colombia. There was not a stone to be seen up to the 1 base of the Andes; the river banks were of argillaceous earth and the bottom of fine sand.

The Napo rises on the flanks of the volcanoes of Antisana, Sincholagua and Cotopaxi. Before it reaches the plains it receives a great number of small streams from impenetrable, saturated and much broken mountainous districts, where the dense and varied vegetation seems to fight for every square foot of ground. From the north it is joined by the river Coca, having its sources in the gorges of Cayambe on the equator, and also a powerful river, the Aguarico, having its headwaters between Cayambe and the Colombian frontier. From the west it receives a secondary tributary, the Curaray, from the Andean slopes, between Cotopaxi and the volcano of Tungur| igua. From its Coca branch to the mouth of the Curaray the Napo is full of snags and shelving sandbanks, and throws out numerous cafios among jungle-tangled islands, which in the wet season are flooded, giving the river an immense width. From the Coca to the Amazon it runs through a forested plain where not a hill is visible from the river— its uniformly level banks being only interrupted by swamps and lagoons. From the Amazon the Napo is navigable for river craft up to its Curaray branch, a distance of about 216 m., and perhaps a few miles farther; thence, by painful canoe navigation, its

upper waters may be ascended as far as Santa Rosa, the usual point of embarkation for any venturesome traveller who descends from the Quito tableland. The Coca river may be penetrated as far up as its middle course, where it is jammed between two mountain walls, in a deep canyon, along which it dashes over high falls and numerous reefs. This is the stream made famous by the expedition of Gonzalo Pizarro.

The Nanay is the next Amazon tributary of importance west of the Napo. It belongs entirely to the lowlands, and is very crooked, has a slow current and divides much into cafios and strings of lagoons which flood the flat, low areas of country on either side. It is simply the drainage ditch of districts which are extensively overflowed in the rainy season. Captain Butt ascended it 195 m., to near its source.

The Tigre is the next west of the Nanay, and is navigable for 125 m. from its confluence with the Amazon. Like the Nanay, it belongs wholly to the plains. Its mouth is 42 m. west of the junctio of the Ucayali with the Amazon. Continuing west from the Tigre we have the Parinari, Chambira, and Nucuray, all short lowland streams, resembling the Nanay in character.*

The Pastaza (the ancient river Sumatara) is the next large river we meet. It rises on the Ecuadorian tableland, where a branch from the valley of Riobamba unites with one from the Latacunga basin and breaks through the inland range of the Andes; and joined, afterwards, by several important tributaries, finds its way south-east among the gorges; thence it turns southward into the plains, and enters the Amazon at a point about 60 m. west of the mouth of the Huallaga. So far as

1 A cafro, like furo, is a kind of natural canal ; it forms a lateral discharge for surplus water from a river.

known, it is a stream of no value except for canoe navigation. Its rise and fall are rapid and uncertain, and it is shallow and full of sandbanks and snags. It is a terrible river when in flood. The Morona flows parallel to the Pastaza and immediately to the west of it, and is the last stream of any importance on the northern side of the Amazon before reaching the Pongo de Manseriche. It is formed from a multitude of water-courses which descend the slopes of the Ecuadorian Andes south of the gigantic volcano of Sangay; but it soon reaches the plain, which commences where it receives its Cusulima branch. The Morona is navigable for small craft for about 300 m. above its mouth, but it is extremely tortuous. Canoes may

ascend many of its branches, especially the Cusulima and the Miazal, the latter almost to the base of Sangay. The Morona has been the scene of many rude explorations, with the hope of finding it serviceable as a commercial route between the inter-Andean tableland of Ecuador and the Amazon river. A river called the Paute dashes through the eastern Andes from the valley ef Cuenca;ahd a second, the Zamora, has broken through the same range from the basin of Loja. Swollen by their many affluents, they reach the lowlands and unite their waters to form the Santiago, which flows into the Marafion at the head of the Pongo de Manseriche. There is but little known of a trustworthy character regarding this river, but Wolf says that it is probably navigable up to the junction of the Paute with the Zamora.

The Main River.

The Amazon Main River is navigable for ocean steamers as far as Iquitos, 2300 m. from the sea, and 486 m. higher up for vessels drawing 14 ft. of water, as far as Achual Point. Physical Beyond that, according to Tucker, confirmed by characte,— Wertheman, it is unsafe; but small steamers frequently istlcs – ascend to the Pongo de Manseriche, just above Achual Point The average current of the Amazon is about 3 m. an hour; but, especially in flood, it dashes through some of its contracted channels at the rate of 5 m. The U.S. steamer "Wilmington" ascended it to Iquitos in 1899. Commander Todd reports that the average depth of the river in the height of the rainy season is 120 ft. It commences to rise in November, and increases in volume until June, and then falls until the end of October. The rise of the Negro branch is not synchronous; for the steady rains do not commence in its valley until February or March. By June it is full, and then it begins to fall with the Amazon. According to Bates, the Madeira " rises and sinks " two months earlier than the Amazon. The Amazon at times broadens to 4 and 6 m. Occasionally, for long distances, it divides into two main streams with inland, lateral channels, all connected by a complicated system of natural canals, cutting the low, flat igapo lands, which are never more than 15 ft. above low river, into almost numberless islands. 1 At the narrows of Obidos, 400 m. from the sea, it is compressed into a single bed a mile wide and over 200 ft. deep, through which the water rushes at the rate of 4 to 5 m. an hour. In the rainy season it inundates the country throughout its course to the extent of several hundred thousand square miles, covering the flood-plain, called iiar gem. The flood-levels are in places from 40 to 50 ft. high above low river. Taking four roughly equidistant places, the rise at Iquitos is 20 ft., at Teffe 45, near Obidos 35, and at Para, 12 ft.

The first high land met in ascending the river is on the north bank, opposite the mouth of the Xingu, and extends for about 150 m. up, as far as Monte Alegre. It is a series of steep, table- topped hills, cut down to a kind of terrace which lies between them and the river. Monte Alegre reaches an altitude of several hundred feet. On the south side, above the Xingu, a line of low bluffs extends, in a series of gentle curves with hardly any breaks nearly to Santarem, but a considerable distance inland, bordering the; flood-plain, which is many miles wide. Then they bend to the south-west, and, abutting upon the lower Tapajos, merge

1 Igapo is thus the name given to the recent alluvial tracts along the margins of rivers, submerged by moderate floods, whereas vargem is the; term used for land between the levels of moderate and high floods, white for land above this the people use the term terra firma.

into the bluffs which form the terrace margin of that river valley. The next high land on the north side is Obidos, a bluff, 56 ft. above the river, backed by low hills. From Serpa, nearly opposite the river Madeira, to near the mouth of the Rio Negro, the banks are low, until approaching Manaos, they are rolling hills; but from the Negro, for 600 m., as far up as the village of Canaria, at the great bend of the Amazon, only very low land is found, resembling that at the mouth of the river. Vast areas of it are submerged at high water, above which only the upper part of the trees of the sombre forests appear. At Canaria, the high land commences and continues as far as Tabatinga, and thence up stream.

On the south side, from the Tapajos to the river Madeira, the banks are usually low, although two or three hills break the general monotony. From the latter river, however, to the Ucayali, a distance of nearly 1500 m., the forested banks are just out of water, and are inundated long before the river attains its maximum flood-line. Thence to the Huallaga the elevation of the land is somewhat greater; but not until this river is passed, and the Pongo de Manseriche approached, does the swelling ground of the Andean foot-hills raise the country above flood-level.

The Amazon is not a continuous incline, but probably consists of long, level stretches connected by short inclined planes of extremely little fall, sufficient, however, owing to its great depth, to give the

gigantic volume of water a continuous impulse towards the ocean. The lower Amazon presents every evidence of having once been an ocean gulf, the upper waters of which washed the cliffs near Obidos. Only about 10 % of the water discharged by the mighty stream enters it below Obidos, very little of which is from the northern slope of the valley. The drainage area of the Amazon basin above Obidos is about 1,945,000 sq. m., and, below, only about 423,000 sq. m., or say 20%, exclusive of the 354,000 sq. m. of the Tocantins basin.

The width of the mouth of the monarch river is usually measured from Cabo do Norte to Punto Patijoca, a distance of 207 statute m.; but this includes the ocean outlet, 40 m. wide, of the Para, river, which should be deducted, as this stream is only the lower reach of the Tocantins. It also includes the ocean frontage of Marajo, an island about the size of the kingdom of Denmark lying in the mouth of the Amazon.

Following the coast, a little to the north of Cabo do Norte, and for 100 m. along its Guiana margin up the Amazon, is a belt of half-submerged islands and shallow sandbanks. Here the tidal phenomenon called the bore, or Pororoca, occurs, where the soundings are not over 4 fathoms. It commences with a roar, constantly increasing, and advances at the rate of from 10 to 15 m. an hour, with a breaking wall of water from 5 to 12 ft. high. Under such conditions of warfare between the ocean and the river, it is not surprising that the former is rapidly eating away the coast and that the vast volume of silt carried by the Amazon finds it impossible to build up a delta.

The Amazon is not so much a river as it is a gigantic reservoir, extending from the sea to the base of the Andes, and, in the wet season, varying in width from 5 to 400 m. Special attention has already been called to the fourteen great streams which discharge into this reservoir, but it receives a multitude of secondary rivers, which in any other part of the world would also be termed great.

For 350 years after the discovery of the Amazon, by Pinzon, the Portuguese portion of its basin remained almost an undis- turbed wilderness, occupied by Indian tribes whom the Papula- f 00(j q ues t jj a(j sp]; t j nt0 CO untless fragments. It is Hon, trade, ,./: ..... ,. . , , . , ,

&Ct doubtful if its indigenous inhabitants ever exceeded

one to every 5 sq. m. of territory, this being the maxi- mum it could

support under the existing conditions of the period in question, and taking into account Indian methods of life. A few settlements on the banks of the main river and some of its tribu- taries, either for trade with the Indians or for evangelizing purposes, had been founded by the Portuguese pioneers of European civilization. The total population of the Brazilian portion of the Amazon basin in 1850 was perhaps 300,000, of

whom about two-thirds were white and slaves, the latter number- ing about 25,000. The principal commercial city, Para, had from 10,000 to 12,000 inhabitants, including slaves; The town of Manaos, at the mouth of the Rio Negro, had from 1000 to 1500 population; but all the remaining villages, as far up as Tabatinga, on the Brazilian frontier of Peru, were wretched little groups of houses which appeared to have timidly effected a lodgment on the river bank, as if they feared to challenge the mysteries of the sombre and gigantic forests behind them. The value of the export and import trade of the whole valley in 1850 was but £500,000.

On the 6th of September 1850 the emperor, Dom Pedro II., sanctioned a law authorizing steam navigation on the Amazon, and confided to an illustrious Brazilian, Barao Maua (Irineu Evangilista de Sousa), the task of carrying it into effect. He organized the " Compania de Navigacao e Commercio do Amazonas" at Rio de Janeiro in 1852; and in the following year it commenced operations with three small steamers, the "Monarch," the "Marajo" and "Rio Negro." At first the naviga- tion was principally confined to the main river; and even in 1857 a modification of the government contract only obliged the company to a monthly service between Para, and Manaos, with steamers of 200 tons cargo capacity, a second line to make six round voyages a year between Manaos and Tabatinga, and a third, two trips a month between Para and Cameta. The government paid the company a subvention of £3935 monthly. Thus the first impulse of modern progress was given to the dormant valley. The success of the venture called attention to the unoccupied field; a second company soon opened commerce on the Madeira, Purus and Negro; a third established a line between Para and Manaos; and a fourth found it profitable to navigate some of the smaller streams; while, in the interval, the Amazonas Company had largely increased its fine fleet. Meanwhile private individuals were building and running small steam craft of their own, not only upon the main river but upon many of its affluents. The government of Brazil, constantly pressed by the maritime powers and by the countries encircling the upper Amazon basin, decreed, on the 31st of July 1867, the opening of the Amazon to all flags; but limited this to certain defined points

— Tabatinga, on the Amazon; Cameta, on the Tocantins; Santarem, on the Tapajos; Borba, on the Madeira; Manaos, on the Rio Negro; the decree to take effect on the 7th of September of the same year. Para, Manaos and Iquitos are now thriving commercial centres. The first direct foreign trade with Manaos was commenced about 1874.

The local trade of the river is carried on by the English successors to the Amazonas Company — the Amazon Steam Navigation Company. In addition to its excellent fleet there are numerous small river steamers, belonging to companies and firms engaged in the rubber trade, navigating the Negro, Madeira, Purus and many other streams. The principal exports of the valley are india-rubber, cacao, Brazil nuts and a few other products of very minor importance. The finest quality of india- rubber comes from the Acre and Beni districts of Bolivia, especially from the valley of the Acre (or Aquiry) branch of the river Funis. Of the rubber production of the Amazon basin, the state of Para gives about 35 %. The cacao tree is not cultivated, but grows wild in great abundance. There is but one railway in the whole valley; it is a short line from Para, towards the coast. The cities of Para, and Manaos have excellent tram- ways, many fine public buildings and private residences, gardens and public squares, all of which give evidence of artistic taste and great prosperity.

The number of inhabitants in the Brazilian Amazon basin (the states of Amazonas and Para) is purely a matter of rough estimate. There may be 500,000 or 600,000; or more; for the immigration during recent years from the other parts of Brazil has been large, due to the rubber excitement. The influx from the state of Ceara alone, from 1892 to 1899 inclusive, reached

98,348.

As Commander Todd, in his report to the United States government, says: "The crying need of the Amazon valley is

food for the people. ... At the small towns along the river it is nearly impossible to obtain beef, vegetables, or fruit of any sort, and the inhabitants depend largely upon river fish, mandioc, and canned goods for their subsistence." Although more than four centuries have passed since the discovery of the Amazon river, there are probably not 25 sq. m. of its basin under cultivation, excluding the limited and rudely cultivated areas among the mountains at its extreme headwaters, which are inaccessible to commerce. The extensive exports of the mighty valley are almost entirely derived from the products of the forest. (G. E. C.)

AMAZONAS, the extreme north-western and largest state of Brazil, bounded N. by Colombia and Venezuela, E. by the state of Para, S. by the state of Matto Grosso and Bolivia, and W. by Peru and Colombia. It embraces an area of 742,123 sq. m., wholly within the Amazon basin. A small part bordering the Venezuelan sierras is elevated and mountainous, but the greater part forms an immense alluvial plain, densely wooded, traversed by innumerable rivers, and subjected to extensive annual inundations. The climate is tropical and generally unfavourable to white settlement, the exceptions being the elevated localities on the Amazon exposed to the strong winds blowing up that river. The state is very sparsely populated; two-thirds of the inhabitants are Indians, forming small tribes, and subject only in small part to government control. The principal products are rubber, cacao and nuts; cattle are raised on the elevated plains of the north, while curing fish and collecting turtle eggs for their oil give occupation to many people on the rivers. Coffee, tobacco, rice and various fruits of superior quality are produced with ease, but agriculture is neglected and production is limited to domestic needs. The capital, Manaos, is the only city and port of general commercial importance in the state; other prominent towns are Serpa and Teffe on the Amazon, Borba and Crato on the Madeira, and Barcellos on the Rio Negro. Up to 1755 all the Portuguese territory on the Amazon formed part of the capitania of Para. The upper districts were then organized into a separate capitania, called S. Jose do Rio Negro, to facilitate administration. When Brazil became independent in 1822, Rio Negro was overlooked in the reorganization into provinces and reverted, notwithstanding the protests and an attempted revolu- tion (1832) of the people, to a state of dependence upon Para. In 1850 autonomy was voted by the general assembly at

Rio de Janeiro, and on the 1st of January 1852 the province of Amazonas was formally installed. In 1889 it became a federal state in the Brazilian republic.

AMAZONAS, a northern department of Peru, covering a mountainous district between the departments of Loreto and Cajamarca, with Ecuador on the N. The Maranon river forms the greater part of its W. boundary-line. Area, 13,943 sq. m.; pop. (1896) 70,676. The rainfall is abundant, and the soil of the heavily wooded valleys and lower mountain slopes is exception- ally fertile and productive. Its settlement and development is seriously impeded by the lack of transportation facilities. The capital, Chachapoyas, is a small town (pop. about 6000) situated on a tributary of the Maranon, 7600 ft. above sea-level. It is the seat of a bishopric, created in 1802, which covers the depart- ments of Amazonas and Loreto, and one province of Libertad. It has an imposing cathedral and a university. The climate is equable and delightful, the mean temperature for the year being 62 F.

AMAZONAS, a territory belonging to Venezuela, and occupy- ing the extreme southern part of that republic, adjoining the Brazilian state of Amazonas. It lies partly within the drainage basin of the Orinoco and partly within that of the Rio Negro, an affluent of the Amazon. The territory is covered with dense forests and is filled with intricate watercourses, one of which, the Casiquiare, forms an open communication between the Orinoco and the Rio Negro and is navigable for large canoes. The capital of the territory is Maroa, situated on the Guainia river, an affluent of the Rio Negro.

AMAZONS, an ancient legendary nation of female warriors. They were said to have lived in Pontus near the shore of the

Euxine sea, where they formed an independent kingdom under the government of a queen, the capital being Themiscyra on the banks of the river Thermodon (Herodotus iv. 110-117). From this centre they made numerous warlike excursions— to Scythia, Thrace, the coasts of Asia Minor and the islands of the Aegean, even penetrating to Arabia, Syria and Egypt. They were supposed to have founded many towns, amongst them Smyrna, Ephesus, Sinope, Paphos. According to another account, they originally came to the Thermodon from the Palus Maeotis (Sea of Azov). No men were permitted to reside in their country; but once a year, in order to prevent their race from dying out, they visited the Gargareans, a neighbouring tribe. The male children who were the result of these visits were either put to death or sent back to their fathers; the female were kept and brought

up by their mothers, and trained in agricultural pursuits, hunting, and the art of war (Strabo xi. p. 503). It is said that their right breast was cut off or burnt out, in order that they might be able to use the bow more freely; hence the ancient derivation of 'Ajudfovts from a-ˆafos, " without breast." But there is no indication of this practice in works of art, in which the Amazons are always represented with both breasts, although the right is frequently covered. Other suggested derivations are: & (intensive) and Aiafos, breast, " full-breasted "; & (privative) and /lacra-w, touch, " not touching men "; maza, a Circassian word said to signify " moon," has suggested their connexion with the worship of a moon- goddess, perhaps the Asiatic representative of Artemis.

The Amazons appear in connexion with several Greek legends. They invaded Lycia, but were defeated by Bellerophon, who was sent out against them by Iobates, the king of that country, in the hope that he might meet his death at their hands (Iliad, yi. 186). They attacked the Phrygians, who were assisted by Priam, then a young man (Iliad, iii. 189), although in his later years, towards the end of the Trojan war, his old opponents took his side against the Greeks under their queen Penthesileia, who was slain by Achilles (Quint. Smyr. i. ; Justin ii. 4; Virgil, Aen. i. 490). One of the tasks imposed upon Heracles by Eurystheus was to obtain possession of the girdle of the Amazonian queen Hippolyte (Apollodorus ii. 5). He was accompanied by his friend Theseus, who carried off the princess Antiope, sister of Hippolyte, an incident which led to a retaliatory invasion of Attica, in which Antiope perished fighting by the side of Theseus. The Amazons are also said to have undertaken an expedition against the island of Leuke, at the mouth of the Danube, where the ashes of Achilles had been deposited by Thetis. The ghost of the dead hero appeared and so terrified the horses, that they threw and trampled upon the invaders, who were forced to retire. They are heard of in the time 'of Alexander the Great, when their queen Thalestris visited him and became a mother by him, and Pompey is said to have found them in the army of Mithradates.

The origin of the story of the Amazons has been the subject of much discussion. While some regard them as a purely mythical people, others assume an historical foundation for them. The deities worshipped by them were Ares (who is consistently assigned to them as a god of war, and as a god of Thracian and generally northern origin) and Artemis, not the usual Greek goddess of that name, but an Asiatic deity in some respects her equivalent. It is conjectured that the Amazons were originally the temple-servants and priestesses (hierodulae) of this goddess; and that the removal of the breast

corresponded with the self-mutilation of the galli, or priests, of Rhea Cybele. Another theory is that, as the knowledge of geography extended, travellers .brought back reports of tribes ruled entirely by women, who carried out the duties which elsewhere were regarded as peculiar to man, in whom alone the rights of nobility and inheritance were vested, and who had the supreme control of affairs. Hence arose the belief in the Amazons as a nation of female warriors, organized and governed entirely by women. According to J. Viirtheim (De Ajacis origine, 1907), the Amazons were of Greek origin: " all the Amazons were Dianas, as Diana herself was an Amazon." It has been suggested that the fact

of the conquest of the Amazons being assigned to the two famous heroes of Greek mythology, Heracles and Theseus — who in the tasks assigned to them were generally opposed to monsters and beings impossible in themselves, but possible as illustrations of permanent danger and damage, — shows that they were mythical illustrations of the dangers which beset the Greeks on the coasts of Asia Minor; rather perhaps, it may be intended to represent the conflict between the Greek culture of the colonies on the Euxine and the barbarism of the native inhabitants.

In works of art, combats between Amazons and Greeks are placed on the same level as and often associated with combats of Greeks and centaurs. The belief in their existence, however, having been once accepted and introduced into the national poetry and art, it became necessary to surround them as far as possible with the appearance of not unnatural beings. Their occupation was hunting and war; their arms the bow, spear, axe, a half shield, nearly in the shape of a crescent, called pelta, and in early art a helmet, the model before the Greek mind having apparently been the goddess Athena. In later art they approach the model of Artemis, wearing a thin dress, girt high for speed; while on the later painted vases their dress is often peculiarly Persian — that is, close-fitting trousers and a high cap called the kidaris. They were usually on horseback but sometimes on foot. The battle between Theseus and the Amazons is a favourite subject on the friezes of temples (e.g. the reliefs from the frieze of the temple of Apollo at Bassae, now in the British Museum), vases and sarcophagus reliefs; at Athens it was represented on the shield of the statue of Athena Parthenos, on wall-paintings in the Theseum and in the Poikile Stoa. Many of the sculptors of antiquity, including

Pheidias, Poly- clitus, Cresilas and Phradmon, executed statues of Amazons; and there are many existing reproductions of these. –

The history of Bohemia affords a parallel to the Greek Amazons. During the 8th century a large band of women, under a certain Vlasta, carried on war against the duke of Bohemia, and enslaved or put to death all men who fell into their hands. In the 16th century the Spanish explorer Orellana asserted that he had come into conflict with fighting women in South America on the river Marafion, which was named after; them the Amazon (q.v.) or river of the Amazons, although others derive its name from the Indian amassona (boat-destroyer), applied to the tidal phenomenon known as the " bore." The existence of " Amazons " (in the sense of fighting women) in the army of Dahomey in modern times is an undoubted fact, but they are said to have died out during the French protectorate. For notable cases of women who have become soldiers, reference may be made to Mary Anne Talbot and Hannah Snell.

See A. D. Mordtmann, Die Amazonen (1862); W. Strieker, Die A. in Sage und Geschichte (1868) ; A. Kliigmann, Die A. in der attischen Literatur und Kunst (1875) ; H. L. Krause, Die Amazonen- sage (1893); F. G. Bergmann, Les Amazones dans Vhistoire et dans la fable (1853); P. Lacour, Les Amazones (1901); articles in Pauly-Wissowa's Realencyclopadie and Roscher's Lexikon der Mythologie; Grote, Hist, of Greece, pt. i. ch. n. In article Greek Art, fig. 40 represents three types of Amazons, and fig. 70 (pi. iv.) a battle between Amazons and Greeks.

AMAZON-STONE, or Amazonite, a green variety of microcline-felspar. The name is taken from that of the river Amazon, whence certain green stones were formerly obtained, but it is doubtful whether green felspar occurs in the Amazon district. The modern amazon-stone is a mineral of restricted occurrence. Formerly it was obtained almost exclusively from the neighbour- hood of Miyask, in the Ilmen mountains, 50 m. S.W. of Chelia- binsk, Russia, where it occurs in granitic rocks. Of late years, magnificent crystals have been obtained from Pike's Peak, Colorado, where it is found associated with smoky quartz, orthoclase and albite in a coarse granite or pegmatite. Some other localities in the United States yield amazon-stone, and it is also found in pegmatite in Madagascar. On account of its lively green colour, it is cut and polished to a limited extent as an ornamental stone. The colour has been attributed to the presence of copper, but as it is discharged by heat it is likely

to be due to some pigment of organic origin, and an organic salt of

iron has been suggested. (See Microcline.)

AMBARVALIA, an annual festival of the ancient Romans, occurring in May, usually on the 29th, the object of which was to secure the growing crops against harm of all kinds. The priests were the Arval Brothers (q.v.), who conducted the victims — ox, sheep and pig (suovetaurilia) — in procession with prayer to Ceres round the boundaries of the ager Romanus. As the extent of Roman land increased, this could no longer be done, and in the Acta of the Fratres, which date from Augustus, we do not find this procession mentioned (Henzen, Acta Fratrum Arvalium, 1874); but there is a good description of this or a similar rite in Virgil, Georg. i. 338 ff., and in Cato's work de Re Rustica (141) we have full details and the text of the prayers used by the Latin farmer in thus " lustrating " his own land. In this last case the god invoked is Mars. The Christian festival which seems to have taken the place of these ceremonies is the Rogation or Gang week of the Roman Church. The perambulation or beating of bounds is probably a survival of the same type of rite.

See W. W. Fowler, Roman Festivals (1899), p. 124 ff.

(W. W. F.)*

AMBASSADOR (also Embassador, the form sometimes still used in America; from the Fr. ambassadeur, with which compare Ital. ambasciatore and Span, embajador, all variants of the Med. Lat. ambasciator, ambassiator, ambasator, &c, derived from Med. Lat. ambasciare or ambactiare, " to go on a mission, to do or say anything in another's name," from Lat. ambactus, 1 a vassal or servant; see Du Cange, Glossarium, s.v. ambasciare) , a public minister of the first rank, accredited and sent by the head of a sovereign state as his personal repre- sentative to negotiate with a foreign government, and to watch over the interests of his own nation abroad. The power thus conferred is defined in the credentials or letters of credence of which the ambassador is the bearer, and in the instructions under the sign-manual delivered to him. The credentials consist of a sealed letter addressed by the sovereign whom the ambassador represents to the sovereign to whom he is accredited, and they embody a general assurance that the sovereign by whom the ambassador is sent will confirm whatever is done by the ambassador in his name. In Great Britain letters of credence are under the royal sign-manual, and are not countersigned by a minister. Ambassadors are distinguished as ordinary and extraordinary, which implied originally the difference between a permanent mission and one appointed to conduct a particular

negotiation. The style of ambassador extraordinary is, however, now often given to a minister accredited to a court for an in- definite time and implies a somewhat more dignified rank.

By the protocol of the 19th of March 1815, afterwards embodied in the treaty of Vienna (181 5) and confirmed by an instrument signed by the five great powers at Aix-la-Chapelle on the 21st of November 1818, it was finally determined that " ambassadors and papal legates and nuncios alone have a representative character," i.e. in the most exalted and peculiar sense, as repre- senting the person of the sovereign, or the head of a republic, as well as the state to which they belong. It follows that only states enjoying " royal honours," i.e. empires, kingdoms, grand duchies, the great republics (e.g. France, Switzerland, the United States of America) and the Holy See, have the right to send or to receive ambassadors. By custom it has moreover been established that, as a general rule, only the greater " royal states " are represented by ambassadors, and then only when these are accredited to states esteemed, for one reason or another, to be of equal rank. Thus the promotion of the Japanese lega- tions in Europe and the United States to the rank of embassies, and the corresponding change in the representation of the various

1 Ambactus is explained by Festus (Paulus Diaconus ex Festo, ed. C. O. Miiller) as a Gallic word used by Ennius and meaning serous. Caesar (De Bello Gallico, vi. 15) says of the Gallic equites, " atque eorum ut quisque est genere copiisque amplissimus, plurimos circum se ambactos clientesque habent." Accepting the Celtic origin of the word, it has been connected with the Welsh amaeth, a tiller of the ground. A Teutonic origin has been suggested in the Old High Ger. ambaht, a retainer, which appears in a Scandinavian word amboht, bondwoman or maid, in the Ormulum (c. 1200).

powers at Tokio, marked in 1905 the definite recognition of Japan as a great power. To this rule the United States of America long remained an exception, and was content, in accordance with the tradition of republican simplicity, to be represented abroad only by ministers of the second rank. The subordinate position given to the representatives of so great a power, however, inevitably led to many inconveniences, and in 1893 an act of Congress empowered the president to accredit ambassadors to the great powers.

The distinction between an ambassador and ministers of the second rank is one rather of rank and dignity than of power or functions. His special immunities he shares with other diplo- matic representatives of all classes. The peculiar privilege which he claims of free access to the sovereign has, in common practice, been reduced to the right of being received on presenting his credentials in public or private audience by the sovereign in person, it being obviously against public policy that a foreign representative should negotiate with the ruler otherwise than through his responsible ministers. In Great Britain the sovereign, when granting an audience to a foreign ambassador, is always attended by one or more ministers, and the same is usual in other states.

An ambassador, however, unless specially armed with plenary authority, cannot decide any questions beyond his instructions without reference to his government. Thus Lord Londonderry ' (Lord Stewart), who represented Great Britain at the conferences of Troppau in 1820 and Laibach in 1821, had not the same standing as the plenipotentiaries of the other powers present, and efforts were even made to exclude him from some of the more important discussions in consequence, not on the ground of inferior rank but of defective powers.

Socially, the position of an ambassador is one of great dignity. The pomp and magnificence which in earlier days characterized his progresses and his " entries " are indeed no longer observed. He is received, however, by the sovereign to whom he is accredited with elaborate state, of which every detail is minutely regulated, and ranks, as representing his own sovereign, next to the princes of the blood in the court where he resides. The controversies that once raged as to the order of precedence of the various ambassadors accredited to any one court were settled by the treaties already mentioned, it being decided that they should rank in order of seniority according to the date of the presentation of their credentials. In Roman Catholic countries, however — as in France before the abrogation of the concordat, — the position of doyen (dean) of the diplomatic body is given by courtesy to the nuncio of the pope.

The special immunities and privileges enjoyed by ambassadors are dealt with in the articles Exterritoriality and Diplomacy. See also the latter for the history of the subject.

The most authoritative modern hand-book on the subject is Charles de Martens, Manuel diplomatique(Paris, 1822 ; new ed., 1868). See

also Henry Wheaton, Hist, of the Law of Nations (New York, 1845); L. Oppenheira, International Law (London, 1905); and the list of books attached to the article Diplomacy. (W. A. P.)

AMBATO, or Asiento de Ambato, an inland town of Ecuador, capital of the province of Tunguragua, 80 m. S. of Quito by the highway, and near the northern foot of Chimborazo. Pop. (est.) 10,000. The town stands in a bowl-like depression, 8606 ft. above sea-level, surrounded by steep, sandy, barren mountains, and has an equable climate, which has been likened to a perpetual autumn. The immediate environs are very fertile and produce a great variety of fruits, including many of the temperate zone, but the surrounding country is arid and sterile, producing scanty crops of barley, Indian corn and pease. The cochineal insect is found on the cactus which grows in abundance in the vicinity, and the town is known throughout Ecuador for its manufacture of boots and shoes, and for a cordage made from cabuya, the fibre of the agave plant. Ambato was destroyed by an eruption of Cotopaxi in 1698, and has been badly damaged two or three times by earthquakes.

Ambato is also the name of a range of mountains in northern Argentina, being a spur of the Sierra de Aconquija crossing the province of Catamarca from north to south.

AMBER, a ruined city of India, the ancient capital of Jaipur state in the Rajputana agency. The name of Amber is first mentioned by Ptolemy. It was founded by the Minas and was still flourishing in a.d. 967. In 1037 it was taken by the Rajputs, who held it till it was deserted. In 1728 it was supplanted by the modern city of Jaipur, from which it is 5 m. distant. The picturesque situation of Amber at the mouth of a rocky mountain gorge, in which nestles a lovely lake, has attracted the admiration of all travellers, including Jacquemont and Heber. It is now only remarkable for its architecture. The old palace begun by Man Sing in 1600 ranks second only to Gwalior. The chief building is the Diwan-i-Khas built by Mirza Raja. " No sooner " (it is related) " had Mirza completed the Diwan-i-Khas than it came to the ears of the emperor Jehangir that his vassal had surpassed him in magnificence, and that this last great work quite eclipsed all the marvels of the imperial city; the columns of red sandstone having been particularly noticed as sculptured with exquisite taste and elaborate detail. In a fit of jealousy the emperor commanded that this masterpiece should be thrown down, and sent commissioners to Amber charged with the execution of this order; whereupon Mirza, in order to save the structure, had the columns plastered over with stucco, so that the messengers from Agra should

have to acknowledge to the emperor that the magnificence, which had been so much talked of, was after all pure invention. Since then his apathetic suc- cessors have neglected to bring to light this splendid work; and it is only by knocking off some of the plaster that one can get a glimpse of the sculptures, which are perfect as on the day they were carved."

AMBER, a fossil resin much used for the manufacture of ornamental objects. The name comes from the Arab, anbar, probably through the Spanish, but this word referred originally to ambergris, which is an animal substance quite distinct from yellow amber. True amber has sometimes been called karabe, a word of oriental derivation signifying " that which attracts straw," in allusion to the power which amber possesses of acquir- ing an electric charge by friction. This property, first recorded by Thales of Miletus, suggested the word " electricity," from the Greek, r/'keiCTpov, a frame applied, however, not only to amber but also to an alloy of gold and silver. By Latin writers amber is variously called electrum, sucinum (succinum), and glaesum or glesum. The Hebrew hashmal seems to have been amber.

Amber is not homogeneous in composition, but consists of several resinous bodies more or less soluble in alcohol, ether and chloroform, associated with an insoluble bituminous substance. The average composition of amber leads to the general formula C10H16O. Heated rather below 300 C. amber suffers decomposi- tion, yielding an "oil of amber," and leaving a black residue which is known as "amber colophony," or "amber pitch"; this forms, when dissolved in oil of turpentine or in linseed oil, " amber varnish " or " amber lac."

True amber yields on dry distillation succinic acid, the pro- portion varying from about 3 to 8%, and being greatest in the pale opaque or " bony " varieties. The aromatic and irritating fumes emitted by burning amber are mainly due to this acid. True Baltic amber is distinguished by its yield of succinic acid, for many of the other fossil resins which are often termed amber contain either none of it, or only a very small proportion; hence the name " succinite " proposed by Professor J. D. Dana, and now commonly used in scientific writings as a specific term for the real Prussian amber. Succinite has a hardness between 2 and 3, which is rather greater than that of many other fossil resins. Its specific gravity varies from 1-05 to i-io.

The Baltic amber or succinite is found as irregular nodules in a marine glauconitic sand, known as " blue earth," occurring in the

Lower Oligocene strata of Samland in East Prussia, where it is now systematically mined. It appears, however, to have been partly derived from yet earlier. Tertiary deposits (Eocene) ; and it occurs also as a derivative mineral in later formations, such as the drift. Relics of an abundant flora Occur in association with the amber, suggesting relations with the flora 0/ Eastern

Asia and the southern part of North America. H. R. Goppert named the common amber-yielding pine of the Baltic forests Pinites succinifer, but as the wood, according to some authorities, does not seem to differ from that of the existing genus it has been also called Pinus succinijera. It is improbable, however, that the production of amber was limited to a single species; and indeed a large number of conifers belonging to different genera are represented in the amber-flora. The resin contains, in addi- tion to the beautifully preserved plant-structures, numerous remains of insects, spiders, annelids, crustaceans und other small organisms which became enveloped while the exudation was fluid. In most cases the organic structure has disappeared, leaving only a cavity, with perhaps a trace of chitin. Even hair and feathers have occasionally been represented among the enclosures. Fragments of wood not infrequently occur, with the tissues well-preserved by impregnation with the resin; while leaves, flowers and fruits are occasionally found in marvellous perfection. Sometimes the amber retains the form of drops and stalactites, just as it exuded from the ducts and receptacles of the injured trees. The abnormal development of resin has been called " succinosis." Impurities are often present, especially when the resin dropped on to the ground, so that the material may be useless except for varnish-making, whence the impure amber is called firniss. Enclosures of pyrites may give a bluish colour to amber. The so-called " black amber " is only a kind of jet. " Bony amber " owes its cloudy opacity to minute bubbles in the interior of the resin.

Although amber is found along the shores of a large part of the Baltic and the North Sea, the great amber-producing country is the promontory of Samland. Pieces of amber torn from the sea-floor are cast up by the waves, and collected at ebb-tide. Sometimes the searchers wade into the sea, furnished with nets at the end of long poles, by means of which they drag in the sea- weed containing entangled masses of amber; or they dredge from boats in shallow water and rake up amber from between the boulders. Divers have

been employed to collect amber from the deeper waters. Systematic dredging on a large scale was at one time carried on in the Kurisches Haff by Messrs Stantien and Becker, the great amber merchants of Konigsberg. At the present time extensive mining operations are conducted in quest of amber. The " pit amber " was formerly dug in open works, but is now also worked by underground galleries. The nodules from the " blue earth " have to be freed from matrix and divested of their opaque crust, which can be done in revolving barrels containing sand and water. The sea-worn amber has lost its crust, but has often acquired a dull rough surface by rolling in sand.

Amber is extensively used for beads and other trivial orna- ments, and for cigar-holders and the mouth-pieces of pipes. It is regarded by the Turks as specially valuable, inasmuch as it is said to be incapable of transmitting infection as the pipe passes from mouth to mouth. The variety most valued in the East is the pale straw-coloured, slightly cloudy amber. Some of the best qualities are sent to Vienna for the manufacture of smoking appliances. In working amber, it is turned on the lathe and polished with whitening and water or with rotten stone and oil, the final lustre being given by friction with flannel. During the working much electricity is developed.

By gradually heating amber in an oil-bath it becomes soft and flexible. Two pieces of amber may be united by smearing the surfaces with linseed oil, heating them, and then pressing them together while hot. Cloudy amber may be clarified in an oil-bath, as the oil fills the numerous pores to which the turbidity is due. Small fragments, formerly thrown away or used only for varnish, are now utilized on a large scale in the formation of " ambroid " or " pressed amber." The pieces are carefully heated with exclusion of air and then compressed into a uniform mass by intense hydraulic pressure; the softened amber being forced through holes in a metal plate. The product is extensively used for the production of cheap jewellery and articles for smoking. This pressed amber yields brilliant interference colours in polarized light. Amber, has often been imitated by other resins

like copal and kauri, as well as by celluloid and even glass. True amber is sometimes coloured artificially.

Amber was much valued as an ornamental material in very early times.. It has been found in Mycenaean tombs; it is known from lake-dwellings in Switzerland, and it occurs with neolithic remains in Denmark, whilst in England it is found with interments of the bronze age. A remarkably fine cup turned in amber from a bronze-age

barrow at Hove is now in the Brighton Museum. Beads of jamber occur with Anglo-Saxon relics in the south of England; and up to a comparatively recent period the material was valued as an amulet. It is still believed to possess certain medicinal virtue.

Rolled pieces of amber, usually small but occasionally of very large size, may be picked up on the east coast of England, having probably been washed up from deposits under the North Sea. Cromer is the best-known locality, but it occurs also on other parts of the Norfolk coast, as well as at Yarmouth, Southwold, Aldeburgh and Felixstowe 'in Suffolk, and as far south as Walton-on-the-Naze in Essex, whilst northwards it is not un- known in Yorkshire. On the other side of the North Sea, amber is found at various localities on the coast of Holland and Denmark. On the shores of the Baltic it occurs not only on the Prussian and Pomeranian coast but in the south of Sweden, in Bornholm and other islands, and in S. Finland. Amber has indeed a very wide distribution, extending over a large part of. northern Europe and occurring as far east as the Urals. Some of the amber districts of the Baltic and North Sea were known in prehistoric times, and led to early trade with the south of Europe. Amber was carried to Olbia on the Black Sea, Massilia on the Mediterranean, and Hatria at the head of the Adriatic; and from these centres it was distributed over the Hellenic world.

Whilst succinite is the common variety of European amber, the following varieties also occur: —

Gedanite, or " brittle amber," closely resembling succinite, but much more brittle, not quite so hard, with a lower melting- point and containing no succinic acid. It is often covered with a white powder easily removed by wiping. The name comes from Gedanum, the Latin name of Danzig.

Stantienite, a brittle, deep brownish-black resin, destitute of succinic acid.

Beckerite, a rare amber in earthy-brown nodules, almost opaque, said to be related in properties to gutta-percha.

Glessite, a nearly opaque brown resin, with numerous micro- scopic cavities and dusty enclosures, named from glesunt, an old name for amber, ,

Krantzite, a soft amber-like resin, found in the lignites of Saxony.

Allingite, a fossil resin allied to succinite, from Switzerland.

Roumanite, or Rumanian amber, a dark reddish resin, occurring with lignite in Tertiary deposits. The nodules are penetrated by cracks, but the material can be worked on the lathe. Sulphur is present to the extent of more than i %, whence the smell of sulphuretted hydrogen when the resin is heated. According to G, Murgoci the Rumanian amber is true succinite.

Simetite, or Sicilian amber, takes its name from the river Simeto or Giaretta. It occurs in Miocene deposits and is also found washed up by the sea near Catania. This beautiful material presents a great diversity of tints, but a rich hyacinth red is common. It is remarkable for its fluorescence, which in the opinion of some authorities adds to its beauty. Amber is also found in many localities in Emilia, especially near the sulphur-mines of Cesena. It has been conjectured that the aflcient Etruscan ornaments in amber were wrought in the Italian material, but it seems that amber from the Baltic reached the Etruscans at Hatria. It has even been supposed that amber passed from Sicily to northern Europe in early times: — a sup- position said to receive some support from the fact that much of the amber dug up in Denmark is red; but it must not be forgotten that reddish amber is found also on the Baltic, though not being fashionable it is used rather for varnish-making than for ornaments. Moreover, yellow amber after long burial is

apt to acquire a reddisn colour. The amber of Sicily seems not to have been recognized in ancient times, for it is not mentioned by local authorities like Diodorus Siculus.

Burmite is the name under which the Burmese amber is now described. Until the British occupation of Burma but little was known as to its occurrence, though it had been worked for centuries and was highly valued by the natives and by the Chinese. It is found in flat rolled pieces, irregularly distributed through a blue clay probably of Miocene age. It occurs in the Hukawng valley, in the Nangotaimaw hills, where it is irregularly worked in shallow pits. The mines were visited some years ago by Dr Fritz Noetling, and the mineral has been described by Dr Otto Helm. The Burmese amber is yellow or reddish, some being of ruby tint, and like the Sicilian amber it is fluorescent. Burmite and simetite agree also in being destitute of succinic acid. Most of the Burmese amber is worked at Mandalay into rosary-beads and ear-cylinders.

Many other fossil resins more or less allied to amber have been described. Schraufitc is a reddish resin from the Carpathian sandstone, and it occurs with jet in the cretaceous rocks of the Lebanon; ambrite is a resin found in many of the coals of New Zealand; retinite occurs in the lignite of Bovey Tracey in Devonshire and elsewhere; whilst copaline has been found in the London clay of Highgate in North London. Chemawinite or cedarite is an amber-like resin from the Saskatchewan river in Canada.

Amber and certain similar substances are found to a limited extent at several localities in the United States, as in the green- sand of New Jersey, but they have little or no economic value. A fluorescent amber is said, however, to occur in some abundance in Southern Mexico. Amber is recorded also from the Dominican Republic.

References. — See, for Baltic amber, P. Dahms, " Ueber die Vorkommen und die Verwendung des Bernsteins," Zeitsch. fur praktische Geologie, 1901, p. 201; H. Conwentz, Monographic der baltischen Bernsteinbdume (Danzig, 1890); R. Klebs, Guide to Exhibit of the German Amber Industry at World's Fair (St Louis, 1904) ; and abstract by G. F. Kunz in Mineral Resources of the U. S. (1904). For Sicilian amber, W. Arnold Buffum, The Tears of the Heliades, or Amber as a Gem (London, 1896). For Burmese amber, papers by Fritz Noetling and Otto Helm in Records of Geol. Sun. of India, vol. xxvi. (1893), pp. 31, 61. For British amber, Clement Reid in Trans. Norfolk Nat. Soc, vol. iii. (1884) p. 601; vol. iv. (1886) p. 247; and H. Conwentz in Natural Science, vol. ix. (1896) pp. 99, 161. (F. W. R:)*

AMBERG, a town of Germany, in the kingdom of Bavaria, formerly the capital of the Upper Palatinate, situated on both sides of the Vils, 42 m. E. of Nuremberg by rail. Pop. 22,089. It has a town hall with handsome rooms, a library, a gymnasium, a lyceum, elementary schools, an arsenal, and eleven churches, the finest of which is St Martin's, of the 15th century, with many excellent paintings and a tower 300 ft. high. A former Jesuit monastery is now used for a grammar school and seminary. There are also a pilgrimage church on a hill 162 1 ft. high, a large convict prison for men, an industrial, commercial and other schools. The principal manufactures are firearms, ironmongery, earthenware, woollen cloth, beer, stoneware, zinc goods, colours and salt; in the neighbourhood are iron and coal mines. The French under Jourdan were defeated by the Austrians under the Archduke Charles near Amberg in 1796.

AMBERGRIS (Ambra grisea, Ambre gris, or grey amber), a solid,

fatty, inflammable substance of a dull grey or blackish colour, the shades being variegated like marble, possessing a peculiar sweet, earthy odour. It occurs as a biliary concretion in the intestines of the spermaceti whale (Physeter macrocephalus), and is found floating upon the sea, on the sea-coast, or in the sand near the sea-coast. It is met with in the Atlantic Ocean; on the coasts of Brazil and Madagascar; also on the coast of Africa, of the East Indies, China, Japan and the Molucca islands; but most of the ambergris which is brought to England comes from the Bahama Islands, Providence, &c. It is also sometimes found in the abdomen of whales, always in lumps of various shapes and sizes, weighing from foz. to 100 or more pounds. Ambergris, when taken from the intestinal canal of

the sperm whale, is of a deep grey colour, soft consistence and a disagreeable smell. On exposure to the air it gradually hardens, becomes pale and develops its peculiar sweet, earthy odour. In that condition its specific gravity ranges from 0-780 to 0-926. It melts at about 62 C. to a fatty, yellow resinous-like liquid; and at ioo° C. it is volatilized into a white vapour. It is soluble in ether, and in volatile and fixed oils; it is only feebly acted on by acids. By digesting in hot alcohol, a substance termed ambrein, closely resembling cholesterin, is obtained, which separates in brilliant white crystals as the solution cools. The use of ambergris in Europe is now entirely confined to perfumery, though it formerly occupied no inconsiderable place in medicine. In minute quantities its alcoholic solution is much used for giving a " floral " fragrance to bouquets, washes and other preparations of the perfumer. It occupies a very important place in the perfumery of the East, and there it is also used in pharmacy and as a flavouring material in cookery. The high price it commands makes it peculiarly liable to adulteration, but its genuineness is easily tested by its solubility in hot alcohol, its fragrant odour, and its uniform fatty consistence on being penetrated by a hot wire.

AMBERT, a town of central France, capital of an arrondisse- ment of the department of Puy-de-D6me, on the Dore, 52 m. E.S.E. of Clermont-Ferrand by rail. Pop. (1906), town, 3889; commune, 7581. The town has a church of the 15 th and 16th centuries and carries on the manufacture of paper, lace, ribbon, rosaries, &c, and trade in cheese. It is the seat of a sub-prefect, and the public institutions include tribunals of first instance and of commerce, a chamber of arts and manufactures, and a communal college.

AMBIENT (from Lat. ambi, on both sides, and ire, to go), surrounding; a word implying a moving rather than a stationary encircling. It is used mostly in the phrase the " ambient air," though

Bacon applied it as an adjective to the clergy, suggesting " ambition." In astrology it means the sky.

AMBIGU, a French game of cards, composed of the character- istic elements of whist, bouillotte and piquet. A whist pack with the court cards deleted is used, and from two to six persons may play. Each player is given an equal number of counters, and a limit of betting is agreed upon. Two cards are dealt, one at a time, to each player, after each has placed two counters in a pool. Each player then either keeps his hand, saying " Enough," or takes one or two new cards from the top of the stock; after which the stock is reshuffled and cut, and each player receives two more cards, one at a time. The players then either " play "or " pass." If a person " plays," he bets a number of counters and the others may equal this bet or raise it. Should no player meet the first bet, the bettor takes back his bet, leaving the pool intact, and receives two counters from the last player who refuses to play. When two or more bet the same number, they again draw cards and " pass " or " play " as before. If all " pass," each pays a counter to the pool and a new deal ensues. The player betting more than the others call wins the pool. He then exposes his hand and is paid by each adversary according to its value. The hands rank as follows: — " Point," the number of pips on two or more cards of a suit (one counter). "Prime," four cards of different suits (two counters). " Grand Prime," the same with the number of pips over 30 (three counters). " Sequence," a hand containing three cards of the same suit in sequence (three counters). " Tricon," three of a kind (four counters). " Flush," four cards of the same suit (five counters) . "Doublet," a hand containing two counting combinations at once, as 2, 3, 4 and 7 of spades, amounting to both a " sequence " and a " flush " (eight counters). " Fredon," four of a kind (the highest possible hand), ten or eleven counters, according to the number of pips. Ties are decided by the' number of pips.

AMBIGUITY (Fr. ambiguilS, med. Lat. ambiguitas, from Lat. ambiguus, doubtful; ambi, both ways, agere, to drive), doubtful- ness or uncertainty. In law an ambiguity as to the meaning of the words Of a written instrument may be of considerable importance. Ambiguity, in law, is of two kinds, patent and latent. (1) Patent

ambiguity is that ambiguity which is apparent on the face of an instrument to any one perusing it, even if he be unacquainted with

the circumstances of the parties. In the case of a patent ambiguity parol evidence is admissible to explain only what has been written, not what it was intended to write. For example, in Saunderson v. Piper, 1839, 5 B.N.C. 425, where a bill was drawn in figures for £245 and in words for two hundred pounds, evidence that " and forty-five " had been omitted by mistake was rejected. But where it appears from the general context of the instrument what the parties really meant, the instrument will be construed as if there was no ambiguity, as in Saye and Sele's case, 10 Mod. 46, where the name of the grantor had been omitted in the operative part of a grant, but, as it was clear from another part of the grant who he was, the deed was held to be valid. (2) Latent ambiguity is where the wording of an instrument is on the face of it clear and in- telligible, but may, at the same time, apply equally to two different things or subject matters, as where a legacy is given " to my nephew, John," and the testator is shown to have two nephews of that name. A latent ambiguity may be ex- plained by parol evidence, for, as the ambiguity has been brought about by circumstances extraneous to the instrument, the explanation must necessarily be sought ior from such circumstances. (See also Evidence.)

AMBIORIX, prince of the Eburones, a tribe of Belgian Gaul. Although Caesar (q.v.) had freed him from paying tribute to the Aduatuci, he joined Catuvolcus (winter, 54 B.C.) in a rising against the Roman forces under Q. Titurius Sabinus and L. Aurunculeius Cotta, and almost annihilated them. An attack on Quintus Cicero (brother of the orator), then quartered with a legion in the territory of the Nervii, failed owing to the timely appearance of Caesar. Ambiorix is said to have found safety across the Rhine.

Caesar, Bell, Gall. v. 26-51, vi. 29-43, viii. 24; Dio Cassius xl. 7-1 1 ; Floras iii. 10.

AMBLESIDE, a market-town in the Appleby parliamentary division of Westmorland, England, a mile from the head of Windermere. Pop. of urban district (1901) 2536. It is most beautifully situated, for though the lake is hardly visible from the town, the bare, sharply rising hills surrounding the richly wooded valley of the Rothay afford a series of exquisite views. The hills immediately above this part of the valley are Wansfell on the east, Loughrigg Fell on the west, and Rydal Fell and the ridge below Snarker Pike (2096 ft.) to the north. At the head of Winder- mere is Waterhead. the landing-stage of Amble- side, which is served by the lake steamers of the Furness Railway Company. The chief roads which centre upon Ambleside are — one from the town of Windermere, following the eastern shore of

the lake; one from Ulls water, by Patterdale and Kirkstone Pass; one from Keswick, by Dunmail Raise and Grasmere, and the two lovely lakes of Grasmere and Rydal Water; and one from the Brathay valley and the Langdales to the west. Ambleside is thus much frequented by tourists. In its vicinity is Rydal Mount, for many years the residence of the poet Wordsworth. The town has some industry in bobbin-making, and there are slate quarries in the neigh- bourhood.

Close by the lake side the outlines are still visible of a Roman fort, the name of which is not known. It appears to have guarded a route over the hills by Hard- knott and Wrynose Pass to Ravenglass on the coast of Cumberland.

AMBLYGONITE, a mineral usually found as cleavable or columnar, and compact masses; it is translucent and has a vitreous lustre, and the colour varies from white to pale shades of violet, grey, green or yellow. There are good cleavages in two directions. The hardness is 6 and the specific gravity 3‘0. The mineral is thus not unlike felspar in general appearance, but

it is readily distinguished from this by its chemical characters, being an aluminium and lithium fluophosphate, Li(AlF)P0 4 , with part of the lithium replaced by sodium and part of the fluorine by hydroxyl. Crystals, which are rarely distinctly developed, belong to the anorthic system, and frequently show twin lamellae.

The mineral was first discovered in Saxony by A. Breithaupt in 1817, and named by him from the Greek aˆi/3Xus, blunt, and yoivia, angle, because of the obtuse angle between the cleavages. Later it was found at Montebras, dep. Creuse, France, and at Hebron in Maine; and on account of slight differences in optical character and chemical composition the names montebrasite and hebronite have been applied to the mineral from these localities. Recently it has been discovered in considerable quantity at Pala in San Diego county, California, and at Caceres in Spain. Amblygonite occurs with lepidolite, tourmaline and other lithia-bearing minerals in pegmatite-veins. It contains about 10% of lithia, and, since 1886, has been utilized as a source of lithium salts, the chief commercial sources being the Montebras deposits, and later the Californian. (L. J. S.)

AMBLYPODA, a suborder of primitive ungulate mammals, taking its name from the short and stumpy feet, which were furnished with five toes each, and supported massive pillar-like limbs. The brain-cavity was extremely small, and insignificant in comparison to the bodily bulk, which was equal to that of the largest rhinoceroses. These

animals are, in fact, descendants of the small ancestral ungulates which have retained all the primitive characters of the latter accompanied by a huge increase in bodily size. They are confined to the Eocene period, and occur both in North America and Europe. The cheek teeth are short crowned (brachyodont) , with the tubercles more or less completely fused into transverse ridges, or cross-crests (lophodont type); and the total number of teeth is in one case the typical 44, but in another is reduced below this. The vertebrae of the neck unite by nearly flat surfaces, the humerus has lost the foramen, or perforation, at the lower end, and the third trochanter to the femur may also be wanting. In the fore-limb the upper and lower series of carpal bones scarcely alternate, but in the hind- foot the astragalus overlaps the cuboid, while the fibula, which is quite distinct from the tibia(as is the radius from the ulna in the fore-limb), articulates with both astragalus and calcaneum. The most generalized type is Coryphodon, representing the family

Restored skeleton of Vintalhcrium {Dinoceras) mirabile. (After O. C. Marsh.)

Coryphodontidae, from the lower Eocene of Europe and North America, in which there were 44 teeth, and no horn-like excrescences on the long skull, while the femur had a third trochanter. The canines are somewhat elongated, and were followed by a short gap in each jaw, and the cheek-teeth were adapted for succulent food. The length of the body reached about 6 ft. in some cases.

In the middle Eocene formations of North America occurs the more specialized Uinlatherium (or Dinoceras) , typifying the family Uintatheriidae, which also contains species sometimes

separated as Tinoceras. Uintatheres were huge creatures, with long narrow skulls, of which the elongated facial portion carried three pairs of bony horn-cores, probably covered with short horns in life, the hind-pair being much the largest. The dental formula is i. %,c. \, p. ˆ?j, m. §; the upper canines being long sabre-like weapons, protected by a descending flange on each side of the front of the lower jaw.

In the basal Eocene, of North America the Amblypoda were represented by extremely primitive, five-toed, small ungulates such

as Periptychus and Pantolambda, each of these typifying a family. The full typical series of 44 teeth was developed in each, but whereas in the Periptychidae the upper molars were bunodont and tritubercular, in the Pantolambdidae they have assumed a selenodont structure. Creodont characters (see Creodonta) are displayed in the skeleton.

See also H. F. Osborn, " Evolution of the Amblypoda," Bull. Amer. Mus. vol. x. p. 169. (R. L.)*

AMBO, or Ambon (Gr. afifjwv, from avaflaiveiv, to walk up, the reading-desk of early Basilican churches, also called Trvpyos. Originally small and movable, it was afterwards made of large proportions and fixed in one place. Iri the Byzantine and early Romanesque periods it was an essential part of church furniture; but during the middle ages it was gradually super- seded in the Western Church by the pulpit and lectern. The gospel and epistle are still read from the ambo in the Ambrosian rite at Milan. The position of the ambo was not absolutely uniform; sometimes in the central point between the sanctuary and the nave, sometimes in the middle of the church, and some times at one or both of the sides of the chancel. The normal ambo, when the church contained only one, had three stages or degrees, one above the other, and it was usually mounted by a flight of steps at each end. The uppermost stage was re- served for the deacon who sang the gospel (facing the congrega- tion); for promulgating episcopal edicts; reciting the names inscribed on the diptychs (see Diptych); announcing fasts, vigils and feasts; reading ecclesiastical letters or acts of the martyrs celebrated on that day; announcing new miracles for popular edification, professions by new converts or recantations by heretics; and (for priests and deacons) preaching sermons, — bishops as a general rule preaching from their own throne. The second stage was for the sub-deacon who read the epistle (facing the altar); and the third for the subordinate clergy who read other parts of scripture. The inconvenience of having a single ambo led to the substitution of two separate ambones, between which these various functions were divided, one on the south side of the chancel being for the reading of the gospel, and one on the north for reading the epistle. In the Russian Orthodox Church the term " ambo " is used of the semicircular steps leading to the platform in front of the iconostasis (q.v.), but in cathedrals the bishop has an ambo in the centre of the church. In the Greek Church the older form remains, usually placed at the side. In the Uniate Greek Catholic Church the " ambo " has become a table, on which ate placed a crucifix and lights, before the doors of the iconostasis; here baptisms, marriages and confirmations take place.

Ambones were made of wood or else of costly marbles, and were decorated with mosaics, reliefs, gilding, &c; sometimes also covered with canopies supported on columns. They were often of enormous size; that at St Sophia in Constantinople was large enough for the ceremonial of coronation. “>

The churches in Rome possess many fine examples of ambones in marble, of which the oldest is probably that in S. Clemente, reconstructed in the beginning of the 12th century. Those of slightly later date are enriched with marble mosaic known as Cosmati work, of which the examples in S. Maria-in-Ara-Coeli, S. Maria-in-Cosmedin and S. Lorenzo are those which are best known. Some early ambones are found in Ravenna, and in the south of Italy are many fine examples; the epistle ambo in the cathedral at Ravello (1130), which is perhaps the earliest, shows a Scandinavian influence in the design of its mosaic inlay, an influence which is found in Sicilian work and may be a Norman importation. The two ambones in the cathedral of Salerno,

which are different in design, are magnificent in effect and are enriched with sculpture as well as with mosaic. In the gospel ambo in the cathedral of Ravello (1272), and also in that of the convent of the Trinita della Cava near Salerno, the spiral columns inlaid with mosaic stand on the backs of lions. In the epistle ambo at Salerno and the gospel ambones at Cava and San Giovanni del Toro in Ravello, the columns support segmental arches carrying the ambones; the epistle ambo at Ravello and all those in Rome are raised on solid marble bases.

See the liturgical and ecclesiastical dictionaries of Martigny, Migne, and Smith and Cheetham, sub voce, where all the scattered references are collected together and summarized. In Ciampinus, Vetera Monumenia (Rome, 1747), plates xii., xiii., are several illustrations of actual examples.

AMBOISE, GEORGES D’ (1460-1510), French cardinal and minister of state, belonged to a noble family possessed of con- siderable influence. His father, Pierre d’Amboise, seigneur de Chaumont, was chamberlain to Charles VII. and Louis XI. and ambassador at Rome. His eldest brother, Charles d’Amboise, was governor of the Isle of France, Champagne and Burgundy, and councillor of Louis XI. Georges d’ Amboise was only fourteen when his father procured for him the bishopric of Montauban, and Louis XL appointed him one of his almoners. On arriving at manhood d’Amboise attached himself to the party of the duke of Orleans, in whose cause he suffered im-

prisonment, and on whose return to the royal favour he was elevated to the archbishopric of Narbonne, which after some time he changed for that of Rouen (1493). On the appointment of the duke of Orleans as governor of Normandy, d'Amboise became his lieutenant-general. In 1498 the duke of Orleans mounted the throne as Louis XII., and d'Amboise was suddenly raised to the high position of cardinal and prime minister. His administration was, in many respects, well-intentioned and useful. Having the good fortune to serve a king who was both economical and just, he was able to diminish the imposts, to introduce order among the soldiery, and above all, by the ordinances of 1499, to improve the organization of justice. He was also zealous for the reform of the church, and particularly for the reform of the monasteries; and it is greatly to his credit that he did not avail himself of the extremely favourable oppor- tunities he possessed of becoming a pluralist. He regularly spent a large income in charity, and he laboured strenuously to stay the progress of the plague and famine which broke out in 1 504. His foreign policy, less happy and less wise, was aniraated by two aims — to increase the French power in Italy and to seat himself on the papal throne; and these aims he sought Xq achieve by diplomacy, not by force. He, hdwever, sympatluzed with, and took part in, the campaign which was begun in 1499 for the conquest of Milan. In 1500 he was named lieutenant- general in Italy and charged with the organization of the con- quest. On the death of Alexander VI. he aspired to the papacy. He had French troops at the gates of Rome, by means of which he could easily have frightened the conclave and induced them to elect him; but he was persuaded to trust to his influence; the troops were dismissed, and an Italian was appointed as Pius III.; and again, on the death of Pius within the month, another; Italian, Julius II., was chosen (1503). D'Amboise received hi compensation the title of legate for life in France and in the Comtat Venaissin. He was one of the negotiators of the dis- astrous treaties of Blois (1504), and in 1508 of the League of Cambrai against 'Venice. In 1509 he again accompanied Louis XII. into Italy, but on his return he was seized at the city of Lyons with a fatal attack of gout in the stomach. He died there on the 25th of May 1510. His body was removed to Rouen; and a magnificent tomb, on which he is represented kneeling in the attitude of prayer, was erected to his memory in the cathedral of that town. Throughout his life he was an enlightened patron of letters and art, and it was at his orders that the chateau of Gaillon near Rouen was built.

See Lettres du roi Louis XII. et du cardinal d'Amboise (Brussels, 1712); L. Legendre, Vie du cardinal d'Amboise (Rouen, 1726); E.

Lavisse, Histoire de France (vol. v. by H. Lemonnier, Paris, 1903);

J. A. Deville, Tombeaux de la cathedrale de Rotten (3rd ed., 1881). For a bibliography of the printed sources, see H. Hauser, Les Sources de I'hisloire de France, XVIe Steele, vol. i. (1906). (J. I.)

AMBOISE, a town of central France in the department of Indre-et-Loire, on the left bank of the Loire, 12 m. E. of Tours by the Orleans railway. Pop. (1906) 4632. Amboise owes its celebrity to the imposing chateau which overlooks the Loire from the rocky eminence above the town. The Logis du Roi, the most important portion, was the work of Charles VIII. ; the other wing was built under Louis XII. and Francis I. The ramparts are strengthened by two massive towers containing an inclined plane on which horses and carriages may ascend. The chapel of St Hubert, said to contain the remains of Leonardo da Vinci, who was summoned to Amboise by Francis I., king of France, and died there in 1519, is in the late Gothic style; a delicately carved relief over the doorway represents the con- version of St Hubert. The h6tel de ville is established in a mansion of Renaissance architecture; a town gateway of the 15th century, surmounted by a belfry, is also of architectural interest. Iron-founding, wool-weaving, and the manufacture of boots and farm implements are among the industries.

Amboise at the end of the nth century was a lordship under the counts of Anjou, one of whom, Hugues I., rebuilt the ancient castle. Its territory was united to the domain of the crown of France by Charles VII. about the middle of the 15th century, and thenceforth the chateau became a favourite residence of the French kings. The discovery in 1560 of the " conspiracy of Amboise," a plot of the Huguenots to remove Francis II. from the influence of the house of Guise, was avenged by the death of 1200 members of that party. In 1563 Amboise gave its name to a royal edict allowing freedom of worship to the Huguenot nobility and gentry. After that period the chateau was fre- quently used as a state prison, and Abd-el-Kader was a captive there from 1848 to 1852. In 1872 it was restored by the National Assembly to the house of Orleans, to which it had come by inheritance from the duke of Penthievre in the latter half of the 1 8th century.

AMBOYNA (Dutch Ambon), the name of a residency, its chief town,

and the island on which the town is situated, in the Dutch East Indies.

The residency shares with that of Ternate the administration of the Moluccas, the previous government of which was abolished in 1867. It includes a mass of islands in the Banda Sea (2 30'- 8° 20′ S. and i25°45'-i35°E.), including the island-belt which surrounds the sea on the north, east and south; and is divided for administrative purposes into nine districts (afdeelingen) : 1) Amboyna, the island of that name; (2) Saparua, with Oma and Nusa Laut; (3) Kajeli (Eastern Bum); (4) Masareti (Western Buru); (5) Kairatu (Western Ceram); (6) Wahai (the northern part of Mid-Ceram); (7) Amahai (the southern part of Mid-Ceram); (8) the Banda Isles, with East Ceram, Ceram Laut and Gorom; (9) the islands of Aru, Kei, Timor Laut or Tenimber, and the south-western islands. The total area of the residency is about 19,861 sq. m., and its population 296,000, including 2400 Europeans. ' Amboyna Island lies off the south-west of Ceram, on the north side of the Banda Sea, being one of a series of volcanic isles in the inner circle round the sea. It is 32 m. in length, with an area of about 386 sq. m., and is of very irregular figure, being almost divided into two. The south-eastern and smaller portion (called Leitimor) is united to the northern (Hitoe) by a neck of land a few yards in breadth. The highest mountains, Wawani (3609 ft.) and Salhutu (4020 ft.), have hot springs and solfataras. They are considered to be volcanoes, and the mountains of the neighbouring Uliasser islands the remains of volcanoes. Granite and serpentine rocks predominate, but the shores of Amboyna Bay are of chalk, and contain stalactite caves. The surface is fertile, the rivers are small and not navigable, and the roads are mere footpaths. Cocoa is one of the products. The climate is comparatively pleasant and healthy; the average temperature is 8o° F., rarely sinking below 72 . The rainfall, however, after the eastern monsoons, is very heavy, and the island is liable to

violent hurricanes. It is remarkable that the dry season (October to April) is coincident with the period of the west monsoon. Indigenous mammals are poor in species as well as few in number; birds are more abundant, but of no greater variety. The ento- mology of the island, however, is very rich, particularly in re- spect of Lepidoptera. Shells are obtained in great numbers and variety. Turtle-shell is also largely exported. The vegetation is also rich, and Amboyna produces most of the common tropical fruits and vegetables, including the sago-palm, bread-fruit, cocoa-nut, sugar-cane, maize, coffee, pepper and cotton. Cloves, however, form its chief product, though the trade in them is less important than formerly, when the Dutch prohibited

the rearing of the clove-tree in all the other islands subject to their rule, in order to secure the monopoly to Amboyna. Amboyna wood, of great value for ornamental work, is obtained from the hard knots which occur on certain trees in the forests of Ceram. The population (about 39,000) is divided into two classes — orang burger or citizens, and orang negri or villagers, the former being a class of native origin enjoying certain privileges conferred on their ancestors by the old Dutch East India Company. The natives are of mixed Malay-Papuan blood. They are mostly Christians or Mahommedans. There are also, besides the Dutch, some Arabs, Chinese and a few Portuguese settlers.

Amboyna, the chief town, and seat of the resident and military commander of the Moluccas, is protected by Fort Victoria, and is a clean little town with wide streets, well planted. Agriculture, fisheries and import and export trade furnish the chief means of subsistence. It lies on the north-west of the peninsula of Leitimor, and has a safe and commodious anchorage. Its population is about 8000.

The Portuguese were the first European nation to visit Amboyna (1511). They established a factory there in 1521, but did not obtain peaceable possession of it till 1580, and were dispossessed by the Dutch in 1609. About 161 5 the British formed a settlement in the island, at Cambello, which they retained until 1623, when it was destroyed by the Dutch, and frightful tortures inflicted on the unfortunate persons connected with it. In 1654, after many fruitless negotiationsˆ Cromwell compelled the United Provinces to give the sum of £300,000, together with a small island, as compensation to the descendants of those who suffered in the " Amboyna massacre." In 1673 the poet Dryden produced his tragedy of Amboyna, or the Cruelties of the Dutch to the English Merchants. In 1796 the British, under Admiral Rainier, captured Amboyna, but restored it to the Dutch at the peace of Amiens in 1802. It was retaken by the British in 1810, but once more restored to the Dutch in

1814.

AMBRACIA (more correctly Ampracia) , an ancient Corinthian colony, situated about 7 m. from the Ambracian Gulf, on a bend of the navigable river Aracthus (or Aratthus), in the midst of a fertile wooded plain. It was founded between 650 and 625 B.C. by Gorgus, son of the Corinthian tyrant Cypselus. After the expulsion of Gorgus's son Periander its government developed into a strong democracy. The early policy of Ambracia was determined by its loyalty to Corinth (for which it probably served as an entrepot in the

Epirus trade), its consequent aversion tq Corcyra, and its frontier disputes with the Amphilochians and Acarnanians. Hence it took a prominent part in the Pelopon- nesian War until the crushing defeat at Idomene (426) crippled its resources. In the 4th century it continued its traditional policy, but in 338 surrendered to Philip II. of Macedon. After forty- three years of autonomy under Macedonian suzerainty it became the capital of Pyrrhus, king of Epirus, who adorned it with palace, temples and theatres. In the wars of Philip V. of Macedon and the Epirotes against the Aetolian league (220-205) Ambracia passed from one alliance to the other, but ultimately joined the latter confederacy. During the struggle of the Aetolians against Rome it stood a stubborn siege. After its capture and plunder by M. Fulvius Nobilior in 189, it fell into insignificance. The foundation by Augustus of Nicopolis (?.».),. into which the remaining inhabitants were drafted, left the site desolate. . In Byzantine times a new settlement took its place

under the name of Arta (q.v.). Some fragmentary walls of large, well-dressed blocks near this latter town indicate the early prosperity of Ambracia.

Authorities. — Thucydides ii. 68-iii. 114; Aristotle, Politics, 1303a sqq.; Strabo p. 325; Polybius xxii. 9-13; Livy xxxviii. 3-9; G. Wolfe, Journal of Geographical Society (London), iii. (1833) PP- 77~94; E. Oberhummer, Akarnanien, Ambrakien, &c. im Altertum (Munich, 1887). (Ml O. B. C.)

AMBRIZ, a West African seaport belonging to Portugal, at the mouth of the Loje River, in 7 50′ S., 13° E., some 70 m. N. of Loanda. It forms a part of the province of Angola (q.v.): The town is within the free-trade area of the conventional basin of the Congo river. Its chief exports are rubber, gum, coffee and copper. Pop. about 2500. Ambriz was, previously to 1884, the northernmost point of Africa south of the equator acknowledged as Portuguese territory.

AMBROS, AUGUST WILHELM (1816-1876), Austrian com- poser and historian of music, was born at Mauth near Prague. His father was a cultured man, and his mother was the sister of R. G. Kiesewetter (1773-1850), the musical archaeologist and collector. Ambros was well educated in music and the arts, which were his abiding passion; but he was destined for the law and an official

career in the Austrian civil service, and he occupied various important posts under the ministry of justice, music being the employment of his leisure. From 1850 onwards he became well known as a critic and essay- writer, and in i860 he began working on his magnum opus, his History of Music, which was published at intervals from 1864 in five volumes, the last two (1878, 1882) being edited and completed by Otto Kade and Langhaus. Ambros became professor of the history of music at Prague in 1869. He was an excellent pianist, and the author of numerous compositions somewhat reminiscent of Mendelssohn. He died at Vienna on the 28th of June 1876.

AMBROSE (fl. 1 190), Norman poet, and chronicler of the Third Crusade, author of a work called L'Estoire de la guerre sainte, which describes in rhyming French verse the adventures of Richard Cceur de Lion as a crusader. The poem is known to us only through one Vatican MS., and long escaped the notice of historians. The credit for detecting its value belongs to the late Gaston Paris, although his edition (1897) was partially anticipated by the editors of the Monumenta Germaniae Historica, who published some selections in the twenty-seventh volume of their Scriptores (1885). Ambrose followed Richard I. as a non- combatant, and not improbably as a court-minstrel. He speaks as an eye-witness of the king's doings at Messina, in Cyprus, at the siege of Acre, and in the abortive campaign which followed the capture of that city. Ambrose is surprisingly accurate in his chronology; though he did not complete his work before 1195, it is evidently founded upon notes which he had taken in the course of his pilgrimage. He shows no greater political insight than we should expect from his position; but relates what he had seen and heard with a naive vivacity which compels attention. He is prejudiced against the Saracens, against the French, and against all the rivals or enemies of his master; but he is never guilty of deliberate misrepresentation. He is rather to be treated as a biographer than as a historian of theCrusade in its broader aspects. None the less he is the chief authority for the events of the years 11 90-1 192, so far as these are connected with the Holy Land. The 1 tinerarium Regis Ricardi (formerly attributed to Geoffrey Vinsauf, but in reality the work of Richard, a canon of Holy Trinity, London) is little more than a free paraphrase of Ambrose. The first book of the Itinerarium contains some additional facts; and the whole of the Latin version is adorned with flowers of rhetoric which are foreign to the style of Ambrose. But it is no longer possible to regard the Itinerarium as a first- hand narrative. Stubbs's edition of the Itinerarium (Rolls Series, 1864), in which the contrary hypothesis, is

maintained, appeared before Gaston Paris published his discovery.

See the edition of L'Estoire de la guerre sainte by Gaston Paris in the Collection des documents inedits sur I'histoire de France (1897); the editor discusses in his introduction the biography of Ambrose, the value of the poem as a historical source, and its relation to the Itinerarium. R. Pauli's remarks (iri Monumenta Germaniae Historica. Scriptores, xxvii.) also deserve attention. (H. W. C. D.)

AMBROSE, SAINT (c. 340-307), bishop of Milan, one of the most eminent fathers of the church in the 4th Century, was a citizen of Rome, bom about 337-340 in Treves, where his father was prefect of Gallia Narbonensis. His mother was a woman of intellect and piety. Ambrose was early destined to follow his father's career, and was accordingly educated in Rome. He made such progress in literature, law and rhetork, that the praetor Anicius Probus first gave him a place in the council and then made him consular prefect of Liguria and Emilia, with headquarters at Milan, where he made an excellent administrator. In 374 Auxentius, bishop of Milan, died, and the orthodox and Arian parties contended for the succession. An address delivered to them at this crisis by Ambrose led to his being acclaimed as the only competent occupant of the see; though hitherto only a catechumen, he was baptized, and a few days saw him duly installed as bishop of Milan. He immediately betook himself to the necessary studies, and acquitted himself in his new office with ability, boldness and integrity. Having apportioned his money among the poor, and settled his lands upon the church, with the exception of making his sister Marcellina tenant during life, and having committed the care of his family to his brother, he entered upon a regular course of theological study, under the care of Simptician, a presbyter of Rome, and devoted himself to the labours of the church, labours which were temporarily interrupted by an invasion of Goths, which compelled Ambrose and other churchmen to retire to Illyricum.

The eloquence of Ambrose soon found ample scope in the dispute between the Arians and the orthodox or Catholic party, whose cause the new bishop espoused. Gratian, the son of the elder Valentinian, took the same side; but the younger Valen- tinian, who had now become his colleague in the empire, adopted the opinions of the Arians, and all the arguments and eloquence of Ambrose could not reclaim the young prince to the orthodox faith. Theodosius, the emperor of the East, also professed the orthodox belief; but there were many adherents of Arius scattered throughout his dominions. In this distracted state of religious opinion, two leaders of the Arians, Palladius and Secundianus, confident of numbers, prevailed upon

Gratian to call a general council from all parts of the empire. This request appeared so equitable that he complied without hesitation; but Ambrose, foreseeing the consequence, prevailed upon the emperor to have the matter determined by a council of the Western bishops. A synod, composed of thirty-two bishops, was accordingly held at Aquileia in the year 381. Ambrose was elected president; and Palladius, being called upon to defend his opinions, declined, insisting that the meeting was a partial one, and that, all the bishops of the empire not being present, the, sense of the Christian church concerning the- question in dispute could not be obtained. A vote was then taken, when Palladius and his associate Secundianus were deposed from the episcopal office.

Ambrose was equally zealous in combating the attempt made by the upholders of the old state religion to resist the enactments of Christian emperors. The pagan party was led by Quintus Aurelius Symmachus (q.v.), consul in 391, who presented to Valentinian II. a forcible but unsuccessful petition praying for the restoration of the altar of Victory to its ancient station in the hall of the. senate, the proper support of seven vestal virgins, and the regular observance of the other pagan ceremonies. To this petition Ambrose replied in a letter to Valentinian, arguing that the devoted worshippers of idols had often been forsaken by their deities; that the native valour of the Roman soldiers had gained their victories, and not the pretended influence of pagan, priests; that these idolatrous worshippers requested for themselves what they refused, to Christians; that voluntary was more honourable than constrained virginity; that as the Christian ministers declined to receive temporal emoluments, they should also be denied to pagan priests; that it was absurd to suppose that God would inflict a famine upon the empire for neglecting to support a religious system contrary to His will as revealed in the Scriptures; that the whole process of nature encouraged innovations, and that all nations had

permitted them, even in religion; that heathen sacrifices were offensive to Christians; and that it was the duty of a Christian prince to suppress pagan ceremonies. In the epistles of Sym- machus and of Ambrose both the petition and the reply are preserved. They are a strange blend of sophistry, superstition, sound sense and solid argument.

The increasing strength of the Arians proved a formidable task for Ambrose. In 384 the young emperor and his mother Justina, along with a considerable number of clergy and laity professing the Arian faith, requested from the bishop the use of two churches, one in the city, the other in the suburbs of Milan. Ambrose refused, and was required to answer for his conduct before the council. He went, attended by a numerous crowd of people, whose impetuous zeal so overawed the ministers of Valentinian that he was permitted to retire without making the surrender of the churches. The day following, when he was performing divine service in the Basilica, the prefect of the city came to persuade him to give up at least the Portian church in the suburbs. As he still continued obstinate, the court proceeded to violent measures: the officers of the household were commanded to prepare the Basilica and the Portian churches to celebrate divine service upon the arrival of the emperor and his mother at the ensuing festival of Easter. Perceiving the growing strength of the prelate's interest, the court deemed it prudent to restrict its demand to the use of one of the churches. But all entreaties proved in vain, and drew forth the following characteristic declaration from the bishop: — " If you demand my person, I am ready to submit: carry me to prison or to death, I will not resist; but I will never betray the church of Christ. I will not call upon the people to succour me; I will die at the foot of the altar rather than desert it. The tumult of the people I will not encourage: but God alone can appease it."

Many circumstances in the history of Ambrose are strongly characteristic of the general spirit of the times. The chief causes of his victory over his opponents were his great popularity and the superstitious reverence paid to the episcopal character at that period. But it must also be noted that he used several in- direct means to obtain and support his authority with the people. He was liberal to the poor; it was his custom to comment severely in his preaching on the public characters of his times; and he introduced popular reforms in the order and manner of public worship. It is alleged, too, that at a time when the influence of Ambrose required vigorous support, he was admonished in a dream to search for, and found under the pavement of the church, the remains of two martyrs, Gervasius and Protasius. The applause of the vulgar was mingled with the derision of the court party.

Although the court was displeased with the religious principles and conduct of Ambrose, it respected his great political talents ; and when necessity required, his aid was solicited and generously granted. When Maximus usurped the supreme power in Gaul, and was meditating a descent upon Italy, Valentinian sent Ambrose to

dissuade him from the undertaking, and the embassy was successful. On a second attempt of the same kind Ambrose was again employed; and although he was unsuccessful, it cannot be doubted that, if his advice had been followed, the schemes of the usurper would have proved abortive; but the enemy was permitted to enter Italy; and Milan was taken. Justina and her son fled; but Ambrose remained at his post, and did good service to many of the sufferers by causing the plate of the church to be melted for their relief. Theodosius, the emperor of the East, espoused the cause of Justina, and regained the kingdom. This Theodosius was sternly rebuked by Ambrose for the massacre of 7000 persons at Thessalonica in 300, and was bidden imitate David in his repentance as he had imitated him in guilt.

In 392, after the assassination of Valentinian and the usurpa- tion of Eugenius, Ambrose fled from Milan; but when Theodosius was eventually victorious, he supplicated the emperor for the pardon of those who had supported Eugenius. Soon after acquiring the undisputed possession of the Roman empire, Theodosius died at Milan in 395, and two years later (4th

April 397) Ambrose also passed away. He was succeeded by Simplician.

A man of pure character, vigorous mind, unwearying zeal and uncommon generosity, Ambrose ranks high among the fathers of the ancient church on many counts. His chief faults were ambition and bigotry. Though ranking with Augustine, Jerome, and Gregory the Great, as one of the Latin " doctors," he is most naturally compared with Hilary, whom he surpasses in administrative excellence as much as he falls below him in theological ability. Even here, however, his achievements are of no mean order, especially when we remember his juridical training and his comparatively late handling of Biblical and doctrinal subjects. In matters of exegesis he is, like Hilary, an Alexandrian; his chief productions are homiletic commentaries on the early Old Testament narratives, e.g. the Hexaemeron (Creation) and Abraham, some of the Psalms, and the Gospel according to Luke. In dogmatic he follows Basil of Caesarea and other Greek authors, but nevertheless gives a distinctly Western cast to the speculations of which he treats. This is particularly manifest in the weightier emphasis which he lays upon human sin and divine grace, and in the place which he assigns to faith in the individual Christian life. His chief works in this field are De fide ad Gratianum Augustum, De Spiritu Sancto, De incarnationis Dominicae sacramento, De mysteriis. His great spiritual successor, Augustine, whose conversion was helped by Ambrose's sermons, owes more to him than to any

writer except Paul. Ambrose's intense episcopal consciousness furthered the growing doctrine of the Church and its sacerdotal ministry, while the prevalent asceticism of the day, continuing the Stoic and Ciceronian training of his youth, enabled him to promulgate a lofty standard of Christian ethics. Thus we have the De qfficiis ministrorum, De viduis, De virginitate and De paenitenlia.

Ambrose has also left several funeral orations and ninety- one letters, but it is as a hymn-writer that he perhaps deserves most honour. Catching the impulse from Hilary and confirmed in it by the success of Arian psalmody, Ambrose composed several hymns, marked by dignified simplicity, which were not only effective in themselves but served as a fruitful model for later times. We cannot certainly assign to him more than four or five (Deus Creator Omnium, Aeterne rerum conditor, Jam surgit hora tertia, and the Christmas hymn Veni redemptor gentium) of those that have come down to us. Each of these hymns has eight four-line stanzas and is written in strict iambic tetrameter.

On the Ambrosian ritual see Liturgy ; on the Ambrosian library see Libraries; on the church founded by him at Milan in 387 see Milan. Editions: The Benedictine (4 vols., Venice, 1748 ff.); Migne, Patrol. Lat. xiv.-xvii. ; P. A. Ballerini (6 vols., Milan, 1875 ff.). Literature: Th. Forster, Ambrose, B. of Mailand (Halle, 1884), and art. in Herzog-Hauck, Realencyk., where the literature is cited in full; A. Ebert, Gesch. der christUch-latein. Litt. (2nd ed., 1889); O. Bardenhewer, Patrologie (2nd ed., 1891); A. Harnack, Hist, of Dogma, esp. vol. v.; W. Bright, Age of the Fathers. (A. J. G.)

AMBROSE (Andrey Sertis-Kamenskiy) (1708-1771), arch- bishop of Moscow, was born at Nezhine in the government of Chernigov, and studied in the school of St Alexander Nevskiy, where he afterwards became a tutor. At the age of thirty-one he entered a monastery, where he took the name of Ambrose. Subsequently he was appointed archimandrite of the convent of New Jerusalem at Voznesensk. From this post he was trans- ferred as bishop, first to the diocese of Pereyaslav, and afterwards to that of Krusitsy near Moscow, finally becoming archbishop of Moscow in 1761. He was famous not only for his interest in schemes for the alleviation of poverty in Moscow, but also as the founder of new churches and monasteries. A terrible outbreak of plague occurred in Moscow in 1771, and the populace began to throng round an image of the Virgin to which they attributed supernatural healing power. Ambrose, perceiving that this crowding together merely enabled the contagion to spread, had the image secretly removed. The mob, suspecting that he was responsible

for its removal, attacked a monastery to which he had retired, dragged him away from the sanctuary, and, having given

him time to receive the sacrament, strangled him. Ambrose's works include a liturgy and translations from the Fathers.

AMBROSE (Ambroise), AUTPERT (d.- 778), French Bene- dictine monk. He became abbe of St Vincent on the Volturno " in the time of Desiderius, king of the Lombards." He wrote a considerable number of works on the Bible and religious subjects generally. Among these are commentaries on the Apocalypse (see Bibl. Patrum, xiii. 403), on the Psalms, on the Song of Solomon; Lives of SS. Paldo, Tuto and Vaso (according to Mabillon); Assumption of the Virgin; Combat between the Virtues and the Vices.

See Mabillon, Acta sand. Bolland. III. ii. 259, 266 ; Georg Lommel, Der ostfrankische Reformator Ambrosius (Giessen, 1847) ' Bollandist Bibl. hag. lat. (1898), 61.

AMBROSE, ISAAC (1604-1663/4), English Puritan divine, was the son of Richard Ambrose, vicar of Ormskirk, and was probably descended from the Ambroses of Lowick in Furness, a well-known Catholic family; He entered Brazeriose College, Oxford, in 1621, in his seventeenth year. Having graduated B.A. in 1624 and been ordained, he received in 1627 the little cure of Castleton in Derbyshire. By the influence of William Russell, earl of Bedford, he was appointed one of the king's itinerant preachers in Lancashire, and after living for a time in Garstang, he was selected by the Lady Margaret Hoghton as vicar of Preston. He associated himself with Presbyterianism, and was on the celebrated committee for the ejection of " scandalous and ignorant ministers and schoolmasters " during the Commonwealth. So long as Ambrose continued at Preston he was favoured with the warm friendship of the Hoghton family, their ancestral woods and the tower near Blackburn affording him sequestered places for those devout meditations and " experiences " that give such a charm to his diary, portions of which are quoted in his Prima Media and Ultima (1650, 1659). The immense auditory of his sermon {Redeeming the Time) at the funeral of Lady Hoghton was long a living tradition all over the county. On account of the feeling engendered by the civil war Ambrose left his great church of Preston in 1654, and became minister of Garstang, whence,

however, in 1662 he was ejected with the two thousand ministers who refused to conform. His after years were passed among old friends and in quiet meditation at Preston. He died of apoplexy about the 20th of January 1663/4. As a religious writer Ambrose has a vividness and freshness of imagination possessed by scarcely any of the Puritan Nonconformists. Many who have no love for Puritan doctrine, nor sympathy with Puritan experience, have appreciated the pathos and beauty of his writings, and his Looking to Jesus long held its own in popular appreciation with the writings of John Bunyan.

AMBROSE THE CAMALDULIAN, the common name of Ambrogio Traversari (1386-1439), French ecclesiastic, born near Florence at the village of Portico. At the age of fourteen he entered the Camaldulian Order in the monastery of Sta Maria degli Angeli, and rapidly became a leading theologian and Hellenist. In Greek literature his master was Emmanuel Chrysoloras. He became general of the order in 143 1, and was a leading advocate of the papacy. This attitude he showed clearly when he attended the council of Basel as legate of Eugenius IV. So strong was his hostility to some of the delegates that he described Basel as a western Babylon. He likewise supported the pope at Ferrara and Florence, and worked hard in the attempt to reconcile the Eastern and Western Churches. Though this cause was unsuccessful, Ambrose is interesting as typical of the new humanism which was growing up within the church. Voigt says that he was the first monk in Florence in whom the love of letters and art became predominant over his ecclesiastical views. Thus while among his own colleagues he seemed merely a hypocritical and arrogant priest, in his re- lations with his brother humanists, such as Cosimo de Medici, he appeared as the student of classical antiquities and especially of Greek theological authors. His chief works are: — Hodoeporicon, an account of a journey taken by the pope's command, during which he visited the monasteries of Italy; a translation of

Palladius' Life 0) Ghrysostom; of Nineteen Sermons ■of Epkraem Syrus;oi the Book of St Basil on Virginity. A number of MSS. remain in the library of St Mark at Venice. He died on the 20th of October 1439.

See G. Voigt, Die Wiederbelebung des klass. Altertums ,(2 vols., 3rd ed., 1893); his Epistolae were published by Cannato (Florence, 1759) with a life by Mehus; Bollandist Bibl. hag. lat. (1898), 63; A. Masius, tlber die Stellung des Kamald-ulensers Ambrogio Ttaversari zum Papst Eugen IV. und zum Busier Konzil (Dobeln, 1888);

Savigny, Geschichte rom. Rechts,.Mittel. (1850), vi. 422-424.

AMBROSIA, in ancient mythology, sometimes the food, sometimes the drink of the gods. The word has generally been derived from Gr. &-, hat, and ju/3poros, mortal; hence the. food or drink of the immortals. A. W. Verrall, however, denies that there is any clear example in which the word dˆSpoatos necessarily means "immortal," and prefers to explain it as "fragrant," a sense which is always suitable; cf. W. Leaf, Iliad (2nd ed.), on the phrase afifipanos vwpos (ii. 18): If so, the word may he derived from the Semitic ambar (ambergris) to which Eastern nations attribute miraculous properties. W. H. Roscher thinks that both nectar and ambrosia were kinds of honey, in which case their power of conferring immor- tality would be due to the supposed healing and cleansing power of honey (see further Nectar) . Derivatively the word A mbrosia (neut. plur.) was given to certain festivals in honour of Dionysus, probably because of the predominance of feasting in connexion with them.*

The name Ambrosia was also applied by Dioscorides and Pliny to certain herbs, and has been retained in modern botany for a genus of plants from which it has been extended to the group of dicotyledons called Ambrosiaceae, including Ambrosia, Xanthium and Iva, all annual herbaceous plants represented in America. Ambrosia maritima and some other species occur also in the Mediterranean region.

There is also an American beetle, the Ambrosia beetle, be- longing to the family of Stolytidae, which derives its name from its curious cultivation of a succulent fungus, called ambrosia. Ambrosia beetles bore deep though minute galleries into trees and timber, and the wood-dust provides a bed for the growth of the fungus, on which the insects and larvae feed.

AMBROSIANS, the name given to several religious brother- hoods which at various times since the 14th century have sprung up in and around Milan; they have about as much connexion with St Ambrose as the " JefOmites " who were found chiefly in upper Italy and Spain have with their patron saint. Only the oldest of them, the Pratres S. Ambrosii ad Nemus, had any- thing more than a very local significance. This order is known from a bull of Gregory XL addressed to the monks of the church of St Ambrose outside Milan. These monks, it would appear, though under the authority of a prior, had no rule. In response to the request of the archbishop, the pope had commanded them to follow the rule of Augustine and to be known by the above name. They were further to recite the Ambrosian

office. Subsequently the order had a number of independent establish- ments in Italy which were united into one congregation by Eugenius IV., their headquarters being at Milan. Their discipline' afterwards became so slack that an appeal Was made to Cardinal Borromeo asking him to reform their houses. By Sixtus V. the order was amalgamated with the congregation of St Barnabas, but Innocent X. dissolved it in 1650.

The name Ambrosiatts is- also given to a 16th-century Ana- baptist sect, which laid claim to immediate communication with God through the Holy Ghost. Basing their theology upon the words of the Gospel of St John i. 9— " There was the true light which lighteth every man, coming into the world "• — they denied the necessit}' of any priests or ministers to interpret the Bible. Their leader Ambrose went so far as to hold further that the revelation which was vouchsafed to him was a higher authority than the Scriptures. The doctrine of the ■• Ambrosians, who belonged probably to that section of the Anabaptists known as Pneumatici, may be*

See Herzog-Hauck's Realencyklopadie, i. 439.

*AHBROSIASTER. A commentary on St Paul's epistles, " brief in words but weighty in matter," and valuable for the' criticism of the Latin text of the New Testament, was long attributed to St Ambrose. Erasmus in 1527 threw doubt on the accuracy of this ascription, and the author is usually spoken of as Ambrosiaster or pseudo- Ambrose. Owing to the fact that Augustine cites part of the commentary on Romans as by " Sanctus Hilarius " it has been ascribed by various critics at different times to almost every known Hilary. Dom G. Morin (Rev. d' hist et de iitt. religieuses, torn. iv. 97 f.) broke new ground by suggesting in 1890 that the writer was Isaac, a converted Jew, writer o*f a tract on the Trinity and Incarnation, who was exiled to Spain in 378-380 and then relapsed to Judaism, but he after- wards abandoned this theory of the authorship in favour of Decimus Hilarianus Hilarius, proconsul of Africa in 377. With this attribution Professor Alex. Souter, in his Study of Ambrosi- aster (Cambridge Univ. Press, 1905), agrees. There is scarcely anything to be said for the possibility of Ambrose having written the book before he became a bishop, and added to it in later years, incorporating remarks of Hilary of Poitiers on Romans. The best presentation of the case for Ambrose is by P. A. Ballerini in his complete edition of*

that father's works.

In the book cited above Professor Souter also discusses the authorship of the Quaestiones Veteris et Nevi Testamenti, which the MSS. ascribe to Augustine. He concludes, on very thorough philological and other grounds, that this is with one possible slight exception the work of the same " Ambrosiaster." The same conclusion had been arrived at previously by Dom Morin.

AMBROSINI, BARTOLOMEO (1588-1657), Italian naturalist, was born and died at Bologna. He was a pupil of Aldrovandi, several of whose works he published, and whom he succeeded eventually as director of the university botanical garden. He studied at the university, and became successively professor of philosophy, of botany and of medicine; and during the plague of 1630 in Bologna he worked assiduously for the relief of the sufferers. He was the author of several medical works of some importance in their day.

His brother, Giacinto Ambrosini (1605-1672), was a dis- tinguished botanist, who succeeded Bartolomeo as professor of botany and director of the university garden in 1657. He published a catalogue of its plants and also a botanical dictionary.

AMBROSIUS AURELIANUS, leader of the Britons against the Saxons in the 5th century, was, according to the legends preserved in Gildas and the Historia Briltonum, of Roman extraction. There are signs of the existence of two parties in the national opposition to the invaders, but as Pascent, son of Vortigern, is said by Nennius to have held his dominions in the west by leave of Ambrosius, the Roman element seems to have triumphed. Some measure of success appears to have attended the efforts of Ambrosius, and it has been suggested that Amesbury in Wiltshire is connected with Emrys, the Celtic form of his name.

See Bede, Eccl. Hist. (Plummer), i. 16; Nennius, Hist. Britt. § 31 ; Gildas, De excidio Brittarum, § 25; J. Rhys, Celtic Britain (1884), pp. 104, 105, 107.

AMBULANCE (from the Fr. ambulance, formerly hdpital ambulant, derived from the Lat. ambulare, to move about), a term generally applied in England and America to the wagon or other vehicle in which the wounded in battle, or those who have sustained injuries in civil life, are conveyed to hospital. More strictly, in military parlance, the term imports a hospital estab- lishment moving with an army in the field, to provide for the collection, treatment and care of

the wounded on the battlefield, and of the sick, until they can be removed to hospitals of a more stationary character. In 1905-1906 the term " field ambulance " was adopted in the British service to denote this organization, the former division of the ambulance service igto " bearer companies " and " field hospitals " being done away with. The description of the British service given below applies generally to the system in vogue in the army after the experience gained in the South African War of 1899—1902; but in recent years the medical arrangements in connexion with the British army hospitals have been altered in various details, and the I. 26

changes in progress showed no sign of absolute finality. Some of these, however, were rather of nomenclature than of substance, and hardly affect the principles as described below.

The ambulance organization which, variously modified in details, now prevails in all civilized armies, only dates from the last decade of the 18th century. Before that time History, wounded soldiers were either carried to the rear by comrades or left unattended to and exposed until the fighting was over. Surgical assistance did not reach the battlefield till the day after the engagement, or even later; and for many of the wounded it was then too late. In 1792 Baron Dominique Jean Larrey (1 766-1842) of the French army introduced his system of ambulances volanles, or flying field hospitals, capable of moving with speed from place to place, like the " flying artillery " of that time. They were adapted both for giving the necessary primary surgical treatment and for removing the wounded quickly from the sphere of fighting. Napoleon warmly supported Larrey in his efforts in this direction, and the system was soon brought to a high state of efficiency in the Grande Armie. About the same time another distinguished surgeon in the French army, Baron Pierre Francois Percy (1754-1825), organized a corps of brancardiers, or stretcher-bearers. These were soldiers trained and equipped for the duty of collecting the wounded while a battle was in progress, and carrying them to a place of safety, where their wounds and injuries could be attended to. An important step towards the amelioration of the condition of the wounded of armies in the field was the European Convention signed at Geneva in 1864, by the terms conven- of which, subject to certain regulations, not only the tton. wounded themselves but also the official staff of ambu- lances and their equipment were rendered neutral, the forme therefore, not being liable to be retained as prisoners of war, noi the latter to be taken as prize of war. This convention has greatly favoured the development of ambulance establishments, but as all combatants have not the same knowledge of the conditions of this convention, or do not*

interpret them in the same way, charges of treachery and abuse of the Red Cross flag are but too common in modern warfare.

The American Civil War marked the beginning of the modern ambulance system. The main feature, however, of the hospital organization throughout that war was the railway hospital service, which provided for the rapid conveyance of the sick and wounded to the rear of the contending armies. Hospital carriages, equipped with medical stores and appliances, for the transport of cases from the front to the base, were rapidly introduced into other armies, and played a great part in the ambulance service of the Franco-German War.

The German hospital service as existing at the time of the Franco-German War of 1870-71 was modified and extended by the Kriegs Sanilats Ordnung of 1878 and the Kriegs • Etappen Ordnung of 1887, which completed the organ- system. ization by the addition in time of war of numerous subordinate offices and departments. The main divisions of the ambulance organization of the German army in the field fall into: (1) sanitary detachments, (2) field hospitals, (3) flying hospitals, (4) hospital reserve depots, (5) " committees for the transport of the sick," and (6) railway hospital trains. The whole administra- tion of the ambulance service of the grand army in the field is in the hands of the chief of the ambulance sanitary staff, who is attached to headquarters. Next in command come surgeons-general of armies in the field, surgeons-general of army corps, and under them again surgeons-in-chief of divisions and regiments; Civil consulting surgeons of eminence, and professors from the universities, are also attached to the various armies and divisions to co-operate with and act as advisers to the surgeons of the standing military surgical staff. The hospital transport service on the lines of communication is highly organized and the hospital railway carriages are elaborately equipped. The French ambulance system, finally settled by the system. reglement of 1884, is organized on almost identical lines with the German; one of the principal peculiarities of the former being the ambulances volantes already referred to. The pease?

Japanese system.

organization of the German and French systems does not materi- ally differ from that of the British service.

In the Japanese army a special feature is the sanitary corps, whose duty is the prevention of disease among the troops; it

has been brought to a great pitch of perfection, with

the result that in the Russo-Japanese War (1904-1905)

the immunity of the troops from all forms of prevent- able disease surpassed all previous experience. Not only was the army accompanied by sanitary experts who advised on all questions of camping grounds, water supply, &c, but before the war began the Intelligence Department collected information as to the diseases of the country likely to be the scene of operations, unhealthy places to be avoided, and precautions to be taken.

Coming now to the ambulance system of the British army, in which are comprised the arrangements and organization of the

medical department for the care and treatment of army tne s ‘ c ˆ an ˆ w ˚unded from the time they are injured

system. or taken ill, till they are able to return to duty or are

invalided home, we will trace the progress of a wounded man from the field of battle to his home; remembering that, as British troops are usually engaged overseas, hospital ships as well as land transport are necessary.

When a soldier falls wounded in action he is attended by the regimental surgeon and stretcher-bearers, who apply some First field extemporized method of stopping bleeding and dress dressing, the wounds with the ” first field dressing ” — a packet

of antiseptic material which every officer and man on active service carries stitched to some part of his clothing, and which contains everything necessary for dressing an ordi- nary gunshot wound. Recent wars have demonstrated that in all uncomplicated cases it is better to leave this dressing undisturbed, as the wounds made by modern projectiles heal up at once if left alone, if air and dirt have been thus excluded. From the field he is carried on a stretcher by bearers (formerly of the ” Bearer Companies “) of the Royal Army Medical Corps … to the collecting station, where he is placed on an station. ambulance wagon of the first line of assistance and

taken to the dressing station. Here his wound will be examined if considered necessary, but as on the field the first medical officer who examined him has already attached a " specification tally " to the patient, giving particulars of the wound, it will probably not be disturbed unless complicated by bleeding, splintering of bone or some other condition requiring interference. Any operation, however, which is urgently called for will be here performed, nourishment, stimulants and opiates administered if required, and the patient moved to the field hospital in an ambulance wagon of the second line of assistance. From the field hospital he is transferred as soon as possible by the ambulance train to the general hospital at the advanced base of operations, and from there in due time in another train to the base of operations at the coast, from which he is ultimately either returned to duty or sent home in a hospital ship. The organiza- tion by which these requirements are fulfilled is the following : — Every regiment and fighting unit has posted to it, on proceeding on active service, a medical officer who looks after the health of the men and advises the commanding officer on sanitary matters. Regl- When the regiment goes into action he takes command

mental of the regimental stretcher-bearers who, to the number arrange- { tw0 p er com p anV) have been in peace time instructed

in first aid and in the carrying of the wounded on stretchers. These men leave their arms behind and wear the Red Cross armlets, to indicate their non-combatant functions, but in these days, when a battle is often fought at long ranges, it is not to be wondered at, or attributed to disregard of the red cross flag by the enemy, if medical officers and stretcher-bearers are hit. The bearer company into whose charge the wounded man next passes is composed of men of the Royal Army Medical Corps, with a detachment of the Army Service Corps for transport duties. In future, bearer sections of the Field Ambulances will perform the duties of the bearer company. Its function is to collect and succour the wounded on the battlefield and to hand them over to the field hospitals, with which these bearer com-

panies are closely associated, though separately organized. In the Indian army the bearer company is provided from the personnel of the field hospital when there is a battle, and reverts to the hospital again after it is over. The war in South Africa of 1899- 1902 clearly demonstrated the superiority of the Indian plan; for after the action the bearer company staff should be available to give the much-needed help in the field hospital, and some amalgamation of the two organizations, or something after the plan of the ambulance volante

of the French, is necessary. The bearers afford the wounded any treatment required, supply water and sedatives, and then carry them back on stretchers to the collecting station in the rear, whence they are conveyed to the dressing station in the wagons or other form of transport.

At the dressing station, which ought to be out of range of the firing, and should have a good water supply, the patient is made as comfortable as possible, nourishment and stimulants are administered, and he is then taken to the field hospital. In times of great stress, when it is desirable to remove the wounded quickly from the field, and there are no roads or wheeled trans- port is not available, large numbers of bearers are employed to carry them on stretchers, &c. These men are engaged locally and are soon given the slight training necessary. This was done in Natal after the battles on the Tugela (1899), in which there were some thousands of wounded to be conveyed; also in Egypt, where the local troops not required for the fighting line were requisitioned; the Japanese in Mongolia employed hundreds of Chinese coolies for this purpose, the general use of sedan-chairs in China having accustomed the poorer class of natives to this kind of labour. In India, the rank and file of the Royal Army Medical Corps not being employed, the bearer work is carried out by natives specially enlisted and bearers. organized into a corps. These men are bearers by caste — a reminiscence of the system which prevailed generally a hundred years ago, and is still met with in out-of-the-way places, of conveyance of travellers in dhoolies, which are closed wooder carriages fixed on long poles and carried on men's shoulders. The bearers convey the wounded in dandies, similar to dhoolies, but made mostly of canvas, so that they are much lighter. The courage of these bearers on the battlefield has often been praised. The old bearer caste is, however, rapidly dying out owing to the general discontinuance of the use of dhoolies. Thus the ambulance organization in India is entirely different from that in other parts of the British empire. The rank and file of the Royal Army Medical Corps are not employed there, although the medical officers are. The warrant and non-commissioned ranks are re- placed by a most useful body of men of Anglo-Indian or Eurasian (half caste) birth, called the Subordinate Medical Department, the members of which, now called assistant surgeons (formerly apothecaries), receive a three years' training in medical work at the Indian medical schools and are competent to perform the compounding of medicines and to deal with all but the most serious cases of injury and illness. In the hospitals the men of the Royal Army Medical Corps are replaced by the Native Army Hospital

Corps, subdivided into ward-servants, cooks, water- carriers, sweepers and washermen. The caste system necessitates this division of labour, and the men are not so efficient or trust- worthy as the white soldiers whose places they take. The bearers of the wounded are a separate and distinct class, partly attached to regiments, &c, as part of the regimental transport, and partly organized into bearer companies, attached to field hospitals. The dandies in which they carry the wounded are much more comfortable than stretchers, being fitted with roofs and sides of canvas to keep off sun and rain, thus being collapsible so that the dandy is quite flat when not in use. Still they are heavy, clumsy, and cannot be folded up into a small compass for trans- port like a stretcher; they also take up a good deal of room in wagons and can scarcely be carried on the backs of animals owing to the length of the pole. Hence riding ponies and mules are much used in Indian warfare, especially in the mountains, for the carriage of less seriously wounded men. In India separate hospitals are necessary for white and native troops, and the latter have accommodation for the large numbers of non-combatant

camp-followers, mule-drivers, cooks, officers' servants, &c, &c, which constitute one of the most remarkable features of the Indian army organization.

Field hospitals, under the new scheme furnished by tent sections of the Field Ambulances, are each supposed to provide

accommodation for 100 patients, who live on their field hospitals, rations suitably cooked and supplemented by various

medical comforts. The patients are not supplied with hospital clothing, nor do they have beds, but lie on straw, which is spread on the ground and covered with waterproof sheets and blankets; of these latter a considerable reserve is carried. These hospitals can and must at times accommodate more than the regulation number of patients, but in the South African War their resources were at times considerably overtaxed, with consequent discomfort and hardship to the patients, the medical equipment proving insufficient for unexpectedly heavy calls upon its resources. These hospitals are supposed to move with the army, and therefore it is imperative to pass the wounded quickly back from these to the stationary hospitals on the lines Hospitals ° communication (which vary according to the*

length on the of these lines) and thence to the general hospitals at Hoes of the base. The size of the lines of communication commuoi- h. 0S pit a i s varies according to circumstances, and they

are as a rule " dieted," that is to say, proper hospital diets and not field rations are issued to the patients, who also are supplied with beds and proper hospital clothing. In these hospitals also there may be nursing sisters, who of course are unsuited for the rough work and life nearer the front. Sisters are also employed on the hospital trains, which were found most useful and brought to great perfection in the South African War, being fitted with beds, kitchens, dispensaries, &c, so that patients were moved long distances in comfort.

Arrived at the base of operations the wounded are admitted to the general hospitals, of which the numbers and situation

vary with circumstances, but each is supposed to hospHais. nave an officers' ward. In the South African War,

owing to the inability of the comparatively small Royal Army Medical Corps to meet all the requirements of the enormous force which was ultimately employed, many of the doctors were drawn from the civil profession, and the rank and file from the St John's Ambulance Association and the Volunteer Medical Staff Corps, while many nursing sisters belonged to the Army Nursing Reserve, ordinarily employed in civil hospitals but liable to be drafted out during war. In the South African War the patriotism and liberality of the British public furnished several large general hospitals, perfectly equipped, and officered by some of the most eminent members of the medical profession

in the United Kingdom. Among others may be men- zeneral tioned the Princess Christian, the Imperial Yeomanry hospitals, (both field and general hospitals), the Langman, the

Portland, the Scottish, Irish and Welsh hospitals. These were staffed entirely by civilians, except that an officer of the Royal Army Medical Corps was attached to each as administrator and organizer; and their personnel was made up of physicians, surgeons, nurses, dressers (medical students and in some cases fully qualified surgeons) and servants; the numbers, of course, varying with the size of the hospitals. In addition to the staff of these hospitals several eminent civil surgeons, including Sir William MacCormac and Sir F. Treves, went out to the seat of war as consultants: an innovation in the British service, but in accordance with the system long in vogue

in Germany.

To the Army Medical organization is affiliated in war time that of the Red Cross Society and other charitable associations, which during the South African War aided the Army Medical Service greatly by gifts of clothing, money and numerous luxuries for the sick and wounded.

Lastly, the wounded man is transferred to a hospital ship, which is fitted up with comfortable swinging cots in airy wards,

with refrigerators for preserving provisions and the

supply of ice, punkahs for hot weather, &c. Each

division of an army corps is supposed to have one such ship, with from 200 to 250 beds and the same staff of doctors,

Hospital ships.

nurses, &c, as a hospital of similar size on shore, when necessary.

*Different regulations are made by various powers as to the work of the Red Cross societies under the Geneva flag. Whereas in Germany and France such aid is officially recognized and placed under direct military control, the English Pieties** Red Cross societies have acted side by side with, but independently of, the military ambulance organization. In the South African War (1899-1902), however, the bonds of union were drawn considerably closer, and cordial co-operation was brought about to prevent overlapping and waste of money. In Germany the volunteer organization is presided over by an imperial commission or inspector-general appointed in peace time, who in time of war is attached to the headquarters staff. His functions are to control the relations of the various Red Cross societies and secure harmonious co-operation. Delegates appointed by him are attached to the various corps and transport commissions. No volunteer assistance can be utilized which is not entirely subordinate to the military control, and has not already in peace time received official recognition and been organized on a skeleton footing. Moreover, only persons of German nationality can be employed under it with the armies in the field. In case of base hospitals situated in Germany itself, the services of foreigners may be employed when specially authorized by the war office. In France, in the main, the same rules obtain in the case of volunteer hospital service.*

*Great attention has been paid to civil ambulance organization in England. In 1878 the British ambulance association of St John of Jerusalem was founded. Its object was to st. John's render first aid to persons injured in accidents on the Ambulance road, railway, or in any of the occupations of civil life. * s socia- , As the result of the initiative taken by this society, ambulance corps have been formed in most large towns of the United Kingdom; and police, railway servants and workmen have been instructed how to render first aid pending the arrival of a doctor. This Samaritan work has been further developed and extended to most parts of the British empire, notably Canada, Australia and India, and there is no doubt that many lives are saved annually by the knowledge, diffused by this' association, as to how to stop bleeding, resuscitate the apparently drowned, &c. Moreover, during the South African War this association provided a most valuable reserve for the Royal Army Medical Corps, and drafted out some hundreds of partially trained men whose assistance was most valuable to the Army Medical Service in dealing with the enormous numbers of sick and wounded who came upon their hands.*

In America each city has its own system and organization of civil ambulance service. In some, as in Boston, the service is worked by the police; in others, notably New York, civil by the hospitals, while Chicago has an admirable ambu- service under municipal control. In most of the , V ,ce J. a capitals of Europe similar systems prevail.

British ambulance wagons are built very strongly to stand rough roads, and are of several patterns; those used in the war in South Africa were reported on as heavy, uncomfort- able, and so unwieldy as to be incapable very often of umce' keeping up with the troops; but a new and more wagons. mobile vehicle, to convey four patients lying down as well as six seated, or fourteen all seated (whereas the old pattern wagons only accommodated two lying-down cases), has been introduced. All patterns of wagons weigh from 17J to i8| cwt., while the Boers and the British Colonial auxiliaries used much lighter Carts, which were taken at a gallop over almost any country. The Indian ambulances are small two-wheeled carts, called tongas, drawn by two bullocks or mules; very strongly made, they are capable of holding two men lying down, or four sitting up, besides the native driver.

Various other forms of transport are found, such as mule litters in mountainous districts, where wheeled carriages cannot go, camel litters in the Sudan, dhoolies in India, hammocks on the west coast of Africa, or sedan-chairs in China. In the Russo- Japanese War an

ingenious form of mule litter for serious cases

Mobiliza tlon.

was made by fixing the ends of two long springy poles about 1 5 ft. long into each side of the pack saddles of two mules, one in front of the other, so as to support a bed for the patient between them; the length and resiliency Qf the poles prevented jolting of the wounded man, and the mules were able to carry him long distances over any kind of ground. The ordinary mule or camel litter provides for a wounded man (lying down) being carried on a sort of stretcher on. either side of the animal, or in cacolets in which the less serious cases are slung in seats (one on each side of the animal), sitting up.

In Great Britain, the material and equipment required are stored in times of peace at the various headquarters stations and carefully examined twice a year; and on orders for mobilization being issued, the doctors and various ranks of attendants, who have previously been told off to each unit, repair to the allotted station, draw the equip- ment and transport, and embark with the brigade to which they are attached. The tendency of the present day is towards reduction in bulk and concentration of strength of drugs, points which simplify the question of transport of ambulance material. As the fighting man can carry concentrated nourish- ment enough for thirty-six hours, in the form of an emergency ration, in a tin the size of an ordinary cigar-case, and enough sweetening material in the form of saccharine to last a fortnight in a bottle smaller than an ordinary watch, so the medical department can take their drugs in the form of compressed tabloids, each the correct dose, and each occupying about one- tenth of the space the drug ordinarily would ; while the medical officers can carry hypodermic cases, not so large as an ordinary cigarette-case, containing a syringe and hundreds of doses of highly concentrated remedies. Again, the traction engines which now accompany an army can also supply electricity for X-ray work, electric-lighting, ice-making, &c. (J. R. D.)

AMBULATORY (Med. Lat. ambulatorium, a place for walking, from ambulare, to walk), the covered passage round a cloister; a term applied sometimes to the procession way round the east end of a cathedral or large church and behind the high altar. AMBUSH (older form, " embush," O. Fr. embusche, from the Ital. imboscata, in and

bosco, a wood), the hiding of troops, primarily in a wood, and so any concealment for the purpose of

AMEDEO FERDINANDO MARIA DI SAVOIA, duke of Aosta (1845-1890), third son of Victor Emmanuel II., king of Italy, and of Adelaide, archduchess of Austria, was born at Turin on the 30th of May 1845. Entering the army as captain in 1859 he fought through the campaign of 1866 with the rank of major-general, leading his brigade into action at Custozza and being wounded at Monte Torre. In May 1867 he married the princess Maria Carlotta del Pozzo della Cisterna. In 1868 he was created vice-admiral of the Italian navy, but, two years later, left Italy to ascend the Spanish throne, his reluctance to accept the invitation of the Cortes having been overridden by the Italian cabinet. On the 16th of November 1870 he was pro- claimed king of Spain by the Cortes; but, before he could arrive at Madrid, Marshal Prim, chief promoter of his candidature, was assassinated. Undeterred by rumours of a plot against his own life, Amedeo entered Madrid alone, riding at some distance from his suite to the church where Marshal Prim's body lay in state. His efforts as constitutional king were paralysed by the rivalry between the various Spanish factions, but with the approval of his father he rejected all idea of a coup d'ttat. Though warned of a plot against his life (August 18, 1872) he refused to take precautions, and, while returning from Buen- Retiro to Madrid in company with the queen, was repeatedly shot at in Via Avenal. The royal carriage was struck by several revolver and rifle bullets, the horses wounded, but its occupants escaped unhurt. A period of calm followed the outrage. On the nth of February 1873, however, Amedeo, abandoned by his partisans and attacked more fiercely than ever by his opponents, signed his abdication. Upon returning to Italy he was cordially welcomed and reinstated in his former position. His consort, whose health had been undermined by anxiety in Spain, died on

the 3rd of November 1876. Not until the nth of September 1888 did Amedeo contract his second marriage, with his niece Princess Letitia Bonaparte. Less than two years later (Janr uary 18,1890) he died at Turin in the arms of his elder brother, King Humbert I., leaving four children — the duke of Aosta, the count of Turin, the duke of the Abruzzi (issue of his first mar- riage), and the count of Salemi. (H. W. S.)

AMELIE-LES-BAINS, a watering-place of south-western France, in the department of Pyrenees-Orientales, at the junction of the Mondony with the Tech, 28§ m. S.S.W. of Perpignan by rail. Pop. (1906) 1247. It has numerous sulphur springs (68°-i4S° F.) used as

baths by sufferers from rheumatism and maladies of the lungs. The town is situated at a height of 770 ft. and has both a winter and summer season. There are two bathing establishments, one of which preserves remains of Roman baths, and a large military thermal hospital. The town, formerly called Arles-les-Bains, is named after Queen Amelia; wife of Louis Philippe.

AMELOT DE LA HQUSSAYE, ABRAHAM NICOLAS (1634- 1706), French historian and publicist, was born at Orleans in February 1634, and died at Paris on the 8th of December 1706. Little is known of his personal history beyond the fact that he was secretary to an embassy from the French court to the republic of Venice. In his Histoire du gouvemementde Venise he undertook to explain, and above all to criticize, the administra- tion of that republic, and to expose the causes of its decadence. The work was printed by the king's printer and dedicated to Louvois, which points to the probability that the government did not disapprove of it. It appeared in March 1676, and pro- voked a warm protest from the Venetian ambassador, , Gius- tiniani. The author was sent to the Bastille, where he remained, however, only six weeks (Archives de la Bastille, vol. viii. pp. 93 and 94) . A second edition with a supplement, published immedi- ately after, drew forth fresh protestations, and the edition was suppressed. This persecution gave the book an extraordinary vogue, and it passed through twenty-two editions in three years, besides being translated into several languages; there is an English translation by Lord Falconbridge, son-in-law of Oliver Cromwell. Amelot next published in 1683 a translation of Fra Paolo Sarpi's History of the Council of Trent. This work, and especially certain notes added by the translator, gave great offence to the advocates of unlimited papal authority, and three separate memorials were presented asking for its repression. Under the pseudonym of La Motte Josseval, Amelot subsequently published a Discours politique sur Tacite, in which he analysed the character of Tiberius.

AMEN, a Hebrew word, of which the root meaning is "stability," .generally adopted in Christian worship as a concluding formula for prayers and hymns. Three distinct biblical usages may be noted, (a) Initial Amen, referring back to words of another speaker, e.g. 1 Kings i. 36; Rev. xxii. 20. (b) Detached Amen, the complementary sentence being suppressed, e.g. Neh. v. 13; Rev. v. 14 (cf. 1 Cor. xiv. 16). (c) Final Amen, with no change of speaker, as in the subscription to the first three divisions of the Psalter and in the frequent doxologies of the New Testament Epistles. The uses of amen (" verily ") in the Gospels form a peculiar class; they are initial, but

often lack any backward reference. Jesus used the word to affirm his own utterances, not those of another person, and this usage was adopted by the church. The liturgical use of the word in apostolic times is attested by the passage from 1 Cor. cited above, and Justin Martyr (c. a.d. 150) describes the congregation as responding " amen " to the benediction after the celebration of the Eucharist. Its introduction into the baptismal formula (in the Greek Church it is pronounced after the name of each person of the Trinity) is probably later. Among certain Gnostic sects Amen became the name of an angel, and in post-biblical Jewish works exaggerated statements are multiplied as to the right method and the bliss of pronouncing it. It is still used in the service of the synagogue, and the Mahommedans not only add it, after reciting the first Sura of the Koran, but also when writing letters, &c, and repeat it three times, often with the word QitrUir, as a kind of ˆtalisman.

AMENDMENT— AMERICA

*a©-**

AMENDMENT (through the 0. Fr. amender, to correct, from Lat. mendum, a fault); an improvement, correction or alteration (nominally at least) for the better. The word is used either of moral character or, more especially, in connexion with " amend- ing "a bill or motion in parliament or resolution at a meeting; and in law it signifies the correction of any defect or error in the record of a civil action or on a criminal indictment. All written constitutions also usually contain a clause providing for the method by which they may be amended. Another noun, in the plural form of " amends," is restricted in its meaning to that of the penalty paid for a fault or wrong committed. In its French form the amende, or amende honorable, once a public confession and apology when the offender passed to the seat of justice barefoot and bareheaded, now signifies in the English phrase a spontaneous and satisfactory rectification of an error.

AMENTIFEBAE, or Amentaceae, a name which has been used to include in one class several natural orders of plants which bear their flowers in catkins {amenta). They are trees and shrubs chiefly of temperate climates, and include many common British trees. It comprised the following orders: — Salicaceae, willows and poplars; Corylaceae, hazel, hornbeam; Betulaceae, birch, alder; Fagaceae, oak, beech, v chestnut; Casuarinaceae, Casuarina (beef wood); Platanaceae, plane; Juglandaceae, walnut; Myricaceae, bog myrtle. This class is not retained in the most modern systems of

classification.

AMERCEMENT, or Amerciament (derived, through the Fr. a merci, from Lat. merces, pay), in English law, an arbitrary pecuniary penalty, inflicted in old days on an offender by the peers or equals of the party amerced. The word has in modern times become practically a poetical synonym for fine or de- privation. But an amercement differed from a fixed fine, prescribed by statute, by reason of its arbitrary nature; it represented a commutation of a sentence of forfeiture of goods, while a fine was originally a composition agreed upon between the judge and the prisoner to avoid imprisonment. The fixing or assessment of an amercement was termed an affeerment. In the lower courts the amercement was offered by a jury of the offender's neighbours (afeerors); in the superior courts by the coroner, except in the case of officers of the court, when the amount was affeered by the judges themselves. All judgments were entered on the court roll as " in mercy " (sit in misericordia), and the word misericordia, or some contracted form of it, Was written on the margin. Articles twenty to twenty-two of Magna Carta regulated the assessment of amercements,

See Stephen, History of Criminal Law; Pollock and Maitland, History of English Law, VV. S, McKechnie, Magna Carta (1905).

AMERIA (mod. A melia) , a city of Umbria, situated about 65 m. N. of Rome on the Via Amerina (which approached it from the S. starting from Falerii and passing through Castellum Amerinum, probably mod. Orte, where it crossed the Tiber). It has a fine position, 1332 ft. above sea-level, and still retains considerable remains of the city wall, built in polygonal masonry of carefully jointed blocks of limestone, some 12 ft. in total thickness, and showing traces of reconstruction at different periods. ; Various remains of the Roman period exist between the walls, including a large water reservoir divided into ten chambers. The lofty campanile of the cathedral was erected in 1050 with fragments of Roman buildings. Ameria is not mentioned in the history of the Roman conquest of Umbria, but is alluded to as a flourish- ing place, with a fertile territory extending to the Tiber, by Cicero in his speech in defence of Sextus Roscius Amerinus, and its fruit is often extolled by Roman writers. Augustus divided its lands among his veterans, but did not plant a colony here. The bishopric of Ameria was founded in the middle of the 4th century.

AMERICA. I. Physical Geography. — The accidental use of a single name, America, for the pair of continents that has a greater

extension from north to south than any other continuous land area of the globe, has had some recent justification, since the small body of geological opinion has turned in favour of the theory of the tetrahedral deformation of the earth's crust as affording explanation of the grouping of continents and oceans. America,

broadening in the north as if to span the oceans by teaching to its neighbours on the east and west, tapering between vast oceans far to the south where the nearest land is in the little-known Antarctic regions, roughly presents the triangular outline that is to be expected Jrom tetrahedral warping; and although greatly broken in the middle, and standing with the northern and southern parts out of a meridian line, America is nevertheless the best witness among the continents of to-day to the tetrahedral theory. There seems to be, however, not a unity but a duality in its plan of construction, for the two parts, North and South America, resemble each other not only in outline but, roughly speaking, in geological evolution also; and the resemblances thus discovered are the more remarkable when it is considered how extremely small is the probability that among all the possible combinations of ancient mountain systems, modem mountain systems and plains, two continents out of five should present so many points of correspondence. Thus regarded, it becomes reasonable to suppose that North and South America have in a broad way been developed under a succession of somewhat similar strains in the earth's crust, and that they are, in so far, favourable witnesses to the theory that there is something individual in the plan of continental growth. The chief points of correspondence between these two great land masses, besides the southward taper- ing, are as follows :—(1) The areas of ancient fundamental rocks of the north-east (Laurehtian highlands of North America, uplands of Guiana in South America) , which have remained Without signi- ficant deformation, although suffering various oscillations of level, since ancient geological times; (2) the highlands of the south- east (Appalachians 'and Brazilian highlands) with a north-east south-west crystalline axis near the ocean, followed by a belt of de- formed and metamorphosed early Palaeozoic strata, and adjoined farther inland by a dissected plateau of nearly horizontal later Palaeozoic formations— all greatly denuded since the ancient de- formation of the mountain axis, and seeming to owe their present altitude to broad uplifts of comparatively modern geological date ; (3) the complex of younger mountains along the western side>f the continents (Western highlands, or Cordilleras, of North America; Andean Cordilleras of South America) of geologically modern deformation and upheaval, with enclosed basins and abundant*

volcanic action, but each a system in itself, disconnected and not standing in alignment; (4) confluent lower lands between the highlands, giving river drainage to the north (Mackenzie, Orinoco), east (St Lawrence, Amazon), and south (Mississippi, La Plata). Differences of dimension and detail are numerous, but they do not suffice to mask what seems to be a resemblance in general plan. Indeed, some of the chief contrasts of the two con- tinents arise not so much from geological unlikeness as from their unsymmetrical situation with respect to the equator, whereby the northern one lies mostly in the temperate zone, while the southern one lies mostly in the torrid zone. North America is bathed in frigid waters around its broad northern shores; its mountain's bear huge glaciers in the north-west; the outlying area of Green- land in the north-east is shrouded with ice; and in geologically recent times a vast ice-sheet has spread over its north-eastern third; while warm waters bring corals to its southern shores. South America has warm waters and corals on the north-east, and cold waters and glaciers only on its narrowing southern end. If the symmetry : that is so noticeable in geological history had extended to climate as well, many geographical features might now present likenesses instead of contrasts.

The relation of the Americas to each other and to the rest of the world, as the home of plants and animals, is greatly affected by the breadth of the adjacent oceans, and also by the geologically recent changes of altitude whereby the breadth of the narrowerparts of the lands and the oceans has been significantly altered. Between the parallels of 6o° and 70° N. the east and west widening of North America forms more than a third of the almost continuous land ring around a zone of sub- Arctic climate, through the middle of which runs the Arctic circle. As a result there is a remarkable community of resemblance of plant and animal life in the high northern latitudes of North America and Eurasia. In strong contrast with this relation of close fellowship is the exceptional

isolation of far southern South America. Excepting the barren lands of the Antarctic regions, with which Patagonia is somewhat associated by a broken string of islands, the nearest continental lands of a more habitable kind are South Africa and New Zealand., In contrast to the sub-Arctic land ring, here is a sub-Antarctic ocean

ring, and as a result the land flora and fauna of South America today are strongly unlike the life forms of the other south-ending continents.

For further treatment of the physical geography of the American continents, see North America, South America.

(W. M. D.)

II. General Historical Sketch. — The name America was derived from that of Amerigo Vespucci (q.v.). In Waldseemuller's map of 1507 the name is given to a body of land roughly corresponding to the continent of South America. As discovery revealed the existence of another vast domain to the north, the name spread to the whole of the pair of continents by customary use, in spite of the protests of the Spaniards, by whom it was not officially used of North America till the 18th century.

The discovery of America is justly dated on the 12th (N.S. 21st) of October 1492, when Christopher Columbus (q.v.), the Genoese, made his landfall on the island of Guanahani, now identified with Watling Island in the Bahamas. In the 10th and nth centuries Norse sea-rovers, starting from Iceland, had made small settle- ments in Greenland and had pushed as far as the coast of New England (or possibly Nova Scotia) in transient visits (see Vinland and Leif Ericsson). But the Greenland colony was obscure, the country was believed to form part of Europe, and the records of the farther explorations were contained in sagas which were only rediscovered by modern scholarship. Throughout the middle ages, legendary tales of mythical lands lying in the western ocean — the Isle of St Brandan, of Brazil and Antilia — had been handed down. Scholars, guessing from isolated passages in classic writers, or arguing on general principles, had held that the " Indies " could be reached by sailing due west. But the venture was beyond the resources of the ships and the seamanship of the time. The opinions of scholars, and the fantasies of poets, became an enthusiastic belief in the mind of Columbus. After many disappointments he persuaded the Catholic sovereigns Ferdinand and Isabella of Spain to furnish him with a squadron of three small vessels. With it he sailed from Palos in Andalusia on the 3rd of August 1492, reached Guanahani on the 12th of October, touched on the coast of Cuba and Hispaniola, established a small post on the latter, and returned to Lisbon on the 4th of March 1493, and thence to Spain.

It was the belief of Columbus and his contemporaries that he had

reached the islands described by Marco Polo as forming the eastern extremity of Asia. Hence he spoke of the " Indies," and " las Indias " continued to be the official name given to their American possessions by the Spaniards for many generations. His feat produced a diplomatic controversy with Portugal which was destined to have important political consequences. In 1454 Pope Nicholas V. had given the Portuguese the exclusive right of exploration and conquest on the road to the Indies. His bull contemplated only the use of the route by the coast of Africa to the south and east. In 1488 the Portuguese Bartholomeu Diaz had rounded the Cape of Good Hope. After the return of Columbus and his supposed demonstration that the Indies could be reached by sailing west, disputes might obviously arise be- tween the two powers as to their respective " spheres of influ- ence." The Catholic sovereigns applied to Pope Alexander VI., a Spaniard, for a confirmation of their rights. The pope drew a line from north to south one hundred leagues west of the Azores and Cape Verde Islands, and gave the Spaniards the claim to all to the west (May 4, 1493). The Portuguese thought the division unfair to them, and protested. A conference was held between the two powers at Tordesillas in 1494, and by common consent the line was shifted to three hundred and seventy leagues west of the Cape Verde Islands. The boundary line corresponded to the 50th 1 degree of longitude west of Greenwich, which strikes the main-

1 The exact position has been disputed. According to John Fiske, the line would be between 41 ° and 44° long.

land of South America about the mouth of the Amazon. Thence- forward the Spaniards claimed the right to exclude all other peoples from trade or settlement " beyond the line."

Between September 1493 and the time of his last voyage (May 1502 to November 1504), Columbus explored the West Indies, reached the mainland of South America at the mouth of the Orinoco and sailed along the coast of Central America from Cape Honduras to Nombre de Dios (near Colon) . Henry VII. of England allowed the Bristol merchants to fit out a western voyage under the command of another Genoese, John Cabot (q.v.), in 1497. The history of the venture is very obscure, but Cabot is thought to have reached Newfoundland and the mainland. Be- tween 1 500 and 1 503 a Portuguese family of the name of Cortereal carried out voyages of exploration on the eastern coast of North America, with the consent of their government, and with little regard for the treaty of Tordesillas. In 1 500 the Portuguese Pedro Alvarez Cabral, while on his way to the East Indies, sighted the coast of Brazil at Monte Pascoal in the

Aimores, and took formal possession. The belief that the eastern extremity of Asia had been reached died slowly, and the great object of exploration in America continued for some years to be the discovery of a passage through to the Spice Islands, in order to compete with the Portu- guese, who had reached them by the Cape route. The first Spanish settlement in Hispaniola spread to the mainland by the adventure of Alonso de Ojeda and Diego de Nicuesa in Darien in 1509. Cuba was occupied by Diego de Velazquez in 1511. In 1512 (or 1513) Juan Ponce de Leon made the first recorded exploration of the coast of Florida and the Bahama Channel. In 1513, Vasco Nunez de Balboa crossed the isthmus of Darien and saw the South Sea (Pacific) . The hope that a passage through to the Spice Islands would be found near existing Spanish settle- ments was now given up. One was sought farther south, and in November 1520 Ferdinand Magellan (q.v.) passed through the strait which bears his name and sailed across the Pacific. At last the existence of a continent divided by a vast stretch of ocean from Asia, and mostly lying within the sphere of influence assigned to Spain by the pope, was revealed to the world.

The first aim of the Spaniards had been trade with the Indies. The Casa de Contratacion, a committee for the regulation of trade, was established at Seville in 1 503. European plants and animals were introduced into Hispaniola and Cuba, and sugar plantations were set up. But the main object of the Spaniards, who could not labour in the tropics even if they had wished to do so, was always gold, to be won by slave labour. As the surface gold of the islands was exhausted, and the feeble island races perished before the invaders, the Spaniards were driven to go farther afield. In 1 5 1 <^ Pedrarias Davila transferred the Darien settlement to Panama, In that and the following year the coasts of Yucatan and of the Gulf of Mexico were explored successively by Francisco Hernan- dez C6rdova and Juan de Grijalva, who both sailed from Cuba. From Cuba it was that Hernan Cortes (q.v.) sailed on the 10th (or 18th) of February 1519 for the conquest of Mexico. Hitherto the Spaniards had met only the weak islanders, or the more robust cannibal Caribs, both alike pure savages. In Mexico they found " pueblo " or town Indians who possessed an organized govern- ment and had made some progress in civilization. The hegemony of the Aztecs, who dominated the other tribes from the central valley of Mexico, was oppressive. Cortes, the most accomplished and statesmanlike of the Spanish conquerors, raised the subject peoples against them. His conquest was effected by 152 1. His example stimulated the settlers at Panama, who had heard of a great people owning vast quantities of gold to the south of

them. Between 1524 and 1535 Francisco Pizarro (q.v.) and Diego de Almagro had completed the conquest of Peru, which was followed, however, by a long period of strife among the Spaniards, and of rebellions. The country between Peru and Panama was subdued before 1537 by the conquest of Quito by Sebastian de Benalcazar and of New Granada by Jimenez de Quesada. From Peru the Spaniards advanced southwards to Chile, which was first unsuccessfully invaded (1535-37) by Diego de Almagro, and afterwards occupied (1540-53) by Pedro de Valdivia. Their advance to the south was checked by the indomitable opposition

of the Araucanians, but from the southern Andes the Spaniards overflowed on to the great plains which now form the interior of the Argentine Republic. The first permanent settlement at the mouth of the river Plate at Buenos Aires dates from 1 580. In its main lines the Spanish conquest was complete by 1550. What the Spaniards had then overrun from Mexico to Chile is still Spanish America. Brazil, after a period of exploration which began in 1510, was gradually settled by the Portuguese, though its bounds on the south remained a subject of dispute with the Spaniards till the 18th century.

The vast territories acquired by Spain in this brief period were held to be, by virtue of the pope's bull, the peculiar property of the sovereign. When the wide and dangerous powers granted to Columbus by his patent were confiscated, Ferdinand first imposed Bishop Fonseca on him as a check. In 1509 the council of the Indies was established, but it did not take its final form till 1524. It consisted of a president, with a board of advisers, who possessed legislative and administrative powers, and who varied in number at different times. There was an appeal to it from all colonial governors and courts. The Casa de Conlratacion, another board, regulated the trade. In America the crown was repre- sented by governors. After the preliminary period of conquest the whole of the Spanish possessions were divided into the two " kingdoms " of New Spain, — consisting of Venezuela and the Spanish possessions north of the isthmus — and of New Castile, a title soon changed to Peru, which included the Central American isthmus and all of South America except Venezuela and Brazil. Each was ruled by a viceroy. As the Spanish dominions became more settled, the viceroyalty of Peru was

found to.be unwieldy. New Granada (which included the present republics of Venezuela, Colombia and Ecuador) was created a viceroyalty in 17 18 (soon abolished, but re-created in 1740). A fourth viceroyalty for the river Plate was formed in 1778. Other governments known as captain-generalships were cut out of the viceroyalties at different periods — Guatemala in 1527, Venezuela in 1773, Cuba in 1777 and Chile in 1778. The captains-general corresponded directly with the council of the Indies, and were independent of the viceroys except in war time. The administrative powers of the viceroys were very great. They were, however, checked by the. audi- encias, or law courts, of which there were eleven from the reign of Philip IV. — Santo Domingo, Mexico, Panama, Lima, Guate- mala, Guadalajara, Bogota, La Plata, Quito, Chile, Buenos Aires. They acted as councils to the governors, and had civil and criminal jurisdiction with an appeal to the council of the Indies at Seville. The towns had municipal franchises, exercised by a governing body comprised of Spaniards, either immigrants from Old Spain, or Creoles, i.e. descendants of Spanish settlers. The places were often sold, and were objects of ambition to the richer merchants. In practice the selling of a seat in the town councils, or cabildos, did not have the bad consequences which might have appeared in- evitable. In the earlier stages of Spanish colonial history meet- ings of delegates (procurators) of the town councils, in imitation of the national cortes of Spain, were not uncommon. The kings of Spain had obtained from the popes Alexander VI. and Julius II. the right of levying the tithe, and of naming the holders of all ecclesiastical benefices. These immense concessions, made when the development of the Spanish settlements could not be foreseen, were regretted by later popes, but the crown adhered firmly to its regalities.

The government of Spain administered its dominions from the beginning in the strictest spirit of the " colonial system." The Indies were expected to supply precious metals and raw materials, and to take all manufactures from the mother country. In order to facilitate the regulation of the trade by the Casa de Conlratacion, it was concentrated first in Seville, and when the Guadalquivir was found to be becoming too shallow for the growing tonnage of ships, at Cadiz. Merchant vessels were required for their protection to sail in convoy. The convoys or flotas sailed in October first to Cartagena in South America, and from thence to Nombre de Dios or, in later times, Porto Bello. The yearly fairs at these places received the imports from Europe and the colonial trade of the Pacific coast, first collected at Panama and then carried over the

isthmus. From Nombre de Dios or Porto Bello the convoys went to La Vera Cruz for the trade of New Spain, and returned home in July by the Florida straits. One-fifth of the produce of the mines belonged to the crown. The collection of this bullion was at all times a main object with the Spanish government, and more especially so after the discovery of the great silver deposits of Potosi in Bolivia. Forced labour was required to work them and the natives were driven to the toil. The excesses of the earliest Spanish settlers have become a commonplace, largely through the passionate eloquence of Bartolome de Las Casas (see Las Casas). The Spanish government made strenuous attempts to regulate forced labour by limiting the rights of the toasters. An encomienda was required by anyone who wished to exact labour, i.e. the Indians of a district were given to him " in commendam " with the power to demand a corvte from them and a small yearly payment per head. The laws endeavoured to check abuses, but there can be no doubt that they were often defeated by the greed of the colonists — more especially in the viceroyalty of Peru, which was always less well governed than Mexico. But the bulk of the inhabitants of the Spanish possessions were of pure or mixed Indian blood, and many Indians were prosperous as traders, manufacturers, farmers and artisans.

The Portuguese settlement in Brazil was more purely colonial than the Spanish possessions. Until 1 534 little was done to regu- late the activity of private adventures. In that year the coast was divided into captaincies, which were united under a single governor-general in 1549. Between 1555 and 1567 the Portu- guese had to contend with the French Huguenot invaders who seized Rio, and whom they expelled. Between 1572 and 1576 there were in Brazil the two governments of Rio de Janeiro and Bahia, but its history is of little importance till the occupation of Portugal by Philip II. drew the country into the wars of the Spanish monarchy.

The ciaim of the Peninsula powers to divide the American con- tinent between them, based as it was on an award given in entire ignorance of the facts, would in no case have been respected. In the great upheaval of the Renaissance and the Reformation it was certain to be defied. As England was in general alliance with the sovereigns of Spain during the early 16th century, English- men turned their attention at first towards the discovery of a route to the Spice Islands round the north of Asia. But the rivalry of Francis I. and Charles V. gave France a strong motive for assailing the Spaniards in the New World now revealed to the ambition of Europe. King Francis encouraged the ill-recorded and disputed voyages of the Florentine Giovanni da Verrazano in 1524, and the undoubted explorations of

Jacques Carrier. Between 1534 and 1542 this seaman, a native of St Malo, explored the Strait of Belle Isle and the Gulf of St Lawrence, and visited the Indian village of Hochelaga, now Montreal. The claims of France to the possession of a great part of the northern half of America were based on the voyages of Verrazano and Carrier. The death of King Francis, and the beginning of the wars of religion, suspended colonial enterprise under royal direction. But the Huguenots, under the inspiration of Coligny, made three attempts to found colonies to the south — at Rio de Janeiro in 1555-1567, near the present Beaufort, South Carolina, in 1562, and in Florida in 1 565. These ventures were ruined partly by the hostility of the Spaniards and Portuguese, partly by the dissen- sions of the colonists. Meanwhile French corsairs from St Malo and Dieppe had been active in infesting the West Indies and the trade route followed by the Spanish convoys. After the accession of Queen Elizabeth, and the beginning of the breach between England and Spain, they were joined by English sea-rovers. The English claimed the right to trade with all Spanish possessions in or out of Europe by virtue of their treaty of trade and amity made in the reign of Charles V. The Spaniards disputed this interpretation of the treaty, and maintained that there was " no peace beyond the line," i.e. Pope Alexander's line as finally fixed by the conference at Tordesillas. The English retaliated by armed smuggling voyages.

It was, however, not till late that they attempted to found permanent settlements. In 1 5 78 Sir Humphrey Gilbert obtained

a patent for discovery and settlement. In 1583 he perished in an effort to establish a colony in Newfoundland. His work was taken up by his half-brother Sir Walter Raleigh in 1584. Between 1586 and 1603 Sir Walter made successive efforts to settle a colony in the wide territory called Virginia, in honour of Queen Elizabeth, a name of much wider significance then than in later days. His colony at Roanoke, in what is now the state of North Carolina, was unsuccessful, and after his fall his patent reverted to the crown, but the new Virginia Company carried on his schemes. In 1607 the first lasting settlement was made in Virginia, and after a period of struggle began to flourish by the cultivation of tobacco.

In 1620 another settlement was made. A small body of reli- gious dissentients, one hundred and one men, women and children, including some who had fled to Holland to escape the discipline of the church of England, secured leave from the Virginia Company to plant themselves within its bounds. They sailed in a single ship, the " Mayflower," and landed near Cape Cod, where they founded the colony of Plymouth, afterwards (1621) obtainˆ ing a patent from the council for New England. From these two centres, and from later settlements, arose the " Plantations " of the English, which gradually increased to the number of thirteen and were destined to become the United States of America. Two strongly contrasted types were found among them. The Virginian or southern type, which may be said to have prevailed from Maryland southward, were for the most part planters producing tobacco, Indian corn, rice, indigo and cotton, largely by the labour of negro slaves. They had no very pronounced religious leaning, though Maryland was founded as a Roman Catholic refuge, but they had a prevailing leaning to the church of England. The northern or New England element began by endeavouring to establish a Puritan theocracy which broke down. But the tendency was towards " Independency," and the New Englanders were farmers tilling their own land, traders and sea-faring men. In the middle region between them religion had a large share in promoting the formation of Pennsylvania, which was founded by the Quaker William Penn.

The English colonies, though divided by interest or character, were all alike jealous to defend, and eager to extend, their freedom of self-government, based on charters granted by, or. extorted from, the crown. The settlers by degrees threw off the control of the proprietors who had received grants from the crown and had promoted the first settlements. It was a marked character- istic of the English colonists, and a strong element in their prosperity, that they were hospitable in welcoming men of other races, — Germans from the Palatinate, and French Huguenots driven out by persecution who brought with them some capital, more intelligence and an enduring hatred of Roman Catholic France. Though the British government gave, more or less unˆ willingly, a large measure of self-government to the Plantations, it was no less intent than the Spanish crown on retaining the whole colonial trade in British hands, and on excluding foreigners. Like the Spaniards it held that this trade should be confined to an exchange of colonial raw produce for home manufactures. Two foreign settlements within the English sphere — the Dutch colony of New Netherland, now New York, and the Swedish settlement on the Delaware— were absorbed by the growing English element.

While the English plantations were striking root along the coast, by somewhat prosaic but fruitful industry, and were growing in population with rapid strides, two other movements were in pro- gress. To the south, the English, French and Dutch, though often in rivalry with one another, combined to break in on the mono- poly of the Spaniards. They turned the maxim that " there is no peace beyond the line " against its inventors. They invaded the West Indies, seized one island after another, and formed the f reebooting communities known as the Brethren of the Coast and the Buccaneers (q.v.). After the renewal of the war between Spain and Holland in 162 1 , the Dutch invaded the Portuguese colony of Brazil, and seized Bahia. A long period of struggle followed, but, after the declaration of Portuguese independence in 1640, local opposition, and the support given to the Portuguese by the French, led to the retreat of the Dutch.

To the north, to the west and to the south of the English settle- ments on the mainland, a : most characteristic French colonial policy was being carriedout. No sooner were the wars of religion over than the French again set about making good their claim to Canada, and to whatever they could represent as arising naturally out of Canada. In 1599, under the encouragement of Henry IV., speculators began to frequent the St Lawrence in pursuit of the fur trade. Their settlements were mainly trading posts. Their colon? ists were not farmers but trappers, woodrangers, coureurs du bois^ who married Indian women, and formed a mixed race known as the bois brules. Not a few of the leaders, notably Samuel de Champlain (q.v.), who founded Quebec in 1608, were brave ingenious men, but the population provided no basis for a lasting colony. It was adventurous, small, scattered and unstable. The religious impulse which was so strong both in the Spanish and the English colonies was prominent in the French, but in the most fatal form. Pious people were eager to bring about the cohversion of the Indians, and were zealously served by missionaries. The Jesuits, whose first appearance in New France dates from 1611, were active and devoted. Their aim was to reduce the fierce Red men to a state of childlike docility to priests, and they discouraged all colonization in their neighbourhood. It was true that the most active French colonial element, the trappers, were barbarized by the natives, and that the pursuit of the fur trade and other causes had brought the French into sharp collision with the most formidable of the native races, the confederation known as the Five (or Six) Nations. During the reign of Louis XIV., after 1660, the French government paid great attention to Canada, but not in a way capable of leading to the

formation of a colony. The king was as intent as the rulers of Spain had been to keep the American possessions free from all taint of heresy. Therefore he carried on the policy- of excluding the Huguenots- — the only colonizing element among his subjects,— and drove them into the English plantations. A small handful of obedient peasants, priest-ridden and over-administered, formed the basis of the colony. On this narrow foundation was raised a vast super-structure, ecclesiastical, administrative and military. His priests; and his officials civil and military, gave the French king many daring explorers. While the English.colonies were slowly digging their way, taking firm hold of the soil, and growing in numbers, from the sea to the Alleghanies, French missionaries arid explorers had ranged far and. wide. In 1682 Robert Cavelier, sieur de la Salle, who had already explored the Ohio, sailed down the Missis- sippi and took possession of the region at the mouth by the name of Louisiana.

The problem which was to be settled by a century of strife was now posed. On the one hand were the English plantations, popu- lated, cultivated, profitable, stretching along the east coast of North America; on the other were the Canadian! settlements; poverty-stricken, empty, over-officialled, a cause of constant expense to the home government, and, at a vast distance, those of Louisiana, struggling and bankrupt. The French remedy im an unsuccessful colony has always been to annex mors territory, and forestall a possible rival. Therefore the French government strove to unite the beggarly settlements in Canada and Louisiana by setting up posts all along the Ohio a$d the Mississippi, in order to confine the English between the Alleghaoiesand thesea.

The political history of North America till 1763,1s mainly the story of the pressure of the English colonies on this paper barrier. As regards Spanish America, England was content to profit by the Asiento (q.v.) treaty, which gave her the monopoly of slave- hunting for the Spanish colonies and an opening for contraband trade. In the river Plate region, where the dissensions of Spaniards and Portuguese afforded another- opening, English traders smuggled. The Spaniards, with monstrous fatuity, refused to make use of the superb waterways provided by the Parana and Paraguay, and endeavoured to stifle all trade, England's main struggle was with France. It was prolonged by her entanglement in European disputes and by political causes, by the want of co-operation among the English colonies and their jealousy of control by the home government. The organization of the French colonies, though industrially ruinousˆ gave them

Plate I,

'HfillMiii

Illustrations representative of the primitive cultures of Central America, Mexico and Peru (q.q.v.) selected and arranged by Dr Walter Lehmann of the Royal Ethnographical Museum, Munich.

Fig. i. — Stone Sculpture, from Teo- tihuacan, Mexico. Prae-Mexican culture (? Totonacan).

-View of the Giant Pyramid of the Sun, Teotihuacan.FiG. 3-— Alabaster Vessel, with carved "■ " Prae-Mexican culture (? Totonacan). lizard as handle Teotihuacan,

Mexico. Proto-Mexican culture.

Fig.

Plateau region, Mexico.

Fig. 6. — Sculptured Frieze of the Temple of Xochicalco. Plateau region, Mexico. Mexican culture with Mayan influence.

(Figs. 2 and 6 from photos by Waite, Mexico.)

Fig. 5. — Carved Stone Figure of the god of sports and dancing (Xochipilli-Miacuil- xochitl, "five flowers"), squatting on a stool, decorated with flowers and tonallo emblems. Plateau region, Mexico. Mexican culture.

Fig. 7. — Stone Tablet in memory of the year chicuei-acatl (" 8 reeds "), a.d. 1487, when the Great Temple in Mexico was con- secrated; above are the figures of the Kings Ticoc and Ahuitzotl, sacrificing, with the date of the beginning of the rebuilding, chicome-acatl ("7 reeds ") , A.D. 1447. Mexico City. Mexican culture.

Fig. 8. — Leaf 3 of the Tonalamatl, or sacred cycle of 260 days, from the Aubin collec- tion. Figures of the gods Quetzalcoatl and Tepeyollotli. Mexico. Mexican culture.

9. — Leaf 10 of Codex Borbonicus. with figure of the god of the underworld (Mictlantecutli) as regent of the tenth of the 20 sections, each of 13 days of the tonalamatl, which begins with "one flint" (ce tepcatl). Mexico. Mexican culture.

Fig.

10. — Leaf 54 of Codex Borbonicus B., with figures of the ancient moon-god, the twelve months, and the rabbit as the animal moon - emblem. Mexico. Mexican culture.

(Figs. 8-10 from the publications of the duke of Loubat.)

Plate II.

AMERICA

Fig. i. — Male Clay Figure, holding weapon (?) . From near Tzintzun- tzan Michoacan, Mexico. (?) Tarascan culture.

Fig. 2-

-View of the Ruins of the Pyramid Temple of Papantla near Vera Cruz, Mexico. Totonacan culture.

Fig. 3. — Hump-Backed Clay Jngure, standing on a fish; a reed staff in one hand, and incised lines on face. From Tzintzuntzan. (?) Tarascan culture.

Fig. 4. — Human Figure, with a rattle-stick in the right hand. From near Alva- rado, Vera Cruz, Mexico. Totonacan culture.

Fig. 5. — Stone Carving, deeply undercut, of the so-called Palmatype. From Coatepec, Canton Falapa, Vera Cruz, Mexico. Totonacan culture.

Fig. 6. — Similar Carving, with human figure. From Coate- pec. Totonacan culture.

Fig. 7. — Stone Yoke, carved in the so-called frog-type. Vera Cruz, Mexico. Totonacan culture.

*I • &£***?■*

Fig. 8. — Crucified Figure, pierced with arrows, of the victim at the festival of the god Xipe (Mexi- can TlacaxipenaliztH), with the symbols of the god. Culture of the Mayan transitional peoples of the Atlantic coast of the Gulf of Mexico. Totonacan culture.

Fig. 9. — Temple Chambers, with stone pillars, from the ruins of Mitla, Oaxaca, with wall mosaic of joined stones. Zapotecan cul- ture with proto- Mexican influ° ence.

Fig. 10. — Wall Mosaic of joined Stone from the ruins of Mitla.

Zapote- can culture with proto- Mexican influence.

(Ftgs. 2, and 10 are from photos by Waite Mexico; Fig. 8, from the ‘ Codex Nuttall, ‘ ‘ publica- tions of the Peabody Museum.)

the command of more available military forces than were at the disposal of the English. Thus the fight dragged on, and was constantly maintained in Acadia, where the sovereignty had been early disputed, and the border never properly settled. At last, when under the leadership of the elder Pitt (see Chatham, Earl of) England set to work resolutely to force a final’ settlement, the end came. The British navy cut off the French from all help from home, and after a gallant struggle, their dominion in Canada was conquered, and the French retired from the North American continent; They surrendered Louisiana to Spain, which had suffered much in an attempt to help them, and their possessions in America were reduced to their islands in the West Indies and French Guiana.

The fall of the French dominion on the continent of North America was ■ practically the beginning of the existence of independent nations of European origin in the New World. The causes which led to the revolt of the Plantations, the political and military history of the War of Independence, are dealt with under the heiading of United States {History) and American War of Independence. The significance of these great events in the general history of America is that from 1783 onwards there was, in the New World, an autonomous community not wholly unified at once, nor without strife, but self-governing and self-subsisting, in entire separation from European control. Such a polity, sur- rounded as it was by territory dependent on European sovereigns, could not be without a profound influence on its neighbours. Of deliberate direct action there was not much, nor was it needed. The peoples of the thirteen states which had secured emancipation from British sovereignty were wisely intent on framing their own Federal Union, and in taking effective possession of the vast terri- tories in the Ohio region and beyond the Mississippi. But their example worked. Their independence tempted, their prosperity stimulated. From the freedom of the United States came the revolt of Spanish America, and the grant by Great Britain to Canada of the amplest rights of self-

government.

The effect which the establishment of the great northern re- public was bound to have on their own colonies was not unknown to the wiser among the rulers of Spain. They took, however, few and weak steps to counteract the visible peril. During the later 1 7th century and the whole of the 18th, the history of the Spanish colonies and of the Portuguese in Brazil, was not, as has often been said, one of pure stagnation. Apart from such a peculiar development as the rise, formation and fall of the Jesuit missions in Paraguay, there was growth and change. The Creole popula- tion increased and was steadily recruited from home. Apart from settlers who came for trade, the flow of government officials, and soldiers, both officers and men, ended generally in recruiting the Creole element. The newcomers married in the country, and died there, leaving their families to grow up Americans. San Martin, the military leader of Buenos Aires in the revolt, was the son of a Spanish army officer and a Creole mother, and he is quoted as the example of thousands. He was educated in Spain, and began as an officer in the Spanish army. Increasing numbers of Creoles came home for education, and though they rarely went beyond Spain, yet Spain itself was being permeated by the influence of French philosophic and economic writers. The Creoles brought back new ideas. Slow as the Spanish government was to move, and obstinately as.it clung to old ways, it was forced to remove restrictions on trade, largely by the discovery that it could not prevent smuggling, which was, in fact, carried on with the con- nivance of its own corrupt officials.' The attempt to prevent all trade on the river Plate was given up, and a vigorous commercial community arose. A revolt of the Indians in Peru in 1 780, which was savagely suppressed, forced the government to take note of the abuses of its colonial administration. Many reforms were introduced. Spanish America was never so well governed as at the end of the 18th century, and was on the whole prosperous. But the reforms and concessions of Spain came too late. In commerce it had to compete with the highly developed maritime industry of Great Britain. In government it had to meet with the growing discontent of the Creoles, who found themselves treated as children, and their country looked on as a milch cow. The

wars of the French Revolution and of the emperor Napoleon, in which Spain was entangled, interrupted its communications with its colonies, and weakened its hold on them. The defeat, in 1806 and 1807, of two British expeditions to Buenos Aires and Monte- video, resulting in the capitulation of the English force, gave a great impulse to the self-reliance of the colonists, to whom the credit of the victory

entirely belonged. When the intervention of Napoleon in Spain plunged the mother country into anarchy, the colonists began to act for themselves. They were still loyal, but they were no longer passive. The brutality of some Spanish governors on the spot provoked [anger.ˆ The cortes assembled in Cadiz, being under the influence of the merchants and mob, could make no concessions, and aU Spanish America flamed into revolt. For the details of the struggle the reader must refer to the articles Argentina, Bolivia, Chile, Colombia, Ecuador, Panama, Peru, Paraguay, Uruguay, Venezuela. Brazil followed the 1 same course in a milder way and a little later. The struggle of Spanish America for independence lasted from 1810 to 1826.

This vast extension of the area of independence in America could not but have its proportionate effect on the general balance of power among nations. So long as Spain retained her colonies on the mainland, while England held Canada, and the English, Dutch and French had possessions in Guiana, the New World must have remained in political dependence on the Old. When the Spanish colonies secured effective independence, and even before their freedom was formally recognized, foreign sovereignty became at once the exception in America. The change thus established de facto owed its first diplomatic consecration to the develop- ments of international politics in the Old World. The committee of the great powers which, since the downfall of Napoleon, had succeeded to the authority which he had usurped in Europe (see Europe: History), was for the few years of its unbroken exist- ence fully occupied with the task of preserving the " European Confederation " from the peril to its peace of renewed revolution- ary outbreaks. As early as the congress of Aix-la-Chapelle (1818), however, the question of the relations of Spain and her colonies had been brought up and the suggestion made of concerted inters vention, to put an end to a state of things scandalous in itself and dangerous, if only by force of example, to the monarchical principle. The proposal came to nothing, and fared no better when revived at subsequent conferences, owing to the opposition of Great Britain and of Spain herself. Spanish pride resented the interference of an alliance in which Spain had no part; Great Britain could not afford to allow any action to be taken which might end in the re-establishment of the old Spanish colonial system and the destruction of the considerable British trade, still' nominally contraband, which had grown up with the colonies during the troubles. Had the Spanish government frankly accepted the situation and acknowledged the trade as legitimate, England would have had no objection to the re-establishment of the Spanish

sovereignty in America. But the stubborn blindness of Ferdinand VII. and his ministers made any such solution impossible, and, before the meeting of the congress of Verona, in 1822, Castlereagh had realized the eventual necessity of recogniz-. ing the independence of the South American states. Matters were brought to a crisis by the outcome of the Verona conferences (see Verona, Congress of), and the re-establishment, in 1823, of the absolute power of the king in Spain by French arms and under French influence, the logical consequence of which seemed to be the reconquest, with the aid of France, of the Spanish colonies. Great Britain could not afford to stand aside and watch, the accomplishment of an ambition to prevent which she had, -at immense sacrifice of blood and treasure, overthrown the power of Louis XIV. and of Napoleon. She had exhausted every art of diplomatic obstruction to the aggressive action of France; her counterstroke to the unexpectedly easy victory of the French arms was the formal recognition of the revolted colonies as independent states. " If France has Spain," cried Canning in parliament, " at least it shall be Spain without the Indies. We have called a New World into existence to redress the balance of the Old."

On the 23rd of July 1824, a commercial treaty was signed

between Great Britain and Brazil; Colombia and Mexico were acknowledged in December of the same year; and the recognition of the other states followed, as each was able to give guarantees of stable government. Meanwhile the United States, acting in harmony, but not in formal co-operation, with England, had taken decisive action. President Monroe, in his message to Congress on the 2nd of December 1823, laid down the rule that no part of America was any longer res nullius, or open to colonial settlement. Though the vast ultimate consequences of this sudden appearance of the great western republic in the arena of international politics were not realized even by those in sympathy with Monroe's action, the weight of the United States thrown into the scale on the side of Great Britain made any effective protest by the European powers impossible; Russia, Austria and Prussia contented themselves with joining in a mild expression of regret that the action of Great Britain " tended to encourage that revolutionary spirit it had been found so difficult to control in Europe." Great Britain and the United States were, indeed,

not in complete agreement as to the legitimacy of fresh colonial settlements in the New World, but they were practically resolved that nobody should make any new settlements except themselves. From President Monroe's de- claration has grown up what is now known as the Monroe Doctrine (q.v.), which, in substance, insists that America forms a separate system apart from Europe, wherein still existing European possessions may be tolerated, but on the understanding that no extension of them, and no establishment of European control over a nominally independent American state, will be allowed.

The Monroe Doctrine is indeed the recognition, rather than the cause, of undeniable fact. Europe is still possessed of some measure of sovereign power in the New World, in Canada, in Guiana and in the West Indian islands. But Canada is bound only by a voluntary allegiance, Guiana is unimportant, and in the West Indian islands, where the independence of Hayti and the loss of Cuba and Porto Rico by Spain have diminished the European sphere, European dominion is only a survival of the colonial epoch. America, North and South, does form a separate system. Within that system power is divided as it has not been in Europe since the fall of the Roman empire. On the one hand are the United States and Canada. On the other are all the states formed out of the colonial empires of Spain and Portugal. The states of the American Union are non-tropical, adapted to the development of European races, not mixed with Indian blood, and possessed by long inheritance of the machinery needed for the successful conduct of self-government. They grew during the 1 9th century in population and wealth at a rate that placed them far ahead of the Spanish and Portuguese states, which in the year 1800 were the richer and the more populous. ' The Spanish and Portuguese states of America are mainly tropical, and therefore ill adapted to the health of a white race. Their population is divided between a white minority, among whom there are to be found strains of Indian blood, and a coloured majority, sometimes docile and in- dustrious, sometimes mere savages. They inherited no machinery of self-government. Townships governed by close corporations, and all embedded in the despotic power of the crown, presented none of the elements out of which a commonwealth could be formed. It was inevitable that in the early stages of their history, the so-called Latin communities should fall under the control of " the single person," and no less inevitable that he should be a soldier. The sword and military discipline supplied the only effective instruments of government. It would have been a miracle if the first generation of Mexican and South American history had not been anarchical. And though in recent years Spanish America has seemingly settled down,

and republican institutions have followed upon long periods of continual revolution, yet over the American continent as a whole there is an overwhelming predominance, material and intellectual, of the communities of English speech and politically of English origin:

Authorities. — Separate bibliographies will be found under the headings of the separate states. Amid the plethora of books, the reader cannot do better than consult the Narrative and Critical History of America, edited by Justin Winsor (1886-1889), in eight large octavo volumes, in which all the chapters are supplied with copious and carefully compiled bibliographies, (D. H.)

*III. Ethnology and Archaeology. — A summary account is here given of the American aborigines, who are discussed in more detail under Indians, North American. Whether with Payne it is assumed that in some remote time a J** speechless anthropoid passed over a land bridge, now aˆrˆfae*. the Bering Sea, which then sank behind him; or with W. Boyd Dawkins and Brinton, that the French cave man came hither by way of Iceland; or with Keane, that two subvarieties, the long-headed Eskimo-Botocudo type and the Mexican round- headed type, prior to all cultural developments, reached the New World, one by Iceland, the other by Bering Sea; or that Malayoid wanderers were stranded on the coast of South America; or that no breach of continuity has occurred since first the march of tribes began this way — ethnologists agree that the aborigines of the western came from the eastern hemisphere,and there is lacking any biological evidence of Caucasoid or Negroid blood flowing in the veins of Americans before the invasions of historic times. The time question is one of geology.*

Following Notes and Queries on Anthropology, published by the British Association for the Advancement of Science, the study of the American aborigines divides itself into two parts: that re- lating to their biology, and that relating to their culture. In the four subdivisions of humanity based on the hair, the Americans are straight-haired or Mongoloid. But it will free this account of them from embarrassments if they be looked upon as a distinct subspecies of Homo sapiens. Occupying 135 degrees of latitude, living on the shores of frozen or of tropical waters; at altitudes varying from sea-level to several thousands of feet; in forests, grassy prairies or deserts; here starved, there in plenty; with a night here of six months' duration, there twelve hours long; here among health-giving winds, and there cursed with malaria — this brown man became, in different culture provinces, brunette or black, tall or short, long-headed or short-headed, and developed on his own hemisphere

variations from an average type.

Since the tribes practised far more in-breeding than out-breed- ing, the tendency was toward forming not only verbal linguistic groups, but biological varieties; the weaker the tribe, the fewer the captures, the greater the isolation and harder the conditions — producing dolichocephaly, dwarfism and other retrogressive characteristics. The student will find differences among anthro- pologists in the interpretation of these marks — some averring that comparative anatomy is worthless as a means of subdividing the American subspecies, others that biological variations point to different Old World origins, a third class believing these structural variations to be of the soil. The high cheek-bone and the hawk's- bill nose are universally distributed in the two Americas; so also are proportions between parts of the body, and the frequency of certain abnormalities of the skull, the hyoid bone, the humerus and the tibia. Viability, by which are meant fecundity, longevity and vigour, was low in average. The death-rate was high, through lack of proper weaning foods, and hard life. The readiness with which the American Indian succumbed to disease is well known. For these reasons there was not, outside of southern Mexico, northern Central America and Peru, a dense population. In the whole hemisphere there were not over ten million souls.

The materials for studying the American man biologically are abundant in the United States National Museum in Washington; thePeabody Museum, at Cambridge, Massachusetts; theAmerican Museum of Natural History, New York; the Academy of Sciences and the Free Museum of Arts and Sciences, Philadelphia; Pennsylvania; the Field Museum in Chicago; the National Museum, city of Mexico, and the Museum of La Plata. In Europe there are excellent collections in London, Cambridge, Paris, Berlin, St Petersburg and Prague.

Professor Putnam measured for the World's Columbian Ex- position 1 700 living Indians, and the results have been summed up by Boas. The breadth of the Indian face is one centimetre more than that of the whites, and the half-breeds are nearer the Indian standard; this last is true also of colour in the skin, eyes and hair. In stature, the tall tribes exceed 170 cm.; middle stature ranges between 166 and 170; and short tribes are under 166 cm. The Indians are on the whole a tall people. Tribes that

have changed residence have changed stature. The tallest statures are on the plains in both America's. The mountains of the south-east and of the west reveal the shortest statures. The whole Mississippi valley was occupied by tall peoples. The Athapascans of New Mexico are of middle stature, the Pueblo peoples are short. The Shoshoni, Shahaptin and Salish tribes are of middle stature; on the coast of British Columbia, Puget Sound, in Oregon, and northern California, are the shortest of all the North Americans save the Eskimo, while among them, on the Columbia, are taller tribes. The comparison of cranial indexes is rendered difficult by intentional flattening of the forehead and undesigned flattening of the occiput by the hard cradle-board. The Mississippi valley tribes are nearly brachy- cephalic; the index increases around the Great Lakes, and lessens farther east. The eastern Eskimo are dolichocephalic, the western are less so, and the Aleuts brachycephalic. On the North Pacific coast, and in spots down to the Rio Grande, are short heads, but scattered among these are long heads, frequent in southern California, but seen northward to Oregon, as well as in Sonora and some Rio Grande pueblos.

The same variety of index exists in South America. In the regions of greatest linguistic mixture is the greatest heterogeneity of cephalic index.

The concepts on which the peoples of the Old World have been classified, such as stature, colour, skeletal measurements, nationality, and so on, cannot as yet be used in America with Classifies tioa. success. The only basis of division practicable is*

language, which must be kept separate in the mind from the others. However, before the conquest, in no other part of the globe did language tally so nearly with kinship. Marriage was exogamic among clans in a tribe, but practically, though not wholly, endogamic as between tribes, wife and slave capture being common in places. In his family tree of HomoAmericanus Keane follows out such a plan, placing the chief linguistic family names on the main limbs, North American on one side, and South American on the other. Deniker groups mankind into twenty- nine races and sub-races. Americans are numbered thus: — 21, South American sub-race; Palaeo Americans and South Americans. 22, North American sub-race; tall, mesocephalic. 23, Central American race; short, brachycephalic. 24, Pata- gonian race; tall, brachycephalic. 25, Eskimo race; short, dolichocephalic.

Farrand speaks of physical, linguistic, geographic, and cultural criteria, the first two the more exact, the latter more convenient and sometimes the only feasible bases.

Zoologists divide the earth into biological areas or regions, so both archaeologists and ethnologists may find it convenient to have in mind some such scheme of provinces as the provinces, following) named partly after the dominant ethnic groups: — Eskimo, on Arctic shores; Dene (Tinneh), in north-western Canada; Algonquin-Iroquois, Canada and eastern United States; Sioux, plains of the west; Muskhogee, Gulf States; Tlinkit-Haida, North Pacific coast; Salish-Chinook, Fraser-Columbia coasts and basins; Shoshoni, interior basin; California-Oregon, mixed tribes; Pueblo province, south- western United States and northern Mexico; Nahuatla-Maya, southern Mexico and Central America; Chibcha-Kechua, the Cordilleras of South America; Carib-Arawak, about Caribbean Sea; Tupi-Guarani, Amazon drainage; Araucanian, Pampas; Patagonian, peninsula; Fuegian, Magellan Strait. It is neces- sary to use geographical terms in the case of California and the North Pacific, the Caucasus or cloaca gentium of the western hemisphere, where were pocketed forty out of one hundred or more families of native

tribes. The same is true in a limited senge of Matto Grosso. That these areas had deep significance for the native races is shown by the results, both in biology and culture. The presence or absence of useful minerals, plants and animals rendered some congenial, others unfriendly; some areas were the patrons of virile occupations, others of feminine pursuits.

Among the languages of America great differences exist in the sounds used. A collection of all the phonetic elements exhausts the standard alphabets and calls for new letters. A comparison

of one family with another shows also that some are vocalic and soft, others wide in the range of sounds, while a third set are harsh and guttural, the speaking of them (according i iaagua m. to Payne) resembling coughing, barking and sneezing. Powell also thinks that man lived in America before he acquired articulate speech. The utterance of these speech elements in definite order constitutes the roots and sentences of the various tongues. From the manner of assemblage, all American languages are agglutinative, or holophrastic, but they should not be called polysynthetic or incorporative or inflexional. They were more or less on the way to such organized forms, in which the world's literatures are preserved. As in all other languages, so in those of aboriginal America, the sentence is the unit. Words and phrases are the organic parts of the sentence, on which, therefore, the languages are classified. It is on this basis of sentential elements that Powell has arranged the linguistic families of North America. He has brought together, in the Bureau of American Ethnology in Washington, many hundreds of manuscripts, written by travellers, traders, missionaries, and scholars; and, better still, in response to circulars, carefully prepared vocabu- laries, texts and long native stories have been written out by trained collectors. A corps of specialists — Boas, Dall, Dorsey, Gatschet, Hewitt, Mooney, Pilling, J. R. Swanton — have studied many of these languages analytically and comparatively. Other institutional investigations have been prosecuted, the result of all which will be an intelligent comprehension of the philology of a primitive race.

Attention is frequently called to the large number of linguistic families in America, nearly 200 having been named, embracing over 1000 languages and dialects. A few of them, how- ever, occupied the greater part of lands both north tamittes. and south of Panama; the others were encysted in the territory of the prevailing families, or concealed in culs-de-sac of the mountains. They are, through poverty of material, unclassed languages, merely outstanding phenomena.

Factions separated from the parent body developed dialects or languages by contact, intermarriage and incorporation with foreign tribes. To the old- time belief that languages multiplied by splitting and colonizing, must be added the theory that languages were formerly more numerous, and that those of the Americans were formed by com- bining.

The families of North America, Middle America and South America are here given in alphabetical order, the prevailing ones in small capitals: —

Algonquin, E. Can., N. Atlantic States, middle States, middle western States; Athapascan, N.W. Can., Alaska, Wash., Or., Cal., Ariz., Mex. ; Attacapan, La.; Beothukan, Nova North Scotia ; Caddoan, Tex., Neb., Dak. ; Chimakuan, Wash. ; America Chimarikan, N. Cal. ; Chimmesyan, Brit. Col. ; Chinoo- kan, Or.; Chitimachan, La.; Chumashan, S. Cal.; Coahuiltecan, Tex.; Copehan, N. Cal.; Costanoan, Cal.; Eskimauan, Arctic province; Esselenian, Cal.; Iroquoian, N.Y., N.C.; Kalapooian, Or.; Karankawan, Tex.; Keresan, N. Mex.; Kiowan, Neb.; Kitunahan, Brit. Col. ; Koluschan, S. Alaska; Kulanapan, Cal. ; Kusan, Cal.; Lutuamian, Or.; Mariposan, Cal.; Moquelumnan, Cal.; Muskhogean, Gulf States; Natchesan, Miss.; Palaihnihan, Cal.; Piman, Ariz.; Pujunan, Cal.; Quoratean, Or.; Salinan, Cal.; Salishan, Brit. Col.; Sastean, Or.; Shahaptian, Or.; Shoshonean, Interior Basin; Siouan, Mo. Valley; Skittagetan, Brit. Col.; Takilman, Or.; Tanyoan, Mex.; Timuquanan, Fla.; Tonikan, Miss. ; Tonkawan, Tex. ; Uchean, Ga. ; Waiilatpuan, Or.; Wakashan, Vancouver I.; Washoan, Nev. ; Weitspekan, Or.; Wishoskan, Cal. ; Yakonan, Or. ; Yanan, Or. ; Yukian, Cal. ; Yuman, L. Cal. ; Zunyan, N. Mex.

Chapanecan, Chi.; Chinantecan, Oax.; Chontalan, S. Mex.; Huatusan, Nic. ; Huavean, Tehuant.; Lencan, Hon.; Mayan, Yuc. and Guat. ; Nahuatlan, Mex. ; Otomitlan, Cen. Mex. ; Middle Raman, Hond. ; Serian, Tiburon I.; Subtiaban, Nic; Amerlva. Tarascan, Mich.; Tehuantepecan, Isthmus; Tequist- latecan, Oax.; Totonacan, Mex.; Triquian, S. Mex.; Ulvan, Nic; Xicaquean, Hond.; Zapotecan, Oax.; Zoquean, Tehuant.

Alikulufan, T. del Fuego; Arauan, R. Puriis; Arawakian, E. Andes; Atacamenyan, S. Peru; Araucanian, Pampas; Aymaran, Peru; Barbacoan, Colombia; Betoyan, Bogota; Cani- south chanan, Bolivia; Carahan, S. Brazil; Caribian, around America. Caribbean Sea; Catamarenyan, Chaco; Changuinan, Panama; Charruan, Parana R.; Chibchan, Colombia; Churoyan, Orinoco R. ; Coconucan,

Colombia; Cunan, Panama ; Guaycuruan.

Paraguay R. ; JivarOan, Ecuador; Kechuan, Peru; Laman, N.E. Peru; Lulean, Vermejo R.; Mainan, S. Ecuador; Matacqan, Vermejo R.; Mocoari, Colombia; Mosetenan, E. Bolivia; Onan,' T. del Fuego; Paniquitan, Colombia; Panoan, Ucayali R. , Peru; Payaguan, Chaco; Puquinan, Titicaca L.; Sainucan, Bolivia; Tacanan, N. Bolivia; Tapuyan, Brazil; Timotean, Venezuela; Topian, Amazon R. ; Tzonecan, Patagonia ; Yahgan, T. del Fuego ; Yuncan, Truxillo, Peru; Yurucarian, E. Bolivia; Zaparoan, Ecuador.

Written language was largely hierographic and heroic. The drama, the cult image, the pictograph, the synecdochic picture, the ideaglyph, were steps in a progress without a break. The warrior painted the story of conflicts on his robe only in part, to help him recount the history of his life; the Eskimo etched the prompters of his legend on ivory; the Tlinkit carved them on his totem post; the women fixed them in pottery, basketry, or blankets. At last, the central advanced tribes made the names of the abbreviated pictures useful in other connexions, and were far on the way to a syllabary. Intertribal communication was through gestures; it may be, survivals of a primordial speech, antedating the differentiated spoken languages. See publications of the Bureau of American Ethnology, by F. W. Hodge (1906); Farrand, Basis of Am. History, chap, xviii. ; and Orozco y Berra, Geografia de las lenguas, &c. (Mexico, 1868).

To supply their wants the Americans invented modifications in natural materials, the working of which was their industries. The vast collections in richly endowed European and Jw"""" American museums are the witnesses and types of these. There is danger of confounding the products of native industries. The following classes must be carefully discrimin- ated: — (a) pre-Columbian, (b) Columbian, (c) pre-oontact, (d) first contact, (e) post-contact, (/) present, and (g) spurious. Pre- Columbian or pre-historic material is further classified into that which had been used by Indians before the discovery, and such as is claimed to be of a prior geological period. Columbian, or 1 5 th- century material, still exists in museums of Europe and America, and good descriptions are to be found in the writings of contem- porary historians. Pre-contact material is such as

continued to exist in any tribe down to the time when they were touched by the presence of the trade of the whites. In some tribes this would bring the student very near to the present time; for example, before Steinen, the Indians in Matto Grosso were in the pre- contact period. Post-contact material is genuine Indian work more or less influenced by acculturation. It is interesting in this connexion to study also first contact in its lists of articles, and the effects produced upon aboriginal minds and methods. For example, a tribe that would jump at iron arrow-heads stoutly declined to modify the shafts. Present material is such as the Indian tribes of the two Americas are making to-day. Spurious material includes all that mass of objects made by whites and sold as of Indian manufacture; some of it follows native models and methods; the rest is fraudulent and pernicious. The question whether similarities in technology argue for contact of tribes, or whether they merely show corresponding states of culture, with modifications produced by environment, divides ethnologists. (See Farrand, chap, xviii.)

The study of mechanics involves materials, tools, processes and products. No iron tools existed in America before the invasion of the whites. Mineral, vegetable and animal substances, mecAunfei soft an< ˆ hard, were wrought into the supply of wants by means of tools and apparatus of stone, wood and bone — tools for cutting, or edged tools; tools for abrading and smoothing the surfaces of substances, like planes, rasps and sand- paper; tools for striking, that is, pounding for the sake of pound- ing, or for crushing and fracturing violently; perforating tools; devices for grasping and holding firmly. These varied in the different culture provinces according to the natural supply, and the presence or absence of good tool material counted for as much as the presence or absence of good substances on which to work. As a means of grading progress among the various tribes, the tool is valuable both in its working part and its hafting, or manual part. Fire drills were universal.

Besides chipped stone knives, the teeth of rodents, sharks, and

other animals served an excellent purpose. In north-west America and in the Caribbean area the adze was highly developed. In Mexico, Colombia and Peru the cutting of friable stgne with tough volcanic hammers and chisels, as well as rude metallurgy, obtained, but the evidences of smelting are not convincing. Engineering devices were almost wanting. The. Eskimo lifted his weighted boat with sheer-legs made of two paddles; he also had a tackle without sheaves, formed by reaving a greased thong through slits cut in the hide of a walrus. The north-west coast Indians hoisted the logs that formed the plates

of their house frames into position with skids and parbuckles of rope. The architectural Mexicans, Central Americans, and especially the Peruvians, had no derricks or other hoisting devices, but rolled great stones into place along prepared ways and up inclined planes of earth, which were afterwards removed. In building the fortress of Sacsahuaman, heights had to be scaled; in Tiahuanaco stones weighing 400 tons were carried seventeen miles; in the edifices of Ollantaytambo not only were large stones hauled up an ascent, but were fitted perfectly. The moving of vast objects by these simple processes shows what great numbers of men could be enlisted in a single effort, and how high a grade of government it was which could hold them together and feed them. In Arizona, Mexico and Peru, reservoirs and aqueducts prove that hydro- techny was understood. (Hodge, Am. Anthrop. vi. 323.)

Time-keeping devices were not common. Sun-dials and calendar monuments were known among the more advanced tribes. Fractional portions of time were gauged by shadows, and time of day indicated by the position of the sun with reference to natural features. No standards of weighing or measuring were known, but the parts of the body were the units, and money con- sisted in rare and durable vegetable and animal substances, which scarcely reached the dignity of a mechanism of exchange. If the interpretation of the Maya calculiform glyphs be trustworthy, these people had carried their numeral system into the hundreds of thousands and devised symbols for recording such high numbers. {See Bulletin 28, Bur. Am. Ethnol.)
■

*The Americans were, in most places, flesh-eaters. The airˆ the waters and the land were their base of supplies, and cannibalism, it is admitted, was widespread. With this animal diet . p oo4 everywhere vegetable substances were mixed, even in the boreal regions. Where the temperature allowed, vegetable diet increased, and fruits, seeds and roots were laid under tribute. Storage was common, and also the drying of ripened fruits. The most favoured areas were those where corn and other plants could be artificially produced, and there barbaric cultures were elabor- ated. This farming was of the , rudest kind. Plots of ground were burned over, trees were girdled, and seeds were ; planted by means of sharpened sticks. The first year the crop would be free from weeds, the second year only those grew whose seeds were wafted or carried by birds, the third year the crop required hoeing, which was done with sticks, and then the space was abandoned for new ground. Irrigation and terrace culture were practised at several points on the Pacific slope from Arizona to Peru. The steps along which plant and animal domestication passed up**

wards in artificiality are graphically illustrated in the aboriginal food quest.

Except in the boreal areas thebreeeh-clout was nearly universa , with men, and the cincture or short petticoat with women. Eve£ in Mexican and Mayan sculptures the gods are arrayed i, . in gorgeous breech-clouts. The foot-gear in the tropics aa a a dorn- was the sandal, and, passing northward, the moccasin, meat. , becoming the long boot in the Arctic. Trousers and the. , :-: blouse were known only among the Eskimo, and it is difficult to say how much these have heen modified by contact. Leggings and skin robes took their place southward, giving way at last to the. nearly nude. Head coverings also were gradually tabooed south of the 49th parallel. Tattooing and painting the body were well-nigh universal. Labrets, i.e. pieces of bone, stone, shell, &c. , were worn as ornaments in the lip (Latin, labrum) or cheek by Eskimo, Tlinkit, Nahuatlas arid tribes o» the Brazilian coast. For ceremonial purposes all American tribes, were expert in. the masquerade and dramatic apparel. A study of these in the

AMERICA

Plate III.

Photo, Wails, Mexico

Fig. 2. — General View of the Ruins of Monte Alban, Oaxaca, with terraced pyramids. Zapotecan culture.

Fig. r. — Stone Tablet with seated figures, and charac- teristic hieroglyphs (un- deciphered). From Monte Alban, Oaxaca. Zapotecan culture.

Fig. 3. — Sepulchral Clay Urn, with beast mask and rich head ornament. Oaxaca. Zapotecan culture.

Fig. 5. — Leaf 44 of Codex Fejervdry Mayer. Figure of the god Tex- catlipoca, surrounded by the 20 day symbols of the sabred cycle of 260 days, tonalamatl. Mexican culture with Mayan influence. (From publications of the Duke of Loubat.)

Fig. 4.— Sepulchral Clay Urn, in the form of a jaguar-like human figure, with shell ornament and loin-cloth. Oaxaca. Zapotecan culture.

Fig. 6.— Temple Chamber, with richly carved wall facing and

hieroglyph groups beneath the plinth. Copan, Honduras. Mayan culture.

Fig. 7. — Temple Pyramid, with sculptured corner- stone at base. Copan, Honduras. Mayan culture.

G. 8. — Stone Stele, with richly dec- orated human figure, the hands meeting across the breast. Copan, Honduras. Mayan culture.

Fig. 9. — Stone Figure of the so-called Chac-Mol type, with round vessel resting on the body and characteristic breastplate. Chi-chen-itza, Yucatan. Proto-Mexican culture.

Fig. 10. — Stone Stele, with human figure. Chiapas, Mexico. Mayan culture.

Plate IV.

AMERICA

Fig. 3. — Polychrome Clay Bowl, with incised curves and figure of the earth monster. Necropolis of Santa Barbara, Guana- caste, Costa Rica. Mexi- can culture.

1

1. ‘7ˆ”

‘<€ff|| ""■I

l

8

Its, ill

i3J 1

HH 1

1E1

sjHK

l r :H|*

pˆB

; aN'«I

F/,

Etms

. ˆIH

i Al,^'

fct| K jK*

Up

**ty Mir <*

Rv-iJ

■kˆˆRhw

HB

Em

**4m*

JfH

Thwui?

■t irˆH

H v '

ˆ1

■ :T S?V ˆHi

PM&

**•£ \ ˆBP*

ˆj|

Fig. 3.— Polychrome Clay Bowl, with maeander border and stencilled figures in three fields. Santa Barbara Necro- polis. Guanacaste. Choro- tega culture.

Fig. 2. — Stone Relief, with figure of a peni- tent (gaca-quixtiani) passing through his tonguea thong studded with thorns. It is accompanied by two groups of hieroglyphs. Lorillard City, Chiapas, Mexico. Mayan culture.

Fig. 4. — Lower Portion of Leaf 60 of Codex Dresdensis, with figures of four deities and groups of hieroglyphs on Agave paper. Mayan culture. From E. F&rstmann, 1892.

Fig. 5. — Gold Breast Ornament from the grave of a chief, in the form of a crocodile with three reptiles on each side. S. E. Costa Rica (EI General), Central America. Culture of the Coto and Quepo.

Fig. 6. — Two Typical Stone Sculptures in the form of human heads, with characteristic

■ *ornaments. Interior of Costa Rica, Central America. Culture of the Guetar.* ■

Fig. 7. — Large Gold Human Figure, with a gold coco-flask in each hand; gold diadem, nose and ear ornaments, and chains on neck and legs. Antioquia, Columbia. Chibcha culture.

Fig. 8. — Stone Vessel supported by prone Human Figure. Interior of Costa Rica, Central America. Culture of the Guetar.

Fig. 9. — Painted Clay Vessel in poly- chrome, with neck in form of a. human face with tear marks. Beneath a stencilled bird resem- bling a condor. Tiahuanaco style. Pachacamac, Peru. Pre- inra culture.

Fig. 10.— Painted Clay Vessel in polychrome on white stucco ground. A human figure with pearl chain and arrows in left hand, and parrot on a wooden stick in the right. Nasca style. Nasca, Peru. Pre-Inca culture.

Fig. 11. — Typical painted Clay Vessel, with geometric pattern, standing on a conical point. Cuzco style. Cuzco, Peru.

historic tribes makes plain the motives in gorgeous Mexican

sculptures.

The tribal system of family organization, universal in America, dominated the dwelling. The Eskimo underground houses of sod and snow, the Dene (Thmeh) and Sioux bunch of bark Hon. or s ˆ n wigwams, the Pawnee earth lodge, the Iroquois

long house, the Tlinkit great plank house, the Pueblo with its honeycomb of chambers, the small groups of thatched houses in tropical America and the Patagonian toldos of skin are examples. The Indian habitation was made up of this composite abode, with whatever out-structures and garden plots were needed. A group of abodes, however joined together, constituted the village or home of the tribe, and there was added to these a town hall or large assembly structure where men gathered and gossiped, and' where all dramatic and religious ceremonies were held. Powell contends that in a proper sense none of the Indian tribes was nomadic, but that, governed by water-supply, bad seasons and superstition (and discomfort from vermin must be added), even the Pueblo tribes often tdre down and rebuilt their domiciles. The fur trade, the horse, the gun, disturbed the sedent- ary habit of American tribes. Little attention was paid to furni- ture. In the smoke-infested wigwam and hut the ground was the best place for sitting or sleeping. The communal houses of the Pacific coast had bunks. The hammock was universal in the tropics, and chairs of wood or stone. Eating was from the pot, with the hand or spoon. Tables, knives, forks and other prandial apparatus were as lacking as they were in the palaces of kings a few centuries before. (Morgan, Houses and HouseLife; Farrand, p. 286.)

Stone- working was universal in America. The tribes quarried by means of crowbars and picks of wood and bone. They split the silicious rocks with stonehammers,and then chipped working. th em mto shape with bone tools. Soapstone for pot- tery was partly cut into the desired shape in the native ledge, broken or prised loose, and afterwards scraped into form. Paint was excavated with the ubiquitous digging-stick, and rubbed fine on stones with water or grease. For polished stone- work the material was pecked by blows, ground with other stones, and smoothed with fine material. Sawing was done by means of sand or with a thin piece of harder stuff. Boring was effected with the sand-drill; the hardest rocks may have been pierced with specially hard sand. At any rate stones were sawed, shaped, polished, carved and perforated, not only by the Mexicans, but among other tribes. For building purposes stones were got out, dressed, carved and sculptured with stone hammers and chisels made of hard and tenacious rock. Stone-cutters' tools of

metal are not known to have existed, and they were not needed. Their quarrying and stone- working were most wasteful. Those localities where chipping was done reveal hundreds of tons of splinters and failures, and these are often counted as ruder implements of an earlier time. The dressed stones for great buildings were pecked out of the ledges, and broken off with levers in pieces much too large for their needs. (McGiiire, " The Stone Hammer," Am. Anthrop. iv., 1801; Holmes, Archaeological Studies; see Hodge's List, Bur. Am. Ethnol., 1906, and Handbook.)

Metals were treated as malleable stones by the American ab- origines. No evidence of smelting ores with fluxes is offered, but casting from metal melted in open fires is assumed. lurgy. Gold, silver, copper, pure or mixed with tin or silver,

are to be found here and there in both continents, and nuggets were objects of worship. Tools and appliances for work- ing metals were of the rudest kind, and if moulds for casting were employed these were broken up; at least no museum contains samples of them, and the processes are not described. In the Arctic and Pacific coast provinces, about Lake Superior, in Virginia and North Carolina, as well as in ruder parts of Mexico and South America, metals were cold-hammered into plates, weapons, rods and wire, ground and polished, fashioned into carved blocks of hard, tenacious stone by pressure or blow, over- laid, cold-welded and plated. Soldering, brazing and the blow- pipe in the Cordilleran provinces are suspected, but the evidence of their existence must be further examined. A deal of studv has

Pottery.

been devoted to the cunning Tubal Cains, the surprising produc- tions of whose handiwork have been recovered in the art provinces of Mexico and the Cordilleras, especially in Chiriqui, between Costa Rica and Colombia. It must be admitted, however, that both the tools and the processes have escaped the archaeologist, as they did " the ablest goldsmiths in Spain, for they never could conceive how they had been made, there being no sign of a hammer or an engraver or any other instrument used by them, the Indians having none such" (Herrera).

The potter's wheel- did not exist in the western world, but it was almost invented. Time and muscle, knack and touch, a trained eye and brain and an unlimited array of patterns hanging on fancy's walls, aided by a box of dry sand, were competent to give the

charming results. No more striking contrast can be found between forlorn conditions and refined art products. Art in clay was far from universal in the two Americas. The Eskimo on Bering Sea had learned to model shallow bowls for lamps. No pottery existed in Athapascan boundaries. Algonquin- Iroquois tribes made creditable ware in Canada and eastern United States. Muskhogean tribes were potters, but Sioiian tribes, as a rule, in all the Mississippi drainage were not. In their area, however, dwelt clay-working tribes, and the Mandans had the art. Moreover, the mound-builders in the eastern half of this vast plain, being sedentary, were excellent potters. The efflor- escence of aboriginal pottery is to be found in the Pueblo region of south-westernUnited States, in Mexico, Central America, Carib- bean Islands, Colombia, Ecuador, Peru and restricted areas of eastern Brazil. (The literature on this subject is extensive. See Cushing, Fewkes, Holmes, Hough, Stevenson.) On the Pacific side of the continent not one of the forty linguistic families made pottery. The only workers in clay west of the Rockies and north of the Pueblo country belonged to the Shoshonean family of the Interior Basin.

The study of Indian textiles includes an account of their fibres, tools, processes, products, ornaments and uses. The fibres were either animal or vegetable; animal fibres were hair, fur on the skin, feathers, hide, sinew and intestines;] n a,, str j es vegetable fibres were stalks of small trees, brush, straw, cotton, bast, bark, leaves and seed vessels in great variety as one passes from the north southward through all the culture provinces. The products of the textile industry in America were bark cloth, wattling for walls, fences and weirs, paper, basketry, matting, loom products, needle or point work,' net-work, lace- work and embroidery. In the manufacture of these the sub- stances were reduced to the form of slender filaments, shreds, rods, splints, yarn, twine and sennit or braid. All textile work was done by hand; the only devices known were the bark peeler and beater, the shredder, the flint-knife, the spindle, the rope-twister, the bodkin, the warpˆbeam and the most primitive harness;: The processes involved were gathering the raw material, shredding, splitting, gauging, wrapping, twining, spinning and braiding. Twining and spinning were done with the fingers of both hands, with the palm on the thigh, with the spindle and with the twister. Ornamentation was in form, colour, technical processes and dyes. The uses to which the textiles were put were for clothing, furniture for the house, utensils for a thousand industries, fine arts, social functions and worship.

Jn order to comprehend the more intricate processes of the higher peoples it is necessary to examine the textile industry in all of the

culture areas. It is essentially woman's work, though among the Pueblos, strangely enough, men are weavers.

The Eskimo woman did not weave, but was expert in sewing and embroidering with sinew thread by means of a bodkin. The Dene (Tinneh) peoples used strips of hide for snowshoes and game-bags, sewed their deerskin clothing with sinew thread, and embroidered in split quill. Their basketry, both in Canada and in Arizona, was coiled work. The northern Algonquin and Iroquoian tribes practised similar arts, and in the Atlantic states wove robes of animal and bird skins by cutting the latter into long strips, wind- ing these strips on twine of hemp, and weaving them by the same processes employed in their basketry. Textile work in the Sioux province was chiefly the making of skin garments with sinew

thread, but in the Gulf states the existence of excellent cane and grasses gave opportunity for several varieties of weaving. On the Pacific coast of America the efflorescence of basketry in every form of technic was known. This art reached down to the borders of Mexico. Loom-weaving in its simplest form began with the Chilkats of Alaska, who hung the warp over a long pole, and wrought mythological figures into their gorgeous blankets by a process resembling tapestry work. The forming of bird skins, rabbit skins and feathers into robes, and all basketry technic, existed from Vancouver Island to Central America. In northern Mexico net-work, rude lace-work in twine, are followed farther south, where finer material existed, by figured weaving of most intricate type and pattern; warps were crossed and wrapped, wefts were omitted- and texture changed, so as to produce marvel- lous effects upon the surface. This composite art reached its climax in Peru, the llama wool affording the finest staple on the whole hemisphere. Textile work in other parts of South America did not differ from that of the Southern states of the Union. The addition of brilliant ornamentation in shell, teeth, feathers, wings of insects and dyed fibres completed the round of the textile art. A peculiar type of coiled basketry is found at the Strait of Magellan, but the motives are not American. (Consult the works of Boas, Dixon, G. T. Emmons, Holmes, Otis T. Mason, Matthews, John Murdoch, E. W. Nelson, A. P. Niblack, Lucien M. Turner.)

Since most American tribes lived upon flesh, the activities of life were associated with the animal world. These activities were not confined to the land, but had to do also with those y ‘ littoral meadows where invertebrate and vertebrate marine animals fed in unlimited numbers. An account of savage life, therefore, includes the knowledge of the animal life of America and its distribution, regarding the continent, not only as ” a whole, but in those natural history provinces and migrations which governed and characterized the activities of the peoples. This study would include industries connected with capture, those that worked up into products the results of capture, the social organizations and labours which were involved in pursuit of animals, the language, skill, inventions and knowledge resulting therefrom, and, finally, the religious conception united with the animal world, which has been named zootheism. In the capture of animals would be involved the pedagogic influence of animal life; the engineering embraced in taking them in large numbers; the cunning and strategy necessary to hunters so poorly armed giving rise to disguises and lures of many kinds. Capture begins among-the lower tribes with the hand, without devices, develop- ing knack and skill in seizing, pursuing, climbing, swimming, and maiming without weapons; and proceeds to gathering with devices that take the place of the hand in dipping, digging, hook- ing and grasping; weapons for striking, whether clubs, missiles or projectiles; edged weapons of capture, which were rare in America; piercing devices for capture, in lances, barbed spears, harpoons and arrows; traps for enclosing, arresting and killing, such as pens, cages, pits, pen-falls, nets, hooks, nooses, clutches, adhesives, deadfalls, impalers, knife traps and poisons; animals consciously and unconsciously aiding in capture ; fire in the form of torches, beacons, burning out and smoking out; poisons and asphyxiators; the accessories to hunting, including such changes in food, dress, shelter, travelling, packing, mechanical tools and intellectual apparatus as demanded by these arts. Finally, in this connexion, the first steps in domestication, beginning with the improvement of natural corrals or spawning ground, and hunting with trained dogs and animals. Zootechnic products include food, clothing, ornaments, habitations, weapons, industrial tools, textiles, money, &c.

In sociology the dependence of the American tribes upon the animal world becomes most apparent. A great majority of all the family names in America were from animal totems. The division of labour among the sexes was based on zootechny. Labour organizations for hunting, communal hunt and migrations had to do with the animal

world.

In the duel between the hunter and the beast-mind the intellectual powers of perception, memory, reason and will

were developed; experience and knowledge by experience were enlarged, language and the graphic arts were fostered, the inventive faculty was evoked and developed, and primitive science was fostered in the unfolding of numbers, metrics, clocks, astronomy, history and the philosophy of causation. Beliefs and practices with reference to the heavenly world were inspired by zoic activities; its location, scenery and environment were the homes of beast gods. It was largely a zoopantheon: thus zootheism influenced the organization of tribes and societies in the tribes. The place, furniture, liturgies and apparatus of worship were hereby suggested. Myths, folk-lore, hunting charms, fetishes, superstitions and customs were based on the same idea. (For life zones, see C. H. Merriam, Biol. Survey, U. S. Dept. of Agriculture.)

Excepting for extensive and rapid travel over the snow in the Arctic regions by means of dog sleds, the extremely limited transportation by dog travail (or sledge) in the Sioux province, and the use of the llama as a beast of burden throughout the Peruvian highlands, land travel was on foot, and land transportation on the backs of men and women. One of the most interesting topics of study is the trails along which the seasonal and annual migrations of tribes occurred, becoming in Peru the paved road, with suspension bridges and wayside inns, or tambos. In Mexico, and in Peru especially, the human back was utilized to its utmost extent, and in most parts of America harness adapted for carrying was made and frequently decorated with the best art. In the Mexican codices pictures of -men and women carrying are plentiful. Travelling on the water was an important activity in aboriginal times. Hundreds of thousands of miles of inland waters and archipelagoes were traversed. Commencing in the Arctic region, the Eskimo in his' kayak, consisting of a framework of driftwood or bone covered with dressed sealskin, could paddle down east Greenland, up the west shore to Smith Sound, along Baffin Land and Labrador, and the shores of Hudson Bay throughout insular Canada and the Alaskan coast, around to Mount St Elias, and for many miles on the eastern shore of Asia. In addition to this most delicate and rapid craft, he had his umiak or freight boat, sometimes called woman's boat. The Athapascan covered all north-western Canada with his open and portable birch-bark canoe, somewhat resembling the kayak in finish. The Algonquin-Iroquois took up the journey at Bear Lake and its

tributaries, and by means of paddling and portages traversed the area of middle and eastern Canada, including the entire St Lawrence drainage. The absence of good bark, dugout timber, and chisels of stone deprived the whole Mississippi valley of creditable water-craft, and reduced the natives to the clumsy trough for a dugout and miserable bull-boat, made by stretching dressed buffalo hide over a crate. On the Atlantic coast of the United States the dugout was improved in form where the waters were more dis- turbed. John Smith's Indians had a fleet of dugouts. The same may be said of the Gulf states tribes, although they added rafts made of reed. Along the archipelagoes of the North Pacific coast, from Mount St Elias to the Columbia river, the dugout attained its best. The Columbia river canoe resembled that of the Amur, the bow and stern being pointed at the water-line. Poor dugouts and rafts, made by tying reeds together, con- stituted the water-craft of California and Mexico until Central America is reached.

The Caribs were the Haidas of the Caribbean Sea and northern South America. Their craft would vie in form, in size, and sea- worthiness with those of the North Pacific coast. The cata- maran and the reed boat were known to the Peruvians. The tribes of Venezuela and Guiana, according to Im Thurn, had both the dugout and the built-up hull. The simplest form of navi- gation in Brazil was the woodskin, a piece of bark stripped from a tree and crimped at the ends. The sangada, with its platform and sail, belonging to the Brazilian coast, is spoken of as a good seaworthy craft. Finally, the Fuegian bark canoe, made in three pieces So that it can be taken apart and transported over hills and sewed together, ends the series. The American craft was pro- pelled by poling, paddling, rowingˆ and by rude sails of matting.

The aesthetic arts of the American aborigines cannot be studied apart from their languages, industries, social organizations, lore Fine art an< ˆ worships. Art was limited most of all by poverty in technical appliances. There were just as good materials and inspirations, but what could the best of them do without metal tools? One and all skilful to a surpassing degree — weavers, embroiderers, potters, painters, engravers, carvers, sculptors and jewellers, — they were wearied by drudgery and over- powered by a never-absent,

weird and grotesque theology. The Eskimo engraved poorly, the Dene (Tinneh) embroidered in quill, the North Pacific tribes carved skilfully in horn, slate and cedar, the California tribes had nimble fingers for basketry, the Sioux gloried in feathers and painted parfleche. The mound builders, Pueblo tribes, middle Americans and Peruvians, were potters of many schools; gorgeous colour fascinated the Amazonians, the Patagonians delighted in skins, and even the Fuegians saw beauty in the pretty snail shells of their desolate island shores. Of the Mexican and Central American sculpture and architecture a competent judge says that Yucatan and the southern states of Mexico are not rich in sculptures, apart from architecture; but in the valley of Mexico the human figure, animal forms, fanciful life motives in endless variety, were embodied in masks, yokes, tablets, calendars, cylinders, disks, boxes, vases and ornaments. The Nahuatl lapidaries had at hand many varieties of workable and beautiful stone — onyx, marble, limestone, quartz and quartz crystal, granite, syenite, basalt, trachyte, rhyolite, diorite and obsidian, the best of material prepared for them by nature; while the Mayas had only limestone, and hard, tenacious rock with which to work it, and timber for burning lime. However, looking over the whole field of North American achievement, architectural and non-architectural, composite and monolithic, the palm for boldness, magnitude of proportions and infinity of labour, must go to the sculptured mosaics of Yucatan. Maya architecture is the best remaining index of the art achievements of the American race. The construction of such buildings as the palace at Uxmal and the Castillo at Chichen (Chichenitza) indi- cates a mastery in architectural design. There is lack of unity in plan and grouping, and an enormous waste of material as com- pared with available room. At Uxmal the mass of masonry is to chamber space about as forty to one. The builders were " ignor- ant of some of the most essential principles of construction, and are to be regarded as hardly more than novices in the art " (Holmes, Archaeological Studies, &c). As for the marvels of Peru, the walls of the temple of the sun in Cuzco, with their circular form and curve inward, from the ground upward, are most imposing. Some of the gates without lintels are beautiful, and the geometric patterns in the walls extremely effective. The same objection to over-massiveness might not apply here as in Mexico, owing to volcanic activity.

Institutions in Europe and America have gathered abundant material for an intelligent comprehension of American Indian Sociology, sociology. The British Association had a committee reporting during many years on the tribes of north- west Canada. The American

Museum in New York has prepared a series of monographs on the tribes of the North Pacific coast, of northern Mexico, and of the Cordilleras of South America. The reports of the Bureau of American Ethnology in Washington cover the Eskimo, east and west, and all the tribes of the United States. In Mexico the former labours of Pimentel and Orozco y Berra are supplemented by those of Bandelier, Penafiel, Herrera and Alfredo Chavero. Otto Stoll's studies ˆin Guatemala, Berendt's in Central America, Ernst's in Veneztrela, Im Thurn's in Guiana, those of Ehrenreich, von den Steinen, Meyer in Brazil, or of Bandelier, Bastian, Briihl, Middendorf, von Tschudi in Peru, afford the historian of comparative sociology ample ground- work for a comprehensive grasp of South American tribes. In all parts of the western hemisphere society was organized on cognate kinship, real or artificial, the unit being the clan. There were tribes where the basis of kinship was agnate, but these were the exceptions. The headship of the clan was sometimes hereditary, sometimes elective, but each clan had a totemic name, and the clans together constituted the tribe, the bond being not land, but

blood. Women could adopt prisoners of war, in which case the latter became their younger sons. When a confederacy was organized under a council, intermarriage between tribes some- times occurred; an artificial kinship thus arose, in which event the council established the rank of the tribes as elder and younger brother, grandfather, father and sons, rendering the relationship and its Vocabulary most intricate, but necessary in a social system in which age was the predominant consideration and etiquette most exacting. (See Morgan, Tables of Consanguinity, Smithsonian Contributions, xvii.)

The Eskimo have a regular system of animal totem marks and corresponding gentes. Powell sets forth the laws of real and arti- ficial kinship among the North American tribes, as well as tribal organization and government, the formation of confederacies, and the intricate rules of artificial kinship by which rank and courtesy were established. (Many papers in Reports of Bur. Am. Ethnol.) Bandelier declares that in Mexico existed neither state nor nation, nor political society of any kind, but tribes represent- ing dialects, and autonomous in matters of government, and forming confederacies for the purposes of self-defence and con- quest. The ancient Mexican tribe was composed of twenty autonomous kins. According to Brinton the social organization of ancient Peru was a government by a council of the gentes. The Inca was a war chief elected by the council to carry out its commands. Among the Caribs a

like social order prevailed; indeed, their family system is identical with the totem system of North American Indians. Dominated by the rule of blood relationship, the Indians regulated all co-operative activities on this basis. Not only marriage, but speech and common industries, such as rowing a boat or chasing a buffalo, were under its sway. It obtrudes itself in fine art, behaviour, law-making, lore and religion. In larger or smaller numbers of cognate kindred, for shorter or longer periods of time, near or far from home, the aborigines developed their legislatures, courts, armies,, secret societies and priesthoods.

In organization, engineering, strategy, offence and defence, the art of war was in the barbarous and the savage status or grade. One competent to judge asserts that peace, not war, was the normal intertribal habit. They held frequent intercourse, gave feasts and presents, and practised unbounded hospitality. Through this traffic objects travelled far from home, and now come forth out of the tombs to perplex archaeologists. Remembering the organization of the tribe everywhere prevalent, it is not difficult to understand that the army, or horde, that stands for the idea, was assembled on the clan basis. The number of men arrayed under one banner, the time during which they might cohere, the distances from home they could march, their ability to hold permanently what they had gained, together form an excellent metric scale of the culture grade in the several American provinces, and nowhere, even in the most favoured, is this mark high. With the Mexicans war was a passion, but warfare was little above the raid (Bandelier; Farrand) . The lower tribes hunted their enemies as they hunted animals. In their war dances, which were only rehearsals, they disguised themselves as animals, and the pantomime was a mimic hunt. They had striking, slashing and piercing weapons held in the hand, fastened to a shaft or thong, hurled from the hand, from a sling, from an atlatl or throwing-stick, or shot from a bow. Their weapons were all individual, not one co-operative device of offence being known among them, although they under- stood fortification.

The term " slavery " is often applied to the aboriginal American tribes. The truth of this depends upon the definition of the word " slave." If it means the capture of men, and especially of women, and adoption into the tribe, this existed everywhere; but if subjection to a personal owner, who may compel service, sell or put to death the individual, slavery was far from universal. Nieboer finds it only on the North Pacific coast as far south as Oregon, among the Navajo and the Cibola pueblos, and in a few tribes of Middle and South America.

The thought life of the American aborigines is expressed in their practical knowledge and their lore. The fascination which

Art of war.

hangs around the latter has well-nigh obscured the former. As in medicine theory is one thing and practice another, so among , these savages must the two be carefully discriminated.

Dorsey, again, draws a distinction between lore narratives, which can be rehearsed without fasting or prayer, and rituals which require the most rigid preparation. In each culture province the Indians studied the heavenly bodies. The Arctic peoples regulated their lives by the long day and night in the year; among the tribes in the arid region the place of sunrise was marked on the horizon for each day; the tropical Indians were not so observant, but they worshipped the sun-god above all. The Mayas had a calendar of 360 days, with intercalary days; this solar year was intersected by their sacred year of twenty weeks of thirteen days each, and these assembled in bewildering cycles. Their knowledge of the air and its properties was no less profound. Heat and cold, rain and drought, the winds in relation to the points of the compass, were nearest their wants and supplies, and were never out of their thoughts. In each province they had found the best springs, beds of clay, paint, soapstone, flinty rock, friable stone for sculpture and hard, tenacious stone for tools, and used ashes for salt. The vegetal kingdom was no less familiar to them. Edible plants, and those for dyes and medicines, were on their lists, as well as wood for tools, utensils and weapons, and fibres for textiles. They knew poisonous plants, and could eliminate noxious properties. The universal reliance on animal life stimulated the study of the animal king- dom. Everywhere there were names for a large number of species; industries and fine arts were developed through animal substances. Society was organized in most cases on animal clans, and religion was largely zoomorphic. The hunting tribes knew well the nature and habits of animals, their anatomy, their migrations, and could interpret their voices. Out of this practical knowledge, coupled with the belief in perscneity, grew a folk-lore so vast that if it were written down the world would not contain the books.

The religion of the American aborigines, so far as it can be made a subject of investigation, consisted (1) in what the tribes believed

Religion about spirits, or shades, and the spirit world — its organization, place, activities and relation to'our world; and (2) in what they did in response to these beliefs. The former was their creeds, the latter their cults or worships. In these worships, social organization, religious dramas and paraphernalia, amusement and gambling, and private religion or fetichism, found place. In order to obtain an intelligent grasp of the religion of tribes in their several culture provinces, it must be understood : (1) That the form of belief called animism by Tylor (more correctly speaking, personeity) , was universal; everything was somebody, alive, sentient, thoughtful, wilful. This personeity lifts the majority of earthly phenomena out of the merely physical world and places them in the spirit world. Theology and science are one. All is supernatural, wakan. (2) That there existed more than one self or soul or shade in any one of these personalities, and these shades had the power not only to go away, but to transform their bodily tenements at will; a bird, by raising its head, could become a man; the latter, by going on all fours, could become a deer. (3) That the regulative side of the spirit world was the natural outcome of the clan social system and the tribal government in each tribe. Even one's personal name had reference to the world of ghosts. The affirmation that American aborigines believed in an all-pervading, omnipotent Spirit is entirely inconsistent with the very nature of the case. (4) Worship was everywhere dramatic. Only here and there among the higher tribes were bloody sacrifices in vogue, and prayers were in pantomime.

In the culture areas the environment gave specific characters to the religion. In the Arctic province the overpowering influ- ence of meteorological phenomena manifested itself both in the doctrine of shades and in their shamanistic practices. The raven created the world. The Den6 (Tinneh) myths resembled those of the Eskimo, and all the hunting tribes of eastern Canada and United States and the Mississippi valley have a mythology based upon their zootechny and their totemism. The religious concep-

tions of the fishing tribes on the Pacific coast between Mount St Elias and the Columbia river are worked out by Boas; the trans- formation from the hunting to the agricultural mode of life was accompanied by changes in belief and worship quite as radical. These have been carefully studied by Cushing, Stevenson and Fewkes. The pompous ceremonials of the civilized tribes of Mexico and the Cordilleras in South America, when analysed, reveal only a higher grade of the prevailing idea. Im Thurn says of the Carib: " All objects, animate

and inanimate, seem exactly of the same nature, except that they differ in the accident of bodily form." These mythological ideas and symbols of the American aborigines were woven in their textiles, painted on their robes and furniture, burned into their pottery, drawn in sand mosaics on deserts, and perpetuated in the only sculptures worthy of the name, in wood and stone. They are inseparable from industry; language, social organization and custom wait upon them: they explain the universe in the savage mind.

The archaeology of the western hemisphere should be divided as follows: (1) that of Indian activities; (2) the question of man's existence in a prior geological period. There is no dividing line between first-contact ethnology and to ' pre-contact archaeology. Historians of this time, both north and south of Panama, described tools and products of activities similar to those taken from beneath the soil near by. The archaeologist recovers his specimens from waste places, cave deposits, abandoned villages, caches, shell-heaps, refuse-heaps, enclosures, mounds, hut rings, earthworks, garden beds, quarries and workshops, petroglyphs, trails, graves and cemeteries, cliff and cavate dwellings, ancient pueblos, ruined stone dwellings, forts and temples, canals or reservoirs. The relics found in these places are material records of language, industries, fine arts, social life, lore and religion.

Here and there in the Arctic province remains of old village sites have been examined, and collections brought away by whalers and exploring expeditions. Two facts are established— namely, that the Eskimo lived formerly farther south on the Atlantic coast, and that, aboriginally, they were not specially adept in carving and etching. The old apparatus of hunting and fishing is quite primitive. The Dene (Tinneh) province in Alaska and north-western Canada yields nothing to the spade. Algon- quin-Iroquois Canada, thanks to the Geological Survey and the Department of Education in Ontario, has revealed old Indian camps, mounds and earthworks along the northern drainage of Lakes Erie and Ontario, and pottery in a curved line from Montreal to Lake of the Woods. Throughout eastern United States shell-heaps, quarries, workshops and camp sites are in abundance. The Sioux and the Muskhogee province is the mound area, which extends also into Canada along the Red river. The forms of these are earth-heaps, conical mounds, walls of earth, rectangular pyramids and effigies (Putnam). Thomas sums up the work of the Bureau of American Ethnology upon the struc- ture, contents and distribution of these earth monuments, over a vast area from which adobe, building stone and stone-working material were absent. (See Hodge's List of Pubs, of the Bur. Am. Ethnol.) No writings have been

recovered, the artisans shaping small objects in stone were specially gifted, the potters in – only a few places approached those of the Pueblos, the fine art was poor, and relics found in the mounds do not indicate in their makers a grade of culture above that of the Indian tribes near by. The archaeology of the Pacific coast, from the Aleutian Islands, is written in shell-heaps, village sites, caves, and burial-places (Dall, Harlan I. Smith, Schumacher). The relics of bone, antler, stone, shell and copper are of yesterday. Even the Calaveras man is no exception, since his skull and his polished conical pestle, the latter made of stone more recent than the auriferous gravels, show him to have been of Digger Indian type. In Utah begin the ruins of the Pueblo culture. These cover Arizona and New Mexico, with extensions into Colorado on the north and Mexico on the south. The reports of work done in this province for several years past form a library of text and illustration. Cliff dwellings, cavate houses, pueblos and casas are all brought into a series without a break by Bandelier, Cushing, Fewkes, Holmes, Hough,*

AMERICA

Plate V.

Fig. i. — Reddish Brown Clay Vessel, in the form of a human head (portrait). Trujillo style. Chimboto, Peru. Inca culture.

Fig. 2. — Red Clay Vessel, in the form of a demon shaped like a crab upon a mussel. Tru- jillo style. Chimboto, Peru- Inca culture.

FlG. 3. — Black Clay Vessel, in the form of a human figure, with peculiar head – gear. Trujillo, Peru. Inca

culture.

Fig. 4. — Black Clay Vessel, in the form of a human figure, with large head-gear and ornamen- tation of maize-cobs. Trujillo, Peru. Inca culture.

Fig. 5. — Red-Brown Clay Flask, with impressed relief repre- senting a mythological scene. Supe, Peru.

Fig. 6. — Female Mummy, with mantle of feathered mosaic ; neckband, shawls, hair-net, head-wrap over tassels of parrot feathers. Peru, Inca culture.

Fig. 7. — Textile Fabric, with

stencilled human figure ; colours, black, red-brown and yellow. Peru. Inca

culture.

Fig. 8.— Coloured Textile Fabric, with picture writing. Peru.

Fig. 9. — Textile Fabric in brown and yellowish white, with figures of birds and men holding staves and head trophies. Inca style. Peru.

Fig. 10. — Two Gold Beakers, with human faces. Peru. Inca culture.

Fig. 11. — Human Clay Figure, with bead chain of mussel shells and of Venetian glass in the ears and on the neck; 1st period of Spanish con- quest. Chancay, Peru.

Fig. 12. — Black-Painted Clay Vessel, in form of a human figure holding a mussel, Chancay, Peru.

Mindeleff, Nordenskjold, Powell and Stevenson. From Casa Grande, in Chihuahua, to Quemada, in Zacatecas, Carl S. Lum- holtz found survivals of the cliff dwellers. Between Quemada and Copan, in Honduras, is an unbroken series of mural structures. The traditions agree with the monuments, whatever may be objected to assigning any one ruin to the Toltec, the Chichimec or the Nahuatl, that there are distinct varieties in ground-plan, motives, stone-craft, wall decorations and sculptures. Among these splendours in stone the following recent explorers must be the student's guide: — Bowditch, Charnay, Forstemann, F. T. Goodman, Gordon, Holmes, Maudslay, Mercer, Putnam, Sapper, Marshall H. Saville, Seler, Cyrus Thomas, Thompson. A list of the ruins, printed in the handbook on Mexico published by the Department of State in Washington, covers several pages. The special characteristics of each are to be seen partly in the skill and genius of their makers, and partly in the exigencies of the site and the available materials. A fascinating study in this con- nexion is that of the water-supply. The cenotes or underground reservoirs were the important factors in locating the ruins of northern Yucatan. From Honduras to Panama the urn burials, the pottery, the rude carved images and, above all, the grotesque jewellery, absorb the archaeologist's attention. (Publications of

Peabody Museum.)

Beyond Chiriqui southward is El Dorado. Here also bewilder- ing products of ancient metallurgy tax the imagination as to the processes involved, and questions of acculturation also interfere with true scientific results. The fact remains, however, that the curious metal-craft of the narrow strip along the Pacific from Mexico to Titicaca is the greatest of archaeological enigmas. Bandelier, Dorsey, Holmes, Seler and Uhle have taken up the questions anew. Beyond Colombia are Ecuador and Peru, where, in the widening of the continent, architecture, stone-working, pottery, metallurgy, textiles are again exalted. Among the Cordilleras in their western and interior drainages, over a space covering more than twenty degrees of latitude, the student comes again upon massive ruins. The materials on the coast were clay and gravel wrought into concrete, sun-dried bricks and pise, or rammed work, cut stalks of plants formed with clay a kind of staff, and lintels were made by burying stems of cana brava (Gynerium saccharoides) in blocks of pise. On the uplands structures were of stone laid up in a dozen ways. Walls for buildings, garden terraces and aqueducts were straight or sloping. Doorways were usually square, but corbelled archways and gateways surmounted with sculptures were not uncommon. Ornamentation was in carving and in colour, the latter far more effectively used than in Middle America. A glance at the exquisite textiles reveals at once the inspiration of mural decorations. The most prolific source of Peruvian relics is the sepulchres or huacas, the same materials being used in their construction as in building the houses. Here, owing to a dry climate, are the dead, clad and surrounded with food, vessels, tools and art products, as in life. The textiles and the pottery can only be mentioned; their quality and endless varieties astonish the technologist. In the Carib province there are no mural remains, but the pottery, with its excessive onlaying, recalls Mexico and the jewellers of Chiriqui. The polished stone work is superb, finding its climax in Porto Rico, which seems to have been the sacred island of the Caribs. For the coasts of South America the vast shell-heaps are the repositories of ancient history.

Since 1880 organized institutions of anthropology have taken the spade out of the hands of individual explorers in order to know the truth concerning Glacial or Pleistocene man. The Hthic man. geologist and the trained archaeologist are associated. In North America the sites have been examined by the Peabody Museum, the Bureau of American Ethnology, and others, with the result that only the Trenton gravels have any standing. The so-called palaeolithic implements are everywhere. The question is one of geology, simply to

decide whether those re- covered at Trenton are ancient. Putnam and George Frederick Wright maintain that they are ancient, Alex. Francis Chamber- lain and Holmes that they are post-Glacial and comparatively recent (Am. Anihrop., N.S. i. pp. 107, 614). Elsewhere in the

United States fossilized bones, crania of a low order, association of human remains with those of fossil animals are not necessarily evidence of vast antiquity. In South America the shell-heaps, of enormous size, are supposed to show that the animals have under- gone changes in size and that such vast masses require untold ages to accumulate. The first is a biological problem. As for the second, the elements of savage voracity and wastefulness, of uncertainty as to cubical contents on uneven surface, and of the number of mouths to fill, make it hazardous to construct a chrono' logical table on a shell-heap. Hudson's village sites in Patagonia contain pottery, and that brings them all into the territory of Indian archaeology. Ameghino refers deposits in Patagonia, from which undoubted human bones and relics have been exhumed, to the Miocene. The question is of the age of the sediments from which these were taken. The bones of other associated animalsy says John B. Hatcher, demonstrate the Pleistocene nature of the deposits, by which is not necessarily meant older Quaternary, for their horizons have not been differentiated and correlated in South America. Hatcher believes that " there is no good evidence in favour of a great antiquity for man in Patagonia." In a cave near Consuelo Cove, southern Patagonia, have been found frag- ments of the skin and bones of a large ground-sloth, Grypotherium (N eomylodon) listai, associated with human remains. Ameghino argues that this creature is still living, while Dr Moreno advances the theory that the animal has been extinct for a long period, and that it was domesticated by a people of great antiquity, who dwelt there prior to the Indians. Rodolfo Hauthal, Walter E. Roth and Dr R. Lehmann Nitsche review their work with the conclusion, not unanimously held by them, that man co-existed here with all the other animals whose remains were found during an inter- Glacial period. Arthur Smith Woodward sums up the question in Proceedings of the Zoological Society of London, closing with this sentence: "If we accept the confirmatory evidence afforded by Mr Spencer Moore, we can hardly refuse to believe that this ground-sloth was kept and fed by an early race of men.", These are individual opinions, subject to revision by that court of appeals, the institutional, judgment. (Summary in H. Hesketh Prichard, Through the Heart of Patagonia (1902), Appendix A.)

Authorities. — A valuable endowment of research in specimens,

literature and pictures^ deposited in libraries, museums and galleries since 1880, will keep ethnologists and archaeologists employed for many years to come. The scientific inquirer will find a mass of material in the papers and reports contributed to the numerous societies and institutions which are devoted to anthropological research. Museums of aboriginal culture are without number; in Washington the Smithsonian Institution, the National Museum, the Bureau of American Ethnology and the American Anthropologist issue publications on every division of the subject, lists of their publications and general bibliographies. Also the Peabody Museum, Cambridge; the American Museum of Natural History, New York; the Academy of Natural Sciences, Philadelphia ; the Field Museum, Chicago; the California Academy and the California University, San trancisco; and the Canadian Institute, Toronto, publish monographs and lists. The most comprehensive work on North America is the Handbook of American Indians (prepared by the Bureau of American Ethnology, under W. H. Holmes, and edited by F. Webb Hodge).

The following represent a select list of works on the American aborigines: — H. H. Bancroft, Native Races of the Pacific States oj North America, vols. i.-v. (1874-1876); A. F. Bandelier, Papers on the Sedentary Indians of New Mexico (see Papers of the Archaeo-logical Institute of America, 1881, 1890, 1892); also 10th, nth, 1 2th Reports Peabody Museum; Franz Boas, The Central Eskimo (6th Rep. Bur. Am. Ethnol., 1888) ; also Bulls. 20, 26, 27 and Reports Brit. Assoc. 1885-1898; Charles P. Bowditch, Mexican and Central American Antiquities; Bull. 28, Bur. Am. Ethnol:; also The Temples of the Cross and Mayan Nomenclature (Cambridge, Mass.-, 1906) ; David Boyle, Reports of the Provincial Museum of Toronto; on Archaeology and Ethnology of Canada; D. G. Brinton, Library of Aboriginal American Literature, vols, i.-viii. (Philadelphia, 182'2-i 890) ; The American Race (New York, 1891); Gustav Bruhl, Die Cultur- volker Amerikas (Cincinnati, 1889); Desire Charnay, The Ancient Cities of the New World (New York, 1887) ; Frank Cushing, Zufii Folk Tales (New York, 1901); William H. Dall, Alaska and its Resources (Boston: Lee & Shepard, 1870) (also papers by Bur. Am. Ethnol.) ; J. Deniker, The Races of Man (London, 1900) ; Roland B. Dixon, The Northern Maidu, Cal., Bull. 17, Am. Mus. Nat. Hist. (New York, 1905) ; Paul Ehrenreich, Die Volkerstdmme Brasiliens (Berlin, 1 892) ; A nthropologische Studien ilber die Urbewohner Brasiliens (Berlin, 1897) ; Livingston Farrand, The American Nation: A History,

vol. ii. (New York, 1904), with copious references; J. W. Fewkes, A Journal of American Ethnology and Archaeology, vols, i.-iv. (Boston, 1891-1894); Pliny Earle Goddard, Life and Culture of the Hupa, Univ. of Cal., vol. i. (1903) ; papers by F. W. Hodge, List of Publications of the Bur. Am. Ethnol., Bull. 31 (1906); W. H. Holmes, Handbook of the Indians North of Mexico ; Alice C. Fletcher, Francis la Flesche and John Comfort Fillmore, " A Study of Omaha Indian Music," Peabody Museum Archaeological and Ethnological Papers, i. (1893); George Byron Gordon, " Researches in Central America," Memoirs of the Peabody Museum, vol. i. Nos. 1, 4, 5, 6; and Proc. Mus. Univ. of Pa. ; William H. Holmes, Archaeological Studies among the Ancient Cities of Mexico (Chicago, 1895); Walter Hough, Archaeological Field Work in N.-E. Arizona, Museum-Gates Expedition of 1901 ; Report U.S. National Museum, 1901 ; Ales. Hrdlicka, "The Chichimecs," Am. Anthropologist, 1903, pp. 385-440; also papers on physical anthropology in the Handbook and Pubs, of the National Museum and the American Museum; Archer Butler Hulbert, Historic Highways of America, 16 vols. (Cleveland, O.) ; E. F. Im Thurn, Among the Indians of British Guiana (London, 1883); A. H. Keane, Ethnology (Cambridge, 1896); and Man, Past and Present (Cambridge, 1899); A. L. Kroeber, Papers on Eskimo, Arapaho, Languages and Culture of California Tribes, in Pubs, of California University and the American Museum of Natural History, N. Y.; Albert Buell Lewis, " Tribes of the Columbia Valley," Mem. Anthrop. Assoc, vol. i. (1906), with bibliography; Joseph D. McGuire, " The Stone Hammer and its Various Uses," Am. Anthro- pologist, iv. (1891); Teobert Maler, " Researches in Usumatsintla Valley" (1901-1903), Peabody Museum Mem. ii.; Clements R. Markham, Cuzco (London, 1856, and Hakluyt Soc, 1859); Marquis de Nadaillac, V Amerique prehistorique (Paris, 1883); H. J. Nieboer, Slavery as an Industrial System (The Hague, 1900) ; G. Nordenskjold, Tlie Cliff Dwellers of the Mesa Verde, Colorado (Stockholm, 1893) ; Zelia Nuttall, The Book of the Life of the Ancient Mexicans (Univ. of Cal., 1903); An Ancient Mexican Codex, special publications of the Peabody Museum (Cambridge, Mass., 1902); Edward John Payne, History of the New World called America (vol. i. 1892, vol. ii. 1899, Ox- ford) ; Antonio Penafiel, Monumentos del Arte Mexicano antiguo(Berlin, 1890); James C. Pilling, "Bibliographies of Indian Languages," Bulls. Bur. Am. Ethnol. 5-19; J. W. Powell, " Indian Linguistic Families," 7th Report Bureau of American Ethnology (1891); H. Hesketh Prichard, Through the Heart of Patagonia (New York, 1902) (appendix on the

co-existence of mylodon and man) ; F. W. Putnam, " Archaeology and Ethnology," vol. vii., Wheeler Surveys, &c. (Washington, 1879); Charles Rau, The Palenque Tablet, Smithsonian Contributions, Washington; Caecilie Seler, Auf alien Wegen in Mexico und Guatemala (Berlin, 1900) ; Harlan I. Smith, " Archaeo- logical Discoveries in North-Western America," Bull. Am. Geo- graphical Society (May 1906); also Mem. Am, Mus. Nat. History (New York) ; Karl von den Steinen, Unter den Naturvolkern Zentral- Brasiliens (Berlin, 1884) ; E. H. Thompson, " Explorations in Loltun and Labna," Memoirs Peabody Museum of Archaeol. and Ethnol. i. (1897); Max Uhle, " Explorations in Peru," Memoir Univ. of Cal. i.; Washington Matthews, Navaho Legends (Cambridge, Mass.); Anne Cary Maudslay and Alfred Percival Maudslay, A Glimpse at Guatemala (London, 1899) (Maudslay's whole series in Biologia Centrali Americana, 1889-1902, are valuable); H. C. Mercer, The Hill Caves of Yucatan (Philadelphia, 1896); Clarence B. Moore, papers on archaeology of Florida and neighbouring states, Journal Acad. Nat. Sc. (Philadelphia, vol. xiii., 1905); Lewis H. Morgan, Smithsonian Contributions, xvii., 1869; and Ancient Society, New York. (O. T. M.)

AMERICA ISLANDS, a name given to Christmas, Fanning, Palmyra and attendant islets, belonging to Great Britain, in the Central Pacific Ocean, between the equator and 6° N., and about 160 W. They are so named because frequented for their guano by traders from the United States. Christmas Island is probably the largest atoll in the Pacific (it is about 90 m. in circuit), and was discovered by Captain Cook in 1777. The islands were annexed by Great Britain in 1888 in view of the laying of the Pacific cable, of which Fanning Island is a station. Guano and mother-of-pearl shells are the principal articles of export; the population of the islands is about 300.

AMERICAN CIVIL WAR (1861-1865). i- The "Civil War between the northern and southern sections of the United States, which began with the bombardment of Fort Sumter on the 12th of April 1861, and came to an end, in the last days of April 1865, with the surrender of the Confederates, was in its scope one of the greatest struggles known to history. Its operations were spread over thousands of miles, vast numbers of men were employed, and both sides fought with an even more relentless determination than is usual when " armed nations " meet in battle. The duration of the war was due to the nature of the country and the enormous distances to be traversed, not to any want of energy, for the armies were in deadly earnest and their battles and combats (of

which two thousand four hundred can be named) sterner than those of almost any war in modern history. The political history of the war, its antecedents and its consequences, are dealt with in the articles United States {History) and Confederate States. For the purposes of the military narrative it is sufficient to say that eleven southern states seceded from the Union and formed the Confederate States of America. Jefferson Davis was chosen president of this confederacy, and an energetic government prepared to repel the expected attack of the " Union " states. The " resumption " by the seceding states of the coast defences (built on land ceded by the various states to the Federal government, and, it was argued, withdrawn therefore by the act of secession) brought on the war.

2. Bombardment of Fort Sumter. — South Carolina, finding other means of seizing or regaining Fort Sumter at Charleston ineffectual, ushered in the great struggle by the bombardment of the 12th of April 1861. Against overwhelming odds the United States troops held out until honour was satisfied; they then surrendered the ruins of the fort and were conveyed by warships to the north. At once the war spirit was aroused. President Lincoln called out 75,000 men. The few southern states which had not yet seceded, refused their contingents and promptly- joined the " rebels," but there was no hesitation in the people of the North, and the state troops volunteered in far greater numbers than had been demanded. Nearly the whole of the nation had now definitely taken sides in the quarrel. The Confederacy consisted of eleven states (Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, Arkansas and Tennessee). All the remaining states and terri- tories stood by the Union, except Missouri, Kentucky and Maryland, in which public opinion was divided. But the first operations of the war brought about the willing or unwilling adhesion of these border states to the Federal cause. Citizens of these states served on either side in the war. The small, but highly efficient, regular army stood by the president, though large numbers of the officers, amongst them many of the best in the service, left it when their states seceded. The navy likewise remained national, and of its officers very few went with their states, for the foreign relations of the navy tended to produce a sentiment wider than local. But the Federal armaments were not on such a scale as to enable the government to cope with a " nation in arms," and the first call for volunteers was followed by more and more, until in the end the Federals had more than a million men under arms. At first the troops on both sides were volun- tarily enlisted, but the South quickly, the North later, put in force conscription acts. Reducing the figures to a three years' average, the

North furnished about 45 % of her military popula- tion, the South not less than 90 % for that term. Even so the Confederacy was numerically, as in every other respect, far weaker, and rarely, after the second year, opposed equal numbers to the troops of the Union. Throughout the critical period of the war, that is, from the beginning of 1862 up to the day of Chattanooga, three distinct campaigns were always in progress. Virginia, separating the two hostile capitals, Richmond and Washington, was the theatre of the great campaigns of the east, where the flower of both armies fought. In the centre, the valleys of the Ohio, the Cumberland and the Tennessee were the battle-ground of large armies attacking and defending the south and south-eastern states of the Confederacy, while on and beyond the great waterway of the Mississippi was carried on the struggle for those interests, vital to either party, which depended on the mighty river and its affluents. Until the end of 1863 the events in these three regions remain distinct episodes; after that the whole theatre of war is comprised in the " anaconda policy," which concentrated irresistible masses of troops from all sides on the heroic remnants of the Confederacy. In Virginia and the east, Washington, situated on the outpost line of the Union, and separated by the " border " state of Maryland from Penn- sylvania and the North, was for some time in great peril. Virginia, and with it the Federal navy yard at Norfolk and the arsenal at Harper's Ferry, was controlled by the rebels. Baltimore was the scene of a bloody riot as the first Northern regiment

(6th Mass.) passed through on its way to Washington on the 19th of April, and, until troops could be spared to protect the railway through Maryland, all reinforcements for the national capital had to be brought up to Annapolis by sea. When that state was reduced to order, the Potomac became the front, and, later, the base, of the Northern armies.

3. Missouri andWest Virginia. — Missouri, at the other flank of the line, contained an even stronger Confederate element, and it was not without a severe struggle that the energy of Mr (after- wards General) F. P. Blair, and of Nathaniel Lyon, the Unionist military commander, prevailed over the party of secession. In Kentucky the Unionist victory was secured almost without a blow, and, even at the end of 186 1, the Confederate outposts west of the Alleghenies lay no farther north than the line Columbus — Bowling Green —

Cumberland Gap, though southern Missouri was still a contested ground. Between the Mississippi and the mountains the whole of the year was spent by both sides in pre- paring for the contest. In the east hostilities began in earnest in western Virginia. This part of the state, strongly Unionist, had striven to prevent secession, and soon became itself a state of the Union (1863). A force under General G. B. McClellan advanced from the Ohio in June and captured Philippi. This promptitude was not only dictated by the necessity of preserving West Virginia, but imposed by the necessity of holding the Baltimore & Ohio railway, which, as the great link between east and west, was essential to the Federal armies. A month later, an easy triumph was obtained by McClellan and Rosecrans against the Confederates of Virginia at Rich Mountain.

4. First Bull Run. — The opposing forces now in the field numbered 190,000 Unionists and half that number of Confeder- ates; sixty-nine warships flew the Stars and Stripes and a number of improvised ironclads and gunboats the rival "Stars and Bars. " On the 10th of June a Federal force was defeated at Big Bethel (near Fortress Monroe), and soon afterwards the main Virginian campaign began. On the Potomac the Unionist generals McDowell and Patterson commanded respectively the forces at Washington and Harper's Ferry, opposed by the Confederates under Generals J. E. Johnston and Beauregard at Winchester and at Manassas. The forces of these four commanders were raw but eager, and the people behind them clamoured for a decision. Much against his own judgment, Licutenant-General Winfield Scott, the Federal general-in-chief, a veteran of the second war with England and of the war with Mexico, felt constrained to order an advance against Beau- regard, while Patterson was to hold Johnston in check on the Shenandoah. On the 21st of July took place the first battle of Bull Run {q.v.) between McDowell and Beauregard, fought by the raw troops of both sides with an obstinacy that foreboded the desperate battles of subsequent campaigns. The arrival of Johnston on the previous evening and his lieutenant Kirby Smith at the crisis of the battle (for Patterson's part in the plan had completely failed), turned the scale, and the Federals, not yet disciplined to bear the strain of a great battle, broke and fled in wild rout. The equally raw Confederates were in no condition to pursue. A desultory duel between the forces of Rosecrans and Robert E. Lee in West Virginia, which ended in the withdrawal of the Confederates, and a few combats on the Potomac (Ball's Bluff or Leesburg, October 2 1 ; Dranesville, December 20) , brought to a close the first campaign in the east.

5. Close of the First Year. — In the end Bull Run did more harm to

the victors than to the conquered. The Southerners undeniably rested on their laurels, and enabled McClellan, who was now called to the chief military command at Washington, to raise, organize and train the famous Army of the Potomac, which, in defeat and victory, won its reputation as one of the finest armies of modern history. Johnston meanwhile was similarly employed in fashioning the equally famous Army of northern Virginia, which for three years carried the Confederacy on its bayonets. It was not until the people was stung by the humiliation of Bull Run that the unorganized enthusiasm of the North settled down into an invincible determination to crush the rebellion at all costs. The men of the South were not less in

earnest, and the most highly individualized people in the world was thus found ready to accept a rigorous discipline as the only way to success. In the autumn, a spirited attempt was made by the Arkansas Confederates to reoccupy Missouri. Fremont, the Federal commander, proved quite unable to deal with this, and the gallant Lyon was defeated and killed at Wilson's Creek (August 10). Soon afterwards, after a steady resistance, the Unionist garrison of Lexington surrendered to Sterling Price. But the work of Blair and' Lyon had not been in vain, and the mere menace of Fremont's advance sufficed to clear the state, while General John Pope, by vigorous action in the field and able civil administration, restored order and quiet in the northern part of the state. In the central theatre (Kentucky), the only event of importance was a daring reconnaissance of the Con- federate fort at Columbus on the Mississippi by a small force under Brigadier- General U. S. Grant (action of Belmont, November 7).

6. The Blockade. — Meanwhile the Federal navy had settled down to its fourfold task of blockading the enemy's coast against the export of cotton and the import of war material, protecting the Union commerce afloat, hindering the creation of a Con- federate navy and co-operating with the land forces. From the first months of the war the sea power of the Federals was practically unchallenged, and the whole length of the hostile coast-line was open to invasion. But the blockade of 3000 miles of coast was a far more formidable task, and international law required it to be effective in order to be respected. Nevertheless along the whole line some kind of surveillance was established long before the close of 1861, and, in proportion as the number of vessels available increased, the blockade became more and more stringent, until at last it was practically unbreakable at any point save by the fastest steamers working under unusually favourable conditions of wind and weather. As against the civilian enemy the navy strangled commerce; its military pre-*

ponderance nipped in the bud every successive attempt of the Confederates to create a fleet (for each new vessel as it emerged from the estuary or harbour in which it had been built, was destroyed or driven back), while at any given point a secure base was available for the far-ranging operations of the Union armies. Two hundred and twelve warships or converted merchantmen were in commission on the 1st of January 1862. There had been severalcoastal successes in 1 86 1 ,notably the occupation of Hatteras Inlet, North, Carolina, by Commodore S.H. Stringhamand General B. F. Butler (August 28-29, 1861), and the bombardment and capture of Forts Beauregard and Walker at Port Royal, South Carolina,by the fleet under Commodore S.F. duPont and the forces of General T. W. Sherman (November 7, 1861). Early in 1862: a large expedition under General A. E. Burnside and Commodore L. M. GoldsborOugh captured Roanoke Island, and the troops penetrated inland as far as Newbern (actions of February 8 and March 14). About the same time Fort Pulaski (the main de- fence of Savannah, Georgia) was invested and captured. But the greatest and most important enterprise was the capture of New Orleans (q.v.) by Flag-Officer D. G. Farragut and General Butler (April 18-25, 1862). This success opened up the lower Mississippi at the same time as the armies of the west began to move down that river under Grant, who was always accompanied by the gunboat flotilla which had been created on the upper waters in 1861. A slight campaign in New Mexico took place in February 1862, in which several brilliant tactical successes were won by the Texan forces, but no permanent foothold was secured by them.

7. Fort Donelson.— In the early months of 1862 preparations on a gigantic scale were made for the conquest of the South. McClellan and the Army of the Potomac faced Johnston, who with the Army of northern Virginia lay at Manassas, exercising and training his men with no less care than his opponent. Major- General D. C. Buell in Kentucky had likewise drilled his troops to a high state of efficiency and was preparing to move against the Confederate general Albert Sidney Johnston, whose reputation was that of being the foremost soldier on either side. Farther west the troops on both sides were by no means so well trained,

yet active operations began on the Tennessee. Here Fort Donelson on the Cumberland, Fort Henry on the Tennessee and Columbus on the Mississippi guarded the left of the Southern line, Sidney Johnston

himself maintaining a precarious advanced position at Bowling Green, with his lieutenants, Zollicoffer and Crittenden, farther east at Mill Springs, and a small force under General Marshall in the mountains of eastern Kentucky. The last-named was soon defeated by General James A. Garfield at Prestonburg, and a few days later General G. H. Thomas won his first victory at Mill Springs (Logan's Cross Roads). Zollicoffer was killed and his army forced to make a disastrous retreat (January 10-20, 1862). The centre of Johnston's line (Forts Henry and Donelson) was next attacked by General Grant and Flag-Officer A. H. Foote. On the 6th of February Fort Henry fell to Foote's gunboat flotilla, and Grant then moved overland to Donelson. His troops were raw and possessed no decisive superiority in numbers, and sharp fighting took place when the garrison of Donelson tried to cut its way out. The attempt failed when almost on the point of success, and the Federals, under the excellent leadership of Generals C. F. Smith, Lew Wallace and McClernand, effected a lodgment in the works. The Con- federate commanders proved themselves quite unequal to the crisis, and 15,000 men surrendered with the fort on the 16th Of February.

8. Island No. 10 and Pea Ridge. — This very considerable success thrust back Johnston's whole line to New Madrid, Corinth and the Memphis & Charleston railway. The left flank, even after the evacuation of Columbus, was exposed, and the Missouri divisions under Pope quickly seized New Madrid. The adjoining river defences of Island No. 10 in the Mississippi proved more formidable. Foote's gunboats could, anddid, run the gauntlet, but a canal had to be cut right round the batteries for the transports, before the land forces could cross the river and attack the works in rear; when this was accomplished, by the skill and energy of all concerned, the place with its garrison of 7000 men surrendered at once (April 8, 1862). Meanwhile, in the Missouri theatre, the Federal general Curtis, outnumbered and outmanoeuvred by the forces of Price and Van Dorn, fought, and by his magnificent tenacity won, the battle of Pea Ridge (March 7-8), which put an end to the war in this quarter. On the whole, the first part of the western campaign was uniformly a brilliant success for the Federal arms. General H. W. Halleck, who was here in control of all the operations of the Federals, had meanwhile ordered Grant's force to ascend the Tennessee river and operate against Corinth; Buell's well-disciplined forces were to march overland from Nashville to join him, and General O. M. Mitchel with a division was sent straight southwards from the same place to cut the Memphis & Charleston line. The latter mission, brilliantly as it was executed, failed, through want of support, to secure a foothold.

Had Halleck reinforced Mitchel, that officer might perhaps have forestalled the later victories of Grant and Sherman. As it was, the enterprise became a mere diversion.

9. Shiloh.— Meanwhile Grant was encamped at Pittsburg Landing on the Tennessee with an army of 45,000 men, and Buell with 37,000 men about two marches away. Early on the 6th of April A. S. Johnston and Beauregard completely surprised the camps of Grant's divisions. The battle of Shiloh (.q.v.) was a savage scuffle between two half -disciplined hosts, contested with a fury rare even in this war. On the 6th the Unionists, scattered and unable to combine, were driven from point to point, and at nightfall barely held their ground on the banks of the river. The losses were enormous on both sides, Johnston himself, being amongst the killed. The arrival of Buell enabled the Federals to take the offensive next morning along the whole line, and by sunset on the 7th, after another sanguinary battle, Beauregard was in full retreat. Some weeks afterwards, Halleck with the combined armies of Grant, Buell and Pope began the siege of Corinth, which Beauregard ultimately evacuated a month later. Thus the first campaign of the western armies, completed by the victory of the gunboat flotilla at Memphis (June 6), cleared the Mississippi as far down as Vicksburg, and compelled

the Confederates to- evacuate the Cumberland and a large portion of the Tennessee basins.

10. The Peninsular-ˆMa.ny schemes were discussed between McClellan and President Lincoln before the Army of the Potomac finally took the offensive in Virginia. It was eventually decided that General Banks was to oppose " Stonewall " Jackson in the Shenandoah Valley, Fremont to hold western Virginia against the same general's enterprise, and McDowell with a strong corps to advance overland to meet McClellan, who, with the main army, was to proceed by sea to Fortress Monroe and thence to advance on Richmond. The James river afterwards so much used for the Federal operations, was not yet clear, and it was here, in Hampton Roads, that the famous fight took place between the ironclads "Merrimac" (or " Virginia ") and "Monitor" (March 8-9, 1862). McClellan's advance was opposed by a small force of Con- federates under General Magruder, which, gradually reinforced, held the historic position of Yorktown for a whole month, and only evacuatedit on the 3rd of May. Two days later McClellan's advanced troops fought a sharp combat at Williamsburg and the Army of the Potomac rendezvoused on the Chickahominy with its base at White House on the Pamunkey (May 7). J. E.Johnston had, long ere this, fallen back*

from Manassas towards Rich- mond, and the two armies were in touch when a serious check was given to McClellan by the brilliant successes of Jackson in the Shenandoah Valley.

■ *11. Jackson's V alley Campaign.— The "Valley of Virginia," called also the " Granary of the Confederacy," was cut into long parallel strips by ridges and rivers, across which passages were rare, and along which the Confederates could, with little fear of interruption from the east, debouch into Maryland and approach Washington itself. Here Stonewall Jackson lay with a small force, and in front of him at the outlet of the valley was Banks, while Fremont threatened him from West Virginia. Jackson had already fought a winter campaign which ended in his defeat at the hands of General Shields at Kernstown (March 23). Banks's main army, early in May, lay far down the Valley at Strasburg and Front Royal, Fremont at the town of McDowell. Jackson's first blow fell on part of Fremont's corps, which was sharply attacked and driven into the mountains (McDowell, May 8). The victor quickly turned upon Banks, destroyed his garrison of Front Royal and nearly surrounded his main body; barely esca'ping, Banks was again defeated at Winchester and driven back to the Maryland border (May 23-25). These rapid suc- cesses paralysed the Federal offensive. McDowell, instead of marching to join McClellan, was ordered to the Valley to assist in " trapping Jackson," an operation which, at one critical moment very near success, ended in the defeat of Fremont at Cross Keys and of McDowell's advanced troops at Port Republic (June 8-9) and the escape of the daring Confederates with trifling loss. McClellan, deprived of McDowell's corps, felt himself reduced to impotence, and three Federal armies were vainly marching up and down the Valley when Johnston fell with all his forces upon the Army of the Potomac. The Federals lay on both sides of the Chickahominy river, and at this moment Johnston heard that McDowell's arrival need not be feared. The course of the battle of Seven Pines or Fair Oaks (q.v.) bore some resemblance to that of Shiloh; a sharp attack found the Unionists unprepared, and only after severe losses and many partial defeats could McClellan check the rebel advance. Here also fortune was against the Confederates; J. E. Johnston fell severely wounded, and in the end a properly connected and combined advance of the Army of the Potomac drove back his successor. into the lines of Richmond (May 31-June 1).*

12. The Seven Days.— Bad weather and skilful defence com- pletely checked the assailants for another three Weeks, and the situation was now materially altered. Jackson with the Valley troops hadstealtbily left Harrisonburg by rail on the 1 7 th of June, and was

now at Ashland in McClellan's rear. General Lee, who had succeeded Johnston in the command of the Army of northern Virginia, proposed to attack the Federals in their line of com- munication with White House, and passed most of his forces round to the aid of Jackson. The Seven Days' Battle (q.v.)

opened with the combat of Mechanicsville on the 26th of June, and the battle of Gaines' Mill on the 27th. Lee soon cut the communication with White House, but McClellan changed his base and retreated towards Harrison's Landing on the James river. It was some time before Lee realized this. In the end the Federals were sharply pursued, but McClellan had gained a long start and, fighting victoriously almost every day, at length placed himself in a secure position on the James, which was now patrolled by the Federal warships (June 26-July 1). But the second advance on Richmond was clearly a strategical failure.

13. The Campaign of Perry vttle. — After the capture of Corinth Halleck had suspended the Federal advance all along the line in the west, and many changes took place about this time. Halleck went to Washington as general-in-chief, Pope was transferred to Virginia, Grant, with his own Army of the Tennessee and Rose- crans's (lately Pope's) Army of the Mississippi, was entrusted with operations on the latter river, while Buell's Army of the Ohio was ordered to east Tennessee to relieve the inhabitants of that district, who, as Unionist sympathizers, were receiving harsh treatment from the Confederate and state authorities. Late in July Braxton Bragg, who had succeeded Beauregard in command of the Confederates, transferred his forces to the neighbourhood of Chattanooga. Tennessee was thenceforward to be the central theatre of war, and too late it was recognized that Mitchel should have been supported in the spring. The forces left south of Corinth were enough to occupy the attention of Grant and Rose- crans, and almost contemporaneously with Lee's advance on Washington (see below), Price and Bragg took the offensive against Grant and Buell respectively. The latter early in August lay near Murfreesboro, covering Nashville, but the Confederate general did not intend to threaten that place. The valleys and ridges of eastern Tennessee screened him as he rapidly marched on Louisville and Cincinnati. The whole of the Southern army in the west swung round on its left wing as the pivot, and Buell only just reached Louisville before his opponent. The Washington

authorities, thoroughly dissatisfied, ordered him to turn over the command to General Thomas, but the latter magnanimously declined the offer, and Buell on the 8th of October fought the sanguinary and indecisive battle of Perryville, in consequence of which Bragg retired to Chattanooga.

14. The Western Campaign.— The Union leader was now ordered once more to east Tennessee, but he protested that want of supplies made such a move impossible. Rosecrans, the victor of Corinth and Iuka (see below), was thereupon ordered to replace him. Buell's failure to appreciate political considerations as a part of strategy justified his recall, but the value of his work, like that of McClellan, can hardly be measured by marches and victories. The disgraced general was not again employed, but the men of the Army of the Ohio retained throughout, as did those of the Army of the Potomac, the impress of their first general's discipline and training. Sterling Price in the meanwhile had been ordered forward against Grant and Rosecrans, and Van Dorn promised his assistance. Before the latter could come up, how- ever, Rosecrans defeated Price at Iuka (September 19). The Confederates, not dismayed thereby, effected their junction and moved on Corinth, which was defended by Rosecrans and 23,000 Federal troops. Grant's other forces were split up into detach- ments, and when Van Dorn, boldly marching right round Rose- crans, descended upon Corinth from the north, Grant could hardly stir to help his subordinate. Rosecrans, however, won the battle of Corinth (October 3-4), though on the evening of the 3rd he had been in a perilous position. The Confederates fell back to the southward, escaping Grant once more, and thus ended the Confederate advance in the West.

15. Pope's Campaign in Virginia. — The Army of Virginia under Pope was composed of the troops lately chasing Jackson in the Valley — Fremont's (now Sigel's), Banks's and McDowell's corps. Halleck (at the Washington headquarters) began by withdrawing McClellan from the James to assist Pope in central Virginia; Lee, thus released from any fear for the safety of Richmond, turned swiftly upon Pope. That officer desired to concentrate his command on Gordonsville, but Jackson was before

him at that place, and he fell back on Culpeper. On the oth of August Banks and Jackson joined battle once more at Cedar Mountain (or Cedar Run) ; the Federals, though greatly inferior in numbers, attacked with much vigour. . Banks was eventually beaten, but he had come very near to success, and Jackson, soon retired across the Rapidan, where (the Army of the Potomac having now begun, to

leave the James) Lee joined him (August 17) with the corps of Longstreet. Pope now fell back behind the Rappahannockwithout showing fight. Here Halleck's orders bade him cover both Washington and Aquia Creek (whence the Arrny of the Potomac was to join him), orders almost impossible of execution, as any serious change of position necessarily un- covered one of these lines. The leading troops of the Army of the Potomac were now landed, and set out to join Pope's army, which faced Longstreet and Jackson on the Rappahannock between Bealton and Waterloo. On the 24th of August Lee ordered Jackson to march round Pope's right wing and descend on his rear through Thoroughfare Gap on Manassas and the old battle-ground of 1861. Pope was at this. moment about to take the offensive, when a violent storm swelled the rivers and put an end to all movement. On the 26th of August the daring flank march of Jackson's corps . ended at Manassas Station (see Bull Run). Longstreet fqllowed, Jackson, and Lee's army was reunited on the battlefield, By the 1st of September the campaign of "Second Manassas" was over. Pope's army and such of the troops of the Army of the Potomac as had been involved in the catastrophe were driven, tired and disheartened, into the Washington lines. The Confederates were once more masters of eastern Virginia.

16. Antietanj,. — It was at this moment that Bragg was in the full tide of his temporary success in Tennessee and Kentucky, and, after his great victory of Second Bull Run, Lee naturally invaded Maryland, which, it was assumed, had not forgotten its Southern sympathies. But Lee received no real accession of strength, and:when McClellan with all available forces moved qut of Washington to encounter the Army of northern Virginia, the Confederates were still but a few marches from the point where they had crossed the Potomac. Lee had again divided his army. On the 13th of September Jackson was besieging 11,000 Federals in Harper's Ferry, Longstreet was at Hagerstown, Stuart's cavalry holding the passes of the South Mountain, while McClellan's whole army lay at Frederick. Here extraordinary good fortune, put into the enemy's hands a copy of Lee's orders, from which it was clear that the Confederates were dangerously dispersed. Had McClellan moved at once he could have seized the passes without difficulty, as he was aware that he had only cavalry to oppose him. But the 13th was spent in idleness, and stubborn infantry now held the passes. A serious and costly action had to be fought before the way was cleared (battle of South Mountain, September 14). On the following day Harper's Ferry capitulated after a Weak defence. Jackson therei upon swiftly rejoined Lee, leaving only a division to carry out the capitulation. On

the 16th McClellan found Lee in position behind the Antietam Creek, and on the 17th was fought the sanguinary and obstinately contested battle of Antietam (q.v.) or Sharpsburg. At the price of enormous losses both sides escaped defeat in the field, but Lee's offensive was at an end and he retired into Virginia. Thenceforward the Confederacy was purely on the defensive. Only twice more did the forces, of the South strike out (Gettysburg, 1863; Nashville, 1864), and then the offensive was more of a counter-attack than an advance.

17. Vicksburg in 1862. — The Confederate failures of Corinth, Perryville and Antietam were followed by a general advance by the Federals. It is about this time that Vicksburg becomes a place of importance. Farragut from New Orleans, and the gun- boat flotilla from the upper waters, had engaged the flatteries in June and July, but had returned to their respective stations, while a Federal force under General Williams, which had appeared before the fortress, retired to Baton Rouge. Early in August, Van Dorn, now in command of the place, sent a force to attack Williams, and on the 5 th a hard : f ought action took place a.t Baton Rouge, in which Williams was killed but his troops held

their own. At this time the minor fortress of Port Hudson was established to guard the rear of Vicksburg. In November Grant, with 57,000 men, began to move down from the north against General J. C. Pemberton, who had superseded the talented Van Dorn. A converging movement made by Grant from Grand Junction, W. T. Sherman from Memphis, and a force from Helena on the Arkansas side, failed, owing to Pemberton's prompt retirement to Oxford, Mississippi, and complications brought about by the intrigues of an able but intractable sub- ordinate, McClernand, induced Grant to make a complete change of plan. Sherman was to proceed down the great river, and join the ships from the Gulf before Vicksburg, while Grant himself drove Pemberton southwards along the Mississippi Central railway. This double plan failed. Grant, as he pushed Pemberton before him to Granada, lengthened day by day his line of communication, and when Van Dorn, ever enterprising, raided the great Federal depot of Holly Springs the game was up. Grant retired hastily, for starvation was imminent, and Pember- ton, thus freed, turned upon Sherman, and inflicted a severe defeat on that general at Chickasaw Bayou near Vicksburg (December 29). McClernand

now assumed command, and on the nth of January 1863 captured Fort Hindman near Arkansas Post. This was the solitary gain of the whole operation. Mean- while Vicksburg was steadily becoming stronger and more formidable.

18. Fredericksburg. — McClellan, after the battle of the Antietam, paused for some time to reorganize his forces, some of which had barely recovered from the effects of Pope's unlucky campaign. He then slowly moved down the east side of the Blue Ridge, while Lee retired up the Valley on the west side of the same range. On the 6th of November the Army of the Potomac was at Warrenton, Lee at Culpeper, and Jackson in the Valley. When on the point of resuming the offensive, McClellan was suddenly superseded by Burnside, one of his corps commanders. Like Buell, McClellan had tempered the tools with which others were to strike; he was not again employed, and in his fall was involved his most brilliant subordinate, Fitz John Porter (q.v.). Burnside was by no means the equal of his predecessor, though a capable subordinate, and indeed only accepted the chief command with reluctance. He began his campaign by cancelling McClellan's operation, and, his own plan being to strike at Richmond from Fredericksburg, he moved the now augmented army to Falmouth opposite that place, hoping to surprise the crossing of the Rappa- hannock. Delays and neglect, not only at the front, but on the part of the headquarters staff at Washington, permitted Lee to seize the heights of the southern bank in time. When Burnside fought his battle of Fredericksburg (q.v.) an appalling reverse was the result, the more terrible as it was absolutely useless (December 13).

19. Closing Operations of 1S62. — Chickasaw Bayou and Fredericksburg ended the Federal initiative in the west and the east ; the Army of the Cumberland under Rosecrans alone could claim a victory. Buell's successor retained the positions about Nashville, whilst a new Army of the Ohio prepared to operate in east Tennessee. Bragg lay at Murfreesboro (see Stone River), where Rosecrans attacked him on the 31st of December 1862. A very obstinate and bloody two days' battle ended in Bragg's retirement towards Chattanooga. During these campaigns the United States navy had not been idle. The part played by the gunboats on the upper Mississippi had been most conspicuous, as had been the operations of Farragut's heavier ships in the lower waters of the same river. The work of Du Pont and Goldsborough on the Atlantic coast has been alluded to above. Charleston was attacked without success in 1862, but from June to August 1863 it was besieged by General Gillmore and Admiral Dahlgren, and under great difficulties the Federals secured a lodgment, though it was not until Sherman appeared on the land side

early In 1865 that the Confederate defence collapsed. Fort Fisher near Wilmington also underwent a memorable siege by land and sea. Certain incursions were from time to time made at different points along the whole sea-board. Minor operations moreover, especially in Arkansas and southern Missouri, were continually

undertaken by both sides during 1862-1863, of which the battle of Prairie Grove, Arkansas (December 7, 1862), was the most notable incident. Meanwhile the blockade had become so stringent that few ordinary vessels could expect to break through, and a special type of steamer came into vogue for the purpose.

20. Capture of Vicksburg. — In 1863 the campaigns once more divided themselves accurately into those of east, centre and west. This year saw the greatest successes and the heaviest reverses of the Union army, Gettysburg and Vicksburg and Chattanooga against Chancellorsville and Chickamauga. Opera- tions began in the west with the second advance upon Vicksburg. One corps of the Army of the Tennessee was detached to cover the Memphis & Charleston railway. Grant, with the other three under Sherman, McClernand and McPherson, moved by water to the neighbourhood of the fortress. Many weeks passed without any success to the Union arms. Vicksburg and its long line of fortifications stood on high bluffs, all else was swampy lowland and intricate waterways. As Sherman in 1862, so now Grant was unable to obtain any foothold on the high ground, and no effective attack was possible until this had been gained. At last, after many trials and failures, Grant took a daring step. The troops with their supplies marched round through a network of lakes and streams to a point south of Vicksburg; Admiral Porter's gunboats and the transports along with them " ran " the batteries. At Bruinsburg, beyond Pemberton's reach, a landing was made on the eastern bank and, without any base of supplies or line of retreat, Grant embarked upon a campaign which made him in the end master of the prize. On the 4th of July Pemberton surrendered the fortress and 37,000 men. Grant's endurance and daring had won what was perhaps the greatest success of the war. General Joseph Johnston with a small relieving army had appeared at Jackson, Mississippi, but had been held in check by General F. P. Blair and a force from the Army of the Tennessee; when Vicksburg surrendered a larger force was at once sent against him, whereupon he retired. In the meanwhile Banks had moved upstream from New Orleans, and laid siege to Port Hudson. Operations were pressed with vigour, and the place surrendered four days after Vicksburg. A Con- federate attack on the post of Helena, Arkansas, was the last serious fight on the great river, and before the end of July the first merchant steamer

from St Louis discharged her cargo at New Orleans.

21. Chancellorsville and Gettysburg.— hi Virginia Burnside had made, in January 1863, an attempt to gain by manoeuvre what he had missed in battle. The sudden swelling of rivers and down- pour of rain stopped all movement at once, and the " Mud March " came to an end. A Federal general could retain his hold on the men after a reverse, but not after a farce: Burnside was replaced by General Joseph Hooker, who had a splendid reputa- tion as a subordinate leader. The new commander displayed great energy in reorganizing the Army of the Potomac, the discipline of which had not come unscathed through a career of failure. Lee still held the battlefield of Fredericksburg and had not attempted the offensive, and in April he was much weakened by thedetachmentof Longstreet's corps to a minor theatre of opera- tions. Hooker's operations began well, Lee was outmanoeuvred and threatened in flank and rear, but the Federals were in the end involved in the confused and disastrous battle of Chancellors- ville (q.v.). Stonewall Jackson was mortally wounded, but his men and those of Longstreet's who had remained with Lee defeated Hooker and forced him to retire again beyond the Rappahannock, though he had double Lee's force. But Hooker could at least make himself obeyed, and when Lee initiated his second invasion of the North a month after the battle of Chancellorsville, the Army of the Potomac was as resolute as ever. On the 9th of June the cavalry combat of Brandy Station made it clear to the Federal staff that Lee was about to use the Valley once more to screen an invasion of Maryland. Longstreet, A. P. Hill and Ewell (who were now Lee's corps commanders) were at one time scattered from Strasburg in the Valley to Fredericksburg, and Hooker earnestly begged to be allowed to attack them in detail. Success was certain, but the scheme was

vetoed by the Federal headquarters and government, whose first and ruling idea was to keep the Army of the Potomac between Lee and Washington. Hooker was thus compelled to follow Lee's movements. Ewell's men were raiding unchecked as far north as the Susquehanna, while Hooker was compelled to inactivity before the forces of Hill and Longstreet. The Federal general, within his limitations, acted prudently and skilfully. The Army of the Potomac crossed that river only one day later than Lee, and concentrated at Frederick. But Hooker was no longer trusted by the Washington authorities, and his dispositions were interfered with. Not allowed to

control the operations of his own men, the unfortunate general resigned his command on the 28th. He was succeeded by General G. G. Meade, who, besides steadi- ness and ability, possessed the confidence of Lincoln and Halleck which Hooker had lacked. Meade was thus able to move promptly, Lee was compelled to meet him, and the Army of the Potomac began to take up its position on Pipe Creek, screened by Generals Reynolds and Buford at Gettysburg (q.v.). On the 1st of July the heads of Lee's columns engaged Buford's cavalry out- posts, and the conflict began. All troops on both sides hurried to the unexpected battlefield, and after a great three days' battle, the Army of the Potomac emerged at last with a decisive victory. On the 4th, as Pemberton surrendered at Vicksburg, Lee drew off his shattered forces. One third of the Army of northern Virginia and one quarter of the Army of the Potomac remained on the field . Pursuit was not seriously undertaken, and the armies manoeuvred back to the old battle-grounds of the Rapidan and the Rappahannock. A war of manoeuvre followed, each side being reduced in turn by successive detachments sent to aid Rosecrans and Bragg in the struggle for Tennessee. In October Lee attempted a third Bull Run campaign on the same lines as the second, but Meade's steadiness foiled him, and he retired to the Rapidan again, where he in turn repulsed Meade's attempt to surprise him (Mine Run, November 26-28, 1863).

22. Chickamauga. — In the centre Rosecrans and Bragg spent the first six months of the year, as it were glaring at each other. Nothing was done by the main armies, but the far-ranging cavalry raids of the Confederates under J. H. Morgan and other leaders created much excitement, especially " Morgan's Raid " (June 27-July 26), through Indiana, Kentucky and Ohio, which states had hitherto little or no experience of the war on their own soil. At last the Army of the Cumberland advanced. Rosecrans manoeuvred his opponent out of one position after another until Bragg was driven back into Chattanooga. These operations were very skilfully conducted by Rosecrans and his second-in-command, Thomas, and, at a trifling cost, advanced the Union outposts to the borders of Georgia. Burnside and the new Army of the Ohio had now cleared east Tennessee and occupied Knoxville (September 2), and meanwhile Rosecrans by a brilliant movement, in which he displayed no less daring in execution than skill in planning, once more manoeuvred Bragg out of his position and occupied Chattanooga. But he had to fight-to maintain his prize, and in the desperate battle of Chickamauga (q.v.) on the 19th and 20th of September, Bragg, reinforced by Longstreet from Virginia, won a complete victory. Thomas's defence won him the popular title of the " Rock of Chicka-

mauga " and enabled Rosecrans to draw off his men, but the critical position of the Army of the Cumberland in Chattanooga aroused great alarm.

23. Chattanooga. — Grant was now given supreme command in the west, and the Army of the Tennessee (now under Sherman) and two corps from Virginia under Hooker were hurried by rail to Tennessee. In spite of his good record Rosecrans was deprived of his command. But Thomas, his successor, was one of the greatest soldiers of the war, and Grant's three generals, all men of great ability, set to work promptly. Hooker defeated Longstreet at Wauhatchie and revictualled Chattanooga (q.v.), and on the 23rd, 24th and 25th of November the three armies attacked Bragg's position. On the left Sherman made little progress; on the right, however, Hooker and the men from the Potomac army fought and won the extraordinary " Battle above the Clouds " on Lookout Mountain, and on the 25th the Confederate centre

on Missionary Ridge was brilliantly stormed by Thomas and the Army of the Cumberland. Grant's triumph was decisive of the war in the west, and with Burnside's victory over Longstreet at Knoxville, the struggle for Tennessee was over. Vicksburg, Gettysburg and Chattanooga ended the crisis of the war, which had been at its worst for the Union in this year. Henceforth the South was fighting a hopeless battle.

24. Plan of Campaign for 1864. — Grant, now the foremost soldier in the Federal army, was on the 9th of March 1864 com- missioned lieutenant-general and appointed general-in-chief. Halleck, Lincoln and Stanton, the intractable, if energetic, war secretary, now stood aside, and the efforts of the whole vast army were to be directed and co-ordinated by one supreme military authority. Sherman was to command in the west, Grant's headquarters accompanied Meade and the Army of the Potomac. The general plan was simple and comprehensive. Meade was to " hammer " Lee, and Sherman, at the head of the armies which had been engaged at Chattanooga and Knoxville, was to deal with the other great field army of Confederates under Johnston, and as far as possible gain ground for the Union in the south-east. Sherman's own plans went farther still, and in- cluded an eventual invasion of Virginia itself from the south, but this was not contemplated as part of the immediate programme. Butler with the new Arm}' of the James was to move up that river towards Richmond and Petersburg. Subsidiary forces were to operate on the sea-board, in the Shenandoah Valley and else- where. At this time took place the Red River Expedition, which was intended for the

subjugation of western Louisiana. The troops of General Banks and the war vessels under Admiral Porter moved up the Red river, and on the 16th of March 1864 reached Alexandria. Skirmishing constantly with the Confeder- ates under Kirby Smith and Taylor, the Federals eventually on the 8th and 9th of April suffered serious reverses at Sabine Cross Roads and Pleasant Hill. Banks thereupon retreated, and, high water in the river having come to an end, the fleet was in the gravest danger of being cut off, until Colonel Bailey suggested, and rapidly carried out, the construction of a dam and weir over which the ships ran down to the lower waters. Eventually the various forces retired to the places whence they had come.

25. The Wilderness Campaign. — Virginia was now destined to be the scene of the bloodiest fighting of the whole war. Grant and Meade, reinforced by Burnside's IX. Corps to a strength of 120,000 men, crossed the Rapidan on the 4th of May with the intention of attacking Lee's inner flank, that nearer Richmond. With a bare 70,000 men the Confederate general struck at the flank of Grant's marching columns in that same Wilderness where Jackson had won his last battle twelve months before. The battle of the Wilderness (q.v.) went on for two days, with little advantage to either side. On his part Grant had lost 1 8,000 men. Lee had lost fewer, but could ill spare them, and Longstreet had been severely wounded (May 5-6). Grant, astonished perhaps, but here as always resolute, tried again to reach Lee's right wing, and on the 8th another desperate battle began at Spottsylvania (q.v.) Court House. The fighting on this field lasted ten days, at the end of which Grant had doubled his losses and was as far as ever from success. On the 21st of May, with extraordinary pertinacity, he sent Meade and Burnside once more against the inner flank of the Army of northern Virginia. The action of North Anna ended like the rest, though on this occasion the loss was small. A week later the Federals, again moving to their left, arrived upon the ground on which McCIeHan had fought two years before, and at Cold Harbor (Porter's battle- field of Gaines' Mill) the leading troops of the Army of the James joined the lieutenant-general. Meanwhile the minor armies had come to close quarters all along the line. The Army of the James moved towards Richmond on the same day on which the Army of the Potomac crossed the Rapidan. On the 16th of May Butler fought the indecisive battle of Drury's Bluff against Beauregard, in consequence of which he had to retire to Bermuda Hundred, whence most of his troops were sent to join Grant. At the same time the Union troops under Sigel in the Shenandoah Valley were defeated at New Market (May 15). General Hunter, who

replaced Sigel, won a combat at Piedmont, and marched oh: the 8th of June towards Lynchburg. The danger threatening this important point caused Lee to send thither General Early with the remnants of Jackson's old Valley troops. Hunter's assault (June 1 8) failed, and the Federals, unable to hold their ground, had to make a circuitous retreat to the Potomac by way of West Virginia.

26. Cold Harbor. — On the 3rd of June at Cold Harbor (q.v.) took place the last of Grant's " hammering " battles in the open fields. The attack of the Federals failed utterly; not even Fredericksburg was so disastrous a defeat. Six thousand men fell in one hour's fighting, and the total losses on this field, where skirmishing went on for many days, were 13,000. But Grant was as resolute as ever. His forces once more manoeuvred against Lee's inner flank, still found no weak spot, and eventually arrived upon the James. The river was crossed, Lee as usual conforming to the movement, and on the 15th of June the Federals appeared before the works of Petersburg (q.v.). Here, and in the narrow neck of land between the Appomattox and the James, was the ganglion of the Confederacy, and the struggle for its possession was perhaps the greatest of modern history. A first assault made at once (June 15-18) failed with a loss of 815a men. Two sharp combats followed on the 22nd of June and the 2nd of July, as Grant once more began to feel Lee's right. But the anniversary of Gettysburg saw Lee's works still intact, and 72,000 men of the Army of the Potomac and the Army of the James had fallen since ■ the campaign had opened two months before. History has few examples to show comparable to this terrible campaign in Virginia. The ruthless determination of the superior leaders had been answered splendidly by the devotion of the troops, but the men of Chancellorsville and Gettysburg were mostly dead or wounded, and the recruits attracted by bounties or compelled by the " draft," which had at last been enforced ia the North, proved far inferior soldiers to the gallant veterans whom they replaced.

27. Petersburg. — There was no formal siege of Lee's position. A vast network of fortifications covered the front of both armies, whose flank extended far to the south-west, Grant seeking to capture, Lee to defend, the Danville railway by which the Con- federates received their supplies. Richmond, though no longer of paramount importance, was no less firmly held than Peters- burg, and along the whole long line fighting went on with little interruption. On the 30th

of July the Federal engineers exploded a mine under the hostile works, and Burnside's corps rushed to the assault. But the attempt ended in failure— the first defeat of the Army of the Potomac which could fairly be called. dis- creditable. Still, Lee was losing men, few it is true, but most precious, since it was impossible to replace them, while the North poured unlimited numbers into the Federal camps. The policy of " attrition " upon which Grant had embarked, and which he was carrying through regardless of his losses, was having its effect. About this time Early, freed from the opposition of Hunter's forces, made a bold stroke upon Washington. Crossing the' Potomac, he marched eastward, and, defeating a motley force (action of the Monocacy) which General Lew Wallace had collected to oppose him, appeared before the lines of Washington. The Federal capital was at the moment almost denuded of troops, and forces hastily despatched from the James only arrived just in time to save it. Thereupon the Confederates retired, narrowly escaping Hunter, and the brief campaign came to an end with an engagement at Kernstown. Early had been nearer to the immediate success than Lee had been in 1862 and 1863, but he had failed utterly to relax Grant's hold on Petersburg, which was becoming daily more crushing.

On the decisive theatre the Federals made their way, little by little and at a heavy cost, to the Weldon railway, and beyond it to the westward. Lee's lines were becoming dangerously extended, but he could not allow the enemy to cut him off from the west. On the 25th of August there was a battle at Reams Station, in which the Federals were forced back, and the famous II. Corps under Hancock was for the first time routed. But Grant was tireless, and five davs later another battle was fought, at

Peebles Farm, in which the lost ground.was regained. Butler and the Anny of; the James at the same time won some successes in front of the Richmond works. One more attempt to outflank Lee to the westward was made by Grant without success, before wintercame on, and the campaign closed with an expedition, under the .direction of General Warren, which destroyed the Weldon line. Grant had not reached Lee's flank at any point, and his casualties from first to last had been unprecedentedly heavy, but " hammering " was steadily prevailing where skill and valour had failed.

28. Sheridan's Valley Campaign. — In the closing months of the year Grant's brilliant cavalry commander Sheridan had been put in command of an army to operate against Early in the Valley. The Federals in this quarter had hitherto suffered from want of unity in

the command (e.g. Banks, Fremont and McDowell in 1862). The Army of the Shenandoah would not be thus handicapped, for Sheridan was a leader of exceptional character. The first encounter took place on the Opequan near Winchester. Early was defeated, but not routed(September 19), and another battle took place near Strasburg (Fisher's Hill) on the 22nd. Always disposing of superior numbers, Sheridan on this occasion won an important victory without much loss. A combat which took place, at Mount Jackson, during the pursuit, again ended successfully, and the triumphant Federals retired down, the Valley, ruthlessly destroying everything which might be of the slightest value to the enemy. Early sharply followed them up, his men infuriated by the devastation of the " Granary of the Confederacy." At Cedar Creek (q.v.), during a momentary absence of the Federal commander, his camps were surprised by Early (October 19).. The Army of the Shenandoah was routed and driven towards the Poitomac. But the gallant stand of the old : Potomac troops of the VI. Corps checked the Confederates. Sheridan arrived on the scene to find a new battle in progress. He was at his best at such a moment, and the rallied Federals under his command swept all before them. The victory was decisive, and, the country being now bare of supplies, the Army of the Shenandoah was sent to reinforce Grant, while the remnant of Early's forces also went to Petersburg. Sheridan's campaign was a. famous episode of the war. It was conducted with skill, though, with twice the numbers of the enemy at his.command, Sheridan's victory was a foregone conclusion. But he had at least shown that he possessed to an unusual degree the real attribute of a great captain— power over men.

29. Sherman and Johnston.— rMeanvrhile Sherman had fought hia Atlanta campaign. General Johnston opposed him almost on the old Chickamauga battle-ground, where the Federal commander, after a brief campaign in Mississippi and Alabama, the result of which was to clear his right flank (February. 3-March 6, 1864)., collected his armies — the Army of the Tennessee under McPherson, the Army of the Cumberland underThomas (Hooker's troops had now become part of this army) and the Army of the Ohio under Schofield. In the celebrated campaign of Atlanta the highest manceuvring skill was displayed by both the famous commanders. Whilst Grant, with his avowed object of crushing Lee's army, lostno opportunity of fighting a battle coute que caftte, Sherman, intent rather on the conquest of territory, acted on different lines. Johnston, than whom there was no better soldier in the Confederate service when a careful defence was required, disposed of sensibly inferior forces, and it was to be:

expected that the 18th-century methods of. making war by manceuvring and by combats, not battles, would receive a modern illustration in Georgia. Operations began early in May 1864, and five days of manceuvring and skirmishing about Resaca and Rocky Face ended in Johnston's retirement to Resaca. A fortnight later the same manoeuvres, combined with constant " tapping " at the Confederate defences, caused him to fall back again. At Adairs- ville the same process was gone through, and Johnston retired to Cassville, where he offered battle. Sherman was far too wary to be drawn into an action under unfavourable conditions. If each general had been able to obtain a great battle upon his own terms, each would have fought most willingly, for neither desired a use- less prolongation of the war. As it was, both declined to risk a

decision. Johnston's inferiority in numbers was now becoming lessened as Sherman had to detach more and more troops to his ever-lengthening communications with Chattanooga. Another manoeuvre brought about a heavy combat near Dallas (Pickett's Mills and New Hope Church, May 25-27). After a time Johnston fell back, and on the 6th of June the Federals appeared before Marietta (q.v.) . Hitherto neither leader had offered a weak spot to his opponent, though the constant skirmishing had caused a loss of 9000 men to Sherman and about two-thirds of that number to the Confederates. At this moment Sherman suddenly changed his policy and sent his troops straight against the hostile entrenchments. The neighbourhood of Marietta witnessed for the next fortnight very heavy fighting, notably at Pine Mountain on the 14th and Kenesaw on the 27th, both actions being frontal assaults gallantly pushed home and as gallantly repulsed. Sherman acted thus in order to teach his own men and the enemy that he was not " afraid," and the lesson was not valueless. He then resumed his manoeuvring, which was now facilitated by improved weather and better roads,

30. A tianta. — Johnston in due time evacuated the Marietta lines. On the 7th of July his fortifications on the Chattahoochee river were turned, and he fell back into the Atlanta (q.v.) position, which was carefully prepared, like all the others, beforehand. Here Johnston was deprived of his command. His campaign had not been unsuccessful, for Sherman had never succeeded in taking him at a disadvantage, but the whole of the South, including President Davis and his chief of staff General Bragg, clamoured for a more "

energetic " policy, and General J. B. Hood was put in command on the understanding that he should " fight." The new general, whose bold and skilful leading had been conspicuous on most of the Virginia battlefields, promptly did so. At first successful, the Confederates had in the end to retire. A few days after this battle (called Peach Tree Creek) took place the battle of Atlanta, which was fiercely contested by the veterans of both sides, and in which McPherson, one of the best generals in the Union army, was killed. Still, Hood was again beaten. The Army of the Tennessee, under its new commander General O. O. Howard, fought and won the battle of Ezra Church on the 28th of July, and, Atlanta being now nearly surrounded, Hood was compelled to adopt the Fabian methods of his predecessor, and fell back to the southward. An attack on the Army of the Ohio near Jonesboro concluded the Atlanta campaign, which left Sherman in control of Atlanta, but hampered by the neces- sity of preserving his communications with Chattanooga and weakened by a total loss of 30,000 men. In this celebrated campaign the American generals rivalled if they did not excel the exploits of Marlborough, Eugene and Villars, under allied conditions.

31. The March to the Sea. — Although General Canby, with a Federal force in the south, had been ordered to capture Mobile early in the year — after which he was to operate towards Atlanta — Mobile still flew the Confederate flag, and Hood, about to resume the offensive, was thus able to base himself on Mont- gomery in order to attack Sherman in flank and rear. But the Federal commander was not to be shaken off from his prize. He held firmly to Atlanta, clearing the city of non-combat- ants and in other ways making ready for a stubborn defence. Thomas and the Army of the Cumberland were sent back to guard Tennessee. A heavy attack on the post of Allatoona (to the garrison of which Sherman sent the famous message, " Hold the fort, for I am coming ") was repulsed (October 5). The main armies quickly regained contact, each edging away norths westwards towards the Tennessee and. coming into' contact at Gaylesville, Alabama, and again at Decatur. General Slocum with Hooker's old Potomac troops garrisoned Atlanta, and every important post along the railway to Chattanooga was held in force. Sherman had now resolved to execute his plan of a march through Georgia to the sea and thence through the Carolinas towards Virginia, destroying everything of military value en route. With the provisos that if Lee turned upon Sherman, Grant must follow him up sharply, and that Thomas could be left to deal with Hood (both of which could be, and were, done), the scheme

might well be decisive of the war. Preparations were carefully made.

Fifty thousand picked men were to march through Georgia with Sherman, and Thomas was to be reinforced by all other forces available. There was no force to oppose the "March to the Sea." Hood was far away on the Tennessee, which he crossed on the 29th of October at Tuscumbia, making for Nashville. Want of supplies checked the Confederates after a few marches, while Schofield was pressing forward to meet them at Pulaski and Thomas was gathering, at Nashville, a motley army drawn from all parts of the west. It was at this same time that Sherman broke up his railway communication, destroying Atlanta as a place of arms, and set out on his adventurous expedition There was little in his path. Skirmishes at Macon and Milledge- ville alone varied the daily routine of railway-breaking and supply-finding, in which a belt of country 60 m. wide was absol- utely cleared. On the 10th of December the army, thoroughly invigorated by its march, appeared before the defences of Savannah. On the 13th of December a division stormed Fort McAllister, and communication was opened with the Federal fleet. The march concluded with the occupation of Savannah on the 20th.

32. Nashville.— Hood, at a loss to divine Sherman's purpose^ hastened on into Tennessee amidst weather which would have stopped most troops. Schofield met him on the Duck river, while Thomas was shaping his army in rear. Hood manoeuvred Schofield out of his lines and pushed on once more. < At Franklin Schofield hadto accept battle, and thirteen distinct assaults on his works were made, all pushed with extraordinary fury and lasting far into the night. Thomas ordered his lieutenant to retire on Nashville, Hood following him up, impressing recruits, transports and supplies, and generally repeating the scenes of Bragg's march of 1862. The civil authorities and the lieutenant-general also urgently demanded that Thomas should advance. Constancy of purpose was the salient feature of Thomas's military character. He would not fight till he was ready. But this last great counter- stroke of the Confederacy alarmed the whole North. So great was the tension that Grant finally sent General J. A. Logan to take command. But before Logan arrived, Thomas had on the 1.5th and 16th of December fought and won the battle of Nashville (q.v.), the most crushing victory of the whole war. Hood's army was absolutely ruined. Only a remnant of it reassembled beyond the Tennessee.

33. The Carolinas.— From Savannah, Sherman started on his final march through the Carolinas. Columbia, his first objective, was reached on the 17th of February 1865. As usual, all that could be of possible value to the enemy was destroyed and^ by some accident, the town itself was burned. Sherman, like Sheridan, was much criticized

for his methods of reducing opposi- tion, but it does not seem that his " bummers " were guilty of wanton cruelty and;destructiveness, at least in> general,' though the cavalry naturally gave-more ground for the accusation than the main body of the army. And the methods of the Confeder- ates had on occasion been somewhat similar. The Confederate general Hardee managed to gather some force (chiefly from the evacuated coast towns) wherewith to oppose the onward progress of the Federals. As commander-in-chief, Lee now reappointed Johnston to command, and the latter soon attacked and very nearly defeated his old opponent at Bentonville (March 10-20). But the '< bummers K were no mere marauders,: but picked men from the armies that had won Vicksburg and Chatta- nooga, and, though surrounded, held their ground stoutly and successfully. Advancing once more, they were joined at Golds- boro by the forces lately besieging Fort Fisher (see below), and nearly_ 90,000 men marched northward towards Virginia, pushing Johnston's weak army before them. Meanwhile the bulk of the forces at Nashville had been sent to the north-east to close Leefe escape to the mountains, and in March the final campaign had opened at Petersburg.*

*- 34. The Final Campaign — At last Lee's men had lost heart in the unequal struggle. Sheridan raided the upper James and destroyed all supplies. Grant lay in front of the Armyiof northern Virginia with 125,000 men, and when active operation^*

began Lee had no resource but to try and escape to the south- west in order .to join Johnston. The western movement was covered by a furious sortie from the lines of Petersburg, which was repulsed with heavy loss. Grant felt that this was a mere feint to screen some other move, and instantly carried the Army of the Potomac to the westward, leaving a bare screen of troops in his lines. On the 29th of March the movement began, followed in rapid succession by the combats of White Oak Road and Din- widdie Court House and Sheridan's great victory of Five Forks. At the same time the VI. Corps at last carried the Petersburg lines by storm. Thereupon Lee and Longstreet evacuated the Peters- burg and Richmond lines and began their retreat. Their men were practically starving, though their rearguard showed a brave front. The remnant of Ewell's corps was cut off at Sailor's Creek, and when Sheridan got ahead of the Confederates while Grant furiously pressed them in the rear, surrender was inevitable (April 8). On the 9th the gallant remnant of

the Army of northern Virginia laid down its arms at Appomattox Court House, and the Confederacy came to an end. Johnston surrendered to Sherman at Durham Station on the 26th , and soon afterwards all the remain- ing Confederate soldiers followed their example. So ended the gigantic struggle, as to the conduct of which it is only necessary to quote, with a more general application, the envoi of a Federal historian, " It has not seemed necessary to me to attempt a eulogy of the Army of the Potomac or the Army of northern Virginia." The general terms of surrender were that the Con- federates should give up all material, and sign a parole not to take up arms again. There were no manifestations of triumph or exultation on the part of the victors, the lot of the vanquished was made as easy as possible, and after a short time the armies melted into the mass of the people without disturbance or disorder. A general amnesty proclaimed by the president of the United States on the 29th of May was the formal ending of the Civil War.

35. Character of the War. — No undisciplined levies could have fought as did the armies on both sides. Grave faults the men had, from the regular's point of view. They required humouring, and their march discipline was very elastic. But in battle the " think- ing bayonets " resolutely obeyed orders, even though it were to attack a Marye's Hill, or a " Bloody Angle," for they had under- taken their task and would carry it through unflinchingly. So much may be said of both armies. The great advantage of the Confederate — an advantage which he had in a less degree as against the hardier and country-bred Federal of the west — was that he was a hunter and rider born and bred, an excellent shot, and still not infrequently settled his quarrels by the duel. The town-bred soldier of the eastern states was a thoughtful citizen who was determined to do his duty, but he had far less natural aptitude for war than his enemy from the Carolinas or his comrade from Illinois or Kansas. At the same time the more varied con- ditions of urban life made him more adaptable to changes of climate and of occupation than the " Southron." Irish brigades served on both sides and shot each other to pieces as at Fredericks- burg. They had the reputation of being excellent soldiers. The German divisions, on the other hand, were rarely as good as the rest. The leading of these men was in the hands, as a rule, of regular or ex-regular officers, who made many mistakes in their handling of large masses, but had been taught at West Point and on the Indian frontier to command men in danger, and administer them in camp. The volunteer officers rarely led more than a division. When given high command at once they usually failed, but the best of them rose gradually to the superior ranks; Logan, for instance, became an

army commander, Sickles, Terry and others corps commanders. Cleburne, one of the best division commanders of the South, had been a corporal in the British army. Meagher, the leader of the " Irish brigade " at Fredericksburg, was the young orator of the " United Irishmen." But Lee, the Johnstons, McClellan, Grant and Sherman had all served in the old army. Most of them were young men in 1861. Stuart was twenty-eight, Sheridan thirty, Grant and Jackson under forty, while some of the subordinate generals were actually fresh from West Point.

36. Strategy and Tactics. — The roughness of much of the country gave a peculiar tone to the strategy of the combatants. Roads were untrustworthy, rivers swelled suddenly, advance and retreat were conditioned and compelled, especially in the case of the ill-equipped Confederates, by the exigencies of food supply. Long forward strides of the Napoleonic type were rarely attempted; " changes of base " were indeed made across country, and over considerable distances, as by Sherman in 1864, but ordinarily either the base and the objective were connected by rail or water, or else every forward step was, after the manner of Marlborough's time, organized as a separate campaign. Hence field fortifications played an unusually prominent part, time and material being available as a rule for works of solid construction. In isolated instances of more rapid campaigning — e.g. Antietam and Gettysburg — they were of subordinate importance. The attack and defence of these entrenchments led to tactical phenomena of unusual interest. Cavalry could not bring about the decision in such country, and sought a field for its restless activity elsewhere. Artillery had fallen, technically, far behind the infantry arm, and in face of long-range rifle fire could not annihilate the hostile line with case-shot fire as in the days of Napoleon. In a battle such as Chancellorsville or the Wilderness guns were almost valueless, since there was little open space in which they might be used. It thus fell to the infantry to attack and defend with its own weapons, and the defence was, locally, almost inexpugnable behind its tall breastworks. One line of works could be stormed, but there were almost always two or three retrenchments behind. The attacking infantry, who found it necessary to cross a fire-swept zone 1000 yds. broad, had to be used resolutely in masses, line following line, and each carrying forward the wrecks of its predecessor. Partial attacks were invariably costly failures. The use of masses was never put in practice more sternly than by Grant in 1864. At the same time, as has been said, the cavalry arm found plenty of work. The horses were not trained for European shock-tactics, nor did the country offer charging room,

and though melees of mounted men engaging with sword and pistol were not infrequent, the usual method of fighting was dismounted fire action, which was prac- tised with uncommon skill by the troopers on both sides. The far-ranging strategic " raid " was a notable feature of the war; freely employed by both sides, it was sometimes harmful, more usually profitable, especially to the South, by reason of the captures in material, the information acquired and the alarm and confusion created. These raids, and the more ordinary screening work, were never executed more brilliantly than by Lee's great cavalry general, " Jeb " Stuart, in Virginia, but the Federal generals, Pleasonton and Sheridan, did excellent work in the east, as also Wheeler and Forrest on the Confederate, Wilson and Grierson on the Federal, side in the west. The technical services, in which the mechanical skill and ingenuity of the American had full play, developed remarkable efficiency. Whether it was desired to build a railway bridge, disable a locomotive or cut a canal, the engineers were always ready with some happy expedi- ent. On one occasion an infantry division of 8000 men repaired 102 miles of railway and built 182 bridges in 40 days, forging their own tools and using local resources. Many novelties, too, such as the field telegraph, balloons and signalling, were employed.

37. The Union and Confederate Navies. — The naval war had been likewise fruitful of lessons for the future. Though wooden ships were still largely employed, the ironclad even then had begun to take a commanding place, and the sailing ship at last disappeared from naval warfare. Mines, torpedoes and sub- marines were all employed, and with the " Monitor " may fairly be said to have begun the application of mechanical science to the uses of naval war. The Federal navy was enormously expanded. Three hundred and thirteen steamers were brought into the service. Sloops of an excellent type were built for work on the high seas, of which the celebrated " Kearsarge " was one. Gun- boats were constructed so fast that they were called " ninety-day gunboats." Special reversible paddle steamers (called double- enders) were designed for service in the inlets and estuaries, and sixty-six ironclads were built and employed during the four

years. Mississippi river steamers were armed with heavy guns and protected by armour, boiler-plates, cotton bales, &c, and some fast cruisers were constructed for ocean work, one of them actually

reaching the high speed of 17-75 m – P er hour. The existing Federal navy of 1861 already included some large and powerful modern vessels, such as the " Minnesota " and " Powhatan." To oppose them the Confederates, limited as they were for means, managed to construct various ironclads, and to improvise a considerable fleet of minor vessels, and, though a fighting navy never assembled under a Confederate flag-officer, the Southern warships found another more damaging and more profitable scope for their activity. It has been said that the blockade of the Confederate coast became in the end practically impenetrable, and that every attempt of the Confederate naval forces to break out was checked at once by crushing numerical preponderance. The exciting and profitable occupation of blockade-running led to countless small fights off the various harbours, and sometimes the United States navy had to fight a more serious action when some new " rebel " ironclad emerged from her harbour, inlet or sound.

38. Fort Fisher. — Many of the greater combats in which the navy was engaged on the coast and inland have been referred to above, and thefighting before Charleston,NewOrleans,Mobileand Vicksburg is described in separate articles. One of the heaviest of the battles was fought at Fort Fisher in 1864. This place guarded the approaches to Wilmington, North Carolina. Troops under Butler and a large fleet under Admiral Porter were destined for this enterprise. An incendiary vessel was exploded close to the works without effect on the 23rd-24th of December, and the ships engaged on the 24th. The next day the troops were disembarked, only to be called off after a partial assault. B utler then withdrew, and Porter was informed on the 31st that " a competent force properly commanded " would be sent out. On the 8th of January 1865 General Terry arrived with the land forces, and the armada arrived off Fisher on the 12th. On the 13th, 6000 men were landed, covered by the guns of the fleet, and, after Porter had subjected the works to a terrific bombardment, Fisher was bril- liantly carried by storm on the 15th. Reinforcements arriving, the whole force then marched inland to meet Sherman.

39. Other Naval Actions. — Apart from this, and other actions referred to, two incidents of the coast war call for notice — the career of the " Albemarle " and the duel between the " Atlanta " and the " Weehawken." The ironclad ram " Albemarle," built at Edwards' Ferry on the Roanoke river, had done considerable damage to the Federal vessels which, since Burnside's expedition to Newberne, had cruised in Albemarle Sound, and in 1864 a force of double-enders and gunboats, under Captain Melancton Smith, U.S.N., was given the special task of destroying the rebel ram. A naval battle was

fought on the 5th of May 1864, in which the double-ender " Sassacus " most gallantly rammed the " Albemarle " and was disabled alongside her, and Smith's vessel and others, unarmoured as they were, fought the ram at close quarters. After this the ironclad retired upstream, where she was eventually destroyed in the most daring manner by a boat's crew under Lieutenant W. B. Cushing. Making his way up the Roanoke as far as Plymouth he there sank the ironclad at her wharf by exploding a spar-torpedo (October 27). On the 17th of June 1863 after a brief action the monitor " Weehawken " captured the Confederate ironclad " Atlanta " in Wassaw Sound, South Carolina. This duel resembled in its attendant circumstances the famous fight of the " Chesapeake " and the " Shannon." Captain John Rodgers, like Broke, was one of the best officers, and the " Weehawken," like the "Shannon," was known as one of the smartest ships in the service. Five heavy accurate shots from the Federal's turret guns crushed the enemy in a few minutes.

40. The Commerce- Destroyers. — Letters of marque were issued to Confederate privateers as early as April 1861, and Federal commerce at once began to suffer. When, however, surveillance became blockade, prizes could only with difficulty be brought into port, and, since the parties interested gained nothing by burning merchantmen, privateering soon died out, and was replaced by

commerce-destroying pure and simple, carried out by com- missioned vessels of the Confederate navy. Captain Raphael Semmes of the C.S.S. " Sumter" made a successful cruise on the high seas, and before she was abandoned at Gibraltar had made seventeen prizes. Unable to build at home, the Confederates sought warships abroad, evading the obligations of neutrality by various ingenious expedients. The " Florida " (built at Liverpool in 1861-1862) crossed the Atlantic, refitted at Mobile, escaped the blockaders, and fulfilled the instructions which, as her captain said, " left much to the discretion but more to the torch." She was captured by the U.S.S. " Wachusett " in the neutral harbour of Bahia (October 7, 1862). The most suc- cessful of the foreign-built cruisers was the famous " Alabama," commanded by Semmes and built at Liverpool. In the course of her career she burned or brought into port seventy prizes, fought and sank the U.S.S. " Hatteras " off Galveston, and was finally sunk by the U.S.S. " Kcarsarge," Captain Winslow, off Cherbourg (June 10, 1864). The career of another promising cruiser, the " Nashville," was summarily ended by the Federal monitor "Montauk" (February 28,1863). The "Shenandoah" was burning Union whalers in the Bering Sea when the war came to an end. None of the various " rams " built abroad for the " rebel " government ever came into action.

The difficulties of coaling and the obligations of neutrality hampered these commerce-destroyers as much as the Federal vessels that were chasing them, but, in spite of drawbacks, the guerre de course was the most successful warlike operation undertaken by the Confederacy. The mercan- tile marine of the United States was almost driven off the high seas by the terror of these destructive cruisers.

41. Cost of the War. — The total loss of life in the Union forces during the four years of war was 359,528, and of the many thousands discharged from the services as disabled or otherwise unfit, a large number died in consequence of injuries or disease incurred in the army. The estimate of 500,000 in all may be taken as approximately correct. The same number is given as that of the Southern losses, which of course fell upon a much smaller population. The war expenditure of the Federal govern- ment has been estimated at $3,400,000,000; the very large sums devoted to the pensions of widows, disabled men, &c, are not included in this amount (Dodge). In 1879 an estimate made of all Federal war expenses up to that date, including pension charges, interest on loans, &c, showed a total of $6,190,000,000 (Dewey, Financial History of the United States).

Bibliography. — The United Statesgovernment'sO$«W .Records 0/ the Union and Confederate Armies (70 vols., most of which are divided into two or three " parts," and atlas, 1880-1900) include every im- portant official document of either side that it was possible to obtain in the course of many years' work. A similar but less voluminous work is the Records of the Union and Confederate Navies (1894-) ; The Rebellion Record (1862-1868), edited by F. W. Moore, a contem- porary collection, has been superseded to a great extent by the official records, but is still valuable as a collection of unofficial docu- ments of all kinds. Battles and Leaders of the Civil War (1887-1889) is a series of papers, covering the whole war, written by the prominent commanders of both sides. The sixteen volumes of the Campaigns of the Civil War (1881-1882) and the Navy in the Civil War (1883) (written by various authors) are of very unequal merit, but several of the volumes are indispensable to the study of the Civil War. Of general works the following are the best : — Comte de Paris, History of the Civil War in America, translated from the French (1875ˆ1888) ; Horace Greeley, The American Conflict (1864-1866); J. Scheibert, Der Biirgerkrieg i. d. Nordam. Freistaaten (Berlin, 1874) ; Wood and Edmonds, Civil War in the United States (London, 1905) ; T. A. Dodge, Bird's Eye View of our Civil War (revised edition, 1887) ; E. A. Pollard, A Southern

History of the War (1866). The con- temporary accounts mentioned should be studied with caution. Of critical works, J. C. Ropes, The Story of the Civil War (1894-1898); G. F. R. Henderson, Stonewall Jackson and the American Civil War (London, 1898) and The Science of War, chapters viii. and ix. (London, 1905) ; C. C. Chesney, 'Essays in Military Biography (1874) ; Freytag-Loringhoven, Studien ilber Kriegfiihrung, 1861-186ˆ (Berlin, 1901-1903), are the most important. Publications of the Military Historical Society of Massachusetts (vols, i.-x., 1881 onwards) also comprise critical accounts of nearly all the important campaigns. A critical account of the Virginian operations and the Chickamauga campaign is Gen. E. P. Alexander's Military Memoirs of a Confederate (1906). C. R. Cooper, Chronological and Alphabetical Record of the Great Civil War (Milwaukee, 1904) may be mentioned as a work of reference.

A fairly complete bibliography will be found in J. N. Lamed, Litera- ture of American History (Boston, 1902), and useful lists in Ropes, op. cit., and in the Cambridge Modern History, vol. vii. p. 812. For biographies, memoirs and general works, see the lists appended to the various biographical articles and to the articles United States and Confederate States. (C. F. A.)

AMERICAN LAW. The laws of the various states and terri- tories of the United States rest at bottom on the same foundation as those of England, namely, the English common law as it existed at the beginning of the 17 th century. (See English Law.) The only exceptions worth noting are to be found in the state of Louisiana, the territory of New Mexico, and the acquisi- tions following the Spanish war of 1898. Those derive most of their law from France or Spain, and thus remotely from the principles of Roman jurisprudence. A part also, but compara- tively a small part , of the law of Texas, Missouri, Arizona and the Pacific states comes from similar sources. The United States as a whole has no common law, except so far as its courts have followed the rules of English common-law procedure in determin- ing their own. Most of the positive law of the United States comes from the several states. It is the right of each state to regulate at its pleasure the general relations of persons within its territory to each other, as well as all rights to property subject to its jurisdiction. Each state has also its own system of adjective law. The trial courts of the United States of original jurisdiction follow in general the

practice of the state in which they sit as to procedure in cases of common-law character. As to that in equity, or what means the same thing, chancery causes, they follow in general the practice of the English court of chancery as it existed towards the close of the 18th century, when the original Judiciary Act of the United States was adopted. The public statutes of the United States are to be found in the Revised Statutes of 1875, and in the succeeding volumes of the Statutes at Large, enacted by each Congress. Those of each state and territory are printed annually or biennially as they are enacted by each legis- lature, and are commonly revised every fifteen or twenty years, the revision taking the place of all former public statutes, and being entitled Revised Statutes, General Statutes, or Public Laws. The private or special laws of each state, so far as such legislation is permitted by its constitution, are in some states published separately, and made the subject of similar compilations or revisions; in others they are printed with the public session laws. American courts are often given power by statute to make rules of procedure which have the force of laws. Municipal sub- divisions of a state generally have authority from the legislature to make ordinances or by-laws on certain subjects, having the character of a local law, with appropriate sanctions, commonly by fine or forfeiture.

Law in the United States has been greatly affected by the results of the Civil War. During its course (1861-1865) the powers of the president of the United States may be said to Amend- ˆ ave Deen re-defined by the courts. It was its first civil meat. war, and thus for the first time the exercise of the military authority of the United States within a state which had not sought its aid became frequent and necessary. Next followed the amendments of the Constitution of the United States having for their special purpose the securing beyond question of the permanent abolition of slavery and the civil and political rights of the coloured race. At the outset the Supreme Court of the United States was inclined to treat them as having a very limited operation in other directions. One of the provisions of the XIV th Amendment is that no state shall deny to any person within its jurisdiction the equal protection of the laws. The benefit of this guarantee was claimed by the butchers of New Orleans, in contending against a monopoly in respect of the slaughter of cattle granted by the state of Louisiana to a single corporation. Their suit was dismissed by (he Supreme Court in 1873, with the expression of a doubt whether any action of a state not directed by way of discrimination against the negroes as a class, o on account of their race, would ever be held to come ■within the purview of the provision in question. 1 The chief justice and three of his associates*

dissented from the judgment, 1 The Slaughter-House Cases, 16 Wallace's Reports, 36, 81.

holding that the XIV th Amendment did protect the citizens of the United States against the deprivation of their common rights by state legislation. 2 Public sentiment supported the view of the minority, and it was not long before changes in the personnel of the court, occurring in common course, led it to the same conclusions. The protection of the XIV th Amendment is now invoked before it more frequently than is that afforded by any other article of the Constitution. In one of its recent terms twenty-one cases of this nature were decided. 3 Very few of them related to the negro. Since the decision in the Slaughter-House Cases, the controversies as to the constitutional rights of the negro have been comparatively infrequent, but there has been a great and steadily increasing number in all the courts in the country, involving questions of discrimination in favour of or against particular individuals, or of changes affecting the rights of parties in the accustomed forms of judicial procedure.

Down to 1868, when this amendment was adopted, it was, as to most matters, for the state alone to settle the civil rights and immunities of those subject to its jurisdiction. If they were to be free from arbitrary arrests, secure in liberty and property, equal in privilege and entitled to an impartial administration, it was because the constitution of the state so declared. Now they have the guarantee of the United States that the state shall never recede from these obligations. This has readjusted and reset the whole system of the Ameiican law of personal rights. 4

The Supreme Court of the United States has used the great power thus confided to it with moderation. Its general rules of decision are well stated in these words of Mr Justice Brown, found in one of its recent opinions: —

" In passing upon the validity of legislation, attacked as contrary to the XlVth Amendment, it has not failed to recognize the fact that the law is, to a certain extent, a progressive science; that in some of the states methods of procedure, which at the time the constitution was adopted were deemed essential to the protection and safety of the people or to the liberty of, the citizen, have been found to be no longer necessary ; that restrictions which had formerly been laid upon the conduct of individuals, or of classes of individuals, had proved detrimental to their interests; while, upon the other hand, certain other classes of persons, particularly those engaged in dangerous or unhealthful employments, have been found to be in

need of additional protection. Even before the adoption of the constitution, much had been done toward mitigating the severity of the common law, particularly in the administration of its criminal branch. The number of capital crimes, in this country at least, had been largely decreased. Trial by ordeal and by battle had never existed here, and had fallen into disuse in England. The earlier practice of the common law, which denied the benefit of witnesses to a person accused of felony, had been abolished by statute, though, so far as it deprived him of the assistance of counsel and compulsory process for the attendance of his witnesses, it had not been changed in England. But, to the credit of her American colonies, let it be said that so oppressive a doctrine had never obtained a foothold there. The 19th century originated legal reforms of no less importance. The whole fabric of special pleading, once thought to be necessary to the elimination of the real issue between the parties, has crumbled to pieces. The ancient tenures of real estate have been largely swept away, and land is now transferred almost as easily and cheaply as personal property. Married women have been emancipated from the control of their husbands, and placed upon a practical equality with them with respect to the acquisition, possession and trans- mission pi property. Imprisonment for debt has been abolished. Exemptions from executions have been largely added to, and in most of the states homesteads are rendered incapable of seizure and sale upon forced process. Witnesses are no longer incompetent by reason of interest, even though they be parties to the litigation. Indictments have been simplified, and an indictment for the most serious of crimes. is now the simplest of all. In several of the states grand juries, formerly the only safeguard against a malicious prosecu- tion, have been largely abolished, and in others the rule of unanimity, so far as applied to civil cases, has given way tp verdicts rendered, by a three-fourths majority. This case does not call for an expression of opinion as to the wisdom of these changes, or their validity under the XlVth Amendment,, although the substitution of prosecution by information in lieu of indictment was recognized as valid in Hurtado v. California, no U.S. 516. They are mentioned only for the purpose of calling attention to the probability that other changes of no less importance may be made in the future, and that while the cardinal principles of justice are immutable, the methods by which justice

! Ibid. 89, in, 129.

3 Guthrie on the Fourteenth Amendment, 27.

4 Baldwin's Modern Political Institutions, in, 112.

is administered are subject to constant fluctuation, and that the Constitution of the United States, which is necessarily and to a large extent inflexible and exceedingly difficult of amendment, should not be so construed as to deprive the states of the power to amend their laws so as to make them conform to the wishes of the citizens as they may deem best for the public welfare without bringing them into conflict with the supreme law of the land. Of course, it is impossible to forecast the character or extent of these changes, but in view of the fact that from the day Magna Carta was signed to the present moment, amendments to the structure of the law have been made with increasing frequency, it is impossible to suppose that they will not continue, and the law be forced to adapt itself to new conditions of society, and particularly to the new relations between employers and employees, as they arise." 1

The Civil War deeply affected also the course of judicial decision in the southern states. During its progress it engaged the attention of a very large part of the population, and the business of the courts necessarily was greatly lessened. Upon its close political power passed, for a time, into new hands, and many from the northern and western states took prominent positions both at the bar and on the bench. The very basis of society was changed by the abolition of slavery. New state constitutions were adopted, inspired or dictated by the ideas of the North. The transport system was greatly extended, and commerce by land took to a large extent the place formerly filled by commerce by navigation. Manufacturing came in to supplement agricultural industry. Cities grew and assumed a new importance. Northern capital sought investment in every state. It was a natural con- sequence of all these things that the jurisprudence of the South should come to lose whatever had been its distinctive character. The unification of the nation inevitably tended to unify its law.

An important contribution towards this result was made by the organization of the American Bar Association in 1878. Of the fourteen signers of the call for the preliminary Associit- conference, five were from the southern states. Its Uob. declared objects were " to advance the science of juris-

prudence, promote the administration of justice and uniformity of legislation throughout the Union, uphold the honour of the profession of the law, and encourage cordial intercourse among the members of

the American Bar."

Largely through its efforts, the American law schools have taken on a new character. The course of study has been both broadened and prolonged, and the attendance of students has schools. increased in full proportion to the additions to the facilities for obtaining a more thorough training in the profession. When the association commenced its labours, those studying law in the offices of practising lawyers very largely out- numbered those found in the law school. The proportion is now reversed. During the year 1900, for instance, the state board of law examiners in New York examined 899 applicants for admission to the bar of that state. Of these all but 157 had received their legal education wholly or in part at a law school. 2 In 1878 few law schools had adopted any system of examination for those desiring to enter them. Such a requirement for admission is now common. In only one school were opportunities then afforded for advanced studies by graduate students with a view to attaining the doctorate in law. Courses of this description are now offered by several of the university schools.

A more scientific character has thus been taken on by American law. It is noticeable both in legal text-books and in the opinions of the courts of last resort. In the latter precision of statement and method in discussion are invited by the uniform practice of preparing written opinions. The original practice of reading these from the bench has been generally discontinued. They are simply handed down to an official reporter for publication, which is done at the expense of the government by which the court is commissioned. With the judicial reports of each state the lawyers of that state are required to be familiar; and this is rendered possible, even in the larger ones, by state digests, prepared every few years by private enter- prise. Outside of the state their circulation is comparatively limited, though sets of all are generally found in each state library,

1 Holden v. Hardy, 169 United States Reports, 336, 385-387. 2 Columbia Law Review, i. 99.

Reports.

and of many in the Bar libraries at the principal county seats. The private libraries of lawyers in large practice also often cori^ tain the reports of adjoining and sometimes those of distant states as well as those of their own and of the Supreme Court of the United States. The decisions of one state, however, are now best known in others through unofficial reports. One large publishing concern prints every

case decided in the courts of last resort. They are published in several distinct series, those, for instance, coming from the northern Atlantic states being grouped together as the Atlantic Reporter, and those from the states on the Pacific coast- as the Pacific Reporter. Another house has published a compilation professing to give all the leading American cases from the first to the latest volume of reports. Another makes a similar selection from the decisions of each year as they appear, and publishes them with critical annotations. There are also annual digests of a national character, comprehending substantially all American cases and the leading English cases reported during the preceding year.

These various publications are widely diffused, and so the American lawyer is enabled, in preparing for the argument of any cause involving questions of difficulty, to inform himself with" ease of such precedents'as may apply. A court in Texas is thus as likely to be made acquainted with a decision in Maine or Oregon as with one in any nearer state, and in the development of American law all American courts are brought in close touch with each other.

This tendency has been advanced by the steady growth of codification. That is beginning also to serve to bring English and American law nearer together in certain directions. Englisn A Negotiable Instruments Act, promoted by the and American Bar Association, and prepared by a confer- American ence of commissioners appointed by the several states '*

to concert measures of uniform legislation, has been adopted in the leading commercial states. It is founded upon the English " Chalmers's Act," and the English decisions giving a construction to that have become of special importance. The acts of partial ment known as the Employers' Liability Act and the Railway and Canal Traffic Act have also served as the foundation of similar legislation in the United States, and with the same result. Modern English decisions are, however, cited less frequently in American courts than the older ones; and the older ones them- selves are cited far less frequently than they once were. In the development of their legislation, England and the United States have been in general harmony so far as matters of large com- mercial importance are concerned, but as to many others they have since 1850 drawn apart. Statutes, at one point or .another, probably now affect the disposition of most litigated causes in both countries. Their application, therefore, must serve more or less to obscure or displace general principles, which might other- wise control the decision and make it a source of authority in foreign tribunals. The movement of*

the judicial mind in the United States, and also its modes and form of expression, have a different measure from that which characterizes what comes from the English bench. American judges are so numerous, and (except as to the Supreme Court of the United States) the extent of their territorial jurisdiction so limited, that they can give more time to the careful investigation of points of difficulty, and also to the methodical statement of their conclusions. Whatever they decide upon appeal being announced in writing, and destined to form part of the permanent published records of the state, they are expected and endeavour to study their words and frame opinions not only sound in law but unobjectionable as literary, compositions.

The choice of American judges, particularly in the older states, has been not uninfluenced by these considerations. Marshall, Bushrod Washington, Story, Kent, Ware, Bradley, and many of their contemporaries and successors, were put upon the bench in part because of their legal scholarship and their power of felicitous expression. Hence the better American opinions have more elaboration and finish than many which come from the English courts, and are more readily accepted as authorities by American judges. But the great multiplication of reports haS

so widened the field of citation as in effect to reduce it. Each of the larger and older states has now a settled body of legal precedent of its own, beyond which its judges in most cases do not look. If a prior decision applies, it is controlling. If there be none, they prefer to decide the case, if possible, on principle rather than authority.

While the state courts are bound to accept the construction placed upon the Constitution and laws of the United States by the Supreme Court of the United States, and thus uniformity of decision is secured in that regard, the courts of the United States, on the other hand, are as a rule obliged to accept in all other particulars the construction placed by the courts of each state on its constitution and laws. This often gives a seeming incon- gruity to the decisions of the Supreme Court of the United States. A point in a case coming up from one judicial circuit may be determined in a way wholly different from that followed in a previous judgment in a cause turning upon the same point, but appealed from another circuit, because of a departure from the common law in one state which has not been made in another. In view of this, a doctrine originally proposed by

Mr Justice Story in 1842 l has not been infrequently invoked of late years, which rests upon the assumed existence of a distinctive federal jurisprudence of paramount authority as to certain matters of general concern, as for example those intimately affecting commerce between the states or with foreign nations. The consequence is that a case involving such questions may be differently adjudged, according as it is brought in a state or in a federal court. 2

The divergences now most noticeable between English and American law are in respect of public control over personal liberty and private property, criminal procedure and the scope of the powers of municipal corporations.

Under the constitutional provision that no one shall be deprived of life, liberty or property without due process of law, American courts frequently declare void statutes which in England would be within the acknowledged powers of parliament. These provisions are liberally expounded in favour of the individual, and liberty is held to include liberty of contract as well as of person. Criminal procedure is hedged about with more refinements and safeguards to the accused than are found in England, and on the other hand, prosecutions are more certain to follow the offence, because they are universally brought by a public officer at public expense. The artificiality of the proceed- ings is fostered by a general right of appeal on points of law to the court of last resort. It is in criminal causes involving questions of common-law liability and procedure 3 that English law-books and reports are now most frequently cited. American municipal corporations are confined within much narrower limits than those of England, and their powers more strictly construed.

Trial by jury in civil causes seems to be declining in public esteem. The expenses necessarily incident to it are naturally th lb increasing, and the delays are greater also from a lury. general tendency, especially in cities, where most

judicial business is transacted, to reduce the number of hours a day during which the court is in session. The require- ment of unanimity is dispensed with in a few states, and it has been thus left without what many deem one of its essential features. The judge interposes his authority to direct and expedite the progress of the trial less frequently and less per-

1 Swift v. Tyson, 16 Peter?' Reports, 1, 19.

- *See Forepaugh v. Delaware, Lackawanna & Western Railroad*

Company, 128 Pennsylvania State Reports, 267; Faulkner v. Hart, 82 New York Reports, 313; and Lake Shore & Michigan Southern Railway Company v. Prentice, 147 United States Reports, 101.

3 See, as examples, Commonwealth v. Rubin, 165 Massachusetts Reports, 453, in which Holmes, CJ., traces the rule that, if a man abuse an authority given him by the law, he becomes a trespasser ab initio, back to the Year Books; and Commonwealth v. Cleary, 172 Massachusetts Reports, 175, in which the same judge refers to Glanville and Fleta as authority for the proposition that the admission in evidence, in cases of rape, of complaints made by the woman soon after the commission of the offence is a perverted survival of the old rule that she could not bring an appeal unless she had made prompt hue and cry.

emptorily than in England. A jury is waived more often than formerly, and there is a growing conviction that, with a capable and independent judiciary, justice can be looked for more confidently from one man than from thirteen.

The United States entered on the work of simplifying the forms of pleading earlier than England, but has not carried it so far. Demurrers have not been abandoned, and in some states little has been done except to replace one system of formality by another hardly less rigid. The general plan has been to codify the laws of pleading by statute. In a few states they have proceeded more nearly in accordance with the principles of the English Judicature Act, and left details to be worked out by the judges, through rules of court. 4

Most of the state constitutions assume that the powers of government can be divided into three distinct departments, executive, legislative and judicial; and direct such a distribution. In thus ignoring the administrative tatunfaad functions of the state, they have left a difficult que-itxn the courts. for the courts, upon which the legislature often seeks in part to cast them. The general tendency has been to construe, in such circumstances, the judicial power broadly, and hold that it may thus be extended over much which is rather to be called quasi-judicial. 6 A distinction is taken between entrusting juris- diction of this character to the courts, and imposing it upon them. Where the statute can be construed as simply permissive, the authority may be exercised as a matter of grace, when it would be peremptorily declined, were the meaning of the legislature that it must be accepted. 6 The courts, for similar reasons, have generally declined (in the absence of any constitutional require- ment to that

effect) to advise the legislature, at its request, whether a proposed statute, if enacted, would be valid. While its validity, were it to be enacted, might become the subject of a judicial decision, it is thought for that reason, if for no other, to be improper to prejudge the point, without a hearing of parties interested. The constitutions of several states provide for such a proceeding, and in these the Supreme Court is not infrequently called upon in this way, and gives responses which are always considered decisive of legislative action, but would not be treated as conclusive in any subsequent litigation that might arise.

The general trend of opinion in the Supreme Court of the United States since 1870, upon questions other than those arising under the XlVth Amendment, has been towards recog- nizing the police power of the several states as entitled power to a broad scope. Even, for instance, in such a matter of states. as the regulation of commerce between different states, it has been upheld as justifying a prohibition against running any goods trains on a Sunday, and a requirement that all railway cars must be heated by steam. 7 In the " Granger Cases," 8 the right of the state to fix the rate of charges for the use of a grain elevator for railway purposes, and for general railway services of trans- portation, was supported, and although the second of these was afterwards overruled, 9 the principle upon which it was originally rested was not shaken.

On the other hand, reasons of practical convenience have necessarily favoured the substantial obliteration of state lines as to the enforcement of statutory private rights. Massachusetts in 1840, six years before the passage of Lord Campbell's Act, provided a remedy by indictment for the negligent killing of a man by a railway company, a pecuniary penalty being fixed which the state was to collect for the benefit of his family. In most of the other states by later statutes a similar result has been reached through a civil action brought by the executor or administrator

4 This has been carried furthest in Connecticut. See Botsford v. Wallace, 72 Connecticut Reports, 195.

5 Norwalk Street Railway Company's Appeal, 69 Connecticut Reports, 576; 38 Atlantic Reporter, 708.

6 Zanesville v. Zanesville Telephone Company, 63 Ohio State Re- ports, 442; 59 North-Eastern Reporter, 109.

7 New York Railroad v. New York, 165 United States Reports, 628.

8 Munn v. Illinois, 94 United States Reports, 1 13; Chicago Railroad Company v. Iowa, ibid. 155. –

9 Wabash Railway Company v. Illinois, 118 United States Reports, 557 ; Reagan v. Farmers' Loan and Trust Company, 154 Un't^ States Reports, 362.

Begin- nings.

as an agent of the law. In some, however, the state must be the plaintiff; in others the widow, if any there be. The accident resulting in death often occurs in a state where the man who was killed does not reside, or in which the railway company does not have its principal seat. It may therefore be desirable to sue in one state for an injury in another. Notwithstanding such an action is unknown to the common law, and rests solely on a local statute, the American courts uniformly hold that, when civil in form, it can be brought under such statutes in any state the public policy of which is not clearly opposed to such a remedy. In like manner, the responsibilities of stockholders and directors of a moneyed corporation, under the laws of the state from which the charter is derived, are enforced in any other states in which they may be found. Thus a double liability of stockholders to creditors, in case of the insolvency of the company, or a full liability to creditors of directors who have made false reports or certificates regarding its financial condition, is treated as of a contractual nature, and not penal in the international sense of that term. 1 As a judgment of one state has equal force in another, so far as the principle of res adjudicata is concerned, the orders of a court in a state to which a corporation owes its charter, made in proceedings for winding it up, may be enforced to a large extent in any other. The shareholders are regarded as parties by representation to the winding-up proceedings, and so bound by decrees which are incidental to it. 2

The provisions of the United States law on different subjects and the literature concerning them are given in the separate articles. See the bibliography to the article Law; also Cooley on The Con- stitutional Limitations which rest upon the Legislative Power of the Stales of the American Union; Andrews on American Law; and Russell on The Police Power of the State, and Decisions thereon as illustrating the Development and Value of Case Law. (S. E. B.)

AMERICAN LITERATURE. The earliest books which are commonly described as the beginnings of American literature were written by men born and bred in England; they were published there; they were, in fact, an undivided part of English literature, belonging to the province of exploration and geographical description and entirely similar in matter and style to other works of voyagers and colonizers that illustrate the expansion of England. They contain the materials of history in a form of good Elizabethan narrative, always vigorous in language, often vivid and pictur- esque. John Smith (1579-1631) wrote the first of these, A True Relation of such Occurrences and Accidents of Note as hath happened in Virginia (1608), and he later added other accounts of the country to the north. William Strachey, a Virginian official of whom little is known biographically, described (1610) the ship- wreck of Sir Thomas Gates on the Bermudas, which is believed to have yielded Shakespeare suggestions for The Tempest. Colonel Henry Norwood (d. 1689), hitherto unidentified, of Leck- hampton, Gloucestershire, a person eminent for loyalty in the reign of Charles I. and distinguished in the civil wars, later governor of Tangiers and a member of parliament for Gloucester, wrote an account of his voyage to Virginia as an adventurer, in 1649. These are characteristic works of the earliest period, and illustrate variously the literature of exploration which exists in numerous examples and is preserved for historical reasons. The settlement of the colonies was, in general, attended by such narratives of adventure or by accounts of the state of the country or by documentary record of events. Thus George Alsop (b. 1 638) wrote the Character of the Province of Maryland (1666), and Daniel Denton a Brief Description of New York (1670), and in Virginia the progress of affairs was dealt with by William Stith (1680-1755), Robert Beverly (f. 1700), and William Byrd (1674- 1744). Each settlement in turn, as it came into prominence or provoked curiosity, found its geographer and annalist, and here and there sporadic pens essayed some practical topic. The product, however, is now an indistinguishable mass, and titles and authors alike are found only in antiquarian lore. The

1 Huntington v. Altrill, 146 United States Reports, 657.

2 Great Western Telegraph Company v. Purdy, 162 United States Reports, 329; Fish v. Smith, 73 Connecticut Reports, 377; 47 Atlantic Reporter, 710.

distribution of literary activity was very uneven along the sea-board; it was naturally greatest in the more thriving and important colonies, and bore some relation to their commercial prosperity and political

activity and to the closeness of the con- nexion with the home culture of England. From the beginning New England, owing to the character of its people and its ecclesiastical rule, was the chief seat of the early literature, and held a position apart from the other colonies as a community characterized by an intellectual life. There the first printing press was set up, the first college founded, and an abundant literature was produced.

The characteristic fact in the Puritan colonies is that literature there was in the hands of its leading citizens and was a chief concern in their minds. There were books of exploration and description as in the other colonies, such as William Wood's (d. 1639) New England's Prospect (1634), and John Jos'selin's New England's Rarities (1672), and talcs of adventure in the wilderness and on the sea, most commonly described as " re- markable providences," in the vigorous Elizabethan narrative; but besides all this the magistracy and the clergy normally set themselves to the labour of history, controversy and counsel, and especially to the care of religion. The governors, beginning with William Bradford (1590-1657) of Plymouth, and John Winthrop (1 588-1649) of Massachusetts Bay, wrote the annals of their times, and the line of historians was continued by Winslow, Nathaniel Morton, Prince, Hubbard and Hutchinson. The clergy, headed by John Cotton (1585-1652), Thomas Hooker (i586?-i647), Nathaniel Ward (i579?-i652), Roger Williams (1600-1683), Richard Mather (1596-1669), John Eliot (1604- 1690), produced sermons, platforms, catechisms, theological dissertations, tracts of all sorts, and their line also was continued by Shepard, Norton, Wise, the later Mathers and scores of other ministers. The older clergy were not inferior in power or learning to the leaders of their own communion in England, and they commanded the same prose that characterizes the Puritan tracts of the mother country; nor did the kind of writing deteriorate in their successors. This body of divines.in successive generations gave to early New England literature its overwhelming ecclesi- astical character; it was in the main a church literature, and its secular books also were controlled and coloured by the Puritan spirit. The pervasiveness of religion is well illustrated by the three books which formed through the entire colonial period the most popular domestic reading of the Puritan home. These were The Bay Psalm Book (1640), which was the first book published in America; Michael Wigglesworth's (1631-1705) Dtiy of Doom (1662), a doggerel poem; and the New England Primer (c. 1690), called " the Little Bible." The sole voice heard in opposition was Thomas Morton's satirical New English Canaan (1637), whose author was sent out of the colony for

the scandal of Merrymount, but satire itself remained religious in Ward's Simple Cobbler of Agawam (1647). Poetry was represented in Anne Bradstreet's (1612-1672) The Tenth Muse lately sprung up in America (1650), and was continued by a succession of doggerel writers, mostly ministers or schoolmasters, Noyes, Oakes, Folger, Tompson, Byles and others. The world of books also included a good proportion of Indian war narratives and treatises relating to the aborigines. The close of the 17 th century shows literature, however, still unchanged in its main position as the special concern of the leaders of the state. It is Chief-Justice Samuel Sewall's (1652-1730) Diary (which remained in manuscript until 1878) that affords the most intimate view of the culture and habits of the community; and he was known to his contempor- aries by several publications, one of which, The Selling of Joseph (1700), was the first American anti-slavery tract.

The literature of the first century, exemplified by these few titles, is considerable in bulk, and like colonial literature else- where is preserved for historical reasons. In general, PaHt – it records the political progress and social conditions fc|n> of the Puritan state, and the contents of the Puritan mind. The development of the original settlement took place without any violent check. Though the colony was continually recruited by fresh immigration, the original 20,000 who

arrived before 1640 bad established the . principles of the state, and their will and ideas remained dominant after the Restoration as before. It was a theocratic state controlled by the clergy, and yet containing the principle of liberty. The second and third generations born on the soil, nevertheless, showed some decadence; notwithstanding the effort to provide against intellectual isolation and mental poverty by the foundation of Harvard College, they felt the effects of their situation across the sea and on the borders of a wilderness. The people were a hard- faring folk and engaged in a material struggle to establish the plantations and develop commerce on the sea; their other life was in religion soberly practised and intensely felt. They were a people of one book, in the true sense, — the Bible; it was the organ of their mental life as well as of their spiritual feelings. For them, it was in the place of the higher literature. But long resident there in the strip between the sea and the forest, cut off from the world and consigned to hard labour and to

spiritual ardours, they developed a fanatical temper; their religious life hardened and darkened; intolerance and superstition grew. Time, nevertheless, ripened new changes, and the colony was to be brought back from its religious seclusion into the normal paths of modern development. ■ The sign was contained, perhaps, most clearly in the change effected in the new charter granted by King William which made property the basis of the franchise in place of church-membership, and thus set the state Upon an economic instead of a religious foundation. It is rather by; men than by books that these times are remembered, but it is by the men who were writers of books. In general, the career of the three Mathers coincides with the history of the older Puritanism, and their personal characteristics reflect its stages as their writings contain its successive traits. Richard Mather,: the emigrant, had been joint author m the composition of The Bay Psalm Book, and served the colony among the first of its leaders. It was in his son, Increase Mather (1630-1723), that the theocracy, properly speaking, culminated. He was not only a divine, president of Harvard College and a prolific writer; but he was dominant in the state, the chief man of affairs. It was he who, sent to repre- sent the colony in England, received from King William the new charter. His son, Cotton Mather (1663-17 28), succeeded to his father's distinction ; but the changed condition is reflected in his non-participation in affairs; he was a man of the study and led there a narrower life than his father's had been. He was, never- theless, the most broadly characteristic figure of the Puritan of his time. He was able and learned, abnormally laborious, leaving over 400 titles attributed to him; and at the same time he was an ascetic and visionary. The work by which he is best remembered, the Magnolia Christi Americana, or the Ecclesiastical History of New England from its First Planting in the Year 1620, unto the Year of our Lord i6g8 (1702), is the chief historical monument of the period, and the most considerable literary work done in America up to that time. It is encyclopaedic in scope, and contains an immense accumulation of materials relating to life and events in the colony. There the New England of the 1 7th century is displayed. His numerous other works still further amplify the period, and taken all together his writings best illus- trate the contents of Puritanism in New Englarid. The power of the clergy was waning, but even in the political sphere it was far from extinction, and it continued under its scheme of church government to guard jealously the principles of liberty. In John Wise's (1652-1725) Vindication of the Government of New England Churches (171 7) a precursor of the Revolution is felt. It was in another sphere, however, that Puritanism in New England was to reach its height, intellectually and spiritually alike,

in the brilliant personality of Jonathan Edwards (1763-1758), its last great product. He was free of affairs, and lived essentially the private life of a thinker. He displayed in youth extraordinary precocity and varied intellectual curiosity, and showed at the same early time a temperament of spirtual sensitiveness and religious ideality which suggests the youth of a poet rather than of a logician. It was not without a struggle that he embraced sincerely the Calvinistic scheme of divine rule, but he was able to reconcile the doctrine in its most fearful forms with the serenity

and warmth of; his own spirit; for his soul at all times seems as lucid as his mind; and his affections' were singularly tender and refined. He served as minister to the church at Northampton; and, driven from that post, he was for eight years a, missionary to the Indians at Stockb ridge; finally he was made president of Princeton College, where after a few weeks' incumbency he died. The works upon which his fame is founded are Treatise concerning the Religious Affections (ij 46) < On the Freedom. of the Will (1754), Treatise an Original, Sin (1758). They exhibit extraordinary reasoning powers and place him among the most eminent theo- logians. He contributed by his preaching great inspiring force to the revival, known as " the Great Awakening," which swept over the dry and formal Puritanism of the age and was its last great flame. In him New England idealism had come to the birth. He illustrates, better than all others, the power of Puritanism as a spiritual force; and in him only did that power reach intellectual expression in a memorable way for the larger world. The ecclesiastical literature of Puritanism, abundant as it was, produced no other work of power; nor did the Puritan patronage of literature prove fruitful in other fields. If Puritan- ism was thus infertile, it nevertheless prepared the soil. It impressed upon New England the stamp of the mind; the entire community was by its means intellectually as well as morally bred; and to its training and the predisposition it established in the genius of the people may be ascribed the respect for the book which has always characterized that section, the serious temper and elevation of its later literature and the spiritual quality of the imagination which is so marked a quality of its authors.

The secularization of life in New England, which went on concurrently with the decline of the clergy in social power, was incidental to colonial growth. The practical force of pra B iaia. the people had always been strong; material pros.-:..,., perity increased and a powerful class of merchants grew up; public questions multiplied in variety and gained in importance. The affairs of the world had definitely obtained the upper hand. The new spirit found

its representative in the great figure of Benjamin Franklin (1 706-1 790), who, born in Boston, early emigrated to Philadelphia, an act which in itself may be thought to forecast the transfer of the centre of interest to the west and south and specifically to that city where the congress was to sit. Franklin was a printer, and the books he circulated are an index to the uses of reading in his generation. Practical works, such as almanacs, were plentiful, and it is characteristic that Franklin's name is, in literature, first associated with Poor Richard's Almanack (1732), The literature of the 18th century outside of New England continued to be constituted of works of exploration, description, colonial affairs, with some sprinkling of crude science and doctrines of wealth; but it yields no distinguished names or remembered titles. Franklin's character subsumes the spirit of it. In him thrift and benevolence were main constituents; scientific curiosity of a useful sort and invention distinguished him; after he had secured a competence, public interests filled his mature years. In him was the focus of the federating impulses of the time, and as the representative of the colonies in England and during the Revolution in France, he was in his proper place as the greatest citizen of his country. He was, first of men,broadly interested in all the colonies, and in his mind the future began to be comprehended in its true perspective and scale; and for these reasons to him properly belongs the title of " the first American." The type of his character set forth in the Autobiography (181 7) was profoundly American and prophetic of the plain people's ideal of success in a democracy. It is by his character and career rather than by his works or even by his great public services that he is remembered; he is a type of the citizen- man. Older than his companions, and plain while they were of an aristocratic stamp, hegreatens over them in the popular mind as age greatens over youth; but it was these companions who were to lay the foundations of the political literature of America. With the increasing political life lawyers as a class had naturally come into prominence as spokesmen and debaters. A young generation of orators sprang up, of whom James Otis (17 25-1 783) in the north, and Patrick Henry (1736-1799) in the south, were

the most brilliant; and a group of statesmen, of whom the most notable were Thomas Jefferson (1743-1826), James Madison (1751-1836), and Alexander Hamilton (1757-1804), held the political direction of the times; in the speeches and state-papers of these orators and statesmen and their fellows the political literature of the colonies came to hold the first place. The chief memorials of this literature are The Declaration of Independence (1776), The Federalist (1788), a treatise on the principles- of free government, and Washington's Addresses (1789-1793-1796). Thus politics became, in succession to exploration and religion, the most important literary element in the latter half of the 18th century.

The more refined forms of literature also began to receive intelligent attention towards the close of the period. The Revolur fsth-cen- tion in passing struck out some sparks of balladry and tury poetry song, but the inspiration of the spirit of nationality aad was first felt in poetry by Philip Freneau (1752-1832),

nctJ '"'- whose Poems (1786) marked the best poetical achieve- ment up to his time. Patriotism was also a ruling motive in the works of the three poets associated with Yale College, John Trumbull (1750-1831), Timothy Dwight (1752-1817), and Joel Barlow (1754-1812), authors respectively of McFingal (1782), a Hudibrastic satire of the Revolution, The Conquest of Canaan (1785), an epic, and The Vision of Columbus (1787), later remade into The Columbiad, also an epic. These poets gathered about them a less talented company, and all were denominated in common the " Hartford Wits," by which name rather than by their works they are remembered. The national hymn, " Hail Columbia," was composed by Joseph Hopkinson (1770-1842) in 1708/ Fiction, in turn, was first cultivated by Charles Brockden Brown (r77i-i8io), a Philadelphian, who wrote six romantic novels (1798-1801) after the style of Godwin, but set in the con- ditions of the new world and mixing local description and obser- vation with the material of mystery and terror. Fiction had been earlier attempted by Mrs Susanna Haswell Rowson, whose Charlotte Temple (1700) is remembered, and contemporaneously by Mrs Hannah Webster Foster in The Coquette (1797) and by Royall Tyler (1758-1826) in The Algerian Captive (1799); but to Brown properly belongs the title of the first American novelist, nor are his works without invention and

intensity and a certain distinction that secure for them permanent remembrance. The drama formally began its career on a regular stage and with an established company, in 1786 at New York, with the acting of Royall Tyler's comedy The Contrast; but the earliest American play was Thomas Godfrey's (1 736-1 763) tragedy, The Prince of Parthia, acted in Philadelphia in 1767. William Dunlap (1766- 1839) is, however, credited with being the father of the American theatre on the New York stage, where his plays were produced. One other earlier book deserves mention, John Woolman's (1720-1772) Journal (1775), an autobiography with much charm. With these various attempts the 18 th century was brought to an end. In 200 years no literary classic had been produced in America.

The new nation, which with the 19th century began its integral career, still retained the great disparities which originally existed between the diverse colonies. Political unity, the simplest of the social unities, had been achieved; " a more perfect union," in the language of the founders, had been formed; but even in the political sphere the new state bore in its bosom disuniting forces which again and again threatened to rive it apart until they were dissipated in the Civil War; and in the other spheres of its existence, intellectuallyˆ morally, socially, its unity was far from being accomplished. The expansion of its territory over the continental area brought new local diversity and prolonged the contrasts of border con- ditions with those of the long-settled communities. This state of affairs was reflected in the capital fact that there was no metro- politan centre in which the tradition and forces of the nation were concentrated. Washington was a centre of political administration; but that was all. The nation grew slowly, indeed, into consciousness of its own existence; but it was with- out united history, without national traditions of civilization and

culture, and it was committed to the untried idea of democracy. It was founded in a new faith; yet at the moment that it pro- claimed the equality of men, its own social structure and habit north and south contradicted the declaration, not merely by the fact of slavery, but by the life of its classes. The south long remained oligarchic; in the north aristocracy slowly melted away. The coincidence of an economic opportunity, with a philosophic principle is the secret of the career of American democracy in its first century. The vast resources of. an un- developed country gave this opportunity to the

individual, while the nation was pledged by its fundamental idea to material prosperity for the masses, popular education and the common welfare, as the supreme test of government. In this labour, subduing the new world to agriculture, trade and manufactures, the forces of the nation were spent, under the complication of maintaining the will of the people as the directing power; the subjugation of the soil and experience in popular government are the main facts of American history. In the course of this task the practice of the fine arts was hardly more than an incident. When anyone thinks of Greece, he thinks first of her arts; when anyone thinks of America, he thinks of her arts last. Literature, in the sense of the printed word, has had a great career in America; as the vehicle of use, books, journals, literary communication, educational works and libraries have filled the land; nowhere has the power of the printed word ever been so great, nowhere has the man of literary genius ever had so broad an opportunity to affect the minds of men contemporaneously. But, in the artistic sense, literature, at most, has been locally illustrated by a few eminent names.

The most obvious fact with regard to this literature is that— to adopt a convenient word— it has been regional. It has flourished in parts of the country, very distinctly marked, and is in each case affected by its environment and local culture; if it incorpor- ates; national elements at times, it seems to graft them on itSiOwn stock. The growth of literature in these favoured soils was slow and humble. There was no outburst of genius, no sudden move- ment, no renaissance; but very gradually a step was taken in advance of the last generation, as that had advanced upon its forefathers. The first books of true excellence were experiments ; they seem almost accidents. The cities of Boston, New York and Philadelphia were lettered communities; they possessed imported books, professional classes, men of education and taste; The tradition of literature was strong, especially in New England; there were readers used to the polite letters of the past. It was, however, in the main the past of Puritanism, both in England and at home, and of the 18th century in general, on which they were bred, with a touch ever growing stronger of the new European romanticism. All the philosophic ideas of the 18th century were current. What was most lacking was a standard self -applied by original writers; and in the absence of a great national centre of standards and traditions, and amid the poverty of such small local centres as the writers were bred in, they sought what they desired, not in England, not in any one country nor in any one literature, but in the solidarity of literature itself, in the republic of letters,the world-state itself, — the master-works of all European

lands; they became either actual pilgrims on foreign soil or pilgrims of the mind in fireside travels. The foreign influences that thus entered into American literature are obvious and make a large part of its history; but the fact here brought out is that European literature and experience stood to American writers in lieu of a national centre; it was there that both standard and tradition were found.

*American literature first began to exist for the larger world in the persons of Washington Irving (1785-1859) and James Fenimore Cooper (1789-1851).. Their recognition was EarJy almost contemporaneous. The Sketch Book (1 8 1 9) was l9th-cen- the first American book to win a great reputation in <«or England, and The Spy (182a:) was the first to obtain a < *«"**■ similar vogue on the continent. The fame of both authors is associated with New York, and that city took the first place as the centre of the Literature of the period. It was not that New York was more intellectual than other parts of the country; but*

11

Irving.

it was a highly prosperous community, where a mercantile society flourished and consequently a certain degree of culture obtained. The first American literature was not the product of a raw democracy nor of the new nationality in any sense; there was nothing sudden or vehement in its generation; but, as always, it was the product of older elements in the society where it arose and flourished under the conditions of precedent culture. The family of Irving were in trade. Cooper's father was in the law. A third writer, William Cullen Bryant (1794-1878), is associated with them, and though he announced his poetic talent precociously by Thanatopsis (1807), his Poems (1832), immedi- ately republished in London, were the basis of his true fame. Born in Massachusetts, he lived his long life in New York, and was there a distinguished citizen. His father was a physician. All three men were not supremely endowed; they do not show the passion of genius for its work which marks the great writers; they were, like most American writers, men with the literary temperament, characteristically gentlemen, who essayed literature with varying power. If the quality of this early literature is

to be appreciated truly, the fact of its provenance from a society whose cultivation was simple and normal, a provincial bourgeois society of a prosperous democracy, must be borne in mind. It came, not from the people, but from the best classes developed under preceding conditions.

Irving all his life was in the eyes of his countrymen, whatever their pride might be in him, more a travelled gentleman than one of themselves. He had come home to end his days at Sunnyside by the Hudson, but he had won his fame in foreign fields. In his youth the beginnings of his literary work were most humble — light contributions to the press. He was of a most social nature, warm, refined, humorous, a man belonging to the town. He was not seriously disposed, idled much, and surprised his fellow-citizens suddenly by a grotesque History of New York (1809), an extravaganza satirizing the Dutch element of the province. He discovered in writing this work his talent for humour and also one part of his literary theme, the Dutch tradition; but he did not so convince himself of his powers as to continue, and it was only after the failure of his commercial interests that, being thrown on himself for support, he published in London ten years later, at the age of thirty-six, the volume of sketches which by its success committed: him to a literary career. In that work he found himself; sentiment and distinction of style characterized it, and these were his main traits. He remained abroad, always favoured in society and living in diplomatic posts in Spain and England, for seventeen years, and he later spent four years in Spain as minister. Spain gave him a larger opportunity than England for the cultivation of romantic sentiment, and he found there his best themes in Moorish legend and history. On his return to America he added to his subjects the exploration of the west; and he wrote, besides, biographies of Goldsmith and Washington. He was, as it turned out, a voluminous writer; yet his books successively seem the accident of his situation. The excellence of his work lies rather in the treatment than the substance; primarily, there is the pellucid style, which he drew from his love of Goldsmith, and the charm of his personality shown in his romantic interest, his pathos 1 and humour ever growing in delicacy, and his familiar touch with humanity. He made his name American mainly by creating the legend of the Hudson, and he alone has linked his memory locally with his country so that it hangs over the landscape and blends with it for ever; he owned his nativity, too, by his pictures of the prairie and the fur-trade and by his life of Washington, who had laid his hand upon his head; but he had spent half his life abroad, in the temperamental enjoyment of the romantic sugges- tion

of the old world, and by his writings he gave this expansion of sympathy and sentiment to his countrymen. If his tempera- ment was native-born and his literary taste home-bred, and if his affections gave a legend to the countryside and his feelings expanded with the view of prairie and wilderness, and if he sought to honour with his pen the historic associations and memory of the land which had honoured him, it was, nevertheless, the trans-. Atlantic touch that had loosed his genius and mainly fed it, and

this fact was prophetic of the immediate course of American literature and the most significant in his career.

Cooper's initiation into literature was similar to that of Irving. He had received, perhaps, something more of scanty formal education, since he attended Yale College for a season, Cooper. but he early took to the sea and was a midshipman. He was thirty years old before he began to write, and it was almost >an accident that after the failure of his first novel he finished The Spy, so deterring was the prejudice that[no American book cculd succeed. He was, however, a man of great energy of life, great force of will; it was his nature to persist. The way once opened, he wrote voluminously and with great unevenness. His literary defects, both of surface and construction, are patent. It was not by style nor by any detail of plot or character that he excelled; but whatever imperfections there might be, his work was alive; it had body, motion, fire. He chose his subjects from aspects of life familiar to him in the woods or on the sea or from patriotic memories near to him in the fields of the Revolution. He thus established a vital connexion with his own country, and in so far he is the most national by his themes of any of the American writers. What he gave was the scene of the new world, both in the forest and by the fires of the Revolution and on the swift and daring American ships; but it was especially by his power to give the sense of the primitive wilderness and the ocean weather, and adventure there, that he won success. In France, where he was popular, this came as an echo out of the real world of the west to the dream of nature that had lately grown up in French literature; and, besides, of all the springs of interest native to men in every land adventure in the wild is, perhaps, the easiest to touch, the quickest and most inflaming to respond. Cooper stood for a true element in American experience and con- ditions, for the romance in the mere presence of primeval things of nature newly found by man and opening to his coming; this was an imaginative moment, and Cooper seized it by his imagina- tion. He especially did so in the Indian elements of his tale, and gave permanent ideality to the Indian type. The trait of lofti- ness which he thus incorporated belongs with the impression of the

virgin forest and prairie, the breadth, the silence and the music of universal nature. The distinction of his work is to open so great a scene worthily, to give it human dignity in rough and primitive characters seen in the simplicity of their being, and to fill it with peril, resourcefulness and hardihood. It is the only brave picture of life in the broad from an American pen. Scott, in inventing the romantic treatment of history in fiction, was the leader of the historical novel; but Cooper, except in so far as he employed the form, was not in a true sense an imitator of Scott; he did not create, nor think, nor feel, in Scott's way, and he came far short of the deep human power of Scott's genius. He was not great in character; but he was great in adventure, manly spirit and the atmosphere of the natural world, an Odysseyan writer, who caught the moment of the American planting in vivid and characteristic traits.

This same spirit, but limited to nature in her most elemental forms and having the simplest generic relations to human life, characterizes Bryant. He, too, had slender academic Bryaat. training, and came from the same social origins as Irving and Cooper; but, owing to his extraordinary boyish precocity, the family influences upon him and the kind of home he was bred in are more clearly seen. He framed his art in his boyhood on the model of 18th-century verse, and though he felt the liberalizing influences of Wordsworth later there always remained in his verse a sense of form that suggests a severer school than that of his English contemporaries. He lived the life of a journalist and public man in New York, but the poet in him was a man apart and he jealously guarded his talent in seclusion. Though he was at times abroad, he resembled Cooper in being unaffected by foreign residence; he remained home-bred. He wrote a considerable quantity of verse; but it is by a quality in it rather than by its contents that his poetry is recalled, and this quality exists most highly in the few pieces that are well known. To no verse is the phrase "native wood-notes wild " more properly applied. His poetry gives this deep impression of

privacy; high, clear, brief in voice, and yet, as it were, as of something hidden in the sky or grove or brook, or as if the rock spoke, it is nature in her haunts; it is the voice of the peak, the forests, the cataracts, the smile of the blue gentian, the distant rosy flight of the water-fowl, — with no human element less simple than piety, death or the secular changes of time. It is, too, an expression

of something so purely American that it seems that it must be as uncomprehended by one not familiar with the scene as the beauty of Greece or Italian glows; it is poetry locked in its own land. This presence of the pure, the pristine, the virginal in the verse, this luminousness, spaciousness, serenity in the land, this immemorialness of natural things, is the body and spirit of the true wild, such as Bryant's eyes had seen it and as it had possessed his soul. In no other American poet is there this near- ness to original awe in the presence of nature; nowhere is nature so slightly humanized, so cosmically felt, and yet poetized. Poetry of this sort must be small in amount; a few hundred lines contain it all; but they alone shrine the original grandeur, not so much of the American landscape, as of wild nature when first felt in the primitive American world.

American romanticism thus. began with these three writers, who gave it characterization after all by only a few simple traits. There was in it no profound passion nor philosophy nor revolt; especially there was no morbidness. It was sprung from a new soil. The breath of the early American world was in Bryant's poetry; he had freed from the landscape a Druidical nature- worship of singular purity, simple and grand, unbound by any conventional formulas of thought or feeling but deeply spiritual. The new life of the land filled the scene of Cooper; prairie, forest and sea, Indians, backwoodsmen and sailors, the human struggle of all kinds, gave it diversity and detail; but its life was the American spirit, the epic action of a people taking primitive possession, battling with its various foes, making its world. Irving, more brooding and reminiscent, gave legend to the land-scape, transformed rudeness with humour and brought elements of picturesqueness into play; and in him, in whom the new race was more mature, was first shown that nostalgia for the past, which is everywhere a romantic trait but was peculiarly strong under American conditions. He was consequently more free in imagination than the others, and first dealt with other than American subjects, emancipating literature from provinciality of theme, while the modes of his romantic treatment, the way he felt about his subjects, still owed much to his American birth. In all this literature by the three writers there was little complexity, and there was no strangeness in their personalities. Irving was more genially human, Cooper more vitally intense; Bryant was the more careful artist in the severe limits of his art, which was simple and plain. Simplicity and plainness characterize all three; they were, in truth, simple American gentlemen, of the breeding and tastes that a plain democracy produced as its best, who, giving themselves to literature for a.

career, developed a native romanticism, which, however obvious and uncomplicated with philosophy, passion or moods, represented the first stage of American life with freshness of power, an element of ideal loftiness and much literary charm.

Though Irving, Cooper and Bryant were associated with New York, there was something sporadic in their germination. They have no common source; they stood apart; and their work neither overlapped nor blended, but

General progress.

remained self-isolated. None of them can be said to have founded a school, but Irving left a literary tradition and Cooper had followers in the field of historical fiction. The \iterary product up to the middle of the century presents gener- ally from its early years the appearance of an indistinguishable mass, as in colonial days, in which neither titles nor authors are eminent. The association of American literature with the periodical press is, perhaps, the most important trait to be observed. New York and Philadelphia were book markets, and local presses had long been at work issuing many reprints. Magazines in various degrees of importance sprang up in succes sion to the earlier imitations of English 18th-century periodicals, which abounded at the beginning of the century; and as time

went on these were accompanied by a host of annuals of the English Keepsake variety. Philadelphia was especially dis- tinguished by an early fertility in magazines, which later reached a great circulation, as in the case of Godey's and Graham's; the Knickerbocker became prominent in New York from 1833, when it was founded; Richmond had in The Southern Literary Messenger the chief patron of southern writers from 1834, and there were abortive ventures still farther south in Charleston. These various periodicals and like publications were the literary arena, the place of ambition for young and old, for known and unknown, and there literary fame and what little money came of its pursuit were found. Minor poetry flourished in it; sketches, tales, essays, every sort of writing in prose multiplied there. A change in the atmosphere of letters is also to be noted. The 18th century was fairly left behind. The Philadelphian reprint of Galignani's Paris edition of Keats, Shelley and Coleridge had brought in the new romantic poetry with wide effect; and Disraeli, Bulwer and, later, Dickens are felt in the prose; in verse, especially by women, Mrs Hemans and Mrs Browning ruled the moment. The product was large. In poetry it was displayed on the most

comprehensive scale in Rufus Wilmot Griswold's (1815-1857) collections of American verse, made in the middle of the century. Mrs Lydia Sigourney (1791-1865), a prolific writer, and Mrs Maria GowanBrooks (1795-1845), known as Southey's " Maria del Occidente," a more ambitious aspirant, the "Davidson sisters" (1808-1825 : 1823-1838), and Alice (1820-1871) and Phoebe Cary (1824-1871) illustrate the work of the women ; and Richard Henry Wilde (1789-1847), George Pope Morris (1802-1864), Charles Fenno Hoffman (1806-1884) and Willis Gaylord Clark (1810-1841) may serve forthat of men. In this verse, and in the abundant prose as well, the sentimentality of the period is strongly marked; it continued to the times of the Civil War. Two poets of a better type, Joseph Rodman Drake (1795-1820), distinguished by delicacy of fancy, and Fitz-Greene Halleck (1790-1867), who showed ardour and a real power of phrase, are remembered from an earlier time for their brother- hood in verse, but Drake died young and Halleck was soon sterilized, so that the talents of both proved abortive. The characteristic figure that really exemplifies this secondary literature at its best is Nathaniel Parker Willis (1806-1867) who, though born in Portland, Maine, was the chief litterateur of the Knickerbocker period. He wrote abundantly in both verse and prose, and was the first of the journalist type of authors, a social adventurer with facile powers of literary entertainment, a man of the town and immensely popular. He was the sentimentalist by profession, and his work, transitory as it proved, was typical of a large share of the taste, talent and ambition of the contemporary crowd of writers. Neighbouring him in time and place are the authors of various stripe, known as " the Literati," whom Poe described in his critical papers, which, in connexion with Gris- wold's collections mentioned above, are the principal current source of information concerning the bulk of American literature in that period.

This world of the magazines, the Literati and sentimentalism, was the true milieu of Edgar Allan Poe (1 809-1 849). Born in Boston,. his mother a pleasing English actress and his father a dissipated stage-struck youth of a Baltimore family, left an orphan in childhood, he was reared in the Virginian home of John Allan, a merchant of Scottish extraction; he received there the stamp of southern character. He was all his life characteristically a southerner, with southern ideals of character and conduct, southern manners towards both men and women and southern passions. He showed precocity in verse, but made his real dibut in prose as editor of The Southern Literary Messenger at Richmond in 1835. He was by his talents com-mitted to a literary career, and being usually without definite means

of support he followed the literary market, first to Phil- adelphia and later to New York. He was continuously associated with magazines as editor, reviewer or contributor; they were his means of sustenance; and, whether as cause or effect, this mode of life fell in with the nature of his mind, which was a contempor- ary mind. He was perhaps better acquainted with contemporary

work in literature than any of his associates; he took his first cues from Disraeli and Bulwer and Moore, and he was earliest to recognize Tennyson and Mrs Browning; his principal reading was always in the magazines. He was, however, more than a man of literary temperament like Irving and Cooper; he was a child of genius. As in their case, there was something sporadic in his appearance on the scene. He had no American origins, but only American conditions of life. In fact he bore little relation to his period, and so far as he was influenced, it was for the worse; he transcended the period, essentially, in all his creative work. He chose for a form of expression the sketch, tale or short itory, and he developed it in various ways. From the start there was a melodramatic element in him, itself a southern trait and developed by the literary influence of Disraeli and Bulwer on his mind. He took the tale of mystery as his special province; and receiving it as a mystery that was to be explained, after the recent masters of it, he saw its fruitful lines of development in the fact that science had succeeded to superstition as the source of wonder, and also in the use of ratiocination as a mode of dis- entanglement in the detective story. Brilliant as his success was in these lines, his great power lay in the tale of psychological states as a mode of impressing the mind with the thrill of terror, the thrall of fascination, the sense of mystery.- It is by his tales in these several sorts that he won, more slowly than Irving or Cooper and effectually only after his death, continental repu- tation; at present no American author is so securely settled in the recognition of the world at large, and he owes this, similarly to Cooper, to the power of mystery over the human mind uni- versally; that' is, he owes it to his theme, seconded by a marvel- lous power to develop it by the methods of art. He thus added new traits to American romanticism, but as in the case of Irving's Spanish studies there is no American element in the theme; he is detached from his local world, and works in the sphere of universal human nature, nor in his treatment is there any trace of his American birth. He is a world author more purely than any other

American writer. Though it is on his tales that his continental reputation necessarily rests, his temperament is more subtly expressed in his verse, in which that fond of which his tales are the logical and intelligible growth gives out images and rhythms, the issue of morbid states, which affect the mind rather as a form of music than of thought. Emotion was, in art, his constant aim, though it might be only so simple a thing as the emotion of colour as in his landscape studies; and in bis verse, by an unconscious integration and flow of elements within him it must be thought, he obtained emotional effects by images which have no intellectual value, and which float in rhythms so as to act musically on the mind and arouse pure moods of feeling absolutely free of any other contents. Such poems must be an enigma to most men, but others are accessible to them, and derive from them an original and unique pleasure; they belong outside of the intellectual sphere. It is by virtue of this musical quality and immediacy that his poetry is characterized by genius; in proportion as it has meaning of an intelligible sort it begins to fade and lower; so far as " Lenore " and " Annie " and " Annabel Lee " are human, they are feeble ghosts of that sentimentality which was so rife in Poe's time and so maudlin in his own personal relations; and except for a half-dozen pieces, in which his quality of rhythmical fascination is supreme, his verse as a whole is inferior to the point of being commonplace. Small as the quantity of his true verse is, it more sustains his peculiar genius in American eyes than does his prose; and this is because it is so unique. He stands absolutely alone as a poet with none like him; in his tales, as an artist, he is hardly less solitary, but he has some ties of connexion or likeness with the other masters of mystery. Poe lived in poverty and died in misery; but with- out him romanticism in America would lose its most romantic figure, and American literature the artist who, most of all its writers, had the passion of genius for its work.

Poe left even less trace of himself in the work of others than' did Irving, Cooper and Bryant. He stands in succession to them, and closed the period so far as it contributed to American romanticism anything distinguished, original or permanent.

The ways already opened had, however, been trod, and most notably in fiction. The treatment of manners and customs, essentially in Irving's vein, was pleasingly cultivated in Maryland by John Pendleton Kennedy (1795-1870) inSwallbw Barn (1832) and similar tales of Old Dominion life. In Virginia, Beverly Tucker (1784-185.1) in The Partisan Leader (1836), noticeable for its prophecy of secession, arid John Esten Cooke (1830-1886) in The Virginia Comedians (1854), also won a passing reputation. The champion in

the south, however, was William Gilmore Simms (1806-1870), born in Charleston, a voluminous writer of both prose and verse, who undertook to depict, on the same scale as Cooper and in his manner, the settlement of the southern territory and its Indian and revolutionary history; but of his many novels, of which the characteristic examples are The Yemassee (1835), The Partisan (1835) and Beauchampe (1842), none attained literary distinction. The sea-novel was developed by Herman Melville (1810-1891) in Typee (1846) and its successors, but these tales, in spite of their being highly commended by lovers of adventure, have taken no more hold than the work of Simms. Single novels of wide popularity appeared from time to time, of which a typical instance was The Wide, Wide World (1850) by Susan Warner (1810-1885). The grade of excellence was best illustrated, perhaps, for the best current fiction which was not to be incorporated in literature, by the novels of Catharine Maria Sedgwick (1 789-1867), of a western Massa-chusetts family, in Hope Leslie (1827) and its successors. The distinct Knickerbocker strain was best preserved by James Kirke Paulding (17.78-1860) . among the direct imitators of Irving; but the better part of the Irving tradition, its sentiment, social grace and literary flavour, was not noticeable until it awoke in George William Curtis (1824-1892), born a New Englander but, like Bryant, a journalist and public man of New York, whose novels, notes of travel and casual brief social essays brought that urbane style to an end, as in Donald Grant Mitchell (born 1822) the school of sentiment, descended from the same source, died not unbecomingly in the Reveries of a Bachelor (1850) and Dream Life (1851). Two poets, just subsequent to Poe, George Henry Boker (1823-1890) and Thomas Buchanan Read (1822-1872), won a certain distinction, the former especially in the drama, in the Philadelphia group. The single popular songs, " The Star- Spangled Banner " (1813), by Francis Scott Key (1779-1843) of Maryland, " America " (1832) by Samuel Francis Smith (1808- 1895) of Massachusetts, and " Home, Sweet Home " (1823) by John Howard Payne (1792-1852) of New York, may also be appropriately recorded here. The last distinct literary person- ality to emerge from the miscellany of talent in the middle of the century, in the middle Atlantic states, was James Bayard Taylor (1825-1878), who, characteristically a journalist, gained reputa-tion by his travels, poems and novels, but in spite of brilliant Versatility and a high ambition failed to obtain permanent distinction. His translation of Faust (1870) is his chief title to remembrance; but the later cultivation of the oriental motive in American lyrical poetry owes something to his example.

*In New England, which succeeded to New York as the chief source of literature of high distinction, the progress of culture in the post-Revolutionary period was as normal and New gradual as elsewhere in the country; there was no England violence of development, no sudden break, but the scholar- growth of knowledge and taste went slowly on in con- ‘ *’ junction with the softening of the Puritan foundation of thought, belief and practice. What most distinguished literature in New England from that to the west and south was its connexion with religion and scholarship, neither of which elements was strong in the literature that has been described. The neighbourhood of Harvard College to Boston was a powerful influence in the field of knowledge and critical culture. The most significant fact in respect to scholarship, however, was the residence abroad of George Ticknor (1791-1871), author of The History of Spanish Literature (1849), of Edward Everett(i794-i86s), the orator, and of George Bancroft (1800T-1891), author of the History of the United States (1834-1874), who as young men brought back new ideals of learning. The social connexion of Boston, not only with*

England but with the continent, was more constant, varied and intimate than fell to the fortune of any other city, and owing ‘ to the serious temper of the community the intellectual com- merce with the outer world through bodks was more profound. Coleridge was early deeply influential on the thought of the cultivated class, and to him Carlyle, who found his first sincere welcome and effectual power there, succeeded. The influence of both combined to introduce, and to secure attention for, German writers. Translation, as time went on, followed, and German thought was also further sustained and advanced in the com- munity by Frederick Henry Hedge (1805-1890), a philosophical theologian, who conducted a propaganda of German ideas. The activity of the group about him is significantly marked by the issue of the series of Specimens of Foreign Standard Literature (1838), edited by George Ripley (1802-1880), the critic, which was the first of its kind in America. French ideas, as time went on, were also current, and the field of research extended to the Orient, the writings of which were brought forward especially in connexion with the Transcendental Movement to which all these foreign studies contributed. In New England, in other words, a close, serious and vital connexion was made, for the first time, with the philosophic thought of the world and with its tradition even in the remote past. Unitarianism, which was the form

in which the old Puritanism dissolved in the cultivated class, came in with the beginning of the century, and found its representative in the gentle character, refined intelligence and liberal humanity of William Ellery Channing (1780-1842), who has remained its chief apostle. It was the expression of a moral maturing and intellectual enlightenment that took place with as little dis- turbance as ever marked religious evolution in any community. The people at large remained evangelical, but they also felt in a less degree the softening and liberalizing tendency; neverthe^ less it was mainly in the field of Unitarianism that literature flourished, as was natural, and Transcendentalism was a phe- nomenon that grew out of Unitarianism, being indeed the excess of the movement of enlightenment and the extreme limit of intuitionalism, individualism and private judgment. These two factors, religion and scholarship, gave to New England literature its serious stamp and academic quality; but the preparatory stage being longer, it was slower to emerge than the literature of the rest of the country.

The first stirrings of romanticism in New England were felt, as in the country to the south, by men of literary temperament in a sympathetic enjoyment and feeble imitation of the contemporary English romantic school of fiction exemplified by Mrs Radcliffe, Lewis and Godwin. Washington Allston (1779-1843), the painter, born in South Carolina but by education and adoption a citizen of Cambridge, showed the taste in Monaldi (1841), and Richard Henry Dana (1787-1879) in Paul Felton (1833); in his poem of the same date, " The Buccaneer,"" the pseudo-Byronic element, which belongs to the conception of character and passion in this school of fiction, appears. These elder writers illustrate rather the stage of imaginative culture at the period, and show by their other works also — Allston by his poems " The Sylphs of the Seasons" (1813), and Dana by his abortive periodical The Idle Man (182^) issued at New York — their essential sympathy with the literary conditions reigning before the time of Irving. They both were post-Revolutionary, and advanced American culture in other fields rather than imagina- tion, Allston in art and Dana in criticism, as editor of The North American Review, which was founded in 181 5, and was long the chief organ of serious thought and critical learning, influential in the dissemination of ideas and in the maintenance of the intel- lectual life. The influence of their personality in the community, like that of Channing, with whom they were closely connected, was of more importance than any of their works.

The definite moment of the appearance of New England in literature in the true sense was marked by Ralph Waldo Emerson's (i8o3-r882)

Nature (1836), Nathaniel Hawthorne's (1804-1864) Twice-Told Tales (1837) and Henry Wadsworth Longfellow's (1807-1882) Voices of the Night (1839). Of this group of men Longfellow is the most national figure, and from

the point of view of literary history the most significant by virtue of what he contributed to American romanticism in the large. He felt the conscious desire of the people for Emerson: an American literature, and he obeyed it in the choice Hsw- of his subjects. He took national themes, and his work thorne: is in this respect the counterpart in poetry to that of Jto Cooper in prose. In Hiawatha (1855) he poetized the Indian life; and, though the scene and figures of the poem are no more localized than the happy hunting-grounds, the ideal of the life of the aborigines in the wilderness is given with freshness and primitive charm and with effect on the imagination. It is the sole survivor of many poetic attempts to naturalize the Indian in liter- ature, and will remain the classic Indian poem. In Evangeline (1847), The Courtship of Miles Standish (1858) and The New England Tragedies (1868), he depicted colonial Hfe. Ashe thus em- bodied national tradition in one portion of his work, he rendered national character in another, and with more spontaneity, in those domestic poems of childhood and the affections, simple moods of the heart in the common lot, which most endeared him as the poet of the household. These are American poems as truly as his historical verse, though they are also universal for the English race. In another large portion of his work he brought back from the romantic tradition of Europe, after Irving's manner, motives which he treated for their pure poetic quality, detached from anything American, and he also translated much foreign verse from the north and the south of Europe, including Dante's Divine Comedy (1867). He has, more than any other single writer, reunited America with the poetic past of Europe, particularly in its romance. The same serenity of disposition that marked Irving and Bryant characterized his life; and his art, more varied than Bryant's or Irving's, has the same refine- ment, being simple and so limpid as to deceive the reader into an oblivion of its quality and sometimes into an unwitting disparage- ment of what seems so plain and natural as to be commonplace. In Longfellow, as in Irving, one is struck by that quietude, which is so prevailing a characteristic of American literature, and which proceeds from its steady and even flow from sources that never knew any disturbance or perturbation. The life, the art, the moods are all calm; deep passion is absent.

Hawthorne was endowed with a soul of more intense brooding, but he remained within the circle of this peace. He developed in solitude

exquisite grace of language, and in other respects was an artist, the mate of Poe in the tale and exceeding Poe in signifi- cance since he used symbolism for effects of truth. He, like Longfellow, embodied the national tradition, in this case the Puritan past; but he seized the subject, not in its historical aspects and diversity of character and event, but psychologically in its moral passion in The Scarlet Letter (1850) , and less abstractly, more picturesquely, more humanly, in its blood tradition, in The House of the Seven Gables: In his earlier work, as an artist, he shows the paucity of the materials in the environment, especially in his tales; but when his residence in Italy and England gave into his hands larger opportunity, he did not succeed so well in welding Italy with America in The Marble Faun (i860), or England with America in his experimental attempts at the work which he left uncompleted, as he had done in the Puritan romances. He had, however, added a new domain to American romanticism; and, most of all these writers, he blended moral truth with fiction; he, indeed, spiritualized romance, and with- out loss of human reality,— a rare thing in any literature. Both Longfellow and Hawthorne were happy in reconciling their art with their country: both, not less than Poe, were universal artists, but they incorporated the national past in their art and were thereby more profoundly American.

Emerson, whose work lay in the religious sphere, not unlike Jonathan Edwards at an earlier time of climax but in a different way, marked the issue of Puritanism in pure idealism, and was more contemporaneously associated with life in the times than were the purely imaginative writers. He was the central figure of Transcendentalism, and apart from his specific teachings stood for the American spirit, disengaged from authority, independent, personal, responsible only to himself. He reached a revolutionary

extreme, but he had not arrived at it by revolutionary means; without storm or stress, with characteristic peacefulness, he came to the great denials, and without much concerning himself with them turned to his own affirmations of spiritual reality, methods of life and personal results. Serenity was his peculiar trait; amid all the agitation about him he was entirely unmoved, lived calmly and wrote with placid power, concentrating into the slowly'wrought sentences of his Essays (1841-1875) the spiritual essence and moral metal of a life lived to God, to himself and to his fellow-men. He, more than

any other single writer, reunited American thought with the philosophy of the world; more than all others, he opened the ways of liberalism, wherever they may lead. He was an emancipator of the mind. Inhis Poems (1847- 1867), though the abstract and the concrete often find themselves awkward mates, his philosophic ideas are put forth under forms of imagination and his personal life is expressed with nobility; his poetic originality, though so different in kind, is as unique as Poe's, and reaches a height of imaginative faculty not elsewhere found in American verse. His poetry belongs more peculiarly to universal art, so pure in general is its philosophic content and so free from any temporal trait is the style; but it is as dis- tinguished for the laconic expression of American ideas, minted with one blow, as his prose is for the constant breathing of the American spirit. It is the less possible to define the American traits in Emerson, because they constituted the man. He was as purely an American type as Lincoln. The grain of the man is in his work also; and the best that his prose and verse contain is his personal force. In him alone is genius felt as power; in the others it impresses one primarily as culture, modes of artistic faculty, phases of temperament. In this, too, he brings to mind Jonathan Edwards, the other climax of the religious spirit in New England; in Edwards it was intellectual power, in Emerson it was moral power; in both it was indigenous, power springing from what was most profound in the historic life of the community.

Three other names, John Greenleaf Whittier (1807-1892), Oliver Wendell Holmes (1809-1894), James Russell Lowell

(1819-1891), complete the group of the greater writers Ho/roes" °^ ^ ew England. Holmes was a more local figure, by Lowell.' his humour and wit and his mental acuteness a Yankee

and having the flavour of race, but neither in his verse nor his novels reaching a high degree of excellence and best known by The Autocrat of the Breakfast Table (1858) , which is the Yankee prose classic. His contemporary reputation was largely social and owed much to the length of his life, but his actual hold on literature already seems slight and his work of little permanent value. Whittier stands somewhat apart as the poet of the soil and also because of his Quakerism; he was first eminent as the poet of the anti-slavery movement, to which he contributed much stirring verse, and later secured a broader fame by Snowbound (1866) and his religious poems of simple piety, welcome to every faith; he was also a balladist of local legends. In general he is the voice of the plain people without the medium of academic culture, and his verse though of low flight is

near to their life and faith. Lowell first won distinction by The Biglow Papers (1848), which with the second series (1886) is the Yankee classic in verse, and is second only to his patriotic odes in maintaining his poetic reputation; his other verse, variously romantic in theme and feeling, and latterly more kindred to English classic style, shows little originality and was never popularly received; it is rather the fruit of great talent working in close literary sympathy with other poets whom frOm time to time he valued. His prose consists in the main of literary studies in criticism, a field in which he held the first rank. Together with Holmes and Whittier he gives greater body, diversity and illustration to the literature of New England; but in the work of none of these is there the initiative or the presence of single genius that characterize Emerson, Hawthorne and Longfellow. Lowell was a scholar with academic ties, a patriot above party, master of prose and verse highly developed and finished, and at times of a lofty strain owing to his moral enthusiasm; Whittier was a Quaker priest, vigorous in a great cause of humanity, with fluent power to express in poetry the life of the farm, the roadside and the legends

that were like folklore in the memory of the settlement; Holmes was a town wit and master of occasional verse, with notes here and there of a higher strain in single rare poems.

The secondary literature that accompanied the work of these writers was abundant. .It was largely the product of Trans- cendentalism and much of it gathered about Emerson. In The Dial (1840), the organ of Transcendentalism, he aentalism. introduced to the public his young friend, Henry David Thoreau (1817-1862), author of Walden (1854) and the father of the nature-writers, who as a hermit-type has had some European vogue and shows an increasing hold as an exception among men, but whose work has little literary distinction; and together with him, his companion, William Ellery Channing (1818-1901), a poet who has significance only in the transcendentalist group. With them should be named Emerson's coeval, Amos Bronson Alcott (1790-1888), the patriarch of the so-called Concord philosophers, better esteemed for his powers of monologue than as a writer in either prose or verse. Emerson's associate-editor in The Dial was Sarah Margaret Fuller, afterwards Marchioness d'Ossoli (r8io-i85o), a woman of extraordinary qualities and much usefulness, who is best remembered by her Woman in the Nineteenth Century (1844), but contributed no permanent work to literature. She was a leading figure at Brook Farm, the socialistic community founded by members of the group, and especially by Ripley, who like her afterwards emigrated to New

York and together with her began a distinguished critical career in connexion with The New York Tribune. Transcendentalism produced also its peculiar poet in Jones Very (1813-1881), whose Poems (1839) have original quality though slight merit, and its novelist in Sylvester Judd (1813-1853), whose Margaret (1845) is a unique work in American fiction. Other transcendentalist poets were Christopher Pearse Cranch (1813-1892), and Charles Timothy Brooks (1813-1883), who translated Faust (1856), besides a score of minor names. Outside of this group Thomas William Parsons (1819-1892), who translated Dante's Inferno (1843), was a poet of greater distinction, but his product was slight. The prose of the movement, though abundant, yielded nothing that is remembered.

The literary life of Boston was, however, by no means confined within this circle of thought. It was most distinguished in the field of history, where indeed the writers rivalled the History. imaginative authors in public fame. They were, besides George Bancroft already mentioned, John Gorham Palf rey (1 7 96- 1 88 1) , author of The History of New England{ r 8 58) , William Hickling Prescott (1796-1859), whose field was Spanish and Spanish-American history, John Lothrop Motley (1814- 1877), whose attention was given to Dutch history, and Jared Sparks (1789-1866), whose work lay in biography. In the writings of Prescott and Motley the romanticism of the period is clearly felt, and th'ey attained the highest distinction in the literary school of history of the period. Oratory also flourished in Daniel Webster (1782-1852), Edward Everett (1794-1865), RufusChoate(i799-i859), Wendell Phillips (1811-1884), Charles Sumner (i8n-r874),and Robert Charles Winthrop (1809-1894), the last survivor of a long line of fiery or classic oratory in which New England was especially distinguished and had oratory. rivalry only from Henry Clay (1777-1852) of Virginia, and John Caldwell Calhoun (1 782-1850) of South Carolina. The church also produced two powerful speakers in Theodore Parker (1810-1860), the protagonist of the liberals in Boston, and Henry Ward Beecher, (1813-1887), who sustained a liberal form of New England Congregationalism in Brooklyn, New York, where he made Plymouth Church a national pulpit. The single memorable novel of the period was Mrs Harriet Beecher Stowe's (1811-1896) Uncle Tom's Cabin (1852), which had a world-wide vogue; it is the chief contribution of the anti-slavery movement to American literature and stands for plantation life in the old south. Another female writer, Mrs Lydia Maria Child (1802-1880), remembered by her ' Philothea (1836), deserves mention in the line of notable American women who served their generation in literary

ways and by devotion to public causes. Criticism was served excellently by Edwin Percy Whipple (1819"

Fiction.

1885), and less eminently by Henry Theodore Tuckerman (1813-187 1), who emigrated to New York; but scholarship in general

flourished under the protection of Harvard College, i/jfa where Ticknor, Longfellow and Lowell maintained a

high ideal of literary knowledge and judgment in the chair they successively filled, and were accompanied in English by Francis James Child (1825-1896), whose English and Scottish Ballads, first issued in 1858, was brought to its final and monu- mental form in 1892. Cornelius Conway Felton (1807-1862), president of Harvard College, stood for Greek culture, but the classical influence was little in evidence. Elsewhere in New England George Perkins Marsh (1801-1882) of Vermont, long minister to Italy, and William Dwight Whitney (1827-1894) of Yale, were linguistic scholars of high distinction. The develop- ment of the colleges into universities was already prophesied in the presence and work of these men. Outside of New England scholarship had been illustrated in New York by Charles Anthon (1797-1867), the classical editor, by the Duyckincks, Evert Augustus (1816-1878) and George Long (1823-1863), editors of the Cyclopaedia of American Literature (1855), and by Giulian Crommelin Verplanck (1786-1870), editor of Shakespeare (1846). New England thus, standing somewhat apart, produced a characteristic literature, more deeply rooted in. the community Character- i ˆ- in was tne case elsewhere; and this literature, blend- istics ing with what was produced to the south and west,

of New became a predominant share of what has been nation- England a iiy accepted as standard American literature. It is

also the more profound and scholarly share; and if quantity as well as quality be counted, and, as is proper, Bryant be included as the product of Puritan culture, it is the more artistic share. American standard literature, so constituted, belongs to romanticism, and is a phase of the romanticism which was then the general mood of literature; but it is a native product, with traits of its own and

inward development from local conditions, not only apparent by its themes, but by its distinct evolution. Though it owed much to contact with Europe through its travelled scholars and its intellectual commerce by means of translations and imported books, and often dealt with matter detached from America both in prose and poetry, it was essentially self-contained. It was, in a marked way, free from the passions whose source was the French Revolution and its after-throes from 1789 to 1848; it is by this fact that it differs most from European romanticism. Just as the Puritan Rebellion in England left the colonies untouched to their own development, the political revolutions in Europe left the new nation unaffected to its normal evolution. There was never any revolution, in the French sense, in America, whether social, political, religious or literary; its great historical changes, such as the termination of English rule, the passing away of Puritan- ism, the abolition of slavery with the consequent destruction of the old South, were in a true sense conservative changes, normal phases of new life. In literature this state of things is reflected in the absence in it of any disturbance, its serenity of mood, its air of quiet studies. It is shown especially in its lack of passion. The only ardours displayed by its writers are moral, patriotic or religious, and in none of them is there any sense of conflict. The life which they knew was wholesome, regular, still free from urban corruption, the experience of a plain, prosperous and law- abiding people. None of these writers, though like Hawthorne they might deal with sin or like Poe with horror and a lover's despair at death, struck any tragic note. No tragedy was written, no love-poetry, no novel of passion. No literature is so maiden-pure. It is by refinement rather than power that it is most distinguished, by taste and cultivation, by conscientiousness in art, in poetic and stylistic craft; it is romance retrospectively seen in the national past, or conjured out of foreign lands by reminiscent imagination, or symbolically created out of fantasy; and this is supplemented by poetry of the domestic affections, the simple sorrows, all " that has been and may be again" in daily human lives, and by prose similarly related to a well- ordered life. If it is undistinguished by any work of supreme genius, it reflects broadly and happily and in enduring forms

the national tradition and character of the land in its dawning century.

The original impulse of this literature had spent its force by 1 86 1 — that is, before the Civil War. The greater writers had, in general, already done their characteristic work, and though the survivors continued to produce till toward the close of the century, their works

contained no new element and were at most mellow fruits of age. The war itself, like the Revolution, left little trace in literature beyond a few popular songs and those occasional poems which the older poets wrote in the course of the conflict. Their attitude toward it and (with the exception of Whittier and Lowell) toward the anti-slavery movement which led up to it was rather that of citizens than of poets, though in the verse of Longfellow and Emerson there is the noble stamp of the hour, the impress of liberty, bravery and sorrow. Lowell is the exception; he found in the Commemoration Ode (1865) his loftiest subject and most enduring fame. The work began to fall into new hands, and a literature since the war grew up, which was, however, especially in poetry, a continuation of romanticism and contained its declining force. It was contributed to from all parts of the older country, and also from the west, and a genera- tion has now added its completed work to the sum. No author, in this late period, has received the national welcome to the same degree as the men of the elder time; none has had such personal distinction, eminence or public affection; and none has found such . honourable favour abroad, either in England or on the continent. Poetry has felt the presence of the art of Tennyson, which has maintained an extreme sensitiveness among the poets to artistic requirements of both material and technique; and it also has taken colour from the later English schools. It has, however, yielded its pre-eminent position to prose. The novel has displaced romance as the highest form of fiction, and the essay has succeeded the review as the form of criticism. The older colleges have grown into universities, and public libraries have multiplied throughout the north and west. The literature of information, meant for the popularization of knowledge of all kinds, has been put forth in great quantity, and the annual increase in the production of books keeps pace with the general growth of the country. Literature of distinction, however, makes but a small part of this large mass.

In poetry the literary tradition was continued in Boston by Thomas Bailey Aldrich (1836-1907), essentially a stylist in verse, brief , definite, delicate, who carried the lighter graces of the art, refinement, wit, polish, to a high point of excel- writers. lence. His artistic consanguinity is with Herrick and Landor, and he takes motive and colour for his verse from every land, as his predecessors had done, but with effects less rich. He divided attention between drama and lyric, but as his dramas look strictly to the stage, it is on the lyrics that his reputation rests. He was master also of an excellent prose and wrote novels, sketches of travel, and especially stories, strongly marked by humour, surprise and literary distinction.

In New York, Edmund Clarence Stedman (1833-1908) became the chief repre- sentative of the literary profession. He was both poet and critic, and won reputation in the former and the first rank in the latter field. His Victorian Poets (1875) and Poets of America (1885), followed by comprehensive anthologies (1894-1900), together with The Nature and Elements of Poetry (1892), are the principal critical work of his generation, and indeed the sole work that is eminent. His verse, less practised as time went on, was well wrought and often distinguished by flashes of spirited song and balladry. With him is associated his elder friend, Richard Henry Stoddard (1825-1903), who made his appearance before the Civil War, and whose verse belongs in general character to the style of that earlier period and is as rapidly forgotten. Both Stedman and Stoddard were of New England birth, as was also the third to be mentioned, William Winter (born 1836), better known as the lifelong dramatic critic of the metropolis. The last of the New York poets of established reputation, Richard Watson Gilder (b. 1 844 in New Jersey ; d. 1 909) , was at first affiliated with the school of Rossetti, and his work in general, Five Books of Song (1894), strongly marked by artistic susceptibility, is in a high degree

refined and delicate. In the country at large popular success, in England as well as in America, was won by Charles Godfrey Leland (1824-1903), in Hans Breitmann's Ballads (1871), humorous poems in the Pennsylvania Dutch dialect. Born in Philadelphia, he spent the greater part of his mature life abroad and wrote numerous works on diverse topics, but his reputation is chiefly connected with his books on gypsy life and lore. Another foreign resident who deserves mention was William Wetmore Story (1819-1895), the sculptor, of Massachusetts, connected with the Boston group, whose verse and prose gave him the rank of a litterateur. The South again entered into literature with the work of Sidney Lanier (1842-1881), in succes- sion to Henry Timrod (1829-1867) and Paul Hamilton Hayne (1830-1886), who find a place rather by the affection in which they are held at the South than by positive merit. Lanier showed originality and a true poetic gift, but his talents were little effectual. From the West humorous poetry was produced by Francis Bret Harte (1 839-1 902), born in Albany, in The Heathen Chinee (1870) and similar verse, but he is better remembered as the artistic narrator of western mining life in his numerous stories and novels. Verse of a similar kind also first brought into literary notice John

Hay (1838-1905), in Pike County Ballads (187 1), who also wrote in prose; but his reputation was rather won as a statesman in the closing years of his life. Minor poets of less distinction but with a vein superior to that of the earlier period, more excellent in workmanship and more coloured with imagination and mood, arose in all parts, of whom the most notable are Julia Ward Howe (born 1819), in Boston, the vener- able friend of many good causes, Henry Howard Brownell (1820- 1872) of Rhode Island, author of the most vigorous and realistic poetry of the Civil War, War Lyrics (1866), Edward Rowland Sill (1841-1887), born in Connecticut but associated with California, Henry Van Dyke (born 1852), in New York, better known by his prose in tale and essay, Silas Weir Mitchell (born 1830), in Philadelphia, whose repute as a novelist has overshadowed his admirable verse, Eugene Field (1850-1895) of Chicago, James VVhitcomb Riley (born 1853) of Indiana, both distinguished for their humorous and childhood verse, and Joaquin Miller (born 1841) of Oregon, whose first work, Songs of the Sierras (1871), had in it much of the spirit of the wild land, the colour of the desert, the free, adventurous character of the filibuster, all strangely mixed with pseudo-Byronic passions.

Apart from all these, whether minor or major poets, stands Walt Whitman (1 819-1892), whose Leaves of Grass (1855) first appeared before the war, but whose fame is associated rather with its successive editions and its companion volumes, and definitely dated, perhaps, from 1867. He received attention in England, as did Miller, on an assumption that his works expressed the new and original America, the unknown demo- cracy, and he has had some vogue in Germany iriainly owing to his naturalism. His own countrymen, however, steadily refuse to accept him as representative of themselves, and his naturalism is uninteresting to them, while on the other hand a group appar- ently increasing in critical authority treat his work as significant. It is, in general, only by those few fine lyrics which have found a place in all anthologies of American verse that he is well known and highly valued in his own land.

The chief field of literary activity has been found in the novel, and nowhere has the change been so marked as here. The romantictreatmentofthenovelpractically disappeared, and in its place came the realistic or analytic treatment, rendering manners by minute strokes of observation or dissecting motives psychologically. This amounted to a substitu- tion of the French art of fiction, in some of its forms, for the English tradition of broad ideality and historical picturesqueness. The protagonist of the reform was William Dean Howells (born 1837), a cultivated literary scholar,and avarious

writer of essays, travel sketches, poetry and plays, editor of many magazines and books, whose career in letters has been more laborious and mis- cellaneous than any other contemporary, but whose main work has been the long series of novels that he has put forth almost annually throughout the period. He not only wrote fiction, but

Whitman.

The later novel.

he endeavoured to make known to Americans fictiari as it was practised in other lands, Russia, Italy, Spain, and to bring the art that was dearest to him into line with the standard of the European world. He was an apostle of the realistic school, and directed his teaching to the advocacy of the novel of observation, which records life in its conditions and attempts to realize what is in the daily lives and experience of man rather than what belongs to adventure, imagination or the dreaming part of life. Of his works, The Lady of tlie Aroostook (1879), The Rise of Silas Laphatn (1885), A Hazard of New Fortunes (1889), are character- istic examples. He won a popular vogue, and if it is now less than it was, it is because after a score of years tastes and fashions change. The conscientiousness of his art continues the tradition of American writers in that respect, and he is master of an affable style. His work, including all its phases, is the most important body of work done in his generation. Henry James (born 1843), who mainly resided abroad, is his compeer, and in a similar way has followed French initiative. He also has been a various writer of criticism and travel and the occasional essay; but his equally long series of novels sustains his reputation. He has developed the psychological treatment of fiction, and of his work The Portrait of a Lady (i88i) > The Princess Casamassima (1886) and The Tragic Muse (1 890) are ch aracteristic. He has had less vogue owing to both matter and style, but in certain respects his power, more intellectual than that of Howells, has greater artistic elements, while the society with which he deals is more complex. He is really a cosmopolitan writer and has no other connexion with America than the accident of birth. A third novelist, also a foreign resident, Francis Marion Crawford (1854-1909), f a]| s i n to the same category. A prolific novelist, in the beaten track of story-telling, he has always a story to tell and excellent narrative power. The work regarded as most important from his hand is Saracinesca (1887) and its sequels; but his subjects are cosmo- politan, his talent is personal, and he has no effectual con- nexion with his own country. The romantic tradition of the

older time was continued by Lew Wallace (1827-1905) of Indiana, a distinguished general and diplomat, in his Mexican tale, The Fair God (1873), and his oriental romances, Ben Hitr (1880), one of the most widely circulated of American books, and The Prince of India (1893). A mode of the novel which was wholly unique was practised by Francis Richard Stockton (1834-1902) in his droll tales, of which Rudder Grange (1879) is the best known.

The principal minor product of the novel lay in the provincial tale. The new methods easily lent themselves to the portraiture of local conditions, types and colour. Every part of the country had its writers who recorded its traits in this way. For New England Mrs Harriet Beecher Stowe described the older life in Old Town Folks (1869),. and was succeeded by Sarah Orne Jewett (1849-1909) and Mary Eleanor Wilkiris (born 1862). The West was notably treated by Edward Eggleston (1837-1902) in The Hoosier School Master (1871), Mary Hallock Foote (born 1847) in Led-Horse Claim (1883) and Hamlin Garland (born i860) in Main Travelled Roads (1891). The. South was represented by Mary Noailles Murfree [" Charles Egbert Craddock"] (born 1850) in In the Tennessee Mountains (1884) and its successors, by Thomas Nelson Page (born 1853) in Marse Chan (1887) and other tales of the reconstruction in Virginia, and with most literary grace by George Washington Cable (born 1844), whose novels of Louisiana are remarkable for their poetic charm. The list is sufficiently illustrative of the general movement, which made what was called the dialect novel supreme for the season. This was succeeded by a revival of the historical novel in local fields, of which Winston Churchill (born 1871) in Richard Carvel (1899) is the leading exponent, and together with it the sword and dagger tale of the Dumas type, the special contemporary plot invented by Anthony Hope, and romance in its utmost forms of adventure and extravagance, came in like a flood at the close of the Spanish War. There were during the period from 1870 to 1900 many other writers of fiction, who often proceeded in con- ventional and time-honoured ways to tell their tale, but none of them is especially significant for the general view or as showing any tendencies of an original sort. The pietistic novel, for

example, was. produced with immense popularity by Edward Payson Roe (1838-1888), who shared the same vogue as Josiah Gilbert Holland (18 10-188 1), and both fell heir to the same audience

which in the earlier period had welcomed The Wide, Wide World with the same broad acceptance.

The essay, and the miscellaneous work which may be classed with it, was cultivated with most distinction by Thomas Went- Essayists. wortn Higginson (born 1823), one of the Boston group, a writer of the greatest versatility, as in his life he followed many employments, from that of preaching in a Uni- tarian pulpit to that of commanding a negro regiment in the Civil War. He has written good verse and excellent prose, and his familiar style, often brilliant with life and wit, especially becomes the social essay or reminiscent paper in which he excelled, and gives agreeableness to his writings in every form. Atlantic Essays (1871) is a characteristic book; and, in general, in his volumes is to be found a valuable fund of reminiscence about the literature and the times of his long life, not elsewhere so abundant or entertaining. Charles Dudley Warner (1 829-1900) of Hartford, also in close touch in the later years with the Boston group, was more gifted with gentle humour and of a literary temperament that made the social essay his natural expression. He won popularity by My Summer in a Garden (1870), and was the author of many volumes of travel and several hovels, but the familiar essay, lighted with humour and touched with a reminis- cence of the Irving quality in sentiment, was his distinctive work. The long life of Edward Everett Hale (1822-1909), minister at Boston, was fruitful in many miscellaneous volumes, including fiction of note, The Man Without a Country (1868), but the most useful writing from his pen falls into prose resembling the essay in its form and manner of address, though cousin, too, to the sermon. John Burroughs (b. 1837) of New York carried on in essay form the nature tradition of Thoreau, touched with Emersonianism in the thought, and after his example books of mingled observation, sentiment and literary quality, with an out-of-door atmosphere, have multiplied.

American humour often cultivates a form akin to the essay, but it also falls into the mould of the tale or scene from life. In Humour. tne P el "i°d before the Civil War, to sum up the whole subject in this place, it had the traits which it has since maintained, as its local tang, of burlesque, extravaganza, violence, but it recorded better an actual state of manners and scene of life in raw aspects. Its noteworthy writers were Seba Smith (1792-1868) of Maine, author of the Letters of Major Jack Downing, which began to appear in the press in 1830; Augustus Baldwin Longstreet of Georgia in Georgia Scenes (1835) ; William Tappan Thompson (1812-1882), born in Ohio but associated with the South by descent and residence, in Major Jones' Courtship (1840), a Georgian publication; Joseph G.

Baldwin (1815-1864) in Flush Times in Alabama and Mississippi (1853); and Benjamin Penhallow Shillaber (1814-1890) in Life and Sayings of Mrs Partington (1854). A fresh form, attended by whimsicality, appears in George Horatio Derby's (1823-1861) Phoenixiana (1855). In the war-times Robert Henry Newell (1836-1901) and David Ross Locke (1833-1888), respectively known as " Orpheus C. Kerr " and " Petroleum V, Nasby " cultivated grotesque orthography in a characteristic vein of wit; and with more quaintness and drollery Henry Wheeler Shaw (1818-1885) and Charles Farrar Browne (1834-1867), known as " Josh Billings " and " Artemus Ward," won immense popularity which extended to England. These latter writers were men of Northern birth, but of Western and wandering journalistic experience as a rule. Their works make up a body of what is known as " American humour," a characteristic native product of social conditions and home talent. One poet, John Godfrey Saxe (1816-1887) of Vermont, attempted something similar in literary verse after the style of Tom Hood. The heir to this tradition of farce, drollery and joke was Samuel Langhorne Clemens (1835-1910), known as "Mark Twain," born in Missouri, who raised it to an extraordinary height of success and won world-wide reputation as a great and original humorist. His works, however, include a broader compass of fiction; greater humanity and reality, and ally him to

the masters- of humorous creation. Joel Chandler Harris (1848-5 1908) of Georgia introduced a new variety in Nights with Uncle Remus (1883), which is literary negro folklore, and Finley Peter Dunne (born 1857) of Chicago, the creator of " Mr Dooley," continues the older American style in its original traits.

History was represented in this period with a distinction not inferior to that of the elder group by Francis Parkman (1823- 1893) of Boston, who, however, really belongs with Hl&toiy the preceding age by his affiliations; his series of histories fell after the Civil War by their dates of publication, but they began with History of the Conspiracy of Pontiac (1851); he was the contemporary of Lowell and differed from the other members of the elder group, who survived, only by the fact of the later maturing of his work. He was not less eminent than Motley and Prescott and his history is of a more modern type. In the next generation the field of American history was cultivated by many scholars, and a large part of local history and of national biography was for the first time recorded. James Ford Rhodes's (1848) History of the United States (1892) holds standard rank ;, the various writings of John Fiske (1842-1901), distinguished also as a philosophical writer, in the

colonial and revolutionary periods are valued both for scholarship and for excellent literary style; and Theodore Roosevelt's (born 1858) The Winning of the West (1889) and his several biographical studies deserve mention by their merit as well as for his eminent position. The historians, how- ever, have seldom sought literary excellence, and their works belong rather to learning than to literature. The same state- ment is true of the scholarship of the universities in general, where the spirit of literary study has changed. In the department of scholarship little requires mention beyond Horace Howard Furness's (born 1833) lifelong work on his Variorum Edition of Shakespeare, the Shakespearian labours of Henry Norman Hudson (1814-1886) and Richard Grant White (1821-1885), the Chaucerian studies of Thomas Raynesfof d Lounsbury (born 1838) of Yale, and the translations of Dante (1867, 1892) by Charles Eliot Norton (1827-1908) of Harvard.

The period has been one of great literary activity, effort and ambition, but it affects one by its mass rather than its details; it presents few eminent names. The romantic motives fixed in early colonizing history as a taking possession of ueas!'" the land by a race of Puritans, pioneers, river-voyagers, backwoodsmen, argonauts, have been exhausted; and no new motives have been found. The national tradition has been absorbed and incorporated, so far as literature was able to accomplish this. The national character on the other hand has been expressed rather in local types, the colour of isolated com- munities and provincial conditions for their picturesque value and human truth, and in commonplace characters of average life; but no broadly ideal types of the old English tradition have been created, and the great scene of life has not been staged after the manner of the imaginative masters of the past. There has been no product of ideas since Emerson; he was, indeed, the sole author who received and fertilized ideas as such, and he has had no successor. America is, in truth, perhaps intellectually more remote from Europe than in its earlier days. The contact of its romanticism with that of Europe was, as has been seen, imperfect, but its touch with the later developments and reactions of the movement in Europe is far more imperfect. With Tolstoy, Ibsen, d'Annunzio, Zola, Nietzsche, Maeterlinck, Sudermann, the American people can have no effectual touch; their social tradition and culture make them impenetrable to the present ideas of Europe as they are current in literary forms. Nor has anything been developed from within that is fertile in literature. The political unity of the nation is achieved, but it is not an integral people in other respects. It has not the unity of England or France or even of the general European

mind; it rather contains such disparate elements as characterize the Roman or the Turkish empire. It is cleft by political tradition and in social moral conviction, north and south, and by intellectual strata of culture east and west; it is still a people in the making. Its literature has been regional^ as was said, centred in New England, New York, Philadelphia, contributed to sporadically from the

South, growing up in Western districts like Indiana or germinating in Louisville in Kentucky, abundant in California, but always much dependent on the culture of its localities; it blends to some extent in the mind of the national reading public, but not very perfectly. The universities have not, on the whole, been its sources or fosterers, and they are now filled with research, useful for learning but impotent for literature. The intellectual life is now rather to be found in social, political and natural science than elsewhere; the imaginative life is feeble, and when felt is crude; the poetic pulse is imperceptible.

Bibliography. — The best general histories of American literature are by Barrett Wendell (1900) and William P. Trent (1903). Histories of particular periods or topics, most serviceable, are M. C. Tyler's History of American Literature during the Colonial Time (2 vols., 1878), Literary History of the American Revolution (2 vols., l %9l)'< J- F. Jameson, History of Historical Writing in America (1891); D. D. Addison, The Clergy in American Life and Letters (1900); W. H. Venable, Beginnings of Literary Culture in the Ohio Valley (1891); M. Nicholson, The Hoosiers (1900); A. H. Smith, Philadelphia Magazines and their Contributors, 1741-1850 (1892) ; W. B. Cairns, Development of American Literature, 1815-1833 (1898) ; O. B. Frothingham, Transcendentalism in New England (1876); L. Swift, Brook Farm (1900) ; T. W. Higginson, Old Cambridge (1 900) . The entire field is covered encyclopaedically by Stedman and Hutchinson, Library of American Literature (11 vols., i888-l89o)and the Duyckincks, Cyclopaedia (3rd ed., 1875), and portions of it in R. W. Griswold's successive collections, Poets and Poetry of America (1842), Prose Writers of America (1847), Female Poets of America (1848); Trent and Wells, Colonial Prose and Poetry (3 vols., 1901); Louise Manly, Southern Literature (1900), and E. C. Stedman, American Anthology (1900). The American Men of Letters series (Houghton, Mifflin & Co., Boston) and the English Men of Letters, American Series (Macmillan, New York), present the biographical and critical view in general, to which may be added E.

C. Stedman, Poets of America (1885); W. C. Lawton, The New England Poets (1898), and G. E. VVoodberry, America in Literature (1903). Detailed and admirable bibliographies for all aspects of the subject are to be found in Wendell's and Trent's Histories, and abundant and minute biographical detail in Stedman's indexes of authors.in his collections. See also the separate bibliographies to the articles in this work on each individual writer. (G. E. W.)

AMERICAN WAR OF INDEPENDENCE (1775-1781). This war, by which the United States definitely separated themselves from the British connexion, began with the affair of Lexington in Massachusetts, on the 1 9th of April 1775, and was virtually ended by the capitulation of Cornwallis at Yorktown, Virginia, on the 19th of October 1781. In this article the progress of the war itself is alone considered, its political side being treated under United States : History. From a military standpoint as well as politically it was a conspicuous and instructive conflict, — conspicuous, or even unique, as being the most famous struggle in history where colonial dependencies defeated their powerful parent state, and instructive as presenting exceptional conditions and consequent errors in the attempt to break down the revolt. The reasons for Great Britain's failure appear in the progress of the war, which assumed two distinct stages, operations in the north followed by operations in the south. In point of time and energy military activity was about equally divided between these two fields. As the naval operations in connexion with the war have a European interest as well, they are dealt with in a separate section.

To strike at the rebellion first in the north was natural and inevitable. To King George and his ministry, Massachusetts was

the hotbed of disloyalty, the head and front of opposi- mtioas. t ' on t0 tne i r colonial policy, and there coercion should

begin. It was also a convenient point for a prompt display of authority, as the town of Boston was the headquarters of General Gage, recently appointed royal governor of Massa- chusetts and commander of the king's troops in North America. He had with him four regiments of regulars, the initial force with which to overawe the restless and defiant population in his vicinity. While Gage is to be credited with advising his govern- ment that not less than 20,000 men would be necessary for the work in hand, he proceeded at once to suppress demon- strations around Boston. His principal expedition brought about the skirmish of the 19th of April 1775 (see Lexington), in which a detachment sent to seize some military stores

collected at Concord suffered heavily at Lexington, Concord and other

places, at the hands of the surrounding militia. This encounter roused the New England colonies, and in a few days some 16,000 of their townsmen marched in small bands upon Boston to protest against and resist further similar incursions; and in this irregular body we have the nucleus of the colonial forces which carried the war through. A noteworthy incident of the Concord affair, and characteristic of the attitude which the provincials had maintained and continued to maintain for another year, was the official representation to the king by the Massachusetts people that the regulars were the first to fire upon them, and that they returned the fire and fought through the day in strict defence of their rights and homes as Englishmen. They repeated their professions of loyalty to his majesty and the principles of the English Constitution. Conscious, nevertheless, that a struggle impended, they instantly sent word to all the other colonies, whose whig elements sympathetically responded to the alarm. The war had opened.

The home government extended its precautions and prepara- tions. General (Sir) William Howe, who succeeded Gage in the chief command in October, and Generals (Sir) Henry Clinton and John Burgoyne were sent out at once with reinforcements. Cornwallis followed a year later. These four generals were identified with the conduct of the principal operations on the side of the British. The force at Boston was increased to xo,ooc men. The American Congress at Philadelphia, acting for all the thirteen colonies, voted general defensive measures, called out troops and appointed George Washington of Virginia com- mander-in-chief. Before he reached the camp forming around Boston, a second and more important collision took place. On the 17th of June 1775 occurred the battle of Bunker Hill (q.v.), in which, although victorious, the British m U- suffered heavily, losing one-third of their force in storm- ing the hastily constructed lines of the " rebels." The latter's most serious loss was that of General Joseph Warren, one of the prominent leaders of the revolutionary movement in Massa- chusetts. In moral effect the battle proved anything but a defeat to the Americans, who now drew a cordon of works around Boston, hemming Howe's army in a contracted, and, as it proved, untenable, position. On the 3rd of July Washington took command of the American army at Cambridge and proceeded with what is known as the " siege of Boston," which was marked by no special incident, and closed with the evacuation of the towr> by the British on the 17th of March 1776, Howe sailing away to Halifax, Nova Scotia. While the main interest centred at this

point, the year 1775 was marked by two enterprises elsewhere. Fort Ticonderoga, the key to the passage of Lakes George and Champlain to Canada, was surprised and taken on the 10th of May by a small band under Colonel Ethan Allen, while Colonel Benedict Arnold headed an expedition through the Maine woods to effect the capture of Quebec, where Sir Guy Carleton com- manded. Arnold joined General Richard Montgomery, who was already near the city, and the combined force assaulted Quebec on the 31st of December, only to meet with complete defeat. Montgomery was killed and many of his men taken prisoners. Demonstrations against Canada were soon discontinued, Arnold drawing off the remnant of his army in May 1776.

The events of 1775, though favourable to America, were but a prelude to the real struggle to come. For the campaign of 1776 both sides made extensive preparations. To the home govern- ment the purely military problem, although assuming larger dimensions and more difficulties, still seemed to admit of a simple solution, namely, to strike hard where the rebellion was most active and capable of the longest resistance. Defeated there, it would quickly dissipate in all quarters. As much more than one-half of the population and resources of the colonists lay north of Chesapeake Bay — New England alone having an estimated population of over 700,000 persons — it was only a question as to what point in this area should be made the future base of operations. Largely upon the representations of Howe, Burgoyne and others, it was determined to shift the field from Boston to New York city, from there to hold the line of the Hudson river in co-operation with a force to move

do from Canada under Carleton and Burgoyne, and thus effectually to isolate New England.*

Upon this plan the new campaign opened in June 1 7 76. Howe, heavily reinforced from home, sailed on the 10th from Halifax to New York and on the 5th of July encamped on Staten Island. Washington, anticipating this move, had already marched from Boston and fortified the city. His left flank was thrown across the East river beyond the village of Brooklyn, while his front and right on the harbour and North or Hudson river were open to a combined

naval and military attack. The position proved untenable. Howe drove Washington out of it, and forced the abandonment of the whole of Manhattan Island by three well- directed movements upon the American left. On the 22nd of August he crossed the Narrows to the Long Island shore with 15,000 troops, increasing the number to 20,000 on the 25th, and on the 27 th surprised the Americans, driving them into their Brooklyn works and inflicting a loss of about 1400 men. Among the prisoners were Generals J. Sullivan and W. Alexander, soi-disant earl of Stirling. (See Long Island.) Howe has been criticized, rightly or wrongly, for failing to make full use of his victory. Washington skilfully evacuated his Brooklyn lines on the night of the 29th, and in a measure relieved the depression which the defeat had produced in his army. On the 15th of September Howe crossed the East river above the city, captured 300 of the militia defending the lines and occupied the city. Washington had withdrawn his main army to the upper part of the island. A skirmish, fought the next day, opposite the west front of the present Columbia University, and known as the affair of Harlem Heights, cost the British a loss of seventy of their light infantry. Delaying until the 12th of October, Howe again moved forward by water into Westchester county, and marching toward White Plains forced another retreat on Washington. In the fight on Chatterton Hill at the Plains, on the 28th of October, an American brigade was defeated. Instead of pressing Washington further, Howe then returned to Manhattan £° rt . . Island, and on the 16th of November captured Fort

Washing- ,,,,.' . , , . m ■

too. Washington with nearly 3000 prisoners. 1ms was

the heaviest blow to the Americans throughout the war in the north. The British then pushed down through New Jersey with designs on Philadelphia. Washington, still retreating with a constantly diminishing force, suddenly turned upon Lieutenant-Colonel Rail's advanced corps of Hessians at Trenton on the 26th of December and captured nearly 1000 prisoners. This brilliant exploit was followed by another on the 3rd of January, when Washington, again crossing the Delaware, outmarched Cornwallis at Trenton, and marching to his rear defeated three British regiments and three companies of light cavalry at Princeton, New Jersey. Marching on to Morristown, Washington encamped there on the flank of the British advance in New Jersey, thus ending the first campaign fought on the new issue of American Independence, which had been declared on the 4th of July 1776.

While these closing successes inspirited the Americans, it was undeniable that the campaign had gone heavily against them. Having raised a permanent force for the war called the Conti- nental Line, they awaited further operations of the enemy. Following up the occupation of New York, Howe proceeded in 1777 to capture Philadelphia. Complete success again crowned his movements. Taking his army by sea from New York to the head of the Chesapeake, he marched up into Pennsylvania, whither Washington had repaired to watch him, and on the 26th of September entered the city. The Americans attempted to check the advance of the British at the river Brandy- wio', wine, where an action occurred on the nth, resulting

in their defeat (see Brandywine); and on the 4th of October Washington directed a well-planned attack upon the enemy's camp at Germantown on the outskirts of the city, but failed of success. (See Germantown.)

Howe's victorious progress in Pennsylvania was neutralized by disasters farther north. Burgoyne marched from Canada in June 1777, with a strong expeditionary force, to occupy Albany and

put himself in touch with Howe at the other end of the Hudson. Driving the Americans under General Arthur St Clair out of Ticonderoga, and making his way through the deep woods with difficulty, he reached the Hudson at Fort Edward on the 30th of July. General Philip Schuyler, commanding the Americans in that quarter, retreated to Stillwater, 30 m. above Albany, barricading the roads and impeding Burgoyne's progress. Dis- satisfaction with his conduct led Congress to replace him in command by General Gates. On the 13th of August Burgoyne despatched a force to Bennington, Vermont, under the German colonel Friedrich Baum, to capture stores and overawe the country. On the 1 6th Baum was attacked by General John Stark with the militia from the surrounding country, and was overwhelmed. Colonel Breyman, marching to his relief, was also routed. The misfortune cost the British 1000 men. Equally unfortunate was the fate of an expedition sent Saratoga. under Colonel Barry St Leger to co-operate with Burgoyne by way of the Mohawk Valley. On the 6th of August he was met at Oriskany by General Nicholas Herkimer and forced to retreat. Despite these disasters Burgoyne pushed south to Stillwater, where he was defeated by Gates's improvised army of continentals and militia in two battles on the 19th of September (Freeman's Farm) and the 7th of October (Bemis's Height). On the 1 7th he was forced to surrender. (See Saratoga, Battle or.) This disaster was followed by the alliance

between America and France in 1778, and later by the addition of Spain to England's enemies- — events of far-reaching importance.

A movement of importance, in 1778-79, was the expedition of George Rogers Clark, under the authority of the state of Virginia, against the British posts in the north-west. With a company of volunteers Clark captured Kaskaskia, the chief post in the Illinois country, on the 4th of July 1778, and later secured the submission of Vincennes, which, however, was recaptured by General Henry Hamilton, the British commander at Detroit. In the spring of 1779 Clark raised another force, and recaptured Vincennes from Hamilton. This expedition did much to free the frontier from Indian raids, gave the Americans a hold upon the north-west, of which their diplomats duly took advantage in the peace negotiations, and later, by giving the states a community of interest in the western lands, greatly promoted the idea of union.

In 1778 Sir Henry Clinton succeeded Howe in the chief com- mand in America. With fewer resources than his predecessor had disposed of, he could accomplish practically nothing in the north. In June 1778 he evacuated Philadelphia, with the intention of concentrating his force at New York. Washington, who had passed the winter at Valley Forge, overtook him at Monmouth, N.J., and in an action on the 28th of June both armies suffered about equal loss. Thereafter (except in the winter cf 1779, at Morristown) Washington made West Point on the Hudson the headquarters of his army, but Clinton avowed himself too weak to attack him there. In 1779 he attempted to draw Washington out of the Highlands, with the result that in the manoeuvres he lost the garrison at Stony Point, 700 strong, the position being stormed by Wayne with the American light infantry on the 16th of July. During the summer General John Sullivan marched with a large force against the Indians (all the Iroquois tribes except the Oneidas and part of the Tuscaroras siding with the British during the war) and against the Loyalists of western New York, who had been committing great depreda- tions along the frontier; and on the 29th of August he inflicted a crushing defeat upon them at Newtown, on the site of the present Elmira. In addition several Indian villages and the crops of the Indians were destroyed in the lake region of western New York.

Meanwhile the co-operation of the French became active. In July Count Rochambeau arrived at Newport, Rhode Island. That place had been occupied by the British from 1776 to the close of 1779. An unsuccessful attempt was made to drive them out in 1778 by the Americans assisted by the French admiral d'Estaing and a French

corps. The year 1780 is also marked by the treason of General Benedict Arnold (q.v.), and the consequent

execution of Major Andre. Minor battles and skirmishes occurred until in August 1781 Washington conceived the pro- ject of a combined American^French attack On Cornwallis at Yorktown. Va., the success of which was decisive of the war (see below).

The inadequate results of the British campaigns against the northern colonies in 1776 and 1777 led the home government to turn its attention to the weaker colonies in the south. in'aeonia. Operations in the north were not to cease, but a power- ful diversion was now to be undertaken in the south ivith a view to the complete conquest of that section. Success there would facilitate further movements in the- north. An isolated attack on Charleston, South Carolina, had been made by Sir Henry Clinton and Sir Peter Parker as earry as June 1776, but this was foiled by the spirited resistance of General William Moultrie; after 1778 the southern attempts, stimulated in part by the activity of the French in the West Indies, were vigor- ously sustained. On the 29th of December of this year Colonel Archibald Campbell (1730-1701) with an expeditionary corps of 3500 men from Clinton's army in New York, captured Savannah; Georgia, defeating the American force under General Robert Howe. In the following month he pushed into the interior and occupied Augusta. General Benjamin Lincoln,succeeding Howe, undertook to drive the British out of Georgia, but General Augustine Prevost, who had commanded in Florida, moved up and compelled Lincoln to retire to Charleston. Prevost, making Savannah his headquarters, controlled Georgia. In September 1779 he was besieged by Lincoln in conjunction with a French naval and military force under Admiral d'Estaing, but Success- fully repelled an assault (October 9), and Lincoln again fell back to Charleston. In this assault Count Casimir Pulaski, on the American side, was mortally wounded.

The prestige thus won by the British in the south in 1779 was immensely increased in the following year, when they victoriously swept up through South and North Carolina. Failing, as stated, to achieve any advantage in the north in 1779, Sir Henry Clinton, under instructions from government, himself headed a combined military and naval expedition southward. He < evacuated New- port, R.I. (October 25), left New York in command of the German

general Wilhelrh von Knyphausen, and in December sailed with 8500 men to join Prevost at Savannah. Cornwallis accompanied him, and later Lord Rawdbn joined him with an

■ *additional force. Marching upon Charleston, Clinton*

ton. cut °^ tne ” tv lrom relief, and after a brief siege

compelled Lincoln to surrender on the 12th of May. (See Charleston.) The loss of this place and of the 5000 troops included in the surrender was a serious blow to the American cause. The apparent submission of South Carolina followed. In June Clinton returned to New York, leaving Cornwallis in command, with instructions to reduce North Carolina also. Meanwhile an active and bitter partisan warfare opened. The British advance had been marked by more than the usual destruction of war; the Loyalists rose to arms; the whig population scattered and without much organization formed groups of riflemen and mounted troopers to harass the enemy. Little mercy was shown on either side. The dashing rider, Colonel Banastre Tarleton, cut to pieces (April 14, 1780) a detachment of Lincoln’s cavalry, and followed it up by practi- cally destroying Buford’s Virginia regiment near the North Carolina border. On the other hand, daring and skilful leaders such as Francis Marion and Thomas Sumter kept the spirit of resistance alive by their sudden attacks and surprises of British outposts. Hanging Rock, Ninety-Six, Rocky Mount and other affairs brought their prowess and devotion into notice. By the month of August 1780, with the main British force encamped near the North Carolina line, the field seemed clear for the next advance.

The threatening situation in the Carolinas alarmed Congress and Washington and measures were taken to protect the dis- tressed section. Before Cornwallis could be brought to bay he was faced successively by four antagonists— Generals Gates, Greene, Lafayette and Washington. They found in him the

Camden.

most capable and dangerous opponent of the war. Greene called him ” the modern Hannibal.” With Lincoln’s surrender of nearly all the continental soldiers in the south, a new force had to be supplied to meet the British veterans. Two thousand men, mainly the Maryland line, were hurried down from Washington’s camp under Johann de Kalb; Virginia and North Carolina put ; new men into the field, and the entire force was placed under command of General Gates. Gates

marched towards Camden, S.C., and on the 1 6th of August encountered Cornwallis near that place. Each army by a night march attempted a surprise of the other, but the British tactics prevailed, and Gates was utterly routed. The reputation he had won at Saratoga was ruined on the occasion by over-confidence and-incompetence. De Kalb was killed in the action. General Greene, standing next to Washington as the ablest and most trusted officer of the Revolution, succeeded Gates. Cornwallis marched leisurely into North Carolina, but before meeting Greene some months later he suffered the loss of two detachments sent at intervals to disperse various partisan corps of the Americans; On the 7th of October 1780 a force of 1100 men under Major Patrick Ferguson was surrounded at King's Mountain, S. C.,near the North Carolina line, by bands of riflemen under Colonels Isaac Shelby, James Williams, William Campbell and others, and after a desperate fight on the wooded and rocky slopes, surrendered. Ferguson himself was killed. On the 17th of January 1781 General Daniel Morgan was attacked at Cowpens, south-west of King's Mountain, by Colonel Tarleton with his legion. Both were leaders of repute, and a most stirring action occurred in which Morgan, with Colonel William Washington leading his cavalry, practically destroyed Tarleton's corps. Despite the weakening his army suffered by these losses, Corn- wallis marched rapidly through North Carolina, giving Greene a hard chase nearly to the Virginia line. On the 15th of March the two armies met at Guilford Court House (near the present Greensboro, N.C.), and a virtually drawn c" urt battle was fought. The British, by holding their House. ground with their accustomed tenacity when engaged with superior numbers, were tactically victors, but were further weakened by a loss of nearly 600 men; Greene, cautiously avoiding another Camden, retreated with his forces intact. With his small' army,, less than 2000 strong, Cornwallis declined to follow Greene into the back country, and retiring to Hills- borough, N.C., raised the royal standard, offered protection to the inhabitants, and for the moment appeared to be master of Georgia and the two Carolinas. In a few weeks, however, he abandoned the heart of the state and marched to the coast at Wilmington, N.C., to recruit and refit his command.

At Wilmington the British general faced a serious problem, the solution of which upon his own responsibility unexpectedly led to the close of the war within seven months. Instead of remain- ing in Carolina he determined to march into Virginia, justifying the move on the ground that until Virginia was reduced he could not firmly hold the more southern states he had just overrun; This decision was subsequently sharply criticized by Clinton as unmilitary, and as

having been made contrary to his instructions. To Cornwallis he wrote in May: " Had you intimated the proba- bility of your intention, I should certainly have endeavoured to stop you,as I did then as well as now consider such a move likely to be dangerous to our interests in the Southern Colonies." The danger lay in the suddenly changed situation in that direction; as General Greene, instead of following Cornwallis to the coast, boldly pushed down towards Camden and Charleston, S.C.,'with a view to drawing his antagonist after him to the points where he was the year before, as' well as to driving back Lord Rawdon, whom Cornwallis had left in that field. In his main object, the recovery of the southern states, Greene succeeded by the close of the year; but not without hard fighting and repeated reverses; " We fight, get beaten, and fight again," were his words. On the 25th of April 1 781 he was surprised in his camp at Hobkirk's Hill, near Camden, by Lord Rawdon and defeated, both sides suffering about an equal loss. On the 22nd of May he attempted to storm the 'strong British post at Ninety-Six but was repulsed;

and finally on the 8th of September he fought the last battle

of the war in the lower southern states at Eutaw Springs, S.C.

In the first part of the action Greene was successful Butaiv

Springs. after a desperate conflict; in the pursuit, • however, the Americans failed to dislodge the British from a stone house which they held, and their severe loss in both engagements was over 500 men. The British lost about 1000, one-half of whom were prisoners. Better success attended the American partisan operations directed by Greene and conducted by Marion, Sumter, Andrew Pickens, Henry Lee and William Washington. They fell upon isolated British posts established to protect the Loyalist population, and generally captured or broke them up. Rawdon found himself unable with his diminish- ing force to cover the country beyond Charleston; and he fell back to that place, leaving the situation in the south as it had been in the early part of 1780. On the American side, Greene was hailed as the deliverer of that section.

Cornwallis, meantime, pursued his Virginia project. Leaving Wilmington, N.C., on the 25th of April 1781, he reached Peters- burg

on the 20th of May. There he found British campaign, detachments, 2000 strong, composed of troops whom Clinton had sent down separately under Generals Benedict Arnold and William Phillips to establish a base in the Chesapeake, as a diversion in favour of the operations of Corn- wallis in the Carolinas. Virginia at the moment presented a clear field to the British, and they overran the state as far north as Fredericksburg and west to Charlottesville. At the latter place Jefferson, governor of the state, barely escaped capture by Tarleton's men. A small American force under Lafayette, whom Wayne reinforced during the summer, partially checked the enemy. At Green Spring, near Jamestown Island, Lafayette boldly attacked his antagonist on the 6th of July, but had to save himself by a hasty retreat. Early in August Cornwallis retired to York town to rest and await developments. There he fortified himself, and remained until the American-French military and naval combination, referred to above, appeared and compelled his surrender. (See Yorktown.)

With this event war operations ceased. Preliminary articles of peace, signed on the 30th of November 1782, were followed by a definitive treaty concluded on the 3rd of September 1783. Charleston, S.C, was evacuated late in 1782; New York on the 25th of November 1783. The reasons of Great Britain's mis- 1 fortunes and failure may be summarized as follows: — Miscon- ception by the home government of the temper and reserve strength of her colonists, a population mainly of good English blood and instincts; disbelief at the outset in the probability of a protracted struggle covering the immense territory in America; consequent failure to despatch sufficient forces to the field; the safe and Fabian generalship of Washington; and finally, the French alliance and European combinations by which at the close of the conflict England was without a friend or ally on the continent.

Bibliography. — The most exhaustive reference work for this period is vol. vi. of Winsor's Narrative and Critical History of America (Boston, 1887). Its nine chapters, prepared by different writers, give a complete review of the struggle, both military and naval, and each closes with numerous illustrative notes, editorial criticisms and a full list of authorities. The volume is interspersed, far more extensively and richly than any other treatise on the war, with reproductions of contemporary plans, maps, documents, portraits and prints. Supple- menting Winsor and bringing the material down to recent date is Prof. C. H. Van Tyne's American Revolution (Harper's " Am. Nation " Series, New York, 190$), chap, xviii., on bibliographical aids and authorities. General histories of the war are mainly of American authorship, such as: George Bancroft's History of the United States

(Boston, 1883-1885) which, in spite of minor errors of fact and judgment, will remain standard ; J. Fiske's American Revolu- tion (2 vols., Boston, 1891); Carrington's Battles of the American Revolution (New York, 1876) is a critical study by a military officer; B. J. Lossing's Pictorial Field Book of the Revolution (2 vols., New York, 1850-1859), not always accurate, but preserves local traditions and details. Monographs on single events or campaigns abound: Dawson's papers on Ticonderoga, "Storming of Stony Point," &c. (New York, 1866-); Johnston's "Campaign of 1776 around New York " (L. I. Hist. Soc, 1877), " Yorktown Campaign " (New York, 1881), &c. ; Sargent's Life of Major John

Andre (Boston, J861), one of the best of Revolutionary biographies; Gen. William Stryker's Battles of Trenton and Princeton (Boston, 1898) ; and others mentioned in Winsor and Van Tyne.

English works of importance are Lord Mahon's History of England, vol. vi. ; Sir George O. Trevelyan's American Revolution (New York and London; vol. i., 1899; 4 vols, published, 1908), a new study of cabinet and parliamentary politics of the period, with review of the military events; Hon. J. W. Fortescue, History of the British Army, vol. iii. (1902); Stedman's American War (2 vols., 1794); Col. Tarleton's Southern Campaigns, 1 780-1 781 (London, 1787) ; the pamphlet controversy between Sir Henry Clinton and Lord Corn- wallis (1783), see Winsor, vi., p. 516, n. ; Burgoyne's State of the Expedition from Canada in 1777 (London, 1780). (H. P. J.)*

The naval operations of the War of Independence divide them- selves naturally into two periods. (1) From 1775 till the summer of 1778 the British navy was engaged in co-operating „.. with the troops employed against the insurgents, on sea . power , the coasts, rivers and lakes of North America, or in ~ endeavouring to protect British commerce against the enterprise of American privateers. (2) During the second period the successive interventions .of France, Spain and Holland extended the naval war till it ranged from the West Indies to the Bay of Bengal. This second period lasted from the summer of 1778 to the middle of 1783, and it included both such operations as had already been in progress in America, or for the protection of commerce, and naval campaigns on a great scale carried out by the fleets of the maritime powers.

First Period.— The history of the naval war from 1775 to 1778 was made up of many small operations. The naval force at the disposal of the admirals commanding on the station, who until Lord! Howe took up the command on the 12th of July 1776 were Samuel Graves and

Molyneux Shuldham, was insufficient to patrol the long line of coast. A large part of such squadrons as there were was necessarily limited to aiding General Gage and Sir W. Howe at Boston, in seeking stores for the army and in supplying naval brigades. At other points of the coast the British navy was employed in punitive expeditions against the coast towns — as for example the burning of Falmouth (now Portland, Maine) in October 1775- — which served to exasperate, rather than to weaken the enemy, or the unsuccessful attack on Charleston, S.C, in June 1776, It was wholly unequal to the task of blockading the many towns from which privateers could be fitted out. British commerce therefore suffered severely, even as far off as the Irish coasts, where it was found necessary to supply convoy to the Belfast linen trade. The Americans were not yet in a position to provide a fleet. On the 23rd of March 1776 Congress did indeed issue letters of marque and reprisal, and efforts were made to fit out a national force. But the so-called " continental " vessels which sailed with the commission of the Congress hardly differed in character, or in the nature of their operations, from the privateers. The British navy was able to cover the retreat of the army from Boston to Halifax in April 1776, and to convey it to New York in June. It assisted in the expedition to Philadelphia in July 1777. On the St Lawrence and the Lakes it was able to play a more aggressive part. The relief of Quebec by Captain — afterwards Sir Charles — Douglas in May 1776 forced the American general Arnold to retreat. The destruction of his squadron on Lake Champlain in October covered the frontier of Canada, and supplied a basis for the march of General Burgoyne in 1777 which ended in the surrender at Saratoga.

Second Period. — The disaster at Saratoga was followed in 1778 by war with France, which had already given much private help to the American privateers and to their forces in the field. The rupture came in March when the British ambassador, Lord Stormont, was recalled from Paris, but as neither fleet was ready for service, actual conflict did not take place till July. The French government was somewhat more ready than the British. On the r3th of April it despatched a squadron of twelve sail of the line and four frigates from Toulon to America under the command of the Count d'Estaing. As no attempt was made to stop him in the Straits of Gibraltar, he passed them on the 16th of May, and though the rawness of his

crews and his own error in wasting time in pursuit of prizes delayed

his passage, he reached the mouth of the Delaware on the 8th of July unopposed. The French government, which by the fault of the British administration was allowed to take the offensive, had three objects in view — to help the Americans, to expel the British from the West Indies and to occupy the main strength of the naval forces of Great Britain in the Channel. Therefore a second and more powerful fleet was fitted out at Brest under the command of the Count d'Orvilliers. The British government, having neglected to occupy the Straits of Gibraltar in time, despatched Admiral Byron from Plymouth on the 9th of June with thirteen sail of the line to join Admiral (Lord) Howe, Sir William's brother, in America, and collected a strong force at home, called the Western Squadron, under Viscount Keppel. Keppel, after a preliminary cruise in June, brought d'Orvilliers to action off Brest on the 27th of July. The fleets were equal and the action was indecisive, — as the two forces merely passed one another, cannonading. A violent quarrel exacerbated by political differences broke out among the British commands, which led to two courts-martial and to the resignation of Keppel, and did great injury to the discipline of the navy. No further event of note occurred in European waters. On the coast of America the news of the approach of d'Estaing com- pelled the British commanders to evacuate Philadelphia on the 1 8th of June. Howe then concentrated his force of nine small line-of-battle ships at Sandy Hook on the 29th of June, and on the nth of July he learnt that d'Estaing was approaching. The French admiral did not venture to make an attack, and on the 22nd of July sailed to co-operate with the Americans in an endeavour to expel the British garrison from Rhode Island. Howe, who had received a small reinforcement, followed; The French admiral, who had anchored above Newport, R.I., came to sea to meet him, but both fleets were scattered by storms. D'Estaing sailed to Boston on the 21st of August. Howe received no help from Byron, whose badly appointed fleet was damaged and scattered by a gale on the 3rd of July in mid- Atlantic. His ships dropped in by degrees during September. Howe resigned on the 25th of that month, and was succeeded by Byron. The approach of winter made a naval campaign on the coast of North America dangerous. The operations of naval forces in the New World were largely dictated by the facts that from June to October are the hurricane months in the West Indies, while from October to June includes the stormy winter of the northern coast. On the 4th of November d'Estaing sailed for the West Indies, on the very day that Commodore William Hotham was despatched from New York to reinforce the British fleet in those waters. On the 7th of September the French governor of Martinique, the marquis de Bouille, had surprised the British island of Dominica. Admiral

Samuel Barrington, the British admiral in the Leeward Islands, had retaliated by seizing Santa Lucia on the 13th and 14th of December after the arrival of Hotham from North America. D'Estaing, who followed Hotham closely, was beaten off in two feeble attacks on Barring- ton at the Cul-de-Sac of Santa Lucia on 'the 15th of December. On the 6th of January 1779 Admiral Byron reached the West Indies. During the early part of this year the naval forces in the West Indies were mainly employed in watching one another. But in June, while Byron had gone to Antigua to guard the trade convoy on its way home, d'Estaing first captured St Vincent, and then on the 4th of July Grenada. Admiral Byron, who had returned, sailed in hopes of saving the island, but arrived too late. An indecisive action was fought off Grenada on the 6th of July. The war now died down in the West Indies. Byron returned home in August. D'Estaing, after co-operating un- successfully with the Americans in an attack on Savannah, in September also returned to Europe. In European waters the Channel had been invaded by a combined French and Spanish fleet of sixty-six sail of the line, Spain having now joined the coa ? lition against Great Britain. Only thirty-five sail of the line could be collected against them under the command of Sir Charles Hardy. But they came late and did nothing. The allies retired early in Sc~t°mber and were not even able to molest the British

trade convoys. In the meantime the Spaniards had formed the siege of Gibraltar.

So far the British navy had stood on the defensive, without material loss except in the West Indies, but without triumph. The operations of 1 780 went on much the same lines. The British government, not feeling strong enough to blockade Brest and the Spanish ports, was compelled to regulate its movements by those of its opponents. In the Channel it was saved from disaster by the ineptitude of the French and Spanish fleets. The only real success achieved by this numerically imposing force was the capture on the 8th and 9th of August of a large British convoy of ships bound for the East and West Indies carrying troops. But on the American coast and in the West Indies more vigour was displayed. Early in the year Admiral Marriot Arbuthnot was sent to take command in North America. On the French side the count de Guichen was sent with reinforcements to the West Indies to take command of the ships left in the previous year by d'Estaing. He arrived in March, and was able to confine the small British force under Sir Hyde Parker at Gros Islet Bay in Santa Lucia. In May M. d'Arzac de Ternay was sent from Brest with seven line-of-battle ships, and a convoy carrying 6060 French troops to act with the Americans. He had a brush with a small British force under

Cornwallis near Bermuda on the 20th of June, and reached Rhode Island on the nth of July. During the rest of the year, and part of the next, the British and French naval forces in North American waters remained at their respective headquarters, New York and Newport, watching one another. The West Indies was again the scene of the most important operations of the year. In February and March a Spanish force from New Orleans, under Don Bernardo de Galvez, invaded West Florida with success. But the allies made no further progress. At the close of 1779 Sir George Rodney had been appointed to command a large naval force which was to relieve Gibraltar, then closely blockaded, and send stores to Minorca. Rodney was to go on to the West Indies with part of the fleet. He sailed on the 29th of December 1779 with the trade for the West Indies under his protection, captured a Spanish convoy on his way off Finisterre on the 8th of January, defeated a smaller Spanish force near Cape St Vincent on the 16th, relieved Gibraltar on the 19th, and left for the West Indies on the 13th of February. On the 27th of March he joined Sir Hyde Parker at Santa Lucia, and Guichen retired to Fort Royal in Martinique. Until July the fleets of Rodney and Guichen, of equal strength, were engaged in operations round the island of Martinique. The British admiral endeavoured to force on a close engagement. But in the first encounter on the 17th of April to leeward of the island, Rodney's orders were not executed by his 1 captains, and the action was indecisive. He wished to concen- trate on the rear of the enemy's line, but his captains scattered themselves along the French formation. In two subsequent actions, on the 15 th and 19th of May, to windward of Martinique, the French admiral would not be brought to close action. The arrival of a Spanish squadron of twelve ships of the line in June gave a great numerical superiority to the allies, and Rodney retired to Gros Islet Bay in Santa Lucia. But nothing decisive occurred. The Spanish fleet was in bad health, the French much worn-out. The first went on to Havana, the second to San Domingo. In July, on the approach of the dangerous hurricane season, Rodney sailed for North America, reaching New York on the 14th of September. Guichen returned home with the most worn-out of his ships. On the 6th of December Rodney was back at Barbadoes from the North American station, where he was not able to effect anything against the French in Narragansett Bay.

The rambling operations of the naval war till the close of 1780 — directed by the allies to such secondary objects as the capture of West Indian islands, or of Minorca and Gibraltar, and by Great Britain to defensive movements — began to assume a degree of coherence in 1781. Holland having now joined the allies, the British

government was compelled to withdraw part of its fleet from other purposes to protect the North Sea trade. A desperate battle was fought on the Dogger Bank on the 5th

of August between Sir Hyde Parker and the Dutch admiral Zoutman, both being engaged in protecting trade; but Holland did not affect the general course of the war. The allies again failed to make a vigorous attack on the British forces in the Channel. They could not even prevent Admiral George Darby from relieving Gibraltar and Minorca in April. The second of these places was closely invested later on, and was compelled to surrender on the 5th of February 1782. But a vigorous policy was carried out by France in the West Indies and America, while she' began a most resolute attack on the British position in the East Indies.

In the West Indies Rodney, having received news of the breach with Holland early in the year, took the island of St Eustatius, which had been a great depot of contraband of war, on the 3rd of February. The British admiral was accused of applying himself so entirely to seizing and selling his booty that he would not allow his second in command, Sir Samuel Hood, who had recently joined him, to take proper measures to impede the arrival of French forces known to be on their way to Martin- ique. The French admiral, the count de Grasse, reached the island with reinforcements in April. Until July he was engaged in a series of skilful operations directed to menacing the British islands while he avoided being brought to battle by Rodney. In July he sailed for the coast of North America, whither he was followed in August by Sir S. Hood, Rodney having been compelled to return home in ill-health.

On the coast of North America the war came to its crisis. In the earlier part of the year the British at New York and the French at Newport continued to watch one another. In April the British admiral Arbuthnot did indeed succeed in baffling an attempt of the French to carry reinforcements to the American cause in Virginia. The action he fought off the capes of Virginia on the 16th of April was ill conducted, but his main purpose was achieved. Washington, who was wisely anxious to concentrate attack on one or other of the centres of British power in Virginia or New York, had to wait till the arrival of Grasse before he could see his ideas applied. The French admiral gave the allies a superiority of naval strength on the coast of

Virginia, and Lord Cornwallis, the British commander, was beleaguered in Yorktown. Admiral Thomas Graves, Arbuthnot's successor, who had been joined by Hood from the West Indies, endeavoured to drive off the French fleet. But the feeble battle he fought on the 5th of September failed to shake the French hold on the Chesapeake, and Grasse having been reinforced, Graves sailed away. Yorktown fell on the 19th of October, and the war was settled as far as the coast of North America was concerned.

The French admiral, having rendered this vital service to his ally, now returned to the West Indies, whither he was followed by Hood, and resumed the attacks on the British islands. In January and February 1782 he conquered St Christopher, in spite of the most determined opposition of Hood, who with a much inferior force first drove him from his anchorage at Basseterre, and then repulsed his repeated attacks. The next purpose of the French was to combine with the Spaniards for an attack on Jamaica. Sir George Rodney, having returned to his command with reinforcements, baffled this plan by the series of operations which culminated in the battle of the 12th of April 1782. (See Saints, Battle of.) No further operations of note occurred in the West Indies. At home Howe relieved Gibraltar for the last time in September and October 1782.

The war in the East Indies formed a separate series of episodes. In 1778 the British authorities had little difficulty in seizing the French settlement of Pondicherry. A naval engagement of a very feeble kind took place on the 10th of August in the Bay of Bengal, between the British naval officer in command and M. de Tronjoly. But the French were too weak in these seas for offensive movements, and therefore remained quiescent at Bourbon and Mauritius till the beginning of 1782. In the spring of 1 78 1 the bailli de Suffren was sent to the East with a small squadron ; on his way he fell upon a British force which had been sent to take the Cape from the Dutch, and which he found in

the Portuguese anchorage of Porto Praya, on the 16th of April. Having provided for the security of the Cape, Suffren went on to the French islands. He sailed from them early in 1782 to carry out a vehement attack on the British forces in the Bay of Bengal. From the 17th of February 1782 to the 20th of June 1783 he fought a series of fine actions against Sir Edward Hughes, by which he secured a marked superiority on the water. Though he had no port in which to refit and no ally save Hyder AJi, he kept the sea and did not even return to the French islands during the north-easterly monsoon. Suffren failed in his main purpose, which was to make such a

capture as would put his government in a strong position during the negotiations for peace. But his capture of Trincomalee in July 1782 in spite of Sir Edward Hughes, and the heavy loss he inflicted on the British fleet in several of the actions he fought, consti- tute the most honourable part of the French naval operations in the war. ,

Authorities.— The Influence of Sea Power upon History, by Captain Mahan, gives the best critical examination of the naval aspects of the war. The French side will be found in the Histoire de la marine francaise pendant la Guerre de V Independence americaine (Paris, 1877), by Captain Chevalier. For accounts of the American navy see C. O. Paullin, The Navy of the American Revolution (Chicago, 1906) ; E. S. Maclay, History of the U.S. Navy, vol. i. (New York, 1897) ; C. H. Lincoln, Naval Records of the American Revolution (Washington, 1906) ; and Edward Field, Esek Hopkins, Commander-in-chief of the Continental Navy during the American Revolution (Providence, R.I., 1898). For details of actions the reader may be referred to Beatson's Naval and Military Memoirs of Great Britain from 1727 to 1781 (London, 1804), and to Sir W. Laird Clowes's The Royal Navy: A History (London, 1897, &c). (D. H.)

AMERICAN WAR OF 1812. The war between the United States and Great Britain, commonly known as "of 1812," began by the American declaration of war on the 18th of June of that year, and lasted till the beginning of 1815. The treaty of peace signed at Ghent on the 24th of December 1814 was ratified by the president of the United States on the 17th of February 1815. These two years and a half of conflict were filled with isolated encounters which can hardly be reduced to coherent and ordered operations. Although the outbreak of war had been preceded by years of angry diplomatic dispute, the United States were absolutely unready, while Great Britain was still hard pressed by the hostility of Napoleon, and was compelled to re- tain the greater part of her forces and her best crews in European waters, till the ruin of the Grande Armee in Russia and the rising of Germany left her free to send an overwhelming force of ships to American waters.

The forces actually available on the American side when the war began consisted of a small squadron of very fine frigates and sloops in an efficient state. Twenty-two was the extreme limit of the naval force the States were able to commission. The paper strength of the army was 35,000, but the service was voluntary and unpopular, while there was an almost total want of trained and experienced officers. The available strength was a bare third of the nominal. The militia, called in to aid the regulars, proved untrustworthy. They

objected to serve beyond the limits of their states, were not amenable to discipline, and behaved as a rule very ill in the presence of the enemy. On the British side, the naval force in American waters under Sir John Borlase Warren, who took up the general command on the 26th of September 1812, consisted of ninety-seven vessels in all, of which eleven were of the line and thirty-four were frigates, a power much greater than the national navy of America, but in- adequate to the blockade of the long coast from New Brunswick to Florida. The total number of British troops present in Canada in July 181 2 was officially stated to be 5004, consisting in part of Canadians.

The scene of operations naturally divided into three sections : — (1) the ocean; (2) the Canadian frontier, from Lake Huron, by Lakes Erie and Ontario, the course of the St Lawrence and Lake Champlain ; (3) the coast of the United States. As the opera- tions on these three fields had little interaction on one another, it will be more convenient to take them separately than to follow the confusing chronological order.

Operations on the Ocean. — These cover all cruises of sea-going ships, even when they did not go far from the coast. They again subdivide into the actions of national vessels, and the raids of the privateers. The first gave to the United States the most brilliant successes of the war. When it began two small squadrons were getting ready for sea at New York; the frigate " President " (44) and sloop " Hornet " (18), under Commodore John Rodgers, who had also the general command; and the frigates " United States" (44) and " Congress " (38), with the brig " Argus " (16) to which two guns were afterwards added, under Captain Stephen Decatur. Rodgers would have preferred to keep his command together, and to strike with it at the main course of British commerce, but he was overruled. He sailed on the 21st of June, and after chasing the British frigate " Belvidera " (36), which escaped into Halifax by throwing boats, &c. , overboard, stood across the North Atlantic in search of a West Indian convoy, which he failed to sight, re- turning by the 31st of August to Boston. While he was absent, Captain Isaac Hull, commanding the " Constitution " (44), sailed from the Chesapeake, and after a narrow escape from a British squadron, which pursued him from the 18th to the 20th of July, reached Boston. Going to sea again on the 2nd of August he" captured and burned the British frigate " Guerriere " (38). On the 8th of October

Rodgers and Decatur sailed— the first on a cruise to the east, the second to the south. Commodore Rodgers met with no marked success, but on the 25th of October Captain Decatur in the "United States" captured the British frigate " Macedonian " (38) , which he carried back to port. At the close of the month Captain Bainbridge sailed with the " Constitution," " Essex " (32) and " Hornet " (18) on a southerly cruise. On the 29th of December, when off Bahia, he fell in with the British frigate " Java " (38), which was carrying General Hislop, the governor of Bombay, to India, and took her after a sharp action. The "Essex" and "Hornet" were not in company. The first, under the command of Captain David Porter, went on to the Pacific, where she did great injury to British trade, till she was captured off Valparaiso by the British frigate " Phoebe " (38) and the sloop " Cherub " (24) on the 28th of March 1814. In these actions, except the last, the Americans had the advantage of greater size and a heavier broadside, but they showed excellent seamanship and gunnery. The capture of three British frigates one after another caused a painful impression in Great Britain and stimu- lated her to greater exertions. Vessels were accumulated on the American sea-board, and the watch became more strict. On the 1st of June 1813 the capture of the U.S. frigate " Chesapeake " (38), by the British frigate " Shannon " (38), a vessel of equal force, counterbalanced the moral effect of previous disasters. The blockade of American ports was already so close that the United States ships found it continually more difficult to get to sea, or to keep the sea without meeting forces of irresistibly superior strength.

The operations of American privateers were too numerous and far-ranging to be told in detail. They continued active till the close of the war, and were only partially baffled by the strict enforcement of convoy by the British authorities. A signal instance of the audacity of the American cruisers was the capture of the U.S. sloop " Argus " (20) by the British sloop " Pelican " (18) so far from home as St David's Head in Wales on the 14th of August 1813. The " Pelican's " guns were heavier than those of the " Argus."

Operations on the Lakes. — The American people, who had expected little from their diminutive navy, had calculated with confidence on being able to overrun Canada. As, however, they had taken no effectual measures to provide a mobile force they were disappointed. The British general, Sir George Prevost, was neither able nor energetic, but his subordinate, Major-General Isaac Brock, was both. In July, before the Americans were ready, Brock seized Mackinac at the head of Lake Huron; and on the 1 6th of August Detroit in the channel between Huron and Erie was surrendered. Kingston was held

at the east end of Ontario. Montreal on the St Lawrence was a strong position on the British side to which, however, the Americans had an easy road of approach by Lake Champlain. Sound reasoning would have led

the Americans to direct their chief attacks on Kingston and Montreal, since success at those points would have isolated the British posts on Lakes Ontario, Erie and Huron. But they were much influenced by fear of the Indians, who had been won over to the British side by the energy of Brock. They therefore looked more carefully to the lakes than to the course of the St Lawrence, and it may be added that their leaders showed ah utter want of capacity for the intelligent conduct of war.*

The impracticable character of the communications by land made it absolutely necessary for both parties to obtain control of the water. Neither had made any preparations, and the war largely resolved itself into a race of shipbuilding. The Americans, who had far greater facilities for building than the British, allowed themselves to be forestalled. In the second half of 1812 the British general, Sir Isaac Brock, lieutenant- governor of Upper Canada; adopted measures for opposing the Americans on the frontier line, between Huron and Erie. The American brigadier-general William Hull invaded Canada on the 1 2th of July from Detroit, just below the small Lake of St Clair between Huron and Erie. His army was mainly composed of militiamen, who behaved very badly, and his papers having been captured in a boat, his plans were revealed. General Brock drove him back and forced him to surrender at Detroit on the 16th of August. Brock now promptly transferred himself to the western end of Erie, where the American general Henry Dearborn was attempting another invasion. Brock fell in action on the 13th of October, while repulsing Dearboni's subordinate Van Rensselaer, a politician named to command by favour, and ignorant of a soldier's business. The Americans were driven back. In this field also their militia behaved detestably. The Canadians on the other hand; both the French who were traditionally amenable to authority and those of English descent, who being largely sons of loyalists of the War of Independence had a bitter hatred of the Americans, did excellent service. The discontent of New England with the war both hampered the American generals and also aided the British, who drew their supplies to a great extent from United States territory. On the 22nd of January 1813, at Frenchtown, the American troops under Winchester surrendered to a British and Indian force under Procter.

During the winter both sides were busy in building ships. On Ontario

the Americans pushed on their preparations at Sackett's Harbour under Isaac Chauncey; the English were similarly engaged at Kingston. Sir James Lucas Yeo took command on the 15th of May 18 13. On Erie the American headquarters were at Presqu' Isle, now the city of Erie; the English at Fort Maiden. The American commander was Captain Oliver Perry, the British commander, Captain Robert Barclay. On Lake Ontario Yeo formed a more mobile though less powerful force than Chauncey's, and therefore manoeuvred to avoid being brought to close action. Three engagements, on the 10th of August, nth of September and 28th of September, led to no decisive' result. By the close of the war Yeo had constructed a ship of 102 guns which gave him the superiority, and the British became masters of Lake Ontario. On Lake Erie the energy of Captain Perry, aided by what appears to have been the' mis judgment of Barclay, enabled him to get 1 a superior force by the 4th of August, and on the 10th of September he fought a successful action which left the Americans masters of Lake Erie. The military operations were subordinate to the naval. In April 18 13 the Americans took York (now Toronto), and in May moved on Fort George; but a counter-attack by Yeo and Prevost on Sackett's Harbour, on the 29th of May, having made the Americans anxious about the safety of their base, naval support failed the American generals, and they were paralysed. A success was gained by them (October 5) at the Thames, where the Indian chief Tecumseh fell, but they made no serious progress. The Americans turned to the east of Ontario, intending to assail Montreal by the St Lawrence in combination with their forces at Lake Champlain. But the combination failed; they were severely harassed on the St Lawrence, and the invasion was given up.

The operations of 18 14 bear a close resemblance to those of

1813, with, however, one important difference. The 1 American generals, having by this time brought their troops to order, were able to fight with much better effect. Their attack on the Niagara peninsula led to hot fighting at Chippewa (July 5) and Lundy's Lane (July 25), the first a success for the Americans, the second a drawn battle. The fall of Napoleon having now freed the British government from the obligation to retain its army in Europe, troops from Spain began to pour in. .But cm the Canadian frontier they made little difference. In August 1814 Sir George Prevost attacked the American forces at Champlain. But his naval support, ill prepared, was hurried

into action by him at Plattsburg on the nth of September, and defeated. Prevost then retired. His management of the war, more especially on Lake Champlain, was severely criticized, and he was threatened with a court-martial, but died before the trial came en. A British occupation of part of the coast of Maine proved to be mere demonstration.

Operations on the American Coast.— When the war began the British naval forces were unequal to the work of blockading the whole coast. They were also much engaged in seeking for the American cruisers under Rodgers, Decatur and Bainbridge. The British government, having need of American foodstuffs for its army in Spain, was willing to benefit by the discontent of the New Englanders. No blockade of New England was at first attempted. The Delaware and Chesapeake were declared in a state of blockade on the 26th of December 181 2. This was extended to the whole coast south of Narragansett by November

1 813, and to the whole American coast on the 31st of May

1814. In the meantime much illicit trade was carried on by collusive captures arranged between American traders and British officers. American ships were fraudulently transferred to neutral flags. Eventually the United States government was driven to issue orders for the purpose of stopping illicit trading, and the commerce of the country was ruined. The now Over- powering strength of the British fleet enabled it to occupy the Chesapeake and to execute innumerable attacks of a destructive character on docks and harbours. The burning by the American general McClure, on the iothof December 1813, of Newark(Niagara on the Lake), for which severe retaliation was taken at Buffalo, was made the excuse for much destruction. The most famous of these destructive raids was the burning of the public buildings at Washington by Sir Alexander Cochrane, who succeeded Warren in April in the naval command, and General Robert Ross. The expedition was carried out between the 19th and 20th of August 1814, and was well organized and vigorously executed. 1 On the 24th the American militia, collected at Bladensburg to protect the capital, fled almost before they were attacked. A subse- quent attack on Baltimore, in which General Ross was killed (September 12, 1814), was a failure. The expedition to New Orleans (q.v.) is separately dealt with.

Authorities. — In his Sea Power in its Relations to the War of 1812 Captain Mahan has given a careful account of the war by land and sea with reference to services. The Naval War of 18 1 2, by Theodore

Roosevelt (New York, 1882), is lively but somewhat passionate, and not free from prejudice. A vehement statement of the Canadian side will be found in How Canada was held for the Empire, by James Hannay (London,Edinburgh,Toronto, 1905). See also The Canadian War of 1812, by Charles P. Lucas (Oxford, 1906). (D- H.)

AMERICUS, a city and the county-seat of Sumter county, Georgia, U.S.A., about 71 m. S.S.W. of Macon. Pop. (1880) 3635; (1890) 6398; (1900) 7674 (4661 of negro descent); (1910) 8063. It is served by the Central of Georgia and the Seaboard Air Line railways, and is the seat of the Third Congressional District Agricultural High School, a branch of the state uni- versity of Georgia. The city is in a rich sugar-cane and fruit country, is a large cotton and mule and horse market, and has division shops of the Seaboard Air Line railway. : Among the city's manufactures are cotton-seed oil, fertilizers, chemicals, iron, carriages and wagons and harness (especially horse collars). The city owns the waterworks; the water-supply is

1 The burning of Washington was an act of vandalism by ho means approved of by many of the British officers who were compelled to take part in it. (See Smith. Sir Henry George Wakelyn.)

obtained from artesian wells. Americus was settled in 1832, and was first chartered as a city in 1855.

AMERSFOORT, a town in the province of Utrecht, Holland, on the navigable Eem, and a junction station 14 m. by rail N.E. by E. of Utrecht. Pop. (1000) 19,089. It is situated in the midst of picturesque and undulating country, consisting of wide sandy heaths and woods, and dotted with many fine country houses. One of the most interesting of its few historic monu- ments is the Koppelpoof t, an old gateway situated at the end of a fine avenue of trees bordering the canal. Close by is a lofty Gothic tower (rjoo), which belonged to the ancient church of St Mary, which was wrecked by an explosion of gunpowder in 1787. The large plain church of St George dates from the first half of the 13 th century. There is also a Jansenist church, to which a seminary is attached. Besides these there are a town hall, a court of primary jurisdiction, industrial and other schools. Amersf oort has a large garrison, consisting chiefly of artillery, and manu- factures woollen goods, cotton, silk, glass and brandy. It has also a considerable trade in tobacco, grown in the neighbourhood} and in com and fish.

AMERSHAM, a market town in the Wycombe parliamentary division

of Buckinghamshire, England, 24 m. W.N.W. of London by the Metropolitan railway. Pop. (1901) 2674. It is pleasantly situated in the narrow valley of the Misbourne stream, which is flanked by the well-wooded slopes of the Chiltern Hills. The church of St Mary is almost entirely Perpendicular, and has a beautiful south porch, brasses of the 1 5th, 16th and 1 7th centuries and numerous monuments, several of which, in a chantry, commemorate members of the family of Drake, lords of the manor. The town hall was built by Sir William Drake in 1642. At Coleshill, near Amersham, Edmund Waller the poet was born in 1606; he sat in parliament for the former borough of Amersham. The town has flour mills and breweries, and some straw-plaiting and lace-making are carried on in the vicinity. The district is one of the most beautiful near London; the village of Chenies, overlooking the valley of the Chess, is especially picturesque.

Amersham (Elmodesham, Agmondesham, Hagmondesham, Aumundesham, Homersham) at the time of the Domesday Survey was divided into no less than six holdings. The manor, or chief of them, was held by Geoffrey de Mandeville. At the time of Edward the Confessor it was held by Queen Edith. The manor afterwards descended to the families of Fitz Piers, Bohun and Strafford, and was granted by Henry VIII. to Sir John Russell, ancestor of the earls of Bedford. In 1638 Francis,,_ earl of Bedford, conveyed it to William Drake, by whose descendants it is still held. The north chapel in the church of St Michael, Chenies, has been the burial-place of the Russell family since its erection in 1556, and contains a number of fine memorials, notably that of Anne, countess of Bedford (d. 1558), who founded the chapel. : Amersham was formerly a parliamentary borough by prescription, and returned two members in 1300, 1306, 1307 and 1309. In 1623 this privilege was restored, and was only annulled by the Reform Bill of 1832. ■ The annual fair, in September, is held under a charter secured by Geoffrey Fitz Peter, earl of Essex, in 1200, that on Whit Monday under a charter of 1614, secured by Edward, earl of Bedford, which transferred the Friday market, also granted under the earlier charter, to Tuesday.

AMES, FISHER (1758-1808), American statesman, orator and political writer, son of Nathaniel Ames, a physician, was born at Dedham, Massachusetts, on the 9th of April 1758. He graduated at Harvard College in 1774, and began the practice of the law at Dedham in 1781, but eventually abandoned that profession for the more congenial pursuit of politics. He was a prominent member of the Massachusetts convention which (February 1788) ratified for that state the Federal Constitution, and in the same year, having

entered the lower house in the state legislature, he distinguished himself greatly by his eloquence and readiness in debate. During the eight years of Washington's administration (1 789-1 797) he was a prominent Federalist member of the national House of Representatives. On the 28th of April 1796, when the Republicans, hostile to the Jay Treaty, were on the point of holding up the appropriation necessary for its execution, Ames, who had just arisen from a sick-bed, made what has been con- sidered the greatest speech of bis life; before the delivery of bis

speech his opponents had claimed a majority of six, but the appropriation was finally passed, in the committee of the whole, by the casting vote of the chairman. When Washington retired from the presidency, Congress voted him an address and chose Ames to deliver it. In 1797 he returned to Dedham to resume the practice of the law, which the state of his health after a few years obliged him to relinquish. He published numerous essays, chiefly in relation to the contest between Great Britain and revolutionary France, as it might affect the liberty and prosperity of America. Ames was one of the group of New England ultra- Federalists known as the " Essex Junto," who opposed the French policy of President John Adams in 1798, and were conspicuous for their British sympathies. Four years before his death he was chosen president of Harvard College, an honour which his broken state of health obliged him to decline. He died on the 4th of July 1808.

His writings and speeches, which abound in sparkling passages, displaying great fertility of imagination, were collected and published, with a memoir of the author, in 1809, by the Rev. Dr J. T. Kirkland, in one large octavo volume. A more complete edition in two volumes was published by his son, Seth Ames, at Boston, Mass., in 1854.

AMES, JOSEPH (1680-1759), English author, was born at Yarmouth on the 23rd of January 1689. He wrote an account of printing in England from 1471 to 1600, Typographical Antiquities (1 749) . Ames sent out circular letters with a list of two hundred and fifteen English printers with whose works he intended to deal, asking for any available information. He earned the gratitude of subsequent bibliographers by disregarding printed lists and consulting the title-pages of the books themselves. An inter- leaved copy of the work with

many notes in the author's hand is now in the British Museum. Editions of his works were published with added information by William Herbert (3 vols., 1785-1790), and T. F. Dibdin (4 vols., 1810-1819). Ames's occupation is variously given. It is uncertain whether he was a ship-chandler, a patten-maker, a plane-iron maker or an ironmonger; but he led a prosperous life at Wapping, and amassed valuable collections of antiquities. He died on the 7th of October 1759. His other works are catalogues of English printers, of the collection of coins which belonged to the earl of Pembroke, of some two thousand English portraits, and Parentalia (1750), a memoir of the Wrens, undertaken in conjunction with Sir Christopher Wren's grand- son, Stephen Wren. Part of his correspondence in bibliography is included in Nichols's Literary Anecdotes and Illustrations.

AMES, OAKES (1804-1873), American manufacturer, capitalist and politician, was born in Easton, Massachusetts, on the 10th of January 1804. As a manufacturer of shovels, in association with his father.and his brother Oliver (1807-1877), he amassed a large fortune. In i860 he became a member of the executive council of Massachusetts, and from 1863 to 1873 was a republican member of the national House of Representatives. As a member of the committee on railroads he became interested in the project, greatly aided by the government, to build a trans-continental railway, connecting the eastern states with California. Others having failed, he was induced in 1865 to assume the direction of the work, and to him more than to any other one man the credit for the construction of the Union Pacific railway was due. The execution was effected largely through a construction company, the Credit Mobilier Company of America. In disposing of some of the stock of this company, Ames in 1867-187 1 sold a number of shares to members of Congress at a price much below what these shares eventually proved to be worth. This, on becoming known , gave rise in 1872-1873 to a great congressional scandal. After an investigation by a committee of the House, which recommended the expulsion of Ames, a resolution was passed on the 28th of February 1873, " that the House absolutely condemns the con- duct of Oakes Ames … in seeking to secure congressional atten- tion to the affairs of a corporation in which he was interested, and whose interest directly depended upon the legislation of Congress, by inducing members of Congress to invest in the stocks of said corporation." Many have since attributed this resolution to partisanship, and the influence of popular clamour, and in 1883 the legislature of Massachusetts passed a resolution vindicating

Ames. He died at North Easton, Mass., on the 8th of May 1873. His

son, Oliver Ames (1831-1895), was lieutenant- governor of Massachusetts from 1883 until 1887, and governor from 1887 to 1890.

See Credit Mobilier of America and the references there given. For a defence of Oakes Ames, see Oakes Ames, A Memorial Volume (Cambridge, Mass., 1884).

AMES, WILLIAM (1576-1633), English Puritan divine, better known, especially in Europe, as Amesius, was born of an ancient family at Ipswich, Suffolk, in 1576, and was educated at the local grammar school and at Christ's College, Cambridge, • where, as throughout his life, he was an omnivorous student. He was considerably influenced by his tutor, the celebrated William Perkins, and by his successor, a man of kindred intellect and fervour, Paul Bayne. He graduated B.A. and M.A. in due course, and was chosen to a fellowship in Christ's College. He was universally beloved in the university. His own college (Christ's) would have chosen him for the mastership; but a party opposi- tion led to the election of Valentine Cary, who had already quarrelled with Ames for disapproving of the surplice and other outward symbols. One of Ames's sermons became historical in the Puritan controversies. It was delivered on St Thomas's day (1609) before the feast of Christ's nativity, and in it he rebuked sharply " lusory lotts " and the " heathenish debauchery " of the students during the twelye days ensuing. The scathing vehem- ence of his denunciations led to his being summoned before the vice- chancellor, who suspended him " from the exercise of his ecclesiastical function and from all degrees taken or to be taken." After Cary's election he left the university and would have ac- cepted the great church of Colchester, but the bishop of London refused to grant institution and induction. Like persecution awaited him elsewhere, and at last he passed over to Holland, being aided by certain wealthy English merchants who wished him to controvert the supporters of the English church in Leiden. At Rotterdam, clad in the fisherman's habit donned for the passage, he opposed Grevinchovius (Nicholas Grevinckhoven, d. 163 2), minister of the Arminian or Remonstrant church, and over- whelmed him with his logical reasoning from Phil. ii. 13, " It is God that worketh in us both to will and to do." The fisherman- controversialist made a great stir, and from that day became known and honoured in the Low Countries. Subsequently Ames entered into 4 controversy in print with Grevinchovius on uni- versal redemption and election, and cognate problems. He brought together all he had maintained in his Coronis ad Collati- onem Hagiensem — his most masterful book, which figures largely in Dutch church history. At Leiden, Ames became

intimate with the venerable Mr Goodyear, pastor of the English church there. While thus resident in comparative privacy he was sent for to the Hague by Sir Horatio Vere, the English governor of Brill, who appointed him a minister in the army of the states-general, and of the English soldiers in their service, a post held by some of the greatest of England's exiled Puritans. He married a daughter of Dr Burgess, who was Vere's chaplain, and, on his father-in-law's return to England, succeeded to his place.

It was at this time he began his memorable controversy with Episcopius, who, in attacking the Coronis, railed against the author as having been " a disturber of the public peace in his native country, so that the English magistrates had banished him thence; and now, by his late printed Coronis, he was raising new disturbances in the peaceable Netherlands." It was a miserable libel and was at once rebutted by Goodyear. The Coronis had been primarily prepared for the synod of Dort, which sat from November 1618 until May 1619. At this celebrated synod the position of Ames was a peculiar one. The High Church party in England had induced Vere to dismiss him from the chaplaincy; but he was still held, deservedly, in such reverence, that it was arranged he should attend the synod, and accordingly he was retained by the Calvinist party at four florins a day to watch the proceedings on their behalf and advise them when necessary. A proposal to make him principal of a theological college at Leiden was frustrated by Archbishop Abbot; and when later invited by the state of Friesland to a professoriate at Franeker,

the opposition was renewed, but this time abortively. He was installed at Franeker on the 7th of May 1622, and delivered a most learned discourse on the occasion on " Urim and Thummin." He soon brought renown to Franeker as pro- fessor, preacher, pastor and theological writer. He prepared his Medulla Theologiae, a manual of Calvinistic doctrine, for his students. His Be Conscientia, ejus Jure et Casibus (1632), an attempt to bring Christian ethics into clear relation with particular cases of conduct and of conscience, was a new thing in Protestantism.- Having continued twelve years at Franeker (where he was rector in 1626), his health gave way, and he contemplated removal to New England. But another door was opened for him. He yearned for more frequent opportunities of preaching to his fellow-countrymen, and an invitation to Rotter- dam gave him such opportunity. His friends at Franeker were passionately opposed

to the transference, but ultimately ac- quiesced. At Rotterdam he drew all hearts to him by his elo- quence and fervour in the pulpit, and his irrepressible activity as a pastor. Home-controversy engaged him again, and he prepared his Fresh Suit against Ceremonies — the book which made Richard Baxter a Nonconformist. It ably sums up the issues between the Puritan school and that of Hooker. It was posthumously pub- lished. He did not long survive his removal to Rotterdam. Having caught a cold from a flood which inundated his house, he died in November 1633, at the age of fifty-seven, apparently in needy circumstances. He left, by a second wife, a son and a daughter. His valuable library found a home in New England. Few Englishmen have exercised so formative and controlling an influence on European thought and opinion as Ames. He was a master in theological controversy, shunning not to cross swords with the formidable Bellarmine. He was a scholar among scholars, being furnished with extraordinary resources of learning. His works, which even the Biographia Britannica (1778) testifies were famous over Europe, were collected at Amsterdam in 5 vols. 4to. Only a very small proportion was translated into his mother tongue. His Lectiones in omnes Psalmos Davidis (1635) is ex- ceedingly suggestive and terse in its style, reminding of Bengel's Gnomon, as does also his Commentarius utriusque Epist. S. Petri. His " Replies " to Bishop Morton and Dr Burgess on " Cere- monies " tell us that even kinship could not prevent him from " contending earnestly for the faith."

See John Quick's MS. Icones Sacrae Anglicanae, which gives the fisherman anecdote on the personal authority of one who was present ; Life by Nethenus prefixed to collected edition of Latin works (5 vols., Amsterdam, 1658); Winwood's Memorials, vol. iii. pp. 346-347; Neal's Puritans, i. 532; Fuller's Cambridge (Christ's College) ; Hanbury's Hist. Memorials, i. 533 ; Collections of the Massachusetts Historical Society, vol. vi., fourth series, 1863, pp. 576-577-

AMES, a city of Story county, Iowa, U.S.A., about 35 m. N. of Des Moines, at the intersection of two lines of the Chicago & North-Western railway. Pop. (1890) 1276; (1900) 2422; (1910 U. S. census) 4223. The city is the seat of the state college of agriculture and mechanic arts; this institution, opened in 1869, has for its use about n 75 acres of land, on which the state has erected, at a cost of $1,200,000, thirty-two college buildings, besides dwelling-houses and buildings for farm purposes. On the college campus are beautiful groves containing several hundred varieties of trees, and in a central position stands a campanile with excellent chimes. The college offers

four-year courses in agronomy, animal husbandry, dairying, domestic economy, general science, veterinary medicine, and civil, mechanical, electrical and mining engineering. In I900-I9ioit had an enrollment of 2631 students (including 796 in the winter short course) and a library of 23,000 volumes. The cost of instruction and experimentation is met by the income from national grants (under the Morrill Acts of 1862 and 1882) and by state appropriations. Ames has a Carnegie library, and owns and operates its electric-lighting plant and waterworks. It was laid out as a town in 1864 and was named in honour of Oakes Ames, at the time one of the proprietors of the Cedar Rapids & Missouri River railway (now part of the Chicago & North-Western) ; five years later it was incorporated.

AMESBURY, a small town in the Wilton parliamentary division of Wiltshire, England, 8 m. N. of Salisbury, on the London & South-Western railway. Pop. (1901) 1143. It stands on a wooded upland, amid the chalk downs of Salisbury Plain. The church of St Mary is cruciform, with a low square tower, and is largely Early English, with some richly decorated windows in the chancel. A curious two-storeyed building which adjoins the north transept consists of a chapel with a piscina below and a priest's chamber above. Amesbury Abbey, a beautiful house built by Inigo Jones for the dukes of Queensberry, stands close to the village, in a park watered by the river Avon, here famous for its trout. Stonehenge (q.v.), the greatest surviving megalithic work in the British Isles, is a mile and a half distant; and on a hill near the village is Vespasian's Camp or the Ramparts, a large earthwork, which is undoubtedly of British, not Roman, origin.

At Amesbury (Ambresberia, Aumbresbery) a witenagemot was held in 932, while about 980 ˆElfthryth (Ethelfrida), queen- dowager of Edgar, erected here a nunnery in expiation of the murder of her stepson. The house afterwards acquired such ill repute that in n 77 the nuns were dispersed and the house was attached to the abbey of Fontevrault, by whom it was re-estab- lished. From this date, by a succession of royal charters and private gifts, the nunnery amassed vast wealth and privileges, and became a fashionable retreat for ladies of high rank, among whose number were Eleanor, widow of Henry III., and Mary, daughter of Edward I. After the dissolution in 1 540 the site was granted to Edward, earl of Hertford, afterwards duke of Somerset and protector of the kingdom. It subsequently passed to the duke of Queensberry. According to the Domesday, Amesbury was a royal manor and did not pay geld, but was under the obligation of providing one night's entertainment for the king. In

13 1 7 the prioress obtained a Saturday market and a three days' fair at the feast of St Melor (Meliorus). The market was subsequently changed' to Friday, and three additional fairs were granted. Pipe-clay abounds in the neighbourhood, and in the 17th century Amesbury was famous for the best pipes in England, many of which are preserved in Salisbury museum.

See Victoria County History — Wiltshire; Sir Richard Colt Hoare, History of Modern Wiltshire (1822-1844).

AMESBURY, a township of Essex county, in N.E. Massa- chusetts, U.S. A., situated on the Merrimac river, about 6 m. above its mouth. Pop. (1890) 9798; (1900) 9473, of whom 2448 were foreign-born; (1910, U. S. census), 9894. Amesbury is served by two divisions of the Boston & Maine railway, and is connected by electric line with Haverhill and Newburyport, Mass., and with Hampton Beach, New Hampshire, and Salisbury Beach, Mass., two summer resorts. The township covers a land area of about 13 sq. m. The surface is hilly. The Powow river, a small stream, passes through the centre of the township. There is a public library. Among Amesbury's manufactures are hats, cotton goods, carriages, automobile bodies, carriage and auto- mobile lamps, thermometers, brass castings and motor boats. In 1905 the factory products were valued at $3,614,692. Ames- bury was settled about 1644 as a separate part of Salisbury, and in 1654, by mutual agreement of the old and new " towns," became practically independent, although not legally a township until 1666 (named Amesbury, from the English town in Wilts, in 1667). It suffered repeatedly in the course of the colonial Indian wars. Quakers settled here as early as 1701. Josiah Bartlett (1 729-1795), a signer of the Declaration of Independence, was born here, and is commemorated by a statue (1888) by Karl – Gerhardt. Shipbuilding was an important industry in the 18th and especially the first quarter of the 19th century, and the U.S. frigate "Alliance" was built at Salisburypoint in 1778. A nail factory, one of the earliest in the country, was built on the Powow in 1796. The manufacture of iron began about 1710, of hats in 1 769, of carriages in 1 800 and of cotton goods in 1 8 \ 2. Paul Moody, who with F. C. Lowell constructed in 1814 at Waltham the first successful power-loom in America, was engaged in the manufacture of cotton goods in Amesbury. The township was the home of John G. Whittier from 1836 to 1892; here were written most of the poems of his middle and later life, many of which

describe the surrounding country. In 1876 Merrimac township was created out of the territory of Amesbury; in 1886 the west part of the old township of Salisbury was united to Amesbury. See Joseph Merrill, History of Amesbury (Haverhill, 1880); S. T. Pickard, Whittier-land, A Handbook of North Essex (Boston, New York, 1904).

AMETHYST, a violet or purple variety of quartz used as an ornamental stone. The name is generally said to be derived from the Gr. d, " not," and ntdvaKtiv, " to intoxicate," expressing the old belief that the stone protected its owner from strong drink. It was held that wine drunk out of a cup of amethyst would not intoxicate. According, however, to the Rev. C. W. King, the word may probably be a corruption of an Eastern name for the stone.

The colour of amethyst is usually attributed to the presence of manganese, but as it is capable of being much altered and even discharged by heat it has been referred by some authorities to an organic source. Ferric thiocyanate has been suggested, and sulphur is said to have been detected in the mineral. On exposure to heat, amethyst generally becomes yellow, and much of the cairngorm or yellow quartz of jewellery is said to be merely " burnt amethyst." Veins of amethystine quartz are apt to lose their colour on the exposed outcrop.

Amethyst is composed of an irregular superposition of alter- nate lamellae of right-handed and left-handed quartz. (See Quartz.) It has been shown by Prof. J. W. Judd that this structure may be due to mechanical stresses. In consequence of this composite formation, amethyst is apt to break with a rippled fracture, or to show " thumb markings," and the intersection of two sets of curved ripples may produce on the fractured surface a pattern something like that of " engine turning." Some mineral- ogists, following Sir D. Brewster, apply the name of amethyst to all quartz which exhibits this structure, regardless of its colour.

The amethyst was used as a gem-stone by the ' ancient Egyptians, and was largely employed in antiquity for intaglios. Beads of amethyst are found in Anglo-Saxon graves in England. Amethyst is a very widely distributed mineral, but fine clear specimens fit for cutting as ornamental stones are confined to comparatively few localities. Such crystals occur either in cavities in mineral- veins and in granitic rocks, or as a lining in agate geodes. A huge geode, or "

amethyst-grotto," from near Santa Cruz in southern Brazil, was exhibited at the Diisseldorf Exhibition of 1902. Many of the hollow agates of Brazil and Uruguay contain a crop of amethyst-crystals in the interior. Much fine amethyst comes from Russia, especially from near Mursinka in the Ekaterinburg district, where it occurs in drusy cavities in granitic rocks. Many localities in India yield amethyst ; and it is found also in Ceylon, chiefly as pebbles.

Purple corundum, or sapphire of amethystine tint, is called Oriental amethyst, but this expression is often applied by jewellers to fine examples of the ordinary amethystine quartz, even when not derived from Eastern sources.

Amethyst occurs at many localities in the United States, but rarely fine enough for use in jewellery. Among these may be men- tioned Amethyst Mountain, Texas; Yellowstone National Park; Delaware Co., Pennsylvania; Haywood Co., North CarolinajDeer Hill, and Stow, Maine. It is found also in the Lake Superior dis- trict. See G. F. Runz, Gems &c. of North America (1890), and Reporlfomth Census (vol. "Mines and Quarries"). (F.W.R.)*

AMHARA, the central province of Abyssinia. The chief town, Gondar (q.v.), by which name the province is also known, was the residence of the negus negusti, or emperor, of Abyssinia from the middle ages up to 1854. The speech of the inhabitants, Amharic, which differs in several features from the dialects spoken in Tigre and Shoa, is the official language of Abyssinia.

AMHERST, JEFFREY AMHERST, Baron (1717-1797'), British soldier, was the son of Jeffrey Amherst of Riverhead, Kent, and by the interest of the duke of Dorset obtained an ensigncy in the Guards in 173 1. He served in Germany and the Low Countries as aide-de-camp to General (Lord) Ligonier, and was present at Dettingen, Fontenoy and Roucoux. He then served on Cumberland's staff, and took part with the duke in the

later campaigns of the Austrian Succession war, in the battle of Val, and the North German campaign of 1757, including the battle of Hastenbeck. A year previously he had been promoted to a lieutenant-colonelcy. In 1 758 William Pitt caused Amherst to be made a major-general, and: gave him command of an expedition to attack the French in North America. For the great plan of conquering Canada, Pitt chose young and ardent officers, with Amherst, distinguished for steadiness and self-control, as their commander-in-chief. The first victory of the expedition, the capture of Louisburg (July 26, 1758),

was.soon followed by other successes, and Amherst was given the chief command oi all the forces in the theatre of war. In the campaign of 1759 Amherst's own share was the capture of Ticonderoga and Crown Point, while Fort Niagara fell to another column, and Quebec was taken by Wolfe. In 1760 a concentric march on Montreal was carried out with complete success. Amherst was immedi- ately appointed governor-general of British North America, and in the following year was made a K.B. His conduct, of the operations against the Indians under Pontiac was, however, far from being as successful as his generalship against regular troops; and he returned to England in 1763, being made governor of Virginia and colonel of the 60th regiment in the same year. In 1768 the king, who had had a quarrel with Amherst, made amends by giving him another colonelcy; in 1770 he was made governor of Guernsey; and two years later, though not yet a full general, he was made lieutenant-general of the ordnance and acting commander-in-chief of the forces. In this capacity he was the chief adviser at headquarters during the American War of Independence. He was created a peer in 1776, was promoted general in 1778 and became colonel of the 2nd Horse Grenadiers (2nd Life Guards) two years later. He aided in suppressing the Gordon riots of 1780. The rest of his active life, with a short interval in 1782-1783, he spent at the Horse Guards as com- mander-in-chief, but he was no longer capable of good service, and in 1795 he was succeeded by the duke of York, In 1796 Lord Amherst was made field-marshal; and he died on the 3rd of August 1797 at " Montreal," his residence in Kent.

AMHERST, WILLIAM PITT AMHERST, Earl (1773-1857), governor-general of India, was the nephew of Jeffrey, Baron Amherst, and succeeded to his title in 1797 by the remainder provided when the patent of nobility was renewed in 1788. In 1 81 6 he was sent as ambassador extraordinary to the court of China, with a view of establishing more satisfactory commercial relations between that country and Great Britain, On arriving in the Peiho he was given to understand that he could- only be admitted to the emperor's presence on condition of performing the ko-tou (kow-tow) , a ceremony which Western nations consider degrading, and which is, indeed, a homage exacted by a Chinese sovereign from his tributaries. To this Lord Amherst, following the advice of Sir George T. Staunton, who accompanied hita as second commissioner, refused to consent, as Lord Macartney had done in 1793, unless the admission was made that his sovereign was entitled to the same show of reverence from a mandarin 0i his rank. – In consequence of this he was not allowed to enter Pekin, and the object of his mission was frustrated. His ship,

the " Alceste," after a cruise along the coast of Korea and to the Loo-Choo Islands, on proceeding homewards was totally wrecked on a sunken rock in Gaspar Strait. Lord Amherst and part of his shipwrecked companions escaped in the ship's boats to Batavia, whence relief was sent to the rest. The ship in which he returned to England in 1817 having touched at St Helena, he had several interviews with the emperor Napoleon (see Ellis's Proceedings of the Late Embassy to China, 181 7; M'Leod's Narrative of a Voyage in H.M.S. "Alceste," 1817). Lord Amherst held the office of governor-general of India from August 1823 to February 1828. The principal event of his government was the first Burmese war of 1824, resulting in the cession of Arakan and Tenasserim to Great Britain. He was created Earl Amherst of Arakan in 1826. On his return to England he lived- in retirement till his death in March 1857.

*See A. Thackeray and R. Evans, Lord Amherst (" Rulers oif India * series), 1894. ' '«'<■•*

AMHERST, a town and district in the Tenasserim division of Lower Burma. The town is situated about 30 m. S. of Moul- mein. It was founded by the British in 1826 on the restoration of the town of Martaban to the Burmese, and named in compliment to the governor-general of India of that day; but in 1827 the headquarters were transferred to Moulmein. Amherst has been eclipsed in prosperity by the latter city, and is now merely a bathing-place for Moulmein.

The district forms a narrow strip of land between the Indian Ocean and the mountains which separate it from the independent kingdom of Siam. It has an area of 7062 sq. m. and had a population in 1901 of 300,173; it consists partly of fertile valleys formed by spurs of mountain system which divides it from Siam, and partly of a rich alluvial tract created by the great rivers which issue from them. The most important of these are the Salween and the Gyaing, formed by the junction of the Hlaingbwe and Haungtharaw rivers. The river highways bring down inex- haustible supplies of rice to Moulmein, the chief town of the district, as also of the province of Tenasserim. The district is subject to very heavy rainfall approaching 1 50 in. in the year, and has a uniform temperature of about 8o° F. throughout the twelve- month.

AMHERST, a village of Amherst township, Hampshire county,

Massachusetts, U.S.A., in the central part of the state, about 7 m. N.E. of Northampton. Pop. of the township (1890) 4512; (1900) 5028; (1910, U. S. census) 5112. It is served by the Boston & Maine and the Central Vermont railways, and by inter- urban electric railways to Northampton, Holyoke, Sunderland and Pelham. The village is picturesquely situated on a plateau within a rampart of hills on the E. side of the Connecticut river valley. About 3 m. to the S. are the Holyoke Mountains (so called), while on the three remaining sides the land slopes to meadows, beyond which rise on the W. the Hampshire and Berkr shire Hills, on the N. the Sugar Loaf Mountains and Mt. Toby, and on the E. the Pelham Hills, including Mt Lincoln (1246 ft.). Two small rivers (Mill and Fort) flow through the township. Amherst is a quiet, pleasing, academic village of attractive homes. It is noteworthy as the seat of Amherst College, one of the best known of the smaller colleges of the United States. Amherst Academy (opened about 1814, chartered 1816), a co-educational school at which Mary Lyon, the founder of Mt. Holyoke College, was educated, preceded the college (not co-educational) ,which was opened in 182 1 and was chartered in 1825. It was originally a collegiate charitable institution, its basis being a fund for the schooling of ministers, and the charity element has remained very large relatively to other colleges. The principal college buildings are College Hall (1828); College Chapel (1828); the Henry T. Morgan Library; Williston Hall, containing the Mather Art Museum, the rooms of the Young Men's Christian Association, and several lecture-rooms; Walker Hall, with college offices and lecture-rooms; Hitchcock Hall; Barrett Hall (1859), the first college gymnasium built in the United States, now used asalecture hall; the Pratt Gymnasium and Natatorium and the Pratt Health Cottage, whose donors also gave to the college the Pratt Field; an astronomical observatory; and the two dormitories, North College and South College, supplemented by several fraternity houses. The natural history collections (including the very large ichnological collection of President Hitchcock, and Audubon's collection of birds) are of exceptional richness. At Amherst is also the Massachusetts Agricultural College (co-educational ; 1 86 7) and experiment station (1887). Among the presidents of Amherst College have been in 1845-1854 and in 1876-1890 respectively — ■ Edward Hitchcock, the famous geologist, and the Rev. Julius H. Seelye (1824-1895), a well-known educationalist. The township seems to have been first settled in 1731; it was incorporated in 1759 as a " district" (i.e. having all the rights of a township save corporate representation in the legislature) and in 1776 as a " town " (township). It was originally part of Hadley. Itsname was given to it

in honour of General Jeffrey Amherst (1717-1797). During the Shays' Rebellion Amherst was a centre of disaffection and a rallying-point of the insurgents. Noah Webster lived in the village from 1812 to 1822, when working on his Dictionary; and

Emily Dickinson and Helen M. Fiske (later Helen Hunt-Jackson,

" H. H.") were born here.

See William Seymour Tyler, A History of Amherst College (New York, 1896), and Carpenter and Morehouse, The History of the Town of Amherst (New York, 1896).

AMHERST, the county town of Cumberland county, and port of entry in Novia Scotia, Canada, at the head of Chignecto Bay and on the Intercolonial railway, 138 m. from Halifax. Pop. (1901) 4964. It is situated in a rich agricultural and mining district, and contains county and railway buildings and numerous mills and factories. It is the distributing centre for the surround- ing district, and exports railway carriages, engines, boilers, stoves, &c.

AMHURST, NICHOLAS (1697-1742), English poet and political writer, was bOrn at Maiden, Kent, on the 16th of October 1697. He was educated at the Merchant Taylors' School, arid received an exhibition (1716) to St John's College, Oxford. In I7i9he was expelled from the university, ostensibly for his irregularities" of conduct, but in reality, according to his own account, because of his whig principles, which were sufficiently evident in a congratu- latory epistle to Addison, in Protestant Popery; or the Convoca- tion (17 18), an attack on the opponents of Bishop Hoadly, and in The Protestant Session . . . by a member of the Constitution Club at Oxford (1719), addressed to James, first Earl Stanhope, and printed anonymously, but doubtless by Amhurst. He had satir- ized Oxford morals in Strephon's Revenge; a Satire on the Oxford Toasts (17 18), and he attacked from time to time the administra- tion of the university and its principal members. An old Oxford Custom on public occasions permitted some persqn to deliver from the rostrum a humorous, satirical speech, full of university scandal. This orator was known as Terrae filius. In 1721 Amhurst produced a series of bi-weekly satirical papers under this name, which ran for seven months and incidentally provides much curious information. These publications were reprinted in 1726 in two volumes as Terrae Filius; or the secret history of the University of Oxford; in several essays. . . . He collected his poems in 1720, and wrote another university satire, Oculus Bri- tanniae, in 1724. On leaving Oxford for London

he became a prominent pamphleteer on the opposition side. On the 5th of December 1726 he issued the first number of the Craftsman, a weekly periodical, which he conducted under the pseudonym of Caleb D' Anvers. The paper contributed largely to the final overthrow of Sir Robert Walpole's government, and reached a circulation of 10,000 copies. For this success Amhurst's editorship was not perhaps chiefly responsible. It was the organ of Lord Bolingbroke and William Pulteney, the latter of whom was a frequent and caustic contributor. In 1 73 7 an imaginary letter from Colley Cibber was inserted, in which he was made to suggest that many plays by Shakespeare and the older dramatists contained passages which might be regarded as seditious. He therefore desired to be appointed censor of all plays brought on the stage. This was regarded as a " suspected " libel, and a warrant was issued for the arrest of the printer. Amhurst surrendered himself instead, and suffered a short imprisonment. On the overthrow of the government in 1742 the opposition leaders did nothing for the useful editor of the Craftsman, and this neglect is said to have hastened Amhurst's death, which took place at Twickenham on the 27th of April 1742.

AMIANTHUS, a corruption of amiantus (Gr. afilavros, unde- fined), a name applied to the finer kinds of asbestos (q.v.), in conse- quence, it is said, of the mineral being unaffected by fire. Some of the finest amianthus, with long silky flexible fibres, occurs in the district of the Tarentaise in Savoy. According to Dr J. W. Evans, the ancient amianthus, derived mostly from Karystos in Euboea and from Cyprus, was probably a fibrous serpentine, or chrysotile (now called locally Trajx-iraKoweTpa, or cotton-stone).

See Mineralogical Mag. (London) vol. xiv. no. 65 (1906), art. by J. W. Evans.

AMICABLE NUMBERS, two numbers so related that the sum of the factors of the one is equal to the other, unity being con- sidered as a factor. Such a pair are 220 and 284; for the factors of 220 are 1,2,4,5,10,11,20,22,44,55 and no, of which the sum is 284; and the factors of 284 are 1,2,4,71, and 142, of which the sum

is 220. Amicable numbers were known to the Pythagoreans, who accredited them with many mystical properties. A general formula by which these numbers could be derived was invented by the Arabian

astronomer Tobit ben Korra (836-901): if p = ˆ-2 m — 1, 5 = 3-2 m_l — 1 and r = o-2 2m – 1 — 1, where m is an integer and p,q,r prime numbers, then 2 m pq and 2 m r are a pair of amicable numbers. This formula gives the pairs 220 and 284, 17,296 and 18,416, 9,463,584 and 9,437,056. The pair 6232 and 6368 are amicable, but they cannot be derived from this formula. Amicable numbers have been studied by Al Madshritti (d. 1007), Rene Descartes, to whom the formula of Tobit ben Korra is some- times ascribed, C. Rudolphus and others.

AMICE (earlier forms: amyt, atnys, O. Fr. amit, Lat. amictus, from amicire, to throw or wrap round, the change of / to s being probably due to an early confusion with the aumuce: see Almuce), a liturgical vestment of the Western Church. It is a rectangular piece of cloth which is wrapped round the neck, shoulders and breast. Sometimes, more particularly in Germany, it is called the hunter ale (from humerus, shoulder). According to modern Roman use, laid down by the decree of the Congregation of Rites in 1819, the amice must be of linen or of a hempen material, not wool; and, as directed by the new Roman Missal (1570), a small cross must be sewn or embroidered in the middle of it. In putting it on it is first laid on the head, then allowed to fall on the shoulders, and finally folded round the chest and tied with the strings attached for that purpose (see fig. 1). The amice

is now worn under the alb, except at Milan and Lyons, where it is put on over it. The vest- ment was at first a perfectly plain white cloth, but in the 12th century the custom arose of decorating the upper border with a band of embroidery, the parure (paruru) or " apparel." This was abandoned at Rome about the end of the 15th century and is not prescribed in the Missal; it survived, however, in many parts of Europe till much later. This apparel, when the vestment has been adjusted, forms a sort of stiff collar which appears above the chasuble or dalmatic (see fig. 2). In

From Braun, Lilurgische Gewandung, by permission of the publisher, B. Herder.

Fig. 1. — Amice of the Present Day.

Redrawn from Braun, Lilurgische Gewandung.

Fig. 2. — Medieval Method of putting on the Amice.

some exceptional cases, as at Milan, it has become detached from the

amice and is fixed like a collar to the chasuble.

The Latin word amictus was applied to any wrap-like garment, and, according to Father Braun, the liturgical amice originated in the ordinary neck-cloth worn by all classes of Romans. It had at the outset no liturgical significance whatever, and was simply adopted by the clergy for the same reason that the clergy of the 1 8th century wore wigs — because it was part of the full dress of ordinary life. The first record of its ecclesiastical use is at Rome in the 8th century, when it was worn only with the dalmatic and was known as the anabolagium {anagolaium, anagolagium, from Gr. avaˆoKoiov) , a name it continued to bear at Rome till the 13th century. In the 9th century it spread to the other countries that adopted the Roman use: it is mentioned in an inventory of vestments given by Abbot Angilbert (d. 814) to the

monastery at Centula (St Riguier) and in the de clericorum insu- tutione of Hrabanus Maurus (c. 820). The amice was worn firav simply as a shoulder-cloth, but at the end of the 9th century thr custom grew up of putting it on over the head and of wearing it as a hood, either while the other vestments were being put on or. according to the various uses of local churches, during part o! the Mass, though never during the canon. This ceased at Rome at the same time as the apparel disappeared; but two relics of it survive — (1) in the directions of the Missal for putting on the amice, (2) in the ordination of subdeacons, when the bishop lays the vestment on the ordinand's head with the words, " Take the amice, which symbolizes discipline over the tongue, &c." The priest too in putting it on prays, " Place on my head the helmet of salvation, &c."

The amice, whatever its origin or symbolism, became specific- ally a vestment associated with the sacrifice of the Mass, and as such it was rejected with the other " Mass vestments " in England at the Reformation. Its use has, however, been revived in many Anglican churches, the favourite form being the medi- eval apparelled amice. (See Vestments.) A vestment akin to the amice is also worn in the Armenian and some other oriental churches, but it is unknown to the Orthodox Eastern Church.

Akin to the amice is a vestment peculiar to the popes, the fanone (Med. Lat. fano, " cloth," Goth, fana, " cloth," Mod. Ger. Fahne, " a flag "), also called the orale (from or a, an edge, border). This is at present a circular broad collar of two thicknesses of silk, ornamented with gold stripes and a gold-em- broidered cross (see fig. 3). It is put on after the alb, &c, and under the tunicle, dalmatic and chasuble,

but then drawn up so as to fall over the latter like a collar. The fanone was originally a cloth like the amice and was wrapped round neck and shoulders; until the 15th century, moreover, it was not worn with the amice.

From Braun, Lilurgische Gewandung.

Fig. 3. — The Papal Fanone.

Since then, however, both vestments have been worn, one under, the other over, the alb. It is worn by the popes only on certain special days or occasions, and forms part of the vestments in which they are buried.

See Joseph Braun, S. J., Die liturgische Gewandung, pp. 21-56 (Freiburg im Breisgau, 1907), and bibliography to the article Vestments.

AMICI, GIOVANNI BATTISTA (1786-1863), Italian astronomer and microscopist, was born on the 2 5th of March 1 786 at Modena. After studying at Bologna, he became professor of mathematics at Modena, and in 183 1 was appointed inspector- general of studies in the duchy. A few years later he was chosen director of the' observatory at Florence, where he also lectured at the museum of natural history. He died at Florence on the 10th of April 1863. His name is best known for the improvements he effected in the mirrors of reflecting telescopes and especially in the construction of the microscope. He was also a diligent and skilful observer, and busied himself not only with astronomical subjects, such as the double stars, the satellites of Jupiter and the measurement of the polar and equatorial diameters of the sun, but also with biological studies of the circulation of the sap in plants, the fructification of plants, infusoria, &c.

AMICIS, EDMONDO DE (1846- 1908), Italian writer, was born at Oneglia, in Liguria, on the 21st of October 1846. After some schooling at Cuneo and Turin, he was sent to the Military School at Modena, from which he was appointed to a lieutenancy in the 3rd regiment of the line in 1865. He fought at the battle 01 Custozza in 1866. In 1867 he became director of the Italia

Militate, Florence. In the following year he published his first book,

La Vita Militare, which consisted of sketches of military life, and attained wide popularity. After the overthrow of the pope's temporal power in 1870, De Amicis retired from the army and devoted himself to literature, making his headquarters at Turin. Always a traveller by inclination, he found opportunity for this in his new leisure, and some of his most popular books have been the product of his wanderings. Several of these have been translated into English and the other principal languages of Europe. The most important of these are his descriptions of Spain (1873), Holland (1874), Constantinople (1877) and Morocco (1879;. These gained him a well-deserved reputation as a brilliant depicter of scenery and the external aspects of life; solid information is not within their sphere; and much of their success is owing to the opportunities they afford for spirited illustration. Subsequently De Amicis greatly extended his fame as a writer of fiction, especially by 77 Romanzo d' un Maestro, and the widely read II Cuore (translated into English as An Italian Schoolboy's Journal); later volumes from his pen being La Carozza di tutti (centring round an electric tram), Memorie, Speranze e glorie, Ricordi d' infanzia e di scuola, L' Idioma gentile, and a volume of short stories, Nel Regno dell' Amore. He died suddenly of heart disease at Bordighera on the 12th of March 1908.

AMICUS CURIAE (Lat. for " a friend of the court "), a term used primarily in law, signifying a person (usually a member of the bar) who, having special knowledge but not being engaged in the suit, intervenes during its hearing to give information for the assistance of the court, either upon some fact relevant to the issue or upon a point of law, such as the hearing of a local custom, the precedent of some decided case, &c.

AMIDINES, in organic chemistry, the name given to compounds of general formula R-C: (NH)- NH 2 , which maybe considered as derived from the acid-amides by replacement of oxygen by the divalent imino (= NH) group. They may be prepared by the action of ammonia or amines on imide chorides, or on thiamides (0. Wallach, A. Bernthsen); by the action of ammonium chloride or hydrochlorides of amines on nitriles; by condensing amines and amides in presence of phosphorus trichloride; by the action of hydrochloric acid on acid-amides (0. Wallach, Ber.,

1882, 15, p. 208); and by the action of ammonia or amines on imino-ethers (A. Pinner, Ber., 1883, 16, p. 1647; 1884, 17, p. 179). They are monacid bases, which are not very stable; they readily take up the elements of water (when boiled with acids or alkalies) , yielding amides and ammonia. On dry distillation they yield nitriles

and ammonia. When warmed with sulphuretted hydrogen they yield thiamides, R-C : (NH)NHR+H 2 S = RC(NH 2)(SH)NHR = R-CSNH 2 +NH 2 -RorRCS-NHR+NH 3 . With /3-ketonic esters, H0(CH 3)C : CH- C0 2 R, they yield oxy- pyrimidines (A. Pinner, Ber., 1890, 23, p. 3820).

Formamidine, HC: (NH)NH 2 , is only known in the form of its salts, the hydrochloride being obtained by the action of ammonia on the hydrochloride of formimido-ethyl ether (A. Pinner, Ber.,

1883, 16, p. 357). Acetamidine, CHjC : (NH)-NH 2 , is alkaline in reaction, and readily splits up into acetic acid and ammonia when warmed with acids. Its hydrochloride melts at 163 C, and crystallizes from alcohol in colourless deliquescent prisms. Acetic anhydride converts the base into an acetamino-dimethyl pyrimidine, acetic acid and acetamide being also formed.

Benzamidine, CeHs-C: (NH)NH 2 , forms colourless crystals which melt at 75-80° C. When warmed it breaks down into ammonia and cyanphenine (s-triphenyl triazine). It condenses with acetic anhydride to form a methyldiphenyl triazine, acet- amide being also formed; with acetyl-acetone to form dimethyl- phenyl pyrimidine (A. Pinner, Ber., 1893, 26, p. 2125); and with trimethylene bromide to form a phenyl tetrahydropyrimidine (Pinner). H. v. Pechmann {Ber., 1895, 28, p. 2362) has shown that amidines of the type R-C : (NY)-NHZ sometimes react as if they possessed the constitution R-C : (NZ)- NHY; but this only appears to occur when Y and Z are groups which function in the same way. If Y and Z are groups which behave very differently, then there is apparently no tautomerism and a definite formula can be given to the compound.

The formulae of the ringed compounds mentioned above are here shown :

N-C— (CH 3) N-C— (CH S)

R-c/ \CH CH 3 -c/ \ CH

N=C— (OH) N=C— (NHCOCH s)

Oxypyrimidine. Acetaminodimethyl pyrimidine.

N-

N – CH 2 C 6 H 6 -C

NH-CH 2

GH 6 -C<ˆ %

• N = c/

\CH 3

Methyldiphenyl triazine. Phenyl tetrahydropyrimidine.

AMIEL, HENRI FREDERIC (1821-1881), Swiss philosopher and critic, was born at Geneva on the 27th of September 1821. He was descended from a Huguenot family driven to Switzerland by the revocation of the edict of Nantes. Losing his parents at an early age, he travelled widely, became intimate with the intellectual leaders of Europe and made a special study of German philosophy in Berlin. In 1849 he was appointed professor of aesthetics at the academy of Geneva, and in 1854 became professor of moral philosophy. These appointments, conferred by the democratic party, deprived him of the support of the aristocratic party; which comprised nearly all the culture of the city. This isolation inspired the one book by which Amiel lives, the Journal Intime, which, published after his death, obtained a European reputation. It was translated into English by Mrs Humphry Ward. Although second-rate as regards productive power, Amiel's mind was of no inferior quality, and his journal gained a sympathy which the author had failed to obtain in his life. In addition to the Journal, he produced several volumes of poetry and wrote studies on Erasmus, Madame de Stael and other writers. He died in Geneva on the nth of March 1881. His chief poetical works are Grains de mil, II penseroso, Part du rive, Les Etrangeres, Charles le Temeraire, Romancero historique, Jour a jour.

See Life of Amiel by Mdlle Berthe Vadier (Paris, 1885); Paul Bourget, Nouveaux essais (Paris, 1885) ; E. Scherer, introd. to the Journal and in Etudes sur la litt. contemp. (vol. viii.).

AMIENS, a city of northern France, capital of the department of Somme, on the left bank of the Somme, 81 m. N. of Paris on the Northern railway to Calais. Pop. (1906) 78,407. Amiens was once a place of great strength, and still possesses a citadel of the end of the 16th century, but the ramparts which surrounded it have been replaced by boulevards, bordered by handsome residences. Suburbs, themselves bounded by another line of boulevards, have arisen beyond these limits, and the city also extends to the right bank of the Somme. The busy quarter of Amiens lies between the river and the

railway, which for some distance follows the inner line of boulevards. The older and more picturesque quarter is situated directly on the Somme; its narrow and irregular streets are intersected by the eleven arms of the river and it is skirted on the north by the canal derived therefrom. Besides its boulevards Amiens has the ample park or Promenade de la Hotoie to the west and several fine squares, notably the Place Longueville and the Place St Denis, in which stands the statue of the famous 17th-century scholar Charles Ducange. The cathedral (see Architecture: Romanesque and Gothic Architecture in France; and Cathedral), which is perhaps the finest church of Gothic architecture in France, far exceeds the other buildings of the town in importance. Erected on the plans of Robert de Luzarches, chiefly between 1220 and 1288, it consists of a nave, nearly 140 ft. in height, with aisles and lateral chapels, a transept with aisles, and a choir (with deambulatory) ending in an apse surrounded by chapels. The total length is 469 ft., the breadth 216 ft. The facade, which is flanked by two square towers without spires, has three portals decorated with a pro- fusion of statuary, the central portal having a remarkable statue of Christ of the 13th century; they are surmounted by two galleries, the upper one containing twentv-two statues of the kings of Judah in its arcades, and by a hne rose-window. A slender spire rises above the crossing. The southern portal is remarkable for a figure of the Virgin and otner statuary. In the interior, which contains beautifully carved stalls, a choir-scr«en

in the flamboyant style and many other works of art> the most striking features are the height of the nave and the boldness of the columns supporting the vaulting. The chief of the other churches of Amiens is St Germain (15th century), which has some good stained glass. The hotel de ville, begun in 1550, a belfry of the 14th and 18th centuries and several old mansions are of interest. Amiens has a rich library and admirable collections of paintings, sculptures and antiquities in the museum of Picardy. Its learned associations include the Societe des Antiquaires de Picardie, by whom the museum was built in 1854-1864. The city is the seat of a bishop, a prefect, a court of appeal and a court of assizes, and headquarters of the II. Army Corps. There are also tribunals of first instance and of commerce, a board of trade-arbitrators, a chamber of Commerce and a branch of the Bank of France. The educational institutions include lycees for boys and girls, training-colleges for teachers, a preparatory school of medicine, a school of music and a school of

iron-working and wood- working. The textile industries for which Amiens has been celebrated since the middle ages include manufactures of velvet, cotton-, wool-, silk-, hemp- and flax-spinning, and the weaving of hosiery and a variety of mixed fabrics. Manufactures of machinery, chemicals, blacking, polish and sugar, and printing, dyeing and iron-founding are also carried on. Market gardens, known as horlillonnages, intersected by small canals derived from the Somme and Avre, cover a considerable area to the north-east of Amiens; and the city has trade in vegetables, as well as in grain, sugar, wool, oil-seeds and the duck-pasties and macaroons for which it is renowned.

Amiens occupies the site of the ancient Samarobriva, capital of the Ambiani, from whom it probably derives its name. At the beginning of the 4th century Christianity was preached there by St Firmin, its first bishop. During the middle ages its territory formed the countship of Amienois. The authority of the counts was, however,balanced by that of the bishops,and early in the 1 2th century the citizens, profiting by this rivalry, gained a charter of enfranchisement. The fief became for the first time a dependency of the French crown in 1185, when Philip of Alsace, count of Flanders, ceded it to Philip Augustus. It more than once passed out of the power of the French kings, notably in 1435, when, by the treaty of Arras, it came into the possession of the dukes of Burgundy, to whom it belonged till 1477. Surprised by the Spaniards in 1597, the city was recaptured from them after a long siege by Henry IV. Till 1790 it was the capital of the gouverne- ment of Picardy (q.v.). The famous treaty between Great Britain, France, Spain and Holland which took its name from Amiens was signed in the hotel de ville on the 25th of March 1802. During the war between France and Germany, Amiens, after an important action, fell into the hands of the Prussians on the 28th of November 1870. (See Franco- German War.)

See A. de Calonne, Histoire de la ville d' Amiens (1900) ; John Ruskin, The Bible of Amiens (1881); La Picardie historique et monumentale, tome i., published by the Societe des Antiquaires de Picardie (1893).

AMINES, in chemistry, derivatives of ammonia in which one or more of the hydrogen atoms are replaced by alkyl or aryl groups. The replacement of one hydrogen atom by one aikyl or aryl group gives rise to primary amines; of two hydrogen atoms by two groups, to secondary amines; of three hydrogen atoms by three groups, to tertiary amines. The tertiary amines possess the power of combining with one molecular proportion of an alkyl iodide to form quaternary

ammonium salts. The structural relations of these compounds may be shown thus: NH 3 ; NH 2 R;

Ammonia ; primary amine ; NHR 2 ; NR 3 ; NR4I.

secondary amine; tertiary amine; quaternary ammonium iodide.

Aliphatic amines. — These compounds possess properties very similar to those of ammonia, the lowest members of the series being combustible gases readily soluble in water. The next higher members of the series are liquids of low boiling point also readily soluble in water, the solubility and volatility, however, decreasing with the increasing carbon content of the molecule, until the highest members of the series are odourless solids of high boiling point and are insoluble in water. They ale all strong

bases, readily forming salts with the mineral acids and double salts with the chlorides of gold, platinum and mercury. They are ionized in aqueous solution to a much greater extent than ammonia, the quaternary ammonium bases being the most ionized, and the secondary bases being more strongly ionized than the primary or tertiary bases. For data concerning the conductivity of the organic bases see G. Bredig (Zeit. fur phys. Chem., 1894, 13, p. 289).

Many methods have been devised for the preparation of the amines, the first amine having been isolated in 1849 by A. Wurtz on boiling methyl isocyanate with caustic potash, CON-CH 3 f 2KHO = CH 3 NH 2 -r-K 2 C08; The primary amines may also be prepared by heating the alkyl iodides with ammonia (A. W. Hof- mann) ; by the reduction of nitriles with alcohol and sodium (A. Ladenburg, Ber., 1886, 19, p. 783); by heating the esters of nitric acid with alcoholic ammonia at ioo° C. (O. Wallach, Ber., 1881, 14, p. 421); by the action of reducing agents on nitro- paraffins; by the action of zinc and hydrochloric acid on aldehyde ammonias (German Patent 73,812); by the reduction of the phenylhydrazones and oximes of aldehydes and ketones with sodium amalgam in the presence of alcohol and sodium acetate (J. Tafel, Ber., 1886, 19, p. 1925; 1889, 22, p. 1854; H. Gcld- schmidt, Ber., r886, 19, p. 3232); by the action of dilute hydro- chloric acid on the isonitriles, R-NC + 2H 2 = R-NH { f H„C0 2 ; by heating the mustard oils with a mineral acid, by the hydro lysis of the alkyl phthalimides (S. Gabriel, Ber., 1887, 20, p. 2224; 1891, 24, p. 3104),

/CCX RI ,CO v 2H 2 Q /COOH

C,

NK -> C 6 H 4 <

A

>

NR

C 6 H 4 .

+NH 2 R;

OK Vx)/ 1 “^ ” ^”” \CQOH

by distilling the amino-acids with baryta; by the action of bromine and caustic potash on the acid-amides (A. W. Hofmann, Ber., 1885, 18, p. 2734; 1886, 19, p. 1822); CH 3 CONH 2 4CH 3 CONHBr>CH 3 CONKBr->

*CH 3 NCO-*CH 3 NH 2 ; and by the hydrolysis of substituted urethanes (Th. Curtius, Ber., 1894, 27, p. 779; 1896, 20, p.‘n66),*

N 2 H 4 -H 2 HONO

R-COOH-ˆR-COOR 1 ->-» R-CONH-NH 2 ->

acid ester hydrazide

C 2 H 6 OH HC1

R-CON 3 -> R-NH-C0 2 C 2 H 6 ‘-» R-NH 2 azide urethane

The secondary amines are prepared, together with the primary and tertiary, by the action of ammonia on the alkyl iodides (see below), or by the hydrolysis of para-nitroso derivatives of tertiary aromatic amines, such as para-nitrosodimethylaniline, thus: NO-C 6 H 4 - N(CH 3) 2 + H 2 = NO-C 6 H 4 OH + NH(CH 3) 2 . By the action of ammonia on the alkyl iodides a complex mixture Of primary, secondary and tertiary amines, along with a quaternary ammonium salt, is obtained, the separation of which is difficult. The method worked out by A. W. Hofmann is as follows;ˆ— the mixture is distilled with caustic potash, when the primary, secondary and tertiary amines distil over, and the quaternary ammonium salt remains behind unaffected. The aqueous solu tion of the amines is now shaken up with diethyl oxalate, when the primary amine forms

a crystalline dialkyl oxamide and the secondary amine an insoluble liquid, which is an ethyl dialkyl oxamate, the tertiary amine not reacting: (C02C 2 H 5) 2 t 2NH 2 R = (CONHR) 2 + 2C 2 H 5 OH; (C0 2 C 2 H 5) ? + NHR 2 « C 2 H 5 2 C-CONR 2 +C 2 H 5 OH. The tertiary amine is then dis- tilled off, the residual products separated by filtration and finally hydrolysed by a caustic alkali.

The primary, secondary and tertiary amines may be readily dis- tinguished by their behaviour with various reagents. Primary amines when heated with alcoholic potash and chloroform yield isonitriles, which are readily detected by their offensive smell. The secondary and tertiary amines do not give this reaction. With nitrous acid, the primary amines yield alcohols, the secondary amines yield nitrosamines and the tertiary amines do not react: R-NH 2 +ONOH- R-OH+N 2 H 2 0; R 2 NH ONOH=R 2 N-NO+H 2 0. With benzene sulphochloride in the presence of alkali, the primary amines yield compounds of the type C6H5SO2NHR, soluble in alkalies, whilst the secondary amines

yield compounds of the type CsHjS0 2 NR 2 , insoluble in alkalies (O. Hinsberg, Ber., r8oo, 2.3, p. 2963). Priirlary amines heated with carbon bisulphide in alcoholic solution are converted into mustard oils, when the dithiocarbamate first produced is heated with a solution of mercuric chloride.

Methylamine, CH 3 NH 2 , occurs in Mercurialis perennis, in bone- oil, and herring brine. It is also a decomposition product of many alkaloids. At ordinary temperatures it is a gas, but may be condensed to a liquid which boils at – 6° C. It has a strong am- moniacal smell, burns readily and is exceedingly soluble in water. Its critical temperature is 155° C. and critical pressure 72 atmos. (C. Vincent, J. Chappuis; /aAr&sft., 1886, p. 202). Dimetnylamine, (CH S) 2 NH, is found in Peruvian guano. It is a heavy vapour which condenses at 7 C. to a liquid, having a pronounced fish-like smell. Trimethylamine, (CHaˆN, is very similar to dimethyl- amine, and condenses to a liquid which boils at 3 -2-3 8° C. It is usually obtained from " vinasses," the residue obtained from the distillation of beet sugar alcohol, and is used in the manufao ture of potassium bicarbonate by the Solvay process, since its hydrochloride is much more soluble than potassium carbonate. Tetramethylammonium iodide, N(CHs)4l, is the chief product obtained by the action of

methyl iodide on ammonia (Hofmann). It crystallizes in quadratic prisms and has a 'bitter taste. By warming its aqueous solution with an excess of silver oxide it is converted into tetramethylammonium hydroxide, N(CHj) tillation it is resolved into trimethylamine and methyl alcohol. If the nitrogen atom in the quaternary ammonium salts be in combination with four different groups, then the molecule is asymmetrical, and the salt can be resolved into optically active enantiamorphous isomerides. W. J. Pope (Jour. Chem. Soc, 1901, 79, p. 828) has resolved benzyl-allyl-phenyl-methylamine iodide by boiling with silver rf-camphorsulphonate in a nearly anhydrous mixture of acetone and ethyl acetate. The silver iodide is separated and the solvent distilled off. The residue crystallizes slowly, and the crystalline product is almost wholly <2-benzyl-allyl-phenyl-ammonium-<£-surphonate, the correspond- ing /-compound remaining as a syrupy residue. The correspond- ing iodides are obtained by the addition of potassium iodide to solutions of the sulphonates, and are optically active antipodes.

Diamines.— The diamines contain two amino groups and bear the same relation to the glycols that the primary monamines bear to the primary alcohols. They are of importance, since the higher homologues are identical in many cases with the ptomaines pro- duced by the putrefactive action of some bacteria on albumen and other related substances. Ethylene diamine, C 2 H 4 (NH 2) 2 , may be prepared by heating ethylene dibromide with alcoholic ammonia to ioo° C. (F. S. Cloez, Jakresb., 1853, p.. 468); or by the action of tin and hydrochloric acid on cyanogen (T. Fairley, Ann. Suppl., 3, 1864, p. 372). It is an alkaline liquid, which when anhydrous boils at 116-5° C. Nitrous acid converts it into ethylene oxide. It combines directly with many metallic salts. (See S. F. Jorgensen, Jour. pr. Chem., 1889 (2), 39, p. 8.) Tri- methylene diamine, NH 2 -(CH 2) 3 -NH 2 , is prepared by the action of ammonia on trimethylene bromide (E. Fischer, Ber., 1884, 17, p. 1799). It is a liquid which boils at 135-136 C, and is readily soluble in alcohol, ether, chloroform and benzene. Tetramethyl- ene diamine (putrescine) , NH 2 -(CH 2)4-NH 2 , is prepared by re- ducing ethylene dicyanide (succinonitrile) with sodium in absolute alcoholic solution (A. Ladenburg, Ber., 1886, 19, p. 780). It melts at 27° C, and is easily soluble in water. Pentamethylene diamine (cadaverine) , NHj-(CH 2) 6 NH 2 ,is prepared by reducing trimethylene cyanide in ether solution by zinc and hydrochloric acid (A. Ladenburg, Ber., 1883, 16, p. 1151). J. v. Braun (Ber., 1904, 37, p. 3583) has prepared pentamethylene derivatives from piperidine by the action of phosphorus pentachloride. On heat, ing piperidine with phosphorus

pentachloride to 2co°C. in a sealed tube pentamethylene dichloride is obtained, and this on treat- ment with potassium phthalimide gives a condensation product of composition, CH4[CO]2N(CHj) 6 N[CO] 2 C 6 H4, which is finally

hydrolysed by hydrochloric acid. Cadaverine is a syrup at ordin ary temperatures, and boils at 1 78-1 79° C. It is readily soluble in water and alcohol, but only slightly soluble in ether.*

Aromatic Amines.— The. aromatic amines in some respects resemble the aliphatic amines, since they form salts with acids and double salts with platinum chloride, and they also distil without decomposition. On the other hand, they are much weaker bases than the aliphatic amines, their salts undergoing hydrolytic dissociation in aqueous solution. The primary aromatic amines may be prepared by the reduction of the nitro-hydrocarbonsy the reducing agents used being either alcoholic-ammonium sulphide (N. Zinin), zinc and* hydrochloric acid (A. W. Hofmann) , an alcoholic solution of stannous chloride (containing hydrochloric acid) (R. Anschutz, Ber., 1886, 19, p. 2161), tin and hydrochloric acid, or, on the manufacturing scale, iron and hydrochloric acid. They may also be obtained by the reduction of .nitroso compounds and of hydrazo compounds and of hydrazones (J. Tafel, Ber., 1886, 19, p. 1924), by distilling the amido-acids with lime, by heating phenols with zinc chloride ammonia (V. Merz, Ber., 1880, 13, p. 1298), and by heating the secondary and tertiary bases with concentrated hydrochloric acid to about 180° C.*

At a temperature of about 300-400° C. the alkyl chloride formed in this reaction attacks the benzene nucleus and replaces hydrogen by an alkyl group or groups, forming primary amines homologous with the original amine; thus methylaniline hydroˆ chloride is converted' into para- and ortho-toluidine hydro- chloride, and trimethyl phenyl ammonium iodide is converted into mesidine hydriodide. It is to be noted that only traces of the aromatic amines are produced by heating the halogen substituted benzenes with ammonia, unless the amino group be situated in the side chain, as in the case of benzylamine.

The primary amines are colourless liquids or crystalline solids, which are insoluble in water, but readily soluble in the common organic solvents. When heated with alkyl or aryl iodides, they are converted into secondary and tertiary amines. Concentrated nitric acid attacks them violently, producing various oxidation products, but if the amino group be "protected" by being previously acetylated, then

nitro derivatives are obtained. When heated with concentrated sulphuric acid for some time, they are sulphonated. They form condensation products with alde- hydes, benzaldehyde and aniline forming benzylidene aniline, CeHeN: CHCeHs, and when heated with acids they form anilides. They give the isonitrile reaction (see above) when warmed with chloroform and a caustic alkali, and form alkyl thioureas when heated with an alcoholic solution of carbon bisulphide. When warmed with a solution of nitrous acid, they are converted into phenols; if, however, nitrous acid be added to an ice-cold solution of a primary amine in excess of mineral acid, a diazonium salt is formed (see Azo Compounds and Diazo Compounds), or in absence of excess of acid, a diazoamine is produced.

The secondary amines may be of two types — namely, the purely aromatic amines, and the mixed secondary amines, which contain an aromatic residue and an alkyl group. The purely aromatic amines result upon heating the primary amines with their hydrochlorides, and, in some cases, by : heating a phenol with a primary amine and anhydrous zinc chloride. The mixed secondary amines are prepared by the action of alkyl iodides on the primary amines, or by heating salts of the primary amine with alcohols under pressure. The mixed secondary amines have basic properties, but the purely aromatic secondary amines are only very feeble bases. Both classes readily exchange the imide hydrogen for acid radicals, and give nitrosamines with nitrous acid. The secondary amines do not give the isonitrile reaction.

The tertiary amines may also be of two types, the purely aromatic and the mixed type. The mixed tertiary amines are produced by the action of alkyl halides on the primary amines. The simplest aromatic tertiary amine, triphenylamine, is prepared by the action of brombenzene on sodium diphenylamine (C Heydrich, Ber., 1885, 18, p. 2156). The simplest aromatic monamine is aniline (q.v.), and the simplest mixed amines are

mono- and di-methyl aniline. These substances are treated in the article Aniline.

The aromatic amine resembling the aliphatic amines is ben-zylamine, CeHj-CHˆ-NHˆ, which may be prepared by reducing

benzonitrile in alcoholic solution by means of zinc and acetic acid (O. Mendius, Ann. 1862, 121, p. 144), or by metallic sodium (E. Bamberger, Ber., 1887, 20, p. 1709). It can also be obtained by the action of ammonia on benzyl chloride (S. Cannizzaro, Ann., 1865, 134, p. 128), but di- and tri-benzylamines are simul- taneously formed. It is a liquid, which boils at 183 C, and is miscible in all proportions with water, alcohol and ether. It is basic in character, and has a strongly alkaline reaction. Di- phenylamine, (CeHs^NH, is the simplest representative of the true aromatic secondary amines. It is prepared by heating aniline and aniline hydrochloride for some hours to 210-240 C, (Ch. Girard and G. de Laire, Zeit fur. Chem., 1866, p. 438). It crystallizes in white plates, which melt at 45 C. and boil at 302 C. It is almost insoluble in water, but readily volatilizes in steam. When heated with monobasic saturated acids and zinc chloride it yields acridines.

Aromatic Diamines.— -The diamines are prepared by reducing the nitranilines or the dinitrohydrocarbons. They crystallize in plates, and for the most part distil without decomposition. Orthophenylene diamine, CeFLi (NH))i, crystallizes from water in plates, which melt at 102-103 C. and boil at 256-258° C. When heated with 10 % hydrochloric acid to 180 C. it yields pyro- catechin (Jacob Meyer, Ber., 1897, 30, p. 2569). The ortho- diamines are characterized by the large number of condensation products they form. (See Imidazoles, Quinoxalines, &c). Metaphenylene diamine crystallizes in rhombic plates which melt at 63° C. and boil at 287 C. It is easily soluble in water and alcohol. When heated with 10 % hydrochloric acid to 180° C. it yields resorcin (J. Meyer). Paraphenylene diamine may be prepared as above, and also by the reduction of amidoazobenzene. It crystallizes in tables which melt at 140° C. and boil at 267° C. When heated with 10 % hydrochloric acid to 180° C. it yields hydroquinone (J. Meyer). Manganese dioxide and dilute sul- phuric acid oxidize it to quinone. The three classes of diamines may be distinguished by their behaviour towards nitrous acid. The ortho- compounds condense to azimido benzenes, the meta- compounds yield azo-dyestuffs, and the para-compounds yield bis-diazo compounds of the type XN 2 -C6H 4 -N 2 X.

AMIOT, JEAN JOSEPH MARIE (1718-1793), French Jesuit missionary, was born at Toulon in February 17 18. He entered the Society of Jesus in 1737 and was sent in 1750 as a missionary to China. He soon won the confidence of the emperor Kien-lung and spent the remainder of his life at Pekin, where he died on the Oth of October 1793. Amiot was eminently fitted to make good use of the advantages which his situation afforded, and his works did more

than had ever been done before to make known to the Western world the thought and life of the Far East. His Didionnaire tatare-mantchou-franqais (Paris, 1789) was a work of great value, the language having been previously quite unknown in Europe. His other writings are to be found chiefly in the Memoires concernant Vhistoire, les sciences et les arts de Chinois (15 vols., Paris, 1776-1791). The Vie de Confucius, the twelfth volume of that collection, is complete and accurate.

For full bibliography see De Backer and C. Sommervogel, Bibliotheque de la Cie. de Jesus, i. 294-303 ; for his works on Chinese music see F. J. Fetis, Biog. univers. des musiciens (Brussels, 1837-

1844).

AMIR, or Ameer (an Arabic word meaning " commander," from the root amr, "commanding"), a title common in the Mahommedan East. The form emir is also commonly employed in English. The word originally signified a military commander, but very early came to be extended to anyone bearing rule, Mahomet himself being styled by the pagan Arabs amir of Mecca. Thus the term gradually came to be applied to any high office-bearer, or to any lord or chief. The caliph has the style of Amir ul Omara, " lord of lords. " The title Amir ul Muminim, or " commander of the faithful," now borne by the sultan of Turkey, was first assumed by Abu Bekr, and was taken by most of

the various dynasties which claimed the caliphate, including the Fatimites, the Spanish Omayyads and the Almohades. The Almoravides and the Merinides assumed the style of Amir ul Muslimin, " commander of the Mussulmans."

The use of the word is, in fact, closely akin to that of the English "lord," sometimes connoting office, as in Amir ul- ahghal (minister of finance) under the Almohades (cf. " lord of the treasury "), sometimes mere dignity, as in the case of the title of honour borne by all descendants of the Prophet, or of the title Mir assumed by men of great rank in the Far East. Sometimes it implies a temporary office of dignity and command — e.g. the Amir ul-haj, " commander of the pilgrimage " (to Mecca). Sometimes again it connotes the meaning of " sovereign lord," in which sense it was early assumed by the princes of Sind and by the rulers of Afghanistan and Bokhara, the title implying a lesser dignity than that of sultan. Thus too it is very generally applied in the East to the chiefs of independent or semi-inde- pendent tribes. In the Lebanon both the Christian clans and the Druses are ruled by hereditary amirs. Finally the word (con- fused not unnaturally with the particle usually attached to it) was borrowed by the West, and is the origin of the English " admiral."

AMIS ET AMILES, the title of an old French romance based on a widespread legend of friendship and sacrifice. In its earlier and simpler form it is the story of two friends, one of whom, Amis, was smitten with leprosy because he had committed perjury to save his friend. A vision informed him that he could only be cured by bathing in the blood of Amiles's children. When Amiles learnt this he killed the children, who were,- however, miraculously restored to life after the cure of Amis. The tale was probably of Oriental origin, and introduced to the West by way of Byzantium. It found its way into

French literature through the medium of Latin, as the names Amicus and Amelius indicate, and was eventually attached to the Carolingian cycle in the 12th-century chanson de geste of Amis et Amiks. This poem is written in decasyllabic assonanced verse, each stanza being terminated by a short line. It belongs to the heroic period of French epic, containing some passages of great beauty, notably the episode of the slaying of the children, and maintains a high level of poetry throughout. Amis has married Lubias and become count of Blaives (Blaye), while Amiles has become seneschal at the court of Charlemagne, and is seduced by the emperor's daughter, Bellisant. The lovers are betrayed, and Amiles is unable to find the necessary supporters to enable him to clear himself by the ordeal of single combat, and fears, moreover, to fight in a false cause. He is granted a reprieve, and goes in search of Amis, who engages to personate him in the combat. He thus saves his friend, but in so doing perjures him- self. Then follows the leprosy of Amis, and, after a lapse of years, his discovery of Amiles and cure. There are obvious reminis- cences in this story of Damon and Pythias, and of the classical instances of sacrifice at the divine command. The legend of Amis and Amiles occurs in many forms with slight variations, the names and positions of the friends being sometimes reversed. The crown of martyrdom was not lacking, for Amis and Amiles were slain by Ogier the Dane at Novara on their way home from a pilgrimage to the Holy Land. Jourdain de Blaives, a chanson de geste which partly reproduces the story of Apollonius of Tyre, was attached to the geste of Amis by making Jourdain his grandson.

The versions of Amis and Amiles include — (a) numerous Latin recensions in prose and verse, notably that given by Vincent de Beauvais in his Speculum historiale (lib. xxiii. cap. 162-166 and 169) ; (b) an Anglo-Norman version in short rhymed couplets, which is not attached to the Charlemagne legend and agrees fairly closely with the English Amis and Amiloun (Midland dialect, 13th century); these with the old Norse version are printed by E. Kolbing, Altengl. Bibl. vol. ii. (1889), and the English romance also in H. Weber, Metrical Romances, vol. ii. (1810); (c) the 12th-century French chanson de geste analysed by P. Paris in Hist. litt. de la France (vol. xxii.), and edited by K. Hofmann (Erlangen, 1882) with the addition of Jourdain de Blaives; (d) the Latin Vita Sand. Amid et Amelii (pr. by Kolbing, op. cit.) and its Old-French translation, Li amities de Ami et Amilr c-A. L. Mnland and C. d'Hericault in Nouvelles . . .

du xiii' siecle (Paris, 1856) ; (e) a 14th-century drama, Un Miracle de Noire Dame a" Amis et Amile, ed. L. J. N. Monmerque and

F. Michelin Thedtrefr.au moyendge (1839) ; (/) old Norse, Icelandic, Danish versions, &c. (see K. Hofmann, op. cit.) ; (g) an imitation which under the name of Oliver and Artus was current in many languages and was the subject of Hans Sachs's comedy, Die treuen Gesetten (1556); (h) Engelhart und Engeltrut, by the minnesinger Conrad von Wurzburg (ed. M. Haupt, Leipzig, 1844, 2nd ed., 1900) ; (t) the late prose romances, with many changes and additions, Milles et Amys, printed by A. Verard (Paris, c. 1503), &c, for which see

G. Brunet, Manuel du libraire, s. v. " Milles." A different version of the legend is inserted at considerable length in L' Ystoire des sept sages (ed. G. Paris, Soc. des anc. textesfr., 1876), in which the friends are called Alexandre and Louis, and Bellisant Florentine. For a further bibliography see L. Gautier, Bibl. des chansons de geste (Paris, 1897). William Morris's version of the French romance was printed at the Kelmscott Press in 1894-. See also the essay by W. Pater in The Renaissance, 1893.

AMITERNUM, an ancient town of the Sabines, situated about 5 m. N. of Aquila, in the broad valley of the Aternus, from which, according to Varro, it took its name. It was stormed by the Romans in 293 B.C., and though it suffered from the wars of the Republican period, it seems to have risen to renewed prosperity under the empire. This it owed largely to its position. It lay at the point of junction of four roads — the. Via Caecilia, the Via Claudia Nova and two branches of the Via Salaria, which joined it at the 64th and 89th miles respectively. The fertility of its territory was also praised by ancient authors. There are con- siderable remains of an aqueduct, an amphitheatre and a theatre (the latter excavated in 1880 — see Notizie degli scavi, 1880, 290, 350, 379), all of which belong to the imperial period, while in the hill on which the village of S. Vittorino is built are some Christian catacombs. Amiternum was the birthplace of the historian Sallust. In a gorge i|n. east are massive remains of Cyclopean walls {i.e. in rough blocks), probably intended to regulate the flow of the stream (N. Persichetti in Romische Mitleilungen, 1902, 134 seq.).

AMLWCH {llwch= " lake "), a market town of Anglesey, North Wales, situated on slightly rising ground on the N. coast of the island, 15 m. N.W. of Beaumaris and 262 m. from London, by the London & North-Western railway. Pop. of urban district (1901)

2994. Originally it owed its whole importance to the copper mines of the Parys (probably, Parry's) mountain, as, before ore was discovered in March 1 768, it was a small hamlet of fishermen. The mines once produced 3000 tons of metal annually, copper smelting being largely carried on, but have now almost ceased working. Though apparently not mentioned by Ptolemy, they were perhaps Roman. Robert Parys, chamberlain of North Wales under Henry IV., is often given as their godfather. The poor harbour called the " port," protected by a breakwater, has been cut out of the rock (shingle) . Amlwch is the terminus of the branch railway from Gaerwen to Amlwch, formerly the Anglesey Central Railway Company. Porthllechog, or Bull Bay (so called from the Bull Rock), at a mile's distance, is a small 'out favourite watering-place. Beyond, on the coast, some 3 m. distant, are the remains of a British fort and of the Llanllaianau monastery, opposite the Middle Mouse islet and close to Llanba- drig old church and Cemmaes. Industries include slate quarry- ing, shipbuilding, iron and brass foundries, alum, vitriol, manure, guano and tobacco works. At Llanllaianau was found, in 1841, a stone coffin, holding a well-preserved skeleton of 75 ft. in length. The coffin was apparently of Aberdovey (Aberdyfi) limestone, much corroded. At Llangefni, not far from Amlwch, in 1829, and at Llangristiolus, 3 m. distant from Llangefni, about 1770, were found human bones of a high antiquity, between Glan Hwfa and Fron, and at Capel, respectively. The town has an old Anglican church (St Eleth's).

AMMAN, JOHANN CONRAD (1669-C.1730), Swiss physician, was born at Schaffhausen in 1669. After graduating at Basel in 1687 he began to practise at Amsterdam, where he gained a great reputation. He was one of the earliest writers on the instruction of the deaf and dumb, and first called attention to his method in his S urdus loquens (Amsterdam, 1692), which was often reprinted, and was reproduced by John Wallis in the Philosophical Trans- actions (1698). His process consisted principally in exciting the

attention of his pupils to the motions of his lips and larynx while he spoke, and then inducing them to imitate these movements, till he brought them to repeat distinctly letters, syllables and words. The edition of Caelius Aurelianus, which was undertaken by the Wetsteins in 1 709, was superintended by Amman. He died about 1730 at Warmoud, near Leiden.

AMMAN, JOST (1539-1591), Swiss artist, celebrated chiefly for his engravings on wood, was born at Zurich. Of his personal history little is known beyond the fact that he removed in 1 560 to Nuremberg,

where he continued to reside until his death in March 1 59 1 . His productiveness was very remarkable, as may be gathered from the statement of one of his pupils, that the draw- ings he made during a period of four years would have filled a hay wagon. A large number of his original drawings are contained in the Berlin collection of engravings. The genuineness of not a few of the specimens to be seen elsewhere is at least questionable. A series of copperplate engravings by Amman of the kings of France, with short biographies, appeared at Frankfort in 1576. He also executed many of the woodcut illustrations for the Bible published at Frankfort by Sigismund Feierabend. Another serial work, the Panoplia Omnium Liberalium Mechanicarum et Seden- tariarum Artium Genera Continens, containing 115 plates, is of great value. Amman's drawing is correct and spirited, and his delineation of the details of costume, &c, is minute and accurate. He executed too much, however, to permit of his reaching the highest style of art. Paintings in oil and on glass are attributed to him, but no specimen of these is known to exist.

AMMAN, PAUL (1634-1691), German physician and botanist, was born at Breslau in 2634. In 1662 he received the degree of doctor of physic from the university of Leipzig, and in 1664 was admitted a member «rf the society Naturae Curiosorum, under the name of Dryander. Shortly afterwards he was chosen extra- ordinary professor of medicine in the above-mentioned university; and in 1674 he was promoted to the botanical chair, which he again in 1682 exchanged for the physiological. He died at Leipzig in 1 69 1. He seems to have been a man of critical mind and extensive learning. His principal works were: Medicina Critica (1670) ; Paraenesis ad Docentes occupata circa Institutionum Medicarum Emendalionem (1673) ; Irenicum Numae Pompiliicum Hippocrale (1689); Supellex Botanica (1675); and Character Naturalis Plantarum (1676).

AMMANATI, BARTOLOMEO (1511-1592), Florentine architect and sculptor. He studied under Bandinelli and Jacopo Sanso- vino, and closely imitated the style of Michelangelo. He was more distinguished in architecture than in sculpture. He de- signed many buildings in Rome, Lucca and Florence, an addition to the Pitti Palace in the last-named city being one of his most celebrated works. He was also employed in 1569 to build the beautiful bridge over the Amo, known as Ponte della Trinita — one of his celebrated works. The three arches are elliptic, and though very light and elegant, have resisted the fury of the river, which has swept away several other bridges at different times. Another of his most important works was the fountain for the Piazza della Signoria. In 1550 Ammanati married Laura Battiferri, an elegant poet and an accomplished woman.

AMMIANUS, MARCELLINUS, the last Roman historian of importance, was born about a.d. 325-330 at Antioch; the date of his death is unknown, but he must have lived till 391, as he mentions Aurelius Victor as the city prefect for that year. He was a Greek, and his enrolment among the protectores domestici (household guards) shows that he was of noble birth. He entered the army at an early age, when Constantius II. was emperor of the East, and was sent to serve under Ursicinus, governor of Nisibis and magister militiae. He returned to Italy with Ursicinus, when he was recalled by Constantius, and accompanied him on the expedition against Silvanus the Frank, who had been forced by the unjust accusations of his enemies into proclaiming himself emperor in Gaul. With Ursicinus he went twice to the East, and barely escaped with his life from Amida or Amid (mod.Diarbekr), when it was taken by the Persian king Shapur (Sapor) II. When Ursicinus lost his office and the favour of Constantius, Ammianus seems to have shared his downfall; but under Julian, Constantius's

successor, he regained his position. He accompanied this em- peror, for whom he expresses enthusiastic admiration, in his campaigns against the Alamanni and the Persians; after his death he took part in the retreat of Jovian as far as Antioch, where he was residing when the conspiracy of Theodoras (371) was dis- covered and cruelly put down. Eventually he settled in Rome, where, at an advanced age, he wrote (in Latin) a history of the Roman empire from the accession of Nerva to the death of Vafens (96-378), thus forming a continuation of the work of Tacitus. This history (Rerum Gestarum Libri XXXI.) was originally in thirty-one books; of these the first thirteen are lost, the eighteen which remain cover the period from 353 to 378. As a whole if is extremely valuable, being a clear, comprehensive and impartial account of events by a contemporary of soldierly honesty, independent judgment and wide reading. " Ammianus 1 is an accurate and faithful guide, who composed the history of his own times without indulging the prejudices and passions which usually affect the mind of a contemporary" (Gibbon) . AlthoughAnimianus was no doubt a heathen, his altitude towards Christianity is that of a man of the world, free from prejudices in favour of any form of belief. If anything he himself inclined to rieo-Platonism. His style is generally harsh, often pompous and extremely obscure, occasionally even journalistic in tone, but the author's foreign origin and his military life and training partially explain this.

Further, the work being intended for public recitation, some rhetorical embellishment was necessary, even at the cost of simplicity. It is a striking fact that Ammiamis, though a professional soldier, gives excellent pictures of social and economic problems, and in his attitude to the non-Roman' peoples of the empire he is far more broad-minded than writers like Livy and Tacitus; his digressions on the various countries he had visited are peculiarly interesting. In his description of the empire — the exhaustion produced by excessive taxation, the financial ruin of the middle classes, the progressive decline in the morale of' the army — we find the explanation of its fall before the Goths twenty years after his death.

The work was discovered by Poggio, who copied the original MS. Editio princeps (bks. 14-26) by Sabinus, 1474; completed by Accursius, 1533; with variorum notes, by Wagner-Erfurdt, 1808; latest edition of text, Gardthausen, 1874-1875. English translations by P. Holland, 1609; Yonge (Bohn's Classical Library), 1862; also Max Budinger, Ammianus Marcellinus und die Eigenart seines Geschichtswerkes (1895); F. Liesenberg, Die Sprache des Ammianus Marcellinus (1888-1890) ; T. R. Glover, Life arid Letters in the Fourth Century (1901); Abbe Gimazane, Ammianus Marcellinus, sa vie et son wuvre (Toulouse, 1889), a work containing a number of very doubtful theories. For a criticism of his views on Roman society see S. Dill, Roman Society in the Last Century of the Western Empire (London, 1898).

AMMIRATO, SCIPIONE (1531-1601), Italian historian, born at Lecce, in the kingdom of Naples. His father, intending him for the profession of law, sent him to study at Naples, but his own decided preference for literature prevented him from fulfilling his father's wishes. Entering the church, he resided for a time at Venice, and afterwards engaged in the service of Pope Pius IV. In 1569 he went to Florence, where he was fortunate in securing the patronage and support of Duke Cosimo I., who gave him a resid- ence at the Medici Palace and the Vjlla Zopaja on the, understand- ing that he should write his Istorie Florentine {1606) , the work by which he is best known. In 1595 he was made a canon of the cathedral of Florence. He died in 1601. Among the other works of Ammirato, some of which were first published after his death, may be mentioned discourses on Tacitus and genealogies of the families of Naples and Florence.

AMMON, the Graecized name of an Egyptian deity, in the native language Amun, connected by the priests with a root meaning "

conceal." He was, to begin with, the local deity of Thebes, when it was an unimportant town on the east bank of the river, about the region now occupied by the temple of Karnak. The Xlth dynasty sprang from a family in the Hermonthite nome or perhaps at Thebes itself, and adorned the temple of Karnak with statues. Amehemhe, the name of the founder of the XHth dynasty, was compounded with that of Amun and was borne by three of his successors. Several Theban kings of the later part

of the. Middle Kingdom adopted the same name; and when the Theban family of the XVIItli dynasty drove out the Hyksos, Ammon, as the god of the royal city, was again prominent; It was not, however, until the rulers of the XVIIIth dynasty carried their victorious arms beyond the Egyptian frontiers in every direction that Ammon began to assume the proportions of a universal god for the Egyptians, eclipsing all, their other deities and asserting his power over the gods of all foreign lainds. To Amnion the Pharaohs attributed all their successful etiterˆ prises, and on his temples they lavished their wealth and captured spoil.

Ammon is figured of human form, wearing on his head a plain deep circlet' from which rise two straight parallel plumes, perhaps representing the tail feathers of a hawk. Two main types are seen: in the one he is seated on a throne, in the other he isstand- ing, ithyphallic, holding a scourge, precisely like Min, the god of Coptos and Chemhiis (Akhmim) . The latter may be his original form, as a god of fertility, before whom the king ceremoniously breaks tip the ground for sowing Or cuts the ripe corn. His consort was sometimes called Amaune (feminine of Amun), but more usually Mut, " mother ": she was human-headed, wearing the double crown of Upper and Lower Egypt, and their son was Khons (Chon or Chons), a lunar god, represented as a youth wearing the crescent and disk Of the moon. A great temple was built to Mut at Karnak not later than the XVIIIth dynasty, and another to Khons not later than the XX th dynasty.

The name of Rg, the sun-god, was generally joined to Ammon, especially in his title as " king of the gods ": the rule of heaven belonged to the sun-god in the Egyptian cosmos, and this identifi- cation with Re was only logical for a supreme deity. Ammon was entitled " lord of the thrones of the two lands," or, more proudly still, " king of the gods." Such indeed was his un- questioned position when suddenly he was overthrown anct his worship proscribed. Not even a henotheist fervently worshipping one of many gods, Amenophis (Amenhotp) IV. of the XVIIIth dynasty became the mohotheist Akhenaton; discarding all the gods of Egypt, and

especially persecuting Amnion the arch-god, he devoted himself to the purer and more sublime worship of AtOn, the sun. But he failed to win the permanent adhesion of the people to his reform, or to conciliate or entirely crush the enor- mously powerful priesthood of Ammon. A few years after the reformer's death, the old cults were re-established and the monu- ments of Aton studiously defaced. Hymns were then addressed to Amen-re, which are almost 'monotheistic in expression. The cult of the supreme god spread throughout Egypt and was carried by the Egyptian conquerors into other lands, Syria, Ethiopia and Libya, and was accepted by the natives both in Ethiopia and in the Libyan cases, where civilization was low and Egyptian influence permanent. After the XX th dynasty the centre qf power was removed from Thebes, and the authority Of Ammori began to wane. In the XXIst dynasty the secondary line of priest kings of Thebes upheld his dignity to the best of their power, and the XXnnd dynasty favoured Thebes: but as the sovereignty weakened the division between Upper and Lower Egypt asserted itself, and thereafter Thebes would have rapidly decayed had it hot been for the piety of the king's of Ethiopia towards Ammon, whose worship had long prevailed in their country. Thebes was at first their Egyptian capital, and they honoured Ammon greatly, although their wealth and culture were not sufficient to effect much. Ammon (Zeus) continued to be the great god of Thebes in its decay, and notwithstanding that a nome-capital in the north of the Delta and many lesser temrlles, from El Hibeh in Middle Egypt to Canopus on the sea, acknow- ledged Ammon as their supreme divinity, he probably in some degree represented the national aspirations of Upper Eˆgypt as opposed to Middle and Lower Egypt: he also "remained the national god of Ethiopia, where his name was pronounced Amane. The priests' of Amine at Meroe and Napata, in fact, regulated through his oracle the whole government of the country, choosing the king, directing his military expeditions (and even compelling him to commit suicide, according to Diodorus) until in the 3rd century B.C. Arkamane (Ergamenes) broke through the bondage

and slew the priests. Ammon had yet another outburst of glory. There was an oracle of Ammon established for some centuries in Libya, in the distant oasis of Siwa. Such was its reputation among the Greeks that Alexander journeyed thither s after the battle of Issus, and during his occupation of Egypt, in order to be

acknowledged the son of the god. The Egyptian Pharaohs of the XVIIIth dynasty had likewise been proclaimed mystically sons of this god, who, it was asserted, had impregnated the queen- mother; and on occasion wore the ram's horns of Ammon, even as Alexander is represented with them on coins.

The Egyptian goose (chenalopex) is figured in the XVIIIth dynasty as sacred to Ammon; but his most frequent and cele- brated incarnation was the woolly sheep with curved (" Ammon") horns (as opposed to the oldest native breed with long horizontal twisted horns and hairy coat, sacred to Khnum or Chnumis). It is found as representing Ammon from the time of Amenophis III. onwards.

As king of the gods Ammon was identified by the Greeks with Zeus and his consort Mut with Hera. Khnum was likewise identified with Zeus probably through his similarity to Ammon; his proper animal having early become extinct, Ammon horns in course of time were attributed to this god also.

See Erman, Handbook of Egyptian Religion (London, 1907) ; Ed. Meyer, art. " Ammon " in Roscher's Lexikon ier griechischen und rbmischen Myihologie; Pietschmann, arts. "Ammon," ." Ammoneion" in Pauly-Wissowa, Realencyclopddie ; and works on Egyptian religion quoted under Egypt, section Religion. (F. Ll. G.)

AMMON, CHRISTOPH FRIEDRICH VON (1766-1850), German theological writer and preacher, was born at Baireuth. He studied at Erlangen, held various professorships in the philosophical and theological faculties of Erlangen and Gottingen, succeeded Franz Reinhard (1753-1812) in 1813 as court preacher and member of the consistorial court at Dresden, retired from these offices in 1849, and died on the 21st of May 1850. Seeking to establish for himself a middle position between rationalism and supernaturalism, he declared for a "rational supernatural- ism," and contended that there must be a gradual development of Christian doctrine corresponding to the advance of knowledge and science. But at the same time he sought, like other repre- sentatives of this school of thought, such as K. G. Bretschneider and Julius Wegscheider, to keep in close touch with the historical theology of the Protestant churches. He was a man.pf great versatility and extensive learning, a philologist and philosopher as well as a theologian, and a very voluminous author., His principal theological work was the Fortbildung des Christenthums zur Weltreligion, in 4 volumes (Leipzig, 1833-1840). Entwurf einer reinbiblischen Theologie appeared in 1792 (2nd ed., 1801), Sutnma Theologiac Christianae

in 1803 (other editions, 1808, 1816, 1830); Das Leben Jesu in 1842, and Die wahre und falsche Orthodoxie in 1849. Von Ammon's style in preaching was terse and lively, and some of his discourses are regarded as models of pulpit treatment of political questions.

See Herzog-Hauck, Realencyklopadie ; Otto Pfleiderer, The Development of Theology in Germany since Kant, pp. 89 ff.

AMMONIA (NH 3). Salts of ammonia have been known from very early times ; thus the term Hammoniacus sal appears in the writings of Pliny (Nat. Hist. xxxi. 39), although it is not known whether the term is identical with the more modern sal-ammoniac (q.v.). In the form of sal-ammoniac, ammonia was known, how- ever, to the alchemists as early as the 13th century, being mentioned by Albertus Magnus, whilst in the 1 5th century Basil Valentint showed that ammonia could be obtained by the action of alkalies on sal-ammoniac. At a later period when sal-ammoniac was obtained by distilling the hoofs and horns of oxen, and neutralizing the resulting carbonate with hydrochloric acid, the name spirits of hartshorn was applied to ammonia. Gaseous ammonia was first isolated by J. Priestley in 1 774 and was termed by him "alkaline air." In 1777 K. W. Scheele showed that it contained nitrogen, and C. L. Berthollet, in about 1785, ascer- tained its composition.

Ammonia is found in small quantities as the carbonate in the atmosphere, being produced from the putrefaction of nitrogenous

animal and vegetable matter; ammonium salts are also found in small quantities in. rain-water, whilst ammonium chloride (sal-ammoniac) and ammonium sulphate are found in volcanic districts; and crystals of ammonium bicarbonate have been found in Patagonian guano. Ammonium salts too are found distributed through all fertile soil, in sea- water, and in most plant and animal liquids, and also in urine.

■ *Ammonia can be synthesized by submitting a mixture of nitrogen and hydrogen to the action of the silent electric dis- charge, the combination, however, being very imperfect. It is obtained by the dry distillation of nitrogenous vegetable and animal products; by the reduction of nitrous acid and nitrites with nascent hydrogen; and also by the decomposition of ammonium salts by alkaline hydroxides or by slaked lime, the salt most generally used being the chloride {sal-ammoniac, q.v.) thus* $2NH_4Cl + Ca(OH)_2 = CaCl_2 + 2H_2O + 2NH_3$ *. It also results on decomposing magnesium nitride (*Mg_3N_2*) with water,* $Mg_3N_2 + 6H_2O = 3Mg(OH)_2 + 2NH_3$ *. Large*

quantities of ammonia and ammonium salts are now obtained from the am- moniacal liquor of gas-works.

Ammonia is a colourless gas possessing a characteristic pungent smell and a strongly alkaline reaction; it is lighter than air, its specific gravity being 0-589 (air= 1). It is easily liquefied and the liquid boils at— 33-7° C.,and solidifies at— 75° C. to a mass of white crystals. It is extremely soluble in water, one volume of water at 0° C. and normal pressure absorbs 1148 volumes of ammonia (Roscoe and W. Dittmar). All the ammonia contained in an aqueous solution of the gas may be expelled by boiling. It does not support combustion; and it does not burn readily unless mixed with oxygen, when it burns with a pale yellowish-green flame. Ammonia gas has the power of combining with many substances, particularly with metallic halides; thus with calcium chloride it forms the compound CaCl 2 -8NH 3 , and consequently calcium chloride cannot be used for drying the gas. With silver chloride it forms two compounds (F. Isambert, Comptes rendus, 1868, Ixvi. p. 1259) — one, AgCl-3NH 3 at temperatures below 15 C.; the other, 2AgCl-3NH 3 at temperatures above 20° C. On heating these substances, ammonia is liberated and the metallic chloride remains. It was by the use of silver chloride ammonia compounds that in 1823 M. Faraday was first able to liquefy ammonia. It can be shown by Isambert's results that the com- pound AgCl-3NH 3 cannot be formed above 20° C, by the action of ammonia on silver chloride at atmospheric pressure; whilst 2AgCl-3NH 3 ; under similar conditions, cannot be formed above about 68° C. Liquid ammonia is used for the artificial prepara- tion of ice. It readily dissolves sodium and potassium, giving in each case a dark blue solution. At a red heat ammonia is easily decomposed into its constituent elements, a similar decomposi- tion being brought about by the passage of electric sparks through the gas. Chlorine takes fire when passed into ammonia, nitrogen and hydrochloric acid being formed, and unless the ammonia be present in excess, the highly explosive nitrogen chloride NC1 3 is also produced. With iodine it reacts to form nitrogen iodide. This compound was discovered in 181 2 by Bernard Courtois, and was originally supposed to contain nitrogen and iodine only, but in 1840 R.F.Marchand showed that it contained hydrogen, whilst R. Bunsen showed that no oxygen was present. As regards its constitution, it has been given at different times the formulae NI3, NHI 2) : NHjI, N 2 H 3 I 3 , &c, these varying results being due to the impurities in the substance, owing to the different investi gators working under unsuitable conditions, and also to the decomposing action of light. F. D.Chattaway determined its composition as NjHjIj, by the addition

of excess of standard sodium sulphite solution, in the dark, and subsequent .titration of the excess of the sulphite with standard iodine. The con- stitution has been definitely determined by O. Silberrad {Jdur. of Chem. Soc, 1905, lxxxvii. p. 55) by the interaction of nitrogen iodide with zinc ethyl, the products of the reaction being triethylamine and ammonia; the ammonia liberated was ab- sorbed in hydrochloric acid, and 95 % of the theoretical amount of the ammonium chloride was obtained. On these grounds O. Silberrad assigns the formula NH 3 -NI 3 to the compound

and explains the decomposition as taking place, 2NH 3 -Nl3 + 6Zn(C 2 H s) 2 = 6ZnC2H 5 -I + 2NH3 + 2N(C 2 H5)3. The hydrogen in ammonia is capable of replacement by metals, thus magnesium burns in the gas with the formation of magnesium nitride Mg3N 2 , and when the gas is passed over heated sodium or potassium, sodamide, NaNH 2 , and potassamide, KNH 2 , are formed.

One of the most characteristic properties of ammonia is its power of combining directly with acids to form salts; thus with hydrochloric acid it forms ammonium chloride (sal-ammoniac); with nitric acid, ammonium nitrate, &c. It is to be noted that H. B. Baker (Journal of Chem. Soc, 1894, lxv. p. 612) has shown that perfectly dry ammonia will not combine with per- fectly dry hydrochloric acid, moisture being necessary to bring about the reaction. The aqueous solution of ammonia is very basic in its reactions, and since it is a weak electrolyte, one must assume the solution to contain a certain amount of ammonium hydroxide NH4OH, although it is probably chiefly composed of a solution of ammonia in water. (On the constitution of aqueous ammonia solutions see also Carl Frenzel, Zeitfiir angew. Chemie, xxxii. 3, p. 319.) Ammonia finds a wide application in organic chemistry as a synthetic reagent; it reacts with alkyl iodides to form amines (?.».), with esters to form acid amides (q.v.), with halogen fatty acids to form amino-acids; while it also combines with isocyanic esters to form alkyl ureas and with the mustard oils to form alkyl thioureas. Aldehydes also combine directly with ammonia.

Liquid ammonia possesses strong ionizing powers, and solutions of salts in liquid ammonia have been much studied. For details see E. C. Franklin and C. A. Kraus, Amer. Chem. Jour., 1899, xxi. p. 8; 1900, xxiv. p. 83; 1902, xxviii. p. 277; also Carl Frenzel, Zeits fur

Elektrochemie, 1900, vi. p. 477.

The salts produced by the action of ammonia on acids are known as the ammonium salts and all contain the compound radical ammonium (NHj) . Numerous attempts have been made to isolate this radical, but so far none have been successful. By the addition of sodium amalgam to a concentrated solution of ammonium chloride, the so-called ammonium amalgam is obtained as a spongy mass which floats on the surface of the liquid; it decomposes readily at ordinary temperatures into ammonia and hydrogen; it does not reduce silver and gold salts, a behaviour which distinguishes it from the amalgams of the alkali metals, and for this reason it is regarded by some chemists as being merely mercury inflated by gaseous ammonia and hydrogen. M. le Blanc has shown, however, that the effect of ammonium amalgam on the magnitude of polarization of a battery is comparable with that of the amalgams of the alkali metals.

Many of the ammonium salts are made from the ammoniacal liquor of gas-works, by heating it with milk of lime and then absorbing the gas so liberated in a suitable acid. (See Gas: Manufacture.)

Ammonium bromide, Nr^Br, can be prepared by the direct action of bromine on ammonia. It crystallizes in colourless prisms, possessing a saline taste; it sublimes on heating and is easily soluble in water. On exposure to air it gradually assumes a yellow colour and becomes acid in its reaction.

Ammonium chloride, NH4CI. (See Sal-Ammoniac.)

Ammonium fluoride, NHjF, may be obtained by neutralizing ammonia with hydrofluoric acid. It crystallizes in small prisms, having a sharp saline taste, and is exceedingly soluble in water. It decomposes silicates on being heated with them.

Ammonium iodide, NH4I, can be prepared by the action of hydriodic acid on ammonia. It is easily soluble in water, from which it crystallizes in cubes, and also in alcohol. It gradually turns yellow on standing in moist air, owing to decomposition with liberation of iodine.

Ammonium chlorate, NH4CIO3, is obtained by neutralizing chloric acid with either ammonia or ammonium carbonate, or by precipitating barium, strontium or calcium chlorates with ammonium carbonate. It crystallizes in small needles, which are readily soluble in water, and on heating, decompose at about 102 C., with liberation

of nitrogen, chlorine and oxygen. It is soluble in dilute aqueous alcohol, but insoluble in strong alcohol.

Ammonium carbonates. The commercial salt is known as sal- volatile or salt of hartshorn and was formerly obtained by the dny distillation of nitrogenous organic matter such as hair, horri, decomposed urine, &c, but is now obtained by heating a mixture of sal-ammoniac, or ammonium sulphate and chalk, to redness in iron retorts, the vapours being condensed in leaden receivers. The crude product is refined by sublimation, when it is obtained as a white fibrous mass, which consists of a mixture of hydrogen ammonium carbonate, NH4-HC0 3 , and ammonium carbamate, NH 2 COONH 4 , in molecular proportions; on account of its possessing this constitution it is sometimes called ammonium sesquicarbonate. It possesses a strong ammoniacal smell, and on digestion with alcohol the carbamate is dissolved and a residue of ammonium bicarbonate is left; a similar decomposition taking place when the sesquicarbonate is exposed to air. Ammonia gas passed into a strong aqueous solution of the sesquicarbonate con- verts it into normal ammonium carbonate, (NH4) 2 C03, which can be obtained in the crystalline condition from a solution prepared at about 30 C. This compound on exposure to air gives off ammonia and passes back to ammonium bicarbonate.

Ammonium bicarbonate, NH 4 HC0 3 , is formed as shown above and also by passing carbon dioxide through a solution of the normal compound, when it is deposited as a white powder, which has no smell and is only slightly soluble in water. The aqueous solution of this salt liberates carbon dioxide on exposure to air or on heating, and becomes alkaline in reaction. The aqueous solu tions of all the carbonates when boiled undergo decomposition with liberation of ammonia and of carbon dioxide.

Ammonium nitrate, NH4NO3, is prepared by neutralizing nitric acid with ammonia, or ammonium carbonate, Or by double decomposition between potassium nitrate and ammonium sulphate. It can be obtained in three different crystalline forms, the transition points of which are 35° C, 83° C. and 125° C. It is easily soluble in water, a considerable lowering of tempera- ture taking place during the operation; on this account it is sometimes used in the preparation of freezing mixtures. On gentle heating, it is decomposed into water, and nitrous oxide. P. E. M. Berthelot in 1883 showed that if ammonium nitrate be rapidly heated the following reaction takes place with explosive violence: — 2NH4N0 3 = 4H 2 0+2N 2 +0 2 .

Ammonium nitrite, NH4NO2, is formed by oxidizing ammonia with ozone or hydrogen peroxide; by precipitating barium or lead nitrites with ammonium sulphate, or silver nitrite with ammonium chloride. The precipitate is filtered off and the solution concentrated. It forms colourless crystals which are soluble in water and decompose on heating, with the formation of nitrogen.

Ammonium phosphates. The normal phosphate, (NHˆPOˆis obtained as a crystalline powder, on mixing concentrated solu- tions of ammonia and phosphoric acid, or on the addition of ex- cess of ammonia to the acid phosphate (NHˆjHPOˆ It is soluble in water, and the aqueous solution on boiling loses ammonia and the acid phosphate NH 4 H 2 P0 4 is formed. Diammonium hydro- gen phosphate, (NH 4) 2 HP0 4 , is formed by evaporating a solution of phosphoric acid with excess of ammonia. It crystallizes in large transparent prisms, which melt on heating and decompose, leaving a residue of me ta phosphoric acid, (HPO3). Ammonium dihydrogen phosphate, NHrH 2 P0 4 , is formed when a solution of phosphoric acid is added to ammonia until the solution is dis- tinctly acid. It crystallizes in quadratic prisms.

Ammonium sodium hydrogen phosphate, NH 4 -NaHP0 4 -4H 2 0. (See Microcosmic Salt.)

Ammonium sulphate (NKt) 2 S04 is prepared commercially from the ammoniacal liquor of gas-works (see Gas : Manufacture) and is purified by recrystallization. It forms large rhombic prisms, has a somewhat saline taste and is easily soluble in water. Th6 aqueous solution on boiling loses some ammonia and forms an aciflI sulphate. It is used largely as an artificial manure, and also for the preparation of other ammonium salts.

Ammonium persulphate (NH 4) 2 S 2 0s has been prepared by H. Marshall (Jour, of Chem. Soc, 1891, lix. p. 777) by the method used for the preparation of the corresponding potassium salt

(see Sulphur). Pure specimens are difficult to obtain. It is very soluble in cold water, a large fall of temperature accompanying jolution.

Ammonium sulphide, (NIL^S, is obtained, in the form of micaceous crystals, by passing sulphuretted hydrogen mixed with a slight excess

of ammonia through a well-cooled vessel; the hydrosulphide NHˆ-HS is formed at the same time. It dissolves readily in water, but is probably partially dissociated in solution. The hydrosulphide NHrHS can be obtained as a white solid, by mixing well-cooled ammonia with a slight excess of sulphuretted hydrogen. According to W. P. Bloxam (./ow. ofCkem. Soc, 1895, lxvii. p. 283), if sulphuretted hydrogen is passed into strong aqueous ammonia at ordinary temperature, the compound (NHˆSˆNILHS is obtained, which, on cooling to o° C. and passing more sulphuretted hydrogen, forms the compound (NH4) 2 S-i2NH,|HS. An ice-cold solution of this substance kept at o° C. and having sulphuretted hydrogen continually passed through it gives the hydrosulphide. Several complex poly-sulphides of ammonium have been isolated, for details of which see Bloxam's paper quoted above. Compounds are known which may be looked upon as derived from ammonia by the replacement of its hydrogen by the sulpho-group (HS0 3); thus potassium ammon-trisulphonate,N(S0 3 K) 3 – 2H 2 0,is obtained as a crystalline precipitate on the addition of excess of potassium sulphite to a solution of potassium nitrite, KN0 2 -f-3K 2 S03+2H 2 = N(S0 3 K)3 -+-4KHO. It can be recrystallized by solution in alkalies. On boiling with water, it is converted, first into the disulphonate NH(S0 3 K) 2 thus, N(SO,K),+H 2 = NH(SO,K)2+KHS0 4 , and ultimately into the monosulphonateNH 2 S03K. The disulphon ate is more readily obtained by moistening the nitrilosulphonate with dilute sulphuric acid and letting it stand for twenty-four hours, after which it is recrystallized from dilute ammonia. It forms monosymmetric crystals which by boiling with water yield amidosulphonic acid. (See also E. Divers, Jour, of Chem. Soc, 1892, lxi. p. 943.) Amidosulphoric acid crystallizes in prisms, slightly soluble in water, and is a stable compound.

Ammonia and ammonium salts can be readily detected, in very minute traces, by the addition of Nessler's solution, which gives a distinct yellow coloration in the presence of the least trace of ammonia or ammonium salts. Larger quantities can be detected by warming the salts with a caustic alkali or with quicklime, when the characteristic smell of ammonia will be at once apparent. The amount of ammonia in ammonium salts can be estimated quantitatively by distillation of the salts with sodium or potassium hydroxide, the ammonia evolved being absorbed in a known volume of standard sulphuric acid and the excess of acid then determined volumetrically; or the ammonia may be absorbed in hydrochloric acid and the ammonium chloride so formed pre- cipitated as ammonium chlorplatinate, (NHˆPtCU.

AMMONIACUM, or Gum Ammoniac, a gum-resin exuded from the stem of a perennial herb (Dorema ammoniacum) , natural order Umbelliferae. The plant grows to the height of 8 or 9 ft., and its whole stem is pervaded with a milky juice, which oozes out on an incision being made at any part. This juice quickly hardens into round tears, forming the " tear ammoniacum " of commerce. " Lump ammoniacum," the other form in which the substance is met with, consists of aggregations of tears, frequently incorporat- ing fragments of the plant itself, as well as other foreign bodies. Ammoniacum has a faintly fetid, unpleasant odour, which becomes more distinct on heating; externally it possesses a reddish-yellow appearance, and when the tears or lumps are freshly fractured they exhibit a waxy lustre. It is chiefly collected in central Persia, and comes to the European market by way of Bombay. Ammoniacum is closely related to asafetida and gal- banum (from which, however, it differs in yielding no umbelli- ferone) both in regard to the plant which yields it and its thera- peutical effects. Internally it is used in conjunction with squills in bronchial affections; and in asthma and chronic colds it is found useful, but it has no advantages over a number of other substances of more constant and active properties (Sir Thomas Fraser). Only the " tear ammoniacum " is official.

African ammoniacum is the product of a plant said to be

Ferula lingitana, which grows in North Africa; it is a dark coloured gum-resin, possessed of a very weak odour and a persistent acrid taste.

AMMONITES, or the " children of Ammon," a people of east Palestine who, like the Moabites, traced their origin to Lot, the nephew of the patriarch Abraham, and must have been regarded, therefore, as closely related to the Israelites and Edomites. Both the Ammonites and Moabites are sometimes spoken of under the common name of the children of Lot (Deut. ii. 19; Ps. lxxxiii. 8) ; and the whole history shows that they preserved throughout the course of their national existence a sense of the closest brother- hood. According to the traditions, the original territory of the two tribes was the country lying immediately on the east of the Dead Sea, and of the lower half of the Jordan, having the Jabbok for its northern boundary; and of this tract the Ammonites laid claim to the northern portion between the Arnon and the Jabbok, out of which they had expelled the Zamzummim (Judg. xi. 13; Deut. ii. 20 sqq.; cf. Gen. xiv. 5), though apparently it had been held, in part at least, conjointly with the Moabites, or perhaps under their supremacy (Num. xxi. 26, xxii. 1; Josh. xiii. 32). From this their original

territory they had been in their turn ex- pelled by Sihon, king of the Amorites, who was said to have been found by the Israelites, after their deliverance from Egypt, in possession of both Gilead and Bashan, that is, of the whole country on the left bank of the Jordan, lying to the north of the Arnon (Num. xxi. 13). By this invasion, as the Moabites were driven to the south of the Arnon, which formed their northern boundary from that time, so the Ammonites were driven out of Gilead across the upper waters of the Jabbok where it flows from south to north, which henceforth continued to be their western boundary (Num. xxi. 24; Deut. ii. 37, iii. 16). The other limits of the Ammonitis, or country of the Ammonites (‘A/ijuanns x&pa, 2 Mac. iv. 26) , there are no means of exactly defining. On the south it probably adjoined the land of Moab; on the north it may have met that of the king of Geshur (Josh. xii. 5) ; and on the east it probably melted away into the desert peopled by Amalekites and other nomadic races.

The chief city of the country, called Rabbah, or Rabbath of the children of Ammon, i.e. the metropolis of the Ammonites (Deut. iii. n), and Rabbathammana by the later Greeks (Polyb, v. 7. 4),whose name was changed into Philadelphia by Ptolemy Philadelphus, a large and strong city with an acropolis, was situated on both sides of a branch of the Jabbok, bearing at the present day the name of Nahr ‘Amman, the river of Ammon, whence the designation ” city of waters ” (2 Sam. xii. 27; see Survey of E. Pal (Pal. Explor. Fund), pp.19 sqq. The ruins called Amman by the natives are extensive and imposing. The country to the south and east of Amman is distin- guished by its fertility ; and ruined towns are scattered thickly over it, attesting that it was once occupied by a population which, however fierce, was settled and industrious, a fact indicated also by the tribute of corn paid annually to Jotham (2 Chron. xxvii. 5).

The traditional history of Ammon as related in the Old Testa- ment is not free from obscurity, due to the uncertain date of the various references and to the doubt whether the individual details belong to the particular period to which each is ascribed. (See further Moab.) From the Assyrian inscriptions we learn that the Ammonite king Ba’sa (Baasha) (son) of Ruhubi, with 1000 men joined Ahab and the Syrian allies against Shalmaneser II. at the battle of Karkar in 854. In 734 their king Sanip(b)u was a vassal of Tiglathpileser IV., and his successor, P(b)udu-ilu, held the same position under Senna- cherib and Esarhaddon. Somewhat later, their king Amminadab was among the tributaries who suffered in the course of the great Arabian campaign of Assurbanipal. With the neighbour- ing tribes, the Ammonites helped the Babylonian monarch Nebuchadrezzar against

Jehoiakim (2 Kings xxiv. 2); and if they joined Zedekiah's conspiracy (Jer. xxvii. 3), and were threatened by the Babylonian army (Ezek. xxi. 20 sqq.), they do not appear to have suffered punishment at that period, perhaps on account of a timely submission. When, after the destruction of Jerusalem, the fugitive Jews were again gathered together, it was at the instigation of Baalis, king of Ammon, that Gedaliah, the ruler whom Nebuchadrezzar had appointed over them, was murdered, and new calamities were incurred (Jer. xl. 14); and

when Nehemiah prepared to rebuild the walls of Jerusalem an Ammonite was foremost in opposition (Neh. ii. 10,19, i v – I-3)- 1 True to their antecedents, the Ammonites, with some of the neighbouring tribes, did their utmost to resist and check the re- vival of the Jewish power under Judas Maccabaeus (1 Mace. v. 6 ; cf. Jos. Ant. Jud. xii. 8. 1.). The last notice of them is in Justin Martyr {Dial, cum Tryph. § 119), where it is affirmed that they were still a numerous people. The few Ammonite names that have been preserved (Nahash, Hanun, and those mentioned above, Zelek in 2 Sam. xxiii. 37 is textually uncertain) testify, in harmony with other considerations, that their language was Semitic, closely allied to Hebrew and to the language of the Moabites. Their national deity was Molech or Milcon. (See Moloch.) (S.A. C.)

AMMONIUS GRAMMATICUS, the supposed author of a treatise entitled Hepl oˆoioov Kal Siaifropcw Xeˆecov (On the Differences of Synonymous Expressions), of whom nothing is known. He was formerly identified with an Egyptian priest who, after the destruction of the pagan temple at Alexandria (389), fled to Constantinople, where he became the tutor of the ecclesi- astical historian Socrates. But it seems more probable that the real author was Herennius Philo of Byblus, who was born during the reign of Nero and lived till the reign of Hadrian, and that the treatise in its present form is a revision prepared by a later Byzantine editor, whose name may have been Ammonius.

Text by Valckenaer, 1739, Schafer, 1822; Kopp, DeAmmonii . . . Distinctionibus Synonymicis, 1883.

AMMONIUS HERMIAE (5th century a.d.), Greek philosopher, the son of Hermias or Hermeias, a fellow-pupil of Proclus. He taught at

Alexandria, and had among his scholars Asclepius, John Philoponus, Damascius and Simplicius. His commen- taries on Plato and Ptolemy are lost. Those on Aristotle are all that remain of his reputedly numerous writings. Of the commentaries we have — (1) one on the Isagoge of Porphyry (Venice, 1500 fol.); (2) one on the Categories (Venice, 1503 fol.), the authenticity of which is doubted by Brandis; (3) one on the De Interpretation (Venice, 1503 fol.). They are printed in Brandis's scholia to Aristotle, forming the fourth volume of the Berlin Aristotle; they are also edited (1891-1899) in A. Busse's Commentaria in Aristot. Graeca. The special section on fate was published separately by J. C. Orelli, Alex. Aphrod., Ammonii, et aliorum de Fato quae super sunt (Zurich, 1824). A life of Aristotle, ascribed to Ammonius, but with more accuracy to John Philoponus, is often prefixed to editions of Aristotle. It has been printed separately, with Latin translation and scholia, at Leiden, 1621, at Helmstadt, 1666, and at Paris, 1850. Other com- mentaries on the Topics and the first six books of the Meta- physics still exist in manuscript. Of the value of the logical writings of Ammonius there are various opinions. K. Prantl speaks of them with great, but hardly merited, contempt.

For a list of his works see J. A. Fabricius, Bibliotheca Graeca, v. 704-707; C. A. Brandis, XJber d. Reihenf. d. BOcher d. Aristot. Org., 283 f . ; K. Prantl, Gesch. d. Logik, i. 642.

AMMONIUS SACCAS (3rd century a.d.), Greek philosopher of Alexandria, often called the founder of the neo-Platonic school. Of humble origin, he appears to have earned a livelihood as a porter; hence his nickname of " Sack-bearer " (Sa/c/cas, for aa.KKo6pos). The details of his life are unknown, insomuch that he has frequently been confused with a Christian philosopher of the same name. Eusebius (Church History, vi. 19), who is followed by Jerome, asserts that he was born a Christian, remained faithful to Christianity throughout his life, and even

1 The allusions in Jer. xlix. 1-6; Zeph.ii. 8-11; Ezek. xxi. 28-32; Judg. xi. 12-28, have been taken to refer to an Ammonite occupa- tion of Israelite territory after the deportation of the east Jordanic Israelites in 734, but more probably belong to a later event. The name Chephar-Ammoni (in Benjamin ; Josh, xviii. 24) seems to imply that the " village " became a settlement of " Ammonites." Some light is thrown upon the obscure history of the post -exile period by the references to the mixed marriages which aroused the reforming zeal of Ezra and culminated in the exclusion of Ammon and Moab from the religious community — on the ground of

incidents which were ascribed to the time of the " exodus " (Deut. xxiii. 3 sqq.; Ezr. ix. I sqq.; Neh. xiii. I sqq.).

produced two works called The Harmony of Moses and Jesus and The Diatessaron, or Harmony of the Four Gospels, which is said by some to exist in a Latin version by Victor, bishop of Capua. Porphyry, quoted by Eusebius, ib. vi. 19. 6, however, says that he apostatized in later life and left no writings behind him. There seems no reason, therefore, to doubt that Eusebius is here referring to the Christian philosopher. After long study and meditation, Ammonius opened a school of philosophy in Alexandria. His principal pupils were Herennius, the two Origens, Cassius Longinus and Plotinus. As he designedly wrote nothing, and, with the aid of his pupils, kept his views secret, after the manner of the Pythagoreans, his philosophy must be inferred mainly from the writings of Plotinus. As Zeller points out, however, there is reason to think that his doctrines were rather those of the earlier Platonists than those of Plotinus. Hierocles, writing in the 5th century a.d., states that his fundamental doctrine was an eclecticism, derived from a critical study of Plato and Aristotle. His admirers credited him with having reconciled the quarrels of the two great schools. His death is variously given between a.d. 240 and 245. See Neo-Platonism, Origen.

Bibliography.— C. Rosier, De commentitiis philosophiae Ammoniaceae fraudibus et noxis (Tubingen, 1786); L. J. Dehaut, Essai historique sur la vie et la doctrine d' Ammonius Saccas (Brussels, 1836); E. Zeller, " Ammonius Saccas und Plotinus," Arch. f. Gesch. d. P.fiilos. vii., 1894, PP- 295-312; E. Vacherot, Hist. crit. de I'ecole d' Alexandria (Paris, 1846) ; T. Whittaker, The Neo-platonists (Camb., 1901); Eusebius, Hist. Eccles., trans. A. C. M'Giffert (Oxford and New York, 1890), notes on passages quoted above.

AMMUNITION, a military term (derived, through the French, from Lat. munire, to provide), for consumable stores used in attack or defence, such as rifle cartridges, cartridges, projectiles, igniting tubes and primers for ordnance, &c.

The components of ammunition intended for rifles and ordnance may be divided into (a) explosives and propellants (see Ex- plosives and Gunpowder), (b) projectiles of all kinds, and © cartridges. The military classification of explosives differs some- whatfrom that of the Explosives Act 1875, but, broadly speaking, they are divided into two groups. The first of these comprises explosives in bulk, made-up cartridges for cannon, and filled quick- firing cartridges; Group II. contains small-arm cartridges, fuzes, primers, tubes, 1 filled shells

(fuzed or unfuzed), &c. Each group is subdivided, and arrangements are made for storing certain divisions of Group I. in a magazine in separate compartments. All the divisions of Group II. are, and the remaining divisions of Group I. (comprising wet gun-cotton, picric acid and Q.F. cartridges) may be, stored in ammunition stores.

These general conditions apply to the storage of ammunition in fortresses. Here the positions.for the magazine and ammunition stores are so chosen as to afford the best means of protection from an enemy's fire. Huge earth parapets cover these buildings, which are further strengthened, where possible, by traverses protecting the entrances. For the purpose of filling, emptying and examining cannon cartridges and shell, a laboratory is gener- ally provided at some distance from the magazine. The various stores for explosives are classified into those under magazine conditions (viz. magazines, laboratories and cartridge stores) and those with which these restrictions need not be observed (viz. ammunition and shell stores). The interior walls of a magazine are Kned and the floors laid so that there may be no exposed iron or steel. At the entrance there is a lobby or barrier, inside which persons about to enter the magazine change their clothes for a special suit, and their boots for a pair made without nails. In an ammunition or shell store these precautions need not be taken except where the shell store arid the adjacent cartridge store have a common entrance; persons entering may do so in their ordinary clothes. A large work may have a main magazine and several subsidiary magazines, from which the stock of cartridges is renewed in the cartridge stores attached to each group of guns or in the expense cartridge stores and cartridge recesses. The same applies to main ammunition stores which supply the shell stores, expense stbres and recesses.

The supply of ammunition may be divided roughly into (a) that

for guns forming the movable armament, (6) that for guns placed in permanent positions. The movable armament will consist of guns and howitzers of small and medium calibre, and it is neces- sary to arrange suitable expense cartridge stores and shell stores in close proximity to the available positions. They can generally be constructed to form part of the permanent work in the pro- jected face of traverses or Other strong formations, and should be arranged for a twenty-four hours' supply of ammunition. These stores are

refilled from the main magazine every night under cover of darkness. Light railways join the various positions. The guns mounted in permanent emplacements are divided into groups of two or three guns each, and usually each group will require but one calibre of ammunition. A cartridge store, shell store and a general store, all well ventilated, are arranged for the especial service of such a group of guns. In the cartridge store the cylinders containing the cartridges are so placed and labelled that the required charge, whether reduced or full, can be immedi- ately selected. In the shell store also for the same reason the common shell are separated from the armour-piercing or shrapnel. Each nature of projectile is painted in a distinctive manner to render identification easy. The fuzes, tubes, &c, are placed in the general store with the tools and accessories belonging to the guns. The gun group is distinguished by some letter and the guns of the group by numerals; thus, } is No. 1 gun of group A. The magazine and shell stores are also indicated by the group letter, and so that mistakes, even by those unaccustomed to the fort, may be avoided, the passages are pointed out by finger posts and direction boards. For the immediate service of each gun a few cartridges and projectiles are stored in small receptacles' — called cartridge and shell recesses respectively — built in the parapet as near the gun position as practicable. In some cases a limited number of projectiles may be placed close underneath the parapet if this is conveniently situated near the breech of the gun and not exposed to hostile fire.

In order to supply the ammunition sufficiently rapidly for the efficient service of modern guns, hydraulic, electric or hand- power hoists are employed to raise the cartridges and shell from

Fig. 1.

-Ammunition Hoist.

AMMUNITION PASSAGE

V'yS-IS.-i > 'fl'

the cartridge store and shell store to the gun floor, whence they are transferred to a derrick or loading tray attached to the mounting for loading the gun.

Projectiles for B.L. guns above 6-in. calibre are stored in shell stores ready filled and fuzed standing on their bases, except

shrapnel and high-explosive shell, which are fuzed only when abou t

to be used. Smaller sizes of shells are laid on their sides in layers, each layer pointing in the opposite direction to the one below to prevent injury to the driving bands. Cartridges are stored in brass corrugated cases or in zinc cylinders. The corrugated cases are stacked in layers in the magazine with the mouth of the case towards a passage between the stacks, so that it can be opened and the cartridges removed and transferred to a leather case when required for transport to the gun. Cylinders are stacked, when possible, vertically one above the other. The charges are sent to the gun in these cylinders, and provision is made for the rapid removal of the empty cylinders.

The number and nature of rounds allotted to any fortress depends on questions of policy and location, the degrees of resist- ance the nature of the works and personnel could reasonably be expected to give, and finally on the nature of the arma- ment. That is to say, for guns of large calibre three hundred to four hundred rounds per gun might be sufficient, while for light Q.F. guns it might amount to one thousand or more rounds per gun. (A. G. H.)

With every successive improvement in military arms there has necessarily been a corresponding modification in the method of supplying ammunition and in the quantity required to gaooiy of be supplied. When hand-to-hand weapons were the ammuoi- principal implements of battle, there was, of course, no iion 1″ such need, but even in the middle ages the archers and tbe tieU ‘ crossbowmen had to replenish the shafts and bolts expended in action, and during a siege stone bullets of great size, as well as heavy arrowsˆere freely used. The missiles of those days were, however, interchangeable, and at the battle of Towton (1461) the commander of the Yorkist archers, by inducing the enemy to waste his arrows, secured a double supply of ammunition for his own men. This interchangeability of war material was even possible for many centuries after the invention of firearms. At the battle of Liegnitz (1760) a general officer was specially commissioned by Frederick the Great to pack up and send away, for Prussian use, all the muskets and ammunition left on the field of battle by the defeated Austrians. Captured material is, of course, utilized whenever possible, at the present time, and in the Chino-Japanese War the Japanese went so far as to prepare beforehand spare parts for the Chinese guns they expected to capture (Wei-Hai-Wei, 1895), but it is rare to find a modern army trusting to captures for arms and ammunition; almost the only instance of the practice is that of the Chilean civil war of 1891, in which the army of one belligerent was almost totally dependent upon this means of replenishing stores of arms and cartridges. But what

was possible with weapons of comparatively rough make -is no longer to be thought of in the case of modern arms. The Lee-Metford bullet of 303 in. diameter can scarcely be used in a rifle of smaller calibre, and in general the minute accuracy of parts in modern weapons makes interchangeability almost impossible. Further, owing to the rapidity with which, in modern arms, ammunition is expended, and the fact that, as battles are fought at longer ranges than formerly, more shots have to be fired in order to inflict heavy losses, it is necessary that the reserves of ammunition should be as close as possible to the troops who have to use them. This was always the case even with the older firearms, as, owing to the great weight of the ammuni tion, the soldier could carry but few rounds on his person. Nevertheless it is only within the past seventy years that there has grown up the elaborate system of ammunition supply which now prevails in all regularly organized armies. That which is described in the present article is the British, as laid down in the official Combined Training (1005) and other manuals. The new system designed for stronger divisions, and others, vary only in details and nomenclature.

Infantry .—The. infantry soldier generally carries, in pouches, bandoliers, &c, one hundred rounds of small-arms ammunition (S.A.A.), and it is usual to supplement this, when an action is imminent, from the regimental reserve (see below). It is to be noticed that every reduction in the calibre of the rifle means an increase in the number of rounds carried. One hundred rounds of

the Martini-Henry ammunition weighed iolb 10 oz. ; the same weight gives 155 with -303 ammunition (incl.charges), and if a 256 calibre is adopted the number of rounds will be still greater. It is, relatively, a matter of indifference that the reserves of ammuni tion include more rounds than formerly; it is of the highest im- portance that the soldier should, as far as possible, be independent of fresh supplies, because the bringing up of ammunition to troops closely engaged is laborious and costly in lives. The regimental reserves are carried in S.A.A. carts and on pack animals. Of the former each battalion has six, of the latter eight. The six carts are distributed, one as reserve to the machine gun, three as reserve to the battalion itself, and two as part of the brigade reserve, which consists therefore of eight carts. The brigade reserve communicates directly with the brigad 3 ammunition columns of the artillery (see below). The eighi pack

animals follow the eight companies of their battalion. These, with two out of the three battalion carts, endeavour to keep close to the firing line, the remaining cart being with the reserve companies. Men also are employed as carriers, and this duty is so onerous that picked men only are detailed. Gallantry displayed in bringing up ammunition is considered indeed to justify special rewards. The amount of S.A.A. in regimental charge is 100 rounds in the possession of each soldier, 2000 to 2200 on each pack animal, and 16,000 to 17,600 in each of four carts, with, in addition, about 4000 rounds with the machine gun and 16,000 more in the fifth cart.

Artillery. — The many vehicles which accompany batteries (see Artillery) carry a large quantity of ammunition, and with the contents of two wagons and the limber each gun may be con- sidered as well supplied, more especially as fresh rounds can be brought up with relatively small risk, owing to the long range at which artillery fights and the use of cover. Each brigade of artillery has its own ammunition column, from which it draws its reserve in the first instance.

Ammunition Columns. — An ammunition column consists of military vehicles carrying gun and S.A. ammunition for the combatant unit to which the column belongs. Thus the am- munition columns of a division, forming part of the brigades of field artillery, carry reserve ammunition for the guns, the machine guns of the infantry and the rifles of all arms. Generally speak- ing, the ammunition column of each of the artillery brigades furnishes spare ammunition for its own batteries and for one of the brigades of infantry. All ammunition columns are officered and manned by the Royal Artillery. They are not reserved exclusively to their own brigades, divisions, &c, but may be called upon to furnish ammunition to any unit requiring it during an action. The officers and men of the R.A. employed with the ammunition column are, as a matter of course, immediately available to replace casualties in the batteries. Teams, wagons and maUriel generally are also available for the same purpose. The horse artillery, howitzer and heavy brigades of artillery have each their own ammunition columns, organ- ized in much the same way and performing similar duties. The ammunition column of the heavy brigade is divisible into three sections, so that the three batteries, if operating independently, have each a section at hand to replenish the ammunition expended. The horse artillery brigade ammunition columns carry, besides S.A.A. for all corps troops other than artillery, the reserve of pom-pom ammunition. In action these columns are on the battlefield itself. Some miles to the rear are the

divisional and corps troops columns, which on the one hand replenish the empty wagons of the columns in front, and on the other draw fresh supplies from the depots on the line of communication. These also are in artillery charge; a divisional column is detailed to each division(t.e. to replenish each set of brigade ammuni- tion columns), and the corps troops column supplies the columns attached to the heavy, howitzer and horse artillery brigades. The ammunition thus carried includes ordinarily seven or eight kinds at least. S.A.A., field, horse, howitzer and heavy gun shrapnel, howitzer and heavy gun lyddite shells, cartridges for the four different guns employed and pom-pom cartridges for the cavalry, — in all twelve distinct types of stores would be carried

for a complete army corps. Consequently the rounds of each kind in charge of each ammunition column must vary in accordance with the work expected of the combatant unit to which it belongs. Thus pom-pom ammunition is out of place in the brigade ammunition columns of field artillery, and S.A.A. is relatively unnecessary in that attached to a heavy artillery brigade. Under these circumstances a column may be unable to meet the particular wants of troops engaged in the vicinity ; for instance, a cavalry regiment would send in vain to a heavy artillery ammunition section for pom-pom cartridges. The point to be observed in this is that the fewer the natures of weapons used, the more certain is the ammunition supply. (C. F. A.)

The first projectiles fired from cannon were the darts and stone shot which had been in use with older weapons. These darts (" garros ") had iron heads or were of iron wrapped sbot

with leather to fit the bore of small guns, and con- tinued in use up to nearly the end of the 1 6th century. Spherical stone shot were chosen on account of cheapness; forged iron, bronze and lead balls were tried, but the expense prevented their general adoption. Further, as the heavy metal shot necessitated the use of a correspondingly large propelling charge, too great a demand was made on the strength of the feeble guns of the period. Stone shot being one-third the weight of those of iron the powder charge was reduced in proportion, and this also effected an economy. Both iron and stone shot were occasionally covered with lead, probably to preserve the interior of the bore of the gun. Cast iron, while known in the 14th century, was not sufficiently common to be much used for the manufacture of shot, although small ones were made about that time. They were used more frequently at the latter part of the following century. Towards the end of the 16th century nearly all shot were of iron, but stone

shot were still used with guns called Petrieroes (hence the name) or Patararoes, for attacking weak targets like ships at short range.

Case shot are very nearly as ancient as spherical shot. They can be traced back to the early part of the 1 5th century, and they

have practically retained their orig- tifting «. n rf/«»j na i f orm up t0 t h e present date.

They are intended for use at close quarters when a volley of small shot is required. With field guns they are not of much use at ranges exceeding about four hundred yards; those for heavy guns are effective up to one thousand yards. In the earlier forms lead or iron shot were packed in wood casks or in canvas bags tied up with twine like the later quilted shot. In the present (fig. 2) type small shot are placed in a cylindri- cal case of sheet iron, with iron ends, one end being provided with handles. For small guns the bullets are made of lead and antimony — like shrapnel bullets — while for larger calibres they are of cast ounces to three and a half pounds

Fig. 2. — Case Shot.

iron weighing from two each.

Grape shot is now obsolete. It consisted generally of three tiers of cast-iron balls separated by iron plates and held in place by an iron bolt which passed through the centre of the plates.

There was also another type called quilted shot which consisted of a number of small shot in a canvas covering tied up by rope. Chain shot, in the days of sailing ships, was much in favour as a means of destroying rigging. Two spherical shot were fastened together by a short length of chain. On leaving the gun they began gyrating around each other and made a formidable missile.

Red-hot shot were invented in 1579 by Stephen Batory, king of Poland. They were used with great effect by the English during the siege of Gibraltar, especially on the 13th of September 1782, when the French floating batteries were destroyed, together with a large part of the Spanish fleet. Martin's shell was a

modified form; here a cast-iron shell was filled with molten cast iron

and immediately fired. On striking the side of a ship the shell broke up, freeing the still molten iron, which set fire to the vessel.

Rotation. — Projectiles intended for R.M.L. guns were at first fitted with a number of gun-metal studs arranged around them in a spiral manner corresponding to the twist of rifling. This was defective, as it allowed, as in the old smooth-bore guns, the powder gas to escape by the clearance (called " windage ") between the projectile and the bore, with a consequent loss of efficiency; it also quickly eroded the bore of the larger guns. Later the rotation was effected by a cupped copper disc called a "gas check" attached to the base end of the projectile. The powder gas pressure expanded the rim of the gas check into the rifling grooves and prevented the escape of gas; it also firmly fixed the gas check to the projectile, thus. causing it to rotate. A more regular and efficient action of the powder gas was thus ensured, with a corresponding greater range and an improvement in accuracy. With the earlier Armstrong (R.B.L.) guns the projectiles were coated with lead (the late Lord Armstrong's system), the lead being forced through the rifling grooves by the pressure of the exploded powder gas. The lead coating is, how- ever, too soft with the higher velocities of modern B.L. guns. Mr Vavasseur, C.B., devised the plan of fitting by hydraulic pressure a copper " driving band " into a groove cut around the body of the projectile. This is now universal. It not only fulfils the purpose of rotating the projectile, but renders possible the use of large charges of slow-burning explosive. The copper band, on being forced through the gun, gives rise to considerable resistance, which allows the propelling charge to burn properly and thus to exert its enormous force on the projectile.

The laws which govern the designs of projectiles are not well defined. Certain formulae are used which give the thickness of the walls of the shell for a known chamber pressure in the gun, and for a particular stress on the material of the shell. The exact proportions of the shell depend, however, greatly on experi- mental knowledge.

Armour-piercing Shot and Shell. — On the introduction of iron ships it was found that the ordinary cast-iron projectile readily pierced the thin plating, and in order to protect the vital parts of the vessel wrought-iron armour of considerable thickness was placed on the sides. It then became necessary to produce a projectile which would pierce this armour. This was effected by Sir VV. Palliscr, who invented a method of hardening the head of the pointed cast-iron shot. By casting the projectile point downwards and forming the head in an iron mould, the hot metal was suddenly chilled and became

intensely hard, while the remainder of the mould being formed of sand allowed the metal to cool slowly and the body of the shot to be made tough.

These shot proved very effective against wrought-iron armour, but were not serviceable against compound and steel armour. A new departure had, therefore, to be made, and forged steel shot with points hardened by water, &c, took the place of the Palliser shot. At first these forged steel shot were made of ordinary carbon steel, but as armour improved in quality the projectiles followed suit, and, for the attack of the latest type of cemented steel armour, the projectile is formed of steel — either forged or cast — containing both nickel and chromium. Tungsten steel has also been used with success.

Armour-piercing shot or shell are generally cast from a special mixture of chrome steel melted in pots; they are afterwards forged into shape. The shell is then thoroughly annealed, the core bored and the exterior turned up in the lathe. The shell is finished in a similar manner to others described below. The final or tempering treatment is very important, but details are kept strictly secret. It consists in hardening the head of the projectile and tempering it in a special manner, the rear portion being reduced in hardness so as to render it tough. The cavity of these projectiles is capable of receiving a small bursting charge of about 2 % of the weight of the complete projectile, and when this is used the projectile is called an armour-piercing shell. The shell, whether fuzed or unfuzed, will burst on striking a medium thick-

ness of armour. Armour-piercing shells, having a bursting charge of about 3 % of the weight of the complete projectile, are now often fitted with a soft steel cap (fig. 3) for the perforation of

Fig. 3.— Capped A. P. Shell.

hard steel armour. For the theory of the action of the cap see Armour Plates.

Even with these improvements the projectile cannot, with a reasonable velocity, be relied upon to pierce one calibre in thick-ness of modern cemented steel armour.

Explosive shells do not appear to have been in general use before the middle of the 16th century. About that time hollow balls of stone or cast iron were fired from mortars. The balls were nearly filled with gunpowder and the remain- ing space with a slow-burning

composition. This plan was unsatisfactory, as the composition was not always ignited by the flash from the discharge of the gun, and moreover the amount of composition to

SheU.

burn a stipulated time could not easily be gauged. The shell was, therefore, fitted with a hollow forged iron or copper plug, filled with slow-burn- ing powder. It was impossible to ignite with certainty this primitive fuze simply by firing the gun; the fuze was con- sequently first ignited and the gun fired immediately after- wards. This entailed

Fuze Hole.

-Sabot.

Rivet Fig. 4. — Spherical Common Shell.

Lifting Eye.

the use of a mortar or a very short piece, so that the fuze could be easily reached from the muzzle without unduly endangering the gunner. Cast-iron spherical common shell (fig. 4) were in use up to 187 1. For guns they were latterly fitted with a

wooden disc called a sabot, .Fuze Hole attached by a copper rivet,

intended to keep the fuze central when loading. They were also supposed to reduce the rebounding tendency of the shell as it travelled along the bore on discharge. Mortar shell (fig. 5) were not fitted with sabots.

Cast iron held its own as the most convenient material for projectiles up to recent for projectiles intended for for common shell for high-

Mortar Shell.

years, steel supplanting it, first piercing armour, and afterwards

velocity guns where the shock of discharge has been found too severe for cast iron.

Common shell is essentially a material destructor. Filled with ordinary gunpowder, the larger natures are formidable projectiles for the attack of fortifications and the unarmoured portions of warships. On bursting they break up into somewhat large pieces, which carry destruction forward to some distance from the point of burst. For the

attack of buildings common shell are superior to shrapnel and they are used to attack troops posted behind cover where it is impossible for shrapnel to reach them; their effect against troops is, however, generally insignificant. When

filled with lyddite, melinite, &c, they are called highˆexplosive (H.E.) shell (see below). Common shell for modern high-velocity guns may be made of cast steel or forged steel; those made of cast iron are now generally made for practice, as they are found to break up on impact, even against earthworks, before the fuze has time to act; the bursting charge is, therefore, not ignited or only ignited after the shell has broken up, the effect of the bursting charge being lost in either case. So long as the shell is strong enough to resist the shocks of discharge and impact against earth or thin steel plates, it should be designed to contain as large a bursting charge as possible and to break up into a large number of medium-sized pieces. Their effect between decks is generally more far-reaching than lyddite shell, but the purely local effect is less. Light structures, which, at a short distance from the point of burst, successfully resist lyddite shell and confine the effect of the explosion, may be destroyed by the shower of heavy pieces produced by the burst of a large common shell.

To prevent the premature explosion of the shell, by the friction of the grains of powder on discharge, it is heated and coated intern- ally with a thick lacquer, which on cooling presents a smooth surface. Besides this, the bursting charge of all shell of 4-in. calibre and upwards (also with all other natures except shrapnel) is contained. in a flannel or canvas bag. The bag is inserted through the fuze hole and the bursting charge of pebble and fine grain powder gradually poured in. The shell is tapped on the out- side by a wood mallet to settle the powder down. When all the powder has been got in, the neck of the bag is tied and pushed through the fuze hole. A few small shalloon primer bags, filled with seven drams of fine grain powder, are then inserted to fill up the shell and carry the flash from the fuze through the burster bag.

In the United States specially long common shell called torpedo shell, about 4-7 calibres in length, are employed with the coast artillery 12-in. mortars. They were made of cast steel, but owing to a premature explosion in a mortar, supposed to be due to weakness of the shell, they are now made of forged steel. The weight of the usual

projectile for this mortar is 850 lb. The torpedo shell, however, weighs 1000 lb and contains 137 lb of high explosive ; it is not intended for piercing armour but for producing a powerful explosion on the armoured deck of a War- ship. The compression, and consequent generation of heat on discharge of the charge in these long shell, render them liable to premature explosion if fired with high velocities. Some inventors have, therefore, sought to overcome this by dividing the shell transversely into compartments and so making each portion of the charge comparatively short.

Cast-steel common shell (fig. 6) are cast in sand moulds head downwards from steel of the required composition to give the proper tenacity. A large head, which is subsequently removed, is cast on the base to give solidity and soundness to the castings. The castings are annealed by placing them in a furnace or oven until red hot, then allowing them to cool gradually. The process of casting is very similar to that for the old cast- iron commonshell, which, however, Were cast base downwards. The Steel cast- ings after being annealed are dressed and carefully examined for defects. The exterior of the body is generally ground by an emery wheel or turned in a lathe; the groove for the driving band is also turned and the fuze hole Driving Band fitted with a gun-metal bush. Forged- – Bast Plug steel common shell are made from solid steel billets. These are heated to red- ness and shaped by a series of punches which force the heated metal through steel dies by hydraulic pressure. If the shell is intended for a nose fuze the base end is shaped by the press and the head subsequently formed by a properly shaped die,

Fig. 6. — Pointed Com- mon Shell (cast steel).

Fig. 7. — Lyddite Shell (forged steel).

or, in the case of stnaE shell, the head can, when red hot, be spun up in a lathe by a properly formed tool. For a base fuze shell the head is produced by the punches and dies, and the base is subsequently formed by pressing in the metal to the desired shape. The shell is then completed as described above.

High-explosive shell (fig. 7), as used in the English service, are simply forged-steel common shell filled with lyddite and having a special nose fuze and exploder. The base end of lyddite shell is made solid to prevent the possibility of the gas pressure in the gun producing a premature explosion. In filling the shell great precautions are necessary to prevent the melted lyddite (picric acid) from coming in contact with certain materials such as combinations

of lead, soda, &c, which produce sensitive picrates. The shell are consequently painted externally with a special non-lead paint and lacquered inside with special lacquer. The picric acid is melted in an oven, the temperature being carefully limited. The melted material is .poured into the shell by means of a bronze funnel, which also forms the space for the exploder of picric powder. On cooling, the material solidifies into a dense, hard mass (density 1 -6), in which state it is called lyddite. The fuze on striking ignites the exploder and in turn the lyddite. When properly detonated a dense black smoke is produced and the projectile is broken up into small pieces, some of which are almost of the fineness of grains of sand. The radius of the explosion is about 25 yds., but the local effect is intense, and hence on light structures in a confined space the destruction is complete. The shell is only of use against thin plates; against modern armour it is ineffective. When detonation has not been complete, as sometimes happens with small shells, the smoke is yellowish and the pieces of the exploded shell are as large as when a powder burster is used.

The French high-explosive shell obus torpille or obus & melinite was adopted in 1886. The melinite was originally filled into the ordinary cast-iron common shell (obus ordinaire) with thick walls, but soon afterwards a forged-steel thin-walled shell (obus allonge) was introduced. To explode the shell a steel receptacle (called a gaine) is screwed into the nose of the shell. It is filled with explosive and fitted with a detonator which is exploded by a percussion fuze. Except for the means adopted to ensure detonation this shell is practically the same as the lyddite shell.

Picric acid in some form or other is used in nearly all countries for filling high-explosive shell. In some the explosive is melted and poured into cardboard cases instead of being poured directly into the shell. The cases are placed in the shell either by the head of the shell unscrewing from the body or by a removable base plug. The French melinite and the Italian pertite are believed to be forms of picric acid. Russia and the United States use com- pressed wet gun-cotton (density 1-2) as the charge for their high- explosive shell. The gun-cotton is packed in a thin zinc or copper case and is placed in the shell either by the head or base of the shell being removable. The gun-cotton is detonated by a power- ful exploder, the form of which differs in each country. Ammonal is also used in high-explosive shell, but owing to its light density it is not in great favour. For field-gun and other small high- explosive shells, ordinary smokeless powder is often used.

Double shell is a term given to a common shell which was made

abnormally long, so as to receive a large bursting charge. They were intended to be fired with a reduced charge at short range. They are now practically obsolete; their place with modern B.L. guns has been taken by high-explosive shell. Star shell are intended for illuminating the enemy's position. They are very Similar to shrapnel shell, composition stars made up in cylindricaJ paper cases taking the place of the bullets. The shell on bursting,

blows off the head and scatters the ignited stars. This shell is only supplied to mountain guns and howitzers, and takes the place of the older types of illuminating shell, viz. the ground light ball and the parachute light ball.

Hand grenades were used at the assault of entrenchments or in boat attacks. Although generally regarded as obsolete, they were much used by the Japanese at the siege of Port Arthur, 1904. In the British service they were small, thin, spherical common shell weighing 3 lb for land service and 6 H> for sea service, filled with powder. They were fitted with a small wood time fuze to burn 7-5 seconds. The grenade was held in the hand and

H

Bursting Charge. Diaphragm

— f— Bullets

—Weakening Groove

Sabot

N Rivet. Fig. 8. — Boxer Shrapnel.

the fuze lighted by a port-fire. It was then thrown some 20 to 30 yds. at the enemy's works or boats. Sometimes a number were fired from a mortar at an elevation of about 30 so that none should strike the ground too near the mortar. New types of grenades filled with high explosives deton- ated by a percussion fuze have been pro- duced of late years, and it is probable that they will be again introduced into most countries.

Shrapnel shell were invented by Lieu- tenant (afterwards Lieutenant-

General) Henry Shrapnel, R.A. (1761-1842), in 1784. They were spherical common shell with lead bullets mixed with the bursting charge. Although far superior to common shell in man-killing effect, their action was not altogether satis- factory, as the shell on bursting projected the bullets in all directions, and there was a liability of premature explosion. In order to overcome these defects Colonel Boxer, R.A., separated the bullets from the bursting charge by a sheet-iron diaphragm — hence the name of "diaphragm shell" (fig. 8). The bullets were hardened by the addition of antimony, and, as the bursting charge was small, the shell was weakened by four grooves made inside the shell extending from the fuze hole ' to the opposite side.

Fig. 9.— Shrapnel With rifled guns the form of the shell Shell. altered, but its character remained. The

body of the shell was still made of cast iron with a cavity at the base for the bursting charge; on this was placed a thick steel diaphragm with a hollow brass tube which communi- cated the flash from the nose fuze to the bursting charge. The body was filled with hard lead bullets, and a wood head covered

with sheet iron or steel surmounted it and carried the fuze. By making the body of toughened steel (fig. o) and by slightly reducing the diameter of the bullets, the number of bullets contained was much increased. In the older field shrapnel, bullets of 18 and 34 to the lb were used; for later patterns see

7 4

a.

£ 1. vtPomt

t of iBurst

1 "^*£;iH.Cv

•' ' -if s

. . • . I c

-230 metres –

*"K2**

Fig. 10.

table in Ordnance: Field Equipments. Thus with the cast-iron body the percentage of useful weight, i.e. the proportion of the weight of the bullets to the total weight of the shell, was from 26 to 28 %, while with modern steel shell it is from 47 to 53 %. The limit of the forward effect of shrapnel at effective range is about 300 yds. and the extent of front covered 25 yds.

[Fig. 10 shows in plan the different effects of (a) snrapnel and of (6) high-explosive, burst in the air with a time fuze in the usual way. It will be seen that the shrapnel bullets sweep an area of about 250 yds. by 30 yds., half the bullets falling on the first 50 yds. of the beaten zone. With the high-explosive shell, however, the fragments strike the ground closer to the point of burst and beat a shallow, but broad, area of ground (about 7 yds. by 55 yds.). These areas show the calculated performance of the German field gun (96 N.A.), firing at a range of 3300 yds. In the case of the high- explosive shell, the concussion of the burst is highly dangerous, quite apart from the actual distribution of the fragments of the shell.]

The term " shooting shrapnel " is given to certain howitzer shrapnel, which are designed to contain a large bursting charge for the pur- pose of considerably augmenting the velocity of the bullets when the shell bursts.

High-explosive shell of a conir pound type have also lately appeared. Messrs Krupp have made a kind of ring shell with a steel body, a central tube conveys the. flash from the fuze to a base magazine containing a smoke-producing charge, while surrounding the central tube is a bursting charge of ordinary smokeless nitro-powder. A shrapnel on somewhat similar lines has been made by Ehrhardt; in form (fig. n), it is an ordinary shrapnel with base burster, but near the head is a second magazine filled with a high-explosive charge ; this is attached to the end of the fuze and is so arranged that when the shell is burst as time shrapnel the flash from the fuze passes clear of the high-explosive magazine and ignites only the base magazine, the bullets being blown out in the usual manner. When, however, the fuze acts on graze, the percussion part detonates the high-explosive charge and the bullets are blown out sideways and thus reach men behind shields, &c. (fig. 10). There is some loss of bullet capacity in this shell, and it appears likely that the bullets will be materially

Fig. 11. — High-Explosive Shrapnel (Ehrhardt).

deformed when detonation occurs; the advantages may, how- ever, counterbalance their objections.

Segment and ring shell are varieties of shrapnel, the interior of the shell being built up of cast-iron segments or rings (which break up into segments) about a tinned-iron cylinder which formed the magazine of the shell. The shell was completed by a cast-iron body formed around the segments or rings. The German army in 1870 employed ring shell almost exclusively against the French. The French found that common shell (obus ordinaire) when made of cast iron broke up on bursting into a small number of irregularly shaped pieces, and in order to obtain a systematic fragmentation for small shells they adopted a variety of projectiles of the segment and shrapnel types. With the improvements made latterly these have become obsolete, and the French system does not now materially differ from that employed in England and other countries. The old shell are, however, of sufficient interest to be enumerated; thus the " double-walled shell " (obus a double paroi) was built up of two shells, the internal portion had a cylindrical chamber for the bursting charge, but on the outside it was so shaped as to break up into well-defined pieces; the external portion of the shell was cast around the internal part, and also broke up into a number of pieces; this shell was liable to premature explosion. The obus a couronnes de balles (1879) was practically a segment shell with cast-iron balls in Jieu of segments; thin iron partitions separated each layer, and the balls were flattened where they came in contact with the plates. The obus a. balles libres, adopted in 1880, were of the same type, but there were no separating plates. The obus a anneaux was simply a ring shell of the same type as used in England. The obus a mitraille adopted in 1883 for field and siege guns had a cast-iron disc for its base with the body built up of segments and steel balls; a hollow ogival head surmounted this and a thin steel envelope bound all together. The head was filled with powder and fitted with a fuze; on explosion

It is of importance in firing shrapnel shell that the position of the burst shall be plainly seen. With the larger patterns of shell this presents no difficulty, but with the shrapnel for field guns which contain a small bursting charge only, and at long range in certain states of the atmosphere, the difficulty becomes pronounced. The problem has been solved in some cases by packing the bullets in fine

grain black powder (instead of resin) and compressing both bullets and powder in order to prevent the generation of heat when the bullets set back on the discharge of the gun. In Germany a mixture of red amorphous phosphorus and fine grain powder is used for the same purpose and produces a dense white cloud of smoke. In Russia a mixture of magnesium and antimony sulphide is used.

Fuzes. — The fuzes first used were short iron or copper tubes filled with slow-burning composition. They were roughly screwed on the exterior to fit a similar thread in the fuze hole of the shell. There was no means of regulating the length of time of burning, but later, about the end of the 17th century, the fuze case was made of paper or wood, so that, by boring a hole through the outer casing into the composition, the fuze could be made to burn approximately for a given time before exploding the shell — or the fuze could be cut to the correct length for the same purpose.

Early attempts to produce percussion fuzes were unsuccessful, but the discovery of fulminate of mercury in 1799 finally afforded the means of attaining this object. Some fifty years, however, elapsed before a satisfactory fuze was made. This was the Pettman fuze, in which a roughened ball covered with detonating composition was released by the discharge of the gun. When the shell hit any object, the ball struck against the interior walls of the fuze, the composition was exploded and thence the bursting charge of the shell. At present there are three types of per- cussion fuzes — (1) those which depend on the gas pressure in the gun setting the pellet of the fuze free — this type is necessarily a base fuze; (2) those which rely on the shock of discharge or the rotation of the shell setting the pellet free, as in various kinds of nose and base fuzes; (3) those relying on direct impact with the object.

Spring

Needle' Pellet

£.. . Body

-Locking N-it – Centrifugal Bolt

Spindle . Pressure Plate

The British base percussion fuze (fig. 12) illustrates type (1). In this, before firing, the needle pellet is held back by a central

Powder Pellet s P indI ? with a P res " sure plate attached Detonating

Cap to its rear end. For additional safety a centrifugal bolt is added which is re- leased by the rota- tion of the shell. On discharge, the gas pressure pushes the pressure plate in, the central spindle is carried forward with it and unlocks the centri- fugal bolt; this is withdrawn by the rotation of the shell, and the needle pellet is then free to move forward and explode the detonating cap when the shell strikes.

Type (2) is that usually adopted in small base fuzes and in the percussion part of " time and percussion " fuzes. Here the ferrule, on shock of discharge, moves back relatively to the per- cussion pellet by collapsing the stirrup spring; this leaves the pellet free to move forward, on the shell striking, and its detonator to strike the needle fixed in the fuze body. A spiral spring prevents any movement of the pellet during flight.

The direct-action or impact fuzes of type (3) are very simple (see fig. 13 of direct-action fuze). They are made of such a strength that during dis-

Fig. 12.-

..- ..'.. Holes for Key

Base Percussion Fuze.

charge nothing happens, but on striking an object the needle disc is crushed in and the needle explodes the detonating composition and thence the powder.

The action of all time fuzes is started by the discharge of the gun. By this the pellet strikes the detonator and so ignites a length of slow-burning composition which is pressed- into channel formed in a metal ring.

Fig. 13-

Safety Plug

■ *Need/a & Needle Pise Detonating Composition*

Poujaet

-Bottom Plug

Direct-Action Percussion Fuze.

a wood tube or into a To regulate the time of burning of the wood fuze, a hole is bored through into the composition as before stated, so that when it has burnt down to this hole one of the side channels filled with powder is ignited and explodes the shell. Wood fuzes are now only used for R. M.L. guns.

With modern long-burning fuzes (fig. 14), two composition time rings are used. The lower of these rings is made movable so that it can be turned to bring any desired place over a hole in the body of the fuze, which is filled with powder and communicates with the magazine. On the gun being fired the detonator is exploded and its flash ignites the upper time ring. This burns round to a passage made in the lower ring, when the lower ring begins to burn and continues to do so until the channel to the magazine is reached. The gases from the ignited composition escape from an external hole made in each time ring.

Mechanical time fuzes depending on the rotation of the shell to give a regular motion to clockwork have been tried, but so far no practicable form of these fuzes has been found.

It is important that all fuzes should be rigidly guarded against dampness, which tends to lengthen their time of burning; hence they are protected either by being kept in hermetically sealed tins holding one or more fuzes, or by some similar means.

Tubes and Primers. — In ancient times various devices were adopted to ignite the charge. Small guns were fired by thrusting a hot wire down the vent into the charge, or slow-burning powder was poured down the vent and ignited by a hot wire,

Later the priming powder was ignited by a piece of slow match held in a lint-stock (often called linstock). About a.d. 1700 this was effected by means of a port-fire (this was a paper case about

Time detonator,

- *Screw cap*

— « Stirrup spring for time pellet*

t Top composition

ˆPercussion pellet with ping ‘fte-Magazint

*Gasa plug *»»*

Fig. 14. — Fuze, Time and Percussion, No. 80, Mk. I.

16 in. long filled with slow-burning composition which burnt rather more than 1 in. per minute). Later again the charge was exploded by paper tubes (sometimes called Dutch tubes) filled with powder and placed in the vent and ignited by a port- fire. In comparatively modern times friction tubes have been used, while in the latest patterns percussion or electric tubes are employed.

In most B.L. guns it is essential to stop the erosion of the metal of the vent by preventing the escape of gas through it when the gun is fired. For this purpose the charges in such guns are ignited by ” vent-sealing tubes.” For M.L. guns and small B.L. guns radially vented, especially those using black powder, the amount of erosion in the vent is not so serious. The charge is fired by ordinary friction tubes, which are blown away by the escape of gas through the vent. In all guns axially vented, vent- sealing tubes, which are not blown out, must be employed so that the men serving the gun may not be injured.

The common friction tube is a copper tube, driven with powder, having at the upper end a short branch (called a nib piece) at right angles. This branch is filled with friction composition in which a friction bar is embedded. On the friction bar being sharply pulled out, by means of a lanyard, the composition is ignited and sets fire to the powder in the long tube; the flash is conveyed through the vent and explodes the gun charge. For

Half round copper wire twisted and roughened Gun Metat Head

Loop dipped in solder

Shearing wire tin and antimony

Soft copper bs/l 3 Hales

Corh plug shellaced Shet/oc cement

Fig. 15.— T-headed Friction Tube.

naval purposes, in order that the sailors should not be cut about the face or hurt their feet, tubes of quill instead of copper were used. If

friction tubes are employed when cordite or other smokeless powder charges are used, the erosion of the vent is very rapid unless the escape of the gas is prevented; in this case T-headed tubes (fig. 15) are used. They are similar in action to

the ordinary type, but are fixed to the vent by the head fitting a bayonet joint formed with the vent. The explosion blows a small

. Right hand spiral ˆ.Sarcenet

Plan of Heod

A.,

....Oiled silk

.Copper wire Insulated with silk -Brass body

, Ebonite

. .Copper poles Coated with pure fin

. . Platinum silver wire – -Sheet 'Ebonite

—Composition priming -, Paper discs

- Powder

..Cor A diso Fig. 16.— Electric Tube.

ball upwards and blocks the coned hole at the top of the tube and so prevents any rush of gas. >

The vent-sealing tube accurately fits into a chamber formed at the end of the vent, and is held

in place by the gun lock or some similar means. The force of the explosion expands the tube against the walls of its chamber, while the internal structure of the tube renders it gas-tight, any escape of gas through the vent being thus prevented.

In the English service electric tubes (in the United States called " primers ") are mostly used, but percussion or friction tubes are in most favour on the continent, and electric tubes are seldom or never used. There are two types of electric tube, one with long wires (fig. 16) for join- ing up with the electric circuit

73 .Contact 1 disc 4: _ _ Insulated Wire Brass Body

— Ebonite Insulation Brass Cone

. Composition Priming

. . . P/atmum Sr'trer Sridga

WSSg, taper Disc

. . Powcfer

,4j – . Copper Pole

m...CorA/°/ug Fig. 17. — Wireless Tube.

and the other without external wires. The first type has two insulated wires led into the interior and attached to two insulated

Brass Washer

.. . . Brass Body BrassStriker

. Percussion Cap

. Antii

...Cork Plug

Fig. 18. — Primer.

brass cones which are connected by a wire " bridge " of platinum silver. This bridge is surrounded by a priming composition of guncotton dust and mealed powder and the remainder of the tube is filled with powder. On an electric current passing, the bridge is heated to incandescence and ignites the priming composition.

In the wireless tube (fig. 17) the lock of the gun makes the electric contact with an insulated disc in 'the head of the tube. This disc is connected by an insulated wire to a brass cone, also insulated, the bridge being formed from an edge of the cone to a brass wire which is soldered to the mouth of the tube. Priming composition surrounds the bridge and the tube is filled with powder. The electric circuit passes

'from the gun lock to the disc, thence through the bridge to the

body of the tube, returning through the metal of the gun and mounting. The percussion tube (fig. 18) has a similarly shaped body to the wire- less electric tube, but the internal construction differs; it is fitted with a striker, below which is a percussion cap on a hollow brass anvil, and the tube is filled with powder.

With Q.F. guns (that is, strictly, . Fine Grsin Powder those using metallic cartridge cases) the case itself is fitted with the igniting medium ; in England these are called primers. For small guns the case contains a percussion primer, usually a copper cap filled with a chlorate mixture and resting against an anvil. The striker of the gun strikes the cap and fires the mixture. For larger guns an electric primer (fig. 19) is used, the internal construction and action of which are precisely similar to the wireless tube already described; the exterior is screwed for the case. For percussion

ˆ.Waterproof Cement

ˆe Glaze board Disc

Gun-cotton Oust "" and Heeled Powder,*

ˆPlatinum silver wire

- *Tart of gun-cotton yarn*

.impure tin

-» Crown metal poh

ˆm Brass screw collar

ˆEbonite washer

- Oiled Silk*

4T. Brass Cone

nBUck Thread

-m Copper wihe insulated with silk, bared at end with one turn in head

■*mfbonite ctyn screwed*

•* *White metal contact*

Section FutJ Size

Fig. 19. — Electric Primer.

firing an ordinary percussion tube is placed in an adapter screwed into the case. In some foreign services a combined electric and percussion primer is used; the action of this will be understood from fig. 20.

The first cartridges for cannon were made up of gunpowder packed in a paper bag or case. For many years after the intro- duction of cannon the powder was introduced into the bore by means of a scoop-shaped ladle fixed to the end of a long stave. The ladle was made of the same diameter as the shot, and it had a definite length so that it was filled once for the charging of small guns but for larger guns the

ladle had to be filled twice or even thrice. The rule was to make the powder charge the same weight as that of the shot. Cartridges made up in paper or canvas bags were after-

Car fridges.*

wards used in forts at night-time or on board ship, so that the guns could be more rapidly loaded and with less risk than by using a ladle. Before loading, a piece of the paper or canvas covering had to be cut open immediately under the vent; after the shot had been rammed home the vent was filled with

— Magazine

_. Platinum Wire

Insulation Percussion Cap

— Anvil

Fig. 20. — Combined Primer.

powder from a priming horn, and the gun was then fired by means of a hot iron, quick match or port-fire.

The ancient breech-loading guns were not so difficult to load, as the

powder chamber of the gun was removable and was charged by simply filling it up with powder and ramming a wad on top to prevent the escape of the powder.

Paper, canvas and similar materials are particularly liable to smoulder after the gun has been fired, hence the necessity of well sponging the piece. Even with thia precaution accidents often occurred owing tc a cartridge being ignited by the still glowing debris of the previous round. In order to prevent this, bags of non-smouldering material, such as flannel, serge or silk cloth are used; combustible material such as woven gun-cotton cloth has also been tried, but there are certain disadvantages attending this.

All smokeless powders are somewhat difficult to ignite in a gun, so that in order to prevent hang-fires every cartridge has a primer or igniter, of ordinary fine grain gunpowder, placed so as to intercept the flash from the tube; the outside of the bag con- taining this igniter is made of shalloon, to allow the flash to pene- trate with ease. The charge for heavy guns (above 6 in.) is made up in separate cartridges containing half and quarter charges, both for convenience of handling, and to allow of a reduced charge being used.

The cartridges are made of a bundle of cordite, or other smoke- less powder, tightly tied with silk, placed in a silk cloth bag with the primer or igniter stitched on the unclosed end; the exterior is taped with silk cloth tape so as to form a stiff cartridge. For

]Hillboard Disc "I steeped in Shellac – Silk cloth attached to millboard disc — 1 Primer stitched across in 4 places

Plan ot Top shewing disc to be lorn ofr

‘Silk braid becket Fig. 21. — 10-inch B.L. Gun Cartridge.

some of the longer guns, the exterior of the cartridge is conven- iently rnade of a coned shape, the coned form being produced by building Up layers outside a cylindrical core. In these large cartridges a silk cord becket runs up the centre with a loop at the top for handling (fig. 21).

AMMUNITION

873

For howitzers, variable charges are used, and are made up so that the weight can be readily altered. The following typical instance (fig. 22) will serve to show the general method of making

.2 OE .

_ _ ring of cordite covered with shalloon

- Shalloon dh. RFC’ Powder v 1 0! r i n g f cordite round bundle

Fig. 22. — 6-inch B.L. Howitzer Cartridge.

up such charges, whether for B.L. or Q.F. howitzers. Small size cordite is used, and the charge is formed of a mushroom-shaped core, made up in a shalloon bag; on the stalk, so as to be easily removed, three rings of cordite are placed. The bottom of the core contains the primer, and the rings can be attached to the core by two silk braids. The weight of the rings is graduated so that by detaching one or more the varying charges required can be obtained.

For quick-firing guns the charge is contained in a brass case to which is fitted a primer for igniting the charge. This case is

-Sleet Sk»H-—

*.Driving Band 1 J *

*„. C’P *

*Sor/no *

Pellet’of ‘< Lead Body

Hokhklss Base Puts MarkJY

Brass Case- —

ˆBursting Chans 4 01 Powder

AHotchkiss fuze III. \I2 Threads per ‘ inch left hand

■Paper wad

Cordite

. Silk twist*

[Silk Mst for ” {securing primer \to bottdm of cordite > Igniter or ‘Primer

Sech on Fig. 23. — 6-pr. Q.F. Cartridge.

”” Percussion Cap

inserted into the gun, and when fired slightly expands and tightly fits the chamber of the gun, thus acting as an obturator and preventing any escape of gas from the breech. This class of ammunition is especially useful for the smaller calibres of guns, such as 3-pr., 6-pr. and field guns, but Messrs Krupp also employ metallic cartridge cases for the largest type of

_ Lubricatinq Lid

- *—Felt Wad 3*

Silk Braids

gun, probably on account of the known difficulty of ensuring trustworthy obturation by any other means practicable with sliding wedge guns.

The charges for these cases are made up in a very similar manner to those already de- scribed for B.L. guns. Where necessary, distance . pieces formed of papier-mdcM tubes and felt wads are used to fill up the space in the case and so prevent any move- ment of the charge. The mouth of the case is closed either by the base end of the projectile (fig. 23), in which case it is called ” fixed ammunition ” or ” simultane- ous loading ammunition,” or by a metallic cap (fig. 24), when it is called ” separate loading ammunition,” the projectile and charge being

. Brass Case

—..SUA: Braid ‘•“Cordite Charqe SI6./OZ.. Sizi 20

Cordite Cylinder

.... Powder Igniter

‘•••Shalloon Bag

■■■• Electric Primer

Fig. 24. — 4-7-inch Q.F. Cartridge (greatly reduced scale).

thus loaded by separate operations. (A. G. H.)

The Bullet. — The original musket bullet was a spherical leaden ball two sizes smaller than the bore, wrapped in a loosely fitting paper patch which formed the cartridge. The loading was, therefore, easy with the old smooth-bore Brown Jˆ s ‘ am . Bess and similar military muskets. The original munition. muzzle-loading rifle, on the other hand, with a closely fitting ball to take the grooves, was loaded with difficulty, particu- larly when foul, and for this reason was not generally used for military purposes.

In 1826 Delirque, a French infantry officer, invented a breech with abrupt shoulders on which the spherical bullet was rammed down until it expanded and filled the grooves. The objection in this case was that the deformed bullet had an erratic flight. The Brunswick rifle, introduced into the British army in the reign of William IV., fired a spherical bullet weighing 557 grs. with a belt to fit the grooves. The rifle was not easily loaded, and soon fouled. In 1835 W. Greener produced a new expansive bullet, an oval ball, a diameter and a half in length, with a flat end, perforated, in which a cast metallic taper plug was inserted. The explosion of the charge drove the plug home, expanded the bullet, filled the grooves and prevented windage. A trial of the Greener bullet in August 1835, at Tynemouth, by a party of the 60th (now King’s Royal) Rifles, proved successful. The rangeand accuracy of the rifle were retained, while the loading proved as easy as with a smooth-bore musket. The invention was, however, rejected by the military authorities on the ground that the bullet was a compound one. In 1852 the government awarded Minie, a Frenchman, £20,000 for a bullet of the same principle, adopted into the British service. Subsequently, in 1857, Greener was also awarded £1000 for ” the first public suggestion of the principle of expansion, commonly called the Minie principle, in 1836.” The Minie bullet contained an iron cup in a cavity in the base of the bullet. The form of the bullet was subsequently changed from

conoidal to cylindro-conoidal, with a hemispherical iron cup. This bullet was used in the Enfield rifle introduced into the British army in 1855. It weighed 530 grs., and was made up into cartridges and lubricated as for the Minie rifle. A boxwood plug to the bullet was also used. The bullet used in the breech-loading Martini-Henry rifle, adopted by the British government in 187 1 in succession to the Snider-Enfield rifle, weighed 480 grs., and was fired from an Eley-Boxer cartridge- case with a wad of wax lubrication at the base of the bullet.

Between 1854 and 1857 Sir Joseph Whitworth conducted a long series of rifle experiments, and proved, among other points, the advantages of a smaller bore and, in particular, of an elongated bullet. The Whitworth bullet was made to fit the grooves of the rifle mechanically. The Whitworth rifle was never adopted by the government, although it was used extensively for match purposes and target practice between 1857 and 1866, when

it was gradually superseded by Metford's system mentioned below.

The next important change in the history of the rifle bullet occurred in 1883, when Major Rubin, director of the Swiss Laboratory at Thun, invented the small-calibre rifle, one of whose essential features was the employment of an elongated compound bullet, with a leaden core in a copper envelope. About 1862 and later, W. E. Metford had carried out an ex- haustive series of experiments on bullets and rifling, and had invented the important system of light rifling with increasing spiral, and a hardened bullet. The combined result of the above inventions was that in December 1888 the Lee-Metford small-bore •303 rifle, Mark I., was finally adopted for the British army. The latest development of this rifle is now known as the 303 Lee Enfield, which fires a long, thin, nickel-covered, leaden-cored bullet 1-25 in. long, weighing only 215 grs., while the Martini- Henry bullet, 1-27 in. in length and -45 in. in diameter, weighed 480 grs.

The adoption of the smaller elongated bullet, necessitated by the smaller calibre of the rifle, entailed some definite disad- vantages. The lighter bullet is more affected by wind. Its greater relative length to diameter necessitates a sharper pitch of rifling in order properly to

revolve the bullet (one turn in 10 in. for the -303 rifle as compared with one turn in 22 in. for the Martini-Henry). This, in its turn, necessitates a hard nickel envelope for the leaden bullet in order to prevent its " stripping," or being forced through the barrel without rotation. The general result is that, while the enveloped bullet has a much higher penetrative power than one of lead only, it does not usually inflict so severe a wound, nor has it such a stunning effect as the old lead bullet. It cuts a small clean hole, but does not deform. This fact is of some military importance, as, for example, in warfare with savages, in which the chief danger is usually a rush of large numbers at close quarters. The advantages, however, of the smaller calibre and the lighter bullet and ammunition are considered to outweigh the disadvantages, and they have been universally adopted for all military rifles.

Bullets for target and sporting-rifles have, in the main, followed, or occasionally preceded, the line of progress of military rifle bullets. In 1861 Henry introduced a modification of the grooving of the cylindrical Whitworth bullet, and in 1864 and 1865 the Rigby mechanically fitting bullet was used with success at the National Rifle Association meeting, and in the second stage of the Queen's prize. The bullets of sporting rifles, and particu- larly those of Express rifles, are often lighter than military bullets, and made with hollow points to ensure the expansion of the projectile on or after impact. The size and shape of the hollow in the point vary according to the purpose required and the nature of the game hunted. If greater penetration is needed, the leaden bullet is hardened with mercury or tin, or the military nickel-coated bullet is used with the small-bore, smokeless- powder rifles. Explosive bullets filled with detonating powder were at one time used in Express and large-bore rifles for large game. The use of these bullets is now practically abandoned owing to their uncertainty of action and the danger involved in handling them. Their use in warfare is prohibited by inter- national law.

The nickel-covered bullet, when used in a modern small-bore rifle for sporting purposes, is made into an expanding bullet, either by leaving the leaden core uncovered at the nose of the bullet, with or without a hollow point, or by cutting transverse or longitudinal nicks of varying depth in the point or circumfer- ence of the bullet.

A cone-shaped sharp-pointed bullet, named the Spitzer bullet, has been tried in the United States under the auspices of the Ordnance Department, in a Springfield rifle, which is practically identical with the British service -303 Lee-Enfield. This bullet is lighter than the

Lee-Enfield bullet (150 grs. as against 215 grs.), and when fired with a heavier charge of powder (51 grs, as against 31 grs.) gives, it is claimed, better results in muzzle-velocity, trajectory, deflexion from wind and wear and tear of rifling, than the present universally used cylinder-shaped

bullet. In 1906 details of its prototype, the German " S " bullet (Spitzgesckoss) , and of the French " D " bullet, were published. The Cartridge. — The original cartridge for military small arms dates from 1 586. It consisted of a charge of powder and a bullet in a paper envelope. This cartridge was used with the muzzle- loading military firearm, the base of the cartridge being ripped or bitten off by the soldier, the powder poured into the barrel, and the bullet then rammed home. Before the invention of the fire- lock or flint-lock, about 1635, the priming was originally put into the pan of the wheel-lock and snaphance muskets from a flask containing a fine-grained powder called serpentine powder. Later the pan was filled from the cartridge above described before loading. The mechanism of the flint-lock musket, in which the

r

r\ t

rv

" 0-31l"*>

British .303 ballet

« 0-322 J-

German "S"bulle<

3t

< -.4se" —>

Lee Metford

•303 in.

440 •■*

Rumanian •SS56 in.

*3**

Fig. 25.

pan was covered by the furrowed steel struck by the flint, rendered this method of priming unnecessary, as, in loading, a portion of the charge of powder passed from the barrel through the vent into the pan, where it was held by the cover and hammer.

The next important advance in the method of ignition was the introduction of the copper percussion cap. This was only gener- ally applied to the British military musket (the Brown Bess) in 1842, a quarter of a century after the invention of percussion powder and after an elaborate government test at Woolwich in 1834. The invention which made the percussion cap possible was patented by the Rev. A. J. Forsyth in 1807, and consisted of priming with a fulminating powder made of chlorate of potash, sulphur and charcoal, which exploded by concussion. This invention was gradually developed, and used, first in a steel cap, and then in a copper cap, by various gunmakers and private individuals before coming into general military use nearly thirty years later. The alteration of the military flint-lock to the per- cussion musket was easily accomplished by replacing the powder pan by a perforated nipple, and by replacing the cock or hammer which held the flint by a smaller hammer with a hollow to fit on the nipple when released by the trigger. On the nipple was placed the copper cap containing the detonating composition, now made of three parts of chlorate of potash, two of fulminate of mercury and one of powdered glass. The detonating cap thus invented and adopted, brought about the invention of the modern cartridge case, and rendered possible the general adop- tion of the breech-loading principle for all varieties of rifles, shot guns and pistols. Probably no invention connected with fire- arms has wrought such changes in the principle of gun construc- tion as those effected by the expansive cartridge case. This invention has completely revolutionized the art of gunmaking,

has been successfully applied to all descriptions of firearms, and has produced a new and important industry— that of cartridge manufacture.

Its essential feature is the prevention of all escape of gas at the breech when the weapon is fired, by means of an expansive cartridge case containing its own means of ignition. Previous to this invention

shot guns and sporting rifles were loaded by means of powder flasks and shot flasks, bullets, wads and copper caps, all carried separately. The earliest efficient modern cartridge case was the pin-fire, patented, according to some authorities, by Houiller, a Paris gunsmith, in 1847; and, according to others, by Lefaucheux, also a Paris gunsmith, in or about 1850. It consisted of thin weak shell made of brass and paper which expanded by the force of the explosion, fitted perfectly into the barrel, and thus formed an efficient gas check. A small percussion cap was placed in the middle of the base of the cartridge, and was exploded by means of a brass pin projecting from the side and struck by the hammer. This pin also afforded the means of extracting the cartridge case. This cartridge was introduced in England by Lang, of Cockspur Street, London, about 1855.

The central-fire cartridge was introduced into England in 1861 by Daw. It is said to have been the invention of Pottet of Paris, improved upon by Schneider, and gave rise to much litigation in respect of its patent rights. Daw was subsequently defeated in his control of the patents by Eley Bros. In this cartridge the cap in the centre of .the cartridge base is detonated by a striker passing through the standing breech to the inner face, the cartridge case being withdrawn, or, in the most modern weapons, ejected by a sliding extractor fitted to the breech end of the barrel, which catches the rim of the base of the cartridge.

This is practically the modern cartridge case now in universal use. In the case of shot guns it has been gradually inproved in small details. The cases are made either of paper of various qualities with brass bases, or entirely of thin brass. The wadding between powder and shot has been thickened and improved in quality; and the end of the cartridge case is now made to fit more perfectly into the breech chamber. These cartridges vary in size from 32 bore up to 4 bore for shoulder guns. They are also made as small as -410 and -360 gauge: their length varies from if in. to 4 in. Cartridges for punt guns are usually i\ in. in diameter and 9J in. in length.

In the case of military rifles the breech-loading cartridge case was first adopted in principle by the Prussians about 1841 in the needle-gun (q.v.) breech-loader. In this a conical bullet rested on a thick wad, behind which was the powder, the whole being enclosed in strong lubricated paper. The detonator was in the hinder surface oi the wad, and fired by a needle driven forward from the breech, through the base of tht cartridge and through the powder, by the action of a spiral spring set free by the pulling of the trigger.

In 1867 the British war office adopted the Eley-Boxer metallic central-fire cartridge case in the Enfield rifles, which were converted to breech-loaders on the Snider principle. This con- sisted of a block opening on a hinge, thus forming a false breech against which the cartridge rested. The detonating cap was in the base of the cartridge, and was exploded by a striker passing through the breech block. Other European powers adopted breech-loading military rifles from 1866 to 1868, with paper instead of metallic cartridge cases. The original Eley-Boxer cartridge case was made of thin coiled brass. Later the solid- drawn, central-fire cartridge case, made of one entire solid piece of tough hard metal, an alloy of copper, &c, with a solid head of thicker metal, has been generally substituted.

Central-fire cartridges with solid-drawn metallic cases contain- ing their own means of ignition are now universally used in all modern varieties of military and sporting rifles and pistols. There is great variety in the length and diameter of cartridges for the different kinds and calibres of rifles and pistols. Those for military rifles vary from 2-2 in. to 2-25 in. in length, and from ■256 to -315 gauge. For sporting rifles from 2j in. to 3 J in. in length, and through numerous gauges from -256 in. to -6oo in.

For revolvers, pistols, rook and rabbit rifles, and for Morris tubes, cartridges vary from -22 in. to -301 in. in gauge. All miniature cartridges with light charges are made for breech adapters to enable -303 military rifles to be used on miniature rifle ranges. All the above cartridges are central-fire. Rim-fire cartridges for rifles, revolvers and pistols vary from -22 in. to -56 in. gauge according to the weapon for which they are required. The cartridge for the British war office miniature rifle is -22 calibre, with 5 grs. of powder and a bullet weighing 40 grs. Most modern military rifles are supplied with clip or charger loading arrangements, whereby the magazine is filled with the required number of cartridges in one motion. A clip is simply a case of cartridges which is dropped into the magazine; a charger is a strip of metal holding the bases of the cartridges, and is placed over the magazine, the cartridges being pressed out into the latter. Both clips and chargers, being consumable stores, may be considered as ammunition. (H. S.-K.)

AMNESTY (from the Gr. anvqcrria, oblivion), an act of grace by which the supreme power in a state restores those who may have been guilty of any offence against it to the position of innocent persons. It includes more than pardon, inasmuch as it obliterates all legal remembrance of the offence. Amnesties, which may be granted by the crown alone, or by act of parliament, were formerly usual on

coronations and similar occasions, but are chiefly exercised towards associations of political criminals, and are sometimes granted absolutely, though more frequently there are certain specified exceptions. Thus, in the case of the earliest recorded amnesty, that of Thrasybulus at Athens, the thirty tyrants and a few others were expressly excluded from its operation; and the amnesty proclaimed on the restoration of Charles II. did not extend to those who had taken part in the execution of his father. Other celebrated amnesties are that proclaimed by Napoleon on the 13th of March 1815, from which thirteen eminent persons, including Talleyrand, were excepted; the Prussian amnesty of the 10th of August 1840; the general amnesty proclaimed by the emperor Francis Joseph of Austria in 1857; the general amnesty granted by President Johnson after the Civil War in 1868; and the French amnesty of 1905. The last act of amnesty passed in Great Britain was that of 1747, which proclaimed a pardon to those who had taken part in the second Jacobite rebellion.

AMOEBA, the Greek equivalent of the name ” Amibe ” given by Bery St Vincent to the Proteus animalcule of earlier natural- ists, used as a quasi-popular term for any simple naked protist the sole external organs of which are pseudopodia, i.e. temporary outgrowths of the clearer outer layer of the soft protoplasmic body. It is also used as a generic name, and in its present limitations by E. Penard includes only those the pseudopodia of which are constantly changing, blunt outgrowths. In the former wider sense, amoebae are found in sluggish waters, fresh and salt, all over the world; they readily make their appearance in infusions putrefying after infection from aerially carried germs, and the leucocytes or colourless blood corpuscles of Metazoa are essentially amoebae in their structure and behaviour. The protoplasm of the individual is divided into a centrally placed body, the nucleus, of relatively stable shape, and the cytoplasm, itself divided into an outer, clearer ectoplasm (” ectosarc “) and an inner, more granular endoplasm (” endosarc “), passing into one another. The movements of amoebae are of several kinds. (1) The amoeba may grow out irregularly into blunt lobes, the pseudopodia, some being emitted while others are retracted, and so may advance in any direction by the emission of pseudopodia thitherward, and the enlargement of these by the passage of the organism into them. (2) Again, it may advance by a sort of rolling: the lower surface, or that in contact with the sub- stratum over or under which it is passing, is viscid and adheres to the substratum, the superficial dorsal layer passing forward and bending over to the ventral side; whilst the converse action takes place at the hinder end; (3) or again, the

pseudopodia, when long, well marked and relatively permanent, may serve as actual limbs on which the body is supported and on which it moves. In the outgrowth of a pseudopod the process may take

place gradually, the ectoplasm growing as it stretches, or it may take place by the limiting layer of the ectosarc bursting, as it were, and a rounded prominence of the endosarc protruding and at once forming a new " skin " or pellicle. This last mode, termed " eruptive," is common in the case of the enormous, multinucleate amoeba termed Pelomyxa palustris, which attains a diameter when contracted and spherical of as much as a line (over 2 mm.). From the ease with which amoebae are obtained and kept alive under the microscope, as well as from their identity in structure with the primitive elements of Metazoa, they have always been favourite objects of study for protoplasmic physi- ology under its simplest conditions. Among the investigators of protoplasmic movements we may cite F, Dujardin, O. Biitschli, L. Rhumbler and H. S. Jennings. The opening to the exterior of the contractile vesicle has been found here. Pelomyxa has yielded to A. E. Dixon and M. Hartog a peptic ferment, such as has been extracted by C. F. W. Krukenbergfromthe Myxomycete Fidigo (Flowers of Tan), which is the largest known naked mass of protoplasm without cellular differentiation.

Amoeba shows also the multiplication by fission, so character- istic of the cell: for the study of other modes of reproduction, spore formation and syngarrtic (or so-called fertilization) pro- cesses, fresh-water or salt-water amoebae are ill suited, and up to this date we do not know the life cycle of any free-living naked amoeba, though that of some parasitic forms and shell-bearers have been fully made out. Some amoebae are certainly young states of Myxomycetes. Encystment, the excretion of a mem- brane around the cell to tide over unfavourable circumstances, has been noted in almost all species.

Amoeba colt and A. histolytica are parasites in the gut of man, the former relatively harmless, the latter the cause of severe dysentery and hepatic abscess, common in India.

H. S. Jennings has recently made a full study of the move- ments of Amoeba, and of its general behaviour, and found therein many indications that these are on the whole such as we should expect of

an organism working by " trial and error " rather than the uniform modes of non-living beings. Thus the operations of an amoeba ingesting a round, encysted Euglena are summed up thus: " One seems to see that the amoeba is trying to obtain this cyst for food, that it shows remarkable pertinacity in continuing its attempts to put forth efforts to accomplish this in various ways, and that it shows remarkable pertinacity in continuing its attempts to ingest the food when it meets with difficulties. Indeed the scene could : be described in a much more vivid and interesting way by the use of terms still more anthropomorphic in tendency." (M. Ha.)

AMOL, or Amul, a town of Persia, in the province of Mazan- daran, 23 m. W. of Barfurush, in 36° 28′ N. Lat. and 52° 23′ E. long Pop. about 10,000. It is situated on both banks of the Heraz, or Herhaz river, which is crossed here by a very narrow stone bridge of twelve arches and flows into the Caspian Sea 12 m. lower down. Amol is not walled and is now a place of little importance, but in and around it there are ruins and ancient buildings which bear witness to its former greatness. Of these the most conspicuous is the mausoleum of Seyed Kawam ud-din, king of Mazandaran, who died in 1379, and one old mosque dates from a.d. 793. The town has spacious and well-supplied bazaars and post and telegraph offices.

AMONTONS, GUILLAUME (1663-1705), French experimental philosopher, the son of an advocate who had left his native province of Normandy and established himself at Paris, was born in that city on the 31st of August 1663. He devoted himself particularly to the improvement of instruments employed in physical experiments. In 1687 he presented to the Academy of Sciences an hygrometer of his own invention, and in 1695 he published his only book, Remarques el experiences physiques sur la construction d'une nouvelle clepsydre, sur les baromelres, les thermometres et les hygrometres. In 1699 he published some in- vestigations on friction, and in 1702-1703 two noteworthy papers on thermometry. He experimented with an air-thermometer, in which the temperature was defined by measurement of the length of a column of mercury; and he pointed out that

the extreme cold of such a thermometer would be that which reduced the " spring " of the air to nothing, thus being the first to recognize that the use of air as a thermometric substance led to the inference of the existence of a zero of temperature. In 1704 he noted that barometers are affected by heat as well as by the weight of the atmosphere, and in the following year he described barometers without mercury, for use at sea. Amontons, who through disease was

rendered almost completely deaf in early youth, died at Paris on the nth of October 1705.

'AMORA (Hebrew for "speaker" or " discourser "), a title applied to the rabbis of the 2nd to 5th centuries, i.e. to the com- pilers of the Talmud. Each tana — or rabbi of the earlier period — had a spokesman, who repeated to large audiences the discourses of the tana. But the 'amora soon ceased to be a mere repeater, and developed into an original expounder of scripture and tradition.

AMORITES, the name given by the Israelites to the earlier inhabitants of Palestine. They are regarded as a powerful people, giants in stature "like the height of the cedars," who had occupied the land east and west of the Jordan. The Biblical usage appears to show that the terms " Canaanites " and " Amorites " were used synonymously, the former being char- acteristic of Judaean, the latter of Ephraimite and Deuteronomic writers. A distinction is sometimes maintained, however, when the Amorites are spoken of as the people of the past, whereas the Canaanites are referred to as still surviving. The old name is an ethnic term, evidently to be connected with the terms Amurru and Amar, used by Assyria and Egypt respectively. In the spelling Mar-tu, the name is as oldasthefirstBabyloniandynasty, but from the 15th century B.C. and downwards its syllabic equivalent Amurru is applied primarily to the land extending northwards of Palestine as far as Kadesh on the Orontes. The term " Canaan," on the other hand, is confined more especially to the southern district (from Gebal to the south of Palestine). But it is possible that the terms at an early date were inter- changeable, Canaan being geographical and Amorite ethnical. The wider extension of the use of Amurru by the Babylonians and Assyrians is complicated by the fact that it was even applied to a district in the neighbourhood of Babylonia. If the people of the first Babylonian dynasty (about 21st century B.C.) called them- selves " Amorites," as Ranke seems to have shown, it is possible that some feeling of common origin was recognized at that early date.

See Ranke, Bab. Exped. Pennsylvania, series D, iii. 33 sqq. ; and for general information, W. M.Miiiier,Asienu.Europa,2iˆsqq. ; Pinches, Old Testament, Index (s.v.). The people of Amar are represented on the Egyptian monuments with yellow skin, blue eyes, red eyebrows and beard, whence it has been conjectured that they were akin to the Libyans (Sayce, Expositor, July 1888). Senir, the " Amorite " name of Hermon (Deut. iii. 9), appears to be identical with Saniru in the Lebanon, mentioned by Shalmaneser II. In the Old Testament the chief references may be classified as follows : — primitive inhabit-

ants generally, Is. xvii. 9 (on text see comm.), Ezek. xvi. 3; a people W. of Jordan, Josh. x. 5; Judg. i. 34-36; Deut. i. 7, 44; Gen. xiv. 7, xlviii. 22; E. of Jordan, Num. xxi. 13, 21 sqq.; Josh. ii. 10, xxiv. 8; Judg. x. 8. See further Canaan, Palestine.

AMORPHISM (from a, privative, and fiopli, form), a term used in chemistry and mineralogy to denote the absence of regular or crystalline structure in a body; the adjective " amor phous," formless or of irregular shape, being also used technically in biology, &c.

AMORT, EUSEBIUS (1692-1775), German Catholic theologian, was born at Bibermuhle, near Tolz, in Upper Bavaria, on the 15th of November 1692. He studied at Munich, and at an early age joined the Canons Regular at Polling, where, shortly after his ordination in 1717, he taught theology and philosophy. In 1 733 he went to Rome as theologian to Cardinal Niccolo Maria Lercari (d. 1757). He returned to Polling in 1735 and devoted the rest of his life to the revival of learning in Bavaria. He died at Polling on the 5th of February 1775. Amort, who had the reputation of being the most learned man of his age, was a voluminous writer on every conceivable subject, from poetry to astronomy, from dogmatic theology to mysticism. His best known works are: a manual of theology in 4 vols., Theologia

eclectica, moralis et sckolastica (Augsburg, 1752; revised by Benedict XIV. for the 1753 edition published at Bologna); a defence of Catholic doctrine, entitled Demonslratio critica religibnis Catholicae (Augsburg, 1751); a work on indulgences, which has of ten been criticized by Protestant writers, DeOrigine, Progressu, Valore, et Fructu Indulgentiorum (Augsburg, 1735); a treatise on mysticism, De Revelationibus et Visionibus, &c. (2 vols., 1744); and the astronomical work Nova philosophiae planetarum et artis criticae syslemata (Nuremberg, 1723). The list of his other works, including his three erudite contributions to the question of authorship of the Imitatio Christi, will be found in C. Toussaint's scholarly article in A. Vacant's Diet, de thtologie (1900, cols. 1115-1117).

AMORTIZATION (derived through the French from Lat. ad, and mortem, to death) , literally an extinction or doing to death, a word formerly used of alienating lands in mortmain, and now for the paying off of a debt, particularly by means of a regular sinking-fund;

thus "amortization" and "amortization fund" generally refer to the latter method of extinguishing some pecuniary liability.

AMORY, THOMAS (c. 1691-1788), British author, was born about 1691, his father being the secretary for the forfeited estates in Ireland. He was an eccentric character and seems to have lived a very secluded life. He published Memoirs; containing the lives of several Ladies of Great Britain; a History of Antiquities 6 c – (r 7SS) an d Life of John Bunch Esq. (1756 and 1766). Both books are an extraordinary mixture of fiction, autobiography, scenic description and theological discussion. Amory died on the 25th of November 1788.*

AMOS, in the Bible, an Israelitish prophet of the 8th century B.C. He was a native of Tekoa, i.e. as most suppose, a place which still bears the same name 6 m. S. of Bethlehem. He was a shepherd, or perhaps a sheep-breeder, but combined this occupation with that of a tender of sycomore figs. It is true, the Tekoa just mentioned lies too high for sycomores; so it has been almost too ingeniously supposed that Amos may have owned a plantation of sycomores in the hill country leading down to Philistia, techni- cally called the Shephelah (R. V '., " lowland "). Here there were sycomores in abundance (1 Kings x. 27). That this was his usual occupation we learn from a better source than the heading (i. 1), viz. a narrative (vii. 10, 17), evidently of early origin, which interrupts the series of prophetic visions on the fall of the kingdom of Israel. Amos, it appears, though himself a Judahite, had been prophesying in the northern kingdom, when his activity was brought to an abrupt close by the head priest of the royal sanctuary at Bethel, Amaziah, who bade him escape to the land of Judah and get his living there. The reply of Amos is full of instruction. "No prophet am I; no prophet's son am I; a shepherd am I, and one who tends sycomore-figs. And Yahweh took me from behind the flock; and Yahweh said to me, Go, prophesy against my people Israel." The following words show tha t a prophet in ancient Israel had the utmost freedom of speech. It was far otherwise in the period of the fall of Judah. (See Jeremiah.)

But what had Amos said that appeared so dangerous to the head priest ? Amaziah summarizes it thus, " Jeroboam shall die by the sword, and Israel shall go away into captivity from his own land " (vii. n; cf. vii. 9b, v. 27, vi. 7). He omits all the reasons for this stern prophecy. The reasons are that the good old Israelitish virtue of brotherliness is dying away, that oppres- sion and injustice are rampant (ii. 6-8, iii. 9, 10, iv. 1, v. n, 12, viii. 4-6), and that rites are practised in the name of religion which are abhorrent to Yahweh,

because they either have no moral meaning at all, and are mere forms (v. 21-23), or else, judged from Amos's purified point of view, are absolutely immoral (ii. 7; cf. viii. 14), On the details of the captivity Amos preserves a mysterious vagueness. The fact, however, he puts forward with the confidence of one who is intimate with his God (iii. 7), and most probably it was at some great festival that he spoke the words which so perturbed Amaziah. The priest may not indeed himself have believed them, but he probably feared their effect on the moral courage of the people. And it is

perhaps not arbitrary to suppose that the splendour of the ritual in Amos's time implies a tremulous anxiety that Israel's seeming prosperity under Jeroboam II. (see Jews) may not be as secure as could be wished. For Amos cannot have been quite alone either in Israel or in Judah; there must have been a little flock of those who felt with Amos that there was small reason indeed to "desire the day of Yahweh" (v. 18; see Harper's note) .

But why did Amos so emphatically decline to be called a prophet ? A prophet in some true sense he certainly was, a prophet who, within his own range, has not been surpassed. He means this — that he is no mere ecstatic enthusiast or " dervish," whose primary aim is to keep up the warlike spirit of the people, taking for granted that Yahweh is on the people's side, and that he is perfectly free from the taint of selfishness, not having to support himself by his prophesying. He could not indeed tell Amaziah this, but it is nevertheless true that he was the founder, or one of the founders, of a new type of prophet. He was also either the first, or one of the first, to write down, or to get written down, the substance of his spoken prophecies, and perhaps also prophecies which he never delivered at all. This was the consequence of his ill success as a public preacher. The other prophets of the same order may be presumed to have been hardly less unsuccessful. Hence the new phenomenon of written prophecies. The literary skill of Amos leads one to suppose that he had prepared in advance for this, perhaps we may say, not altogether unfortunate necessity.

That there are many hard problems connected with the fascin- ating book of Amos cannot be denied. The one point on which we have indicated a doubt, viz. as to the situation of Tekoa, ought strictly to be accompanied by others. For instance, how came Amos to transfer himself to northern Israel ? How hard it must have been to obtain a footing there while he was a mere student and observer! And how came he by his wide knowledge of people outside the limits of Israel ? The most recent and elaborate commentator even calls him an "

ethnologist." And lastly, whence came his mastery of the poetical and literary arts ? Is he really the Columbus of written prophecy ? And behind these questions is the fundamental problem of the text, which has been somewhat too slightly treated. The text of Hosea may be in a much worse condition, but a keen scrutiny discloses many an uncertainty, not to say impossibility, in the traditional form of Amos. That the text has been much adapted and altered is certain; not less obvious are the corruptions due to carelessness and accident.

The main divisions of the book are plain, viz. chaps, i.-ii., chaps, iii. — vi., and chaps, vii.-ix. This arrangement, however, is probably not due to Amos himself, or to his immediate disciples, but to some later redactor. A number of passages seem to have been inserted subsequently to the time of Amos, on which see Ency. Bib., " Amos," and the introduction to Robertson Smith's Prophets of Israel (2), though in some cases the final decision will have to be preceded by a more thorough examination of the traditional text. The most obvious non-Amosian passage in the book is the concluding passage, ix. 8-15, which has evidently supplanted the original close of the section. The meaning of the phrase " the tabernacle (booth) of David that is fallen " (ver. n) is not perfectly clear. Beyond reasonable doubt, however, the writer seeks to take out the sting of the preceding passage in which Israel is devoted to utter destruction. The penitent and God-fearing Jews of the post-exilic age needed some softening appendix, and this the editor provided.

English readers are now well supplied with books on Amos. Driver's Joel and Amos (see Joel) (1897) and G. A. Smith's Twelve Prophets, vol. i. (1896), supplement and illustrate each other. Harper's Amos and Hosea (see Hosea) (1905) gives the cream of all the good things that have been said before, with a generally sound judgment; it is addressed to advanced students, and is perhaps less cautious than the two former. The German commentaries on the Minor Prophets by Nowack (2nd ed., 1903) and (especially) Marti (1904) must not, however, be neglected. Wellhausen's briefer work (3rd ed., 1898) is especially suggestive for textual criticism. Cheyne's Critica Biblica (1904), cf. his review of Harper in Hibbert Journal, iii. 824 ff., breaks new ground. (T. K. C.)

AMOS, SHELDON (1835-1886), English jurist, was educated at Clare College, Cambridge, and was called to the bar as a member of

the Middle Temple in 1862. In 1869 he was appointed to the chair of jurisprudence in University College, London, and in 1872 became reader under the council of legal education and examiner in constitutional law and history to the university of London. Failing health led to his resignation of those offices, and he took a voyage to the South Seas. He resided for a short time at Sydney, and finally settled in Egypt, where he practised as an advocate. After the bombardment of Alexandria, and the reorganization of the Egyptian judicature, he was appointed judge of the court of appeal, but being without any previous experience of administrative work he found the strain too great for his health. He came to England on leave in the autumn of 1885, and on his return to Egypt he died suddenly at Alexandria on the 3rd of January 1886. His principal publications are: Systematic View of the Science 0} Jurisprudence (1872); Lectures on International Law (1873); Science of Law (1874); Science of Politics (1883); History and Principles of the Civil Law of Rome as Aid to the Study of Scientific and Comparative Jurisprudence (1883), and numerous pamphlets. His wife, Mrs Sheldon Amos (Sarah Maclardie Bunting), took a prominent part in Liberal Nonconformist politics and in movements connected with the position of women. She died at Cairo on the 21st of January

1908.

AMOY, a city and treaty-port in the province of Fuh-kien, China, situated on the slope of a hill, on the south coast of a small and barren island named Hiamen, in 24 28′ N. and 118 10′ E. It is a large and exceedingly dirty place, about 9 m. in circumference, and is divided into two portions, an inner and an outer town, which are separated from each other by a ridge of hills, on which a citadel of considerable strength has been built. Each of these divisions of the city possesses a large and com- modious harbour, that of the inner town, or city proper, being protected by strong fortifications. There are dry-docks and an excellent anchorage. Amoy may be regarded as the port of the inland city of Chang-chow, with which it has river communication, and its trade, both foreign and coastwise, is extensiveand valuable. The chief articles imported are sugar, rice, raw cotton and opium, as well as cotton cloths, iron goods and other European manu- factures. The chief exports are tea, porcelain and paper. The trade carried on by means of Chinese junks is said to be large, and the native merchants are considered to be among the wealthiest and most enterprising in China. By other vessels the trade in 1870 was: — imports, £1,915,427; exports, £1,440,000. In 1904 the figures were: — imports, £2,081,494; exports, £384,494. The falling off of exports is due to the decreased demand for China tea,

for which Amoy was one of the chief centres. The native population is now estimated at 300,000, and the foreign residents number about 280. A large part of the trade is that carried on with the neighbouring Japanese island of Formosa. The province of Fuh-kien is claimed by the Japanese as their particular sphere of influence. Amoy was captured by the British in 1 84 1, after a determined resistance, and is one of the five ports that were opened to British commerce by the treaty of 1842; it is now open to the ships of all nations.

AMPELIUS, LUCIUS, possibly a tutor or schoolmaster, and author of an extremely concise summary — a kind of index — of universal history (Liber Memorialis) from the earliest times to the reign of Trajan. Its object and scope are sufficiently indi- cated in the dedication to a certain Macrinus: " Since you desire to know everything, I have written this ' book of notes/ that you may learn of what the universe and its elements consist, what the world contains, and what the human race has done." It seems to have been intended as a text-book to be learnt by heart. The little work, in fifty chapters, gives a sketch of cosmo- graphy, geography, mythology (chaps, i.-x.), and history (chap, x.-end). The historical portion, dealing mainly with the republican period, is untrustworthy, and the text in many places corrupt; the earlier chapters are more valuable, and contain some interesting information. In chap. viii. (Miracula Mundi) occurs the only reference in an ancient writer to the famous

sculptures of Pergamum, discovered in 1871, excavated in 1878, and now at Berlin: " At Pergamum there is a great marble altar, 40 ft. high, with colossal sculptures, representing a battle of the giants." Nothing is known of the author or of the date at which he lived: the times of Trajan, Hadrian, Antoninus Pius, the beginning of the 3rd century, and the age of Diocletian and Constantine have all been suggested. The Macrinus to whom the work is dedicated may have been the emperor, who reigned 217-218, but the name is not uncommon, and it seems more likely that he was a young man with a thirst for universal know- ledge, which the Liber Memorialis was compiled to satisfy.

There is no English edition or translation. The first edition of Ampelius was published in 1638 by Salmasius (Saumaise) from the Dijon MS., now lost, together with the Epitome of Florus; the latest edition is by Wolfflin (1854), based on Salmasius's copy of the lost codex.

See Glaser, Rheinisches Museum, ii. (1843); Zink, Eos, ii. (1866);

Wolfflin, De L. Ampelii Libro Memorials (1854).

AMPELOPSIS (from Gr. ti/xxeXos , vine, and oipis, appear- ance, as it resembles the grape-vine in habit), a genus of the vine order Ampelideae and nearly allied to the grape-vine. The plants are rapidly-growing, hardy, ornamental climbers, which flourish in common garden soil, and are readily propagated by cuttings. They climb by means of tendrils. A . quinquefolia, Virginian creeper, a native of North America, introduced to Europe early in the 17th century, has palmately compound leaves with three to five leaflets. A . tricuspidata, better known as A. Veitchii, a more recent introduction (1868) from Japan, has smaller leaves very variable in shape; it clings readily to stone or brick work by means of suckers at the ends of the branched tendrils.

AMPERE, ANDRE MARIE (1775-1836), French physicist, was born at Polemieux, near Lyons, on the 22nd of January 1775. He took a passionate delight in the pursuit of knowledge from his very infancy, and is reported to have worked out long arithmetical sums by means of pebbles and biscuit crumbs before he knew the figures. His father began to teach him Latin, bu}: ceased on discovering the boy's greater inclination and aptitude for mathematical studies. The young Ampere, however, soon resumed his Latin lessons, to enable him to master the works oˆ Euler and Bernouilli. In later life he was accustomed to say tha.< he knew as much about mathematics when he was eighteen as ever he knew; but his reading embraced nearly the whole round of knowledge — history, travels, poetry, philosophy and the natural sciences. When Lyons was taken by the army of the Convention in 1793, the father of Ampere, who, holding the office oijuge de paix, had stood out resolutely against the previous revolutionary excesses, was at once thrown into prison, and soon after perished on the scaffold. This event produced a profound impression on his susceptible mind, and for more than a year he remained sunk in apathy. Then his interest was aroused by some letters on botany which fell into his hands, and from botany he turned to the study of the classic poets, and to the writing of verses himself. In 1796 he met Julie Carron, and an attachment sprang up between them, the progress of which he naively recorded ina journal (Amorum). In 1799 they were married. Fromabout 1796 Ampere gave private lessons at Lyons in mathematics, chemistry and languages; and in 1801 he removed to Bourg, as professor of physics and chemistry, leaving his ailing wife and infant son at Lyons. She died in 1804, and he never recovered from the blow. In the same year he was appointed professor of mathematics at the lycee of Lyons. His small treatise, Considera- tions sur la theorie

mathematique dujeu, which demonstrated that the chances of play are decidedly against the habitual gambler, published in 1802, brought him under the notice of J. B. J. Delambre, whose recommendation obtained for him the Lyons appointment, and afterwards (1804) a subordinate position in the polytechnic school at Paris, where he was elected professor of mathematics in 1809. Here he continued to prosecute his scientific researches and his multifarious studies with unabated diligence. He was admitted a member of the Institute in 1814. It is on the service that he rendered to science in establishing the relations between electricity and magnetism, and in developing the

science of electromagnetism, or, as he called it, electrodynamics, that Ampere's fame mainly rests. On the nth of September 1820 he heard of H. C. Oersted's discovery that a magnetic needle is acted on by a voltaic current. On the 18th of the same month he presented a paper to the Academy, containing a far more complete exposition of that and kindred phenomena. (See Electrokinetics.) The whole field thus opened up he explored with characteristic industry and care, and developed a mathe- matical theory which not only explained the electromagnetic phenomena already observed but also predicted many new ones. His original memoirs on this subject may be found in the Ann. Chim. Phys. between 1820 and 1828. Late in life he prepared a remarkable Essai sur la philosophic des sciences. In addition, he wrote a number of scientific memoirs and papers, including two on the integration of partial differential equations (Jour. Ecole Polytechti. x., xi.). He died at Marseilles on the 10th of June 1836. The great amiability and childlike simplicity of Ampere's character are well brought out in his Journal et corre- spondance (Paris, 1872).

AMPERE, JEAN JACQUES (1800-1864), French philologist and man of letters, only son of Andre Marie Ampere, was born at Lyons on the 12 th of August 1800. He studied the folk-songs and popular poetry of the Scandinavian countries in an extended tour in northern Europe. Returning to France, he delivered in 1830 a series of lectures on Scandinavian and early German poetry at the Athenaeum in Marseilles. The first of these was printed as De I'Histoire de la poesie (1830) , and was practically the first intro- duction of the French public to the Scandinavian and German epics. In Paris he taught at the Sorbonne, and became professor of the history of French

literature at the College de France. A journey in northern Africa (1841) was followed by a tour in Greece and Italy, in company with Prosper Merim6e and others. This bore fruit in his Voyage dantesque (printed in his Grece, Rome et Dante, 1848), which did much to popularize the study of Dante in France. In 1848 he became a member of the French Academy, and in 1851 he visited America. From this time he was occupied with his chief work, L'Histoire romaine a Rome (4 vols., 1861-1864), until his death at Pau on the 27th of March

1864.

The Correspondance et souvenirs (2 vols.) of A. M. and J. J. Ampere (1805-1854) was published in 1875. Notices of J. J. Ampere are to be found in Sainte-Beuve's Portraits litteraires, vol. iv., and Nouveaux Lundis, vol. xiii.; and in P. Merimee's Portraits historiques et litteraires (2nd ed., 1875).

AMPEREMETER, or Ammeter, an instrument for the measurement of electric currents in terms of the unit called the ampere. (See Electrokinetics; Conduction, Electric; and Units, Physical.) Since electric currents may be either con- tinuous, i.e. unidirectional, or alternating, and the latter of high or of low frequency, amperemeters may first be divided into those (1) for continuous or direct currents, (2) for low frequency alternating currents, and (3) for high frequency alternating currents. A continuous electric current of one ampere is defined to be one which deposits electrolytically 0001 118 of a gramme of silver per second from a neutral solution of silver nitrate. 1 An alternating current of one ampere is defined to be one which produces the same heat in a second in a wire as the unit continu- ous current defined as above to be one ampere. These definitions provide a basis on which the calibration of amperemeters can be conducted. Amperemeters may then be classified according to the physical principle on which they are constructed. An electric current in a conductor is recognized by its ability (a) to create heat in a wire through which it passes, (b) to produce a magnetic field round the conductor or wire. The heat makes itself evident by raising the temperature and therefore elongating the wire, whilst the magnetic field creates mechanical forces which act on pieces of iron or other conductors conveying electric currents when placed in proximity to the conductor in question. Hence we may classify ammeters into (1) Thermal; (2) Electro- magnetic, and (3) Electrodynamic instruments.

1 See J. A.Fleming, A Handbook for the Electrical Laboratory and

Testing Room, vol. i. p. 341 (1901), also A. Gray, Absolute Measure- ments in Electricity arid Magnetism, vol. ii. pt. ii. p. 412 (1893).

1. Thermal Ammeters. — These instruments are also called hot-wire ammeters. In their simplest form they consist of a wire through which passes the current to be measured, some arrange- ment being provided for measuring the small expansion produced by the heat generated in the wire. This may consist simply in attaching one end of the wire to an index lever and the other to a fixed support, or the elongation of the wire may cause a rotation in a mirror from which a ray of light is reflected, and the move- ment of this ray over a scale will then provide the necessary means of indication. It is found most convenient to make use of the sag of the wire produced when it is stretched between two fixed points (KiK 2 , fig. 1) and then heated. To render the elonga- tion evident, another wire

is attached to its centre \ t

S2, this last having a thread fixed to its middle of which the other end is twisted round the shaft of an in- dex needle or in some way connected to it through a multiplying gear. The ex- pansion of the working wire when it is heated will then increase or create a sag in it owing to its increase in Fig. i.— Diagram showing the arrange- 1 ,v „ 1 ,!• ;„ „„„i f ; ments of Hartmann and Braun s Hot- length, and this is multi- wire Ammeter

plied and rendered evi- dent by the movement of the index needle. In order that this may take place, the heated wire must be flexible and must therefore be a single fine wire or a bundle of fine wires. In ammeters for small currents it is customary to pass the whole current through the heating wire. In instruments for larger currents the main current passes through a metallic strip acting as a bye-pass or shunt, and to the ends of this shunt are attached the ends of the working wire. A known fraction of the current is then indicated and measured. This shunt is generally a strip of platinoid or constantm, and the working wire itself is of the same metal. There is therefore a certain ratio in which any current passing through the ammeter is divided between the shunt and the working wire.

Thermal ammeters recommend themselves for the following reasons: — (1) the same instrument can be used for continuous- currents and for alternating currents of low frequency; (2) there is no temperature correction; (3) if used with alternating currents no correction is necessary for frequency, unless that frequency is very high. It is,

however, requisite to make provision for the effect of changes in atmospheric temperature. This is done by mounting the working wire on a metal plate made of the same metal as the working wire itself; thus if the working wire is of platinoid it must be mounted on a platinoid bar, the supports which carry the ends of the working wire being insulated from- this bar by being bushed with ivory or porcelain. Then no changes of external temperature can affect the sag of the wire, and the only thing which can alter its length relatively to the supporting bar is the passage of a current through it. Hot-wire ammeters are, however, liable to a shift of zero, and means are always provided by some adjusting screw for slightly altering the sag of the wire and so adjusting the index needle to the zero of the scale. Hot-wire ammeters are open to the following objec- tions: — The scale divisions for equal increments of current are not equal in length, being generally much closer together in the lower parts of the scale. The reason is that the heat produced in a given time in a wire is proportional to the square Of the strength of the current passing through it, and hence the rate at which the heat is produced in the wire, and therefore its temperature, increases much faster than the current itself increases. From this it follows that hot-wire ammeters are generally not capable of giving visible indications below a certain minimum current for each instrument. The instrument therefore does not begin to read from zero current, but from some higher limit which, gener- ally speaking, is about one-tenth of the maximum, so that an ammeter reading up to 10 amperes will not give much visible

*j_*

J L_S'

indication below i ampere. On the other hand, hot-wire instru- ments are very " dead-beat," that is to say, the needle does not move much for the small fluctuations in the current, and this quality is generally increased by affixing to the index needle a small copper plate which is made to move in a strong magnetic field (see fig. 2). Hot-wire instruments working on the sag

principle can be used in> any position if properly constructed, and are very portable. In the construc- tion of such an instrument it is essential that the wire should be subjected to a process of preparation or " ageing," which consists in passing through it a fairly

strong current, at least the maximum that it will ever have to carry, and starting and stopping this current frequently. The wire ought to be so

ˆ.. . , treated for many hours

Fig. 2,-Hot-wire Ammeter. before k ig pkced ˆ

the instrument. It is also necessary to notice that shunt instruments cannot be used for high frequencies, as then the relative inductance of the shunt and wire becomes important and affects the ratio in which the current is divided, whereas for low frequency currents the inductance is unimportant. In con- structing a hot-wire instrument for the measurement of high frequency currents it is necessary to make the working wire of a number of fine wires placed in parallel and slightly separated from one another, and to pass the whole of the current to be measured through this strand.

In certain forms, hot-wire instruments are well adapted for the measurement of very small alternating currents. One useful form has been made as follows: — Two fine wires of diameter not greater than -ooi in. are stretched parallel to one another and 2 or 3 mm. apart. At the middle of these parallel wires, which are preferably about 1 m. in length, rests a very light metallic bridge to which a mirror is attached, the mirror reflecting a ray of light from a lamp upon a screen. If a small alternating current is passed through one wire, it sags down, the mirror is tilted, and the spot of light on the screen is displaced. Changes of atmospheric temperature affect both wires equally and do not tilt the mirror. The instrument can be calibrated by a continuous current, Another form of hot-wire ammeter is a modification of the electric thermometer originally invented by Sir W. Snow Harris. It consists of a glass bulb, in which there is a loop of fine wire, and to the bulb is attached a U-tube in which there is some liquid. When a current is passed through the wire, continuous or alternating, it creates heat, which expands the air in the bulb and forces the liquid up one side of the U-tube to a certain position in which the rate of loss of heat by the air is equal to the rate at which it is gaining heat. The instrument can be calibrated by continuous currents and may then be used for high frequency alternating currents.

2. Electromagnetic Ammeters. — Another large class of ammeters depend for their action upon the fact thatanelectriccurrentcreates an electric field round its conductor, which varies in strength from point to point, but is otherwise proportional to the current. A small piece

of iron placed in this field tends to move from weak to strong places in the field with a force depending on the strength of the field and the rate at which the field varies. In its simplest form an electromagnetic ammeter consists of a circular coil of wire in which is pivoted eccentrically an index needle carrying at its lower end a small mass of iron. The needle is balanced so that gravity compels it to take a certain position in which the fragment of iron occupies a position in the centre of the field of the coil where it is weakest. When a current is passed through the coil the iron tends to move nearer to the coil of the wire where the field is stronger and so displaces the index needle over the scale.

Such an instrument is called a soft-iron gravity ammeter. Another type of similar instrument consists of a coil of wire having a fragment of iron wire suspended from one arm of an index needle near the mouth of a coil. When a current is passed through the wire forming the coil, the fragment of iron is drawn more into the aperture of the coil where the field is stronger and so displaces an index needle over a scale. In the construction of this soft-iron instrument it is essential that the fragment of iron should be as small and as well annealed as possible and not touched with tools after annealing; also it should be preferably not too elongated in shape so that it may not acquire permanent magnetization but that its magnetic condition may follow the changes of the current in the coil. If these conditions are not fulfilled sufficiently, the ammeter will not give the same indica- tions for the same current if that current has been reached (a) by increasing from a smaller current, or (b) by decreasing from a larger current. In this case there is said to be hysteresis in the readings. Although therefore most simple and cheap to construct, such soft-iron instruments are not well adapted for accurate work. A much better form of electromagnetic ammeter can be con- structed on a principle now extensively employed, which consists in pivoting in the strong field of a permanent magnet a small coil through which a part of the current to be measured is sent. Such an instrument is called a shunted movable coil ammeter, and is represented by a type of instrument shown in fig. 3. The

Fig. 3. — Shunted Movable Coil Ammeter, Isenthal & Co.

construction of this instrument is as follows: — Within the instrument is a horseshoe magnet having soft-iron pole pieces so arranged as to produce a uniform magnetic field. In this magnetic field is pivoted a small circular or rectangular coil carried in jewelled bearings, the current being passed into and out of the movable coil by fine flexible conductors. The coil carries an index

needle moving over a scale, and there is generally an iron core in the interior of the coil but fixed and independent of it. The coil is so situated that, in its zero position when no current is passing through it, the plane of the coil is parallel to the direction of the lines of force of the field. When a current is passed through the coil it rotates in the field and displaces the index over the scale against the control of a spiral spring like the hairspring of a watch. Such instruments can be made to have equidivisional scales and to read from zero upwards. It is essential that the permanent magnet should be subjected to a process of ageing so that its field may not be liable to change subsequently with time.

In the case of ammeters intended for very small currents, the whole current can be sent through the coil, but for larger currents it is necessary to provide in the instrument a shunt which carries the main current, the movable coil being connected to the ends of this shunt so that it takes a definite small fraction of the current passed through the instrument. Instruments of this type with a permanent magnetic field are only available for the measurement of continuous currents, but soft-iron instruments of

the above-described gravity type can be employed with certain restrictions for the measurement of alternating currents. Direct reading equidivisional movable coil ammeters can be made in various portable forms, and are very much employed as laboratory instruments and also as ammeters for the measurement of large eiectric currents in electric generating stations. In this last case the shunt need not be contained in the instrument itself but may be at a considerable distance, wires being brought from the shunt which carries the main current to the movable coil ammeter itself, which performs the function simply of an indicator,

3. Electr adynamic Ammeters. — Instruments of the third class depend for their action on the fact discovered by Ampere, that mechanical forces exist between conductors carrying electric currents when those conductors occupy certain relative positions. If there be two parallel wires through which currents are passing, then these wires are drawn together if the currents are in the same direction and pressed apart if they are in opposite directions. (See Electrokinetics.) Instruments of this type are called Electrodynamometers, and have been employed both as laboratory

research instruments and for technical purposes. In one well-known form, called a Siemens Electrodynamometer, there is a fixed coil (fig. 4), which is surrounded by another coil having its axis at right angles to that of the fixed coil. This second coil is suspended by a number of silk fibres, and to the coil is also attached a spiral spring the other end of which is fastened to a torsion head. If then the torsion head is twisted, the suspended coil experiences a torque and is displaced through

+ T

Ip HEI

Fig. 4. — Siemens Electrodynamometer. F, Fixed coil; D, Movable coil; 5, Spiral spring; T, Torsion head; MM, Mercury cups; /, Index needle.

\n angle equal to that of the torsion head. The current can be passed into and out of the movable coil by permitting the ends of the coil to dip into two mercury cups. If a current is passed through the fixed coil and movable coil in series with one another, the movable coil tends to displace itself so as to bring the axes of the coils, which are normally at right angles, more into the same direction. This tendency can be resisted by giving a twist to the torsion head and so applying to the movable coil through the spring a restoring torque, which opposes the torque due to the dynamic action of the currents. If then the torsion head is provided with an index needle, and also if the movable coil is provided with an indicating point, it is possible to measure the torsional angle through which the head must be twisted to bring the movable coil back to its zero position. In these circumstances the torsional angle becomes a measure of the torque and therefore of the product of the strengths of the currents in the two coils, that is to say, of the square of the strength of the current passing through the two coils if they are joined up in series. The instrument can therefore be graduated by passing through it known and measured continuous currents, and it then becomes available for use with either continuous or alternating currents. The instrument can be provided with a curve or table showing the current corresponding to each angular displacement

of the torsion head. It has the disadvantage of not being direct reading when made in the usual form, but can easily be converted into a direct reading instrument by appropriately dividing the scale over which the index of the torsion head moves.

Ampere Balance. — Very convenient and accurate instruments based on the above principles have been devised by Lord Kelvin, and a large variety of these ampere balances, as they are called, suitable for measuring currents from a fraction of an ampere up to many thousands of amperes, have been constructed by that illustrious inventor. The difficulty which has generally pre- sented itself to those who have tried to design instruments on the

Fig. 5. — Kelvin Flexible Metallic Ligament.

*electrodynamometer principle for use with large currents has been that of getting the current into and out of the movable conductor, and yet permitting that conductor to remain free to move under very small force. The use of mercury cups is open to many objections on account of the fact that the mercury becomes oxidized, and such instruments are not very convenient for transportation. The great novelty in the ampere balances of Lord Kelvin was a joint or electric coupling, which is at once exceedingly flexible and yet capable of being constructed to carry with safety any desired current. This he achieved by the intro- duction of a device which is called a metallic ligament. The general principle of its construction is as follows: — Let+A,— A (fig. s). be a pair of semi-cylindrical fixed trunnions which are carried on a supporting frame and held with flat sides downwards. Let + B, — B, be two smaller trunnions which project out from the sides of the two strips connecting together a pair of rings CC. The rings and the connecting strips constitute the circuit which is to be rendered movable. A current entering by the trunnion + B flows round the two halves of the circuit, as shown by the arrows, and comes out at the trunnion— B. In fig. 5 the current is shown dividing round the two rings; but in all the balances, except those intended for the largest currents, the current really circulates first round one ring and then round the other. To make the ligament, a very large number of exceedingly fine copper wires laid close together are soldered to the upper surface of the upper trunnion. The movable circuit CC thus hangs by two ligaments which are formed of very fine copper wires. This mode of suspension enables the conductor CC to vibrate freely like a balance, but at the same time very large currents can easily be passed through this perfectly flexible joint. Above and below these movable coils, which form as it were the two scale- pans of a balance, are fixed other stationary coils, and the connexions of all these , 1 1 ˆ. — » six coils (shown in fig. 6) *i— vˆJˆ) are such that when a cur- rent is passed through the whole of the coils in series,*

Fig.

forces of attraction and repulsion are brought into existence which tend to force one movable coil upwards and the other movable coil downwards. This tendency is resisted by the weight of a mass of metal, which can be caused to slide along a tray attached to the movable coils. The appearance of the complete instru- ment is shown by fig. 7. When a current is passed through the instrument it causes one end of the movable system to tilt down- wards, and the other end upwards; the sliding weight is then moved along the tray by means of a silk cord until equilibrium is again established. The value of the current in amperes is then

obtained approximately by observing the position of the weight on the scale, or it may be obtained more accurately in the follow-

Fig. 7. — Lord Kelvin's Ampere Balance.

ing manner: — The upper edge of the shelf on which the weights slide (see fig. 8) is graduated into equal divisions, and the weight

is provided with a sharp tongue. of metal in order that its position on the shelf may be accurately determined. Since the cur- rent passing through the balance when equilibrium is obtained with a given weight is proportional to the square ro'ot of the couple due to this weight, it follows that the current strength when equilibrium is obtained is proportional to the product of the square root of the weight used and the square root of the

Fig. 8. — Slider of Kelvin Ampere Balance.

displacement distance of this weight from its zero position. Each instrument is accompanied by a pair of weights and by a square root table, so that the product of the square root of the number corresponding to the position of the sliding weight and the ascertained constant for each weight, gives at once the value of the current in amperes. Each of these balances is made to cover a certain range of reading. Thus the centi-ampere balance ranges from 1 to 100 centi-amperes, the deci-ampere balance from 1 to 100 deci-amperes, the ampere balance from 1 to 100 amperes, the deka-ampere balance from 1 to 100 amperes, the hecto-ampere balance from 6 to 600 amperes, and the kilo-ampere balance from 100 to

2500 amperes. They are constructed for the measurement not only of continuousorunvaryingbutalsoof alternating currents. In those intended for alternating currents, the main current through the movable coil, whether consisting of one turn or more than one turn, is carried by a wire rope, of which each component strand is insulated by silk covering, to prevent the inductive action from altering the distribution of the current across the transverse section of the conductor. To avoid the creation of induced currents, the coil frames and the base boards are con- structed of slate. Kelvin ampere balances are made in two types — (1) a variable weight type suitable for obtaining the ampere value of any current within their range; and (2) a fixed weight type intended to indicate when a current which can be varied at pleasure has a certain fixed value. An instrument of the latter type of considerable accuracy was designed by Lord Kelvin for the British Board of Trade Electrical Laboratory, and it is there used as the principal standard ampere balance. A fixed weight is placed on one coil and the current is varied gradu- ally until the balance is just in equilibrium. In these circum- stances the current is known to have a fixed value in amperes determined by the weight attached to the instrument.

Calibration. — The calibration of ammeters is best conducted by means of a series of standard low resistances and of a potentio-

meter (q.i).). The ammeter to be calibrated is placed in series with a suitable low resistance which may be -i ohm, -oi ohm, •001 ohm or more as the case may be. A steady continuous current is then passed through the ammeter and low resistance, placed in series with one another and adjusted so as to give any required scale reading on the ammeter. The potential difference of the ends of the low resistance is at the same time measured on the potentiometer, and the quotient of this potential difference by the known value of the low resistance gives the true value of the current passing through the ammeter. This can be then compared with the observed scale reading and the error of the ammeter noted. 1

A good ammeter should comply with the following qualifica- tions: — (1) its readings should be the same for the same current whether reached by increasing from a lower current or decreasing from a higher current; (2) if used for alternating currents its indications should not vary with the frequency within the range of frequency for which it is likely to be used; (3) it should not be disturbed by external magnetic fields; (4) the scale divisions should, if possible, be equal in length and there should be no dead part in the scale. In the use of ammeters in which the control is the gravity of a weight, such

as the Kelvin ampere balances and other instruments, it should be noted that the scale reading or indication of the instrument will vary with the latitude and with the height of the instrument above the mean sea-level. Since the difference between the acceleration of gravity at the pole and at the equator is about 5 %, the correction for latitude will be quite sensible in an instrument which might be used at various times in high and low latitudes. If G is the acceleration of gravity at the equator and g that at any lati- tude X, then g = G(i +o-oo5i3 sin 2 X). In the case of an instrument with gravity control, the latitude at which it is calibrated should there- fore be stated.

Switchboard Ammeters. — For switchboard use in electric supply stations where space is valuable, instruments of the type called edgewise ammeters are much employed. In these the indicating needle moves over a graduated cylindrically shaped scale, and they are for the most part electromagnetic instruments (see fig. 9).

Bibliography. — Lord Kelvin (Sir W. Thomson), " New Standard and Inspectional Electrical Measuring Instruments," Proc. Soc. Telegraph Engineers, 1888, 17, p. 540; J. A. Fleming, A Handbook for the Electrical Laboratory and Testing Room (2 vols., London, 1901, 1903) ;G.D.Aspinall Parr, Electrical Measuring Instruments (Glasgow, I 9°3) I J- Swinburne, "Electric Light Measuring Instruments," Proc. Inst. Civ. Eng., 1891-1892, no, pt. 4; K. Edgcumbe and F. Punga, " Direct Reading Measuring instruments for Switchboard Use," Jour. Inst. Elec. Eng., 1904, 33, p. 620. (J. A. F.)

AMPERSAND (a corruption of the mixed English and Latin phrase, " and per se and," of which there are many dialect forms, as " ampussyand," or " amperseand "), the name of the sign &° or &, which is a combination of the letters e, t, of the Lat. et = and. The sign is now usually called " short and." In old- fashioned primers and nursery books the name and sign were always added at the end of the alphabet.

AMPHIARAUS, in Greek mythology, a celebrated seer and prince of Argos, son of Oiicles (or Apollo) and Hypermestra, and through his father descended from the prophet Melampus (Odyssey, xv. 244). He took part in the voyage of the Argonauts and in the chase of the Calydonian boar; but his chief fame is in connexion with the expedition of the Seven against Thebes, organized by Adrastus, the brother of his wife Eriphyle, for the purpose of restoring Polyneices to the throne. Amphiaraus, fore- seeing the disastrous issue of the war, at first refused to share in it; he had, however, promised Eriphyle when he married her that, in the event of any dispute

arising between her brother and

1 See " The Electrolysis of Copper Sulphate in Standardizing Electrical Instruments," by A. W; Meikle, read before the Physical Society of Glasgow University on the 27th of January 1888, or J. A. Fleming, A Handbook for the Electrical Laboratory and Testing Room. vol. i. p. 343.

Fig. 9.— Edgewise Switchboard Ammeter, Kelvin &

James White Ltd.

himself, she should decide between them; and now Eriphyle, bribed by Polyneices with the fatal necklace given by Cadmus to Harmonia, persuaded him against his better judgment to set out on the expedition. Knowing his doom, he bade his sons, Alcmaeon and Amphilochus, avenge his death upon their mother, upon whom, as he stepped into his chariot, he turned a look of anger. This scene was represented upon the chest of Cypselus described by Pausanias (v. 17).

The assault on Thebes was disastrous for the Seven; and Amphiaraus, pursued by Periclymenus, would have been slain with his spear, had not Zeus with a thunderbolt opened a chasm into which the seer, with his chariot, horses and charioteer, disappeared. Henceforth he was numbered with the immortals and worshipped as a god. Near Oropus, on the supposed site of his passing, his sanctuary arose, with healing springs, and an oracle famous for its interpretation of dreams (Pausanias i. 34). The ruins of this temple, with inscriptions which identify it, have been discovered and preserved at Mavrodilisi, in the provinces of Boeotia and Attica. There was another temple dedicated to him on the road from Thebes to Potniae, and here was the oracle of Amphiaraus consulted by Croesus and Mardonius.

Homer, Odyssey, xi. 326; Herodotus viii. 134; Pindar, Olympia, vi., Nemea, ix. ; Apollodorus iii. 6.

AMPHIBIA, a zoological term originally employed by Linnaeus to denote a class of the Animal Kingdom comprising crocodiles, lizards and salamanders, snakes and Caeciliae, tortoises and turtles and frogs; to which, in the later editions of the Sy sterna Naturae he

added some groups of fishes. In the Tableau Elementaire, published in 1795, Cuvier adopts Linnaeus's term in its earlier sense, but uses the French word " Reptiles," already brought into use by Brisson, as the equivalent of Amphibia. In addition Cuvier accepts the Linnaean subdivisions of Amphibia- Reptilia for the tortoises, lizards (including crocodiles), salamanders and frogs; and Amphibia-Serpenles for the snakes, apodal lizards and Caeciliae.

In 1799′ Alexandre Brongniart pointed out the wide differences which separate the frogs and salamanders (which he terms Batrachia) from the other reptiles; and in 1804 P. A. Latreille, 2 rightly estimating the value of these differences, though he was not an original worker in the field of vertebrate zoology, proposed to separate Brongniart's Batrachia from the class of Reptilia proper, as a group of equal value, for which he retained the Linnaean name of Amphibia.

Cuvier went no further than Brongniart, and, in the Regne Animal, he dropped the term Amphibia, and substituted Reptilia for it. J. F. Meckel, 3 on the other hand, while equally accepting Brongniart's classification, retained the term Amphibia in its earlier Linnaean sense; and his example has been generally followed by German writers, as, for instance, by H. Stannius, in that remarkable monument of accurate and extensive research, the Handbuch der Zootomie (2nd ed., 1856).

In 1816, de Blainville, 4 adopting Latreille's view, divided the Linnaean Amphibia into Squamiferes and Nudipelliferes, or Amphibiens; though he offered an alternative arrangement, in which the class Reptiles is preserved and divided into two sub- classes, the Ornithoides and the Ichlhyoides. The latter are Brongniart's Batrachia, plus the Caeciliae, whose true affinities had, in the meanwhile, been shown by A. M. C. Dumeril; and, in this arrangement, the name Amphibiens is restricted to Proteus and Siren.

B. Merrem's Pholidota and Batrachia (1820), F. S. Leuckart's Monopnoa and Dipnoa (1821), J. Muller's Squamata and Nuda (1832), are merely new names for de Blainville's Ornithoides and Ichlhyoides, though Muller gave far better anatomical characters of the two groups than had previously been put forward. More-

1 Brongniart's Essai d'une classification naturelle its reptiles was not published in full till 1803. It appears in the volume of the Memoir es presentes & Vlnstitut par divers savans for 1805.

2 Nouveau dictionnaire d'histoire naturelle, xxiv., cited in Latreille's Families naturelles du regne animal.

' System der vergleichenden Anatomie (182 1).

- *" Prodrome d'une Nouvelle Distribution du Regne Animal," Bulletin des sciences par la Societc Philomatique de Paris (1816), p. 1 13.*

over, following the indications already given by K. E. von Baer in 1828, 5 Muller calls the attention of naturalists to the important fact, that while all the Squamata possess an amnion and an allantois, these structures are absent in the embryos of all the Nuda. An appeal made by Muller for obser/ations on the development of the Caeciliae, and of those Amphibia which re- tain gills or gill-clefts throughout life, has unfortunately yielded no fruits.

In 1825 P. A. Latreille 6 published a new classification of the Vertebrata, which are primarily divided into Haematherma, containing the three classes of Mammifera, Monotremata and Aves; and Haemacryma, also containing three classes — Reptilia, Amphibia and Pisces. This division of the Vertebrata into hot and cold blooded is a curiously retrograde step, only intelligible when we reflect that the excellent entomologist had no real comprehension of vertebrate morphology; but he makes some atonement for the blunder by steadily upholding the class distinctness of the Amphibia. In this he was followed by Dr J. E. Gray; but Dumeril and Bibron in their great work, 7 and Dr Gunther in his Catalogue, in substance, adopted Brongniart's arrangement, the Batrachia being simply one of the four orders of the class Reptilia. Huxley adopted Latreille's view of the dis- tinctness of the Amphibia, as a class of the Vertebrata, co-ordinate with the Mammalia, Aves, Reptilia and Pisces; and the same arrangement was accepted by Gegenbaur and Haeckel. In the Hunterian lectures delivered at the Royal College of Surgeons in 1863, Huxley divided the Vertebrata into Mammals, Sauroids and Ichthyoids, the latter division containing the Amphibia and Pisces. Subsequently he proposed the names of Sauropsida and Ichthyopsida for the Sauroids and Ichthyoids respectively.

Sir Richard Owen, in his work on The Anatomy of Vertebrates, followed Latreille in dividing the Vertebrata into Haematotherma and Haematocrya, and adopted Leuckart's term of Dipnoa for the Amphibia. T. H. Huxley, in the ninth edition of this Encyclo- paedia, treated of Brongniart's Batrachia, under the designation Amphibia, but this use of the word has not been generally accepted. (See

Batrachia.) (T. H. H.; P. C. M.)

AMPHIBOLE, an important group of rock-forming minerals, very similar in chemical composition and general characters to the pyroxenes, and like them falling into three series according to the system of crystallization. They differ from the pyroxenes, however, in having an angle between the prismatic cleavage of 56° instead of 87 ; they are specifically lighter than the corre- sponding pyroxenes; and, in their optical characters, they are distinguished by their stronger pleochroism and by the wider angle of extinction on the plane of symmetry.

They are minerals of either original or secondary origin; in the former case occurring as constituents (hornblende) of igneous rocks, such as granite, diorite, andesite, &c. Those of secondary origin have either been developed (tremolite) in limestones by contact-metamorphism, or have resulted (actinolite) by the alteration of augite by dynamo-metamorphism. Pseudomorphs of amphibole after pyroxene are known as uralite.

The name amphibole (from the Gr. a/<£i0oXos, ambiguous) was used by R. J. Haiiy to include tremolite, actinolite and hornblende; this term has since been applied to the whole group. Numerous sub-species and varieties are distinguished, the more important of which are tabulated below in three series. The formulae of each will be seen to conform to the general meta- silicate formula R"Si0 3 .*

Orthorhombic Series. (Mg,Fe)Si0 3 . Monoclinic Series. CaMg 3 (Si0 3) 4 . Ca(Mg,Fe) 3 (Si0 3) 4 . (Fe,Mg)Si0 3 . (K 2 ,Na 2 ,Mg,Ca,Mn)Si0 3 . (Ca(Mg,Fe) s (Si0 3) 4 with 1 N a Al(SiQ 3) 2 and (Mg.Fe) (Al,Fe). 2 SiO«.

5 Entwickelungs-Geschichte der Thi'ere, p. 262.

6 Families naturelles du regne animal.

7 Erpetologie genSrale, ou histoire naturelle complete des reptiles

(1836).

Anthophyllite .

Tremolite Actinolite Cummingtonite Richterite

Hornblende

Glaucophane Crocidolite Riebeckite Arfvedsonite

Aenigmatite

Monoclinic Series — continued. . NaAl(Si0 3) 2 -(Fe,Mg)Si0 3 . . NaFe(Si0 3) 2 -FeSi0 3 . 2NaFe(Si0 3) 2 -FeSi0 3 . . Na 8 (Ca,Mg) 3 (Fe,Mn) 1 4(Al,Fe) 2 Si al 04 6 .

Anorthic Series. . Na 4 Fe" 9 Al Fe" ' (Si,Ti) 12 O „.

Of these, tremolite, hornblende and crocidolite, as well as the important varieties, asbestos and jade, are treated under their own headings. Brief mention only need be here made of some of the others. Naturally, on account of the wide variations in chemical composition, the different members vary considerably in characters and general appearance; the specific gravity, for example, varies from 2-0 in tremolite to 3-8 in aenigmatite.

Anthophyllite occurs as brownish, fibrous or lamellar masses with hornblende in mica-schist at Kongsberg in Norway and some other localities. An aluminous variety is known as gedrite, and a deep green, Russian variety containing little iron as kupfferite.

Actinolite is an important member of the monoclinic series, forming radiating groups of acicular crystals of a bright green or greyish-green colour. It occurs frequently as a constituent of crystalline schists. The name (from aicrts, a ray, and \Wos, a stone) is a translation of the old German word Strahlstein, radiated stone.

Glaucophane, crocidolite, riebeckite and arfvedsonite form a somewhat special group of alkali-amphiboles. The two former are blue fibrous minerals occurring in crystalline schists, and are the result of dynamo-metamorphic processes; the two latter are dark green minerals which occur as original constituents of igneous rocks rich in soda, such as nepheline-syenite and phonolite.

Aenigmatite and its variety cossyrite are rare minerals forming constituents of igneous rocks of the nepheline-syenite and phonolite groups. (L. J. S.)

AMPHIBOLITE, the name given to a rock consisting mainly of amphibole (hornblende), the use of the term being restricted,

however, to metamorphic rocks. Holocrystalline plutonic igneous rocks composed essentially of hornblende are known as hornblendites. As is the case with most petrological terms the exact connotation is not very strictly defined; most authors allow that accessory minerals such as felspar, garnet, augite and quartz may be present in variable and often considerable amount. A foliated or schistose structure, though often developed in these rocks, is not universal. The hornblende is usually dark green (actinolite) but may be nearly black in the hand specimen; in the microscopic slide it is commonly green of various shades, but may be brown, blue or nearly colourless. It frequently occurs in elongated bladed prisms, but rarely shows good crystal faces. The term hornblende-schist is employed by many writers as nearly, synonymous with amphibolite; most hornblende-schists contain felspar and iron oxides, while sphene, rutile, quartz and apatite are rarely absent. Reddish garnets are often conspicu- ous in the rocks of this group (garnet-amphibolites), and when in addition a green-coloured augite occurs the rocks are inti- mately allied to the hornblende-eclogites. Epidote also, in yellow grains, is common (epidote-amphibolites), and in these rocks the hornblende may be of the blue and richly pleochroic variety known as glaucophane (glaucophane-epidote-schists). Horn- blende-schists containing dark green ferriferous hornblende (grunerite-schists) are abundant in some parts of North America. Tremolite-schists consist essentially of white or very pale green amphibole; occasionally they are black from the presence of numerous minute grains of iron oxide or of graphite. Many tremolite-schists contain much talc and chlorite, and as these rocks have been derived from peridotites they not infrequently show residual grains of olivine. Nephrite (Gr. veQpos, a kidney) is a very compact, hardly schistose amphibolite, consisting of fine interwoven fibres of hornblende. Among other accessory minerals biotite, chlorite, talc, scapolite and tourmaline may be mentioned; if abundant they give rise to special varieties such as biotite-amphibolite, &c.

The amphibolites are typical rocks of the metamorphic group and as such attain a large development in all regions of crystalline schists and gneisses such as the Alps, Ardennes, Harz, Scottish Highlands, and the Lakes district of North America. They occur in two ways, viz. as large circular or elliptical areas which mark the site of old plutonic stocks or bosses of basic rock, and as long narrow strips intercalated among outcrops of other meta- morphic rocks. Regarded from the point of view of their origin they fall into two groups, the ortho-amphibolites, which are modified igneous rocks, and the para-amphibolites, which are altered sediments. The former are far the

more common. Igneous rocks which contain much augite (e.g. dolerites, gabbros, diabases, pyroxenites and many peridotites) are usually con- verted into amphibolites when they are subjected to pressure and interstitial movements during earth-folding. If felspar be present also, epidote may form, while part of the felspar recrystal- lizes as a species of the same mineral richer in alkalies or as mica. Olivine and ilmenite, the other common constituents of these rocks, may, alone or in conjunction with the above-named minerals, yield garnet, talc, spherie, rutile, &c. There is little or no alteration in the bulk composition of the rock, but its component elements enter into new combinations. Chemical analysis, accordingly, will often enable us to identify an igneous rock (diabase, &c.) under the guise of an amphibolite. The trans- formation of the rock may be complete, so that no trace is left of the original structures or minerals. Very often, however, it is only partial, and by obtaining a sufficiently large number of specimens a series of intermediate or transitional stages may be studied; these prove conclusively the nature of the process, though its causes are less clearly understood. Green hornblende may be seen gradually replacing augite, at first in needle-like crystals, for which gradually more compact masses are substi- tuted. The felspar breaks up into a mosaic in which albite, epidote or zoisite, quartz and garnet may often be identified. Biotite and primary hornblende suffer comparatively little change; olivine disappears, and garnet, talc and tremolite or anthophyllite take its place. The original structures of this ˆroup of rocks (ophitic, porphyritic, poikilitic, vesicular, &c.) gradually fade away, and merge into those of the metamorphic amphi- bolites. Even when the greater part of the rock mass has suffered complete reconstruction, kernels or phacoids may remain, show- ing the old igneous structures, though the minerals are greatly altered. The transitional stages from gabbro or diabase to amphibolite are so common that they form a widespread and important group of rocks, which have been described under the names greenstone, greenstone-schist, flaser-gabbro, saussurite-gabbro, meta-diabase, &c. The ortho-amphibolites also include a small group of igneous rocks, which have a foliated or banded structure due to movements and pressure during consolidation, e.g. foliated diorite or diorite-schist.

The sedimentary amphibolites or para-amphibolites, less common than those above described, are frequent in some districts, such as the northern Alps, southern highlands of Scotland, Green Mountains, U.S.A. Many of them have been ash-beds, and their conversion into hornblende-schists follows exactly similar stages to those exemplified by basic crystalline igneous rocks. Others have been greywackes of

varied com- position with epidote, chlorite, felspar, quartz, iron oxides, &c, and may have been mixed with volcanic materials, or may be partly derived from the disintegration of basic rocks. When they are most metamorphosed they are often very hard to distinguish from igneous hornblende-schists; yet they rarely fail to reveal signs of bedding, pebbly structure, sedimentary banding and gradual transition into undoubtedly sediment- ary types of gneiss and schist. Deposits containing dolomite and siderite also readily yield amphibolites (tremolite-schists, grunerite-schists, &c.) especially where there has been a cer- tain amount of contact metamorphism by adjacent granitic masses. (J. S. F.)

AMPHIBOLOGY, or Amphiboly (Gr. aˆifioXia), in logic, a verbal fallacy arising from ambiguity in the grammatical structure of a sentence (Aristot., Organon,Soph., El., chap. iv.).

It occurs frequently in poetry, owing to the alteration for metrical reasons of the natural order of words; Jevons quotes as an example Shakespeare, Henry VI.: "The duke yet lives that Henry shall depose."

AMPHICTYONY (Gr. an4>iKTVOvia, i.e. a body composed of aniKTiovts, aniKTVoves, " dwellers around "), an association of ancient Greek communities centring in a shrine. As the extant sources do not define the term, and as they apply it to but five or six associations, the majority of which are little known, modern scholars are in doubt as to the essential character of the institution, and hesitate therefore to extend the name beyond this limited list. The word itself indicates that the association primarily comprised neighbours, though the Delphic amphictyony came in time to include relatively distant communities (Strabo ix. 3, 7). For the origin of the institution it is safe to assume that neighbouring communities, whether tribes (Wvri) or cities, desiring friendly intercourse with one another chose the sanctu- ary of some deity conveniently situated, at which to hold their periodical festival for worship and their fair for the interchange of goods. If the limited use of the word according to our sources is not purely accidental, at all events there were many Greek leagues, not expressly termed amphictyonies, which had the characteristics here stated.

The Delian amphictyony probably reached the height of its splendour

early in the 7th century B.C. The Hymn to the Delian Apollo, composed about that time, celebrates the gathering of the Ionians with their wives and children at the shrine of their god on the island of Delos, to worship him with music, dancing and gymnastic contests (vv. 146-164; cf. Thuc. iii. 104). The later misfortunes of the Ionians caused a decline of the festival. Peisistratus, taking possession of Delos, seems to have used the sanctuary as a means of extending his political influence. When after the great war with Persia the Aegean cities under the leadership of Athens united in a political league (477 B.C.), they chose as its centre the temple of the Delian Apollo, doubtless through a desire to connect the new alliance with the associations of the old amphictyony. How far the council and other institu- tions of the Delian confederacy were based upon the amphictyonic organization cannot be determined. The removal of the treasury to Athens in 454 B.C. deprived Delos of political importance, though the amphictyony continued. The council gradually dwindled, and probably came to an end without formal abolition. In 426 B.C. the Athenians purified the island and instituted a great festival to be held under their presidency every four years (Thuc. iii. 104). In 422 they expelled the Delians (Thuc. v. 1). At the end of the Peloponnesian War Athens was deprived of Delos along with her other possessions, but she appears to have regained control of the island after the victory of Cnidus (394). An inscription of 390 B.C. proves that at this date Athenian authority had been restored. The affairs of the temple were managed by a board of five Athenian amphictyons, assisted by some Delian officials (inscrr. in Bull. Hell. viii. 284, 304, 307 f .) ; and in the 4th century we again hear of a council in addition to the board (CIG. i. 158). At this time the amphictyony is known to have embraced both the Athenians and the inhabitants of the Cyclades; but a strong Delian party bitterly opposed Athenian rule (cf. inscr. in Bull. Hell. iii. 473 f.), which came to an end with the supremacy of Macedon. The dissolution of the amphictyony soon followed.

Far more famous is the Delphic, or more strictly, the Pylaeic-Delphic, amphictyony. It was originally composed of twelve tribes dwelling round Thermopylae — the Thessalians, Boeotians, Dorians, Ionians, Perrhaebians, Magnetes, Locrians, Oetaeans, Phthiotes, Malians, Phocians (Aeschih. ii. 116), and Dolopians (Paus. x. 8. 2). The name of the council (pylaea) and of one set of deputies (pylagori), together with the important place held in the amphictyony by the temple of Demeter at Anthela, near Thermopylae, suggests that this shrine was the original centre of the association. How and when Delphi became a second centre is quite uncertain. The council of the

league included deputies of two different kinds — pylagori and hieromnemones. The latter were twenty-four in number, two

from each tribe. As the league was originally made up of neighbours, the Dorian tribe must have comprised simply the inhabitants of Doris; the Locrians were probably the eastern (Opuntian) branch; and the Ionians were doubtless limited to the adjacent island of Euboea. Afterwards, by affiliating them- selves to Doris the Peloponnesian Dorians gained admission, and Athens must have entered as an Ionian city before the first Sacred War. Henceforth Athens monopolized one of the two Ionian votes, while the other passed in rotation among the remaining Ionic, perhaps only among the Euboeic, cities. In the same way Doris held one Dorian vote and the other passed in rotation among the Dorian cities of Peloponnesus; and the east and west Locrians came to have one each. When after the second Sacred War the Phocians were expelled, Macedon received their two votes (346 B.C.) About the same time the Perrhaebians and the Dolopians were deprived of half their representation, and the two votes were transferred to the Delphians (inscrr. in N. Jahrb. f. cl. Phttol. civ. 742, cf. 743, 753; Bull. Hell. xxi. 322, cf. 325; Bourguet, Sanct. Pyth. 145, 147). In the following century the Aetolians gained such dominance in the amphictyony as to convert the council into an organ of their league. Recent research has made it appear certain (cf. Pomp tow, ib. 754 ff.) that they were never formally admitted to membership, but that they maintained their supremacy in the council (Livy xxxi. 32.3; Polyb. iv. 25. 8) by controlling the votes of their allies, who — called Aetolians in the inscriptions — were often in the majority. They made no material change in its composition, which, accord- ingly, after the dissolution of their league by the Romans is found to be nearly as it was after the second Sacred War. A few minor changes came in under the supremacy of the Roman republic; and finally Augustus increased the number of votes to thirty, and distributed them according to his pleasure. In the age of the Antonines the association was still in existence (Paus. x. 8. 4 f.).*

Although the hieromnemones of the Thessalians, who held the presidency, and perhaps of a few other communities, must have been elected, the office was ordinarily, as at Athens, filled by lot. As a rule they were renewed annually (Aristoph. Clouds, 623 f . ; Foucart, in Bull. Hell. vii. 411, 413 f.). Each hieromnemon was accompanied by two pylagori, elected semi-annually (Demosth. xviii. 149; Aeschin. iii. 115; Tim. Lex. Plat., s.v. ‘ A/jupucTVoves) , and representing the same tribe, though not necessarily the same city. On one occasion Athens is known to have sent three. The

hieromnemones were formally superior, but because of the method of appointment they were necessarily men of mediocre ability, inexperienced in speaking and public business, and for that reason they readily became the tools of the pylagori, who were orators and statesmen. In the literary sources, accordingly, the latter are rightly given credit for the acts of the council; it was the pylagori who set a price on the head of the traitor Ephialtes (Herod, vii. 2 1 3) , and who on the motion of Themistocles rejected the proposition of Lacedaemon for the expulsion of the states which had sided with Persia (Plut. Them. 20) . The pylagori had a right to propose measures and to take part in the delibera- tions; they as well as the hieromnemones were required to take the juror's oath; and the acts of the council were inscribed officially as resolutions of the hieromnemones and pylagori conjointly. The hieromnemon, however, cast the vote of his community, though in the record his two pylagori were made equallyresponsiblefor it. Thenecessaryinferencefrom these facts is that the vote was determined by a majority of the three deputies (inscr. in Bull. Hell, xxvii. 106-111, A 20-33; B 1-10). The council decided all questions which fell within its competence. Matters of greater importance, as the levy of an extraordinary fine on a state or the declaration of a sacred war, it presented in the form of a resolution to an assembly {tKKK-qcrla) , com- posed of the deputies, the amphictyonic priests, and any other citizens of the league who chanced to be present (Aeschin. iii. 124; cf. Hyp. iv. 7, 26 f.). This assembly was relatively unim- portant, however, and is mentioned only by the two authorities here cited.

It is now well established by epigraphic evidence {Bull. Hell.

vii. 412 f., 417; Pomptow, in N. Jahrb. f. cl. Philol. cxlix. 826-829) that the amphictyons met both in the spring and in the autumn at Delphi, and the literary sources should alone be sufficient authority for meetings in the same seasons at Thermopylae (Hyp. iv. 7, 25 ff.; Strabo ix. 3, 7, 4, 17; Harpocration, s.v. IlvXat). It is known, too, that the meeting at Thermopylae followed that at Delphi (inscr. in Bull. Hell. xxiv. 136 f.).

The primary function of the council was to administer the temporal affairs of the two shrines, of which the sanctuary of Apollo at Delphi claimed by far the greater share of attention. The hieromnemones were required periodically to inspect the lands belonging to this god,

to punish those who encroached, and to see that the tenants rendered their quota of produce; and the council held the states responsible for the right performance of such duties by their respective deputies (CIA. ii. 545; inscr. in Bull. Hell. vii. 428 f.). Another task of the council was to super- vise the treasury, to protect it from thieves, and by investments to increase the capital (Strabo ix. 3, 7; Isoc. xv. 232; Demosth. xxi. 144; Plut. Sull. 12). Naturally, too, it controlled the expenditure. We find it, accordingly, in the 6th century B.C. contracting for the rebuilding of the Delphic temple after it had been destroyed by fire (Herod, v. 62; Paus. x. 5. 13), and in the 4th century creating an Hellenic college of temple-builders for the purpose (inscrr. in Bull. Hell. xx. 202 f., 206, xxi. 478, xxiv. 464), adorning the interior with statues and pictures (Diod. xvi. 2,z), inscribing the proverbs of the Seven Sages on the walls (Paus. x. 24. 1), bestowing crowns on benefactors of the god (CIG. i. 1689 b), preparing for the Pythian games, awarding the prizes (Pind. Pyth. iv. 66, x. 8 f.), instituting a board of treasurers (inscr. in Bourguet, Sanct. Pyth. 175 ff.) and issuing coins. It was also in the material interest of Apollo that the council passed a law which forbade the Greeks to levy tolls on pilgrims to the shrine (Aeschin. iii. 107; Strabo ix. 3, 4), and another requiring the amphictyonic states to keep in repair their own roads which led towards Delphi (CIA. ii. 545). A law of great interest, dating from the beginning of the institution, imposed an oath upon the members of the league not to destroy an amphictyonic city or to cut it off from running water in war or peace; but to wage war upon those who transgressed this ordinance, to destroy their cities, and to punish any others who by theft or plotting sought to injure the god (Aeschin. ii. 115). In this regulation, which was intended to mitigate the usages of war amongst the members of the league, we have one of the origins of Greek interstate law. Though other regulations were made to secure peace at the time of the festival (Dion. Hal. iv. 25. 3), and though occasionally the council was called upon to arbitrate in a dispute (cf. Demosth. xviii. 13s), no provision was made to compel arbitration.

For the enforcement of such laws and for administrative effi- ciency in general it was necessary that the council should have judicial power. As jurors the deputies took an oath to decide according to written law, or in cases not covered by law, accord- ing to their best will and judgment (CIA. ii. 545). The earliest known amphictyonic penalty was the destruction of Crisa for having levied tolls on pilgrims (Aeschin. iii. 107; Strabo ix. 3, 4; cf . Paus. x. 3 7. 5-8) . This offence was the cause of the first Sacred War. The second and third Sacred Wars, fought in the 4th century B.C., were waged by the

amphictyons against the l'hocians and the Amphissaeans respectively for alleged tres- passing on the sacred lands (Aeschin. iii. 124, 128; Diod. xvi. 23, 31 f.). In the 5th century the council fined the Dolopians for having disturbed commerce by their piracy (Plut. Cim. 8), and in the 4th century the Lacedaemonians for having occupied the citadel of Thebes in time of peace (Diod. xvi. 23, 29).

The judgments of the council were sometimes considered unfair, and were occasionally defied by the states affected. The Lacedaemonians refused to pay the fine above mentioned; the Athenians protested against the treatment of Amphissa, and were slow in accepting the decisions given under the influence of Mace- don. The inability of the council to enforce its resolutions was chiefly due to its composition; the majority of the communities

represented were even in combination no match for individual cities like Athens, Sparta or Thebes. The council was a power in politics only when manipulated by a great state, as Thebes, Macedon or Aetolia, and in such a case its decrees were most likely to give offence by their partisanship. Although the council sometimes championed the Hellenic cause, as could any association or individual, it never acquired a recognized authority over all Greece; and notwithstanding its frequent par- ticipation in political affairs, it remained essentially a religious convocation.

In addition to the three associations thus far mentioned there was an amphictyony of Onchestus (Strabo ix. 2, 33). It may be inferred from a comparison of Paus. iv. 5. 2 with Herod, vi. 92 that there was an amphictyony of Argos of which Epidaurus and Aegina were members. An amphictyony of Corinth has, with less justification, been assumed on the strength of a passage in Pindar (Nem. Od. vi. 40-42).

Authorities. — Foucart, " Amphictyones," in Daremberg and Saglio, Diet. d. antiq. grecq. et rom. (1873) i. 235-238; F. Cauer, " Amphiktyonia," in Pauly-Wissowa, Realencycl. d. cl. Altertumswiss. (1894) i. 1904-1935; Pomptow, Fasti Delphici, ii. in Neue Jahrb. f. cl. Philol. (1894) cxlix. 497-558, civ. (1897) 737-765, 785-848; E. A. Freeman, History of Federal Government in Greece and Italy (2nd ed., London and New York, 1895), 95-ui; W. S. Ferguson, " Delian Amphictyony," in Classical Review (1901), xv. 38-40; Schomann-Lipsius, Griechische Alterlhiimer (1902), ii. 29-44; E. Bourguet, V Administration financiire du sanctuaire pythique auIV' sihele avant J.C. (Paris, 1905). The earlier literature has been deprived of a great part of its value by recent discoveries of inscrip tions, many of which

may be found in the Bulletin de correspondance hellenique, iii. vii. viii. x. xx. xxi. xxiv. xxvi. xxvii., edited with commentary chiefly by Bourguet, Colin, Foucart and Homolle. See also H. Collitz, Sammlung d. griech. Dialekl-Inschriften, ii. p. 643 ff. and Nos. 2508 ff., edited by Baunack. (G. W. B.)

AMPHILOCHUS, in Greek legend, a famous seer, son of Amphiaraus and Eriphyle and brother of Alcmaeon. According to some he assisted in the murder of Eriphyle, which, according to others, was carried out by Alcmaeon alone (Apollodorus iii. 6, 7). He took part in the expedition of the Epigoni against Thebes and in the Trojan War. After the fall of Troy he founded, in conjunction with Mopsus, another famous seer, the oracle of Mallos in Cilicia. The two seers afterwards fought for its posses- sion, and both were slain in the combat. Amphilochus is also said to have been killed by Apollo (Strabo xiy. 675, 676). Accord- ing to another story, he returned to Argos from Troy, but, being dissatisfied with the condition of things there, left it for Acarnania, where he founded Amphilochian Argos on the Ambracian gulf. He was worshipped at Oropus, Athens and Sparta.

Strabo xiv. pp. 675, 676 ; Thucydides ii. 68 ; Pausanias i. 34, iii. 15.

AMPHION and ZETHUS, in ancient Greek mythology, the twin sons of Zeus by Antiope. When children, they were exposed on Mount Cithaeron, but were found and brought up by a shepherd. Amphion became a great singer and musician, Zethus a hunter and herdsman (Apollodorus iii. 5). After punishing Lycus and Dirce for cruel treatment of Antiope (q.v.), they built and fortified Thebes, huge blocks of stone forming themselves into walls at the sound of Amphion's lyre (Horace, Odes, iii. n). Amphion married Niobe, and killed himself after the loss of his wife and children (Ovid, Metam. vi. 270). The brothers were buried in one grave and worshipped as the Dioscuri " with white horses " (Eurip. Phoen. 609).

AMPHIOXUS, or Lancelet, the name of small, fish-like, marine creatures, forming the class Cephalochorda, of the phylum Vertebrata. Lancelets are found in brackish or salt water, generally near the coast, and have been referred to several genera and many species. They were first discovered by P. S. Pallas in 1778, who took them to be slugs and described them under the name Limax lanceolatus. The true position in the animal kingdom was first recognized in 1834 by O. G. Costa, who named the genus Branchiostoma, and it has since been dealt with by many writers.

The theoretical interest of Amphioxus depends upon a variety of circumstances. In its manner of development from the egg,

and in the constitution of its digestive, vascular, respiratory (branchial), excretory, skeletal, nervous and muscular systems it exhibits what appears to be a primordial condition of vertebrate organization, a condition which is, in fact, partly recapitulated in the course of the embryonic stages of craniate vertebrates. In comparative morphology it provides many illustrations of im- portant biological principles (such, for example, as substitution and change of function of organs), and throws new light upon, or at least points the way to new ideas of, the primitive relations of different organic systems in respect of their function and topo- graphy. One of the most puzzling features in its structure, and, at the same time, one of the greatest obstacles to the view that it is essentially primitive and not merely a degenerate creature, is the entire absence of the paired organs of special sense, olfactory, optic and auditory, which are so characteristic of the higher vertebrates. Although it is true that there is a certain amount of gradation in the degree of development to which these organs have attained in the various orders, yet it is hardly sufficient to enable the imagination to bridge over the gap which separates Amphioxus from the lowest fishes in regard to this feature of organization.

Classification. — On account of the absence of anything in the nature of a skull, Amphioxus has been regarded as the type of a division, Acrania, in contrast with the Craniata which comprise all the higher Chordata. The ordinal name for the genera and species of Amphioxus is Cephalochorda, the term referring to the extension of the primary backbone or notochord to the anterior extremity of the body; the family name is Branchiostomidae. The amount of generic divergence exhibited by the members of this family is not great in the mass, but is of singular interest in detail. There are two principal genera — 1. Branchiostoma Costa, having paired sexual organs (gonadic pouches) ; 2. Heteropleuron Kirkaldy, with unilateral gonads. Of these, the former includes two subgenera, Amphioxus (s. str.) Yarrell and Dolichorhynchus Willey. The species belonging to the genus Heteropleuron are divided among the three subgenera Paramphioxus Haeckel, Epigonichthys Peters, and Asymmelron Andrews. The generic characters are based upon definite modifications of form which affect the entire facies of the animals,

while the specific diagnoses depend upon minor characters, such as the number of myotomes or muscle-segments.

Habits and Distribution. — With regard to its habits, all that need be said here is that while Amphioxus is an expert swimmer when occasion requires, yet it spends most of its time burrowing in the sand, in which, when at rest, it lies buried with head pro- truding and mouth wide agape. Its food consists of microscopic organisms and organic particles; these are drawn into the mouth

tfc an.

Fig. 1. — Epigonichthys cultellus from below and from the left side. (Slightly altered from Kirkaldy.) rm .and Im, Right and left meta-pleur; at, atriopore; an, anus; e, " eyespot " at anterior end of neurochord projecting beyond the myotomes (my) ; n, notochord ; rg". gonads of right side only showing through by transparency; go 20, the last gonad ; dfr, dorsal fin with fin chambers and fin rays ; vfc, ventral fin chambers.

together with currents of water induced by the action of the vibratile cilia which are abundant along special tracts on the sides and roof of the vestibule of the mouth and in the walls of the perforated pharynx ("ciliary ingestion"). Amphioxus favours a littoral habitat, and rarely if ever descends below the 50-fathom line. Species occur in all seas of the temperate, tropical and subtropical zones. The EuroDean species. A. lanceolatus As found

in the Black and Mediterranean Seas, and on the coasts of France, Great Britain and Scandinavia, while a closely allied species or subspecies, A. caribaeus, frequents the Caribbean region from Chesapeake to La Plata. A . californiensis occurs on the coast of California, and A. belcher i extends its area of distribution from Queensland through Singapore to Japan. A recently described species, Dolichorhynchus indicus, characterized by the great length of the praeoral lobe or snout, has been dredged in the Indian Ocean. Paramphioxus bassanus occurs on the coast of Australia from Port Phillip to Port Jackson; P. cingalensis at Ceylon. Epigon- ichthys cultellus (fig. 1) inhabits Torres Strait, and has also been

FlG. 2. — Amphioxus lanceolatus, Yarrell (Branchiostoma lubricum, Coste). (From Ray Lankester.) (1) Lateral view o." adult, to show general form, the myomeres, fin rays and gonads. A. Oral tentacles (28 to 32 in full-grown animals, 20 to 24 in half-growii specimens) ; B, praeoral hood or praeoral epipleur; C, plicated ventral surface of

atrial chamber; D 1 , D 17 , D 26 , gonads, twenty-six pairs, coincident with myotomes 10 to 36; E, metapleur or lateral ridge on atrial epipleur; F, atripore, coincident with myotome 36; G 1 , G 15 , G 3t , double ventral fin rays, extending from myotomes 37 to 52, but having no numerical relation to them; H, position of anus, between myotomes 51 and 52; I, notochord, projecting beyond myotomes; K 7 , K 27 , K 62 , myotomes or muscular segments of body-wall, 62 in number; L m , L 23c , L 253 , dorsal fin rays, about 250 in number, the hard substance of the rav being absent at the extreme ends of the

body (these have no constant numerical relation to the myomeres) ; M, notochord as seen through the transparent myotomes, the thin double-lined spaces being the connective-tissue septa and the broader spaces the muscular tissue of the myotomes; N, position of brown funnel of left side (atrio-coelomic canal) ; O, nerve tube resting on notochord.

(2) Dissection of Amphioxus. By a horizontal incision on each side of the body a large ventral area has been separated and turned over, as it were on a hinge, to the animal's left side. The perforated pharyngeal region has then been detached from the adherent epi-pleura or opercular folds (wall of atrial or branchial chamber) by cutting the fluted pharyngo-pleural membrane d, and separated by a verticar cut from the intestinal region, a, Edge of groove formed by adhesion of median dorsal surface of alimentary canal to sheath of notochord ; b, median dorsal surface of alimentary canal ; c, left dorsal aorta ; cc, single dorsal aorta, formed by union of the two anterior vessels; cc', same vessel resting on intestine; d, cut edge of pharyngo-pleural folds of atrial tunic, really the original outer body-wall before the downgrowth of epipleura; d', atrial tunic (original body-wall) at non-perforate region, cut and turned back so as to expose peri-enteric coelom and intestine r; e', upstanding folds of body-wall (pharyngo-pleural folds) on alternate bars of per- forate region of body; /, atrio-coelomic canals or brown funnels (collar-pores of Balanoglossus); g, cavity of a gonad-sac; m, cut musculature of body- wall; n, anus; 0, post-atrioporal extension of atrial chamber in form of a tubular caecum; p, atriopore; q, hepatic caecum ; r, intestine ; s, coelom ; /, area of adhesion between alimentary canal and sheath of notochord; v, atrial chamber or branchial cavity; w, post-atrioporal portion of intestine; x, canals of metapleura exposed

by cutting; E, probe passing through atrio- pore into atrial or branchial chamber; FF , probe passing from coelom, where it expands behind the atriopore, into narrower peri- enteric coelom of praeatrioporal region.

(3) Portion of (2) enlarged to show atrio-coelomic canals ("brown funnels " of Lankester). Lettering as in (2).

(4) Section taken transversely through praeoral region near termination of nerve tube, a, Olfactory ciliated pit on animal's left side, its wall confluent with substance of nerve tube; b, pigment spot (rudimentary eye) on anterior termination of nerve tube ; c, first pair of nerves in section; d, fin ray; e, myotome; /, notochord; g, space round myotome (?artifact or coelom) ; h, subchordal canal (? blood-vessel) ; i, a symmetrical epipleura of praeoral hood.

found at Ternate. Asymmetron lucayanum is the Bahaman representative of the family, with a subspecies, A. caudatum, in the South Pacific from New Guinea to the Loyalty Islands. The Peruvian species, Branchiostoma elongatum, with nearly eighty myotomes, cannot at present be assigned to its proper subgenus.

External Form.— The following description, unless otherwise stated, refers to A. lanceolatus. Amphioxus is a small fish-like creature attaining a maximum length of about 3 in., semi- transparent in appearance, showing iridescent play of colour. The body is narrow, laterally compressed and pointed at both ends. The main musculature can be seen through the thin skin to be divided into about sixty pairs of muscle-segments (myo- tomes) by means of comma-shaped dissepiments, the myocommas, which stretch between the skin and the central skeletal axis of the body. These myotomes enable it to swim rapidly with char- acteristic serpentine undulations of the body, the movements being effected by the alternate contraction and relaxation of the longitudinal muscles on both sides. Apparently correlated with this peculiar locomotion is the anatomical fact of the alteration of the myotomes on the two sides. Symmetrical at their first appearance in the embryo, the somites (from which the myotomes are derived) early undergo a certain distortion, the effect of which is to carry the somites of the left side forwards through the length of one half-segment. For example, the twenty-seventh myotome of the left side is placed opposite to the twenty-sixth myocomma of the right side. The back of the body is occupied by a crest, called the dorsal fin, consisting of a hollow ridge, the cavity of which is divided into about 250 compartments or fin chambers, into each of which, with the exception of those near

the anterior and posterior end of the body, projects a stout pillar composed of characteristic laminar tissue, the fin ray. The dorsal crest is continued round both extremities, becoming expanded to form the rostral fin in front and the caudal fin behind. Even in external view, careful inspection will show that the body is divisible into four regions, namely, cephalic, atrial, abdominal and caudal. The cephalic region includes the rostrum or praeoral

flIGHT

Fig. 3. — Transverse sections of Amphioxus. (From Lankester.) A. Section through region of atrio-coelomic canals, v. B. Section in front of mouth ; the right and left sides are transposed, a, Cavity surround- ing fin ray; a', fin ray; b, muscular tissue of myotome; c, nerve- cord ; d, notochord ; c, left aorta ; /, thickened ridges of epithelium of praeoral chamber (Rader organ) ; g, coiled tube lying in a coelomic space on right side of praeoral hood, apparently an artery ; h, cuticle of notochord ; i, connective-tissue sheath of notochord ; k, median ridge of skeletal canal of nerve-cord; /, skeletal canal protecting nerve-cord; m, inter-segmental skeletal septum of myotome; n, subcutaneous ' skeletal connective tissue; 0, ditto of metapleur (this should be relatively thicker than it is) ; q, sub cutaneous connective tissue of ventral surface of atrial wall (not a canal, as supposed by Stieda and others); r, epiblastic epithelium; s, gonad-sac containing ova ; /, pharyngeal bar in section, one of the " tongue " bars alternating with the main bars and devoid of pharyngo-pleural fold and cqelom; v, atrio-coelomic funnel; u\ so- called dorsal " coelom; x, lymphatic space or canal of metapleur; y, sub-pharyngeal vascular trunk; z, blood-vessel (portal vein) on wall of hepatic caecum; aa, space of atrial or branchial chamber; bb, ventral groove of pharynx (anteriorly this takes the form of a ridge); cc, hyperbranchial groove of pharynx; dd, lumen or space of hepatic caecum; ee, narrow coelomic space surrounding hepatic caecum ; ff, lining cell-layer of hepatic caecum ; gg, inner face of a pharyngeal bar clothed with hypoblast, the outer face covered with epiblast (represented black) ; hh, a main pharyngeal bar with projecting pharyngeal fold (on which the reference line rests) in section, showing coelomic space beneath the black 'epiblast ; ii, transverse ventral muscle of epipleura; kk, raphe or plane of fusion of two down-grown epipleura; 11, space and nucleated cells on dorsal face of notochord; mm, similar space and cells en its ventral face.

lobe and the mouth. As already stated, the notochord extends beyond the mouth to the tip of the rostrum. The mouth consists of two portions, an outer vestibule and an inner apertura oris; the latter is surrounded by a sphincter muscle, which forms the so-called velum. The vestibule of the mouth is the space bounded by the oral hood; this arises by second- ary downgrowth of lid-like folds over the true oral aperture, and is provided with a fringe of tentacular cirri, each of which is supported by a solid skeletal axis. The oral hood with its cirri has a special nerve supply and musculature by which the cirri can be either spread out, or bent inwards so that those of one side may interdigitate with those of the other, thus completely closing the en- trance to the mouth. The velum is also provided withacircletof twelve tantacles (in some species sixteen) which hang backwards into the pharynx; these are the velar tentacles. The atrial region extends from the mouth over about two- thirds of the length of the body, terminat- ing at a large median ventral aperture, the atriopore; this is the excurrent orifice for the respiratory current of water and also serves for the evacuation of the generative products. This region is really the branchiogenital region, al- though the fact is not apparent in exter- nal view. The ventral side of the body in the atrial region is broad and convex, so that the body presents the appearance of a spherical triangle in transverse sec- tion, the apex being formed by the dorsal fin and the angles bordered by two hollow folds, the metapleural folds, each of which contains a continuous longitudi- nal lymph-space, the metapleural canal. In the genus Branchiostoma the meta- pleural folds terminate symmetrically shortly behind the atriopore, but in Heteropleuron the right metapleur passes uninterruptedly into the median crest of the ventral fin (fig. 1). In this connexion it may also be mentioned that in all cases the right half of the oral hood is directly continuous with the rostral fin (fig. 2). The abdominal region comprises a short stretch of body between atriopore and anus, the termination of the alimentary canal. It is characterized by the presence of a special development of the lophioderm or median fin-system, namely, the ventral fin, which is composed of two portions, a lower keel-like portion, which underlies an upper chambered portion, each chamber containing typically a pair of gelatinous fin rays. Finally, the caudal region comprises the post-anal division of the trunk. The keel of the ventral fin is continued past the anus into the expanded caudal fin, and so it happens that the anal opening is displaced from the middle line to the left side of the fin. In Asymmetron the caudal region is remarkable for the curious elongation of the notochord, which is produced far beyond the last of the myotomes.

Alimentary, Respiratory and Excretory Systems.— Although the function of the two latter systems of organs is the purification of the blood, they are not usually considered together, and it is therefore the more remarkable that their close association in Amphioxus renders it necessary to treat them in common. The alimentary canal is a perfectly straight tube lined throughout by ciliated epithelium. As food particles pass in through the mouth they become enveloped in a slimy substance (secreted by the endostyle) and conveyed down the gut by the action of the vibratile cilia as a continuous food-rope, the peristaltic move- ments of the gut-wall being very feeble. The first part of the alimentary canal consists of the pharynx or branchial sac, the side walls of which are perforated by upwards of sixty pairs of elongated

Fig. 4. — Amphioxus lanceolatus laid open ven- trally. (After Rathke, slightly altered.) m, Mouth appearing as an elongated slit when relaxed (as in the lamprey) ; p, perforated pharynx; e, endostyle; g, gonads; /, liver; at, level of atriopore; i, intestine; an, anus. In this species the atrium is produced as an asym- metrical blind pouch behind the atriopore as far as the anus.

slits, the gill-clefts. Each primary gill-cleft becomes divided into two by a tongue-bar which grows down secondarily from the upper wall of the cleft and fuses with the ventral wall. New clefts continue to form at the posterior end of the pharynx during the adult life of the animal. The gill-clefts open directly from the cavity of the pharynx into that of the atrium, and so give egress to the respiratory current which enters the mouth with the food (fig. 4) . The atrium or atrial chamber is a peripharyngeal cavity of secondary origin effecting the enclosure of the gill-clefts, which in the larva opened directly to the exterior. The atrium is thus analogous to the opercular cavity of fishes and tadpoles, and, as stated above, remains in communication with the exterior by means of the atriopore. The primary and secondary bars which separate and divide the successive gill-clefts from one another are traversed by blood-vessels which run from a simple tubular con- tractile ventral branchial vessel along the bars into a dorsal aorta. The ventral branchial vessel lies below the hypobranchial groove or endostyle, and is the representative of a heart. As water for respiration streams through the clefts, gaseous interchange takes place between the circulating colourless blood and the percolat- ing water. The pharynx projects freely into the atrium; it is surrounded at the sides and below by the continuous atrial cavity, but dorsally it is held in position in two ways. First, its dorsal wall (which is grooved to form the hyperpharyngeal groove) is closely adherent to the sheath of the notochord; and secondly, the

pharynx is attached through the intermediation of the primary bars. These are suspended to the muscular body- wall by a double membrane, called the ligamentum denticuiatum, which forms at once the roof of the atrial chamber and the floor of a persistent portion of the original body-cavity or coelom (the dorsal coelomic canal on each side of the pharynx). The liga- mentum denticuiatum is thus lined on one side by the epiblastic atrial epithelium, and on the other by mesoblastic coelomic epithelium. Now this ligament is inserted into the primary bars some distance below the upper limits of the gill-clefts, and it therefore follows that, corresponding with each tongue-bar, the atrial cavity is produced upward beyond the insertion of the ligament into a series of bags or pockets, which may be called the atrial pouches. At the top of each of these pouches there is a minute orifice, the aperture of a small tubule lying above each pouch in the dorsal coelom. These tubules are the excretory tubules or nephridia. They communicate with the coelom by several openings or nephrostomes, and with the atrium by a single opening in each case, the nephridiopore. It is important to emphasize the fact that in Amphioxus the excretory tubules are co-extensive with the gill-clefts. The perforated pharynx terminates some distance in front of the atriopore. At the level of its posterior end a pair of funnel-shaped pouches of the atrium are produced forwards into the dorsal coelom. These are the atrial coelomic funnels or brown funnels, so called on account of the characteristic pigmentation of their walls. There are reasons for supposing that these funnels are vestiges of an ancient excretory system, which has given way by substitution to the excretory tubules described above. In the same region of the body, namely, close behind the pharynx, a large diverticulum is given off from the ventral side of the gut. This is the hepatic caecum (fig. 2, 2, q, fig. 4, /), which is quite median at its first origin, but, as it grows in length, comes to lie against the right wall of the pharynx. Although within the atrial cavity, it is separated from the latter by a narrow coelomic space, bounded towards the atrium by coelomic and atrial epithelium. No food passes into the hepatic caecum, whichhas been definitely shown on em bryological and physiological grounds to be the simplest persistent form of the vertebrate liver. Nervous System.- — As has already been indicated, a solid sub- cylindrical elastic rod, the notochord, surrounded by a sheath of laminar connective tissue, the cordal sheath, lies above the ali- mentary canal in contact with its dorsal wall, and extends beyond it both in front and behind to the obtusely pointed extremities of the body. This notochord represents the persistent primordial skeletal axis which, in the higher Craniata (though not so in the lower), gives way by substitution to the segmented vertebral column. Immediately above

the notochord there lies another

subcylindrical cord, also surrounded by a sheath of connective tissue. This cord is neither elastic nor solid, but consists of nerve tissue, fibres and ganglion cells, surrounding a small central canal. For the sake of uniformity in nomenclature this nerve-cord may be called the neurochord. It is the central nervous system, and contains within itself the elements of the brain and spinal marrow of higher forms. The neurochord tapers towards its posterior end, where it is coextensive with the notochord, but ends abruptly in front, some distance behind the tip of the snout. The neurochord attains its greatest thickness not at its anterior end but some way behind this region; but the central canal dilates at the anterior extremity to form a thin-walled cerebral vesicle, in the front wall of which there is an aggregation of dark pigment cells constituting an eyespot, visible through the transparent skin (fig. 1). There are two pairs of specialized cerebral nerves innervating the praeoral lobe, and provided with peripheral ganglia placed near the termination of the smaller branches. Corresponding with each pair of myotomes, and subject to the same alternation, two pairs of spinal nerves arise from the neurochord, namely, a right and left pair of compact dorsal sensory roots without ganglionic enlargement, and a right and left pair of ventral motor roots composed of loose fibres issuing separately from the neurochord and passing directly to their termination on the muscle-plates of the myotomes. The first dorsal spinal nerve coincides in position with the myocomma which separates the first myotome from the second on each side, and thereafter the successive dorsal roots pass through the substance of the myocommata on their way to the skin; they are therefore septal or intersegmental in position. The ventral roots, on the contrary, are myal or seg- mental in position. In addition to the cerebral eyespot there are large numbers of minute black pigmented bodies beside and

below the central canal of theneuro- chord, commencing from the level of the third myotome. It has been determined that these bodies are of the nature of eyes (Becheraugen, R. Hesse), each consisting of two cells, a cup-shaped pigment cell and a triangular retinal cell. These may be called the spinal eyes, and it is said that they are disposed in such a way as to receive illumination preferentially from the right side, although this fact has no relation with the side upon which Amphi- oxus may lie upon the sand. When kept in captivity

the animal often lies upon one side on the surface of the sand, but on either side indiffer- ently. Over the cerebral eye there is a small orifice placed to the left of the base of the cephalic fin, leading into a pit which extends from the surface of the body to the surface of the cerebral vesicle; this is known as A. von Kolliker's olfactory pit.

Reproductive System.- — The sexes are separate, and the male or female gonads, which are exactly similar in outward appearance, occur as a series of gonadic pouches project- ing into the atrial cavity at the base of the myotomes (figs. 2,3,4). At the breeding season the walls of the pouches burst and the sexual elements pass into the atrium, whence they are discharged through the atriopore into the water, where fertilization takes place.

Development. — The development of Amphioxus possesses many features of interest, and cannot fail to retain its importance as an introduction to the study of

W^m >m y

Fig. 5. — Diagram of embryo of Amphioxus seen from above in optical section. (Adapted from Hatschek.) pc, Pre- chordal head-cavity of em- bryo; cc, collar-cavity (first somite) ; my, mesodermic somites (myocoelomic or archenteric pouches) ; ch, notochord with the neural tube (neurochord) lying upon it; np, anterior neuropore; ne, position of posterior neur- enteric canal.

embryology. The four principal phases in the development are: (1) Blastula, (2) Gastrula, (3) Flagellate Embryo, (4) Larva. The segmentation or cleavage of the ovum which follows upon fertilization terminates in the achievement of the blastula form, a minute sphere of cells surrounding a central cavity. Then follows the phenomenon of gastrulation, by which one- half of the blastula is invaginated into the other, so as to obliterate the segmentation cavity. The embryo now consists of two layers of cells, epiblast and hypoblast, surrounding a cavity, the archenteron, which opens to the exterior by the orifice of invagination or blastopore. One important fact should

anp 8″ cc

r w&

m rm.',

Fig. 6. — Anterior region of two pelagic larvae of A. lanceolatus ob-

tained by the tow-net in 8-10 fathoms, showing the asymmetry of the large lateral sinistral mouth with its ciliated margin cm and the dextral series of simple primary gill-slits (lps-iˆps). The larvae swim normally like the adult or suspend themselves by their flagella (not shown in the figures) vertically in mid-water. There is nothing in their mode of life which will afford an explanation of the asymmetry which is a developmental phenomenon. Lettering of upper figure. — anp, Anterior neural pore ; be, rudiment of buccal skeleton ; c, cilia; cb, ciliated band; cc, ciliated groove; cm, cilia at margin of mouth; gl, external opening of club-shaped gland; Hn, Hatschek's nephridium; Im, left metapleur; n, notochord; pp, praeoral pit; ps, primary gill-slits, 1, 5, and 13; rm, right meta- pleur showing through. Lettering of lower figure. — a, Atrium ; al, alimentary canal; bv, blood-vessel; cv, cerebral vesicle; if, dorsal section of myocoel (= fin spaces); e, "eyespot"; end, endostyle; gl, club-shaped gland; Im, edge of left metapleur; m, lower edge of mouth; n, notochord; nt, pigmented nerve tube; ps, primary gill-slits, I, 9, and 14; re, renal cells on atrial floor; rm, edge of right metapleur; so, sense organ opening into praeoral pit ; is, thickenings, the rudiments of the row of secondary gill-slits.

be noted with regard to the gastrula, in which it seems to differ from the gastrulae of invertebrata. After invagination is completed, the embryo begins to elongate, the blastopore becomes narrower, and the dorsal wall of the gastrula loses its convexity, and becomes flattened to form the dorsal plate, the outer layer of which is the primordium of the neurochord and the inner layer the primordium of the notochord. While still within the egg-membrane the epiblastic cells become flagellated, and the gastrula rotates within the membrane. About the eighth hour after commencement of development the membrane ruptures and the oval embryo escapes, swimming by means of its flagella at the surface of the sea for another twenty-four hours, during which the principal organs are laid down, although the mouth does not open until the close of this period. The primordium of the neurochord (neural or medullary plate) referred to above becomes closed in from the surface by the overgrowth of surrounding epiblast, and its edges also bend up, meet, and finally fuse to form a tube, the medullary or neural tube. An important fact to note is that the blastopore is included in this overgrowth of epiblast, so that the neural tube remains for some time in open communication with the archenteron by means of a posterior neurenteric canal. It is still longer before the neural tube completes its closure in front, exhibiting a small orifice at the surface, the anterior neuropore. It is thus possible that the neurenteric canal is due to the con- junction of

a posterior neuropore with the blastopore, i.e. it is a complex and not a simple structure. Paired archenteric pouches

meanwhile appear at the sides of the axial notochordal tract, the mesoblastic somites. The first of these differs in several respects from those which succeed, and has been called the collar cavity (MacBride) . In front of the latter there remains a portion of the archenteron, which becomes constricted off as the head cavity. This becomes divided into two, the right half forming the cavity of the rostrum, while the left acquires an opening to the exterior, and forms the praeoral pit of the larva, which subsequently gives rise to special ciliated tracts in the vestibule of the mouth mentioned above. The larval period commences at about the thirty-sixth hour with the perforation of the mouth, first gill-cleft and anus. The larva is curiously asymmetrical, as many as fourteen gill-clefts appearing in an unpaired series on the right side, while the mouth is a large orifice on the left side, the anus being median. The adult form is achieved by metamorphosis, which cannot be further described here. One point must not be omitted, namely, the homogeny of the endostyle of Amphioxus and the thyroid gland of Craniata.

References. — T. Boveri, " Die Nierencanalchen des Amphi- oxus," Zool Jahrb. Anat. v. (1892), p. 429; T. Felix, " Beitrage zur Entwickelungsgeschichte der Salmoniden," Anat Hefte Arb. viii. 1897; Amphioxus, p. 333; T. Garbowski, "Amphioxus als Grundlage der Mesodermtheorie," Anat Anz. xiv. (1898), p. 473; R. Hesse, " Die Sehorgane des Amphioxus," Zeitschr. wiss. Zool. lxiii. (1898), p 456 ; J. W. Kirkaldy, " A Revision of the Genera and Species of the Branchiostomidae," Quart. J. Micr. Sci. xxxvii. (1895), p. 303; E. R. Lankester, " Contributions to the Knowledge of Amphioxus lanceolatus (Yarrell)," op, cit., xxix. (1889), p. 365; Lwoff, " Die Bildung der primaren Keimblatter und die Ent- stehung der Chorda und des Mesoderms bei den Wirbelthieren," Bull. Soc. Moscow (1894); E. W. MacBride, " The early Development of Amphioxus," Quart. J. Micr. Sci. xl. (1897), p. 589, and xliii. (1900) ; T. H. Morgan and A. P. Hazen, " The Gastrulation of Amphioxus," J. Morphol. xvi. (1900), p. 569; P. Sammassa, " Studien iiber den Einfluss des Dotters auf die Gastrulation und die Bildung der primaren Keimblatter der Wirbelthiere : iv. Amphioxus" Arch. f. Entwick. Mech. vii. (1898), p. 1; G. Schneider, " Einiges iiber Resorption und Excretion bei Amphioxus lanceolatus," Anat. Anz.

xvi. (1899), p. 601 ; J. Sobotta, " Die Reifung und Befruchtung des Eies von Amphioxus lanceolatus," Arch. mikr. Anat. 1. (1897), p. 15; F. E. Weiss, " Excretory tubules in Amphioxus lanceolatus," Quart. J. Micr. Sci. xxxi. (1890), p. 489; A. Willey, Amphioxus and the Ancestry of the Vertebrates (1894) ; " Remarks on some recent Work on the Protochorda," Quart. J. Micr. Sci. xliii. (1899), p. 223; '" Dolichorhynchus indicus," ib. (1901); W. B. Benham, " Hetero-pleuron of New Zealand," ib. (1901); E Burchardt, "Finer Anatomy of Amphioxus," with bibliography, Jena Zeitschr. xxxiv. (1900), p. 719. (A. W.)*

AMPHIPOLIS (mod. Yeni Keui), an ancient city of Macedonia, on the east bank of the river Strymon, where it emerges from Lake Cercinitis, about 3 m. from the sea. Originally a Thracian town, known as "E.vvta 'Odoi (" Nine Roads "), it was colonized by Athenians with other Greeks under Hagnon in 437 B.C., previous attempts — in 497, 476 (Schol. Aesch. De fals. leg. 31) and 465 — having been unsuccessful. In 424 B.C. it surrendered to the Spartan Brasidas without resistance, owing to the gross negli- gence of the historian Thucydides, who was with the fleet at Thasos. In 422 B.C. Cleon led an unsuccessful expedition to recover it, in which both he and Brasidas were slain. The im- portance of Amphipolis in ancient times was due to the fact that it commanded the bridge over the Strymon, and consequently the route from northern Greece to the Hellespont; it was important also as a depot for the gold and silver mines of the district, and for timber, which was largely used in shipbuilding. This importance is shown by the fact that, in the peace of Nicias (421 B.C.), its restoration to Athens is made the subject of a special provision, and that about 417, this provision not having been observed, at least one expedition was made by Nicias with a view to its recovery. Philip of Macedon made a special point of occupying it (357), and under the early empire it became the headquarters of the Roman propraetor, though it was recognized as independent. Many inscriptions, coins, &c, have been found here, and traces of the ancient fortifications and of a Roman aqueduct are visible.

AMPHIPROSTYLE (from the Gr. apcbi, on both sides, and irpocrTv'Kos, a portico), the term for a temple (q.v.) with a portico both in the front and in the rear.

AMPHISBAENA (a Greek word, from aix&s, both ways, and fiaiveiv, to go), a serpent in ancient mythology, beginning or ending at both head and tail alike. Its fabled existence has been utilized by the poets, such as Milton, Pope and Tennyson. In modern zoology it is

the name given to the main genus of a family of worm-shaped lizards, most of which inhabit the tropical parts of America, the West Indies and Africa. The commonest species in South America and the Antilles is the sooty or dusky A. fuliginosa. The body of the amphisbaena, from 18 to 20 in. long, is of nearly the same thickness throughout. The head is small, and there can scarcely be said to be a tail, the vent being close to the extremity of the body. The animal lives mostly underground, burrowing in soft earth, and feeds on ants and other small animals. From its appearance, and the ease with which it moves backwards, has arisen the popular belief that the amphisbaena has two heads, and that when the body is cut in two the parts seek each other out and reunite. From this has arisen another popular error, which attributes extraordinary curative properties to its flesh when dried and pulverized.

AMPHITHEATRE (Gr. &/j.

In Italy, combats of gladiators at first took place in the forums, where temporary wooden scaffoldings were erected for the spectators; and Vitruvius gives this as the reason why in that country the forums were in the shape of a parallelo- gram instead of being squares as in Greece. Wild beasts were also hunted in the circus. But towards the end of the Roman republic, when the shows increased both in frequency and in costliness, special buildings began to be provided for them.

The first amphitheatre at Rome was that constructed, 59 B.C., by C. Scribonius Curio. Pliny tells us that Curio built two wooden theatres, which were placed back to back, and that after the dramatic representations were finished, they were turned round, with all the spectators in them, so as to make one circular theatre, in the centre of which gladiators fought; but the story is incredible, and must have arisen from the false translation of aixfadearpov by " double theatre." It is uncertain whether Caesar, in 46 B.C., constructed a temporary amphitheatre of wood for his shows of wild beasts; at any rate, the first permanent amphitheatre was built by C. Statilius Taurus in 29 B.C. Probably the shell only was of stone. It was burnt in the great fire of a.d. 64.

We hear of an amphitheatre begun by Caligula and of a wooden structure raised in the year a.d. 57 by Nero; but these were superseded by the Amphitheatrum Flavium (known at least since the 8th century as the Colosseum, from its colossal size), which was begun by Vespasian on the site of an artificial lake included in the Golden House of Nero, and inaugurated by Titus in a.d. 80 with

shows lasting one hundred days. It was several times restored by the emperors, having been twice struck by lightning in the 3rd century and twice damaged by earthquake in the 5th. Gladiatorial shows were suppressed by Honorius in a.d. 404, and wild beast shows are not recorded after the reign of Theodoric (d. a.d. 526). In the 8th century Bede wrote Quamdiu stabit Coliseus, stabit et Roma; quando cadet Coliseus, cadet et Roma. A large part of the western arcades seem to have collapsed in the earthquake of a.d. 1349, and their remains were used in the Renaissance as a quarry for building materials (e.g. for the Palazzo di Venezia, the Cancelleria and the Palazzo Farnese).

Rome possesses the remains of a second amphitheatre on the Esquiline, called by the chronologist of a.d. 354 Amphitheatrum Castrettse, which probably means the " court " or " imperial "

amphitheatre. Its fine brickwork seems to date from Trajan's reign. It was included by Aurelian in the circuit of his wall. The remains of numerous amphitheatres exist in the various provinces of the empire. The finest are — in Italy, those of Verona (probably of the Flavian period), Capua (built under Hadrian) and Pozzuoli; in France, at Nlmes, Aries and Frejus; in Spain, at Italica (near Seville) ; in Tunisia, at Thysdrus (El- Jem); and at Pola, in Dalmatia. The builders often took advantage of natural features, such as a depression between hills; and ruder structures, mainly consisting of banked-up earth, are found, e.g. at Silchester (Calleva) . The amphitheatre at Pompeii (length 444 ft., breadth 342 ft., seating capacity 20,000) is formed by a huge embankment of earth supported by a retaining wall and high buttresses carrying arches. The stone seats (of which there are thirty-five rows in three divisions) were only gradu- ally constructed as the means of the community allowed. Access to the highest seats was given by external staircases, and there was no system of underground chambers for wild beasts, combatants, &c.

In contrast to this simple structure the Colosseum represents the most elaborate type of amphitheatre created by the architects of the empire. Its external elevation consisted of four storeys. The three lowest had arcades whose piers were adorned with engaged columns of the three Greek orders. The arches numbered eighty. Those of the basement storey served as entrances; seventy-six were numbered and

allotted to the general body of spectators, those at the extremities of the major axis led into the arena, and the boxes reserved for the emperor and the presiding magistrate were approached from the extremities of the minor axis. The higher arcades had a low parapet with (apparently) a statue in each arch, and gave light and air to the passages which surrounded the building. The openings of the arcades above the principal entrances were larger than the rest, and were adorned with figures of chariots. The highest stage was composed of a continuous wall of masonry, pierced by forty small square windows, and adorned with Corinthian pilasters. There was also a series of brackets to support the poles on which the awning was stretched.

The interior may be naturally divided into the arena and the cavea (see annexed plan, which shows the Colosseum at two different levels).

The arena was the portion assigned to the combatants, and derived its name from the sand with which it was strewn, to absorb the blood and prevent it from becoming slippery. Some of the emperors showed their prodigality by substituting precious powders, and even gold dust, for sand. The arena was generally of the same shape as the amphitheatre itself, and was separated from the spectators by a wall built perfectly smooth, that the wild beasts might not by any possibility climb it. At Rome it was faced inside with polished marble, but at Pompeii it was simply painted. For further security, it was surrounded by a metal railing or network, and the arena was sometimes surrounded also by a ditch (euripus), especially on account of the elephants.

Below the arena were subterranean chambers and passages, from which wild beasts and gladiators were raised on movable plat- forms (pegmata) through trap-doors. Such chambers have been found in the amphitheatres of Capua and Pozzuoli as well as in the Colosseum. Means were also provided by which the arena could be flooded when a sea-fight (naumachia) was exhibited, as was done by Titus at the inauguration of the Colosseum.

The part assigned to the spectators was called cavea. It was divided into several galleries (maeniana) concentric with the outer walls, and therefore, like them, of an elliptical form. The place of honour was the lowest of these, nearest to the arena, and called the podium. The divisions in it were larger, so as to be able to contain movable seats. At Rome it was here that the emperor sat, his box bearing the name of suggestus, cubiculum or pulvinar. The senators, principal

magistrates, vestal virgins, the provider {editor) of the show, and other persons of note, occupied the rest of the podium. At Nimes, besides the high officials of the town, the podium had places assigned to the principal gilds, whose names are still seen inscribed upon it, with the number of places reserved for each. In the Colosseum there were three maeniana above the podium, separated from each other by terraces (praecinctiones) and walls (baltei), and divided vertically into wedge-shaped blocks (cunei) by stairs. The lowest was appropriated to the equestrian order, the highest was covered in with a portico, whose roof formed a terrace on which spectators found standing room. Numerous passages (vomiloria) and small stairs gave access to them; while long covered corridors, behind and below them, served for shelter in the event of rain. At Pompeii each place was numbered, and elsewhere their extent is defined by little marks cut in the stone. The spectators were admitted by tickets (tesserae), and order preserved by a staff of officers appointed for the purpose.

The height of the Colosseum is about 160 ft.; but the fourth storey in its present form is not earlier in date than the 3rd century a.d. It seems to have been originally of wood, since an inscription of the year a.d. 80 mentions the summum maenianum in ligneis. It is stated in the Notitia Urbis Romae (4th century) that the Colosseum contained 87,000 places; but Huelsen calcu- lates that the seats would accommodate 45,000 persons at most, besides whom 5000 could find standing room. The exaggerated estimate is due to the fact that space was allotted to corporate bodies, whose numbers were taken as data. The greatest length is about 615 ft., and the length of the shorter axis of the ellipse about 510 ft. The dimensions of the arena were 281 ft. by 177 ft.

The following table, giving the dimensions of some of the principal amphitheatres, is based mainly on the figures given by Friedlander (I.e.): —

Entire Building.

Arena.

Greater Axis.

Shorter Axis.

Greater Axis.

Shorter Axis.

Rome (Colosseum)

Capua

Juha Caesarea .

Italica (Seville)

Verona

Thysdrus .

Tarraco

Pozzuoli .

Pola .

Pompeii NJmes

615

557

551

514

502 i

488

486

482

472

449i

448

444 440

510I

458

289

439i

4°3

406

390

383

406

367i

352 342 336

281 250 459

248

308

277

236i

223

230

229

2l8|

227

177 148 197

H5i

197 181 137!

98i

144 129*

II5 , 126J

Bibliography. — Arts. ” Amphitheatrum ” in Smith’s Dictionary of Greek and Roman Antiquities (3rd ed., 1890), and in Daremberg and Saglio’s Dictionnaire des antiquites; Friedlander, Darstellungen ausder Sittengeschichte Roms (6th ed., 1888-1890), vol. ii. pp. 551-620 ; Durm, Geschichte der Baukunst, II. 2 (1905), 360 ft”. Of older works, J. Lipsius, De Amphitheatris (1585); Carlo Fontana, L’Anfiteatro Flavio (1725); and Maffei, Verona Illustrata, vol. ii. (1826), are worthy of mention. For the amphitheatre at Pompeii, see Mau-Kelsey.

AMPHITHEATRE

Plate I.

»?«JW« St.Mf:-

it i

r ■ – 5 1 1

“T ■’ ”

EXTERIOR OF THE AMPHITHEATRE AT POLA (Pietas Julia), ISTRIA.

Photo, Dr. T.Ashby.

‘]

e fift «^:A*MA tm^^^*

*i#»*s«» T^j’,*

: i = ’: ^c .;;ij; ^|| Vf r i ‘ ‘: ‘

*^WfWf^v^^^iWw’^*

1. 892.

Photo, Neurdem.

EXTERIOR OF THE AMPHITHEATRE AT NlMES (NEMAUSUS).

Plate II.

AMPHITHEATRE

INTERIOR OF THE AMPHITHEATRE AT POMPEII.

INTERIOR OF THE AMPHITHEATRE AT POZZUOLI (PUTEOLI).

Photo, Brogi.

seum, Middleton, Remains of Ancient Rome, ii. pp. 78-110, and Huelsen's art. " Flaviura Amphitheatrum " in Pauly-Wissowa,

Realencyclopddie.

Pompeii, its Life and Art (2nd ed. 1904), chap. 30; for the Colos-

*"■-"" n --- ' *-• — ' » ■ '■ 78-IIO, 3" A*

ly-Wissoi (H. S. J.)

AMPHITRITE, in ancient Greek mythology, a sea-goddess, daughter of Nereus (or Oceanus) and wife of Poseidon. She was so entirely confined in her authority to the sea and the creatures in it, that she was never associated with her husband either for purposes of worship or in works of art, except when he was to be distinctly regarded as the god who controlled the sea. She was one of the Nereids, and distinguishable from the others only by her queenly attributes. It was said that Poseidon saw her first dancing at Naxos among the other Nereids, and carried her off (Schol. on Od. iii. 91). But in another version of the myth, she then fled from him to the farthest ends of the sea, where the dolphin of Poseidon found her, and was rewarded by being placed among the stars (Eratosthenes, Catast. 31). In works of art she is represented either enthroned beside him, or driving with him in a chariot drawn by sea-horses or other fabulous creatures of the deep, and attended by Tritons and Nereids. In poetry her name is often used for the sea.

AMPHITRYON, in Greek mythology, son of Alcaeus, king of Tiryns

in Argolis. Having accidentally killed his uncle Electryon, king of Mycenae, he was driven out by another uncle, Sthenelus. He fled with Alcmene, Electryon 's daughter, to Thebes, where he was cleansed from the guilt of blood by Creon, his maternal uncle, king of Thebes. Alcmene, who had been betrothed to Amphi- tryon by her father, refused to marry him until he had avenged the death of her brothers, all of whom except one had fallen in battle against the Taphians. It was on his return from this expedition that Electryon had been killed. Amphitryon accord- ingly took the field against the Taphians, accompanied by Creon, who had agreed to assist him on condition that he slew the Teumessian fox 'which had been sent by Dionysus to ravage the country. The Taphians, however, remained invincible until Comaetho, the king's daughter, out of love for Amphitryon cut off her father's golden hair, the possession of which rendered him immortal. Having defeated the enemy, Amphitryon put Comaetho to death and handed over the kingdom of the Taphians to Cephalus. On his return to Thebes he married Alcmene, who gave birth to twin sons, Iphicles being the son of Amphitryon, Heracles of Zeus, who had visited her during Amphitryon's absence. He fell in battle against the Minyans, against whom he had undertaken an expedition, accompanied by the youthful Heracles, to deliver Thebes from a disgraceful tribute. Accord- ing to Euripides {Hercules Furens) he survived this expedition, and was slain by his son in his madness. Amphitryon was the title of a lost tragedy of Sophocles; the episode of Zeus and Alcmene forms the subject of comedies by Plautus and Moliere. From Moliere's line " Le veritable Amphitryon est l'Amphitryon oil Ton dine " {Amphitryon, iii. 5), the name Amphitryon has come to be used in the sense of a generous entertainer, a good host.

Apollodorus ii. 4; Herodotus v. 59; Pausanias viii. 14, ix, 10, 11, 17; Hesiod, Shield, 1-56; Pindar, Pythia, ix. 81.

AMPHORA (a Latin word from Gr. afi4>optvs, derived from d,u< £i, on both sides, and 4>eptiv, to bear), a large big-bellied vessel used by the ancient Greeks and Romans for preserving wine, oil, honey, and fruits; and in later times as a cinerary urn. It was so named from usually having an ear or handle on each side of the neck {diota) . It was commonly made of earthenware, but sometimes of stone, glass or even more costly materials. Amphorae either rested on a foot, or ended in a point so that they had to be fixed in the ground. The older amphorae were oval-shaped, such as the vases filled with oil for prizes at the Panathenaic festival, having on one side a figure of Athena, on the other a representation of the contest; the latter were tall and slender, with voluted handles. The first class exhibits

black figures on a reddish background, the second red figures on a black ground. The amphora was a standard measure of capacity among both Greeks and Romans, the Attic containing nearly nine gallons, and the Roman about six. In modern botany it is a

technical term sometimes denoting the lower part of the capsule called pyxidium, attached to the flower stalk in the form of an urn.

AMPLIATIVE (from Lat. ampliare, to enlarge), an adjective used mainly in logic, meaning " extending " or " adding to that which is already known." In Norman law an " ampliation " was a postponement of a sentence in order to obtain further evidence.

AMPLITUDE (from Lat. amplus, large), in astronomy, the angular distance of the rising or setting sun, or other heavenly body, from the east or west point of the horizon; used mostly by navigators in finding the variation of the compass by the setting sun. In algebra, if a be a real positive quantity and co a root of unity, then a is the amplitude of the product aw. In elliptic in- tegrals, the amplitude is the limit of integration when the integral is

expressed in the form j 'Py'i-N 2 sin 2 d. The hyperbolic or

*Gudermannian amplitude of the quantity x is tan (sinh *). In mechanics, the amplitude of a wave is the maximum ordinate. (See Wave.)*

AMPSANCTUS, or Amsanctus (mod. Sorgente Mefita), a small lake in the territory of the Hirpini, 10 m. S.E. of Aeclanum, close to the Via Appia. There are now two small pools which exhale carbonic acid gas and sulphuretted hydrogen. Close by was a temple of the goddess Mephitis, with a cave from which suffocating vapours rose, and for this reason the place was brought into connexion with the legends of the infernal regions. Virgil's description (Aeneid, vii. 563) is not, however, very accurate.

AMPTHILL, 0D0 WILLIAM LEOPOLD RUSSELL, ist Baron (1829-1884), British diplomatist and ambassador, was born in Florence on the 20th of February 1829. He was the son of Major-General Lord George William Russeli, by Elizabeth Ann, niece of the marquess of Hastings, who was governor-general of India during the final struggle with the Mahrattas. His education, like that of his two brothers — Hastings, who became eventually 9th duke of Bedford, and Arthur, who sat for a generation in the House of Commons as member for Tavistock — -was carried on entirely at home, under the

general direction of his mother, whose beauty was celebrated by Byron in Beppo. Lady William Russell was as strong-willed as she was beautiful, and certainly deserved to be described as she was by Disraeli, who said in con- versation, " I think she is the most fortunate woman in England, for she has the three nicest sons." If it had not been for her strong will it is as likely as not that all the three would have gone through the usual mill of a public school, and have lost half their very- peculiar charm. In March 1849 Odo was appointed by Lord Malmesbury attach6 at Vienna. From 1850 to 1852 he was temporarily employed in the foreign office, whence he passed to Paris. He remained there, however, only about two months, when he was transferred to Vienna. In 1853 he became second paid attache at Paris, and in August 1854 he was transferred as first paid attache to Constantinople, where he served under Lord Stratford de Redcliffe. He had charge of the embassy during his chief's two visits to the Crimea in 1855, but left the East to work under Lord Napier at Washington in 1857. In the following year he became secretary of legation at Florence, but was detached from that place to reside in Rome, where he remained for twelve years, till August 1870. During all that period he was the real though unofficial representative of England at the Vatican, and his consummate tact enabled him to do all, and more than all, that an ordinary man could have done in a stronger position. A reference, however, to his evidence before a committee of the House of Commons in 1871 will make it clear to any unprejudiced reader that those were right who, during the early 'fifties, urged so strongly the importance of having a duly accredited agent at the papal court. The line taken by him during the Vatican council has been criticized, but no fault can justly be found with it. Abreast as he was of the best thought of his time — the brother of Arthur Russell, who, more perhaps than any other man, was its most ideal representative in London society — he sympathized strongly with the views of those who

laboured to prevent the extreme partisans of papal infallibility from having everything their own way. But in his capacity of clear-headed observer, whose business it was to reflect the actual truth upon the mind of his government, he was obliged to make it quite clear that they had no chance whatever, and in conversing with those whose opinions were quite unlike his own, such as Cardinal Manning,he seems to have shown that he had no illusions about the result of the long debate. In 1868 Odo Russell married Lady Emily Theresa

Villiers, the daughter of Lord Clarendon. In 1870 he was appointed assistant under-secretary at the foreign office, and in November of that year was sent on a special mission to the headquarters of the German army, where he remained till 1871.

It was in connexion with this mission that an episode occurred which at the time threw much discredit upon Gladstone's government. Russia had taken advantage of the collapse of France and her own cordial relations with Prussia to denounce the Black Sea clauses of the treaty of Paris of 1856. Russell, in an interview with Bismarck, pointed out that unless Russia withdrew from an attitude which involved the destruction of a treaty solemnly guaranteed by the powers, Great Britain would be forced to go to war "with or without allies." This strong attitude was effective, and the question was ultimately referred to and settled by the conference which met at London in 1871. Though the result was to score a distinct diplomatic success for the Liberal government, the bellicose method employed wounded Liberal sentiment and threatened to create trouble for the ministry in parliament. On the 16th of February 1871, accord- ingly, Gladstone, in answer to a question, said that " the argu- ment used by Mr Odo Russell was not one which had been directed by her Majesty's government," that it was used by him " without any specific instructions or authority from the govern- ment," but that, at the same time, no blame was to be attached to him, as it was " perfectly well known that the duty of diplo- matic agents requires them to express themselves in that mode in which they think they can best support and recommend the propositions of which they wish to procure acceptance." This Gladstonian explanation was widely criticized as an illegitimate attack on Russell. What is certain is that the foreign office and the country profited by Russell's firmness. (See Morley's Gladstone, ii. 534.)

A little later in the same year he received the well-deserved reward of his labours by being made ambassador at Berlin.

During the months he passed at the foreign office he was examined before the committee of the House of Commons, already alluded to, and had an opportunity of stating very dis- tinctly in public some of his views with regard to his profession. " If you could only organize diplomacy properly," he said, " you would create a body of men who might influence the destinies of mankind and ensure the peace of the world." In these words we have the key to the thought and habitual action of one of the best and wisest public servants of the time.

Russell remained at Berlin, with only brief intervals of absence, from

the 16th of October 1871 till his death at Potsdam on the 25th of August 1884. He was third plenipotentiary at the Berlin congress, and is generally credited with having prevented, by his tact and good sense, the British prime minister from making a speech in French, which he knew very imperfectly and p'ronounced abominably. In 1874 Odo Russell received a patent of precedence raising him to the rank of a duke's son, and after the congress of Berlin he was offered a peerage by the Conservative government. This he naturally declined, but accepted the honour in 1881 when it was offered by the Liberals, taking the title of Baron Ampthill. He became a privy councillor in 1872 and was made a G.C.B. somewhat later. At the conference about the Greek frontier, which followed the congress of Berlin, he was the only British representative. During all his long sojourn in the Prussian capital, he did everything that in him lay to bring about close and friendly relations between Great Britain and Germany. He kept on the best of terms with Bismarck, carefully avoiding everything that could give any cause of offence to that most jealous and most unscrupulous minister, whom he, however,

did not hesitate to withstand when his unscrupulousness went the length of deliberately attempting to deceive.

He was succeeded as 2nd baron by his son, Arthur Oliver Villiers Russell (b. 1869), who rowed in the Oxford eight (1889, 1890, 1891) and became a prominent Unionist politician. He was private secretary to Mr Chamberlain, 1895-1897, and governor of Madras, 1899-1906. In 1904 he acted temporarily as Viceroy of India. (M. G. D.)

AMPTHILL, a market town in the northern parliamentary division of Bedfordshire, England, 44 m. N.N.W. of London by the Midland railway. Pop. of urban district (1901) 2177. It lies on the southern slope of a low range of hills, in a well-wooded district. The church of St Andrew ranges in date from Early English to Perpendicular. It contains a monument to Richard Nicolls (1624-1672), who, under the patronage of the duke of York, brother to Charles II., to whom the king had granted the Dutch North American colony of New Netherland, received the submission of its chief town, New Amsterdam, in 1664, and became its first English governor, the town taking the name of New York. Nicolls perished in the action between the English and Dutch fleets at Solebay, and the ball which killed him is preserved on his tomb. Houghton Park, in the vicinity, contains the ruins of Houghton House, built by Mary, countess of Pem- broke, in the time of James I. To this countess Sir Philip Sidney dedicated the Arcadia. Ampthill Park became in 1818 the seat of that Lord

Holland in whose time Holland House, in Kensington, London, became famous as a resort of the most distinguished intellectual society. In the park a cross marks the site of Ampthill Castle, the residence of Catherine of Aragon while her divorce from Henry VIII. was pending. A commemorative inscription on the cross was written by Horace Walpole. Brewing, straw- plaiting and lace-making are carried on in Ampthill.

AMPULLA (either a diminutive of amphora, or 'from Lat. ambo, both, and olla, a pot), a small, narrow-necked, round-bodied vase for holding liquids, especially oil and perfumes. It is the Latin term equivalent to the Greek \tjkv6os. It was used in ancient times for toilet purposes and anointing the bodies of the dead, being then buried with them. Gildas mentions the use of ampullae as established among the Britons in his time, arid St Columba is said to have employed one in the coronation of King Aidan. Both the name and the function of the ampulla have survived in the Western Church, where it still signifies the vessel containing the oil consecrated by the bishop for ritual uses, especially in the sacra- ments of Confirmation, Orders and Extreme Unction. The word occurs repeatedly in the service of coronation of the English sovereign in connexion with the ancient ceremony of anointing by the archbishop of Canterbury, which is still observed. The ampulla of the regalia of England takes the form of a golden eagle with outspread wings. The most celebrated ampulla in history was that known as la sainte ampoule, in the abbey of St Remi at Reims, from which the kings of France were anointed. Accord- ing to the legend it had been brought from heaven by a dove for the coronation of Clovis, and at one period the kings of France claimed precedence over all other sovereigns on account of it. It was destroyed at the Revolution. The word " ampulla " is used in biology, by analogy from the shape, for a certain portion of the anatomy of a plant or animal.

AMRAM (d. 875), a famous gaon or head of the Jewish Academy of Sura (Persia) in the 9th century. He was author of many " Responsa," but his chief work was liturgical. He was the first to arrange a complete liturgy for the synagogue, and his Prayer-Book (Siddur Rab 'Amram) was the foundation of most of the extant rites in use among the Jews. The Siddur was published in Warsaw in two parts (1865).

AMRAOTI, or Umrawattee, a town and district of India, in Berar, Central Provinces. The district was reconstituted in 1905, when that of Ellichpur was incorporated with it. The town has a station 6 m. from Badnera junction on the Great Indian Peninsula line. Pop.

(1901) 34,216, showing an increase of 22% in the decade. It is the richest town of Berar, with the most numerous and substantial commercial population. It possesses a branch of the Bank of Bombay, and has the largest

cotton mart, where an average of 80,593 bqjas of cotton are bought and sold annually. It has also a large grain market, cotton presses, ginning factories and oil mills. Amraoti raw cotton is quoted on the Liverpool Exchange.

The district of Amraoti has an area of 4754 sq. m. In 1901 the population was 630,245, showing a decrease of 4% in the decade; on the area as now constituted it was 809,499. The district is an extensive plain, about 800 ft. above sea-level, the general flatness being only broken by a small chain of hills, running in a north-westerly direction between Amraoti and Chandor, with an average height from 400 to 500 ft. above the lowlands. The principal towns, besides Amraoti, are Karinja, Kolapur, and Badnera, which lies on the Great Indian Peninsula railway, the main line of which crosses the district. Severe drought visited Amraoti in 1890- 1900.

AMRAVATI, or Amaravati, a ruined city of India in the Gun tur district of the Madras presidency, on the south bank of the Kistna river, 62 m. from its mouth. The town is of great interest for the antiquary as one of the chief centres of the Buddhist kingdom of Vengi, and for its stupa (sepulchral monument). Amravati has been identified with Hsiian Tsang's To-na-kie-tse-kia and with the Rahmi of Arab geographers. Subsequent to the disappearance of Buddhism from this region the town became a centre of the Sivaite faith. When Hsiian Tsang visited Amravati in a.d. 639 it had already been deserted for a century, but he speaks in glowing terms of its magnificence and beauty. Very careful and artistic representations of the stupa with its daghoba and interesting rail, pillars and sculptures will be found in Fergusson's Tree and Serpent Worship, and in his History of Indian Architecture (1876). Its elaborate carvings illustrate the life of Buddha. Some are preserved in the British Museum; others in the museum at Madras.

An account by Dr James Burgess was published in 1877 as one of the volumes of the Archaeological Survey of Southern India.

‘AMR-IBN-EL-ASS, or ‘Amr (strictly ‘Amr b. ‘As), one of the most famous of the first race of the Saracen leaders, was of the tribe of Koreish (Qureish). In his youth he was an antagonist of Mahomet. His zeal prompted him to undertake an embassy to the king of Ethiopia, in order to stimulate him against the con- verts whom he had taken under his protection, but he returned a convert to the Mahommedan faith and joined the fugitive prophet at Medina. When Abu Bekr resolved to invade Syria, he en- trusted ‘Amr with a high command. ‘Amr soon perceived that his troops were not sufficient for a serious battle. Reinforced by Khalid b. al-Walld, whom Abu Bekr sent in all haste from Irak to Syria, he defeated the imperial troops, commanded by Theodorus, the brother of Heraclius, not far from Ramleh in Palestine, on the 31st of July 634. When Omar became caliph he made Khalid chief commander of the Syrian armies, ‘Amr remaining in Palestine to complete the submission of that province. It is not certain that ‘Amr assisted Khalid in the siege of Damascus, but very probable that he took part in the decisive battle of Yarmuk, 20th of August 636. After this battle he laid siege to Jerusalem, in which enterprise he was seconded a year later by Abu Obeida, then chief commander. After the surrender of Jerusalem ‘Amr began the siege of Caesarea, which, however, was brought to a successful end in September or October 640 by Moawiya, ‘Amr having obtained Omar’s sanction for an expedition against Egypt. Towards the end of 639 he led an army of 4000 Arabs into that country. During his march a messenger from Omar arrived with a letter containing directions to return if he should have received it in Syria, but if in Egypt to advance, in which case all needful assistance would be instantly sent to him. The contents of the letter were not made known to his officers until he was assured that the army was on Egyptian soil, so that the expedition might be continued under the sanction of Omar’s orders. Having taken Farama (Pelusium), he advanced to Misr, north of the ancient’ Memphis, and besieged it and the strong fortress of Babylon for seven months. Although numerous rein- forcements arrived, he would have found it very difficult to storm the place previous to the inundation of the Nile but for treachery within the citadel; the Greeks who remained there were cither

made prisoners or put to the sword. On the same spot ‘Amr built a city named Fostat (” the encampment “), the ruins of which are known by the name of Old Cairo. The mosque which he erected and called by his own name is described in Asiatic Journal (1890), p. 759. ‘Amr pursued the Greeks to Alexandria, but finding that it was impossible to take the place by storm, he contented himself with blockading it with the greater part of his army, and reducing the

Delta to submission with the rest. At the end of twelve months Alexandria sued for peace, and a treaty was signed on the 8th of November 641. To 'Amr acting on Omar's command has been attributed the burning of the famous Alexandrian library. (See Libraries and Alexandria.) Not only is this act of barbarism inconsistent with the characters of Omar and his general, but the earliest authority for the story is Abulfaragius (Barhebraeus), a Christian writer, who lived six centuries later. After the conquest of Egypt 'Amr carried his conquests eastward along the North African coast as far as Barca and even Tripolis. His administration of Egypt was moderate and statesmanlike, and under his rule the produce of the Nile Valley was a constant source of supply to the cities of Arabia. He even reopened a canal at least 80 m. long from the Nile to the Red Sea with the object of renewing communication by sea. Removed from his office by Othman in 647, who replaced him by Ibn abi Sarh, he sided with Moawiya in the contest for the cali- phate, and was largely responsible for the deposition of Ali (q.v.) and the establishment of the Omayyad dynasty. (See Caliphate, section B.) In 658 he reconquered Egypt in Moawiya's interest, and governed it till his death on the 6th of January 664. In a pathetic speech to his children on his deathbed, he bitterly lamented his youthful offence in opposing the prophet, although Mahomet had forgiven him and had frequently affirmed that ■" there was no Mussulman more sincere and steadfast in the faith than 'Amr."

Sir W. Muir, The Caliphate (London, 1891); E. Gibbon's Decline and Fall; M. J. de Goeje, Memoire sur la conquite de la Syrie (Leiden, 1900) ; Butler, Arab Conquest of Egypt (Oxford, 1902) ; art. Egypt, History, Mahommedan Period.

'AMR IBN KULTHUM, Arabian poet, author of one of the Mo'allakat. Little or nothing is known of his life save that he was a member of the tribe of Taghlib and that he is said to have died of excessive v/ine-drinking. Some stories of him are told in the Book of Songs (see Abulfaraj), vol. ix. pp. 181-185.

AMRITSAR, or Umritsar, a city and district of British India, in the Lahore division of the Punjab. The city has a station on the North Western railway 32 m. E. of Lahore, its position on which has greatly assisted its development. Amritsar is chiefly notable as the centreof the Sikh religion and the site of the Golden Temple, the chief worshipping place of the Sikhs. Ram Das, the fourth guru, laid the foundations of the city upon a site granted by the emperor Akbar. He also excavated the holy tank from which the town derives its name of Amrita Turas, or Pool of Immortality. It is upon a small island in the

middle of this tank that the Golden Temple is now situated. About two centuries afterwards, in the course of the struggle between the Sikhs and the Mahommedans, Ahmad Shah Durani routed the Sikhs at the great battle of Panipat, and on his homeward march he destroyed the town of Amritsar, blew up the temple with gunpowder, filled in the sacred tank with mud, and defiled the holy place by the slaughter of cows. But when Ahmad Shah returned to Kabul the Sikhs rose once more and re-established their religion. Finally the city and surrounding district fell under the sway of Ranjit Singh at Lahore, and passed with the rest of the Punjab into the possession of the British after the second Sikh war. The Golden Temple is so called on account of its copper dome, covered with gold foil, which shines brilliantly in the rays of the Indian sun, and is reflected back from the waters of the lake; but the building as a whole is too squat to have much architectural merit apart from its ornamentation. Marble terraces and balustrades surround the tank, and a marble cause- way leads across the water to the temple, whose gilded walls, roof, dome and cupolas, with vivid touches of red curtains, are reflected in the still water. The temple was considerably

enriched by the spoils taken by Ranjit Singh in his conquests. The population of Amritsar in 1901 was 162,429. A Sikh college for university education was opened in 1897. The other public buildings include two churches, a town hall and a hospital. Amritsar is famous for its carpet-weaving industry. It was the first mission station of the church of England in the Punjab.

The district is bounded on the N.W. by the river Ravi, on the S.E. by the river Beas, on the N.E. by the district of Gurdaspur, and on the S.W. by the district of Lahore. Amritsar district is a nearly level plain, with a very slight slope from east to west. The banks of the Beas are high, and on this side of the district well-water is not found except at 50 ft. below the surface; while towards the Ravi wells are less than 20 ft. in depth. The only stream passing through the district is the Kimi or Saki, which takes its rise in a marsh in the Gurdaspur district, and after traversing part of the district empties itself into the Ravi. Numerous canals intersect the district, affording ample means of irrigation. The Sind, Punjab and Delhi railway (North Western) and Grand Trunk road, which runs parallel with it, afford the principal means of land communication and traffic. The area of the district is 1601 sq. m.; pop. (1901) 1,023,828, showing an increase

of 3 % on the previous decade. It is the headquarters of the Sikh religion, containing 264,329 Sikhs as against 280,985 Hindus and 474,976 Mahommedans. The principal crops are wheat, pulse, maize, millet, with some cotton and sugar-cane. There are factories for ginning and pressing cotton.

AMROHA, a town of British India, in the Moradabad dis- trict of the United Provinces. It contains the tomb of a Mahom- medan saint, Shaikh Saddu, and has been for many centuries a Mahommedan centre. Pop. (1901) 40,077.

AMRUM, or Amrom, a German island in the North Sea, off the coast of Schleswig-Holstein to the south of Sylt. Pop. (1900) 900. It is 6 m. long and 3 m. broad, with an area of 105 sq. m., and is reached from the mainland by a regular steamboat service to Wittdun, a favourite sea-bathing resort; or at low water by carriage from Fohr. The larger part of Amrum consists of a treeless sandy expanse, but a fringe of rich marshes affords good pasture-land. The principal place is Nebel, connected by a light railway with Wittdun. (See also Frisian Islands.)

AMRU'-UL-QAIS, or Imrtj'-ul Qais, IBN HUJR, Arabian poet of the 6th century, the author of one of the Mo'allakat (q.v.), was regarded by Mahomet and others as the most distinguished poet of pre-Islamic times. He was of the kingly family of Kinda, and his mother was of the tribe of Taghlib. While he was still young, his father was killed by the Bani Asad. After this his life was devoted to the attempt to avenge his father's death. He wandered from tribe to tribe to gain assistance, but his attempts were always foiled by the persistent following of the messengers of Mundhir of Hira (Hfra). At last he went to the Jewish Arabian prince, Samu'al, left his daughter and treasure with him, and by means of Harith of Ghassan procured an introduc- tion to the Byzantine emperor Justinian. After a long stay in Constantinople he was named phylarch of Palestine, and received a body of troops from Justin II. With these he started on his way to Arabia. It is said that a man of Asad, who had followed him to Constantinople, charged him before the emperor with the seduction of a princess, and that Justin sent him a poisoned cloak, which caused his death at Ancyra.

His poems are contained in W. Ahlwardt's The Divans of the six ancient Arabic Poets (London, 1870), and have been published separately in M'G. de Slane's Le Diwan d'Amro'lkats (Paris, 1837) ; a German version with life and notes in F. Riickert's Amrilkais der Dichter und Konig (Stuttgart, 1843). Many stories of his life are told

in the Kitab ul-Aghdni, vol. viii. pp. 62-77. (G. W. T.)

AMSDORF, NICOLAUS VON (1483-1565), German Protestant reformer, was born on the 3rd of December 1483 at Torgau, on the Elbe. He was educated at Leipzig, and then at Wittenberg, where he was one of the first who matriculated (1502) in the recently founded university. He soon obtained various academi- cal honours, and became professor of theology in 1511. Like Andreas Carlstadt, he was at first a leading exponent of the older type of scholastic theology, but under the influence of Luther abandoned his Aristotelian positions for a theology based on the

Augustinian doctrine of grace. Throughout his life he remained one of Luther's most determined supporters; was with him at the Leipzig conference (15 19), and the diet of Worms (1521); and was in the secret of his Wartburg seclusion. He assisted the first efforts of the Reformation at Magdeburg (1524), at Goslar (1531) and at Einbeck (1534) ; took an active part in the debates at Schmalkalden (1537), where he defended the use of the sacra- ment by the unbelieving; and (1539) spoke out strongly against the bigamy of the landgrave of Hesse. After the death of the count palatine, bishop of Naumburg-Zeitz, he was installed there (January 20, 1542), though in opposition to the chapter, by the elector of Saxony and Luther. His position was a painful one, and he longed to get back to Magdeburg, but was persuaded by Luther to stay. After Luther's death (1 546) and the battle of Muhlberg (1547) he had to yield to his rival, Julius von Pflug, and retire to the protection of the young duke of Weimar. Here he took part in founding Jena University (1548); opposed the " Augsburg Interim " (1548); superintended the publication of the Jena edition of Luther's works; and debated on the freedom of the will, original sin, and, more noticeably, on the Christian value of good works, in regard to which he held that they were not only useless, but prejudicial. He urged the separation of the High Lutheran party from Melanchthon (1557), got the Saxon dukes to oppose the Frankfort Recess (1558) and continued to fight for the purity of Lutheran doctrine. He died at Eisenach on the 14th of May 1565, and was buried in the church of St George there, where his effigy shows a well-knit frame and sharp-cut features. He was a man of strong will, of great aptitude for controversy, and considerable learning, and thus exercised a decided influence on the Reformation. Many letters and other short productions of his pen are extant in MS., especially five thick volumes of Amsdorfiana, in the Weimar library. They are a valuable source for our knowledge of Luther. A small sect, which adopted his opinion on good works, was called after him; but it is now of mere historical interest.

Bibliography. — Life, in Th. Pressel, Leben u. ausgewahlte Schrift. der Voter der luth. Kirche, vol. viii. (published separately Elberfeld, 1862, 8vo) ; J. Meier in Das Leben der Altvater der luth. Kirche, vol. iii. ed. M. Meurer (1863) ; art. by G. Kawerau in Herzog-Hauck, Realencyk. fiir prot. Theologie (3rd ed., Leipzig, 1896).

AMSLER, SAMUEL (1791-1849), Swiss engraver, was bom at Schinznach, in the canton of Aargau. He studied his art under Johan Heinrich Lips (1758-1817) and Karl Ernst Hess, at Munich, and from 1816 pursued it in Italy, and chiefly at Rome, till in 1829 he succeeded his former master Hess as professor of copper engraving in the Munich academy. The works he designed and engraved are remarkable for the grace of the figures, and for the wonderful skill with which he retains and expresses the characteristics of the original paintings and statues. He was a passionate admirer of Raphael, and had great success in reproducing his works. Amsler's principal engravings are: " The Triumphal March of Alexander the Great," a.nd a full-length " Christ," after the sculptures of Thorwaldsen and Dannecker; the " Entombment of Christ," and two " Madonnas " after Raphael; and the " Union between Religion and the Arts," after Overbeck, his last work, on which he spent six years.

AMSTERDAM, the chief city of Holland, in the province of North Holland, on the south side of the Y or Ij, an arm of the Zuider Zee, in 52 22′ N. and 4 53′ E. Pop. (1900) 523,557. It has communication by railway and canal in every direction; steam-tramways connect it with Edam, Purmerend, Alkmaar and Hilversum, and electric railways with Haarlem and the sea- side resort of Zandvoort. Amsterdam, the " dam or dyke of the Amstel," is so called from the Amstel, the canalized river which passes through the city to the Y. Towards the land the city is surrounded by a semicircular fosse or canal, and was at one time regularly fortified; but the ramparts have been demolished and are replaced by fine gardens and houses, and only one gateway, the Muiderpoort, is still standing. Within the city are four similar canals (grackten) with their ends resting on the Y, extend- S ing in the form of polygonal crescents nearly parallel to each

other and to the outer canal. Each of these canals marks the line of the city walls and moat at different periods. Lesser canals intersect the others radially, thus virtually dividing the city into a number of

islands; whence it has been compared with Venice. The nucleus of the town lies within the innermost crescent canal, and, with the large square, the Dam, in the centre, represents the area of Amsterdam about the middle of the 14th century. At one extremity of the enclosing canal is the Schrei- jerstoren (1482) or " Weepers' Tower," so called on account of its being at the head of the ancient harbour, and the scene in former days of sorrowful leave-takings. Between this and the next crescent of the Heeren Gracht sprang up, on the east, the labyrinthine quarter where for more than three centuries the large Jewish population has been located, and in the middle of which the painter Rembrandt lived (1640-1656) and the philo- sopher Spinoza was born (1632). Beyond the Heeren Gracht lie the Keizers Gracht and the Prinsen Gracht respectively, and these three celebrated canals, with their tree-bordered quays and plain but stately old-fashioned houses, form the principal thorough- fares of the city. West of the Prinsen Gracht lies the region called De Jordaan, a corruption of Le Jardin, the name which it acquired from the fact of its streets being called after various flowers. It was formed by the settlement of French refugees here after the revocation of the edict of Nantes. The outermost crescent canal is called the Singel Gracht (girdle canal), and marks the boundary of the city at the end of the 17th century. The streets in the oldest part of Amsterdam are often narrow and irregular, and the sky-line is picturesquely broken by fantastic gables, roofs and towers. The site of the city being originally a peat bog, the foundations of the houses have to be secured by driving long piles (4-20 yds.) into the firm clay below, the palace on the Dam being supported on nearly 14,000 piles. As late as 1822, however, an overladen corn magazine sank into the mud. Modern Amsterdam extends southward beyond the Singel Gracht, and here the houses are often very handsome, while the broad streets are planted with rows of large trees. In the middle of this new region lies the Vondel Park, named after the great national poet Joost van den Vondel (d. 1679), whose statue stands in the park. The Willems Park adjoining was added in later times. In the older part of the town the chief open space is the Zoological Gardens in the north-eastern corner. They belong to a private society called Natura ArtisMagistra, and came into existence in 1838. They have, however, been much enlarged since then, and bear a high reputation. In connexion with the gardens there are an aquarium (1882), a library, and an ethno- graphical and natural history museum. Concerts are given here in summer as well as in the Vondel Park. Close to the Zoological Gardens are the Botanical Gardens, and a small park, also the property of a private society, in which there is a variety theatre. The public squares of the city include the Sophiaplein, with the

picturesque old mint-tower; the Rembrandtplein, with a monu- ment (1852) to the painter by Lodswyk Royer; the Thorbecke- plein, with a monument to the statesman, J. R. Thorbecke (1708-1872), and the Leidscheplein, with the large town theatre, rebuilt in 1890-1894 after a fire.

Buildings and Institutions. — The Dam is the vital centre of Amsterdam. All the tramways meet here, and some of the busiest streets, and here too are situated the Nieuwe Kerk and the palace. In the middle of the Dam stands a monument to those who fell in the Belgian revolution of 1 830-1 831, and called the Metal Cross after the war medals struck at that time. The palace is an imposing building in the classical style, originally built as a town-hall in 1648-1655 by the architect Jacob van Kempen. It was first given up to royalty on the occasion of the visit of the Stadtholder William V. in 1768, and forty years later was appropriated as a royal palace by Louis Bonaparte, king of Holland. But King William I. afterwards formally returned the palace to the city, and the sovereign is therefore actually the city's guest when residing in it. Beautifully decorated on the exterior with gable reliefs by Artus Quellinus (1 600-1 668) of Antwerp, its great external defect is the absence of a grand entrance. The architectural and ornamental sculpture of the

interior is mostly by the same artist, and there area few interest- ing pictures, as well as some realistic wall paintings by the 18th- century artist Jacob de Wit similar to those in the Huis ten Bosch near the Hague. The great hall is one of the most splendid of its kind in Europe. Like most of the lesser apartments, it is lined with white Italian marble, and in spite of its enormous dimensions the roof is unsupported by pillars. Ancient flags captured in war decorate the walls, and in the middle of the marble floor is a representation of the firmament inlaid in copper. The Nieuwe Kerk (St Catherine's), in which the sovereigns of Holland are crowned, is a fine Gothic building dating from 1408. Inter- nally it is remarkable for its remains of ancient stained glass, fine carvings and interesting monuments, including one to the famous Admiral de Ruyter (d. 1676). A large stained-glass window commemorates the taking of the oath by Queen Wilhel- mina in 1898. The new exchange (1901) is a striking building in red brick and stone, and lies a short distance away between the Dam and the fine central station (1889). The Oude Kerk (St Nicholaas), so called, was built about the year 1300, and contains some beautiful stained glass of the 1 6th and 17th centuries, by Pieter Aertsen of Amsterdam (1508-1575) and others.

One window contains the arms of the burgomasters of Amsterdam from 1578 to 1767. Among the monuments are those to various naval heroes, including Admirals van Heemskerk (d. 1607), Sweers (d. 1673) and van der Hulst (d. 1666). The North Church was the last work of the architect Hendrik de Keyser (1565-1621) of Utrecht. The Roman Catholic church of St Nicholaas (1886) was built to replace the accommodation previously afforded by a common dwelling-house, now the Museum Amstelkring of ecclesiastical antiquities. Among the numerous Jewish synagogues, the largest is that of the Portuguese Jews (1670), which is said to be an imitation of the temple of Solomon. Other buildings of interest are the St Antonieswaag, built as a town gate in 1488-1585, and now containing the city archives; the Trippenhuis, built as a private house in 1662, and now the home of the Royal Society of Science, Letters and Fine Arts; the Netherlands Bank (1865-1869), built by the architect W. A. Froger; the new building (i860) of the Seamen's Institute, founded in 1785; the cellular prison; and the so-called Paleis van Volksvlijt, an immense building of iron and glass with a fine garden, built by Dr Samuel Sarphati, and used for industrial exhibitions, the performance of operas, &c. The museums and picture galleries of Amsterdam are of great interest. The Ryks Museum, or state museum, is the first in Holland. It is a large, handsome and finely situated building designed by Dr P. J. H. Cuyper in the Dutch Renaissance style, and erected in 1876-1885. The exterior is decorated with sculptures and tile-work, and internally it is divided, broadly speaking, into a museum of general antiquities below, and the large gallery of pictures of the Dutch and Flemish schools above. The nucleus of this unsurpassed national collection of pictures was formed out of the collections removed hither from the Pavilion at Haarlem, consisting of modern paintings, and from the town-hall, the van der Hoop Museum and the Trippenhuis in Amsterdam. The important van der Hoop collection arose out of bequests by Adrian van der Hoop and his widow in 1854 and 1880; but the most famous pictures in the Ryks Museum are perhaps the three which come from the Trippenhuis, namely, the so-called " Night- watch " and the " Syndics of the Cloth Hall " by Rembrandt, and the " Banquet of the Civic Guard," by van der Heist. The Trippenhuis gallery consisted of the pictures brought from the Hague by Louis Bonaparte, king of Holland, and belonging to the collection of the Orange family dispersed during the Napokonic period. The municipal museum contains a collection of furniture, paintings, &c, bequeathed by Sophia Lopez-Suasso (1890), a medico-pharmaceutical collection, and the National Guard Museum. The Joseph Fodor Museum (i860) contains modern French and Dutch pictures. The private collection

founded by Burgomaster Jan Six (d. 1702), the friend and patron of Rembrandt, was sold to the state in 1907; the pictures, except the family Rembrandts, are in the Ryks Museum. Close to this is the Willet-Holthuysen Museum (1895) of furniture, porcelain, &cv

Education and Charities. — There are two universities in Amsterdam: the Free University (1880), and the more ancient state university of Amsterdam, originally founded in 1632, but reconstructed in 1887. In addition to the numerous science laboratories the state university possesses a very fine library of about 100,000 volumes, including the Rosenthal collection of over 8000 books on Jewish literature. Modern educational institutions include a school of engineering (1879), a school for teachers (1878) and a school of industrial art(i87o). Amsterdam is also remarkable for the number and high character of its benevolent institutions, which are to a large extent supported by voluntary contributions. Among others may be mentioned hospitals for the sick, the aged, the infirm, the blind, the deaf, the dumb, the insane, and homes for widows, orphans, foundlings and sailors. The costumes of the children educated at the different orphanages are varied and picturesque, those of the municipal orphanage being dressed in the city colours of red and black. In the Walloon orphanage are some interesting pictures by van der Heist and others. The Society for Public Welfare {Maatschappij tot nut van het Algemeen), founded in 1785, has for its object the promotion of the education and improvement of all classes, and has branches in every part of Holland. Among other Amsterdam societies are the Felix Meritis (1776), and the Arti et Amicitiae (1839), whose art exhibitions are of a high order.

Harbour and Commerce. — -The first attempt which the city of Amsterdam made to overcome the evils wrought to its trade by the slow formation of the Pampus sandbank at the entrance to the Y from the Zuider Zee, was the construction of the North Holland canal to the Helder in 1825. But the route was too long and too intricate, and in 1876 a much larger and more direct ship canal was built across the isthmus to the North Sea at Ymuiden. The serious rivalry of Rotterdam, especially with regard to the transit trade, and the inadequacy of the Keulsche Vaart, which connected the city with the Rhine, led to the construction in 1892 of the Merwede canal to

Gorinchem. Meanwhile a complete transformation took place on the Y to suit the new requirements of the city's trade. The three islands built out into the river serve to carry the railway across the front of the city, and form a long series of quays. On either side are the large East and West docks (1825-1834), and beyond these stretch the long quays at which the American and East Indian liners are berthed. On the west of the West, dock is the timber dock, and east of the East dock is another series of islands joined together so as to form basins and quays, one of which is the State Marine dock (1790-1795) with the arsenal and admiralty offices. Opening out of one of the crescent canals which penetrate the city from the Y is the State Entrep6t dock (1900), the free harbour of Amsterdam, where the produce from the Dutch East Indies is stored. On the north side of the Y are the dry docks and the petroleum dock (1880-1890). The principal imports are timber, coal, grain, ore, petroleum and colonial produce. Under the last head fall tobacco, tea, coffee, cocoa, sugar, Peruvian bark and other drugs. Diamond-cutting has long been practised by the Jews and forms one of the most characteristic industries of the city. Other industries include sugar refineries, soap, oil, glass, iron, dye and chemical works; distilleries, breweries, tanneries; tobacco and snuff factories; shipbuilding and the manufacture of machinery and stearine candles. Although no longer the centre of the banking transac- tions of the world, the Amsterdam exchange is still of considerable importance in this respect. The celebrated Bank of Amsterdam, founded in 1609, was dissolved in 1796, and the present Bank of the Netherlands was established in 1814 on the model of the Bank of England. The money market is the headquarters of companies formed to promote the cultivation of colonial produce.

History.— In 1204, when Giesebrecht II. of Amstel built a castle there, Amsterdam was a fishing hamlet held in fee by the lords of Amstel of the bishops of Utrecht, for whom they acted as bailiffs. In 1240 Giesebrecht III., son of the builder of the castle, constructed a dam to keep out the sea. To these two, then, the origin of the city may be ascribed. The first mention

of the town is in 1275, in a charter of Floris IV., count of Holland, exempting it from certain taxes.

In 1 296 the place passed out of the hands of the lords of Amstel, owing to the part taken by Giesebrecht IV. in the murder of Count Floris V. of Holland. Count John (d. 1304), after coming to an understanding with the bishop of Utrecht, bestowed the fief on his brother, Guy of Hainaut. Guy gave the town its first charter in 1300. It established the usual type of govern- ment under a bailiff (schout)

and judicial assessors (scabini, or schoppenen), the overlord's supremacy being guarded, and an appeal lying from the court of the scabini, in case of their dis- agreement, to Utrecht. In 1342 more extensive privileges were granted by Count William IV., including freedom from tolls by land and water in return for certain annual dues. In 1482 the town was surrounded with walls; and in the 16th century, during the religious troubles, it received a great increase of prosperity owing to the influx of refugees from Antwerp and Brabant. Amsterdam, influenced by its trading interests, did not join the other towns in revolt against Spain until 1578. In 1587 the earl of Leicester made an unsuccessful attempt to seize it. The great development of Amsterdam was due, however, to the treaty of Westphalia in 1648, by which its rival, Antwerp, was ruined, owing to the closing of the Scheldt. The city held out obstin- ately against the pretensions of the stadtholders, and in 1650 opened the dykes in order to prevent William II. from seizing it. The same device was successful against Louis XIV. in 1672; and Amsterdam, now reconciled with the stadtholder, was one of the staunchest supporters of William III. against France. After the revocation of the edict of Nantes in 1685 it opened its gates to numerous French refugees; but this hardly compensated it for its losses during the war. In 1787 Amsterdam was occupied by the Prussians, and in 1795 by the French under Pichegru. It was now made the capital of the Batavian Republic and after- wards of the kingdom of Holland. When, in 1810, this was united with the French empire, Amsterdam was recognized officially as the third town of the empire, ranking next after Paris and Rome.

See J. ter Gouw, Geschiedeniss van Amsterdam (3 vols., Amsterdam, 1879-1881), a full history with documents.

AMSTERDAM (New Amsterdam), an uninhabited and almost inaccessible island in the Indian Ocean, in 37°47'S., and 77 34′ E., about 60 m. N. of St Paul Island, and nearly midway between the Cape of Good Hope and Tasmania. It is an extinct volcano, rising 2989 ft. from the sea. It was dis- covered by Anthony van Diemen in 1633, and annexed by France in 1893. It may have been sighted by the companions of Magellan returning to Europe in 1522, and by a Dutch vessel, the " Zeewolf, " in 1617. In 1871 the British frigate " Megaera " was wrecked here, and most of the 400 persons on board had to remain upwards of three months on the island. The Memoires of a Frenchman, Captain Francois Peron (Paris, 1824), who was marooned three years on the island (1792-1795), are of much interest.

AMSTERDAM, a city of Montgomery county, New York, U.S.A., on the north bank of the Mohawk river, about 33 m. N.W. of Albany. Pop. (1890) 17,336; (1900) 20,929, of whom 5575 were foreign-born; (1910) 31,267. It is served by the New York Central & Hudson River and the West Shore railways, and by the Erie Canal. Hills on both sides of the river command fine views of the Mohawk Valley. Amsterdam has two hospitals, a free public library and St Mary's Institute (Roman Catholic). Manufacturing is the most important industry, and carpets and rugs, hosiery and knit goods are the most important products. In 1905 the city's factory products were valued at $15,007,276 (an increase of 41 % over their value in 1900); carpets and rugs being valued at $5,667,742, and hosiery and knit goods (in the manufacture of which Amsterdam ranked third among the cities of the country) at $4,667,022, or 3-4 % of the total product of the United States. Among the other manufactures are brushes, brooms, buttons, silk gloves, paper boxes, electrical supplies, dyeing machines, cigars, and wagon and carriage springs. Amsterdam was settled about 1775, and was called Veedersburg

until 1804, when its present name was adopted. It was incorporated as a village in 1830, and was chartered as a city in 1885.

AMUCK, RUNNING (or more properly Amok), the native term for the homicidal mania which attacks Malays. A Malay will suddenly and apparently without reason rush into the street armed with a kris or other weapon, and slash and cut at every- body he meets till he is killed. These frenzies were formerly regarded as due to sudden insanity. It is now, however, certain that the typical amok is the result of circumstances, such as domestic jealousy or gambling losses, which render a Malay des- perate and weary of his life. It is, in fact, the Malay equivalent of suicide. " The act of running amuck is probably due to causes over which the culprit has some amount of control, as the custom has now died out in the British possessions in the peninsula, the offenders probably objecting to being caught and tried in cold blood " (W. W. Skeat).

Though so intimately associated with the Malay there is some ground for believing the word to have an Indian origin, and the act is certainly far from unknown in Indian history. Some notable cases have occurred among the Rajputs. Thus, in 1634, the eldest son of the raja of Jodhpur ran amuck at the court of Shah Jahan, failing in

his attack on the emperor, but killing five of his officials. During the 18th century, again, at Hyderabad (Sind), two envoys, sent by the Jodhpur chief in regard to a quarrel between the two states, stabbed the prince and twenty- six of his suite before they themselves fell.

In Malabar there were certain professional assassins known to old travellers as Amouchi or Amuco. The nearest modern equivalent to these words would seem to be the Malayalim A mar- khan, " a warrior " (from amar, " fight "). The Malayalim term chaver applied to these ruffians meant literally those " who devote themselves to death." In Malabar was a custom by which the zamorin or king of Calicut had to cut his throat in public when he had reigned twelve years. In the 17th century a variation in his fate was made. He had to take his seat, after a great feast lasting twelve days, at a national assembly, surrounded by his armed suite, and it was lawful for anyone to attack him, and if he succeeded in killing him the murderer himself became zamorin (see Alex. Hamilton, " A new Account of the East Indies," in Pinkerton's Voyages and Travels, viii. 374). in 1600 thirty would-be assassins were killed in their attempts. These men were called Amar-khan, and it has been suggested that their action was " running amuck " in the true Malay sense. Another proposed derivation for amouchi is Sanskrit amokshya, " that cannot be loosed," suggesting that the murderer was bound by a vow, an explanation more than once advanced for the Malay amuck; but amokshya in such a sense is unknown in Malayalim.

See Sir F. A. Swettenham, Malay Sketches (1895); H. Clifford, Studies in Brown Humanity (1898).

AMU1ET (Late Lat. amuletum, origin unknown; falsely con- nected with the Arab, himdlah, a cord used to suspend a small Koran from the neck), a charm, generally, but not invariably, hung from the neck, to protect the wearer against witch- craft, sickness, accidents, &c. Amulets have been of many different kinds, and formed of different substances, — stones, metals, and strips of parchment being the most common, with or without characters or legends engraved or written on them. Gems have often been employed and greatly prized, serving for ornaments as well as for charms. Certain herbs, too, and animal preparations have been used in the same way. In setting them apart to their use as amulets, great precautions have been taken that fitting times be selected, stellar and other magic influences propitious, and everything avoided that might be supposed to destroy or weaken the force of the charm. From the earliest ages the Oriental races have had a firm belief in the prevalence of occult evil influences, and a superstitious trust in amulets and similar

preservatives against them. There are references to, and apparently correctives of, these customs in the Mosaic injunctions to bind portions of the law upon the hand and as frontlets be- tween the eyes, as well as write them upon the door-posts and the gates; but, among the later Jews especially, the original design

and meaning of these usages were lost sight of; and though it has been said that the phylacteries were not strictly amulets, there is no doubt that they were held in superstitious regard. Amulets were much used by the ancient Egyptians, and also among the Greeks and Romans. We find traces of them too in the early Christian church, in the emphatic protests of Chrysostom, Augustine and others against them. The fish was a favourite symbol on these charms, from the word lx8vs being the initials of 'lijarovs Xpiarbs Qeov vlos a-oirrip. A firm faith in amulets still prevails widely among Asiatic nations. Talisman, also from the Arabic, is a word of similar meaning and use, but some distinguish it as importing a more powerful charm. A talisman, whose " virtues are still applied to for stopping blood and in cases of canine madness," figures prominently in, and gives name to, one of Sir Walter Scott's novels.

See also Arpe, De Prodigiis Naturae et Artis Operibus Talismanes et Amuleta diclis (Hamburg, 1717) ; Ewele, Ueber Amulete (1827) ; and Koop's Palaeographica Crilica, vols. iii. and iv. (1829).

AMUR (known also as the Sakhalin-ula), a river of eastern Asia, formed by the confluence of the Argun and the Shilka, at Ust-Stryelka, in 53 19′ N. lat. and 120° 30′ E. long. Both these rivers come from the south-west: the Argun, or Kerulen as it is called above Lake Kulun (Dalai-nor) , through which it flows about half way between its source and Ust-Stryelka, rises in 49 N. lat. and 109° E. long.; the Shilka is formed by the union of the Onon and the Ingoda, both of which have their sources a little farther north-east than the Kerulen (Argun). The Amur proper flows at first in a south-easterly direction for about 800 m., as far as long. 132′ E., separating Manchuria from the Amur govern- ment; it then turns to the north-east, cuts its way through the Little Khingan mountains in a gorge 2000 ft. wide and 140 m. long, and after a total course of over 1700 m. discharges into the Sea of Okhotsk, opposite to the island of Sakhalin. It is esti- mated to drain an area of 772,000 sq. m. its principal tributaries from the south are the Sungari, which the Chinese consider to be the true head-river of the Amur, and the Usuri; from the north it receives the Oldoi, Zeya, Bureya, Kur, Gorin and Amgun. As the mouth is choked with sandbanks, goods are disembarked at Mariinsk and carried by train (9 m.) to

Alexandrovsk at the head of the Gulf of Tartary. Navigation on the river is open from April to early in November.

See T. W. Atkinson, Travels in the Region of the Amoor (i860); Collins, Exploration of the Amoor (ed. 1864) and Voyage down the Amoor (1866); Andree, Das Amurgebiet (ed. 1876); and Grum-Grshimaylo, Account of the Amur (Russian, 1894).

AMUR, a government of East Siberia, stretching from the Stanovoi (Yablonoi) mountains southwards to the left bank of the Amur river. It includes the basins of the Oldoi, Zeya and Bureya, left-bank tributaries of the river Amur, and has the governments of Transbaikalia on the W., Irkutsk and Yakutsk on the N., the Maritime province on the E., and Manchuria on the S.W. and S. Area, 172,848 sq. m. Immense districts are quite uninhabited. All the north-western part is occupied by a high plateau, bordered by the Great Khingan range, whose exact position in the region is not yet definitely settled. Next comes a belt of fertile plateaus bounded on the east by the Little Khingan, or Dusse-alin, a picturesque well-wooded range, which stretches in a north-easterly direction from Kirin across Man- churia, is pierced by the Amur, and continues on its left bank, separating the Bureya from the Amgun. To the east of it stretches in the same direction a strip of marshy lowlands. In the ranges which rise above the high plateau in the north-west, in the vicinity of the Stanovoi watershed, gold mines of great richness are worked. Coal of inferior quality is known to exist on the Oldoi, Zeya and Bureya. The Russians are represented by the Amur Cossacks, whose villages, e.g. Albazin, Kumara, Ekaterino-Nikolsk and Mikhailo-Semenovsk, are strung at intervals of 17 to 20 m. along the whole course of the river; by peasant immigrants, chiefly nonconformists, who are the wealthiest part of the population; and by a floating population of gold miners. Nomadic Tungus (Orochons), Manegres and Golds hunt and fish along the rivers. Steamers ply regularly

along the Amur for 6ˆ months, from Khabarovsk to Stryetensk, on the Shilka terminus of the Trans-Siberian railway; but only light steamers with 2 to 3 ft. draught can navigate the upper Amur and Shilka. In the winter the frozen river is the usual highway. Rough roads and bridle-paths only are found in the interior. The great engineering difficulties in building a railway along the Amur induced

the Russian government to obtain from China permission to build a railway through Manchuria, but the project for a railway from Khabarovsk to Stryetensk received imperial sanction in the summer of 1906. The Amur government has a continental climate, the yearly average at Blagovyeshchensk (50 N. lat.) being 30 Fahr. (January, 17 ; July, 70°). It benefits from the influence of the monsoons. Cold north-west winds prevail from October to March, while in July and August torrential rains fall, resulting in a sudden and very considerable rise in the Amur and its right-bank tributaries. The only town is Blagovyeshchensk, but the centre of the adminis- tration is Khabarovsk in the Maritime province. The settled population in 1897 was 119,909, of whom 31,51s lived in towns.

The governor-generalship of Amur includes this government and the Maritime province, the total area being 888,830 sq. m., and the total population in 1897, 339,127. This region became known to the Russians in 1639. In 1649ˆ1651 a party of Cossacks, under Khabarov, built a fort at Albazin on the Amur river, but in 1689 they withdrew in favour of the Chinese. From 1847 onwards they once more turned their attention to this region, and began to make settlements, especially after 1854, when a powerful flotilla sailed from Ust-Stryelka down to the mouth of the river. Four years later China ceded to Russia the whole left bank of the Amur, and also the right bank below the confluence of the Ussuri, and in i860 all the territory between the Ussuri and the Eastern Sea. (P. A. K.)

AMYGDALIN (from the Gr. anvySa\ri, almond), CˆHˆNOn, a glucoside isolated from bitter almonds by H. E. Robiquet and A. F. Boutron-Charlard in 1830, and subsequently investigated by Liebig and Wohler, and others. It is extracted from almond cake by boiling alcohol; on evaporation of the solution and the addition of ether, amygdalin is precipitated as white minute crystals. Sulphuric acid decomposes it into rf-glucose, benzaldehyde and prussic acid; while hydrochloric acid gives mandelic acid, d-glucose and ammonia. The decom- position induced by enzymes may occur in two ways. Maltase partially decomposes it, giving i-glucose and mandelic nitrile glucoside, C6H 5 CH(CN)0-C6H U 05; this compound is isomeric with sambunigrin, a glucoside found by E. E. Bourquelot and Danjou in the berries of the common elder, Sambucus nigra. Emulsin. on the other hand, decomposes it into benzaldehyde, prussic acid, and two molecules of glucose; this enzyme occurs in the bitter almond, and consequently the seeds invariably contain free prussic acid and benzaldehyde. An " amorphous amygdalin " is said to occur in the cherry-laurel. Closely related to these glucosides is dhurrin, C14H17O7N, isolated by W. Dunstan and T. A. Henry from the

common sorghum or " great millet," Sorghum vulgare; this substance is decom- posed by emulsin or hydrochloric acid into d-glucose, prussic acid, and ˆ-hydroxybenzaldehyde.

AMYGDALOID, a term meaning " almond-shaped," used in anatomy and geology.

AMYL ALCOHOLS (C 6 H u OH). Eight amyl alcohols are known: normal amyl alcohol CH 3 -(CH 2) 4 -OH, isobutyl carbinol or isoamyl alcohol (CH 3) 2 -CHCH 2 -CH 2 OH, active amyl alcohol (CH 3)(C 2 H 5):CH-CH 2 OH,tertiarybutylcarbinol(CH 3) 3 C-CH 2 OH, diethyl carbinol ˆHsHCH-OH, methyl (n) propyl carbinol (CHrCH 2 -CH 2)(CH 3):CH:OH, methyl isopropyl carbinol (CH 3) 2 :CH(CH 3):CHOH, and dimethyl ethyl carbinol (CH 3) 2 -(C 2 H 5)iC-OH. Of these alcohols, the first four are primary, the last one a tertiary, the other three secondary alcohols; three of them, viz. active amyl alcohol, methyl (n) propyl carbinol, and methyl isopropyl carbinol, contain an asym- metric carbon atom and can consequently each exist in two optically active, and one optically inactive form.

The most important is isobutyl carbinol, this being the chief

constituent of fermentation amyl alcohol, and consequently a constituent of fusel (q.v.) oil. It may be separated from fusel oil by shaking with strong brine solution, separating the oily layer from the brine layer and distilling it, the portion boiling between 125° and i40°C. being collected. For further purification it may be shaken with hot milk of lime, the oily layer separ- ated, dried with calcium chloride and fractionated, the fraction boiling between 128° and i32°C. only being collected. It may be synthetically prepared from isobutyl alcohol by conversion into isovaleryl-aldehyde, which is subsequently reduced to isobutyl carbinol by means of sodium amalgam.

It is a colourless liquid of specific gravity 0-8248 (o°C), boiling at i3i-6°C, slightly soluble in water, easily soluble in alcohol, ether, chloroform and benzene. It possesses a characteristic strong smell and a sharp burning taste. When perfectly pure, it is not a poison, although the impure product is. On passing its vapour through a red-hot tube, it undergoes decomposition with production of acetylene, ethylene, propylene, &c. It is oxidized by chromic acid mixture to isovaleryl-aldehyde; and it forms crystalline addition compounds with calcium and stannic chlorides.

The other amyl alcohols may be obtained synthetically. Of these, tertiary butyl carbinol has been the most difficult to obtain, its synthesis having only been accomplished in 1891, by L. Tissier (Comptes Rendus, 1891, 112, p. 1065) by the reduction of a mixture of trimethyl acetic acid and trimethylacetyl chloride with sodium amalgam. It is a solid whichmelts at 48°-so° C. and boils at 112-3° C.

AMYL NITRITE (isoamyl nitrite), C 6 H ir ONO, a liquid prepared by passing nitrous fumes (from starch and concen- trated nitric acid) into warm isoamyl alcohol; or by distilling a mixture of 26 parts of potassium nitrite in 15 parts of water with 30 parts of isoamyl alcohol in 30 parts of sulphuric acid (Renard, Jahresb., 1874, p. 352). It is a yellow-coloured liquid of specific gravity 0-877, boiling at about 95°-96° C. It has a characteristic penetrating odour, and produces marked effects on the system when its vapour is inhaled. It is insoluble in water, but dissolves readily in alcohol, ether, glacial acetic acid, chloroform and benzene. On heating with methyl alcohol it is converted into isoamyl alcohol, methyl nitrite being produced at the same time; a similar reaction takes place with ethyl alcohol, but the change is less complete. It is readily decomposed by nascent hydrogen, with the formation of ammonia and isoamyl alcohol; and on hydrolysis with caustic potash it forms potassium nitrite and isoamyl alcohol. When the liquid is dropped on to fused caustic potash, it forms potassium valerate. Amyl nitrite finds application in medicine, and in the prepara- tion of anhydrous diazonium salts (E. Knoevenagel, Berichte, 1890, 23, p. 2094).

AMYMONE, in ancient Greek legend, daughter of Danaiis. With her sisters, she had been sent to look for water, the district of Argos being then parched through the anger of Poseidon. Amymone having thrown her spear at a stag, missed it, but hit a satyr asleep in the brake. The satyr pursued her, and she called for help on Poseidon, who appeared, and for love of her beauty caused a spring to well up, which received her name. Aeschylus wrote a satyric drama on the subject. By the god Amymone became the mother of Nauplius, the wrecker. Her meeting with Poseidon at the spring is frequently represented on ancient coins and gems.

Apollodorus ii. I, 4; Hyginus, Fab. 169; Propertius ii. 26.

AMYNTAS I., king of Macedonia (c. 540-498 B.C.), was a tributary vassal of Darius Hystaspes. With him the history of Macedonia may be said to begin. He was the first of its rulers to have relations with other countries; he entered into an alliance with the Peisistratidae, and when Hippias was driven out of Athens he offered him the

territory of Anthemus on the Thermaic Gulf, with the object of turning the Greek party feuds to his own advantage (Herodotus v. 17, 94; Justin vii. 2; Thucydides ii. 100; Pausanias ix. 40). See Macedonian Empire.

AMYNTAS II. (or III.), son of Arrhidaeus, great-grandson of Alexander I., king of Macedonia from 393 (or 389) to 369 B.C.

He came to the throne after the ten years of confusion which followed the death of Archelaus, the patron of art and literature, and showed the same taste for Greek culture and its representa- tives. But he had many enemies at home; in 383 he was driven out by the Illyrians, but in the following year, with the aid of the Thessalians, he recovered his kingdom. He concluded a treaty with the Spartans, who assisted him to reduce Olynthus (379). He also entered into a league with Jason of Pherae, and assidu- ously cultivated the friendship of Athens. By his wife, Eurydice, he had three sons, the youngest of whom was the famous Philip of Macedon.

Diodorus xiv. 89, xv. 19, 60; Xenophon, Hellenica, v. 2; Justin vii. 4.

AMYOT, JACQUES (1513-1593), French writer, was born of poor parents, at Melun, on the 30th of October 1513. He found his way to the university of Paris, where he supported himself by serving some of the richer students. He was nineteen when he became M.A. at Paris, and later he graduated doctor of civil law at Bourges. Through Jacques Colure (or Colin), abbot of St Ambrose in Bourges, he obtained a tutorship in the family of a secretary of state. By the secretary he was recommended to Marguerite de Valois, and through her influence was made professor of Greek and Latin at Bourges. Here he translated Thiagene et Chariclee from Heliodorus (1547 fol.), for which he was rewarded by Francis I. with the abbey of Bellozane. He was thus enabled to go to Italy to study the Vatican text of Plutarch, on the translation on whose Lives (1559; 1565) he had been some time engaged. On the way he turned aside on a mission to the council of Trent. Returning home, he was appointed tutor to the sons of Henry II., by one of whom (Charles IX.) he was after- wards made grand almoner (1561) and by the other (Henry-III.) was appointed, in spite of his plebeian origin, commander of the order of the Holy Ghost. Pius I. promoted him to the bishopric of

Auxerre, and here he continued to live in comparative quiet, repairing his cathedral and perfecting his translations, for the rest of his days, though troubled towards the close by the insub- ordination and revolts of his clergy. He was a devout and conscientious churchman, and had the courage to stand by his principles. It is said that he advised the chaplain of Henry III. to refuse absolution to the king after the murder of the Guise princes. He was, nevertheless, suspected of approving the crime. His house was plundered, and he was compelled to leave Auxerre for some time. He died on the 6th of February 1593, bequeathing, it is said, 1 200 crowns to the hospital at Orleans for the twelve " deniers " he received there when " poor and naked " on his way to Paris. He translated seven books of Diodorus (1554), the Daphnis et Chloe of Longus (1559) and the Opera M or alia of Plutarch (1572). His vigorous and idiomatic version of Plutarch, Vies des hommes illustres, was translated into English by Sir Thomas North, and supplied Shakespeare with materials for his Roman plays. Montaigne said of him," I give the palm to Jacques Amyot over all our French writers, not only for the simplicity and purity of his language in which he surpasses all others, nor for his constancy to so long an undertaking, nor for his profound learning . . . but I am grateful to him especially for his wisdom in choosing so valuable a work." It was indeed to Plutarch that Amyot devoted his attention. His other trans- lations were subsidiary. The version of Diodorus he did not publish, although the manuscript had been discovered by him- self. Amyot took great pains to find and interpret correctly the best authorities, but the interest of his books to-day lies in the style. His translation reads like an original work. The personal method of Plutarch appealed to a generation ad- dicted to memoirs and incapable of any general theory of history. Amyot's book, therefore, obtained an immense popularity, and exercised great influence over successive generations of French writers.

There is a good edition of the works of Amyot from the firm of Didot (25 vols., 1818-1821). See also AugustedeBlignieres, Essai sur Amyot et les traducteurs franco-is au xvi e sihcle (Paris, 1851).

AMYRAUT, MOSES (1596-1664), also known as Amyrai,dtjs, French Protestant theologian and metaphysician, was born at

Bourgueil, in the valley of Anjou, in 1596. His father was a lawyer, and, designing Moses for his own profession, sent him on the completion of his study of the humanities at Orleans to the university of Poitiers. Here he took the degree of licentiate (B.A.) of laws. On his way home from the university he passed through Saumur, and, having visited the pastor of the Protestant church there, was

introduced by him to Philippe de Mornay, governor of the city. Struck with young Amyraut's ability and culture, they both urged him to change from law to theology. His father advised him to revise his philological and philosophical studies, and read over Calvin's Institutions, before finally deter- mining. He did so, and decided for theology. He thereupon removed to Saumur — destined to be for ever associated with his name — and studied under J. Cameron, who ultimately regarded him as his greatest scholar. He had a brilliant course, and was in due time licensed as a minister of the French Protestant Church. The contemporary civil wars and excitements hindered his advancement. His first church was in St Aignan, in the province of Maine. There he remained two years. The eminent theologian, Jean Daille, being then removed to Paris, advised the church at Saumur to secure Amyraut as his successor, praising him " as above himself." The university of Saumur at the same time had fixed its eyes on him as professor of theology. The great churches of Paris and Rouen also contended for him, and to win him sent their deputies to the provincial synod of Anjou. Amyraut had left the choice to the synod. He was appointed to Saumur in 1633, and to the professor's chair along with the pastorate. On the occasion of his inauguration he maintained for thesis De Sacerdotio Christi. His co-professors were Louis Cappel and Josue de la Place, who also were Cameron's pupils. Very beautiful was the lifelong friendship of these three remark- able men, who collaborated in the Theses Salmurienses, a collec- tion of theses propounded by candidates in theology prefaced by the inaugural addresses of the three professors. Full of energy, Amyraut very speedily gave to French Protestantism a new force. In 1 63 1 he published his Traits des religions, a book that still lives; and from this year onward he was a foremost man in the church. Chosen to represent the provincial synod of Anjou, Touraine and Maine at the national synod held in 1631 at Charenton, he was appointed as orator to present to the king " The Copy of their Complaints and Grievances for the Infrac- tions and Violations of the Edict of Nantes." Previous deputies had addressed the king on their bended knees, whereas the repre- sentatives of the Catholics had been permitted to stand. Amy- raut consented to be orator only if the assembly authorized him to stand. There was intense resistance. Cardinal Richelieu himself, preceded by lesser dignitaries, condescended to visit Amyraut privately, to persuade him to kneel; but Amyraut held resolutely to his point and carried it. His " oration " on this occasion, which was immediately published in the French Mercury, remains a striking landmark in the history of French Protestantism. During his absence on this matter the assembly debated " Whether the Lutherans who desired it, might be admitted

into communion with the Reformed Churches of France at the Lord's Table." It was decided in the affirmative previous to his return; but he approved with astonishing eloquence, and thereafter was ever in the front rank in maintaining inter- communication between all churches holding the main doctrines of the Reformation. P. Bayle recounts the title-pages of no fewer than thirty-two books of which Amyraut was the author, These show that he took part in all the great controversies on predestination and Arminianism which then so agitated and harassed all Europe. Substantially he held fast the Calvinism of his preceptor Cameron; but, like Richard Baxter in England, by his breadth and charity he exposed himself to all manner of misconstruction. In 1634 he published his Traiti de la pri- destination, in which he tried to mitigate the harsh features of predestination by his " Universalismus hypotheticus." God, he taught, predestines all men to happiness on condition of their having faith. This gave rise to a charge of heresy, of which he was acquitted at the national synod held at Alencon in 1637, and presided over by Benjamin Basnage (1580-1652). The

q02

ANA

charge was brought up again at the national synod of Charenton in 1644, when he was again acquitted. A third attack at the synod of Loudun in 1659 met with no better success. The university of Saumur became the university of French Pro- testantism. Amyraut had as many as a hundred students in attendance upon his prelections. Another historic part filled by Amyraut was in the negotiations originated by Pierre le Gouz de la Berchere (1600-1653), first president of the parlement of Grenoble, when exiled to Saumur, for a reconciliation and reunion of the Catholics of France with the French Protestants. Very large were the concessions made by Richelieu in his personal interviews with Amyraut; but, as with the Worcester House negotiations in England between the Church of England and nonconformists, they inevitably fell through. On all sides the statesmanship and eloquence of Amyraut were conceded. His De V elevation de la Joy el de I' abaissement de la raison en la creance des mysleres de la religion (1641) gave him early a high place as a metaphysician. Exclusive of his controversial writings, he left behind him a very voluminous series of practical evangelical books, which have long remained the fireside favourites of the peasantry of French Protestantism. Amongst these are Eslat des fideles apres la mort; Sur I'oraison dominicale; Du nitrite des ceuvres; Traite de la justification; and paraphrases of books of the Old and New

Testament. His closing years were weakened by a severe fall he met with in 1657. He died on the 1 8th of January 1664.

See Edm. Saigey, Moses Amyraut, sa vie et ses ecrits (1849) ; Alex. Schweizer in Tub. theol. Jahrbb., 1852, pp. 41 ft". 155 ft., Protestant. Central-Dogmen(i8$4 ff.), ii. 225 ff., and in Herzog-Hauck, Real- encyklopadie ; Bayle, s.v.; Biog. Univ., s.v. ; John Quick's Synod, in Gall. Reform, pp. 35 2 "357; Ibid. MS. Itones Sacrae Callicanae; Life of Cameron.

ANA, a Latin neuter plural termination appropriated to various collections of the observations and criticisms of eminent men, delivered in conversation and recorded by their friends, or discovered among their papers after their decease. Though the term Ana is of comparatively modern origin, the introduction of this species of composition is not of recent date. It appears, from d'Herbelot's Bibliotheque Orientate, that from the earliest periods the Eastern nations were in the habit of preserving the maxims of their sages. From them the practice passed to the Greeks and Romans. Plato and Xenophon treasured up and recorded the sayings of their master Socrates; and Arrian, in the concluding books of his Enchiridion, now lost, collected the casual observations of Epictetus. The numerous apophthegms scattered in Plutarch, Diogenes Laertius and other writers, show that it was customary in Greece to preserve the colloquially expressed ideas of illustrious men. It appears that Julius Caesar compiled a book of apophthegms, in which he related the bons mots of Cicero; and Quintilian informs us that a freedman of that celebrated wit and orator composed three books of a work entitled De Jocis Ciceronis. We are told by Suetonius that Caius Melissus, originally the slave but afterwards the freedman and librarian of Maecenas, collected the sayings of his master; and Aulus Gellius has filled his Nodes Atticae with anecdotes which he heard from the eminent scholars and critics whose society he frequented in Rome.

But though vestiges of Ana may be traced in the classical ages, it is only in modern times that they have come to be regarded as constituting a distinct species of composition, comprising literary anecdotes, critical reflexions, and historical incidents, mingled with the detail of bons mots and ludicrous tales. The term Ana seems to have been applied to such collections as far back as the beginning of the 15th century. Francesco Barbaro, in a letter to Poggio, says that the information and anecdotes which Poggio and Bartolommeo of Montepulciano had picked up during a literary excursion through Germany will be called Ana: " Quemadmodum mala ab Appio e

Claudia gente Appiana, et pira a Mallio Malliana cognominata sunt, sic haec literarum quae vestra ope et opera Germania in Italiam defe- rentur, aliquando et Poggiana et Montepolitiana vocabuntur."

Poggio Bracciolini, to whom this letter is addressed, and to whom the world is indebted for the preservation of so many

classical remains, is the first eminent person of modern times whose jests and opinions have been transmitted to posterity. Poggio was secretary to five successive popes. During the pontificate of Martin V., who was chosen in 1417, Poggio and other members of the Roman chancery were in the habit of assembling in a common hall adjoining the Vatican, in order to converse freely on all subjects. Being more studious of wit than of truth, they termed this apartment Buggiale, a word which Poggio himself interprets Mendaciorum Officina. Here Poggio and his friends discussed the news and scandal of the day; communicated entertaining anecdotes; attacked what they did not approve (and they approved of little); and indulged in the utmost latitude of satiric remark, not sparing even the pope and cardinals. The jests and stories which occurred in these unrestrained conversations were collected by Poggio, and formed the chief materials of his Facetiae, first printed, according to de Bure, in 1470. This collection, which forms a principal part of the Poggiana, is chiefly valuable as recording interesting anecdotes of eminent men of the 14th and 15th centuries. It also contains a number of quibbles or jeux de mots, and a still greater number of facetiae, idle and licentious stories. These Facetiae form, upon the whole, the most amusing and interesting part of the Poggiana printed at Amsterdam in 1720; but this collection also comprehends additional anecdotes of Poggio's life, and a few extracts from his graver compositions.

Though Poggio was the first person whose remarks and bons mots were collected under the name of Ana, the Scaligerana, which contains the opinions of Joseph Scaliger, was the first worked published under that appellation, and accordingly may be regarded as having led the way to that class of publications. There are two collections of Scaligerana — the Prima and Secunda. The first was compiled by a physician named Francois Vertunien, sieur de Lavau, who attended a family with whom Joseph Scaliger resided. He, in consequence, had frequent opportunities of meeting the celebrated critic, and was in the custom of com- mitting to writing the observations which dropped from him in the course of conversation, to which he occasionally added remarks of his own. This collection, which was chiefly Latin, remained in manuscript many years after the death of the com- piler. It was at length purchased by M. de

Sigogne, who published it in 1669, under the title of Prima Scaligerana, nusquam antehac edita, calling it prima in order to preserve its claim of priority over another Scaligerana, which, though published three years before, had been more recently compiled. This second work, known as Secunda Scaligerana, was collected by two brothers of the name of Vassan, students of the university of Leiden, of which Scaliger was one of the professors. Being particularly recommended to Scaliger, they were received in his house, and enjoyed his conversation. Writing down what they had heard, particularly on historical and critical subjects, they soon made up a large manuscript volume, in which, however, there was neither connexion nor arrangement of any description. After passing through various hands this manuscript came into the possession of M. Daille, who for his own use arranged in alpha- betical order the articles which it contained. Isaac Vossius, obtaining the manuscript in loan from M. Daille, transcribed it, and afterwards published it at the Hague, under the title of Scaligerana, sive Excerpta ex Ore Josephi Scaligeri. This edition was full of inaccuracies and blunders, and a more correct im- pression was afterwards published by M. Daille, with a preface complaining of the use that Vossius had made of the manuscript, which he declares was never intended for publication, and was not of a nature to be given to the world. Indeed, most literary men in that age conceived that the Scaligerana, particularly the second, detracted considerably from the reputation of the great scholar. Joseph Scaliger, with more extensive erudition, but, as some think, less genius than his father Julius Caesar Scaliger, had inherited his vanity and dogmatical spirit. Con- versing with two young students, he would probably be but little cautious in the opinions he expressed, as his literary errors could not be detected or exposed. Unfortunately the blind admiration of his pupils led them to regard his opinions as the responses

of an oracle, and his most unmerited censures as just condemna- tions. The Scaligerana, accordingly, contains many falsehoods, with much unworthy personal abuse of the most distinguished characters of the age.

In imitation of the Scaligerana, a prodigious number of similar works appeared in France towards the end of the 17th and beginning of the 18th century. At first these collections were confined to what had fallen from eminent men in con- versation ; but they were afterwards

made to embrace fragments found among their papers, and even passages extracted from their works and correspondence. Of those which merely record the conversations of eminent men, the best known and most valuable is the Menagiana. Gilles Menage was a person of good sense, of various and extensive information and of a most communicative disposition. A collection of his oral opinions was published in 1693, soon after his death; and this collection, which w:as entitled Menagiana, was afterwards corrected and enlarged by Bernard de la Monnoye, in an edition published by him in 1 715.

The Perroniana, which exhibits the opinions of Cardinal du Perron, was compiled from his conversation by C. Dupuy, and published by Vossius in 1666, by the same contrivance which put him in possession of the Scaligerana. The Thuana, or observa- tions of the president de Thou, have usually been published along with the Perroniana, but first appeared in 1669.

The Valesiana is a collection of the literary opinions of the historiographer Adrien de Valois, published by his son. M. de Valois was a great student of history, and the Valesiana accord- ingly comprehends many valuable historical observations, par- ticularly on the works of du Cange.

The Fnreteriana (1696) contains the bons mots of Antoine Furetiere, the Academician, the stories which he was in the habit of telling, and a number of anecdotes and remarks found in his papers after his decease.

The Chevraeana (1697), so called from Urbain Chevreau, is more scholarly than most works of a similar description, and probably more accurate, as it differs from the Ana proper, of which the works described above are instances, in having been published during the life of the author and revised by himself.

Parrhasiana (169Q-1701) is the work of JeanleClerc, a professor of Amsterdam, who bestowed this appellation on his miscel- laneous productions with the view of discussing various topics of philosophy and politics with more freedom than he could have employed under his own name.

The Huetiana contains the detached thoughts and criticisms of P. D. Huet, bishop of Avranches, which he himself committed to writing when he was far advanced in life. Huet was born in 1630, and in 171 2 he was attacked by a malady which impaired his memory, and

rendered him incapable of the sustained attention necessary for the completion of a long or laborious work. In this situation he employed himself in putting his detached observa- tions on paper. These were published by the Abbe d'Olivet the year after his death (1722).

The Casauboniana presents us with the miscellaneous observa- tions, chiefly philological, of the celebrated Isaac Casaubon. During the course of a long life that eminent commentator was in the daily practice of committing to paper anything remarkable which he heard in conversation with his friends, especially if it bore on the studies in which he was engaged. He also made annotations from day to day on the works he read, with which he connected his judgments concerning the authors and their writings. This compilation was styled Ephemerides. His Adver- saria, and materials amassed for a refutation of the Ecclesiastical Annals of Baronius, were bequeathed by his son Meric Casaubon to the Bodleian Library at Oxford. These were shown to J. C. Wolf during a visit which he paid to that university; and having been transcribed by him, were published in 17 10 under the title of Casauboniana.

Besides the above a great many works under the title of Ana appeared in France about the same period. Thus, the opinions and conversation of Charpentier, Colomesius and St Evremond were recorded in the Carpenteriana, Colomesiana and St Evre-

moniana; and those of Segrais in the Segraisiana, — a collection formed by a person stationed behind the tapestry in a house where Segrais was accustomed to visit, of which Voltaire declared, " que de tous les Ana c'est celui qui merite le plus d'etre mis au rang des mensonges imprim6s, et surtout des mensonges insipides." The Ana, indeed, from the popularity which they now enjoyed, were compiled in such numbers and with so little care that they became almost proverbial for inaccuracy.

In 1743 the Abbe d'Olivet spoke indignantly of " ces ana, dont le nombre se multiple impunement tous les jours a la honte de notre siecle." About the middle of the 18th century, too, they were sometimes made the vehicles of revolutionary and heretical opinions. Thus the evil naturally began to cure itself, and by a reaction the French Ana sank in public esteem as much below their intrinsic value as they had formerly been exalted above it.

Of the examples England has produced of this species of composition, perhaps the most interesting is the W alpoliana, a transcript of the literary conversation of Horace Walpole, earl of Orford. Most other

works which in England have been published under the name of Ana, as Baconiana, Alterburyana, &c, are rather extracts from the writings and corresponded ce of eminent men than memorials of their conversation.

There are some works which, though they do not bear the title, belong more strictly to the class of Ana than many of the collections which are known under that appellation. Such are the Melanges d'histoire et de lilterature, published under the name of Vigneul Marville, though the work of a Benedictine, d'Argonne; and the Locorum Communium Collectanea, ex Lectionibus Philippi Melanchthonis, — a work of considerable reputation on account of its theological learning, and the information it communi- cates concerning the early state of the Eeformed Church. But of those productions which belong to the class, though they do not bear the name, of Ana, the most celebrated are the Colloquia Mensalia of Luther and Selden's T able-Talk. The former, which comprehends the conversation of Luther with his friends and coadjutors in the great work of the Reformation, was first published in 1566. Captain H. Bell, who translated it into English in the time of the Commonwealth, informs us that, an edict having been promulgated commanding the works of Luther to be destroyed, it was for some time supposed that all the copies of the Colloquia Mensalia had been burned; but in 1626, on the foundation of a house being removed, a printed copy was found lying in a deep hole and wrapped up in a linen cloth. The book, translated by Bell, and again by the younger Hazlitt in 1847, was originally collected by Dr Anton Lauterbach (1 502-1 569.) " out of the holy mouth of Luther." It consists chiefly of observations and discussions on idolatry, auricular confession, the mass, excommunication, clerical jurisdiction, general councils, and all the points agitated by the reformed church in those early periods. The Table- Talk of Selden contains a more genuine and undisguised expression of the sentiments of that eminent man than we find in his more studied productions. It was published after his death by Richard Milward, his amanuensis, who affirms that for twenty years he enjoyed the opportunity of daily hearing his discourse, and made it his practice faithfully to commit to writing " the excellent things that usually fell from him."

The most remarkable collection of Ana in the English language — and, indeed, in any language — is to be found in a work which does not correspond to the normal type either in name or in form. In his Life of Samuel Johnson, LL.D., Boswell relates that to his remark, a propos of French literature, " Their Ana are good," Johnson replied, " A few of them are good; but we have one book of that kind better

than any of them — Selden's Table- Talk." Boswell's own work, however, is incomparably superior to all.

J. C. Wolf has given a history of the Ana in a preliminary dis- course to his edition of the Casauboniana, published in 1710. In the Repertoire de bibliographies speciales, curieuses, et instructives, by Peignot, there is a Notice bibliographique of these collections; but many of the books there enumerated consist of mere extracts from the writings of popular authors.

ANABAPTISTS (" re-baptizers," from Gr. ava. and PairTifoc), a name given by their enemies to various sects which on the

occasion of Luther's revolt from Romanism denied the validity of infant baptism, and therefore baptized those whom they quite logically regarded as not having received any Christian initiation at all.

On the 27th of December 1521 three "prophets " appeared in Wittenberg from Zwickau, Thomas Miinzer, Nicolas Storch and Mark Thomas Stiibner. Luther's reform was not thorough enough for them. He professed to rest all upon Scripture, yet accepted from the Babylon of Rome a baptism neither scriptural nor primitive, nor fulfilling the chief conditions of admission into a visible brotherhood of saints, to wit, repentance, faith, spiritual illumination and free surrender of self to Christ. Melanchthon, powerless against the enthusiasts with whom his co-reformer Carlstadt sympathized, appealed to Luther, still concealed in the Wartburg. He had written to the Waldenses that it is better not to baptize at all than to baptize little children; now he was cautious, would not condemn the new prophecy off-hand; but advised Melanchthon to treat them gently and to prove their spirits, less they be of God. There was confusion in Wittenberg, where schools and university sided with the " prophets " and were closed. Hence the charge that Anabaptists were enemies of learning, which is sufficiently rebutted by the fact that the first German translation of the Hebrew prophets was made and printed by two of them, Hetzer and Denk, in 1527. The first leaders of the movement in Zurich — Grebel, Manz, Blaurock, Hubmaier — were men learned in Greek, Latin and Hebrew. On the 6th of March Luther returned, interviewed the prophets, scorned their " spirits," forbade them the city, and had their adherents ejected from Zwickau

and Erfurt. Denied access to the churches, the latter preached and celebrated the sacrament in private houses. Driven from the cities they swarmed over the countryside. Compelled to leave Zwickau, Miinzer visited Bohemia, resided two years at Alltstedt in Thuringia, and in 1524 spent some time in Switzerland. During this period he proclaimed his revolutionary doctrines in religion and politics with growing vehemence, and, so far as the lower orders were concerned, with growing success. The crisis came in the so- called Peasants' War in South Germany in 1525. In its origin a revolt against feudal oppression, it became, under the leader- ship of Miinzer, a war agaiict all constituted authorities, and an attempt to establish by force his ideal Christian commonwealth, with absolute equality and the community of goods. The total defeat of the insurgents at Frankenhausen (May 15, 1525), followed as it was by the execution of Miinzer and several other leaders, proved only a temporary check to the Anabaptist move- ment. Here and there throughout Germany, Switzerland and the Netherlands there were zealous propagandists, through whose teaching many were prepared to follow as soon as another leader should arise. A second and more determined attempt to establish a theocracy was made at Miinster, in Westphalia (1532-1535). Here the sect had gained considerable influence, through the adhesion of Rothmann, the Lutheran pastor, and several prominent citizens; and the leaders, Johann Matthys- zoon or Matthiesen, a baker of Haarlem, and Johann Bockholdt, a tailor of Leiden, had little difficulty in obtaining possession of the town and deposing the magistrates. Vigorous prepara- tions were at once made, not only to hold what had been gained, but to proceed from Miinster as a centre to the conquest of the world. The town being besieged by Francis of Waldeck, its expelled bishop (April 1534), Matthiesen, who was first in command, made a sally with only thirty followers, under the fanatical idea that he was a second Gideon, and was cut off with his entire band. Bockholdt, better known in history as John of Leiden, was now supreme. Giving himself out as the successor of David, he claimed royal honours and absolute power in the new " Zion." He justified the most arbitrary and extrava- gant measures by the authority of visions from heaven, as others have done in similar circumstances. With this pre- tended sanction he legalized polygamy, and himself took four wives, one of whom he beheaded with his own hand in the market-place in a fit of frenzy. As a natural consequence of such licence, Miinster was for twelve months a scene of unbridled

profligacy. After an obstinate resistance the town was taken by the besiegers on the 24th of June 1535, and in January 1536 Bockholdt and some of his more prominent followers, after being cruelly

tortured, were executed in the market-place. The outbreak at Miinster was the crisis of the Anabaptist movement. It never again had the opportunity of assuming political im- portance, the civil powers naturally adopting the most stringent measures to suppress an agitation whose avowed object was to suppress them. It is difficult to trace the subsequent history of the sect as a religious body. The fact that, after the Miinster insurrec- tion the very name Anabaptist was proscribed in Europe, is a source of twofold confusion. The enforced adoption of new names makes it easy to lose the historical identity of many who really belonged to the Miinster Anabaptists, and, on the other hand, has led to the classification of many with the Miinster sect who had no real connexion with it. The latter mistake, it is to be noted, has been much more common than the former. The Mennonites, for example, have been identified with the earlier Anabaptists, on the ground that they included among their number many of the fanatics of Miinster. But the continuity of a sect is to be traced in its principles, and not in its adherents, and it must be remembered that Menno and his followers expressly repudiated the distinctive doctrines of the Miinster Anabaptists. They have never aimed at any social or political revolution, and have been as remarkable for sobriety of conduct as the Miinster sect was for its fanaticism (see Mennonites). In English history frequent reference is made to the Anabaptists during the 16th and 17th centuries, but there is no evidence that any considerable number of native Englishmen ever adopted the principles of the Miinster sect. Many of the followers of Miinzer and Bockholdt seem to have fled from persecution in Germany and the Netherlands to be subjected to a persecution scarcely less severe in England. The mildest measure adopted towards these refugees was banishment from the kingdom, and a large number suffered at the stake. It was easier to burn Anabaptists than to refute their arguments, and contemporary writers were struck with the intrepidity and number of their martyrs. Thus Stanislaus Hosius (1504-1579), a Polish cardinal and bishop of Warmie, wrote {Opera, Venice, 1573, p. 202):—

" They are far readier than followers of Luther and Zwingli to meet death, and bear the harshest tortures for their faith. For they run to suffer punishments, no matter how horrible, as if to a banquet ; so that if you take that as a test either of the truth of doctrine or of their certitude of grace, you would easily conclude that in no other sect is to be found a faith so true or grace so certain. But as Paul wrote: ' Even if I give my body up to be burned and have not charity, it avails me naught.' But he has not charity who divides the unity. . . . He cannot be a martyr who is not in the Church."

The excesses of John of Leiden, the Brigham Young of that age, cast an unjust stigma on the Baptists, of whom the vast majority were good, quiet people who merely carried out in practice the early Christian ideals of which their persecutors prated. They have been reckoned an extreme left wing of the Reformation, because for a time they followed Luther and Zwingli. Yet their Christology and negative attitude towards the state rather indicate, as in the case of Wicklif, Hus and the Fraticelli, an affinity to the Cathari and other medieval sects. But this affiliation is hard to establish. The earliest Anabaptists of Zurich allowed that the Picardi or Waldensians had, in contrast with Rome and the Reformers, truth on their side, yet did not claim to be in their succession; nor can it be shown that their adult baptism derived from any of the older Baptist sects, which undoubtedly lingered in parts of Europe. Later on Hermann Schyn claimed descent for the peaceful Baptists from the Waldensians, who certainly, as the records of the Flemish inquisi- tion, collected by P. Fredericq, prove, were wide-spread during the 15th century over north France and Flanders. It would appear from the way in which Anabaptism sprang up everywhere independently, as if more than one ancient sect took in and through it a new lease of life. Ritschl discerned in it the leaven of the Fraticelli or Franciscan Tertiaries. In Moravia, if what Alex. Rost related be true, namely that they called themselves

Apostolici, and went barefooted healing the sick, they must have at least absorbed into themselves a sect of whom we hear in the 1 2th century in the north of Europe as deferring baptism to the age of 30, and rejecting oaths, prayers for the dead, relics and invocation of saints. The Moravian Anabaptists, says Rost, went bare-footed, washed each other's feet (like the Fraticelli), had all goods in common, worked everyone at a handicraft, had a spiritual father who prayed with them every morning and taught them, dressed in black and had long graces before and after meals. Zeiler also in his German Itinerary (1618) describes their way of life. The Lord's Supper, or bread-breaking, was a commemoration of the Passion, held once a year. They sat at long tables, the elders read the words of institution and prayed, and passed a loaf round from which each broke off a bit and ate, the wine being handed round in flagons. Children in their colonies were separated from the parents, and lived in the school, each having his bed and blanket. They were taught reading, writing and summing, cleanliness, truthfulness and industry,

and the girls married the men chosen for them. In the following points Anabaptists resembled the medieval dissenters:— (1) They taught that Jesus did not take the flesh from his mother, but either brought his body from heaven or had one made for him by the Word. Some even said that he passed through his mother, as water through a pipe, into the world. In pictures and sculp- tures of the 15 th century and earlier, we often find represented this idea, originated by Marcion in the 2nd century. The Anabaptists were accused of denying the Incarnation of Christ: they did, but not in the sense that he was not divine; they rather denied him to be human. (2) They condemned oaths, and also the reference of disputes between believers to law-courts. (3) The believer must not bear arms or offer forcible resistance to wrongdoers, nor wield the sword. No Christian has the jus gladii. (4) Civil government belongs to the world, is Caesar. The believer who belongs to God's kingdom must not fill any office, nor hold any rank under government, which is to be passively obeyed. (5) Sinners or unfaithful ones are to be excommunicated, and excluded from the sacraments and from intercourse with believers unless they repent, according to Matt, xviii. 15 seq. But no force is to be used towards them.

Some sects calling themselves Spirituals or Perfecti also held that the baptized cannot sin, a very ancient tenet.

They seem to have preserved among them the primitive manual called the Teaching of the Apostles, for Bishop Longland in Eng- land condemned an Anabaptist for repeating one of its maxims " that alms should not be given before they did sweat in a man's hand." This was between 1518 and 1521.

On the 1 2th of April 1 549, certain London Anabaptists brought before a commission of bishops asserted. —

" That a man regenerate could not sin; that though the outward man sinned, the inward man sinned not; that there was no Trinity of Persons; that Christ was only a holy prophet and not at all God; that all we had by Christ was that he taught us the way to heaven; that he took no flesh of the Virgin, and that the baptism of infants was not profitable."

The Anabaptists were great readers of Revelation and of the Epistle of James, the latter perhaps by way of counteracting Luther's one-sided teaching of justification by faith alone. Luther feebly rejected this scripture as " a right strawy epistle." English Anabaptists often knew it by heart. Excessive reading of Revelation seems to have been

the chief cause of the aberrations of the Miinster fanatics.

In Poland and Holland certain of the Baptists denied the Trinity, hence the saying that a Socinian was a learned Baptist (see Socinus). With these Menno and his followers refused to hold communion.

One of the most notable features of the early Anabaptists is that they regarded any true religious reform as involving social amelioration. The socialism of the 16th century was necessarily Christian and Anabaptist. Lutheranism was more attractive- to grand-ducal patriots and well-to-do burghers than to the poor and oppressed and disinherited. The Lutherans and Zwinglians never converted the Anabaptists. Those who yielded to stress

of persecution fell back into Papalism and went to swell the tide of the Catholic reaction.

Authorities. — Filssli, Kitchen- und Ketzerhistorie der mittlern Zeit (contains Bullinger); Zwinglius, In catabaptistarum strophas elenchus (1527) (Opera iii. 351) ; Bullinger, Der Wiedertdufer Ursprung (1560); Gieseler, Ecclesiastical History, Engl. tr. v. 344; Spanheim, De origine Anabapt. (Lugd. 1643); Ranke's History of the Re- formation; Melanchthon, Die Historie von Th. Miintzer (1525) (in Luthers Werke, ed. Walch, xvi. 199) ; Strobel, Leben Th. Muntzers (i795); C. A. Cornelius, Die niederldndischen Wiedertdufer, in publications of Bavarian Academy (1869); J, G. Walch, Hist. u. theolog. Einleitung (Jena, 1733) ; Mosheim, Ecclesiastical History Gerbert, Gesch. d. Strassb. Sektenbewegung (Strassburg, 1889) W. Moeller, History of the Christian Church, tr. by Freese, i960, Jos. v. Beck, Die Geschichtsbucher der Wiedertdufer in Osterr.-Ung. (Wien, 1883), (Fontes return Austr II. xliii., a valuable history of the sect from their own early documents) ; Ritschl, Geschichte des Pietismus, vol. i. T.Bonn, 1880) ; Loserth, B. Hubmaier und die Anfdnge der Wiedertdufer in Mdhren (Brunn, 1893) ; Kolde, in Kirchengesch. Studien (Leipzig, 1888); Kessler, Sabbata; Leendertz and Zur Linden, M. Hofmann (Haarlem, 1883-1885); Erbkam, Gesch. der prot. Sekten der Reform. (1848); Justus Menius, Der Wiedertdufer Lehre (Wittenberg, 1534); johann Cloppenburg and Fred. Spanheim, Gangraena theologiae Anabaptisticae (Franekerd, 1656) ; Balthasar Lydius, Waldensia, id est conservatio verae Ecclesiae (Rotterdam, 1616) ; Herman Schyn, Historiae Mennonitarum (Amsterdam, 1729) ; Joh. Henr. Ottius, Annates Anabaptistici (Basileae. 1772); Karl Rembert, Die Wiedertdufer in Herzogtum Julich (Miinster, 1873); Universal Lexicon, art. " Wiedertaufer " (Leipzig. 1748) ; Tielmann Janssen

van Bracht, Martyrologia Mennonitarum (Haarlem, 1615-1631); Joh. Gastii, Tractat. de Anabapt. Exordio (Basel, 1545); Jehring, History of the Baptists; Auss Bundt, or hymns written by and of the Baptist martyrs from 1 526-1620, first printed without date or place, reprinted Basel, 1838. (F. C. C.)

ANABASIS (avafiaais, a march up country), the title given by Xenophon (q.v.) to his narrative of the expedition of Cyrus the younger against his brother, Artaxerxes of Persia, 401 B.C., and adopted by Arrian for his history of the expedition of Alexander the Great.

ANABOLISM (Gr. ava, up, |3o\ii, a throw), the biological term for the building up in an organism of more complex from simpler substances, constructive metabolism. (See Physiology.)

ANACHARSIS, a Scythian philosopher, who lived about 600 B.C. He was the son of Gnurus, chief of a nomadic tribe of the Euxine shores, and a Greek woman. Instructed in the Greek language by his mother, he prevailed upon the king to entrust him with an embassy to Athens about 589 B.C. He became acquainted with Solon, from whom he rapidly acquired a know- ledge of the wisdom and learning of Greece, and by whose influence he was introduced to the principal persons in Athens. He was the first stranger who received the privileges of citizenship. He was reckoned one of the Seven Sages, and it is said that he was initiated into the Eleusinian mysteries. After he had resided several years at Athens, he travelled through different countries in quest of knowledge, and returned home filled with the desire of instructing his countrymen in the laws and the religion of the Greeks. According to Herodotus he was killed by his brother Saulius while he was performing sacrifice to the goddess Cybele. It was he who compared laws to spiders' webs, which catch small flies and allow bigger ones to escape. His simple and forcible mode of expressing himself gave birth to the proverbial expression " Scythian eloquence," but his epigrams are as unauthentic as the letters which are often attributed to him. According to Strabo he was the first to invent an anchor with two flukes. Barth61emy borrows his name as the title for his Anacharsis en Grece.

Herodotus iv. 76; Lucian, Scyiha; Cicero, Tusc. Disp. v. 32; Diog. Laert. i. 101.

ANACHRONISM (from ava, back, and xpovos, time), a neglect or falsification, whether wilful or undesigned, of chronological relation. Its commonest use restricts it to the ante-dating of events,

circumstances or customs; in other words, to the introduction, especially in works of imagination that rest on a historical basis, of details borrowed from a later age. Ana- chronisms may be committed in many ways, originating, for instance, in disregard of the different modes of life and thought that characterize different periods, or in ignorance of the progress

of the arts and sciences and the other ascertained facts of history, and may vary from glaring inconsistency to scarcely perceptible misrepresentation. Much of the thought entertained about the past is so deficient in historical perspective as to be little better than a continuous anachronism. It is only since the close of the 1 8th century that this kind of untruthfulness has jarred on the general intelligence. Anachronisms abound in the works of Raphael and Shakespeare, as well as in those of the meanest daubers and playwrights of earlier times. In particular, the artists, on the stage and on the canvas, in story and in song, assimilated their dramatis personae to their own nationality and their own time. The Virgin was represented here as an Italian contadina, and there as a Flemish frow; Alexander the Great appeared on the French stage in the full costume of Louis XIV. down to the time of Voltaire; and in England the contemporaries of Addison could behold, without any suspicion of burlesque,

" Cato's long wig, flower'd gown, and lacquer'd chair."

Modern realism, the progress of archaeological research, and the more scientific spirit of history, have made an anachronism an offence, where our ancestors saw none.

ANACOLUTHON (Gr. for " not following on "), a grammatical term, given to a defectively constructed sentence which does not run on as a continuous whole; this may occur either, in a text, by some corruption, or, in the case of a writer or speaker, simply through his forgetting the way in which he started. In the case of a man who is full of his subject, or who is carried along by the passion of the moment, such inconsequents are very apt to occur. Of Niebuhr it is told that his oral lectures consisted almost entirely of anacoluthic constructions. To this kind of licence some languages, as Greek and English, readily lend themselves; while the grammatical rigidity of others, as Latin and French, admits of it but sparingly. In Herodotus,

Thucydides, Aeschylus, Pindar and Plato, abundant specimens are to be found; and the same is true of the writers of the Elizabethan age in English. The following is an example: — " And he charged him to tell no man; but go show thyself," &c. (Luke v. 14).

ANACONDA, a city and the county-seat of Deer Lodge county, Montana, U.S.A., situated in the mountains on the W. side of Deer Lodge Valley, in the S.W. part of the state, about 26 m. N.W. of Butte, and at an altitude of about 5300 ft. Pop. (1890) 3975; (1900) 9453, of whom 3478 were foreign-born; (1910, census) 10,134. It is connected with Butte by the Butte, Anaconda & Pacific railroad. Among its public buildings are the county court-house and the Hearst free public library (1898). Industrially, Anaconda is essentially a smelting camp for the copper ores from the Butte mines, probably the largest copper- smelter in the world being located here ; the principal copper-mine at Butte — one of the most famous copper-mines in the world — is called the Anaconda. In 1903 the capital invested in manu- facturing was $13,728,456, and the factory product was valued at $28,581,530. Electric power generated at the Helena Power Transmission Company's plant on the Missouri river, 18 m. from Helena, comes to Anaconda over 1 10 m. of wire at 70,000 voltage. Anaconda is to a large degree the market and trading-place of the Big Hole Basin cattle country in the north-western part of Beaverhead county; with Wisdom, in the Big Hole Basin, it was connected in 1905 by a 65 m. telephone line. Anaconda was first settled in 1884 and was chartered as a city in 1888.

ANACONDA, an aquatic boa, inhabiting the swamps and rivers of the dense forests of tropical South America. It is the largest of all modern snakes, said to attain over 30 ft. in length. The Eunectes murinus (formerly called Boa murina) differs from Boa by the snout being covered with shields instead of small scales, the inner of the three nasal shields being in contact with that of the other side. The general colour is dark olive-brown, with large oval black spots arranged in two alternating rows along the back, and with smaller white-eyed spots along the sides. The belly is whitish, spotted with black. The anaconda combines an arboreal with an aquatic life, and feeds chiefly upon birds and mammals, mostly during the night. It lies submerged in the water, with only a small part of its head above the surface,

waiting for any suitable prey, or it establishes itself upon the branches of a tree which overhangs the water or the track of game. Being eminently aquatic this snake is viviparous. It is the only large

boa which is decidedly ill-tempered.

ANACREON, Greek lyric poet, was born about 560 B.C., at Teos, an Ionian city on the coast of Asia Minor. Little is known of his life, except a ifew scattered notices, not in all cases certainly authentic. He probably shared the voluntary exile of the mass of his fellow-townsmen, who, when Cyrus the Great was besieging the Greek cities of Asia (545) , rather than surrender, their city to his general Harpagus, sailed to Abdera in Thrace, where they founded a colony. Anacreon seems to have taken part in the fighting, in which, on his own admission, he did not distinguish himself, but, like Alcaeus and Horace, threw away his shield and fled. From Thrace he removed to the court of Polycrates of Samos, one of the best of those old " tyrants," who by no means deserved the name in its worst sense. He is said to have acted as tutor to Polycrates; that he enjoyed the tyrant's confidence we learn on the authority of Herodotus (iii. 121), who represents the poet as sitting in the royal chamber when audience was given to the Persian herald. In return for his favour and protection, Anacreon wrote many complimentary odes upon his patron. Like his fellow-lyrist, Horace, who was one of his great admirers, and in many respects of a kindred spirit, Anacreon seems to have been made for the society of courts. On the death of Polycrates, Hipparchus, who was then in power at Athens and inherited the literary tastes of his father Peisis- tratus, sent a special embassy to fetch the popular poet to Athens in a galley of fifty oars. Here he became acquainted with the poet Simonides, and other members of the brilliant circle which had gathered round Hipparchus. When this circle was broken up by the assassination of Hipparchus, Anacreon seems to have returned to his native town of Teos, where, according to a metrical epitaph ascribed to his friend Simonides, he died and was buried. According to others, before returning to Teos, he accompanied Simonides to the court of Echecrates, a Thessalian dynast of the house of the Aleuadae. Lucian mentions Anacreon amongst his instances of the longevity of eminent men, as having completed eighty-five years. If an anecdote given by Pliny (Nat. Hist. vii. 7) is to be trusted, he was choked at last by a grape-stone, but the story has an air of mythical adaptation to the poet's habits, which makes it somewhat apocryphal. Anacreon was for a long time popular at Athens, where his statue was to be seen on the Acropolis, together with that of his friend Xanthippus, the father of Pericles. On several coins of Teos he is represented, holding a lyre in his hand, sometimes sitting, sometimes standing. A marble statue found in 1835 in the Sabine district, and now in the Villa Borghese, is said to represent Anacreon. Anacreon had a reputation as a

composer of hymns, as well as of those bacchanalian and amatory lyrics which are commonly associated with his name. Two short hymns to Artemis and Dionysus, consisting of eight and eleven lines respectively, stand first amongst his few undisputed remains, as printed by recent editors. But pagan hymns, especially when addressed to such deities as Aphrodite, Eros and Dionysus, are not so very unlike what we call " Anacreontic " poetry as to make the contrast of style as great as the word might seem to imply. The tone of Anacreon's lyric effusions has probably led to an unjust estimate, by both ancients and moderns, of the poet's personal character. The " triple worship " of the Muses, Wine and Love, ascribed to him as his religion in an old Greek epigram (Anthol. iii. 25,51), may have been as purely professional in the two last cases as in the first, and his private character on such points was probably neither much better nor worse than that of his contemporaries. Athenaeus remarks acutely that he seems at least to have been sober when he wrote; and he him- self strongly repudiates, as Horace does, the brutal characteristics of intoxication as fit only for barbarians and Scythians (Fr. 64). Of the five books of lyrical pieces by Anacreon which Suidas and Athenaeus mention as extant in their time, we have now but the merest fragments, collected from the citations of later writers. Those graceful little poems (most of them first printed

from the MSS. by Henry Stephens in 1554), which long passed among the learned for the songs of Anacreon, and which are well-known to many English readers in the translations of Cowley and Moore, are really of much later date, though possibly here and there genuine fragments of the poet are included. Modern critics, however, regard the entire collection as imitations belonging to different periods — the oldest probably to Alexandrian times, the most recent to the last days of paganism. They will always retain a certain popularity from their lightness and elegance, and some of them are fair copies of Anacreon's style, which would lend itself readily enough to a clever imitator. A strong argument against their genuineness lies in the fact that the peculiar forms of the Ionic Greek, in which Anacreon wrote, are not to be found in these reputed odes, while the fragments of his poems quoted by ancient writers are full of Ionicisms. Again, only one of the quotations from Anacreon in ancient writers is to be found in these poems, which further contain no references to contemporaries, whereas Strabo (xiv. p. 638) expressly states that Anacreon's poems included numerous allusions

to Polycrates. The character of Love as a mischievous little boy is quite different from that given by Anacreon, who describes him as " striking with a mighty axe, like a smith," and is more akin to the conceptions of later literature.

The best edition of the genuine fragments of Anacreon, as well as of the Anacreontea, is by Bergk (Poetae lyrici graeci, 1882). He includes in an appendix a similar collection of imitations from the Anecdota graeca of P. Matranga (1850), which had their origin in the beginning of the middle ages, and resemble the Christian anacreontics of Sophronius.

ANACREONTICS (from the name of the Greek poet Anacreon), the title given to short lyrical pieces, of an easy kind, dealing with love and wine. The English word appears to have been first used in 1656 by Abraham Cowley, who called a section of his poems " anacreon tiques," because they were paraphrased out of the so-called writings of Anacreon into a familiar measure which was supposed to represent the metre of the Greek. Half a century later, when the form had been much cultivated, John Phillips (1 631-1706) laid down the arbitrary rule that an ana- creontic line " consists of seven syllables, without being tied to any certain law of quantity." In the 18th century, the antiquary William Oldys (1696-1761) was the author of a little piece which is the perfect type of an anacreontic: this begins: —

" Busy, curious, thirsty fly, Drink with me, and drink as I ; Freely welcome to my cup, Could'st thou sip and sip it up. Make the most of life you may; Life is short and wears away."

In 1800 Tom Moore published a collection of erotic anacreontics which are also typical in form; Moore speaks of the necessity of catching " the careless facility with which Anacreon appears to have trifled," as a reason why anacreontics are often tame and worthless. He dwells, moreover, on the absurdity of writing " pious anacreontics," a feat, however, which was performed by several of the Greek Christian poets, and in particular by Gregory of Nazianzus and John of Damascus. (E. G.)

ANADYOMENE (' kvahvonkvq), an epithet of Aphrodite (Venus), expressive of her having sprung from the foam of the sea. In a famous picture by Apelles she was represented under this title as if just emerged from the sea and in the act of wringing her tresses. This painting was executed for the temple of Asclepius at Cos, from which it was taken to Rome by Augustus in part payment of tribute, and set

up in the temple of Caesar. In the time of Nero, owing to its dilapidated condition, it was replaced by a copy made by the painter Dorotheus (Pliny, Nat. Hist. xxxv. 36). There are several epigrams on it in the Greek anthology.

ANADYR, (1) a gulf, and (2) a river, in the extreme N.E. of Siberia, in the Maritime Province. The gulf extends from Cape Chukchi on the north to Cape Navarin on the south, forming part of the Bering Sea. The river, taking its rise in the Stanovoi mountains as the Ivashki or Ivachno, about 67 N. lat. and 173°

E. long., flows through the Chukchi country, at first south-west and then east, and enters the Gulf of Anadyr after a course of about 500 m. The country through which it passes is thinly populated, barren and desolate. For nine months of the year the ground is covered with snow. Reindeer, upon which the in- habitants subsist, are found in considerable numbers.

ANAEMIA (from Gr. av-, privative, and al/xa, blood), literally " want of blood," a word used as a generic term for various forms of disease characterized by a defective constitution of the blood. For different types of anaemia see the article Blood, section Pathology.

ANAESTHESIA and ANAESTHETICS (Gr. Ai«ucr0ij(rfa, from av-, privative, and dxaQ-qavs, sensation), terms used in medicine to describe a state of local or general insensibility to external impressions, and the substances used for inducing this state. In diseases of the brain or spinal cord anaesthesia is an occasional symptom, but in such cases it is usually limited in extent, involving a limb or a definite area of the body's surface. Com- plete anaesthesia occurs in a state of catalepsy or trance — conditions associated with no definite lesion of the nervous system.

The artificial induction of anaesthesia has come to occupy a foremost place in modern medicine, but there is abundant evidence to show that it is a practice of great antiquity. Besides the mention by Homer of the anaesthetic effects of nepenthe, and the reference by Herodotus to the practice of the Scythians of inhaling the vapours of a certain kind of hemp to produce intoxication, the employment of anaesthetics in surgery by the use of mandragora is particularly alluded to by Dioscorides and Pliny. It also appears, from an old Chinese manuscript laid before the French Academy by Stanislas Julien, that a physician named Hoa-tho, who lived in the 3rd century, gave his patients a preparation of hemp, whereby they were rendered insensible during the performance of surgical operations.

Mandragora was extensively used as an anaesthetic by Hugo de Lucca, who practised in the 13th century. The soporific effects of mandrake are alluded to by Shakespeare, who also makes frequent mention of anaesthetizing draughts, the composition of which is not specified.

In the Medical Gazette, vol. xii. p. 515, Dr Sylvester, quoting from a German work by Meissner, published in 1782, mentions the case of Augustus, king of Poland, who underwent amputation while rendered insensible by a narcotic. But the practice of anaesthesia never became general, and surgeons appear to have usually regarded it with disfavour. When, towards the close of the 1 8th century, the discoveries of Priestley gave an impetus to chemical research, the properties of gases and vapours began to be more closely investigated, and the belief was then entertained that many of them would become of great medicinal value. In 1800, Sir Humphry Davy, experimenting on nitrous oxide (the so-called " laughing gas "), discovered its anaesthetic properties, and described the effects it had on himself when inhaled with the view of relieving local pain. He suggested its employment in surgery in the following words: — " As nitrous oxide, in its extensive operation, seems capable of destroying physical pain, it may probably be used with advantage in surgical operations in which no great effusion of blood takes place." His suggestion, however, remained unheeded for nearly half a century. The inhalation of sulphuric ether for the relief of asthma and other lung affections had been employed by Dr Pearson of Birmingham as early as 1785; and in 1805 Dr J. C. Warren of Boston, U.S.A., used this treatment in the later stages of pulmonary consumption. In 1818 Faraday showed that the inhalation of the vapour of ether produced anaesthetic effects similar to those of nitrous oxide; and this property of ether was also shown by the American physicians, John D. Godman (1822), James Jackson (1833), Wood and Bache (1834).

These observations, however, appear to have been regarded in the light of mere scientific curiosities and subjects for lecture- room experiment, rather than as facts capable of being applied practically in the treatment of disease, till December 1844, when Dr Horace Wells, a dentist of Hartford, Connecticut, underwent

in his own person the operation of tooth-extraction while rendered

insensible by nitrous oxide. Satisfied, from further experience, chat teeth could be extracted in this way without pain, Dr Wells proposed to establish the practice of painless dentistry under the influence of the gas; but in consequence of an unfortunate failure in an experiment at Boston he abandoned the project. On the 30th of September 1846 Dr W. T. G. Morton, a dentist of Boston, employed the vapour of ether to procure general anaesthesia in a case of tooth-extraction, and thereafter administered it in cases requiring surgical operation with complete success. This great achievement marked a new era in surgery. Operations were performed in America in numerous instances under ether in- halation, the result being only to establish more firmly its value as a successful anaesthetic. The news of the discovery reached England on the 17th of December 1846. On the 19th of December Mr Robinson, a dentist in London, and on the 21st Robert Liston, the eminent surgeon, operated on patients anaesthetized by ether; and the practice soon became general both in Great Britain and on the continent.

Sir James Simpson was the first to apply anaesthesia by ether to midwifery practice; this he did in 1847, an d found that the pains of labour could be abolished without interference with uterine contractions or injury to the child. On the 8th of March 1847 M. J. P. Flourens read a paper before the Academie des Sciences on the effect of chloroform on the lower animals, but no notice was taken of what has since proved to be a discovery of epoch-making importance. In November of the same year Simpson announced his discovery of the anaesthetic properties of chloroform, the trial of which had been suggested to him by Waldie, a chemist of Liverpool. As the result, chloroform came to be widely used instead of ether, though it was found by several casualties that it was not the absolutely safe anaes-thetic that had at first been hoped. It, however, remained the drug that was chiefly used till Dr J. T. Clover (1825-1882) of London introduced his regulating ether-inhaler in 1876, embodying a new principle — that of limiting the quantity of air during etherization and regulating the strength of the vapour.

During the intervening period, as the results of the labours of John Snow, Sir Benjamin Ward Richardson, Thomas Nunnely, and Colton amongst others, several drugs were found to possess anaesthetic properties. Of these one, ethyl chloride, which was speedily given up, has come into deserved prominence at the present time; and another, nitrous oxide, which had been lost sight of since Wells's failure at Boston, was reintroduced, and it became and has remained the most popular anaesthetic in dental practice.

Since 1876 no new drugs have been introduced; the progress has been in the direction of improvements in the technique of anaesthetization. The most important of these is the administra- tion of oxygen with nitrous oxide, resulting from the recogni- tion of the fact that this drug does not owe its anaesthetic properties to partial asphyxia, as was thought till the contrary was shown by Edmund Andrews of Chicago in 1868. It was not till twenty years later that this knowledge was put to practical use, when F. W. Hewett introduced his regulating stopcock, which enabled the anaesthetist to exhibit the nitrous oxide and oxygen in such proportions as were demanded by the patient's condition. At the present time the anaesthetics in common use are the following: —

(1) Nitrous oxide gas, or laughing gas, N 2 0. This is a colour- less, odourless gas, which for convenience is carried about in liquid form in iron cylinders. When about to be used, it is allowed to escape into a large rubber bag, connected with a closely- fitting face-piece, which covers up the nose and mouth, and allows of inspiration only from the bag of gas, expiration being into the air. When thus given the patient is exposed to a certain degree of asphyxia. This asphyxia is not only not necessary but is harmful, and may be obviated by giving oxygen in small amounts simultaneously by means of Hewett's regulating stopcock. This drug is used chiefly for dental operations, and for minor surgery where absolute muscular relaxation is not required. When mixed with oxygen, it can be given if necessary for an hour or

longer. It has an induction period of a few breaths only, and the recovery is as a rule unaccompanied by excitement or nausea. It is also used as a preliminary to ether; the gas is given till unconsciousness is reached, the unpleasant taste of the ether being thus avoided and the induction period shortened. The mortality from nitrous oxide is small, and from the gas and oxygen in expert hands nil.

(2) Ethyl chloride, C 2 H 5 C1, a colourless liquid of a pleasant odour, boiling at 1 2.5° C. It is used in the same class of operations as the last anaesthetic. It is best given in an apparatus that consists of a mask closely adapted to the face, and a rubber bag of small capacity, with which is connected the bottle containing the ethyl chloride. The vapour supplied from the bottle is breathed backwards and forwards from the bag, fresh air being admitted in small quantities only. The period of induction is shorter than in the case of nitrous oxide, the patienl losing consciousness in two or three breaths; the stage of recovery is not so uniformly pleasant, headache,

nausea and vomiting occurring not infrequently. It is difficult at present to estimate the mortality, as it has only recently come into general use, but it seems to occupy an intermediate position between ether and chloroform.

(3) Ether, or ethyl oxide, (C 2 H 5) 2 0, a colourless, volatile liquid, boiling at 36.5° C. It has a pungent odour. It is best administered, as in the case of ethyl chloride, by limiting the amount of air during inhalation. The induction is much slower than in the case of the last two drugs, and it is accompanied by a feeling of suffocation, owing to the pungent odour of the ether. On that account the anaesthetic is best started with nitrous oxide or ethyl chloride. The recovery is always marked by some nausea and very frequently by vomiting. The mortality is small during the actual operation, but fatalities from respiratory complications later on are not uncommon.

(4) Chloroform, CHCI3, a colourless liquid of a penetrating odour, boiling at 63 C. It is administered in such a way as to ensure the free admixture of air. To secure this the face-piece must be loosely-fitting, and the strength of the vapour so gradually increased that the patient is never inconvenienced or impelled to hold the breath. The induction is slow, occupying two or more minutes, but it is not at all unpleasant; nausea and vomiting during recovery are rarer than in the case of ether; but if they do occur they last longer. The mortality on the table is about 1 in 2500.

The question as to which is the better anaesthetic, ether or chloroform, for long operations, is a moot point. In the hands of an experienced anaesthetist there is probably nothing to choose as regards safety, and the anaesthetic advantages of the latter are incontestable. In the hands of the less-experienced anaesthetist, ether is the more suitable drug. At the extremes of life, chloroform is well taken, as it is also by women in labour, and it is indicated where there has been recent inflammation of the air passages. In operations, too, about the mouth, chloroform must be the drug used, as a closely-fitting mask is obviously impossible.

The introduction by inhalation of any of the above drugs into the organism produces an anaesthesia, the degree of which at any moment varies directly as the amount or tension of the vapour in the blood, and therefore also as the tension of the vapour in the inspired air. The organism in this case may be compared to an electric lamp, of which the voltage is, say 100, a current of any less voltage will only produce a red heat, however many amperes are forced through; with the voltage at 100 the filament will be white hot, at over 100

the filament will fuse. So with these drugs : with the vapour at a low tension a certain low depth of anaesthesia is obtained; if the administrator increases the tension, true surgical anaesthesia is produced; if he increases it again, the filament fuses and the patient dies. This is the principle which guides the anaesthetist; it is the quality of the vapour that decides the depth of the anaesthesia, not the quantity. An infinite quantity of chloroform may be absorbed with impunity if the tension be low, but a few drops will kill if the tension be high. For practical purposes four

degrees of anaesthesia are described, through which a patient passes from unconsciousness to (in the last resort) death: —

(1) A state of disordered consciousness, with analgesia; the patient's ideas are confused, the special senses are disturbed, and though the application of stimuli to the skin causes no mental impression, yet in response to them there may be what look like purposeful movements.

(2) In the second stage there is complete loss of consciousness, and though the reflexes persist, the movements in response to the stimuli are purposeless. The muscles generally act strongly.

(3) The stage of surgical anaesthesia; there is a general muscular relaxation, with the loss of many of the reflexes, i.e. an operation may be performed without evoking any movement on the part of the patient, while the vital reflexes and the vital centres in the medulla are still active, and the heart muscle is not paralysed.

(4) Finally, the stage of paralysis of the medulla, when the respiratory and circulatory centres are paralysed, and the heart muscle itself is poisoned and death ensues. #

The aim of the anaesthetist is to keep the patient in the third degree of anaesthesia, thus avoiding the movements of the second and the dangers of the fourth; he therefore keeps the patient under close observation, and by watching the respiration, pulse and facial aspect, is able to judge the condition of the respiration and circulation. He has a further guide in the lid- reflex, i.e. the movement of the eyelid when the globe is touched ; this and the size of the pupil tell him to what extent the central nervous system is depressed and complete the information he requires.

It will have been observed that the administration of the above drugs is by inhalation, and has to be continued throughout the operation, the reason being that all the drugs are as rapidly excreted as they are absorbed, especially by the lungs, and therefore no other method would be of any avail. That there are drugs which are sufficiently slowly eliminated to allow of an operation being performed between the moment of induction and that of recovery, cannot be doubted, and their discovery and use can only be a matter of time. Even at the present time there is one, urethane, which, if injected with a hypodermic needle, soon produces a profound general anaesthesia. It has only been used on the lower animals, as its depressing effect on the re- spiratory centre contra-indicates its use in human beings.

Local Anaesthesia. — Much attention has recently been devoted to the discovery of methods by which the insensibility may be confined to the area of operation and the loss of consciousness avoided. Such a procedure has been common for many years for small operations, but it is only lately that it has been success- fully applied to the severer ones. It is very doubtful whether local anaesthesia will ever replace general in the latter class. Though the preliminary starvation is avoided, and the patient has the shock of operation alone to recover from, without the cardiac depression resulting from the anaesthetic during the operation, the patient, unless of a very apathetic tempera- ment, is in that state of severe nervous strain, when any un- expected movement or remark, or sight of a soiled instrument, may produce an alarming or fatal syncope. The earliest local anaesthetic was cold, produced by a mixture of ice and salt. In place of this cumbersome method, the skin is now frozen by means of a fine spray of ether or ethyl chloride directed upon it. The spraying is discontinued when the skin becomes white, and it is then allowed to regain its colour. The moment this occurs the incision is made and will be quite painless. The recovery, like that from any other frost-bite, is very painful, and the time during which an operation can be done is very short ; con- sequently this method has been very largely superseded by the use of drugs. The drugs chiefly used are cocaine and its de- rivatives. Cocaine has by far the highest anaesthetic properties ; it is, however, in certain individuals a most powerful cardiac depressant and has caused numerous fatalities, and further, it cannot be sterilized by heat, as it undergoes decomposition. Eucaine has now largely taken its place, though its anaesthetic properties are less; it is, however, less toxic, and can be

sterilized by heat. In combination with these drugs there is usually given some of the extract of the suprarenal body of the sheep; this substance increases and prolongs the anaesthetic effect by

constricting the blood-vessels, the result of which is to reduce the haemorrhage, and also to prevent the too rapid absorption of the drug into the general system, confining it to the area of operation.

The chief methods of bringing about local anaesthesia are as follows : —

(1) Painting or spraying a solution of the drugs on to the area on which it is proposed to operate.

(2) Injection by means of a needle of the solution into the skin and the deeper structures.

(3) Spinal analgesia. The method of inducing analgesia by- injecting solutions into the sheath surrounding the spinal cord was devised by Bier in 1898, and for the purpose he employed a solution of cocaine. It was found, however, that there was con- siderable danger with this drug, so the method was not adopted to any great extent, until Fourneau discovered stovaine in 1904.

The principle involved in spinal anaesthesia is this: that a substance in solution is injected into the sac containing the spinal cord in the lumbar region. The spinal cord as such ends at the level of the first lumbar vertebra in a leash of nerves termed the cauda equina. When giving an injection there is little danger of injuring these nerves because in this situation there is a space filled with fluid between the wall of the sac and the nerves. The substances injected, by virtue of their specific action on nervous tissues, cause loss of painful sensations in the lower limbs and for a variable distance up the trunk. It has been found that the specific gravity of the solution injected has some influence on the height to which the analgesia will extend up the trunk, and this distance can also be controlled by altering th6 position of the patient. The canal in which the cord is situated is not a straight tube, but is curved backwards in the sacral and upper dorsal regions, and forwards in the lower dorsal and lumbar regions. Therefore with the patient lying on his back, any solution injected that has a greater specific gravity than that of the cerebrospinal fluid which bathes the cord, tends to gravitate towards the sacral and upper dorsal regions; and, conversely, any solution of lower specific gravity than that of the cerebro- spinal fluid tends to rise and produce analgesia at a still higher level. In this way the situation of the fluid producing analgesia can be controlled to some extent. It has been found that a very serious danger exists if the solution passes up to the brain, or even if it passes higher than the sixth cervical nerve. It is important that the osmotic pressure of the

solutions employed should be as nearly as possible that of the cerebrospinal fluid, that is to say, the nearer the solution is isotonic with the cerebrospinal fluid, the better will be the analgesia, and the less will be the harmful effects. At present it has not been found possible to separate in any of the substances employed the radicle which produces motor effects from that which blocks the advent of sensory stimuli. Although both effects last only a short time there seems to be a certain risk due to the temporary muscular par- alysis, and in a patient with a tendency to bronchitis this is a matter of considerable moment.

The fluid is injected in the following manner. A puncture is made with a special trocar and canula in the lumbar region be- tween the second and third or third and fourth lumbar spines. The sheath of the sac having been entered, as is evidenced by the loss of resistance to the point of the trocar, and by the fact that cerebrospinal fluid escapes when the trocar is withdrawn, the dose of the fluid selected is injected through the canula, which is then withdrawn. An important point is that the operation must be absolutely aseptic; great care is taken to sterilize thoroughly the instruments, site of operation and fluid used. The patient is placed in that position which will yield the best and safest analgesia for the operation; it is essential, however, that the patient's head be raised well above the level of the spine. The injection is followed very quickly, generally within three to five minutes, by the production of analgesia, which lasts for a period varying from half an hour to two hours. Various substances have

been used for the injection, of which the following are the chief — tropacocaine, stovaine, novocaine, cocaine, eucaine and alypin. All of these have been combined with adrenalin hydrochloride with a view to limiting their action in one degree or another; and also with other inert substances in such , quantity as will produce isotonic solutions of relatively high specific gravity.

The points in favour of this method of producing analgesia are as follows: (a) The patient is not rendered unconscious, and is often able to assist at his own operation, such as by coughing or moving his limbs in any way as may be desired, (b) There are no troublesome after-effects, such as nausea, vomiting and thirst. (c) The formation of haematoma is less frequent, (d) Surgical shock is considerably lessened, especially in such operations as amputations and severe

abdominal emergencies, (e) The risk attending a general anaesthetic is avoided.

The disadvantages at present attending the method are: (a) A severe form of headache may sometimes follow, but this has seemed to depend on the kind of fluid injected, and in the recent cases has not been so frequent as in the early ones. (6) The paralysis of muscles. In a very few cases this has been permanent. The temporary paralysis of the muscles of respiration is apt to be a serious matter, (c) Occasionally incontinence of urine and faeces occurs; this, however, has not been permanent except in a few of the earlier cases, (d) The uncertainty of the method, so that the analgesia is not always as complete as is desirable, (e) The analgesia for safety must be limited to a line below the level of the second rib in front. (/) The use of the Trendelenburg position is impossible, or indeed the use of any position which involves lowering the patient's head.

It would appear that the method undoubtedly has its uses, and that it will take its place in surgery and find its proper level. A large amount of work is being done on the subject, with a view of determining the limitations and possibilities of the method, the best kind of substance to use and the proper dose to employ.

Finally, a large number of operations have been performed under a local anaesthesia produced by hypnotism (g.v.), but this is a method that can only be used on selected cases. (H. C. C.)

ANAGNIA [mod. Anagni; pop. (iooi) 10,059], an ancient town of the Hernici, situated on a hill (1558 ft.) above the valley of the Trerus and the Via Labicana (the post-station 3 m. below the town, from which a branch road ascended to it, was Com- pitum Anagninum, which was 40 m. E.S.E. of Rome: see T. Ashby, in Papers of the British School at Rome, i. 215). In 1880 a pre-Aryan grave was found between the town and the river, with a skeleton painted red, stone implements and a bronze dagger. After the Italian immigration, its position in a fertile district soon gave it importance, and it became the seat of the assembly of the Hernican towns. In the war of 306 B.C. it was conquered by Q. Marcius Tremulus and lost its independence. Its inhabitants had certainly acquired Roman citizenship before the Social War and it continued to be a municipium throughout the Roman period. It was besieged by the Saracens in 877, but in the nth century was a place of considerable importance, the Conti and Gaetani being the chief families; Pope Boniface VIII., a member of the latter, was there made prisoner in 1303. The ancient city walls are in some points still existing, in

others they have been much restored; they are built of rectangular blocks of porous limestone about lift. high. On the north of the town they are especially well-preserved, and at one point the area within them is slightly extended by a terrace supported by three lofty pillars. Within the city there are no ancient remains, except some massive substruction walls which supported build- ings on the hillside. The present town still preserves in parts its medieval aspect. The cathedral, constructed in 1074 at the summit of the hill, is externally plain; it has a fine Gothic interior, somewhat spoilt by restoration, with a good Cosmati pavement, and a canopy and paschal candlestick in the same style. The crypt contains frescoes of the 13th century, and in the treasury are valuable vestments. Lower down is the Palazzo Civico, belonging to the nth or early 12th century, which is supported on arches of a single span, under which the road passes. .Its posterior facade is fine. Pope Adrian IV. (Nicholas Break-

speare) died here, and there is a chapel of St Thomas Becket in the crypt of the cathedral.

See L. Pigorini, in Bullettino di Paletnologia Italiana (1880, 8 seq.)', J. Kulakowski, in Atti del Congresso Internazionale di Scienze Storiche (Rome, 1904), v. 673 seq. (T. As.)

ANAGRAM (Gr. ava, back, and ypaeiv, to write), the result of transposing the letters of a word or words in such a manner as to produce other words that possess meaning. The construction of anagrams is an amusement of great antiquity, its invention being ascribed without authority to the Jews, probably because the later Hebrew writers, particularly the Kabbalists, were fond of it, asserting that " secret mysteries are woven in the numbers of letters." Anagrams were known to the Greeks and also to the Romans, although the known Latin examples of words of more than one syllable are nearly all imperfect. They were popular throughout Europe during the middle ages and later, particularly in France, where a certain Thomas Billon was appointed " ana- grammatist to the king " by Louis XIII. W. Camden (Remains, .7th ed., 1674) defines " Anagrammatisme " as " a dissolution of a name truly written into his letters, as his elements, and a new connection of it by artificial transposition, without addition, subtraction or change of any letter, into different words, making some perfect sence applyable to the person named." Dryden disdainfully called the pastime the " torturing of one poor word ten thousand ways," but many men and women of note have found amusement in it. A well-known anagram is the change of Ave Maria, gratia plena, Dominus tecum into Virgo serena, pia, munda et immaculata. Among others are the

anagrammatic answer to Pilate's question, "Quid est Veritas?" — namely, " Es vir qui adest "; and the transposition of " Horatio Nelson ." into " Honor est a Nilo "; and of " Florence Nightingale " into " Flit on, cheering angel." James I.'s courtiers discovered in " James Stuart " " A just master," and converted " Charles James Stuart " into " Claimes Arthur's seat." " Eleanor Audeley," wife of Sir John Davies, is said to have been brought before the High Commission in 1634 for extravagances, stimulated by the discovery that her name could be transposed to " Reveale, O Daniel," and to have been laughed out of court by another anagram submitted by the dean of the Arches, " Dame Eleanor Davies," " Never soe mad a ladie." There must be few names that could furnish so many anagrams as that of " Augustus de Morgan," who tells that a friend had constructed about 800 on his name, specimens of which are given in his Budget of Paradoxes, p. 82. The pseudonyms adopted by authors are often transposed forms, more or less exact, of their names; thus " Calvinus " becomes " Alcuinus "; " Francois Rabelais," " Alcofribas Nasier "; " Bryan Waller Proctor," " Barry Cornwall, poet "; " Henry Rogers," " R. E. H. Greyson," &c. It is to be noted that the last two are impure anagrams, an " r " being left out in both cases. " Telliamed," a simple reversal, is the title of a well- known work by " De Maillet." The most remarkable pseudonym of this class is the name " Voltaire," which the celebrated philosopher assumed instead of his family name, " Francois Marie Arouet," and which is now generally allowed to be an anagram of " Arouet, l.j.," that is, Arouet the younger. Perhaps the only practical use to which anagrams have been turned is to be found in the transpositions in which some of the astronomers of the 17th century embodied their discoveries with the design apparently of avoiding the risk that, while they were engaged in further veri- fication, the credit of what they had found out might be claimed by others. Thus Galileo announced his discovery that Venus had phases like the moon in the form, " Haec immatura a me jam frustra leguntur — oy," that is, " Cynthiae figuras aemulatur Mater Amorum."*

Another species of anagram, called " palindrome " (Gr. iraXiv, back, and 8p6y,os, running), is a word or sentence which may be read backwards as well as forwards, letter by letter, while pre- serving the same meaning; for example, the words " Anna," "noon," " tenet," or the sentence with which Adam is humorously supposed to have greeted Eve: "Madam, I'm Adam!"

A still more complicated variety is the " logogram " (Gr. \6yos, word) , a versified puzzte containing several words derived

from recombining the letters of the original word, the difficulty lying in the fact that synonyms of the derived words may be used. Thus, if the original word be " curtain," the word " dog " may be used instead of " cur."

ANAH, or 'Ana, a town on the Euphrates, about mid-way between the Gulf of Alexandretta and the Persian Gulf. It is called Hanat in a Babylonian letter (about 2200 B.C.), and An-at by the scribe of Assur-nasir-pal (879 B.C.), 'Avadu (Isidore Charax), Anatha (Ammianus Marcellinus) by Greek and Latin writers in the early Christian centuries, 'Ana (sometimes, as if plural, 'Anat) by Arabic writers. The name has been connected with that of the deity Anat. Whilst 'Ana has thus retained its name for forty-one centuries the site is variously described. Most early writers concur in placing it on an island; so Assur- nasir-pal, Isidore, Ammianus Marcellinus, Ibn Serapion, al- Istakri, Abulfeda and al-Karamani. Ammianus (lib. 24, c. 2) calls it a munimentum, Theophylactus Simocatta (iv. 10, v. 1, 2) to 'Avadwv pobpwv, Zosimus (iii. 14) a (ppovpiov, opp. Qadvcrcu, which may be the Be6(d)iva of Ptolemy (v. 19). 1 Leonhart Rauwolff, in a.d. 1574, found it " divided . . . into two towns," the one " Turkish," " so surrounded by the river, that you cannot go into it but by boats," the other, much larger, on the Arabian side of the river. 2 G. A. Olivier in the beginning of the 19th century describes it as a long street (5 or 6 m. long), parallel to the right bank of the Euphrates — some 100 yards from the water's edge and 300 to 400 paces from the rocky barrier of the Arabian desert — with, over against its lower part, an island bearing at its north end the ruins of a fortress (p. 451).

This southernmost town of Mesopotamia proper (Gezira) must have shared the chequered history of that land (see Mesopo- tamia). Of 'Ana's fortunes under the early Babylonian empire the records have not yet been unearthed; but in a letter dating from the third millennium B.C., six men of Hanat (Ha-na-at K1) are mentioned in a statement as to certain disturbances which had occurred in the sphere of the Babylonian Resident of Suhi, which would include the district of 'Ana. How 'Ana fared at the hands of the Mitanni and others is unknown. The suggestion that Amenophis (Amenhotep) I. (16th century B.C.) refers to it is improbable; but we seem to be justified in holding 'Ana to be the town " in the middle of the Euphrates " opposite (ina put) to which Assur-nasir-pal halted in his

campaign of 879 B.C. The supposed reference to 'Ana in the speech put into the mouth of Sennacherib's messengers to Hezekiah (2 Kings xix. 13, Is. xxxvii. 13) is exceedingly improbable. T ne town may be mentioned, however, in four 7 th ceniury documents edited by C. H. W. Johns. 3 It was at 'Ana that the emperor Julian met the first opposition on his disastrous expedition against Persia (363), when he got possession of the place and transported the people ; and there that Ziyad and Shureih with the advanced guard of 'Ali's army were refused passage across the Euphrates (36/657) to join 'Ali in Mesopotamia (Tabari i. 3261). Later 'Ana was the place of exile of the caliph Qaim (al-Qaim bi-amr-illah) when Baslslri was in power (450/1058). In the 14th century 'Ana was the seat of a Catholicos, primate of the Persians (Marin Sanuto). In 1610 Delia Valle found a Scot, George Strachan, resident at 'Ana (to study Arabic) as physician to the amir (i. 671-681). In 1835 the steamer " Tigris " of the English Euphrates expedition went down in a hurricane just above "Ana, near where Julian's force had'suffered from a similar storm. Delia Valle described 'Ana as the chief Arab town on the Euphrates, an importance which it owes to its position on one of the routes from "the west to Bagdad; Texeira said that the power of its amir extended to Palmyra (early 17th century); but Olivier found the ruling prince with only twenty-five men in his service, the town becoming more depopulated every day from lack of protection from the Arabs of the desert. Von Oppenheim (1893) reported that Turkish troops having been recently stationed at the place, it had no longer to pay blackmail (huwwa)

1 Steph. Byz. (sub Tupos) says that Arrian calls Anatha Tipos.

2 Texeira (1610) says that "Anna" lay on both banks of the river, and so Delia Valle (i. 671).

3 Ass. Deeds and Doc. nos. 23, 168, 228, 385. The characters used are DlS TU, which may mean Ana-tu.

to the Arabs. F. R. Chesney reported some 1800 houses, 2 mosques and 16 water-wheels; W. F. Ainsworth (1835) reported the Arabs as inhabiting the N. W. part of the town, the Christians the centre, and the Jews the S.E.; Delia Valle (1610) found some sun-worshippers still there.

Modern 'Ana lies from W. to E. on the right bank along a bend of the river just before it turns S. towards Hit, and presents an attractive appearance. It extends, chiefly as a single street, for several miles along a narrow strip of land between the river and a ridge of rocky hills._ The houses are separated from one another by fruit gardens. 'Ana marks the boundary between the olive (N.) and the date (S.). Arab poets celebrated its wine (Yaqut, iii. 593 f.), and Mustaufi (8/ i4th century) tells of the fame of its palm-groves. In the river, facing the town, is a succession of equally productive islands. The most easterly contains the ruins of the old castle, whilst the remains of the ancient Anatho extend from this island for about 2 m. down the left bank. Coarse cloth is almost the only manufacture.

Bibliography. — In addition to the authorities cited above may be mentioned: G. A. Olivier, Voyage dans I' empire othoman, Gfc, iii. 450-459 (1807) ; Carl Ritter, Erdkunde von Asien, vii. b., pp. 716-726 (1844); W. F. Ainsworth, Euphrates Expedition, i. 401-418 (1888). For a map see sheet 5 of the atlas accompanying Chesney 's work. (H. W. H.)

ANAHEIM, a city of Orange county, California, U.S.A., about 54 m. S.E. of Los Angeles, about 12 m. from the Pacific Ocean, and about 3 m. from the Santa Ana river. (1900) 1456; (1910) 2628. It is served by the Atchison, Topeka & Santa F6, and the Southern Pacific railways. It lies in a fine fruit region, in which oranges, lemons, apricots, grapes and walnuts are raised. The plain on which it is laid out, now fertile and well- watered, was originally an arid waste. Water for irrigation is obtained from the Santa Ana river, about 15 m. above the nearest point along the river to the city. The city itself has an area of only i| sq. m., and in 1908 the population of the district, including that of the city, was estimated at 5000. The principal manu- factures are dried and canned fruits, wine, beer, and agricultural implements. Anaheim is of particular interest as the earliest of various settlements in southern California in which co-opera- tion has made possible the establishment of intensive fruit

culture in semi-desert regions. In 1857 fifty Germans (mostly mechanics) organized in San Francisco the Los Angeles Vineyard Association and bought 1165 acres of land here which could be irrigated from the Santa Ana river; each member took posses- sion of a 20 acre share only when gradual improvement had made everything ready for occupancy and the tracts had been dis- tributed by lot, with bonuses or rebates to equalize them in value to the drawers. This ended the co-operative feature of the enterprise, which was never communistic except that its irrigat- ing canal remained common property. The settlement was uninterruptedly successful, and was influential as a pioneer experiment. Anaheim was incorporated as a town in 1870; this incorporation, was revoked in 1872; in 1878 the town was incor- porated again; and in 1888 Anaheim received a city charter.

ANAHUAC, a geographical district of Mexico, limited by the traditional and vaguely defined boundaries of an ancient Indian empire or confederation of that name previous to the Spanish conquest. The word is said to signify " country by the waters " in the old Aztec language; hence the theory that Anahuac was located on the sea coast. One of the theories relating to the location of Anahuac describes it as all the plateau region of Mexico, with an area equal to three-fourths of the republic, and extending between the eastern and western coast ranges from Rio Grande to the isthmus of Tehuantepec. A more exact description, however, limits it to the great plateau valley in which the city of Mexico is located, between 18 40′ and 20 30′ N. lat., about 200 m. long by 75 m. wide, with an average eleva- tion of 7500 ft., and a mean temperature of 62 . The accepted meaning of the name fits this region as well as any on the sea coast, as the lakes of this valley formerly covered one-tenth of its area. The existence of the name in southern Utah, United States, and on the gulf coast of Mexico, has given rise to theories of other locations and wider bounds for the old Indian empire.

ANALCITE, a commonly occurring mineral of the zeolite group. It crystallizes in the cubic system, the common form being the icositetrahedron (211), either alone (fig. 1) or in combination with the cube (100); sometimes the faces of the cube predominate in size, and its corners are each replaced by three small triangular faces representing the icositetrahedron (fig. 2). Although cubic in form, analcite usually shows feeble double refraction, and is thus optically

anomalous. This feature of analcite has been much studied, Sir David Brewster in 1826 being the earliest investigator. Crystals of analcite are often perfectly colourless and transparent with a brilliant glassy lustre, but some are opaque and white or pinkish-white. The hardness of the mineral is 5 to 5I, and its specific gravity is 2-25. Chemically, analcite is a hydrated sodium and aluminium silicate, NaAlSioOe+HjO; small amounts of the sodium being sometimes replaced by calcium or by potassium. The water of crystallization is readily expelled by heat, with modification of the optical characters of the crystals. Before the blowpipe the mineral readily fuses with intumescence to a colourless glass. It is decomposed by acids with separation of gelatinous silica.

ff^wS

Fig. 1.

Fig. 2.

Analcite usually occurs, associated with other zeolitic minerals, lining amygdaloidal cavities in basic volcanic rocks such as basalt and melaphyre, and especially in such as have undergone alteration by weathering; the Tertiary basalts of the north of Ireland frequently contain cavities lined with small brilliant crystals of analcite. Larger crystals of the same kind are found in the basalt of the Cyclopean Islands (Scogli de' Ciclopi or Faraglioni) N.E. of Catania, Sicily. Large opaque crystals of the pinkish-white colour are found in cavities in melaphyre at the Seisser Alpe near Schlern in southern Tirol. In all such cases the mineral is clearly of secondary origin, but of late years another mode of occurrence has been recognized, analcite having been found as a primary constituent of certain igneous rocks such as monchiquite and some basalts. The irregular grains, of which it has the form, had previously been mistaken for glass.

Owing to the fact that analcite often crystallizes in cubes, it was long known as cubic zeolite or as cuboite. The name now in use was proposed in 1797 in the form analcime, by R. J. Hauy, in allusion to the weak (avdSxis) electrification of the mineral produced by friction. Euthallite is a compact, greenish analcite, produced by the alteration of elaeolite at various localities in the Langesund-f jord in southern Norway. Eudno- phite, from the same region, was originally described as an orthorhombic mineral dimorphous with analcite, but has since been found to be identical with it. Cluthalite, from the Clyde (Clutha) valley, is an altered form of the mineral. (L. J. S.)

ANALOGY (Gr. avakoyla, proportion), a term signifying, (1) in general, resemblance which falls short of absolute similarity or identity. Thus by analogy, the word "loud," originally applied to sounds, is used of garments which obtrude themselves on the attention; all metaphor is thus a kind of analogy. (2) Euclid used the term for proportionate equality; but in mathe- matics it is now obsolete except in the phrase, " Napier's Analogies " in spherical trigonometry (see Napier, John). (3) In grammar, it signifies similarity in the dominant character- istics of a language, derivation, orthography and so on. (4) In logic, it is used of arguments by inference from resemblances between known particulars to other particulars which are not observed. Under the name of " example " (7rapa.5fl.7jua) the process is explained by Aristotle (Prior Anal. ii. 4) as an

inference which differs from induction (q.v.) in having a particular, not a general, conclusion; i.e. if A is demonstrably like B in certain respects, it may be assumed to be like it in another, though the latter is not demonstrated. Kant and his followers state the distinction otherwise, i.e. induction argues from the possession of an attribute by many members of a class that all members of the class possess it, while analogy argues that, because A has some of B's qualities, it must have them all (cf. Sir Wm. Hamilton, Lectures on Logic, ii. 165-174, for a slight modification of this view). J. S. Mill very properly rejects this artificial distinction, which is in practice no distinction at all; he regards induction and analogy as generically the same, though differing in the demonstrative validity of their evidence, i.e. induction proceeds on the basis of scientific, causal connexion, while analogy, in absence of proof, temporarily accepts a probable hypothesis. In this sense, analogy may obviously have ? universal conclusion. This type of inference is of the greates value in physical science, which has frequently and quite legiti mately used such conclusions until a negative instance has disproved or further evidence confirmed them (for a list of typical cases see T. Fowler's edition of Bacon's Nov. Org. Aph. ii. 27 note). The value of such inferences depends on the nature of the resemblances on which they are based and on that of the differences which they disregard. If the resemblances are small and unimportant and the differences great and fundamental, the argument is known as " False Analogy." The subject is dealt with in Francis Bacon's Novum Organum, especially ii. 27 (see T. H. Fowler's notes) under the head of Instantiae conformes sive proportionatae. Strictly the argument by analogy is based on similarity of relations between things, not on the similarity of things, though it is, in general, extended to cover the latter. See

works on Logic, e.g. J. S. Mill, T. H. Fowler, W. S. Jevons. For Butler's Analogy and its method see Butler, Joseph.

The term was used in a special sense by Kant in his phrase, "Analogies of Experience," the third and most important group in his classification of the a priori elements of knowledge. By it he understood the fundamental laws of pure natural science under the three heads, substantiality, causality, reciprocity (see F. Paulsen, /. Kant, Eng. trans. 1902, pp. 188 ff.).

ANALYSIS (Gr. ava and \vtiv, to break up into parts), in general, the resolution of a whole into its component elements; opposed to synthesis, the combining of separate elements or minor wholes into an inclusive unity. It differs from mere " disintegration " in proceeding on a definite scientific plan. In grammar, analysis is the breaking up of a sentence into subject, predicate, object, &c. (an exercise introduced into English schools by J. D. Morell about 1852) ; so the analysis of a book or a lecture is a synopsis of the main points. The chief technical uses of the word, which retains practically the same meaning in all the sciences, are in (1) philosophy, (2) mathematics, (3) chemistry.

(1) Logical analysis is the process of examining into the connotation of a concept or idea, and separating the attributes from the whole and each other. It, therefore, does not increase knowledge, but merely clarifies and tests it. In this sense Kant distinguished an analytic from a synthetic judgment, as one in which the predicate is involved in the essence of the subject. Such judgments are also known as verbal, as opposed to real or ampliative judgments. The processes of synthesis and analysis though formally contradictory are practically supple- mentary; thus to analyse the connotation is to synthesize the denotation of a term, and vice versa; the process of knowledge involves the two methods, analysis being the corrective of synthetic empiricism. In a wider sense the whole of formal logic is precisely the analysis of the laws of thought. Ana- lytical psychology is distinguished from genetic and empirical psychology inasmuch as it proceeds by the method of introspective investigation of mental phenomena instead of by physiological or psycho-physical experiment. For the relation between analysis and synthesis on the one hand, and deduction and induction on the other, see Induction.

(2) In mathematics, analysis has two distinct meanings, conveniently termed ancient and modern. Ancient analysis,

as described by Pappus, related chiefly to geometrical problems, and is the method of reasoning from the solution, as taken for granted, to consequences which are known to be true, whereas synthesis reasons from known data to the solution. (See Geometry.)

Modern analysis is practically coeval with Descartes, the founder of " analytical geometry," although the calculus of general quantities had previously been termed analysis. Many mathematical subjects are now included under this name, and are treated in the following articles: — Geometry, Analytical; Infinitesimal Calculus; Differential Equation; Varia- tions, Calculus of; Curve; Surface; Function; Spheri- cal Harmonics; Series; Fourier's Series; Groups, Theory of; Probability.

(3) In Chemistry, the word analysis was introduced by Robert Boyle to denote the determination of the composition of sub- stances. (See Chemistry, Analytical).

ANALYST, in modern times, a person professionally skilled in chemical analysis. He may be called upon, in the discharge of his profession, to analyse a wide range of substances. Apart from private practitioners and those engaged in large manufac- turing concerns, analysts employed by public bodies are termed public analysts. In most large manufacturing establishments there is usually a staff of analysts, whose duty it is primarily to exercise constant watchfulness over the processes of manufacture, to test the purity of the substances used, as well as that of the final products. The services of analysts are constantly required in judicial enquiries, sometimes in purely criminal cases, some- times in civil proceedings, such as offences against the customs or excise or under the various British Food and Drugs Acts. In the case of criminal proceedings, the services of the official analyst attached to the British Home Office are employed. The inland revenue department has a laborator}' at Somerset House, with a staff of analysts, who are engaged in analysing for excise and other purposes. Under the Fertilizers and Feeding Stuffs Act 1893, the Board of Agriculture employs an agricultural chemist, whose duty is the analysis of fertilizers and feeding stuffs.

A " public analyst " is an analyst appointed by a local authority for the purposes of the Sale of Food and Drugs Acts. He must be possessed of competent medical, chemical and micro- scopical knowledge to analyse all articles of food and drink (see

Adulteration) .

ANALYTIC (the adjective of " analysis," q.v.), according with, or consisting in, the method of separating a whole into its parts, the opposite of synthetic. For analytic chemistry, analytic language, &c, see the articles under the noun-headings. The title of ava'KvTLKa or Analytics was given by Aristotle to his treatises on logic.

ANAMALAI HILLS, a range of mountains in southern India, in the Coimbatore district of Madras, lying between io° 13′ and io° 31′ N. lat., and between 76 52′ and 77 23′ E. long., forming a portion of the Western Ghats, after this range has been broken by the Palghat Pass, south of the Nilgiris. They really consist of a forest-clad and grassy tableland, with summits rising about 8000 ft.; the Anaimudi mountain, which is the highest in southern India, having an altitude of 8850 ft. Their geological formation is metamorphic gneiss, veined with felspar and quartz, and interspersed with reddish porphyrite. The lower slopes yield valuable teak and other timber; and some land has been taken up for coffee planting. The only inhabitants are a few wild tribes who live by hunting and collecting jungle produce.

ANAMORPHOSIS (a Gr. word, derived from dva, back, and ixopri, form: the second o in the Greek is long, but in English the pronunciation varies), a deformation or distortion of appearance; in drawing, the representation of an object as seen, for instance, altered by reflexion in a mirror; in botany, e.g. in the case of fungi or lichens, an abnormal change giving the appearance of a different species.

'ANAN BEN DAVID, a Persian Jew of the 8th century, and founder within Judaism of the sect of Qaraites (Karaites) which set itself in opposition to the rabbinic tradition. 'Anan was an unsuccessful candidate for the dignity of Exilarch, and thus his

opposition to the rabbanite Jews was political as well as theo-logical. His secession occurred at a moment when the time was ripe for a reaction against rabbinism, and 'Anan became the rallying point for many opponents of tradition. (See Qaraites.)

ANANDA, one of the principal disciples of the Buddha (q.v.) . He has been called the beloved disciple of the Buddhist story. He was the first cousin of the Buddha, and was devotedly attached to him. Ananda entered the Order in the second year of the Buddha's ministry, and became one of his personal attendants, accompanying him on most of his wanderings and being the interlocutor in many of

the recorded dialogues. He is the subject of a special panegyric delivered by the Buddha just before his death (Book of the Great Decease, v. 38) ; but it is the panegyric of an unselfish man, kindly, thoughtful for others and popular; not of the intellectual man, versed in the theory and practice of the Buddhist system of self-culture. So in the long list of the disciples given in the Anguttara (i. xiv.) where each of them is declared to be the chief in some gift, Ananda is mentioned five times (which is more often than any other), but it is as chief in conduct and in service to others and in power of memory, not in any of the intellectual powers so highly prized in the community. This explains why he had not attained to arahat- ship; and in the earliest account of the convocation said to have been held by five hundred of the principal disciples immediately after the Buddha's death, he was the only one who was not an arahat (Cullavagga, book xi.). In later, accounts this incident is explained away. Thirty-three verses ascribed to Ananda are preserved in a collection of lyrics by the principal male and female members of the order (Thera Gatha, 1017-1050). They show a gentle and reverent but simple spirit. (T. W. R. D.)

ANANIAS, the Gr. form of Hananiah, or Ananiah, a name occurring several times in the Old Testament and Apocrypha (Neh. iii. 23, 1 Ch. xxv. 23, Tob. v. 12. &c), and three times in the New Testament. Special mention need be made only of the bearers of the name in the New Testament. (1) A member of the first Christian community, who, with his wife Sapphira, was miraculously punished by Peter with sudden death for hypocrisy and falsehood (Acts v. 1-10; cf. Josh. vii. 1 ff.).

(2) A disciple at Damascus who figures in the story of the conversion and baptism of Paul (Acts ix. 10-17, xx ii- 12-16).

(3) Son of Nedebaios (Jos. Ant. xx. 5. 2), a high priest who presided during the trial of Paul at Jerusalem and Caesarea (Acts xxiii. 2, xxiv. 1-5). He officiated as high priest from about a.d. 47 to 59. Quadratus, governor of Syria, accused him of being responsible for acts of violence. He was sent to Rome for trial (a.d. 52), but was acquitted by the emperor Claudius. Being a friend of the Romans, he was murdered by the people at the beginning of the Jewish war.

ANANTAPUR, a town and district of India, in the Madras presidency. The town has a station on the Madras railway, 62 m. S.E. from Bellary. Pop. (1901) 7938.

The district of Anantapur was constituted in 1882 out of the

unwieldy district of Bellary. It has an area of 5557 sq. m., and in its northern and central portions is a high plateau, generally undulating, with large granite rocks or low hill ranges rising here and there above its surface. In the southern portion of the district the surface is more hilly, the plateau there rising to 2600 ft. above the sea. There is a remarkable fortress rock at Gooty, 2171 ft. above the sea, and a similar but larger rock at Penukonda, with an elevation equal to that of Bangalore, about 3100 ft. Gooty fortress was a stronghold of the Mahrattas, but was taken from them by Hyder Ali. In 1 789 it was ceded by Tippoo to the nizam, and in 1800 the nizam ceded the district of Anantapur with others to the British in payment for a subsidiary British force. The population in 1901 was 788,254, showing an increase of 8 % in the decade. The principal crops are millet, rice, other food grains, pulse, oil seeds and cotton. There are several steam factories for pressing cotton. Two railways traverse the district.

ANAPA, a seaport town of Russia, in the government of Kuban, on the N. coast of the Black Sea, 45 m. S.E. from the Strait of Yenikale or Kerch, giving access to the Sea of Azov. It

was originally built in 1781 as a frontier fortress of the Turks against Russia. Three times captured by the Russians, in 1791, 1807 and 1828, and twice restored by them, in 1792 and 1812, it was finally left in their hands by the treaty of Adrianople in 1829. During the Crimean War its fortifications were destroyed (1855) by the Russians themselves. Pop. (1897) 6676.

ANAPAEST (from Gr. ava-rraio-Tos, reversed), a metrical foot consisting of three syllables, the first two short and the third long and accented; so called as the reverse of a dactyl, which has the first a long syllable, followed by two short ones. An anapaestic verse is one which only contains, or is mostly made up of, anapaestic feet.

ANARCHISM (from the Gr. av-, and apxi?, contrary to authority), the name given to a principle or theory of life and conduct under which society is conceived without government — harmony in such a society being obtained, not by submission to law, or by obedience to any authority, but by free agreements concluded between the various groups, territorial and professional, freely constituted for the sake of production and consumption, as also for the satisfaction of the

infinite variety of needs and aspirations of a civilized being. In a society developed on these lines, the voluntary associations which already now begin to cover all the fields of human activity would take a still greater extension so as to substitute themselves for the state in all its functions. They would represent an interwoven network, com- pose I of an infinite variety of groups and federations of all sizes and degrees, local, regional, national and international — temporary or more or less permanent — for all possible purposes: production, consumption and exchange, communications, sanitary arrangements, education, mutual protection, defence of the territory, and so on; and, on the other side, for the satisfaction of an ever-increasing number of scientific, artistic, literary and sociable needs. Moreover, such a society would represent nothing immutable. On the contrary — as is seen in organic life at large — harmony would (it is contended) result from an ever-changing adjustment and readjustment of equili- brium between the multitudes of forces and influences, and this adjustment would be the easier to obtain as none of the forces would enjoy a special protection from the state.

If, it is contended, society were organized on these principles, man would not be limited in the free exercise of his powers in productive work by a capitalist monopoly, maintained by the state; nor would he be limited in the exercise of his will by a fear of punishment, or by obedience towards individuals or metaphysical entities, which both lead to depression of initiative and servility of mind. He would be guided in his actions by his own understanding, which necessarily would bear the impres- sion of a free action and reaction between his own self and the ethical conceptions of his surroundings. Man would thus be enabled to obtain the full development of all his faculties, intellectual, artistic and moral, without being hampered by overwork for the monopolists, or by the servility and inertia of mind of the great number. He would thus be able to reach full individualization, which is not possible either under the present system of individualism, or under any system of state- socialism in the so-called Volkstaat (popular state).

The Anarchist writers consider, moreover, that their conception is not a Utopia, constructed on the a priori method, after a few desiderata have been taken as postulates. It is derived, they maintain, from an analysis of tendencies that are at work already, even though state socialism may find a temporary favour with the reformers. The progress of modern technics, which wonder- fully simplifies the production of all the necessaries of life; the growing spirit of independence, and the rapid spread of free initiative and free understanding in all branches of activity — including those

which formerly were considered as the proper attribution of church and state — are steadily reinforcing the no-government tendency.

As to their economical conceptions, the Anarchists, in common with all Socialists, of whom they constitute the left wing, maintain that the now prevailing system of private ownership in land, and our capitalist production for the sake of profits, represent a

monopoly which runs against both the principles of justice and the dictates of utility. They are the main obstacle which prevents the successes of modern technics from being brought into the service of all, so as to produce general well-being. The Anarchists consider the wage-system and capitalist production altogether as an obstacle to progress. But they point out also that the state was, and continues to be, the chief instrument for permitting the few to monopolize the land, and the capitalists to appropriate for themselves a quite disproportionate share of the yearly accumulated surplus of production. Consequently, while combating the present monopolization of land, and capitalism altogether, the Anarchists combat with the same energy the state, as the main support of that system. Not this or that special form, but the state altogether, whether it be a monarchy or even a republic governed by means of the referendum.

The state organization, having always been; both in ancient and modern history (Macedonian empire, Roman empire, modern European states grown up on the ruins of the autonomous cities), the instrument for establishing monopolies in favour of the ruling minorities, cannot be made to work for the destruction of these monopolies. The Anarchists consider, therefore, that to hand over to the state all the main sources of economical life — the land, the mines, the railways, banking, insurance, and so on — as also the management of all the main branches of industry, in addition to all the functions already accumulated in its hands (education, state-supported religions, defence of the territory, &c), would mean to create a new instrument of tyranny. State capitalism would only increase the powers of bureaucracy and capitalism. True progress lies in the direction of decentralization, both territorial and functional, in the development of the spirit of local and personal initiative, and of free federation from the simple to the compound, in lieu of the present hierarchy from the centre to the periphery.

In common with most Socialists, the Anarchists recognize that, like all evolution in nature, the slow evolution of society is followed from time to time by periods of accelerated evolution which are called

revolutions; and they think that the era of revolutions is not yet closed. Periods of rapid changes will follow the periods of slow evolution, and these periods must be taken advantage of — not for increasing and widening the powers of the state, but for reducing them, through the organization in every township or commune of the local groups of producers and consumers, as also the regional, and eventually the international, federations of these groups.

In virtue of the above principles the Anarchists refuse to be party to the present state organization and to support it by infusing fresh blood into it. They do not seek to constitute, and invite the working men not to constitute, political parties in the parliaments. Accordingly, since the foundation of the International Working Men's Association in 1864-1866, they have endeavoured to promote their ideas directly amongst the labour organizations and to induce those unions to a direct struggle against capital, without placing their faith in parlia- mentary legislation.

The Historical Development of Anarchism. — The conception of society just sketched, and the tendency which is its dynamic expression, have always existed in mankind, in opposition to the governing hierarchic conception and tendency — now the one and now the other taking the upper hand at different periods of history. To the former tendency we owe the evolution, by the masses themselves, of those institutions — the clan, the village community, the gild, the free medieval city — by means of which the masses resisted the encroachments of the con- querors aˆid the power-seeking minorities. The same tendency asserted itself with great energy in the great religious movements of medieval times, especially in the early movements of the reform and its forerunners. At the same time it evidently found its expression in the writings of some thinkers, since the times of Lao-tsze, although, owing to its non-scholastic and popular origin, it obviously found less sympathy among the scholars than the opposed tendency.

As has been pointed out by Prof. Adler in his Geschichte des

Sozialismus und Kommunismus, Aristippus (b. c. 430 B.C.), one of the founders of the Cyrenaic school, already taught that the wise must not give up their liberty to the state, and in reply to a question by Socrates he said that he did not desire to belong either to the

governing or the governed class. Such an attitude, however, seems to have been dictated merely by an Epicurean attitude towards the life of the masses.

The best exponent of Anarchist philosophy in ancient Greece was Zeno (342-267 or 270 B.C.), from Crete, the founder of the Stoic philosophy, who distinctly opposed his conception of a free community without government to the state-Utopia of Plato. He repudiated the omnipotence of the state, its inter- vention and regimentation, and proclaimed the sovereignty of the moral law of the individual — -remarking already that, while the necessary instinct of self-preservation leads man to egotism, nature has supplied a corrective to it by providing man with another instinct — that of sociability. When men are reasonable enough to follow their natural instincts, they will unite across the frontiers and constitute the Cosmos. They will have no need of law-courts or police, will have no temples and no public worship, and use no money — free gifts taking the place of the exchanges. Unfortunately, the writings of Zeno have not reached us and are only known through fragmentary quotations. However, the fact that his very wording is similar to the wording now in use, shows how deeply is laid the tendency of human nature of which he was the mouth-piece.

In medieval times we find the same views on the state expressed by the illustrious bishop of Alba, Marco Girolamo Vida, in his first dialogue De dignitate reipublicae (Ferd. Cavalli, in Mem. dell' Istituto Veneto, xiii.; Dr E. Nys, Researches in the History of Economics). But it is especially in several early Christian movements, beginning with the 9th century in Armenia, and in the preachings of the early Hussites, particularly Chojecki, and the early Anabaptists, especially Hans Denk (cf. Keller, Ein Apostel der Wiedertaufer), that one finds the same ideas forcibly expressed — special stress being laid of course on their moral aspects.

Rabelais and Fenelon, in their Utopias, have also expressed similar ideas, and they were also current in the 18th century amongst the French Encyclopaedists, as may be concluded from separate expressions occasionally met with in the writings of Rousseau, from Diderot's Preface to the Voyage of Bougainville, and so on. However, in all probability such ideas could not be developed then, owing to the rigorous censorship of the Roman Catholic Church.

These ideas found their expression later during the great French Revolution. While the Jacobins did all in their power to centralize everything in the hands of the government, it appears now, from

recently published documents, that the masses of the people, in their municipalities and " sections," accomplished a considerable constructive work. They appro- priated for themselves the election of the judges, the organization of supplies and equipment for the army, as also for the large cities, work for the unemployed, the management of charities, and so on. They even tried to establish a direct correspondence between the 36,000 communes of France through the inter- mediary of a special board, outside the National Assembly (cf. Sigismund Lacroix, Actes de la commune de Paris).

It was Godwin, in his Enquiry concerning Political Justice (2 vols., 1793), who was the first to formulate the political and economical conceptions of Anarchism, even though he did not give that name to the ideas developed in his remarkable work. Laws, he wrote, are not a product of the wisdom of our ancestors: they are the product of their passions, their timidity, their jealousies and their ambition. The remedy they offer is worse than the evils they pretend to cure. If and only if all laws and courts were abolished, and the decisions in the arising contests were left to reasonable men chosen for that purpose, real justice would gradually be evolved. As to the state, Godwin frankly claimed its abolition. A society, he wrote, can perfectly well exist without any government: only the communities should be small and perfectly autonomous. Speaking of property, he

stated that the rights of every one " to every substance capable of contributing to the benefit of a human being " must be regulated by justice alone: the substance must go " to him who most wants it." His conclusion was Communism. Godwin, however, had not the courage to maintain his opinions. He entirely rewrote later on his chapter on property and mitigated his Communist views in the second edition of Political Justice (8vo, 1796).

Proudhon was the first to use, in 1840 (Qu'est-ce que Id pro- pri&U? first memoir), the name of Anarchy with application to the no-government state of society. The name of " Anarchists " had been freely applied during the French Revolution by the Girondists to those revolutionaries who did not consider that the task of the Revolution was accomplished with the overthrow of Louis XVI., and insisted upon a series of economical measures being taken (the abolition of feudal rights without redemption, the return to the village communities of the communal lands enclosed since 1669, the limitation of landed property to 120 acres, progressive income-tax, the national organization of exchanges on a just value basis, which already received a begin- ning of practical realization, and so on).

Now Proudhon advocated a society without government, and used the word Anarchy to describe it. Proudhon repudiated, as is known, all schemes of Communism, according to which mankind would be driven into communistic monasteries or barracks, as also all the schemes of state or state-aided Socialism which were advocated by Louis Blanc and the Collectivists. When he proclaimed in his first memoir on property that " Property is theft," he meant only property in its present, Roman-law, sense of " right of use and abuse " ; in property-rights, on the other hand, understood in the limited sense of possession, he saw the best protection against the encroachments of the state. At the same time he did not want violently to dispossess the present owners of land, dwelling-houses, mines, factories and so on. He preferred to attain the same end by rendering capital incapable of earning interest; and this he proposed to obtain by means of a national bank, based on the mutual confidence of all those who are engaged in production, who would agree to exchange among themselves their produces at cost-value, by means of labour cheques representing the hours of labour required to produce every given commodity. Under such a system, which Proudhon described as " Mutuellisme," all the exchanges of services would be strictly equivalent. Besides, such a bank would be enabled to lend money without interest, levying only something like 1 %, or even less, for covering the cost of administration. Every one being thus enabled to borrow the money that would be required to buy a house, nobody would agree to pay any more a yearly rent for the use of it. A general " social liquidation " would thus be rendered easy, without violent expropriation. The same applied to mines, railways, factories and so on.

In a society of this type the state would be useless. The chief relations between citizens would be based on free agreement and regulated by mere account keeping. The contests might be settled by arbitration. A penetrating criticism of the state and all possible forms of government, and a deep insight into all economic problems, were well-known characteristics of Proudhon's work.

It is worth noticing that French mutualism had its precursor in England, in William Thompson, who began by mutualism before he became a Communist, and in his followers John Gray {A Lecture on Human Happiness, 1825; The Social System, 1831) and J. F. Bray {Labour's Wrongs and Labour's Remedy, 1839). It had also its precursor in America. Josiah Warren, who was born in 1798 (cf. W. Bailie, Josiah Warren, the First American Anarchist, Boston, 1900), and belonged to Owen's " New Harmony," considered that the failure of this enterprise was chiefly due to the suppression of individuality

and the lack of initiative and responsibility. These defects, he taught, were inherent to every scheme based upon authority and the community of goods. He advocated, therefore, complete individual liberty. In 1827 he opened in Cincinnati a little country store which was the first " Equity Store," and which the people called

" Time Store," because it was based on labour being exchanged hour for hour in all sorts of produce. " Cost — the limit of price," and consequently " no interest," was the motto of his store, and later on of his " Equity Village," near New York, which was still in existence in 1865. Mr Keith's " House of Equity " at Boston, founded in 1855, is also worthy of notice.

While the economical, and especially the mutual-banking, ideas of Proudhon found supporters and even a practical applica- tion in the United States, his political conception of Anarchy found but little echo in France, where the Christian Socialism of Lamennais and the Fourierists, and the State Socialism of Louis Blanc and the followers of Saint-Simon, were dominating. These ideas found, however, some temporary support among the left-wing Hegelians in Germany, Moses Hess in 1843, an d Karl Griin in 1845, who advocated Anarchism. Besides, the authori- tarian Communism of Wilhelm Wei tling having given origin to opposition amongst the Swiss working men, Wilhelm Marr gave expression to it in the 'forties.

On the other side, Individualist Anarchism found, also in Germany, its fullest expression in Max Stirner (Kaspar Schmidt), whose remarkable works (Der Einzige und sein Eigenthum and articles contributed to the Rheinische Zeitung) remained quite overlooked until they were brought into prominence by John Henry Mackay.

Prof. V. Basch, in a very able introduction to his interesting book, L'lndividualisme anarchiste: Max Stirner (1904), has shown how the development of the German philosophy from Kant to Hegel, and " the absolute " of Schelling and the Geist of Hegel, necessarily provoked, when the anti-Hegelian revolt began, the preaching of the same " absolute " in the camp of the rebels. This was done by Stirner, who advocated, not only a complete revolt against the state and against the servitude which authori- tarian Communism would impose upon men, but also the full liberation of the individual from all social and moral bonds — the rehabilitation of the " I," the supremacy of the

individual, complete " a-moralism," and the " association of the egotists." The final conclusion of that sort of Individual Anarchism has been indicated by Prof. Basch. It maintains that the aim of all superior civilization is, not to permit all members of the com- munity to develop in a normal way, but to permit certain better endowed individuals " fully to develop," even at the cost of the happiness and the very existence of the mass of mankind. It is thus a return towards the most common individualism, advocated by all the would-be superior minorities, to which indeed man owes in his history precisely the state and the rest, which these individualists combat. Their individualism goes so far as to end in a negation of their own starting-point, — to say nothing of the impossibility for the individual to attain a really full development in the conditions of oppression of the masses by the " beautiful aristocracies." His development would remain uni-lateral. This is why this direction of thought, notwithstanding its un- doubtedly correct and useful advocacy of the full development of each individuality, finds a hearing only in limited artistic and literary circles.

Anarchism in the International Working Men's Association. — A general depression in the propaganda of all fractions of Socialism followed, as is known, after the defeat of the uprising of the Paris working men in June 1848 and the fall of the Republic. All the Socialist press was gagged during the reaction period, which lasted fully twenty years. Nevertheless, even Anarchist thought began to make some progress, namely in the writings of Bellegarrique (Cceurderoy), and especially Joseph Dejacque (Les Lazar&ennes, L'Humanisphere, an Anarchist- Communist Utopia, lately discovered and reprinted). The Socialist movement revived only after 1864, when some French working men, all " rnutualists," meeting in London during the Universal Exhibition with English followers of Robert Owen, founded the International Working Men's Association. This association developed very rapidly and adopted a policy of direct economical struggle against capitalism, without interfering in the political parliamentary agitation, and this policy was followed until 1871. However, after the Franco-German War, when the

International Association was prohibited in France after tin Uprising of the Commune, the German working men, who hao received manhood suffrage for elections to the newly constituted imperial parliament, insisted upon modifying the tactics of the International, and began to build up a Social-Democratic political party. This soon led to a division in the Working Men's Association, and the Latin federations, Spanish, Italian, Belgian and Jurassic (France could not be represented), constituted among themselves a Federal union which

broke entirely with the Marxist general council of the International. Within these federations developed now what may be described as modern Anarchism. After the names of " Federalists " and " Anti-authoritarians " had been used for some time by these federations the name of " Anarchists," which their adversaries insisted upon applying to them, prevailed, and finally it was revindicated.

Bakunin (q.v.) soon became the leading spirit among these Latin federations for the development of the principles of Anarchism, which he did in a number of writings, pamphlets and letters. He demanded the complete abolition of the state, which — he wrote— is a product of religion, belongs to a lower state of civilization, represents the negation of liberty, and spoils even that which it undertakes to do for the sake of general well being. The state was an historically necessary evil, but its complete extinction will be, sooner or later, equally necessary; Repudiating all legislation, even when issuing from universal suffrage, Bakunin claimed for each nation, each region and each commune, full autonomy, so long as it is not a menace to its neighbours, and full independence for the individual, adding that one becomes really free only when, and in proportion as, all others are free. Free federations of the communes would constitute free nations.

As to his economical conceptions, Bakunin described himself, in common with his Federalist comrades of the International (Cesar De Paepe, James Guillaume Schwitzguebel) , a " Collecti- vist Anarchist " — not in the sense of Vidal and Pecqueur in the 'forties, or of their modern Social-Democratic followers, but to express a state of things in which all necessaries for production are owned in common by the Labour groups and the free com- munes, while the ways of retribution of labour, Communist or otherwise, would be settled by each group for itself. Social revolution, the near approach of which was foretold at that time by all Socialists, would be the means of bringing into life the new conditions.

The Jurassic, the Spanish, and the Italian federations and sections of the International Working Men's Association, as also' the French, the German and the American Anarchist groups, were for the next years the chief centres of Anarchist thought and propaganda. They refrained from any participation in parliamentary politics, and always kept in close contact with the Labour organizations. However, in the second half of the 'eighties and the early 'nineties of the 19th century, when the influence of the Anarchists began to be felt in strikes, in the 1 st of May demonstrations, where they promoted the idea of a general strike for an eight hours' day, and in

the anti-militarist propaganda in the army, violent prosecutions were directed against them, especially in the Latin countries (including physical torture in the Barcelona Castle) and the United States (the execution of five Chicago Anarchists in 1887). Against these prosecutions the Anarchists retaliated by acts of violence which in their turn were followed by more executions from above, and new acts of revenge from below. This created in the general public the impression that violence is the substance of Anarchism, a view repudiated by its supporters, who hold that in reality violence is resorted to by all parties in proportion as their open action is obstructed by repression, and exceptional laws render them outlaws. (Cf . Anarchism and Outrage, by C. M. Wilson, and Report of the Spanish Atrocities Committee, in " Freedom Pam- phlets"; A Concise History of the Great Trial of the Chicago Anarchists, by Dyer Lum (New York, 1886); The Chicago Martyrs: Speeches, &C.). 1

1 It is important to remember that the term " Anarchist " is inevitably rather loosely used in public, in connexion with the authors

Anarchism continued to develop, partly in the direction of Proudhonian " Mutuellisme," but chiefly as Communist-Anar- chism, to which a third direction, Christian-Anarchism, was added by Leo Tolstoy, and a fourth, which might be ascribed as literary-Anarchism, began amongst some prominent modern writers.

The ideas of Proudhon, especially as regards mutual banking, Corresponding with those of Josiah Warren, found a considerable following in the United States, creating quite a school, of which the main writers are Stephen Pearl Andrews, William Grene, Lysander Spooner (who began to write in 1850, and whose unfinished work, Natural Law, was full of promise), and several others, whose names will be found in Dr Nettlan's Bibliographic de I'anarchie.

A prominent position among the Individualist Anarchists in America has been occupied by Benjamin R. Tucker, whose journal Liberty was started in 1881 and whose conceptions are a combination of those of Proudhon with those of Herbert Spencer. Starting from the statement that Anarchists are egotists, strictly speaking, and that every group of individuals, be it a secret league of a few persons, or the Congress of the United States, has the right to oppress all mankind, provided it

has the power to do so, that equal liberty for all and absolute equality ought to be the law, and " mind every one your own business " is the unique moral law of Anarchism, Tucker goes on to prove that a general and thorough application of these principles would be beneficial and would offer no danger, because the powers of every individual would be limited by the exercise of the equal rights of all others.

of a certain class of murderous outrages, and that the same looseness of definition often applies to the professions of " Anarchism " made by such persons. As stated above, a philosophic Anarchist would repudiate the connexion. And the general public view which regards Anarchist doctrines indiscriminately is to that extent a confusion of terms. But the following resume of the chief modern so-called " Anarchist " incidents is appended for convenience in stating the facts under the heading where a reader would expect to find them.

Between 1882 and 1886, in France, Prince Kropotkin, Louise Michel and others were imprisoned. In England, Most, one of the German Anarchist leaders, founded Die Freiheit, and, for defending in it the assassination of Alexander II. at St Petersburg, was sen- tenced to eighteen months' imprisonment with hard labour. After this he moved to the United States, and re-established his paper there in New York, in May 1 886. During this period there were several Anarchist congresses in the United States. In one at Albany, in 1878, the revolutionary element, led by Justus Schwab, broke away from the others; at Allegheny City, in 1879, again there was a rupture between the peaceful and the revolutionary sections. The Voice of the People at St Louis, the Arbeiter Zeitung at Chicago, and the Anarchist at Boston, were the organs of the revolutionary element. In 1883, at Pittsburg, a congress of twenty-eight delegates, representing twenty-two towns, drew up an address to the working men of America. The programme it proposed was as follows: —

First, Destruction of the existing class rule by all means, i.e. energetic, relentless, revolutionary and international action.

Second, Establishment of a free society, based upon co-operative organization of production.

Third, Free exchange of equivalent products by and between the productive organizations, without commerce and profit-mongery.

FouHh, Organization of education on a secular, scientific and equal basis for both sexes.

Fifth, Equal rights for all, without distinction of sex or race.

Sixth, Regulation of all public affairs by free contracts between the autonomous (independent) communes and associations, resting on a federalistic basis.

This, together with an appeal to the working men to organize, was published in Chicago, November 1883, by a local committee of four, representing French, Bohemian, German and English sections, the head of the last being August Spies, who was hanged in 1887 for participation in the Haymarket affair in Chicago, 4th May 1886. This affair was the culmination of a series of encounters between the Chicago working men and the police, which had covered several years. The meeting of 4th May was called by Spies and others to protest against the action of the police, by whom several working men had been killed in collisions growing out of the efforts to introduce the eight hours' day. The mayor of the city attended the meeting, but, finding it peaceful, went home. The meeting was subsequently entered by the police and commanded to disperse. A bomb was thrown, several policemen being killed and a number ■wounded. For this crime eight men were tried in one panel and condemned, seven — Spies, Parsons, Engel, Fischer, Fielden, Schwab, and Ling — to death, and one — Neebe — to imprisonment for fifteen

He further indicated (following H. Spencer) the difference which exists between the encroachment on somebody's rights and resistance to such an encroachment; between domination and defence: the former being equally condemnable, whether it be encroachment of a criminal upon an individual, or the encroach- ment of one upon all others, or of all others upon one; while resistance to encroachment is defensible and necessary. For their self-defence, both the citizen and the group have the right to any violence, including capital punishment. Violence is also justified for enforcing the duty of keeping an agreement. Tucker thus follows Spencer, and, like him, opens (in the present writer's opinion) the way for reconstituting under the heading of " defence " all the functions of the state. His criticism of the present state is very searching, and his defence of the rights of the individual very powerful. As regards his economical views B. R. Tucker follows Proudhon.

The Individualist Anarchism of the American Proudhonians finds, however, but little sympathy amongst the working masses. Those who profess it — they are chiefly " intellectuals " — soon realize that the individualization they so highly praise is not attainable by individual

efforts, and either abandon the ranks of the Anarchists, and are driven into the Liberal individualism of the classical economists, or they retire into a sort of Epicurean a-moralism, or super-man-theory, similar to that of Stirner and Nietzsche. The great bulk of the Anarchist working men prefer the Anarchist-Communist ideas which have gradually evolved out of the Anarchist Collectivism of the International Working Men's Association. To this direction belong — to name only the better

years. The sentences on Fielden and Schwab were commuted by Governor Oglesby to imprisonment for life, on the recommendation of the presiding judge and the prosecuting attorney. Ling com- mitted suicide in jail, and Spies, Parsons, Engel and Fischer were hanged, nth November 1887. On 26th June 1893 an unconditional pardon was granted the survivors, Fielden, Schwab and Neebe, by Governor Altgeld. The reasons for the pardon were stated by the governor to be that, upon an examination of the records he found that the jury had not been drawn in the usual manner, but by a special bailiff, who made his own selection and had summoned a ' prejudiced jury "; that the " state had never discovered who it was that threw the bomb which killed the policemen, and the evidence does not show any connexion whatever between the de- fendants and the man who did throw it," ... or that this man " ever heard or read a word coming from the defendants, and conse- quently fails to show that he acted on any advice given by them." Judge Gary, the judge at the trial, published a defence of its pro- cedure in the Century Magazine., vol. xxiii p. 803.

A number of outbreaks in later years were attributed to the propa- ganda of reform by revolution, like those in Spain and France in 1892, in which Ravachol was a prominent figure. In 1893 a bomb was exploded in the French Chamber of Deputies by Vaillant. The spirit of these men is well illustrated by the reply which Vaillant made to the judge who reproached him for endangering the lives of innocent men and women: " There can be no innocent bour- geois." In 1894 there was an explosion in a Parisian cafe, and another in a theatre at Barcelona. For the latter outrage six men were executed. President Carnot of the French Republic was assassinated by an Italian at Lyons in the same year. The empress Elizabeth of Austria was assassinated in September 1898. These events, all associated by the public with " Anarchism," led to the passage by the United States Congress of a law, in 1894, to keep out foreign Anarchists, and to deport any who might be found in the country, and also to the assemblage of an international conference in Rome, in 1898, to agree upon some plan for dealing with these revolutionists. It was

proposed that their offences should no longer be classed as political, but as common-law crimes, and be made subject to extradition. The suppression of the revolutionary press and the international co-operation of the police were also suggested. The results of the conference were not, however, published; and the question of how to deal with the campaign against society fell for a while into abeyance. The attempt made by the youth Sipido on the (then) prince of Wales at Brussels in 1900 recalled attention to the subject. The acquittal of Sipido, and the failure of the Belgian government to see that justice was done in an affair of such international importance, excited considerable feeling in England, and was the occasion of a strongly-worded note from the British to the Belgian government. The murder of King Humbert of Italy in July 1900 renewed the outcry against Italian Anarchists. Even greater 'horror and indignation were excited by the assassination of President McKinley by Czolgoscz on the 6th of September 1901, at Buffalo, U.S.A. And a particularly dastardly attempt was made to blow up the young king and queen of Spain on their wedding-day in 1906. (Ed. E.B.)

known exponents of Anarchism — Elisee Reclus, Jean Grave, Sebastien Faure, Emile Pouget in France; Enrico Malatesta and Covelli in Italy; R. Mella, A. Lorenzo, and the mostly unknown authors of many excellent manifestos in Spain ; John Most amongst the Germans; Spies, Parsons and their followers in the United States, and so on; while Domela Nieuwenhuis occupies an intermediate position in Holland. The chief Anarchist papers which have been published since 1 880 also belong to that direction ; while a number of Anarchists of this direction have joined the so-called Syndicalist movement — the French name for the non-political Labour movement, devoted to direct struggle with capitalism, which has lately become so prominent in Europe.

As one of the Anarchist-Communist direction, the present writer for many years endeavoured to develop the following ideas: to show the intimate, logical connexion which exists between the modern philosophy of natural sciencesandAnarchism ; to put Anarchism on a scientific basis by the study of the tendencies that are apparent now in society and may indicate its further evolution; and to work out the basis of Anarchist ethics. As regards the substance of Anarchism itself, it was Kropotkin's aim to prove that Communism — at least partial — has more chances of being established than Collectivism,

especially in communes taking the lead, and that Free, or Anarchist-Com- munism is the only form of Communism that has any chance of being accepted in civilized societies; Communism and Anarchy are therefore two terms of evolution which complete each other, the one rendering the other possible and acceptable. He has tried, moreover, to indicate how, during a revolutionary period, a large city — if its inhabitants have accepted the idea — ■ could organize itself on the lines of Free Communism; the city guaranteeing to every inhabitant dwelling, food and clothing to an extent corresponding to the comfort now available to the middle classes only, in exchange for a half-day's, or a five-hours' work; and how all those things which would be considered as luxuries might be obtained by every one if he joins for the other half of the day all sorts of free associations pursuing all possible aims — educational, literary, scientific, artistic, sports and so on. In order to prove the first of these assertions he has analysed the possibilities of agriculture and industrial work, both being combined with brain work. And in order to elucidate the main factors of human evolution, he has analysed the part played in history by the popular constructive agencies of mutual aid and the historical role of the state.

Without naming himself an Anarchist, Leo Tolstoy, like his predecessors in the popular religious movements of the 15 th and 16th centuries, Chojecki, Denk and many others, took the Anarchist position as regards the state and property rights, deducing his conclusions from the general spirit of the teachings of the Christ and from the necessary dictates of reason. With all the might of his talent he made (especially in The Kingdom of God in Yourselves) a powerful criticism of the church, the state and law altogether, and especially of the present property laws. He describes the state as the domination of the wicked ones, supported by brutal force. Robbers, he says, are far less dangerous than a well-organized government. He makes a searching criticism of the prejudices which are current now concerning the benefits conferred upon men by the church, the state and the existing distribution of property, and from the teachings of the Christ he deduces the rule of non-resistance and the absolute condemnation of all wars. His religious arguments are, however, so well combined with arguments borrowed from a dispassionate observation of the present evils, that the anarchist portions of his works appeal to the religious and the non-religious reader alike.

It would be impossible to represent here, in a short sketch, the penetration, on the one hand, of Anarchist ideas into modern literature, and the influence, on the other hand, which the libertarian ideas of the best comtemporary writers have exercised upon the

development of Anarchism. One ought to consult the ten big volumes of the Supplement UtUraire to the paper La r&voltc and later the Temps nouveaux, which contain repro-

ductions from the works of hundreds of modern authors express- ing Anarchist ideas, in order to realize how closely Anarchism is connected with all the intellectual movement of our own times. J. S. Mill's Liberty, Spencer's Individual versus The Slate, Marc Guyau's Morality without Obligation or Sanction, and Fouillee's La morale, I'art et la religion, the works of Multatuli (E. Douwes Dekker), Richard Wagner's Art and Revolution, the works of Nietzsche, Emerson, W. Lloyd Garrison, Thoreau, Alexander Herzen, Edward Carpenter and so on; and in the domain of fiction, the dramas of Ibsen, the poetry of Walt Whitman, Tolstoy's War and Peace, Zola's Paris and Le travail, the latest works of Merezhkovsky, and an infinity of works of less known authors, — are full of ideas which show how closely Anarchism is interwoven with the work that is going on in modern thought in the same direction of enfranchisement of man from the bonds of the state as well as from those of capitalism.

Bibliography. — William Godwin, An Enquiry concerning Political Justice and its Influence on General Virtue and. Happiness, 1st edition, 2 vols. (1793). Mutualism: — John Gray, A Lscture on Human Happiness (1825); The Social System, a Treatise on the Principles of Exchange (1 83 1) ; Proudhon, Qu'est-ce que la propriete ? ler memoir e (1840) (Eng. trans, by B. Tucker); Idee generate sur la revolution (1851); Confession d'un revolutionnaire (1849); Contradictions economiques (1846); Josiah Warren, Practicable Details of Equitable Commerce (New Yoik, 1852); True Civilization (Boston, 1863); Stephen Pearl Andrews, The Science of Society (1851); Cost, the Limit of Price; Moses Hess, " Sozialismus und Communismus, Philosophic der That " (on Herwegh's Ein-und-Zwanzig Bogen aus der Schweiz, 1843); Karl Griin, Die soziale. Bewegung in Frankreich und Belgien(i845) ; W. Marr, Dasjunge DeutscHland (1845). Anarch- ist Individualism: — Max Stirner (J. K. Schmidt), Der Einzige und sein Eigenthum (1845) (Fr. trans., 1900) ; J. H. Mackay, Max Stirner, sein Leben und sein Werk (1898) ; V. Basch, V Individualisme anarchiste (1904). Transition period : — J. Dejacque, Les Lazareennes (1851); Le Libertaire, weekly, New York, 1858-1861, containing L'Humanisphere (re-edited at Brussels, Bibl. des temps nouveaux). Anarchist Collectivism of the International: — The papers Egalite, Progres (Locle), Solidarite; James Guillaume, Idies sur V organisation sociale (1876); Bulletin de la federationˆurassienne (1872-1879); A. Schwitzguebel,

CEuvres; Paul Brousse\ Le Suffrage universel (1874) ; V'Etat a Versailles et dans V association internationale (1874) ; newspaper L' Avant-garde (suppressed 1878) ; Arthur Arnould, L'£tat et la revolution (1877); Histoire populaire de la commune (3 vols., 1878) ; Cesar de Paepe, in Rive gauche and La liberte (1867- 1883). Ma riy others are in the Comptes rendus of the congresses of the International Working Men's Association. All these ideas, conceived as a whole, may be found in Bakunin's Federalisme, socialisme ehanti-theologisme, published first in portions under the names of L'Empire knouto-germanique, Dieu et I'etat, The State-Idea and Anarchy (Russian), and only now reproduced in full in his CEuvres (Paris, 1905 and seq.) ; Sozialpolitischer Briefwechsel (1894); Statuts de I'alliance internationale (1868); Proposition motivee au comite central de la ligue de la paix etdela liberte(i868). The famous Revolutionary Catechism attributed to Bakunin, was not his work. Biographie von Michael Bakunin, by Dr M. Nettlan, 3 large vols., contains masses of letters, &c. (hectographed in 50 copies; in all chief libraries).

Modern Anarchism. — The best sources are the collections of newspapers which, although compelled sometimes to change their names, were run for considerable lengths of time and are appearing still: J. Most, Freiheit, since 1878; Le Revolle — La Revolte — Temps nouveaux, since 1878; Domela Nieuwenhuis, Recht voor Allen, since 1878; Freedom, since 1886; Le Libertaire; Pouget's Pere Pesuard; Reveil-Risveglio; see Nettlan's Bibliographic These papers and a great number of pamphlets are indispensable for those who intend to know anarchism, as the works published in book form are not numerous. Of the latter only a few will be mentioned : — Elisee Reclus, Evolution and Revolution, many editions in all languages; " Anarchy by an Anarchist," in Contemp. Review (May, 1884); The Ideal and Youth (1895); Jean Grave, La Societe au lendemain de la revolution, many editions since 1882; La Societe mourante et I'anarchie (1893); L' Autonomic selon la science (1882); La SocietS future (1895); V Anarchic, son but, ses moyens; Sebastien Faure, La Douleur universelle (1892); A. Hamon, Les Hommes et les theories de I'anarchie (1893) ; Psychologie de V anarchisle-socialiste (1895); Enrico Malatesta, Fra Contadini, transl. in all languages — Eng. trans. A Talk about Anarchist Communism, in " Freedom Pamphlets" (1891); Anarchy (do. 1892); Au cafe; and many other Italian pamphlets, as also several papers started at variot; times in Italy under different names: F. S. Merlino, Socialismo c Monopolismo? (1887). Pamphlets,. reviews and papers by P. Gori L. Molinari, E. Covelli, &c. The manifestos of the Spanish Federa- tions contain

excellent expositions of Anarchism; cf. also many books, pamphlets and papers by J. Llunas y Pujals, J. Serrano y Oteiza, Ricardo Mella, A. Lorenzo, &c. John Most, the paper

Freiheil, of which a few articles only have been reprinted as pamphlets in the Internationale Biblioihek (" The Deistic Pestilence," " The Beast of Property " in English) ; Memoiren, 3 fascicules. F. Domela Nieuwenhuis, Le Socialisme en danger (1895) ; C. Malato, Philosophie de I'anarchie (1890); Charlotte Wilson, Anarchism (" Fabian Tracts," 4); Anarchism and Violence (" Freedom Pam- phlets ") ; Albert Parsons, Anarchism, its Philosophy and Scientific Basis (Chicago, 1888); The Chicago Martyrs: Speeches in Court; P. Kropotkin, Paroles a" un revolte (1884); Conquest of Bread (1906) (1st French ed. in 1890) ; Anarchist Morality ; Anarchy ; its Philosophy and Ideals ; A narchist Communism ; The State, its Historic Role ; and other " Freedom Pamphlets "; Fields, Factories and Workshops (5th popular edition, 1807) ; Mutual Aid: a Factor of Evolution (1904). Modern Individualist Anarchists: — B. Tucker, the paper Liberty (1892 sqq.); Instead of a Book, by one too busy to write one (Boston, 1893); Dyer Lum, Social Problems (1883); Lysander Spooner, Natural Law, or the Science of Justice (Boston, 1891). Religious Anarchists : — Leo Tolstoy, The Kingdom of God in Your- selves ; My Faith ; Confession ; & c.

The best work on Anarchism, and in fact the only one written with full knowledge of the Anarchist literature, and quite fairly, is by a German judge Dr Paul Eltzbacher, Anarchismus (transl. in all chief European languages, except English). Prof. Adler's article " Anarch- ismus " in Conrad's Handworterbuch der Staatswissenschaften, vol. i., is less accurate for modern times than for the earlier periods. G. v. Zenker, Der Anarchismus (1895); and Prof. Edmund Bernatzik, " Der Anarchismus," in Schmoller's Jahrbuch, may also be men- tioned — the remainder being written with absolute want of know- ledge of the subject.

A most important work is the reasoned Bibliographie de I'anarchie, by Dr M. Nettlan (Brussels, 1897, 8vo, 294 ff.), written with a full knowledge of the subject and its immense literature. (P. A. K.)

ANASTASIUS, the name of four popes.

Anastasius I., pope from 399-401. Heitwaswho condemned the writings of Origen shortly after their translation into Latin.

Anastasius II., pope from 496-498. He lived in the time of the schism of Acacius Of Constantinople. He showed some tendency towards conciliation, and thus brought upon himself the lively reproaches of the author of the Liber ponliftcalis. On the strength of this tradition, Dante has placed this pope in hell.

Anastasius III., pope from 911-913, was a Roman by birth. Practically nothing is recorded of him, his pontificate falling in the period when Rome was in the power of the Roman nobles.

Anastasius IV. was pope from 11 53 to 11 54. He was a Roman named Conrad, son of Benedictus, and at the time of his election, on the 9th of July 1153, was cardinal bishop of Sabina. He had taken part in the double election of 11 30, had been one of the most determined opponents of Anacletus II. and, when Innocent II. fled to France, had been left behind as his vicar in Italy. During his short pontificate, however, he played the part of a peacemaker; he came to terms with the emperor Frederick I. in the vexed question of the appoint- ment to the see of Magdeburg and closed the long quarrel, which had raged through four pontificates, about the appointment of William Fitzherbert (d. 1 1 54) — commonly known as St William of York — to the see of York, by sending him the pallium, in spite of the continued opposition of the powerful Cistercian order. Anastasius died on the 3rd of December 11 54, and was succeeded by Cardinal Nicholas of Albano as Adrian IV.

ANASTASIUS I. (c. 430-518), Roman emperor, was born at Dyrrhachium not later than a.d. 430. At the time of the death of Zeno (491), Anastasius, a palace official {silentiarius) , held a very high character, and was raised to the throne of the Roman empire of the East, through the choice of Ariadne, Zeno's widow, who married him shortly after his accession. His reign, though afterwards disturbed by foreign and intestine wars and religious distractions, commenced auspiciously. He gained the popular favour by a judicious remission of taxation, and displayed great vigour and energy in administering the affairs of the empire. The principal wars in which Anastasius was engaged were those known as the Isaurian and the Persian. The former (492-496) was stirred up by the supporters of Longinus, the brother of Zeno. The victory of Cotyaeum in 493 " broke the back " of the revolt, but a guerilla warfare continued in the Isaurian mountains for some years longer. In the war with Persia (502- 505), Theodosiopolis and Amida were

captured by the enemy, but the Persian provinces also suffered severely and the Romans recovered Amida.. Both adversaries were exhausted when

peace was made (506) on the basis of status quo. Anastasius afterwards built the strong fortress of Daras to hold Nisibis in check. The Balkan provinces were devastated by invasions of Slavs and Bulgarians; to protect Constantinople and its vicinity against them he built the " Anastasian wall," extending from the Propontis to the Euxine. The emperor was a convinced Monophysite, but his ecclesiastical policy was moderate; he endeavoured to maintain the principle of the Henolikon of Zeno and the peace of the church. It was the uncompromising attitude of the orthodox extremists, and the rebellious demonstra- tions of the Byzantine populace, that drove him in 51 2 to abandon this policy and adopt a monophysitic programme. His con- sequent unpopularity in the European provinces was utilized by an ambitious man, named Vitalian, to organize a dangerous rebellion, in which he was assisted by a horde of " Huns " (514-515); it was finally suppressed by a naval victory won by the general Marinus. The financial policy of Anastasius was so prudent and economical that it gained him a reputation for avarice and contributed to his unpopularity. He died in 518.

Authorities. — Sources: Joshua the Stylite, Chronicle, ed. Wright, with English translation, Cambridge, 1882; Marcellinus, Chronicle; Zachariah of Mytilene, Chronicle (Eng. trans, by Hamilton and Brooks, London, 1899); Evagrius, Ecclesiastical History; John Lydus, De Magistratibus; John Malalas, Chronicle. Modern works: Gibbon, Decline and Fall, vol. iv. (ed. Bury); Bury, Later Roman Empire, vol. i.

ANASTASIUS II. (d. 721), Roman emperor in the East, whose original name was Artemius, was raised to the throne of Con- stantinople by the voice of the senate and people in a.d. 713, on the deposition of Philippicus, whom he had served in the capacity of secretary. The empire was threatened by the Saracens both by land and sea, and Anastasius sent an army under Leo the Isaurian, afterwards emperor, to defend Syria; adopted wise and resolute measures for the defence of his capital; attempted to reorganize the discipline of the army; and equipped and despatched to Rhodes a formidable naval force, with orders not only to resist the approach of the enemy, but to destroy their naval stores. The troops of the Opsikian province, resenting the emperor's strict measures, mutinied, slew the admiral, and proclaimed Theodosius, a person of low extraction, emperor. After a six months' siege, Constantinople was

taken by Theodosius; and Anastasius, who had fled to Nicaea, was compelled to submit to the new emperor, and, retiring to Thessalonica, becameamonk (716). In 721 he headed a revolt against Leo, who had succeeded Theodosius, and receiving a considerable amount of support, laid siege to Con- stantinople; but the enterprise failed, and Anastasius, falling into Leo's hands, was put to death by his orders.

Authorities. — Sources: Theophanes, Chronicle; Nicephorus Patriarches, Breviarium. Modern works : Gibbon, Decline and Fall, vol. v. (ed. Bury) ; Bury, Later Roman Empire, vol. ii.

ANASTOMOSIS (a Greek word in which the second is long, from avaoTOixovv, to furnish with a mouth or outlet) , the inter-communication between two vessels; a word used in vegetable and animal anatomy for the communication between channels (arteries and veins) containing fluid, and also for the crossing between the veins or branches of leaves, trees, insect-wings or river-connexions, and by analogy in art-design.

ANATASE, one of the three mineral forms of titanium dioxide. It is always- found as small, isolated and sharply developed crystals, and like rutile, a more commonly occurring modification of titanium dioxide, it crystallizes in the tetragonal system; but, although the degree of symmetry is the same for both, there is no relation between the interfacial angles of the two minerals, except, of course, in the prism-zone of 45° and 90 . The common pyramid lin} (fig. 1) of anatase, 1 parallel to the faces of which there are perfect cleavages, has an angle over the polar edge of 82° 9', the corresponding angle (1 1 1) : (11 1) of rutile being 56 52!'. It was on account of this steeper pyramid of anatase that the mineral was named, by R. J. Hauy in 1801, from the Gr. Avdratris, "extension," the vertical axis of the crystals being longer than in rutile. There are also important differences 1 For the notation see Crystallography.

Fig. i.

Fig. 2.

between the physical characters of anatase and rutile; the former is not quite so hard (H=s^-6) or dense (sp. gr. = 3-o); it is optically negative, rutile being positive; and its lustre is even more strongly

adamantine or metallic-adamantine than that of rutile.

Two types or habits of anatase crystals may be distinguished. The commoner occurs as simple acute double pyramids {111} (fig. i) with an indigo-blue to black colour and steely lustre. Crystals of this kind are abundant at Le Bourg d'Oisans in Dauphine, where they are associated with rock-crystal, felspar and axinite in crevices in granite and mica-schist. Similar crystals, but of microscopic size, are widely distributed in sedi- mentary rocks, such as sandstones, clays and slates, from which

they may be separ- ated by washing away the lighter constituents of the powdered rock. Crystals of the second type have numerous pyra- midal faces de- veloped, and they are usually flatter or sometimes pris- matic in habit (fig. 2); the colour is honey – yellow to brown. Such crystals closely resemble xenotime in appearance and, indeed, were for a long time supposed to belong to this species, the special name wiserine being applied to them. They occur attached to the walls of crevices in the gneisses of the Alps, the Binnenthal near Brieg in canton Valais, Switzerland, being a well-known locality.

When strongly heated, anatase is converted into rutile, changing in specific gravity to 4-1; naturally occurring pseudo- morphs of rutile after anatase are also known. Crystals of anatase have been artificially prepared by several methods; for instance, by the interaction of steam and titanium chloride or fluoride.

Another name commonly in use for this mineral is octahedrite, a name which, indeed, is earlier than anatase, and given because of the common (acute) octahedral habit of the crystals. Other names, now obsolete, are oisanite and dauphinite, from the well-known French locality. (L. J. S.)

ANATHEMA (from Gr. avaridevai, to lift up), literally an offering, a thing set aside. The classical Greek form avdfhma (Lat. anathema) was the technical term for a gift (cf. donarium, oblatio) made to a god either in gratitude or with a view to propitiation. Thus at Athens the Thesmothetae (perhaps all the archons) made a vow that, should they break any law, they would dedicate a life-size gilt statue in the temple at Delphi. Similarly, of spoils taken in war, a part, generally a tenth, was dedicated to the god of the city (e.g. to Athena); to this class probably belong the trophies erected by the victors on the field of battle; sometimes a captured ship was placed upon a hill as an offering to Poseidon (Neptune). Persons who had recovered from an illness offered anathemata in the temples of Asclepius (Aesculapius);

those who had escaped from ship- wreck offered their clothes, or, if these had been lost, a lock of hair, to Neptune (Hor. Odes, i. 5. 13; Virg. Aeneid, xii. 768). The latter offering was very commonly made by young men and girls, especially young brides. Works of art of all kinds and the implements of a craftsman giving up his work were likewise dedicated. Such presents were far more common, as also more valuable, among the Greeks than among the Romans. Similar practices were prevalent, to an extent hardly realized, among the Christians up to the middle ages and even later. Just as the ancients hung their offerings on trees, temple columns and the images of the gods, so offerings were made to the Cross, to the Virgin Mary and on altars generally.

In the form anathSma, the word is used in the Septuagint,

the New Testament and ecclesiastical writers as the equivalent of the Hebrew herem, which is commonly translated " accursed thing" (A.V.) or "devoted thing" (R.V.; cf. the Roman devotio). In Hebrew the root h-r-m means to " set apart," " devote to Yahweh," for destruction; but in Arabic it means simply to separate or secli}de (cf. "harem"). The idea of destruction or perdition is thus a secondary meaning of the word, which gradually lost its primary sense of consecration. In the New Testament, though it is used in the sense of " offering " (Luke xxi. 5), it generally signifies " separated " from the church, i.e. " accursed " (cf. Gal. i. 8 ff.; 1 Cor. xvi. 22), and it became the regular formula of excommunication from the time of the council of Chalcedon in 451, especially against heretics, e.g. in the canons of the council of Trent and those of the Vatican council of 1870. See Excommunication; Penance. The expression maranatha (" the Lord cometh "), which follows anathema in 1 Cor. xvi. 22, is often erroneously quoted as though it were an amplification of the curse.

ANATOLI, JACOB (c .1194-1256), Hebrew translator from the Arabic. He was invited to Naples by the enlightened ruler Frederick II., and under this royal patronage and in association with Michael Scot, made Arabic learning accessible to Western readers. Among his most important services were translations of works by Averroes.

ANATOLIA (Gr. avaroXr], sunrise, i.e. eastern land), in ancient geography, the country east of the Aegean, i.e. Asia Minor. It was the name of one of the three themes (provinces) into which Phrygia was divided in the military reorganization of the East Roman empire. It is now used (by the Turks in the form (AnadBli) to denote a division of the Turkish empire, practically coincident with Asia Minor (q.v.).

ANATOMY (Gr. avamfiri, from ava-rinvew, to cut up), literally dissection or cutting asunder, a term always used to denote the study of the structure of living things; thus there is animal anatomy (zootomy) and vegetable anatomy (phytotomy). Animal anatomy may include the study of the structure of different animals, when it is called comparative anatomy or animal morphology, or it may be limited to one animal only, in which case it is spoken of as special anatomy. From a utilitarian point of view the study of Man is the most important division of special anatomy, and this human anatomy may be approached from different points of view. From that of the medical man it consists of a knowledge of the exact form, position, size and relationship of the various structures of the human body in health, and to this study the term descriptive or topographical human anatomy is given, though it is often, less happily, spoken of as Anthropotomy. An accurate knowledge of all the details of the human body takes years of patient observation to gain and is possessed by only a few. So intricate is man's body that only a small number of professional human anatomists are complete masters of all its details, and most of them specialize on certain parts, such as the brain, viscera, &c; contenting themselves with a good working knowledge of the rest. Topographical anatomy must be learned by each person for himself by the repeated dissection and inspection of the dead human body. It is no more a science than a pilot's knowledge is, and, like that knowledge, must be exact and available in moments of emergency.

From the morphological point of view, however, human anatomy is a scientific and fascinating study, having for its object the discovery of the causes which have brought about the existing structure of Man, and needing a knowledge of the allied sciences of embryology or ontogeny, phylogeny and histology.

Pathological or morbid anatomy is the study of diseased organs, while sections of normal anatomy, applied to various purposes, receive special names such as medical, surgical, gynaecological, artistic and superficial anatomy. The com- parison of the anatomy of different races of mankind is part of the science of physical anthropology or anthropological anatomy. In the present edition of this work the subject of anatomy is treated systematically rather than topographically. Each anatomical article contains first a description of the structures of an organ or system (such as nerves, arteries, heart, &c), as it

HISTORY]

is found in Man; and this is followed by an account of the development or embryology and comparative anatomy or morphology, as far as vertebrate animals are concerned; but only those parts of the lower animals which are of interest in explaining Man's structure are here dealt with. The articles have a twofold purpose; first, to give enough details of man's structure to make the articles on physiology, surgery, medicine and pathology intelligible; and, secondly, to give the non-expert inquirer, or the worker in some other branch of science, the chief theories on which the modern scientific groundwork of anatomy is built.

The following separate anatomical articles will be found under their own headings:—

Alimentary canal.

Arteries.

Brain.

Coelom and serous membranes.

Connective tissues.

Diaphragm.

Ductless glands.

Ear.

Nervous system. Nerve.

Olfactory system. Pharynx. Pancreas. Placenta.

Reproductive system. Respiratory system.

Epithelial, endothelial and glan- Scalp.

dular tissues. Skeleton.

Eye. Skin and Exoskeleton.

Heart. Skull.

Joints. Spinal cord.

Liver. Teeth.

Lymphatic system. Tongue.

Mammary gland. Urinary system.

Mouth and salivary glands. Vascular system.

Muscular system. Veins.

History of Anatomy 1

In tracing the history of the origin of anatomy, it may be justly said that more learning than judgment has been displayed. Some writers claim for it the highest antiquity, and pretend to find its first rudiments alternately in the animal sacrifices of the shepherd kings, the Jews and other ancient nations, and in the art of embalming as practised by the Egyptian priests. 2 Even the descriptions of wounds in the Iliad have been supposed adequate to prove that in the time of Homer mankind had distinct notions of the structure of the human body. Of the first it may be said that the rude information obtained by the slaughter of animals for sacrifice does not imply profound anatomical knowledge; and those who adduce the second as evidence are deceived by the language of the poet of the Trojan War, which, distinguishing certain parts by their ordinary Greek epithets, as afterwards used by Hippocrates, Galen and all anatomists, has been rather too easily supposed to prove that the poet had studied systematically the structure of the human frame.

With not much greater justice has the cultivation of anatomical knowledge been ascribed to Hippocrates, who, because he is universally allowed to be the father of medicine, has also been thought to be the creator of the science of anatomy. Of

1 The article in the 9th edition of this Encyclopaedia, dealing with the history of anatomy, and written by the late Dr Craigie of Edinburgh, has gained such a just reputation as the classical work on the subject in the English language that it is substantially repro- duced. Here and there points of special or biographical interest are drawn attention to in the shape of footnotes, but any reader interested in the subject would do well to consult, with this article, the work of R. R. von Toply, Studien zur Geschichle tier Anatomie im Mittelalter (Leipzig, 1898). In addition to this Professor A. Macalister has published a series of articles, under the head of " Archaeologia

Anatomica," in the Journal of Anatomy and Physi- ology. These are written from a structural rather than a biblio- graphical point of view, and will be found under the following headings: " Atlas and Epistropheus," /. Anat. vol. xxxiii. p. 204; "Veins of Forearm," vol. xxxiii. p. 343; " Poupart's Ligament," vol. xxxiii. p. 493; " Tendo-Achillis," vol. xxxiii. p. 676; " Parotid," vol. xxxv. p. 117; " Trochanter," vol. xxxv. p. 269.

2 The oldest anatomical treatise extant is an Egyptian papyrus probably written sixteen centuries before our era. It shows that the heart, vessels, liver, spleen, kidneys, ureters and bladder were recog- nized, and that the blood-vessels were known to come from the heart. Other vessels are described, some carrying air, some mucus, while two to the right ear are said to carry the breath of life, and two to the left ear the breath of death. See A. Macalister, " Archaeologia Anatomica," J. Anat. and Phys. vol. xxxii. p. 775. But see also the article Omen.

the seven individuals of the family of the Heracleidae who bore this celebrated name, the second, who was the son of Heraclides and Phenarita, and grandson of the first Hippocrates, was indeed distinguished as a physician of crates. great observation and experience, and the first who appreciated the value of studying accurately the phenomena, effects and terminations of disease. It does not appear, however, notwithstanding the vague and general panegyrics of J. Riolan, Bartholin, D. le Clerc, and A. Portal, that the anatomical know- ledge of this illustrious person was either accurate or profound. Of the works ascribed to Hippocrates, five only are genuine. Most of them were written either by subsequent authors of the same name, or by one or other of the numerous impostors who took advantage of the zealous munificence of the Ptolemies, by fabricating works under that illustrious name. Of the few which are genuine, there is none expressly devoted to anatomy; and of his knowledge on this subject the only proofs are to be found in the exposition of his physiological opinions, and his medical or surgical instructions. From these it appears that Hippocrates had some accurate notions on osteology, but that of the structure of the human body in general his ideas were at once superficial and erroneous. In his book on injuries of the head, and in that on fractures, he shows that he knew the sutures of the cranium and the relative situation of the bones, and that he had some notion of the shape of the bones in general and of their mutual connexions. Of the muscles, of the soft parts in general, and of the internal organs, his ideas are confused, indistinct and erroneous. The term d>\k\l/ he seems, in imitation of the colloquial Greek, to have used generally to

signify a blood-vessel, without being aware of the distinction of vein and artery; and the term b.prr\pia, or air-holder, is restricted to the windpipe. He appears to have been unaware of the existence of the nervous chords; and the term nerve is used by him, as by Grecian authors in general, to signify a sinew or tendon. On other points his views are so much combined with peculiar physiological doctrines, that it is impossible to assign them the character of anatomical facts; and even the works in which these doctrines are contained are with little probability to be ascribed to the second Hippocrates. If, however, we overlook this difficulty, and admit what is con- tained in the genuine Hippocratic writings to represent at least the sum of knowledge possessed by Hippocrates and his immediate descendants, we find that he represents the brain as a gland, from which exudes a viscid fluid; that the heart is muscular and of pyramidal shape, and has two ventricles separated by a partition, the fountains of life — and two auricles, receptacles of air; that the lungs consist of five ash-coloured lobes, the substance of which is cellular and spongy, naturally dry, but refreshed by the air; and that the kidneys are glands, but possess an attractive faculty, by virtue of which the moisture of the drink is separated and descends into the bladder. He distinguishes the bowels into colon and rectum (d apxos).

The knowledge possessed by the second Hippocrates was transmitted in various degrees of purity to the descendants and pupils, chiefly of the family of the Heracleidae, who succeeded him. Several of these, with feelings of grateful affection, appear to have studied to preserve the written memory of his instructions, and in this manner to have contributed to form part of that collection of treatises which have long been known to the learned world under the general name of the Hippocratic writings. Though composed, like the genuine remains of the physician of Cos, in the Ionian dialect, all of them differ from these in being more diffuse in style, more elaborate in form, and in studying to invest their anatomical and medical matter with the fanciful ornaments of the Platonic philosophy. Hippocrates had the merit of early recognizing the value of facts apart from opinions, and of those facts especially which lead to general results; and in the few genuine writings which are now extant it is easy to perceive that he has recourse to the simplest language, expresses himself in terms which, though short and pithy, are always precise and perspicuous, and is averse to the introduction of philosophical dogmas. Of the greater part of the writings collected under his name, on the contrary the general character

is verboseness, prolixity and a great tendency to speculative opinions. For these reasons, as well as for others derived from internal evidence, while the Aphorisms, the Epidemics and the works above mentioned, bear distinct marks of being the genuine remains of Hippocrates, it is impossible to regard the book Ilept vaios avdp6)irov as entirely the composition of that physician; and it appears more reasonable to view it as the work of some one of the numerous disciples to whom the author had communi- cated the results of his observation, which they unwisely attempted to combine with the philosophy of the Platonic school and their own mysterious opinions.

Among those who aimed at this distinction, the most fortunate

in the preservation of his name is Polybus, the son-in-law of the

physician of Cos. This person, who must not be

r u3 ‘ confounded with the monarch of Corinth, immortalized by Sophocles in the tragic story of Oedipus, is represented as a recluse, severed from the world and its enjoyments, and devoting himself to the study of anatomy and physiology, and to the composition of works on these subjects. To him has been ascribed the whole of the book on the Nature of the Child and most of that On Man; both physiological treatises interspersed with anatomical sketches. His anatomical information, with which we are specially concerned, appears to have been rude and inaccurate, like that of his preceptor. He represents the large vessels of the body as consisting of four pairs; the first proceeding from the head by the back of the neck and spinal cord to the hips, lower extremities and outer ankle; the second, consisting of the jugular vessels (ai ayin8es) , proceeding to the loins, thighs, hams and inner ankle; the third proceeding from the temples by the neck to the scapula and lungs, and thence by mutual intercrossings to the spleen and left kidney, and the liver and right kidney, and finally to the rectum; and the fourth from the fore-part of the neck to the upper extremities, the fore-part of the trunk, and the organs of generation.

This specimen of the anatomical knowledge of one of +he most illustrious of the Hippocratic disciples differs not essentially from that of Syennesis, the physician of Cyprus, and Diogenes, the

philosopher of Apollonia, two authors for the preservation of whose opinions we are indebted to Aristotle. They may be admitted as representing the state of anatomical knowledge among the most enlightened men at that time, and they only show how rude and erroneous were their ideas on the structure of the animal body. It may indeed, without injustice, be said that the anatomy of the Hippocratic school is not only erroneous, but fanciful and imaginary in often substituting mere supposition and assertion for what ought to be matter of fact. From this censure it is impossible to exempt even the name of Plato himself, for whom some notices in the Timaeus on the structure of the animal body, as taught by Hippocrates and Polybus, have pro- cured a place in the history of the science.

Amidst the general obscurity in which the early history of anatomy is involved, only two leading facts may be admitted with certainty. The first is, that previous to the time of Aristotle there was no accurate knowledge of anatomy; and the second, that all that was known was derived from the dissection of the lower animals only. By the appearance of Aristotle this species of knowledge, which was hitherto acquired in a desultory and irregular manner, began to be cultivated systematically and with a definite object ; and among the services which the philosopher of Stagira rendered to mankind, one of the greatest and most substantial is, that he was the founder of Comparative Anatomy, and was the first to apply its facts to the elucidation of zoology. The works of this ardent and original naturalist show that his zootomical know- ledge was extensive and often accurate; and from several of his descriptions it is impossible to doubt that they were derived from frequent personal dissection. Aristotle, who was born 384 years before the Christian era, or in the first year of the 99th Olympiad, was at the age of thirty-nine requested by Philip to undertake the education of his son Alexander. During this period it is said he composed several works on anatomy, which, however, are now lost. The military expedition of his royal

Aristotle.

pupil into Asia, by laying open the animal stores of that vast and little-known continent, furnished Aristotle with the means of extending his knowledge, not only of the animal tribes, but of their structure, and of communicating more accurate and distinct notions than were yet accessible to the world. A sum of 800 talents, and the concurrent aid of numerous intelligent assistants in Greece and Asia, were intended to facilitate his researches in composing a system of zoological knowledge; but it has been observed that the number of instances in which he was thus compelled to trust to the testimony of

other observers led him to commit errors in description which personal observa- tion might have enabled him to avoid.

The first three books of the History of Animals, a treatise consisting of ten books, and the four books on the Parts of Animals, constitute the great monument of the Aristotelian Anatomy. From these we find that Aristotle was the first who corrected the erroneous statements of Polybus, Syennesis and Diogenes regarding the blood-vessels, which they made, as we have seen, to arise from the head and brain. These he represents to be two in number, placed before the spinal column, the larger on the right, the smaller on the left, which, he also remarks, is by some called aorta (aoprh), the first time we observe that this epithet occurs in the history. Both he represents to arise from the heart, the larger from the largest upper cavity, the smaller or aorta from the middle cavity, but in a different manner and forming a narrower canal. He also distinguishes the thick, firm and more tendinous structure of the aorta from the thin and membranous structure of vein. In describing the distribution of the latter, however, he confounds the vena cava and pulmonary artery, and, as might be expected, he confounds the ramifications of the former with those of the arterial tubes in general. While he represents the lung to be liberally supplied with blood, he describes the brain as an organ almost destitute of this fluid. His account of the distribution of the aorta is wonderfully correct. Though he does not notice the coeliac, and remarks that the aorta sends no direct branches to the liver and spleen, he had observed the mesenteric, the renal and the common iliac arteries. It is nevertheless singular that though he remarks particularly that the renal branches of the aorta go to the substance and not the pelvis (kolXLo) of the kidney, he appears to mistake the ureters for branches of the aorta. Of the nerves (vevpa) he appears to have the most confused notions. Making them arise from the heart, which he says has nerves (tendons) in its largest cavity, he represents the aorta to be a nervous or tendinous vein (vevp&8ris X). By and by, afterwards saying that all the articulated bones are connected by nerves, he makes them the same as ligaments.

He distinguishes the windpipe or air-holder (aprrjpla) from the oesophagus, because it is placed before the latter, because food or drink passing into it causes distressing cough and suffocation, and because there is no passage from the lung to the stomach. He knew the situation and use of the epiglottis, seems to have had some indistinct notions of the larynx, represents the windpipe to be necessary to convey air to and from the lungs, and appears to have a tolerable understanding of the structure of the lungs. He repeatedly represents the heart, the shape and site of which he describes

accurately, to be the origin of the blood-vessels, in opposition to those who made them descend from the head; yet, though he represents it as full of blood and the source and fountain of that fluid, and even speaks of the blood flowing from the heart to the veins, and thence to every part of the body, he say? nothing of the circular motion of the blood. The diaphragm he distin- guishes by the name diaˆcafia, and wr6f co/ia. With the liver and spleen, and the whole alimentary canal, he seems well acquainted. The several parts of the quadruple stomach of the ruminating animals are distinguished and named; and he even traces the relations between the teeth and the several forms of stomach, and the length or brevity, the simplicity or complication of the intestinal tube. Upon the same principle he distinguishes the jejunum (ˆ vrjani), or the empty portion of the small intestines in animals (rd 'evrepov \eirrbv), the caecum (rv\6v ti Kcd ojKudes), the colon (to kuXov), and the sigmoid flexure

((jTtvwrtpov koX el\iy fitvov) . The modern epithet of rectum is the literal translation of his description of the straight progress (ei>8v) of the bowel to the anus (tpuiktSs). He knew the nasal cavities and the passage from the tympanal cavity of the ear to the palate, afterwards described by B. Eustachius. He distinguishes as -" partes similares " those structures, such as bone, cartilage, vessels, sinews, blood, lymph, fat, flesh, which, not confined to one locality, but distributed throughout the body generally, we now term the tissues or textures, whilst he applies the term " partes dissimilares " to the regions of the head, neck, trunk and extremities.

Next to Aristotle occur the names of Diodes of Carystus and Praxagoras of Cos, the last of the family of the Asclepiadae. The latter is remarkable for being the first who distinguished the arteries from the veins, and the author of the opinion that the former were air-vessels.

Hitherto anatomical inquiry was confined to the examination of the bodies of brute animals. We have, indeed, no testimony of the human body being submitted to examination previous drtaa"' to tne time ° Erasistratus and Herophilus; and it is school. vain to look for authentic facts on this point before the foundation of the Ptolemaic*

dynasty of sovereigns in Egypt. This event, which, as is generally known, succeeded the death of Alexander, 320 years before the Christian era, collected into one spot the scattered embers of literature and science, which were beginning to languish in Greece under a weak and distracted government and an unsettled state of society. The children of her divided states, whom domestic discord and the uncertainties of war rendered unhappy at home, wandered into Egypt, and found, under the fostering hand of the Alexandrian monarchs, the means of cultivating the sciences, and repaying with interest to the country of Thoth and Osiris the benefits which had been conferred on the infancy of Greece by Thales and Pythagoras. Alexandria became in this manner the reposi- tory of all the learning and knowledge of the civilized world; and while other nations were sinking under the effects of internal animosities and mutual dissensions, or ravaging the earth with the evils of war, the Egyptian Greeks kept alive the sacred flame of science, and preserved mankind from relapsing into their original barbarism. These happy effects are to be ascribed in an eminent degree to the enlightened government and liberal opinions of Ptolemy Soter, and his immediate successors Phila- delphus and Euergetes. The two latter princes, whose authority was equalled only by the zeal with which they patronized science and its professors, were the first who enabled physicians to dissect the human body, and prevented the prejudices of ignorance and superstition from compromising the welfare of the human race. To this happy circumstance Herophilus and Erasistratus are indebted for the distinction of being known to posterity as the first anatomists who dissected and described the parts of the human body. Both these physicians flourished under Ptolemy Soter, and probably Ptolemy Philadelphus, and were indeed the principal supports of what has been named in medical history the Alexandrian School, to which their reputation seems to have attracted numerous pupils. But though the concurrent testi- mony of antiquity assigns to these physicians the merit of dis- secting the human body, time, which wages endless war with the vanity and ambition of man, has dealt hardly with the monu- ments of their labours. As the works of neither have been preserved, great uncertainty prevails as to the respective merits of these ancient anatomists; and all that is now known of their anatomical researches is obtained from the occasional notices of Galen, Oribasius and some other writers. From these it appears that Erasistratus recognized the valves of the heart, and distinguished them by the names of tricuspid and sigmoid; that he studied particularly the shape and structure of the brain, and its divisions, and cavities, and membranes, and likened the convolutions to the folds of the jejunum; that he first formed a distinct idea of the nature

of the nerves, which he made issue from the brain; and that he discovered lymphatic vessels in the mesentery, first in brute animals, and afterwards, it is said, in man. He appears also to

Erasis- tratus.

have distinguished the nerves into those of sensation and those of motion.

Of Herophilus it is said that he had extensive anatomical knowledge, acquired by dissecting not only brutes but human bodies. Of these he probably dissected more than any of his predecessors or contemporaries. Devoted phiius. to the assiduous cultivation of anatomy, he appears to have studied with particular attention those parts which were least understood. He recognized the nature of the pulmonary artery, which he denominates arterious vein ; he knew the vessels of the mesentery, and showed that they did not go to the vena portae, but to certain glandular bodies; and he first applied the name of twelve-inch or duodenum (8o}5tKa.8a.KTv\os) to that part of the alimentary canal which is next to the stomach. Like Erasistratus, he appears to have studied carefully the configuration of the brain; and though, like him, he distinguishes the nerves into those of sensation and those of voluntary motion, he adds to them the ligaments and tendons. A tolerable descrip- tion of the liver by this anatomist is preserved in the writings of Galen. He first applied the name of choroid or vascular membrane to that which is found in the cerebral ventricles; he knew the straight venous sinus which still bears his name; and to him the linear furrow at the bottom of the fourth ventricle is indebted for its name of calamus scriptorius.

The celebrity of these two great anatomists appears to have thrown into the shade for a long period the names of all other inquirers; for, among their numerous and rather celebrated successors in the Alexandrian school, it is impossible to recognize a name which is entitled to distinction in the history of anatomy. In a chasm so wide it is not uninteresting to find, in one who combined the characters of the greatest orator and philosopher of Rome, the most distinct traces of attention to anatomical knowledge. Cicero, in his treatise De Nalura Deorum, in a short sketch of physiology, such as it was taught by Aristotle and his disciples, introduces various anatomical notices, from which the classical reader may form some idea of the state of anatomy at that time. The Roman orator appears to have formed a pretty distinct idea of the shape and connexions of the windpipe and lungs; and though he informs his readers that he knows the alimentary canal, he omits the details through motives of

delicacy. In imitation of Aristotle, he talks of the blood being conveyed by the veins {venae) , that is, blood-vessels, through the body at large; and, like Praxagoras, of the air inhaled by the lungs being conveyed through the arteries.

Aretaeus, though chiefly known as a medical author, makes some observations on the lung and the pleura, maintains the glandular structure of the kidney, and describes the anastomoses or communications of the capillary extremities of the vena cava with those of the portal vein.

The most valuable depository of the anatomical knowledge of these times is the work of Celsus, one of the most judicious medical authors of antiquity. He left, indeed, no express anatomical treatise; but from the introductions to the 4th and 8th books of his work, De Medicina, with incidental remarks in the 7 th, the modern reader may form very just ideas of his anatomical attainments. From these it appears that Celsus was well acquainted with the windpipe and lungs and the heart; with the difference between the windpipe and oesophagus (stomachus), which leads to the stomach (venlriculus) ; and with the shape, situation and relations of the diaphragm. He enumerates also the principal facts relating to the situation of the liver, the spleen, the kidneys and the stomach. He appears, however, to have been unaware of the distinction of duodenum or twelve-inch bowel, already admitted by Herophilus, and represents the stomach as directly connected by means of the pylorus with the jejunum or upper part of the small intestine.

The 7th and 8th books, which are devoted to the consideration of those diseases which are treated by manual operation, contain sundry anatomical notices necessary to explain the nature of the diseases or mode of treatment. Of these, indeed, the merit is unequal; and it is not wonderful that the ignorance of the day prevented Celsus from understanding rightly the mechanism of

the pathology of hernia. He appears, however, to have formed a tolerably just idea of the mode of cutting into the urinary bladder; and even his obstetrical instructions show that his knowledge of the

uterus, vagina and appendages was not con- temptible. It is in osteology, however, that the information of Celsus is chiefly conspicuous. He enumerates the sutures and several of the holes of the cranium, and describes at great length the superior and inferior maxillary bones and the teeth. With a good deal of care he describes the vertebrae and the ribs, and gives very briefly the situation and shape of the scapula, humerus, radius and ulna, and even of the carpal and metacarpal bones, and then of the different bones of the pelvis and lower extremities. He had formed a just idea of the articular connexions, and is desirous to impress the fact that none is formed without cartilage. From his mention of many minute holes (multa et tenuia foramina) in the recess of the nasal cavities, it is evident that he was acquainted with the perforated plate of the ethmoid bone; and from saying that the straight part of the auditory canal becomes flexuous and terminates in numerous minute cavities (multa et tenuia foramina diducitur), it is inferred by Portal that he knew the semicircular canals.

Though the writings of Celsus show that he cultivated ana- tomical knowledge, it does not appear that the science was much studied by the Romans; and there is reason to believe that, after the decay of the school of Alexandria, it languished in neglect and obscurity. It is at least certain that the appearance of Marinus during the reign of Nero is mentioned by authors as an era remarkable for anatomical inquiry, and that this person is distinguished by Galen as the restorer of a branch of knowledge which had been before him suffered to fall into undeserved neglect. From Galen also we learn that Marinus gave an accurate account of the muscles, that he studied particularly the glands, and that he discovered those of the mesentery. He fixed the number of nerves at seven; he observed the palatine nerves, which he rated as the fourth pair; and described as the fifth the auditory and facial, which he regards as one pair, and the hypoglossal as the sixth.

Not long after Marinus appeared Rufus (or Ruffus) of Ephesus, a Greek physician, who in the reign of Trajan was much attached to physiology, and as a means of cultivating this science studied Comparative Anatomy and made sundry experiments on living animals. Of the anatomical writings of this author there remains only a list or catalogue of names of different regions and parts of the animal body. He appears, however, to have directed attention particularly to the tortuous course of the uterine vessels, and to have recognized even at this early period the Fallopian tube. He distinguishes the nerves into those of sensation and those of motion. He knew the re- current nerve. His name is further associated with

the ancient experiment of compressing in the situation of the carotid arteries the pneumogastric nerve, and thereby inducing insensibility and loss of voice.

Of all the authors of antiquity, however, none possesses so just a claim to the title of anatomist as Claudius Galenus, the Oaten, celebrated physician of Pergamum, who was born about the 130th year of the Christian era, and lived under the reigns of Hadrian, the Antonines, Commodus and Severus. He was trained by his father Nicon (whose memory he embalms as an eminent mathematician, architect and astronomer) in all the learning of the day, and initiated particularly into the mysteries of the Aristotelian philosophy. In an order somewhat whimsical he afterwards studied philosophy successively in the schools of the Stoics, the Academics, the Peripatetics and the Epicureans. When he was seventeen years of age, his father, he informs us, was admonished by a dream to devote his son to the study of medicine; but it was fully two years after that Galen entered on this pursuit, under the auspices of an instructor whose name he has thought proper to conceal. Shortly after he betook himself to the study of anatomy under Satyrus, a pupil of Quintus, and of medicine under Stratonicus, a Hippocratic physician, and Aeschrion, an empiric. He had scarcely attained the age of twenty when he had occasion to deplore the loss of the

Rufus.

first and most affectionate guide of his studies; and soon after he proceeded to Smyrna to obtain the anatomical instructions of Felops, who, though mystified by some of the errors of Hip- pocrates, is commemorated by his pupil as a skilful anatomist. After this he appears to have visited various cities distinguished for philosophical or medical teachers; and, •finally, to have gone to Alexandria with the view of cultivating more accurately and intimately the study of anatomy under Heraclianus. Here he remained till his twenty-eighth year, when he regarded himself as possessed of all the knowledge then attainable through the medium of teachers. He now returned to Pergamum to exercise the art which he had so anxiously studied, and received, in his twenty-ninth year, an unequivocal testimony of the confidence which his fellow-citizens reposed in his skill, by being intrusted with the treatment of the wounded gladiators; and in this capacity he is said to have treated wounds with success which were fatal under former treatment. A seditious tumult appears to have caused him to form the resolution of quitting Pergamum and proceeding to Rome at the age of thirty-two. Here, how- ever, he remained only five years; and returning once more to Pergamum,

after travelling for some time, finally settled in Rome as physician to the emperor Commodus. The anatomical writings ascribed to Galen, which are numerous, are to be viewed not merely as the result of personal research and information, but as the common depository of the anatomical knowledge of the day, and as combining all that he had learnt from the several teachers under whom he successively studied with whatever personal investigation enabled him to acquire. It is on this account not always easy to distinguish what Galen had himself ascertained by personal research from that which was known by other anatomists. This, however, though of moment to the history of Galen as an anatomist, is of little consequence to the science itself; and from the anatomical remains of this author a pretty just idea may be formed both of the progress and of the actual state of the science at that time.

The osteology of Galen is undoubtedly the most perfect of the departments of the anatomy of the ancients. He names and distinguishes the bones and sutures of the cranium nearly in the same manner as at present. Thus, he notices the quadrilateral shape of the parietal bones; he distinguishes the squamous, the styloid, the mastoid and the petrous portions of the temporal bones; and he remarks the peculiar situation and shape of the sphenoid bone. Of the ethmoid, which he omits at first, he after- wards speaks more at large in another treatise. The malar he notices under the name of zygomatic bone; and he describes at length the upper maxillary and nasal bones, and the connexion of the former with the sphenoid. He gives the first clear account of the number and situation of the vertebrae, which he divides into cervical, dorsal and lumbar, and distinguishes from the sacrum and coccyx. Under the head Bones of the Thorax, he enumerates the sternum, the ribs (at xXeupat), and the dorsal vertebrae, the connexion of which with the former he designates as a variety of diarthrosis. The description of the bones of the extremities and their articulations concludes the treatise.

Though in myology Galen appears to less advantage than in osteology, he nevertheless had carried this part of anatomical knowledge to greater perfection than any of his predecessors. He describes a frontal muscle, the six muscles of the eye and a seventh proper to animals; a muscle to each ala nasi, four muscles of the lips, the thin cutaneous muscle of the neck, which he first termed platysma myoides or muscular expansion, two muscles of the eyelids, and four pairs of muscles of the lower jaw — the temporal to raise, the masseter to draw to one side, and two depressors, corresponding to the digastric and internal pterygoid muscles. After speaking of the muscles which move the head and the scapula, he adverts to those by

which the windpipe is opened and shut, and the intrinsic or proper muscles of the larynx and hyoid bone. Then follow those of the tongue, pharynx and neck, those of the upper extremities, the trunk and the lower extremities successively; and in the course of this description he swerves so little from the actual facts that most of the names by which he distinguishes the principal muscles have been

retained by the best modern anatomists. It is chiefly in the minute account of these organs, and especially in reference to the minuter muscles, that he appears inferior to the moderns.

The angiological knowledge of Galen, though vitiated by the erroneous physiology of the times and ignorance of the separate usfs of arteries and veins, exhibits, nevertheless, some ac- curate facts which show the diligence of the author in dissection. Though, in opposition to the opinions of Praxagoras and Erasis- t>atus, he proved that the arteries in the living animal contain not air but blood, it does not appear to have occurred to him to 'letermine in what direction the blood flows, or whether it was movable or stationary. Representing the left ventricle of the heart as the common origin of all the arteries, though he is misled by the pulmonary artery, he nevertheless traces the distribution of the branches of the aorta with some accuracy. The vena azygos also, and the jugular veins, have contributed to add to the confusion of his description, and to render his angiology the most imperfect of his works.

In neurology we find him to be the author of the dogma that the brain is the origin of the nerves of sensation, and the spinal cord of those of motion; and he distinguishes the former from the latter by their greater softness or less consistence. Though he admits only seven cerebral pairs, he has the merit of distin- guishing and tracing the distribution of the greater part of both classes of nerves with great accuracy. His description of the brain is derived from dissection of the lower animals, and his distinctions of the several parts of the organ have been retained by modern anatomists. His mode of demonstrating this organ, which indeed is clearly described, consists of five different steps. In the first the bisecting membrane — i.e. the falx (nvvt-yˆ Sixorofioma) — and the connecting blood- vessels are removed; and the dissector, commencing at the anterior

extremity of the great fissure, separates the hemispheres gently as far as the torcular, and exposes a smooth surface {rfiv x&pa-v rvKwSr] wws owrav), the mesolobe of the moderns, or the middle band. In the second he exposes by successive sections the ventricles, the choroid plexus and the middle partition. The third exhibits the pineal body (croiˆa Ko>vott,8ts) or conarium, concealed by a membrane with numerous veins, meaning that part of the plexus which is now known by the name of velum interpositum, and a complete view of the ventricles. The fourth unfolds the third ventricle (jl% aXhr) rpirq KoiKLa), the communication between the two lateral ones, the arch-like body (a£>na xf/aKiSotides) fornix, and the passage from the third to the fourth ventricle. In the fifth he gives an accurate description of the relations of the third and fourth ventricle, of the situation of the two pairs of eminences, nates (7X0117-0.) and testes (5i5u/ua or opx«s), the scolecoid or worm-like process, anterior and posterior, and lastly the linear furrow, called by Herophilus calamus scriptorius.

In the account of the thoracic organs equal accuracy may be recognized. He distinguishes the pleura by the name of inclosing membrane {vfirjv wrefojKtitt, membrana succingens), and remarks its similitude in structure to that of the peritoneum, and the covering which it affords to all the organs. The pericardium also he describes as a membranous sac with a circular basis corresponding to the base of the heart and a conical apex; and after an account of the tunics of the arteries and veins, he speaks shortly of the lung, and more at length of the heart, which, however, he takes some pains to prove not to be muscular, because it is harder, its fibres are differently arranged, and its action is incessant, whereas that of muscle alternates with the state of rest; he gives a good account of the valves and of the vessels; and notices especially the bony ring formed in the heart of the horse, elephant and other large animals.

The description of the abdominal organs, and of the kidneys and urinary apparatus, is still more minute, and in general accurate. Our limits, however, do not permit us to give any abstract of them; and it is sufficient in general to say that Galen gives correct views of the arrangement of the peritoneum and omentum, and distinguishes accurately the several divisions of the alimentary canal and its component tissues. In the liver, which he allows to receive an envelope from the peritoneum, he

admits, in imitation of Erasistratus, a proper substance or parenchyma, interposed between the vessels, and capable of removal by suitable dissection. His description of the organs of generation is

rather brief, and is, like most of his anatomical sketches, too much blended with physiological dogmas.

This short sketch may communicate some idea of the condition of anatomical knowledge in the days of Galen, who indeed is justly entitled to the character of rectifying and digesting, if not of creating, the science of anatomy among the ancients. Though evidently confined, perhaps entirely by the circumstances of the times, to the dissection of brute animals, so indefatigable and judicious was he in the mode of acquiring knowledge, that many of his names and distinctions are still retained with advantage in the writings of the moderns. Galen was a practical anatomist, and not only describes the organs of the animal body from actual dissection, but gives ample instructions for the proper mode of exposition. His language is in general clear, his style as correct as in most of the authors of the same period, and his manner is animated . Few passages in early science are indeed so interesting as the description of the process for demonstrating the brain and other internal organs which is given by this patient and enthusiastic observer of nature. To some it may appear absurd to speak of anything like good anatomical description in an author who writes in the Greek language, or anything like an interesting and correct manner in a writer who flourished at a period when taste was depraved or extinct and literature cor- rupted — when the philosophy of Antoninus and the mild virtues of Aurelius could do little to soften the iron sway of Lucius Verus and Commodus; but the habit of faithful observation in Galen seems to have been so powerful that in the description of material objects, his genius invariably rises above the circumstances of his age. Though not so directly connected with this subject, it is nevertheless proper to mention that he appears to have been the first anatomist who can be said, on authentic grounds, to have attempted to discover the uses of organs by vivisection and experiments on living animals. In this manner he ascertained the position and demonstrated the action of the heart; and he mentions two instances in which, in consequence of disease or injury, he had an opportunity of observing the motions of this organ in the human body. In short, without eulogizing an ancient author at the expense of critical justice, or com- mending his anatomical descriptions as superior to those of the moderns, it must be admitted that the anatomical writings of the physician of Pergamum form a remarkable era in the history of the science; and that by diligence in dissection and accuracy in description he gave the science a degree of importance and stability which it has retained through a lapse of many centuries.

The death of Galen, which took place at Pergamum in the seventieth

year of his age and the 200th of the Christian era, may be regarded as the downfall of anatomy in ancient times. After this period we recognize only two names of any celebrity in the history of the science — those of Soranus and Oribasius, with the more obscure ones of Meletius and Theophilus, the latter the chief of the imperial guard of Heraclius.

Soranus, who was an Ephesian, and flourished under the emperors Trajan and Hadrian, distinguished himself by his researches on the female organs of generation. He appears to have dissected the human subject; and this perhaps is one reason why his descriptions of these parts are more copious and more accurate than those of Galen, who derived his knowledge from the bodies of the lower animals. He denies the existence of the hymen, but describes accurately the clitoris. Soranus the anatomist must be distinguished from the physician of that name, who was also a native of Ephesus.

Oribasius, who was born at Pergamum, is said to have been at once the friend and physician of the emperor Julian, and to have contributed to the elevation of that apostate to oribasius the imperial throne. For this he appears to have suffered the punishment of a temporary exile under Valens and Valentinian; but was soon recalled, and lived in great honour till the period of his death (387). By le Clerc, Oribasius is regarded as a compiler; and indeed his anatomical writings bear so close

i. correspondence with those of Galen that the character is not altogether groundless. In various points, nevertheless, he has rendered the Galenian anatomy more accurate; and be has distinguished himself by a good account of the salivary glands, which were overlooked by Galen.

To the same period generally is referred the Anatomical Introduction of an anonymous author, first published in 1618 by Lauremberg, and afterwards by C. Bernard. It is to be regarded as a compilation formed on the model of Galen and Oribasius. The same character is applicable to the treatises of Meletius and Theophilus.

The decline indicated by these languid efforts soon sank into a state of total inactivity; and the unsettled state of society during the latter

ages of the Roman empire was extremely unfavourable to the successful cultivation of science. The sanguinary conflicts in which the southern countries of Europe were repeatedly engaged with their northern neighbours between the 2nd and 8th centuries tended gradually to estrange their minds from scientific pursuits; and the hordes of . barbarians by which the Roman empire was latterly overrun, while they urged them to the necessity of making hostile resistance, and adopting means of self-defence, introduced such habits of ignorance and barbarism, that science was almost universally forgotten. While the art of healing was professed only by some few ecclesiastics or by itinerant practitioners, anatomy was utterly neglected; and no name of anatomical celebrity occurs to diversify the long and uninteresting period commonly dis- tinguished as the dark ages.

Anatomical learning, thus neglected by European nations, is believed to have received a temporary cultivation from the Arabian Asiatics. Of these, several nomadic tribes, known Physl- to Europeans under the general denomination of Arabs nans. an(j Saracens, had gradually coalesced under various

leaders; and by their habits of endurance, as well as of enthusi- astic valour in successive expeditions against the eastern division of the Roman empire, had acquired such military reputation as to render them formidable wherever they appeared. After a century and a half of foreign warfare or internal animosity, under the successive dynasties of the Omayyads and Abbasids, in which the propagation of Islam was the pretext for the extinction of learning and civilization, and the most remorseless system of rapine and destruction, the Saracens began, under the latter dynasty of princes, to recognize the value of science, and especially of that which prolongs life, heals disease and alleviates the pain of wounds and injuries. The caliph Mansur combined with his official knowledge of Moslem law the successful cultiva- tion of astronomy; but to his grandson Mamun, the seventh prince of the line of the Abbasids, belongs the merit of under- taking to render his subjects philosophers and physicians. By the directions of this prince the works of the Greek and Roman authors were translated into Arabic; and the favour and muni- ficence with which literature and its professors were patronized speedily raised a succession of learned Arabians. The residue of the rival family of the Omayyads, already settled in Spain, was prompted by motives of rivalry or honourable ambition to adopt the same course; and while the academy, hospitals and library of Bagdad bore testimony to the zeal and liberality of the Abbasids, the munificence of the Omayyads was not less conspicuous in the

literary institutions of Cordova, Seville and Toledo.

Notwithstanding the efforts of the Arabian princes, however, and the diligence of the Arabian physicians, little was done for anatomy, and the science made no substantial acquisition. The Koran denounces as unclean the person who touches a corpse; the rules of Islam forbid dissection; and whatever their instructors taught was borrowed from the Greeks. Abu- Bekr Al-Rasi, Abu-Ali Ibn-Sina, Abul-Qasim and Abul Walid ibn Rushd, the Rhazes, Avicenna, Abulcasis and Averroes of European authors, are their most celebrated names in medicine; yet to none of these can the historian with justice ascribe any anatomical merit. Rhazes has indeed left descriptions of the eye, of the ear and its meatus, and of the heart; and Avicenna,

Abul-Qasim and Averroes give anatomical descriptions of the parts of the human body. But of these the general character is, that they are copies from Galen, sometimes not very just, and in all instances mystified with a large proportion of the fanciful and absurd imagery and inflated style of the Arabian writers. The chief reason of their obtaining a place in anatomical history is, that by the influence which their medical authority enabled them to exercise in the European schools, the nomen- clature which they employed was adopted by European ana- tomists, and continued till the revival of ancient learning restored the original nomenclature of the Greek physicians. Thus, the cervix, or nape of the neck, is nucha; the oesophagus is meri; the umbilical region is sumen or sumac; the abdomen is myrach; the peritoneum is siphac; and the omentum, zirbus.

From the general character now given justice requires that we except Abdallatif, the annalist of Egyptian affairs. This author, who maintains that it is impossible to learn anatomy from books, and that the authority of Galen must yield to personal inspection, informs us that the Moslem doctors did not neglect opportunities of studying the bones of the human body in cemeteries; and that he himself, by once examining a collection of bones in this manner, ascertained that the lower jaw is formed of one piece; that the sacrum, though sometimes composed of several, is most generally of one; and that Galen is mistaken when he asserts that these bones are not single.

The era of Saracen learning extends to the 13th century; and after this we begin to approach happier times. The univer- sity of Bologna, which, as a school of literature and law, was already celebrated in the 12 th century, Bologna. became, in the course of the following one, not less distinguished for its medical teachers. Though the

misgovern- ment of the municipal rulers of Bologna had disgusted both teachers and students, and given rise to the foundation of similar institutions in Padua and Naples, — and though the school of Salerno, in the territory of the latter, was still in high repute, — it appears, from the testimony of M. Sarti, that medicine was in the highest esteem in Bologna, and that it was in such per- fection as to require a division of its professors into physicians, surgeons, physicians for wounds, barber-surgeons, oculists and even some others. Notwithstanding these indications of refine- ment, however, anatomy was manifestly cultivated rather as an appendage of surgery than a branch of medical science; and according to the testimony of Guy de Chauliac, the cultiva- tion of anatomical knowledge was confined to Roger of Parma, Roland, Jamerio, Bruno, and Lanfranc or Lanfranchi of Milan; and this they borrowed chiefly from Galen.

In this • state matters appear to have proceeded with the medical school of Bologna till the commencement of the 14th century, when the circumstance of possessing a teacher Mondino of originality enabled this university to be the agent cf as great an improvement in medical science as she had already effected in jurisprudence. This era, indeed, is distinguished for the appearance of Mondino (Mundinus), under whose zealous cultivation the science first began to rise from the ashes in which it had been buried. This father of modern anatomy, who taught in Bologna about the year 1315, quickly drew the curiosity of the medical profession by well-ordered demonstra- tions of the different parts of the human body. In 13 15 he dis- sected and demonstrated the parts of the human body in two female subjects; and in the course of the following year he accomplished the same task en the person of a single female. But while he seems to have had sufficient original force of intellect to direct his own route, J. Riolan accuses him of copying Galen; and it is certain that his descriptions are corrupted by the barbarous leaven of the Arabian schools, and his Latin defaced by the exotic nomenclature of Avicenna and Rhazes. He died, according to G. Tiraboschi, in 1325.

Mondino divides the body into three cavities {ventres), the upper containing the animal members, as the head, the lower containing the natural members, and the middle containing the spiritual members. He first describes the anatomy of the lower cavity or the abdomen, then proceeds to the middle or

thoracic organs, and concludes with the upper, comprising the head and its contents and appendages. His general manner is to notice shortly the situation and shape or distribution of textures or membranes, and then to mention the disorders to which they are subject. The peritoneum he describes under the name of siphac, in imitation of the Arabians, the omentum under that of zirbus, and the mesentery or eucharus as distinct from both. In speaking of the intestines he treats first of the rectum, then the colon, the left or sigmoid flexure of which, as well as the transverse arch and its connexion with the stomach, he particularly remarks; then the caecum or monoculus, after this the small intestines in general under the heads of ileum and jejunum, and latterly the duodenum, making in all six bowels. The liver and its vessels are minutely, if not accurately, ex- amined; and the cava, under the name chilis, a corruption from the Greek no'Cki), is treated at length, with the emulgents and kidneys. His anatomy of the heart is wonderfully accurate; and it is a remarkable fact, which seems to be omitted by all subsequent authors, that his description contains the rudiments of the circulation of the blood. " Postea vero versus pulmonem est aliud orificium venae arterialis, quae portal sanguinem ad pulmonem a corde; quia cum pulmo deserviat cordi secundum modum dictum, ut ei recompenset, cor ei transmittit sanguinem per hanc venam, quae vocatur vena arterialis; est vena, quia portat sanguinem, et arterialis, quia habet duas tunicas; et habet duas tunicas, primo quia vadit ad membrum quod existit in continuo motu, et secundo quia portat sanguinem valde subtilem et cholericum." The merit of these distinctions, however, he afterwards destroys by repeating the old assertion that the left ventricle ought to contain spirit or air, which it generates from the blood. His osteology of the skull is erroneous. In his account of the cerebral membranes, though short, he notices the principal characters of the dura mater. He describes shortly the lateral ventricles, with their anterior and posterior cornua, and the choroid plexus as a blood-red substance like a long worm. He then speaks of the third or middle ventricle, and one posterior, which seems to correspond with the fourth; and describes the infundibulum under the names of lacuna and emboton. In the base of the organ he remarks, first, two mammillary caruncles, the optic nerves, which he reckons the first pair; the oculo- muscular, which he accounts the second; the third, which appears to be sixth of the moderns; the fourth; the fifth, evidently the seventh; a sixth, the nervus vagus; and a seventh, which is the ninth of the moderns. Notwithstanding the

misrepresenta- tions into which this early anatomist was betrayed, his book is valuable, and has been illustrated by the successive commentaries of Alessandro Achillini, Jacopo Berengario and Johann Dryander

(1500-1560).

Matthew de Gradibus, a native of Gradi, a town in Friuli, near Milan, distinguished himself by composing a series of treatises on the anatomy of various parts of the human body (1480). He is the first who represents the ovaries of the female in the correct light in which they were subsequently regarded by Nicolas Steno or Stensen (1638-1687).

Objections similar to those already urged in speaking of Mondino apply to another eminent anatomist of those times. Gabriel de Zerbis, who flourished at Verona towards the con- clusion of the 15th century, is celebrated as the author of a system in which he is obviously more anxious to astonish his readers by the wonders of a verbose and complicated style than to instruct by precise and faithful description. In the vanity of his heart he assumed the title of Medicus Theoricus; but though, like Mondino, he derived his information from the dissection of the human subject, he is not entitled to the merit either of describing truly or of adding to the knowledge previously acquired. He is superior to Mondino, however, in knowing the olfactory nerves.

Eminent in the history of the science, and more distinguished than any of this age in the history of cerebral anatomy, Achillini of Bologna (1463-1512), the pupil and commentator of Mondino, appeared at the close of the 15th century. Though a follower of the Arabian school, the assiduity with

AcMHfa/.

which he cultivated anatomy has rescued his name from the inglorious obscurity in which the Arabian doctors have in general slumbered. He is known in the history of anatomical discovery as the first who described the two tympanal bones, termed malleus and incus. In 1503 he showed that the tarsus consists of seven bones; he rediscovered the fornix and the infundibulum; and he was fortunate enough to observe the course of the cerebral cavities into the inferior cornua, and to remark peculiarities to which the anatomists of a future age did not advert. He mentions the orifices of the ducts, afterwards described by Thomas Wharton (1610-1673). He knew the

ileo-caecal valve; and his description of the duodenum, ileum and colon shows that he was better acquainted with the site and disposition of these bowels than any of his predecessors or contemporaries.

Not long after, the science boasts of one of its most distin- guished founders. Berengario, commonly called Berenger of Carpi, in the Modenese territory, flourished at Bologna _ at the beginning of the 16th century. In the annals of medicine his name will be remembered not only as the most zealous and eminent in cultivating the anatomy of the human body, but as the first physician who was fortunate enough to calm the alarms of Europe, suffering under the ravages' of syphilis, then raging with uncontrollable virulence. In the former character he surpassed both predecessors and contem- poraries; and it was long before the anatomists of the following age could boast of equalling him. His assiduity was indefatig- able; and he declares that he dissected above one hundred human bodies. He is the author of a compendium, of several treatises which he names Introductions (Isagogae), and of com- mentaries on the treatise of Mondino, in which he not only rectifies the mistakes of that anatomist, but gives minute and in general accurate anatomical descriptions.

He is the first who undertakes a systematic view of the several textures of which the human body is composed; and in a pre— liminary commentary he treats successively of the anatomical characters and properties of fat, of membrane in general (pan- niculus), of flesh, of nerve, of villus or fibre (filum), of ligament, of sinew or tendon, and of muscle in general. He then proceeds to describe with considerable precision the muscles of the abdomen, and illustrates their site and connexions by woodcuts which, though rude, are spirited, and show that anatomical drawing was in that early age beginning to be understood. In his account of the peritoneum he admits only the intestinal division of that membrane, and is at some pains to prove that Gentilis Fulgineus, who justly admits the muscular division also, is in error. In his account of the intestines he is the first who mentions the vermiform process of the caecum; he remarks the yellow tint communicated to the duodenum by the gall- bladder; and he recognizes the opening of the common biliary duct into the duodenum (quidam porus portans choleram) . In the account of the stomach he describes the several tissues of which that organ is composed, and which he represents to be three, and a fourth from the peritoneum; and afterwards notices the rugae of its villous surface. He is at considerable pains to explain the organs of generation in both sexes, and gives a long account of the anatomy of the foetus. He was the first who recognized the larger proportional size of the chest

in the male than in the female, and conversely the greater capacity of the female than of the male pelvis. In the larynx he discovered the two arytenoid cartilages. He gives the first good description of the thymus; distinguishes the oblique situation of the heart; describes the pericardium, and maintains the uniform presence of pericardial liquor. He then describes the cavities of the heart; but perplexes himself, as did all the anatomists of that age, about the spirit supposed to be contained. The aorta he properly makes to arise from the left ventricle; but confuses himself with the arteria venalis, the pulmonary vein, and the vena arterialis, the pul- monary artery. His account of the brain is better. He gives a minute and clear account of the ventricles, remarks the corpus striatum, and has the sagacity to perceive that the choroid plexus consists of veins and arteries; he then describes the middle 01

third ventricle, the infundibulum or lacuna of Mondino, and the pituitary gland; and lastly, the passage to the fourth ventricle, the conarium or pineal gland, and the fourth or posterior ventricle itself, the relations of which he had studied accurately. He rectifies the mistake of Mondino as to the olfactory or first pair of nerves, gives a good account of the optic and others, and is entitled to tne praise of originality in being the first observer who contradicts the fiction of the wonderful net and indicates the principal divisions of the carotid arteries. He enumerates the tunics and humours of the eye, and gives an account of the internal ear, in which he notices the malleus and incus.

Italy long retained the distinction of giving birth to the first eminent anatomists in Europe, and the glory she acquired in the

names of Mondino, Achillini, Berenger and N. Massa, school- was destined to become more conspicuous in the labours

of R. Columbus, G. Fallopius and Eustachius. While Italy, however, was thus advancing the progress of science, the other nations of Europe were either in profound ignorance or in the most supine indifference to the brilliant career of their zealous neighbours. The 16th century had commenced before France began to acquire anatomical distinction in the names of Jacques Dubois, Jean Fernel

and Charles Etienne; and even these cele- brated teachers were less solicitous in the personal study of the animal body than in the faithful explanation of the anatomical writings of Galen. The infancy of the French school had to contend with other difficulties. The small portion of knowledge which had been hitherto diffused in the country was so inadequate to eradicate the prejudices of ignorance, that it was either difficult or absolutely impossible to procure human bodies for the purposes of science; and we are assured, on the testimony of A. Vesalius and other competent authorities, that the practical part of ana- tomical instruction was obtained entirely from the bodies of the lower animals. The works of the Italian anatomists were un- known ; and it is a proof of the tardy communication of know- ledge that, while the structure of the human body had been taught in Italy for more than a century by Mondino and his followers, these anatomists are never mentioned by Etienne, who flourished long after.

Such was the aspect of the times at the appearance of Jacques Dubois (1478-1555), who, under the Romanized name of Jacobus

Sylvius, according to the fashion of the day, has been

fortunate in acquiring a reputation to which his re- searches do not entitle him. For the name of Dubois the history of anatomy, it is said, is indebted to his inordinate love of money. At the instance of his brother Francis, who was professor of eloquence in the college of Tournay at Paris, he devoted himself to the study of the learned languages and mathematics; but discovering that these elegant accomplishments do not invariably reward their cultivators with the goods of fortune, Dubois betook himself to medicine. After the acquisition of a medical degree in the university of Montpellier, at the ripe age of fifty-one Dubois returned to Paris to resume a course of anatomical instruction. Here he taught anatomy to a numerous audience in the college of Trinquet; and on the departure of Vidus Vidius for Italy was appointed to succeed that physician as professor of surgery to the Royal College. His character is easily estimated. With greater coarseness in his manners and language than even the rude state of society in his times can palliate, with much varied learning and considerable eloquence, he was a blind, indiscriminate and ir- rational admirer of Galen, and interpreted the anatomical and physiological writings of that author in preference to giving demonstrations from the subject. Without talent for original research or discovery himself, his envy and jealousy made him detest every one who gave proofs of either. We are assured by Vesalius, who was some time his pupil, that his manner of teaching was calculated

neither to advance the science nor to rectify the mistakes of his predecessors. A human body was never seen in the theatre of Dubois; the carcases of dogs and other animals were the materials from which he taught; and so difficult even was it to obtain human bones, that unless Vesalius and his fellow-students had collected assiduously from the Innocents and other cemeteries, they must have committed

Dubois.

numerous errors in acquiring the first principles. This assertion, however, is contradicted by J. Riolan, and afterwards by K. P. J. Sprengel and T. Lauth, the last of whom decidedly censures Vesalius for this ungrateful treatment of his instructor. It is certain that opportunities of inspecting the human body were by no means so frequent as to facilitate the study of the science. Though his mention of injections has led some to suppose him the discoverer of that art, he appears to have made no substantial addition to the information already acquired; and the first acknowledged professor of anatomy to the university of Paris appears in history as one who lived without true honour and died without just celebrity. He must not be confounded with Franciscus Sylvius (de le Boe), who is mentioned by F. Ruysch and M. V. G. Malacarne as the author of a particular method of demonstrating the brain.

Almost coeval may be placed Charles Etienne (1 503-1 564), a younger brother of the celebrated printers, and son to Henry, who Hellenized the family name by the classical utienae appellation of Stephen (Stˆoto). It is uncertain whether he taught publicly. But his tranquillity was disturbed, and his pursuits interrupted, by the oppressive persecutions in which their religious opinions involved the family; and Charles Etienne drew the last breath of a miserable life in a dungeon in 1564. Etienne, though sprung of a family whose classical taste has been their principal glory, does not betray the same servile imitation of the Galenian anatomy with which Dubois is charged. He appears to have been the first to detect valves in the orifice of the hepatic veins. He was ignorant, however, of the researches of the Italian anatomists; and his description of the brain is inferior to that given sixty years before by Achillini. His comparison of the cerebral cavities to the human ear has persuaded F. Portal that he knew the inferior cornua, the hippocampus and its prolongations; but this is no reason for giving him that honour to the detriment of the reputation of Achillini, to whom, so far as historical testimony goes, the first knowledge of this fact is due. The researches of Etienne into the structure of the nervous system are, however, neither useless nor inglorious; and the circumstance of demonstrating

a canal through the entire length of the spinal cord, which had neither been suspected by contemporaries nor noticed by successors till J. B. Senac (1693-1770) made it known, is sufficient to place him high in the rank of anatomical discoverers.

The French anatomy of the 16th century was distinguished by two circumstances unfavourable to the advancement of the science — extravagant admiration of antiquity, with excessive confidence in the writings of Galen, and the general practice of dissecting principally the bodies of the lower animals. Both these errors were much amended, if not entirely removed, by the exertions of a young Fleming, whose appearance forms a conspicuous era in the history of anatomy. Andreas Vesalius, (1 514-1564), a native of Brussels, after acquiring at Louvain the ordinary classical attainments of the day, began at the age of fourteen to study anatomy under the auspices of Dubois. Though the originality of his mind soon led him to abandon the prejudices by which he was environed, and take the most direct course for attaining a knowledge of the structure of the human frame, he neither underrated the Galenian anatomy nor was indolent in the dissection of brute animals. The difficulties, however, with which the practical pursuit of human anatomy was beset in France, and the dangers with which he had to contend, made him look to Italy as a suitable field for the cultivation of the science; and in 1536 we find him at Venice, at once pursuing the study of human anatomy with the utmost zeal, and requested, ere he had attained his twenty-second year, to demonstrate publicly in the university of Padua. After remaining here about seven years, Vesalius went by express invitation to Bologna, and shortly afterwards to Pisa; and thus professor in three universities, he appears to have carried on his anatomical investigations and instructions alternately at Padua, Bologna and Pisa, in the course of the same winter. It is on this account that Vesalius, though a Fleming by birth and trained originally in the French school, belongs, as an anatomist, to the Italian, and may be

Vesalius.

viewed as the, first of an illustrious line of teachers by whom the anatomical reputation of that country was in the course of the 16th

century raised to the greatest eminence.

Vesalius is known as the first author of a comprehensive and systematic view of human anatomy. The knowledge with which his dissections had furnished him proved how many errors were daily taught and learned under the broad mantle of Galenian authority; and he perceived the necessity of a new system of anatomical instruction, divested of the omissions of ignorance and the misrepresentations of prejudice and fancy. The early age at which he effected this object has been to his biographers the theme of boundless commendation; and we are told that he began at the age of twenty-five to arrange the materials he had collected, and accomplished his task ere he had completed his 28th year.

Soon after this period we find him invited as imperial physician to the court of Charles V., where he was occupied in the duties of practice and answering the various charges which were un- ceasingly brought against him by the disciples of Galen. After the abdication of Charles he continued at court in great favour with his son Philip II. To this he seems to have been led princi- pally by the troublesome controversies in which his anatomical writings had involved him. It is painful to think, however, that even imperial patronage bestowed on eminent talents does not ensure immunity from popular prejudice; and the fate of Vesalius will be a lasting example of the barbarism of the times, and of the precarious tenure of the safety even of a great physician. On the preliminary circumstances authors are not agreed; but the most general account states that when Vesalius was dissecting, with the consent of his kinsmen, the body of a Spanish grandee, it was observed that the heart still gave some feeble palpitations when divided by the knife. The immediate effects of this outrage to human feelings were the denunciation of the anatomist to the Inquisition; and Vesalius escaped the severe treatment of that tribunal only by the influence of the king, and by promising to perform a pilgrimage to the Holy Land. He forthwith pro- ceeded to Venice, from which he sailed with the Venetian fleet, under James Malatesta, for Cyprus. When he reached Jerusalem, he received from the Venetian senate a message requesting him again to accept the Paduan professorship, which had become vacant by the death of his friend and pupil Fallopius. His destiny, however, which pursued him fast, suffered him not again to breathe the Italian air. After struggling for many days with the adverse winds in the Ionian Sea, he was wrecked on the island of Zante, where he quickly breathed his last in such penury that unless a liberal goldsmith had defrayed the funeral charges, his remains must have been devoured by beasts of prey. At the time of his death he was scarcely fifty years of age.

To form a correct estimate of the character and merits of Vesalius, we must not compare him, in the spirit of modern perfection, with the anatomical authors either of later times or of the present day. Whoever would frame a just idea of this anatomist must imagine, not a bold innovator without academical learning, not a genius coming from a foreign country, unused to the forms and habits of Catholic Europe, nor a wild reformer, blaming indiscriminately everything which accorded not with his opinion; but a young student scarcely emancipated from the authority of instructors, whose intellect was still influenced by the doctrines with which it had been originally imbued, — a scholar strictly trained in the opinions of the time, living amidst men who venerated Galen as the oracle of anatomy and the divinity of medicine, — exercising his reason to estimate the soundness of the instructions then in use, and proceeding, in the way least likely to offend authority and wound prejudice, to rectify errors, and to establish on the solid basis of observation the true elements of anatomical science. Vesalius has been denominated the founder of human anatomy; and though we have seen that in this career he was preceded with honour by Mondino and Berenger, still the small proportion of correct observation which their reverence for Galen and Arabian doctrines allowed them to communicate, will not in a material degree impair the original merits of Vesalius. The errors which he rectified and the additions which he made are so numerous,

I.30

Eusta- chius.

that it is impossible, in such a sketch as the present, to communicate a just idea of them.

Besides the first good description of the sphenoid bone, he showed that the sternum consists of three portions and the sacrum of five or six; and described accurately the vestibule in the interior of the temporal bone. He not only verified the observation of Etienne on the valves of the hepatic veins, but he described well the vena azygos, and discovered the canal which passes in the foetus between the umbilical vein and the vena cava, since named ductus venosus. He described the omentum, and its connexions with the stomach, the spleen and the colon; gave the first correct views of the structure of the pylorus; remarked the small size of the caecal appendix in man; gave the first good account of the mediastinum and pleura and the fullest description of the anatomy of the brain yet advanced. He appears, however, not to have understood well the inferior recesses;

and his account of the nerves is con- fused by regarding the optic as the first pair, the third as the fifth and the fifth as the seventh.

The labours of Vesalius were not limited to the immediate effect produced by his own writings. His instructions and examples produced a multitude of anatomical inquirers of different characters and varied celebrity, by whom the science was extended and rectified. Of these we cannot speak in detail; but historical justice requires us to notice shortly those to whose exertions the science of anatomy has been most indebted.

The first that claims attention on this account is Bartolomeo Eustachi of San Severino, near Salerno, who though greatly less fortunate in reputation than his contemporary Vesalius, divides with him the merit of creating the science of human anatomy. He extended the knowledge of the internal ear by rediscovering and describing correctly the tube which bears his name; and if we admit that G. F. Ingras- sias anticipated him in the knowledge of the third bone of the tympanal cavity, the stapes, he is still the first who described the internal and anterior muscles of the malleus, as also the stapedius, and the complicated figure of the cochlea. He is the first who studied accurately the anatomy of the teeth, and the phenomena of the first and second dentition. The work, however, which demonstrates at once the great merit and the unhappy fate of Eustachius is his Anatomical Engravings, which, though completed in 1552, nine years after the impression of the work of Vesalius, the author was unable to publish. First com- municated to the world in 17 14 by G. M. Lancisi, afterwards in 1744 by Cajetan Petrioli, again in 1744 by B. S. Albinus, and subsequently at Bonn in 1790, the engravings show that Eustachius had dissected with the greatest care and diligence, and taken the utmost pains to give just views of the shape, size and relative position of the organs of the human body.

The first seven plates illustrate the history of the kidneys and some of the facts relating to the structure of the ear. The eighth represents the heart, the ramifications of the vena azygos, and the valve of the vena cava, named from the author. In the seven subsequent plates is given a succession of different views of the viscera of the chest and abdomen. The seventeenth contains the brain and spinal cord; and the eighteenth more accurate views of the origin, course and distribution of the nerves than had been given before. Fourteen plates are devoted to the muscles.

Eustachius did not confine his researches to the study of relative

anatomy. He investigated the intimate structure of organs with assiduity and success. What was too minute for unassisted vision he inspected by means of glasses. Structure which could not be understood in the recent state, he unfolded by maceration in different fluids, or rendered more distinct by injection and exsiccation. The facts unfolded in these figures are so important that it is justly remarked by Lauth, that if the author himself had been fortunate enough to publish them, anatomy would have attained the perfection of the 18th century two centuries earlier at least. Their seclusion for that period in the papal library has given celebrity to many names which would have been known only in the verification of the discoveries of Eustachius.

II

93°

ANATOMY

[HISTORY

Aranzi.

M. R. Columbus and G. Fallopius were pupils of Vesalius. Columbus, as his immediate successor in Padua, and afterwards Columbus as professor at Rome, distinguished himself by rectify- ing and improving the anatomy of the bones; by giving correct accounts of the shape and cavities of the heart, of the pulmonary artery and aorta and their valves, and tracing the course of the blood from the right to the left side of the heart; by a good description of the brain and its vessels, and by correct understanding of the internal ear, and the first good account of the ventricles of the larynx.

Fallopius, who, after being professor at Pisa in 1548, and at Padua in 1551, died at the age of forty, studied the general Faliooius anatomy of the bones; described better than hereto- fore the internal ear, especially the tympanum and its osseous ring, the two fenestras and their communication with the vestibule and cochlea; and gave the first good account of the stylo-mastoid hole and canal, of the ethmoid bone and cells, and of the lacrymal passages. In myology he rectified several mistakes of Vesalius. He also devoted attention to the organs of generation in both sexes, and discovered the utero-peritoneal canal which still bears his name.

Osteology nearly at the same time found an assiduous culti- vator in Giovanni FilippoIngrassias(i 545-1 58b), a learned Sicilian

lairrassias physician, who, in a skilful commentary on the osteology of Galen, corrected numerous mistakes. He gave the first distinct account of the true configuration of the sphenoid and ethmoid bones, and has the merit of first describing (1546) the third bone of the tympanum, called stapes, though this is also claimed by Eustachius and Fallopius.

The anatomical descriptions of Vesalius underwent the scrutiny of various inquirers. Those most distinguished by the importance and accuracy of their researches, as well as the temperate tone of their observations, were Julius Caesar Aranzi (1 530-1 589), anatomical professor for thirty-two years in the university of Bologna, and Constantio Varoli, physician to Pope Gregory XIII. To the former we are indebted for the first correct account of the anatomical peculiarities of the foetus, and he was the first to show that the muscles of the eye do not, as was falsely imagined, arise from the dura mater but from the margin of the optic hole. He also, after considering the anatomical relations of the cavities of the heart, the valves and the great vessels, corroborates the views of Columbus regarding the course which the blood follows in passing from the right to the left side of the heart. Aranzi is the first anatomist who describes distinctly the inferior cornua of the ventricles of the cerebrum, who recognizes the objects by which they are distinguished, and who gives them the name by which they are still known {hippocampus) ; and his account is more minute and perspicuous than that of the authors of the subsequent century. He speaks at large of the choroid plexus, and gives a particular description of the fourth ventricle, under the name of cistern of the cerebellum, as a discovery of his own.

Italy, though rich in anatomical talent, has probably few greater names than that of Constantio Varoli (b. 1543) of Bologna. Though he died at the early age of thirty-two, he acquired a reputation not inferior to that of the most eminent of his contemporaries. He is now known chiefly as the author of an epistle, inscribed to Hieronymo Mercuriali, on the optic nerves, in which he describes a new method of dissect- ing the brain, and communicates many interesting particulars relating to the anatomy of the organ. He observes the threefold division of the inferior surface or base, defines the limits of the anterior, middle and posterior eminences, as marked by the compartments of the skull, and justly remarks that the cerebral cavities are capacious, communicate with each other, extending first backward and then forward, near the angle of the pyramidal portion of the temporal bone, and that they are folded on them- selves, and finally lost above the middle and inferior eminence of the brain. He

appears to have been aware that at this point they communicate with the exterior or convoluted surface. He recognized the impropriety of the term corpus callosum, seems to have known the communication called afterwards foramen

VaroIIus.

Monroianum, and describes the hippocampus more minutely than had been previously done.

Among the anatomists of the Italian school, as a pupil of Fallopius, Eustachius and U. Aldrovandus, is generally enumer- ated Volcher Coiter (b. 1534) of Groningen. He distinguished himself by accurate researches on the cartilages, the bones and the nerves, recognized the value of morbid anatomy, and made experiments on living animals to ascertain the action of the heart and the influence of the braiif.

The Fruiefull and Necessary Briefe Worke of John Halle 1 (1565) and The Englisheman's Treasure by Master Thomas Vicary (1586), 2 English works published at this time, are tolerable compilations from former authors, much tinged by Galenian and Arabian distinctions. A more valuable compendium than either is, however, that of John Banister (1578), entitled The Historie of Man, from the most approved Anathomistes in this Present Age.

The celebrity of the anatomical school of Italy was worthily maintained by Hieronymo Fabricio of Acquapendente, who, in imitation of his master Fallopius, laboured to render p a ft ric/us anatomical knowledge more precise by repeated dissections, and to illustrate the obscure by researches on the structure of animals in general. In this manner he investigated the formation of the foetus, the structure of the oesophagus, stomach and bowels, and the peculiarities of the eye, the ear and the larynx. The discovery, however, on which his surest claims to eminence rest is that of the membranous folds, which he names valves, in the interior of veins. Several of these folds had been observed by Fernel, Sylvius and Vesalius; and in 1547 G. B. Canani observed those of the vena azygos; but no one appears to have offered any rational conjecture on their use, or to have traced them through the venous system at large, until Fabricius in 1574, upon this hypothesis, demonstrated the presence of these valvular folds in all the veins of the extremities.

Fabricius, though succeeded by his pupil Julius Casserius of Placenza, may be regarded as the last of that illustrious line of anatomical teachers by whom the science was so successfully studied

and taught in the universities of Italy. The discoveries which each made, and the errors which their successive labours rectified, tended gradually to give anatomy the character of a useful as well as an accurate science, and to pave the way for a discovery which, though not anatomical but physiological, is so intimately connected with correct knowledge of the shape and situation of parts, that it exercised the most powerful influence on the future progress of anatomical inquiry. This was the knowledge of the circular motion of the blood — a fact which though obscurely conjectured by Aristotle, Nemesius, Mondino and Berenger, and partially taught by Servetus, Columbus, Andreas Caesalpinus and Fabricius, it was nevertheless reserved to William Harvey fully and satisfactorily to demonstrate.

Mondino believed that the blood proceeds from the heart to the lungs through the vena arterialis or pulmonary artery, and that the aorta conveys the spirit into the blood through all parts of the body. This doctrine was adopted with little modification by Berenger, who further demonstrated the existence and opera- tion of the tricuspid valves in the right ventricle, and of the sigmoid valves at the beginning of the pulmonary artery and aorta, and that there were only two ventricles separated by a solid impervious septum. These were afterwards described in greater detail by Vesalius, who nevertheless appears not to have been aware of the important use which might be made of this knowledge. It was the Spaniard Michael Servet or Servetus (born in 1509, burnt in 1553) who in his treatise De servetus. Trinitalis Erroribus, published at Haguenau in 1531, first maintained the imperviousness of the septum, and the

1 An interesting article on the character and work of the Maidstone surgeon, John Halle, by E. Barclay Smith, will be found in the /. A nat. and Pays. vol. xxxiv. p. 275.

2 It has been pointed out by Dr J. F. Payne that Vicary's work is merely an abridged copy of an unpublished English anatomical treatise of the 14th century. The name of the author is unknown, but internal evidence shows that he was a London surgeon. The manuscript was written in English in 1392. See British Medical Journal, January 25, 1896.

transition of the blood by what he terms an unknown route, namely, from the right ventricle by the vena arteriosa (pulmonary artery) to the lungs, and thence into the arteria venosa or pul- monary vein and left auricle and ventricle, from which, he adds afterwards, it is conveyed by the aorta to all parts of the body. 1

Though the leading outlines, not only of the pulmonary or small but even of the great circulation, were sketched thus early by one who, though a philosopher, was attached to the church, it was only in his work De Re Anatomica, published at Venice in 1559, that Columbus formally and- distinctly announced the circular course of the blood as a discovery of his own; and main- tained, in addition to the imperviousness of the septum, the fact that the arteria venalis (pulmonary vein) contains, not air, but blood mixed with air brought from the lungs to the left ventricle of the heart, to be distributed through the body at large.

Soon after, views still more complete of the small or pulmonary circulation were given by Andreas Caesalpinus (15 19-1603) of Arezzo, who not only maintained the analogy between pfaus ‘ t ˆ le structure 0I tne arterious vein or pulmonary artery and the aorta, and that between the venous artery or pulmonary veins and veins in general, but was the first to remark the swelling of veins below ligatures, and to infer from it a refluent motion of blood in these vessels. The discoveries of Aranzi and Eustachius in the vessels of the foetus tended at first to perplex and afterwards to elucidate some of these notions.

At length it happened that, between the years 1598 and 1600, a young Englishman, William Harvey, pursuing his anatomical studies at Padua under Fabricius, learnt from that anatomist the existence of the valves in the veins of the extremities, and undertook to ascertain the use of these valves by experimental inquiry. It is uncertain whether he learnt from the writings of Caesalpinus the fact observed by that author of the tumescence of a vein below the ligature, but he could not fail to be aware, and indeed he shows that he was aware, of the small circulation as taught by Servetus and Columbus. Combining these facts already known, he, by a series of well-executed experiments, demonstrated clearly the existence, not only of the small, but of a general circulation from the left side of the heart by the aorta and. its subdivisions, to the right side by the veins. This memorable truth was first announced in the year 1619.

It is unnecessary here to consider the arguments and facts by which Harvey defended his theory, or to notice the numerous assaults to

which he was exposed, and the controversies in which his opponents wished to involve him. It is sufficient to say that, after the temporary ebullitions of spleen and envy had

1 The passage of Servetus is so interesting that our readers may feel some curiosity in perusing it in the language of the author; and it is not unimportant to remark that Servetus appears to have been led to think of the course of the blood by the desire of explaining the manner in which the animal spirits were supposed to be generated : — " Vitalis spiritus in sinistro cordis ventriculo suam originem habet, juvantibus maxime pulmonibusad ipsius perfectionem. Est spiritus tenuis, caloris vi elaboratus, flavo colore, ignea potentia, ut sit quasi ex puriore sanguine lucens, vapor substantiam continens aquae, aeris, et ignis. Generatur ex facta in pulmone commixtione inspirati aeris cum elaborato subtili sanguine, quem dexter ventriculus sinistro com- municat. Fit autem communicatio haec, non per parietem cordis medium, ut vulgo creditur, sed magno artificio a dextro cordis ventri- culo, longo per pulmones ductu agitatur sanguis subtilis; a pulmoni- bus praeparatur, flavus efficitur, et a vena arteriosa in arteriam venosam transfunditur. Deinde in ipsa arteria venosa, inspirato aeri miscetur et exspiratione a fuligine expurgatur; atque ita tandem a sinistro cordis ventriculo totum mixtum per diastolen attrahitur, apta supellex, ut fiat spiritus vitalis. Quod ita per pulmones fiat com- municatio et praeparatio, docet conjunctio varia, et communicatio venae arteriosae cum arteria venosa in pulmonibus. Confirmat hoc magnitudo insignis venae arteriosae, quae nee talis nee tanta esset facta, nee tantam a corde ipso vim purissimi sanguinis in pulmones emitteret, ob solum eorum nutrimentum; nee cor pulmonibus hac ratione serviret, cum praesertimantea inembryone solerent pulmones ipsi aliunde nutriri, ob membranulas illas seu valvulas cordis, usque ad horum nativitatem ; ut docet Galenus, &c. Itaque ille spiritus a sinistro cordis ventriculo arterias totius corporis deinde transfunditur, ita ut qui tenuior est, superiora petit, ubi magis elaboratur, praecipue in plexu retiformi, sub basi cerebri sito, ubi ex vitali fieri incipit animalis, ad propriam rationalis animae rationem accedens." — De Triniiate, lib. v.

subsided, the doctrine of the circular motion of the blood was admitted by all enlightened and unprejudiced persons, and finally was universally adopted as affording the most satisfactory explanation of many facts in anatomical structure which were either misunderstood or entirely overlooked. The inquiries to which the investigation of the doctrine gave rise produced numerous researches on the shape and structure of the heart and its divisions, of the lungs,

and of the blood-vessels and their distribution. Of this description were the researches of Nicolas Steno on the structure of the heart, the classical work of Richard Lower, the dissertation of J. N. Pechlin, the treatise of Raymond Vieussens, the work of Marcello Malpighi on the structure of the lungs, several sketches in the writings of John Mayow, and othet treatises of less moment. Systematic treatises of anatomy began to assume a more instructive form, and to breathe a more philosophical spirit. The great work of Adrian Spigelius, which appeared in 1627, two years after the death of the author, contains indeed no proof that he was aware of the valuable generalization of Harvey; but in the institutions of Caspar Bartholinus, as republished and improved by his son Thomas in 1651, the anatomical descriptions and explanations are given with reference to the new doctrine. A still more unequivocal proof of the progress of correct anatomical knowledge was given in the lectures delivered by Peter Dionis, at the Jardin Royal of Paris, in 1673 and the seven following years, in which that intelligent surgeon gave most accurate demonstrations of all the parts composing the human frame, and especially of the heart, its auricles, ventricles and valves, and the large vessels connected with it and the lungs. These demonstrations, first published in 1690, were so much esteemed that they passed through seven editions in the space of thirty years, and were translated into English.

The progress of anatomical discovery continued in the mean- time to advance. In the course of the 16th century Eustachius, in studying minutely the structure of the vena azygos, had recognized in the horse a white vessel full of watery fluid, connected with the internal jugular vein, on the left side of the vertebral column, corresponding accurately with the vessel since named thoracic duct. Fallopius also described vessels belonging to the liver distinct from arteries and veins; and similar vessels appear to have been noticed by Nicolaus Massa (1499-1569). The nature and properties of these vessels were, however, entirely unknown. On the 23rd of July 1622 Gaspar Aselli, pro- fessor of anatomy at Pavia, while engaged in demonstrat- ing the recurrent nerves in a living dog, first observed numerous white delicate filaments crossing the mesentery in all directions; and though he took them at first for nerves, the opaque white fluid which they shed quickly convinced him that they were a new order of vessels. The repetition of the experiment the following day showed that these vessels were best seen in animals recently fed; and as he traced them from the villous membrane of the intestines, and observed the valves with which they were liberally supplied, he inferred that they were genuine chyliferous vessels. By confounding them with the lymphatics, he made them proceed to the pancreas and liver — a mistake which appears to have been first rectified by Francis de le Boe. The discovery of Aselli was announced in 1627; and the following year, by means of the zealous efforts of Nicolas Peiresc, a liberal senator of Aix, the vessels were seen in the person of a felon who had eaten copiously before execution, and whose body was inspected an hour and a half after. In 1629 they were publicly demonstrated at Copenhagen by Simon Pauli, and the same year the thoracic duct was observed by Jacques Mentel (1599-1670) for the first time since it was described by Eustachius. Five years after (1634) , John Wesling, professor of anatomy and surgery at Venice, gave the first delineation of the lacteals from the human subject, and evinced more accurate knowledge than his predecessors of the thoracic duct and the lymphatics.. Nathaniel Highmore 1 in 1637 demonstrated unequivocally the difference between the lacteals and the mesenteric veins; and though some perplexity

1 Highmore was a physician practising at Sherborne all his life

(1613-1685).

AselU.

was occasioned by the discovery of the pancreatic duct by Christopher Wirsung, this mistake was corrected by Thomas Bartholinus; and the discovery by Jean Pecquet in 1647 of the common trunk of the lacteals and lymphatics, and of the course which the chyle follows to reach the blood, may be regarded as the last of the series of isolated facts by the generalization of which the extent, distribution and uses of the most important organs of the animal body were at length developed.

To complete the history of this part of anatomical science one step yet remained — the distinction between the lacteals and JoyWte lymphatics, and the discovery of the termination of the latter order of vessels. The honour of this discovery is divided between George Joyliffe (1621-1658), an English ana- tomist, and Olaus Rudbeck (1630-1702), a young Swede. The former, according to the testimony of Francis Glisson and Thomas Wharton, was aware of the distinct existence of. the lymphatics in 1650, and demonstrated them as such in 1652. It is neverthe- less doubtful whether he knew them much before the latter period ; and it is certain that Rudbeck observed the lymphatics of the large intestines, and traced them to glands, on the 27th of January 1651, after he had, in the course of 1650, made various erroneous conjectures regarding them, and, like others, attempted to trace them to the liver. The following year he demonstrated them in presence of Queen Christina, and traced them to the thoracic duct, and the latter to the subclavian vein. Their course and distribu- tion were still more fully investigated by Thomas Bartholinus, Wharton, J. Swammerdam and G. Blaes, the last two of whom recognized the existence of valves; while Antony Nuck of Leiden, by rectifying various errors of his predecessors, and adding several new and valuable observations, rendered this part of anatomy much more precise than formerly.

After this period anatomists began to study more minutely the organs and textures. Francis Glisson 1 distinguished himself by a minute description of the liver (1654), and a clearer account of the stomach and intestines, than had yet been given. Thomas Wharton 2 investigated the structure of the glands with particular care; and though rather prone to indulge in fanciful generaliza- tion, he developed some interesting views of these organs; while Walter Charleton (1610-1707), who appears to have been a person of great genius, though addicted to hypothesis, made some good remarks on

the communication of the arteries with the veins, the foetal circulation and the course of the lymphatics. But the circumstance which chiefly distinguished the history of anatomy at the beginning of the 17th century was the appear- ance of Thomas Willis 3 (1621-1675), who rendered himself eminent not only by good researches on the brain and nerves, but by many judicious observations on the structure of the lungs, the intestines, the blood-vessels and the glands. His anatomy of the brain and nerves is so minute and elaborate, and abounds so much in new information, that the reader is struck by the immense chasm between the vague and meagre notices of his predecessors and the ample and correct descriptions of Willis. This excellent work, however, is not the result of his own personal and unaided exertions; and the character of Willis derives additional lustre from the candid avowal of his obligations to Sir Christopher Wren and Thomas Millington, and, above all, to the diligent researches of his fellow-anatomist Richard Lower.

Willis was the first who numbered the cranial nerves in the order in which they are now usually enumerated by anatomists. His observation of the connexion of the eighth pair with the slender nerve which issues from the beginning of the spinal cord is known to all. He remarked the parallel lines of the mesolobe, afterwards minutely described by Felix Vicq d'Azyr (1748-1794). He seems to have recognized the communication of the convoluted surface of the brain and that between the lateral cavities beneath the fornix. He described the corpora striata and optic thalami;

1 Glisson was for forty years professor of physic at Cambridge.

2 Wharton was a graduate both of Oxford and Cambridge, and physician to St Thomas's Hospital.

' Willis was Sedleian professor of natural philosophy in Oxford in 1660. Later he practised in London.

Willis.

the four orbicular eminences, with the bridge, which he first named annular protuberance; and the white mammillary eminences, behind the infundibulum. In the cerebellum he remarks the arborescent arrangement of the white and grey matter, and gives a good account of the internal carotids, and the communications which they make with the branches of the basilar artery.

About the middle of the 17 th century R. Hooke and Nehemiah Grew employed the simple microscope in the minute examination of plants and animals; and the Dutch philosopher A. Leeuwen- hoek with great acuteness examined microscopically the solids and fluids of the body, recognized the presence of scales in the cuticle, and discovered the corpuscles in the blood and milk, and the spermatozoa in the seminal fluid. The researches of Malpighi also tended greatly to improve the knowledge of minute Matolghl. ' structure. He gave the first distinct ideas on the organization of the lung, and the mode in which the bronchial tubes and vessels terminate in that organ. By the microscope he traced the transition of the arteries into the veins, and saw the movements of the blood corpuscles in the capillaries, fie endeavoured to unfold,by dissection and microscopic observation, the minute structure of the brain. He studied the structure of bone, he traced the formation and explained the structure of the teeth; and his name is to this day associated with the discovery of the deeper layer of the cuticle and the Malpighian bodies in the spleen and kidney. In these difficult inquiries the observations of Malpighi are in general faithful, and he may be regarded as the founder of histological anatomy.

Nicolas Steno, or Stensen, described with accuracy (1660) the lacrymal gland and passages, and rediscovered the parotid duct. L. Bellini studied the structure of the kidneys, and described the tongue and tonsils with some care; and Charles Drelincourt laboured to investigate the changes effected on the uterus by impregnation, and to elucidate the formation of the foetus. The science might have derived still greater advantages from the genius of Regnier de Graaf, who investigated with accuracy the structure of the pancreas and of the organs of generation in both? sexes, had he not been cut off at the early age of thirty-two. Lastly, Wepfer, though more devoted to morbid anatomy, made, nevertheless, some just observations on the anatomical disposi- tion of the cerebral vessels, the glandular structure of the liver, and the termination of the common duct in the duodenum.

The appearance of Frederic Ruysch, who was born in 1638, became professor of anatomy at Amsterdam in 1665 and' died in that city in 1731, gave a new impulse to anatomi- cal research, and tended not only to give the science greater precision, but to extend its limits in every direction. The talents of Ruysch are said to have been developed by accident. To repel the audacious and calumnious aspersions with which Louis de Bils attacked de le Boe and van Home, Ruysch published his tract on the valves of the lymphatics, which completely established his character as an anatomist of

originality and research. This, however, is the smallest of his services' to the science. The art of injecting, which had been originally attempted by Eustachi and Varoli, and was afterwards rudely practised by Glisson, Bellini and Willis, was at length carried to greater perfection by de Graaf and Swammerdam, the former of whom injected the spermatic vessels with mercury and variously coloured liquors; while the latter, by employing melted wax with other ingredients, made the first approach to the refinements of modern anatomy. By improving this idea of using substances which, though solid, may be rendered fluid at the period of injecting, Ruysch carried this art to the highest perfection.

By the application of this happy contrivance he was enabled to demonstrate the arrangement of minute vessels in the interior of organs which had escaped the scrutiny of previous anatomists. Scarcely a part of the human body eluded the penetration of his syringe; and his discoveries were proportionally great. His account of the valves of the lymphatics, of the vessels of the lungs, and their minute structure; his researches on the vascular structure of the skin, of the bones, and their epiphyses, and their

Ruysch.

mode of growth and union; his observations on the spleen, the glans penis, the clitoris, and the womb impregnated and unimpregnated, were but a limited part of his anatomical labours. He studied the minute structure of the brain; he demonstrated the organization of the choroid plexus; he de- scribed the state of the hair when affected with Polish plait; he proved the vascular structure of the teeth; he injected the dura mater, the pleura, the pericardium and peritoneum; he unfolded the minute structure of the conglomerate glands; he investigated that of the synovial apparatus placed in the interior of the joints; and he discovered several curious par- ticulars relating to the lacteals, the lymphatics and the lymphatic glands.

Meanwhile, H. Meibomius rediscovered (1670) the palpebral glands, which were known to Casserius; Swammerdam studied the action of the lungs, described the structure of the human uterus, and made numerous valuable observations on the coeca and pancreatoid

organs of fishes; and Th. Kerckring laid the foundation of a knowledge of the process of ossification. John Conrad B runner, in the course of experiments on the pancreas, discovered (1687) the glands of the duodenum named after him, and J. Conrad Peyer (1677-1681) described the solitary and agminated glands of the intestinal canal. Leonard Tassin, distinguished for original observation, rendered the anatomical history of the brain more accurate than heretofore, and gave particular accounts of the intestinal tube, the pancreatic duct and the hepatic ligaments (1678).

That France might not be without participation in the glory of advancing the progress of anatomical knowledge, the names Duverae °^ J ose P n Guichard Duverney and Vieussens are commemorated with distinction. Duverney, born in 1648, and first introduced into public life in 1676 in the Royal Academy of Sciences, decorated with the honorary title of professor of anatomy to the dauphin, and appointed in 1679 professor at the Jardin Royal, distinguished himself by the first accurate account of the organ of hearing, and by his dissections of several animals at the academy supplied valuable materials for the anatomical details of the natural history of animals published by that learned body. He appears to have been the first who demonstrated the fact that the cerebral sinuses open into the jugular veins, and to have been aware that the former receives the veins of the brain and are the venous receptacles of the organ. He understood the cerebral cavities and their mode of communication; distinguishes the posterior pillars of the vault from the pedes hippocampi; recognizes the two plates of the septum lucidum; and, what is still more remarkable, he first indicates distinctly the discussation of the anterior pyramids, of the medulla oblongata— a fact afterwards verified by the researches of Mistichelli, F. P. du Petit and G.D. Santorini. He studied the ganglions attentively, and gives the first distinct account of the formation, connexions and distribution of the intercostal nerves. It is interesting to remark that his state- ment that the veins or sinuses of the spinal cord terminate in the vena azygos was verified by the subsequent researches of G. Dupuytren (1777-1835) and G. Breschet (1784-1845), which showed that the vertebral veins communicate by means of the intercostal and superior lumbar veins with the azygos and hemi-azygos. His account of the structure of bones and of the progress of ossification is valuable. He recognized the vascular structure of the spleen, and described the excretory ducts of the prostate gland, the verumontanum, and the ante- prostates.

One of the circumstances which at this time tended consider- ably to

the improvement of anatomical science was the attention with which Comparative Anatomy was beginning to be cultivated. In ancient times, and at the revival of letters, the dissection of the lower animals was substituted for that of the human body; and the descriptions of the organs of the latter were too often derived from the former. The obloquy and contempt in which this" abuse involved the study of animal anatomy caused it to be neglected, or pursued with indifference, for more than two centuries, during which anatomists confined their descriptions,

Collins.

at least very much, to the parts of the human body. At this period, however, the prejudice against Comparative Anatomy began to subside; and animal dissection, though not substituted for that of the human body, was employed, as it ought always to have been, to illustrate obscurities, to determine doubts and to explain difficulties, and, in short, to enlarge and rectify the knowledge of the structure of animal bodies generally.

For this revolution in its favour, Comparative Anatomy was in a great measure indebted to the learned societies which were established about this time in the different countries of Europe. Among these, the Royal Society of London, embodied by charter by Charles II. in 1662, and the Academy of Sciences of Paris, founded in 1666 by J. B. Colbert, are undoubtedly entitled to the first rank. Though later in establishment, the latter institution was distinguished by making the first great efforts in favour of Comparative Anatomy; and Claude Perrault, Pecquet, Duverney and Jean Mery, by the dissections of rare animals obtained from the royal menagerie, speedily supplied valuable materials for the anatomical naturalist. In England, Nehemiah Grew, Edward Tyson 1 and Samuel Collins 2 cultivated the same department with diligence and success. Grew has left an interesting account of the anatomical peculiarities of the intestinal canal in various animals; Tyson, in the dissection of a porpoise, an opossum and an orang outang, adduces some valuable illustrations of the comparative differences between the structure of the human body and that of the lower animals; Collins has the merit of conceiving, and executing on an enlarged plan, a comprehensive system, embodying all the information then extant (1685). With the aid of Tyson and his own researches, which were both extensive and accurate, he composed a system of anatomical knowledge in which he not only gives ample and accurate descriptions of the structure of the human body, and the various morbid changes to which the organs are liable, but illustrates the whole by accurate and interesting

sketches of the peculiarities of the lower animals. The matter of this work is so excellent that it can only be ascribed to ignorance that it has received so little attention. Though regarded as a compilation, and though indeed much of the human anatomy is derived from Vesalius, it has the advantage of the works pub- lished on the continent at that time, that it embodies most of the valuable facts derived from Malpighi, Willis and Vieussens. The Comparative Anatomy is almost all original, the result of personal research and dissection; and the pathological observations, though occasionally tinged with the spirit of the times, show the author to have been endowed with the powers of observation and judicious reflexion in no ordinary degree.

About this time also we recognize the first attempts to study the minute constitution of the tissues, by the combination of the microscope and the effects of chemical agents. Bone furnished the first instance in which this method was put in use; and though Gagliardi, who undertook the inquiry, had fallen into some mistakes which it required the observation of Malpighi to rectify, this did not deter Clopton Havers 3 and Nesbitt, 4 in England, and Courtial, H. L. Duhamel-Dumonceau and Delasone, and afterwards Herissant, in France, from resuming the same train of investigation. The mistakes into which these ana- tomists fell belong to the imperfect method of inquiry. The facts which they ascertained have been verified by recent experiment, and constitute no unessential part of our knowledge of the structure of bone.

Ten years after the publication of the work of Collins, Ridley, 6 another English anatomist, distinguished himself by a monograph (1695) on the brain, which, though not free from errors, contains, nevertheless, some valuable observations. Ridley is the first

1 Tyson was a graduate both of Oxford and Cambridge. He was reader of anatomy at Surgeons' Hall, London.

2 Collins was an M. D. of Padua, Oxford and Cambridge. He was physician in ordinary to Charles II.

3 Havers was a London physician, and died in 1702.

4 Robert Nesbitt (d. 1761) studied at Leiden and practised as a physician in London.

'Humphrey Ridley (1653-1708) was a London physician who studied at Leiden.

who distinguishes by name the restiform processes, or the posterior pyramidal eminences. He recognized the figure of the four eminences in the human subject; he remarked the mam- millary bodies; and he discovered the sinus which passes under his name.

Raymond Vieussens, by the publication of his great work on neurography in 1684, threw new light on the configuration and Vieussens structure of the brain, the spinal cord and the nerves; and gave a description of the arrangement and dis- tribution of the latter more precise than heretofore. Of the formation and connexions of the sympathetic nerve especially he gave views which have been generally adopted by subsequent anatomists. His new arrangement of the vessels, published in 1705, contains several curious opinions. His observations on the structure of the heart, published in 1706, and enlarged in 171 5, exhibit the first correct views of the intimate structure of an organ which afterwards was most fully developed by the labours of G. M. Lancisi and J. B. Senac.

To the same period (1685-1697) belong the rival publications of G. Bidloo 1 and William Cowper, the latter of whom, however, stained a reputation otherwise good by publishing as his own the engravings of the former. Cowper further distinguished himself by a minute account of the urethral glands, already known to Columbus and Mery; by a good description of the intestinal glands, discovered by Brunner and Peyer; and by demon- strating the communication of the arteries and veins of the mesentery.

The anatomical genius of Italy, which had slumbered since the death of Malpighi, was destined once more to revive in Lancisi, A. M. Valsalva, and his illustrious pupils G. D. Santorini and J. B. Morgagni. Valsalva especially distinguished himself by his description of the structure of the ear, which, in possessing still greater precision and minuteness than that of Duverney, is valuable in setting the example of rendering anatomy altogether Saatorlni. a sc ‘ ence of description. Santorini, who was professor at Venice, was no unworthy friend of Valsalva and Morgagni. His anatomical observations, which relate to the muscles of the face, the brain and several of the nerves, the ducts of the lachrymal gland, the nose and its cavities, the larynx, the viscera of the chest and belly, and the

organs of generation in the two sexes, furnish beautiful models of essays, distinguished for perspicuity, precision and novelty, above anything which had then appeared. These observations, indeed, which bear the impress of accurate observation and clear conception, may be safely compared with any anatomical writings which have appeared since. Those on the brain are particularly interesting. Morvagai. Morgagni, though chiefly known as a pathological anatomist, did not neglect the healthy structure. His Adversaria, which appeared between 1706 and 1719, and his Epistles, published in 1728, contain a series of observations to rectify the mistakes of previous anatomists, and to determine the characters of the healthy structure of many parts of the human body. Many parts he describes anew, and indicates facts not previously observed. All his remarks show how well he knew what true anatomical description ought to be. In this respect, indeed, the three anatomists now mentioned may be said to have anticipated their contemporaries nearly a century; for, while other authors were satisfied with giving loose and inaccurate or meagre notices of parts, with much fanciful supposition, Valsalva, Santorini and Morgagni laboured to determine with precision the anatomical characters of the parts which they describe.

The same character is due to J. B. Winslow (1669-1760), a native of Denmark, but, as pupil and successor of Duverney, as winslow. we ˆ as a convert t° Catholicism, naturalized in France, and finally professor of anatomy at the Royal Gardens. His exposition of the structure of the human body is distinguished for being not only the first treatise of descriptive anatomy, divested of physiological details and hypothetical explanations foreign to the subject, but for being a close description derived from actual objects, without reference to the writings of previous

'Bidloo was a Dutch anatomist and Cowper a London surgeon.

anatomists. About the same time W. Cheselden in London, the first Alexander Monro in Edinburgh, and B. S. Albinus in Leiden, contributed by their several treatises to render anatomy still more precise as a descriptive science. The Osteograpkia of the first-mentioned was of much use in directing attention to the study of the skeleton and the morbid changes to which it is liable. This work, however, magnificent as it was, was excelled by that of Albinus, who in 1747 published engravings, executed Albinus. by Jan Wandelaar (1691-1759), of the bones and muscles, which had never been surpassed in accuracy of outline or beauty of execution. The several labours of Albinus, indeed, constitute an important era in the history

of the science. He was the first who classified and exhibited the muscles in a proper arrangement, and applied to them a nomenclature which is still retained by the consent of the best anatomists. He gives a luminous account of the arteries and veins of the intestines, represents with singular fidelity and beauty the bones of the foetus, inquires into the structure of the skin and the cause of its colour in different races; represents the changes incident to the womb in different periods of pregnancy, and describes the relations of the thoracic duct and the vena azygos with the contiguous parts. Besides these large and magnificent works, illustrated by the most beautiful engravings, six books of Academical Annotations were the fruits of his long and assiduous cultivation of anatomy. These contain valuable remarks on the second structure and morbid deviations of numerous parts of the human body.

Albinus found a worthy successor in his pupil Albert von Haller (1708-1777), who, with a mind imbued with every depart- ment of literature and science, directed his chief atten- Hatter tion, nevertheless, to the cultivation of anatomical and physiological knowledge. Having undertaken at an early age (twenty-one) to illustrate, with commentaries, the physiological prelections of his preceptor H. Boerhaave, he devoted himself assiduously to the perusal of every work which could tend to facilitate his purpose; and, as he found numerous erroneous or imperfect statements, and many deficiencies to supply, he under- took an extensive course of dissection of human and animal bodies to obtain the requisite information. During the seventeen years he was professor at Gottingen, he dissected 400 bodies, and inspected their organs with the utmost care. The result of these assiduous labours appeared at intervals in the form of dissertations by himself, or under the name of some one of his pupils, finally published in a collected shape between 1746 and 1751 (Disputationes Anatomicae Selectiores), andin eight numbers of most accurate and beautiful engravings, representing the most important parts of the human body, e.g. the diaphragm, the uterus, ovaries and vagina, the arteries of the different regions and organs, with learned and critical explanatory observations. He verified the observations that in the foetus the testicles lie in the abdomen, and showed that their descent into the scrotum may be complicated with the formation of congenital hernia. Some years after, when he had retired from his academical duties at Gottingen, he published between 1757 and 1765 the large and elaborate work which, with singular modesty, he styled Elements of Physiology. This work, though professedly devoted to physio- logy, rendered, nevertheless, the most essentially services to anatomy.

Haller, drawing an accurate line of distinction between the two, gave the most clear, precise and complete descriptions of the situation, position, figure, component parts and minute structure of the different organs and their appendages> The results of previous and coeval inquiry, obtained by extensive reading, he sedulously verified by personal observation; and though he never rejected facts stated on credible authorities, he in all cases laboured to ascertain their real value by experiment. The anatomical descriptions are on this account not only the most valuable part of his work, but the most valuable that had then or for a long time after appeared. It is painful, nevertheless, to think that the very form in which this work is composed, with copious and scrupulous reference to authorities, made it be regarded as a compilation only; and that the author was compelled to show, bv a list of his personal researches,

that the most learned work ever given to the physiologist was also the most abundant in original information.

With the researches of Haller it is proper to notice those of his contemporaries, Jehn Frederick Meckel, J. N. Lieberkiihn, and his pupil John Godfrey Zinn. The first, who was professor of anatomy at Berlin, described the Casserian ganglion, the first pair of nerves and its distribution and that of the facial nerves generally, and discovered the spheno-palatine ganglion (1748- 1 7 5 1) . He made some original and judicious observations on the tissue of the skin and the mucous net (1753-1757); and above all, he recognized the connexion of the lymphatic vessels with the veins — a doctrine which, after long neglect, was revived by Vincent Fohmann (1794-1837) and Lippi. He also collected several valuable observations on the morbid states of the heart and brain. Lieberkiihn published in 1745 a dissertation on the villi and glands of the small intestines. Zinn, who was professor of medicine at Gottingen, published a classical treatise on the eye (1755), which demonstrated at once the defects of previous inquiries, and how much it was possible to elucidate, by accurate research and precise description, the structure of one of the most important organs of the human frame. It was republished after his death by H. A. Wrisberg (1780). About the same time J. Weitbrecht gave a copious and minute account of the ligaments, and J. Lieutaud (1703-1780), who had

already laboured to rectify many errors in anatomy, described with care the structure and relations of the heart and its cavities, and rendered the anatomy of the bladder very precise, by describing the triangular space and the mammillary eminence at its neck.

The study of the minute anatomy of the tissues, which had originally been commenced by Leeuwenhoek, Malpighi and Ruysch, began at this period to attract more general attention. Karl August von Bergen had already demonstrated (1732) the general distribution of cellular membrane, and showed that it not only incloses every part of the animal frame, but forms the basis of every organ — a doctrine which was adopted and still more fully expanded (1757) by his friend Haller, in opposition to what was asserted by Albinus, who maintains that each part has a proper tissue. William Hunter at the same time gave a clear and W Hunter i n S emous statement of the difference between cellular membrane and adipose tissue (1757), in which he maintained the general distribution of the former, and represented it as forming the serous membranes, and regulating their physiological and pathological properties — doctrines which were afterwards confirmed by his brother John Hunter. A few years after, the department of general anatomy first assumed a substantial form in the systematic view of the membranes and their mutual connexions traced by Andrew Bonn of Amsterdam. In his inaugural dissertation De Continuationibus Membra- narum, published at Leiden in 1763, this author, after some preliminary observations on membranes in general and their structure, and an exposition of that of the skin, traces its transition into the mucous membranes and their several divisions. He then explains the distribution of the cellular membrane, the aponeurotic expansions, and the periosteum and perichondrium, by either of which, he shows, every bone of the skeleton is invested and connected. He finally gives a very distinct view of the arrangement of the internal membranes of cavities, those named serous and fibro-serous, and the manner of their dis- tribution over the contained organs. This essay, which is a happy example of generalization, is remarkable for the interesting general views of the structure of the animal body which it exhibits; and to Bonn belongs the merit of sketching the first outlines of that system which it was reserved for the genius of M. F. X. Bichat to complete and embellish. Lastly, T. de Bordeu, in an elaborate essay (1767) on the mucous tissue, or cellular organ, as he terms it, brought forward some interesting views of the constitution, 'nature and extent of the cellular membrane.

Though anatomy was hitherto cultivated with much success as illustrating the natural history and morbid states of the human body,

yet little had been done for the elucidation of local diseases, and the surgical means by which they may be successfully treated. The idea of applying anatomical knowledge directly to this

A. Boon.

purpose appears to have originated with Bernardin Genga, a Roman surgeon, who published in 1672, at Rome, a work entitled Surgical Anatomy, or the Anatomical History of the Bones and Muscles of the Human Body, with the Description of the Blood- vessels. This work, which reached a second edition in 1687, is highly creditable to the author, who appears to have studied intimately the mutual relations of different parts. It is not im- probable that the example of Genga led J. Palfyn, a surgeon at Ghent, to undertake a similar task about thirty years after (1718- 1726). For this, however, he was by no means well qualified; and the work of Palfyn, though bearing the name of Surgical Anatomy, is a miserable compilation, meagre in details, inaccurate in description, and altogether unworthy of the honour of being republished, as it afterwards was by Antony Petit.

While these two authors, however, were usefully employed in showing what was wanted for the surgeon, others were occupied in the collection of new and more accurate facts. Albinus, indeed, ever assiduous, had, in his account of the operations of Rau, given some good sketches of the relative anatomy of the bladder and urethra ; and Cheselden had already, in his mode of cutting into the urinary bladder, shown the necessity of an exact knowledge of the relations of contiguous parts. The first decided application, however, of this species of anatomical research it was reserved for a Dutch anatomist of the 18th century to make. Peter Camper, professor of anatomy at Amsterdam, published in 1 760 and 1762 his anatomico- camper. pathological demonstrations of the'parts of the human arm and pelvis, of the diseases incident to them, and the mode of relieving them by operation, and explained with great clearness the situation of the blood-vessels, nerves and important muscles. His remarks on the lateral operation of lithotomy, which contain all that was then known on the subject, are exceedingly interest- ing and valuable to the surgeon. It appears, further, that he was the first who examined anatomically the mechanism of ruptures, his delineations of which were published in 1801 by S. T. Sommerring. Camper also wrote some important memoirs on Comparative Anatomy, and he was the author of a well-known work on the Relations of Anatomy to the Fine Arts.

The attention of anatomists was now directed to the elucidation of

the most obscure and least explored parts of the human frame — the lymphatic vessels and the nerves. Although, since the first discovery of the former by Aselli, Rudbeck and Pecquet, much had been done, especially by Ruysch, Nuck, Meckel and Haller, many points, notwithstanding, relating to their origin and distribution in particular organs, and in the several classes of animals, were imperfectly ascertained or entirely unknown. William Hunter investigated their arrangement, and proposed the doctrine that they are absorbents; u unten and John Hunter, who undertook to demonstrate the truth of this hypothesis by experiment, discovered, in 1758, lymphatics in the neck in birds. As the doctrine re- quired the existence of this order of vessels, not only in quad- rupeds and birds but in reptiles and fishes, the inquiry attracted attention among the pupils of Hunter; and William Hewson 1 at length communicated, in December 1768, to the Hewson. Royal Society of London an account of the lac teals and lymphatics in birds, fishes and reptiles, as he had discovered and demonstrated them. The subject was about the same time investigated by the second Alexander Monro, who indeed claimed the merit of discovering these vessels in the classes of animals now mentioned. But whatever researches this anatomist may have instituted, Hewson, by communicating his observations to the Royal Society, must be allowed to possess the strongest as well as the clearest claim to discovery. The same author, in 1774, gave the first complete account of the anatomical peculiarities of the lymphatic system in man and other animals, and thereby supplied an important gap in this department. Hewson is the first who distinguishes the lymphatics into two orders — the superficial and the deep — both in the extremities and in the internal organs. He also studied the structure of the

1 Hewson was a partner with William Hunter in the Windmili Street School of Anatomy.

Cruik' shaak.

intestinal villi, in which he verified the observations of Lieberkiihn; and he made many important observations on the corpuscles of the lymph and blood. He finally applied his anatomical discoveries to explain many of the physiological and pathological phenomena of

the animal body. Ten years after, John Sheldon, another pupil of Hunter, gave a second history and description of the lymphatics, which, though divested of the charm of novelty, contains many interesting anatomical facts. He also examined the structure of the villi.

Lastly, Cruikshank; 1 in 1786, published a valuable history of the anatomy of the lymphatic system, in which he maintains the accuracy of the Hunterian doctrine, that the lymphatics are the only absorbents; gave a more minute account than heretofore of these vessels, of their coats and valves; and explained the structure of the lymphatic glands. He also injected the villi, and examined them microscopically, verifying most of the observations of Lieberkiihn. The origin of the lymphatics he maintains rather by inference than direct demonstration. To these three works, though in other respects very excellent, it is a considerable objection that the anatomical descriptions are much mixed with hypothetical speculation and reasonings on properties, and that the facts are by no means always distinguished from mere matters of opinion. At the same time J. G. Haase published an account of the lymphatics of the skin and intestines, and the plexiform nets of the pelvis.

To complete this sketch o'f the history of the anatomy of the lymphatic system, it may be added that Paolo Mascagni, Mascasni wn0 ˆ a< ˆ been engaged from the year 1777 to 1781 in the same train of investigation, first demonstrated to his pupils several curious facts relating to the anatomy of the lymphatic system. When at Florence in 1782 he made several preparations, at the request of Peter Leopold, grand duke of Tuscany; and when the Royal Academy of Sciences at Paris announced the anatomy of this system for their prize essay appointed for March 1784, Mascagni resolved on communicating to the public the results of his researches — the first part of his commentary, with four engravings. Anxiety, however, to complete his preparations detained him at Florence till the close of 1785; and from these causes his work did not appear till 1787. These delays, however, unfavourable as they were to his claims of priority to Sheldon and Cruikshank, were on the whole advantageous to the perfection of his work, which is not only the most magnificent, but also the most complete that ever was published on the lymphatics. In his account of the vessels and their valves he confirms some of Hewson's observations and rectifies others. Their origin he proves by inference much in the same manner as Cruikshank; but he anticipates this author in the account of the glands, and he gives the most minute description of the superficial and deep lymphatics, both in the members and in the internal organs.

General accounts of the nerves had been given with various degrees of accuracy by Willis, Vieussens, Winslow, and the first Monro; and the subject had been much rectified and improved by the indefatigable Haller. The first example of minute de- scriptive neurography was given in 1748 by John Frederick Meckel, whose account of the fifth pair and of the nerves of the face will long remain a lasting proof of accuracy and research. The same subject was investigated in 1765 by Hirsch and in 1777 by Wrisberg. In 1766 Metzger examined the origin, distribution and termination of the first pair — a point which was afterwards very minutely treated by A. Scarpa 2 in his anatomical disquisitions, published in 1780; and the internal nerves of the nostrils were examined in 1791 by Haase. The optic nerve, which had been studied originally by Varoli, and afterwards by Mery, Duverney, J. F. Henkel, Moeller, Hein and Kaldschmid, was examined with extreme accuracy, with the other nerves of the organ of vision, by Zinn in his elaborate

1 W. Cruikshank followed W. Hunter as lecturer at the Windmill Street school.

- *Scarpa was professor of anatomy at Modena and Pavia.*

treatise. The phrenic nerves and the oesophageal branches of the vagus were studied by Haase ; the phrenic, the abdominal and the pharyngeal nerves, by Wrisberg; those of the heart most minutely by Andersch; and the origins, formation and distribution of the intercostal nerves, by Iwanov, C. G. Ludwig, and Girardi. The labours of these anatomists, however, were eclipsed by the splendid works of Walter (1783) on the nerves of the chest and belly ; and those of Scarpa (1794) on the distribu- tion of the eighth pair and splanchnic nerves in general. In minuteness of description and in beauty of engraving these works have not yet been equalled, and will never perhaps be surpassed. About the same time, Scarpa, so distinguished in every branch of anatomical research, investigated the minute structure of the ganglions and plexuses. The anatomy of the brain itself was also studied (1780) with great attention by the second Monro, M. V. G. Malacarne and Vicq d'Azyr.

Lastly, the anatomy of the gravid uterus, which had been originally studied by Albinus, Roederer and Smellie, was again illustrated (1774) most completely by William Hunter, whose engravings will remain a lasting memorial of scientific zeal and artistic talent.

The perfection which anatomical science attained in the last ten years of the 18th and during the 19th century is evinced not only in the improved character of the systems published by anatomists, but in the enormous advance which has taken place in the knowledge of the minute structure of the animal tissues, of the development of the tissues and organs, and of the modifications in form and structure exhibited by various groups of animals.

The first who gave a good modern system was R. B. Saba tier; but his work was speedily eclipsed by the superior merits of the treatises of Sommerring, Bichat and Portal. The excellent work by Samuel Thomas Sommerring, originally published in the German language, between the years 1791 and „ 1 796 ; then in the Latin language, between the years riAg; 1794 and 1800; and in a second edition in the German language in 1800 and 1801, maintaining the high character which it first possessed for clear arrangement, accurate descrip- tion and general precision, was, between the years 1841 and 1844. republished in eight volumes at Leipzig by Th. L. W. Bischoff, F. G. J. Henle, E. H. Huschke, Theile, G. G. Valentin, Vogel, and R. Wagner, with suitable additions, and a large amount of new and accurate information. In this edition Rudolph Wagner gives, in the first division of the first volume, the life, correspondence and literary writings of Sommerring; and in the second volume the anatomy of the bones and ligaments. The third volume contains the anatomy of the muscles and the vascular system by Theile. G. G. Valentin devotes one volume, the fourth, to the minute anatomy of the nervous system and its parts, as disclosed by careful examination by the microscope; and it must be allowed that the author has been at great pains to present just views of the true anatomy of the brain, the spinal cord, the nervous branches and the ganglia. In the fifth volume, E. H. Huschke of Jena gives the anatomical history of the viscera and the organs of the senses, a department which had been left in some degree incomplete in the original, but for one division of which the author had left useful materials in his large figures already mentioned. In the sixth volume, an entire and complete system of general anatomy, deduced from personal observation and that of other careful observers, the materials being in general new, and in all instances confirmed and rectified is given by F. G. J. Henle. The seventh volume contains the history of the process of development in mammalia and man, by Th. L. W. Bischoff. The eighth volume treats of the patho- logical anatomy of the human body, by Julius Vogel, but contains only the first division, relating to the generalities of the subject. This, which is probably the most accurate as it is the most elaborate system of anatomical knowledge up to the date of its

publication in 1844, was translated into the French language by Jourdan, and published in 1846 under the name of Encyclopidie anatomique. The eighth volume was translated into English in the year 1847.

MODERN HUMAN]

ANATOMY

937

Blehat.

The Anatomie genirale of M. F. X. Bichat is a monument of his philosophical genius which will last as long as the structure

and functions of the human body are objects of interest.

His Anatomie descriptive is distinguished by clear and natural arrangement, precise and accurate description, and the general ingenuity with which the subject is treated. The physiological observations are in general correct, often novel, and always highly interesting. It is unfortunate, however, that the ingenious author was cut off prematurely during the preparation of the third volume. The later volumes are, however, pervaded with the general spirit by which the others are im- pressed, and are highly creditable to the learning, the judgment and the diligence of P. J. Roux and M. F. R. Buisson. The system of A. Portal is a valuable and correct digest of anatomical and French pathological knowledge, which, in exact literary systematic information, is worthy of the author of the Histoire aaato- £ e l' anatomie et de la chirurgie, and, in accuracy of

descriptive details, shows that Portal trusted not to the labours of his predecessors only. A. Boyer published in 1803 a complete treatise on descriptive anatomy. H. Cloquet formed, on the model of the Anatomie descriptive of Bichat, a system in which he avails himself of the literature and precision of Sommerring and the details of Portal. An English translation of this work was prepared by Dr Robert Knox. Jean Cruveilhier published in 1834- 183 5 a good general treatise on descriptive anatomy, which was translated into English, and published as a part of The Library of Medicine. Cruveilhier's treatise has passed through several editions. The most elaborate work of the French school is the great treatise of M. J. Bourgery, consisting of four divisions, on descriptive, general, surgical and philosophical anatomy (1832-1854). These are beautifully illustrated.

Modern Human Anatomy (Anthropotomy)

The history of modern human anatomy in Great Britain begins with the time at which the dissection of the human body became part of the training of students of medicine, and this is one of the greatest debts, though by no means the best recognized, of the many which medical science owes to that remarkable man William Hunter. Before his time the anatomy professors of the most celebrated schools both at home and abroad used one or at most two subjects to illustrate their courses of lectures, and were in the habit of demonstrating the performance of surgical operations not on human bodies but on those of lower animals. Few students dissected the human body, because for such dissection they had no opportunities. The English law, since the time of Henry VIII., allowed only the bodies of persons executed for murder to be dissected, and the supply seems to have been sufficient for the humble needs of the time. The reformation of this antiquated and imperfect system took place in 1747, when Hunter established complete courses of anatomical lectures and opened a school for dissection. The practice of dissection grew so rapidly that by about 1793 there were 200 regular anatomy students in London, while in 1823 their number was computed at about 1000. Of course the supply of murderers was not enough for all these students, and the very fact that only murderers were allowed for this purpose made people bitterly hostile to the bodies of their relations and friends being dissected. In accounting for the great aversion which there has always been from dissection in England, it should be remembered that, although capital punishment was the penalty for very many offences at the beginning of the 19th century, only the bodies of murderers were handed over to the anatomists.

When once the absolute necessity of a surgeon's having a good knowledge of anatomy was realized, bodies had to be procured at any hazard, and the chief method was to dig them up as soon as possible after their burial. This practice of exhumation or " body-snatching " on a large scale seems to have been peculiar to Great Britain and America, and not to have been needed on the continent of Europe. In France, Italy, Portugal and Austria no popular objection was raised to the bodies of friendless people, who died in hospitals, or of those whose burial was paid for by

the state, being dissected, provided a proper religious service was held over them. In Germany it was obligatory that the bodies of all people unable to pay for their burials, all dying in prisons, all suicides and public women should be given up. In all these countries

the supply was most ample, exhumation was unknown, and the cost of learning anatomy to the students was very moderate. In Great Britain the earlier exhumations seem to have caused very little popular concern; Hunter, it is said, could manage to get the body of any person he wanted, were it that of giant, dwarf, hunchback or lord, but later, when the number of students increased very rapidly, the trade of " resurrection man " became commoner, and attracted the lowest dregs of the vicious classes. It is computed that in 1828 about 200 people were engaged in it in London alone, though only a few gained their entire livelihood by it. In the first half of the 18th century, and for some time afterwards, the few dissections which were undertaken were carried out in the private houses of medical men. In 1702 a rule was passed at St Thomas's Hospital preventing the surgeons or pupils from dissecting bodies there without the express permission of the treasurer, but by 1780 this rule seems to have lapsed, and a definite dissecting-room was established, an example which" was soon followed by Guy's and St Bartholomew's.

In the early years of the 19th century the number of students increased so rapidly that a good many private anatomy schools grew up, and in 1828 we find that the total list of London dis- secting rooms comprised those of Guy's, London, St Bartholo- mew's and St Thomas's hospitals, the Webb Street school of Mr Grainger, the Aldersgate school of Mr Tyrrell, the Windmill Street school where Caesar Hawkins and Herbert Mayo lectured, and the schools of Messrs. Bennett, Carpue, Dermott and Sleigh. These schools needed and, it seems, obtained nearly 800 bodies a year in the years about 1823, when there were nearly 1000 students in London, and it is recorded that bodies were even sent to Edinburgh and Oxford.

When it is realized that the greater number of these were ex- humed, it is easy to understand how hostile the public feeling became to the body-snatchers or " resurrection men," and also in a modified form to the teachers of anatomy and medical students. This was increased by the fact that it soon, became well known that many of the so-called resurrection men only used their calling as a cloak for robbery, because, if they were stopped with a horse and cart by the watch at night, the presence of a body on the top of stolen goods was sufficient to avert suspicion and search. It is in many places suggested, though not definitely stated, that the Home Office authorities under- stood how absolutely necessary it was that medical students should learn the details of the human body, on which they would be called to operate, and that the police had instructions not to interfere more than was necessary with the only method by which that education could be supplied, however unlawful

it might be. So emboldened and careless did these body-snatchers become, and so great was the demand for bodies, that they no longer confined themselves to pauper graves, but took the remains of the wealthier classes, who were in a position to resent it more effectually; often they did not even take the trouble to fill in the graves after rifling their contents, and, in con- sequence, many sextons, who no doubt had been bribed, lost their posts, and men armed with firearms watched the London burial-places at night. The result of this was that the " resurrec- tion men " had to go farther afield, and their occupation was attended with considerable danger, so that the price of a body gradually rose from £2 to about £14, which seems the maximum ever paid. In addition to this heavy sum the anatomical teachers had to pay the fines of the exhumers when they were caught, or to support their families when they were imprisoned. By 1828 the annual supply of bodies had dropped to about 450, and about 200 English students were forced each year to go to Paris for their anatomical instruction. There they could get a body for about seven francs and could also be taught by English anatomists who settled in that city for the purpose.

As early as about 1 810 an anatomical society was formed, to

impress on the government the necessity for an alteration in the law, and among the members we find the names of John Aber- nethy, Charles Bell, Everard Home, Benjamin Brodie, Astley Cooper and Henry Cline. It was owing to the exertions of this body that in 1828 a select committee was appointed by the government to report on the whole question, and to the minutes of evidence taken before this body the reader is referred for further details.

The report of this committee led to the Anatomy Act of 1832, but there can be little doubt that its passage through the House was expedited by the recent discovery and arrest of the infamous William Burke and William Hare, who, owing to the extreme difficulty of procuring subjects for dissection in Edinburgh and the high price paid for them, had made a practice of enticing men to their lodgings and then drugging and suffocating them in order to sell their bodies to Dr Knox. Hare turned king's evidence but Burke was executed. (See MacGregor's History of Burke and Hare, 1884, Lonsdale's Life and

Writings of Robert Knox, 1870. Many further details connected with the condition of anatomy, especially in Dublin, before the passing of the Anatomy Act, wili be found in Memoirs of James Macartney by Professor A. Macalister, F.R.S.) The bill to legalize and regulate the supply of subjects for dissection did not pass without considerable opposition. In 1829 the College of Surgeons petitioned against it, and it was withdrawn in the House of Lords owing to the opposition of the archbishop of Canterbury, but in 1832 a new Anatomy Bill was introduced, which, though violently opposed by Messrs Hunt, Sadler and Vy vyan, was supported by Macaulay and O'Connell, and finally passed the House of Lords on the 19th of July 1832.

This is the act which governs the practice of anatomy in the British Isles up to the present day, and which has only been slightly modified as to the time during which bodies may be kept unburied in the schools. It provides that any one intend- ing to practise anatomy must obtain a licence from the home secretary. As a matter of fact only one or two teachers in each institution take out this licence and are known as licensed teachers, but they accept the whole responsibility for the proper treatment of all bodies dissected in the building for which their licence is granted. Watching over these licensed teachers, and receiving constant reports from them, are four inspectors of anatomy, one each for England, Scotland, Ireland and London, who report to the home secretary and know the whereabouts of every body which is being dissected. The main clause of the act is the seventh, which says that a person having lawful possession of a body may permit it to undergo anatomical examination provided no relative objects; the other clauses are subsidiary and detail the methods of carrying this into effect. In clause 16, however, the old act of Henry VIII. is repealed and the bodies of murderers are no longer to be given up for dissection after execution.

There can be little doubt that this act has worked well and with a minimum of friction; it at once did away with body-snatching and crimes like those of Burke and Hare. No licensed teacher now could or would receive a body without a medical certificate and a warrant from the inspector of anatomy, and, when the bodies are buried, a proper religious service, according to the creed professed during fife, is provided. The great majority of bodies are those of unclaimed poor in the workhouse in- firmaries, but a few are obtained each year from the general hospitals. Occasionally a well-to-do person, following the example of Jeremy Bentham, leaves his body for the advance- ment of science, but even then, if his relatives object, it is not received.

The ample supply of subjects obtained by legitimate means which the anatomy act provided was followed by the opening of anatomical schools at all the great London hospitals and the universities, with the result that anatomical research was stimulated and text-books embodying the latest discoveries were brought out. It is wonderful, however, how much descrip- tive anatomy was taught in the days before text-books were common and how much of what is essential to the study of

surgery and medicine the students knew. In looking through an old book of anatomical questions and answers dated 181 2, one is struck by the fact that any one working through them with the body would probably pass an average modern anatomical examination to-day.

The various phases which anatomy in the British Isles has passed through have also been experienced in America, though it is difficult to compare the two countries owing to the fact that each state in the Union makes its own laws as to dissection, and that these vary considerably. The first anatomy act worthy of the name was that of Massachusetts, and was passed in 183 1, one year before the British act. There is reason to believe, however^ that, in some states, all the evils of body-snatching existed up to the end of the 19th century. In some more enlightened states, such as Pennsylvania and Massachusetts, the modern acts are in advance of the British in that they are mandatory instead of permissive, and their compulsory nature is found rather to reduce than to increase public opposition to dissection. A study of the history of anatomy in the United States during the 19th century furnishes an instructive lesson on the futility: of attempting to suppress dissection by legislation and on the serious and some- times terrible crimes to which any such attempt naturally leads. It also teaches that, when unclaimed bodies must be given up and must be treated reverently and buried decently, there is less friction than when public boards have the right of arbitrarily refusing to allow their unclaimed dead to be used for the service of the living.

In all the important countries of Europe, with the exception of Russia and Turkey, anatomy acts exist. They almost all differ from the British act in being mandatory instead of per- missive; in other words, certain unclaimed bodies must be given up to the schools of anatomy. As a rule these come from the general hospitals, but sometimes, as in Germany, Austria and Sweden, suicides are received and form a considerable part of the whole number. Even where executed criminals are available they nowadays form a negligible contribution, but the unclaimed bodies of people dying in

prison are provided for in the French, Belgian, Norwegian, Swedish, German and Italian regulations, and in Paris they form an important element of the supply. In Russia several attempts to gain an anatomy act have been made, but have always been opposed by those in authority, and there is good reason to believe that bodies are procured by bribing hospital and mortuary attendants. It is said that the army contributes a large percentage of the total number. In Turkey no facilities for dissecting the dead body exist, as the practice is against the Mahbmmedan religion; the German pathologists in Turkey, however, insist on making post mortem examinations. In the British colonies anatomical regulations vary a good deal; sometimes, as in New South Wales, the act is founded on that of Great Britain and is permissive, but in Victoria the minister may authorize the medical officer of any public institution supported wholly or in part by funds from the general revenue to permit unclaimed bodies to be dissected, provided the persons, during life had not expressed a wish against it. This act in its working is equivalent to a mandatory one, since the power of refusing bodies is not left in the hands of, in this respect, uneducated poor law guardians.

In the early years of the 19th century Sir Charles Bell's work on human anatomy is by far the most important in the British Isles. He wrote the article on the nerves in his brother John Bell's work on the anatomy of the human body, as well as his own classical works on the anatomy of expression, the hand and the arteries; but his chief work was the discovery of the difference between motor and sensory nerves. Sir Astley Cooper brought out his beautifully illustrated monograph on hernia in 1807. Besides these, the Edinburgh school had contributed the system- atic treatises of Andrew Fyf e, John Bell, the third Monro and John Gordon. In 1828 appeared the first edition of Quain's Anatomy, written by Jones Quain. This monumental work, which is still among the very first of English, text-books, has run through ten editions, and is of even greater value to the teacher and researcher than to the medical student, because of its

excellent bibliographies and the way in which it has been kept abreast of modern morphological knowledge by its various editors. Hardly any of the original work now remains. In 1858 another famous text-book on systematic anatomy appeared, written by Henry

Gray, and this has always been particularly popular with students both in Great Britain and in America; it pays more attention to the surgical applications of anatomy than to the scientific and morphological side, and has reached its sixteenth edition.

The Cyclopedia of Anatomy and Physiology, edited by Dr Robert Todd from 1835 to 1859, which contained articles on both human and comparative anatomy, is now somewhat out of date, but did much for the advancement of the science when it appeared.

In 1893 a text-book written by several authors and edited by Henry Morris appeared. It has run through three editions and is especially popular in America. The latest English system- atic work of first-rate importance is the splendid compilation edited by D. J. Cunningham (1902) and written, with one or two exceptions, by pupils of the veteran anatomist Sir William Turner. It is dedicated to him and will long serve as a memento of the work which he has done in training anatomists for the whole of the British empire. Besides these systematic treatises, many dissecting manuals have been published. The earliest were the Dublin Dissector and the London Dissector; others still in use are those of G. V. Ellis, C. Heath, D. J. Cunningham, and J. Cleland and J. Mackay. In 1889 Professor A. Macalister published a book on anatomy, which combined the advantages of a text-book with those of a dissecting guide.

In America the English text-books are largely used in addition to that edited by F. H. Gerrish. There is a special American edition of Gray.

Many systematic works on modern anatomy have come from Germany. J. F. Meckel, J. C. Rosenmuller, C. F. Krause, G. F. Hildebrandt, J. Hyrtl, H. Luschka and A. Meyer have all pub- lished works which have made their mark, but by far the most important, and, as some consider, still the best of all anatomical text-books, is that of F. G. J. Henle, professor of anatomy in Got- tingen, which was completed in 1873. The beautiful illustrations of frozen specimens of the body brought out by W. Braune added a great deal to the student's opportunities of learning the relations of the various structures, and are largely used all over the world. Rudinger's Anatomy also contains many plates showing various sections, but the most complete text-book in the German language is that by Prof. Karl von Bardeleben of Jena; this is in eight volumes and contains notices of the latest literature on de- scriptive and morphological anatomy by the most prominent German anatomists. In addition to these W. Spalteholz and C. Toldt have brought out valuable atlases. In France J. Testut's and Poirier's anatomies, both of great excellence and

beautifully illustrated, are the ones in common use.

There are two epoch-making dates in the history of modern English anatomy besides that of the passing of the Anatomy Act in 1832. The first of these is 1867, when the first volume of the Journal of Anatomy and Physiology appeared. This afforded a medium for English anatomists to publish their original work, besides containing valuable reviews and notices of books and work published abroad; it has appeared quarterly without a break since that time, and was long under the immediate direction of Sir William Turner.

The second date is 1887, when the Anatomical Society of Great Britain and Ireland was founded through the exertions of Mr C. B. Lockwood. It meets three times a year in London and once, in the summer, at some provincial school. It numbers some one hundred and fifty members, and enables anatomists from the whole British empire to meet one another and discuss subjects of common interest. Its first president was Prof. Murray Humphry of Cambridge, and its official organ is the Journal of Anatomy and Physiology.

No account of modern anatomical work would be complete without drawing attention to the great mass of special periodical literature containing the records of original work which are being

published. It is said that some three or four thousand articles on anatomy appear in six hundred journals each year. To mention a few of these, in addition to the British Journal of Anatomy and Physiology there is an American Journal of Anatomy, the French Bulletin et mimoires de la societe anatomique, and La journal de I'anatotnie et de la physiologie, and the German Inter- nationale Monatschrift fur Anatomie und Physiologie, Anatom- ischer Anzeiger, Waldeyer's Archiv fiir Anatomie und Physiologie, Schwalbe's Zeitschrift fiir Morphologie und Anlhropologie, Gegenbaur's Morphologisches Jahrbuch, edited by Ruge, and Merkel's Analomische Hefte.

Unfortunately the outlook of anatomy in Great Britain is not altogether satisfactory. The number of subjects for dissection has since 1895 been steadily diminishing, especially in London. This is due partly to the modern system of insuring lives for small sums and so decreasing the number of unclaimed bodies, and partly to the fact that, owing to the permissive nature of the British Anatomy Act, several boards of guardians will not allow even Unclaimed bodies to be used for dissection and for the teaching of operative surgery. It is not popularly understood that a dearth of bodies means not only a

check to abstract science, but a serious handicap to medical education, which must react more upon the poor than upon the rich, since the latter can afford to pay for the services of medical men educated abroad, where no difficulties are placed in the way of their learning fully the structure of the body they have to treat in disease. (F. G. P.)

Anatomy — Superficial and Artistic

The objects of the study of superficial anatomy are to show, first, the form and proportions of the human body and, second, the surface landmarks which correspond to deeper structures hidden from view. This study blends imperceptibly with others, such as physical anthropology, physiognomy, phrenology and palmistry, but whereas these deal chiefly with variations, superficial anatomy is concerned with the type.

With regard to the proportions of the body the artist and anatomist approach the subject from a slightly different point of view. The former, by a process of artistic selection, seeks the ideal and adopts the proportions which give the most pleasing effect, while the latter desires to know only the mean of a large series of measurements.

The scheme which Dr Paul Richer suggests(Anatomie artistique, Paris, 1890), and Professor Arthur Thomsonapproves(y4wato»jy for Art Students, 1896), is to divide the whole body into head-lengths, of which seven and a half make up the stature. Four of these are above the fork and three and a half below (see figs. 1 and 2). Of the four above, one forms the head and face, the second reaches from the chin to the level of the nipples, the third from the nipples to the navel, and the fourth from there to the fork. By dividing these into half-heads other points can be determined; for instance the middle of the first head-length corresponds to the eyes, the middle of the second to the shoulder, of the fourth to the top of the hip-joint, and of the fifth to the knee-joint.

The elbow-joint, when the arms are by the side, is a little above the lower limit of the third head-length, whilst the wrist is opposite the very centre of the stature, three head-lengths and three-quarters from the crown or the soles. The tips of the fingers reach a little below the middle of the fifth head-length. (In fig. 1 the fingers are bent.) By making the stature eight head-lengths instead of seven and a half the artistic effect is increased, as it is also by slightly lengthening the legs in proportion to the body. Approximate average breadth measurements are two heads for the greatest width of the shoulders,

one and a half for the greatest width of the hips, one for the narrowest part of the waist, and three-quarters for the breadth of the head on a level with the eyes.

The relation of superficial landmarks to deep structures cannot be treated here in full detail, but the chief points may be indicated. Certain parts of the head may easily be felt through the skin. If the finger is run along the upper margin of the orbit, the notch for the supraorbital nerve may usually be felt at the junction of the inner and middle thirds. At the outer end of

the margin is its junction with the malar bone, and this easily felt point is known as the external angular process. The junction of the frontal and nasal bones at the root of the nose is the nasion, while at the back of the skull the external occipital protuberance or inion is felt and marks the position of the torcular Herophili, where the venous sinuses meet. The zygoma may be felt running back from the malar bone to just in front of the ear, and two fingers' breadth above 'the middle of it marks the pterion, a very important point in the localization of intracranial structures. It corresponds to the anterior branch of the middle meningeal artery, to the Sylvian point where the three limbs of the fissure of Sylvius diverge, to the middle cerebral artery, the central lobe of the brain or island of Reil, and the anterior part of the corpus striatum. The fissure of Sylvius can be marked out by drawing a line from the external angular process back through the Sylvian point to the lower part of the parietal eminence.

Fig. i.

a, Serratus magnus.

/3, Deltoid.

•y, Biceps.

5, Poupart's ligament.

t, Patella. T.P. Transpyloric plane. S.C. Subcostal plane. I.T. Intertubercular plane.

P,

Fig. 2.

Dimple over posterior superior spine of ilium.

Lower angle of scapula.

External head of triceps.

Depression over great tro- chanter.

Popliteal space.

Gastrocnemius.

The scale between the figures represents head-lengths.

The position of the sulcus of Rolando is important because of the numerous cortical centres which lie close to it. For practical purposes it may be mapped out by taking the superior Rolandic point, f in. behind the bisection of a line drawn from the nasion to the inion over the vault of the skull, and joining that to the inferior Rolandic point, which is just above the line of the fissure of Sylvius and i in. behind the Sylvian point. The external parieto-occipital fissure, which forms the boundary between the parietal and occipital lobes of the brain, is situated practically at the lambda, which is a hand's breadth (2! in.) above the inion. The lateral sinus can be mapped out by joining the inion to the asterion, a point two-thirds of the distance from the lambda to the tip of the mastoid process; thence the sinus curves down- ward and forward toward the tip of the mastoid process. A point i in. horizontally backward from the top of the external auditory meatus will always strike it.

Cranio-cerebral topography has been dealt with by Broca, Bischoff , Turner, Fere, Pozzi, Giacomini, Ecker, Hefftler and Hare. Among the more recent papers are those of R. W. Reid (Lancet, 27th September 1884), W. Anderson and G. Makins (Lancet, 13th July 1889),

Prof. Chiene (detailed in Cunningham's Text-Book of Anatomy), V. Horsley (Am. Journal Med. Sci., 1887), G. Thane and R. Godlee (Quain's Anatomy— appendix to loth edition). D. J. Cunningham discusses the whole question in his " Contribution to the Surface Anatomy of the Cerebral Hemispheres " (Cunningham Memoirs, No. vii. R. Irish Academy, Dublin, 1892), and he has prepared a series of

casts to illustrate it.

The Face. — On the front of the face a line drawn down from the supraorbital notch between the bicuspid teeth to the side of the chin will cut the exit of the second division of the fifth nerve from the infraorbital foramen, a quarter of an inch below the infraorbital margin, and also the exit of the third division of the fifth at the mental foramen, midway between the upper and lower margins of the body of the jaw. In practice it will be found that the angle of the mouth at rest usually corresponds to the interval between the bicuspid teeth. The skin of the eyelids is very thin, and is separated from the subjacent fibrous tarsal plates by the orbicularis palpebrarum muscle. On everting the lids the delicate conjunctival membrane is seen, and between this and the tarsal plates lie the meibomian glands, which can be faintly seen as yellowish streaks. From the free edges of the eyelids come the eyelashes, between which many large sweat- glands open, and when one of these is inflamed it causes a " stye." Internally the two eyelids form a little recess called the internal canthus, occupied by a small red eminence, the caruncula lachrymalis, just external to which a small vertical fold of conjunctiva may often be seen, called the plica semilunaris, representing the third eyelid of birds and many mammals. By gently drawing down the lower eyelid the lower punctum may be seen close to the caruncula; it is the pinhole opening into the lower of the two canaliculi which carry away the tears to the lachrymal sac and duct. On the side of the face the facial artery may be felt pulsating about an inch in front of the angle of the jaw; it runs a tortuous course to near the angle of the mouth, the angle of the nose and the inner angle of the eye; in the greater part of its course its vein lies some distance behind it. The parotid gland lies between the ramus of the jaw and the mastoid process; anteriorly it overlaps the masseter to form the socia parotidis, and just below this its duct, the duct of Stensen, runs forward to pierce the buccinator and open into the mouth opposite the second upper molar tooth. The line of this duct may be marked out by joining the lower margin of the tragus to a point midway between the lower limit of the nose and the mouth. The facial or seventh nerve emerges from the skull at the stylo- mastoid foramen just in front of the root of the mastoid process; in the parotid gland it forms a network called the pes anserinus, after which it divides into six branches which radiate over the face to supply the muscles of expression.

The Neck. — In the middle line below the chin can be felt the body of the hyoid bone, just below which is the prominence of the thyroid cartilage called " Adam's apple," better marked in men than in

women. Still lower the cricoid cartilage is easily felt, while between this and the suprasternal notch the trachea and isthmus of the thyroid gland may be made out. At the side the outline of the sterno-mastoid muscle is the most striking mark; it divides the anterior triangle of the neck from the posterior. The upper part of the former contains the submaxillary gland, which lies just below the posterior half of the body of the jaw. The line of the common and the external carotid arteries may be marked by joining the sterno-clavicular articulation to the angle of the jaw. The eleventh or spinal accessory nerve corresponds to a line drawn from a point midway between the angle of the jaw and the mastoid process to the middle of the posterior border of the sterno-mastoid muscle and thence across the posterior triangle to the deep surface of the trapezius. The external jugular vein can usually be seen through the skin; it runs in a line drawn from the angle of the jaw to the middle of the clavicle, and close to it are some small lymphatic glands. The anterior jugular vein is smaller, and runs down about half an inch from the middle line of the neck. The clavicle or collar-bone forms the lower limit of the neck, and laterally the outward slope of the neck to the shoulder is caused by the trapezius muscle.

The Chest. — It is important to realize thai the snape of the

chest does not correspond to that of the bony thorax which encloses the heart and lungs; all the breadth of the shoulders is due to the shoulder girdle, and contains the axilla and the head of the humerus. In the middle line the suprasternal notch is seen above, while about three fingers' breadth below it a transverse ridge can be felt, which is known as Ludovic's angle and marks the junction between the manubrium and gladiolus of the sternum. Level with this line the second ribs join the sternum, and when these are found the lower ribs may be easily counted in a moderately thin subject. At the lower part of the sternum, where the seventh or last true ribs join it, the ensiform cartilage begins, and over this there is often a depression popularly known as the pit of the stomach. The nipple in the male is situated in front of the fourth rib or a little below; vertically it lies a little external to a line drawn down from the middle of the clavicle; in the female it is not so constant. A little below it the lower limit of the great pectoral muscle is seen running upward and outward to the

axilla; in the female this is obscured by the breast, which extends from the second to the sixth rib vertically and from the edge of the sternum to the mid-axillary line later- ally. The female nipple is surrounded for half an inch by a more or less pigmented disc, the areola. The apex of a normal heart is in the fifth left intercostal space, three and a half inches from the mid-line.

The A bdomen. — In the mid-line a slight furrow extends from the ensiform cartilage above to the symphysis pubis below; this marks the linea alba in the abdominal wall, and about its middle point is the umbilicus or navel. On each side of it the broad recti muscles can be seen in muscular people. The outline of these muscles is interrupted by three or more transverse depressions indicating the lineae transversae in the recti; there is usually one about the ensiform cartilage, one at the umbilicus, and one between; sometimes a fourth is present below the umbilicus. The upper lateral limit of the abdomen is the sub- costal margin formed by the cartilages of the false ribs (8, 9, 10) joining one another; the lower lateral limit is the anterior part of the crest of the ilium and Poupart's ligament running from the anterior superior spine of the ilium to the spine of the pubis (see fig. 1, <5); these lower limits are marked by definite grooves. Just above the pubic spine is the external abdominal ring, an opening in the muscular wall of the abdomen for the spermatic cord to emerge in the male. The most modern method of mark- ing out the abdominal contents is to draw three horizontal and two vertical lines; the highest of the former is the transpyloric lineof C. Addison (fig. i,T.P.), which is situated half-way between the suprasternal notch and the top of the symphysis pubis; it often cuts the pyloric opening of the stomach an inch to the right of the mid-line. The hilum of each kidney is a little below it, while its left end approximately touches the lower limit of the spleen. It corresponds to the first lumbar vertebra behind. The second line is the subcostal (fig. 1, S.C.), drawn from the lowest point of the subcostal arch (tenth rib) ; it corresponds to the upper part of the third lumbar vertebra, and is an inch or so above the umbilicus; it indicates roughly the transverse colon, the lower ends of the kidneys, and the upper limit of the trans- verse (3rd) part of the duodenum. The third line is called the intertubercular (fig. 1, I.T.), and runs across between the two rough tubercles, which can be felt on the outer lip of the crest of the ilium about two and a half inches from the anterior superior spine. This line corresponds to the body of the fifth lumbar vertebra, and passes through or just above the ileo-caecal valve where the small intestine joins the large. The two vertical or mid-Poupart lines are drawn from the point midway between the anterior superior

spine and the pubic symphysis on each side vertically upward to the costal margin. The right one is the most valuable, as the ileo-caecal valve is situated where it cuts the intertuber- cular line, while the orifice of the vermiform appendix is an inch lower down. At its upper part it meets the transpyloric line at the lower margin of the ribs, usually the ninth, and here the gall- bladder is situated. The left mid-Poupart line corresponds in its upper three-quarters to the inner edge of the descending colon. The right subcostal margin corresponds to the lower

limit of the liver, while the right nipple is about half an inch above the upper limit of this viscus.

The Back. — There is a well-marked furrow stretching all the way down the middle line of the back from the external occipital protuberance to the cleft of the buttocks. In this the spinous processes of the vertebrae can be felt, especially if the model bend forward. The cervical spines are difficult to feel, except the seventh and sometimes the second, and although the former is called the vertebra prominens, its spine is less easily felt than is that of the first thoracic. In practice it is not very easy to identify any one spine with certainty: one method is to start from the prominent first thoracic and to count down ; another is to join the lower angles of the two scapulae (fig. 2, 7) when the arms are hanging down, and to take the spine through which the line passes as the seventh.

The spinal furrow is caused by the prominence of the erector spinae muscles on each side; these become less well marked as they run upward. The outlines of the scapulae can be well seen; they cover the ribs from the second to the seventh inclusive. The scapular spine is quite subcutaneous, and can be followed upward and outward from the level of the third thoracic spine to the acromion, and so to the outer end of the clavicle. On the lower margin of the acromion is a little tubercle known as the metacromial process or acromial angle, which is very useful for taking measurements from. The tip of the twelfth rib may usually be felt about two inches above the middle of the iliac crest, but this rib is very variable in length. The highest point of the iliac crest corresponds to the fourth lumbar spine, while the posterior superior iliac spine is on a level with the second sacral vertebra. This posterior superior spine is not easily felt, owing to the ligaments attached to it, but there is usually a little dimple in the skin over it (fig. 2 , ft) . By drawing horizontal lines through the 1st, 3rd and 5th lumbar spines, the transpyloric, subcostal and intertubercular lines or planes may be reproduced behind and the same viscera localized.

The Arm. — Running downward and outward from the inner half of the clavicle, where that bone is convex forward, is the clavicular part of the pectoralis major, while from the outer third of the bone, where it is concave forward, is the clavicular part of the deltoid ; between these two muscles is an elongated triangular gap with its base at the clavicle, and here the skin is somewhat depressed, while the cephalic vein sinks between the two muscles to join the axillary vein. The tip of the coracoid process is situated just under cover of the inner edge of the deltoid, one inch below the junction between the outer and middle thirds of the clavicle. The deltoid muscle (fig. 1, |3) forms the prominence of the shoulder, and its convex outline is due to the presence of the head of the humerus deep to it; when this is dislocated the shoulder becomes flattened. The pectoralis major forms the anterior fold of the axilla or armpit, the posterior being formed by the latissimus dorsi and teres major muscles. The skin of the floor of this space is covered with hair in the adult, and contains many large sweat glands. The axillary vessels and brachial plexus of nerves lie in the outer wall, while on the inner wall are the serrations of the serratus magnus muscle, the outlines of some of which are seen on the side of the thorax, through the skin, when the arm is raised (fig. 1, a). Below the edge of the pectoralis major, the swelling of the biceps (fig. 1, y) begins to be visible, and this can easily be traced into its tendon of insertion, which reaches below the level of the elbow joint. On each side of the biceps is the external and internal bicipital furrow, in the latter of which the brachial artery may be felt and compressed. The median nerve is here in close relation to the artery. At the bend of the elbow the two condyles of the humerus may be felt; the inner one projects beneath the skin, but the outer one is obscured by the rounded outline of the brachio-radialis muscle. The superficial veins at the bend of the elbow are very conspicuous; they vary a good deal, but the typical arrangement is an M, of which the radial and ulnar veins form the uprights, while the outer oblique bar is the median cephalic and the inner oblique the median basilic vein. At the divergence of these two the median vein comes up from the front of the forearm, while

the two vertical limbs are continued up the arm as the cephalic and basilic, the former on the outer side, the latter on the inner. On the back of the arm the three heads of the triceps are distin- guishable,

the external forming a marked oblique swelling when the forearm is forcibly extended and internally rotated (fig. 2,5). In the upper part of the front of the forearm the antecubital fossa or triangle is seen; its outer boundary is the brachio-radialis, its inner the pronator radii teres, and where these two join below is the apex. In this space are three vertical structures — externally the tendon of the biceps, just internal to this the brachial artery, and still more internally the median nerve. Coming from the inner side of the biceps tendon the semi -lunar fascia may be felt; it passes deep to the median basilic vein and superficial to the brachial artery, and in former days was a valuable protection to the artery when unskilful operators were bleeding from the median basilic vein. About the middle of the forearm the fleshy parts of the superficial flexor muscles cease, and only the tendons remain, so that the limb narrows rapidly. In front of the wrist there is a superficial plexus of veins, while deep to this two tendons can usually be made to start up if the wrist be forcibly flexed; the outer of these is the flexor carpi radialis, which is the physician's guide to the radial artery where the pulse is felt. If the finger is slipped to the outer side of this tendon, the artery, w T hich here is very superficial, can be felt beating. The inner of the two tendons is the palmaris longus, though it is not always present. On cutting down between these two the median nerve is reached.

The wrist joint may be marked out by feeling the styloid process of the radius on the outer side, and the styloid process of the ulna on the inner side behind, and joining these two by a line convex upward. The superficial appearance of the palm of the hand is described in the article on Palmistry; with regard to anatomical landmarks the superficial palmar arterial arch is situated in the line of the abducted thumb, while the deep arch is an inch nearer the wrist. The digital nerves correspond to lines drawn from the clefts of the fingers toward the wrist. On the back of the forearm the olecranon process of the ulna is quite subcutaneous, and during extension of the elbow is in a line with the two condyles, while between it and the inner condyle lies the ulnar nerve, here known popularly as the " funny bone." From the olecranon process the finger may be run down the posterior border of the ulna, which is subcutaneous as far as the styloid process at the lower end. On the dorsum of the hand is a plexus of veins, deep to which the extensor tendons are seen on extending the fingers. When the thumb is extended, two tendons stand out very prominently, and enclose a triangular space between them which is sometimes known as the "anatomical snuffbox "; the outer of these is the tendon of the extensor brevis, the inner of the extensor longus pollicis. Situated deeply in the space is the radial

artery, covered by the radial vein. On the dorsum of the hand there is a plexus of veins, and deep to these the tendons of the extensor longus digitorum stand out when the wrist and fingers are extended.

Tlte Leg. — Just below Poupart's ligament (fig. i, 5), a tri- angular depression with its apex downward may be seen in muscular subjects; it corresponds to Scarpa's triangle, and its inner border is the tendon of the adductor longus, which is easily felt if the model forcibly adducts the thigh. In this triangle the superficial inguinal glands may be made out. The head of the femur lies just below the centre of Poupart's ligament. The sartorius muscle forms the outer boundary of the triangle, and may be traced from the anterior superior spine obliquely down- ward and inward, across the front of the thigh, to the inner side of the knee. The two vasti muscles are well marked, the internal being the lower and forming with the sartorius the rounded bulging above the inner side of the knee. The internal saphenous vein runs superficially up the inner side of the thigh from behind the internal condyle to the femur to the saphenous opening in the deep fascia, the top of which is an inch horizontally outward from the spine of the pubis. On the other side of the thigh , a groove runs down which corresponds to the ilio-tibial band, a thickening of the fascia lata or deep fascia; the lower end of

this leads to the head of the fibula. On the front of the thigh, below the sartorius, the rectus muscle makes a prominence which leads down to the patella, the outlines of which bone are very evident (fig. i, e). The only part of the femur besides the great trochanter which is superficial is the lower end, and this forms the two condyles for articulation with the tibia. If the posterior part of the inner condyle be joined to the mid-point between the anterior superior spine and the symphysis pubis, when the thigh is externally rotated, the line will correspond in its upper two- thirds to that of the common and superficial femoral arteries, the former occupying the upper inch and a half. The common femoral vein lies just internal to its artery, while the anterior crural nerve is a quarter of an inch external to the latter. The rounded mass of the buttock is formed by the gluteus maximus muscle covered by fat; the lower horizontal boundary is called the fold of the nates, and does not correspond exactly to the lower edge of the muscle. At the side of the buttock is a de- pression (fig. 2, e) where the great trochanter of the femur can be felt; a line, named after Nelaton, drawn from the anterior superior spine to the tuberosity of the ischium, passes through the top of this. On the back of the thigh the hamstrings form a distinct swelling; below the middle these separate to enclose the diamond-shaped popliteal space (fig. 2, f), the outer ham- strings or biceps being specially evident, while, on

the inner side, the tendons of the semi-tendinosus and semi-membranosus can be distinguished. The external popliteal nerve may be felt just behind the biceps tendon above the head of the fibula.

On the front of the leg, below the knee, the ligamentum patellae is evident, leading down from the patella (fig. i, e) to the tubercle of the tibia. From this point downward the anterior border of the tibia or shin is subcutaneous, as is also the internal surface of the tibia. Internal to the skin is the fleshy mass made by the tibialis anticus and extensor longus digitorum muscles. At the inner side of the ankle the internal malleolus is subcutaneous, while on the outer side the tip of the external malleolus is rather lower and farther back. Both this malleolus and the lower quarter of the shaft of the fibula are subcutaneous, and this area, if traced upward, is continuous with a furrow on the outer side of the leg which separates the anterior tibial from the peroneal groups of muscles, and eventually leads to the subcu- taneous head of the fibula. At the back of the leg the two heads of the gastrocnemius form the calf, the inner one (fig. 2, 77) being larger than the outer. Between the two, in the mid-line of the calf, the external saphenous vein and nerve lie, while lower down they pass behind the external malleolus to the outer side of the foot. The internal saphenous vein and nerve lie just behind the internal border of the tibia, and below pass in front of the internal malleolus. At the level of the ankle-joint the tibialis posticus and flexor longus digitorum tendons lie just behind the internal malleolus, while the peroneus longus and brevis are behind the external. Running down to the heel is the tendo Achillis with the plantaris on its inner side. On the dorsum of the foot the musculo-cutaneous nerve may be seen through the skin in thin people when the toes are depressed; it runs from the anterior peroneal furrow, already described, to all the toes, except the cleft between the two inner ones. There is also a venous arch to be seen, the two extremities of which pass respec- tively into the external and internal saphenous veins. The long axis of the great toe, even in races unaccustomed to boots, runs forward and outward, away from the mid-line between the two feet, so that perfectly straight inner sides to boots are not really anatomical. The second toe in classical statues is often longer than the first, but this is seldom seen in Englishmen. On the outer side of the sole the skin is often in contact with the ground all along, but on the inner side the arch is more marked, and, except in flat-footed people, there is an area in which the sole does not touch the ground at all.

For further details of surface anatomy see Anatomy for Art Students, by A. Thomson (Oxford,. 1896); Harold Stiles's article in Cunningham's Text-Book of Anatomy (Young J. Pentland, 1902) ; G.

Thane and R. Godlee's Appendix to Quain' s Anatomy (Longmans, Green & Co., 1896); Surface Anatomy, by B. Windle and Manners Smith (H. K. Lewis, 1896) ; Landmarks and Surface Markings of

the Human Body, by L. B. Rawling (H. K. Lewis, 1906) ; Surface Anatomy, by T. G. Moorhead (Bailliere, Tindall & Cox, 1905). No one interested in the subject should omit to read an article on " Art in its relation to Anatomy," by W. Anderson, British Medical Journal, 10th August 1895. (F. G. P.)

ANATTO (possibly a native American name, with many variants such as annatto, arnotto), a colouring matter produced from the seeds of Bixa orellana (natural order Flacourtiaceae) , a small tree which grows in Central and South America. The seeds are surrounded with a thin coating of a waxy pulp, which is separated from them by washing in water, passing the liquid through a sieve and allowing the suspended pulp to deposit. The water is then drained away and the paste dried, till it is a thick, stiff, unctuous mass. In this state it has a dark orange-red colour and is known as " roll " or " flag " amotto, according to the form in which it is put up, but when further dried it is called^ " cake " arnotto. Arnotto is much used by South American Indians for painting their bodies; among civilized communities its principal use is for colouring butter, cheese and varnishes. It yields a fugitive bright orange colour, and is to some extent used alone, or in conjunction with other dyes, in the dyeing of silks and in calico printing. It contains a yellow colouring matter, bixin, Ci 6 H 2 60 2 .

ANAXAGORAS, Greek philosopher, was born probably about the year 500 B.C. (Apollodorus ap. Diog. Laert. ii. 7.) At his native town of Clazomenae in Asia Minor, he had, it appears, some amount of property and prospects of political influence, both of which he surrendered, from a fear that they would hinder his search after knowledge. Nothing is known of his teachers; there is no reason for the theory that he studied under Her- motimus of Clazomenae, the ancient miracle-worker. In early manhood (c. 464-462 B.C.) he went to Athens, which was rapidly becoming the headquarters of Greek culture. There he is said to have remained for thirty years. Pericles learned to love and admire him and the poet Euripides derived from him an enthu- siasm for science and humanity. Some authorities assert that even Socrates was among his disciples. His influence was

due partly to his astronomical and mathematical eminence, but still more to the ascetic dignity of his nature and his superiority to ordinary weaknesses — traits which legend has embalmed. It was he who brought philosophy and the spirit of scientific inquiry from Ionia to Athens. His observations of the celestial bodies led him to form new theories of the universal order, and brought him into collision with the popular faith. He attempted, not without success, to give a scientific account of eclipses, meteors, rainbows and the sun, which he described as a mass of blazing metal, larger than the Peloponnesus; the heavenly bodies were masses of stone torn from the earth and ignited by rapid rotation. The ignorant polytheism of the time could not tolerate such explanation, and the enemies of Pericles used the superstitions of their countrymen as a means of attacking him in the person of his friend.

Anaxagoras was arrested on a charge of contravening the established dogmas of religion (some say the charge was one of Medism) , and it required all the eloquence of Pericles to secure his acquittal. Even so he was forced to retire from Athens to Lampsacus (434-433 B.C.) , where he died about 428 B.C., honoured and respected by the whole city.

It is difficult to present the cosmical theory of Anaxagoras in an intelligible scheme. All things have existed in a sort of way from the beginning. But originally they existed in infinitesi- mally small fragments of themselves, endless in number and in- extricably combined throughout the universe. All things existed in this mass, but in a confused and indistinguishable form. There were the seeds (

other that the keenest analysis can never completely sever them. The work of arrangement, the segregation of like from unlike and the summation of the dfwiofiepr) into totals of the same name, was the work of Mind or Reason; wavra xpv /j-clto, fjv oixov • elra vovs ekddiv aira bienoa jj/qae. This peculiar thing, called Mind {vovs), was no less illimitable than the chaotic mass, but, unlike the Intelligence of Heraclitus (q.v.), it stood pure and independent (fj,ovvos e‘ ecovrov), a thing of finer texture, alike in all its manifestations and every- where the same. This subtle agent, possessed of all knowledge and power, is especially seen ruling in all the forms of life. Its first appearance, and the only manifestation of it which Anaxa- goras describes, is Motion. It originated a rotatory movement in the mass (a movement far exceeding the most rapid in the world as we know it), which, arising in one corner or point, gradually extended till it gave distinctness and reality to the aggregates of like parts. But even after it has done its best, the

original intermixture of things is not wholly overcome. No one thing in the world is ever abruptly separated, as by the blow of an axe, from the rest of things. The name given to it signifies merely that in that congeries of fragments the particular " seed " is preponderant. Every a of this present universe is only a by a majority, and is also in lesser number b, c, d. It is noteworthy that Aristotle accuses Anaxagoras of failing to differentiate between vovs and ˆ/vxv, while Socrates (Plato, Phaedo, 98 b) objects that his vovs is merely a deus ex machina to which he refuses to attribute design and knowledge.

Anaxagoras proceeded to give some account of the stages in the process from original chaos to present arrangements. The division into cold mist and warm ether first broke the spell of confusion. With increasing cold, the former gave rise to water, earth and stones. The seeds of life which continued floating in the air were carried down with the rains and produced vegeta- tion. Animals, including man, sprang from the warm and moist clay. If these things be so, then the evidence of the senses must be held in slight esteem. We seem to see things coming into being and passing from it; but reflection tells us that decease and growth only mean a new aggregation (crvy- tcpiais) and disruption (5i&Kpi

Anaxagoras marks a turning-point in the history of philosophy. With him speculation passed from the colonies of Greece to settle at Athens. By the theory of minute constituents of things, and his emphasis on mechanical processes in the formation of order, he paved the way for the atomic theory. By his enunciation of the order that comes from reason, on the other hand, he suggested, though he seems not to have stated ex- plicitly, the theory that nature is the work of design. The con- ception of reason in the world passed from him to Aristotle, to whom it seemed the dawn of sober thought after a night of disordered dreams. From Aristotle it descended to his com- mentators, and under the influence of Averroes became the engrossing topic of speculation.

Authorities. — The fragments of Anaxagoras have been collected by E. Schaubach (Leipzig, 1827), and W. Schorn (Bonn, 1829); see also F. W. A. Mullach, Fragmenta Philos. Graec. i. 243-252 ; A. Fair- banks, The First Philosophers of Greece (1898). For criticism see T. Gomperz, Greek Thinkers (Eng. trans., L. Magnus, 1901), bk. ii. chap. 4; E. Bersot, De controversis quibusdam Anaxagorae doctrinis (Paris, 1844) ; E. Zeller, Die Philosophic der Griechen (Eng. trans., S. F. Alleyne, 2 vols., London, 1881); J. M. Robertson, Short History of Freethought (London, 1906) ; W. Windelband, History of Philo- sophy (Eng. trans., J. H. Tufts, 1893); J. I. Beare, Greek Theories of

Elementary Cognition (1906) ; L. Parmentier, Euripide et Anaxagore (1892) ; F. Lortzing, " Bericht liber die griechischen Philosophen vor Sokrates " (for the years 1 876-1 897) in Bursian's Jahresbericht iiber die Fortschritte der classischen Altertumswissenschaft, cxvi. (1904), with references to important articles in periodicals.

(W. W. ; J. M. M.)

ANAXARCHUS (c. 340 B.C.), a Greek philosopher of the school of Democritus, was born at Abdera. He was the companion and friend of Alexander in his Asiatic campaigns. He checked

the vainglory of Alexander, when he aspired to the honours of divinity, by pointing to his wounded finger, saying, " See the blood of a mortal, not of a god." The story that at Bactra in 327 B.C. in a public speech he advised all to worship Alexander as a god even during his lifetime, is with greater probability attributed to the Sicilian Cleon. It is said that Nicocreon, tyrant of Cyprus, commanded him to be pounded to death in a mortar, and that he endured this torture with fortitude; but the story is doubtful, having no earlier authority than Cicero. His philosophical doctrines are not known, though some have inferred from the epithet ebdatfiowcds ("fortunate"), usually applied to him, that he held the end of life to be evSainovia.

ANAXILAUS, of Larissa, a physician and Pythagorean philo- sopher, who was banished from Rome by Augustus, B.C. 28, on the charge of practising the magic art. This accusation appears to have originated in his superior skill in natural philosophy, by which he produced effects that the ignorant attributed to magic.

Euseb., Chron. ad Olymp. clxxxviii. ; St Iren. i. 13; Pliny xix. 4, xxv. 95, xxviii. 49, xxxii. 52, xxxv. 50.

ANAXIMANDER, the second of the physical philosophers of Ionia, was a citizen of Miletus and a companion or pupil of Thales. Little is known of his life. Aelian makes him the leader of the Milesian colony to Amphipolis, and hence some have inferred that he was a prominent citizen. The computations of Apollo- dorus have fixed his birth in 611, and his death shortly after 547 B.C. Tradition, probably correct in its general estimate, represents him as a

successful student of astronomy and geo- graphy, and as one of the pioneers of exact science among the Greeks. He taught, if he did not discover, the obliquity of the ecliptic, is said to have introduced into Greece the gnomon (for determining the solstices) and the sundial, and to have invented some kind of geographical map. But his reputation is due mainly to his work on nature, few words of which remain. From these fragments we learn that the beginning or first principle (apxh, a word which, it is said, he was the first to use) was an endless, unlimited mass {airupov), subject to neither old age nor decay, and perpetually yielding fresh materials for the series of beings which issued from it. He never defined this principle precisely, and it has generally (e.g. by Aristotle and Augustine) been understood as a sort of primal chaos. It embraced everything, and directed the movement of things, by which there grew up a host of shapes and differences. Out of the vague and limitless body there sprung a central mass, — this earth of ours, cylindrical in shape, poised equidistant from surrounding orbs of fire, which had originally clung to it like the bark round a tree, until their continuity was severed, and they parted into several wheel- shaped and fire-filled bubbles of air. Man himself and the animals had come into being by like transmutations. Mankind was supposed by Anaximander to have sprung from some other species of animals, probably aquatic. But as the measureless and endless had been the prime cause of the motion into separate existences and individual forms, so also, according to the just award of destiny, these forms would at an appointed season suffer the vengeance due to their earlier act of separation, and return into the vague immensity whence they had issued. Thus the world, and all definite existences contained in it, would lose their independence and disappear in the " indeterminate." The blazing orbs, which have drawn off from the cold earth and water, are the temporary gods of the world, clustering round the earth, which, to the ancient thinker, is the central figure.

See Histories of the Ionian School by Ritten, Mallet; Schleier-macher, " Dissert, sur la philosophic d'Anaximandre," in the Memoires de I'acad. des sciences de Berlin (1815); J. Burnet, Early Greek Philosophy (Lond. 1892); A. W. Benn, Greek Philosophers (Lond. 1883 foil.); A. Fairbanks, First Philosophers of Greece (Lond. 1898); Ritter and Preller, Historia Phil. §§ 17-22; Mullach, Fragmenta Phil. Graec. i. 237-240, and Ionian School of Philo-sophy.

ANAXIMENES, of Lampsacus (fl. 380-320 B.C.), Greek rhetori- cian and historian, was a favourite of Alexander the Great, whom he accompanied in his Persian campaigns. He wrote histories of Greece

and of Philip, and an epic on Alexander (fragments in Miiller, Scriptores Rerum Alexandri Magni). As

a rhetorician, he was a determined opponent of Isocrates and his school. The Rhetorica ad Alexandrum, usually included among the works of Aristotle, is now generally admitted to be by Anaximenes, although some consider it a much later production (edition by Spengel, 1847).

See P. Wendland, Anax. von Lampsakos (1905) ; also Rhetoric.

ANAXIMENES, of Miletus, Greek philosopher in the latter half of the 6th century, was probably a younger contemporary of Anaximander, whose pupil or friend he is said to have been. He held that the air, with its variety of contents, its universal presence, its vague associations in popular fancy with the phenomena of life and growth, is the source of all that exists. Everything is air at different degrees of density, and under the influence of heat, which expands, and of cold, which contracts its volume, it gives rise to the several phases of existence. The process is gradual, and takes place in two directions, as heat or cold predominates. In this way was formed a broad disk of earth, floating on the circumambient air. Similar condensations produced the sun and stars; and the flaming state of these bodies is due to the velocity of their motions.

See Schmidt, Disserlatio de Anaximensis psychologia (Jena, 1869); Ritter and Preller, Historia Phil. §§ 23-27; A. Fairbanks, First Philosophers of Greece (1898); Mullach, Fragmenta Phil. Graec. i. 241-243 ; also Ionian School of Philosophy ; Evolution.

ANAZARBUS (med. Ain Zarba; mod. Navarza), an ancient Cilician city, situated in the Aleian plain about 10 m. W. of the main stream of the Pyramus (Jihun) and near its tributary the Sempas Su. A lofty isolated ridge formed its acropolis. Though some of the masonry in the ruins is certainly pre-Roman, Suidas's identification of it with Cyinda, famous as a treasure city in the wars of Eumenes of Cardia, cannot be accepted in the face of Strabo's express location of Cyinda in western Cilicia. Under the early Roman empire the place was known as Caesarea, and was the metropolis of Cilicia Secunda. Rebuilt by the emperor Justin after an earthquake, it became Justinopolis (a.d. 525); but the old native name persisted, and when Thoros I., king of Lesser Armenia, made it his capital early in the 12th century, it was known as Anazarva. Its great natural strength and situation, not far from the mouth of the Sis pass, and near the great road which debouched from the Cilician gates, made

Anazarbus play a considerable part in the struggles between the Byzantine empire and the early Moslem invaders. It had been rebuilt by Harun al-Rashid in 796 a.d., refortified at great expense by Saif addaula, the Hamdanjd (10th century) and Saiked, and ruined by the crusaders.

The present wall of the lower city is of late construction, probably Armenian. It encloses a mass of ruins conspicuous in which are a fine triumphal arch, the colonnades of two streets, a gymnasium, &c. A stadium and a theatre lie outside on the south. The remains of the acropolis fortifications are very interesting, including roads and ditches hewn in the rock; but beyond ruins of two churches and a fine tower built by Thoros I. there are no notable structures in the upper town. For pictur- esqueness the site is not equalled in Cilicia, and it is worth while to trace the three fine aqueducts to their sources. (D. G. H.)

ANBAR, originally called Firuz Shapur, or Perisapora, a town founded about a.d. 350 by Shapur (Sapor) II. Sassanid, king of Persia, on the east bank of the Euphrates, just south of the Nahr Isa, or Sakhlawieh canal, the northernmost of the canals connect- ing that river with the Tigris, in lat. 33° 22′ N., long. 43° 49′ E. It was captured and destroyed by the emperor Julian in a.d. 363, but speedily rebuilt. It became a refuge for the Christian and Jewish colonies of that region, and there are said to have been 90,000 Jews in the place at the time of its capture by Ali in 657. The Arabs changed the name of the town to Anbar (" granaries "). Abu 'l-'Abbas as-Saffah, the founder of the Abbasid caliphate, made it his capital, and such it remained until the founding of Bagdad in 762. It continued to be a place of much im- portance throughout the Abbasid period. It is now entirely deserted. The site is occupied only by ruin mounds, as yet unexplored. Their great extent indicates the former importance of the city. (J. P. Pe.)

ANCACHS, a coast province of central Peru, lying between the departments of Lima and Libertad, and W. of the Marafion river. Area, 16,562 sq. m.; pop. (1896) 428,703. The depart- ment was created in 1835, and received its present name in 1839, and its last accession of territory in 1861. Lying partly on the arid coast, partly in the high Cordilleras and partly in the valley of the Marafion, it has every variety of climate and productions. Rice, cotton, sugar-

cane, yucas (Manihot aipi) and tropical fruits are produced in the irrigated valleys of the coast, and wheat, Indian corn, barley, potatoes, coffee, coca, &c, in the upland regions. Cattle and sheep are also raised for the coast markets. Mining is likewise an important industry. The capital, Huaraz (est. pop. 8000 in 1896), on the Rio Santa or Huaraz, is a large mining centre in the sierras, 9931 ft. above sea-level, from which a railway runs to the small seaports of Santa and Chimbote, 172 m. distant. Other noteworthy towns are Caraz (6000) and Carhuaz (5000) in the sierra region, and Huarmey (1500) on the coast.

ANCAEUS, in Greek legend, son of Zeus or Poseidon, king of the Leleges of Samos. In the Argonautic expedition, after the death of Tiphys, helmsman of the " Argo," he took his place. It is said that, while planting a vineyard, he was told by a sooth- sayer that he would never drink of its wine. As soon as the grapes were ripe, he squeezed the juice into a cup, and, raising it to his lips, mocked the seer, who retorted with the words, IloXXa neraˆv 7reXet kvXikos ko.1 xˆˆos cucpov (" there is many a slip between the cup and the lip "). At that moment it was announced that a wild boar was ravaging the land. Ancaeus set down the cup, leaving the wine untasted, hurried out, and was killed by the boar. Apollonius Rhodius, i. 188 (and Scholiast), ii. 867-900.

ANCASTER AND KESTEVEN, Duke of, an English title borne by the well-known Lincolnshire family of Bertie from 1715 to 1809. Robert Bertie (1660-1723), son and heir of Robert, third earl of Lindsey (d. 1701), who succeeded his father as lord great chamberlain of England, was created marquess of Lindsey in 1706, being made duke of Ancaster and Kesteven in July 1715. His eldest surviving son, Peregrine (1686-1742), who had been a member of parliament for Lincolnshire from 1708 to 1 7 14, succeeded to the dukedom and also to the lord- lieutenancy of Lincolnshire, which had been held by his father. His son and successor, Peregrine (1714-1778), who was also lord great chamberlain and lord-lieutenant of Lincolnshire, attained the rank of general in the British army. The fourth duke was Robert (1756-1779), son of the third duke, who died in July 1 7 7 9, when his barony of Willoughby de Eresby and the hereditary office of lord great chamberlain fell into abeyance until 1780. The dukedom, however, and other honours came to his uncle Brownlow (1729-1809), on whose death in February 1809 the dukedom of Ancaster and Kesteven became extinct; but the earldom of Lindsey descended to a distant kinsman, Albemarle Bertie (1744-1818). After a second period of abeyance the barony of Willoughby de Eresby was revived in 1871 in favour of Clementina Elizabeth (d.

1888), a descendant of the Berties, who was the widow of Gilbert John Heathcote, 1st Baron Aveland (d. 1867). Her son and successor, Gilbert Henry Heathcote-Drummond-Willoughby (b. 1830), 23rd Baron Willoughby de Eresby, and joint hereditary lord great chamber- lain, was created earl of Ancaster in 1898.

ANCELOT, JACQUES ARSENE FRANCOIS POLYCARPE (1794-1854), French dramatist and litterateur, was born at Havre, on the 9th of February 1794. He became a clerk in the admiralty, and retained his position until the revolution of 1830. In 1816 his play Warwick was accepted by the Theatre Francais, but never produced, and three years later a five-act tragedy, Louis IX., was staged. Three editions of the play were speedily exhausted; it had a run of fifty representations, and brought him a pension of 2000 francs from Louis XVIII. His next work, Le Make du palais, was played in 1825 with less success; but for it he received the cross of the legion of honour. In 1824 he produced Fiesque, a clever adaptation of Schiller's Fiesco. In 1828 appeared Olga, ou I'orpheline russe, the plot of

which had been inspired by a voyage he made to Russia in 1826. About the same period he produced in succession Marie de Brabant (1825), a poem in six cantos; L'Homme du monde (1827), a novel in four volumes, afterwards dramatized with success; and in 1829 a play, Elisabeth d' Angleterre. By the revolution of July 1830 he lost at once his royal pension and his office as librarian at Meudon; and he was chiefly employed during the next ten years in writing vaudevilles and light dramas and comedies. A tragedy, Maria Padilla (1838), gained him admission to the French Academy in 1841. Ancelot was sent by the French government in 1849 to Turin, Florence, Brussels and other capitals, to negotiate on the subject of international copyright; and the treaties which were concluded soon after were the result, in a great measure, of his tact and intelligence.
ANCESTOR-WORSHIP, a general name for the cult of deceased parents and forefathers. Aristotle in his Ethics stigmatizes as " extremely unloving " (\lav H.&'kov) the denial that ancestors are interested in or affected by the fortunes of their descendants; and in effect ancestor-worship is the staple of most religions, ancient or modern, civilized or savage. The ancient Jews were a striking exception; for though the frequent mention of ancestral graves on hilltops or in caves, and in connexion with sacred trees and pillars, and the resemblance of the " elohim " in Exod. xxi. 4-6 to household gods, may suggest that cults of the dead preceded that of Yahweh, nevertheless in the classical age of their religion (see Hebrew Religion) as reflected in the Old Testament, ancestor-worship has

already vanished. " The Semitic nomads," remarks Renan in his History of Israel (tome 1, p. 50), " were the religious race par excellence, because in fact they were the least superstitious of the families of mankind, the least duped by the dream of a beyond, by the phantasmagory of a double or a shadow surviving in the nether regions. . . . They suppressed the chimeras which went with belief in a complete survival after death, chimeras which were homicidal at the time, in so far as they robbed man of the true notion of death and led him to multiply murders."

Renan here refers to the burial rite of an ancient Scythian king (as described by Herodotus, iv. 71), at whose tomb were strangled his concubine, cup-bearer, cook, groom, lackey, envoy, and several of his horses. Such cruel customs were, of course, and still are associated in many lands with the cult of the dead; but, on the other hand, there are gentler and more beneficial aspects observable to-day in China and Japan. There the mighty dead are present with the living, protect them and their houses and crops, are their strength in battle, and teach their hands to war and their fingers to fight. In the Russo-Japanese War in 1904-5 the greatest incentive to deeds of patriotic valour was for Japanese soldiers the belief that the spirits of their ancestors were watching them; and in China it is not the man himself that is ennobled for his philanthropic virtues or learning, but his ancestor. No more solemn duty weighs upon the China- man than that of tending the spirits of his dead forefathers. Confucius, it is recorded, sacrificed to the dead, as if they were present, and to the spirits, as if they were there. In view of such Chinese sacrifices the names of the dead are in- scribed on wooden plaques called spirit-tablets, into which the spirits are during the ceremony supposed to enter, having quitted the very heaven and presence of God in order to commune with posterity. Twice a year, in spring and autumn, 1 a Chinese ruler goes in state to the imperial college in Pekin, and presents the appointed offerings before the spirit-tablets of Confucius and of the worthies who have been associated with him in his temples. He greets the sage's spirit with this prayer : — " This year, in this month, on this day, I, the emperor, offer sacrifice to the philosopher K'ung, the ancient teacher, the perfect sage, and say, teacher, in virtue equal to heaven and earth. . . Now in this second month of spring, in reverent observance of the old statutes, with victims, silks, spirits, and fruits, I offer sacrifice to thee."

In ancient Rome painted wax images of ancestors who had

1 Prof. J. Legge, in Religious Systems of the World, London, 1892. p. 72.

served the state in its highest offices were preserved in the atria or halls of their descendants, inscribed, like the Chinese tablets, with titles recording their dignity and exploits. Whether the departed spirits tenanted them according to the Chinese belief is not recorded; though it probably was so, for at funerals they might be carried, like the images of the gods in Lectisternia (see Image Worship), on couches before the corpse. Oftener, however, they were mere masques worn at funerals by men who personated the ancestors and wore their robes of office. Perhaps the vulgar regarded these men as temporary reincarnations of those whom they thus represented.

The word Manes signified the friendly ancestral ghosts of a Roman household. To them, under the name of Lares, it was the solemn preoccupation of male descendants to offer food and sacrifice and to keep alight the hearth fire which cooked the offerings. Small waxen images of the Manes called Lares, clothed in dogskin, and on feast days crowned with garlands, stood round the family hearth of which they were the unseen guardians (but see Lares). To lack such care and tendance was — along with want of regular burial — the most dreadful fate that could overtake an ancient; and a Roman, like a Hindu, in case he was childless, adopted a male child whose duty it would be, as if his own son, to continue after his death the family rites or sacra. On this side the ancestor-worship of the Aryans has been productive of the most important institutions of adop- tion and will or testament. Sir Henry Maine {Ancient Law, ch. v.) has justly observed that " the history of political ideas begins with the assumption that kinship in blood is the sole possible ground of community in political functions," and that in early commonwealths "citizens considered all the groups in which they claimed membership to be founded on common lineage." A man only shared in house, tribe and state, so far as he was descended from particular ancestors and eponymous heroes, and due cult of these illustrious dead was the condition of his enjoying any rights or inheriting any property. Yet if society was to grow, men of alien descent had to be admitted into the original brotherhood and amalgamated therewith. " Adverting to Rome singly," adds the same author, " we perceive that the primary group, the family, was being constantly adulterated by the practice of adoption." Thus transition was made possible from an agnatic society based on blood ties to one based on contiguity.

In the worship of the Lares the head of a Roman household

commemorated and reinforced the blood tie which made one ‘ C.esh of all its members living and dead. The gens in turn was regarded as an expansion of the family, as was the state of the gens; and members of these larger units by worship of common ancestors — usually mythical — kept alive the feeling that they were a single organic whole animated by a common soul and joined in consanguinity. Outcasts alone, the offspring of irregular unions, could be ignorant of the blood which ran in their veins, of the unseen ancestors to be fed and tended in family and gentile rites. 1 Such considerations help us to understand the enormous importance attached in ancient societies to the right of intermarriage, as also to grasp the origin of wills and testa- ments. For a will was to begin with but a mode of indicating (not necessarily in writing) on whom devolved the duty of con- ducting a parent’s funeral, and together with that duty the right of inheriting his property. The due performance of funeral rites re-created the blood tie and renewed the kinship of living and dead at the moment when death seemed specially to en- danger it by removal of that representative of the household whose special duty it had been to keep up the family sacra. In Hindostan, as Maine remarks (op. cit. ch. vi.), we have a parallel to the Roman system; for there ” the right to inherit a dead man’s property is exactly co-extensive with the duty of performing his obsequies. If the rites are not properly performed or not performed by the proper person, no relation is considered as established between the deceased and anybody surviving

1 Livy iv. 2: — ” Quam enim aliam vim connubia promiscua habere, nisi ut ferarum prope ritu vulgentur concubitus plebia Patrumque? ut qui natus sit, ignoret, cujus sanguinis, quorum sacrorum sit.”

him; the law of succession does not apply, and nobody can in- herit the property. Every great event in the life of a Hindu seems to be regarded as leading up to and bearing on these solemnities. If he marries, it is to have children who may celebrate them after his death; if he has no children, he lies under the strongest obligation to adopt them from another family, ‘ with a view,’ writes the Hindu doctor, ‘ to the funeral cake, the water and the solemn sacrifice.’ ” ” May there be born in our lineage,” so the Indian Manes are supposed to say, ” a man to offer to us, on the thirteenth day of the moon, rice boiled in milk, honey and ghee.” 2

It is then in connexion with the history of inheritance and adoption, and of the gradual evolution from societies held together only by blood-kinship to societies consolidated on other bases, especially on that of local contiguity, that ancestor-worship chiefly calls for

investigation.

We must now pass on to other aspects of it less important for the student of ancient law, but interesting to the folklorist.

In ancient Rome the Di manes, or as we should say the blessed dead, who reposed in their necropolis outside the walls, were specially commemorated on the dies parentales or days of placat- ing them (placandis Manibus). These began on the 13th of February and ended on the 22nd with the Caristia or feast of CaraCognatio. The family have on the preceding days solemnly visited the grave, and offered to the shades gifts of water, wine, milk, honey, oil, and the blood of black victims; they have decked the tomb with flowers, have renewed the feast and fare- well of the funeral, and have prayed to the ancestors to watch over their welfare.. Now the survivors return home and hold a love-feast, in which all quarrels are healed, all trespasses forgiven. The Lares are brought out to preside over this solemn feast, and for the occasion are incincti or clothed in tunics girt at the loins.

It is doubtful whether we should dignify by the name of ancestor-worship the older Roman festival of the Lemuria, which was held on the 9th, nth and 13th of May. For the lemures were, like our unlaid ghosts, unburied, mischievous or inimical spirits, and these three days were nefasti or unlucky, because their malign influence was abroad. The ghosts had to be driven out of the house, and Ovid (Fasti, v. 432) relates how the head of the family arose at midnight, and with feet unfettered by shoon or sandals, and with washen hands traversed his house beckoning against the ghosts with fingers joined to thumb. Nine times with averted glance he spat a black bean out of his mouth and cried: " With these I redeem me and mine." The ghosts followed and picked up, or perhaps entered into the beans. Then he washed afresh, and rattled his brass vessels, and nine times over bade them begone with the polite formula, Manes exite paterni, " Go forth, O paternal manes."

The gesture described was probably the same as that with which a Christian priest averts demonic influences from the heads of his congregation in the act of blessing them. The many hands of Zeus Sabazios turned up in ancient excavations observe a similar gesture. All over the earth we meet with such periodically recurrent ceremonies of expelling demons and ghosts, who usually are given a meal before being hunted back into their graves. But an account of such ceremonies belongs rather to demonology than to the history of the worship of Manes, which are peaceful, well-conducted and

beneficent beings, endowed and, so to speak on the foundation, like the Christian souls for whose masses money has been left. Ancestor-worship has its parallels in Christian cults of the dead and of the saints; it must be remembered, however, that a saint is not as a rule an ancestor, and that his cult is not based upon family feeling and love of kinsmen, nor tends to stimulate and encourage the same. Such cults have never prevented those who participated in them from fighting one another. Ancestor-worship on this side is also in strong contrast with the teaching of the Gospel, for it is an apotheosis of family affections and supplies a real cement where- with to bind society together; whereas the Christian Messiah taught that, " If any cometh to me, and hateth not his father 2 E. B. Tylor, Primitive Culture, ii. p. 119.

and his mother, and his wife and his children, and his brethren and his sister, yea, and his own life also, he cannot be my disciple." To the ordinary good citizen of antiquity, whose religion was the consecration of family ties, such a precept was no less scandalous than it is to a Chinaman or Hindu of to-day. Was not the duty of following the Messiah to supersede even that of burying one's parents, the most sacred of all ancient obligations? The Church when it had once conquered the world allowed such precepts to lapse and fall into the background, and no one save monks or Manichaean heretics remembered them any more; indeed modern divines affect to believe that marriage rites and family ties were the peculiar concern of the Church from the very first; and few moderns will fail to sympathize with the misgivings of the barbarian chief who, having been converted and being about to receive Christian baptism, paused as he stepped down into the font, and asked the priests if in the heaven to which their rites admitted him he would meet and converse with his pagan ancestors. On being assured that he would not, he stepped out again and declined their methods of salvation.

In the above paragraphs we have drawn examples only from races organized on a patriarchal basis among whom the headship passes from father to son. But many primitive societies do not trace descent through males and yet may be said to worship ancestors. The aborigines of Australia furnish an example. The Aruntas among them are said to have no idea of paternity, but believe that local spirits of tree, rock or stream enter women as they pass by their haunts. In doing so they drop a wooden soul-token called a Churinga. This the

elders of the tribe pick up or pretend to find, and carefully store up in a cleft of the hills or in a cave which no woman may approach. The souls of members of the tribe who have died survive in these slips of wood, which are treasured up for long generations and repaired if they decay. They are carried into battle to assist the tribe, are regularly anointed, fondled and invoked; for it is believed that the souls present in them are powerful to work weal and woe to friend and enemy respectively. They thus resemble the Chinese spirit tablet.

Reference has been made above to the possibility that the Roman imago of an ancestor actually embodied his ghost, at least on solemn occasions. The custom of providing a material abode or nidus for the ghost is found all over the earth; e.g. in New Ireland a carved chalk figure of the deceased, indicating the sex, is procured, and entrusted to the chief of a village, who sets it up in a funeral hut in the middle of a large taboo house adorned with plants. The survivors believe that the ghostly ogre, being so well provided for, will abstain from haunting them.

The Romans, as we remarked above, distinguished between the Lemures or wandering mischievous ghosts and the Manes snugly interred and tended in the cemetery which was part of every Italian settlement. The distinction, however, is one for which survivors alone are responsible and not one inherent in the nature of ghosts. No race at all, it would seem, except the Jews, has ever been able to regard a man's death as the end of him; and except in the higher forms of Christianity the dead are everywhere supposed to need the same sort of food, equip- ment, tenement and gear which they enjoyed in life, and to molest the living unless they obtain it. It may be affection, or it may be fear, which prompts the survivor to feed and tend his dead; in general no doubt it is a mixture of both feelings.

In Africa and other savage countries a third motive sometimes operates, namely the desire to consult the dead — as Odysseus, anxious about his return home, was constrained to do — or to use them against the living; for negro magicians are reputed even to murder remarkable individuals in order to possess them- selves of their power and to be able to use them as familiar spirits.

The question has often been raised, what is the relation of private cults of ancestors to public religion? Do men after death become gods? Euhemerus of Messenia tried of old to rationalize the Greek myths by supposing that the Olympian gods were deified men. Such a theory, like its modern rival of the sun-myth, may of course be pushed till it becomes absurd;

yet in India critical observers, like Sir Alfred C. Lyall, attest innumerable examples of the gradual elevation into gods of human beings, the process even beginning in their lifetime. There a man wins local fame as an ascetic with abnormal powers, or a wife, because Alcestis-like she sacrificed herself for her husband and immolated herself on his pyre. Miracles occur at their shrines, and the surviving relatives who guard them wax rich off the offerings brought. " In the course of a very few years, as the recollection of the man's personality becomes misty, his origin grows mysterious, his career takes a legendary hue, his birth and death were both supernatural; in the next generation the names of the elder gods get introduced into the story, and so the marvellous tradition works itself into a myth, until nothing but a personal incarnation can account for such a series of prodigies. The man was an Avatdr of Vishnu or Siva; his supreme apotheosis is now complete, and the Brahmins feel warranted in providing for him a niche in the orthodox pantheon." 1

Authorities. — H. S. Maine, Ancient Law (London, 1906) ; E. B. Tylor, Primitive Culture (London, 1903) ; and article on the " Matriarchal Family System," in the Nineteenth Century, xl. 81 (1896) ; W. W. Fowler, The Roman Calendar (London, 1906) ; Fustel de Coulanges, La Cite antique (17th ed., 1900) ; L. Andre. Le Culte des morts chez les Hebreux (1895) ; C. Gruneisen, Der Ahnen-kultus und die Vrreligion Israels (Halle, 1900) ; Grant Allen, The Evolution of the Idea of God (London, 1897) ; F. B. Jevons, Introduction to the History of Religion (London, 1896) ; Sir A. C. Lyall, Asiatic Studies (London, 1899 and 1907); D. G. Brinton, Religions of Primitive Peoples (New York, 1897) ; H. Oldenberg, Die Religion des Veda (Berlin, 1894). (F. C. C.)

ANCHISES, in Greek legend, Trojan hero, son of Capys and Themis, grandson (according to Hyginus, son) of Assaracus, connected on both sides with the royal family of Troy, was king of Dardanus on Mt. Ida. Here Aphrodite met him and, enamoured of his beauty, bore him Aeneas. For revealing the name of the child's mother, in spite of the warnings of the goddess, he was killed or struck blind by lightning (Hyginus, Fab. 94). In the more recent legend, adopted by Virgil in the Aeneid, he was conveyed out of Troy on the shoulders of his son Aeneas, whose wanderings he followed as far as Sicily, where he died and was buried on Mt. Eryx. On the other hand, there was a grave on Mt. Ida at Troy pointed out as his. From the name Assaracus, from the intercourse between the Phoenicians and the early inhabitants of the Troad, and from the connexion of Aphrodite, the protecting goddess of the Phoenicians, with Anchises, it has been inferred that his family was originally of Assyrian origin. His flight

on the shoulders of Aeneas is fre- quently represented on engraved gems of the Roman period; and his visit from Aphrodite is rendered in a beautiful bronze relief, engraved in Millingen's Unedited Gems.

ANCHOR (from the Greek ayKvpa, which Vossius considers is from bynr), a crook or hook), an instrument of iron or other heavy material used for holding ships or boats in any locality required, and preventing them from drifting by winds, tides, currents or other causes. This is done by the anchor, after it is let go from the ship by means of the cable, fixing itself in the ground and there holding the vessel fast.

The word " anchor " is also used figuratively for anything which gives security, or for any ornament or appendage which takes the same form. Owing to a vessel's safety depending upon the anchor, it is obviously an appliance of great importance, and too much care cannot be expended on its manufacture and proper construction. The most ancient anchors consisted of large stones, baskets full of stones, sacks filled with sand, or logs of wood loaded with lead. Of this kind were the anchors of the ancient Greeks, which, according to Apollonius Rhodius and Stephen of Byzantium, were formed of stone; and Athenaeus states that they were sometimes made of wood. Such anchors held the vessel merely by their weight and by the friction along, the bottom. Iron was afterwards introduced for the construction of anchors, and an improvement was made by forming them with teeth or " flukes " to fasten themselves into the bottom;

1 A. C. Lyall, Asiatic Studies (reprinted by Watts and Co., London, 1907), p. 19-

whence the words oSovres and denies are frequently taken for anchors in the Greek and Latin poets. The invention of the teeth is ascribed by Pliny to the Tuscans; but Pausanias gives the credit to Midas, king of Phrygia. Originally there was only one fluke or tooth, whence anchors were called ertpooroixoi; but a second was added, according to Pliny, by Eupalamus, or, according to Strabo, by Anacharsis, the Scythian philosopher. The anchors with two teeth were called anil3o\oi or dju0t

Fig. i. — Rodger's Anchor. Fig. 2. — Improved Martin Anchor.

responding to our sheet anchor, was only used in extreme danger,

and was hence peculiarly termed Upa or sacra, whence the proverb sacram anchoram solvere, as flying to the last refuge.

Until the beginning of the 19th century anchors were of imperfect manufacture, the means of effecting good and efficient welding being absent and the iron poor, whilst the arms, being straight, generally parted at the crown, when weighing from good holding-ground. A clerk in Plymouth Yard, named Pering, in the early part of that century (1813) introduced curved arms; and after 1852 the Admiralty anchor, under the direction of the Board, was supplied to H.M. ships, followed by Lieutenant (afterwards Captain) Rodger's anchor (fig. 1). This marked a great departure from the form of previous anchors. The arms, de, df were formed in one piece, and were pivoted at the crown iJona bolt passing through the forked shank ab. The points or pees e,f, to the palms g were blunt. This anchor had an excellent reputation amongst nautical men of that period, and by the committee on anchors, appointed by the admiralty in 1852,

it was placed second only to the anchor of Trotman. Later came the self-canting and close-stowing Martin anchor, which, passing through successive im- provements, became the improved Martin anchor (fig. 2) made of forged iron. A projection in the centre of the arms works in a recess at the hub of the shank; the vacancies out-side the shank are filled by blocks bolted through on each side, and are flush with the side plates, which keep the flukes in position. The introduction of cast

Fig.

-Improved Martin-Adelphi Anchor.

steel in 1894 led to the improved Martin-Adelphi pattern (fig. 3) , in which the crown and arms are cast in one, and, with the stock, are made of cast steel, the shank remaining of forged iron. A projection in the crown works in a recess (right, fig. 3), and is secured in its place by a forged steel pin, fitted with a nut and washer, which passes through the crown and the heel of the shank. All the above anchors were provided with a stock

(fig. 1, hk), the use of which is to "cant" the anchor. If it falls on the ground, resting on one arm and one stock, when a strain is brought on the cable, the stock cants the anchor, causing the arms to lie at a downward angle to the holding ground; and the pees enter and bury themselves below the surface of the soil.

To stow a stocked anchor on the forecastle, it is hove up close to the forefoot, and by means of a ground chain (secured to a balancing or gravity band on the anchor), which is joined to a catting chain rove through a cat davit, the anchor is hove up

Fig. 4. — Anchor Crane.

horizontally and placed on its bed, where it is secured by chains passing over a rod fitted with a lever for " letting go." The cat davit is hinged at its base, and can be laid flat on the deck for right ahead fire or when at sea. Ground and catting chains have been superseded in some ships by a wire pendant and cat hook; the anchor is then hove close up to the hawse-pipe. To avoid cutting away a portion of the forecastle, in the " Cressy," " Terrible " and " Diadem " classes of the British navy, the anchors, secured by chains, are stowed a-cock-bill, outside the ship, with their crowns resting on iron shoes secured to the ship's side and the flukes fore and aft. A difficulty is experienced in stowing the anchors when the ship is pitching or rolling heavily. Fig. 4 illustrates an anchor with cat davit or anchor crane used in the P. and O. Company's steamers (" India " class, 8000 tons) ; for sea the anchor is stowed on board by the anchor crane.

Stockless anchors have been extensively used in the British mercantile marine and in some foreign navies. In 1903 they

Fig. 5. — Hall's Improved Stockless Anchor.

Fig. 6.— W. L. Byer's Stockless Anchor.

were adopted generally for the British navy, after extensive anchor trials, begun in 1885. Their advantages are: — handiness co"mbined with a saving of time and labour; absence of davits, anchor-beds and other gear, with a resulting reduction in weight; and a clear forecastle for " right ahead " gun fire or for working ship. On the other hand a larger hawse-pipe is required, and there appears to be a consensus of opinion that a stockless anchor

when " let go " does not hold so quickly as a stocked one, is'more uncertain in its action over uneven ground, and is more liable to "

come home " (drag) . The stockless anchors principally in use in the British navy are Hall's improved, Byer's, and Wasteneys Smith's. In Hall's improved (fig. 5) the arms and crown of cast steel are in one piece, and the shank of forged steel passes up through an aperture in the crown to which it is secured by two cross bolts. Two trunnions or lugs are forged to the lower end of the shank. In Byer's plan (fig. 6) the flukes and crown

consist of a steel-casting secured to a forged shank by a through bolt of mild steel, the axis of which is parallel to the points of the flukes; one end of the bolt has a head, but the other is screwed and fitted with a phos- phor bronze nut to allow the bolt to be withdrawn for ex- amination. A palm is cast on each side of the crown to trip the flukes when the anchor is on the ground, and for bringing them ˆ3 snug against the ship's side when weighing. Wasteneys Smith's

*Fig. 7 .-Wasteneys Smith's * nchor ˆ ?> * ~mPosed of Stockless Anchor. three maln P arts > the shank and*

crown which form one forging, and the two flukes or arms which are separate castings. A bolt passes through the crown of the anchor, connecting the flukes to it; to prevent the flukes working off the connecting through bolt, two smaller bolts pass through the flukes at right angles to the through bolt and are recessed half their diameter into it.

Fig. 8 represents the starboard bow of H.M.S. " New Zealand "

Fig. 8.— Starboard Bow of H.M.S. " New Zealand.'

(16,350 tons) with lower and sheet (spare) anchors stowed. To let go a stockless anchor (fig. 9) the cable or capstan holder C is unscrewed, and in practice it is found desirable to knock off the bottle screw-slip A, allowing the weight of the anchor to be taken by the inner slip A' (Blake's stopper). Stern, stream and kedge anchors are usually stowed with special davits. A portable anchor suitable for small yachts is the invention of Mr Louis Moore; the shank passes through the crown of the anchor like the handle of a pickaxe and the stock over the head of the shank. At the end of the stock are loose pawls. There are no keys or bolts, and the only fastening is for the cable. The anchor takes to pieces readily and stows snugly. In 1890 Colonel Bucknill also invented a portable anchor for small yachts.

Iron buoy-sinkers (fig. 10), as used by the London Trinity House Corporation, weigh from 8 to 40 cwt.; the specified weight is cast on

them in large raised figures, and the cast and

wrought irons used are of special quality, of which samples are previously submitted to the engineer-in-chief.

The anchors supplied to ships of the British navy are required

A. A'. D. C. C.

Fig. 9. — Forecastle of H.M.S. " New Zealand."

Bottle or screw-slip. B.

Slip or Blake's stopper. F.

Bitts. H.

Cable or Capstan-holders. S.

Centre line capstan. R.

Deck or navel pipes.

Fairleads for wire hawsers.

Hawse-pipes.

Stopper-bolts.

Rollers.

Fig.

10. — Iron Buoy- Sinker.

to withstand a certain tensile strain, expressed in tons, proportionate to their weights in cwts. New anchors are supplied by contractors, but repairs are made in H.M. dockyards, a record of its repairs being stamped on each anchor. In the Anchors and Cables Act 1899 a list is given of authorized testing-establishments, with their dis- tinctive marks and charges, and testing- houses for foreign-owned vessels are enumerated in Table 22 of Lloyd's Register of British and Foreign Shipping.

Cast-steel anchors, in addition to the statutory tests, are sub- jected to percussive, hammering and bending tests, and are stamped " annealed steel." (J. W. D.)

ANCHOVY {Engraulis encrasicholus) , a fish of the herring family, easily distinguished by its deeply-cleft mouth, the angle of the gape being behind the eyes. The pointed snout extends beyond the lower jaw. The ash resembles a sprat in having a forked tail and a single dorsal fin, but the body is round and slender. The maximum length is 85 in. Anchovies are abundant in the Mediterranean, and are regularly caught on the coasts of Sicily, Italy, France and Spain. The range of the species also extends along the Atlantic coast of Europe to the south of Norway. In winter it is common off Devon and Cornwall, but has not hitherto been caught in such numbers as to be of com- mercial importance. Off the coast of Holland in summer it is more plentiful, entering the Zuider Zee in such numbers as to give rise to a regular and valuable fishery. It is also taken in the estuary of the Scheldt. There is reason to believe that the anchovies found at the western end of the English Channel in November and December are those which annually migrate from the Zuider Zee and Scheldt in autumn, returning thither in the following spring; they must be held to form an isolated stock, for none come up from the south in summer to occupy the English Channel, though the species is resident on the coast of Portugal. The explanation appears to be that the shallow and landlocked waters of the Zuider Zee, as well as the sea on the Dutgh coast, become raised to a higher temperature in summer than any part of the sea about the British coasts, and that there- fore anchovies are able to spawn and maintain their numbers in these waters. Their reproduction and development were first described by a Dutch naturalist from observations made on the shores of the Zuider Zee. Spawning takes place in June and July, and the eggs, like those of the majority of marine fishes, are buoyant and transparent, but they are peculiar in having an elongated, sausage-like shape, instead of being globular. They resemble those of the sprat and pilchard in having a segmented yolk and there is no oil globule. The larva is hatched two or

three days after the fertilization of the egg, and is very minute and transparent. In August young specimens i| to 3! in. in length have been tak~n in the Zuider Zee, and these must be held to have been derived from the spawning of the previous summer. There is no evidence to decide the question whether all the young anchovies as well as the adults leave the Zuider Zee in autumn, but, considering the winter temperature there, it is probable that they do. The eggs have also been obtained from the Bay of Naples, and near

Marseilles, also off the coast of Holland, and once at least off the coast of Lancashire. The occurrence of anchovies in the English Channel has been carefully studied at the laboratory of the Marine Biological Association at Plymouth. They were most abundant in 1889 and 1890. In the former year considerable numbers were taken off Dover in drift nets of small mesh used for the capture of sprats. In the follow- ing December large numbers were taken together with sprats at Torquay. In November 1890 a thousand of the fish were obtained in two days from the pilchard boats fishing near Ply- mouth; these were caught near the Eddystone. When taken in British waters anchovies are either thrown away or sent to the market fresh with the sprats. If salted in the proper way, they would doubtless be in all respects equal to Dutch anchovies, if not to those imported from Italy. The supply, however, is small and inconstant, and for this reason English fish-curers have not learnt the proper way of preparing them. The so-called " Nor- wegian anchovies " imported into England in little wooden kegs are nothing but sprats pickled in brine with bay-leaves and whole pepper. (J. T. C.)

ANCIEN REGIME, The, a French phrase commonly used, even by English writers, to denote the social and political system established in France under the old monarchy, which was swept away by the Revolution of 1789. The phrase is generally appli- cable only to France, for in no other country, with perhaps the exception of Japan, has there been in modern times so clearly marked a division between "the old order" and the new.

ANCIENT (also spelt Antient; derived, through the Fr. ancien, old, from the late Lat. antianum, from ante, before), old or in olden times. "Ancient history" is distinguished from medieval and modern, generally as meaning before the fall of the western Roman empire. In English legal history, " ancient " tenure or demesne refers to what was crown property in the time of Edward the Confessor or William the Conqueror. "The Ancient of days " is a Biblical phrase for God. In the London Inns of Court the senior barristers used to be called "ancients." From the 16th to the 18th century the word was also used, by confusion with "ensign," i.e. flag or standard-bearer, for that military title, as in the case of Shakespeare's " ancient Pistol " ; but this use has nothing to do with "ancient" meaning "old."

ANCIENT LIGHTS, a phrase in English law for a negative easement (q.v.) consisting in the right to prevent the owner or occupier of an adjoining tenement from building or placing on his own land anything which has' the effect of illegally obstructing or obscuring the light of the dominant tenement. At common law a person, who

opens a window in his house, has a natural right to receive the flow of light that passes through it. But his neighbour is not debarred thereby from building on his own land even though the effect of his action is to obstruct the flow of light thus obtained. Where, however, a window had been opened for so long a time as to constitute immemorial usage in law, the light became an "ancient light" which the law protected from disturbance. The Prescription Act 1832 created a statutory prescription for light. It provided (s. 3) that " when the access and use of light to and for " (any building) " shall have been actually enjoyed therewith for the full period of 20 years with- out interruption, the right theretoshall be deemed absolute and indefeasible, any local usage or custom to the contrary notwith- standing, unless it shall appear that the same was enjoyed by some consent or agreement, expressly made or given for that purpose by deed or writing." The statute does not create an absolute or indefeasible right immediately on the expiration of twenty years. Unless and until the dominant owner's claim is brought

into question (s. 4) no absolute or indefeasible title can arise under the act. The dominant owner has only an inchoate right to avail himself under the act of the twenty years' uninterrupted enjoyment, if his claim is brought into question. But in the meantime, however long the enjoyment may have been, his right is just the same, and the origin of his right is just the same as if the act had never been passed. These principles were laid down in 1904 by the House of Lords in the leading case of Colls v. Home & Colonial Stores Ltd. (1904 A.C. 179). They overrule an earlier view propounded by Lord Westbury in 1865 (Tapling v. Jones, n H.L.C. 290) that the Prescription Act 1832 had abrogated the common law prescription as to light, that the right to "ancient lights" now depends upon positive enactment alone, and does not require, and ought not to be rested on, any fiction of a "lost grant" (see Easement). There has been much difference of judicial opinion as to what constitutes an actionable interference with " ancient lights." On the one hand, the test has been prescribed that if an angle of 45° — uninterrupted sky light— was left, the easement was not interfered with, and, while this is not a rule of law, it is a good rough working criterion. On the other hand, it was held in effect by the Court of Appeal in the case of Colls v. Home & Colonial Stores Ltd. (1902; 1 Ch. 302) that to constitute an actionable obstruction of ancient lights it was sufficient if the light was sensibly less than it was before. The House of Lords, however, in the same case (1904 A. C. 179) overruled this view, and held that there must be a substantial privation of light enough to render the occupation of the house or building uncomfortable*

according to the ordinary notions of mankind and (in the case of business premises) to prevent the plaintiff from carrying on his business as beneficially as before. See also Kine v. Jolly (1905; 1 Ch. 480).

There is, in Scots law, no special doctrine as to " ancient lights." The servitude of light in Scotland is simply the Roman servitude non officiendi luminibus vcl prospectui (see Easement and Roman Law). The same observation applies to the Code Civil and other European Codes based on it. The doctrine as to ancient lights does not prevail generally in the United States (consult Ruling Cases, under "Air").

ANCILLARY (from the Lat. ancilla, a handmaid), an adjective meaning "subordinate to" or "merely helping," as opposed to "essential." By Thackeray and some other writers it is also employed rather affectedly in its primary meaning of "pertaining to a maid-servant."

ANCILLON, CHARLES (1659-1715), one of a distinguished family of French Protestants, was born on the 28th of July 1659, at Metz. His father, David Ancillon (1617-1692), was obliged to leave France on the revocation of the edict of Nantes, and became pastor of the French Protestant community in Berlin. Charles Ancillon studied law at Marburg, Geneva, and Paris, where he was called to the bar. At the request of the Huguenots at Metz, he pleaded its cause at the court of Louis XIV., urging that it should be excepted in the revocation of the edict of Nantes, but his efforts were unsuccessful, and he joined his father in Berlin. He was at once appointed by the elector Frederick "juge et directeur de colonie de Berlin." He had before this published several works on the revocation of the edict of Nantes and its consequences, but his literary capacity was mediocre, his style stiff and cold, and it was his personal character rather than his reputation as a writer that earned him the confidence of the elector. In 1687 he was appointed head of the so-called Acadimie des nobles, the principal educational establishment of the state; later on, as councillor of embassy, he took part in the negotiations which led to the assumption of the title of king by the elector. In 1699 he succeeded Pufendorf as historiographer to the elector, and the same year replaced his uncle Joseph Ancillon as judge of all the French refugees in Brandenburg. He died on the 5th of July 1715. Ancillon's chief claim to remem- brance is the work that he did for education in Prussia, and the share he took, in co-operation with Leibnitz, in founding the Academy of Berlin. Of his fairly numerous works the only one still of value is the Histoire de I'etablissement des Francais rejugiis dans les Stats de Brandebourg (Berlin, 1690).

ANCILLON, JOHANN PETER FRIEDRICH (1766-1837), Prussian historian and statesman, great-grandson of Charles Ancillon, was born at Berlin on the 30th of April 1766. He studied theology at Geneva, and after finishing his course was appointed minister to the French community at Berlin. At the same time his reputation as a historical scholar secured him the post of professor of history at the military academy. In 1793 he visited Switzerland, and in 1796 France, and published the impressions gathered during his travels in a series of articles which he afterwards collected under the title of Melanges de liiterature et de philosophic (1801). Ancillon took rank among the most famous historians of his day by his next work, Tableau des revolutions du systeme politique de P Europe depuis le X V" siecle (1803, 4 vols.; new ed., 1824), which gained him the eulogium of the Institute of France, and admission to the Academy of Berlin. It was the first attempt to recognize psychological factors in historical movements, but otherwise its importance was exaggerated. Its " sugary optimism, unctuous phraseology and pulpit logic " appealed, however, to the reviving pietism of the age succeeding the Revolution, and these qualities, as well as his eloquence as a preacher, early brought Ancillon into notice at court. In 1808 he was appointed tutor to the royal princes, in 1809 councillor of state in the department of religion, and in 1810 tutor of the crown prince (afterwards Frederick William IV.), on whose sensitive and dreamy nature he was to exercise a power- ful but far from wholesome influence. In October 1814, when his pupil came of age, Ancillon was included by Prince Harden- berg in the ministry, as privy councillor of legation in the department of foreign affairs, with a view to utilizing his supposed gifts as a philosophical historian in the preparation of the pro jected Prussian constitution. But Ancillon's reputed liberalism was of too invertebrate a type to survive the trial of actual contact with affairs. The practical difficulty of the constitutional problem gave the " court parson " — as Gneisenau had con- temptuously called him — excuse enough for a change of front which, incidentally, would please his exalted patrons. He covered his defection from Hardenberg's liberal constitu- tionalism by a series of " philosophical " treatises on the nature of the state and of man, and became the soul of the reactionary movement at the Berlin court, and the faithful henchman of Metternich in the general politics of Germany and of Europe.

In 1817 Ancillon became a councillor of state, and in 1818 director

of the political section of the ministry for foreign affairs under Count Bernstorff. In his chief's most important work, the establishment of the Prussian Zollverein, Ancillon had no share, while the entirely subordinate role played by Prussia in Europe during this period, together with the personal part taken by the sovereign in the various congresses, gave him little scope for the display of any diplomatic talents he may have possessed. During this time he found plentiful leisure to write a series of works on political philosophy, such as the Nouveaux essais de politique et de philosophie (Paris, 1824). In May 1831 he was made an active privy councillor, was appointed chief of the department for the principality of Neuchatel, in July became secretary of state for foreign affairs, and in the spring of 1S32, on Bernstorff's retirement, succeeded him as head of the ministry.

By the German public, to whom Ancillon was known only through his earlier writings and some isolated protests against the " demagogue-hunting " in fashion at Berlin, his advent to power was hailed as a triumph of liberalism. They were soon undeceived. Ancillon had convinced himself that the rigid class distinctions of the Prussian system were the philosophically ideal basis of the state, and that representation " by estates " was the only sound constitutional principle; his last and indeed only act of importance as minister was his collaboration with Metternich in the Vienna Final Act of the 12th of June 1834, the object of which was to rivet this system upon Germany forever. He died on the 19th of April 1S37, the last of his family. His historical importance lies neither in his writings nor in his political activity, but in his personal influence at the Prussian

court, and especially in its lasting effect on the character of Frederick William IV.

See C. A. L. P. Varnhagen von Ense, Blatter aus der preussischen Geschichte, 5 vols. (Leipzig, 1868-1869); ib. Tagebilcher, vol. i. (Leipzig, 1861); H. O. Treitschke, Deutsche Geschichte (Leipzig, 1 879-1 894), and essay on Ancillon in Preussische Jahrbiicher for April 1872; Allgemeine Deutsche Biographie, s.v. (Leipzig, 1875).

ANCON, a small village and bathing-place on the coast of Peru, 22 m. N. of Lima by rail. The bay is formed by two projecting headlands and is one of the best on the coast. It has a gently sloping beach of fine sand and has been a popular bathing- place since the time of President Balta, although the country behind it is arid and absolutely barren. At some time previous to the discovery of America, Ancon had a large ab- original population. Traces of terraces on the southern headland can still be seen, and the sand-covered hills and

slopes overlooking the bay contain extensive burial-grounds which were systematic- ally explored in 1875 by Messrs W. Reiss and A. Stiibel (see Reiss-and Stiibel's The Necropolis of Ancon in Peru, translated by A. H. Keane, 3 vols., Berlin, 1880-1887). In modern times Ancon has been the scene of several important historical events. Its anchorage was used by Lord Cochrane in 1820 during his attacks on Callao; it was the landing-place of an invading Chilean army in 1838; it was bombarded by the Chileans in 1880; and in 1883 it was the meeting-place of the Chilean and Peruvian commissioners who drew up the treaty of Ancon, which ended the war between Chile and Peru.

ANCON (from the Gr. ayicwv), the anatomical name for " elbow "; " ancones " in architecture are the projecting bosses left on stone blocks or on drums of columns, to allow of their being either hoisted aloft or rubbed backwards and forwards to obtain a fine joint; the term is also given by Vitruvius to the trusses or console brackets on each side of the doorway of a Greek or Roman building which support the cornice over the same. A particular sort of sheep, with short crooked forelegs, is called " ancon " sheep.

ANCONA, ALESSANDRO (1835-), Italian critic and man of letters, was born at Pisa on the 20th of February 1835, of a wealthy Jewish family, and educated in Florence; at the age of eighteen he published his essay on the life and work of the philosopher Tommaso Campanella. In 1855 Ancona went to Turin, nominally to study law, but in reality to act as inter- mediary between the Tuscan Liberals and Cavour; he was an intimate friend of Luigi Carlo Farini (q.v.) and represented Tuscany in the Societa Nazionale. On the fall of the Austrian dynasty in Tuscany (April 27, 1859) he returned to Florence, where he edited the newly founded newspaper La Nazione. In 1 86 1 he was appointed professor of Italian literature at the university of Pisa. Among his works the following may be mentioned: Opera di Tommaso Campanella, 2 vols. (Turin, 1854) ; Sacre Rappresentazioni dei secoli XIV., XV., e XVI. (3 vols., Florence, 1872); Origini del Teatro in Italia (2 vols., Florence, 1877); La Poesia popolare italiana (Livorno, 1878), besides several volumes of literary essays, editions of the works of Dante and other early Italian writers, &c.

ANCONA, a seaport and episcopal see of the Marches, Italy, capital of the province of Ancona, situated on the N.E. coast of Italy, 185 m. N.E. of Rome by rail and 132 m. direct, and 127 m. S.E. of Bologna. Pop. (1901) 56,835. The town is finely situated on and between the slopes of the two extremities of the promontory of Monte

Conero, Monte Astagno to the S., occupied by the citadel, and Monte Guasco to the N., on which the cathedral stands (300 ft.). The latter, dedicated to S. Ciriaco, is said to occupy the site of a temple of Venus, who is mentioned by Catullus and Juvenal as the tutelary deity of the place. It was consecrated in n 28 and completed in 1189. Some writers suppose that the original church was in the form of a Latin cross and belonged to the 8th century. An early restoration was completed in 1234. It is a fine Romanesque building in grey stone, built in the form of a Greek cross, with a dodecagona! dome over the centre slightly altered by Maigaritone d' Arezzo in 1270. The facade has a Gothic portal, ascribed to Giorgio da Corno ('1228). which was intended to have a. lateral arch on ea>~h

side. The interior, which has a crypt in each transept, in the main preserves its original character. It has ten columns which are attributed to the temple of Venus, and there are good screens of the 1 2th century, and other sculptures. In the dilapidated episcopal palace Pope Pius II. died in 1464. An interesting church is S. Maria della Piazza, with an elaborate arcaded facade (12 10). The Palazzo del Comune, with its lofty arched sub- structures at the back, was the work of Margaritone d' Arezzo, but has been since twice restored. There are also several fine late Gothic buildings, among them the churches of S. Francesco and S. Agostino, the Palazzo Benincasa, and the Loggia dei Mercanti, all by Giorgio Orsini, usually called da Sebenico (who worked much at Sebenico, though he was not a native of it), and the prefecture, which has Renaissance additions. The portal of S. Maria della Misericordia is an ornate example of early Renais- sance work. The archaeological museum contains interesting pre-Roman objects from tombs in the district, and two Roman beds with fine decorations in ivory (E. Brizio, in Notizie degli scavi, 1902, 437, 478).*

To the east of the town is the harbour, now an oval basin of 990 by 880 yards, the finest harbour on the S. W. coast of the Adriatic, and one of the best in Italy. It was originally protected only by the promontory on the N., from the elbow-like shape of which (Gk. ayncov) the ancient town, founded by Syracusan refugees about 390 B.C., took the name which it still holds. Greek merchants established a purple factory here (Sil. Ital. viii. 438). Even in Roman times it kept its own coinage with the punning device of the bent arm holding a palm branch, and the head of Aphrodite on the reverse, and

continued the use o£ the Greek language. When it became a Roman colony is doubtful. 1 It was occupied as a naval station in the Illyrian war of 178 B.C. (Liv. xli. 1). Caesar took possession of it immediately after crossing the Rubicon. Its harbour was of considerable importance in imperial times, as the nearest to Dalmatia, 2 and was enlarged by Trajan, who constructed the north quay, his architect being Apollodorus of Damascus. At the beginning of it stands the marble triumphal arch with a single opening, and without bas-reliefs, erected in his honour in a.d. 115 by tne senate and people. Pope Clement II. prolonged the quay, and an inferior imitation of Trajan's arch was set up; he also erected a lazaretto at the south end of the harbour, n o w a sugar refinery, Vanvitelli being the architect-in-chief. The southern quay was built in 1880, and the harbour is now pro- tected by forts on the heights, while the place is the seat of the 7th army corps.

The port of Ancona was entered in 1904 by 869 steamships and 600 sailing vessels, with a total tonnage of 961,612 tons. The main imports were coal, timber, metals, jute. The main exports were asphalt and calcium carbide. Sugar refining and ship- building are carried on.

Ancona is situated on the railway between Bologna and Brindisi, and is also connected by rail with Rome, via Foligno and Orte.

After the fall of the Roman empire Ancona was successively attacked by the Goths, Lombards and Saracens, but recovered its strength and importance. It was one of the cities of the Pentapolis under the exarchate of Ravenna, the other four being Fano, Pesaro, Senigallia and Rimini, and eventually became a semi-independent republic under the protection of the popes, until Gonzaga took possession of it for Clement VII. in 1532. From 1797 onwards, when the French took it, it frequently appears in history as an important fortress, until Lamoriciere capitulated here on the 29th of September i860, eleven days after his defeat at Castelfidardo. (T. As.)

ANCREN RIWLE, a Middle English prose treatise written for a small community of three religious women and their servants at Tarent Raines (Tarrant Crawford), at the junction of the Stour and the Tarrant, Dorset. It was generally supposed to

1 Scanty remains of the ancient town walls, of a gymnasium near the harbour and of the amphitheatre are still extant.

2 It was connected by a road with the Via Flaminia at Nuceria

(Norcera), a distance of 70 m.

date from the first quarter of the 13th century, but Pro- fessor E. Kolbing is inclined to place the Corpus Christi MS. about the middle of the 12 th century. The house of Tarrant was founded by Ralph de Kahaines, and greatly enriched about 1 230 by Richard Poor, bishop successively of Chichester, Salis- bury and Durham, who was born at Tarrant and died there in 1237. At the time when the Ancren Riwle was addressed to them the anchoresses did not belong to any of the monastic orders, but the monastery was under the Cistercian rule before 1266. 3 There are extant seven English MSS. of the work, and one Latin, the Latin version being generally supposed to be a translation. The Latin MS., Regula Anachoritarum sive de vita solitaria (Magdalen College, Oxford, No. 67, fol. 50) has a prefatory note : — Hie incipit prohemium venerabilis patris magistri Simonis de Gandavo, episcopi Sarum, in librum de vita solitaria, quern scripsit sororibus suis anachoritis apud Tarente. But Bishop Simon of Ghent, who died in 1315, could not have written the book, if it dates, at latest, from the early 13th century. It has been tentatively attributed to Richard Poor, who was connected with Tarrant, and was actually a benefactor of the monastery. But the adoption of Prof. Kolbing's early date would almost destroy Poor's claim.

The Ancren Riwle is written in a simple, non-rhetorical style. The severity of the doctrine of self-renunciation is softened by the affectionate tone in which it is inculcated. The book contains rules for the conduct of the anchoresses, and gives liturgical directions for divine service; but the greater part of it is taken up with the purely spiritual side of religion. The rules for the restraint of the senses, for confession and penance, are sub- ordinated to the central idea of the supreme importance of purity of heart and the love of Christ. The last chapter deals with the domestic affairs and administration of the monastery. Incident- ally the writer gives a picture of the manners and ideas of the time, and provides an account of the doctrine then generally accepted in the English church.

A ncren Riwle was edited for the Camden Society by the Rev. James Morton in 1843 from the Cotton MS. (Nero A xiv.). Acollation'of this text with the MS. by E. Kolbing is printed in the Jahrbuch fiir romanische u. engl. Spr. und Lit. xv. 180 seq. (1876). The Ancren Riwle (ed. Abbot F. A. Gasquet, 1905) is available for the ordinary reader in The King's Classics. There are three English MSS. of Ancren Riwle in the Cottonian collection in the British Museum, numbered Nero A xiv., Titus D xviii., and Cleopatra C vi. Nero A xiv. is written in pure south-western dialect. Portions of this text are

printed in Henry Sweet's First Middle English Primer (Oxford, 2nd ed., 1895), which contains a grammatical introduction. MS. 402 in the library of Corpus Christi College, Cambridge, contains the earliest version of Ancren Riwle, entitled Ancren Wisse, and dating (according to E. Kolbing in Englische Studien, 1886, vol. ix. 116) from about 1 150. The language shows considerable traces of the Midland dialect. MS. 234 in Caius College, Cambridge, contains a considerable portion of the Ancren Riwle, but does not follow the order of the other MSS. For its exact contents see Kolbing, in Englische Studien, iii. 535 (1880). A more recently discovered version in Magdalene College, Cambridge, in MS. Pepys 2498, is entitled The Recluse, and is abridged and differently arranged. It is written in English of the latter half of the 14th century (see A. C. Paues in Englische Studien, xxx. 344-346, 1902). A Latin version (Cotton MS. Vitellius E vii.), and a French copy {ibid. F vii.) were seriously damaged in the fire at Ashburnham House, but both MSS. have been recently restored. The Latin MS. (Codex lxvii.) at Magdalen College, Oxford, is probably a copy of another Latin text, for it contains obvious slips.

See also R. Wiilker, " Ueber die Sprache der Ancren Riwle und die der Homilie: Hali Meidenhad," in Beitrdge zur Geschichte der deutschen Sprache und Literatur (Halle, 1874, i. 209), giving an analysis of the differences in dialect between the two works; and Edgar Elliott Bramlette, " The Original Language of the Ancren Riwle," in Anglia, xv. 478-498, arguing in favour of a -Latin original.

ANCRUM, a village on Ale or Alne Water (a tributary of the Teviot), Roxburghshire, Scotland, 2 m. W. of Jedfoot Bridge station on the Roxburgh- Jedburgh branch of the North British railway. Pop. (1901) 973. The earlier forms of the name, " Alnecrumba," " Ankrom " and " Alnecrom," indicate its Gaelic derivation from crom, "crooked" — "the crook or bend of the

3 For information on the subject of Tarent Kaines see Sir W. Dugdale, Monasticon Anglicanum (new ed., 1846), vol. v. 619 et seq.

Alne." The village is of considerable antiquity, and was formerly held by the see of Glasgow. Its cross, said to date from the time of David I., is one of the best preserved crosses in the Border counties. Ancrum Moor, 2 m. N.W., was the scene of the battle in which, on the 17th of February 1545, the Scots under the earl' of Angus, Sir Walter Scott of Buccleuch, and Norman Leslie, defeated 5000 English, whose leaders, Sir Ralph Evers or Eure and Sir Brian Latoun or Layton, were slain. A Roman road, 24 ft. broad, forms the N.E. boundary of the parish of Ancrum.

ANCUS MARCIUS (640-616 B.C.), fourth legendary king of Rome. Like Numa, his reputed grandfather, he was a friend of peace and religion, but was obliged to make war to defend his territories. He conquered the Latins, and a number of them he settled on the Aventine formed the origin of the Plebeians. He fortified the Janiculum, threw a wooden bridge across the Tiber, founded the port of Ostia, established salt-works and built a prison.

Ancus Marcius is merely a duplicate of Numa, as is shown by his second name, Numa Marcius, the confidant and pontifex of Numa, being no other than Numa Pompilius himself, represented as priest. The identification with Ancus is shown by the legend which makes

the latter a bridge-builder (pontifex), the constructor of the first wooden bridge over the Tiber. It is in the exercise of his priestly functions that the resemblance is most clearly shown. Like Numa, Ancus died a natural death.

See Livy i. 32, 33; Dion Halic. iii. 36-45; Cicero, De Republica, ii. 18. For a critical examination of the story see Schwegler, Romische Geschichte, bk. xiii. ; Sir G. Cornewall Lewis, Credibility of Early Roman History, ch. xi. ; W. Ihne, History of Rome, i. ; R. Pais, Storia di Roma, i. (1898). who considers that the name points to the personification of the cult of Mars, and that the military achievements of Ancus are anticipations of later events.

*ANCYLOPODA, or Ancylodactyla, an apparently primitive extinct subordinal group of Ungulata showing certain resem- blances to the Perissodactyla, both as regards the cheek-teeth and the skeleton, but broadly distinguished by the feet being of an edentate type, carrying long curved and cleft terminal claws. From this peculiar structure of the feet it would seem that the weight of the body was mainly carried on their outer sides, as in Edentates. The group is typified by Chalicotherium, of which the original species was discovered in the Lower Pliocene strata of Eppelsheim, Hesse-Darmstadt, in 1825, and named on the evidence of the teeth, the limbs being subsequently described as Macrotherium. The skull is short, with a dental formula of *■$”> c – 1 “j P-i- m -i, but in fully adult animals most of the front teeth were shed. The molar teeth recall those of Palaeosyops (see Titanotherudae) . Remains referred to Chalicotherium have been also obtained from the Lower Pliocene and Upper Miocene strata of Greece, Hungary, India, China and North America. A skull from Pikermi, near Mt. Pentelikon, Attica, shows the absence in the adult state of upper and lower incisors and upper canines, much the same condition being indicated in an Indian skull. There were three toes to each foot, and the femur lacked a third trochanter.*

Macrotherium, which is typically from the Middle Miocene of Sansan, in Gers, France, may indicate a distinct genus. Limb- bones nearly resembling those of Macrotherium, but relatively stouter, have been described from the Pliocene beds of Attica and Samos as Ancyiotherium. In America the names Moro- therium and Moropus have been applied to similar bones, on the belief that they indicated edentates. Macrotherium magnum must have been an animal of about 9 ft. in length.

The South American genus Homalodontotherium is often placed in the Ancylopoda, but reasons against this view are given in the article

Litopterna. Professor H. F. Osborn considers that the Ancylopoda are directly descended from the Condylarthra.

See also H. F. Osborn, " The Ancylopoda Chalicotherium and Artionyx.," Amer. Nat. (1893), p. 118, and " Artionyx, a NewGenusof Ancylopoda," Bull. Amer. Mus. vol. v. p. I (1893). [N.B. — Artionyx was subsequently found to be an Artiodactyle.] (R. L.)*

ANCYRA (mod. AngSra, q.v.), an ancient city of Galatia in Asia Minor, situated on a tributary of the Sangarius. Originally a large and prosperous Phrygian city on the Persian Royal Road, Ancyra became the centre of the Tectosages, one of the three

Gaulish tribes that settled permanently in Galatia about 232 B.C. The barbarian occupation dislocated civilization, and the town sank to a mere village inhabited chiefly by the old native popula- tion who carried on the arts and crafts of peaceful life, while the Gauls devoted themselves to war and pastoral life (see Galatia). In 189 B.C. Ancyra was occupied by Cn. Manlius Vulso, who made it his headquarters in his operations against the tribe. In 63 B.C. Pompey placed it (together with the Tectosagan territory) under one chief, and it continued under native rule till it became the capital of the Roman province of Galatia in 25 B.C. By this time the population included Greeks, Jews, Romans and Romanized Gauls, but the town was not yet Hellenized, though Greek was spoken. Strabo (c. a.d. 19) calls it not a city, but a fortress, implying that it had none of the institutions of the Graeco-Roman city. Inscriptions and coins show that its civil- ization consisted of a layer of Roman ideas and customs super- imposed on Celtic tribal characteristics, and that it is not until c. a.d. 150 that the true Hellenic spirit begins to appear. Christianity was introduced (from the N. or N.W.) perhaps as early as the 1st century, but there is no shred of evidence that the Ancyran Church (first mentioned a.d. 192) was founded by St Paul or that he ever visited northern Galatia. The real great- ness of the town dates from the time when Constantinople became the metropolis of the Roman world: then its geographical situation raised it to a position of importance which it retained throughout the middle ages. See further Angora (i).

The modern town contains many remains of the Roman and Byzantine periods. The most important monument is the Augusteum, a temple of white marble erected to " Rome and Augustus " during the lifetime of that emperor by the common council or diel of the three Galatian tribes. The temple was afterwards converted into a

church, and in the 16th century a fine mosque was built against its S. face. On the walls of the temple is engraved the famous Monumentum Ancyranum, a long inscription in Latin and Greek describing the Res gestae divi Augusti; the Latin portion being inscribed on the inner left-hand wall of the pronaos, the Greek on the outside wall of the naos (cella). The inscription is a grave and majestic narrative of the public life and work of Augustus. The original was written by the emperor in his 76th year (a.d. 13-14) to be engraved on two bronze tablets placed in front of his mausoleum in Rome, and as a mark of respect to his memory a copy was inscribed on the temple walls by the council of the Galatians. Thus has been preserved an absolutely unique historical document of great importance, recounting (1) the numerous public offices and honours conferred on him, (2) his various benefactions to the state, to the plebs and to his soldiers, and (3) his military and administrative services to the empire.

Bibliography. — C. Ritter, Erdkunde von Asien, vol. xviii.(i837-1859); Hamilton, Researches in A. M. (1842); Texier, Descrip. de I'Asie Min. (1839-1849); Perrot, Explor. de la Galatie (1862); Humann and Puchstein, Reisen in Kleinasien (1890). For Mon. Ancyr., Mommsen, Res gestae divi Augusti (1883) ; and Inscr. graecae ad res Romanas pertinentes, iii. (1902). For coins, Brit. Museum Catal., Galatia (1899); Babelon-Reinach, Recueil general d A. M. See also under Galatia. (J. G. C. A.)

Synod of Ancyra. — An important ecclesiastical synod was held at Ancyra, the seat of the Roman administration for the province of Galatia, in a.d. 314. The season was soon after Easter; the year may be safely deduced from the fact that the first nine canons are intended to repair havoc wrought in the church by persecution, which ceased after the overthrow of Maximinus in 313. The tenth canon tolerates the marriages of deacons who previous to ordination had reserved the right to take a wife; the thirteenth forbids chorepiscopi to ordain presbyters or deacons; the eighteenth safeguards the right of the people in objecting to the appointment of a bishop whom they do not wish.

See Mansi, ii. 514 ff. The critical text of R. B. Rackham (Oxford, 1891), Studio- btblica et ecclesiastica, iii. 139 ff., is conveniently re-printed in Lauchert 29 ff. H. R. Percival translates and comments on an old text in the Nicene and Post-Nicene Fathers (2nd series), xiv. 61 ff. An elaborate discussion is found in Hefele, Conciliengeschichte (2nd ed.), i. 219 ff. (English translation, i. 199 ff.); more briefly in Herzog-Hauck (3rd ed.), i. 497. For full titles see Council.

ANDALUSIA, or Andalucia, a captaincy-general, and formerly a province, of southern Spain; bounded on the N. by Estremadura and New Castile, E. by Murcia and the Mediterranean Sea, S. by the Mediterranean and Atlantic, and W. by Portugal. Pop. (1900) 3,563,606; area, 33,777 sq. m. Andalusia was divided in 1833 into the eight provinces of Almeria, Cadiz, Cordova, Granada, Jaen, Huelva, Malaga and Seville, which are described in separate articles. Its ancient name, though no longer used officially, except to designate a military district, has not been superseded in popular speech by the names of the eight modern divisions.

Andalusia consists of a great plain, the valley of the Guadal- quivir, shut in by mountain ranges on every side except the S.W., where it descends to the Atlantic. This lowland, which is known as Andalucia Baja, or Lower Andalusia, resembles the valley of the Ebro in its slight elevation above sea-level (300-400 ft.), and in the number of brackish lakes or fens, and waste lands (despoblados) impregnated with salt, which seem to indicate that the whole surface was covered by the sea at no distant geological date. The barren tracts are, however, exceptional and a far larger area is richly fertile. Some districts, indeed, such as the Vega of Granada, are famous for the luxuri- ance of their vegetation. The Guadalquivir- (q.v.) rises among the mountains of Jaen and flows in a south-westerly direction to the Gulf of Cadiz, receiving many considerable tributaries on its way. On the north, its valley is bounded by the wild Sierra Morena; on the south, by the mountains of the Mediterranean littoral, among which the Sierra Nevada (q.v.), with its peaks of Mulhacen(n,42i ft.)andVeleta(i 1,148 ft.), is the most conspicu- ous. These highlands, with the mountains of Jaen and Almeria on the east, constitute Andalucia Alta or Upper Andalusia.

No part of Spain has greater natural riches. The sherry produced near Jerez de la Frontera, the copper of the Rio Tinto mines and the lead of Almeria are famous. But the most note- worthy characteristics of the province are, perhaps, the brilliancy of its climate, the beauty of its scenery (which ranges in character from the alpine to the tropical), and the interest of its art and antiquities. The climate necessarily varies widely with the altitude. Some of the higher mountains are covered with perpetual snow, a luxury which is

highly prized by the inhabit- ants of the valleys, where the summer is usually extremely hot, and in winter the snow falls only to melt when it reaches the ground. Here the more common European plants and trees give place to the wild olive, the caper bush, the aloe, the cactus, the evergreen oak, the orange, the lemon, the palm and other productions of a tropical climate. On the coasts of the Mediter- ranean about Marbella and Malaga, the sugar-cane is successfully cultivated. Silk is produced in the same region. Agriculture is in a very backward state and the implements used are most primitive. The chief towns are Seville (pop. 1900, 148,315), which may be regarded as the capital, Malaga (130,109), Granada (75,900), Cadiz (69,382), Jerez de la Frontera (63,473), Cordova (58,275) and Almeria (47,326).

Andalusia has never been, like Castile or Aragon, a separate kingdom. Its history is largely a record of commercial and artistic development. The Guadalquivir valley is often, in part at least, identified with the biblical Tarshish and the classical Tartessus, a famous Phoenician mart. The port of Agadir or Gaddir, now Cadiz, was founded as early as 1100 B.C. Later Carthaginian invaders came from their advanced settlements in the Balearic Islands, about 516 B.C. Greek merchants also visited the coasts. The products of the interior were conveyed by the native Iberians to the maritime colonies, such as Abdera (Adra), Calpe (Gibraltar) or Malaca (Malaga), founded by the foreign merchants. The Punic wars transferred the supreme power from Carthage to Rome, and Latin civilization was established firmly when, in 27 B.C., Andalusia became the Roman province of Baetica — so called after its great waterway, the Baelis (Guadalquivir). In the 5th century the province was overrun by successive invaders — Vandals, Suevi and Visigoths — from the first of whom it may possibly derive its name. The forms Vandalusia and Vandalitia are undoubtedly ancient;

many authorities, however, maintain that the name is derived from the Moorish Andalus or Andalosh, " Land of the West." The Moors first entered the province in 711, and only in 1492 was their power finally broken by the capture of Granada. Their four Andalusian kingdoms, Seville, Jaen, Cordova and Granada, developed a civilization unsurpassed at the time in Europe. An extensive literature, scientific, philosophical and historical, with four world-famous buildings — the Giralda and Alcazar of Seville, the Mezquita or cathedral of Cordova and the Alhambra at Granada — are its chief monuments. In the 16th and 17 th centuries, painting replaced architecture as the distinctive art of Andalusia; and many of the foremost Spanish painters, including Velazquez and Murillo, were

natives of this province.

Centuries of alien domination have left their mark upon the character and appearance of the Andalusians, a mixed race, who contrast strongly with the true Spaniards and possess many oriental traits. It is impossible to estimate the influence of the elder conquerors, Greek, Carthaginian and Roman; but there are clear traces of Moorish blood, with a less well-defined Jewish and gipsy strain. The men are tall, handsome and well-made, and the women are among the most beautiful in Spain; while the dark complexion and hair of both sexes, and their peculiar dialect of Spanish, so distasteful to pure Castilians, are indisput- able evidence of Moorish descent. Their music, dances and many customs, come from the East. In general, the people are lively, good-humoured and ready-witted, fond of pleasure, lazy and extremely superstitious. In the literature and drama of his country, the Andalusian is traditionally represented as the Gascon of Spain, ever boastful and mercurial; or else as a picaresque hero, bull-fighter, brigand or smuggler. Andalusia is still famous for its bull -fighters; and every outlying hamlet has its legends of highwaymen and contraband.

In addition to the numerous works cited under the heading Spain, see Curiosidades historicas de Andalucia, by N. Diaz de Escovar (Malaga, 1900) ; Histoire de la conquete de I Andalousie, by O. Houdas (Paris, 1889); Andalousie el Portugal (Paris, 1886); El. Folk-Lore Andaluz (Seville, 1883); and Nobleza de Andalucia, by G. Argote de Molina (Seville, 1588).

*ANDALUSITE, a mineral with the same chemical composition as cyanite and sillimanite, being a basic aluminium silicate, Al 2 Si05. As in sillimanite, its crystalline form is referable to the orthorhombic system. Crystals of andalusite have the form of almost square prisms, the prism-angle being 89 12'; they are terminated by a basal plane and some- times by small dome-faces. As a rule the crystals are roughly developed and rude colum- nar masses are common, these being frequently altered partially to kaolin or mica. Such crystals, opaque, and of a greyish or brownish colour, occur abundantly in the mica-schist of the Lisens Alp near Innsbruck in Tirol, while the first noted of the many localities of the mineral is in /J**

Andalusia, from which place the mineral (J|j

*derives its name. The unaltered mineral is a^^*

found as transparent pebbles with topaz ^B

in the gem-gravels of the Minas Novas n

district, in Minas Geraes, Brazil. These \E8

pebbles are usually green but sometimes (9ˆ

reddish-brown in colour, and are remarkable vfi§

for their very strong dichroism, the same fjˆ

pebble appearing green or reddish-brown «■

according to the direction in which it is fs£i

viewed. Such specimens make very effective \gm

gem-stones, the degree of hardness of the £5£)

mineral (H. = 7|) being quite sufficient for \jf

this purpose. Its specific gravity is 3-18; it is unattacked by acids and is infusible before the blowpipe.

Andalusite is typically a mineral of i(te~ metamorphic origin, occurring most fre- quently in altered clay-slates and crystalline schists, near the junction of these with masses of intrusive igneous rocks such as

th

Fig. 1.

Fig. 2. — Trans- verse sections of a crystal of Chiasto-

granite. It has been recognized also, however, as a primary-constituent of granite itself.

A curious variety of andalusite known as chiastolite is specially characteristic of clay-slates near a contact with granite. The elongated prismatic crystals enclose symmetrically arranged wedges of carbonaceous material, and in cross-section show a black cross on a greyish ground. Cross-sections of such crystals are polished and worn as amulets or charms. Crystals of a size suitable for this

purpose are found in Brittany and the Pyrenees, while still larger specimens have been found recently in South Australia. The name chiastolite is derived from the Greek XiatrTos, crossed or marked with the letter x : cross-stone and made are earlier names, the latter having been given on account of the resemblance the cross-section of the stone bears to the heraldic macula or mascie. (L. J. S.)

ANDAMAN ISLANDS, a group of islands in the Bay of Bengal. Large and small, they number 204, and lie 590 m. from the mouth of the Hugh, 120 m. from Cape Negrais in Burma, the nearest point of the mainland, and 340 m. from the northern extremity of Sumatra. Between the Andamans and Cape Negrais intervene two small groups, Preparis and Cocos; between the Andamans and Sumatra lie the Nicobar Islands, the whole group stretching in a curve, to which the meridian forms a tangent between Cape Negrais and Sumatra; and though this curved line measures 700 m., the widest sea space is about 91 m. The extreme length of the Andaman group is 219 m. with an extreme width of 32 m. The main part of it consists of a band of five chief islands, so closely adjoining and overlapping each other that they have long been known collectively as " the great Andaman." The axis of this band, almost a meridian line, is 156 statute miles long. The five islands are in order from north to south: North Andaman (51 m. long); Middle Andaman (59 m.); South Andaman (49 m.); Baratang, running parallel to the east of the South Andaman for 17 m. from the Middle Andaman; arid Rutland Island (n m.). Four narrow straits part these islands: Austin Strait, between North and Middle Andaman; Homfray's Strait between Middle Andaman and Baratang, and the north extremity of South Andaman; Middle (or Anda- man) Strait between Baratang and South Andaman; and Macpherson Strait between South Andaman and Rutland Island. Of these only the last is navigable by ocean-going vessels. Attached to the chief islands are, on the extreme N., Landfall Islands, separated by the navigable Cleugh Passage; Interview Island, separated by the very narrow but navigable Interview Passage, off the W. coast of the Middle Andaman; tne Labyrinth Island off the S.W. coast of the South Andaman, through which is the safe navigable Elphinstone Passage; Ritchie's (or the Andaman) Archipelago off the E. coast of the South Andaman and Baratang, separated by the wide and safe Diligent Strait and intersected by Kwangtung Strait and the Tadma Juru (Strait). Little Andaman, roughly 26 m. by 16, forms the southern extremity of the whole group and lies 31m. S. of Rutland Island across Duncan Passage, in which lie the Cinque and other islands, forming Manners Strait, the main commercial highway between the Andamans and the

Madras coast. Besides these are a great number of islets lying off the shores of the main islands. The principal outlying islands are the North Sentinel, a dangerous island of about 28 sq. m., lying about 18 m. off the W. coast of the South Andaman; the remarkable marine volcano, Barren Island (1150 ft.), quiescent for more than a century, 71 m. N.E. of Port Blair; and the equally curious isolated mountain, the extinct volcano of Narcondam, rising 2330 ft. out of the sea, 71 m. E. of the North Andaman. The land area of the Andaman Islands is 2508 sq. m. About 18 m. to the W. of the Andamans are the dangerous Western Banks and Dalrymple Bank, rising to within a few fathoms of the surface of the sea and forming, with the two Sentinel Islands, the tops of a line of submarine hills parallel to the Andamans. Some 40 m. distant to the E. is the Invisible Bank, with one rock just awash; and 34 m. S.E. of Narcondam is a submarine hill rising to 377 fathoms below the surface of the sea. Narcondam, Barren Island and the Invisible Bank, a

great danger of these seas, are in a line almost parallel to the Andamans inclining towards them from north to south.

Topography. — The islands forming Great Andaman consist of a mass of hills enclosing very narrow valleys, the whole covered by an exceedingly dense tropical jungle. The hills rise, especially on the east coast, to a considerable elevation: the chief heights being in the North Andaman, Saddle Peak (2400 ft.); in the Middle Andaman, Mount Diavolo behind Cuthbert Bay (1678 ft.) ; in the South Andaman, Koiob (1505 ft.), Mount Harriet (1 193 ft.) and the Cholunga range (1063 ft.); and in Rutland Island, Ford's Peak (1422 ft.). Little Andaman, with the exception of the extreme north, is practically flat. There are no rivers and few perennial streams in the islands. The scenery is every- where strikingly beautiful and varied, and the coral beds of the more secluded bays in its harbours are conspicuous for their exquisite colouring.

Harbours. — The coasts of the Andamans are deeply indented, giving existence to a number of safe harbours and tidal creeks, which are often surrounded by mangrove swamps. The chief harbours, some of which are very capacious, are (starting north- wards from Port Blair, the great harbour of South Andaman) on the E. coast: Port Meadows, Colebrooke Passage, Elphin- stone Harbour (Homfray's Strait), Stewart Sound and Port Cornwallis. The last three are very large. On the W. coast: Temple Sound, Interview Passage, Port Anson or Kwangtung Harbour (large), Port Campbell (large), Port Mouat and Mac- pherson Strait. There are besides many other safe

anchorages about the coast, notably Shoal Bay and Kotara Anchorage in the South Andaman; Cadell Bay and the Turtle Islands in the North Andaman; and Outram Harbour and Kwangtung Strait in the archipelago. The whole of the Andamans and the out- lying islands were completely surveyed topographically by the Indian Survey Department under Colonel Hobday in 1883-1886, and the surrounding seas were charted by Commander Carpenter in 1888-1889.

Geology. — The Andaman Islands, in conjunction with the other groups mentioned above, form part of a lofty range of submarine mountains, 700 m. long, running from Cape Negrais in the Arakan Yoma range of Burma, to Achin Head in Sumatra. This range separates the Bay of Bengal from the Andaman Sea; and it contains much that is geologically characteristic of the Arakan Yoma, and formations common also to the Nicobars and to Sumatra and the adjacent islands. The older rocks are early Tertiary or late Cretaceous but there are no fossils to indicate age. The newer rocks, common also to the Nicobars and Sumatra, are in Ritchie's Archipelago chiefly and contain radiolarians and foraminifera. There is coral along the coasts everywhere, and the Sentinel Islands are composed of the newer rocks with a super- structure of coral. A theory of a still continuing subsidence of the islands was formed by Kurz in 1866 and confirmed by Oldham in 1884. Signs of its continuance are found on the east coast in several places. Barren Island is a volcano of the general Sunda group which includes also the Pegu group to which Narcondam belongs. Barren Island was last in eruption in 1803, but there is still a thin column of steam from a sulphur bed at the top and a variable hot spring at the point where the last outburst of lava flowed into the sea.

Climate. — Rarely affected by a cyclone, though within the influence of practically every one that blows in the Bay of Bengal, the Andamans are of the greatest importance because of the accurate information relating to the direction and intensity of storms which can be communicated from them better than from any other point in the bay, to the vast amount of shipping in this part of the Indian Ocean. Trustworthy information also' regarding the weather which may be expected in the north and east of India, is obtained at the islands, and this proves of the utmost value to the controllers of the great trades dependent upon the rainfall. A well-appointed meteorological station has been established at Port Blair since 1868. Speaking generally, the climate of the Andamans themselves may be described as normal for tropical islands of similar latitude. It is warm always, but tempered by pleasant sea-breezes; very hot when

the sun is northing; irregular rainfall, but usually dry during the north-east, and very wet during the south-west monsoon. Not only does the rainfall at one place vary from year to year, but there is an extraordinary difference in the returns for places quite close to one another. The official figures in inches for the station at Port Blair, which is situated in by far the driest part of the settlement, were: — •

1895-

1896.

1897-

1898.

1899.

- ‘

1900.

1901.

125-64

107-28

136-41

127-22

87-01

83-28

132-50

A tidal observatory has also been maintained at Port Blair since

1880.

Flora. — A section of the Forest Department of India has been established in the Andamans since 1883, and in the neighbour- hood of Port Blair 156 sq. m. have been set apart for regular forest

operations which are carried on by convict labour. The chief timber of indigenous growth is padouk {Pterocarpus dalber- gioid.es) used for buildings, boats, furniture, fine joinery and all purposes to which teak, mahogany, hickory, oak and ash are applied. This tree is widely spread and forms a valuable export to European markets. Other first-class timbers are koko (Albizzia lebbek), white chuglam (Terminalia biaiata), black chuglam (Myrislica irya), marble or zebra wood (Diospyros kurzii) and satin-wood {Murray a exotica), which differs from the satin- wood of Ceylon {Chloroxylon sw- ietenia) . All of these timbers are used for furniture and similar purposes. In addition there are a number of second-and third-class timbers, which are used locally and for export to Calcutta. Gangaw {Messuaf erred) the Assam iron-wood, is suitable for sleepers; and didu (Bombax insigne) is used for tea-boxes and packing-cases. Among the imported flora are tea, Siberian coffee, cocoa, Ceara rubber (which has not done well), Manila hemp, teak, cocoanut and a number of ornamental trees, fruit-trees, vegetables and garden plants. Tea is grown in considerable quantities and the cultivation is under a department of the penal settlement. The general character of the forests is Burmese with an admixture of Malay types. Great mangrove swamps supply unlimited fire-wood of the best quality. The great peculiarity of Andaman flora is that, with the exception of the Cocos islands, no cocoanut palms are found in the archipelago.

Fauna. — Animal life is generally deficient throughout the Andamans, especially as regards mammalia, of which there are only nineteen separate species in all, twelve of these being peculiar to the islands. There is a small pig (Sus andamanensis) , important to the food of the people, and a wild cat (Paradoxurus tytleri); but the bats(sixteen species) and rats(thirteen species) constitute nearly three-fourths of the known mammals. This paucity of animal life seems inconsistent with the theory that the islands were once connected with the mainland. Most of the birds also are derived from the distant Indian region, while the Indo- Burmese and Indo-Malayan regions are represented to a far less degree. Rasorial birds, such as peafowl, junglefowl, pheasants and partridges, though well represented in the Arakan hills, are rare in the islands; while a third of the different species found are peculiar to the Andamans. Moreover, the Andaman species differ from those of the adjacent Nicobar Islands. Each group has its distinct harrier-eagle, red-cheeked paroquet, oriole, sun- bird and bulbul. Fish are very numerous and many species are peculiar to the Andaman seas. Turtles are abundant and supply the Calcutta market. Of imported animals, cattle, goats, asses and dogs thrive well, ponies and horses

indifferently, and sheep badly, though some success has been achieved in breeding them.

Population. — The Andaman Islands, so near countries that have for ages attained considerable civilization and have been the seat of great empires, and close to the track of a great commerce which has gone on at least 2000 years, are the abode of savages as low in civilization as almost any known on earth. Our earliest notice of them is in a remarkable collection of early Arab notes on India and China (a.d. 851) which accurately represents the view entertained of this- people by mariners down to modern times. " The inhabitants of these islands eat men alive. They

are black, with woolly hair, and in their eyes and countenances there is something quite frightful .... They go naked and have no boats. If they had, they would devour all who passed near them. Sometimes ships that are windbound and have ex- hausted their provision of water, touch here and apply to the natives for it; in such cases the crews sometimes fall into the hands of the latter and most of them are massacred." The traditional charge of cannibalism has been very persistent; but it is entirely denied by the islanders themselves, and is now and probably always has been untrue. Of their massacres of ship- wrecked crews, even in quite modern times, there is no doubt, but the policy of conciliation unremittingly pursued for the last forty years has now secured a friendly reception for shipwrecked crews at any port of the islands except the south and west of Little Andaman and North Sentinel Island. The Andamanese are probably the relics of a negro race that once inhabited the S.E. portion of Asia and its outlying islands, representatives of which are also still to be found in the Malay Peninsula and the Philip- pines. Their antiquity and their stagnation are attested by the remains found in their kitchen-middens. These are of great age, and rise sometimes to a height exceeding 15 ft. The fossil shells, pottery and rude stone implements, found alike at the base and at the surface of these middens, prove that the habits of the islanders have not varied since a remote past, and lead to the belief that the Andamans were settled by their present inhabi- tants some time during the Pleistocene period, and certainly no later than the Neolithic age. The population is not susceptible of accurate computation, but probably it has always been small. The estimated total at a census taken in 1901 was only 2000. Though all descended from one stock, there are twelve distinct tribes of the Andamanese, each with its own clearly-defined locality, its own distinct variety of the one fundamental language and to a certain extent its own separate habits. Every tribe is divided into septs fairly well defined. The tribal feeling may be expressed as friendly within

the tribe, courteous to other Anda- manese if known, hostile to every stranger, Andamanese or other. Another division of the natives is into Aryauto or long-shore-men, and the Eremtaga or jungle-dwellers. The habits and capacities of these two differ, owing to surroundings, irrespectively of tribe. Yet again the Andamanese can be grouped according to certain salient characteristics: the forms of the bows and arrows, of the canoes, of ornaments and utensils, of tattooing and of language. The average height of males is 4 ft. io| in. ; of females, 4 ft. 6 in. Being accustomed to gratify every sensation as it arises, they endure thirst, hunger, want of food and bodily discomfort badly. The skin varies in colour from an intense sheeny black to a reddish-brown on the collar-bones, cheeks and other parts of the body. The hair varies from a sooty black to dark and light brown and red. It grows in small rings, which give it the appear- ance of growing in tufts, though it is really closely and evenly distributed over the whole scalp. The figures of the men are muscular and well-formed and generally pleasing; a straight, well-formed nose and jaw are by no means rare, and the young men are often distinctly good-looking. The only artificial deformity is a depression of the skull, chiefly among one of the southern tribes, caused by the pressure of a strap used for carrying loads. The pleasing appearance natural to the men is not a characteristic of the women, who early have a tendency to stoutness and ungainliness of figure, and sometimes to pronounced prognathism. They are, however, always bright and merry, are under no special social restrictions and have considerable influence. The women's heads are shaved entirely and the men's into fantastic patterns. Yellow and red ochre mixed with grease are coarsely smeared over the bodies, grey in coarse patterns and white in fine patterns resembling tattoo marks. Tattoo- ing is of two distinct varieties. In the south the body is slightly cut by women with small flakes of glass or quartz in zigzag or lineal patterns downwards. In the north it is deeply cut by men with pig-arrows in lines across the body. The male matures when about fifteen years of age, marries when about twenty-six, begins to age when about -forty, and lives on to sixty or sixty-five if he reaches old age. Except

as to the marrying age, these figures fairly apply to women. Before marriage free intercourse between the sexes is the rule, though certain conventional precautions are taken to prevent it. Marriages rarely produce more than three children and often none at all. Divorce is rare, unfaithfulness after marriage not common and incest

unknown. By preference the Andamanese are exogamous as regards sept and endogamous as regards tribe. The children are possessed of a bright intelligence, which, how- ever, soon reaches its climax, and the adult may be compared in this respect with the civilized child of ten or twelve. The Andamanese are, indeed, bright and merry companions, busy in their own pursuits, keen sportsmen, naturally independent and not lustful, but when angered, cruel, jealous, treacherous and vindictive, and always unstable — in fact, a people to like but not to trust. There is no idea of government, but in each sept there is a head, who has attained that position by degrees on account of some tacitly admitted superiority and commands a limited respect and some obedience. The young are deferential to their elders. Off ences are punished by the aggrieved party. Property is communal and theft is only recognized as to things of absolute necessity, such as arrows, pigs' flesh and fire. Fire is the one thing they are really careful about, not knowing how to renew it. A very rude barter exists between tribe's of the same group in regard to articles not locally obtainable. The religion consists of fear of the spirits of the wood, the sea, disease and ancestors, and of avoidance of acts traditionally displeasing to them. There is neither worship nor propitiation. An anthropomorphic deity, Puluga, is the cause of all things, but it is not necessary to pro- pitiate him. There is a vague idea that the " soul " will go some- where after death, but there is no heaven nor hell, nor idea of a corporeal resurrection. There is much faith in dreams, and in the utterances of certain " wise men," who practise an embryonic magic and witchcraft. The great amusement of the Andamanese is a formal night dance, but they are also fond of simple games. The bows differ altogether with each group, but the same two kinds of arrows are in general use: (i) Jong and ordinary for fishing and other purposes; (2) short with a detachable head fastened to the shaft by a thong, which quickly brings pigs up short when shot in the thick jungle. Bark provides material for string, while baskets and mats are neatly and stoutly made from canes and buckets out of bamboo and wood. None of the tribes ever ventures out of sight of land, and they have no idea of steering by sun or stars. Their canoes are simply hollowed out of trunks with the adze and in no other way, and it is the smaller ones which are outrigged; they do not last long and are not good sea-boats, and the story of raids on Car Nicobar, out of sight across a stormy and sea-rippled channel, must be discredited. Honour is shown to an adult when he dies, by wrapping him in a cloth and placing him on a platform in a tree instead of burying him. At such a time the encampment is deserted for three months. The Andaman languages are extremely interesting from the philological standpoint. They are agglutinative

in nature, show hardly any signs of syntactical growth though every indication of long etymological growth, give expression to only the most direct and the simplest thought, and are purely colloquial and wanting in the modifications always necessary for communication by writing. The sense is largely eked out by manner and action. Mincopie is the first word in Colebrooke's vocabulary for " Andaman Island, or native country," and the term — though probably a mishearing on Colebrooke's part for Mongebe (" I am an Onge," i.e. a member of the Onge tribe) — – has thus become a persistent book-name for the people. At- tempts to civilize the Andamanese have met with little success either among adults or children. The home established near Port Blair is used as a sort of free asylum which the native visits according to his pleasure. The policy of the government is to leave the Andamanese alone, while doing what is possible to ameliorate their condition.

Penal Settlement. — The point of enduring interest as regards the Andamans is the penal system, the object of which is to turn the life-sentence and few long-sentence convicts, who alone are sent to the settlement, into honest, self-respecting men and

women, by leading them along a continuous course of practice m self-help and self-restraint, and by offering them every inducement to take advantage of that practice. After ten years' graduated labour the convict is given a ticket-of-leave and becomes self- supporting. He can farm, keep cattle, and marry or send for his family, but he cannot leave the settlement or be idle. With approved conduct, however, he may be absolutely released after twenty to twenty-five years in the settlement; and throughout that time, though possessing no civil rights, a quasi-judicial procedure controls all punishments inflicted upon him, and he is as secure of obtaining justice as if free. There is an unlimited variety of work for the labouring convicts, and some of the establishments are on a large scale. Very few experts are employed in supervision; practically everything is directed by the officials, who themselves have first to learn each trade. Under the chief commissioner, who is the supreme head of the settlement, are a deputy and a staff of assistant superintendents and overseers, almost all Europeans, and sub-overseers, who are natives of India. All the petty supervising establishments are composed of convicts. The garrison consists of 140 British and 300 Indian troops, with a few local European volunteers. The police are organized as a military battalion 643 strong. The number of convicts has somewhat diminished of late years and in 1001 stood at 11,947. The total population of the settlement, consisting of convicts, their guards, the supervising, clerical and departmental staff, with the families of the

latter, also a certain number of ex-convicts and trading settlers and their families, numbered 16, 106. The labouring convicts are distributed among four jails and nineteen stations; the self-supporters in thirty- eight villages. The elementary education of the convicts' children is compulsory. There are four hospitals, each under a resident medical officer, under the general supervision of a senior officer of the Indian medical service, and medical aid is given free to the whole population. The net annual cost of the settlement to the government is about £6 per convict. The harbour of Port Blair is well supplied with buoys and harbour lights, and is crossed by ferries at fixed intervals, while there are several launches for hauling local traffic. On Ross Island there is a light- house visible for 19 m. A complete system of signalling by night and day on the Morse system is worked by the police. Local posts are frequent, but there is no telegraph and the mails are irregular. History. — It is uncertain whether any of the names of the islands given by Ptolemy ought to be attached to the Andamans; yet it is probable that his name itself is traceable in the Alexan- drian geographer. Andaman first appears distinctly in the Arab notices of the 9th century, already quoted. But it seems possible that the tradition of marine nomenclature had never perished; that the 'A7a0oO Saiixovos vrjaos was really a misunderstanding of some form like Agdamdn, while Nijcroi Bapowcrai survived as Lanka Balus, the name applied by the Arabs to the Nicobars. The islands are briefly noticed by Marco Polo, who probably saw without visiting them, under the name Angamanain, seemingly an Arabic dual, " The two Angamans," with the exaggerated but not unnatural picture of the natives, long current, as dog-faced Anthropophagi. Another notice occurs in the story of Nicolo Conti (c. 1440), who explains the name to mean " Island of Gold," and speaks of a lake with peculiar virtues as existing in it. The name is probably derived from the Malay Handuman, coming from the ancient Hanuman (monkey). Later travellers repeat the stories, too well founded, of the ferocious hostility of the people; of whom we may instance Cesare Federici (1569), whose narrative is given in Ramusio, vol. iii. (only in the later editions), and in Purchas. A good deal is also told of them in the vulgar and gossiping but useful work of Captain A. Hamilton (1727). In 1 788-1 789 the government of Bengal sought to establish in the Andamans a penal colony, associated with a harbour of refuge. Two able officers, Colebrooke of the Bengal Engineers, and Blair of the sea service, were sent to survey and report. In the sequel the settlement was established by Captain Blair, in September 1789, on Chatham Island, in the S.E. bay of the Great Andaman, now called Port Blair, but then Port Cornwallis. There was much sickness, and after two

years, urged by Admiral Cornwallis,

the government transferred the colony to the N.E. part of Great Andaman, where a naval arsenal was to be established. With the colony the name also of Port Cornwallis was transferred to this new locality. The scheme did ill; and in 1796 the govern- ment put an end to it, owing to the great mortality and the embarrassments of maintenance. The settlers were finally removed in May 1796. In 1824 Port Cornwallis was the rendez- vous of the fleet carrying the army to the first Burmese war. In 1839, Dr Heifer, a German savant employed by the Indian government, having landed in the islands, was attacked and killed. In 1844 the troop-ships " Briton " and " Runnymede " were driven ashore here, almost close together. The natives showed their usual hostility, killing all stragglers. Outrages on shipwrecked crews continued so rife that the question of occupa- tion had to be taken up again; and in 1855 a project was formed for such a settlement, embracing a convict establishment. This was interrupted by the Indian Mutiny of 1857, but as soon as the neck of that revolt was broken, it became more urgent than ever to provide such a resource, on account of the great number of prisoners falling into British hands. Lord Canning, therefore, in November 1857, sent a commission, headed by Dr F. Mouat, to examine and report. The commission reported favourably, selecting as a site Blair's original Port Cornwallis, but pointing out and avoiding the vicinity of a salt swamp which seemed to have been pernicious to the old colony. To avoid confusion, the name of Port Blair was given to the new settlement, which was established in the beginning of 1858. For some time sickness and mortality were excessively large, but the reclamation of swamp and clearance of jungle on an extensive scale by Colonel Henry Man when in charge (1 868-1 870), had a most beneficial effect, and the health of the settlement has since been notable. The Anda- man colony obtained a tragical notoriety from the murder of the viceroy, the earl of Mayo, by a Mahommedan convict, when on a visit to the settlement on the 8th of February 1872. In the same year the two groups, Andaman and Nicobar, the occupation of the latter also having been forced on the British government (in 1869) by the continuance of outrage upon vessels, were united under a chief commissioner residing at Port Blair.

See Sir Richard Temple, The Andaman and Nicobar Islands (Indian Census, 1901); C. B. Kloss, In the Andamans and Nicobars (i9 3) !

E. H. Man, Aboriginal Inhabitants of the Andaman Islands (1883); M. V. Portman, Record of the Andamanese (n volumes MS. in India Office, London, and Home Department, Calcutta), 1893- 1898, Andamanese Manual (1887), Notes on the Languages of the South Andaman Group of Tribes (1898), and History of our Relations ■with the Andamanese (1899); S. Kurz, Vegetation of the Andamans (1867) ; G. S. Miller, Mammals of the Andaman and Nicobar Islands (vol. xxiv. of the Proceedings of the National Museum, U.S.A.) ; A. L. Butler, " Birds of the Andamans and Nicobars " (Proc. Bombay Nat. Hist. Soc, vols. xii. and xiii.) ; and A. Alcock, A Naturalist in Indian Seas (1902).

ANDANTE (Ital. for " moving' slowly," from andare, to go), a musical term to indicate pace, coming between adagio and allegro; it is also used of an independent piece of music or of the slow movement in a sonata, symphony, &c.

ANDERIDA, an ancient Roman fort at Pevensey, near East- bourne in Sussex (England), built about a.d. 300 as part of a scheme of land-defence against the Saxon pirates; repaired, probably by the great Stilicho, about a.d. 400; and after the Norman Conquest utilized by William the Conqueror for a Norman castle. Its massive Roman enceinte still stands but little damaged.

ANDERNACH, a town of Germany, in the Prussian Rhine province, on the left bank of the Rhine, 10 m. N.W. of Coblenz by the main line to Cologne. Pop. (1900) 7889. Viewed from the river it makes a somewhat gloomy, though picturesque, im- pression, with its parish church (a basilica dating from the 12th century, with four towers), the round watch-tower on the Rhine, old walls in places 15 ft. thick, and a famous crane (erected 1554) for lading merchandise. Among other buildings are a Gothic Minorite church (now Protestant), a town hall, and a prison, formerly the castle of the archbishops of Cologne. Andernach has considerable industries, brewing and manufactures of chemicals and perfumes, and has also a trade in corn and wine. But its

most notable article of commerce is that of mill-stones, made of lava and tufa-stone, a product much used by the Dutch in the construction of their dykes.

Andernach (Antunnacum) is the old Roman Castellum ante Nacum, founded by Drusus and fortified in the 3rd century a.d. In 1 109 Andernach received civic rights, passed in 1167 to the electors of Cologne, in 1253 joined the confederation of the Rhine cities and

was the most southern member of the Hanseatic league. Here in 1474 a treaty was signed between the emperor Frederick III., the four electors of the Rhine and France. In 1 794 Andernach passed to France, but in 1 8 1 5 was ceded, together with the left bank of the Rhine, to Prussia.

ANDERSEN, HANS CHRISTIAN (1805-1875), Danish poet and fabulist, was born at Odense, in Fiinen, on the 2nd of April 1805. He was the son of a sickly young shoemaker of twenty- two, and his still younger wife: the whole family lived and slept in one little room. Andersen very early showed signs of imaginative temperament, which was fostered by the indulgence and superstition of his parents. In 18 16 the shoe- maker died and the child was left entirely to his own devices. He ceased to go to school; he built himself a little toy-theatre and sat at home making clothes for his puppets, and reading all the plays that he could borrow; among them were those of Holberg and Shakespeare. At Easter 1819 he was confirmed at the church of St Kund, Odense, and began to turn his thoughts to the future. It was thought that he was best fitted to be a tailor; but as nothing was settled, and as Andersen wished to be an opera-singer, he took matters into his own hand and started for Copenhagen in September 1819. There he was taken for a lunatic, snubbed at the theatres, and nearly reduced to starvation, but he was befriended by the musicians Christoph Weyse and Siboni, and afterwards by the poet PYederik Hoegh Guldberg (1771-1852). His voice failed, but he was admitted as a dancing pupil at the Royal Theatre. He grew idle, and lost the favour of Guldberg, but a new patron appeared in the person of Jonas Collin, the director of the Royal Theatre, who became Andersen's life-long friend. King Frederick VI. was interested in the strange boy and sent him for some years, free of charge, to the great grammar-school at Slagelse. Before he started for school he published his first volume, The Ghost at Palnatoke's Grave (1822). Andersen, a very backward and un- willing pupil, actually remained at Slagelse and at another school in Elsinore until 1827; these years, he says, were the darkest and bitterest in his life. Collin at length consented to consider him educated, and Andersen came to Copenhagen. In 1829 he made a considerable success with a fantastic volume entitled A Journey on Foot from Holman's Canal to the East Point of Amager, and he published in the same season a farce and a book of poems. He thus suddenly came into request at the moment when his friends had decided that no good thing would ever come out of his early eccentricity and vivacity. He made little further progress, however, until 1833, when he received a small travel- ling stipend from the king, and made the first of his long

European journeys. At Le Locle, in the Jura, he wrote Agnate and the Mer- man; and in October 1834 he arrived in Rome. Early in 1835 Andersen's novel, The Improvisatore, appeared, and achieved a real success; the poet's troubles were at an end at last. In the same year, 1835, the earliest instalment of Andersen's immortal Fairy Tales (Eventyr) was published in Copenhagen. Other parts, completing the first volume, appeared in 1836 and 1837. The value of these stories was not at first perceived, and they sold slowly. Andersen was more successful for the time being with a novel, O.T., and a volume of sketches, In Sweden; in 1837 he produced the best of his romances, Only a Fiddler. He now turned his attention, with but ephemeral success, to the theatre, but was recalled to his true genius in the charming miscellanies of 1840 and 1842, the Picture-Book without Pictures, and A Poet's Bazaar. Meanwhile the fame of his Fairy Tales had been steadily rising; a second series began in 1838, a third in 1845. Andersen was now celebrated throughout Europe, although in Denmark itself there was still some resistance to his pretensions. In June 1847 he paid his first visit to England, and enjoyed a

triumphal social success; when he left, Charles Dickens saw him off from.Ramsgate pier. After this Andersen continued to publish much; he still desired to excel as a novelist and a dramatist, which he could not do, and he still disdained the enchanting Fairy Tales, in the composition of which his unique genius lay. Nevertheless he continued to write them, and in 1847 and 1848 two fresh volumes appeared. After a long silence Andersen published in 1857 another romance, To be or not to be. In 1863, after a very interesting journey, he issued one of the best of his travel-books, In Spain. His Fairy Tales continued to appear, in instalments, until 1872, when, at Christmas, the last stories were published. In the spring of that year Andersen had an awkward accident, falling out of bed and severely hurting himself. He was never again quite well, but he lived till the 4th of August 1875, when he died very peacefully in the house called Rolighed, near Copenhagen. (E. G.)

ANDERSON, ADAM (1692-1765), Scottish economist, was born in 1602, and died in London on the 10th of January 1765. He was a clerk for forty years in the South Sea House, where he published a work entitled Historical and Chronological Deduction of the Origin of Commerce from the Earliest Accounts to the Present Time, containing a History of the Great Commercial Interests of the British

Empire (1762, 2 vols. fol.).

ANDERSON, ALEXANDER (c. 1582-1620?), Scottish mathematician, was born at Aberdeen. In his youth he went to the continent and taught mathematics at Paris, where he published or edited, between the years 1612 and 1619, various geometrical and algebraical tracts, which are conspicuous for their ingenuity and elegance. He was selected by the executors of Franciscus Vieta to revise and edit his manuscript works, a task which he discharged with great ability. The works of Anderson amount to six thin 4to volumes, and as the last of them was published in 1619, it is probable that the author died soon after that year, but the precise date is unknown.

ANDERSON, SIR EDMUND (1530-1605), English lawyer, descended from a Scottish family settled in Lincolnshire, was born in 1530 at Flixborough or Broughton in that county. After studying for a short time at Lincoln College, Oxford, he became in 1550 a student of the Inner Temple. In 1579 he was appointed serjeant-at-law to Queen Elizabeth, and also an assistant judge on circuit. As a reward for his services in the trial of Edmund Campian and his followers (1581), he was, on the death of Sir James Dyer, appointed lord chief justice of the Common Pleas (1582), and was knighted. He took part in all the leading state trials which agitated England during the latter years of Elizabeth's reign. Though a great lawyer and thoroughly impartial in civil cases, he became notorious by his excessive severity and harshness when presiding over the trials of catholics and nonconformists; more markedly so in those of Sir John Perrot, Sir Walter Raleigh, and John Udall the puritan minister. Anderson was also one of the commissioners appointed to try Mary queen of Scots in 1586. He died on the 1st of August 1605 at Eyworth in Bedfordshire. In addition to Reports of Many Principal Cases Argued and Adjudged in the Time of Queen Elizabeth in the Common Bench, published after his death, he drew up several expositions of statutes enacted in Elizabeth's reign which remain in manuscript in the British Museum.

ANDERSON, ELIZABETH GARRETT (1836-), English medical practitioner, daughter of Newson Garrett, of Aldeburgh, Suffolk, was born in 1836, and educated at home and at a private school. In i860 she resolved to study medicine, an unheard- of thing for a woman in those days, and one which was regarded by old-fashioned people as almost indecent. Miss Garrett managed to obtain some more or less irregular instruction at the Middlesex hospital, London, but was refused admission as a full student both there and at many other

schools to which she applied. Finally she studied anatomy privately at the London hospital, and with some of the professors at St Andrews University, and at the Edinburgh Extra-Mural school. She had no less difficulty in gaining a qualifying diploma to practise medicine. London University, the Royal Colleges of Physicians

and Surgeons, and many other examining bodies refused to admit her to their examinations; but in the end the Society of Apothecaries, London, allowed her to enter for the License of Apothecaries' Hall, which she obtained in 1865. In 1866 she was appointed general medical attendant to St Mary's dispensary, a London institution started to enable poor women to obtain medical help from qualified practitioners of their own sex. The dispensary soon developed into the New hospital for women, and there she worked for over twenty years. In 1870 she obtained the Paris degree of M.D. The same year she was elected to the first London School Board, at the head of the poll for Marylebone, and was also made one of the visiting physicians of the East London hospital for children; but the duties of these two positions she found to be incompatible with her principal work, and she soon resigned them. In 1871 she married Mr J. G. S. Anderson (d. 1907), a London shipowner, but did not give up practice. She worked steadily at the develop- ment of the New hospital, and (from 1874) at the creation of a complete school of medicine in London for women. Both institutions have since been handsomely and suitably housed and equipped, the New hospital (in the Euston Road) being worked entirely by medical women, and the schools (in Hunter Street, W.C.) having over 200 students, most of them preparing for the medical degree of London University, which was opened to women in 1877. In 1897 Mrs Garrett Anderson was elected president of the East Anglian branch of the British Medical Association. In 1908 she was elected (the first lady) mayor of Aldeburgh. The movement for the admission of women to the medical profession, of which she was the indefatigable pioneer in England, has extended to every civilized country except Spain and Turkey.

ANDERSON, JAMES (1662-1728), Scottish genealogist, anti- quary and historian, was born at Edinburgh on the 5th of August 1662. He was educated for the law, and became a writer to the signet in 1691. His profession gave him the opportunity of gratifying his taste for the study of ancient documents; and just before the union the Scottish parliament commissioned him to prepare for publication what remained of the public records of the kingdom, and in their last session voted a sum of £1940 sterling to defray his expenses. At this work he laboured for several years with great judgment and perseverance; but it was not completed at his death in 1728. The

book was published posthumously in 1739, edited by Thomas Ruddiman, under the title Selectus Diplomalum el Numismatum Scoliae Thesaurus. The preparation of this great national work involved the author in considerable pecuniary loss; and soon after his death, the numerous plates, engraved by Sturt, were sold for £530. These plates are now lost, and the book has become exceedingly scarce. After the union of the crowns, Anderson was appointed in 1715 postmaster-general for Scotland, as some compensation for his labours; but in the political struggles of 1717 he was deprived of this office, and never again obtained any reward for his services. He died on the 3rd of April 1728. He published, during the controversy about the union, An Historical Essay showing that the Crown and King- dom of Scotland is Imperial and Independent (Edin., 1705,), and later Collections relating to the History of Mary Queen of Scotland (in 4 vols., Edin., 1727-1728).

ANDERSON, JAMES (1739-1808), Scottish agriculturist and economist, was born at Hermiston, near Edinburgh, in 1739. While still a boy he undertook the working of a farm in Mid- Lothian which his family had occupied for several generations, and later he rented in Aberdeenshire a farm of 1300 acres of unimproved land. In 1783 he settled in Edinburgh, where in 1 791 he projected a weekly publication called The Bee, which was largely written by himself, and of which eighteen volumes were published. In 1797 he began to reside at Isleworth, and from 1799 to 1802 he produced a monthly publication, Recreations in Agriculture, Natural History, Arts and Miscellaneous 'Litera- ture. He was also the author of many pamphlets on agri- cultural and economical topics. He died on the 15th of October 1808.

ANDERSON, JOHN (i 726-1 796), Scottish natural philosopher, was born at Roseneath, Dumbartonshire, in 1726. In 1756 he became professor of oriental languages in the university of Glasgow, where he had finished his education; and in 1760 he was appointed to the more congenial post of professor of natural philosophy. He devoted himself particularly to the application of science to industry, instituting courses of lectures intended especially for artisans, and he bequeathed his property for the foundation of an institution for the furtherance of technical and scientific education in Glasgow, Anderson's College, now merged in the Glasgow and West of Scotland Technical College. He died in Glasgow on the 13th of

January 1796. His Institutes of Physics, published in 1786, went through five editions in ten years.

ANDERSON, MARY (1859-), American actress, was born at Sacramento, California, on the 28th of July 1859. Her father, an officer in the Confederate service in the Civil War, died in 1863 . She was educated in various Roman Catholic institutions, and at the age of thirteen, with the advice of Charlotte Cushman, began to study for the stage, making her first appearance at Louisville, Kentucky, as Juliet in 1875. Her remarkable beauty created an immediate success, and she played in all the large cities of the United States with increasing popularity. Between 1883 and 1889 she had several seasons in London, and was the Rosalind in the performance of A s You Like It which opened the Shakespeare Memorial theatre at Stratford-on-Avon. Among her chief parts were Galatea (in W. S. Gilbert's Pygmalion and Galatea), Clarice (in his Comedy and Tragedy, written for her), Hermione, Perdita, and Julia (in The Hunchback) . In 1889 she retired from the stage and in 1890 married Antonio de Navarro, and settled in England.

See William Winter's Stage Life of Mary Anderson (New York, 1886), and her own A Few Memories (New York, 1896).

ANDERSON, RICHARD HENRY (1821-1879), American soldier, was born in South Carolina on the 7th of October 182 1. Graduating at West Point in 1842, he served in the Mexican War (in which he won the brevet of first lieutenant) and in the Kansas troublesof 1856-1857, becomingfirstlieutenant in 1848 and captain in 1855. At the outbreak of the Civil War in 1861 he resigned his commission in the U.S. army, and entered the Confederate service as a brigadier-general, being promoted major-general in August 1862 and lieutenant-general in May 1864. With the exception of a few months spent with the army under Bragg in 1862, Anderson's service was wholly in the Army of Northern Virginia. Under Lee and Longstreet he served as a divisional commander in nearly every battle from 1862 to 1864, winning especial distinction at Chancellorsville and Gettysburg. When Longstreet was wounded at the battle of the Wilderness, Ander- son succeeded him in command of the 1st corps, which he led in the subsequent battles. His services at the battle of Spott- sylvania (q.v.) were most important. He remained with the army, as a corps commander, to the close of the war, after which he retired into private life. He died at Beaufort S.C. on the 26th of June 1879.

ANDERSON, ROBERT (1750-1830), Scottish author and critic, was

born at Carnwath, Lanarkshire, on the 7th of January 1750. He studied first divinity and then medicine at the uni- versity of Edinburgh, and subsequently, after some experience as a surgeon, took the degree of M.D. at St Andrews in 1778. He began to practise as a physician at Alnwick, but he became financially independent by his marriage with the daughter of Mr John Gray, and abandoned his profession for a literary life in Edinburgh. For several years his attention was occupied with his edition of The Works of the British Poets, with Prefaces Biographical and Critical (14 vols. 8vo, Edin., 1 792-1807). His other publications were, The Miscellaneous Works of Tobias Smollett, M.D., with Memoirs of his Life and Writings (Edin., 1796); Life of Samuel Johnson, LL.D., with Critical Observations on his Works (Edin., 1815); The Works of John Moore, M.Dˆ with Memoirs of his Life and Writings (Edin., 7 vols., 1820); and The Grave and other Poems, by Robert Blair; to which are pre- fixed some Account of his Life and Observations on his Writings

(Edin., 1826). Dr Anderson died at Edinburgh on the 20th of February 1830.

ANDERSON, a city and the county-seat of Madison county, Indiana, U.S.A., situated on the west fork of the White river, about 35 m. N.E. of Indianapolis. Pop. (1880) 4126; (1S90) 10,741; (1900) 20,178, of whom 1081 were foreign-born; (1910, census) 22,476. It is served by the Central Indiana, the Cleveland, Cincinnati, Chicago & St Louis, and the Pittsburg, Chicago & St Louis railways, and also by the Indiana Union Traction System (electric), the general offices and central power plant of which are situated there. Its importance as a manu- facturing centre is due to its location in the natural gas region. In 1905 Anderson ranked first among the cities of the state in the manufacture of carriage and wagon material, and iron and steel. Among its many other manufactures are glass and glass- ware, paper, strawboards, crockery and tiles. In 1905 the total factory product was valued at $8,314,760. There is a good public library; much attention has been devoted to public improvements; and the water works and the electric lighting plants are owned and operated by the city. In connexion with the water works there is a good filtration plant. First settled about 1822, Anderson was incorporated in 1865.

ANDERSONVILLE, a village of Sumter county, Georgia, U.S.A., in the S.W. part of the state, about 60 m. S. W . of Macon, on the Central of Georgia railway. Pop. (1910) 174. from November 1863 until the close of the Civil War it was the seat of a Confederate military prison. A tract of i6| acres of land near the village was

cleared of trees and enclosed with a stockade. Prisoners began to arrive in February 1864, before the prison was completed and before adequate supplies had been received, and in May their number amounted to about 12,000. In June the stockade was enlarged so as to include 265 acres, but the congestion was only temporarily relieved, and in August the number of prisoners exceeded 32,000. No shelter had been provided for the inmates: the first arrivals made rude sheds from the debris of the stockade; the others made tents of blankets and other available pieces of cloth, or dug pits in the ground. Owing to the slender resources of the Confederacy, the prison was frequently short of food, and even when this was sufficient in quantity it was of a poor quality and poorly prepared on account of the lack of cooking utensils. The water supply, deemed ample when the prison was planned, became polluted under the congested conditions. During the summer of 1864 the prisoners suffered greatly from hunger, exposure and disease, and in seven months about a third of them died. In the autumn, after the capture of Atlanta, all the prisoners who could be moved were sent to Millen, Georgia and Florence, South Carolina. At Millen better arrangements prevailed, and when, after Sherman began his march to the sea, the prisoners were returned to Andersonville, the conditions there were somewhat improved. During the war 49,485 prisoners were received at the Anderson- yille prison, and of these about 13,000 died. The terrible con- ditions obtaining there were due to the lack of food supplies in the Confederate States, the incompetence of the prison officials, and the refusal of the Federal authorities in 1864 to make exchanges of prisoners, thus filling the stockade with unlooked-for numbers. After the war Henry Wirz, the superintendent, was tried by a court-martial, and on the 10th of November 1865 was hanged, and the revelation of the sufferings of the prisoners was one of the factors that shaped public opinion regarding the South in the Northern states, after the close of the Civil War. The prisoners' burial ground at Andersonville has been made a national cemetery, and contains 13,714 graves of which 921 are marked " unknown."

There is an impartial account of the Andersonville prison in James F. Rhodes, History of the United States (vol. v., New York, 1904). The partisan accounts are numerous; see, for instance, A. C. Hamlin, Martyria; or, Andersonville Prison (Boston, 1866); and R. R. Stevenson, The Southern Side; or, Andersonville Prison (Baltimore, 1876).

ANDES, a vast mountain system forming a continuous chain of highland along the western coast of South America. It is roughly 4400 m. long, 100 m. wide in some parts, and of an

average height of 13,000 ft. 1 The connexion of this system with that of the Rocky Mountains, which has been pointed out by many writers, has received much support from the discovery of the extensive eruptions of granite during Tertiary times, extend- ing from the southern extremity of South America to Alaska. The Andean range is composed of two great principal chains with a deep intermediate depression, in which, and at the sides of the great chains, arise other chains of minor importance, the chief of which is that called the Cordillera de la Costa of Chile. This starts from the southern extremity of the continent, and runs in a northerly direction, parallel with the coast, being broken up at its beginning into a number of islands, and afterwards forming the western boundary of the great central valley of Chile. To the north this coastal chain continues in small ridges or isolated hills along the Pacific as far as Colombia, always leaving the same valley more or less visible to the west of the western great chain.

Of the two principal chains the eastern is generally called Los Andes, and the western La Cordillera, in Colombia, Peru and Bolivia, where the eastern is likewise known as Cordillera Real de los Andes, while to the south of parallel 23 S. lat. in Chile and Argentina, the western is called Cordillera de los Andes. The eastern disappears in the centre of Argentina, and it is therefore only the Cordillera de los Andes that is prolonged as far as the south-eastern extremity of the continent. The Cordillera de la Costa begins near Cape Horn, which is composed principally of crystalline rocks, and its heights are inconsiderable when compared with those of the trueCordillera of the Andes. The latter, as regards its main chain, is on the northern coast of the Beagle Channel, inTierra del Fuego, bounded on the north by the deep depression of Lake Fagnano and of Admiralty Sound. Staten Island appears to be the termination to the east. The Cordillera of the Andes in Tierra del Fuego is formed of crystalline schists, and culminates in the snow- capped peaks of Mount Darwin and Mount Sarmiento (7200 ft.), which contains glaciers of greater extent than those of Mont Blanc. The extent of the glaciers is considerable in this region, which, geographically, is more complex than was formerly supposed. Although, in the explored portion of the Fuegian chain, the volcanoes which have been mentioned from time to time have not been met with, there seem to have existed to the south, on the

islands, many neo-volcanic rocks, some of which appear to be contemporaneous with the basaltic sheet that covers a part of eastern Patagonia. The insular region between Mount Sarmiento and the Cordillera de los Andes, properly so called, i.e. that which extends from Magellan Strait northwards, is not fully explored, and all that is known of it is that it is principally composed of the same rocks as the Fuegian section, and that the greater part of its upper valleys is occupied by glaciers that reach down to the sea amid dense forest.

As Admiralty Sound and Lake Fagnano bound the Cordillera to the north in Tierra del Fuego, so at the eastern side of the Cordillera in the southernmost part of the continent there is a longitudinal depression which separates the Andes from some independent ridges pertaining to a secondary parallel broken chain called the pre-Cordillera. This depression is occupied in great part by a series of lakes, some of these filling transversal breaches in the range, whilst others are remains of glacial re- servoirs, bordered by morainic dams, extending as far as the eastern tableland and corresponding in these cases with trans- versal depressions which reach the Atlantic Ocean. Between the larger lakes, fed by the Andine glaciers of the eastern Argentina, s ‘°P e °f tne Southern Andes, are Lakes Maravilla, S2°-38° s.’ 100 sq. m., and Sarmiento, 26 sq. m., 51 S. lat., which overflow into Last Hope Inlet; Argentino, 570 sq. m., 50 S. lat.; and Viedma, 450 sq. m., 49° 30′ S. lat., which empty into the river Santa Cruz; the fjordian Lake San Martin, 40 S. lat., and Lakes Nansen, 18 sq. m. ; Azara, 8 sq. m.; and Belgrano, 18 sq. m., which are dependents of Lake San Martin

1 As to the specific elevations of many of the peaks mentioned in this article, various authorities differ, and it is impossible in many cases to rate one estimate as of greater value than another.

(380 sq. m.), and Lakes Pueyrredon (98 sq. m.) and Buenos Aires (700 sq. m.), which now overflow into the Pacific, through one of the remarkable inlets that are found throughout the Cordillera, the Calen Inlet, which is the largest western fjord of Patagonia. To the north of Lake Buenos Aires there is Lake Elizalde, which, while situated on the eastern slope, sends its waters to the Pacific Ocean, and Lakes Fontana (30 sq. m.) and La Plata (34 sq. m.), 45 S. lat., which feed the river Senguerr, which flows to the Atlantic. Lake General Paz (66 sq. m.) on the eastern slope of the Andes, at 44 S. lat., is the principal source of the Palena river, which cuts all the Cordillera, while Lakes Fetalauquen (20 sq.m.) Menendez (28 sq. m.), Riva-

davia (10 sq. m.), and other smaller lakes, also situated between 43° 30', and 42° 30′ S. lat. on the eastern slope send their waters to the Pacific by the river Fetaleufu which cuts through the Andes by a narrow gorge. The waters of Lake Puelo (18 sq. m.) likewise flow into the same ocean through the river of that name, which also cuts the Cordillera, and of which the principal affluent likewise drains the waters of a system of small lakes, the largest of which, Lake Mas-cardi, measures 1 7 sq. m., which in comparatively re- cent times formed part of the basin of Lake Nahuel- Huapi (207 sq. m.), 41 S. lat. An ex- tensive area of glacial deposits shows that a sheet of ice formerly covered the whole eastern slope to a great distance from the mountains. To the west another sheet reached at the same t'Tie the Pacific Ocean.

From the Strait of Magellan up to 52° S. lat., the western slope of the Cordillera does not, properly speaking, exist. Abrupt walls overlook the Pacific, and great longitudinal and transversal channels and fjords run right through the heart of the range, cutting it generally in a direction more or less oblique to its axis, che result of movements of the earth's crust.

is

The mountains forming the Cordillera between Magellan Strait and 41° S. lat. are higher than those previously mentioned in Tierra del Fuego. Generally composed of granite, gneiss and Palaeozoic rocks, covered in many parts by rugged masses of volcanic origin, their general height is not less than 6500 ft., while Mount Qeikie is 7 500 ft. and Mount Stokes 7 100 ft. To the north are Mounts Mayo (7600 ft.), Agassiz (10,600 ft.), and Fitzroy, in 49° S. lat. (11,120 ft.). The section from 52° to 48° S. lat. is a continuous ice-capped mountain range, and some of the glaciers extend from the eastern lakes to the western channels, where they reach the sea-leyel. The level of the lakes begins at 130 ft. at Lake Maravilla and gradually ascends to nearly 700 ft. at Lake San Martin. Passing the breach through which Lake San Martin empties itself into Calen Inlet, in 48° S. lat., is found a wide oblique opening in the range, through which flows the river Las Heras, fed by Lake Pueyrredon, which is only 410 ft. above the sea-level to the east of the Andes, while Lake Buenos Aires, immediately to the north, is 710 ft. The Andes continue to be to the west an enormous rugged mass of ice and snow of an average height

of 9000 ft., sending glaciers to all the eastern fjords.

Mount San Lorenzo, detached from the main chain in the pre-Cordillera,is 11,800 ft. high. Mount San Valentin (12,700 ft.) is the culminating point of the Andes in the region extending from 49° to 46° S. lat., a little north of which is the river Huemules which is followed by the breach of the river Aisen. These two rivers have emptied a large system of lakes, which in pre-Glacial times occupied the eastern zone, thus forming a region suitable for colonization in the broad valleys and hollows, where the rivers, as in the case with those in the north, cut through the Andes by narrow gaps, forming cataracts and rapids between the snowy peaks. Volcanic action is still going on in these latitudes, as the glaciers are at times covered by ashes, but the predominant rocks to the east are the Tertiary granite, while to the west gneiss, older granite and Palaeozoic rocks prevail. The highest peaks, however, seem to be of volcanic origin. Farther north, up to 41 S. lat., the water gaps are situated at a lesser distance one from the other, owing mainly to more continuous erosion, this section of the continent being the region of the maximum rainfall on the western coast to the south of the equator. Between the gaps of the river Aisen and river Cisnes or Frias, which also pierces the chain, is found a huge mountain mass, in which is situated Mount la Torre (7150 ft.). These form the continental watershed, but in this region erosion is taking place so rapidly that the day is not far distant when Lakes La Plata and Fontana, situated to the east at a height of 3000 ft. and now tributaries of the Atlantic, may become tributaries of the Pacific. Already nitrations from the former go to feed western affluents through the granitic masses; To the north of Mount la Torre flows in the river Cisnes, 44° 48′ S. lat., across another water gap, continuing the range to the north with high peaks, as Alto Nevado (7350 ft.) and Cacique (7000'ft.). The glaciers reach almost the western channels, as is the case at the river Quelal. The northern glaciers, descending nearly to sea- level, are situated at 43° 40′ S. lat. To the north 45 S. lat. a well-defined western longitudinal valley, at some recent time occupied by lakes and rivers, divides the Cordillera into two chains, the eastern being the main chain, to which belong Mounts Alto Nevado, Cacique, Dentista, Maldonado, Serrano, each over 7000 ft. high; and Torrecillas (7400 ft.), Ventisquero (7500 ft.), and Tronador (11,180 ft.); while the western chain, broken into imposing. blocks, contains several high volcanic peaks such as Mounts Tanteles, Corcovado, Minchimahuida, Hornopiren and Yates. The rivers Palena, with its two branches, Pico and Carrenleufu, Fetaleufu, Puelo and Manso cut the two chains, while the rivers Renihue,

Bodadahue and Cochamo have their sources in the main eastern ridge. Mention has been made of active volcanoes in 51°, 49° and 47 S. lat., but these have not been properly located. The active volcanoes south of 41°, con- cerning which no doubt exists, are the Huequen, in 43 lat., and the Calbuco, both of which have been in eruption in modern times.

The surroundings of Mount Tronador, consisting of Tertiary granite and basalt, form one of the most interesting regions in

the Patagonian Andes for the mountaineers of the future. To the east extends the large and picturesque lake of Nahuel-Huapi, to the west is Lake Todos Los Santos (50 sq. m.), to which the access is easy and of which the scenery is of surpassing beauty. Between 41° and 38° S. lat., among other smaller lakes, are Lakes Traful (45 sq. m.), Lacar (32 sq. m.), which, properly belonging to the system of Atlantic lakes, empties itself by the only water gap that occurs in this zone of the Cordillera into the river Valdivia, a tributary of the Pacific, Lake Lolog (15 sq. m.), Huechu-lafquen (45 sq. m.), and Lake Alumine (21 sq. m.). The volcanoes of Lanin (12,140 ft.), Quetropillan (9180 ft.), Villarica (10,400 ft.), Yaimas and Tolhuaca are all more or less active; the first is in the main chain, while the others are on the western slope. The scenery in the neighbourhood is magni- ficent, the snowy cones rising from amidst woods of araucaria, and being surrounded by blue lakes. While the scenery of the western slope of the Andes is exceedingly grand, with its deep fjords, glaciers and woods, yet the severity of its climate detracts considerably from its charm. The climate of the eastern slope, however, is milder, the landscapes are magnificent, with wooded valleys and beautiful lakes. The valleys are already partly settled by colonists. Between 52° and 40° S. lat. erosion has carried the watershed of the continent from the summit of the Cordillera to the eastern plains of Patagonia.

From 40° S. southward the Chile-Argentine Boundary Com- mission under Sir T. H. Holdich carried out important investiga- tions in 1902; and between 38° and 33° S. lat. the Andes were somewhat extensively explored about the close of the 19th century by Argentine and Chilean Commissions. The highest peaks in the latter section are volcanic and their eruptions have sensibly modified the character of the primitive ridges. Out- flows of lava and tufa cover the mountain sides and fill up the valleys. The Jurassic and Cretaceous formations, which in the Southern Cordillera are situated outside of the range to the east, form to a considerable extent the mass of the great range, together with quartz porphyry, the Tertiary, granite and other eruptive rocks, which have been observed along all the chain in

South America up to Alaska in the north. Gneiss is seldom met with, but there are crystalline rocks, belonging chiefly to the pre-Cordillera of the eastern and to the Cordillera de la Costa on the western side.

About 38° S. the Andes take a great transversal extension; there are no wide intermediate valleys between the different ridges but the main ridge is perfectly defined. Volcanic _. .. _ cones continue to predominate, the old crystalline rocks Argentina almost disappear, while the Mesozoic rocks are most from 38° s. common. The higher peaks are in the main chain, while n< "?" the Domuyo (15,317 ft.) belongs to a lateral eastern ridge. The principal peaks between this and Mount Tupungato at 33° S. lat. are: Mount Cochico (8255 ft.), Campanario, (13,140 ft.), Peteroa (13,297 ft.), Tinguiririca, Castillo (16,535 ft.), Volcano Maipu (17,576 ft.), Alvarado (14,600 ft.), Amarillo (15,321 ft.), Volcano San Jose (19,849 ft.), Piuquenes (17,815 ft.), and Volcano Bravard (19,619 ft.).*

North of Maipu volcano, ascended by R. P. Giissfeldt in 1883, the Cordillera is composed of two huge principal ridges which unite and terminate in the neighbourhood of Mount Tupungato. The valley between them is 9000 ft. high; and in that part of the Cordillera are situated the highest passes south of 33° S. lat., one of which, the Piuquenes Pass, reaches 13,333 ft., whilst the ■ easiest of transit and almost the lowest is that of Pichachen (6505 ft.), which is the most frequented during winter. Mount Tupungato reaches 22,329 ft., according to Argentine measure- ment. To the north of this mountain, situated at the watershed of the Andes, extends a lofty region comprising peaks such as Chimbote (18,645 ft-) and Mount Polleras (20,266 ft.). The Pircas Pass is situated at a height of 16,962 ft. The gaps of Bermejo and Iglesia, in the Uspallata road, the best known of all the passes between Argentina and Chile, are at 13,025 ft. and 13,412 ft. altitude respectively, while the nearest peaks, those of Juncal and Tolorsa, are 19,358 and 20,140 ft. high.

Mounts Tupungato, Aconcagua (23,393 ft-) and Mercedario

ANDES

9 6 3

x

Casfada yv

Pircala'

Canada Colorado

after C. BurckhardJ

A. Alluvium

C. Cretaceous (including upper A lower) M. Upper Jurassic (Malm)
|

D. Middle Jurassic f Dogger) [”””ˆZˆl’JlTf. L. Liassic

•

porphyritic conglomerate

(21 ,982 ft.) are the highest peaks of the central Argentine-Chilean Andes. These three peaks are formed of eruptive rocks, sur- rounded by Jurassic beds which have undergone a thorough metamorphosis. While in the west of the Andes, from the latitude of Aconcagua, the central valley of Chile runs without any notable interruption to the south end of the continent, a valley which almost disappears to the north, leaving only some rare inflexions which are considered by Chilean geographers and geologists to be a continuation of the same valley; to the east in Argentina a longitudinal valley, perfectly characterized, runs along the eastern foot of the Cordillera, separating this from the pre- Cordillera, which is parallel to the Cordillera de la Costa of Chile. Between Aconcagua and Mercedario are the passes of Espinacito (14,803 ft.) and Los Patos or Valle Hermoso (11,736 ft.), chosen by the Argentine General San Martin, when he made his memor- able passage across the chain during the War of Independence. North of Valle Hermoso the Andean ridges, while very high, are not abrupt, and the passes are more numerous than in the south; some of them descending 10,000 ft., but most of them between 13,000 and 14,000 ft. The pass of Quebrada Grande is 12,468 ft. in altitude; Cencerro, 12,944 ft.; Mercedario, 13,206 ft.; Ojota, 14,304 ft.; Pachon, 14,485 ft. ; while Gordito is 10,318 ft. Farther north the passes are higher. Barahona Pass is 13,092 ft.; Ternera, 15,912 ft.; San Lorenzo, 16,420 ft., while the peak of the volcano reaches 18,143 ft- ; Mount Olivares, 20,472 ft.; Porongos, 19,488 ft.; Tortolas, 20,121 ft.; and Potro, 19,357 ft.

As far as 28 S. lat. the Cordillera de los Andes has been prin- cipally formed by two well-defined ridges, but to the north, recent volcanic action has greatly modified its orography. Only a single line of passes characterizes the main ridge, and amongst them are the passes of Ollita (15,026 ft.), Pefias Negras (14,435 ft.), Pircas Negras

(13,615 ft.), La Gallina (16,240 ft.), Tres Quebradas (15,535 ft.), and Aguita (15,485 ft.). To the north of Mount Potro the peaks in the Cordillera are not very prominent as far as the great mass of Tres Quebradas, but here are to be met with some that may be considered as amongst the highest of the whole range. Mount Aguita is 20,600 ft., and the culminating peak of those of Tres Cruces reaches 22,658 ft. To the east of the eastern longitudinal valley, at 27 S. lat., begins a high volcanic plateau between the Cordillera and the southern prolongation of the Bolivian Cordillera Real, which contains lofty summits, such as Mount Veladero (20,998 ft.) , Mount Bonete (21,980), Mount Reclus (20,670), Mount Pissis (22,146), Mount Ojo del Salado (21,653), and Incahuasi (21,719). To the north of Tres Cruces is a transversal depression in the Cordillera, which is considered to be the southern termination of the high plateau of the Puna de Atacama. The Cordillera of the Andes borders the Puna to the west, while the Bolivian Cordillera Real bounds it to the east. In that region the Cordillera

Bolivia.

G. Upper Jurassic Gypsum

YV. Younger Volcanic Rocks

OV. Older Volcanic Rocks

Di. Dioritic Rocks

X. Change of bearing in the Sections

of the Andes is of comparatively recent origin, being principally constituted by a line of high volcanoes, the chief summits being those of Juncal, Panteon de Aliste, Azufre or Listarria(i8,636 ft.), Llullaillaco (21,720), Miniques (19,357), Socompa (19,948), Licancaur (19,685), Viscachuelas (20,605), Tapaquilcha (19,520), Oyahua (19,242), Ancaquilcha (20,275), Ota- (19,159), Mino (20,112), Sillilica (21,100), Perinacota (20,918), Sagama (22,339), Tacona (19,740), Misti (19,029); to the east closes in the inter- mediary high plateau which begins at 28 S. lat. in Argentina. The principal peaks of the Bolivian Andes and its prolongation from south to north, are Famatina, in the centre of Argentina, (20,340 ft.), Languna Blanca (18,307), Diamante (18,045), Cachi (20,000), Granadas,Lipez(i9, 680), Guadalupe (18,910), Chorolque (18,480), Cuzco (17,930), Enriaca (18,716), Junari (16,200), Michiga (17,410), Quimza-Cruz (18,280), Illimani (21,190) and Sorata

(21,490).

While the western range of the Cordillera is principally formed by volcanic rocks, the eastern (to the east of the range is Cerro Potosi, 15,400 ft.) Andes of Bolivia are chiefly composed of old crystalline rocks. Between the ranges in the high plateau north to 27 are numerous isolated volcanoes which have been in activity in recent times, such as Peinado (18,898 ft.), San Pedro (18,701), Antuco (19,029), Antofalla (20,014), Rincon (17,881), Pastos Grandes (17,553), Zapalegui (17, 553), Suniguira (19,258), Tahue (17,458); volcanoes which have been elevated from a lacustrine basin, which very recently occupied the whole ex- tension, and the remains of which are, in the south, the Laguna Verde, at 28 , and in the north Lake Titicaca. The discovery of great Pampean mammals in the Pleistocene beds of that region shows that this upheaval of the latter is very recent, for in the heart of the Cordillera, as well as on the west coast of Bolivia and Peru, there have been discovered, in very recent deposits, the remains of some mammals which cannot have crossed the high range as it now exists.

The two Cordilleras that formed the Andes to the north of 28°S. lat. are continued in Peru. The western, which reaches an altitude of about 10,000 ft., then ceases to exist as a con- tinuous chain, there remaining only a short, high ridge, called by Edward Whymper the " Pacific range of the equator," and between this ridge and the crystalline Andean axis, the " avenue of volcanoes," to use his words, arises amidst majestic scenery. Chimborazo, which is not in the main chain, reaches 20,517 ft.; Cotopaxi (19,580), Antisana (19,260), Coyambo (19,200) are in the eastern range, with many other peaks over 16,000 ft. which still contain glaciers. Sangay (17,380 ft.), under the equator, according to Wolff, appears to be the most active volcano in the world. Pichincha (15,804 ft.) and Cotocachi (16,297 ft.) are the loftiest volcanoes of the western range. In Colombia the three principal chains are continuations of those under the equator, and show very slight traces of volcanic action,

Peru- Ecuador.

In the western chain, which is remarkable for its regularity, the highest peak is 11,150 ft., and the lowest pass 6725 ft. The

Colombia centra l chain, separated from the western chain by the valley of the Cauca and from the eastern by the valley of the Magdalena, is unbroken; it is the more important owing to its greater altitudes and is of volcanic character. To the south, near the equator, are Mounts Arapul (13,360 ft.) and Chumbul (15,720 ft.). The volcanoes Campainero (12, 470 ft.) and Pasto (14,000 ft.) are also in that zone. Farther north is the volcano Purace, which presents a height of 16,000 ft.; then come Huila (18,000), Santa Catalina (16,170), and Tolima (18,400), Santa Isabel (16,760), Ruiz (17,390) andHervas (18,340). The eastern chain begins north of the equator at 6000 ft., gradually rises to the height of Nevado (14,146 ft.), Pan de Azucar (12,140 ft.), and in the Sierra Nevada de Cochi attains to peaks of 16,700 ft.

The snow-line of the Andes is highest in parts of Peru where it lies at about 16,500 ft. Its general range from the extreme north to Patagonia is 14,000 to 15,500 ft., but along the Patagonian frontier it sinks rapidly, until in Tierra del Fuego it lies at about 4900 ft.

Structure. — The structure of the Andes is least complex in the southern portion of the range. Between 33 and 36 S. the chain consists broadly of a series of simple folds of Jurassic and Cretaceous beds, It is probably separated on the east from the recent deposits of the pampas by a great fault, which, however, is always concealed by an enormous mass of scree material. The Cretaceous beds lie in a broad synclinal upon the eastern flank, but the greater part of the chain is formed of Jurassic beds, through which, on the western margin, rise the numerous andesitic volcanic centres. There is no continuous band of ancient gneiss, nor indeed of any beds older than the Jurassic. There is very little over-folding or faulting, and the structure is that of the Jura mountains rather than of the Alps. The inner or eastern ridge farther north of Argentina consists of crystalline rocks with infolded Ordovician and Cambrian beds, often overlaid unconformably by a sandstone with plant-remains (chiefly Rhaetic). In Bolivia this eastern ridge, separated from the western Cordillera by the longitudinal valley in which Lake Titicaca lies, is formed chiefly of Archaean and Palaeozoic rocks. All the geological systems,from the Cambrian to the Carboniferous, are represented and they are all strongly folded, the folds leaning over towards the west. West of the great valley the range is composed of Mesozoic beds, together with Tertiary volcanic rocks. (The Cordillera of Argentina and Chile is clearly the continuation of the western chain alone.) In Ecuador there is still an inner chain of ancient gneisses and schists and an outer chain composed of Mesozoic beds. The longitudinal valley which separates them is occupied mainly by

volcanic deposits. North of Ecuador the structure becomes more complex. Of the three main chains into which the mountains are now divided, the western branch is formed mostly of Cretaceous beds; but the inner chains no longer consist exclusively of the older rocks, and Cretaceous beds take a considerable share in their formation.

The great volcanoes, active and extinct, are not confined to any one zone. Sometimes they rise from the Mesozoic zone of the western Cordillera, sometimes from the ancient rocks of the eastern zone. But they all lie within the range itself and do not, as in the Carpathians and the Apennines, form a fringe^ upon the inner border of the chain.

The curvature of the range around the Brazilian massif, and the position of the zone of older rocks upon the eastern flank, led Suess to the conclusion that the Andes owe their origin to an overthrust from east to west, and that the Vorland lies beneath the Pacific. In the south Wehrli and Burckhardt maintain that the thrust came from the west, and they look upon the ancient rocks of Argentina as the Vorland. In this part of the chain, however, there is but little evidence of overthrusting of any kind.

Authorities. — John B. Minchin, " Journey in the Andean Tableland of Bolivia," Proceedings of Geographical Society (1882) ; Paul Giissfeldt, Reise in den centralen chileno-argentinischen Andes (Berlin, 1884) ; John Ball, Notes of a Naturalist in South America (London, 1887) ; Alfred Hettner, Reisen in den colombianischen Andeen (Leipzig, 1888); " Die Kordillere von Bogota," Peterm.

Mitteilungen, civ. (1 892) ; Edward Whymper, Travels amongst the Great Andes of the Equator (London, 1892); Teodoro Wolff, Geografia y Geologia del Ecuador (Leipzig, 1892); E. A. Fitzgerald, The Highest Andes (London, 1899); Sir Martin Conway, " Explorations in the Bolivian Andes," Geogr. Journ. xiv. (London, 1899); The Bolivian Andes (London and New York, 1901) ; Carl Burckhardt, Expedition geologique dans la region Andine, 38°— jp° S. lot.; Leo Wehrli, " Cordillere argentino-chilienne, 40 et 41 S. lat.," Revista del Museo de La Plata (1899) ; F. P. Moreno, " Explorations in Pata- gonia," Geogr. Journ. xvi. (1900); Hans Steffen, " The Patagonian Cordillera and its Main Rivers, between 41 ° and 48°S. lat.," Geogr. Journ. (London, 1900) ; Paul Kruger, Die chilenische Renihue Expedition (Berlin, 1900); Carl Burckhardt, " Profils geologiques transversaux de la Cordillera argentino-ehilienne," Anales del Museo de La Plata (1900) ; Argentine- Chilian Boundaries in the Cordillera de los Andes, Argentine Evidence (London, 19O0); "South America; Outline of its Physical

Geography," Geogr. journ. xvii. (1901); Maps of Cordillera de los Andes, Surveys of Argentine Boundary Commission; L. R. Patron, Cordillera de los Andes (Republica de Chile, Oficina des Limites) Santiago (Chile), 1903 et seq.) ; Sir T. H. Holdich, " The Patagonian Andes," Geogr. Journ. xxiii. (1904).

ANDESINE, a member of the group of minerals known as plagioclase felspars, occupying a position in the isomorphous series about midway between albite (NaAlSi 3 8) and anorthite (CaAl 2 Si 2 0s) ; its chemical composition and physical char- acters are therefore intermediate between those of the two extremes of the series. Distinctly developed crystals or crystal- lized specimens are rarely met with, the mineral usually occurring as embedded crystals and grains in the igneous and gneissic rocks, of which it forms a component part. It occurs, for example, in the andesite of the Andes, from whence it derives its name.

ANDESITE, a name first applied by C. L. von Buch to a series of lavas investigated by him from the Andes, which has passed into general acceptance as the designation of a great family of rocks playing an important part in the geology of most of the volcanic areas of the globe. Not only the Andes but most of the Cordillera of Central and North America consist very largely of andesites; they occur also in great numbers in Japan, the Philippines, Java and New Zealand. They belong to all geo- logical epochs, and are frequent among the Silurian and Devonian rocks of Britain, forming the ranges of the Cheviots, Ochils, Breidden Hills, and part of the Lake district. The well-known volcanoes, Montagne Pelee, the Souf riere of St Vincent, Krakatoa, Tarawera and Bandaisan have within recent years emitted great quantities of andesitic rocks with disastrous violence. No group of lavas is more widespread and more important from a geo- graphical standpoint than the andesites.

They are typical intermediate rocks, containing on an average about 60 % of silica, but showing a considerable range of com- position. Most of them correspond to the plutonic diorites, but others more nearly represent the gabbros. Their essential distinguishing features are mineralogical and consist in the presence of much soda-lime felspar (ranging from oligoclase to bytownite and even anorthite), along with one or more of the ferro-magnesian minerals, biotite, hornblende, augite and hypers- thene. Both olivine and quartz are typically absent, though in some varieties they occur in small quantity. Orthoclase is more common than these two, but is never very abundant. The andesites have mostly a porphyritic structure, and the larger felspars and ferro-magnesian minerals are often

visible to the naked eye, lying in a finer groundmass, usually crystalline, but sometimes to a large extent vitreous. When very fresh they are dark-coloured if they contain much glass, but paler in colour, red, grey or pinkish when more thoroughly crystallized. They weather to various shades of dark brown, reddish-brown, green, grey and yellow. Many of them are highly vesicular or amygda- loidal.

The older (pre-Tertiary) andesites are grouped together by many German, and formerly by British petrologists, under the term porphyrites, but are distinguished only by being, as a rule, in a less fresh condition. Apart from this there are three great subdivisions of this family of rocks, the quartz-andesites or dacites, the hornblende- and biotite-andesites, and the augite and hypersthene-andesites (or pyroxene-andesites). The dacites, a term first applied by Karl Heinrich Hektor Guido Stache (b. 1833) to quartz-bearing andesite of Transylvania or Dacia, contain

primary quartz, and are the most siliceous members of the family; their quartz may appear in small blebs (or phenocrysts), or may occur only as minute interstitial grains in the ground- mass; other dacites are very vitreous (dacitic-pitchstones) . In many of their structural peculiarities they closely simulate the rhyolites, from which they differ in containing less potash and more soda, and in consequence less orthoclase felspar and more plagioclase. The hornblende- and biotite-andesites, like the dacites, have in most cases a pale colour (pink, yellow or grey), being comparatively rich in felspar. They resemble the trachytes both in appearance and in structure, but their felspar is mostly plagioclase, not sanidine. The biotite and hornblende have much the same characters in both of these groups of rocks, and are often surrounded by black borders produced by corrosion and partial resorption by the magma. A pale green augite is common in these andesites, but bronzite or hypersthene is comparatively rare. The pyroxene-andesites are darker, more basic rocks, with a higher specific gravity, and approach closely to the basalts and dolerites, especially when they contain a small amount of olivine. They are probably the commonest types of andesite, both at the present time and in former geo- logical periods. Often their groundmass consists of brownish glass, filled with small microliths of augite and felspar, and having a velvety, glistening lustre when observed in a good light (hyalopilitic structure).

In addition to the accessory minerals, zircon, apatite and iron oxides, which are practically never absent, certain others occur which, on account of their rarity and importance, are of special interest. Sharply-formed little crystals of cordierite are occasion- ally found in andesites (Japan,. Spain, St Vincent, Cumberland); they seem to depend on more or less complete digestion of fragments of gneiss and other rocks in the molten lava. Garnet and sapphire have also been found in andesites, and perhaps have the same signification; a rose-red variety of epidote (withamite) is known as a secondary product in certain andesites (Glencoe, Scotland), and the famous red porphyry (porfido rosso) of the ancients is a rock of this type. Ore deposits very frequently occur in connexion with andesitic rocks (Nevada, California, Hungary, Borneo, &c.) , especially those of gold and silver. They have been laid down in fissures as veins of quartz, and the sur- rounding igneous rocks are frequently altered and decomposed in a peculiar way by the hot ascending metalliferous solutions. Andesites affected in this manner are known as propylites. The alteration is one of those post-volcanic, pneumatolytic processes, so frequent in volcanic districts. Propylitization consists in the replacement of the original minerals of the andesite by secondary products such as kaolin, epidote, mica, chlorite, quartz and chalcedony, often with the retention of the igneous structures of the rocks.

In microscopic characters the andesites present considerable variety; their porphyritic felspars are usually of tabular shape with good crystalline outlines, but often filled with glass enclosures. Zonal structure is exceedingly common, and the central parts of the crystals are more basic (bytownite, &c.) than the edges (oligoclase). Sanidine occurs with considerable fre- quency, but not in notable amount. The biotite and hornblende are yellow or brown and richly pleochroic. The hypersthene is nearly always idiomorphic, with a distinct pleochroism ranging from salmon-pink to green. Augite may be green in the more acid andesites, but is pale brown in the pyroxene-andesites. The apatite is often filled with minute dust-like enclosures. In the dacites felsitic groundmasses are by no means rare, but micro- crystalline types consisting of plagioclase and sanidine with quartz are more prevalent. The hornblende- and mica-andesites have groundmasses composed mainly of acid plagioclase with little orthoclase or glassy base (pilo taxi tic groundmass). Clear brown glass with many small crystals of plagioclase and pale brown augite (hyalopilitic groundmass) is very frequent in pyroxene-andesites. Vitreous rocks belonging to all of the above groups are well known though not very common, and exhibit the perlitic,

pumiceous, spherulitic and other structures, character- istic to volcanic obsidians and pitchstones. (J. S. F.)

ANDIJAN, a town of Russian Turkestan, Province of Ferghana, eastern terminus of the Transcaspian railway, 84 m. by rail E.N.E. of Khokand, on the left bank of the upper Syr-darya. Altitude 1630 ft. Pop. (1900) 49,682. It was formerly the residence of the khans of Khokand, and has beautiful gardens and a large park in the middle of the town. Andijan is a centre for the trade in raw cotton and has cotton factories. All over Central Asia, West Turkestan merchants are known generally as Andijani. The town was destroyed by an earthquake on the i6th-i7th of December 1902, when 5000 persons perished and 16,000 houses were demolished. It has since been rebuilt.

ANDIRON (older form anderne; med. Lat. andena, anderia), a horizontal iron bar, or bars, upon which logs are laid for burning in an open fireplace. Andirons stand upon short legs and are usually connected with an upright guard. This guard, which may be of iron, steel, copper, bronze, or even silver, is often elaborately ornamented with conventional patterns or heraldic ornaments, such as the fleur-de-lys, with sphinxes, grotesque animals, mythological statuettes or caryatides supporting heroic figures or emblems. Previously to the Italian Renaissance, andirons were almost invariably made entirely of iron and comparatively plain, but when the ordinary objects of the house- hold became the care of the artist, the metal-worker lavished skill and taste upon them, and even such a man as Jean Berain, whose fancy was most especially applied to the ornamentation of Boulle furniture, sometimes designed them. Indeed the fire-dog or chenet reached its most artistic development under Louis XIV. of France, and the first extant examples — often of cast-iron — are to be found in French museums and royal palaces. Fire-dogs, with little or no ornament, were also used in kitchens, with ratcheted uprights for the spits. Very often these uprights branched out into arms or hobs for stewing or keeping the viands hot.

ANDKHUI, a town and khanate in Afghan Turkestan. The town (said to have been founded by Alexander the Great) stands between the northern spurs of the Paropamisus and the Oxus; it is 100 m. due west of Balkh on the edge of the Turkman desert. The khanate is of importance as being one of the most northern in Afghanistan, on the Russian border. Until 1820 it was sub- ject to Bokhara, but in that year Mahmud Khan besieged it for four months, took it by storm and left it a heap of ruins. To preserve himself from utter destruction the khan threw himself into the arms of the Afghans. The tract in which

Andkhui stands is fertile, but proverbially unhealthy; the Persians account it " a hell upon earth " by reason of its scorching sands, brackish water, flies and scorpions. The population, estimated at 15,000, consists principally of Turkmans with a mixture of Uzbegs and a few Tajiks. The district was allotted to Afghanistan by the Russo- Afghan boundary commission of 1885.

ANDOCIDES, one of the " ten " Attic orators, was born about 440 B.C. Implicated in the mutilation of the Hermae (415), although he saved his life by turning informer, he was condemned to partial loss of civil rights and went into exile. He engaged in commercial pursuits, and after two unsuccessful attempts returned to Athens under the general amnesty that followed the restoration of the democracy (403), and filled some important offices. In 391 he was one of the ambassadors sent to Sparta to discuss peace terms, but the negotiations failed, and after this time we hear no more of him. Oligarchical in his sympathies, he offended his own party and was distrusted by the democrats. Andocides was no professional orator; his style is simple and lively, natural but inartistic.

Speeches extant : — De Reditu, plea for his return and removal of civil disabilities; De Mysteriis, defence against the charge of impiety in attending the Eleusinian mysteries; De Pace, advocating peace with Sparta; Contra Alcibiadem, generally considered spurious. Text: — Blass, 1880, Lipsius, 1888; De Myst., with notes by Hickie, 1885; De Red. and De Myst., with notes by Marchant, 1889; see Jebb, Attic Orators; L. L. Forman, Index Andocideus, 1897.

ANDORRA, or Andorre, a small, neutral, autonomous, and semi-independent state, on the Franco-Spanish frontier, and chiefly on the peninsular side of the eastern Pyrenees. Pop. (1900) about S5°°; area about 175 sq. m. Andorra is surrounded

by mountains, and comprises one main valley, watered by the Gran Balira, Valira or Balire, a tributary of the Segre, which itself flows into the Ebro; with several smaller valleys, the most important being that of the Balira del Orien, which joins the Gran Balira on the left. The territory was once densely wooded, and is said to derive its name from the Moorish Aldarra, " the place thick with trees "; but almost all the forests have been destroyed for fuel. The climate is generally cold, with very severe winters. The land is chiefly devoted

to pasture for the numerous flocks and herds; but on the more sheltered southern slopes it is carefully cultivated, and produces grain, potatoes, fruit and tobacco. Game and trout are plentiful; milk, butter, hams, hides and wool are exported, principally to France. The local industries are of the most primitive kind, merely domestic, as in the middle ages. Lack of capital, of coal, and of good means of communication prevents the inhabitants from making use of the iron and lead in their mountains. During the coldest winter months their com- munications are much easier with Spain than through the snow- clad passes leading into Ariege. The only roads are bridle-paths, and one municipal road by the Balira valley, connecting Andorra with the high road to Seo de Urgel and Manresa; but in 1904 France and Spain agreed to build a railway from Ax to Ripoll, which would greatly facilitate traffic.

The Andorrans are a robust and well-proportioned race, of an independent spirit, simple and severe in their manners. They are all Roman Catholics. Apart from the wealthier landowners, who speak French fluently, and send their children to be educated in France, they use the Catalan dialect of Spanish. Andorra comprises the six parishes or communes of Andorra Vicilla, Canillo, Encamp, La Massana, Ordino and San Julian de Loria, which are subdivided into fifty-two hamlets or pueblos.

Preserved from innovations by the mutual jealousy of rival potentates, as well as by the conservative temper of a pastoral population, Andorra has kept its medieval usages and institutions almost unchanged. In each parish two consuls, assisted by a local council, decide matters relating to roads, police, taxes, the division of pastures, the right to collect wood, &c. Such matters, as well as the general internal administration of the territory, are finally regulated by a Council General of 24 members (4 to each parish), elected since 1866 by the suff rages of all heads of families, but previously confined to an aristocracy composed of the richest and oldest families, whose supremacy had been preserved by the principle of primogeniture. A general syndic, with two inferior syndics, chosen by the Council General, constitutes the supreme executive of the state. Two viguiers — one nominated by France, and the other by the bishop of Urgel — command the militia, which consists of about 600 men, although all capable of bearing arms are liable to be called out. This force is exempt from all foreign service, and the chief office of the viguiers is the administration of criminal justice, in which their decisions, given simply accord- ing to their judgment and conscience, there being no written laws, are final. Civil cases, on the other hand, are tried in the first instance before one of the two aldermen, who

act as deputies of the viguiers; the judgment of this court may be set aside by the civil judge of appeal, an officer nominated by France and the bishop of Urgel alternately; the final appeal is either to the Court of Cassation at Paris or to the Episcopal College at Urgel. The French viguier is taken from the French department of Ariege and appointed for life, but the viguier of the bishop must be an Andorran, holding office for three years and re-eligible. There are notaries and clerks, auditors for each parish elected by the heads of families, police agents and bailiffs, chosen and sworn in, like all the above officers, by the Council General. The archives are mostly kept in the " house of the valley " in the capital, Andorra Vicilla, a struggling village of 600 inhabitants. In this government house the Council General meets and has a chapel. Here also the aldermen, viguiers and judge of appeal administer justice and assemble for all purposes of administration. Two magistrates, styled rahanadores, are appointed by the Council General to see that viguiers and judges preserve the customs and privileges of Andorra. The parishes have a permanent patrol of six armed men besides the militia. Spain and the bishop of Urgel are very

jealous of French encroachments, and claim to have a better right ultimately to annex the little state. In the meanwhile it continues to pay each of the suzerain powers £40 a year, levied by a tax on pastures.

Andorra is the sole surviving specimen of the independence possessed in medieval times by the warlike inhabitants of many Pyrenean valleys. Its privileges have remained intact, because the suzerainty of the district became equally and indivisibly shared in 1278 between the bishops of Urgel and the counts of Foix, the divided suzerainty being now inherited by the French crown and the present bishop of Urgel; and the two powers have mutually checked innovations, while the insignificant territory has not been worth a dispute. Thus Andorra is not a republic, but is designated in official documents as the V allies el Suzerainetes. Before 1278 it was under the suzerainty of the neighbouring counts of Castelbo, to whom it had been ceded in 1 1 70 by the counts of Urgel. A marriage between the heiress of Castelbo and Roger Bernard, count of Foix, carried the rights of the above-named Spanish counts into the house of Foix, and hence subsequently to the crown of France, when the heritage of the feudal system was absorbed by the sovereign; but the bishops of Urgel claimed certain rights, which after long disputes were satisfied by the " Act of Division " executed in 1 278. The claims of the bishopric dated from Carolingian times, and the independ- ence of Andorra, like most other Pyrenean anomalies, has been traditionally ascribed

to Charlemagne (742-814).

Authorities. — With the exception of Etudes geographiques sur la vallee d'Andorre, by J. Blade (Paris, 1875), the standard books on Andorra deal mainly with its history and institutions. They comprise the following: — The Valley of Andorra, translated from the French of E. B. Berthet by F. H. Deverell (Bristol, 1886) ; J. Aviles Arnau, El Pallas y Andorra (Barcelona, 1893) ; L. Dalmau de Baquer, Historia de la Republica de Andorra (Barcelona, 1849) ; C. Baudon de Mony, Origines historiques de la question d'Andorre (in the Bibliotheque de I'Mcole des Chartes, vol. 46, Paris, 1885). See also C. Baudon de Mony, Relations politiques des comtes de Foix avec la Catalogue, jusqu'au commencement du XIV" Steele (Paris, 1896). A fair map was published by A. Hartleben, of Vienna, in 1898.

ANDOVER, a market-town and municipal borough in the Andover parliamentary division of Hampshire, England, 67 m. W.S.W. of London by the London & South Western railway, served also by the Midland & South Western Junction railway. Area 8663 acres. Pop. (1901) 6509. It is pleasantly situated on the river Anton, a tributary of the Test, in a hilly district. The church of St Mary replaced an ancient one in 1848; a Norman doorway is preserved from the original structure. The site of a Norman priory can be traced. Several early earthworks are seen in the vicinity, among which the circular camp on Bury Hill, S.W. of the town, is a very fine example. It is probably of British origin. Andover is the centre of a large agricultural district. Malting is carried on and there is a large iron-foundry; but the silk manufactures, once prosperous, are now extinct. The corporation consists of a mayor, 4 aldermen and 12 councillors.

There are numerous Roman villas in the district, but Andover itself is not a Roman site. The town, the name of which appears in the forms Andefeian, .\ndieura and Andever, probably owes much of its importance to the neighbourhood of the Roman road from Silchet,ter to Old Sarum. It is mentioned in King Edred's will, a document of doubtful authenticity, dated c. 955. Later the Witenagemot met here, and it is the traditional scene of the meeting of Ethelred and Olaf the Dane. Andover existtd as a borough before 1 1 76, and Henry II. exempted its inhabitants from toll and passage. In 1201 King John increased the farm paid by the burgesses, while Henry III. granted them return of writs, probate of wills and other privileges. The corporation was reconstituted in 1599 and again in 1682. From 1295 till 1305 the burgesses returned two members to parliament but then ceased to do so till 1586. After the reform of 1867 they returned only one member and in 1885 the borough was dis- franchised. A gild merchant is mentioned as early as 1175. The cattle-market was granted in 1682, and there is an ancient corn-market, probably held by prescription. The November sheep-fair dates from 1205, and

(since 1599 a part of the borough) was formerly among the most important in England. The town possessed an iron-market early in the 14th century. At that date the wool-trade also was very prosperous, and the manufactures of silk and parchment are among the extinct industries of the town.

ANDOVER, a township of Essex county, Massachusetts, U.S.A., pleasantly situated on the S. side of the Merrimac Valley. Pop. (1890) 6142; (1900) 6813; (1910, U. S. census) 7301. The Shawsheen river siipplies power for a considerable manu- facturing industry (twine, woollens and rubber goods being manufactured) in the villages of Andover, Ballardville and Frye. Andover, the principal village, is about 23 m. N. of Boston and is served by the western division of the Boston & Maine railway and by interurban electric railways. The township is noteworthy for its educational institutions. Abbot Academy, opened in 1829, is said to be the oldest existing academy in the United States incorporated for the education of girls alone; an art gallery, given to the academy by Mrs John Byers, was opened in 1907. Phillips Academy, opened in 1778 (incorporated in 1780), was the first incorporated academy of the state; it was founded through the efforts of Samuel Phillips (1752-1802, president of the Massachusetts senate in 1785-1787 and in 1788-1801, and lieutenant-governor of Massachusetts in 1801-1802), by his father, Samuel Phillips (1715-1790), and his uncle, John Phillips (1719-1795), " for the purpose of instructing youth, not only in English and Latin grammar, writing, arithmetic and those sciences wherein they are commonly taught, but more especially to learn them the great end and real business of living." It is one of the largest secondary schools in New England and enjoys a wide and high reputation. An archaeological department, with an important collection in American archaeology, was founded by Robert S. Peabody and his wife in 1901. The Academy grounds include those occupied in 1 808-1909 by the Andover Theological Seminary before its removal to Cam- bridge (q.v.). Andover was settled about 1643 and was incorporated in 1646, being named from the English town of Andover, Hampshire, whence some of the chief settlers had migrated; the first settlement was made in what is now the township of North Andover (pop. 5529 in 1910), which was separated from Andover in 1855. Simon Bradstreet (1603-1697), important among the early

men of Massachusetts, was one of the founders; and his wife, Anne Dudley Bradstreet (1612-1672), was the first woman versifier of America; the Bradstreet house in North Andover, said to have been built about 1667, is still standing. Andover was a prominent centre in the witchcraft trials of 1692. Elizabeth Stuart Phelps-Ward was born and lived for many years in Andover, and Harriet Beecher Stowe lived here from 1852 to 1864 and is buried here.

See S. L. Bailey, Historical Sketches of Andover (Boston, 1880); John L. Taylor, Memoir of Samuel Phillips (Boston, 1856); and Philena and Phebe F. M'Keen, History of Abbot Academy (Andover,

1880).

ANDRADA, DIEGO DE PAIVA DE (1528-1575), Portuguese theologian, was born at Coimbra, son of the grand treasurer of John III. His original bent was towards foreign mission. He earned distinction in 1562 at the council of Trent as envoy of King Sebastian. Between 1562 and 1567 he published many controversial tracts, especially against the Lutheran, Martin Chemnitz {q.v.). His first tract, De Societatis Jesu Origine, led to his being erroneously presumed a Jesuit (P. Alegambe, Biblioth. Scriptorum S. /., 1676, p. 177). His De Conciliorum A nctoritate was welcomed at Rome as exalting the papal authority. Posthumous were his Defensio Tridentinae Fidei, 1578 (remark- able for its learned statement of various opinions regarding the Immaculate Conception), and three sets of his sermons in Portuguese.

His nephew, Diego, the younger (1586-1660), produced Chauleidos (1628) and other Latin poems, including sacred dramas; a novel, Casamenlo Perfeito (1630); and shone as a historical critic.

See Bibliographic Universelle (181 1); N. Antonio, Biblioth. Hisp. Nova (1783), i. 304; and for the nephew, life by A. Dos Reys in Corp. Illust. Poet. Lai. (1745) Hi. ..

ANDRADA E SYLVA, BONIFACIO JOZfi D' (1765-1838), Brazilian statesman and naturalist, was born at Villa de Santos, near Rio Janeiro. In 1800 he was appointed professor of geology at Coimbra, and soon after inspector-general of the Portuguese mines; and in 1812 he was made perpetual secretary of the Academy of Lisbon. Returning to Brazil in 1819, he urged Dom Pedro to resist the recall of the Lisbon court, and was appointed one of his ministers in 1821. When the independence of Brazil was declared, Andrada was made minister of the interior and of foreign affairs; and when it was

established, he was again elected by the Constituent Assembly, but his democratic principles resulted in his dismissal from office, July 1823. On the dissolution of the Assembly in November, he was arrested and banished to France, where he lived in exile near Bordeaux till, in 1829, he was permitted to return to Brazil. But being again arrested in 1833, and tried for intriguing on behalf of Dom Pedro I., he passed the rest of his days in retirement till he died at Nictheroy in 1838.

ANDRASSY, JULIUS (Gyula), Count (1823-1890), Hungarian statesman, the son of Count Karoly Andrassy and Etelka Szapary, was born at Kassa in Hungary on the 8th of March 1823. The son of a Liberal father, who belonged to the Opposition at a time when to be in opposition was to be in danger, Andrassy at a very early age threw himself into the political struggles of the day, adopting at the outset the patriotic side. Count Istvan Szechenyi w r as the first adequately to appreciate his capacity, when in 1845 the young man first began his public career as president of the society for the regulation of the waters of the Upper Theiss. In 1846 he attracted attention by his bitter articles against the government in Kossuth's paper, the Pesti Hirlap, and was returned as one of the Radical candidates to the diet of 1848, where his generous, impulsive nature made him one of the most thorough-going of the patriots. When the Croats under Jellachich invaded Hungary, Andrassy placed himself at the head of the gentry of his county, and served with distinction at the battles of Pakozd and Schwechat, as Gorgei's adjutant (Sept. 1848). Towards the end of the war Andrassy was sent to Constantinople by the revolutionary government to obtain at least the neutrality of Turkey during the struggle. After the catastrophe of Vilagos he migrated first to London and then to Paris. On the 21st of September 1851 he was hanged in effigy by the Austrian government for his share in the Hungarian revolt. He employed his ten years of exile in studying politics in what was then the centre of European diplomacy, and it is memorable that his keen eye detected the inherent weakness of the second French empire beneath its imposing exterior. Andrassy returned home from exile in 1858, but his position was very difficult. He had never petitioned for an amnesty, steadily rejected all the overtures both of the Austrian government and of the Magyar Conservatives (who would have accepted something short of full autonomy), and clung enthusiastically to the Deak party. On the 21st of December 1865 he was chosen vice- president of the diet, and in March 1866 became president of the sub-committee appointed by the parliamentary commission to draw up the Composition (commonly known as the Ausgieich) between Austria and Hungary,

of which the central idea, that of the " Delegations," originated with him. It was said at that time that he was the only member of the commission who could persuade the court of the justice of the national claims. After Koniggratz he was formally consulted by the emperor for the first time. He advised the re-establishment of the constitution and the appointment of a responsible ministry.

On the 17th of February 1867 the king appointed him the first constitutional Plungarian premier. It was on this occasion that Deak called him " the providential statesman given to Hungary by the grace of God." As premier, Andrassy by his firmness, amiability and dexterity as a debater, soon won for himself a commanding position. Yet his position continued to be difficult, inasmuch as the authority of Deak dwarfed that of all the party leaders, however eminent. Andrassy chose for himself the departments of war and foreign affairs. It was he who reorganized the Honved system, and he used often to say that the regulation

of the military border districts was the most difficult labour of his life. On the outbreak of the Franco-German War of 1870, Andrassy resolutely defended the neutrality of the Austrian monarchy, and in his speech on the 28th of July 1870 warmly protested against the assumption that it was in the interests of Austria to seek to recover the position she had held in Germany before 1863. On the fall of Beust (6th of November 1871), Andrassy stepped into his place. His tenure of the chancellorship was epoch-making. Hitherto the empire of the Habsburgs had never been able to dissociate itself from its Holy Roman traditions. But its loss of influence in Italy and Germany, and the consequent formation of the Dual State, had at length indicated the proper, and, indeed, the only field for its diplomacy in the future — the near East, where the process of the crystalliza- tion of the Balkan peoples into nationalities was still incomplete. The question was whether these nationalities were to be allowed to become independent or were only to exchange the tyranny of the sultan for the tyranny of the tsar. Hitherto Austria had been content either to keep out the Russians or share the booty with them. She was now, moreover, in consequence of her misfortunes deprived of most of her influence in the councils of Europe. It was Andrassy who recovered for her her proper place in the European concert. First he approached the German emperor; then more friendly relations were established with the courts of Italy and Russia by means of

conferences at Berlin, Vienna, St Petersburg and Venice.

The recovered influence of Austria was evident in the negotia- tions which followed the outbreak of serious disturbances in Bosnia in 1875. The three courts of Vienna, Berlin The "An- an(j 5 t Petersburg had come to an understanding Note' as t0 t ˆ le ' r att it u de in the Eastern question, and their views were embodied in the despatch, known as the " Andrassy Note," addressed on the 30th of December 1875 by Count Andrassy to Count Beust, now Austrian ambassador to the court of St James's. In it he pointed out that the efforts of the powers to localize the revolt seemed in danger of failure, that the rebels were still holding their own, and that the Ottoman promises of reform, em bodied in various firmans, were no more than vague statements of principle which had never had, and were probably not intended to have, any local application. In order to avert the risk of a general conflagration, therefore, he urged that the time had come for concerted action of the powers for the purpose of pressing the Porte to fulfil its promises. A sketch of the more essential reforms followed: the recognition rather than the toleration of the Christian religion; the abolition of the system of farming the taxes; and, in Bosnia and Herzegovina, where the religious was complicated by an agrarian question, the conversion of the Christian peasants into free proprietors, to rescue them from their double subjection to the great Mussulman landowners. In Bosnia and Herzegovina also elected provincial councils were to be established, irremovable judges appointed and individual liberty guaranteed. Finally, a mixed commission of Mussulmans and Christians was to be empowered to watch over the carrying out of these reforms. The fact that the sultan would be responsible to Europe for the realization of his promises would serve to allay the natural suspicions of the insurgents. 1*

To this plan both Great Britain and France gave a general assent, and the Andrassy Note was adopted as the basis of negotia- tions. When war became inevitable between Russia and the Porte, Andrassy arranged with the Russian court that, in case Russia prevailed, the status quo should not be changed to the detriment of the Austrian monarchy. When, however, the treaty of San Stefano threatened a Russian hegemony in the near East, Andrassy concurred with the German and British courts that the final adjustment of matters must be submitted to a European congress. At the Berlin Congress in 1878 he. was the principal Austrian plenipotentiary, and directed his efforts to diminish the gains of Russia and aggrandize the Dual Monarchy. The latter object was gained by the occupationof Bosnia-Herzegovina under a mandate from the congress. This occupation

was most unpopular

1 Hertslet, Map of Europe by Treaty, No. 456, vol. iv. p. 2418.

in Hungary, both for financial reasons and because of the strong philo-Turk sentiments of the Magyars, but the result brilliantly justified Andrassy's policy. Nevertheless he felt constrained to bow before the storm, and placed his resignation in the emperor's hands (8th of October 1879). The day before his retirement he signed the offensive-defensive alliance with Germany, which placed the foreign relations of Austria-Hungary once more on a stable footing.

After his retirement, Andrissy continued to take an active part in public affairs both in the Delegations and in the Upper House. In 1885 he warmly supported the project for the reform of the House of Magnates, but on the other hand he jealously defended the inviolability of the Composition of 1867, and on the 5th of March 1889 in his place in the Upper House spoke against any particularist tampering with the common army. In the last years of his life he regained his popularity, and his death on the 18th of February 1890 was universally mourned as a national calamity. He was the first Magyar statesman who, for centuries, had occupied a European position. Breadth of view, swift resourcefulness, and an intimate knowledge of men and things were his distinguishing qualities as a statesman. Personally he was the most amiable of men; it has been well said that he united in himself the Magyar magnate with the modern gentleman. His motto was: " It is hard to promise, but it is easy to perform." If Deak was the architect, Andrassy certainly was the master-builder of the modern Hungarian state.

By his wife, the countess Katinka Kendeffy, whom he married in Paris in 1856, Count Andrassy left two sons, and one daughter, Ilona (b. 1859), who married Count Lajos Batthyany. Both the sons gained distinction in Hungarian politics. The eldest, Tivador (Theodore) Andreas (b. 10th of July 1857), was elected vice-president of the Lower House of the Hungarian parliament in 1890. The younger, Gyula (Julius, b. 30th of June i860), became under-secretary in the Wekerle ministry in 1892; in 1893 he became minister of education, and in June 1894 was appointed minister in attendance on the king, retiring in 1895 with Wekerle; in 1898, with his elder brother, he left the Liberal party, but returned to it again after the fall of the Banffy ministry; he is the author of Ungarns Ausgleich mit Osterreich vom Jahre 1867 (Ger. ed., Leipzig, 1897), and a work in Hungarian on the origins of the Hungarian state and constitution (Budapest,

1901).

See Andrassy's Speeches (Hung.) edited by Bela Lederer (Buda- pest, 1891); Memoir (Hung.) by Benjamin Kallay (Budapest, 1891); Necrology (Hung.) in the Akad. Ertesito, Evf. 14 (Budapest, 1891); Recollections of Count Andrassy (Hung.), by Mano Konyi (Budapest, 1891). (R. N. B.)

ANDR& JOHN (1751-1780), British soldier, was born in London in 1751 of Genevese parents. Accident brought him in 1769 to Lichfield, where, in the house of the Rev. Thomas Seward, whose daughter Anna was the centre of a literary circle, he met the beautiful Miss Honora Sneyd. A strong attachment sprang up between the two, but their marriage was disapproved of by Miss Sneyd's family, and Andre was sent to cool his love in his father's counting-house in London and on a business tour to the continent. Commerce was, however, too tame an occupation for his ambitious spirit, and in March 1771 he obtained a com- mission in the Seventh (Royal Fusiliers), which, after travel in Germany, he joined in Canada in 1 7 74. Here his character, con- duct and accomplishments .gained him rapid promotion. Miss Sneyd in 1773 married R.L. Edgeworth, the father of the novelist, Maria Edgeworth, having previously refused Thomas Day, the author of Sand] or d and Merton; but Andre remained faithful to his love for her. In a letter to Anna Seward, written shortly after being taken prisoner by the Americans at the capitulation of St John's on the 3rd of November 1775, he states that he has been " stripped of everything except the picture of Honora, which I concealed in my mouth. Preserving this I yet think myself fortunate." Exchanged towards the close of 1776, Andre became in succession aide-de-camp, to General Grey and to the commander-in-chief of the British forces, Sir Henry Clintoiv who raised him to the rank of major and appointed him adjutant- general of the forces in 1778. Early in 1780 the American

general, Benedict Arnold (q.v.) , thinkinghimself injuriously treated by his colleagues, made overtures to the British to betray to them the important fortress of West Point on the Hudson river, the key of the American position, of which he was commandant. This seemed to Sir Henry Clinton a favourable opportunity for concluding the war, and Major Andre was appointed to negotiate with Arnold. For this purpose he landed from a vessel bearing a flag of truce and had an

interview with Arnold, who delivered to him full particulars and plans of the fortress of West Point, and arranged with him to co-operate with the British during an attack which was to be made in a few days. Unfortunately for Andre, the British vessel was fired on before the negotiations were finished and obliged to drop down the river. Andre, there- fore, could not return by the way he came and was compelled to pass the night within the American lines. After making the fatal mistake of exchanging his uniform for a civilian disguise, he set out next day by land for New York, provided by Arnold with a passport, and succeeded in passing the regular American outposts undetected. Next day, however, just when all danger seemed to be over, Andre was stopped by three American militiamen, to whom hegave such contradictory answers that, in spite of Arnold's pass, they searched him and discovered in his boots the fatal proofs of his negotiations for the betrayal of West Point. Not-withstanding his offer of a large sum for his release, his captors delivered him up to the nearest American officer. Washington, although admitting that Andre was " more unfortunate than criminal," sent him before a court-martial, by which, notwith-standing a spirited defence, he was, in consequence of his own admissions, condemned to death as a spy. In spite of the protests and entreaties of Sir Henry Clinton and the threats of Arnold he was hanged at Tappan on the 2nd of October 1780. Arnold, warned by the unfortunate Andre, escaped by flight the punishment he so richly merited. The justice of Andr6's execu- tion has been a fruitful theme for discussion, but both British and American military writers are agreed that he undoubtedly acted in the character of a spy, although under orders and entirely contrary to his own feelings. Washington's apparent harshness in refusing the condemned man a soldier's death by shooting has also been censured, but it is evident that no other course was open to the American commander, since a mitigation of the sentence would have implied a doubt as to its justice. Besides courage and distinguished military talents, Major Andre was a proficient in drawing and in music, and showed considerable poetic talent in his humorous Cow-chase, a kind of parody on Chevy-chase, which appeared in three successive parts at New York, the last on the very day of his capture. His fate excited universal sympathy both in America and Europe, and the whole British army went into mourning for him. A mural sculptured monument to his memory was erected in Westminster Abbey by the British government when his remains were brought over and interred there in 182 1; and a memorial has been erected to him by Americans on the spot where he was taken. Andre's military journal, giving an interesting account of the British movements in America from June 1777 to the close of 1778, was

taken to England in 1782 by General Grey, whose descendant, Earl Grey, discovered it in 1902 and disposed of it to an American gentleman.

See The Life and Career of Major John Andre, fife, by Winthrop Sargent (new ed., New York, 1902); Andres Journal (Boston, Mass., The Bibliophile Society, 1904).

ANDREA, GIOVANNI (1275-1348), Italian canonist, was born at Mugello, near Florence, about 1275. He studied canon law at Bologna, where he distinguished himself in this subject so much that he was made professor at Padua, and later at Pisa and Bologna, rapidly acquiring a high reputation for his learning and his moral character. Curious stories are told of him; for instance, that by way of self-mortifiCation he lay every night for twenty years on the bare ground with only a bear's skin for a covering; that in an audience he had with Pope Boniface VIII. his extraordinary shortness of stature led the pope to believe he was kneeling, and to ask him three times to rise, to the immense merriment of the cardinals; and that he had a daughter, Novella,

so accomplished in law as to be able to read her father's lectures in his absence, and so beautiful, that she had to read behind a curtain lest her face should distract the attention of the students. He is said to have died at Bologna of the plague in 1348, and an epitaph in the church of the Dominicans in which he was buried, calling him Rabbi Doctorum, Lux, Censor, Normaque Morum, testifies to the public estimation of his character. Andrea wrote a Gloss on the Sixth Book of the Decretals, Glosses on the Clemen- tines and a Commentary on the Rules of Sextus. His additions to the Speculum of Durando are a mere adaptation from the Consilia of Oldradus, as is also the book De Sponsalibus et Matrimonio, from J. Anguisciola.

ANDREA DEL SARTO (1487-1531). This celebrated painter of the Florentine school was born in Gualfonda, Florence, in 1487, or perhaps 1486, his father Agnolo being a tailor (sarto) : hence the nickname by which the son is constantly designated. There were four other children. The family, though of no distinction, can be traced back into the 14th century. Vannucchi has since 1677 been constantly given as the surname — according to some modern writers, without any authority. It has recently been said that the true name is Andrea d' Agnolo di Francesco di Luca di Paolo del Migliore. But this only gives, along with our painter's Christian name, the Christian names of his antecessors for five generations, and is in no way his own surname. In 1494 Andrea was put to work under a

goldsmith. This occupation he disliked. He took to drawing from his master's models, and was soon transferred to a skilful woodcarver and inferior painter named Gian Barile, with whom he remained until 1498. Barile, though a coarse-grained man enough, would not stand in the way of the advancement of his promising pupil, so he recom- mended him to Piero di Cosimo as draughtsman and colourist. Piero retained Andrea for some years, allowing him to study from the famous cartoons of Leonardo da Vinci and Michelangelo. Finally Andrea agreed with his friend Franciabigio, who was somewhat his senior, that they would open a joint shop; at a date not precisely defined they took a lodging together in the Piazza del Grano. Their first work in partnership may probably have been the " Baptism of Christ," for the Florentine Com- pagnia dello Scalzo, a performance of no great merit, the begin- ning of a series, all the extant items of which are in monochrome chiaroscuro. Soon afterwards the partnership was dissolved. From 1509 to 1514 the brotherhood of the Servites emp'oyed Andrea, as well as Franciabigio and Andrea Feltrini, the first- named undertaking in the portico of the Annunziata three frescoes illustrating the life of the Servite saint Filippo Benizzi (d. 1285). He executed them in a few months, being endowed by nature with remarkable readiness and certainty of hand and unhesitating firmness in his work, although in the general mould of his mind he was timid and diffident. The subjects are the saint sharing his cloak with a leper, cursing some gamblers, and restoring a girl possessed with a devil. The second and third works excel the first, and are impulsive and able performances. These paintings met with merited applause, and gained for their author the pre-eminent title " Andrea senza errori " (Andrew the unerring) — the correctness of the contours being particularly admired. After these subjects the painter proceeded with two others — the death of S. Filippo and the children cured by touching his garment, — all the five works being completed before the close of 1510. The youth of twenty-three was already in technique about the best fresco-painter of central Italy, barely rivalled by Raphael, who was the elder by four years. Michel- angelo's Sixtine frescoes were then only in a preliminary stage. Andrea always worked in the simplest, most typical and most trying method of fresco — -that of painting the thing once and for all, without any subsequent dry-touching. He now received many commissions. The brotherhood of the Servites engaged him to do two more frescoes in the Annunziata at a higher price; he also painted, towards 1512, an Annunciation in the monastery of S. Gallo.

The " Tailor's Andrew " appears to have been an easy-going

plebeian, to whom a modest position in life and scanty gains were no grievances. As an artist he must have known his own

value; but he probably rested content in the sense of his super- lative powers as an executant, and did not aspire to the rank of a great inventor or leader, for which, indeed, he had no vocation. He led a social sort of life among his compeers of the art, was intimate with the sculptor Rustici, and joined a jolly dining-club at his house named the Company of the Kettle, also a second club named the Trowel. At one time, Franciabigio being then the chairman of the Kettle-men, Andrea recited, and is by some regarded as having composed, a comic epic, " The Battle of the Frogs and Mice " — a rechauffe, as one may Surmise, of the Greek Batrachomyomachia, popularly ascribed to Homer. He fell in love with Lucrezia (del Fede), wife of a hatter named Carlo Recanati; the hatter dying opportunely, the tailor's son married he on the 26th of December 1512. She was a very handsome woman and has come down to us treated with great suavity in many a picture of her lover-husband, who constantly painted her as a Madonna and otherwise; and even in painting other women he made them resemble Lucrezia in general type. She has been much less gently handled by Vasari and other biographers. Vasari, who was at one time a pupil of Andrea, describes her as faithless, jealous, overbearing and vixenish with the apprentices. She lived to a great age, surviving her husband forty years.*

By 1 514 Andrea had finished his last two frescoes in the court of the Servites, than which none of his works was more admired — the " Nativity of the Virgin," which shows the influence of Leonardo, Domenico Ghirlandajo and Fra Bartolommeo, in effective fusion, and the " Procession of the Magi," intended as an amplification of a work by Baldovinetti; in this fresco is a portrait of Andrea himself. He also executed at some date a much-praised head of Christ over the high altar. By November 1 51 5 he had finished at the Scalzo the allegory of Justice, and the " Baptist preaching in the desert," — followed in 1517 by " John baptizing," and other subjects. Before the end of 1516 a " Pieta. " of his composition, and afterwards a Madonna, were sent to the French court. These were received with applause; and the art-loving monarch Francis I. suggested in 1518 that Andrea should come to Paris. He journeyed thither towards June of that year, along with his pupil Andrea Sguazzella, leaving

his wife in Florence, and was very cordially received, and for the first and only time in his life was handsomely remunerated. Lucrezia, however, wrote urging his return to Italy. The king assented, but only on the understanding that his absence from France was to be short; and he entrusted Andrea with a sum of money to be expended in purchasing works of art for his royal patron. The temptation of having a goodly amount of pelf in hand proved too much for Andrea's virtue. He spent the king's money and some of his own in building a house for himself in Florence. This necessarily brought him into bad odour with Francis, who refused to be appeased by some endeavours which the painter afterwards made to reingratiate himself. No serious punishment, however, and apparently no grave loss of pro- fessional reputation befell the defaulter.

In 1520 he resumed work in Florence, and executed the " Faith " and " Charity " in the cloister of the Scalzo. These were succeeded by the " Dance of the Daughter of Herodias," the " Beheading of the Baptist," the " Presentation of his head to Herod," an allegory of Hope, the " Apparition of the Angel to Zacharias " (1523), and the monochrome of the Visitation. This last was painted in the autumn of 1524, after Andrea had returned from Luco in Mugello, — to which place an outbreak of plague in Florence had driven him, his wife, his step-daughter and other relatives. In 1525 he painted the very famous fresco named the " Madonna del Sacco, " a lunette in the cloisters of the Servites; this picture (named after a sack against which Joseph is represented propped) is generally accounted his master- piece. His final work at the Scalzo was the " Birth of the Baptist" (1526), executed with some enhanced elevation of style after Andrea had been diligently studying Michelangelo's figures in the sacristy of S. Lorenzo. In the following year he completed at S. Salvi, near Florence, a celebrated " Last Supper," in which all the personages seem to be portraits. This also is a very fine example of his style, though the conception

of the subject is not exalted. It is the last monumental work of importance which Andrea del Sarto lived to execute. He dwelt in Florence throughout the memorable siege, which was soon followed by an infectious pestilence. He caught the malady, struggled against it with little or no tending from his wife, who held aloof, and he died, no one knowing much about it at the moment, on the 22nd of January 1 531, at the comparatively early age of forty-three. He was buried unceremoniously in the church of the Servites.

Various portraits painted by Andrea are regarded as likenesses of

himself, but this is not free from some doubt. One is in London, in the National Gallery, an admirable half-figure, purchased in 1862. Another is at Alnwick Castle, a young man about twenty years of age, with his elbow on a table. Another at Panshanger may perhaps represent in reality bis, pupil Domenico Conti. Another youthful portrait is in the Uffizi Gallery, and the Pitti Gallery contains more than one. Among his more renowned works not already specified are the following. The Virgin and Child, with St Francis and St John the Evangelist and two angels, now in the Uffizi, painted for the church of S. Francesco in Florence; this is termed the " Madonna di S. Francesco," or " Madonna delle Arpie," from certain figures of harpies which are decoratively introduced, and is rated as Andrea's masterpiece in oil-painting. The altar-piece in the Uffizi, painted for the monastery of S. Gallo, the " Fathers disputing on the doctrine of the Trinity " — SS. Augustine, Dominic, Francis, Lawrence, Sebastian and Mary Magdalene — a very energetic work. Both these pictures are comparatively early — towards 15 17. The " Charity " now in the Louvre (perhaps the only painting which Andrea executed while in France). The " Pieta," in the Belvedere of Vienna; this work, as well as the " Charity," shows a strong Michelangelesque influence. At Poggio a Caiano a celebrated fresco (1521) representing Julius Caesar receiving tribute, various figures bringing animals from foreign lands — a striking per- spective arrangement; it was left unfinished by Andrea and was completed by Alessandro Allori. Two very remarkable paintings (1523) containing various incidents in the life of the patriarch Joseph, executed for the Borgherini family. In the Pitti Gallery two separate compositions of the " Assumption of the Virgin," also a fine " Pieta." In the Madrid museum the " Virgin and Child," with Joseph, Elizabeth, the infant Baptist and an Archangel. In the Louvre the " Holy Family," the Baptist pointing upwards. In Berlin a portrait of his wife. In Panshanger a fine portrait named " Laura." The second picture in the National Gallery ascribed to Andrea, a " Holy Family," is by some critics regarded as the work rather of one of his scholars — we hardly know why. A very noticeable incident in the life of Andrea del Sarto relates to the copy, which he produced in 1523, of the portrait group of Leo X. by Raphael: it is now in the Naples Museum, the original being in the Pitti Gallery. Ottaviano de' Medici, the owner of the original, was solicited by Frederick II., duke of Mantua, to present it to him. Unwilling to part with so great a pictorial prize and unwilling also to disoblige the duke, Ottaviano got Andrea to make the copy, which was consigned to the duke as being the original. So deceptive was the imitation that even Giulio Romano, who had himself manipulated the original to some extent, was com- pletely taken in; and, on showing

the supposed Raphael years afterwards to Vasari, who knew the facts, he could only be un- deceived wheii a private mark on the canvas was named to him by Vasari and brought under his eye. It was Michelangelo who had introduced Vasari in 1524 to Andrea's studio. He is said to have thought very highly of Andrea's powers, saying on one occasion to Raphael, " There is a little fellow in Florence who will bring sweat to your brow if ever he is engaged in great works."

Andrea had true pictorial style, a very high standard of correct- ness and an enviable balance of executive endowments. The point of technique in which he excelled least was perhaps that of discriminating the varying textures of different objects and surfaces. There is not much elevation or ideality in his works — much more of reality. His chiaroscuro is not carried out accord- ing to strict rule, but is adjusted to his liking for harmony of

colour and fused tone and transparence ; in fresco more especially his predilection for varied tints appears excessive. It may be broadly said that his taste in colouring was derived mainly from Fra Bartolommeo, and in form from Michelangelo; and his style partakes of the Venetian and Lombard, as well as the Florentine and Roman — some of his figures are even adapted from Albert Diirer. In one way or other he continued improving to the last. In drawing from nature, his habit was to sketch very slightly, making only such a memorandum as sufficed to work from. The scholars of Andrea were very numerous; but, according to Vasari, they were not wont to stay long, being domineered over by his wife; Pontormo and Domenico Puligo may be mentioned.

In this account of Andrea del Sarto we have followed the main lines of the narrative of Crowe and Cavalcaselle, supple- mented by Vasari, Lanzi and others.

There are biographies by Biadi (1829), by von Reumont (1831), by Baumann (1878), and by Guinness (1899). (W. M. R.)

ANDREANI, ANDREA, Italian engraver on wood, in chiaro- scuro, was born at Mantua about 1540 (Brulliot says 1560) and died at Rome in 1623. His engravings are scarce and valuable, and are chiefly copies of Mantegna, Diirer and Titian. The most remarkable

of his works are " Mercury and Ignorance," the " Deluge," " Pharaoh's host drowned in the Red Sea " (after Titian), the "Triumph of Caesar" (after Mantegna), and " Christ retiring from the judgment-seat of Pilate."

ANDREE, KARL (1808-1875), German geographer, was born at Brunswick on the 20th of October 1808. He was educated at Jena, Gottingen and Berlin. After having been implicated in a students' political agitation he became a journalist, and in 1851 founded the Bremer Handelsblalt. From 1855, however, he devoted himself entirely to geography and ethnography, working successively at Leipzig and at Dresden. In 1862 he founded the important geographical periodical Globus. His works include Nordamerika in geographischen und geschichtlichen Umrissen (Brunswick, 1854), Geographische Wanderungen (Dresden, 1859), and Geographie des Welthandels (Stuttgart, 1867-1872). He died at Wilduhgen on the 10th of August 1875.

His son Richard, born on the 26th of February 1835, followed his father's career, devoting himself especially to ethnography. He wrote numerous books on this subject, dealing notably with the races of his own country, while an important general work was Ethnographische Parallelen und Vorgleiche (Stuttgart, 1878). He also took up cartography, having a chief share in the production of the Physikalisch-statistische Atlas des deutschen Rciches (Leipzig, 1877), Allgemeine Handatlas (first ed., 1881), and other atlases; and he continued the editorship of the Globus.

ANDREE, SALOMON AUGUST (1854-1897?), Swedish engineer, was born at Grenna, on Lake Vetter, on the 18th of October 1854. After education at the Stockholm technical college, he studied aeronautics, and in 1895 elaborated a plan for crossing the north polar region by a balloon which should be in some degree dirigible by sails and trailing ropes. After an abortive effort in 1896, the winds being contrary, he started with two companions from Danes Island, Spitsbergen, on the nth of July 1897. The party was never seen, again, nor is the manner of its fate known. Of several expeditions sent in search of it, the first started in November 1897, on the strength of a report of cries of distress heard by shipwrecked sailors at Spitsbergen; in 1898 and 1899 parties searched the north Asiatic coast and the New Siberia Islands; and in May 1899 Dr Nathorst headed an expedi- tion to eastern Greenland. None was successful, and only scanty information was obtained or inferred from the discovery of a few buoys (on the west of Spitsbergen, northern Norway, Iceland, &c.) which the balloonists had arranged to drop,

and a message taken from a carrier pigeon despatched from the balloon two days after its ascent. There were also messages in two of the buoys, but they dated only from the day of the ascent. The others were empty.

ANDREINI, FRANCESCO, Italian actor, was born at Pistoia in the last half of the 16th century. He was a member of the

company of the Gelosi which Henry IV. summoned to Paris to please his bride, the young queen Marie de' Medici. His wife Isabella Andeeini (1 562-1604) was a member of her husband's company, distinguished alike for her acting and her character, — commemorated in the medal struck at Lyons in the year of her death, with her portrait on one side, and the figure of Fame on the reverse with the words aetema fama. She was also known in literature, her books including a pastoral, M irtilla (Verona, 1588), a volume of songs, sonnets and other poems (Milan, 1601), and a collection of letters, published after her death. She inspired many of the French poets, notably Isaac du Ryer (d. c. 1631). Her son Giambattista Andreini (1578-1650) was born in Florence, and had a great success as a comedian in Paris under the name of Leylio. He was a favourite with Louis XIII., and also with the public, especially as the young lover. He left a number of plays full of extravagant imagination. The best known are L'Adamo (Milan, 1613), The Penitent Magdalene (Mantua, 1617), and The Centaur (Paris, 1622). From the first of these three volumes, which are extremely rare, Italians have often asserted that Milton, travelling at that time in their country, took the idea of Paradise Lost.

ANDREOSSY, ANTOINE-FRANCOIS, Count (1761-1828), French soldier and diplomatist, was born at Castelnaudary, in Languedoc, on the 6th of March 1761. He was of Italian extrac- tion, and his ancestor Francois Andreossy (1633-1688) had been concerned with Riquet in the construction of the Languedoc Canal in 1669. He had a brilliant career at the school of artillery at Metz, obtained his commission in 1781, and became captain in 1788. On the outbreak of the Revolution he adopted its principles. He saw active service on the Rhine in 1794 and in Italy in 1795, and in the campaign of 1796-97 was employed in engineer duties with the Army of Italy. He became chef de brigade in December 1796 and general of brigade in 1798, in which year he accompanied Bonaparte to Egypt. He served in the Egyptian campaign with distinction, and was selected as one of Napoleon's companions on his return to Europe. Andreossy took part in the coup d'etat of the 18th of Brumaire, and on the 6th of January 1800 was made general of division. Of particular importance was his

term of office as ambassador to England during the short peace which followed the treaties of Amiens and Luneville. It had been shown (Coquille, Napoleon and England, 1904) that Andreossy repeatedly warned Napoleon that the British government desired to maintain peace but must be treated with consideration. His advice, however, was dis- regarded. When Napoleon became emperor he made Andreossy inspector-general of artillery and a count of the empire. In the war of 1805 Andreossy was employed on the headquarters staff of Napoleon. From 1808 to 1809 he was French ambassador at Vienna, where he displayed a hostility to Austria which was in marked contrast to his friendliness to England in 1802-1803. In the war of 1809, Andreossy was military governor of Vienna during the French occupation. In 1812 he was sent by Napoleon as ambassador to Constantinople, where he carried on the policy initiated by Sebastiani. In 1814 he was recalled by Louis XVIII. Andreossy now retired into private life, till the escape of his former master from Elba once again called him forth. In 1826 he was elected to the Acad&mie des Sciences, and in the following year was deputy for the department of the Aude. His numerous works included the following: — on artillery (with which arm he was most intimately connected throughout his military career), Quelques idees relatives a I'usage de I'artillerie dans I'attaque et . . . la defense des places (Metz) ; Essai sur le tir des projectiles creux (Paris, 1826); and on military history, Campagne sur le Main et la Rednitz de Varmee gallo-batave (Paris, 1802); Opera- tions des pontonniers en Italie . . . IJQ5-1JQ6 (Paris, 1843). He also wrote scientific memoirs on the mouth of the Black Sea (1818-1819); on certain Egyptian lakes (during his stay in Egypt); and in particular the history of the Languedoc Canal (Hisloire du canal du Midi, 2nd ed., Paris, 1804), the chief credit of which he claimed for his ancestor. Andreossy died at Montauban in 1828.

See Marion, Notice necrologique sur le Li. -General Comte Andreossy .

ANDRES, JUAN (1740-1817), Spanish Jesuit, was born at Planes in the province of Valencia, and became professor of literature at Gandia and finally royal librarian at Naples. He died at Rome on the 12th of January 1817. He is the author of many miscellaneous treatises on science, music, the art of teach- ing the deaf and dumb, &c. But his chief work, the labour of fully twenty years, is entitled

Dell' origine, progressi, e stato attuale d' ogni Letteratura (7 vols., Parma, 17823-1799). A Spanish translation by his brother Carlos appeared at Madrid between 1784 and 1806, and an abridgment in French (1838-1846) was compiled by the Jesuit Alexis Nerbonne. The original was frequently reprinted during the first half of the 19th century.

See C. Sommervogel, Bibliotheque de la compagnie de Jesus, premiere partie (Brussels and Paris), vol. i. col. 342-350.

ANDREW (Gr. 'Avdpias, manly), the Christian Apostle, brother of Simon Peter, was born at Bethsaida on the Lake of Galilee. He had been a disciple of John the Baptist (John i. 37-40) and was one of the first to follow Jesus. He lived at Capernaum (Mark i. 29). In the gospel story he is referred to as being present on some important occasions as one of the disciples more closely attached to Jesus (Mark xiii. 3; John vi. 8, xii. 22); in Acts there is only a bare mention of him (i. 13). Tradition relates that he preached in Asia Minor and in Scythia, along the Black Sea as far as the Volga. Hence he became a patron saint of Russia. He is said to have suffered crucifixion at Patras (Patrae) in Achaea, on a cross of the form called Crux decussata (X) and commonly known as "St Andrew's cross." According to tradition his relics were removed from Patras to Constantinople, and thence to St Andrews (see below). The apocryphal book. The Acts of Andrew, mentioned by Eusebius, Epiphanius and others, is generally attributed to Leucius the Gnostic. It was edited and published by C. Tischendorf in the Acta Aposlolorum apocrypha (Leipzig, 1821). This book, as well as a Gospel of St Andrew, was declared apocryphal by a decree of Pope Gelasius. Another version of the Andrew legend is found in the Passio Andreae, published by Max Bonnet {Supplementum II Codicis apocryphi, Paris, 1895). On this was founded an Anglo-Saxon poem (" Andreas und Elene," first published by J. Grimm, 1841; cf. C. W. Goodwin, The Anglo-Saxon Legends of S. Andreas and S. Veronica, 1851). The festival of St Andrew is held on the 30th of November.

See Apocryphal Literature ; also Lipsius, Die apokryphen Apos- telgeschichten und Apostellegenden, vol. i. (1883), and Hastings' Dic- tionary of the Bible, s.v.

Scottish Legends. — About the middle of the 8th century Andrew became the patron saint of Scotland. Concerning this there are several legends which state that the relics of Andrew were brought under supernatural guidance from Constantinople to the place where the modern St Andrews stands (Pictish, Muckross; Gaelic,

Kilrymont). The oldest stories (preserved in the Colbertine MSS., Paris, and the Harleian MSS. in the British Museum) state that the relics were brought by one Regulus to the Pictish king Angus (or Ungus) Macfergus (c. 731- 761). The only historical Regulus (Riagail or Rule, whose name is preserved by the tower of St Rule) was an Irish monk expelled from Ireland with St Columba; his date, however, is c. 573-600. There are good reasons for supposing that the relics were origin- ally in the collection of Acca, bishop of Hexham, who took them into Pictland when he was driven from Hexham (c. 732), and founded a see, not, according to tradition, in Galloway, but on the site of St Andrews. The connexion with Regulus is, therefore, due in all probability to the desire to date the foundation of the church at St Andrews as early as possible.

See A. Lang, St Andrews (London, 1893), pp. 4 ff. ; W. F. Skene, Celtic Scotland ; also the article St Andrews.

ANDREW II. (1175-1235), king of Hungary, son of Bela III., king of Hungary, succeeded his nephew, the infant Ladislaus III., in 1205. No other Magyar king, perhaps, was so mischievous to his country. Valiant, enterprising, pious as he was, all these fine qualities were ruined by a reckless good nature which never thought of the morrow. He declares in one of his decrees that the generosity of a king should be limitless, and he acted up to

this principle throughout his reign. He gave away everything, money, villages, domains, whole counties, to the utter impoverish- ment of the treasury, thereby rendering the crown, for the first time in Hungarian history, dependent upon the great feudatories, who, in Hungary as elsewhere, took all they could get and gave as little as possible in return. In all matters of government, Andrew was equally reckless and haphazard. He is directly responsible for the beginnings of the feudal anarchy which well- nigh led to the extinction of the monarchy at the end of the 13th century. The great feudatories did not even respect the lives of the royal family, for Andrew was recalled from a futile attempt to reconquer Galicia (which really lay beyond the Hungarian sphere of influence), through the murder of his first wife Gertrude of Meran (September 24, 1213), by rebellious nobles jealous of the influence of her relatives. In 1 2 1 5 he married Iolanthe of France, but in 1 21 7 was compelled by the pope to lead a crusade to the Holy Land, which he undertook in hopes of being elected Latin emperor of Constantinople. The crusade excited no enthusiasm in Hungary, but Andrew contrived to collect 15,000 men together, whom he led to Venice; whence, not without much haggling and the surrender of all the Hungarian claims upon Zara, about two-

thirds of them were conveyed to Acre. But the whole expedition was a forlorn hope. The Christian kingdom of Palestine was by this time reduced to a strip of coast about 440 sq. m. in extent, and after a drawn battle with the Turks on the Jordan (November 10), and fruitless assaults on the fort- resses of the Lebanon and on Mount Tabor, Andrew started home (January 18, 1218) through Antioch, Iconium, Constantinople and Bulgaria. On his return he found the feudal barons in the ascendant, and they extorted from him the Golden Bull (see Hungary, History). Andrew's last exploit was to defeat an invasion of Frederick of Austria in 1234. The same year he married his third wife, Beatrice of Este. Besides his three sons, Bela, Coloman and Andrew, Andrew had a daughter Iolanthe, who married the king of Aragon. He was also the father of St Elizabeth of Hungary.

No special monograph for the whole reign exists, but there is a good description of Andrew's crusade in Reinhold Roehricht, 'Geschichte des Konigreiches Jerusalem (Innsbruck, 1898) . The best account of Andrew's government is in LaszloSzalay's/ftstoryo/ H ungary (Hung.), vol. i. (Leipzig and Pest, 1851-1862). (R. N. B.)

ANDREW OF LONGJUMEAU (Longumeau, Lonjumel, &c), a French Dominican, explorer and diplomatist. He accom- panied the mission under Friar Ascelin, sent by Pope Innocent IV. to the Mongols in 1247; at the Tatar camp near Kars he met a certain David, who next year (1248) appeared at the court of King Louis IX. of France in Cyprus. Andrew, who was now with St Louis, interpreted to the king David's message, a real or pretended offer of alliance from the Mongol general Ilchikdai (Ilchikadai) , and a proposal of a joint attack upon the Islamic powers for the conquest of Syria. In reply to this the French sovereign despatched Andrew as his ambassador to the great Khan Kuyuk; with Longjumeau went his brother (a monk) and several others — John Goderiche, John of Carcassonne, Herbert " le sommelier," Gerbert of Sens, Robert a clerk, a certain William, and an unnamed clerk of Poissy. The party set out about the 16th of February 1249, with letters from King Louis and the papal legate, and rich presents, including a chapel-tent, lined with scarlet cloth and embroidered with sacred pictures. From Cyprus they went to the port of Antioch in Syria, and thence travelled for a year to the khan's court, going ten leagues a day. Their route led them through Persia, along the southern and eastern shores of the Caspian (whose inland character, un- connected with the outer ocean, their journey helped to demon- strate), and probably through Talas, north-east of Tashkent. On arrival at the supreme Mongol court — either that on the Imyl river (near Lake Ala-kul and the present Russo-Chinese

frontier in the Altai), or more probably at or near Karakorum itself, south-west of Lake Baikal — Andrew found Kuyuk Khan dead, poisoned, as the envoy supposed, by Batu's agents. The regent-mother Ogul Gaimish (the " Camus " of Rubruquis) seems to have received and dismissed him with presents and a

letter for Louis IX. , the latter a fine specimen of Mongol insolence. But it is certain that before the friar had quitted "Tartary," Mangu Khan, Kuyuk's successor, had been elected. Andrew's report to his sovereign, whom he rejoined in 1251 at Caesarea in Palestine, appears to have been a mixture of history and fable; the latter affects his narrative of the Mongols' frise to greatness, and the struggles of their leader, evidently Jenghiz Khan, with Prester John; it is still more evident in the position assigned to the Tatar homeland, close to the prison of Gog and Magog. On the other hand, the envoy's account of Tatar manners is fairly accurate, and his statements about Mongol Christianity and its prosperity, though perhaps exaggerated {e.g. as to the 800 chapels on wheels in the nomadic host), are based on fact. Mounds of bones marked his road, witnesses of devastations which other historians record in detail; Christian prisoners, from Germany, he found in the heart of "Tartary" (at Talas); the ceremony of passing between two fires he was compelled to observe, as a bringer of gifts to a dead khan, gifts which were of course treated by the Mongols as evidence of submission. This insulting behaviour, and the language of the letter with which Andrew reappeared, marked the mission a failure: King Louis, says Joinville, " se repenti fort."

We only know of Andrew through references in other writers: see especially William of Rubruquis in Recueil de voyages, iv. (Paris, 1839). PP- 261, 265, 279, 296, 310, 353, 363, 370; Joinville, ed. Francisque Michel (1858, &c), pp. 142, &c. ; Jean Pierre Sarrasin, in same vol., pp. 254-255 ; William of Nangis in Recueil des historiens des Gaules, xx. 359-367 ; Remusat, Memoires sur les relations politiques des princes Chretiens . . . avec les . . . Mongols (1822, &c), p. 52- (C R- B.)

ANDREW, JOHN ALBION (1818-1867), American political le.ader, " war governor " of Massachusetts, was born at Wind- ham, Maine, on the 31st of May 1818. He graduated at Bowdoin College in 1837, studied law in Boston, was admitted to the Suffolk bar in 1840, and practised his profession in Boston. He also took a deep interest in

religious matters, was a prominent member of the Church of the Disciples (Unitarian; founded in Boston by the Rev. James Freeman Clarke), and was assistant editor for some time of The Christian World, a weekly religious paper. With ardent anti-slavery principles, he entered political life as a " Young Whig " opposed to the Mexican War; he became an active Free-Soiler in 1848, and in 1854 took part in the organization in Massachusetts of the new Republican party. He served one term, in 1858, in the state House of Representa- tives, and in 1859 declined an appointment to a seat on the bench of the state supreme court. In this year he took such an active part in raising funds to defend John Brown, then on trial in Virginia, that he aroused the suspicions of a senatorial committee investigating Brown's raid, and was summoned to Washington to tell what he knew of the affair. In i860 he was chairman of the Massachusetts delegation to the Republican national convention at Chicago, which nominated Lincoln for the presidency; and from 1861 to January 1866, throughout the trying period of the Civil War, he was governor of Massachusetts, becoming known as one of the ablest, most patriotic and most energetic of the remarkable group of "war governors" in the North. Immediately after his inauguration he began filling the militia regiments with young men ready for active service, saw that they were well drilled and supplied them with good modern rifles. As a result, Massachusetts was the only northern state in any way prepared for war when the Confederates fired on Fort Sumter; and her troops began to muster in Boston on the 16th of April, the very day after President Lincoln's call for volunteers. On the next day the Sixth Massachusetts Volunfeer Infantry started south for the defence of Washington, and was the first fully armed and equipped volunteer regiment to reach the capital. Within six days after the call, nearly four thousand Massachusetts volunteers had departed for Washington. In 1 863 , at Governor Andrew's own request, the secretary of war author- ized him to raise several regiments of negro troops, with white commissioned officers, and the Fifty-fourth Massachusetts Infantry was the first regiment of free negroes raised in the North. Governor Andrew's example was quickly followed in

other states, and before the end of the year 36,000 negroes had been enrolled in the Union armies. When the war department ruled that thenegro troops were entitled to pay only as "labourers " and not as soldiers, Governor Andrew used all his influence with the president and the secretary of war to secure for them the same pay as white troops, and was finally successful. Notwithstanding his loyal support of the administration during the struggle, he did not fully approve of its conduct of the war, which he deemed shifting and timid; and it

was with great reluctance that he sup- ported Lincoln in 1864 for a second term. In 1865 he rejected the more radical views of his party as to the treatment to be accorded to the late Confederate states, opposed the immediate and unconditional enfranchisement of freedmen, and, though not accepting President Johnson's views in their entirety, he urged the people of Massachusetts to give the new president their support. On retiring from the governor's office he declined the presidency of Antioch College, at Yellow Springs, Ohio, and various positions in the service of the Federal government, and resumed the practice of law, at once achieving great success. In 1865 he presided at the first national convention of this- Unitarian Church. He died suddenly of apoplexy, at Boston, on the 30th of October 1867.

See Henry G. Pearson's Life of John A. Andrew (2 vols., Boston and New York, 1904).

ANDREWES, LANCELOT (1555-1626), English divine, was born in 1555 in London. His family was an ancient Suffolk one; his father, Thomas, became master of Trinity House. Lancelot was sent to the Cooper's free school, Ratcliff , in the parish of Stepney, and then to the Merchant Taylors' school under Richard Mulcaster. In 1571 he was entered as a Watts scholar at Pem- broke Hall, Cambridge, where in 1574-1575 he graduated B.A., proceeding M.A. in 1578. In 1576 he had been elected fellow of Pembroke. In 1580 he took orders; in 1581 he was in- corporated M.A. at Oxford. As catechist at his college he read lectures on the Decalogue, which, both on their delivery and on their publication (in 1630), created much interest. He also gained much reputation as a casuist. After a residence in the north as chaplain to Henry Hastings, earl of Huntingdon, President of the North, he was made vicar of St Giles's, Cripple- gate, in 1588, and there delivered his striking sermons on the temptation in the wilderness and the Lord's prayer. In a great sermon on the 10th of April (Easter week) 1588, he stoutly vindicated the Protestantism of the Church of England against the Romanists, and, oddly enough, adduced " Mr Calvin " as a new writer, with lavish praise and affection. Andrewes was preferred to the prebendal stall of St Pancras in St Paul's, London, in 1 589, and on the 6th of September of the same year became master of his own college of Pembroke, being at the time one of the chaplains of Archbishop Whitgift. From 1589 to 1609 he was also prebendary of Southwell. On the 4th of March 1590, as one of the chaplains of Queen Elizabeth, he preached before her a singularly outspoken sermon, and in October gave his introductory lecture at St Paul's, undertaking to comment on the first four chapters of Genesis. These seem to have been worked

up later into a compilation called The Orphan Lectures (1657). Andrewes was an incessant worker as well as preacher, and often laboured beyond his strength. He delighted to move among the people, and yet found time to meet with a society of antiquaries, of which Raleigh, Sidney, Burleigh, Arundel, the Herberts, Saville, Stow and Camden were members. In 1598 he declined the two bishoprics of Ely and Salisbury, as the offers were coupled with a proposal to alienate part of the revenues of those sees. On the 23rd of November 1600 he preached at Whitehall a remarkable sermon on justification, which gave rise to a memorable controversy. On the 4th of July 1601 he was appointed dean of Westminster and gave much attention to the school there. He assisted at the coronation of James I. and in 1604 took part in the Hampton Court conference. His name is the first on the list of divines appointed to make the authorized version of the Bible. In 1605 he was consecrated bishop of Chichester and made lord almoner. In 1609 he published Tortura Torti, a learned work which grew out of the Gunpowder

Plot controversy and was written in answer to Bellarmine's Mallhaeus Tortus, which attacked James I.'s book on the oath of allegiance. After his translation to Ely (1609), he again controverted Bellarmine in the Responsio ad Apologiam, a treatise never answered. In 1617 he accompanied James I. to Scotland with a view to persuading the Scots that Episcopacy was preferable to Presbyterianism. In 1618 he attended the synod of Dort, and was soon after made dean of the Chapel Royal and translated to Winchester, a diocese which he ad- ministered with loving prudence and the highest success. He died on the 26th of September 1626, mourned alike by leaders in church and state.

Two generations later, Richard Crashaw caught up the universal sentiment, when, in his lines " Upon Bishop Andrewes' Picture before his Sermons," he exclaims: —

" This reverend shadow cast that setting sun, Whose glorious course through our horizon run, Left the dim face of this dull hemisphere, All one great eye, all drown'd in one great teare." Andrewes was distinguished in many fields. At court, though no trifler or flatterer, he was a favourite counsellor in three successive reigns, but he never meddled much in civil or temporal affairs. His learning made him the equal and the friend of Grotius, and of the foremost contemporary

scholars. His preaching was a unique combination of rhetorical splendour and scholarly richness; his piety that of an ancient saint, semi-ascetic and unearthly in its self- denial. As a churchman he is typically Anglican, equally removed from the Puritan and the Roman positions. He stands in true succession to Richard Hooker in working out the principles of the English Reformation, though while Hooker argued mainly against Puritanism, Andrewes chiefly combated Romanism. A good sum- mary of his position is found in his First Answer to Cardinal Perron, who had challenged James I.'s use of the title " Catholic." His position in regard to the Eucharist is naturally more mature than that of the first reformers. " As to the Real Presence we are agreed ; our controversy is as to the mode of it. As to the mode we define nothing rashly, nor anxiously investigate, any more than in the Incarnation of Christ we ask how the human is united to the divine nature in One Person. There is a real change in the elements — we allow ut panis iam consecratus non sit panis quern natura formavit; sed, quern benedictio consecravit, et consecrando etiam immutavit " (Responsio, p. 263). Adoration is permitted, and the use of the terms " sacrifice " and " altar " maintained as being consonant with scripture and antiquity. Christ is " a sacrifice — so, to be slain; a propitiatory sacrifice — so, to be eaten " (Sermons, vol. ii. p. 296). " By the same rules that the Passover was, by the same may ours be termed a sacrifice. In rigour of speech, neither of them ; for to speak after the exact manner of divinity, there is but one only sacrifice, veri nominis, that is Christ's death. And that sacrifice but once actually performed at His death, but ever before represented in figure, from the beginning; and ever since repeated in memory to the world's end. That only absolute, all else relative to it, repre- sentative of it, operative by it. . . . Hence it is that what names theirs carried, ours do the like, and the Fathers make no scruple at it — no more need we " (Sermons, vol. ii. p. 300). As to reservation, " it needeth not : the intent is had without it," since an invalid may always have his private communion. Andrewes declares against the invocation of saints, the apparent examples in patristic literature are " rhetorical outbursts, not theological definitions." His services to his church have been summed up thus: — (1) he has a keen sense of the proportion of the faith and maintains a clear distinction between what is fundamental, needing ecclesiastical commands, and subsidiary, needing only ecclesiastical guidance and suggestion ; (2) as distinguished from the earlier protesting standpoint, e.g. of the Thirty-nine Articles, he emphasized a positive and constructive statement of the Anglican position.

Literature. — Of his works the Manual of Private Devotions is the

best known, for it appeals to Christians of every church. One of the many good modern editions is that by Alex. Whyte (1900). Andrewes's other works occupy eight volumes in the Library of Anglo-Catholic Theology (1841-1854). Of biographies we have those by H. Isaacson (1650), A. T. Russell (1863), R. L. Ottley (1894), and Dean Church's essay in Masters in English Theology. See also W. H. Frere, Lancelot Andrewes as a Representative of Anglican Principles (1898; Church Hist. Soc. Publications, No. 44).

ANDREWS, JAMES PETTIT (c. 1737-1797), English historian and antiquary, was the younger son of Joseph Andrews, of Shaw House, Newbury, Berkshire, where he was born. He was educated privately, and having taken to the law was one of the magistrates at the police court in Queen Square, West- minster, from 1792 to his death. He developed a taste for literature, and his miscellaneous works include The Savages of Europe (London, 1764), a satire on the English which he trans- lated from the French, and Anecdotes Ancient and Modern (London,

1789), an amusing collection of gossip. His chief work was a History of Great Britain connected with the Chronology of Europe from Caesar's Invasion to Accession of Edward VI., in 2 vols. (London, 1 794-1 795). Its plan is somewhat singular, as a portion of the history of England is given on one page, and a general sketch of the contemporaneous history of Europe on the opposite page. He also wrote a History of Great Britain from Death of Henry VIII. to Accession of James VI. of Scotland, a continuation of Robert Henry's History of Great Britain, published in 1796 and again in 1806. Andrews died at Brompton on the 6th of August 1797, and was buried in Hampstead Church. He married Anne Penrose, daughter of a rector of Newbury.

ANDREWS, THOMAS (1813-1885), Irish chemist and physicist, was born on the 19th of December 1813 at Belfast, where his father was a linen merchant. After attending the Belfast Academy and also the Academical Institution, he went to Glasgow in 1828 to study chemistry under Professor Thomas Thomson, and thence migrated to Trinity College, Dublin, where he gained distinction in classics as well as in science. Finally, he graduated as M.D. at Edinburgh in 1835, and settled down to a successful medical practice in his native place, also giving instruction in chemistry at the Academical Institution. Ten years later he was appointed vice-president of the newly estab- lished Queen's College, Belfast, and professor of chemistry, and these two offices he held till 1879, when failing health com- pelled his retirement. He died on the 26th of November

1885. Andrews first became known as a scientific investigator by his work on the heat developed in chemical actions, for which the Royal Society awarded him a Royal medal in 1844. Another important research, undertaken with P. G. Tait, was devoted to ozone. But the work on which his reputation mainly rests, and which best displayed his skill and resourcefulness in experi- ment, was concerned with the liquefaction of gases. He carried out a very complete inquiry into the laws expressing the relations of pressure, temperature and volume in carbonic dioxide, in particular establishing the conceptions of critical temperature and critical pressure, and showing that the gas passes from the gaseous to the liquid state without any breach of continuity.

His scientific papers were published in a collected form in 1889, with a memoir by Professors Tait and Crum Brown.

ANDRIA, a town and episcopal see of Apulia, Italy, in the province of Bari; 35m. W. of the town of Bari by steam tramway, and 6 m. S.S.E. of Barletta. Pop. (1901) 49,569. It was founded probably about 1046 by Peter, the first Norman count of Andria. It was a favourite residence of the emperor Frederick II., whose second and third wives, Iolanthe and Isabella of England, were buried in the cathedral dedicated to St Richard, who is believed to have come from England in 492; their tombs, however, no longer exist. There are several other fine churches of the 13th century. The Castel del Monte, 9J m. S. of Andria, was constructed by Frederick II., who frequently resided here; it is an octagonal building in two storeys with octagonal towers at each angle, and was further surrounded by three outer walls. Despite its massive and imposing exterior, its details are fine.

See E. Rocchi in L'Arte, i. (1898) 121.

ANDRIEU, BERTRAND (1761-1822), French engraver of medals, was born at Bordeaux. He is considered as the restorer of the art in France, which had declined after the time of Louis XIV. ; and during the last twenty years of his life he was entrusted by the French government with the execution of every work of importance. Many of his medals are figured in the Medallic History of Napoleon.

ANDRIEUX, FRANQOIS GUILLAUME JEAN STANISLAS (1759-1833), French man of letters, was born at Strassburg on the 6th of May 1759. He was educated at Strassburg and pro- ceeded to Paris to study law. There he became a close friend of Collin d'Harleville. He became secretary to the duke of Uzes, and practised

at the bar, but his attention was divided between his profession and literature. His plays are of the 1 8th century style, comedies of intrigue, but they rank with those of Collin d'Harleville among the best of the period next to those of Beaumarchais. Les Etourdis, his best comedy,

was represented in 1788 and won for the author the praise of La Harpe. Andrieux hailed the beginning of the Revolution with delight and received a place under the new government, but at the beginning of the Terror he retreated to Mevoisins, the patrimony of his friend Collin d'Harleville. Under the Convention he was made civil judge in the Court of Cassation, and was one of the original members of the Institute. A moderate statesman, he was elected secretary and finally president of the Tribunat, but with other of his colleagues he was expelled for his irreconcilable attitude towards the establishment of the civil code. On his retirement he again turned to write for the stage, producing Le TrSsor and Moliere avec ses amis in 1804. He became librarian to Joseph Bonaparte and to the Senate, was professor of grammar and literature at the Ecole Polytechnique and eventually at the College de France. As a professor he was extraordinarily successful, and his lectures, which have un- happily not been preserved, attracted mature men as well as the ordinary students. He was rigidly classical in his tastes, and an ardent opponent of romanticism, which tended in his opinion to the subversion of morals. Among his other plays are La Comedienne (1 816), one of his best comedies, and a tragedy, Lucius Junius Brutus (1830). Andrieux was the author of some excellent stories and fables: La Promenade de FSnelon, Le Bulle d' Alexandre VI. and the Meunier de Saint-Souci. In 1829 he became perpetual secretary to the Academy, and in fulfilment of his functions he worked hard at the completion of the Dictionary. He died on the 9th of May 1833 in Paris.

See also A. H. Taillandier, Notice sur la vie et les ouvrages d' Andrieux (1850) ; Sainte-Beuve, Portraits litteraires, vol. i.

ANDRISCUS, often called the "pseudo-Philip," a fuller of Adramyttium, who claimed to be a son of Perseus, last king of Macedonia. He occupied the throne for a year (149-148 B.C.). Unable to obtain a following in Macedonia, he applied to Deme- trius Soter of Syria, who handed him over to the Romans. He contrived,

however, to escape; reappeared in Macedonia with a large body of Thracians; and, having completely defeated the praetor Publius Juventius (149), he assumed the title of king. His conquest of Thessaly and alliance with Carthage made the situation dangerous. Eventually he was defeated by Q. Caecilius Metellus (148), and fled to Thrace, whose prince gave him up to Rome. He figured in the triumph of Metellus (146), who received the title of "Macedonicus" for his victory. Andriscus's brief reign was marked by cruelty and extortion. After this Macedonia was formally reduced to a province.

Velleius Paterculus i. 11; Florus ii. 14; Livy, Epit. 49, 50, 52; Diod. Sic. xxxii. 9.

ANDROCLUS, a Roman slave who lived about the time of Tiberius. He is the hero of a story told by Aulus Gellius (v. 14), which states that Androclus had taken refuge from the cruelties of his master in a cave in Africa, when a lion entered the cave and showed him his swollen paw, from which Androclus extracted a large thorn. The grateful animal subsequently recognized him when he had been captured and thrown to the wild beasts in the circus, and, instead of attacking him, began to caress him (Aelian, De Nat. An. vii. 48).

ANDROMACHE, in Greek legend, the daughter of Eetion, prince of Thebe in Mysia, and wife of Hector. Her father and seven brothers fell by the hands of Achilles when their town was taken by him; her mother, ransomed at a high price, was slain by Artemis (Iliad, vi. 414). During the Trojan War her husband was slain by Achilles, and after the capture of the city her son Astyanax (or Scamandrius) was hurled from the battlements (Eurip. Troades, 720). When the captives were allotted, Andro- mache fell to Neoptolemus (Pyrrhus), the son of Achilles, whom she accompanied to Epirus, and to whom she bore three sons. When Neoptolemus was slain at Delphi, he left his wife and kingdom to Helenus, the brother of Hector (Virgil, Aen. iii. 294). After the death of her third husband, Andromache returned to Asia Minor with her youngest son Pergamus, who there founded a town named after himself. Andromache is one of the finest characters in Homer, distinguished by her affection for her husband and child, her misfortunes and the resignation with

which she endures them. The death of Astyanax, and the farewell scene between Andromache and Hector {Iliad, vi. 323), were represented in ancient works of art, while Andromache herself is the subject of tragedies by Euripides and Racine.

ANDROMEDA, in Greek legend, the daughter of Cepheus and

Cassiopeia (Cassiope, Cassiepeia), king and queen of the Ethiopians. Cassiopeia, having boasted herself equal in beauty to the Nereids, drew down the vengeance of Poseidon, who sent an inundation on the land and a sea-monster which destroyed man and beast. The oracle of Ammon having announced that no relief would be found until the king exposed his daughter Andro- meda to the monster, she was fastened to a rock on the shore. Here Perseus, returning from having slain the Gorgon, found her, slew the monster, set her free, and married her in spite of Phineus, to whom she had before been promised. At the wedding a quarrel took place between the rivals, and Phineus was turned to stone by the sight of the Gorgon's head (Ovid, Metam. v. 1). Andro- meda followed her husband to Tiryns in Argos, and became the ancestress of the family of the Perseidae. After her death she was placed by Athena amongst the constellations in the northern sky, near Perseus and Cassiopeia. Sophocles and Euripides (and in modern times Corneille) made the story the subject of tragedies, and its incidents were represented in numerous ancient works of art.

Apollodorus ii. 4; Hyginus, Fab. 64; Ovid, Metam. iv. 662; Fedde, De Perseo et Andromeda (i860).

The Greeks personified the constellation Andromeda as a woman with her arms extended and chained. Its Latin names are Persea, Mulier catenata ("chained woman"), Virgo devota, &c; the Arabians replaced the woman by a seal; Wilhelm Schickard (1592-1635) named the constellation " Abigail "; Julius Schiller assigned to it the figure of a sepulchre, naming it the "Holy Sepulchre." In 1786 Johann Elert Bode formed a new constella- tion, named the " Honours of Frederick," after his patron Frederick II., out of certain stars situated in the arm of Ptolemy's Andromeda; this innovation found little favour and is now discarded.

Twenty-three stars are catalogued by Ptolemy and Tycho Brahe; Hevelius increased this number to forty-seven, while Flamsteed gave sixty-six. The most brilliant stars are a Andromedae or " Andromeda's head," and j3 Andromedae in the girdle (Arabic mirach or mizar), both of the second magnitude; y Andromedae in the foot (alamak or alhames), of the third magnitude. Scientific interest centres mainly on the following : — • the nebula in Andromeda, one of the finest in the sky (see Nebula); y Andromedae, the finest binary in the heavens, made up of a yellow star of magnitude 2§, and a blue-green of magnitude Si, the latter being itself binary; Nova Andromedae, a "new" star, discovered in the nebula by C. E. A. Hartwig in 1885, and subsequently spectroscopically examined by

many observers; R Andromedae, a regularly variable star; and the Andromedids, a meteoric swarm, associated with Biela's comet, and having their radiant in this constellation (see Meteor).

ANDRON (Gr. avbpuv), that part of a Greek house which was reserved for men, as distinguished from the gynaeceum (yvvai-Kitov), the women's quarters.

ANDRONICUS I. (Comnenus), emperor of the East, son of Isaac, and grandson of Alexius I. Comnenus, was born about the beginning of the 12th century. He was endowed by nature with the most remarkable gifts both of mind and body. He was handsome and eloquent, but licentious; and at the same time active, hardy, courageous, a great general and an able politician. Hisearly years werespentinalternatepleasureandmilitaryservice. In 1 141 he was taken captive by the Turks (Seljuks) and remained in their hands for a year. On being ransomed he went to Constan- tinople,where was held the court of his cousin, the emperor Manuel, with whom he was a great favourite. Here the charms of his niece, the princess Eudoxia. attracted him. She became his mistress, while her sister Theodora stood in a similar relation to the emperor Manuel. In n 52, accompanied by Eudoxia, he set out for an important command in Cilicia. Failing in his principal enterprise, an attack upon Mopsuestia, he returned, but was

again appointed to the command of a province. This second post he seems also to have left after a short interval, for he appeared again in Constantinople, and narrowly escaped death at the hands of the brothers of Eudoxia. About this time (T153) a conspiracy against the emperor, in which Andronicus participated, was discovered and he was thrown into prison. There he re- mained for about twelve years, during which time he made repeated but unsuccessful attempts to escape. At last, in 1165, he was successful; and, after passing through many dangers, reached the court of Yaroslav, grand prince of Russia, at Kiev. While under the protection of the grand prince, Andronicus brought about an alliance between him and the emperor Manuel, and so restored himself to the emperor's favour. With a Russian army he joined Manuel in the invasion of Hungary and assisted at the siege of Semlin. After a successful campaign they re- turned together to Constantinople (1168); but a year after, Andronicus refused to take the oath of allegiance to the prince of

Hungary, whom Manuel desired to become his successor. He was removed from court, but received the province of Cilicia. Being still under the displeasure of the emperor, Andronicus fled to the court of Raymund, prince of Antioch. While residing here he captivated and seduced the beautiful daughter of the prince, Philippa, sister of the empress Maria. The anger of the emperor was again roused by this dishonour, and Andronicus was compelled to fly. He took refuge with Amalric, king of Jerusalem, whose favour he gained, and who invested him with the town of Berytus, now Beirut. In Jerusalem he saw Theodora, the beautiful widow of the late king Baldwin and niece of the emperor Manuel. Although Andronicus was at that time fifty-six years old, age had not diminished his charms, and Theodora became the next victim of his artful seduction. To avoid the vengeance of the emperor, she fled with him to the court of the sultan of Damascus; but not deeming themselves safe there, they continued their perilous journey through Persia and Turkestan,round the Caspian Sea and across MountCaucasus, until at length they settled among the Turks on the borders of Trebizond. Into that province Andronicus, with a body of adventurers, made frequent and successful incursions. While he was absent upon one of them, his castle was surprised by the governor of Trebizond, and Theodora with her two children were captured and sent to Constantinople. To obtain their release Andronicus made abject submission to the emperor; and, appearing in chains before him, implored pardon. This he ob- tained, and was allowed to retire with Theodora into banishment in the little town of Oenoe, on the shores of the Black Sea. In 1 180 the emperor Manuel died, and was succeeded by his son Alexius II., who was under the guardianship of the empress Maria. Her conduct excited popular indignation; and the consequent disorders, amounting almost to civil war, gave an opportunity to the ambition of Andronicus. He left his retire- ment, secured the support of the army and marched upon Constantinople, where his advent was stained by a cruel massacre ef the Latin inhabitants. Alexius was compelled to acknowledge him as colleague in the empire, but was soon put to death. Andronicus, now (1183) sole emperor, married Agnes, widow of Alexius II., a child eleven years of age. His short reign was characterized by strong and wise measures. He resolved to suppress many abuses, but, above all things, to check feudalism and limit the power of the nobles. The people, who felt the severity of his laws, at the same time acknowledged their justice, and found themselves protected from the rapacity of their superiors. The aristocrats, however, were infuriated against him, and summoned to their aid William of Sicily. This prince landed in Epirus with a strong force, and marched as far as Thessalonica, which he took and

destroyed; but he was shortly afterwards defeated, and compelled to return to Sicily. An dronicus seems then to have resolved to exterminate the

aristocracy, and his plans were nearly crowned with success. But in 1185, during his absence from the capital, his lieutenant ordered the arrest and execution of Isaac Angelus, a descendant of the first Alexius. Isaac escaped and took refuge in the church of St Sophia. He appealed to the populace, and a tumult arose which spread rapidly over the whole city. When An- dronicus arrived he found that his power was overthrown, and that Isaac had been proclaimed emperor. Isaac delivered him over to his enemies, and for three days he was exposed to their fury and resentment. At last they hung him up by the feet between two pillars. His dying agonies were shortened by an Italian soldier, who mercifully plunged a sword into his body. He died on the 12th of September 1185.

ANDRONICUS II. (Palaeologus) (1260-1332), eastern Roman emperor, was the elder son of Michael Palaeologus, whom he succeeded in 1282. He allowed the fleet, which his father had organized, to fall into decay; and the empire was thus less able than ever to resist the exacting demands of the rival powers of Venice and Genoa. During his reign the Turks under Osman conquered nearly the whole of Bithynia; and to resist them the emperor called in the aid of Roger di Flor, who commanded a body of Spanish adventurers. The Turks were defeated, but Roger was found to be nearly as formidable an enemy to the imperial power. He was assassinated by Andronicus's son and colleague, the emperor Michael IX., in 1305. His adventurers (known as the Catalan Grand Company) declared war upon Andronicus, and, after devastating Thrace and Macedonia, conquered the duchy of Athens and Thebes. From 1320 onwards the emperor was engaged in war with his grandson Andronicus (see below). He abdicated in 1328 and died in 1332.

ANDRONICUS III. (c. 1296-1341), eastern Roman emperor, was the son of Michael, son of Andronicus II. His conduct during youth was so violent that, after the death of his father Michael in 1320, his grandfather resolved to deprive him of his right to the crown. Andronicus rebelled; he had a powerful party, and the first period of civil war ended in his being crowned and accepted as colleague by his grandfather, 1325. The quarrel broke out again and, notwithstanding the help of the Bulgarians, the older emperor was compelled to abdicate, 1328. During his reign Andronicus III. was engaged in constant war, chiefly with the Turks, who greatly extended their conquests. He annexed large regions in Thessaly and

Epirus, but they were lost before his death to the rising power of Servia under Stephen Dusan. He did something for the reorganization of the navy, and re- covered Lesbos and Chios from the Genoese. He died in 1341.

ANDRONICUS OF CYRRHUS, Greek astronomer, flourished about 100 B.C. He built a horologium at Athens, the so-called " tower of the winds," a considerable portion of which still exists. It is octagonal, with figures carved on each side, repre- senting the eight principal winds. A brazen Triton on the summit, with a rod in his hand, turned round by the wind, pointed to the quarter from which it blew. From this model is derived the custom of placing weathercocks on steeples.

ANDRONICUS OF RHODES (c. 70 B.C.), the eleventh scholarch of the Peripatetics. His chief work was the arrangement of the writings of Aristotle and Theophrastus with materials supplied to him by Tyrannion. Besides arranging the works, he seems to have written paraphrases and commentaries, none of which is extant. Two treatises are sometimes erroneously attributed to him, one on the Emotions, the other a commentary on Aristotle's Ethics (really by Constantine Palaeocappa in the 16th century, or by John Callistus of Thessalonica). ..

ANDROPHAGI (Gr. for " man-eaters "), an ancient nation of cannibals north of Scythia (Herodotus iv. 18, 106), probably in the forests between the upper waters of the Dnieper and Don. They were most likely Finns (Samoyed has the same meaning) and perhaps the ancestors of the Mordvinians (q.v.).

PRINTED IN U.S.A.

VOL02_ANDROS-AUSTRIA

Britannica

THE

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

FIRST edit

ˆon, published

in three volumes, 1768— 1771.

SECOND ,

> »»

ten ,

, 1777— 1784.

THIRD ,

i >

eighteen ,

, 1788— 1797.

FOURTH ,

i >

twenty ,

, 1801 — 1810.

FIFTH ,

j >

twenty ,

, 1815— 1817.

SIXTH ,

i >

twenty ,

, 1823 — 1824.

SEVENTH ,

> >

twenty-one ,

, 1830 — 1842.

EIGHTH ,

9)

twenty-two ,

, 1853—1860

NINTH ,

J)

twenty-five ,

1875—1889.

TENTH

, ninth editibn and eleven

supplementary volumes,

1902 — 1903.

ELEVENTH ,

, publi

shed

in twenty-nine volume

is, 1910— 1911.

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the

UNIVERSITY OF CAMBRIDGE

All rights reserved

THE

ENCYCLOPEDIA BRITANNICA

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME II

ANDROS to AUSTRIA

New York

Encyclopaedia Britannica, Inc.

342 Madison Avenue

INITIALS USED IN VOLUME II. TO IDENTIFY INDIVIDUAL

CONTRIBUTORS, 1 WITH THE HEADINGS OF THE

ARTICLES IN THIS VOLUME SO SIGNED.

A. A. B.

Assaying.

A. B. R.

A. C. R* C«

A. C. Sp.

A.F.L.

A. F. P.

A.O.

A. H. S.

A. H.-S.

A.J.L.

At.

A. M. C.

A. S. M.

A.T.

A.W.R.

B.

B.R.

C. At.

C.B.*

CCh.

Askew.

4 Anthropometry.

Andrew Alexander Blair.

Chief Chemist, U.S. Geological Survey and Tenth U.S. Census, 1879-1881. Member American Philosophical Society. Author of Chemical Analysis of Iron ; &c.

Alfred Barton Rendle, F.R.S., F.L.S., D.Sc.

Keeper of the Department of Botany, British Museum.

Albert Charles Robinson Carter. . Editor of The Year's Art.

Arthur Coe Spencer, Ph.D.

Geologist to the Geological Survey of the United States.

Arthur Francis Leach, M.A. r

Charity Commissioner since 1906. Fellow of All Souls' College, Oxford, 1874-1881. J Ascham Formerly Assistant Secretary, Board of Education. Author of English Schools at] '

the Reformation; History of Winchester College; Bradfield College; &c. I

Albert Frederick Pollard, M.A., F.R.Hist.Soc.

Professor of English History in University of London. Fellow of All Souls' College, – Oxford.

Major Arthur George Frederick Griffiths (d. 1908).

H.M. Inspector of Prisons, 1878-1896. Author of The Chronicles of Newgate; Secrets of -the Prison House ; &c.

Rev. Archibald Henry Sayce, D.Litt., LL.D., D.D. See the biographical article: Sayce, A. H.

Sir A. Houtum-Schindler, CLE.

General in the Persian Army. Author of Eastern Persian Irak.

Andrew Jackson Lamoureux.

Librarian, College of Agriculture, Cornell University. Editor of the Rio News (Rio de Janeiro), 1879-1901.

Andrew Lang.

See the biographical article: Lang, Andrew.

Agnes Mary Clerke.

See the biographical article: Clerke, A. M.

Alexander Stuart Murray, LL.D.

See the biographical article: Murray, Alexander Stuart.

Antoine Thomas, D.-es-L.

Professor in the University of Paris. Member of the Institute of France. Director of Studies at the ficole Pratique des Hautes fitudes. Author of Les Utats pro- vinciaux de la France centrale sous Charles VII ; &c.

Alexander Wood Renton, M.A., LL.B.

Puisne Judge of the Supreme Court of Ceylon. Editor of Encyclopaedia of the Laws of England. .

Lord Balcarres, M.P., F.S.A.

Eldest son of the 26th Earl of Crawford. Trustee of National Portrait Gallery. Hon. Secretary, Society for Protection of Ancient Buildings. Author of Donatello ; &c.

Sir Boverton Redwood, D.Sc, F.R.S. (Edin.), Assoc.Inst.CE., M.Inst.M.E. Adviser on Petroleum to the Admirajty, the Home Office and the Indian Office. President, Society Chemical Ind., 1907-1908.

Channing Arnold.

University College, Oxford. Barrister-at-law. Author of The American Egypt.

Charles Bemont, D.-is-L., D.Litt. (Oxon.). See the biographical article: Bemont, Charles.

Charles Chree, M.A,, D.Sc, LL.D., F.R.S.

Superintendent, Observatory Department, National Physical Laboratory. Formerly Fellow of King's College, Cambridge. President, Physical Society of London.

■i Angiosperms (in part); Apple.

-j Art Societies.

4 Appalachian Mountains.

j Assur: City ; Assur-Bani-Pal.

-I Ardebil.

Argentina: Geography. Asuncidn; Atacama, Desert of.

■I Apparitions.

j Astronomy: History.

A Aqueduct (in part).

\ Aubusson: Town.

J Apportionment; 1 Arbitration.

Art Galleries.

-j Asphalt. ‘ <

J Australia: Aborigines.

J Annals; Anselme;

\ Arbois de Jubainville; Aulard.

J Atmospheric Electricity; I Aurora Polaris.

1 A complete list, showing all individual contributors, appears in the final volume.

C.E1.

INITIALS AND HEADINGS OF ARTICLES

C. P. A.

C.

H.Rd

C.

Pf.

C.

PL

C.

W.*

c. w. w.

D. C. B.

D. F. T.

D. G. H.

D.

H.

E.

Br

E.

B.

T

E.

C.

B

Ed. M.

E.

G.

E.

0.

•

E.

P.

H.*

E.

R.

L.

E.Tn. E. V. L,

Sir Charles Norton Edgecumbe Eliot, K.C.M.G., C.B., M.A., LL.D., D.C.L.

Vice-Chancellor of Sheffield University. Scholar of Balliol, Oxford, 1881-1885. Hertford, Boden, Ireland, Craven and Derby Scholar. Fellow of Trinity. Third. Secretary Embassy at St Petersburg, 1888-1892; Constantinople, 1893-1898. Commissioner for British East Africa, 1900-1904. Author of Turkey in Europe; Letters from the Far East.

Charles Francis Atkinson.

Formerly Scholar of Queen's College, Oxford. Captain, 1st City of London (Royal ' Fusiliers). Author of The Wilderness and Cold Harbour.

Charles Hercules Read, LL.D. (St Andrews).

Keeper of British and Medieval Antiquities and Ethnography, British Museum. . President of the Society of Antiquaries of London. Past President of the Anthro- pological Institute. Author of Antiquities from Benin; &c.

Christian Pfister, D.-es-L.

Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour, of Etudes sur le r'egne de Robert le Pieux.

Rev. Charles Plummer, M.A.

Fellow of Corpus Christi College, Oxford. and Times of Alfred the Great; &c.

Asia: History.

Arms and Armour: Firearms; Army; Artillery.

Author ■

Archaeology.

Antrustion; Austrasia.

Ford's Lecturer, 1901. Author of Life\ Anglo-Saxon Chronicle.

Argos: The Heraeum.

Ararat; Armenia; Asia Minor.

Charles Waldstein, M.A., D.Litt., Ph.D.

Slade Professor of Fine Art, Cambridge. Fellow of King's College, Cambridge. . Director of the Fitzwilliam Museum at Cambridge, 1883-1889. Director of the American Archaeological School at Athens, 1 889-1 893.

Sir Charles William Wilson, K.C.B., K.C.M:G., F.R.S. (1836-1897).

Major-General, Royal Engineers. Secretary to the North American Boundary Commission, 1 858-1 862. British Commissioner on the Servian Boundary Com-, mission. Director-General of the Ordnance Survey, 1 886-1 894. Director- General of Military Education, 1895-1898. Author of From Korti to Khartum; Life of Lord Clive; &c.

Demetrius Charles Boulger. f ■

Author of England and Russia in Central Asia; History of China; Life of Gordon -A Antwerp. India in the igth Century ; History of Belgium ; &c. I

Donald Francis Tovey. f

Balliol College, Oxford. Author of Essays in Musical Analysis, comprising The A Aria. Classical Concerto, The Goldberg Variations, and analyses of many other classical works. I

David George Hogarth, M.A. r

Keeper of the Ashmolean Museum, Oxford. Fellow of Magdalen College, Oxford. Anlioch; Apamea; Arabgir; Fellow of the British Academy, Excavated at Paphos, 1888; Naukratis, 1899 -j. Asia Minor; Aspendus; and 1903; Ephesus, 1 904-1905; Assiut, 1906-1907. Director, British School at a ssus Athens, 1 897-1 900. Director, Cretan Exploration Fund, 1899. ˆ assus.

David Hannay. f Anson, Baron;

Formerly British Vice-Consul at Barcelona. Author of Short History of the Royal A Antonio Prior Of Crato – Navy, 1217-1688; Life of Emilio Castelar; &c. I Aranda,' Count of ; Arhiada.

Ernest Barker, M.A.

Fellow and Lecturer of St John's College, Oxford. Formerly Fellow and Tutor of -{ Alllic Council. Merton College.

Edward Burnett Tylor, F.R.S. , D.C.L. (Oxon.). See the biographical article : Tylor, E. B.

Right Rev. Edward Cuthbert Butler, O.S.B., D.Litt. (Dubl.). Abbot of Downside Abbey, Bath.

Eduard Meyer, D.Litt. (Oxon.).

Professor of Ancient History in the University of Berlin. Author of Geschichte des Alterthums; Forschungen zur alten Geschichte; Geschichte des alten Aegyptens; Die Israeliten und ihre Nachbarstdmme ; &c.

Edmund Gosse, LL.D..

See the biographical article: Gosse, E. W.

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc

Consulting Surgeon to St Mary's Hospital, London, and to the Children's Hospital, Great Ormond Street. Late Examiner in Surgery at the Universities of Cam- bridge, Durham and London. Author of A Manual of Anatomy for Senior Students.

Ernest Prescot Hill, M.Inst.C.E.

Member of the firm of G. A. Hill & Sons, Civil Engineers, London.

Sir Edwin Ray Lankester, K.C.B., F.R.S., D.Sc (Oxon.) LL.D.

Hon. Fellow of Exeter College, Oxford. President of the British Association, 1906. Professor of Zoology and Comparative Anatomy in University College, London, 1874-1890. Linacre Professor of Comparative Anatomy at Oxford, 1891-1898. Director of the Natural History Departments of the British Museum, 1898-1907. Vice-President of the Royal Society, 1896. Romanes Lecturer at Oxford,

1905. Author of Degeneration ; The Advancement of Science; The Kingdom of Man; &c.

Rev. Ethelred Leonard Taunton (d. 1907). f

Author of The English Black Monks of St Benedict; History of the Jesuits in -j Aquaviva, Claodio. England; &c. I

Edward Verrall Lucas.

Editor of Letters of Charles and Mary Lamb. Author of Life of Charles Lamb.

J Anthropology.

r Anthony, Saint; Augustinian A Canons; Augustinian I Hermits; Augustinians.

{Arbaces; Ardashir; Arsaces; Arses; Artabanus; Artaphernes; Artaxerxes; Astyages.

f Asbjornsen and Moe; I Assonance.

J Aneurysm; 1 Appendicitis.

-j Aqueduct: Modern.

Arachnida; Arthropods.

I Austen, Jane.

INITIALS AND HEADINGS OF ARTICLES

Vll

P. c. c.

F. G. P

Frederick Cornwallis Conybeare, M.A. D.Th. (Giessen).

F.

H.

Ne.

F.

y.

G.

F.

R.

C.

F.

T.

M.

F.

W

Mo.

F. W

R.*

G.

C.

B.

G.

E.

G.

H.

C.

G. H. Fo.

G.K. G. Sn.

G. W. B.

G. W. T.

H.B.

H. Ch.

H. F. G.

H. F. P. H.F.T.

H. Ha. H. H. S.

H. M. C.

f Anointing; Armenian Chureh; Formerly Fellow of University College, Oxford. Fellow of the British Academy. < Armenian Language and Author of The Ancient Armenian Texts of Aristotle; Myth, Magie and Morals; &c. Literature; Asceticism.

Frederick Gymer Parsons, F.R.C.S., F.Z.S., F.R.Anthrop.Inst.

Vice-President Anatomical Society of Great Britain and Ireland. Lecturer on Anatomy at St Thomas's Hospital and the London School of Medicine for -| Arteries. Women. Formerly Examiner in the Universities of Cambridge, Aberdeen, London and Birmingham ; and Hunterian Professor at the Royal College of Surgeons.

Francis Henry Neville, M.A., F.R.S. [”

Fellow of Sidney Sussex College, Cambridge, and Lecturer on Physics and A Atom. Chemistry. (_

Francis Llewelyn Griffith, M.A., Ph.D. (Leipzig), F.S.A. f .

Reader in Egyptology, Oxford. Editor of the Archaeological Survey and Archaeo- J Anubis; Apis; logical Reports of the Egypt Exploration Fund. Fellow of the Imperial German 1 Assiut; Assuan. Archaeological Institute. I

Frank R. Cana.

Author of South Africa from the Great Trek to the Union.

Sir Frank T. Marzials, C.B. f

Formerly Accountant-General of the Army. Author of Lives of Victor Hugo ; -i Augier, G. V. E. Moliere; Dickens; &c. (_

j Ashanti.

Apoplexy.

Asbestos; Atacamite.

j Argentina : History.

Frederick Walker Mott, F.R.S., M.D.

Physician to Charing Cross Hospital. Pathologist to the London County Asylums. Fullerian Professor of Physiology at the Royal Institution.

Frederick William Rudler, I.S.O., F.G.S.

Curator and Librarian of the Museum of Practical Geology, London, 1879-1902. President of the Geologists' Association, 1887-1889.

Gilbert Charles Bourne, M.A., F.R.S. , F.L.S., D.Sc. (Oxon.).

Linacre Professor of Comparative Anatomy at Oxford. Fellow of Merton-j Anthozoa. College, Oxford.

Rev. George Edmundson, M.A., F.R.Hist.S.

Formerly Fellow and Tutor of Brasenose College, Oxford. Ford's Lecturer, 1909.

George Herbert Carpenter, B.Sc.

Professor of Zoology in the Royal College of Science, Dublin. President of the Association of Economic Biologists. Author of Insects: their Structure and Life.

George Herbert Fowler, F.Z.S., F.L.S., Ph.D.

Formerly Berkeley Fellow of Owens College, Manchester, and Assistant Professor of Zoology at University College, London.

Gustav Kruger, Ph.D.

Professor of Church History, University of Giessen. • Author of Das Papsttum; &c.

Grant Showerman, Ph.D.

Professor of Latin in the University of Wisconsin. the Gods.

George Willis Botsford, A.M.

Professor in Columbia University, New York. (1909); &c.

Ant; Aptera.

Aquarium.

Arius; Athanasius; Augustine, Saint (of Hippo).

0f\ J

Author of The Great Mother of < Attis,

Author of The Roman Assemblies \ Areopagus.

Rev. Griffithes Wheeler Thatcher, M.A., B.D.

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and Old Testament History at Mansfield College, Oxford.

‘Antara ibn Shaddad;

Arabia : Antiquities, History, Literature ; Arabian Philo- sophy (in part) ; A’Sha;

Ash’Arl; Asma’T; Assassin.

Hilary Bauermann, F.G.S. (d. 1909). r

Formerly Lecturer on Metallurgy at the Ordnance College, Woolwich. Author of J Anthracite A Treatise on the Metallurgy of Iron. [

Hugh Chisholm, M.A.

Formerly Scholar of Corpus Christi College, Oxford. Editor of the nth edition of the Encyclopaedia Britannica; co-editor of the 10th edition.

Hans Friedrich Gadow, F.R.S., Ph.D.

Strickland Curator and Lecturer on Zoology in the University of Cambridge. Author of Amphibia and Reptiles.

Henry Francis Pelham, LL.D.

See the biographical article: Pelham, H. F.

Rev. Henry Fanshawe Tozer, M.A., F.R.G.S.

Hon. Fellow of Exeter College, Oxford. Fellow of the British Academy. Corre- sponding Member of Historical Society of Greece. Author of Lectures on the Geo- graphy of Greece ; History of Ancient Geography. Editor of Finlay's History of Greece.

Heber Hart.

Barrister-at-law.

Argyll, Earls and Dukes 0! (in part) ; Asquith, H. H.

Archaeopteryx.

Augustus.

Attica.

Henry Heathcote Statham, F.R.I.B.A.

Editor of The Builder. Author of Architecture (Modern) for General Readers; Modern Architecture; &c.

Hector Munro Chadwick, M.A.

FelloTtr and Librarian of Clare College, Cambridge. Saxon Institutions.

Auctions and Auctioneers. Architecture: Modem.

Author of Studies on Anglo- J Angli; Anglo-Saxons.

Vlll

H

N. D

H.

Se.

H.

Sm.

I.

A.

INITIALS AMD HEADINGS OF ARTICLES

I. B. B.

J. A. H. J. A. R.

J. B. T.

J. Bn. J. D. B.

J. D. Pr.

J.

6.

C. A.

J.

G.

F.

J.

G.

H.

J.

G.

Sc.

J.

H.

A. H

J.

H.F.

J.

H.

R.

J.

HI

. R.

J.

I.

J.

L.

W.

J. M. M.

J. Mac.

J. P. E.

Henry Newton Dickson, M.A., D.Sc. (Oxon.), F.R.G.S., F.R.S. (Edin.).

Professor of Geography, University College, Reading. Author of ; Elementary Meteorology; Papers on Oceanography; &c. ;■ ‘ .

Henri See. , , , .

Professor in the University of Rennes.

Hugh Sheringham.

Angling Editor of The Field (London).

Israel Abrahams, M.A.

Reader in Talmudic and Rabbinic Literature, University of ‘ Cambridge. President, Jewish Historical Society of England. Author of A Short History of Jewish Litera- ture; Jewish Life in the Middle Ages.

Isaac Bayley Balfour, F.R.S., M.D. ‘

King’s Botanist in Scotland. Regius Keeper of Royal Botanic Garden,

Edinburgh. •Professor of Botany in the University of Edinburgh. Regius Professor of Botany in the University of Glasgow, 1 879-1 884. Sherardian Professor of Botany in the University of Oxford, 1884-1888.

John Allen Howe, B.Sc.

Curator and Librarian of the Museum of Practical Geology, London.

■" Very Rev. Joseph Armitage Robinson, M.A., D.D.

Dean of Westminster. Fellow of the British Academy. Hon. Fellow of Christ's College, Cambridge. Formerly Fellow of Christ's College, Cambridge, and Norrisian Professor of Divinity. Author of Some Thoughts on the Incarnation ; &c.

Sir John Batty Tuke, M.D., LL.D. (Edin.), D.Sc (Dubl.)

President of the Neurological Society of the United Kingdom. Medical Director of New Saughton Hall Asylum, Edinburgh. M.P. for the Universities of Edinburgh and St Andrews, 1900-1910.

John Bilson.

External Examiner in Architecture, University of Manchester. •

James David Bourchier, M.A., F.R.G.S.

Correspondent of The Times in South-Eastern Europe. Commander of the Orders of Prince Danilo of Montenegro and of the Saviour of Greece, and Officer of the Order of St Alexander of Bulgaria. '

John Dyneley Prince, Ph.D.

Professor of Semitic Languages, Columbia University, New York. Took part in the Expedition to Southern Babylonia, 1888-89. Author of A Critical Commentary on the Book of Daniel; Assyrian Primer.

John George Clark Anderson, M.A. . , ■

Student, Censor and Tutor of Christ Church, Oxford. Craven Fellow, 1896. Formerly Fellow of Lincoln College, Oxford. Joint-author of Studica Pontica,

Sir Joshua Girling Fitch. ,

See the biographical article: Fitch, Sir Joshua G.

Atlantic Ocean.

Anne of Brittany.

1.1

I Angling.

‘Asher Ben Jehiel.

Angiosperms (in part).

J~ Archean System; \ Arenig Group.

1 Aristides, Apology of.

< Aphasia.

f Architecture : Romanesque and [Gothic, in England. ., i

J Athens; 1 Athos.

I

Assur (Biblical).

■1 Angora.

{

Arnold, Matthew (in part%

Joseph G. Horner, A.M.I.Mech.E.

Author 6f Plating and Boiler Making ; &c.

J Annealing.

Sir James George Scott, K.C.I.E.

Superintendent and Political Officer, Southern Shan States. Author of Burma, a J Arakan. Handbook ; The Upper Burma Gazetteer ; &c.

John Henry Arthur Hart, M.A.

Fellow, Lecturer and Librarian of St John’s College, Cambridge.

John Henry Freese, M.A.

Formerly Fellow of St John's College, Cambridge.

John Horace Round, M.A., LL.D. (Edin.).

Author of Feudal England ; Peerage and Pedigree ; &c.

John Holland Rose, M.A., Litt.D. f

Lecturer on Modern History to the Cambridge University Local Lectures I . 1

Syndicate. Author of Life of Napoleon I; Napoleonic Studies; The Development of \ AU S ereau – the European Nations; The Life of Pitt; Chapters in the Cambridge Modern History. '["

J" Arehelaus, King of Judaea; \Asmoneus; Assideans. J Annalists; Aphrodite;; Apollo; \ Artemis; Athena.

-j Arundel, Earldom of.

Jules Isaac. ,

Professor of History at the Lycee of Lyons.

Miss Jessie L. Weston.

Author of Arthurian Romances.

John Malcolm Mitchell.

Formerly Scholar of Queen's College, Oxford. Lecturer in Classics, East London College (University of London). Joint-editor of Grote's History of Greece.

James Macqueen.

Member and Fellow of the Royal College of Veterinary Surgeons." Professor of Surgery at the Royal Veterinary College, London. Examiner for the Fellowship Diploma of the R.C.V.S. Editor, of Fleming's Operative Veterinary Surgery (2nd edition); Dun's Veterinary Medicines (10th edition); and Neumann's Parasites and Parasitic Diseases of the Domesticated Animals (2nd edition).

Jean Paul Hippolyte Emmanuel Adhemar Esmein.

Professor of Law in the University of Paris. Officer of the Legion of Honour. Member of the Institute of France. Author of Cours

eWnentaire d’histoire du~ droit franqais; &c.

4 Anne of France.

/Arthur (King);

\ Arthurian Legend. Aqueduct: Ancient and ”■ ˆ M edieval ; Aquinas, Thomas (in part); Archon; Arnte’ and Armour: Ancient.

Anthrax.

Appanage.

INITIALS AND HEADINGS OF ARTICLES

IX

J. S. B.

J. S. F.

J. Si.*

J. V. B.

J. W. G. J. W. He.

K.S. L. H.*

L. J. S.

L. M. Br. L.W.

M.6.

M. H. C.

M. J. De G. M. Ja.

M. L. H. M. N. T.

M. 0. B. C.

M. P.* N.M.

H. W. T.

Jacob; Samuel Ballin.

Founder and Hon. Sec. of the National Institution of Apprenticeship, London.

John Smith Flett, D.Sc, F.G.S. f

Peirographer to the Geological Survey. Formerly Lecturer on Petrology in Edin- J burgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby I Medallist of the Geological Society of London. L

Rev. James Sibree.

Author of Madagascar and its People; &c.

James Vernon Bartlet, M.A., D.D. (St Andrews).

Professor of Church History, Mansfield College, Oxford. Age; &c.

John Walter Gregory, F.R.S., D.Sc.

Professor of Geology, University of Glasgow. Mineralogy, University of Melbourne, 1900-1904. Australia; Australasia.

{

{

Author of The Apostolic <

Professor of Geology and j Author of The Dead Heart of j

Apprenticeship.

Aplite.

Antananarivo.

Apostle; Apostolic Fathers.

Australia: Physical Geography.

James Wycliffe Headlam, M.A. f

Staff Inspector of Secondary Schools under the Board of Education. Formerly J

Fellow of King's College, Cambridge. Professor of Greek and Ancient History at ") Arnim, Count.

Queea's College, London. Author of Bismarck and the Foundation of the German

. Empire ; &c.

Kathleen Schlesinger.

Author of The Instruments of the Orchestra.

Louis Halfhen, D.-es-L.

Lecturer on Medieval History at the University of Bordeaux. • of the Ecole des Chartes, Paris.

‘ {

Formerly Secretary -s

Leonard James Spencer, M.A., F.G.S.

Department of Mineralogy, British Museum. Formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar. Editor of the Mineralogical Magazine.

Louis Maurice Brandin, M.A.

Fielden Professor of French and of Romance Philology in the University of London. ”

Formerly President of

Arghoul; Asor; Aulos.

Anjou.

Anhydrite; Ankerite; Annabergite; Anorthite; Apatite; Apophyllite; Aragonite; Argentite; Argyrodite; Augite.

Anglo-Norman Literature. Anti-Semitism.

Anthim the Iberian.

Lucien, Wolf.

Vice-President of the Jewish Historical Society of England, the Society. Joint editor of the Btbliotheca Anglo-Judaica.

Moses GAster.

Chief Rabbi of the Sephardic communities of England. Vice-President, Zionist Congress, 1898, 1899,1 1900. Ilchester Lecturer at Oxford on Slavonic and Byzantine Literature, 1886 and 1891. President, Folklore Society of England." Vice-President, Anglo-Jewish Association. Author of History of Rumanian Popular Literature ; A New Hebrew Fragment of Ben-Sira ; The Hebrew Version of Sectitum Secrelorum of Aristotle:

Montague Hughes Crackanthorpe, K.C., D.C.L. f

President of the Eugenics Education Society. Formerly Member of the General J Arbitration, International. Council of the Bar and Council of Legal Education. Late Chairman, Incorporated Council of Law Reporting. Honorary Fellow St John's College, Oxford. I

MichAel Jan de Goeje.

See the biographical article : Goeje, Michael Jan de.

Morris JastrOW, Ph.D. (Leipzig).

, Professor of Semitic Languages, University of Pennsylvania. of the Babylonians and Assyrians; &c.

Lady Huggins.

See the biographical article: Huggins, Sir William.

Marcus Niebuhr Tod, M.A. fAnoiia. iˆhM.mtic

Fellow and Tutor of Oriel College, Oxford. University Lecturer in Epigraphy. A . p .' 8 ' Arcnmamus, Joint author of Catalogue of the Sparta Museum. I Anstodemus; Anstomenes.

-j Arabia: Literature (in part).

Author of Religion

J Anu; Assur (God) ; ■(_ Astrology.

{

Armilla; Astrolabe.

Maximilian Otto Bismarck Caspari, M.A.

Reader in Ancient History at London University. Lecturer in Greek at Birming- ham University, 1905-1908. Author of chapters on Greek

History in The Year's' Work in Classical Studies.

f Aratus of Sicyon; Arcadia; Argos: History; Aristides the Just; Athens (in part).

Leon Jacques Maxime Prinet.

Formerly Archivist Jo the French National Archives, of France (Academy of Moral and Political Sciences).

Auxiliary to the Instituted Aumale, Due d\

Norman McLean, M.A. r

Fellow, Lecturer and Librarian of Christ's College, Cambridge. University Lecturer J a-i,.—ˆ- in Aramaic. Examiner for the Oriental Languages Tripos and the Theological ") Apnraaws. Tripos at Cambridge. [

Northcote Whitbridge Thomas, M.A. f Animal- Worship*

Government Anthropologist to Southern Nigeria. Corresponding Member of the J . . . Societe d'Anthropologie de Paris. Author of Thought Transference; Kinship and~\ Animism. Marriage in Australia; &c. [_

X

0.

Ba.

0.

Br.

A.

A. K

CM.

INITIALS AND HEADINGS OF ARTICLES

Oswald Barron, F.S. A. f Arms and Armour-

Editor of The Ancestor, 1902-1905. Hon. Genealogist to Standing Council of -i * rms *. Armour « Honourable Society of Baronetage. I English.

Oscar Briliant. \ Austria: Statistics.

Paul Daniel Alphandery. , , f , ._

Professor of the History of Dogma, Ecole Pratique des Hautes Etudes, Sorbonne, J ApostOllClJ Paris. Author of Les Idees morales chez les heterodoxes latines au debut du XIII' j Arnold Of Brescia.

siede. I

Prince Peter Alexeivitch Kropotkin. J Aral* Astrakhan.

See the biographical article: Kropotkin, Prince Peter A. I '

Annelida.

Peter Chalmers Mitchell, F.R.S., F.Z.S., D.Sc, LL.D.

Secretary to the Zoological Society of London from 1903. University Demon- Animal'

strator in Comparative Anatomy and Assistant to Linacre Professor at Oxford, – '

1888-1891. Lecturer on Biology at Charing Cross Hospital, 1892-1894; at London

Hospital, 1894. Examiner in Biology to the Royal College of Physicians, 1892-

1896,1901-1903. Examiner in Zoology to the University of London, 1903.; r ■ ' "

Anglesey, 1st Earl of;

Anne, Queen;

Anne of Cleves; P. C. Y Philip Chesney Yorke, M.A. -\ Anne of Denmark;

Magdalen College, Oxford. Antrjmj lgt Marquess „,.

P. G. Percy Gardner, Litt.D., LL.D

Argyll, Earls and Dukes of; Arlington, Earl of.

:y Gardner, Litt.D., LL.D. f .

See the biographical article: Gardner, Percy. \ Apelles.

P. Gi. Peter Giles, M.A., Litt.D., LL.D. f , . .

Fellow and Classical Lecturer of Emmanuel College, Cambridge, and University -{ Aryan. Reader in Comparative Philology. Author of Manual of Comparative Philology. I

P. La. Philip Lake, M.A., F.G.S. fAoennines-

Lecturer on Physical and Regional Geography in Cambridge University. Formerly J V . „ .' of the Geological Survey of India. Author of Monograph of British Cambrian 1 Asia: Geology; ,..

TrUobites. Translator and editor of Kayser's Comparative Geology. I Austria: Geology.

P. Vi. Paul Vinogradoff, D.C.L. (Oxford), LL.D. (Cambridge and Harvard). f

Corpus Professor of Jurisprudence in the University of Oxford. Fellow of the J Anglo-Saxdn Law. '

British Academy. Honorary Professor of History in the University of Moscow. | Author of Villainage in England; English Society in the nth Century; Set. L

The Right Hon. Lord Rayleigh. -(Argon. ■""

See the biographical article: Rayleigh, 3RD Baron. , I

Robert Alexander Stewart Macalister, M.A., F.S. A. /Ascalon.

Director of Excavations for the Palestine Exploration Fund. \

Colonel Robert Alexander Wahab, CM.G-, CLE. f

Served in the Afghan War, 1878-1880; with the Hazara Expeditions, 1888 and J Arabia: Modem History;

1891; with the Tirah Expeditionary Force, 1897-1898, &c. Commissioner for] Asir.

the Aden Boundary Delimitation. L ‘ ‘ ■;;

Sir Richard Claverhouse Jebb, LL.D., D.C.L. J . . , .

See the biographical article: Jebb, Sir Richard C. ‘ l AHStopnaneS.

Richard Garnett, LL.D. f . . ,.

See the biographical article: Garnett, Richard. -ˆAnthology; Apot(»eofflS.

Rev. Robert Henry Charles, M.A., D.D., Litt.D. (Oxon.). r

Grinfield Lecturer and Lecturer in Biblical Studies, Oxford. Fellow of the British J Apocalyptic Literatureˆ Academy. Professor of Biblical Greek at Trinity College, Dublin, 1 898-1906.] Apocryphal Literature. Author of Critical History of a Future Life ; &c. I

Reginald Innes Pocock, F.Z.S., F.L.S. r . . » •

Superintendent of the Zoological Gardens, London. ~\ AnWioB; Aphides. ■’■ -■ •

Ronald John McNeill, M.A. r

Christ Church, Oxford. Formerly Editor of the St James’s Gazette (London). 4 Australia: Recent LegislatiOK.

Richard Lydekker, F.R.S., F.G.S., F.Z.S. r

Author of Catalogues of Fossil Mammals, Reptiles and Birds in British Museum;) Antelope; Arsinoitherium; The Deer of all Lands; &c. | Artiodaetyla; Aurpchs. ,

Rev. Robert Mackintosh, M.A., D.D. J Anthropomorphism; Apolo-

Professor at Lancashire Independent College, Manchester. ˆ getics; Apotheosis(t« />ar/).

Robert Nisbet Bain (d. 1909). f Anne, Empress of Russia;

Assistant Librarian, British Museum, 1883-1909. Author of Scandinavia: the Political History of Denmark, Norway and Sweden, 1513-1900; The Firstjiomanovs, – 1613 to 1725; Slavonic Europe : the Political History of Poland and Russia from 1469 to 1796; &c.

R.

R.

A.

S. M

R.

A.

W.

R.

C.

J.

R.

G.

R.

H

c.

R.

I.

R.

J.

M.

R.

L.

•

R.

Ma.

R.

N.

B.

Apraksin, T. M.; Arakcheev, A. A., Count; Arany, Janos; Armielt, G. M., Count. <

R. N. W. Ralph Nicholson Wornum (1812-1877).

Keeper of the National Gallery, 1854-1877. Author of The Epochs of Painting; &c. -j Arabesque.

R. P. S. R. Phene Spiers, F.S.A., F.R.I.B.A. fApse;

Formerly Master of the Architectural School, Royal Academy, London. Past. Arcade* President of Architectural Association. Associate and Fellow of King's College,ˆ . . . ' London. Corresponding Membej of the Institute of France. Editor of Fergusson's Arcn; History of Architecture. Author of Architecture: East and West; &c. . I Architecture.

INITIALS AND HEADINGS OF ARTICLES

XI

R, Po.

R

s.

R

S.C

R.

Tr.

S.

A.C

S.C. S.N. STC. Sw.

T. A. C.

r. a. i.

T. As.

T.Ba.

T.Ca.

T.

H.

T.

H.

H.*

T.L.

H.

T.

M.

L.

T. W

-D.

T.

W

R.

D

Rene Poupardin, D.-es-L.

Secretary of the Ecole des Chartes. Honorary Librarian at the Bibliotheque ~j Aries, Kingdom of. Nationale, Paris.

Lieut.-Gen. Sir Richard Strachey, R.E., G.C.S.I., LL.D., F.R.S. See the biographical article: Strachey, Sir R.

f Asia: Climate, Flora and \ Fauna.

Robert Seymour Conway, M.A., D.Litt. (Cantab.). f

Professor of Latin in the University of Manchester. Formerly Professor of Latin J Apulia: Archaeology;

in University College, Cardiff. Author of The Italic Dialects.

Fellow of Gonville and Caius College, Cambridge. | Aricini; Aurunci.

Roland Tsuslove, M.A.

Fellow and Lecturer in Classics, Worcester College, Oxford, of Christ Church, Oxford.

Formerly Scholar

Aries.

Ark; Asa; Asher; Astarte.

Art.

Stanley Arthur Cook, M.A.

Editor for Palestine Exploration Fund. Formerly Fellow and Lecturer in Hebrew and Syriac, Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904-1908; Council of Royal Asiatic Society," 1904-1905. Author of Glossary of Aramaic Inscriptions; The Laws of Moses and Code of Hammurabi; Critical Notes on Old Testament History; Religion of Ancient Palestine; &c.

Sidney Colvtn, M.A., D.Litt.

See the biographical article : Colvin, Sidney.

Simon Newcomb, LL.D., D.Sc, D.CL. (Oxon.). See the biographical article: Newcomb, Simon.

Viscount St Cyres.

See the biographical article: Iddesleigh, ist Earl of. L

The Right Hon. Lord Swaythling (Sir Samuel Montagu). [

M.P. for Whitechapel, 1885-1900. Founder of the firm of Samuel Montagu & Co., “j Arbitrage. Bankers, London. I

Timothy Augustine Coghlan, I.S.O. f

Agent-General for New South Wales. President of Australasian Association for the J Australia. Advancement of Science (Economics and Statistics), 1902. Author of The Seven | Colonies of Australia; Statistical Account of Australia and New Zealand. I

Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.

f Astronomy: Descriptive- X Astrophysics.

4 Arnauld : Family.

{

Thomas Ashby, M.A., D.Litt. (Oxon.).

Director of the British School of Archaeology at Rome. Formerly Scholar of Christ Church, Oxford. Craven Fellow, 1897. Author of numerous articles in the – Papers of the British School at Rome; The Classical Topography of the Roman Campagna; &c.

Assignats.

Antium; Appia Via;

Apulia: History;

Aqueduct: Roman;

Aquileia; Aquino;

Ardea; Arezzo;

Ariano di Puglia; Aricia;

Ariminum; Arpi; Arpino;

Arretium; Ascoli Piceno;

Asisium; Assisi; Astura;

Ateste; Aufidena;

Augusta (Sicily);

Augusta Bagiennorum;

Augusta Praetoria Salassorum*

Aurelia, Via.

Angary;

Annexation.

Asylum, Right of.

Aristotle.

Sir Thomas Barclay, M.P.

Member of the Institute of International Law. Member of the Supreme Council of ˆ the Congo Free State. Officer of the Legion of Honour. Author of Problems of* International Practice and Diplomacy; &c. M.P. for Blackburn, 1910.

Thomas Case, M.A.

President of Corpus Christi College, Oxford. Formerly Waynflete Professor of Moral • and Metaphysical Philosophy at Oxford. Author of Physical Realism; &c.

Thomas Hodgkin, LL.D., D.Litt.

See the biographical article: Hodgkin, T.

Col. Sir Thomas Hungerford Holdich, K.C.M.G., K.C.I. E., D.Sc, F.R.G.S. j Asia: Geography and Superintendent, Frontier Surveys, India, 1892-1898. Author of The Indianˆ Ethnology. Borderland; The

Countries of the King's Award; &c.

Attila.

Sir Thomas Little Heath, K.C.B.,

Assistant Secretary to the Treasury.

D Sc (Cantab) f Anthemius ;

Formerly Fellow of Trinity College, Cambridge.] A P ollonius 0* Perga;

[Archimedes. Rev. Thomas Martin Lindsay, LL.D., D.D. r

Principal of the United Free Church College, Glasgow. Formerly Assistant to the J A nl] ;_ a – Thnmae Professor of Logic and Metaphysics in the University of Edinburgh. Author of 1 A Q ulnas > momas. History of the Reformation; Life of Luther; &c. [

Walter Theodore Watts-Dunton -f Arnold, Matthew.

See the biographical article : Watts-Dunton, W. T. [_

T. W. Rhys Davids, M.A., Ph.D., LL.D. f

Professor of Comparative Religion in the University of Manchester. President of J Agolsa. the Pali Text Society. Fellow of the British Academy. Secretary and Librarian] • of Royal Asiatic Society, 18.85-1902. Author of Buddhism; &c. I

Xll

W» A* Be C

W. A. P.

W. Bo.

W. Cr. W. E. Co.

W. E. E.

W. F. C.

INITIALS AND HEADINGS OF ARTICLES

w.

F.

Sh.

w.

H.

Be

w.

H

Di.

w.

J.

F.

w.

Ma.

w.

M.

R.

w.

P.

R.

W. R. L.

W.W. W. W. F.*

W. W. R.*

Rev. William Augustus Brevoort Coolidge, M.A.,F.R.G.S., Hon. Ph.D. (Bern). Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880-1881. Author of Guide du haut dauphine; The Range of* the Todi; Guide to Grindelwald; Guide

to Switzerland; The Alps in Nature and in History; &c. Editor of the Alpine Journal, 1880-1889; &c.

Walter Alison Phillips, M.A.

Principal Assistant Editor of the nth edition of the Encyclopaedia Britannica. . Formerly Exhibitioner of Merton College, Oxford, and Senior Scholar of St John's College. Author of Modern Europe ; &c.

Annecy; Antibes; Appenzell; Arnaud, Henri.

Archbishop; Archdeacon.

WlLHELM BOUSSET, D.THEOL.

Professor of New Testament Exegesis in the University of Gottingen. Das We sen der Religion; The Antichrist Legend; &c.

Walter Crane.

See the biographical article: Crane, Walter.

Right Rev. William Edward Collins, D.D., Bishop of Gibraltar Formerly Professor of Ecclesiastical History, King's College, London.

Author of j Antichrist.

f Arts and Crafts; I Art Teaching.

istical History, Kings College, London. Lecturer, J « , .. . „ ... ,. St John's and Selwyn Colleges, Cambridge. Author of The Beginnings of English 1 Apostolical Constitutions. Christianity. |_

Major William Egerton Edwards. f

Captain and Brevet Major, Royal Field Artillery. Inspector, Inspection Staff, Wool- J Armour Plates wich Arsenal. Lecturer on Armour and Explosives at the Royal Naval War 1 ridw».

College, Greenwich, 1904-1909. I

William Feilden Craies, M.A. f

Barrister-at-law, Inner Temple. Lecturer on Criminal Law, King's College, London. J Anneal Editor of Archbold's Criminal Pleading (23rd edition). Author of Craies on Statute 1 "PP eal * Law. L

William Fleetwood Sheppard, M.A., D.Sc.

Senior Examiner under the Board of Education. Senior Wrangler, 18 Fellow of Trinity College, Cambridge.

William Henry Bennett, M.A., D.D., D.Litt. (Cantab.). f

Professor of Old Testament Exegesis in New and Hackney Colleges, London. J Formerly Fellow of St John's College, Cambridge. Lecturer in Hebrew at Firth j College, Sheffield. Author of Religion of the Post-Exilic Prophets; &c. I

William Henry Dines, F.R.S. -j

William Justice Ford, M.A. (d. 1904).

Formerly Scholar of St John's College, Cambridge. Head Master of Leamington College.

Sir William Markby, K.C.I.E., D.C.L. J

See the biographical article: Markby, Sir W. \

William Michael Rossetti. f

See the biographical article: Rossetti, Dante Gabriel. 1

Hon. William Pember Reeves.

Director, London School of Economics. Agent-General and High Commissioner for New Zealand, 1896-1909. Author of A History of New Zealand.

W. R. Lethaby, F.S.A. f

Principal of the Central School of Arts and Crafts under the London County -\ Council. Author of A rchitecture, Mysticism and Myth ; &c. L

William Wallace, M.A. f

See the biographical article: Wallace, William (d. 1897). \

William Warde Fowler, M.A. f

Fellow of Lincoln College, Oxford. Sub-Rector, 1881-1904. Gifford Lecturer, j Edinburgh University, 1908. Author of The City-State of the

Greeks and Romans; j The Roman Festivals of the Republican Period ; &c. I

William Walker Rockwell, Lie. Theol.

Assistant Professor of Church History, Union Theological Seminary, New York.

Formerly -j Arithmetic.

Angel; Atonement.

Anemometer.

Archery.

Austin, John.

Angelico, Fra.

Atkinson, Sir Henry Albert.

Architecture: Romanesque and Gothic in France.

Arabian Philosophy {in part).

Anna Perenna; Argei.

Antioeh, Synods of; Aries, Synod of; Augsburg, Confession of.

PRINCIPAL UNSIGNED ARTICLES

Anglican Communion. Angola. Annuity. Anselm. Antimony. Apothecary. Arabs.

Arbitration and Concilia- tion in Labour Disputes.

Argenson: Family.

Ariosto.

Arizona.

Arkansas.

Arsenic.

Arthur, Chester Alan.

Art Sales.

Arundel, Earls of.

Arya Samaj.

Asparagus.

Aspern-Essling.

Assam.

Assembly.

Assets.

Assize.

Association of Ideas.

Asthma.

Athletic Sports.

Atholl, Earls and Dukes

of. Atlas Mountains. Attainder. Atterbury, Francis. Audit and Auditor.

Augurs.

Augustan History. Aungervyle, R. Aurangzeb. Aurelian. Auricula. Auscultation. Austerlitz.

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

VOLUME II

ANDROS, SIR EDMUND (1637-1714), English colonial governor in America, was born in London on the 6th of December 1637, son of Amice Andros, an adherent of Charles I., and the royal bailiff of the island of Guernsey. He served for a short time in the army of Prince Henry of Nassau, and in 1660-1662 was gentleman in ordinary to the queen of Bohemia (Elizabeth Stuart, daughter of James I. of England). He then served against the Dutch, and in 1672 was commissioned major in what is said to have been the first English regiment armed

with the bayonet. In 1674 he became, by the appointment of the duke of York (later James II.), governor of New York and the Jerseys, though his jurisdiction over the Jerseys was disputed, and until his recall in 1681 to meet an unfounded charge of dishonesty and favouritism in the collection of the revenues, he proved himself to be a capable administrator, whose imperious disposi- tion, however, rendered him somewhat unpopular among the colonists. During a visit to England in 1678 he was knighted. In 1686 he became governor, with Boston as his capital, of the " Dominion of New England," into which Massachusetts (in- cluding Maine), Plymouth, Rhode Island, Connecticut and New Hampshire were consolidated, and in 1688 his jurisdiction was extended over New York and the Jerseys. But his vexatious interference with colonial rights and customs aroused the keenest resentment, and on the 18th of April 1689, soon after news of the arrival of William, prince of Orange, in England reached Boston, the colonists deposed and arrested him. In New York his deputy, Francis Nicholson, was soon afterwards deposed by Jacob Leisler (q.v.) ; and the inter-colonial union was dissolved. Andros was sent to England for trial in 1690, but was immediately released without trial, and from 1692 until 1698 he was governor of Virginia, but was recalled through the agency of Commissary James Blair (q.v.), with whom he quarrelled. In 1693-1694 he was also governor of Maryland. From 1704 to 1706 he was governor of Guernsey. He died in London in February 17 14 and was buried at St Anne's, Soho.

See The Andros Tracts (3 vols., Boston, 1 869-1 872).

ANDROS, or Andro, an island of the Greek archipelago, the most northerly of the Cyclades, 6 m. S.E. of Euboea, and about 2 m. N. of Tenos; it forms an eparchy in the modern kingdom of Greece. It is nearly 25 m. long, and its greatest breadth is 10 m. Its surface is for the most part mountainous, with many fruitful and well-watered valleys. Andros, the capital, on the east coast, contains about 2000 inhabitants. The ruins of Palaeopolis, the ancient capital, are on the west coast; the town

possessed a famous temple, dedicated to Bacchus. The island has about 18,000 inhabitants.

The island in ancient times contained an Ionian population, perhaps with an admixture of Thracian blood. Though originally dependent on Eretria, by the 7th century B.C. it had become sufficiently prosperous to send out several colonies to Chalcidice (Acanthus, Stageirus, Argilus, Sane). In 480 it supplied ships to Xerxes and was subsequently harried by the Greek fleet. Though enrolled in the Delian

League it remained disaffected towards Athens, and in 447 had to be coerced by the settlement of a cleruchy. In 411 Andros proclaimed its freedom and in 408 withstood an Athenian attack. As a member of the second Delian League it was again controlled by a garrison and an archon. In the Hellenistic period Andros was contended for as a frontier-post by the two naval powers of the Aegean Sea, Macedonia and Egypt. In S33 it received a Macedonian garrison from Antipater; in 308 it was freed by Ptolemy I. In the Chremonidean War (266-263) it passed again to Macedonia after a battle fought off its shores. In 200 it was captured by a com- bined Roman, Pergamene and Rhodian fleet, and remained a possession of Pergamum until the dissolution of that kingdom in 133 B.C. Before falling under Turkish rule, Andros was from a.d. 1207 till 1566 governed by the families Zeno and Sommariva under Venetian protection.

ANDROTION (c. 350 B.C.), Greek orator, and one of the leading politicians of his time, was a pupil of Isocrates and a con- temporary of Demosthenes. He is known to us chiefly from the speech of Demosthenes, in which he was accused of illegality in proposing the usual honour of a crown to the Council of Five Hundred at the expiration of its term of office. Androtion filled several important posts, and during the Social War was appointed extraordinary commissioner to recover certain arrears of taxes. Both Demosthenes and Aristotle (Rhet. iii. 4) speak favourably of his powers as an orator. He is said to have gone into exile at Megara, and to have composed an Atthis, or annalistic account of Attica from the earliest times to his own days (Pausanias vi. 7; x. 8). It is disputed whether the annalist and orator are identical, but an Androtion who wrote on agriculture is certainly a different person. Professor Gaetano de Sanctis (in L'Attide di Androzione e un papiro di Oxyrhynchos, Turin, 1908) attributes to Androtion, the atthidographer, a 4th-century historical frag- ment, discovered by B. P. Grenfell and A. S. Hunt (Oxyrhynckus Papyri, vol. v.). Strong arguments against this view are set forth by E. M. Walker in the Classical Review, Mayi9o8i

II

ANDUJAR— ANEMOMETER

ANDUJAR (the anc. Slilurgi), a town of southern Spain, in the province of Jaen; on the right bank of the river Guadal- quivir and the Madrid-Cordova railway. Pop. (1900) 16,302. Andujar is widely known for its porous earthenware jars, called alcarrazas, which keep water cool in the hottest weather, and are manufactured from a whitish clay found in the neighbourhood.

ANECDOTE (from av-, privative, and e/cSiSw/ii, to give out or publish), a word originally meaning something not published. It has now two distinct significations. The primary one is something not published, in which sense it has been used to denote either secret histories — Procopius, e.g., gives this as one of the titles of his secret history of Justinian's court — or portions of ancient writers which have remained long in manuscript and are edited for the first time. Of such anecdola there are many collections; the earliest was probably L. A. Muratori's, in 1709. In the more general and popular acceptation of the word, however, anecdotes are short accounts of detached interesting particulars. Of such anecdotes the collections are almost infinite; the best in many respects is that compiled by T. Byerley (d. 1826) and J. Clinton Robertson (d. 1852), known as the Percy Anecdotes

(1820-1823).

ANEL, DOMINIQUE (1 679-1 730), French surgeon, was born at Toulouse about 1679. After studying at Montpellier and Paris, he served as surgeon-major in the French army in Alsace; then after two years at Vienna he went to Italy and served in the Austrian army. In 17 10 he was teaching surgery in Rouen, whence he went to Genoa, and in 17 16 he was practising in Paris. He died about 1730. He was celebrated for his successful surgical treatment of fistula lacrymalis, and while at Genoa invented for use in connexion with the operation the fine-pointed syringe still known by his name.

ANEMOMETER (from Gr. dvefios, wind, and n'trpov, a measure), an instrument for measuring either the velocity or the pressure of the wind. Anemometers may be divided into two classes, (1) those- that measure the velocity, (2) those that measure the pressure of the wind, but inasmuch as there is a close connexion between the pressure and the velocity, a suitable anemometer of either class will give information about both these quantities.

Velocity anemometers may again be subdivided into two classes, (1) those which do not require a wind vane or weather- cock, (2) those which do. The Robinson anemometer, invented (1846) by Dr Thomas Romney Robinson, of Armagh Observatory, is the best-known and most generally used instrument, and belongs to the first of these. It consists of four hemispherical cups, mounted one on each end of a pair of horizontal arms, which lie at right angles to each other and form a cross. A vertical axis round which the cups turn passes through the centre of the cross; a train of wheel-work counts up the number of turns which this axis makes, and from the number of turns made in

any given time the velocity of the wind during that time is calculated. The cups are placed symmetrically on the end of the arms, and it is easy to see that the wind always has the hollow of one cup presented to it ; the back of the cup on the opposite end of the cross also faces the wind, but the pressure on it is naturally less, and hence a continual rotation is produced; each cup in turn as it comes round providing the necessary force. The two great merits of this anemometer are its simplicity and the absence of a w ind vane ; on the other hand it is not well adapted to leaving a record on paper of the actual velocity at any definite instant, and hence it leaves a short but violent gust unrecorded. Unfortunately, when Dr Robinson first designed his anemometer, he stated that no matter what the size'of the cups or the length of the arms, the cups always moved with one-third of the velocity of the wind. This result was apparently confirmed by some independent experi- ments, but it is very far from the truth, for it is now known that the actual ratio, or factor as it is commonly called, of the velocity of the wind to that of the cups depends very largely on the dimensions of the cups and arms, and may have almost any value between two and a little over three. The result has been that wind velocities published in many official publications have often been in error by nearly 50 %.

The other forms of velocity anemometer may be described as belonging to the windmill type. In the Robinson anemometer the axis of rotation is vertical, but with this subdivision the axis of rotation must be parallel to the direction of the wind and therefore horizontal. Furthermore, since the wind varies in direction and the axis has to follow its changes, a wind vane or some other contrivance to fulfil the saft.e purpose must be em- ployed. This type of instrument is very little used in England, but seems to be more in favour in France. In cases where the direction of the air motion is always the same, as in the ventilating shafts of mines and buildings for instance, these anemometers, known, however, as air meters, are employed, and give most satisfactory results.

Anemometers which measure the pressure may be divided into the plate and tube classes, but the former term must be taken as including a good many miscellaneous forms. The simplest type of this form consists of a flat plate, which is usually square or circular, while a wind vane keeps this exposed normally to the wind, and the pressure of the wind on its face is balanced by a spring. The distortion of the spring determines the actual force which the wind is exerting on the plate, and this is either read off on a suitable gauge, or leaves a record in the ordinary way by means of a pen writing on a sheet of paper moved by clockwork. Instruments of this kind have been in use for a

long series of years, and have recorded pressures up to and even exceeding 60 lb per sq. ft., but it is now fairly certain that these high values are erroneous, and due, not to the wind, but to faulty design of the anemometer.

The fact is that the wind is continually varying in force, and while the ordinary pressure plate is admirably adapted for measuring the force of a steady and uniform wind, it is entirely unsuitable for following the rapid fluctuations of the natural wind. To make matters worse, the pen which records the motion of the plate is often connected with it by an extensive system of chains and levere. A violent gust strikes the plate, which is driven back and carried by its own momentum far past the position in which a steady wind of the same force would place it; by the time the motion has reached the pen it has been greatly exaggerated by the springiness of the connexion, and not only is the plate itself driven too far back, but also its position is wrongly recorded by the pen; the combined errors act the same way, and more than double the real maximum pressure may be indicated on the chart.

A modification of the ordinary pressure-plate has recently been designed. In this arrangement a catch is provided so that the plate being once driven back by the wind cannot return until released by hand; but the catch does not prevent the plate being driven back farther by a gust stronger than the last one that moved it. Examples of these plates are erected on the west coast of England, where in the winter fierce gales often occur; a pres- sure of 30 lb per sq. ft. has not been shown by them, and instances exceeding 20 lb are extremely rare.

Many other modifications have been used and suggested. Probably a sphere would prove most useful for a pressure anemometer, since owing to its symmetrical shape it would not require a weathercock. A small light sphere hanging from the end of 30 or 40 ft. of fine sewing cotton has been employed to measure the wind velocity passing over a kite, the tension of the cotton being recorded, and this plan has given satisfactory results.

Lind's anemometer, which consists simply of a (J tube contain- ing liquid with one end bent into a horizontal direction to face the wind, is perhaps the original form from which the tube class of instrument has sprung. If the wind blows into the mouth of a tube it causes an increase of pressure inside and also of course an equal increase in all closed vessels with which the mouth is in air- tight communication. If it blows horizontally over the open end of a vertical tube it causes a

decrease of pressure, but this fact is not of any practical use in anemometry, because the magnitude of the decrease depends on the wind striking the tube exactly at right angles to its axis, the most trifling departure from the true direction causing great variations in the magnitude. The pressure tube anemometer (fig. 1) utilizes the increased pressure in the open mouth of a straight tube facing the wind, and the decrease

of pressure caused inside when the wind blows over a ring of small holes drilled through the metal of a vertical tube which is closed at the upper end. The pressure differences on which the action depends are very small, and special means are required to register them, but in the ordinary form of recording anemometer (fig. 2), any wind capable of turning the vane which keeps the mouth of the tube facing the wind is capable of registration.

The great advantage of the tube anemometer lies in the fact that the exposed part can be mounted on a high pole, and requires no oiling or attention for years; and the registering part can be placed in any convenient position, no matter how far from the external part. Two connecting tubes are required. It might appear at first sight as though one connexion would serve, but the differences in pressure on which these instruments depend are so minute, that the pressure of the air in the room where the record- ing part is placed has to be considered. Thus if the instrument depends on the pressure or suction effect alone, and this pressure or suction is measured against the air pressure in an ordinary room, in which the doors and windows are carefully closed and a newspaper is then burnt up the chimney, an effect may be pro- duced equal to a wind of 10 m. an hour; and the opening of a

Fig. 1.

Fig. 2.

window in rough weather, or the opening of a door, may entirely alter the registration.

The connexion between the velocity and the pressure of the wind is one that is not yet known with absolute certainty. Many text-books on engineering give the relation P= -005 v 2 when P is the pressure in lb per sq. ft. and v the velocity in miles per hour. The history of this untrue relation is curious. It was given about the end of the 18th

century as based on some experiments, but with a footnote stating that little reliance could be placed on it. The statement without the qualifying note was copied from book to book, and at last received general acceptance. There is no doubt that under average conditions of atmospheric density, the .005 should be replaced by -003, for many independent authorities using different methods have found values very close to this last figure. It is probable that the wind pressure is not strictly proportional to the extent of the surface exposed. Pressure plates are generally of moderate size, from a half or quarter of a sq. ft. up to two or three sq. ft., are round or square, and for these sizes, and shapes, and of course for a flat surface, the relation P= .003 1> 2 is fairly correct.

In the tube anemometer also it is really the pressure that is measured, although the scale is usually graduated as a velocity scale. In cases where the density of the air is not of average value, as on a high mountain, or with an exceptionally low barometer for example, an allowance must be made. Approximately i\% should be added to the velocity recorded by a tube anemometer for each 1000 ft. that it stands above sea-level. (W. H. Di.)

ANEMONE, or Wind-Flower (from the Gr. foe/ios, wind), a genus of the buttercup order (Ranunculaceae), containing about ninety species in the north and south temperate zones. Anemone ncmorosa, wood anemone, and A. Pulsatilla, Pasque-flower, occur in Britain; the latter is found on chalk downsand limestone pastures in some of the more southern and eastern counties. The plants are perennial herbs with an underground rootstock, and radical, more or less deeply cut, leaves. The elongated flower stem bears one or several, white, red, blue or rarely yellow, flowers; there is an involucre of three leaflets below each flower. The fruits often bear long hairy styles which aid their distribution by the wind. Many of the species are favourite garden plants; among the best known is Anemone coronaria, often called the poppy anemone, a tuberous-rooted plant, with parsley-like divided leaves, and large showy poppy-like blossoms on stalks of from 6 to 9 in. high; the flowers are of various colours, but the principal are scarlet, crimson, blue, purple and white. There are also double-flowered varieties, in which the stamens in the centre are replaced by a tuft of narrow petals. It is an old garden favourite, and of the double forms there are named varieties. They grow best in a loamy soil, enriched with well-rotted manure, which should be dug in below the tubers. These may be planted in October, and for succession in January, the autumn-planted ones being protected by a covering of leaves or short stable litter. They will flower in May and June, and when the leaves have ripened should be taken up into a dry room till

planting time. They are easily raised from the seed, and a bed of the single varieties is a valuable addition to a flower-garden, as it affords, in a warm situation, an abundance of handsome and often brilliant spring flowers, almost as early as the snowdrop or crocus. The genus contains many other lively spring-blooming plants, of which A. hortensis and A. fulgens have less divided leaves and splendid rosy-purple or scarlet flowers; they require similar treatment. Another set is represented by A. Pulsatilla, the Pasque-flower, whose violet blossoms have the outer surface hairy; these prefer a calcareous soil. The splendid A. japonica, and its white variety called Honorine Joubert, the latter especially, are amongst the finest of autumn-blooming hardy perennials; they grow well in light soil, and reach 2§ to 3 ft. in height, blooming continually for several weeks. A group of dwarf species, represented by the native British A. nemorosa and A. apennina, are amongst the most beautiful of spring flowers for planting in woods and shady places.

The genus Hepatica is now generally included in anemone as a subgenus. The plants are known in gardens as hepaticas, and are varieties of the common South European A. Hepatica; they are charming spring-flowering plants with usually blue flowers.

ANENCLETUS, or Anacletus, second bishop of Rome. Abcut the 4th century he is treated in the catalogues as two persons — Anacletus and Cletus. According to the catalogues he occupied the papal chair for twelve years (c. 77-88).

ANERIO, the name of two brothers, musical composers, very great Roman masters of 16th-century polyphony. Felice, the elder, was born about 1560, studied under G. M. Nanino and succeeded Palestrina in 1594 as composer to the papal chapel. Several masses and motets of his are printed in Proske's Musica Divina and other modern anthologies, and it is hardly too much to say that they are for the most part worthy of Palestrina himself. The date of his death is conjecturally given as 1630. His brother, Giovanni Francesco, was born about 1567, and seems to have died about 1620. The occasional attribution of some of his numerous compositions to his elder brother is a pardonable mistake, if we may judge by the works that have been reprinted. But the statement, which continues to be repeated in standard works of reference, that " he was one of the first of Italians to use the quaver and its subdivisions " is incompre- hensible. Quavers were common pioperty in all musical countries quite early in the 16th century, and' semiquavers appear in a madrigal of Palestrina published in 1574. The two brothers are probably the latest composers who handled 16th-century music as their mother-language; suffering

neither from the temptation

to indulge even in such mild neologisms as they might have learnt from the elder brother's master, Nanino, nor from the necessity of preserving their purity of style by a mortified negative asceticism. They wrote pure polyphony because they understood it and loved it, and hence their work lives, as neither the progressive work of their own day nor the reactionary work of their imitators could live. The 12-part Stabat Mater in the seventh volume of Palestrina's complete works has been by some authorities ascribed to Felice Anerio.

ANET, a town of northern France, in the department of Eure-et-Loir, situated between the rivers Eure and Vegre, 10 m. N.E. of Dreux by rail. Pop. (1906) 1324. It possesses the remains of a magnificent castle, built in the middle of the 16th century by Henry II. for Diana of Poitiers. Near it is the plain of Ivry, where Henry IV. defeated the armies of the League in 1590.

ANEURIN, or Aneirin, the name of an early 7th-century British (Welsh) bard, who has been taken by Thomas Stephens (1821-1875), the editor and translator of Aneurin's principal epic poem Gododin, for a son of Gildas, the historian. Gododin is an account of the British defeat (603) by the Saxons at Cattraeth (identified by Stephens with Dawstane in Liddesdale), where Aneurin is said to have been taken prisoner; but the poem is very obscure and is differently interpreted. It was translated and edited by W. F. Skene in his Four Ancient Books of Wales (1866), and Stephens' version was published by the Cymmrodorion Society in 1888. See Celt: Literature (Welsh).

ANEURYSM, or Aneubism (from Gr. avevpur/xa, a dilata- tion), a cavity or sac which communicates with the interior of an artery and contains blood. The walls of the cavity are formed either of the dilated artery or of the tissues around that vessel. The dilatation of the artery is due to a local weakness, the result of disease or injury. The commonest cause is chronic inflamma- tion of the inner coats of the artery. The breaking of a bottle or glass in the hand is apt to cut through the outermost coat of the artery at the wrist (radial) and thus to cause a local weakening of the tube which is gradually followed by dilatation. Also when an artery is wounded and the wound in the skin and superficial structures heals, the blood may escape into the tissues, displacing them, and by its pressure causing them to condense and form the sac-wall. The coats of an artery, when diseased, may be torn by a severe strain, the blood escaping into the condensed tissues

which thus form the aneurysmal sac.

The division of aneurysms into two classes, true and false, is unsatisfactory. On the face of it, an aneurysm which is false is not an aneurysm, any more than a false bank-note is legal tender. A better classification is into spontaneous and traumatic. The man who has chronic inflammation of a large artery, the result, for instance, of gout, arduous, straining work, or kidney- disease, and whose artery yields under cardiac pressure, has a spontaneous aneurysm; the barman or window-cleaner who has cut his radial artery, the soldier whose brachial or femoral artery has been bruised by a rifle bullet or grazed by a bayonet, and the boy whose naked foot is pierced by a sharp nail, are apt to be the subjects of traumatic aneurysm. In those aneurysms which are a saccular bulging on one side of the artery the blood may be induced to coagulate, or may of itself deposit layer upon layer of pale clot, until the sac is obliterated. This laminar coagulation by constant additions gradually fills the aneurysmal cavity and the pulsation in the sac then ceases; contraction of the sac and its contents gradually takes place and the aneurysm is cured. But in those aneurysms which are fusiform dilatations of the vessel there is but slight chance of such cure, for the blood sweeps evenly through it without staying to deposit clot or laminated fibrine.

In the treatment of aneurysm the aim is generally to lower the blood pressure by absolute rest and moderated diet, but a cure is rarely effected except by operation, which, fortunately, is now resorted to more promptly and securely than was previously the case. Without trying the speculative and dangerous method of treatment by compression, or the application of an indiarubber bandage, the surgeon now without loss of time cuts down upon the

artery, and applies an aseptic ligature close above the dilatation. Experience has shown that this method possesses great advantages, and that it has none of the disadvantages which were formerly supposed to attend it. Saccular dilatations of arteries which are the result of cuts or other injuries are treated by tying the vessel above and below, and by dissecting out the aneurysm. Pop- liteal, carotid and other aneurysms, which are not of traumatic origin, are sometimes dealt with on this plan, which is the old ” Method of Antyllus ” with modern aseptic conditions. Speak- ing generally, if an aneurysm can be dealt with surgically the sooner that the artery is tied the better. Less heroic measures are too apt to prove painful, dangerous, ineffectual and dis- appointing. For aneurysm in the chest or abdomen (which cannot be dealt with by operation) the treatment may be tried of injecting a pure solution of gelatine into the loose

tissues of the armpit, so that the gelatine may find its way into the blood stream and increase the chance of curative coagulation in the distant aneurysmal sac. (E. O.*)

ANFRACTUOSITY (from Lat. anfracluosus, winding), twisting and turning, circuitousness; a word usually employed in the plural to denote winding channels such as occur in the depths of the sea, mountains, or the fissures {sulci) separating the convolutions of the brain, or, by analogy, in the mind.

ANGARIA (from 0770730$, the Greek form of a Babylonian word adopted in Persian for ” mounted courier “), a sort of postal system adopted by the Roman imperial government from the ancient Persians, among whom, according to Xenophon (Cyrop. viii. 6; cf. Herodotus viii. 98) it was established by Cyrus the Great. Couriers on horseback were posted at certain stages along the chief roads of the empire, for the transmission of royal despatches by night and day in all weathers. In the Roman system the supply of horses and their maintenance was a compulsory duty from which the emperor alone could grant exemption. The word, which in the 4th century was used for the heavy transport vehicles of the cursus publicus, and also for the animals by which they were drawn, came to mean generally ” compulsory service.” So angaria, angariare, in medieval Latin, and the rare English derivatives ” angariate,” ” angaria- tion/’ came to mean any service which was forcibly or unjustly demanded, and oppression in general.

ANGARY (Lat. jus angariae; Fr. droit d’angarie; Ger. Angarie; from the Gr. ayyapela, the office of an ayyapos, courier or messenger), the name given to the right of a belligerent to seize and apply for the purposes of war (or to prevent the enemy from doing so) any kind of property on, belligerent territory, including that which may belong to subjects or citizens of a neutral state. Art. 53 of the Regulations respecting the Laws and Customs of War on Land, annexed to the Hague Convention of 1899 on the same subject, provides that railway plant, land telegraphs, telephones, steamers and other ships (other than such as are governed by maritime law), though belonging to companies or private persons, may be used for military opera- tions, but ” must be restored at the conclusion of peace and indemnities paid for them.” And Art. 54 adds that ” the plant of railways coming from neutral states, whether the property of those states or of companies or private persons, shall be sent back to them as soon as possible.” These articles seem to sanction the right of angary against neutral property, while limiting it as against both belligerent and neutral property. It may be considered, however, that the right to use implies as wide a

range of contingencies as the ” necessity of war ” can be made to cover. (T. Ba.)

ANGEL, a general term denoting a subordinate superhuman being in monotheistic religions, e.g. Islam, Judaism, Christianity, and in allied religions, such as Zoroastrianism. In polytheism the grades of superhuman beings are continuous; but in mono- theism there is a sharp distinction of kind, as well as degree, between God on the one hand, and all other superhuman beings on the other; the latter are the ” angels.”

1 ” Angel ” is a transcription of the Gr. 0,776X05, messenger. O.yye \os in the New Testament, and the corresponding mal’akh in the Old Testament, sometimes mean ” messenger,” and

sometimes ” angel,” and this double sense is duly represented in the English Versions. ” Angel ” is also used in the English Version for “v?* ‘Abbir, Ps. lxxviii. 25. (lit. “mighty”), for d’.jjk ‘Elohim, Ps. viii. 5, and for the obscure Jkb* shin’ an, in Ps. lxviii. 17.

In the later development of the religion of Israel, ‘Elohim is almost entirely reserved for the one true God; but in earlier times ‘Elohim (gods), bne ‘Elohim, bne Elim (sons of gods, i.e. members of the class of divine beings) were general terms for superhuman beings. Hence they came to be used collectively of superhuman beings, distinct from Yahweh, and therefore inferior, and ultimately subordinate. 1 So, too, the angels are styled “holy ones,” 2 and “watchers,” 3 and are spoken, of as the ” host of heaven” 4 or of ” Yahweh.” 6 The ” hosts,” n’wyt Sebdoth in the title Yahweh Sebaoth, Lord of Hosts, were probably at one time identified with the angels. 6 The New Testament often speaks of “spirits,” irvevfiara. 7 In the earlier periods of the religion of Israel, the doctrine of monotheism had not been formally stated, so that the idea of ” angel ” in the modern sense does not occur, but we find the Mal’akh Yahweh, Angel of the Lord, or Mal’akh Elohim, Angel of God. The Mal’akh Yahweh is an appearance or manifestation of Yahweh in the form of a man, and the term Mal’akh Yahweh is used interchangeably with Yahweh (cf. Exod. iii. 2, with iii. 4; xiii. 21 with xiv. 19). Those who see the Mai’ akh Yahweh say they have seen God. 8 The Mal’akh Yahweh (or Elohim) appears to Abraham, Hagar, Moses, Gideon, &c, and leads the Israelites in the Pillar of Cloud. 9 The phrase Mal’akh Yahweh may have been originally a courtly circumlocution for the Divine King; but it readily became a means of avoiding crude anthropomorphism, and later on, when the angels

were classified, the Mal'akh Yahweh came to mean an angel of distinguished rank. 10 The identificaton of the Mal'akh Yahweh with the Logos, or Second Person of the Trinity, is not indicated by the references in the Old Testament; but the idea of a Being partly identified with God, and yet in some sense distinct from Him, illustrates the tendency of religious thought to distinguish persons within the unity of the Godhead, and foreshadows the doctrine of the Trinity, at any rate in some slight degree.

In the earlier literature the Mal'akh Yahweh or Elohim is almost the only mal'akh (" angel ") mentioned. There are, however, a few passages which speak of subordinate superhuman beings other than the Mal'akh Yahweh or Elohim. There are the cherubim who guard Eden. In Gen. xviii., xix. (J) the appearance of Yahweh to Abraham and Lot is connected with three, afterwards two, men or messengers; but possibly in the original form of the story Yahweh appeared alone. 11 At Bethel, Jacob sees the angels of God on the ladder, 12 and later on they appear to him at Mahanaim. 13 In all these cases the angels, like the Mal'akh Yahweh, are connected with or represent a theophany. Similarly the " man " who wrestles with Jacob at Peniel is identified with God. 14 In Isaiah vi. the seraphim, superhuman beings with six wings, appear as the attendants of Yahweh. Thus the pre-exilic literature, as we now have it, has little to say about angels or about superhuman beings other than Yahweh and manifestations of Yahweh; the pre-exilic prophets hardly mention angels. 15 Nevertheless we may well suppose that the popular religion of ancient Israel had much to say of super- human beings other than Yahweh, but that the inspired writers have mostly suppressed references to them as unedifying. Moreover such beings were not strictly angels.

I E.g. Gen. vi. 2; Job i. 6; Ps. viii. 5, xxix. 1. 2 Zech. xiv. 5. 3 Dan. iv. 13. 4 Deut. xvii. 3 (?). 5 Josh. v. 14 (?).

6 The identification of the " hosts " with the stars comes to the same thing; the stars were thought of as closely connected with angels. It is probable that the " hosts " were also identified with the armies of Israel.

7 Rev. i. 4. 8 Gen. xxxii. 30; Judges xiii. 22. 9 Exod. iii. 2, xiv. 19. M Zech. i. 11 f.

II Cf. xviii. 1 with xviii. 2, and note change of number in xix. 17. 12 Gen. xxviii. 12, E. 13 Gen. xxxii. 1, E. u Gen. xxxii. 24, 30, J. 15 " An angel " of I Kings xiii. 18 might be the Mal'akh Yahweh,

as in xix. 5, cf. 7, or the passage, at any rate in its present form, may be exilic or post-exilic.

The doctrine of monotheism was formally expressed in the period immediately before and during the Exile, in Deuteronomy 16 and Isaiah 17 ; and at the same time we find angels prominent in Ezekiel who, as a prophet of the Exile, may have been influenced by the hierarchy of supernatural beings in the Babylonian religion, and perhaps even by the angelology of Zoroastrianism. 18 Ezekiel gives elaborate discriptions of cherubim 19 ; and in one of his visions he sees seven angels execute the judgment of God upon Jerusalem. 20 As in Genesis they are styled ” men,” mal’akh for ” angel ” does not occur in Ezekiel. Somewhat later, in the visions of Zechariah, angels play a great part; they are some- times spoken of as ” men,” sometimes as mal’akh, and the Mal’akh Yahweh seems to hold a certain primacy among them. 21 Satan also appears to prosecute (so to speak) the High Priest before the divine tribunal. 22 Similarly in Job the bne Elohim, sons of God, appear as attendants of God, and amongst them Satan, still in his r61e of public prosecutor, the defendant being Job. 23 Occasional references to ” angels ” occur in the Psalter 24 ; they appear as ministers of God.

In Ps. lxxviii. 49 the ” evil angels ” of A. V. conveys a false impression; it should be “angels of evil,” as R.V., i.e. angels who inflict chastisement as ministers of God.

The seven angels of Ezekiel may be compared with the seven eyes of Yahweh in Zech. iii. 9, iv. 10. The latter have- been connected by Ewald and others with the later doctrine of seven chief angels 25 , parallel to and influenced by the Ameshaspentas (Amesha Spenta), or seven great spirits of the Persian mythology, but the connexion is doubtful.

In the Priestly Code, c. 400 B.C., there is no reference to angels apart from the possible suggestion in the ambiguous plural in Genesis i. 26.

During the Persian and Greek periods the doctrine of angels underwent a great development, partly, at any rate, under foreign influences. In Daniel, c. 160 B.C., angels, usually spoken of as ” men ” or ” princes,” appear as guardians or champions of the nations; grades are implied, there are ” princes ” and ” chief ” or ” great princes “; and the names of some angels are known, Gabriel, Michael; the latter is pre-eminent 26 , he is the guardian of Judah. Again in Tobit a leading part is played by Raphael, ” one of the seven holy angels.” 27

In Tobit, too, we find the idea of the demon or evil angel. In the canonical Old Testament angels may inflict suffering as ministers of God, and Satan may act as accuser or tempter; but they appear as subordinate to God, fulfilling His will; and not as morally evil. The statement 28 that God ” chargeth His angels with folly ” applies to all angels. In Daniel the princes or guardian angels of the heathen nations oppose Michael the guardian angel of Judah. But in Tobit we find Asmodaeus the evil demon, to irovrjpdv dai/ioviov, who strangles Sarah’s husbands, and also a general reference to ” a devil or evil spirit,” irPevfia.’ 19 The Fall of the Angels is not properly a scriptural doctrine, though it is based on Gen. vi. 2, as inter- preted by the Book of Enoch. It is true that the bne Elohim of that chapter are subordinate superhuman beings (cf. above), but they belong to a different order of thought from the angels of Judaism and of Christian doctrine; and the passage in no way suggests that the bne Elohim suffered any loss of status through their act.

The guardian angels of the nations in Daniel probably represehx the gods of the heathen, and we have there the first step of the process by which these gods became evil angels, an idea expanded by Milton in Paradise Lost. The development of i.he doctrine of an organized hierarchy of angels belongs to the Jewish litera- ture of the period 200 B.C. to a.d. 100. In Jewish apocalypses especially, the imagination ran riot on the rank, classes and names of angels; and such works as the various books of Enoch and

16 Deut. vi. 4. 5. 17 Isaiah xliii. 10 &c.

18 It is not however certain that these doctrines of Zoroastrianism were developed at so early a date.

19 Ezek. i. x. 20 Ezek. ix. 21 Zech. i. 11 f. 22 Zech. iii. 1. 23 Job i., ii. Cf. 1 Chron. xxi. I. 24 Pss. xci. 11, ciii. 20 &c.

25 Tobit xii. 15; Rev. viii. 2. 26 Dan. viii. 16, x. 13, 20,21.

27 Tob. xii. 15. 2S Job iv. 18. m Tobit iii. 8, 17, vi. 7.

the Ascension of Isaiah supply much information on this subject.

In the New Testament angels appear frequently as the ministers of God and the agents of revelation 1 ; and Our Lord speaks of angels as fulfilling such functions 2 , implying in one saying that they neither marry nor are given in marriage. 3 Naturally angels are most

prominent in the Apocalypse. The New Testa- ment takes little interest in the idea of the angelic hierarchy, but there are traces of the doctrine. The distinction of good and bad angels is recognized; we have names, Gabriel 4 , and the evil angels Abaddon or Apollyon 6 , Beelzebub 6 , and Satan 7 ; ranks are implied, archangels 8 , principalities and powers 9 , thrones and dominions 10 . Angels occur in groups of four or seven 11 . In Rev. i.iii. we meet with the “Angels ” of the Seven Churches of Asia Minor. These are probably guardian angels, standing to the churches in the same relation that the ” princes ” in Daniel stand to the nations; practically the ” angels ” are personifications of the churches. A less likely view is that the ” angels ” are the human representatives of the churches, the bishops or chief presbyters. There seems, however, no parallel to such a use of ” angel,” and it is doubtful whether the mon archical government of churches was fully developed when the Apocalypse was written.

Later Jewish and Christian speculation followed on the lines of the angelology of the earlier apocalypses; and angels play an important part in Gnostic systems and in the Jewish Mid- rashim and the Kabbala. Religious thought about the angels during the middle ages was much influenced by the theory of the angelic hierarchy set forth in the De Hierarchia Celesti, written in the 5th century in the name of Dionysius the Areopagite and passing for his. The creeds and confessions do not formulate any authoritative doctrine of angels; and modern rationalism has tended to deny the existence of such beings, or to regard the subject as one on which we can have no certain knowledge. The principle of continuity, however, seems to require the existence of beings intermediate between man and God.

The Old Testament says nothing about the origin of angels; but the Book of Jubilees and the Slavonic Enoch describe their creation; and, according to Col. i. 16, the angels were created in, unto and through Christ.

Nor does the Bible give any formal account of the nature of angels. It is doubtful how far Ezekiel’s account of the cherubim and Isaiah’s account of the seraphim are to be taken as descriptions of actual beings; they are probably figurative, or else subjective visions. Angels are constantly spoken of as ” men,” and, including even the Angel of Yahweh, are spoken of as discharging the various functions of human life; they eat and drink 12 , walk 13 and speak 14 . Putting aside the cherubim and seraphim, they are not spoken of as having wings. On the other hand they appear and vanish 15 , exercise miraculous powers 16 , and fly 17 . Seeing that the anthropomorphic language used of the angels is similar to that used of God, the Scriptures would

hardly seem to require a literal interpretation in either case. A special association is found, both in the Bible and elsewhere, between the angels and the heavenly bodies 18 , and the elements or elemental forces, fire, water, &c 19 . The angels are infinitely numerous 20 .

The function of the angels is that of the supernatural servants of God, His agents and representatives; the Angel of Yahweh, as we have seen, is a manifestation of God. In old times, the bne Elohim and the seraphim are His court, and the angels are alike the court and the army of God; the cherubim are his throne-bearers. In his dealings with men, the angels, as their

1 E.g. Matt. i. 20 (to Joseph), iv. n (to Jesus), Luke i. 26 (to Mary), Acts xii. 7 (to Peter).

2 E.g. Mark viii. 38, xiii. 27. 3 Mark xii. 25. 4 Luke i. 19. 5 Rev. ix. 11. 6 Mark iii. 22. 7 Mark i. 13.

8 Michael, Jude 9. 9 Rom. viii. 38; Co!, ii. 10.

10 Col. i. 16. » Rev. vii. I. 12 Gen. xviii. 8.

13 Gen. xix. 16. 14 Zech. iv. I. u Judgss vi. 12, 21.

16 Rev. vii. I. viii. 17 Rev. viii. 13, xiv. 6.

18 Job xxxviii. 7; Asc. of Isaiah, iv. 18; Slav. Enoch, iv. 1.

19 Rev. xiv. 18, xvi. 5; possibly Gal. iv. 3; Col. ii. 8, 20.

20 Ps. lxviii. 17; Dan. vii. 10.

name implies, are specially His messengers, declaring His will and executing His commissions. Through them he controls nature and man. They are the guardian angels of the nations; and we also find the idea that individuals have guardian angels 21 . Later Jewish tradition held that the Law was given by angels 22 . According to the Gnostic Basilides, the world was created by angels. Mahommedanism has taken over and further elaborated the Jewish and Christian ideas as to angels.

While the scriptural statements imply a belief in the existence of spiritual beings intermediate between God and men, it is probable that many of the details may be regarded merely as symbolic imagery. In Scripture the function of the angel overshadows his personality; the stress is on their ministry; they appear in order to perform specific

acts.

Bim.iOGRAPHY. — See the sections on ” Angels ” in the handbooks of O. T. Theology by Ewald, Schultz, Smend, Kayser-Marti, &c. ; and of N. T. Theology by Weiss, and in van Oosterzee’s Dogmatics. Also commentaries on special passages, especially Driver and Bevan on Daniel, and G. A. Smith, Minor Prophets, ii. 310 ff. ; and articles s.v. ” Angel ” in Hastings’ Bible Dictionary, and the Encyclopaedia Biblica. (W. H. Be.)

ANGEL, a gold coin, first used in France (angelot, ange) in 1340, and introduced into England by Edward IV. in 1465 as a new issue of the “noble,” and so at first called the ” angel-noble.” It varied in value between that period and the time of Charles I. (when it was last coined) from 6s. 8d. to 10s. The name was derived from the representation it bore of St Michael and the dragon. The angel was the coin given to those who came to be touched for the disease known as king’s evil; after it was no longer coined, medals, called touch-pieces, with the same device, were given instead.

ANGELICA, a genus of plants of the natural order Umbelliferae, represented in Britain by one species, A . sylvestris, a tall perennial herb with large bipinnate leaves and large compound umbels of white or purple flowers. The name Angelica is popularly given to a plant of an allied genus, Archangelica officinalis, the tender shoots of which are used in making certain kinds of aromatic sweetmeats. Angelica balsam is obtained by extracting the roots with alcohol, evaporating and extracting the residue with ether. It is of a dark brown colour and contains angelica oil, angelica wax and angelicin, Ci 8 H 30 O. The essential oil of the roots of Angelica archangelica contains /3-terebangelene, CioHic, and other terpenes; the oil of the seeds also contains /J-terebangelene, together with methylethylacetic acid and hydroxymyristic acid.

The angelica tree is a member of the order Avaliaceae, a species of Aralia {A. spinosa), a native of North America; it grows 8 to 12 ft. high, has a simple prickle-bearing stem forming an umbrella-like head, and much divided leaves.

ANGELICO, FRA (1387-1455), Italian painter. II Beato Fra Giovanni Angelico da Fiesole is the name given to a far-famed painter-friar of the Florentine state in the 15th century, the representative, beyond all other men, of pietistic painting. He is often, but not accurately, termed simply ” Fiesole,” which is merely the name of the town where he first took the vows; more often Fra Angelico. If we turn his compound

designation into English, it runs thus — ” the Beatified Friar John the Angelic of Fiesole.” In his lifetime he was known no doubt simply as Fra Giovanni or Friar John; “The Angelic” is a laudatory term which was assigned to him at an early date, — we find it in use within thirty years after his death; and, at some period which is not defined in our authorities, he was beatified by due ecclesiastical process. His baptismal name was Guido, Giovanni being only his name in religion. He was born at Vicchio, in the Tuscan province of Mugello, of unknown but seemingly well-to-do parentage, in 1387 (not 1390 as sometimes stated); in 1407 he became a novice in the convent of S. Domenico at Fiesole, and in 1408 he took the vows and entered the Dominican order. Whether he had previously been a painter by profession is not certain, but may be pronounced probable. The painter named Lorenzo Monaco may have contributed to his art-training, and the influence of the Sienese school is discernible in his work.

21 Matt, xviii. 10; Acts xii. 15. 22 Gal. iii. 19; Heb. ii. 2; LXX. of Deut. xxxiii. 2.

ANGELICO

According to Vasari, the first paintings of this artist were in the Certosa of Florence; none such exist there now. His earliest extant performances, in considerable number, are at Cortona, whither he was sent during his novitiate, and here apparently he spent all the opening years of his monastic life. His first works executed in fresco were probably those, now destroyed, which he painted in the convent of S. Domenico in this city; as a fresco- painter, he may have worked under, or as a follower of, Gherardo Stamina. From 1418 to 1436 he was back at Fiesole; in 1436 he was transferred to the Dominican convent of S. Marco in Florence, and in 1438 undertook to paint the altarpiece for the choir, followed by many other works; he may have studied about this time the renowned frescoes in the Brancacci chapel in the Florentine church of the Carmine and also the paintings of Orcagna. In or about 1445 he was invited by the pope to Rome. The pope who reigned from 143 1 to 1447 was Eugenius IV., and he it was who in 1445 appointed another Dominican friar, a colleague of Angelico, to be archbishop of Florence. If the story (first told by Vasari) is true — that this appointment was made at the suggestion of Angelico only after the archbishopric had been offered to himself, and by him declined on the ground of his inaptitude for so elevated and responsible a station — Eugenius, and not (as stated by Vasari) his successor Nicholas V., must have been the pope who sent the invitation and made the offer to Fra Giovanni, for Nicholas only

succeeded in 1447. The whole statement lacks authentication, though in itself credible enough. Certain it is that Angelico was staying in Rome in the first half of 1447; and he painted in the Vatican the Cappella del Sacra- mento, which was afterwards demolished by Paul III. In June 1447 he proceeded to Orvieto, to paint in the Cappella Nuova of the cathedral, with the co-operation of his pupil Benozzo Gozzoli. He afterwards returned to Rome to paint the chapel of Nicholas V. In this capital he died in 1455, and he lies buried in the church of the Minerva.

According to all the accounts which have reached us, few men on whom the distinction of beatification has been conferred could have deserved it more nobly than Fra Giovanni. He led a holy and self-denying life, shunning all advancement, and was a brother to the poor; no man ever saw him angered. He painted with unceasing diligence, treating none but sacred subjects; he never retouched or altered his work, probably with a religious feeling that such as divine providence allowed the thing to come, such it should remain He was wont to say that he who illustrates the acts of Christ should be with Christ. It is averred that he never handled a brush without fervent prayer and he wept when he painted a Crucifixion. The Last Judgment and the Annunciation were two of the subjects he most frequently treated.

Bearing in mind the details already given as to the dates of Fra Giovanni's sojournings in various localities, the reader will be able to trace approximately the sequence of the works which we now proceed to name as among his most important productions. In Florence, in the convent of S. Marco (now converted into a national museum), a series of frescoes, beginning towards 1443; in the first cloister is the Crucifixion with St Dominic kneeling; and the same treatment recurs on a wall near the dormitory; in the chapterhouse is a third Crucifixion, with the Virgin swooning, a composition of twenty life-sized figures — the red background, which has a strange and harsh effect, is the misdoing of some restorer; an " Annunciation," the figures of about three-fourths of life-size, in a dormitory; in the adjoining passage, the " Virgin enthroned," with four saints; on the wall of a cell, the " Corona- tion of the Virgin," with Saints Paul, Thomas Aquinas, Benedict, Dominic, Francis and Peter Martyr; two Dominicans welcom- ing Jesus, habited as a pilgrim; an " Adoration of the Magi "; the" Marysat the Sepulchre." All these works are later than the altarpiece which Angelico painted (as before mentioned) for the choir connected with this convent, and which is now in the academy of Florence; it represents the Virgin with Saints Cosmas and Damian (the patrons of the Medici family), Dominic, Peter, Francis, Mark,

John Evangelist and Stephen; the pediment illustrated the lives of Cosmas and Damian, but it has long been

severed from the main subject. In the Uffizi gallery, an altarpiece, the Virgin (life-sized) enthroned, with the Infant and twelve angels. In S. Domenico, Fiesole, a few frescoes, less fine than those in S. Marco; also an altarpiece in tempera of the Virgin and Child between Saints Peter, Thomas Aquinas, Dominic and Peter Martyr, now much destroyed. The subject which originally formed the predella of this picture has, since i860, been in the National Gallery, London, and worthily represents there the hand of the saintly painter. The subject is a Glory, Christ with the banner of the Resurrection, and a multitude of saints, including, at the extremities, the saints or beati of the Dominican order; here are no fewer than 266 figures or portions of figures, many of them having names inscribed. This predella was highly lauded by Vasari; still more highly another picture which used to form an altarpiece in Fiesole, and which now obtains world-wide celebrity in the Louvre — the ” Coronation of the Virgin,” with eight predella subjects of the miracles of St. Dominic. For the church of Santa Trinita, Florence, Angelico executed a ” Depo- sition from the Cross,” and for the church of the Angeli, a ” Last Judgment,” both now in the Florentine academy; for S. Maria Novella, a ” Coronation of the Virgin,” with a predella in three sections, now in the Uffizi, — this again is one of his masterpieces. In Orvieto cathedral he painted three triangular divisions of the ceiling, portraying respectively Christ in a glory of angels, sixteen saints and prophets, and the virgin and apostles: all these are now much repainted and damaged. In Rome, in the Chapel of Nicholas V., the acts of Saints Stephen and Lawrence; also various figures of saints, and on the ceiling the four evangelists. These works of the painter’s advanced age, which have suffered somewhat from restorations, show vigour superior to that of his youth, along with a more adequate treatment of the architectural perspectives. Naturally, there are a number of works currently attributed to Angelico, but not really his; for instance, a ” St Thomas with the Madonna’s girdle,” in the Lateran museum, and a ” Virgin enthroned,” in the church of S. Girolamo, Fiesole. It has often been said that he commenced and frequently practised as an illuminator; this is dubious and a presumption arises that illuminations executed by Giovanni’s brother, Benedetto, also a Dominican, who died in 1448, have been ascribed to the more famous artist. Benedetto may perhaps have assisted Giovanni in the frescoes at S. Marco, but nothing of the kind is distinctly traceable. A folio series of engravings from these paintings was published in Florence, in 1852. Along with Gozzoli already mentioned, Zanobi Strozzi and Gentile da Fabriano

are named as pupils of the Beato.

We have spoken of Angelico ‘s art as ” pietistic “; this is in fact its predominant character. His visages have an air of rapt suavity, devotional fervency and beaming esoteric consciousness, which is intensely attractive to some minds and realizes beyond rivalry a particular ideal — that of ecclesiastical saintliness and detachment from secular fret and turmoil. It should not be denied that he did not always escape the pitfalls of such a method of treatment, the faces becoming sleek and prim, with a smirk of sexless religiosity which hardly eludes the artificial or even the hypocritical; on other minds, therefore, and these some of the most masculine and resolute, he produces little genuine impres- sion. After allowing for this, Angelico should nevertheless be accepted beyond cavil as an exalted typical painter according to his own range of conceptions, consonant with his monastic calling, unsullied purity of life and exceeding devoutness. Exquisite as he is in his special mode of execution, he undoubtedly falls far short, not only of his great naturalist contemporaries such as Masaccio and Lippo Lippi, but even of so distant a precursor as Giotto, in all that pertains to bold or life-like invention of a subject or the realization of ordinary appearances, expressions and actions — the facts of nature, as distinguished from the aspirations or contemplations of the spirit. Technically speaking, he had much finish and harmony of composition and colour, without corresponding mastery of light and shade, and his knowledge of the human frame was restricted. The brilliancy and fair light scale of his tints is constantly remarkable, combined with a free use of gilding; this conduces materially to that celestial character

which so pre-eminently distinguishes his pictured visions of the divine persons, the hierarchy of heaven and the glory of the redeemed.

Books regarding Fra Angelico are numerous. We may mention those by S. Beissel, 1895; V. M. Crawford, 1900; R. L. Douglas, 1900; I. B. Supino, 1901 ; D. Tumiati, 1897; G. Williamson, 1901.

(VV. M. R.)

ANGELL, GEORGE THORNDIKE (1823-1909), American philanthropist, was born at Southbridge, Massachusetts, on the 5th of June 1823. He graduated at Dartmouth in 1846, studied law at the Harvard Law School, and in 1851 was admitted to the bar in Boston,

where he practised for many years. In 1868 he founded and became president of the Massachusetts Society for the Prevention of Cruelty to Animals, in the same year establishing and becoming editor of Our Dumb Animals, a journal for the promotion of organized effort in securing the humane treatment of animals. For many years he was active in the organization of humane societies in England and America. In 1882 he initiated the movement for the establishment of Bands of Mercy (for the promotion of humane treatment of animals), of which in 1908 there were more than 72,000 in active existence. In 1889 he founded and became president of the American Humane Education Society. He became well known as a criminologist and also as an advocate of laws for the safe- guarding of the public health and against adulteration of food. He died at Boston on the 16th of March 1909.

ANGEL-LIGHTS, in architecture, the outer upper lights in a perpendicular window, next to the springing; probably a corruption of the word angle-lights, as they are nearly triangular.

ANGELUS, a Roman Catholic devotion in memory of the Annunciation. It has its name from the opening words, Angelus Domini nuntiavit Mariae. It consists of three texts describing the mystery, recited as versicle and response alternately with the salutation ” Hail, Mary! ” This devotion is recited in the Catholic Church three times daily, about 6 a.m., noon and 6 p.m. At these hours a bell known as the Angelus bell is rung. This is still rung in some English country churches, and has often been mistaken for and alleged to be a survival of the curfew-bell. The institution of the Angelus is by some ascribed to Pope Urban II., by some to John XXII. The triple recitation is ascribed to Louis XI. of France, who in 1472 ordered it to be thrice said daily.

ANGELUS SILESIUS (1624-1677), German religious poet, was born in 1624 at Breslau. His family name was Johann Scheffler, but he is generally known by the pseudonym Angelus Silesius, under which he published his poems and which marks the country of his birth. Brought up a Lutheran, and at first physician to the duke of Wiirttemberg-Oels, he joined in 1652 the Roman Catholic Church, in 1661 took orders as a priest, and became coadjutor to the prince bishop of Breslau. He died at Breslau on the 9th of July 1677. In 1657 Silesius published under the title Heilige Seelenlust, oder geistliche Hirtenlieder der in ihrenjesumverliebten Psyche (1657), a collection of 205 hymns, the most beautiful of which, such as, Liebe, die du mich zum Bilde deiner Gottheit hast gemacht and Mir nach, spricht Christus, unser Held, have been adopted in the German Protestant

hymnal. More remarkable, however, is his Geistreiche Sinn- und Schluss- reime (1657), afterwards called Cherubinischer Wander smann (1674). This is a collection of ” Reimspriiche ” or rhymed distichs embodying a strange mystical pantheism drawn mainly from the writings of Jakob Bohme and- his followers. Silesius delighted specially in the subtle paradoxes of mysticism. The essence of God, for instance, he held to be love; God, he said, can love nothing inferior to himself; but he cannot be an object of love to himself without going out, so to speak, of himself, without manifesting his infinity in a finite form; in other words, by becoming man. God and man are therefore essentially one.

A complete edition of Scheffler’s works {Sdmtliche poetische Werke) was published by D. A. Rosenthal, 2 vols. (Rej,ensburg, 1862). Both the Cherubinischer Wandersmann and Heilige Seelenlust have been republished by G. Ellinger (1895 and 1901); a selection from the former work by O. E. Hartleben (1896). For further notices

of Silesius’ life and work, see Hoffmann von Fallersleben in Wei’ mar’sches Jahrbuch I. (Hanover, 1854) ; A. Kahlert, Angelus Silesius (1853) ; C. Seltmann, Angelus Silesius und seine Mystik (1896), and a biog. by H. Mahn (Dresden, 1896).

ANGERMUNDE, a town of Germany, in the Prussian province of Brandenburg, on Lake Miinde, 43 m. from Berlin by the Berlin- Stettin railway, and at the junction of lines to Prenzlau, Freien- walde and Schwedt. Pop. (1900) 7465. It has three Protestant churches, a grammar school and court of law. Its industries embrace iron founding and enamel working. In 1420 the elector Frederick I. of Brandenburg gained here a signal victory over the Pomeranians.

ANGERONA, or Angeronia, an old Roman goddess, whose name and functions are variously explained. According to ancient authorities, she was a goddess who relieved men from pain and sorrow, or delivered the Romans and their flocks from angina (quinsy) ; or she was the protecting goddess of Rome and the keeper of the sacred name of the city, which might not be pronounced lest it should be revealed to her enemies; it was even thought that Angerona itself was’ this name. Modern scholars regard her as a goddess akin to Ops, Acca Larentia and Dea Dia; or as the goddess of the new year and the returning sun (according to Mommsen, ab angerendo = airo tov avaipe

ANGERS, a city of western France, capital of the department of Maine-et-Loire, 191 m. S.W. of Paris by the Western railway to Nantes. Pop.

(1906) 73,585. It occupies rising ground on both banks of the Maine, which are united by three bridges. The surrounding district is famous for its flourishing nurseries and market gardens. Pierced with wide, straight streets, well provided with public gardens, and surrounded by ample, tree- lined boulevards, beyond which lie new suburbs, Angers is one of the pleasantest towns in France. Of its numerous medieval buildings the most important is the cathedral of St Maurice, dating in the main from the 12th and 13th centuries. Between the two flanking towers of the west facade, the spires of which are of the 16th century, rises a central tower of the same period. The most prominent feature of the fagade is the series of eight warriors carved on the base of this tower. The vaulting of the nave takes the form of a series of cupolas, and that of the choir and transept is similar. The chief treasures of the church are its rich stained glass (12th, 13th and 15th centuries) and valuable tapestry (14th to 18th centuries). The bishop's palace which adjoins the cathedral contains a fine synodal hall of the 12th century. Of the other churches of Angers, the principal are St Serge, an abbey-church of the 12th and 15th centuries, and La Trinite (1 2 th century) . The prefecture occupies the buildings of the famous abbey of St Aubin ; in its courtyard are elaborately sculptured arcades of the nth and 12th centuries, from which period dates the tower, the only survival of the splendid abbey- church. Ruins of the old churches of Toussaint (13th century) and Notre-Dame du Ronceray (nth century) are also to be seen. The castle of Angers, an imposing building girt with towers and a moat, dates from the 13th century and is now used as an armoury. The ancient hospital of St Jean (12th century) is occupied by an archaeological museum; and the Logis Barrault, a mansion built about 1500, contains the public library, the municipal museum, which has a large collection of pictures and sculptures, and the Musee David, containing works by the famous sculptor David d' Angers, who was a native of the town. One of his masterpieces, a bronze statue of Rene of Anjou, stands close by the castle. The Hotel de Pince or d' Anjou (1 523-1530) is the finest of the stone mansions of Angers; there are also many curious wooden houses of the 15th and 16th centuries. The palais de justice, the Catholic institute, a fine theatre, and

a hospital with 1500 beds are the more remarkable of the modern buildings of the town. Angers is the seat of a bishopric, dating from the 3rd century, a prefecture, a court of appeal and a court of assizes. It has a tribunal of first instance, a tribunal of com- merce, a board of trade-arbitrators, a chamber of commerce, a branch of the Bank of France and several learned societies. Its educational institutions

include ecclesiastical seminaries, a lycee, a preparatory school of medicine and pharmacy, a uni- versity with free faculties (Jacultis libres) of theology, law, letters and science, a higher school of agriculture, training colleges, a school of arts and handicrafts and a school of fine art. The prosperity of the town is largely due to the great slate-quarries of the vicinity, but the distillation of liqueurs from fruit, cable, rope and thread-making, and the manufacture of boots and shoes, umbrellas and parasols are leading industries. The weaving of sail-cloth and woollen and other fabrics, machine construction, wire-drawing, and manufacture of sparkling wines and preserved fruits are also carried on. The chief articles of commerce, besides slate and manufactured goods, are hemp, early vegetables, fruit, flowers and live-stock.

Angers, capital of the Gallic tribe of the Andecavi, was under the Romans called Juliomagus. During the 9th century it became the seat of the counts of Anjou (q.v.) . It suffered severely from the invasions of the Northmen in 845 and the succeeding years, and of the English in the 12th and 15th centuries; the Huguenots took it in 1585, and the Vendean royalists were repulsed near it in 1793. Till the Revolution, Angers was the seat of a celebrated university founded in the 14th century.

See L. M. Thorode, Notice de la ville a" Angers (Angers, 1897).

ANGERSTEIN, JOHN JULIUS (1735-1822), London merchant, and patron of the fine arts, was born at St Petersburg and settled in London about 1749. His collection of paintings, consisting of about forty of the most exquisite specimens of the art, purchased by the British government, on his death, formed the nucleus of the National Gallery.

ANGILBERT (d. 814), Frankish Latin poet, and minister of Charlemagne, was of noble Frankish parentage, and educated at the palace school under Alcuin. As the friend and adviser of the emperor's son, Pippin, he assisted for a while in the govern- ment of Italy, and was later sent on three important embassies to the pope, in 792, 794 and 796. Although he was the father of two children by Charlemagne's daughter, Bertha, one of them named Nithard, we have no authentic account of his marriage, and from 790 he was abbot of St Riquier, where his brilliant rule gained for him later the renown of a saint. Angilbert, however, was little like the true medieval saint; his poems reveal rather the culture and tastes of a man of the world, enjoying the closest intimacy with the imperial family. He accompanied Charlemagne to Rome in 800 and was one of the

witnesses to his will in 814. Angilbert was the Homer of the emperor's literary circle, and was the probable author of an epic, of which the fragment which has been preserved describes the life at the palace and the meeting between Charlemagne and Leo III. It is a mosaic from Virgil, Ovid, Lucan and Fortunatus, composed in the manner of Einhard's use of Suetonius, and exhibits a true poetic gift. Of the shorter poems, besides the greeting to Pippin on his return from the campaign against the Avars (796), an epistle to David (Charlemagne) incidentally reveals a delightful picture of the poet living with his children in a house surrounded by pleasant gardens near the emperor's palace. The reference to Bertha, however, is distant and respectful, her name occurring merely on the list of princesses to whom he sends his salutation.

Angilbert's poems have been published by E. Dummler in the Monumenta Germaniae Historica. For criticisms of this edition see Traube in Roederer's Schriften fur germanische Philologie (1888). See also A. Molinter, Les Sources de Vhistoire de France.

ANGINA PECTORIS (Latin for " pain of the chest "), a term applied to a violent paroxysm of pain, arising almost invariably in connexion with disease of the coronary arteries, a lesion causing progressive degeneration of the heart muscle (see Heart: Disease). An attack of angina pectoris usually comes on with a sudden seizure of pain, felt at.first over the region of the heart, but radiating through the chest in various directions, and

frequently extending down the left arm. A feeling of constriction and of suffocation accompanies the pain, although there is seldom actual difficulty in breathing. When the attack comes on, as it often does, in the course of some bodily exertion, the sufferer is at once brought to rest, and during the continuance of the paroxysm experiences the most intense agony. The countenance becomes pale, the surface of the body cold, the pulse feeble, and death appears to be imminent, when suddenly the attack subsides and complete relief is obtained. The dura- tion of a paroxysm rarely exceeds two or three minutes, but it may last for a longer period. The attacks are apt to recur on slight exertion, and even in aggravated cases without any such exciting cause. Occasionally the first seizure proves fatal; but more commonly death takes place as the result of repeated attacks. Angina pectoris is extremely rare under middle life, and is much more common in males than in females; It must always be regarded as a disorder of a very serious nature. In the treatment of the paroxysm, nitrite of amyl has now replaced all other remedies. It can be carried by the patient in the form of nitrite of amyl pearls, each pearl containing the dose

prescribed by the physician. Kept in this way the drug does not lose strength. As soon as the pain begins the patient crushes a pearl in his handkerchief and holds it to his mouth and nose.. The relief given in this way is marvellous and usually takes place within a very few seconds. In the rare cases where this drug does not relieve, hypodermic injections of morphia are used. But on account of the well-known dangers of this drug, it should only be administered by a medical man. To prevent recurrence of the attacks something may be done by scrupulous attention to the general health, and by the avoidance of mental and physical strain. But the most important preventive of all is ” bed,” of which fourteen days must be enforced on the least premonition of anginal pain.

Pseudo-angina. — In connexion with angina pectoris, a far more common condition must be mentioned that has now universally received the name of pseudo-angina. This includes the praecordial pains which very closely resemble those of true angina. The essential difference lies in the fact that pseudo- angina is independent of structural disease of the heart and coronary arteries. In true angina there is some condition within the heart which starts the stimulus sent to the nerve centres. In pseudo-angina the starting-point is not the heart but some peripheral or visceral nerve. The impulse passes thence to the medulla, and so reaching the sensory centres starts a feeling of pain that radiates into the chest or down the arm. There are three main varieties: — (1) the reflex, (2) the vaso-motor, (3) the toxic. The reflex is by far the most common, and is generally due to irritation from one of the abdominal organs. An attack of pseudo-angina may be agonizing, the pain radiating through the chest and into the left arm, but the patient does not usually assume the motionless attitude of true angina, and the duration of the seizure is usually much longer. The treatment is that of the underlying neurosis and the prognosis is a good one, sudden death not occurring.

ANGIOSPERMS. The botanical term ” Angiosperm ” (ayyeiov, receptacle, and cnrkpixa, seed) was coined in the form Angio- spermae by Paul Hermann in 1690, as the name of that one of his primary divisions of the plant kingdom, which included flowering plants possessing seeds enclosed in capsules, in contra- distinction to his Gymnospermae, or flowering plants with achenial or schizo-carpic fruits — the whole fruit or each of its pieces being here regarded as a seed and naked. The term and its antonym were maintained by Linnaeus with the same sense, but with restricted application, in the names of the orders of his class Didynamia. Its use with any approach to its modern scope only became possible after Robert Brown had established in 1827 the existence of truly naked seeds in the Cycadeae

and Coniferae, entitling them to be correctly called Gymnosperms. From that time onwards, so long as these Gymnosperms were, as was usual, reckoned as dicotyledonous flowering plants, the term Angiosperm was used antithetically by botanical writers, but with varying limitation, as a group-name for other

dicotyledonous plants. The advent in 1851 of Hofmeister's brilliant discovery of the changes proceeding in the embryo-sac of flowering plants, and his determination of the correct relation- ships of these with the Cryptogamia, fixed the true position of Gymnosperms as a class distinct from Dicotyledons, and the term Angiosperm then gradually came to be accepted as the suit- able designation for the whole of the flowering plants other than Gymnosperms, and as including therefore the classes of Dicoty- ledons and Monocotyledons. This is the sense in which the term is nowadays received and in which it is used here.

The trend of the evolution of the plant kingdom has been in the direction of the establishment of a vegetation of fixed habit and adapted to the vicissitudes of a life on land, and the Angio- sperms are the highest expression of this evolution and constitute the dominant vegetation of the earth's surface at the present epoch. There is no land-area from the poles to the equator, where plant-life is possible, upon which Angiosperms are not found. They occur also abundantly in the shallows of rivers and fresh-water lakes, and in less number in salt lakes and in the sea; such aquatic Angiosperms are not, however, primitive forms, but are derived from immediate land-ancestors. Associated with this diversity of habitat is great variety in general form and manner of growth. The familiar duckweed which covers the surface of a pond consists of a tiny green " thalloid " shoot, one, that is, which shows no distinction of parts — stem and leaf, and a simple root growing vertically downwards into the water. The great forest-tree has a shoot, which in the course perhaps of hundreds of years, has developed a wide -spreading system of trunk and branches, bearing on the ultimate twigs or branchlets innumerable leaves, while beneath the soil a widely-branching root-system covers an area of corresponding extent. Between these two extremes is every conceivable gradation, embracing aquatic and terrestrial herbs, creeping, erect or climbing in habit, shrubs and trees, and representing a much greater variety than is to be found in the other subdivision of seed-plants, the Gymnosperms.

In internal structure also the variety of tissue-formation far exceeds that found in Gymnosperms (see Plants: Anatomy). The vascular bundles of the stem belong to the col- stmctare. lateral type, that is to say, the elements of the wood or xylem and the bast or phloem stand side by side on the same radius. In the larger of the two great groups into which the Angiosperms are divided, the Dicotyledons, the bundles in the very young stem are arranged in an open ring, separating a central pith from an outer cortex. In each bundle, separating the xylem and phloem, is a layer of meristem or active formative tissue, known as cambium; by the formation of a layer of cambium between the bundles (interfascicular cambium) a complete ring is formed, and a regular periodical increase in thickness results from it by the development of xylem on the inside and phloem on the outside. The soft phloem soon becomes crushed, but the hard wood persists, and forms the great bulk of the stem and branches of the woody perennial. Owing to differences in the character of the elements produced at the beginning and end of the season, the wood is marked out in transverse section into concentric rings, one for each season of growth — the so-called annual rings. In the smaller group, the Monocotyledons, the bundles are more numerous in the young stem and scattered through the ground tissue. Moreover they contain no cambium and the stem once formed increases in diameter only in exceptional cases.

As in Gymnosperms, branching is monopodial; dichotomy or the forking of the growing point into two equivalent branches which replace the main stem, is absent both in the case organs. °f tne si em an d the root. The leaves show a remark able variety in form (see Leat), but are generally small in comparison with the size of the plant; exceptions occur in some Monocotyledons, e.g. in the Aroid family, where in some genera the plant produces one huge, much-branched leaf each season.

In rare cases the main axis is unbranched and ends in a flower, as, for instance, in the tulip, where scale-leaves, forming the

underground bulb, green foliage-leaves and coloured floral leaves are borne on one and the same, axis. Generally, flowers are formed only on shoots of a higher order, often only on the ultimate branches of a much branched system. A potential branch or bud, either foliage or flower, is formed in the axil of each leaf; sometimes more than one bud arises, as for instance in the walnut, where two or three stand in vertical series above each leaf. Many of the buds remain dormant, or are called to development under exceptional circumstances, such as the destruction of existing branches. For instance, the clipping of a hedge or the lopping of a tree will cause to develop numerous buds

which may have been dormant for years. Leaf-buds occasionally arise from the roots, when they are called adven- titious; this occurs in many fruit trees, poplars, elms and others. For instance, the young shoots seen springing from the ground around an elm are not seedlings but root-shoots. Frequently, as in many Dicotyledons, the primary root, the original root of the seedling, persists throughout the life of the plant, forming, as often in biennials, a thickened tap-root, as in carrot, or in perennials, a much-branched root system. In many Dicotyledons and most Monocotyledons, the primary root soon perishes, and its place is taken by adventitious roots developed from the stem.

The most characteristic feature of the Angiosperm is the flower, which shows remarkable variety in form and elaboration, and supplies the most trustworthy characters for the Flower distinction of the series and families or natural orders, into which the group is divided. The flower is a shoot (stem bearing leaves) which has a special form associated with the special function of ensuring the fertilization of the egg and the development of fruit containing seed. Except where it is terminal it arises, like the leaf-shoot, in the axil of a leaf, which is then known as a bract. Occasionally, as in violet, a flower arises singly in the axil of an ordinary foliage-leaf; it is then termed axillary. Generally, however, the flower-bearing portion of the plant is sharply distinguished from the foliage leaf- bearing or vegetative portion, and forms a more or less elaborate branch-system in which the bracts are small and scale-like. Such a branch-system is called an inflorescence. The primary function of the flower is to bear the spores. These, as in Gymno- sperms, are of two kinds, microspores or pollen-grains, borne in the stamens (or microsporophylls) and megaspores, in which the egg-cell is developed, contained in the ovule, which is borne enclosed in the carpel (or megasporophyll) . The flower may consist only of spore-bearing leaves, as in willow, where each flower comprises only a few stamens or two carpels. Usually, however, other leaves are present which are only indirectly concerned with the reproductive process, acting as protective organs for the sporophylls or forming an attractive envelope. These form the perianth and are in one series, when the flower is termed monochlamydeous, or in two series (dichlamydeous) . In the second case the outer series (calyx of sepals) is generally green and leaf-like, its function being to protect the rest of the flower, especially in the bud; while the inner series (corolla of petals) is generally white or brightly coloured, and more delicate in structure, its function being to attract the particular insect or bird by agency of which pollination is effected. The insect, &c, is attracted by the colour and scent of the flower, and frequently also by honey which

is secreted in some part of the flower. (For further details on the form and arrangement of the flower and its parts, see Flower.)

Each stamen generally bears four pollen-sacs (microsporangia) which are associated to form the anther, and carried up on a stalk or filament. The development of the micro- sporangia and the contained spores (pollen-grains) an< / „„//,,„ is closely comparable with that of the microsporangia in Gymnosperms or heterosporous ferns. The pollen is set free by the opening (dehiscence) of the anther, generally by means of longitudinal slits, but sometimes by pores, as in the heath family (Ericaceae), or by valves, as in the barberry. It is then dropped or carried by some external agent, wind, water or some member of the animal kingdomj on to the receptive surface of

embryo-

sac

the carpel of the same or another flower. The carpel, or aggregate of carpels forming the pistil or gynaeceum, comprises an ovary containing one or more ovules and a receptive surface or stigma; the stigma is sometimes carried up on a style. The mature pollen- grain is, like other spores, a single cell; except in the case of some submerged aquatic plants, it has a double wall, a thin delicate wall of unaltered cellulose, the endospore or intine, and a tough outer cuticularized exospore or extine. The exo- spore often bears spines or warts, or is variously sculptured, and the character of the markings is often of value for the distinction of genera or higher groups. Germination of the microspore begins before it leaves the pollen-sac. In very few cases has anything representing prothallial development been observed; generally a small cell (the antheridial or generative cell) is cut off, leaving a larger tube-cell. When placed on the stigma, under favourable circumstances, the pollen-grain puts forth a pollen-tube which grows down the tissue of the style to the ovary, and makes its way along the placenta, guided by projections or hairs, to the mouth of an ovule. The nucleus of the tube-cell has meanwhile passed into the tube, as does also the generative nucleus which divides to form two male- or sperm- cells. The male-cells are carried to their destination in the tip of the pollen-tube.

The ovary contains one or more ovules borne on a pla- centa, which is

generally some part of the ovary-wall. The development of the ovule, which represents the f™!'!".!"' macrosporangium, is very similar to the process in Gymnosperms; when mature it consists of one or two coats surrounding the central nucellus, except at the apex where an opening, the micropyle, is left. The nucellus is a cellular tissue enveloping one large cell, the embryo-sac or macrospore. The germination of the macrospore consists in the repeated division of its nucleus to form two groups of four, one group at each end of the embryo-sac. One nucleus from each group, the polar nucleus, passes to the centre of the sac, where the two fuse to form the so-called definitive nucleus. Of the three cells at the micropylar end of the sac, all naked cells (the so-called egg-apparatus), one is the egg-cell or oosphere, the other two, which may be regarded as representing abortive egg-cells (in rare cases capable of fertilization), are known as synergidae. The three cells at the opposite end are known as antipodal cells and become invested with a cell-wall. The gametophyte or prothallial generation is thus extremely reduced, consisting of but little more than the male and female sexual cells — the two sperm-cells in the pollen-tube and the egg-cell (with the synergidae) in the embryo-sac. At the period of fertilization the embryo-sac lies in close proximity Uoo. ' to l ˆ e opening of the micropyle, into which the pollen- tube has penetrated, the separating cell-wall becomes absorbed, and the male or sperm-cells are ejected into the embryo-sac. Guided by the synergidae one male-cell passes into the oosphere with which it fuses, the two nuclei uniting, while the other fuses with the definitive nucleus, or, as it is also called, the endosperm nucleus. This remarkable double fertilization as it has been called, although only recently discovered, has been proved to take place in widely-separated families, and both in Monocotyledons and Dicotyledons, and there is every probability that, perhaps with variations, it is the normal process in Angio- sperms. After impregnation the fertilized oosphere immediately surrounds itself with a cell-wall and becomes the oospore which by a process of growth forms the embryo of the new plant. The endosperm-nucleus divides rapidly to produce a cellular tissue which fills up the interior of the rapidly-growing embryo- sac, and forms a tissue, known as endosperm, in which is stored a supply of nourishment for the use later on of the embryo. It has long been known that after fertilization of the egg has taken place, the formation of endosperm begins from the endosperm nucleus, and this had come to be regarded as the recommence- ment of the development of a prothallium after a pause following the reinvigorating union of the polar nuclei. This view is still maintained by those who differentiate two acts of fertilization within the embryo-sac, and regard that of the egg by the first

male-cell, as the true or generative fertilization, and that of the polar nuclei by the second male gamete as a vegetative fertiliza- tion which gives a stimulus to development in correlation with the other. If, on the other hand, the endosperm is the product of an act of fertilization as definite as that giving rise to the embryo itself, we have to recognize that twin-plants are produced within the embryo-sac — one, the embryo, which becomes the angiospermous plant, the other, the endosperm, a short-lived, undifferentiated nurse to assist in the nutrition of the former, even as the subsidiary embryos in a pluri-embryonic Gymno- sperm may facilitate the nutrition of the dominant one. If this is so, and the endosperm like the embryo is normally the product of a sexual act, hybridization will give a hybrid endosperm as it does a hybrid embryo, and herein (it is suggested) we may have the explanation of the phenomenon of xenia observed in the mixed endosperms of hybrid races of maize and other plants, regarding which it has only been possible hitherto to assert that they were indications of the extension of the influence of the pollen beyond the egg and its product. This would not, however, explain the formation of fruits intermediate in size and colour between those of crossed parents. The signification of the coalescence of the polar nuclei is not explained by these new facts, but it is noteworthy that the second male-cell is said to unite sometimes with the apical polar nucleus, the sister of the egg, before the union of this with the basal polar one. The idea of the endosperm as a second subsidiary plant is no new one; it was suggested long ago in explanation of the coalescence of the polar nuclei, but it was then based on the assumption that these represented male and female cells, an assumption for which there was no evidence and which was inherently improbable. The proof of a coalescence of the second male nucleus with the definitive nucleus gives the conception a more stable basis. The antipodal cells aid more or less in the process of nutrition of the developing embryo, and may undergo multiplication, though they ultimately disintegrate, as do also the synergidae. As in Gymnosperms and other groups an interesting qualitative change is associated with the process of fertilization. The number of chromosomes (see Plants: Cytology) in the nucleus of the two spores, pollen-grain and embryo-sac, is only half the number found in an ordinary vegetative nucleus; and this reduced number persists in the cells derived from them. The full number is restored in the fusion of the male and female nuclei in the process of fertilization, and remains until the formation of the cells from which the spores are derived in the new generation.

In several natural orders and genera departures from the course of development just described have been noted. In the natural order

Rosaceae, the series Querciflorae, and the very anomalous genus Casuarina and others, instead of a single macrospore a more or less extensive sporogenous tissue is formed, but only one cell proceeds to the formation of a functional female cell. In Casuarina, Juglans and the order Corylaceae, the pollen-tube does not enter by means of the micropyle, but passing down the ovary wall and through the placenta, enters at the chalazal end of the ovule. Such a method of entrance is styled chalazogamic, in contrast to the porogamic or ordinary method of approach by means of the micropyle.

The result of fertilization is the development of the ovule into the seed. By the segmentation of the fertilized egg, now invested by cell-membrane, the embryo-plant arises. A varying number of transverse segment-walls transform it into i <&, a pro-embryo — a cellular row of which the cell nearest the micropyle becomes attached to the apex of the embryo-sac, and thus fixes the position of the developing, embryo, while the terminal cell is projected into its cavity. In Dicotyledons the shoot of the embryo is wholly derived from the terminal cell of the pro-embryo, from the next cell the root arises, and the remaining ones form the suspensor. In many Monocotyledons the terminal cell forms the'cotyledonary portion alone of the shoot of the embryo, its axial part and the root being derived from the adjacent cell; the cotyledon is thus a terminal structure and the apex of the primary stem a lateral one — a condition in marked contrast with that of the Dicotyledons. In some Monocotyledons,

however, the cotyledon is not really terminal. The primary root of the embryo in all Angiosperms points towards the micropyle. The developing embryo at the end of the suspensor grows out to a varying extent into the forming endosperm, from which by surface absorption it derives good material for growth; at the same time the suspensor plays a direct part as a carrier of nutrition, and may even develop, where perhaps no endosperm is formed, special absorptive ” suspensor roots ” which invest the developing embryo, or pass out into the body and coats of the ovule, or even into the placenta. In some cases the embryo or the embryo-sac sends out suckers into the nucellus and ovular integument. As the embryo develops it may absorb all the food material available, and store, either in its cotyledons or in its hypocotyl, what is not immediately required for growth, as reserve-food for use in germination, and by so doing it increases in size until it may fill entirely the embryo-sac; or its absorptive power at this stage

may be limited to what is necessary for growth and it remains of relatively small size, occupying but a small area of the embryo-sac, which is otherwise filled with endosperm in which the reserve-food is stored. There are also intermediate states. The position of the embryo in relation to the endosperm varies, sometimes it is internal, sometimes external, but the significance of this has not yet been established.

The formation of endosperm starts, as has been stated, from the endosperm nucleus. Its segmentation always begins before that of the egg, and thus there is timely preparation for the nursing of the young embryo. If in its extension to contain the new formations within it the embryo-sac remains narrow, endo- sperm formation proceeds upon the lines of a cell-division, but in wide embryo-sacs the endosperm is first of all formed as a layer of naked cells around the wall of the sac, and only gradually acquires a pericellular character, forming a tissue filling the sac. The function of the endosperm is primarily that of nourishing the embryo, and its basal position in the embryo-sac places it favourably for the absorption of food material entering the ovule. Its duration varies with the precocity of the embryo. It may be wholly absorbed by the progressive growth of the embryo within the embryo-sac, or it may persist as a definite and more or less conspicuous constituent of the seed. When it persists as a massive element of the seed its nutritive function is usually apparent, for there is accumulated within its cells reserve-food, and according to the dominant substance it is starchy, oily, or rich in cellulose, mucilage or proteid. In cases where the embryo has stored reserve food within itself and thus provided for self -nutrition, such endosperm as remains in the seed may take on other functions, for instance, that of water-absorption.

Some deviations from the usual course of development may be noted. Parthenogenesis, or the development of an embryo from an egg-cell without the latter having been fertilized has been de- scribed in speciesof Thalictrum, Antennaria&iid Alchemilla. Poly- embryony is generally associated with the development of cells other than the egg-cell. Thus in Erythronium and Limnocharis the fertilized egg may form a mass of tissue on which several embryos are produced. Isolated cases show that any of the cells within the embryo-sac may exceptionally form an embryo, e.g. the synergidae in species of Mimosa, Iris and Allium, and in the last-mentioned the antipodal cells also. In Coelebogyne (Euphorbiaceae) and in Funkia (Liliaceae) polyembryony results from an adventitious production of embryos from the cells of the nucellus around the top of the embryo-sac. In a species of Allium, embryos have been found developing in the same individualfrom the egg-cell, synergids, antipodal cells and cells of the

nucellus. In two Malayan species of Balanophora, the embryo is developed from a cell of the endosperm, which is formed from the upper polar nucleus only, the egg apparatus becoming disorganized. The last-mentioned case has been regarded as representing an apogamous development of the sporophy te from the gametophy te comparable to the cases of apogamy described in Ferns. But the great diversity of these abnormal cases as shown in the examples cited above suggests the use of great caution in for- mulating definite morphological theories upon them.

As the development of embryo and endosperm proceeds within

the embryo-sac, its wall enlarges and commonly absorbs the substance of the nucellus (which is likewise enlarging) to near its outer limit, and combines with it and the integument to form the seed-coat: or the whole nucellus and even

the integument may be absorbed. In some plants the nucellus is not thus absorbed, but itself becomes a seat of de- posit of reserve-food constituting the perisperm which may coexist with endosperm, as in the water-lily order, or may alone form a food-reserve for the embryo, as in Canna. Endospermic food- reserve has evident advantages over perispermic, and the latter is comparatively rarely found and only in non-progressive series. Seeds in which endosperm or perisperm or both exist are com- monly called albuminous or endospermic, those in which neither is found are termed exalbuminous or exendospermic. These terms, extensively used by systematists, only refer, however, to the grosser features of the seed, and indicate the more or less evident occurrence of a food-reserve ; many so-called exalbuminous seeds show to microscopic examination a distinct endosperm which may have other than a nutritive function. The presence or absence of endosperm, its relative amount when present, and the position of the embryo within it, are valuable characters for the distinction of orders and groups of orders. Meanwhile the ovary wall has developed to form the fruit or pericarp, the structure of which is closely associated with the manner of distribution of the seed. Frequently the influence of fertilization is felt beyond the ovary, and other parts of the flower take part in the formation of the fruit, as the floral receptacle in the apple, strawberry and others. The character of the seed-coat bears a definite relation to that of the fruit. Their function is the twofold one of protecting the embryo and of aiding in dissemination; they may also directly promote germination. If the fruit is a dehiscent one and the seed is therefore soon exposed, the seed-coat has to provide for the

protection of the embryo and may also have to secure dissemina- tion. On the other hand, indehiscent fruits discharge these functions for the embryo, and the seed-coat is only slightly developed. Dissemination is effected by the agency of water, of air, of animals — and fruits and seeds are a tion. therefore grouped in respect of this as hydrophilous, anemophilous and zooidiophilous. The needs for these are obvious — buoyancy in water and resistance to wetting for the first, some form of parachute for the second, and some attaching mechanism or attractive structure for the third. The methods in which these are provided are of infinite variety, and any and every part of the flower and of the inflorescence may be called into requisition to supply the adaptation (see Fruit). Special outgrowths, arils, of the seed-coat are of frequent occurrence. In the feature of fruit and seed, by which the distribution of Angio- sperms is effected, we have a distinctive character of the class. In Gymnosperms we have seeds, and the carpels may become modified and close around these, as in Pinus, during the process of ripening to form an imitation of a box-like fruit which subsequently open- ing allows the seeds to escape; but there is never in them the closed ovary investing from the outset the ovules, and ultimately forming the ground-work of the fruit.

Their fortuitous dissemination does not always bring seeds upon a suitable nidus for germination, the primary essential of which is a sufficiency of moisture, and the duration of vitality of the embryo is a point of interest. Some Oermina- seeds retain vitality for a period of many years, though seeA there is no warrant for the popular notion that genuine ” mummy wheat ” will germinate; on the other hand some seeds lose vitality in little more than a year. Further, the older the seed the more slow as a general rule will germination be in starting, but there are notable exceptions. This pause, often of so long duration, in the growth of the embryo between the time of its perfect development within the seed and the moment of germination, is one of the remarkable and distinctive features of the life of Spermatophytes. The aim of germination is the fixing of the embryo in the soil, effected usually by means of the root, which is the first part of the embryo to appear, in preparation for the elongation of the epicotyledonary portion of the shoot, and there is infinite variety in the details of the process. In

repro- duction.

albuminous Dicotyledons the cotyledons act as the absorbents of the reserve-food of the seed and are commonly brought above ground (epigeal), either withdrawn from the seed-coat or carrying it upon them, and then they serve as the first green organs of the plant. The part of the stem below the cotyledons (hypocotyl) commonly plays the greater part in bringing this about. Ex- albuminous Dicotyledons usually store reserve-food in their cotyledons, which may in germination remain below ground (hypogeal) . In albuminous Monocotyledons the cotyledon itself, probably in consequence of its terminal position, is commonly the agent by which the embryo is thrust out of the seed, and it may function solely as a feeder, its extremity developing as a sucker through which the endosperm is absorbed, or it may become the first green organ, the terminal sucker dropping off with the seed-coat when the endosperm is exhausted. Exalbuminous Monocotyledons are either hydrophytes or strongly hygrophilous plants and have often peculiar features in germination.

Distribution by seed appears to satisfy so well the requirements of Angiosperms that distribution by vegetative buds is only an

occasional process. At the same time every bud on a ~ e # Sff Wve shoot has the capacity to form a new plant if placed

in suitable conditions, as the horticultural practice

of propagation by cuttings shows; in nature we see plants spreading by the rooting of their shoots, and buds we know may be freely formed not only on stems but on leaves and on roots. Where detachable buds are produced, which can be transported through the air to a distance, each of them is an incipient shoot which may have a root, and there is always reserve-food stored in some part of it. In essentials such a bud resembles a seed. A relation between such vegetative distribu- tion buds and production of flower is usually marked. Where there is free formation of buds there is little flower and commonly no seed, and the converse is also the case. Viviparous plants are an illustration of substitution of vegetative buds for flower.

The position of Angiosperms as the highest plant-group is unassailable, but of the point or points of their origin from the

general stem of the plant kingdom, and of the path Phytogeny or pˆhs f their evolution, we can as yet say little. taxonomy. Until well on in the Mesozoic period geological history

tells us nothing about Angiosperms, and then only by their vegetative

organs. We readily recognize in them now-a- days the natural classes of Dicotyledons and Monocotyledons distinguished alike in vegetative and in reproductive construction, yet showing remarkable parallel sequences in development; and we see that the Dicotyledons are the more advanced and show the greater capacity for further progressive evolution. But there is no sound basis for the assumption that the Dicoty- ledons are derived from Monocotyledons; indeed, the palaeonto- logical evidence seems to point to the Dicotyledons being the older. This, however, does not entitle us to assume the origin of Monocotyledons from Dicotyledons, although there is mani- festly a temptation to connect helobic forms of the former with ranal ones of the latter. There is no doubt that the phylum of Angiosperms has not sprung from that of Gymnosperms.

Within each class the flower-characters as the essential feature of Angiosperms supply the clue to phylogeny, but the uncertainty regarding the construction of the primitive angiospermous flower gives a fundamental point of divergence in attempts to construct progressive sequences of the families. Simplicity of flower-structure has appeared to some to be always primitive, whilst by others it has been taken to be always derived. There is, however, abundant evidence that it may have the one or the other character in different cases. Apart from this, botanists are generally agreed that the concrescence of parts of the flower-whorls — in the gynaeceum as the seed-covering, and in the corolla as the seat of attraction, more than in the androecium and the calyx — is an indication of advance, as is also the concrescence that gives the condition of epigyny. Dorsiventrality is also clearly derived from radial construction, and anatropy of the ovule has followed atropy. We should expect the albuminous state of the seed to be an antecedent one to the ex-albuminous condition, and the recent discoveries in fertilization tend to confirm this view. Amongst Dicotyledons the gamopetalous forms are admitted to be the highest development and a dominant one of our epoch. Advance has been along two lines, markedly in relation to insect-pollination, one of which has culminated in the

hypogynous epipetalous bicarpellate forms with dorsiventral often large and loosely arranged flowers such as occur in Scrophulariaceae, and the other in the epigynous bicarpellate small-flowered families of which the Compositae represent the most elaborate type. In the polypetalous forms progression from hypogyny.to epigyny is gener- ally recognized, and where dorsiventrality with insect-pollination has been established, a dominant group has been developed as in the Leguminosae. The starting-point of the class, however, and the position within it of apetalous families with frequently unisexual

flowers, have provoked much discussion. In Monocotyledons a similar advance from hypogyny to epigyny is observed, and from the dorsiventral to the radial type of flower. In this connexion it is noteworthy that so many of the higher forms are adapted as bulbous geophytes, or as aerophytes to special xerophilous conditions. The Gramineae offer a prominent example of a dominant self-pollinated or wind-pollinated family, and this may find explanation in a multiplicity of factors.

Though best known for his artificial (or sexual) system, Linnaeus was impressed with the importance of elaborating a natural system of arrangement in which plants should be arranged according to their true affinities. In his Philosophia Botanica (1751) Linnaeus, grouped the genera then known into sixty-seven orders (fragmenta), all except five of which are Angiosperms. He gave names to these but did not characterize them or attempt to arrange them in larger groups. Some represent natural groups and had in several cases been already recognized by Ray and others, but the majority are, in the light of modern knowledge, very mixed. Well-defined poly- petalous and gamopetalous genera sometimes occur in the same order, and even Monocotyledons and Dicotyledons are classed together where they have some striking physiological character in common.

Work on the lines suggested by the Linnaean fragmenta was continued in France by Bernard de Jussieu and his nephew, Antoine Laurent, and the arrangement suggested by the latter in his Genera Plantarum secundum Or dines Naturales disposita (1789) is the first which can claim to be a natural system. The orders are carefully characterized, and those of Angiosperms are grouped in fourteen classes under the two main divisions Monocotyledons and Dicoty- ledons. The former comprise three classes, which are distinguished by the relative position of the stamens and ovary; the eleven classes of the latter are based on the same set of characters and fall into the larger subdivisions Apetalae, Monopetalae and Polypetalae, characterized respectively by absence, union or freedom of the petals, and a subdivision, Diclines Irregulares, a very unnatural group, including one class only. A. P. de Candolle introduced several improvements into the system. In his arrangement the last sub- division disappears, and the Dicotyledons fall into two groups, a larger containing those in which both calyx and corolla are present in the flower, and a smaller, Monochlamydeae, representing the Apetalae and Diclines Irregulares of Jussieu. The dichlamydeous group is subdivided into three, Thalamiflorae, Calyciflorae and Corolliflorae, depending on the position and union of the petals. This, which we may distinguish as the French system, finds its most perfect expression in the classic

Genera Plantarum (1862-1883) of Bentham and Hooker, a work containing a description, based on careful examination of specimens, of all known genera of flowering plants. The subdivision is as follows : — Dicotyledons.

f Thalamiflorae. Polypetalae -I Disciflorae. I Calyciflorae. [Inferae. Gamopetalae < Heteromerae. [Bicarpellatae. Monochlamydeae in eight series. Monocotyledons in seven series.

Of the Polypetalae, series 1, Thalamiflorae, is characterized by hypogynous petals and stamens, and contains 34 orders distributed in 6 larger groups or cohorts. Series 2, Disciflorae, takes its name from a development of the floral axis which forms a ring or cushion at the base of the ovary or is broken up into glands; the ovary is superior. It contains 23 orders in 4 cohorts. Series 3, Calyciflorae, has petals and stamens perigynous, or sometimes superior. It contains 27 orders in 5 cohorts.

Of the Gamopetalae, series 1, Inferae, has an inferior ovary and stamens usually as many as the corolla-lobes. It contains 9 orders in 3 cohorts. Series 2, Heteromerae, has generally a superior ovary, stamens as many as the corolla-lobes or more, and more than two carpels. It contains 12 orders in 3 cohorts. Series 3, Bicarpellatae, has generally a superior ovary and usually two carpels. It contains 24 orders in 4 cohorts.

The eight series of Monochlamydeae, containing 36 orders, form groups characterized mainly by differences in the ovary and ovules, and are now recognized as of unequal value.

The seven series of Monocotyledons represent a sequence beginning with the most complicated epigynous orders, such as Orchideae and Scitamineae, and passing through the pe’taloid hypogynous orders (series Coronarieae) of which Liliaceae is the representative to juncaceae and the palms (series Calycinae) where the perianth loses its petaloid character and thence to the Aroids, screw-pines and

others where it is more or less aborted (series Nudiflorae). Series 6, Apocarpeae, is characterized by 5 carpels, and in the last series Glumaceae, great simplification in the flower is associated with a grass-like habit.

The sequence of orders in the polypetalous subdivision of Dicotyledons undoubtedly represents a progression from simpler to more elaborate forms, but a great drawback to the value of the system is the inclusion among the Monochlamydeae of a number of orders which are closely allied with orders of Polypetalae though differing in absence of a corolla. The German systematise A. W. Eichler, attempted to remove this disadvantage which since the time of Jussieu had characterized the French system, and in 1883 grouped the Dicotyledons in two subclasses. The earlier Choripetalae embraces the Polypetalae and Monochlamydae of the French systems. It includes 21 series, and is an attempt to arrange as far as possible in a linear series those orders which are characterized by absence or freedom of petals. The second subclass, Gamopetalae, includes 9 series and culminates in those which show the most elaborate type of flower, the series Aggregatae, the chief representa- tive of which' is the great and widespread order Compositae. A modification of Eichler's system, embracing the most recent views of the affinities of the orders of Angiosperms, has been put forward by Dr Adolf Engler of Berlin, who adopts the suggestive names Archichlamydeae and Metachlamydeae for the two subdivisions of Dicotyledons. Dr Engler is the principal editor of a large series of volumes which, under the title Die naturlichen Pflanzenfamilien, is a systematic account of all the known genera of plants and represents the work of many botanists. More recently in Das Pflanzenreich the same author organized a series of complete monographs of the families of seed-plants.

As an attempt at a phylogenetic arrangement, Engler's system is now preferred by many botanists. More recently a startling novelty in the way of system has been produced by van Tieghem, as follows : Monocotyledons. Liorhizal Dicotyledons. Dicotyledons.

Insemineae. Semineae.

Unitegmineae. Bitegmineae.

The most remarkable feature here is the class of Liorhizal Dicotyledons, which includes only the families of Nymphaeaceae and Gramineae. It is based upon the fact that the histological differentiation of the epidermis of their root is that generally characteristic of Monocotyledons, whilst they have two cotyledons — the old view of the epiblast as a second cotyledon in Gramineae being adopted. But the presence of a second cotyledon in grasses is extremely doubtful, and though there may be ground for reconsidering the position of Nymphaeaceae, their association with the grasses as a distinct class is not warranted by a comparative examination of the members of the

two orders. Ovular characters determine the group- ing in the Dicotyledons, van Tieghem supporting the view that the integument, the outer if there be two, is the lamina of a leaf of which the funicle is the petiole, whilst the nucellus is an outgrowth of this leaf, and the inner integument, if present, an indusium. The Insemineae include forms in which the nuceilus is not developed, and therefore there can be no seed. The plants included are, however, mainly well-established parasites, and the absence of nucellus is only one of those characters of reduction to which parasites are liable. Even if we admit van Tieghem's interpretation of the integuments to be correct, the diagnostic mark of his unitegminous and biteg- minous groups is simply that of the absence or presence of an in- dusium, not a character of great value elsewhere, and, as we know, the number of the ovular coats is inconstant within the same family. At the same time the groups based upon the integuments are of much the same extent as the Polypetalae and Gamopetalae of other systems. We do not yet know the significance of this correla- tion, which, however, is not an invariable one, between number of integuments and union of petals.

Within the last few years Prof. John Coulter and Dr C. J. Chamberlain of Chicago University have given a valuable general account of the morphology of Angiosperms as far as concerns the flower, and the series of events which ends in the formation of the seed {Morphology of Angiosperms, Chicago, 1903).

Authorities. — The reader will find in the following works details of the subject and references to the literature: Bentham and Hooker, Genera Plantarum (London, 1862-1883); Eichler, Bluthen- diagramme (Leipzig, 1875-1878) ; Engler and Prantl, Die naturlichen Pflanzenfamilien (Leipzig, 1887-1899); Engler, Syllabus der Pflanzenfamilien, 3rd ed. (Berlin, 1903) ; Knuth, Handbuch der Btutenbiologie (Leipzig, 1898, 1899); Sachs, History of Botany, English ed. (Oxford, 1890); Solereder, Syslematische Anatomie der Dicotyledonen (Stuttgart, 1899); van Tieghem, Elements de botan- ique; Coulter and Chamberlain, Morphology of Angiosperms (New York, 1903). _ (I. B. B.; A. B. R.)

ANGKOR, an assemblage of ruins in Cambodia, the relic of the ancient Khmer civilization. They are situated in forests to the north of the Great Lake (Tonle-Sap), the most conspicuous

of the remains being the town of Angkor-Thorn and the temple of Angkor-Vat, both of which lie on the right bank of the river Siem-Reap, a tributary of Tonle-Sap. Other remains of the same form and

character lie scattered about the vicinity on both banks of the river, which is crossed by an ancient stone bridge.

Angkor-Thorn lies about a quarter of a mile from the river. According to Aymonier it was begun about a. d. 860, in tht reign of the Khmer sovereign Jayavarman III., and finished towards a.d. 900. It consists of a rectangular enclosure, nearly 2 m. in each direction, surrounded by a wall from 20 to 30 ft. in height. Within the enclosure, which is entered by five monu- mental gates, are the remains of palaces and temples, overgrown by the forest. The chief of these are: —

(1) The vestiges of the royal palace, which stood within an enclosure containing also the pyramidal religious structure known as the Phimeanakas. To the east of this enclosure there extends a terrace decorated with magnificent reliefs.

(2) The temple of Bayon, a square enclosure formed by galleries with colonnades, within which is another and more elaborate system of galleries, rectangular in arrangement and enclosing a cruciform structure, at the centre of which rises a huge tower with a circular base. Fifty towers, decorated with quadruple faces of Brahma, are built at intervals upon the galleries, the whole temple ranking as perhaps the most remarkable of the Khmer remains.

Angkor-Vat, the best preserved example of Khmer architec- ture, lies less than a mile to the south of the royal city, within a rectangular park surrounded by a moat, the outer perimeter of which measures 6060 yds. On the west side of the park a paved causeway, leading over the moat and under a magnificent portico, extends for a distance of a quarter of a mile to the chief entrance of the main building. The temple was originally devoted to the worship of Brahma, but afterwards to that of Buddha; its construction is assigned by Aymonier to the first half of the 1 2th century a.d . It consists of three stages, connected by numerous exterior staircases and decreasing in dimensions as they rise, culminating in the sanctuary, a great central tower pyramidal in form. Towers also surmount the angles of the terraces of the two upper stages. Three galleries with vault- ing supported on columns lead from the three western portals to the second stage. They are connected by a transverse gallery, thus forming four square basins. Khmer decoration, profuse but harmonious, consists chiefly in the representa- tion of gods, men and animals, which are displayed on every flat surface. Combats and legendary episodes are often depicted; floral decoration is reserved chiefly for borders, mouldings ‘and capitals. Sandstone of various colours was the chief material employed by the Khmers; limonite was also used. The

stone was cut into huge blocks which are fitted together with great accuracy without the use of cement.

See E. Aymonier, Le Cambodge (3 vols., 1900-1904) ; Doudart de Lagree, Voyage d' exploration en Indo-Chine (1872-1873); A. H. Mouhot, Travels in Indo-China, Cambodia and Laos (2 vols., 1864); Fournereau and Porcher, Les Ruines a" Angkor (1890) ; L. Delaporte, Voyage au Cambodge: V architecture Khmer (1880); J. Moura, Le Royaume de Cambodge (2 vols., 1883).

ANGLE (from the Lat. angulus, a corner, a diminutive, of which the primitive form, angus, does not occur in Latin; cognate are the Lat. angere, to compress into a bend or to strangle, and the Gr. ay/cos, a bend; both connected with the Aryan root ank-, to bend: see Angling), in geometry, the inclination of one line or plane to another. Euclid (Elements, book 1) defines a plane angle as the inclination to each other, in a plane, of two lines which meet each other, and do not lie straight with respect to each other (see Geometry, Euclidean). According to Proclus an angle must be either a quality or a quantity, or a relationship. The first concept was utilized by Eudemus, who regarded an angle as a deviation from a straight line; the second by Carpus of Antioch, who regarded it as the interval or space between the intersecting lines; Euclid adopted the third concept, although his definitions of right, acute, and obtuse angles are certainly quantitative. A discussion of

these concepts and the various definitions of angles in Euclidean geometry is to be found in W. B. Frankland, The First Book of Euclid's Elements (ipoj). Following Euclid, a right angle is formed by a straight line standing upon another straight line so as to make the adjacent angles equal; any angle less than a right angle is termed an acute angle, and any angle greater than a right angle an obtuse angle. The difference between an acute angle and a right angle is termed the complement of the angle, and between an angle and two right angles the supplement of the angle. The generalized view of angles and their measurement is treated in the article Trigonometry. A solid angle is definable as the space contained by three or more planes intersecting in a common point; it is familiarly represented by a corner. The angle between two planes is termed dihedral, between three trihedral, between any number more than three polyhedral. A spherical angle is a particular dihedral angle; it is the angle between two intersecting

arcs on a sphere, and is measured by the angle between the planes containing the arcs and the centre of the sphere.

The angle between a line and a curve (mixed angle) or between two curves (curvilinear angle) is measured by the angle between the line and the tangent at the point of intersection, or between the tangents to both curves at their common point. Various names (now rarely, if ever, used) have been given to particular cases: — • amphicyrtic (Gr. a/xi, on both sides, Kvpros, convex) or cissoidal (Gr. macros, ivy), biconvex; xystroidal or sistroidal (Gr. %varpLs, a tool for scraping), concavo-convex; amphicoelic (Gr. Koi\r], a hollow) or angulus lunularis, biconcave.

ANGLER, also sometimes called fishing-frog, frog-fish, sea- devil (Lophius piscatorius), a fish well known off the coasts of Great Britain and Europe generally, the grotesque shape of its body and its singular habits having attracted the attention of naturalists of all ages. To the North Sea fishermen this fish is known as the ” monk,” a name which more properly belongs to Rhina squatina, a fish allied to the skates. Its head is of enormous size, broad, flat and depressed, the remainder of the body appearing merely like an appendage. The wide mouth extends

The Angler {Lophius piscatorius).

all round the anterior circumference of the head; and both jaws are armed with bands of long pointed teeth, which are inclined inwards, and can be depressed so as to offer no impedi- ment to an object gliding towards the stomach, but to prevent its escape from the mouth. The pectoral and ventral fins are so articulated as to perform the functions of feet, the fish being enabled to move, or rather to walk, on the bottom of the sea, where it generally hides itself in the sand or amongst sea-weed. All round its head and also along the body the skin bears fringed appendages resembling short fronds of sea-weed, a structure which, combined with the extraordinary faculty of assimilating the colcur of the body to its surroundings, assists this fish greatly in concealing itself in places which it selects on account of the abundance of prey. To render the organization of this creature perfect in relation to its wants, it is provided with three lohg filaments inserted along the middle of the head, which are, in fact, the detached and modified three first spines of the anterior dorsal fin. The filament most important in the economy of the angler is the first, which is the longest, terminates in a lappet, and is movable in every direction. The angler is

believed to attract other fishes by means of its lure, and then to seize them with its enormous, jaws. It is probable enough thai smaller fishes are attracted in this way, but experiments have shown that the action of the jaws is automatic and depends on contact of the prey with the tentacle. Its stomach is disten- sible in an extraordinary degree, and not rarely fishes have been taken out quite as large and heavy as their destroyer. It grows to a length of more than 5 ft.; specimens of 3 ft. are common. The spawn of the angler is very remarkable. It consists of a thin sheet of transparent gelatinous material 2 or 3 ft. broad and 25 to 30 ft. in length. The eggs in this sheet are in a single layer, each in its own little cavity. The spawn is free in the sea. The larvae are free-swimming and have the pelvic fins elongated into filaments. The British species is found all round the coasts of Europe and western North America, but becomes scarce beyond 6o° N. lat.; it occurs also on the coasts of the Cape of Good Hope. A second species {Lophius budegassa) inhabits the Mediterranean, and a third {L. seligerus) the coasts of China and Japan.

ANGLESEY, ARTHUR ANNESLEY, 1st Earl of (1614-1686), British statesman, son of the 1st Viscount Valentia (cr. 1621) and Baron Mountnorris (cr. 1628), and of Dorothy, daughter of Sir John Philipps of Picton Castle, Pembrokeshire, was born at Dublin on the 10th of July 1614, was educated at Magdalen College, Oxford, and was admitted to Lincoln's Inn in 1634. Having made the grand tour he returned to Ireland; and being employed by the parliament in a mission to the duke of Ormonde, now reduced to the last extremities, he succeeded in conclud- ing a treaty with him on the 19th of June 1647, thus securing the country from complete subjection to the rebels. In April 1647 he was returned for Radnorshire to the House of Commons. He supported the parliamentary as against the republican or army party, and appears to have been one of the members excluded in 1648. He sat in Richard Cromwell's parliament for Dublin city, and endeavoured to take his seat in the restored Rump Parliament of 1659. He was made president of the council in February 1660, and in the Convention Parliament sat for Carmarthen borough. The anarchy of the last months of the commonwealth converted him to royalism, and he showed great activity in bringing about the Restoration. He used his influence in moderating measures of revenge and violence, and while sitting in judgment on the regicides was 01- the side of leniency. In November 1660 by his father's death he had become Viscount Valentia and Baron Mountnorris in the Irish peerage, and on the 20th April 1661 he was created Baron Annesley of Newport Pagnell in Buckinghamshire and earl of Anglesey in the peerage of Great Britain. He supported the king's administration in parliament, but opposed

strongly the unjust measure which, on the abolition of the court of wards, placed the extra burden of taxation thus rendered necessary on the excise. His services in the administration of Ireland were especially valuable. He filled the office of vice- treasurer from 1660 till 1667, served on the committee for carrying out the declaration for the settlement of Ireland and on the committee for Irish affairs, while later, in 167 1 and 1672, he was a leading member of various commissions appointed to investigate the working of the Acts of Settlement. In February 1661 he had obtained a captaincy of horse, and in 1667 he exchanged his vice-treasuryship of Ireland for the treasuryship of the navy. His public career was marked by great independence and fidelity to principle. On the 24th of July 1 663 he alone signed a protest against the bill" for the encourage- ment of trade," on the plea that owing to the free export of coin and bullion allowed by the act, and to the importation of foreign commodities being greater than the export of home goods, " it must necessarily follow . . . that our silver will also be carried away into foreign parts and all trade fail for want of money." 1 He especially disapproved of another clause in the same bill forbidding the importation of Irish cattle into England, a mischievous measure promoted by the duke of Buckingham, and he opposed again the bill brought in with that object in January

1 Protests of the Lords, by J. E. Thorold Rogers (1875), i. 27: Carti's Life of Ormonde (1851), iv. 234; Pari. Hist. iv. 284.

1667. This same year his naval accounts were subjected to an examination in consequence of his jndignant refusal to take part in the attack upon Ormonde; 1 and he was suspended from his office in 1 668, no charge,however, against him being substantiated. He took a prominent part in the dispute in 167 1 between the two Houses concerning the right of the Lords to amend money bills, and wrote a learned pamphlet on the question entitled The Privileges of the House of Lords and Commons (1702), in which the right of the Lords was asserted. In April 1673 he was appointed lord privy seal, and was disappointed at not obtaining the great seal the same year on the removal of Shaftesbury. In 1679 he was included in Sir W. Temple's new-modelled council.

In the bitter religious controversies of the time Anglesey showed great moderation and toleration. In 1674 he is men- tioned as endeavouring

to prevent the justices putting into Torce the laws against the Roman Catholics and Nonconformists. 2 In the panic of the ” Popish Plot ” in 1678 he exhibited a saner judgment than most of his contemporaries and a conspicuous courage. On the 6th of December he protested with three other peers against the m asure sent up from the Commons enforcing the disarming of all convicted recusants and taking bail from them to keep the peace; he was the only peer to dissent from the motion declaring the existence of an Irish plot; and though believing in the guilt and voting for the death of Lord Stafford, he interceded, according to his own account, 3 with the king for him as well as for Langhorne and Plunket. His independent attitude drew upon him an attack by Dangerfield, and in the Commons by the attorney-general, Sir W. Jones, who accused him of endeavouring to stifle the evidence against the Romanists. In March 1679 he protested against the second reading of the bill for disabling Danby. In 1681 Anglesey wrote A Letter from a Person of Honour in the Country, as a rejoinder to the earl of Castlehaven, who had published memoirs on the Irish rebellion defending the action of the Irish and the Roman Catholics. In so doing Anglesey was held by Ormonde to have censured his conduct and that of Charles I. in concluding the ” Cessation,” and the duke brought the matter before the council. In 1682 he wrote The Account of Arthur, Earl of Anglesey . . . of the true state of Your Majesty’s Government and Kingdom, which was addressed to the king in a tone of censure and remonstrance, but appears not to have been printed till 1694. 4 In consequence he was dismissed on the 9th of August 1682 from the office of lord privy seal. In 1683 he appeared at the Old Bailey as a witness in defence of Lord Russell, and in June 1685 he protested alone against the revision of Stafford’s attainder. He died at his home at Blechingdon in Oxfordshire on the 26th of April 1686, closing a career marked by great ability, statesmanship and business capacity, and by con- spicuous courage and independence of judgment. He amassed a large fortune in Ireland, in which country he had been allotted lands by Cromwell.

The unfavourable character drawn of him by Burnet is certainly unjust and not supported by any evidence. Pepys, a far more trustworthy judge, speaks of him invariably in terms of respect and approval as a ” grave, serious man,” and com- mends his appointment as treasurer of the navy as that of “a very notable man and understanding and will do things regular and understand them himself.” 5 He was a learned and cultivated man and collected a celebrated library, which was dispersed at his death. Besides the pamphlets already mentioned, he wrote: — A True Account of the Whole Proceedings betwixt . . .the Duke of Ormond and . . . the Earl of Anglesey (1682); A Letter of

Remarks upon Jovian (1683); other works ascribed to him being The King's Right of Indulgence in Matters Spiritual . . . asserted (1688) ; Truth Unveiled, to which is added a short Treatise on . . . Transubstantiation (1676) ; The Obligation resulting from the Oath of Supremacy (1688); and

1 Carti's Ormonde, iv. 330, 340.

1 Cat. of State Pap. Dom. (1673-1675), p. 152. 3 Memoirs, 8, 9. ' By Sir J. Thompson, his son-in-law. Reprinted in Somers Tracts (Scott, 1812), viii. 344, and in Pari. Hist. iv. app. xvi. 1 Diary (ed. Wheatley, 19.04), iv. 298, vii. 14.

England's Confusion (1659). Memoirs of Lord Anglesey were published by Sir P. Pett in 1693, but contain little biographical information and were repudiated as a, mere imposture by Sit John Thompson (Lord Haversham), his son-in-law, in his preface to Lord Anglesey's State of the Government in 1694. The authoJ however of the preface to The Rights of the Lords asserted (1702), while blaming their publication as "scattered and unfinished papers," admits their genuineness.

Lord Anglesey married Elizabeth, daughter and co-heiress of Sir James Altham of Oxey, Hertfordshire, by whom, besides other children, he had James, who succeeded him, Altham, created Baron Altham, and Richard, afterwards 3rd Baron Altham. His descendant Richard, the 6th earl (d. 1761), left a son Arthur, whose legitimacy was doubted, and the peerage became extinct. He was summoned to the Irish House of Peers as Viscount Valentia, but was denied his writ to the parliament of Great Britain by a majority of one vote. He was created in 1793 earl of Mountnorris in the peerage of Ireland. All the male descendants of the 1st earl of Anglesey became extinct in the person of George, 2nd earl of Mountnorris, in 1844, when the titles of Viscount Valentia and Baron Mountnorris passed to his cousin Arthur Annesley (1785-1863), who thus became 10th Viscount Valentia, being descended from the 1st Viscount Valentia. the father of the 1st earl of Anglesey in the Annesley family. The 1st viscount was also the ancestor of the Earls Annesley in the Irish peerage.

Authorities. — Diet, of Nat. Biography, with authorities there collected; lives in Wood's Athenae Oxonienses (Bliss), iv. 181, Biographia Britannica, and H. Walpole's Royal and Noble Authors (1806), iii. 288 (the latter a very inadequate review of Anglesey's character and career) ; also Biblioiheca A nglesiana . . . perThomam Philippum (1686) ; The Happy Future State of England, by Sir Peter

Pett (1688); Great News from Poland (1683), where his religious tolerance is ridiculed; Somers Tracts (Scott, 1812), viii. 344; Notes of the Privy Council (Roxburghe Club, 1896) ; Cat. of State Papers, Dom.;State Trials, viii. and ix. 619. (P. C. Y.)

ANGLESEY, HENRY WILLIAM PAGET, 1st Marquess of (1768-1854), British field-marshal, was born on the 17th of May 1 768. He was the eldest son of Henry Paget, 1st earl of Uxbridge (d. 1812), and was educated at Westminster School and Christ Church, Oxford, afterwards entering parliament in 1790 as member for Carnarvon, for which he sat for six years. At the outbreak of the French Revolutionary wars Lord Paget (as he was then styled), who had already served in the militia, raised on his father's estate the regiment of Staffordshire volunteers, in which he was given the temporary rank of lieutenant-colonel (1793). The corps soon became part of the regular army as the 80th Foot, and it took part, under Lord Paget's command, in the Flanders campaign of 1794. In spite of his youth he held a brigade command for a time, and gained also, during the campaign, his first experience of the cavalry arm, with which he was thence- forward associated. His substantive commission as lieutenant- colonel of the 1 6th Light Dragoons bore the date of the 15th of June 1795, and in 1796 he was made a colonel in the army. In 1795 he married Lady Caroline Elizabeth Villiers, daughter of the earl of Jersey. In April 1797 Lord Paget was transferred to a lieut.-colonelcy in the 7th Light Dragoons, of which regiment he became colonel in 1801. From the first he applied himself strenously to the improvement of discipline, and to the perfection of a new system of cavalry evolutions. In the short campaign of 1799 in Holland, Paget commanded the cavalry brigade, and in spite of the unsuitable character of the ground, he made, on several occasions, brilliant and successful charges. After the return of the expedition, he devoted himself zealously to his regiment, which under his command became one of the best corps in the service. In 1802 he was promoted major-general, and six years later lieutenant- general. In command of the cavalry of Sir John Moore's army during the Corunna campaign, Lord Paget won the -greatest distinction. At Sahagun, Mayorga and Benavente, the British cavalry behaved so well under his leadership that Moore wrote : — " It is impossible for me to say too much in its praise. . . . Our cavalry is very superior in quality to any the French have, and

the right spirit has been infused into them by the example and

instruction of their . . . leaders . . . .” At Benavente one of Napoleon’s best cavalry leaders, General Lefebvre Desnoettes, was taken prisoner. Corunna was Paget’s last service in the Peninsula. His liaison with the wife of Henry Wellesley, after- wards Lord Cowley, made it impossible at that time for him to serve with Wellington, whose cavalry, on many occasions during the succeeding campaigns, felt the want of the true cavalry leader to direct them. His only war service from 1809 to 181 5 was in the disastrous Walcheren expedition (1809) in which he commanded a division. During these years he occupied himself with his parliamentary duties as member for Milborne Port, which he represented almost continuously up to his father’s death in 18 12, when he took his seat in the House of Lords as earl of Uxbridge. In 18 10 he was divorced and married Mrs Wellesley, who had about the same time been divorced from her husband. Lady Paget was soon afterwards married to the duke of Argyll. In 181 5 Lord Uxbridge received command of the British cavalry in Flanders. At a moment of danger such as that of Napoleon’s return from Elba, the services of the best cavalry general in the British army could not be neglected. Wellington placed the greatest confidence in him, and on the eve of Waterloo extended his command so as to include the whole of the allied cavalry and horse artillery. He covered the retirement of the allies from Quatre Bras to Waterloo on the 17th of June, and on the 18th gained the crowning distinction of his military career in leading the great cavalry charge of the British centre, which checked and in part routed D’Erlon’s corps d’armee (see Waterloo Campaign) . Freely exposing his own life throughout, the earl received, by one of the last cannon shots fired, a severe wound in the leg, necessitating amputation. Five days later the prince regent created him marquess of Anglesey in recognition of his brilliant services, which were regarded universally as second only to those of the duke himself. He was made a G.C.B. and he was also decorated by many of the allied sovereigns.

In 1818 the marquess was made a knight of the Garter, in 1819 he became full general, and at the coronation of George IV. he acted as lord high steward of England. His support of the proceedings against Queen Caroline made him for a time un- popular, and when he was on one occasion beset by a crowd, who compelled him to shout ” The Queen,” he added the wish, ” May all your wives be like her.” At the close of April 1827 he became a member of the Canning administration, taking the post of master-general of the ordnance, previously held by Wellington. He was at the same time sworn a member of the privy council. Under the Wellington administration he accepted the appoint- ment of lord-lieutenant of Ireland (March 1828), and in the discharge of his important duties he greatly endeared

himself to the Irish people. The spirit in which he acted and the aims which he steadily set before himself contributed to the allaying of party animosities, to the promotion of a willing submission to the laws, to the prosperity of trade and to the extension and improvement of education. On the great question of the time his views were opposed to those of the government. He saw clearly that the time was come when the relief of the Catholics from the penal legislation of the past was an indispensable measure, and in December 1828 he addressed a letter to the Roman Catholic primate of Ireland distinctly announcing his view. This led to his recall by the government, a step sincerely lamented by the Irish. He pleaded for Catholic emancipation in parliament, and on the formation of Earl Grey's administration in November 1830, he again became lord-lieutenant of Ireland. The times were changed; the act of emancipation had been passed, and the task of viceroy in his second tenure of office was to resist the agitation for repeal of the union carried on by O'Connell. He felt it his duty now to demand Coercion Acts for the security of the public peace; his popularity was diminished, differences appeared in the cabinet on the difficult subject, and in July 1833 the ministry resigned. To the marquess of Anglesey Ireland is indebtedfor the board of education, the origination of which may perhaps be reckoned as the most memorable act of his viceroyalty. For thirteen years after his retirement he

remained out of office, and took little part in the affairs of government. He joined the Russell administration in July 1846 as master-general of the ordnance, finally retiring with his chief in March 1852. His promotion in the army was completed by his advancement to the rank of field-marshal in 1846. Four years before, he exchanged his colonelcy of the 7th Light Dragoons which he had held over forty years, for that of the Royal Horse Guards. He died on the 29th of April 1854.

The marquess had a large family by each of his two wives, two sons and six daughters by the first and six sons and four daughters by the second. His eldest son, Henry, succeeded him in the marquessate; but the title passed rapidly in succession to the 3rd, 4th and 5th marquesses. The latter, whose extravagances were notorious, died in 1905, when the title passed to his cousin.

Other members of the Paget family distinguished themselves in the army and the navy. Of the first marquess's brothers one, Sir Charles Paget (1778-1839), rose to the rank of vice-admiral in the Royal Navy; another, General Sir Edward Paget (1 775-1849), won great distinction by his skilful and resolute handling of a division at

Corunna, and from 1822 to 1825 was commander-in-chief in India. One of the marquess's sons by his second marriage, Lord Clarence Edward Paget (1811-1895), became an admiral; another, Lord George Augustus Frederick Paget (1818-1880), led the 4th Light Dragoons in the charge of the Light Brigade at Balaklava, and subsequently commanded the brigade, and, for a short time, the cavalry division in the Crimea. In 1865 he was made inspector-general of cavalry, in 1871 lieutenant-general and K.C.B., and in 1877 full general. His Crimean journals were published in 1881.

ANGLESEY, or Anglesea, an insular northern county of Wales. Its area is 176,630 acres or about 276 sq. m. Anglesey, in the see of Bangor, is separated from the mainland by the Menai Straits (Afon Menai), over which were thrown Telford's suspension bridge, in 1826, and the Stephenson tubular railway bridge in 1850. The county is flat, with slight risings such as Parys, Cadair Mynachdy (or Monachdy, i.e. "chair of the monastery"; there is a Nanner, " convent," not far away) and Holyhead Mountain. There are a few lakes, such as Cors cerrig y daran, but rising water is generally scarce. The climate is humid, the land poor for the most part compared with its old state of fertility, and there are few industries.

As regards geology, the younger strata in Anglesey rest upon a foundation of very old pre-Cambrian rocks which appear at the surface in three areas: — (1) a western region including Holyhead and Llanfaethlu, (2) a central area about Aberffraw and Tref- draeth, and (3) an eastern region which includes Newborough, Caerwen and Pentraeth. These pre-Cambrian rocks are schists and slates, often much contorted and disturbed. The general line of strike of the formations in the island is from N.E. to S.W. A belt of granitic rocks lies immediately north-west of the central pre-Cambrian mass, reaching from Llanfaelog near the coast to the vicinity of Llanerchymedd. Between this granite and the pre-Cambrian of Holyhead is a narrow tract of Ordovician slates and grits with Llandovery beds in places; this tract spreads out in the N. of the island between Dulas Bay and Carmel Point. A small patch of Ordovician strata lies on the northern side of Beaumaris. In parts, these Ordovician rocks are much folded, crushed and metamorphosed, and they are associated with schists and altered volcanic rocks which are probably pre-Cambrian. Between the eastern and central pre-Cambrian masses carboni- ferous rocks are found. The carboniferous limestone occupies a broad area S. of Ligwy Bay and Pentraeth, and sends a narrow spur in a south-westerly direction by Llangefni to Malldraeth sands. The limestone is underlain on the N. W. by a red basement conglomerate and yellow sandstone (sometimes considered

to be of Old Red Sandstone age). Limestone occurs again on the N. coast about Llanfihangel and Llangoed; and in the S.W. round Llanidan on the border of the Menai Strait. Puffin Island is made of carboniferous limestone. Malldraeth Marsh is occupied by coal measures, and a small patch of the same formation appears near Tall-y-foel Ferry on the Menai Straits. A patch of granitic and felsitic rocks form Parys Mountain, where copper and iron

ochre have been worked. Serpentine (Mona Marble) is found near Llanfaerynneubwll and upon the opposite shore in Holyhead. There are abundant evidences of glaciation, and much boulder clay and drift sand covers the older rocks. Patches of blown sand occur on the S.W. coast.

The London & North-Western railway (Chester and Holy- head branch) crosses Anglesey from Llanfairpwllgwyngyll to Gaerwen and Holyhead (Caer Gybi), also from Gaerwen to Amlwch. The staple of the island is farming, the chief crops being turnips, oats, potatoes, with flax in the centre. Copper (near Amlwch), lead, silver, marble, asbestos, lime and sandstone, marl, zinc and coal have all been worked in Anglesey, coal especially at Malldraeth and Trefdraeth. The population of the county in iooi was 50,606. There is no parliamentary borough, but one member is returned for the county. It is in the north- western circuit, and assizes are held at Beaumaris, the only municipal borough (pop. 2326). Amlwch (2994), Holyhead (10,079), Llangefni (1751) and Menai Bridge (Pont y Borth, 1 700) are urban districts. There are six hundreds and seventy- eight parishes.

Mon (a cow) is the Welsh name of Anglesey, itself a corrupted form of O.E., meaning the Isle of the Angles. Old Welsh names are Ynys Dywyll (" Dark Isle ") and Ynys y cedairn (cedyrn or kedyrn; " Isle of brave folk "). It is the Mona of Tacitus (Ann. xiv. 29, Agr. xiv. 18), Pliny the Elder (iv. 16) and Dio Cassius (62). It is called Mam Cymru by Giraldus Cambrensis. Clas Merddin, Y vel Ynys (honey isle), Ynys Prydein, Ynys Brut are other names. According to the Triads (67), Anglesey was once part of the mainland, as geology proves. The island was the seat of the Druids, of whom 28 cromlechs remain, on uplands over- looking the sea, e.g. at Plas Newydd. The Druids were attacked in a.d. 61 by Suetonius Paulinus, and by Agricola in a.d. 78. In the 5th century Caswallon lived here, and here, at Aberffraw, the princes of G wy nedd lived till 1 2 7 7 . The present road from Holyhead to

Llanfairpwllgwyngyll is originally Roman. British and Roman camps, coins and ornaments have been dug up and discussed, especially by the Hon. Mr Stanley of Penrhos. Pen Caer Gybi is Roman. The island was devastated by the Danes (Dub Gint or black nations, genies), especially in a.d. 853.

See Edw. Breese, Kalendar of Gwynedd (Venedocia), on Anglesey, Carnarvon and Merioneth (London, 1873) ; and The History of Powys Fadog.

ANGLESITE, a mineral consisting of lead sulphate, $PbS0_4$, crystallizing in the orthorhombic system, and isomorphous with barytes and celestite. It was first recognized as a mineral species by Dr Withering in 1783, who discovered it in the Parys copper- mine in Anglesey; the name anglesite, from this locality, was given by F. S. Beudant in 1832. The crystals from Anglesey, which were formerly found abundantly on a matrix of dull limonite, are small in size and simple in form, being usually bounded by four faces of a prism and four faces of a dome; they are brownish-yellow in colour owing to a stain of limonite. Crystals from some other localities, notably from Monteponi in Sardinia, are transparent and colourless, possessed of a brilliant adamantine lustre, and usually modified by numerous bright faces. The variety of combinations and habits presented by the crystals is very extensive, nearly two hundred distinct forms being figured by V. von Lang in his monograph of the species; without measurement of the angles the crystals are frequently difficult to decipher. The haidness is 3 and the specific gravity 6-3. There are distinct cleavages parallel to the faces of the prism jnof and the basal plane \ 001 } , but these are not so well developed as in the isomorphous minerals barytes and celestite.

Anglesite is a mineral of secondary origin, having been formed by the oxidation of galena in the upper parts of mineral lodes where these have been affected by weathering processes. At Monteponi the crystals encrust cavities in glistening granular galena; and from Leadhills, in Scotland, pseudomorphs of anglesite after galena are known. At most localities it is found

as isolated crystals in the lead-bearing lodes, but at some places, in Australia and Mexico, it occurs as large masses, and is then mined as an ore of lead, of which the pure mineral contains 68 %.

ANGLI, Anglii or Angles, a Teutonic people mentioned by Tacitus in his Germania (cap. 40) at the end of the 1st century. He gives no precise indication of their geographical position, but states that,

together with six, other tribes, including the Varini (the Warni of later times), they worshipped a goddess named Nerthus, whose sanctuary was situated on ” an island in the Ocean.” Ptolemy in his Geography (ii. n. § 15), half a century later, locates them with more precision between the Rhine, or rather perhaps the Ems, and the Elbe, and speaks of them as one of the chief tribes of the interior. Unfortunately, however, it is clear from a comparison of his map with the evidence furnished by Tacitus and other Roman writers that the indica- tions which he gives cannot be correct. Owing to the uncertainty of these passages there has been much speculation regarding the original home of the Angli. One theory, which however has little to recommend it, is that they dwelt in the basin of the Saale (in the neighbourhood of the canton Engilin), from which region the Lex Angliorum et Werinorum hoc est Thuringorum is believed by many to have come. At the present time the majority of scholars believe that the Angli had lived from the beginning on the coasts of the Baltic, probably in the southern part of the Jutish peninsula. The evidence for this view is derived partly from English and Danish traditions dealing with persons and events of the 4th century (see below), and partly from the fact that striking affinities to the cult of Nerthus as described by Tacitus are to be found in Scandinavian, especially Swedish and Danish, religion. Investigations in this subject have rendered it very probable that the island of Nerthus was Sjaelland (Zealand), and it is further to be observed that the kings of Wessex traced their ancestry ultimately to a certain Scyld, who is clearly to be identified with Skioldr, the mythical founder of the Danish royal family (Skioldungar). In English tradition this person is connected with ” Scedeland ” (pi.), a name which may have been applied to Sjaelland as well as Skane, while in Scandinavian tradition he is specially associated with the ancient royal residence at Leire in Sjaelland.

Bede states that the Angli before they came to Britain dwelt in a land called Angulus, and similar evidence is given by the Historia Brittonwm. King Alfred and the chronicler ˆEthelweard identified this place with the district which is now called Angel in the province of Schleswig (Slesvig), though it may then have been of greater extent, and this identification agrees very well with the indications given by Bede. Full confirmation is afforded by English and Danish traditions relating to two kings named Wermund (q.v.) and Off a (q.v.), from whom the Mercian royal family were descended, and whose exploits are connected with Angel, Schleswig and Rendsburg. Danish tradition has pre- served record of two governors of Schleswig, father and son, in their service, Frowinus (Freawine) and Wigo (Wig), from whom the royal family of Wessex claimed descent. During the 5th century the

Angli invaded this country (see Britain, Anglo- Saxon), after which time their name does not recur on the con- tinent except in the title of the code mentioned above.

The province of Schleswig has proved exceptionally rich in prehistoric antiquities which date apparently from the 4th and 5th centuries. Among the places where these have been found, special mention should be made of the large cremation cemetery at Borgstedterfeld, between Rendsburg and Eckernforde, which has yielded many urns and brooches closely resembling those found in heathen graves in England. Of still greater importance are the great deposits at Thorsbjaerg (in Angel) and Nydam, which contained large quantities of arms, ornaments, articles of clothing, agricultural implements, &c, and in the latter case even ships. By the help of these discoveries we are able to reconstruct a fairly detailed picture of English civilization in the age preceding the invasion of Britain.

Authorities. — Bede, Hist. Ecc. i. 15: King Alfred's version of Orosius, i. I.. §§ 12, 19; ˆEthelweard's Chronicle, lib. i. For traditions concerning the kings of Angel, see under Offa (i). L. Weiland,

Die Angeln (1889); A. Erdmann, tfber die Heimat und den Namen der Angeln (Upsala, 1890 — cf. H. Moller in the Anzeiger fur deutsches Altertum und deutsche Litteratur, xxii. 129 ff.) ; A. Kock in the Historisk Tidskrift (Stockholm), 1895, xv. p. 163 ff. ; G. Schiitte, Var Anglerne Tyskere? (Flensborg, 1900) ; H. Munro Chadwick, Tlie Origin of the English Nation (Cambridge, 1907); C. Engelhardt, Denmark in the Early Iron Age (London, 1866); J. Mestorf, Urnen-friedhofe in Schleswig-Holstein (Hamburg, 1886) ; S. Miiller, Nordische A Itertumskundc (Ger. trans., Strassburg, 1898), ii. p. 122 ff. ; see further Anglo-Saxons and Britain, Anglo-Saxon. (H. M. C.)

ANGLICAN COMMUNION, the name used to denote that great branch of the Christian Church consisting of the various churches in communion with the Church of England. The necessity for such a phrase as " Anglican Communion," first used in the 19th century, marked at once the immense development of the Anglican Church in modern times and the change which his taken place in the traditional conceptions of its character and sphere. The Church of England itself is the subject of a separate article (see England, Church of); and it is not without significance that for more than two centuries after the

Reformation the history of Anglicanism is practically confined to its developments within the limits of the British Isles. Even in Ireland, where it was for over three centuries the established religion, and in Scotland, where it early gave way to the dominant Fresbyterianism, its religious was long overshadowed by its political significance. The Church, in fact, while still claiming to be Catholic in its creeds and in its religious practice, had ceased to be Catholic in its institutional conception, which was now bound up with a particular state and also with a particular conception of that state. To the native Irishman and the Scots- man, as indeed to most Englishmen, the Anglican Church wasone of the main buttresses of the supremacy of the English crown and nation. This conception of the relations of church and state was hardly favourable to missionary zeal; and in the age succeed- ing the Reformation there was no disposition on the part of the English Church to emulate the wonderful activity of the Jesuits, which, in the 16th and 17th centuries, brought to the Church of Rome in countries beyond the ocean compensation for what she had lost in Europe through the Protestant reformation. Even when English churchmen passed beyond the seas, they carried with them their creed, but not their ecclesiastical organiza- tion. Prejudice and real or imaginary legal obstacles stood in the way of the erection of episcopal sees in the colonies; and though in the 17th century Archbishop Laud had attempted to obtain a bishop for Virginia, up to the time of the American revolution the churchmen of the colonies had to make the best of the legal fiction that their spiritual needs were looked after by the bishop of London, who occasionally sent commissaries to visit them and ordained candidates for the ministry sent to England for the purpose.

The change which has made it possible for Anglican churchmen to claim that their communion ranks with those of Rome and the Orthodox East as one of the three great historical divisions of the Catholic Church, was due, in the first instance, to the American revolution. The severance of the colonies from their allegiance to the crown brought the English bishops for the first time face to face with the idea of an Anglican Church which should have nothing to do either with the royal supremacy or with British nationality. When, on the conclusion of peace, the church-people of Connecticut sent Dr Samuel Seabury to England, with a request to the archbishop of Canterbury to consecrate him, it is not surprising that Archbishop Moore refused. In the opinion of prelates and lawyers alike, an act of parliament was necessary before a bishop could be consecrated for a see abroad; to consecrate one for a foreign country seemed impossible, since, though the bestowal of the poteslas ordinis would be valid, the

crown, which, according to the law, was the source of the episcopal jurisdiction, could hardly issue the necessary mandate for the consecration of a bishop to a sec outside the realm (see Bishop). The Scottish bishops, however, being hampered by no such legal restrictions, were more amen- able; and on the nth of November 1784 Seabury was con- secrated by them to the see of Connecticut. In 1786, on the

initiative of the archbishop, the legal difficulties in England were removed by the act for the consecration of bishops abroad ; and, on being satisfied as to the orthodoxy of the church in America and the nature of certain liturgical changes in con- templation, the two English archbishops proceeded, on the 14th of February 1787, to consecrate William White and Samuel Prevoost to the sees of Pennsylvania and New York (see Protestant Episcopal Church).

This act had a significance beyond the fact that it established in the United States of America a flourishing church, which, while completely loyal to its own country, is bound by special ties to the religious life of England. It marked the emergence of the Church of England from that insularity to which what may be called the territorial principles of the Reformation had condemned her. The change was slow, and it is not yet by any means complete.

Since the Church of England, whatever her attitude towards the traditional Catholic doctrines, never disputed the validity of Catholic orders whether Roman or Orthodox, nor the juris- diction of Catholic bishops in foreign countries, the expansion of the Anglican Church has been in no sense conceived as a Protestant aggressive movement against Rome. Occasional exceptions, such as the consecration by Archbishop Plunket of Dublin of a bishop for the reformed church in Spain, raised so strong a protest as to prove the rule. In the main, then, the expansion of the Anglican Church has followed that of the British empire, or, as in America, of its daughter states; its claim, so far as rights of jurisdiction are concerned, is to be the Church of England and the English race, while recognizing its special duties towards the non-Christian populations subject to the empire or brought within the reach of its influence. As against the Church of Rome, with its system of rigid centraliza- tion, the Anglican Church represents the principle of local autonomy, which it holds to be once more primitive and more catholic. In this respect the Anglican communion has developed on the lines defined in her articles at the Reformation; but, though in principle there is no great difference between a church defined by national, and a church defined by racial boundaries, there is an immense difference in effect, especially when

the race — as in the case of the English — is itself ecumenical.

The realization of what may be called this catholic mission of the English church, in the extension of its organization to the colonies, was but a slow process.

On the 12th of August 1787 Dr Charles Inglis was consecrated bishop of Nova Scotia, with jurisdiction over all the British possessions in North America. In 1793 the see of j-he Quebec was founded; Jamaica and Barbados followed Church in 1824, and Toronto and Newfoundland in 1839. I ˆ t . he . Meanwhile the needs of India has $ > een tardily met, on the urgent representations in parliament of William Wilberforce and others, by the consecration of Dr T. F. Middleton as bishop of Calcutta, with three archdeacons to assist him. In 181 7 Ceylon was added to his charge; in 1823 all British subjects in the East Indies and the islands of the Indian Ocean; and in 1824 "New South Wales and its dependencies"! Some five years later, on the nomination of the duke of Wellington, William Broughton was sent out to work in this enormous jurisdiction as archdeacon of Australia. Soon afterwards, in 1835 and 1837, the sees of Madras and Bombay were founded; whilst in 1836 Broughton himself was consecrated as first bishop of Australia. Thus down to 1840 there were but ten colonial bishops; and of these several were so hampered by civil regulations that they were little more than government chaplains in episcopal orders. In April of that year, however, Bishop Blomfield of London published his famous letter to the archbishop of Canterbury, declaring that " an episcopal church without a bishop is a contradiction in terms," and strenuously advocating a great eftort for the extension of the episcopate. It was not in vain. The plan was taken up with enthusiasm, and on Whitsun Tuesday of 1841 the bishops of the United Kingdom met and issued a declaration which inaugurated the Colonial Bishoprics Council. Subsequent

declarations in 1872 and 1891 have served both to record progress and to stimulate to new effort. The diocese of New Zealand was founded in 1841, being endowed by the Church Missionary- Society through the council, and George Augustus Selwyn was chosen as the first bishop. Since then the increase has gone on, as the result both of home effort and of the action of the colonial churches. Moreover, in many cases bishops have been sent to inaugurate new missions, as in the cases of the Universities' Mission to Central Africa, Lebombo,

Corea and New Guinea; and the missionary jurisdictions so founded develop in time into dioceses. Thus, instead of the ten colonial jurisdictions of 1 84 1, there are now about a hundred foreign and colonial jurisdictions, in addition to those of the Protestant Episcopal Church of the United States.

It was only very gradually that these dioceses acquired legislative independence and a determinate organization. At first, sees were created and bishops were nominated by the crown by means of letters patent; and in some cases an income was assigned out of public funds. Moreover, for many years all bishops alike were consecrated in England, took the customary ” oath of due obedience ” to the archbishop of Canterbury, and were regarded as his extra-territorial suffragans. But by degrees changes have been made on all these points.

(1) Local conditions soon made a provincial organization necessary, and it was gradually introduced. The bishop of Cal- cutta received letters patent as metropolitan of India

Provincial w jj en the sees of Madras and Bombay were founded; tioo. an d fresh patents were issued to Bishop Broughton in

1847 and Bishop Gray in 1853, as metropolitans of Australia and South Africa respectively. Similar action was’ taken in 1858, when Bishop Selwyn became metropolitan of New Zealand; and again in i860, when, on the petition of the Canadian bishops to the crown and the colonial legislature for permission to elect a metropolitan, letters patent were issued appointing Bishop Fulford of Montreal to that office. Since then metropolitans have been chosen and provinces formed by regular synodical action, a process greatly encouraged by the resolutions of the Lambeth conferences on the subject. The constitution of these provinces is not uniform. In some cases, as South Africa, New South Wales, and Queensland,the metropolitan see is fixed. Elsewhere, as in New Zealand, where no single city can claim pre-eminence, the metropolitan is either elected or else is the senior bishop by consecration. Two further developments must be mentioned: (a) The creation of diocesan and provincial synods, the first diocesan synod to meet being that of New Zealand in 1844, whilst the formation of a provincial synod was foreshadowed by a conference of Australasian bishops at Sydney in 1850; (b) towards the close of the 19th century the title of archbishop began to be assumed by the metropolitans of several provinces. It was first assumed by the metropolitans of Canada and Rupert’s Land, at the desire of the Canadian general synod in 1893; and subsequently, in accordance

with a resolution of the Lambeth conference of 1897, it was given by their synods to the bishop of Sydney as metropolitan of New South Wales and to the bishop of Cape Town as metropolitan of South Africa Civil obstacles have hitherto delayed its adoption by the metro-politan of India.

(2) By degrees, also, the colonial churches have been freed from their rather burdensome relations with the state. The

church of the West Indies was disestablished and Freedom disendowed in 1868. In 1857 it was decided, in control. Regina v. Eton College, that the crown could not claim

the presentation to a living when it had appointed the former incumbent to a colonial bishopric, as it does in the case of an English bishopric. In 1861, after some protest from the crown lawyers, two missionary bishops were consecrated without letters patent for regions outside British territory: C. F. Mackenzie for the Zambezi region and J. C. Patteson for Melanesia, by the metropolitans of Cape Town and New Zealand respectively. In 1863 the privy council declared, in Long v. The Bishop of Cape Town, that ” the Church of England, in places where there is no church established by law, is in the same

situation with any other religious body.” In 1865 it adjudged Bishop Gray’s letters patent, as metropolitan of Cape Town, to be powerless to enable him ” to exercise any coercive juris- diction, or hold any court or tribunal for that purpose,” since the Cape colony already possessed legislative institutions when they were issued; and his deposition of Bishop Colenso was declared to be ” null and void in law ” {re The Bishop of Natal). With the exception of Colenso the South African bishops forthwith surrendered their patents, and formally accepted Bishop Gray as their metropolitan, an example followed in 1865 in the province of New Zealand. In 1862, when the diocese of Ontario was formed, the bishop was elected in Canada, and con-secrated under a royal mandate, letters patent being by this time entirely discredited. And when, in 1867, a coadjutor was chosen for the bishop of Toronto, an application for a royal mandate produced the reply from the colonial secretary that ” it was not the part of the crown to interfere in the creation of a new bishop or bishopric, and not consistent with the dignity of the crown that he should advise Her Majesty to issue a mandate which would not be worth the paper on which it was written, and which, having been sent out to Canada, might be disregarded in the most complete manner.” And at the present day the colonial churches are entirely free in this matter. This, however, is not the case with the church in India. Here the bishops of

sees founded down to 1879 receive a stipend from the revenue (with the exception of the bishop of Ceylon, who no longer does so). They are not only nominated by the crown and consecrated under letters patent, but the appointment is expressly subjected ” to such power of revocation and recall as is by law vested ” in the crown; and where additional oversight was necessary for the church in Tinnevelly, it could only be secured by the consecration of two assistant bishops, who worked under a com- mission for the archbishop of Canterbury which was to expire on the death of the bishop of Madras. Since then, however, new sees have been founded which are under no such restrictions: by the creation of dioceses either in native states (Travancore and Cochin), or out of the existing dioceses (Chota Nagpur, x Lucknow, &c). In the latter case there is no legal subdivision of the older diocese, the new bishop administering such districts as belonged to it under commission from its bishop, provision being made, however, that in all matters ecclesiastical there shall be no appeal but to the metropolitan of India.

(3) By degrees, also, the relations of colonial churches to the archbishop of Canterbury have changed. Until 1855 no colonial bishop was consecrated outside the British Isles, the first instance being Dr MacDougall of Labuan, con- Jˆt oa u omy , secrated in India under a commission from the arch- bishop of Canterbury; and until 1874 it was held to be unlawful for a bishop to be consecrated in England without taking the suffragan’s oath of due obedience. This necessity was removed by the Colonial Clergy Act of 1874, which permits the archbishop at his discretion to dispense with the oath. This, however, has not been done in all cases; and as late as 1890 it was taken by the metropolitan of Sydney at his consecration. Thus the constituent parts of the Anglican communion gradually acquire autonomy: missionary jurisdictions develop into organized dioceses, and dioceses are grouped into provinces with canons of their own. But the most complete autonomy does not involve isolation. The churches are in full communion with one another, and act together in many ways; missionary jurisdictions and dioceses are mapped out by common arrangement, and even transferred if it seems advisable; e.g. the diocese Honolulu (Hawaii), previously under the jurisdiction of the archbishop of Canterbury, was transferred in 1900 to the Episcopal Church in the United States on account of political changes. Though the see of Canterbury claims no primacy over the Anglican communion analogous to that exercised over the Roman Church by the popes, it is regarded with a strong affection and deference, which shows itself by frequent consultation and interchange of greetings. There is also a strong common life emphasized by common action.

The conference of Anglican bishops from all parts of the world,

ANGLING

instituted by Archbishop Longley in 1867, and known as the Lambeth Conferences (q.v.), though even for the a “a an Anglican communion they have not the authority of an Congress, ecumenical synod, and their decisions are rather of the nature of counsels than commands, have done much to promote the harmony and co-operation of the various branches of the Church. An even more imposing manifestation of this common life was given by the great pan-Anglican congress held in London between the 12th and 24th of June 1908, which preceded the Lambeth conference opened on the 5th of July. The idea of this originated with Bishop Montgomery, secretary to the Society for the Propagation of the Gospel, and was endorsed by a resolution of the United Boards of Mission in 1903. As the result of negotiations and preparations extending over five years, 250 bishops, together with delegates, clerical and lay, from every diocese in the Anglican communion, met in London, the opening service of intercession being held in Westminster Abbey. In its general character, the meeting was but a Church congress on an enlarged scale, and the subjects discussed, e.g. the attitude of churchmen towards the question of the marriage laws or that of socialism, followed much the same lines. The congress, of course, had no power to decide or to legislate for the Church, its main value being in drawing its scattered members closer together, in bringing the newer and more isolated branches into consciousness of their contact with the parent stem, and in opening the eyes of the Church of England to the point of view and the peculiar problems of the daughter-churches.

The Anglican communion consists of the following: — (1) The Church of England, 2 provinces, Canterbury and York, with 24 and 11 dioceses respectively. (2) The Church of Ireland, 2 provinces, Armagh and Dublin, with 7 and 6 dioceses respec- tively. (3) The Scottish Episcopal Church, with 7 dioceses. (4) The Protestant Episcopal Church of the United States, with 89 dioceses and missionary jurisdictions, including North Tokyo, Kyoto, Shanghai, Cape Palmas, and the independent dioceses of Hayti and Brazil. (5) The Canadian Church, consisting of (a)the province of Canada, with 10 dioceses; (b) the province of Rupert’s Land, with 8 dioceses. (6) The Church in India and Ceylon, 1 province of 11 dioceses. (7) The Church of the West Indies, 1 province of 8 dioceses, of which Barbados and the Windward Islands are at present united. (8) The Australian Church, consisting of (a) the province of New South Wales, with 10 dioceses; (b) the province of Queensland, with 5 dioceses; (c) the province of Victoria, with 5 dioceses. (9) The Church of New Zealand, 1 province

of 7 dioceses, together with the missionary jurisdiction of Melanesia. (10) The South African Church, 1 province of 10 dioceses, with the 2 missionary jurisdictions of Mashonaland and Lebombo. (n) Nearly 30 isolated dioceses and missionary jurisdictions holding mission from the see of Canterbury.

Authorities. — Official Year-book of the Church of England; Phillimore, Ecclesiastical Law, vol. ii. (London, 1895); Digest of S.P.G. Records (London, 1893); E. Stock, History of the Church Missionary Society, 3 vols. (London, 1899); H. W. Tucker, The English Church in Other Lands (London, 1886) ; A. T. Wirgman, The Church and the Civil Power (London, 1893).

ANGLING, the art or practice of the sport of catching fish by means of a baited hook or ” angle ” (from the Indo-European root ank-, meaning ” bend “). 1 It is among the most ancient of human activities, and may be said to date from the time when man was in the infancy of the Stone Age, eking out a precarious existence by the slaughter of any living thing which he could reach with the rude weapons at his command. It is probable that attack on fishes was at first much the same as attack on

1 As to whether ” angling ” necessarily implies a rod as well as a line and hook, see the discussion in the law case of Barnard v. Roberts (Times L.R., April 13, 1907), when the question arose as to the use of night-lines being angling; but the decision against night-lines went on the ground of the absence of the personal element rather than on the absence of a rod. The various dictionaries are blind guides on this point, and the authorities cited are inconclusive; but, broadly speaking, angling now implies three necessary factors — a personal angler, the sporting element, and the use of recognized fishing-tackle.

animals, a matter of force rather than of guile, and conducted by means of a rude spear with a flint head. It is probable, too, that the primitive harpooners were not signally successful in their efforts, and so set their wits to work to devise other means of getting at the abundant food which waited for them in every piece of water near their caves. Observation would soon show them that fish fed greedily on each other and on other inhabitants of the water or living things that fell into it, and so, no doubt, arose the idea of entangling the prey by means of its appetite. Hence came the notion of the first hook, which, it seems certain, was not a hook at all but a ” gorge,” a piece of flint or stone which the fish could swallow with the bait but which it could not eject afterwards. From remains found in cave-dwellings and their neighbourhood in different parts of the world it is obvious that

these gorges varied in shape, but in general the idea was the same, a narrow strip of stone or flake of flint, either straight or slightly curved at the ends, with a groove in the middle round which the line could be fastened. Buried in the bait it would be swallowed end first; then the tightening of the line would fix it cross- wise in the quarry's, stomach or gullet and so the capture would be assured. The device still lingers in France and in a few remote parts of England in the method of catching eels which is known as " sniggling." In this a needle buried in a worm plays the part of the prehistoric gorge.

The evolution of the fish-hook from the slightly curved gorge is easily intelligible. The ends became more and more curved, until eventually an object not unlike a double hook was attained. This development would be materially assisted by man's dis- covery of the uses of bronze and its adaptability to his require- ments. The single hook, of the pattern more or less familiar to us, was possibly a concession of the lake-dweller to what may even then have been a problem — the " education " of fish, and to a recognition of the fact that sport with the crude old methods was falling off. But it is also not improbable that in some parts of the world the single hook developed pari passu with the double, and that, on the sea-shore for instance, where man was able to employ so adaptable a substance as shell, the first hook was a curved fragment of shell lashed with fibre to a piece of wood or bone, in such a way that the shell formed the bend of the hook while the wood or bone formed the shank. Both early remains and recent hooks from the Fiji Islands bear out this supposition. It is also likely that flint, horn and bone were pressed into service in a similar manner. The nature of the line or the rod that may have been used with these early hooks is largely a matter of conjecture. The first line was perhaps the tendril of a plant, the first rod possibly a sapling tree. But it is fairly obvious that the rod must have been suggested by the necessity of getting the bait out over obstacles which lay between the fisherman and the water, and that it was a device for increas- ing both the reach of the arm and the length of the line. It seems not improbable that the rod very early formed a part of the fisherman's equipment.

Literary History. — From prehistoric times down to compara- tively late in the days of chronicles, angling appears to have remained a practice; its development into an art or sport is a modern idea. In the earliest literature references to angling are not very numerous, but there are passages in the Old Testament which show that fish-taking with hook as well as net was one of the common industries in the East, and that fish, where it was obtainable, formed an important article of diet. In Numbers (xi. 5) the children of Israel mourn for the fish which they " did eat in Egypt freely." So much too is proved by

the monuments of Egypt; indeed more, for the figures found in some of the Egyptian fishing pictures using short rods and stout lines are sometimes attired after the manner of those who were great in the land. This indicates that angling had already, in a highly civilized country, taken its place among the methods of diversion at the disposal of the wealthy, though from the uncompromising nature of the tackle depicted and the. apparent simplicity of the fish it would scarcely be safe to assume that in Egypt angling arrived at the dignity of becoming an ” art.” In Europe it took I very much longer for the taking of fish to be regarded even as an

amusement, and the earliest references to it in the Greek and Latin classics are not very satisfying to the sportsman. There is, however, a passage in the Odyssey (xii. 247) which is of consider- able importance, as it shows that fishing with rod and line was well enough understood in early Greece to be used as a popular illustration. It occurs in the well-known scene where Scylla seizes the companions of Odysseus out of the ship and bears them upwards, just as ” some fisher on a headland with a long rod ” brings small fishes gasping to the shore. Another important, though comparatively late, passage in Greek poetry is the twenty-first idyll of Theocritus. In this the fisherman Asphalion relates how in a dream he hooked a large golden fish and describes graphically, albeit with some obscurity of language, how he ” played ” it. Asphalion used a rod and fished from a rock, much after the manner of the Homeric angler. Among other Greek writers, Herodotus has a good many references to fish and fishing; the capture of fish is once or twice mentioned or implied by Plato, notably in the Laws (vii. 823); Aristotle deals with fish?s in his Natural History; and there are one or two fishing passages in the anthology. But in Greek literature, as a whole the subject of angling is not at all prominent. In writers of late Greek, however, there is more material. Plutarch, for instance, gives us the famous story of the fishing match between Antony and Cleopatra, which has been utilized by Shakespeare. Moreover, it is in Greek that the first complete treatise on fishing which has come down to us is written, the Halieutica of Oppian (c. a.d. 169). It is a hexameter poem in five books with perhaps more technical than sporting interest, and not so much even of that as the length of the work would suggest. Still it contains some information about tackle and methods, and some passages describing battles with big fish, in the right spirit of enthusiasm. Also in Greek is what is famous as the first reference in literature to fly-fishing, in the

fifteenth book of Aelian's Natural History (3rd century a.d.). It is there described how the Macedonians captured a certain spotted fish in the river Astraeus by means of a lure composed of coloured wool and feathers, which was presumably used in the manner now known as " dapping." That there were other Greek writers who dealt with fish and fishing and composed " halieutics " we know from Athenaeus. In the first book of his Deipnosophislae he gives a list of them. But he compares their work unfavourably with the passage of Homer already cited, in a way which suggests that their knowledge of angling was not a great advance upon the knowledge of their remote literary ancestors. In Latin literature allusions to angling are rather more numerous than in Greek, but on the whole they are un- important. Part of a poem by Ovid, the Halieuticon, composed during the poet's exile at Tomi after a.d. 9, still survives. In other Roman writers the subject is only treated by way of allusion or illustration. Martial, however, provides, among other passages, what may perhaps be entitled to rank as the earliest notice of private fishery rights — the epigram Ad Piscatorem, which warns would-be poachers from casting a line in the Baian lake. Pliny the elder devoted the ninth book of his Natural History to fishes and water-life, and Plautus, Cicero, Catullus, Horace, Juvenal, Pliny the younger and Suetonius all allude to angling here and there. Agricultural writers, too, such as Varro and Columella, deal with the subject of fish ponds and stews rather fully. Later than any of these, but still just included in Latin literature, we have Ausonius (c. a.d. 320) and his well- known idyll the Mosella, which contains a good deal about the fish of the Moselle and the methods of catching them. In this poem is to be found the first recognizable description of members of the salmon family, and, though the manner of their application is rather doubtful, the names salmo, salar and Jario strike a responsive note in the breast of the modern angler.

Post-classical Literature. — As to what happened in the world of angling in the first few centuries of the Christian era we know little. It may be inferred, however, that both fish and fishermen occupied a more honourable position in Christendom than they ever did before. The prominence of fishermen in the gospel narratives would in itself have been enough to bring this about, but it also happened that the Greek word for fish, IX0TS, had an

anagrammatic significance which the devout were not slow to perceive. The initials of the word resolve into what is practically a confession of faith, 'Ir;

preserved in the Denison collection. This was published in 1883 by Mr Thomas Satchell under the title An Older Form of the Treatyse of Fysshynge wyth an Angle. But it is also possible that a still older work was the parent of both books, for it has been held that the manuscript is an independent version. How- ever this may be, it is certain that the treatise itself has been the parent of many other works. Many of the instructions contained in it are handed down from generation to generation with little change except in diction. Especially is this the case with the list of trout-flies, a meagre twelve, which survives in many fishing books until well into the 18th century.

From the beginning of the 16th century the fisherman's library begins to grow apace, as, though books solely devoted to fishing are not yet frequent, works on husbandry and country pursuits almost all contain something on the subject. In Italy the fisherman and his occupation apparently were considered poetic- ally; the word pescatore or its cognates are common on Italian 16th and 17th century title-pages, though in many instances the fulfilment of the implied promise is not adequate, from an angler's point of view. From the pages of Bibliotheca Piscatoria a fairly long list of Italian writers could be gleaned. Among them may be mentioned Sannazaro {Piscatoria, &c, Rome, 1526) and Andrea Calmo (Rime pescalorie. Venice, 1557). A century later was Parthenius, who published a volume of Halieutica at Naples. This writer has an amusing reference to the art of " tickling " trout as practised in Britain. In Germany, as has been shown, the original little Flemish treatise had a wide vogue in the 16th century, and fishing played a part in a good many books on husbandry such as that of Conrad Heresbach (1570). Fish and fish-ponds formed the main topic of a Latin work by Dubravius (1552), while Gesner in the middle of the 16th and Aldrovandi at the beginning of the 17th centuries wrote at length on the natural history of fishes. In France the subject is less well represented, but Lcs Pcscheries of Chris, de Gamon (Lyons, 1599) and Le Plaisir des champs of CI. Gauchet (Paris, 1604) deserve to be noted. Les Ruses innocentes by Francois Fortin, first published at Paris in 1600, and several times in later editions, is characterized by Messrs Westwood and Satchell as " on the whole the most interesting contribution made by France to the literature of angling." England during the most part of the 16th century was evidently well enough served by the original treatise out of The Book of St Albans. It was republished twice by Wynkyn de Worde, six or seven times by Copland, and some five times by other printers. It was also practically republished in A Booke of Fishing by L. M. (1590). L. M. (Leonard Mascall) ranks as an angling author, but he did little

more than borrow and edit the treatise. The same may be said of another version of The Book of St Albans ” now newly collected by W. G. Faulkener ” and issued in 1596.

Modern Literature. — In 1 600 appeared John Taverner’s Certaine Experiments concerning Fish and Fruite, and after this the period of angling literature proper begins. TheSecrets of Angling (1613), by J(ohn) D(ennys), Esq., is one of the most important volumes in the angler’s library, both on account of the excellence of the verse in which it is written and also on account of its practical value. Gervase Markham, ” the first journalist,” as he has been called, published his first book of husbandry at the same date, and, as in most of his many books on the same subject, devoted a certain amount of space to fishing. But Markham gathered his materials in a rather shameless manner and his angling passages have little originality. Thomas Barker’s The Art of Angling (1st ed., 1651) takes a more honourable position, and received warm commendation from Izaak Walton himself, who followed it in 1653 with The Compleat Angler. So much has been written about this treasured classic that it is only necessary to indicate its popularity here by saying that its editions occupy some twenty pages in Bibliotheca Piscatoria (1883), and that since that work was published at least forty new editions have to be added to the list. During Walton’s life-time the book ran through five editions, and with the fifth (1676) was incorporated Charles Cotton’s second part, the ” instructions how to angle for a trout or grayling, in a clear

stream.” In some cases too there was added a third book, the fourth edition of The Experienced Angler, by Robert Venables (1st ed., 1662). The three books together bore the title of The Universal Angler. Venables’s portion was dropped later, but it is worth reading, and contained sound instruction though it has not the literary merit of Walton and Cotton.

A few other notable books of the century call for enumeration, The Gentleman ‘s Recreation by Nicholas Cox (1674), Gilbert’s The Angler’s Delight (1676), Chetham’s Vade-Mecum (1681), The Complete Trotter by Robert Nobbes (1682), R. Franck’s Northern Memoirs (1694), and The True Art of Angling by J. S. (1696). Of these Chetham, Nobbes, Franck and J. S. have the merit of considerable originality. Franck has gained some notoriety by his round abuse of Walton. In the 18th century among others we find The Secrets of Angling by C. G. (1705), Robert Howlett’s The Angler’s Sure Guide (1706), The Whole Art of Fishing (1714), The Compleat Fishermanby James Saunders (1724), The Art of Angling by R. Brookes (1740), another book with the same title by R. and C. Bowlker (Worcester, c.

1750), The Complete Sportsman by Thomas Fairfax (c. 1760), The Angler's Museum by T. Shirley (1784), and A Concise Treatise on the Art of Angling by Thomas Best (1787). Of these only Saunders's, Bowlker's and Best's books are of much importance, the rest being for the most part " borrowed." One volume of verse in the 18th century calls for notice, Moses Browne's Piscatory Eclogues (1729). Among greater names we get angling passages in Pope, Gay and Thomson; the two last were evidently brothers of the angle.

With the 19th century angling literature becomes too big a subject to be treated in detail, and it is only possible to glance at a few of the more important books and writers. Daniel's Rural Sports appeared in 1801; it is a treasure-house of odd facts. In 1828 Sir Humphry Davy published his famous Salmonia, which was reviewed in the Quarterly by Sir Walter- Scott. At about this time too were appearing the Nodes Ambro- sianae in Blackwood's Magazine. Christopher North (Professor Wilson) often touched upon angling in them, besides contributing a good many angling articles to the magazine. In 1835 that excellent angling writer Thomas Tod Stoddart began his valuable series of books with The Art of Angling as Practised in Scotland. In 1839 he published Songs and Poems, among which are pieces of great merit. During this period, too, first appeared, year by year, the Newcastle Fishers' Garlands, collected by Joseph Crawhall afterwards and republished in 1864. These border. verses, like Stoddart's, have often a genuine ring about them which is missing from the more polished effusions of Gay and Thomson. Alfred Ronalds's The Fly-Fisher's Entomology (1st ed., 1836) was a publication of great importance, for it marked the beginning of the scientific spirit among trout-fishers. It ran through many editions and is still a valuable book of reference. A step in angling history is also marked by George Pulman's Vade-Mecum of Fly-fishing for Trout (1841), for it contains the first definite instructions on fishing with a " dry fly." Another is marked by Hewett Wheatley's The Rod and the Line (1849), where is to be found the earliest reference to the " eyed " hook. Yet another is marked by W. C. Stewart's The Practical Angler (1857), in which is taught the new doctrine of " up-stream " fishing for trout. This is a book of permanent value. Among the many books of this period Charles Kingsley's Miscellanies (1859) stands out, for it contains the immortal " Chalk-Stream Studies." The work of Francis Francis begins at about the same time, though his A Book on Angling, which is still one of the most valuable text-books, was not first published till 1867. Another well-known and excellent writer, Mr H. Cholmondeley Pennell, began in the early 'sixties; it is to him that we owe the admirable volumes on fresh-water fishing in the " Badminton Library." Among other English

writers mention must be made of Messrs William Senior, John Bicker-dyke and F. M. Halford, who have all performed signal services for angling and its literature. (See further bibliography ad fin.) In America the latter half of the 19th century produced a good deal of fishing literature, much of it of a high standard. / go

a-Fishing by Dr W. C. Prime (1873), Fishing with the Fly by C. F. Orvis, A. Nelson Cheney and others (1883), The American Salmon Fisherman and Fly Rods and Fly Tackle by H. P. Wells (1886 and 1885), Little Rivers and other books by the Rev. H. Van Dyke — these are only a few specially distinguished in style and matter. Germany and France have not contributed so largely to the modern library, but in the first country we find several useful works by Max von dem Borne, beginning with the Handbuch der Angelfischerei of 1875, and there are a good many other writers who have contributed to the subject, while in France there are a few volumes on fishing by different hands. The most noticeable is M. G. Albert Petit's La Truite de riviere (1897), an admirable book on fly-fishing. Asyet, however, though there are many enthusiastic anglers in France, the sport has not established itself so firmly as to have inspired much literature of its own ; the same may be said of Germany.

Modern Conditions. — In the modern history of angling there are one or two features that should be touched upon. The great increase in the number of fishermen has had several results. One is a corresponding increase in the difficulty of obtaining fishing, and a notable rise in the value of rivers, especially those which are famed for salmon and trout. Salmon-fishing now may be said to have become a pastime of the rich, and there are signs that trout-fishing will before long have to be placed in the same exclusive category, while even the right to angle for less-esteemed fish will eventually be a thing of price. The development is natural, and it has naturally led to efforts on the part of the angling majority to counteract, if possible, the growing difficulty. These efforts have been directed chiefly in two ways, one the establishment of fishing clubs, the other the adoption of angling in salt water. The fishing club of the big towns was originally a social institution, and its members met together to sup, con- 1 verse on angling topics and perhaps to display notable fish that .they had caught. Later, however, arose the idea that it would be a convenience if a club could give its members privileges of fishing as well as privileges of reunion. So it comes about that all over the United

Kingdom, in British colonies and dependencies, in the United States, and also in Germany and France, fishing clubs rent waters, undertake preservation and restocking and generally lead an active and useful existence. It is a good sign for the future of angling and anglers that they are rapidly increasing in number. One of the oldest fishing clubs, if not the oldest, was the Schuylkill club, founded in Pennsylvania in 1732. An account of its history was published in Philadelphia in 1830. Among the earliest clubs in London are to be numbered such societies as The True Waltonians, The Piscatorial, The Friendly Anglers and The Gresham, which are still flourishing. A certain amount of literary activity has been observable in the world of angling clubs, and several volumes of " papers " are on the records. Most noticeable perhaps are the three volumes of Anglers' Evenings published in 1880-1894, a collection of essays by members of the Manchester Anglers' Association. The other method of securing a continuance of sport, the adoption of sea- angling as a substitute for fresh-water fishing, is quite a modern thing. Within the memory of men still young the old tactics of hand-line and force were considered good enough for sea fish. Now the fresh-water angler has lent his centuries of experience in deluding his quarry; the sea-angler has adopted many of the ideas presented to him, has modified or improved others, and has developed the capture of sea-fish into a science almost as subtle as the capture of their fresh-water cousins. One more modern feature, which is also a result of the increase of anglers, is the great advance made in fish-culture, fish-stocking and fish-acclimatiza- tion during the last half-century. Fish-culture is now a recognized industry; every trout-stream of note and value is restocked from time to time as a matter of course; salmon-hatcheries are numerous, though their practical utility is still a debated matter, in Great Britain at any rate; coarse fish are also bred for purposes of restocking; and, lastly, it is now considered a fairly simple matter to introduce fish from one country to another, and even from continent to continent. In England the movement owes a great deal to Francis Francis,

who, though he was not the earliest worker in the field, was among the first to formulate the science of fish-breeding; his book Fish-Culture, first published in 1863, still remains one of the best treatises on the subject. In the United States, where fishery science has had the benefit of generous governmental and official support and countenance and so has reached a high level of achievement, Dr. T. Garlick (The Artificial Reproduction oj Fishes, Cleveland, 1857) is honoured as a pioneer. On the continent of Europe the latter half of the 19th century saw a very considerable and rapid development in fish-culture, but until comparatively recently the propagation and care

of fish in most European waters have been considered almost entirely from the point of view of the fish-stew and the market. As to what has been done in the way of acclimatization it is not necessary to say much. Trout {Salmo fario) were introduced to New Zealand in the late ‘sixties from England; in the ‘eighties rainbow trout (Salmo irideus) were also introduced from California ; now New Zealand provides the finest trout-fishing of its kind in the world. American trout of different kinds have been introduced into England, and brown trout have been introduced to America; but neither innovation can be said to have been an unqualified success, though the rainbow has established itself firmly in some waters of the United Kingdom. It is still regarded with some suspicion, as it has a tendency to wander from waters which do not altogether suit it. For the rest, trout have been established in Ceylon, in Kashmir and in South Africa, and early in 1906 an attempt was made to carry them to British Central Africa. In fact the possibilities of acclimatization are so great that, it seems probable, in time no river of the civilized world capable of holding trout will be without them.

Methods and Practice

Angling now divides itself into two main divisions, fishing in fresh water and fishing in the sea. The two branches of the sport have much in common, and sea-angling is really little more than an adaptation of fresh-water methods to salt-water con- ditions. Therefore it will not be necessary to deal with it at great length and it naturally comes in the second place. Angling in fresh water is again divisible into three principal parts, fishing on the surface, i.e. with the fly; in mid- water, i.e. with a bait simulating the movements of a small fish or with the small fish itself; and on the bottom with worms, paste or one of the many other baits which experience has shown that fish will take. With the premise that it is not intended here to go into the minutiae of instruction which may more profitably be discovered in the many works of reference cited at the end of this article, some account of the subdivisions into which these three styles of fishing fall may be given.

Fresh-Water Fishing.

Fly-fishing. — Fly-fishing is the most modern of them, but it is the most highly esteemed, principally because it is the method par excellence of taking members of the most valuable sporting family of fish, the Salmonidae. It may roughly be considered under three heads, the use of the ” wet ” or sunk fly, of the ” dry ” or floating fly, and of the natural insect. Of these the first is the most important, for it covers the widest field and is the most universally practised. There are few

varieties of fish which may not either consistently or occasionally be taken with the sunk fly in one of its two forms. The large and gaudy bunch of feathers, silk and tinsel with which salmon, very large trout, black bass and occasionally other predaceous fish are taken is not, strictly speaking, a fly at all. Jt rather represents, if anything, some small fish or subaqueous creature on which the big fish is accustomed to feed and it may conveniently receive the generic name of salmon-fly. The smaller lures, however, which are used to catch smaller trout and other fish that habitually feed on insect food are in most cases intended to represent that food in one of its forms and are entitled to the name of “artificial flies.” The dry or floating fly is simply a development of the imitation theory, and has been evolved from the wet fly in course of closer observation of the habits of flies and fish in certain waters. Both wet and dry fly methods are really a substitute for the third and

oldest kind of surface-fishing, the use of a natural insect as a bait. Each method is referred to incidentally below.

Spinning, b’c. — Mid-water fishing, as has been said, broadly consists in the use of a small fish, or something that simulates it, and its devices are aimed almost entirely at those fish which prey on their fellows. Spinning, live-baiting and trolling 1 are these devices. In the first a small dead fish or an imitation of it made in metal, india-rubber, or other substance, is caused to revolve rapidly as it is pulled through the water, so that it gives the idea of something in difficulties and trying to escape. In the second a small fish is put on the angler’s hook alive and conveys the same idea by its own efforts. In the third a small dead fish is caused to dart up and down in the water without revolving; it conveys the same idea as the spinning fish, though the manipula- tion is different.

Bottom-Fishing. — Bottom-fishing is the branch of angling which is the most general. There is practically no fresh-water fish that will not take some one or more of the baits on the angler’s list if they are properly presented to it when it is hungry. Usually the baited hook is on or near the bottom of the water, but the rule suggested by the name ” bottom-fishing ” is not invariable and often the bait is best used in mid-water; similarly, in ” mid-water fishing ” the bait must sometimes be used as close to the bottom as possible. Bottom-fishing is roughly divisible into two kinds, float-fishing, in which a bite is detected by the aid of a float fastened to the line above the hook and so balanced that its tip is visible above the water, and hand-fishing, in

which no float is used and the angler trusts to his hand to feel the bite of a fish. In most cases either method can be adopted and it is a matter of taste, but broadly speaking the float-tackle is more suited to water which is not very deep and is either still or not rapid. In great depths or strong streams a float is difficult to manage.

The Fish.

It is practically impossible to classify the fish an angler catches according to the methods which he employs, as most fish can be taken by at least two of these methods, while many of those most highly esteemed can be caught by all three. Sporting fresh-water fish are therefore treated according to their families and merits from the angler's point of view, and it is briefly indicated which method or methods best succeed in pursuit of them.

Salmon. — First in importance come the migratory Salmonidae, and at the head of them the salmon {Salmo salar), which has a two-fold reputation as a sporting and as a commercial asset. The salmon fisheries of a country are a very valuable possession, but it is only comparatively recently that this has been realized and that salmon rivers have received the legal protection which is necessary to their well-being. Even now it cannot be asserted that in England the salmon question, as it is called, is settled. Partly owing to our ignorance of the life-history of the fish, partly owing to the difficulty of reconciling the opposed interests of commerce and sport, the problem as to how a river should be treated remains only partially solved, though it cannot be denied that there has been a great advance in the right direction. The life-history of the salmon, so far as it concerns the matter in hand, may be very briefly summed up. It is bred in the rivers and fed in the sea. The parent fish ascend in late autumn as high a"s they can get, the ova are deposited on gravel shallows, hatching out in the course of a few weeks into parr. The infant salmon remains in fresh water at least one year, generally two years, without growingmore than a few inches, and then about May assumes what is called the smolt-dress, that is to say, it loses the dark parr-bands and red spots of infancy and becomes silvery all over. After this it descends without delay to the sea, where it feeds to such good purpose that in a year it has reached a weight of 2 lb to 4 lb or more, and it may then reascend as a grilse. Small grilse indeed may only have been in the sea a few months, ascending in the autumn of the year of their first descent. If the fish survives the

1 Trolling is very commonly confused in angling writing and talk with trailing, which simply means drawing a spinning-bait along behind a

boat in motion.

perils of its first ascent and spawning season and as a kelt or spawned fish gets down to the sea again, it comes up a second time as a salmon of weight varying from 8 lb upwards. Whether salmon come up rivers, and, if so, spawn, every year, why some fish are much heavier than others of the same age, what their mode of life is in the sea, why some run up in spring and summer when the breeding season is not till about November or December, whether they were originally sea-fish or river-fish — these and other similar questions await a conclusive answer. One principal fact, however, stands out amid the uncertainty , and that is that without a free passage up and down unpolluted rivers and without protection on the spawning beds salmon have a very poor chance of perpetuating their species. Economic prudence dictates therefore that every year a considerable proportion of running salmon should be allowed to escape the dangers that confront them in the shape of nets, obstructions, pollutions, rods and poachers. And it is in the adjustment of the interests which are bound up in these dangers (the last excepted; officially poachers have no interests, though in practice their plea of ” custom and right ” has too often to be taken into consideration) that the salmon question consists. To secure a fair proportion of fish for the market, a fair proportion for the rods and a fair proportion for the redds, without unduly damaging manufacturing interests, this is the object of those who have the question at heart, and with many organizations and scientific observers at work it should not be long before the object is attained. Already the system of ” marking ” kelts with a small silver label has resulted in a considerable array of valuable statistics which have made it possible to estimate the salmon’s ordinary rate of growth from year to year. It is very largely due to the efforts of anglers that the matter has gone so far. Whether salmon feed in fresh water is another question of peculiar interest to anglers, for it would seem that if they do not then the whole practice of taking them must be an anomaly. Champions have arisen on both sides of the argu- ment, some, scientists, asserting that salmon (parr and kelts excluded, for both feed greedily as opportunity occurs) do not feed, others, mostly anglers, maintaining strongly that they do, and bringing as evidence their undoubted and customary capture by rod and line, not only with the fly, but also with such obvious food-stuffs as dead baits, worms and prawns. On the other side it is argued that food is never found inside a salmon after it has been long enough in a river to have digested its last meal taken in salt water. The very few instances of food found in salmon which have been brought forward to support the contrary opinion are in the scientific view to be regarded with great caution; certainly in one case

of recent years, which at first appeared to be well authenticated, it was afterwards found that a small trout had been pushed down a salmon's throat after capture by way of a joke. A consideration of the question, however, which may perhaps make some appeal to both sides, is put forward by Dr J. Kingston Barton in the first of the two volumes on Fishing {Country Life Series). He maintains that salmon do not habitually feed in fresh water, but he does not reject the possibility of their occasion- ally taking food. His view is that after exertion, such as that entailed by running from pool to pool during a spate, the fish may feel a very transient hunger and be impelled thereby to snap at anything in its vicinity which looks edible. The fact that the angler's best opportunity is undoubtedly when salmon have newly arrived into a pool, supports this contention. The longer they are compelled to remain in the same spot by lack of water the worse becomes the prospect of catching them, and " unfishable " is one of the expressive words which fishermen use to indicate the condition of a river during the long periods of drought which too often distinguish the sport.

Salmon Tackle and Methods. — It is when the drought breaks up and the long-awaited rain has come that the angler has his chance and makes ready his tackle, against the period of a few days (on some short streams only a few hours) during which the water will be right; right is a very exact term on some rivers, meaning not only that the colour of the water is suitable to the fly, but that its height shall be within an inch or two of a given mark, prescribed by experience. As to the tackle which is made ready,

there is, as in most angling matters, divergence of opinion. Salmon fly-rods are now made principally of two materials, greenheart and split-cane; the former is less expensive, the latter is more durable; it is entirely a matter of taste which a man uses, but the split-cane rod is now rather more in favour, and for salmon-fishing it is in England usually built with a core of steel running from butt to tip and known as a " steel centre." How long the rod shall be is also a matter on which anglers differ, but from 16 ft. to 17 ft. 6 in. represents the limits within which most rods are preferred. The tendency is to reduce rather than to increase the length of the rod, which may be accounted for by the adoption of a heavy line. Early in the 19th century anglers used light-topped rods of 20 ft. and even more, and with them a light line composed partly of horse-hair; they thought 60 ft. with such

material a good cast. Modern experience, however, has shown that a shorter rod with a heavier top will throw a heavy dressed silk line much farther with less exertion. Ninety feet is now considered a good fishing cast, while many men can throw a great deal more. In the United States, where rods have long been used much lighter than in England, the limits suggested would be considered too high. From 1 2 ft. 6 in. to 1 5 ft. 6 in. is about the range of the American angler's choice, though long rods are not unknown with him. The infinite variety of reels, lines, gut collars 1 and other forms of tackle which is now presented to the angler's consideration and for his bewilderment is too wide a subject to be touched upon here. Something, however, falls to be said about flies. One of the perennially fruitful topics of inquiry is what the fish takes a salmon-fly to be. Beyond a fairly general admission that it is regarded as something endowed with life, perhaps resembling a remembered article of marine diet, perhaps inviting gastro- nomic experiment, perhaps irritating merely and rousing an impulse to destroy, the discussion has not reached any definite conclusion. But more or less connected with it is the controversy as to variety of colour and pattern. Some authorities hold that a great variety of patterns with very minute differences in colour and shades of colour is essential to complete success; others contend that salmon do not differentiate between nice shades of colour, that they only draw distinctions between flies broadly as being light, medium or dark in general appearance, and that the size of a fly rather than its colour is the important point for the angler's consideration. Others again go some way with the supporters of the colour-scheme and admit the efficacy of flies whose general character is red, or yellow, or black, and so on. The opinion of the majority, however, is probably based on past experience, and a man's favourite flies for different rivers and condition of water are those with which he or someone else has previously succeeded. It remains a fact that in most fly-books great variety of patterns will be discoverable, while certain old standard favourites such as the Jock Scott, Durham Ranger, Silver Doctor, and Thunder and Lightning will be prominent. Coming out of the region of controversy it is a safe generalization to say that the general rule is: big flies for spring fishing when rivers are probably high, small flies for summer and low water, and flies medium or small in autumn according to the conditions. Spring fishing is considered the cream of the sport. Though salmon are not as a rule so numerous or so heavy as during the

1 The precise date when silkworm gut (now so important a feature of the angler's equipment) was introduced is obscure. Pepys, in his Diary (1667), mentions " a gut string varnished over " which " is beyond

any hair for strength and smallness ” as a new angling secret which he likes ” mightily.” In the third edition (1700) of Chetham’s Vade-Mecum, already cited, appears an advertisement of the ” East India weed, which is the only thing for trout, carp and bottom- fishing.” Again, in the third edition of Nobbes’s Art of Trolling (1805), in the supplementary matter, appears a letter signed by J. Eaton and G. Gimber, tackle-makers of Crooked Lane (July 20, 1801), in which it is stated that gut ” is produced from the silkworm and not an Indian weed, as has hitherto been conjec- tured. . . .” The word ” gut ” is employed before this date, but it seems obvious that silkworm gut was for a long time used under the impression that it was a weed, and that its introduction was a thing of the 17th century. It is probable, however, that vegetable fibre was used too; we believe that in some parts of India it is used by natives to this day. Pepys’ ” minikin ” was probably cat-gut.

autumn run, and though kelts are often a nuisance in the early months, yet the clean-run fish of February, March or April amply repays patience and disappointment by its fighting powers and its beauty. Summer fishing on most rivers in the British Islands is uncertain, but in Norway summer is the season, which possibly explains to some extent the popularity of that country with British anglers, for the pleasure of a sport is largely increased by good weather.

Two methods of using the fly are in vogue, casting and harling. The first is by far the more artistic, and it may be practised either from a boat, from the bank or from the bed of the river itself; in the last case the angler wades, wearing waterproof trousers or wading-stockings and stout nail-studded brogues. In either case the fishing is similar. The fly is cast across and down stream, and has to be brought over the ” lie ” of the fish, swimming naturally with its head to the stream, its feathers working with tempting movement and its whole appearance suggesting some live thing dropping gradually down and across stream. Most anglers add to the motion of the fly by “working ” it with short pulls from the rod-top. When a fish takes, the rise is sometimes seen, sometimes not; in any case the angler should not respond with the rod until he feels the pull. Then he should tighten, not strike. The fatal word ” strike,” with its too literal interpretation, has caused many a breakage. Having hooked his fish, the angler must be guided by circumstances as to what he does; the salmon will usually decide that for him. But it is a sound rule to give a well-hooked fish no unnecessary advantage and to hold on as hard as the tackle will allow. Good tackle will stand an immense strain, and with this ” a minute a pound ” is a fair estimate of the time in which a fish

should be landed. A foul-hooked salmon (no uncommon thing, for a fish not infre- quently misses the fly and gets hooked somewhere in the body) takes much longer to land. The other method of using the fly, harling, which is practised on a few big rivers, consists in trailing the fly behind a boat rowed backward and forwards across the stream and dropping gradually downwards. Fly-fishing for salmon is also practised on some lakes, into which the fish run. On lakes the boat drifts slowly along a " beat," while the angler casts diagonally over the spots where salmon are wont to lie. Salmon may also be caught by " mid-water fishing," with a natural bait either spun or trolled and with artificial spinning- baits of different kinds, and by " bottom-fishing " with prawns, shrimps and worms. Spinning is usually practised when the water is too high or too coloured for the fly; trolling is seldom employed, but is useful for exploring pools which cannot be fished by spinning or with the fly; the prawn is a valuable lure in low water and when fish are unwilling to rise ; while the worm is killing at all states of the river, but except as a last resource is not much in favour. There are a few waters where salmon have the reputation of not taking a fly at all; in them spinning or prawning are the usual modes of fishing. But most anglers, wherever possible, prefer to use the fly. The rod for the alter- native methods is generally shorter and stiffer than the fly-rod, though made of like material. Twelve to fourteen feet represents about the range of choice. Outside the British Islands the salmon-fisher finds the headquarters of his sport in Europe in Scandinavia and Iceland, and in the New World in some of the waters of Canada and Newfoundland.

Land-locked Salmon. — The land-locked salmon (Salmo salar sebago) of Canada and the lakes of Maine is, as its name implies, now regarded by scientists as merely a land-locked form of the salmon. It does not often attain a greater size than 20 lb, but it is a fine fighter and is highly esteemed by American anglers. In most waters it does not take a fly so well as a spinning- bait, live-bait or worm. The methods of angling for it do not differ materially from those employed for other Salmonidae.

Pacific. Salmon. — Closely allied to Salmo salar both in appear- ance and habits is the genus Oncorhynchus, commonly known as Pacific salmon. It contains six species, is peculiar to the North Pacific Ocean, and is of some importance to the angler, though of not nearly so much as the Atlantic salmon. The quinnat is the largest member of the genus, closely resembles salar in

appearance and surpasses him in size. The others, sockeye, humpback, cohoe, dog-salmon and masu, are smaller and of less interest to the angler, though some of them have great commercial value. The last-named is only found in the waters of Japan, but the rest occur in greater or less quantities in the rivers of Kam- chatka, Alaska, British Columbia and Oregon. The problems presented to science by solar are offered by Oncorhynchus also, but there are variations in his life-history, such as the fact that few if any fish of the genus are supposed to survive their first spawning season. When once in the rivers none of these salmon is of very much use to the angler; as, though it is stated that they will occasionally take a fly or spoon in fresh water, they are not nearly so responsive as their Atlantic cousin and in many streams are undoubtedly not worth trying for. At the mouths of some rivers, however, where the water is distinctly tidal, and in certain bays of the sea itself they give very fine sport, the method of fishing for them being usually to trail a heavy spoon- bait behind a boat. By this means remarkable bags of fish have been made by anglers. The sport is of quite recent development. Sea-Trout. — Next to the salmon comes the sea-trout, the other migratory salmonid of Europe. This is a fish with many local names and a good deal of local variation. Modern science, how- ever, recognises two ” races ” only, Salmo trutta, the sea-trout proper, and Salmo cambricus or eriox, the bull-trout, or sewin of Wales, which is most prominent in such rivers as the Coquet and Tweed. The life-history of sea-trout is much the same as that of salmon, and the fish on their first return from the sea in the grilse-stage are called by many names, finnock, herling and whitling being perhaps the best known. Of the two races Salmo trutta alone is of much use to the fly-fisher. The bull-trout, for some obscure reason, is not at all responsive to his efforts, except in its kelt stage. Then it will take greedily enough, but that is small consolation. The bull-trout is a strong fish and grows to a great size and it is a pity that it is not of greater sporting value, if only to make up for its bad reputation as an article of food. Some amends, however, are made by its cousin the sea-trout, which is one of the gamest and daintiest fish on the angler’s list. It is found in most salmon rivers and also in not a few streams which are too small to harbour the bigger fish, while there are many lakes in Scotland and Ireland (where the fish is usually known as white trout) where the fishing is superb when the trout have run up into them. Fly-fishing for sea-trout is not a thing apart. A three-pounder that will impale itself on a big salmon-fly, might equally well have taken a tiny trout-fly. Many anglers, when fishing a sea-trout river where they run large, 5 lb or more, and where there is also a

chance of a salmon, effect a compromise by using a light 13 ft. or 14 ft. double-handed rod, and tackle not so slender as to make hooking a salmon a certain disaster. But undoubtedly to get the full pleasure out of sea-trout-fishing a single-handed rod of 10 ft. to 12 ft. with reasonably fine gut and small flies should be used, and the way of using it is much the same as in wet-fly fishing for brown trout, which will be treated later. When the double- handed rod and small salmon-flies are used, the fishing is practically the same as salmon-fishing except that it is on a somewhat smaller scale. Flies for sea-trout are numberless and local patterns abound, as may be expected with a fish which has so catholic a taste. But, as with salmon-fishers so with sea-trout- fishers, experience forms belief and success governs selection. Among the small salmon-flies and loch-flies which will fill his book, the angler will do well to have a store of very small trout- flies at hand, while experience has shown that even the dry fly will kill sea-trout on occasion, a thing that is worth remembering where rivers are low and fish shy. July, August and September are in general the best months for sea-trout, and as they are dry months the angler often has to put up with indifferent sport. The fish will, however, rise in tidal water and in a few localities even in the sea itself, or in salt-water lochs into which streams run. Sea-trout have an irritating knack of " coming short," that is to say, they will pluck at the fly without really taking it. There are occasions, on the other hand, in loch-fishing where plenty of time must be given to the fish without tightening on it, especially

if it happens to be a big one. Like salmon, sea-trout are to be caught with spinning-baits and also with the worm. The main controversy that is concerned with sea-trout is whether or no the fish captured in early spring are clean fish or well-mended kelts. On the whole, as sea-trout seldom run before May, the majority of opinion inclines to their being kelts.

Non-migratory Salmonidae. — Of the non-migratory members of the Salmonidae the most impotant in Great Britain is the brown trout (Salmo fario). Its American cousin the rainbow trout (S. irideus) is now fairly well established in the country too, while other transatlantic species both of trout and char (which are some of them partially migratory, that is to say, migratory when occasion offers), such as the steelhead (S. rivu- laris), fontinalis (S. fonlinalis) and the cut-throat trout (S. clarkil), are at least not unknown.- All these fish,. together with their allied forms in America, can be captured wdth the fly, and, speaking broadly, the wet-fly method will do well for them all. Therefore it is only necessary to deal with the methods applicable to one species, the brown trout.

Trout. — Of the game-fishes the brown trout is the most popular, for it is spread over the whole of Great Britain and most of Europe, wherever there are waters suited to it. It is a fine sporting fish and is excellent for the table, while in some streams and lakes it grows to a very considerable size, examples of 16 lb from southern rivers and 20 lb from Irish and Scottish lakes being not unknown. One of the signs of its popularity is that its habits and history have produced some very animated con- troversies. Some of the earliest discussions were provoked by the liability of the fish to change its appearance in different surroundings and conditions, and so at one time many a district claimed its local trout as a separate species. Now, however, science admits but one species, though, to such well-defined varieties as the iˆoch Leven trout, the estuarine trout and the gillaroo, it concedes the right to separate names and ” races.” In effect all, from the great Jerox of the big lakes of Scotland and Ireland to the little fingerling of the Devonshire brook, are one and the same — Salmo fario.

Wet-Fly Fishing for Trout. — Fly-fishing for trout is divided into three kinds: fishing with the artificial fly sunk or ” wet,” fishing with it floating or ” dry ” and fishing with the natural insect. Of the two first methods the wet fly is the older and may be taken first. Time was when all good anglers cast their flies down- stream and thought no harm. But in 1857 W. C. Stewart pub- lished his Practical Angler, in which he taught that it paid better to fish up-stream, for by so doing the angler was not only less likely to be seen by the trout but was more likely to hook his fish. The doctrine was much discussed and criticized, but it gradually won adherents, until now up-stream fishing is the orthodox method where it is possible. Stewart was also one of the first to advocate a lighter rod in place of the heavy 12 ft. and 13 ft. weapons that were used in the North in his time. There are still many men who use the long rod for wet-fly fishing in streams, but there are now more who find 10 ft. quite enough for their purpose. For lake-fishing from a boat, however, the longer rod is still in many cases preferred. In fishing rivers the main art is to place the right flies in the right places and to let them come naturally down with the stream. The right flies may be ascer- tained to some extent from books and from local wisdom, but the right places can only be learnt by experience. It does not, however, take long to acquire “an eye for water” and that is half the battle, for the haunts of trout in rapid rivers are very much alike. In lake-fishing chance has a greater share in bring- ing about success, but here too the right fly and the right place are important; the actual management of rod, line and flies, of course, is easier, for there is no stream to be reckoned with. Though

there is little left to be said about wet-fly fishing where the fly is an imitation more or less exact of a natural insect, there is another branch of the art which has been stimulated by modern developments. This is the use of salmon-flies for big trout much in the same way as for salmon. In such rivers as the Thames, where the trout are cannibals and run very large, ordinary trout-flies are of little use, and the fly-fisher's only

chance is to use a big fly and " work " it, casting across and down stream. The big fly has also been found serviceable with the great fish of Ntew Zealand and with the inhabitants of such a piece of water as Blagdon Lake near Bristol, where the trout run very large. For this kind of fishing much stronger tackle and a heavier rod are required than for catching fish that seldom exceed the pound.

Dry Fly. — Fishing with the floating fly is a device of southern origin, and the idea no doubt arose from the facts that on the placid south-country streams the natural fly floats on the surface and that the trout are accustomed to feed on it there. The controversy " dry versus wet " was long and spirited, but the new idea won the day and now not only on the chalk-streams, but on such stretches of even Highland rivers as are suitable, the dry-fly man may be seen testing his theories. These theories are simple and consist in placing before the fish an exact imitation of the insect on which it is feeding, in such a way that it shall float down exactly as if it were an insect of the same kind. To this end special tackle and special methods have been found necessary. Not only the fly but also the line has to float on the wa f er; the line is very heavy and therefore the rod (split-cane or greenheart) must be stiff and powerful; special precautions have to be taken that the fly shall float unhindered and shall not " drag "; special casts have to be made to counteract awkward winds; and, lastly, the matching of the fly with the insect on the water is a matter of much nicety, for the water-flies are of many shades and colours. Many brains have busied themselves with the solution of these problems with such success that dry-fly fishing is now a finished art. The entomology of the dry-fly stream has been studied very deeply by Mr F. M. Halford, the late G. S. Marryat and others, and improvements both in flies and tackle have been very great. Quite lately, however, there has been a movement in favour of light rods for dry-fly fishing as well as wet-fly fishing. The English split-cane rod for dry-fly work weighs about an ounce to the foot, rather more or rather less. The American rod of similar action

and material weighs much less — approximately 6 oz. to 10 ft. The light rod, it is urged, is much less tiring and is quite powerful enough for ordinary purposes. Against it is claimed that dry-fly fishing is not "ordinary purposes," that chalk-stream weeds are too strong and chalk-stream winds too wild for the light rod to be efficient against them. However, the light rod is growing in popular favour; British manufacturers are building rods after the American style; and anglers are taking to them more and more. The dry-fly method is now practised by many fishermen both in Germany and France, but it has scarcely found a footing as yet in the United States or Canada.

Fishing with the Natural Fly. — The natural fly is a very killing bait for trout, but' its use is not wide-spread except in Ireland. In Ireland " dapping " with the green drake or the daddy- longlegs is practised from boats on most of the big loughs. A light whole-cane rod of stiff build, about 16 ft. in length, is required with a floss-silk line light enough to be carried out on the breeze; the " dap " (generally two mayflies or daddy-long- legs on a small stout- wired hook) is carried out by the breeze and just allowed to touch the water. When a trout rises it is well to count " ten " before striking. Very heavy trout are caught in this manner during the mayfly season. In the North " creeper- fishing " is akin to this method, but the creeper is the larva of the stone-fly, not a fly itself, and it is cast more like an ordinary fly and allowed to sink. Sometimes, however, the mature insect is used with equally good results. A few anglers still practise the old style of dapping or " dibbling " after the manner advised by Izaak Walton. It is a deadly way of fishing small overgrown brooks. A stiff rod and strong gut are necessary, and a grass- hopper or almost any large fly will serve for bait.

Other Methods. — The other methods of taking trout principally employed are spinning, live-baiting and worming. For big river trout such as those of the Thames a gudgeon or bleak makes the best spinning or live bait, for great lake trout (Jerox) a small fish of their own species and for smaller trout a minnow. There are numberless artificial spinning-baits which kill well at times, the

Devon being perhaps the favourite. The use of the drop-minnow, which is trolling on a lesser scale, is a killing method employed more in the north of England than elsewhere. The worm is mostly deadly in thick water, so deadly that it is looked on askance. But there is a highly artistic mode of fishing known as " clear- water worming." This is most successful when rivers are low and weather hot, and it needs an expert angler to succeed in it. The worm has to be cast up-stream rather like a fly, and the method is little inferior to fly-fishing in

delicacy and difficulty. The other baits for trout, or rather the other baits which they will take sometimes, are legion. Wasp-grubs, maggots, cater- pillars, small frogs, bread — there is very little the fish will not take. But except in rural districts little effort is made to catch trout by means less orthodox than the fly, minnow and worm, and the tendency nowadays both in England and America is to restrict anglers where possible to the use of the artificial fly only.

Grayling. — The only other member of the salmon family in England which gives much sport to the fly-fisher is the grayling, a fish which possesses the recommendation of rising well in winter. It can be caught with either wet or dry fly, and with the same tackle as trout, which generally inhabit the same stream. Gray- ling will take most small trout-flies, but there are many patterns of fly tied specially for them, most of them founded on the red tag or the green insect. Worms and maggots are also largely used in some waters for grayling, and there is a curious con- trivance known as the ” grasshopper,” which is a sort of com- promise between the fly and bait. It consists of a leaded hook round the shank of which is twisted bright-coloured wool. The point is tipped with maggots, and the lure, half artificial, half natural, is dropped into deep holes and worked up and down in the water. In some places the method is very killing. The grayling has been very prominent of late years owing to the controversy ” grayling versus trout.” Many people hold that grayling injure a trout stream by devouring trout-ova and trout- food, by increasing too rapidly and in other ways. Beyond, however, proving the self-evident fact that a stream can only support a given amount of fish-life, the grayling’s opponents do not seem to have made out a very good case, for no real evidence of its injuring trout has been adduced.

Char. — The chars (Salvelinus) are a numerous family widely distributed over the world, but in Great Britain are not very important to the angler. One well-defined species (Salvelinus alpinus) is found in some lakes of Wales and Scotland, but principally in Westmorland acd Cumberland. It sometimes takes a small fly but is a ore cften caught with small artificial spinning-baits. The fish seldom exceeds if lb in Great Britain, though in Scandinavia it is caught up to 5 Jb or more. There are some important chars in America, fontinalis being one of the most esteemed. Some members of the genus occasionally attain a size scarcely excelled by the salmon. Among them are the Great Lake trout of America, Cristivomer namaycush, and the Danubian ” salmon ” or huchen, Salmo hucho. Both of these fish are caught principally with spinning-baits, but both will on occasion take a salmon-fly, though not with any freedom after they have reached a certain size. An attempt has been made to introduce huchen into the Thames but at

the time of writing the result cannot yet be estimated.

Pike. — The pike (Esox lucius), which after the Salmonidae is the most valued sporting fish in Great Britain, is a fish of prey pure and simple. Though it will occasionally take a large fly, a worm or other ground-bait, its systematic capture is only essayed with small fish or artificial spinning-baits. A live bait is supposed to be the most deadly lure for big pike, probably because it is the method employed by most anglers. But spinning is more artistic and has been found quite successful enough by those who give it a fair and full trial. Trolling, the method of ” sink and draw ” with a dead bait, referred to previously in this article, is not much practised nowadays, though at one time it was very popular. It was given up because the traditional form of trolling-tackle was such that the bait had to be swallowed by the pike before the hook would take hold, and that necessitated killing all fish caught, whether large or small. The same objection formerly applied to

live-baiting with what was known as a gorge-hook. Now, how- ever, what is called snap-tackle is almost invariably used in live-baiting, and the system is by some few anglers extended to the other method too. Pike are autumn and winter fish and are at their best in December. They grow to a very considerable size, fish of 20 lb being regarded as ” specimens ‘.’ and an occasional thirty-pounder rewarding the zealous and fortunate. The heaviest pike caught with a rod in recent years which is sufficiently authenticated, weighed 37 ft), but heavier specimens are said to have been taken in Irish lakes. River pike up to about 10 lb in weight are excellent eating.

America has several species of pike, of which the muskelunge of the great lake region (Esox masquinongy) is the most important. It is a very fine fish, excelling Esox lucius both in size and looks. From the angler’s point of view it may be considered simply as a large pike and may be caught by similar methods. It occasion- ally reaches the weight of 80 lb or perhaps more. The pickerel {Esox reticulatus) is the only other of the American pikes which gives any sport. It reaches a respectable size, but is as inferior to the pike as the pike is to the muskelunge.

Perch. — Next to the pikes come the perches, also predatory fishes. The European perch (Perca fluviatilis) has a place by itself in the

affections of anglers. When young it is easy to catch by almost any method of fishing, and a large number of Walton's disciples have been initiated into the art with its help. Worms and small live-baits are the principal lures, but at times the fish will take small bright artificial spinning-baits well, and odd attrac- tions such as boiled shrimps, caddis-grubs, small frogs, maggots, wasp-grubs, &c. are sometimes successful. The drop-minnow is one of the best methods of taking perch. Very occasionally, and principally in shallow pools, the fish will take an artificial fly greedily, a small salmon-fly being the best thing to use in such a case. A perch of 2 lb is a good fish, and a specimen of 4J lb about the limit of angling expectation. There have been rare instances of perch over 5 lb, and there are legends of eight-pounders, which, however, need authentication.

Black Bass. — The yellow perch of America (Perca flavescens) is very much like its European cousin in appearance and habits, but it is not so highly esteemed by American anglers, because they are fortunate in being possessed of a better fish in the black bass, another member of the perch family. There are two kinds of black bass (Micropterus salmoides and Micropterus dolomieu), the large- mouthed and the small-mouthed. The first is more a lake and pond fish than the second, and they are seldom found in the same waters. As the black bass is a fly-taking fish and a strong fighter, it is as valuable to the angler as a trout and is highly esteemed. Bass-flies are sui generis, but incline more to the nature of salmon- flies than trout-flies. An artificial frog cast with a fly-rod or very light spinning-rod is also a favourite lure. For the rest the fish will take almost anything in the nature of worms or small fish, like its cousin the perch. A 4 lb bass is a good fish, but five- pounders are not uncommon. Black bass have to some extent been acclimatized in France.

The ruffe or pope (Acerina vulgaris) is a little fish common in the Thames and many other slow-flowing English rivers. It is very like the perch in shape but lacks the dusky bars which distinguish the other, and is spotted with dark brown spots on a golden olive background. It is not of much use to the angler as it seldom exceeds 3 oz. in weight. It takes small worms, maggots and similar baits greedily, and is often a nuisance when the angler is expecting better fish. Allied to the perches is the pike-perch, of which two species are of some importance to the angler, one the wall-eye of eastern America (Stizostedion vitreuvi) and the other the zander of Central Europe {Sandrus lucioperca). The last especially is a fine fighter, occasionally reaching a weight of 20 lb. It is usually caught by spinning, but will take live-baits, worms and other things of that nature. The Danube may be described as its headquarters. It is a fish whose sporting

importance will be more realized as anglers on the continent become more numerous.

Cyprinidae. — The carp family (Cyprinidae) is a large one and its members constitute the majority of English sporting fishes. In America the various kinds of chub, sucker, dace, shiner, &c.

are little esteemed and are regarded as spoils for the youthful angler only, or as baits for the better fish in which the continent is so rich. In England, however, the Cyprinidae have an honoured place in the affections of all who angle ” at the bottom,” while in Europe some of them have a commercial value as food-fishes. In India at least one member of the family, the mahseer, takes rank with the salmon as a ” big game ” fish.

Carp, Tench, Barbel, Bream. — The family as represented in England may be roughly divided into two groups, those which feed on the bottom purely and those which occasionally take flies. The first consists of carp, tench, barbel and bream. Of these carp, tench and bream are either river or pool fish, while the barbel is found only in rivers, principally in the Thames and Trent. The carp grows to a great size, 20 lb being not unknown; tench are big at 5 lb; barbel have been caught up to 14 lb or rather more; and bream occasionally reach 8 lb, while a fish of over n lb is on record. All these fish are capricious feeders, carp and barbel being particularly undependable. In some waters it seems to be impossible to catch the large specimens, and the angler who seeks to gain trophies in either branch of the sport needs both patience and perseverance. Tench and bream are not quite so difficult. The one fish can sometimes be caught in great quantities, and the other is generally to be enticed by the man who knows how to set about it. Two main principles have to be observed in attacking all these fish, ground-baiting and early rising. Ground-baiting consists in casting food into the water so as to attract the fish to a certain spot and to induce them to feed. Without it very little can be done with shy and large fish of these species. Early rising is necessary because they only feed freely, as a rule, from daybreak till about three hours after sun-rise. The heat of a summer or early autumn day makes them sluggish, but an hour or two in the evening is sometimes remunerative. The bait for them all should usually lie on the bottom, and it consists mainly of worms, wasp and other grubs, pastes of various kinds; and for carp, and sometimes bream, of vegetable baits such as small boiled potatoes, beans, peas, stewed wheat, pieces of banana, &c. None of these fish feed well in winter.

Roach, Rudd, Dace, Chub. — The next group of Cyprinidae consists of

fish which will take a bait similar to those already mentioned and also a fly. The sizes which limit the ordinary angler's aspirations are roach about 2 lb, rudd about 2§ lb, dace about 1 lb and chub about 5 lb. There are instances of individuals heavier than this, one or two roach and many rudd of over 3 lb being on record, while dace have been caught up to 1 lb 6 oz., and chub of over 7 lb are not unknown. Roach only take a fly as a rule in very hot weather when they are near the surface, or early in the season when they are on the shallows ; the others will take it freely all through the summer. Ordinary trout flies do well enough for all four species, but chub often prefer something larger, and big bushy lures called " palmers," which represent caterpillars, are generally used for them. The fly may be used either wet or dry for all these fish, and there is little to choose between the methods as regards effective- ness. Fly-fishing for these fish is a branch of angling which might be more practised than it is, as the sport is a very fair substitute for trout fishing. Roach, chub and dace feed on bottom food and give good sport all the winter.

Gudgeon, Bleak, Minnow, &c. — The small fry of European waters, gudgeon, bleak, minnow, loach, stickleback and bullhead, are principally of value as bait for other fish, though the first- named species gives pretty sport on fine tackle and makes a succulent dish. Small red worms are the best bait for gudgeon and minnows, a maggot or small fly for bleak, and the rest are most easily caught in a small-meshed net. The loach is used principally in Ireland as a trout bait, and the ether two are of small account as hook-baits, though sticklebacks are a valuable form of food for trout in lakes and pools.

Mahseer. — Among the carps of India, several of which give good sport, special mention must be made of the mahseer (Barbus mosal), a fish which rivals the salmon both in size and strength. It reaches a weight of 60 lb and sometimes more and is fished for in much the same manner as salmon, with the

> >

difference that after about 10 lb it takes a spinning-bait, usually a heavy spoon-bait, better than a fly.

Cat-fish. — None of the fresh-water cat-fishes (of which no example is found in England) are what may be called sporting fish, but several

may be caught with rod and line. There are several kinds in North America, and some of them are as heavy as 150 lb, but the most important is the wels (Silurus glanis) of the Danube and neighbouring waters. This is the largest European fresh-water fish, and it is credited with a weight of 300 lb or more. It is a bottom feeder and will take a fish-bait either alive or dead; it is said occasionally to run at a spinning bait when used very deep.

Burbot. — The burbot (Lota vulgaris) is the only fresh-water member of the cod family in Great Britain, and it is found only in a few slow-flowing rivers such as the Trent, and there not often, probably because it is a fish of sluggish habits which feeds only at night. It reaches a weight of 3 lb or more, and will take most flesh or fish baits on the bottom. The burbot of America has similar characteristics.

Sturgeon. — The sturgeons, of which there are a good many species in Europe and America, are of no use to the angler. They are anadromous fishes of which little more can be said than that a specimen might take a bottom bait once in a way. In Russia they are sometimes caught on long lines armed with baited hooks, and occasionally an angler hooks one. Such a case was reported from California in The Field of the 19th of August 1905.

Shad. — Two other anadromous fish deserve notice. The first is the shad, a herring-like fish of which two species, allice and twaite (Clupea alosa and C. finta), ascend one or two British and several continental rivers in the spring. The twaite is the more common, and in the Severn, Wye and Teme it sometimes gives very fair sport to anglers, taking worm and occasionally fly or small spinning bait. It is a good fighter, and reaches a weight of about 3 lb. Its sheen when first caught is particularly beautiful. America also has its shads.

Flounder. — The other is the flounder (Pleuronectes flesus) , the only flat-fish which ascends British rivers. It is common a long way up such rivers as the Severn, far above tidal influence, and it will take almost any flesh-bait used on the bottom. A flounder of 1 lb is, in a river, a large one, but heavier examples are some- times caught.

Eel. — The eel (Anguilla vulgaris) is regarded by the angler more as a nuisance than a sporting fish, but when of considerable size (and it often reaches a weight of 8 lb or more) it is a splendid fighter and stronger than almost any fish that swims. Its life history has long been disputed, but it is now accepted that it breeds in the sea and ascends rivers in its youth. It is found practically everywhere, and its occurrence in isolated ponds to which it has never been introduced by

human agency has given rise to a theory that it travels overland as well as by water. The best baits for eels are worms and small fish, and the best time to use them is at night or in thundery or very wet weather.

Sea Angling.

Sea angling is attended by almost as many refinements of tackle and method as fresh-water angling. The chief differences are differences of locality and the habits of the fish. To a certain extent sea angling may also be divided into three classes — fishing on the surface with the fly, at mid-water with spinning or other bait, and on the bottom; but the first method is only practicable at certain times and in certain places, and the others, from the great depths that often have to be sounded and the heavy weights that have to be used in searching them, necessitate shorter and stouter rods, larger reels and stronger tackle than iresh-water anglers employ. Also, of course, the sea-fisherman is liable to come into conflict with very large fish occasionally. In British waters the monster usually takes the form of a skate or halibut. A specimen of the former weighing 194 lb has been landed off the Irish coast with rod and line in recent years. In American waters there is a much greater opportunity of catching fish of this calibre.

Great Game Fishes. — There are several giants of the sea which

are regularly pursued by American anglers, chief among them being the tarpon (Tarpon allanticus) and the tuna or tunny (Thunnus thynnus), which have been taken on rod and line up to 223 lb and 251 lb respectively. Jew-fish and black sea-bass of over 400 lb have been taken on rod and line, and there are many other fine sporting fish of large size which give the angler exciting hours on the reefs of Florida, or the coasts of California, Texas or Mexico. Practically all of them are taken with a fish-bait either live or dead, and used stationary on the bottom or in mid-water trailed behind a boat.

British Game Fishes. — On a much smaller scale are the fishes most esteemed in British waters. The bass (Labrax lupus) heads the list as a plucky and rather difficult opponent. A fish of 10 lb is a large one, but fifteen-pounders have been taken. Small or ” school ” bass up to 3 lb or 4 lb may sometimes be caught with the fly (generally a roughly constructed thing with big wings), and when they are really taking the sport is magnificent. In some few localities it is possible to cast for them from rocks with a salmon rod, but usually a boat is required. In other places bass may be caught from the shore with fish bait used on the bottom in quite shallow water. They may again sometimes be

caught in mid-water, and in fact there are few methods and few lures employed in sea angling which will not account for them at times. The pollack (Gadus pollachius) and coal-fish (Gadus virens) come next in esteem. Both in some places reach a weight of 20 lb or more, and both when young will take a fly. Usually, however, the best sport is obtained by trailing some spinning-bait, such as an artificial or natural sand-eel, behind a boat. Sometimes, and especially for pollack, the bait must be kept near the bottom and heavy weights on the line are necessary; the coal-fish are more prone to come to the surface for feeding. The larger grey mullet (Mugil capito) is a great favourite with many anglers, as it is extremely difficult to hook, and when hooked fights strongly. Fishing for mullet is more akin to fresh-water fishing than any branch of sea-angling, and indeed can be carried on in almost fresh water, for the fish frequent harbours, estuaries and tidal pools. They can be caught close to the surface, at mid-water and at the bottom, and as a rule vegetable baits, such as boiled macaroni, or rag-worms are found to answer best. Usually ground-baiting is necessary, and the finer the tackle used the greater is the chance of sport. Not a few anglers fish with a float as if for river fish. The fish runs up to about 8 lb in weight. The cod (Gadus morhua) grows larger and fights less gamely than any of the fish already mentioned. It is generally caught with bait used on the bottom from a boat, but in places codling, or young cod, give some sport to anglers fishing from the shore. The mackerel (Scomber scomber) gives the best sport to a bait, usually a strip of fish skin, trailed behind a boat fairly close to the surface, but it will sometimes feed on the bottom. Mackerel on light tackle are game fighters, though they do not usually much exceed 2 lb. Whiting and whiting-pout (Gadus merlangus and Gadus luscus) both feed on or near the bottom, do not grow to any great size, and are best sought with fine tackle, usually an arrangement of three or four hooks at intervals above a lead which is called a ” pater- noster.” If one or more of the hooks are on the bottom the tackle will do for different kinds of flat fish as well, flounders and dabs being the two species most often caught by anglers. The bream (Pagellus centrodontus) is another bottom-feeder which resembles the fresh-water bream both in appearance and habits. It is an early morning or rather a nocturnal fish, and grows to a weight of 3 lb or 4 lb. Occasionally it will feed in mid-water or even close tf- the surface. The conger eel (Conger vulgaris) is another night-feeder, which gives fine sport, as it grows to a great size, and is very powerful. Strong tackle is essential for conger fishing, as so powerful an opponent in the darkness cannot be given any law. The bait must be on or near the bottom. There are, of course, many other fish which come to the angler’s rod at times, but the list given is fairly- complete as

representing the species which are especially sought. Beside them are occasional (in some waters too frequent) captures such as dog-fish and sharks, skates and rays. Many of them run to a great size and give

plenty of sport on a rod, though they are not as a rule welcomed. Lastly, it must be mentioned that certain of the Salmonidae, smelts (Osmerns eperlanus), sea-trout, occasionally brown trout, and still more occasionally salmon can be caught in salt water either in sea-lochs or at the mouths of rivers. Smelts are best fished for with tiny hooks tied on fine gut and baited with frag- ments of shrimp, ragworm, and other delicacies.

Modern Authorities and Reference Books. — History and Literature : Prof. A. N. Mayer, Sport with Gun and Rod (New York and Edinburgh), with a chapter on ” The Primitive Fish-Hook,” by Barnet Phillips; Dr R. Munro, Lake Dwellings of Europe (London, 1890), with many illustrations and descriptions of early fish-hooks, &c. ; H. Cholmondeley Pennell and others, Fishing Gossip (Edin- burgh, 1866), contains a paper on ” Fishing and Fish-Hooks of the Earliest Date,” by Jonathan Couch; C. D. Badham, Prose Halieutics (London, 1854), full of curious lore, relating, however, more to ichthyophagy than angling; The Angler’s Note-Booh and Naturalist’s Record (London, 1st series 1881, 2nd series 1888), edited by T. Satchell, the two volumes containing much valuable matter on angling history, literature, and other topics; R. Blakey, Angling Literature (London, 1856), inaccurate and badly arranged, but containing a good deal of curious matter not to be found else- where; O. Lambert, Angling Literature in England (London, 1881), a good little general survey; J. J. Manley, Fish and Fishing (London, 1881), with chapters on fishing literature, &c. ; R. B. Marston, Walton and Some Earlier Writers on Fish and Fishing (London and New York, 1894); Piscatorial Society’s Papers (vol. i. London, 1890), contains a paper on ” The Useful and Fine Arts in their Relation to Fish and Fishing,” by S. C. Harding; Super Flumina (Anon.; London, 1904), gives passim useful information on fishing literature; T. Westwood and T. Satchell, Bibliotheca Piscatoria (London, 1883) an admirable bibliography of the sport: together with the supplement prepared by R. B. Marston, 1 901, it may be considered wonderfully complete.

Methods and Practice. — General Fresh-water Fishing: F. Francis, A Book on Angling (London, 1885), though old, a thoroughly sound text-

book, particularly good on salmon fishing; H. C. Pennell and others, Fishing — Salmon and Trout and Pike and Coarse Fish (Bad- minton Library, 2 vols., London, 1904); John Bickerdyke, The Book of the All-Round Angler (London, 1900) ; Horace G. Hutchinson and others, Fishing (Country Life Series, 2 vols., London, 1904), contains useful ichthyological notes by G. A. Boulenger, a chapter on ” The Feeding of Salmon in Fresh-Water,” by Dr J. Kingston Barton, and a detailed account of the principal salmon rivers of Norway, by C. E. Radclyffe.

Salmon and Trout. — Major J. P. Traherne, The Habits of the Salmon (London, 1889); G. M. Kelson, The Salmon Fly (London, 1895), contains instructions on dressing salmon-flies; A. E. Gathorne Hardy, Tlie Salmon (” Fur, Feather and Fin Series,” London, 1898) ; Sir H. Maxwell, Bt., Salmon and Sea Trout (Angler’s Library, London, 1898); Sir E. Grey, Bt., Fly Fishing (Haddon Hall Library, London and New York, 1899); W. Earl Hodgson, Salmon Fishing (London, 1906), contains a series of coloured plates of salmon flies; Marquis of Granby, The Trout (” Fur, Feather and Fin Series,” London, 1898). Wet Fly Fishing: W. C. Stewart, The Practical Angler (London, 1905), a new edition of an old but still valuable work; E. M. Tod, Wet Fly Fishing (London, 1903); W. Earl Hodgson, Trout Fishing (London, 1905), contains a scries of admirable coloured plates of artificial flies. Dry Fly Fishing: F. M. Halford, Dry-Fly Fishing in Theory and Practice (London, 1902), the standard work on the subject; G. A. B. Dewar, The Book of the Dry Fly (London, 1897). Grayling: T. E. Pritt, The Book of the Grayling (Leeds, 1888); H. A. Rolt, Grayling Fishing in South Country Streams (London, 1905).

Coarse Fish. — C. H. Wheeley, Coarse Fish (Angler’s Library, London, 1897); J. W. Martin, Practical Fishing (London); Float- fishing and Spinning (London, 1885) ; W. Senior and others, Pike and Perch (” Fur, Feather and Fin Series,” London, 1900); A. J. Jardine, Pike and Perch (Angler’s Library, London, 1898); H. C. Pennell, The Book of the Pike (London, 1884); Greville Fennell, The Book of the Roach (London, 1884).

Sea Fishing. — J. C. Wilcocks, The Sea Fisherman (London, 1884); John Bickerdyke (and others), Sea Fishing (Badminton Library, London, 1895); Practical Letters to Sea Fishers (London, 1902); F. G. Aflalo, Sea Fish (Angler’s Library, London, 1897); P. L. Haslope, Practical Sea Fishing (London, 1905).

Tackle, Flies, afc. — H. C. Pennell, Modern Improvements in Fishing Tackle (London, 1887); H. P. Wells, Fly Rods and Fly Tackle (New York and London, 1901); A. Ronalds, The Fly-Fisher’s Entomology

(London, 1883); F. M. Halford, Dry Fly Entomology (London, 1902) ; Floating Flies and How to Dress them (London, 1886); T. E. Pritt, North Country Flies (London, 1886); H. G. M'Clelland, How to tie Flies for Trout and Grayling (London, 1905); Capt. J. H. Hale, How to tie Salmon Flies (London, 1892); F. G. Aflalo, John Bickerdyke and C. H. Wheeley, How to buy Fishing Tackle (London).

Ichthyology, Fislieries, Fish-Culture, &c. — Dr Francis Day, Fishes of Great Britain and Ireland (2 vols., London, 1889); British and

Irish Salmonidae (London, 1887) ; Dr A. C. L. G. Giinther, Introduction to the Study of Fishes (London, 1880) ; Dr D. S. Jordan, A Guide to the Study of Fishes (2 vols., New York and London, 1905); F. Francis, Practical Management of Fisheries (London, 1 883); Fish Culture (London, 1865) ; F. M. Halford, Making a Fishery (London, 1902); J. J. Armistead, An Angler's Paradise (Dumfries, 1902); F. Mather, Modern Fish-Culture (New York, 1899) ; Livingstone Stone, Domesticated Trout (Charlestown and London, 1896).

Angling Guide Books, Geographical Information, &c. — Great Britain: The Angler's Diary (London), gives information about most important waters in the British Isles, and about some foreign waters, published annually ; The Sportsman's and Tourist's Guide to Scotland (London), a good guide to angling in Scotland, published twice a year; Augustus Grimble, The Salmon Rivers of Scotland (London, 1900, 4 vols.) ; The Salmon Rivers of Ireland (London, 1903); The Salmon and Sea Trout Rivers of England and Wales (London, 1904, 2 vols.), this fine series gives minute information as to salmon pools, flies, seasons, history, catches, &c. ; W. M. Gallichan, Fishing in Wales (London, 1903) ; Fishing in Derbyshire (London, I 9°5) ; J- Watson, English Lake District Fisheries (London, 1899) ; C. Wade, Exmoor Streams (London, 1903); G. A. B. Dewar, South Country Trout Streams (London, 1899); "Hi Regan," How and Where to Fish in Ireland (London, 1900) ; E. S. Shrubsole, The Land of Lakes (London, 1906), a guide to fishing in County Donegal). Europe: " Palmer Hackle," Hints on Angling (London, 1846), contains " suggestions for angling excursions in France and Bel- gium," but they are too old to be of much service; W. M. Gallichan, Fishing and Travel in Spain (London, 1905) ; G. W. Hartley, Wild Sport with Gun, Rifle and Salmon Rod (Edinburgh, 1903), contains a chapter on huchen fishing; Max von dem Borne, Wegweiser fur Angler durch Deutschland, Oesterreich und die Schweiz (Berlin, 1877), a book of good conception and arrangement, and still useful, though out of date in many particulars; Illustrierte Angler-Schule (der deutschen Fischerei Zeitung), Stettin, contains good chapters on the wels and huchen; H. Storck, Der Angelsport (Munich,

1898), contains a certain amount of geographical information; E. B. Kennedy, Thirty Seasons in Scandinavia (London, 1904), contains useful information about fishing; General E. F. Burton, Trouling in Norway (London, 1897); Abel Chapman, Wild Norway (London, 1897); F. Sandeman, Angling Travels in Norway (London, 1895). America: C. F. Holder, Big Game Fishes of the United States (New York, 1903) ; J. A. Henshall, Bass, Pike, Perch and Pickerel (New York, 1903) ; Dean Sage and others, Salmon and Trout (New York, 1902) ; E. T. D. Chambers, Angler's Guide to Eastern Canada (Quebec, 1899); Rowland Ward, The English Angler in Florida (London, 1898) ; J. Turner Turner, The Giant Fish of Florida (London, 1902). India: H. S. Thomas, The Rod in India (London, 1897); "Skene Dhu," The Mighty Mahseer (Madras, 1906), contains a chapter on the acclimatization of trout in India and Ceylon. New Zealand : W. H. Spackman, Trout in New Zealand (London, 1894); Capt. Hamilton, Trout Fishing and Sport in Maoriland (Wellington, 1905), contains a valuable section on fishing waters.

Fishery Law. — G. C. Oke, A Handy Book of the Fishery Laws (edited by J. W. Willis Band and A. C. M'Barnet, London, I9°3) •

ANGLO-ISRAELITE THEORY, the contention that the British people in the United Kingdom, its colonies, and the United States, are the racial descendants of the " ten tribes " forming the kingdom of Israel, large numbers of whom were deported by Sargon king of Assyria on the fall of Samaria in 721 B.C. The theory (which is fully set forth in a book called Philo-Israel) rests on premises which are deemed by scholars — both theological and anthropological — to be utterly unsound.

ANGLO-NORMAN LITERATURE:— The French language (q.v.j came over to England with William the Conqueror. During the whole of the 12th century it shared with Latin the distinction of being the literary language of England, and it was in use at the court until the 14th century. It was not until the reign of Henry IV. that English became the native tongue of the kings of England. After the loss of the French provinces, schools for the teaching of French were established in England, among the most celebrated of which we may quote that of Marlborough. The language then underwent certain changes which gradually distinguished it from the French spoken in France; but, except for some graphical characteristics, from which certain rules of pronunciation are to be inferred, the changes to which the language was subjected were the individual modifications of the various authors, so that, while we may still speak of Anglo- Norman writers, an Anglo-Norman language, properly so called, gradually ceased to exist. The prestige enjoyed by the French language, which, in the 14th

century, the author of the Maniere de language calls ” le plus bel et le plus gracious language

et plus noble parler, apres latin d’escole, qui soit au monde et de touz genz mieulx prisee et amee que nul autre (quar Dieux le fist si douce et amiable principalement a l’oneur et loenge de luy mesmes. Et pour ce il peut comparer au parler des angels du ciel, pour la grand doulceur et biaultee d’icel),” was such that it was not till 1363 that the chancellor opened the parlia- mentary session with an English speech. And although the Hundred Years’ War led to a decline in the study of French and the disappearance of Anglo-Norman literature, the French language continued, through some vicissitudes, to be the classical language of the courts of justice until the 17 th century. It is still the language of the Channel Islands, though there too it tends more and more to give way before the advance of English.

It will be seen from the above that the most flourishing period of Anglo-Norman literature was from the beginning of the 12th century to the end of the first quarter of the 13 th. The end of this period is generally said to coincide with the loss of the French provinces to Philip Augustus, but literary and political history do not correspond quite so precisely, and the end of the first period would be more accurately denoted by the appearance of the history of William the Marshal in 1225 (published for the Societe de I’histoire de France, by Paul Meyer, 3 vols., 1891-1901). It owes its brilliancy largely to the protection accorded by Henry II. of England to the men of letters of his day. ” He could speak French and Latin well, and is said to have known something of every tongue between ‘the Bay of Biscay and the Jordan.’ He was probably the most highly educated sovereign of his day, and amid all his busy active life he never lost his interest in literature and intellectual discussion; his hands were never empty, they always had either a bow or a book ” {Diet, of Nat. Biog.). Wace and Benoit de Sainte-More compiled their histories at his bidding, and it was in his reign that Marie de France composed her poems. An event with which he was closely connected, viz. the murder of Thomas Becket, gave rise to a whole series of writings, some of which are purely Anglo-Norman. In his time appeared the works of Beroul and Thomas respectively, as well as some of the most celebrated of the Anglo-Norman romans d’aventure. It is important to keep this fact in mind when studying the different works which Anglo-Norman literature has left us. We will examine these works briefly, grouping

them into narrative, didactic, hagiographic, lyric, satiric and dramatic literature.

Narrative Literature: (a) Epic and Romance. — The French epic came over to England at an early date. We know that the Chanson de Roland was sung at the battle of Hastings, and we possess Anglo-Norman MSS. of a few chansons de geste. The Pelerinage de Charlemagne (Koschwitz, Altfranzosische Bibliothek, 1883) was, for instance, only preserved in an Anglo-Norman manuscript of the British Museum (now lost), although the author was certainly a Parisian. The oldest manuscript of the Chanson de Roland that we possess is also a manuscript written in England, and amongst the others of less importance we may mention La Chancun de Willame, the MS. of which has (June 1903) been published in facsimile at Chiswick (cf. Paul Meyer, Romania, xxxii. 597-618). Although the diffusion of epic poetry in England did not actually inspire any new chansons de geste, it developed the taste for this class of literature, and the epic style in which the tales of Horn, of Bovon de Hampton, of Guy of Warwick (still unpublished), of Waldef (still unpublished), and of Fulk Fitz Warine are treated, is certainly partly due to this circumstance. Although the last of these works has come down to us only in a prose version, it contains unmistakable signs of a previous poetic form, and what we possess is really only a render- ing into prose similar to the transformations undergone by many of the chansons de geste (cf. L. Brandin, Introduction to Fulk Fits Warine, London, 1904).

The interinfluence of French and English literature can be studied in the Breton romances and the romans d'aventure even better than in the epic poetry of the period. The Lay of Orpheus is known to us only through an English imitation; the Lai du cor was composed by Robert Biket, an Anglo-Norman poet of the 12th century (Wulff, Lund, 1888). The lais of Marie de

France were written in England, and the greater number of the romances composing the matiere de Brelagne seem to have passed from England to France through the medium of Anglo-Norman. The legends of Merlin and Arthur, collected in the Historia Regum Britanniae by Geoffrey of Monmouth (f 1 1 54) , passed into French literature, bearing the character which the bishop of St Asaph had stamped upon them. Chretien de Troye's Perceval (c. 1175) is doubtless based on an Anglo-Norman poem. Robert de Boron (c. 1 21 5) took the subject of his Merlin (published by G. Paris and J. Ulrich, 1886, 2 vols., SocietS des Anciens Textes) from Geoffrey of Monmouth. Finally, the most celebrated love-legend of the middle ages, and one of the most beautiful inventions of world-literature, the

story of Tristan and Iseult, tempted two authors, Beroul and Thomas, the first of whom is probably, and the second certainly, Anglo-Norman (see Arthurian Legend; Grail, The Holy; Tristan). One Folie Tristan was composed in England in the last years of the 12th century. (For all these questions see Soc. des Anc. Textes, Muret's ed. 1903; Bedier's ed. 1902-1905). Less fascinating than the story of Tristan and Iseult, but nevertheless of considerable interest, are the two romans d'aventure of Hugh of Rutland, Ipomedon (published by Kolbing and Koschwitz, Breslau, 1889) and Protesilaus (still unpublished) written about 1185. The first relates the adven- tures of a knight who married the young duchess of Calabria, niece of King Meleager of Sicily, but was loved by Medea, the king's wife. The second poem is the sequel to Ipomedon, and deals with the wars and subsequent reconciliation between Ipomedon's sons, Daunus, the elder, lord of Apulia, and Prote- silaus, the younger, lord of Calabria. Protesilaus defeats Daunus, who had expelled him from Calabria. He saves his brother's life, is reinvested with the dukedom of Calabria, and, after the death of Daunus, succeeds to Apulia. He subsequently marries Medea, King Meleager's widow, who had helped him to seize Apulia, having transferred her affection for Ipomedon to his younger son (cf. Ward, Cat. of- Rom., i. 728). To these two romances by an Anglo-Norman author, Amadas et Idoine, of which we only possess a continental version, is to be added. Gaston Paris has proved indeed that the original was composed in England in the 12th century (An English Miscellany presented to Dr Furnivall in Honour of his Seventy-fifth Birthday, Oxford, 1 901, 386-394). The Anglo-Norman poem on the Life of Richard Cceur de Lion is lost, and an English version only has been pre- served. About 1250 Eustace of Kent introduced into England the roman d' Alexandre in his Roman de toute chevalerie, many passages of which have been imitated in one of the oldest English poems on Alexander, namely, King Alisaunder (P. Meyer, Alexandre le grand, Paris, 1886, ii. 273, and Weber, Metrical Romances, Edinburgh).

(b) Fableaux, Fables and Religious Tales. — In spite of the incontestable popularity enjoyed by this class of literature, we have only some half-dozen fableaux written in England, viz. Le chevalier d la corbeille, Le chevalier qui faisait parler les muets, Le chevalier, sa dame et un clerc, Les trois dames, La gageure, Le pre.tre d' Alison, La bourgeoise d'Orleans (Bedier, Les Fabliaux, 1895). As to fables, one of the most popular collections in the middle ages was that written by Marie de France, which she claimed to have translated from King Alfred. In the Contes moralises, written by Nicole Bozon shortly before 1320 (Soc. Anc. Textes, 1889), a few fables bear a strong resemblance to those of Marie de France.

The religious tales deal mostly with the Mary Legends, and have been handed down to us in three collections:

(i.) The Adgar's collection. Most of these were translated from William of Malmesbury (tii43?) by Adgar in the 12th century ("Adgar's Marien-Legenden," Altfr. Biblioth. ix.; J. A. Herbert, Rom. xxxii. 394).

(ii.) The collection of Everardof Gateley, a monk of St Edmund at Bury, who wrote c. 1250 three Mary Legends (Rom. xxix. 27).

(iii.) An anonymous collection of sixty Mary Legends composed c. 1250 (Brit. Museum Old Roy. 20 B, xiv.), some of which have been published in Suchier's Bibliotheca Normannica; in the Altf. Bibl. See also Mussafia, " Studien zu den mittelalterlichen

Marien-legenden " in Sitzungsb. der Wien. Akademie (t. cxiii., ex v., cxix., exxiii., exxix.).

Another set of religious and moralizing tales is to be found in Chardri's Set dormans and Josaphat, c. 1216 (Koch, Altfr. Bibl., 1880; G. Paris, Poemes et legendes du moyen dge).

(c) History. — Of far greater importance, however, are the works which constitute Anglo-Norman historiography. The first Anglo-Norman historiographer is Geoffrey Gaimar, who wrote his Estorie des Angles (between 1147 and 1151) for Dame Constance, wife of Robert Fitz-Gislebert {The Anglo-Norman Metrical Chronicle, Hardy and Martin, i. ii., London,i888). This history comprised a first part (now lost), which was merely a translation of Geoffrey of Monmouth's Historia regumBritanniae, preceded by a history of the Trojan War, and a second part which carries us as far as the death of William Rufus. For this second part he has consulted historical documents, but he stops at the year 1087, just when he has reached the period about which he might have been able to give us some first-hand information. Similarly, Wace in his Roman de Rou et des dues de Normandie (ed. Andresen, Heilbronn, 1877-1870, 2 vols.), written 1160-1174, stops at the battle of Tinchebray in 1107 just before the period for which he would have been so useful. His Brut or Geste des Bretons (Le Roux de Lincy, 1836-1838, 2 vols.), written in 1 1 55, is merely a translation of Geoffrey of Monmouth. " Wace," says Gaston Paris, speaking of the Roman de Rou, " traduit en les abregeant des historiens latins que nous posse- dons; mais ca. et la. il ajoute soit des

contes populaires, par exemple sur Richard I”, sur Robert I”, soit des particularites qu’il savait par tradition (sur ce meme Robert le magnifique, sur l’expedition de Guillaume, &c.) et qui donnent a. son ceuvre un reel interet historique. Sa langue est excellente; son style clair, serre, simple, d’ordinaire assez monotone, vous plait par sa saveur archaique et quelquefois par une certaine grace et une certaine malice.”

The History of the Dukes of Normandy by Benolt de, Sainte- More is based on the work of Wace. It was composed at the request of Henry II. about 11 70, and takes us as far as the year 1 135 (ed. by Francisque Michel, 1836-1844, Collection de docu- ments inedits, 3 vols.)’. The 43,000 lines which it contains are of but little interest to the historian; they are too evidently the work of a romancier courtois, who takes pleasure in recounting love-adventures such as those he has described in his romance of Troy. Other works, however, give us more trustworthy information, for example, the anonymous poem on Henry II. ‘s Conquest of Ireland in 1172 (ed. Francisque Michel, London, 1837), which, together with the Expugnatio hibernica of Giraud de Barri, constitutes our chief authority on this subject. The Conquest of Ireland was republished in 1892 by Goddard Henry Orpen, under the title of The Song of Dermot and the Earl (Oxford, Clarendon Press). Similarly, Jourdain Fantosme, who was in the north of England in n 74, wrote an account of the wars between Henry II., his sons, William the Lion of Scotland and Louis VII., in 1173 and 1174 (Chronicle of the reigns of Stephen . . . III., ed. by Joseph Stevenson and Fr. Michel, London, 1886, pp. 202-307). Not one of these histories, however, is to be com- pared in value with The History of William the Marshal, Count of Striguil and Pembroke, regent of England from 1216-1219, which was found and subsequently edited by Paul Meyer (Sociitt de Vhistoire de France, 3 vols., 1891-1901). This masterpiece of historiography was composed in 1225 or 1226 by a professional poet of talent at the request of William, son of the marshal. It was compiled from the notes of the marshal’s squire, John d’Early (t 1230 or 1 231), who shared all the vicissitudes of his master’s life and was one of the executors of his will. This work is of great value for the history of the period 11 86-1 2 19, as the informa- tion furnished by John d’Early is either personal or obtained at first hand. In the part which deals with the period before n 86, it is true, there are various mistakes, due to the author’s ignorance of contemporary history, but these slight blemishes are amply atoned for by the literary value of the work. The style is concise, the anecdotes are well told, the descriptions short and picturesque; the whole constitutes one of the most

living pictures of medieval society. Very pale by the side of this work

appear the Chronique of Peter of Langtoft, written between 1311 and 1320, and mainly of interest for the period 1294-1307 (ed. by T. Wright, London, 1866-1868); the Chron- ique of Nicholas Trevet (1258 ?-i328 ?), dedicated to Princess Mary, daughter of Edward I. (Duff us Hardy, Descr. Catal. III., 349-350); the Scala Chronica compiled by Thomas Gray of Heaton (f c. 1369), which carries us to the year 1362-1363 (ed. by J. Stevenson, Maitland Club, Edinburgh, 1836); the Black Prince, a poem by the poet Chandos, composed about 1386, and relating the life of the Black Prince from 1346-1376 (re-edited by Francisque Michel, London and Paris, 1883); and, lastly, the different versions of the Brutes, the form and historical import- ance of which have been indicated by Paul Meyer {Bulletin de la SociUe des Anciens Textes, 1878, pp. 104-145), and by F. W. D. Brie (Geschichte und Quellen der mittelenglischen Prosachronik, The Brute of England or The Chronicles of England, Marburg, io˚s)-

Finally we may mention, as ancient history, the translation of Eutropius and Dares, by Geoffrey of Waterford (13th century), who gave also the Secret des Secrets, a translation from a work wrongly attributed to Aristotle, which belongs to the next division {Rom. xxiii. 314).

Didactic Literature. — This is the most considerable, if not the most interesting, branch of Anglo-Norman literature: it com- prises a large number of works written chiefly with the object of giving both religious and profane instruction to Anglo-Norman lords and ladies. The following list gives the most important productions arranged in chronological order :—

Philippe de Thaun, Comput, c. 11 19 (edited by E. Mall, Strassburg, 1873), poem on the calendar; Bestiaire, c. 1130 (ed. by E. Walberg, Paris, 1900; cf. G. Paris, Rom. xxxi. 175); Lois de Guillaume le Conquer ant (redaction between it 50 and 1 1 70, ed. by J. E. Matzke, Paris, 1899); Oxford Psalter, c. 11 50 (Fr. Michel, Libri Psalmorum versio antiqua gallica, Oxford, i860); Cambridge Psalter, c. 11 60 (Fr. Michel, Le Livre des Psaumes, Paris, 1877); London Psalter, same as Oxford Psalter (cf. Beyer, Zt.f. rom. Phil. xi. 513-534; xii. 1-56); Disticha Catonis, translated by Everard de Kirkham and Elie de Winchester (Stengel, Ausg. u. Abhandlungen) ; Le Roman de fortune, summary of Boetius' De consolatione philosophiae, by Simon de Fresne (Hist. lit. xxviii. 408) ; Quatre liwes des rois, translated into French in the 12 th century, and imitated in England soon after (P. Schlosser, Die LautverhSltnisse der- quatre liwes des rois, Bonn, 1886; Romania, xvii. 124); Donnei des Amanz, the conversation of two lovers, overheard and carefully noted by the poet, of a purely didactic

character, in which are included three interesting pieces, the first being an episode of the story of Tristram, the second a fable, L'homme et le serpent, the third a tale, L'homme et I'oiseau, which is the basis of the celebrated Lai de I'oiselet (Rom. xxv. 497); Livre des Sibiles (1160); Enseignements Trebor, by Robert de Ho (= Hoo, Kent, on the left bank of the Medway) [edited by Mary Vance Young, Paris; Picard, 101; cf. G. Paris, Rom. xxxii. 141]; Lapidaire de Cambridge (Pannier, Les Lapidaires franqais) ; Frere Angier de Ste. Frideswide, Dia- logues, 29th of November 1212 (Rom. xii. 145-208, and xxix.; M. K. Pope, £tude sur la langue de Frere Angier, Paris, 1903); Li dialoge Gregoire le pape, ed. by Foerster, 1876; Petit Plet, by Chardri, c. 1216 (Koch, Altfr Bibliothek, i., and Mussafia, Z.f. r.P. iii. 591); Petite philosophic, c. 1225 (Rom. xv. 356; xxix. 72); Histoire de Marie et de Jisus (Rom. xvi. 248-262); Poeme sut I'Ancien Testament (Not. et Extr. xxxiv. 1, 210; Soc. Anc. Textes, 1889, 73-74); Le Corset and Le Miroir, by Robert de Gretham (Rom. vii. 345; xv. 296); Lumiere as Lais, by Pierre de Peckham, c. 1 250 (Rom. xv. 287) ; an Anglo-Norman redaction of Image du monde, c. 1250 (Rom. xxi. 481); two Anglo-Norman versions of Quatre sceurs (Justice, Truth, Peace, Mercy), 13th century (ed. by Fr. Michel, Psautierd' Oxford, pp. 364-368, Bulletin Soc. Anc. Textes, 1886, 57, Romania, xv. 352); another Comput by Rauf de Lenham, 1256 (P. Meyer, Archives des missions, 2nd series iv. 154 and 160-164; Rom. xv. 285); Le chastel d'amors, by Robert Grosseteste or Greathead, bishop of

Lincoln (J1253) [ed. by Cooke, Carmina Anglo-N ormannica, 1852, Caxton Society]; Poeme sur V amour de Dieu et sur la haine du peche, 13th century, second part {Rom. xxix. 5); Le mariage des neuf filles du diable (Rom. xxix. 54); Ditie d'Urbain, attri- buted without any foundation to Henry I. (P. Meyer, Bulletin Soc. Anc. Textes, 1880, p. 73 and Romania xxxii, 68); Dialogue de I'eveque Saint Julien et son disciple {Rom. xxix. 21) ; Poeme sur V antichrist et lejugement dernier, by Henri d'Arci (Rom. xxix. 78; Not. et. Ex/r. 35, i. 137). Wilham de Waddington produced at the end of the 13 th century his Manuel des peches, which was adapted in England by Robert of Brunne in his Handlying Sinne (1303) {Hist. lit. xxviii. 179-207; Rom. xxix. 5, 47-53]; see Fumiv&ll, Robert of Brunne' s Handlying Synne (Roxb. Club, 1862) ; in the 14th century we find Nicole Bozon's Contes moralises (see above) ; Traite de naturesse (Rom. xiii. 508) ;

Sermons in verse (P. Meyer, op. cit. xlv.) ; Proverbes de bon enseignement (op. cit. xlvi.). We have also a few handbooks on the teaching of French. Gautier de Biblesworth wrote such a treatise a Madame Dyonise de Mountechensi pur aprise de langage (Wright, A Volume of Vocabularies; P. Meyer, Rec. d'anc. textes, p. 360 and Romania xxxii, 22); Orthographia gallica (Stiirzinger, Altfr. Bibl. 1884); La mani'ere de language, written in 1396 (P. Meyer, Rev. cril. d'hist. et de lilt. nos. compl. de 1870); Un petit livre pour enseigner les enfants de leur entreparler comun francois, c. 1399 (Stengel, Z. fur n. /. Spr. u. Litt. i. 11). The im- portant Mirour de I'omme, by John Gower, contains about 30,000 lines written in very good French at the end of the 14th century (Macaulay, The Complete Works of John Gower, i., Oxford, 1899).

Hagiography. — Among the numerous lives of saints written in Anglo-Norman the most important ones are the following, the list of which is given in chronological order: — Voyage de Saint Brandan (or Brandain), written in 1121, by an ecclesiastic for Queen Aelis of Louvain (Rom. St. i. 553-588; Z. f. r. P. ii. 438- 459; Rom. xviii. 203. C. Wahlund, Die altfr. Prosauberseiz. von Brendan's Meerfahrt, Upsala, 1901); life of St Catherine by Clemence of Barking (Rom. xiii. 400, Jarnik, 1894); life of St Giles, c. 1 170, by Guillaume de Berneville (Soc. Anc. Textes fr., 1 88 1 ; Rom. xi. and xxiii. 94) ; life of St Nicholas, life of Our Lady, by Wace (Delius, 1850; Stengel, Cod. Digby, 66); Uhlemann, Gram. Kril. Studien zu Wace's Conception und Nicolas, 1878; life of St George by Simon de Fresne (Rom. x. 319; J. E. Matzke, Public, of the Mod. Lang. Ass. of Amer. xvii. 1902; Rom. xxxiv. 148); Expurgatoire de Ste. Patrice, by Marie de France (Jenkins, 1894; Eckleben, Aelteste Schilderung vom Fegefeuer d. H. Patricius, 1851; Ph. de Felice, 1906); La vie de St Edmund le Rei, by Denis Pyramus, end of 12th century (Memorials of St Edmund's Abbey, edited by T. Arnold, ii. 1892; Rom. xxii. 170); Henri d'Arci's life of St Thais, poem on the Antichrist, Visio S. Pauli (P. Meyer, Not. et Exir. xxxv. 137-158); life of St Gregory the Great by Frere Angier, 30th of April 12 14 (Rom. viii. 509-544; ix. 176; xviii. 201); life of St Modwenna, between 1225 and 1250 (Suchier, Die dem Matthdns Paris zugeschriebene Vie de St Auban, 1873, pp. 54-58); Fragments of a life of St Thomas Becket, c. 1230 (P. Meyer,' Soc. Anc. Text.fr., 1885); and another life of the same by Benoit of St Alban, 13th century (Michel, Chron. des dues de Normandie; Hist. Lit. xxiii. 383); a life of Edward the Confessor, written before 1245 (Luard, Lives of Edward the Confessor, 1858; Hist. Lit. xxvii. 1), by an anonymous monk of Westminster; life of St Auban, c. 1250 (Suchier, op. cit. ; Uhlemann, " Uber die vie de St Auban in Bezug auf Quelle," &c. Rom. St. iv.

543-626; ed. by Atkinson, 1876). The Vision of Tnudgal, an Anglo-Norman fragment, is preserved in MS. 312, Trinity College, Dublin; the MS. is of the 14th century; the author seems to belong to the 13th (La vision de Tondale, ed. by Friedel and Kuno Meyer, 1906). In this category we may add the life of Hugh of Lincoln, 13th century (Hist. Lit. xxiii. 436; Child, The English and Scottish Popular Ballads, 1888, p. v; Wolter, Bibl. Anglo-Normˆ ii. 115). Other lives of saints were recognized to be Anglo-Norman by Paul Meyer when examining the MSS. of the Welbeck library (Rom. xxxii. 637 and Hist. Lit. xxxiii. 338-378).

Lyric Poetry. — The only extant songs of any importance are

the seventy-one Ballads of Gower (Stengel, Gower's Minnesang, 1886). The remaining songs are mostly of a religious character. Most of them have been discovered and published by Paul Meyer (Bulletin de la Soc. Anc. Textes, 1889; Not. et Extr. xxxiv; Rom. xiii. 518, t. xiv. 370; xv. p. 254, &c). Although so few have come down to us such songs must have been numerous at one time, owing to the constant intercourse between English, French and Provencals of all classes. An interesting passage in Piers Plowman furnishes us with a proof of the extent to which these songs penetrated into England. We read of : "... dykers and deluers that doth here dedes ille, And dryuen forth the longe day with ' Deu, vous saue, Dame Emme! ' " (Prologue, 223 f.)

One of the finest productions of Anglo-Norman lyric poetry written in the end of the 13th century, is the Plainte d'amour (Vising, Goteborg, 1905; Romania xiii. 507, xv. 292 and xxix. 4), and we may mention, merely as literary curiosities, various works of a lyrical character written in two languages, Latin and French, or English and French, or even in three languages, Latin, English and French. In Early English Lyrics (Oxford, 1907) we have a poem in which a lover sends to his mistress a love-greeting composed in three languages, and his learned friend replies in the same style (De amico ad amicam, Responcio, viii and ix).

Satire. — The popularity enjoyed by the Roman de Renarl and the Anglo-Norman version of the Riote du Monde (Z. f. rom. Phil. viii. 275-289) in England is proof enough that the French spirit of satire was keenly appreciated. The clergy and the fair sex presented the most attractive target for the shots of the satirists. However, an Englishman raised his voice in favour of the ladies in a poem entitled La Bonte des dames (Meyer, Rom. xv – 3 I 5"339)) and Nicole Bozon, after having represented " Pride " as a feminine being whom he supposes to be the daughter of Lucifer, and after having fiercely attacked the women of

his day in the Char d'Orgueil (Rom. xiii. 516), also composed a Bounte des femmes (P. Meyer, op. cit. 33) in which he covers them with praise, commending their courtesy, their humility, their openness and the care with which they bring up their children. A few pieces of political satire show us French and English exchanging amenities on their mutual shortcomings. The Roman des Francais, by Andre de Coutances,was written on the continent, and cannot be quoted as Anglo-Norman although it was composed before 1204 (cf. Gaston Paris: Trois versions rimees de I'evangile de Nicodeme, Soc. Anc. Textes, i885),it is a very spiritedreply to Frenchauthors who hadattacked the English.

Dramatic Literature. — This must have had a considerable influence on the development of the sacred drama in England, but none of the French plays acted in England in the 12 th and 13th centuries has been preserved. Adam, which is generally considered to be an Anglo-Norman mystery of the 12th century, was probably written in France at the beginning of the 13th century (Romania xxxii. 637), and the so-called Anglo-Norman Resurrection belongs also to continental French. It is necessary to state that the earliest English moralities seem to have been imitations of the French ones.

Bibliography. — Apart from the works already mentioned see generally: Scheibner, " Uber die Herrschaft der frz. Sprache in England " (Annaberg, Progr. der KSniglichen Realschule, 1880, 38 f.) ; Groeber, Grundr. der romanischen Philologie, ii. iii. (Strassburg, 1902) ; G. Paris, La Litt. fr. au moyen age (1905) ; Esquisse historique de la litt. fr. au moyen age (1907); La Lilt. norm, avant V annexion 912-1204 (Paris, 1899) ; " L'Esprit normand en Angleterre," La Poesie au moyen age (2nd series 45-74, Paris, 1906) ; Thomas Wright, Biographia britannica literaria (Anglo-Norman period, London, 1846); Ten Brink, Geschichte der englischen Lilteratur (Berlin, 1877, i. 2) ; J. J. Jusserand, Hist. lilt, du peuple anglais (2nd ed. 1895, vol. i.); W. H.Schofield, English Literature from the Norman Con- quest to Chaucer (London, 1906) ; Johan Vising, Franska Spraket i England (Goteborg, 1900, 1901, 1902). (L. Br.)

ANGLO-SAXON CHRONICLE. It is usual to speak of " the Anglo-Saxon Chronicle "; it would be more correct to say that there are four Anglo-Saxon Chronicles. It is true that these all grow out of a common stock, that in some even of their later entries two or more of them use common materials; but the same

may be said of several groups of medieval chronicles, which no one dreams of treating as single chronicles. Of this fourfold Chronicle there are seven MSS. in existence; C.C.C. Cant. 173 (A); Colt. Tib. A vi. (B); Cott. Tib. B i. (C); Cott. Tib. B iv. (D); Bodl. Laud. Misc. 636 (E); Cott. Domitian A viii. (F); Cott. Otho B xi. (G). Of these G is now a mere fragment, and it is known to have been a transcript of A. F is bilingual, the entries being given both in Saxon and Latin. It is interesting as a stage in the transition from the vernacular to the Latin chronicle; but it has little independent value, being a mere epitome, made at Canterbury in the 1 1 th or 1 2 th century, of a chronicle akin to E. B, as far as it goes (to 1)77). is identical with C, both having been copied from a common original, but A, C, D, E have every right to be treated as independent chronicles. The relations between the four vary very greatly in different parts, and the neglect of this consideration has led to much error and confusion. The common stock, out of which all grow, extends to 892. The present writer sees no reason to doubt that the idea of a national, as opposed to earlier local chronicles, was inspired by Alfred, who may even have dictated, or at least revised, the entries relating to his own campaigns; while for the earlier parts pre-existing materials, both oral and written, were utilized. Among the latter the chronological epitome appended to Bede's Ecclesiastical History may be specially mentioned. But even this common stock exists in two different recensions, in A, B, C, on the one hand, and D, E on the other. The main points of difference are that in D, E (1) a series of northern annals have been incorporated; (2) the Bede entries are taken, not from the brief epitome, but from the main body of the Eccl. Hist. The inference is that, shortly after the compiling of this Alfredian chronicle, a copy of it was sent to some northern monastery, probably Ripon, where it was expanded in the way indicated. Copies of this northernized Chronicle afterwards found their way to the south. The impulse given by Alfred was con- tinued under Edward, and we have what may be called an official continuation of the history of the Danish wars, which, in B, C, D extends to 915, and in A to 924. After 915 B, C insert as a separate document a short register of Mercian affairs during the same period (902-924), which might be called the acts of ˆEthel- flaed, the famous " Lady of the Mercians," while D has incorpor- ated it, not very skilfully, with the official continuation. Neither of these documents exists in E. From 925 to 97 5 all the chronicles are very fragmentary; a few obits, three or four poems, among them the famous ballad on the battle of Brunanburh, make up the meagre tale of their common materials, which each has tried to supplement in its own way. A has

inserted a number of Winchester entries, which prove that A is a Winchester book. And this local and scrappy character it retains to 1001, where it practically ends. At some subsequent time it was transferred bodily to Canterbury, where it received numerous interpolations in the earlier part, and a few later local entries which finally tail off into the Latin acts of Lanfranc. A may therefore be dismissed. C has added to the common stock one or two Abingdon entries, with which place the history of C is closely connected; while D and E have a second group of northern annals 901-966, E being however much more fragmentary than D, omitting, or not having access to, much both of the common and of the northern material which is found in D. From 983 to 1018 C, D and E are practically identical, and give a connected history of the Danish struggles under /Ethelred II. This section was probably composed at Canterbury. From 1018 the relations of C, D, E become too complicated to be expressed by any formula; sometimes all three agree together, sometimes all three are independent; in other places each pair in turn agree against the third. It may be noted that C is strongly anti-Godwinist, while E is equallypro-Godwinist, 1) occupying an intermediate position. C extends to 1066, where it ends abruptly, and probably mutilated. D ends at 1079 and is certainly mutilated. In its later history D is associated with some place in the diocese of Worcester, probably Evesham. In its present form D is a comparatively late MS., none of it probably much earlier, and some of it later, than 1100. In the case of entries in the earlier part of the chronicles, which are peculiar to D, we cannot exclude the possibility that they may be late

interpolations. E is continued to 1 1 54. In its present form it is unquestionably a Peterborough book. The earlier part is full of Peterborough interpolations, to which place many of the later entries also refer. But (apart from the interpolations) it is only the entries after 1 1 2 1 , where the first hand in the MS. ends, which were actually composed at Peterborough. The section 1023-1067 certainly, and possibly also the section 1068-1121, was composed at St Augustine's, Canterbury; and the former is of extreme interest and value, the writer being in close contact with the events which he describes. The later parts of E show a great degeneration in language, and a querulous tone due to the sufferings of the native population under the harsh Norman rule; " but our debt to it is inestimable; and we can hardly measure what the loss to English history would have been, if it had not been written; or if, having been written, it had, like so many another English chronicle, been lost."

Bibliography. — The above account is based on the introduction in vol. ii. of the Rev. C. Plummer's edition of Two of the Saxon

Chronicles Parallel (Clarendon Press, 1892, 1899); to which the student may be referred for detailed arguments. The editio princeps of the Anglo-Saxon Chronicle was by Abraham Wheloc, professor of Arabic at Cambridge, where the work was printed (1643-1644). It was based mainly on the MS. called G above, and is the chief source of our knowledge of that MS. which perished, all but three leaves, in the Cottonian lire of 1723. Edmund Gibson of Queen's College, Oxford, afterwards bishop of London, published an edition in 1692. He used Wheloc's edition, and E, with collations or tran- scripts of B and F. Both Wheloc and Gibson give Latin translations. In 1823 appeared an edition by Dr Ingram, of Trinity College, Oxford, with an English translation. Besides A, B, E, F, Ingram used C and D for the first time. But both he and Gibson made the fatal error of trying to combine the disparate materials contained in the various chronicles in a single text. An improvement in this respect is seen in the edition made by Richard Price (d. 1833) for the first (and only) volume of Monumenta Ilistorica Britannica (folio 1848). There is still, however, too much conflation, and owing to the plan of the volume, the edition only extends to 1066. A translation is appended. In 1861 appeared Benjamin Thorpe's six-text edition in the Rolls Series. Though not free from defects, this edition is absolutely indispensable for the study of the chronicles and the mutual relations of the different MSS. A second volume contains the translation. In 1865 the Clarendon Press published Two Saxon Chronicles (A and E) Parallel, with supplementary extracts from the others, by the Rev. John Earle. This edition has no translation, but in the notes and introduction a very considerable advance was made. On this edition is partly based the later edition by the Rev. C. Plummer, already cited above. In addition to the trans- lations contained in the editions already mentioned, the following have been issued separately. The first translation into modern English was by Miss Anna Gurney, privately printed in 1819. This was largely based on Gibson's edition, and was in turn the basis of Dr Giles' translation, published in 1847, and often reprinted. The best translation is that by the Rev. Joseph Stevenson, in his series of Church Historians of England (1853). Up to the Conquest it is a revision of the translation contained in Man. Hist. Brit. From that point it is an independent translation. (C. Pl.)

ANGLO-SAXON LAW. 1. The body of legal rules and customs which obtained in England before the Norman conquest constitutes, with the Scandinavian laws, the most genuine expression of Teutonic legal thought. While the so-called "barbaric laws" (leges barbarorum) of the continent, not except- ing those compiled in the territory now called Germany, were largely the product of Roman influence, the continuity of Roman life was almost completely broken in the island, and even

the Church, the direct heir of Roman tradition, did not carry on a continuous existence: Canterbury was not a see formed in a Roman province in the same sense as Tours or Reims. One of the striking expressions of this Teutonism is presented by the language in which the Anglo-Saxon laws were written. They are uniformly worded in English, while continental laws, apart from the Scandinavian, are all in Latin. The English dialect in which the Anglo-Saxon laws have been handed down to us is in most case? a common speech derived from West Saxon — naturally enough as Wessex became the predominant English state, and the court of its kings the principal literary centre from which most of the compilers and scribes derived their dialect and spelling. Traces of Kentish speech may be detected, however, in the Textus Roffensis, the MS. of the Kentish laws, and Northumbrian dialectical peculiarities are also noticeable on some occasions,

while Danish words occur only as technical terms. At the conquest, Latin takes the place of English in the compilations made to meet the demand for Anglo-Saxon law texts as still applied in practice.

2. It is easy to group the Anglo-Saxon laws according to the manner of their publication. They would fall into three divisions : (i) laws and collections of laws promulgated by public authority; (2) statements of custom; (3) private compilations of legal rules and enactments. To the first division belong the laws of the Kentish kings, yEthelberht, Hlothhere and Eadric, Withraed; those of Ine of Wessex, of Alfred, Edward the Elder, ˆEthelstan, 1 Edmund, Edgar, /Ethelred and Canute; the treaty between Alfred and Guthrum and the so-called treaty between Edward and Guthrum. The second division is formed by the convention between the English and the Welsh Dunsaetas, the law of the Northumbrian priests, the customs of the North people, the fragments of local custumals entered in Domesday Book. The third division would consist of the collections of the so-called Pseudo-leges Canati, the laws of Edward the Confessor, of Henry I . , and the great compilation of the Quadripartitus, then of a number of short notices and extracts like the fragments on the ” wedding of a wife,” on oaths, on ordeals, on the king’s peace, on rural customs (Rectitudines singularum personarum) , the treatises on the reeve (gerefa) and on the judge (dema), formulae of oaths, notions as to wergeld, &c. A fourth group might be made of the charters, as they are based on Old English private and public law and supply us with most important materials in regard to it. Looking somewhat deeper at the sources

from which Old English law was derived, we shall have to modify our classification to some extent, as the external forms of publication, although important from the point of view of historical criticism, are not sufficient standards as to the juridical character of the various kinds of material. Direct statements of law would fall under the following heads, from the point of view of their legal origins: i. customary rules followed by divers communities capable of formulating law; ii. enactments of authorities, especially of kings; iii. private arrangements made under recognized legal rules. The first would comprise, besides most of the state- ments of custom included in the second division according to the first classification, a great many of the rules entered in collections promulgated by kings; most of the paragraphs of .Ethelberht's, Hlothhere's, and Eadric's and Ine's laws, are popular legal customs that have received the stamp of royal authority by their insertion in official codes. On the other hand, from Withraed's and Alfred's laws downwards, the element of enactment by central authority becomes more and more prominent. The kings endeavour, with the help of secular and clerical witan, to introduce new rules and to break the power of long-standing customs (e.g. the precepts about the keeping of holidays, the enactments of Edmund restricting private vengeance, and the solidarity of kindreds as to feuds, and the like). There are, however, no outward signs enabling us to distinguish conclusively between both categories of laws in the codes, nor is it possible to draw a line between permanent laws and personal ordinances of single sovereigns, as has been attempted in the case of Frankish legislation.

3. Even in the course of a general survey of the legal lore at our disposal, one cannot help being struck by peculiarities in the distribution of legal subjects. Matters which seem to us of primary importance and occupy a wide place in our law-books are almost entirely absent in Anglo-Saxon laws or relegated to the background. While it is impossible to give here anything like a complete or exact survey of the field — a task rendered almost impossible by the arbitrary manner in which paragraphs are divided, by the difficulty of making Old English enactments fit into modern rubrics, and by the necessity of counting several times certain paragraphs bearing on different subjects — a brief statistical analysis of the contents of royal codes and laws may be found instructive.

We find roughly 419 paragraphs devoted to criminal law and

1 The Judicia civitatis Lundoniae are a gild statute confirmed by King /Ethelstan.

procedure as against 91 concerned with questions of private law and civil procedure. Of the criminal law clauses, as many as 238 are taken up with tariffs of fines, while 80 treat of capital and corporal punishment, outlawry and confiscation, and 101 include rules of procedure. On the private law side 18 clauses apply to rights of property and possession, 13 to succession and family law, 37 to contracts, including marriage when treated as an act of sale; 18 touch on civil procedure. A subject which attracted special attention was the law of status, and no less than 107 paragraphs contain disposition dictated by the wish to discriminate between the classes of society. Questions of public law and administration are discussed in 217 clauses, while 197 concern the Church in one way or another, apart from purely ecclesiastical collections. In the public law division it is chiefly the power, interests and privileges of the king that are dealt with, in roughly 93 paragraphs, while local administra- tion comes in for 39 and purely economic and fiscal matter for 13 clauses. Police regulations are very much to the fore and occupy no less than 72 clauses of the royal legislation. As to church matters, the most prolific group is formed by general precepts based on religious and moral considerations, roughly 115, while secular privileges conferred on the Church hold about 62, and questions of organization some 20 clauses.

The statistical contrasts are especially sharp and characteristic when we take into account the chronological sequence in the elaboration of laws. Practically the entire code of ˆEthelberht, for instance, is a tariff of fines for crimes, and the same subject continues to occupy a great place in the laws of Hlothhere and Eadric, Ine and Alfred, whereas it appears only occasionally in the treaties with the Danes, the laws of Withraed, Edward the Elder, ˆEthelstan, Edgar, Edmund and ˆEthelred. It re- appears in some strength in the code of Canute, but the latter is chiefly a recapitulation of former enactments. The system of " compositions " or fines, paid in many cases with the help of kinsmen, finds its natural place in the ancient, tribal period of English history and loses its vitality later on in consequence of the growth of central power and of the scattering of maegths. Royalty and the Church, when they acquire the lead in social life, work out a new penal system based on outlawry, death penalties and corporal punishments, which make their first appearance in the legislation of Withraed and culminate in that of /Ethelred and Canute.

As regards status, the most elaborate enactments fall into the period preceding the Danish settlements. After the treaties with the Danes, the tendency is to simplify distinctions on the lines of an opposition between twelvehynd-men and twyhynd- men, paving the way towards the feudal distinction between the free and the unfree. In the

arrangements of the commonwealth the clauses treating of royal privileges are more or less evenly distributed over all reigns, but the systematic development of police functions, especially in regard to responsibility for crimes, the catching of thieves, the suppression of lawlessness, is mainly the object of 10th and nth century legislation. The reign ol ˆEthelred, which witnessed the greatest national humiliation and the greatest crime in English history, is also marked by the most lavish expressions of religious feeling and the most frequent appeals to morality. This sketch would, of course, have to be modified in many ways if we attempted to treat the unofficial fragments of customary law in the same way as the paragraphs of royal codes, and even more so if we were able to tabulate the indirect evidence as to legal rules. But, imperfect as such statistics may be, they give us at any rate some insight into the direction of governmental legislation.

4. The next question to be approached concerns the pedigree of Anglo-Saxon law and the latter's natural affinities. What is its position in the legal history of Germanic nations? How far has it been influenced by non-Germanic elements, especially by Roman and Canon law? The oldest Anglo-Saxon codes, especially the Kentish and the West Saxon ones, disclose a close relationship to the barbaric laws of Lower Germany — those of Saxons, Parisians, Thuringians. We find a division of social ranks which reminds us of the threefold gradation of Lower Germany

(edelings, frilings, lazzen — eorls, ceorls, laets), and not of the twofold Frankish one (ingenui Franci, Romani) , nor of the minute differentiation of the Upper Germans and Lombards. In sub- sequent history there is a good deal of resemblance between the capitularies' legislation of Charlemagne and his successors on one hand, the acts of Alfred, Edward the Elder, iEthelstan and Edgar on the other, a resemblance called forth less by direct borrowing of Frankish institutions than by the similarity of political problems and condition. Frankish law becomes a powerful modifying element in English legal history after the Conquest, when it was introduced wholesale in royal and in feudal courts. The Scandinavian invasions brought in many northern legal customs, especially in the districts thickly populated with Danes. The Domesday survey of Lincolnshire, Nottinghamshire, Yorkshire, Norfolk, &c, shows remarkable deviations in local organization and justice (lagmen, sokes), and great peculiarities as to status (socmen, freemen), while from laws and a few charters we can perceive some influence on criminal law (nidings- vaerk), special usages as to fines (lahslit), the keeping of peace, attestation and sureties of acts (faeslermen) , &c. But, on the whole, the introduction of Danish and Norse elements,apart from local cases, was more important owing to the conflicts and compromises it called forth and its social results, than on account of any distinct trail of Scandinavian views in English law. The Scandinavian newcomers coalesced easily and quickly with the native population.

The direct influence of Roman law was not great during the Saxon period: we notice neither the transmission of important legal doctrines, chiefly through the medium of Visigothic codes, nor the continuous stream of Roman tradition in local usage. But indirectly Roman law did exert a by no means insignificant influence through

the medium of the Church, which, for all its insular character, was still permeated with Roman ideas and forms of culture. The Old English ” books ” are derived in a roundabout way from Roman models, and the tribal law of real property was deeply modified by the introduction of individual- istic notions as to ownership, donations, wills, rights of women, &c. Yet in this respect also the Norman Conquest increased the store of Roman conceptions by breaking the national isolation of the English Church and opening the way for closer intercourse with France and Italy.

5. It would be useless to attempt to trace in a brief sketch the history of the legal principles embodied in the documents of Anglo-Saxon law. But it may be of some value to give an outline of a few particularly characteristic subjects.

(a) The Anglo-Saxon legal system cannot be understood unless one realizes the fundamental opposition between folk-right and privilege. Folk-right is the aggregate of rules, formulated or latent but susceptible of formulation, which can be appealed to as the expression of the juridical consciousness of the people at large or of the communities of which it is composed. It is tribal in its origin, and differentiated, not according to boundaries between states, but on national and provincial lines. There may be the folk-right of West and East Saxons, of East Angles, of Kentish men, Mercians, Northumbrians, Danes, Welshmen, and these main folk-right divisions remain even when tribal kingdoms disappear and the people is concentrated in one or two realms. The chief centres for the formulation and application of folk- right were in the 10th and nth centuries the shire-moots, while the witan of the realm generally placed themselves on the higher ground of State expediency, although occasionally using folk- right ideas. The older law of real property, of succession, of contracts, the customary tariffs of fines, were mainly regulated by folk-right; the reeves employed by the king and great men were supposed to take care of local and rural affairs according to folk-right. The law had to be declared and applied by the people itself in its communities, while the spokesmen of the people were neither democratic majorities nor individual experts, but a few leading men — the twelve eldest thanes or some similar quorum. Folk-right could, however, be broken or modified by special law or special grant, and the fountain of such privileges was the royal power. Alterations and exceptions were, as a matter of

fact, suggested by the interested parties themselves, and chiefly by the Church. Thus a privileged land-tenure was created — bookland; the rules as to the succession of kinsmen were set at nought by concession

of testamentary power and confirmations of grants and wills; special exemptions from the jurisdiction of the hundreds and special privileges as to levying fines were conferred. In process of time the rights originating in royal grants of privilege overbalanced, as it were, folk-right in many respects, and became themselves the starting-point of a new legal system — the feudal one.

(b) Another feature of vital importance in the history of Anglo-Saxon law is its tendency towards the preservation of peace. Society is constantly struggling to ensure the main condition of its existence — peace. Already in ˆEthelberht's legislation we find characteristic fines inflicted for breach of the peace of householders of different ranks — the ceorl, the eorl, and the king himself appearing as the most exalted among them. Peace is considered not so much a state of equilibrium and friendly relations between parties, but rather as the rule of a third within a certain region- — a house, an estate, a kingdom. This leads on one side to the recognition of private authorities — the father's in his family, the master's as to servants, the lord's as to his personal or territorial dependents. On the other hand, the tendency to maintain peace naturally takes its course towards the strongest ruler, the king, and we witness in Anglo-Saxon law the gradual evolution of more and more stringent and complete rules in respect of the king's peace and its infringements.

(c) The more ancient documents of Anglo-Saxon law show us the individual not merely as the subject and citizen of a certain commonwealth, but also as a member of some group, all the fellows of which are closely allied in claims and responsibilities. The most elementary of these groups is the maegth, the associa- tion of agnatic and cognatic relations. Personal protection and revenge, oaths, marriage, wardship, succession, supervision over settlement, and good behaviour, are regulated by the law of kinship. A man's actions are considered not as exertions of his individual will, but as acts of the kindred, and all the fellows of the maegth are held responsible for them. What began as a natural alliance was used later as a means of enforcing responsi- bility and keeping lawless individuals in order. When the association of kinsmen failed, the voluntary associations — gilds — appeared as substitutes. The gild brothers associated in mutual defence and support, and they had to share in the payment of fines. The township and the hundred came also in for certain forms of collective responsibility, because they pre- sented groups of people associated in their economic and legal interests.

(d) In course of time the natural associations get loosened and intermixed, and this calls forth the elaborate police legislation of the

later Anglo-Saxon kings. Regulations are issued about the sale of cattle in the presence of witnesses. Enactments about the pursuit of thieves, and the calling in of warrantors to justify sales of chattels, are other expressions of the difficulties attending peaceful intercourse. Personal surety appears as a complement of and substitute for collective responsibility. The hlaford and his hiredmen are an institution not only of private patronage, but also of police supervision for the sake of laying hands on malefactors and suspected persons. The landrica assumes the same part in a territorial district. Ultimately the laws of the 10th and 1 1 th centuries show the beginnings of the frankpledge associations, which came to act so important a part in the local police and administration of the feudal age.

The points mentioned are not many, but, apart from their intrinsic importance in any system of law, they are, as it were, made prominent by the documents themselves, as they are constantly referred to in the latter.

Bibliography. — Editions: Liebermann, Die Gesetze der Angel- sachsen (1903, 1906) is indispensable, and leaves nothing to be desired as to the constitution of the texts. The translations and notes are, of course, to be considered in the light of an instructive, but not final, commentary. R. Schmid, Gesetze der Angelsachsen (2nd ed., Leipzig, 1858) is still valuable on account of its handiness

and the fulness of its glossary. B. Thorpe, Ancient Laws and Institutes of England (1840) is not very trustworthy. Domesday Book, i. ii. (Rec. Comm.); Codex Diplomaticus Aevi Saxonici, i.-vi. ed. J. M. Kemble (1839-1848) ; Cartularium Saxonicum (up to 940), ed. W. de Gray Birch (1885-1893); J. Earle, Land Charters (Oxford, (888); Thorpe, Diplomatarium Anglicanum; Facsimiles 0} Ancient Charters, edited by the Ordnance Survey and by the British Museum ; Haddan and Stubbs, Councils of Great Britain, i.iii. (Oxford, 1869

1878).

Modem works. — Konrad Maurer, Uber Angelsachsische Rechts- verhaltnisse , Kritische Ueberschau (Munich, 1853 ff.), still the best account of the history of Anglo-Saxon law; Essays on Anglo-Saxon Law, by H. Adams, H. C. Lodge, J. L. Laughlin and E. Young (1876) ; J. M. Kemble, Saxons in England; F. Palgrave, History of the English

Commonwealth; Stubbs, Constitutional History of England, {.; Pollock and Maitland, History of English Law, i. ; H. Brunner, ‘/.ur Reclitsgeschichte der romisch-germanischen Urkunde (1880); Sir F. Pollock, The King’s Peace (Oxford Lectures); F. Seebohm; The English Village Community; Ibid. Tribal Custom in Anglo- Saxon Law; Marquardsen, Haft und Biirgschaft im Angelsdchsischen Recht; Jastrow, ” t’ber die Strafrechtliche Stellung der Sklaven,” Gierke’s Untersuchungen, i. ; Steenstrup, Normannerne, iv. ; F. W. Maitland, Domesday and Beyond (Cambridge, 1897) ; H.M. Chadwick, Studies on A.nglo-Saxon Institutions (1905); P. Vinogradoff, ” Folc- land ” in the English Historical Review, 1893; ” Romanistische Ein- flijsse im Angelsachsischen Recht : Das Buchland ” in the Melanges Fitting, 1907; “The Transfer of Land in Old English Law” in the Harvard Law Review, 1907. (P. Vi.)

ANGLO-SAXONS. The term ” Anglo-Saxon ” is commonly applied to that period of English history, language and literature which preceded the Norman Conquest. It goes back to the time of King Alfred, who seems to have frequently used the title rex Anglorum Saxonum or rex Angid-Saxonum. The origin of this title is not quite clear. It is generally believed to have arisen from the final union of the various kingdoms under Alfred in 886. Bede (Hist. Eccl. i. 15) states that the people of the more northern kingdoms (East Anglia, Mercia, Northumbria, &c.) belonged to the Angli, while those of Essex, Sussex and Wessex were sprung from the Saxons {q.v.), and those of Kent and southern Hampshire from the Jutes (q.v.). Other early writers, however, do not observe these distinctions, and neither in language nor in custom do we find evidence of any appreciable differences between the two former groups, though in custom Kent presents most remarkable contrasts with the other king doms. Still more curious is the fact that West Saxon writers regularly speak of their own nation as a part of the Angelcyn and of their language as Englisc, while the West Saxon royal family claimed to be of the same stock as that of Bernicia. On the other hand, it is by no means impossible that the distinction drawn by Bede was based solely on the names Essex (East Seaxan), East Anglia, &c. We need not doubt that the Angli and the Saxons were different nations originally; but from the evidence at our disposal it seems likely that they had practically coalesced in very early times, perhaps even before the invasion. At all events the term Angli Saxones seems to have first come into use on the continent, where we find it, nearly a century before Alfred’s time, in the writings of Paulus Diaconus (Paul the Deacon). There can be little doubt, however, that there it was used to distinguish the Teutonic inhabitants of Britain from the Old Saxons of the continent.

See W. H. Stevenson, Asser's Life of King Alfred (Oxford, 1904, pp. 148 ff.) ; H. Munro Chadwick, The Origin of the English Nation (Cambridge, 1907); also Britain, Anglo-Saxon. (H. M. C.)

ANGOLA, the general name of the Portuguese possessions on the west coast of Africa south of the equator. With the exception of the enclave of Kabinda (q.v.) the province lies wholly south of the river Congo. Bounded on the W. by the Atlantic Ocean, it extends along the coast from the southern bank of the Congo (6° S., 12 E.) to the mouth of the Kuncne river (17° 18′ S., 11° 50′ E.). The coast-line is some 900 m. long. On the north the Congo forms for 80 m. the boundary separating Angola from the Congo Free State. The frontier thence (in 5° 52′ S.) goes due east to the Kwango river. The eastern boundary — dividing the Portuguese possessions from the Congo State and Barotseland (N.W. Rhodesia) — is a highly irregular line. On the south Angola borders German South- West Africa, the frontier being drawn somewhat S. of the 17th degree of S. latitude. The area

of the province is about 480,000 sq. m. The population is estimated (1906) at 4,119,000.

The name Angola (a Portuguese corruption of the Bantu word Ngola) is sometimes confined to the 105 m. of coast, with its hinterland, between the mouths of the rivers Dande and Kwanza, forming the central portion of the Portuguese dominions in West Africa; in a looser manner Angola is used to designate all the western coast of Africa south of the Congo in the possession of Portugal; but the name is now officially applied to the whole of the province. Angola is divided into five districts: four on the coast, the fifth, Lunda, wholly inland, being the N.E. part of the province. Lunda is part of the old Bantu kingdom of Muata Yanvo, divided by international agreement between Portugal and the Congo Free State.

The coast divisions of Angola are Congo on the N. (from the river Congo to the river Loje), corresponding roughly with the limits of the " kingdom of Congo " (see History below); Loanda, which includes Angola in the most restricted sense mentioned above; Benguella and Mossamedes to the south. Mossamedes is again divided into two portions — the coast region and the hinterland, known as Huilla.

Physical Features. — The coast is for the most part flat, with occasional low cliffs and bluffs of red sandstone. There is but one deep inlet of the sea — Great Fish Bay (or Bahia dos Tigres), a little north of the Portuguese- German frontier. Farther north are Port Alexander, Little Fish Bay and Lobito Bay, while shallower bays are numerous.

Lobito Bay has water sufficient to allow large ships to unload close inshore. The coast plain extends inland for a distance varying from 30 to 100 m. This region is in general sparsely watered and somewhat sterile. The approach to the great central plateau of Africa is marked by a series of irregidar terraces. This intermediate mountain belt is covered with luxuriant vegetation. Water is fairly abundant, though in the dry season obtainable only by digging in the sandy beds of the rivers. The plateau has an altitude ranging from 4000 to 6000 ft. It consists of well-watered, wide, rolling plains, and low hills with scanty vegetation. In the east the tableland falls away to the basins of the Congo and Zambezi, to the south it merges into a barren sandy desert. A large number of rivers make their way westward to the sea; they rise, mostly, in the mountain belt, and are unimportant, the only two of any size being the Kwanza and the Kunene, separately noticed. The mountain chains which form the edge of the plateau, or diversify its surface, run generally parallel to the coast, as Tala Mugongo (4400 ft.), Chella and Vissecua (5250 ft. to 6500 ft.). In the district of Benguella are the highest points of the province, viz. Loviti (7780 ft.), in 1 2° 5′ S., and Mt. Elonga (7550 ft.). South of the Kwanza is the volcanic mountain Caculo-Cabaza (3300 ft.). From the tableland the Kwango and many other streams flow north to join the Kasai (one of the largest affluents of the Congo), which in its upper course forms for fully 300 m. the boundary between Angola and the Congo State. In the south-east part of the province the rivers belong either to the Zambezi system, or, like the Okavango, drain to Lake Ngami.

Geology. — The rock formations of Angola are met with in three distinct regions: (1) the littoral zone, (2) the median zone formed by a series of hills more or less parallel with the coast, (3) the central plateau. The central plateau consists of ancient crystal- line rocks with granites overlain by unfossiliferous sandstones and conglomerates considered to be of Palaeozoic age. The outcrops are largely hidden under laterite. The median zone is composed largely of crystalline rocks with granites and some Palaeozoic unfossiliferous rocks. The littoral zone contains the only fossiliferous strata. These are of Tertiary and Cretaceous ages, the latter rocks resting on a reddish sandstone of older date. The Cretaceous rocks of the Dombe Grande region (near Ben- guella) are of Albian age and belong to the A canthoceras mamillari zone. The beds containing Schloenbachia inflata are referable to the Gault. Rocks of Tertiary age aremet with at Dombe Grande, Mossamedes and near Loanda. The sandstones with gypsum, copper and sulphur of Dombe are doubtfully considered to be of Triassic age. Recent eruptive rocks, mainly basalts, form a line

of hills almost bare of vegetation between Benguella and Mossa- medes. Nepheline basalts and liparites occur at Dombe Grande. The presence of gum copal in considerable quantities in the superficial rocks is characteristic of certain regions.

Climate. — With the exception of the district of Mossamedes, the coast plains are unsuited to Europeans. In the interior, above 3300 ft., the temperature and rainfall, together with malaria, decrease. The plateau climate is healthy and invigor- ating. The mean annual temperature at Sao Salvador do Congo is 72-5° F.; at Loanda, 74-3°; and at Caconda, 67-2°. The climate is greatly influenced by the prevailing winds, which arc W., S.W. and S.S.W. Two seasons are distinguished — the cool, from June to September; and the rainy, from October to May. The heaviest rainfall occurs in April, and is accompanied by violent storms.

Flora and Fauna. — Both flora and fauna are those character- istic of the greater part of tropical Africa. As far south as Benguella the coast region is rich in oil-palms and mangroves. In the northern part of the province are dense forests. In the south towards the Kunene are regions of dense thorn scrub. Rubber vines and trees are abundant, but in some districts their number has been considerably reduced by the ruthless methods adopted by native collectors of rubber. The species most common are various root rubbers, notably the Carpodinus chylorrhiza. This species and other varieties of carpodinus are very widely distributed. Landolphias are also found. The coffee, cotton and Guinea pepper plants are indigenous, and the tobacco plant flourishes in several districts. Among the trees are several which yield excellent timber, such as the tacula (Pterocarpus tinctorius), which grows to an immense size, its wood being blood-red in colour, and the Angola mahogany. The bark of the musuemba {Albizzia coriaria) is largely used in the tanning of leather. The mulundo bears a fruit about the size of a cricket ball covered with a hard green shell and con- taining scarlet pips like a pomegranate. The fauna includes the lion, leopard, cheetah, elephant, giraffe, rhinoceros, hippo- potamus, buffalo, zebra, kudu and many other kinds of antelope, wild pig, ostrich and crocodile. Among fish are the barbel, bream and African yellow fish.

Inhabitants. — The great majority of the inhabitants are of Bantu-Negro stock with some admixture in the Congo district with the pure negro type. In the south-east are various tribes of Bushmen. The best-known of the Bantu-Negro tribes are the Ba-Kongo (Ba-Fiot), who dwell chiefly in the north, and the Abunda (Mbunda, Ba-Bundo), who

occupy the central part of the province, which takes its name from the Ngola tribe of Abunda. Another of these tribes, the Bangala, living on the west bank of the upper Kwango, must not be confounded with the Bangala of the middle Congo. In the Abunda is a consider- able strain of Portuguese blood. The Ba-Lunda inhabit the Lunda district. Along the upper Kunene and in other districts of the plateau are settlements of Boers, the Boer population being about 2000. In the coast towns the majority of the white inhabitants are Portuguese. The Mushi-Kongo and other divi- sions of the Ba-Kongo retain curious traces of the Christianity professed by them in the 16th and 17th centuries and possibly later. Crucifixes are used as potent fetish charms or as symbols of power passing down from chief to chief; whilst every native has a ” Santu ” or Christian name and is dubbed dom or dona. Fetishism is the prevailing religion throughout the province. The dwelling-places of the natives are usually small huts of the simplest constuction, used chiefly as sleeping apartments; the day is spent in an open space in front of the hut protected from the sun by a roof of palm or other leaves.

Chief Towns. — The chief towns are Sao Paulo de Loanda, the capital, Kabinda, Benguella and Mossamedes {q.v.). Lobito, a little north of Benguella, is a town which dates from 1905 and owes its existence to the bay of the same name having been chosen as the sea terminus of a railway to the far interior. Noki is on the southern bank of the Congo at the head of navigation from the sea, and close to the Congo Free State frontier. It is available for ships of large tonnage, and through it passes

the Portuguese portion of the trade of the lower Congo. Ambriz — the only seaport of consequence in the Congo district of the province — is at the mouth of the Loje river, about 70 m. N. of Loanda. Novo Redondo and Egito are small ports between Loanda and Benguella. Port Alexander is in the district of Mossamedes and S. of the town of that name.

In the interior Humpata, about 95 m. from Mossamedes, is the chief centre of the Boer settlers; otherwise there are none but native towns containing from 1000 to 3000 inhabitants and often enclosed by a ring of sycamore trees. Ambaca and Malanje are the chief places in the fertile agricultural district of the middle Kwanza, S.E. of Loanda, with which they are in railway communication. Sao Salvador (pop. 1500) is the name given by the Portuguese to Bonza Congo, the chief town of the ‘• kingdom of Congo.” It stands 1840 ft. above sea-level and is about 160 m. inland and 100 S.E. of the river port of Noki, in 6° 15′ S. Of the cathedral and other stone buildings erected in the 16th century,

there exist but scanty ruins. The city walls were destroyed in the closing years of the 19th century and the stone used to build government offices. There is a fort, built about 1850, and a small military force is at the disposal of the Portuguese resident. Bembe and Encoje are smaller towns in the Congo district south of Sao Salvador. Bihe, the capital of the plateau district of the same name forming the hinterland of Benguella, is a large caravan centre. Kangomba, the residence of the king of Bihe, is a large town. Caconda is in the hill country S.E. of Benguella.

Agriculture and Trade. — Angola is rich in both agricultural and mineral resources. Amongst the cultivated products are mealies and manioc, the sugar-cane and cotton, coffee and tobacco plants. The chief exports are coffee, rubber, wax, palm kernels and palm-oil, cattle and hides and dried or salt fish. Gold dust, cotton, ivory and gum are also exported. The chief imports are food-stuffs, cotton and woollen goods and hardware. Consider- able quantities of coal come from South Wales. Oxen, intro- duced from Europe and from South Africa, flourish. There are sugar factories, where rum is also distilled and a few other manufactures, but the prosperity of the province depends on the ” jungle ” products obtained through the natives and from the plantations owned by Portuguese and worked by indentured labour, the labourers being generally ” recruited ” from the far interior. The trade of the province, which had grown from about £800,000 in 1870 to about £3,000,000 in 1905, is largely with Portugal and in Portuguese bottoms. Between 1893 and 1904 the percentage of Portuguese as compared with foreign goods entering the province increased from 43 to 201 %, a result due to the preferential duties in force.

The minerals found include thick beds of copper at Bembe, and deposits on the M’Brije and the Cuvo and in various places in the southern part of the province; iron at Ociras (on the Lucalla affluent of the Kwanza) and in Bailundo; petroleum and asphalt in Dande and Quinzao; gold in Lombije and Cassinga; and mineral salt in Quissama. The native black- smiths are held in great repute.

Communications. — There is a regular steamship communication between Portugal, England and Germany, and Loanda, which port is within sixteen days’ steam of Lisbon. There is also a regular service between Cape Town, Lobito and Lisbon and Southampton. The Portuguese line is subsidized by the govern- ment. The railway from Loanda to Ambaca and Malanje is known as the Royal Trans-African railway. It is of metre gauge, was begun in 1887 and is some 300 m. long. It was in- tended to carry the line across the continent to

Mozambique, but when the line reached Ambaca (225 m.) in 1894 that scheme was abandoned. The railway had created a record in being the most expensive built in tropical Africa — £8942 per mile. A railway from Lobito Bay, 25 m. N. of Benguella, begun in 1904, runs towards the Congo-Rhodesia frontier. It is of standard African gauge (3 ft. 6 in.) and is worked by an English company. It is intended to serve the Katanga copper mines. Besides these two main railways, there are other short lines linking the seaports to their hinterland. Apart from the railways.

communication is by ancient caravan routes and by ox-wagon tracks in the southern district. Riding-oxen are also used. The province is well supplied with telegraphic communication and is connected with Europe by submarine cables.

Government and Revenue. — The administration of the province is carried on under a governor-general, resident at Loanda, who acts under the direction of the ministry of the colonies at Lisbon. At the head of each district is a local governor. Legislative powers, save those delegated to the governor-general, are exercised by the home government. Revenue is raised chiefly from customs, excise duties and direct taxation. The revenue (in 1904-1905 about £350,000) is generally insufficient to meet expenditure (in 1904-1905 over £490,000) — the balance being met by a grant from the mother country. Part of the extra expenditure is, however, on railways and other reproductive works.

History. — The Portuguese established themselves on the west coast of Africa towards the close of the 1 5th century. The river Congo was discovered by Diogo Cam or Cao in 1482. He erected a stone pillar at the mouth of the river, which accordingly took the title of Rio de Padrao, and established friendly relations with the natives, who reported that the country was subject to a great monarch, Mwani Congo or lord of Congo, resident at Bonza Congo. The Portuguese were not long in making them- selves influential in the country. Gongalo de Sousa was despatched on a formal embassy in 1490; and the first mis- sionaries entered the country in his train. The king was soon afterwards baptized and Christianity was nominally established as the national religion. In 1534 a cathedral was founded at Bonza Congo (renamed Sao Salvador), and in 1560 the Jesuits arrived with Paulo Diaz de Novaes. Of the prosperity of the country the Portuguese

have left the most glowing and indeed incredible accounts. It was, however, about this time ravaged by cannibal invaders (Bangala) from the interior, and Portuguese influence gradually declined. The attention of the Portuguese was, moreover, now turned more particularly to the southern districts of Angola. In 1627 the bishop's seat was removed to Sao Paulo de Loanda and Sao Salvador declined in importance. In the 18th century, in spite of hindrances from Holland and France, steps were taken towards re-establishing Portuguese authority in the northern regions; in 1758 a settlement was formed at Encoje; from 1784 to 1789 the Portuguese carried on a war against the natives of Mussolo (the district immediately south of Ambriz); in 1791 they built a fort at Quincollo on the Loje, and for a time they worked the mines of Bembe. Until, however, the " scramble for Africa" began in 1884, they possessed no fort or settlement on the coast to the north of Ambriz, which was first occupied in 1855. At Sao Salvador, however, the Portuguese continued to exercise influence. The last of the native princes who had real authority was a potentate known as Dom Pedro V. He was placed on the throne in 1855 with the help of a Portuguese force, and reigned over thirty years. In 1888 a Portuguese resident was stationed at Salvador, and the kings of Congo became pensioners of the government.

Angola proper, and the whole coast-line of what now con- stitutes the province of that name, was discovered by Diogo Cam during 1482 and the three following years. The first governor sent to Angola was Paulo Diaz, a grandson of Bartholomew Diaz, who reduced to submission the region south of the Kwanza nearly as far as Benguella. The city of Loanda was founded in 1576, Benguella in 1617. From that date the sovereignty of Portugal over the coast-line, from its present southern limit as far north as Ambriz (7 50′ S.) has been undisputed save between 1640 and 1648, during which time the Dutch attempted to expel the Portuguese and held possession of the ports. Whilst the economic development of the country was not entirely neglected and many useful food products were introduced, the prosperity of the province was very largely dependent on the slave trade with Brazil, which was not legally abolished until 1830 and in fact continued for many years subsequently.

In 1884 Great Britain, which up to that time had steadily refused to acknowledge that Portugal possessed territorial rights

north of Ambriz, concluded a treaty recognizing Portuguese sovereignty over both banks of the lower Congo; but the treaty, meeting with opposition in England and Germany, was not ratified. Agreements concluded with the Congo Free State, Germany and

France in 1885-1886 (modified in details by subsequent arrangements) fixed the limits of the province, except in the S.E., where the frontier between Barotseland (N.W. Rhodesia) and Angola was determined by an Anglo-Portuguesa agreement of 1891 and the arbitration award of the king of Italy in 1 905 (see Africa : History) . Up to the end of the 1 9th century the hold of Portugal over the interior of the province was slight, though its influence extended to the Congo and Zambezi basins. The abolition of the external slave trade proved very injurious to the trade of the seaports, but from i860 onward the agricultural resources of the country were developed with increasing energy, a work in which Brazilian merchants took the lead. After the definite partition of Africa among the European powers, Portugal applied herself with some seriousness to exploit Angola and her other African possessions. Nevertheless, in comparison with its natural wealth the development of the country has been slow. Slavery and the slave trade continued to flourish in the interior in the early years of the 20th century, despite the prohibitions of the Portuguese government. The extension of authority over the inland tribes proceeded very slowly and was not accomplished without occasional reverses. Thus in September 1904 a Portu- guese column lost over 300 men killed, including 1 14 Europeans, in an encounter with the Kunahamas on the Kunene, not far from the German frontier. The Kunahamas are a wild, raiding tribe and were probably largely influenced by the revolt of their southern neighbours, the Hereros, against the Germans. In 1905 and again in 1907 there was renewed fighting in the same region. Authorities. — E. de Vasconcellos, As Colonias Portuguesas (Lisbon, 1896-1897); J. J. Monteiro, Angola and the River Congo (2 vols. London, 1875) ; Viscount de Paiva Manso, Historia do Congo .... (Documentos) (Lisbon, 1877); A Report of the Kingdom of Congo (London, 1881), an English translation, with notes by Mar- garite Hutchinson, of Filippo Pigafetta's Relatione del Reame di Congo (Rome, 1591), a book founded on the statements and writings of Duarte Lopez; Rev. Thos. Lewis, "The Ancient Kingdom of Kongo " in Geographical Journal, vol. xix. and vol. xxxi. (London, 1902 and 1908); The Strange Adventures of Andrew Battell of Leigh in Angola and the Adjoining Regions (London, 1901), a volume of the Hakluyt Society, edited by E. G. Ravenstein, who gives in appendices the history of the country from its discovery to the end of the 17th century; J. C. Feo Cardozo, Memorias contendo .... a historia dos governadores e capitaens generaes de Angola, desde i£75 ate 1825 (Paris, 1825); H. W. Nevinson, A Modern Slavery (London, 1906), an examination of the system of indentured labour and its recruitment; Ornithologie d' Angola, by J. V. Barboza du Bocage (Lisbon, 1881); " Geologie des Colonies portugaises en Afrique," by P. Choffat, in Com.

d. service geol. du Portugal. See also the annual reports on the Trade of Angola, issued by the British Foreign Office.

ANGORA, or Enguri. (i) A city of Turkey (anc. Ancyra) in Asia, capital of the vilayet of the same name, situated upon a steep, rocky hill, which rises 500 ft. above the plain, on the left bank of the Enguri Su, a tributary of the Sakaria(Sangarius), about 220 m. E.S.E. of Constantinople. The hill is crowned by the ruins of the old citadel, which add to the picturesqueness of the view; but the town is not well built, its streets being narrow and many of its houses constructed of sun-dried mud bricks; there are, however, many fine remains of Graeco- Roman and Byzantine architecture, the most remarkable being the temple of Rome and Augustus, on the walls of which is the famous Monumentum Ancyranum (see Ancyra). Ancyra was the centre of the Tectosages, one of the three Gaulish tribes which settled in Galatia in the 3rd century B.C., and became the capital of the Roman province of Galatia when it was formally constituted in 25 B.C. During the Byzan- tine period, throughout which it occupied a position of great importance, it was captured by Persians and Arabs; then it fell into the hands of the Seljuk Turks, was held for eighteen years by the Latin Crusaders, and finally passed to the Ottoman Turks in 1360. In 1402 a great battle was fought in the vicinity of Angora, in which the Turkish sultan Bayezid was defeated and made prisoner by the Tatar conqueror Timur. In 141 5 it was recovered by the Turks under Mahommed L, and since that period has

belonged to the Ottoman empire. In 1832 it was taken by the Egyptians under Ibrahim Pasha. Angora is connected with Constantinople by railway, and exports wool, mohair, grain and yellow berries. Mohair cloth is manufactured, and the town is noted for its honey and fruit. From 1639 to 1768 there was an agency of the Levant Company here; there is now a British consul. Pop. estimated at 28,000 (Moslems, 18,000; Christians, largely Roman Catholic Armenians, about 9400; Jews, 400).

(2) A Turkish vilayet in north-central Asia Minor, which includes most of the ancient Galatia. It is an agricultural country, depending for its prosperity on its grain, wool (average annual export, 4,400,000 lb), and the mohair obtained from the beautiful Angora goats (average annual clip, 3,300,000 lt>). The fineness of the hair may perhaps be ascribed to some peculiarity in the atmosphere, for it is remarkable

that the cats, dogs and other animals of the country are to a certain extent affected in the same way, and that they all lose much of their distinctive beauty when taken from their native districts. The only important industry is carpet-weaving at Kir-sheher and Kaisarieh. There are mines of silver, copper, lignite and salt, and many hot springs, including some of great repute medicinally. Average annual exports 1896-1898, £920,762; imports, £411,836. Pop. about 900,000 (Moslems, 765,000 to 800,000, the rest being Christians, with a few hundred Jews). (J. G. C. A.)

See C. Ritter, Erdkunde von Asien (vol. xviii., 1837-1839); V. Cuinet, La Turquie d'Asie, t. i. (1891); Murray's Handbook to Asia Minor (1895) ; and other works mentioned under Ancyra.

ANGOULEME, CHARLES DE VALOIS, Duke of (1573-1650), the natural son of Charles IX. of France and Marie Touchet, was born on the 28th of April 1573, at the castle of FayetinDauphine. His father dying in the following year, commended him to the care and favour of his brother and successor, Henry III., who faithfully fulfilled the charge. His mother married Francois de Balzac, marquis d'Entragues, and one of her daughters, Henriette, marchioness of Verneuil, afterwards became the mistress of Henry IV. Charles of Valois, was carefully educated, and was destined for the order of Malta. At the early age of sixteen he attained one of the highest dignities of the order, being made grand prior of France. Shortly after he came into possession of large estates left by Catherine de' Medici, from one of which he took his title of count of Auvergne. In 1591 he obtained a dispensation from the vows of the order of Malta, and married Charlotte, daughter of Henry, Marshal d'Amville, afterwards duke of Montmorency. In 1 589 Henry III. was assassinated, but on his deathbed he commended Charles to the good-will of his successor Henry IV. By that monarch he was made colonel of horse, and in that capacity served in the campaigns during the early part of the reign. But the connexion between the king and the marchioness of Verneuil appears to have been very displeasing to Auvergne, and in 1601 he engaged in the conspiracy formed by the dukes of Savoy, Biron and Bouillon, one of the objects of which was to force Henry to repudiate his wife and marry the marchioness. The conspiracy was discovered; Biron and Auvergne were arrested and Biron was executed. Auvergne after a few months' imprisonment was released, chiefly through the influence of his half-sister, his aunt, the duchess of Angouleme and his father-in-law. He then entered into fresh intrigues with the court of Spain, acting in concert with the marchioness of Verneuil and her father d'Entragues. In 1604 d'Entragues and he were arrested and condemned to death; at the same time the marchioness was

condemned to perpetual imprisonment in a convent. She easily obtained pardon, and the sentence of death against the other two was commuted into perpetual imprisonment. Auvergne remained in the Bastille for eleven years, from 1605 to 1616. A decree of the parlement (1606), obtained by Marguerite de Valois, deprived him of nearly all his possessions, including Auvergne, though he still retained the title. In 1616 he was released, was restored to his rank of colonel-general of horse, and despatched against one of the disaffected nobles, the duke of Longueville, who had taken Peronne. Next year he commanded the forces collected in the lie de France, and obtained some successes. In 1619 he received by bequest, ratified in 1620 by

royal grant, the duchy of Angouleme. Soon after he was engaged on an important embassy to Germany, the result of which was the treaty of Ulm, signed July 1620. In 1627 he commanded the large forces assembled at the siege of La Rochelle; and some years after in 1635, during the Thirty Years' War, he was general of the French army in Lorraine. In 1636 he was made lieutenant- general of the army. He appears to have retired from public life shortly after the death of Richelieu in 1643. His first wife died in 1636, and in 1644 he married Francoise de Narbonne, daughter of Charles, baron of Mareuil. She had no children and survived her husband until 1713. Angouleme himself died on the 24th oi September 1650. By his first wife he had three children: Henri, who became insane; Louis Emmanuel, who succeeded his father as duke of Angouleme and was colonel-general of light cavalry and governor of Provence; and Francois, who died in 1622.

The duke was the author of the following works: — (i)Memoires, from the assassination of Henri III. to the battle of Arques (1589- J 593)i published at Paris by Boneau, and reprinted by Buchon in his Choix de chroniques (1836) and by Petitot in his Memoir es (1st series, vol. xliv.) ; (2) Les Harangues, prononces en assemblee de MM. les princes protestants d' Allemagne, par Monseigneur le due d' Angoultme (1620); (3) a translation of a Spanish work by Diego de Torres. To him has also been ascribed the work, La generate et fideh Relation de tout ce qui s'est passe en I' isle de Re, envoyee par le roi d, la royne sa mere (Paris, 1627).

ANGOULEME, a city of south-western France, capital of the department of Charente, 83 m. N.N.E. of Bordeaux on the railway between Bordeaux and Poitiers. . Pop. (1906) 30,040. The town proper occupies an elevated promontory, washed on the north by the Charente and on the south and west by the Anguienne, a small tributary of that river. The more important of the suburbs lie towards

the east, where the promontory joins the main plateau, of which it forms the north-western extremity. The main line of the Orleans railway passes through a tunnel beneath the town. In place of its ancient fortifications Angou- leme is encircled by boulevards known as the Remparts, from which fine views may be obtained in all directions. Within the town the streets are often dark and narrow, and, apart from the cathedral and the hotel de ville, the architecture is of little interest. The cathedral of St Pierre (see Cathedkal), a church in the Byzantine-Romanesque style, dates from the nth and 12 th centuries, but has undergone frequent restoration, and was partly rebuilt in the latter half of the 19th century by the architect Paul Abadie. The facade, flanked by two towers with cupolas, is decorated with arcades filled in with statuary and sculpture, the whole representing the Last Judgment. The crossing is surmounted by a dome, and the extremity of the north transept by a fine square tower over 160 ft. high. The hotel de ville, also by Abadie, is a handsome modern structure, but preserves two towers of the chateau of the counts of Angou- leme, on the site of which it is built. It contains museums of paintings and archaeology. Angouleme is the seat of a bishop, a prefect, and a court of assizes. Its public institutions include tribunals of first instance and of commerce, a council of trade-arbitrators, a chamber of commerce and a branch of the Bank of France. It also has a lycee, training-colleges, a school of artillery, a library and several learned societies. It is a centre of the paper-making industry, with which the town has been connected since the 14th century. Most of the mills are situated on the banks of the watercourses in the neighbourhood of the town. The subsidiary industries, such as the manufacture of machinery and wire fabric, are of considerable importance. Iron and copper founding, brewing, tanning, and the manufacture of gunpowder, confectionery, heavy iron goods, gloves, boots and shoes and cotton goods are also carried on. Commerce is carried on in wine, brandy and building-stone.

Angouleme (Iculisma) was taken by Clovis from the Visigoths in 507, and plundered by the Normans in the 9th century. In 1360 it was surrendered by the peace of Bretigny to the English; they were, however, expelled in 1373 by the troops of Charles V., who granted the town numerous privileges. It suffered much during the Wars of Religion, especially in 1 568 after its capture by the Protestants under Coligny.

The countship of Angouleme dated from the 9th century, the most important of the early counts being William Taillefer, whose descendants held the title till the end of the 12th century. Withdrawn from them on more than one occasion by Richard Coeur-de-Lion, it passed to King John of England on his marriage with Isabel, daughter of Count Adhemar, and by her subsequent marriage in 1220 to Hugh X. passed to the Lusignan family, counts of Marche. On the death of Hugh XIII. in 1302 without issue, his possessions passed to the crown. In 1394 the countship came to the house of Orleans, a member of which, Francis I., became king of France in 151 5 and raised it to the rank of duchy in favour of his mother Louise of Savoy. The duchy afterwards changed hands several times, one of its holders being Charles of Yalois, natural son of Charles IX. The last duke was Louis-Antoine, eldest son of Charles X., who died in 1844.

See A. F. Lievre, Angouleme: histoire, institutions et monuments (Angouleme, 1885).

ANGOUMOIS, an old province of France, nearly corre- sponding to-day to the department of Charente. Its capitr.l was Angouleme.

See Essai d'une bibliotkeque historique de VAngoumois, by E. Castaigne (1845).

ANGRA, or Angra do Heroismo ("Bay of Heroism," a name given it in 1829, to commemorate its successful defence against the Miguelist party), the former capital of the Portuguese archipelago of the Azores, and chief town of an administrative district, comprising the islands of Terceira. St George and Graciosa. Pop. (1900) 10,788. Angra is built on the south coast of Terceira in 38° 38′ N. and in 27° 13′ W. It is the headquarters of a military command, and the residence of a Roman Catholic bishop; its principal buildings are the cathedral, military college, arsenal and observatory. The harbour, now of little commercial or strategic importance, but formerly a cele brated naval station, is sheltered on the west and south-west by the promontory of Mt. Brazil; but it is inferior to the neighbour- ing ports of Ponta Delgada and Horta. The foreign trade is net large, and consists chiefly in the exportation of pineapples and other fruit. Angra served as a refuge for Queen Maria II. cf Portugal from 1830 to 1833.

ANGRA PEQUENA, a bay in German South-West Africa, in 26° 38′ S., 1 5 E., discovered by Bartholomew Diaz in 1487. F. A. E. Luderitz, of Bremen, established a trading station here in 1883, and his agent concluded treaties with the neighbouring chiefs, who ceded large tracts of country to the newcomers. On the 24th of April 1884

Luderitz transferred his rights to the German imperial government, and on the following 7th of August a German protectorate over the district was proclaimed. (See Africa, § 5, and German South-West Africa.) Angra Pequena has been renamed by the Germans Luderitz Bay, and the adjacent country is sometimes called Liideritzland. The harbour is poor. At the head of the bay is a small town, whence a railway, begun in 1906, runs east in the direction of Bechuana- land. The surrounding country for many miles is absolute desert, except after rare but terrible thunderstorms, when the dry bed of the Little Fish river is suddenly filled with a turbulent stream, the water finding its way into the bay.

The islands off the coast of Angra Pequena, together with others north and south, were annexed to Great Britain in 1867 and added to Cape Colony in 1874. Seal Island and Penguin Island are in the bay; Ichaboe, Mercury, and Hollam's Bird islands are to the north; Halifax, Long, Possession, Albatross, Pomona, Plumpudding, and Roastbeef islands are to the south. On these islands are guano deposits; the most valuable is on Ichaboe Island.

ANGSTROM, ANDERS JONAS (1814-1874), Swedish physicist, was born on the 13th of August 1814 at Logdo, Medelpad, Sweden. He was educated at Upsala University, where in 1839 he became prival doccnt in physics. In 1842 he went to Stockholm Observatory in order to gain experience in practical astronomical work, and in the following year he became observer at Upsala Observatory. Becoming interested in terrestrial magnetism he made many observations of magnetic intensity

and declination in various parts of Sweden, and was charged by the Stockholm Academy of Sciences with the task, not completed till shortly before his death, of working out the magnetic data obtained by the Swedish frigate " Eugenie " on her voyage round the world in 1851-1853. In 1858 he succeeded Adolph Ferdinand Svanberg (1806-1857) in the chair of physics at Upsala, and there he died on the 21st of June 1874. His most important work was concerned with the conduction of heat and with spectroscopy. In his optical researches, Optiska Undersok- ningar, presented to the Stockholm Academy in 1853, he not only pointed out that the electric spark yields two superposed spectra, one from the metal of the electrode and the other from the gas in which it passes, but deduced from Euler's theory of resonance that an incandescent gas emits luminous rays of the same refrangibility as those which it can absorb. This statement, as Sir E. Sabine remarked when awarding him the Rumford medal of the Royal Society in 1872, contains a fundamental principle

of spectrum analysis, and though for a number of years it was overlooked it entitles him to rank as one of the founders of spectroscopy. From 1861 onwards he paid special attention to the solar spectrum. He announced the existence of hydrogen, among other elements, in the sun's atmosphere in 1862, and in 1868 published his great map of the normal solar spectrum which long remained authoritative in questions of wave-length, although his measurements were inexact to the extent of one part in 7000 or 8000 owing to the metre which he used as his standard having been slightly too short. He was the first, iii 1867, to examine the spectrum of the aurora borealis, and detected and measured the characteristic bright line in its yellow green region; but he was mistaken in supposing that this same line, which is often called by his name, is also to be seen in the zodiacal light.

His son, Knut Joiian Angstrom, was born at Upsala on the 12th of January 1857, and studied at the university of that town from 1877 to 1884. After spending a short time in Strassburg he was appointed lecturer in physics at Stockholm University in 1885, but in 1891 returned to Upsala, where in 1896 he became professor of physics. He especially devoted himself to investiga- tions of the radiation of heat from the sun and its absorption by the earth's atmosphere, and to that end devised various delicate methods and instruments, including his electric compensation pyrheliometer, invented in 1893, and apparatus for obtaining a photographic representation of the infra-red spectrum (1895).

ANGUIER, FRANCOIS (c. 1604-1669), and MICHEL (1612- 1686), French sculptors, were two brothers, natives of Eu in Normandy. Their apprenticeship was served in the studio of Simon Guillain. The chief works of Francois are the monument to Cardinal de Berulle, founder of the Carmelite order, in/ the chapel of the oratory at Paris, of which all but the bust has been destroyed, and the mausoleum of Henri II., last due de Mont- morency, at Moulins. To Michel are due the sculptures of the triumphal arch at the Porte St Denis, begun in 1674, to serve as a memorial for the conquests of Louis XIV. A marble group of the Nativity in the church of Val de Grace was reckoned his masterpiece. From 1662 to 1667 he directed the progress of the sculpture and decoration in this church, and it was he who superintended the decoration of the apartments of Anne of Austria in the old Louvre. F. Fouquet also employed him for his chateau in Vaux.

See Henri Stein, Les freres Anguier (1889), with catalogue of works, and many references to original sources; Armand Sanson, Deux sculpteurs Normands: les freres Anguier (1889).

ANGUILLA, or Snake, a small island in the British Indies, part of the presidency of St Kitts-Nevis, in the colony of the Leeward Islands. Pop. (1901) 3890, mostly negroes. It is situated in 18° 12′ N. and 63° s‘“w., about 60 m. N.W. of St Kitts, is 16 m. long and has an area of 35 sq.m. The destruction of trees by charcoal-burners has resulted in the almost complete deforestation of the island. Nearly all the land is in the hands of peasant proprietors, who cultivate sweet potatoes, peas, beans, corn, &c, and rear sheep and goats. Cattle, phosphate of lime and salt, manufactured from a lake in the interior, are the principal

exports, the market for these being the neighbouring island of St Thomas.

ANGULATE (Lat. angulus, an angle), shaped with corners or angles; an adjective used in botany and zoology for the shape of stems, leaves and wings.

ANGUS, EARLS OF. Angus was one of the seven original earldoms of the Pictish kingdom of Scotland, said to have been occupied by seven brothers of whom Angus was the eldest. The Celtic line ended with Matilda (fl. 1240), countess of Angus in her own right, who married in 1243 Gilbert de Umfravill and founded the Norman line of three earls, which ended in 1381, the then holder of the title being summoned to the English parlia- ment. Meanwhile John Stewart of Bonkyl, co. Berwick, had been created earl of Angus in a new line. This third creation ended with Margaret Stewart, countess of Angus in her own right, and widow of Thomas, 13 th earl of Mar. By an irregular connexion with William, 1st earl of Douglas, who had married Mar’s sister, she became the mother of George Douglas, 1st earl of Angus (c. 1380-1403), and secured a charter of her estates for her son, to whom in 1389 the title was granted by King Robert II. He was taken prisoner at Homildon Hill and died in England. The 5th earl was his great-grandson.

Archibald Douglas, 5th earl of Angus (c. 1450-c. 1514), the famous ” Bell the-Cat,” was born about 1450 and succeeded his father, George the 4th earl, in 1462 or 1463. In 1481 he was made warden of the east marches, but the next year he joined the league against James III. and his favourite Robert Cochrane at Lauder, where he earned his nickname by offering to bell the cat, i.e. to deal with the latter, beginning the attack upon him by pulling his gold chain off his neck

and causing him with others of the king's favourites to be hanged. Subsequently he joined Alexander Stewart, duke of Albany, in league with Edward IV. of England, on the 1 ith of February 1483, signing the convention at Westminster which acknowledged the overlordship of the English king. In March however they returned, outwardly at least, to their allegiance, and received pardons for their treason. Later Angus was one of the leaders in the rebellion against James in 1487 and 1488, which ended in the latter's death. He was made one of the guardians of the young king James IV. but soon lost influence, being superseded by the Homes and Hepburns, and the wardenship of the marches was given to Alexander Home. Though outwardly on good terms with James, he treacherously made a treaty with Henry VII. about 1489 or 1491, by which he undertook to govern his relations with James according to instructions from England, and to hand over Hermitage Castle, commanding the pass through Liddesdale into Scotland, on the condition of receiving English estates in compensation. In October 1491 he fortified his castle of Tantallon against James, but was obliged to submit and exchange his Liddesdale estate and Hermitage Castle for the lordship of Both well. In 1493 he was again in favour, received various grants of lands, and was made chancellor, which office he retained till 1498. In 1501 he was once more in disgrace and confined to Dumbarton Castle. After the disaster at Flodden in 15 13, at which he was not present, but at which he lost his two eldest sons, Angus was appointed one of the counsellors of the queen regent. He died at the close of this year, or in 15 14. He was married three times, and by his first wife had four sons and several daughters. His third son, Gavin Douglas, bishop of Dunkeld, is separately noticed.

Archibald Douglas, the 6th earl (c. 1489-1557), son of George, master of Douglas, who was killed at Flodden, succeeded on his grandfather's death. In 1509 he had married Margaret (d. 1513), daughter of Patrick Hepburn, 1st earl of Bothwell; and in 1514 he married the queen dowager Margaret of Scotland, widow of James IV., and eldest sister of Henry VIII. By this latter act he stirred up the jealousy of the nobles and the opposi- tion of the French party, and civil war broke out. He was superseded in the government on the arrival of John Stewart, duke of Albany, who was made regent. Angus withdrew to his estates in Forfarshire, while Albany besieged the queen at Stirling and got possession of the royal children; then he joined

Margaret after her flight at Morpeth, and on her departure for London returned and made his peace with Albany in 1516. He met her once more at Berwick in June 151 7, when Margaret returned to Scotland on Albany's departure in vain hopes of regaining the regency.

Meanwhile, during Margaret's absence, Angus had formed a connexion with a daughter of the laird of Traquair. Margaret avenged his neglect of her by refusing to support his claims for power and by secretly trying through Albany to get a divorce. In Edinburgh Angus held his own against the attempts of James Hamilton, istˆearl of Arran, to dislodge him. But the return of Albany in 1521, with whom Margaret now sided against her husband, deprived him of power. The regent took the government into his own hands; Angus was charged with high treason in December, and in March 1522 was sent practically a prisoner to France, whence he succeeded in escaping to London in 1524. He returned to Scotland in November with promises of support from Henry VIII., with whom he made a close alliance. Margaret, however, refused to have anything to do with her husband. On the 23rd, therefore, Angus forced his way into Edinburgh, but was fired upon by Margaret and retreated to Tantallon. He now organized a large party of nobles against Margaret with the support of Henry VIII., and in February 1525 they entered Edinburgh and called a parliament. Angus was made a lord of the articles, was included in the council of regency, bore the king's crown on the opening of the session, and with Archbishop Beaton held the chief power. In March he was appointed lieutenant of the marches, and suppressed the disorder and anarchy on the border. In July the guardianship of the king was entrusted to him for a fixed period till the 1st of November, but he refused at its close to retire, and advancing to Linlithgow put to flight Margaret and his opponents. He now with his followers engrossed all the power, succeeded in gaining over some of his antagonists, includ- ing Arran and the Hamiltons, and filled the public offices with Douglases, he himself becoming chancellor. " None that time durst strive against a Douglas nor Douglas's man." 1 The young king James, now fourteen, was far from content under the tutelage of Angus, but he was closely guarded, and several attempts to effect his liberation were prevented, Angus com- pletely defeating Lennox, who had advanced towards Edinburgh with 10,000 men in August, and subsequently taking Stirling. His successes were consummated by a pacification with Beaton, and in 1527 and 1528 he was busy in restoring order through the country. In the latter year, on the nth of March, Margaret succeeded in obtaining her divorce from Angus, and about the end of the month she and her lover, Henry Stewart, were besieged at Stirling. A few weeks later, however, James suc- ceeded in escaping from Angus's custody, took refuge with Margaret and Arran at Stirling, and immediately proscribed Angus and all the Douglases, forbidding them to come within seven miles of his person. Angus, having fortified himself in Tantallon, was attainted and his lands confiscated. Repeated attempts of James to subdue the fortress failed,

and on one occasion Angus captured the royal artillery, but at length it was given up as a condition of the truce between England and Scotland, and in May 1529 Angus took refuge with Henry, obtained a pension and took an oath of allegiance, Henry engaging to make his restoration a condition of peace. Angus had been chiefly guided in his intrigues with England by his brother, Sir George Douglas of Pittendriech (d. 1552), master of Angus, a far cleverer diplomatist than himself. His life and lands were also declared forfeit, as were those of his uncle, Archibald Douglas of Kilspindie (d. 1535), who had been a friend of James and was known by the nickname of " Greysteel." These took refuge in exile. James avenged himself on such Douglases as lay within his power. Angus's third sister Janet, Lady Glamis, was summoned to answer the charge of com- municating with her brothers, and on her failure to appear her estates were forfeited. In 1537 she was tried for conspiring against the king's life. She was found guilty and burnt on the Castle Hill, Edinburgh, on the 17th of July 1537. Her innocence 1 Lindsay of Pitscottie (1814), ii. 314.

has been generally assumed, but Tytler (Hist, of Scotland, iv. pp. 433 , 434) considered her guilty. Angus remained in England till 1542, joining in the attacks upon his countrymen on the border, while James refused all demands from Henry VIII. for his restoration, and kept firm to his policy of suppressing and extirpating the Douglas faction. On James V.'s death in 1542 Angus returned to Scotland, with instructions from Henry to accomplish the marriage between Mary and Edward. His forfeiture was rescinded, his estates restored, and he was made a privy councillor and lieutenant-general. In 1543 he negotiated the treaty of peace and marriage, and the same year he himself married Margaret, daughter of Robert, Lord Maxwell. Shortly afterwards strife between Angus and the regent Arran broke out, and in April 1544 Angus was taken prisoner. The same year Lord Hertford's marauding expedition, which did not spare the lands of Angus, made him join the anti-English party. He entered into a bond with Arran and others to maintain their allegiance to Mary, and gave his support to the mission sent to France to offer the latter's hand. In July 1544 he was appointed lieutenant of the south of Scotland, and distinguished himself on the 27th of February 1545 in the victory over the English at Ancrum Moor. He still corresponded with Henry VIII., but nevertheless signed in 1546 the act cancelling the marriage and peace treaty, and on the 10th of September commanded the van in the great defeat of Pinkie, when he again won fame. In 1548 the attempt

by Lennox and Wharton to capture him and punish him for his duplicity failed, Angus escaping after his defeat to Edinburgh by sea, and Wharton being driven back to Carlisle. Under the regency of Mary of Lorraine his restless and ambitious character and the number of his retainers gave cause for frequent alarms to the government. On the 31st of August 1547 he resigned his earldom, obtaining a regrant sibi et suis haeredibus masculis et suis assignalis quibuscumque. His career was a long struggle for power and for the interests of his family, to which national considerations were completely subordinate. He died in January 1557. By Margaret Tudor he had Margaret, his only surviving legitimate child, who married Matthew, 4th earl of Lennox, and was mother of Lord Darnley. He was succeeded by bis nephew David, son of Sir George Douglas of Pittendriech. Archibald Douglas, 8th earl, and earl of Morton (1555- 1588), was the son of David, 7 th earl. He succeeded to the title and estates in 1558, being brought up by his uncle, the 4th earl of Morton, a Presbyterian. In 1573 he was made a privy councillor and sheriff of Berwick, in 1574 lieutenant-general of Scotland, in 1577 warden of the west marches and steward of Fife, and in 1578 lieutenant-general of the realm. He gave a strong support to Morton during the attack upon the latter, made a vain attempt to rescue him, and was declared guilty of high treason on the 2nd of June 1581. He now entered into correspondence with the English government for an invasion of Scotland to rescue Morton, and on the latter's execution in June went to London, where he was welcomed by Elizabeth. After the raid of Ruthven in 1582 Angus returned to Scotland and was reconciled to James, but soon afterwards the king shook off the control of the earls of Mar and Cowrie, and Angus was again banished from the court. In 1584 he joined the rebellion of Mar and Glamis, but the movement failed, and the insurgents fled to Berwick. Later they took up their residence at Newcastle, which became a centre of Presbyterianism and of projects against the Scottish government, encouraged by Elizabeth, who regarded the banished lords as friends of the English and antagonists of the French interest. In February 1585 they came to London, and cleared themselves of the accusa- tion of plotting against James's life; a plan was prepared for their restoration and for the overthrow of James Stewart, earl of Arran. In October they invaded Scotland and gained an easy victory over Arran, captured Stirling Castle with the king in November, and secured from James the restoration of their estates and the control of the government. In 1586 Angus was appointed warden of the marches and lieutenant-general on the border, and performed good services in restoring order; but he was unable to overcome the king's hostility to the establishment

of Presbyterianˆ government. In January 1586 he was granted the earldom of Morton with the lands entailed upon him by his uncle. He died on the 4th of August 1 588. He was succeeded in the earldom by his cousin William, a descendant of the 5 th earl. (For the Morton title, see Morton, James Douglas, 4thEARL or.) William Douglas, 10th earl (c. 1554-1611), was the son of William, the 9th earl (1533-1591). He studied at St Andrews University and joined the household of the earl of Morton. Subsequently, while visiting the French court, he became a Roman Catholic, and was in consequence, on his return, dis- inherited and placed under restraint. Nevertheless he succeeded to his father's titles and estates in 1591, and though in 1592 he was disgraced for his complicity in Lord Bothwell's plot, he was soon liberated and performed useful services as the king's lieutenant in the north of Scotland. In July 1592, however, he was asking for help from Elizabeth in a plot with Erroll and other lords against Sir John Maitland, the chancellor, and protesting his absolute rejection of Spanish offers, while in October he signed the Spanish Blanks (see Erroll, Francis Hay, 9th Earl or) and was imprisoned (on the discovery of the treason) in Edinburgh Castle on his return in January 1593. He succeeded on the 13th in escaping by the help of his countess, joining the earls of Huntly and Erroll in the north. They were offered an act of "oblivion" or "abolition" provided they renounced their religion or quitted Scotland. Declining these conditions they were declared traitors and " forfeited." They remained in rebellion, and in July 1594 an attack made by them on Aberdeen roused James's anger. Huntly and Erroll were subdued by James himself in the north, and Angus failed in an attempt upon Edinburgh in concert with the earl of Bothwell. Subsequently in 1597 they all renounced their religion, declared themselves Presbyterians, and were restored to their estates and honours. Angus was again included in the privy council, and in June 1598 was appointed the king's lieutenant in southern Scotland, in which capacity he showed great zeal and conducted the " Raid of Dumfries," as the campaign against the Johnstones was called. Not long afterwards, Angus, offended at the advance- ment of Huntly to a'marquisate, recanted, resisted all the argu- ments of the ministers to bring him to a " better mind," and was again excommunicated in 1608. In 1609 he withdrew to France, and died in Paris on the 3rd of March 1611. He was succeeded by his son William, as nth earl of Angus, afterwards 1 st marquis of Douglas (1580-1660). The title is now held by the dukes of Hamilton.

Authorities. — The Douglas Booh, by Sir W. Fraser (1885); History of the House of Douglas and Angus, by D. Hume of Godscroft (1748, legendary in some respects) ; History of the House of Douglas, by Sir

H. Maxwell (1902).

ANGUSSOLA or Angussciola, SOPHONISBA, Italian portrait painter of the latter half of the 16th century, was born at Cremona about 1535, and died at Palermo in 1626. In 1560, at the invitation of Philip II., she visited the court of Madrid, where her portraits elicited great commendation. Vandyck is said to have declared that he had derived more knowledge of the true principles of his art from her conversation than from any other source. She painted several fine portraits of herself, one of which is at Althorp. A few specimens of her painting are to be seen at Florence and Madrid. She had three sisters, who were also celebrated artists.

ANHALT, a duchy of Germany, and a constituent state of the German empire, formed, in 1863, by the amalgamation of the two duchies Anhalt-Dessau-Cbthen and Anhalt-Bernburg, and comprising all the various Anhalt territories which were sundered apart in 1603. The country now known as Anhalt consists of two larger portions — Eastern and Western Anhalt, separated by the interposition of a part of Prussian Saxony — and of five enclaves surrounded by Prussian territory, viz. Alsleben, Muhlingen,Dornburg,GMnitz and Tilkerode-Abberode. The eastern and larger portion of the duchy is enclosed by the Prussian government district of Potsdam (in the Prussian province of Brandenburg), and Magdeburg and Merseburg (belonging to the Prussian province of Saxony). The western

or smaller portion (the so-called Upper Duchy or Ballenstedt) is also enclosed by the two latter districts and, for a distance of 5 m. on the west, by the duchy of Brunswick. The western portion of the territory is undulating and in the extreme south- west, where it forms part of the Harz range, mountainous, the Ramberg peak attaining a height of 1900 ft. From the Harz the country gently shelves down to the Saale; and between this river and the Elbe there lies a fine tract of fertile country. The portion of the duchy lying east of the Elbe is mostly a fiat sandy plain, with extensive pine forests, though interspersed, at intervals, by bog-land and rich pastures. The Elbe is the chief river, and intersecting the eastern portion of the duchy, from east to west, receives at Rosslau the waters of the Mulde. The navigable Saale takes a northerly direction through the western portion of the eastern part of the territory and receives, on the right, the Fuhne and, on the left, the Wipper and the Bode. The climate is on the whole mild, though

somewhat inclement in the higher regions to the south-west. The area of the duchy is 906 sq. m., and the population in 1905 amounted to 328,007, a ratio of about 351 to the square mile. The country is divided into the districts of Dessau, Cothen, Zerbst, Bernburg and Ballenstedt, of which that of Bernburg is the most, and that of Ballenstedt the least, populated. Of the towns, four, viz. Dessau, Bernburg, Cothen and Zerbst, have populations exceeding 20,000. The inhabitants of the duchy, who mainly belong to the upper Saxon race, are, with the exception of about 12,000 Roman Catholics and 1700 Jews, members of the Evan- gelical (Union) Church. The supreme ecclesiastical authority is the consistory in Dessau; while a synod of 39 members, elected for six years, assembles at periods to deliberate on internal matters touching the organization of the church. The Roman Catholics are under the bishop of Paderborn. There are within the duchy four grammar schools (gymnasia), five semi-classical and modern schools, a teachers' seminary and four high-grade girls' schools. Of the whole surface, land under tillage amounts to about 60, meadowland to 7 and forest to 25%. The chief crops are corn (especially wheat), fruit, vegetables, potatoes, beet, tobacco, flax, linseed and hops. The land is well cultivated, and the husbandry on the royal domains and the large estates especially so. The pastures on the banks of the Elbe yield cattle of excellent quality. The forests are well stocked with game, such as deer and wild boar, and the open country is well supplied with partridges. The rivers yield abundant fish, salmon (in the Elbe), sturgeon and lampreys. The country is rich in lignite, and salt works are abundant. Of the manufactures of Anhalt, the chief are its sugar factories, distilleries, breweries and chemical works. Commerce is brisk, especially in raw products — corn, cattle, timber or wool. Coal (lignite), guano, oil and bricks are also articles of export. The trade of the country is furthered by its excellent roads, its navig- able rivers and its railways (165 m.), which are worked in con- nexion with the Frussian system. There is a chamber of commerce in Dessau.

Constitution. — The duchy, by virtue of a fundamental law, proclaimed on the 17th of September 1859 and subsequently modified by various decrees, is a constitutional monarchy. The duke, who bears the title of " Highness," wields the executive power while sharing the legislation with the estates. The diet (Landtag) is composed of thirty-six members, of whom two are appointed by the duke, eight are representatives of landowners paying the highest taxes, two of the highest assessed members of the commercial and manufacturing classes, fourteen of the other electors of the towns and ten of the rural districts. The representatives are chosen for six years by indirect vote

and must have completed their twenty-fifth year. The duke governs through a minister of state, who is the praeses of all the depart- ments — finance, home affairs, education, public worship and statistics. The budget estimates for the financial year 1905- 1906 placed the expenditure of the estate at £1,323,437. The public debt amounted on the 30th of June 1904 to £226,300. By convention with Prussia of 1867 the Anhalt troops form a contingent of the Prussian army. Appeal from the lower

courts of the duchy lies to the appeal court at Naumburg in Prussian Saxony.

History. — During the nth century the greater part of Anhalt was included in the duchy of Saxony, and in the 12 th century it came under the rule of Albert the Bear, margrave of Branden- burg. Albert was descended from Albert, count of Ballenstedt, whose son Esico (d. 1059 or 1060) appears to have been the first to bear the title of count of Anhalt. Esico's grandson, Otto the Rich, count of Ballenstedt, was the father of Albert the Bear, by whom Anhalt was united with the mark of Brandenburg. When Albert died in n 70, his son Bernard, who received the title of duke of Saxony in 1 1 80, became count of Anhalt. Bernard died in 121 2, and Anhalt, separated from Saxony, passed to his son Henry, who in 1218 took the title of prince and was the real founder of the house of Anhalt. On Henry's death in 1252 his three sons partitioned the principality and founded respectively the lines of Aschersleben, Bernburg and Zerbst. The family ruling in Aschersleben became extinct in 1315, and this district was subsequently incorporated with the neighbouring bishopric of Halberstadt. The last prince of the line of Anhalt-Bernburg died in 1468 and his lands were inherited by the princes of the sole remaining line, that of Anhalt-Zerbst. The territory belonging to this branch of the family had been divided in 1396, and after the acquisition of Bernburg Prince George I. made a further partition of Zerbst. Early in the 16th century, however, owing to the death or abdication of several princes, the family had become narrowed down to the two branches of Anhalt-Cothen and Anhalt-Dessau. Wolfgang, who became prince of Anhalt- Cothen in 1508, was a stalwart adherent of the Reformation, and after the battle of Muhlberg in 1547 was placed under the ban and deprived of his lands by the emperor Charles V. After the peace of Passau in 1552 he bought back his principality, but as he was childless he surrendered it in 1562 to his kinsmen the princes of Anhalt-Dessau. Ernest I. of Anhalt-Dessau (d. 1516) left three sons, John II., George III., and Joachim, who ruled their lands together for many years, and who, like Prince Wolfgang, favoured the reformed doctrines, which thus became dominant in Anhalt. About 1546 the three brothers divided their

principality and founded the lines of Zerbst, Plotzkau and Dessau. This division, however, was only temporary, as the acquisition of Cothen, and a series of deaths among theVuling princes, enabled Joachim Ernest, a son of John II., to unite the whole of Anhalt under his rule in 1570.

Joachim Ernest died in 1586 and his five sons ruled the land in common until 1603, when Anhalt was again divided, and the lines of Dessau, Bernburg, Plotzkau, Zerbst and Cothen were refounded. The principality was ravaged during the Thirty Years' War, and in the earlier part of this struggle Christian I. of Anhalt-Bernburg took an important part. In 1635 an arrangement was made by the various princes of Anhalt, which gave a certain authority to the eldest member of the family, who was thus able to represent the principality as a whole. This proceeding was probably due to the necessity of maintaining an appearance of unity in view of the disturbed state of European politics. In 1665 the branch of Anhalt-Cothen became extinct, and according to a family compact this district was inherited by Lebrecht of Anhalt-Plotzkau, who surrendered Plotzkau to Bern-burg,and took the title of prince of Anhalt- Cothen. In the same year the princes of Anhalt decided that if any branch of the family became extinct its lands should be equally divided between the remaining branches. This arrangement was carried out after the death of Frederick Augustus of Anhalt-Zerbst in 1793, and Zerbst was divided between the three remaining princes. During these years the policy of the different princes was marked, perhaps intentionally, by considerable uniformity. Once or twice Calvinism was favoured by a prince, but in general the house was loyal to the doctrines of Luther. The growth of Prussia provided Anhalt with a formidable neighbour, and the establishment and practice of primogeniture by all branches of the family prevented further divisions of the principality. In 1806 Alexius of Anhalt-Bernburg was created a duke by the emperor Francis II., and after the dissolution of the Empire each of the three princes

took this title. Joining the Confederation of the Rhine in 1807, they supported Napoleon until 1813, when they transferred their allegiance to the allies; in 181 5 they became members of the Germanic Confederation, and in 1828 joined, somewhat reluct- antly, the Prussian Zollverein.

Anhalt-Cothen was ruled without division by a succession of princes,

prominent among whom was Louis (d. 1650), who was both a soldier and a scholar; and after the death of Prince Charles at the battle of Semlin in 1789 it passed to his son Augustus II. This prince sought to emulate the changes which had recently been made in France by dividing Cothen into two departments and introducing the Code Napoleon. Owing to his extravagance he left a large amount of debt to his nephew and successor, Louis II., and on this account the control of the finances was transferred from the prince to the estates. Under Louis's successor Ferdinand, who was a Roman Catholic and brought the Jesuits into Anhalt, the state of the finances grew worse and led to the interference of the king of Prussia and to the appointment of a Prussian official. When the succeeding prince, Henry, died in 1847, this family became extinct, and according to an arrangement between the lines of Anhalt-Dessau and Anhalt-Bernburg, Cothen was added to Dessau.

Anhalt-Bernburg had been weakened by partitions, but its princes had added several districts to their lands; and in 181 2, on the extinction of a cadet branch, it was again united under a single ruler. The feeble rule of Alexander Charles, who became duke in 1834, and the disturbed state of Europe in the following decade, led to considerable unrest, and in 1849 Bernburg was occupied by Prussian troops. A number of abortive attempts were made to change the government, and as Alexander Charles was unlikely to leave any children, Leopold of Anhalt-Dessau took some part in the affairs of Bernburg. Eventually in 1859 a new constitution was established for Bernburg and Dessau jointly, and when Alexander Charles died in 1863 both were united under the rule of Leopold.

Anhalt-Dessau had been divided in 1632, but was quickly reunited; and in 1693 it came under the rule of Leopold I. (see Anhalt-Dessau, Leopold I., Prince of), the famous soldier who was generally known as the " Old Dessauer." The sons of Leopold's eldest son were excluded from the succession on account of the marriage of their father being morganatic, and the princi- pality passed in 1747 to his second son, Leopold II. The unrest of 1848 spread to Dessau, and led to the interference of the Prussians and to the establishment of the new constitution in 1859. Leopold IV., who reigned from 1817 to 1871, had the satisfaction in 1863 of reuniting the whole of Anhalt under his rule. He took the title of duke of Anhalt, summoned one Landtag for the whole of the duchy, and in 1866 fought for Prussia against Austria. Subsequently a quarrel over the posses- sion of the ducal estates between the duke and the Landtag broke the peace of the duchy, but this was settled in 1872. In 1 87 1 Anhalt became a state of the German Empire. Leopold IV. was followed by his son Frederick I.,

and on the death of this prince in 1904 his son Frederick II. became duke of Anhalt.

Authorities. — F. Knoke, Anhaltische Geschichte (Dessau, 1893); G. Krause, Urkunden, Aktenstilcke und Brief e zur Geschichte der anhaltischen Lande und ihrer Fiirsten unter dem Drucke des 30 jahrigen Krieges (Leipzig, 1861-1866); O. von Heinemann, Codex diplomaticus Anhaltinus (Dessau, 1867-1883); Siebigk, Das Herzogthum Anhalt historisch, geographisch und statistisch dargestellt (Dessau, 1867).

ANHALT-DESSAU, LEOPOLD I., Prince of (1676-1747), called the "Old Dessauer" (Alter Dessauer), general field marshal in the Prussian army, was the only surviving son of John George II., prince of Anhalt-Dessau, and was born on the 3rd of July 1676 at Dessau. From his earliest youth he was devoted to the pro- fession of arms, for which he educated himself physically and mentally. .He became colonel of a Prussian regiment in 1693, and in the same year his father's death placed him at the head of his own principality; thereafter, during the whole of his long life, he performed the duties of a sovereign prince and a Prussian officer. His first campaign was that of 1695 in the Netherlands, in which he was present at the siege of Namur. He remained in the field

to the end of the war of 1697, the affairs of the principality being managed chiefly by his mother, Princess Henriette Catherine of Orange. In 1698 he married Anna Luise Fose, an apothecary's daughter of Dessau, in spite of his mother's long and earnest opposition, and subsequently he procured for her the rank of a princess from the emperor (1701). Their married life was long and happy, and the princess acquired an influence over the stern nature of her husband which she never ceased to exert on behalf of his subjects, and after the death of Leopold's mother she performed the duties of regent when he was absent on campaign. Often, too, she accompanied him into the field. Leopold's career as a soldier in important commands begins with the outbreak of the War of the Spanish Succession. He had made many improve- ments in the Prussian army, notably the introduction of the iron ramrod about 1700, and he now took the field at the head of a Prussian corps on the Rhine, serving at the sieges of Kaiserswerth and Venlo. In the following year (1 703) , having obtained the rank of lieutenant-general, Leopold took part in the siegeof Bonnand dis- tinguished himself very greatly in the battle of Hochstadt, in which the Austrians and their allies were defeated by the French under Marshal Villars (September 20, 1 703). In the campaign of 1 704 the Prussian contingent served under Prince Louis

of Baden and sub- sequently under Eugene, and Leopold himself won great glory by his conduct at Blenheim. In 1703 he was sent with a Prussian corps to join Prince Eugene in Italy, and on the 16th of August he displayed his bravery at the hard-fought battle of Cassano. In the following year he added to his reputation in the battle of Turin, where he was the first to enter the hostile entrenchments (September 7, 1706). He served in one more campaign in Italy, and then wen t with Eugene to join Marlborough in the Netherlands, being present in 1709 at the siege of Tournay and the battle of Malplaquet. In 17 10 he succeeded to the command of the whole Prussian contingent at the front, and in 171 2, at the particular desire of the crown prince, Frederick William, who had served with him as a volunteer, he was made a general field marshal. Shortly before this he had executed a coup de main on the castle of Mors, which was held by the Dutch in defiance of the claims of the king of Prussia to the possession. The operation was effected with absolute precision and the castle was seized without a shot being fired. In the earlier part of the reign of Frederick William I., the prince of Dessau was one of the most influential members of the Prussian governing circle. In the war with Sweden (17 15) he accompanied the king to the front, commanded an army of 40,000 men, and met and defeated Charles XII. in a severe battle on the island of Riigen (November 16). His conduct of the siege of Stralsund which followed was equally skilf ul,and the great results of the war to Prussia were largely to be attributed to his leader- ship in the campaign. In the years of peace, and especially after a court quarrel (1725) and duel with General von Grumbkow, he devoted himself to the training of the Prussian army. The reputa- tion it had gained in the wars of 1675 to 1715, though good, gave no hint of its coming glory, and it was even in 1740 accounted one of the minor armies of Europe. That it proved, when put to the test, to be by far the best military force existing, may be taken as the summary result of Leopold's work. The "Old Dessauer " was one of the sternest disciplinarians in an age of stern discipline, and the technical training of the infantry, under his hand, made them superior to all others in the proportion of five to three (see Austrian Succession, War of the). He was essentially an infantry soldier; in his time artillery did not decide battles, but he suffered the cavalry service, in which he felt little interest, to be comparatively neglected, with results which appeared at Mollwitz. Frederick the Great formed the cavalry of Hohenfried- berg and Leuthen himself, but had it not been for the incompar- able infantry trainedby the "Old Dessauer" he would never have had the opportunity of doing so. Thus Leopold, heartily sup- ported by Frederick William, who was himself called the great drill- master of Europe, turned to good account the twenty years following

the peace with Sweden. During this time two incidents in his career call for special mention: first, his intervention in the case of the crown prince Frederick, who was condemned to death for desertion, and his continued and finally successful efforts to

secure Frederick's reinstatement in the Prussian army; and secondly, his part in the War of the Polish Succession on the Rhine, where he served under his old chief Eugene and held the office of field marshal of the Empire.

With the death of Frederick William in 1740, Frederick succeeded to the Prussian throne, and a few months later took place the invasion and conquest of Silesia, the first act in the long Silesian wars and the test of the work of the "Old Dessauer's" lifetime. The prince himself was not often employed in the king's own army, though his sons held high commands under Frederick. The king, indeed, found Leopold, who was reputed, since the death of Eugene, the greatest of living soldiers, somewhat difficult to manage, and the prince spent most of the campaigning years up to 1745 in command of an army of observation on the Saxon frontier. Early in that year his wife died. He was now over seventy, but his last campaign was destined to be the most brilliant of his long career. A combined effort of the Austrians and Saxons to retrieve the disasters of the summer by a winter campaign towards Berlin itself led to a hurried concentration of the Prussians. Frederick from Silesia checked the Austrian main army and hastened towards Dresden. But before he had arrived, Leopold, no longer in observation, had decided the war by his overwhelming victory of Kesselsdorf (December 14, 1745). It was his habit to pray before battle, for he was a devout Lutheran. On this last field his words were, " O Lord God, let me not be disgraced in my old days. Or if Thou wilt not help me, do not help these scoundrels, but leave us to try it ourselves." With this great victory Leopold's career ended. He retired from active service, and the short remainder of his life was spent at Dessau, where he died on the 7th of April 1747.

He was succeeded by his son, Leopold II., Maximilian, Prince of Anhalt-Dessau (1700-1751), who was one of the best of Frederick's subordinate generals, and especially distinguished himself by the capture of Glogau in 1741, and his generalship at Mollwitz, Chotusitz (where he was made general field marshal on the field of battle), Hohenfriedberg and Soor.

Another son, Prince Dietrich of Anhalt-Dessau (d. 1769), was also a distinguished Prussian general.

But the most famous of the sons was Prince Moritz of Anhalt-Dessau (1712-1760), who entered the Prussian army in 1725, saw his first service as a volunteer in the War of the Polish Succession (1734-35), ar >d in the latter years of the reign of Frederick William held important commands. In the Silesian wars of Frederick II., Moritz, the ablest of the old Leopold's sons, greatly distinguished himself, especially at the battle of Hohen- friedberg (Striegau), 1745. At Kesselsdorf it was the wing led by the young Prince Moritz that carried the Austrian lines and won the "Old Dessauer's" last fight. In the years of peace preceding the Seven Years' War, Moritz was employed by Frederick the Great in the colonizing of the waste lands of Pomerania and the Oder Valley. When the king took the field again in 1756, Moritz was in command of one of the columns which hemmed in the Saxon army in the lines of Pirna, and he received the surrender of Rutowski's force after the failure of the Austrian attempts at relief. Next year Moritz underwent changes of fortune. At the battle of Kolin he led the left wing, which, through a misunder- standing with the king, was prematurely rjrawn into action and failed hopelessly. In the disastrous days which followed, Moritz was under the cloud of Frederick's displeasure. But the glorious victory of Leuthen (December 5, 1757) put an end to this. At the close of that day, Frederick rode down the lines and called out to General Prince Moritz, "I congratulate you, Herr Feldmarschall!" At Zorndorf he again distinguished himself, but at the surprise of Hochkirch fell wounded into the hands of the Austrians. Two years later, soon after his release, his wound proved mortal.

Authorities. — Varnhagen von Ense, Preuss. biographische Denk-male, vol. ii. (3rd ed., 1872); Militar Konversations-Lexikon, vol. ii. (Leipzig, 1833) ; Anon., Fiirst Leopold I. von Anhalt und seine Sbhne (Dessau, 1852); G. Pauli, Leben grosser Heiden, vol. vi. ; von Orlich, Prim Moritz von Anhalt-Dessau (Berlin, 1842) ; Crousatz, Militdrische Denkwiirdigkeiten des Fursten Leopold von Anhalt-Dessau (1875); supplements to Militar Wochenblatt (1878 and 1889); Siebigk, Selbstbiographie des Fursten Leopold von Anhalt-Dessau

(Dessau, i860 and 1876); Hosaus, Zur Biographie des Fursten Leopold von Anhalt-Dessau (Dessau, 1876); Wiirdig, Des Alten Dessauers Leben und Taten (3rd ed., Dessau, 1903); Briefe Kbnig Friedrich Wilhelms I. an den Fursten L. (Berlin, 1905).

ANHYDRITE, a mineral, differing chemically from the more

commonly occurring gypsum in containing no water of crystal- lization, being anhydrous calcium sulphate, CaS04. It crystal- lizes in the orthorhombic system, and has three directions of perfect cleavage parallel to the three planes of symmetry. It is not isomorphous with the orthorhombic barium and strontium sulphates, as might be expected from the chemical formulae. Distinctly developed crystals are somewhat rare, the mineral usually presenting the form of cleavage masses. The hardness is 3 1 and the specific gravity 2-9. The colour is white, sometimes greyish, bluish or reddish. On the best developed of the three cleavages the lustre is pearly, on other surfaces it is of the ordinary vitreous type.

Anhydrite is most frequently found in salt deposits with gypsum; it was, for instance, first discovered, in 1794, in a salt mine near Hall in Tirol. Other localities which produce typical specimens of the mineral, and where the mode of occurrence is the same, are Stassfurt in Germany, Aussee in Styria and Bex in Switzerland. At all these places it is only met with at some depth; nearer the surface of the ground it has been altered to gypsum owing to absorption of water.

From an aqueous solution calcium sulphate is deposited as crystals of gypsum, but when the solution contains an excess of sodium or potassium chloride anhydrite is deposited. This is one of the several methods by which the mineral has been prepared artificially, and is identical with its mode of origin in nature, the mineral having crystallized out in salt basins.

The name anhydrite was given by A. G. Werner in 1804, because of the absence of water, as contrasted with the presence of water in gypsum. Other names for the species are muriacite and karstenite; the former, an earlier name, being given under the impression that the substance was a chloride (muriate). A peculiar variety occurring as contorted concretionary masses is known as tripe-stone, and a scaly granular variety, from Vulpino, near Bergamo, in Lombardy, as vulpinite; the latter is cut and polished for ornamental purposes. (L. J. S.)

ANI (anc. Abnicum), an ancient and ruined Armenian city, in Russian Transcaucasia, government Erivan, situated at an altitude of 4390 ft., between the Arpa-chai {Harpasus) and a deep ravine. In 961 it became the capital of the Bagratid kings of Armenia, and when yielded to the Byzantine emperor (1046) it . was a populous city, known traditionally as the ” city with the 1 00 1 churches.” It was taken eighteen years later by the Seljuk Turks, five times by the Georgians between 1125 and 1209, in 1239 by the Mongols, and its

ruin was completed by an earth- quake in 1319. It is still surrounded by a double wall partly in ruins, and amongst the remains are a ” patriarchal ” church finished in 1010, two other churches, both of the nth century, a fourth built in 121 5, and a palace of large size.

See Brosset, Les Ruines d’Ani (1860-1861).

ANICETUS, pope c. 154-167. It was during his pontificate that St Polycarp visited the Roman Church.

ANICHINI, LUIGI, Italian engraver of seals and medals, a native of Ferrara, lived at Venice about 1550. Michelangelo pronounced his ” Interview of Alexander the Great with the high-priest at Jerusalem,” “the perfection of the art.” His medals of Henry II. of France and Pope Paul III. are greatly valued.

ANILINE, Phenylamine, or Aminobenzene, (CcHsNH;.), an organic base first obtained from the destructive distillation of indigo in 1826 by O. Unverdorben (Pogg. Ann., 1826, 8, p. 397), who named it crystalline. In 1834, F. Runge (Pogg. Ann., 1834, 31, p. 65; 32, p. 331) isolated from coal-tar a substance which produced a beautiful blue colour on treatment with chloride of lime; this he named kyanol or cyanol. In 1841, C. J. Fritzsche showed that by treating indigo with caustic potash it yielded an oil, which he named aniline, from the specific name of one of the

indigo-yielding plants, Indigofera anil, anil being derived from the Sanskrit nila, dark-blue, and nila, the indigo plant. About the same time N. N. Zinin found that on reducing nitrobenzene, a base was formed which he named benzidam. A. W. von Hofmann investigated these variously prepared substances, and proved them to be identical, and thenceforth they took their place as one body, under the name aniline or phenylamine. Pure aniline is a basic substance of an oily consistence, colourless, melting at —8° and boiling at 184 C. On exposure to air it absorbs oxygen and resinifies, becoming deep brown in colour; it ignites readily, burning with a large smoky flame. It possesses a somewhat pleasant vinous odour and a burning aromatic taste; it is a highly acrid poison.

Aniline is a weak base and forms salts with the mineral acids. Aniline hydrochloride forms large colourless tables, which become greenish on exposure; it is the ” aniline salt ” of com- merce. The sulphate

forms beautiful white plates. Although aniline is but feebly basic, it precipitates zinc, aluminium and ferric salts, and on warming expels ammonia from its salts. Aniline combines directly with alkyl iodides to form secondary and tertiary amines; boiled with carbon disulphide it gives sulphocarbanilide (diphenyl thio-urea), CS(NHC 6 H 6)2, which may be decomposed into phenyl mustard-oil, C6H5CNS, and triphenyl guanidine, C 6 H 5 N: C(NHC 6 H 5)2. Sulphuric acid at 180° gives sulphanilic acid, Nˆ-CeHˆSOaH. Anilides, com- pounds in which the amino group is substituted by an acid radical, are prepared by heating aniline with certain acids; antifebrin or acetanilide is thus obtained from acetic acid and aniline. The oxidation of aniline has been carefully investigated. In alkaline solution azobenzene results, while arsenic acid pro- duces the violet-colouring matter violaniline. Chromic acid converts it into quinone, while chlorates, in the presence of certain metallic salts (especially of vanadium), give aniline black. Hydrochloric acid and potassium chlorate give chloranil. Potas- sium permanganate in neutral solution oxidizes it to nitro- benzene, in alkaline solution to azobenzene, ammonia and oxalic acid, in acid solution to aniline black. Hypochlorous acid gives para-amino phenol and para-amino diphenylamine (E. Bam- berger, Ber., 1898, 31, p. 1522).

The great commercial value of aniline is due to the readiness with which it yields, directly or indirectly, valuable dyestuffs. The discovery of mauve in 1858 by Sir W. H. Perkin was the first of a series of dyestuffs which are now to be numbered by hundreds. Reference should be made to the articles Dyeing, Fuchsine, Safranine, Indulines, for more details on this subject. In addition to dyestuffs, it is a starting-product for the manufacture of many drugs, such as antipyrine, antifebrin, &c. Aniline is manufactured by reducing nitrobenzene with iron and hydrochloric acid and steam-distilling the product. The purity of the product depends upon the quality of the benzene from which the nitrobenzene was prepared. In com- merce three brands of aniline are distinguished — aniline oil for blue, which is pure aniline; aniline oil for red, a mixture of equimolecular quantities of aniline and ortho- and para-tolui- dines; and aniline oil for safranine, which contains aniline and ortho-toluidine, and is obtained from the distillate {Schappis) of the fuchsine fusion. Monomethyl and dimethyl aniline are colourless liquids prepared by heating aniline, aniline hydro- chloride and methyl alcohol in an autoclave at 220°. They are of great importance in the colour industry. Monomethyl aniline boils at 103-105°; dimethyl aniline at 192°.

ANIMAL (Lat. animalis, from anima, breath, soul), a term first used as a noun or adjective to denote a living thing, but now used to designate

one branch of living things as opposed to the other branch known as plants. Until the discovery of protoplasm, and the series of investigations by which it was established that the cell was a fundamental structure essentially alike in both animals and plants (see Cytology), there was a vague belief that plants, if they could really be regarded as animated crea- tures, exhibited at the most a lower grade of life. We know now that in so far as life and living matter can be investigated by science, animals and plants cannot be described as being alive

in different degrees. Animals and plants are extremely closely related organisms, alike in their fundamental characters, and each grading into organisms which possess some of the characters of both classes or kingdoms (see Protista). The actual boundaries between animals and plants are artificial; they are rather due to the ingenious analysis of the systematist than actually resident in objective nature. The most obvious distinction is that the animal cell-wall is either absent or composed of a nitrogenous material, whereas the plant cell-wall is composed of a carbohydrate material — cellulose. The animal and the plant alike require food to repair waste, to build up new tissue and to provide material which, by chemical change, may liberate the energy which appears in the processes of life. The food is alike in both cases; it consists of water, certain inorganic salts, carbohydrate material and proteid material. Both animals and plants take their water and inorganic salts directly as such. The animal c,ell can absorb its carbohydrate and proteid food only in the form of carbohydrate and proteid; it is dependent, in fact, on the pre-existence of these organic substances, themselves the products of living matter, and in this respect the animal is essentially a parasite on existing animal and plant life. The plant, on the other hand, if it be a green plant, containing chloro- phyll, is capable, in the presence of light, of building up both, carbohydrate material and proteid material from inorganic salts; if it be a fungus, devoid of chlorophyll, whilst it is de- pendent on pre-existing carbohydrate material and is capable of absorbing, like an animal, proteid material as such, it is able to build up its proteid food from material chemically simpler than proteid. On these basal differences are founded most of the characters which make the higher forms of animal and plant life so different. The animal body, if it be composed of many cells, follows a different architectural plan; the compact nature of its food, and the yielding nature of its cell-walls, result in a form of structure consisting essentially of tubular or spherical masses of cells arranged concentrically round the food-cavity. The relatively rigid nature of the plant cell-wall, and the attenu- ated inorganic food-supply of plants, make possible and neces-

sary a form of growth in which the greatest surface is exposed to the exterior, and thus the plant body is composed of flattened laminae and elongated branching growths. The distinctions between animals and plants are in fact obviously secondary and adaptive, and point clearly towards the conception of a common origin for the two forms of life, a conception which is made still more probable by the existence of many low forms in which the primary differences between animals and plants fade out.

An animal may be defined as a living organism, the protoplasm of which does not secrete a cellulose cell-wall, and which requires for its existence proteid material obtained from the living or dead bodies of existing plants or animals. The common use of the word animal as the equivalent of mammal, as opposed to bird or reptile or fish, is erroneous.

The classification of the animal kingdom is dealt with in the article Zoology. (P. C. M.)

ANIMAL HEAT. Under this heading is discussed the physiology of the temperature of the animal body.

The higher animals have within their bodies certain sources of heat, and also some mechanism by means of which both the production and loss of heat can be regulated. This is conclusively shown by the fact that both in summer and winter their mean temperature remains the same. But it was not until the intro- duction of thermometers that any exact data on the temperature of animals could be obtained. It was then found that local differences were present, since heat production and heat loss vary considerably in different parts of the body, although the circulation of the blood tends to bring about a mean temperature of the internal parts. [Hence it is important to determine the temperature of those parts which most nearly approaches to that of the internal organs. Also for such results to be compar- able they must be made in the same situation. The rectum gives most accurately the temperature of internal parts, or in women and some animals the vagina, uterus or bladder.

Occasionally that of the urine as it leaves the urethra may be of use. More usually the temperature is taken in the mouth, axilla or groin.

Warm and Cold Blooded Animals. — By numerous observations upon men and animals, John Hunter showed that the essential difference between the so-called warm-blooded and cold-blooded animals lies in the constancy of the temperature of the former, and the variability of the temperature of the latter. Those animals high in the scale of evolution, as hirds and mammals, have a high temperature almost constant and independent of that of the surrounding air, whereas among the lower animals there is much variation of body temperature, dependent entirely on their surroundings. There are, however, certain mammals which are exceptions, being warm-blooded during the summer, but cold-blooded during the winter when they hibernate; such are the hedgehog, bat and dormouse. John Hunter suggested that two groups should be known as ” animals of permanent heat at all atmospheres ” and ” animals of a heat variable with every atmosphere,” but later Bergmann suggested that they should be known as ” homoiothermic ” and ” poikilothermic ” animals. But it must be re- membered there is no hard and fast line between the two groups. Also, from work re- cently done by J. O. Wakelin Barratt, it has been shown that 99-6 under certain pathological con ditions a warm-blooded (homoi- othermic) animal may become ” 2 for a time cold-blooded (poiki- 99.0 lothermic). He has shown conclusively that this condition exists in rabbits suffering from 98-6 rabies during the last period of their life, the rectal temperature being then within a few degrees 98 ‘ 2 of the room temperature and ˆ.q varying with it. He explains this condition by the assump tion that the nervous mechan ism of heat regulation has become paralysed. The re- spiration and heart-rate being 97-2 also retarded during this period, the resemblance to the condition of hibernation is considerable. Again, Sutherland Simpson has shown that during deep anaesthesia a warm-blooded animal tends to take the same temperature as that of its. environment. He demonstrated that when a monkey is kept deeply anaesthetized with ether and is placed in a cold chamber, its temperature gradu- ally falls, and that when it has reached a sufficiently low point (about 2 5 C. in the monkey) , the employment of an anaesthetic is no longer necessary, the animal then being insensible to pain and incapable of being roused by any form of stimulus; it is, in fact, narcotized by cold, and is in a state of what may be called “artificial hibernation.” Once again this is explained by the fact that the heat-regulating mechanism has been interfered with. Similar results have been obtained from experiments on cats. These facts — with many others — tend to show that the power of

maintaining a constant temperature has been a gradual development, as Darwin's theory of evolution suggests, and that anything that interferes with the due working of the higher nerve-centres puts the animal back again, for the time being, on to a lower plane of evolution.

Variations in the Temperature of Man and some other Animals. — As stated above, the temperature of warm-blooded animals is maintained with but slight variation. In health under normal conditions the temperature of man varies between 36 C. and 38° C, or if the thermometer be placed in the axilla, between 36-25° C. and 37 -5° C. In the mouth the reading would be from •25 C. to 1-5° C. higher than this; and in the rectum some -9° C. higher still. The temperature of infants and young children

has a much greater range than this, and is susceptible of wide divergencies from comparatively slight causes.

Of the lower warm-blooded animals, there are some that appear to be cold-blooded at birth. Kittens, rabbits and puppies, if removed from their surroundings shortly after birth, lose their body heat until their temperature has fallen to within a few degrees of that of the surrounding air. But such animals are at birth blind, helpless and in some cases naked. Animals who are born when in a condition of greater development can maintain their temperature fairly constant. In strong, healthy infants a day or two old the temperature rises slightly, but in that of weakly, ill-developed children it either remains stationary or falls. The cause of the variable temperature in infants and young immature animals is the imperfect development of the nervous regulating mechanism.

The average temperature falls slightly from infancy to puberty and again from puberty to middle age, but after that stage is passed the temperature begins to rise again, and by about the eightieth year is as high as in infancy. A diurnal variation has been observed dependent on the periods of rest and activity,

Hours of activity and work.

Hours of rest and sleep.

98-4

97 8

97-6

the maximum ranging from 10 a.m. to 6 p.m., the minimum from 11 p.m. to 3 a.m. Sutherland Simpson and J. J. Galbraith have recently done much work on this subject. In their first experi- ments they showed that in a monkey there is a well-marked and regular diurnal variation of the body temperature, and that by reversing the daily routine this diurnal variation is also reversed. The diurnal temperature curve follows the periods of rest and activity, and is not dependent on the incidence of day and night; in monkeys which are active during the night and resting during the day, the body temperature is highest at night and lowest through the day. They then made observations on the tempera ˆ ture of animals and birds of nocturnal habit, where the periods of rest and activity are naturally the reverse of the ordinary through habit and not from outside interference. They found that in nocturnal birds the temperature is highest during the natural period of activity (night) and lowest during the period of rest (day), but that the mean temperature is lower and the range less than in diurnal birds of the same size. That the temperature curve of diurnal birds is essentially similar to that of man and other homoiothermal animals, except that the maximum occurs earlier in the afternoon and the minimum earlier in the morning. Also that the curves obtained from rabbit, guinea-pig and dog were quite similar to those from man. The mean temperature of the female was higher than that of the male in all the species examined whose sex had been determined. Meals sometimes cause a slight elevation, sometimes a slight depression — alcohol seems always to produce a fall. Exercise

and variations of external temperature within ordinary limits cause very slight change, as there are many compensating influences at work, which are discussed later. Even from very active exercise the temperature does not rise more than one degree, and if carried to exhaustion a fall is observed. In travelling from very cold to very hot regions a variation of less than one degree occurs, and the temperature of those living in the tropics is practically identical with those dwelling in the Arctic regions.

Limits compatible with Life. — There are limits both of heat and cold that a warm-blooded animal can bear, and other far wider limits that a cold-blooded animal may endure and yet live. The effect of too extreme a cold is to lessen metabolism, and hence to lessen the production of heat. Both katabolic and anabolic changes share in the depression, and though less energy is used up, still less energy is

generated. This diminished metabolism tells first on the central nervous system, especially the brain and those parts concerned in consciousness. Both heart-beat and respiration-number become diminished, drowsiness supervenes, becoming steadily deeper until it passes into the sleep of death. Occasionally, however, convulsions may set in towards the end, and a death somewhat similar to that of asphyxia takes place. In some recent experiments on cats performed by Sutherland Simpson and Percy T. Herring, they found them unable to survive when the rectal temperature was reduced below i6° C. At this low temperature respiration became increasingly feeble, the heart-impulse usually continued after respiration had ceased, the beats becoming very irregular, apparently ceasing, then beginning again. Death appeared to be mainly due to asphyxia, and the only certain sign that it had taken place was the loss of knee jerks. On the other hand, too high a temperature hurries on the metabolism of the various tissues at such a rate that their capital is soon exhausted. Blood that is too warm produces dyspnoea and soon exhausts the metabolic capital of the respiratory centre. The rate of the heart is quickened, the beats then become irregular and finally cease. The central nervous system is also profoundly affected, consciousness may be lost, and the patient falls into a comatose condition, or delirium and convulsions may set in. All these changes can be watched in any patient suffering from an acute fever. The lower limit of temperature that man can endure depends on many things, but no one can survive a temperature of 45 C. (113 F.) or above for very long. Mammalian muscle becomes rigid with heat rigor at about 50° C, and obviously should this temperature be reached the sudden rigidity of the whole body would render life impossible. H. M. Vernon has recently done work on the death temperature and paralysis temperature (temperature of heat rigor) of various animals. He found that animals of the same class of the animal kingdom showed very similar temperature values, those from the Amphibia examined being 38-5° C, Fishes 30°, Reptilia 45 , and various Molluscs 46 . Also in the case of Pelagic animals he showed a relation between death temperature and the quantity of solid constituents of the body, Cestus having lowest death temperature and least amount of solids in its body. But in the higher animals his experiments tend to show that there is greater variation in both the chemical and physical characters of the protoplasm, and hence greater variation in the extreme temperature compatible with life.

Regulation of Temperature. — The heat of the body is generated by the chemical changes — those of oxidation — undergone not by any particular substance or in any one place, but by the tissues at large. Wherever destructive metabolism (katabolism) is going on, heat is

being set free. When a muscle does work it also gives rise to heat, and if this is estimated it can be shown that the muscles alone during their contractions provide far more heat than the whole amount given out by the body. Also it must be remembered that the heart — also a muscle, — never resting, does in the 24 hours no inconsiderable amount of work, and hence must give rise to no inconsiderable amount of heat. From this it is clear that the larger proportion of total heat of the body is supplied by the muscles. These are essentially the " thermogenic tissues." Next to the muscles as heat generators

come the various secretory glands, especially the liver, which appears never to rest in this respect. The brain also must be a source of heat, since its temperature is higher than that of the arterial blood with which it is supplied. Also a certain amount of heat is produced by the changes which the food undergoes in the alimentary canal before it really enters the body. But heat while continually being produced is also continually being lost by the skin, lungs, urine and faeces. And it is by the constant modification of these two factors, (1) heat production and (2) heat loss, that the constant temperature of a warm-blooded animal is maintained. Heat is lost to the body through the faeces and urine, respiration, conduction and radiation from the skin, and by evaporation of perspiration. The following are approximately the relative amounts of heat lost through these various channels (different authorities give somewhat different figures): — faeces and urine about 3, respiration about 20, skin (conduction, radiation and evaporation) about 77. Hence it is clear the chief means of loss are the skin and the lungs. The more air that passes in and out of the lungs in a given time, the greater the loss of heat. And in such animals as the dog, who do not perspire easily by the skin, respiration becomes far more important.

But for man the great heat regulator is undoubtedly the skin, which regulates heat loss by its vasomotor mechanism, and also by the nervous mechanism of perspiration. Dilatation oi the cutaneous vascular areas leads to a larger flow of blood through the skin, and so tends to cool the body, and vice versa. Also the special nerves of perspiration can increase or lessen heat loss by promoting or diminishing the secretions of the skin. There are greater difficulties in the exact determination in the amount of heat produced, but there are certain well- known facts in connexion with it. A larger living body naturally produces more heat than a smaller one of the same nature, but the surface of the smaller, being greater in proportion to its bulk than that of the larger, loses heat at a more rapid rate. Hence to maintain the same constant bodily temperature, the smaller animal must produce a relatively larger amount of heat. And in the struggle

for existence this has become so.

Food temporarily increases the production of heat, the rate of production steadily rising after a meal until a maximum is reached from about the 6th to the 9th hour. If sugar be included in the meal the maximum is reached earlier; if mainly fat, later. Muscular work very largely increases the production of heat, and hence the more active the body the greater the production of heat.

But all the arrangements in the animal economy for the pro- duction and loss of heat are themselves probably regulated by the central nervous system, there being a thermogenic centre — situated above the spinal cord, and according to some observers in the optic thalamus.

Authorities. — M.S. Pembrey, “Animal Heat,” inSchafer’s Text- book of Physiology (1898); C. R. Richet, ” Chaleur,” in Dictionnaire de physiologie (Paris, 1898) ; Hale White, Croonian Lectures, Lancet, London, 1897; Pembrey and Nicol, Journal of Physiology, vol. xxiii., 1898-1899; H. M.Vernon, “Heat Rigor,” Journal of Physio- logy,‘xxiv., 1899; H. M. Vernon, “Death Temperatures,” Journal of Physiology, xxv., 1899; F. C. Eve, “Temperature on Nerve Cells,” Journal of Physiology, xxvi., 1900; G. Weiss, Comptes Rendus, Soc. de Biol., lii., 1900; Swale Vincent and Thomas Lewis, ” Heat Rigor of Muscle,” Journal of Physiology, 1901 ; Sutherland Simpson and Percy Herring, ” Cold and Reflex Action,” Journal of Physiology, 1905 ; Sutherland Simpson, Proceedings of Physiological Soc, July 19, 1902; Sutherland Simpson and J. J. Galbraith, “Diurnal Variation of Body Temperature,” Journal of Physiology, 1905; Transactions Royal Society Edinburgh, 1905; Proc. Physiological Society, p. xx., 1903; A. E. Boycott and J. S. Haldane, Effects of High Temperatures on Man.

ANIMAL WORSHIP, an ill-defined term, covering facts ranging from the worship of the real divine animal, commonly conceived as a ” god-body,” at one end of the scale, to respect for the bones of a slain animal or even the use of a respectful name for the living animal at the other end. Added to this, in many works on the subject we find reliance placed, especially for the African facts, on reports of travellers who were merely visitors to the regions on which they wrote.

Classification. — Animal cults may be classified in two ways: (A)

according to their outward form; (B) according to their inward meaning, which may of course undergo transformations.

(A) There are two broad divisions: (i) all animals of a given species are sacred, perhaps owing to the impossibility of dis- tinguishing the sacred few from the profane crowd; (2) one or a fixed number of a species are sacred. It is probable that the first of these forms is the primary one and the second in most cases a development from it due to (i.) the influence of other individual cults, (ii.) anthropomorphic tendencies, (iii.) the influence of chieftainship, hereditary and otherwise, (iv.) annual sacrifice of the sacred animal and mystical ideas connected therewith, (v.) syncretism, due either to unity of function or to a philosophic unification, (vi.) the desire to do honour to the species in the person of one of its members, and possibly other less easily traceable causes.

(B) Treating cults according to their meaning, which is not necessarily identical with the cause which first led to the deifica- tion of the animal in question, we can classify them under ten specific heads: (i.) pastoral cults; (ii.) hunting cults; (iii.) cults of dangerous or noxious animals; (iv.) cults of animals regarded as human souls or their embodiment; (v.) totemistic cults; (vi.) cults of secret societies, and individual cults of tutelary animals; (vii.) cults of tree and vegetation spirits; (-viii.) cults of ominous animals; (ix.) cults, probably derivative, of animals associated with certain deities; (x.) cults of animals used in magic.

(i.) The pastoral type falls into two sub-types, in which the species (a) is spared and (b) sometimes receives special honour at intervals in the person of an individual. (See Cattle, Buffalo, below.)

(ii.) In hunting cults the species is habitually killed, but (a) occasionally honoured in the person of a single individual, or (b) each slaughtered animal receives divine honours. (See Bear, below.)

(iii.) The cult of dangerous animals is due (a) to the fear that the soul of the slain beast may take vengeance on the hunter, (b) to a desire to placate the rest of the species. (See Leopard, below.)

(iv.) Animals are frequently regarded as the abode, temporary or permanent, of the souls of the dead, sometimes as the actual souls of the dead. Respect for them is due to two main reasons: (a) the kinsmen of the dead desire to preserve the goodwill of their dead relatives ; (b) they wish at the same time to secure that their kinsmen are not molested and caused to undergo unnecessary suffering. (See

Serpent, below.)

(v.) One of the most widely found modes of showing respect to animals is known as totemism (see Totem and Totemism), but except in decadent forms there is but little positive worship ; in Central Australia, however, the rites of the Wollunqua totem group are directed towards placating this mythical animal, and cannot be termed anything but religious ceremonies.

(vi.) In secret societies we find bodies of men grouped together with a single tutelary animal ; the individual, in the same way, acquires the nagual or individual totem, sometimes by ceremonies of the nature of the bloodbond.

(vii.) Spirits of vegetation in ancient and modern Europe and in China are conceived in animal form. (See Goat, below.)

(viii.) The ominous animal or bird may develop into a deity. (See Hawk, below.)

(ix.) It is commonly assumed that the animals associated with certain deities are sacred because the god was originally therio- morphic; this is doubtless the case in certain instances; but Apollo Smintheus, Dionysus Bassareus and other examples seem to show that the god may have been appealed to for help and thus become associated with the animals from whom he protected the crops, &c.

(x.) The use of animals in magic may sometimes give rise to a kind of respect for them, but this is of a negative nature. See, however, articles by Preuss in Globus, vol. lxvii., in which he maintains that animals of magical influence are elevated into divinities.

Bear. — The bear enjoys a large measure of respect from all savage races that come in contact with it, which shows itself in

apologies and in festivals in its honour. The most cults. important developments of the cult are in East Asia

among the Siberian tribes; among the Ainu of Sak- halin a young bear is caught at the end of winter and fed for some nine months; then after receiving honours it is killed, and the people, who previously show marks of grief at its approaching fate, dance merrily and feast on its body. Among the Gilyaks a similar festival is found, but here it takes the form of a celebration in honour of a recently dead kinsman, to whom the spirit of the bear is sent. Whether this feature or a cult of the hunting type

was the primary form, is so far an open question. There is, a good deal of evidence to connect the Greek goddess Artemis with a cult of the bear; girls danced as “bears” in her honour, and might not marry before undergoing this ceremony. The bear is traditionally associated with Bern in Switzerland, and in 1832 a statue of Artio, a bear goddess, was dug up there.

Buffalo. — The Todas of S. India abstain from the flesh of their domestic animal, the buffalo; but once a year they sacrifice a bull calf, which is eaten in the forest by the adult males.

Cattle. — Cattle are respected by many pastoral peoples; they live on milk or game, and the killing of an ox is a sacrificial function. Conspicuous among Egyptian animal cults was that of the bull, Apis. It was distinguished by certain marks, and when the old Apis died a new one was sought; the finder was rewarded, and the bull underwent four months’ education at Nilopolis. Its birthday was celebrated once a year; oxen, which had to be pure white, were sacrificed to it; women were forbidden to approach it when once its education was finished. Oracles were obtained from it in various ways. After death it was mummified and buried in a rock-tomb. Less widespread was the cult of the Mnevis, also consecrated to Osiris. Similar observances are found in our own day on the Upper Nile; the Nuba and Nuer worship the bull; the Angoni of Central Africa and the Sakalava of Madagascar keep sacred bulls. In India respect for the cow is widespread, but is of post-Vedic origin; there is little actual worship, but the products of the cow are important in magic.

Crow. — The crow is the chief deity of the Thlinkit Indians of N. W. America; and all over that region it is the chief figure in a group of myths, fulfilling the office of a culture hero who brings the light, gives fire to mankind, &c. Together with the eagle- hawk the crow plays a great part in the mythology of S.E. Australia.

Dog. — Actual dog- worship is uncommon; the Nosarii of western Asia are said to worship a dog; the Kalangs of Java had a cult of the red dog, each family keeping one in the house; according to one authority the dogs are images of wood which are worshipped after the death of a member of the family and burnt after a thousand days. In Nepal it is said that dogs are worshipped at the festival called Khicha Puja. Among the Harranians dogs were sacred, but this was rather as brothers of the mystae.

Elephant. — In Siam it is believed that a white elephant may contain the soul of a dead person, perhaps a Buddha; when one is taken the

capturer is rewarded and the animal brought to the king to be kept ever afterwards; it cannot be bought or sold. It is baptized and feted and mourned for like a human being at its death. In some parts of Indo-China the belief is that the soul of the elephant may injure people after death; it is therefore feted by a whole village. In Cambodia it is held to bring luck to the kingdom. In Sumatra the elephant is regarded as a tutelary spirit. The cult of the white elephant is also found at Ennarea, southern Abyssinia.

Fish. — Dagon seems to have been a fish-god with human head and hands; his worshippers wore fish-skins. In the temples of Apollo and Aphrodite were sacred fish, which may point to a fish cult. Atargatis is said to have had sacred fish at Askelon, and from Xenophon we read that the fish of the Chalus were regarded as gods.

Goat. — Dionysus was believed to take the form of a goat, probably as a divinity of vegetation. Pan, Silenus, the Satyrs and. the Fauns were either capriform or had some part of their bodies shaped like that of a goat. In northern Europe the wood spirit, Ljesche, is believed to have a goat's horns, ears and legs. In Africa the Bijagos are said to have a goat as their principal divinity.

Hare. — In North America the Algonquin tribes had as their chief deity a " mighty great hare " to whom they went at death. According to one account he lived in the east, according to another in the north. In his anthropomorphized form he was known as Menabosho or Michabo.

Hawk. — In North Borneo we seem to see the evolution of a

god in the three stages of the cult of the hawk among the Ken- yans, the Kayans and the sea Dyaks. The Kenyahs will not kill it, address to it thanks for assistance, and formally consult it before leaving home on an expedition; it seems, however, to be regarded as the messenger of the supreme god Balli Penya- long. The Kayans have a hawk-god, Laki Neho, but seem to regard the hawk as the servant of the chief god, Laki Tenangan. Singalang Burong, the hawk-god of the Dyaks, is completely anthropomorphized. He is god of omens and ruler of the omen birds; but the hawk is not his messenger, for he never leaves his house; stories are, however, told of his attending feasts in human form and flying away in hawk form when all was over.

Horse. — There is some reason to believe that Poseidon, like other water gods, was originally conceived under the form of a horse. In the cave of Phigalia Demeter was, according to popular tradition, represented with the head and mane of a horse, possibly a relic of the time when a non-specialized corn- spirit bore this form. Her priests were called Poloi (colts) in Laconia. In Gaul we find a horse-goddess, Epona; there are also traces of a horse-god, Rudiobus. The Gonds in India worship a horse-god, Koda Pen, in the form of a shapeless stone; but it is not clear that the horse is regarded as divine. The horse or mare is a -common form of the corn-spirit in Europe.

Leopard. — The cult of the leopard is widely found in West Africa. Among the Ewe a man who kills one is liable to be put to death; no leopard skin may be exposed to view, but a stuffed leopard is worshipped. On the Gold Coast a leopard hunter who has killed his victim is carried round the town behind the body of the leopard; he may not speak, must besmear himself so as to look like a leopard and imitate its movements. In Loango a prince's cap is put upon the head of a dead leopard, and dances are held in its honour.

Lion. — The lion was associated with the Egyptian gods Re and Horus; there was a lion-god at Baalbek and a lion-headed goddess Sekhet. The Arabs had a lion-god, Yaghuth. In modern Africa we find a lion-idol among the Balonda.

Lizard. — The cult of the lizard is most prominent in the Pacific, where it appears as an incarnation of Tangaloa. In Easter Island a form of the house-god is the lizard; it is also a tutelary deity in Madagascar.

Mantis. — Cagn is a prominent figure in Bushman mythology; the mantis and the caterpillar, Ngo, are his incarnations. It was called the " Hottentots' god " by early settlers.

Monkey. — In India the monkey-god, Hanuman, is a prominent figure; in orthodox villages monkeys are safe from harm. Monkeys are said to be worshipped in Togo. At Porto Novo, in French West Africa, twins have tutelary spirits in the shape of small monkeys.

Serpent. — The cult of the serpent is found in many parts of the Old World; it is also not unknown in America; in Australia, on the other hand, though many species of serpent are found, there does not appear to be any species of cult unless we include the Warramunga cult of the mythical Wollunqua totem animal, whom they seek to placate by rites. In Africa the chief centre of serpent worship was Dahomey; but the cult of the python seems to have been of exotic

origin, dating back to the first quarter of the 17th century. By the conquest of Whydah the Dahomeyans were brought in contact with a people of serpent worshippers, and ended by adopting from them the cult which they at first despised. At Whydah, the chief centre, there is a serpent temple, tenanted by some fifty snakes; every python of the danh-gbi kind must be treated with respect, and death is the penalty for killing one, even by accident. Danh-gbi has numerous wives, who until 1857 took part in a public procession from which the profane crowd was excluded ; a python was carried round the town in a hammock, perhaps as a ceremony for the expulsion of evils. The rainbow-god of the Ewe was also conceived to have the form of a snake; his messenger was said to be a small variety of boa; but only certain individuals, not the whole species, were sacred. In many parts of Africa the serpent is looked upon as the incarnation of deceased relatives; among the Amazulu, as among the Bctsilco of Madagascar,

certain species are assigned as the abode of certain classes; the Masai, on the other hand, regard each species as the habitat of a particular family of the tribe.

In America some of the Amerindian tribes reverence the rattlesnake as grandfather and king of snakes who is able to give fair winds or cause tempest. Among the Hopi (Moqui) of Arizona the serpent figures largely in one of the dances. The rattlesnake was worshipped in the Natchez temple of the sun; and the Aztec deity Quetzalcoatl was a serpent-god. The tribes of Peru are said to have adored great snakes in the pre-Inca days; and in Chile the Araucanians made a serpent figure in their deluge myth.

Over a large part of India there are carved representations of cobras (Nagas) or stones as substitutes; to these human food and flowers are offered and lights are burned before the shrines. Among the Dravidians a cobra which is accidentally killed is burned like a human being; no one would kill one intentionally; the serpent-god's image is carried in an annual procession by a celibate priestess.

Serpent cults were well known in ancient Europe; there does not, it is true, appear to be much ground for supposing that Aesculapius was a serpent-god in spite of his connexion with serpents. On the other hand, we learn from Herodotus of the great serpent which defended the citadel of Athens; the Roman genius loci took the form of a serpent; a snake was kept and fed with milk in the temple of Potrimpos, an old Slavonic god. To this day there are numerous traces in popular belief, especially in Germany, of respect for the snake, which seems to be a survival of ancestor worship, such as still exists

among the Zulus and other savage tribes; the ” house-snake,” as it is called, cares for the cows and the children, and its appearance is an omen of death, and the life of a pair of house-snakes is often held to be bound up with that of the master and mistress themselves. Tradition says that one of the Gnostic sects known as the Ophites caused a tame serpent to coil round the sacramental bread and worshipped it as the representative of the Saviour. See also Serpent Worship.

Sheep. — Only in Africa do we find a sheep-god proper; Ammon was the god of Thebes; he was represented as ram-headed; his worshippers held the ram to be sacred; it was, however, sacrificed once a year, and its fleece formed the clothing of the idol.

Tiger. — The tiger is associated with Siva and Durga, but its cult is confined to the wilder tribes; in Nepal the tiger festival is known as Bagh Jatra, and the worshippers dance disguised as tigers. The Waralis worship Waghia the lord of tigers in the form of a shapeless stone. In Hanoi and Manchuria tiger-gods are also found.

Wolf. — Both Zeus and Apollo were associated with the wolf by the Greeks; but it is not clear that this implies a previous cult of the wolf. It is frequently found among the tutelary deities of North American dancing or secret societies. The Thlinkits had a god, Khanukh, whose name means ” wolf,” and worshipped a wolf-headed image.

Authorities. — For a fuller discussion and full references to these and other cults, that of the serpent excepted, see N. W. Thomas in Hastings’ Dictionary of Religions; Frazer, Golden Bough; Camp- bell’s Spirit Basis of Belief and Custom; Maclennan’s Studies (series 2) ; V. Gennep, Tabou et totemisme a. Madagascar. For the serpent, see Ellis, Ewe-speaking Peoples, p. 54; Internat. Archiv, xvii. 113; Tylor, Primitive Culture, ii. 239; Fergusson, Tree and Serpent Worship; Mahly, Die Schlange im Mythus; Staniland Wake, Serpent Worship, &c; j6th Annual Report of the American Bureau of Ethnology, p. 273, and bibliography, p. 312. For the bull, &c, in Egypt, see Egypt: Religion. (N. W. T.)

ANIMfi, an oleo-resin (said to be so called because in its natural state it is infested with insects) which is exuded from the locust tree, Hymenaea coumaril, and other species of Hymenaea growing in tropical South America. It is of a pale brown colour, transparent, brittle, and in consequence of its agreeable odour is used for fumigation and in perfumery. Its specific gravity varies from 1-054 to 1-057. It melts readily over the fire, and softens even with the heat of

the mouth; it is insoluble in water, and nearly so in cold alcohol. It is allied to copal in its

nature and appearance, and is much used by varnish-makers. The name is also given to Zanzibar copal (q.v.).

ANIMISM (from animus, or anima, mind or soul), according to the definition of Dr E. B. Tylor, the doctrine of spiritual beings, including human souls; in practice, however,, the term is often extended to include panthelism or animatism, the doctrine that a great part, if not the whole, of the inanimate kingdom, as well as all animated beings, are endowed with reason, intelligence and volition, identical with that of man. This latter theory, which in many cases is equivalent to personification, though it may be, like animism, a feature of the philosophy of peoples of low culture, should not be confused with it. But it is difficult in practice to distinguish the two phases of thought and no clear account of animatism can yet be given, largely on the ground that no people has yet been discovered which has not already developed to a greater or less extent an animistic philosophy. On theoretical grounds it is probable that animatism preceded animism; but savage thought is no more consistent than that of civilized man; and it may well be that animisti* and panthe- istic doctrines are held simultaneously by the same person. In like manner one portion of the savage explanation of nature may have been originally animistic, another part animatistic.

Origin. — Animism may have arisen out of or simultaneously with animatism as a primitive explanation of many different phenomena; if animatism was originally applied to non-human or inanimate objects, animism may from the outset have been in vogue as a theory of the nature of man. Lists of phenomena from the contemplation of which the savage was led to believe in animism have been given by Dr Tylor, Herbert Spencer, Mr Andrew Lang and others; an animated controversy arose between the former as to the priority of their respective lists. Among these phenomena are: trance (q.v.) and unconsciousness, sickness, death, clairvoyance (q.v.), dreams (q.v.), apparitions (q.v.) of the dead, wraiths, hallucinations (q.v.), echoes, shadows and reflections.

Primitive ideas on the subject of the soul, and at the same time the origin of them, are best illustrated by an analysis of the terms applied

to it. Readers of Dante know the idea that the dead have no shadows; this was no invention of the poet's but a piece of traditionary lore; at the present day among the Basutos it is held that a man walking by the brink of a river may lose his life if his shadow falls on the water, for a crocodile may seize it and draw him in; in Tasmania, North and South America and classical Europe is found the conception that the soul — auk, umbra — is somehow identical with the shadow of a man. More familiar to the Anglo-Saxon race is the connexion between the soul and the breath ; this identification is found both in Aryan and Semitic languages; in Latin we have spirilus, in Greek pneuma, in Hebrew ruach; and the idea is found extending downwards to the lowest planes of culture in Australia, America and Asia. For some of the Red Indians the Roman custom of receiving the breath of a dying man was no mere pious duty but a means of ensuring that his soul was transferred to a new body. Other familiar conceptions identify the soul with the liver (see Omen) or the heart, with the reflected figure seen in the pupil of the eye, and with the blood. Although the soul is often distinguished from the vital principle, there are many cases in which a state of unconsciousness is explained as due to the absence of the soul; in South Australia wilyamarraba (without soul) is the word used for insensible. So too the autohypnotic trance of the magician or shaman is regarded as due to his visit to distant regions or the nether world, of which he brings back an account. Telepathy or clairvoyance (q.v.), with or without trance, must have operated powerfully to produce a conviction of the dual nature of man, for it seems probable that facts unknown to the automatist are sometimes discovered by means of crystal-gazing (q.v.), which is widely found among savages, as among civilized peoples. Sickness is often explained as due to the absence of the soul; and means are sometimes taken to lure back the wandering soul; when a Chinese is at the point of death and his soul is supposed to have already left his body, the patient's coat is held up on a long bamboo while a priest endeavours to bringthe departed spirit

back into the coat by means of incantations. If the bamboo begins to turn round in the hands of the relative who is deputed to hold it, it is regarded as a sign that the soul of the moribund has returned (see Automatism). More important perhaps than all these phenomena, because more regular and normal, was the daily period of sleep with its frequent concomitant of fitful and incoherent ideas and images. The mere immobility of the body was sufficient to show that its state was not identical with that of waking; when, in addition, the sleeper awoke to give an account of visits to distant lands, from which, as modern psychical investigations suggest, he may even have brought back veridical details, the conclusion must have been irresistible that

in sleep something journeyed forth, which was not the body. In a minor degree revival of memory during sleep and similar phenomena of the sub-conscious life may have contributed to the same result. Dreams are sometimes explained by savages as journeys performed by the sleeper, sometimes as visits paid by other persons, by animals or objects to him; hallucinations, possibly more frequent in the lower stages of culture, must have contributed to fortify this interpretation, and the animistic theory in general. Seeing the phantasmic figures of friends at the moment when they were, whether at the point of death or in good health, many miles distant, must have led the savage irresistibly to the dualistic theory. But hallucinatory figures, both in dreams and waking life, are not necessarily those of the living; from the reappearance of dead friends or enemies primitive man was inevitably led to the belief that there existed an incorporeal part of man which survived the dissolution of the body. The soul was conceived to be a facsimile of the body, sometimes no less material, sometimes more subtle but yet material, sometimes altogether impalpable and intangible.

Animism and Eschatology. — The psychological side of animism has already been dealt with; almost equally important in primitive creeds is the eschatological aspect. In many parts of the world it is held that the human body is the seat of more than one soul; in the island of Nias four are distinguished, the shadow and the intelligence, which die with the body, a tutelary spirit, termed begoe, and a second which is carried on the head. Similar ideas are found among the Euahlayi of S.E. Australia, the Dakotas and many other tribes. Just as in Europe the ghost of a dead person is held to haunt the churchyard or the place of death, although more orthodox ideas may be held and enunciated by the same person as to the nature of a future life, so the savage, more consistently, assigns different abodes to the multiple souls with which he credits man. Of the four souls of a Dakota, one is held to stay with the corpse, another in the village, a third goes into the air, while the fourth goes to the land of souls, where its lot may depend on its rank in this life, its sex, mode of death or sepulture, on the due observance of funeral ritual, or manyother points (see Eschatology) . From the belief in the survival of the dead arose the practice of offering food, lighting fires, &c, at the grave, at first, maybe, as an act of friendship or filial piety, later as an act of worship (see Ancestor Worship) . The simple offering of food or shedding of blood at the grave develops into an elaborate system of sacrifice; even where ancestor- worship is not found, the desire to provide the dead with comforts in the future life may lead to the sacrifice of wives, slaves, animals, &c, to the breaking or burning of objects at the grave

or to the provision of the ferryman's toll, a coin put in the mouth of the corpse to pay the travelling expenses of the soul. But all is not finished with the passage of the soul to the land of the dead ; the soul may return to avenge its death by helping to discover the murderer, or to wreak vengeance for itself; there is a wide- spread belief that those who die a violent death become malignant spirits and endanger the lives of those who come near the haunted spot; the woman who dies in child-birth becomes a pontianak, and threatens the life of human beings; and man resorts to magical or religious means of repelling his spiritual dangers.

Development of Animism. — If the phenomena of dreams were, as suggested above, of great importance for the development of animism, the belief, which must originally have been a doctrine of human psychology, cannot have failed to expand speedily into

a general philosophy of nature. Not only human beings but animals and objects are seen in dreams; and the conclusion would be that they too have souls; the same conclusion may have been reached by another line of argument; primitive psychology posited a spirit in a man to account, amongst other things, for his actions; a natural explanation of the changes in the external world would be that they are due to the operations and volitions of spirits.

Animal Souls. — But apart from considerations of this sort, it is probable that animals must, early in the history of animistic beliefs, have been regarded as possessing souls. Education has brought with it a sense of the great gulf between man and animals ; but in the lower stages of culture this distinction is not adequately recognized, if indeed it is recognized at all. The savage attributes to animals the same ideas, the same mental processes as himself, and at the same time vastly greater power and cunning. The dead animal is credited with a knowledge of how its remains are treated and sometimes with a power of taking vengeance on the fortunate hunter. Powers of reasoning are not denied to animals nor even speech; the silence of the brute creation may be put down to their superior cunning. We may assume that man attributed a soul to the beasts of the field almost as soon as he claimed one for himself. It is therefore not surprising to find that many peoples on the lower planes of culture respect and even worship animals (see Totem; Animal Worship); though we need not attribute an animistic origin to all the

develooments, it is clear that the widespread respect paid to animals as the abode of dead ancestors, and much of the cult of dangerous animals, is traceable to this principle. With the rise of species, deities and the cult of in- dividual animals, the path towards anthropomorphization and polytheism is opened and the respect paid to animals tends to lose its strict animistic character.

Plant Souls. — Just as human souls are assigned to animals, so primitive man often credits trees and plants with souls in both human or animal form. All over the world agricultural peoples practise elaborate ceremonies explicable, as Mannhardt has shown, on animistic principles. In Europe the corn spirit some- times immanent in the crop, sometimes a presiding deity whose life does not depend on that of the growing corn, is conceived in some districts in the form of an ox, hare or cock, in others as an old man or woman ; in the East Indies and America the rice or maize mother is a corresponding figure ;-in classical Europe and the East we have in Ceres and Demeter, Adonis and Dionysus, and other deities, vegetation gods whose origin we can readily trace back to the rustic corn spirit. Forest trees, no less than cereals, have their indwelling spirits; the fauns and satyrs of classical literature were goat-footed and the tree spirit of the Russian peasantry takes the form of a goat; in Bengal and the East Indies wood-cutters endeavour to propitiate the spirit of the tree which they cut down ; and in many parts of the world trees are regarded as the abode of the spirits of the dead. Just as a process of syncretism has given rise to cults of animal gods, tree spirits tend to become detached from the trees, which are thence- forward only their abodes; and here again animism has begun to pass into polytheism.

Object Souls. — We distinguish between animate and inanimate nature, but this classification has no meaning for the savage. The river speeding on its course to the sea, the sun and moon, if not the stars also, on their never-ceasing daily round, the lightning, fire, the wind, the sea, all are in motion and therefore animate; but the savage does not stop short here; mountains and lakes, stones and manufactured articles, are for him alike endowed with souls like his own; he deposits in the tomb weapons and food, clothes and implements, broken, it may be, in order to set free their souls; or he attains the same result by burning them, and thus sending them to the Other World for the use of the dead man. Here again, though to a less extent than in tree cults, the theriomorphic aspect recurs; in the north of Europe, in ancient Greece, in China, the water or river spirit is horse or bull-shaped; the water monster in serpent shape is even more widely found, but it is less strictly the spirit of the water. The spirit of syn- cretism manifests itself in this department of animism too; the

immanent spirit of the earlier period becomes the presiding genius or local god of later times, and with the rise of the doctrine of separable souls we again reach the confines of animism pure and simple.

Spirits in Genera/.— Side by side with the doctrine of separable souls with which we have so far been concerned, exists the belief in a great host of unattached spirits; these are not immanent souls which have become detached from their abodes, but have every appearance of independent spirits. Thus, anirriism is in some directions little developed, so far as we can see, among the Australian aborigines; but from those who know them best we learn that they believe in innumerable spirits and bush bogies, which wander, especially at night, and can be held at bay by means of fire; with this belief may be compared the ascription in European folk belief of prophylactic properties to iron. These spirits are at first mainly malevolent; and side by side with them we find the spirits of the dead as hostile beings. At a higher stage the spirits of dead kinsmen are no longer unfriendly, nor yet all non -human spirits; as fetishes (see Fetishism), naguals (see Totem) , familiars, gods or demi-gods (for which and the general question see Demonology), they enter into relations with man. On the other hand there still subsists a belief in innumerable evil spirits, which manifest themselves in the phenomena of possession (q.v.), lycanthropy (q.v.), disease, &c. The fear of evil spirits has given rise to ceremonies of expulsion of evils (see Exorcism), designed to banish them from the community.

Animism and Religion. — Animism is commonly described as the most primitive form of religion; but properly speaking it is not a religion at all, for religion implies, at any rate, some form of emotion (see Religion), and animism is in the first instance an explanation of phenomena rather than an attitude of mind toward the cause of them, a philosophy rather than a religion. The term may, however, be conveniently used to describe the early stage of religion in which man endeavours to set up relations between himself and the unseen powers, conceived as spirits, but differing in many particulars from the gods of polytheism. As an example of this stage in one of its aspects may be taken the European belief in the corn spirit, which is, however, the object of magical rather than religious rites; Dr Frazer has thus defined the character of the animistic pantheon, ” they are restricted in their operations to definite departments of nature; their names are general, not proper; their attributes are generic rather than individual; in other words, there is an indefinite number of spirits of each class, and the individuals of a class are much alike; they have no definitely marked individuality; no accepted traditions are current as to their origin, life and character.” This stage of religion is well

illustrated by the Red Indian custom of offering sacrifice to certain rocks, or whirlpools, or to the indwelling spirits connected with them; the rite is only performed in the neighbour- hood of the object, it is an incident of a canoe or other voyage, and is not intended to secure any benefits beyond a safe passage past the object in question ; the spirit to be propitiated has a purely local sphere of influence, and powers of a very limited nature. Animistic in many of their features too are the temporary gods of fetishism (q.v.), naguals or familiars, genii and even the dead who receive a cult. With the rise of a belief in departmental gods comes the age of polytheism ; the belief in elemental spirits may still persist, but they fall into the background and receive no cult.

Animism and the Origin of Religion. — Two animistic theories of the origin of religion have been put forward, the one, often termed the " ghost theory," mainly associated with the name of Herbert Spencer, but also maintained by Grant Allen, refers the beginning of religion to the cult of dead human beings; the other, put forward by Dr E. B. Tylor, makes the foundation of all religion animistic, but recognizes the non-human character of polytheistic gods. Although ancestor-worship, or, more broadly, the cult of the dead, has in many cases overshadowed other cults or even extinguished them, we have no warrant, even in these cases, for asserting its priority, but rather. the reverse; not only so, but in the majority of cases the pantheon is made up by a multitude of spirits in human, sometimes in animal form, which bear no signs of ever having been incarnate; sun gods and moon goddesses,

gods of fire, wind and water, gods of the sea, and above all gods of the sky, show no signs of having been ghost gods at any period in their history. They may, it is true, be associated with ghost gods, but in Australia it cannot even be asserted that the gods are spirits at all, much less that they are the spirits of dead men; they are simply magnified magicians, super-men who have never died; we have no ground, therefore, for regarding the cult of the dead as the origin of religion in this area; this conclusion is the more probable, as ancestor-worship and the cult of the dead generally cannot be said to exist in Australia.

The more general view that polytheistic and other gods are the elemental and other spirits of the later stages of animistic creeds, is

equally inapplicable to Australia, where the belief seems to be neither animistic nor even animatistic in character. But we are hardly justified in arguing from the case of Australia to a general conclusion as to the origin of religious ideas in all other parts of the world. It is perhaps safest to say that the science of religions has no data on which to go, in formulating conclusions as to the original form of the objects of religious emotion; in this connexion it must be remembered that not only is it very difficult to get precise information of the subject of the religious ideas of people of low culture, perhaps for the simple reason that the ideas themselves are far from precise, but also that, as has been pointed out above, the conception of spiritual often approximates very closely to that of material. Where the soul is regarded as no more than a finer sort of matter, it will obviously be far from easy to decide whether the gods are spiritual or material. Even, therefore, if we can say that at the present day the gods are entirely spiritual, it is clearly possible to maintain that they have been spiritualized pari passu with the increasing importance of the animistic view of nature and of the greater prominence of eschatological beliefs. The animistic origin of religion is therefore not proven.

Animism and Mythology. — But little need be said on the relation of animism and mythology (q.v.). While a large part of mythology has an animistic basis, it is possible to believe, e.g. in a sky world, peopled by corporeal beings, as well as by spirits of the dead; the latter may even be entirely absent; the mythology of the Australians relates largely to corporeal, non-spiritual beings; stories of transformation, deluge and doom myths, or myths of the origin of death, have not necessarily any animistic basis. At the same time, with the rise of ideas as to a future life and spiritual beings, this field of mythology is immensely widened, though it cannot be said that a rich mytho- logy is necessarily genetically associated with or combined with belief in many spiritual beings.

Animism in Philosophy. — The term ” animism ” has been applied to many different philosophical systems. It is used to describe Aristotle’s view of the relation of soul and body held also by the Stoics and Scholastics. On the other hand monadology (Leibnitz) has also been termed animistic. The name is most commonly applied to vitalism, a view mainly associated with G. E. Stahl and revived by F. Bouillier (1813- 1899), which makes life, or life and mind, the directive principle in evolution and growth, holding that all cannot be traced back to chemical and mechanical processes, but that there is a directive force which guides energy without altering its amount. An entirely different class of ideas, also termed animistic, is the belief in

the world soul, held by Plato, Schelling and others.

Bibliography. — Tylor, Primitive Culture; Frazer, Golden Bough; Id. on Burial Customs in /. A. I. xv. ; Mannhardt, Baumkultus; G. A. Wilken, Het Animisme; Koch on the animism of S. America in Internationales Archiv, xiii., Suppl. ; Andrew Lang, Making of Religion; Skeat, Malay Magic; Sir G. Campbell, "Spirit Basis of Belief and Custom," in Indian Antiquary, xxiii. and succeeding volumes; Folklore, iii. 289. xi. 162; Spencer, Principles of Socio- logy; Mind (1877), 141, 415 et seq. For animism in philosophy, Stahl, Theoria ; Bouillier, Du Principe vital. (N. W. T.)

ANIMUCCIA, GIOVANNI, Italian musical composer, was born at Florence in the last years of the 1 5th century. At the request of St Filippo Neri he composed a number of Laudi, or hymns of praise, to be sung after sermon time, which have given him an accidental prominence in musical history, since their per-

formance in St Filippo's Oratory eventually gave rise (on the disruption of 16th century schools of composition) to those early forms of " oratorio " that are not traceable to the Gregorian-polyphonic " Passions." St Filippo admired Animuccia s>o warmly that he declared he had seen the soul of his friend fly upwards towards heaven. In 1555 Animuccia was appointed maestro di capella at St Peter's, an office which he held until his death in 1571. He was succeeded by Palestrina, who had been his friend and probably his pupil. The manuscript of many of Animuccia's compositions is still preserved in the Vatican Library. His chief published works were Madrigali e Motetti a quattro e cinque voci (Ven. 1548) and 77 primo Libro di Messe (Rom. 1567). From the latter Padre Martini has taken two specimens for his Saggio di Contrapunto. A mass from the Primo Libro di Messe on the canto fermo of the hymn Condilor alme siderum is published in modern notation in the Anthologie des maitres religieux primitifs of the Chanteurs de Saint Gervais. It is solemn and noble in conception, and would be a great work but for a roughness which is more careless than archaic.

Paolo Animuccia, a brother of Giovanni, was also celebrated as a composer; he is said by Fetis to have been maestro di capella at S. Giovanni in Laterano from the middle of January 1550 until 1552, and to have died in 1563.

ANISE (Pimpinella Anisum), an umbelliferous plant found in Egypt and the Levant, and cultivated on the continent of Europe for medicinal purposes. The officinal part of the plant is the fruit, which

consists of two united carpels, called a cremocarp. It is known by the' name of aniseed, and has a strong aromatic taste and a powerful odour. By distillation the fruit yields the volatile oil of anise, which is useful in the treatment of flatulence and colic in children. It may be given as Aqua Anisi, in doses of one or more ounces, or as the Spiritus Anisi, in doses of 5-20 minims. The main constituent of the oil (up to 90 %) is anethol, C, H 12 O or CsHjiˆKOCHsXCHiCH-CIL.) It- also contains methyl chavicol, anisic aldehyde, anisic acid, and' a terpene. Most of the oil of commerce, however, of which anethol is also the chief constituent , comes from Jllicium verum (order Magno- liaceae, sub-order Wintereae), indigenous in N.E. China, the star-anise of liqueur makers. It receives its name from its flavour, and from its fruit spreading out like a star. The anise of the Bible (Matt, xxiii. 23) is Anethum or Peucedanum graveolens, i.e. dill (q.v.).

ANJAR, a fortified town of India, and the capital of a district of the same name in the native state of Cutch, in the presidency of Bombay. The country is dry and sandy, and entirely depends on well irrigation for its water supply. The town is situated nearly 10 miles from the Gulf of Cutch. It suffered severely from an earthquake in 181 9, which destroyed a large number of houses, and occasioned the loss of several lives. In 1901 the population was 18,014. The town and district of Anjar were both ceded to the British in 1816, but in 1822 they were again transferred to the Cutch government in consideration of an annual money payment. Subsequently it was discovered that this obligation pressed heavily upon the resources of the native state, and in 1832 the pecuniary equivalent for Anjar, both prospectively and inclusive of the arrears which had accrued to that date, was wholly remitted by the British government.

ANJOU, the old name of a French territory, the political origin of which is traced to the ancient Gallic state of the Andes, on the lines of which was organized, after the conquest by Julius Caesar, the Roman civitas of the Andecavi. This was afterwards preserved as an administrative district under the Franks with the name first of pagus, then of comitatus, or count- ship of Anjou. This countship, the extent of which seems to have been practically identical with that of the ecclesiastical diocese of Angers, occupied the greater part of what is now the department of Maine-et-Loire, further embracing, to the north, Craon, Bazouges (Chateau-Gontier), Le Lude, and to the east, Chateau-la- Valliere and Bourgueil, while to the south, on the other hand, it included neither the present town of Montreuil- Bellay, nor Vihiers, Cholet, Beaupreau, nor the whole district lying to the west of the Ironne and Thouet, on the left bank of

the Loire, which formed the territory of the Mauges. It was bounded on the north by the countship of Maine, on the east by that of Touraine, on the south by that of Poitiers and by the Mauges, on the west by the countship of Nantes.

From the outset of the reign of Charles the Bald, the integrity of Anjou was seriously menaced by a two-fold danger: from Brittany and from Normandy. Lambert, a former count of Nantes, after devastating Anjou in concert with Nominoe, duke of Brittany, had by the end of the year 851 succeeded in occupy- ing all the western part as far as the Mayenne. The principality, which he thus carved out for himself, was occupied, on his death, by Erispoe, duke of Brittany; by him it was handed down to his successors, in whose hands it remained till the beginning of the 10th century. All this time the Normans had not ceased ravaging the country; a brave man was needed to defend it, and finally towards 861, Charles the Bald entrusted it to Robert the Strong (q.v.), but he unfortunately met with his death in 866 in a battle against the Normans at Brissarthe. Hugh the Abbot succeeded him in the countship of Anjou as in most of his other duties, and on his death (886) it passed to Odo (q.v.), the eldest son of Robert the Strong, who, on his accession to the throne of France (888) , probably handed it over to his brother Robert. In any case, during the last years of the 9th century, in Anjou as elsewhere the power was delegated to a viscount, Fulk the Red (mentioned under this title after 898), son of a certain Ingelgerius.

In the second quarter of the 10th century Fulk the Red had already usurped the title of count, which his descendants kept for three centuries. He was succeeded first by his son Fulk II. the Good (941 or 942-c. 960), and then by the son of the latter, Geoffrey I. Grisegonelle (Grey tunic) (c. 960-2 1st of July 987), who inaugurated a policy of expansion, having as its objects the extension of the boundaries of the ancient count- ship and the reconquest of those parts of it which had been annexed by the neighbouring states; for, though western Anjou had been recovered from the dukes of Brittany since the begin ning of the 10th century, in the east all the district of Saumur had already by that time fallen into the hands of the counts of Blois and Tours. Geoffrey Greytunic succeeded in making the count of Nantes his vassal, and in obtaining from the duke of Aquitaine the concession in fief of the district of Loudun. Moreover, in the wars of king Lothaire against the Normans and against the emperor Otto II. he distinguished

himself by feats of arms which the epic poets were quick to celebrate. His son Fulk III. Nerra (q.v.) (21st of July 98 7- 21st of June 1040) found himself confronted on his accession with a coalition of Odo I., count of Blois, and ConanI.,count of Rennes. The latter having seized upon Nantes, of which the counts of Anjou held themselves to be suzerains, Fulk Nerra came and laid siege to it, routing Conan's army at Conquereuil (27th of June 992) and re-establishing Nantes under his own suzerainty. Then turning his attention to the count of Blois, he proceeded to establish a fortress at Langeais, a few miles from Tours, from which, thanks to the intervention of the king Hugh Capet, Odo failed to oust him. On the death of Odo I., Fulk seized Tours (996); but King Robert the Pious turned against him and took the town again (997). In 1016 a fresh struggle arose between Fulk and Odo II., the new count of Blois. Odo II. was utterly defeated at Pontlevoy (6th of July 1016), and a few years later, while Odo was besieging Montboyau, Fulk surprised and took Saumur (1026). Finally, the victory gained by Geoffrey Martel (q.v.) (21st of June i040-i4th of November 1060), the son and successor of Fulk, over Theobald III., count of Blois, at Nouy (21st of August 1044), assured to the Angevins the possession of the countship of Touraine. At the same time, continuing in this quarter also the work of his father (who in 1025 took prisoner Herbert Wake-Dog and only set him free on condition of his doing him homage), Geoffrey succeeded in reducing the countship of Maine to complete dependence on himself. During his father's life-time he had been beaten by Gervais, bishop of Le Mans (1038), but now (1047 or 1048) succeeded in taking the latter prisoner, for which he was excommunicated by Pope Leo IX.

at the council of Reims (October 1049). In spite, however, of the concerted attacks of William the Bastard (the Conqueror), duke of Normandy, and Henry I., king of France, he was able in 105 1 to force Maine to recognize his authority, though failing to revenge himself on William.

On the death of Geoffrey Martel (14th of November 1060) there was a dispute as to the succession. Geoffrey Martel, having no children, had bequeathed the countship to his eldest nephew, Geoffrey III. the Bearded, son of Geoffrey, count of Gatinais, and of Ermengarde, daughter of Fulk Nerra. But Fulk le Rechin (the Cross-looking), brother of Geoffrey the Bearded, who had at first been contented with an appanage consisting of Saintonge and the chdlcllenie of Vihiers, having allowed Saintonge to be taken in 1062 by the duke of Aquitaine, took advantage of the general discontent aroused in the countship by the unskilful policy of Geoffrey to make himself master of Saumur (25th of February 1067) and Angers (4th of April), and cast

Geoffrey into prison at Sable. Compelled by the papal authority to release him after a short interval and to restore the countship to him, he soon renewed the struggle, beat Geoffrey near Brissac and shut him up in the castle of Chinon (1068). In order, however, to obtain his recognition as count, Fulk IV. Rechin (io68-i4th of April 1 109) had to carry on a long struggle with his barons, to cede Gatinais to King Philip I., and to do homage to the count of Blois for Touraine. On the other hand, he was successful on the whole in pursuing the policy of Geoffrey Martel in Maine: after destroying La Fleche, by the peace of Blanchelande (1081), he received the homage of Robert " Courteheuse " (" Curthose "), son of William the Conqueror, for Maine. Later, he upheld Elias, lord of La Fleche, against William Rufus, king of England, and on the recognition of Elias as count of Maine in 1100, obtained for Fulk the Young, his son by Bertrade de Montfort, the hand of Eremburge, Elias's daughter and sole heiress.

Fulk V. the Young (14th of April 1109-1129) succeeded to the countship of Maine on the death of Elias (nth of July mo); but this increase of Angevin territory came into such direct collision with the interests of Henry I., king of England, who was also duke of Normandy, that a struggle between the two powers became inevitable. In 1 1 1 2 it broke out, and Fulk, being unable to prevent Henry I. from taking Alencon and making Robert, lord of Belleme, prisoner, was forced, at the treaty of Pierre Pecoulee, near Alencon (23rd of February 1113), to do homage to Henry for Maine. In revenge for this, while Louis VI. was overrunning the Vexin in n 18, he routed Henry's army at Alencon (November), and in May n 19 Henry demanded a peace, which was sealed in June by the marriage of his eldest son, William the Aetheling, with Matilda, Fulk's daughter. William the Aetheling having perished in the wreck of the " White Ship " (25th of November 1120), Fulk, on his return from a pilgrimage to the Holy Land (1120-1121), married his second daughter Sibyl, at the instigation of Louis VI., to William Clito, son of Robert Courteheuse, and a claimant to the duchy of Normandy, giving her Maine for a dowry (n 22 or 1123). Henry I. managed to have the marriage annulled, on the plea of kinship between the parties (1123 or 1124). But in 11 27 a new alliance was made, and on the 22nd of May at Rouen, Henry I. betrothed his daughter Matilda, widow of the emperor Henry V., to Geoffrey the Handsome, son of Fulk, the marriage being cele- brated at Le Mans on the 2nd of June 1 1 29. Shortly after, on the invitation of Baldwin II., king of Jerusalem, Fulk departed to the Holy Land for good, married Melisinda, Baldwin's daughter and heiress, and succeeded to the throne of Jerusalem (14th of September 1131). His eldest son, Geoffrey IV. the Handsome or "

Plantagenet," succeeded him as count of Anjou (n 29- 7th of September 1151). From the first he tried to profit by his marriage, and after the death of Henry I. (1st of December 1135), laid the foundation of the conquest of Normandy by a series of campaigns: about the end of 113 5 or the beginning of n 36 he entered that country and rejoined his wife, the countess "Blatilda, who had received the submission of Argentan, Domfront and Exmes. Having been abruptly recalled into Anjou by a revolt of his barons, he returned to the charge in September 1136 witha

strong army, including in its ranks William, duke of Aquitaine, Geoffrey, count of Vendome, and William Talvas, count of Ponthieu, but after a few successes was wounded in the foot at the siege of Le Sap (October i) and had to fall back. In May 1137 began a fresh campaign in which he devastated the district of Hiemois (round Exmes) and burnt Bazoches. In June 1138, with the aid of Robert of Gloucester, Geoffrey obtained the submission of Bayeux and Caen; in October he devastated the neighbourhood of Falaise; finally, in March 1 141, on hearing of his wife's success in England, he again entered Normandy, when he made a triumphal procession through the country. Town after town surrendered: in 1141, Verneuil, Nonancourt, Lisieux, Falaise; in 1142, Mortain, Saint-Hilaire, Pontorson; in 1143, Avranches, Saint-L6, Cerences, Coutances, Cherbourg; in the beginning of 1144 he entered Rouen, and on the 19th of January received the ducal crown in its cathedral. Finally, in 1149, after crushing a last attempt at revolt, he handed over the duchy to his son Henry " Curtmantel," who received the investiture at the hands of the king of France.

All the while that Fulk the Young and Geoffrey the Handsome were carrying on the work of extending the countship of Anjou, they did not neglect to strengthen their authority at home, to which the unruliness of the barons was a menace. As regards Fulk the Young we know only a few isolated facts and dates: about 1109 Doue and L'lle Bouchard were taken; in 1112 Brissac was besieged, and about the same time Eschivard of Preuilly subdued; in n 14 there was a general war against the barons who were in revolt, and in rn8 a fresh rising, which was put down after the siege of Montbazon; in n 23 the lord of Doue revolted, and in n 24 Montreuil-Bellay was taken after a siege of nine weeks. Geoffrey the Handsome, with his indefatigable energy, was eminently fitted to suppress the coalitions of his vassals, the most

formidable of which was formed in n 29. Among those who revolted were Guy of Laval, Giraud of Mon- treuil-Bellay, the viscount of Thouars, the lords of Mirebeau, Amboise, Partbenay and Sable. Geoffrey succeeded in beating them one after another, razed the keep of Thouars and occupied Mirebeau. Another rising was crushed in 1 134 by the destruction of Cande and the taking of L'lle Bouchard. In 1136, while the count was in Normandy, Robert of Sable put himself at the head of the movement, to which Geoffrey responded by destroying Briollay and occupying La Suze, and Robert of Sable himself was forced to beg humbly for pardon through the intercession of the bishop of Angers. In 1 1391 Geoffrey took Mirebeau, and in 1 142 Champtoceaux, but in ri45 a new revolt broke out, this time under the leadership of Elias, the count's own brother, who, again with the assistance of Robert of Sable, laid claim to the countship of Maine. Geoffrey took Elias prisoner, forced Robert of Sable to beat a retreat, and reduced the other barons to reason. In 1147 he destroyed Doue and Blaison. Finally in 1 1 50 he was checked by the revolt of Giraud, lord of Montreuil-Bellay: for a year he besieged the place till it had to surrender; he then took Giraud prisoner and only released him on the mediation of the king of France.

Thus, on the death of Geoffrey the Handsome (7th of Sep- tember 1 1 51), his son Henry found himself heir to a great empire, strong and consolidated, to which his marriage with Eleanor of Aquitaine (May 1152) further added Aquitaine.

At length on the death of King Stephen, Henry was recognised as king of England (19th of December 1154). But then his brother Geoffrey, who had received as appanage the three fortresses of Chinon, Loudun and Mirebeau, tried to seize upon Anjou, on the pretext that, by the will of their father, Geoffrey the Handsome, all the paternal inheritance ought to descend to him, if Henry succeeded in obtaining possession of the maternal inheritance. On hearing of this, Henry, although he had sworn • to observe this will, had himself released from his oath by the pope, and hurriedly marched against his brother, from whom in the beginning of 1 1 56 he succeeded in taking Chinon and Mire- beau; and in July he forced Geoffrey to give up even his three fortresses in return for an annual pension. Henceforward Henry succeeded in keeping the countship of Anjou all his life; for

though he granted it in 1168 to his son Henry "of the Short Mantle," when the latter became old enough to govern it, he absolutely refused to allow him to enjoy his power. After Henry II. 's death in 1189 the countship, together with the rest of his dominions, passed to his son Richard I. of England, but on the death of the latter in 1199, Arthur of

Brittany (born in 1 187) laid claim to the inheritance, which ought, according to him, to have fallen to his father Geoffrey, fourth son of Henry II., in accordance with the custom by which ” the son of the eldest brother should succeed to his father’s patrimony.” He therefore set himself up in rivalry with John Lackland, youngest son of Henry II., and supported by Philip Augustus of France, and aided by William des Roches, seneschal of Anjou, he managed to enter Angers (18th of April 1199) and there have himself recognized as count of the three countships of Anjou, Maine and Touraine, for which he did homage to the king of France. King John soon regained the upper hand, for Philip Augustus having deserted Arthur by the treaty of Le Goulet (22nd of May 1200), John made his way into Anjou; and on the 18th of June 1200 was recognized as count at Angers. In 1202 he refused to do homage to Philip Augustus, who, in consequence, confiscated all his continental possessions, including Anjou, which was allotted by the king of France to Arthur. The defeat of the latter, who was taken prisoner at Mirebeau on the 1st of August 1202, seemed to ensure John’s success, but he was abandoned by William des Roches, who in 1 203 assisted Philip Augustus in subduing the whole of Anjou. A last effort on the part of John to possess himself of it, in 1214, led to the taking of Angers (17th of June) , but broke down lamentably at the battle of La Roche- aux-Moines (2nd of July), and the countship was attached to the crown of France.

Shortly afterwards it was separated from it again, when in August 1246 King Louis IX. gave it as an appanage to his son Charles, count of Provence, soon to become king of Naples and Sicily (see Naples) . Charles I. of Anjou, engrossed with his other dominions, gave little thought to Anjou, nor did his son Charles IL the Lame, who succeeded him on the 7th of January 1285. On the 1 6th of August 1 290, the latter married his daughter Margaret to Charles of Valois, son of Philip III. the Bold, giving her Anjou and Maine for dowry, in exchange for the kingdoms of Aragon and Valentia and the countship of Barcelona given up by Charles. Charles of Valois at once entered into possession of the countship of Anjou, to which Philip IV. the Fair, in September 1297, attached a peerage of France. On the 16th of December 1325, Charles died, leaving Anjou to his eldest son Philip of Valois, on whose recognition as king of France (Philip VI.) on the 1st of April 1328, the countship of Anjou was again united to the crown. On the 17th of February 1332, Philip VI. bestowed it on his son John the Good, who, when he became king in turn (22nd of August 1350), gave the countship to his second son Louis I., raising it to a duchy in the peerage of France by letters patent of the 25th of October 1360. Louis I., who became in time count of Provence and king of Naples (see

Louis I . , king of Naples,) died in 1384, and was succeeded by his son Louis II., who devoted most of his energies to his kingdom of Naples, and left the ad- ministration of Anjou almost entirely in the hands of his wife, Yolande of Aragon. On his death (29th of April 1417) she took upon herself the guardianship of their young son Louis III., and in her capacity of regent defended the duchy against the English. Louis III., who also succeeded his father as king of Naples, died on the 15th of November 1434, leaving no children. The duchy of Anjou then passed to his cousin Rene, second son of Louis II. and Yolande of Aragon, and king of Naples and Sicily (see Naples).

Unlike his predecessors, who had rarely stayed long in Anjou, Rene from 1443 onwards paid long visits to it, and his court at Angers became one of the most brilliant in the kingdom of France. But after the sudden death of his son John in December 1470, Rene, for reasons which are not altogether clear, decided to move his residence to Provence and leave Anjou for good. After making an inventory of all his possessions, he left the duchy in October 1471, taking with him the most valuable of his

treasures. On .the 22nd of July 1474 he drew up a will by which he divided the succession between his grandson Rene II. of Lorraine and his nephew Charles II., count of Maine. On hearing this, King Louis XL, who was the son of one of King Rene's sisters, seeing that his expectations were thus completely frustrated, seized the duchy of Anjou. He did not keep it very long, but became reconciled to Rene in 1476 and restored it to him, on condition, probably, that Rene should bequeath it to him. However that may be, on the death of the latter (10th of July 14S0) he again added Anjou to the royal domain.

Later, King Francis I. again gave the duchy as an appanage to his mother, Louise of Savoy, by letters patent of the 4th of February 151 5. On her death, in September 1531, the duchy returned into the king's possession. In 1552 it was given as an appanage by Henry II. to his son Henry of Valois, who, on becoming king in 1574, with the title of Henry III., conceded it to his brother Francis, duke of Alencon, at the treaty of Beaulieu near Loches (6th of May 1576). Francis died on the 10th of June 1584, and the vacant appanage definitively became part of the royal domain.

At first Anjou was included in the gouvemement (or military

command) of Orleanais, but in the 17th century was made into a separate one. Saumur, however, and the Saumurois, for which King Henry IV. had in 1589 created an independent military governor-generalship in favour of Duplessis-Mornay, continued till the Revolution to form a separate gouvemement, which in- cluded, besides Anjou, portions of Poitou and Mirebalais. Attached to the generalite (administrative circumscription) of Tours, Anjou on the eve of the Revolution comprised five elections (judicial districts) : — Angers, Beauge, Saumur, Chateau- Gontier, Montreuil-Bellay and part of the elections of La Fleche and Richelieu. Financially it formed part of the so-called pays de grande gabelle (see Gabelle), and comprised sixteen special tribunals, or greniers a sel (salt warehouses) : — Angers, Beauge, Beaufort, Bourgueil, Cande, Chateau-Gontier, Cholet, Craon, La Fleche, Saint-Florent-le-Vieil, Ingrandes, Le Lude, Pouance, Saint-Remy-la-Varenne, Richelieu, Saumur. From the point of view of purely judicial administration, Anjou was subject to the parlement of Paris; Angers was the seat of a presidial court, of which the jurisdiction comprised the sen&chaussecs of Angers, Saumur, Beauge, Beaufort and the duchy of Richelieu; there were besides presidial courts at Chateau-Gontier and La Fleche. When the Constituent Assembly, on the 26th of February 1790, decreed the division of France into departments, Anjou and the Saumurois, with the exception of certain territories, formed the department of Maine-et-Loire, as at present con- stituted.

Authorities. — (1) Principal Svurces : The history of Anjou may be told partly with the aid of the chroniclers of the neighbouring provinces, especially those of Normandy (William of Poitiers, William of Jumieges, Ordericus Vitalis) and of Maine (especially Actus pontificum Cenomannis in urbe degentium). For the loth, nth and 12th centuries especially, there are some important texts dealing entirely with Anjou. The most important is the chronicle called Gesta consilium Andegavorum, of which only a poor edition exists {Chroniques des comtes d' Anjou, published by Marchegay and Salmon, with an introduction by E. Mabille, Paris, 1856-1871, collection of the Societe de Vhistoire de France). See also with refer- ence to this text Louis Halphen, £,tude sur les chroniques des comtes d' Anjou el des seigneurs d'Amboise (Paris, 1906). The above may be supplemented by some valuable annals published by Louis Halphen, Recueil d'annales angevines et vendomoises (Paris, 1903), (in the series Collection de textes pour semir & V etude et a I'enseignement de I'histoire). For further details see Auguste Molinier, Les Sources de I'hiiloirc de France (Paris, 1902), ii. 1276-1310, and the book of Louis Halphen mentioned below.

(2) Works: The Art de verifier les dates contains a history of Anjou which is very much out of date, but has not been treated elsewhere as a whole. The nth centuty only has been treated in detail by Louis Halphen, in Le Comte d Anjou au XI' siecle (Paris, 1906), which has a preface with bibliography and an introduction dealing with the history of Anjou in the 10th century. For the 10th, nth and 12th centuries, a good summary will be found in Kate Norgate. England under the Angevin Kings (2 vols., London, 1887). On Rene of Anjou, there is a book by A. Lecoy de la Marche, Le Roi Rene (2 vols., Paris, 1875). Lastly, the work of Celestin Port, Dictionnaire historique, geographique et biographique de Maine-et- Loire (3 vols.. Paris and Angers, 1874-1878), and its small volume of

Preliminaires (including a summary of the history of Anjou), contain, in addition to the biographies of the chief counts of Anjou, a mass of information concerning everything connected with Angevin ruV.ory. * (L. H.*)

ANKERITE, a member of the mineral group of rhombohedral carbonates. In composition it is closely related to dolomite, but differs from this in having magnesia replaced by varying amounts of ferrous and manganous oxides, the general formula being Ca(Mg,Fe,Mn)(CO;,) 2 . Normal ankerite is Ca 2 MgFe(C0 3)4. The crystallographic and physical characters resemble those of dolomite and chalybite. The angle between the perfect rhombohedral cleavages is 73 48', the hardness 3! to 4, and the specific gravity 2-9 to 3-1; but these will vary slightly with the chemical composition. The colour is white, grey or reddish.

Ankerite occurs with chalybite in deposits of iron-ore. It is one of the minerals of the dolomite-chalybite series, to which the terms brown-spar, pearl-spar and bitter-spar are loosely applied. It was first recognized as a distinct species by W. von Haidinger in 1825, and named by him after M. J. Anker of Styria. (L. J. S)

ANKLAM, or Anclam, a town of Germany in the Prussian province of Pomerania, on the Peene, 5 m. from its mouth in the Kleines Haff, and 53 m. N.W. of Stettin, by the railway to Stralsund. Pop. (1900) 14,602. The fortifications of Anklam were dismantled in 1762 and have not since been restored, al- though the old walls are still standing; formerly, however, it was a town of considerable military importance, which suffered severely during the Thirty Years' and the Seven Years' Wars; and this fact, together with the repeated ravages of fire and of the plague, has made its history more eventful than is usually the case with towns of the same size. It does not possess any

remarkable buildings, although it contains several, private as well as public, that are of a quaint and picturesque style of architecture. The church of St Mary (12th century) has a modern tower, 335 ft. high. The industries consist of iron-foundries and factories for sugar and soap; and there is a military school. The Peene is navigable up to the town, which has a considerable trade in its own manufactures, as well as in the produce of the surrounding country, while some shipbuilding is carried on in wharves on the river.

Anklam, formerly Tanglim, was originally a Slav fortress; it obtained civic rights in 1 244 and joined the Hanseatic league. In 1648 it passed to Sweden, but in 1676 was retaken by Frederick William I. of Brandenburg, and after being plundered by the Russians in 17 13 was ceded to Prussia by the peace of Stockholm in 1720.

ANKLE, or Ancle (a word common, in various forms, to Teutonic languages, probably connected in origin with the Lat. angulus, or Gr. ayidi\os, bent), the joint which connects the foot with the leg (see Joints).

ANKOBER, a town in, and at one time capital of, the kingdom of Shoa, Abyssinia, 90 m. N.E. of Adis Ababa, in 9° 34′ N., 39 54′ E., on a mountain about 8500 ft. above the sea. Ankober was made (c. 1890) by Menelek II. the place of detention of political prisoners. Pop. about 2000. ,

ANKYLOSIS, or Anchylosis (from Gr. ayKvXos, bent, crooked) , a stiffness of a joint, the result of injury or disease. The rigidity may be complete or partial and may be due to inflamma- tion of the tendinous or muscular structures outside the joint or of the tissues of the joint itself. When the structures outside the joint are affected, the term ” false ” ankylosis has been used in contradistinction to ” true ” ankylosis, in which the disease is within the joint. When inflammation has caused the joint-ends of the bones to be fused together the ankylosis is termed osseous or complete. Excision of a completely ankylosed shoulder or elbow may restore free mobility and usefulness to the limb. ” Anky- losis ” is also used as an anatomical term, bones being said to ankylose (or anchylose) when, from being originally distinct, they coalesce, or become so joined together that no motion can take place between them.

ANKYLOSTOMIASIS, or Ankylostomiasis (also called helminthiasis, “miners’ anaemia,” and in Germany Wurmkrank-

heit), a disease to which in recent years much attention has been paid, from its prevalence in the mining industry in England, France, Germany, Belgium, North Queensland and elsewhere. This disease (apparently known in Egypt even in very ancient times) caused a great mortality among the negroes in the West Indies towards the end of the 18th century; and through descriptions sent from Brazil and various other tropical and sub-tropical regions, it was subsequently identified, chiefly through the labours of Bilharz and Griesinger in Egypt (1854), as being due to the presence in the intestine of nematoid worms (A nkylostoma duodenalis) from one-third to half an inch long. The symptoms, as first observed among the negroes, were pain in the stomach, capricious appetite, pica (or dirt-eating), obstinate constipation followed by diarrhoea, palpitations, small and unsteady pulse, coldness of the skin, pallor of the skin and mucous membranes, diminution of the secretions, loss of strength and, in cases running a fatal course, dysentery, haemorrhages and dropsies. The parasites, which cling to the intestinal mucous membrane, draw their nourishment from the blood-vessels of their host, and as they are found in hundreds in the body after death, the disorders of digestion, the increasing anaemia and the consequent dropsies and other cachectic symptoms are easily explained. The disease was first known in Europe among the Italian workmen employed on the St Gotthard tunnel. In 1896, though previously unreported in Germany, 107 cases were registered there, and the number rose to 295 in 1900, and 1030 in 1901. In England an outbreak at the Dolcoath mine, Cornwall, in 1902, led to an investigation for the home officeby Dr Haldane F.R.S. (see especially the Parliamentary Paper, numbered Cd. 1843), and since then discussions and inquiries have been frequent. A committee of the British Association in 1904 issued a valuable report on the subject. After the Spanish- American War American physicians had also given it their attention, with valuable results; see Stiles {Hygienic Laboratory Bulletin, No. 10, Washington, 1903). The American parasite described by Stiles, and called Uncinaria americana (whence the name Uncinariasis for this disease) differs slightly from the Ankylostoma. The parasites thrive in an environment of dirt, and the main lines of precaution are those dictated by sanitary science. Malefern, santonine, thymol and other anthelmintic remedies are prescribed.

ANNA, BALDASARRE, a painter who flourished during part of the 16th and 1 7th centuries. He was born at Venice, probably about 1 560, and is said to have been of Flemish descent. The date of his death is uncertain, but he seems to have been alive in 1639. For a number of

years he studied under Leonardo Corona, and on the death of that painter completed several works left unfinished by him. His own activity seems to have been confined to the production of pieces for several of the churches and a few private houses in Venice, and the old guide-books and descriptions of the city notice a considerable number of paintings by him. Scarcely any of these, however, have survived.

ANNA (Hindustani ana), an Indian penny, the sixteenth part of a rupee. The term belongs to the Mahommedan mone- tary system (see Rupee). There is no coin of one anna, but there are half-annas of copper and two-anna pieces of silver. The term anna is frequently used to express a fraction. Thus an Anglo-Indian speaks of two annas of dark blood (an octoroon), a four-anna (quarter) crop, an eight-anna (half) gallop.

ANNA AMALIA (1739-1807), duchess of Saxe-Weimar, daughter of Charles I., duke of Brunswick-Wolfenbilttel, was born at Wolfenbiittel on the 24th of October 1739, and married Ernest, duke of Saxe-Weimar, 1756. Her husband died in 1758, leaving her regent for their infant son, Charles Augustus. During the protracted minority she administered the affairs of the duchy with the greatest prudence, strengthening its resources and improving its position in spite of the troubles of the Seven Years' War. She was a patroness of art and literature, and attracted to Weimar many of the most eminent men in Germany. Wieland was appointed tutor to her son; and the names of Herder, Goethe and Schiller shed an undying lustre on her court. In 1775 she retired into private life, her son having attained his majority. In 1788 she set out on a lengthened tour through

Italy, accompanied by Goethe. She died on the 10th of April 1807. A memorial of the duchess is included in Goethe's works under the title Zum Andcnken der Furstin Anna-Amalia.

See F. Bornhak, A nna Amalia Herzogin von Saxe-Weimar-Eisenach (Berlin. 1892).

ANNABERG, a town of Germany, in the kingdom of Saxony, in the Erzgebirge, 1894 ft. above the sea, 6 m. from the Bohemian frontier, 18J m. S. by E. from Chemnitz by rail. Pop. (1905) 16,811. It has three Evangelical churches, among them that of St Anne, built 1499-1525, a Roman Catholic church, several public monuments, among them those of Luther, of the famous arithmetician Adam Riese, and of Barbara Uttmann. Anna- berg, together with the neighbouring suburb, Buchholz, is the chief seat of the braid and lace-making

industry in Germany, introduced here by Barbara Uttmann in 1561, and further developed by Belgian refugees, who, driven from their country by the duke of Alva, settled here in 1 590. The mining industry, for which the town was formerly also famous and which embraced tin, silver and cobalt, has now ceased. Annaberg has technical schools for lace-making, commerce and agriculture, in addition to high grade public schools for boys and girls.

ANNABER6ITE, a mineral consisting of a hydrous nickel arsenate, Nis(As04)2+8H 2 0, crystallizing in the monoclinic system and isomorphous with vivianite and erythrite. Crystals are minute and capillary and rarely met with, the mineral occurring usually as soft earthy masses and encrustations. A fine apple-green colour is its characteristic feature. It was long known (since 1758) under the name nickel-ochre; the name annabergite was proposed by H. J. Brooke and W H. Miller in 1852, from Annaberg in Saxony, one of the localities of the mineral. It occurs with ores of nickel, of which it is a product of alteration. A variety, from Creetown in Kirkcudbrightshire, in which a portion of the nickel is replaced by calcium, has been called dudgeonite, after P. Dudgeon, who found it. (L. J. S.)

ANNA COMNENA, daughter of the emperor Alexius I. Comnenus, the first woman historian, was born on the 1st of December 1083. She was her father's favourite and was care- fully trained in the study of poetry, science and Greek philosophy. But, though learned and studious, she was intriguing and ambitious, and ready to go to any lengths to gratify her longing for power. Having married an accomplished young nobleman, Nicephorus Bryennius, she united with the empress Irene in a vain attempt to prevail upon her father during his last illness to disinherit his son and give the crown to her husband. Still undeterred, she entered into a conspiracy to depose her brother after his accession; and when her husband refused to join in the enterprise, she exclaimed that " nature had mistaken their sexes, for he ought to have been the woman." The plot being discovered, Anna forfeited her property and fowtune, though, by the clemency of her brother, she escaped with her life. Shortly afterwards, she retired into a convent and employed her leisure in writing the Alexiad — a history, in Greek, of her father's life and reign (1081-1118), supplementing the historical work of her husband. It is rather a family panegyric than a scientific history, in which the affection of the daughter and the vanity of the author stand out prominently. Trifling acts of her father are described at length in exaggerated terms, while little notice is taken of important constitutional matters. A determined opponent of the Latin church and an enthusiastic admirer of the Byzantine empire, Anna Comnena regards the Crusades as a danger

both political and religious. Her models are Thucydides, Polybius and Xenophon, and her style exhibits the striving after Atticism characteristic of the period, with the result that the language is highly artificial. Her chronology especially isdefective. Editions in Bonn Corpus Scriptorum Hist. Byz., by J. Schopen and A. Reifferscheid (1 839-1 878), with Du Cange's valuable com- mentary; and Teubrier series, by A. Reifferscheid (1884). See also C. Krumbacher, Geschichte der byzantinischen Literatur (2nd ed. 1897) ; C. Neumann, Griechische Geschichtschreiber im 12 Jahrhunderte (1888); E. Oster, Anna Komnena (Rastatt, 1868-1871); Gibbon, Decline and. Fall, ch. 48; Finlay, Hist, of Greece, iii. pp. 53, 128 (1877); P. Adam, Princesses byzantines (1893); Sir Walter Scott, Count Robert of Paris; L. du Sommerard, Anne Comnine . . . Agnes de France (1907); C. Diehl, Figures byzantines (1906).

ANNA LEOPOLDOVNA, sometimes called Anna Carlovna (1718-1746), regent of Russia for a few months during the minority of her son Ivan, was the daughter of Catherine, sister of the empress Anne, and Charles Leopold, duke of Mecklenburg- Schwerin. In 1739 she married Anton Ulrich (d. 1775), son of Ferdinand Albert, duke of Brunswick, and their son Ivan was adopted in 1740 by the empress and proclaimed heir to the Russian throne. A few days after this proclamation the empress died, leaving directions regarding the succession, and appointing her favourite Ernest Biren, duke of Courland, as regent. Biren, however, had made himself an object of detestation to the Russian people, and Anna had little difficulty in overthrowing his power, She then assumed the regency, and took the title of grand-duchess, but she knew little of the character of the people with whom she had to deal, was utterly ignorant of the approved Russian mode of government, and speedily quarrelled with her principal supporters. In December 1741, Elizabeth, daughter of Peter the Great, who, from her habits, was a favourite with the soldiers, excited the guards to revolt, overcame the slight opposition that was offered, and was proclaimed empress. Ivan was thrown into prison, where he soon afterwards perished. Anna and her husband were banished to a small island in the river Dvina, where on the 18th of March 1746 she died in childbed.

ANNALISTS (from Lat. annus, year; hence annates, sc. libri, annual records), the name given to a class of writers on Roman history, the period of whose literary activity lasted from the time of the Second

Punic War to that of Sulla. They wrote the history of Rome from the earliest times (in most cases) down to their own days, the events of which were treated in much greater detail. For the earlier period their authorities were state and family records — above all, the annales maximi (or annales pontificum) , the official chronicle of Rome, in which the notable occurrences of each year from the foundation of the city were set down by the pontifex maximus. Although these annals were no doubt destroyed at the time of the burning of Rome by the Gauls, they were restored as far as possible and continued until the pontificate of P. Mucius Scaevola, by whom they were finally published in eighty books. Two generations of these annalists have been distinguished — an older and a younger. The older, which extends to 150 i.e., set forth, in bald, un- attractive language, without any pretensions to style, but with a certain amount of trustworthiness, the most important events of each successive year. Cicero (DeOratore, ii. 12. 53), comparing these writers with the old Ionic logographers, says that they paid no attention to ornament, and considered the only merits of a writer to be intelligibility and conciseness. Their annals were a mere compilation of facts. The younger generation, in view of the requirements and criticism of a reading public, cultivated the art of composition and rhetorical embellishment. As a general rule the annalists wrote in a spirit of uncritical patriotism, which led them to minimize or gloss over such disasters as the conquest of Rome by Porsenaand the compulsory payment of ransom to the Gauls, and to flatter the people by exaggerated accounts of Roman prowess, dressed up in fanciful language. At first they wrote in Greek, partly because a national style was not yet formed, and partly because Greek was the fashionable language amongst the educated, although Latin versions were probably published as well. The first of the annalists, the father of Roman history, as he has been called, was Q. Fabius Pictor (see Fabius Pictor); contemporary with him was L. Cincius Alimentus, who flourished during the Hannibalic war. 1 Like Fabius Pictor, he wrote in Greek. He was taken prisoner by Hannibal (Livy xxi. 38), who is said to have given him details of the crossing of the Alps. His work embraced the history of Rome from its foundation down to his own days. With M. Porcius Cato (q.v.) historical composition

1 He is not to be confused with L. Cincius, the author of various political and antiquarian treatises (de Fastis, de Comitiis, de Priscis Verbis), who lived in the Augustan age, to which period Mommsen, considering them a later fabrication, refers the Greek annals of L. Cincius Alimentus.

in Latin began, and a livelier interest was awakened in the history of Rome. Among the principal writers of this class who succeeded Cato,

the following may be mentioned. L. Cassius Hemina (about 146), in the fourth book of his Annals, wrote on the Second Punic War. His researches went back to very early times; Pliny {Nat. Hist. xiii. 13 [27]) calls him vetustissimus auctor annalium. L. Calpurnius Piso, surnamed Frugi (see under Piso), wrote seven books of annals, relating the history of the city from its foundation down to his own times. Livy regards him as a less trustworthy authority than Fabius Pictor, and Niebuhr considers him the first to introduce systematic forgeries into Roman history. Q. Claudius Quadrigarius (about 80 B.C.) wrote a history, in at least twenty-three books, which began with the conquest of Rome by the Gauls and went down to the death of Sulla or perhaps later. He was freely used by Livy in part of his work (from the sixth book onwards). A long fragment is preserved in Aulus Gellius (ix. 13), giving an account of the single combat between Manlius Torquatus and the Gaul. His language was antiquated and his style dry, but his work was considered important. Valerius Antias, a younger contemporary of Quadrigarius, wrote the history of Rome from the earliest times, in a voluminous work consisting of seventy-five books. He is notorious for his wilful exaggera- tion, both in narrative and numerical statements. For instance, he asserts the number of the Sabine virgins to have been exactly 527; again, in a certain year when no Greek or Latin writers mention any important campaign, Antias speaks of a big battle with enormous casualties. Nevertheless, Livy at first made use of him as one of his chief authorities, until he became convinced of his untrustworthiness. C. Licinius Macer (died 66), who has been called the last of the annalists, wrote a voluminous work, which, although he paid great attention to the study of his authorities, was too rhetorical, and exaggerated the achieve- ments of his own family. Having been convicted of extortion, he committed suicide (Cicero, De Legibus, i. 2, Brutus, 67; Plutarch, Cicero, 9).

The writers mentioned dealt with Roman history as a whole; some of the annalists, however, confined themselves to shorter periods. Thus, L. Caelius Antipater (about 1 20) limited himself to the Second Punic War. His work was overloaded with rhetorical embellishment, which he was the first to introduce into Roman history. He was regarded as the most careful writer on the war with Hannibal, and one who did not allow himself to be blinded by partiality in considering the evidence of other writers (Cicero, De Oratore, ii. 12). Livy made great use of him in his third decade. Sempronius Asellio (about 100 B.C.), military tribune of Scipio Africanus at the siege of Numantia, composed Rerum Gestarum Libri in at least fourteen books. As he himself took part in the events he describes, his work was a kind of memoirs. He was the first of his class who endeavoured to trace the

causes of events, instead of contenting himself with a bare statement of facts. L. Cornelius Sisenna (119-67), legate of Pompey in the war against the pirates, lost his life in an expedition against Crete. He wrote twenty-three books on the period between the Social War and the dictatorship of Sulla. His work was commended by Sallust (Jugurtha, 95), who, however, blames him for not speaking out sufficiently. Cicero remarks upon his fondness for archaisms (Brutus, 74. 259). Sisenna also translated the tales of Aristides of Miletus, and is supposed by some to have written a cemmentary on Plautus. The autobiography of Sulla may also be mentioned.

See C. W. Nitzsch, Die rbmische Annalistik (1873) ; H. Peter, Zur Kritik der Quellen der alteren romischen Geschichte (1879); L. O. Brocker, Moderne Quellenforscher und antike Geschichtschreiber (1882); fragments in H. Peter, Historicorum Romanorum Reliquiae (1870, 1906), and Historicorum Romanorum Fragmenta (1883); also articles Rome, History (ancient) ad fin., section ” Authorities,” and Livy, where the use made of the annalists by the historian is discussed; Pauly-Wissowa, Realencyclopadie, art. “Annales”; the histories of Roman Literature by M. Schanz and Teuffel- Schwabe; Mommsen, Hist, of Rome (Eng. tr.), bk. ii. ch. 9, bk. iii. ch. 14, bk. iv. ch. 13, bk. v. ch. 12; C. Wachsmuth, Einleitung in das Studium der alten Geschichte (1895); H. Peter, bibliography of the subject in Bursian’s Jahresbericht, exxvi. (1906). (J. H. F.)

ANNALS (Annates, from annus, a year), a concise historical record in which events are arranged chronologically, year by year. The chief sources of information in regard to the annals of ancient Rome are two passages in Cicero (De Oralore, ii. 12. 52) and in Servius (ad Aen. i. 373) which have been the subject of much discussion. Cicero states that from the earliest period down to the pontificate of Publius Mucius Scaevola (c. 131 B.C.), it was usual for the pontifex maximus to record on a white tablet (album), which was exhibited in an open place at his house, so that the people might read it, first, the name of the consuls and other magistrates, and then the noteworthy events that had occurred during the year (per singulos dies, as Servius says). These records were called in Cicero’s time the Annates Maximi. After the pontificate of Publius, the practice of compiling annals was carried on by various unofficial writers, of whom Cicero names Cato, Pictor and Piso. The Annates have been generally regarded as the same with the Commentarii Pontificum cited by Livy, but there seems reason to

believe that the two were dis- tinct, the Commentarii being fuller and more circumstantial. The nature of the distinction between annals and history is a subject that has received more attention from critics than its intrinsic importance deserves. The basis of discussion is fur- nished chiefly by the above-quoted passage from Cicero, and by the common division of the work of Tacitus into Annates and Historiae. Aulus Gellius, in the Nodes Alticae (v. 18), quotes the grammarian Verrius Flaccus, to the effect that history, according to its etymology (Urroptiv, inspicere, to inquire in person), is a record of events that have come under the author's own observa- tion, while annals are a record of the events of earlier times arranged according to years. This view of the distinction seems to be borne out by the division of the work of Tacitus into the Historiae, relating the events of his own time, and the Annates, containing the history of earlier periods. It is more than questionable, however, whether Tacitus himself divided his work under these titles. The probability is, either that he called the whole Annates, or that he used neither designation. (See Tacitus, Cornelius.)

In the middle ages, when the order of the liturgical feasts was partly determined by the date of Easter, the custom wa3 early established in the Western Church of drawing up tables to indicate that date for a certain number of years or even centuries. These Paschal tables were thin books in which each annual date was separated from the next by a more or less con- siderable blank space. In these spaces certain monks briefly noted the important events of the year. It was at the end of the 7th century and among the Anglo-Saxons that the compiling of these Annals was first begun. Introduced by missionaries on the continent, they were re-copied, augmented and continued, especially in the kingdom of Austrasia. In the 9th century, during the great movement termed the Carolingian Renaissance, these Annals became the usual form of contem- porary history; it suffices- to mention the Annates Einhardi, the Annates Laureshamcnses (or " of Lorsch "), and the Annates S. Berlini, officially compiled in order to preserve the memory of the more interesting acts of Charlemagne, his ancestors and his successors. Arrived at this stage of development, the Annals now began to lose their primitive character, and henceforward became more and more indistinguishable from the Chronicles.

In modern literature the title annals has been given to a large number of standard works which adhere more or less strictly to the order of years. The best known are the Annates Eccle- siastici, written by Cardinal Baronius as a rejoinder to and refutation of the Historia ecclesiaslica or " Centuries " of the Protestant theologians of Magdeburg (12 vols., published at Rome from 1788 to 1793; Baronius's work stops at the year 1 197). In the 19th century the

annalistic form was once more employed, either to preserve year by year the memory of passing events (Annual Register , Annuaire de la Revue des deux tnondes, &c.) or in writing the history of obscure medieval periods (Jahrbiicher der deutschen Geschichte, Jahrbucher des deutschen Reiches, Richter's Reichsannalen, &c). (C. B.*)

ANNAM, or Anam, a country of south-eastern Asia, now forming a French protectorate, part of the peninsula of Indo- China. (See Indo-China, French) . It is bounded N. by Tong- king, E. and S.E. by the China Sea, S.W. by Cochin-China, and W. by Cambodia and Laos. It comprises a sinuous strip of territory measuring between 750 and 800 m. in length, with an approximate area of 52,000 sq. m. The population is estimated at about 6,124,000

The country consists chiefly of a range of plateaus and wooded mountains, running north and south and declining on the coast to a narrow band of plain varying between 12 and 50 m. in breadth. The mountains are cut transversely by short narrow valleys, through which run rivers, most of which are dry in summer and torrential in winter.' The Song-Ma and the Song- Ca in the north, and the Song-Ba, Don-Nai and Se-Bang-Khan in the south, are alone of any size. The chief harbour is that afforded by the bay of Tourane at the centre of the coast-line. South of this point the coast curves outwards and is broken by peninsulas and indentations; to the north it is concave and bordered in many places by dunes and lagoons.

Climate. — In Annam the rainy season begins during September and lasts for three or four months, corresponding with the north- east monsoon and also with a period of typhoons. During the rains the temperature varies from 59 or even lower to 75 F. June, July and August are the hottest months, the thermometer often reaching 85 or 90°, though the heat of the day is to some degree compensated by the freshness of the nights. The south- west monsoon which brings rain in Cochin-China coincides with the dry season in Annam, the reason probably being that the mountains and lofty plateaus separating the two countries retain the precipitation.

Ethnography. — The Annamese, or, to use the native term, the Giao-chi, are the predominant people not only in Annam but in the lowland and cultivated parts of Tongking and in Cochin- China and southern Cambodia. According to their own annals and traditions they once inhabited southern China, a theory which is confirmed by many of their habits and physical character- istics; the race has, however, been modified by crossings with the Chams and other of the previous inhabitants of Indo-China.

The Annamese is the worst-built and. ugliest of all the Indo- Chinese who belong to the Mongolian race. He is scarcely of middle height and is shorter and less vigorous than his neighbours. His complexion is tawny, darker than that of the Chinese, but clearer than that of the Cambodian; his hair is black, coarse and long; his skin is thick; his forehead low; his skull slightly depressed at the top, but well developed at the sides. His face is flat, with highly protruding cheek-bones, and is lozenge-shaped or eurygnathous to a degree that is nowhere exceeded. His nose is not only the flattest, but also the smallest among the Indo- Chinese; his eyes are rarely oblique; his mouth is large and his lips thick; his teeth are blackened and his gums destroyed by the constant use of the betel-nut, the areca-nut and lime. His neck is short, his shoulders slope greatly, his body is thick-set and wanting in suppleness. Another peculiarity is a separation of the big toe from the rest, greater than is found in any other people, and sufficiently general and well marked to serve as an ethnographic test. The Annamese of Cochin-China are weaker and smaller than those of Tongking, probably as a result of living amid marshy rice-fields. The Annamese of both sexes wear wide trousers, a long, usually black tunic with narrow sleeves and a dark-coloured turban, or in the case of the lower classes, a wide straw hat; they either go bare-foot or wear sandals or Chinese boots. The typical Annamese dwelling is open to the gaze of the passer-by during the day; at night a sort of partition of bamboo is let down. The roof is supported on wooden pillars and walls are provided only at the sides. The house consists principally of one large room opening on the front verandah and containing the altar of the family's ancestors, a table in the centre and couches placed against the wall. The chief elements of the native diet are rice, fish and poultry; vegetables and pork are also eaten. The family is the base of the social system in Annam and is ruled by its head, who is also priest and judge.

Polygamy is permitted but rarely practised, and the wife enjoys a position of some freedom.

Though fond of ease the Annamese are more industrious than the neighbouring peoples. Theatrical and musical entertainments are popular among them. They show much outward respect for superiors and parents, but they are insincere and incapable of deep emotion. They cherish great love of their native soil and native village and cannot remain long, from home. A proneness to gambling and opium-

smoking, and a tinge of vanity and deceitfulness, are their less estimable traits. On the whole they are mild and easy-going and even apathetic, but the facility with which they learn is remarkable. Like their neighbours the Cambodians and the Chinese, the Annamese have a great respect for the dead, and ancestor worship constitutes the national religion. The learned hold the doctrine of Confucius, and Buddhism, alloyed with much popular superstition, has some influence. Like the Chinese the Annamese bury their dead.

Among the savage tribes of the interior there is scarcely any idea of God and their superstitious practices can scarcely be considered as the expression of a definite religious idea. Roman Catholics number about 420,000. In the midst of the Annamese live Cambodians and immigrant Chinese, the latter associated together according to the districts from which they come and carrying on nearly all the commerce of the country. In the forests and mountains dwell tribes of savages, chiefly of Indonesian origin, classed by the Annamese under the name Mots or ” savages.” Some of these tribes show traces of Malay ancestry. Of greater historical interest are the Chams, who are to be found for the most Dart in southern Annam and in Cambodia, and who, judging from the numerous remains found there, appear to have been the masters of the coast region of Cochin-China and Annam till they succumbed before the pressure of the Khmers of Cambodia and the Annamese. They are taller, more muscular, and more supple than the Annamese. Their language is derived from Malay, and while some of the Chams are Mussulmans, the dominant religion is Brahmanism, and more especially the worship of Siva. Their women have a high reputation for virtue, which, combined with the general bright and honest character of the whole people, differentiates them from the surrounding nations.

Evidently derived from the Chinese, of which it appears to be a very ancient dialect, the Annamese language is composed of monosyllables, of slightly varied articulation, expressing different ideas according to the tone in which they are pronounced. It is quite impossible to connect with our musical system the utterance of the sounds of which the Chinese and Annamese languages are composed. What is understood by a” tone ” in this language is distinguished in reality, not by the number of sonorous vibrations which belong to it, but rather by a use of the vocal apparatus special to each. Thus, the sense will to a native be completely changed according as the sound is the result of an aspiration or of a simple utterance of the voice. Thence the difficulty of substituting our phonetic alphabet for the ideo-graphic characters of the Chinese, as well as for the ideophonetic writing partly borrowed by the Annamese from the letters of the

celestial empire. To the Jesuit missionaries is due the intro- duction of an ingenious though very complicated system, which has caused remarkable progress to be made in the employment of phonetic characters. By means of six accents, one bar and a crotchet it is possible to note with sufficient precision the indica- tions of tone without which the Annamese words have no sense for the natives.

Agriculture and other Industries. — The cultivation of rice, which is grown mainly in the small deltas along the coast and in some districts gives two crops annually, and fishing, together with fish-salting and the preparation of nuoc-mam, a sauce made from decaying fish, constitute the chief industries of Annam.

Silk spinning and weaving are carried on on antiquated lines, and silkworms are reared in a desultory fashion. Besides rice, theproductsof the countryinclude tea, tobacco, cotton, cinnamon, precious woods and rubber; coffee, pepper, sugar-canes and

jute are cultivated to a minor extent. Trie exports (total value in 1905 £237,010) comprise tea, raw silk and small quantities of cotton, rice and sugar-cane. The imports (£284,824 in 1905) include rice, iron goods, flour, wine, opium and cotton goods. There are coal-mines at Nong-Son, near Tourane, and gold, silver, lead, iron and other metals occur in the mountains. Trade, which is in the hands of the Chinese, is for the most part carried on by sea, the chief ports being Tourane and Qui-Nhon, which are open to European commerce.

Administration. — Annam is ruled in theory by its emperor, assisted by the ” comat ” or secret council, composed of the heads of the six ministerial departments of the interior, finance, war, ritual, justice and public works, who are nominated by himself. The resident superior, stationed at Hue, is the representative of France and the virtual ruler of the country. He presides over a council (Conseil de Protectorat) composed of the chiefs of the French services in Annam, together with two members of the ‘ ‘ comat ” ; this body deliberates on questions of taxation affecting the budget of Annam and on local public works. A native governor (tong-doc or tuan-phu), assisted by a native staff, administers each of the provinces into which the country is divided, and native officials of lower rank govern the areas into which these provinces are subdivided. The governors take their orders from the imperial government, but they are under the eye of French residents. Native officials are appointed by the court, but the resident superior has power to annul an appointment. The mandarinate or official class is recruited from all ranks of the people by competitive examination. In the province of Tourane, a French tribunal alone exercises

jurisdiction, but it administers native law where natives are concerned. Outside this territory the native tribunals survive. The Annamese village is self-governing. It has its council of notables, forming a sort of oligarchy which, through the medium of a mayor and two subordinates, directs the interior affairs of the community — policing, recruiting, the assignment and collection of taxes, &c. — and has judicial power in less important suits and crimes. More serious cases come within the purview of the an-sat, a judicial auxiliary of the governor. An assembly of notables from villages grouped together in a canton chooses a cantonal representative, who is the mouthpiece of the people and the intermediary between the government and its subjects. The direct taxes, which go to the local budget of Annam, consist primarily of a poll-tax levied on all males over eighteen and below sixty years of age, and of a land-tax levied according to the quality and the produce of the holding.

The following table summarizes the local budget of Annam for the years 1899 and 1904: —

—

Receipts.

Expenditure.

1899 1904

£203,082 (direct taxes, £171,160) £247,435 („ „ £219,841)

£i75-H7 £232,480

In 1904 the sum allocated to the expenses of the court, the royal family and the native administration, the members of which are paid by the crown, was £85,000, the chief remaining heads of expenditure being the government house and residencies (£39,709), the native guard (£32,609) and public works (£24,898).

Education is available to every person in the community. The primary school, in which the pupils learn only Chinese writing and the precepts of Confucius, stands at the base of this system. Next above this is the school of the district capital, where a half-yearly examination takes place, by means of which are selected those eligible for the course of higher education given at the capital of the province in a school under the direction of a doc-hoc, or inspector of studies. Finally a great triennial competition decides the elections. The candidate whose work is notified as Ires bien is admitted to the

examinations at Hue, which qualify for the title of doctor and the holding of administra- tive offices. The education of a mandarin includes local history, cognizance of the administrative rites, customs, laws and prescriptions of the country, the ethics of Confucius, the rules

01 good breeding, the ceremonial of official and social life, and the practical acquirements necessary to the conduct of public or private business. Annamese learning goes no farther. It includes no scientific idea, no knowledge of the natural sciences, and neglects even the most rudimentary instruction conveyed in a European education. The complications of Chinese writing greatly hamper education. The Annamese mandarin must be acquainted with Chinese, since he writes in Chinese characters. But the character being ideographic, the words which express them are dissimilar in the two languages, and official text is read in Chinese by a Chinese, in Annamese by an Annamese.

The chief towns of Annam are Hue (pop. about 42,000), seat both of the French and native governments, Tourane (pop. about 4000), Phan-Thiet (pop. about 20,000) in the extreme south, Qui-Nhon, and Fai-Fo, a commercial centre to the south of Tourane. A road following the coast from Cochin-China to Tongking, and known as the ” Mandarin road,” passes through or near the chief towns of the provinces and forms the chief artery of communication in the country apart from the railways (see Indo-China, French).

History. — The ancient tribe of the Giao-chi, who dwelt on the confines of S. China, and in what is now Tongking and northern Annam, are regarded by the Annamese as their ancestors, and tradition ascribes to their first rulers descent from the Chinese imperial family. These sovereigns were suc- ceeded by another dynasty, under which, at the end of the 3rd century B.C., the Chinese invaded the country, and eventually established there a supremacy destined to last, with little intermission, till the 10th century a.d. In 968 Dinh-Bo-Lanh succeeded in ousting the Chinese and founded an independent dynasty of Dinh. Till this period the greater part of Annam had been occupied by the Chams, a nation of Hindu civilization, which has left many monuments to testify to its greatness, but the encroachment of the Annamese during the next six centuries at last left to it only a small territory in the south of the country. Three lines of sovereigns followed that of Dinh, under the last of which, about 1407, Annam again fell under the Chinese yoke. In 1428 an Annamese general Le-Loi succeeded in freeing the country once more, and founded a dynasty which lasted till the end of the 18th century. During the greater part of this period, however, the titular sovereigns were mere puppets, the reality of power being in the hands of the family of Trinh in Tongking and that of Nguyen in southern Annam, which in 1 568 became a separate principality under the

name of Cochin- China. Towards the end of the 18th century a rebellion over- threw the Nguyen, but one of its members, Gia-long, by the aid of a French force, in 1801 acquired sway over the whole of Annam, Tongking and Cochin-China. This force was procured for him by Pigneau de Behalne, bishop of Adran, who saw in the political condition of Annam a means of establishing French influence in Indo-China and counterbalancing the English power in India. Before this, in 1787, Gia-long had concluded a treaty with Louis XVI., whereby in return for a promise of aid he ceded Tourane and Pulo-Condore to the French. That treaty marks the beginning of French influence in Indo-China.

See also Legrand de la Liraye, Notes historiques sur la nation annamite (Pans, 1866?); C. Gosselin, V Empire d' Annam (Paris, 1904) ; E. Sombsthay, Cours de legislation et d' administration annamites (Paris, i~

ANNAN, a royal, municipal and police burgh of Dumfriesshire, Scotland, on the Annan, nearly 2 m. from its mouth, 15 m. from Dumfries by the Glasgow & South-Western railway. It has a station also on the Caledonian railway company's branch line from Kirtlebridge to Brayton (Cumberland), which crosses the Solway Firth at Seafield by a viaduct, ij m. long, constructed of iron pillars girded together by poles, driven through the sand and gravel into the underlying bed of sandstone. Annan is a well- built town, red sandstone being the material mainly used. Among its public buildings is the excellent academy of which Thomas Carlyle was a pupil. The river Annan is crossed by a stone bridge of three arches dating from 1824, and by a railway bridge. The Harbour Trust, constituted in 1897, improved the shipping

accommodation, and vessels of 300 tons approach close to the town. The principal industries include cotton and rope manu- factures, bacon-curing, distilling, tanning, shipbuilding, sand- stone quarrying, nursery-gardening and salmon-fishing. Large marine engineering works are in the vicinity. Annan is a burgh of considerable afttiquity. Roman remains exist in the neighbour- hood, and the Bruces, lords of Annandale, the Baliols, and the Douglases were more or less closely associated with it. During the period of the Border lawlessness the inhabitants suffered repeatedly at the hands of moss-troopers and through the feuds of rival families, in addition to the losses caused by the English and Scots wars. Edward Irving was a native of the town. With Dumfries, Kirkcudbright, Lochmaben and Sanquhar, Annan unites in sending one member to parliament. Annan Hill com- mands a beautiful prospect. Population (1901) 5805.

ANNA PERENNA, an old Roman deity of the circle or ” ring ” of the year, as the name (per annum) clearly indicates. Her festival fell on the full moon of the first month (March 15), and was held at the grove of the goddess at the first milestone on the Via Flaminia. It was much frequented by the city plebs, and Ovid describes vividly the revelry and licentiousness of the occasion (Fasti, \i. 523 foil.). From Macrobius we learn (Sat.i. 12. 6) that sacrifice was made to her ” ut annare perannareque com- mode liccat,” i.e. that the circle of the year may be completed happily. This is all we know for certain about the goddess and her cult; but the name naturally suggested myth-making, and Anna became a figure in stories which may be read in Ovid (I.e.) and in Silius Italicus (8.50 foil.). The coarse myth told by Ovid, in which Anna plays a trick on Mars when in love with Minerva, is probably an old Italian folk-tale, poetically applied to the persons of these deities when they became partially anthropo- morphized under Greek influence. (W. W. F.*)

ANNAPOLIS, a city and seaport of Maryland, U.S.A., the capital of the state, the county seat of Anne Arundel county, and the seat of the United States Naval Academy; situated on the Severn river about 2 m. from its entrance into Chesapeake Bay, 26 m. S. by E. from Baltimore and about the same distance E. by N. from Washington. Pop. (1890) 7604; (1900) 8525, of whom 3002 were negroes; (1910 census) 8609. Annapolis is served by the Washington, Baltimore & Annapolis (electric) and the Maryland Electric railways, and by the Baltimore & Annapolis steamship line. On an elevation near the centre of the city stands the state house (the corner stone of which was laid in 1772), with its lofty white dome (200 ft.) and pillared portico. Close by are the state treasury building, erected late in the 17th century for the House of Delegates; Saint Anne’s Protestant Episcopal church, in later colonial days a state church, a statue of Roger B. Taney (by W.H. Rinehart) , and a statue of Baron Johann de Kalb. There are a number of residences of 18th century architecture, and the names of several of the streets — such as King George’s, Prince George’s, Hanover, and Duke of Gloucester — recall the colonial days. The United States Naval Academy was founded here in 1845. Annapolis is the seat of Saint John’s College, a non- sectarian institution supported in part by the state; it was opened in 1789 as the successor of King William’s School, which was founded by an act of the Maryland legislature in 1696 and was opened in 1701. Its principal building, McDowell Hall, was originally intended for a governor’s mansion; although £4000 current money was appropriated for its erection in 1742, it was not completed until after the War of Independence. In 1907 the college became the school of arts and sciences of the university of Maryland.

Annapolis, at first called Providence, was settled in 1649 by Puritan exiles from Virginia. Later it bore in succession the names of Town at Proctor's, Town at the Severn, Anne Arundel Town, and finally in 1694, Annapolis, in honour of Princess Anne, who at the time was heir to the throne of Great Britain. In 1694 also, soon after the overthrow of the Catholic government of the lord proprietor, it was made the seat of the new government as well as a port of entry, and it has since remained the capital of Maryland; but it was not until 1708 that it was incorporated as a city. From the middle of the 18th century until the War of

Independence, Annapolis was noted for its wealthy and cultivated society. The Maryland Gazette, which became an important weekly journal, was founded by Jonas Green in 1745; in 1769 a theatre was opened; during this period also the commerce was considerable, but declined rapidly after Baltimore, in 1780, was made a port of entry, and now oyster-packing is the city's only im- portant industry. Congress was in session in the state house here from the 26th of November 1783 to the 3rd of June 1784, and it was here on the 23rd of December 1783 that General Washington resigned his commission as commander-in-chief of the Continental Army. In 1786 a convention, to which delegates from all the states of the Union were invited, was called to meet in Annapolis to consider measures for the better regulation of commerce (see Alexandria, Va.) ; but delegates came from only five states (New York, Pennsylvania, Virginia, New Jersey, and Delaware), and the convention — known afterward as the " Annapolis Con- vention," — without proceeding to the business for which it had met, passed a resolution calling for another convention to meet at Philadelphia in the following year to amend the articles of confederation; by this Philadelphia convention the present Constitution of the United States was framed.

See D. Ridgely, Annals of Annapolis from 1649 until the War of 1812 (Baltimore, 1841); S. A. Shafer, "Annapolis, Ye Ancient City," in L. P. Powell's Historic Towns of the Southern States (New York, 1900); and W. Eddis, Letters from America (London, 1792).

ANNAPOLIS, a town of Nova Scotia, capital of Annapolis county and up to 1750 of the entire peninsula of Nova Scotia; situated on an arm of the Bay of Fundy, at the mouth of the Annapolis river, 95 m. W. of Halifax; and the terminus of the Windsor & Annapolis railway. Pop.

(1901) 1019. It is one of the oldest settlements in North America, having been founded in 1604 by the French, who called it Port Royal. It was captured by the British in 17 10, and ceded to them by the treaty of Utrecht in 1 7 13, when the name was changed in honour of Queen Anne. It possesses a good harbour, and the beauty of the surrounding country makes it a favourite summer resort. The town is surrounded by apple orchards and in May miles of blossoming trees make a beautiful sight. The fruit, which is excellent in quality, is the principal export of the region.

ANN ARBOR, a city and the county-seat of Washtenaw county, Michigan, U.S.A., on the Huron river, about 38 m. W. of Detroit. Pop. (1890) 9431; (1900) 14,509, of whom 2329 were foreign-born; (1910) 14,817. It is served by the Michigan Central and the Ann Arbor railways, and by an electric line running from Detroit to Jackson and connecting with various other lines. Ann Arbor is. best known as the seat of the university of Michigan, opened in 1837. The city has many attractive residences, and the residential districts, especially in the east and south-east parts of the city, command picturesque views of the Huron valley. Ann Arbor is situated in a productive agricultural and fruit-growing region. The river provides good water-power, and among the manufactures are agricultural implements, carriages, furniture (including sectional book-cases), pianos and organs, pottery and flour. In 1824 Ann Arbor was settled, laid out as a town, chosen for the county-seat, and named in honour of Mrs Ann Allen and Mrs Ann Rumsey, the wives of two of the founders. It was incorporated as a village in 1833, and was first chartered as a city in 1851.

ANNATES (Lat. annatae, from annus, ” year “), also known as ” first-fruits ” (Lat. primitiae), in the strictest sense of the word, the whole of the first year’s profits of a spiritual benefice which, in all countries of the Roman obedience, were formerly paid into the papal treasury. This custom was only of gradual growth. The jus deportuum, annalia or annatae, was originally the right of the bishop to claim the first year’s profits of the living from a newly inducted incumbent, of which the first mention is found under Pope Honorius (d. 1227), but which had its origin in a custom, dating from the 6th century, by which those ordained to ecclesiastical offices paid a fee or tax to the ordaining bishop. The earliest records show the annata to have been, sometimes a privilege conceded to the bishop for a term of years, sometimes a right based on immemorial precedent. In

course of time the popes, under stress of financial crises, claimed the privilege for themselves, though at first only temporarily. Thus, in 1305, Clement V. claimed the first-fruits of all vacant benefices in

England, and in 13 19 John XXII. those of all Christendom vacated within the next two years. In those cases the rights of the bishops were frankly usurped by the Holy See, now regarded as the ultimate source of the episcopal jurisdic- tion; the more usual custom' was for the pope to claim the first-fruits only of those benefices of which he had reserved the patronage to himself. It was from these claims that the papal annates, in the strict sense, in course of time developed.

These annates may be divided broadly into three classes, though the chief features are common to all: (1) the servilia communia or servitia Camerae Papae, i.e. the payment into the papal treasury by every abbot and bishop, on his induction, 01 one year's revenue of his new benefice. The servitia communia are traceable to the oblatio paid to the pope when consecrating bishops as metropolitan or patriarch. When, in the middle of the 13th century, the consecration of bishops became established as the sole right of the pope, the oblations of all bishops of the West were received by him and, by the close of the 14th century, these became fixed at one year's revenue. 1 A small additional payment, as a kind of notarial feeˆwas added (servilia minula). (2) The jus deportuum, fructus medii temporis, or annalia, i.e. the annates due to the bishop, but in the case of " reserved " benefices paid by him to the Holy See. (3) The quindennia, i.e. annates payable, under a bull of Paul II. (1469), by benefices attached to a corporation, every fifteen years and not at every presentation.

The system of annates was at no time worked with absolute uniformity and completeness throughout the various parts of the church owning obedience to the Holy See, and it was never willingly submitted to by the clergy. Disagreements and dis- putes were continual, and the easy expedient of rewarding the officials of the Curia and increasing the papal revenue by " re- serving " more and more benefices was met by repeated protests, such as that of the bishops and barons of England (the chief sufferers), headed by Robert Grossetesteof Lincoln, at the council of Lyons in 1245. 2 The subject, indeed, frequently became one of national interest, on account of the alarming amount of specie which was thus drained away, and hence numerous enactments exist in regard to it by the various national governments. In England the collection and payment of annates to the pope was prohibited in 1531 by statute. At that time the sum amounted to about £3000 a year. In 1534 the annates were, along with the supremacy over the church in England, bestowed on the crown; but in February 1 704 they were appropriated by Queen Anne to the assistance of the poorer clergy, and thus form what has since been known as " Queen Anne's Bounty " (q.i).). The amount to be paid was originally regulated by a valuation made under the direction of

Pope Innocent IV. by Walter, bishop of Norwich, in 1254, later by one instituted under commission from Nicholas III. in 1292, which in turn was superseded in 1535 by the valua- tion, made by commissioners appointed by Henry VIII., known as the King's Books, which was confirmed on the accession of Elizabeth and is still that by which the clergy are rated. In France, in spite of royal edicts — like those of Charles VI., Charles VII., Louis XL, and Henry II. — and even denunciations of the Sorbonne, at least the custom of paying the servilia communia held its ground.till the famous decree of the 4th of August during the Revolution of 1789. In Germany it was decided by the concordat of Constance, in 1418, that bishoprics and abbacies should pay the servitia according to the valuation of the Roman chancery in two half-yearly instalments. Those reserved bene- fices only were to pay the annalia which were rated above twenty- four gold florins; and as none were so rated, whatever their annual value may have been, the annalia fell into disuse. A

1 For cases see du Cange, Glossarium, s. Servitium Camerae Papae ; J. C. L. Gieseler, Eccles. Hist., vol. iii. div. iii., notes to p. 181, &c. (Eng. trans., Edinburgh, 1853).

2 Durandus (Guillaume Durand), in his de modo generalis concilii celebrandi, represents contemporary clerical hostile opinion and attacks the corruptions of the officials of the Curia.

similar convenient fiction also led to their practical abrogation in France, Spain and Belgium. The council of Basel (1431-1443) wished to abolish the servitia, but the concordat of Vienna (1448) confirmed the Constance decision, which, in spite of the efforts of the congress of Ems (1786) to alter it, still remains nominally in force. As a matter of fact, however, the revolution caused by the secularization of the ecclesiastical states in 1803 practically put an end to the system, and the servitia have either been commuted via gratiae to a moderate fixed sum under particular concordats, or are the subject of separate negotiation with each bishop on his appointment. In Prussia, where the bishops receive salaries as state officials, the payment is made by the government.

In Scotland annat or ann is half a year's stipend allowed by the Act 1672, c. 13, to the executors of a minister of the Church of Scotland above what was due to him at the time of his death. This is neither

assignable by the clergyman during his life, nor can it be seized by his creditors.

ANNE (1665-1714), queen of Great Britain and Ireland, second daughter of James, duke of York, afterwards James II., and of Anne Hyde, daughter of the 1st earl of Clarendon, was born on the 6th of February 1665. She suffered as a child from an affection of the eyes, and was sent to France for medical treat- ment, residing with her grandmother, Henrietta Maria, and on the latter's death with her aunt, the duchess of Orleans, and returning to England in 1670. She was brought up, together with her sister Mary, by the direction of Charles II., as a strict Protestant, and as a child she made the friendship of Sarah Jennings (afterwards duchess of Marlborough), thus beginning life under the two influences which were to prove the most powerful in her future career. In 1678 she accompanied Mary of Modena to Holland, and in 1679 joined her parents abroad and afterwards in Scotland. On the 28th of July 1683 she married Prince George of Denmark, brother of King Christian V., an unpopular union because of the French proclivities of the bridegroom's country, but one of great domestic happiness, the prince and princess being conformable in temper and both preferring retirement and quiet to life in the great world. Sarah Churchill became Anne's lady of the bedchamber, and, by the latter's desire to mark their mutual intimacy and affection, all deference due to her rank was abandoned and the two ladies called each other Mrs Morley and Mrs Freeman.

On the 6th of February 1685 James became king of England. In 1687 a project of settling the crown on the princess, to the exclusion of Mary, on the condition of Anne's embracing Roman Catholicism, was rendered futile by her pronounced attachment to the Church of England, and beyond sending her books and papers James appears to have made no attempt to coerce his daughter into a change of faith, 1 and to have treated her with kindness, while the birth of his son on the 10th of June 1688 made the religion of his daughters a matter of less political importance. Anne was not present on the occasion, having gone to Bath, and this gave rise to a belief that the child was spurious; but it is most probable that James's desire to exclude all Protestants from affairs of state was the real cause. " I shall never now be satisfied," Anne wrote to Mary, " whether the child be true or false. It may be it is our brother, but God only knows . . . one cannot help having a thousand fears and melancholy thoughts, but whatever changes may happen you shall ever find me firm to my religion and faithfully yours." 2 In later years, however, she had no doubt that the Old Pretender was her brother. During the events immediately preceding the Revolution Anne kept in seclusion. Her ultimate

conduct was probably influenced by the Churchills ; and though forbidden by James, to pay Mary a projected visit in the spring of 1688, she corresponded with her; and was no doubt aware of William's plans. Her position was now a very critical and painful one. She refused to show any sympathy with the king after William had landed in November, and wrote, with the advice of the Churchills, to the prince,

1 See also Hist. MSS. Comm., MSS. of Duke of Rutland at Belvoir, ii. 109.

2 Dalrymple's Memoirs, ii. 175.

declaring her approval of his action. 3 Churchill abandoned the king on the 24th, Prince George on the 25th, and when James returned to London on the 26th he found that Anne and her lady-in-waiting had during the previous night followed their husbands' examples. Escaping from Whitehall by a back staircase they put themselves under the care of the bishop of London, spent one night in his house, and subsequently arrived on the 1st of December at Nottingham, where the princess first made herself known and appointed a council. Thence she passed through Leicester, Coventry and Warwick, finally entering Oxford, where she met Prince George, in triumph, escorted by a large company. Like Mary, she was reproached for showing no concern at the news of the king's flight, but her justification was that " she never loved to do anything that looked like an affected constraint." She returned to London on the 19th of December, when she was at once visited by William. Subse- quently the Declaration of Rights settled the succession of the crown upon her after William and Mary and their children.

Meanwhile Anne had suffered a series of maternal disappoint- ments. Between 1684 and 1688 she had miscarried' four times and given birth to two children who died infants. On the 24th of July 1689, however, the birth, of a son, William, created duke of Gloucester, who survived his infancy, gave hopes that heirs to the throne under the Bill of Rights might be forthcoming. But Anne's happiness was soon troubled by quarrels with the king and queen. According to the duchess of Marlborough the two sisters, who had lived hitherto while apart on extremely affectionate terms, found no enjoyment in each other's society. Mary talked too much for Anne's comfort, and Anne too little for Mary's satisfaction. But money appears to have been the first and real cause of ill-feeling. The granting away by William of the

private estate of James, amounting to £22,000 a year, to which Anne had some claim, was made a grievance, and a factious motion brought forward in the House to increase her civil list pension of £30,000, which she enjoyed in addition to £20,000 under her marriage settlement, greatly displeased William and Mary, who regarded it as a plot to make Anne independent and the chief of a separate interest in the state, while their resentment was increased by the refusal of Anne to restrain the action of her friends, and by its success. The Marlboroughs had been active in the affair and had benefited by it, the countess (as she then was) receiving a pension of £1000, and their conduct was noticed at court. The promised Garter was withheld from Marlborough, and the incensed " Mrs Morley" in her letters to " Mrs Freeman " styled the king " Caliban " or the " Dutch Monster." At the close of 1691 Anne had declared her approval of the naval expedition in favour of her father, and expressed grief at its failure. 4 According to the doubtful Life of James, she wrote to him on the 1st of December a " most penitential and dutiful " letter, and henceforward kept up with him a "fair correspondence." 5 The same year the breach between the royal sisters was made final by the dismissal of Marlborough, justly suspected of Jacobite intrigues, from all his appointments. Anne took the part of her favourites with great zeal against the court, though in all probability unaware of Marlborough's treason; and on the dismissal of the countess from her household by the king and queen she refused to part with her, and retired with Lady Marlborough to the duke of Somerset's residence at Sion House. Anne was now in disgrace. She was deprived of her guard of honour, and Prince George, on entering Kensington Palace, received no salute, though the drums beat loudly on his departure. 6 Instructions were given that the court expected no one to pay his respects, and no attention in the provinces was to be shown to their rank. In May, Marlborough was arrested on a charge of high treason which subsequently broke down, and Anne persisted in regarding his disgrace as a personal injury to herself. In August 1 693 , however,

3 Dalrymple's Memoirs, ii. 249.

4 Lord Ailesbury's Memoirs, 293.

6 Macpherson i. 241 ; Clarke's Life of James II., ii. 476. The letter, which is only printed in fragments, is not in Anne's style, and if genuine was probably dictated by the Churchills.

e Luttrell ii. 366, 376.

the two sisters were temporarily reconciled, and on the occasion of Mary's last illness and death Anne showed an affectionate consideration.

The death of Mary weakened William's position and made it necessary to cultivate good relations with the princess. She was now treated with every honour and civility, and finally established with her own court at St James's Palace. At the same time William kept her in the background and refrained from appointing her regent during his absence. In March 1695 Marlborough was allowed to kiss the king's hands, and subse- quently was made the duke of Gloucester's governor and restored to his employments. In return Anne gave her support to William's government, though about this time, in 1606 — according to James, in consequence of the near prospect of the throne — she wrote to her father asking for his leave to wear the crown at William's death, and promising its restoration at a convenient opportunity. 1 The unfounded rumour that William contem- plated settling the succession after his death on James's son, provided he were educated a Protestant in England, may possibly have alarmed her. 2 Meanwhile, since the birth of the duke of Gloucester, the princess had experienced six more miscarriages, and had given birth to two children who only survived a few hours, and the last maternal hope flickered out on the death of the young prince on the 29th of July 1700. Henceforth Anne signs herself in her letters to Lady Marlborough as " your poor unfortunate " as well as " faithful Morley." In default of her own issue, Anne's personal choice would probably have inclined at this time to her own family at St Germains, but the necessity of maintaining the Protestant succession caused the enactment of the Act of Settlement in 1701, and the substitution of the Hanoverian branch. She wore mourning for her father in 1701, and before his death James is said to have written to his daughter asking for her protection for his family; but the recognition of his son by Louis XIV. as king of England effectually prevented any good offices to which her feelings might have inclined her.

On the 8th of March 1702 Anne became, by King William's death, queen of Great Britain, being crowned on the 23rd of April. Her reign was destined to be one of the most brilliant in the annals of England. Splendid military triumphs crushed the hereditary national foe. The Act of Union with Scotland constituted one of the strongest foundations of the future empire. Art arid literature found a fresh renascence.

In her first speech to parliament, like George III. afterwards, Anne declared her ” heart to be entirely English,” words which were resented by some as a reflection on the late king. A ministry, mostly Tory, with Godolphin at its head,was established. She obtained a grant of £700,000 a year, and hastened to bestow a pension of £100,000 on her husband, whom she created general- issimo of her forces and lord high admiral, while Marlborough obtained the Garter’, with the captain-generalship and other prizes, including a dukedom, and the duchess was made mistress of the robes with the control of the privy purse. The queen showed from the first a strong interest in church matters, and declared her intention to keep church appointments in her own hands. She detested equally Roman Catholics and dissenters, showed a strong leaning towards the high-church party, and gave zealous support to the bill forbidding occasional conformity. In 1 704 she announced to the Commons her intention of granting to the church the crown revenues, amounting to about £16,000 or £17,000 a year, from tenths and first-fruits (paid originally by the clergy to the pope, but appropriated by the crown in 1534), for the increase of poor livings; her gift, under the name of ” Queen Anne’s Bounty,” still remaining as a testimony of her piety. This devotion to the church, the strongest of all motives in Anne’s conduct, dictated her hesitating attitude towards the two great parties in the state. The Tories had for this reason her personal preference, while the Whigs, who included her power- ful favourites the Marlboroughs, identified their interests with

1 Macpherson i. 257 ; Clarke’s James II., ii. 559. See also Shrewsbury’s anonymous correspondent in Hist. MSS. Comm. Ser.; MSS. Duke of Buccleugh at Montagu House, ii. 169.

• Macaulay iv. 799 note

the war and its glorious successes, the queen slowly and un- willingly, but inevitably, gravitating towards the latter.

In December, the archduke Charles visited Anne at Windsor and was welcomed as the king of Spain. In 1 704 Anne acquiesced in the resignation of Lord Nottingham, the leader of the high Tory party. In the same year the great victory of Blenheim further consolidated the power of the Whigs and increased the influence of Marlborough, upon whom Anne now conferred the manor of Woodstock. Nevertheless, she declared in November to the duchess that whenever things leaned towards the Whigs, ” I shall think the church is beginning to be in danger.” Next year she supported the election of the Whig speaker, John Smith, but long resisted the influence and claims of the Junto, as

the Whig leaders, Sorhers, Halifax, Orford, Wharton and Sunderland, were named. In October she was obliged to appoint Cowper, a Whig, lord chancellor, with all the ecclesiastical patronage belonging to the office. Marlborough's successive victories, and especially the factious conduct of the Tories, who in November 1705 moved in parliament that the electress Sophia should be invited to England, drove Anne farther to the side of the Whigs. But she opposed for some time the inclusion in the government of Sunderland, whom she especially disliked, only consenting at Marlborough's intercession in December 1706, when various other offices and rewards were bestowed upon Whigs, and Nottingham with other Tories was removed from the council. She yielded, after a struggle, also to the appointment of Whigs to bishoprics, the most mortifying submission of all. In 1708 she was forced to dismiss Harley, who, with the aid of Mrs Masham, had been intriguing against the government and projecting the creation of a third party. Abigail Hill, Mrs Masham, a cousin of the duchess of Marlborough, had been introduced by the latter as a poor relation into Anne's service, while still princess of Denmark. The queen found relief in the quiet and respectful demeanour of her attendant, and gradually came to prefer her society to that of the termagant and tem- pestuous duchess. Abigail, however, soon ventured to talk " business," and in the summer of 1707 the duchess discovered to her indignation that her protegee had already undermined her influence with the queen and had become the medium of Harley's intrigue. The strength of the Whigs at this time and the necessities of the war caused the retirement of Harley, but he remained Anne's secret adviser and supporter against the faction, urging upon her " the dangers to the crown as well as to the church and monarchy itself from their counsels and actions," 3 while the duchess never regained her former influence. The inclusion in the cabinet of Somers, whom she especially disliked as the hostile critic of Prince George's admiralty administration, was the subject of another prolonged struggle, ending again in the queen's submission after a futile appeal to Marlborough in October 1708, to which she brought herself only to avoid a motion from the Whigs for the removal of the prince, then actually on his deathbed. His death on the 28th of October was felt deeply by the queen, and opened the way for the inclusion of more Whigs. But no reconciliation with the duchess took place, and in 1 709 a further dispute led to an angry correspondence, the queen finally informing the duchess of the termination of their friendship, and the latter drawing up a long narrative of her services, which she forwarded to Anne together with suitable passages on the subject of friendship and charity transcribed from the Prayer Book, the Whole Duty of Man and from Jeremy Taylor. 4 Next year Anne's

desire to give a regiment to Hill, Mrs Masham's brother, led to another ineffectual attempt in retaliation to displace the new favourite, and the queen showed her antagonism to the Whig administra- tion on the occasion of the prosecution of Sacheverell. She was present at his trial and was publicly acclaimed by the mob as his supporter, while the Tory divine was consoled immediately on the expiration of his sentence with the living of St Andrew's, Holborn. Subsequently the duchess, in a final interview which she had forced upon the queen, found her tedrs and reproaches

3 Swift's Mem. on the Change of the Ministry.

4 Conduct of the Duchess of Marlborough, p. 225.

unavailing. In her anger she had told the queen she wished for no answer, and she was now met by a stony and exasperating silence, broken only by the words constantly repeated, "You desired no answer and you shall have none."

The fall of the Whigs, now no longer necessary on account of the successful issue of the war, to accomplish which Harley had long been preparing and intriguing, followed; and their attempt to prolong hostilities from party motives failed. A friend of Harley, the duke of Shrewsbury, was first appointed to office, and subsequently the great body of the Whigs were displaced by Tories, Harley being made chancellor of the exchequer and Henry St John secretary of state. The queen was rejoiced at being freed from what she called a long captivity, and the new parliament was returned with a Tory majority. On the 17th of January 1711, in spite of Marlborough's efforts to ward off the blow, the duchess was compelled to give up her key of office. The queen was now able once more to indulge in her favourite patronage of the church, and by her influence an act was passed in 171 2 for building fifty new churches in London. Later, in 1 7 14, she approved of the Schism Bill. She gave strong support to Harley, now earl of Oxford and lord treasurer, in the intrigues and negotiations for peace. Owing to the alliance between the Tory Lord Nottingham and the Whigs, on the condition of the support by the latter of the bill against occasional conformity passed in December 1711, the defeated Whigs maintained a majority in the Lords, who declared against any peace which left Spain to the Bourbons. To break down this opposition Marlborough was dismissed on the 31st from all his employments,

while the House of Lords was ” swamped ” by Anne’s creation of twelve peers, 1 including Mrs Masham’s husband. The queen’s conduct was generally approved, for the nation was now violently adverse to the Whigs and war party; and the peace of Utrecht was finally signed on the 31st of March 1 713, and proclaimed on the 5th of May in London.

As the queen’s reign drew to its close, rumours were rife on the great subject of the succession to the throne. Various Jacobite appointments excited suspicion. Both Oxford and Bolingbroke were in communication with the Pretender’s party, and on the 27th of July Oxford, who had gradually lost influence and quarrelled with Bolingbroke, resigned, leaving the supreme power in the hands of the latter. Anne herself had a natural feeling for her brother, and had shown great solicitude concerning his treatment when a price had been set on his head at the time of the Scottish expedition in 1708. On the 3rd of March 1 7 14 James wrote to Anne, Oxford and Bolingbroke, urging the necessity of taking steps to secure his succession, and promising, on the condition of his recognition, to make no further attempts against the queen’s government; and in April a report was circulated in Holland that Anne had secretly determined to associate James with her in the government. The wish expressed by the Whigs, that a member of the electoral family should be invited to England, had already aroused the queen’s indignation in 1708; and now, in 1714, a writ of summons for the electoral prince as duke of Cambridge having been obtained, Anne forbade the Hanoverian envoy, Baron Schutz, her presence, and declared all who supported the project her enemies; while to a memorial on the same subject from the electress Sophia and her grandson in May, Anne replied in an angry letter, which is said to have caused the death of the electress on the 8th of June, requesting them not to trouble the peace of her realm or diminish her authority.

These demonstrations, however, were the outcome not of any returning partiality for her own family, but of her intense dislike, in which she resembled Queen Elizabeth, of any ” successor,” ” it being a thing I cannot bear to have any successor here though but for a week “; and in spite of some appearances to the contrary, it is certain that religion and political wisdom kept Anne firm to the Protestant succession. 2 She had main- tained a friendly correspondence with the court of Hanover since

1 For their names see Hume and Smollett’s Hist. (Hughes, 1854) viil. no.

2 See also Hist. MSS. Comm. Ser. Rep. vii. App. 246b.

1705, and in 1706 had bestowed the Garter on the electoral prince and created him duke of Cambridge; while the Regency Act provided for the declaration of the legal heir to the crown by the council immediately on the queen's death, and a further enactment naturalized the electress and her issue. In 1708, on the occasion of the Scottish expedition, notwithstanding her solicitude for his safety, she had styled James in her speech closing the session of parliament as " a popish pretender bred up in the principles of the most arbitrary government." The duchess of Marlborough stated in 17 13 that all the time she had known "that thing" (as she now called the queen) , "she had never heard her speak a favourable word of him." 3 No answer appears to have been sent to James's letter in 17 14; on the contrary, a proclamation was issued (June 23) for his apprehension in case of his arrival in England. On the 27th of April Anne gave a solemn assurance of her fidelity to the Hanoverian succession to Sir William Dawes, archbishop of York; in June she sent Lord Clarendon to Hanover to satisfy the elector.

The sudden illness and death of the queen now frustrated any schemes which Bolingbroke, or others might have been contem- plating. On the 27th, the day of Oxford's resignation, the discussions concerning his successor detained the council sitting in the queen's presence till two o'clock in the morning, and on retiring Anne was instantly seized with fatal illness. Her ad- herence to William in 1688 had been a principal cause of the success of the Revolution, and now the final act of her life was to secure the Revolution settlement and the Protestant succes- sion. During a last moment of returning consciousness, and by the advice of the whole council, who had been joined on their own initiative by the Whig dukes Argyll and Somerset, she placed the lord treasurer's staff in the hands of the Whig duke of Shrewsbury, and measures were immediately taken for assuring the succession of the elector. Her death took place on the 1st of August, and the security felt by the public, and perhaps the sense of perils escaped by the termination of the queen's life, were shown by a considerable rise in the national stocks. She was buried on the south side of Henry VII.'s chapel in West- minster Abbey, in the same tomb as her husband and children. The elector of Hanover, George Louis, son of the electress Sophia (daughter of Elizabeth, daughter of James I.), peacefully succeeded to the throne as George I. (q.v.).

According to her physician Arbuthnot, Anne's life was shortened by the " scene of contention among her servants. I believe sleep was never more welcome to a weary traveller than death was to her." By

character and temperament unfitted to stand alone, her life had been unhappy and tragical from its isolation. Separated in early years from her parents and sister, her one great friendship had proved only baneful and ensnaring. Marriage had only brought a mournful series of infant funerals. Constant ill-health and suffering had darkened her career. The claims of family attachment, of religion, of duty, of patriotism and of interest, had dragged her in opposite directions, and her whole life had been a prey to jealousies and factions which closed around her at her accession to the throne, and surged to their height when she lay on her deathbed. The modern theory of the relations between the sovereign and the parties, by which the former identifies himself with the faction for the time in power while maintaining his detachment from all, had not then been invented; and Anne, like her Hanoverian successors, maintained the struggle, though without success, to rule independently, finding support in Harley. During the first year of her reign she made known that she was ” resolved not to follow the example of her predecessor in making use of a few of her subjects to oppress the rest. She will be queen of all her subjects, and would have all the parties and distinctions of former reigns ended and buried in hers.” 4 Her motive for getting rid of the Whigs was not any real dislike of their administration, but the wish to escape from the domination of the party, 5 and on the advent

3 Ibid. Portland MSS. v. 338.

4 Sir J. Leveson-Gower to Lord Rutland, Hist. MSS. Comm., Duke of Rutland’s MSS. ii. 173.

6 See Bolingbroke’s Letter to Sir W. Wyndham.

to power of the Tories she carefully left some Whigs in their employments, with the aim of breaking up the party system and acting upon what was called ” a moderate scheme.” She attended debates in the Lords and endeavoured to influence votes. Her struggles to free herself from the influence of factions only involved her deeper; she was always under the domination of some person or some party, and she could not rise above them and show herself the leader of the nation like Elizabeth.

Anne was a women of small ability, of dull mind, and of that kind of obstinacy which accompanies weakness of character. According to the

duchess she had ” a certain knack of sticking to what had been dictated to her to a degree often very dis- agreeable, and without the least sign of understanding or judg- ment.” l ” I desire you would not have so ill an opinion of me,” Anne writes to Oxford, ” as to think when I have determined anything in my mind I will alter it.” 2 Burnet considered that ” she laid down the splendour of a court too much,” which was ” as it were abandoned.” She dined alone after her husband’s death, but it was reported by no means abstemiously, the royal family being characterized in the lines: — ” King William thinks all.

Queen Mary talks all,

Prince George drinks all,

And Princess Anne eats all.” 3

She took no interest in the art, the drama or the literature of her day. But she possessed the homely virtues; she was deeply religious, attached to the Church of England and concerned for the efficiency of the ministry. One of the first acts of her reign was a proclamation against vice, and Lord Chesterfield regretted the strict morality of her court. Instances abound of her kind- ness and consideration for others. Her moderation towards the Jacobites in Scotland, after the Pretender’s expedition in 1708, was much praised by Saint Simon. She showed great forbearance and generosity towards the duchess of Marlborough in the face of unexampled provocation, and her character was unduly disparaged by the latter, who with her violent and coarse nature could not understand the queen’s self-restraint in sorrow, and describes her as ” very hard ” and as ” not apt to cry.” According to her small ability she served the state well, and was zealous and conscientious in the fulfilment of public’ duties, in which may be included touching for the king’s evil, which she revived. Marlborough testifies to her energy in finding money for the war. She surrendered £ 1 0,000 a year for public purposes, and in 1706 she presented £30,000 to the officers and soldiers who had lost their horses. Her contemporaries almost unani- mously record her excellence and womanly virtues; and by Dean Swift, no mild critic, she is invariably spoken of with respect, and named in his will as of ” ever glorious, immortal and truly pious memory, the real nursing-mother of her king- doms.” She deserves her appellation of ” Good Queen Anne,” and notwithstanding her failings must be included among the chief authors and upholders of the great Revolution settlement. Her person was described by Spanheim, the Prussian ambassador, as handsome though inclining to stoutness, with black

hair, blue eyes and good features, and of grave aspect.

Anne's husband, Prince George- (1653-1708), was the second son of Frederick III., king of Denmark. Before marrying Anne he had been a candidate for the throne of Poland. He was created earl of Kendal and duke of Cumberland in 1689. Some censure, which was directed against the prince in his capacity as lord high admiral, was terminated by his death. In religion George remained a Lutheran, and in general his qualities tended to make him a good husband rather than a soldier or a statesman.

Bibliography.— Diet, of Nat. Biography (Dr A. W. Ward); A. Strickland, Lives of the Queens of England (1852), somewhat uncritical; an excellent account written by Spanheim for the king of Prussia, printed in the Eng. Hist. Rev. ii. 757; histories of Stan- hope, Lecky, Ranke, Macaulay, Boyes, Burnet, Wyon, and Somer- ville; F. E. Morris, The Age of Anne (London, 1877) ; Correspondence

1 Private Correspondence, ii. 120. '

s Hist. MSS. Comm., MSS. of Marq. of Bath at Longleat; i. 237.

3 Notes and Queries, xi. 254. '

and Diary of Lord Clarendon (1828) ; Hatton Correspondence (Camden Soc, 1878); Evelyn's Diary; Sir J. Dalrymple's Memoirs (1790); N. Lutfrell's Brief Hist. Relation (1857); Wentworth Papers (1883); W.'Coxe, Mem. of the Duke of Marlborough (1847); Conduct of the Dowager Duchess of Marlborough (1742) ; Ralph, The other Side of the Question (1742) ; Private Correspondence of Sarah Duchess of Marl- borough (1838) ; A. T, Thomson, Mem. of the Duchess and the. Court of Queen Anne (1839); J. S. Clarke's Life of James II. (1816); J. Macpherson's Original Papers (1775); Swift's Some Considerations upon the Consequences from the Death of the Queen, An Inquiry into the Behaviour of the Queen's last Ministry, Hist, of the Four Last Years of Queen Anne, and Journals and Letters; The Lockhart Papers (1817), i.;.F. Salomon, Geschichte des letzien 'Minislrriums Kbnigin Annas (1894); Marchmont Papers, Hi. (1831); W. Sichel Life of Bolingbroke (190H902) ; Mem. of Thomas Earl of Ailesbury (Roxburghe Club, 1890); Eng. Hist, Rev. i. 470, 756, viii. 740 ; Royal Hist. Soc. Trans. N.S. xiv. 69; Col. of Slate Papers; Treasury; Hist. MSS. Comm. Series, MSS. of Duke of Portland, including the Harley Papers, Duke of Buccleugh at Montagu House, Lord Kenyon, Marq. of Bath at Longleat; Various Collections, ii. 146, Duke Of Rutland at Belvoir, ph Rep. app., and H. M. the King {Stuart

Papers, i.); Stowe MSS. in Brit. Museum; Sir J. Mackintosh's Transcripts, Add. MSS. in Brit. Museum, 34, 487-526; Edinburgh Rev.; October 1835, p. 1; Notes and Queries, vii. ser. iii. 178, viii. ser. i. 72, xii. 368, ix, ser. iv. 282, xi, 254; C. Hodgson, An Account of the Augmentation of Small Livings by the Bounty of Queen Anne (1845) ; Observations of the Governors of Queen Anne's Bounty (1867) ; Sbmers Tracts, xii. xiii. (1814-1815) ; H. Paul, Queen Anne (London, 1907). (P C. Y.)

ANNE (1693-1740), empress of Russia, second daughter of Tsar Ivan V., Peter the Great's imbecile brother, and Praskovia Saltuikova. Her girlhood was passed at Ismailovo near Moscow, with her mother, an ignorant, bigoted tsaritsa of the old school, who neglected and even hated her daughters. Peter acted as a second father to the Ivanovs, as Praskovia and her family were called. In 1 7 10 he married Anne to Frederick William, duke of Courland, who died of surfeit on his journey home from St Petersburg. The reluctant young widow was ordered to proceed on her way to Mittau to take over the government of Courland, with the Russian resident, Count Peter Bestuzhev, as her adviser. He was subsequently her lover, till supplanted by Biren (q.v.). Anne's residence at Mittau was embittered by the utter inadequacy of her revenue, which she keenly felt. It was therefore with joy that she at once accepted the Russian crown, as the ,next heir, after the death of Peter II. (January 30, 1730), when it was offered to her by the members of the supreme privy council, even going so far as to subscribe previously nine articles which would have reduced her from an absolute to a very limited monarch. On the 26th of February she made her public entry into Moscow under strict surveillance. On the 8th of March a coup d'etat, engineered by a party of her personal friends, overthrew the supreme privy council and she was hailed as autocrat. Her government, on the whole, was prudent, beneficial and even glorious; but it was undoubtedly severe and became at last universally unpopular. This was due in the main to the outrageous insolence of her all- powerful favourite Biren, who hated the Russian nobility and trampled upon them mercilessly. Fortunately, Biren was sufficiently prudent not to meddle with foreign affairs or with the army, and these departments in the able hands of two Other foreigners, who thoroughly identified themselves with Russia, Andrei Osterman {q.v.) and Burkhardt Munnich (q.v.) did great things in the reign of Anne. The chief political events of the period were the War of the Polish Succession and the second { Crimean War. The former was caused by the reappearance of Stanislaus Leszczynski as a candidate for the Polish throne after the death of Augustus II. (February 1, 1733). The interests of Russia would not permit her to recognize a

candidate dependent directly on France and indirectly upon Sweden and Turkey, all three powers being at that time opposed to Russia's "system." She accordingly united with Austria to support the candidature of the late king's son, Augustus of Saxony. So far as Russia was con- cerned, the War of the Polish Succession was quickly over. Much more important was the Crimean War of .1 736-39. This war marks the beginning of that systematic struggle on the part of Russia to recover her natural and legitimate southern boundaries. It lasted

4 Vasily Golltsuin's expedition under the regency of Sophia was the first Crimean War (1687-89).

four years and a half, and cost her a hundred thousand men and millions of roubles; and though invariably successful, she had to be content with the acquisition of a single city (Azov) with a small district at the mouth of the Don. Yet more had been gained than was immediately apparent. In the first place, this was the only war hitherto waged by Russia against Turkey which had not ended in crushing disaster. Munnich had at least dissipated the illusion of Ottoman invincibility, and taught the Russian soldier that 100,000 janissaries and spahis were no match, in a fair field, for half that number of grenadiers and hussars. In the second place the Tatar hordes had been well nigh exterminated. In the third place Russia's signal and unexpected successes in the Steppe had immensely increased her prestige on the continent. " This court begins to have a great deal to say in the affairs of Europe," remarked the English minister, SirClaudius Rondeau, a year later.

The last days of Anne were absorbed by the endeavour to strengthen the position of the heir to the throne, the baby cesarevich Ivan, afterwards Ivan VI., the son of the empress's niece, Anna Leopoldovna, against the superior claims of her cousin the cesarevna Elizabeth. The empress herself died three months later (28th of October 1740). Her last act was to appoint Biren regent during the infancy of her great-nephew.

Anne was a grim, sullen woman, frankly sensual, but as Well- meaning as ignorance and vindictiveness would allow her to be. But she had much natural good sense, was a true friend and, in her more cheerful moments, an amiable companion. Lady Rondeau's portrait of the

empress shows her to the best advan- tage. She is described as a large woman, towering above all the cavaliers of her court, but very well shaped for her size, easy and graceful in her person, of a majestic bearing, but with an awful- negs in her countenance which revolted those who disliked her.

See R. Nisbet Bain, The Pupils of Peter the Great (London, 1897) ; Letters from a lady who resided some years in Russia (i.e. Lady Rondeau) (London, 1775); Christoph Hermann .Manstein, Mimoires sur la Russie (Amsterdam, 1771 ; English edition, London, 1856); Gerhard Anton von Wa\em,Lebensschreibung des Feldm.B. C.Graf en von Munnich (Oldenburg, 1 803) ; Claudius Rondeau,DiplomaticDespatches from Russia, 1728-1739 (St Petersburg, 1889-1892). (R. N. B.)

ANNE OF BRITTANY (1477-1514), daughter of Francis II., duke of Brittany, and Marguerite de Foix. She was scarcely twelve years old when she succeeded her father as duchess on the 9th of September 1488. Charles VIII. aimed at establishing his authority over her; Alain d'Albret wished to marry her; Jean de Rohan claimed the duchy ; and her guardian, the marshal de Rieux, was soon in open revolt against his sovereign. In 1489 the French army invaded Brittany. In order to protect her independence,' Anne concluded an alliance with Maximilian of Austria, and soon married him by proxy (December 1489). But Maximilian was incapable of defending her, and in 1491 the young duchess found herself compelled to treat with Charles VIII. and to marry him. The two sovereigns made a reciprocal arrangement as to their rights and pretensions to the crown of Brittany, but in the event of Charles predeceasing her, Anne undertook to marry the heir to the throne. Nevertheless, in 1492, after the conspiracy of Jean de Rohan, who had endeavoured to hand over the duchj to the king of England, Charles VIII. confirmed the privileges of Brittany, and in particular guaranteed to the Bretons the right of paying only those taxes to which the assembly of estates consented, After the death of Charles VIII. in 1498, without any children, Anne exercised the sovereignty in Brittany, and in January 1499 she married Louis XII., who had just repudiated Joan of France. The marriage contract was ostensibly directed in favour of the independence of Brittany, for it declared that Brittany should revert to the second son or to the eldest daughter of the two sovereigns, and, failing issue, to the natural heirs of the duchess. Until her death Anne occupied herself personally with the administration of the duchy. In 1504 she caused the treaty of Blois to be concluded, which assured the hand of her daughter, Claude of France, to Charles of Austria (the future emperor, CharlesV.),andpromised him thepossession of Brittany ,Burgundy and

the county of Blois. But this unpopular treaty was broken, and the queen had to consent to the betrothal of Claude to Francis

of Angouleme, who in 1515 became king of France as Francis I. Thus the definitive reunion of Brittany and France was prepared.

See A. de la Borderie, Choix de documents inedits sur le regne de la duchesse Anne en Bretagne (Rennes, 1866 and 1902) — extracts from the Memoires de la Societe Archeologique du departement a" Ille-et-Vildine, vols. iv. and vi. (1866 and 1868) ; Leroux de Lincy, Vie de la reine Anne de Bretagne (1860-1861); A. Dupuy, La Reunion de la Bretagne ita France (1880); A. de la Borderie, La Bretagne aux demiers siecles du moyen age (1893), and La Bretagne aux temps modernes (1894). (H. Se.)

ANNE OF CLEVES (1515-1557), fourth wife of Henry VIII., king of England, daughter of John, duke of Cleves, and Mary, only daughter of William, duke of Juliers, was born on the 22nd of September 1515. Her father was the leader of the German Protestants, and the princess, after the death of Jane Seymour, was regarded by Cromwell as a suitable wife for Henry VIII. She had been brought up in a narrow retirement, could speak no language but her own, had no looks, no accomplishments and no dowry, her only recommendations being her proficiency in needlework, and her meek and gentle temper. Nevertheless her picture, painted by Holbein by the king's command (now in the Louvre, a modern copy at Windsor), pleased Henry and the marriage was arranged, the treaty being signed on the 24th of September 1539. The princess landed at Deal on the 27th of December; Henry met her at Rochester on the 1st of January 1540, and was so much abashed at her appearance as to forget to present the gift he had brought for her, but nevertheless controlled himself sufficiently to treat her with courtesy. The next day he expressed openly his dissatisfaction at her looks; " she was no better than a Flanders mare." The attempt to prove a pre-contract with the son of the duke of Lorraine broke down, and Henry was forced to resign himself to the sacrifice. On the wedding morning, however, the 6th of January 1540, he declared that no earthly thing would have induced him to marry her but the fear of driving the duke of Cleves into the arms of the emperor. Shortly afterwards Henry had reason to regret the policy which had identified him so closely with the German Protestantism, and denied reconciliation with the emperor. Cromwell's fall was the result, and the chief obstacle to the repudiation of his wife being thus removed, Henry declared the marriage had not been and could not be consummated; and did not scruple to cast doubts on his wife's honour. On the 9th of July the marriage was declared null and

void by convocation, and an act of parliament to the same effect was passed immedi- ately. Henry soon afterwards married Catherine Howard. On first hearing of the king's intentions, Anne swooned away, but on recovering, while declaring her case a very hard and sorrowful one from the great love which she bore to the king, acquiesced quietly in the arrangements made for her by Henry, by which she received lands to the value of £4000 a year, renounced the title of queen for that of the king's sister, and undertook not to leave the kingdom. In a letter to her brother, drawn up by Gardiner by the king's direction, she acknowledged the unreality of the marriage and the king's kindness and generosity. Anne spent the rest of her life happily in England at Richmond or Bletchingley, occasionally visiting the court, and being described as joyous as ever, and wearing new dresses every day! An attempt to procure her reinstalment on the disgrace of Catherine Howard failed, and there was no foundation for the report that she had given birth to a child of which Henry was the reputed father. She was present at the marriage of Henry with Catherine Parr and at the coronation of Mary. She died on the 28th of July 1557 at Chelsea, and was buried in Westminster Abbey.

See Lives of the Queens of England, by A. Strickland, iii. (1851); The Wives of Henry VIII., by M. Hume (1905); Henry VIII., by A. F. Pollard (1905) '; Four Original Documents relating to the Marriage of Henry VIII. to Anne of Cleves, ed. by E. and G. Goldsmid (1886); for the pseudo Anne of Cleves see Allgemeine deutsche Biographie, i. 467. (P. C. Y.)

ANNE OF DENMARK (1574-1619), queen of James I. of England and VI. of Scotland, daughter of King Frederick II. of Denmark and Norway and of Sophia, daughter of Ulric III., duke of Mecklenburg, was born on the 1 2th of December 1 574. On the 20th of August 1589, in spite of Queen Elizabeth's opposition,

she was married by proxy to King James, without dower, the alliance, however, settling definitely the Scottish claims to the Orkney and Shetland Islands. Her voyage to Scotland was interrupted by a violent storm — for the raising of which several Danish and Scottish witches were burned or executed — which drove her on the coast of Norway, whither the impatient James came to meet her, the marriage taking place at Opslo (now Christiania) on the 23rd of November. The royal couple, after visiting Denmark, arrived in Scotland in May 1 590. The

position of queen consort to a Scottish king was a difficult and perilous one, and Anne was attacked in connexion with various scandals and deeds of violence, her share in which, however, is supported by no evidence. The birth of an heir to the throne (Prince Henry) in 1504 strengthened her position and influence; but the young prince, much to her indignation, was immediately withdrawn from her care and entrusted to the keeping of the earl and countess of Mar at Stirling Castle; in 1595 James gave a written command, forbidding them in case of his death to give up the prince to the queen till he reached the age of eighteen. The king's intention was, no doubt, to secure himself and the prince against the unruly nobles, though the queen's Roman Catholic tendencies were probably another reason for his decision. Brought up a Lutheran, and fond of pleasure, she had shown no liking for Scottish Calvinism, and soon incurred rebukes on account of her religion, " vanity," absence from church, " night waking and balling." She had become secretly inclined to Roman Catholicism, and attended mass with the king's conniv- ance. On the death of Queen Elizabeth, on the 24th of March 1603, James preceded her to London. Anne took advantage of his absence to demand possession of the prince, and, on the " flat refusal " of the countess of Mar, fell into a passion, the violence of which occasioned a miscarriage and endangered her life. In June she followed the king to England (after distributing all her effects in Edinburgh among her ladies) with the prince and the coffin containing the body of her dead infant, and reached Windsor on the 2nd of July, where amidst other forms of good fortune she entered into the possession of Queen Elizabeth's 6000 dresses.

On the 24th of July Anne was crowned with the king, when her refusal to take the sacrament according to the Anglican use created some sensation. She communicated on one occasion subsequently and attended Anglican service occasionally; but she received consecrated objects from Pope Clement VIII., continued to hear mass, and, according to Galluzzi, supported the schemes for the conversion of the prince of Wales and of England, and for the prince's marriage with a Roman Catholic princess, which collapsed on his death in 161 2. She was claimed as a convert by the Jesuits. 1 Nevertheless on her deathbed, when she was attended by the archbishop of Canterbury and the bishop of London, she used expressions which were construed as a declaration of Protestantism. Notwithstanding religious differences she lived in great harmony and affection with the king, latterly, however, residing mostly apart. She helped to raise Buckingham to power in the place of Somerset, maintained friendly relations with him, and approved of his guidance and control of the

king. In spite of her birth and family she was at first favourably inclined to Spain, disapproved of her daughter Elizabeth's marriage with the elector palatine, and supported the Spanish marriages for her sons, but subsequently veered round towards France. She used all her influence in favour of the unfortunate Raleigh, answering his petition to her for protection with a personal letter of appeal to Buckingham to save his life. " She carrieth no sway in state matters," however, it was said of her in 1605, " and, praeter rem iixoriam, hath'no great reach in other affairs." " She does not mix herself up in affairs, though the king tells her anything she chooses to ask, and loves and esteems her." 2 Her interest in state matters was only occasional, and secondary to the pre-occupations of court festivities, masks, progresses, dresses, jewels, which she much enjoyed; the court being, says Wilson — whose severity cannot

1 Fasti S. J., by P. Joannis Drews (pub. 1723), p. 160. 2 Cal. of St. Pap. — Venetian, x. 513.

entirely suppress his admiration — " a continued maskarado, where she and her ladies, like so many nymphs or Nereides, appeared … to the ravishment of the beholders," and " made the night more glorious than the day." Occasionally she even joined in the king's sports, though here her only recorded exploit was her accidental shooting of James's " most principal and special hound," Jewel. Her extravagant expenditure, returned by Salisbury in 1605 at more than £50,000 and by Chamberlain at her death at more than £84,000, was unfavourably contrasted with the economy of Queen Elizabeth ; in spite of large allowances and grants of estates which included Oatlands, Greenwich House and Nonsuch, it greatly exceeded her income, her debts in 1616 being reckoned at nearly £10,000, while her jewelry and her plate were valued at her death at nearly half a million. Anne died after a long illness on the 2nd of March 1619, and was buried in Westminster Abbey. She was generally regretted. The severe Wilson, while rebuking her gaieties, allows that she was " a good woman," and that her character would stand the most prying investigation. She was intelligent and tactful, a faithful wife, a devoted mother and a staunch friend. Besides several children who died in infancy she had Henry, prince of Wales, who- died in 161 2, Charles, afterwards King Charles I., and Elizabeth, electress palatine and queen of Bohemia.

Bibliography.— See Dr A. W. Ward's article in the Diet, of Nat. Biography, with authorities; Lives of the Queens of England, by A. Strickland (I844), vii.; " Life and Reign of King James I.," by A. Wilson, in History of England (1706); Isloria del Granducato di Toscana, by R. Galluzzi (1781), lib. vi. cap. ii. ; Cal. of State Papers-

Domestic and Venetian; Hist. MSS. Comtn. Series, MSS. of Marq. of Salisbury, iii. 420, 438, 454, ix. 54; Harleian MSS. 5176, art. 22, 293, art. 106. Also see bibliography to the article on James I.

(P. C. Y.)

ANNE OF FRANCE (1460-1522), dame de Beaujeu, was the eldest daughter of Louis XI. and Charlotte of Savoy. Louis XL betrothed her at first to Nicholas of Anjou, and afterwards offered her hand successively to Charles the Bold, to the duke of Brittany, and even to his own brother, Charles of France. Finally she married Pierre de Beaujeu, a younger brother of the duke of Bourbon. Before his death Louis XI. entrusted to Pierre de Beaujeu and Anne the entire charge of his son, Charles VIII., a lad of thirteen; and from 1483 to 1492 the Beaujeus exercised a virtual regency. Anne was a true daughter of Louis XL Energetic, obstinate, cunning and unscrupulous, she inherited, too, her father's avarice and rapacity. Although they made some concessions, the Beaujeus succeeded in main- taining the results of the previous reign, and in triumphing over the feudal intrigues and coalitions, as was seen from the meeting of the estates general in 1484, and the results # of the " Mad War " (1485) and the war with Brittany (1488)*; and in spite of the efforts of Maximilian of Austria they concluded the marriage of Charles VIII. and Anne, duchess of Brittany (1491). But a short time afterwards the king disengaged himself completely from their tutelage, to the great detriment of the kingdom. In 1488 Pierre de Beaujeu had succeeded to the Bourbonnais, the last great fief of France. He died in 1503, but Anne survived him twenty years. From her establishments at Moulins and Chan telle in the Bourbonnais she continued henceforth vigorously to defend the Bourbon cause against the royal family. Anne's only daughter, Suzanne, had married in 1505 her cousin, Charles of Bourbon, count of Montpensier, the future constable; and the question of the succession of Suzanne, who died in 1521, was the determining factor of the treason of the constable de Bourbon (1523). Anne had died some months before, on the 14th of November 1522.

See P. Pelicier, Essai sur le gouvernement de la Dame de Beaujeu (Chartres, 1882). (J. I.)

ANNEALING, HARDENING AND TEMPERING. Annealing

(from the prefix an, and the old English aelan, to burn or bake;

the meaning has probably also been modified from the French

nieler, to enamel black on gold or silver, from the med. Lat.

nigellare, to make black; cf. niello) is a process of treating a

metal or alloy by heat with the object of imparting to it a certain

condition of ductility, extensibility, or a certain grade of softness

or hardness, with all that is involved in and follows from those

ANNEALING

Conditions. The effect may be mechanical only, or a chemical change may take place also. Sometimes the causes are obvious, in other cases they are more or less obscure. But of the actual facts, and the immense importance of this operation as well as of the related ones of tempering and hardening in shop processes, there is no question.

When the treatment is of a mechanical character only, there can be no reasonable doubt that the common belief is correct, namely, that the metallic crystals or fibres undergo a molecular rearrangement of some kind. When it is of a chemical character, the process is one of cementation, due to the occlusion of gases in the molecules of the metals.

Numerous examples of annealing due to molecular rearrange- ment might be selected from the extensive range of workshop operations. The following are a few only: — when a boiler- maker bends the edges of a plate of steel or iron by hammer blows (flanging), he does so in successive stages (heats), at each of which the plate has to be reheated, with inevitable cooling down during the time work is being done upon it. The result is that the plate becomes brittle over the parts which have been subjected to this treatment; and this brittleness is not uniformly distributed, but is localized, and is a source of weakness, inducing a liability to crack. If, however, the plate when finished is raised to a full red heat, and allowed to cool down away from access of cool air, as in a furnace, or underneath wood ashes, it resumes its old ductility. The plate has been annealed, and is as safe as it was before it was flanged. Again, when a sheet of thin metal is forced to assume a shape very widely different from its original plane aspect, as by hammering, or by drawing out in a press — a cartridge case being a familiar ex- ample — it is necessary to anneal it several times during the progress of the operation. Without such annealing it would never arrive at the final stage desired, but would become torn asunder by the extension of its metallic fibres. Cutting tools are made of steel having sufficient carbon to afford capacity for hardening. Before the

process is performed, the condition in which the carbon is present renders the steel so hard and tough as to render the preliminary turning or shaping necessary in many cases (e.g. in milling cutters) a tedious operation. To lessen this labour, the steel is first annealed. In this case it is brought to a low red heat, and allowed to cool away from the air. It can then be machined with comparative ease and be subsequently hardened or tempered. When a metallic structure has endured long service a state of fatigue results. Annealing is, where practicable, resorted to in order to restore the original strength. A familiar illustration is that of chains which are specially liable to succumb to constant overstrain if continued for only a year or two. This is so well known that the practice is regularly adopted of annealing the chains at regular intervals.' They are put into a clear hot furnace and raised to a low red heat, continued for a few hours, and then allowed to cool down in the furnace after the withdrawal of the source of heat. Before the annealing the fracture of a link would be more crystalline than afterwards.

In these examples, and others of which these are typical, two conditions are essential, one being the grade of temperature, the other the cooling. The temperature must never be so high as to cause the metal to become overheated, with risk of burning, nor so low as to prevent the penetration of the substance with a good volume of heat. It must also be continued for sufficient time. More than this cannot be said. Each particular piece of work requires its own treatment and period, and nothing but experience of similar work will help the craftsman. The cooling must always be gradual, such as that which results from removing the source of heat, as by drawing a furnace fire, or covering with non-conducting substances.

The chemical kind of annealing is specifically that employed in the manufacture of malleable cast iron. In this process, castings are made of white iron, — a brittle quality which has its carbon wholly in the combined state. These castings, when subjected to heat for a period of ten days or a fortnight, in closed boxes, in the presence of substances containing oxygen, become

highly ductile. This change is due to the absorption of the carbon by the oxygen in the cementing material, a comparatively pure soft iron being left behind. The result is that the originally hard, brittle castings after this treatment may be cut with a knife, and be bent double and twisted into spirals without fracturing.

The distinction between hardening and tempering is one of degree only, and both are of an opposite character to annealing. Hardening,

in the shop sense, signifies the making of a piece of steel about as hard as it can be made — ” glass hard ” — while tempering indicates some stage in an infinite range between thi fully hardened and the annealed or softened condition. As a matter of convenience only, hardening is usually a stage in the work of tempering. It is easier to harden first, and ” let down ” to the temper required, than to secure the exact heat for tempering by raising the material to it. This is partly due to the long established practice of estimating temperature by colour tints; but this is being rapidly invaded by new methods in which the temper heat is obtained in furnaces provided with pyrometers, by means of which exact heat regulation is readily secured, and in which the heating up is done gradually. Such furnaces are used for hardening balls for bearings, cams, small toothed wheels and similar work, as well as for tempering springs, milling cutters and other- kinds of cutting tools. But fOr the cutting tools having single edges, as used in engineers’ shops, the colour test is still generally retained.

In the practice of hardening and tempering tools by colour, experience is the only safe guide. Colour tints vary with degrees of light; steels of different brands require different treatment in regard to temperature and quenching; and steels even of identical chemical composition do not always behave alike when tempered. Every fresh brand of steel has, therefore, to be treated at first in a tentative and experimental fashion in order to secure the best possible results. The larger the masses of steel, and the greater the disparity in dimensions of adjacent parts, the greater is the risk of cracking and distortion. Ex cessive length and the presence of keen angles increase the difficulties of hardening. The following points have to be observed in the work of hardening and tempering.

A grade of steel must be selected of suitable quality for the purpose for which it has to be used. There are a number of such grades, ranging from about if to J % content of carbon, and each having its special utility: Overheating must be avoided, as that burns the steel and injures or ruins it. A safe rule is never to heat any grade of steel to a temperature higher than that at which experience proves it will take the temper required. Heat- ing must be regular and thorough throughout, and must therefor^ be slowly done when dealing with thick masses. Contact with sulphurous fuel must be avoided. Baths of molten alloys of lead and tin are used when very exact temperatures are required, and when articles have thick and thin parts adjacent. But the gas furnaces have the same advantages in a more handy form. Quenching is done in water, oil, or in various hardening mixtures, and sometimes in solids. Rain water is the principal hardening agent, but various saline compounds are often added to intensify its action.

Water that has been long in use is preferred to fresh. Water is generally used cold, but in many cases it is warmed to about 80° F., as for milling cutters and taps, warmed water being less liable to crack the cutters than cold. Oil is preferred to water for small springs, for guns and for many cutters. Mer- cury hardens most intensely, because it does not evaporate, and so does lead or wax for the same reason; water evaporates, and in the spheroidal state, as steam, leaves contact with the steel. This is the reason why long and large objects are moved vertically about in the water during quenching, to bring them into contact with fresh cold water.

There is a good deal of mystery affected by many of the hardeners, who are very particular about the composition of their baths, various oils and salts being used in an infinity of combinations. Many of these are the result of long and successful experience, some are of the nature of ” fads.” A change of bath may involve injury to the steel. The most difficult articles to

harden are springs, milling cutters, taps, reamers. It would be easy to give scores of hardening compositions.

Hardening is performed the more efficiently the more rapidly the quenching is done. In the case of thick objects, however, especially milling cutters, there is risk of cracking, due to the difference of temperature on the outside and in the central body of metal. Rapid hardening is impracticable in such objects. This is the cause of the distortion of long taps and reamers, and of their cracking, and explains why their teeth are often protected with soft soap and other substances.

The presence of the body of heat in a tool is taken advantage of in the work of tempering. The tool, say a chisel, is dipped, a length of 2 in. or more being thus hardened and blackened. It is then removed, and a small area rubbed rapidly with a bit of grindstone, observations being made of the changing tints which gradually appear as the heat is communicated from the hot shank to the cooled end. The heat becomes equalized, and at the same time the approximate temperature for quenching for temper is estimated by the appearance of a certain tint; at that instant the article is plunged and allowed to remain until quite cold. For every different class of tool a different tint is required.

” Blazing off ” is a particular method of hardening applied to small springs. The springs are heated and plunged in oils, fats, or tallow, which is burned off previous to cooling in air, or in the ashes of the forge, or in oil, or water usually. They are hardened, reheated and tempered, and the tempering by blazing off is repeated for heavy springs. The practice varies almost infinitely with dimensions, quality of steel, and purpose to which the springs have to be applied.

The range of temper for most cutting tools lies between a pale straw or yellow, and a light purple or plum colour. The corres- ponding range of temperatures is about 430 F. to 530° F., respectively. ” Spring temper ” is higher, from dark purple to blue, or 550° F. to 630 F. In many fine tools the range of temperature possible between good and poor results lies within from 5 to 10° F.

There is another kind of hardening which is of a superficial character only — ” case hardening.” It is employed in cases where toughness has to be combined with durability of surface. It is a cementation process, practised on wrought iron and mild steel, and applied to the link motions of engines, to many pins and studs, eyes of levers, &c. The articles are hermetically luted in an iron box, packed with nitrogenous and saline substances such as potash, bone dust, leather cuttings, and salt. The box is placed in a furnace, and allowed to remain for periods of from twelve to thirty-six hours, during which period the surface of the metal, to a depth of ˆj to ˆ in., is penetrated by the cement- ing materials, and converted into steel. The work is then thrown into water and quenched.

A muffle furnace, employed for annealing, hardening and tempering is shown in fig. 1 ; the heat being obtained by means

Fig. 1. — Automatic Oil Muffle Furnace.

of petroleum, which is contained in the tank A, and is kept under pressure by pumping at intervals with the wooden handle, so that when the valve B is opened the oil is vaporized by passing through a heating coil at the furnace entrance, and when ignited burns fiercely as a gas flame. This passes into the furnace through the two holes, C, C, and plays under and up around the

muffle D, standing on a fireclay slab. The doorway is closed by two fireclay blocks at E. A temperature of over 2000 F. can be obtained in furnaces of this class, and the heat is of course under perfect control.

A reverberatory type of gas furnace, shown in fig. 2, differs from the

oil furnace in having the flames brought down through the roof, by pipes A,A,A, playing on work laid on the fireclay slab B, thence passing under this and out through the elbow-

Fig. 2. — Reverberatory Furnace,

pipe C. The hinged doors, D, give a full opening to the interior of the furnace. It will be noticed in both these furnaces (by Messrs Fletcher, Russell & Co., Ltd.) that the iron casing is a mere shell, enclosing very thick firebrick linings, to retain the heat effectively. (J. G. H.)

ANNECY, the chief town of the department of Haute Savoie in France. Pop. (1906) 10,763. It is situated at a height of 1470 ft., at the northern end of the lake of Annecy, and is 25 m. by rail N.E. of Aix les Bains. The surrounding country presents many scenes of beauty. The town itself is a pleasant residence, and contains a 16th century cathedral church, an 18th century bishop's palace, a 14th-! 6th century castle (formerly the resi- dence of the counts of the Genevois), and the reconstructed convent of the Visitation, wherein now reposes the body of St Francois de Sales (born at the castle of Sales, close by, in 1 567 ; died at Lyons in 1622), who held the see from 1602 to 1622. There is also a public library, with 20,000 volumes, and various scientific collections, and a public garden, with a statue of the chemist Berthollet (1748-1822), who was born not far off. The bishop's see of Geneva was transferred hither in 1535, after the Reformation, but suppressed in 1801, though revived in 1822. There are factories of linen and cotton goods, and of felt hats, paper mills, and a celebrated bell foundry at Annecy le Vieux. This last-named place existed in Roman times. Annecy itself was in the 10th century the capital of the counts of the Genevois, from whom it passed in 1401 to the counts of Savoy, and became French in i860 on the annexation of Savoy.

The Lake of Annecy is about 9 m. in length by a m. in breadth, its surface being 1465 ft. above the level of the sea. It discharges its waters, by means of the Thioux canal, into the Fier, a tributary of the Rhone. (W. A. B. C.)

ANNELIDA, a name derived from J. B. P. Lamarck's term AnnMides, now used to denote a major phylum or division of coelomate invertebrate animals. Annelids are segmented worms, and differ from the Arthropoda (q.v.), which they closely resemble in many respects, by the possession of a portion of the coelom traversed by the alimentary canal. In the latter respect, and ir* the fact that they frequently develop by a metamorphosis, they approach the Mollusca (q.v.), but they differ from that group notably in the occurrence of

metameric segmentation affecting many of the systems of organs. The body- wall is highly muscular and, except in a few probably specialized cases, possesses chitinous spines, the setae, which are secreted by the ectoderm and are embedded in pits of the skin. They possess a modi- fied anterior end, frequently with special sense organs, forming a head, a segmented nervous system, consisting of a pair of anterior, dorsally-placed ganglia, a ring surrounding the

alimentary canal, and a double ventral ganglionated chain, a definite vascular system, an excretory system consisting of nephridia, and paired generative organs formed from the coelomic epithelium. They are divided as follows: (i) Haplodrili (q.v.) or Archiannelida; (2) Chaetopoda (q.v.); (3) Myzostomida (q.v.), probably degenerate Polychaeta; (4) Hirudinea (see Chaetopoda and Leech); (5) Echiuroidea (q.v.). (P. CM.)

ANNET, PETER (1693-1769), English deist,issaid to have been born at Liverpool. A schoolmaster by profession, he became prominent owing to his attacks on orthodox theologians, and his membership of a semi-theologkal debating society, the Robin Hood Society, which met at the ” Robin Hood and Little John ” in Butcher Row. To him has been attributed a work called A History of theManafterGod’sownHeart (1 761), intended to show that George II. was insulted by a current comparison with David. The book is said to have inspired Voltaire’s Saul. It is also attributed to one John Noorthouck (Noorthook) . In 1 763 he was condemned for blasphemous libel in his paper called the Free Enquirer (nine numbers only). After his release he kept a small school in Lambeth, one of his pupils being James Stephen (1758-1832), who became master in Chancery. Annet died on the 18th of January 1769. He stands between the earlier philosophic deists and the later propagandists of Paine’s school, and ” seems to have been the first freethought lecturer ” (J. M. Robertson) ; his essays (A Collection of the Tracts of a certain Free Enquirer, 1 739-1 745) are forcible but lack refinement. He invented a system of shorthand (2nd ed., with a copy of verses by Joseph Priestley).

ANNEXATION (Lat. ad, to, and nexus, joining), in interna- tional law, the act by which a state adds territory to its dominions ; the term is also used generally as a synonym for acquisition. The assumption of a protectorate over another state, or of a sphere of influence, is not strictly annexation, the latter implying the complete displacement in

the annexed territory of the government or state by which it was previously ruled. Annexation, may be the consequence of a voluntary cession from one state to another, or of conversion from a protectorate or sphere of influence, or of mere occupation in uncivilized regions, or of conquest. The cession of Alsace-Lorraine to Germany by France, although brought about by the war of 1870, was for the purposes of interna- tional law a voluntary cession. Under the treaty of the 17th of December 1885, between the French republic and the queen of Madagascar, a French protectorate was established over this island. In 1896 this protectorate was converted by France into an annexation, and Madagascar then became ” French territory.” The formal annexation of Bosnia-Herzegovina by Austria (Oct. 5, 1908) was an unauthorized conversion of an ” occupation ” authorized by the Treaty of Berlin (1878), which had, however, for years operated as a de facto annexation. A recent case of conquest was that effected by the South African War of 1899- 1902, in which the Transvaal republic and the Orange Free State were extinguished, first de facto by occupation of the whole of their territory, and then dejure by terms of surrender entered into by the Boer generals acting as a government.

By annexation, as between civilized peoples, the annexing state takes over the whole succession with the rights and obligations attaching to the ceded territory, subject only to any modifying conditions contained in the treaty of cession. These, however, are binding only as between the parties to them. In the case of the annexation of the territories of the Transvaal republic and Orange Free State, a rather complicated situation arose out of the facts, on the one hand, that the ceding states closed their own existence and left no recourse to third parties against the previous ruling authority, and, on the other, that, having no means owing to the de facto British occupation, of raising money by taxation, the dispossessed governments raised money by selling certain securities, more especially a large holding of shares in the South African Railway Company, to neutral purchasers. The British government repudiated these sales as having been made by a government which the British government had already displaced. The question of at what point, in a war of conquest, the state succession becomes operative is one of great delicacy. As early

as the 6th of January 1900, the high commissioner at Cape Town issued a proclamation giving notice that H. M. government would ” not recognize as valid or effectual ” any conveyance, transfer or transmission of any property made by the government of the Transvaal republic or Orange Free State subsequently to the 10th of October 1899, the date of the commencement of the war. A proclamation forbidding transactions with a state which might still be

capable of maintaining its independence could obviously bind only those subject to the authority of the state issuing it. Like paper blockades (see Blockade) and fictitious occupations of territory, such premature proclamations are viewed by interna- tional jurists as not being jure gentium. The proclamation was succeeded, on the 9th of March 1900, by another of the high commissioner at Cape Town, reiterating the notice, but confining it to ” lands, railways, mines or mining rights.” And on the 1st of September 1900 Lord Roberts proclaimed at Pretoria the annexation of the territories of the Transvaal republic to the British dominions. That the war continued for nearly two years after this proclamation shows how fictitious the claim of annexa- tion was. The difficulty which arose out of the transfer of the South African Railway shares held by the Transvaal government was satisfactorily terminated by the purchase by the British government of the total capital of the company from the different groups of shareholders (see on this case, Sir Thomas Barclay, Law Quarterly Review, July 1905; and Professor Westlake, in the same Review, October 1905).

In a judgment of the judicial committee of the privy council in 1899 (Coote v. Sprigg, A.C. 572), Lord Chancellor Halsbury made an important distinction as regards the obligations of state succession. The case in question was a claim of title against the crown, represented by the government of Cape Colony. It was made by persons holding a concession of certain rights in eastern Pondoland from a native chief. Before the grantees had taken up their grant by acts of possession, Pondoland was annexed to Cape Colony. The colonial government refused to recognize the grant on different grounds, the chief of them being that the concession conferred no legal rights before the annexation and therefore could confer none afterwards, a sufficiently good ground in itself. The judicial committee, however, rested its decision chiefly on the allegation that the acquisition of the territory was an act of state and that ” no municipal court had authority to enforce such an obligation ” as the duty of the new government to respect existing titles. ” It is no answer,” said Lord Halsbury, ” to say that by the ordinary principles of international law private property is respected by the sovereign which accepts the cession and assumes the duties and legal obligations of the former sovereign with respect to such private property within the ceded territory. All that can be meant by such a proposition is that according to the well-understood rules of international law a change of sovereignty by cession ought not to affect private property, but no municipal tribunal has authority to enforce such an obligation. And if there is either an express or a well-understood bargain between the

ceding potentate and the government to which the cession is made that private property shall be respected, that is only a bargain which can be enforced by sovereign against sovereign in the ordinary course of diplomatic pressure." In an editorial note on this case the Law Quarterly Review of Jan. 1900 (p. 1), dissenting from the view of the judicial committee that "no municipal tribunal has authority to enforce such an obligation," the writer observes that "we can read this only as meant to lay down that, on the annexation of territory even by peaceable cession, there is a total abeyance of justice until the will of the annexing power is expressly made known; and that, although the will of that power is commonly to respect existing private rights, there is no rule or presumption to that effect of which any court must or indeed can take notice." So construed the doctrine is not only contrary to international law, but according to so authoritative an exponent of the common law as Sir F. Pollock, there is no warrant for it in English common law.

An interesting point of American constitutional law has arisen out of the cession of the Philippines to the United States, through the fact that the federal constitution does not lend itself to the

exercise by the federal congress of unlimited powers, such as are vested in the British parliament. The sole authority for the powers of the federal congress is a written constitution with defined 'powers. Anything done in excess of those powers is null and void. The Supreme Court of the United States, on the other hand, has declared that, by the constitution, a government is ordained and established " for the United States of America " and not for countries Outside their limits (Ross's Case, 140 U.S. 453, 464), and that no such power to legislate for annexed territories as that vested in the British crown in council is enjoyed by the president of the United States (Field v. Clark, 143 U.S. 640, 692). Every detail connected with the administration of the territories acquired from Spain Under the treaty of Paris (December 10, 1898) has given rise to minute discussion.

See Carman F. Randolph, Law and Policy of Annexation (New York and London, 1901); Charles Henry Butler, Treaty-making Power of the United States (New York, 1902), voL.i. p. 79 et seq. (T. Ba.)

> ANNICERIS, a Greek philosopher of the Cyrenaic school. There is no certain information as to his date, but from the statement that he

was a disciple of Paraebates it seems likely that he was a contemporary of Alexander the Great. A follower of Aristippus, he denied that pleasure is the general end of human life. To each separate action there is a particular end, namely the pleasure which actually results from it Secondly, pleasure is not merely the negation of pain, inasmuch as death ends all pain and yet cannot be regarded as pleasure. There is, however, an absolute pleasure in certain virtues such as belong to the love of country, parents and friends. In these relations a man will have pleasure, even though it may result in painful and even fatal consequences. Friendship is not merely for the satisfaction of our needs, but is in itself a source of pleasure. He maintains further, in opposition to most of the Cyrenaic school, that wisdom or prudence alone is an insufficient guarantee against error. The wise man is he who has acquired a habit of wise action; human wisdom is liable to lapses at any moment. Diogenes Laertius says that Anniceris ransomed Plato from Dionysius, tyrant of Syracuse, for twenty minas. If we are right in placing Anniceris in the latter half of the 4th century, it is clear that the reference here is to an earlier Anniceris, who, according to Aelian, was a celebrated charioteer.

ANNING, MARY (1 799-1847), English fossil-collector, the daughter of Richard Anning, a cabinet-maker, was born at Lyme Regis in May 1 799. Her father was one of the earliest collectors and dealers in fossils, obtained chiefly from the Lower Lias in that famous locality. When but a child in 181 1 she discovered the first specimen of Ichthyosaurus which was brought into scientific notice; in 1821 she found remains of a new saurian, the Plesiosaurus, and in 1828 she procured, for the first time in England, remains of a pterodactyl (Dimorphodon) . She died on the 9th of March 1S47.

ANNISTON, a city and the county seat of Calhoun county, Alabama, U.S.A., in the north-eastern part of the state, about 63 m. E. by N. of Birmingham. Pop. (1890) 9998; (1900), 9695, of whom 3669 were of negro descent: dcjio census) 12,794. Anniston is served by the Southern, the Seaboard Air Line, and the Louisville & Nashville railways. The city is situated on the slope of Blue Mountain, a chain of the Blue Ridge, and is a health resort. It is the seat of the Noble Institute (for girls), established in 1886 by Samuel Noble (1834-1888), a wealthy iron-founder, and of the Alabama Presbyterian College for Men (1905). There are vast quantities of iron ore in the vicinity of the city, the Coosa coal-fields being only 25 m. distant. Anniston is an important manufacturing city, the principal industries being the manufacture of iron, steei and cotton. In 1905 the city's factory products were valued at $2,525,455. An iron furnace was established on the site of Anniston during the Civil War, but it was destroyed by

the federal troops in 1865; and in 1872 it was rebuilt on a much larger scale. The city was founded in 1 8 7 2 as a private enterprise, by the Woodstock Iron Company, organized by Samuel Noble and Gen. Daniel Tyler (1799-1882); but it was not opened for general settlement until twelve years later. It was chartered as a city in 1879.

ANNO, or HannO, SAINT (e. 1010-1075), archbishop of Cologne, belonged to a Swabian family, and was educated at Bamberg. He became confessor to the emperor Henry III., who appointed him archbishop of Cologne in 1056. He took a prominent part in thegovernmentof Germany during the minority of King Henry IV., and was the leader of the party which in 1062 seized the person of Henry, and deprived his mother, the empress Agnes, of power. For a short time Anno exercised the chief authority in the kingdom, but he was soon obliged to share this with Adalbert, archbishop of Bremen, retaining for himself the supervision of Henry's education and the title of magister. The office of chancellor of the kingdom of Italy was at this period regarded as an appanage of the archbishopric of CoIogne,and this was probably the reason why Anno had a considerable share in settling the papal dispute in 1064. He declared Alexander II. to be the rightful pope at a synod held at Mantua in May 1064, and took other steps to secure his recognition. Returning to Germany, he found the chief power in the hands of Adalbert, and as he was disliked by the young king, he left the court but returned and regained some of his former influence when Adalbert fell from power in 1066. He succeeded in putting down a rising against his authority in Cologne in 1074, and it was reported he had allied himself with William the Conqueror, king of England, against the emperor. Having cleared himself of this charge, Anno took no further part in public business, and died at Cologne on the 4th of December 1075. He was buried in the monastery of Siegburg and was canonized in n 83 by Pope Lucius III. He was a founder of monasteries and a builder of churches, advocated clerical celibacy and was a strict disciplinarian. He was a man of great energy and ability, whose action in recognizing Alexander II. was of the utmost consequence for Henry IV. and for Germany.

There is a Vita Annonis, written about 1100, by a monk of Sieg- burg, but this is of slight value, it appears in the Monumenta Germaniae historica: Scriptores, Bd. xi. (Hanover and Berlin, 1 826-1892). There is an "Epistola ad monachos Malmundarienses" by Anno in the Neues Archiv der Gesellschaft fur alter e deutsche Geschichtskunde, Bd. xiv. (Hanover, 1876 seq.). See also the Annolied, or Incerti poetae Teutonics rhythmus de S. Anndne, written about 1 180, and edited by J. Kehrein (Frankfort, 1865); Th. Lindner, Anno II. der Heilige,

Erzbischof von Koln (Leipzig, 1869).

ANNOBON, or Anno Bom, an island in the Gulf of Guinea, in 1° 24′ S. and 5 35′ E., belonging to Spain. It is no m. S.W. of St Thomas. Its length is about 4 m., its breadth 2, and its area 6f sq. m. Rising in some parts nearly 3000 ft. above the sea, it presents a succession of beautiful valleys and steep mountains, covered with rich woods and luxuriant vegetation. The inhabitants, some 3000 in number, are negroes and profess belief in the Roman Catholic faith. The chief town and residence of the governor is called St Antony (San Antonio de Praia). The roadstead is tolerably safe, and passing vessels take advantage of it in order to obtain water and fresh provisions, of which Annobon contains an abundant supply. The island was discovered by the Portuguese on the 1st of January 1473, from which circumstance it received its name (= New Year). Annobon, together with Fernando Po, was ceded to Spain by the Portuguese in 1 7 78. The islanders revolted against their new masters and a state of anarchy ensued, leading, it is averred, to an arrangement by which the island was adminis- tered by a body of five natives, each of whom held the office of governor during the period that elapsed till ten ships touched at the island. In the latter part of the 19th century the authority of Spain was re-established.

ANNONA (from Lat. annus, year), in Roman mythology, the personification of the produce of the year. She is represented in works of art, often together with Ceres, with a cornucopia (horn of plenty) in her arm, and a ship's prow in the back- ground, indicating the transport of grain over the sea. She frequently occurs on coins of the empire, standing between a modius (corn-measure) and the prow of a galley, with ears of corn in one liand and a cornucopia in the other; sometimes she holds a rudder or an anchor. The Latin word itself has various mean- ings: (1) the produce of the year's harvest; (2) all means of

subsistence, especially grain stored in the public granaries for provisioning the city; (3) the market-price of commodities, especially corn; (4) a direct tax in kind, levied in republican times in several provinces, chiefly employed in imperial times for distribution amongst officials and the support of the soldiery.

In order to ensure a supply of corn sufficient to enable it to be sold at

a very low price, it was procured in large quantities from Umbria, Etruria and Sicily. Almost down to the times of the empire, the care of the corn-supply formed part of the aedile's duties, although in 440 B.C. (if the statement in Livy iv. 12, 13 is correct, which is doubtful) the senate appointed a special officer, called praefectus annonae, with greatly extended powers. As a consequence of the second Punic War, Roman agriculture was at a standstill; accordingly, recourse was had to Sicily and Sardinia (the first two Roman provinces) in order to keep up the supply of corn; a tax of one- tenth was imposed on it, and its export to any country except Italy forbidden. The price at which the corn was sold was always moderate; the corn law of Gracchus (123 B.C.) made it absurdly low, and Clodius (58 B.C.) bestowed it gratuitously. The number of the recipients of this free gift grew so enormously, that both Caesar and Augustus were obliged to reduce it. From the time of Augustus to the end of the empire the number of those who were entitled to receive a monthly allowance of corn on presenting a ticket was 200,000. In the 3rd century, bread formed the dole. A praefectus annonae was appointed by Augustus to superintend the corn-supply; he was assisted by a large staff in Rome and the provinces, and had jurisdiction in all matters connected with the corn-market. The office lasted till the latest times of the empire.

ANNONAY, a town of south-eastern France, in the north of the department of Ardeche, 50 m. S. of Lyons by the Paris-Lyons railway. Pop. (1006) 15,403. Annonay is built on the hill overlooking the meeting of the deep gorges of the Deome and the Cance, the waters of which supply power to the factories of the town. By means of a dam across the Ternay, an affluent of the Deome, to the north-west of the town, a reservoir is provided, in which an additional supply of water, for both industrial and domestic purposes, is stored. At Annonay there is an obelisk in honour of the brothers Montgolfier, inventors of the balloon, who were natives of the place. A tribunal of commerce, a board of trade-arbitrators, a branch of the Bank of France, and chambers of commerce and of arts and manufactures are among the public institutions. Annonay is the principal industrial centre of its department, the chief manufactures being those of leather, especially for gloves, paper, silk and silk goods, and flour. Chemical manures, glue, gelatine, brushes, chocolate and candles are also produced.

ANNOY (like the French ennui, a word traced by etymologists to a Lat. phrase, in odio esse, to be " in hatred " or hateful of someone), to vex or affect with irritation. In the sense of " nuisance," the noun " annoyance," apart from its obvious meaning, is found in the English " Jury of Annoyance " appointed by an act of 17 54 to report upon obstructions in the highways.

ANNUITY (from Lat. annus, a year), a periodical payment, made annually, or at more frequent intervals, either for a fixed term of years, or during the continuance of a given life, or a com- bination of lives. In technical language an annuity is said to be payable for an assigned status, this being a general word chosen in preference to such words as ” time,” ” term ” or ” period,” because it may include more readily either a term of years certain, or a life or combination of lives. The magnitude of the annuity is the sum to be paid (and received) in the course of each year. Thus, if £100 is to be received each year by a person, he is said to have ” an annuity of £100.” If the payments are made half-yearly, it is sometimes said that he has ” a half-yearly annuity of £100 “; but to avoid ambiguity, it is more commonly said he has an annuity of £100, payable by half-yearly instal- ments. The former expression, if clearly understood, is prefer- able on account of its brevity. So we may have quarterly, monthly, weekly, daily annuities, when the annuity is payable by quarterly, monthly, weekly or daily instalments. An annuity-

is considered as accruing during each instant of the status for which it is enjoyed, although it is only payable at fixed intervals. If the enjoyment of an annuity is postponed until after the lapse of a certain number of years, the annuity is said to be deferred. If an annuity, instead of being payable at the end of each year, half-year, &c, is payable in advance, it is called an annuity-due.

If an annuity is payable for a term of years independent of any contingency, it is called an annuity certain; if it is to con- tinue for ever, it is called a perpetuity; and if in. the latter case it is not to commence until after a term of years, it is called a deferred perpetuity. An annuity depending on the continuance of an assigned life or lives, is sometimes called a life annuity; but more commonly the simple term ” annuity ” is understood to mean a life annuity, unless the . contrary is stated. A life annuity, to cease in any event after a certain term of years, is called a temporary annuity. The holder of an annuity is called an annuitant, and the person on whose life the annuity depends is called the nominee.

If not otherwise stated, it is always understood that an annuity is payable yearly, and that the annual payment (or rent, as it is sometimes called) is £1. It is, however, customary to consider the annual payment to be, not £1, but simply 1, the reader supplying whatever monetary unit he pleases, whether pound, dollar, franc, Thaler, &c.

The annuity is the totality of the payments to be made (and received),

and is so understood by all writers on the subject; but some have also used the word to denote an individual payment (or rent), speaking, for instance, of the first or second year's annuity, — a practice which is calculated to introduce confusion and should therefore be carefully avoided.

Instances of perpetuities are the dividends upon the public stocks in England, France and some other countries. Thus, although it is usual to speak of £100 consols, the reality is the yearly dividend which the government pays by quarterly instal- ments. The practice of the French in this, as in many other matters, is more logical. In speaking of their public funds {rentes) they do not mention the ideal capital sum, but speak of the annuity or annual payment that is received by the public creditor. Other instances of perpetuities are the incomes derived from the debenture stocks of railway companies, also the feu-duties commonly payable on house property in Scotland. The number of years' purchase which the perpetual annuities granted by a government or a railway company realize in the open market, forms a very simple test of the credit of the various governments or railways.

Terminable Annuities are employed in the system of British public finance as a means of reducing the National Debt (q.v.). This result is attained by substituting for a perpetual annual charge (or one lasting until the capital which it represents can be paid off en bloc), an annual charge of a larger amount, but lasting for a short term. The latter is so calculated as to pay off, during its existence, the capital which it replaces, with interest at an assumed or agreed rate, and under specified conditions. The practical effect of the substitution of a terminable annuity for an obligation of longer currency is to bind the present genera- tion of citizens to increase its own obligations in the present and near future in order to diminish those of its successors. This end might be attained in other ways; for instance,, by setting aside out of revenue a fixed annual sum for the purchase and cancellation of debt (Pitt's method, in intention), or by fixing the annual debt charge at a figure sufficient to provide a margin for reduction of the principal of the debt beyond the amount required for interest (Sir Stafford Northcote's method), or by providing an annual surplus of revenue over expenditure (the " Old Sinking Fund "), available for the same purpose. All these methods have been tried in the course of British financial history, and the second and third of them are still employed; but on the whole the method of terminable annuities has been the one preferred by chancellors of the exchequer and by parlia- ment.

Terminable annuities, as employed by the British government, fall

under two heads: — (a) Those issued to, or held by private

persons; (6) those held by government departments or by funds under government control. The important difference between these two classes is that an annuity under (a), once created, cannot be modified except with the holder's consent, i.e. is practically unalterable without a breach of public faith; whereas an annuity under (b) can, if necessary, be altered by inter- departmental arrangement under the authority of parliament. Thus annuities of class (a) fulfil most perfectly the object of the system as explained above; while those of class (b) have the advantage that in times of emergency their operation can be suspended without any inconvenience or breach of faith, with the result that the resources of government can on such occasions be materially increased, apart from any additional taxation. For this purpose it is only necessary to retain as a charge on the income of the year a sum equal to the (smaller) perpetual charge which was originally replaced by the (larger) terminable charge, whereupon the difference between the two amounts is temporarily released, while ultimately the increased charge is extended for a period equal to that for which it is suspended. Annuities of class (a) were first instituted in 1808, but are at present mainly regulated by an act of 1829. They may be granted either for a specified life, or two lives, or for an arbitrary term of years; and the consideration for them may take the form either of cash or of government stock, the latter being cancelled when the annuity is set up. Annuities (b) held by government departments date from 1863. They have been created in exchange for per- manent debt surrendered for cancellation, the principal opera- tions having been effected in 1863, 1867, 1870, 1874, 1883 and 1899. Annuities of this class do not affect the public at all, except of course in their effect on the market for government securities. They are merely financial operations between the government, in its capacity as the banker of savings banks and other funds, and itself, in the capacity of custodian of the national finances. Savings bank depositors are not concerned with the manner in which government invests their money, their rights being confined to the receipt of interest and the repayment of deposits upon specified conditions. The case is, however, different as regards forty millions of consols (included in the above figures), belonging to suitors in chancery, which were cancelled and replaced by a terminable annuity in 1883. As the liability to the suitors in that case was for a specified amount of stock, special arrangements were made to ensure the

ultimate replacement of the precise amount of stock cancelled.

Annuity Calculations— The mathematical theory of life annuities is based upon a knowledge of the rate of mortality among mankind in general, or among the particular class of persons on whose lives the annuities depend. It involves a mathematical treatment too complicated to be dealt with fully in this place, and in practice it has been reduced to the form of tables, which vary in different places, but which are easily accessible. The history of the subject may, however, be sketched. Abraham Demoivre, in his Annuities on Lives, propounded a very simple law of mortality which is to the effect that, out of 86 children born alive, 1 will die every year until the last dies between the ages of 85 and 86. This law agreed sufficiently well at the middle ages of life with the mortality deduced from the best observations of his time; but, as observations became more exact, the approximation was found to be not sufficiently close. This was particularly the case when it was desired to obtain the value of joint life, contingent or other complicated benefits. Therefore Demoivre's law is entirely devoid of practical utility. No simple formula has yet been discovered that will represent the rate of mortality with sufficient accuracy.

The rate of mortality at each age is, therefore, in practice usually determined by a series of figures deduced from observa- tion ; and the value of an annuity at any age is found from these numbers by means of a series of arithmetical calculations. The mortality table here given is an example of modern use.

The first writer who is known to have attempted to obtain, on correct mathematical principles, the value of a life annuity, was Jan De Witt, grand pensionary of Holland and West Friesland. Our knowledge of his writings on the subject is derived from two

papers contributed by Frederick Hendriks to the Assurance Magazine, vol. ii. p. 222, and vol. iii. p. 93. The former of these contains a translation of De Witt's report upon the value of life annuities, which was prepared in consequence of the resolution passed by the states-general, on the 25th of April 1671, to nego- tiate funds by life annuities, and which was distributed to the members on the 30th of July 1671. The latter contains the translation of a number of letters addressed by De Witt td Burgomaster Johan Hudde, bearing dates from September 1670 to October 167 1. The existence of De Witt's report was well known among his contemporaries, and Hendriks collected a number of extracts from various authors referring to it; but the

Table of Mortality— Hm, Healthy Lives — Male.

Number Living and Dying at each Age, out of 10,000 entering at Age 10.

Age.

Living.

Dying.

Age.

Living.

Dying.

10

1 0,000

79

54

6791

129

11

9,921

55

6662

153

12

9,921

40

56

6509

150

13

9,881

35

57

6359

152

14

9,846

40

58

6207

156

15

9,806

22

59

6051

153

16

9.7 8 4

60

5898

184

17

9.784

41

61

5714

186

18

9,743

59

62

5528

191

19

9,684

68

63

5337

200

20

9,616

56

64

5137

206

21

9,56o

67

65

4931

215

22

9,493

59

66

4716

220

23

9,434

73

67

4496

220

24

9,36i

64

68

4276

237

25

9,297

48

69

4039

246

26

9,249

64

70

3793

213

27

9,i85

60

71

358o

222

28

9,125

71

72

3358

268

29

9,o54

67

73

3090

243

3°

8,987

74-

74

2847

300

3 1

8,913

65

75

2547

241

3 2

8,848

74

76

2306

245

33

8,774

73

77

2061

224

34

8,701 .

76

78

1837

226

35

8,625

71

79

1611

219

36

8,554

75

80

1392

I96

37

8,479

81

81

1 196

191

38

8,398

87

82

1005

173

39

8,311

88

83

832

172

40

8,223

81

84

660

119

4 1

8,142

85,

85

54i

“7 ,

4 2

8,057

87

86

424

92

43

7,97°

84

87

332

72

44

7,886

93

88

260

74 ; ‘

45

7,793

97

89

186

36

46

7,696

96

.90

150

34

47

7,600

107

91

116

36

48

7,493

106

92

80

36

49

7,387

“3

93

44

29

50

7,274

120

94

15

51

7,154

124

95

15

5

52

7,030

120

96

10

10

53

6,910

119

report is not contained in any collection of his works extant, and had been entirely lost for 180 years, until Hendriks discovered it among the state archives of Holland in company with the letters to Hudde. It is a document of extreme interest, and (notwith- standing some inaccuracies in the reasoning) of very great merit, more especially considering that it was the very first document on the subject that was ever written.

It appears that it had long been the practice in Holland for life annuities to be granted to nominees of any age, in the con- stant proportion of double the rate of interest allowed on stock; that is to say, if the towns were borrowing money at 6 %, they would be willing to grant a life annuity at 12 %, and so on. De Witt states that " annuities have been sold, even in the present century, first at six years' purchase, then at seven and eight; and that the majority of all life annuities now current at the country's expense were obtained at nine years' purchase "; but that the price had been increased in the course of a few years from eleven years' purchase to twelve, and from twelve to

fourteen. He also states that the rate of interest had been successively reduced from 6| to 5 %, and then to 4 . The principal object of his report is to prove that, taking interest at 4, a life annuity was worth at least sixteen years' purchase; and, in fact, that an annuitant purchasing an annuity for the life of a young and healthy nominee at sixteen years' purchase, made an excellent bargain. It may be mentioned that he argues that it is more to the advantage, both of the country and of the private investor, that the public loans should be raised by way of grant of life annuities rather than perpetual annuities. It appears conclusively from De Witt's correspondence with

Hudde, that the rate of mortality assumed as the basis of his calculations was deduced from careful examination of the mortality that had actually prevailed among the nominees on whose lives annuities had been granted in former years. De Witt appears to have come to the conclusion that the probability of death is the same in any half-year from the age of 3 to 53 inclusive; that in the next ten years, from 53 to 63, the probability is greater in the ratio of 3 to 2; that in the next ten years, from 63 to 73, it is greater in the ratio of 2 to 1 ; and in the next seven years, from 73 to 80, it is greater in the ratio of 3 to 1 ; and he places the limit of human life at 80. If a mortality table of the usual form is deduced from these suppositions, out of 212 persons alive at the age of 3, 2 will die every year up to 53, 3 in each of the ten years from 53 to 63, 4 in each of the next ten years from 63 t0 73) an d 6 in each of the next seven years from 73 to 80, when all will be dead.

De Witt calculates the value of an annuity in the following way. Assume that annuities on 10,000 lives each ten years of age, which satisfy the Hm mortality table, have been purchased. Of these nominees 79 will die before attaining the age of n, and no annuity payment will be made in respect of them; none will die between the ages of n and 12, so that annuities will be paid for one year on 0921 lives; 40 attain the age of 12 and die before 13, so that two payments will be made with respect to these lives. Reasoning in this way we see that the annuities on 35 of the nominees will be payable for three years; on 40 for four years, and so on. Proceeding thus to the end of the table, 15 nominees attain the age of 95, 5 of whom die before the age of 96, so that 8s payments will be paid in respect of these 5 lives. Of the survivors all die before attaining the age of 97, so that the annuities on these lives will be payable for 86 years. Having previously calculated a table of the values of annuities certain for every number of years up to 86, the value of all the annuities on the 10,000 nominees will be found by taking 40 times the value of an annuity for 2 years, 35 times the value of an annuity for 3 years, and so on — the last term being the value of 10 annuities for 86 years — and adding them together; and the value of an annuity on one of the nominees will then be found by dividing by 10,000. Before leaving the subject of De Witt, we may mention that we find in the correspondence a distinct suggestion of the law of mortality that bears the name of Demoivre. In De Witt's letter, dated the 27th of October 1671 (Ass. Mag. vol. iii. p. 107), he speaks of a " provisional hypothesis " suggested by Hudde, that out of 80 young lives (who, from the context, may be taken as of the age 6) about 1 dies annually. In strictness, therefore, the law in question might be more correctly

termed Hudde's than Demoivre's.

De Witt's report being thus of the nature of an unpublished state paper, although it contributed to its author's reputation, did not contribute to advance the exact knowledge of the subject; and the author to whom the credit must be given of first showing how to calculate the value of an annuity on correct principles is Edmund Halley. He gave the first approximately correct mortality table (deduced from the records of the numbers of deaths and baptisms in the city of Breslau), and showed how it might be employed to calculate the value of an annuity on the life of a nominee of any age (see Phil. Trans. 1693; Ass. Mag. vol. xviii.).

Previously to Halley's time, and apparently for many years Subsequently, all dealings with life annuities were based upon

mere conjectural estimates. The earliest known reference to any estimate of the value of life annuities rose out of the require- ments of the Falcidian law, which (40 B.C.) was adopted in the Roman empire, and which declared that a testator should not give more than three-fourths of his property in legacies, so that at least one-fourth must go to his legal representatives. It is easy to see how it would occasionally become necessary, while this law was in force, to value life annuities charged upon a testator's estate. Aemilius Macer (a.d. 230) states that the method which had been in common use at that time was as follows: — From the earliest age until 30 take 30 years' purchase, and for each age after 30 deduct 1 year. It is obvious that no consideration of compound interest can have entered into this estimate; and it is easy to see that it is equivalent to assuming that all persons who attain the age of 30 will certainly live to the age of 60, and then certainly die. Compared with this esti- mate, that which was propounded by the praetorian prefect Ulpian was a great improvement. His table is as follows: —

Years'

Years'

Age.

Purchase.

Age.

Purchase.

Birth to 20 ,

30

45 to 46

14

20 „ 25

28

46 „ 47

13

25 – 30

25

47 ., 48 .

12

30 „ 35

22

48 „ 49

11

35 .. 40

20

49 – 50

10

40 „ 41

19

50 „ 55

9

41 .- 42

18

55 .. 6o

7

42 „ 43

17

60 and 1 upwards t

5

43 -. 44

16

44 .. 45

15

Here also we have no reason to suppose that the element of interest was taken into consideration; and the assumption, that between the ages of 40 and 50 each addition of a year to the nominee's age diminishes the value of the annuity by one year's purchase, is equivalent to assuming that there is no probability of the nominee dying between the ages of 40 and 50. Con- sidered, however, simply as a table of the average duration of life, the values are fairly accurate. At all events, no more correct estimate appears to have been arrived at until the close of the 17 th century.

The mathematics of annuities has been very fully treated in Demoivre's Treatise on Annuities (1725); Simpson's Doctrine of Annuities and Reversions (1742); P. Gray, Tables and Formulae; Baily's Doctrine of Life Annuities; there are also innumerable compilations of Valuation Tables and Interest Tables, by means of which the value of an annuity at any age and any rate of interest may be found. See also the article Interest, and especially that on Insurance.

Commutation tables, aptly so named in 1840 by Augustus De Morgan (see his paper " On the Calculation of Single Life Contingencies," Assurance Magazine, xii. 328), show the propor- tion in which a benefit due at one age ought to be changed, so as to retain the same

value and be due at another age. The earliest known specimen of a commutation table is contained in William Dale's Introduction to the Study of the Doctrine of Annuities, published in 1772. A full account of this work is given by F. Hendriks in the second number of the Assurance Magazine, pp. 15-17. William Morgan's Treatise on Assurances, 1779, also contains a commutation table. Morgan gives the table as furnishing a convenient means of checking the correctness of the values of annuities found by the ordinary process. It may be assumed that he was aware that the table might be used for the direct calculation of annuities; but he appears to have been ignorant of its other uses.

The first author who fully developed the powers of the table was John Nicholas Tetens, a native of Schleswig, who in 1785, while professor of philosophy and mathematics at Kiel, published in the German language an Introduction to the Calculation of Life Annuities and Assurances. This work appears to have been quite unknown in England until E. Hendriks gave, in the first number of the Assurance Magazine, pp. 1-20 (Sept. 1850), an account of it, with a translation of the passages describing the construction and use of the commutation table, and a sketch

of the author's life and writings, to which we refer the reader who desires fuller information. It may be mentioned here that Tetens also gave only a specimen table, apparently not imagining that persons using his work would find it extremely useful to have a series of commutation tables, calculated and printed ready for use.

The use of the commutation table was independently developed in England— apparently between the years 1788 and 181 1 — by George Barrett, of Petworth, Sussex, who was the son of a yeoman farmer, and was himself a village schoolmaster, and afterwards farm steward or bailiff. It has been usual to consider Barrett as the originator in England of the method of calculating the values of annuities by means of a commutation table, and this method is accordingly sometimes called Barrett's method. (It is also called the commutation method and the columnar method.) Barrett's method of calculating annuities was ex- plained by him to Francis Baily in the year 181 1, and was first made known to the wdrld in a paper written by the latter and read before the Royal Society in 181 2.

By what has been universally considered an unfortunate error of judgment, this paper was not recommended by the council of the Royal Society to be printed, but it was given by Baily as an appendix to the second issue (in 18 13) of his work on life annuities and assurances., Barrett had calculated exten- sive tables, and with Baily's aid attempted to get them published by subscription, but without success; and the only printed tables calculated according to his manner, besides the specimen tables given by Baily, are the tables contained hi Babbage's Comparative View of the various Institutions for the Assurance of Lives, 1826.

In the year 1825 Griffith Davies published his Tables of Life Contingencies , a work which contains, among others, two tables, which are confessedly derived from Baily's explanation of Barrett's tables.

Those who desire to pursue the subject further can refer to the appendix to Baily's Life Annuities and Assurances, De Morgan's paper " On the Calculation of Single Life Contingencies," Assurance Magazine, xii. 348-349; Gray's Tables and Formulae, chap, viii.; the preface to Davies's Treatise on Annuities; also' Hendriks's papers in the Assurance Magazine, No. 1, p. I, and No. 2, p. 12; and in particular De Morgan's " Account of a Correspondence between Mr George Barrett and Mr Francis Baily," in the Assurance Magazine, vol. iv. p. 185.

The principal commutation tables published in England are contained in the following works: — David Jones, Value of Annuities and Reversionary Payments, issued in parts by the Useful Knowledge Society, completed in 1843; Jenkin Jones, New Rate of Mortality, 1843'; G. Davies, Treatise on Annuities, 1825 (issued 1855); David Chisholm, Commutation Tables, 1858; Nelson's Contributions to Vital Statistics, 1857; Jardine Henry, Government Life Annuity Commutation Tables, 1866 and 1873; Institute of Actuaries Life Tables, 1872; R. P. Hardy, Valuation Tables, 1873; and Dr William Farr's contributions to the sixth (1844), twelfth (1849), and twentieth (1857) Reports of the Registrar General in England (English Tables, I. 2), and to the English Life Table, 1864.

The theory of annuities may be further studied in the discussions in the English Journal of the Institute of Actuaries. The institute was founded in the year 1,848, the first sessional meeting being held in January 1849. Its establishment has contributed in various ways to promote the study of the theory of life contingencies. Among these may be specified the following: — Before it was formed, students of

the subject worked for the most part alone, and without any concert ; and when any person had made an improvement in the theory, it had little chance of becoming publicly known unless he wrote a format treatise on the whole subject. But the formation of the institute led to much greater interchange of opinion among actuaries, and afforded them a ready means of making known to their professional associates any improvements, real or supposed, that they thought they had made. Again, the discussions which follow the reading of papers before the institute have often served, first, to bring out into bold relief differences of opinion that, were previously unsuspected, and afterwards to soften down those differ- ences, — to correct extreme opinions in every direction, and to bring about a greater agreement of opinion on many important subjects. In no way, probably, have the objects of the institute been so effectually advanced as by the publication of its Journal. The first number of this work, which was originally called the Assurance Magazine, appeared in September 1850, and it has been continued quarterly down to the present time. It was originated by the public gpirit of two well-known actuaries (Mr Charles Jellicoe and Mr Samuel Brown), and was adopted as the organ of the Institute of

Actuaries in the year 18.52, and called the Assurance Magazine and Journal of the Institute of Actuaries, Mr Jellicoe continuing to be trie editor, — a post he held until the year 1867, when he was succeeded by Mr T. B. Spragiie (who contributed to the 9th edition of this Encyclopaedia an elaborate article on ” Annuities,” on which the above account is based). The name was again changed in 1866, the words ” Assurance Magazine ” being dropped; but in the following year it was considered desirable to resume these, for the purpose of showing the continuity of the publication, and it is now called the Journal of the Institute of Actuaries and Assurance Magazine. This work contains not only the papers read before the institute (to which have been appended of late years short abstracts of the discussions on them), and many original papers which were unsuitable for reading, together with correspondence, but also reprints of many papers published elsewhere, which from various causes had become difficult of access to the ordinary reader, among which may be specified various papers which originally appeared in the Philosophical Transactions , the Philosophical Magazine, the Mechanics’ Magazine, and 1 the Companion to the Almanac; also translations of various papers from the French, German, and Danish. Among the useful objects which the continuous publication of the Journal of the institute has served, we may specify in particular two: — that any supposed improvement in the theory was effectually submitted to the

criticisms of the whole actuarial profession, and its real value speedily discovered; and that any real improvement, whether great or small, being placed on record, successive writers have been able, one after the other, to take it up and develop it, each com- mencing where the previous one Had left off.

ANNULAR, ANNULATE, &c. (Lat. annulus, a ring), ringed, “Annulate” is used in botany and zoology in connexion with certain plants, worms, &c. (see Annelida), either marked with rings or composed of ring-like segments. The word ” annulated ” is also used in, heraldry and architecture. An annulated cross is one with the points ending in an “annulet ” (an heraldic ring, supposed to be taken from a coat of mail), while the annulet in architecture is a small fillet round a column, which encircles the lower part of the Doric capital immediately above the neck or trachelium. The word ” annulus ” (f or ” ring “) is itself used tech- nically ingeometry, astronomy, &c, and the adjective ” annular ” corresponds, An annular space is that between an inner and outer ring. The annular finger is the ring finger. An annular eclipse is an eclipse of the sun in which the visible part of the latter com- pletely encircles the dark body of the moon; for this to happen, the centres, of the sun and moon, and the point on the earth where the observer is situated, must be collinear. Certain nebulae having the form of a ring are also called “annular.”

ANNUNCIATION, the announcement made by the angel Gabriel to the Virgin Mary of the incarnation of Christ (Luke i, 26-38). The Feast of the Annunciation in the Christian Church is celebrated on the 25 th of March. The first authentic allusions to it are in a canon, of the council of Toledo (656), and another of the council of Constantinople ” in Trullo ” (692), forbidding the celebration. of all festivals in Lent, excepting the Lord’s day and the Feast of the Annunciation. An earlier origin has been claimed for it on the ground that it is mentioned in sermons of Athanasius and of Gregory Thaumaturgus, but both of these documents are now admitted to be spurious. A synod held at Worcester, England (1240), forbade all servile work on this feast day. See further Lady, Day.

ANNUNZIO, GABRIELE D’ (1863 ;, Italian novelist and

poet, of Dalmatian extraction, was born at Pescara (Abruzzi) in 1863. The first years of his youth were spent in the freedom of the open fields; at sixteen he was sent to school in Tuscany. While still at school he published a small volume of verses called Primo Vere (1879), in which, side by side with some almost brutal imitations of Lorenzo Stecchetti, the then fashionable poet of Postuma, were some

translations from the Latin, dis- tinguished by such agile grace that Giuseppe Chiarini on reading them brought the unknown youth before the public in an enthusi? astic article. The young poet then went to Rome, where Lc was received as one of their own by the Cronaca Bizantina group (see Carducci). Here he published Canto Nuovo (1882), Terra Vergine (1882), V Intermezzo di Rime (1883), // Libro delle Vergini (1884), and the greater part of the short stories that were afterwards collected under the general title of San Pantaleone (1886). In Canto Nuovo ws have admirable poems full of pulsating youth and the picmise of power, some descriptive

of the sea and some of the Abruzzi landscape, commented on and completed in prose by Terra Vergine, the latter a collection of short stories dealing in radiant language with the peasant life of the author's native province. With the Intermezzo di Rime we have the beginning of d'Annunzio's second and characteristic manner. His conception of style was new, and he chose to express all the most subtle vibrations of voluptuous life. Both style and contents began to startle his critics; some who had greeted him as an enfant prodige — Chiarini amongst others — rejected him as a perverter of public morals, whilst others hailed him as one bringing a current of fresh air and the impulse of a new vitality into the somewhat prim, lifeless work hitherto produced.

Meanwhile the Review of Angelo Sommaruga perished in the midst of scandal, and his group of young authors found itself dispersed. Some entered the teaching career and were lost to literature, others threw themselves into journalism. Gabriele d' Annunzio took this latter course, and joined the staff of the Tribuna. For this paper, under the pseudonym of " Duca Minimo," he did some of his most brilliant work, and the articles he wrote during that period of originality and exuberance would well repay being collected. To this period of greater maturity and deeper culture belongs 77 Libro d' Isotla (1886), a love poem, in which for the first time he drew inspiration adapted to modern sentiments and passions from the rich colours of the Renaissance. II Libro d' Isotta is interesting also, because in it we find most of the germs of his future work, just as in Intermezzo melico and in certain ballads and sonnets we find descriptions and emotions which later went to form the aesthetic contents of II Piacere, II Trionfo della Morte, and Elegie Romane (1892).

D' Annunzio's first novel II Piacere (1889) — translated into English as

The Child of Pleasure — was followed in 1891 by L' Innocente {The Intruder), and in 1892 by Giovanni Episcopo. These three novels created a profound impression. 77 Innocente, admirably translated into French by Georges Herelle, brought its author the notice and applause of foreign critics. His next work, II Trionfo della Morte {The Triumph of Death) (1894), was followed at a short distance by Le Vergini della Roccio (1896) and // Fuoco (1900), which in its descriptions of Venice is perhaps the most ardent glorification of a city existing in any language.

D' Annunzio's poetic work of this period, in most respects his finest, is represented by II Poema Paradisiaco (1893), the Odi Navali (1893), a superb attempt at civic poetry, and Laudi

(1900).

A later phase of d' Annunzio's work is his dramatic production, represented by II Sogno di un mattino di primavera (1897), a lyrical fantasia in one act; his Cilia Morta (1898), written for Sarah Bernhardt, which is certainly among the most daring and original of modern tragedies, and the only one which by its unity, persistent purpose, and sense of fate seems to continue in a measure the traditions of the Greek theatre. In 1S98 he wrote his Sogno di un Pomeriggio d' Aulunno and La Gioconda; in the succeeding year La Gloria, an attempt at contemporary political tragedy which met with no success, probably through the audacity of the personal and political allusions in some of its scenes; and then Francesca da Rimini (1901), a perfect reconstruction of medieval atmosphere and emotion, magnificent in style, and declared by one of the most authoritative Italian critics — -Edoardo Boutet — to be the first real although not perfect tragedy which has ever been given to the Italian theatre.

The work of d' Annunzio, although by many of the younger generation injudiciously and extravagantly admired, is almost the most important literary work given to Italy since the days when the great classics welded her varying dialects into a fixed language. The psychological inspiration of his novels has come to him from many sources — French, Russian, Scandinavian, German — and in much of his earlier work there is little fundamental originality. His creative power is intense and searching, but narrow and personal; his heroes and heroines are little more than one same type monotonously facing a different

problem at a different phase of life. But the faultlessness of his style and the wealth of his language have been approached by none of his

contemporaries, whom his genius has somewhat paralysed. In his later work, when he begins drawing his inspira- tion from the traditions of bygone Italy in her glorious centuries, a current of real life seems to run through the veins of his personages. And the lasting merit of d' Annunzio, his real value to the literature of his country, consists precisely in that he opened up the closed mine of its former life as a source of inspiration for the present and of hope for the future, and created a language, neither pompous nor vulgar, drawn from every source and district suited to the requirements of modern thought, yet absolutely classical, borrowed from none, and, independently of the thought it may be used to express, a thing of intrinsic beauty. As his sight became clearer and his purpose strengthened, as ex- aggerations, affectations, and moods dropped away from his con- ceptions, his work became more and more typical Latin work, upheld by the ideal of an Italian Renaissance.

ANOA, the native name of the small wild buffalo of Celebes, Bos {Bubalus) depressicornis, which stands but little over a yard at the shoulder, and is the most diminutive of all wild cattle. It is nearly allied to the larger Asiatic buffaloes, showing the same reversal of the direction of the hair on the back. The horns are peculiar for their upright direction and comparative straightness, although they have the same triangular section as in other buffaloes. White spots are sometimes present below the eyes, arid there may be white markings on the legs and back; and the absence or presence of these white markings may be indicative of distinct races. The horns of the cows are very small. The nearest allies of the anoa appear to be certain extinct buffaloes, of which the remains are found in the Siwalik Hills of northern India. In habits the animal appears to resemble the Indian buffalo.

ANODYNE (from Gr. av-, privative, and oSwt;, pain), a cause which relieves pain. The term is commonly applied to medicines which lessen the sensibility of the brain or nervous system, such as morphia, &c.

ANOINTING, or greasing with oil, fat, or melted butter, a process employed ritually in all religions and among all races, civilized or savage, partly as a mode of ridding persons and things of dangerous influences and diseases, especially of the demons (Persian drug, Greek /ojpes, Armenian dev) which are or cause those diseases; and partly as a means of introducing into things and persons a sacramental or divine influence, a holy emanation, spirit or power. The riddance of an evil influence is often synonymous with the introduction of the good principle, and therefore it is best to consider first the use of

anointing in consecrations.

The Australian natives believed that the virtues of one killed could be transferred to survivors if the latter rubbed themselves with his caul-fat. So the Arabs of East Africa anoint themselves with lion's fat in order to gain courage and inspire the animals with awe of themselves. Such rites are often associated with the actual eating of the victim whose virtues are coveted. Human fat is a powerful charm all over the world; for, as R. Smith points out, after the blood the fat was-peculiarly the vehicle and seat of life. This is why fat of a victim was smeared on a sacred stone, not only in acts of homage paid to it, but in the actual consecration thereof. In such cases the influence of the god, communicated to the victim, passed with the unguent into the stone. But the divinity could by anointing be transferred into men no less than into stones; and from immemorial an- tiquity, among the Jews as among other races, kings were anointed or greased, doubtless with the fat of the victims which, like the blood, was too holy to be eaten by the common votaries.

Butter made from the milk of the cow, the most sacred of animals, is used for anointing in the Hindu religion. A newly- built house is smeared with it, so are demoniacs, care being taken to smear the latter downwards from head to foot.

In the Christian religion, especially where animal sacrifices, together with the cult of totem or holy animals, have been given up, it is usual to hallow the oil used in ritual anointings with

special prayers and exorcisms; oil from the lamps lit before the altar has a peculiar virtue of its own, perhaps because it can be burned to give light, and disappears to heaven in doing so. In any case oil has ever been regarded as the aptest symbol and vehicle of the holy and illuminating spirit. For this reason the catechumens are anointed with holy oil both before and after baptism; the one act (of eastern origin) assists the expulsion of the evil spirits, the other (of western origin), taken in con- junction with imposition of hands, conveys the spirit and retains it in the person of the baptized. In the postbaptismal anointing the oil was applied to the organs of sense, to the head, heart, and midriff. Such ritual use of oil as a apayis or seal may have been suggested in old religions by the practice of keeping wine fresh in jars and amphorae by pouring on a top layer of oil; for the spoiling of

wine was attributed to the action of demons of corruption, against whom many ancient formulae of aversion or exorcism still exist.

The holy oil, chrism, or nvpov, as the Easterns call it, was prepared and consecrated on Maundy Thursday, and in the Gelasian sacramentary the formula used runs thus: ” Send forth, O Lord, we beseech thee, thy Holy Spirit the Paraclete from heaven into this fatness of oil, which thou hast deigned to bring forth out of the green wood for the refreshing of mind and body; and through thy holy benediction may it be for all who anoint with it, taste it, touch it, a safeguard of mind and body, of soul and spirit, for the expulsion of all pains, of every infirmity, of every sickness of mind and body. For with the same thou hast anointed priests, kings, and prophets and martyrs with this thy chrism, perfected by thee, O Lord, blessed, abiding within our bowels in the name of our Lord Jesus Christ.”

In various churches the dead are anointed with holy oil, to guard them against the vampires or ghouls which ever threaten to take possession of dead bodies and live in them. In the Armenian church, as formerly in many Greek churches, a cross is not holy until the Spirit has been formally led into it by means of prayer and anointing with holy oil. A new church is anointed at its four corners, and also the altar round which it is built; similarly tombs, church gongs, and all other instruments and utensils dedicated to cultual uses. In churches of the Greek rite a little of the old year’s chrism is left in the jar to communicate its sanctity to that of the new. (F. C. C.)

ANOMALY (from Gr. dvco/iaXia, unevenness, derived from &.P-, privative, and o/xaKos, even), a deviation from the common rule. In astronomy the word denotes the angular distance of a body from the pericentre of the orbit in which it is moving. Let AB be the major axis of the orbit, B the pericentre, F the focus or centre of motion, P the position of the body. The anomaly is then the angle BFP which the radius vector makes with the major axis. This is the actual or true anomaly. Mean

anomaly is the anomaly which the body would have if it moved from the pericentre around F with a uniform angular motion such that its revolution would be completed in its actual time (see Orbit) – Eccentric anomaly is defined thus: — Draw the circumscribing circle of the elliptic orbit around the centre C of the orbit. Drop the perpendicular RPQ through P, the position of the planet, upon the major axis. Join CR; the angle CRQ is then the eccentric anomaly.

In the ancient astronomy the anomaly was taken as the angular

distance of the planet from the point of the farthest recession from the earth.

Kepler's Problem, namely, that of finding the co-ordinates of a planet at a given time, which is equivalent — given the mean anomaly — to that of determining the true anomaly, was solved approximately by Kepler, and more completely by Wallis, Newton and others.

The anomalistic revolution of a planet or other heavenly body is the revolution between two consecutive passages through the

pericentre. Starting from the pericentre, it is completed on the return to the pericentre. If the pericentre is fixed, this is an actual revolution; but if it moves the anomalistic revolution is greater or less than a complete circumference.

An Anomalistic year is the time (365 days, 6 hours, 13 minutes, 48 seconds) in which the earth (and similarly for any other planet) passes from perihelion to perihelion, or from any given value of the anomaly to the same again. Owing to the precession of the equinoxes it is longer than a tropical or sidereal year by 25 minutes and 2-3 seconds. An Anomalistic month is the time in which the moon passes from perigee to perigee, &c.

For the mathematics of Kepler's problem see E. W. Brown, Lunar Theory (Cambridge 1896), or the work of Watson or of Bauschinger on Theoretical Astronomy.

ANORTHITE, an important mineral of the felspar group, being one of the end members of the plagioclase (q.v.) series. It is a calcium and aluminium silicate, CaAlaSisOg, and crystallizes in the anorthic system. Like all the felspars, it possesses two cleavages, one perfect and the other less so, here inclined to one another at an angle of 85° 50'. The colour is white, greyish or reddish, and the crystals are trans- parent to translucent. The hard- ness is 6— 6§, and the specific gravity

2-75.

Anorthite is an essential con- stituent of many basic igneous rocks, such as gabbro and basalt, also of some meteoric stones. The best developed crystals are those which accompany mica, augite, sanidine, &c, in the ejected blocks

of metamorphosed limestone from .

Monte Somma, the ancient portion .

of Mount Vesuvius; these are Anorthite.

perfectly colourless and transparent, and are bounded by numerous brilliant faces. Distinctly developed crystals are also met with in the basalts of Japan, but are usually rare at other localities.

The name anorthite was given to the Vesuvian mineral by G. Rose in 1823, on account of its anorthic crystallization. The species had, however, been earlier described by the comte de Bournon under the name indianite, this name being applied to a greyish or reddish granular mineral forming the matrix of corun- dum from the Carnatic in India. Several unimportant varieties have been distinguished. (L. J, S.)

ANQUETIL, LOUIS PIERRE (1723-1808), French historian, was born in Paris, on the 21st of February 1723. He entered the congregation of Sainte-Genevieve, where he took holy orders and became professor of theology and literature. Later, he became director of the seminary at Reims, where he wrote his Histoire civile et politique de Reims (3 vols., 1756-1757), perhaps his best work. He was then director of the college of Serdis, where he composed his Esprit de la Ligue ou histoire politique des troubles de la Fronde pendant le XVI" et le XVII s siecles (1767). During the Reign of Terror he was imprisoned at St Lazare; there he began his Pricis de Vhistoire universelle, afterwards published in nine volumes. On the establishment of the national institute he was elected a meriiber of the second group (moral and political sciences), and was soon afterwards employed in the office of the ministry of foreign affairs, profiting by his experience to write his Motifs des guerreset des traites de paix sous Louis XI V ., Louis X V, et Louis XVI. He is said to have been asked by Napoleon to write his Histoire de France (14 vols., 1805), a mediocre compila- tion at second or third hand, with the assistance of de Mezeray andof Paul Francois Velly (1700-1750). This work, nevertheless, passed through numerous editions, and by it his name is remem- bered. He died on the 6th of September 1808.

ANQUETIL DUPERRON, ABRAHAM HYACINTHS (1731 1805), French orientalist, brother of Louis Pierre Anquetil, the historian, was born in Paris on the 7th of December 1731. He was educated for the priesthood in Paris and Utrecht* but his taste for Hebrew,. Arabic, Persian, and other languages of the East

developed into a passion, and he discontinued his theological course to devote himself entirely to them. His diligent attend- ance at the Royal Library attracted the attention of the keeper of the manuscripts, the Abbe Sallier, whose influence procured for him a small salary as student of the oriental languages. He had lighted on some fragments of the Vendidad Sade, and formed the project of a voyage to India to discover the works of Zoroaster. With this end in view he enlisted as a private soldier, on the 2nd of November 1754, in the Indian expedition which was about to start from the port of L 'Orient. His friends procured his dis- charge, and he was granted a free passage, a seat at the captain's table, and a salary, the amount of which was to be fixed by the governor of the French settlement in India. After a passage of six months, Anquetil landed, on the 10th of August 1755ˆ at Pondicherry. Here he remained a short time to master modern Persian, and then hastened to Chandernagore to acquire Sanskrit. Just then war was declared between France and England; Chandernagore was taken, and Anquetil returned to Pondicherry by land. He found one of his brothers at Pondicherry, and embarked with him for Surat; but, with a view of exploring the country, he landed at Mah6 and proceeded on foot. At Surat he succeeded, by perseverance and address in his intercourse with the native priests, in acquiring a sufficient knowledge of the Zend and Pahlavi languages to translate the liturgy called the Vendidad Sade and some other works. Thence he proposed going to Benares, to study the language, antiquities, and sacred laws of the Hindus; but the capture of Pondicherry obliged him to quit India. Returning to Europe in an English vessel, he spent some time in London and Oxford, and then set out for France. He arrived in Paris on the 14th of March 1762 in possession of one hundred and eighty oriental manuscripts, besides other curiosities. The Abbe Barthelemy procured for him a pension, with the appointment of interpreter of oriental languages at the Royal Library. In 1763 he was elected an associate of the Academy of Inscriptions, and began to arrange for the publication of the materials he had collected during his eastern travels. In 1771 he published his Zend-Avesta (3 vols.), containing collections from the sacred writings of the fire-worshippers, a life of Zoroaster, and fragments of works ascribed to him. In 1778 -he published at Amsterdam his Legislation orientate, in which he endeavoured to prove that the nature of oriental despotism had been greatly misrepresented. His Recherches hisloriques et geographiques sur I'Inde appeared in 1786, and formed part of Thieffenthaler's Geography of India. The Revolution seems to have greatly affected him. During that period he abandoned society, and lived in voluntary poverty on a few pence a day. In 1798 he published L'Inde en rapport avec I' Europe (Hamburg, 2 vols.), which contained

much invective against the English, and numerous misrepresentations. In 1802-1804 he published a Latin transla- tion (2 vols.) from the Persian of the Oupnek'hat or Upanishada. It is a curious mixture of Latin, Greek, Persian, Arabic, and Sanskrit. He died in Paris on the 17th of January 1805.

See Biographie universelle; Sir William Jones, Works (vol. x., 1807); and the Miscellanies of the Philobiblon Society (vol. iii., 1856-1857). For a list of his scattered writings see Querard, La France litteraire.

ANSA (from Lat. ansa, a handle), in astronomy, one of the apparent ends of the rings of Saturn as seen in perspective from the earth: so-called because, in the earlier telescopes, they looked like handles projecting from the planet. In anatomy the word is applied to nervous structures which resemble loops. In archaeology it is used for the engraved and ornamented handle of a vase, which has often survived when the vase itself, being less durable, has disappeared.

ANSBACH, or Anspach, originally Onohbach, a town of Germany, in the kingdom of Bavaria, on the Rezat, 27 m. by rail S.W. of Nuremberg, and 00 m. N. of Munich. Pop. (1900) 17,555- It contains a palace, once the residence of the margraves of Anspach, with fine gardens; several churches, the finest of which are those dedicated to St John, containing the vault of the former margraves, and St Gumbert; a gymnasium; a picture gallery; a municipal museum and a special technical

school. Ansbach possesses monuments to the poets August, Count von Platen-Hailermund, and Johann Peter Uz, who were born here, and to Kaspar Hauser, who died here. The chief manufactures are machinery, toys, woollen, cotton, and half-silk stuffs, embroideries, earthenware, tobacco, cutlery and playing cards. There is considerable trade in grain, wool and flax. In 1 79 1 the last margrave of Anspach sold his principality to Frederick William II., king of Prussia; it was transferred by Napoleon to Bavaria in 1806, an act which was confirmed by the congress of Vienna in 1815.

ANSDELL, RICHARD (1815-1885), English painter, was born in Liverpool, and first exhibited at the Royal Academy in 1840. He was a painter of genre, chiefly animal and sporting pictures, and he became very popular, being elected A.R.A. in 1861 and R.A. in 1870. His " Stag at Bay " (1846), " The Combat " (1847), and " Battle of the Standard " (1848), repre- sent his best work, in which he showed himself a notable follower of Landseen

ANSELM (c. 1033-1109), archbishop of Canterbury, was born at Aosta in Piedmont. His family was accounted noble, and was possessed of considerable property. Gundulph, his father, was by birth a Lombard, and seems to have been a man of harsh and violent temper; his mother, Ermenberga, was a prudent and virtuous woman, from whose careful religious training the young Anselm derived much benefit. At the age of fifteen he desired to enter a convent, but he could not obtain his father's consent. Disappointment brought on an illness, on his recovery from which he seems for a time to have given up his studies, and to have plunged into the gay life of the world. During this time his mother died, and his father's harshness became unbearable. He left home, and with only one attendant crossed the Alps, and wandered through Burgundy and France. Attracted by the fame of his countryman, Lanfranc, then prior of Bee, he entered Normandy, and, after spending some time at Avranches, settled at the monastery of Bee. There, at the age of twenty- seven, he became a monk; three years later, when Lanfranc was promoted to the abbacy of Caen, he was elected prior. This office he held for fifteen years, and then, in 1078, on the death of Herlwin, the warrior monk who had founded the monastery, he was made abbot. Under his rule Bee became the first seat of learning in Europe, a result due not more to his intellectual powers than to the great moral influence of his noble character and kindly discipline. It was during these quiet years at Bee that Anselm wrote his first philosophical and re- ligious works, the dialogues on Truth and Freewill, and the two celebrated treatises, the Monologion and Proslogion.

Meanwhile the convent had been growing in wealth, as well as in reputation, and had acquired considerable property in England, which it became the duty of Anselm occasionally to visit. By his mildness of temper and unswerving rectitude, he so endeared himself to the English that he was looked upon and desired as the natural successor to Lanfranc, then archbishop of Canterbury. But on the death of that great man, the ruling sovereign', William Rufus, seized the possessions and revenues of the see, and made no new appointment. About four years after, in 1092, on the invitation of Hugh, earl of Chester, Anselm with some reluctance, for he feared to be made archbishop, crossed to England. He was detained by business for nearly four months, and when about to return, was refused permission by the king. In the following year William fell ill, and thought his death was at hand. Eager to make atonement for his sin with regard to the archbishopric, he nominated Anselm to the vacant see, and after a great struggle compelled him to accept the pastoral staff of office. After obtaining dispensation from his duties in Normandy, Anselm was consecrated in

1093. He demanded of the king, as the conditions of his retaining office, that he should give up all the possessions of the see, accept his spiritual counsel, and acknowledge Urban as pope in opposition to the anti-pope, Clement. He only obtained a partial consent to the first of these, and the last involved him in a serious difficulty with the king. It was a rule of the church that the consecration of metropolitans could not be completed without their receiving

the pallium from the hands of the pope. Anselm, accordingly, insisted that he must proceed to Rome to receive the pall. But William would not permit this; he had not acknowledged Urban, and he maintained his right to prevent any pope being acknow- ledged by an English subject without his permission. A great council of churchmen and nobles, held to settle the matter, advised Anselm to submit to the king, but failed to overcome his mild and patient firmness. The matter was postponed, and William meanwhile privately sent messengers to Rome, who acknowledged Urban and prevailed on him to send a legate to the king bearing the archiepiscopal pall. A partial reconciliation was then effected, and the matter of the pall was compromised. It was not given by the king, but was laid on the altar at Canterbury, whence Anselm took it.

Little more than a year after, fresh trouble arose with the king, and Anselm resolved to proceed to Rome and seek the counsel of his spiritual father. With great difficulty he obtained a reluctant permission to leave, and in October 1097 he set out for Rome. William immediately seized on the revenues of the see, and retained them to his death. Anselm was received with high honour by Urban, and at a great council held at Bari, he was put forward to defend the doctrine of the procession of the Holy Ghost against the representatives of the Greek Church. But Urban was too politic to embroil himself with the king of England, and Anselm found that he could obtain no substantial result. He withdrew from Rome, and spent some time at the little village of Schiavi, where he finished his treatise on the atonement, Cur Deus homo, and then retired to Lyons.

In 1 100 William was killed, and Plenry, his successor, at once recalled Anselm. But Henry demanded that he should again receive from him in person investiture in his office of archbishop, thus making the dignity entirely dependent on the royal authority. Now, the papal rule in the matter was plain; all homage and lay investiture were

strictly prohibited. Anselm represented this to the king; but Henry would not relinquish a privilege possessed by his predecessors, and proposed that the matter should be laid before the Holy See. The answer of the pope reaffirmed the law as to investiture. A second ejnbassy was sent, with a similar result. Henry, however, remained firm, and at last, in 1103, Anselm and an envoy from the king set out for Rome. The pope, Paschal, reaffirmed strongly the rule of investiture, and passed sentence of excommunication against all who had infringed the law, except Henry. Practically this left matters as they were, and Anselm, who had received a message forbidding him to return to England unless on the king's terms, withdrew to Lyons, where he waited to see if Paschal would not take stronger measures. At last, in 1105, he resolved himself to excommunicate Henry. His intention was made known to the king through his sister, and it seriously alarmed him, for it was a critical period in his affairs. A meeting was arranged, and a reconciliation between them effected. In 1 106 Anselm crossed to England, with power from the pope to remove the sentence of excommunication from the illegally invested churchmen. In 1107 the long dispute as to investiture was finally ended by the king resigning his formal rights. The remaining two years of Anselm's life were spent in the duties of his archbishopric. He died on the 2tst of April 1100. He was canonized in 1494 by Alexander VI.

Anselm may, with some justice, be considered the first scho- lastic philosopher and theologian. His only great predecessor, Scotus Erigena, had more of the speculative and mystical element than is consistent with a schoolman; but in Anselm are found that recognition of the relation of reason to revealed truth, and that attempt to elaborate a rational system of faith, which form the special characteristics of scholastic thought. His constant endeavour is to render the contents of the Christian consciousness clear to reason, and to develop the intelligible truths interwoven with the Christian belief. The necessary preliminary for this is the possession of the Christian conscious- ness. " He who does not believe will not experience; and he who has not experienced will not understand." That faith must precede knowledge is reiterated by him. " Na/uc cnitn quaero

intelligere ut credam, sed credo id intelligam. Nam et hoc credo, quia, nisi credidero, non intelligam." (" Nor do I seek to under- stand that I may believe, but I believe that I may understand. For this too I believe, that unless I first believe, I shall not under- stand.") But after the f».ith is held fast, the attempt must be made to demonstrate by reason the truth of what we believe. It is wrong not to do so. "Negligentiae mihi esse videtyr, si, postquam confirmati sumus in fide,

non studemus quod credimus, intelligere." ("I hold it to be a failure in duty if after we have become steadfast in the faith we do not strive to understand what we believe.") To such an extent does he carry this demand for rational explanation that, at times, it seems as if he claimed for unassisted intelligence the power of penetrating even to the mysteries of the Christian faith. On the whole, however, the qualified statement is his real view; merely rational proofs are always, he affirms, to be tested by Scripture. (Cur Deus homo, i. 2 and 38; De Fide Trin. 2.)

The groundwork of his theory of knowledge is contained in the tract De Veritate, in which, from the consideration of truth as in knowledge, in willing, and in things, he rises to the affirma- tion of an absolute truth, in which all other truth participates. This absolute truth is God himself, who is therefore the ultimate ground or principle both of things and of thought. The notion of God comes thus into the foreground of the system; before all things it is necessary that it should be made clear to reason, that it should be demonstrated to have real existence. This demonstration is the substance of the Monologion and Proshgion. In the first of these the proof rests on the ordinary grounds of realism, and coincides to some extent with the earlier theory of Augustine, though it is carried out with singular boldness and fulness. Things, he says, are called good in a variety of ways and degrees; this would be impossible if there were not some absolute standard, some good in itself, in which all relative goods participate. Similarly with such predicates as great, just; they involve a certain greatness and justice. The very existence of things is impossible without some one Being, by whom they are. This absolute Being, this goodness, justice, greatness, is God. Anselm was not thoroughly satisfied with this reasoning; it started from a posteriori grounds, and con- tained several converging lines of proof. He desired to have some one short demonstration. Such a demonstration he presented in the Proslogion; it is his celebrated ontological proof. God is that being than whom none greater can '.Be conceived. Now, if that than which nothing greater cf n t)e conceived existed only in the intellect, it would not be the absolutely greatest, for we could add to it existence in reality. It follows, then, that the being than whom nothing greater can be conceived, i.e. God, necessarily has real existence. This reasoning, in which Anselm partially anticipated the Cartesian philosophers, has rarely seemed satisfactory. It was opposed at the time by the monk Gaunilo, in his Liber pro Insipiente, on the ground that we cannot pass from idea to reality. The same criticism is made by several of the later schoolmen, among others by Aquinas, and is in substance what Kant advances against all ontological proof. Anselm

replied to the objections of Gaunilo in his Liber Apologelicus. The existence of God being thus held proved, he proceeds to state the rational grounds of the Christian doctrines of creation and of the Trinity. With reference to this last, he says we cannot know God from himself, but only after the analogy of his creatures; and the special analogy used is the self-consciousness of man, its peculiar double nature, with the necessary elements, memory and intelligence, representing the relation of the Father to the Son. The mutual love of these two, proceeding from the relation they hold to one another, symbolizes the Holy Spirit. The further theological doctrines of man, original sin, free will, are developed, partly in the Mono- logion, partly in other mixed treatises. Finally, in his greatest work, Cur Deus homo, he undertakes to make plain, even to infidels, the rational necessity of the Christian mystery of the atonement. The theory rests on three positions: that satisfac- tion is necessary on account of God's honour and justice; that such satisfaction can be given only by the peculiar oersonalitv

of the God-man; that such satisfaction is really given by the voluntary death of this infinitely valuable person. The demon- stration is, in brief, this. All the actions of men are due to the furtherance of God's glory; if, then, there be sin, i.e. if God's honour be wounded, man of himself can give no satisfaction. But the justice of God demands satisfaction; and as an insult to infinite honour is in itself infinite, the satisfaction must be infinite, i.e. it must outweigh all that is not God. Such a penalty can only be paid by God himself, and, as a penalty for man, must be paid under the form of man. Satisfaction is only possible through the God-man. Now this God-man, as sinless, is exempt from the punishment of sin ; His passion is therefore voluntary, not given as due. The merit of it is therefore infinite; God's justice is thus appeased, and His mercy may extend to man. This theory has exercised immense influence on the form of church doctrine. It is certainly an advance on the older patristic theory, in so far as it substitutes for a contest between God and Satan, a contest between the goodness and justice of God; but it puts the whole relation on a merely legal footing, gives it no ethical bearing, and neglects altogether the consciousness of the individual to be redeemed. In this respect it contrasts un- favourably with the later theory of Abelard.

Anselm's speculations did not receive, in the middle ages, the respect and attention justly their due. This was probably due to their

unsystematic character, for they are generally tracts or dialogues on detached questions, not elaborate treatises like the great works of Albert, Aquinas, and Erigena. They have, however, a freshness and philosophical vigour, which more than makes up for their want of system, and which raises them far above the level of most scholastic writings.

Bibliography. — The main sources for the history of St Anselm and his times are Eadmer's Vita Anselmi and his Historia Novorum, edited by M. Rule in Rolls Series (London, 1884); the best modern work is by Pere Ragey, Histoire de Saint Anselme (Paris, 1890), and Saint Anselme professeur (Paris, 1890). Other appreciations are by A. Mohler, Anselm Erzbischof von Canterbury (Regensburg, 1839; Eng. trans, by H. Rymer, London, 1842); F. R. Hasse, Anselm von Canterbury (2 vols., Leipzig, 1 842-1853) ; C. de Remusat, S. Anselme de Cantorbery (Paris, 1853, new ed. 1868) ; R. W. Church, St Anselm, first published in Sunday Library (London, 1870; often reprinted); Martin Rule, Life and Times of St Anselm (London, 1883).

Works : The best edition of St Anselm's complete works is that of Dom Gerberon (Paris, 1675); reprinted with many notes in 1712; incorporated by J. Migne in his Patrologia Latina, tomi clyiii.-clix. (Paris. 1853-1854). Migne's reprint contains many errors. The Cur Deus homo may be best studied in the editions published by D. Nutt (London, 1885) and by Griffith (1898). The Mariale, or poems in honour of the Blessed Virgin, has been carefully edited by P. Ragey (Tournai, 1885) ; the Monologion and Proslogion, by C. E. Ubaghs (Louvain, 1854; Eng. trans, by S. N. Deane, Chicago, 1903); the Meditationes, many of which are wrongly attributed to Anselm, have been frequently reprinted, and were included in Methuen's Library of Devotion (London, 1903).

The best criticism of Anselm's philosophical works is by J. M. Rigg (London, 1896), and Domet de Vorges (Grands Philosophes series, Paris, 1901). For a complete bibliography, see A. Vacant's Dictionnaire de theologie.

ANSELM, of Laon (d. 11 17), French theologian, was born of very humble parents at Laon before the middle of the nth century. He is said to have studied under St Anselm at Bee. About 1076 he taught with great success at Paris, where, as the associate of William of Champeaux, he upheld the realistic side of the scholastic controversy. Later he removed to his native place, where his school for theology and exegetics rapidly became the most famous in Europe. He died in n 17. His greatest work, an interlinear gloss on the Scriptures, was one

of the great authorities of the middle ages. It has been frequently reprinted. Other commentaries apparently by him have been ascribed to various writers, principally to the great Anselm. A list of them, with notice of Anselm's life, is contained in the Histoire litteraire dc la France, x. 170-189.

The works are collected in Migne's Patrologia Latina, tome 1 62; some unpublished Sententiae were edited by G. Lefevre (Milan, 1894), on which see Haureau in the Journal des savants for 1895.

ANSELME (Father Anselme of the Virgin Mary) (1625-1694), French genealogist, was born in Paris in 1625. As a layman his name was Pierre Guibours. He entered the order of the bare- footed Augustinians on the 31st of March 1644, and it was in

their monastery (called the Couvent des Petits Peres, near the church of Notre-Dame des Victoires) that he died, on the 17th of January 1694. He devoted his entire life to genealogical studies. In 1663 he. published Le Palais de Vhonneur, which besides giving the genealogy of the houses of Lorraine and Savoy, is a complete treatise on heraldry, and in 1664 Le Palais de la gloire, dealing with the genealogy of various illustrious French and European families. These books made friends for him, the most intimate among whom, Honore Caille, seigneur du Fourny (1630-1713), persuaded him to publish his Histoire genealogique de la maison royale de France, el des grands officiers de la couromte (1674, 2 vols. 4); after Father Anselme's death, Honore Caille collected his papers,and brought out a new edition of this highly important work in 171 2. The task was taken up and continued by two other friars of the Couvent des Petits Peres, Father Ange de Sainte-Rosalie (Frangois Raffard, 1655- 1726), and Father Simplicien (Paul Lucas, 1683-1759), who published the first and second volumes of the third edition in 1726. This edition consists of nine volumes folio; it is a genea- logical and chronological history of the royal house of France, of the peers, of the great officers of the crown and of the king's household, and of the ancient barons of the kingdom. The notes were generally compiled from original documents, references to which are usually given, so that they remain useful to the present day. The work of Father Anselme, his collaborators and successors, is even more important for the history of France than is Dugdale's Baronage of England for the history of England. (C. B.*)

ANSON, GEORGE ANSON, Baron (1697-1762), British admiral, was born on the 23rd- of April 1697. He was the son of William Anson of Shugborough in Staffordshire, and his wife Isabella Carrier, who was

the sister-in-law of Lord Chancellor Macclesfield, a relationship which proved very useful to the future admiral. George Anson entered the navy in February 171 2, and by rapid steps became lieutenant in 17 16, commander in 1722, and post-captain in 1724. In this rank he served twice on the North American station as captain of the " Scarborough " and the " Squirrel " from 1724 to 1730 and from 1733 to 1735. In 1737 he was appointed to the " Centurion," 60, on the eve of war with Spain, and when hostilities had begun he was chosen to command as commodore the squadron which was sent to attack her possessions in South America in 1740. The original scheme was ambitious, and was not carried out. Anson's squadron, which sailed later than had been intended, and was very ill-fitted, consisted of six ships, which were reduced by successive disasters to his flagship the " Centurion." The lateness of the season forced him to round Cape Horn in very stormy weather, and the navigating instruments of the time did not allow of exact observa- tion. Two of his vessels failed to round the Horn, another, the " Wager," was wrecked in the Golfo de Panas on the coast of Chile. By the time Anson reached the island of Juan Fernandez in June 1741, his six ships had been reduced to three, while the strength of his crews had fallen from 961 to 335. In the absence of any effective Spanish force on the coast he was able to harass the enemy, and to capture the town of Paita on the I3th-i5th of November 1741. The steady diminution of his crew by sick- ness, and the worn-out state of his remaining consorts, compelled him at last to collect all the survivors in the " Centurion." He rested at the island of Tinian, and then made his way to Macao in November 1742. After considerable difficulties with the Chinese, he sailed again with his one remaining vessel to cruise for one of the richly laden galleons which conducted the trade between Mexico and the Philippines. The indomitable per- severance he had shown during one of the most arduous voyages in the history of sea adventure was rewarded by the capture of an immensely rich prize, the " Nuestra Sefiora de Covadonga," which was met off Cape Espiritu Santo on the 20th of June 1743. Anson took his prize back to Macao, sold her cargo to the Chinese, keeping the specie, and sailed for England, which he reached by the Cape of Good Hope on the 15th of June 1744. The prize-money earned by the capture of the galleon had made him a rich man for life, and under the influence of irritatian caused by the

refusal of the admiralty to confirm a captain's commission he had given to one of his officers, Anson refused the rank of rear- admiral,

and was prepared to leave the service. His fame would stand nearly as high as it does if he had done so, but he would be a far less important figure in the history of the navy. By the world at large he is known as the commander of the voyage of circumnavigation, in which success was won by indomitable perseverance, unshaken firmness, and infinite resource; But he was also the severe and capable administrator who during years of hard work at the admiralty did more than any other to raise the navy from the state of corruption and indiscipline into which it had fallen during the first half of the eighteenth century. Great anger had been caused in the country by the condition of the fleet as revealed in the first part of the war with France and Spain, between 1739 and 1747. The need for reform was strongly felt, and the politicians of the day were conscious that it would not be safe to neglect the popular demand for it. In 1745 the duke of Bedford, the new first lord, invited Anson to join the admiralty with the rank of rear-admiral of the white. As subordinate under the duke, or Lord Sandwich, and as first lord himself, Anson was at the admiralty with one short break from 1745 till his death in 1762. His chiefs in the earlier years left him to take the initiative in all measures of reform, and supported him in their own interest. After 17 51 he was himself first lord, except for a short time in 1756 and 1757. At his suggestion, or with his advice, the naval administration was thoroughly over-hauled. The dockyards were brought into far better order, and though corruption was not banished, it was much reduced. The navy board was compelled to render accounts, a duty it had long neglected. A system of regulating promotion to flag rank, which has been in the main followed ever since, was introduced. The Navy Discipline Act was revised in 1749, and remained unaltered till 1865. Courts martial were put on a sound footing. Inspec- tions of the fleet and the dockyards were established, and the corps of Marines was created in 1 7 5 5 . The progressive improve- ment which raised the navy to the high state of efficiency it attained in later years dates from Anson's presence at the admiralty. In 1747 he, without ceasing to be a member of the board, commanded the Channel fleet which on the 3rd of May scattered a large French convoy bound to the East, and West Indies, in an action off Cape Finisterre. Several men-of-war and armed French Indiamen were taken, but the overwhelming superiority of Anson's fleet (fourteen men-of-war, to six men-of- war and four Indiamen) in the number and weight of ships deprives the action of any strong claim to be considered remark- able. In society Anson seems to have been cold and taciturn. The sneers of Horace Walpole, and the savage attack of Smollett in The Adventures of an Atom, are animated by personal or political spite. Yet they would not have accused him of defects from which he was notoriously free. In political

life he may sometimes have given too ready assent to the wishes of powerful politicians. He married the daughter of Lord Chancellor Hardwicke on the 27th of April 1 748. There were no children of the marriage. His title of Baron Anson of Soberton was given him in 1747, but became extinct on his death. The title of Viscount Anson was, however, created in 1806 in favour of his great-nephew, the grandson of his sister Janetta and Mr Sam- brook Adams, whose father had assumed the name and arms of Anson. The earldom of Lichfield was conferred on the family in the next generation. A fine portrait of the admiral by Reynolds is in the possession of the earl of Lichfield, and there are copies in the National Portrait Gallery and at Greenwich. Anson's promotions in flag rank were: rear-admiral in 1745, vice-admiral in 1746, and admiral in 1748. In 1749 he became vice-admiral of Great Britain, and in 1761 admiral of the fleet. He died on the 6th of June 1762.

A life of Lord Anson, inaccurate in some details but valuable and interesting, was published by Sir John Barrow in 1839. The standard account of his voyage round the world is that by his chaplain Richard Walter, 1748, often reprinted. A share in the work has been claimed on dubious grounds for Benjamin Robins, the mathematician. Another and much inferior account was published in 1745 by Pascoe Thomas, the schoolmaster of the r ' Centurion." (D. H.)

ANSON, SIR WILLIAM REYNELL, Bart. (1843-), English jurist, was born on the 14th of November 1843, at Walberton, Sussex, son of the second baronet. Educated at Eton and Balliol College, Oxford, he took a first class in the final classical schools in 1866, and was elected to a fellowship of All Souls in the following year. In 1869 he was called to the bar, and went the home circuit until 1873, when he succeeded to the baronetcy. In 1874 he became Vinerian reader in English law at Oxford, a post which he held until he became, in 1881, warden of All Souls College. He identified himself both with local and university interests; he became an alderman of the city of Oxford in 1892, chairman of quarter sessions for the county in 1894, was vice-chancellor of the university in 1 898-1 899, and chancellor of the diocese of Oxford in 1899. In that year he was returned, without opposition, as M.P. for the university in the Liberal Unionist interest, and consequently resigned the vice-chancellorship. In parliament he preserved an active interest in education, being a member of the newly created consultative committee of the Board of Education in 1900, and in 1902 he became parliamentary secretary. He took an active part in the foundation of a school of law at Oxford, and his volumes on The Principles of the English Law of Contract (1884, nth ed. 1906), and on The Law and Custom of the Constitu- tion in two

parts, ” The Parliament ” and ” The Crown ” (1886-

1892, 3rd ed. 1907, pt. Lvol. ii.), are standard works. ANSONIA, a city of New Haven county, Connecticut, U.S.A.,

coextensive with the township of the same name, on the Nauga- tuck river, immediately N. of Derby and about 12 m. N.W. of New Haven. It is served by the New York, New Haven & Hartford railway, and by interurban electric lines running N., S. and E. Pop. (1900) 12,681, of whom 4296 were foreign born; (1910 census) 13,152. Land area about 5-4 sq. m. The city has extensive manufactures of heavy machinery, electric supplies, brass and copper products and silk goods. In 1905 the capital invested in manufacturing was $7,625,864, and the value of the products was $19,132,455. Ansonia, Derby and Shelton form one of the most important industrial communities in the state. The city, settled in 1840 and named in honour of the merchant and philanthropist, Anson Green Phelps (1781-1853), was originally a part of the township of Derby; it was chartered as a borough in 1864 and as a city in

1893, when the township of Ansonia, which had been incorporated in 1889, and the city were consolidated.

ANSTED, DAVID THOMAS (1814-1880), English geologist, was born in London on the 5th of February 1814. He was educated at Jesus College, Cambridge, and after taking his degree of M.A. in 1839 was elected to a fellowship of the college. In- spired by the teachings of Adam Sedgwick, his attention was given to geology, and in 1840 he was elected professor of geology in King’s College, London, a post which he held until 1853. Meanwhile he became a fellow of the Royal Society in 1844, and from that date until 1847 he was vice-secretary of the Geological Society and edited its Quarterly Journal. The practical side of geology now came to occupy his chief attention, and he visited various parts of Europe and the British Islands as a consulting geologist and mining engineer. He was also in 1868 and for many years examiner in physical geography to the science and art department. He died at Melton near Woodbridge, on the 13th of May 1880.

Publications. — Geology, Introductory, Descriptive and Practical (2 vols., 1844); The Ionian Islands (1863); The Applications of Geology to the Arts and Manufactures (1865); Physical Geography (1867); Water and Water Supply (Surface Water) (1878); and The Channel Islands (with R. G. Latham) (1862).

ANSTEY, CHRISTOPHER (1724-1805), English poet, was the son of the rector of Brinkley, Cambridgeshire, where he was born on the 31st of October 1724. He was educated at Eton and King's College, Cambridge, where he distinguished himself for his Latin verses. He became a fellow of his college (1745), but the degree of M.A. was withheld from him, owing to the offence caused by a speech made by him beginning: " Doctores sine doctrina, magistri artium sine artibus, et baccalaurei baculo potius qiiam lauro digni." In 1754 he succeeded to the family

estates and left Cambridge; and two years later he married the daughter of Felix Calvert of Albury Hall, Herts. For some time Anstey published nothing of any note, though he cultivated letters as well as his estates. Some visits to Bath, however, where later, in 1770, he made his permanent home, resulted in 1766 in his famous rhymed letters, The New Bath Guide or Memoirs of the B . . . r . . . d [Blunderhead] Family . . ., which had immediate success, and was enthusiastically praised for its original kind of humour by Walpole and Gray. The Election Ball, in Poetical Letters from Mr Inkle at Bath to his Wife at Gloucester (1776) sustained the reputation won by the Guide. Anstey's other productions in verse and prose are now forgotten. He died on the 3rd of August 1805. His Poetical Works were collected in 1808 (2 vols.) by the author's son John (d. 1819), himself author of The Pleader's Guide (1796), in the same vein with the New Bath Guide.

ANSTRUTHER (locally pronounced Anster), a seaport of Fife- shire, Scotland. It comprises the royal and police burghs of Anstruther Easter (pop. 1190), Anstruther Wester (501) and Kilrenny (2542), and lies 9 m. S.S.E. of St Andrews, having a station on the North British railway company's branch line from Thornton Junction to St Andrews. The chief industries include coast and deep-sea fisheries, shipbuilding, tanning, the making of cod-liver oil and fish-curing. The harbour was completed in 1877 at a cost of £80,000. The two Anstruthers are divided only by a small stream called Dreel Burn. James Melville (1556-1614), nephew of the more celebrated reformer, Andrew Melville, who was minister of Kilrenny, has given in his Diary a graphic account of the arrival at Anstruther of a weather- bound ship of the Armada, and the tradition of the intermixture of Spanish and Fifeshire blood still prevails in the district. Anstruther fair supplied William Tennant (1784-1848), who was born and buried in the town,

with the subject of his poem of ” Anster Fair.” Sir James Lumsden, a soldier of fortune under Gustavus Adolphus, who distinguished himself in the Thirty Years’ War, was born in the parish of Kilrenny about 1598. David Martin (1737-1798), the painter and engraver; Thomas Chalmers (1 780-1847), the great divine; and John Goodsir (1814-1867), the anatomist, were natives of Anstruther. Little more than a mile to the west lies the royal and police burgh of Pittenweem (Gaelic, ” the hollow of the cave “), a quaint old fishing town (pop. 1863), with the remains of a priory. About 2 m. still farther westwards is the fishing town of St Monans or Abercromby (pop. 1898), with a fine old Gothic church, picturesquely perched on the rocky shore. These fisher towns on the eastern and south-eastern coasts of Fifeshire furnish artists with endless subjects. Archibald Constable (1774-1827), Sir Walter Scott’s publisher, was born in the parish of Carnbee, about 3 m. to the north of Pittenweem. The two Anstruthers, Kilrenny and Pittenweem unite with St Andrews, Cupar and Crail, in sending one member to parliament.

ANSWER (derived from and, against, and the same root as swar) , originally a solemn assertion in opposition to some one or something, and thus generally any counter-statement or defence, a reply to a question or objection , or a correct solution of a problem . In English law, the ” answer ” in pleadings was, previous to the Judicature Acts 1873-1875, the statement of defence, especially as regards the facts and not the law. Its place is now taken by a ” statement of defence.” ” Answer ” is the term still applied in divorce proceedings to the reply of the respondent (see Pleading). The famous Latin ResponsaPrudentum (” answers of the learned”) were the accumulated views of many successive generations of Roman lawyers, a body of legal opinion which gradually became authoritative. In music an ” answer ” is the technical name in counterpoint for the repetition by one part or instrument of a theme proposed by another.

ANT (O. Eng. aemete, from Teutonic a, privative, and maitan, cut or bite off, i.e. ” the biter off “; aimete in Middle English became differentiated in dialect use to amete, then amte, and so ant, and also to emete, whence the synonym ” emmet,” now only used provincially, ” ant ” being the general literary form). The fact that the name of the ant has come down in English from a

thousand years ago shows that this class of insects impressed the old inhabitants of England as they impressed the Hebrews and Greeks. The soc”al instincts and industrious habits of ants have always made them favourite objects of study, and a vast amount of literature has accumulated on the subject of their structure and their modes of life.

Characters. — An ant is easily recognized both by the casual observer and by the student of insects. Ants form a distinct and natural family (Formicidae) of the great order Hymenoptera, to which bees, wasps and sawflies also belong. The insects of this order have mandibles adapted for biting, and two pairs of mem- branous wings are usually present; the first abdominal segment (propodeum) becomes closely associated with the fore-body (thorax) , of which it appears to form a part. In all ants the second (apparently the first) abdominal segment is very markedly constricted at its front and hind edges, so that it forms a ” node ” at the base of the hind-body (fig. i), and in many ants the third abdominal segment is similarly ” nodular ” in form (fig. 3, b,.c,). It is this peculiar ” waist ” that catches the eye of the observer, and makes the insects so easy of recognition. Another con spicuous and well-known feature of ants is the wingless condition of the ” workers,” as the specialized females, with undeveloped ovaries, which form the largest proportion of the population of ant-communities, are called. Such ” workers ” are essential to the formation of a social community of Hymenoptera, and their wingless condition among the ants shows that their specialization has been carried further in this family than among the wasps and bees. Further, while among wasps and bees we find some solftary and some social genera, the ants as a family are social, though some

1 ‘ , * 2

Fig. i.— Wood Ant (Formica rufa). 1, Queen; 2, male; 3, worker.

aberrant species are dependent on the workers of other ants. It is interesting and suggestive that in A few families of digging Hymenoptera (such as the Mutillidae), allied to the ants, the females are wingless. The perfect female or ” queen ” ants (figs. 1, 1, 3, a) often cast their wings (fig. 3,6) after the nuptial flight; in a few species the females, and in still fewer the males, never develop wings. (For the so-called ” white ants,“which belong to an order far removed from the Hymenoptera, see Termite.)

Structure. — The head of an ant carries a pair of elbowed feelers, each consisting of a minute basal and an elongate second segment, forming the stalk or ” scape,” while from eight to eleven short segments make up the terminal ” flagellum.” These segments are abundantly supplied with elongate tooth-like projections connected with nerve-endings probably olfactory in function. The brain is well developed and its ” mushroom-bodies ” are exceptionally large. The mandibles, which are frequently used for carrying various objects, are situated well to the outside of the maxillae, so that they can be opened and shut without

interfering with the latter. The peculiar form and arrangement of the anterior abdominal segments have already been described. The fourth abdominal segment is often very large, and forms the greater part of the hind-body; this segment is markedly constricted at its basal (forward) end, where it is embraced by the small third segment. In many of those ants whose third abdom- inal segment forms a second ” node,” the basal dorsal region of the fourth segment is traversed by a large number of very fine transverse stria tions; over these the sharp hinder edge of the third segment can be scraped to and fro, and the result is a stridulating organ which gives rise to a note of very high pitch. For the appreciation of the sounds made by these stridulators, the ants are furnished with delicate organs of hearing (chordotonal organs) in the head, in the three thoracic and two of the abdominal segments and in the shins of the legs.

The hinder abdominal segments and the stings of the queens and workers resemble those of other stinging Hymenoptera. But there are several subfamilies of ants whose females have the lancets of the sting useless for piercing, although the poison-glands are functional, their secretion being ejected by the insect, when occasion may arise, from the greatly enlarged reservoir, the reduced sting acting as a squirt.

Nests. — The nests of different kinds of ants are constructed in very different situations; many species (Lasius, for example) make underground nests; galleries and chambers being hollowed out in the soil, and opening by small holes on the surface, or protected above by a large stone. The wood ant (Formica rufa, fig. i) piles up a heap of leaves, twigs and other vegetable refuse, so arranged as to form an orderly series of galleries, though the structure appears at first sight a chaotic heap. Species of Camponotus and many other ants tunnel in wood. In tropical countries ants sometimes make their nests in the hollow thorns of trees or on leaves; species with this habit are believed to make a return to the tree for the shelter that it affords by protecting it from the ravages of other insects, including their own leaf -cutting relations.

Early Stages. — The larvae of ants (fig. 3, e) are legless and helpless maggots with very small heads (fig. 3, /), into whose mouths the requisite food has to be forced by the assiduous ‘ ‘ nurse ‘ ‘ workers. The maggots are tended by these nurses with the greatest care, and carried to those parts of the nest most favour- able for their health and

growth. When fully grown, the maggot spins an oval silken cocoon within which it pupates (fig. 3, g). These cocoons, which may often be seen carried between the mandibles of the workers, are the “ants’ eggs” prized as food for fish and pheasants. The workers of a Ceylonese ant (Oecophylla smaragdina) are stated by D. Sharp to hold the maggots between their mandibles and induce them to spin together the leaves of trees from which they form their shelters, as the adult ants have no silk-producing organs.

Origin of Societies. — Ant-colonies are founded either by a single female or by several in association. The foundress of the nest lays eggs and at first feeds and rears the larvae, the earliest of which develop into workers. C. Janet observed that in a nest of Lasius alienus, established by a single female, the first workers emerged from their cocoons on the 102nd day. These workers then take on themselves the labour of the colony, some collecting food, which they transfer to their comrades within the nest whose duty is to tend and feed the larvae. The foundress-queen is now .vaited on by the workers, who supply her with food and spare her all cares of work, so that henceforth she may devote her whole energies to egg-laying. The population of the colony increases fast, and a well-grown nest contains several ” queens ” and males, besides a large number of workers. One of the most interesting features of ant-societies is the dimorphism or polymorphism that may often be seen among the workers, the same species being represented by two or more forms. Thus the British ” wood ant ” (Formica rufa) has a smaller and a larger race of workers (•’ minor ” and ” major ” forms), while in Ponera we find a blind race of workers and another race provided with eyes, and in Atla, Eciton and other genera, four or five forms of yworkers are produced , the largest of which, with huge heads and elongate trenchant mandibles, are known as the ” soldier ” caste. The development of such diversely-formed insects as the offspring of the unmodified females which show none of their peculiarities raises many points of difficulty for students in heredity. It is thought that the differences are, in part at least, due to differences in the nature of the food supplied to larvae, which are apparently all alike. But the ovaries of worker ants are in some cases sufficiently developed for the production of eggs, which may give rise parthenogenetic- ally to male, queen or worker offspring.

Food. — Different kinds of ants vary greatly in the substances which they use for food. Honey forms the staple nourishment of many ants, some of the workers seeking nectar from flowers, working it up into honey within their stomachs and regurgitating it so as to feed their comrades within the nest, who, in their turn, pass it on to the grubs. A curious specialization of certain

workers in connexion with the transference of honey has been demonstrated by H. C. McCook in the American genus Myrmecocystus, and by later observers in Australian and African species of Plagiolepis and allied genera. The workers in question remain within the nest, suspended by their feet, and serve as living honey-pots for the colony, becoming so distended by the supplies of honey poured into their mouths by their foraging comrades that their abdomens become sub-globular, the pale intersegmental membrane being tightly stretched between the widely-separated dark sclerites. The ” nurse ” workers in the nest can then draw their supplies from these ” honey-pots.” Very many ants live by preying upon various insects, such as the British ” red ants ” with well-developed stings (Myrmica rubra), and the notorious ” driver ants ” of Africa and America, the old-world species of which belong to Dorylus and allied genera, and the new-world species to Eciton (fig. 2, 2, 3). In these ants the difference between the large, heavy, winged males and females, and the small, long-legged, active workers, is so great, that various forms of the same species have been often referred to distinct genera; in Eciton, for example, the female has a single petiolate abdominal segment, the worker two. The workers of these ants range over the country in large armies, killing and carrying off all the insects and spiders that they find and sometimes attacking vertebrates. They have been known to enter human dwellings, removing all the verminous insects contained therein. These driver ants shelter in temporary nests made in

Fig. 2. — Leaf-cutting and Foraging Ants. 1, Atta cephalus; 2, Eciton drepanophora; 3, Eciton erratica.

hollow trees or similar situations, where the insects may be seen, according to T. Belt, ” clustered together in a dense mass like a great swarm of bees hanging from the roof.”

The harvesting habits of certain ants have long been known,the subterranean store-houses of Mediterranean species of Aphaenogaster having been described by J. T. Moggridge and A. Forel, and the complex industries of the Texan Pogonomyrmex barbatus by H. C. McCook and W. M. Wheeler. The colonies of Aphaeno- gaster occupy nests extending over an area of fifty to a hundred square yards several feet below the surface of the ground. Into these underground chambers the ants carry seeds of grasses and other plants of which they accumulate large stores. The species of Pogonomyrmex strip the husks from the seeds and carry them out of the nest, making a refuse heap near the entrance. The seeds are harvested from various grasses, especially from Aristida oligantha, a species known as ” ant rice,” which often grows in quantity close to the site selected for the nest,

but the statement that the ants deliberately sow this grass is an error, due, according to Wheeler, to the sprouting of germinating seeds which the ants have turned out of their store-chambers.

Perhaps no ants have such remarkable habits as those of the genus Atta, — the leaf -cutting ants of tropical America (fig. 2,1). There are several forms of worker in these species, some with enormous heads, which remain in the underground nests, while their smaller comrades scour the country in search of suitable trees, which they ascend, biting off small circular pieces from the leaves, and carrying them off to the nests. Their labour often results in the complete defoliation of the tree. The tracks along which the ants carry the leaves to their nests are often in part subterranean. H. C. McCook describes an almost straight tunnel, nearly 450 ft. long, made by Attafervens.

Within the nest, the leaves are cut into very minute fragments and gathered into small spherical heaps forming a spongy mass, which — according to the researches of A. Moller — serves as the substratum for a special fungus (Rozites gongylophora) , the staple food of the ants. The ‘insects cultivate their fungus, weeding out

mould and bacterial growths, and causing the appearance, on the surface of their ” mushroom garden,” of numerous small white bodies formed by swollen ends of the fungus hyphae. When the fungus is grown elsewhere than in the ants’ nest it produces gonidia instead of the white masses on which the ants feed, hence it seems that these masses are indeed produced as the result of some unknown cultural process. Other genera of South American ants — A pier stigma and Cyphomyrmex — make similar fungal cultivations, but they use wood, grain or dung as the substratum instead of leaf fragments. Each kind of ant is so addicted to its own particular fungal food that it refuses disdainfully, even when hungry, the produce of an alien nest.

Guests of Ants. — Many ants feed largely and some almost entirely on the saccharine secretions of other insects, the best known of which are the Aphides (plant-lice or ” green-fly “). This consideration leads us to one of the most remarkable and fascinating features of ant-communities — the presence in the nests of insects and other small arthropods, which are tended and cared for by the ants as their ” guests,” rendering to the ants in return the sweet food which they desire. The relation between ants and aphids has often been compared

to that between men and milch cattle. Sir J. Lubbock (Lord Avebury) states that the common British yellow ants (Lasius flavus) collect flocks of root-feeding aphids in their underground nests, protect them, build earthen shelters over them, and take the greatest care of their eggs. Other ants, such as the British black garden species (L. niger), go after the aphids that frequent the shoots of plants. Many species of aphid migrate from one plant to another at certain stages in their life-cycle when their numbers have very largely increased, and F. M. Webster has observed ants, foreseeing this emigration, to carry aphids from apple trees to grasses. It has been shown by M. Btisgen that the sweet secretion (honey-dew) of the aphids is not derived, as generally believed, from the paired cornicles on the fifth abdominal segment, but from the intestine, whence it exudes in drops and is swallowed by the ants.

Besides the aphids, other insects, such as scale insects (Coccidae) , caterpillars of blue butterflies (Lycaenidae) , and numerous beetles, furnish the ants with nutrient secretions. The number of species of beetles that inhabit ants' nests is almost incredibly large, and most of these are never found elsewhere, being blind, helpless and dependent on the ants' care for protection and food; these beetles belong for the most part to the families Pselaphidae, Paussidae and Staphylinidae. Spring-tails and bristle-tails (order Aptera) of several species also frequent ants' nests. While some of these " guest " insects produce secretions that furnish the ants with food, some seem to be useless inmates of the nest, obtaining food from the ants and giving nothing in return. Others again play the part of thieves in the ant society; C. Janet observed a small bristle-tail (Lepismima) to lurk beneath the heads of two Lasius workers, while one passed food to the other, in order to steal the drop of nourishment and to make off with it. The same naturalist describes the associa- tion with Lasius of small mites (Antennophortis) which are carried about by the worker ants, one of which may have a mite beneath her mouth, and another on either side of her abdomen. On patting their carrier or some passing ant, the mites are supplied with food, no service being rendered by them in return for the ants' care. Perhaps the ants derive from these seemingly useless guests the same satisfaction as we obtain by keeping pet animals. Recent advance in our knowledge of the guests and associates of ants is due principally to E. Wasmann, who has compiled a list of nearly 1500 species of insects, arachnids and crustaceans, inhabiting ants' nests. The warmth, shelter and abundant food in the nests, due both to the fresh supplies brought in by the ants and to the large amount of waste matter that accumulates, must prove strongly attractive to the various " guests." Some of the inmates of ants' nests

are here for the purpose of preying upon the ants or their larvae, so that we find all kinds of relations between the owners of the nests and their companions, from mutual benefit to active hostility.

Among these associations or guests other species of ants are

not wanting. For example, a minute species (Solenopsis fugax) lives in a compound nest with various species of Formica, forming narrow galleries which open into the larger galleries of its host. The Solenopsis can make its way into the territory of the Formica to steal the larvae which serve it as food, but the Formica is too large to pursue the thief when it returns to its own galleries.

Slaves. — Several species of ants are found in association with another species which stands to them in the relation of slave to master. Formica sanguinea is a well-known European slave- making ant that inhabits England; its workers raid the nests of F. fusca and other species, and carry off to their own nests pupae from which workers are developed that live contentedly as slaves of their captors. F. sanguinea can live either with or without slaves, but another European ant (Polyergus rufescens) is so dependent on its slaves— various species of Formica— that its workers are themselves unable to feed the larvae. The remarkable genus Aner gates has no workers, and its wingless males and females are served by communities of Tetramorium cespitum (fig. 3).

Fig. 3. — Ant, Tetramorium cespitum (Linn.), a, Female; b, female after loss of wings; c, male; d, worker; e, larva; g, pupa; /, head of larva more highly magnified. After Marlatt, Bull. 4 (n.s.) Div. Ent. U. S. Depi. Agriculture.

Senses and Intelligence of Ants. — That ants possess highly developed senses and the power of communicating with one another has long been known to students of their habits; the researches of P. Huber and Sir J. Lubbock (Lord Avebury) on these subjects are familiar to all naturalists. The insects are guided by light, being very sensitive to ultra-violet rays, and also by scent and hearing. Recent experiments by A. M. Fielde show that an ant follows her own old track by a scent exercised by the tenth segment of the feeler, recognizes other inmates of her nest by a sense of smell resident in the eleventh segment, is guided to the eggs, maggots and pupae, which she has to tend, by sensation through the eighth and ninth segments, and appreciates the general smell of the nest itself by means of organs in the twelfth segment. Lubbock's experiments of inducing ants to seek objects that had been removed show that they are guided by scent rather than by

sight, and that any disturbance of their surroundings often causes great uncertainty in their actions. Ants invite one another to work, or ask for food from

one another, by means of pat? with the feelers; and they respond to the solicitations of their guest-beetles or mites, who ask for food by patting the ants with their feet. In all probability the actions of ants are for the most part instinctive or reflex, and some observers, such as A. Bethe, deny them all claim to psychical qualities. But it seems impossible to doubt that in many cases ants behave in a manner that must be considered intelligent, that they can learn by experience and that they possess memory. Lubbock goes so far as to conclude the account of his experiments with the remark that " It is difficult altogether to deny them the gift of reason . . . their mental powers differ from those of men, not so much in kind as in degree." Wasmann considers that ants are neither miniature human beings nor mere reflex automata, and most students of their habits will probably accept this intermediate position as the most satisfactory. C. L. Morgan sums up a discussion on Lubbock's experiments in which the ants failed to utilize particles of earth for bridgeˆmaking, with the suggestive remark that " What these valuable experi- ments seem to show is that the ant, probably the most intelligent of all insects, has no claim to be regarded as a rational being." Nevertheless, ants can teach " rational beings " many valuable lessons.

Bibliography. — The literature on ants is so vast that it is only possible to refer the reader to a few of the most important works on the family. Pierre Huber's Traite des maiurs desfourmis indigenes (Geneve, 1810) is the most famous of the older memoirs. H. W. Bates, A Naturalist on the Amazons; T. Belt, A Naturalist in Nicaragua; H. C. McCook, Agricultural Ant of Texas (Philadelphia, 1880); and A. Moller's paper in Botan. Mitt, aus denˆTropen, (I 893), contain classical Observations on American species. Sir J. Lubbock's (Lord Avebury) Ants, Bees and Wasps (London t 1882), dealing with British and European species, has been followed by numerous important papers by A. Forel and C. Emery in various Swiss and German periodicals, and especially by C. Janet in his Etudes sur les fourmis, les guepes et les abeilles (Paris, &c, 1893- 1904). Forel (Ann. Soc. Ent. Belg. xlvii., 1893, Journ. Bomnay N. H. Soc. 1900-1903, and Biologia Cent. Americana) and Enifery (Zool. Jahrb. Syst. viii., 1896) have written on the classification of the Formicidae. Among recent

American writers on habit may be mentioned W. M. Wheeler (American Naturalist, 1900-1902) and A. M. Fielde (Proc. Acad. Sci. Philadelphia, 1901); E. Wasmann (Kritisches Verzeichniss der myrmecophilen und'termitophilen Arthro- poden, Berlin, 1894, and 3"" Congres Intern. Zool. 1895) is the great authority on ant-guests and associates. D. Sharp's general account of ants in the Cambridge Nat. Hist. (vol. vi., 1898) is excellent. For discussions on intelligence see A. Bethe, Journ. f. d. ges. Physiol. lxx. (1898); Wasmann, Die psychischen Pahigkeiten der Ameisen (Stuttgart, 1899) ; C. LI. Morgan, Animal Behaviour (London, 1900.)

(G. H. C.)

ANTAE (a Lat. plural word, possibly from ante, before), an architectural term given to slightly projecting pilaster strips which terminate the winged walls of the naos of a Greek temple. They owe their origin to the vertical posts of timber employed in the primitive palaces or temples of Greece, as at Tiryns and in the Heraeum at Olympia, to carry the roof timbers, as no reliance could be placed on the walls built with unburnt brick or in rubble masonry with clay mortar. When between these winged walls there are columns to carry the architrave, so as to form a porch, the latter is said to be in-antis. (See Temple.)

ANTAEUS, in Greek mythology, a giant of Libya, the son of Poseidon and Gaea. He compelled all strangers passing through the country to wrestle with him, and as, when thrown, he derived fresh strength from each successive contact with his mother earth, he proved invincible. With the skulls of those whom he had slain he built a temple to his father. Heracles, in combat with him, discovered the source of his strength, and lifting him up from the earth crushed him to death (Apollodorus ii. 5; Hyginus, Fab. 31). The struggle between Antaeus and Heracles is a favourite subject in ancient sculpture.

ANTALCIDAS, Spartan soldier and diplomatist. In 393 (or 392 B.C.) he was sent to Tiribazus, satrap of Sardis, to undermine the friendly relations then existing between Athens and Persia by offering to recognize Persian claims to the whole of Asia Minor. The Athenians sent an embassy under Conon to counteract his efforts. Tiribazus, who was favourable to Sparta, threw Conon into prison, but Artaxerxes II. (Mnemon) disapproved and recalled his satrap. In 388 Antalcidas, then commander of the

Spartan fleet, accompanied Tiribazus to the Persian court, and secured the active assistance of Persia against Athens. The success of his naval

operations in the neighbourhood of the Hellespont was such that Athens was glad to accept terms of peace (the ” Peace of Antalcidas “), by which (1) the whole of Asia Minor, with the islands of Clazomenae and Cyprus, was recognized as subject to Persia, (2) all other’ Greek cities — so far as they were not under Persian rule — were to be independent, except Lemnos, Imbros and Scyros, which were to belong, as formerly, to the Athenians. The terms were announced to the Greek envoys at Sardis in the winter 387-386, and were finally accepted by Sparta in 386. Antalcidas continued in favour with Artaxerxes, until the annihilation of Spartan supremacy at Leuctra diminished his influence. A final mission to Persia, probably in 367, was a failure, and Antalcidas, deeply chagrined and fearful of the consequences, is said to have starved himself to death. ˆ(SeeˆSPARTA.)

ANTANANARIVO, i.e. “town of a thousand” (Fr. spelling Tananarive), the capital of Madagascar, situated centrally as regards the length of the island, but only about 90 m. distant from the eastern coast, in 18 55′ S., 47° 30′ E. It is 135 m. W.S.W. of Tamatave, the principal seaport of the island, with which it is connected by railway, and for about 60 m. along the coast lagoons, a service of small steamers. The city occupies a commanding position, being chiefly built on the summit and slopes of a long and narrow rocky ridge, which extends north and south for about 2J m., dividing to the north in a Y-shape, and rising at its highest point to 690 ft. above the extensive rice plain to the west, which is itself 4060 ft. above sea-level. For long only the principal village of the Hova chiefs, Antananarivo advanced in importance as those chiefs made themselves sovereigns of the greater part of Madagascar, until it became a town of some 80,000 inhabitants. Until 1869 all buildings within the city proper were of wood or rush, but even then it possessed several timber palaces of considerable size, the largest being 120 ft. high. These crown the summit of the central portion of the ridge; and the largest palace, with its lofty roof and towers, is the most conspicuous object from every point of view. Since the intro- duction of stone and brick, the whole city has been rebuilt and now contains numerous structures of some architectural pre- tension, the royal palaces, the houses formerly belonging to the prime minister and nobles, the French residency, the Anglican and Roman Catholic cathedrals, several stone churches, as well as others of brick, colleges, schools, hospitals, courts of justice and other government buildings, and hundreds of good dwelling-houses. Since the French conquest in 1895 good roads have been constructed throughout the city, broad flights of steps connect places too steep for the formation of carriage roads, and the central space, called Andohalo, has become a handsome place, with walks and

terraces, flower-beds and trees. A small park has been laid out near the residency, and the planting of trees and the formation of gardens in various parts of the city give it a bright and attractive appearance. Water is obtained from springs at the foot of the hill, but it is proposed to bring an abundant supply from the river Ikopa, which skirts the capital to the south and west. The population, including that of the suburbs, is 69,000 (1907). The city is guarded by two forts built on hills to the east and south-west respectively. Including an Anglican and a Roman Catholic cathedral, there are about fifty churches in the city and its suburbs, as well as a Mahom- medan mosque. (J. Sl*)

‘ANTARA IBN SHADDAD, Arabian poet and warrior of the 6th century, was famous both for his poetry and his adventurous life. His chief poem is contained in the M o’allakdt. The account of his life forms the basis of a long and extravagant romance. His father Shaddad was a soldier, his mother Zabuba a negro slave. Neglected at first, he soon claimed attention and respect for himself, and by his remarkable personal qualities and courage in battle he gained his freedom and the acknowledgment of his father. He took part in the great war between the related tribes of Abs and Dhubyan, which began over a contest of horses and was named after them the war of Dahis and Ghabra.

He died in a fight against the tribe of Tai. His poems, which are chiefly concerned with fighting or with his love for Abla, are published in W. Ahlwardt’s The Diwans of the six ancient Arabic Poets (London, 1870); they have also been published separately at Beirut (1888). As regards their genuineness, cf. W. Ahlwardt’s Bemerkungen iiber die Aechtheit der alten arabi- schenGedichte (Greifswald, 1872), pp.50 ff. The Romance of ‘ Antar (Sirat ‘Antar ibn Shaddad) is a work which was long handed down by oral tradition only, has grown to immense proportions and has been published in 32 vols, at Cairo, 1307 (a.d. 1889), and in 10 vols, at Beirut, 1871. It was partly translated by Terrick Hamilton under the title ‘Antar, a Bedoueen Romance (4 vols., London, 1820).

For an account of the poet and his works see H. Thorbeckes, Antarah, ein vorislamischer Dichter (Leipzig, 1867), and cf. the Book of Songs (see Abulfaraj), vol. vii. pp. 148-153. (G. W. T.)

ANTARCTIC (Gr. iuni, opposite, and ap/cros, the Bear, the northern constellation of Ursa Major), the epithet applied to the region (including both the ocean and the lands) round the South Pole. The Antarctic circle is drawn at 66° 30′ S., but polar conditions of climate, &c, extend considerably north of the area thus enclosed. (See Polar Regions.)

ANTEATER, a term applied to several mammals, but (zoo- logically at any rate) specially indicating the tropical American anteaters of the family Myrmecophagidae (see Edentata). The typical and largest representative of the group is the great anteater or ant-bear {Myrmecophagajubata) , an animal measuring 4 ft. in length without

the tail, and 2 ft. in height at the shoulder. Its prevailing colour is grey, with a broad black band, bordered with white, commencing on the chest, and passing obliquely over the shoulder, diminishing gradually in breadth as it ap- proaches the loins, where it ends in a point. It is extensively distributed in the tropical parts of South and Central America, frequenting low swampy savannas, along the banks of rivers, and the depths of the humid forests, but is nowhere abundant. Its food consists mainly of termites, to obtain which it opens their nests with its powerful sharp anterior claws, and as the insects swarm to the damaged part of their dwelling, it draws them into its mouth by means of its long, flexible, rapidly moving tongue covered with glutinous saliva. The great anteater is terrestrial in habits, not burrowing underground like armadillos. Though generally an inoffensive animal, when attacked it can defend itself vigorously and effectively with its sabre-like anterior claws. The female produces a single young at a birth. The tamandua anteaters, as typified by Tamandua (or Uroleptes) telradaclyla, are much smaller than the great anteater, and differ essentially from it in their habits, being mainly arboreal. They inhabit the dense primeval forests of South and Central America. The usual colour is yellowish- white, with a broad black lateral band, covering nearly the whole of the side of the body.

The little or two-toed anteater (Cyclopes or Cycloturus didac- tylus) is a native of the hottest parts of South and Central America, and about the size of a rat, of a general yellowish colour, and exclusively arboreal in its habits. The name scaly anteater is applied to the pangolin (q.v.); the banded anteater (Myrme- cobius fasciatus) is a marsupial, and the spiny anteater (Echidna) is one of the monotremes (see Marsupialia and Monotremata).

ANTE-CHAPEL, the term given to that portion of a chapel which lies on the western side of the choir screen. In some of the colleges at Oxford and Cambridge the ante-chapel is carried north and south across the west end of the chapel, constituting a western transept or narthex. This model, based on Merton College chapel (13th century), of which only chancel and tran- sept were built though a nave was projected, was followed at Wadham, New and Magdalen Colleges, Oxford, in the new chapel of St John's College, Cambridge, and in Eton College. In Jesus College, Cambridge, the transept and a short nave constitute the ante-chapel; in Clare College an octagonal vestibule serves the same purpose; and in Christ's, Trinity and King's Colleges, Cambridge, the ante-chapel is a portion of the main chapel, divided off from the chancel by the choir screen.

ANTE-CHOIR, the term given to the space enclosed in a church

between the outer gate or railing of the rood screen and the door of the screen; sometimes there is only one rail, gate or door, but in Westminster Abbey it is equal in depth to one bay of the nave. The ante-choir is also called the “fore choir.”

ANTE-FIXAE (from Lat. antefigere, to fasten before), the vertical blocks which terminate the covering tiles of the roof of a Greek temple; as spaced they take the place of the cymatium and form a cresting along the sides of the temple. The face of the ante-fixae was richly carved with the anthemion (q.v.) ornament.

ANTELOPE, a zoological name which, so far as can be deter- mined, appears to trace its origin, through the Latin, to Pantholops, the old Coptic, and Antholops, the late Greek name of the fabled unicorn. Its adoption by the languages of Europe cannot apparently be traced farther back than the 4th century of our era, at which date it was employed to designate an imaginary animal living on the banks of the Euphrates. By the earlier English naturalists, and afterwards by Buffon, it was, however, applied to the Indian blackbuck, which is thus entitled to rank as the antelope. It follows that the subfamily typified by this species, in which are included the gazelles, is the one to which alone the term antelopes should be applied if it were employed in a restricted and definable sense.

Although most people have a general vague idea of what constitutes an ” antelope,” yet the group of animals thus designated is one that does not admit of accurate limitations or definition. Some, for instance, may consider that the chamois and the so-called white goat of the Rocky Mountains are entitled to be included in the group; but this is not the view held by the authors of the Book of Antelopes referred to below; and, as a matter of fact, the term is only a vague designation for a number of more or less distinct groups of hollow-horned ruminants which do not come under the designation of cattle, sheep or goats; and in reality there ought to be a distinct English group- name for each subfamily into which “antelopes” are sub-divided.

The great majority of antelopes, exclusive of the doubtful chamois group (which, however, will be included in the present article), are African, although the gazelles are to a considerable extent an Asiatic group. They include ruminants varying in size from a hare to an ox; and comprise about 150 species, although this number is subject to considerable variation accord- ing to personal views as to the limitations of species and races. No true antelopes are American, the prongbuck (Antilocapra), which is commonly called ” antelope ” in

the United States, representing a distinct group; while, as already mentioned, the Rocky Mountain or white goat stands on the borderland between antelopes and goats.

The first group, or Tragelaphinae, is represented by the African elands (Taurotragus) , bongo (Boocercus), kudus (Strepsiceros) and bushbucks or harnessed antelopes (Tragelaphus) , and the Indian nilgai (Boselaphus). Except in the bongo and elands, horns are present only in the males, and these are angulated and generally spirally twisted, and without rings. The muzzle is naked, small glands are present on the face below the eyes, and the tail is comparatively long. The colours are often brilliant; white spots and stripes being prevalent. The harnessed antelopes, or bushbucks, are closely allied to the kudus, from which they chiefly differ by the spiral formed by the horns generally having fewer turns. They include some of the most brilliantly coloured of all antelopes; the ornamentation taking the form of vertical white lines and rows of spots. Usually the sexes differ in colour. Whereas most of the species have hoofs of normal shape, in some, such as the nakong, or situtunga (Tragelaphus spekei), these are greatly elongated, in order to be suited for walking in soft mud, and these have accordingly been separated as Limnotragus. The last-named species spends most of its time in water, where it may be observed not infrequently among the reeds with all but its head and horns submerged. The true or smaller bushbucks, represented by the widely spread Tragelaphus scriptus, with several local races (fig. 1) are sometimes separated as Sylvicapra,

leaving the genus Tragelaphus to be represented by the larger T. angasi and its relatives. The genus Strepsiceros is represented by the true or great kudu (S. capensis or 5. strepsiceros) , fig. 2, ranging from the Cape to Somaliland, and the smaller 5. imberbis of North-East Africa, which has no throat-fringe. The large and brightly coloured bongo (Boocercus euryceros) of the equatorial forest-districts serves in some respects to connect the bushbucks with the elands, having horns in both sexes, and a tufted tail,

but a brilliant orange coat with vertical white stripes. Still larger are the elands, of which the typical Taurolragus oryx of the Cape is uniformly sandy- coloured, although stripes ap- pear in the more northern T. 0. livingstonei; while the black- necked eland (T. derbianus) of Senegambia and the Bahr-el- Ghazal district is a larger and more brilliantly coloured ani- mal. The small horns and bluish-grey colour of the adult bulls serve to distinguish the Indian nilgai

(q.v.), Boselaphus Iragocamelus, from the other members of the subfamily.

The second group, which is mainly African, but also repre- sented in Syria, is that of the Hippotraginae, typified by the sable antelope (Hippotragus niger) and roan antelope(i?. equinus) , but also including the oryxes (Oryx) and addax. These are for the most part large antelopes, with long cylindrical horns, which are present in both sexes, hairy muzzles, no face-glands, long tufted tails and tall thick molars of the ox-type. In Hippo- tragus the stout and thickly ringed horns rise vertically from a ridge above the eyes at an obtuse angle to the plane of the lower part of the face, and then sweep backwards in a bold curve; while theie are tufts of long white hairs near the eyes. The sable antelope is a southern species in which both sexes are black or

Fig. 1. — Female Bushbuck

{Tragelaphus scriptus) .

Fig. 2.— Male Kudu (Strepsiceros capensis).

blackish when adult; while the lighter-coloured and larger roan antelope has a much wider distribution. The South African blauwbok (H. leucophaeus) is extinct. In the addax (Addax nasomaculalus) , which is a distinct species common to North Africa and Syria, the ringed horns form an open spiral ascending in the plane of the face, and there is long, shaggy, dark hair on the fore-quarters in winter. The various species of oryx differ from Hippotragus by the absence of the white eye-tufts, and by the horns sloping backwards in the plane of the face. In the South African gemsbuck (Oryx gazella), fig. 3, the East African beisa or true oryx (O. beisa), and the white Arabian (0. beatrix) the horns are straight, but in the North African white oryx or algazel (O. leucoryx or O. algazal) they are

scimitar-shaped; the colour of this species being white and pale chestnut (see Addax, Oryx, and Sable Antelope).

The third subfamily is the Antilopinae, the members of which have a much wider geographical range than either of the fore- going groups. The subfamily is characterized by the narrow crowns of the molars, which are similar to those of sheep, and the hairy muzzle. Generally there are face-glands below the eyes; and the tail is moderate or short. Pits are present in the forehead of the skull, and the horns are ringed for part of their length, with a compressed base; their form being often lyrate, but sometimes spiral. Lateral hoofs are generally present.

Gazelles (Gazella) , which form by far the largest genus of the subfamily, are inhabitants of open and frequently more or less desert districts. They are mostly of a sandy colour, with dark and light markings on the face, and often a dark band on the flanks. The horns are more or less lyrate, and generally developed in both sexes; there are frequently brushes of haii on the knees. Gazelles may be divided into groups. The one to which the North African G. dorcas belongs is characterized by the presence of

Fig. 3. — Gemsbuck, or Cape Oryx (Oryx gazella).

lyrate or sub-lyrate horns in both sexes, and by the white of the buttocks not extending on to the haunches. Nearly allied is the group including the Indian G. bennetti and the Arabian G. arabica, in which the horns have a somewhat S-shaped curvature in profile. In the group represented by the African G. granti, G. thomsoni, G. mohr, &c, the whitcspf the buttocks often sends a prolongation on to the flanks, the horns are long and the size is large. Lastly, the Central Asian G. gutturosa, G. subgutturosd and G. picticaudata form a group in which the females are hornless and the face-markings inconspicuous or wanting.

The South African springbuck (Antidorcas euchore) is nearly related to the gazelles, from which it is distinguished by the presence on the middle line of the loins of an evertible pouch, lined with long white hairs capable of erection. It has also one premolar tooth less in the lower jaw. Formerly these beautiful antelopes existed in countless numbers on the plains of South Africa, and were in the habit of migrating in droves which com- pletely filled entire valleys. Now they are comparatively rare.

The dibatag or Clarke's gazelle (Ammodorcas clarkei) , of Somali-land, forms a kind of connecting link between the true gazelles and the gerenuk, this being especially shown in the skull. The face has the ordinary gazelle-markings; but the rather short horns— which are wanting in the female — have a peculiar upward and forward curvature, unlike that obtaining in the gazelles

and somewhat resembling that of the reedbuck. The neck is longer and more slender than in ordinary gazelles, and the tail is likewise relatively long. Although local, these animals are fairly common in the

interior of Somaliland, where they are known by the name of dibatag. In running, the head and neck are thrown backwards, while the tail is turned forwards over the back.

The East African gerenuk (q.v.), or Waller's gazelle (Litho- cranius walleri), of which two races have been named, is a very remarkable ruminant, distinguished not only by its exceedingly elongated neck and limbs, but also by the peculiar hooked form of the very massive horns of the bucks, the dense structure and straight profile of the skull, and the extreme slenderness of the lower jaw.

Astillmoreaberrantgazelle is a small North-East African species known as the beira (Dorcatragus melanotis) , with very short horns, large hoofs and a general appearance recalling that of some of the members of the subfamily Neotraginae, although in other respects gazelle-like. The blackbuck (Anlilope cervicapra or A . bezoartica) of India, a species taking its name from the deep black coat assumed by the adult bucks, and easily recognized by the graceful, spirally twisted horns ornamenting the heads of that sex, is now the sole representative of the genus Anlilope, formerly taken to embrace the whole of the true antelopes. Large face- glands are characteristic of the species, which inhabits the open plains of India in large herds. They leap high in the air, like the springbuck, when on the move.

With the palla (q.v.) , or impala(ˆ4 cpyceros melampus) , we reach an exclusively African genus, characterized by the lyrate horns of the bucks, the absence of lateral hoofs, and the presence of a pair of glands with black tufts of hair on the hind-feet.

The sheep-like saiga (q.v.) , Saiga tatarica, of the Kirghiz steppes stands apart from all other antelopes by its curiously puffed and trunk-like nose, which can be wrinkled up when the animal is feeding and has the nostrils opening downwards. More or less nearly related to the saiga is the chiru (q.v.), Pantholops hodgsoni. of Tibet, characterized by the long upright black horns of the bucks, and the less convex nose, in which the nostrils open anteriorly instead of downwards.

The Neotraginae (or Nanotraginae) form an exclusively African group of small-sized antelopes divided into several, for the most part nearly related, genera. Almost the only characters they possess in common are the short and spike-like horns of the bucks, which are ringed at the base, with smooth tips, and the large size of the face-gland, which opens by a circular aperture. Neotragus is represented by the pigmy royal antelope (A r . pygmaeus) of Guinea; Hylarnus includes one species from Cameroon and a second from the Semliki forest; while

Ncsotragus comprises the East African suni antelopes, A r . moschatus and A r . livingstonianus. All three might, however, well be included in Neotragus. The royal antelope is the smallest of the Bovidae.

The steinbok (Rhaphiceros campestris) and the grysbok (R. melanotis) are the best-known representatives of a group char- acterized by the vertical direction of the horns and the small gland-pit in the skull; lateral hoofs being absent in the first- named and present in the second. A bare gland-patch behind the ear serves to distinguish the oribis or ourebis, as typified by Oribia montana of the Cape; lateral hoofs being present and the face-pit large.

From all the preceding the tiny dik-diks (Madoqua) of North- East Africa differ by their hairy noses, expanded in some species into short trunks; while the widely spread klipspringer (q.v.), Oreotragus saltator, with its several local races, is unfailingly distinguishable by its rounded blunt hoofs and thick, brittle, golden-flecked hair.

In some respects connecting the last group with the Cervi- caprinae is the rhebok, or vaal-rhebok (Pelea capreolus), a grey antelope of the size of a roebuck, with small upright horns in the bucks recalling those of the last group, and small lateral hoofs, but no face-glands. In size and several structural. features it approximates to the more typical Ccrvicaprinac, as represented

by the reedbuck (Cervicapra), and the waterbucks and kobs ■(Cobus or Kobus), all of which are likewise African. These are medium-sized or large antelopes with naked muzzles, narrow sheep-like upper molars, fairly long tails, rudimentary or no face-glands, and pits in the frontal bones of the skull. Reedbuck (q.v.), or rietbok (Cervicapra), are foxy-red antelopes ranging in size from a fallow-deer to a roe, with thick bushy tails, for- wardly curving black horns, and a bare patch of glandular skin behind each ear. They keep to open country near water. The waterbuck (q.v.), Cobus, on the other hand, actually seek refuge from pursuit in the water. They have heavily fringed necks, tufted tails, long lyrate horns in the bucks (fig. 4) but no glandular ear-patches. The true waterbuck (C. ellipsiprymnus) , and the defassa or sing-sing (C. defassa), are the two largest species, equal in size to red deer, and grey or reddish in colour. Of the smaller forms or kobs, C. maria and C. leucotis of the swamps of the White Nile are characterized by the black coats of the adult bucks; the West African C. cob, and its East African repre- sentative C. thomasi,- are wholly red antelopes of the size of

Fig. 4. — Waterbuck (Cobus ellipsiprymnus).

roedeer; the lichi or lech we (C. lichi) is characterized by its long horns, black fore-legs and superior size; while the puku (C. vardoni), which is also a swamp-loving species from South- Central Africa, differs from the three preceding species by the fore-legs being uniformly foxy.

The duikers, or duikerboks (Cephalophus) , of Africa, which range in size from a large hare to a fallow-deer, typify the sub- family Cephalophinae, characterized by the spike-like horns of the bucks, the elongated aperture of the face-glands, the naked muzzle, the relatively short tail, and the square-crowned upper molars; lateral hoofs being present. In the duikers themselves the single pair of horns is set in the midst of a tuft of long hairs, and the face-gland opens in a long naked line on the side of the face above the muzzle. The group is represented in India by the chousingha or four-horned antelope (Tetraceros quadricornis), generally distinguished by the feature from which it takes its name (see Duiker).

The last section of the true antelopes is the Bubalinae, repre- sented by the hartebeest (q.v.), Bubalis, blesbok and sassaby (Damaliscus), and the gnu (q.v.) or wildebeest (Connochaetes, also called Catoblepas) , all being African with the exception of one or two hartebeests which range into Syria. All these are large and generally more or less uniformly coloured antelopes with horns in both sexes, long and more or less hairy tails, high withers, small face-glands, naked muzzles, tall, narrow upper molars, and the absence of pits in the frontal bones. The long face, high crest for the horns, which are ringed, lyrate and more or less strongly angulated, and the moderately long tail, are the distinctive features of the hartebeests. They are large red

antelopes (fig. 5), often with black markings on the face and limbs. In Damaliscus, which includes, among many other species, the blesbok and bontebok (D. albifrons and D. pygargus) and the sassaby or bastard hartebeest (D. lunatus), the face is shorter, and the horns straighter and set on a less elevated crest. The colour, too, of these antelopes tends in many cases to purple, with white markings. From the hartebeest the gnus (fig. 6)

Fig. 5. — Cape Hartebeest (Bubalis cama).

differ by their smooth and outwardly or downwardly directed horns,

broad bristly muzzles, heavy manes and long horse-like tails. There are two chief types, the white-tailed gnu or black wildebeest (Connochaetes gnu) of South Africa, now nearly extinct (fig. 6), and the brindled gnu, or blue wildebeest (C. iaurinus), which, with some local variation, has a large range in South and East Africa.

Fig. 6. — White-tailed Gnu, or Black Wildebeest (Connochaetes gnu) .

In concluding this survey of living antelopes, reference may be made to the subfamily Rupicaprinae (typified by the European chamois), the members of which, as already stated, are in some respects intermediate between antelopes and goats. They are all small or medium-sized mountain ruminants, for the most part European and Asiatic, but with one North American repre- sentative. They are heavily built ruminants, with horns of nearly equal size in both sexes, short tapering tails, large hoofs, narrow goat-like upper molars, and usually small face-glands.

The horns are generally rather small, upright, ringed at the base, and more or less curved backwards, but in the takin they are gnu-like. The group is represented by the European chamois or gemse (Rupicapra tragus or R. rupicapra), broadly distin- guished by its well-known hook-like horns, and the Asiatic gorals (Urotragus) and serows (Nemorhaedus), which are represented by numerous species ranging from Tibet, the Himalaya, and China, to the Malay Peninsula and islands, being in the two latter areas the sole representatives of both antelopes and goats. In the structure of its horns the North American white Rocky Mountain goat (Oreamnus) is very like a serow, from which it differs by its extremely short cannon-bones. In the latter respect this ruminant resembles the takin (Budorcas) of Tibet, which, as already mentioned, has horns recalling those of the white-tailed gnu. Possibly the Arctic musk-ox (Ovibos) may be connected with the takin by means of certain extinct ruminants, such as the North American Pleistocene Euceralherium and the European Pliocene Criotherium (see Chamois, Goral, Serow, Rocky Mountain Goat and Takin).

Extinct Antelopes s — Only a few lines can be devoted to extinct antelopes, the earliest of which apparently date from the Euro- pean Miocene. An antelope from the Lower Pliocene of Northern India known as Bubalis, or Damaliscus, palaeindicus indicates the occurrence of the hartebeest group in that country. Cobus also occurs in the same formation, as does likewise Hippotragus. Palaeoryx from the corresponding horizon in Greece and Samos is to some extent intermediate between Hippotragus and Oryx. Gazelles are common in

the Miocene and Pliocene of both Europe and Asia. Elands and kudus appear to have been represented in India during the Pliocene; the European Palaeoreas of the same age seems to be intermediate between the two, while Protragelaphus is evidently another European representative of the group. Helicophora is another spiral-horned European Pliocene antelope, but of somewhat doubtful affinity; the same being the case with the large Criotherium of the Samos Pliocene, in which the short horns are curiously twisted. As already stated, there is a possibility of this latter ruminant being allied both to the takin and the musk-ox. Palaeotragus and Tragoceros, of the Lower Pliocene of Greece, at one time regarded as antelopes, are now known to be ancestors of the okapi.

For antelopes in general, see P. L. Sclater and O. Thomas, The Book of Antelopes- (4 vols., London, 1894-1900). (R. L.*)

ANTEMNAE (Lat. ante amnem, sc. Anienem; Varro, Ling. Lot. v. 28), an ancient village of Latium, situated on the W. of the Via Salaria, 2 m. N. of Rome, where the Anio falls into the Tiber. It is said to have been conquered by Romulus after the rape of the Sabine women, and to have assisted the Tarquins. Certainly it soon lost its independence, and in Strabo's time was a mere village. The site is one of great strength, and is now occupied by a fort, in the construction of which traces of the outer walls and of huts, and several wells and a cistern, all belonging to the primitive village, were discovered, and also the remains of a villa of the end of the Republic.

See T. Ashby in Papers of the British School at Rome, iii. 14.

ANTENOR, an Athenian sculptor, of the latter part of the 6th century B.C. He was the author of the group of the tyran- nicides Harmodius and Aristogeiton, set up by the Athenians on the expulsion of the Peisistratidae, and carried away to Persia by Xerxes. A basis with the signature of Antenor, son of Eumares, has been shown to belong to one of the dedicated female figures of archaic style which have been found on the Acropolis of Athens.

See Greek Art ; and E. A. Gardner's Handbook of Greek Sculpture, i. p. 182.

ANTENOR, in Greek legend, one of the wisest of the Trojan elders and counsellors. He advised his fellow-townsmen to send Helen back to her husband, and showed himself not unfriendly to the Greeks and an advocate of peace. In the later story, according to Dares and Dictys, he was said to have treacherously opened the gates of Troy to the enemy;

in return for which, at the general sack of the city, his house, distinguished by a panther's skin at the door, was spared by the victors. Afterwards,

according to various versions of the legend, he either rebuilt a city on the site of Troy, or settled at Cyrene, or became the founder of Patavium.

Homer, Iliad, iii. 148, vii. 347; Horace, Epp. i. 2. 9; Livy i. 1; Pindar, Pythia, v. 83; Virgil, A en. i. 242.

ANTEQUERA (the ancient Anticaria), a town of southern Spain, in the province of Malaga; on the Bobadilla- Granada railway. Pop. (1900) 31,609. Antequera overlooks the fertile valley bounded on the S. by the Sierra de los Torcales, and on the N. by the river Guadalhorce. It occupies a commanding position, while the remains of its walls, and of a fine Moorish castle on a rock that overhangs the town, show how admirably its natural defences were supplemented by art. Besides several interesting churches and palaces, it contains a fine arch, erected in 1595 in honour of Philip II., and partly constructed of inscribed Roman masonry. In the eastern suburbs there is one of the largest grave-mounds in Spain, said to be of prehistoric date* and with subterranean chambers excavated to a depth of 65 ft. The Pena de los Enamorados, or " Lovers' Peak," is a conspicuous crag which owes its name to the romantic legend adapted by Robert Southey (1774-1843) in his Laila and Manuel. Woollen fabrics are manufactured, and the sugar industry established in 1890 employs several thousand hands; but the majority of the inhabitants are occupied by the trade in grain, fruit, wine and oil. Marble is quarried; and at El Torcal, 6 m. south, there is a very curious labyrinth of red marble rocks. Antequera was captured from the Moors in 1410, and became until 1492 one of the most important outposts of the Christian power in Spain.

See C. Fernandez, Historia de Antequera, desde su fondacion (Malaga, 1842).

ANTEROS, pope for some weeks at the end of the year 235. He died on the 3rd of January 236. His original epitaph was discovered in the Catacombs.

ANTHELION (late Gr. dvflijXios, opposite the sun), the luminous ring or halo sometimes seen in Alpine or polar regions surrounding the

shadow of the head of an observer cast upon a bank of cloud or mist. The halo diminishes in brightness from the centre outwards, and is probably due to the diffraction of light. Under favourable ‘conditions four concentric rings may be seen round the shadow of the observer’s head, the outermost, which seldom appears, having an angular radius of 40 .

ANTHEM, derived from the Gr. kvri*Uiva, through the Saxon antefn, a word which originally had the same meaning as anti- phony (g.v.). It is now, however, generally restricted to a form of church music, particularly in the service of the Church of England, in which it is appointed by the rubrics to follow the third collect at both morning and evening prayer, ” in choirs and places where they sing.” It is just as usual in this place to have an ordinary hymn as an anthem, which is a more elaborate composition than the congregational hymns. Several anthems are included in the English coronation service. The words are selected from Holy Scripture or in some cases from the Liturgy, and the music is generally more elaborate and varied than that of psalm or hymn tunes. Anthems may be written for solo voices only, for the full choir, or for both, and according to this distinction are called respectively Verse, Full, and Full with Verse. Though the anthem of the Church of England is analogous to the motel of the Roman Catholic and Lutheran Churches, both being written for a trained choir and not for the congregation, it is as a musical form essentially English in its origin and development. The English school of musicians has from the first devoted its chief attention to this form, and scarcely a composer of any note can be named who has not written several good anthems. Tallis, Tye, Byrd, and Farrant in the 1 6th century; Orlando Gibbons, Blow, and Purcell in the 17th, and Croft, Boyce, James Kent, James Nares, Benjamin Cooke, and Samuel Arnold in the 18th were famous composers of anthems, and in more recent times the names are too numerous to mention.*

ANTHEMION (from the Gr. &.vdifitov, a flower), the conven- tional design of flower or leaf forms which was largely employed by the Greeks to decorate (1) the fronts of ante-fixae, (2) the upper portion of the stele or vertical tombstones, (3) the necking

of the Ionic columns of the Erechtheum and its continuation as a decorative frieze on the walls of the same, and (4) the cymatium of a cornice. Though generally known as the honeysuckle ornament, from its resemblance to that flower, its origin will be found in the flower of the acanthus plant.

ANTHEMIUS, Greek mathematician and architect, who pro- duced, under the patronage of Justinian (a.d. 532), the original and daring plans for the church of St Sophia in Constantinople, which strikingly displayed at once

his knowledge and his ignore ance. He was one of five, brothers — the sons of Stephanus, a physician of Tralles — who were all more or less eminent in their respective departments. Dioscorus followed his father's pro- fession in his native place; Alexander became at Rome one of the most celebrated medical men of his time; •Olympius was deeply versed in Roman jurisprudence; and Metrodorus was one of the distinguished grammarians of the great Eastern capital. It is related of Anthemius that, having a quarrel with his next-door neighbour Zeno, he annoyed him in two ways. First, he made a number of leathern tubes the ends of which he contrived to fix among the joists and flooring of a fine upper-room in which Zeno entertained his friends, and then subjected it to a miniature earthquake by sending steam through the tubes. Secondly, he simulated thunder and lightning, the latter by flashing in Zeno's eyes an intolerable light from a slightly hollowed mirror. Certain it is that he wrote a treatise on burning-glasses. A fragment of this was published under the title Hepi Trapa86i;uv iir\x avr \i i ˆ r ˆ>v by L. Dupuy in 1777, and also appeared in 1786 in the forty- second volume of the Hist, de P Acad, des Inscr.; A. Westermann gave a revised edition of it in his napa&j&rypdcˆoi (Scriptores rerum mirabilium Graeci), 1839. In the course of constructions for surfaces to reflect to one and the same point (1) all rays in whatever direction passing through another point, (2) a set of parallel rays, Anthemius assumes a property of an ellipse not found in Apollonius (the equality of the angles subtended at a focus by two tangents drawn from a point), and (having given the focus and a double ordinate) he uses the focus and directrix to obtain any number of points on a parabola — the first instance on record of the practical use of the directrix.

On Anthemius generally, see Procopius, De Aedific. i. 1 ; Agathias, Hist. v. 6-9 ; Gibbon's Decline and Fall, cap. xl. (T. L. H-)

ANTHESTERIA, one of the four Athenian festivals in honour of Dionysus, held annually for three days (nth-i3th) in the month of Anthesterion (February-March) . The pbject of the festival was to celebrate the maturing of the wine stored at the previous vintage, and the beginning of spring. On the first day, called Pithoigia (opening of the casks), libations were offered from the newly opened casks to the god of wine, all the household, including servants and slaves, joining in the festivities. The rooms and the drinking vessels in them were adorned with spring flowers, as were also the children over three years of age. The second day, named Cho'es (feast of beakers) , was a time of merrymaking. The people dressed themselves gaily, some in the disguise of the mythical personages in the suite of Dionysus, and paid a round of visits to their acquaintances. Drinking clubs met to drink off matches, the winner being he who drained his cup most rapidly. Others poured libations on the tombs of deceased relatives. On the 'part of the state this day was the occasion of a peculiarly solemn and secret

ceremony in one of the sanctuaries of Dionysus in the Lenaeum, which for the rest of the year was closed. The basilissa (or basilinna), wife of the archon basileus for the time, went through a ceremony of marriage to the wine god, in which she was assisted by fourteen Athenian matrons, called geraerae, chosen by the basileus and sworn to secrecy. The days on which the Pithoigia and Choes were celebrated were both regarded as airop&8ts (nefasti) and fuapai (" denied "), necessitating ex- piatory libations; on them the souls of the dead came up from the underworld and walked abroad; people chewed leaves of whitethorn and besmeared their doors with tar to protect them- selves from evil. But at least in private circles the festive character of the ceremonies predominated. The third day was named Chytri (feast of pots, from xvrpoSt a P°t), a festival of the dead. Cooked pulse was offered to Hermes, in his capacity of 3

god of the lower world, and to the souls of the dead. Although no performances were allowed at the theatre, a sort of rehearsal took place, at which the players for the ensuing dramatic festival were selected.

The name Anthesteria, according to the account of it given above, is usually connected with &vdos (" flower," or the " bloom " of the grape), but A. W. Verrall (Journal of Hellenic Studies, xx., 1900, p. 115) explains it as a feast of " revocation" (from avadiffffaadai, to " pray back " or " up "), at which the ghosts of the dead were recalled to the land of the living (cp. the Roman mundus patel) . J. E. Harrison (ibid. 100,100, and Prolego- mena), regarding the Anthesteria as primarily a festival of all souls, the object of which was the expulsion of ancestral ghosts by means of placation, explains iridoLyla as the feast of the opening of the graves (irWos meaning a large urn used for burial purposes), xo« as the day of libations, and xurpoi as the day of the grave-holes (not " pots," which is xfrrpcu), i n point of time really anterior to the nOotyia. E. Rohde and M. P. Nilsson, however, take the xvrpot. to mean " water vessels," arid connect the ceremony with the Hydrophoria, a libation festival to pro- pitiate the dead who had perished in the flood of Deucalion.

See F. Hiller von Gartringen in Pauly-Wissowa's Realencyclapddie (s.v.) ; J. Girard in Daremberg and Saglio, Dictionnaire des antiquites (s.v. " Dionysia ") ; and F. A. Voigt in Roscher's Lexikon der Mythologie (s.v. " Dionysos ") ; J. E. Harrison, Prolegomena to the Study of Greek Religion (1903) ; M. P. Nilsson, Studia de Dionysiis Atticis (1900) and Griechische Feste (1906); G. F. Schomann, Griechische Alterthilmer, ii. (ed. J. H. Lipsius, 1902), p. 516; A. Mommsen, Feste der Stadt Athen (1898) ; E.

Rohde, Psyche (4th ed., 1907), p. 237.

ANTHIM THE IBERIAN, a notable figure in the ecclesiastical history of Rumania. A Georgian by birth, he came to Rumania early in the second half of the 17 th century, as a simple monk. He became bishop of Ramnicu in 1705, and m 1708 archbishop of VValachia. Taking a leading part in the political movements of the time, he came into conflict with the newly appointed Greek hospodars, and was exiled to Rumelia. But on his crossing the Danube in 17 16 he was thrown into the water and drowned, as it is alleged, at the instigation of the prince of Walachia. He was a man of great talents and spoke and wrote many Oriental and European languages. Though a foreigner, he soon acquired a thorough knowledge of Rumanian, and was instru- mental in helping to introduce that language into the church as its official language. He was a master printer and an artist of the first order. He cut the wood blocks for the books which he printed in Tirgovishtea, Ramnicu, Snagov and Bucharest. He was also the first to introduce Oriental founts of type into Rumania, and he printed there the first Arabic missal for the Christians of the East (R&mnicu, 1702). He also trained Georgians in the art of printing, and cut the type with which under his pupil Mihail Ishtvanovitch they printed the first Georgian Gospels (Tiflis, 1709). A man of great oratorical power, Anthim delivered a series of sermons (Didahii), and some of his pastoral letters are models of style and of language as wejl as of exact and beautiful printing. He also completed a whole corpus of lectionaries, missals, gospels, &c.

See M. Gaster, Chrestomathie roumaine (1881), and " Gesch. d. rumanischen Litteratur," in Grober, Grundriss d. rom. Philo- logie, vol. ii. (1899); and E. Picot, Notice sur Anthim d'lvir (Paris, 1886). (M. G.)

ANTHOLOGY. The term "anthology," literally denoting a garland or collection of flowers, is figuratively applied to any selection of literary beauties, and especially to that great body of fugitive poetry, comprehending about 4500 pieces, by upwards of 300 writers, which is commonly known as the Greek Anthology.

Literary History of the Greek Anthology. — The art of occasional poetry had been cultivated in Greece from an early period, — less, however, as the vehicle of personal feeling, than as the recognized commemoration of remarkable individuals or events, on sepulchral monuments and votive offerings: Such com- positions were termed epigrams, i.e. inscriptions. The modern use of the word is a departure from the original sense, which simply indicated that the composition was intended to be en- graved or inscribed. Such a composition must necessarily be

brief, and the restraints attendant upon its publication concurred with the

simplicity of Greek taste in prescribing conciseness of expression, pregnancy of meaning, purity of diction and single- ness of thought, as the indispensable conditions of excellence in the epigrammatic style. The term was soon extended to any piece by which these conditions were fulfilled. The transition from the monumental to the purely literary character of the epigram was favoured by the exhaustion of more lofty forms of poetry, the general increase, from the general diffusion of culture, of accomplished writers and tasteful readers, but, above all, by the changed political circumstances of the times, which in- duced many who would otherwise have engaged in public affairs to addict themselves to literary pursuits. These causes came into full operation during the Alexandrian era, in which we find every description of epigrammatic composition perfectly developed. About 60 B.C., the sophist and poet, Meleager of Gadara, undertook to combine the choicest effusions of his predecessors into a single body of fugitive poetry. Collections of monumental inscriptions, or of poems on particular subjects, had previously been formed by Polemon Periegetes and others; but Meleager first gave the principle a comprehensive application. His selection, compiled from forty-six of his predecessors, and including numerous contributions of his own, was entitled The Garland (Sridyavos) ; and in an introductory poem each poet is compared to some flower, fancifully deemed appropriate to his genius. The arrangement of his collection was alphabetical, according to the initial letter of each epigram.

In the age of the emperor Tiberius (or Trajan, according to others) the work of Meleager was continued by another epigram- matist, Philippus of Thessalonica, who first employed the term anthology. His collection, which included the compositions of thirteen writers subsequent to Meleager, was also arranged alphabetically, and contained an introductory poem. It was of inferior quality to Meleager's. Somewhat later, under Hadrian, another supplement was formed by the sophist Diogenianus of Heracleia (2nd century A.D.), and Strato of Saxdis compiled his elegant but tainted Movaa UmSikji (Musa Puerilis) from his productions and those of earlier writers. No further collection from various sources is recorded until the time of Justinian, when epigrammatic writing, especially of an amatory character, experienced a great revival at the hands of Agathias of Myrina, the historian, Paulus Silentiarius, and their circle. Their in- genious but mannered productions were collected by Agathias into a new anthology, entitled The Circle (KukXos); it was the first to be divided into books, and arranged with reference to the subjects of the pieces.

These and other collections made during the middle ages are now lost. The partial incorporation of them into a single body, classified according to the contents in 1 5 books, was the work of a certain Constantinus Cephalas, whose name alone is preserved in the single MS. of his compilation extant, but who probably lived during the temporary revival of letters under

Constantine Porphyrogenitus, at the beginning of the 10th century. He appears to have merely made excerpts from the existing antho- logies, with tne addition of selections from Lucillius, Palladas, and other epigrammatists, whose compositions had been published separately. His arrangement, to which we shall have to recur,, is founded on a principle of classification, and nearly corresponds to that adopted by Agathias. His principle of selection is un- known; it is only certain that while he omitted much that he should have retained, he has preserved much that would other- wise have perished. The extent of our obligations may be ascer- tained by a comparison between his anthology and that of the next editor, the monk Maximus Planudes (a.d. 1320), who has not merely grievously mutilated the anthology of Cephalas by omissions, but has disfigured it by interpolating verses of his own. We are, however, indebted to him for the preservation of the epigrams on works of art, which seem to have been accidentally omitted from our only transcript of Cephalas.

The Planudean (in seven books) was the only recension of the anthology known at the revival of classical literature, and was first published at Florence, by Janus Lascaris, in 1494. It long continued

to be the only accessible collection, for although the Palatine MS., the sole extant copy of the anthology of Cephalas, was discovered in the Palatine library at Heidelberg, and copied by Saumaise (Salmasius) in 1606, it was not published until 1776, when it was included in Brunck's Analecta Veterum Poetarum Graecorum. The MS. itself had frequently changed its quarters. In 1623, having been taken in the sack of Heidelberg in the Thirty Years' War, it was sent with the rest of the Palatine Library to Rome as a present from Maximilian I. of Bavaria to Gregory XV., who had it divided into two parts, the first of which was by far the larger; thence it was taken to Paris in 1797. In 1816 it went back to Heidelberg, but in an incomplete state, the second part remaining at Paris. It is now represented at Heidelberg by a photographic facsimile. Brunck's edition was superseded by the standard one of Friedrich Jacobs (1794-1814, 13 vols.), the text of which was reprinted in a more convenient form in 1813-1817, and occupies three pocket volumes in the Tauchnitz series of the classics. The best edition for general purposes is perhaps that of Diibner in Didot's Bibliotheca (1864- 1872), which contains the Palatine Anthology, the epigrams of the Planudean Anthology not comprised in the former, an appendix of pieces derived from other sources, copious notes selected from all quarters, a literal Latin prose translation by Boissonade, Bothe, and Lapaume and the metrical Latin versions of Hugo Grotius. A third volume,

edited by E. Cougny, was published in 1890. The best edition of the Planudean Anthology is the splendid one by van Bosch and van Lennep (1795-1822). There is also a complete edition of the text by Stadtmiiller in the Teuhner series.

Arrangement. — The Palatine MS., the archetype of the present text, was transcribed by different persons at different times, and the actual arrangement of the collection 'does not correspond with that signalized in the index. It is as follows: Book 1. Christian epigrams; 2. Christodorus's description of certain statues; 3. Inscriptions in the temple at Cyzicus; 4. The pre- faces of Meleager, Philippus, and Agathias to their respective collections; 5. Amatory epigrams; 6. Votive inscriptions; 7. Epitaphs; 8. The epigrams of Gregory of Nazianzus; 9. Rhetorical and illustrative epigrams; 10. Ethical pieces; 11. Humorous and convivial; 12. Strato's Musa Puerilis; 13. Metrical curiosities; 14. Puzzles, enigmas, oracles; 15. Mis- cellanies. The epigrams on works of art, as already stated, are missing from the Codex Palatinus, and must be sought in an appendix of epigrams only occurring in the Planudean Anthology. The epigrams hitherto recovered from ancient monuments and similar sources form appendices in the second and third volumes of Dubner's edition.

Style and Value. — One of the principal claims of the Anthology to attention is derived from its continuity, its existence as a living and growing body of poetry throughout all the vicissitudes of Greek civilization. More ambitious descriptions of com- position speedily ran their course, and having attained their complete development became extinct or at best lingered only in feeble or conventional imitations. The humbler strains of the epigrammatic muse, on the other hand, remained ever fresh and animated, ever in intimate union with the spirit of the generation that gave them birth. To peruse the entire collection; accord- ingly, is as it were to assist at the disinterment of an ancient city, where generation has succeeded generation on the same site, and each stratum of soil enshrines the vestiges of a distinct epoch, but where all epochs, nevertheless, combine to constitute an organic whole, and the transition from one to the other is hardly percep- tible. Four stages may be indicated : — 1 . The Hellenic proper, of which Simonides of Ceos (c. 556-469 B.C.), the author of most of the sepulchral inscriptions on those who fell in the Persian wars, is the characteristic representative. This is characterized by a' simple dignity of phrase, which to a modern taste almost verges upon baldness, by a crystalline transparency of diction, and by an absolute fidelity to the original conception of the epigram. Nearly all the pieces of this era are actual bona fide inscriptions or addresses to real personages, whether living or deceased; narratives, literary exercises, and sports of fancy are exceedingly rare. 2. The epigram received a great development in its second or Alexandrian era, when its range was so extended as to include anecdote,

satire, and amorous longing; when epitaphs and votive inscriptions were composed on imaginary persons and things, and men of taste successfully attempted the same subjects in mutual emulation, or sat down to compose verses as displays of their ingenuity. The result was a great gain in richness of style

and general interest, counterbalanced by a falling off in purity of diction and sincerity of treatment. The modification — a perfectly legitimate one, the resources of the old style being exhausted — had its real source in the transformation of political life, but may be said to commence with and to find its best representative in the playful and elegant Leonidas of Tarentum, a contemporary of Pyrrhus, and to close with Antipater of Sidon, about 140 B.C. (or later). It should be noticed, however, that Callimachus, one of the most distinguished of the Alexandrian poets, affects the sternest simplicity in his epigrams, and copies the austerity of Simonides with as much success as an imitator can expect.

3. By a slight additional modification in the same direction, the Alexandrian passes into what, for the sake of preserving the parallelism with eras of Greek prose literature, we may call the Roman style, although the peculiarities of its principal representative are decidedly Oriental. Meleager of Gadara was a Syrian; his taste was less severe, and his temperament more fervent than those of his Greek predecessors; his pieces are usually erotic, and their glowing imagery sometimes reminds us of the Song of Solomon. The luxuriance of his fancy occasionally betrays him into far-fetched conceits, and the lavishness of his epithets is only redeemed by their exquisite felicity. Yet his effusions are manifestly the offspring of genuine feeling, and his epitaph on himself indicates a great advance on the exclusive- ness of antique Greek patriotism, and is perhaps the first clear enunciation of the spirit of universal humanity characteristic of the later Stoic philosophy. His gaiety and licentiousness are imitated and exaggerated by his somewhat later contem- porary, the Epicurean Philodemus, perhaps the liveliest of all the epigrammatists; his fancy reappears with diminished brilliancy in Philodemus's contemporary, Zonas, in Crinagoras, who wrote under Augustus, and in Marcus Argentarius, of un- certain date; his peculiar gorgeousness of colouring remains entirely his own. At a later period of the empire another genre, hitherto comparatively in abeyance, was developed, the satirical. Lucillius, who flourished under Nero, and Lucian, more renowned in other fields of literature, display a remarkable talent for shrewd, caustic epigram, frequently embodying moral reflexions of great cogency, often lashing vice and folly with signal effect, but not seldom indulging in mere trivialities, or deformed by scoffs at personal blemishes. This style of com- position is not properly Greek, but Roman; it answers to the modern definition of epigram, and has hence attained a celebrity in excess of its deserts. It is remarkable, however, as an

almost solitary example of direct Latin influence on Greek literature. The same style obtains with Palladas, an Alexandrian gram- marian of the 4th century, the last of the strictly classical epi- grammatists, and the first to be guilty of downright bad taste. His better pieces, however, are characterized by an austere ethical ifnpressiveness, and his literary position is very interesting as that of an indignant but despairing opponent of Christianity.

4. The fourth or Byzantine style of epigrammatic composition was cultivated by the beaux-esprits of the court of Justinian. To a great extent this is merely imitative, but the circumstances of the period operated so as to produce a species of originality. The peculiarly ornate and rechercM diction of Agathias and his compeers is not a merit in itself, but, applied for .the first time, it has the effect of revivifying an old form, and many of their new locutions are actual enrichments of the language. The writers, moreover, were men of genuine poetical feeling, ingenious in invention, and capable of expressing emotion with energy and liveliness; the colouring of their pieces is sometimes highly drama tici

It wojild be hard to exaggerate the substantial value of the Anthology, whether as a storehouse of facts bearing on antique manners, customs and ideas, or as one among the influences which have contributed to mould the literature of the modern world. The multitudinous votive inscriptions, serious and sportive, connote the phases of Greek religious sentiment, from pious awe to irreverent familiarity and sarcastic scepticism ; the moral tone of the nation at various periods is mirrored with cor- responding fidelity; the sepulchral inscriptions admit us into

the inmost sanctuary of family affection, and reveal a depth and tenderness of feeling beyond the province of the historian to depict, which we should not have surmised even from the dramatists; the general tendency of the collection is to display antiquity on its most human side, and to mitigate those contrasts with the modern world which more ambitious modes of com- position force into relief. The constant reference to the details of private life renders the Anthology an inexhaustible treasury for the student of archaeology; art, industry and costume receive their fullest illustration from its pages. Its influence on European literatures will be appreciated in proportion to the inquirer's knowledge of each. The further his researches extend, the greater will be his astonishment at the extent to which the Anthology has been laid under contribution for thoughts which have become household words in all cultivated languages, and at the beneficial effect of the imitation of its brevity, simplicity, and absolute verbal

accuracy upon the undisciplined luxuriance of modern genius.

Translations, Imitations, &c. — The best versions of the Anthology ever made are the Latin renderings of select epigrams by Hugo Grotius. They have not been printed separately, but will be found in Bosch and Lennep's edition of the Planudean Anthology, in the Didot edition, and in Dr Wellesley's Anthologia Polyglotta. The number of more or less professed imitations in modern languages is infinite, that of actual translations less considerable. French and Italian, indeed, are ill adapted to this purpose, from their incapacity of approximating to the form of the original, and their poets have usually contented themselves with paraphrases or imitations, often exceedingly felicitous. F. D. Deheque's French prose translation, however (1863), is most excellent and valuable. The German language alone admits of the preservation of the original metre — a circumstance advantageous to the German translators, Herder and Jacobs, who have not, however, compensated the loss inevitably consequent upon a change of idiom by any added beauties of their own. Though unfitted to reproduce the precise form, the English language, from its superior terseness, is better adapted to preserve the spirit of the original than the German; and the comparative ill success of many English translators must be chiefly attributed to the extremely low standard of fidelity and brevity observed by them. Bland, Merivale, and their associates (1806-1813), are often intolerably diffuse and feeble, from want, not of ability, but of taking pains. Archdeacon Wrangham's too rare versions are much more spirited; and John Sterling's translations of the inscriptions of Simonides deserve high praise. Professor Wilson (Blackwood's Magazine, 1833-1835) collected and commented upon the labours of these and other translators, with his accustomed critical insight and exuberant geniality, but damaged his essay by burdening it with the indifferent attempts of William Hay. In 1849 Dr Wellesley, principal of New Inn Hall, Oxford, published his Anthologia Poly- glotta, a most valuable collection of the best translations and imita- tions in all languages, with the original text. In this appeared some admirable versions by Goldwin Smith and Dean Merivale, which, with the other English renderings extant at the time, will be found accompanying the literal prose translation of the Public School Selections, executed by the Rev. George Burges for Bohn's Classical Library (1854). This is a useful volume, but the editor's notes are worthless. In 1864 Major R. G. Macgregor published an almost complete translation of the Anthology, a work whose stupendous industry and fidelity almost redeem the general mediocrity of the execution. Idylls and Epigrams, by R. Garnett (1869, reprinted 1892 in the Cameo series), includes about 140 translations or imita- tions, with some original compositions in the same style. Recent translations (selections) are: J. W. Mackail, Select Epigrams from the Greek Anthology (with text, introduction, notes, and prose

translation), 1890, revised 1906, a most charming volume; Graham R. Tomson (Mrs Marriott Watson), Selections from the Greek A.nthology (1889); W. H. D. Rouse, Echo of Greek Song (1899); L. C. Perry, From the Garden of Hellas (New York, 1891); W. R. Paton, Love Epigrams (1898). An agreeable little volume on the Anthology, by Lord Neaves, is one of Collins's series of Ancient Classics for Modern Readers. The earl of Cromer, with all the cares of Egyptian administration upon him, found time to translate and publish an elegant volume of selections (1903). ' Two critical con- tributions to the subject should be noticed, the Rev. James Davies's essay on Epigrams in the Quarterly Review (vol. cxvii.), especially valuable for its lucid illustration of the distinction between Greek and Latin epigram; and the brilliant disquisition in J. A. Symonds's Studies of the Greek Poets (1873; 3rd ed., 1893).

Latin Anthology. — The Latin Anthology is the appellation bestowed upon a collection of fugitive Latin verse, from the age of Ennius to about a.d. iooo, formed by Peter Burmann the Younger. Nothing corresponding to the Greek anthology is known to have existed among the Romans, though professional

epigrammatists like Martial published their volumes on their own account, and detached sayings were excerpted from authors like Ennius and Publius Syrus, while the Priapeia were probably but one among many collections on special subjects. The first general collection of scattered pieces made by a modern scholar was Scaliger's Catalecta veterum Poetarum (1573), succeeded by • the more ample one of Pithoeus, Epigrammata et Poemata e Codicibus et Lapidibus collecta (1590). Numerous additions, principally from inscriptions, continued to be made, and in I 7S9 _I 773 Burmann digested the whole into his Anthologia veterum Latinorum Epigrammatum et Poematum. This, occa- sionally reprinted, was the standard edition until 1869, when Alexander Riese commenced a new and more critical recension, from which many pieces improperly inserted by Burmann are rejected, and his classified arrangement is discarded for one according to the sources whence the poems have been derived. The first volume contains those found in MSS., in the order of the importance of these documents; those furnished by inscrip- tions following. The first volume (in two parts) appeared in 1869-1870, a second edition of the first part in 1894, and the second volume, Carmina Epigraphica (in two parts), in 1895- 1897, edited by F. Bucheler. An Anthologiae Latinae Supple- menta, in the same series, followed. Having been formed by scholars actuated by no aesthetic principles of selection, but solely intent on preserving everything they could find, the Latin anthology is much more heterogeneous than the Greek, and unspeakably inferior. The really beautiful poems of Petronius and Apuleius are more properly inserted in the collected editions of their writings, and more than half the remainder consists of the frigid conceits of pedantic

professional exercises of gram- marians of a very late period of the empire, relieved by an occasional gem, such as the apostrophe of the dying Hadrian to his spirit, or the epithalamium of Gallienus. The collection is also, for the most part, too recent in date, and too exclusively literary in character, to add much to our knowledge of classical antiquity. The epitaphs are interesting, but the genuineness of many of them is very questionable. (R. G.)

ANTHON, CHARLES (1797-1867), American classical scholar, was born in New York city on the 19th of November 1797. After graduating with honours at Columbia College in 1815, he began the study of law, and in 1819 was admitted to the bar, but never practised. In 1820 he was appointed assistant pro- fessor of Greek and Latin in his old college, full professor ten years later, and at the same time headmaster of the grammar school attached to the college, which post he held until 1864. He died at New York on the 29th of July 1867. He produced for use in colleges and schools a large number of classical works, which enjoyed great popularity, although his editions of classical authors were by no means in favour with schoolmasters, owing to the large amount of assistance, especially translations, contained in the notes.

ANTHONY, SAINT, the first Christian monk, was born in Egypt about 250. At the age of twenty he began to practise an ascetical life in the neighbourhood of his native place, and after fifteen years of this life he withdrew into solitude to a mountain by the Nile, called Pispir, now Der el Memun, opposite Arsinog in the Fayum. Here he lived strictly enclosed in an old fort for twenty years. At last in the early years of the 4th century he emerged from his retreat and set himself to organize the monastic life of the crowds of monks who had followed him and taken up their abode in the caves around him. After a time, again in pursuit of more complete solitude, he withdrew to the mountain by the Red Sea, where now stands the monastery that bears his name (Der Mar Antonios). Here he died about the middle of the 4th century. His Life states that on two occasions he went to Alexandria, to strengthen the Christians in the Diocletian persecution and to preach against Arianism. Anthony is recognized as the first Christian monk and the first organizer and father of Christian monachism (seeMoNASTiciSM). Certain letters and sermons are attributed to him, but their authenticity is more than doubtful. The monastic rule which bears his name was not written by him, but was compiled out of these writings

and out of discourses and utterances put into his mouth in the Life and the

Apophlhegmata Patrum. According to this rule live a number of Coptic Syrian and Armenian monks to this day. The chief source of information about St Anthony is the Life, attributed to St Athanasius. This attribution, as also the historical character of the book, and even the very existence of St Anthony, were questioned and denied by the sceptical criticism of thirty years ago; but such doubts are no longer entertained by critical scholars.

The Greek Vila is among the works of St Athanasius ; the almost contemporary Latin translation is among Rosweyd's Vitae Patrum (Migne, Patrol. Lat. lxxiii.) ; an English translation is in the Athan- asius volume of the " Nicene and Post-Nicene Library." Accounts of St Anthony are given by Card. Newman, Church of the Fathers (Historical Sketches) and Alban Butler, Lives of the Saints (Jan. 17). Discussions of the historical and critical questions raised will be found in E. C. Butler's Lausiac History of Palladius (1898, 1904), Part I. pp. 197, 215-228; Part II. pp. ix.-xii. (E. C. B.)

ANTHONY OF PADUA, SAINT (1195-1231), the most cele- brated of the followers of Saint Francis of Assisi, was born at Lisbon on the 1 5 th of August 1 1 9 5 . In his fifteenth year he entered the Augustinian order, and subsequently joined the Franciscans in 1220. He wished to devote himself to missionary labours in North Africa, but the ship in which he sailed was cast by a storm on the coast of Sicily, whence he made his way to Italy. He taught theology at Bologna, Toulouse, Montpellier and Padua, and won a great reputation as a preacher throughout Italy. He was the leader of the rigorous party in the Franciscan order against the mitigations introduced by the general Elias. His death took place at the convent of Ara Coeli, near Padua, on the 13th of June 1231. He was canonized by Gregory IX. in the following year, and his festival is kept on the 13th of June. He is regarded as the patron saint of Padua and of Portugal, and is appealed to by devout clients for finding lost objects. The meagre accounts of his life which we possess have been supple- mented by numerous popular legends, which represent him as a continuous worker of miracles, and describe his marvellous eloquence by pictures of fishes leaping out of the water to hear him. There are many confraternities established in his honour throughout Christendom, and the number of "pious" biographies devoted to him would fill many volumes.

The most trustworthy modern works are by A. Lepitre, St Antoine de Padoue (Paris, 1902, in Les Saints series: good bibliography; Eng. trans, by Edith Guest, London, 1902), and by Leopold de Cherance, 5/ Antoine de Padoue (Paris, 1895; Eng. trans., London, 1896). His works, consisting of sermons and a mystical commentary on the Bible, were published in an appendix to those of St Francis, in the Annates Minorum of Luke Wadding (Antwerp, 1623), and are also reproduced by Horoy, Medii aevi

bibliotheca patristica (1880, vi. PP- 555 et sqq) ; see art. ” Antonius von Padua ” in Herzog-Hauck, Realencyklopddie.

*ANTHONY, SUSAN BROWNELL (1820-1906), American reformer, was born at Adams, Massachusetts, on the 15th of February 1820, the daughter of Quakers. Soon after her birth, her family moved to the state of New York, and after 1845 she lived in Rochester. She received her early education in a school maintained by her father for his own and neighbours' children, and from the time she was seventeen until she was thirty-two she taught in various schools. In the decade preceding the outbreak of the Civil War she took a prominent part in the anti-slavery and temperance movements in New York, organizing in 1852 the first woman's state temperance society in America, and in 1856 becoming the agent for New York state of the American Anti-slavery Society. After 1854 she devoted herself almost exclusively to the agitation for woman's rights, and became recognized as one of the ablest and most zealous advocates, both as a public speaker and as a writer, of the complete legal equality of the two sexes. From 1868 to 1870 she was the proprietor of a weekly paper, The Revolution, published in New York, edited by Mrs Elizabeth Cady Stanton, a*id having for its motto, ” The true republic— men, their rights and nothing more; women, their rights and nothing less.” She was vice-president-at-large of the National Woman's Suffrage Association from the date of its organization in 1869 until 1892, when she became president. For casting a vote in the presidential election*

11. 4

of 1872, as, she asserted, the Fourteenth Amendment to the Federal Constitution entitled her to do, she was arrested and fined $100, but she never paid the fine. In collaboration with Mrs Elizabeth Cady Stanton, Mrs Matilda Joslyn Gage, and Mrs Ida Husted Harper, she published The History of Woman Suffrage (4 vols., New York, 1884-1887). She died at Rochester, New York, on the 13th of March 1906.

See Mrs Ida Husted Harper's Life and Work of Susan B. Anthony (3 vols., Indianapolis, I898-1908).

ANTHOZOA (i.e. “flower-animals”), the zoological name for a class of marine polyps forming ” coral ” (?.».). Although corals have been familiar objects since the days of antiquity, and the variety known as the precious red coral has been for a long time an article of commerce in the Mediterranean, it was only in the 18th century that their true nature and structure came to be understood. By the ancients and the earlier naturalists of the Christian era they were regarded either as petrifactions or as plants, and many supposed that they occupied a position midway between

minerals and plants. The discovery of the animal nature of red coral is due to J. A. de Peyssonel, a native of Marseilles, who obtained living specimens from the coral fishers on the coast of Barbary and kept them alive in aquaria. He was thus able to see that the so-called " flowers of coral " were in fact nothing else than minute polyps resembling sea- anemones. His discovery, made in 1727, was rejected by the Academy of Sciences of France, but eventually found acceptance at the hands of the Royal Society of London, and was published by that body in 1751. The structure and classification of polyps, however, were at that time very imperfectly understood, and it was fully a century before the true anatomical characters and systematic position of corals were placed on a secure basis.

The hard calcareous substance to which the name coral is applied is the supporting skeleton of certain members of the Anthozoa, one of the classes of the phylum Coelentera. The most familiar Anthozoan is the common sea-anemone, Actinia equina, L., and it will serve, although it does not form a skeleton or corallum, as a good example of the structure of a typical Antho- zoan polyp or zooid. The individual animal or zooid of Actinia equina has the form of a column fixed by one extremity, called the base, to a rock or other object, and bearing at the opposite extremity a crown of tentacles. The tentacles surround an area known as the peristome, in the middle of which there is an elongated mouth-opening surrounded by tumid lips. The mouth does not open directly into the general cavity of the body, as is the case in a hydrozoan polyp, but into a short tube called the stomodaeum, which in its turn opens below into the general body-cavity or coelenteron. In Actinia and its allies, and most generally, though not invariably, in Anthozoa, the stomodaeum is not circular, but is compressed from side to side so as to be oval or slit-like in transverse section. At each end of the oval there is a groove lined by specially long vibratile cilia. These grooves are known as the sulcus and sulculus, and will be more particularly described hereafter. The elongation of the mouth and stomodaeum confer a bilateral symmetry on the body of the zooid, which is extended to other organs of the body. In Actinia, as in all Anthozoan zooids, the coelenteron is not a simple cavity, as in a Hydroid, but is divided by a number of radial folds or curtains of soft tissue into a corresponding number of radial chambers. These radial folds are known as mesenteries, and their position and relations may be understood by reference to figs. 1 and 2. Each mesentery is attached by its upper margin to the peristome, by its outer margin to the body-wall, and by its lower margin to the basal disk. A certain number of mesenteries, known as complete mesenteries, are attached by the upper parts of their internal margins to the stomodaeum, but below this level their edges hang in the coelenteron. Other mesenteries, called incomplete, are not attached to the stomo- daeum, and their internal margins are free from the peristome to the basal disk. The lower part of the

free edge of every mesentery, whether complete or incomplete, is thrown into numerous puckers or folds, and is furnished with a glandular thickening known as a mesenterial filament. The reproductive

Fig. i. — Diagrammatic longitudinal section of an Anthozoan zooid.

in, Mesentery.

/, Tentacles.

st, Stomodaeum.

sc, Sulcus.

r, Rotteken's muscle.

s, Stoma.

Im, Longitudinal muscle. Diagonal muscle. Gonads.

d,

go

organs or gonads are borne on the mesenteries, the germinal cells being derived from the inner layer or endoderm.

In common with all Coelenterate animals, the walls of the columnar body and also the tentacles and peristome of Actinia are composed of three layers of tissue. The external layer,

or ectoderm, is made up of cells, and contains also muscular and ner- vous elements. The pre- ponderating elements of the ectodermic layer are elongated columnar cells, each containing a nucleus, and bearing cilia at their free ex- tremities. Packed in among these are gland cells, sense cells, and cnidoblasts. The last- named are specially numerous on the ten- tacles and on some other regions of the body, and produce the well-known " thread cells," or nemalocysts, so char- acteristic of the Coe- lentera. The inner layer or endoderm is also a cellular layer, and is chiefly made up of columnar cells, each bearing a cilium at its free ex- tremity and terminating internally in a long muscular fibre. Such cells, made up of epithelial and

musculaT components, are

known as ©pithelio-mus- cular or myo-epithelial cells. In Actinians the epithelio-muscular cells of the endoderm are crowded with yellow spherical bodies, which are unicellu- lar plants or Algae, living symbiotically in the tissues of the zooid. The endoderm contains in addition gland cells and nervous elements. The middle layer or mesogloea is not originally a cellular layer, but a gelatinoid structureless substance, secreted by the two cellular layers. In the course of development, however, cells from the ectoderm and endoderm may mi- grate into it. In Actinia equina the mesogloea con- sists of fine fibres imbedded

5′

Fig. 2. — i, Portion of epithelium from the tentacle of an Actinian, showing three supporting cells and one in a homogeneous matrix, sense cell (sc) ; 2, a cnidoblast with an d between the fibres enclosed nematocyst from the same specimen; 3 and 4, two forms of gland cell from the stomodaeum ; 50, 56, epithelio-muscular cells from the tentacle in different states of con- traction; 5c, an epithelio-muscular cell from the endoderm, containing a symbiotic zooxanthella ; 6, a ganglion cell from theectoderm of the peristome. (After O. and R. Hertwig.)

ible into two sub-classes, sharply marked off from one another by definite anatomical characters. These are the Alcyonaria and the Zoantharia. To the first-named belong the precious red coral and its allies, the sea-fans or Gorgoniae; to the second belong the white or Madreporarian corals.

are minute branched or spindle-shaped cells. For further details of the structure of Actinians, the reader should consult the work of 0. and R. Hertwig. The Anthozoa are divis-

Alcyonaria. — In this sub-class the zooid (fig. 3) has very constant anatomical characters, differing in some important respects from the Actinian zooid, which has been taken as a type. There is only one ciliated groove, the sulcus, in the stomodaeum. There are always eight tentacles, which are hollow and fringed on their sides, with hollow projections or pinnae; and always eight mesenteries, all of which are complete, i.e. inserted on the stomodaeum. The mesen- teries are provided with well-developed longitudinal retractor muscles, supported on longitudinal folds or plaits of the mesogloea, so that in cross-section they have a branched appearance. These muscle-banners, as they are called, have a highly characteristic arrangement; they are all situated on those faces of the mesenteries which look towards the sulcus (fig. 4). Each mesentery has a fila- ment; but two of them, namely, the pair farthest from the sul- cus, are

longer than the rest, and have a differ- ent form of filament. It has been shown that these asulcar filaments are derived from the ectoderm, the re- Q mainder from the en- doderm. The only exceptions to this structure are found in the arrested or modified zooids, which occur in Fig. 3. — An expanded Alcyonarian zooid, many of the colonial showing the mouth surrounded by eight Alcyonaria. In these pinnate tentacles, st, Stomodaeum in the the tentacles are centre of the transparent body; m, mes- st tinted or suppressed enteries; asm, asulcar mesenteries; B, and the mesenteries are spicules, enlarged. ill-developed, but the

sulcus is unusually large and has long cilia. Such modified zooids are called siphonozpoids, their function being to drive currents of fluid through the canal-systems of the colonies to which they belong. With very few exceptions a calcareous skeleton is present in all Alcyonaria ; it usually consists of spicules of carbonate of lime, each spicule being formed within an ectodermic cell (fig. 3, B). Most commonly the spicule-forming cells pass out of the ectoderm and are imbedded in the mesogloea, where they may remain separate from one another or may be fused together to form a strong mass. In addition to the spicular skeleton an organic horny skeleton is fre- quently present, either in the form of a horny ex- ternal investment (Cor- nularia), or an internal axis (Gorgonia), or it may form a matrix in which spicules are imbedded (Keroeides, Melitodes).

Nearly all the Alcyonaria are colonial. Four solitary species have been de- scribed, viz. Haimea funebris and H. hyalina, Hartea elegans, and Mon- oxenia Darwinii; but it is doubtful whether these are not the young forms of colonies. For the present the solitary forms may be placed in a grade, Protal- cyonacea; and the colonial forms may be grouped in another grade, Synalcyon-

acea. Every Alcyonarian FlG ,_ T ransverse section of an colony is developed by A , cyonari an zooid. mm, Mesenteries; budding from a single mb musde banners; sc sulcus . stt parent zooid The buds stomodaeum . are not direct outgrowths

of the body-wall, but are formed on the courses of hollow out growths of the base or body-wall, called solenia. These form a more or less complicated canal system, lined by endoderm, and communicating with the cavities of the zooids. The most simple form of budding is found in the genus Cornularia, in which the mother zooid gives off from its base one or more simple radiciform outgrowths. Each outgrowth contains a single tube or solenium, and at a longer or shorter distance from the mother zooid a daughter zooid is formed as a bud. This gives off new outgrowths, and these, branching and anastomosing with one another, may form a network, adhering to stones, corals, or other objects, from which

0-

youm

. st,

; colony of Stolon ; p,

Fig.

A, Skeleton of a Tubipora purpurea. platform.

B, Diagrammatic longitudinal section of a corallite, showing two platforms, £,and simple and cup-shaped tabulae, /. (After S. J. Hickson.)

zooids arise at intervals. In Clavularia and its allies each outgrowth contains several solenia, and the outgrowths may take .the form of flat expansions, composed of a number of solenial tubes felted together to form a lamellar surface of attachment. Such outgrowths are called stolons, and a stolon may be simple, i.e. contain only one solenium, as in Cornularia, or may be complex and built up of many solenia, as in Clavularia. Further complications arise when the lower walls of the mother zooid become thickened and interpene- trated with solenia, from which buds are developed, so that lobose,

tufted, or branched colonies are formed. The chief orders of the Synalcyonacea are founded upon the different architectural features of colonies produced by differ- ent modes of budding. We recognize six orders — the Stolonifera, Alcyon- acea,pseudaxonia, axif- era, Stelechotokea, and

COENOTHECALIA.

In the order Stolonifera the zooids spring at intervals from branching or lamellar stolons, and are usually free from one another, except at their bases, but in some t ases horizontal solenia arising at various heights from the body-wall may place the more distal portions of the zooids in commu- nication with one another. In the genus Tubipora these horizontal solenia unite to' form a series of horizontal platforms (fig. 5). The order comprises the families Cor- nulariidae, Syringoporidae, Tubiporidae, and Favosi- tidae. In the first-named the zooids are united only by their bases and the skeleton consists of loose spicules. In the Tubiporidae the spicules of the proximal part of the body-wall are fused together to form a firm tube, the

corallite, into which the distal part of the zooid can be retracted. The corallites are connected at intervals by horizontal platforms containing solenia, and at the level of each platform the cavity of the corallite is divided by a transverse calcareous partition, either flat or cup-shaped, called a tabula. Formerly all corals in which tabulae are present were classed together as Tabulata, but Tubipora is an undoubted Alcyonarian with a lamellar stolon, and the structure of the fossil genus Syringopora, which has vertical corallites united by horizontal solenia, clearly shows its affinity to

_,. Tubipora. The Favosi- ;)tˆ"i tidae, a fossil family from the Silurian and Devonian, have a massive corallum composed of numerous polygonal corallites closely packed together. The cavities of adjacent coral- lites communicate by means of numerous per- forations, which appear to represent solenia, and numerous transverse tab- ulae are also present. In Favosites hemisphaerica a number of radial spines, projecting into the cavity Fig. 6.— Portion of a colony of Coral- of the corallite, give it the Hum rubrum, showing expanded and appearance of a madrepor- contracted zooids. In the lower part of arian coral, the figure the cortex has been cut away I n th ˆ order Alcyon- to show the axis, ax, and the longi- ACEA tne colony consists tudinal canals, Ic, surrounding it. of . bunches of elongate

cylindrical zooids, whose proximal portions are united by solenia and compacted, by fusion of their own walls and those of the solenia, into a fleshy mass called the coenenchyma. Thus the coenenchyma forms a stem, sometimes branched, from the surface of which the free portions of the zooids project. The skeleton of the Alcyonacea consists of separate calcareous spicules, which are often, especially in the Nephthyidae, so abundant and so closely interlocked as to form a tolerably firm and hard armour. The order comprises the families Xeniidae, Alcyonidae and Nephthyidae. Alcyonium digitatum, a pink digitate form popularly known as " dead men's fingers," is common in 10-20 fathoms of water off the English coasts.

In the order Pseudaxoma the colonies are upright and branched,

consisting of a number of short zooids whose proximal ends are im- bedded in a coenenchyma containing numerous ramifying solenia and spicules. The coenenchyma is further differentiated into a medullary portion and a cortex. The latter contains the proximal moieties of the zooids and numerous but separate spicules. The medullary portion is densely crowded with spicules of different shape from those in the cortex, and in some forms the spicules are cemented together to form a hard supporting axis. There are four families of Pseud- axonia — the Briareidae, Sclerogorgidae,

Melitodidae, and Corallidae. In the first-named the medulla is penetrated by solenia and forms an indistinct axis; in the remainder the me- dulla is devoid of solenia, and in the Melitodidae and Corallidae it forms a dense axis, which in the Melito- didae consists of alternate calcareous andhornyjoints. The precious red coral of commerce, Corallium rub- rum (fig. 6), a member of the family Corallidae, is found at depths varying from 15 to 120 fathoms in

Fig. 7.-

The sea-fan (Gorgonia cavolinii) . the Mediterranean Sea, chiefly on the African coast. It owes its commercial value to the beauty of its hard red calcareous axis which in life is covered by a cortex in which the proximal moieties of the zooids are imbedded. Corallium rubrum has been the subject of a beautifully-illustrated memoir by de Lacaze-Duthiers, which should be consulted for details of anatomy.

The Axifera comprise those corals that have a horny or calcified axis, which in position corre- sponds to the axis of the Pseudaxonia, but, unlike it, is never formed of fused spicules; the most familiar example is the pink sea-fan, Gorgonia cavolinii, which is found in abundance in 10-25 fathoms of water off the English coasts . (fig. 7). In this order the axis is formed as an ingrowth of the ecto- derm of the base of the mother zooid of the colony, the cavity of the ingrowth being filled by a horny sub- stance secreted by the ecto- derm. In Gorgonia the axis remains horny throughout life, but in many forms it is further strengthened by a deposit of calcareous matter. In the family Isidinae the axis consists of alternate segments of horny and cal- careous substance, the latter being amorphous. The order contains six families — the Dasygorgidae, Isidae, Primnoidae, Muriceidae, Plexauridae, and Gorgonidae. In the order Stelecho- tokea the colony consists of a stem formed by a greatly- elongated mother zooid, and the daughter zooids are borne as lateral buds on the stem. In the section A siphonacea the colonies are upright and branched, springing from membranous or ramifying stolons. They resemble and are closely allied to certain families of the Cornulariidae, differing from them only in mode of budding and in the disposi- tion of the daughter zooids round a central, much-elongated mother zooid. The section contains two families, the Telestidae and the Coelogorgidae. The second section comprises the Pennalulacea or sea-pens, which are remarkable from the fact that the colony is not fixed by the base to a rock or other

Fig. 8.

A, Colony olPennatulaphospkorea from the metarachidial aspect, p, The peduncle.

B, Section of the rachis bearing a single pinna, a, Axis; b, metarachi- dial; c, prorachidial ; d, pararachidial stem canals.

object, but is imbedded in sand or mud by the proximal portion of the stem known as the peduncle. In the typical genus, Pennatula (fig. 8), the colony looks like a feather having a stem divisible into an upper moiety or rachis, bearing lateral central leaflets (pinnae), and a lower peduncle, which is sterile and imbedded in sand or mud. The stem represents a greatly enlarged and elongated mother zooid. It is divided longitudinally by a partition separating a so-called " ventral " or prorachidial canal from a so-called " dorsal " or metarachidial canal. A rod-like supporting axis of peculiar texture is developed in the longitudinal partition, and a longitudinal canal is hollowed out on either side of the axis in the substance of the longitudinal partition, so that there are four stem-canals in all. The prorachidial and metarachidial aspects of the rachis are sterile, but the sides or pararachides bear numerous daughter zooids of two kinds—(i) fully-formed autozooids, (2) small stunted siphono- zooids. The pinnae are formed by the elongated autozooids, whose proximal portions are fused together to form a leaf-like expansion, from the upper edge of which the distal extremities of the zooids

Croject. The siphonozooids are very numerous and lie between the ases -al the pinnae on the pararachides; they extend also on the prorachidial and metarachidial surfaces. The calcareous skeleton of the Pennatulacea consists of scattered spicules, but in one species, Protocaulon molle, spicules are absent. Although of great interest the Pennatulacea do not form an enduring skeleton or "coral," and need not be considered in detail in this place.

The order Coenothecalia is represented by a single living species, Heliopora coerulea, which differs from all recent Alcyonana in the fact that its skeleton is not composed of spicules, but is formed as a secretion from a layer of cells called calicoblasts, which originate from the ectoderm. The corallum of Heliopora is of a blue colour, and has the form of broad, upright, lobed, or digitate masses flattened from side to side. The surfaces are pitted all over with perforations of two kinds, viz. larger star-shaped cavities, called calices, in which the zooids are lodged, and very numerous smaller round or polygonal apertures, which in life contain as many short unbranched

A Fig. 9. B

A, Portion of the surface of a colony of Heliopora coerulea magni- fied, showing two calices and the surrounding coenenchymal tubes.

B, Single zooid with the adjacent soft tissues as seen after removal of the skeleton by decalcification. Z 1 , the distal, and Z 2 , the proximal or intracalicular portion of the zooid; ec, ectoderm; ct, coenen- chymal tubes; sp, superficial network of solenia.

tubes, known as the coenenchymal tubes (fig. 9, A). The walls of the calices and coenenchymal tubes are formed of flat plates of calcite, which are so disposed that the walls of one tube enter into the com- position of the walls of adjacent tubes, and the walls of the calices are formed by the walls of adjacent coenenchymal tubes. Thus the architecture of the Helioporid colony differs entirely from such forms as Tubipora or Favosites, i.T which each corallite has its own distinct and proper wall. The cavities both of the calices and coenenchymal tubes of Heliopora are closed below by horizontal partitions or tabulae, hence the genus was formerly included in the group Tabulata, and was supposed to belong to the madreporarian corals, both because of its lamellar skeleton, which resembles that of a Madrepore, and because each calicle has from twelve to fifteen radial partitions or septa projecting into its cavity. The structure of the zooid of Heliopora, however, is that of a typical Alcyonarian, and the septa have only a resemblance to, but no real homology with, the similarly named structures in madreporarian corals. Heliopora coerulea is found between tide-marks on the shore platforms of coral islands. The order was more abundantly represented in Palaeozoic times by the Heliolitidae from the Upper and Lower Silurian and the Devonian, and by the Thecidae from the Wenlock limestone. In Heliolites porosus the colonies had the form of spheroidal masses; the calices were furnished with twelve pseudosepta, and the coenenchymal tubes were more or less regularly hexagonal.

Zoantharia. — In this sub-class the arrangement of the mesenteries is subject to a great deal of variation, but all the types hitherto observed may be referred to a common pj an > illustrated by the living genus Edwardsia (fig. 10, A, B). This is a small solitary Zoantharian which lives embedded in sand. Its body is divisible into three portions, an upper capitulum bearing the mouth and tentacle, a median scapus covered by a friable cuticle, and a terminal*

physa which is rounded. Both capitulum and physa can be retracted within the scapus. There are from sixteen to thirty- two simple tentacles, but only eight mesenteries, all of which are complete. The stomodaeum is compressed laterally, and is furnished with two longitudinal grooves, a sulcus and a sulculus. The arrangement of the muscle-banners on the mesenteries is characteristic. On six of the mesenteries the muscle-banners

have the same position as in the Alcyonaria, namely, on the sulcar faces; but in the two remain- ing mesenteries, namely, those which are attached on either side of the sulcus, the muscle-banners are on the opposite or sulcular faces. It is not known whether all the eight mesenteries of Edwardsia are developed simultaneously or not, but in the youngest

Fig. 10.

A, Edwardsia claparedii (after A. Andres). Cap, capitulum; sc, scapus; pli, physa.

B, Transverse section of the same, showing the arrangement of the mesenteries, s, Sulcus; si, sulculus.

C, Transverse section of Halcampa. d, d, Directive mesenteries; st, stomodaeum.

form which has been studied all the eight mesenteries were present, but only two of them, namely the sulco-laterals, bore mesenterial filaments, and so it is presumed that they are the first pair to be developed. In the common sea-anemone, Actinia equina (which has already been quoted as a type of Anthozoan structure), the mesenteries are numerous and are arranged in cycles. The mesen- teries of the first cycle are complete (i.e. are attached to the stomo- daeum), are twelve in number, and arranged in couples, distinguish- able by the position of the muscle-banners. In the four couples o' mesenteries which are attached to the sides of the elongated stomo- daeum the muscle-banners of each couple are turned towards one another, but in the sulcar and sulcular couples, known as the directive

Fig. 11. — A, Diagram showing the sequence of mesenterial devel- opment in an Actinian. B, Diagrammatic transverse section of Gonactinia prolifera.

mesenteries, the muscle-banners are on the outer faces of the mesen- teries, and so are turned away from one another (see fig. 10, C). The space enclosed between two mesenteries of the same couple is called an entocoele; the space enclosed between two mesenteries of adjacent couples is called an exocoele. The second cycle of mesen- teries consists of six couples, each formed in an exocoele of thb primary cycle, and in each couple the muscle-banners are vis-a-vis The third cycle comprises twelve couples, each formed in an exocoek between the primary and secondary couples and so on, it being a general rule (subject, however, to exceptions) that new mesenterial couples are always formed in the exocoeles, and not in the entocoeles. While the mesenterial couples belonging to the second and each successive cycle are formed simultaneously, those of the first cycle

are formed in successive pairs, each member of a pair being placed on opposite sides of the stomodaeum. Hence the arrangement in six couples is a secondary and not a primary feature. In most Actinians the mesenteries appear in the following order: — At the time when the stomodaeum is formed, a single pair of mesenteries, marked I, I in the diagram (fig. 11, A), makes its appearance, dividing the coelenteric cavity into a smaller sulcar and a large sulcular chamber. The muscle-banners of this pair are placed on the sulcar faces of the mesenteries. Next, a pair of mesenteries, marked 11,11 in the diagram, is developed in the sulcular chamber, its muscle- banners facing the same way as those of I, I. The third pair is formed in the sulcar chamber, in close connexion with the sulcus, and in this case the muscle-banners are on the sulcular faces. The fourth pair, having its muscle-banners on the sulcar faces, is devel- oped at the opposite extremity of the stomodaeum in close connexion with the sulculus. There are now eight mesenteries present, having exactly the same arrangement as in Edwardsia. A pause in the development follows, during which no new mesenteries are formed, and then the six-rayed symmetry characteristic of a normal Actinian zooid is completed by the formation of the mesenteries V, V in the lateral chambers, and VI, VI in the sulcolateral chambers, their muscle-banners being so disposed that they form couples respectively with 11,11 and I, I. In Actinia equina the Edwardsia stage is arrived at somewhat differently. The mesenteries second in order of forma- tion form the sulcular directives, those fourth in order of formation form with the fifth the sulculo-lateral couples of the adult.

As far as the anatomy of the zooid is concerned, the majority of the stony or madreporarian corals agree exactly with the soft-bodied Actinians, such as Actinia equina, both in the number and arrange-

FlG. 12.

A, Zoanthid colony, showing the expanded zooids.

B, Diagram showing the arrangement of mesenteries in a young Zoanthid.

C, Diagram showing the arrangement of mesenteries in an adult Zoanthid. I, 2, 3, 4, Edwardsian mesenteries.

ment of the adult mesenteries and in the order of development of the first cycle. The few exceptions will be dealt with later, but it may be stated here that even in these the first cycle of six couples of mesenteries is always formed, and in all the cases which have been examined the course of development described above is followed . There are, however, several

groups of Zoantharia in which the mesenterial arrangement of the adult differs widely from that just described. But it is possible to refer all these cases with more or less certainty to the Edwardsian type.

The order Zoanthidea comprises a number of soft-bodied Zoan- tharians generally encrusted with sand. Externally they resemble ordinary sea-anemones, but there is only one ciliated groove, the sulcus, in the stomodaeum, and the mesenteries are arranged on a peculiar pattern. The first twelve mesenteries are disposed in couples, and do not differ from those of Actinia except in size. The mesenterial pairs I, II and III are attached to the stomodaeum, and are called macromesenteries (fig. 12, B), but IV, V and VI are much shorter, and are called micromesenteries. The subsequent development is peculiar to the group. New mesenteries are formed only in the sulco-lateral exocoeles. They are formed in couples, each couple consisting of a macromesentery and a micromesentery, disposed so that the former is nearest to the sulcar directives. The derivation of the Zoanthidea from an Edwardsia form is sufficiently obvious.

The order CERiANTHiDEAcomprisesa few soft-bodied Zoantharians with rounded aboral extremities pierced by pores. They have two circlets of tentacles, a labial and a marginal, and there is only one ciliated groove in the stomodaeum, which appears to be the sulculus. The mesenteries are numerous, and the longitudinal muscles, though distinguishable, are so feebly developed that there are no muscle- banners. The larval forms of the type genus Cerianthus float freely in the sea, and were once considered to belong to a separate genus, Aracknactis. In this larva four pairs of mesenteries having the typical Edwardsian arrangement are developed, but the fifth and sixth pairs, instead of forming couples with the first and second, arise in the sulcar chamber, the fifth pair inside the fourth, and the

sixth pair inside the fifth. New mesenteries are continually added in the sulcar chamber, the seventh pair within the sixth, the eighth pair within the seventh, and so on (fig. 13). In the Cerian

The order Antipathidea is a well-defined group whose affi dries

Fig. 13*

A, Cerianthus solitarius (after A. Andres). ‘ „S

B, Transverse section of the stoiti the sulculus, si, and the arrangement of the mesenteries.

*C, Oral aspect *>f Aracknactis brachiolata, the larva of Cerianthus, with seven tentacles. ,*

D, Transverse section, of an older larva. The numerals indicate the order of .developioent of the mesenteries. , j;

are more obscure. The type farm, Antipathes dieketoiptt (fig. 14), forms arborescent colonies consisting of numerous' zciDtft arranged in a single series alon Each*

zooid has six tentacles; the stotnodaeum is elongate, btilt'he sulcus and sulculus are very feefcly represented. Therejai tfertlBtesenteries in which the musculature $j so "tittte developed as tftˆbe almost indistinguishable.- 1 uteJenteries art

Fig. 14.

A, Portion of a colony of Antipathes dichotoma.

B, Single zooid aftd axis of the same magnified, m, Mouth; m)r mesenterial filament; a#, axis. .

C, Transverse section through the oral cone of Antipatkella minor st, Stomodaeum; ov, ovary.

short, the sulco-lateral and sulculo-lateral pairs are a little longer, but the two transverse are very large and are the only mesenteries which bear gonads. As the development of the Antipathidea- is unknown, it is impossible to say what is the sequence of the mesen- terial development, but in Leiopathes glaberrima, a genus with twelve mesenteries, there are distinct indications of an Edwardsia stage.

There are, in addition to these groups, several genera of Actinians whose mesenterial arrangement differs from the normal type. Of

these perhaps the most interesting is Gonadinia prolifera (fig. n, B), with eight macromesenteries arranged on the Edwardsian plan. Two pairs of micromesenteries form couples with the first anl second Edwardsian pairs, and in addition there is a couple of micro- mesenteries in each of the sulculo-lateral exocoeles. Only the first and second pairs of Edwardsian macromesenteries are fertile, i.e. bear gonads.

The remaining forms, the Actiniidea, are divisible into the Malacactiniae, or soft-bodied sea-anemones, which have already been described sufficiently in the course of this article, and the Scleractiniae (= Madreporaria) or true corals.

All recent corals, as has already been said, conform so closely to the anatomy of normal Actinlans that they cannot be classified apart from them, except that they are distinguished by the possession of a calcareous skeleton. This skeleton is largely composed of a number of radiating plates or septa, and it differs both in origin and structure from the calcareous skeleton of all Alcyonaria except Heliopora. It is formed, not from fused spicules, but as a secretion of a special layer of cells derived from the basal ectoderm, and known as calicoblasts. The skeleton or corallum of a typical solitary coral — the common Devonshire cup- coral Caryophyllia smithii (fig. 15) is a good example — exhibits the folio wings parts: — (1) The basal plate, between the zooid and • he surface of attachment. (2) The septa, radial plates of

Fig. 15. — Corallum of Caryophyllia; semi-diagrammatic, th, Theca ; c, costae; sp, septa; p, palus; col, columella.

calcite reaching from the periphery nearly or quite to the centre of the coral-cup or calicle. (3) The theca or wall, which in many corals is not an independent structure, but is formed by the con- joined thickened peripheral ends of the septa. (4) The columella, a structure which occupies the centre of the calicle, and may arise from the basal plate, when it is called essential, or may be formed by union of trabecular offsets of the septa, when it is called unessential. (5) The costae, longitudinal ribs or rows of spines on the outer surface of the theca. True costae always correspond to the septa, and are in fact the peripheral edges of the latter. (6) Epitheca, an offset of the basal plate which surrounds the base of the theca in a ring-like manner, and in some corals may take the place of a true theca. (7) Pali, spinous or blade-like upgrowths from the bottom of the calicle, which project between the inner edges of certain septa and the columella. In addition to these parts the following structures may exist in corals: — Dissepiments are oblique calcareous partitions, stretching from septum to septum, and closing the interseptal chambers below. The whole system of dissepiments in any given calicle is often called endotheca. Synapticulae are calcareous bars uniting adjacent septa. Tabulae are stout horizontal partitions traversing the centre of the calicle and dividing it into as many superimposed chambers. The septa in recent corals always bear a definite relation to the mesenteries, being found either in every entocoele or in every entocoele and exocoele. Hence in corals in which there is only a single cycle of mesenteries the septa are corre- spondingly few in number; where several cycles of mesenteries

are present the septa are correspondingly numerous. In some cases — e.g. in some species of Madrepora — only two septa are fully developed, the remainder being very feebly represented.

Though the corallum appears to live within the zooid, it is morphologically external to it, as is best shown by its develop- mental history. The larvae of corals are free swimming ciliated forms known as planulae, and they do not acquire a corallum until they fix themselves. A ring-shaped plate of calcite, secreted by the ectoderm, is then formed, lying between the embryo and the surface of attachment. As the mesenteries are

Fig. 16. — Tangential section of a larva of Astroides calicularis which has fixed itself on a piece of cork, ec, Ectoderm; era, endo- derm; mg, mesogloea; m, m, mesenteries; s, septum; b, basal plate formed of ellipsoids of carbonate of lime secreted by the basal ectoderm ; ep, epitheca. (After von Koch.)

formed, the endoderm of the basal disk lying above the basal plate is raised up in the form of radiating folds. There may be six of these folds, one in each entocoele of the primary cycle of mesenteries; or there may be twelve, one in each exocoele and entocoele. The ectoderm beneath each fold becomes detached from the surface of the basal plate, and both it and the mesogloea are folded conformably with the endoderm. The cells forming the limbs of the ectodermic folds secrete nodules of calcite, and these, fusing together, give rise to six (or twelve) vertical radial plates or septa. As growth proceeds new septa are formed simultaneously with the new couples of secondary mesenteries. In some corals, in which all the septa are entocoelic, each new system is embraced by a mesenteric couple; in others,in which the septa are both entocoelic and exocoelic, three septa are formed in

M

Fig. 17. — Transverse section through a zooid of Cladocora. The corallum shaded with dots, the mesogloea represented by a thick line. Thirty-two septa are present, six in the entocoeles of the primary cycle of mesenteries, I ; six in the entocoeles of the secondary cycle of mesenteries, II; four in the entocoeles of the tertiary cycle of mesenteries, III, only four pairs of the latter being developed; and sixteen in the entocoeles between the mesenterial pairs. D, D, Directive mesenteries; st, stomodaeum. (After Duerden.)

every chamber between two primary mesenterial couples, one in the eiitocoele of the newly formed mesenterial couple of the secondary cycle, and one in each exocoele between a primary and a secondary couple. These latter are in turn embraced by the couples of the tertiary cycle of mesenteries, and new septa are formed in the exocoeles on either side of them, and so forth.

It is evident from an inspection of figs. 16 and 17 that every

septum is covered by a fold of endoderm, mesogloea, and ectoderm, and is in fact pushed into the cavity of the zooid from without. The zooid then is, as it were, moulded upon the corallum. When fully extended, the upper part of the zooid projects for some distance out of the calicle, and its wall is reflected for some distance over the lip of the latter, forming a fold of soft tissue extending to a greater or less distance over the theca, and containing in most cases a cavity continuous over the lip of the calicle with the coelenteron. This fold of tissue is known as the edge-zone. In some corals the septa aresolid imperforate plates of calcite, and their peripheral ends are either firmly welded together, or are united by interstitial pieces so as to form imperforate theca. In others the peripheral ends of the septa are united only by bars or trabeculae, so that the theca is perforate, and in many such perforate corals the septa themselves are pierced by numerous perforations. In the former, which have been called

Fig. 18.

A, Schematic longitudinal section through a zooid and bud of Stylophora digitata. In A, B, and C the thick black lines represent the soft tissues; the corallum is dotted, s, Stomodaeum; c, c, coenosarc ; col, columella ; T, tabulae.

B, Similar section through a single zooid and bud of Astroides calicularis.

C, Similar section through three corallites of Lophohelia prolifera. ez, Edge-zone.

D Diagram illustrating the process of budding by unequal division.

E, Section through a dividing calicle of Mussa, showing the union of two septa in the plane of division and the origin of new septa at right angles to them.

(C original; the rest after von Koch.)

aporose corals, the only communication between the cavity of the edge-zone and the general cavity of the zooid is by way of the lip of the calicle; in the latter, or perforate corals, the theca is permeated by numerous branching and anastomosing canals lined by endoderm, which place the cavity of the edge-zone in communication with the general cavity of the

zooid.

A large number of corals, both aporose and perforate, are colonial. The colonies are produced by either budding or divi- sion. In the former case the young daughter zooid, with its corallum, arises wholly outside the cavity of the parent zooid, and the component parts of the young corallum, septa, theca, columella, &c, are formed anew in every individual produced. In division a vertical constriction divides a zooid into two equal or unequal parts, and the several parts of the two corals thus produced are severally derived from the corresponding parts of the dividing corallum. In colonial corals a bud is always formed from the edge-zone, and this bud develops into a new zooid with its corallum. The cavity of the bud in an aporose coral (fig. 18, A, C) does not communicate directly with that of the parent form, but through the medium of the edge-zone. As growth proceeds, and parent and bud become separated farther from one another, the edge- zone forms a sheet of soft tissue,

bridging over the space between the two, and resting upon projecting spines of the corallum. This sheet of tissue is called the coenosarc. Its lower surface is clothed with a layer of calicoblasts which continue to secrete carbonate of lime, giving rise to a secondary deposit which more or less fills up the spaces between the individual coralla, and is distinguished as coenen- chyme. This coenenchyme may be scanty, or may be so abundant that the individual corallites produced by budding seem to be immersed in it. Budding takes place in an analogous manner in perforate corals (fig. 18, B), but the presence of the canal system in the perforate theca leads to a modification of the pro- cess. Buds arise from the edge-zone which already communicate with the cavity of the zooid by the canals. As the buds develop the canal system becomes much extended, and calcaieous tissue is deposited between the network of canals, the confluent edge- zones of mother zooid and bud forming a coenosarc. As the process continues a number of calicles are formed, imbedded in a spongy tissue in which the canals ramify, and it is impossible to say where the theca of one corallite ends and that of another begins. In the formation of colonies by division a constriction at right angles to the long axis of the mouth involves first the mouth, then the peristome, and finally the calyx itself, so that the previously single corallite becomes divided into two (fig. 18, E). After division the corallites continue to grow upwards, and their zooids may remain united by a bridge of soft tissue' or coenosarc. But in some cases, as they grow farther apart, this continuity is broken, each corallite has its own edge-zone, and internal continuity is also broken by the formation of dissepi- ments within each calicle, all organic connexion between the two zooids being eventually lost. Massive meandrine corals are produced by continual repetition of a process of incomplete division, involving the mouth and to some extent the peristome: the calyx, however, does not divide, but

elongates to form a characteristic meandrine channel containing several zooid mouths. ‘ Corals have been divided into Aporosa and Perforata, according as the theca and septa are compact and solid, or are perforated by pores containing canals lined by endoderm. The division is in many respects convenient for descriptive purposes, but recent researches show that it does not accurately represent the relationships of the different families. Various attempts have been made to classify corals according to the arrangement of the septa, the characters of the theca, the microscopic structure of the corallum, and the anatomy of the soft parts. The last-named method has proved little more than that there is a remark- able similarity between the zooids of all recent corals, the differences which have been brought to light being for the most part secondary and valueless for classificatory purposes. On the other hand, the study of the anatomy and development of the zooids has thrown much light upon the manner in which the corallum is formed, and it is now possible to infer the structure of the soft parts from a microscopical examination of the septa, theca, &c, with the result that unexpected relationships have been shown to exist between corals previously supposed to stand far apart. This has been particularly the case with the group of Palaeozoic corals formerly classed together as Rugosa. In many of these so-called rugose forms the septa have a char- acteristic arrangement, differing from that of recent corals chiefly in the fact that they show a tetrameral instead of a hexameral symmetry. Thus in the family Slauridae there are four chief septa whose inner ends unite in the middle of the calicle to form a false columella, and in the Zaphrentidae there are many instances of an arrangement, such as that depicted in fig. 19, which represents the septal arrangement of Streptelasma corniculum from the lower Silurian. In this coral the calicle is divided into quadrants by four principal septa, the main septum, counter septum, and two alar septa. The remaining septa are so disposed that in the quadrants abutting on the chief septum they converge towards that septum, whilst in the other quadrants they converge towards the alar septa. The secondary septa show a regular gradation in size, and, assuming that the smallest were the most recently formed, it will be noticed that in the chief quadrants the youngest septa lie nearest to the main septum;

Fig. 19. — Diagram of the arrange- ment of the septa in a Zaphrentid coral, m, Main septum; c, counter septum; t, t, alar septa.

in the other quadrants the youngest septa lie nearest to the alar septa. This arrangement, however, is by no means characteristic even of the Zaphrentidae, and in the family Cyathophyllidae most of the genera exhibit

a radial symmetry in which no trace of the bilateral arrangement described above is recognizable, and indeed in the genus Cyathophylkim itself a radial arrangement is the rule. The connexion between the Cyathophyllidae and modern Astraeidae is shown by Moseleya latistellata, a living reef-building coral from Torres Strait. The general structure of this coral leaves no doubt that it is closely allied to the Astraeidae, but in the young calicles a tetrameral symmetry is indicated by the presence of four large septa placed at right angles to one another. Again, in the family Amphiastraeidae there is commonly a single septum much larger than the rest, and it has been shown that in the young calicles, e.g. of Thecidio- smilia, two septa, corresponding to the main- and counter-septa jn of Streptelasma, are iirst

formed, then two alar septa, ‘ and afterwards the remaining septa, the latter taking on a generally radial arrange- ment, though the original bilaterality is marked by the preponderance of the main septum. As the microscopic char- acter of the corallum of these extinct forms agrees with that of re- cent corals, it may be assumed that the anat- omy of the soft parts also was similar, and the tetrameral arrange- ment, when present, may obviously be referred to a stage when only the first two pairs of Edwardsian mesenteries were present and septa were formed in the intervals between them.

Space forbids a discussion of the proposals to classify corals after the minute structure of their coralla, but it will suffice to say that it has been shown that the septa of all corals are built up of a number of curved bars called trabeculae, each of which is composed of a number of nodes. In many secondary corals (Cydolites, Thamnastraea) the trabeculae are so far separate that the individual bars are easily recognizable, and each looks something like a bamboo owing to the thickening of the two ends of each node. The trabeculae are united together by these thickened internodes, and the result is a fenestrated septum, which in older septa may become solid and aporose by continual deposit of calcite in the fenestrae. Each node of a trabecula may be simple, i.e. have only one centre of calcification, or may be compound. The septa of modern perforate corals are shown to have a structure nearly identical with that of the secondary forms, but the trabeculae and their nodes are only apparent on microscopical examination. The aporose corals, too, have a practically identical structure, their compactness being due to the union of the trabeculae throughout their entire lengths in- stead of at intervals, as in the Perforata. Further, the trabeculae may be evenly spaced throughout the septum, or may be grouped together, and this feature is probably of value in estimating the affinities of corals. (For an account of coral formations see Coral-reefs.)

In the present state of our knowledge the Zoantharia in which a primary

cycle of six couples of mesenteries is (or may be inferred to be) completed by the addition of two pairs to the eight Edwardsian mesenteries, and succeeding cycles are formed in the exocoeles of the pre-existing mesenterial cycles, may be classed in an order Actiniidea, and this may be divided into the sub- orders Malacadiniae, comprising the soft-bodied Actinians, such as Actinia, Sagartia, Bunodes, &c, and the Sder actiniae, comprising the corals. The Scleractiniae may best be divided

into groups of families which appear to be most closely related to one another, but it should not be forgotten that there is great reason to believe that many if not most of the extinct corals must have differed from modern Actiniidea in mesenterial characters, and may have only possessed Edwardsian mesenteries, or even have possessed only four mesenteries, in this respect showing close affinities to the Stauromedusae. Moreover, there are some modern corals in which the secondary cycle of mesenteries departs from the Actinian plan. For example, J. E. Duerden has shown that in Pontes the ordinary zooids possess only six couples of mesenteries arranged on the Actinian plan. But some'zooids grow to a larger size and develop a number of additional mesenteries, .which arise either in the sulcar or the sulcular entocoele, much in the same manner as in Cerianthus. Bearing this in mind, the following arrangement may be taken to represent the most recent knowledge of coral structure: —

Group A.

Family I. Zaphrentidae. — Solitary Palaeozoic corals with an epithecal wall. Septa numerous, arranged pinnately with regard to four principal septa. Tabulae present. One or more pits or fossulae present in the calicle. Typical genera— Zaphrentis, Raf. Amplexus, M. Edw. and H. Streptelasma, Hall. Omphyma, Raf.

Family 2. Turbinolidae. — Solitary, rarely colonial corals, with radially arranged septa and without tabulae. Typical genera — Flabellum, Lesson. Turbinolia, M. Edw. and H. Caryophyllia, Lamarck. Sphenotrochus, Moseley, &c.

Family 3. Amphiastraeidae. — Mainly colonial, rarely solitary corals, with radial septa, but bilateral arrangement' indicated by persistence of a main septum. Typical genera — Amphiastraea, Etallon. Thecidiosmilia.

Family a. Stylinidae. — Colonial corals allied to the Amphi- astraeidae, but with radially symmetrical septa arranged in cycles. Typical genera — Stylina, Lamarck (Jurassic). Convexaslraea, D' Orb. (Jurassic). Isastraea, M. Edw. and H. (Jurassic). Ogilvie refers the modern genus Galaxea to this family.

Group B.

Family 5. Ocui.inidae. — Branching or massive aporose corals, the calices projecting above the level of a compact coenenchyme formed from the coenosarc which covers the exterior of the corallum. Typical genera— Lophohelia, M. Edw. and H. Oculiha, M. Edw. and H.

Family 6. Pocilloporidae. — Colonial branching aporose corals, with small calices sunk in the coenenchyme. Tabulae present, and two larger septa, an axial and abaxial, are always present, with traces of ten smaller septa. Typical genera — Pocillopora, Lamarck. Seriatopora, Lamarck.

Family 7. Madreporidae. — Colonial branching or palmate perforate corals, with abundant trabecular coenenchyme. Theca porous; septa compact and reduced in number. Typical genera — Madrepora, Linn. Turbinariq, Oken. Montipora, Quoy and G.

Family 8. Poritidae. — Incrusting or massive colonial perforate corals; calices usually in contact by their edges, sometimes disjunct and immersed in coenenchyme. Theca and septa perforate. Typical genera — Porites, M. Edw. and H. Goniopora, Quoy and G. Rhoda- raea, M. Edw. and H.

Group C.

Family 9. Cyathophyllidae. — Solitary and colonial aporose corals. Tabulae and vesicular endotheca present. Septa numerous, generally radial, seldom pinnate. Typical genera— Cyathophyllum, Goldfuss (Devonian and Carboniferous). Moseleya, Quelch (recent).

Family 10. Astraeidae.— Aporose, mainly colonial corals, massive, branching, or maeandroid. Septa radial; dissepiments present ; an epitheca surrounds the base of massive or maeandroid forms, but only surrounds individual corallites in simple or branching forms. Typical genera— Goniastraea, M. Edw. and H. Heliastraea, M. Edw. and H. Maeandrina, Lam. Coeloria, M. Edw. and H. Favia, Oken.

Family u. Fungidae. — Solitary and colonial corals, with numerous radial septa united by synapticulae. Typical genera — Lophoseris, M. Edw. and H. Thamnastraea, Le Sauvage. Lepto- phyllia, Reuss (Jurassic and Cretaceous). Futtgia, Dana. Sider- astraea, Blainv.

Group D.

Family 12. EuPSAMMiDAE.ˆSolitary or colonial perforate corals, branching, massive, or encrusting. Septa radial ; the primary septa usually compact, the remainder perforate. Theca perforate. Synap ticula present in

some genera. Typical genera — Stephanophyllia, Michelin. Eupsammia, M. Edw. and H. Astroides, Blainv. Rhodop- sammia, M. Edw. and H. Dendrophyllia, M. Edw. and H.

Group E.

Family 13. Cystiphyllidae. — Solitary corals with rudimentary septa, and the calicle filled with vesicular endotheca. Genera—

Cystiphyllum,' Lonsdale (Silurian and Devonian). Goniophyllum, M. Edw. and H. (In this Silurian genus the calyx is provided with a movable operculum, consisting of four paired triangular pieces, the bases of each' being attached to the sides of the calyx, and their apices meeting in the middle when the operculum is closed). Calcecla, Lam. (In this Devonian genus there is a single semicircular oper- culum furnished with a stout median septum and numerous feebly developed secondary septa. The calyx is triangular in section, pointed below, and the operculum is attached to it by hinge-like teeth.)

*Authorities. — The following list contains only the names of the more important and more general works on the structure and classification of corals and on coral reefs. For a fuller bibliography the works marked with an asterisk should be consulted : * A. Andres, Fauna und Flora des Golfes von Neapel, ix. (1884) ; H. M. Bernard, " Catalogue of Madreporarian Corals " in Brit. Museum, ii. (1896), iii. (1897) ;* ***G. C. Bourne, " Anthozoa," in E. Ray Lankester's Treatise on Zoology, vol. ii. (London, 1900); G. Brook, "Chal- lenger Reports," Zoology, xxxii. (1899) (Antipatharia); "Cat. Madrep. Corals," Brit. Museum, i. (1893); D.C.Danielssen, "Report Norwegian North Atlantic Exploring Expedition," Zoology, xix. (1890); J. E. Duerden, "Some Results on the Morphology and Development of Recent and Fossil Corals," Rep. Brit. Association, 1903*** *pp. 684-685; " The Morphology of the Madreporaria," Biol. Bullet, vii. pp. 79-104; P. M. Duncan, Journ. Linnean Soc. xviii. (1885); P. H. Gosse, Actinologia britannica (London, i860); O. and R. Hertwig, Die Actinien (Jena, 1 879); R. Hertwig, " Challenger Reports," Zoology, vi. (1882) and xxvi. (1888); * C. B. Klunzinger, Die Korallthiere des Rothen Meeres (Berlin, 1877); * G. von Koch, Fauna und Flora des Golfes von Neapel, xv. (1887) ; Mitth. Zool. Stat. Neapel, ii. (1882) and xii. (1897); Palaeontographica, xxix. (1883); (also many papers in the Morphol. Jahrbuch from 1878 to 1898); F. Koby, " Polypiers jurassiques de la Suisse," Mem. Soc. Palaeont. Suisse,*

*vii.-xvi. (1880-1889); A. von Kolliker, "Die Pennatuliden," Abh. d. Senck. Naturf. Gesell. vii.; *" Challenger Reports," Zoology, i. Pennatulidae (1880); Koren and Danielssen, Norske Nordhaus Exped., Alcyonida (1887) ; H. de Lacaze-Duthiers, Hist. not. du corail (Paris, 1864) ; H. Milne-Edwards and J. Haime, Hist. nat. des coralliaires (Paris, 1857); H. N. Moseley, " Challenger Reports," Zoology, ii. (1881); H. A. Nicholson, - Palaeozoic Tabulate Corals (Edinburgh, 1879) ; M.M. Ogilvie, Phil. Transactions, clxxxvii. (1896); E. Pratz, Palaeontographica, xxix. (1882); J. J. Quelch, " Challenger Reports," Zoology, xvi. (1886); * P. S. Wright and Th. Studer, " Challenger Reports," Zoology, xxxi. (1889). (G. C. B.)*

ANTHRACENE (from the Greek a.vdpa£, coal), Ci 4 H l0 , a hydrocarbon obtained from the fraction of the coal-tar distillate boiling between 270 and 400 C. This high boiling fraction is allowed to stand for some days, when it partially solidifies. It is then separated in a centrifugal machine, the low melting-point impurities are removed by means of hot water, and the residue is finally hot-pressed. The crude anthracene cake is purified by treatment with the higher pyridine bases, the operation being carried out in large steam-jacketed boilers. The whole mass dissolves on heating, and the anthracene crystallizes out on cooling. The crystallized anthracene is then removed by a centrifugal separator and the process of solution in the pyridine bases is repeated. Finally the anthracene is purified by sub-limation.

Many synthetical processes for the preparation of anthracene and its derivatives are known. It is formed by the condensation of acetylene tetrabromide with benzene in the presence of aluminium chloride: — ■

Br-CH-Br /CH X

C.H 6 + I +C 6 H6=4HBr+C 6 H 4 < I >C 6 H 4 ,

Br-CH-Br X CH/

and similarly from methylene dibromide and benzene, and also when benzyl chloride is heated with aluminium chloride to 200 C. By condensing ortho-brombenzyl bromide with sodium, C. L. Jackson and J. F. White (Ber., 1879, 12, p. 1965) obtained dihydro-anthr'acene

C 6 H 4 <ˆ 2Br +4Na + BrC ˆ>C,H < = 4NaBr+C 6 H 4 <ˆpC 6 H4.

Anthracene has also been obtained by heating ortho-tolylphenyl ketone with zinc dust

*/CPU * X CH,*

C 6 H,< = H,0+C 6 H 4 < I >C 6 H 4 .

MTOCsHi YH/

Anthracene crystallizes in colourless monoclinic tables which show a fine blue fluorescence. It melts at 213 C. and boils at 351° C. It is insoluble in water, sparingly soluble in alcohol and ether, but readily soluble in hot benzene. It unites with

picric acid to form a picrate, ChHio'CjHj (N0 2)3-OH, which crystallizes in needles, melting at 138 C. On exposure to sunlight a solution of anthracene in benzene or xylene deposits para-anthracene (CuHioˆ, which melts at 244 C. and passes back into the ordinary form. Chlorine, and bromine form both addition and substitution products with anthracene; the addition product, anthracene dichloride, C14H10CI2, being formed when chlorine is passed into a cold solution of anthracene in carbon bisulphide. On treatment with potash, it forms the substitution product, monochlor-anthracene, G4H9CI. Nitro-anthracenes are not as yet known. The mono-oxyanthracenes (anthrols), C14H9OH or

/ CH \ CsHVC I)C6H 3 OH (a) and (/3), resemble the phenols, whilst

CH

XXOHk

C«Hj

CH

anthraquinone. /3-anthrol and anthranol give the corresponding amino compounds (anthramines) when heated with ammonia.

Numerous sulphonic acids of anthracene are known, a mono- sulphonic acid being obtained with dilute sulphuric acid, whilst concentrated sulphuric acid produces mixtures of the anthracene disulphonic acids. By the action of sodium amalgam on an alcoholic solution of anthracene, an anthracene dihydride, C14H12, is obtained, whilst by the use of stronger reducing agents, such as hydriodic acid and amorphous phosphorus, hydrides of composition G4H16 and C14H24 are produced.

Methyl and phenyl anthracenes are known; phenyl anthranol (phthalidin) being somewhat closely related to the phenol- phthaleins (q.v.). Oxidizing agents convert anthracene into anthraquinone (q.v.) ; the production of this substance by oxidiz- ing anthracene in glacial acetic acid solution, with chromic acid, is the usual method employed for the estimation of

anthracene.

ANTHRACITE (Gr. avdpa£, coal), a term applied to those varieties of coal which do not give off tarry or other hydrocarbon vapours when heated below their point of ignition; or, in other words, which burn with a smokeless and nearly non-luminous flame. Other terms having the same meaning are, " stone coal " (not to be confounded with the German Steinkohle) or " blind coal " in Scotland, and " Kilkenny coal " in Ireland. The im- perfect anthracite of north Devon, which however is only used as a pigment, is known as culm, the' same term being used in geological classification to distinguish the strata in which it is found; and similar strata in the Rhenish hill countries which are known as the Culm Measures. In America, culm is used as an equivalent for waste or slack in anthracite mining.

Physically, anthracite differs from ordinary bituminous coal by its greater hardness, higher density, 1-3-1-4, and lustre, the latter being often semi-metallic with a somewhat brownish reflection. It is also free from included soft or fibrous notches and does not soil the fingers when rubbed. Structurally it shows some alteration by the development of secondary divisional planes and fissures so that the original stratification lines are not always easily seen. The thermal conductivity is also higher, a lump of anthracite feeling perceptibly colder when held in the warm hand than a similar lump of bituminous coal at the same tempera- ture. The chemical composition of some typical anthracites is given in the article Coal.

Anthracite may be considered to be a transition stage between ordinary bituminous coal and graphite, produced by the more or less complete elimination of the volatile constituents of the former; and it is found most abundantly in areas that have been subjected to considerable earth-movements, such as the flanks of great mountain ranges. The largest and most important anthracite region, that of the north-eastern portion of the Penn- sylvania coal-field, is a good example of this; the highly con torted strata of the Appalachian region produce anthracite exclusively, while in the western portion of the same basin on the Ohio and its tributaries, where the strata are undisturbed, free-burning and coking coals, rich in volatile matter, prevail. In the same way the anthracite region of South Wales is confined to the contorted portion west of Swansea and Llanelly, the

central and eastern portions producing steam, coking and house coals.

Anthracites of newer, tertiary or cretaceous age, are found in the Crow's Nest part of the Rocky Mountains in Canada, and at various points in the Andes in Peru.

The principal use of anthracite is as a smokeless fuel. In the eastern United States, it is largely employed as domestic fuel, usually in close stoves or furnaces, as well as for steam purposes, since, unlike that from South Wales, it does not decrepitate when heated, or at least not to the same extent. For proper use, however, it is necessary that the fuel should be supplied in pieces as nearly uniform in size as possible, a condition that has led to the develop- ment of the breaker which is so characteristic a feature in American anthracite mining (see Coal). The large coal as raised from the mine is passed through breakers with toothed rolls to reduce the lumps to smaller pieces, which are separated into different sizes by a system of graduated sieves, placed in descending order. Each size can be perfectly well burnt alone on an appropriate grate, if kept free from larger or smaller admixtures. The common American classification is as follows:—

Lump, steamboat, egg and stove coals, the latter in two or three sizes, all three being above iˆ in. size on round-hole screens.

Chestnut below I J inch above |. inch. rt -a ,, H ,, ,, j fi ,,

Buckwheat ,, f e ,, „ I ,,

Rice ,, I „ ,, ,»„ ,,

Barley „ A „ „ l> „

From the pea size downwards the principal use is for steam purposes. In South Wales a less elaborate classification is adopted; but great care is exercised in hand-picking and cleaning the coal from included particles of pyrites in the higher qualities known as best malting coals, which are used for kiln-drying malt and hops.

Formerly, anthracite was largely used, both in America and South Wales, as blast-furnace fuel for iron smelting, but for this purpose it has been largely superseded by coke in the former country and entirely in the latter. An important application has, however, been developed in the extended use of internal combustion motors driven by the so-called "mixed," "poor," " semi-water " or " Dowson gas " produced by the gasification of anthracite with air and a small proportion of steam. This is probably the most economical method of obtaining power known; with an engine as small as 15 horse-power the expendi- ture of fuel is at the rate of only 1 lb per horse-power hour, and with larger engines it is proportionately less. Large quantities of anthracite for power purposes are now exported from South

Wales to France, Switzerland and parts of Germany. (H. B.)

ANTHRACOTHERIUM (" coal-animal," so called from the fact of the remains first described having been obtained from the Tertiary lignite-beds of Europe), a genus of extinct artio- dactyle ungulate mammals, characterized by having 44 teeth, with five semi-crescentic cusps on the crowns of the upper molars. In many respects, especially the form of the lower jaw, Anlhracotherium, which is of Oligocene and Miocene age in Europe, and typifies the family Anlhracotheriidae, is allied to the hippopotamus, of which it is probably an ancestral form. The European A. magnum was as large as the last-mentioned animal, but there were several smaller species and the genus also occurs in Egypt, India and North America. (See Artiodactyla.)

ANTHRAQUINONE, Ci 4 H 8 0._., an important derivative of anthracene, first prepared in 1834 by A. Laurent. It is prepared commercially from anthracene by stirring a sludge of anthracene and water in horizontal cylinders with a mixture of sodium bichromate and caustic soda. This suspension is then run through a conical mill in order to remove all grit, the cones of the mill fitting so tightly that water cannot pass through unless the mill is running; the speed of the mill when working is about 3000 revolutions per minute. After this treatment, the mixture is run into lead-lined vats and treated with sulphuric acid, steam is blown through the mixture in order to bring it to the boil, and the anthracene is rapidly oxidized to anthraquinone. When the oxidation is complete, the anthraquinone is separated in a filter

press, washed and heated to 120 C. with commercial oil of vitriol, using about 2§ parts of vitriol to 1 of anthraquinone. It is then removed to lead-lined tanks and again washed with water and dried; the product obtained contains about 95 % of anthraquinone. It may be purified by sublimation. Various synthetic processes have been used for the preparation of anthra-quinone. A. Behr and W. A. v. Dorp (Ber., 1874,7ˆ.578) obtained orthobenzoyl benzoic acid by heating phthalic anhydride with benzene in the presence of aluminium chloride. This compound on heating with phosphoric anhydride loses water and yields anthraquinone,

r „ /CO-ˆ C.H. ˆCO-C 6 H 5 x „ „ ˆ-CCK. r „

C6H ˆ CeH4< COOH ˆC 6 H 4 < C0 >CeH 4 .

It may be prepared in a similar manner by heating phthalyl chloride with benzene in the presence of aluminium chloride. Dioxy- and tetraoxy-anthraquinones areobtained when meta-oxy- and dimeta-dioxy-benzoic acids are heated with concentrated sulphuric acid.

Anthraquinone crystallizes in yellow needles or prisms, which melt at 277° C. It is soluble in hot benzene, sublimes easily, and is very stable towards oxidizing agents. On the other hand, it is readily attacked by reducing agents. With zinc dust in presence of caustic soda it yields the secondary alcohol oxan- thranol, C6H 4 : CO-CHOH : C 6 H 4 , with tin and hydrochloric acid, the phenolic compound anthranol, C6H 4 : CO-C(OH): C 6 Hi; and with hydriodic acid at 1 50 C. or on distillation with zinc dust, the hydrocarbon anthracene, Ci 4 Hi . When fused with caustic potash, it gives benzoic acid. It behaves more as a ketone than as a quinone, since with hydroxylamine it yields an oxime, and on reduction with zinc dust and caustic soda it yields a secondary alcohol, whilst it cannot be reduced by means of sulphurous acid. Various sulphonic acids of anthraquinone are known, as well as oxy-derivatives, for the preparation and properties of which see Alizarin.

ANTHRAX (the Greek for "coal," or " carbuncle," so called by the ancients because they regarded it as burning like coal; cf. the French equivalent charbon; also known as fievre char- bonneuse, Milzbrand, splenic fever, and malignant pustule), an acute, specific, infectious, virulent disease, caused by the Bacillus anthracis, in animals, chiefly cattle, sheep and horses, and frequently occurring in workers in the wool or hair, as well as in those handling the hides or carcases, of beasts which have been affected.

Animals. — As affecting wild as well as domesticated animals and man, anthrax has been widely diffused in one or more of its forms, over the surface of the globe. It at times decimates the reindeer herds in Lapland and the Polar regions, and is only too well known in the tropics and in temperate latitudes. It has been observed and described in Russia, Siberia, Central Asia, China, Cochin-China, Egypt, West Indies, Peru, Paraguay, Brazil, Mexico, and other parts of North and South America, in Australia, and on different parts of the African continent, while for other European countries the writings which have been published with regard to its nature, its peculiar characteristics, and the injury it inflicts are innumerable. Countries in which are extensive marshes, or the subsoil of which is tenacious or impermeable, are usually those most frequently and seriously visited. Thus there have been regions notorious for its preval- ence, such as the marshes of Sologne, Dombes and Bresse in France; certain parts of Germany, Hungary and Poland; in Spain the half-submerged valleys and the maritime coasts of Catalonia, as well as the Romagna and other marshy districts of Italy; while it is epizootic, and even panzootic, in the swampy regions of Esthonia, Livonia, Courland, and especially of Siberia, where it is known as the Sibirskaja jaswa (Siberian boil plague). The records of anthrax ˆo back to a very ancient date. It is supposed to be the murrain of Exodus. Classical writers allude to anthrax as if it were the only cattle disease worthy cf mention (see Virgil, Georg. iii.). It figures largely in

the history of the early and middle ages as a devastating pestilence attack ing animals, and through them mankind; the oldest Anglo- Saxon manuscripts contain many fantastic recipes, leechdoms.

charms and incantations for the prevention or cure of the " blacan blezene " (black blain) and the relief of the " elfshot " creatures. In the 18th and 19th centuries it sometimes spread like an epizootic over the whole of Europe, from Siberia to France. It was in this malady that disease-producing germs {bacterid) were first discovered, in 1840, by Pollender of Wipper- fiirth, and, independently, by veterinary surgeon Brauell of Dorpat, and their real character afterwards verified by C. J. Davaine (181 2-1882) of Alfort in 1863; and it was in their experiments with this disease that Toussaint, Pasteur and J. B. Chauveau first showed how to make the morbific poison its own antidote. (See Vivisection.)

The symptoms vary with the species of animal, the mode of infection, and the seat of the primary lesion, internal or external. In all its forms anthrax is an inoculable disease, transmission being surely and promptly effected by this means, and it may be conveyed to nearly all animals by inoculation of a wound of the skin or through the digestive organs. Cattle, sheep and horses nearly always owe their infection to spores or bacilli ingested with their food or water, and pigs usually contract the disease by eating the flesh of animals dead of anthrax.

Internal anthrax, of cattle and sheep, exhibits no premonitory symptoms that can be relied on. Generally the first indication of an outbreak is the sudden death of one or more of the herd or flock. Animals which do not die at once may be noticed to stagger and tremble; the breathing becomes hurried and the pulse very rapid, while the heart beats violently; the internal temperature of the body is high, 104 to 106° F. ; blood oozes from the nose, mouth and anus, the visible mucous membranes are dusky or almost black. The animal becomes weak and list- less, the temperature falls and death supervenes in a few hours, being immediately preceded by delirium, convulsions or coma. While death is usually rapid or sudden when the malady is general, constituting what is designated splenic apoplexy, internal anthrax in cattle is not invariably fatal. In some cases the animal rallies from a first attack and gradually recovers.

In the external or localized form, marked by the formation of carbuncles before general infection takes place, death may not occur for several days. The carbuncles may appear in any part of the body, being preceded or

accompanied by fever. They are developed in the subcutaneous connective tissue where this is loose and plentiful, in the interstices of the muscles, lymphatic glands, in the mucous membranes of the mouth and tongue (glossanthrax of cattle), pharynx and larynx (anthrax angina of horses and pigs), and the rectum. They begin as small circumscribed swellings which are warm, slightly painful and oedematous. In from two to eight hours they attain a con- siderable size, are cold, painless and gangrenous, and when they are incised a quantity of a blood-stained gelatinous exudate escapes. When the swellings have attained certain proportions symptoms of general infection appear, and, running their course with great rapidity, cause death in a few hours. Anthrax of the horse usually begins as an affection of the throat or bowel. In the former there is rapid obstructive oedema of the mucous membrane of the pharynx and larynx with swelling of the throat and neck, fever, salivation, difficulty in swallowing, noisy breathing, frothy discharge from the nose and threatening suffocation. General invasion soon ensues, and the horse may die in from four to sixteen hours. The intestinal form is marked by high temperature, great prostration, small thready pulse, tumultuous action of the heart, laboured breathing and symptoms of abdominal pain with straining and diarrhoea. When moved the horse staggers and trembles. Profuse sweating, a falling temperature and cyanotic mucous membranes indicate the approach of a fatal termination.

In splenic fever or splenic apoplexy, the most marked altera- tions observed after death are — the effects of rapid decomposi- tion, evidenced by the foul odour, disengagement of gas beneath the skin and in the tissues and cavities of the body, yellow or yellowish-red gelatinous exudation into and between the muscles, effusion of citron or rust-coloured fluid in various cavities, extravasations of blood and local congestions throughout the

body, the blood in the vessels generally being very dark and tar-like. The most notable feature, however, in the majority of cases is the enormous enlargement of the spleen, which is en- gorged with blood to such an extent that it often ruptures, while its tissue is changed into a violet or black fluid mass.

The bacillus of anthrax, under certain conditions, retains its vitality for a long time, and rapidly grows when it finds a suitable field in which to develop, its mode of multiplication being by scission and the formation of spores, and depending, to a great extent at least, on the presence of oxygen. The morbid action of the bacillus is indeed said to be due to its affinity for oxygen; by depriving the red corpuscles of the blood of that most essential gas, it renders the vital fluid unfit to sustain life. Albert Hoffa and others assert that the fatal lesiqns are produced by the poisonous action of the toxins formed by the bacilli and not by the blocking up of the minute blood-vessels, or the abstraction of oxygen from the blood by the bacilli.

It was by the cultivation of this micro-organism, or attenuation of the virus, that Pasteur was enabled to produce a' prophylactic remedy for anthrax. His discovery was first made with regard to the cholera of fowls, a most destructive disorder which annually carries off great numbers of poultry. Pasteur produced his inoculation material by the cultivation of the bacilli at a temperature of 42 C. in oxygen. Two vaccines are required. The first or weak vaccine is obtained by incubating a bouillon culture for twenty-four days at 42° C, and the second or less attenuated vaccine by incubating a bouillon culture, at the same temperature, for twelve days. Pasteur's method of protective inoculation comprises two inoculations with an interval of twelve days between them. Immunity, established in about fifteen days after the injection of the second vaccine, lasts from nine months to a year.

Toussaint had, previous to Pasteur, attenuated the virus of anthrax by the action of heat; and Chauveau subsequently corroborated by numerous experiments the value of Toussaint's method, demonstrating that, according to the degree of heat to which the virus is subjected, so is its inocuousness when transferred to a healthy creature. In outbreaks of anthrax on farms where many animals are exposed to infection immediate temporary

protection can be conferred by the injection of anthrax serum.

Human Beings. — For many years cases of sudden death had been observed to occur from time to time among healthy men engaged in woollen manufactories, particularly in the work of sorting or combing wool. In some instances death appeared to be due to the direct inoculation of some poisonous material into the body, for a form of malignant pustule was observed upon the skin; but, on the other hand, in not a few cases without any external manifestation, symptoms of blood-poisoning, often proving rapidly fatal, suggested the probability of other channels for the introduction of the disease. In 1880 the occurrence of several such cases among woolsorters at Bradford, reported by Dr J. H. Bell of that town, led to an official inquiry in England by the Local Government Board, and an elaborate investigation into the pathology of what was then called " woolsorters' disease " was at the same time conducted at the Brown Institution, London, by Professor W. S. Greenfield. Among the results of this inquiry it was ascertained: (1) that the disease appeared to be identical with that occurring among sheep and cattle; (2) that in the blood and tissues of the body was found in abundance, as in the disease in animals, the Bacillus anthracis, and (3) that the skins, hair, wool, &c, of animals dying of anthrax retain this infecting organism, which, under certain conditions, finds ready access to the bodies of the workers.

Two well-marked forms of this disease in man are recognized, " external anthrax " and " internal anthrax." In external anthrax the infecting agent is accidentally inoculated into some portion of skin, the seat of a slight abrasion, often the hand, arm or face. A minute swelling soon appears at the part, and develops into a vesicle containing serum or bloody matter, and varying in size, but seldom larger than a shilling. This vesicle speedily bursts and leaves an ulcerated or sloughing

surface, lound about which are numerous smaller vesicles which undergo similar changes, and the whole affected part becomes hard and tender, while the surrounding surface participates in the inflammatory action, and the neighbouring lymphatic glands are also inflamed. This condition, termed " malignant pustule," is frequently accompanied with severe constitutional disturbance, in the form of fever, delirium, perspirations, together with great prostration and a tendency to death from septicaemia, although on the other hand recovery is not uncommon. It was repeatedly found that the matter taken from the vesicle during the progress of the disease, as well as the blood in the body after death, contained the Bacillus

dnthracis, and when inoculated into small animals produced rapid death, with all the symptoms and post-mortem appearances characteristic of the disease as known to affect them.

In internal anthrax there is no visible local manifestation of the disease, and the spores or bacilli appear to gain access to the system from the air charged with them, as in rooms where the contaminated wool or hair is unpacked, or again during the process of sorting. The symptoms usually observed are those of rapid physical prostration, with a small pulse, somewhat lowered temperature (rarely fever), and quickened breathing. Examination of the chest reveals inflammation .of the lungs and pleura. In some cases death takes place by collapse in less than one day, while in others the fatal issue is postponed for three or four days, and is preceded by symptoms of blood- poisoning, including rigors, perspirations, extreme exhaustion, &c. In some cases of internal anthrax the symptoms are more intestinal than pulmonary, and consist in severe exhausting diarrhoea, with vomiting and rapid sinking. Recovery from the internal variety, although not unknown, is more rare than from the external, and its most striking phenomena are its sudden onset in the midst of apparent health, the rapid development of physical prostration, and its tendency to a fatal termination despite treatment. The post-mortem appearances in internal anthrax are such as are usually observed in septicaemia, but in addition evidence of extensive inflammation of the lungs, pleura and bronchial glands has in most cases been met with. The blood and other fluids and the diseased tissues are found loaded with the Bacillus anthracis.

Treatment in this disease appears to be of but little avail, except as regards the external form, where the malignant pustule may be excised or dealt with early by strong caustics to destroy the affected textures. For the relief of the general constitutional symptoms, quinine, stimulants and strong nourishment appear to be the only available means. An anti-anthrax serum has also been tried. As preventive measures in woollen manu- factories, the disinfection of suspicious material, or the wetting of it before handling, is recommended as lessening the risk to the workers. (J. Mac.)

ANTHROPOID APES, or Manlike Apes, the name given to the family of the Simiidae, because, of all the ape-world, they most closely resemble man. This family includes four kinds, the gibbons of S. E. Asia, the orangs of Borneo and Sumatra, the gorillas of W. Equatorial Africa, and the chimpanzees of W. and Central Equatorial Africa. Each of these apes resembles man most in some one physical characteristic: the gibbons in the formation of the teeth, the orangs in the brain-structure, the gorillas in size, and the chimpanzees in the sigmoid flexure of the spine. In general structure they all closely resemble human beings, as in the absence of tails; in their semi-erect position (resting on finger-tips or knuckles); in the shape

of vertebral column, sternum and pelvis; in the adaptation of the arms for turning the palm uppermost at will; in the possession of Si long vermiform appendix to the short caecum of the intestine; in the size of the cerebral hemispheres and the complexity of their convolutions. They differ in certain respects, as in the pro- portion of the limbs, in the bony development of the eyebrow ridges, and in the opposable great toe, which fits the foot to be a climbing and grasping organ.

Man differs from them in the absence of a hairy coat; in the development of a large lobule to the external ear; in his fully

erect attitude; in his flattened foot with the non -opposable great toe; in the straight limb-bones; in the wider pelvis; in the marked sigmoid flexure of his spine; in the perfection of the muscular movements of the arm; in the delicacy of hand; in the smallness of the canine teeth and other dental peculiarities; in the development of a chin; and in the small size of his jaws compared to the relatively great size of the cranium. Together with man and the baboons, the anthropoid apes form the group known to science as Catarhini, those, that is, possessing a narrow nasal septum, and are thus easily distinguishable from the flat-nosed monkeys or Platyrhini. The anthropoid apes are arboreal and confined to the Old World. They are of special interest from the important place assigned to them in the arguments of Darwin and the Evolutionists. It is generally admitted now that no fundamental anatomical difference can be proved to exist between these higher apes and man, but it is equally agreed that none probably of the Simiidae is in the direct line of human ancestry . There is a great gap to be bridged between the highest anthropoid and the lowest man, and much importance has been attached to the discovery of an extinct primate, Pithecanthropus (q.v.), which has been regarded as the " missing link."

See Huxley's Man's Place in Nature (1863);" Robt. Hartmann's Anthropoid Apes (1883; London, 1885); A. H. Keane's Ethnology (1896); Darwin's Descent of Man (1871; pop. ed., 1901); Haeckel's Anthropogeny (Leipzig, 1874, 1903; Paris, 1877; Eng. ed., 1883); W. H. Flower and Rich. Lydekker, Mammals Living and Extinct (London, 1.891).

ANTHROPOLOGY (Gr. avOpoiTos man, and \6yos, theory or science), the science which, in its strictest sense, has as its object the study of man as a unit in the animal kingdom. It is distinguished from ethnology, which is devoted to the study of man as a racial unit, and from ethnography, which deals with the distribution of the races formed by the aggregation of such units. To anthropology, however, in its more general sense. as the natural history of man, ethnology and ethnography may both be considered to belong, being related as parts to a whole.

Various other sciences, in conformity with the above definition, must be regarded as subsidiary to anthropology, which yet hold their own independent places in the field of knowledge. Thus anatomy and physiology display the structure and functions of the human body, while psychology investigates the operations of the human mind. Philology deals with the general principles of language, as well as with the relations between the languages of particular races and nations. Ethics or moral science treats of man's duty or rules of conduct toward his fellow-men. Soci- ology and the science of culture are concerned with the origin and development of arts and sciences, opinions, beliefs, customs, laws and institutions generally among mankind within historic time; while beyond the historical limit the study is continued by inferences from relics of early ages and remote districts, to interpret which is the task of pre-historic archaeology and geology.

I. Man's Place in Nature. — In 1843 Dr J. C. Prichard, who perhaps of all others merits the title of founder of modern anthropology, wrote in his Natural History of Man: —

" The organized world presents no contrasts and resemblances more remarkable than those which we discover on comparing man- kind with the inferior tribes. That creatures should exist so nearly approaching to each other in all the particulars of their physical structure, and yet differing so immeasurably in their endowments and capabilities, would be a fact hard to believe, if it were not manifest to our observation. The differences are everywhere striking: the resemblances are less obvious in the fulness of their extent, and they are never contemplated without wonder by those who, in the study of anatomy and physiology, are first made aware how near is man in his physical constitution to the brutes. In all the principles of his internal structure, in the composition and functions of his parts, man is but an animal. The lord of the earth, who contemplates the eternal order of the universe, and aspires to communion with its invisible Maker, is a being composed of the same materials, and framed on the same principles, as the creatures which he has tamed to be the servile instruments of his willj or slays for his daily food. The points of resemblance are innumerable; they extend to the most recondite arrangements of that mechanism which maintains instrumentally the physical life of the body, which

brings forward its early development and admits, after a given period, its decay, and by means of which is prepared a succession of similar beings destined to perpetuate the race.'

The acknowledgment of man's structural similarity with the anthropomorphous species nearest approaching him, viz.: the higher or anthropoid apes, had long before Prichard's day- been made by Linnaeus, who in his Systema Naturae (1735) grouped them together as the highest order of Mammalia, to which he gave the name of Primates. The Amoenitates Aca- demicae (vol. vi., Leiden, 1764), published under the auspices of Linnaeus, contains a remarkable picture which illustrates a discourse by his disciple Hoppius, and is here reproduced (see Plate, fig. 1). In this picture, which shows the crudeness of the zoological notions current in the 18th century as to both men and apes, there are set in a row four figures: (a) a recognizable orang-utan, sitting and holding a staff; (b) a chimpanzee, absurdly humanized as to head, hands, and feet; (c) a hairy woman, with a tail a foot long; (d) another woman, more completely coated with hair. The great Swedish naturalist was possibly justified in treating the two latter creatures as quasi- human, for they seem to be grotesque exaggerations of such tailed and hairy human beings as really, though rarely, occur, and are apt to be exhibited as monstrosities (see Bastian and Hartmann, Zeitschrift filr Ethnologie, Index, " Geschwaiizte Menschen "; Gould and Pile, Anomalies and Curiosities of Medicine, 1897). To Linnaeus, however, they represented normal anthropomorpha or man-like creatures, vouched for by visitors to remote parts of the world. This opinion of the Swedish naturalist seems to have been little noticed in Great Britain till it was taken up by the learned but credulous Scottish judge, Lord Monboddo (see his Origin and Progress of Language, 1774, &c; Antient Metaphysics, 1778). He had not heard of the tailed men till he met with them in the work of Linnaeus, with whom he entered into correspondence, with the result that he enlarged his range of mankind with races of sub-human type. One was founded on the description by the Swedish sailor Niklas Koping of the ferocious men with long tails inhabiting the Nicobar Islands. Another comprised the orang-utans of Sumatra, who were said to take men captive and set them to work as slaves. One of these apes, it was related, served as a sailor on board a Jamaica ship, and used to wait on the captain. These are stories which seem to carry their own explanation. When the Nicobar Islands were taken over by the British government two centuries later, the native warriors were still wearing their peculiar loin-cloth hanging behind in a most taiU like manner (E. H. Man, Journal Anthropological Institute, vol. xv. p. 442). As for the story of the orang-utan cabin boy, this may even be verbally true, it being borne in mind that in the Malay languages the term orang-utan, " man of the forest," was originally used for inland for:st natives and other rude men, rather than for the miyas apes to which it has come to be generally applied by Europeans. The speculations as to primitive man connected with these stories diverted the British public, headed by Dr Johnson, who said that Monboddo was " as jealous of his tail as a squirrel." Linnaeus's primarily

zoological classification of man did not, however, suit the philosophical opinion of the time, which responded more readily to the systems represented by Buffon, and later by Cuvier, in which the human mind and soul formed an impassable wall of partition between him and other mammalia, so that the definition of man's position in the animal world was treated as not belonging to zoology, but to metaphysics and theology. It has to be borne in mind that Linnaeus, plainly as he recognized the likeness of the higher simian and the human types, does not seem to have entertained the thought of accounting for this similarity by common descent. It satisfied his mind to consider it as belonging to the system of nature, as indeed remained the case with a greater anatomist of the following century, Richard Owen. The present drawing, which under the authority of Linnaeus shows an anthropo- morphic series from which the normal type of man, the Homo sapiens, is conspicuously absent, brings zoological similarity into view without suggesting kinship to account for it. There are few

ideas more ingrained in ancient and low civilization than that of relationship by descent between the lower animals and man. Savage' and barbaric religions recognize it, and the mythology of the world has hardly a more universal theme. But in educated Europe such ideas had long been superseded by the influence of theology and philosophy, with which they seemed too incom- patible. In the 19th century, however, Lamarck's theory of the development of new species by habit and circumstance led through Wallace and Darwin to the doctrines of the hereditary transmission of acquired characters, the survival of the fittest, and natural selection. Thenceforward it was impossible to exclude a theory of descent of man from ancestral beings whom zoological similarity connects also, though by lines of descent not at all clearly defined, with ancestors of the anthropomorphic apes. In one form or another such a theory of human descent has in our time become part of an accepted framework of zbology, if not as a demonstrable truth, at any rate as a working hypothesis which has no effective rival.

The new development from Linnaeus's zoological scheme which has thus ensued appears in Huxley's diagram of simian and human skeletons (fig. 2, (a) gibbon; (b) orang; (c) chim- panzee; (d) gorilla; (e) man). Evidently suggested by the Linnean picture, this is brought up to the modern level of zoology, and continued on to man, forming an introduction to his zoological history hardly to be surpassed. Some of the main points it illustrates may be briefly stated here, the reader' being referred for further information to Huxley's Essays. In tracing the osteological characters of apes and man through this series, the general system of the skeletons, and the close correspondence in number and arrangement of vertebrae and ribs, as well as in the teeth, go far towards justifying the opinion of hereditary connexion. At the same time, the comparison brings into view differences in

human structure adapted to man's pre-eminent mode of life, though hardly to be accounted its chief causes. It may be seen how the arrangement of limbs suited for going on all-fours belongs rather to the apes than to man, and walking on the soles of the feet rather to man than the apes. The two modes of progression overlap in human life, but the child's tendency when learning is to rest on the soles of the feet and the palms of the hands, unlike the apes, which support themselves on the sides of the feet and the bent knuckles of the hands. With regard to climbing, the long stretch of arm and the grasp with both hands and feet contribute to the arboreal life of the apes, contrasting with what seem the mere remains of the climbing habit to be found even among forest savages. On the whole, man's locomotive limbs are not so much specialized to particular purposes, as generalized into adaptation to many ends. As to the mechanical conditions of the human body, the upright posture has always been recognized as the chief. To it contributes tne balance of the skull on the cervical vertebrae, while the human form of the pelvis provides the necessary support to the intestines in the standing attitude. The marked curvature of the vertebral column, by breaking the shock to the neck and head in running and leaping, likewise favours the erect position. The lowest coccygeal vertebrae of man remain as a rudimentary tail. While it is evident that high importance must be attached to the adaptation of the human body to the life of diversified intelligence and occupation he has to lead, this must not be treated as though it were the principal element of the superiority of man, whose comparison with all lower genera of mammals must be mainly directed to the intellectual organ, the brain. Comparison of the brains of vertebrate animals (see Brain) brings into view the immense difference between the small, smooth brain of a fish or bird and the large and convoluted organ in man. In man, botn size and complexity contribute to the increased area of the cortex or outer layer of the brain, which has been fully ascertained to be the seat of the mysterious processes by which sensation furnishes the groundwork of thought. Schafer (Textbook of Physiology, vol. ii. p. 697) thus defines it: " The cerebral cortex is the seat of the intellectual functions, of intelligent sensation or consciousness, of ideation, of volition, and of memory."

The relations between man and ape are most readily stated in

comparison with the gorilla, as on the whole the most anthropo- morphous ape. In the general proportions of the body and limbs there is a marked difference between the gorilla and man. The gorilla's brain-case is smaller, its trunk larger, its lower limbs shorter, its upper limbs longer in proportion

than those of man. The differences between a gorilla's skull and a man's are truly immense. In the gorilla, the face, formed largely by the massive jaw-bones, predominates over the brain-case or cranium; in the man these proportions are reversed. In man the occipital foramen, through which passes the spinal cord, is placed just behind the centre of the base of the skull, which is thus evenly balanced in the erect posture, whereas the gorilla, which goes habitually on all fours, and whose skull is inclined forward, in accordance with this posture has the foramen farther back. In man the surface of the skull is comparatively smooth, and the brow-ridges project but little, while in the gorilla these ridges overhang the cavernous orbits like penthouse roofs. The absolute capacity of the cranium of the gorilla is far less than that of man; the smallest adult human cranium hardly measuring less than 63 cub. in., while the largest gorilla cranium measured had a content of only 34j cub. in. The largest proportional size of the facial bones, and the great projection of the jaws, confer on the gorilla's skull its small facial angle and brutal character, while its teeth differ from man's in relative size and number of fangs. Comparing the lengths of the extremities, it is seen that the gorilla's arm is of enormous length, in fact about one-sixth longer than the spine, whereas a man's arm is one-fifth shorter than the spine; both hand and foot are proportionally much longer in the gorilla than in man; the leg does not so much differ. The vertebral column of the gorilla differs from that of man in its curvature and other characters, as also does the conformation of its narrow pelvis. The hand of the gorilla corresponds essentially as to bones and muscles with that of man, but is clumsier and heavier; its thumb is " opposable " like a human thumb, that is, it can easily meet with its extremity the extremities of the other fingers, thus possessing a character which does much to make the human hand so admirable an instrument; but the gorilla's thumb is proportionately shorter than man's. The foot of the higher apes, though often spoken of as a hand, is anatomically not such, but a prehensile foot. It has been argued by Sir Richard Owen and others that the position of the great toe converts the foot of the higher apes into a hand, an extremely important distinction from man; but against this Professor T. H. Huxley maintained that it has the characteristic structure of a foot with a very movable great toe. The external unlikeness of the apes to man depends much on their hairiness, but this and some other characteristics have no great zoological value. No doubt the difference between man and the apes depends, of all things, on the relative size and organization of the brain. While similar as to their general arrangement to the human brain, those of the higher apes, such as the chimpanzee, are much less complex in their convolutions, as well as much less in both absolute and relative weight — the weight of a gorilla's brain hardly exceeding 20 oz., and a man's brain hardly weighing less than 32 oz., although the gorilla is considerably the larger animal of the two.

These anatomical distinctions are undoubtedly of great moment, and it is an interesting question whether they suffice to place man in a zoological order by himself. It is plain that some eminent zoologists, regarding man as absolutely differing as to mind and spirit from any other animal, have had their discrimination of mere bodily differences unconsciously sharpened, and have been led to give differences, such as in the brain or even the foot of the apes and man, somewhat more importance than if they had merely distinguished two species of apes. Many naturalists hold the opinion that the anatomical differences which separate the gorilla or chimpanzee from man are in some respects less than those which separate these man-like apes from apes lower in the scale. Yet all authorities class both the higher and lower apes in the same order. This is Huxley's argument, some prominent points of which are the following: As regards the proportion of limbs, the hylobates or gibbon is as much longer in the arms than the gorilla as the gorilla is than the man, while on the other hand,

it is as much longer in the legs than the man as the man is than the gorilla. As to the vertebral column and pelvis, the lower apes differ from the gorilla as much as, or more than, it differs from man. As to the capacity of the cranium, men differ from one another so extremely that the largest known human skull holds nearly twice the measure of the smallest, a larger proportion than that in which man surpasses the gorilla; while, with proper allowance for difference of size of the various species, it appears that some of the lower apes fall nearly as much below the higher apes. The projection of the muzzle, which gives the character of brutality to the gorilla as distinguished from the man, is yet further exaggerated in the lemurs, as is also the backward position of the occipital foramen. In characters of such importance as the structure of the hand and foot, the lower apes diverge extremely from the gorilla; thus the thumb ceases to be opposable in the American monkeys, and in the marmosets is directed forwards, and armed with a curved claw like the other digits, the great toe in these latter being insignificant in proportion. The same argument can be extended to other points of anatomical structure, and, what is of more consequence, it appears true of the brain. A series of the apes, arranged from lower to higher orders, shows gradations from a brain little higher that that of a rat, to a brain like a small and imperfect imitation of a man's; and the greatest structural break in the series lies not between man and the man- like apes, but between the apes and monkeys on one side, and the lemurs on the other. On these grounds Huxley, restoring in principle the Linnean classification, desired to include man in the order of Primates. This order he divided into seven families: first, the Anthropini, consisting of man only; second, the Catarhini or Old World apes; third, the Platyrhini, all New World apes, except the marmosets; fourth, the Arclopithecini, or marmosets; fifth, the Lemurini, or lemurs; sixth and seventh, the

Cheiromyini and Galeopithecini.

It is in assigning to man his place in nature on psychological grounds that the greater difficulty arises. Huxley acknowledged an immeasurable and practically infinite divergence, ending in the present enormous psychological gulf between ape and man. It is difficult to account for this intellectual chasm as due to some minor structural difference. The opinion is deeply rooted in modern as in ancient thought, that only a distinctively human element of the highest import can account for the severance between man and the highest animal below him. Differences in the mechanical organs, such as the perfection of the human hand as an instrument, or the adaptability of the human voice to the expression of human thought, are indeed of great value. But they have not of themselves such value, that to endow an ape with the hand and vocal organs of a man would be likely to raise it through any large part of the interval that now separates it from humanity. Much more is to be said for the view that man's larger and more highly organized brain accounts for those mental powers in which he so absolutely surpasses the brutes.

The distinction does not seem to lie principally in the range and delicacy of direct sensation, as may be judged from such well-known facts as man's inferiority to the eagle in sight, or to the dog in scent. At the same time, it seems that the human sensory organs may have in various respects acuteness beyond those of other creatures. But, beyond a doubt, man possesses, and in some way possesses by virtue of his superior brain, a power of co-ordinating the impressions of his senses, which enables him to understand the world he lives in, and by under- standing to use, resist, and even in a measure rule it. No human art shows the nature of this human attribute more clearly than does language. Man shares with the mammalia and birds the direct expression of the feelings by emotional tones and interjectional cries; the parrot's power of articulate utterance almost equals his own; and, by association of ideas in some measure, some of the lower animals have even learnt to recognize words he utters. But, to use words in themselves unmeaning, as symbols by which to conduct and convey the complex in- tellectual processes in which mental conceptions are suggested, compared, combined, and even analysed, and new ones created — this is a faculty which is scarcely to be traced in any lower animal.

ANTHROPOLOGY

in

The view that this, with other mental processes, is a function of the brain, is remarkably corroborated by modern investigation of the disease of aphasia, where the power of thinking remains, but the power is lost of

recalling the word corresponding to the thought, and this mental defect is found to accompany a diseased state of a particular locality of the brain (see Aphasia). This may stand among the most perfect of the many evidences that, in Professor Bain's words, " the brain is the principal, though not the sole organ of mind." As the brains of the vertebrate animals form an ascending scale, more and more approaching man's in their arrangement, the fact here finds its explanation, that lower animals perform mental processes corresponding in their nature to our own, though of generally less power and complexity. The full evidence of this correspondence will be found in such works as Brehm's Thierleben; and some of the salient points are set forth by Charles Darwin, in the chapter on " Mental Powers," in his Descent of Man. Such are the similar effects of terror on man and the lower animals, causing the muscled to tremble, the heart to palpitate, the sphincters to be relaxed, and the hair to stand on end. The phenomena of memory, as to both persons and places, is strong in animals, as is manifest by their recognition of their masters, and their re-turning at once to habits of which, though disused for many years, their brain has not lost the stored-up impressions. Such facts as that dogs " hunt in dreams," make it likely that their minds are not only sensible to actual events, present and past, but can, like our minds, combine revived sensations into ideal scenes in which they are actors, — that is to say, they have the faculty of imagination. As for the reasoning powers in animals, the accounts of monkeys learning by experience to break eggs care- fully, and pick off bits of shell, so as not to lose the contents, or of the way in which rats or martens after a while can no longer be caught by the same kind of trap, with innumerable similar facts, show in the plainest way that the reason of animals goes so far as to form by new experience a new hypothesis of cause and effect which will henceforth guide their actions. The employment of mechanical instruments, of which instances of monkeys using sticks and stones furnish the only rudimentary – traces among the lower animals, is one of the often-quoted distinctive powers of man. With this comes the whole vast and ever-widening range of inventive and adaptive art, where the uniform hereditary instinct of the cell-forming bee and the nest-building bird is supplanted by multiform processes and constructions, often at first rude and clumsy in comparison to those of the lower instinct, but carried on by the faculty of improvement and new invention into ever higher stages. '" From the moment," writes A. R. Wallace (Natural Selection), " when the first skin was used as a covering, when the first rude spear was formed to assist in the chase, when fire was first used to cook his food, when the first seed was sown or shoot planted, a grand revolution was effected in nature, a revolution which in all the previous ages of the earth's history had had no parallel; for a being had arisen who was no longer necessarily subject to change with the changing universe, — a being who was in some degree superior to nature, inasmuch

as he knew how to control and regulate her action, and could keep himself in harmony with her, not by a change in body, but by an advance of mind." As to the lower instincts tending directly to self-preservation, it is acknowledged on all hands that man has them in a less developed state than other animals ; in fact, the natural defence- lessness of the human being, and the long-continued care and teaching of the young by the elders, are among the commonest themes of moral discourse. Parental tenderness and care for the young are strongly marked among the lower animals, though so inferior in scope and duration to the human qualities; and the same may be said of the mutual forbearance and defence which bind together in a rudimentary social bond the families and herds of animals. Philosophy seeking knowledge for its own sake; morality, manifested in the sense of truth, right, and virtue; and religion, the belief in and communion with super- human powers ruling and pervading the universe, are human characters, of which it is instructive to trace, if possible, the

earliest symptoms in the lower animals, but which can there show at most only faint and rudimentary signs of their wondrous development in mankind. That the tracing of physical and even intellectual continuity between the lower animals and our own race, does not necessarily lead the anthropologist to lower the rank of man in the scale of nature, may be shown by citing A. R. Wallace. Man, he considers, is to be placed " apart, as not only the head and culminating point of the grand series of organic nature, but as in some degree a new and distinct order of being."

To regard the intellectual functions of the brain and nervous system as alone to be considered in the psychological comparison of man with the lower animals, is a view satisfactory to those thinkers who hold materialistic views. According to this school, man is a machine, no doubt the most complex and wonderfully adapted of all known machines, but still neither more nor less than an instrument whose energy is provided by force from without, and which, when set in action, performs the various operations for which its structure fits it, namely, to live, move, feel, and think. This view, however, always has been strongly opposed by those who accept on theological grounds a spiritual- istic doctrine, or what is, perhaps, more usual, a theory which combines spiritualism and materialism in the doctrine of a composite nature in man, animal as to the body and in some measure as to the mind, spiritual as to the soul. It may be useful, as an illustration of one opinion on this subject, to continue here the citation of Dr Prichard's comparison between man and the lower animals : —

" If it be inquired in what the still more remarkable difference consists, it is by no means easy to reply. By some it will be said that man, while similar in the organization of his body to the lower tribes, is distinguished from them by the possession of an immaterial soul, a principle capable of

*conscious feeling, of intellect and thought. To many persons it will appear paradoxical to ascribe the endowment of a soul to the inferior tribes in the creation, yet it is difficult to discover a valid argument that limits the possession of an immaterial principle to man. The phenomena of feeling, of desire and aversion, of love and hatred, of fear and revenge, and the perception of external relations manifested in the life of brutes, imply, not only through the analogy which they display to the human faculties, but likewise from all that we can learn or conjecture of their particular nature. the superadded existence of a principle distinct from the mere mechanism of material bodies. That such a principle must exist in all beings capable of sensation, or of anything analogous to human passions and feelings, will hardly be denied by those who perceive the force of arguments which metaphysically demonstrate the im- material nature of the mind. There may be no rational grounds for the ancient dogma that the souls of the lower animals were im- perishable, like the soul of man: this is, however, a problem which we are not called upon to discuss ; and we may venture to conjecture that there may be immaterial essences of divers kinds, and endowed *ith various attributes and capabilities. But the real nature of these unseen principles eludes our research: they are only known to us by their external manifestations. These manifestations are the various powers and capabilities, or rather the habitudes of action, which characterize the different orders of being, diversified according to their several destinations."*

Dr Prichard here puts forward distinctly the time-honoured doctrine which refers the mental faculties to the operation of the soul. The view maintained by a distinguished comparative anatomist, Professor St George Mivart, in his Genesis of Species, ch. xii., may fairly follow. " Man, according to the old scholastic definition, is 'a rational animal ' (animal rationale), and his animality is distinct in nature from his rationality, though in- separably joined, during life, in one common personality. Man's animal body must have had a different source from that of the spiritual soul which informs it, owing to the distinctness of the two orders to which those two existences severally belong." The two extracts just given, however, significant in themselves, fail to render an account of the view of the human constitution which would probably, among the theological and scholastic leaders of public opinion, count the largest weight of adherence. According to this view, not only life but thought are functions of the animal system, in which man excels all other animals as to height of organization: but beyond this, man embodies an immaterial and immortal spiritual principle which no lower cieature possesses, and which makes the resemblance of the anes

to him but a mocking simulance. To pronounce any absolute decision on these conflicting doctrines is foreign to our present purpose, which is to show that all of them count among their adherents men of high rank in science.

II. Origin of Man. — Opinion as to the genesis of man is divided between the theories of creation and evolution. In both schools, the ancient doctrine of the contemporaneous appearance on earth of all species of animals having been aban- doned under the positive evidence of geology, it is admitted that the animal kingdom, past and present, includes a vast series of successive forms, whose appearances and disappearances have taken place at intervals during an immense lapse of ages. The line of inquiry has thus been directed to ascertaining what formative relation subsists among these species and genera, the last link of the argument reaching to the relation between man and the lower creatures preceding him in time. On both the theories here concerned it would be admitted, in the words of Agassiz (Principles of Zoology, pp. 205-206), that " there is a manifest progress in the succession of beings on the surface of the earth. This progress consists in an increasing similarity of the living fauna, and, among the vertebrates especially, in their increasing resemblance to man." Agassiz continues, however, in terms characteristic- of the creationist school: " But this connexion is not the consequence of a direct lineage between the faunas of different ages. There is nothing like parental descent connecting them. The fishes of the Palaeozoic age are in no respect the ancestors of the reptiles of the Secondary age, nor does man descend from the mammals which preceded him in the Tertiary age. The Jink by which they are connected is of a higher and immaterial nature; and their connexion is to be sought in the view of the Creator himself, whose aim in forming the earth, in allowing it to undergo the successive changes which geology has pointed out, and in creating successively all the different types of animals which have passed away, was to introduce man upon the surface of our globe. Man is the end towards which all the animal creation has tended from the first appearance of the first Palaeozoic fishes." The evolutionist, on the contrary (see Evolution), maintains that different successive species of animals are in fact connected by parental descent, having become modified in the course of successive generations. The result of Charles Darwin's application of this theory to man may be given in his own words (Descent of Man, part i. ch. 6) : —

" The Catarhine and Platyrhine monkeys agree in a multitude of characters, as is shown by their unquestionably belonging to one and the same order. The many characters which they possess in common can hardly have been independently acquired by so many distinct species; so that these characters must have been inherited. But an ancient form which possessed many characters common to the Catarhine and Platyrhine

monkeys, and others in an inter- mediate condition, and some few perhaps distinct from those now present in either group, would undoubtedly have been ranked, if seen by a naturalist, as an ape or a monkey. And as man under a genealogical point of view belongs to the Catarhine or Old World stock, we must conclude, however much the conclusion may revolt our pride, that our early progenitors would have been properly thus designated. But we must not fall into the error of supposing that the early progenitor of the whole Simian stock, including man, was identical with, or even closely resembled, any existing ape or monkey."

The problem of the origin of man cannot be properly discussed apart from the full problem of the origin of species. The homologies between man and other animals which both schools try to account for; the explanation of the intervals, with apparent want of intermediate forms, which seem to the creation- ists so absolute a separation between species; the evidence of useless "rudimentary organs," such as in man the external shell of the ear, and the muscle which enables some individuals to twitch their ears, which rudimentary parts the evolutionists claim to be only explicable as relics of an earlier specific condi- tion, — these, which are the main points of the argument on the origin of man, belong to general biology. The philosophical principles which underlie the two theories stand for the most part in strong contrast, the theory of evolution tending toward the supposition of ordinary causes, such as "natural selection," producing modifications in species, whether by gradual accumula-

tion or more sudden leaps, while the theory of creation has recourse to acts of supernatural intervention (see the duke of Argyll, Reign of Law, ch. v.). St George Mivart (Genesis of Species) propounded a theory of a natural evolution of man as to his body, combined with a supernatural creation as to his soul; but this attempt to meet the difficulties on both sides seems to have satisfied neither.

The wide acceptance of the Darwinian theory, as applied to the descent of man, has naturally roused anticipation that geological research, which provides evidence of the animal life of incalculably greater antiquity, would furnish fossil remains of some comparatively recent being intermediate between the anthropomorphic and the anthropic types. This expectation has hardly been fulfilled, but of late years the notion of a variety of the human race, geologically ancient, differing from any known in historic times, and with characters approaching the simian, has been supported by further discoveries. To bring this to the reader's notice, top and side views of three skulls, as placed together in the human development series in the Oxford Uni- versity Museum, are represented in the plate, for the purpose of showing the great size of the orbital ridges, which the reader may contrast with his own by a touch with his fingers on his forehead. The first (fig.3) is

the famous Neanderthal skull from near Dusseldorf, described by Schaafhausen in Muller's Archiv, 1858; Huxley in Lyell, Antiquity of Man, p. 86, and in Man's Place in Nature. The second (fig. 4) is the skull from the cavern of Spy in Belgium (de Puydt and Lohest, Compte rendu du Congrbs de Namur, r886). The foreheads of theses two skulls have an ape-like form, obvious on comparison with the simian skulls of the gorilla and other apes, and visible even in the small- scale figures in the Plate, fig. 2. Among modern tribes of man- kind the forehead of the Australian aborigines makes the nearest approach to this type, as was pointed out by Huxley. This brief description will serve to show the importance of a later discovery. At Trinil, in Java, in an equatorial region where, if anywhere, a being intermediate between the higher apes and man would seem likely to be found, Dr Eugene Dubois in 1891-1892 excavated from a bed, considered by him to be of Sivalik formation (Plio cene), a thighbone which competent anatomists decide to be human, and a remarkably depressed calvaria or skull-cap (fig. 5) , bearing a certain resemblance in its proportions to the corre- sponding part of the simian skull. These remains were referred by their discoverer to an animal intermediate between man and ape, to which he gave the name of Pithecanthropus erectus (q.v.), but the interesting discussions on the subject have shown divergence of opinion among anatomists. At any rate, classing the Trinil skull as human, it may be described as tending towards the simian type more than any other known.*

III. Races of Mankind.— The classification of mankind into a number of permanent varieties or races, rests on grounds which are within limits not only obvious but definite. Whether from a popular or a scientific point of view, it would be admitted that a Negro, a Chinese, and an Australian belong to three such permanent varieties of men, all plainly distinguishable from one another and from any European. Moreover, such a division takes for granted the idea which is involved in the word race, that each of these varieties is due to special ancestry, each race thus representing an ancient breed or stock, however these breeds or stocks may have had their origin. The anthropological classification of mankind is thus zoological in its nature, like that of the varieties or species of any other animal group, and the characters on which it is based are in great measure physical, though intellectual and traditional peculiarities, such as moral habit and language, furnish important aid. Among the best- marked race-characters are the colour of the skin, eyes and hair; and the structure and arrangement of the latter. Stature is by no means a general criterion of race, and it would not, for in- stance, be difficult to choose groups of Englishmen, Kaffirs, and North American Indians, whose mean height should hardly differ. Yet in many cases it is a valuable means of distinction, as between the tall Patagonians and the stunted Fuegians,, and even as a help in minuter

problems, such as separating the

Teutonic and Celtic ancestry in the population of England (see Beddoe, " Stature and Bulk of Man in the British Isles," in Mem. Anthrop. Soc. London, vol. iii.). Proportions of the limbs, compared in length with the trunk, have been claimed as con- stituting peculiarities of African and American races; and other anatomical points, such as the conformation of the pelvis, have speciality. But inferences of this class have hardly attained to sufficient certainty and generality to be set down in the form of rules. The conformation of the skull is second only to the colour of the skin as a criterion for the distinction of race; and the position of the jaws is recognized as important, races being described as prognathous when the jaws project far, as in the Australian or Negro, in contradistinction to the orthognathous type, which is that of the ordinary well-shaped European skull. On this distinction in great measure depends the celebrated " facial angle," measured by Camper as a test of low and high races; but this angle is objectionable as resulting partly from the development of the forehead and partly from the position of the jaws. The capacity of the cranium is estimated in cubic measure by filling it with sand, &c, with the general result that the civilized white man is found to have a larger brain than the barbarian or savage. Classification of races on cranial measure- ments has long been attempted by eminent anatomists, and in certain cases great reliance may be placed on such measurements. Thus the skulls of an Australian and a Negro would be generally distinguished by their narrowness and the projection of the jaw from that of any Englishman; but the Australian skull would usually differ perceptibly from the Negroid in its upright sides and strong orbital ridges. The relation of height to breadth may also furnish a valuable test; but it is acknowledged by all experienced craniologists, that the shape of the skull riiay vary so much within the same tribe, and even the same family, that it must be used with extreme caution, and if possible only in conjunction with other criteria of race. The general contour of the face, in part dependent on the form of the skull, varies much in different races, among whom it is loosely defined as oval, lozenge-shaped, pentagonal, &c. Of particular features, some of the most marked contrasts to European types are seen in the oblique Chinese eyes, the broad-set Kamchadale cheeks, the pointed Arab chin, the snub Kirghiz nose, the fleshy protuberant Negro lips, and the broad Kalmuck ear. Taken altogether, the features have a typical character which popular observation seizes with some degree of correctness, as in the recognition of the Jewish countenance in a European city.

Were the race-characters constant in degree or even in kind, the classification of races would be easy; but this is not so. Every division of mankind presents in every character wide deviations from a standard. Thus the Negro race, well marked as it may seem at the first glance, proves on closer examination to include several shades of complexion and features, in some districts varying far from the accepted Negro type; while the examination of a series of native American tribes shows that, notwithstanding their asserted uniformity of type, they differ in stature, colour, features and proportions of skull. (See Prichard, Nat. Hist, of Man; Waitz, Anthropology, parti, sec. 5.) Detailed anthropological research, indeed, more and more justi- fies Blumenbach's words, that " innumerable varieties of man- kind run into one another by insensible degrees." This state of things, due partly to mixture and crossing of races, and partly to independent variation of types, makes the attempt to arrange the whole human species within exactly bounded divisions an apparently hopeless task. It does not follow, however, that the attempt to distinguish special races should be given up, for there at least exist several definable types, each of which so far prevails in a certain population as to be taken as its standard. L. A. J. Quetelet's plan of defining such types will probably meet with general acceptance as the scientific method proper to this branch of anthropology. It consists in the determination of the stan- dard or typical " mean man " (homme moyen) of a population, with reference to any particular quality, such as stature, weight, complexion, &c. In the case of stature, this would be done by measuring a sufficient number of men, and counting how many

of them belong to each height on the scale. If it be thus ascer- tained, as it might be in an English district, that the 5 ft. 7 in. men form the most numerous groUp, while the 5 ft. 6 in. and 5 ft. 8 in. men are less in number, and the 5 ft. 5 in. and 5 ft. 9 in. still fewer, and so on until the extremely small number of extremely short or tall individuals of 5 ft. or 7 ft. is reached, it will thus be ascertained that the stature of the mean or typical man is to be taken as 5 ft. 7 in. The method is thus that of selecting as the standard the most numerous group, on both sides of which the groups decrease in number as they vary in type. Such classification may show the existence of two or more types, in a community, as, for instance, the population of a Californian settlement made up of Whites and Chinese might show two predominant groups (one of 5 ft. 8 in., the other of 5 ft. 4 in.) corresponding to these two racial types. It need hardly be said that this method of determining the mean type of a race, as being that of its really existing and most numerous class, is altogether superior to the mere calculation of an average, which may actually be represented by comparatively few indi- viduals, and those the exceptional ones. For instance, the average stature of the mixed European and Chinese

population just referred to might be 5 ft. 6 in. — a worthless and indeed misleading result. (For particulars of Quetelet's method, see his Physique sociale (1869), and Anthropometric (1871).)

Classifications of man have been numerous, and though, regarded as systems, most of them are unsatisfactory, yet they have been of great value in systematizing knowledge, and are all more or less based on indisputable distinctions. J. F. Blumen- bach's division, though published as long ago as 1 781, has had the greatest influence. He reckons five races, viz. Caucasian, Mongolian, Ethiopian, American, Malay. The ill-chosen name of Caucasian, invented by Blumenbach in allusion to a South Caucasian skull of specially typical proportions, and applied by him to the so-called white races, is still current; it brings into one race peoples such as the Arabs and Swedes, although these are scarcely less different than the Americans and Malays; who are set down as two distinct races. Again, two of the best-marked varieties of mankind are the Australians and the Bush- men, neither of whom, however, seems to have a natural place in Blumenbach's series. The yet simpler classification by Cuvier into Caucasian, Mongol and Negro corresponds in some measure with a division by mere complexion into white, yellow and black races; but neither this threefold division, nor the ancient classification into Semitic, Hamitic and Japhetic nations can be regarded as separating the human types either justly or sufficiently (see Prichard, Natural History of Man, sec. 15; Waitz, Anthro- pology, vol. i. part i. sec. 5). Schemes which set up a larger number of distinct races, such as the eleven of Pickering, the fifteen of Bory de St Vincent and the sixteen of Desmoulins, have the advantage of finding niches for most well-defined human varieties; but no modern naturalist would be likely to adopt any one of these as it stands. In criticism of Pickering's system, it is sufficient to point out that he divides the white nations into two races, entitled the Arab and the Abyssinian (Picketing, Races of Man, ch. i.). Agassiz, Nott, Crawfurd and others' who have assumed a much larger number of races or species Of man, are not considered to have satisfactorily defined a corre- sponding number of distinguishable types. On the whole, Huxley's division probably approaches more nearly than any other to such a tentative classification as may be accepted in definition of the principal varieties of mankind, regarded from a zoological point of view, though anthropologists may be dis- posed to erect into separate races several of his widely-differing sub-races. He distinguishes four principal types of mankind, the Australioid, Negroid, Mongoloid and Xanthochroic ("fair whites"), adding a fifth variety, the Melanochroic ("dark whites ").

In determining whether the races of mankind are to be classed as varieties of one species, it is important to decide whether every two races can unite to produce fertile offspring. It is settled by experience that the most numerous and well-known crossed races, such as the Mulattos, descended

and Negroes — the Mestizos, from Europeans and American indigenes — the Zambos, from these American indigenes and Negroes, &c, are permanently fertile. They practically con- stitute sub-races, with a general blending of the characters of the two parents, and only differing from fully-established races in more or less tendency to revert to one or other of the original types. It has been argued, on the other hand, that not all such mixed breeds are permanent, and especially that the cross between Europeans and Australian indigenes is almost sterile; but this assertion, when examined with the care demanded by its bearing on the general question of hybridity, has distinctly broken down. On the whole, the general evidence favours the opinion that any two races may combine to produce a new sub-race, which again may combine with any other variety. Thus, if the existence of a small number of distinct races of mankind be taken as a starting-point, it is obvious that their crossing would produce an indefinite number of secondary varieties, such as the population of the world actually presents. The working out in detail of the problem, how far the differences among complex nations, such as those of Europe, may have been brought about by hybridity, is still, however, a task of almost hopeless intricacy. Among the boldest attempts to account for distinctly-marked populations as resulting from the inter- mixture of two races, are Huxley's view that the Hottentots are hybrid between the Bushmen and the Negroes, and his more important suggestion, that the Melanochroic peoples of southern Europe are of mixed Xanthochroic and Australiojd stock.

The problem of ascertaining how the small number of races, distinct enough to be called primary, can have assumed their different types, has been for years the most disputed field of anthropology, the battle-ground of the rival schools of mono- genists and polygenists. The one has claimed all mankind to be descended from one original stock, and generally from a single pair; the other has contended for the several primary races being separate species of independent origin. The great problem of the monogenist theory is to explain by what course of variation the so different races of man have arisen from a single stock. In ancient times little difficulty was felt in this, authorities such as Aristotle and Vitruvius seeing in climate and circumstance the natural cause of racial differences, the Ethiopian having been blackened by the tropical sun, &c. Later and closer observations, however, have shown such influences to be, at any rate, far slighter in amount and slower in operation than was once sup- posed. A. de Quatrefages brings forward {Unite de Vespece humaine) his strongest

arguments for the variability of races under change of climate, &c. {action du milieu),, instancing the asserted alteration in complexion, constitution and character of Negroes in America, and Englishmen in America and Australia. But although the reality of some such modification is not disputed, especially as to stature and constitution, its, amount is not enough to upset the counter-proposition of the remarkable permanence of type displayed by races, ages after they have been transported to climates extremely different from that of their former home. Moreover, physically different peoples, such as the Bushmen and Negroes in Africa, show no signs of approximation under the influence of the same climate; while, on the other hand, the coast tribes of Tierra del Fuego and forest tribes of tropical Brazil continue to resemble one another, in spite of extreme differences of climate and food. Darwin is moderate in his estimation of the changes produced on races of man by climate and mode of life within the range of history {Descent of Man, part i. ch. 4 and 7). The slightness and slowness of variation in human races having become known, a great difficulty of the monogenist theory was seen to lie in the apparent shortness of the Biblical chronology. Inasmuch as several well-marked races of mankind, such as the Egyptian, Phoenician, Ethiopian, &c, were much the same three or four thousand years ago as now, their variation from a single stock in the course of any like period could hardly be accounted for without a miracle. This difficulty the polygenist theory escaped, and in consequence it gained ground. Modern views have however tended to restore, though under a new aspect, the doctrine of a single human

stock. The fact that man has existed during a vast period of time makes it more easy to assume the continuance of very slow natural variation as having differentiated even the white man and the Negro among the descendants of a common progenitor. On the other hand it does not follow necessarily from a theory of evolution of species that mankind must have descended from a single stock, for the hypothesis of development admits of the argument, that several simian species may have culminated in several races of man. The general tendency of the development theory, however, is against constituting separate species where the differences are moderate enough to be accounted for as due to variation from a single type. Darwin's summing-up of the evidence as to unity of type throughout the races of mankind is as distinctly a monogenist argument as those of Blumenbach, Prichard or Quatrefages —

" Although the existing races of man differ in many respects, as in colour, hair, shape of skull, proportions of the body, &c, yet, if their whole organization be taken into consideration, they are found to resemble each other closely in a multitude of points. Many of these points are of so unimportant, or of so singular a nature, that it is extremely improbable that they should have been independently acquired by aboriginally distinct

species or races. The same remark holds good with equal or greater force with respect to the numerous points of mental similarity between the most distinct races of man. ... Now, when naturalists observe a close agreement in numerous small details of habits, tastes and dispositions between two or more domestic races, or between nearly allied natural forms, they use this fact as an argument that all are descended from a common progenitor who was thus endowed ; and, consequently, that all should be classed under the same species. The same argument may be applied with much force to the races of man." — (Darwin, Descent of Man, part i. ch. 7.)

The main difficulty of the monogenist school has ever been to explain how races which have remained comparatively fixed in type during the long period of history, such as the white man and the Negro, should, in even a far longer period, have passed by variation from a common original. To meet this A. R. Wallace suggests that the remotely ancient representatives of the human species, being as yet animals too low in mind to have developed those arts of maintenance and social ordinances by which man holds his own against influences from climate and circumstance, were in their then wild state much more plastic than now to external nature; so that " natural selection " and other causes met with but feeble resistance in forming the permanent varieties or races of man, whose complexion and structure still remained fixed in their descendants (see Wallace, Contributions to the Theory of Natural Selection, p. 319). On the whole, it may be asserted that the doctrine of the unity of mankind stands on a firmer basis than in previous ages. It would be premature to judge how far the problem of the origin of races may be capable of exact solution; but the experience gained since 187 1 countenances Darwin's prophecy that before long the dispute between the monogenists and the polygenists would die a silent and un- observed death.

IV. Antiquity of Man. — Until the 19th century man's first appearance on earth was treated on a historical basis as matter of record. It is true that the schemes drawn up by chronologists differed widely, as was natural, considering the variety and inconi- sistency of their documentary data. On the whole, the scheme of Archbishop Usher, who computed that the earth and man were created in 4004 B.C., was the most popular (see Chronology). It is no longer necessary, however, to discuss these chrono- logies. Geology has made it manifest that our earth must have been the seat of vegetable and animal life for an immense period of time; while the first appearance of man, though comparatively recent, is positively so remote, that an estimate between twenty and a hundred thousand years may fairly be taken as a minimum. This geological claim for a vast antiquity of the human race is supported by the similar claims of prehistoric archaeology and the science of culture, the evidence of all three departments of inquiry being intimately connected, and in perfect harmony.

Human bones and objects of human manufacture have been found in such geological relation to the remains of fossil species of elephant, rhinoceros, hyena, bear, &c, as to lead to the distinct inference that man already existed at a remote period in localities

where these mammalia are now and have long been extinct. The not quite conclusive researches of Tournal and Christol in limestone caverns of the south of France date back to 1828, About the same time P. C. Schmerling of Liege was exploring the ossiferous caverns of the valley of the Meuse, and satisfied himself that the men whose bones he found beneath the stalagmite floors, together with bones cut and flints shaped by human workmanship, had inhabited this Belgian district at the same time with the cave-bear and several other extinct animals whose bones were imbedded with them {Recherches sur les ossements fossiles decouverts dans les cavernes de la province de Li&ge (Liege, ‘ 1 833-1 834)) . This evidence, however, met with little acceptance among scientific men. Nor, at first, was more credit given to the discovery by M. Boucher de Perthes, about 1841, of rude flint hatchets in a sand-bed containing remains of mammoth and rhinoceros at Menchecourt near Abbeville, which first find was followed by others in the same district (see Boucher de Perthes, De I’lndustrie primitive, ou les arts a leur origine (1846); Antiquitis celtiques el antidiluviennes (Paris, 1847), &c). Between 1850 and i860 French and English geologists were induced to examine into the facts, and found irresistible the evidence that man existed and used rude implements of chipped flint during the Quaternary or Drift period. Further investigations were then made, and over- looked results of older ones reviewed. In describing Kent’s Cavern (q.v.) near Torquay, R. A. C. Godwin-Austen had main- tained, as early as 1840 (Proc. Geo. Soc. London, vol. iii. p. 286), that the human bones and worked flints had been deposited indis- criminately together with the remains of fossil elephant, rhinoceros, &c. Certain caves and rock-shelters in the province of Dordogne, in central France, were examined by a French and an English archaeologist, Edouard Lartet and Henry Christy, the remains discovered showing the former prevalence of the reindeer in this region, at that time inhabited by savages, whose bone and stone implements indicate a habit of life similar to that of the Eskimos. Moreover, the co-existence of man with a fauna now extinct or con- fined to other districts was brought to yet clearer demonstration by the discovery in these caves of certain drawings and carvings of the animals done by the ancient inhabitants themselves, such as a group of reindeer on a piece of reindeer horn, and a sketch of a mammoth, showing the elephant’s long hair, on a piece of a mammoth’s tusk from La Madeleine (Lartet and Christy,

Reliquiae Aquitanicae, ed. by T. R. Jones (London, 1865), &c).

This and other evidence (which is considered in more detail in the article Archaeology) is now generally accepted by geologists as carrying back the existence of man into the period of the post-glacial drift, in what is now called the Quaternary period, an antiquity at least of tens of thousands of years. Again, certain inferences have been tentatively made from the depth of mud, earth, peat, &c, which has accumulated above relics of human art imbedded in ancient times. Among these is the argument from the numerous borings made in the alluvium of the Nile valley to a depth of 60 ft., where down to the lowest level fragments of burnt brick and pottery were always found, showing that people advanced enough in the arts to bake brick and pottery have inhabited the valley during the long period required for the Nile inundations to deposit 60 ft. of mud, at a rate probably not averaging more than a few inches in a century. Another argument is that of Professor von Morlot, based on a railway section through a conical accumulation of gravel and alluvium, which the torrent of the Tiniere has gradually built up where it enters the Lake of Geneva near Villeneuve. Here three layers of vegetable soil appear, proved by the objects imbedded in them to have been the successive surface soils in two pre- historic periods and in the Roman period, but now lying 4, 10 and 19 ft. underground. On this it is computed that if 4 ft. of soil were formed in the 1500 years since the Roman period, we must go 5000 years farther back for the date of the earliest human inhabitants. Calculations of this kind, loose as they are, deserve attention.

The interval between the Quaternary or Drift period and the period of historical antiquity is to some extent bridged over by relics of various intermediate civilizations, e.g. the Lake-dwellings

iq.v.) of Switzerland, mostly of the lower grades, and in some cases reaching back to remote dates. And further evidence of man's antiquity is afforded by the kitchen-middens or shell-heaps iq.v.), especially those in Denmark. Danish peat-mosses again show the existence of man at a time when the Scotch fir was abundant; at a later period the firs were succeeded by oaks, which have again been almost superseded by beeches, a succession of changes which indicate a considerable lapse of time.

Lastly, chronicles and documentary records, taken in con- nexion with archaeological relics of the historical period, carry back into distant ages the starting-point of actual history, behind which lies the evidently vast period only known by inferences from the relations of languages and the stages of development of civilization. The most recent work of Egyptologists proves a systematic civilization to have existed in the valley of the Nile at least 6000 to 7000 years ago (see Chronology) .

It was formerly held that the early state of society was one of comparatively high culture, and thus there was no hesitation in assigning the origin of man to a time but little beyond the range of historical records and monuments. But the researches of anthropologists in recent years have proved that the civilization of man has been gradually developed from an original stone-age culture, such as characterizes modern savage life. To the 6000 • years to which ancient civilization dates back must be added a vast period during which the knowledge, arts and institutions of such a civilization as that of ancient Egypt attained the high level evidenced by the earliest records. The evidence of com- parative philology supports the necessity for an enormous time allowance. Thus, Hebrew and Arabic are closely related languages, neither of them the original of the other, but both sprung from some parent language more ancient than either. When, therefore, the Hebrew records have carried back to the most ancient admissible date the existence of the Hebrew language, this date must have been long preceded by that of the extinct parent language of the whole Semitic family; while this again was no doubt the descendant of languages slowly shaping themselves through ages into this peculiar type. Yet more striking is the evidence of the Indo-European (formerly called Aryan) family of languages. The Hindus, Medes,Persians, Greeks, Romans, Germans, Celts and Slavs make their appear- ance at more or less remote dates as nations separate in language •as in history. Nevertheless, it is now acknowledged that at sorne far remoter time, before these nations were divided from the parent stock, and distributed over Asia and Europe, a single barbaric people stood as physical and political representative of the nascent Aryan race, speaking a now extinct Aryan lan- guage, from which, by a series of modifications not to be estimated as possible within many thousands of years, there arose languages which have been mutually unintelligible since the dawn of history, and between which it was only possible for an age of advanced philology to trace the fundamental relationship.

From the combination of these considerations, it will be seen that the farthest date to which documentary or other records extend is now generally regarded by anthropologists as but the earliest distinctly visible point of the historic period, beyond which stretches back a vast indefinite series of prehistoric ages.

V. Language. — In examining how the science of language bears on the general problems of anthropology, it is not necessary to discuss at length the critical questions which arise, the principal of which are considered elsewhere (see Language) . Philology is especially appealed to by anthropologists as contributing to the following lines of argument. A primary mental similarity of all branches of the human race is evidenced by their common faculty of speech, while at the same time secondary

diversities of race-character and history are marked by difference of grammatical structure and of vocabularies. The existence of groups or families of allied languages, each group being evidently descended from a single language, affords one of the principal aids in classifying nations and races. The adoption by one language of words originally belonging to another, proving as it does the fact of intercourse between two races, and even to some extent indicating the results of such intercourse, affords a

valuable clue through obscure regions of the history of civilization.

Communication by gesture-signs, between persons unable to converse in vocal language, is an effective system of expression common to all mankind. Thus, the signs used to ask a deaf and dumb child about his meals and lessons, or to communicate with a savage met in the desert about game or enemies, belong to codes of gesture-signals identical in principle, and to a great extent independent both of nationality and education; there is even a natural syntax, or order of succession, in such gesture- signs. To these gestures let there be added the use of the interjectional cries, such as oh! ugh! hey! and imitative sounds to represent the cat's mew, the click of a trigger, the clap or thud of a blow, &c. The total result of this combination of gesture and significant sound will be a general system of expression, imperfect but serviceable, and naturally intelligible to all man- kind without distinction of race. Nor is such a system of communication only theoretically conceivable; it is, and always has been, in practical operation between people ignorant of one another's language, and as such is largely used in the intercourse of savage tribes. It is true that to some extent these means of utterance are common to the lower animals, the power of ex- . pressing emotion by cries and tones extending far down in the scale of animal life, while rudimentary gesture-signs are made by various mammals and birds. Still, the lower animals make no approach to the human system of natural utterance by gesture-signs and emotional-imitative sounds, while the practical identity of this human system among races physically so unlike as the Englishman and the native of the Australian bush indicates extreme closeness of mental similarity throughout the human species.

When, however, the Englishman and the Australian speak each in his native tongue, only such words as belong to the interjectional and imitative classes will be naturally intelligible, and as it were instinctive to both. Thus the savage, uttering the sound waow! as an explanation of surprise and warning, might be answered by the white man with the not less evidently

significant shl of silence, and the two speakers would be on common ground when the native indicated by the name bwirri his cudgel, flung whirring through the air at a flock of birds, or when the native described as a jakkal-yakkal the bird called by the foreigner a cockatoo. With these, and other very limited classes of natural words, however, resemblance in vocabulary practically ceases. The Australian and English languages each consist mainly of a series of words having no apparent connexion with the ideas they signify, and differing utterly; of course, accidental coincidences and borrowed words must be excluded from such comparisons. It would be easy to enumerate other languages of the world, such as Basque, Turkish, Hebrew, Malay, Mexican, all devoid of traceable resemblance to Australian and English, and to one another. There is, moreover, extreme difference in the grammatical structure both of words and sen- tences in various languages. The question then arises, how far the employment of different vocabularies, and that to a great extent on different grammatical principles, is compatible with similarity of the speakers' minds, or how far does diversity of speech indicate diversity of mental nature? The obvious answer is, that the power of using words as signs to express thoughts with which their sound does not directly connect them, in fact as arbitrary symbols, is the highest grade of the special human faculty in language, the presence of which binds together all races of mankind in substantial mental unity. The measure of this unity is, that any child of any race can be brought up to speak the language of any other race.

Under the present standard of evidence in comparing languages and tracing allied groups to a common origin, the crude specula- tions as to a single primeval language of mankind, which formerly occupied so much attention, are acknowledged to be worthless. Increased knowledge and accuracy of method have as yet only left the way open to the most widely divergent suppositions. For all that known dialects prove to the contrary, on the one hand, there may have been one primitive language, from which

the descendant languages have varied so widely, that neither their words nor their formation now indicate their unity in long past ages, while, on the other hand, the primitive tongues of mankind may have been numerous, and the extreme unlikeness of such languages as Basque, Chinese, Peruvian, Hottentot and Sanskrit may arise from absolute independence of origin.

The language spoken by any tribe or nation is not of itself absolute evidence as to its race-affinities. This is clearly shown in extreme cases. Thus the Jews in Europe have almost lost the use of Hebrew, but speak as their vernacular the language of their adopted nation, whatever it may be; even the Jewish- German dialect, though consisting so largely of' Hebrew words, is philologically German, as any sentence shows: " Ich hab noch

hoiom lo geachelt, " " I have not yet eaten to-day." The mixture of the Israelites in Europe by marriage with other nations is probably much greater than is acknowledged by them; yet, on the whole, the race has been preserved with extraordinary strictness, as its physical characteristics sufficiently show. Language thus here fails conspicuously as a test of race and even of national history. Not much less conclusive is the case of the predominantly Negro populations of the West India Islands, who, nevertheless, speak as their native tongues dialects of English or French, in which the number of intermingled native African words is very scanty: " Dem hitti netli na ini watra bikasi dem de fisiman," " They cast a net into the water, because they were fishermen." (Surinam Negro-Eng.) "Bef pas ca jamain lasse poter cones li," " Le bceuf n'est jamais las de porter ses cornes." (Haitian Negro-Fr.) If it be objected that the linguistic conditions of these two races are more artificial than has been usual in the history of the world, less extreme cases may be seen in countries where the ordinary results of. conquest- colonization have taken place. The Mestizos, who form so large a fraction of the population of modern Mexico, numbering several millions, afford a convenient test in this respect, inasmuch as their intermediate complexion separates them from both their ancestral races, the Spaniard, and the chocolate-brown indigenous Aztec or other Mexican. The mother- tongue of this mixed race is Spanish, with an infusion of Mexican words; and a large proportion cannot speak any native dialect. In most or all nations of mankind, crossing or intermarriage of races has thus taken place between the conquering invader and the conquered native, so that, the language spoken by the nation may represent the results of conquest as, much or more than of ancestry. :The supersession of the Celtic Cornish by English, and of the Slavonic Old-Prussian by German, are but examples of a process which has for untold ages been supplanting native dialects, whose very names have mostly disappeared. On the other hand, the language of the warlike invader or peaceful immigrant may yield, in a few generations, to the tongue of the mass of the population, as the Northman's was replaced by French, and modern German gives way to English in the United States. Judging, then, by the extirpation and adoption of languages within the range of history, it is obvious that to classify mankind intQ races, Aryan, Semitic, Turanian, Polynesian, Kaffir, &c, on the mere evidence of language, is intrinsically unsound.

*VI. Development of Civilization. — The conditions of man at the lowest and highest known levels of culture are separated by a vast interval; but this interval is so nearly filled by known intermediate stages, that the line of continuity between the lowest savagery and the highest civilization is unbroken at any critical point. **

An examination of the details of savage life shows not only that there is an immeasurable difference between the rudest man and the highest lower

animal, but also that the least cultured savages have themselves advanced far beyond the lowest intellectual and moral state at which human tribes can be con- ceived as capable of existing, when placed under favourable circumstances of warm climate, abundant food, and security from too severe destructive influences. The Australian black-fellow or the forest Indian of Brazil, who may be taken as examples of the lowest modern savage, had, before contact with whites, attained to rudimentary stages in many of the characteristic

functions of civilized life. His language, expressing thoughts by conventional articulate sounds, is the same in essential principle as the most cultivated philosophic dialect, only less exact and copious. His weapons, tools and other appliances such as the hammer, hatchet, spear, knife, awl, thread, net, canoe, &c, are the evident rudimentary analogues of what still remains in use among Europeans. His structures, such as the hut, fence, stockade, earthwork, &c, may be poor and clumsy, but they are- of the same nature as our own. In the simple arts of broiling and roasting meat, the use of hides and furs for covering, the plaiting of mats and baskets, the devices of hunting, trapping and fishing, the pleasure taken in personal ornament, the touches of artistic decoration on objects of daily use, the savage differs in degree but not in kind from the civilized man. The domestic and social affections, the kindly care of the young and the old, some acknowledgment of marital and parental obligation, the duty of mutual defence in the tribe, the authority of the elders, and general respect to traditional custom as the regulator of life and duty, are more or less well marked in every savage tribe which is not disorganized and falling to pieces. Lastly, there is usually to be discerned amongst such lower races a belief in unseen powers pervading the universe, this belief shaping itself into an animistic or spiritualistic theology, mostly resulting in some kind of worship. If, again, high savage or low barbaric types be selected, as among the North American Indians, Polyne- sians, and Kaffirs of South Africa, the same elements of culture appear, but. at a more advanced stage, namely, a more full and accurate language, more knowledge of the laws of nature, more serviceable implements, more perfect industrial processes, more definite and fixed social order and frame of government, more systematic and philosophic schemes of religion and a more elaborate and ceremonial worship. At intervals new arts and ideas appear, such as agriculture and pasturage, the manufacture of pottery, the use of metal implements and the device of record and communication by picture writing. Along such stages of improvement and invention the bridge is fairly made between savage and barbaric culture; and this once attained to, the remainder of the series of

stages of civilization lies within the range of common knowledge.

The teaching of history, during the three to four thousand years of which contemporary chronicles have been preserved, is that civilization is gradually developed in the course of ages by enlargement and increased precision of knowledge, invention and improvement of arts, and the progression of social and political habits and institutions towards general well-being. That pro- cesses of development similar to these were in prehistoric times effective to raise culture from the savage to the barbaric level, two considerations especially tend to prove. First, there are numerous points in the culture even of rude races which are not explicable otherwise than on the theory of development. Thus, though difficult or superfluous arts may easily be lost, it is hard to imagine the abandonment of contrivances of practical daily utility, where little skill is required and materials are easily accessible. Had the Australians or New Zealanders, for instance, ever possessed the potter's art, they could hardly have forgotten it. The inference that these tribes represent the stage of culture before the invention of pottery is confirmed by the absence of buried fragments of pottery in the districts they inhabit. The same races who were found making thread by the laborious process of twisting with the hand, would hardly have disused, if they had ever possessed, so simple a labour-saving device as the spindle, which consists merely of a small stick weighted at one end; the spindle may, accordingly, be regarded as an instrument invented somewhere between the lowest and highest savage levels (Tylor, Early Hist, of Mankind, p. 193). Again, many devices of civiliza- tion bear unmistakable marks of derivation from a lower source; thus the ancient Egyptian and Assyrian harps, which differ from ours in having no front pillar, appear certainly to owe this re- markable defect to having grown up through intermediate forms from the simple strung bow, the still used type of the most primitive stringed instrument. In this way the history of numeral words furnishes actual proof of that independent intel-

lectural progress among savage tribes which some writers have rashly denied. Such words as hand, hands, fool, man, &c, are used as numerals signifying 5, 10, 15, 20, &c, among many savage and barbaric peoples; thus Polynesian lima, ,i.e. "hand," means 5; Zulu latisitupa, i.e. "taking the thumb," means 6; Greenlandish arfersanek-pingasut, i.e. "on the other foot three," means 18; Tamanac tevin itoto, i.e. "One man," means 20, &c, &c. The existence of such expressions demon- strates that the people who use them had originally no spoken names for these numbers, but once merely counted them by gesture on their fingers and toes in low savage fashion, till they obtained higher numerals by the inventive process of describing in words these counting-gestures. Second, the process of " survival in culture " has caused the preservation in each stage of society of phenomena .belonging to an earlier period, but kept up by force of custom into the

later, thus supplying evidence of the modern conditibn being derived from the ancient. Thus the mitre over an English bishop's coat-of-arms is a survival which indicates him as the successor of bishops who actually wore mitres, while armorial bearings themselves, and the whole craft of heraldry, are survivals bearing record of a state of warfare and social order whence our present state was by vast modification evolved. Evidence of this class, proving the derivation of modern civilization, not only from ancient barbarism, but beyond this, from primeval savagery, is immensely plentiful, especiallyin rites and ceremonies, where the survival of ancient habits is peculiarly favoured. Thus the modern Hindu, though using civilized means for lighting his household fires, retains the savage " fire-drill " for obtaining fire by friction of wood when what he considers pure or sacred fire has to be produced for sacrificial purposes; while in Europe into modern times the same primitive process has been kept up in producing the sacred and magical " need-fire," which was lighted to deliver cattle from a murrain. Again, the funeral offerings of food, clothing, weapons, &c, to the dead are absolutely intelligible and purposeful among savage races, who believe that the souls of the departed are ethereal beings capable of consuming food, and of receiving and using the souls or phantoms of any objects sacrificed fortheiruse. The primitive philosophy to which these conceptions belong has to a great degree been discredited by modern science; yet the clear survivals of such ancient and savage rites may still be seen in Europe, where the Bretons leave the remains of the All Souls' supper on the table for the ghosts of the dead kinsfolk to partake of, and Russian peasants set out cakes for the ancestral manes on the ledge which supports the holy pictures, and make dough ladders to assist the ghosts of the dead to ascend out of their graves and start on their journey for the future world; while other provision for the same spiritual journey is made when the coin is still put in the hand of the corpse at an Irish wake. In like manner magic still exists in the civilized world as a survival from the savage and barbaric times to which it originally belongs, and in which is found the natural source and proper home of utterly savage practices still carried on by ignorant peasants in Great Britain, such as taking omens from the cries of animals, or bewitching an enemy by sticking full of pins and hanging up to shrivel in the smoke an image or other object, that similar destruction may fall on the hated person represented by the symbol (Tylor, Primitive Culture, ch. i., iii., iv., xi., xii.; Early Hist, of Man, ch. vi.).

The comparative science of civilization thus not only generalizes the data of history, but supplements its information by laying down the lines of development along which the lowest prehistoric culture has gradually risen to the highest modern level. Among the most clearly marked of these lines is that which follows the succession of the Stone, Bronze, and Iron Ages (see Archaeology). The Stone Age represents the early condition of

mankind in general, and has remained in savage districts up to modern times, while the introduction of metals need not at once supersede the use of the old stone hatchets and arrows, which have often long continued in dwindling survival by the side of the new bronze and even iron Ones. The Bronze Age had its most important place among ancient nations of Asia and Europe, and

among them was only succeeded after many centuries by the Iron Age; while in other districts, such as Polynesia and Central and South Africa, and America (except Mexico and Peru), the native tribes were moved directly from the Stone to the Iron Age without passing through the Bronze Age at all. Although the three divisions of savage, barbaric, and civilized man do not correspond at all perfectly with the Stone, Bronze, and Iron Ages, this classification of civilization has proved of extraordinary value in arranging in their proper order of. culture the nations of the Old World.

Another great line of progress has been followed by tribes passing from the primitive state of the wild hunter, fisher and fruit-gatherer to that of the settled tiller of the soil, for to this change of habit may be plainly in great part traced the expansion of industrial arts and the creation of higher social and political institutions. These, again, have followed their proper lines along the course of time. Among such is the immense legal development by which the primitive law of personal vengeance passed gradually away, leaving but a few surviving relics in the modern civilized world, and being replaced by the higher doctrine that crime is an offence against society, to be repressed for the public good. Another vast social change has been that from the patriarchal condition, in which the unit is the family under the despotic rule of its head, to the systems in which individuals make up a society whose government is centralized in a chief or king. In the growth of systematic civilization, the art of writing has had an influence so intense, that of all tests to distinguish the barbaric from the civilized state, none is so generally effective as this, whether they have but the failing link with the past which mere memory furnishes, or can have recourse to written records of past history and written constitutions of present order. Lastly, still following the main lines of human culture, the primitive germs of religious institutions have to be traced in the childish faith and rude rites of savage life, and thence followed in their expansion into the vast systems administered by patriarchs and priests, henceforth taking under their charge the precepts of morality, and enforcing them under divine sanction, while also exercising in political life an authority beside or above the civil law.

The state of culture reached by Quaternary man is evidenced by the stone implements in the drift-gravels, and other relics of human art in the cave deposits. His drawings on bone or tusk found in the caves show no mean artistic power, as appears by the three specimens copied in the Plate. That representing two deer (fig. 6) was found so early as 1852 in the breccia of a limestone cave on the Charente, and its importance recognized in a remarkable letter by Prosper Merimee, as at once historically ancient and geologically modern (Congrcs d' anthropologic et d'archeologie prihistoriques, Copenhagen (1869), p. 128). The other two arc the famous mammoth from the cave of La Madeleine, on which the woolly mane and huge tusks of Elephas primigenius are boldly drawn (fig. 7) ; and the group of man and horses (fig. 8). There has been found one other contemporary portrait of man, where a hunter is shown stalking an aurochs.

That the men of the Quaternary period knew the savage art of producing fire by friction, and roasted the flesh on which they mainly subsisted, is proved by the fragments of charcoal found in the cave deposits, where also occur bone awls and needles, which indicate the wearing of skin clothing, like that of the modern Australians and Fuegians. Their bone lance-heads and dart-points were comparableto thoseof northern and southern savages. Particular attention has to be given to the stone implements used by these earliest known of mankind. The division of tribes in the stone implement stage into two classes, the Palaeolithic or Old Stone Age, and the Neolithic or New Stone Age, according to their proficiency in this most important art furnishes in some respects the best means of determining their rank in general culture.

In order to put this argument clearly before the reader, a few selected implements are figured in the Plate. The group in fig. 9 contains tools and weapons of the Neolithic period such as are dug up on European soil; they are evident relics of

ancient populations who used them till replaced by metal. The stone hatchets are symmetrically shaped and edged by grinding, while the cutting flakes, scrapers, spear and arrow heads are of high finish. Direct knowledge of the tribes who made them is scanty, but implements so similar in make and design having been in use in North and South America until modern times, it may be assumed for purposes of classification that the Neolithic peoples of the New World were at a similar barbarous level in industrial arts, social organization, moral and religious ideas. Such comparison, though needing caution and reserve, at once proved of great value to anthropology. When, however, there came to light from the drift-gravels and limestone caves of Europe the Palaeolithic implements, of which some types are shown in the group (fig. 10), the difficult problem presented itself, what degree of general culture these rude implements

belonged to. On mere inspection, their rude- ness, their unsuitability for being hafted, and the absence of shaping and edging by the grindstone, mark their inferiority to the Neolithic implements. Their immensely greater antiquity was proved by their geological position and their association with a long extinct fauna, and they were not, like the Neoliths, recognizable as corresponding closely to the implements used by modern tribes. There was at first a tendency to consider the Palaeoliths as the work of men ruder than savages, if, indeed, their makers were to be accounted human at all. Since then, however, the problem has passed into a more manageable state. Stone implements, more or less approaching the European Palaeolithic type, were found in Africa from Egypt southwards, where in such parts as Somaliland and Cape Colony they lie about on the ground, as though they had been the rough tools and weapons of the rude inhabitants of the land at no very distant period. The group in fig. 1 1 in the Plate shows the usual Somali- land types. These facts tended to remove the mystery from Palaeolithic man, though too little is known of the ruder ancient tribes of Africa to furnish a definition of the state of culture which might have co-existed with the use of Palaeolithic imple- ments. Information to this purpose, however, can now be furnished from a more outlying region. This is Tasmania, where as in the adjacent continent of Australia, the survival of marsupial animals indicates long isolation from the rest of the world. Here, till far on into the 19th century, the Englishmen could watch the natives striking off flakes of stone, trimming them to convenient shape for grasping them in the hand, and edging them by taking off successive chips on one face only. The group in fig. 12 shows ordinary Tasmanian forms, two of them being finer tools for scraping and grooving. (For further details reference may be made to H. Ling Roth, The Tasmanians, (2nd ed., 1899); R. Brough Smyth, Aborigines of Victoria (1878), vol. ii.; Papers and Proceedings of Royal Society of Tasmania; and papers by the present writer in Journal of the Anthropological Institute.) The Tasmanians, when they came in contact with the European explorers and settlers, were not the broken outcasts they afterwards became. They were a savage people, perhaps the lowest in culture of any known, but leading a normal, self-supporting, and not unhappy life, which had probably changed little during untold ages. The accounts, imperfect as they are, which have been preserved of their arts, beliefs and habits, thus present a picture of the arts, beliefs and habits of tribes whose place in the Stone Age was a grade lower than that of Palaeolithic man of the Quaternary period.

The Tasmanian stone implements, figured in the Plate, show their own use when it is noticed that the rude chipping forms a good hand-grip above, and an effective edge for chopping, sawing, and cutting below. But the absence of the long-shaped implements, so characteristic of the Neolithic and Palaeolithic series, and serviceable as picks, hatchets, and chisels,

shows re- markable limitation in the mind of these savages, who made a broad, hand-grasped knife their tool of all work to cut, saw, and chop with. Their weapons were the wooden club or waddy notched to the grasp, and spears of sticks, often crooked but well balanced, with points sharpened by tool or fire, and sometimes jagged. No spear thrower or bow and arrow was known. The

ANTHROPOLOGY

Plate

Fig. ii.

Fig. 13.

ANTHROPOMETRY

i ii

Tasmanian savages were crafty warriors and kangaroo-hunters, and the women climbed the highest trees by notching, in quest of opossums. Shell-fish and crabs were taken, and seals knocked on the head with clubs, but neither fish-hook nor fishing-net was known, and indeed swimming fish were taboo as food. Meat and vegetable food, such as fern-root, was broiled over the fire, but boiling in a vessel was unknown. The fire was produced by the ordinary savage fire-drill. Ignorant of agriculture, with no dwellings but rough huts or breakwinds of sticks and bark, without dogs or other domestic animals, these savages, until the coming of civilized man, roamed after food within their tribal bounds. Logs and clumsy floats of bark and grass enabled them to cross water under favourable circumstances. They had clothing of skins rudely stitched together with bark thread, and they were decorated with simple necklaces of kangaroo teeth, shells and berries. Among their simple arts, plaiting and basket-work was one in which they approached the civilized level. The pictorial art of the Tasmanians was poor arid childish, quite below that of the Palaeolithic men of Europe. The Tasmanians spoke a fairly copious agglutinating language, well marked as to parts of speech, syntax and inflexion. Numeration was at a low level, based on counting fingers on one hand only, so that the word for man (puggana) stood also for the number 5. The religion of the Tasmanians, when cleared from ideas apparently learnt from the whites, was a simple form of animism based on the shadow (warrawa) being the soul or spirit. The strongest belief of the natives was in the power of the ghosts of the dead, so that they carried the bones of relatives to secure themselves from harm, and they fancied the forest swarming with malignant demons. They placed weapons near the grave for the dead

friend's soul to use, and drove out disease from the sick by exorcising the ghost which was supposed to have caused it. Of greater special spirits of Nature we find something vaguely mentioned. The earliest recorders of the native social life set down such features as their previous experience of rude civilized life had made them judges of. They notice the self- denying affection of the mothers, and the hard treatment of the wives by the husbands, polygamy and the shifting marriage unions. But when we meet with a casual remark as to the tendency of the Tasmanians to take wives from other tribes than their own, it seems likely that they had some custom of exogamy which the foreigners did not understand. Meagre as is the information preserved of the arts, thoughts, and customs of these survivors from the lower Stone Age, it is of value as furnishing even a temporary and tentative means of working out the development of culture on a basis not of conjecture but of fact.

Conclusion. — To-day anthropology is grappling with the heavy task of systematizing the vast stores of. knowledge to which the key was found by Boucher de Perthes, by Lartet, Christy and their successors. There have been recently no discoveries to rival in novelty those which followed the exploration of the bone- caves and drift-gravels, and which effected an instant revolution in all accepted theories of man's antiquity, substituting for a chronology of centuries a vague computation of hundreds of thousands of years. The existence of man in remote geological time cannot now be questioned, but, despite much effort made in likely localities, no bones, with the exception of those of the much-discussed Pithecanthropus, have been found which can be regarded as definitely bridging the gulf between man and the lower creation. It seems as if anthropology had in this direction reached the limits of its discoveries. Far different are the prospects in other directions where the work of co-ordinating the material and facts collected promises to throw much light on the history of civilization. Anthropological researches undertaken all over the globe have shown the necessity of abandoning the old theory that a similarity of customs and superstitions, of arts and crafts, justifies the assumption of a remote relationship, if not an identity of origin, between races. It is now certain that there has ever been an inherent tendency in man, allowing for difference of climate and material surroundings, to develop culture by the same stages and in the same way. American man, for example,

need not necessarily owe the minutest portion of his mental, religious, social or industrial development to remote contact with Asia or Europe, though he were proved to possess identical usages. An example in point is that of pyramid-building. No ethnical relationship can ever have existed between the Aztecs and the Egyptians; yet each race developed the idea of the pyramid tomb through that psychological similarity which is as much a characteristic of the species man as is his physique.

Bibliography. — J. C. Prichard, Natural History of Man (London, 1843); T. H. Huxley, Man's Place in Nature (London, 1863); and " Geographical Distribution of Chief Modifications of Mankind," in Journal Ethnological Society for 1870; E. B. Tylor, Early History of Man (London, 1865), Primitive Culture (London, 1871), and Anthropology (London, 1881); A. de Quatrefages, Histoire generate des races humdines (Paris, 1889), Human Species (Eng. trans., 1879) ; Lord Avebury, Prehistoric Times (1865, 6th ed. 1900) and Origin of Civilization (1870, 6th ed. 1902) ; Theo. Waitz, Anthropologic der Naturvolker (1859-1871) ; E. H. Haeckel, Anthropogenic (Leipzig, 1874-1891), Eng. trans., 1879; O. Peschel, Volkerkunde (Leipzig, 1874-1897); P. Topinard, V Anthropologic (Paris, 1876); Elements d' anthropologic generate (Paris, 1885); D. G. Brinton, Races and Peoples (1890) ; A. H. Keane, Ethnology (1896), and Man: Past and Present (1899); G. Sergi, The Mediterranean Race (Eng. ed., 1889); F. Ratzel, History of Mankind (Eng. trans., 1897) ; G. de Mortillet, Le Prehistorique (Paris, 1882); A. C. Haddon, Study of Man (1897); J. Deniker, The Races of Man (London, 1900); W. Z. Ripley, The Races of Europe (1900, with long bibliography) ; The Journal of the Anthropological Institute of Great Britain; Revue d 'anthropologic (Paris) ; Zeitschrift fur Ethnologie (Berlin). See also bibliographies under separate ethnological headings (Australia, Africa, Arabs, America, &c). (E. B. T.)

ANTHROPOMETRY (Gr. avBpwTOS, man, and ixtrpov, measure), the name given by the French savant, Alphonse Bertillon (b. 1853), to a system of identification (q.v.) depending on the unchanging character of certain measurements of parts of the human frame. He found by patient inquiry that several physical features and the dimensions of certain bones or bony structures in the body remain practically constant during adult life. He concluded from this that when these measurements were made and recorded systematically every single individual would be found to be perfectly distinguishable from others. The system was soon adapted to police methods, as the immense value of being able to fix a person's identity was fully realized, both in preventing false personation and in bringing home to any one charged with an offence his responsibility for previous wrong- doing. " Bertillonage," as it was called, became widely popular, and after its introduction into France in 1883, where it was soon credited with highly gratifying results, was applied to the administration of justice in most civilized countries. England followed tardily, and it was not until 1894 that an investigation of the methods used and results obtained was made by a special committee sent to Paris for the purpose. It reported favourably, especially on the use of the measurements for primary classifica- tion, but recommended also the adoption in part of a system of " finger prints " as suggested by Francis Galton, and already practised in Bengal.

M. Bertillon selected the following five measurements as the basis of his system: (1) head length; (2) head breadth; (3) length of middle finger; (4) of left foot, and (5) of cubit or forearm from the elbow to the extremity of the middle finger. Each principal heading was further subdivided into three classes of " small," " medium " and " large," and as an increased guarantee height, length of little finger, and the colour of the eye were also recorded. From this great mass of details, soon represented in Paris by the collection of some 100,000 cards, it was possible, proceeding by exhaustion, to sift and sort down the cards till a small bundle of half a dozen produced the combined facts of the measurements of the individual last sought. The whole of the information is easily contained in one cabinet of very ordinary dimensions, and most ingeniously contrived so as to make the most of the space and facilitate the search. The whole of the record is independent of names, and the final identification is by means of the photograph which lies with the individual's card of measurements.

Anthropometry, however, gradually fell into disfavour, and it has been generally supplanted by the superior system of finger

prints (q.v.). Bertillonage exhibited certain defects which were first brought to light in Bengal. The objections raised were (i) the costliness of the instruments employed and their liability to get out of order; (2) the need for specially instructed measurers, men of superior education; (3) the errors that frequently crept in when carrying out the processes and were all but irremediable. Measures inaccurately taken, or wrongly read off, could seldom, if ever, be corrected, and these persistent errors defeated all chance of successful search. The process was slow, as it was necessary to repeat it three times so as to arrive at a mean result. In Bengal measurements were already abandoned by 1897, when the finger print system was adopted throughout British India. Three years later England followed suit; and as the result of a fresh inquiry ordered by the Home Office, finger prints were alone relied upon for identification.

Authorities. — Lombroso, Antropometria di 400 delinquenti (1872); Roberts, Manual of Anthropometry (1878); Ferri, Studi comparati di antropometria (2 vols., 1881-1882); Lombroso, Rughe anomale speciali ai criminali (1890) ; Bertillon, Instructions signale- tiques pour I' identification anthropomitrique (1893); Livi, Anthropo- metria (Milan, 1900) ; Fiirst, Indextabeden zum anthropometrischen Gebrauch (Jena, 1902) ; Report of Home Office Committee on the Best Means of Identifying Habitual Criminals (1893-1894). (A. G.)

ANTHROPOMORPHISM (Gr. &vdpwiros, man, ixoprj, form), the attribution (a) of a human body, or (b) of human qualities generally, to God or the gods. The word anthropomorphism is a modern coinage (possibly from 18th century French). The New English Dictionary is misled by the 1866 reprint of Paul Bayne on Ephesians when it quotes " anthropomorphist " as 17 th century English. Seventeenth century editions print " anthropomorphits," i.e. anthropomorphites, in sense (a). The older abstract term is " anthropopathy," literally "attributing human feelings," in sense (b).

Early religion, among its many objects of worship, includes beasts (see Animal-Worship), considered, in the more refined theology of the later Greeks and Romans, as metamorphoses of the great gods. Similarly we find " therianthropic " forms — half animal, half human — in Egypt or Assyria-Babylonia. In contrast with these, it is considered one of the glories of the Olympian mythology of Greece that it believed in happy manlike beings (though exempt from death, and using special rarefied foods, &c), and celebrated them in statues of the most exquisite art. Israel shows us animal images, doubtless of a ruder sort, when Yahweh is worshipped in the northern kingdom under the image of a steer. (Some scholars think the title " mighty one of Jacob," Psalm cxxxii., 2, 5, el al., vi as if from T5*, is really " steer " t?x " of Jacob.") But the higher religion of Israel inclined to morality more than to art, and forbade image worship altogether. This prepared the way for the conception of God as an immaterial Spirit. True mythical anthropomorphisms occur in early parts of the Old Testament (e.g. Genesis iii. 8, cf. vi. 2), though in the majority of Old Testament passages such expres- sions are merely verbal (e.g. Isaiah lix. 1). In the Christian Church (and again in early Mahommedanism) simple minds believed in the corporeal nature of God. Gibbon and other writers quote from John Cassian the tale of the poor monk, who, being convinced of his error, burst into tears, exclaiming, " You have taken away my God! I have none now whom I can worship!" According to a fragment of Origen (on Genesis i. 26), Melito of Sardis shared this belief. Many have thought Melito's work, irepi evaw/xciTOv 6eov, must have been a treatise on the Incarnation; but it is hard to think that Origen could blunder so. Epiphanius tells of Audaeus of Mesopotamia and his followers, Puritan sectaries in the 4th century, who were orthodox except for this belief and for Quartodecimanism (see Easter). Tertullian, who is sometimes called an anthropo morphist, stood ior the Stoical doctrine, that all reality, even the divine, is in a sense material.*

The reaction against anthropomorphism begins in Greek philosophy with the satirical spirit of Xenophanes (540 B.C.), who puts the case as broadly as any. The " greatest God " resembles man " neither in form nor in mind." In Judaism — unless we should refer to the prophets' polemic against

images —

a reaction is due to the introduction of the codified law. God seemed to grow more remote. The old sacred name Yahweh is never pronounced; even " God " is avoided for allusive titles like " heaven " or " place." Still, amid all this, the God of Judaism remains a personal, almost a limited, being. In Philo we see Jewish scruples uniting with others drawn from Greek philosophy. For, though the quarrel with popular anthropo- morphism was patched up, and the gods of the Pantheon were described by Stoics and Epicureans as manlike in form, philo- sophy nevertheless tended to highly abstract conceptions of supreme, or real, deity. Philo followed out the line of this tradi- tion in teaching that God cannot be named. How much exactly he meant is disputed. The same inheritance of Greek philosophy appears in the Christian fathers, especially Origen. He names and condemns the " anthropomorphites," who ascribe a human body to God (on Romans i., sub fin.; Rufinus' Latin version). In Arabian philosophy the reaction sought to deny that God had any attributes. And, under the influence of Mahommedan Aristotelianism, the same paralysing speculation found entrance among the learned Jews of Spain (see Maimonides).

Till modern times the philosophical reaction was not carried out with full vigour. Spinoza (Ethics, i. 15 and 17), representing here as elsewhere both a Jewish inheritance and a philosophical, but advancing further, sweeps away all community between God and man. So later J. G. Fichte and Matthew Arnold (" a magnified and non-natural man "), — strangely, in view of their strong belief in an objective moral order. For the use of the word " anthropomorphic," or kindred forms, in this new spirit of condemnation for all conceptions of God as manlike — sense (b) noted above — see J. J. Rousseau in Mmile iv. (cited by Littre), — Nous sommes pour la plupart de vrais anthropomorphites. Rous- seau is here speaking of the language of Christian theology,— a divine Spirit: divine Persons. At the present day this usage is universal. What it means on the lips of pantheists is plain. But when theists charge one another with " anthropomorphism," in order to rebuke what they deem unduly manlike conceptions of God, they stand on slippery ground. All theism implies the assertion of kinship between man, especially in his moral being, and God. As a brilliant theologian, B. Duhm, has said, physio- morphism is the enemy of Christian faith, not anthropomorphism. The latest extension of the word, proposed in the interests of philosophy or psychology, uses it of the principle according to which man is said to interpret all things (not God merely) through himself. Common-sense intuitionalism would deny that man' does this, attributing to him immediate knowledge of reality. And idealism in all its forms would say that man, interpreting through his reason, does rightly, and reaches truth. Even here then the use of the word is not colourless. It implies blame. It is the symptom of a philosophy which confines knowledge

within narrow limits, and which, when held by Christians (e.g. Peter Browne, or H. L. Mansel), believes only in an " analogical " knowledge of God. (R. Ma.)

ANTI, or Campa, a tribe of South American Indians of Ara- wakan stock, inhabiting the forests of the upper Ucayali basin, east of Cuzco, on the eastern side of the Andes, south Peru. The Antis, who gave their name to the eastern province of Antisuyu, have always been notorious for ferocity and canni- balism. They are of fine physique and generally good-looking. Their dress is a robe with holes for the head and arms. Their long hair hangs down over the shoulders, and round their necks a toucan beak or a bunch of feathers is worn as an ornament.

ANTIBES, a seaport town in the French department of the Alpes-Mari times (formerly in that' of the Var, but transferred after the Alpes-Maritimes department was formed in i860 out of the county of Nice). Pop. (1906) of the town, 5730; of the commune, 11,753. It is 12ˆ m. by rail S.W. of Nice, and is situated on the E. side of the Garoupe peninsula. It was formerly fortified, but all the ramparts (save the Fort Carre, built by Vauban) have now been demolished, and a new town is rising on their site. There is a tolerable harbour, with a 1 considerable fishing industry. The principal exports are dried fruits, salt fish and oil. Much perfume distilling is done here, as the surrounding

country produces an abundance of flowers. Antibes is the ancient Antipolis. It is said to hare been founded before the Christian era (perhaps about 340 B.C.) by colonists from Marseilles, and is mentioned by Strabo. It was the seat of a bishopric from the 5th century to 1 244, when the see was transferred to Grasse.

(W. A. B. C.)

ANTICHRIST (dvrixpia-ros). The earliest mention of the name Antichrist, which was probably first coined in Christian eschatological literature, is in the Epistles of St John (I. ii. 18, 22, iv. 3; II. 7), and it has since come into universal use. The conception, paraphrased in this word, of a mighty ruler who will appear at the end of time, and whose essence will be enmity to God (Dan. xi. 36; cf. 2 Thess. ii. 4; 6 avTiKel/xevos), is older, and traceable to Jewish eschatology. Its origin is to be sought in the first place in the prophecy of Daniel, written at the beginning of the Maccabean period. The historical figure who served as a model for the " Antichrist "

was Antiochus IV. Epiphanes, the persecutor of the Jews, and he has impressed indelible traits upon the conception. Since then ever-recurring characteristics of this figure (cf. especially Dan xi. 46, &c.) are, that he would appear as a mighty ruler at the head of gigantic armies, that he would destroy three rulers (the three horns, Dan. vii. 8, 24), persecute the saints (vii. 25), rule for three and a half years (vii. 25, &c), and subject the temple of God to a horrible devastation (fSSeXvy/ia ttjs epjy/ioxrecos). When the end of the world foretold by Daniel did not take place, but the book of Daniel retained its validity as a sacred scripture which foretold future things, the personality of the tyrant who was God's enemy disengaged itself from that of Antiochus IV., and became merely a figure of prophecy, which was applied now to one and now to another historical phenomenon. Thus for the author of the Psalms of Solomon (c. 60 B.C.), Pompey, who destroyed the independent rule of the Maccabees and stormed Jerusalem, was the Adversary of God (cf . ii. 26, &c.) ; so too the tyrant whom the Ascension of Moses (c. a.d. 30) expects at the end of all things, possesses, besides the traits of Antiochus IV., those of Herod the Great. A further influence on the development of the eschatological imagination of the Jews was exercised by such a figure as that of the emperor Caligula (a.d. 37-41), who is known to have given the order, never carried out, to erect his statue in the temple of Jerusalem. In the little Jewish Apocalypse, the existence of which is assumed by many scholars, which in Mark xiii. and Matt. xxiv. is combined with the words of Christ to form the great eschatological discourse, the prophecy of the " abomination of desolation " (Mark xiii. 14 et seq.) may have originated in this episode of Jewish history. Later Jewish and Christian writers of Apocalypses saw in Nero the tyrant of the end of time. The author of the Syriac Apocalypse of Baruch (or his source), cap. 36-40, speaks in quite general terms of the last ruler of the end of time. In 4 Ezra v. 6 also is found the allusion : regnabit quern non sperant.

The roots of this eschatological fancy are to be sought perhaps still deeper in a purely mythological and speculative expectation of a battle at the end of days between God and the devil, which has no reference whatever to historical occurrences. This idea has its original source in the apocalypses of Iran, for these are based upon the conflict between Ahura-Mazda (Auramazda, Ormazd) and Angro-Mainyush (Ahriman) and its consumma- tion at the end of the world. This Iranian dualism is proved to have penetrated into the late Jewish eschatology from the beginning of the 1st century before Christ, and did so probably still earlier. Thus the opposition between God and the devil already plays a part in the Jewish groundwork of the Testaments of the Patriarchs, which was perhaps composed at the end of the period of the Maccabees. In this the name of the devil appears, besides the usual form (aaravas, 5id/3o\os), especially

as Belial (Beliar, probably, from Ps. xviii. 4, where the rivers of Belial are spoken of, originally a god of the under- world) , a name which also plays a part in the Antichrist tradition. In the Ascension of Moses we already hear, at the beginning of the description of the latter time (x. 1): " And then will God's rule be made manifest over all his creatures, then will the devil

have an end " (cf. Matt. xii. 28; Luke xi. 20; John xii. 31, xiv. 30, xvi. n). 1 This conception of the strife of God with the devil was further interwoven, before its introduction into the Antichrist myth, with another idea Of different origin, namely, the myth derived from the Babylonian religion, of the battle of the supreme God (Marduk) with the dragon of chaos (Tiamat), originally a myth of the origin of things which, later perhaps, was changed into an eschatological one, again under Iranian influence. 2 Thus it comes that the devil, the opponent of God, appears in the end often also in the form of a terrible dragon- monster; this appears most clearly in Rev. xii. Now it is possible that the whole conception of Antichrist has its final roots in this already complicated myth, that the form of the mighty adversary of God is but the equivalent in human form of the devil or of the dragon of chaos. In any case, however, this myth has exercised a formative influence on the conception of Antichrist. For only thus can we explain how his figure acquires numerous superhuman and ghostly traits, which cannot be explained by any particular historical phenomenon on which it may have been based. Thus the figure of Antiochus IV. has already become superhuman, when in Dan. viii. 10, it is said that the little horn " waxed great, even to the host of heaven; and cast down some of the host and of the stars to the ground." Similarly Pompey, in the second psalm of Solomon, is obviously represented as the dragon of chaos, and his figure exalted into myth. Without this assumption of a continual infusion of mytho- logical conceptions, we cannot understand the figure of Anti- christ. Finally, it must be mentioned that Antichrist receives, at least in the later sources, the name originally proper to the devil himself. 3

From the Jews, Christianity took over the idea. It is present quite unaltered in certain passages, specifically traceable to Judaism, e.g. (Rev. xi.). "The Beast that ascendeth out of the bottomless pit " and, surrounded by a mighty host of nations, slays the " two witnesses " in Jerusalem, is the entirely super- human Jewish conception of Antichrist. Even if the beast (ch. xiii.), which rises from the sea at the summons of the devil, be interpreted as the Roman empire, and, specially, as any particular Roman ruler, yet the original form of the malevolent tyrant of the latter time is completely preserved.

A fundamental change of the whole idea from the specifically Christian

point of view, then, is signified by the conclusion of ch. ii. of the Second Epistle to the Thessalonians. 4 There can, of course, be no doubt as to the identity of the " man of sin, the son of perdition " here described with the dominating figure of Jewish eschatology (cf. ii. 3 &c, 6 avdpwiros ttjs avofiias, i.e. Beliar (?), 6 avrucdntvos — the allusion that follows to Dan xi. 36). But Antichrist here appears as a tempter, who works by signs and wonders (ii. 9) and seeks to obtain divine honours; it is further signified that this "man of sin " will obtain credence, more especially among the Jews, because they have not accepted the truth. The conception, moreover, has become almost more superhuman than ever (cf. ii. 4, " showing himself that he is God "). The destruction of the Adversary is drawn from Isaiah xi. 4, where it is said of the Messiah: " with the breath of his lips shall he slay the wicked." 6 The idea that Antichrist was to establish himself in the temple of Jerusalem (ii. 4) is very enigmatical, and has not yet been explained. The " abomination of desolation " has naturally had its influence upon it; possibly also the experience of the time of Caliguia (see above). Remarkable also is the allusion to a power which

1 See further, Bousset, Religion des Judentums, ed. ii. pp. 289 &c, 381 &c, 585 &c.

2 See Gunkel, Schopfung und Chaos (1893).

3 It is, of course, uncertain whether this phenomenon already occurs in 2 Cor. vi. 15, since here Belial might still be Satan; cf. however, Ascensio Jesaiae iv. 2 &c. ; Sibyll. iii. 63 &c, ii. 167 &c.

4 It is not necessary to decide whether the epistle is by St Paul or by a pupil of Paul, although the former seems to the present writer to be by far the more probable, in spite of the brilliant attack on the genuineness of the epistle by Wrede in Texte und ffbersetzungen, N.F. ix. 2.

s Cf. 2 Thess. ii. 8; the Targum aiso. in its comment on the passage of Isaiah, applies " the wicked " to Antichrist.

still retards the revelation of Antichrist (2 Thess. ii. 6 &c, t6 Karexov; 6 Karkxav), an allusion which, in the tradition of the Fathers of the church, came to be universally, and probably correctly, referred to the Roman empire. In this then consists the significant turn given by St Paul in the Second Epistle to the Thessalonians to the whole conception, namely, in the substitu- tion for the tyrant of the latter time who should persecute the Jewish people, of a pseudo-Messianic figure, who, establishing himself in

the temple of God, should find credence and a following precisely among the Jews. And while the originally Jewish idea led straight to the conception, set forth in Revelation, of the Roman empire or its ruler as Antichrist, here, on the con- trary, it is probably the Roman empire that is the power which still retards the reign of Antichrist. With this, the expectation of such an event at last separates itself from any connexion with historical fact, and becomes purely ideal. In this process of transformation of the idea, which has become of importance for the history of the world, is revealed probably the genius of Paul, or at any rate, that of the young Christianity which was breaking its ties with Judaism and establishing itself in the world of the Roman empire.

This version of the figure of Antichrist, who may now really for the first time be described by this name, appears to have been at once widely accepted in Christendom. The idea that the Jews would believe in Antichrist, as punishment for not having believed in the true Christ, seems to be expressed by the author of the fourth gospel (v. 43). The conception of Antichrist as a perverter of men, leads naturally to his connexion with false doctrine (1 John ii. 18, 22; iv. 3; 2 John 7). The Teaching of the Apostles (xvi. 4) describes his form in the same way as 2 Thessalonians {kcu. rdre cuvricreTCu 6 K.00 twirXavos ebs vios Otov kcu. Tout cri)titia K

But this version of the idea of Antichrist, hostile to the Jews and better expressing the relation of Christianity to the Roman empire, was prevented from obtaining an absolute ascendancy in Christian tradition by the rise of the belief in the ultimate return of Nero, and by the absorption of this outcome of pagan superstition into the Jewish-Christian apocalyptic conceptions. It is known that soon after the death of Nero rumours were current that he was not dead. This report soon took the. more concrete form that he had fled to the Parthians and would return thence to take vengeance on Rome. This expectation led to the appearance of several pretenders who posed as Nero; and as late as a.d. 100 many still held the belief that Nero yet lived. 2 This idea of Nero's return was in the first instance taken up by the Jewish apocalyptic writers. While the Jewish author of the fourth Sibylline book (c. a.d. 80) still only refers simply to the heathen belief, the author of the (Jewish?) original of the 17th chapter of the Apocalypse of St John expects the return of Nero with the Parthians to take vengeance on Rome, because she had shed the blood of the Saints (destruction of Jerusalem!). In the fifth Sibylline book, which, with the exception of verses 1-5 1, was mainly composed by a Jewish writer at the close of the first century, the return of Nero plays a great part. Three times the author recurs to this theme, 137-154; 214-227; 361-385. He sees in the coming again of Nero, whose figure he endows with

1 See Bousset, Kommentar zur Offenbarung Johannis, on these passages.

2 Ibid. ch. xvii. : and Charles, Ascension of Isaiah, lvii. sq.

supernatural and, daemonic characteristics, a judgment of God, in whose hand the revivified Nero becomes a rod of chastisement. Later, the figure of Nero redivivus became, more especially in Christian thought, entirely confused with that of Antichrist. The less it became possible, as time went.on, to believe that Nero yet lived and would return as a living ruler, the greater was the tendency for his figure to develop into one wholly infernal and daemonic. The relation to the Parthians is also gradually lost sight of; and from being the adversary of Rome, Nero becomes the adversary of God and of Christ. This is the version of the expectation of Nero's second coming preserved in the form given to the prophecy, under Domitian, by the collaborator in the Apocalypse of John (xiii., xvii.). Nero is here the beast that returns from the bottomless pit, " that was, and is not, and yet is "; the head " as it were wounded to death " that lives again; the gruesome similitude of the L,amb that was slain, and his adversary in the final struggle. The number of the Beast, 666, points certainly to Nero (p"U ,iDp = 666, or I'M -irp=6i6>. In the little apocalypse of the Ascensio Jesaiae (iii. i3b-iv, 18), which dates perhaps from the second, perhaps only from the first, decade of the third century, 3 it is said that Beliar, the king of this world, would descend from the firmament in the human form of Nero. In the same way, in Sibyll. v. 28-34, Nero and Antichrist are absolutely identical (mostly obscure remin- iscences, Sib. viii. 68 &c, 140 &c, 151 &c). Then the Nero- legend gradually fades away. But Victorinus of Pettau, who wrote during the persecution under Diocletian, still knows the relation of the Apocalypse to the legend of Nero; and Commodian, whose Carmen Apologeticum was perhaps not written until the beginning of the 4th century, knows two Anti- christ-figures, of which he still identifies the first with Nero redivivus.

In proportion as the figure of Nero again ceased to dominate the imagination of the faithful, the wholly unhistorical, un- political and an ti-Jewish conception of Antichrist, which based itself more especially on 2 Thess. ii., gained the upper hand, having usually become associated with the description, of the universal conflagration of the world which had also originated in the Iranian eschatology. On the strength of exegetical com-binations, and with the assistance of various traditions, it was developed even in its details, which it thenceforth maintained practically unchanged. In this form it is in great part present in the eschatological portions of the Adv. Haereses of Irenaeus, and in the de Antithristo and commentary on Daniel of Hippolytus. In times of political excitement, during the following centuries, men appealed again and again to the prophecy of Antichrist. Then the foreground scenery of the prophecies was shifted; special

prophecies, having reference to contemporary events, are pushed to the front, but in the background remains standing, with scarcely a change, the prophecy of Antichrist that is bound up with no particular time. Thus at the beginning of the Testamentum Domini, edited by Rahmani, there is an apocalypse, possibly of the time of Decius, though it has been worked over (Harnack, Chronol. der altchrist. Lilt. ii. 514 &c). In the third century, the period of Aurelianus and Gallienus, with its wild warfare of Romans and Persians, and of Roman pretenders one with another, seems especially to have aroused the spirit of prophecy. To this period belongs the Jewish apocalypse of Elijah (ed. Butten wieser) , of which the Antichrist is possibly Odaenathus of Palmyra, while Sibyll. xiii., a Christian writing of this period, glorifies this very prince. It is possible that at this time also the Sibylline fragment (iii. 63 &c.) and the Christian recension of the two first Sibylline books were written. 4 To this time possibly belongs also a recension of the Coptic apocalypse of Elijah, edited by Steindorff {Texts und Untersuchungen, N. F. h. 3). To the 4th century belongs, according to Kamper {Die deutsche Kaiser- idee, 1896, p. 18) and Sackur {Texte und Forschungen, 1898, p. 114 &c), the first nucleus of the " Tiburtine " Sibyl, very cele- brated in the middle ages, with its prophecy of the return of

- *Harnack, Chronologie der altchristlichen Literatur, i. 573. 4 See Bousset, in Ucrzog-Haucfc, Realencyklop. fur Theoiogie und Kirche (ed. 3), xvi-ii. 273 &c.*

Constans, and its dream, which later on exercised so much influence, that after ruling over the whole world he would go to Jerusalem and lay down his crown upon Golgotha. To the 4th century also perhaps belongs a series of apocalyptic pieces and homilies which have been handed down under the name of Ephraem. At the beginning of the Mahommedan period, then, we meet with the most influential and the most curious of these prophetic books, the Pseudo-Methodius, 1 which prophesied of the emperor who would awake from his sleep and conquer Islam. From the Pseudo-Methodius are derived innumerable Byzantine prophecies (cf . especially Vassiliev, Anecdota Graeeo- Byzantina) which follow the fortunes of the Byzantine emperors and their governments. A prophecy in verse, adorned with pictures, which is ascribed to Leo VI. the Philosopher (Migne, Pair. Graeca, cvii. p. 112 1 &c), tells of the downfall of the house of the Comneni and sings of the emperor of the future who would one day awake from death and go forth from the cave in which he had lain. Thus the prophecy of the sleeping emperor of the future is very closely connected with the Antichrist tradition. There is extant a Daniel prophecy which, in

the time of the Latin empire, foretells the restoration of the Greek rule. 2 In the East, too, Antichrist prophecies were extraordinarily flourishing during the period of the rise of Islam and of the Crusades. To these belong the apocalypses in Arabic, Ethiopian and perhaps also in Syrian, preserved in the so-called Liber dementis discipuli S. Petri {Petri apostoli apocalypsis per Clementem), the late Syrian apocalypse of Ezra (Bousset, Antichrist, 45 &c), the Coptic (14th) vision of Daniel (in the appendix to Woide's edition of the Codex Alexandrinus; Oxford, 1799), the Ethiopian Wisdom of the Sibyl, which is closely related to the Tiburtine Sibyl (see Basset, Apocryphes elhiopienncs, x.); in the last mentioned of these sources long series of Islamic rulers are foretold before the final time of Antichrist. Jewish apocalypse also awakes to fresh developments in the Mahommedan period, and shows a close relationship with the Christian Antichrist literature. One of the most interesting apocalypses is the Jewish History of Daniel, handed down in Persian. 3

This whole type of prophecy reached the West above all through the Pseudo-Methodius, which was soon translated into Latin. Especially influential, too, in this respect was the letter which the monk Adso in 954 wrote to Queen Gerberga, De ortu et tempore Antichristi. The old Tiburtine Sibylla went through edition after edition, in each case being altered so as to apply to the government of the monarch who happened to be ruling at the time. Then in the West the period arrived in which eschatology, and above all the expectation of the coming of Antichrist, exercised a great influence on the world's history. This period, as is well known, was inaugurated, at the end of the 12th century, by the apocalyptic writings of the abbot Joachim of Floris. Soon the word Antichrist re-echoed from all sides in the em- bittered controversies of the West. The pope bestowed this title upon the emperor, the emperor upon the pope, the Guelphs on the Ghibellines and the Ghibellines on the Guelphs. In the contests between the rival powers and courts of the period, the prophecy of Antichrist played a political part. It gave motives to art, to lyrical, epic and dramatic poetry. 4 Among the visionary Franciscans, enthusiastic adherents of Joachim's prophecies, arose above all the conviction that the pope was Antichrist, or at least his precursor. From the Franciscans, influenced by Abbot Joachim, the lines of connexion are clearly traceable with Milic of Kremsier (Libellus de Antichristo) and Matthias of Janow. For Wycliffe and his adherent John Purvey (probably the author of the Commentarius in Apocalypsin ante centum annos editus, edited in 1528 by Luther), as on the other hand for Hus, the conviction that the papacy is essentially Antichrist is absolute. Finally, if Luther advanced in his contest with the papacy with greater and greater energy, he did so because he was borne on by

1 Latin text by Sackur, cf. op. cit. 1 &c. ; Greek text by V. Istrin.

2 See Bousset, Zeitschrift fur Kirchengeschichte, xx. p. 289 &c.

*3 Published in Merx, Archiv zur Erforschung des Alten Testament. * See especially the Ludus de Antichristo, ed. W. Meyer.*

the conviction that the pope in Rome was Antichrist. And if in the Augustana the expression of this conviction was suppressed for political reasons, in the Articles of Schmalkalden, drawn up by him, Luther propounded it in the most uncompromising fashion. This sentence was for him an articulus stantis et cadentis ecdesiae. To write the history of the idea of Antichrist in the last centuries of the middle ages, would be almost to write that of the middle ages themselves.

Authorities. — See, for the progress of the idea in Jewish and New Testament times, the modern commentaries on Revelation and the 2nd Epistle to the Thessalonians ; Bousset, Antichrist (1895), and the article " Antichrist " in the Encyclop. Biblica; R. H. Charles, Ascension of Isaiah, Introduction, li.-lxxiii. For the history of the legend of Nero, see J. Geffcken, Nachrichten, der Gottinger Gesellschaft der Wissenschaft (1899), p. 446 &c. ; Th. Zahn, Zeitschrift fur kirchliche Wissenschaft und kirchliches Leben (1886), p. 337 &c. ; Bousset, Kritisch-exegetisches Kommentar zur Offenbarung Johannis, cap. 17, and the article " Sibyllen " in Herzog-Hauck, Realencyklo- pddie fur Theologie und Kirche (3rd ed.), xviii. 265 &c. ; Nordmeyer, Der Tod Neros in der Legende, a Festschrift of the Gymnasium of Moos. For the later history of the legend, see Bousset, Antichrist, where will be found a more detailed discussion of nearly all the sources named; Bousset, " Beitrage zur Geschichte der Eschato- logie," in Zeitschrift fur Kirchengeschichte, xx. 2, and especially xx. 3, on the later Byzantine prophecies; Vassiliev, Anecdota Graeco-Byzantina, i. (Moscow, 1893), which gives the texts of a series of Byzantine prophecies; E. Sackur, Sibyllinische Texte und Forschungen (1898), containing (1) Pseudo-Methodius, Latin text, (2) Epistola Adsonis, (3) the Tiburtine Sibylla; V. Istrin, The Apocalypse of Methodius of Patara and the Apocryphal Visions of Daniel in Byzantine and Slavo-Russian Literature, Russian (Moscow, 1897); J. Kampers, Die deutsche Kaiseridee in Prophetie und Sage (Munich, 1896), and " Alexander der Grosse und die Idee des Welt-imperiums," in H. Grauert's Studien und Darstettungen aus dem Gebiet der Geschichte, vol. i. 2-3 (Freiburg, 1901); E. Wadstein, Die eschqtologische Ideengruppe, Antichrist, Weltsabbat, Weltende und Welgericht (Leipzig, 1896), which contains excellent material for the history of the idea in the West during the middle ages; W Meyer; " Ludus de Antichristo," in Sitzbericht der Miinchener Akad. (Phil, hist. Klasse 1882, H. i.); Kropatschek, Das Schriftprincip der lutherischen Kirche, i. 247 &c. (Leipzig, 1904) ; H. Rreuss, Die Vorstellungen vom Antichrist im spdteren Miltelalter, beiLuther u. i. d. Konfessionellen Polentik (Leipzig, 1906). (W.

Bo.)

ANTICLIMAX (i.e. the opposite to " climax "), in rhetoric, an abrupt declension (either deliberate or unintended) on the part of a speaker or writer from the dignity of idea which he appeared to be aiming at; as in the following well-known distich: — " The great Dalhousie, heˆ the god of war. Lieutenant-colonel to the earl of Mar."

An anticlimax can be intentionally employed only for a jocular or satiric purpose. It frequently partakes of the nature of antithesis, as —

" Die and endow a college or a cat." It is often difficult to distinguish between "anticlimax" and " bathos "; but the former is more decidedly a relative term. A whole speech may never rise above the level of bathos; but a climax of greater or less elevation is the necessary antecedent of an anticlimax.

ANTICOSTI, an island of the province of Quebec, Canada, situated in the Gulf of St Lawrence, between 49 and 50 N., and between 6i° 40′ and 64 30′ W., with a length of 135 m. and a breadth of 30 m. Population 250, consisting chiefly of the keepers of the numerous lighthouses erected by the Canadian government, The coast is dangerous, and the only two harbours, Ellis Bay and Fox Bay, are very indifferent. Anticosti was sighted by Jacques Cartier in 1 534, and named Assomption. In 1763 it was ceded by France to Britain, and in 1774 became part of Canada. Wild animals, especially bears, are numerous, but prior to 1896 the fish and game had been almost exterminated by indiscriminate slaughter. In that year Anticosti and the shore fisheries were leased to M. Menier, the French chocolate manufacturer, who converted the island into a game preserve, and attempted to develop its resources of lumber, peat and minerals.

See Logan, Geological Survey of Canada, Report of Progress from its Commencement to 1863 (Montreal, 1863-1865); E. Billings, Geo- logical Survey of Canada: Catalogue of the Silurian Fossils of Anti- costi (Montreal, 1866); J. Schmitt, Anticosti (Paris, 1904).

ANTICYCLONE (i.e. opposite to a cyclone), an atmospheric system in which there is a descending movement of the air and a relative increase in barometric pressure over the part of the earth's surface affected by it. At the surface the air tends to flow outwards in all directions from the central area of high pressure, and is deflected on account of the earth's rotation (see Ferrel's Law) so as to give a spiral movement in the direc- tion of the hands of a watch face upwards in the northern hemisphere, against that direction in the southern hemisphere. Since the air in an anticyclone is descending, it becomes warmed and dried, and therefore transmits radiation freely whether from the sun to the earth or from the earth into space. Hence in winter anticyclonic weather is characterized by clear air with periods of frost, causing fogs in towns and lew-lying damp areas, and in summer by still cloudless days with gentle variable airs and fine weather.

ANTICYRA, the ancient name of three cities of Greece, (i) (Mod. Aspraspitia), in Phocis, on the bay of Anticyra, in the Corinthian gulf; some remains are still visible. It was a town of considerable importance in ancient times; was destroyed by Philip of Macedon; recovered its prosperity; and was cap- tured by T. Quinctius Flamininus in 198 B.C. The city was famous for its black hellebore, a herb which was regarded as a cure for insanity. This circumstance gave rise to a number of proverbial

expressions, like 'Avrucipas at Set or " naviget Anticyram," and to frequent allusions in the Greek and Latin writers. Hellebore was likewise considered beneficial in cases of gout and epilepsy. (2) In Thessaly, on the right bank of the river Spercheus, near its mouth. (3) In Locris, on the north side of the entrance to the Corinthian gulf, near Naupactus.

ANTIETAM, the name of a Maryland creek, near which, on the i6th-i7th of September 1862, was fought the battle of Antietam or Sharpsburg (see American Civil War), between the Federals under McClellan and the Confederates commanded by Lee. General McClellan had captured the passes of South Mountain farther east on the 14th, and his Army of the Potomac marched to meet Lee : s forces which, hitherto divided, had, by the 16th, successfully concentrated between the Antietam and the Potomac. The Confederate Army of Northern Virginia occupied a position which, in relation to the surrounding country, may be compared to the string of a bow in the act of being drawn, Lee's left wing forming the upper half of the string, his right the lower, and the Potomac in his rear the bow itself. The town of Sharpsburg represents the fingers of the archer drawing the bow. The right wing of the position was covered by the Antietam as it approaches the Potomac, the upper course of that stream formed no part of the battlefield. Generals Longstreet and Jackson commanded the right and left wings. The division of A. P. Hill was at Harper's Ferry, but had received orders to rejoin Lee. McClellan's troops appeared late on the 16th, and Hooker was immediately sent across the upper Antie- tam. He had a sharp fight with Jackson's men, but night soon put an end to the contest. Early on the 19th the corps of Sumner and Mansfield followed Hooker across the upper stream whilst McClellan's left wing (Burnside's corps) drew up opposite Lee's extreme right. The Federal leader intended to hold back his centre whilst these two forces were rolling up Lee's wings. The battle began with a furious assault on the extreme right by Hooker's corps. After a very severe struggle he was repulsed with the loss of a quarter of his men, Jackson's divisions suffering even more severely and losing nearly all their generals and colonels. It was only the arrival of Hood and D. H. Hill which enabled Stonewall Jackson's corps to hold its ground, and had the other Federal corps been at hand to support Hooker the result might have been very different. Mansfield next attacked farther to the left and with better fortune. Mansfield was killed, but his successor led the corps well, and after heavy fighting Hood and D. H. Hill were driven back. Again want of support checked the Federals and the fight became stationary, both sides losing many men. Sumner now came into action, and overhaste involved him in a catastrophe, his troops being attacked in front and flank and driven back in great confusion with nearly

half their number killed and wounded; and their retreat in- volved the gallant remnants of Mansfield's corps. Soon after- wards the Federal

divisions of French and Richardson attacked D. H. Hill, whose men were now exhausted by continuous fighting. Here occurred the fighting in the "Bloody Lane," north of Sharpsburg which French and Richardson eventually carried. Opposed as they were by D. H. Hill, whose men had fought the battle of South Mountain and had already been three times engaged & fond on this day, proper support must have enabled the Federals to crush Lee's centre, but Franklin and Porter in reserve were not allowed by McClellan to move forward and the opportunity passed. Burnside, on the southern wing, had received his orders late, and acted on them still later. The battle was over on the right before he fired a shot, and Lee had been able to use nearly all his right wing troops to support Jackson. At last Burnside moved forward, and, after a brilliant defence by the handful of men left to oppose him, forced the Antietam and began to roll up Lee's right, only to be attacked in rear himself by A. P. Hill's troops newly arrived from Harper's Ferry. The repulse of Burnside ended the battle. Pressure was brought, to bear on McClellan to renew the fight, but he refused and Lee retired across the Potomac unmolested. The Army of the Potomac had lost 11,832 men out of 46,000 engaged; the cavalry and two corps in reserve had only lost 578. Lee's 31,200 men lost over 8000 of their number.

See the bibliography appended to American Civil War, and also General Palfrey's Antietam and Fredericksburg.

ANTI-FEDERALISTS, the name given in the political history of the United States to those who, after the formation of the federal Constitution of 1 7 8 7 , opposed its ratification by the people of the several states. The " party " (though it was never regularly organized as such) was composed of statesrights, particularistic, individualistic and radical democratic elements; that is, of those persons who thought that a stronger govern- ment threatened the sovereignty and prestige of the states', or the special interests, individual of commercial, of localities, or the liberties of individuals, or who fancied they saw in the government proposed a new centralized, disguised " monarchic " power that would only replace the cast-off despotism of Great Britain. In every state the opposition to the Constitution was strong, and in two—North Carolina and Rhode Island — it prevented ratification until the definite establishment of the new government practically forced their adhesion. The in- dividualistic was the strongest element of opposition; the necessity, or at least the desirability, of a bill of rights was almost universally felt. Instead of accepting the Constitution upon the condition of amendments, — in which way they might very likely have secured large concessions, — the Anti-Federalists stood for unconditional rejection, and public opinion, which went against them, proved that for all its shortcomings the Constitution was regarded as preferable to the Articles of Con- federation. After the inauguration of the

new government, the composition of the Anti-Federalist party changed. The Federalist (q.v.) party gradually showed broad-construction, nationalistic tendencies; the Anti-Federalist party became a strict-construction party and advocated popular rights against the asserted aristocratic, centralizing tendencies of its opponent, and gradually was transformed into the Democratic-Republican party, mustered and led by Thomas Jefferson, who, however, had approved the ratification of the Constitution and was not, therefore, an Anti-Federalist in the original sense of that term.

See O. G. Libby, Geographical Distribution of the Vote . . . on the Federal Constitution, 1787-1788 (University of Wisconsin, Bulletin, 1894) '• S. B. Harding, Contest over the Ratification of the Federal Constitution in . . . Massachusetts (Harvard University Studies, New York, 1896) ; and authorities on political and constitutional history in the article United States.

ANTIGO, a city and the county-seat of Langlade county, Wisconsin, U.S.A., about 160 m. N.W. of Milwaukee. ' Pop. (1890) 4424; (1900) 5145, of whom 965 were foreign-born; (1905) 6663; (1910) 7196. It is served by the Chicago & North Western railway. Antigo is the centre of a good farming and lumbering district, and its manufactures consist principally of

lumber,chairs,furniture,sashes,doors and blinds, hubs and spokes, and other wood products. The city has a Carnegie library. Antigo was first settled in 1880, and was chartered as a city in 1885. Its name is said to be part of an Indian word, neequee- antigo-sebi, meaning " evergreen."

ANTIGONE. (1) in Greek legend, daughter of Oedipus and Iocaste (Jocasta), or, according to the older story, of Euryganeia. When her father, on discovering that Iocaste, the mother of his children, was also his own mother, put his eyes out and resigned the throne of Thebes, she accompanied him into exile at Colonus. After his death she returned to Thebes, where Haemon, the son of Creon, king of Thebes, became enamoured of her. When her brothers Eteocles and Polyneices had slain each other in single combat, she buried Polyneices, although Creon had forbidden it. As a punishment she was sentenced to be buried alive in a vault, where she hanged herself, and Haemon killed himself in despair. Her character and these incidents of her life presented an attrac- tive subject to the Greek tragic poets, especially Sophocles in the Antigone and Oedipus at Colonus, and Euripides, whose Antigone, though now lost, is partly known

from extracts incidentally preserved in later writers, and from passages in his Phoenissae. In the order of the events, at least, Sophocles departed from the original legend, according to which the burial of Polyneices took place while Oedipus was yet in Thebes, not after he had died at Colonus. Again, in regard to Antigone's tragic end Sophocles differs from Euripides, according to whom the calamity was averted by the intercession of Dionysus and was followed by the marriage of Antigone and Haemon. In Hyginus's version of the legend, founded apparently on a tragedy by some follower of Euripides, Antigone, on being handed over by Creon to her lover Haemon to be slain, was secretly carried off by him, and concealed in a shepherd's hut, where she bore him a son Maeon. When the boy grew up, he went to some funeral games at Thebes, and was recognized by the mark of a dragon on his body. This led to the discovery that Antigone was still alive. Heracles pleaded in vain with Creon for Haemon, who slew both Antigone and himself, to escape his father's vengeance. On a painted vase the scene of the intercession of Heracles is represented (Heyder- mann, Uber eine nacheuripideische Antigone, 1868). Antigone placing the body of Polyneices on the funeral pile occurs on a sarcophagus in the villa Pamfili in Rome, and is mentioned in the description of an' ancient painting by Philostratus (Imag. ii. 29), who states that the flames consuming the two brothers burnt apart, indicating their unalterable hatred, even in death.

(2) A second Antigone was the daughter of Eurytion, king of Phthia, and wife of Peleus. Her husband, having accidentally killed Eurytion in the Calydonian boar hunt, fled and obtained expiation from Acastus, whose wife made advances to Peleus. Finding that her affection was not returned, she falsely accused Peleus of infidelity to his wife, who thereupon hanged herself (Apollodorus, iii. 13).

ANTIGONUS CYCLOPS (or Monopthalmos ; so called from his having lost an eye) (382-301 B.C.), Macedonian king, son of Philip, was one of the generals of Alexander the Great. He was made governor of Greater Phrygia in 333, and in the division of the provinces after Alexander's death (323) Pamphylia and Lycia were added to his command. He incurred the enmity of Perdiccas, the regent, by refusing to assist Eumenes (q.v.) to obtain possession of the provinces allotted to him. In danger of his life he escaped with his son Demetrius into Greece, where he obtained the favour of Antipater, regent of Macedonia (321) ; and when, soon after, on the death of Perdiccas, a new division took place, he was entrusted with the command of the war against Eumenes, who had joined Perdiccas against the coalition of Antipater, Antigonus, and the other generals. Eumenes was completely defeated, and obliged to retire to Nora in Cappadocia, and a new army that was marching to his relief was routed by Antigonus. Polyperchon succeeding Antipater (d. 319) in the regency, to the exclusion of Cassander, his son, Antigonus resolved to set himself up as lord of all

Asia, and in conjunction with Cassander and Ptolemy of Egypt, refused to recognize Polyperchon. He entered into negotiations with Eumenes; but

Eumenes remained faithful to the royal house. Effecting his escape from Nora, he raised an army, and formed a coalition with the satraps of the eastern provinces. He was at last delivered up to Antigonus through treachery in Persia and put to death (316). Antigonus again claimed authority over the whole of Asia, seized the treasures at Susa, and entered Baby- lonia, of which Seleucus was governor. Seleucus fled to Ptolemy, and entered into a league with him (315), together with Lysi- machus and Cassander. After the war had been carried on with varying success from 315 to 311, peace was concluded, by which the government of Asia Minor and Syria was provisionally secured to Antigonus. This agreement was soon violated on the pretext that garrisons had been placed in some of the free Greek cities by Antigonus, and Ptolemy and Cassander renewed hostilities against him. Demetrius Poliorcetes, the son of Antigonus, wrested part of Greece from Cassander. At first Ptolemy had made a successful descent upon Asia Minor and on several of the islands of the Archipelago; but he was at length totally defeated by Demetrius in a naval engagement off Salamis, in Cyprus (306). On this victory Antigonus assumed the title of king, and bestowed the same upon his son, a declaration that he claimed to be the heir of Alexander. Antigonus now prepared a large army, and a formidable fleet, the command of which he gave to Demetrius, and hastened to attack Ptolemy in his own dominions. His invasion of Egypt, however, proved a failure; he was unable to penetrate the defences of Ptolemy, and was obliged to retire. Demetrius now attempted the reduction of Rhodes, which had refused to assist Antigonus against Egypt; but, meeting with obstinate resistance, he was obliged to make a treaty upon the best terms that he could (304). In 302, although Demetrius was again winning success after success in Greece, Antigonus was obliged to recall him to meet the con- federacy that had been formed between Cassander, Seleucus and Lysimachus. A decisive battle was fought at Ipsus, in which Antigonus fell, in the eighty-first year of his age.

Diodorus Siculus xviii., xx. 46-86; Plutarch, Demetrius, Eumenes; Nepos, Eumenes; Justin xv. 1-4. See Macedonian Empire; and Kohler, " Das Reich des Antigonos," in the Sitzungsberichte d. Berl. Akad., 1898, p. 835 f.

ANTIGONUS GONATAS (c. 319-239 B.C.), Macedonian king, was the son of Demetrius Poliorcetes, and grandson of Antigonus Cyclops. On the death of his father (283), he assumed the title of king of Macedonia, but did not obtain possession of the throne till 276, after it had been successively in the hands of Pyrrhus, Lysimachus, Seleucus, and Ptolemy Ceraunus. Antigonus repelled the invasion of the Gauls, and continued in undisputed possession of Macedonia till 274, when Pyrrhus returned from

Italy, and (in 273) made himself master of nearly all the country. On the advance of Pyrrhus into Peloponnesus, he recovered his dominions. He was again (between 263 and 255) driven out of his kingdomby Alexander, the son of Pyrrhus, and again recovered it. The latter part of his reign was comparatively peaceful, and he gained the affection of his subjects by his honesty and his cultivation of the arts. He gathered round him distinguished literary men — philosophers, poets, and historians. He died in the eightieth year of his age, and the forty-fourth of his reign. His surname was usually derived by later Greek writers from the name of his supposed birthplace, Gonni (Gonnus) in Thessaly; some take it to be a Macedonian word signifying an iron plate for protecting the knee; neither conjecture is a happy one, and in our ignorance of the Macedonian language it must remain unexplained.

Plutarch, Demetrius, Pyrrhus, Aratus; Justin xxiv. 1; xxv. 1-3; Polybius ii. 43-45, ix. 29, 34. See Thirlwall, History of Greece, vol viii. (1847); Holm, Griech. Gesch. vol. iv. (1894); Niese, Gesch. d. griech. u. maked. Staaten, vols. i. and ii. (1893, 1899); Beloch, Griech. Gesch. vol. iii. (1904) ; also Wilamowitz-Moellendorff, Antigonos von Karystos (1881).

ANTIGONUS OF CARYSTUS (in Euboea), Greek writer on various subjects, flourished in the 3rd century B.C. After some time spent at Athens and in travelling, he was summoned to the court of Attalus I. (241-197) of Pergamum. His chief work was the Lives of Philosophers drawn from personal knowledge, of which considerable fragments are preserved in Athenaeus

and Diogenes Laertius. We still possess his Collection of Wonder- ful Tales, chiefly extracted from the Qav/xacna 'XKovaiiara. attributed to Aristotle and the Qav/iaaui of Callimachus. It is doubtful whether he is identical with the sculptor who, accord- ing to Pliny {Nat. Hist, xxxiv. 19), wrote books on his art.

Text in Keller, Rerum Naturalium Scriptores Graeci Minores, i. (1877); see Kopke, De Antigono Carystio (1862); Wilaroowitz- Mollendorff, " A. von Karystos," in Philologische Untersuchungen, iv.

(1881).

ANTIGUA, an island in the British West Indies, forming, with Barbuda and Redonda, one of the five presidencies in the colony of the Leeward Islands. It lies 50 m. E. of St Kitts, in 1 7 6′ N. and 61° 45′ W., and is 54 m. in

circumference, with an area of 108 sq. m. The surface is comparatively flat, and there is no central range of mountains as in most other West Indian islands, but among the hills in the south-west an elevation of 1328 ft. is attained. Owing to the absence of rivers, the paucity of springs, and the almost complete deforestation, Antigua is subject to frequent droughts, and although the average rainfall is 45-6 in., the variations from year to year are great. The dryness of the air proves very beneficial to persons suffering from pulmonary complaints. The high rocky coast is much indented by bays and arms of the sea, several of which form excellent harbours, that of St John being safe and commodious, but inferior to English Harbour, which, although little frequented, is capable of receiving vessels of the largest size. The soil, especially in the interior, is very fertile. Sugar and pineapples are the chief products for export, but sweet potatoes, yams, maize and guinea corn are grown for local consumption. Antigua is the residence of the governor of the Leeward Islands, and the meeting place of the general legislative council, but there is also a local legislative council of 16 members, half official and half unofficial. Until 1898, when the Grown Colony system was adopted, the legislative council was partly elected, partly nominated. Elementary education is compulsory. Agricultural training is given under government control, and the Cambridge local examinations and those of the University of London are held annually. Antigua is the see of a bishop of the Church of England, the members of which predominate here, but Moravians and Wesleyans are numerous. There is a small volunteer defence force. The island has direct steam com- munication with Great Britain, the United States and Canada, and is also served by the submarine cable. The three chief towns are St John, Falmouth and Parham. St John (pop. about 10,000), the capital, situated on the north-west, is an exceedingly picturesque town, built on an eminence overlooking one of the most beautiful harbours in the West Indies. Although both Falmouth and Parham have good harbours, most of the produce of the island finds its way to St John for shipment. The trade is chiefly with the United States, and the main exports are sugar, molasses, logwood, tamarinds, turtles, and pineapples. The cultivation of cotton has been introduced with success, and this also is exported. The dependent islands of Barbuda and Redonda have an area of 62 sq. m. Pop. of Antigua (1001), 34,178; of the presidency, 35,073.

Antigua was discovered in 1493 by Columbus, who is said to have named it after a church in Seville, called Santa Maria la Antigua. It remained, however, uninhabited until 1632, when a body of English settlers took possession of it, and in 1663 another settlement of the same nation was effected under the direction of Lord Willoughby, to whom the entire island was granted by Charles II. It was ravaged by the French in 1666, but was soon after reconquered by the British and formally restored to them by the

treaty of Breda. Since then it has been a British possession.

ANTILEGOMENA (avTiXeyoiitva, contradicted or disputed), an epithet used by the early Christian writers to denote those books of the New Testament which, although sometimes publicly read in the churches, were not for a considerable time admitted to be genuine, or received into the canon of Scripture. They were thus contrasted with the Homologoumena, or universally acknowledged writings. Eusebius (Hist. Eccl. iii. 25) applies

the term Antilegomena to the Epistle of James, the Epistle 0/ Jude, 2 Peter, 2 and 3 John, the Acts of Paul, the Shepherd of Hermas, the Teaching of the Apostles, the Apocalypse of John, and the Gospel according to the Hebrews. In later usage it describes those of the New Testament books which have obtained a doubtful place in the Canon. These are the Epistles of James and Jude, 2 Peter, 2 and 3 John, the Apocalypse of John, and the Epistle to the Hebrews.

ANTILIA or Antillia, sometimes called the Island of the Seven Cities (Portuguese Isla das Sete Cidades), a legendary island in the Atlantic ocean. The origin of the name is quite uncertain. The oldest suggested etymology (1455) fancifully connects it with the name of the Platonic Atlantis, while later writers have endeavoured to derive it from the Latin anterior {i.e. the island that is reached " before " Cipango), or from the Jezirat al Tennyn, " Dragon's Isle," of the Arabian geographers. Antilia is marked in an anonymous mapwhich is dated 1424 and preserved in the grand-ducal library at Weimar. It reappears in the maps of the Genoese B. Beccario or Beccaria (1435), and of the Venetian Andrea Bianco (1436), and again in 1455 and 1476. In most of these it is accompanied by the smaller and equally legendary islands of Royllo, St Atanagio, and Tanmar, the whole group being classified as insulae de novo reperiae, " newly discovered islands." The Florentine Paul Toscanelli, in his letters to Columbus and the Portuguese court (1474), takes Antilia as the principal landmark for measuring the distance between Lisbon and the island of Cipango or Zipangu (Japan). One of the chief early descriptions of Antilia is that inscribed on the globe which the geographer Martin Behainvmade at Nuremberg in 1492 (see Map: History). Behaim relates that in 734— a date which is probably a misprint for 714 — and after the Moors had conquered Spain and Portugal, the island of Antilia or " Septe Cidade " was colonized by Christian refugees under the archbishop of Oporto and six bishops. The inscription adds that a Spanish vessel sighted the island in 1414. According to an old Portuguese tradition each of the seven leaders founded and ruled a city, and the whole island became a Utopian common-wealth, free from the disorders of less favoured states. Later Portuguese tradition localized Antilia in the island of St Michael's, the largest of the Azores. It is impossible to estimate how far this legend commemorates some

actual but imperfectly recorded discovery, and how far it is a reminiscence of the ancient idea of an elysium in the western seas which is embodied in the legends of the Isles of the Blest or Fortunate Islands.

ANTILLES, a term of somewhat doubtful origin, now generally used, especially by foreign writers, as synonymous with the expression " West India Islands." Like " Brazil," it dates from a period anterior to the discovery of the New World, " Antilia," as stated above, being one of those mysterious lands, which figured on the medieval charts sometimes as an archipelago, sometimes as continuous land of greater or lesser extent, constantly fluctuating in mid-ocean between the Canaries and East India. But it came at last to be identified with the land discovered by Columbus. Later, when this was found to consist of a vast archipelago enclosing the Caribbean Sea and Gulf of Mexico, Antilia assumed its present plural form, Antilles, which was collectively applied to the whole of this archipelago.

A distinction is made between the Greater Antilles, including Cuba, Jamaica, Haiti, and Porto Rico; and the Lesser Antilles, covering the remainder of the islands.

ANTILOCHUS, in Greek legend, son of Nestor, king of Pylos. One of the suitors of Helen, he accompanied his father to the Trojan War. He was distinguished for his beauty, swiftness of foot, and skill as a charioteer; though the youngest among the Greek princes, he commanded the Pylians in the war, and performed many deeds of valour. He was a favourite of the gods, and an intimate friend of Achilles, to whom he was com- missioned to announce the death of Patroclus. When his father was attacked by Memnon, he saved his life at the sacrifice of his own (Pindar, Pyth. vi. 28), thus fulfilling an oracle which had bidden him " beware of an Ethiopian." His death was avenged by Achilles. According to other accounts, he was slain by

Hector (Hyginus, Fab. 113), or by Paris in the temple of the Thymbraean Apollo together with Achilles (Dares Phrygius 34). His ashes, with those of Achilles and Patroclus, were deposited in a mound on the promontory of Sigeum, where the inhabitants of Ilium offered sacrifice to the dead heroes (Odyssey, xxiv. 72; Strabo xiii. p. 596). In the Odyssey (xi. 468) the three friends are represented as united in the underworld and walking together in the fields of asphodel; according to Pausanias (iii. 19) they dwell together in the island of Leuke.

ANTIMACASSAR, a separate covering for the back of a chair, or the head or cushions of a sofa, to prevent soiling of the perma- nent fabric. The name is attributable to the unguent for the hair commonly used in the early 19th century, — Byron calls it " thine incomparable oil, Macassar." The original antimacassar was almost invariably made of white crochet-work, very stiff, hard, and uncomfortable, but in the third quarter of the 19th century it became simpler and less inartistic, and was made of soft coloured stuffs, usually worked with a simple pattern in tinted wools or silk.

ANTIMACHUS, of Colophon or Claros, Greek poet and gram- marian, flourished about 400 B.C. Scarcely anything is known of his life. His poetical efforts were not generally appreciated, although he received encouragement from his younger con- temporary Plato (Plutarch, Lysander, 18). His chief works were: a long-winded epic Thebais, an account of the expedition of the Seven against Thebes and the war of the Epigoni; and an elegiac poem Lyde, so called from the poet's mistress, for whose death he endeavoured to find consolation by ransacking mythology for stories of unhappy love affairs (Plutarch, Consol. ad Apoll. 9; Athenaeus xiii. 597). Antimachus was the founder of "learned" epic poetry, and the forerunner of the Alexandrian school, whose critics allotted him the next place to Homer. He also prepared a critical recension of the Homeric poems.

Fragments, ed. Stoll (1845); Bergk, Poetae Lyrici Craeci (1882); Kinkel, Fragmenta epicorum Graecorum (1877).

ANTI-MASONIC PARTY, an American political organization which had its rise after the mysterious disappearance, in 1826, of William Morgan (c. 1776-c. 1826), a Freemason of Batavia, New York, who had become dissatisfied with his Order and had planned to publish its secrets. When his purpose became known to the Masons, Morgan was subjected to frequent annoyances, and finally in September 1826 he was seized and surreptitiously conveyed to Fort Niagara, whence he disappeared. Though his ultimate fate was never known, it was generally believed at the time that he had been foully dealt with. The event created great excitement, and led many to believe that Masonry and good citizenship were incompatible. Opposition to Masonry was taken up by the churches as a sort of religious crusade, and it also became a local political issue in western New York, where early in 1827 the citizens in many mass meetings resolved to support no Mason for public office. In New York at this time the National Republicans, or " Adams men," were a very feeble organization, and shrewd political leaders at once determined to utilize the strong anti-Masonic feeling in creating a new and vigorous party to oppose the rising Jacksonian Democracy. In this effort they were aided by the fact that

Jackson was a high Mason and frequently spoke in praise of the Order. In the elections of 1828 the new party proved unexpectedly strong, and after this year it practically superseded the National Republican party in New York. In 1829 the hand of its leaders was shown, when, in addition to its antagonism to the Masons, it became a champion of internal improvements and of the protective tariff. From New York the movement spread into other middle states and into New England, and became especially strong in Pennsyl- vania and Vermont. A national organization was planned as early as 1827, when the New York leaders attempted, unsuccess- fully, to persuade Henry Clay, though a Mason, to renounce the Order and head the movement. In September 183 1 the party at a national convention in Baltimore nominated as its candidates for the presidency and vice-presidency William Wirt of Maryland and Amos Ellmaker (1 787-1 851) of Pennsylvania; and in the election of the following year it secured the seven electoral votes

of the state of Vermont. This was the high tide of its prosperity; in New York in 1833 the organization was moribund, and its members gradually united with other opponents of Jacksonian Democracy in forming the Whig party. In other states, however, the party survived somewhat longer, but by 1836 most of its members had united with the Whigs. Its last act in national politics was to nominate William Henry Harrison for president and John Tyler for vice-president at a convention in Philadelphia in November 1838.

The growth of the anti-Masonic movement was due to the political and social conditions of the time rather than to the Morgan episode, which was merely the torch that ignited the train. Under the name of " Anti-Masons " able leaders united those who were discontented with existing political conditions, and the fact that William Wirt, their choice for the presidency in 1832, was not only a Mason but even defended the Order in a speech before the convention that nominated him, indicates that simple opposition to Masonry soon became a minor factor in holding together the various elements of which the party was composed.

See Charles McCarthy, The Anlimasonic Party: A Study of Political Anti-Masonry in the United States, 1827-1840, in the Report of the American Historical Association for 1902 (Washington, 1903) ; the Autobiography of Thurlow Weed (2 vols., Boston, 1884); A. G. Mackey and W. R. Singleton, The History of Freemasonry, vol. vi. (New York, 1898) ; and J. D. Hammond, History of Political Parties in th-e Slate of New York (2 vols., Albany, 1842).

ANTIMONY (symbol Sb, atomic weight 120-2), one of the metallic chemical elements, included in the same natural family of the elements as

nitrogen, phosphorus, arsenic, and bismuth. Antimony, in the form of its sulphide, has been known from very early times, more especially in Eastern countries, reference to it being made in the Old Testament. The Arabic name for the naturally occurring stibnite is " kohl "; Dioscorides mentions it under the term cri^/it, Pliny as stibium; and Geber as antimonium. By the German writers it is called Speissglanz. Basil Valentine alludes to it in his Triumphal Car of Antimony (circa 1600), and at a later date describes the preparation of the metal.

Native mineral antimony is occasionally found, and as such was first recognized in 1748. It usually occurs as lamellar or glanular masses, with a tin-white colour and metallic lustre, in limestone or in mineral veins often in association with ores of silver. Distinct crystals are rarely met with; these are rhombo- hedral and isomorphous with arsenic and bismuth; they have a perfect cleavage parallel to the basal plane, c (in), and are sometimes twinned on a rhombohedral plane, e (no). Hardness 3~3i> specific gravity 6-65-6-72. Sala in Sweden, Allemont in Dauphine, and Sarawak in Borneo may be mentioned as some of the localities for this mineral.

Antimony, however, occurs chiefly as the sulphide, stibnite; to a much smaller extent it occurs in combination with other metallic sulphides in the minerals wolfsbergite, boulangerite, bournonite, pyrargyrite, &c. For the preparation of metallic antimony the crude stibnite is first liquated, to free it from earthy and siliceous matter, and is then roasted in order to convert it into oxide. After oxidation, the product is reduced by heating with carbon, care being taken to prevent any loss through volatilization, by covering the mass with a layer of some protective substance such as potash, soda or glauber salt, which also aids the refining. For rich ores the method of roasting the sulphide with metallic iron is sometimes employed; carbon and salt or sodium sulphate being used to slag the iron. Electrolytic methods, in which a solution of antimony sulphide in sodium sulphide is used as the electrolyte, have been proposed (see German Patent 67973, an d also Borcher's Electro-Metallurgie), but do not yet appear to have been used on the large scale.

Antimony combines readily with many other metals to form alloys, some of which find extensive application in the arts. Type-metal is an alloy of lead with antimony and tin, to which occasionally a small quantity of copper or zinc is added. The presence of the antimony in this alloy gives to it hardness, and the property of expanding on solidification, thus allowing a sharp cast of the letter to be taken. An alloy of tin and antimony forms

the basis of Britannia-metal, small quantities of copper, lead, zinc or bismuth being added. It is a white metal of bluish tint and is malleable and ductile. For the linings of brasses, various white metals are used, these being alloys of copper, antimony and tin, and occasionally lead.

Antimony is a silvery white, crystalline, brittle metal, and has a high lustre. Its specific gravity varies from 6-7 to 6-86; it melts at 43 2° C. (Dalton), and boils between 1090-1600° C. (T. Carnelley), or above 1300° (V. Meyer), Its specific heat is 0-0523 (H. Kopp). The vapour density of antimony at 1572° C. is 10-74, and at 1640° C. 9-78 (V. Meyer, Berichte, 1889, 22, p. 725), so that the antimony molecule is less complex than the molecules of the elements phosphorus and arsenic. An amorphous modifica- tion of antimony can be prepared by heating the metal in a stream of nitrogen, when it condenses in the cool part of the apparatus as a grey powder of specific gravity 6-22, melting at 614° C. and containing 98-99% of antimony (F. Herard, Comptes Rendus, 1888, cvii. 420).

Another form of the metal, known as explosive antimony, was discovered by G. Gore (Phil. Trans., 1858, p. 185; 1859, p. 797; 1862, p. 623), on electrolysing a solution of antimony trichloride in hydrochloric acid, using a positive pole of antimony and a negative pole of copper or platinum wire. It has a specific gravity of 5-78 and always contains some unaltered antimony trichloride (from 6 to 20%, G. Gore). It is very unstable, a scratch causing it instantaneously to pass into the stable form with explosive violence and the development of much heat. Similar phenomena are exhibited in the electrolysis of solutions of antimony tribromide and tri-iodide, the product obtained from the tribromide having a specific gravity of 5-4, and con- taining 18-20% of antimony tribromide, whilst that from the tri-iodide has a specific gravity of 5-2-5-8 and contains about 22 % of hydriodic acid and antimony tri-iodide.

The atomic weight of antimony has been determined by the analysis of the chloride, bromide and iodide. J. P. Cooke (Proc. Amer. Acad., 1878, xiii. 1) and J. Bongartz {Berichte, 1883, 16, p. 1942) obtained the value 120, whilstF. Pfeiffer (Ann. Chim. el Phys. ccix. 173) obtained the value 121 from the electrolysis of the chloride.

Pure antimony is quite permanent in air at ordinary tempera- tures, but when heated in air or oxygen it burns, forming the trioxide. It decomposes steam at a red heat, and burns (especially when finely powdered)in chlorine. Dilute hydrochloric acid is without action on it, but on warming with the concentrated acid, antimony trichloride is formed; it dissolves in warm concentrated sulphuric acid, the sulphate Sb 2 (S0 4) 3 being formed. Nitric acid oxidizes antimony either to the trioxide Sb 4 0e or the pentoxide Sb 2 5 , the product obtained depending on the temperature and

concentration of the acid. It combines directly with sulphur and phosphorus, and is readily oxidized when heated with metallic oxides (such as litharge, mercuric oxide, manganese dioxide, &c). Antimony and its salts may be readily detected by the orange precipitate of antimony sulphide which is produced when sulphuretted hydrogen is passed through theiracid solutions, and also by the Marsh test (see Arsenic); in this latter case the black stain produced is not soluble in bleaching powder solution. Antimony compounds when heated on charcoal with sodium carbonate in the reducing flame give brittle beads of metallic antimony, and a white incrustation of the oxide. The antimonious compounds are decomposed on addition of water, with formation of basic salts.

Antimony may be estimated quantitatively by conversion into the sulphide; the precipitate obtained is dried at 100° C. and heated in a current of carbon dioxide, or it may be converted into the tetroxide by nitric acid.

Antimony, like phosphorus and arsenic, combines directly with hydrogen. The compound formed, antimoniuretted hydrogen or stibine, SbH 3 , may also be prepared by the action of hydrochloric acid on an alloy of antimony and zinc, or by the action of nascent hydrogen on antimony compounds. As pre- pared by these methods it contains a relatively large amount of hydrogen, from which it can be freed by passing through a tube

immersed in liquid air, when it condenses to a white solid. It is a poisonous colourless gas, with a characteristic offensive smell. In its general behaviour it resembles arsine, burning with a violet flame and being decomposed by heat into its constituent elements. When passed into silver nitrate solution it gives a black precipitate of silver antimonide, SbAg 3 . It is decomposed by the halogen elements and also by sulphuretted hydrogen. All three hydrogen atoms are replaceable by organic radicals and the resulting compounds combine with compounds of the type RC1, RBr and Rl.to form stibonium compounds.

There are three known oxides of antimony, the trioxide Sb 4 0« which is capable of combining with both acids and bases to form salts, the tetroxide Sb 2 4 and the pentoxide SbjOj. Antimony tri- oxide occurs as the minerals valentinite and senarmontite, and can be artificially prepared by burning antimony in air; by heating the metal in steam to a bright red heat; by oxidizing melted antimony with litharge ; by decomposing antimony trichloride with an aqueous solution of sodium carbonate, or by the action of dilute nitric acid on the metal. It is a white powder, almost insoluble in water, and when volatilized, condenses in two crystalline forms, either octa- hedral or prismatic. It is insoluble in sulphuric and nitric acids, but is readily soluble in hydrochloric and tartaric acids and in solutions of the caustic alkalies. On strongly heating in air it is converted into the tetroxide.

The corresponding hydroxide, orthoantimonious acid, Sb(OH) 3 , can be obtained in a somewhat impure form by precipi- tating tartar emetic with dilute sulphuric acid ; or better by decom- posing antimony! tartaric acid with sulphuric acid and drying the Erecipitated white powder at 100° C. Antimony tetroxide is formed y strongly heating either the trioxide or pentoxide. It is a non- volatile white powder, and has a specific gravity of 6-6952; it is insoluble in water and almost so in acids — concentrated hydrochloric acid dissolving a small quantity. It is decomposed by a hot solution of potassium bitartrate. Antimony pentoxide is obtained by repeatedly evaporating antimony with nitric acid and heating the resulting antimonic acid to a temperature not above 275° C. ; by heating antimony with red mercuric oxide until the mass becomes yellow (J. Berzelius) ; or by evaporating antimony trichloride to dryness with nitric acid. It is a pale yellow powder (of specific gravity 6-5), which on being heated strongly gives up oxygen and forms the tetroxide. It is insoluble in water, but dissolves slowly in hydrochloric acid. It possesses a feeble acid character, giving metantimoniates when heated with alkaline carbonates.

Orthoantimonic acid, H 3 Sb0 4 , is obtained by the decomposition of its potassium salt with nitric acid (A. Geuther) ; or by the addition of water to the pentachloride, the precipitate formed being dried over sulphuric acid (P. Conrad, Chem. Ntws, 1879, xl. 198). It is a white powder almost insoluble in water and nitric acid, and when heated, is first converted into metantimonic acid, HSb0 3 , and then into the pentoxide Sb 2 Os. Pyroantimonic acid, H 4 Sb 2 07 (the metantimonic acid of E. Fremy), is obtained by decomposing antimony pentachloride with hot water, and drying the precipitate so obtained at 100 ° C. It is a white powder which is more soluble in water and acids than orthoantimonic acid. It forms two series of salts, of the types M 2 H 2 Sb 2 7 and M 4 Sb 2 7 . Metantimonic acid, HSb0 3 , can be obtained by heating orthoantimonic acid to 175 C;, or by long fusion of antimony with antimony sulphide and nitre. The fused mass is extracted with water, nitric acid is added to the solution, and the precipitate obtained washed with water (J. Berzelius). It is a white powder almost insoluble in water. On standing with water for some time it is slowly converted into the ortho-acid.

Compounds of antimony with all the halogen elements are known, one atom of the metal combining with three or five atoms of the halogen, except in the case of bromine, where only the tribromide is known. The majority of these halide compounds are decomposed by water, with the formation of basic salts. Antimony trichloride (" Butter of Antimony "), SbCl 3 , is obtained by burning the metal in chlorine; by distilling antimony with excess of mercuric chloride; and by fractional distillation of antimony tetroxide or trisulphide in hydrochloric acid solution. It is a colourless deliquescent solid of specific gravity 3-06; it melts at 73-2° C. (H. Kopp) to

a colourless oil; and boils at 223° (H. Capitaine). It is soluble in alcohol and in carbon bisulphide, and also in a small quantity of Water; but with an excess of water it gives a precipitate of various oxychlorides, known as powder of algaroth (q.v.). These precipitated oxychlorides on continued boiling With water lose all their chlorine and ultimately give a residue of antimony trioxide. It combines with chlorides of the alkali metals to form double salts, and also with barium, calcium, strontium, and magnesium chlorides. Antimony pentachloride, SbCl 5 > is prepared by heating the trichloride in a current of chlorine. It is a nearly colourless fuming liquid of unpleasant smell, which can be solidified to a mass of crystals melting at — 6° C. It dissociates into the trichloride and chlorine when heated. It combines with water, forming the hydrates SbCI 5 -H 2 and SbCl 5 -4H 2 0; it also combines with phosphorus oxychloride, hydrocyanic acid, and cyanogen chloride. In chloroform solution it combines with anhydrous oxalic

acid to form a compound, SbjClsCCaCˆ), which is to be considered as

COOSbCh tetra-chlorstibonium oxalate | (R. Anschutz and Evans,

COOSbCU Annalen, 1887, ccxxxix. 235). Antimony! chloride, SbOCl, is pro- duced by the decomposition of one part of the trichloride with four parts of water. Prepared in this way it contains a small quantity of the unaltered chloride, which can be removed by ether or carbon bisulphide. It is a white powder insoluble in water, alcohol and ether. On heating, it is converted into the oxychloride SbiOsCl2 (Sb23- SbOCl). Antimony oxychloride, SbOCU, is formed by addi- tion o f the calculated quantity of water to ice-cooled antimony pentachloride, SbCl 5 4-H 2 = SbOCl3 + 2HCl. It forms a yellowish crystalline precipitate which in moist air goes to a thick liquid. Compounds of composition, SbOCl3-2SbCls and SbOjClˆSbOCU, have also been described (W. C. Williams, Chem. News. 1871, xxiv.

234)-

Antimony tribromide, SbBrs, and tri-iodide, Sbla, may be prepared by the action of antimony on solutions of bromine or iodine in carbon bisulphide. The tribromide is a colourless crystalline mass of specific gravity 4-148 (23 °), melting at 90 to 94 C. and boiling at 2 75‘4° C. (H. Kopp). The tri-iodide forms red-coloured crystals of specific gravity 4-848 (26), melting at 165 to 167 C. and boiling at 401° C. By the action of water they give

oxybromides and oxy- iodides SbOBr, SbiOsBro, SbOI. Antimony penta-iodide, SbU, is formed by heating antimony with excess of iodine, in a sealed tube, to a temperature not above I30°C. It forms a dark brown crystalline mass, melting at 78 to 79 C., and is easily dissociated on heating. Antimony trifluoride, SbF3, is obtained by dissolving the trioxide in aqueous hydrofluoric acid or by distilling antimony with mercuric fluoride. By rapid evaporation of its solution it may be obtained in small prisms. The pentafluoride SbF 6 results when metantimonic acid is dissolved in hydrofluoric acid, and the solution is evaporated. It forms an amorphous gummy mass, which is decomposed by heat. Oxyfluorides of composition SbOF and SbOFs are known.

Two sulphides of antimony are definitely known, the trisulphide SbnS3 and the pentasulphide Sb?Ss; a third, the tetrasulphide SbzS, has also been described, but its existence is doubtful. Antimony trisulphide, SbA, occurs as the mineral antimonite or stibnite, from which the commercial product is obtained by a process of liquation. The amorphous variety may be obtained from the crystalline form by dissolving it in caustic potash or soda or in solutions of alkaline sulphides, and precipitating the hot solution by dilute sulphuric acid. The precipitate is then washed with water and dried at 100 C, by which treatment it is obtained in the anhydrous, form. On precipitating antimony trichloride or tartar emetic in acid solution with sulphuretted hydrogen, an orange-red precipitate of the hy- drated sulphide is obtained, which turns black on being heated to 200 C The trisulphide heated in a current of hydrogen is reduced to the metallic state; it burns in air forming the tetroxide, and is soluble in concentrated hydrochloric acid, in solutions of the caustic alkalis, and in alkaline sulphides. By the union of antimony tri- sulphide with basic sulphides, livers of antimony are obtained. These substances are usually prepared by fusing their components together, and are dark powders which are less soluble in water the more antimony they contain. These thioantimonites are used in the vulcanizing of rubber and in the preparation of matches. Anti- mony pentasulphide, Sb 2 S 5 , is prepared by precipitating a solution of the pentachloride with sulphuretted hydrogen, by decomposing " Schlippe's salt " (5.11.) with an acid, or by passing sulphuretted hydrogen into water containing antimonic acid. It forms a fine dark orange powder, insoluble in water, but readily soluble in aqueous solutions of the caustic alkalis and alkaline carbonates. On heating in absence of air, it decomposes into the trisulphide and sulphur.*

An antimony phosphide and arsenide are known, as is also a thiophosphate, SbPSi, which is prepared by heating together anti- mony trichloride and phosphorus pentasulphide.

Many organic compounds containing antimony are known. By distilling an

alloy of antimony and sodium with mythyl iodide, mixed with sand, trimethyl stibine, Sb(CH3)i, is obtained; this com- bines with excess of methyl iodide to form tetramethyl stibonium iodide, Sb(CH 3).|I. From this iodide the trimethyl stibine may be obtained by distillation with an alloy of potassium and antimony in a current of carbon dioxide. It is a colourless liquid, slightly soluble in water, and is spontaneously inflammable. The stibonium iodide on treatment with moist silver oxide gives the correspond- ing tetramethyl stibonium hydroxide, Sb(CH 3)iOH, which forms deliquescent crystals, of alkaline reaction, and absorbs carbon dioxide readily. On distilling trimethyl stibine with zinc methyl, antimony tetra-methyl and penta-methyl are formed. Correspond- ing antimony compounds containing the ethyl group are known, as is also a tri-phenyl stibine, Sb(CeH 6)3, which is prepared from anti- mony trichloride, sodium and monochlorbenzene. See Chung Yu Wang, Antimony (1909).

Antimony in Medicine. — So far back as Basil Valentine and Paracelsus, antimonial preparations were in great vogue as medicinal agents, and came to be so much abused that a pro-

hibition was placed upon their employment by the Paiis parle- ment in 1566. Metallic antimony was utilized to make goblets in which wine was allowed to stand so as to acquire emetic properties, and ” everlasting ” pills of the metal, supposed to act by contact merely, were administered and recovered for future use after they had fulfilled their purpose. Antimony compounds act as irritants both externally and internally. Tartar emetic (antimony tartrate) when swallowed, acts directly on the wall of the stomach, producing vomiting, and after absorption continues this effect by its action on the medulla. It is a powerful cardiac depressant, diminishing both the force and frequency of the heart’s beat. It depresses respiration, and in large doses lowers temperature. It depresses the nervous system, especially the spinal cord. It is excreted by all the secretions and excretions of the body. Thus as it passes out by the bronchial mucous membrane it increases the amount of secretion and so acts as an expectorant. On the skin its action is that of a diaphoretic, and being also excreted by the bile it acts slightly as a cholagogue. Summed up, its action is that of an irritant, and a cardiac and nervous depressant. But on account of this depressant action it is to be avoided for women and children and rarely used for men.

Toxicology. — Antimony is one of the ” protoplasmic ” poisons, directly lethal to all living matter. In acute poisoning by it the symptoms are almost identical with those of arsenical poison- ing, which is much commoner (See Aksenic). The post-mortem appearances are also very similar, but the gastro-intestinal irritation is much less marked and inflammation of the

lungs is more commonly seen. If the patient is not already vomiting freely the treatment is to use the stomach-pump, or give sulphate of zinc (gr. 10-30) by the mouth or apomorphine (gr. sVtV) subcutaneously. Frequent doses of a teaspoonful of tannin dissolved in water should be administered, together with strong tea and coffee and mucilaginous fluids. Stimulants may be given subcutaneously, and the patient should be placed in bed between warm blankets with hot'vi'ater bottles. Chronic poisoning by antimony is very rare, but resembles in essentials chronic poisoning by arsenic. In its medico-legal aspects antimonial poisoning is of little and lessening importance.

ANTINOMIANS (Gr. avri, against, vofios, law), a term apparently coined by Luther to stigmatize Johannes Agricola (q.v.) and his following, indicating an interpretation of the anti- thesis between law and gospel, recurrent from the earliest times. Christians being released, in important particulars, from con- formity to the Old Testament polity as a whole, a real difficulty attended the settlement of the limits and the immediate authority of the remainder, known vaguely as the moral law. Indications are not wanting that St Paul's doctrine of justification by faith was, in his own day, mistaken or perverted in the interests of immoral licence. Gnostic sects approached the question in two ways. Marcionites, named by Clement of Alexandria Antitaclae (revolters against theDemiurge) held the Old Testament economy to be throughout tainted by its source; but they are not accused of licentiousness. Manichaeans, again, holding their spiritual being to be unaffected by the action of matter, regarded carnal sins as being, at worst, forms of bodily disease. Kindred to this latter view was the position of sundry sects of English fanatics during the Commonwealth, who denied that an elect person sinned, even when committing acts in themselves gross and evil. Different from either of these was the Antinomianism charged by Luther against Agricola. Its starting-point was a dispute with Melanchthon in 1527 as to the relation between repentance and faith. Melanchthon urged that repentance must precede faith, and that knowledge of the moral law is needed to produce repentance. Agricola gave the initial place to faith, maintaining that repentance is the work, not of law, but of the gospel-given knowledge of the love of God. The resulting Antinomian controversy (the only one within the Lutheran body in Luther's lifetime) is not remarkable for the precision or the moderation of the combatants on either side. Agricola was apparently satisfied in conference with Luther and Melanchthon at Torgau, December 1527. His eighteen Positiones of 1537 revived the

controversy and made it acute. Random as are some of his statements, he was consistent in two objects: (i) in the interest of solifidian doctrine, to place the rejection of the Catholic doc- trine of good works on a sure ground; (2) in the interest of the New Testament, to find all needful guidance for Christian duty in its principles, if not in its precepts. From the latter part of the 17 th century charges of Antinomianism have frequently been directed against Calvinists, on the ground of their dis- paragement of "deadly doing " and of "legal preaching," The virulent controversy between Arminian and Calvinistic Methodists produced as its ablest outcome Fletcher's Checks to Antinomianism (17 71-1775).

See G. Kawerau, in A. Hauck's Realencyklopadie (1896) ; Riess, in I. Goschler's Diet. Encyclop. de la theol. cath. (1858); J. H. Blunt. Diet, of Docl. and Hist. Theol. (1872) ; J. C. L. Gieseler, Ch. Hist. (New York ed. 1868, vol. iv.).

ANTINOMY (Gr. avrl, against, po/xos, law), literally, the mutual incompatibility, real or apparent, of two laws. The term acquired a special significance in the philosophy of Kant, who used it to describe the contradictory results of applying to the universe of pure thought the categories or criteria proper to the universe of sensible perception (phenomena). These anti- nomies are four — two mathematical, two dynamical — connected with (1) the limitation of the universe in respect of space and time, (2) the theory that the whole consists of indivisible atoms (whereas, in fact, none such exist), (3) the problem-of freedom in relation to universal causality, (4) the existence of a universal being — about each of which pure reason contradicts the em- pirical, as thesis and antithesis. Kant claimed to solve these contradictions by saying, that in no case is the contradiction real, however really it has been intended by the opposing parti- sans, or must appear to the mind without critical enlightenment. It is wrong, therefore, to impute to Kant, as is often done, the view that human reason is, on ultimate subjects, at war with itself, in the sense of being impelled by equally strong arguments towards alternatives contradictory of each other. The difficulty arises from a confusion between the spheres of phenomena and noumena. In fact no rational cosmology is possible.

See John Watson, Selections from Kant (trans. Glasgow, 1897), PP- '55 foil.; W. Windelband, History of Philosophy . (Eng. trans. 1893); H. Sidgwick, Philos. of Kant, lectures x. and xi. (Lond., 1905); F. Paulsen, /. Kant (Eng. trans. 1902), pp. 216 foil.

ANTINOUS, a beautiful youth of Claudiopolis in Bithynia, was the favourite of the emperor Hadrian, whom he accompanied on his journeys.

He committed suicide by drowning himself in the Nile (a.d. 130), either in a fit of melancholy or in order to prolong his patron's life by his voluntary sacrifice. After his death, Hadrian caused the most extravagant respect to be paid to his memory. Not only were cities called after him, medals struck with his effigy, and statues erected to him in all parts of the empire, but he was raised to the rank of the gods, temples were built for his worship in Bithynia, Mantineia in Arcadia, and Athens, festivals celebrated in his honour and oracles delivered in his name. The city of Antinoopolis was founded on the ruins of Besa where he died (Dio Cassius lix. 1 1 ; Spartianus, Hadrian). A number of statues, busts, gems and coins represented Antinoiis as the ideal type of youthful beauty, often with the attributes of some special god. We still possess a colossal bust in the Vatican, a bust in the Louvre, a bas-relief from the Villa Albani, a statue in the Capitoline museum, another in Berlin, another in the Lateran, and many more.

See Levezow, tjber den Antivous (1808); Dietrich, Antinoos (1884); Laban, Der Gemiitsausdruck des Antinoos (1891);' Antinoiis, A Romance of Ancient Rome, from the German of A. Hausrath, by M. Safford (New York, 1882); Ebers, Der Kaiser (1881).

ANTIOCH. There were sixteen cities known to have been founded under this name by Hellenistic monarchs; and at least twelve others were renamed Antioch. But by far the most famous and important in the list was 'Actiox«"i V &ri Aa4>vri (mod. Antakia), situated on the left bank of the Orontes, about 20 m. from the sea and its port, Seleucia of Pieria (Suedia). Founded as a Greek city in 300 B.C. by Seleucus Nicator, as soon as he

had assured his grip upon western Asia by the victory of Ipsus (301), it was destined to .rival Alexandria in Egypt as the chief city of the hearer East, and to be the cradle of gentile Christianity. The geographical character of the district north and north-east of the elbow of Orontes makes it the natural centre of Syria, so long as that country is held by a western power; and only Asiatic/ and especially Arab, dynasties have neglected it for the oasis of Damascus. The two easiest routes from the Mediterranean lying through the Orontes gorge and the Beilan Pass, converge in the plain of the Antioch Lake (Baliik Geul or El Bahr) and are met there by (1) the road from the Amanic Gates (Baghche Pass) and western Commagene, which descends the valley of the Kara Su, (2) the roads from eastern Commagene and the Euphratean crossings at Samosata (Samsat) and Apamea Zeugma (Birejik), which descend the valleys of the Afrin and the Kuwaik, and (3) the road from the Euphratean ford at Thapsacus, which skirts the fringe of the Syrian steppe. Travellers by all these roads must proceed south by the single route of the Orontes valley. Alexander is said to have camped on the site of Antioch, and dedicated an

altar to Zeus Bottiaeus, which lay in the north- west of the future city. But the first western sovereign practi- cally to recognize the importance of the district was Antigonus, who began to build a city, Antigonia, on the Kara Su a few miles north of the situation of Antioch; but, on his defeat, he left it to serve as a quarry for his rival Seleucus. The latter is said to have appealed to augury to determine the exact site of his projected foundation; but less fantastic considerations went far to settle it. To build south of the river, and on and under the last east spur of Casius, was to have security against invasion from the north, and command of the abundant waters of the mountain. One torrent, the Onopniktes (" donkey-drowner "), flowed through the new city, and many other streams came down a few miles west into the beautiful suburb of Daphne. The site appears not to have been found wholly uninhabited. A settlement \ Meroe, boasting a shrine of Anait, called by the Greeks the " Persian Artemis," had long been located there, and was ultimately included in the eastern suburbs of the new city; and there seems to have been a village on the spur (Mt. Silpius), of which we hear in late authors under the name Io, or Iopolis. This name was always adduced as evidence by Antiochenes (e.g. Libanius) anxious to affiliate themselves to the Attic Ionians — an anxiety which is illustrated by the Athenian types used on the city's coins. At any rate, Io may have been a small early colony of trading Greeks (Javan). John Malalas mentions also a village, Bottia, in the plain by the river.

The original city of Seleucus was laid out in imitation of the '"' gridiron " plan of Alexandria by the architect, Xenarius. Libanius describes the first building and arrangement of this city (i. p. 300. 17). The citadel was on Mt. Silpius and the city lay mainly on the low ground to the north, fringing the river. Two great colonnaded streets intersected in the centre. Shortly afterwards a second quarter was laid out, probably on the east and by Antiochus I., which, from an expression of Strabo, appears to have been the native, as contrasted with the Greek, town. It was enclosed by a wall of its own. In the Orontes, north of the city, lay a large island, and on this Seleucus II. Callinicus began a third walled " city," which was finished by Antiochus III. A fourth and last quarter was added by Antiochus IV. Epiphanes (175-164 B.C.); and thenceforth Antioch was known as Tetrapolis. From west to east the whole was about 4 m. in diameter and little less from north to south, this area including many large gardens. Of its population in, the Greek period we know nothing. In the 4th century a.d. it was about 200,000 according to Chrysostom, who probably did not reckon slaves. About 4 m. west and beyond the suburb, Heraclea, lay the paradise of Daphne, a park of woods and waters, in the midst of which rose a great temple to the Pythian Apollo, founded by Seleucus I. and enriched with a cult-statue of the god, as Musagetes, by Bryaxis. A companion sanctuary of Hecate ,was constructed underground by

Diocletian. The beauty and the lax morals of Daphne were celebrated all over

ANTIOCH

«3′

the western world; and indeed Antioch as a whole shared in both these titles to fame. Its amenities awoke both the enthusiasm and the scorn of many writers of antiquity.

Antioch became the capital and court-city of the western Seleucid empire under Antiochus I., its counterpart in the east being Seleucia-on-Tigris ; but its paramount importance dates from the battle of Ancyra (240 B.C.), which shifted the Seleucid centre of gravity from Asia Minor, and led indirectly to the rise of Pergamum. Thenceforward the Seleucids resided at Antioch and treated it as their capital par excellence. We know little of it in the Greek period, apart from Syria (q.v.), all our informa- tion coming from authors of the late Roman time. Among its great Greek buildings we hear only of the theatre, of which substructures still remain on the flank of Silpius, and of the royal palace, probably situated on the island. It enjoyed a great reputation for letters and the arts (Cicero pro Archia, 3); but the only names of distinction in these pursuits during the Seleucid period, that have come down to us, are Apollophanes, the Stoic, and one Phoebus, a writer on dreams. The mass of the population seems to have been only superficially Hellenic, and to have spoken Aramaic in non-official life. The nicknames which they gave to their later kings were Aramaic; and, except Apollo and Daphne, the great divinities of north Syria seem to have remained essentially native, such as the " Persian Artemis " of Meroe and Atargatis of Hierapolis Bambyce. We may infer, from its epithet, " Golden," that the external appearance of Antioch was magnificent; but the city needed constant restora- tion owing to the seismic disturbances to which the district has always been peculiarly liable. The first great earthquake is said by the native chronicler John Malalas, who tells us most that we know of the city, to have occurred in 148 B.C., and to have done immense damage. The inhabitants were turbulent, fickle and notoriously dissolute. In the many dissensions of the Seleucid house they took violent part, and frequently rose in rebellion, for example against Alexander Balas in 147 B.C., and Demetrius II. in 129. The latter, enlisting a body of Jews, punished his capital with fire and sword. In the last struggles of the Seleucid house, Antioch turned definitely against its feeble rulers, invited Tigranes of Armenia to occupy the city in 83, tried to unseat Antiochus XIII. in 65, and petitioned Rome against his restoration in the following year. Its wish prevailed, and it passed with Syria to the Roman Republic in 64 B.C., but remained a civitas libera.

The Romans both felt and expressed boundless contempt for the hybrid Antiochenes; but their emperors favoured the city from the first, seeing in it a more suitable capital for the eastern part of the empire than Alexandria could ever be, thanks to the isolated position of Egypt. To a certain extent they tried to make it an eastern Rome. Caesar visited it in 47 B.C., and con- firmed its freedom. A great temple to Jupiter Capitolinus rose on Silpius, probably at the instance of Octavian, whose cause the city had espoused. A forum of Roman type was laid out. Tiberius built two long colonnades on the south towards Silpius. Agrippa and Tiberius enlarged the theatre, and Trajan finished their work. Antoninus Pius paved the great east to west artery with granite. A circus, other colonnades and great numbers of baths were built, and new aqueducts to supply them bore the names of Caesars, the finest being the work of Hadrian. The Roman client, King Herod, erected a long stoa on the east, and Agrippa encouraged the growth of a new suburb south of this. Under the empire we chiefly hear of the earthquakes which shook Antioch. One, in a.d. 37, caused the emperor Caligula to send two senators to report on the condition of the city. Another followed in the next reign; and in 115, during Trajan's sojourn in the place with his army of Parthia, the whole site was convulsed, the landscape altered, and the emperor himself forced to take shelter in the circus for several days. He and his successor restored the city; but in 526, after minor shocks, the calamity returned in a terrible form, and thousands of lives were lost, largely those of Christians gathered to a great church assembly. We hear also of especially terrific earthquakes on the 29th of November 528 and the 31st of October 588.

At Antioch Germanicus died in a.d. 19, and his body was burnt in the forum. Titus set up the Cherubim, captured from the Jewish temple, over one of the gates. Commodus had Olympic games celebrated at Antioch, and in a.d. 266 the town was suddenly raided by the Persians, who slew many in the theatre. In 387 there was a great sedition caused by a new tax levied by order of Theodosius, and the city was punished by the loss of its metropolitan status. Zeno, who renamed it Theopolis, restored many of its public buildings just before the great earthquake of 526, whose destructive work was completed by the Persian Chosroes twelve years later. Justinian made an effort to revive it, and Procopius describes his repairing of the walls; but its glory was past.

The chief interest of Antioch under the empire lies in its relation to Christianity. Evangelized perhaps by Peter, according to the tradition upon which the Antiochene patriarchate still rests its claim for primacy (cf . Acts xi.) , and certainly by Barnabas and Saul, its converts were the first to be called " Christians." They multiplied exceedingly, and by the time of Theodosius were reckoned by Chrysostom at about 100,000 souls. Between 252 and 300 a.d. ten assemblies of the church were held at Antioch and it

became the residence of the patriarch of Asia, When Julian visited the place in 362 the impudent population railed at him for his favour to Jewish and pagan rites, and to revenge itself for the closing of its great church of Constantine, burned down the temple of Apollo in Daphne. The emperor's rough and severe habits and his rigid administration prompted Antiochene lampoons, to which he replied in the curious satiric apologia, still extant, which he called Misopogon. His successor, Valens, who endowed Antioch with a new forum having a statue of Valentinian on a central column, reopened the great church, which stood till the sack of Chosroes in 538. Antioch gave its name to a certain school of Christian thought, distinguished by literal interpretation of the Scriptures and insistence on the human limitations of Jesus. Diodorus of Tarsus and Theodore of Mopsuestia were the leaders of this school. The principaflocal saint was Simeon Stylites, who performed his penance on a hill some 40 m. east. His body was brought to the city and buried in a building erected under the emperor Leo. In a.d. 635, during the reign of Heraclius, Antioch passed into Saracen hands, and decayed apace for more than 300 years; but in 969 it was recovered for Byzantium by Michael Burza and Peter the Eunuch. In 1084 the Seljuk Turks captured it but held it only fourteen years, yielding place to the crusaders, who besieged it for nine months, enduring frightful sufferings. Being at last betrayed, it was given to Bohemund, prince of Tarentum, and it remained the capital of a Latin principality for nearly two centuries. It fell at last to the Egyptian, Bibars, in 1268, after a great destruc- tion and slaughter, from which it never revived. Little remains now of the ancient city, except colossal ruins of aqueducts and part of the Roman walls, which are used as quarries for modern Antakia; but no scientific examination of the site has been made. A statue in the Vatican and a silver statuette in the British Museum perpetuate the type of its great effigy of the civic Fortune of Antioch — a majestic seated figure, with Orontes as a youth issuing from under her feet.

Antakia, the modern town, is still of considerable importance. Pop. about 25,000, including Ansarieh, Jews, and a large body of Christians of several denominations about 8000 strong. Though superseded by Aleppo (q.v.) as capital of N. Syria, it is still the centre of a large district, growing in wealth and productiveness with the draining of its central lake, undertaken by a French company. The principal cultures are tobacco, maize and cotton, and the mul- berry for silk production. Liquorice also is collected and exported. In 1822 (as in 1872) Antakia suffered by earthquake, and when Ibrahim Pasha made it his headquarters in 1835, it had only some 5000 inhabitants. Its hopes, based on a Euphrates valley railway, which was to have started from its port of Suedia (Seleucia), were doomed to disappointment, and it has suffered repeatedly from visitations of cholera; but it has nevertheless grown rapidly and will resume much of its old

importance when a railway is made down the lower Orontes valley. It is a

centre of American mission enterprise, and has a British vice- consul.

See C. O. Miiller, Antiguitates Antiochenae (1839); A. Freund, Beitrdge zur antiochenischen . . . Stadtchronik (1882) ; R. Forster, in Jahrbuch of Berlin Arch. Institute, xii. (1897). Also authorities for Syria. (D. G. H.)

Synods or Antioch. Beginning with three synods convened between 264 and 269 in the matter of Paul of Samosata, more than thirty councils were held in Antioch in ancient times. Most of these dealt with phases of the Arian and of the Christo- logical controversies. The most celebrated took place in the summer of 341 at the dedication of the golden Basilica, and is therefore called in encaeniis {iv eyKcuvloLs), in dedicdtione. Nearly a hundred bishops were present, all from the Orient, but the bishop of Rome was not represented. The emperor Constantius attended in person. The council approved three creeds (Hahn, §§ 153-155). Whether or no the so-called "fourth formula" (Hahn, § 156) is to be ascribed to a continuation of this synod or to a subsequent but distinct assembly of the same year, its aim is like that of the first three; while repudiating certain Arian formulas it avoids the Athanasian shibboleth " homoousios." The somewhat colourless compromise doubtless proceeded from the party of Eusebius of Nicomedia, and proved not inacceptable to the more nearly orthodox members of the synod. The twenty-five canons adopted regulate the so-called metropolitan constitution of the church. Ecclesiastical power is vested chiefly in the metropolitan (later called archbishop), and the semi-annual provincial synod (cf. Nicaea, canon 5), which he summons and over which he presides. Consequently the powers of country bishops (chorepiscopi) are curtailed, and direct recourse to the emperor is forbidden. The sentence of one judicatory is to be respected by other judicatories of equal rank; re-trial may take place only before that authority to whom appeal regularly lies (see canons 3, 4, 6). Without due invitation, a bishop may not ordain, or in any other way interfere with affairs lying outside his qroper territory; nor may he appoint his own successor. Penalties are set on the refusal to celebrate Easter in accordance with the Nicene decree, as well as on leaving a church before the service of the Eucharist is completed. The numerous objections made by eminent scholars in past centuries to the ascription of these twenty-five canons to the synod in encaeniis have been elaborately stated and probably refuted by Hefele. The canons formed part of the Codex canonum used at Chalcedon in 451 and passed over into the later collections of East and West.

The canons are printed in Greek by Mansi ii. 1307 ff., Bruns i. 80 ff., Lauchert 43 ff., and translated by Hefele, Councils, ii. 67 ff. and by H. R. Percival in the Nicene and Post-Nicene Fathers, 2nd aeries, xiv. 108 ff. The four dogmatic formulas are given by G. Ludwig Hahn, Bibliothek der Symbole, 3rd edition (Bresiau, 1897), 183 ff. ; for translations compare the Nicene and Post-Nicene Fathers, 2nd series, iv. 461 ff., ii. 39 ff., ix. 12, ii. 44, and Hefele, ii. 76 ff. For full titles see Councils. (W. W. R.)*

ANTIOCH IN PISIDIA, an ancient city, the remains of which, including ruins of temples, a theatre and a fine aqueduct, were found by Arundell in 1833 close to the modern Yalovach. It was situated on the lower southern slopes of the Sultan Dagh, in the Konia vilayet of Asia Minor, on the right bank of a stream, the ancient Anthius, which flows into the Hoiran Geul. It was probably founded on the site of a Phrygian sanctuary, by Seleucus Nicator, before 280 B.C. and was made a free city by the Romans in 189 B.C. It was a thoroughly Hellenized, Greek- speaking city, in the midst of a Phrygian people, with a mixed population that included many Jews. Before 6 B.C. Augustus made it a colony, with the title Caesarea, and it became the centre of civil and military administration in south Galatia, the romanization of which was progressing rapidly in the time of Claudius, a.d. 41-54, when Paul visited it (Acts xiii. 14, xiv. 21, xvi. 6, xviii. 23). In 1097 the crusaders found rest and shelter within its walls. The ruins are interesting, and show that Antioch was a strongly fortified city of Hellenic and Roman type.

ANTIOCHUS, the name of thirteen kings of the Seleucid dynasty in Nearer Asia. The most famous are Antiochus III. the Great (223-187 B.C.) who sheltered Hannibal and waged war with Rome, and his son Antiochus IV. Epiphanes (176-164 B.C.)

who tried to suppress Judaism by persecution (see Seleucid Dynasty) .

The name was subsequently borne by the kings of Commagene (69 b.c.-a.d. 72), whose house was affiliated to the Seleucid.

Antiochus I. of Commagene, who without sufficient reason has been identified with the Seleucid Antiochus XIII. Asiaticus, made peace on advantageous terms with Pompey in 64 B.C. Subsequently he fought on Pompey's side in the Civil War, and later still repelled an attack on Samosata by Marcus Antonius (Mark Antony.) He died before 31 B.C. and was succeeded by one Mithradates I. This Mithradates was succeeded by an Antiochus II., who was executed by Augustus in 29 B.C. After another Mithradates we know of an Antiochus III., on whose death in a.d. 17 Commagene became a Roman province. In 38 his son Antiochus IV. Epiphanes was made king by Caligula, who deposed him almost

immediately. Restored by Claudius in 41, he reigned until 72 as an ally of Rome against Parthia. In that year he was deposed on suspicion of treason and retired to Rome. Several of his coins are extant.

On all the above see " Antiochos " in Pauly-Wissowa's Realen- cyclopddie der classischen Altertumswissenschajl, i. part ii. (1894).

ANTIOCHUS OF ASCALON (1st century B.C.), Greek philo- sopher. His philosophy consisted in an attempt to, reconcile the doctrines of his teachers Philo of Larissa and Mnesarchus the Stoic. Against the scepticism of the former, he held that, the intellect has in itself a sufficient test of truth; against Mnesarchus, that happiness, though its main factor is virtue, depends also on outward circumstances. This electicism is known as the Fifth Academy (see Academy, Greek). His writings are lost, and we are indebted for information to Cicero {Acad. Pr. ii. 43), who studied under him at Athens, and Sextus Empiricus (Pyrrh. hyp. i. 235). Antiochus lectured also in Rome and Alexandria.

See R. Hoyer, De Antiocho Ascalonita (Bonn, 1883).

ANTIOCHUS OF SYRACUSE, Greek historian, flourished about 420 B.C. Nothing is known of his life, but his works, of which only fragments remain, enjoyed a, high reputation. He wrote a History of Sicily from the earliest times to 424', which was used by Thucydides, and the Colonizing of Italy, , frequently referred to by Strabo and Dionysius of Halicarnassus.

Miiller, Fragmenta Histbricorum Graecorum, i.,; WolfHin, Antiochos von Syrakus, 1872. •

ANTIOPE. (1) In Greek legend, the mother of Amphion and Zethus, and, according to Homer {Od. xi. 260), a daughter of the Boeotian river-god Asopus. In later poems she is called the daughter of Nycteus or Lycurgus. Her beauty attracted Zeus, who, assuming the form of a satyr, took her by force (Apollodorus iii. 5). After this she was carried off by Epopeus, king of Sicyon, who would not give her up till compelled by her uncle Lycus. On the way home she gave birth, in the neighbour- hood of Eleutherae on Mount Cithaeron, to the twins Amphion and Zethus, of whom Amphion was the son of the god, and Zethus the son of Epopeus. Both were left to be brought up by herdsmen. At Thebes Antiope now suffered from the per- secution of Dirce, the wife of Lycus, but at last escaped towards Eleutherae, and there found shelter, unknowingly, in the house where her two sons were living as herdsmen. Here she was discovered by Dirce, who ordered the two young men to tie her to the horns of a wild bull. They were about to obey, when the old herdsman, who had brought them up, revealed his secretj and they carried out the punishment on Dirce instead (Hyginus,

Fab. 8). For this, it is said, Dionysus, to whose worship Dirce had been devoted, visited Antiope with madness, which caused her to wander restlessly all over Greece till she was cured, and married by Phocus of Tithorea, on Mount Parnassus, where both were buried in one grave (Pausanias ix. 17, x. 32).

(2) A second Antiope, daughter of Ares, and sister cf Hippolytej queen of the Amazons, was the wife of Theseus. There are various accounts of the manner in which Theseus became possessed of her, and of her subsequent fortunes. Either she gave herself up to him out of love, when with Heracles he captured Themiscyra, the seat of the Amazons, or she fell 1 to his lot as a captive (Dipdorus iv. 16). Or again, Theseus himseM

invaded the dominion of the Amazons and carried her off, the consequence of which was a counter-invasion of Attica by the Amazons. After four months of war peace was made, and Antiope left with Theseus as a peace-offering. According to another account, she had joined the Amazons against him because he had been untrue to her in desiring to marry Phaedra. She is said to have been killed by another Amazon, Molpadia, a rival in her affection for Theseus. Elsewhere it was believed that he had himself killed her, and fulfilled an oracle to that effect (Hyginus, Fab. 241). By Theseus she had a son, the well-known Hippolytus (Plutarch, Theseus).

ANTIOQUIA, an interior department of the republic of Colombia, lying S. of Bolivar, W. of the Magdalena river, and E. of Cauca. Area, 22,870 sq. m.; pop. (est. 1899) 464,887. The greater part of its territory lies between the Magdalena and Cauca rivers and includes the northern end of the Central Cordillera. The country is covered with valuable forests, and its mineral wealth renders it one of the most important mining regions of the republic. The capital, Medellin (est. pop. 53 ,000 in 1902), is a thriving mining centre, 4822 ft. above sea-level, and 125 m. from Puerto Berrio on the Magdalena. Other important towns are Manizales (18,000) in the extreme south, the commer- cial centre of a rich gold and grazing region; Antioquia, the old capital, on the Cauca; and Puerto Berrio on the Magdalena, from which a railway has been started to the capital.

ANTIPAROS (anc. Oliaros), an island of the kingdom of Greece, in the modern eparchy of Naxos, separated by a strait (about i|m. wide at the narrowest point) from the west coast of Pares. It is 7 m. long by 3 broad, and contains about 700 inhabitants, most of whom live in Kastro, a village

on the north coast, and are employed in agriculture and fishing. Formerly piracy was common. The only remarkable feature in the island is a stalactite cavern on the south coast, which is reached by a narrow passage broken by two steep and dangerous descents which are accomplished by the aid of rope-ladders. The grotto itself, which is about 150 ft. by 100, and 50 ft. high (not all can be seen from any part, and probably some portions are still unexplored), shows many remarkable examples of stalactite formations and incrustations of dazzling brilliance. It is not mentioned by ancient writers; the first western traveller to visit it was the marquis de Nointel (ambassador of Louis XIV. to the Porte) who descended it with a numerous suite and held high mass there on Christmas day 1673. There is, however, in the entrance of the cavern an inscription recording the names of visitors in ancient times.

See' J. P. de Tournefort, Relation d'un voyage au Levant (1717); English edition, 1718, vol. i. p. 146, and guide-books to Greece.

ANTIPATER (3g8?-3i9 B.C.), Macedonian general, and regent of Macedonia during Alexander's Eastern expedition (334-323). He had previously (346) been sent as ambassador by Philip to Athens and negotiated peace after the battle of Chaeroneia (338). About 332 he set out against the rebellious tribes of Thrace; but before this insurrection was quelled, the Spartan king Agis had risen against Macedonia. Having settled affairs in Thrace as well as he could, Antipater hastened to the south, and in a battle near Megalopolis (331) gained a complete victory over the insurgents (Diodorus xvii. 62). His regency was greatly troubled by the ambition of Olympias, mother of Alexander, and he was nominally superseded by Craterus. But, on the death of Alexander in 323, he was, by the first partition of the empire, left in command of Macedonia, and in the Lamian War, at the battle of Crannon (322), crushed the Greeks who had attempted to re-assert their independence. Later in the same year he and Craterus were engaged in a war against the Aetolians, when the news arrived from Asia which induced Antipater to conclude peace with them; for Antigonus reported that Perdiccas contemplated making himself sole master of the empire. Antipater and Craterus accordingly prepared for war against Perdiccas, and allied themselves with Ptolemy, the governor of Egypt. Antipater crossed over into Asia in 321 ; and while still in Syria, he received information that Perdiccas had been murdered by his own soldiers. Craterus

fell in battle against Eumenes (Diodorus xviii. 25-39). Antipater, now sole regent, made several new regulations, and having quelled a mutiny of his troops and commissioned Antigonus to continue the war against Eumenes and the other partisans of Perdiccas, returned to Macedonia, where he arrived in 320 (Justin xiii. 6). Soon after he was seized by an illness which

terminated his active career, 319. Passing over his son Cassander, he appointed the aged Polyperchon regent, a measure which gave rise to much confusion and ill-feeling (Diodorus xvii. , xviii) .

ANTIPHANES, the most important writer of the Middle Attic comedy with the exception of Alexis, lived from about 408 to 334 B.C. He was apparently a foreigner who settled in Athens, where he began to write about 387. He was extremely prolific: more than 200 of the 365 (or 260) comedies attributed to him are known to us from the titles and considerable fragments preserved in Athenaeus. They chiefly deal with matters connected with the table, but contain many striking sentiments.

Fragments in Koch, Comicorum Atticorum Fragmenta, ii. (1884); see also Clinton, Philological Museum,. 1. (1832); Meineke, Historia Critica Comicorum Graecorum (1839).

ANTIPHILUS, a Greek painter, of the age of Alexander. He worked for Philip of Macedon and Ptolemy I. of Egypt. Thus he was a contemporary of Apelles, whose rival he is said to have been, but he seems to have worked in quite another style. Quintilian speaks of his facility: the descriptions of his works which have come down to us show that he excelled in light and shade, in genre representations, and in caricature.

See Brunn, Geschichte der griechischen Kunstler, ii.. p. 249.

ANTIPHON, of Rhamnus in Attica, the earliest of the " ten " Attic orators, was born in 480 B.C. He took an active part in political affairs at Athens, and, as a zealous supporter of the oligarchical party, was largely responsible for the establishment of the Four Hundred in 41 1 (see Theramenes) ; on the restoration of the democracy he was accused of treason and condemned to death. Thucydides (viii. 68) expresses a very high opinion of him. Antiphon may be regarded as the founder of political oratory, but he never addressed the people himself except on the occasion of his trial. Fragments of his speech then delivered in defence of his policy (called Ilepl ˆeraoracrecos) have been edited by J. Nicole (1907) from an Egyptian papyrus. His chief business was that of a professional speech-writer (\oyoypaovuccd 8Lkcu). Antiphon is also said to have composed a Ttx V7 l or ar t of Rhetoric.

Edition, with commentary, by Maetzner (1838); text by Blass (1881); Jebb, Attic Orators; Plutarch, Vitae X. Oratorum; Philo- stratus, Vit. Sophistarum, i. 15; van Cleef, Index Antiphonteus, Ithaca, N. Y. (1895) ; see also Rhetoric.

ANTIPHONY (Gr. avrl, and cj>o>vri, a voice) , a species of psalmody in

which the choir or congregation, being divided into two parts, sing alternately. The peculiar structure of the Hebrew psalms renders it probable that the antiphonal method originated in the service of the ancient Jewish Church. According to the historian Socrates, its introduction into Christian worship was due to Ignatius (died 115 a.d.), who in a vision had seen the angels singing in alternate choirs. In the Latin Church it was not practised until more than two centuries later, when it was introduced by Ambrose, bishop of Milan, who compiled an antiphonary, or collection of words suitable for antiphonal singing. The antiphonary still in use in the Roman Catholic Church was compiled by Gregory the Great (590 a.d.).

ANTIPODES (Gr. avrl, opposed to, and irodes, feet), a term applied strictly to any two peoples or places on opposite sides of the earth, so situated that a line drawn from the one to the other passes through the centre of the globe and forms a true diameter. Any two places having this relation— as London and, approximately, Antipodes Island, near New Zealand — – must be distant from each other by 180° of longitude, and the

one must be as many degrees to the north of the equator as the other is to the south, in other words, the latitudes are numerically equal, but one is north and the other south. Noon at the one place is midnight at the other, the longest day corresponds to the shortest, and mid-winter is contemporaneous with mid- summer. In the calculation of days and nights, midnight on the one side may be regarded as corresponding to the noon either of the previous or of the following day. If a voyager sail eastward, and thus anticipate the sun, his dating will be twelve hours in advance, while the reckoning of another who has been sailing westward will be as much in arrear. There will thus be a difference of twenty-four hours between the two when they meet. To avoid the confusion of dates which would thus arise, it is necessary to determine a meridian at which dates should be brought into agreement, i.e. a line the crossing of which would involve the changing of the name of the day either forwards, when proceeding westwards, or backwards, when proceeding eastwards. Mariners have generally adopted the meridian 180 from Greenwich, situated in the Pacific Ocean, as a convenient line for co-ordinating dates. The so-called ” International Date Line,” which is, however, practically only due to American initiative, is designed to remove certain objections to the meridian of 180 W., the most important of which is that groups of islands lying about this meridian differ in date by a day although only a few miles apart. Several forms have been suggested; these generally agree in retaining the meridian of 180° in the mid Pacific, with a bend in the north in order

to make the Aleutian Islands and Alaska of the same time as America, and also in the south so as to bring certain of the South Sea islands into line with Australia and New Zealand.

ANTIPYRINE (phenyldimethyl pyrazolone) (C u H 12 N 2 0), is prepared by the condensation of phenylhydrazine with aceto- acetic ester, the resulting phenyl methyl pyrazolone being heated with methyl iodide and methyl alcohol to 100-110 C: —

CH 3 -C = N v CH 3 -C-N-CH 3

I >N-C 6 H 6 H> 11 >N.C 6 H 6

CH 2 -CCK HC-CO

Phenyl methyl pyrazolone Antipyrine

On the large scale phenylhydrazine is dissolved in dilute sulphuric acid, the solution warmed to about 40 C. and the aceto-acetic ester added. When the reaction is complete the acid is neutral- ized with soda, and the phenyl methyl pyrazolone extracted with ether and distilled in vacuo. The portion distilling at about 200 C. is then methylated by means of methyl alcohol and methyl iodide at ioo-no C, the excess of methyl alcohol removed and the product obtained decolorized by sulphuric acid. The residue is treated with a warm concentrated solution of soda, and the oil which separates is removed by shaking with benzene. The benzene layer on evaporation deposits the anti- pyrine as a colourless crystalline solid which melts at 113° C. and is soluble in water. It is basic in character, and gives a red coloration on the addition of ferric chloride. In medicine anti- pyrine (" phenazonum ") has been used as an analgesic and antipyretic. The dose is 5-20 grs., but on account of its depressant action on the heart, and the toxic effects to which it occasionally gives rise, it is now but little used'. It is more safely replaced by phenacetine.

ANTIQUARY, a person who devotes himself to the study of ancient learning and " antiques," i.e. ancient objects of art or science. The London Society of Antiquaries was formed in the 1 8th century to promote the study of antiquities. As early as 1372 a society had been founded by Bishop Matthew Parker, Sir Robert Cotton, William Camden and others for the pre- servation of national antiquities. This body existed till 1604, when it fell under suspicion of being political in its aims, and was abolished by James I. Papers read at their meetings are pre- served in the Cottonian library and were printed by Thomas Hearne in 1720 under the title A Collection of Curious Discourses, a second edition appearing in 1 7 7 1 . In 1 707 a number of English antiquaries began to hold regular meetings for

the discussion of their hobby and in 171 7 the Society of Antiquaries was formally reconstituted, finally receiving a charter from George II. in 1751.

In 1780 George III. granted the society apartments in Somerset House, Strand. The society is governed by a council of twenty and a president who is ex officio a trustee of the British Museum. The present headquarters of the society are at Burlington House, Piccadilly.

The Society of Antiquaries of Scotland was founded in 1780, and has the management of a large national antiquarian museum in Edinburgh. In Ireland a society was founded in 1849 called the Kilkenny Archaeological Society, holding its meetings at Kilkenny. In 1869 its name was changed to the Royal Historical and Archaeological Association of Ireland, and in 1890 to the Royal Society of Antiquaries of Ireland, its office being transferred to Dublin. In France La SociitS Nationale des Antiquaires de France was formed in 1814 by the reconstruction of the Academie Celtique, which had existed since 1805. The American Antiquarian Society was founded in 181 2, with its headquarters at Worcester, Mass. It has a library of upwards of 100,000 volumes and its transactions have been published biannually since 1849. In Germany the Gesamtvcrein der Deutschen Geschichts-und Altertumsvereine was founded in 1852. La Sociiti Roy ale des Antiquaires du Nord at Copenhagen is among the best known of European antiquarian societies.

ANTIQUE (Lat. antiquus, old), a term conventionally restricted to the remains of ancient art, such as sculptures, gems, medals, seals, &c. In a limited sense it applies only to Greek and Roman art, and includes neither the artistic remains of other ancient nations nor any product of classical art of a later date than the fall of the western empire.

ANTI-SEMITISM. In the political struggles of the concluding quarter of the 19th century an important part was played by a religious, political and social agitation against the Jews, known as " Anti-Semitism." The origins of this remarkable movement already threaten to become obscured by legend. The Jews contend that anti-Semitism is a mere atavistic revival of the Jew-hatred of the middle ages. The extreme section of the anti-Semites, who have given the movement its quasi- scientific name, declare that it is a racial struggle — an incident of the eternal conflict between Europe and Asia — and that the anti-Semites are engaged in an effort to prevent what is called the Aryan race from being subjugated by a Semitic immigration, and to save Aryan ideals from being modified by an alien and demoralizing oriental Anschauung. There is no essential foun- dation for either of these contentions. Religious prejudices reaching back to the dawn of history have been reawakened by the anti-Semitic agitation, but they did not originate it, and they have not entirely controlled it. The alleged racial divergence is,

too, only a linguistic hypothesis on the physical evidence of which anthropologists are not agreed (Topinard, Anthropologic, p. 444; Taylor, Origins of Aryans, cap. i.), and, even if it were proved, it has existed in Europe for so many centuries, and so many ethnic modifications have occurred on both sides, that it cannot be accepted as a practical issue. It is true that the ethnographical histories of the Jews and the nations of Europe have proceeded on widely diverging lines, but these lines have more than once crossed each other and become interlaced. Thus Aryan elements are at the beginning of both; European morals have been ineradicably semitized by Christianity, and the Jews have been Europeans for over a thousand years, during which their character has been modified and in some respects transformed by the ecclesiastical and civil polities of the nations among whom they have made their permanent home. Anti-Semitism is then exclusively a question of European politics, and its origin is to be found, not in the long struggle between Europe and Asia, or between the Church and the Synagogue, which filled so much of ancient and medieval history, but in the social conditions resulting from the emancipa- tion of the Jews in the middle of the 19th century.

If the emancipated Jews were Europeans in virtue of the antiquity of their western settlements, and of the character impressed upon them by the circumstances of their European history, they none the less presented the appearance of a strange people to their Gentile fellow-countrymen. They had been

secluded in their ghettos for centuries, and had consequently acquired a physical and moral physiognomy differentiating them in a measure from their former oppressors. This peculiar physiognomy was, on its moral side, not essentially Jewish or even Semitic. It was an advanced development of the main attributes of civilized life, to which Christendom in its transition from feudalism had as yet only imperfectly adapted itself. The ghetto, which had been designed as a sort of quarantine to safeˆ guard Christendom against the Jewish heresy, had in fact proved a storage chamber for a portion of the political and social forces which were destined to sweep away the last traces of feudalism from central Europe. In the ghetto, the pastoral Semite, who had been made a wanderer by the destruction of his nationality, was steadily trained, through centuries, to become an urban European, with all the parasitic activities of urban economics, and all the democratic tendencies of occidental industrialism. Excluded from the army, the land, the trade corporations and the artisan gilds, this quondam oriental peasant was gradu- ally transformed into a

commercial middleman and a practised dealer in money. Oppressed by the Church, and persecuted by the State, his theocratic and monarchical traditions lost their hold on his daily life, and he became saturated with a passionate devotion to the ideals of democratic politics. Finally, this former bucolic victim of Phoenician exploitation had his wits preternaturally sharpened, partly by the stress of his struggle for life, and partly by his being compelled in his urban seclusion to seek for recreation in literary exercises, chiefly the subtle dialectics of the Talmudists (Loeb, Juif de Vhistoire; Jellinek, Der Jiidische Stamm) . Thus, the Jew who emerged from the ghetto was no longer a Palestinian Semite, but an essentially modern European, who differed from his Christian fellow-country- men only in the circumstances that his religion was of the older Semitic form, and that his physical type had become sharply defined through a slightly more rigid exclusiveness in the matter of marriages than that practised by Protestants and Roman Catholics (Andree, Volkskunde der Juden, p. 58).

Unfortunately, these distinctive elements, though not very serious in themselves, became strongly accentuated by concen- tration. Had it been possible to distribute the emancipated Jews uniformly throughout Christian society, as was the case with other emancipated religious denominations, there would have been no revival of the Jewish question. The Jews, however, through no fault of their own, belonged to only one class in European society — the industrial bourgeoisie. Into that class all their strength was thrown, and owing to their ghetto pre- paration, they rapidly took a leading place in it, politically and socially. When the mid-century revolutions made the bourgeoisie the ruling power in Europe, the semblance of a Hebrew domina- tion presented itself. It was the exaggeration of this apparent domination, not by the bourgeoisie itself, but by its enemies among the vanquished reactionaries on the one hand, and by the extreme Radicals on the other, which created modern anti- Semitism as a political force.

The movement took its rise in Germany and Austria. Here the concentration of the Jews in one class of the population was aggravated by their excessive numbers. While in France the proportion to the total population was, in the early 'seventies, 0-14%, and in Italy, 0-12 %, it was 1-22 % in Germany, and 385 % in Austria-Hungary; Berlin had 4-36% of Jews, and Vienna 6-62% (Andree, Volkskunde, pp. 287, 291, 294, 295). The activity of the Jews consequently manifested itself in a far more intense form in these countries than elsewhere. This was apparent even before the emancipations of 1848. Towards the middle of the 18th century, a limited number of wealthy Jews had been tolerated as Schutz-Juden outside the ghettos, and their sons, educated as Germans under the influence of Moses Mendelssohn and his school (see Jews), supplied a majority of the leading spirits of the revolutionary agitation. To this period belong the formidable

names of Ludwig Borne (1786-1837), Heinrich Heine (1799-1854), Edward Ganz (1798-1839), Gabriel Riesser (1806-1863), Ferdinand Lassalle (1825-1864), Karl Marx (1818-1883), Moses Hess (1812-1875),

Ignatz Kuranda (1811-1884), and Johann Jacobi (1805-ˆ77). When the revolution was completed, and the Jews entered in a body the national life of Germany and Austria, they sustained this high average in all the intellectual branches of middle-class activity. Here again, owing to the accidents of their history, a further concentration became apparent. Their activity was almost exclusively intellectual. The bulk of them flocked to the financial and the distributive (as distinct from the productive) fields of industry to which they had been confined in the ghettos. The sharpened faculties of the younger generation'at the same time carried everything before them in the schools, with the result that they soon crowded the professions, especially medicine, law and journalism (Nossig, Statistik des Jild. Stammes, pp. 33-37; Jacobs, Jew. Statistics, pp. 41-69). Thus the " Semitic domina- tion," as it was afterwards called, became every day more strongly accentuated. If it was a long time in exciting resent- ment and jealousy, the reason was that it was in no sense alien to the new conditions of the national life. The competition was a fair one. The Jews might be more successful than their Christian fellow-citizens, but it was in virtue of qualities which complied with the national standards of conduct. They were as law-abiding and patriotic as they were intelligent. Crime among them was far below the average (Nossig, p. 31). Their complete assimilation of the national spirit was brilliantly illustrated by the achievements in German literature, art and science of such men as Heinrich Heine and Berthold Auerbach (181 2-1882), Felix Mendelssohn (-Bartholdy) (1800-1847), an d Jacob Meyerbeer (1 794-1864), Karl Gustav Jacobi the mathe- matician (1804-1851), Gabriel Gustav Valentin the physiologist (1810-1883), and Moritz Lazarus (1824-1903) and Heymann Steinthal (1823-1899) the national psychologists. In politics, too, Edward Lasker (1829-1884) and Ludwig Bamberger (1823- 1899) had shown how Jews could put their country before party, when, at the turning-point of German imperial history in 1866, they led the secession from the Fortschritts-Partei and founded the National Liberal party, which enabled Prince Bismarck to accomplish German unity. Even their financiers were not behind their Christian fellow-citizens in patriotism. Prince Bismarck himself confessed that the money for carrying on the 1866 campaign was obtained from the Jewish banker Bleich- roeder, in face of the refusal of the money-market to support the war. Hence the voice of the old Jew-hatred — for in a weak way it was still occasionally heard in obscurantist corners — – was shamed into silence, and it was only in the European twilight — in Russia and Rumania — and in lands where medievalism still lingered, such as

northern Africa and Persia, that oppression and persecution continued to dog the steps of the Jews.

The signal for the change came in 1873, and was given un- consciously by one of the most distinguished Jews of his time, Edward Lasker, the gifted lieutenant of Bennigsen in the leader- ship of the National Liberal party. The unification of Germany in 1870, and the rapid payment of the enormous French war indemnity, had given an unprecedented impulse to industrial and financial activity throughout the empire. Money became cheap and speculation universal. A company mania set in which was favoured by the government, who granted railway and other concessions with a prodigal hand. The inevitable result of this state of things was first indicated by Jewish politicians and economists. On the 14th of January 1873, Edward Lasker called the attention of the Prussian diet to the dangers of the situation, while his colleague, Ludwig Bamberger, in an able article in the Preussischen Jahrbucher, condemned the policy which had permitted the milliards to glut the country instead of being paid on a plan which would have facilitated their gradual digestion by the economic machinery of the nation. Deeply impressed by the gravity of the impending crisis, Lasker instituted a searching inquiry, with the result that he discovered a series of grave company scandals in which financial promoters and aristocratic directors were chiefly involved. Undeterred by the fact that the leading spirit in these abuses, Bethel Henry Strous- berg (1823-1884), was a Jew, Lasker presented the results of his inquiry to the diet on the 7th of February 1873, in a speech

of great power and full of sensational disclosures. The dramatic results of this speech need not be dwelt upon here (for details see Blum, Das deutsche Reich zur Zeit Bismarcks, pp. 153-181). It must suffice to say that in the following May the great Vienna " Krach " occurred, and the colossal bubble of speculation burst, bringing with it all the ruin foretold by Lasker and Bamberger. From the position occupied by the Jews in the commercial class, and especially in the financial section of that class, it was inevitable that a considerable number of them should figure in the scandals which followed. At this moment an obscure Hamburg journalist, Wilhelm Marr, who as far back as 1862 had printed a still-born tract against the Jews (Judenspiegel) , published a sensational pamphlet entitled Der Sieg des Jitden- thums iiber das Germanthum (" The Victory of Judaism over Germanism "). The book fell upon fruitful soil. It applied to the nascent controversy a theory of nationality which, under the great sponsorship of Hegel, had seized on the minds of the German youth, and to which the

stirring events of 1870 had already given a deep practical significance. The state, according to the Hegelians, should be rational, and the nation should be a unit comprising individuals speaking the same language and of the same racial origin. Heterogeneous elements might be absorbed, but if they could not be reduced to the national type they should be eliminated. This was the pseudo-scientific note of the new anti-Semitism, the theory which differentiated it from the old religious Jew-hatred and sought to give it a rational place in modern thought. Marr's pamphlet, which reviewed the facts of the Jewish social concentration without noticing their essentially transitional character, proved the pioneer of this teaching. It was, however, in the passions of party politics that the new crusade found its chief sources of vitality. The enemies of the bourgeoisie at once saw that the movement was calculated to discredit and weaken the school of Manchester Liberalism, then in the ascendant. Agrarian capitalism, which had been dethroned by industrial capitalism in 1848, and had burnt its fingers in 1873, seized the opportunity of paying off old scores. The clericals, smarting under the Kulturkampf, which was supported by the whole body of Jewish liberalism, joined eagerly in the new cry. In 1876 another sensational pamphlet was published, Otto Glogau's Die Borsen und Grundergeschwindel in Berlin (" The Bourses and the Company Swindles in Berlin "), dealing in detail with the Jewish participation in the scandals first revealed by Lasker. The agitation gradually swelled, its growth being helped by the sensitiveness and cacoethes scribendi of the Jews themselves, who contributed two pamphlets and a much larger proportion of newspaper articles for every one supplied by their opponents (Jacobs. Bibliog. Jew. Question, p. xi.). Up to 1870, however, it was more of a literary than a political agitation, and was generally regarded only as an ephemeral craze or a passing spasm of popular passion.

Towards the end of 1879 it spread with sudden fury over the whole of. Germany. This outburst, at a moment when no new financial scandals or other illustrations of Semitic demoraliza- tion and domination were before the public, has never been fully explained. It is impossible to doubt, however, that the secret springs of the new agitation were more or less directly supplied by Prince Bismarck himself. Since 1877 the relations between the chancellor and the National Liberals had gradually become strained. The deficit in the budget had compelled the govern- ment to think of- new taxes, and in order to carry them through the Reichstag the support of the National Liberals had been solicited. Until then the National Liberals had faithfully supported the chancellor in nursing the consolidation of the new empire, but the great dream of its leaders, especially of Lasker and Bamberger, who had learnt their politics in England, was to obtain a constitutional and economic regime similar to that of the British Isles. The organization of German unity was now completed, and they regarded the

new overtures of Prince Bismarck as an opportunity for pressing their constitu- tional demands. These were refused, the Reichstag was dissolved and Prince Bismarck boldly came forward with a new fiscal

policy, a combination of protection and state socialism. Lasker and Bamberger thereupon led a powerful secession of National Liberals into opposition, and the chancellor was compelled to seek a new majority among the ultra-Conservatives and the Roman Catholic Centre. This was the beginning of the famous " journey to Canossa." Bismarck did not hide his mortification. He began to recognize in anti-Semitism a means of " dishing " the Judaized liberals; and to his creatures who assisted him in his press campaigns he dropped significant hints in this sense (Busch, Bismarck, \. 453-454, iii. 16). He even spoke of a new Kulturkampf against the Jews (ibid. ii. p. 484). How these hints were acted upon has not been revealed, but it is sufficiently instructive to notice that the final breach with the National Liberals took place in July 1879, and that it was immediately followed by a violent revival of the anti-Semitic agitation. Marr's pamphlet was reprinted, and within a few months ran through nine further editions. The historian Treitschke gave the sanction of his great name to the movement. The Conserva- tive and Ultramontane press rang with the sins of the Jews. In October an anti-Semitic league was founded in Berlin and Dresden (for statutes of the league see Nineteenth Century, February 1881, p. 344).

The leadership of the agitation was now definitely assumed by a man who combined with social influence, oratorical power and inexhaustible energy, a definite scheme of social regeneration and an organization for carrying it out. This man was Adolf Stocker (b. 1835), one of the court preachers. He had embraced the doctrines of Christian socialism which the Roman Catholics, under the guidance of Archbishop Ketteler, had adopted from the teachings of the Jew Lassalle (Nitti, Catholic Socialism, pp. 94-96, 122, 127), and he had formed a society called "The Christian Social Working-man's Union." He was also a cbnˆ spicuous member of the Prussian diet, where he sat and voted with the Conservatives. He found himself in strong sympathy with Prince Bismarck's new economic policy, which, although also of Lassallian origin (Kohut, Ferdinand Lassalle, pp. 144 et seq.), was claimed by its author as being essentially Christian (Busch, p. 483). Under his auspices the years 1880-1881 became a period of bitter and scandalous conflict with the Jews. The Conservatives supported him, partly to satisfy their old grudges against the Liberal bourgeoisie and partly because Christian Socialism, with its anti-Semitic appeal to ignorant prejudice, was likely to weaken the hold of the Social Democrats on the lower classes. The Lutheran clergy followed suit, in order to prevent the Roman Catholics from obtaining a monopoly of Christian Socialistˆ while the Ultramontanes readily adopted anti- Semitism, partly to maintain their monopoly, and

partly to avenge themselves on the Jewish and Liberal supporters of the Kulturkampf. In this way a formidable body of public opinion was recruited for the anti-Semites. Violent debates took place in the Prussian diet. A petition to exclude the Jews from the national schools and universities and to disable them from holding public appointments was presented to Prince Bismarck. Jews were boycotted and insulted. Duels between Jews and anti- Semites, many of them fatal, became of daily occurrence. Even unruly demonstrations and street riots were reported. Pamphlets attacking every phase and aspect of Jewish life streamed by the hundred from the printing-press. On their side the Jews did not want for friends, and it was owing to the strong attitude adopted by the Liberals that the agitation failed to secure 1 legislative fruition. The crown prince (afterwards Emperor Frederick) and crown princess boldly set themselves at the head of the party of protest. The crown prince publicly declared that the agita- tion was " a shame and a disgrace to Germany." A manifesto denouncing the movement as a blot on German culture, a danger to German unity and a flagrant injustice to the Jews themselves, was signed by a long list of illustrious men, including Herr von Forckenbeck, Professors Mommsen, Gneist, Droysen, Virchow, and Dr Werner Siemens (Times, November 18, 1880). During the Reichstag elections of 1881 the agitation played an active part, but without much effect, although Stocker was elected. This was due to the fact that the great Conservative parties, so

far as their political organizations were concerned, still remained chary of publicly identifying themselves with a movement which, in its essence, was of socialistic tendency. Hence the electoral returns of that year supplied no sure guide to the strength of anti-Semitic opinion among the German people.

The first severe blow suffered by the German anti-Semites was in 1881, when, to the indignation of the whole civilized world, the barbarous riots against the Jews in Russia and the revival of the medieval Blood Accusation in Hungary (see infra) illustrated the liability of unreasoning mobs to carry into violent practice the incendiary doctrines of the new Jew-haters. From this blow anti-Semitism might have recovered had it not been for the divisions and scandals in its own ranks, and the artificial forms it subsequently assumed through factitious alliances with political parties bent less on persecuting the Jews than on profiting by the anti-Jewish agitation. The divisions showed themselves at the first attempt to form a political party on an anti-Semitic basis. Imperceptibly the agitators had grouped themselves into two classes, economic and ethnological anti-Semites. The imprac- ticable racial views of Marr and Treitschke had not found favour with Stocker and the Christian Socialists. They were disposed to leave the Jews in peace so long as they behaved themselves properly, and although they carried on their agitation against Jewish malpractices in a comprehensive form which seemed superficially to identify them with the root-and-branch anti-Semites, they were in reality not inclined to accept the racial theory with its scheme of revived Jewish disabilities (Huret, La Question Sociale — interview with Stocker). This feeling was strengthened by a tendency on the part of an extreme wing of the racial anti-Semites to extend their campaign against Judaism to its offspring, Christianity. In 1879 Professor Sepp, arguing that Jesus was of no human race, had proposed that Christianity should reject the Hebrew Scriptures and seek a fresh historical basis in the cuneiform inscriptions. Later Dr Eugen Duhring, in several brochures, notably Die Judenfrage als Frage des Rassen-charaklers (1881, 5th ed. Berlin, 1901), had attacked Christianity as a manifestation of the Semitic spirit which was not compatible with the theological and ethical conceptions of the Scandinavian peoples. The philosopher Friedrich Nietzsche had also adopted the same view, without noticing that it was a reduclio ad absurdum of the whole agitation, in his Menschliches, Alhumenschliches (1878), Jenseits von Gut und Bose (1886), Genealogie der Moral (1887) . With these tendencies the Christian Socialists could have no sympathy, and the consequence was that when in*

March 1881 a political organization of anti-Semitism was attempted, two rival bodies were created, the "' Deutsche Volksverein," under the Conservative auspices of Herr Liebermann von Sonnenberg (b. 1848) and Herr Forster, and the " Sociale Reichsverein," led by the racial and Radical anti-Semites, Ernst Henrici (b. 1854) and Otto Bfickel (b. 1859). In 1886, at an anti-Semitic congress held at Cassel a reunion was effected under the name of the " Deutsche antisemitische Verein," but this only lasted three years. In June 1889 the anti-Semitic Christian Socialists under Stocker again seceded.

Meanwhile racial anti-Semitism with its wholesale radical proposals had been making considerable progress among the ignorant lower classes. It adapted itself better to popular passions and inherited prejudice than the more academic con- ceptions of the Christian Socialists. The latter, too, were largely Conservatives, and their points of contact with the proletariat were at best artificial. Among the Hessian peasantry the inflammatory appeals of Bockel secured many adherents. This paved the way for a new anti-Semitic leader, Herrmann Ahlwardt (b. 1846), who, towards the end of the 'eighties, eclipsed all the other anti-Semites by the sensationalism and violence with which he prosecuted the campaign. Ahlwardt was a person of evil notoriety. He was loaded with debt. In the Manche decoration scandals it was proved that he had acted first as a corrupt intermediary and afterwards as the betrayer of his confederates. His anti-Semitism was adopted originally as a means of chantage, and it was only when it failed to yield profit in this form that he came out boldly as an agitator. The wildness, unscrupulousness,

and full-bloodedness of his propaganda enchanted the mob, and he bid fair to become a powerful democratic leader. His pamphlets, full of scandalous revelations of alleged malpractices of eminent Jews, were read with avidity. No fewer than ten of them were written and published during 1892. Over and over again he was prosecuted for libel and convicted, but this seemed only to strengthen his influence with his followers. The Roman Catholic clergy and newspapers helped to inflame the popular passions. The result was that anti-Jewish riots broke out. At Neustettjn the Jewish synagogue was burnt, and at Xanten the Blood Accusation was revived, and a Jewish butcher was tried on the ancient charge of murdering a Christian child' for ritual purposes. The man was, of course, acquitted, but the symptoms it revealed of reviving medievalism strongly stirred the liberal and cultured mind of Germany. All protest, however, seemed powerless, and the barbarian movement appeared destined to carry everything before it.

German politics at this moment were in a very intricate state. Prince Bismarck had retired, and Count Caprivi, with a pro- gramme of general conciliation based on Liberal principles, was in power. Alarmed by the non-

renewal of the anti-Socialist law, and by the conclusion of commercial treaties which made great concessions to German industry, the landed gentry and the Conservative party became alienated from the new chancellor. In January 1892 the split was completed by the withdrawal by the government of the Primary Education bill, which had been designed to place primary instruction on a religious basis. The Conservatives saw their opportunity of posing as the party of Christianity against the Liberals and Socialists, who had wrecked the bill, and they began to look towards Ahlwardt as a possible ally. He had the advantages over Stocker that he was not a Socialist, and that he was prepared to lead his apparently large following to assist the agrarian movement and weaken the Social Democrats. The intrigue gradually came to light. Towards the end of the year Herr Liebknecht, the Social Democratic leader, denounced the Conservatives to the Reichstag as being concerned " in using the anti-Semitic movement as a bastard edition of: Socialism for the use of stupid people." (1st December). Two days later the charge was confirmed. At a meeting of the party held on the 3rd of December the following plank was added to the Conservative programme : ' ' We combat the oppressive and disintegrating Jewish influence on our national life; we demand for our Christian people a Christian magistracy and Christian teachers for Christian pupils; we repudiate the excesses of anti- Semitism." In pursuance of the resolution Ahlwardt was re- turned to the Reichstag at a by-election by the Conservative district of Arnswalde-Friedeberg. The coalition was, however, not yet completed. The intransigeant Conservatives, led by Baron von Hammerstein, the editor of the Kreuz-Zeitung, justly felt that the concluding sentence of the resolution of the 3rd of December repudiating " the excesses of anti-Semitism " was calculated to hinder a full and loyal co-operation between the two parties. Accordingly on the 9th of December another meeting of the party was summoned. Twelve hundred members met at the Tivoli Hall in Berlin, and with only seven dissentients solemnly expunged the offending sentence from the resolution. The history of political parties may be searched in vain for a parallel to this discreditable transaction.

The capture of the Conservative party proved the high-water mark of German anti-Semitism. From that moment the tide began to recede. All that was best in German national life was scandalized by the cynical tactics of the Conservatives. The emperor, strong Christian though he was, was shocked at the idea of serving Christianity by a compact with unscrupulous demagogues and ignorant fanatics. Prince Bismarck growled out a stinging sarcasm from his retreat at Friedrichsruh. Even Stocker raised his voice in protest against the " Ahlwardtismus " and " Bockelianismus," and called upon his Conservative colleagues to distinguish between " respectable and disreputable anti-Semitism." As for the Liberals and Socialists, they filled

the air with bitter laughter, and declared from the housetops that the stupid party had at last been overwhelmed by its own

Stupidity. The Conservatives began to suspect that they had made a false step, and they were confirmed in this belief by the conduct of their new ally in the Reichstag. His debut in parlia- ment was the signal for a succession of disgraceful scenes. His whole campaign of calumny was transferred to the floor of the house, and for some weeks the Reichstag discussed little else than his so-called revelations. The Conservatives listened to his wild charges in uncomfortable silence, and refused to support him. Stocker opposed him in a violent speech. The Radicals and Socialists, taking an accurate measure of the shallow vanity of the man, adopted the policy of giving him ” enough rope.” Shortly after his election he was condemned to five months’ imprisonment for libel, and he would have been arrested but for the interposition of the Socialist party, including five Jews, who claimed for him the immunities of a member of parliament. When he moved for a commission to inquire into his revelations, it was again the Socialist party which supported him, with the result that all his charges, without exception, were found to be absolutely baseless. Ahlwardt was covered with ridicule, and when in May the Reichstag was dissolved, he was marched off to prison to undergo the sentence for libel from which his parlia- mentary privilege had up to that moment protected him.

His hold on the anti-Semitic populace, was, however, not diminished. On the contrary, the action of the Conservatives at the Tivoli congress could not be at once eradicated from the minds of the Conservative voters, and when the electoral cam- paign began it was found impossible to explain to them that the party leaders had changed their minds. The result was that Ahlwardt, although in prison, was elected by two constituencies. At Arnswalde-Friedeberg he was returned in the teeth of the opposition of the official Conservatives, and at Neustettin he defeated no less a person than his anti-Semitic opponent Stocker. Fifteen other anti-Semites, all of the Ahlwardtian school, were elected. This, however, represented little in the way of political influence; for henceforth the party had to stand alone as one of the many minor factions in the Reichstag, avoided by all the great parties, and too weak to exercise any influence on the main course of affairs.

During the subsequent seven years it became more and more discredited. The financial scandals connected with Forster’s attempt to found a Christian Socialist colony in Paraguay, the conviction of Baron von

Hammerstein, the anti-Semitic Con- servative leader, for forgery andswindling(i895-i89< >),andseveral minor scandals of the same unsavoury character, covered the party with the very obloquy which it had attempted to attach to the Jews. At the same time the Christian Socialists who had remained with the Conservative party also suffered. After the elections of 1803, Stocker was dismissed from his post of court preacher, and publicly reprimanded for speaking familiarly of the empress. Two years later the Christian Socialist, Pastor Neumann, observing the tendency of the Conservatives tocaalesce with the moderate Liberals in antagonism to Social Democracy, declared against the Conservative party. The following year the emperor publicly condemned Christian Socialism and the " political pastors," and Stocker was expelled from the Conserva- tive party for refusing to modify the socialistic propanganda of his organ, Das Yolk. His fall was completed by a quarrel with the Evangelical Social Union. He left the Union and appealed to the Lutheran clergy to found a new church social organization, but met with no response. Another blow to anti-Semitism came from the Roman Catholics. They had become alarmed by the unbridled violence of the Ahlwardtians, and when in 1894 Forster declared in an address to the German anti-Semitic Union that anarchical outrages like the murder of President Carnot were as much dut tc the " Anarchismus von oben " as the " Anar- chismus von unten,'- the Ultramontane Germania publicly washed its hands of the Jew-baiters (1st of July 1894). Thus gradually German anti-Semitism became stripped of every adventitious alliance; and at the general election of 1898 it only managed to return twelve members to the Reichstag, and in 1903 its party strength fell to nine. A remarkable revival in its for- tunes, however; took place between 1905 and 1907. Identifying

Russia.

itself with the extreme Chauvinists and Anglophobes it profited by the anti-national errors of the Clericals and Socialists, and won no fewer than twelve by-elections. At the general election of 1907 its jingoism and aggressive Protestantism were rewarded with twenty-five seats. It is clear, however, from the figures of the second ballots that these successes owed far more to the tend- encies of the party in the field of general politics than to its anti- Semitism. Indeed the specifically anti-Semitic movement has shown little activity since 1893.

The causes of the decline of German anti-Semitism are not difficult to determine. While it remained a theory of nationality and a fad of the metaphysicians, it made considerable noise in the world, but without exercising much practical influence. When it attempted to play an active part in politics it became sub- merged by the ignorant and superstitious voters, who could not understand its scientific justification, but who were

*quite ready *to declaim and riot against the Jew bogey. It thus became a sort of Jacquerie which, being exploited by unscrupulous demagogues, soon alienated all its respectable elements. Its moments of real importance have been due not to inherent strength but to the uses made of it by other political parties for their own purposes. These coalitions are no longer of perilous significance so far as the Jews are concerned, chiefly because, in face of the menace of democratic socialism and its unholy alliance with the Roman Catholic Centrum, all supporters of the present organization of society have found it necessary to sink their differences. The new social struggle has eclipsed the racial theory of nationality. The Social Democrat became the enemy, and the new reaction counted on the support of the rich Jews and the strongly individualist Jewish middle class to assist it in preserving the existing social structure. Hence in Prince Billow's " Bloc " (1908) anti- Semites figured side by side with Judeophil Radicals.*

More serious have been the effects of German anti-Semitic teachings on the political and social life of the countries adjacent to the empire — Russia, Austria and France. In Russia these effects were first seriously felt owing to the fury of autocratic reaction to which the tragic death of the tsar Alexander II. gave rise. This, however, like the Strousberg Krach in Germany, was only the proximate cause of the out- break. There were other elements which had created a milieu peculiarly favourable to the transplantation of the German craze. In the first place the medieval anti-Semitism was still an integral part of the polity of the empire. The Jews were cooped up in one huge ghetto in the western provinces, " marked out to all their fellow-countrymen as aliens, and a pariah caste set apart for special and degrading treatment " {Persecution of the Jews in Russia, i89i,p.s). In the next place, owing to the emancipation of the serfs which had half ruined the landowners, while creating a free but moneyless peasantry, the Jews, who could be neither nobles nor peasants, had found a vocation as money-lenders and as middlemen between the grain producers, and the grain consumers and exporters. There is no evidence that this function was performed, as a rule, in an exorbitant or oppressive way. On the contrary, the fall in the value of cereals on all the pro- vincial markets, after the riots of 1881, shows that the Jewish competition had previously assured full prices to the farmers (Schwabacher, Denkschrift, 1882, p. 27). Nevertheless, the Jewish activity or " exploitation," as it was called, was resented, and the ill-feeling it caused among landowners and farmers was shared by non- Jewish middlemen and merchants who had thereby been compelled to be satisfied with small profits. Still there was but little thought of seeking a remedy in an organized anti- Jewish movement. On the contrary, the abnormal situation aggravated by the disappointments and depression caused by the Turkish war, had stimulated a widespread demand for con- stitutional changes which would enable the people to

adopt a state-machinery more exactly suited to their needs. Among the peasantry this demand was promoted and fomented by the Nihilists, and among the landowners it was largely adopted as a means of checking what threatened to become a new Jacquerie (Walcker, Gegenwartige Lage Russlands, 1873; Innere Krisis Russlands, 1876). The tsar, Alexander II., strongly sympathized

with this movement, and on the advice of Count Loris-Melikov and the council of ministers a rudimentary scheme of parlia- mentary government had been drafted and actually signed when the emperor was assassinated. Meanwhile a nationalist and re- actionary agitation, originating like its German analogue in the Hegelianism of a section of the lettered public, had manifested itself in Moscow. After some early vicissitudes, it had been organized, under the auspices of Alexis Kireiev, Chomyakov, Aksakov and Kochelev, into the Slavophil party, with a Romanticist programme of reforms based on the old traditions of the pre-Petrine epoch. This party gave a great impetus to Slav nationalism. Its final possibilities were sanguinarily illustrated by Muraviev's campaign in Poland in 1863, and in the war against Turkey in 1877, which was exclusively its handiwork (Statement by General Kireiev: Schiitz, Das heutige Russland, p. 104). After the assassination of Alexander II. the Slavophil teaching, as expounded by Ignatiev and Pobedo- nostsev, became paramount in the government, and the new tsar was persuaded to cancel the constitutional'project of his father. The more liberal views of a section of the Slavophils under Aksakov, who had been in favour of representative institutions on traditional lines, were displaced by the reactionary system of Pobfidonostsev, who took his stand on absolutism, orthodoxy and the racial unity of the Russian people. This was the situa- tion on the eve of Easter 1881. The hardening nationalism above, the increasing discontent below, the economic activity of the Hebrew heretics and aliens, and the echoes of anti-Semitism from over the western border were combining for an explosion.

A scuffle in a tavern at Elisabethgrad in Kherson sufficed to ignite this combustible material. The scuffle grew into a riot, the tavern was sacked, and the drunken mob, hounded on by agitators who declared that the Jews were using Christian blood for the manufacture of their Easter bread, attacked and looted the Jewish quarter. The outbreak spread rapidly. On the 7 th of May there was a similar riot at Smiela, near Cherkasy, and the following day there was a violent outbreak at Kiev, which left 2000 Jews homeless. Within a few weeks the whole of western Russia, from the Black

Sea to the Baltic, was smoking with the ruins of Jewish homes. Scores of Jewish women were dishonoured, hundreds of men, women and children were slaughtered, and tens of thousands were reduced to beggary and left without a shelter. Murderous riots or incendiary outrages took place in no fewer than 167 towns and villages, including Warsaw, Odessa and Kiev. Europe had witnessed no such scenes of mob savagery since the Black Death massacres in the 14th century. As the facts gradually filtered through to the western capitals they caused a thrill of horror everywhere. An indignation meeting held at the Mansion House in London, under the presidency of the lord mayor, was the signal for a long series of popular demonstrations condemning the persecutions, held in most of the chief cities of England and the continent.

Except as stimulated by the Judeophobe revival in Germany the Russian outbreak in its earlier forms does not belong speci- fically to modern anti-Semitism. It was essentially a medieval uprising animated by the religious fanaticism, gross superstition and predatory instincts of a people still in the medieval stage of their development. This is proved by the fact that, although the Russian peasant was supposed to be a victim of unbearable Jewish " exploitation," he was not moved to riot until he had been brutalized by drink and excited by the old fable of the Blood Accusation. The modern anti-Semitic element came from above and followed closely on the heels of the riots. It has been freely charged against the Russian government that it promoted the riots in 1881 in order to distract popular attention from the Nihilist propaganda and from the political disappoint^ ments involved in the cancellation of the previous tsar's con- stitutional project (Lazare, L' Antisemitisme, p. 21 1). This seems to be true of General Ignatiev, then minister of the interior, and the secret police (Semenoff, The Russian Government and the Massacres, pp. 17, 32, 241). It is certain that the local authori- ties, both civil and military, favoured the outbreak, and took no steps to suppress it, a-nd that the feudal bureaucracy who had

just escaped a great danger were not sorry to see the discontented populace venting their passions on the Jews. In the higher circles of the government, however, other views prevailed. The tsar himself was at first persuaded that the riots were the work of Nihilists, and he publicly promised his protection to the Jews. On the other hand, his ministers, ardent Slavophils, thought they recognized in the outbreak an endorsement of the nationalist teaching of which they were the apostles, and, while reprobating the acts of violence, came to the conclusion that the most reason- able solution was to aggravate the legal disabilities of the perse- cuted aliens and heretics. To this view the tsar was won over, partly by the clamorous indignation of western Europe, which had wounded his national amour propre to the quick, and partly by the strongly partisan report of a commission appointed to inquire, not into

the administrative complaisance which had allowed riot to run loose over the western and southern provinces, but into the " exploitation " alleged against the Jews, the reasons why " the former-laws limiting the rights of the Jews " had been mitigated, and how these laws could be altered so as " to stop the pernicious conduct of the Jews " (Rescript of the 3rd of September 1881). The result of this report was the drafting of a " Temporary Order concerning the Jews " by the minister of the interior, which received the assent of the tsar on the 3 rd of May 1 882 . This order, which was so little temporary that it has not yet been repealed, had the effect of creating a number of fresh ghettos within the. pale of Jewish settlement. The Jews were cooped up within the towns, and their rural interests were arbitrarily confiscated. The doubtful incidence of the order gave rise to a number of judgments of the senate, by which all its persecuting possibilities were brought out, with the result that the activities of the Jews were completely para- lysed, and they became a prey to unparalleled cruelty. As the gruesome effect of this legislation became known, a fresh outburst of horror and indignation swelled up from western Europe. It proved powerless. Count Ignatiev was dismissed owing to the protests of high-placed Russians, who were disgusted by the new Kulturkampf, but his work remained, and, under the influence of Pobedonostsev, the procurator of the Holy Synod, the policy of the " May Laws," as they were significantly called, was applied to every aspect of Jewish life with pitiless rigour. The temper of the tsar may be judged by the fact that when an appeal for mercy from an illustrious personage in England was conveyed to him at Fredensborg through the gracious medium of the tsaritsa, he angrily exclaimed within the hearing of an Englishman in the ante-room who was the bearer of the message, " Never let me hear you mention the name of that people again !"

The Russian May Laws are the most conspicuous legisla- tive monument achieved by modern anti-Semitism. It is true that they re-enacted regulations which resemble the oppressive statutes introduced into Poland through the influence of the Jesuits in the 16th century (Sternberg, Gesch. d. Juden in Polen, pp. 141 et seq.), but their Orthodox authors were as little con- scious of this irony of history as they were of the Teutonic origins of the whole Slavophil movement. These laws are an experimental application of the political principles extracted by Marr and his German disciples from the metaphysics of Hegel, and as such they afford a valuable means of testing the practical operation of modern anti-Semitism. Their result was a wide- spread commercial depression which was felt all over the empire. Even before the May Laws were definitely promulgated the passport registers showed that the anti-Semitic movement had driven 67,900 Jews across the frontier, and it was estimated that they had taken with them 13,000,000 roubles, representing a minimum loss of 60,000,000 roubles to

the annual turnover of flie country's trade. Towards the end of 1882 it was calculated that the agitation had cost Russia as much as the whole Turkish war of 1877. Trade was everywhere paralysed. The enormous increase of bankruptcies, the transfer of investments to foreign funds, the consequent fall in the value of the rouble and the prices of Russian stocks, the suspension of farming operations owing to advances on growing crops being no longer available, the rise in the prices of the necessaries of life, and lastly, the

appearance of famine, filled half the empire with gloom. Banks closed their doors, and the great provincial fairs proved failures. When it was proposed to expel the Jews from Moscow there was a loud outcry all over the sacred city, and even the Orthodox merchants, realizing that the measure would ruin their flourishing trade with the south and west, petitioned against it. The Moscow Exhibition proved a failure. Nevertheless the government persisted with its harsh policy, and Jewish refugees streamed by tens of thousands across the western frontier to seek am asylum in other lands. In 1891 the alarm caused by this emigration led to further protests from abroad. The citizens of London again assembled at Guildhall, and addressed a petition to the tsar on behalf of his Hebrew subjects. It was handed back to the lord mayor by the Russian ambassador; with a curt intimation that the emperor declined to receive it. At the same time orders were defiantly given that the May Laws should be strictly enforced; Meanwhile the Russian minister of finance was at his wits' ends for money. Negotiations for a large loan had been entered upon with the house of Rothschild, and a preliminary contract had been signed, when, at the instance of the London firm, M- Wyshnigradski, the finance minister, was informed that unless the persecutions of the Jews were stopped the great banking- house would be compelled to withdraw from the operation. Deeply mortified by this attempt to deal with him de puissance a puissance, the tsar peremptorily broke off the negotiations, and ordered that overtures should be made to a non-Jewish French syndicate. In this way anti-Semitism, which had already so profoundly influenced the domestic politics of Europe, set its mark on the international relations of the powers, for it was the urgent need of the Russian treasury quite as much as the termination of Prince Bismarck's secret treaty of mutual neu- trality which brought about the Franco-Russian alliance (Daudet, Hisl. Dipt, de I' Alliance Franco-Russe, pp. 2 59 et. seq.).

For nearly three years more the persecutions continued. Elated by the success of his crusade against the Jews, Pob&do- nostsev extended his

persecuting policy to other non-Orthodox denominations. The legislation against the Protestant Stundists became almost as unbearable as that imposed on the Jews. In the report of the Holy Synod, presented to the tsar towards the end of 1893, the procurator called for repressive measures against Roman Catholics, Moslems and Buddhists, and denounced the rationalist tendency of the whole system of secular education in the empire {Neue Freie Presse, 31st January 1894). A year later, however, the tsar died, and his successor, without repealing any of the persecuting laws, let it gradually be understood that their rigorous application might be mitigated. The country was tired and exhausted by the persecution, and the tolerant hints which came from high quarters were acted upon with significant alacrity.

A new era of conflict dawned with the great constitutional struggle towards the end of the century. The conditions, however, were very different from those which prevailed in the 'eighties. The May Laws had avenged themselves With singular fitness. By confining the Jews to the towns at the very moment that Count Witte's policy of protection was creating an enormous industrial proletariat they placed at the disposal of the disaffected masses an ally powerful in numbers and intelligence, and especially in its bitter sense of wrong, its reckless despair and its cosmopolitan outlook and connexions.. As early as 1885 the Jewish workmen assisted by Jewish university students led the way in the formation of trades unions. They also became the colporteurs of western European socialism, and they played an important part in the organization of the Russian Social Democratic Federation which their " Arbeiter Bund " joined in 1898 with no fewer than 30,000 members. The Jewish element in the new democratic movement excited the resentment of the government, and undCr the minister of the interior, M. Sipiaguine, the persecuting laws were once more rigorously enforced. The " Bund " replied in 1001 by proclaiming itself frankly political and revolutionary, and at once took a leading place in the revolutionary movement. The reactionaries were not slow to profit by this circumstance. With the support of M. Plehve, the new minister of the interior, and the whole of the bureaucratic class they denounced the

revolution as a Jewish conspiracy, engineered for exclusively Jewish purposes and designed to establish a Jewish domination over the Russian people. The government and even the intimates of the tsar became persuaded that only by the terrorization of the Jews could the revolutionary movement be effectually dealt with. For this purpose a so-called League of True Russians was formed. Under high patronage, and with the assistance of the secret police and a large number of the local authorities, it set itself to stir-up the populace, chiefly the fanatics and the hooligans, against the Jews. Incendiary proclamations were prepared and printed in the ministry

of the interior itself, and were circulated by the provincial governors and the police (Prince Urussov's speech in the Duma, June'8 (21), 1906). The result was another series of massacres which began at Kishinev in 1903 and cul- minated in wholesale butchery at Odessa and Bielostok in October 1905.' An attempt was made to picture and excuse these outbreaks as a national upheaval against the Jew-made revolu- tion but it failed. They only embittered the revolutionists and "intellectuals" throughout the country, and. won for them a great deal of outspoken sympathy abroad. The artificiality of the anti- Jewish outbreak was illustrated by the first Duma elections. Thirteen Jews Were elected and every constituency which had been the scene of a pogrom returned a liberal member, Unfortunately the Jews benefited little by the new parliamentary constitution. The privileges of voting for members of the Duma and Of sitting in the new assembly were granted them, but all their civil and religious disabilities were maintained. Both the first and the second Duma proposed to emancipate them, but they were dissolved before any action could be taken. By the modification of the electoral law under which the third Duma was elected the voting power of the Jews was diminished and further restrictions were imposed upon them through official intimidation during the elections. The result was that only two Jews were elected, while the reactionary tendency of the new electorate virtually removed the question of their emancipation from the field of practical politics.

The only other country in Europe in which a legalized anti- Semitism exists is Rumania. The conditions are very similar to those which obtain in Russia, with the important numahia difference that Rumania is a constitutional country, and that the Jewish persecutions are the work of the elected deputies of the nation. Like the Bourgeois Gentilhomme who wrote prose all his life without knowing it, the Rumanians practised the nationalist doctrines of the Hegelian anti-Semites unconsciously long before they were formulated in .Germany. In the old days of Turkish domination the lot of the Rumanian Jews was not conspicuously unhappy. It was only when the nation began to be emancipated, and the struggle in the East assumed the form of a crusade against Islam that the Jews were persecuted. Rumanian politicians preached a nationalism limited exclusively to indigenous Christians, and they were strongly supported by all who felt the commercial competition of the Jews. Thus, al- though the Jews had been settled in the land for many centuries, they were by law declared aliens. This was done in defiance of the treaty of Paris of 1856 and the convention of, 1858 which declared all Rumans to be equal before the law. Under the influence of this distinction the Jews became persecuted, and sanguinary riots were of frequent occurrence. The realization of a Jewish question led to legislation imposing disabilities on the Jews. In 1878 the congress of Berlin agreed to recognize ■ the independence of Rumania on

condition that all religious dis- abilities were removed. Rumania agreed to this condition, but ultimately persuaded the powers to allow her to carry out the emancipation of the Jews gradually. Persecutions, however, continued, and in 1902 they led to a great exodus of Jews. The United States addressed a strong remonstrance to the Rumanian government, but the condition of the Jews was in no way im- proved. Their emancipation was in 1908 as far off as ever, and their disabilities heavier than those of their brethren in Russia. For this state of thing's the example of the anti-Semites in Germany, Russia, Austria and France was largely to blame, since it had justified the intolerance of the Rumans. Owing, also, to

the fact that of late years Rumania had become a sort of annexe of the Triple Alliance, it wag found impossible to induce the signatories of the treaty of Berlin to take action to compel the state to fulfil its obligations under that treaty.

In Austria-Hungary the anti-Semitic impulses came almost simultaneously from the North and East. Already in the 'seventies the doctrinaire anti-Semitism of Berlin had Hungary, found an ec ho in Budapest. Two members of the diet, Victor Istoczy and Geza Onody, together with a publicist named Georg Marczianyi, busied themselves in making known the doctrine of Marr in Hungary. Marczianyi, who translated the German Judeophobe pamphlets into Magyar, and the Magyar works of Onody into German, was the chief medium between the northern and southern schools. In 1880 Istoczy tried to establish a " Nichtjuden Bund" in Hungary, with statutes literally translated from those of the German anti- Semitic league-. The movement, however, made no progress, owing to the stalwart Liberalism of the predominant political parties, and of the national principles inherited from the revolu- tion of 1848. The large part played by the Jews in that struggle, and the fruitful patriotism with which they had worked for the political and economic progress of the country, had created, too, a strong claim on the gratitude of the best elements in the nation. Nevertheless, among the ultramontane clergy, the higher aristo- cracy, the ill-paid minor officials, and the ignorant peasantry, the seeds of a tacit anti-Semitism were latent. It was probably the aversion of the nobility from anything in the nature of a demagogic agitation which for a time prevented these seeds from germinating. The news of the uprising in Russia and the appearance of Jewish refugees on the frontier, had the effect of giving a certain prominence to the agitation of Istoczy and Onody and of exciting the rural communities, but it did not succeed in impressing the public with the pseudo-scientific doctrines of the new anti-Semitism. It was not until the

agitators resorted to the Blood Accusation — that never-failing decoy of obscurantism and superstition — that Hungary took a definite place in the anti- Semitic movement. The outbreak was short and fortunately blood-less, but while it lasted its scandals shocked the whole of Europe.

Dr August Rohling, professor of Hebrew at the university of Prague, a Roman Catholic theologian of high position but dubious learning, had for some years assisted the Hungarian anti-Semites with rechauffe's of Eisenmenger's Entdecktes Juden- thum (Frankfurt a/M. 1700). Ini88i he made a solemn deposition before the Supreme Court accusing the Jews of being bound by their law to work the moral and physical ruin of non-Jews. He followed this up with an offer to depose on oath that the murder of Christians for ritual purposes was a doctrine secretly taught among Jews. Professor Delitzsch and other eminent Hebraists, both Christian and Jewish, exposed and denounced the ignorance and malevolence of Rohling, but were unable to stem the mischief he was causing. In April 1882 a Christian girl named Esther Sobymossi was missed from the Hungarian village of Tisza Eszlar, where a small community of Jews were settled. The rumour got abroad that she had been kidnapped and murdered by the Jews, but it remained the burden of idle gossip, and gave rise to neither judicial complaint nor public disorders. At this moment the question of the Bosnian Pacification credits was before the diet. The unpopularity of the task assumed by Austria-Hungary, under the treaty of Berlin, which was calcu- lated to strengthen the disaffected Croat element in the empire, had reduced the government majority to very small proportions, and all the reactionary factions in the country were accordingly in arms. The government was violently and unscrupulously attacked on all sides. On the 23rd of May there was a debate in the diet when M. Onody, in an incendiary harangue, told the story of the missing girl at Tisza Eszlar, and accused ministers of criminal indulgence to races alien to the national spirit. In the then excited state of the public mind on the Croat question, the manoeuvre was adroitly conceived. The government fell into the trap, and treated the story with lofty disdain. There- upon the anti-Semites set to work on the case, and M. Joseph Bary, the magistrate at Nyiregyhaza, and a noted anti-Semite,

was induced to go to Tisza Eszlar and institute an inquiry. All the anti-liberal elements in the country now became banded together in this effort to discredit the liberal government, and for the first time the Hungarian anti-Semites found themselves at the head of a powerful party. Fifteen Jews were arrested and . thrown into prison. No pains were spared in preparing the case for trial. Perjury and even forgery were freely resorted to. The son of one of the accused, a boy of fourteen, was taken into custody by the police, and by threats and cajoleries prevailed upon to give evidence for the prosecution. He was elaborately coached for the terrible rdle he was to

play. The trial opened at Nyiregyhaza on the 19th of June, and lasted till the 3rd of August. It was one of the most dramatic causes cSlebres of the century. Under the brilliant cross-examination of the advocates for the defence the whole of the shocking conspiracy was gradually exposed. The public prosecutor thereupon withdrew from the case, and the four judges— the chief of whom held strong anti- Semitic opinions — unanimously acquitted all the prisoners. The case proved the death-blow of Hungarian anti-Semitism. Although another phase of the Jewish question, which will be referred to presently, had still to occupy the public mind, the shame brought on the nation by the Tisza Eszlar conspiracy effectually prevented the anti-Semites from raising their voices with any effect again.

Meanwhile a more formidable and complicated outburst was preparing in Austria itself. Here the lines of the German agita- tion were closely followed, but with far more dramatic results. It was exclusively political — that is to say, it appealed to anti- Jewish prejudices for party purposes while it sought to re- habilitate them on a pseudo-scientific basis, racial and economic. At first it was confined to sporadic pamphleteers. By their side there gradually grew up a school of Christian Socialists, recruited from the ultra-Clericals, for the study and application of the doctrines preached at Mainz by Archbishop Ketteler. This constituted a complete Austrian analogue to the Evangelical- Socialist movement started in Germany by Herr Stocker. For some years the two movements remained distinct, but signs of approximation were early visible. Thus one of the first com- plaints of the anti-Semites was that the Jews were becoming masters of the soil. This found an echo in the agrarian principles of the Christian Socialists, as expounded by Rudolph Meyer, in which individualism in landed property was admitted on the condition that the landowners were " the families of the nation " and not " cosmopolitan financiers." A further indication of anti- Semitism is found in a speech delivered in 1878 by Prince Alois von Liechtenstein (b. 1846), the most prominent disciple of Rudolph- Meyer, who denounced the national debt as a tribute paid by the state to cosmopolitan rentiers (Nitti, Catholic Social- ism, pp. 200, 201, 211, 216). The growing disorder in parliament, due to the bitter struggle between the German and Czech parties, served to bring anti-Semitism into the field of practical politics. Since 1867 the German Liberals had been in power. They had made enemies of the Clericals by tampering with the concordat, and they had split up their own party by the federalist policy adopted by Count Taaffe. The Radical secessionists in their turn found it difficult to agree, and an ultra-national German wing formed itself into a separate party under the leadership of Ritter von Schonerer (b. 1842), a Radical nationalist of the most violent type. In 1882 two anti-Semitic leagues had been founded in Vienna, and to these the Radical nationalists now appealed for support. The growing importance of the party led the

premier, Count Taaffe, to angle for the support of the Clericals by accepting a portion of the Christian Socialist programme. The hostility this excited in the liberal press, largely written by Jews, served to bring the feudal Christian Socialists and Radical anti-Semites together. In 1891 these strangely assorted factions became consolidated, and during the elections of that year Prince Liechtenstein came forward as an anti-Semitic candidate and the acknowledged leader of the party. The elections resulted in the return of fifteen anti-Semites to the Reichsrath, chiefly from Vienna. ;

Although Prince Liechtenstein and the bulk of the Christian

Socialists had joined the anti-Semites with the support of the Clerical organ, the Vaterland, the Clerical party as a whole still held aloof from the Jew-baiters. The events of 1892-1895 put an end to their hesitation. The Hungarian government, in compliance with long-standing pledges to the liberal party, introduced into the diet a series of ecclesiastical reform bills providing for civil marriage, freedom of worship, and the legal recognition of Judasim on an equality with other denominations. These proposals, which synchronized with Ahlwardt's turbulent agitation in Germany, gave a great impulse to anti—5emitism and served to drive into its ranks a large number of Clericals. The agitation was taken in hand by the Roman Catholic clergy, and the pulpits resounded with denunciations of the Jews. One clergyman, Father Deckert, was prosecuted for preaching the Blood Accusation and convicted (1894). Cardinal Schlauch, bishop of Grosswardein, declared in the Hungarian House of Magnates that the Liberals were in league with " cosmopolitans " for the ruin of the country. In October 1894 the magnates adopted two of the ecclesiastical bills with amendments, but threw out the Jewish bill by a- majority of six. The crown sided with the magnates, and the ministry resigned, although it had a majority in the Lower House. An effort was made to form a Clerical cabinet, but it failed. Baron Banffy was then entrusted with the construction of a fresh Liberal ministry. The announce- ment that he would persist with the ecclesiastical bills lashed the Clericals and anti-Semites into a fury, and the agitation broke out afresh. The pope addressed a letter to Count Zichy encouraging the magnates to resist, and once more two of the bills were amended, and the third rejected. The papal nuncio, Mgr. Agliardi, now thought proper to pay a visit to Budapest, where he allowed himself to be interviewed on the crisis. This interference in the domestic concerns of Hungary was deeply resented by the Liberals, and Baron Banffy requested Count Kalnoky, the imperial minister of foreign affairs, to protest against it at the Vatican. Count Kalnoky refused arid tendered his

resignation to the emperor. Clerical sympathies were pre- dominant in Vienna, and the emperor was induced for a moment to decline the count's resignation. It soon became clear, how- ever, that the Hungarians were resolved to see the crisis out, and that in the end Vienna would be compelled to give way. The emperor accordingly retraced his steps, Count Kalnoky's resignation was accepted, the papal nuncio was recalled, a batch of new magnates were created, and the Hungarian ecclesiastical bills passed.

Simultaneously with this crisis another startling phase of the anti-Semitic drama was being enacted in Vienna itself. En- couraged by the support of the Clericals the anti-Semites resolved to make an effort to carry the Vienna municipal elections. So far the alliance of the Clericals with the anti-Semites had been unofficial, but on the eve of the elections (January 1895) the pope, influenced partly by the Hungarian crisis andpartly by an idea of Cardinal Rampolla that the best antidote to democratic socialism would be a clerically controlled fusion of the Christian Socialists and anti-Semites, sent his blessing to Prince Liechtenstein and his followers. This action alarmed the government and a con- siderable "body of the higher episcopate, who felt assured that any permanent encouragement given to the anti-Semites would in the end strengthen the parties of sedition and disorder. Cardinal Schonborn was despatched in haste to Rome to ex- postulate with the pontiff, and his representations were strongly supported by the French and Belgian bishops. The mischief was however, done, and although the pope sent a verbal message to Prince Liechtenstein excluding the anti-Semites from his blessing, the elections resulted in a great triumph for the Jew- haters. The municipal council was immediately dissolved by the government, and new elections were ordered, but these only strengthened the position of the anti-Semites, who carried 92 seats out of a total of 138. A cabinet crisis followed, and the premiership was entrusted to the Statthalter of Galicia, Count Badeni, who assumed office with a pledge of war to the knife against anti-Semitism. In October the new municipal council elected as burgomaster of Vienna Dr Karl Lueger (b. 1844), a

vehement anti-Semite, who had displaced Prince Liechtenstein as leader of the party. The emperor declined to sanction the election, but the council repeated it in face of the imperial displeasure. Once more a dissolution was ordered, and for three months the city was governed by administrative commissioners. In February 1896 elections were again held, and the anti-Semites were returned with an increased majority. The emperor then capitulated, and after a temporary arrangement, by which for one year Dr Lueger acted as vice-burgomaster and handed over the burgomastership to an inoffensive nominee, permitted the municipal council to have its way. The growing anarchy in parliament at this moment served still further to

strengthen the anti-Semites, and their conquest of Vienna was speedily followed by a not less striking conquest of the Landtag of Lower Austria (November 1896).

Since then a reaction of sanity has slowly but surely asserted itself. In 1908 the anti-Semites had governed Vienna twelve years, and, although they had accomplished much mischief, the millennium of which they were supposed to be the heralds had not dawned. On the contrary, the commercial interests of the city had suffered and the rates had beerr enormously increased {Neue Freie Presse, 29th March 1901), while the pre- datory hopes which secured them office had only been realized on a small and select scale. The spectacle of a Clerico-anti- Semitic tammany in Vienna had strengthened the resistance of the better elements in the country. Time had also shown that Christian Socialism is only a disguise for high Toryism, and that the German Radicals who were originally induced to join the anti-Semites had been victimized by the Clericals. The fruits of this disillusion began to show themselves in the general elections of 1900-1901, when the anti-Semites lost six seats in the Reichsrath. The elections were followed (26th January 1901) by a papal encyclical on Christian democracy, in which Christian Socialism was declared to be a term unacceptable to the Church, and the faithful were adjured to abstain from agitation of a demagogic and revolutionary character, aˆid " to respect the rights of others." Nevertheless, in 1907 the Christian Socialists trebled their representation in the Reichsrath. This, however, was due more to their alliance with the German national parties than to any large increase of anti-Semitism in the electorate.

The last country in Europe to make use of the teachings of German anti-Semitism in its party politics was France. The fact that the movement should have struck root in a republican country, where the ideals of democratic freedom have been so passionately cultivated, has been regarded as one of the paradoxes of our latter-day history. As a matter of fact, it is more surprising that it was not adopted earlier. All the social and political conditions which produced anti-Semitism in Germany were present in France, but in an aggravated form due primarily to the very republican regime which at first sight seemed to be a guarantee against it. In the monarchical states the dominance of the bourgeoisie was tempered in a measure by the power of the crown and the political activity of the aris-tocracy, which carried with them a very real restraining influence in the matter of political honour and morality. In France these restraining influences were driven out of public life by the re- public. The nobility both of the ancien rSgime and the empire stood aloof, and politics were abandoned for the most part to professional adventurers, while the bourgeoisie assumed the form of s3 omnipotent plutocracy. This naturally attracted to France all the financial adventurers in Europe, and in the train

of the immigration came not a few German Jews, alienated from their own country by the agitation of Marr and Stocker. Thus the bourgeoisie was not only more powerful in France than in other countries, but the obnoxiousness of its Jewish element was accentuated by a tinge of the national enemy. The anti- clericalism of the bourgeois republic and its unexampled series of financial scandals, culminating in the Panama " Krach," thus sufficed to give anti-Semitism a- strong hold on the public mind.

Nevertheless, it was not until 1882 that the anti- Jewish move- ment was seriously heard of in France. Paul Bontoux (b. 182a), 1 who haa formerly been in the employ of the Rothschilds,

but had been obliged to leave the firm in consequence of his disastrous speculations, had joined the Legitimist party, and had started the Union Generale with funds obtained from his new allies. Bontoux promised to break up the alleged financial monopoly of the Jews and Protestants and to found a new plutocracy in its itead, which should be mainly Roman Catholic and aristocratic. The bait was eagerly swallowed. For five years the Union Generale, with the blessing of the pope, pursued an apparently prosperous career. Immense schemes were undertaken, and the 125-fr. shares rose gradually to 3200 francs. The whole structure, however, rested on a basis of audacious speculation, and in January 1882 the Union Generale failed, with liabilities amounting to 212,000,000 francs. The cry was at once raised that the collapse was due to the manoeuvres of the Jews, and a strong anti-Semitic feeling manifested itself in clerical and aristocratic circles. In 1886 violent expression was given to this feeling in a book since become famous, La France juive, by Edouard Drumont (b. 1844). The author illustrated the theories of German anti-Semitism with a chronique scandaleuse full of piquant personalities, in which the corrup- tion of French national life under Jewish influences was painted in alarming colours. The book was read with avidity by the public, who welcomed its explanations of the obviously growing debauchery. The Wilson scandals and the suspension of the Panama Company in the following year, while not bearing out Drumont's anti-Semitism, fully justified his view of the prevailing corruption. Out of this condition of things rose the Boulangist movement, which rallied all the disaffected elements in the country, including Drumont's following of anti-Semites. It was not, however, until the flight of General Boulanger and the ruin of his party that anti-Semitism came forward as a political movement. The chief author of the rout of Boulangism was a Jewish politician and journalist,

Joseph Reinach (b. 1856), formerly private secretary to Gambetta, and one of the ablest men in France. He was a Frenchman by birth and education, but his father and uncles were Germans, who had founded an important banking establishment in Paris. Hence he was held to personify the alien Jewish domination in France, and the ex-Boulangists turned against him and his co-religionists with fury. The Boulangist agitation had for a second time involved the Legiti- mists in heavy pecuniary losses, and under the leadership of the marquis de Mores they now threw all their influence on the side of Drumont. An anti-Semitic league was established, and with Royalist assistance branches were organized all over the country. The Franco- Russian alliance in 1891, when the persecutions of the Jews by Pobedonostsev were attracting the attention of Europe, served to invest Drumont's agitation with a fashionable and patriotic character. It was a sign of the spiritual approxima- tion of the two peoples. In 1892 Drumont founded a daily anti-Semitic newspaper, La Libre Parole. With the organization of this journal a regular campaign for the discovery of scandals was instituted. At the same time a body of aristocratic swash-bucklers, with the marquis de Mores and the comte de Lamase at their head, set themselves to terrorize the Jews and pro- voke them to duels. At a meeting held at Neuilly in 1891, Jules Guerin, one of the marquis de Mores's lieutenants, had demanded rhetorically un cadavre de Juif. He had not long to wait. Anti- Semitism was most powerful in the army, which was the only branch of the public service in which the reactionary classes were fully represented. The republican law compelling the seminarists to serve their term in the army had strengthened its Clerical and Royalist elements, and the result was a movement against the Jewish officers, of whom 500 held commissions. A series of articles in the Libre Parole attacking these officers led to a number of ferocious duels, and these culminated in 1892 in the death of an amiable and popular Jewish officer, Captain Armand Mayer, of the Engineers, who fell, pierced through the lungs by the marquis de Mores. This tragedy, rendered all the more painful by the discovery that Captain Mayer had chivalrously fought to shield a friend, aroused a great deal of popular indignation against the anti-Semites, and for a moment it was believed that the agitation had been killed with its victim.

Towards the end of 1892, the discovery of the widespread corruption practised by the Panama Company gave a fresh impulse to anti-Semitism. The revelations were in a large measure due to the industry of the Libre Parole; and they were all the more welcome to the readers of that journal since it was discovered that three Jews were implicated in the scandals, one of whom, baron de Reinach, was uncle and father-in-law to the hated destroyer of Boulangism. The escape of the other two, Dr Cornelius Herz and M. Arton, and the difficulties experienced in obtaining their extradition, deepened the popular conviction that the authorities were

implicated in the scandals, and kept the public eye for a long time absorbed by the otherwise restricted Jewish aspects of the scandals. In 1894 the military side of the agitation was revived by the arrest of a prominent Jewish staff officer, Captain Alfred Dreyfus, on a charge of treason. From the beginning the hand of the anti-Semite was flagrant in the new sensation. The first hint of the arrest appeared in the Libre Parole; and before the facts had been officially communicated to the public that journal was busy with a campaign against the war minister, based on the apprehension that, in conspiracy with the Juiverie and his republican colleagues, he might exert himself to shield the traitor. Anti-Semitic feeling was now thoroughly aroused. Panama had prepared the people to believe anything; and when it was announced that a court-martial, sitting in secret, had convicted Dreyfus, there was a howl of execration against the Jews from one end of the country to the other, although the alleged crime of the convict and the evidence by which it was supported were quite unknown. Dreyfus was degraded and transported for life amid unparalleled scenes of public excitement.

The Dreyfus Case registers the climax not only of French, but of European anti-Semitism. It was the most ambitious and most unscrupulous attempt yet made to prove the nationalist hypothesis of the anti-Semites, and in its failure it afforded the most striking illustration of the dangers of the whole movement by bringing France to the verge of revolution. For a few months after the Dreyfus court-martial there was a comparative lull; but the highly strung condition of popular passion was illustrated by a violent debate on " The Jewish Peril " in the Chamber of Deputies (25th April 1895), and by two outrages with explosives at the Rothschild bank in Paris. Meanwhile the family of Dreyfus, absolutely convinced of his innocence, were casting about for the means of clearing his character and securing his liberation. They were wealthy, and their activity unsettled the public mind and aroused the apprehensions of the conspirators. Had the latter known how to preserve silence, the mystery would perhaps have been yet unsolved; but in their anxiety to allay all suspicions they made one false step, which proved the begin- ning of their ruin. Through their friends in the press they secured the publication of a facsimile of a document known as the Bordereau — a list of documents supposed to be in Dreyfus's handwriting and addressed apparently to the military attache of a foreign power, which was alleged to constitute the chief evidence against the convict. It was hoped by this publication to put an end to the doubts of the so-called Dreyfusards. The result, how- ever, was only to give them a clue on which they worked with remarkable ingenuity. To prove that the Bordereau was not in Dreyfus's handwriting was not difficult. Indeed, its authorship was recognized almost on the day of publication; but the Dreyfusards held their hands in order to make assurance doubly sure by further evidence.

Meanwhile one of the officers of the general staff, Colonel Picquart, had convinced himself by an examination of the dossier of the trial that a gross miscarriage of justice had taken place. On mentioning his doubts to his superiors, who were animated partly by anti-Semitic feeling and partly by reluctance to confess to a mistake, he was ordered to the Tunisian hinterland on a dangerous expedition. Before leaving Paris, however, he took the precaution to confide his discovery to his legal adviser. Harassed by their anxieties, the conspirators made further communications to the newspapers; and the government, questioned and badgered in parliament, added to the revelations. The new disclosures, so far from

stopping the Dreyfusards,provedtothem,among other things, that the conviction had been partially based on documents which had not been communicated to the counsel for the defence, and hence that the judges had been tampered with by the ministry of war behind the prisoner's back. So far, too, as these documents related to correspondence with foreign military attaches, it was soon ascertained that they were forgeries. In this way a terrible indictment was gradually drawn up against the ministry of war. The first step was taken towards the end of 1897 by a brother of Captain Dreyfus, who, in a letter to the minister of war, de- nounced Major Esterhazy as the real author of the Bordereau. The authorities, supported by parliament, declined to reopen the Dreyfus Case, but they ordered a court-martial on Esterhazy, which was held with closed doors and resulted in his acquittal. It now became clear that nothing short of an appeal to public opinion and a full exposure of all the iniquities that had been perpetrated would secure justice at the hands of the military chiefs. On behalf of Dreyfus, Emile Zola, the eminent novelist, formulated the case against the general staff of the army in an open letter to the president of the republic, which by its dramatic accusations startled the whole world. The letter was denounced as wild and fantastic even by those who were in favour of revision. Zola was prosecuted for libel and convicted, and had to fly the country; but the agitation he had started was taken in hand by others, notably M. Clemenceau, M. Reinach and M. Yves Guyot. In August 1898 their efforts found their first reward. A re- examination of the documents in the case by M. Cavaignac, then minister of war, showed that one was undoubtedly forged. Colonel Henry, of the intelligence department of the war office, then confessed that he had fabricated the document, and, on being sent to Mont Valerien under arrest, cut his throat.

In spite of this damaging discovery the war office still per- sisted in believing Dreyfus guilty, and opposed a fresh inquiry. It was supported by

three successive ministers of war, and ap- parently an overwhelming body of public opinion. By this time the question of the guilt or innocence of Dreyfus had become an altogether subsidiary issue. As in Germany and Austria, the anti-Semitic crusade had passed into the hands of the political parties. On the one hand the Radicals and Socialists, recognizing the anti-republican aims of the agitators and alarmed by the clerical predominance in the army, had thrown in their lot with the Dreyfusards; on the other the reactionaries, anxious to secure the support of the army, took the opposite view, denounced their opponents as sans patrie, and declared that they were conspiring to weaken and degrade the army in the face of the national enemy. The controversy was, consequently, no longer for or against Dreyfus, but for or against the army, and behind it was a life-or-death struggle between the republic and its enemies. The situation became alarming. Rumours of military plots filled the air. Powerful leagues for working up public feeling were formed and organized; attempts to discredit the republic and intimidate the government were made. The president was insulted; there were tumults in the streets, and an attempt was made by M. Deroulede to induce the military to march on the Elysee and upset the republic. In this critical situation France, to her eternal honour, found men with sufficient courage to do the right. The Socialists, by rallying to the Radicals against the reactionaries, secured a majority for the defence of the republic in parliament. Brisson's cabinet transmitted to the court of cassation an application for the revision of the case against Dreyfus; and that tribunal, after an elaborate inquiry, which fully justified Zola's famous letter, quashed and annulled the proceedings of the court-martial, and remitted the accused to another court-martial, to be held at Rennes. Throughout these proceedings the military party fought tooth and nail to impede the course of justice; and although the innocence of Dreyfus had been completely established, it concentrated all its efforts to secure a fresh condemnation of the prisoner at Rennes. Popular passion was at fever heat, and it manifested itself in an attack on M. Labori, one of the counsel for the defence, who was shot and wounded on the eve of his cross-examination of the witnesses for the prosecution. To the amazement and indignation of the

whole world outside France, the Rennes court-martial again found the prisoner guilty; but all reliance on the conscientious- ness of the verdict was removed by a rider, which found "ex- tenuating circumstances," and by a reduction of the punishment to ten years' imprisonment, to which was added a recommenda- tion to mercy. The verdict was evidently an attempt at a com- promise, and the government resolved to advise the president of the republic to pardon Dreyfus. This lame conclusion did not satisfy the accused; but his innocence had been so clearly proved, and on political grounds there were such urgent reasons for desiring a termination of the

affair, that it was accepted without protest by the majority of moderate men.

The rehabilitation of Dreyfus, however, did not pass without another effort on the part of the reactionaries to turn the popular passions excited by the case to their own advantage. After the failure of Deroulede's attempt to overturn the republic, the various Royalist and Boulangist leagues, with the assistance of the anti-Semites, organized another plot. This was discovered by the government, and the leaders were arrested. Jules Guerin, secretary of the anti-Semitic league, shut himself up in the league offices in the rue Chabrol, Paris, which had been fortified and garrisoned by a number of his friends, armed with rifles. For more than a month these anti-Semites held the authorities at bay, and some 5000 troops were employed in the siege. The con- spirators were all tried by the senate, sitting as a high court, and Guerin was sentenced to ten years' imprisonment. The evidence showed that the anti-Semitic organization had taken an active part in the anti-republican plot (see the report of the Commission d'Instruction in the Petit Temps, 1st November 1899).

The government now resolved to strike at the root of the mischief by limiting the power of the religious orders, and with this view a drastic Association bill was introduced into the chambers. This anti-clerical move provoked the wildest passions of the A reactionaries, but it found an overwhelming support in the elections of 1902 and the bill became law. The war thus definitely reopened soon led to a revival of the Dreyfus controversy. The nationalists flooded the country with incend- iary defamations of " the government of national treason," and Dreyfus on his part loudly demanded a fresh trial. It was clear that conciliation and compromise were useless. Early in: 1905 M. Jaures urged upon the chamber that the demand of the Jewish officer should be granted if only to tranquillize the country. The necessary faits nouveaux were speedily found by the minister of war, General Andre, and having been examined by a special commission of revision were ordered to be transmitted to the court of cassation for final adjudication. On the 12th of July 1906, the court, all chambers united, gave its judgment. Aftetf a lengthy review of the case it declared unanimously that the whole accusation against Dreyfus had been disproved, and it quashed the judgment of the Rennes court-martial sans renvoi. The explanation of the whole case is that Esterhazy and Henry were the real culprits; that they had made a trade of supplying the German government with military documents; and that once the Bordereau was discovered they availed themselves of the anti- Jewish agitation to throw suspicion on Dreyfus.

Thus ended this famous case, to the relief of the whole country and with the approval of the great majority of French citizens. Except a knot of anti-

Semitic monomaniacs all parties bowed loyally to the judgment of the court of cassation. The govern^ ment gave the fullest effect to the judgment. Dreyfus and Picquart were restored to the active list of the army with the ranks respectively of major and general of brigade. Dreyfus was also created a knight of the Legion of Honour, and received the decoration in public in the artillery pavilion of the military school. Zola, to whose efforts the triumph of truth was chiefly due, had not been spared to witness the final scene, but the chambers decided to give his remains a last resting-place in the Pantheon. When three months later M. Clemenceau formed his first cabinet he appointed General Picquart minister of war. Nothing indeed was left undone to repair the terrible series of wrongs which had grown out of the Dreyfus case. Nevertheless its destructive work could not be wholly healed. For over ten years it had been

a nightmare to France, and it now modified the whole course of French history. In the ruin of the French Church, which owed its disestablishment very largely to the Dreyfus conspiracy, may be read the most eloquent warning against the demoralizing madness of anti-Semitism.

In sympathy with the agitation in France there has been a similar movement ii? Algeria, where the European population have long resented the admission of the native Jews to the rights of French citizenship. The agitation has been marked by much violence, and most of the anti-Semitic deputies in the French parliament, including M. Drumont, have found constituencies in Algeria. As the local anti-Semites are largely Spaniards and Levantine riff-raff, the agitation has not the peculiar nationalist bias which characterizes continental anti-Semitism. Before the energy of the authorities it has lately shown signs of subsiding.

While the main activity of anti-Semitism has manifested itself in Germany, Russia, Rumania, Austria-Hungary and France, its vibratory influences have been felt in other countries Brf// when conditions favourable to its extension have*

4c ‘ presented themselves. In England more than one attempt to acclimatize the doctrines of Marr and Treitschke has been made. The circumstance that at the time of the rise of German anti-Semitism a premier of Hebrew race, Lord Beaconsfield, was in power first suggested the Jewish bogey to English political extremists. The Eastern crisis of 1876-1878, which was regarded by the Liberal party as primarily a struggle between Christianity, as represented by Russia, and a degrad- ing Semitism, as represented by

Turkey, accentuated the anti- Jewish feeling, owing to the anti-Russian attitude adopted by the government. Violent expression to the ancient prejudices against the Jews was given by Sir J. G. Tollemache Sinclair (A Defence of Russia, 1877). Mr T P. O'Connor, in a life of Lord Beaconsfield (1878), pictured him as the instrument of the Jewish people, " moulding the whole policy of Christendom to Jewish aims." Professor Goldwin Smith, in several articles in the Nineteenth Century (1878, 1881 and 1882), sought to synthetize the growing anti-Jewish feeling by adopting the nationalist theories of the German anti-Semites. This movement did not fail to find an equivocal response in the speeches of some of the leading Liberal statesmen; but on the country generally it pro- duced no effect. It was revived when the persecutions in Russia threatened England with a great influx of Polish Jews, whose mode of life was calculated to lower the standard of living in the industries in which they were employed, and it has left its trace in the anti-alien legislation of 1905. In 1883 Stocker visited London, but received a very unflattering reception. Abortive attempts to acclimatize anti-Semitism have also been made in Switzerland, Belgium, Greece and the United States.

Anti-Semitism made a great deal of history during the thirty years up to 1908, but has left no permanent mark of a con- structive kind on the social and political evolution of Europe. It is the fruit of a great ethnographic and political error, and it has spent itself in political intrigues of transparent dishonesty. Its racial doctrine is at best a crude hypothesis: its nationalist theory has only served to throw into striking relief the essentially economic bases of modern society, while its political activity has revealed the vulgarity and ignorance which constitute its main sources of strength. So far from injuring the Jews, it has really given Jewish racial separatism a new lease of life. Its extravagant accusations, as in the Tisza Eszlar and Dreyfus cases, have resulted in the vindication of the Jewish character. Its agitation generally, coinciding with the revival of interest in Jewish history, has helped to transfer Jewish solidarity from a religious to a racial basis. The bond of a common race, vitalized by a new pride in Hebrew history and spurred on to resistance by the insults of the anti-Semites, has given a new spirit and a new source of strength to Judaism at a moment when the approxima- tion of ethical systems and the revolt against dogma were sapping its essentially religious foundations. In the whole history of Judaism, perhaps, there have been no more numerous or remark- able instances of reversions to the faith than in the period in question. The reply of the Jews to anti-Semitism has taken

two interesting practical forms. In the first place there is the so-called Zionist movement, which is a kind of Jewish nationalism and is vitiated by the same errors that distinguish its anti- Semitic analogue (see Zionism). In the second place, there is a movement represented by the Maccabaeans'

Society in London, which seeks to unite the Jewish people in an effort to raise the Jewish character and to promote a higher consciousness of the dignity of the race. It lays no stress on orthodoxy, but welcomes all who strive to render Jewish conduct an adequate reply to the theories of the anti-Semites. Both these movements are elements of fresh vitality to Judaism, and they are prob- ably destined to produce important fruit in future years. A splendid spirit of generosity has also been displayed by the Jewish community in assisting and relieving the victims of the Jew- haters. Besides countless funds raised by public subscription, Baron de Hirsch founded a colossal scheme for transplanting persecuted Jews to new countries under new conditions of life, and endowed it with no less a sum than £9,000,000 (see Hirsch, Maurice de).

Though anti-Semitism has been unmasked and discredited, it is to be feared that its history is not yet at an end. While there remain in Russia and Rumania over six millions of Jew& who are being systematically degraded, and who periodically overflow the western frontier, there must continue to be a Jewish question in Europe; and while there are weak governments, and ignorant and superstitious elements in the enfranchized classes of the countries affected, that question will seek to play a part in politics.

Literature. — No impartial history of modern anti-S«mitism has yet been written. The most comprehensive works on the subject, Israel among the Nations, by A. Leroy-Beaulieu (1895), and L'Anti- stmitisme, son histoire et ses causes, by Bernard Lazare (1894), are collections of studies rather than histories. M. Lazare's work will be found most useful by the student on account of its detached standpoint and its valuable bibliographical notes. A good list of works relating to Jewish ethnography will be found at the end of M. Isidor Loeb's valuable article, " Juifs," in the Dictionnaire universel de gSographie (1884). To these should be added, Adolf Jellinek, Der Judische Stamm (1869); Chwolson, Die semitischen Volker (1872); Nossig, Materialien zur Statistik (1887); Jacobs, Jewish Statistics (1891); and Andree, Zur Volkskunde der Juden (1881). A bibliography of the Jewish question from 1875 to 1884 has been published by Mr Joseph Jacobs (1885). Useful additions and rectifications will be found in the Jewish World, nth September 1885. During the period since 1885 the anti-Semitic movement has produced an immense pa,mphlet literature. Some of these pro- ductions have already been referred to ; others will be found in current bibliographies under the names of the personages mentioned, such as Stocker, Ahlwardt, &c. On the Russian persecutions, besides the works quoted by Jacobs, see the pamphlet issued by the Russo-Jewish Committee in 1890, and the annual reports of the Russo-Jewish Mansion House Fund ; Les Juifs de Russie (Paris, 1 891); Report of the Commissioners of Immigration upon the Causes which incite Immigration to the United States (Washington, 1892) ; The New Exodus, by Harold Frederic (1892); Les

Juifs russes, by Leo Errera (Brussels, 1893). The most valuable collection of facts relating to the persecutions of 1881-1882 are to be found in the Feuilles Jaunes (52 nos.), compiled and circulated for the information of the European press by the Alliance Israelite of Paris. Complete collections are very scarce. For the struggle during the past decade the Russische Correspondenz of Berlin should be consulted, together with its French and English editions. See also the publications of the Bund (Geneva; Imprimerie Israelite); Semenoff, The Russian Government and the Massacres, and Quarterly Review, October 1906. On the Rumanian question, see Bluntschli, Roumania and the Legal Status of the Jews (London, 1879); Wir Juden (Zurich, 1883); Schloss, The Persecution of the Jews in Roumania (London, 1885); Schloss, Notes of Information (1886); Sincerus, Juifs en Roumanie (London, 1901) ; Plotke, Die rumanischen Juden unter dem Fiirsten u. Kbnig Karl (1901); Dehn, Diplomatie u. Hochfinanz in der rumanischen Judenfrage (1901); Conybeare, "Roumania as a Persecuting Power," Nat. Rev., February 1901. On Hungary and the Tisza Eszlar Case, see (besides the references in Jacobs) Nathan, Der Prozess von Tisza Eszlar (Berlin, 1892). On this case and the Blood Accusation generally, see Wright, " The Jews and the Mali- cious Charge of Human Sacrifice," Nineteenth Century, 1883. The origins of the Austrian agitation are dealt with by Nitri, Catholic Socialism (r895). This work, though inclining to anti-Semitism, should be consulted for the Christian Socialist elements in the whole continental agitation. The most valuable source of information on the Austrian movement is the Osterteichische Wochenschrift, edited by Dr Bloch. See also pamphlets and speeches by the anti-Semitic leaders, Liechtenstein, Lueger, Schoenerer, &c. The case of the French anti-Semites is stated by E. Drumont in his France juive.

and other works; the other side by Isidor Loeb, Bernard Lazare, Leonce Reynaud, &c. Of the Dreyfus Case there is an enormous literature : see especially the reports of the Zola and Picquart trials, the revision case before the Court of Cassation, the proceedings of the Rennes court-martial, and the final judgment of the Court of Cas- sation printed in full in the Figaro, July 15, 1906; also Reinach, Histoire de I'affaire Dreyfus (Paris, 1908, 6 vols.), and the valuable series of volumes by Captain Paul Marin, MM. Clemenceau, Lazare, Yves Guyot, Paschal Grousset, Urbain Gohier, de Haime, de Pressense, and the remarkable letters of Dreyfus (Lettres d'un innocent). An English history of the case was published by F. C. Conybeare (I 898) , whose articles and those of Sir Godfrey Lushington and L. J. Maxse in the National Review, 1897-1900, will be found invaluable by the

student. On the Algerian question, see M. Wahl in the Revue des etudes juives; L. Forest, Naturalisation des Israe- lites algeriens ; and E. Audinet in the Revue generate de droit inter- national publique, 1897, No. 4. On the history of the anti-Semitic movement generally, see the annual reports of the Alliance Israelite of Paris and the Anglo-Jewish Association of London, also the annual summaries published at the end of the Jewish year by the Jetvish Chronicle of London. The connexion of the movement with general party politics must be followed in the newspapers. The present writer has worked with a collection of newspaper cuttings numbering several thousands and ranging over thirty years. (L. W.)

ANTISEPTICS (Gr. deri, against, and crq-KTi.Kb's, putrefactive), the name given to substances which are used for the prevention of bacterial development in animal or vegetable matter. Some are true germicides, capable of destroying the bacteria, whilst others merely prevent or inhibit their growth. The antiseptic method of treating wounds (see Surgery) was introduced by Lord List, and was an outcome of Pasteur's germ theory of putrefaction. For the growth of bacteria there must be a certain food supply, moisture, in most cases oxygen, and a certain minimum temperature (see Bacteriology). These conditions have been specially studied and applied in connexion with the preserving of food (see Food Preservation) and in the ancient practice of embalming the dead, which is the earliest illustration of the systematic use of antiseptics (see Embalming). In early inquiries a great point was made of the prevention of putre- faction, and work was done in the way of' finding how much of an agent must be added to a given solution, in order that the bacteria accidentally present might not develop. But for various reasons this was an inexact method, and to-day an antiseptic is judged by its effects on pure cultures of definite pathogenic microbes, and on their vegetative and spore forms. Their standardization has been effected in many instances, and a water solution of carbolic acid of a certain fixed strength is now taken as the standard with which other antiseptics are compared. The more important of those in use to-day are carbolic acid, the perchloride and biniodide of mercury, iodo- form, formalin, salicylic acid, &c. Carbolic acid is germicidal in strong solution, inhibitory in weaker ones. The so-called " pure" acid is applied to infected living tissues, especially to tuberculous sinuses or wounds, after scraping them, in order to destroy any part of the tuberculous material still remaining. A solution of 1 in 20 is used to sterilize instruments before an operation, and towels or lint to be used for the patient. Care must always be taken to avoid absorption (see Carbolic Acid). The per- chloride of mercury is another very powerful antiseptic used in solutions of strength 1 in 2000, 1 in 1000 and 1 in 500. This or the biniodide of mercury is the last antiseptic applied to the surgeon's and assistants' hands before an operation begins. They are not, however, to be*

used in the disinfection of instru- ments, nor where any large abraded surface would favour absorp- tion. Boracic acid receives no mention here; though it is popularly known as an antiseptic, it is in reality only a soothing fluid, and bacteria will flourish comfortably in contact with it. Of the dry antiseptics iodoform is constantly used in septic or tuberculous wounds, and it appears to have an inhibitory action on Bacillus tuberculosis . Its power depends on the fact that it is slowly decomposed by the tissues, and free iodine given off. Among the more recently introduced antiseptics, chinosol, a yellow substance freely soluble in water, and lysol, another coal-tar derivative, are much used. But every anti- septic, however good, is more or less toxic and irritating to a

wounded surface. Hence it is that the " antiseptic " method has been replaced in the surgery of to-day by the "aseptic" method (see Surgery), which relies on keeping free from the invasion of bacteria rather than destroying them when present.

ANTISTHENES (c. 444-365 B.C.), the founder of the Cynic school of philosophy, was born at Athens of a Thracian mother, a fact which may account for the extreme boldness of his attack on conventional thought. In his youth he studied rhetoric under Gorgias, perhaps also under Hippias and Prodicus. Gomperz suggests that he was originally in good circumstances, but was reduced to poverty. However this may be, he came under the influence of Socrates, and became a devoted pupil. So eager was he to hear the words of Socrates that he used to walk daily from Peiraeus to Athens, and persuaded his friends to accompany him. Filled with enthusiasm for the Socratic idea of virtue, he founded a school of his own in the Cynosarges, the hall of the bastards (vodoi). Thither he attracted the poorer classes by the simplicity of his life and teaching. He wore a cloak and carried a staff and a wallet, and this costume became the uniform of his followers. Diogenes Laertius says that his works filled ten volumes, but of these fragments only remain. His favourite style seems to have been the dialogue, wherein we see the effect of his early rhetorical training. Aristotle speaks of him as uneducated and simple-minded, and Plato describes him as struggling in vain with the difficulties of dialectic. His work represents one great aspect of Socratic philosophy, and should be compared with the Cyrenaic and Megarian doctrines.

Bibliography. — Charles Chappuis, Antisthene (Paris, 1854); A. Miiller, De Antisthenis cynici vita et scriptis (Dresden, i860); T. Gomperz, Greek Thinkers (Eng. trans., 1905), vol. ii. pp. 142 ff., 150 ff. For his philosophy see Cynics, ami for his pupils, Diogenes and Crates, see articles under these headings.

ANTISTROPHE, the portion of an ode which is sung by the chorus in its

returning movement from west to east, in response to the strophe, which was sung from east to west. It is of the nature of a reply, and balances the effect of the strophe. Thus, in Gray's ode called " The Progress of Poesy," the strophe, which dwelt in triumphant accents on the beauty, power and ecstasy of verse, is answered by the antistrophe, in a depressed and melancholy key —

" Man's feeble race what ills await, Labour, and Penury, the racks of Pain, Disease and Sorrow's weeping Train, And Death, sad refuge from the storms of Fate," &c.

When the sections of the chorus have ended their responses, they unite and close in the epode, thus exemplifying the triple form in which the ancient sacred hymns of Greece were com- posed, from the days of Stesichorus onwards. As Milton says, " strophe, antistrophe and epode were a kind of stanza framed only for the music then used with the chorus that sang."

ANTITHESIS (the Greek for " setting opposite "), in rhetoric, the bringing out of a contrast in the meaning by an obvious contrast in the expression, as in the following: — " When there is need of silence, you speak, and when there is need of speech, you are dumb; when present, you wish to be absent, and when absent, you desire to be present; in peace you are for war, and in war you long for peace; in council you descant on bravery, and in the battle you tremble." Antithesis is sometimes double or alternate, as in the appeal of Augustus: — " Listen, young men, to an old man to whom old men were glad to listen when he was young." The force of the antithesis is increased if the words on which the beat of the contrast falls are alliterative, or otherwise similar in sound, as — " The fairest but the falsest of her sex." There is nothing that gives to expression greater point and vivacity than a judicious employment of this figure; but, on the other hand, there is nothing more tedious and trivial than a pseudo-antithetical style. Among English writers who have made the most abundant use of antithesis are Pope, Young, Johnson, and Gibbon; and especially Lyly in his Euphues. It is, however, a much more common feature in French than in

English; while in German, with some striking exceptions, it is conspicuous by its absence.

ANTITYPE (Gr. 6.vt'ltvko%) , the correlative of " type," to which it corresponds as the stamp to the die, or vice versa. In the sense of copy or

likeness the word occurs in the Greek New Testament (Heb. ix. 24; 1 Peter iii. 21), English " figure." By theological writers antitype is employed to denote the reality of which a type is the prophetic symbol. Thus, Christ is the anti- type of many of the types of the Jewish ritual. By the fathers of the Greek church (e.g. Gregory Nazianzen) antitype is em- ployed as a designation of the bread and wine in the sacrament of the Lord's Supper.

ANTIUM (mod. Anzio), an ancient Volscian city on the coast of Latium, about 33 m. S. of Rome. The legends as to its foundation, and the accounts of its early relations with Rome, are untrustworthy; but Livy's account of wars between Antium and Rome, early in the 4th century B.C., may perhaps be ac- cepted. Antium is named with Ardea, Laurentum and Circeii, as under Roman protection, in the treaty with Carthage in 348 B.C. In 341 it lost its independence after a rising with the rest of Latium against Rome, and the beaks (rostra) of the six captured Antiatine ships decorated and gave their name to the orators' tribunal in the Roman Forum. At the end of the Republican period it became a resort of wealthy Romans, and the Julian and Claudian emperors frequently visited it; both Caligula and Nero were born there. The latter founded a colony of veterans and built a new harbour, the projecting moles of which are still extant. In the middle ages it was deserted in favour of Nettuno: at the end of the 17th century Innocent XII. and Clement XI. restored the harbour, not on the old site but to the east of it, with the opening to the east, a mistake which leads to its being frequently silted up; it has a depth of about 15 ft. Remains of Roman villas are conspicuous all along the shore, both to the east and to the north-west of the town. That of Nero cannot be certainly identified, but is generally placed at the so-called Arco Muto, where remains of a theatre (discovered in 1712 and covered up again) also exist. Many works of art have been found. Of the famous temple of Fortune (Horace, Od. i. 35) no remains are known. The sea is encroaching slightly at Anzio, but some miles farther north-west the old Roman coast-line now lies slightly inland (see Tiber). The Volscian city stood on higher ground and somewhat away from the shore, though it extended down to it. It was defended by a deep ditch, which can still be traced, and by walls, a portion of which, on the eastern side, constructed of rectangular blocks of tufa, was brought to light in 1897. The modern place is a summer resort and has several villas, among them the Villa Borghese.

See A. Nibby, Dintorni di Roma, i. 181; Notizie degli scavi, passim. (T. As.)

ANTIVARI (Montenegrin Bar, so called by the Venetians from its position opposite Bari in Italy), a seaport of Montenegro which until 1878 belonged to Turkey. Pop. (1900) about 2500. The old town is built inland, on a strip of country running between the Adriatic Sea and the Sutorman range

of mountains, overshadowed by the peak of Rumiya (5148 ft.). At a few hundred yards' distance it is invisible, hidden among dense olive groves. Within, there is a ruinous walled village, and the shell of an old Venetian fortress, surrounded by mosques and bazaars; for Antivari is rather Turkish than Montenegrin. The fine bay of Antivari, with Prstan, its port, is distant about one hour's drive through barren and forbidding country, shut in by mountains. At the northern horn of the bay stands Spizza, an Austrian military station. Antivari contains the residence of its Roman Catholic archbishop, and, in the centre of the shore, Topolitsa, the square undecorated palace of the crown prince. Antivari is the name applied both to Prstan and the old town. The Austrian Lloyd steamers call at times, and the " Puglia " S.S. Company runs a regular service of steamers to and from Bari. As an outlet for Montenegrin com- merce, however, Antivari cannot compete with the Austrian Cattaro, the harbour being somewhat difficult of access in

stormy weather. Fishing and olive-oil refining are the main industries.

ANT-LION, the name given to neuropterous insects of the family Myrmeleonidae, with relatively short and apically clubbed antennae and four large densely reticulated wings in which the apical veins enclose regular oblong spaces. The perfect insects are for the most part nocturnal and are believed to be carnivorous. The best-known species, Myrmeleon fortnicarius, which may be found adult in the late summer, occurs in many countries on the European continent, though like the rest of this group it is not indigenous in England. Strictly speaking, how- ever, the term ant-lion applies to the larval form, which has been known scientifically for over two hundred years, on account of its peculiar and forbidding appearance and its skilful and unique manner of entrapping prey by means of a pitfall. The abdomen is oval, sandy-grey in hue and beset with warts and bristles; the prothorax forms a mobile neck for the large square head, which carries a pair of long and powerful toothed mandibles. It is in dry and sandy soil that the ant-lion lays its trap. Having marked out the chosen site by a circular groove, it starts to crawl backwards, using its abdomen as a plough to shovel up the soil. By the aid of one front leg it places consecutive heaps of loosened particles upon its head, then with a smart jerk throws each little pile clear of the scene of operations. Proceeding thus it gradually works its way from the circumference towards the centre. When the latter is reached and the pit completed, the larva settles down at the bottom, buried in the soil with only the jaws pro- jecting above the surface. Since the sides of the pit consist of loose sand they afford an insecure foothold to any small insect that inadvertently ventures over the edge. Slipping to the bottom the prey is immediately seized by the lurking ant-lion; or if it attempt to scramble again up the treacherous walls of the pit, is speedily checked in its efforts and brought down by showers of loose sand which are

jerked at it from below by the larva. By means of similar head-jerks the skins of insects sucked dry of their contents are thrown out of the pit, which is then kept clear of refuse. A full-grown larva digs a pit about 2 in. deep and 3 in. wide at the edge. The pupa stage of the ant-lion is quiescent. The larva makes a globular case of sand stuck together with fine silk spun, it is said, from a slender spinneret at the posterior end of the body. In this it remains until the completion of the transformation into the sexually mature insect, which then emerges from the case, leaving the pupal integument behind. In certain species of Myrmeleonidae, such as Dendroleon pantheormis, the larva, although resembling that of Myrmeleon structurally, makes no pitfall, but seizes passing prey from any nook or crevice in which it shelters.

The exact meaning of the name ant-lion (Fr. fourmilion) is uncertain. It has been thought that it refers to the fact that ants form a large percentage of the prey of the insect, the suffix " lion " merely suggesting destroyer or eater. Per- haps, however, the name may only signify a large terrestrial biting apterous insect, surpassing the ant in size and predatory habits. (R. I. P.)

ANTOFAGASTA, a town and port of northern Chile and capital of the Chilean province of the same name, situated about 768 m. N. of Valparaiso in 23° 38′ 39″ S. lat. and 70 24′ 39″ W. long. Pop. (est. 1902) 16,084. Antofagasta is the seaport for a railway running to Oruro, Bolivia, and is the only available outlet for the trade of the south-western departments of that republic. The smelting works for the neighbouring silver mines are located here, and a thriving trade with the inland mining towns is carried on. The town was founded in 1870 as a shipping port for the recently discovered silver mines of that vicinity, and belonged to Bolivia until 1879, when it was occupied by a Chilean military force.

The province of Antofagasta has an area of 46,611 sq. m. lying within the desert of Atacama and between the provinces of Tarapaca. and Atacama. It is rich in saline and other mineral deposits, the important Caracoles silver mines being about 90 m. north-east of the port of Antofagasta. Like the other provinces of this region, Antofagasta produces for export copper, silver,

silver ores, lead, nitrate of soda, borax and salt. Iron and manganese ores are also found. Besides Antofagasta the principal towns are Taltal, Mejillones, Cobija (the old capital) and Tocopilla. Up to 1879 the province

belonged to Bolivia, and was known as the department of Atacama, or the Litoral. It fell into the possession of Chile in the war of 1879-82, and was definitely ceded to that republic in 1885;

ANTOINE, ANDR£ (1858-), French actor-manager, was born at Limoges, and in his early years was in business. But he was an enthusiastic amateur actor, and in 1887 he founded in Paris the Theatre Libre, in order to realize his ideas as to the proper development of dramatic art. For an account of his work, which had enormous influence on the French stage, see Drama: France. In 1894 he gave up the direction of this theatre, and became connected with the Gymnase, and later (1896) with the Od6on.

ANTONELLI, GIACOMO (1806-1876), Italian cardinal, was born at Sonnino on the 2nd of April 1806. He was educated for the priesthood, but, after taking minor orders, gave up the idea of becoming a priest, and chose an administrative career. Created secular prelate, he was sent as apostolic delegate to Viterbo, where he early manifested his reactionary tendencies in an attempt to stamp out Liberalism. Recalled to Rome in 1 84 1, he entered the office of the papal secretary of state, but four years later was appointed pontifical treasurer-general. Created cardinal (nth June 1847), he was chosen by Pius IX. to preside over the council of state entrusted with the drafting of the constitution. On the 10th of March 1848 Antonelli became premier of the first constitutional ministry of Pius IX., a capacity in which he displayed consummate duplicity. Upon the fall of his cabinet Antonelli created for himself the governorship of the sacred palaces in order to retain constant access to and influence over the pope. After the assassination of Pellegrino Rossi (15th November 1848) he arranged the flight of Pius IX. to Gaeta, where he was appointed secretary of state. Notwith- standing promises to the powers, he restored absolute govern- ment upon returning to Rome (12th April 1850) and violated the conditions of the surrender by wholesale imprisonment of Liberals. In 1855 he narrowly escaped assassination. As ally of the Bourbons of Naples, from whom he had received an annual subsidy, he attempted, after i860, to facilitate their restoration by fomenting brigandage on the Neapolitan frontier. To the overtures of Ricasoli in 1861, Pius IX., at Antonelli's sugges- tion, replied with the famous " Non possumus," but subse- quently (1867) accepted, too late, Ricasoli's proposal concerning ecclesiastical property. After the September Convention (1864) Antonelli organized the Legion of Antibes to replace French troops in Rome, and in 1867 secured French aid against Gari- baldi's invasion of papal territory. Upon the reoccupation of Rome by the French after Mentana, Antonelli again ruled supreme, but upon the entry of the Italians in 1870 was obliged to restrict his activity to the management of foreign relations. He wrote, with papal approval, the letter requesting the Italians to occupy the Leonine city, and obtained from the Italians payment of the Peter's pence (5,000,000 lire)

remaining in the papal exchequer, as well as 50,000 scudi — the first and only instalment of the Italian allowance (subsequently fixed by the Law of Guarantees, March 21, 1871) ever accepted by the Holy See. At Antonelli's death the Vatican finances were found to be in disorder, with a deficit of 45,000,000 lire. His personal fortune, accumulated during office, was considerable, and was bequeathed almost entirely to members of his family. To the Church he left little and to the pope only a trifling souvenir. From 1850 until his death he interfered little in affairs of dogma and church discipline, although he addressed to the powers circulars enclosing the Syllabus (1864) and the acts of the Vatican Council (1870). His activity was devoted almost exclusively to the struggle between the papacy and the Italian Risorgimento, the history of which is comprehensible only when the influence exercised by his unscrupulous, grasping and sinister personality is fully taken into account. He died on the 6th of November 1876.

ANTONELLO DA MESSINA (c. 1430-1479), Italian painter, was probably born at Messina about the beginning of the 15th century, and laboured at his art for some time in his native country. Happening to see at Naples a painting in oil by JaTi Van Eyck, belonging to Alphonso of Aragon, he was struck by the peculiarity and value of the new method, and set out for the Netherlands "to acquire a knowledge of the process from Van Eyck's disciples. He spent some time there in the prosecution of his art; returned with his secret to Messina about 1465; probably visited Milan; removed to Venice in 1472, where he painted for the Council of Ten; and died there in the middle of February 1479 (see Venturi's article in Thieme-Becker, Kiinstler- lexikon, 1907) .. His style is remarkable for its union — not always successful — of Italian simplicity with Flemish love of detail. His subjects are frequently single figures, upon the complete representation of which he bestows his utmost skill. There are extant — besides a number more or less dubious — twenty authentic productions, consisting of renderings of " Ecce Homo," Madonnas, saints, and half-length portraits, many of them painted on wood. The finest of all is said to be the nameless picture of a man in the Berlin museum. The National Gallery, London, has three works by him, including the " St Jerome in his Study." Antonello exercised an important influence on Italian painting, not only by the introduction of the Flemish invention, but also by the transmission of Flemish tendencies.

ANTONINI ITINERARIUM, a valuable register, still extant; of the stations and distances along the various roads of the Roman empire, seemingly based on official documents, which were probably those of the survey organized by Julius Caesar, and carried out under Augustus. Nothing is known with certainty as to the date or author. It is considered probable that the date of the original edition was the beginning of the 3rd century,

while that which we possess is to be assigned to the time of Diocletian. If the author or promoter of the work is one of the emperors, it is most likely to be Antoninus Caracalla.

Editions by Wesseling, 1735, Parthey and Pindar, 1848. The portion relating to Britain was published under the title Iter Britan- niarum, with commentary by T. Reynolds, 1799.

ANTONINUS, SAINT [Antonio Pierozzi, also called de For- ciglioni] (1389-1459), archbishop of Florence, was born at that city on the 1st of March 1389. He entered the Dominican order in his 1 6th year, and was soon entrusted, in spite of his youth, with the government of various houses of his order at Cortona, Rome, Naples and Florence, which he laboured zealously to reform. He was consecrated archbishop of Florence in 1446, and won the esteem and love of his people, especially by his energy and resource in combating the effects of the plague and earthquake in 1448 and 1453. He died on the 2nd of May 1459, and was canonized by Pope Adrian VI. in 1523. His feast is annually celebrated on the 13th of May. Antoninus had a great reputation for theological learning, and sat as papal theologian at the council of Florence (1439). Of his various works, the list of which is given in Quetif-Echard, De Scriptoribus Ord. Praedicat., i. 818, the best-known are his Summa theologica (Venice, 1477; Verona, 1740) and the Summa confessionalis (Mondovi, 1472), invaluable to confessors.

See Bolland, Acta Sanctorum, i., and U. Chevalier, Rep. des. s. hist. (1905), pp. 285-286.

ANTONINUS LIBERALIS, Greek grammarian, probably flourished about a.d. 150. He wrote a collection of forty-one tales of mythical metamorphoses (MeTafxop

Westermann, Mythographi Graeci (1843); Oder, De Antonino Liber ali (1886).

ANTONINUS PIUS [Titus Aurelius Fulvus Boionius Arrius Antoninus], (a.d. 86-161), Roman emperor a.d. 138- 161, the son of Aurelius Fulvus, a Roman consul whose family had originally belonged to Nemausus (Nimes), was born near Lanuvium on the 19th of September 86. After the death of his father, he was brought up under- the care of Arrius Antoninus, his maternal grandfather, a man of integrity and culture, and on terms of friendship with the younger Pliny. Having filled with more than usual success the offices of quaestor and praetor,

he obtained the consulship in 120; he was next chosen one of the four consulars for Italy, and greatly increased his reputation by his conduct as proconsul of Asia. He acquired much influence with the emperor Hadrian, who adopted him as his son and successor on the 25th of February 138, after the death of his first adopted son Aelius Verus, on condition that he himself adopted Marcus Annius Verus, his wife's brother's son, and Lucius, son of Aelius Verus, afterwards the emperors Marcus Aurelius and Lucius Aelius Verus (colleague of Marcus Aurelius). A few months afterwards, on Hadrian's death, he was enthusiastically welcomed to the throne by the Roman people, who, for once, were not disappointed in their anticipation of a happy reign. For Antoninus came to his new office with simple tastes, kindly disposition, extensive experience, a well-trained intelligence and the sincerest desire for the welfare of his subjects. Instead of plundering to support his prodigality, he emptied his private treasury to assist distressed provinces and cities, and everywhere exercised rigid economy (hence the nickname KVfj.LVoirplo-Ti]s, , " cummin splitter "). Instead of exaggerating into treason whatever was susceptible of unfavourable interpretation, he turned the very conspiracies that were formed against him into opportunities of signalizing his clemency. Instead of stirring up persecution against the Christians, he extended to them the strong hand of his protection throughout the empire. Rather than give occasion to that oppression which he regarded as inseparable from an emperor's progress through his dominions, he was content to spend all the years of his reign in Rome, or its neighbourhood. Under his patronage the science of jurisprud ence was cultivated by men of high ability, and a number of humane and equitable enactments were passed in his name. Of the public transactions of this period we have but scant information, but, to judge by what we possess, those twenty-two years were not remarkably eventful. One of his first acts was to persuade the senate to grant divine honours to Hadrian, which they had at first refused; this gained him the title of Pius (duti- ful in affection). He built temples, theatres, and mausoleums, promoted the arts and sciences, and bestowed honours and salaries upon the teachers of rhetoric and philosophy. His reign was comparatively peaceful. Insurrections amongst the Moors, Jews, and Brigantes in Britain were easily put down. The one military result which is of interest to us now is the building in Britain of the wall of Antoninus from the Forth to the Clyde. In his domestic relations Antoninus was not so fortunate. His wife, Faustina, has almost become a byword for her lack of womanly virtue; but she seems to have kept her hold on his affections to the last. On her death he honoured her memory by the foundation of a charity for orphan girls, who bore the name of Alimentariae Faustinianae. He had by her two sons and two daughters; but they all died before his eleva- tion to the throne, except Annia Faustina, who became the wife of Marcus Aurelius. Antoninus died of fever at Lorium in Etruria, about 12 m. from Rome, on the 7th of March

i6r, giving the keynote to his life in the last word that he uttered when the tribune of the night-watch came to ask the password — aequanimUas.

The only account of his life handed down to us is that of Julius Capitolinus, one of the Scriptores Historiae Augustae. See Bossart- Muller, Zur Geschichte des Kaisers A. (1868); Lacour-Gayet, A. le Pieux et son Temps (1888); Bryant, The Reign of Antonine (Cam- bridge Historical Essays, 1895); P. B. Watson, Marcus Aurelius Antoninus (London, 1884), chap. ii.

ANTONIO, known as " The Prior or Crato " (1531-1595), claimant of the throne of Portugal, was the natural son of Louis (Luis), duke of Beja, by Yolande (Violante) Gomez, a Jewess, who is said to have died a nun. His father was a younger son of Emanuel, king of Portugal (1495-1521). Antonio was educated at Coimbra, and was placed in the order of St John. He was endowed with the wealthy priory of Crato. Little is known of his life till 1578. In that year he accompanied King Sebastian (1557—1578) in his invasion of Morocco, and was taken prisoner by the Moors at the battle of Alcazar-Kebir, in which the king was slain. Antonio is said to have secured his release on easy terms by a fiction. He was asked the meaning

of the cross of St John which he wore on his doublet, and replied that it was the sign of a small benefice which he held from the pope, and would lose if he were not back by the 1st of January. His captor, believing him to be a poor man, allowed him to escape for a small ransom. On his return to Portugal he found that his uncle, the cardinal Henry, only surviving son of King John III. (1521-1557), had been recognized as king. The cardinal was old, and was the last legitimate male representative of the royal line (see Portugal: History). The succession was claimed by Philip II. of Spain. Antonio, relying on the popular hostility to a Spanish ruler, presented himself as a candidate. He had endeavoured to prove that his father and mother had been married after his birth. There was, however, no evidence of the marriage. Antonio's claim, which was inferior not only to that of Philip II., but to that of the duchess of Braganza, was not supported by the nobles or gentry. His partisans were drawn exclusively from the inferior clergy, the peasants and workmen. The prior endeavoured to resist the army which Philip II. marched into Portugal to enforce his pretensions, but was easily routed by the duke of Alva, the Spanish commander, at Alcantara, on the 25th of August 1580. At the close of the year, or in the first days of 158 1, he fled to France carrying with him the crown jewels, which included many valuable diamonds. He was well received by Catherine de' Medici, who had a claim of her own on the crown of Portugal, and looked upon him as a convenient instrument to be used against Philip II. By promising to cede the Portuguese colony of Brazil to her, and by the sale of part of his jewels, Antonio secured means to fit out

a fleet manned by Portuguese exiles and French and English adventurers. As the Spaniards had not yet occupied the Azores he sailed to them, but was utterly defeated at sea by the marquis of Santa Cruz off Saint Michael's on the 27th of July 1582. He now returned to France, and lived for a time at Ruel near Paris. Peril from the assassins employed by Philip II. to remove him drove Antonio from one refuge to another, and he finally came to England. Elizabeth favoured him for much the same reasons as Catherine de' Medici. In 1589, the year after the Armada, he accompanied an English expedition under the com- mand of Drake and Norris to the coast of Spain and Portugal. i The force consisted partly of the queen's ships, and in part of privateers who went in search of booty. Antonio, with all the credulity of an exile, believed that his presence would provoke a general rising against Philip II., but none took place, and the expedition was a costly failure. In 1590 the pretender left England and returned to France,, where he fell into poverty. His remaining diamonds were disposed of by degrees. The last and finest was acquired by M. de Sancy, from whom it was purchased by Sully and included in the jewels of the crown. During his last days he lived as a private gentleman on a small pension given him by Henry IV., and he died in Paris on the 26th of August 1595. He left two illegitimate sons, and his descendants can be traced till 1687. In addition to papers published to defend his claims Antonio was the author of the Panegyrus Alphonsi Lusitanorum Regis (Coimbra, 1 550), and of a cento of the Psalms, P 'salmi Confessionales (Paris 1592), which was translated into English under the title of The Royal Penitent by Francis Chamberleyn (London, 1659), and into German as Heilige Betrachtungen (Marburg, 1677).

Authorities. — AntOnio is frequently mentioned in the French, English, and Spanish state papers of the time. A life of him, attri- buted to Gomes Vasconcellos de Figueredo, was published in a French translation by Mme de Sainctonge at Amsterdam (1696). A modern account of him, Un pretendant portugais au XVI. Steele, by E. Fournier (Paris, 1852), is based on authentic sources. See also Dom Antonio Prior de Crato — notas de bibliographia, by J. de Aranjo (Lisbon, 1897). (D. H.)

ANTONIO, NICOLAS (1617-1684), Spanish bibliographer, was born at Seville on the 31st of July 1617. After taking his degree at Salamanca (1636-1639), he returned to his native city, wrote his treatise De Exilio (which was not printed till 1659), and began his monumental register of Spanish writers. The fame of his learning reached Philip IV., who conferred the order of Santiago I on him in 1645, and sent him as general agent to Rome in 1654.

Returning to Spain in 1679, Antonio died at Madrid in the spring of 1684. His Bibliotheca Hispana nova, dealing with the works of Spanish authors who flourished after 1 500, appeared at Rome in 1672; the Bibliotheca Hispana vetus, a literary history of Spain from the time of Augustus to the end of the 15th century, was revised by Manuel Marti, and published by Antonio's friend, Cardinal Jose Saenz de Aguirre at Rome in 1696. A fine edition of both parts, with additional matter found in Antonio's manu- scripts, and with supplementary notes by Francisco Perez Bayer, was issued at Madrid in 1 787-1 788. This great work, incompar- ably superior to any previous bibliography, is still unsuperseded and indispensable.

Of Antonio's miscellaneous writings the most important is the posthumous Censura de historias fabidosas (Valencia, 1742), in which erudition is combined with critical insight. His Bibliotheca Hispana rabinica has not been printed ; the manuscript is in the national library at Madrid.

ANTONIO DE LEBRIJA [Antonitjs Nebrissensis], (1444- 1522), Spanish scholar, was born at Lebrija in the province of Andalusia. After studying at Salamanca he resided for ten years in Italy, and completed his education at Bologna University. On his return to Spain (1473), he devoted himself to the advance- ment of classical learning amongst his countrymen. After holding the professorship of poetry and grammar at Salamanca, he was transferred to the university of Alcala de Henares, where he lectured until his death in 1522, at the age of seventy-eight. His services to the cause of classical literature in Spain have been compared with those rendered by Valla, Erasmus and Budaeus to Italy, Holland and France. He produced a large number of works on a variety of subjects, including a Latin and Spanish dictionary, commentaries on Sedulius and Persius, and a Compendium of Rhetoric, based on Aristotle, Cicero and Quintilian. His most ambitious work was his chronicle entitled Rerum in Hispania Gesiarum Decades (published in 1545 by his son as an original work by his father), which twenty years later was found to be merely a Latin translation of the Spanish chronicle of Pulgar, which was published at Saragossa in 1567. De Lebrija also took part in the production of the Complutense polyglot Bible published under the patronage of Cardinal Jimenes.

Antonio, Bibliotheca Hispana Nova, i. 132 (1888) ; Prescott, History of Ferdinand and Isabella, i. 410 (note) ; MacCrie, The Reformation in Spain in the Sixteenth Century (1829).

ANTONIUS, the name of a large number of prominent citizens of ancient Rome, of the gens Antonia. Antonius the triumvir claimed that his family

was descended from Anton, son of Heracles. Of the Antonii the following are important.

1. Marcus Antonius (143-87 B.C.), one of the most dis- tinguished Roman orators of his time, was quaestor in 113, and praetor in 102 with proconsular powers, the province of Cilicia being assigned to him. Here he was so successful against the pirates that a naval triumph was awarded him. He was consul in 99, censor 97, and held a command in the Marsic War in 90. An adherent of Sulla, he was put to death by Marius and Cinna when they obtained possession of Rome (87) . Antonius's reputa- tion for eloquence rests on the authority of Cicero, none of his orations being extant. He is one of the chief speakers in Cicero's De Oratore.

Velleius Paterculus ii. 22 ; Appian, Bell. Civ. i. 72 ; Dio Cassius xlv. 47; Plutarch, Marius, 44; Cicero, Orator, 5, Brutus, 37; Quintilian, Instit. iii. 1, 19; O. Enderlein, De M. Antonio oratore (Leipzig, 1882).

2. Marcus Antonius, nicknamed Creticus in derision, elder son of Marcus Antonius, the " orator," and father of the triumvir. He was praetor in 74 B.C., and received an extraordinary com- mand (similar to that bestowed upon Pompcy by the Gabinian law) to clear the sea of pirates, and thereby assist the operations against Mithradates VI. He failed in the task, and made him- self unpopular by plundering the provinces (Sallust, Hist, iii., fragments ed. B. Maurenbrecher, p. 108; Velleius Paterculus ii. 31; Cicero, In Verrem, iii. 91). He attacked the Cretans, who had made an alliance with the pirates, but was totally defeated, most of his ships being sunk. Diodorus Siculus (xl. 1) states that he only saved himself by a disgraceful treaty. He died

soon afterwards (72-71) in Crete. All authorities are agreed as to his avarice and incompetence.

3. Gaius Antonius, nicknamed Hybrida from his half-savage disposition (Pliny, Nat. Hist. viii. 213), second son of Marcus Antonius, the " orator," and uncle of the triumvir. He was one of Sulla's lieutenants in the Mithradatic War, and, after Sulla's return, remained in Greece to plunder with a force of cavalry. In 76 he was tried for his malpractices, but escaped punishment; six years later he was removed from the senate by the censors, but soon afterwards reinstated. In spite of his bad reputation, he was elected tribune in 71, praetor in 66, and consul with Cicero in 63. He secretly supported Catiline, but Cicero won him over by promising him the rich province of Macedonia. On the outbreak of the Catilinarian conspiracy, Antonius was obliged to lead an army into Etruria, but handed over the command on the day of battle to Marcus Petreius, on the ground of ill-health. He then went to Macedonia, where he made himself so

detested by. his oppression and extortions that he left the province, and was accused in Rome (59) both of having taken part in the . conspiracy and of extortion in his province. It was said that Cicero had agreed with Antonius to share his plunder. Cicero's defence of Antonius two years before in view of a proposal for his recall, and also on the occasion of his trial, increased the suspicion. In spite of Cicero's eloquence, Antonius was con- demned, and went into exile at Cephallenia. He seems to have been recalled by Caesar, since he was present at a meeting of the senate in 44, and was censor in 42.

Cicero, In Cat. iii. 6, pro Flacco, 38; Plutarch, Cicero, 12; Dio Cassius xxxvii. 39, 40 ; xxxviii. 10. On his trial see article in Pauly- Wissowa's Realencyclopddie.

4. Marcus Antonius, commonly called Mark Antony, the Triumvir, grandson of Antonius the " orator " and son of Antonius Creticus, related on his mother's side to Julius Caesar, was born about 83 B.C. Under the influence of his stepfather, Cornelius Lentulus Sura, he spent a profligate youth. For a time he co-operated with P. Clodius Pulcher, probably out of hostility to Cicero, who had caused Lentulus Sura to be put to death as a Catilinarian; the connexion was severed by a disagreement arising from his relations with Clodius's wife, Fulvia. In 58 he fled to Greece to escape his creditors. After a short time spent in attendance on the philosophers at Athens, he was summoned by Aulus Gabinius, governor of Syria, to take part in the cam- paigns against Aristobulus in Palestine, and in support of Ptolemy Auletes in Egypt. In 54 he was with Caesar in Gaul. Raised by Caesar's influence to the offices of quaestor, augur, and tribune of the plebs, he supported the cause of his patron with great energy, and was expelled from the senate-house when the Civil War broke out. Deputy-governor of Italy during Caesar's absence in Spain (49), second in command in the decisive battle of Pharsalus (48), and again deputy - governor of Italy while Caesar was in Africa (47) , Antony was second only to the dictator, and seized the opportunity of indulging in the most extravagant excesses, depicted by Cicero in the Philippics. In 46 he seems to have taken offence because Caesar insisted on payment for the property of Pompey which Antony professedly had purchased, but had in fact simply appropriated. The estrangement was not of long continuance; for we find Antony meeting the dictator at Narbo the following year, and rejecting the suggestion of Trebonius that he should join in the conspiracy that was already on foot. In 44 he was consul with Caesar, and seconded his ambition by the famous offer of the crown at the festival of Lupercalia (February 15). After the murder of Caesar on the 15th of March, Antony conceived the idea of making himself sole ruler. At first he seemed disposed to treat the conspirators leniently, but at the same time he so roused the people against them-by the publication of Caesar's will and by his eloquent

funeral oration, that they were obliged to leave the city. He surrounded himself with a bodyguard of Caesar's veterans, and forced the senate to transfer to him the province of Cisalpine Gaul, which was then administered by Decimus Junius Brutus, one of the conspirators. Brutus refused to surrender the province, and Antony set out to attack him in October 44,

ANTONIUS— ANTRAIGUES

*1 5**

But at this time Octavian, whom Caesar had adopted as his son, arrived from Illyria, and claimed the inheritance of his " father." Octavian obtained the support of the senate and of Cicero; and the veteran troops of the dictator flocked to his standard. Antony was denounced as a public enemy, and Octavian was entrusted with the command of the war against him. Antony was defeated at Mutina (43) where he was besieging Brutus. The consuls Aulus Hirtius and C. Vibius Pansa, however, fell in the battle, and the senate became suspicious of Octavian, who, irritated at the refusal of a triumph and the appointment of Brutus to the command over his head, entered Rome at the head of his troops, and forced the senate to bestow the consul- ship upon him (August 19th). Meanwhile, Antony escaped to Cisalpine Gaul, effected a junction with Lepidus and marched towards Rome with a large force of infantry and cavalry. Octavian betrayed his party, and came to terms with Antony and Lepidus. The three leaders met at Bononia and adopted the title of Triumviri rcipublicae constituendae as joint rulers. Gaul was to belong to Antony, Spain to Lepidus, and Africa Sardinia and Sicily to Octavian. The arrangement was to last for five years. A reign of terror followed; proscriptions, confiscations, and executions became general; some of the noblest citizens were put to death, and Cicero fell a victim to Antony's revenge. In the following year (42) Antony and Octavian proceeded against the conspirators Cassius and Brutus, and by the two battles of Philippi annihilated the senatorial and republican parties. Antony proceeded to Greece, and thence to Asia Minor, to procure money for his veterans and complete the subjugation of the eastern provinces. On his passage through Cilicia in 41 he fell a victim to the charms of Cleopatra, in whose company he spent the winter at Alexandria. At length he was aroused by the Parthian invasion of Syria and the report of an outbreak between Fulvia his wife and Lucius his brother on the one hand and Octavian on the other. On arriving in Italy he found that Octavian was already victorious; on the death of Fulvia, a reconciliation was effected between the triumvirs, and cemented by the marriage of Antony with Octavia, the sister of his col- league. A new division of the Roman world was made at Brundusium, Lepidus receiving Africa, Octavian the west, and Antony the east. Returning to his province*

Antony made several attempts to subdue the Parthians, without any decided success. In 39 he visited Athens, where he behaved in a most extravagant manner, assuming the attributes of the god Dionysus. In 37 he crossed over to Italy, and renewed the triumvirate for five years at a meeting with Octavian. Return- ing to Syria, he resumed relations with Cleopatra. His treatment of Octavia, her brother's desire to get rid of him, and the manner in which he disposed of kingdoms and provinces in favour of Cleopatra alienated his supporters. In 32 the senate deprived him of his powers and declared war against Cleopatra. After two years spent in preparations, Antony was defeated at the battle of Actium (2nd September 31). Once more he sought refuge in the society of Cleopatra, who had escaped with sixty ships to Egypt. He was pursued by his enemies and his troops abandoned him. Thereupon he committed suicide in the mistaken belief that Cleopatra had already done so (30 B.C.). Antony had been married in succession to Fadia, Antonia, Fulvia and Octavia, and left behind him a number of children.

See Rome, History, II. "The Republic" {ad fin.); Caesar, De Bello Gallico, De Bello Civili; Plutarch, Lives of Antony, Brutus, Cicero, Caesar; Cicero, Letters (ed. Tyrrell and Purser) and Philip- pics; Appian, Bell. Civ. i.-v. ; Dio Cassius xli.-liii. In addition to the standard histories, see V. Gardthausen, Augustus und seine Zeit (Leipzig, 1891-1904); W. Drumann, Geschichte Roms (2nd ed. P. Groebe, 1 899), i. pp. 46-384; article by Groebe in Pauly-Wissowa's Realencyclopadie; and a snort but vivid sketch by de Quincey in his Essay on the Caesars.

5. Lucius Antonius, youngest son of Marcus Antonius Creticus, and brother of the triumvir. In 44, as tribune of the people, he brought forward a law authorizing Caesar to nominate the chief magistrates during his absence from Rome. After the murder of Caesar, he supported his brother Marcus. He pro- posed an agrarian law in favour of the people and Caesar's

veterans, and took part in the operations at Mutina (43). In 41 he was consul, and had a dispute with Octavian, which led to the so-called Perusian War, in which he was supported by Fulvia (Mark Antony's wife), who was anxious to recall her husband from Cleopatra's court. Later, observing the bitter feelings that had been evoked by the distribution of land among the veterans of Caesar, Antonius and Fulvia changed their attitude, and stood forward as the defenders of those who had suffered from its operation. Antonius marched on Rome, drove out Lepidus, and promised the people that the triumvirate should be abolished. On the approach of Octavian, he retired to Perusia in Etruria, where he was besieged by three armies, and compelled to surrender (winter of 41). His life was spared, and he was sent by Octavian to Spain as governor. Nothing is known of the circumstances or date of his death. Cicero, in his Philippics,

actuated in great measure by personal animosity, gives a highly unfavourable view of his character.

Appian, Bellum Civile, v. 14 flf. ; Dio Cassius xlviii. 5-14.

6. Gaius Antonius, second son of Marcus Antonius Creticus, and brother of the triumvir. In 49 he was legate of Caesar and, with P. Cornelius Dolabella, was entrusted with the defence of Illyricum against the Pompeians. Dolabella's fleet was destroyed; Antonius was shut up in the island of Curicta and forced to surrender. In 44 he was city praetor, his brothers Marcus and Lucius being consul and tribune respectively in the same year. Gaius was appointed to the province of Macedonia, but on his way thither fell into the hands of M. Junius Brutus on the coast of Illyria. Brutus at first treated him generously, but ultimately put him to death (42).

Plutarch , Brutus, 28 ; Dio Cassius xl vii. 2 1 -24. On the whole family , see the articles in Pauly-Wissowa's Realencyclopadie, i. pt. 2 (1894).

ANTONOMASIA, in rhetoric, the Greek term for a substitution of any epithet or phrase for a proper name; as " Pelides," or " the son of Peleus," for Achilles; " the Stagirite " for Aristotle; " the author of Paradise Lost " for Milton; " the little corporal " for Napoleon I. ; " Macedonia's madman " for Alexander the Great, &c. &c. The opposite substitution of a proper name for some generic term is also sometimes called antonomasia; as " a Cicero " for an orator.

ANTRAIGUES, EMMANUEL HENRI LOUIS ALEXANDRE DE LAUNAY, Comte d' (c. 1755-1812), French publicist and political adventurer, was a nephew of Francois Emmanuel de Saint-Priest (1735-1821), one of the last ministers of Louis XVI. He was a cavalry captain, but, having little taste for the army, left it and travelled extensively, especially in the East. On his return to Paris, he sought the society of philosophers and artists, visited Voltaire at Ferney for three months, but was more attracted by J. J. Rousseau, with whom he became somewhat intimate. He published a Memoire sur les etals-gSneraux, sup- ported the Revolution enthusiastically when it broke out, was elected deputy, and took the oath to the constitution; but he suddenly changed his mind completely, became a defender of the monarchy and emigrated in 1790. He was the secret agent of the comte de Provence (Louis XVIII.) at different courts of Europe, and at the same time received money from the courts he visited. He published a number of pamphlets, Des monstres ravagent partout, Point a" accommodement, &c. At Venice, where he was attache to the Russian legation, he was arrested in 1 797, but escaped to Russia. Sent as Russian attache to Dresden, he published a violent pamphlet against Napoleon I.,

and was expelled by the Saxon government. He then went to London, and it was universally believed that he betrayed the secret articles of the treaty of Tilsit to the British cabinet, but his recent biographer, Pingaud, contests this. In 181 2 he and his wife Madame Saint-Huberty, an operatic singer, were assas- sinated by an Italian servant whom they had dismissed. It has never been known whether the murder was committed from private or political motives.

See H. Vaschalde, Notice bibliographique sur Louis Alexandre de Launay, comte d'Antraigues, sa vie et ses ceuvres; Leonce Pingaud, Un Agent secret, sous la revolution et I'empire, le comte d'Antraigues (Paris, 1893) ; fidouard de Goncourt, La Saint-Huberty et V opera au XVIIP siecle.

ANTRIM, RANDAL MACDONNELL, ist Earl of (d. 1636), called " Arranach," having been brought up in the Scottish island of Arran by the Hamiltons, was the 4th son of Sorley Boy MacDonnell (q.v.), and of Mary, daughter of Conn O'Neill, ist earl of Tyrone. He fought at first against the English government, participating in his brother James's victory over Sir John Chichester at Carrickfergus in November 1597, and joining in O'Neill's rebellion in 1600. But on the 16th of December he signed articles with Sir Arthur Chichester and was granted protection; in 1601 he became head of his house by his elder brother's death, his pardon being confirmed to him; and in 1602 he submitted to Lord Mount joy and was knighted. On the accession of James I. in 1603 he obtained a grant of the Route and the Glynns (Glens) districts, together with the island of Rathlin, and remained faithful to the government in spite of the unpopularity he thereby incurred among his kinsmen, who conspired to depose him. In 1607 he successfully defended himself against the charge of disloyalty on the occasion of the flight of the earls of Tyrone and Tyrconnell, and . rendered services to the government by settling and civilizing his districts, being well received the following year by James in London. In 1618 he was created Viscount Dunluce, and subsequently he was appointed a privy councillor and lord-lieutenant of the county of Antrim. On the 12th of December 1620 he was created earl of Antrim. In 162 1 he was charged with harbouring Roman Catholic priests, confessed his offence and was pardoned. He offered his assistance in 1625 during the prospect of a Spanish invasion, but was still regarded as a person that needed watching. His arbitrary conduct in Ireland in 1627 was suggested as a fit subject for examination by the Star Chamber, but his fidelity to the government was strictly maintained to the last. In 163 1 he was busy repairing Protestant churches, and in 1634 he attended the Irish parliament. He made an important agree- ment in 1635

for the purchase from James Campbell, Lord Cantire, of the lordship of Cantire, or Kintyre, of which the MacDonnells had been dispossessed in 1600 by Argyll; but his possession was successfully opposed by Lord Lome. He died on the 10th of December 1636. Antrim married Alice, daughter of Hugh O'Neill, earl of Tyrone, by whom, besides six daughters, he had Randal, 2nd earl and ist marquess of Antrim (q.v.), and Alexander, 3rd earl. Three other sons, Maurice, Francis and James, were probably illegitimate. The earldom has continued in the family down to the present day, the nth earl (b. 1851) succeeding in 1869.

See also An Historical Account of the MacDonnells of Antrim, by G. Hill (1873).

ANTRIM, RANDAL MACDONNELL, ist Marquess or (1609- 1683), son of the ist earl of Antrim, was born in 1609 and edu- cated as a Roman Catholic. He travelled abroad, and on his return in 1634 went to court, next year marrying Katherine Manners, widow of the ist duke of Buckingham, and living on her fortune for some years in great splendour. In 1639, on the outbreak of the Scottish war, he initiated a scheme of raising a force in Ireland to attack Argyll in Scotland and recover Kintyre (or Cantire), a district formerly possessed by his family; but the plan, discouraged and ridiculed by Strafford, miscarried. 1 Soon afterwards he returned to Ireland, and sought in 1641 to create a diversion, together with Ormonde, for Charles I. against the parliament. He joined in his schemes Lord Slane and Sir Phelim O'Neill, later leaders of the rebellion, but on the outbreak of the rebellion in the autumn he dissociated himself from his allies and retired to his castle at Dunluce. His suspicious conduct, however, and his Roman Catholicism, caused him to be regarded as an enemy by the English party. In May 1642 he was captured at Dunluce Castle by the parliamentary general Robert Munro, and imprisoned at Carrickfergus. Escaping thence he joined the queen at York; and subsequently, having proceeded to Ireland to negotiate a cessation of hostilities, he was again captured with his papers in May 1643 and confined at Carrick- fergus, thence once more escaping and making his way to Kilkenny, the headquarters of the Roman Catholic confedera- 1 Strafford's Letters, ii. 300.

tion. He returned to Oxford in December with a scheme for raising 10,000 Irish for service in England and. 2000 to join Montrose in Scotland, which through the influence of the duchess of Buckingham secured the consent of the king. On the 26th of January 1644 Antrim was created a marquess. He returned to Kilkenny in February, took the oath of association, and was made a member of the council and lieutenant-general of the forces of the Catholic confederacy. The confederacy, however, giving him no support in his projects, he threw up his commission, and with Ormonde's help

despatched about 1600 men in June to Montrose's assistance in Scotland, subsequently returning to Oxford and being sent by the king in 1645 with letters for the queen at St Germains. He proceeded thence to Flanders and fitted out two frigates with military stores, which he brought to the prince of Wales at Falmouth. He visited Cork and after- wards in July 1646 joined his troops in Scotland, with the hope of expelling Argyll from Kintyre; but he was obliged to retire by order of the king, and returning to Ireland threw himself into : theintrigues between the various factions. In 1647 he was appointed with two others by the confederacy to negotiate a treaty with the prince of Wales in France, and though he antici- pated his companions by starting a week before them, he failed to secure the coveted lord-lieu tenancy > which was confirmed to Ormonde. He now ceased to support the Roman Catholics or the king's cause; opposed the treaty between Ormonde and the confederates; supported the project of union between O'Neill and the parliament; and in 1649 entered into com- munications with Cromwell, for whom he performed various services, though there appears no authority to support Carte's story that Antrirn was the author of a forged agreement for the betrayal- of the king's army by Lord Inchiquin. 1 Subsequently he joined Ireton, and was present at the siege of Carlow. He returned to England in December 1650, and in lieu of his con- fiscated estate received a pension of £500 and later of £800, together with lands in Mayo. At the Restoration Antrim was excluded from the Act of Oblivion on account of his religion, and on presenting himself at court was imprisoned in the Tower subsequently being called before the lords justices in Ireland, In 1663 he succeeded, in spite of Ormonde's opposition, in securing a decree of innocence from the commissioners of claims. This raised an outcry from the adventurers who had been put in possession of his lands, and who procured a fresh trial; but Antrim appealed to the king, and through the influence of the queen mother obtained a pardon, his estates being restored to him by the Irish/ Act of Explanation in 1665. 2 Antrim died on the 3rd of February 1683. He is described by Clarendon as of handsome appearance but " of excessive pride and vanity and of a marvellous weak and narrow understanding." He married secondly Rose, daughter of Sir Henry O'Neill, but had no children, being succeeded in the earldom by his brother Alexander, 3rd earl of Antrim.*

See Hiberrlia Anglicana, by R. Cox (1 689-1 690) esp. app. xlix. vol. ii. 206; History of the Irish Confederation, by J. T. Gilbert (1882-1891); Aphorismical Discovery (Irish Archaeological Society, 1879-1880); Thomason Tracts (Brit. Mus.), E 59 (18), 149 (12), 138 (7), 153 (19), 61 (23) ; Murder will out, or the King's Letter justi- fying the Marquess of Antrim (1689); Hist. MSS. Comm. Series — MSS. of Marq. of Ormonde. (P. C. Y.)

ANTRIM, a county in the north-east corner of Ireland, in the province of Ulster. It is bounded N. and E. by the narrow seas separating Ireland from Scotland, the Atlantic Ocean and Irish Sea, S. by: Belfast Lough and the Lagan river dividing it from the county Down, W. by Lough Neagh, dividing it from the counties Armagh and Tyrone, and by' county Londonderry, the boundary with which is the river Bann.

The area is 751,965 acres or about 1175 sq.m. A large por- tion of the county is hilly, especially in the east, where the highest elevations are attained, though these are nowhere great. The range runs north and south, and, following this direction

1 Life of Ormonde, iii. 509; see also Cal. of State Papers, Ireland, 1660-1662, pp. 294, 217; Cal. of Clarendon St. Pap., ii. 69, and Gardiner's Commonwealth, i. 153. "

2 Hallam, ConsU'Hist., iii. 396 (ed. 1855).

the highest points are Knocklayd (1695 ft), Slieveanorra (1676), Trostan (1817), Slemish (1457), and Divis (1567). The inland slope is gradual, but on the northern shore the range terminates in abrupt and almost perpendicular declivities, and here, conse- quently, some of the finest coast scenery in the island is found, widely differing, with its unbroken lines of cliffs, from the indented coast-line of the west. The most remarkable cliffs are those formed of perpendicular basaltic columns, extending for many miles, and most strikingly displayed in Fair Head and the celebrated Giant's Causeway. From the eastern coast the hills rise instantly but less abruptly, and the indentations are wider and deeper. On both coasts there are several frequented watering-places, of which may be mentioned on the north Portrush (with well-known golf links), Port Ballintrae and Bally-castle; on the east Cushendun, Cushendall and Mill town on Red Bay, Cam Lough and Glenarm, Lame, and Whitehead on Belfast Lough. All are somewhat exposed to the easterly winds prevalent in spring. The only island of size is Rathlin, off Ballycastle, 65 m. in length by 15 in breadth, 7 m. from the coast, and of similar basaltic and limestone formation to that of the mainland. It is partially arable, and supports a small population. The so-called Island Magee is a peninsula separating Larne Lough from the Irish Channel.

The valleys of the Bann and Lagan, with the intervening shores of Lough Neagh, form the fertile lowlands. These two rivers, both rising in county

Down, are the only ones of import- ance. The latter flows to Belfast Lough, the former drains Lough Neagh, which is fed by a number of smaller streams, among them the Crumlin, whose waters have petrifying powers. The fisheries of the Bann and of Lough Neagh (especially for salmon) are of value both commercially and to sportsmen, the small town of Toome, at the outflow of the river, being the centre. Immediately below this point lies Lough Beg, the " Small Lake," about 15 ft. lower than Lough Neagh, which it excels in the pleasant scenery of its banks. The smaller streams are of great use in working machinery.

Geology. — On entering the county at the south, a scarped barrier of hills is seen beyond the Lagan valley, marking the edge of the basaltic plateaus, and running almost continuously round the coast to Red Bay. Below it, Triassic beds are exposed from Lisburn to Island Magee, giving sections of red sands and marls. Above these, marine Rhaetic beds appear at intervals, notably near Larne, where they are succeeded by Lower Lias shales and limestones. At Portrush, the Lower Lias is seen on the shore, crowded with ammonites, but silicified and meta- morphosed by invading dolerite. The next deposits, as the scarps are approached, are greensands of " Selbornian " age, succeeded by Cenomanian, and locally by Turonian, sands. The Senonian series is represented by the White Limestone, a hardened chalk with flints, which is often glauconitic and con- glomeratic at the base. Denudation in earliest Eocene times has produced flint gravels above the chalk, and an ancient stream deposit of chalk pebbles occurs at Ballycastle. The volcanic fissures that allowed of the upwelling of basalt are represented by numerous dykes, many cutting the earlier lava-flows as well as all the beds below them. The accumulations of lava gave rise to the plateaus which form almost the whole interior of the county. In a quiet interval, the Lower Eocene plant-beds of Glenarm and Ballypalady were formed in lakes, where iron-ores also accumulated. Rhyolites were erupted locally near Tardree, Ballymena and Glenarm. The later basalts are especially marked by columnar jointing, which determines the famous structures of the Giant's Causeway and the coast near Bengore Head. Volcanic necks may be recognized at Carrick-a-rede, in the intrusive mass of dolerite at Slemish, at Carnmoney near Belfast, and a few other points. Fair Head is formed of intrusive dolerite, presenting a superb columnar seaward face. Faulting, probably in Pliocene times, lowered the basaltic plateaus to form the basin of Lough Neagh, leaving the eastern scarp at heights ranging up to 1800 ft. The glens of Antrim are deep notches cut by seaward-running streams through the basalt scarp, their floors being formed of Triassic or older rocks. Unlike most

Irish counties, Antrim owes its principal features to rocks of Mesozoic and Cainozoic age. At Cushendun, however, a coarse conglomerate is believed to be Devonian, while Lower Carbon- iferous Sandstones, with several coal-

seams, form a small pro- ductive basin at Ballycastle. The dolerite of Fair Head sends off sheets along the bedding-planes of these carboniferous strata. " Dalradian " schists and gneisses, with some dark limestones, come out in the north-east of the county, forming a moorland- region between Cushendun and Ballycastle. The dome of Knock- layd, capped by an outlier of chalk and basalt, consists mostly of this far more ancient series. Glacial gravels are well seen near Antrim town, and as drumlins between Ballymena and Ballycastle. The drift-phenomena connected with the flow of ice from Scotland are of special interest. Recently elevated marine clays, of post-glacial date, fringe the south-eastern coast, while gravels with marine shells, side by side with flint imple- ments chipped by early man, have been lifted some 20 ft. above sea-level near Larne.

Rock-salt some 80 ft. thick is mined in the Trias near Carrickfergus. The Keuper clays yield material for bricks. Bauxite, probably derived from the decay of lavas, is found between Glenarm and Broughshane, associated with brown and red pisolitic iron-ores; both these materials are worked commercially. Bauxite occurs also near Ballintoy. The Bally- castle coal is raised and sold locally.

Industries. — The climate is very temperate. The soil varies greatly according to the district, being in some cases a rich loam, in others a chalky marl, and elsewhere showing a coating of peat. The proportion of barren land to the total area is roughly as 1 to 9; and of tillage to pasture as 2 to 3. Tillage is therefore, relatively to other counties, well advanced, and oats and potatoes are largely, though decreasingly, cultivated. Flax is a less important crop than formerly. The numbers of cattle, sheep, pigs and poultry are generally increasing. Dutch, Ayrshire and other breeds are used to improve the breed of cattle by crossing. Little natural wood remains in the county, but plantations flourish on the great estates, and orchards have proved successful.

The linen manufacture is the most important industry. Cotton-spinning by jennies was first introduced by Robert Joy and Thomas M'Cabe of Belfast in 1777; and an estimate made twenty-three years later showed upwards of 27,000 hands employed in this industry within 10 m. of Belfast, which remains the centre for it. Women are employed in the working of patterns on muslin. There are several paper-mills at Bushmills in the north; whisky-distilling is carried on; and there are valuable sea-fisheries divided between the district of Ballycastle and Carrickfergus, while the former is the headquarters of a salmon-fishery district. The workings at the Ballycastle collieries are probably the oldest in Ireland. In 1770 the miners accidentally discovered a complete gallery, which has been driven many hundred yards into the bed of coal, branching into thirty-six chambers dressed quite square, and in a workman-like mariner. No tradition of the

mine having been formerly worked remained in the neighbourhood. The coal of some of the beds is bituminous, and of others anthracite.

Communications. — Except that the Great Northern railway line from Belfast to the south and west runs for a short distance close to the southern boundary of the county, with a branch from Lisburn to the town of Antrim, the principal lines of communication are those of the Northern Counties system, under the control of the Midland railway of England. The chief routes are : — Belfast, Antrim, Ballymena (and thence to Coleraine and Londonderry) ; a line diverging from this at White Abbey to Carrickfergus and Larne, the port for Stranraer in Scotland; branches from Ballymena to Larne and to Park- more; and from Coleraine to Portrush. The Ballycastle railway runs from Ballymoney to Ballycastle on the north coast; and the Giant's Causeway and Portrush is an electric railway (the first to be worked in the United Kingdom). The Lagan Canal connects Lough Neagh with Belfast Lough.

Population and Administration. — The population in 1891 was

208,010, and in 1901, 196,090. The county is among those least seriously affected by emigration. Of the total about 50 % are Presbyterians, about 20 % each Protestant Episcopalians and Roman Catholics; Antrim being one of the most decidedly Protestant counties in Ireland. Of the Presbyterians the greater part are in connexion with the General Synod of Ulster, and the other are Remonstrants, who separated from the Synod in 1829, or United Presbyterians. The principal towns are Antrim (pop. 1826), Ballymena (10,886), Ballymoney (2952), Carrickfergus (4208), Lame (6670), Lisburn (11,461) and Port- rush (1941). Belfast though constituting a separate county ranks as the metropolis of the district. Ballyclare, Bushmills, Crumlin, Portglenone and Randalstown are among the lesser towns. Belfast and Larne are the chief ports. The county comprises 14 baronies and 79 civil parishes and parts of parishes. The constabulary force has its headquarters at Ballymena. The assize town is Belfast, and quarter sessions are held at Ballymena, Ballymoney, Belfast, Larne and Lisburn. The county is divided between the Protestant dioceses of Deny and Down, and the Roman Catholic dioceses of Down and Connor, and Dromore. It is divided into north, mid, east and south parliamentary divisions, each returning one member.

History and Antiquities. — At what date the county of Antrim was formed is not known, but it appears that a certain district bore this name before the

reign of Edward II. (early 14th cen- tury), and when the shiring of Ulster was undertaken by Sir John Perrot in the 16th century, Antrim and Down were already recognized divisions, in contradistinction to the remainder of the province. The earliest known inhabitants were of Celtic origin, and the names of the townlands or subdivisions, supposed to have been made in the 13th century, are pure Celtic. Antrim was exposed to the inroads of the Danes, and also of the northern Scots, who ultimately effected permanent settlements. The antiquities of the county consist of cairns, mounts or forts, remains of ecclesiastical and military structures, and round towers. The principal cairns are: one on Colin mountain, near Lisburn; one on Slieve True, near Carrickfergus; and two on Colinward. The cromlechs most worthy of notice are: one near Cairngrainey, to the north-east of the old road from Belfast to Templepatrick; the large cromlech at Mount Druid, near Ballintoy; and one at the northern extremity of Island Magee. The mounts, forts and intrenchments are very numerous. There are three round towers: one at Antrim, one at Armoy, and one on Ram Island in Lough Neagh, only that at Antrim being perfect. There are some remains of the ecclesiastic establish- ments at Bonamargy, where the earls of Antrim are buried, Kelts, Glenarm, Glynn, Muckamore and White Abbey. The noble castle of Carrickfergus is the only one in perfect preserva- tion. There are, however, remains of other ancient castles, as Olderfleet, Cam's, Shane's, Glenarm, Garron Tower, Redbay, &c, but the most interesting of all is the castle of Dunluce, remarkable for its great extent and romantic situation. Mount Slemish, about 8 m. east of Ballymena, is notable as being the scene of St Patrick's early life. Island Magee had, besides antiquarian remains, a notoriety as a home of witch- craft, and was the scene of an act of reprisal for the much- disputed massacre of Protestants about 1641, by the soldiery of Carrickfergus.

ANTRIM, a market-town in the west of the county Antrim, Ireland, in the south parliamentary division, on the banks of the Six-Mile Water, half a mile from Lough Neagh, in a beautiful and fertile valley. Pop. (1901) 1826. It is 2if m. north-west of Belfast by the Northern Counties (Midland) railway, and is also the terminus of a branch of the Great Northern railway from Lisburn. There is nothing in the town specially worthy of notice, but the environs, including Shane's Castle and Antrim Castle, possess features of considerable interest. About a mile from the town is one of the most perfect of the round towers of Ireland, 93 ft. high and 50 in circumference at the base. It stands in the grounds of Steeple, a neighbouring seat, where is also the " Witches' Stone," a prehistoric monument. A battle was fought near Antrim between the English and Irish in the

reign of Edward III.; and in 1642 a naval engagement took place on Lough Neagh, for Viscount Massereene and Ferrard (who founded Antrim Castle

in 1662) had a right to maintain a fighting fleet on the lough. On the 7th of June 1798 there was a smart action in the town between the king's troops and a large body of rebels, in which the latter were defeated, and Lord O'Neill mortally wounded. Before the Union Antrim returned two members to parliament by virtue of letters patent granted in 1666 by Charles II. There are manufactures of paper, linen, and woollen cloth. The government is in the hands of town commissioners.

ANTRUSTION, the name of the members of the bodyguard or military household of the Merovingian kings. The word, of which the formation has been variously explained, is derived from the O.H.Germ. trost, comfort, aid, fidelity, trust, through the latinized form trustis. Our information about the antrustions is derived from one of the formulae of Marculfus (i. 18, ed. Zeumer, p. 55) and from various provisions of the Salic law (see du Cange, Glossarium, s. "trustis"). Any one desiring to enter the body of Antrustions had to present himself armed at the royal palace, and there, with his hands in those of the king, take a special oath or trustis and fidelitas, in addition to the oath of fidelity sworn by every subject at the king's accession. This done, he was considered to be in trusle dominica and bound to the dis- charge of all the services this involved. In return for these, the antrustion enjoyed certain valuable advantages, as being speci- ally entitled to the royal assistance and protection; his wergeld is three times that of an ordinary Frank; the slayer of a Frank paid compensation of 200 solidi, that of an antrustion had to find 600. The antrustion was always of Frankish descent, and only in certain exceptional cases were Gallo-Romans admitted into the king's bodyguard. These Gallo-Romans then took the name of convivae regis, and the wergeld of 300 solidi was three times that of a homo romanus. The antrustions, belonging as they did to one body, had strictly defined duties towards one another; thus one antrustion was forbidden to bear witness against another under penalty of 1 5 solidi compensation.

The antrustions seem to have played an important part at the time of Clovis. It was they, apparently, who formed the army which conquered the land, an army composed chiefly of Franks, and of a few Gallo-Romans who had taken the side of Clovis. After the conquest, the role of the antrustions became less important. For each of their expeditions, the kings raised an army of citizens in which the Gallo-Romans mingled more and more with the Franks; they only kept one small permanent body which acted as their bodyguard {trustis dominica), some members of which were from time to time told off for other tasks, such as that of forming garrisons in the frontier towns. The institution seems to have disappeared during the anarchy with which the 8th century opened. It has wrongly been held to be the origin of vassalage. Only the king bad antrustions; every lord could have vassals. The antrustions were a military institution; vassalage was a

social institution, the origins of which are very complex.

All historians of Merovingian institutions and law have treated of the antrustions, and each one has his different system. The principal authorities are : — Waitz, Deutsche Verfassungsgeschichte, 3rd ed. vol. ii. pp. 335 et seq. ; Brunner, Deutsche Rechtsgeschichte, vol. ii. p. 97 et seq.; Fustel de Coulanges, La Monarchic franque, p. 80 et seq. ; Maxime Deloche, La Trustis et V antrustion royal sous les deux premieres races (Paris, 1873), collecting and discussing the principal texts; Guilhermoz, Les Origines de la noblesse (Paris, 1902), suggesting a system which is new in part. (C. Pf.)

ANTWERP, the most northern of the nine provinces of Belgium. It is conterminous with the Dutch frontier on the north. Malines, Lierre and Turnhout are among the towns of the province. Its importance, however, is derived from the fact that it contains the commercial metropolis of Belgium. It is divided into three administrative districts (arrondissements), viz. Antwerp, Malines and Turnhout. These are subdivided into 25 cantons and 152 communes. The area is 707,932 acres or 1 106 sq. m. Pop. (1904) 888,980, showing an average of 804 inhabitants to the square mile.

ANTWERP (Fr. Anvers), capital of the above province, an important city on the right bank of the Scheldt, Belgium's chief centre of commerce and a strong fortified position.

Modern Antwerp is a finely laid out city with a succession of broad avenues which mark the position of the first enceinte. There are long streets and terraces of fine houses belonging to the merchants and manufacturers of the city which amply testify to its prosperity, and recall the 16th century distich that Antwerp was noted for its moneyed men (" Antwerpia nummis ") . Despite the ravages of war and internal disturbances it still preserves some memorials of its early grandeur, notably its fine cathedral. This church was begun in the 14th century, but not finished till 1518. Its tower of over 400 ft. is a conspicuous object to be seen from afar over the surrounding flat country. A second tower which formed part of the original plan has never been erected. The proportions of the interior are noble, and in the church are hung three of the masterpieces of Rubens, viz. " The Descent from the Cross," " The Elevation of the Cross," and " The Assumption." Another fine church in Antwerp is that of St James, far more ornate than the cathedral, and con- taining the tomb of Rubens, who devoted himself to its embel- lishment. The Bourse or exchange, which

claims to be the first distinguished by the former name in Europe, is a fine new building finished in 1872, on the site of the old Bourse erected in 1 53 1 and destroyed by fire in 1858. Fire has destroyed several other old buildings in the city, notably in 1891 the house of the Hansa League on the northern quays. A curious museum is the Maison Plantin, the house of the great printer C. Plantin (q.v.) and his successor Moretus, which stands exactly as it did in the time of the latter. The new picture gallery close to the southern quays is a fine building divided into ancient and modern sections. The collection of old masters is very fine, containing many splendid examples of Rubens, Van Dyck, Titian and the chief Dutch masters. Antwerp, famous in the middle ages and at the present time for its commercial enter- prise, enjoyed in the 17 th century a celebrity not less distinct or glorious in art for its school of painting, which included Rubens, Van Dyck, Jordaens, the two Teniers and many others.

Commerce. — Since 1863, when Antwerp was opened to the trade of the outer world by the purchase of the Dutch right to levy toll, its position has completely changed, and no place in Europe has made greater progress in this period than the ancient city on the Scheldt. The following figures for the years 1904 and 1905 show that its trade is still rapidly increasing: —

\ear.

Exports.

Imports.

Tonnage.

Value.

Tonnage.

Value.

1904 1905

6,578,558 7,153,655

£71,349,678 £80,032,355

8,427,894 9,061,781

£79,539,ioo £91,194,517

The growth of its commerce in recent times may be measured by a comparison of the following figures. In 1888, 4272 ships entered the port

and 4302 sailed from it. In 1905, 6095 entered the port and 6065 sailed from it — an increase of nearly 50 %. In 1888 the total tonnage was 7,800,000; in 1905 it had risen to 19,662,000. These figures explain how and why Antwerp has outgrown its dock accommodation. The eight principal basins or docks already existing in 1908 were (1) the Little or Bonaparte dock; (2) the Great dock, also constructed in Napoleon's time; (3) the Kattendijk, built in i860 and enlarged in 1881 ; (4) the Wood dock; (5) the Campine dock, used especially for minerals; (6) the Asia dock, which is in direct communication with the Meuse by a canal as well as with the Scheldt; (7) the Lefebvre dock; and (8) the America dock, which was only opened in 1905. Two new docks, called " intercalary " because they would fit into whatever scheme might be adopted for the rectification of the course of the Scheldt, were still to be con- structed, leading out of the Lefebvre dock and covering 70 acres. With the completion of the new maritime lock, ships drawing 3c ft. of water would be able to enter these new docks and also the Lefebvre and America docks. In connexion with the projected grandc coupure (that is, a cutting through the neck of

the loop in the river Scheldt immediately below Antwerp), the importance of these four docks would be greatly increased because they would then flank the new main channel of the river. When the Belgian Chambers voted in February 1906 the sums necessary for the improvement of the harbour of Antwerp no definite scheme was sanctioned, the question being referred to a special mixed commission. The improvements at Antwerp are not confined to the construction of new docks. The quays flanking the Scheldt are 3ˆ m. in length. They are constructed of granite, and no expense has been spared in equipping them with hydraulic cranes, warehouses, &c.

Fortifications. — Besides being the chief commercial port of Belgium, Antwerp is the greatest fortress of that country. Nothing, however, remains of the former enceinte or even of the famous old citadel defended by General Chasse in 1832, except the Steen, which has been restored and contains a museum of arms and antiquities. After the establishment of Belgian independence Antwerp was defended only by the citadel and an enceinte of about 2\ m. round the city. No change occurred till 1859, when the system of Belgian defence was radically altered by the dismantlement of seventeen of the twenty-two fortresses constructed under Wellington's supervision in 18 15- 1818. At Antwerp the old citadel and enceinte were removed. A new enceinte 8 m. in length was constructed, and the villages of Berchem and Borgerhout, now parishes of Antwerp, were absorbed within the city. This enceinte still exists, and is a fine work of art. It is protected by a broad wet ditch (plans in article Fortification), and in the caponiers are the magazines and store chambers of the fortress. The enceinte is pierced by nineteen openings or gateways, but of these seven are

not used by the public. As soon as the enceinte was finished eight detached forts from 2 to 2§ m. distant from the enceinte were constructed. They begin on the north near Wyneghem and the zone of inundation, and terminate on the south at Hoboken. In 1870 Fort Merxem and the redoubts of Beren- drecht and Oorderen were built for the defence of the area to be inundated north of Antwerp. In 1878, in consequence of the increased range of artillery and the more destructive power of explosives, it was recognized that the fortifications of Antwerp were becoming useless and out of date. It was therefore decided to change it from a fortress to a fortified position by constructing an outer line of forts and batteries at a distance varying from 6 to 9 m. from the enceinte. This second line was to consist of fifteen forts, large and small. Up to 1898 only five had been constructed,, but in that and the two following years five more were finished, leaving another five to complete the line. A mixed commission selected the points at which they were to be placed. With the completion of this work, which in 1908 was being rapidly pushed on, Antwerp might be regarded as one of the best fortified positions in Europe, and so long as its com- munications by sea are preserved intact it will be practically impregnable.

Two subsidiary or minor problems remained over. (1) The much-discussed removal of the existing enceinte in order to give Antwerp further growing space. If it were removed there arose the further question, should a new enceinte be made at the first line of outer forts, or should an enceinte be dispensed with? An enceinte following the line of those forts would be 30 m. in length. Then if the city grew up to this extended enceinte the outer forts would be too near. To screen the city from bombardment they would have to be carried 3 m. further out, and the whole Belgian army would scarcely furnish an adequate garrison for this extended position. A new enceinte, or more correctly a rampart of a less permanent character, connecting the eight forts of the inner line and extending from Wyneghem to a little south of Hoboken, was decided upon in 1008. (2) The second problem was the position on the left bank of the Scheldt. All the defences enumerated are on the right bank. On the left bank the two old forts Isabelle and Marie alone defend the Scheldt. It is assumed (probably rightly) that no enemy could get round to this side in sufficient strength to deliver any attack that the existing forts could not easily

repel. The more interesting question connected with the left bank is whether it does not provide, as Napoleon thought, the most natural outlet for the expansion of Antwerp. Proposals to connect the two banks by a tunnel under the Scheldt have been made from time to time in a fitful manner, but

nothing whatever had been done by 1908 to realize what appears to be a natural and easy project.

Population. — The following statistics show the growth of population in and since the 19th century. In 1800 the population was computed not to exceed 40,000. At the census of 1846 the total was 88,487; of 1851, 95,501; of 1880, 169,100; of 1900, 272,830; and of 1904, 291,949. To these figures ought to be added the populations (1904) of Borgerhout (43,391) and Berchem (26,383), as they are part of the city, which would give Antwerp a total population of 361,723.

History. — The suggested origin of the name Antwerp from Hand-werpen (hand- throwing), because a mythical robber chief indulged in the practice of cutting off his prisoners' hands and throwing them into the Scheldt, appeared to Motley rather far- fetched, but it is less reasonable to trace it, as he inclines to do, from an t werf (on the wharf), seeing that the form Andhunerbo existed in the 6th century on the separation of Austrasia and Neustria. Moreover, hand-cutting was ' not an uncommon practice in Europe. It was perpetuated from a savage past in the custom of cutting off the right hand of a man who died without heir, and sending it as proof of main-morte to the feudal lord. Moreover, the two hands and a castle, which form the arms of Antwerp, will not be dismissed as providing no proof by any one acquainted with the scrupulous care that heralds displayed in the golden age of chivalry before assigning or recognizing the armorial bearings of any claimant.

In the 4th century Antwerp is mentioned as one of the places in the second Germany, and in the nth century Godfrey of Bouillon was for some years best known as marquis of Antwerp. Antwerp was the headquarters of Edward III. during his early negotiations with van Artevelde, and his son Lionel, earl of Cambridge, was born there in 1338.

It was not, however, till after the closing of the Zwyn and the decay of Bruges that Antwerp became of importance. At the end of the 1 5th century the foreign trading gilds Or houses were transferred from Bruges to Antwerp, and the building assigned to the English nation is specifically mentioned in 1 5 10. In 1 560, a year which marked the highest point of its prosperity, six nations, viz. the Spaniards, the Danes and the Hansa together, the Italians, the English, the Portuguese and the Germans, were named at Antwerp, and over 1000 foreign merchants were resident in the city. Guicciardini, the Venetian envoy, describes the activity of the port, into which 500 ships sometimes passed in a day, and as evidence of the extent of its land trade he mentioned that 2000 carts entered the city each week. Venice had fallen from its first place in European commerce, but still it was active and prosperous. Its envoy, in explaining the importance of

Antwerp, states that there was as much business done there in a fortnight as in Venice throughout the year.

The religious troubles that marked the second half of the 16th century broke out in Antwerp as in every other part of Belgium excepting Liege. In 1576 the Spanish soldiery plundered the town during what was called " the Spanish Fury," and 6000 citizens were massacred. Eight hundred houses were burnt down, and over two millions sterling of damage was wrought in the town on that occasion.

In 1585 a severe blow was struck at the prosperity of Antwerp when Parma captured it after a long siege and sent all its Protes- tant citizens into exile. The recognition of the independence of the United Provinces by the treaty of Miinster in 1648 carried with it the death-blow to Antwerp's prosperity as a place of trade, for one of its clauses stipulated that the Scheldt should be closed to navigation. This impediment remained in force until 1863, although the provisions were relaxed during French rule from 1795 to 1814, and also during the time Belgium formed part of the kingdom of the Netherlands (1815 to 1830). Antwerp had reached the lowest point of its fortunes in 1800, and its

population had sunk under 40,000, when Napoleon, malizingits strategical importance, assigned two millions for the construc- tion of two docks and a mole.

One other incident in the chequered history of Antwerp deserves mention. In 1830 the city was captured by the Belgian insurgents, but the citadel continued to be held by a Dutch garrison under General Chasse. For a time this officer subjected the town to a periodical bombardment which inflicted much damage, and at the end of 1832 the citadel itself was besieged by a French army. During this attack the town was further injured. In December 1 83 2 , after a gallant defence, Chasse made an honourable surrender.

See J. L. Motley's Rise of the Dutch Republic; C. Scribanii, Origines Antwerpiensiwm; Gens, Hist, de la ville d'Anvers; Mertens and Torfs, GesChiedenis van Antwerp; Genard, Anvers & travers les ⩾ Annuairestatisque de la Belgique. (D. C. B.)

ANU, a Babylonian deity, who, by virtue of being the first figure in a triad consisting of Anu, Bel and Ea, came to be re- garded as the father and king of the gods. Anu is so prominently associated with the city of Erech in southern Babylonia that there are good reasons for believing this place to have been the original seat of the Anu cult. If this be correct, then the goddess Nana (or Ishtar) of Erech was presumably regarded as his consort. The name of the god signifies the " high one " and he was probably a god

of the atmospheric region above the earth — perhaps a storm god like Adad (q.v.), or like Yahweh among the ancient Hebrews. However this may be, already in the old- Babylonian period, i.e. before Khammurabi, Anu was regarded as the god of the heavens and his name became in fact synony- mous with the heavens, so that in some cases it is doubtful whether, under the term, the god or the heavens is meant. It would seem from this that the grouping of the divine powers recognized in the universe into a triad symbolizing the three divisions, heavens, earth and the watery deep, was a process of thought which had taken place before the third millennium. To Anu was assigned the control of the heavens, to Bel the earth, and to Ea the waters. The doctrine once established remained an inherent part of the Babylonian-Assyrian religion and led to the more or less complete disassociation of the three gods constituting the triad from their original local limitations. An intermediate step between Anu viewed as the local deity of Erech (or some other centre), Bel as the god of Nippur, and Ea as the god of Eridu is represented by the prominence which each one of the centres associated with the three deities in ques- tion must have acquired, and which led to each one absorbing the qualities of other gods so as to give them a controlling position in an organized pantheon. For Nippur we have the direct evidence that its chief deity, En-lil or Bel, was once regarded as the head of an extensive pantheon. The sanctity and, therefore, the importance of Eridu remained a fixed tradition in the minds of the people to the latest days, and analogy there- fore justifies the conclusion that Anu was likewise worshipped in a centre which had acquired great prominence. The summing- up of divine powers manifested in the universe in a threefold division represents an outcome of speculation in the schools attached to the temples of Babylonia, but the selection of Anu, Bel and Ea for the three representatives of the three spheres recognized, is due to the importance which, for one reason or the other, the centres in which Anu, Bel and Ea were worshipped had acquired in the popular mind. Each of the three must have been regarded in his centre as the most important member in a larger or smaller group, so that their union in a triad marks also the combination of the three distinctive pantheons into a harmonious whole.

In the astral theology of Babylonia and Assyria, Anu, Bel and Ea became the three zones of the ecliptic, the northern, middle and southern zone respectively. The purely theoretical character of Anu is thus still further emphasized, and in the annals and votive inscriptions as well as in the incantations and hymns, he is rarely introduced as an active force to whom a personal appeal can be made. His name becomes little more than a synonym for the heavens in general and even his title as king

or father of the gods has little of the personal element in it. A consort Antum (or as some scholars prefer to read, Anatum) is assigned to him, on the theory that every deity must have a female associate, but Antum is a purely artificial product— a lifeless symbol playing even less of a part in what may be called the active pantheon than Anu.

For works of reference see Babylonian and Assyrian Religion.

(M. Ja.)

ANUBIS (in Egyptian Anup, written Inpw in hieroglyphs), the name of one of the most important of the Egyptian gods, There were two types of canine divinities in Egypt, their leading representatives being respectively Anubis and Ophois (Wp-wi-wt, " opener of the ways "): the former type is symbolized by the

recumbent animal J«\, the other by a similar animal (in a

stiff standing attitude), carried as an emblem on a standard

"V^ in war or in religious processions. The former comprised

two beneficent gods of the necropolis; the latter also were beneficent, but warlike, divinities. They thus corresponded/at any rate in some measure, respectively to the fiercer and milder aspects of the dog-tribe. In late days the Greeks report that Kvves (dogs) were the sacred animals of Anubis while those of

Ophois were Xwcoi (wolves). The above figure 3^ is coloured black as befits a funerary and nocturnal animal: it is more attenuated than even a greyhound, but it has the bushy tail of the fox or the jackal. Probably tliese were the original genii of the necropolis, and in fact the same lean animal figured passant •^^ is sib " jackal " or " fox." The domestic dog would be brought into the sacred circle through the increased veneration for animals, and the more pronounced view in later times of Anubis as servant, messenger and custodian of the gods.

Anubis was the principal god in the capitals of the XVIIth and XVTIIth nomes of Upper Egypt, and secondary god in the Xlllth and probably in the Xllth nome; but his cult was universal. To begin with, he was the god of the dead, of the cemetery, of all supplies for the dead, and therefore of embalming when that became customary. In very early inscriptions the funerary prayers in the tombs are addressed to him almost exclusively, and he always took a leading place in them. In the scene of the weighing of the

soul before Osiris, dating from the New-kingdom onwards, Anubis attends to the balance while Thoth registers the result. Anubis was believed to have been the embalmer of Osiris: the mummy of Osiris, or of the deceased, on a bier, tended by this god, is a very common subject on funerary tablets of the late periods. Anubis came to be con- sidered especially the attendant of the gods and conductor of the dead, and hence was commonly identified with Hermes (cf. the name Hermanubis); but the role of Hermes as the god of eloquence, inventor of arts and recorder of the gods was taken by Thoth. In those days Anubis was considered to be son of Osiris by Nephthys; earlier perhaps he was son of Re, the sun-god. In the 2nd century a. d. his aid was " com- pelled " by the magicians and necromancers to fetch the gods and entertain them with food (especially in the ceremony of gazing into the bowl of oil), and he is invoked by them some- times as the " Good Ox-herd." The cult of Anubis must at all times have been very popular in Egypt, and, belonging to the Isis and Serapis cycle, was introduced into Greece and Rome.

See Erman, Egyptian Religion; Budge, Gods of the Egyptians', Meyer, in Zeits. J. Aeg. Spr. 41-97- (F – Ll. G.)

ANURADHAPURA, a ruined city of Ceylon, famous for its ancient monuments. It is situated in the North-central province, Anuradhapura became the capital of Ceylon in the 5th century B.C., and attained its highest magnificence about the commence- ment of the Christian era. In its prime it ranked beside Nineveh and Babylon in its colossal proportions — its four walls, each 16 m. long, enclosing an area oi 256 sq. m., — in the number of its inhabitants, and the splendour of its shrines and public edifices. It suffered much during the earlier Tamil invasions, and was finally deserted as a royal residence in a.d. 760, It fell, com-

pletely into decay, and it is only of recent years that the jungle has been cleared away, the ruins laid bare, and some measure of prosperity brought back to the surrounding country by the restoration of hundreds of village tanks. The ruins consist of three classes of buildings, dagobas, monastic buildings, and pokunas. The dagobas are bell-shaped masses of masonry, varying from a few feet to over 11 00 in circumference. Some of them contain enough masonry to build a town for twenty-five thousand inhabitants. Remains of the monastic buildings are to be found in every direction in the shape of raised stone plat- forms, foundations and stone pillars. The most famous is the Brazen Palace erected by King Datagamana about 164 B.C. The pokunas are bathing-tanks or tanks for the supply of drinking-water, which are scattered everywhere through the jungle. The city also contains a sacred Bo-tree, which is said to date back to the year 245 B.C. The railway was extended from Matale to Anuradhapura in 1905. Population: town, 3672; province, 79,110.

ANVIL (from Anglo-Saxon anfilt or onfilti, either that on which something is " welded " or " folded," cf. German falzen, to fold, or connected with other Teutonic forms of the word, cf. German amboss, in which case the final syllable is from " beat," and the meaning is " that on which something is beaten "), a mass of iron ou which material is supported while being shaped under the hammer (see Forging). The common blacksmith's anvil is made of wrought iron, often in America of cast iron, with a smooth working face of hardened steel. It has at one end a projecting conical beak or bick for use, in hammering curved pieces of metal; occasionally the other end is also provided with a bick, which is then partly rectangular in section. There is also a square hole in the face, into which tools, such as the anvil-cutter or chisel, can be dropped, cutting edge uppermost. For power hammers the anvil proper is supported on an anvil block which is of great massiveness, sometimes weighing over 200 tons for a 12-ton hammer, aiid this again rests on a strong foundation of timber and masonry or concrete. In anatomy the term anvil is applied to one of the bones of the middle ear, the incus, which is articulated with the malleus.

ANVILLE, JEAN BAPTISTE BOURGUIGNON D' (1697- 1782), perhaps the greatest geographical author of the 18th century, was born at Paris on the nthof July 1697. Hispassion for geographical research displayed itself from early years: at the age of twelve he was already amusing himself by drawing maps for Latin authors. Later, his friendship with the anti-quarian, Abbe Longuerue, greatly aided his studies. His first serious map, that of Ancient Greece, was published when he was fifteen, and at the age of twenty-two he was appointed one of the king's geographers, and began to attract the attention of the first authorities. D'Anville's studies embraced everything of geographical nature in the world's literature, as far as he could master it: for this purpose he not only searched ancient and modern historians, travellers and narrators of every description, but also poets, orators and philosophers. One of his cherished objects was to reform geography by putting an end to the blind copying of older maps, by testing the commonly accepted posi- tions of places through a rigorous examination of all the descrip- tive authority, and by excluding from cartography every name inadequately supported. Vast spaces, which had before been covered with countries and cities, were thus suddenly reduced almost to a blank.

D'Anville was at first employed in the humbler task of illustrat- ing by maps the works of different travellers, such as Marchais, Charlevoix, Labat and Duhalde. For the history of China by the last-named writer he was employed to make an atlas, which was published separately at the Hague in 1737. In 1735 and 1736 he brought out two treatises on the figure of the earth; but these attempts to solve geometrical problems by literary material were, to a great extent, refuted by Maupertuis' measurements of a

degree within the polar circle. D'Anville's historical method was more successful in his 1743 map of Italy, which first indicated numerous errors in the mapping of that country, and was accom- panied by a valuable memoir (a novelty in such work), showing

in full the sources of the design. A trigonometrical survey which Benedict XIV. soon after had made in the papal states strikingly confirmed the French geographer's results. In his later years d'Anville did yeoman service for ancient and medieval geography, accomplishing something like a revolution in the former; mapping afresh all the chief countries of the pre-Christian civilizations (especially Egypt), and by his MSmoire et abregi de giographie ancienne et generate and his Etats formSs en Europe apres la chute de I' empire romain en Occident (1771) rendering his labours still more generally useful. In 1754, at the age of fifty- seven, he became a member of the Academie des Inscriptions et Belles Lettres, whose transactions he enriched with many papers. In 1775 he received the only place in the Academie des Sciences which is allotted to geography; and in the same year he was appointed, without solicitation, first geographer to the king. His last employment consisted in arranging his collection of maps, plans and geographical materials. It was the most extensive in Europe, and had been purchased by the king, who, however, left him the use of it during his life. This task per- formed, he sank into a total imbecility both of mind and body, which continued for two years, till his death in January 1782.

D'Anville's published memoirs and dissertations amounted to 78, and his maps to 211. A complete edition of his works was an- nounced in 1806 by de Manne in 6 vols, quarto, Only two of which had appeared when the editor died in 1832. See Dacier's &oge de d'Anville (Paris, 1802). Besides the separate works noticed above, d'Anville's maps executed for Rollin's Histoire ancienne and Histoire romaine, and his Traite des mesures anciennes et modernes (1769), deserve special notice.

ANWARI [Auhad-uddin Ali Anwari], Persian poet, was born in Khorasan early in the 12th century. He enjoyed the especial favour of the sultan Sinjar, whom he attended in all his warlike expeditions. On one occasion, when the sultan was besieging the fortress of Hazarasp, a fierce poetical conflict was maintained between Anwari and his rival Rashidi, who was within the beleaguered castle, by means of verses fastened to arrows. Anwari died at Balkh towards the end of the 12 th century. The Diwan, or collection of his poems, consists of a series of long poems, and a number of simpler lyrics. His longest piece, The Tears of Khorassan, was translated

into English verse by Captain Kirkpa trick (see also Persia. Literature).

ANWEILER, or Annweiler, a town of Germany, in the Bavarian Palatinate, on the Queich, 8 m. west of Landau, and on the railway from that place to Zweibrücken. Pop. 3700. It is romantically situated in the part of the Haardt called the Pfalzer Schweiz (Palatinate Switzerland), and is surrounded by high hills which yield a famous red sandstone. On the Sonnen- berg (1600 ft.) lie the ruins of the castle of Trifels, in which Richard Cceur de Lion was imprisoned in 1193/ The industries include cloth-weaving, tanning, dyeing and saw mills. There is also a considerable trade in wine.

ANZENGRUBER, LUDWIG (1839-1889), Austrian dramatist and novelist, was born at Vienna on the 29th of November 1839. He was educated at the Realschule of his native town, and then entered a bookseller's shop; from i860 to 1867 he was an actor, without, however, displaying any marked talent, although his stage experience later stood him in good stead. In 1869 he became a clerk in the Viennese police department, but having in the following year made a success with his anti-clerical drama, Der Pfarrer von Kirchfeld, he gave up his appointment and devoted himself entirely to literature. He died at Vienna on the 10th of December 1889. Anzengruber was exceedingly fertile in ideas, and wrote a great many plays. They are mostly of Austrian peasant life, and although somewhat melancholy in tone are interspersed with bright and witty scenes. Among the best known are Der Meineidbauer (187 1), Die Kreuzelschreiber (1872), Der G'wissensimirm (1874), Hand und Herz (1875), Doppelselbstmord (1875), Das vierte Gebot (1877), and Der Fleck auf der Ehr' (1889). Anzengruber also published a novel of considerable merit, Der Schandfleck (1876; remodelled 1884); and various short stories and tales of village life collected under the title Wolken und Sunn'schein (1888).

Anzengruber's collected works, with a biography, were published in 10 vols, in 1890 (3rd ed. 1897); his correspondence has been

edited by A. Bettelheim (1902). See A. Bettelheim, L. Anzengruber (1890); L. Rosner, Erinnerungen an L. Anzengruber (1890): H. Sittenberger, Studien zur Dramaturgie der Gegenwart (1899); S. Friedmann, L. Anzengruber (1902).

ANZIN, a town of northern France, in the department of Nord, on the Scheldt, 15 m. N.W. of Valenciennes, of which it is a suburb. Pop. (1906) 14,077. Anzin is the centre of im- portant coal-mines of the Valenciennes basin belonging to the Anzin Company, the formation of which dates to 1717. The metallurgical industries of the place are extensive, and include iron and copper founding and the manufacture of steam-engines,

machinery, chain-cables and a great variety of heavy iron goods. There are also glass-works and breweries.

AONIA, a district of ancient Boeotia, containing the mountains Helicon and Ci-thaeron, and thus sacred to the Muses, who are called by Pope the " Aonian maids."

AORIST (from Gr. aopiaros, indefinite), the name given in Greek grammar to certain past tenses of verbs (first aorist, second aorist).

AOSTA (anc. Augusta Praetoria Salassorum), a town and episcopal see of Piedmont, Italy, in the province of Turin, 80 m. N.N.W. by rail of the town of Turin, and 48 m. direct, situated 1910 ft. above sea-level, at the confluence of the Buthier and the Dora Baltea, and at the junction of the Great and Little St Bernard routes. Pop. (1901) 7875. The cathedral, reconstructed in the nth century (to which one of its campanili and some architectural details belong), was much altered in the 14th and 17th; it has a rich treasury including an ivory diptych of 406 with a representation of Honorius. The church of St Ours, founded in 425, and rebuilt in the 12th century, has good cloisters (1133); the 15th-century priory is picturesque. The castle of Bramafam (nth century) is interesting. Cretinism is common in the district.

After the fall of the Roman empire the valley of Aosta fell into the hands of the Burgundian kings; and after many changes of masters, it came under the rule of Count Humbert I. of Savoy (Biancamano) in 1032. The privilege of holding the assembly of the states-general was granted to the inhabitants in 11 89. An executive council was nominated from this body in 1536, and continued to exist until 1802. After the restoration of the rule of Savoy it was reconstituted and formally recognized by Charles Albert, king of Sardinia, at the birth of his grandson Prince Amedeo, who was created duke of Aosta. Aosta was the birthplace of Anselm. For ancient remains see Augusta Praetoria Salassorum.

APACHE (apparently from the Zuni name, = " enemy," given to the Navaho Indians), a tribe of North American Indians of Athapascan stock. The Apaches formerly ranged over south- eastern Arizona and south-western Mexico. The chief divisions of the Apaches were the Arivaipa, Chiricahua, Coyotero, Faraone Gileno, Llanero, Mescalero, Mimbreno, Mogollon, Naisha, Tchikun and Tchishi. They were a powerful and warlike tribe, constantly at enmity with the whites. The final surrender of the tribe took place in 1886, when the Chiricahuas, the division involved, were deported to Florida and Alabama, where they underwent military imprisonment. The Apaches are now in reservations in Arizona, New Mexico and Oklahoma, and number between 5000 and 6000.

For details see Handbook of American Indians, ed. F. W. Hodge, (Washington, 1907) ; also Indians, North American.

APALACHEE (apparently a Choctaw name, = "people on the other side "), a tribe of North American Indians of Muskho- gean stock. They have been known since the 16th century, and formerly ranged the country around Apalachee Bay, Florida. About 1600 the Spanish Franciscans founded a successful mission among them, but early in the 18th century the tribe suffered defeat at the hands of the British, the mission churches were burnt, the priests killed, and the tribe practically annihil- ated, more than one thousand of them being sold as slaves.

See Handbook of American Indians, ed. F. W. Hodge (Washington,

1907).

APALACHICOLA, a city, port of entry, and the county-seat of Franklin county, Florida, U.S.A., in the N.W. part of the

state, on Apalachicola Bay and at the mouth of the Apalachicola river. Pop. (1890) 2727; (1900) 3077, of whom 1589 were of negro descent; (1905, state census) 3244. It is served by the Apalachicola Northern railway (to Chattahoochee, Florida), and by river steamers which afford connexion with railways at Carrabelle about 25 m. distant, at Chatahoochee (or River Junction), and at Columbus and Bainbridge, Georgia, and by ocean-going vessels with American and foreign ports. The city has a monument (1900) to John Gorrie (1803-1855), a physician who discovered the cold-air process of refrigeration in 1849 (and patented an ice-machine in 1850), as the result of experiments to lower the temperatures of fever patients. The bay is well protected by St Vincent, Flag, Sand, and St George's islands; and the shipping of lumber, naval stores and cotton, which reach the city by way of the river, forms the principal industry. Before the development of railways in the Gulf states, Apala- chicola was one of the principal centres of trade in the southern states, ranking third among the Gulf ports in 1835. In 1907 the Federal government projected a channel across the harbour bar 100 ft. wide and 10 ft. deep and a channel 150 ft. wide and 18 ft. deep for Link Channel and the West Pass. In 1907 the exports were valued at $317,838; the imports were insignificant. The value of the total domestic and foreign commerce of the port for the year ending on the 30th of June 1907 was estimated at $1,240,000 (76,000 tons). The fishery products, including

oysters, tarpon, sturgeon, caviare and sponges, are also important.
APAMEA, the name of several towns in western Asia.

1. A treasure city and stud-depot of the Seleucid kings in the valley of the Orontes. It was so named by Seleucus Nicator, after Apama, his wife. Destroyed by Chosroes in the 7 th century a.d., it was partially rebuilt and known as Famia by the Arabs; and overthrown by an earthquake in 1152. It kept its importance down to the time of the Crusades. The acropolis hill is now occupied by the ruins of Kalat el-Mudik.

See R. F. Burton and T. Drake, Unexplored Syria; E. Sachau, Reise in Syrien, 1883.

2. A city in Phrygia, founded by Antiochus Soter (from whose mother, Apama, it received its name), near, but on lower ground than, Cclaenae. It was situated where the Marsyas leaves the hills to join the Maeander, and it became a seat of Seleucid power, and a centre of Graeco-Roman and Graeco-Hebrew civilization and commerce. There Antiochus the Great collected the army with which he met the Romans at Magnesia, and there two years later the treaty between Rome and the Seleucid realm was signed. After Antiochus' departure for the East, Apamea lapsed to the Pergamenian kingdom and thence to Rome in 133, but it was resold to Mithradates V., who held it till 1 20. After the Mithradatic wars it became and remained a great centre for trade, largely carried on by resident Italians and by Jews. In 84 Sulla made it the seat of a convcntus of the Asian province, and it long claimed primacy among Phrygian cities. Its decline dates from the local disorganization of the empire in the 3rd century a.d.; and though a bishopric, it was not an important military or commercial centre in Byzantine times. The Turks took it first in 1070, and from the 13th century onwards it was always in Moslem hands. For a long period it was one of the greatest cities of Asia Minor, commanding the Maeander road; but when the trade routes were diverted to Constantinople it rapidly declined, and its ruin was completed by an earthquake. A Jewish tradition, possibly arising from a name Cibotus (ark), which the town bore, identified a neigh- bouring mountain with Ararat. The famous " Noah " coins of the emperor Philip commemorate this belief. The site is now partly occupied by Bineir (q.v., sometimes locally known also as Geiklar, " the gazelles," perhaps from a tradition of the Persian hunting-park, seen by Xenophon at Celaenae), which is connected with Smyrna by railway; there are considerable remains, including a great number of important Graeco-Roman inscriptions.

See W. M. Ramsay, Cities and Bishoprics of Phrygia, vol. ii. ; G. Weber, Dineir-Celenes (1892); D. G. Hogarth in Journ. Hell. Studies (1888); O. Hirschfeld' in Trans, Berlin Academy (1875).

"(D. G. H.)

3. A town on the left bank of the Euphrates, at the end of a bridge of boats {zeugma) ; the Til-Barsip of the Assyrian inscrip- tions, now Birejik (q.v.).

4. The earlier Myrlea of Bithynia, now Mudania (q.v.), the portof Brusa. Thename was given it by Prusias I., who rebuilt it.

5. A city mentioned by Stephanus and Pliny as situated near the Tigris, the identification of which is still uncertain.

6. A Greek city in Parthia, near Rhagae.

APARRI, a town of the province of Cagayan, Luzon, Philip- pine Islands, on the Grande de Cagayan river near, its mouth, about 55 m. N. of Tuguegarao, the capital. Pop. (1903) 18,252. The valley is one of the largest tobacco-producing sections in the Philippines; and the town has a considerable coastwise trade. Here, too, is a meteorological station.

APATITE, a widely distributed mineral, which, when found in large masses, is of considerable economic value as a phosphate. As a mineral species it was first recognized by A. G. Werner in 1786 and named by him from the Greek airaTav, to deceive, because it had previously been mistaken for other minerals, such as beryl, tourmaline, chrysolite, amethyst, &c. Although long known to consist mainly of calcium phosphate, it was not until 1827 that G. Rose found that fluorine or chlorine is an essential constituent. Two chemical varieties of apatite are to be distinguished, namely a fluor-apatite, (CaF) Ca 4 P30i 2 , and a chlor-apatite, (CaCl) Ca 4 P 3 0i 2 : the former, which is much the commoner, contains 42-3% of phosphorus pentoxide (P 2 5) and 3-8% fluorine, and the latter 4-10% P 2 5 and 6-8% chlorine. Fluorine and chlorine replace each other in indefinite proportions, and they may also be in part replaced by hydroxyl, so that the general formula becomes [Ca (F, CI, OH)] Ca 4 P 3 0i 2 , in which the univalent group Ca(F, CI, OH) takes the place of one hydrogen atom in orthophosphoric acid H 3 P0 4 . The formula is sometimes written in the form 3Ca 3 (P0 4) 2 +CaF 2 . Mangan-apatite is a variety in which calcium is largely replaced by manganese (up to 10% MnO). Cerium, didymium, yttrium, &c, oxides may also sometimes be present, in amounts up to 5 %.

Apatite frequently occurs as beautifully developed crystals, sometimes a foot or more in length, belonging to that division of the hexagonal system in which there is pyramidal hemi- hedrism. In this type of symmetry, of which apatite is the best

Fig. 1.

Fig. 2.

example, there is only one plane of symmetry, which is per- pendicular to the hexad axis. The arrangement of the pyramidal faces n and u in fig. 2 show the hemihedral character and absence of the full number of planes and axes of symmetry. Fig. 2 represents a highly modified crystal from St Gotthard; a more common form is shown in fig. 1, which is bounded by the hex- agonal prism m, hexagonal bipyramid x and basal pinacoid c.

In its general appearance, apatite exhibits wide variations. Crystals may be colourless and transparent or white and opaque, but are often coloured, usually some shade of green or brown, occasionally violet, sky-blue, yellow, &c. The lustre is vitreous, inclining to sub-resinous. There is an imperfect cleavage parallel to the basal pinacoid, and the fracture is conchoidal. Hardness 5, specific gravity 3-2.

Yellowish-green prismatic crystals from Jumilla in Murcia in Spain have long been known under the name asparagus-stone. Lazurapatite is a sky-blue variety found as crystals with lapis- lazuli in Siberia; and moroxite is the name given to dull greenish- blue crystals from Norway and Canada. Francolite, from Wheal Franco, near Tavistock in Devonshire, and also from several Cornish mines, occurs as crystallized stalactitic masses. In

addition to these crystallized varieties, there are massive varieties, fibrous, concretionary, stalactitic, or earthy in form, which are included together under the name phosphorite (q.v), and it is these massive varieties, together with various rock-phosphates (phosphatic nodules, coprolites, guano, &c.) which are of such great economic importance: crystallized apatite is mined for phosphates only in Norway and Canada.

With regard to its mode of occurrence, apatite is found under a variety of conditions. In igneous rocks of all kinds it is in- variably present in small amounts as minute acicular crystals, and was one of the first constituents of the rock to crystallize out from the magma. The extensive deposits of chlor-apatite near Kragero and Bamle, near Brevik, in southern Norway, are in connexion with gabbro, the felspar of which has been altered, by emanations containing chlorine, to scapolite, and titanium minerals have been developed. The apatite occurring in con- nexion with granite and veins of tin-stone is, on the other hand, a fluor-apatite, and, like the other fluorine-bearing minerals characteristic of tin-veins, doubtless owes its origin to the emanations of tin fluoride which gave rise to the tin-ore.

Special mention may be here made of the beautiful violet crystals of fluor-apatite which occur in the veins of tin-ore in the Erz- gebirge, and of the brilliant bluish-green crystals encrusting cavities in the granite of Luxullian in Cornwall. Another common mode of occurrence of apatite is in metamorphic crystalline rocks, especially in crystalline limestones: in eastern Canada extensive beds of apatite occur in the limestones associated with the Laurentian gneisses. Still another mode of occur- rence is presented by beautifully developed and transparent crystals found with crystals of felspar and quartz lining the crevices in the gneiss of the Alps. Crystallized apatite is also occasionally found in metalliferous veins, other than those of tin, and in beds of iron ore; whilst if the massive varieties (phosphorite) be considered many other modes of occurrence might be cited. (L. J.S.)

APATURIA (' ATaroiipia) , an ancient Greek festival held annually by all the Ionian towns except Ephesus and Colophon (Herodotus i. 147). At Athens it took place in the month of Pyanepsion (October to November), and lasted three days, on which occasion the various phratries (i.e. clans) of Attica met to discuss their affairs. The name is a slightly modified form of airaTopia = a/xaTraTopia, oyuoxaropta, the festival of "common relationship." The ancient etymology associated it with airaTr; (deceit), a legend existing that the festival originated in 1100 B.C. in commemoration of a single combat between a certain Melan- thus, representing King Thymoetes of Attica, and King Xanthus of Boeotia, in which Melanthus successfully threw his adver- sary off his guard by crying that a man in a black goat's skin (identified with Dionysus) was helping him (Schol. Aristophanes, Acharnians, 146). On the first day of the festival, called Dorpia or Dorpeia, banquets were held towards evening at the meeting-place of the phratries or in the private houses of members. On the second, Anarrhysis (from avappveiv, to draw back the victim's head), a sacrifice of oxen was offered at the public cost to Zeus Phratrius and Athena. On the third day, Cureotis (Kovpewns) , children born since -the last festival were presented by their fathers or guardians to the assembled phratores, and, after an oath had been taken as to their legitimacy and the sacrifice of a goat or a sheep, their names were inscribed in the register. The name Koupewris is derived either from /coOpos, that is, the day of the young, or less probably from Kelpu, because on this occasion young people cut their hair and offered it to the gods. The victim was called y.elov. On this day also it was the custom for boys still at school to declaim pieces of poetry, and to receive prizes (Plato, Timaeus, 21 b). According to Hesychius these three days of the festival were followed by a fourth, called iirifida, but this is merely a general term for the day after any festival.

APE (Old Eng. apa; Dutch aap; Old Ger. affo; Welsh epa; Old Bohemian op; a word of uncertain origin, possibly an imitation of the animal's

chatter), the generic English name, till the 1 6th century, for animals of the monkey tribe, and still

used specifically for the tailless, manlike representatives of the order Primates (q.v.). The word is now generally a synonym for " monkey," but the common verb for both (as transferred figuratively to human beings) is " to ape," i.e. to imitate.

APELDOORN, a town in the province of Gelderland, Holland, and a junction station 263 m. by rail W. of Amersfoort. It is connected by canal north and south with Zwolle and Zutphen respectively. Pop. (1000) 25,834. The- neighbourhood of Apel- doorh is very picturesque and well wooded. The Protestant church was restored after a fire in 1890. Close by is the favourite country-seat of the royal family of Holland called the Loo. It was originally a hunting-lodge of the dukes of Gelderland, but in its present form dates chiefly from the time of the Stadt- holder William in., king of England. Apeldoorn possesses large paper-mills.

APELLA, the official title of the popular assembly at Sparta, corresponding to the ecclesia in most other Greek states. Every full citizen who had completed his thirtieth year was entitled to attend the meetings, which, according to Lycurgus's ordinance, must be held at the time of each full moon within the boundaries of Sparta. They had in all probability taken place originally in the Agora, but were later transferred to the neighbouring building known as the Skias (Paus. iii. 12. 10). The presiding officers were at first the kings, but in historical times the ephors, and the voting was conducted by shouts; if the president was doubtful as to the majority of voices, a division was taken and the votes were counted. Lycurgus had ordained that the apella must simply accept or reject the proposals submitted to it, and though this regulation fell into neglect, it was practically restored by the law of Theopompus and Polydorus which em- powered the kings and elders to set aside any " crooked " decision of the people (Plut. Lycurg. 6). In later times, too, the actual debate was almost, if not wholly, confined to the kings, elders, ephors and perhaps the other magistrates. The apella voted on peace and war, treaties and foreign policy in general: it decided which of the kings should conduct a campaign and settled questions of disputed succession to the throne: it elected elders, ephors and other magistrates, emancipated helots and perhaps voted on legal proposals. There is a single reference (Xen. Hell. iii. 3. 8) to a "small assembly" (17 /xi/cp& Ka.'Kovnevr] eKKkqaia) at Sparta, but nothing is known as to its nature or competence. The term apella does not occur in extant Spartan inscriptions, though" two decrees of Gythium belonging to the Roman period refer to the p.eyk\ai cbreXXtu (Le Bas-Foucart, Voyage arckiologique, ii., Nos. 242a, 243).

See G. Gilbert, Constitutional Antiquities of Sparta and Athens (Eng. trans., 1895), pp. 49 ff. ; Sludien zur altspartanischen Geschichte (Gottingen, 1872), pp. 131 ff. ; G. F. Schomann, Antiquities of Greece: The Stale (Eng. trans., 1880), pp. 234 ff. ; De ecclesiis Lacedaemoniorum (Griefswald, 1836) [= Opusc. academ. i. pp. 87 ff.]; C. O. Miiller, History and Antiquities of the Doric Race (Eng. trans., 2nd ed. 1839), book iii. ch. 5, §§ 8-10; G. Busolt, Die griechischen Staats- urid Rechtsaltertiimer, 1887 (in Iwan Miiller's Handbuch der klassischen Altertumswissenschaft, iv. i), § 90; Griechische Geschichte (2nd ed.), i. p. 552 ff- (M. N. T.)

APELLES, probably the greatest painter of antiquity. He lived from the time of Philip of Macedon till after the death of Alexander. He was of Ionian origin, but after he had attained some celebrity he became a student at the celebrated school of Sicyon, where he worked under Pamphilus. He thus combined the Dorian thoroughness with the Ionic grace. Attracted to the court of Philip, he painted him and the young Alexander with such success that he became the recognized court painter of Macedon, and his picture of Alexander holding a thunderbolt ranked with the Alexander with the spear of the sculptor Lysippus. Other works of Apelles had a great reputation in antiquity, such as the portraits of the Macedonians Clitus, Archelaus and Antigonus, the procession of the high priest of Artemis at Ephesus, Artemis amid a chorus of maidens, a great allegorical picture representing Calumny, and the noted paint- ing representing Aphrodite rising out of the sea. Of none of these works have we any copy, unless indeed we may consider a painting of Alexander as Zeus in the house of the Vettii at Pompeii as a reminiscence of his work; but some of

the Italian artists of the Renaissance repeated the subjects, in a vain hope of giving some notion of the composition of them.

Few things are more hopeless than the attempt to realize the style of a painter whose works have vanished. But a great wealth of stories, true or invented, clung to Apelles in antiquity; and modern archaeologists have naturally tried to discover what they indicate. We are told, for example, that he attached great value to the drawing of outlines, practising every day. The tale is well known of his visit to Protogenes, and the rivalry of the two masters as to which could draw the finest and steadiest line. The power of drawing such lines is conspicuous in the decoration of red-figured vases of Athens. Apelles is said to have treated his rival with generosity, for he increased the value of his pictures by spreading a report that he meant to

buy them and sell them as his own. Apelles allowed the superiority of some of his contemporaries in particular matters: according to Pliny he admired the dispositio of Melanthius, i.e. the way in which he spaced his figures, and the mensurae of Asclepiodorus, who must have been a great master of symmetry and proportion. It was especially in that undefinable quality "grace" that Apelles excelled. He probably used but a small variety of colours, and avoided elaborate perspective: simplicity of design, beauty of line and charm of expression were his chief merits. When the naturalism of some of his works is praised — for example, the hand of his Alexander is said to have stood out from the picture — we must remember that this is the merit always ascribed by ignorant critics to works which they admire. In fact the age of Alexander was one of notable idealism, and probably Apelles succeeded in a marked degree in imparting to his figures a beauty beyond nature.

Apelles was also noted for improvements which he introduced in technique. He had a dark glaze, called by Pliny atramentum, which served both to preserve his paintings and to soften their colour. There can be little doubt that he was one of the most bold and progressive, of artists. (P. G.)

APELLICON, a wealthy native of Teos, afterwards an Athenian citizen, a famous book collector. He not only spent large sums in the acquisition of his library, but stole original documents from the archives of Athens and other cities of Greece. Being detected, he fled in order to escape punishment, but returned when Athenion (or Aristion) , a bitter opponent of the Romans, had made himself tyrant of the city with the aid of Mithradates. Athenion sent him with some troops to Delos, to plunder the treasures of the temple, but he showed little military capacity. He was surprised by the Romans under the command of Orobius (or Orbius), and only saved his life by flight. He died a little later, probably in 84 B.C.

Apeliicon's chief pursuit was the collection of rare and import- ant books. He purchased from the family of Neleus of Skepsis in the Troad manuscripts of the works of Aristotle and Theo- phrastus (including their libraries), which had been given to Neleus by Theophrastus himself, whose pupil Neleus had been. They had been concealed in a cellar to prevent their falling into the hands of the book-collecting princes of Pergamum, and were in a very dilapidated condition. Apellicon filled in the lacunae, and brought out a new, but faulty, edition. In 84 Sulla removed Apeliicon's library to Rome (Strabo xiii. p. 609; Plutarch, Sulla, 26). Here the MSS. were handed over to the grammarian Tyrannion, who took copies of them, on the basis of which the peripatetic philosopher Andronicus of Rhodes prepared an edition of Aristotle's works. Apeliicon's library contained a remarkable old copy of the Iliad. He is said to have published a biography of Aristotle, in which the calumnies of other bio- graphers were refuted.

APENNINES (Gr. 'Arivvivos, Lat. Appenninus— in both cases used in the singular), a range of mountains traversing the entire peninsula of Italy, and forming, as it were, the backbone of the country. The name is probably derived from the Celtic pen, a mountain top: it originally belonged to the northern portion of the chain, from the Maritime Alps to Ancona; and Polybius is probably the first writer who applied it to the whole chain, making, indeed, no distinction between the

n. 6

Apennines and the Maritime Alps, and extending the former name as far as Marseilles. Classical authors do not differentiate the various parts of the chain, but use the name as a general name for the whole. The total length is some 800 m. and the maximum width 70 to 80 m.

Divisions. — Modern geographers divide the range into three parts,, northern, central and southern.

1. The northern Apennines are generally distinguished (though there is no real solution of continuity) from the Maritime Alps at the Bocchetta dell' Altare, some 5 m. W. of Savona on the high road to Turin. 1 They again are divided into three parts — the Ligurian, Tuscan and Umbrian Apennines. The Ligurian Apennines extend as far as the pass of La Cisa in the upper valley of the Magra (anc. Macro) above Spezia; at first they follow the curve of the Gulf of Genoa, and then run east-south-east parallel to the coast. On the north and north-east lie the broad plains of Piedmont and Lombardy, traversed by the Po, the chief tributaries of which from the Ligurian Apennines are the Scrivia (0/w&m) > Trebbia {Trebia) andTaro (Tarus). TheTanaro (Tanarus), though largely fed by tributaries from the Ligurian Apennines, itself rises in the Maritime Alps, while the rivers on the south and south-west of the range are short and unim- portant. The south side of the range rises steeply from the sea, leaving practically no coast strip: its slopes are sheltered and therefore fertile and highly cultivated, and the coast towns are favourite winter resorts (see Riviera). The highest point (the Monte Bue) reaches 591 5 ft. The range is crossed by several railways — the line from Savona to Turin (with a branch at Ceva for Acqui) , that from Genoa to Ovada and Acqui, the main lines from Genoa to Novi, the junction for Turin and Milan (both of which 2 pass under the Monte dei Giovi, the ancient Mons Ioventius, by which the ancient Via Postumia ran from Genua to Dertona), and that from Spezia to Parma under the pass of La Cisa. 3 All these traverse the ridge by long tunnels — that on the new line from Genoa to Honco is upwards of 5 m. in length.

The Tuscan Apennines extend from the pass of La Cisa to the sources of the Tiber. The main chain continues to run in an east-south-east direction, but

traverses the peninsula, the west coast meanwhile turning almost due south. From the northern slopes many rivers and streams run north and north-north-east into the Po, the Secchia {Secia) and Panaro (Scultenna) being among the most important, while farther east most of the rivers are tributaries of the Reno (anc. Rhenus). Other small streams, e.g. the Ronco (Bedesis) and Montone (litis), which flow into the sea together east of Ravenna, were also tributaries of the Po; and the Savio (Sapis) and the Rubicon seem to be the only streams from this side of the Tuscan Apennines that ran directly into the sea in Roman days. From the south-west side of the main range the Arno (q.v.) and Serchio run into the Mediterranean. This section of the Apennines is crossed by two railways, from Pistoia to Bologna and from Florence to Faenza, and by several good high roads, of which the direct road from Florence to Bologna over the Futa pass is of Roman origin; and certain places in it are favourite summer resorts. The highest point of the chain is Monte Cimone (7 1 03 f t.) . The so-called Alpi Apuane (the Apuani were an ancient people of Liguria), a detached chain south-west of the valley of the Serchio, rise to a maximum height of 6 1 00 ft. They contain the famous marble quarries of Carrara. The greater part of Tuscany, however, is taken up by lower hills, which form no part of the Apennines, being divided from the main chain by the valleys of the Arno, Chiana {Clams) and Paglia (Pallia). Towards the west they are rich in minerals and chemicals, which the Apennines proper do not produce.

The Umbrian Apennines extend from the sources of the Tiber to (or perhaps rather beyond) the pass of Scheggia near Cagli, where the ancient Via Flaminia crosses the range. The highest point is the Monte Nerone (5010 ft.). The chief river is the Tiber itself: the others, among which the Foglia (Pisaurus), Metauro

1 The ancient Via Aemilia, built in 109 B.C., led over this pass, but originally turned east to Dertona (mod. Tortona).

2 There are two separate lines from Sampierdarena to Ronco.

3 This pass was also traversed by a nameless Roman road.

(Metaurus) and Esino 1 may be mentioned, run north-east into the Adriatic, which is some 30 m. from the highest points of the chain. This portion of the range is crossed near its southern termination by a railway

from Foligno to Ancona (which at Fabriano has a branch to Macerata and Porto Civitanova, on the Adriatic coast railway), which may perhaps be conveniently regarded as its boundary. 2 By some geographers, indeed, it is treated as a part of the central Apennines.

2. The central Apennines are the most extensive portion of the chain, and stretch as far as the valley of the Sangro (Sangrus) . To the north are the Monti Sibillini, the highest point of which is the Monte Vettore (8128 ft.). Farther south three parallel chains may be traced, the westernmost of which (the Monti Sabini) culminates to the south in the Monte Viglio (7075 ft.), the central chain in the Monte Terminillo (7260 ft.), and farther south in the Monte Velino (8160 ft.), and the eastern in the Gran Sasso d'ltalia (9560 ft.), the highest summit of the Apen- nines, and the Maiella group (Monte Amaro, 9170 ft.). Between the western and central ranges are the plain of Rieti, the valley of the Sal to (Himella), and the Lago Fucino; while between the central and eastern ranges are the valleys of Aquila and Sulmona. The chief rivers on the west are the Nera (Nar), with its tribu- taries the Velino (Velinus) and Salto, and the Anio, both of which fall into the Tiber. On the east there is at first a succession of small rivers which flow into the Adriatic, from which the highest points of the chain are some 25 m. distant, such as the Potenza (Flosis), Chienti (Cluentus), Tenna (Tinna), Tronto (Truentus), Tordino (Helvinus), Vomano (Vomanus), &c. The Pescara {Atemus), which receives the Aterno from the north-west and the Gizio from the south-east, is more important; and so is the Sangro.

The central Apennines are crossed by the railway from Rome to Castelammare Adriatico via Avezzano and Sulmona: the railway from Orte to Terni (and thence to Foligno) follows the Nera valley; while from Terni a line ascends to the plain of Rieti, and thence crosses the central chain to Aquila, whence it follows the valley of the Aterno to Sulmona. In ancient times the Via Salaria, Via Caecilia and Via Valeria-Claudia all ran from Rome to the Adriatic coast. The volcanic mountains of the province of Rome are separated from the Apennines by the Tiber valley, and the Monti Lepini, or Volscian mountains, by the valleys of the Sacco and Liri.

3. In the southern Apennines, to the south of the Sangro valley, the three parallel chains are broken up into smaller groups; among them may be named the Matese, the highest point of which is the Monte Miletto (6725 ft.). The chief rivers on the south-west are the Liri or Garigliano (anc. Liris)} with its tributary the Sacco (Trerus), the Volturno (Volturnus), Sebeto (Sabalus), Sarno (Sarnus), on the north the Trigno (Trinius), Biferno (Tifernus), and Fortore (Frento). The promontory of Monte Gargano, on the east, is completely isolated, and so are the volcanic groups near Naples. The district is traversed from north-west to south-east by the

railway from Sulmona to Benevento and on to Avellino, and from south-west to north- east by the railways from Caianello via Isernia to Campobasso and Termoli, from Caserta to Benevento and Foggia, and from Nocera and Avellino to Rocchetta S. Antonio, the junction for Foggia, Spinazzola (for Barletta, Bari, and Taranto) and Potenza. Roman roads followed the same lines as the railways: the Via Appia ran from Capua to Benevento, whence the older road went to Venosa and Taranto and so to Brindisi, while the Via Traiana ran nearly to Foggia and thence to Bari.

The valley of the Ofanto (Aufidus), which runs into the Adriatic close to Barletta, marks the northern termination of the first range of the Lucanian Apennines (now Basilicata), which runs from east to west, while south of the valleys of the Sele (on the west) and Basiento (on the east) — which form the line followed by the railway from Battipaglia via Potenza to

1 This river (anc. Aesis) was the boundary of Italy proper in the 3rd and 2nd centuries B.C.

2 The Monte Conero, to the south of Ancona, was originally an island of the Pliocene sea.

Metaponto — the second range begins to run due north and south as far as the plain of Sibari (Sybaris). The highest point is the Monte Pollino (7325 ft.). The chief rivers are the Sele {Silarus) — joined by the Negro (Tanager) and Calore (Color) — on the west, and the Bradano (Bradanus), Basiento (Casuentus), Agri (Aciris), Sinni (Siris) on the east, which flow into the gulf of Taranto; to the south of the last-named river there are only unimportant streams flowing into the sea east and west, inasmuch as here the width of the peninsula diminishes to some 40 m. The railway running south from Sicignano to Lagonegro, ascending the valley of the Negro, is planned to extend to Cosenza, along the line followed by the ancient Via Popilia, which beyond Cosenza reached the west coast at Terina and thence followed it to Reggio. The Via Herculia, a branch of the Via Traiana, ran from Aequum Tuticum to the ancient Nerulum. At the narrowest point the plain of Sibari, through which the rivers Coscile (Sybaris) and Crati (Crathis) flow to the sea, occurs on the east coast, extending halfway across the peninsula. Here the limestone Apennines proper cease and the granite mountains of Calabria (anc. Bruttii) begin. The first group extends as far as the isthmus formed by the gulfs of S. Eufemia and Squillace; it is known as the Sila, and the highest point reached is 6330 ft. (theBotteDonato). The forests which covered it in ancient times supplied the Greeks and Sicilians with timber for shipbuilding. The railway from S. Eufemia to Catanzaro and Catanzaro Marina crosses the isthmus, and an ancient road may have run from Squillace to Monteleone. The second group extends to the south end of the Italian

peninsula, culminating in the Aspromonte (-6420 ft.) to the east of Reggio di Calabria. In both groups the rivers are quite unimportant.

Character. — The Apennines are to some extent clothed with forests, though these were probably more extensive in classical times (Pliny mentions especially pine, oak and beech woods, Hist. Nat. xvi. 177); they have indeed been greatly reduced in comparatively modern times by indiscriminate timber-felling, and though serious attempts at reafforestation have been made by the government, much remains to be done. They also furnish considerable summer pastures, especially in the Abruzzi: Pliny (Hist. Nat. xi. 240) praises the cheese of the Apennines. In the forests wolves were frequent, and still are foˆund, the flocks being protected against them by large sheep-dogs; bears, however, which were known in Roman times, have almost entirely dis- appeared. Nor are the wild goats called rotae, spoken of by Varro (R. R. II. i. 5), whjch may have been either chamois or steinbock, to be found. Brigandage appears to have been prevalent in Roman times in the remoter parts of the Apennines, as it was until recently: an inscription found near the Furlo pass was set up in a.d. 246 by an evocatus Augusti (a member of a picked corps) on special police duty with a detachment of twenty men from the Ravenna fleet (G. Henzen in Romische Mitteilungen, 1887, 14). Snow lies on the highest peaks of the Apennines for almost the whole year. The range produces no minerals, but there are a considerable number of good mineral springs, some of which are thermal (such as Bagni di Lucca, Monte Catini, Monsummano, Porretta, Telese, &c), while others are cool (such as Nocera, Sangemini, Cinciano, &c), the water of which is both drunk on the spot and sold as table water elsewhere. (T. As.)

Geology. — The Apennines are the continuation of the Alpine chain, but the individual zones of the Alps cannot be traced into the Apennines. The zone of the Brianconnais (see Alps) may be followed as far as the Gulf of Genoa, but scarcely beyond, unless it is represented by the Trias and older beds of the Apuan Alps. The inner zone of crystalline and schistose rocks which forms the main chain of the Alps, is absent in the Apennines except towards the southern end. The Apennines, indeed, consist almost entirely of Mesozoic and Tertiary beds, like the outer zones of the Alps. Remnants of a former inner zone of more ancient rocks may be seen in the Apuan Alps, in the islands off the Tuscan coast; in the Catena Metallifera, Cape Circeo and the island of Zannone, as well as in the Calabrian peninsula. These remnants lie at a comparatively low level, and excepting

the Apuan Alps and the Calabrian peninsula they do not now form any part of the Apennine chain. But that in Tertiary times there was a high interior zone of crystalline rocks is indicated by the character of the Eocene beds in the southern Apennines. These are formed to a large extent of thick con- glomerates which are full of pebbles and boulders of granite and schist. Many of the boulders are of considerable size and they are often still angular. There is now no crystalline region from which they could reach their present position; and this and other considerations have led the followers of E. Suess to conclude that even in Tertiary times a large land mass consisting of ancient rocks occupied the space which is now covered by the southern portion of the Tyrrhenian Sea. This old land mass has been called Tyrrhenis, and probably extended from Sicily into Latium and as far west as Sardinia. On the Italian border of this land there was raised a mountain chain with an inner crystalline zone and an outer zone of Mesozoic and Tertiary beds. Subsequent faulting has caused the subsidence of the greater part of Tyrrhenis, including nearly the whole of the inner zone of the mountain chain, and has left only the outer zones standing as the present Apennines.

Be this as it may, the Apennines, excepting in Calabria, are formed chiefly of Triassic, Jurassic, Cretaceous, Eocene and Miocene beds. In the south the deposits, from the Trias tothe middle Eocene, consist mainly of limestones, and were laid down, with a few slight interruptions, upon a quietly subsiding sea-floor. In the later part of the Eocene period began the folding which gave rise to the existing chain. The sea grew shallow, the deposits became conglomeratic and shaly, volcanic eruptions began, and the present folds of the Apennines were initiated. The folding and consequent elevation went on until the close of the Miocene period when a considerable subsidence took place and the Pliocene sea overspread the lower portions of the range. Subsequent elevation, without folding, has raised these Pliocene deposits to a considerable height — in some cases over 3000 ft. and they now lie almost undisturbed upon the older folded beds. This last elevation led to the formation of numerous lakes which are now filled up by Pleistocene deposits. Both volcanic eruptions and movements of elevation and depression continue to the present day on the shores of the Tyrrhenian Sea. In the northern Apennines the elevation of the sea floor appears to have begun at an earlier period, for the Upper Cretaceous of that part of the chain consists largely of sandstones and conglomerates. In Calabria the chain consists chiefly of crystalline and schistose rocks; it is the Mesozoic and Tertiary zone which has here been sunk beneath the sea. Similar rocks are found beneath the Trias farther north, in some of the valleys of Basilicata. Glaciers no longer exist in the Apennines, but Post-Pliocene moraines have been observed in

Basilicata.

References. — G. de Lorenzo, " Studi di geologia nell' Appennino Meridionale," Atti d. R. Accad. d. Sci. Fis. e Mat., Napoli, ser. 2, vol. viii., no. 7 (1896); F. Sacco, " L' Appennino settentrionale," Boll. Soc.geol. Ital. (1 893-1 899). (P. La.)

APENRADE, a town of Germany in the Prussian province of Schleswig, beautifully situated on the Apenrade Fjord, an arm of the Little Belt, 38 m. N. of the town of Schleswig. Pop. (1900) 5952. It is connected by a branch line with the main railway of Schleswig, and possesses a good harbour, which affords shelter for a large carrying trade. Fishing, shipbuilding and various small factories provide occupation for the population. The town is a bathing resort, as is Elisenlund close by.

APERTURE (from Lat. aperire, to open), an opening, In optics, it is that portion of the diameter of an object-glass or mirror through which light can pass free from obstruction. It is equal to the actual diameter of the cylinder of rays admitted by a telescope.

APEX, the Latin word (pi. apices) for the top, tip or peak of anything. A diminutive " apiculus " is used in botany.

APHANITE, a name given (from the Gr. ct.avr)s, invisible) to certain dark-coloured igneous rocks which are so fine-grained that their component minerals arc not detected by the unaided

eye. They consist essentially of plagioclase felspar, with horn- blende or augite, and may contain also biotite, quartz and a limited amount of orthoclase. Although a few authorities still recognize the aphanites as a distinct class, most systematic petrologists, at the present time, have discarded it, and regard these rocks as merely structural facies of other species. Those which contain hornblende are uniform, fine-grained diorites, vogesites, &c, while when pyroxene predominates they are ascribed to the dolerites, quartz-dolerites, &c. Hence, any rock which is compact, crystalline and fine grained, is frequently said to be aphanitic, without implying exactly to which of the principal rock groups it really belongs.

APHASIA 1 (from Gr. a, privative, and (jmais, speech), a term which means literally inability to speak, and is used to denote various defects in the comprehension and expression of both spoken and written language which result from lesions of the brain. Aphasic disorders may be classed in two groups: — first, receptive or sensory aphasia, which comprises (a) inability to understand spoken language (auditory aphasia), and (b) inability to read (visual aphasia, or alexia); second, emissive or motor aphasia, under which category are included (a) inability to speak (motor vocal aphasia, or aphemia), and (b) inability to write (motor graphic

aphasia, or agraphia). It has been shown that each of these defects is produced by destruction of a special region of the cortex of the brain. These regions, which are termed the speech centres, are, in right-handed people, situated in the left cerebral hemisphere; this is the reason why aphasia is so commonly associated with paralysis of the right side of the body.

A study of the acquisition of the faculty of speech throws light upon the education of the speech centres, and helps to elucidate their physiological interaction and the phenomena of aphasia. The auditory speech centre is the first to show signs of functional activity, for within a few months of birth the child begins to understand spoken language. Some months later the motor vocal speech centre begins to functionate. The memories of the auditory word images which are stored up in the auditory speech centre play a most important part In the process of learning to speak. The child born deaf grows up mute. The visual speech centre comes into activity when the child is taught to read. Again, when he learns to write and thus begins to educate his graphic centre, he is constantly calling upon his visual speech centre for the visual images of the words he wishes to produce. From these remarks it will be seen that there is a very intimate association between the auditory speech centre and the motor vocal speech centre, also between the visual speech centre and the graphic centre.

Auditory Aphasia.- — The auditory speech centre is situated in the posterior part of the first and second temporo-sphenoidal convolutions on the left side of the brain. Destruction of this centre causes " auditory aphasia." Hearing is unimpaired but spoken language is quite unintelligible. The subject of auditory aphasia may be compared to an individual who is listening to a foreign language of which he does not understand a word. Word deafness, a term often used as synonymous with auditory aphasia, is misleading and' should be abandoned. Auditory aphasia commonly interferes with vocal expression, for the

1 In 1906 Pierre Marie of Paris expressed views (La Semaine medicate, May 23 and October 17, and elsewhere) upon the ques- tion of aphasia which have given rise to much animated controversy, since they are in many respects at complete variance with the classical conception which has been represented in the present article. Marie holds that Broca's convolution plays no special r61e in the function of speech. He admits that a lesion in the region of the lenticular nucleus is followed by inability to speak, but this defect is, in his opinion, to be regarded as an anarthria. He further admits the production of sensory aphasia — the aphasia of Wernicke, as he prefers to call it after its discoverer — by lesions which destroy the angular and supramarginal gyri, and the upper two temporo-sphenoidal convolutions, but -he regards the essential foundation of sensory aphasia as a diminution of intelligence. There are, in his opinion, no sensory images of language. Motor aphasia is, he believes, nothing more than a combination of sensory aphasia and anarthria These conclusions have been vigorously attacked, more especially by Dejcrine of Paris (La Presse medicate, July 1906. and elsewhere).

majority of people when they speak do so by recalling the auditory memories of words stored up in the auditory speech centre. Amnesia verbalis is employed to designate failure to call up in the memory the images of words which are needed for purposes of vocal expression or silent thought.

Visual Aphasia or Alexia.— The visual speech centre; which is located in the left angular gyrus, is connected with the two centres for vision which are situated one in either occipital' lobe. Destruction of the visual speech centre produces visual aphasia or alexia. Word blindness, sometimes used as the equivalent of visual aphasia, is, like word deafness, a misleading term. The individual is not blind, he sees the Words and letters per- fectly, but they appear to him as unintelligible cyphers, -When the visual speech centre is destroyed, the memories of the visual images of words are obliterated and interference with writing, a consequence of amnesia verbalis, results. On the other hand, when the lesion is situated deeply in the occipital lobe, anddoes not implicate the cortex, but merely cuts off the connexions of the angular gyrus with both visual centres, agraphia is not produced, for the visual word centre and its connexion with the graphic centre are still intact (pure, or sub-cortical word blindness).

Motor Vocal Aphasia or Aphemia. — The centre for motor vocal speech is

situated in the posterior part of the third left frontal convolution and extends on to the foot of the left ascend- ing frontal convolution (Broca's convolution) . Complete destruc- tion of this region produces loss of speech, although it often happens that a few words, such as "yes" and "no," and, it may be, emotional exclamations such as "Oh! dear!" and the like are retained. The utterance of unintelligible sounds is still possible, however, and there is neither defective voice production {aphonia) nor paralysis of the mechanism of articulation. The individual can recall the auditory and visual images of the words which he wishes to use, but his memory for the complicated, co-ordinated movements which he acquired in the process of learning to speak, and which are necessary for vocal, expression, has been blotted out. In the great majority of cases of motor vocal aphasia there is associated agraphia, a circumstance which is perhaps to be accounted for by the proximity of the graphic centre. When the lesion is situated below the cortex of Broca's convolution but destroys the fibres which pass from it towards the internal capsule, agraphia is not produced (sub-cortical or pure motor vocal aphasia). Destruction of the auditory speech centre is, as we have seen, commonly accompanied by more or less interference with vocal speech, a consequence of amnesia verbalis.

Agraphia. — Discussion still rages as to the presence of a special writing centre. Those who favour the separate existence of a graphic centre locate it in the second left frontal convolution. It may be that the want of unanimity as to the graphic centre is to be explained by an anatomical relationship so close between the graphic centre and that for the fine movement of the hand that a lesion in this situation which produces agraphia must at the same time cause a paralysis of the hand. Destruction of the visual speech centre by obliterating the visual memories of words (amnesia verbalis) produces agraphia. Further, several instances are on record in which agraphia has followed destruc- tion of the commissure between the visual speech centre and the graphic centre. As already mentioned, agraphia is very often associated with motor vocal aphasia.

A number of aphasic defects are met with in addition to those already mentioned. Thus paraphasia is a condition in which the patient makes use of words other than those he intends. He may mix up his words so that his conversation is quite unintelligible. In the most pronounced forms he gabbles away, employing unrecognizable sounds in place of words {jargon and gibberish aphasia). Paragraphia is a similar defect which occurs in writing. Both paraphasia and paragraphia may be produced by partial lesions of the sensory speech centres or of the com- missures which connect these with the motor centres. Object blindness (syn. mind-blindness) refers to an inability to recognize an object or its uses by the aid of sight alone. The probable

explanation would seem to be that the ordinary centre for, vision, has been isolated from the other sensory centres with which it is connected. Not uncommonly there is associated visual aphasia; Optic aphasia was introduced to designate a somewhat similar state in which, although the uses of an object are recogˆ nized, the patient cannot name it at sight, yet, if it is of such a nature that it appeals directly toone of, the other senses, he may at once be able to name it. Tactile aphasia is a rare defect in which there exists an inability to recognize an object by touch alone although the qualities which, under normal circumstances, suffice for its detection can be accurately described. Amusia, or loss of the musical faculty, may occur in association with or independent of aphasia. There is reason for believing that special receptive and emissive centres exist for the musical sense exactly analogous to; those for speech. : The speech centres are all supplied by the left middle cerebral artery. When this artery is blocked close to its origin by an embolus or thrombus, total aphasia results. It may be, however, thait only one of the smaller branches of the artery is obstructed, and, according to the region of the brain to which this branch; is distributed, one or more of the speech centres may be destroyed. Occlusion of the left posterior cerebral artery causes extensive softening of the occipital lobe and produces pure word blindness. Further, a tumour, abscess, haemorrhage or meningitis may be so situated as to damage or; destroy the individual speech centres or their connecting commissures. The amount of recovery to be expected in any given case depends upon the nature, situation and -extent of the. lesion, and upon the age of the patient. Even after complete destruction of the speech centres, perfect recovery may take place, for the centres in the right hemisphere of the brain are capable of education. This is only possible in young individuals. In the great majority of instances the nature of the lesion is such as to render futile all treatment directed towards its removal. In suitable cases, however, the education of the right side of the brain may be very greatly assisted by an intelligent application of scientific methods.

Bibliography.— Broca, Bidletin de la Societe anatomique (1861) ; Wernicke, Der Aphasische Symptomen-complex (Breslau, 1874); Kussmaul, Ziemssen's, Cyclopaedia, vol. xiv. p. 759; Wyllie, The Disorders of Speech (1895) ; Elder, Aphasia and the Cerebral Speech Mechanism (1897); Collins, The Faculty of Speech (1897) ; Bastian, Aphasia and other Speech Defects (1898) ; Byrom Bramwetl, " Willr making and Aphasia," British Medical Journal (1897) ; " The Morison Lectures on Aphasia," The Lancet (1906). See also the works of Charcot, Hughlings Taokson, Dejerine, Lichtheimj Pitres; Grasset, Ross, Broadbent, Mills; Bateman, Miralli6, Exner, Marie and others. (J. B. T.)

'APHELION (from Gr. &x6, from, and tjXios, sun), in astronomy, that point of the orbit of a planet at which it is most distant from the sun.

Apogeeˆ Apocentre, Aposaturnium, &c. are terms applied, to those points of the orbit of a body moving around a centre of force — as the Earth, Saturn, &c. — at which it is farthest from the central body.

APHEMIA (from Gr. a, without, and <$>r\}L-n, speech), in patho- logy, the loss of the power of speech (see Aphasia).

APHIDES (pi. of Aphis), minute insects, also known as " plant-lice," "blight," and " green-fly," belonging to the homopterous division of the order Hemiptera, with long antennae and legs, two- jointed, twO-clawed tarsi, and usually a pair of abdominal tubes through which a waxy secretion is exuded. These tubes were formerly supposed to secrete the sweet substance known as " honey : ddw " so much sought after by a'nts; but this is now known to come from the alimentary canal. Both winged and wingless forms of both sexes occur, and the wings when present are normal in number, that is to say two pairs. Apart from their importance from the economic standpoint, Aphides are chiefly remarkable for the phenomena connected with the propagation of the species. The following brief summary of what takes place in the plant-louse of the rose (Aphis rosae), may be regarded as typical of the family, though exceptions occur in other species: Eggs produced in the autumn by fertilized females remain on the plant through the winter and hatching in the spring give rise to female individuals which may be winged or wingless. From these females are born

parthenogenetically, that is to say without the intervention of males, and by a process that has been compared to internal bud- ding, large numbers of young resembling their parents in every particular except size, which themselves reproduce their kind in the same way. This process continues throughout the summer, generation after generation being produced until the number of descendants from a single individual of the spring-hatched brood may amount to very many thousands. In the autumn winged males appear, union between the sexes takes place and the females lay the fertilized eggs which are destined to carry the species through the cold months of winter. If, however, the food-plant is grown in a conservatory where protection against cold is afforded, the aphides may go on reproducing agamogenetically without cessation for many years together. Not the least interesting features connected with this strange life-history are the facts that the young may be born by the oviparous or viviparous methods and either gamogenetically or agamogenetically, and may develop into winged forms or remain wingless, and that the males only appear in any number at the close of the season. Although the factors which*

determine these phenomena are not clearly understood, it is believed that the appearance of the males is connected with the increasing cold of autumn and the growing scarcity of food, and that the birth of winged females is similarly associated with decrease in the quantity or vitiation of the quality of the nourishment imbibed. Sometimes the winged females migrate from the plant they were born on to start fresh colonies on others often of quite a different kind. Thus the apple blight (Aphis mali) after producing many generations of apterous females on its typical food-plant gives rise to winged forms which fly away and settle upon grass or corn-stalks.

Closely related to the typical aphides is Phylloxera vaslatrix, the insect which causes enormous loss by attacking the leaves and roots of vines. Its life-history is somewhat similar to that of Aphis rosae summarized above. In the autumn a single fertile egg is laid by apterous females in a crevice of the bark of the vine where it is protected during the winter. From this egg in the spring emerges an apterous female who makes a gall in the new leaf and lays therein a large number of eggs. Some of the apterous young that are hatched from these form fresh galls and continue to multiply in the leaves, others descend to the root of the plant, becoming what are known as rooMorms. These, like the parent form of spring, reproduce parthenogenetic- ally, giving rise to generation after generation of egg-laying individuals. In the course of the summer, from some of these eggs are hatched females which acquire wings and lay eggs from which wingless males and females are born. From the union of the sexes comes the fertile egg from which the parent form of spring is hatched.

See generally G. B. Buckton, British Aphides (Ray Soc. 1876- 1883) ; also Economic Entomology. (R. I. P.)

APHORISM (from the Gr. d<£opif«e, to define), literally a distinction or a definition, a term used to describe a principle expressed tersely in a few telling words or any general truth conveyed in a short and pithy sentence, in such a way that when once heard it is unlikely to pass from the memory. The name was first used in the Aphorisms of Hippocrates, a long series of propositions concerning the symptoms and diagnosis of disease and the art of healing and medicine. The term came to be applied later to other sententious statements of physical science, and later still to statements of all kinds of principles. Care must be taken not to confound aphorisms with axioms. Aphor- isms came into beirig as the result of experience, whereas axioms are self-evident truths, requiring no proof, and appertain to pure reason. Aphorisms have been especially used in dealing with subjects to which no methodical or scientific treatment was applied till late, such as art, agriculture, medicine, jurisprudence and politics. The Aphorisms of Hippocrates form far the most celebrated as well as the earliest collection

of the kind, and it may be interesting to quote a few examples. " Old men support abstinence well: people of a 1 ripe age less well: young folk badly, and children less well than all the rest, particularly thoise

of them who are very lively. ” ” Those who are very fatbynature are more exposed to die suddenly than those who are thin.” ” Those who eject foaming blood, eject it from the lung.” ” When two illnesses arrive at the same time, the stronger silences the weaker.” The first aphorism, perhaps the best known of all, which serves as a kind of introduction to the book, runs as follows:—” Life is short, art is long, opportunity fugitive, experimenting dangerous, reasoning difficult: it is necessary not only to do oneself what is right, but also to be seconded by the patient, by those who attend him, by external circum- stances.” Another famous collection of aphorisms is that of the school of Salerno in Latin verse, in which Joannes de Meditano, one of the most celebrated doctors of the school of medicine of Salerno, has summed up the precepts of this school. The book was dedicated to a king of England. It is a disputed point as to which king, some authorities dating the publication as at 1066, others assigning a later date. The dedication gives the following excellent advice :ˆ

” Anglorum regi scribit schola tota Salernae. Si vis incolumem, si vis te reddere sanum, Curas tolle graves: irasci crede profanum : Parce mero : coenato parum ; non sit tibi vanum Surgere post epulas : somnum fuge meridianum : Ne mictum retine, nee comprime fortiter artdm : Haec bene si serves,. tu longo tempore vives.”

Another collection of aphorisms, also medical and also in Latin, is that of the Dutchman Hermann BoerhaaVe, published at Leiden in the year 1709; it gives a terse summary of the medical knowledge prevailing at the time, and is of great interest to the student of the history of medicine. v

APHRAATES (a Greek form of the Persian name Aphrahat or Pharhadh), a Syriac writer belonging to the middle of the 4th century a. d., who composed a series of twenty-three expositions or homilies on points of Christian doctrine and practice. The first ten were written in 337, the following twelve in 344, and the last in 345. J The author was early known as hakklmi pharsaya (“the Persian sage”), was a subject of Sapor II., arid was probably of heathen parentage and himself a convert from heathenism. He seems at some time in his life to have assumed the name of Jacob, and is so entitled in the colophon to. a MS. of a.d. 512 which contains twelve of his homilies. Hence he was already by Gennadius of Marseilles (before 496) confused, with Jacob) bishop of Nisibis; and the ancient Armenian version of nineteen of the homilies has been published under this latter name. But (1) Jacob of Nisibis, who attended thaˆcouncil of Nicaea, died in 338; and (2) our author, being a Persian subject, cannot

have lived at Nisibis, which became Persian only by Jovian's treaty of 363. . That his name was Aphrahat or Pharhadh we learn from comparatively late writers— Bar Bahlul (10th' century), Elias of Nisibis (nth), Bar-Hebraeus, and 'Abhd-Isho'. George, bishop of the Arabs, writing in a.d. 714 to a friend who had sent him a series of questions about the " Persian sage," confesses ignorance of his name, home and rank,' but infers from his homilies that he was a monk, and of high esteem among the clergy. The fact that in 344 he was selected to draw up a circular letter from a council of bishops and other clergy to the churches of Seleucia and Ctesiphon and elsewhere— included in our collection as homily 14 — is held by Dr W. Wright and others to prove that he was a bishop. According to a marginal note in a 14th-century MS. (B.M. Orient. 1017), he was " bishop of Mar Mattai," a famous monastery near Mosul, but it is un- likely that this institution existed so early. The homilies of Aphraates are intended to form, as Professor Bnrkitt has shown. " a full and ordered exposition of the Christian faith." The standpoint is that of the Syriac-speaking church, before it was touched by the Arian controversy. Beginning with faith as the foundation, the writer proceeds to build up the structure of doctrine and duty. The first ten homilies, which form one division completed in 337, are without polemical reference;*

1 Horn. 1-22 begin with the letters of the Syriac alphabet in suc- cessiˆ Their present order in the Syriac MSS. is therefore right. The ancient Armenian version, published by Antonelli in 1756, has only 19 of the homilies, and those in a somewhat different order.

their subjects are faith, love, fasting, prayer, wars (a somewhat mysterious setting forth of the conflict between Rome and Persia under the imagery of Daniel), the sons of the covenant (monks or ascetics), penitents, the resurrection, humility, pastors. Those numbered 11-22, written in 344, are almost all directed against the Jews; the subjects are circumcision, passover, the sabbath, persuasion (the encyclical letter referred to above), distinction of meats, the substitution of the Gentiles for the Jews, that Christ is the Son of God, virginity and holiness, whether the Jews have been finally rejected or are yet to be restored, provision for the poor, persecution, death and the last times. The 23rd homily, on the " grape kernel " (Is. lxv. 8), written in 344, forms an appendix on the Messianic fulfilment of prophecy, together with a treatment of the chronology from Adam to Christ. Aphraates impresses a reader favourably by his moral earnestness, his guilelessness, his moderation in con- troversy, the simplicity of his style and language, his saturation with the ideas and words of

Scripture. On the other hand, he is full of cumbrous repetition, he lacks precision in argument and is prone to digression, his quotations from Scripture are often inappropriate, and he is greatly influenced by Jewish exegesis. He is particularly fond of arguments about numbers. How wholly he and his surroundings were untouched by the Arian conflict may be judged from the 17th homily — "that Christ is the Son of God." He argues that, as the name " God " or " Son of God " was given in the O.T. to men who were worthy, and as God does not withhold from men a share in His attributes- — such as sovereignty and fatherhood — it was fitting that Christ who has wrought salvation for mankind should obtain this highest name. From the frequency of his quotations, Aphraates; is a specially important witness to the form in which the Gospels were read in the Syriac church in his day; Zahn and others have shown that he — mainly at least — used the Diatessaron. Finally, he bears important contemporary witness to the suffer- ings of the Christian church in Persia under Sapor (Shapur) II. as well as the moral evils which had infected the church, to the sympathy of Persian Christians with the cause of the Roman empire, to the condition of early monastic institutions, to the practice of the Syriac church in regard to Easter, &c.

Editions by W. Wright (London, 1869), and J. Parisot (with Latin translation, Paris, 1894); the ancient Armenian version of 19 homilies edited, translated into Latin, and annotated by Anto- nelli (Rome, 1756). Besides translations of particular homilies by G. Bickell and E. W. Budge, the whole have been translated by G. Bert (Leipzig, 1888). Cf. also C. J. F. Sasse, Proleg, in Aphr. Sapientis Persae sermones homileticos (Leipzig, 1879) ; J. Forget, De Vita et Scriptis Aphraatis (Louvain, 1882); F. C. Burkitt, Early Eastern Christianity (London, 1904) ; J. Labourt, Le Christianisme dans I 'empire perse (Paris, 1904); J. Zahn, Forschungen I.; " Aphraates and the Diatessaron," vol. ii. pp. 180-I86 of Burkitt's Evangelion Da-Mepharreshe (Cambridge, 1904); articles on " Aphraates and Monasticism," by R. H. Connolly and Burkitt in Journal of Theological Studies (1905) pp. 522-539; (1906) pp 10-15. (N. M.)

APHRODITE, 1 the Greek goddess of love and beauty, counter- part of the Roman Venus. Although her myth an4 cult were essentially Semitic, she soon became Hellenized and was admitted to a place among the deities of Olympus. Some mythologists hold that there already existed in the Greek system an earlier goddess of love, of similar attributes, who was absorbed by the Asiatic importation; and one writer (A. Enmann) goes so far as to deny the oriental origin of Aphrodite altogether. It is therefore necessary first to examine the nature and character- istics of her Eastern prototype, and then to see how far they reappear in the Greek Aphrodite.

Among the Semitic peoples (with the notable exception of the Hebrews) a

supreme female deity was worshipped under different names— the Assyrian Ishtar, the Phoenician Ashtereth (Astarte), the Syrian Atargatis (Derketo), the Babylonian Belit (Mylitta), the Arabian Hat (Al-ilat). The article " Aphrodite "

1 No satisfactory etymology of the name has been given ; although the first part is usually referred to a4>p6s ("the sea foam"), it is equally probable that it is of Eastern origin. F. Homoll (Jahrbiicher fiir classische Philologie, cxxv., 1882) explains it as a corruption of Ashtoreth ; for other derivations see O. Gruppe, Griechische Mytho- logie, ii. p. 1348, note 2.

in Roscher's Lexikon der Mythologie is based upon the theory that all these were originally moon-goddesses, on which assump- tion all their functions are explained. This view, however, has not met with general acceptance, on the ground that, in Semitic mythology, the moon is always a male divinity; and that the full moon and crescent, found as attributes of Astarte, are due to a misinterpretation of the sun's disk and cow's horns of Isis, the result of the dependence of Syrian religious art upon Egypt. On the other hand, there is some evidence in ancient authorities (Herodian v. 6, 10; Lucian, De Dea Syria, 4) that Astarte and the moon were considered identical.

This oriental Aphrodite was worshipped as the bestower of all animal and vegetable fruitfulness, and under this aspect especially as a goddess of women. This worship was degraded by repulsive practices {e.g. religious prostitution, self mutilation), which subsequently made their way to centres of Phoenician influence, such as Corinth and Mount Eryx in Sicily. In this connexion may be mentioned the idea of a divinity, half male, half female, uniting in itself the active and passive functions of creation, a symbol of luxuriant growth and productivity. Such was the bearded Aphrodite of Cyprus, called Aphroditos by Aristophanes according to Macrobius, who mentions a statue of the androgynous divinity in his Saturnalia (iii. 8. 2; see also Hermaphroditus). The moon, by its connexion with men struation, and as the cause of the fertilizing dew, was regarded as exercising an influence over the entire animal and vegetable creation.

The Eastern Aphrodite was closely related to the sea and the element of moisture; in fact, some consider that she made her first appearance on Greek soil rather as a marine divinity than as a nature goddess. According to Syrian ideas, as a fish goddess, she represented the fructifying power of water. At Ascalon there was a lake full of fish near the temple of Atargatis-Derketo, into which she was said to have been thrown together with her son Ichthys (fish) as a punishment for her arrogance, and to have been devoured by fishes; according to another version, ashamed of her amour with a beautiful youth, which resulted in the birth of Semiramis, she attempted to drown herself, but was changed into a fish with human face

(see Atargatis). At Hierapplis (Bambyce) there was a pool with an altar in the middle, sacred to the goddess, where a festival was held, at which her images were carried into the water. Her connexion with the sea is explained by the influence of the moon on the tides, and the idea that the moon, like the sun and the stars, came up from the ocean.

The oriental Aphrodite is connected with the lower world, and came to be looked upon as one of its divinities. Thus, Ishtar descends to the kingdom of Hat the queen of the dead, to find the means of restoring her favourite Tammuz (Adon, Adonis) to life. During her stay all animal and vegetable productivity ceases, to begin again with her return to earth — a clear indication of the conception of her as a goddesj of fertility. This legend, which strikingly resembles that of Persephone, probably refers to the decay of vegetation in winter, and the reawakening of nature in spring (cf. Hyacinthus). The lunar theory connects it with the disappearance of the moon at the time of change or during an eclipse.

Another aspect of her character is that of a warlike goddess, armed with spear or bow, sometimes wearing a mural crown, as sovereign lady and protectress of the locality where she was worshipped. The spear and arrows are identified with the beams of the sun and moon.

The attributes of the goddess were the ram, the he-gqat, the dove, certain fish, the cypress, myrtle and pomegranate, the animals being symbolical of fertility, the plants remedies against sterility.

The worship of Aphrodite at an early date was introduced into Cyprus, Cythera and Crete by Phoenician colonists, whence it spread over the whole of Greece, and as far west as Italy and Sicily. In Crete she has been identified with Ariadne, who, according to one version of her story, was put ashore in Cyprus, where she died and was buried in a grove called after the name

of Ariadne-Aphrodite (L. R. Farnell, Cults of the Greek States, ii. p. 663). Cyprus was regarded as her true home by the Greeks, and Cythera was one of the oldest seats of her worship (cf. her titles Cytherea, Cypris, Paphia, Amathusia, Idalia — the last three from places in Cyprus). In both these islands there lingered a definite tradition of a connexion with the cult of the oriental Aphrodite Urania, an epithet which will be referred to later. The oriental features of her worship as practised at Corinth are due to its early commercial relations with Asia Minor; the fame of her temple worship on

Mount Eryx spread to Carthage, Rome and Latium.

In the Iliad, Aphrodite is the daughter of Zeus and Dione, a name by which she herself is sometimes called. This has been supposed to point to a confusion between Aphrodite and Hebe, the daughter of Zeus and Hera, Dione being an Epirot name for the last-named goddess. In the Odyssey, she is the wife of Hephaestus, her place being taken in the Iliad by Charis, the personification of grace and divine skill, possibly supplanted by Aphrodite, the goddess of love and beauty. Her amour with Ares, by whom she became the mother of Harmonia, the wife of Cadmus, is famous (Od. viii. 266). From her relations with these acknowledged Hellenic divinites it is argued that there once existed a primitive Greek goddess of love.. This view is examined in detail and rejected by Farnell (Cults, ii. pp. 619-626).

It is admitted that few traces remain of direct relations of the Greek goddess to the moon, although such possibly survive in the epithets Traoiaris, aarepia, ovpavia. It is suggested that this is due to the fact that, at the time of the adoption of the oriental goddess, the Greeks already possessed lunar divinities in Hecate, Selene, Artemis. But, although her connexion with the moon has practically disappeared, in all other aspects a development from the Semitic divinity is clearly manifest.

Aphrodite as the goddess of all fruitfulness in the animal and vegetable world is especially prominent. In the Homeric hymn to Aphrodite she is described as ruling over all living things on earth, in the air, and in the water, even the gods being subject to her influence. She is the goddess of gardens, especially worshipped in spring and near lowlands and marshes, favourable to the growth of vegetation. As such in Crete she is called Antheia ("the flower-goddess"), at Athens iv ktjttois (" in the gardens "), and h /caXd/xois (" in the reed-beds ") or kv eXei (" in the marsh ") at Samos. Her character as a goddess of vegetation is clearly shown in the cult and ritual of Adonis (q.v.; also Farnell, ii. p. 644) and Attis (q.v.). In the animal world she is the goddess of sexual impulse; amongst men, of birth, marriage, and family life. To this aspect may be referred the names Genetyllis- (" bringing about birth "), Arma (apa>, " to join," i.e., in marriage, cf. Harmonia), Nymphia (" bridal goddess "), Kourotrophos (" rearer of boys "). Aphrodite Apaturus (see G. M. Hirst in Journal of Hellenic Studies, xxiii., 1903) refers to her connexion with the clan and the festival Apaturia, at which children were admitted to the phr.atria. It is pointed out by Farnell that this cult of Aphrodite, as the patroness of married life, is probably a native development of the Greek religion, the oriental legends representing her by no means as an upholder of the purer relations of man and woman. As the goddess of the grosser form of love she inspires both men and women with passion {hnarpola, " turning them to " thoughts of love), or the reverse {airoarpoˆla, " turning them away ").

Upon her male favourites (Paris, Theseus) she bestows the fatal gift of seductive beauty, which generally leads to disastrous results in the case of the woman (Helen, Ariadne). As firixaviTLS (" contriver ") she acts as an intermediary for bringing lovers together, a similar idea being expressed in ;rpa£is (of "success" inlove, ox = creatrix). The two epithets avdpoifrovos (" man-slayer ") and aoxravSpa (" man-preserver ") find, an illustration in the pseudo-Plautine (in the Mercator) address to Astarte, who is described as the life and death, the saviour and destroyer of men and gods. It was natural that a personality invested with such charms should be regarded as the ideal of womanly beauty, but it is remarkable that the only probable instance in which she appears as such is as Aphrodite ttopu

(" form ") at Sparta (O. Gruppe suggests the meaning " ghost," C. Tiimpel the " dark one," referring to Aphrodite's connexion with the lower world). The function of Aphrodite as the patroness of courtesans represents the most degraded form of her worship as the goddess of love, and is certainly of Phoenician or Eastern origin. In Corinth there were more than a thousand of these tepo < 5ovXoi (" temple slaves "), and wealthy men made it a point of honour to dedicate their most beautiful slaves to the service of the goddess.

Like her oriental prototype, the Greek Aphrodite was closely connected with the sea. Thus, in the Hesiodic account of her birth, she is represented as sprung from the foam which gathered round the mutilated member of Uranus, and her name has been explained by reference to this. Further proof may be found ia many of her titles — avadvop.ivTj (" rising from the sea "), ewrXoiq (" giver of prosperous voyages "), yaXrivaia (" goddess of fail weather"), KaraaKoiria ("she who keeps a look-out from tha heights ") — in the attribute of the dolphin, and the veneration in which she was held by seafarers. Aphrodite Aineias, the protectress of the Trojan hero, is probably also another form of the maritime goddess of the East (see E. Worner, article "Aineias " in Roscher's Lexikon, and Farnell, ii. p. 638), which originated in the Troad, where Aphrodite Aineias may have been identical with the earth-goddess Cybele. The title injicinros is connected with the legend of Aeneas, who is said to have dedicated to his mother a statue that represented her on horse- back. Remembering the importance of the horse in the cult of the sea-god Poseidon, it is natural to associate it with Aphro- dite as the sea-goddess, although it may be explained with reference to her character as a goddess of vegetation, the horse being an embodiment of the corn-spirit (see J. G. Frazer, The Golden Rough, ii., 1900, p. 281).

Like Ishtar, Aphrodite was connected with the lower world. Thus, at Delphi there was an image of Aphrodite hrtrvfifiia ("Aphrodite of the tomb "), to which the dead were summoned to receive libations; the epithets

ru^/3o)pi»xos (" grave-digger"), fivx^a (" goddess of the depths "), p.«Xaim (" the dark one "), the grave of Ariadne- Aphrodite at Amathus, and the myth of Adonis, point in the same direction.

The cult of the armed Aphrodite probably belongs to the earlier period of her worship in Greece, and down to the latest period of Greek history she retained this character in some of the Greek states. The cult is found not only where oriental influence was strongest, but in places remote from it, such as Sparta, where she was known by the name of Areia (" the warlike "), and there are numerous references in the Anthology to an Aphrodite armed with helmet and spear. It is possible that the frequent association of Aphrodite with Ares is to be explained by an armed Aphrodite early worshipped at Thebes, the most ancient seat of the worship of Ares.

The most distinctively oriental title of the Greek Aphrodite is Urania, the Semitic " queen of the heavens." It has been explained by reference to the lunar character of the goddess, but more probably signifies "she whose seat is in, heaven," whence she exercises her sway over the whole world — earth, sea, and air alike. Her cult was first established in Cythera, probably in connexion with the purple trade, and at Athens it is associated with the legendary Porphyrion, the purple king. At Thebes, Harmonia (who has been identified with Aphrodite herself) dedicated three statues, of Aphrodite Urania, Pandemos, and Apostrophia. A few words must be added on the second of these titles. There is no doubt that Pandemos was originally an extension of the idea of the goddess of family and city life to include the whole people, the political community. Hence the name was supposed to go back to the time of Theseus, the reputed author of the reorganization of Attica and its demes. Aphrodite Pandemos was held in equal regard with Urania; she was called aty.vi\ ("holy"), and was served by priestesses upon whom strict chastity was enjoined. In time, however, the meaning of the term underwent a change, probably due to the philosophers and moralists, by whom a radical distinction was drawn between Aphrodite Urania and Pandemos. According to Plato

(Symposium, 180), there are two Aphrodites, " the elder, having' no mother, who is called the heavenly Aphrodite — she is the daughter of Uranus; the younger, who is the daughter of Zeus and Dione — her we call common." The same distinction is found in Xenophon's Symposium (viii. 9), although the author is doubtful whether there are two goddesses, or whether Urania and Pandemos are two names for the same goddess, just as Zeus, although one and the same, has many titles; but in any case, he says,

the ritual of Urania is purer, more serious, than that of Pandemos. The same idea is expressed in the statement (quoted by Athenaeus, 569 d, from Nicander of Colophon) that after Solon's time courtesans were put under the protection of Aphro- dite Pandemos. But there is no doubt that the cult of Aphrodite was on the whole as pure as that of any other divinities, and although a distinction may have existed in later times between the goddess of legal marriage and the goddess of free love, these titles do not express the idea. Aphrodite Urania was represented in Greek art on a swan, a tortoise or a globe; Aphrodite Pan- demos as riding on a goat, symbolical of wantonness. (For the legend of Theseus and Aphrodite hnrpayla, "on the goat," see Farnell, Cults, ii. p. 633.)

To her oriental attributes the following may be added: the sparrow and hare (productivity), the wry- neck (as a love-charm, of which Aphrodite was considered the inventor) , the swan and dolphin (as a marine divinity), the tortoise (explained by Plutarch as a symbol of domesticity, but connected by Griippe with the marine deity), the rose, the poppy, and the lime tree.

In ancient art Aphrodite was at first represented clothed, sometimes seated, but more frequently standing; then naked, rising from the sea, or after the bath. Finally, all idea of the divine vanished, and the artists merely presented her as the type of a beautiful woman, with oval face, full of grace and charm, languishing eyes, and laughing mouth, which replaced the dignified severity and repose of the older forms. The most famous of her statues in ancient times was that at Cnidus, the work of Praxiteles, which was imitated on the coins of that town,' and subsequently reproduced in various copies, such as the Vatican and Munich. Of existing statues the most famous is the Aphrodite of Melos (Venus of Milo), now in the Louvre, which was found on the island in 1820 amongst the ruins of the theatre; the Capitoline Venus at Rome and the Venus of Capua, represented as a goddess of victory (these two exhibit a lofty conception of the goddess) ; the Medicean Venus at Florence, found in the porticus of Octavia at Rome and (probably wrongly) attributed to Cleomenes; the Venus stooping in the bath, in the Vatican; and the Callipygos at Naples, a specimen of the most sensual type.

For the oriental Aphrodite . see E. Meyer, article " Astarte " in W. H. Roscher's Lexikon der Mythologie, and Wolf Baudissin, articles " Astarte " and " Atargatis " in Herzog-Hauck's Real- encyklopddie fur protestantische Theologie; for the Greek, articles m Roscher's Lexikon and Pauly-Wissowa's Realencyelopadie; L. Preller, Griechische Mythologie . (4th ed. by C. Robert) ; L. R. Farnell, Cults of the Greek States, ii. (1896); O. Gruppe, Griechische Mythologie und Religionsgeschichte, ii. (1906); L. Dyer, The Gods in Greece (1891) ; A. Enmann, Kypros und der Vr sprung

des Aphro- dite-Kults (1886). W. H. Engel, Kypros, ii. (1841), and J. B. Lajard, Recherches sur le culte de Venus (1837), may still be consulted with advantage. For Aphrodite in art see J. J. Bernoulli, Aphrodite (1873) ; W. J. Stillman, Venus and Apollo in Painting and Sculpture (1897). In the article Greek Art, figs. 71 (pi. v.) and 77 (pi. vi.) represent Aphrodite of Criidusand Melos respectively. (J. H. F.)

APHTHONIUS, of Antioch, Greek sophist and rhetorician, flourished in the second half of the 4th century A.D., or even later. Nothing is known of his life, except that he was a friend of Libanius and of a certain Eutropius, perhaps the author of the epitome of Roman history. We possess by him HpoyvfivaanaTa, a text-book on the elements of rhetoric, with exercises for the use of the young before they entered the regular rhetorical schools. They apparently formed an introduction to the Tkxvr] of Hermogenes. His style is pure and simple, and ancient critics praise his " Atticism." The book maintained its popularity as late as the 17th century, especially in Germany. A collection of forty fables by Aphthonius, after the style of Aesop, is also extant.

Spengel, Rhetores Graeci, ii. ; Finckh, Aphlhonii Progymnasmata

(1865); Hoppichler, De, Theone, Hejimogene, Aphthonioque Pro- gymnasmatum Scriptoribus (1884) ; edition of the fables t>y Furia

(1810).

APHTHONIUS, AELIUS FESTUS, Latin grammarian, possibly of African origin, lived in the 4th century a.d. He wrpte a metrical handbook in four books, which has been incorporated by Marius Victorinus in his system of grammar.

Keil, Grarnmatici Latini, vi. ; Schultz, Quibus Auctoribus Aelius Festus Aphthonius usus sit (1885).

APICIUS, the name of three celebrated Roman epicures. The second of these, M. Gavius Apiciua, who lived under Tiberius, is the most famous (Seneca, Consol. ad Helviam, 10). He in- vented various cakes and sauces, and is said to have written on cookery. The extant De Re Coquinaria (ed. Schuch, 1874), a collection of receipts, ascribed to one Caelius Apicius, is founded on Greek originals, and belongs to the 3rd century a.d. It is probable that the real title was Caelii Apicius, Apicius being the name of the work (cp. Taciti Agricola), and De Re Coquinaria a sub-title.

APICULTURE (from Lat. apis, a bee), bee-keeping (see Bee). So also other compounds of api-. Apiarium or apiary, a bee- house or hive, is used figuratively by old writers for a place of industry, e.g. a college.

APION, Greek grammarian and commentator on Homer, born at Oasis in Libya, flourished in the first half of the 1st century a.d. He studied at Alexandria, and headed a deputation sent to Caligula (in 38) by the Alexandrians to complain of the Jews: his charges were answered by Josephus in his Contra Apionem. He settled at Rome — it is uncertain when— and taught rhetoric till the reign of Claudius. Apion was a man of great industry and learning, but extremely vain. He wrote sevefal works, which are lost. The well-known story of Androclus and the lion, preserved in Aulus Gellius, is from his KlyvKTiand.; fragments of his TAcocom 'O/ irjpLKcd are printed in the Etytnologicum Gudianiom, ed. Sturz, 181S,

APIS or Hapis, the sacred bull of Memphis, in Egyptian Hp, Hope, Hope. By Manetho his worship is said to have been instituted by Kaiechos of the Second Dynasty. Hape is named on very early monuments, but little is ; known of the divine animal before the New Kingdom. He was entitled "the re- newal of the life " of the Memphite god Ptah:' but after death he became Osorapis, i.e. the Osiris Apis, just as dead men were assimilated to Osiris, the king of the underworld. This Osorapis was identified with Serapis, and may well be really identical with him (see Serapis): and Greek writers make the Apis an incarnation of Osiris, ignoring the connexion with Ptah. Apis was the most important of all the sacred animals in Egypt, and, like the others, its importance increased as time went on. Greek and Roman authors have much to say about Apis, the marks by which the black bull-calf was recognized, the manner of his conception by a ray from heaven, his house at Memphis with court for disporting himself, the mode of prognostication from his actions, the mourning at his death, his costly 'burial and the rejoicings throughout the country when a new Apis was found. Mariette's excavation of the Serapeum at Memphis revealed the tombs of over sixty animals, ranging from the time of Amenophis III. to that of Ptolemy Alexander. At first each animal was buried in a separate tomb with a chapel built above it. Khamuis, the priestly son of Rameses II. (c. 1300 B.C.), excavated a great gallery to be lined with the tomb chambers; another similar gallery was added by Ps'ammeti- chus I. The careful statement of the ages of the animals in the later instances, with the regnal dates for their birth, en- thronization and death have thrown much light on the chronology from the XXIInd dynasty onwards. The name of the mother-cow and the place of birth are often recorded. The Sarcophagi are of immense size, and the burial must h&ve entailed enorfnous expense. It is therefore remarkable that the priests' contrived to bury one of the animals in the fourth year of Cambyses.

See Jablonski, Pantheon, ii.; Budge, Gods of the Egyptians, ii. 356; Mariette-Maspero, Le SSrapSum de Memphis. (F. Ll. G.)

APLITE-ˆAPOGALYPITIC BITERATURE

APLITE, in petrology, the name given to intrusive rock in which quartz and felspar are the dominant minerals. Aplites are usually very fine-grained, white, grey or flesh-coloured, and their constituents are visible only with the help of a magnifying lens. Dykes and threads of aplite are very frequently to be observed traversing granitic bosses; they occur also, though in less numbers, in syenites, diorites, quartz-diabases and gabbros. Without doubt they have usually a genetic affinity to the rocks they intersect. The aplites of granite areas, for example, are the last part of the magma to crystallize, and correspond in composition to the quartzo-felspathic aggregates which fill up the interspaces between the early minerals in the main body of the rock. They bear a considerable resemblance to the eutectic mixtures which are formed on the cooling of solutions of mineral salts, and remain liquid till the excess of either of the components has separated out, finally solidifying en masse when the proper proportions of the constituents and a suitable temperature are reached. The essential components of the aplites are quartz and alkali felspar (the latter usually orthoclase or micro perthite). Crystallization has been appar ently rapid (as the rocks are so fine-grained), and the ingredients have solidified almost at the same time. Hence their crystals are rather imperfect and fit closely to one another in a sort of fine mosaic of nearly equi-dimensional grains. Porphyritic felspars occur occasionally and quartz more seldom; but the relation of the aplites to quartz-porphyries, granophyres and felsites is very close, as all these rocks have nearly the same chemical composition. Yet the aplites associated with diorites and quartz-diabases differ in minor respects from the common aplites, which accompany granites. The accessory minerals of these rocks are principally oligoclase, muscovite, apatite and zircon. Biotite and all ferromagnesian minerals rarely appear in them, and never are in considerable amount. Riebeckite- granites (paisanites) have close affinities to aplites, shown especially in the prevalence of alkali felspars. Tourmaline also occurs in some aplites. The rocks of this group are very frequent in all areas where masses of granite are known. They form dykes and irregular veins which may be only a few inches or many feet in diameter. Less frequently aplite forms stocks or bosses, or occupies the edges or -irregular portions of the interior of outcrops of granite. The syenite-aplites consist mainly of alkali felspar; the diorite-aplites of plagioclase; there are nepheline-bearing aplites which intersect some elaeolite-syenites. In all cases they bear the same relation to the parent masses. By increase of quartz aplites pass gradually, in a few localities, through highly quartzose modifications (beresite, &c.) into quartz veins. (J. S. F.)*

APNOEA (Gr. aTVOia, from d-, privative, TVteiv, to breathe), a technical term for suspension of breathing.

APOCALYPSE (Gr. curoKaXuˆts , disclosure), a term applied to the disclosure to certain privileged persons of something hidden from the mass of men. The Greek root corresponds in the Septuagint to the Heb. galdh, to reveal. The last book of the New Testament bears in Greek the title 'Atto/ coXuˆis 'Idiavvov, and is frequently referred to as the Apocalypse of John, but in the English Bible it appears as the Revelation of St John the Divine (see Revelation), Earlier among the hellenistic Jews the term was used of a number of writings which depicted in a prophetic and parabolic way the end or future state of the world (e.g. Apocalypse of Baruch), the whole class is now commonly known as Apocalyptic Literature (q.v.).

APOCALYPSE, KNIGHTS OF THE, a secret society founded in Italy in 1693 to defend the church against the expected Antichrist. Agostino Gabrino, the son of a merchant of Brescia, was its founder. On Palm Sunday 1693, when the choir of St Peter's was chanting Quis est iste Rex Gloriae? Gabrinc. sword in hand, rushed to the altar crying Ego sum Rex Gloriae. Though Gabrino was treated as a madman, the society flourished, until a member denounced it to the Inquisition, who arrested the knights. Though chiefly mechanics they always carried swords even when at work, and wore on their breasts a

star with seven rays. Gabrino styled himself monarch of the Holy Trinity. He was credited by his enemies with a desire to introduce polygamy.

APOCALYPTIC LITERATURE. The Apocalyptic literature of Judaism and Christianity embraces a considerable period, from the centuries following the exile down to the close of the middle ages. In the present survey we shall limit ourselves to the great formative periods in this literature: — in Judaism to 200 B.C. to a.d. 100, and in Christianity to a.d. 50 to 350 or thereabouts.

The transition from prophecy to apocalyptic (airoKaKvTTeiv, to reveal something hidden) was gradual and already accom- plished within the limits of the Old Testament. Beginning in the bosom of prophecy, and steadily differentiating itself from it in its successive developments, it never came to stand in absolute contrast to it. Apocalyptical elements disclose them- selves in the prophetical books of Ezekiel, Joel, Zechariah, while in Isaiah xxiv.-xxvii. and xxxiii. we find well-developed apocalypses; but it is not until we come to Daniel that we have a fully matured and classical example of this class of literature. The way, however, had in an especial degree been prepared for the apocalyptic type of thought and literature by Ezekiel, for with him the word of God had become identical with a written book (ii. 9-iii. 3) by the eating of which he learnt the will of God, just as primitive man conceived that the eating of the tree in Paradise imparted spiritual knowledge. When the divine word is thus conceived as a written

message, the sole office of the prophet is to communicate what is written. Thus the human element is reduced to zero, and the conception of prophecy becomes mechanical. And as the personal element disappears in the conception of the prophetic calling, so it tends to disappear in the prophetic view of history, and the future comes to be conceived not as the organic result of the present under the divine guidance, but as mechanically determined from the beginning in the counsels of God, and arranged under artificial categories of time. This is essentially the apocalyptic conception of history, and Ezekiel may be justly represented as in certain essential aspects its founder in Israel.

We shall now consider (I.) Apocalyptic, its origin and general characteristics; (II.) Old Testament Apocalyptic; (IH.) New Testament Apocalyptic.

I. Apocalyptic — its Origin and General Characteristics

i. Sources of Apocalyptic— -The origin of Apocalyptic is to be sought in (a) unfulfilled prophecy and in (b) traditional elements drawn from various sources.

(a) The origin of Apocalyptic is to be sought in unfulfilled prophecy. That certain prophecies relating to the coming kingdom of God had clearly not been fulfilled was a matter of religious difficulty to the returned exiles from Babylon. The judgments predicted by the pre-exilic prophets had indeed been executed to the letter, but where were the promised glories of the renewed kingdom and Israel's unquestioned sovereignty over the nations of the earth? One such unfulfilled prophecy Ezekiel takes up and reinterprets in such a way as to show that its fulfilment is still to come. The prophets Jeremiah (iv.-vi.) and Zephaniah had foretold the invasion of Judah by a mighty people from the north. But as this northern foe had failed to appear Ezekiel re-edited this prophecy in a new form as a final assault of Gog and his hosts on Jerusalem, and thus established a permanent dogma in Jewish apocalyptic, which in due course passed over into Christian.

But the non-fulfilment of prophecies relating to this or that individual event or people served to popularize the methods of apocalyptic in a very slight degree in comparison with the non- fulfilment of the greatest of all prophecies— the advent of the Messianic kingdom. Thus, though Jeremiah had promised that after seventy years (xxv. n., xxix. 10) Israel should be restored to their own land (xxiv. 5, 6), and then enjoy the blessings of the Messianic kingdom under the Messianic king (xxiii. 5, 6), this period passed by and things remained as of old. Haggai and Zechariah explained the delay by the failure of Judah to rebuild

the temple, and so generation after generation the hope of the kingdom persisted, sustained most probably by ever-fresh reinterpretations of ancient prophecy, till in the first half of the 2nd century the delay is explained in the Books 6f Daniel and Enoch as due not to man's shortcomings but to the counsels of God. The 70 years of Jeremiah are interpreted by the angel in Daniel (ix. 25-27) as 70 weeks of years, of which 69ˆ have already expired, while the writer of Enoch (lxxxv.-xc.) interprets the 70 years of Jeremiah as the 70 successive reigns of the 70 angelic patrons of the nations, which are to come to a close in his own generation.

But the above periods came and passed by, and again the expectations of the Jews were disappointed. Presently the Greek empire of the East was overthrown by Rome, and in due course this new phenomenon, so full of meaning for the Jews, called forth a new interpretation of Daniel. The fourth and last empire which, according to Daniel vii. 10-25, was to be Greek, was now declared to be Roman by the Apocalypse of Baruch (xxxvi.-xl.) and 4 Ezra (x. 60-xii. 35). Once more such ideas as those of " the day of Yahweh " and the " new heavens and a new earth " were constantly re-edited with fresh nuances in conformity with their new settings. Thus the inner development of Jewish apocalyptic was always conditioned by the historical experiences of the nation.

(ft) Another source of apocalyptic was primitive mythological and cosmological traditions, in which the eye of the seer could see the secrets of the future no less surely than those of the past. Thus the six days of the world's creation, followed by a seventh of rest, were regarded as at once a history of the past and a fore- casting of the future. As the world was made in six days its history would be accomplished in six thousand years, since each day with God was as a thousand years and a thousand years as one day; and as the six days of creation were followed by one of rest, so the six thousand years of the world's history would be followed by a rest of a thousand years (2 Enoch xxxii. 2-xxxiii. 2). Of primitive mythological traditions we might mention the primeval serpent, leviathan, behemoth, while to ideas native to or familiar in apocalyptic belong those of the seven archangels, the angelic patrons of the nations (Deut. xxxii. 8, in LXX. ; Isaiah xxiv. 21; Dan. x. 13, 20, &c), the mountain of God in the north (Isaiah xiv. 13; Ezek. i. 4, &c), the garden of Eden.

ii. Object and Contents of Apocalyptic. — The object of this literature in general was to solve the difficulties connected with the righteousness of God and the suffering condition of His righteous servants on earth. The

righteousness of God postulated according to the law the temporal prosperity of the righteous and the temporal prosperity of necessity; for as yet there was no promise of life or recompense beyond the grave. But this connexion was not found to obtain as a rule in life, and the difficulties arising from this conflict between promise and ex- perience centred round the lot of the righteous as a community and the lot of the righteous man as an individual. Old Testament prophecy had addressed itself to both these problems, though it was hardly conscious of the claims of ths latter. It concerned itself essentially with the present, and with the future only as growing organically out of the present. It taught the absolute need of personal and national righteousness, and foretold the ultimate blessedness of the righteous nation on the present earth. But its views were not systematic and comprehensive in regard to the nations in general, while as regards the individual it held that God's service here was its own and adequate reward, and saw no need of postulating another world to set right the evils of this. But later, with the growing claims of the individual and the acknowledgment of these in the religious and intellectual life, both problems, and especially the latter, pressed themselves irresistibly on the notice of religious thinkers, and made it impossible for any conception of the divine rule and righteousness to gain acceptance, which did not render adequate satisfaction to the claims of both problems. To render such satisfaction was the task undertaken by apocalyptic, as well as to vindicate the righteousness of God alike in respect of the individual and of the nation. To justify their contention they sketched in outline

the history of the world and mankind, the origin of evil and its course, and the final consummation of all things. Thus they presented in fact a theodicy, a rudimentary philosophy of religion. The righteous as a nation should yet possess the earth, even in this world the faithful community should attain its rights in an eternal Messianic kingdom on earth, or else in temporary blessed- ness here and eternal blessedness hereafter. So far as regards the righteous community. It was, however, in regard to the destiny of the individual that apocalyptic rendered its chief service. Though the individual might perish amid the disorders of this world, he would not fail, apocalyptic taught,- to attain through resurrection the recompense that was his due in the Messianic kingdom or in heaven itself. Apocalyptic thus forms the indispensable preparation for the religion of the New Testament.

iii. Form of Apocalyptic. — The form of apocalyptic is a literary form; for we cannot suppose that the writers experienced the voluminous and detailed visions we find in their books. On the other hand the reality of the visions is to some extent guaranteed by the writer's intense earnestness and by his manifest belief in the divine origin of his message. But the difficulty of regarding the visions as actual experiences, or as in any sense actual, is intensified, when full account is taken of the artifices of the writer; for the

major part of his visions consists of what is to him really past history dressed up in the guise of prediction. Moreover, the writer no doubt intended that his reader should take the accuracy of the prediction (?) already accomplished to be a guarantee for the accuracy of that which was still un- realized. How, then, it may well be asked, can this be consistent with reality of visionary experience ? Are we not here obliged to assume that the visions are a literary invention and nothing more ?

However we may explain the inconsistency, we are precluded by the moral earnestness of the writer from assuming the visions to be pure inventions. But the inconsistency has in part been explained by Gunkel, who has rightly emphasized that the writer did not freely invent his materials but derived them in the main from tradition, as he held that these mysterious tradi- tions of his people were, if rightly expounded, forecasts of the time to come. Furthermore, the visionary who is found at most periods of great spiritual excitement was forced by the prejudice of his time, which refused to acknowledge any inspiration in the present, to ascribe his visionary experiences and reinterpretations of the mysterious traditions of his people to some heroic figure of the past. Moreover, there will always be a difficulty in deter- mining what belongs to his actual vision and what to the literary skill or free invention of the author, seeing that the visionary must be dependent on memory and past experience for the forms and much of the matter of the actual vision.

iv. Apocalyptic as distinguished from Prophecy.-ˆ-We have already dwelt on certain notable differences between apocalyptic and prophecy; but there are certain others that call for attention.

(a) In the Nature of its Message. — The message of the prophets was primarily a preaching of repentance and righteousness if the nation would escape judgment; the message of the apocalyptic writers was of patience and trust for that deliverance and reward were sure to come.

(b) By its dualistic Theology. — Prophecy believes that this world is God's world and that in this world His goodness and truth will yet be vindicated. Hence the prophet prophesies of a definite future arising out of and organically connected with the present. The apocalyptic writer on the other hand despairs of the present, and directs his hopes absolutely to the future, to a new world standing in essential opposition to the present. (Non fecit Altissimus unum saeculum sed duo, 4 Ezra vii. 50.) Here we have essentially a dualistic principle, which, though it can largely be accounted for by the interaction of certain inner tendencies and outward sorrowful experience on the part of Judaism, may ultimately be derived from Mazdean influences. This principle, which shows itself clearly at first in the conception that the various nations are under angelic rulers, who are in a

greater or less degree in rebellion against God, as in Daniel and

Enoch, grows in strength with each succeeding age, till at last Satan is conceived as " the ruler of this world " (John xii. 31) or " the god of this age " (2 Cor. iv. 4). Under the guidance of such a principle the writer naturally expected the world's culmination in evil to be the immediate precursor of God's intervention on behalf of the righteous, and every fresh growth in evil to be an additional sign that the time was at hand. The natural concomitant in conduct of such a belief is an uncom- promising asceticism. He that would live to the next world must shun this. Visions are vouchsafed only to those who to prayer have added fasting.

(c) By pseudonymous Authorship. — We have already touched" on this characteristic of apocalyptic. The prophet stood in direct relations with his people; his prophecy was first spoken and afterwards written. The apocalyptic writer could obtain no hearing from his contemporaries, who held that, though God spoke in the past, " there was no more any prophet." This pessimism and want of faith limited and defined the form in which religious enthusiasm should manifest itself, and prescribed as a condition of successful effort the adoption of pseudonymous authorship. The apocalyptic writer, therefore, professedly addressed his book to future generations. Generally directions as to the hiding and sealing of the book (Dan. xii. 4, 9; 1 Enoch i. 4; Ass. Mos. i. 16-18) were given in the text in order to explain its publication so long after the date of its professed period. Moreover, there was a sense in which such books were not wholly pseudonymous. Their writers were students of ancient prophecy and apocalyptical tradition, and, though they might recast and reinterpret them, they could not regard them as their own inventions. Each fresh apocalypse would in the eyes of its writer be in some degree but a fresh edition of the traditions naturally attaching themselves to great names in Israel's past, and thus the books named respectively Enoch, Noah, Ezra would to some slight extent be not pseudonymous.

(d) By its comprehensive and deterministic Conception of History. — Apocalyptic took an indefinitely wider view of the world's history than prophecy. Thus, whereas prophecy had to deal with temporary reverses at the hands of some heathen power, apocalyptic arose at a time when Israel had been subject for generations to the sway of one or other of the great world- powers. Hence to harmonize such difficulties with belief in God's righteousness, it had to take account of the r61e of such empires in the counsels of God, the rise, duration and downfall of each in turn, till finally

the lordship of the world passed into the hands of Israel, or the final judgment arrived. These events belonged in the main to the past, but the writer represented them as still in the future, arranged under certain artificial categories of time definitely determined from the beginning in the counsels of God and revealed by Him to His servants the prophets. Determinism thus became a leading characteristic of Jewish apocalyptic, and its conception of history became severely mechanical.

II. Old Testament Apocalyptic

i. Canonical: —

Isaiah xxiv. — xxvii.; xxxiii.; xxxiv.-xxxv.

(Jeremiah xxxiii. 14-26 ?)

Ezekiel ii. 8 ; xxxviii.-xxxix.

Joel iii. 9-17.

Zech. xii.-xiv.

Daniel.

We cannot enter here into a discussion of the above passages and books. 1 All are probably pseudepigraphic except the passages from Ezekiel and Joel. Of the remaining passages and books Daniel belongs unquestionably to the Maccabean period, and the rest possibly to the same period. Isaiah xxxiii. was probably written about 163 B.C. (Duhm and Marti); Zech. xii.-xiv. about 160 B.C., Isaiah xxiv .-xxvii. about 128 B.C., and xxxiv.-xxxv. sometime in the reign of John Hyrcanus. Jeremiah xxxiii. 14-26 is assigned by Marti to Maccabean times, but this is highly questionable.

1 See the separate headings for the various apocalyptic books mentioned in this article.

ii. Extra -canonical: —

(a) Palestinian: —

(2OO-I0O B.C.)

Book of Noah. 1 Enoch vi.— xxxvi. ; lxxii.— xc. Testaments of the XII. Patriarchs. (100 B.C. to I B.C.)

1 Enoch i.— v. ; xxxvii.— lxxi. ; xci.— civ.

Testaments of the XII. Patriarchs, i.e. T. Lev. x., xiv.-xvi.,

T. Jud. xxi. 6-xxiii, T. Zeb. ix., T. Dan. v. 6, 7. Psalms of Solomon.

(a.d. i-ioo and later.) Assumption of Moses. Apocalypse of Baruch. 4 Ezra.

Greek Apocalypse of Baruch. Apocalypse of Zephaniah. Apocalypse of Abraham. Prayer of Joseph. Book of Eldad and Modad. Apocalypse of Elijah.

(b) Hellenistic: —

2 Enoch.

Oracles of Hystaspes.

Testament of Job.

Testaments of the III. Patriarchs.

Sibylline Oracles (excluding Christian portions).

Book of Noah. — Though this book has not come down to us independently, it has in large measure been incorporated in the Ethiopic Book of Enoch, and can in part be reconstructed from it. The Book of Noah is mentioned in Jubilees x. 13, xxi. 10. Chapters lx., lxv.-lxix. 25 of the Ethiopic Enoch are without question derived from it. Thus lx. 1 runs: " In the year 500, in the seventh month … in the life of Enoch." Here the editor simply changed the name Noah in the context before him into Enoch, for the statement is based on Gen. v. 32, and Enoch lived only 365 years. Chapters vi.-xi. are clearly from the same source; for they make no reference to Enoch, but bring forward Noah (x. 1) and treat of the sin of the angels that led to the flood, and of their temporal and eternal punishment. This section is compounded of the Semjaza and Azazel myths, and in its present composite form is already presupposed by 1 Enoch Ixxxviii.-xc. Hence these chapters are earlier than 166 B.C. Chapters cvi.-cvii. of the same book are probably from the same source; likewise liv. 7-lv. 2, and Jubilees vii. 20-39, x – I " I S- In the former passage of Jubilees the subject-matter leads to this identification, as well as the fact that Noah is represented as speaking in the first person, although throughout Jubilees it is the angel that speaks. Possibly Eth. En. xii. 3-8, xliii.-xliv., lix. are from the same work. The book may have opened with Eth. En. cvi.-cvii. On these chapters may have followed Eth. En. vi.-xi., lxv.-lxix. 25, lx., xii. 3-8, xliii.-xliv., liv. 7-lv. 2; Jubilees vii. 26-39, x – 1 tS

The Hebrew Book of Noah, a later work, is printed in Jellinek's Bet ha-

Midrasch, iii. 155-156, and translated into German in Ronsch, Das Buck der Jubilaen, 385-387. It is based on the part of the above Book of Noah which is preserved in the Book of Jubilees. The portion of this Hebrew work which is derived from the older work is reprinted in Charles's Ethiopic Version of the Hebrew Book of Jubilees, p. 179.

/ Enoch, or the Ethiopic Book of Enoch. — This is the most important of all the apocryphal writings for the history of religious thought. Like the Pentateuch, the Psalms, the Megil- loth and the Pirke Aboth, this work was divided into five parts, which, as we shall notice presently, spring from five different sources. Originally written partly in Aramaic (i.e. vi.-xxxvi.) and partly in Hebrew (i.-vi., xxxvii.-cviii.), it was translated into Greek, and from Greek into Ethiopic and possibly Latin. Only one-fifth of the Greek version in two forms survives. The various elements of the book were written by different authors at different dates, vi.-xxxvi. was written before 166 B.C., lxxii -lxxxii. before the Book of Jubilees, i.e. before 120 B.C. or thereabouts, lxxxiii.-xc. about 166 B.C., i.-v., xci.-civ. before 95 B.C., and xxxvii.-lxxi. before 64 B.C. There are many interpolations drawn mainly from the Book of Noah.

Testaments of the XII. Patriarchs. — This book, in some respects

the most important of Old Testament apocryphs, has only recently come into its own. Till a few years ago, owing to Christian interpolations, it was taken to be a Christian apocryph, written originally in Greek in the 2nd century a.d. Now it is acknowledged by Christian and Jewish scholars alike to have been written in Hebrew in the 2nd century B.C. From Hebrew it was translated into Greek and from Greek into Armenian and Slavonic. The versions have come down in their entirety, and small portions of the Hebrew text have been recovered from later Jewish writings. The Testaments were written about the same date as the Book of Jubilees. These two books form the only Apology in Jewish literature for the religious and civil hegemony of the Maccabees from the Pharisaic standpoint. To the Jewish interpolation of the 1st century B.C. (about 60-40), i.e. T. Lev. x., xiv.-xvi.; T. Jud. xxii.-xxiii., &c, a large interest attaches; for these, like 1 Enoch xci.-civ. and the Psalms of Solomon, constitute an unmeasured attack on every office — prophetic, priestly and kingly — administered by the Maccabees. The ethical character of the book is of the highest type, and its profound influence on the writers of the New Testament is yet to be appreciated. (See Testaments of the XII. Patriarchs.)

Psalms of Solomon. — These psalms, in all eighteen, enjoyed but small consideration in early times, for only six direct refer- ences to them are found in early literature. Their ascription to Solomon is due solely to the copyists or translators, for no such claim is made in any of the psalms. On the whole, Ryle and James are no doubt right in assigning 70-40 B.C. as the limits within which the psalms were written. The authors were Pharisees. They divide their countrymen into two classes — " the righteous," ii. 38-39, iii. 3-5, 7, 8, &c, and " the sinners," ii. 38, iii. 13, iv. 9, &c; " the saints," iii. 10, &c, and " the transgressors," iv. 11, &c. The former are the Pharisees; the latter the Sadducees. They protest against the Asmonaean house for usurping the throne of David, and laying violent hands on the high priesthood (xvii. 5, 6, 8), and proclaim the coming of the Messiah, the Son of David, who is to set all things right and establish the supremacy of Israel. Pss. xvii.-xviii. and i.-xvi. cannot be assigned to the same authorship. The hopes of the Messiah are confined to the former, and a somewhat different eschatology underlies the two works. Since the Psalms were written in Hebrew, and intended for public worship in the synagogues, it is most probable that they were composed in Palestine. (See Solomon, The Psalms of.)

The Assumption of Moses.— This book was lost for many cen- turies till a large fragment of it was discovered and published by Ceriani in 1861 {Monumenta Sacra, I. i. 55-64) from a palimpsest of the 6th century. Very little was known about the contents of this book prior to this discovery. The present book is possibly the long-lost AiaOrjKrj Mcovaiws mentioned in some ancient lists, for it never speaks of the assumption of Moses, but always of his natural death. About a half of the original Testament is preserved in the Latin version. The latter half probably dealt with questions about the creation. With this " Testament " the " Assumption," to which almost all the patristic references and that of Jude are made, was subsequently edited. The book was written between 4 B.C. and a.d. 7. As for the author, he was no Essene, for he recognizes animal sacrifices and cherishes the Messianic hope; he was not a Sadducee, for he looks forward to the establishment of the Messianic kingdom (x.) ; nor a Zealot, for the quietistic ideal is upheld (ix.), and the kingdom is estab- lished by God Himself (x.). He is therefore a Chasid of the ancient type, and glorifies the ideals which were cherished by the old Pharisaic party, but which were now being fast disowned in favour of a more active role in the political life of the nation. He pours his most scathing invectives on the Sadducees, who are described in vii. in terms that recall the anti-Sadducean Psalms of Solomon. His object, therefore, is to protest against the growing secularization of the Pharisaic party through its adoption of popular Messianic beliefs and political ideals. (See also Moses, Assumption of.)

Apocalypse of Baruch — The Syriac. — This apocalypse has survived only

in the Syriac version. The Syriac is a translation

from the Greek, and the Greek in turn from the Hebrew. The book treats of the Messiah and the Messianic kingdom, the woes of Israel in the past and the destruction of Jerusalem in the present, as well as of theological questions relating to original sin, free will, works, &c. The views expressed on several of these subjects are often conflicting. We must, therefore, assume a number of independent sources put together by an editor or else that the book is on the whole the work of one author who made use of independent writings but failed to blend them into one harmonious whole. In its present form the book was written soon after a.d. 70. For fuller treatment see Baruch.

4 Ezra. — This apocryph is variously named. In the first Arabic and Ethiopic versions it is called 1 Ezra; in some Latin MSS. and in the English authorized version it is 2 Ezra, and in the Armenian 3 Ezra. With the majority of the Latin MSS. we designate the book 4 Ezra. In its fullest form this apocryph consists of sixteen chapters, but i.-ii. and xv.-xvi. are of different authorship from each other and from the main work iii.xiv. The book was written originally in Hebrew. There are Latin, Syriac, Ethiopic, Arabic (two), and Armenian versions. The Greek version is lost. This apocalypse is of very great import ance, on account of its very full treatment of the theological questions rife in the latter half of the 1st century of the Christian era. The book, even if written by one author, was based on a variety of already existing works. It springs from the same school of thought as the Apocalypse of Baruch, and its affinities with the latter are so numerous and profound that scholars have not yet come to any consensus as to the relative priority of either. In its present form it was composed a.d. 80-100. For fuller treatment see Ezra.

Apocalypse of Baruch — The Greek.— This work is referred to by Origen (de Princip. II. iii. 6) : " Denique etiam Baruch prophetae librum in assertionis hujus' testimonium vocant, quod ibi de septem mundis vel caelis evidentius indicatur." This book survives in two forms in Slavonic and Greek. The former was translated by Bonwetsch in 1896, in the Nachrichten von der konigl. Ges. der Wiss. zu Gott. pp. 91-101; the latter by James in 1897 in Anecdota, ii. 84-94, with an elaborate intro- duction (pp. li.-lxxi.). The Slavonic is only of secondary value, as it is merely an abbreviated form of the Greek. Even the Greek cannot claim to be the original work, but only to be a recension of it; for, whereas Origen states that this apocalypse contained an account of the seven heavens, the existing Greek work describes only five, and the Slavonic only two. As the original, work presupposes 2 Enoch and the Syriac Apocalypse of Baruch and was known to Origen, it was written between a.d. 80 and 200, and nearer the earlier date than the later, as it would otherwise be hard to

understand how it came to circulate among Christians. The superscription shows points of con nexion with the Rest of the Words of Baruch, but little weight can be attached to the fact, since titles and superscriptions were so frequently transformed and expanded in ancient times. As James and Kohler have pointed out, part of section 4 on the Vine is a Christian addition. A German translation of the Greek appears in Kautzsch's Apok. u. Pseud, ii. 448-457, and a strong article by Kohler on the Jewish authorship of the book in the Jewish Encyclopedia, ii. 549-551. (See Baruch.)

Apocalypse of Abraham. — This book is found only in the Slavonic (edited by Bonwetsch, Studien zur Geschichte d. Theo- logie und Kirche, 1897), a translation from the Greek. It is of Jewish origin, but in part worked over by a Christian reviser. The first part treats of Abraham's conversion, and the second forms an apocalyptic expansion of Gen. xv. This book was possibly known to the author of the Clem. Recognitions, i. 32, a passage, however, which may refer to Jubilees. It is most probably distinct from the 'Atok6.\v\I/i.s 'AjSpad/z used by the gnostic Sethites (Epiphanius,, Haer. xxxix. 5), which was Very heretical. On the other hand, it is, probably identical with the apocryphal book 'A/3 paa.fi mentioned in the Stichometry of Nicephorus, and the Synopsis Athanasii, together with the Apocalypses of Enoch, &c.

Lost Apocalypses: Prayer of Joseph.— The Prayer of Joseph is quoted by Origen [Itt Joann. II. xxv, (Lommatzsch, i. 147, 148); in Gen. III. ix. (Lommatzsch, viii. 30-31)].' The fragments in Origen represent Jacob as speaking and claiming to be " the first servant in God's presence," " the first-begotten of every creature animated by God," and declaring that the angel who wrestled with Jacob (and was identified by Christians with Christ) was only eighth in rank. The work was obviously anti-Christian. (See Schiirer, iii. 265-266.)*

Book of Eldad and Modad.-— This book was written in the name of the two prophets mentioned in Num. xi. 26-29. It consisted, according to the Targ. Jon on Num. xi. 26-20, mainly of prophecies on Magog's last attack on Israel. The Shepherd of Hermas quotes it Vis. ii. 3. (See Marshall in Hastings' Bible Dictionary, i. 677.)*

Apocalypse of Elijah. — This apocalypse is mentioned in two of the lists of books. Origen, Ambrosiaster, and Euthalius ascribe to it 1 Cor. ii. 9: If they are right, the apocalypse is pre- Pauline. The peculiar form in which 1 Cor.

ii. 9 appears in Clemens Alex. Protrept. x. 94, and the Const. A post. vii. 32, shows that both have the same source, probably this apocalypse. Epiphanius (Haer. xlii., ed. Oehler, vol. ii. 678) ascribes to this work Eph. v. 14. Isr. Levi (Revue des Uudesjuives, 1880, i. 108 sqq.) argues for the existence of a Hebrew apocalypse of Elijah from two Talmudic passages. A late work of this name has been published by Jellinek, Bet ha-Midrasch, 1855, iii. 65-68, and Buttenwieser in 1 897. Zahn, Gesch. des N. T. Kanons, ii. 801- 810, assigns this apocalypse to the and century a.d. (See Schiirer. iii. 267-271.)*

Apocalypse of Zephaniah. — Apart from two of the lists this work is known to us in its original form only through a citation in Clem. Alex. Strom, v. n, 77. A Christian revision of it is probably preserved in the two dialects of Coptic. Of these the Akhmim text is the original of the Sahidic. These texts and their translations have been edited by Steindorff, Die Apokalypse des Elias, eine unbekannte Apokalypse und Bruchsliicke der Sophonias-Apokalypse (1899). As Schiirer (Theol. Liter alur- zeitung, 1899, No. I. 4-8) has shown, these fragments belong most probably to the Zephaniah apocalypse. They give descrip- tions of heaven and hell, and predictions of the Antichrist. In their present form these Christianized fragments are not earlier than the 3rd century. (See Schiirer,: Gesch.. des jud. Volkes 3 , iii. 271-273.)

2 Enoch, or the Slavonic Enoch, or the Book of the Secrets of Enoch. — This new fragment of theEnochic literaturewas recently brought to light through five MSS. discovered in Russia and Servia. The book in its present form was written before a.d. 70 in Greek by an orthodox Hellenistic Jew, who lived in Egypt. For a fuller account see Enoch. '

Oracles of Hystaspes. — See under N. T. Apocalypses, below.

Testament of Job. — This book was first printed from one MS. by Mai, Script. Vet. Nov. Coll. (1833), VII. i. 180, and translated into French in Migne's Diet, des Apocryphes, ii. 403. An excellent edition from two MSS. is given by M. R. James, Apocrypha Anecdota, ii. pp. lxxii.-cii., 104-137, who holds that the book in its present form was written by a Christian Jew in Egypt on the basis of a Hebrew Midrash on Job in the 2nd or 3rd cen- tury a.d. Kohler (Kohut Memorial Volume, 1897, pp. 264-338) has given good grounds for regarding the whole work, with the exception of some interpolations, as " one of the most remark- able productions of the pre-Christian era, explicable only when viewed in the light of Hasidean practice." See Jewish Encycl. vii. 200-202.

Testaments of the III. Patriarchs. — For an account of these three Testaments (referred to in the A post. Const, vi. 16), the first of which only

is preserved in the Greek and is assigned by James to the 2nd century a.d., see that scholar's " Testament of Abraham," Texts and Studies, ii. 2 (1892), which appears in two recensions from six and three MSS. respectively, and Vassiliev's Anecdota Graeco-Byzantina (1893), pp. 292-308, from, one MS. already used by James. This work was written in Egypt, according to James, and survives also in Slavonic, Rumanian,

Ethiopicj and Arabic' versions. It deals with Abraham's re- luctance to die and the means by which his death was brought about. James holds that this book is referred to by Origen (Horn, in Luc. xxxv.), but this is denied by Schiirer, who also questions its Jewish origin. With the exception of chaps. x.xi., it is really a legend and not an apocalypse. An English transla tion of James's texts will be found in the Ante-Nicene Christian Library (Clark, 1897), pp. 185-201. The Testaments of Isaac and Jacob are still preserved in Arabic and Ethiopic (see James, op. cit. 140-161). See Testaments of the III. Patriarchs.

Sibylline Oracles. — Of the books which have come down to us the main part is Jewish, and was written at various . dates, iii. 97-829, iv.-v. are decidedly of Jewish authorship, and probably xi.-xii., xiv. and parts of i.-ii. The oldest portions are in iii., and belong to the 2nd century B.C. ,

III. New Testament Apocalyptic

When we pass from Jewish literature to that of the New Testament, we enter into a new and larger atmosphere at once recalling and transcending what had been best in the prophetic periods of the past. Again the heavens had opened and the divine teaching come to mankind, no longer merely in books bearing the names of ancient patriarchs, but ■ on the lips of living men, who had taken courage to appear in person as God's messengers before His people. But though Christianity was in spirit the descendant of ancient Jewish prophecy, it was no less truly the child of that Judaism which had expressed its highest aspirations and ideals in pseudepigraphic and apocalyptic literature. Hence we shall not be surprised to find that' the two tendencies are fully represented in primitive Christianity, and, still more strange as it may appear, that New Testament apocalyptic found a more ready hearing amid the stress and storm of the 1st century than the prophetic side of Christianity, and that the type of the forerunner on the side of its declared asceticism appealed more readily to primitive Christianity than that of Him who came " eating and drinking," declaring both worlds good and both God's. ■■■■.■/

Early Christianity had thus naturally a special fondness for this class of literature. It was Christianity that preserved Jewish apocalyptic, when it was abandoned by Judaism as it sank into Rabbinism, and gave it a

Christian character either by a forcible exegesis or by a systematic process of interpolation. MdreoVe; it cultivated this form of literature and made it the vehicle of its own ideas. Though apocalyptic served its purpose in the opening centuries of the Christian era, it must be confessed that in many of its aspects its office is transitory, as they belong riot to the essence of Christian thought. When once it had taught men that the next world was God's world, though it did so at the cost of relinquishing the present to Satan, it had achieved its real task, and the time had come for it to quit the stage of history, when Christianity appeared as the heir of this true spiritual achievement. But Christianity was no less assuredly the heir of ancient prophecy, and thus as spiritual representative of what was true in prophecy and apocalyptic; its essential teaching was as that of its Founder that both worlds were of God and that both should be made God's;* ■

(i.) Canonical: —

Apocalypse in Mark xiii. (Matthew xxiv., Luke xxi.).

2 Thessalonians ii.

Revelation.

(ii.) Extra-Canonical :— Apocalypse of Peter. Testament of Hezekiah. Testament of Abraham. Oracles of Hystaspes. Vision of Isaiah. Shepherd of Hermas.

5 E2ra.

6 Ezra. Christian Sibyllines.

Apocalypses of Pa'ul, Thomas and Stephen.

Apocalypses of Esdras, Paul, John, Peter, The Virgin,

Sedrach, Daniel. Revelations of Bartholomew. Questions of Bartholomew.

t74

APOCALYPTIC LITERATURE

Apocalypse in Mark xiii. — According to the teaching of the Gospels the second advent was to take the world by surprise. Only one passage (Mark xiii. = Matt. xxiv. =Luke xxi.) conflicts with this view, and is therefore suspicious. This represents the second advent as heralded by a succession of signs which are unmistakable precursors of its appearance, such as wars, earth- quakes, famines, the destruction of Jerusalem and the like. Our

suspicion is justified by a further examina tion of Mark xiii. For the words " let him that readeth understand " (ver. 14) indicate that the prediction referred to appeared first not in a spoken ad- dress but in a written form, as was characteristic of apocalypses. Again, in ver. 30, it-is declared that this generation shall not pass away until all these things be fulfilled, whereas in 32 we have an undoubted declaration of Christ " Of that day or of that hour knoweth no one, not even the angels in heaven, neither the Son, but the Father." On these and other grounds verses 7, 8, 14-20, 24-27, 30, 31 should be removed from their present context. Taken together they constitute a Christian adaptation of an originally Jewish work, written a.d. 67-68, during the troubles preceding the fall of Jerusalem. The apocalypse consists of three Acts: Act i. consisting of verses 7, 8, enumerating the woes heralding the parusia, Act ii. describing the actual tribula- tion, and Act iii. the parusia itself. (See Wendt, Lehre Jesu, i. 12-21; Charles, Eschatology, 325 sqq.; H. S. Holtzmann, N. T. Theol. 1-325 sqq. with literature there given.)

2 Thessalonians ii. — The earliest form of Pauline eschatology is essentially Jewish. He starts from the fundamental thought of Jewish apocalyptic that the end of the world will be brought about by the direct intervention of God when evil has reached its climax. The manifestation of evil culminates in the Anti- christ whose parusia (2 Thess. ii. o) is the Satanic counterfeit of that of the true Messiah. But the climax of evil is the immediate herald of its destruction; for thereupon Christ will descend from heaven and destroy the Antichrist (ii. 8). Nowhere in his later epistles does this forecast of the future reappear. Rather under the influence of the great formative Christian conceptions he parted gradually with the eschatology he had inherited from Judaism, and entered on a progressive development, in the course of which the heterogeneous elements were for the most part silently dropped.

Revelation. — Since this book is discussed separately we shall content ourselves here with indicating a few of the conclusions now generally accepted. The apocalypse was written about a.d. 96. Its object, like other Jewish apocalypses, was to en- courage faith under persecution; its burden is not a call to repentance but a promise of deliverance. It is derived from one author, who has made free use of a variety of elements, some of which are Jewish and consort but ill with their new context. The question of the pseudonymity of the book is still an open one.

Apocalypse of Peter. — Till 1892 only some five or more frag- ments of this book were known to exist. These are preserved in Clem. Alex, and in Macarius Magnes (see Hilgenfeld, N.T. extra Can. iv. 74 sqq.; Zahn, Gesch. Kanons, ii. 818-819). It is mentioned in the Muratorian Canon, and according to Eusebius (H.E. vi. 14. 1) was commented on by Clement

of Alexandria. In the fragment found at Akhmim there is a prediction of the last things, and a vision of the abode and blessedness of the righteous, and of the abode and torments of the wicked.

Testament of Hezekiah. — This writing is fragmentary, and has been preserved merely as a constituent of the Ascension of Isaiah. To it belongs iii. i3b-iv. 18 of that book. It is found under the above name, ALaOriKT] 'Ef &dov, only in Cedrenus i. 1 20- 121, who quotes partially iv. 12. 14 and refers to iv. 15-18. For a full account see Isaiah, Ascension of.

Testament of Abraham. — This work in two recensions was first published by James, Texts and Studies, ii. 2. Its editor is of opinion that it was written by a Jewish Christian in Egypt in the 2nd century a.d., but that it embodies legends of an earlier date, and that it received its present form in the 9th or 10th century. It treats of Michaelbeing sent to announce to Abraham his death : of the tree speaking with a human voice (iii.) , Michael's

sojourn with Abraham (iv.-v.) and Sarah's recognition of him as one of the three angels, Abraham's refusal to die (vii.), and the vision of judgment (x.-xx.).

Oracles of Hystaspes. — This eschatological work (Xprjaeis 'Taraairov: so named by the anonymous 5th-century writer in Buresch, Klaros, 1889, p. 95) is mentioned in conjunction with the Sibyllines by Justin (Apol. i. 20), Clement of Alexandria (Strom, vi. 5), and Lactantius (Inst. VII. xv. 19; xviii. 2-3). According to Lactantius, it prophesied the overthrow of Rome and the advent of Zeus to help the godly and destroy the wicked, but omitted all reference to the sending of the Son of God. According to Justin, it prophesied the destruction of the world by fire. According to the Apocryph of Paul, cited by Clement, Hystaspes foretold the conflict of the Messiah with many kings and His advent. Finally, an unknown 5th-century writer (see Buresch, Klaros, 1889, pp. 87-126) says that the Oracles of Hystaspes dealt with the incarnation of the Saviour. The work referred to in the last two writers has Christian elements, which were absent from it in Lactantius's copy. The lost oracles were therefore in all probability originally Jewish, and subsequently re-edited by a Christian.

Vision of Isaiah. — This writing has been preserved in its entirety in the Ascension of Isaiah, of which it constitutes chaps, vi.-xi. Before its incorporation in the latter work it circulated independently in Greek. There are independent versions of these chapters in Latin and Slavonic. (See Isaiah, Ascension of.)

Shepherd of Hermas. — In the latter half of the 2nd century this book

enjoyed a respect bordering on that paid to the writings of the New Testament. Irenaeus, Clement of Alexandria and Origen quote it as Scripture, though in Africa it was not held in such high consideration, as Tertullian speaks slightingly of it. The writer belongs really to the prophetic and not to the apocalyptic school. His book is divided into three parts containing visions, commands, similitudes. In incidental allusions he lets us know that he had been engaged in trade, that his wife was a termagant, and that his children were ill brought up. Various views have been held as to the identity of the author. Thus some have made him but to be the Hermas to whom salutation is sent at the end of the Epistle to the Romans, others that he was the brother of Pius, bishop of Rome in the middle of the 2nd century, and others that he was a contemporary of Clement, bishop of Rome at the close of the 1st century. Zahn fixes the date at 97, Salmon a few years later, Lipsius 142. The literature of this book (see Hermas, Shepherd of) is very extensive. Among the chief editions are those of Zahn, Der Hirt des Hermas (1868) ; Gebhardt and Harnack, Patres Apostolici (1877, with full biblio- graphical material); Funk, Patres Apost. (1878). Further see Harnack, Gesch. d. altchristl. Literatur, i. 49-58; II. i. 257-267,

437 i-

5 Ezra. — This book, which constitutes in the later MSS. the first two chapters to 4 Ezra, falls obviously into two parts. The first (i. 5— ii. 9) contains a strong attack on the Jews whom it regards as the people of God; the second (ii. 10-47) addresses itself to the Christians as God's people and promises them the heavenly kingdom. It is not improbable that these chapters are based on an earlier Jewish writing. In its present form it may have been written before a.d. 200, though James and other scholars assign it to the 3rd century. Its tone is strongly anti- Jewish. The style is very vigorous and the materials of a strongly apocalyptic character. See Hilgenfeld, Messias Judaeorum (1869); James in Bensly's edition of 4 Ezra, pp. xxxviii.-lxxx. ; Weinel in Hennecke's N.T. Apokryphen, 331-336.

6 Ezra.~ This work consists of chapters xv.-xvi. of 4 Ezra. It may have been written as an appendix to 4 Ezra, as it has no proper introduction. Its contents relate to the destruction of the world through war and natural catastrophes — for the heathen a source of menace and fear, but for the persecuted people of God one of admonition and comfort. There is nothing specifically Christian in the book, which represents a persecution which extends over the whole eastern part of the Empire. Moreover, the idiom is particularly Semitic. Thus we have xv. 8 nee

*sustinebo in his quae inique exercent, that is a *v:: in qvindicans vindicabo: in 22 non parcel dextera mea super peccatores = ti*

Christian Sibyllines. — Critics are still at variance as to the extent of the Christian Sibyllines. It is practically agreed that vi.-viii. are of Christian origin. As for i.-ii., xi.-xiv. most writers are in favour of Christian authorship; but not so Geffcken (ed. Sibyll., 1902), who strongly insists on the Jewish origin of large sections of these books.

Apocalypses of Paul, Thomas and Stephen. — These are men- tioned in the Gelasian decree. The first may possibly be the 'Avafiariicbv Havkov mentioned by Epiphanius (Haer. xxxviii. 2) as current among the Cainites. It is not to be confounded with the apocalypse mentioned two sections later.

Apocalypse of Esdras. — This Greek production resembles the more ancient fourth book of Esdras in some respects. The prophet is perplexed about the mysteries of life, and questions God respecting them. The punishment of the wicked especially occupies his thoughts. Since they have sinned in consequence of Adam's fall, their fate is considered worse than that of the irrational creation. The description of the tortures suffered in the infernal regions is tolerably minute. At last the prophet consents to give up his spirit to God, who has prepared for him a crown of immortality. The book is a poor imitation of the ancient Jewish one. It may belong, however, to the 2nd or 3rd centuries of the Christian era. See Tischendorf, Apocalypses Apocryphae, pp. 24-33.

Apocalypse of Paul. — This work (referred to by Augustine, Tractat. in Joan. 98) contains a description of the things which the apostle saw in heaven and hell. The text, as first published in the original Greek by Tischendorf {Apocalypses Apocr. 34-69), consists of fifty -one chapters, but is imperfect. Internal evidence assigns it to the time of Theodosius, i.e. about a.d. 388. Where the author lived is uncertain. Dr Perkins found a Syriac MS. of this apocalypse, which he translated into English, and printed in the Journal of the American Oriental Society, 1864, vol. viii. This was republished by Tischendorf below the Greek version in the above work. In 1893 the Latin version from one MS. was edited by M. R. James, Texts and Studies, ii. 1-42, who shows that the Latin version is the completest of the three, and that the Greek in its present form is abbreviated.

Apocalypse of John (Tischendorf, Apocalypses Apocr. 70 sqq.) contains a description of the future state, the general resurrection and judgment, with

an account of the punishment of the wicked, as well as the bliss of the righteous. It appears to be the work of a Jewish Christian. The date is late, for the writer speaks of the " venerable and holy images," as well as " the glorious and precious crosses and the sacred things of the churches " (xiv.), which points to the 5 th century, when such things were first introduced into churches. It is a feeble imitation of the canonical apocalypse.

Arabic Apocalypse of Peter contains a narrative of events from the foundation of the world till the second advent of Christ. The book is said to have been written by Clement, Peter's disciple. This Arabic work has not been printed, but a summary of the contents is given by Nicoll in his catalogue of the Oriental MSS. belonging to the Bodleian (p. 49, xlviii.). There are eighty-eight chapters. It is a late production; for Ishmaelites are spoken of, the Crusades, and the taking of Jerusalem. See Tischendorf, Apocalypses Apocr. pp. xx.-xxiv.

The Apocalypse of the Virgin, containing her descent into hell, is not published entire, but only several portions of it from Greek MSS. in different libraries, by Tischendorf in his Apocalypses Apocryphae, pp. 95 sqq.; James, Texts and Studies, ii. 3. 109-126.

Apocalypse of Sedrach. — This late apocalypse, which M. R. James assigns to the 10th or nth century, deals with the subject

of intercession for sinners and Sedrach's unwillingness to die. See James, Texts and Studies,ii. 3. 127-137.

Apocalypse of Daniel. ■ — See Vassiliev's Anecdota Graeco- Byzantina (Moscow, 1893), pp. 38-44; Uncanonical Books of the Old Testament (Venice, 1901), pp. 237 sqq., 387 sqq.

The Revelations of Bartholomew.— Dulaurier published from a Parisian Sahidic MS., subjoining a French translation, what is termed a fragment of the apocryphal revelations of St Bartholo- mew {Fragment des revelations apocryphes de Saint BarthMemy, 6"c., Paris, 1835), and of thehistory of the religious communities founded by St Pachomius. After narrating the pardon obtained by Adam, it is said that the Son ascending from Olivet prays the Father on behalf of His apostles; who consequently receive consecration from the Father, together with the Son and Holy Spirit — Peter being made archbishop of the universe. The late date of the production is obvious.

Questions of St Bartholomew.—— See Vassiliev, Anec. Graeco- Byzantina (1893), pp. 10-22. The introduction, which is wanting in the Greek MS., has been supplied by a Latin translation from the Slavonic version (see pp.

vii.ix.). The book contains dis closures by Christ, the Virgin and Beliar and much of the subject- matter is ancient. (R. H. C.)

APOCATASTASIS, a Greek word, meaning " re-establish- ment," used as a technical scientific term for a return to a previous position or condition.

APOCRYPHAL LITERATURE. The history of the earlier usage of the term "Apocrypha" (from awoKpinrreiv, to hide) is not free from obscurity. We shall therefore enter at once on a short account of the origin of this literature in Judaism, of its adoption by early Christianity, of the various meanings which the term " apocryphal " assumed in the course of its history, and having so done we shall proceed to classify and deal with the books that belong to this literature. The word most generally denotes writings which claimed to be, or were by certain sects regarded as, sacred scriptures although excluded from the canonical, scriptures.

Apocrypha in Judaism. — Certain circles in Judaism, as the Essenes in Palestine (Josephus, B.J. ii. 8. 7) and the Therapeutae (Philo, De Vita Contempt, ii. 475, ed. Mangey) in Egypt possessed a secret literature. But such literature was not confined to the members of these communities, but had been current among the Chasids and their successors the Pharisees. 1 To this literature belong essentially the apocalypses which were published in fast succession from Daniel onwards. These works bore, perforce, the names of ancient Hebrew worthies in order to procure them a hearing among the writers' real contemporaries. To reconcile their late appearance with their claims to primitive antiquity the alleged author is represented as " shutting up and sealing " (Dan. xii. 4, 9) the book, until the time of its fulfilment had arrived; for that it was not designed for his own generation but for far-distant ages (1 Enochi. 2, cviii. 1.; Ass. Mos. i. 16, 17). It is not improbable that with many Jewish enthusiasts this literature was more highly treasured than the canonical scrip- tures. Indeed, we have a categorical statement to this effect in 4 Ezra xiv. 44 sqq., which tells how Ezra was inspired to dictate the sacred scriptures which had been destroyed in the overthrow of Jerusalem: " In forty days they wrote ninety-four books: and it came to pass when the forty days were fulfilled that the Highest spake, saying : the first that thou hast written publish openly that the worthy and unworthy may read it; but keep the seventy last that thou mayst deliver them only to such as be wise among the people; for in them is the spring of understand- ing, the: fountain: of wisdom and the stream of knowledge." Such esoteric books are apocryphal in the original conception of the term. In due course the Jewish authorities were forced to draw up a canon or book of sacred scriptures, and mark them off from those which claimed to be such without justification.

1 Judaism was long accustomed to lay claim to an esoteric tradition. Thus

though it insisted on the exclusive canonicity of the 24 books, it claimed the possession of an oral law handed down from Ivloses, and just as the apocryphal books overshadowed in certain instances the Canonical scriptures, so often the oral law displaced the written in the regard of Judaism.

The true scriptures, according to the Jewish canon (Yad. iii. 5;. Toseph. Yad. ii. 3), were those which defiled the hands of such as touched them. But other scholars, such as Zahn, Schurer, Porter, state that the secret books with which we have been dealing formed a class by themselves and were called " Genuizim " (o't:j), and that this name and idea passed from Judaism over into the Greek, and that airoupvˆa. j9t(8X(a is a translation of emu d'tbd. But the Hebrew verb does not mean "to hide " but " to store away," and is only used, of things in them- selves precious. Moreover, the phrase is unknown in Talmudic literature. The derivation of this idea from Judaism has there- fore not yet been established. Whether the Jews had any distinct name for these esoteric works we do not know. For writings that stood wholly without the pale of sacred books such as the books of heretics or Samaritans they used the designation Hisonim, Sanh. x. 1 (s'jixn d'ibd and o>j»n ibb). To this class in later times even Sirach was relegated, and indeed all books not in- cluded in the canon (Midr. r. Num. 14 and on Xoheleth xii. 12; cf. Jer. Sabb. 16). l In Aqiba's time Sirach and other apocryphal books were not reckoned among the Hisonim; for Sirach was largely quoted by rabbis in Palestine tiH the 3rd century a.d.

*Apocrypha in Christianity. — Christianity as it springs from its Founder had no secret or esoteric teaching. . It%as essentially the revelation or manifestation of the truth of- God. But as Christianity took its origin from Judaism, it is not unnatural that a large body of Jewish ideas wasincorpbratfedSfi thesystem of Christian thought. The bulk of these in due course underwent transformation either complete or partial, but there was always a residuum of incongruous and inconsistent elements existingiside by side with the essential truths of Christianity. This * was no isolated phenomenon; for in every progressive period of the history of religion we have on the one side the doctrine of God advancing in depth and fulness: on the other we have cosmo- logical, eschatological and other survivals, which, ' however justifiable in earlier stages, are in unmistakable antagonism with the theistic beliefs of the time. The eschatology of a nationrr-and the most influential portion of Jewish and Christian apocrypha are eschatological — -is always the last part of their' religion to experience the transforming power of new ideas and new facts. ■*

Now the current religious literature of Judaism outside the canon was composed of apocryphal books, the bulk of which bore an apocalyptic character, and dealt with the coming 'of the Messianic kingdom. These naturally became the popular religious books of the rising Jewish-Christian communities; and were held by them in still higher esteem, if possible, than by the Jews. Occasionally these Jewish writings were re-edited or adapted to their new readers by Christian additions, but oh the whole it was found sufficient to submit them to a system of reinterpretation in order to make them testify to the truth of Christianity and foreshadow its ultimate destinies. Christianity, moreover, moved by the same apocalyptic tendency as Judaism, gave birth to new Christian apocryphs, though, in the case of most of them, the subject matter was to a large extent traditional and derived from Jewish sources.

Another prolific source of apocryphal gospels, acts and apocalypses was Gnosticism. While the characteristic features of apocalyptic literature were derived from Judaism, those of Gnosticism sprang partly from Greek philosophy, partly from oriental religions. They insisted on an allegorical interpretation of the apostolic writings : they alleged themselves to be the guardians of a secret apostolic tradition and laid claim to pro- phetic inspiration. With them, as with the bulk of < the Christians of the 1st and 2nd centuries, apocryphal books as such were highly esteemed. They were so designated by those who valued them. It was not till later times that the term became One of reproach.

We have remarked above that the Jewish apocrypha-^-especi-

ally the apocalyptic section and the host of Christian apocryphs — .

became the ordinary religious literature of the early Christians.

And this is not strange seeing that of the former such abundant

1 See Porter in Hastings' Bible Diet. i. 113.

use was made by the writers of the New Testament. 2 Thus. Jude quotes, the Book of Enoch by name, while undoubted use .of this book appears in the four gospels and 1 Peter. The influence of the Testaments of the Twelve Patriarchs is still more apparent in the Pauline : Epistles and the Gospels, and the same holds true of Jubilees and the Assumption of Moses, though in a very slight degree. The genuineness and inspiration of Enoch were believed in by the writer of the Ep. of Barnabas, Irenaeus, Tertullian and Clement of Alexandria. But the high position which apocryphal books occupied in the first two centuries was undermined by a variety of influences. All claims to the posses- sion of a secret tradition were denied

(Irenaeus ii. 27. 2, iii. 2. 1, 3. 1; Tertullian, Praescript. 22-27): true inspiration was limited to the apostolic age, and universal acceptance by the church was required as a proof of apostolic authorship. Under the action of such principles apocryphal books tended to pass into the class of spurious and heretical writings. ■

The Term "Apocryphal." — Turning now to the consideration of the word " apocryphal " itself, we find that in its earliest use it was applied in a laudatory sense to writings,; (1) which were kept secret because they were the vehicles of esoteric knowledge which was too profound or too sacred to be imparted to any save the initiated. Thus it occurs in a magical book of Moses, which hasheen edited from a Leiden papyrus of the 3rd or 4th century by Dieterich {Abraxas, 109). This book, which may be as old as the 1st century, is entitled: " A holy and secret Book of Moses, called eighth, or holy " (Mtowreow Upa /3i/3Xos air6Kpvos tirikuXovfiiwi frySorifj ayia). The disciples of the Gnostic Prodicus boasted (Clem. Alex. Strom, i. 15. 69) that they possessed the secret (aTOKpvQovs) books of Zoroaster. 4 Ezra is in its author's view; a secret work whose value was greater than that of the canonical scriptures (xiv. 44 sqq.) because of its transcendent revelations of the future. It is in a like laudatory meaning that Gregory reckons the New Testament apocalypse as h> airoicpbois (Or'atiovn suam ordinationem, iii. 549, ed. Migne; cf. Epiphanius, Haer. Ii. 3). The word enjoyed high consideration among the Gnostics (cf. Acts of Thomas, 10, 27, 44). (2) But the word was applied to writings ttot were kept from public circulation not because of their transcendent, but of, their secondary or question- able value. Thus Origen distinguishes between writings which were- read by the churches and apocryphal writings; ypatbjj pj) toIs Koivdis Kal SeBrmoativfiivois /3t/3Xtots uk6s 6′ on hi a.iroicpv(f>ois' (hepo/thy (Origen's Comm. in Malt., x. 18, on Matt. xiii. 57, ed. Lommatzsch iii. 49 sqq.). Cf. Epist. ad Africam, ix. (Lommatzsch xvii. 31): Euseb. H.E. ii. 23, 255 iii. 3, 6. See Zahn, Gesch. Kdnons, i. 126 sqq. Thus the meaning of airoicpvcbosis here practically equivalent to "excluded from the public use of the church," and prepares the way for the third and unfavourable sense of this word. (3) The word came finally to mean what is false, spurious, bad, heretical. If we may trust the text, this meaning appears in Origen (Prolog, in Cant. Cantic, Lommatzsch xiv. 325): " De scripturis his, quae appellantur apocryphae, pro eo quod multa in iis corrupta et contra fideiri veram inveniuntur a majoribus tradita non placuit iis dari locum nee admitti ad auctoritatem."

In addition to the above three meanings strange uses of the term appear in the western church. Thus the Gelasian Decree includes the works of Eusebius, Tertullian and Clement of Alexandria, under this designation. Augustine (De Civ. Dei, xv. 23) explains it as meaning obscurity of origin, while Jerome (Prdogus Galeatus) declares that all books outside the

Hebrew canoribelong to this class of apocrypha. Jerome's practice, however, did not square with his theory. The western church did not accept Jerome ? s definition of apocrypha, but retained the word in its original meaning, though great confusion prevailed. Thus the degree of estimation in which the apocryphal books have been held in the church has varied much according to place and time. As they stood in the Septuagint or Greek canon, along

- *The New Testament shows undoubtedly an acquaintance with several of the apocryphal books. Thus James i. 19 shows dependence oh Sirach v. 11, Hebrews i. 3 oil Wisdom vii. 26, Romans ix. 21 on Wisdom xv. 7, 2 Cor. V. I, 4 on Wisdom ix. 15, &c.*

with the other books, and with no marks of distinction, they were practically employed by the Greek Fathers in the same way as the other books; hence Origen, Clement and others often cite them as "scripture," "divine scripture," "inspired," and the like. On the other hand, teachers connected with Palestine, and familiar with the Hebrew canon, rigidly exclude all but the books contained there. This view is reflected, for example, in the canon of Melito of Sardis, and in the prefaces and letters of Jerome. Augustine, however (De Doct. Christ, ii. 8), attaches himself to the other side. Two well-defined views in this way prevailed, to which was added a third, according to which the books, though not to be put in the same rank as the canonical scriptures of the Hebrew collection, yet were of value for moral uses and to be read in congregations, — and hence they were called "ecclesiastical" — a designation first found in Rufinus (ob. 410). Notwithstanding the decisions of some councils held in Africa, which were in favour of the view of Augustine, these diverse opinions regarding the apocryphal books continued to prevail in the church down through the ages till the great dog- matic era of the Reformation. At that epoch the same three opinions were taken up and congealed into dogmas, which may be considered characteristic of the churches adopting them. In 1546 the council of Trent adopted the canon of Augustine, declaring " He is also to be anathema who does not receive these entire books, with all their parts, as they have been accustomed to be read in the Catholic Church, and are found in the ancient editions of the Latin Vulgate, as sacred and canonical." The whole of the books in question, with the exception of 1st and 2nd Esdras, and the Prayer of Manasses, were declared canonical at Trent. On the other hand, the Protestants universally adhered to the opinion that only the books in the Hebrew collection are canonical. Already Wycliffe had declared that " whatever book is in the Old

Testament besides these twenty- five (Hebrew) shall be set among the apocrypha, that is, without authority or belief." Yet among the churches of the Reforma- tion a milder and a severer view prevailed regarding the apocry- pha. Both in the German and English translations (Luther's, 1537; Coverdale's, 1535, &c.) these books are separated from the others and set by themselves; but while in some confessions, e.g. the Westminster, a decided judgment is passed On them, that they are not " to be any otherwise approved or made use of than other human writings," a milder verdict is expressed regarding them in many other quarters, e.g. in the " argument " prefixed to them in the Geneva Bible; in the Sixth Article of the Church of England, where it is said that " the other books the church doth read for example of life and instruction of manners," though not to establish doctrine; and elsewhere.

Old Testament Apocryphal Books We shall now proceed to enumerate the apocryphal books: first the Apocrypha Proper, and next the rest of the Old and New Testament apocryphal literature.

1. The Apocrypha Proper, or the apocrypha of the Old Testament as used by English-speaking Protestants, consists of the following books: 1 Esdras, 2 Esdras, Tobit, Judith, Additions to Esther, Wisdom of Solomon, Ecclesiasticus, Baruch, Epistle of Jeremy, Additions to Daniel (Song of the Three Holy Children, History of Susannah, and Bel and the Dragon), Prayer of Manasses, 1 Maccabees, 2 Maccabees. Thus the Apocrypha Proper constitutes the surplusage of the Vulgate or Bible of the Roman Church over the Hebrew Old Testament. Since this surplusage is in turn derived from the Septuagint, from which the old Latin version was translated, it thus follows that the difference between the Protestant and the Roman Catholic Old Testament is, roughly speaking, traceable to, the, difference between the Palestinian and the Alexandrian canons of the Old Testament. But this is only true with certain reservations; for the Latin Vulgate was revised by Jerome according to the Hebrew, and, where Hebrew originals were wanting, according to the Septuagint. Furthermore, the Vulgate rejects 3 and 4 Maccabees and Psalm cli., which generally appear in the Septua- gint, while the Septuagint and Luther's Bible reject 4 Ezra,

which is found in the Vulgate and the Apocrypha. Proper. Luther's Bible, moreover, rejects also 3 Ezra. It should further be observed that the Vulgate adds the Prayer of Manasses and 3 and 4 Ezra after the New Testament as apocryphal.

It is hardly possible to form any classification which is not open to some objection. In any case the classification must be to some extent provisional, since scholars are still divided as to the original language, date and place of

composition of some of the books which must come under our classification. 1 We may, however, discriminate (i.) the Palestinian and (ii.) the Hellenistic literature of the Old Testament, though even this distinction is open to serious objections. The former literature was generally written in Hebrew or Aramaic, and seldom in Greek; the latter naturally in Greek. Next, within these literatures we shall distinguish three or four classes according to the nature of the subject with which they deal. Thus the books of which we have to treat will be classed as: (a) Historical, (J) Legendary (Haggadic), (c) Apocalyptic, (d) Didactic or Sapiential. The Apocrypha Proper then would be classified as follows: — i. Palestinian Jewish Literature : : —

(a) Historical. (c) Apocalyptic.

1 (i.e. 3) Ezra. 2 (i.e. 4) Ezra (see also

1 Maccabees. under separate article

on Apocalyptic Lit-

erature. (d) Didactic,

Sirach (see Ecclesias-

TICUS).

Tobit.

(b) Legendary.

Book of Baruch (see

Baruch). Judith.

ii. Hellenistic Jewish Literature: —

Historical and Legendary. Didactic.

Additions to Daniel (q.v.). Book of Wisdom (see Wis-

,, ‘ ,, Esther (q.v.). dom, Book of.)

Epistle of Jeremy (q.v.). 2 Maccabees (q.v.). Prayer of Manasses (see Manasses).

Since, all these books are dealt with in separate articles, they call for: no further notice here.

Literature. — Texts : — Holmes and Parsons, Vet. Test. Graecum cumvar. lectionibtis (Oxford, 1798-1827); Swete, Old Testament in Greek, i.-iii. (Cambridge, 1887-1894); Fritzsche, Libri Apocryphi V. T. Graece (1871). Commentaries: — O. F. Fritzsche and Grimm, Kurzgef: exegtt. Handbuch zu den Apok. des A.T. (Leipzig, 1851- 1.860) I'E.C. Bissellj Apocrypha of the Old Testament (Edinburgh, 1880),; Zockler, Apok. des A.T, ■ (Miinchen, 1891); Wace, , The Apocrypha, (" Speaker's Commentary") (1888). Introduction and General Literature: — E. Schiirer 3 , Geschichte des jiid. Volkes, vol. iii. l 35 sqq., and his article on " Apokryphen " in Herzog's RealencyUl i. 622ˆ653; Porter in Hastings' Bible Die. i. m-123.

2(a). Other Old Testament Apocryphal Literature: —

(a) Historical. (c) Apocalyptic. History of Johannes Hyr- (See separate article.)

, canus.

(b) Legendary. (d) Didactic or Sapiential Book of Jubilees. Pirke Aboth. Paralipomena Jeremiae, or*

the Rest of the Words

of Baruch. Martyrdom of Isaiah. Pseudo-Philo's Liber

Antiquitatutn. \ ■

Books of Adam.

Jannes and Jambres. oseph and Asenath.

, (a) Historical. — The History of Johannes , Hyrcanus is meni- tioned in 1 Mace. xvi. 23-24, but no trace has been discovered of its existence elsewhere. It must have early passed out of circulation, as it was unknown to Josephus. ,

. {b) Legendary. — The Book of Jubilees was written in Hebrew by a Pharisee between the year of the accession of Hyrcanus to the high-priesthood in 135 and his breach with the Pharisees some;years before his death in 105 B.C. Jubilees was translated into Greek and from Greek into Ethiopk and Latin. It is 1 Thus some of the additions to Daniel and the Prayer of Manasses are most probably derived from a Semitic original written in Pales- tine, yet in compliance with the prevailing opinion they are classed under Hellenistic Jewish literature. Again, the Slavonic Enoch goes back undoubtedly in parts to a Semitic original, though most of it was written by a Greek Jew in Egypt.

preserved in its entirety only in Ethiopic. Jubilees is the most advanced pre-Christian representative of the midrashic. tend- ency, which was already at work in the Old Testament i and 2 Chronicles. As the chronicler rewrote the history of Israel and Judah from the basis of the Priests' Code, so our author re-edited from the Pharisaic standpoint of his time the book of Genesis and the early chapters of Exodus. Etys work constitutes an enlarged targum on these books, and its object is to prove the everlasting validity of the law, which, though revealed in time, was superior to time. Writing in the palmiest days of the Maccabean dominion, he looked for the immediate advent of the Messianic kingdom. This kingdom was to be ruled over by a Messiah sprung not from Judah but from Levi, that is, from the reigning Maccabean family. This kingdom was to be gradually realized on earth, the transformation of physical nature going hand in hand with the ethical transformation of man. (For a fuller account see Jubilees, Book of.)

Paralipomena Jeremiae, or the Rest of the Words of Baruch.- — • This book has been preserved in Greek, Ethiopic, Armenian and Slavonic. The Greek was first printed at Venice in 1609, and next by Ceriani in 1868 under the title Paralipomena Jeremiae. It bears the same name in the Armenian, but in Ethiopic it is known by the second title. (See under Baruch.)

Martyrdom of Isaiah. — This Jewish work has been in part preserved in the Ascension of Isaiah. To it belong i. 1, 2 , 6 i '-i3 a ; ii. 1-8, 10-iii. 12; v. i c -i4 of that book. It is of Jewish origin, and recounts the martyrdom of Isaiah at the hands of Manasseh. (See Isaiah, Ascension of.)

Pseudo-Philo's Liber Antiquitatum Biblicarum. — Though the Latin version of this book was thrice printed in the 16th century (in 1527, 1550 and 1500)1 it was practically unknown to modern scholars till it was recognized by Conybeare and discussed by Cohn in the Jewish Quarterly Review, 1898, pp. 279-332. It is an Haggadic revision of the Biblical history from Adam to the death of Saul. Its chronology agrees frequently with the LXX. against that of the Massoretic text, though conversely in a few cases. The Latin is undoubtedly translated from the Greek. Greek words are frequently transliterated. While the LXX. is occasionally followed in its translation of Biblical passages, in others the Massoretic is followed against the LXX., and in one or two passages the text presupposes a text different from both. On many grounds Cohn infers a Hebrew

original. The escha- tology is similar to that taught in the similitudes of the Book of Enoch. In fact, Eth. En. Ii. 1 is reproduced in this connexion. Prayers of the departed are said to be valueless. The book was written after a.d. 70; for, as Cohn has shown, the exact date of the fall of Herod's temple is predicted.

Life of Adam and Eve. — Writings dealing with this subject are extant in Greek, Latin, Slavonic, Syriac, Armenian and Arabic. They go back undoubtedly to a Jewish basis, but in some of the forms in which they appear at present they are christianized throughout. The- oldest and for the most part Jewish portion of this literature is preserved to us in Greek, Armenian, Latin and Slavonic, (i.) The Greek kayy-qais irepl 'ASdji /cat Euas (published under the misleading title 'A7roKdXui/

The Book of Adam and Eve, also called the Conflict of Adam and Eve with Satan, translated from the Ethiopic (1882) by Malan. This was first translated by Dillmann (Das christl. Adambuch des Morgenlandes, 1853), and the Ethiopic book first edited by Trump {Abh. d. Miinch. Akad. xv., 1870-1881). (v.) A Syriac work entitled Die Schalzhohle translated by Bezold from three Syriac MSS. in 1883 and subsequently edited in Syriac in 1888. This work has close affinities to (iv.), but is said by Dillmann to be more original, (vi.) Armenian books on the Death of Adam (Uncanonical Writings of O.T. pp. 84 sqq., 1901, translated from the Armenian), Creation and Transgression of Adam (op. cit. 39 sqq.), Expulsion of Adam from Paradise (op. cit. 47 sqq.), Penitence of Adam and Eve (op. cit. 71 sqq.) are mainly later writings from Christian hands.

Returning to the question of the Jewish origin of i., ii., iii., we have already observed that these spring from a common original. As to the language of this original, scholars are divided. The evidence, however, seems to be strongly in favour of Hebrew. How otherwise are we to explain such Hebraisms (or Syriacisms) as iv$ pkei to iXaiov 4£ ovtoO (§ 9), ov tltav . . . n't] (bayetv air' awov (§ 21). For others see §§ 23, 35. Moreover, as Fuchs has pointed out, in the words tcrfl ec /zaraiois addressed to Eve (§ 25) there is a corruption of D'^an into o'^an. Thus the words were: " Thou shalt have pangs." In fact, Hebraisms abound throughout this book. (See Fuchs, Apok. u. Pseud, d. A.T. ii. 511; Jewish Encyc. i. 179 sq.)

Jannes and Jambres. — These two men are referred to in 2 Tim. iii. 8 as the Egyptian magicians who withstood Moses. The book which treats of them is mentioned by Origen (ad Matt, xxiii. 37 and xxvii. 9 [Jannes et Mambres Liber]), and in the Gelasian Decree as the Paenitentia Jamnis et Mambre. The names in Greek are generally 'lavvrjs naX 'Ia/ij3pi?s (= Dn20'i b

Joseph and Asenath. — The statement in Gen. xli. 45, 50 that Joseph married the daughter of a heathen priest naturally gave offence to later Judaism, and gave rise to the fiction that Asenath was really the daughter of Shechem and Dinah, and only the foster-daughter of Potipherah (Targ.Jon. on Gen. xli. 45; Tractat. Sopherim, xxi. 9; Jalkut Shimoni, c. 134. See Oppen heim, Fabula Josephi et Asenethae, 1886, pp. 2-4). Origen also was acquainted with some form of the legend (Selecta in Genesin, ad Gen. xli. 45, ed. Lommatzsch, viii, 89-90). The Christian legend, which is no doubt in the main based on the Jewish, is found in Greek, Syriac, Armenian, Slavonic and Medieval Latin. Since it is not earlier than the 3rd or 4th century, it will be sufficient here to refer to Smith's Diet, of Christ. Biog. i. 176-177; Hastings' Bible Diet. i. 162-163; Schurer, iii. 289-291.

(d) Didactic or Sapiential. — The Pirke A both, a collection of sayings of the Jewish Fathers, are preserved in the 9th Tractate of the Fourth Order of the Mishnah. They are attributed to some sixty Jewish teachers, belonging for the most part to the years a.d. 70-170, though a few of them are of a much earlier date. The book holds the same place in rabbinical literature as the Book of Proverbs in the Bible. The sayings are often admirable. Thus in iv. 1-4, "Who is wise? He that learns from every man. . . . Who is mighty? He that subdues his nature, ... Who is rich? He that is contented with his lot. . . . Who is honoured? He that honours mankind." (See further Pirke Aboth.)

2 (b). New Testament Apocryphal Literature:—

(a) Gospels: —

Uncanonical sayings of the Lord in Christian and Jewish

writings. Gospel according to the Egyptians.

,, ,, ,, Hebrews.

Protevangel of James.

Gospel of Nicodemus. „ Peter. ,, „ Thomas. ,, ,, the Twelve.

Gnostic gospels of Andrew, Apelles, Barnabas, Bartholo- mew, Basilides, Cerinthus and some seventeen others.

(b) Acts and Teachings of the Apostles: —

Acts of Andrew and later forms of these Acts.

,, John.

„ Paul. Peter. Preaching of Peter. Acts of Thomas.

Teaching of the Twelve Apostles. Apostolic constitutions.

(c) Epistles: —

The Abgar Epistles. Epistle of Barnabas.

., ,, Clement. " Clement's " 2nd Epistle of the Corinthians.

„ Epistles on Virginity.

,, ,, to James.

Epistles of Ignatius. Epistle of Polycarp.

Pauline Epp. to the Laodiceans and Alexandrians. 3 Pauline Ep. to the Corinthians.

(d) Apocalypses : see under Apocalyptic Literature.

(a) Gospels. — Uncanonical Sayings of the Lord in Christian and Jewish Sources. — Under the head of canonical sayings not found in the Gospels only one is found, i.e. that in Acts xx. 35. Of the rest the uncanonical sayings have been collected by Preuschen (Reste der ausserkanonischen Evangelien, 1001, pp. 44-47). A different collection will be found in Hennecke, NTliche Apok. 9-1 1. The same subject is dealt with in the elaborate volumes of Resch (Aussercanonische Paralleltexte zu den Evangelien, vols, i.-iii., 1893-1895).

To this section belongs also the Fayum Gospel Fragment and the Logia published by Grenfell and Hunt. 1 The former contains two sayings of Christ and one of Peter, such as we find in the canonical gospels, Matt. xxvi. 31-34, Markxiv. 27-30. Thepapy- rus, which is of the 3rd century, was discovered by Bickell among the Rainer collection, who characterized it (Z. f. kath. Theol., 1885, pp. 498-504) as a fragment of one of the primitive gospels mentioned in Luke i. 1. On the other hand, it has been contended that it is merely a fragment of an early patristic homily. (See Zahn, Gesch. Kanons, ii. 780-790; Harnack, Texte und Unter- suchungen, v. 4; Preuschen, op. cit. p. 19.) The Logia (q.v.) is the name given to the sayings contained in a papyrus leaf, by its discoverers Grenfell and Hunt. They think the papyrus was probably written about a.d. 200. According to

Harnack, it is an extract from the Gospel of the Egyptians. All the passages referring to Jesus in the Talmud are given by Laible, Jesus Christus im Talmud, with an appendix, " Die talmudischeri Texte," by G. Dalman (2nd ed. 1901). The first edition of this work was translated into English by A. W. Streane (Jesus Christ in the Talmud, 1893). In Hennecke's NTliche Apok. Handbuch (pp.47-71) there is a valuable study of this question by A. Meyer, entitled Jesus, Jesu Jiinger und das Evangelium im Talmud und verwandten jiidischen Schriflen, to which also a good bibliography of the subject is prefixed.

Gospel according to the Egyptians. — This gospel is first men- tioned by Clem. Alex. (Strom, iii. 6. 45; 9. 63, 66; 13. 92), subsequently by Origen (Horn, in Luc. i.) and Epiphanius (Haer. Ixii. 2), and a fragment is preserved in the so-called 2 Clem. Rom. xii. 2. It circulated among various heretical circles; amongst the Encratites (Clem. Strom, iii. 9), the Naas- senes (Hippolyt. Philos. v. 7), and the Sabellians (Epiph. Haer. Ixii. 2). Only three or four fragments survive; see Lipsius (Smith and Wace, Diet, of Christ. Biog. ii. 712, 713); Zahn, Gesch. Kanons, ii. 628-642; Preuschen, Reste d. ausserkanon- ischen Evangelien, 1901, p. 2, which show that it was a product of pantheistic Gnosticism. With this pantheistic Gnosticism is associated a severe asceticism. The distinctions of sex are

1 These editors have discovered (1907) a gospel fragment of the 2nd century which represents a dialogue between our Lord and a chief priest — a Pharisee.

one day to come to an end; the prohibition of marriage follows naturally on this view. Hence Christ is represented as coming to destroy the work of the female (Clem. Alex. Strom, iii. 9. 63). Lipsius and Zahn assign it to the middle of the 2nd century. It may be earlier.

Protevangel of James. — This title was first given in the 16th century to a writing which is referred to as The Book of James (fi ˆtjSXos 'laKoifiov) by Origen (torn. xi. in Matt.). Its author designates it as 'Ioropta. For various other designations see Tischendorf, Evang. Apocr? 1 seq. The narrative extends from the Conception of the Virgin to the Death of Zacharias. Lipsius shows that in the present form of the book there is side by side a strange " admixture of intimate knowledge and gross ignorance of Jewish thought and custom," and that accordingly we must " distinguish between an original Jewish Christian writing and a Gnostic recast of it." The former was known to Justin(Z>ia/. 78, 101) and Clem. Alex. (Strom, vii. 16), and belongs at latest to the earliest years of the 2nd century. The Gnostic recast Lipsius dates about the middle of the 3rd century. From these two works arose independently the Protevangel in its present form and the Latin pseudo-Matthaeus (Evangelium pseudo- Mallhaei). The Evangelium de

Nativitate Mariae is a redaction of the latter. (See Lipsius in Smith's Diet, of Christ. Biog. ii. 701-703.) But if we except the Zachariah and John group of legends, it is not necessary to assume the Gnostic recast of this work in the 3rd century as is done by Lipsius. The author had at his disposal two distinct groups of legends about Mary. One of these groups is certainly of non-Jewish origin, as it conceives Mary as living in the temple somewhat after the manner of a vestal virgin or a priestess of Isis. The other group is more in accord with the orthodox gospels. The book appears to have been written in Egypt, and in the early years of the 2nd century. For, since Origen states that many appealed to it in support of the view that the brothers of Jesus were sons of Joseph by a former marriage, the book must have been current about a.d. 200. From Origen we may ascend to Clem. Alex, who (Strom, vi. 93) shows acquaintance with one of the chief doctrines of the book — the perpetual virginity of Mary. Finally, as Justin's statements as to the birth of Jesus in a cave and Mary's descent from David show in all probability his acquaint- ance with the book, it may with good grounds be assigned to the first decade of the 2nd century. (So Zahn, Gesch. Kanons, i. 485, 499, 502, 504, 539; ii. 774-780.) For the Greek text see Tischendorf, Evang. Apocr? 1-50; B. P. Grenfell, An Alex- andrian erotic Fragment and other Papyri, 1896, pp. 13-17: for the Syriac, Wright, Contributions to Apocryphal Literature of the N.T., 1865, pp. 3-7; A. S. Lewis, Studia Sinaitica, xi. pp. 1-22. See literature generally in Hennecke, NTliche Apok. Handbuch, 106 seq.

Gospel of Nicodemus.— -This title is first met with in the 13th century. It is used to designate an apocryphal writing entitled in the older MSS. xm-o^vrnxaTo. rod KvpLov tiimov TrjcroC XpioroO irpaxOtvTa hid Hovriov UlXcltov: also " Gesta Salvatoris Domini . . . inventa Theodosio magno imperatore in Ierusalem in praetorio Pontii Pilati in codicibus publicis. " See Tischendorf, Evang. Apocr? pp. S33SS5 This work gives an account of the Passion (i.-xi.), the Resurrection (xii.-xvi.), and the Descensus ad Inferos (xvii.-xxvii.). Chapters i.-xvi. are extant, in the Greek, Coptic, and two Armenian versions. The two Latin versions and a Byzantine recension of the Greek contain i.-xxvii. (see Tischendorf, Evangelia Apocrypha 2 , pp. 210-458). All known texts go back to a. d. 425, if one may trust the reference to Theodosius. But this was only a revision, for as early as 376 Epiphanius (Haer. i. I.) presupposes the existence of a like text. In 325 Eusebius (H.E. ii. 2) was acquainted only with theheathen Acts of Pilate, and knew nothing of a Christian, work. Tischendorf and Hofmann, however, find evidence of its existence in Justin's reference to the "A/cra HiKarov (Apol. i. 35, 48), and in Tertullian's mention of the Acta Pilati (Apol. 21), and on this evidence attribute our texts to the first half of the 2nd century. But these references have been denied by Scholten, Lipsius, and Lightfoot. Recently Schubert has sought to derive the elements

which are found in the Petrine Gospel, but not in the canonical gospels, from the original Acta Pilati, while Zahn exactly reverses the relation of these two works. Rendel Harris (1899) advocated the view that the Gospel of Nicodemus, as we possess it, is merely a prose version of the Gospel of Nicodemus written originally in Homeric centones as early as the 2nd century. Lipsius and Dobschiitz relegate the book to the 4th century. The question is not settled yet (see Lipsius in Smith's Diet, of Christ. Biography, ii. 708-709, and Dobschiitz in Hastings' Bible Dictionary, iii.

544-547).

Gospel according to the Hebrews. — This gospel was cited by Ignatius (Ad Smyrnaeos, iii.) according to Jerome (Viris illus. 16, and in Jes. lib. xviii.), but this is declared to be untrustworthy by Zahn, op. cit. i. 921; ii. 701, 702. It was written in Aramaic in Hebrew letters, according to Jerome {Adv. Pelag. iii. 2), and translated by him into Greek and Latin. Both these translations are lost: A collection of the Greek and Latin fragments that have survived, mainly in Origen and Jerome, will be found in Hilgenf eld's NT extra Canonem receptum, Nicholson's Gospel according to the Hebrews (1&7 a), Westcott's Introd. to the Gospels, and Zahn's Gesch. des NTlichen Kanons, ii. 642-723; Preuschen, op. cit. 3-8. This gospel was regarded by many in the first centuries as the Hebrew original of the canonical Matthew (Jerome, in Matt. xii. 13; Adv. Pelag. iii. 1). With the canonical gospel it agrees in some of its sayings; in others it is independent. It circulated among the Nazarenes in Syria, and was composed, according to Zahn (op. cit. ii. 722), between the years 135 and 150. Jerome identifies it with the Gospel of the Twelve {Adv. Pelag. iii. 2), and states that it was used by the Ebionites {Comm. in Matt. xii. 13). Zahn {op. cit. ii. 662, 724) contests both these statements. The former he traces to a mistaken interpretation ' of Origen {Horn. I. in Luc.). Lipsius, on the other hand, accepts the statements of Jerome (Smith and Wace, Diet, of Christian Biography, ii. 709-712), and is of opinion that this gospel, in the form in which it was known to Epiphanius, Jerome and Origen, was " a recast of an older original," which, written originally in Aramaic, was nearly related to the Logia used by St Matthew and the Ebionitic writing used by St Luke, " which itself was only a later redaction of the Logia."

According to the most recent investigations we may conclude that the Gospel according to the Hebrews was current among the Nazarenes and Ebionites as early as 100-125, sincelgnatius was familiar with the phrase " I am no bodiless demon " — a phrase which, according to Jerome {Comm.

in Is. xviii.), belonged to this Gospel.

The name " Gospel according to the Hebrews " cannot have been original; for if it had been so named because of its general use among the Hebrews, yet the Hebrews themselves would not have used this designation. It may have been known simply as " the Gospel." The language was Western Aramaic, the mother tongue of Jesus and his apostles. Two forms of Western Aramaic survive: the Jerusalem form of the dialect, in the Aramaic portions of Daniel and Ezra; and the Galilean, in isolated expressions in the Talmud (3rd century), and in a frag- 1 mentary 5th century translation of the Bible. The quotations from the Old Testament are made from the Massoretic text.

This gospel must have been translated at an early date into Greek, as Clement and Origen cite it as generally accessible, and Eusebius recounts that many reckoned it among the received books. The gospel is synoptic in character and is closely related to Matthew, though in the Resurrection accounts it has affinities with Luke. Like Mark it seems to have had no history of the birth of Christ, and to have begun with the baptism. (For the literature see Hennecke, NTliche Apok. Handbuch, 21-23.)

Gospel of Peter. — Before 1892 we had some knowlege of this gospel. Thus Serapion, bishop of Antioch (a.d. 190-203) found it in use in the church of Rhossus in Cilicia, and condemned it as Docetic (Eusebius, H.E. vi. 12). Again, Origen (InMatt. torn, xvii. 10) says that it represented the brethren of Christ as his half-brothers. In 1885 a long fragment was discovered at Akhmim, and published by Bouriant in 1892, and subsequently by Lods, Robinson, Harnack, Zahn/iSchubert, Swete.

Gospel of Thomas. — This gospel professes to give an account of our Lord's boyhood. It appears in two recensions. The more complete recension bears the title Qu>p,a 'IffpariXirov 3>iAofjs rod Kvpiov (Tischendorf, op. cit. pp. 158-163). Two Latin translations have been published in this work by the same scholar — one on pp. 164-180, the other under the wrong title, Pseudo-Matthaei Evangelium, on pp. 93-112. A Syriac version, with an English translation, was published by Wright in 1875. This gospel was originally still more Docetic than it now is, according to Lipsius. Its present form is due to an ortho- dox revision which discarded, so far as possible, all Gnostic traces. Lipsius (Smith's Diet, of Christ. Biog. ii. 703) assigns it to the latter half of the 2nd century, but Zahn {Gesch. Kan. ii. 771), on good grounds, to the earlier half. The latter scholar shows that probably it was used by Justin {Dial. 88). At all events it circulated among the Marcosians (Irenaeus, Haer. i. 20) and the Naasenes (Hippolytus, Refut. v. 7), and subsequently among the Manichaeans, and is frequently quoted from Origen downwards {Horn. I. in Luc). If the stichometry of Nicephorus

is right, the existing form of the book is merely fragmentary compared with its original compass. For literature see Hennecke, NTliche Apokryphen Handbuch, 132 seq.

Gospel of the Twelve. — 'This gospel, which Origen knew {Horn. I. in Luc), is not to be identified with the Gospel according to the Hebrews (see above), with Lipsius and others, who have sought to reconstruct the original gospel from the surviving fragments of these two distinct works. The only surviving fragments of the Gospel of the Twelve have been preserved by Epiphanius {Haer. xxx. I3-i6, 22: see Preuschen, op. cit. 9-11). It began with an account of the baptism. It was used by the Ebionites, and was written, according to Zahn {op. cit. ii. 742), about a.d. 170.*

Other Gospels mainly Gnostic and almost all lost.— Gospel of Andrew.— This is condemned in the Gelasian Decree, and is probably the gospel mentioned by Innocent (1 Ep. iii. 7) and Augustine {Contra advers. Leg. et Proph. i. 20).

Gospel of Apettes.- — Mentioned by Jerome in his Prooem. ad Matt.

Gospel of Barnabas. ---Condemned in the Gelasian Decree (see under Barnabas ad fin.).

Gospel of Bartholomew.— Mentioned by Jerome in his Prooem. ad -Matt, and condemned in the Gelasian Decree.

Gospel of Basilides. — Mentioned by Origen {Tract. 26 in Matt. xxxiii. 34, and in his Prooem. in Luc)] by Jerome in his Prooem. in Matt. (See Harnack i. 161; ii. 536-537; Zahn, Gesch. Kanons, i. 763-774.)

Gospel of Cerinthus. — Mentioned by Epiphanius (Haer. Ii. 7).

Gospel of the Ebionites. — A fragmentary edition of the canonical Matthew according to Epiphanius (Haer. xxx. 13), used by the Ebionites and called by them the Hebrew Gospel.

Gospel of Eve. — A quotation from this gospel is given by Epiphanius {Haer. xxvi. 2, 3). It is possible that this is the Gospel of Perfection (EvayyeXiov reXeicocrews) which he touches upon in xxvi. 2. The quotation shows that this gospel was the expression of complete pantheism.

Gospel of James the Less— ˆCondemned in the Gelasian Decree.

Wisdom of Jesus Christ. — This third work contained in the Coptic MS. referred to under Gospel of Mary gives cosmological disclosures and is

presumably of Valentiniaii origin.

Apocryph of John. — This book, which is found in the Coptic MS. referred to under Gospel of Mary arid contains cosmological disclosures of Christ, is said to have formed the source of Irenaeus' account of the Gnostics of Barbelus (i. 29-31). Thus this work would have been written before. 170.

Gospel of Judas Iscariol. — References to this gospel as in use among the Cainites are made by Irenaeus (i. 31. 1); Epiphanius (xxxviii. 1. 3).

Gospel, The Living (Evangelium Vivum). — This was a gospel of the Manichaeans. See Epiphanius, Haer. lxvi. 2; Photius, Contra Manich. i.

Gospel of Marcion. — On this important gospel see Zahn, Gesch. Kanons, i. 585-718.

Descent of Mary (Tkvva Mapias).— This book was an anti- Jewish legend representing Zacharias as having been put to death by the Jews because he had seen the God of the Jews in the form of an ass in the temple (Epiphanius, Haer. xxvi. 12).

Questions of Mary (Great and Little). — Epiphanius (Haer. xxvi. 8) gives some excerpts from this revolting work.

Gospel of Mary. — This gospel is found in a Coptic MS. of the 5th century. According to Schmidt's short account, Sitzungs- bcrichte d. preuss. Akad. d. Wiss. zu. Berlin (1896), pp. 839 sqq., this gospel gives disclosures on the nature of matter (uXij) and the progress of the Gnostic soul through the seven planets.

Gospel of Matthias. — Though this gospel is attested by Origen (Horn, in Luc. i.), Eusebius, H.E. iii. 25. 6, and the List of Sixty Books, not a shred of it has been preserved, unless with Zahn ii. 751 sqq. we are to identify it with the Traditions of Matthias, from which Clement has drawn some quotations.

Gospel of Perfection (Evangelium perfeciionis).—Used by the followers of Basilides and other Gnostics. See Epiphanius, Haer. xxvi. 2.

Gospel of Philip. — This gospel described the progress of a soul through the next world. It is of a strongly Encratite character and dates from the 2nd century. A fragment is pre- served in Epiphanius, Haer. xxvi. 13. In Preuschen, Reste, p. 13, the quotation breaks off too soon. See Zahn ii. 761-768.

Gospel of Thaddaeus. — Condemned by the Gelasian Decree.

Gospel of Thomas. — Of this gospel only one fragment has been preserved in Hippolytus, Philos. v. 7, pp. 140 seq. See Zahn, op. cit. i. 746 seq.; ii. 768-773; Harnack ii. 503-595.

Gospel of Truth.— This gospel is mentioned by Irenaeus i. 1 1. 9, and was used by the Valentinians. See Zahn i. 748 sqq.

(b) Acts and Teachings of the Apostles. — Acts of Andrew. — These Acts, which are of a strongly Encratite character, have come down to us in a fragmentary condition. They belong to the earliest ages, for they are mentioned by Eusebius,. H.E: hi. 25; Epiphanius, Haer. xlvii. 1; Ixi. 1; lxiii. 2; Philaster, Haer. Ixviii., as current among the Manichaeans and heretics. They are attributed to Leucius, a Docetic writer, by Augustine (c. Felic. Manich. ii. 6) and Euodius (De Fide c. Manich. 38). Euodius in the passage just referred to preserves two ismall fragments of the original Acts. On internal grounds the section recounting Andrew's imprisonment (Bonnet, Acta Apostolorur' Apocrypha, ii. 38-45) is also probably a constituent of the original work. As regards the martyrdom, owing to the confusion introduced by the multitudinous Catholic revisions of this section of the Acts, it is practically impossible to restore its original form. For a complete discussion of the various docu- ments see Lipsius, Apokryphen Aposlelgeschichte, i. 543-622; also James in Hastings' Bible Diet. i. 92-93; Hennecke, NT. Apokryphen, in loc. The best texts are given in Bonnet's Acta Apostolorum Apocrypha, 1898, II. i. 1-127. These contain also the Acts of Andrew and Matthew (or Matthias) in which Matthew (or Matthias) is represented as a captive in the country of the anthropophagi. Christ takes Andrew and his disciples with Him, and effects the rescue of Matthew. The legend is found also in Ethiopic, Syriac and Anglo-Saxon. Also the Acts of Peter and Andrew, which among other incidents recount the miracle of a camel passing through the eye of a needle. • This work is preserved partly in Greek, but in its entirety in Slavonic.

Acts of John. — Clement of Alexandria in his Hypoiyposes on 1 John i. 1 seems to refer to chapters xciii. (or lxxxix.) of these Acts. Eusebius (H.E. iii. 25. 6), Epiphanius (Haer. xlvii. 1) and other ancient writers assign them to the authorship of Leucius Charinus. It is generally admitted that

they were written in the 2nd century. The text has been edited most completely by Bonnet, Acta Apostol. Apocr., 1898, 151-216. The contents might be summarized with Hennecke as follows: — Arrival, and first sojourn of the apostle in Ephesus (xviii.-lv.) ;

return to' Ephesus and second sojourn (history of Drusiana, lviii.-lxxxvi.); account of the crucifixion of Jesus and His apparent death (lxxxvii.-cv.) ; the death of John (evi.exv.). There are manifest gaps in the narrative, a fact which we would infer from the extent assigned to it (i.e. 2500 stichoi) by Nice phorus. According to this authority one-third of the text is now lost. Many chapters are lost at the beginning; there is a gap in chapter xxxvii., also before Iviii., not to mention others. The encratite tendency in these Acts is not so strongly developed as in those of Andrew and Thomas. James (Anecdota, ii. 1-25) has given strong grounds for regarding the Acts of John and Peter as derived from one and the same author, but there are like affinities existing between the Acts of Peter and those of Paul. For a discussion of this work see Zahn, Gesch. Kanons, ii. 856-865; Lipsius, Apok. Apostelgesck. i. 348-542; Hennecke, NT. Apokryphen, 423-432. For bibliography, Hennecke, NT. Apok. Handbuch, 492 sq.

Acts of Paul. — The discovery of the Coptic translation of these Acts in 1897, and its publication by C. Schmidt (Acta Pauli auS der Heidelberger koptischen Papyrushandschrift herausgegeben, Leipzig, 1894), have confirmed what had been previously only a hypothesis that the Acts of Thecla had formed a part of the larger Acts of Paul. The Acts therefore embrace now the following elements: — (a) Two quotations given by Origen in his Princip. i. 2. 3 and his comment on John xx. 12. From the latter it follows that in the Acts of Paul the death of Peter was recounted, (b) Apocryphal 3rd Epistle of Paul to the Corinthians and Epistle from the Corinthians to Paul. These two letters are connected by a short account which is intended to give the historical situation. Paul is in prison on account of Strato- nice, the wife of Apollophanes. The Greek and Latin versions of these letters have for the most part disappeared, but they have been preserved in Syriac, and through Syriac they obtained for the time being a place in the Armenian Bible immediately after 2 Corinthians. Aphraates cites two passages from 3 Corinthians as words of the apostle, and Ephraem expounded them in his commentary on the Pauline Epistles. They must therefore have been regarded as canonical in the first half of the 4th century. From the Syriac Bible they made their way into the Armenian and mairitained their place without opposition to the 7 th century. On the Latin text see Carriere and Berger, Correspondance apocr. de S. P. et des Corinthiens, 1891. For a translation of Ephraem's commentary see Zahn ii. 592-611 and Vetter, Der Apocr. j. Korinthien, 70 sqq., 1894. The Coptic version (C. Schmidt, Acta Pauli, pp. 74-82), which is here imperfect, is clearly from a Greek original, while the Latin and Armenian are from the

Syriac. (c) The Acts of Paul and Thecla. These were written, according to Tertullian (De Baptismo, 17) by a presbyter of Asia, who was deposed from his office on account of his forgery. This, the earliest of Christian romances (probably before a.d. 150), recounts the adventures and sufferings of a virgin, Thecla of Icohium. Lipsius discovers Gnostic traits in the story, but these are denied by Zahn (Gesch. Kanons, ii. 902). See Lipsius, op. cit. ii. 424-467; Zahn (op. cit. ii. 892-910). The best text is that of Lipsius, Acta Apostol. Apocr., 1891, i. 235-272. There are Syriac, Arabic, Ethiopic and Slavonic versions. As we have seen above, these Acts are now recognized as belonging originally to the Acts of Paul. They were, however, published separately long before the Gelasian Decree (496). Jerome also was acquainted with them as an independent work. Thecla was most probably a real personage, around whom a legend had already gathered in the 2nd century. Of this legend the author of the Acts of Paul made use, and introduced into it certain historical and geographical facts, (d) The healing of Hermocrates of dropsy in Myra. Through a comparison of the Coptic version with the Pseudo-Cyprian writing " Caena," Rolffs (Hennecke, NT. Apok. 361) concludes that this incident formed originally a constituent of our book, (e) The strife with beasts at Ephesus. This event is mentioned by Nicephorus Callistus (H.E. ii. 25) as recounted in the xepioSoi of Paul. The identity of this work with the Acts of Paul is confirmed by a remark of Hippolytus in his commentary on Daniel iii. 29. 4,

ed. Bonwetsch 176 (so Rolffs). (/) Martyrdom of Paul. The death of Paul by the sentence of Nero at Rome forms the close of the Acts of Paul. The text is in the utmost confusion. It is best given by Lipsius, Acta Apostol. Apocr. i. 104-117.

Notwithstanding all the care that has been taken in collecting the fragments of these Acts, only about 900 stichoi out of the 3600 assigned to them in the Stichometry of Nicephorus have as yet been recovered.

The author was, according to Tertullian (De Baptism. 17), a presbyter in Asia, who out of honour to Paul wrote the Acts, forging at the same time 3 Corinthians. Thus the work was composed before 190, and, since it most probably uses the martyr- dom of Polycarp, after 155. The object of the writer is to embody in St Paul the model ideal of the popular Christianity of the 2nd century. His main emphasis is laid on chastity and the resurrection of the flesh. The tone of the work is Catholic and anti-Gnostic. For the bibliography of the subject see Hennecke, NT. Apok. 358-360.

Acts of Peter. — These acts are first mentioned by Eusebius (H.E. iii. 3) by name, and first referred to by the African poet Commodian about a.d. 250. Harnack, who was the first to show that these Acts were Catholic in character and not Gnostic as had previously been alleged, assigns their composition to this period mainly on the ground that Hippolytus was not acquainted with them; but even were this assumption true, it would not prove the non-existence of the Acts in question. According to Photius, moreover, the Acts of Peter also were composed by this same Leucius Charinus, who, according to Zahn (Gesch. Kanons, ii. 864), wrote about 160 {op. cit. p. 848). Schmidt and Ficker, however, maintain that the Acts were written about 200 and in Asia Minor. These Acts, which Ficker holds were written as a continuation and completion of the canonical Acts of the Apostles, deal with Peter's victorious conflict with Simon Magus, and his subsequent martyrdom at Rome under Nero. It is difficult to determine the relation of the so-called Latin Actus Vercellenses (which there are good grounds for assuming were originally called the Hpa£eis Hfrpov) with the Acts of John and Paul. Schmidt thinks that the author of the former made use of the latter, James that the Acts of Peter and of John were by one and the same author, but Ficker is of opinion that their affinities can be explained by their derivation from the same ecclesiastical atmosphere and school of theological thought. No less close affinities exist between our Acts and the Acts of Thomas, Andrew and Philip. In the case of the Acts of Thomas the problem is complicated, sometimes the Acts of Peter seem dependent on the Acts of Thomas, and sometimes the converse.

For the relation of the Actus Vercellenses to the " Martyrdom of the holy apostles Peter and Paul " (Acta Apostol. Apocr. i. 1 18-177) and to the " Acts of the holy apostles Peter and Paul" {Acta Apostol. Apocr. i. 178-234) see Lipsius ii. I. 84 sqq. The "Acts of Xanthippe and Polyxena," first edited by James (Texts and Studies,\i. 3. 1893), and assigned by him to the middle of the 3rd century, as well as the " Acts of the Disputation of Archelaus. bishop of Mesopotamia, and the Heresiarch Manes" ("Acta Disputatioms Archelai Episcopi Mesopotamiae et Manetis Haeresiarchae," in Routh's Reliquiae Sacrae 2 , v. 36-206), have borrowed largely from our work.

The text of ■ the Actus Vercellenses is edited by Lipsius, Acta Apostol. Apocr. i. 45-79. An independent Latin translation of the " Martyrdom of Peter " is published by Lipsius (op. cit. i. 1-22), Martyrium beali Petri Apostoli a Lino episcopo conscriptum. On the Coptic fragment, which Schmidt maintains is an original con- stituent of these Acts, see that writer's work : Die alien Petrusakten im Zusammenhang dsr apokryphen Apostelliteratur nebst einem neuentdeckten Fragment, and Texte und Untersuch. N.F. ix. I (1903). For the literature see Hennecke, Neutestamentliche Apokryphen Handbuch, 395 sqq.

Preaching of Peter. — This book (Tlirpov Kripvy/xa) gave the substance of a series of discourses spoken by one person in the name of the apostles. Clement of Alexandria quotes it several times as a genuine record of Peter's teachings. Heracleon had previously used it (see Origen, In Evang. Johann. t. xiii. 17). It is spoken unfavourably of by Origen (De Prin. Praef. 8). It was probably in the hands of Justin and Aristides. Hence Zahn gives its date as 90-100 at latest; Dobschutz, as 100-110; and Harnack, as 1 10-130. The extant fragments contain sayings of Jesus, and warnings against Judaism and Polytheism.

They have been edited by Hilgenfeld: Nov. Test, extra Can., 1884, iv. 51-65, and by von Dobschutz, Das Kerygma Petri, 1893. Salmon (Diet. Christ. Biog. iv. 329-330) thinks that this work is part of a larger work, A Preaching of Peter and a Preach- ing of Paul, implied in a statement of Lactantius (Inst. Div. iv. 21); but this view is contested by Zahn, see Gesch. Kanons, ii. 820-834, particularly pp. 827-828; Chase, in Hastings' Bible Diet. iv. 776.

Acts of Thomas. — This is one of the earliest and most famous of the Gnostic Acts. It has been but slightly tampered with by orthodox hands. These Acts were used by the Encratites (Epiphanius, Haer. xlvii. 1), the Manichaeans (Augustine, Contra Faust, xxii. 79), the Apostolici (Epiphanius lxi. 1) and Priscillianists. The work is divided into thirteen Acts, to which the Martyrdom of Thomas attaches as the fourteenth. It was originally written in Syriac, as Burkitt (Journ. of Theol. Studies, i. 278 sqq.) has finally proved, though Macke and Noldeke had previously advanced grounds for this view. The Greek and Latin texts were edited by Bonnet in 1883 and again in 1903, ii. 2; the Greek also by James, Apoc. Anec. ii. 28-45, an d the Syriac by Wright (Apocr. Acts of the Gospels, 1871, i. 172- 333). Photius ascribes their composition to Leucius Charinus — therefore to the 2nd century, but Lipsius assigns it to the early decades of the 3rd. (See Lipsius, Apokryphen Apostel- geschichten, i. 225-347; Hennecke, N.T. Apokryphen, 473-480.)

Teaching of the Twelve Apostles (Didache). — This important work was discovered by Philotheos Bryennios in Constantinople and published in 1883. Since that date it has been frequently edited. The bibliography can be found in Schaff's and in Harnack's editions. The book divides itself into three parts. The first (i.-vi.) contains a body of ethical instruction which is founded on a Jewish and probably pre-Christian document, which forms the basis also of the Epistle of Barnabas. The second part consists of vii.-xv., and treats of church ritual and discipline; and the third part is eschatological and deals with the second Advent. The book is variously dated by different scholars: Zahn assigns it to the years a.d. 80-120; Harnack to 120-165; Lightfoot and Funk to 80-100; Salmon to 120. (See

Salmon in Diet, of Christ. Biog. iv. 806-815, also article Didache.)

Apostolical Constitutions. — For the various collections of these ecclesiastical regulations — the Syriac Didascalia, Eccle- siastical Canons of the Holy Apostles, &c. — see separate article.

(c) Epistles. — The A bgar Epistles. — These epistles are found in Eusebius (H.E. i. 3), who translated them fr<7m the Syriac. They are two in number, and purport to be a petition of Abgar Uchomo, king of Edessa, to Christ to visit Edessa, and Christ's answer, promising after his ascension to send one of his disciples, who should " cure thee of thy disease, and give eternal life and peace to thee and all thy people." Lipsius thinks that these letters were manufactured about the year 200. (See Diet. Christ. Biog. iv. 878-881, with the literature there mentioned.) The above correspondence, which appears also in Syriac, is inwoven with the legend of Addai or Thaddaeus. The best critical edition of the Greek text will be found in Lipsius, Acta Apostolorum Apocrypha, 1891, pp. 279-283. (See also Abgar.)

Epistle of Barnabas.— The special object of this epistle was to guard its readers against the danger of relapsing into Judaism. The date is placed by some scholars as early as 70-79, by others as late as the early years of the emperor Hadrian, 117. The text has been edited by Hilgenfeld in 1877, Gebhardt and Harnack in 1878, and Funk in 1887 and 1901. In these works will be found full bibliographies. (See further Barnabas.)

Epistle of Clement. — The object of this epistle is the restoration of harmony to the church of Corinth, which had been vexed by internal discussions. The epistle may be safely ascribed to the years 95-96. The writer was in all probability the bishop of Rome of that name. He is named an apostle and his work was reckoned as canonical by Clement of Alexandria (Strom, iv. 17. 105), and as late as the time of Eusebius (H.E. iii. 16) it was still read in some of the churches. Critical editions have been published by Gebhardt and Harnack, Patr. A post. Op., 1876,

and in the smaller form in 1900, Lightfoot 2 , 1890, Funk 2 , 1901. The Syriac version has been edited by Kennet, Epp. of St Clement to the Corinthians in Syriac, 1899, and the Old Latin version by Morin, S. Clementis Romani ad Corinthios epistulae versio Latina antiquissima, 1894.

" Clement's " 2nd Ep. to the Corinthians. — This so-called letter of

Clement is not mentioned by any writer before Eusebius (H.E. iii. 38. 4). It is not a letter but really a homily written in Rome about the middle of the 2nd century. The writer is a Gentile. Some of his citations are derived from the Gospel to the Egyptians.

Clement's Epistles on Virginity. — These two letters are pre- served only in Syriac which is a translation from the Greek. They are first referred to by Epiphanius and next by Jerome. Critics have assigned them to the middle of the 2nd century. They have been edited by Beelen, Louvain, 1856.

Clement's Epistles to James. — On these two letters which are found in the Clementine Homilies, see Smith's Diet, of Christian Biography, i. 559, 570, and Lehmann's monograph, Die Clemen- tischen Schriften, Gotha, 1867, in which references will be found to other sources of information.

Epistles of Ignatius. — There are two collections of letters bearing the name of Ignatius, who was martyred between 105 and 117. The first consists of seven letters addressed by Ignatius to the Ephesians, Magnesians, Trallians, Romans, Philadelphians, Smyrnaeans and to Polycarp. The second collection consists of the preceding extensively interpolated, and six others of Mary to Ignatius, of Ignatius to Mary, to the Tarsians, Antiochians, Philippians and Hero, a deacon of Antioch. The latter collection is a pseudepigraph written in the 4th century or the beginning of the 5th. The authenticity of the first collection also has been denied, but the evidence appears to be against this contention. The literature is overwhelming in its extent. See 7ahn, Patr. A post. Op., 1876; Funk 2 , Die apostol. Voter, 1901; Lightfoot 2 , Apostolic Fathers, 1889.

Epistle of Polycarp. — The genuineness of this epistle stands or falls with that of the Ignatian epistles. See article in Smith's Dictionary of Christian Biography, iv. 423-431; Lightfoot, Apostolic Fathers, i. 629-702; also Polycarp.

Pauline Epistles to the Laodiceans and the Alexandrians. — The first of these is found only in Latin. This, according to Lightfoot (see Colossians 8 , 272-298) and Zahn, is a translation from the Greek. Such an epistle is mentioned in the Muratorian canon. See Zahn, op. cit. ii. 566-585. The Epistle to the Alexandrians is mentioned only in the Muratorian canon (see Zahn ii. 586-592).

For the Third Epistle of Paid to ike Corinthians, and Epistle from the Corinthians to Paul, see under " Acts of Paul " above. (R. H. C.)

APODICTIC (Gr. airodeiKTiKos, capable of demonstration), a logical term, applied to judgments which are necessarily true, as of mathematical

conclusions. The term in Aristotelian logic is opposed to dialectic, as scientific proof to probable reasoning. Kant contrasts apodictical with problematic and assertorical judgments.

APOLDA, a town of Germany, in the grand-duchy of Saxe- Weimar, near the river Ilm, 9 m. E. by N. from Weimar, on the main line of railway from Berlin via Halle, to Frankfort-on- Main. Pop. (1900) 20,352. It has few notable public buildings, but possesses three churches and monuments to the emperor Frederick III. and to Christian Zimmermann (1759-1842), who, by introducing the hosiery and cloth manufacture, made Apolda one of the most important places in Germany in these branches of industry. It has also extensive dyeworks, bell foundries, and manufactures of steam engines, boilers and bicycles.

APOLLINARIS, " the Younger " (d. a.d. 390), bishop of Laodicea in Syria. He collaborated with his father Apollinaris the Elder in reproducing the Old Testament in the form of Homeric and Pindaric poetry, and the New after the fashion of Platonic dialogues, when the emperor Julian had forbidden Christians to teach the classics. He is best known, however, as a warm opponent of Arianism, whose eagerness to emphasize the deity of Christ and the unity of His person led him so far as a denial

of the existence of a rational human soul (vovs) in Christ's human nature, this being replaced in Him by a prevailing principle of holiness, to wit the Logos, so that His body was a glorified and spiritualized form of humanity. Over against this the orthodox or Catholic positionmaintained thatChristassumed human nature in its entirety including the vovs, for only so could He be example and redeemer. It was held that the system of Apollinaris was really Docetism (see Docetae), that if the Godhood without constraint swayed the manhood there was no possibility of real human probation or of real advance in Christ's manhood. The position was accordingly condemned by several synods and in particular by that of Constantinople (a.d. 381). This did not prevent its having a considerable following, which after Apollinaris's death divided into two sects, the more con- servative taking its name (Vitalians) from Vitalis, bishop of Antioch, the other (Polemeans) adding the further assertion that the two natures were so blended that even the body of Christ was a fit object of adoration. The whole Apollinarian type of thought persisted in what was later the Monophysite (q.v.) school.

Although Apollinaris was a prolific writer, scarcely anything has survived under his own name. But a number of bis writings an concealed under the names of orthodox Fathers, e.g. ij Kara nipoi jrio-Tis, long ascribed to Gregory Thaumaturgus. These have beeri collected and edited by Hans Lietzirann.

He must be distinguished from the bishop of Hierapolis who bore the same name, and who wrote one of the early Christian " Apolo- gies " (c. 170). See A. Harnack, History of Dogma, vols. iii. and iv. passim; R. L. Ottley, The Doctrine of the Incarnation; G. Voisin, L'Apollinarisme (Louvain, 1901); H. Lietzmann, Apollinaris von Laodicea und seine Schule (Tubingen, 1905).

APOLLINARIS, SULPICIUS, a learned grammarian of Carthage, who flourished in the 2nd century a.d. He taught Pertinax — himself a teacher of grammar before he was emperor, — and Aulus Gellius, who speaks of him in the highest terms (iv. 17). He is the reputed author of the metrical arguments to the Aeneid and to the plays of Terence and (probably) Plautus (J. W. Beck, De Sulpicio Apollinari, 1884).

APOLLINARIS SIDONIUS, CAIUS SOLLIUS (c. 430-487 or 488), Christian writer and bishop, was born in Lyons about a.d. 430. Belonging to a noble family, he was educated under the best masters, and particularly excelled in poetry and polite literature. He married (about 452) Papianilla, the daughter of Avitus, who was consul and afterwards emperor. But Majori- anus, in the year 457, having deprived Avitus of the empire and taken the city of Lyons, Apollinaris fell into the hands of the enemy. The reputation of his learning led Majorianus to treat him with the greatest respect. In return Apollinaris composed a panegyric in his honour (as he had previously done for Avitus); which won for him a statue at Rome and the title of count. In 467 the emperor Anthemius rewarded him for the panegyric which he had written in honour of him by raising him to the post of prefect of Rome, and afterwards to the dignity of a patrician and senator. In 472, more for his political than for his theological abilities, he was chosen to succeed Eparchius in the bishopric of Arverna (Clermont). On the capture of that city by the Goths in 474 he was imprisoned, as he had taken an active part in its defence; but he was afterwards restored by Euric, king of the Goths, and continued to govern his bishopric as before. He died in a.d. 487 or 488. His extant works are his Panegyrics on different emperors (in which he draws largely upon Statius, Ausonius and Claudian) ; and nine books of Letters and Poems, whose chief value consists in the light they shed on the political and literary history of the 5 th century. The Letters, which are very stilted, also reveal Apollinaris as a man of genial temper, fond of good living and of pleasure. The best edition is that in the Monumenta Germaniae Historica (Berlin, 1887), which gives, a survey of the manuscripts.

Apollinaris Sidonius (the names are commonly inverted by the French) is the subject of numerous monographs, historical and literary. See, for bibliography, A. Molinier, Sources de Vhistoire.de France, no. 136 (vol. i.). S. Dill, Roman Society in the Fifth Century, and T. Hodgkin, Italy and her

Invaders (vol. vii.), contain interesting sections on Apollinaris. See also Teuffel and Ebert's histories of Latin literature.

APOLLO (Gr. ' AtSWuv ,' AiriWuv) , in Greek mythology, one of the most important and many-sided of the Olympian divinities. No satisfactory etymology of the name has been given, the least improbable perhaps being that which connects it with the Doric dxeXXa (" assembly "), 1 so that Apollo would be the god of political life (for other suggested derivations, ancient and modern, see C. Wernicke in Pauly-Wissowa's Realencyclopadie). The derivation of all the functions assigned to him from the idea of a single original light- or sun-god, worked out in his Lexikon der Mythologie by Roscher, who regards it as " one of the most certain facts in mythology," has not found general acceptance, although no doubt some features of his character can be readily explained on this assumption.

In the legend, as set forth in the Homeric hymn to Apollo and the ode of Callimachus to Delos, Apollo is the son of Zeus and Leto. The latter, pursued by the jealous Hera, after long wandering found shelter in Delos (originally Asteria)-, where she bore a son, Apollo, under a palm-tree at the foot of Mount Cynthus. Before this, Delos — like Rhodes, the centre of the worship of the sun-god Helios, with whom Apollo was wrongly identified in later times— had been a barren, floating rock, but now became stationary, being fastened down by chains to the bottom of the sea. Apollo was born on the 7th day (efiSonayepris) of the month Thargelion according to Delian, of the month Bysios according to Delphian, tradition. The 7th and 20th, the days of the new and full moon, were ever afterwards held sacred to him. In Homer Apollo appears only as the god of prophecy, the sender of plagues, and sometimes as a warrior, but elsewhere as exercising the most varied functions. He is the god of agriculture, specially connected with Aristaeus (q.v.), which, originally a mere epithet, became an independent person- ality (see, however, Farnell, Cults of the Greek States, iv. 123). This side of his character is clearly expressed in the titles Sitalcas (" protector of corn"); Erythibius ("preventer of blight"); Parnopius (" destroyer of locusts "); Smintheus (" destroyer of mice "), in which, however, some modern inquirers see a totem- istic significance (e.g. A. Lang, "Apollo and the Mouse,"- in Custom and Myth, p. 101; against this, W. W. Fowler, in Classical Review, November 1892) ; Erithius (" god of reapers ") ; and Pasparius (" god of meal "). He is further the god of vegetation generally — Nomios, " god of pastures " (explained, however, by Cicero, as " god of law "), Hersos, " sender of the fertilizing dew." Valleys and groves are under his protection, unless the epithets Napaeus

and Hylates belong to a more primi- tive aspect of the god as supporting himself by the chase, and roaming the gla'des and forests in pursuit of prey. Certain trees and plants, especially the laurel, were sacred to him. As the god of agriculture and vegetation he is naturally connected with the course of the year and the arrangement of the seasons, so important in farming operations, and becomes the orderer of time (Horomedon, " ruler of the seasons "), and frequently appears on monuments in company with the Horae.

Apollo is also the protector of cattle and herds, hence Poimnius (" god of flocks "), Tragius (" of goats "), Kereatas (" of horned animals "). Carneius (probably " horned ") is considered by some to be a pre-Dorian god of cattle, also connected with harvest operations, whose cult was grafted on to that of Apollo; by others, to have been originally an epithet of Apollo, afterwards detached as a separate personality (Farnell, Cults, iv. p. 131). The epithet Maleatas, which, as the quantity of the first vowel (a) shows, 2 cannot mean god of " sheep " or " the apple-tree," is probably a local adjective derived from Malea (perhaps Cape Malea), and may refer to an originally distinct personality, subsequently merged in that of Apollo (see below). Apollo him- self is spoken of as a keeper of flocks, and the legends of his service as a herdsman with Laomedon and Admetus point in the same direction. Here probably also is to be referred the epithet Lyceius, which, formerly connected with Xuk- (" shine ") and used to support the conception of Apollo as a light-god, is now

1 Hesychius; who also gives the explanation oijxis ("fold"), in which case Apollo would be the god of flocks and herds. ! The authority for the quantity is Isyllus.

generally referred to Xiwos (" wolf ") and explained as he who keeps away the wolves from the flock (cf. \vKoepyos, \vkqkt6vos)'. In accordance with this, the epithet \vKi)ytvi)% will not mean " born of " or " begetting light," but rather " born from the she- wolf," in which form Leto herself was said to have been conducted by wolves to Delos. The consecration of the wolf to Apollo is probably the relic of an ancient totemistic religion' (Farnell, Cults, i. 41; W. Robertson Smith, Religion of the Semites, new ed., 1894, p. 226).

With the care of the fruits of the earth and the lower animals is associated that of the highest animal, man, especially the youth on his passage to manhood. As such Apollo is KovpOTpoos (" rearer of boys ") and patron of the palaestra. In many places gymnastic contests form a feature of his festivals, and he himself is proficient in athletic exercises (hvay&vios). Thus he was supposed to be the first victor at the Olympic games; he over- comes Hermes in the foot-race, and Ares in boxing.

The transition is easy to Apollo as a warlike god; in fact, the earlier legends represent him as engaged in strife with Python, Tityus, the Cyclopes and the Aloidae. He is Bo'edromios (" the helper "), Eleleus (" god of the war-cry '■'), and the Paean was said to have been originally a song of triumph composed by him after his victory over Python. In Homer he frequently appears on the field, like Ares and Athene, bearing the aegis to frighten the foe. This aspect is confirmed by the epithets Argyrotoxos ("god of the silver bow"), Hecatebolos ("the shooter from afar "), Chrysaoros (" wearer of the golden sword "), and his statues are often equipped with the accoutrements of war. 3

The fame of the Pythian oracle at Delphi, connected with the slaying of Python by the god immediately after his birth, gave especial prominence to the idea of Apollo as a god of prophecy. Python, always represented in the form of a snake, sometimes nameless, is the symbol of the old chthonian divinity whose home was the place of " enquiry " (irvdwdai). When Apollo Delphinius with his worshippers from Crete took possession of the earth-oracle Python, he received in consequence the name Pythius. That Python was no fearful monster, symbolizing the darkness of winter which is scattered by the advent of spring, is shown by the fact that Apollo was considered to have been guilty of murder in slaying it, and compelled to wander for a term of years and expiate his crime by servitude and purification. Possibly at Delphi and other places there was an old serpent-1 worship ousted by that of Apollo, which may account for expia- tion for the slaying of Python being considered necessary. In the solar explanation, the serpent is the darkness driven away by the rays of the sun. (On the Delphian cult of Apollo and its political significance, see Amphictyony, Delphi, Oracle; and Farnell, Cults, iv. pp. 179-218.) Oracular responses were also given at Claros near Colophon in Ionia by means of the w&ter of a spring which inspired those who drank of it; at Patara in Lycia; and at Didyma near Miletus through the priestly family of the Branchidae. Apollo's oracles, which he did not deliver on his own initiative but as the mouthpiece of Zeus, were in- fallible, but the human mind was not always able to grasp their meaning; hence he is called Loxias (" crooked," " ambiguous "). To certain favoured mortals he communicated the gift of pro- phecy (Cassandra, the Cumaean sibyl, Helenus, Melampus and Epimenides). Although his favourite method was by word of mouth, yet signs were sometimes used; thus Calchas interpreted the flight of birds; burning offerings, sacrificial barley; the arrow of the god, dreams and the lot, all played their part in communi- cating the will of the gods.

Closely connected with the god of oracles was the god of the healing art, the oracle being frequently consulted in cases of sickness. These two functions are indicated by the titles latromantis (" physician and seer ") and Oulios, probably meaning " health-giving " (so Suidas) rather than "

destructive." This side of Apollo's character does not appear in Homer, where Paieon is mentioned as the physician of the gods. Here again, as in the case of Aristaeus and Carneius, the question arises

- *Hence some have derived " Apollo " from Ai-oJAfoai, "to, destroy."*

whether Paean (or Paeon) was originally an epithet of Apollo, subsequently developed into an independent personality, or an independent deity merged in the later arrival (Farnell, Cults, iv. p. 234). According to Wilamowitz-Mollendorff in his edition of Isyllus, the epithet Maleatas alluded to above is also connected with the functions of the healing god, imported into Athens in the 4th century B.C. with other well-known health divinities. In this connexion, it is said to mean the " gentle one," who gave his name to the rock Malion or Maleas (O. Gruppe, Griechische Mythologie, ii. 1442) on the Gortynian coast. Apollo is further supposed to be the father of Asclepius (Aesculapius), whose ritual is closely modelled upon his. The healing god could also prevent disease and misfortune of all kinds: hence he is 4Xe$iKo/fos (" averter of evil ") and airorpoTratos. Further, he is able to purify the guilty and to cleanse from sin (here some refer the epithet iarpofiavris, in the sense of " physician of the soul "). Such a task can be fitly undertaken by Apollo, since he himself underwent purification after slaying Python. Accord- ing to the Delphic legend, this took place in the laurel grove of Tempe, and after nine years of penance the god returned, as was represented in the festival called Stepterion or Septerion (see A. Mommsen, Delphika, 1878). Thus the old law of blood for blood, which only perpetuated the crime from generation to generation, gave way to the milder idea of the expiatory power of atonement for murder (cf. the court called to «ri AeX<£u>ico at Athens, which retained jurisdiction in cases where justifiable homicide was pleaded).

The same element of enthusiasm that affects the priestess of the oracle at Delphi produces song and music. The close con- nexion between prophecy and song is indicated in Homer {Odyssey, viii. 488), where Odysseus suggests that the lay of the fall of Troy by Demodocus was inspired by Apollo or the Muse. The metrical form of the oracular responses at Delphi, the important part played by the paean and the Pythian nomos in his ritual, contributed to make Apollo a god of song and music, friend and leader of the Muses (fwv

A less important aspect of Apollo is that of a marine deity, due to the spread of his cult to the Greek colonies and islands. As such, his

commonest name is Delphinius, the "dolphin god," in whose honour the festival Delphinia was celebrated in Attica. This cult probably originated in Crete, whence the god in the form of a dolphin led his Cretan worshippers to the Delphian shore, where he bade them erect an altar in his honour. He is Epibaterius and Apobalerius (" embarker " and " disembarker "), Nasiotas (" the islander "), Euryalus (" god of the broad sea "). Like Poseidon, he looks forth over his watery kingdom fr,om lofty cliffs and promontories (d/craTos, and perhaps d/cpiras).

These maritime cults of Apollo are probably due to his import- ance as the god of colonization, who accompanied emigrants on their voyage. As such he is ayrirup (" leader "), oIkuttt} ("founder"), 5wM*

It has been mentioned above that W. H. Roscher, in the article " Apollo " in his Lexikon der Mythologie, derives all the aspects and functions of Apollo from the conception of an original light- and sun-god. The chief objections to this are the following. It cannot be shown that on Greek soil Apollo originally had the meaning of a sun-god; in Homer, Aeschylus and Plato, the

sun-god Helios is distinctly separated from Phoebus Apollo; the constant epithet Qoijlas, usually explained as the brightness of the sun, may equally well refer to his physical beauty or moral purity; \vK7iyevqs has already been noticed. It is not until the beginning of the 5th century B.C. that the identification makes its appearance. The first literary evidence is a fragment of Euripides (Phaethon), in which it is especially characterized as an innovation. The idea was taken up by the Stoics, and in the Roman period generally accepted. But the fact of the gradual development of Apollo as a god of light and heaven, and his identification with foreign sun-gods, is no proof of an original Greek solar conception of him. Apollo-Helios must be regarded as "a late by-product of Greek religion" (Farnell, Cults, iv. p. 136; Wernicke in Pauly-Wissowa's Realencyclopadie). For the manner in which the solar theory is developed, reference must be made to Roscher's article, but one legend may here be mentioned, since it helps to trace the spread of the cult of the god. It was said that Apollo soon after his birth spent a year amongst the Hyperboreans, who dwelt in a land of perpetual sunshine, before his return to Delphi. This return is explained as the second birth of the god and his victory over the powers of winter; the name Hyperboreans is explained as the " dwellers beyond the north wind." This interpretation is now, however, generally rejected in favour of that of H. L. Ahrens,- — that Hyperborei is identical with the Perpherees (" the carriers ") , who are described as the servants of Apollo, carriers of cereal offerings from one community to another (Herodotus iv. 33), This would point to the fact that certain settlements of Apolline worship along the northernmost border of Greece (Illyria, Thrace, Macedonia) were in the

habit of sending offerings to the god to a centre of his worship farther south (probably Delphi), advancing by the route from Tempe through Thessaly, Pherae and Doris to Delphi; while others adopted the route through Illyria, Epirus, Dodona, the Malian gulf, Carystus in Euboea, and Tenos to Delos (Farnell, Cults, iv. p. 100).

The most usual attributes of Apollo were the lyre and the bow; the tripod especially was dedicated to him as the god of prophecy. Among plants, the bay, used in expiatory sacrifices and also for making the crown of victory at the Pythian games, and the palm-tree, under which he was born in Delos, were sacred to him ; among animals and birds, the wolf, the roe, the swan, the hawk, the raven, the crow, the snake, the mouse, the grass-hopper and the griffin, a mixture of the eagle and the lion evidently of Eastern origin. The swan and grasshopper symbolize music and song; the hawk, raven, crow and snake have reference to his functions as the god of prophecy.

The chief festivals held in honour of Apollo were the Carneia, Daphnephoria, Delia, Hyacinthia, Pyanepsia, Pythia and Thargelia (see separate articles).

Among the Romans the worship of Apollo was adopted from the Greeks. There is a tradition that the Delphian oracle was consulted as early as the period of the kings during the reign of Tarquinius Superbus, and in 430 a temple was dedicated to Apollo on the occasion of a pestilence, and during the Second Punic War (in 212) the Ludi Apollinares were instituted in his honour. But it was. in the time of Augustus, who considered himself under the special protection of Apollo and was even said to be his son, that his worship developed and he became one of the chief gods of Rome. After the battle of Actium, Augustus enlarged his old temple, dedicated a portion of the spoil to him, and instituted quinquennial games in his honour. He also erected a new temple on the Palatine hill and transferred the secular games, for which Horace composed his Carmen Saeculare, to Apollo and Diana.

Apollo was represented more frequently than any other deity in ancient art. As Apollo Agyieus he was shown by a simple conic pillar; the Apollo of Amyclae was a pillar of bronze sur- mounted by a helmeted head, with extended arms carrying lance and bow. There were also rude idols of him in wood {xoana), in which the human form was scarcely recognizable. In the 6th century, his statues of stone were naked, stiff and rigid in attitude, shoulders square, limbs strong and broad, hair falling

down the back. In the riper period of art the type is softer, and Apollo appears in a form which seeks to combine manhood and eternal youth. His long hair is usually tied in a large knot above his forehead. The most famous statue of him is the Apollo Belvidere in the Vatican (found at Frascati, 1455), an imitation belonging to the early imperial period of a bronze statue repre- senting him, with aegis in his left hand, driving back the Gauls from his temple at Delphi (279 B.C.), or, according to another view, fighting with the Pythian dragon. In the Apollo Cithar- oedus or Musagetes in the Vatican, he is crowned with laurel and wears the long, flowing robe of the Ionic bard, and his form is almost feminine in its fulness; in a statue at Rome of the older and more vigorous type he is naked and holds a lyre in his left hand; his right arm rests upon his head, and a griffin is seated at his side. The Apollo Sauroctonus (after Praxiteles), copied in bronze at the Villa Albani in Rome and in marble at Paris, is a naked, youthful, almost boyish figure, leaning against a tree, waiting to strike a lizard climbing up the trunk. The gigantic statue of Helios (the sun-god), " the colossus of Rhodes," by Chares of Lindus, celebrated as one of the seven wonders of the world, is unknown to us. Bas-reliefs and painted vases reproduce the contests of Apollo with Tityus, Marsyas, and Heracles, the slaughter of the daughters of Niobe, and other incidents in his life.

Authorities. — F. L. W. Schwartz, De_ antiguissima Apollinis Natura (Berlin, 1843); J. A. Schonborn, Uber das Wesen Apollons (Berlin, 1854); A. Milchhofer, Uber den attischen Apollon (Munich, l8 73); T. Schreiber, Apollon Pythoktonos (Leipzig, 1879); W. H. Roscher, Studien zur vergleichenden Mythologie der Criechen und Rbmer, i. (Leipzig, 1873) ; R. Hecker, De Apollinis apud Romanos Cultu (Leipzig, 1879) ; G. Colin, Le Culte d' Apollon pythien a Athenes (1905); L. Dyer, The Gods in Greece (1891); articles in Pauly- Wissowa's Realencyclopddie, W. H. Roscher's Lexikon der Mytho- logie, and Daremberg and Saglio's Dictionnaire des antiquites; L. Preller, Griechische und romische Mythologie (4th ed. by C. Robert); J. Marquardt, Romische Staalsverwaltung, iii. ; G. Wissowa Religion und Kultus der Rbmer (1902); D. Bassi, Saggio di Biblio- grafia mitologica, i. Apollo (1896); L. Farnell, Cults of the Greek States, iv. (1907) ; O. Gruppe, Griechische Mythologie und Religions- geschichte, ii. (1906). In the article Greek Art, fig. 9 represents a

bearded Apollo, playing on the lyre, in a chariot drawn by winged horses; fig. 55 (pi. ii.) Apollo of the Belvidere; fig. 76 (pi. v.) a nude and roughly executed colossal figure of the god. (J. H. F.)

APOLLODORUS, an Athenian painter, who flourished at the end of the 5th

century B.C. He is said to have introduced great improvements in perspective and chiaroscuro. What these were jt is impossible to say: perspective cannot have been in his day at an advanced stage. Among his works were an Odysseus, a priest in prayer, and an Ajax struck by lightning.

APOLLODORUS, an Athenian grammarian, pupil of Aris- tarchus and Panaetius the Stoic, who lived about 140 B.C. He was a prolific and versatile writer. There is extant under his name a treatise on the gods and the heroic age, entitled Bt(3Xto- dijKrj, a valuable authority on ancient mythology. Modern critics are of opinion that, if genuine, it is an abridgment of a larger work by him (Hepl de&v).

Edition, with commentary> by Heyne (1803); text by Wagner (1894) (Mythographi Graeci, vol. i. Teubner series). Amongst other works by him of which only fragments remain, collected in Miiller, Fragmenta Historicorum Graecorum, may be mentioqpd : Xpow/co, a universal history from the fall of Troy to 144 B.C. ; IlepiiJYijffis, a gazetteer wiitten in iambics; Ilcpi Newv, a work on the Homeric catalogue of ships; and a work on etymology (‘ErvnoXoyiai.).

APOLLODORUS, of Carystus in Euboea, one of the most important writers of the New Attic comedy, who flourished at Athens between 300 and 260 B.C. He is to be distinguished from an older Apollodorus of Gela (342-290), also a writer of comedy, a contemporary of Menander. He wrote 47 comedies and obtained the prize five times. Terence borrowed his Hecyra and Phormio from the’Exupd and ‘Ewt-SiKaˆdfievos of Apollodorus.

Fragments in Koch, Comicorum Atticorutn Fragmenta, ii. (1884); see also Meineke, Historia Critica Comicorum Graecorum (1839).

APOLLODORUS, of Damascus, a famous Greek architect, who flourished during the 2nd century a.d. He was a favourite of Trajan, for whom he constructed the stone bridge over the Danube (a.d. 104-105). He also planned a gymnasium, a college, public baths, the Odeum and the Forum Trajanum,

within the city of Rome; and the triumphal arches at Bene- ventum and Ancona. The Trajan column in the centre of the Forum is celebrated as being the first triumphal monument of the kind. On the accession of Hadrian, whom he had offended by ridiculing his performances as architect and artist, Apollodorus was banished, and, shortly afterwards, being charged with imaginary crimes, put to death (Dio Cassius lxix. 4). He also wrote a treatise on Siege Engines (Ho~KiopKr)nKa) , which was dedicated

to Hadrian.

APOLLONIA, the name of more than thirty cities of antiquity. The most important are the following: (1) An Illyrian city (known as Apollonia ko.t "Enribaix.vov or xpos 'E7rt5a(Ui>C})) on the right bank of the Aous, founded by the Corinthians and Corcy- raeans. It soon became a place of increasing commercial prosperity, as the most convenient link between Brundusium and northern Greece, and as one of the starting-points of the Via Egnatia. It was an important military post in the wars against Philip and during the civil wars of Pompey and Caesar, and towards the close of the Roman republic acquired fame as a seat of literature and philosophy. Here Augustus was being educated when the death of Caesar called him to Rome. It seems to have sunk with the rise of Aulon, and few remains of its ruins are to be found. The monastery of Pollina stands on a hill which probably is part of the site of the old city. (2) A Thracian city on the Black Sea (afterwards Sozopolis, and now Sizeboli), colonized by the Milesians, and famous for its colossal statue of Apollo by Calamis, which Lucullus removed to Rome.

APOLLONIUS, surnamed 6 SvctkoXos (" the Surly or Crabbed"), a celebrated grammarian of Alexandria, who lived in the reigns of Hadrian and Antoninus Pius. He spent the greater part of his life in his native city, where he died; he is also said to have visited Rome and attracted the attention of Antoninus. He was the founder of scientific grammar and is styled by Priscian grammaticorum princeps. Four of his works are extant: On Syntax, ed. Bekker, 1817; and three smaller treatises, on Pronouns, Conjunctions and Adverbs, ed. Schneider, 1878.

Grammatici Graeci, i. in Teubner series; Egger, Apollonius Dyscole (1854).

APOLLONIUS, surnamed 6 p.aX

APOLLONIUS, surnamed " the Sophist," of Alexandria, a famous grammarian, who probably lived towards the end of the 1st century a.d. He was the author of a Homeric lexicon (Ae£e« 'Q(j.T]piKal), the only work of the kind we possess, His chief authorities were Aristarchus and Apion's Homeric glossary.

Edition by Villoison (1773), I. Bekker (1833) ; Leyde, De Apollonii Sophistae Lexico Homerico (1885); E. W. B. Nicholson on a newly discovered fragment in Classical Review (Nov. 1897).

APOLLONIUS MOLON (sometimes called simply Molon), a Greek rhetorician, who flourished about 70 B.C. He was a native of Alabanda, a pupil of Menecles, and settled at Rhodes. He twice visited Rome as an

ambassador from Rhodes, and Cicero and Caesar took lessons from him. He endeavoured to moderate the florid Asiatic style and cultivated an " Atticiz- ing" tendency. He wrote on Homer, and, according to Josephus, violently attacked the Jews.

See C. Miiller, Fragmenta Historicorum Graecorum, iii. ; E. Schiirer, History of the Jewish People, iii. (Eng. tr. 1886).

APOLLONIUS OF PERGA [Pergaeus], Greek geometer of the Alexandrian school, was probably born some twenty-five years later than Archimedes, i.e. about 262 B.C. He flourished in the reigns of Ptolemy Euergetes and Ptolemy Philopator (247-205 B.C.). His treatise on Conies gained him the title of The Great Geometer, and is that by which his fame has been transmitted to modern times. All his numerous other treatises have perished, save one, and we have only their titles handed down, with general indications of their contents, by later, writers, especially Pappus. After the Conies in eight Books had been written in a first edition, Apollonius brought out a second edition, considerably revised as regards Books i.-ii., at the instance of one Eudemus of Pergamum;

the first three books were sent to Eudemus at intervals, as re- vised, and the later books were dedicated (after Eudemus' death) to King Attalus I. (241-197 B.C.). Only four Books have survived in Greek; three more are extant in Arabic; the eighth has never been found. Although a fragment has been found of a Latin translation from the Arabic made in the 13th century, it was not until 1661 that a Latin translation of Books v.-vii. was available. This was made by Giovanni Alfonso Borelli and Abraham Ecchellensis from the free version in Arabic made in 983 by Abu '1-Fath of Ispahan and preserved in a Florence MS. But the best Arabic translation is that made as regards Books i.-iv. by Hilal ibn Abl Hilal (d. about 883), and as regards Books v.-vii. by Tobit ben Korra (836-901). Halley used for his translation an Oxford MS. of this translation of Books v.vii., but the best MS. (Bodl. 943) he only referred to in order to correct his translation, and it is still unpublished except for a fragment of Book v. published by L. Nix with German transla tion (Drugulin, Leipzig, 1889). Halley added in his edition (1710) a restoration of Book viii., in which he was guided by the fact that Pappus gives lemmas " to the seventh and eighth books " under that one heading, as well as by the statement of Apollonius himself that the use of the seventh book was illustrated by the problems solved in the eighth.

The degree of originality of the Conies can best be judged from Apollonius' own prefaces. Books i.iv. form an " ele mentary introduction," i.e. contain the essential principles; the rest are specialized investigations in particular directions. For Books i.iv. he claims only that the generation of the curves and their fundamental properties in Book i. are worked out more fully and generally than they were in earlier treatises, and that a number of theorems in Book iii. and the greater part of Book iv. are new. That he made the fullest use of his prede cessors' works, such as Euclid's four Books on Confcs, is clear from his allusions to Euclid, Conon and Nicoteles. The gener- ality of treatment is indeed remarkable; he gives as the fundamental property of all the conies the equivalent of the Cartesian equation referred to oblique axes (consisting of a diameter and the tangent at its extremity) obtained by cutting an oblique circular cone in any manner, and the axes appear only as a particular case after he has shown that the property of the conic can be expressed in the same form with reference to any new diameter and the tangent at its extremity. It is clearly the form of the fundamental property (expressed in the terminology of the " application of areas ") which led him to call the curves for the first time by the names parabola, ellipse, hyperbola. Books v.-vii. are clearly original. Apollonius' genius takes its highest flight in Book v., where he treats of normals as minimum and maximum straight lines drawn from given points to the curve (independently of tangent properties), discusses how many normals can be drawn from particular points, finds their feet by construction, and gives propositions determining the centre of curvature at any point and leading at once to the Cartesian equation of the evolute of any conic.

The other treatises of Apollonius mentioned by Pappus are — 1st, A670U ctaroTO/iJ7, Cutting of a Ratio; 2nd, Xuplov cbroTO/tˆ, Cutting off an Area; 3rd, Aiupur /xtvr] rofiri, Determinate Section; 4th, 'E-waal, Tangencies; 5th, Newms, Inclinations; 6th, Toiroi «riir«5oi, Plane Loci. Each of these was divided into two books, and, with the Data, the Porisms and Surface-Loci of Euclid and the Conies of Apollonius were, according to Pappus, included in the body of the ancient analysis.

1 st. De Rationis Sectione had for its subject the resolution of the following problem: Given two straight lines and a point in each, to draw through a third given point a straight line cutting the two fixed lines, so that the parts intercepted between the given points in them and the points of intersection with this third line may have a given ratio.

2nd. De Spatii Sectione discussed the similar problem which requires the rectangle contained by the two intercepts to be equal to a given rectangle.

An Arabic version of the first was found towards the end of the 17th century in the Bodleian library by Dr Edward Bernard,

who began a translation of it; Halley finished it and published it along with a restoration of the second treatise in 1706.

3rd. De Sectione Determinata resolved the problem: Given two, three or four points on a straight line, to find another point on it such that its distances from the given points satisfy the condition that the square on one or the rectangle contained by two has to the square on the remaining one or the rectangle contained by the remaining two, or to the rectangle contained by the remaining one and another given straight line, a given ratio. Several restorations of the solution have been attempted, one by W. Snellius (Leiden, 1698), another by Alex. Anderson of Aberdeen, in the supplement to his Apollonius Redivivus (Paris, 161 2), but by far the best is by Robert Simson, Opera quaedam reliqua (Glasgow, 1776).

4th. De Tactionibus embraced the following general problem: Given three things (points, straight lines or circles) in position, to describe a circle passing through the given points, and touching the given straight lines or circles. The most difficult case, and the most interesting from its historical associations, is when the three given things are circles. This problem, which is sometimes known as the Apollonian Problem, was proposed by Vieta in the 1 6th century to Adrianus Romanus, who gave a solution by means of a hyperbola. Vieta thereupon proposed a simpler construction, and restored the whole treatise of Apollonius in a small work, which he entitled Apollonius Gallus (Paris, 1600). A very full and interesting historical account of the problem is given in the preface to a small work of J. W. Camerer, entitled Apollonii Pergaei quae super sunt, ac maxime Lemmata Pappi in hos Libros, cum Observationibus, &c. (Gothae, 1795, 8vo).

5th. De Inclinalionibus had for its object to insert a straight line of a given length, tending towards a given point, between two given (straight or circular) lines. Restorations have been given by Marino Ghetaldi, by Hugo d'Omerique (Geometrical Analysis, Cadiz, 1698), and (the best) by Samuel Horsley (1770).

6th. De Locis Planis is a collection of propositions relating to loci which are either straight lines or circles. Pappus gives somewhat full particulars of the propositions, and restorations were attempted by P. Fermat (CEuvres, i., 1891, pp. 3-51), F. Schooten (Leiden, 1656) and, most successfully of all, by R. Simson (Glasgow, 1749).

Other works of Apollonius are referred to by ancient writers, viz. (1) Ilept rod irvpiov, On the Burning-Glass, where the focal properties of the parabola probably found a place; (2) Ilept rod KoxAtou, On the Cylindrical Helix (mentioned by Proclus) ; (3) a comparison of the dodecahedron and the icosahedron inscribed in the same sphere; (4) 'H

KadoXov xpay/Kireia, perhaps a work on the general principles of mathematics in which were included Apollonius' criticisms and suggestions for the improvement of Euclid's Elements; (5) 'Qkvtoklov (quick bringing-to-birth), in which, according to Eutocius, he showed how to find closer limits for the value of ir than the 3-ˆ and 3-ˆ- of Archimedes; (6) an arithmetical work (as to which see Pappus) on a system of expressing large numbers in language closer to that of common life than that of Archimedes' Sand-reckoner, and showing how to multiply such large numbers; (7) a great extension of the theory of irrationals expounded in Euclid, Book x., from binomial to multinomial and from ordered to unordered irraˆ tionals (see extracts from Pappus' comm. on Eucl. x., preserved in Arabic and published by Woepcke, 1856). Lastly, in astronomy he is credited by Ptolemy with an explanation of the motion of the planets by a system of epicycles; he also made researches in the lunar theory, for which he is said to have been called Epsilon (e).

The best editions of the works of Apollonius are the following : (1) Apollonii Pergaei Conicorum libri quatuor, ex versione Frederici Commandini (Bononiae, 1566), fol. ;. (2) Apollonii Pergaei Conicorum libri octo, et Sereni Antissensis de Sectione Cylindri et Coni libri duo (Oxoniae, 1710), fol. (this is the monumental edition of Edmund Halley) ; (3) the edition of the first four books of the Conies given in 1675 by Barrow; (4) Apollonii Pergaei de Sectione Rationis libri duo: Accedunt ejusdem de Sectione Spatii libri duo Restituti: Praemittitur , &c, Opera et Studio Edmundi Halley (Oxoniae, 1706), 4to; (5) a German translation of the Conies by H. Balsam (Berlin, 1861); (6) the definitive Greek text of Heiberg (Apollonii Pergaei quae Graece

exslant Opera, Leipzig, 1891-1893); (7) T. L. Heath, Apollonius, Treatise on Conic Sections (Cambridge, 1 896) ; see also H. G. Zeuthen, Die Lekre von den Kegelschnitten im Alterlum (Copenhagen, 1886 and 1902;. (T. L. H.)

APOLLONIUS OF RHODES (Rhodius), a Greek epic poet and grammarian, of Alexandria, who flourished under the Ptolemies Philopator and Epiphanes (222-181 B.C.). He was the pupil of Callimachus, with whom he subsequently quarrelled. In his youth he composed the work for which he is known— Argonautica, an epic in four books on the legend of the Argonauts. When he read it at Alexandria, it was rejected through the influence of Callimachus and his party. Disgusted with his failure, Apollonius withdrew to Rhodes, where he was very successful as a rhetorician, and a revised edition of his epic was well received. In recognition of his talents the Rhodians bestowed the freedom of their city

upon him- — the origin of his surname. Returning to Alexandria, he again recited his poem, this time with general applause. In 196, Ptolemy Epiphanes appointed him librarian of the Museum, which office he probably held until his death. As to the Argonautica, Longinus' {De Sublim. p. 54, 19) and Quintilian's (Inslit. x. 1, 54) verdict of mediocrity seems hardly deserved; although it lacks the natural- ness of Homer, it possesses a certain simplicity and contains some beautiful passages. There is a valuable collection of scholia. The work, highly esteemed by the Romans, was imitated by Virgil {Aeneid, iv.), Varro Atacinus, and Valerius Flaccus. Marianus (about a.d. 500) paraphrased it in iambic trimeters. Apollonius also wrote epigrams; grammatical and critical works; and Kritras (the foundations of cities).

Editio Princeps (Florence, 1496) ; Merkel-Keil (with scholia, 1854) ; Seaton (1900). English translations: Verse, by Greene (1780); Fawkes (1780); Preston (181 1); Way (1901); Prose by Coleridge (1889); see a ' so Couat, La Poesie alexandrine; Susemihl, Geschichte der griech. Lit. in der alexandrinischen Zeit.

APOLLONIUS OF TRALLES (in Caria), a Greek sculptor, who flourished in the 2nd century B.C. With his brother Tauriscus, he executed the marble group known as the Farnese Bull, re- presenting Zethus and Amphion tying the revengeful Dirce to the tail of a wild bull.

See Greek Art, pi. i. fig. 51.

APOLLONIUS OF TYANA, a Greek philosopher of the Neo- Pythagorean school, born a few years before the Christian era. He studied at Tarsus and in the temple of Asclepius at Aegae, where he devoted himself to the doctrines of Pythagoras and adopted the ascetic habit of life in its fullest sense. He travelled through Asia and visited Nineveh, Babylon and India, imbibing the oriental mysticism of magi, Brahmans and gymnosophists. The narrative of his travels given by his disciple Damis and reproduced by Philostratus is so full of the miraculous that many have regarded him as an imaginary character. On his return to Europe he was saluted as a magician, and received the greatest reverence from priests and people generally. He himself claimed only the power of foreseeing the future; yet in Rome it was said that he raised from death the body of a noble lady. In the halo of his mysterious power he passed through Greece, Italy and Spain. It was said that he was accused of treason both by Nero and by Domitian, but escaped by miraculous means. Finally he set up a school at Ephesus, where he died, apparently at the age of a hundred years. Philostratus keeps up the mystery of his hero's life by saying, " Concerning the manner of his death, if he did die, the accounts are various. ' ' The work of Philostratus composed at the instance of Julia, wife of Severus, is generally regarded as

a religious work of fiction. It contains a number of obviously fictitious stories, through which, however, it is not impossible to discern the general character of the man. In the 3rd century, Hierocles (q.v.) endeavoured to prove that the doctrines and the life of Apollonius were more valuable than those of Christ, and, in modern times, Voltaire and Charles Blount (1654-1693), the English freethinker, have adopted a similar standpoint. Apart from this extravagant eulogy, it is absurd to regard Apollonius merely as a vulgar charlatan and miracle-monger. If we cut away the mass of mere fiction which Philostratus accumulated, we have left a highly imaginative, earnest reformer who laboured

to infuse into the flaccid dialectic of paganism a saner spirit of practical morality.

See L. Dyer, Studies of the Gods in Greece (New York, 1891) ;

A. Chassang, Le Merveilleux dans I'antiquite (1882) ; D. M. Tredwell, Sketch of the Life of Apollonius of Tyana (New York, 18S6) ; F- C. Baur, Apollonius von Tyana und t Christus, ed. Ed. Zeller (Leipzig, 1876, — an attempt to show that Philostratus's story is merely a pagan counterblast to the New Testament history) ; J. Jessen, Apollonius v. Tyana und sein Biograph Philostratos (Hamburg, 1885) ; J. Gott- sching, Apollonius von Tyana (Berlin, 1889); J. A. Froude. Short Studies, vol. iv. ; G. R. S. Mead, Apollonius of Tyana (London, 1901) ;

B. L. Gildersleeve, Essays and Studies (New York, 1896) ; Philo- stratus's Life of Apollonius (Eng. trans. New York, 1905) ; O. de B. Priaulx, The Indian Travels of Apollonius (1873) ; F. W. G. Camp- bell, Apoll. of Tyana (1908); see also Neo-Pythagoreanism.

APOLLONIUS OF TYRE, a medieval tale supposed to be derived from a lost Greek original. The earliest mention of the story is in the Carmina (Bk. vi. 8, 11. 5-6) of Venantius For- tunatus, in the second half of the 6th century, and the romance may well date from three centuries earlier. It bears a marked resemblance to the Antheia and Habrokomes of Xenophon of Ephesus. The story relates that King Antiochus, maintaining incestuous relations with his daughter, kept off her suitors by asking them a riddle, which they must solve on pain of losing their heads. Apollonius of Tyre solved the riddle, which had to do with Antiochus's secret. He returned to Tyre, and, to escape the king's vengeance, set sail in search of a place of refuge. In Cyrene he married the daughter of King Archistrates, and presently, on receiving news of the death of Antiochus, departed to take possession of the kingdom of Antipch, of which he was, for no clear reason, the heir. On the voyage his wife died^ or rather seemed to die, in giving birth to a daughter, and the sailors demanded that she should be thrown

overboard. Apol- lonius left his daughter, named Tarsia, at Tarsus in the care of guardians who proved false to their trust. Father, mother, and daughter were only reunited after fourteen years' separation and many vicissitudes. The earliest Latin MS. of this tale, preserved at Florence, dates from the 9th or 10th century. The pagan features of the supposed original are by no means all destroyed. The ceremonies observed by Tarsia at her nurse's grave, and the preparations for the burning of the, body of Apollonius's wife, are purely pagan. The riddles which Tarsia propounds to her father are obviously interpolated. They are taken from the Enigmata of Caelius Firmianus Symposius. The many inconsistencies of the story seem to be best explained by the supposition (E. Rohde, Der griechische Roman, 2nd ed., 1900, pp. 435 et seq.) that the Antiochus story was originally entirely separate from the story of Apollonius's wanderings, and was clumsily tacked on by the Latin author. The romance kept its form through a vast number of medieval re-arrangements, and there is little change in its outlines as set forth in the Shake- spearian play of Pericles.

The Latin tale is preserved in about 100 MSS., and was printed by M.Velser (Augsburg, 1595), by J. Lapaume in Script. Erot. (Didot, Paris, 1856), and by A. Riese in the Bibl. Teubneriana (1871, new ed. 1893). The most widespread versions in the middle ages were those of Godfrey of Viterbo in his Pantheon (1185), where it is related as authentic history, and in the Gesla Romanorum (cap. 153), which formed the basis of the German folk-tale by H. Steinhowel (Augs- burg, 1471), the Dutch version (Delft, 1493), the French in Le Violier- des histoires romaines (Paris, 1521), the English, by Laurence Twine (London, 1576, new ed. 1607), also of the Scandinavian, Czech, and Hungarian tales.

In England a translation was made as early as the nth century (ed. B. Thorpe, 1834, and J. Zupitza in Archivfur neuere Sprachen, 1896); there is a Middle English metrical version (J. O. Halliwelh A New Boke about Shakespeare, 1850), by a poet who says he was vicar of Wimborne; John Gower uses the tale as an example of the seventh deadly sin in the eighth book of his Confessio Amantis; Robert Copland translated a prose romance of Kynge Apbllyne of Thyre (Wynkyn de Worde, 1510) from the French; Pericles was entered at Stationers' Hall in 1607, and was followed in the next year by George Wilkins's novel, The Painfull Adventures of Pericles, Prynce of Tyre (ed. Tycho Mommsen, Oldenburg, 1857), and George Lillo drew his play Marina (1738) from the piece associated with Shakespeare; Orendel, by a Middle High German minnesinger, contains some of the episodes of Apollonius; Heinrich von Neustadt wrote a poem of 20,000 lines on Apollonius von Tyrland (c. 1400) ; the story was well known in Spanish, Libre de A polonio (yerse, c. 1200), and in J. de Timoneda's PatraKuelo (1576) ; in French much

of it was embodied in Jourdain de Blaives (13th cent.), and it also appears in Italian and medieval Greek. See A. H. Smyth, Shake- speare's Pericles and Apollonius of Tyre (Philadelphia, 1898) ; Elimar Klebs, Die Erzahlung von A. aus Tyrus (Berlin, 1899); S. Singer, Apollonius von Tyrus (Halle, 1895).

APOLLOS ('AttoWws; contracted from Apollonius), an Alexandrine Jew who after Paul's first visit to Corinth worked there in a similar way (1 Cor. iii. 6). He was with Paul at a later date in Ephesus (1 Cor. xvi. 12). In 1 Cor. i. 10-12 we read of four parties in the Corinthian church, of which two attached themselves to Paul and Apollos respectively, using their names, though the " division " can hardly have been due to conflicting doctrines. (See Paul.) From Acts xviii. 24-28 we learn that he spoke and taught with power and success. He may have capti- vated his hearers by teaching " wisdom," as P. W. Schmiedel suggests, in the allegorical style of Philo, and he was evidently a man of unusual magnetic force. There seems to be some con- tradiction between Acts xviii. 25 a b and Acts xviii. 25 c, 26 b c; and it has been suggested that these latter passages are subse- quent accretions. Since Apollos was a Christian and " taught exactly," he could hardly have been acquainted only with John's baptism or have required to be taught Christianity more thoroughly by Aquila and Priscilla. Martin Luther regarded Apollos as the author of the Epistle to the Hebrews, and many scholars since have shared his view.

Jerome says that Apollos was so dissatisfied with the division at Corinth, that he retired into Crete with Zenas, a doctor of the law; and that the schism having been healed by Paul's letter to the Corinthians, Apollos returned to the city, and became its bishop. Less probable traditions assign to him the bishopric of Duras, or of Iconium in Phrygia, or of Caesarea.

See the articles in the Encyclopaedia Biblica; Herzog-Haiick, Realencyklopadie ; The Jewish Encyclopaedia; Hastings' Dictionary of the Bible; and cf. Weizsacker, Das apostolische Zeitalter; A. C. McGiffert, History of Christianity, in the Apostolic Age.

APOLLYON, the " foul fiend " who assaulted Christian on his pilgrimage through the Valley of Humiliation in John Bunyan's great allegory. The name (Gr. ' AiroWvoiv) , which means " destroyer " (airoWbtiv, to destroy), is taken from Rev. ix. 11, where it represents the Hebrew word Abaddon (lit. " place of destruction," but here personified). The identification with the Asmodeus (q.v.) of Tobit iii. 8 is erroneous.

APOLOGETICS, in theology, the systematic statement of the grounds which Christians allege for belief in (at least) a super- natural revelation and a divim redemption (cf. e.g. Heb. i. 1-3). The majority of apologists in the past have further believed in an infallible Bible; but they admit this position can only be reached at a late stage in the argument. We should note, how- ever, that even a liberal orthodoxy, while saying nothing about infallibility, is pledged to the essential authority of the Bible; it cannot e.g. simply ignore the Old Testament with F. E. D. Schleiermacher. Catholic apologetics must further give a central position to Church authority, which Roman Catholics explicitly define as infallible; but this position too is debated in a late section of their system. On the other hand, there may be a Christianity which seeks to extricate the " spiritual " from the" supernatural " (Arnold Toynbee, characterizing T.H.Green). It would only lead to confusion, however, if we called this method " apologetic." Any single effort in apologetics may be termed " an apology." More elaborate contrasts have been proposed between the two words, but are of little practical importance.

I. The Word itself. — In Greek, airo\oyia is the defendant's reply (personally, not through a lawyer) to the speech for the prosecu- tion — Karriyopla. Sometimes defendants' speeches passed into literature, e.g. Plato's splendid version of the Apology of Socrates Thus, in view of persecution or slander, the Christian church naturally produced literary " Apologies." The word has never quite lost this connotation of standing on the defensive and rebutting criticism; e.g. Anselm's Apologia contra insipientem Gaunilonem (c. 1100); or the Lutheran Apology for the Augsburg Confession (1531); or J. H. Newman's Apologia pro vita sua (1864); or A. B. Bruce's Apologetics; or Christianity Defensively Stated (1892). Of course, defence easily passes into counter- attack, as when early apologists denounce Greek and Roman*

religion. Yet the purpose may be defence even then. And there is perhaps a reason of a deeper kind for holding Apologetics to the defensive. Christianity is a prophetic religion. Now a prophet does not argue; he declares what he feels to be God's will. For himself, he rests, like the mystic, upon an immediate vision of truth; but he differs from most mystics in having a message for others; and — again unlike most mystics— he addresses the hearer's conscience, which we might call (in one sense) the mystic element in every man — or better, perhaps, the prophetic. Can the positive grounds for a prophet's message be analysed and stated in terms of argument? If so, apologetics is literally a science, and it is pedantry to claim the defensive and pretend to throw the onus probandi upon objectors. But, if not, then apologetics is a mere auxiliary, and is only " a science " in so far as it presents a conscious and systematic plea. Bruce's title, and his programme of "succouring distressed faith," imply the latter alternative; the

moral appeal of Christianity, primary and essential; its confirmation by argument, secondary. The view has its difficulties; but it is hignly suggestive.

The word airo\oyla is used by Origen (Contra Cel. ii. 65, v. 19) of the general Christian defence. But the introduction of the adjective " apologetic " and of the substantive " apologetics " is recent. They are serviceable as bracketing together (1) Natural Theology or Theism, (2) Christian Evidences — chiefly "miracles" and "prophecy"; or, on a more modern view, chiefly the character and personality of Christ. The lower usage of Apology (as expression of regret for a fault) has tipped many a sarcasm besides George III.'s on the occasion of Bishop Watson's book, " I did not know that the Bible needed an apology! "

II. Apologetics in the Bible.— The Old Testament does not argue in support of its beliefs, unless when (chiefly in parts of the Wisdom literature) it seeks to rebut moral difficulties (cf. T. K. Cheyne, Job and Solomon; A. S. Peake, Problem of Suffer- ing in the Old Testament, 1904). The New Testament reflects chiefly controversy with Jews. Great emphasis is laid upon alleged fulfilments — striking or fanciful, but very generally striking to that age — of Old Testament prophecy (Matt, especi- ally; rather differently Ep. to Heb.). The miracles of Jesus are also canvassed. Jews do not deny their wonderful character, but attribute them to black art (Mark iii. 22 &c, &c). On the other hand, Christians and Jews are pretty well agreed on natural theology; so the New Testament tends to take its theism for granted. However, Rom. i. 20 has had great influence on Christian theology (e.g. Thomas Aquinas) in leading it to base theism upon reason or argument. One apologetic contention, aimed at Gentile readers, is found among the motives of Acts. Christianity is not a lawless but an excellent law-abiding faith. So (it is alleged) rulers, both Jewish and Gentile, have often admitted (xviii. 14; xix. 37; xxiii. 9; xxvi. 32).

III. Early Christian. — When we leave the New Testament, apologetics becomes conspicuous until the political triumph of Christianity, and even somewhat later. The atmosphere is no longer Jewish but fully Greek. True there are, as always, Jewish controversialists. Justin Martyr writes a Dialogue with Trypho; Origen deals with many anti-Christian arguments borrowed by Celsus from a certain nameless Jew. Yet Greece was the sovereign power in all the world of ancient culture. And so Christianity was necessarily Hellenized, necessarily philosophized. One result was to bring natural theology into the forefront. A pure morality, belief in one God, hopes extend- ing beyond death— these appealed to the age; the Church taught them as philosophically true and divinely revealed. But, further still, philosophy offered a vehicle which could be applied to the contents of Christianity. The Platonic or eclectic theism, which adopted the conception

of the Logos, made a place for Christ in terms of philosophy within. the Godhead. (John i. 1 may or may not be affected by Philo; it is almost or quite solitary in the N.T.) Similarly, the immortality of the soul may be maintained on Platonic or quasi-Platonic lines, as by St Athanasius (Contra Centes, § 33) — a writer who repeatedly quotes the Alexandrian Book of Wisdom, in which Platonism and the Old Testament had already joined partnership. This

phase of Platonism, however, was much more slowly adopted. The earlier apologists dispute the natural immortality of the soul; Athanasius himself, in De Incarnatione Dei, §§ 4, 5, tones down the teaching of Wisdom; and the somewhat eccentric writer Arnobius, a layman — from Justin Martyr downwards apologetics has always been largely in the hands of laymen — stands for what has recently been called " conditional immor- tality " — eternal life for the righteous, the children of God, alone.

Allied with this more empiricist stand-point is the assertion that Greek philosophy borrowed from Moses; but in studying the Fathers we constantly find that groundless assertion uttered in the same breath with the dominant Idealist view, according to which Greek philosophy was due to incomplete revelation from the divine Logos.

On purely defensive lines, early apologists rebut charges of cannibalism and sexual promiscuity; the Christians had to meet in secret, and the gossip of a rotten age drew malignant conclusions. They make counter attacks on polytheism as a folly and on the shamefulness of obscene myths. Here they are in line with non-Christian writers or culture-mockers like Lucian of Samosata; or graver spirits like Porphyry, who champions Neo-Platonism as a rival to Christianity, and does pioneer work in criticism by attacks on some of the Old Testament books. Turning to Christian evidence proper, we are struck with the continued prominence of the argument from prophecy. The Old Testament was an immense religious asset to the early church. Their enemies had nothing like it; and — the N.T. canon being as yet but half formed — the Old Testament was pushed into notice by dwelling on this imperfect " argument," which grew more extravagant as the partial control exercised by Jewish learning disappeared. An argument from miracles is also urged, though with more reserve. Formally, every one in that age admitted the supernatural. The question was, whose supernatural ? And how far did it carry you ? Miracle could not be to a 3rd century writer what it was to W. Paley — a conclusive and well-nigh solitary proof. Other apologies are by Aristides (recently recovered in translation),

Athenagoras ("elegant"), Eusebius of Caesarea, Cyril of Alexandria; in Latin by Minucius Felix, Tertullian (a masculine spirit and phrase-coiner like T. Carlyle, if bitterer still), Lactantius Firmi- anus, &c, &C 1

As Christianity wins the day, a new objection is raised to it. The age is full of troubles; Christianity is ruining the empire! Besides notices elsewhere, we find the charge specially dealt with by St Augustine and his friends. Paulus Orosius argues that the world has always been a vale of tears. Salvian contends that not the acceptance of Christianity, but the sins of the people are bringing trouble upon them; and he gives ugly evidence of the continued prevalence of vice. Most impressive of all was Augustine's own contribution in The City of God. Powers created by worldliness and sin are crumbling, as they well may; "the city of God remaineth!" Whether he meant it so or not, the saint's argument became a programme and an apologia for the imperializing of the Western Church under the leadership of Rome during the middle ages.

IV. Middle Ages. — From the point of view of apologetics, we may mass together the long stretch of history which covers the period between the disappearance and the re-appearance of free discussion. When emperors became converts, the church, so lately a victim and a pleader for liberty, readily learned to persecute. Under such conditions there is little scope for apologetics. Force kills argument and drives doubt below the smooth surface of a nominal conformity. But there were two influences beyond the bounds or beyond the power of the christianized empire. The Jew remained, as always, stubbornly unconvinced, and, as often, fond of slanders. Many of the principal medieval attempts in apologetics are directed chiefly against him, e.g. the Pugio Fidei of Raymond Martini (c. 1280),

1 While these writings are of great historical value, they do not, of course, represent the Christian argument as conceived to-day. The Church of Rome prefers medieval or modern statements of its position; Protestantism can use only modern statements.

which became one of Pascal's sources (see V. below), or Peter Abelard's Dialogus inter Judaeum Philosophum et Christianum. And the Moslem came on the scenes bringing, as a gift for Christendom, fuller knowledge of classical, especially Aristo- telian, texts. The Jews, less bitterly opposed to Mahommed- anism than the Christians were, caught fire more rapidly, and in some cases served as an intermediate link or channel of communication. These two religions anticipated the dis- cussion of the problem of faith and reason in the Christian church. According to the great Avicenna and Maimonides, faith and the highest reason are sure to coincide (see Arabian Philosophy). According to Ghazali, in his Destruction of Philo- sophers, the

various schools of philosophy cancel each other; reason is bankrupt; faith is everything. (So nearly Jehuda Halevi.) According to Averroes, reason suffices, and faith, with (what he considers) its dreams of immortality and the like, is useful only for the ignorant masses. Christian theology, how- ever, strikes out a line of its own. Moslems and Jews were applying Aristotelian philosophy to rigorously monotheistic faiths; Christianity had been encouraged by Platonism in teaching a trinity of divine persons, and Platonism of a certain order long dominated the middle ages as part of the Augustinian tradition. In sympathy with this Platonism, the medieval church began by assuming the entire mutual harmony of faith and reason. Such is the teaching, along different lines, alike of St Anselm and of Abelard. But, when increased knowledge of Aristotle's texts (and of the commentaries) led to the victory of a supposed Aristotelianism over a supposed Platonism, Albertus Magnus, and his still more distinguished pupil Thomas Aquinas, mark certain doctrines as belonging to faith but not to reason. They adhere to the general position with exceptions (in the case of what had been considered Platonic doctrines). From the point of view of philosophy, this was a compromise. Faith and reason partly agree, partly diverge. The tendency of the later middle ages is to add to the number of the doctrines with which philosophy cannot deal. Thomas's great rival, Duns Scotus, does this to a large extent, at times affirming " two truths." The latter position, ascribed by the schoolmen to the Averroists, becomes dominant among the later Nominalists, William of Occam and his, disciples, who withdraw all doctrines of faith from the sphere of reason. This was a second and a more audacious compromise. It is not exactly an attempt to base Christian faith on rational scepticism. It is a consistent policy of harbouring inconsistencies in the same mind. A statement may be true in philosophy and false in theology, or vice versa. To the standpoint of Aquinas, however, the Church of Rome (at least in regard to the basis of doctrine) has more and more returned. The councils of Trent and of the Vatican mark the Two Truths hypothesis as heretical, when they affirm that there is a natural knowledge of God and natural certainty of immortality. Along with this affirmation, the Church of Rome (if less decisively) has adopted the limitations of the Thomist theory by the condemnation of " Ontologism "; certain mysterious doctrines are beyond reason. This cautious compromise sanctioned by the Church does not represent the extremest reaction against nominalism. Even in the nominalistic epoch we have Raymond of Sabunde's Natural Theology (accord- ing to the article in Herzog-Hauck, not the title of the oldest Paris MS., but found in later MSS. and almost all the printed editions) or Liber Creaturarum (c. 1435). The book is not what moderns (schooled unconsciously in post-Reformation develop- ments of Thomist ideas) expect under the name of natural theology. It is an attempt once more to demonstrate all scholastic dogmas out of the book of creation or on

principles of natural reason. At many points it follows Anselm closely, and, of course, very often " makes light work " of its task.

The Thomist compromise — or even the more sceptical view of "two truths" — has the merit of giving filling of a kind to the formula "supernatural revelation" — mysteries inaccessible to reason, beyond discovery and beyond comprehension. According to earlier views — repeatedly revived in Protestantism — revelation is just philosophy over again. Can the choice be

fairly stated? If revelation is thought of as God's personal word, and redemption as his personal deed, is it reasonable to view them either as open to a sort of scientific prediction or as capricious and unintelligible? Even in the middle ages there were not wanting those — the St Victors, Bonaventura — who sought to vindicate mystical if not moral redemption as the central thought of Christianity.

V. Earlier Modern Period. — It will be seen that apologetics by no means reissued unchanged from the long period of authority. The compromise of Aquinas, though not unchallenged, holds the field and that even with Protestants. G. W. Leibnitz devotes an introductory chapter in his TheodicSe, 17 10 (as against Pierre Bayle), to faith and reason. He is a good enough Lutheran to quote as a "mystery" the Eucharist no less than the Trinity, while he insists that truths above are not against reason. Stated thus baldly, has the distinction any meaning? The more cele- brated and central thesis of the book — this finite universe, the best of all such that are possible — also restates positions of Augustine and Aquinas.

Before modern philosophy began its career, there was a great revival of ancient philosophy at the Renaissance; sometimes anti-Christian, sometimes pro-Christian. The latter furnishes apologies by Marsilio Ficino, Agostino Steuco, J. L. Vives.

Early in the modern period occurs the great name of Blaise Pascal (1623-1662). A staunch Roman Catholic, but belonging to a school of Augustinian enthusiasts (the Jansenists), whom the Church put down as heretics, he stands pretty much apart from the general currents. His Pensees, published posthumously, seems to have been meant for a systematic treatise, but it has come to us in fragments. Once again, a lay apologist! A layman's work may have the advantage of originality or the drawback of imperfect knowledge. Pascal's work exhibits both characters. It has the originality of rare genius, but it borrows its material (as

industrious editors have shown) from very few sources — the Pugio Fidei, M. de Montaigne, P. Charron. Ideas as well as learning are largely Montaigne's. The latter's cheerful man-of-the-world scepticism is transfigured in Pascal to a deep distrust of human reason, in part, perhaps, from anti-Protestant motives. But this attitude, while not without parallels both earlier (Ghazali, Jehuda Halevi) and later (H. L. Mansel), has peculiarities in Pascal. It is fallen man whom he pursues with his fierce scorn; his view of man's nature — intellect as well as character — is to be read in the light of his unflinching Augus- tinianism. Again, Pascal, unlike most apologists, belongs to the small company of saintly souls. This philosophical sceptic is full of humble joy in salvation, of deep love for the Saviour.

Another French Roman Catholic apologist, P. D. Huet (1630- 1721) — within the conditions of his age a prodigy of learning (in apologetics see his Demonstratio Evangelica) — is not un- influenced by Pascal (Traite de lafaiblesse de I' esprit humaine).

As we might expect, Protestant lands are more busily occupied with apologetics. Intolerant reliance upon force presents greater difficulties to them; soon it grows quite obsolete. Benedict Spinoza, the eminent Jewish pantheist (1632-1677), to whom miracle is impossible, revelation a phrase, and who renews pioneer work in Old Testament criticism, finds at least a fair measure of liberty and comfort in Holland (his birth-land). Bayle, the historical sceptic, lectured and published his learned Dictionnaire (1696) at Rotterdam. From Holland, earlier, had proceeded an apologetic work by a man of European fame. Hugo Grotius's De Veritate Chrislianae Religionis (1627) is partly the medieval tradition: — Oppose Mahommedans and Jews! It is partly practical:- — Arm Christian sailors against religious danger! But in its cool spirit it forecasts the coming age, whose master is John Locke. His Reasonableness of Christianity (1695) is the thesis of " a whole century " of theologians. And his Essay on the Human Understanding (1690) is almost a Bible to men of education during the same period; its lightest word treasured. Locke does not break with the compromise of Aquinas. But he transfers attention from contents to proof. Reason proves that a revelation has been made — and then submits. Leibnitz has to suonlement rather than correct Locke on this point.

In such an atmosphere, deism readily uttered its protest against mysterious revelation. Deism is, in fact, the Thomist natural theology (more clearly distinguished from dogmatic theology than in the middle ages, alike by Protestants and by the post-Tridentine Church of Rome) now dissolving partnership with dogmatic and starting in business for itself. Or it is the doctrine of unfallen man's " natural state " — a doctrine inten- sified in Protestantism — separating itself from the theologians' grave doctrine of

sin. If Socinianism had challenged natural theology — Christ, according to it, was the prophet who first revealed the way to eternal life — it had glorified the natural powers of man; and the learning of the Arminian divines (friends of Grotius and Locke) had helped to modernize Christian apologetics upon rational lines. Deism now taught that reason, or " the light of nature," was all-sufficient.

Not to dwell upon earlier continental " Deists " (mentioned by Viret as quoted first in Bayle's Dictionary and again in the introduction to Leland's View of the Deistical Writers), Lord Herbert of Cherbury (De Veritate, 1624; De Religione Gentilium, 1645? — according to J. G. Walch's Bibliotheca Theologica (1757) not published complete until 1663) was universally understood as hinting conclusions hostile to Christianity (cf . also T. Hobbes, Leviathan, 1651, ch. xxxi.; Spinoza, Tractatus Theologico-Polilicus, 1670, ch. xiv.). Professedly, Herbert's contention merely is that non-Christians feeling after the " supreme God " and the law of righteousness must have a chance of salvation. Herbert was also epoch-making for the whole 18th century in teaching that priests had corrupted this primitive faith. During the 1 8th century deism spread widely, though its leaders were " irrepressible men like Toland, men of mediocre culture and ability like Anthony Collins, vulgar men like Chubb, irritated and disagreeable men like Matthew Tindal, who conformed that he might enjoy his Oxford fellowship and wrote anonymously that he might relieve his conscience " (A. M. Fairbairn). More distinguished sympathizers are Edward Gibbon, who has the deistic spirit, and David Hume, the historian and philosophical sceptic, who has at least the letter of the deistic creed (Dialogues Concerning Natural Religion), and who uses Pascal's appeal to " faith " in a spirit of mockery (Essay on Miracles). In France the new school found powerful speaking-trumpets, especially Voltaire, the idol of his age — a great denier and scoffer, but always sincerely a believer in the God of reason — and the deeper but wilder spirit of J. J. Rousseau. Others in France developed still more startling conclusions from Locke's principles, E. B. Condillac's sensationalism — Locke's philosophy purged of its more ideal if less logical elements — leading on to materialism in J. O. de la Mettrie; and at least one of the Encyclopedists (P. H. von Holbach) capped materialism with confessed atheism.

In Germany the parallel movement of " illumination " (H. S. Reimarus; J. S. Semler, pioneer in N.T. criticism; and a layman, the great Lessing) took the form of " rationalism " within the church— interpreting Bible texts by main force in a way which the age thought " enlightened " (H. E. G. Paulus, 1761-1851, &c).

Among the innumerable English anti-deistic writers (see W. Law, The Case of Reason; R. Bentley, or " Phileleutherus Lipsiensis "; &c, &c), three are of

chief importance. Nathaniel Lardner (Arian, 1684-1768) stands in the front rank of the scholarship of his time, and uses his vast knowledge to maintain the genuineness of all books of the New Testament and the perfect accuracy of its history. Joseph Butler, a very original, careful and honest thinker, lifts controversy with deists from details to principles in his Analogy of Religion both Natural and Revealed to the Constitution and Course of Nature (1736). This title introduces us to a new conception. Deists and orthodox in those days agreed in recognizing not merely natural theology but natural religion — " essential religion," Butler more than once styles it; the expression shows how near he stood in- tellectually to those he criticized. But morally he stood aloof. In part i. — on Natural Religion — he defends a moral or punishing Deity against the sentimental softness of the age. The God of Nature, whom deists confess- does punish in time, if they will

but look at the facts; why not in eternity ? " Morality," as others have confessed, is " the nature of things " ! Not the Being of God is discussed — Butler will not waste words on triflers (as he thinks them) who deny that — but God's character. Un- fortunately (perhaps) Butler prefers to argue on admitted principles; holds much of his own moral belief in reserve; tries to reduce everything to a question of probable fact. If this hampers him in part i., the situation appears still worse in part ii., which is directly occupied with the defence of Chris- tianity. Butler says nothing about incomprehensible mysteries, and protests that reason is the only ground we have to proceed upon. But by treating the atonement simply as revealed (and unexplained) matter of fact — in spite of some partial analogies in human experience, a thing essentially anomalous — Butler repeats, and applies to the moral contents of Christianity, what Aquinas said of its speculative doctrines. (Whether one calls the unknowable a revealed mystery or an unexplained and in- explicable fact makes little difference.) William Paley (1743- 1805) borrows from many writers; he borrows Lardner's learning and Butler's " particular evidence for Christianity," viz. miracles, prophecy and " history "; and he states his points with perfect clearness. No man ever filled a typical position more exactly than Paley. Eighteenth-century ethics— Hedonism, with a theological background. Empiricist Natural Theology — the argument from Design. Christian Evidences— the strong probability of the resurrection of Christ and the consequent authority of his teaching. Horae Paulinae— mutual confirma- tions of Acts and Epistles; better, though one-sided. When such exclusively " external " arguments are urged, the contents of Christianity go for next to nothing.

VI. Later Modern Period. — Towards the end of the 18th century a new epoch of reconstruction begins in the thought and life of civilization. The leader in speculative philosophy is Immanuel Kant, though he includes many agnostic elements, and draws the inference (which some things in the letter of Butler might seem to warrant) that the essence of Christianity is an ethical theism. While he thus created a new and more ethical " rationalism," Kant's many-sided influence, alike in philosophy and in theology, worked to further issues. He (and other Germans, but not G. W. F. Hegel) was represented in England in a frag- mentary way by S. T. Coleridge (1 772-1834), probably the most typical figure of his period — another layman. His general thought was that " rationalism " represents an uprising of the lower reason or " understanding " against the higher or true " reason." The mysteries of theology-are its best part— not alien to reason but of its substance, the " logos." This is to upset the compromise of Aquinas and go back to a Christian platonism. Of course the difficulty revives again: If a philo- sophy, why supernaturally revealed? Thomas Arnold, criti- cizing Edward Hawkins, appeals rather to the atonement as deeper neglected truth. So in Scotland, Thomas Erskine and Thomas Chalmers — the latter in contradiction to his earlier position — hold that the doctrine of salvation, when translated into experience, furnishes " internal evidence " — a somewhat broader use of the phrase than when it applies merely to evidence of date or authorship drawn from the contents of a book. This gives a new and moral filling to the conception of " supernatural revelation." The attempt to work out either of the reactions against Thomism in new theological systems is pretty much confined to Germany. Hegel's theological followers, of every shade and party, represent the first, and Schleiermacher's the second. Schleiermacher rejects natural religion in favour of the positive religions, while the school of A, Ritschl and W. Herrmann reject natural theology outright in favour of revelation — a striking external parallel to early Socinianism. British and American divines, on the other hand, are slow to suspect that a new apologetic principle may mean a new system of apologetics, to say nothing of a new dogmatic. Among the evangelicals, for the most part, natural theology, far from being rejected, is not even modified, and certain doctrines continue to be described as incomprehensible mysteries. No Protestant, of course, can agree with Roman Catholic theology that (supernatural) faith is an

obedient assent to church authority and the mysteries it dictates. To Protestantism, faith is personal trust. But the principle is hardly ever carried out to the end. Mysterious doctrines are ascribed by Protestants to scripture; so half of revelation is regarded as matter for blind assent, if another half is luminous in experience. The movement of German philosophy which led from Kant to Hegel has indeed found powerful British champions (T. H. Green, J. and E. Caird, &c), but less churchly than

Coleridge (or F. D. Maurice or B. F. Westcott), though churchly again in J. R. Illingworth and other contributors to Lux Mundi (1890). Before this wave of thought, H. L. Mansel tried (1858) to play Pascal's game on Kantian principles, developing the sceptical side of 'Kant's many-faceted mind. But as he protested against relying on the human conscience — the one element of positive conviction spared by Kant — his ingenuity found few admirers except H. Spencer, who claims him as justifying anti-Christian agnosticism. Butler's tradition was more directly continued by J. H. Newman — with modifications on becoming a Roman Catholic in the light of the church's decision in favour of Thomism. A. M. Fairbairn {Catholicism, Roman and Anglican, ch. v., and elsewhere) and E. A. Abbott {Philomythus, and elsewhere) suspect Newman of a sceptical leaven and extend the criticism to Butler's doctrine of "probability." Yet it seems plain that any theology, maintaining redemption as historical fact (and not merely ideal), must attach religious importance to conclusions which are technically probable rather than proven. If we transfer Christian evidence from the " historical " to the " philosophical " with H. Rashdall— we surely cut down Chris- tianity to the limits of theism. And the inner mind of Butler has moral anchorage in the Analogy, quite as much as in the Sermons. It is in part ii. more than in part i. of his masterpiece that the light seems to grow dim. Another of the Oxford con- verts to Rome, W. G. Ward, made vigorous contributions to natural theology.

VII. Contents of Modern Apologetics. — Superficially regarded, philosophy ebbs and flows, whatever progress the debate may reveal to speculative insight. Old positions re-emerge from forgetfulness, and there is always a philosophy to back every " case. " More visible dangers arise for the apologist in the region of science, historical or physical. There the progress of truth ; within whatever limits, is manifest. Essays and Reviews (i860) was a vehement announcement of scientific results — startling English conservatism awake for the first time. And in the scientific region the great apologetic classics, like Butler, are hopelessly out of date. The modern apologist must do ephemeral work' — unless it should chance that he proves to be the skir- misher, pioneering for a modified dogmatic. He holds a watching brief. While he must beware of hasty speech, he has often to plead that new knowledge does not really threaten faith; or that it is not genuinely established knowledge at all; or else, that faith has mistaken its own grounds, and will gain strength by concentrating on its true field. The work is not always well done; but the Christian church needs it.

1. Apologetics and Philosophy. —The main part of this subject is discussed under Theism. Some notes may be added on special points, (a) Freewill is generally assumed on the Christian side (R.C. Church; Scottish philosophy; H. Lotze; J. Martineau; W. G. Ward. Not in a libertarian sense; Leibnitz. New and obscure issues raised by Kant). But there is no continuous

tradition or steady trend of discussion, (b) Personal immortality is affirmed as philosophically certain by the Church of Rome and many Protestant writers. Others teach "conditional im- mortality." Others base the hope on belief in the resurrection of Christ, (c) Theodicy — the tradition of Leibnitz is preserved (on libertarian lines) by Martineau (A Study of Religion, 1883). See also F. R. Tennant's Origin and Propagation of Sin (1902) — sin a " bye-product " of a generally good evolution. Others find in the gospel of redemption the true theodicy, (d) The problem of Christian apologetic has been simplified in the past by the prevalence of the Christian ethics and temper even among many non-Christians (e.g. J. S. Mill). But hereafter it may not prove possible for the apologist to assume as unchallenged the Christian

moral outlook. Germans have suspected an anti-Christian strain in Goethe; all the world knows of it in E. von. Hartmann or F. Nietzsche.

2. Apologetics and Physical Science. — (a) Copernicanism has won its battles and the Church of Rome would fain have its error forgotten. The admission is now general that the Bible cannot be expected to use the language of scientific astronomy. Still, it is not certain that the shock of Copernicanism on supernatural Christianity is exhausted, (b) Geology has also won its battles, and few now try to harmonize it with Genesis. (c) Evolution came down from the clouds when C. Darwin and A. R. Wallace succeeded in displacing the naif conception of special creation by belief in the origin of species out of other species through a process of natural law. This gave immense vogue to wider and vaguer theories of evolutionary process, notably to H. Spencer's grandiose cosmic formula in terms of mechanism. Here the apologist has more to say. The special Darwinian hypothesis — natural " selection " — may or may not be true; it was at least a fruitful suggestion. If true, it need not be exhaustive. Again, evolution itself need not apply everywhere. We are offered a philosophical rather than a scientific speculation when E. Caird (Evolution of Religion, 1893) tries to vindicate Christianity as the highest working of nature — true just because evolved from lower religions. The Christian apologist indeed may himself seek, following John Fiske, to philosophize evolution as a re- statement of natural theology — " one God, one law, one element and one far-off divine event "-^-and as at least pointing towards personal immortality. But if evolution is to be the whole truth regarding Christianity, we should have to surrender both supers natural revelation and divine redemption. And these, it may be strongly urged, contain the magic of Christianity. Losing them it might sink into a lifeless theory.

As far as pure science goes, the inference from science in favour of materialism has visibly lost much of its plausibility, and Protestant apologists would probably be prepared to accept in advance all verified discoveries as belonging to a different region from that of faith. Roman Catholic apologetic prefers to negotiate in detail.

3. Apologetics and History: — History brings us nearer the heart of the Christian position, (a) Old Testament criticism won startling victories towards the end of the 19th century. It blots out much supposed knowledge, but throws a vivid and interesting light on the reconstrued process of history. Most Protestants accept the general scheme of criticism; those who hang back make not a few concessions (e.g. J. Orr f Problem of the O.T., 1006). The Roman Catholic Church again prefers an attitude of reserve, (b) New Testament criticism raises even more delicate issues. Positively it may be affirmed that the recovered figure of the historical Jesus is the greatest asset in the possession of modern Christian theology and apologetics. The "Lives" of Christ, Roman Catholic and Protestant; "critical" (D. F. Strauss, A. Renan, &c.,&c.) and "believing," imply this at least. Negatively, "unchallenged historical certainties " are becoming few in number, or are disappearing altogether, through the industry of modern minds. True, the Tubingen criticism of F. C. Baur and his school — important as the first scientific attempt to conceive New Testament conditions and literature as a whole — has been abandoned. (A. Ritschl's Entstehung der alt-katholischen Kirche, 2nd edition, 1857, was an especially telling reply.) The synoptic gospels are now treated with considerable respect. It is no longer suggested in responsible quarters that they are party documents sacrificing truth to " tendency." But not all quarters are responsible; and in the effort to grasp scientifically, i.e. accurately, the amazing facts of Christ and primitive Christianity, every imaginable hypothesis is canvassed. Even the Roman Catholic Church produced the Abbe Loisy (though he undertakes to play off church certainties against historical uncertainties). Hitherto at least the fourth gospel has been the touchstone. The authorship of the epistles is in many cases a matter of subordinate importance; at least for Protestants or for those surrendering Bible infallibility, which Rome can hardly do. (c) New Testament history.

11. 7

The apologist must maintain (1) that Jesus of Nazareth is a real historical«figure — a point well-nigh overlooked by Strauss, and denied by some modern advocates of a mythical theory; (2) that Jesus is knowable (not one " of whom we really know very little "— B. Jowett) in his teaching, example, character, historical personality; and that he is full of moral splendour. On the other hand, faith has no special interest in

claiming that we can compose a biographical study of the development of Jesus. Certainly no early writer thought of providing material for such use. It is a common opinion in Germany that our material is in fact too scanty or too self-contradictory. Yet the fascination of the subject will always revive the attempt. If it succeeds, there will be a new line of communication along which that great personality will tell on men's minds and hearts. If it fails — there are other channels; character can be known and trusted even when we are baffled by a thing neces sarily so full of mystery as the development of a persoaality. Notably, the manifest non-consciousness of personal guilt in Jesus suggests to us his sinlessness. (3) Apologists maintain that Jesus "claimed" Messiahship. There are speculative constructions of gospel history which eliminate that claim; and no doubt apologetics could — with more or less difficulty — restate its position in a changed form if the paradox of to-day became accepted as historical fact to-morrow. The central apologetic thesis is the uniqueness of the "only-begotten"; it is here that " the supernatural " passes into tie substance of Christian faith. But most probably the description of Jesus as thus unique will continue to be associated with the allegation- He told us so; he claimed Messiahship and "died for the claim." (See preface to 5th ed. of Ecce Homo.) Nor did so superhuman a claim crush him, or deprive his soul of its balance. He' imparted to the title a grander significance out of the riches of his personality. (4) In the light of this the " argument from prophecy " is reconstructed. It ceases to lay much stress upon coincidences between Old Testament predictions or " types " and events in Christ's career. It becomes the assertion; historic- ally, providentially, the expectation of a unique religious figure arose; — " the " Messiah; and Jesus gave himself to be thought of as that great figure. (5) It is also claimed as certain that Jesus had marvellous powers of healing. More reserve is being shown towards the other or "nature" miracles. These latter, it may be remarked, are more unambiguously supernatural. But, if Jesus really cured leprosy or really restored the dead to life, we have miracle plainly enough in the region of healing. (6) For Jesus' own resurrection several lines of evidence are alleged. (i.) All who believe that in any sense Christ rose again insist upon the impression which his personality made during life. It was he whose resurrection seemed credible! Some practically stop here; the apologist proceeds, (ii.) There is the report of the empty grave; historically, not easily waved aside, (iii.) We have New Testament reports of appearances of the risen Jesus ; subjective? the mere clothing of the impression made by his personality during life? or objective? "telegrams" from heaven (Th. Keim) — "Veridical Hallucinations"? or something even more, throwing a ray of light perhaps on the state and powers of the happy dead? (iv,) There is the immense influence of Jesus Christ in history, associated with belief in him as the risen Son of God.

In view of the claims of Jesus, different possibilities arise, (i.) The evangelists impute to him a higher claim than he made. This may be called the rationalistic solution; with sympathy in Christ's ethical teaching, there is relief at minimizing his great claim. So, brilliantly, Wellhausen's Gospel Com- mentaries and Introduction. (Mark fairly historical; other gospels' fuller account of Christ's teaching and claims un- reliable.) (ii.) The claim was fraudulent (Reimarus; Renan, ed. 1; popular anti-Christian agitation). This is a counsel of despair, (iii.) He was an enthusiastic dreamer, expecting the world's end. This the apologist will recognize as the most plausible hostile alternative. He may feel bound to admit an element of illusion in Christ's vision' of the future; but he will contend that the apocalyptic form did not destroy the spiritual Content of Christ's revelations — nay, that it was itself the

vehicle of great truths. So he will argue as the essence of the matter that (iv.) he who has occupied Christ's piece in history, and won such reverence from the purest souls, was what he claimed to be, and that his many-sidedness comes to focus and harmony when we recognize him as the Christ of God and the Saviour of the world.

To a less extent, similar problems and alternatives arise in regard to the church: — Catholicism a compromise between Jewish Christianity and Pauline or Gentile Christianity (F. C. Baur, &c); Catholicism the Hellenizing of Christianity (A. Ritschl, A. Harnack); the Catholic church for good and evil the creation of St Paul (P. Wernle, H. Weinel); the church supernaturally guided (R.C. apologetic; in a modified degree High Church apologetic); essential — not necessarily exclusive — truth of Paulinism, essential error in first principles of Catholicism (Protestant apologetic).

Literature. — Omitting the Christian fathers as remote from the

g resent day, we recognize as works of genius Pascal's Pensees and utler's Analogy, to which we might add J. R. Seeley's Ecce Homo (1865). The philosophical, Platonist, or Idealist line of Christian defence is represented among recent writers by J. R. Illingworth [Anglican], in Personality, Human and Divine (1894), Divine Im- manence (1898), Reason and Revelation (1902), who at times seems rather to presuppose the Thomist compromise, and A. M. Fairbairn [Congregationalist], in Place of Christ in

Modern Theology (1893), Philosophy of the Christian Religion (1902). The appeal to ethical or Christian experience — " internal evidence " — is found especially in E. A. Abbott [Christianity supernatural and divine, but not miraculous], Through Nature to Christ (1877), The Kernel and the Husk (1886), The Spirit on the Waters (1897), &c, or A. B. Bruce, Chief End of Revelation (1881), The Miraculous Element in the Gospels (1886), Apologetics (1892), and other works; Bruce's posthumous article, " Jesus " in Encyc. Bib., was understood by some as exchanging Christian orthodoxy for bare theism, but prob- ably its tone oi aloofness is due to the attempt to keep well within the limits of what the author considered pure scientific history. Scholarly and apologetic discussion on the gospels and life of Jesus is further represented by the writings of W. Sanday or (earlier) of J. B. Lightfoot. Much American work of merit on the character of Christ is headed by W. E Channing, and by H. Bushnell (in Nature and the Supernatural) . For defence of Christ's resurrection, reference may be made to H. Latham's The Risen Lord and R. Mackintosh's First Primer of Apologetics. For modification in light of recent scholarship of argument from prophecy, to Riehm's Messianic Prophecy, Stanton's Jewish and Christian Messiah, and Woods's Hope of Israel. Roman Catholic apologetics — of necessity, Thomist — is well represented by Professor Schanz of Tubingen. The whole Ritschl movement is apologetic in spirit; best English account in A. E. Garvie's Ritschlian Theology (1899). See also the chief church histories or histories of doctrine (Harnack; Loofs; Hagenbach; Shedd) ; A. S. Farrar's Critical History of Free {i.e. anti-Christian) Thought (Bampton Lectures, 1862) ; R. C. Trench's Introduction to Notes on the Miracles, and F. W. Macran's English Apologetic Theology (1905). For the 18th century, G. V. Lechler's Ceschichte des englischen Deismus (1841) ; Mark Pattison in Essays and Reviews (i860) ; Leslie Stephen's English Thought in 18th Century (agnostic) ; John Hunt, Religious Thought in England (3 vols., 1870-1873).

(R. Ma.)

APOLOGUE (from the Gr. airoXoyos, a statement or account), a short fable or allegorical story, meant to serve as a pleasant vehicle for some moral doctrine or to convey some useful lesson. One of the best known is that of Jotham in the Book of Judges (ix. 7-15) ; others are " The City Rat and Field Rat," by Horace, " The Belly and its Members," by the patrician Menenius Agrippa in the second book of Livy, and perhaps most famous of all, those of Aesop. The term is applied more particularly to a story in which the actors or speakers are taken from the brute creation or inanimate nature. An apologue is distinguished from a fable in that there is always some moral sense present, which there need not be in a fable. It is generally dramatic, and has been defined as " a satire in action." It differs from a parable in several respects. A parable is equally an ingenious tale

intended to correct manners, but it can be true, while an apologue, with its introduction of animals and plants, to which it lends our ideas and language and emotions, is necessarily devoid of real truth, and even of all probability. The parable reaches heights to which the apologue cannot aspire, for the points in which brutes and inanimate nature present analogies to man are principally those of his lower nature, and the lessons taught by the apologue seldom therefore reach beyond prudential

morality, whereas the parable aims at representing the relations between man and God. It finds its framework in the world of nature as it actually is, and not in any grotesque parody of it, and it exhibits real and not fanciful analogies. The apologue seizes on that which man has in common with creatures below him, and the parable on that which he has in commpn with God. Still, in spite of the difference of moral level, Martin Luther thought so highly of apologues as counsellors of virtue that he edited and revised Aesop and wrote a characteristic preface to the volume. The origin of the apologue is extremely ancient and comes from the East, which is the natural fatherland of everything connected with allegory, metaphor and imagination. Veiled truth was often necessary in the East, particularly with the slaves, who dared not reveal their minds too openly. It is noteworthy that the two fathers of apologue in the West were slaves, namely Aesop and Phaedrus. La Fontaine in France; Gay and Dodsley in England; Gellert, Lessing and Hagedorn in Germany; Tomas de Iriarte in Spain, and Krilov in Russia, are leading modern writers of apologues. Length is not an essential matter in the definition of an apologue. Those of La Fontaine are often very short, as, for example, " Le Coque et la Perle." On the other hand, in the romances of Reynard the Fox we have medieval apologues arranged in cycles, and attain- ing epical dimensions. An Italian fabulist, Corti, is said to have developed an apologue of " The Talking Animals " to the bulk of twenty-six cantos. La Motte, writing at a time when this species of literature was universally admired, attributes its popularity to the fact that it menage et flatte I' amour-propre by inculcating virtue in an amusing manner without seeming to dictate or insist. This was the ordinary 18th-century view of the matter, but Rousseau contested the educational value of instruction given in this indirect form.

A work by P. Soulle, La Fontaine et ses devanciers (1866), is a history of the apologue from the earliest times until its final triumph in France.

APOLOGY (from Gr. a.Tro\oy'ia, defence), in its usual sense, an expression of regret for something which has been wrongfully said or done; a withdrawal or retraction of some charge or imputation which is false. In an action for libel, the fact that an apology has been promptly and fully made is a plea in mitiga- tion of damages. The apology should have the same form of publicity as the original charge. If made publicly, the proper

form is an advertisement in a newspaper; if made within the hearing of a few only, a letter of apology, which may be read to those who have heard what was said, should be sufficient. By the English Libel Act 1843, s. 2, it was enacted that in an action for libel contained in a newspaper it is a defence for the defendant to plead that the libel was inserted without actual malice and without gross negligence, and that before the commencement of the action and at the earliest opportunity afterwards he inserted in the newspaper a full apology for the libel, or, where the news- paper in which the libel appeared was published at intervals exceeding one week, he offered to publish the apology in any newspaper selected by the plaintiff. The apology must be full and must be printed in as conspicuous a place and manner as the libel was.

The word " apology " or " apologia " is also used in the sense of defence or vindication, the only meaning of the Greek cnroXoyia, especially of the defence of a doctrine or system, or of religious or other beliefs, &c, e.g. Justin Martyr's Apology or J. H. Newman's Apologia pro vita sua. (See Apologetics.)

APONEUROSIS (Gr. cbro, away, and vevpov, a sinew), in anatomy, a membrane separating muscles from each other.

APOPHTHEGM (from the Gr. air66ey fia) , a short and pointed utterance. The usual spelling up to Johnson's day was apothegm, which Webster and Worcester still prefer; it indicates the pro- nunciation — i.e. " apothem " — better than the other, which, however, is more usual in England and follows the derivation. Such sententious remarks as " Knowledge is Power " are apophthegms. They become " proverbs " by age and accept- ance. Plutarch made a famous collection in his Apophlhegmata Laconica.

Fig. 1.

Fig. 2.

APOPHYGE (Gr. a-Koˆwyi), a flying off), in architecture, the lowest part of the shaft of an Ionic or Corinthian column, or the highest member of its base if the column be considered as a whole. The apophyge is the inverted cavetto or concave sweep, on the upper edge of which the diminishing shaft rests.

APOPHYLLITE, a mineral often classed with the zeolites, since it behaves like these when heated before the blowpipe and has the same mode of

occurrence; it differs, however, from the zeolites proper in containing no aluminium. It is a hydrous potassium and calcium silicate, HrKCaˆSiOsˆ + ˆHjO. A small amount of fluorine is often present, and it is one of the few minerals in which ammonium has been detected. The tempera- ture at which the water is expelled is higher than is usually the case with zeolites; none is given off below 200°, and only about half at 250°; this is slowly reabsorbed again from moist air, and is therefore regarded as water of crystallization, the remainder being water of constitution. When heated before the blowpipe, the mineral exfoliates, owing to loss of water, and on this account was named apophyllite by R. J. Haiiy in 1806, from the Greek airo, from, and (i\Xov, a leaf.

Apophyllite always occurs as distinct crystals, which belong to the tetragonal system. The form is either a square prism

terminated by the basal planes (fig. 2), or an acute pyramid (fig. 1). A promi- nent feature of the mineral is its perfect basal cleavage, on which the lustre is markedly pearly, present- ing, in white crystals, some- what the appearance of the eye of a fish after boiling, hence the old name fish-eye-stone or ichthyophthalmite for the mineral. On other surfaces the lustre is vitreous. The crystals are usually transparent and colourless, sometimes with a greenish or rose-red tint. Opaque white crystals of cubic habit have been called albine; xylochlore is an olive-green variety. The hardness is 45, and the specific gravity 2-35.

The optical characters of the mineral are of special interest, and have been much studied. The sign of the double refraction may be either positive or negative, and some crystals are divided into optically biaxial sectors. The variety known as leucocyclite shows, when examined in convergent polarized light, a peculiar interference figure, the rings being alternately white and violet- black and not coloured as in a normal figure seen in white light. Apophyllite is a mineral of secondary origin, commonly occurring, in association with other zeolites, in amygdaloidal cavities in basalt and melaphyre. Magnificent groups of greenish and colourless tabular crystals, the crystals several inches across, were found, with flesh-red stilbite, in the Deccan traps of the Western Ghats, near Bombay, during the construction of the Great Indian Peninsular railway. Groups of crystals of a beautiful pink colour have been found in the silver veins of Andreasberg in the Harz and of Guanaxuato in Mexico. Crystals of recent formation have been detected in the Roman remains at the hot springs of Plombieres in France. (L. J.S.)

APOPHYSIS (Gr. air64>v

APOPLEXY (Gr. airoirXijfia, from aic

softening; and the idea for a long time prevailed that apoplexy and cerebral haemorrhage could be employed as synonymous terms, and that an individual who, in popular parlance, " had an apoplectic stroke," had necessarily suffered from haemorrhage into his brain. A small haemorrhage may not, however, cause an apoplectic fit, nor is an apoplectic fit always caused by haemorrhage; it may be due to sudden blocking of a large vessel by a clot from a distant part (embolism), or by a sudden clotting of the blood in the vessel itself (thrombosis). Owing to the prevailing idea in former times that cerebral haemorrhage and apoplexy were synonymous terms, the word apoplexy- was applied to haemorrhage into other organs than the brain; thus the terms pulmonary apoplexy, retinal apoplexy and splenic apoplexy were used.

The term " apoplexy " is now used in clinical medicine to denote that form of coma or deep state of unconsciousness which is due to sudden disturbance of the cerebral circulation occasioned by a local cause within the cranial cavity, as distinct from the loss of consciousness due to sudden failure of the heart's action (syncope) or the coma of narcotic or alcoholic poisoning, of status epilepticus, of uraemia or of head injury.

The sudden coma of sunstroke and heat-stroke might be included, although owing to the suddenness with which a person may be struck down, the term heat apoplexy is frequently used, and, from an etymological point of view, quite justifiably. The older writers use the term simple apoplexy for a sudden attack which could not be explained by any visible disease. Again, congestive apoplexy was applied to those cases of coma where, at the autopsy, nothing was found to account for the coma and death except engorgement of the vessels of the brain and its membranes. In senile dementia and in general paralysis the brain is shrunken and the convolutions atrophied, the increased space in the ventricles and between the convolutions being filled up with the cerebro-spinal fluid. In these diseases apoplectic states may arise, terminating fatally; the excess of fluid found in such cases was formerly thought to be the cause of the symptoms, consequently the condition was called serous apoplexy. Such terms are no longer used, owing to the better knowledge of the pathology of brain disease.

Having thus narrowed down the application of the term " apoplexy," we are in a position to consider its chief features, and the mechanism by which it is produced. Apoplexy may be rapidly fatal, but it is very seldom instantly fatal. The onset is usually sudden, and sometimes the individual may be struck down in an instant, senseless and motionless, " warranting those epithets, which the ancients applied to the victims of this disease, of atloniti and siderati, as if they were thunder-stricken or planet-struck " (Sir Thomas Watson). The attack, however, may be less sudden and, not

infrequently, attended by a con- vulsion; while occasionally, in the condition termed ingravescent apoplexy, the coma is gradual in its onset, occupying hours in its development. Although unexpected, various warning symptoms, sometimes slight, sometimes pronounced, occur in the majority of cases. Such are, fulness in the head, headache, giddiness, noises in the ears, mental confusion, slight lapses of consciousness, numbness or tingling in the limbs. A characteristic apoplectic attack presents the following phenomena: the individual falls down suddenly and lies without sense or motion, except that his pulse keeps beating and his breathing continues. He appears to be in a deep sleep, from which he cannot be roused; the breathing is laboured and stertorous, and is accompanied with puffing out of the cheeks; the pulse may be beating more strongly than natural, and the face is often flushed and turgid. The reflexes are abolished. Although apoplexy may occur with- out paralysis, and paralysis without apoplexy, the two, owning the same cause, very frequently co-exist, or happen in immediate sequence and connexion; consequently there is in most cases definite evidence of paralysis affecting usually one side of the body in addition to the coma. Thus the pupils are unequal; there may be asymmetry of the face, or the limbs may be more rigid or flaccid on one side than on the other. These signs of localized disease enable a distinction to be made from the coma

of narcotic poisoning and alcoholic intoxication. It must be borne in mind that a person smelling strongly of liquor and found lying in the street in a comatose state may be suffering from apoplexy, and the error of sending a dying man to a police cell may be avoided by this knowledge.

If the fit is only moderately severe, the reflexes soon return, and the patient may in a few hours show indications of returning consciousness by making some movements or opening his eyes when spoken to, although later it may be found that he is unable to speak, or may be paralysed or mentally afflicted (see Paralysis). In severe cases the coma deepens and the patient dies, usually from interference with the breathing, or, less commonly, from arrest of the heart's action.

The mechanism by which apoplexy is produced has been a matter of much dispute; the condition was formerly ascribed to the pressure exerted by the clot on the rest of the brain, but there is no increase of intracranial pressure in an apoplectic fit occurring as a result of the sudden closure of a large vessel by embolism or thrombosis. Suddenness of the lesion appears to be, then, the essential element common to all cases of apoplexy from

organic brain disease. It is the sudden shock to the delicate mechanism that produces the unconsciousness; but seeing that the coma is usually deeper and more prolonged in cerebral haemorrhage than when occasioned by vascular occlusion, and that an ingravescent apoplexy coma gradually develops and deepens as the amount of haemorrhage increases, we may presume that increase of intracranial pressure does play an important part in the degree and intensity of the coma caused by the rupture of a vessel. Apoplexy seldom occurs under forty years of .age, but owing to the fact that disease of the cerebral vessels may exist at any age, from causes which are fully explained in the article Neuropathology, no period of life is exempt; consequently cases of true apoplexy are not wanting even in very young children. Recognizing that there are two causes of apoplexy in advanced life, viz. (1) sudden rupture of a diseased vessel usually associated with high arterial pressure, enlarged, powerfully acting heart and chronic renal disease, and (2) the sudden clotting of blood in a large diseased vessel favoured by a low arterial pressure due to a weak-acting heart, it is obvious that the character of the pulse forms a good guide to the diagnosis of the cause, the prevention and warding off of an attack, and the treatment of such should it occur.

Anything which tends directly or indirectly to increase arterial pressure within the cerebral blood-vessels may bring on an attack of cerebral haemorrhage; and although the identification of an apoplectic habit of body with a stout build, a short neck and florid complexion is now generally discredited, it being admitted that apoplexy occurs as frequently in thin and spare persons who present no such peculiarity of conformation, yet a plethoric habit of body, occasioned by immoderate eating or drinking associated with the gouty diathesis, leads to a general arteriosclerosis and high arterial pressure. All condi- tions which can give rise to a local intracranial or a general bodily increase of the arterial pressure, i.e. severe exertion of body and mind, violent emotions, much stooping, overheated rooms, exposure to the sun, sudden shocks to the body, constipa- tion and straining at stool, may, by suddenly increasing the strain on the wall of a diseased vessel, lead to its rupture.

The outlook of apoplexy' is generally unfavourable in cases where the coma is profound; death may take place at different intervals after the onset. If the patient, after recovering from the initial coma, suffers with continual headache and lapses into a drowsy state, the result is likely to be serious ; for such a condition probably indicates that an inflammatory change has taken place about the clot or in the area of softening.

Treatment. — The patient should be placed in the recumbent position with the head and shoulders slightly raised. He should be moved as little as possible from the place where the attack occurred. The medical man who is

summoned will probably give the following directions: an ice-bag to be applied to the head; a few grains of calomel or a drop of croton oil in butter to be placed on the tongue, or an enema of castor oil to be

administered. He may find it necessary to draw off the water with a catheter. The practice of blood-letting, once so common in this disease, is seldom resorted to, although in some cases, where there is very high arterial tension and a general state of plethora, it might be beneficial. Depletives are not employed where there is evidence of failure of the heart's action; indeed the cautious administration of stimulants may be necessary, either subcutaneously or by the mouth (if there exist a power of swallowing), together with warm applications to the surface of the body; a water-bed may be required, and careful nursing is essential to prevent complications, especially the formation of bedsores. • (F. W. Mo.)

APOROSE (from Gr. d, without, and xopos, passage), a biological term meaning imperforate, or not porous: there is a group of corals called Aporosa.

APOSIOPESIS (the Greek for " becoming silent "), a rhetorical device by which the speaker or writer stops short and leaves something unexpressed, but yet obvious, to be supplied by the imagination. The classical example is the threat, " Quos ego !" of Neptune (in Virgil, Aen. i. 135).

APOSTASY (airocTTCuns, in classical Greek a defection or revolt from a military commander), a term generally employed to describe a complete renunciation of the. Christian faith, or even an exchange of one form of it for another, especially if the motive be unworthy. In the first centuries of the Christian era, apostasy was most commonly induced by persecution, and was indicated by some outward act, such as offering incense to a heathen deity or blaspheming the name of Christ. 1 In the Roman Catholic Church the word is also applied to the renun- ciation of monastic vows (apostasis a monachatu), and to the abandonment of the clerical profession for the life of the world (apostasis a clericatu). Such defection was formerly often punished severely.

APOSTIL, or Apostille (possibly connected with Lat. appositum, placed near), a marginal note made by a commentator.

APOSTLE (AxoffToXos, one sent forth on a mission, an envoy, as in Is. xviii. 2; Symmachus, airoo-TeWuv &iroaTo\ovs; Aquila, irpe

1 The readmission of such apostates to the church was a matter that occasioned serious controversy. The emperor Julian's " Apostasy " is discussed under Julian.

applied in practice; and so we find " apostle " used in several senses, once it emerges as a technical term.

i. In the Apostolic age itself, "apostle" often denotes simply an " envoy," commissioned by Jesus Christ to be a primary witness and preacher of the Messianic Kingdom. This wide sense was shown by Lightfoot (in his commentary on Galatians, 1865) to exist in the New Testament, e.g. in 1 Cor. xii. 28 f., Eph. iv. n, Rom. xvi. 7; and his view has since been emphasized 1 by the discovery of the Teaching of the Twelve Apostles (see Didache), with its itinerant order of " apostles," who, together with " prophets " (cf. Eph. ii. 20, iii. 5) and " teachers," constituted a charismatic and seemingly unordained ministry of the Word, in some part of the Church (in Syria?) during the early sub-apostolic age. Paul is our earliest witness, as just cited; also in 1 Cor. xv. 5 ff., where he seems to quote the language of Palestinian tradition, in saying that Christ " appeared to Cephas; then to the Twelve; then … to James; then to the apostles one and all (to is airoaToXois iraaiv) ; and last of all ... to me also." The appearance to " all the Apostles " must refer to the final commission given by the risen Christ to certain assembled disciples (Acts i. 6 ff., cf. Luke xxiv. 33), including not only the Twelve and the Lord's brethren (i. 13 f.), but also some at least of the Seventy. Of this wider circle of witnesses, taken from among personal disciples during Jesus's earthly ministry, we get a further glimpse in the election of one from their number to fill Judas's place among the Twelve (i. 21 ff.), as the primary official witnesses of Messiah and his resurrection. Many of the 120 then present (Acts i. 15), and not only the two set forward for final choice, must have been personal disciples, who by the recent commission had been made " apostles." Among such we may perhaps name Judas Barsabbas and Silas (Acts xv. 22, cf. i. 23), if not also Barnabas (1 Cor. ix. 6) and Andronicus and Junia (Rom. xvi. 7).

So far, then, we gather that the original Palestinian type of apostleship meant simply (a) personal mission from the risen Christ (cf. 1 Cor. ix. 1), following on (b) some preliminary inter- course with Jesus in his earthly ministry. It was pre-eminence in the latter qualification that gave the Twelve their special status among apostles (Acts i. 26, ii. 14, vi. 2; in Acts generally they are simply " the apostles "). Conversely, it was Paul's lack in this respect which lay at the root of his difficulties as an apostle.

It is possible, though not certain, that even those Judaizing missionaries at Corinth whom Paul styles " false-apostles " or, ironically, "the superlative

apostles" (2 Cor. xi. 5, 13; xii. 11), rested part of their claim to superiority over Paul on (b), possibly even as having done service to Christ when on earth (2 Cor. xi. 18, 23). There is no sign in 2 Cor. that they laid claim to (a). If this be so, they were " Christ's apostles " only indirectly, " through men " (as some had alleged touching Paul, cf. Gal. i. 1), i.e. as sent forth on mission work by certain Jerusalem leaders with letters of intro- duction (2 Cor. iii. 1 ; E.ˆvon Dobschtitz, Probleme der apost. Zeitalters, p. 106).

2. The Twelve. — When Jesus selected an inner circle of disciples for continuous training by personal intercourse, his choice of " twelve " had direct reference to the tribes of Israel (Matt. xix. 28; Luke xxii. 30). This gave them a symbolic or representative character as a closed body (cf. Rev. xxi. 14), marking them off as the primary religious authority (cf. Acts ii. 42, " the apostles' teaching ") among the " disciples " or " brethren," when these began to assume the form of a com 7 munity or church. The relationship which other " apostles " had enjoyed with the Master had been uncertain; they had been his recognized intimates, and that as a body. Naturally, then, they took the lead, collectively — in form at least, though really the initiative lay with one or two of their own number, Peter in particular. The process of practical differentiation from their fellow-apostles was furthered by the concentration of the Twelve, or at least of its most marked representatives, in Jerusalem, for a considerable period (Acts viii. 1, cf. xii. 1 ff. ; an early tradition specifies twelve years). Other apostles soon went forth

1 By analogy, that is; for the wider sense of "apostle" in the Apostolic age need not be identical with a sub-apostolic use of the term (see below, 4 fin.).

on their mission to " the cities of Israel " (cf. Acts ix. 31), and so exercised but little influence on the central policy of the Church. Hence their shadowy existence in the New Testament, though the actual wording of Matt. x. 5-42, read in the light of the Didachl, may help us to conceive their work in its main features.

3. "Pillar" Apostles. — But in fact differentiation between apostles existed among the Twelve also. There were " pillars," like Peter and John (and his brother James until his death), who really determined matters of grave moment, as in the conference with Paul in Gal. ii. 9 — a conference which laid the basis of the latter's status as an apostle even in the eyes of Jewish Christians. Such pre-eminence was but the sequel of personal distinctions visible even in the preparatory days of discipleship, and it warns us against viewing the primitive facts touching apostles in the official light of later times.

Consciousness of such personal pre-eminence has left its marks on the lists of the Twelve in the New Testament. Thus (1) Peter, James, John, Andrew, always appear as the first four, though the order varies, Mark representing relative prominence during Christ's ministry, and Acts actual influence in the Apos- tolic Church (cf. Luke viii. 51, ix. 28). (2) The others also stand in groups of four, the first name in each being constant, while the order of the rest varies.

The same lesson emerges when we note that one such apostolic " pillar " stood outside the Twelve altogether, viz. James, the Lord's brother (Gal. ii. 9, cf. i. 19); and further, that "the Lord's brethren " seem to have ranked above " apostles " generally, being named between them and Peter in 1 Cor. ix. 5. That is, they too were apostles with the addition of a certain personal distinction.

4. Paul, the " Apostle of the Gentiles."— So far apostles are only of the Palestinian type, taken from among actual hearers of the Messiah and with a mission primarily to Jews — apostles "of, the circumcision" (Gal. ii. 7-9). Now, however, emerges a new apostleship, that to the Gentiles; and with the change of mission goes also some change in the type of missionary or apostle. Of this type Paul was the first, and he remained its primary, and in some senses its only, example. Though he could claim, on occasion, to satisfy the old test of having seen the risen Lord (1 Cor. ix. 1, cf. xv. 8), he himself laid stress not on this, but on the revelation within his own soul of Jesus as God's Son, and of the Gospel latent therein (Gal. i. 16). This was his divine call as "apostle of the Gentiles " (Rom. xi. 13); here lay both his qualification and his credentials, once the fruits of the divine inworking were manifest in the success of his missionary work (Gal. ii. 8 f.; 1 Cor. xi. 1 f.; 2 Cor. iii. 2 f., xii. 12). But this new criterion of apostleship was capable of wider application, one dispensing altogether with vision of the risen Lord — which could not even in Paul's case be proved so fully as in the case of the original apostles— but appealing to the " signs of an apostle " (1 Cor. ix. 2 ; 2 Cor. xii. 1 2), the tokens of spiritual gift visible in work done, and particularly in the planting of the Gospel in fresh fields (2 Cor. x. 14-18). It may be in this wide charismatic sense that Paul uses the term in 1 Cor. xii. 28 f., Eph. ii. 20, iii. .5, iv. n, and especially in Rom. xvi. 7, " men of mark among the apostles" (cf. 2 Cor. xi. 13, "pseudo-apostles" masquerading as " apostles of Christ," and perhaps 1 Thess. ii. 6, of himself and Silas). That he used it in senses differing with the context is proved by 1 Cor. xv. 9, where he styles himself " the least of apostles," although in other connexions he claims the very highest rank, co-ordinate even with the Twelve as a body (Gal. ii. 7 ff,), in virtue of his distinctive Gospel.

This point of view was not widely shared even in circles appreciative of his

actual work. To most he seemed but a fruitful worker within lines determined by " the twelve apostles of the Lamb " as a body (Rev. xxi. 14). So we read of " the plant (Church) which the twelve apostles of the Beloved shall plant " (Ascension of Isaiah, iv. 3); "those who preached the Gospel to us (especially Gentiles) . . . unto whom He gave authority over the Gospel, being twelve for a witness to the tribes" (Barn. viii. 3, cf. v. 9); and the going forth of the

Twelve, after twelve years, beyond Palestine " into the world," to give it a chance to hear (Preaching of Peter, in Clem. Alex. Strom, vi. 5. 43; 6. 48). Later on, however, his own claim told on the Church's mind, when his epistles were read in church as a collection styled simply " the Apostle."

As the primary medium of the Gentile Gospel (Gal. i. 16, cf. i. 8, ii. 2) Paul had no peers as an " apostle of the Gentiles " (Rom. xi. 13, cf. xv. 15-20, and see 1 Cor. xv. 8, " last of all to me "), unless it were Barnabas who shares with him the title " apostle " in Acts xiv. 4, 14 — possibly with reference to the special " work " on which they had recently been " sent forth by the Spirit " (xiii. 2, 4). Yet such as shared the spiritual gift (charisma) of missionary power in sufficient degree, were in fact apostles of Christ in the Spirit (1 Cor. xii. 28, 11). Such a secondary type of apostolate — answering to " apostolic mission- aries " of later times (cf. the use of lepawdaroXos in this sense by the Orthodox Eastern Church to-day) — would help to account for the apostolic claims of the missionaries censured in Rev. ii. 2, as also for the " apostles " of the second generation implied in the Didac/ie.

In the sub-apostolic age, however, the class of " missionaries " enjoying a charisma such as was conceived to convey apostolic commission through the Spirit, soon became distinguished from " apostles " (cf . Hermas, Sim. ix. 1 5. 4, " the apostles and teachers of the message of the Son of God," so 25. 2; in 17. r the apostles are reckoned as twelve), as the title became more and more confined by usage to the original apostles, particularly the Twelve as a body (e.g. Ascension of Isaiah and the Preaching of Peter), or to them and Paul (e.g. in Clement and Ignatius), and as reverence for these latter grew in connexion with their story in the Gospels and in Acts. 1 Thus Eusebius describes as " evan- gelists " (cf. Philip the Evangelist in Acts xxi. 8, also Eph. iv. 11, 2 Tim. iv. s) those who " occupied the first rank in the succession to the Apostles " in missionary work (Hist. Eccl. iii. ,37, cf. v. 10). Yet the wider sense of " apostle " did not. at once die out even in the third and fourth generations. It lingered on as applied to the Seventy 2 —

by Irenaeus, Tertullian, Clement and Origen — and even to Clement of Rome, by Clem. Alex. (? as a " fellow- worker " of Paul, Phil. iv. 3); while the adjective " apostolic " was applied to men like Poly carp (in his contemporary Acts of Martyrdom) and the Phrygian, Alexander, martyred at Lyons in a.d. 177 (Eus. v. 1), who was " not without share of apostolic charisma."

The authority attaching to apostles was essentially spiritual in character and in the conditions of its exercise. Anything like autocracy among his followers was alien to Jesus's own teaching (Matt, xxiii. 6-1 1). All Christians were "brethren," and the basis of pre-eminence among them was relative ability for service. But the personal relation of the original Palestinian apostles to Jesus himself as Master gave them a unique fitness as authorized witnesses, from which flowed naturally, by sheer spiritual in- fluence, such special forms of authority as they came gradually to exercise in the early Church. " There is no trace in Scripture of a formal commission of authority for government from Christ Himself " (Hort, Chr. Eccl. p. 84) given to apostles, save as representing the brethren in their collective action. Even the " resolutions " (Soynara) of the Jerusalem conference were not set forth by the apostles present simply in their own name, nor as ipso facto binding on the conscience of the Antiochene Church. They expressed " a claim to deference rather than a right to be obeyed " (Hort, op. cit. 81-85). Such was the kind of authority attaching to apostles, whether collectively or individually. It was not a fixed notion, but varied in quantity and quality with

1 The tendency is already visible in the Lucan writings. An analogous process is seen in the use of " disciple," applicable in the apostolic age to Christians at large, but in the course of the sub- apostolic age restricted to personal " disciples of the Lord " or to martyrs (Papias in Eus. iii. 39, cf. Ignatius, Ad Eph. i. 2).

2 In the Edessene legend of Abgar, in Eus. i. 12, we read that " Judas, who is also Thomas, sent Thaddaeus as apostle — one of the Seventy," where simply an authoritative envoy of Jesus seems in- tended. For traces of the wider sense of " apostle " in Gnostic, Marcionite and Montanist circles, see Monnier (as be?ow).

the growing maturity of converts. This is how Paul, from whom we gather most on the point, conceives the matter. The exercise of his spiritual authority is not absolute, lest he " lord it over their faith "; consent of conscience or of " faith " is ever requisite (2 Cor. i. 24; cf. Rom. xiv. 23). But the principle was elastic in application, and would take more patriarchal forms in Palestine than in the Greek world. The case was essentially the same as on the various mission-fields to-day, where the

position of the " missionary " is at first one of great spiritual initiative and authority, limited only by h ; s own sense of the fitness of things, in the light of local usages. So the notion of formal or constitu- tional authority attaching to the apostolate, in its various senses, is an anachronism for the apostolic age. The tendency, however, was for their authority to be conceived more and more on formal lines, and, particularly after their deaths, as absolute.

The authority attaching to apostles as writers, which led gradually to the formation of a New Testament Canon — " the Apostles " side by side with " the Books " of the Old Testament (so 2 Clement xiv., c. a.d. 120-140) — is a subject by itself (see Bible).

This change of conception helped to further the notion of a certain devolution qf apostolic powers to successors constituted by act of ordination. The earliest idea of an apostolical succession meant simply the re-emergence in others of the apostolic spirit of missionary enthusiasm. " The first rank in the succession of the apostles " consisted of men eminent as disciples of theirs, and so fitted to continue their labours (Euseb. iii. 37); and even under Commodus (a.d. 180-193) there were " evangelists of the word " possessed of " inspired zeal to emulate apostles " (v. 10). Such were perhaps the " apostles " of the Didache. Of the notion of apostolic succession in ministerial grace conferred by ordination, there is little or no trace before Irenaeus. The famous passage in Clement of Rome (xliv. 2) refers simply to the succession of one set of men to another in an office of apostolic institution. The grace that makes Polycarp " an apostolic and prophetic teacher " (Mart. Polyc. 16) is peculiar to him personally. But Irenaeus holds, apparently on a priori grounds, that " elders " who stand in orderly succession to the apostolic founders of the true tradition in the churches, have, " along with the succession of oversight," also an " assured gift of (insight into) truth " by the Father's good pleasure (" cum episcopatus succes- sione charisma veritatis certum secundum placitum Patris acceperunt "), in contrast to heretics who wilfully stand outside this approved line of transmission (adv. Haer. iv. 26. 2). So far, indeed, the succession is not limited to the monarchical episcopate as distinct from the presbyteral order to which it belonged (cf. "presbyterii ordo, principalis consessio " in the same context, and see iii. 14. 2), though the bishops of apostolic churches, as capable of being traced individually (iii. 3. 1), are specially appealed to as witnesses (cf. iv. 33. 8, v. 19. 2) — as earlier by Hegesippus (Euseb. iv. 22). Nor is there mention of sacerdotal grace attaching to the succession in apostolic truth. 3 But once the idea of supernatural grace going along with office as such (of which we have already a trace in the Ignatian bishop, though without the notion of actual apostolic succession) arose in con- nexion with successio ab apostolis, the full development of the doctrine was but a matter of time. 4

Literature. — In England the modern treatment of the subject dates from J. B. Lightfoot's dissertation in his Commentary on Galatians, to which Dr F. J. A. Hort's The Christian Ecclesia added elements of value; see also T. M. Lindsay, The Church and the Ministry, and articles in Hastings' Dictionary of the Bible and the Ency. Biblica; A. Harnack, Die Lehre der Apostel, pp. 93 ff., and

3 The above is substantially the view taken by J. B. Lightfoot in his essay on " The Christian Ministry " (Comm. on Philippians, 6th ed., pp. 239, 252 f.), and by T. M. Lindsay, The Church and the Ministry (1 902), pp. 224-228, 278 ff. Even C. Gore, The Church and the Ministry (1889), pp. 119 ff., while inferring a sacerdotal element in Irenaeus's conception of the episcopate, says: " But it is mainly as preserving the catholic traditions that Irenaeus regards the apostolic succession " (p. 120).

4 See Lightfoot's essay for Cyprian's contribution, as also for that of the Clementines, which fix on the twofold position of James at Jerusalem, as apostle and bishop, as bearing on apostolic succession in the episcopate.

Dogmengeschichte (3rd ed.), i- 153 ff. ; E. Haupt, Zum Verstdndnis d. Apostolats in NT. (Halle, 1896); and especially H. Monnier, La Notion de Vapostolat, des origines a Irenee (Paris, 1903). The later legends and their sources are examined by T. Schermann, Propheten- und Apostellegenden (Leipzig, 1907). (J. V. B.)

APOSTLE SPOONS, a set of spoons, usually of silver or silver gilt, with the handles terminating in figures of the apostles, each bearing their distinctive emblem. They were common baptismal gifts during the 15th and 16th centuries, but were dying out by 1666. Often single spoons were given, bearing the figure of the patron or name saint of the child. Sets of the twelve apostles are not common, and complete sets of thirteen, with the figure of our Lord on a larger spoon, are still rarer. The Goldsmiths' Company in London has one such set, all by the same maker and bearing the hall-mark of 1626, and a set of thirteen was sold at Christie's in 1904 for £4900.

See William Hone, The Everyday Book and Table Book (1831); and W. J. Cripps, Old English Plate (9th ed., 1906).

APOSTOLICAL CONSTITUTIONS (Aiartryai or Aiardˆeis r&v ayluiv airooroXoiv bia KX17 fievros tov 'Fufiaioiv ino-KOTrov re /cat toWitov. Ka0oXi/cj) 8i8ao-Ka\La), a collection of ecclesiastical regulations in eight books, the last of which concludes with the eighty-five Canons of the Holy

Apostles. By their title the Con- stitutions profess to have been drawn up by the apostles, and to have been transmitted to the Church by Clement of Rome; sometimes the alleged authors are represented as speaking jointly, sometimes singly. From the first they have been very variously estimated; the Canons, as a rule, more highly than the rest of the work. For example, the Trullan Council of Constanti- nople (quini-sextum) , a.d. 692, accepts the Canons as genuine by its second canon, but rejects the Constitutions on the ground that spurious matter had been introduced into them by heretics; and whilst the former were henceforward used freely in the East, only a few portions of the latter found their way into the Greek and oriental law-books. Again, Dionysius Exiguus (c. a.d. 500) translated fifty of the Canons into Latin, 1 although under the title Canones qui dicuntur Apostolorum, and thus they passed into other Western collections; whilst the Constitutions as a whole remained unknown in the West until they were published in 1563 by the Jesuit Turrianus. At first received with en- thusiasm, their authenticity soon came to be impugned; and their true significance was largely lost sight of as it began to be realized that they were not what they claimed to be. Vain attempts were still made to rehabilitate them, and they were, in general, more highly estimated in England than elsewhere. The most extravagant estimate of all was that of Whiston, who calls them " the most sacred standard of Christianity, equal in authority to the Gospels themselves, and superior in authority to the epistles of single apostles, some parts of them being our Saviour's own original laws delivered to the apostles, and the other parts the public acts of the apostles " (Historical preface to Primitive Christianity Revived, pp. 85-86). Others, however, realized their composite character from the first, and by degrees some of the component documents became known. Bishop Pearson was able to say that " the eight books of the Apostolic Constitutions have been after Epiphanius's time compiled and patched together out of the didascaliae or doctrines which went under the names of the holy apostles and their disciples or suc- cessors " (Vind. Ign. i. cap. 5) ; whilst a greater scholar still, Archbishop Usher, had already gone much further, and con- cluded, forestalling the results of modern critical methods, that their compiler was none other than the compiler of the spurious Ignatian epistles (Epp. Polyc. el Ign. p. lxiii. f., Oxon. 1644). The Apostolical Constitutions, then, are spurious, and they are one of a long series of documents of like character. But we have not really gauged their significance by saying that they are spurious. They are the last stage and climax of a gradual process of compilation and crystallization, so to speak, of un- written church custom; and a short account of this process will show their real importance and value.

1 Why he did not go on to give the remaining thirty-five is not clear; they belong to the same date as, and are not inferior to, the first fifty.

These documents are the outcome of a tendency which is found in every society, religious or secular, at some point in its history. The society begins by living in accordance with its fundamental principles. By degrees these andreai translate themselves into appropriate action. Diffi- nature. culties are faced and solved as they arise; and when similar circumstances recur they will tend to be met in the same way. Thus there grows up by degrees a body of what may be called customary law. Plainly, there is no particular point of time at which this customary law can be said to have begun. To all appearance it is there from the first in solution and gradually crystallizes out; and yet it is being continually modified as time goes on. Moreover, the time comes when the attempt is made, either by private individuals or by the society itself, to put this " customary law " into writing. Now when this is done, two tendencies will at once show themselves.

(a) This "customary law " will at once become more definite:, the very fact of putting it into writing will involve an effort after logical completeness. There will be a tendency on the part of the writer to fill up gaps; to state local customs as if they obtained universally; to introduce his personal equation, and to add to that which is the custom that which, in his opinion, ought to be. (b) There will be a strong tendency to fortify that which has been written with great names, especially in days when there is no very clear notion of literary property. This is done, not always with any deliberate consciousness of fraud (although it must be clearly recognized that truth is not one of the " natural virtues," and that the sense of the obligations of truthfulness was far from strong), but rather to emphasize the importance of what was written, and the fact that it was no new invention of the writer's. In a non-literary age fame gathers about great names; and that which, ex hypothesi, has gone on since the beginning of things is naturally attributed to the founders of the society. Then come interpolations to make this ascription more probable, and the prefixing of a title, then or subsequently, which states it as a fact. This is precisely the way in which the Apostolical Constitutions and other kindred documents have come into being. They are attempts, made in various places and at different times, to put into writing the order and discipline and character of the Church; in part for private instruction and edification, but in part also with a view to actual use; frequently even with an actual reference to particular circumstances. In this lies their importance, to a degree which is only just being adequately realized. They contain evidence of the utmost value as to the order of the Church in early days; evidence, however, which needs to be sifted with the greatest care, since the personal preferences of the writer and the customs of the local church to which he belongs are continually mixed up with things which have a wider preval- ence. It is only by careful investigation, by the method of comparisons, that these elements can be disentangled; but as the number of documents of this class

known to us is continually increasing, their value increases even more than proportionately. And whilst their local and fugitive character must be fully recognized and allowed for, is it unjustifiable to set them aside or leave them out of account as heretical, and therefore negligible.

It will be sufficient here to mention shortly the chief collections of this kind which came into existence during the first four centuries; generally as the work of private individuals, and having, at any rate, no more than a local authority jectioas. " of some kind, (a) The earliest known to us is the Didache or Teaching of the Twelve Apostles, itself compiled from earlier materials, and dating from about 120 (see Didache).

(b) The Apostolic Church Order (aposlolische Kirchenordnung of German writers); Ecclesiastical Canons of the Holy Apostles of one MS.; Sententiae Apostolorum of Pitra: of about 300, and emanating probably from Asia Minor. Its earlier part, cc. 1-14, depends upon the Didache, and the rest of it is a book of discipline in which Harnack has attempted to distinguish two older frag- ments of church law {Texte u. Unters. ii. 5). (c) The so-called Canones Hippolyti, probably Alexandrian or Roman, and of the first half of the 3rd century. It will be observed that these

make no claim to apostolic authorship; but otherwise their origin is like that of the rest, unless indeed, as has been suggested, they represent the work of an actual Roman synod, id) The so-called Egyptian Church Order, in Coptic from a Greek pre- Nicene original (c. 310). It is part of the Egyptian Heptateuch and contains neither communion nor ordination forms, (e) The Ethiopic Church Order, perhaps twenty years later than id), and forming part of the Ethiopic Statutes. (/) The Verona Latin Fragments, discovered and published by Hauler, portions of a form akin to («), which may be dated c. 340, though possibly earlier. It has a preface which refers to a treatise Concerning Spiritual Gifts as having immediately preceded it. (g) The recently discovered Testament of the Lord, which is somewhat later in date (c. 35°), and likewise depends upon the Canones Hippolyli. (h) The so-called Canons of Basil. This is an Arabic work perhaps based on a Coptic and ultimately on a Greek original, embodying with modifications large portions of the Canons of Hippolytus. (On the relations between the six last- named, see Hippolytus, Canons of.)

Here also may be noticed the Didascalia Apostolorum, originally written in Greek, but known through a Syriac version and a frag- mentary Latin one published by Hauler. It is of the middle of the 3rd century — in fact, a

passage in the Latin translation seems to give us the date A.D. 254. It emanates from Palestine or Syria, and is independent of the documents already mentioned ; and upon it the Constitutions themselves very largely depend. It is a mixture of moral and ecclesiastical instruction. The Sacramentary of Serapion (c 350), T)ie Pilgrimage of Etheria (Silvia) (c. 385), and The Cate- chetical Lectures of Cyril of Jerusalem (348) are also of value in this connexion. In the (so-called) Constitutions through Hippolytus we have possibly a preliminary draft of the famous 8th book of the Apostolical Constitutions. 1

The Constitutions themselves fall into three main divisions, (i.) The first of these consists of books i.-vi., and throughout runs Contents. P ara Uel to the Didascalia. Bickell, indeed, held that this latter was an abbreviated form of books i.-vi.; but it is now agreed on all hands that the Constitutions are based on the Didascalia and not vice versa, (ii.) Then follows book vii., the first thirty-one chapters of which are an adaptation of the Didache, whilst the rest contain various liturgical forms of which the origin is still uncertain, though it has been acutely suggested by Achelis, and with great probability, that they originated in the schismatical congregation of Lucian at Antioch. (iii.) Book viii. is more composite, and falls into three parts. The first two chapters, irepl xˆP^^o-Tiiiv, may be based upon a lost work of St Hippolytus, otherwise known only by a reference to it in the preface of the Verona Latin Fragments; and an examination shows that this is highly probable. The next section, cc. 3-27, irepl xˆpoTOVicov, and cc. 28-46, irtpl kclvovuiv, is twofold, and is evidently that upon which the writer sets most store. The apostles no longer speak jointly, but one by one in an apostolic council, and the section closes with a joint decree of them all. They speak of the ordination of bishops (the so-called Clementine Liturgy is that which is directed to be used at the consecration of a bishop, cc. 5-15), of presbyters, deacons, deaconesses, sub- fieacons and lectors, and then pass on to confessors, virgins, Jvidows and exorcists; after which follows a series of canons on various subjects, and liturgical formulae. With regard to this section, all that can be said is that it includes materials which are also to be found elsewhere — in the Egyptian Church Order and other documents already spoken of — and that the precise relation between them is at present not determined. The third section consists of the Apostolic Canons already referred to, the last and most significant of which places the Constitutions and the two epistles of Clement in the canon of Scripture, and omits the Apocalypse. They are derived in part from the preceding Constitutions, in part from the canons of the councils of Antioch, 341, Nicaea, 325, and possibly Laodicaea, 363.

1 At a later date various collections were made of the documents above mentioned, or some of them, to serve as law-books in different churches — e.g. the Syrian Octateuch, the Egyptian Heptateuch, and the Ethiopic

Sinodos. These, however, stand on an entirely different footing, since they are simply collections of existing docu- ments, and no attempt is made to claim apostolic authorship for them.

A comparison of the Constitutions with the material upon which they are based will illustrate the compiler's method. (a) To begin with the Didascalia already mentioned. It is un- methodical and badly digested, homiletical in style, and abound- ing in biblical quotations. There is no precise arrangement; but the subjects, following a general introduction, are the bishop and his duties, penance, the administration of the offerings, the settlement of disputes, the divine service, the order of widows, deacons and deaconesses, the poor, behaviour in persecution, and so forth. The compiler of the Constitutions finds here material after his own heart. He is even more discursive and more homiletical in style; he adds fresh citations of the Scrip- tures, and additional explanations and moral reflexions; and all this with so little judgment that he often leaves confusion worse confounded (e.g. in ii. 57, where, upon a symbolical description of the Church as a sheepfold, he has superimposed the further symbolism of a ship), (b) Passing on to books vii. and viii., we observe that the compiler's method of necessity changes with his new material. In the former book he still makes large additions and alterations, but there is less scope for his prolixity than before; and in the latter, where he is no longer dealing with generalities, but making actual definitions, the Constitutions of necessity become more precise and statutory in form. Throughout he adopts and adapts the language of his sources as far as possible, " only pruning in the most pressing cases," but towards the end he cannot avoid making larger alterations from time to time. And his alterations throughout are not made aimlessly. Where he finds things which would obviously clash with the customs of his own day, he unhesitatingly modifies them. An account of the Passion, with a curiously perverted chronology, the object of which was to justify the length of the Passion-tide fast, is entirely revised for this reason (v. 14) ; the direction to observe Easter according to the Jewish computation is changed into the exact contrary for the same reason (v. 17) ; and where his archetype lapses into speaking of a lull in persecution he naively informs us that the Romans have now given up persecuting and have adopted Christianity (vi. 26), forgetting altogether that he is speaking in the character of the apostles. Above all, he both magnifies the office of the Christian ministry as a whole and alters what is said of it in detail (for example, the deaconess loses rank not a little), to make it agree with the circumstances of his day in general, and with his own ideas of fitness in particular. It is here that his evidence is at once most valuable and needs to be used with the greatest care. To give one striking example of the value of these documents. The Canones Hippolyli (vi. 43) provide that one who has been a confessor for the faith may be received as a presbyter by virtue of

his confessorship and not by the laying on of the bishop's hands; but if he be chosen a bishop, he is to be ordained. This provision passes on into the Egyptian Ecclesiastical Canons and other kindred documents, and even into the Testamentum Domini. But the corresponding passage in the Apostolical Constitutions (viii. 23) entirely reverses it: "A confessor is not ordained, for he is so by choice and patience, and is worthy of great honour. . . . But if there be occasion, he is to be ordained either a bishop, priest, or deacon. But if any one of the con- fessors who is not ordained snatches to himself any such dignity upon account of his confession, let the same person be deprived and rejected; for he is not in such an office, since he has denied the constitution of Christ, and is worse than an infidel."

*Who, then, is the author of the Constitutions, and what can be inferred with regard to him? (i.) By separating off the sources which he used from his own additions to them, it at Author- once becomes clear that the latter are the work of one ship, man: the style is unmistakable, and the method of P' ac « working is the same throughout. The compiler of a<,< * rfate< books i.-vi. is also the compiler of books vii., viii. (ii.) As to his theological position, different views have been held. Funk suggests Apollinarianism, which is tiie retuge of tile destitute; and Achelis inclines in the same direction. But the affinities of the author are quite otherwise, the most pronounced of them being a strong subordinationist tendency, denial of a human*

soul to Christ, and the like, which suggest not indeed Arianism but an inclination towards Arianism. Above all, his polemic is directed against the dying heresies of the 3rd century; and he writes with an absence of constraint which is not the language of one who lives amidst violent controversies or who is conscious of being in a minority. All this points to the position of a " conservative " or semi-Arian of the East, one who belongs, perhaps, to the circle of Lucian of Antioch and writes before the time of Julian. It is hard to think of any other time or circum- stances in which a man could write like this, (iii.) The indica- tions of time have been held to point to a different conclusion. On the one hand, the fact that the attempt to rebuild the, temple by Julian in 363 is not mentioned in vi. 24 points to an earlier date; and the fact that the /co-marai, are not mentioned amongst the church officers points in the same direction, for elsewhere they are first mentioned in a rescript of Constantius in a.d. 357. On the other hand, in the cycle of feasts occur the names of several which are probably of later date — e.g. Christmas and St Stephen, which were introduced at Antioch c. a.d. 378 and 379 respectively. Again, Epiphanius

(c. a.d. 374) appears to be unacquainted with it; he still quotes from the Didascalia, and elaborately explains it away where it is contrary to the usages of his own day. But as regards the former point, it is possible that the Apostolical Constitutions constantly gave rise to these festivals ; or, on the other hand, that the two passages were subsequently intro- duced either by the writer himself or by some other hand, when the last book of the Constitutions was being used as a law-book. And as regards the latter, the fact that Epiphanius does not use the Constitutions is no proof that they had not yet been compiled, (iv.) As to the region of composition there is no real doubt. It was clearly the East, Syria or Palestine. Many indications are against the latter, and Syria is strongly suggested by the use of the Syro-Macedonian calendar. Moreover, the writer represents the Roman Clement as the channel of com- munication between the apostles and the Church. This fact both supplies him with the name by which he is commonly known, Pseudo-Clement, and also furnishes corroboration of his Syrian birth; since the other spurious writings bearing the name of Clement, the Homilies and Recognitions, are likewise of Syrian origin. Moreover, the spurious Ignatian epistles, which are also Syrian, depend throughout upon the Constitutions, (v.) But this is not all. It was long ago noticed that Pseudo- Clement bears a very close resemblance to Pseudo-Ignatius, the interpolator of the Ignatian Epistles in the longer Greek recen- sion. Usher, as we have seen, identified them, and modern criticism accepts this identification as a fact (Lagarde, Harnack, Funk, Brightman). Lightfoot, indeed, still hesitated (Ap. Fathers, 11. i. 266 n.) on the ground that Pseudo-Ignatius occasion- ally misunderstands the Constitutions, that the two writings give the Roman succession differently, and that Pseudo-Clement shows no knowledge of the Christological controversies of Nicaea. But as regards the first of these, it is rather a case of condensed citation than of misinterpretation; the second is explained by the writer's carelessness as shown in other passages, and all are solved if a considerable interval of time elapsed between the com- pilation of the Constitutions and the spurious Ignatian epistles. It seems clear then that the compiler was a Syrian, and that he also wrote the spurious Ignatian epistles; he was likewise probably a semi-Arian of the school of Lucian of Antioch. His date is given by Harnack as a.d. 340—360, with a leaning to 340-343; by Lightfoot as the latter half of the 4th century; by Brightman, 370-380; by Maclean, 375; and by Funk as the beginning of the 5th century.

Authorities. — \V. Ueltzen, Constitutiones Apostolicae (Schwerin, 1853); P. A. de Lagarde, Didascalia Apostolorum Syriace (Leipz., 1854); Constitutiones Apostolorum (Leipz. and Lond., 1862); M. D. Gibson, Didascalia Apost. Syriace, with F.ng. trans. (Florae Semiticae, i. and ii., Cambridge, 1903) ; J. B. Pitra, Juris Ecclesiastici Graecorum Historia et Monumenta, i. (Rome, 1864); Hauler, Didascaliae Apostolorum

Fragmenta Ueronensia Latina (Leipzig, 1900); Bickell, Geschichte des Kirchenrechts, i. (Giessen, 1843); F. X. Funk, Die apostolischen Konstitutionen (Rottenb., 1891) ; A. Harnack, Geschichte d. altchrisil. Litteratur, i. 515 ff. (Leipz., 1893); F. E. Brightman,

Liturgies Eastern and Western, I. xvii. ff. (Oxford, 1896); H. Achelis, in Hauck's Realencyklopddie, i. 734 f., art. " Apostolische Konstitutionen und Kanones " (Leipz., 1896); A. S. Maclean, Recent Discoveries illustrating Early Christian Worship (Lond., 1904) ; J. Wordsworth, The Ministry of Grace, pp. 18 ff ; J. P. Arendzen, "The Apostolic Church Order" (Syriac Text, Eng. trans, and notes) in Journ. of Theol. Studies, iii. 59. Trans, of Apost. Constitutions, book viii., in Ante-Nicene Christian Library. (W. E. Co.)

APOSTOLIC CANONS, a collection of eighty-five rules for the regulation of clerical life, appended to the eighth book of the Apostolical Constitutions (q.v.). They are couched in brief legislative form though on no definite plan, and deal with the vexed questions of ecclesiastical discipline as they were raised towards the end of the 4th century. At least half of the canons are derived from earlier constitutions, and probably not many of them are the actual productions of the compiler, whose aim was to gloss over the real nature of the Constitutions, und secure their incorporation with the Epistles of Clement in the New Testament of his day. The Codex Alexandrinus does indeed append the Clementine Epistles to its text of the New Testament. The Canons may be a little later in date than the preceding Constitutions, but they are evidently from the same Syrian theological circle.

APOSTOLIC FATHERS, a term used to distinguish those early Christian writers who were believed to have been the personal associates of the original Apostles. While the title " Fathers " was given from at least the beginning of the 4th century to church writers of former days, as being the parents of Christian belief and thought for later times, the expression " Apostolic Fathers" dates only from the latter part of the 17th century. The idea of recognizing these " Fathers " as a special group exists already in the title " Patres aevi apostolici, sive SS. Patrum qui temporibus apostolicis floruerunt . . . opera," under which in 1672 J. B. Cotelier published at Paris the writings current under the names of Barnabas, Clement of Rome, Hermas, Ignatius and Polycarp. But the name itself is due to their next editor, Thomas Ittig (1643-1710), in his Bibliotheca Patrum Apostolicorum (1699), who, however, included under this title only Clement, Ignatius and Polycarp. Here already appears the doubt as to how many writers can claim the title, a doubt which has continued ever since, and makes the contents of the "Apostolic Fathers" differ so much from editor to editor. Thus the Oratorian Andrea Gallandi (1709-1779), in re-issuing Cotelier's

collection in his Bibliotheca Veterum Patrum (1765- 1781), included the fragments of Papias and the Epistle to Diognetus, to which recent editors have added the citations from the " Elders " of Papias's day found in Irenaeus and, since 1883, the Didache.

The degree of historic claim which these various writings have to rank as the works 1 of Apostolic Fathers varies greatly on any definition of " apostolic." Originally the epithet was meant to be taken strictly, viz. as denoting those whom history could show to have been personally connected, or at least coeval, with one or more apostles; and an effort was made, as by Cotelier, to distinguish the writings rightly and wrongly assigned to such. Thus editions tended to vary with the historical views of editors. But the convenience of the category " Apostolic Fathers " to express not only those who might possibly have had some sort of direct contact with apostles — such as " Bar- nabas," Clement, Ignatius, Papias, Polycarp — but also those who seemed specially to preserve the pure tradition of apostolic doctrine during the sub-apostolic age, has led to its general use in a wide and vague sense.

Conventionally, then, the title denotes the group of writings which, whether in date or in internal character, are regarded as belonging to the main stream of the Church's teaching during the period between the Apostles and the Apologists (i.e. to c. a.d. 140). Or to put it more exactly, the " Apostolic Fathers " represent, chronologically in the main and still more from the religious and theological standpoint, . the momentous process of

1 Cotelier included the Acts of Martyrdom of Clement, Ignatius and Polycarp; and those of Ignatius and Polycarp are still often printed by editors.

transition from the type of teaching in the New Testament to that which meets us in the early Catholic Fathers, from the last quarter of the 2nd century onwards. The Apologists no doubt show us certain fresh factors entering into this development; but on the whole the Apostolic Fathers by themselves go a long way to explain the transition in question, so far as knowledge of this saeculum obscurum is within our reach at all. It is true that they do not include the whole even of the ecclesiastical literature of the sub-apostolic age, not to mention what remains of Gnostic and other minority types. The Preaching and Apocalypse of Peter, for instance, are quite typical of the same period, and help us to read hetween the lines of the Apostolic Fathers. Yet they do not really add much to what is there

already, and they have the drawbacks of pseudonymity; they lack concrete and personal qualities; they are general expressions of tendencies which we cannot well locate or measure, save by means of the Apostolic Fathers themselves or of their earliest Catholic successors.

(A) In external features the group is far from homogeneous, a fact which has led to their being disintegrated as a group in certain histories of early Christian literature {e.g. those of Harnack and Kriiger), and classed each under its own literary type — so sacrificing to outer form, which is quite secondary in primitive Christian writings, the more significant fact of religious affinity. Its original members, those still best entitled to their name in any strict sense, are epistles, and in this respect also most akin to Apostolic writings. Indeed Ignatius takes pleasure in saluting his readers " after the apostolic stamp " {ad Trail. inscr.), while yet disclaiming all desire to emulate the apostolic manner in other respects, being fully conscious of the gulf between himself and apostles like Peter and Paul in claim to authority {ib. iii. 3, ad Rom. iv. 3). The like holds of Polycarp, who, in explaining that he writes to exhort the Philippians only at their own request, adds, " for neither am I, nor is any other like me, able to follow the wisdom of the blessed and glorious Paul " (iii. 2). Clement's epistle, indeed, conforms more to the elaborate and treatise-like form of the Epistle to the Hebrews, on which it draws so largely; and the same is true of " Barnabas." But one and all are influenced by study of apostolic epistles, and witness to the impression which these produced on the men of the next generation. Unconsciously, too, they correspond to the apostolic type of writing in another respect, viz. their occa- sional and practical character. They are evoked by pressing ri_'eds of the hour among some definite body of Christians and ho by any literary motive. 1 This is a universal trait of primitive Ch/istian writings; so that to speak of primitive Christian " literature " at all is hardly accurate, and tends to an artificial handling of their contents. These sub-apostolic epistles are veritable " human documents," with the personal note running through them. They are after all personal expressions of Christianity, in which are discernible also specific types of local tradition. To such spontaneous actuality a large part of their interest and value is due.*

Nor is this pre-literary and vital quality really absent even from the writing which is least entitled to a place among " Apostolic Fathers," the Epistle to Diognetus. This beautiful picture of the Christian life as a realized ideal, and of Christians as " the soul " of the world, owes its inclusion to a double error: first, to the accidental attachment at the end of another fragment (§ n), which opens with the writer's claim to stand forth as a teacher as being " a disciple of apostles "; and next, to mistaken exegesis of this phrase as implying personal relations with apostles, rather than knowledge of their teaching, written or oral. Whether in form addressed to Diognetus, the tutor

of Marcus Aurelius, as a typical cultured observer of Christianity, or to some other eminent person of the same name in the locality of its origin, or, as seems more likely, to cultured Greeks gener- ally, personified under the significant name " Diognetus " (" Heaven-born," cf. Acts xvii. 28 along with § iii. 4) — the

1 See G. A. Deissmann, Bible Studies, pp. 1-60, for this distinction between the genuine " letter " and the literary " epistle," as applied to the New Testament in particular.

epistle is in any case an " open letter " of an essentially literary type. Further, its opening seems modelled on the lines of the preface to Luke's Gospel, to which, along with Acts, it may owe something of its very conception as a reasoned appeal to the lover of truth. But while literary in form and conception, its appeal is in spirit so personal a testimony to what the Gospel has done for the writer and his fellow Christians, that it is akin to the piety of the Apostolic Fathers as a group. It is true that it has marked affinities, e.g. in its natural theology, with the earliest Apologists, Aristides and Justin, even as it is itself in substance an apology addressed not to the State, but to thoughtful public opinion. But this only means that we cannot draw a hard and fast line between groups of early Christian writings at a time when practical religious interests overshadowed all others.

If thus related to the Apologists of the middle of the 2nd century, the Epistle to Diognetus has also points of contact with one of the most practical and least literary writings found among our Apostolic Fathers, viz. the homily originally known as the Second Epistle of Clement (for this ascription, as for other details, see Clementine Literature). The recovery of its concluding sections in the same MS. which brought the Didache to light, proves beyond question that we have here the earliest extant sermon preached before a Christian congregation, about a.d. 120-140 (so J. B. Lightfoot). Its opening section, recalling to its hearers the passing of the mists of idolatry before the revela- tion in Jesus Christ, is markedly similar in tone and tenor to passages in the Epistle to Diognetus. Far closer, however, are the affinities between the homily and the Shepherd of Hernias, " the first Christian allegory," which as a literary whole dates from about a.d. 140, but probably represents a more or less prolonged prophetic activity on the part of its author, the brother of Pius, the Roman bishop of his day {c. 139-154). In both the primary theme is repentance, as called for by serious sins, after baptism has placed the Christian on his new and higher level of responsibility. Thus both are' hortatory writings, the one argumentative in form, the other prophetic, after the manner of later Old Testament prophets whose messages came in visions and similitudes. This prophetic and apocalyptic note, which char- acterizes Hermas among the Apostolic Fathers (though there are traces of it also in

the Didache and in Ignatius, ad Eph. xx.), is a genuinely primitive trait and goes far to explain the vogue which the Shepherd enjoyed in the generations immediately suc- ceeding, as also the influence of its disciplinary policy, which is its prophetic " burden " (see Hermas, Shepherd of).

We come finally to the anonymous Teaching of the Twelve Apostles and Papias's Exposition of Oracles of the Lord, so far as this is known to us. The former, besides embodying catechetical instruction in Christian conduct (the " Two Ways "), which goes back in substance to the early apostolic age and is embodied also in " Barnabas," depicts in outline the fundamental usages of church life as practised in some conservative region (probably within Syria) about the last quarter of the 1st century and perhaps even later. The whole is put forth as substantially the apostolic teaching {Didache) on the subjects in question. This is probably a bona fide claim. It expresses the feeling common to the Apostolic Fathers and general in the sub-apostolic age, at any rate in regions where apostles had once laboured, that local tradition, as held by the recognized church leaders, did but continue apostolic doctrine and practice. Into later develop- ments of this feeling an increasing element of illusion entered, and all other written embodiments of it known to us take the form of literary fictions, more or less bold. It is in contrast to these that the Didache is justly felt to be genuinely primitive and of a piece with the Apostolic Fathers. Thus while its form would by analogy tend per se to awaken suspicion, its contents remove this feeling; and we may even infer from this surviving early formulation of local ecclesiastical tradition, that others of somewhat similar characcer came into being in the sub-apostolic age, but failed to survive save as embodied in later local teaching, oral or written, very much as if the Didache had perished and its literary offspring alone remained (see Didache) .

As regards Papias's Exposition, which Lightfoot describes

as "among the earliest forerunners of commentaries, partly explanatory, partly illustrative, on portions of the New Testa- ment," we need here only remark that, whatever its exact form may have been — as to which the extant fragments still leave room for doubt — it was in conception expository of the historic meaning of Christ's more ambiguous Sayings, viewed in the light of definitely ascertained apostolic traditions bearing on the subject. The like is true also of the fragments of the Eiders preserved in Irenaeus (so far as these do not really come from Papias). Both bodies of exposition represent the traditional principle at work in the sub-apostolic

age, making for the preser- vation in relative purity, over against merely subjective inter- pretations — those of the Gnostics in particular — of the historic or original sense of Christ's teaching, just as Ignatius stood for the historicity of the facts of His earthly career in their plain, natural sense.

(B) Here the question of external form passes readily over into that of the internal character and spirit. Indeed much has already been said or suggested bearing on these. The relation of these writers to the apostolic teaching generally has become pretty evident. It is one of absolute loyalty and deference, as to the teaching of inspiration. They are conscious, as are we in reading thern, that they are not moving on the same level of insight as the Apostles; they are sub-apostolic in that sense also. Hence there appear constant traces of study of the Apostolic writings, so far as these were accessible in the locality of each writer at his date of writing (for the details of this subject, and its bearing on the history of the Canonical Scriptures of the New Testament, see The New Testament in the Apostolic Fathers, Oxford, 1905). As Lightfoot points out {Apostolic Fathers, pt. i. vol. i. p. 7), however, personality, with its variety of temperament and emphasis, largely colours the Apostolic Fathers, especially the primary group. Clement has all the Roman feeling for duly constituted order and discipline; Ignatius has the Syrian or semi-oriental passion of devotion, showing itself at once in his mystic love for his Lord and his over-strained yearning to become His very " disciple " by drink- ing the like cup of martyrdom; Polycarp is, above all things, steady in his allegiance to what had first won his conscience and heart, and his " passive and receptive character " comes out in the contents of his epistle. Of the rest, whose personalities are less known to us, Papias shares Polycarp's qualities and their limitations, the anonymous homilist and Hermas are marked by intense moral earnestness, while the writer to Diog- netus joins to this a profound religious insight. These personal traits determine by selective affinity, working under conditions given by the special local type of tradition and piety, the elements in the Apostolic writings which each was able to assimilate and express — though we must allow also for variety in the occasions of writing. Thus one New Testament type is echoed in one and another in another; or it may be several in turn. The latter is the case in Clement, Ignatius and Polycarp; perhaps also in " Barnabas." In Hermas there is special affinity to the language and thought of the epistle of James, and in the homilist to those of Paul. Yet their very use of the same terms or ideas makes us the more aware of " a marked contrast to the depth and clear- ness of conception with which the several Apostolic writers place before us different aspects of the Gospel " (Lightfoot). While Apostolic phrases are used, the sense behind them is often different and less evangelic. They have not caught the Apostolic meaning, because they have not penetrated to the full religious experience which gave to the words,

often words with long and varied history both in the Septuagint and in ordinary Greek usage, their specific meaning to each apostle and especially to Paul. This phenomenon was noted particularly by E. Reuss, in his Histoire de la theologie chretienne au siecle apostolique (3rd ed., 1864). Take for instance Clement. Lightfoot, indeed, dwells on the all-round " comprehensiveness " with which Clement, as the mouthpiece of the early Roman Church, utters in succes- sion phrases or ideas borrowed impartially from Peter and Paul and James and the Epistle to Hebrews. He admits, however, that such mere co-ordinalion of the language of Paul and James,

for instance, as appears in his twice bracketing " faith and hospitality " as grounds of acceptance with God (the cases are those of Abraham and Rahab, in chs. x. and xii.), is " from a strictly dogmatic point of view " his weakness. But the weakness is more than a dogmatic one; it is one of religious experience, as the source of spiritual insight. It is not merely that " there is no dogmatic system in Clement " or in any other of the Apostolic Fathers; that may favour, not hinder, religious insight. There is a want of depth in Christian experience, in the power of realizing relative spiritual values in the light of the master prin- ciple involved in the distinctively Christian consciousness, such as could raise Clement above a verbal eclecticism, rather than comprehensiveness, in the use of Apostolic language. As R. W. Dale remarks, in a note on Reuss's too severe words (Eng. trans, ii. 295): " The vital force of the Apostolic convictions gave to Apostolic thought a certain organic and consistent form." It is lack of this organic quality in the thought, not only of Clement but also of the Apostolic Fathers generally — with the possible exception of Ignatius, who seems to share the Apostolic experi- ence more fully than any other, to which Reuss rightly directs attention. In virtue of this defect, due largely to the failure to enter into the Apostolic experience of mystic union with Christ, he can rightly speak of " an immense retrogression " in theology visible " at the end of the century, and in circles where it might have been least expected" (ii. p. 294, cf. 541).

In fact the perspective of the Gospel was seriously changed and its most distinctive features obscured. This was specially the case with the experimental doctrines of grace. Here the central glory of the Cross as " the power of God unto salvation " suffered some eclipse, although the passion of Christ was felt to be a transcendent act of Divine Grace in one way or another. But even more serious was the loss of an adequate sense of the contrast between "grace" and "works" as conditions of salvation. There was little or no sense of the danger of the legal principle, as related to human egoism and the instinct to seek salvation as a reward for merit. The passages in which these things are laid bare by Paul's remorseless analysis of his own experience " under Law " seem to have made practically no impression on the Apostolic Fathers as a whole. Gentile Christians had not

felt the fang of the Law as the ex-Pharisee had occasion to feel it. Even if first trained in the Hellenistic synagogues of the Dispersion, as was often the case, they appre- hended the Law on its more helpful and less exacting side, and had not been brought " by the Law to die unto the Law," that they might " live unto God." The result was too great a continuity between their religious conceptions before and after embracing the Gospel. Thus the latter seemed to them simply to bring forgiveness of past sins for Christ's sake, and then an enhanced moral responsibility to the New Law revealed in Him. Hence a new sort of legalism, known to recent writers as Moralism, underlies much of the piety of the Apostolic Fathers, though Ignatius is quite free from it, while Polycarp and " Barnabas " are less under its influence than are the Didache, Clement, the Homilist and Hermas. It conceives salvation as a " wages " duados) to be earned or forfeited; and regards certain good works, such as prayer, fasting, alms — especially the last — as efficacious to cancel sins. The reality of this tendency, particularly at Rome, betrays itself in Hermas, who teaches the supererogatory merit of alms gained by the self- denial of fasting (Sim. v. 3. 3 ff.). Marcion's reaction, too, against the Judaic temper in the Church as a whole, in the interests of an extravagant Paulinism, while it suggests that Paul's doctrines of grace generally were inadequately realized in the sub-apostolic age, points also to the prevalence of such moralism in particular.

(C) In attempting a final estimate of the value of the Apostolic Fathers for the historian to-day, we may sum up under these heads: ecclesiastical, theological, religious, (a) As a mine of materials for reconstructing the history of Church institutions, they are invaluable, and that largely in virtue of their spon- taneous and " esoteric " character, with no view to the public generally or to posterity, (b) Theologically, as a stage in the

history of Christian doctrine, their value is as great negatively as positively. Impressive as is their witness to the persistence of the Apostolic teaching in its essential features, amidst all personal and local variations, perhaps the most striking thing about these writings is the degree in which they fail to appreciate certain elements of the Apostolic teaching as embodied in the New Testament, and those its higher and more distinctively Christian elements. 1 This negative aspect has a twofold bearing. Firstly, it suggests the supernormal level to which the Apostolic consciousness was raised at a bound by the direct influence of the Founder of Christianity, and justifies the marking-off of the Apostolic writings as a Canon, or body of Christian classics of unique religious authority. To this principle Marcion's Pauline

Canon is a witness, though in too one-sided a spirit. Secondly, it means that the actual development of ecclesiastical doctrine began, not from the Apostolic consciousness itself, but from a far lower level, that of the inadequate consciousness of the sub- apostolic Church, even when face to face with their written words. This theological " retrogression " is of much significance for the history of dogma, (c) On the other hand, there is great religious and moral continuity, beneath even theological discontinuity, in the life working below all conscious apprehension of the deeper ideas involved (E. yon Dobschutz, Christian Life in the Primitive Church, 1005). There is continuity in character; the Apostolic Fathers strike us as truly good men, with a goodness raised to a new type and power. This is what the Gospel of Christ aims chiefly at producing as its proper fruit; and the Apostolic Fathers would have desired no better record than that they were themselves genuine " epistles of Christ."

Literature. — This is too large to indicate even in outline, but is given fully in the chief modern editions, viz. of Gebhardt, Harnack and Zahn jointly (1875-1877), J. B. Lightfoot (1 885-1 890) and F. X. Funk (1901); also in O. Bardenhewer, Gesch. der altkirchlichen Litteratur (1902), Band i., and in Ncutsstamentliche Apokryphen, with Handbuch thereto, edited by E. Hennecke (Tubingen, 1904). The fullest discussion in English of the teaching of Barnabas, Clement, Ignatius and Polycarp is by J. Donaldson, The Apostolical Fathers (1874), which, however, suffers from the imperfect state of the texts when he wrote. The most useful edition for ready reference, containing critical texts (up to date) and good translations, is Lightfoot's one-volume edition, The Apostolic Fathers (London, 1891). (J.V. B.)

APOSTOLICI, Apostolic Brethren, or Apostles, the names given to various Christian heretics, whose common doctrinal feature was an ascetic rigidity of morals, which made them reject property and marriage. The earliest Apostolici appeared in Phrygia, Cilicia, Pisidia and Pamphylia towards the end of the 2nd century or the beginning of the 3rd. Accord- ing to the information given by Epiphanius (Haer. 61) about the doctrines of these heretics, it is evident that they were connected with the Encratites and the Tatianians. They con- demned individual property, hence the name sometimes given to them of A potactites or Renuntiatores. They preserved an absolute chastity and abstained from wine and meat. They refused to admit into their sect those Christians whom the fear of martyr- dom had once restored to paganism. As late as the 4th century St Basil (Can. 1 and 47) knew some Apostolici. After that period they disappeared, either becoming completely extinct, or being confounded with other sects (see St Augustine, Haer. 40; John of Damascus, Haer. 61).

Failing a more exact designation, the name of Apostolici has been given to

certain groups of Latin heretics of the 12 th century. It is the second of the two sects of Cologne (the first being com- posed very probably of Cathari) that is referred to in the letter addressed in 1146 by Everwin, provost of Steinfeld, to St Bernard (Mabillon, Vet. Anal. iii. 452). They condemned marriage (save, perhaps, first marriages), the eating of meat, baptism of children, veneration of saints, fasting, prayers for the dead and belief in purgatory, denied transubstantiation, declared the Catholic priesthood worthless, and considered the whole church of their time corrupted by the " negotia saecularia " which absorbed all

1 One result is their inability to form a true theory of Judaism and of the Old Testament in relation to the Gospel, a matter of great moment for them and for their successors.

its zeal (cf. St Bernard, Serm. 65 and 66 in Cantic.). They do not seem to have been known as Apostles or Apostolici: St Bernard, in fact, asks his hearers: " Quo nomine istos titulove censebis?" (Serm. 66 in Cantic). Under this designation, too, are included the heretics of Perigueux in France, alluded to in the letter of a certain monk Heribert (Mabillon, Vet. Anal. iii. 467). Heribert says merely: " Se dicunt apostolicam vitam ducere." It is possible that they were Henricians (see Henry of Lausanne). During his mission in the south-east of France in 1146-1147 St Bernard still met disciples of Henry of Lausanne in the environs of Perigueux. The heretics of whom Heribert speaks condemned riches, denied the value of the sacraments and of good works, ate no meat, drank no wine and rejected the veneration of images. Their leader, named Pons, gathered round him nobles, priests, monks and nuns.

In the second half of the 13th century appeared in Italy the Order of the Apostles or Apostle Brethren (see especially the Chron. of Fra Salimbene) . This was a product of the mystic fermenta- tion which proceeded from exalted Franciscanism and from Joachimism (see Fraticelli and Joachim). It presents great analogies with groups of the same character, e.g. Sachets, Bizocchi, Flagellants, &c. The order of the Apostles was founded about 1 260 by a young workman from the environs of Parma, Gerard Segarelli, who had sought admission unsuccessfully to the Franciscan order. To make his life conform to that of Christ, his contemporaries say that he had himself circumcisjd, wrapped in swaddling clothes and laid in a cradle, and that he then, clad in a white robe and bare-footed, walked through the streets of Parma crying ■" Penitenz agite!" (" Poenitentiam agite!"). He was soon followed by a throng of men and women, peasants and mechanics. All had to live in absolute poverty, chastity and idleness. They begged, and preached penitence. Opizo, bishop of Parma, protected them until they caused trouble in his diocese. Their diffusion into several countries of Christendom disturbed Pope Honorius IV., who in 1286

ordered them to adhere to an already recognized rule. On their refusal, the pope condemned them to banishment and Opizo imprisoned Segarelli. The councils of Wurzburg (1287) and Chichester (1289) took measures against the Apostles of Germany and England. But in 1291 the sect reappeared, sensibly in- creased, and Pope Nicholas IV. published anew the bull of Honorius IV. From that day the Apostles, regarded as rebels, were persecuted pitilessly. Four were burned in 1294, and Segarelli, as a relapsed heretic, went to the stake at Parma in

1300.

They had had close relations with the dissident Franciscans, but the Spirituals often disavowed them, especially when the sect, which in Segarelli's time had had no very precise doctrinal character, became with Dolcino frankly heterodox. Dolcino of Novara was brought up at Vercelli, and had been an Apostle since 1291. Thrice he fell into the hands of the Inquisition, and thrice recanted. But immediately after Segarelli's death he wrote an epistle, soon followed by a second, in which he declared that the third Joachimite age began with Segarelli and that Frederick of Sicily was the expected conqueror (Hist. Dulcini and Addit. ad Hist. Dulcini in Muratori, Scriptores, vol. ix.). He gave himself out as an angel sent from God to elucidate the prophecies. Soon he founded an Apostolic congregation at whose head he placed himself. Under him were his four lieutenants, his " mystic sister," Margherita di Franck, and 4000 disciples. He taught almost the same principles of devotion as Segarelli, but the Messianic character which he attributed to himself, the announcement of a communistic millennial kingdom, and, besides, an aggressive anti-sacerdotalism, gave to Dolcino's sect a clearly marked character, analogous only to the theocratic community of the Anabaptists of MUnster in the 16th century. On the 5th of June 1305 Pope Clement V., recognizing the impotence of the ordinary methods of repression, issued bulls for preaching a crusade against the Dolcinists. But four crusades, directed by the bishop of Vercelli, were required to reduce the little army of the heresiarch, entrenched in the mountains in the neighbourhood of Vercelli. Not till the 23rd

of March 1307 were the sectaries definitively overcome. The Catholic crusaders seized Dolcino in his entrenchments on Mount Rubello, and the pope at once announced the happy event to King Philip the Fair. At Vercelli Dolcino suffered a horrible punishment. He was torn in pieces with red-hot pincers — the torture lasting an entire day — while Margherita was burned

at a slow lire. Dante mentions Dolcino's name (Inferno, c. xxviii.), and his memory is not yet completely effaced in the province of Novara. The Apostles continued their propaganda in Italy, Languedoc, Spain and Germany. In turn they were condemned by the councils of Cologne (1306), Treves (1310) and Spoleto (1311). The inquisitor of Languedoc, Bernard Gui, persecuted them unremittingly (see Gui's Practice Inquisitionis). From 1316 to 1322 the condemnations of Apostles increased at Avignon and Toulouse. They disappeared, however, at a comparatively late date from those regions (council of Lavaur, 1368; council of Narbonne, 1374). In Germany two Apostles were burned at Liibeck and Wismar at the beginning of the 15th century (1402-1403) by the inquisitor Eylard.

Several controversialists, including Gotti, Krohn and Stock- mann, have mentioned among the innumerable sects that have sprung from Anabaptism a group of individuals whose open-air preaching and rigorous practice of poverty gained them the name of Apostolici. These must be carefully distinguished from the Aposloolians, Mennonites of Frisia, who followed the teachings of the pastor Samuel Apostool (1638-beginning of 18th century). In the Mennonite church they represent the rigid, conservative party, as opposed to the Galenists, who inclined towards the Arminian latitudinarianism and admitted into their community all those who led a virtuous life, whatever their doctrinal tendencies. (P. A.)

APOSTOLIC MAJESTY, a title borne by the kings of Hungary. About a.d. 1000 it was conferred by Pope Silvester II. upon St Stephen (975-1038), the first Christian king of Hungary, in return for his zeal in seeking the conversion of the heathen. It was renewed by Pope Clement XIII. in 1758 in favour of the empress Maria Theresa and her descendants. The emperor of Austria bears the title of apostolic king of Hungary.

APOSTOLIUS, MICHAEL (d. c. 1480), a Greek theologian and rhetorician of the 15th century. When, in 1453, the Turks conquered Constantinople, his native city, he fled to Italy, and there obtained the protection of Cardinal Bessarion. But engaging in the great dispute that then raged between the up- holders of Aristotle and Plato, his zeal for the latter led him to speak so contemptuously of the more popular philosopher and of his defender, Theodoras Gaza, that he fell under the severe displeasure of his patron. He afterwards retired to Crete, where he earned a scanty living by teaching and by copying manuscripts. Many of his copies are still to be found in the libraries of Europe. One of them, the Icones of Philostratus at Bologna, bears the inscription: " The king of the poor of this world has written this book for his living." Apostolius died about 1480, leaving two sons, Aristobulus Apostolius and Arsenius. The latter became bishop of Malvasia (Monemvasia) in the Morea.

Of his numerous works a few have been printed: Hapm/tlai (Basel, 1538), now exceedingly rare; a collection of proverbs in Greek, of which a fuller edition appeared at Leiden, " Curante Heinsio," in 1619; " Oratio Panegyrica ad Fredericum III." in Freher's Scriptores Rerum Cermanicarum, vol. ii. (Frankfort, 1624); Georgii Gemisthi Plethonis et Mich. Apostolii Orationes funebres duae in quibus de Immortalitate Animae exponitur (Leipzig, 1793) ; and a work against the Latin Church and the council of Florence in Le Moine's Varia Sacra.

APOSTROPHE (Gr. iwoa-Tpo^v, turning away; the final e being sounded), the name given to an exclamatory rhetorical figure of speech, when a speaker or writer breaks off and addresses some one directly in the vocative. The same word (representing, through the French, the Greek a.Tr6<7Tpoos Tpovy&La, the accent of elision) means also the sign (') for the omission of a letter or letters, e.g. in " don't." In physiology, " apostrophe " is used more precisely in connexion with its literal meaning of " turning away," e.g. for movement away from the light, in the

case of the accumulation of chlorophyll-corpuscles on the cells of leaves.

APOTACTITES, or Apotactici (from Gr. curoTa/cros, set apart), a sect of early Christians, who renounced all their worldly possessions. (See Apostolici ad init.)

APOTHECARY (from the Lat. apothecarius, a keeper of an apotheca, Gr. cnro&j/oj, a store), a word used by Galen to denote the repository where his medicines were kept, now obsolete in its original sense. An apothecary was one who prepared, sold and prescribed drugs, but the preparing and selling of drugs prescribed by others has now passed into the hands of duly qualified and authorized persons termed " chemists and drug- gists," while the apothecary, by modern legislation, has become a general medical practitioner, and the word itself, when used at all, is applied, more particularly in the United States and in Scotland, to those who in England are called " pharmaceutical chemists." The Apothecaries' Society of London is one of the corporations of that city, and both by royal charters and acts of parliament exercises the power of granting licences to practise medicine. The members of this society do not possess and never have possessed any exclusive power to deal in or sell drugs; and until 1868 any person whatever might open what is called a chemist's shop, and deal in drugs and poisons. In that : year, however, the Pharmacy Act was passed, which prohibits any person from engaging in this business without being registered.

From early records we learn that the different branches of the medical profession were not regularly distinguished till the reign of Henry VIII.,

when separate duties were assigned to them, and peculiar privileges were granted to each. In 1518 the physicians of London were incorporated, and the barber- surgeons in 1 540. But, independently of the physicians and the surgeons, there were a great number of irregular practitioners, who were more or less molested by their legitimate rivals, and it became necessary to pass an act in 1 543 for their protection and toleration. As many of these practitioners kept shops for the sale of medicines, the term " apothecary " was used to designate their calling.

In April 1606 James I. incorporated the apothecaries as one of the city companies, uniting them with the grocers. On their charter being renewed in 16 17 they were formed into a separate corporation, under the title of the " Apothecaries of the City of London." These apothecaries appear to have prescribed medicines in addition to dispensing them, and to have claimed an ancient right of acting in this double capacity; and it may be mentioned that Henry VIII. , after the grant of the charter to the College of Physicians, appointed an apothecary to the Princess Mary, who was delicate and unhealthy, at a salary of 40 marks a year, " pro meliore cura et consider atione sanitatis suae." During the 17th century, however, there arose a warm contest between the physicians and the apothecaries, — the former accusing the latter of usurping their province, and the latter continuing and justifying the usurpation until the dispute was finally set at rest by a judgment of the House of Lords in 1703 (Rose v. College of Physicians, 5 Bro. P. C. 553), when it was decided that the duty of the apothecary consisted not only in compounding and dispensing, but also in directing and ordering the remedies employed in the treatment of disease. In 1722 an act was obtained empowering the Apothecaries' Company to visit the shops of all apothecaries practising in London, and to destroy such drugs as they found unfit for use. In 1748 great additional powers were given to the company by an act authoriz- ing them to appoint a board of ten examiners, without whose licence no person should be allowed to dispense medicines in London, or within a circuit of 7 m. round it. In 1815, however, an act of parliament was passed which gave the Apothecaries' Society a new position, empowering a board, consisting of twelve of their members, to examine and license all apothecaries throughout England and Wales. It also enacted that, from the 1st of August of that year, no persons except those who were so licensed should have the right to act as apothecaries, and it gave the society the power of prosecuting those who practised

without such licence. But the act expressly exempted from prosecution all

persons who were then in actual practice, and it distinctly excluded from its operation all persons pursuing the calling of chemists and druggists. It was also provided that the act should in no way interfere with the rights or privileges of the English universities, or of the English College of Surgeons or the College of Physicians; and indeed a clause imposed severe penalties on any apothecaries who should refuse to com- pound and dispense medicines on the order of a physician, legally qualified to act as such. It is therefore clear that the act contemplated the creation of a class of practitioners who, while having the right to practise medicine, should assist and co-operate with the physicians and surgeons.

Before this act came into operation the education of the medical practitioners of England and Wales was entirely optional on their own part, and although many of them possessed degrees or licences from the universities or colleges, the greater number possessed no such qualification, and many of them were wholly illiterate and uneducated. The court of examiners of the Apothecaries' Society, being empowered to enforce the acquisition of a sufficient medical education upon its future licentiates, specified from time to time the courses of lectures or terms of hospital practice to be attended by medical students before their examination, and in the progress of years regular schools of medicine were organized throughout England.

As it was found that, notwithstanding the stringent regulations as to medical acquirements, the candidates were in many instances deficient in preliminary education, the court of examiners instituted, about the year 1850, a preliminary examination in arts as a necessary and indispensable prerequisite to the medical curriculum, and this provision has been so ex- panded that, at the present day, all medical students in the United Kingdom are compelled to pass a preliminary examination in arts, unless they hold a university degree. An act of parlia- ment, passed in 1858, and known as the Medical Act, made very little alteration in the powers exercised by the Apothecaries' Society, and indeed it confirmed and in some degree amplified them, for whereas by the act of 181 5, the licentiates of the society were authorized to practise as such only in England and Wales, the new measure gave them the same right in Scotland and Ireland. The Medical Act 1886 extended the qualifications necessary for registration under the medical acts, by making it necessary to pass a qualifying examination in medicine, surgery and midwifery. (See Medical Education.)

An act, passed in 1874, related exclusively to the Apothecaries' Society, and is' termed the Apothecaries' Act Amendment Act. By this measure some provisions of the act of 1815, which had become obsolete or unsuitable, were repealed, and powers were given to the society to unite or

co-operate with other medical licensing bodies in granting licences to practise. The act of 1815 had made it compulsory on all candidates for a licence to have served an apprenticeship of five years to an apothecary, and although by the interpretation of the court of examiners of the society this term really included the whole period of medical study, yet the regulation was felt as a grievance by many members of the medical profession. It was accordingly repealed, and no apprenticeship is now necessary. The restriction of the choice of examiners to the members of the society was also repealed, and the society was given the power (which it did not before possess) to strike off from the list of its licentiates the names of disreputable persons. The act of 1874 also specified that the society was not deprived of any right or obligation they may have to admit women to examination, and to enter their names on the list of licentiates if they acquit themselves satisfactorily.

The Apothecaries' Society is governed by a master, two wardens and twenty-two assistants. The members are divided into three grades, yeomanry or freemen, the livery, and the court. Women are not, however, admitted to the freedom. The hall of the society, situated in Water Lane, London, and covering about three-quarters of an acre, was acquired in 1633. It was destroyed by the great fire, but was rebuilt about ten years later

and enlarged in 1786. This is the only property possessed by the society. In 1673, the society established a botanic and physic garden at Chelsea, and in 1722 Sir Hans Sloane, who had become the ground owner, gave it to the society on the condition of presenting annually to the Royal Society fifty dried specimens of plants till the number should reach 2000. This condition was fulfilled in 1774. Owing to the heavy cost of maintenance and other reasons, the "physic garden" was handed over in 1902, with the consent of the Charity Commissioners, to a committee of management, to be maintained in the interests of botanical study and research.

See C. R. B. Barrett, The History of the Society of Apothecaries of London (1905).

APOTHEOSIS (Gr. awoBeovv, to make a god, to deify), literally deification. The term properly implies a clear polytheistic conception of gods in contrast with men, while it recognizes that some men cross the dividing line. It is characteristic of poly- theism to blur that line in several ways. Thus the ancient Greek religion was especially disposed to belief in heroes and demigods. Founders of cities, and even of colonies, received worship; the former are, generally speaking, mythical personages and, in strictness, heroes. But the worship after death of historical persons, such as Lycurgus, or worship of the living as true deities, e.g. Lysander and Philip

II. of Macedon, occurred sporadically even before Alexander's conquests brought Greek life into contact with oriental traditions. It was inevitable, too, that ancient monarchies should enlist polytheistic conceptions of divine or half -divine men in support of the dynasties; " Seu deos regesve canit deorum Sanguinem," Horace {Odes, iv. 2, 11. 12, 13) writes of Pindar; though the reference is to myths, yet the phrase is significant. In the East all such traits are exaggerated, a result perhaps rather of the statecraft than of the religions of Egypt and Persia. Whatever part vanity or the flattery of courtiers may have played with others, or with Alexander, it is significant that the dynasties of Alexander's various successors all claim divine honours of some sort (see Ptolemies, Seleucid Dynasty, &c). Theocritus {Idyll 17) hails Ptolemy Philadelphus as a demigod, and speaks of his father as seated among the gods along with Alexander. Ancestor worship, or reverence for the dead, was a third factor. It may work even in Cicero's determination that his daughter should enjoy " cbrod£to

The Romans had, up to the end of the Republic, accepted only one official apotheosis; the god Quirinus, whatever his original meaning, having been identified with Romulus. But the emperor Augustus carried on the tradition of ancient statecraft by having Julius Caesar recognized as a god {divus Julius), the first of a new class of deities proper {divi). The tradition was steadily followed and was extended to some ladies of the imperial family and even to imperial favourites. Worship of an emperor during his lifetime, except as the worship of his genius, was, save in the cases of Caligula and Domitian, confined to the provinces. Apotheosis after his death, being in the hands of the senate, did not at once cease, even when Christianity was officially adopted. The Latin term is consecratio, which of course has a variety of senses, including simple burial. (Inscription in G. Boissier, La Religion romaine; Renier, Inscriptions d' Algiers, 2510.) The Greek term Apotheosis, probably a coinage of the Hellenistic epoch, becomes more nearly technical for the deifica- tion of dead emperors. But it is still used simply for the erection of tombs (clearly so in some Greek inscriptions, Corpus Inscript. Graec. 2831, 2832, quoted in Pauly-Wissowa, s.v. Apotheosis). Possibly there is a trace of ancestor worship even here; but the two usages have diverged. The squib of the philosopher Seneca on the memory of Claudius (d. a.d. 54), Apocolocyntosis {" pump- kinification "), is evidence that, as early as Seneca's lifetime, apotheosis was in use for the recognition of a departed emperor as a god. It also indicates how much contempt might be associated with this pretended worship. The people, savs

Suetonius (Jul. Caes. c. 88), fully believed in the divinity of Julius Caesar, hinting at the same time that this was by no means the case with the majority of the apotheoses subsequently decreed by the senate. Yet we learn from Capitolinus that Marcus Aurelius was still worshipped as a household divinity in the time of Diocletian, and was believed to impart revelations in dreams (Vit. M. Ant. c. 18). Antinous, the favourite of Hadrian, was adored in Egypt a century after his death (Origen, Contra Celstim, iii. 36) , though, according to Boissier, his worship never had official sanction. The ceremonies attendant on an imperial apotheosis are very fully described by Herodianus (bk. iv. c. 2) on occasion of the obsequies of Severus, which he appears to have witnessed. The most significant was the liberation, at the moment of kindling the funeral pyre, of an eagle which was supposed to bear the emperor's soul to heaven. Sharp-sighted persons had actually beheld the ascension of Augustus (Suet. August, c. 100), and of Drusilla, sister of Caligula. Representa- tions of apotheoses occur on several works of art; the most im- portant are the

apotheosis of Homer on a relief in the Townley col- lection of the British Museum, that of Titus on the arch of Titus, and that of Augustus on a magnificent cameo in the Louvre.

In China at the present day many Taoist gods are (or are given out as) men deified for service to the state. This again may be statecraft. In India, the (still unexplained) rise of the doctrine of transmigration hindered belief. Apotheosis can mean nothing to those who hold that a man may be reborn as a god, but still needs redemption, and that men on earth may win redemption, if they are brave enough. Curiously, Buddhism itself is ruled by the ghost or shadowy remainder of belief in transmigration — Karma.

Apotheosis may also be used in wider senses, (a) Some (e.g. Herbert Spencer) hold that most gods are deified men, and most myths historical traditions which have been grotesquely distorted. This theory is known as Euhemerism (see Euhemerus). It is needless to say that the attitude of those holding the Euhemerist theory is at the farthest pole from belief in apotheosis. Accord- ing to the latter, some men may become gods. According to the former, all gods are but men; or, some men have been "erroneously supposed tojiecome gods. The Euhemerist theory mainly appeals to ancestor worship — a fact of undoubted importance in the history of religion, especially in China and in ancient Rome. In India, too, a dead person treated with funeral honours becomes a guardian spirit — if neglected, a tormenting demon. But whether the great gods of polytheism were really transfigured ancestors is very doubtful, (b) Again, there is a tendency to offer something like worship to the founders of religions. Thus more than human honour is paid to Zoroaster and Buddha and even to the founders of systems not strictly religious, e.g. to Confucius and Auguste Comte. It is noticeable that this kind of worship is not accorded in rigidly monotheistic systems, e.g. to Moses and Mahomet. Nor is it accurate to speak of apotheosis in cases where the founder is in his lifetime regarded as the incarnation of a god (cf. Ali among Shi'ite Mahommedans; the Bab in Babism; the Druse Hakim). Most Christians on this ground repudiate the application of the term to the worship of Jesus Christ. Curiously, Apotheosis is used by the Latin Christian poet, Prudentius (c. 400), as the title of a poem defending orthodox views on the person of Christ and other points of doctrine — the affectation of a decadent age. (c) The worship paid to Saints, in those Christian churches which admit it, is formally distinguished as dulia (8ov\eia) from true worship or latria Xarpeia). Even the Virgin Mary, though she is styled Mother of God and Queen of Heaven, receives only dulia or at most hyperdulia.

(R. G.; R. Ma.)

APPALACHIAN MOUNTAINS, the general name given to a vast system of

elevations in North America, partly in Canada, but mostly in the United States, extending as a zone, from 100 to 300 m. wide, from Newfoundland, Gaspe Peninsula and New Brunswick, 1500 m. south-westward to central Alabama. The whole system may be divided into three great sections: the Northern, from Newfoundland to the Hudson river; the Central,

from the Hudson Valley to that of New river (Great Kanawha), in Virginia and West Virginia; and the Southern, from New river onwards. The northern section includes the Shickshock Mountains and Notre Dame Range in Quebec, scattered eleva- tions in Maine, the White Mountains and the Green Mountains; the central comprises, besides various minor groups, the Valley Ridges between the Front of the Allegheny Plateau and the Great Appalachian Valley, the New York-New Jersey Highlands and a large portion of the Blue Ridge; and the southern con- sists of the prolongation of the Blue Ridge, the Unaka Range, and the Valley Ridges adjoining the Cumberland Plateau, with some lesser ranges.

The Chief Summits. — The Appalachian belt includes, with the ranges enumerated above, the plateaus sloping southward to the Atlantic Ocean in New England, and south-eastward to the border of the coastal plain through the central and southern Atlantic states; and on the north-west, the Allegheny and Cumberland plateaus declining toward the Great Lakes and the interior plains. A remarkable feature of the belt is the longi- tudinal chain of broad valleys— the Great Appalachian Valley — which, in the southerly sections divides the mountain system into two subequal portions, but in the northernmost lies west of all the ranges possessing typical Appalachian features, and separates them from the Adirondack group. The mountain system has no axis of dominating altitudes, but in every portion the summits rise to rather uniform heights, and, especially in the central section, the various ridges and intermontane valleys have the same trend as the system itself. None of the summits reaches the region of perpetual snow. Mountains of the Long Range in Newfoundland reach heights of nearly 2000 ft. In the Shickshocks the higher summits rise to about 4000 ft. elevation. In Maine four peaks exceed 3000 ft., including Katahdin (5200 ft.), Mount Washington, in the White Mountains (6293 ft.), Adams (5805), Jefferson (5725), Clay (5554), Monroe (539°). Madison (5380), Lafayette (5269); and a number of summits rise above 4000 ft. In the Green Mountains the highest point, Mansfield, is 4364 ft.; Lincoln (4078), Killington (4241), Camel Hump (4088); and a number of other heights exceed 3000 ft. The Catskills are not properly included in the system. The Blue Ridge, rising in southern Pennsylvania and there known as South Mountain, attains in that state elevations of about 2000 ft.; southward to the Potomac its altitudes diminish, but 30 m. beyond again reach 2000 ft. In the Virginia Blue Ridge the following are the highest peaks east of New

river: Mount Weather (about 1850 ft.), Mary's Rock (3523), IJeaks of Otter (4001 and 3875), Stony Man (4031), Hawks Bill (4066). In Pennsylvania the summits of the Valley Ridges rise generally to about 2000 ft., and in Maryland Eagle Rock and Dans Rock are conspicuous points reaching 3162 ft. and 2882 ft. above the sea. On the same side of the Great Valley, south of the Potomac, are the Pinnacle (3007 ft.) and Pidgeon Roost (3400 ft.). In the southern section of the Blue Ridge are Grandfather Mountain (5964 ft.), with three other summits above 5000, and a dozen more above 4000. The Unaka Ranges (including the Black and Smoky Mountains) have eighteen peaks higher than 5000 ft., and eight surpassing 6000 ft. In the Black Mountains, Mitchell (the culminating point of the whole system) attains an altitude of 6711 ft., Balsam Cone, 6645, Black Brothers, 6690, and 6620, and Halfback, 6403. In the Smoky Mountains we have Cling- man's Peak (6611), Guyot (6636), Alexander (6447), Leconte (6612), Curtis (6588), with several others above 6000 and many higher than 5000.

In spite of the existence of the Great Appalachian Valley, the master streams are transverse to the axis of the system. The main watershed follows a tortuous course which crosses tie mountainous belt just north of New river in Virginia; south of this the rivers head in the Blue Ridge, cross the higher Unakas, receive important tributaries from the Great Valley, and travers- ing the Cumberland Plateau in spreading gorges, escape by way of the Cumberland and Tennessee rivers to the Ohio and Mississippi, and thus to the Gulf of Mexico; in the central section the rivers, rising in or beyond the Valley Ridges, flow through

great gorges (water gaps) to the Great Valley, and by south- easterly courses across the Blue Ridge to tidal estuaries penetrat- ing the coastal plain ; in the northern section the water-parting lies on the inland side of the mountainous belt, the main lines of drainage running from north to south.

Geology. — The rocks of the Appalachian belt fall naturally into two divisions; ancient (pre-Cambrian) crystallines, including marbles, schists, gneisses, granites and other massive igneous rocks, and a great succession of Paleozoic sediments. The crystallines are confined to the portion of the belt east of the Great Valley where Paleozoic rocks are always highly meta- morphosed and occur for the most part in limited patches, excepting in New England and Canada, where they assume greater areal importance, and are besides very generally intruded by granites. The Paleozoic

sediments, ranging in age from Cambrian to Permian, occupy the Great Valley, the Valley Ridges and the plateaus still farther west. They are rarely metamorphosed to the point of recrystallization, though locally shales are altered to roofing slates, sandstones are indurated, limestones slightly marblized, and coals, originally bituminous, are changed to anthracite in northern Pennsylvania, and to graphite in Rhode Island. Igneous intrusions consist only of unimportant dikes of trap. The most striking and uniformly characteristic geologic feature of the mountains is their internal structure, consisting of innumerable parallel, long and narrow folds, always closely appressed in the eastern part of any cross- section (Piedmont Plateau to Great Valley), less so along a central zone (Great Valley and Valley Ridges), and increasingly open on the west (Allegheny and Cumberland Plateaus). Asymmetry of the folds is a marked characteristic in the zones of closer folding, the anticlines having long gently inclined easterly limbs, and short, steep and even . overturned limbs upon the west. The effect of such folds is often exaggerated by thrusts, and faulting of this sort is prominent in the southern section, where the existence of over- thrusts measured by several miles has been established.

What may be termed the ancestral Appalachian system was formed during the post-carboniferous revolution, though certain of its elements had been previously outlined, and perhaps at different dates. Folding of the rocks resulted from the operation of great compressive forces acting tangentially to the figure of the earth. Extensive and deep-seated crumpling was necessarily accompanied by vertical uplift throughout the zone affected, but once at least since their birth the mountains have been worn down to a lowtend, and the mountains of to-day are the combined product of subsequent uplift of a different sort, and dissection by erosion. Produced by long-continued subaerial decay and erosion, in later Cretaceous times this lowland extended from the Atlantic Ocean well toward the interior of North America; since then the whole continent has been generally elevated, and by successive steps the Appalachian belt has been raised to form a wide but relatively low arch. The crosswise courses of the greater rivers result from the rivers being older than the moun- tains, which indeed have been produced by circumdenudation. The master streams of the present have inherited their channels from the drainage systems of the Cretaceous lowland, and though raised athwart the courses of the lowland trunk streams the great arch was developed so slowly that these channels could be maintained through pari passu deepening. Former tributaries have given place to others developed with reference to the distribution of more or less easily eroded strata, the present longitudinal valleys being determined by the out-crop of soft shales or soluble limestones, and the parallel ridges upheld by hard sandstones or schists. Parallelism of mountain ridges and intervening valleys is thus attributable to the folding of the rocks, but the

origin of the interior structure of the mountains is to be kept distinct from the origin of the mountains as features of topography.

Flora and Fauna. — Much of the region is covered with forest yielding quantities of valuable timber, especially in Canada and northern New England. The most valuable trees for lumber are spruce, white pine, hemlock, cedar, white birch, ash, maple

and basswood; all excepting pine and hemlock and poplar in addition are ground into wood pulp for the manufacture of paper. In the central and southern parts of the belt oak and hickory constitute valuable hard woods, and certain varieties of the former furnish quantities of tan bark. The tulip tree produces a good clear lumber known as white wood or poplar, and is also a source of pulp. In the south both white and yellow pine abounds. Many flowering and fruit-bearing shrubs of the heath family add to the beauty of the mountainous districts, rhododendron and kalmia often forming impenetrable thickets. Bears, mountain lions (pumas), wild cats (lynx) and wolves haunt the more remote fastnesses of the mountains; foxes abound; deer are found in many districts and moose in the north.

Influence on History. — For a century the Appalachians were a barrier to the westward expansion of the English colonies; the continuity of the system, the bewildering multiplicity of its succeeding ridges, the tortuous courses and roughness of its transverse passes, a heavy forest and dense undergrowth all conspired to hold the settlers on the seaward-sloping plateaus and coastal plains. Only by way of the Hudson and Mohawk valleys, and round about the southern termination of the system were there easy routes to the interior of the country, and these were long closed by hostile aborigines and jealous French or Spanish colonists. In eastern Pennsylvania the Great Valley was accessible by reason of a broad gateway between the end of South Mountain and the Highlands, and here in the Lebanon Valley settled German Moravians, whose descendants even now retain the peculiar patois known as " Pennsylvania Dutch." These were late comers to the New World forced to the frontier to find unclaimed lands. With their followers of both German and Scotch-Irish origin, they worked their way southward and soon occupied all of the Virginia Valley and the upper reaches of the Great Valley tributaries of the Tennessee. By 1755 the obstacle to westward expansion had been thus reduced by half; outposts of the English colonists had penetrated the Allegheny and Cumberland plateaus, threatening French monopoly in the transmontane region, and a conflict became inevitable. Making common cause against the French to^determine the control of the Ohio valley, the unsuspected strength of the colonists was revealed, and the successful ending of the French and Indian War extended England's territory to the Mississippi. To this strength the geographic isolation enforced by the Appalachian mountains had been a

prime contributor. The confinement of the colonies between an ocean and a mountain wall led to the fullest occupation of the coastal border of the continent, which was possible under existing conditions of agriculture, conducing to a community of purpose, a political and commercial solidarity, which would not otherwise have been developed. As early as 1700 it was possible to ride from Portland, Maine, to southern Virginia, sleeping each night at some considerable village. In contrast to this complete industrial occupation, the French territory was held by a small and very scattered population, its extent and openness adding materially to the difficulties of a disputed tenure. Bearing the brunt of this contest as they did, the colonies were undergoing preparation for the subsequent struggle with the home government. Unsupported by shipping, the American armies fought toward the sea with the mountains at their back protecting them against Indians leagued with the British. The few settlements beyond the Great Valley were free for self-defence because debarred from general participation in the conflict by reason of their position.

See the separate articles on the states, and also the following references: — Topographic maps and Geologic Folios of the United States Geological Survey; Bailey Willis, " The Northern Appa- lachians," and C. W. Hayes, " The Southern Appalachians," both in National Geographic Monographs, vol. i. ; and chaps, iii., iv. and v. of Miss E. C. Semple's American History and its Geographic Conditions (Boston, 1903). " (A. C. Sp.)

APPANAGE, or Apanage (a French word from the late Lat. apanagium, formed from apanare, i.e. panem porrigere, to give bread, i.e. sustenance), in its original sense, the means of subsistence given by parents to their younger children as distinct

frotu the rights secured to the eldest born by the custom of primogeniture. In its modern usage it is practically confined to the money endowment given to the younger children of reigning or mediatized houses in Germany and Austria, which reverts to the state or to the head of the family on the extinction of the line of the original grantee. In English history the system of appanages never played any great part, and the term is now properly applied only to the appanages of the crown: the duchy of Cornwall, assigned to the king's eldest son at birth, or on his father's accession to the crown, and the duchy of Lancaster. In the history of France, however, the appanage was a very important factor. The word denotes in very early French law the portion of lands or money given by fathers and mothers to their sons or daughters on marriage, and usually connotes a renunciation

by the latter of any future inheritance; or it may denote the portion given by the eldest son to his brothers and sisters when he was sole inheritor. The word apanage is still employed in this sense in French official texts of some Customs; but it was in old public law that it received its definite meaning and importance. Under the kings of the third dynasty, the division of the kingdom among the sons of the dead monarch which had characterized the Merovingian and . Carolingian dynasties, ceased. The eldest son alone succeeded to the crown; but at the same time a custom was established by which the king made territorial provision suitable to their rank for his other children or for his brothers and sisters; custom forbade their being left landless. Lands and lordships thus bestowed con- stituted the appanages, which interfered so greatly with the formation of ancient France. While the persevering policy of the Capets, which armed at reuniting the great fiefs, duchies, countships, baronies, &c, to the domain of the crown, gradually reconstructed for their benefit a territorial sovereignty over France, the institution of the appanage periodically subtracted large portions from it. Louis XI., in particular, had to struggle against the appanaged nobles. The old law, however, never abolished this institution. The edict of Moulins (1566) main- tained it, as one of the exceptions to the inalienability of the crown-lands; only it was then decided that daughters of France should be appanaged in money, or that if, in default of coin, lands were assigned to them, these lands should be redeemable by the crown in perpetuity. The efforts of the kings to minimize this evil, and of the old jurisprudence to deal with the matter, resulted in two expedients: (1) the reversion of the appanage to the crown was secured as far as possible, being declared in- alienable and transmissible only to male descendants in the male line of the person appanaged; (2) originally the person appanaged had possessed all the rights of a duke or count — that is to say, in the middle ages nearly all the attributes of sovereignty; the more important of these attributes were now gradually reserved to the monarch, including public authority over the inhabitants of the appanage in all essential matters. However, it is evident from the letters of appanage, dated April 177 1, in favour of the count of Provence, how many functions of public authority an appanaged person still held. The Constituent Assembly, by the law dated the 22nd of November 1790, decided that in future there should be no appanages in real estate, and that younger sons of monarchs, married and over twenty- five years of age, should be provided for by yearly grants (rentes apanageres) from the public funds. The laws of the 13th of August and the 21st of December 1790 revoked all the existing appanages, except those of the Luxembourg Palace and the Palais Royal. To each person hitherto appanaged an annual income of one million livres was assigned, and two millions for the brothers of the king. All this came to an end with the monarchy. Napoleon, by the senatus-consulte of the 30th of January 1810, resolved to create appanages for the emperor's princely descend- ants, such

*appanages to consist for the most part of lands on French soil. The fall of the empire again annulled this enact- ment. The last appanage known in France was that enjoyed by the house of Orleans. Having been re-established, or recognized as' still existing, by the Restoration, it was formally confirmed by the law of the 15th of January 1825- On th**

accession of Louis Philippe it was united to the national property by the law of the 2nd of March 1832.

For appanages in ancient law see the Essai sur les apanages ou memoires historiques de leur etablissement, attributed to Du Vaucel. about 1780. (J. p. E.)

APPAREL (from 0. Fr. aparail, aparailler, mod. appareil, from Low Lat. adpariculare,. to make fit or equal), equipment, outfit, things furnished for the proper performance of anything, now chiefly used of dress. The word is also applied to the " orphreys," i.e. embroidered strips or borders, on ecclesiastical vestments.

APPARITIONS. An apparition, strictly speaking, is merely an appearance (Lat. apparere, to appear), the result of perception exercised on any stimulus of any of the senses. But in ordinary usa,ge the word apparition denotes a perception (generally through the sense of sight) which cannot, as a rule, be shown to be occasioned by an object in external nature. We say " as a rule " because many so-called apparitions are merely illusions, i.e. misconstructions of the perceptive processes, as when a person in a bad light sees a number of small children leading a, horse, and, finds, on nearer approach, that he sees two men carrying bee-hives suspended from a pole. Again, Sir Walter Scott's vision of Byron, then lately dead, proved to be a mis- construction of certain plaids and cloaks hanging in the hall at Abbotsford, or so Sir Walter declared. Had he not discovered the physical basis of this illusion (which, while it lasted, was an apparition, technically speaking), he and others might have thought that it was an apparition in the popular sense of the word, a ghost. In popular phraseology a ghost is understood to be a phantasm produced in some way by the spirit of a dead person, the impression being usually visual, though the ghost, or apparition, may also affect the sense of hearing (by words, knocks, whistles, groans and so forth), or the sense of touch, or of weight, as in the case of the " incubus." In ordinary speech an apparition of a person not known to the percipient to be dead is called a wraith, in the Highland phrase, a spirit of the living. The terms ghost and wraith involve the hypothesis that the false perceptions are caused by spirits, a survival of the archaic animistic hypothesis (see Animism), an hypothesis as difficult to prove as to disprove. Apparitions, of course, are not confined to anthropomorphic phantasms; we hear of phantom coaches (sometimes seen, but more

frequently heard), of phantom dogs, cats, horses, cattle, deer, and even of phantom houses.

Whatever may be the causes of these and other false percep- tions, — most curious when the impression is shared by several witnesses, — they may best be considered under the head of hallucination (q.v.). Hallucinations may be pathological, i.e. the result of morbid conditions of brain or nerve, of disease, of fever, of insanity, of alcoholism, of the abuse of drugs. Again, they may be the result of dissociation, or may occur in the borderland of sleep or waking, and in this case they partake of the hallucinatory nature of dreams (q.v.}. Again, hallucina- tions may, once or twice in a lifetime, come into the experience of the sane, the healthy, and, as far as any tests can be applied, of the wide-awake. In such instances the apparition (whether it take the form of a visual phantasm, of a recognized voice, of a touch, or what not) may be coincidental or non-coincidental. The phantasm is called coincidental if it represents a known and distant person who is later found to have been dying or in some other crisis at the moment of the percipient's experience. When the false perception coincides with nothing of the sort, it is styled non-coincidental. Coincidental apparitions have been explained by the theory of telepathy (q.v.}, one mind or brain impressing another in some unknown; way so as to beget an hallucinatory apparition or phantasm. On the evidence, so far as it has been collected and analysed, it seems that the mind which, on the hypothesis, begets the hallucinations, usually does so without conscious effort (see Subliminal Self). There are, however, a few cases in which the experiment of begetting, in another, an hallucination from a. distance, is said to have been experimentally and consciously made, with success.

If the telepathic theory of coincidental hallucinations be accepted, we have still to account for the much more common

non-coincidental apparitions of the living who do not happen to be in any particular crisis. In these instances it cannot be demonstrated that telepathy has not been at work, as when a person is seen at a place which he thought of visiting, but did not visit. F. W. Myers even upheld a theory of psychorhagy, holding that the spirits of some persons have a way of manifesting themselves at a distance by a psychic invasion. This involves, as he remarked, paleolithic psychology, and the old savage doctrine of animism, rather than telepathy (see Myers, Human Personality). Of belief in coincidental hallucinations or wraiths amon b savages, records are scanty; the belief, however, is found among Maoris and Fuegians (see

Lang, Making of Religions). The perception of apparitions of distant but actual scenes and occurrences is usually called clairvoyance (q.v.). The belief is also familiar under the name of second sight(see Second Sight), a term of Scots usage, though the belief in it, and the facts if accepted, are of world-wide diffusion. The apparitions may either represent actual persons and places, or may be symbolical, taking the form of phantasmic lights, coffins, skeletons, shrouds and so forth. Again, the appearances may either represent things, persons and occurrences of the past (see Retrocogni- tion), or of the present (clairvoyance), or of the future (see Premonition). When the apparitions produce themselves in given rooms, houses or localities, and are exhibited to various persons at various times, the locality is popularly said to be haunted by spirits, that is, of the dead, on the animistic hy- pothesis (see Hauntings). Like the other alleged facts, these are of world-wide diffusion, or the belief in them is world-wide, and peculiar to no race, age, or period of culture. A haunted place is a centre of permanent possibilities of hallucinations, or is believed to be so. A distinct species of hauntings are those in which unexplained sounds and movements of objects, apparently untouched, occur. The German term Poltergeist (q.v.) has been given to the supposed cause of these occurrences where the cause is not ascertained to be sportive imposture. In the per- formances of modern spiritualists the Poltergeist appears, as it were, to be domesticated, and to come at the call of the medium.

An intermittent kind of ominous haunting attached, not to places, but to families, is that of the banshee (Celtic) or family death omen, such as the white bird of the Oxenhams, the Airlie drummer, the spectral rider of Clan Gilzean, the rappings of the Woodde family. These apparitions, with fairies and djinns (the Arab form of fairy), haunt the borderland between folk-lore and psychical research.

So far we have been concerned with spontaneous apparitions, or with the belief in them. Among induced apparitions may be reckoned the materialized forms of spiritual seances, which have a material basis of veils, false moustaches, wigs and the corpus vile of the medium. It is also possible that mere expectancy and suggestion induce hallucinatory perceptions among the members of the circle. That apparitions of a sort can be induced by hypnotic and posthypnotic suggestion is certain enough (see Hypnotism). Savages produce apparitions in similar ways by suggestion, accompanied by dances, fumigations, darkness, fasting, drugs, and whatever can affect the imaginations of the onlookers (see Magic). Both in savage and civilized life, some persons can provoke themselves into beholding apparitions usually fantastic, but occasionally coincidental, by sedulously staring into any clear deep water, a fragment of rock crystal, a piece of polished basalt or obsidian, a mirror, a ring, a sword blade, or a glass of sherry (see Crystal Gazing). Indeed any object, a wall, the palm of

the hand, the shoulder-blade-bone of a sheep, may be, and has been used to this end (see Divination).

Almost all known apparitions may accommodate themselves to one or other of the categories given, whether they be patho- logical, coincidental or spontaneous, induced, permanently localized, or sporadic.

Seegenerally.SpiRlTUALlSMandPsYCHicAL Research. (A.L.)

APPARITOR, or Apparator (Latin for a servant of a public official, from apparere, to attend in public), an attendant who executed the orders of a Roman magistrate; hence a beadle in a •iniversity, a pursuivant or herald; particularly, in English

ecclesiastical courts, the official who serves the processes of the court and causes defendants to appear by summons.

APPEAL, in law. In the old English common law the term " appeal " was used to describe a process peculiar to English criminal procedure. It was a right of prosecution possessed as a personal privilege by a party individually aggrieved by a felony, a privilege of which the crown could not directly or indirectly deprive him, since he could use it alike when the prisoner was tried and acquitted, and when he was convicted and pardoned. It was chiefly known in practice as the privilege of the nearest relation of a murdered person. When in 1729 (after Colonel Oglethorpe's inquiry and report on the London prisons) Ban- bridge and other gaolers were indicted for their treatment of prisoners, but were acquitted for deficiency of evidence, appeals for murder were freely brought by relatives of deceased prisoners. In the case of Slaughterford (1708) the accused was charged with murdering a woman whom he had seduced; the evidence was very imperfect, and he was acquitted on indictment. But public indignation being aroused by the atrocities alleged to have been perpetrated, an appeal was brought, and on conviction he was hanged, as his execution was a privilege belonging to the prosecutor, of which the crown could not deprive him by a pardon. In 1818 an appeal was ingeniously met by an offer of battle, since if the appellee were an able-bodied man he had the choice between combat or a jury (see Wager). This neutralizing of one obsolete and barbarous process by another called the attention of the legislature to the subject, and appeal in criminal cases, along with trial by battle, was abolished in 1819. The history of this appeal is fully dealt with in Pollock and Maitland, History of English Law, 1898.

In its usual modern sense the term appeal is applied to the proceeding by which the decision of a court of justice is brought for review before another tribunal of higher authority. In Roman jurisprudence it was used in this

and in other significa- tions; it was sometimes equivalent to prosecution, or the calling up of an accused person before a tribunal where the accuser appealed to the protection of the magistrate against injustice or oppression. The derivation from appellare (" call ") suggests that its earliest meaning was an urgent outcry or prayer against injustice. During the republic the magistrate was generally supreme within his sphere, and those who felt themselves out- raged by injustice threw themselves on popular protection by provocatio, instead of looking to redress from a higher official authority. Under the empire different grades of jurisdiction were established, and the ultimate remedy was an appeal to the emperor; thus Paul, when brought before Fes tus, appealed unto Caesar. Such appeals were, however, not heard by the emperor in person but by a supreme judge representing him. In the Corpus Juris the appeal to the emperor is called in- discriminately appellatio and provocatio. A considerable portion of the 49th book of the Pandects is devoted to appeals; but little of the practical operation of the system is to be deduced from the propositions there brought together.

During the middle ages full scope was afforded for appeals from the lower to the higher authorities in the church. In matters ecclesiastical, including those matrimonial, testamentary and other departments, which the church ever tried to bring within the operation of the canon law, there were various grades of appeal, ending with the pope. The claims of the church to engross appeals in matters trenching on the temporal rights of princes led to continual conflicts between church and state, terminated in England at the reformation by the suppression in 1534 of appeals to Rome, which had previously been discouraged by legislation of Edward III. and Richard II.

In temporal, as distinct from spiritual matters, it became customary for ambitious sovereigns to encourage appeals from the courts of the crown vassals to themselves as represented by the supreme judges, and Charlemagne usually enjoys the credit of having set the example of this system of centralization by establishing missi dominici. It is not improbable that his claim was suggested or justified by the practice of the Roman empire, Ao the sovereignty whereof he claimed to be successor.

England. — When the royal authority in England grew strong as against that of the tenants in capite, the king's courts in England were more effectively organized, and their net swept wider so as to draw within their cognizance matters previously adjudged in courts baron or courts leet or in the county court, and they acquired authority to supervise and review the decisions of the inferior and local courts, to control and limit their claims

to exercise jurisdiction, and to transfer causes from the local to the royal courts. The machinery by which this process was usually effected, under the common law, was not by what is now known as appeal, but by the process of certiorari or writs of error or prohibition. Recourse was also had against the decisions of the royal courts by appeal to the great council of the king, or to parliament as a whole. The supremacy of the king's courts over all causes, as well ecclesiastical as civil, has been completely established since the reign of Henry VIII., and they have effectually asserted the power to regulate and keep within their proper jurisdiction all other tribunals within the realm. Since that date the organization of judicial tribunals has gradually been changed and improved with the object (i) of creating a judicial hierarchy independent of executive control; (2) of ensuring that all decisions on questions of law shall be co-ordinated and rendered systematic by correction of the errors and vagaries of subordinate tribunals; and (3) of securing so far as possible uniformity in the judicial interpretation and administration of the law, by creating a supreme appellate tribunal to whose decisions all other tribunals are bound to conform. It would be undesirable to detail at length the history of appellate jurisdic- tion in England, involving as it would the discussion in great detail of the history and procedure of English law, and it may suffice to indicate the system of appeals as at present organized, beginning with the lowest courts.

Justices of the Peace. — The decisions of justices of the peace sitting as courts of summary jurisdiction are subject to review on questions of law only by the High Court of Justice. This review is in a sense consultative, because it is usually effected by means of a case voluntarily stated by the justices at the request of the aggrieved party, in which are set forth the facts as deter- mined by the justices, the questions of law raised and their decision thereon, as to the correctness whereof the opinion of the High Court is invited. The procedure is equally open in criminal and civil matters brought before the justices. But when the justices decline to state a case for the opinion of the High Court, the latter, if review seems desirable, may order the justices to state a case. And the High Court has also power to control the action of justices by prohibiting them from acting in a case beyond their jurisdiction, ordering them to exercise jurisdiction where they have improperly declined {mandamus), or bringing up for review and quashing orders or convictions which they have made in excess of jurisdiction, or in cases in which interested or biassed justices have adjudicated {certiorari). None of these regulative processes exactly corresponds to what is popularly known as an appeal, but in effect if not in form an appeal is thus given.

There is also another form of appeal, in the fullest sense of the term, from the decision of justices sitting as a court of summary jurisdiction to the

justices of the same county sitting in general or quarter sessions, or in the case of a borough to the recorder as judge of the borough court of quarter sessions. This form of appeal is in every case the creation of statute: and even in text-books it is hardly possible to find a really complete list of the matters in respect of which such appeal lies. But as regards criminal cases there is an approximately general rule, given by § 19 of the Summary Jurisdiction Act 1879, v i z – lnat an appeal to quarter sessions lies from the con- viction or order of a court of summary jurisdiction directing imprisonment without the option of a fine as a punishment for an offence, or for failing to do or to abstain from doing any act required to be done or left undone other than an order for the payment of money, or to find sureties or give security or to enter into a recognizance, or a conviction made on a plea of guilty or admission of the truth of the matter of comDlaint.

As a general rule, subject to particular statutory exceptions, appeals of this kind are by way of rehearing, i.e. the actor or prosecutor must before the appellate tribunal call his witnesses and prove his case just as if no previous hearing had taken place before the court appealed from (Pritchard, Quarter Sessions Practice, 2nd ed., 461). The only limit is that the appellant must confine himself to the grounds of appeal stated in the notice of appeal given by him.

Justices in Quarter Sessions. — This tribunal has under the commission of the peace and under statute power to refer questions of difficulty arising before it for decision to the High Court. The old mode of exercising this power was by sending on to assizes indictments raising difficult questions which had been presented at quarter sessions. The High Court has ex officio power to transfer such indictments where the nature of the case and the demands of justice call for such transfer. The quarter sessions had also power under statute on trying an indictment to refer to the court for crown cases reserved (Crown Cases Act 1848), abolished by the Criminal Appeal Act 1907, questions of law which had arisen at the trial, and in all civil cases the quarter sessions has power of its own volition and subject to no direct compulsion to consult the High Court on legal questions of difficulty which have arisen. Until 1894 this jurisdiction was regarded as consultative only. It was and is exercised by stating the facts, of which the court of quarter sessions is the sole judge, and indicating the questions of law arising on the facts, and the view of quarter sessions thereon, and inviting the opinion of the High Court. Under the Judi- cature Act 1894 cases stated in this way are now treated as "appeals" in the popular sense.

Inferior Courts of purely Civil Jurisdiction. — An appeal also lies as a general rule to the High Court from the judgment of a county court or of any inferior tribunal having civil jurisdiction.

(a) County Courts. Any party to an action or matter in a county court who is dissatisfied with the determination or direction of the judge in law or equity, or upon the admission or rejection of any evidence, may appeal against the decision in the following cases: (1) if the amount of claim or counter-claim in the proceeding exceeds £20; or (2) in all equity matters or cases in which an injunction has been given; or (3) in actions to recover possession of land where questions of title are involved (County Courts Act 1888, § 120). In the case of a claim below £20 no appeal lies except by the leave of the county court. The old practice of appeal by way of special case as in appeals from justices has been abolished, and the present procedure is by notice of motion (R.S.C. O. LIX. rr. 10-18).

These appeals are heard in the king's bench division, except in the case of appeals from judgments of a county court sitting in the exercise of admiralty jurisdiction, which are heard by two or more judges sitting in the probate, divorce and admiralty division. The chancery division has never sat to hear " appeals " from a county court exercising equity jurisdiction; but at times, by prohibition or certiorari, has, in effect, reviewed or restrained excess of jurisdiction by county courts in equity matters.

The decision of the High Court on county court appeals is final unless an appeal to the court of appeal is brought by leave of that court or of the High Court (Judicature Act 1894, § 1, sub. sect. 5; Judicature Act 1873, § 45).

{b) Other inferior courts of civil jurisdiction. Appeals from the local courts of record which still survive in certain cities, towns and districts are in a somewhat anomalous position. The general rule is that, unless a statute regulates such appeal, it may be brought in the king's bench division of the High Court on notice of motion in any case in which, before the Judicature Acts, the court of king's bench could have reviewed the decision of the inferior court by writ of error. The history of this question is dealt with in Darlow v. Shuttle-worth, 1902, 1 K.B. 721.

In the case of the mayor's court of London, under the local and general statutes regulating that court, the appeal is usually to the king's bench division, but where there is what is termed " error " on the face of the proceedings of the mayor's court,

the appeal lies direct to the court of appeal as successor of the court of exchequer chamber. Appeals from the Liverpool court of passage and from

the chancery courts of the duchies of Lancaster and Durham lie by statute direct to the court of appeal.

High Court of Justice. — Until the Supreme Court of Judicature Acts of 1873 and 1875 came into operation, the superior courts in England were imperfectly co-ordinated both as to jurisdiction and appeals. The effect of these acts was to create a Supreme Court of Judicature divided into two main branches, the High Court of Justice, which is an appellate court with respect to the inferior courts already mentioned, and to certain other special courts and persons; and the court of appeal, which is mainly concerned with appeals from the High Court of Justice.

The High Court of Justice acts as an appellate court or court of consultation with reference to courts of summary jurisdiction or quarter sessions and to county courts and other inferior courts of civil jurisdiction in the cases already indicated. The three divisions of the court are somewhat differently placed with reference to appeals.

In the chancery division (made up, in 1908, of six single judge courts) no appeals are heard except from subordinate officials (masters) of the court, or an occasional interference by certiorari or prohibition with a county court.

In the probate, divorce and admiralty division, besides the supervision which may be exercised by a single judge over the subordinate officers of the court (registrars), divisional courts (of two judges) hear appeals from decisions of the county court in admiralty causes, and appeals from justices in cases between husband and wife under the Summary Jurisdiction (Married Women) Act 1895, as amended by the Licensing Act 1902. In the first of these cases the appeal is on law only as in the case of other county court appeals; in the second, the procedure is by rehearing, or reconsideration of the facts as minuted in the court appealed from, and of the law there applied to these facts.

The bulk of the appellate work of the High Court is conducted in the king's bench division — which, as successor of the old court of king's bench in the duties of custos morum of the realm, still retains supervisory power over all inferior courts in all cases in which that supervision has not been transferred to the other divisions of the High Court or to the court of appeal, or to the court of criminal appeal.

The king's bench division exercises appellate jurisdiction in the following cases.

With respect to decisions of justices of the peace sitting at quarter sessions,

or as a court of summary jurisdiction, except in the case above stated, the subject matter of appeal is for the most part of a criminal or quasi-criminal character, the civil jurisdiction of justices being comparatively limited. The appeal in such cases is as to matters of law only, the justices' decision on facts not being subject to review.

In the case of the courts above named, the appeal is brought by writ of certiorari, where the jurisdiction of quarter sessions to give the judgment challenged is denied in toto, or in some cases by writ of habeas corpus, where the appellant is in custody under an order of the court appealed from (Judicature Act 1894, § 2). The best example of this is the right of a fugitive criminal committed for extradition .to challenge the legality of the decision of the committing magistrate by writ of habeas corpus. Save in cases of want of jurisdiction or refusal to exercise it, no appeal lies from quarter sessions except by consent of the court appealed from, which states the facts as ascertained by the inferior court, and invites the review of the superior court upon the questions of law raised by the facts as found.

Decisions of justices sitting in the exercise of summary jurisdiction are subject to review by a special case in which the justices state the facts found by them and their decision on the points of law, and invite the review of the appellate court on these grounds. Such cases for appeal are usually stated by consent of the justices, but in the event of their refusal the appellate court may order that a case shall be stated.

Decisions of justices in the exercise of summary jurisdiction may also be challenged by writ of certiorari as having been wholly outside their jurisdiction; and in such proceeding the appellate tribunal may review the evidence taken below so far as to ascertain whether the justices have by an erroneous finding of fact enabled themselves to assume a jurisdiction which upon the true facts they did not possess.

Where the decision appealed from is in a criminal cause or matter the decision of the High Court is final. Where it is in a civil matter a further appeal also lies to the court of appeal by leave of the High Court or of the court of appeal (Judicature Act 1873, § 45).

Appeals in criminal cases tried on indictment, criminal information or coroner's inquisition, stand on a different footing from other appeals.

For many years the question of criminal appeal in general had been a matter of great controversy. As early as 1844 a bill had been unsuccessfully introduced for the purpose of establishing appeal in criminal cases, and from that time up to 1906 nearly thirty bills were brought forward with the same object, but none succeeded in passing. In 1892 the

question was referred to the council of judges and favourably reported upon by them. It may be remarked that England was practi- cally the only civilized country in which there was no appeal in criminal cases. It is true there was an appeal on questions of law arising at the trial. But the procedure was intricate and technical, being either (1) by writ of error, issued by the consent of the attorney-general (expressed by his fiat) , to review errors of law appearing in the record of the trial, or (2) by special case, stated by the judge presiding at the trial, with respect to a question of law raised at the trial. These appeals were heard by the king's bench division. Meanwhile there had been a considerable development of public opinion in favour of the establishment of criminal appeal, a development undoubtedly hastened by the report of a committee of inquiry in the case of Adolf Beck (1904), showing clearly that the home office was not a satisfactory tribunal of final appeal. In 1906 the lord chancellor (Lord Loreburn) introduced another criminal appeal bill, which passed the House of Lords, but was dropped in the House of Commons after a first reading. The next year the act (Criminal Appeal Act 1907), which was ultimately carried, was introduced into the House of Commons. By this act a court is established consisting of the lord chief justice and eight judges of the king's bench division, the jurisdiction of the court for crown cases reserved being transferred to the new court. The court to be duly constituted must consist of not less than three judges and of an uneven number of judges. The court may sit in two or more divisions if the lord chief justice so directs. Its sittings are held in London unless special directions are given by the lord chief justice that it shall sit at some other place. The opinion of the majority of those hearing the case determines any question before the court, and judgment is pronounced by the president (who is the lord chief justice or senior member present), unless in questions of law, when, if it is convenient that separate judgments should be pronounced by the members of the court, they may be so pronounced. The judgment of the court of criminal appeal is final, except where the decision involves a point of law of exceptional public importance, and a certificate must be obtained from the attorney-general to that effect. The court of criminal appeal is a superior court of record. An appeal may be made either against conviction or agains t sentence. A person convicted on indictment may appeal either on a question of law alone or of fact alone, or on a question of mixed law and fact. On a point of law a prisoner has an unqualified right of appeal, on a question of fact or of mixed law and fact there is a right of appeal only if leave be obtained from the court of criminal appeal or a certificate be granted by the judge who tried the prisoner that it is a fit case for appeal. The court is given a wide discretion as to whether a conviction may be sustained or set aside. The court may allow the appeal if they think that the verdict of the jury should be set aside because it is.

unreasonable, or because it cannot be supported having regard to the evidence, or that the judgment should be set aside on the ground of a wrong decision on any point of law, or that on any ground there was a miscarriage of justice. Power is given to the court to dismiss the appeal if they consider that no substantial miscarriage of justice has occurred, even though they are of opinion that the point raised in the appeal might be decided in favour of the appellant. The sentence passed at the trial may be quashed by the appeal court and such other sentence (whether more or less severe) warranted in law by the verdict substituted. Notice of appeal or notice of application for leave to appeal must be given within ten days of the date of conviction; where a conviction involves sentence of death or corporal punishment the sentence must not be executed until after the expiration of ten days, and, if notice of appeal is given, not until after the determination of the appeal or the final dismissal of the application for leave to appeal. The act gives the court power to order any witnesses who would have been compellable witnesses at the trial to attend and be examined before the court, and to receive the evidence, if tendered, of any witness who is a competent but not com- pellable witness. If any question arises on the appeal involving prolonged examination of documents or accounts or any scientific or local investigation, which the court thinks cannot be con- veniently conducted before it, the matter may be referred to a special commissioner appointed by the court, and the court may act on the report of that commissioner if it thinks fit. An appellant is given the right to be present on the hearing of his appeal, if he desires it, except where the appeal is on some ground involving a question of law alone, but rules of court may provide for his presence in such a case, or the court may give him leave. The act requires shorthand notes to be taken of the proceedings at the trial of any person, who, if convicted, would have a right to appeal under the act. Nothing in the act affects the prerogative of mercy, and the home secretary may, if he thinks fit, at any time refer a case to the court of criminal appeal.

The Court of Appeal. — The court of appeal, constituted under the Judicature Acts, is one of the two permanent divisions of the Supreme Court of Judicature. As now constituted the court consists of ex officio members and five ordinary members, styled lords justices of appeal. The ex officio members are the lord chancellor, every person who has held that office, the lord chief justice, the master of the rolls, and the president of the probate, &C, division.

The ordinary business of the court is carried on by the lords justices under

the presidency of the master of the rolls, who in 1881 ceased to be a judge of the High Court (Judicature Act 1 88 1, § 2). The court usually sits in two divisions of three judges, but on occasion a third court can be formed, with the assistance of the other ex officio judges, in the absence of the ordinary judges from illness or public engagements, or to deal with arrears of business. The quorum for final appeals is three, for interlocutory appeals two judges.

The court of appeal has succeeded to the appellate authority exercised (1) in the case of equity and bankruptcy matters by the lord chancellor and the lords justices of appeal in chancery (Judicature Act 1873, § 18); (2) in the case of common law matters, by the court of exchequer chamber, as a court of error, and the superior courts of common law sitting to review the decisions of single judges of these courts sitting with or without a jury at first instance in civil actions; (3) in the case of divorce or probate causes by the full court of divorce (Judicature Act 1 88 1, § 9); (4) in the case of admiralty causes by the king in council or the judicial committee of the privy council; (5) in the case of applications for new trials in jury actions by the king's bench division (Judicature Act 1890, §1).

The court never had jurisdiction to hear an appeal in any criminal cause or matter, but was able to review by writ of error decisions of the king's bench division in such cases, unless the court for crown cases reserved had dealt with the question under the Crown Cases Act 1848. This Dr> >cedure has been

abolished by the Criminal Appeal Act 1907. Instances of procedure by writ of error were rare. Those best worth notice are the cases of the Tichborne claimant on his conviction of perjury, and the case of C. Bradlaugh on the sufficiency of the indictment against him for publishing the Fruits of Philosophy.

The appellate jurisdiction of the court as now exercised entitles the court to hear and determine (1) appeals from every judgment or decree of every division of the High Court in all civil cases in which such judgment is not declared final by statute; (2) applications for a new trial in civil cases tried in the king's bench division by judge and jury which, until 1800, were dealt with by two or more judges in that division; (3) appeals in matters of civil practice and procedure from decisions of a single judge in chambers, which, until 1894, were dealt with in a divisional court or by a judge in open court; (4) appeals from the chancery courts of Durham (Palatine Court of Durham Act 1889) and Lancaster (act of 1890, c. 23) and the Liverpool court of passage (Anderson v. Dean, 1894, 2 Q.B. 222), and on error in a record of the mayor's court of London (Le Blanche v. Heaton Telegram Co., 1876, 1 Ex.D. 408); and from county courts under the Agricultural

Holdings Acts and Workmen's Compensation Acts; (5) appeals on questions of law from decisions of the railway commissioners in England (Railway and Canal Traffic Act 1888).

The court of appeal also exercises the lunacy jurisdiction of the lord chancellor, but in regard to this the jurisdiction of the court is for the most part original and not appellate.

The jurisdiction of the court of appeal is excluded or limited in the following cases: — (1) judgments of the High Court — (a) where its jurisdiction is consultative only; (b) where there is an appeal to the High Court from an inferior court of civil jurisdic- tion; (c) where there is an appeal to the High Court from any court of person, unless in cases (b) and © leave be obtained of the court by which the order is made, or of the court of appeal; (2) orders of the High Court in registration and election cases except with the like leave; (3) orders made by consent of parties, or as to costs only which by law are left to the discretion of the court; (4) certain interlocutory orders mentioned in § 1 of the Supreme Court of Judicature (Procedure) Act 1894, except by leave of the judge appealed from or of the court of appeal (5) orders of the admiralty division in cases of prize, the appeal from which lies to His Majesty in Council; (6) where the decision of any court whose jurisdiction was transferred to the High Court is declared by statute to be final; (7) matters which from their nature were not appealable to any court before the Judicature Acts, or in which the court of appeal has no means of enforcing or executing its judgment. For example, it was held in the House of Lords, in Cox v. Hakes, 1890, 15 A.C. 506, that no appeal lies from the order of a judge discharging a prisoner under a writ of habeas corpus. " If," said Lord Herschell, " the conten- tion of the respondent is to prevail, the statute has effected a grave constitutional change "; and later, " if " the High Court " has inherited the combined powers of the courts whose functions were transferred to it, but done of them had any jurisdiction or authority to review a discharge by a competent court under a writ of habeas corpus, or to enforce the arrest of one thus freed from custody … it seems to me to follow, that however wrong the court of appeal might think a discharge to have been, it would have been powerless to order a rearrest, or at least tc enforce such an order."

The procedure of the court of appeal is regulated by the rules of the Supreme Court. A distinction is drawn between appeals from a final judgment or order (which, unless the parties consent to a smaller quorum, must be heard by three judges) and an appeal from an interlocutory order (which may be determined by two judges of the court of appeal) .

In the case of appeals from a final or interlocutory " judg- ment," or from

an order, including applications for a new trial, the appeal must be brought within three months from the time when the judgment or order is signed, entered or otherwise perfected, or in the case of refusal of an application from the date of refusal. The appeal is by notice of motion, which.

except in cases of application for a new trial, need not state the grounds of appeal. Fourteen clear days' notice of the motion must be given by the appellant to the other party, the respondent.

In the case of appeals from an interlocutory order, or from a final order, or from an order made in any matter which is not an action, or from an order made in chambers, the appeal must be brought within fourteen days by motion, of which four clear days' notice must be given by the appellant to all parties directly affected by the appeal. Controversies have arisen as to the meaning of the term " interlocutory," which (in the absence of any authoritative definition) the court of appeal settles as they arise. The test most generally accepted is that a judgment or order is final if, as made, it finally disposes of the rights of the parties in a manner equally conclusive between them. The court may by special leave allow appeals of either class to be brought after the time above limited. The respondent may by proper notice bring a cross appeal against any portion of the judgment or order made below with which he is dissatisfied. The court has power to order the appellant to find security for the costs of an appeal, if special circumstances, such as in- solvency or poverty or foreign domicile or the like, make the giving of security desirable. The court of appeal " rehears " the case. Under ordinary circumstances it does not permit a new case to be set up inconsistent with the case as presented below; and it is content with the judges' notes, or a transcript of the evidence given below, and with a note or transcript of the judgment appealed from, but has power on special grounds to receive fresh evidence either viva voce or on affidavit. The court may call in for its assistance assessors who are experts on the matters of fact or science involved in the appeal, and usually does so in cases arising out of collisions at sea.

The court of appeal may make any order which it deems just as to the costs of the whole or any part of an appeal, except possibly in the case of certain appeals in matters on the crown side of the High Court, as to which some doubt still exists. In practice the costs follow the event, unless the court in a particular case makes an order to the contrary.

A decision of the court of appeal is final in appeals from the High Court in

bankruptcy, unless leave be given to appeal to the House of Lords (§ 104, Bankruptcy Act 1883), and in divorce appeals, except where the decision either is upon the grant or refusal of a decree for dissolution or nullity of marriage, or for a declaration of legitimacy, or is upon any question of law on which the court gives leave to appeal (Supreme Court of Judicature Act i88r, § 9); but no further appeal to the House of Lords lies, even with leave of the court of appeal, on appeals from the High Court sitting as a court of appeal from county courts in bankruptcy. With these exceptions there is now a right of appeal from every order of the court of appeal to the House of Lords.

The House of Lords. — The House of Lords has for centuries been the court of last resort, and is still the final court of appeal from the chief courts in the United Kingdom. The origin of the appellate jurisdiction of the House of Lords was undoubtedly of that partly feudal and partly popular character already alluded to, which made the suitor seek from the high court of parliament the justice denied elsewhere in the baronial courts or by the king's judges. The lords exercised the mixed function of jurymen and judges, and, as in judgments on impeachment, might be influenced by private or party considerations, debating and dividing on the question before the House. A revolution was silently accomplished, however, by which the function of reviewing the decisions of the courts fell entirely to the lawyers raised to the peerage, while the unprofessional lords only attended to give the sanction of a quorum to the proceedings, and the House has always had the right to invoke the assistance of the judges of the superior courts to advise on the questions of law raised by an appeal. The letters and memoirs, so late as Queen Anne's reign, show that party or personal influence and per- suasion were employed to procure votes on appeals, as they have been in later times on railway or other local bills. The last

instance probably in which a strong division of opinion was manifested among the unprofessional lords was the celebrated Douglas cause in 1769, when the House was addressed by the dukes of Newcastle and Bedford, but was led by the authoritative opinion of Lord Mansfield on the effect of the evidence — an opinion which was treated rather as that of a political partisan than of a judge. The case of Daniel O'Connell and others, brought up on writ of error from the queen's bench in Ireland in 1844, may be said to have finally established the precedent that the judgments of the House of Lords were to be given solely by the law lords. On that occasion there was a difference of opinion among the law lords themselves. The judgment of the majority of the House was strongly against the political feeling of the government and of the peers as a body, while the law lords who carried the decision had been appointed by previous govern- ments opposed in politics to the existing cabinet. But all these temptations to a party vote by the

unprofessional members were resisted.

By § 20 of the act of 1873, the appellate jurisdiction of the House of Lords (so far as it affects England) was abolished, but this section was repealed by the Appellate Jurisdiction Act 1876. Under that act and an amending act of 1887, the appellate business of the House of Lords is conducted solely by the law lords, though lay peers may still sit (Bradlaugh v. Clarke, 1882, 8 App. Cas. 354). No appeal may be heard or determined except in the presence of not less than three of the following persons: — (1) the lord chancellor; (2) the lords of appeal, four of whom are appointed under the act from among persons who hold, or have held, high judicial office, or, at the date of appoint- ment, have been in practice for not less than fifteen years as barristers in England or Ireland, or as advocates in Scotland; (3) such peers of parliament as hold, or have held, high judicial office. By " high judicial office " is meant the office of lord chancellor of Great Britain or Ireland, lord of appeal in ordinary, paid judge of the judicial committee or member of that com- mittee, or judge of one of the superior courts of Great Britain or Ireland.

An appeal lies to the House of Lords (1) from any order or judgment of the court of appeal in England except as above stated; (2) from a judgment or order of any court in Scotland or Ireland from which error or an appeal to the House of Lords lay by common law or statute immediately before the 1st of November 1876. No appeals are heard from the decision of courts in criminal cases. The House of Lords has an indirect power by standing orders to admit appeals from Scotland or Ireland which under former law or practice could not be admitted (Appellate Jurisdiction Act 1876, § 12). The procedure on appeals is regulated by standing orders of the House. The proceedings are commenced by petition of appeal, which must be lodged with the clerk of the parliaments within one year from the date of the last judgment it appealed from. Security for costs (£200) must be given by bond or lodgment of the money, unless dispensed with by the House on the ground of poverty (act of 1893). Each party lodges a printed case signed and certified by counsel, containing a resume of the matters to be discussed and of the contentions for or against the allowance of the appeal. The hearing is before three or more law lords, who may call in nautical assessors in admiralty cases (acts of 1 893 and 1 894) . It is not public in the full sense of the term, as persons not con- cerned in the appeal can attend only by consent of the House. The House pronounces the judgment which in the opinion of the majority of the law lords should have been pronounced below, and has jurisdiction in the case of all appeals to give or refuse costs to the successful party. The costs of the appeal if given are taxed by the officers of the House. The jurisdiction as to costs does not directly arise under any statute (see West Ham Guardians v. Bethnal Green Churchwardens, 1896, A.C. 477).

Appeals to the King in Council. — The decisions of ecclesiastical courts when acting within the limits of their jurisdiction, and the decisions of courts in the king's dominions outside the United Kingdom, and of courts in foreign countries set up under the Foreign Jurisdiction Acts, cannot be dealt with by the

House of Lords or any of the ordinary tribunals of any part of the United Kingdom. The power once claimed by the court of king's bench in England to control the courts of Ireland has lapsed, and its power to intervene in colonial cases is limited to the grant of the writ of habeas corpus to a possession in which no court exists having power to issue that writ or one of like effect (Habeas Corpus Act 1862). As regards all British possessions, the appeal to the king in council is in its origin and nature like that of the provincials unto Caesar, and flows from the royal prerogative to admit appeals. With the growth of the British empire it has been found necessary to create a com- paratively constant and stable tribunal to advise the king in the exercise of this prerogative. For this purpose the judicial committee of the privy council was created in 1833. In 1851, and again in 1870, it was reorganized, and by acts of 1876, 1887 and 1898 it received its present form. The committee consists of the president of the council, and of the following persons, if privy councillors — the lord chancellor and ex-chancellors of Great Britain and of Ireland, the four lords of appeal in ordinary, the lords justices of appeal in England or retired lords justices of appeal in England, and persons who hold or have held the office (a) of judge of the High Court of Justice or the court of appeal in England or Ireland, or of the court of session in Scotland; (b) any person who is or has been chief justice or a judge of the Supreme Court of Canada or of a superior court of any province of Canada, of any of the Australian states (except Fiji and Papua), or of New Zealand or the Cape of Good Hope or Natal. The number of persons of this class who may be members at once is limited to five (1895, c. 44); (c) provision is also made for the payment of two privy councillors who have been judges in India who attend the privy council.

Numerous as are the members of the committee, the quorum is three. One or more of the lords of appeal in ordinary usually attend at every hearing, but the composition of the committee is very fluctuating. Appeals from the British dominions abroad lie in criminal as well as civil matters. The right of appeal is regulated as to most possessions by order in council, and in some cases is limited by imperial or colonial statute. Appeals are on fact as well as on law, but the committee rarely if ever disturbs the concurrent

judgments on facts of two colonial courts. In the case of admiralty appeals from colonial or consular courts, naval assessors may be called in. The committee also hears (with the aid of ecclesiastical assessors) appeals from ecclesiastical courts. The judgment of the committee is in the form of a report and advice to the king, which is read by one of the members sitting, and no indication is given as to whether the members present are unanimous. Effect is given to the advice by orders in council dismissing or allowing the appeal, and giving direction as to the payment of costs and as to the further proceedings to be taken in trie colonial courts.

The procedure of the committee is on the same lines as that on appeals to the House of Lords ; no well-arranged code of practice existed however up to the end of 1908, and new rules were then being proposed on the subject. The appeal is commenced by a petition of appeal, and by the giving of security for costs. In colonial appeals printed cases are lodged containing a summary of the contentions of the parties, and with this a printed copy of the record of the proceedings and documents used in the courts appealed from. The hearing is in the privy council chamber and is not public. When an appeal is called on, the counsel and parties are summoned into the chamber, and when the arguments are concluded they are requested to retire. The appeals to the king in council from colonial states having a federal constitution, like Canada and Australia, stand in an exceptional position. The act creating the Supreme Court of Canada purports to make the decision of that court final. But it is still the practice to admit by special leave a prerogative appeal from the court, and to entertain appeals from courts of the provinces of Canada direct to the king in council, without requiring them to go to the Supreme Court. The constitution of the Australian Common- wealth contemplates (§73) the possibility of restricting appeals to the king in council from the supreme courts of Australia,

and sec. 74 forbids appeals to the king in council except by leave of the High Court of Australia from decision of that court on any question however arising as to the limits inter se of the constitutional powers of the commonwealth and those of any state or states, or as to the limits inter se of the constitutional powers of any two or more states. The exact effect of these enactments and of Australian legislation under § 73 is a matter of controversy.

Scotland. — In Scotland the ordinary appellate tribunal for decisions of inferior courts and of the lords ordinary is the court of session, which for appellate purposes sits in two divisions. Appeals from inferior tribunals in criminal cases go before the judges of the court of session sitting in the High Court of Justiciary. The court of session was in its original constitution a committee of parliament for the performance of its judicial functions, and

an appeal to parliament was consequently anomalous. In the reign of Charles II., however, the courts grew so intolerably corrupt that a determined effort was made to have their judgments overturned, by an appeal which was strictly of the old character of a cry for protection against flagrant injustice. It was called a " protest for remeid of law," and was inserted as one of the national claims in the Petition of Right at the revolution. The treaty of union is silent as to appeals, though definitely excluding the right of English courts to interfere with Scottish courts or cases. The House of Lords has since the Union acted without challenge as the final appellate tribunal for Scotland in civil causes; but has always declined jurisdiction in Scottish criminal cases.

Ireland. — The Supreme Court of Judicature (Ireland) Acts have remodelled the courts and appellate system of Ireland on the same lines as those of England. The High Court of Justice in Ireland now consists of two divisions only, the chancery division, which has little or no appellate functions, and the king's bench division, which has for Ireland substantially the same power of reviewing and correcting the decisions of inferior courts as has the corresponding court in England. To this there is one exception, that appeals from a county court in Ireland may be heard on circuit by a single judge of assize. In Ireland there is also a court of appeal, created in 1877, whose jurisdiction and procedure follow the same lines as that of the English court of appeal.

France. — The court of last resort in France for all cases, whether civil or criminal (en matiere criminelle, correctionnelle et de police), is the cour de cassation, which sits in Paris. It is a court of error for the review of all judgments of tribunals of last resort (except juges de paix in certain cases), and for the transfer of causes from one court to another when justice so demands, and to determine conflicts of jurisdiction (Law 1 Dec. 1790). Ordinarily it is confined to errors of law and procedure, but where evidence not available below is brought before the court, it may send the case back for retrial or give the appropriate final judgment, as in the case of Dreyfus (1906). It also hears appeals from courts martial.

Next to the cour de cassation are the courts of appeal, which have jurisdiction to hear appeals (1) in civil matters from courts of first instance, juges de paix, and where the amount in dispute exceeds £60 from commercial courts, tribunaux de commerce (Civil Proc. Code, arts. 443-475); (2) in criminal matters from tribunaux correclionnels (Com. Proc. Code, arts. 202-235). The appeal is both on fact and on law, and applies to interlocutory or preparatory as well as to final judgments.

Spain. — In Spain the jurisdiction and procedure with reference to appeals is on the same lines as in France. As regards civil matters it is regulated by

title 21 of the Civil Procedure Code. The appeal to the supreme court is for the most part on questions of law (por infraccion de ley de doctrina) ; but the court has also power to review judgments on materials not available at the first hearing (arts. 1796, 1801).

British India. — In British India complete and systematic provision is made for appeals both in civil and in criminal cases by the Procedure Codes (Civil of 1882, with subsequent amend- ments, and Criminal of 1898), and also to some extent by the

charters of the high courts of Calcutta, Bombay and Madras (see Ilbert, Government of India, Oxford, 1898, p. 137). In addition, the decisions of subordinate tribunals may be revised by a superior tribunal proprio motu, or reviewed in a proper case by the tribunal which has given them; and provision is made for the consultation of a superior by an inferior tribunal in cases of legal difficulty. The policy of admitting so many appeals has been criticized. But with an enormous population which has no representative institutions it has been deemed wise to provide ample means of correcting judicial errors at the instance not only of the aggrieved person but also at the instance of the supervising judicial authorities, as a means of ensuring regularity and propriety in the conduct of judicial business by subordinate judges in out-of-the-way districts.

Civil Appeals. — (1) Except where otherwise expressly pro- vided by the Civil Procedure Code, or by any other law for the time being in force, an appeal lies from the whole or part of any decree, whether made ex parte or inter partes, of a court exercis- ing original jurisdiction (Civil Procedure Code, § 540). By " decree " is meant the final expression of an adjudication upon a right claimed or defence set up in a civil court, when such adjudication, so far as regards the court expressing it, decides the suit (§2). The appeal is both on facts and on law. "The procedure on the appeal is prescribed by c. 41 of the Civil Procedure Code, and the directions of the code deal even with the language of the judgment on appeal and the matters to be stated therein. (2) Decrees passed on an appeal to any court in India subordinate to a High Court are as a general rule subject to appeal to the High Court on the grounds (a) that they are contrary to a specified law, or usage having the force of law; (b) that they have failed to determine some material issue of law, or usage having the force of law; (c) of substantial error or defect in procedure prescribed by the code or other law. which might possibly have produced error or defect in the decision of the case upon the merits (§ 584). The procedure on these

appeals is regulated by c. 42 of the Civil Procedure Code. (3) Appeals from orders which do not fall within the definition of decrees are allowed in the cases specified in § 588 of the code. The procedure with respect to these appeals is on the same lines as that on appeals against decrees (§ 590). Provision is made (by c. 44) for allowing appeals in forma pauperis after certain preliminary inquiries. In the High Courts appeals lie from the decision of one judge to two or more judges of the High Court, whose decision has effect as a judgment of the full court. Appeals, in civil cases, from the courts of India to the king in council are regulated by c. 45 of the Civil Procedure Code. The appealable amount is for most cases Rs.io,ooo or a claim or question as to property of like amount.

Besides the provisions stated as to appeals, Indian courts have power in certain contingencies to review their own decisions (§ 623). An inferior court may also refer cases of difficulty to the High Court On a statement of the facts as found in the referring court and of the opinion thereon of that Court (§§ 617-620); and in cases in which no appeal lies to the High Court, that court may call for the record of any case in which the court below appears to have acted without jurisdiction or failed to exercise its jurisdiction, or to have exercised its jurisdiction illegally or with material illegality (§622).

Criminal Matters. — Criminal jurisdiction in India is exercised by magistrates of the first, second and third class, by sessions courts, and the high or chief courts of the presidencies or provinces (Criminal Procedure Code of 1 898) . The higher judges in a district have the power of revising those decisions which are not absolutely summary of the judges of the classes below them in the same district; i.e. the sessions judge can revise the decisions of a first-class magistrate, and the High Court those of a sessions judge (§ 43 s). Inferior tribunals can also refer questions of law to the High Court (§§ 432, 4.33); and where a sentence of death is passed, or a sessions judge differs from the jury (§307), the matter must be referred to the High Court. On matters of reference or revision the parties have no right to be heard.

Provision is also made for appeals by c. 31 of the Code. Appeals from second- or third-class magistrates are dealt with by the district (first-class) magistrate (§ 407). Persons con- victed on trial by assistant sessions judges or first-class magis- trates, except in cases where the punishment is very small, have an appeal to the sessions judge (§§ 408, 413). A person convicted on trial by the sessions judge has an appeal to the High Court (§ 410), but where he has pleaded guilty the only point on which appeal is open is the legality or extent of sentence (§412). Special provision is made as to appeals by persons born in Europe (whether British subjects or not) and Americans (§§ 408, 415, and c. 33).

In criminal cases there is a right of appeal to the king in council in certain cases provided for by the charters of the chartered high courts (see Ilbert, Government of India, Oxford, 1898, p. 137).

An appeal also lies in certain cases from the courts of British officers in feudatory states of India to a high court in India, and from the courts of Aden and Zanzibar and British East Africa to the High Court of Bombay. Appeals do not lie from the courts of native states to British courts in India, though in some cases there is an appeal of a political rather than judicial nature from the judicial tribunals of feudatory states; e.g. in the case of Kathiawar (Hemchand Derchand v. Azam Sakarlal; 1906. L.R. A.C. 212).

Canada.— In Canada each province has the regulation of its own courts of justice. In Ontario the judiciary are organized, under the Provincial Judicature Acts, in much the same manner as in England; and the review of decisions of inferior courts (by appeal or other proceedings based on English practice) is in the hands of the High Court of Justice, subject to appeal to the provincial court of appeal. In Quebec the highest court (king's bench) , besides its original jurisdiction, has appellate jurisdiction over the superior court (see Quebec Civil Procedure Code, art. 1 1 14 et seq.). The jurisdiction is exercised by writ of error or by appeal, according to the nature of the decision appealed from. The judges of the superior court have also, under art. 494, power to review before three judges decisions of a judge of that court or of a circuit court (arts. 494-504). Nova Scotia, New Bruns- wick, Manitoba and British Columbia have supreme courts with appellate authority over decisions of single judges of the court and over inferior tribunals in the province. Appeals lie from the highest courts of each province, in civil matters, to the Supreme Court of Canada, or to the king in council in cases falling within the orders in council applying to each province, but in criminal matters to the king in council. From the Supreme Court of Canada no appeal lies as of right to the king in council (Dominion Act 1875, 38 Vic. c. n, § 47), and the royal prerogative of granting special leave to appeal is sparingly exer- cised. The principles on which the judicial committee acts in advising for or against the grant of special leave in civil cases are stated in Daily Telegraph Newspaper Co. v. M' Laughlin f 1904, L.R. A.C. 776, It is, however, as before, quite common for appeals to be brought direct to the privy council from the provincial courts without resort to the Dominion court (se Wheeler, Privy Council Law, p. 955).*

Australia.— Each of the states of the Australian Common, wealth has its own supreme court. The Commonwealth parlia- ment constituted in 1903 a High Court for Australia, which, besides its original federal jurisdiction, is also a court of appeal from the supreme courts of the constitutional states, or from any state court from which an appeal lay to the king in council at the establishment of the Commonwealth. The jurisdiction of the court is

defined by the Judiciary Act of 1903, by which it is created. The right of appeal is given both as to criminal and civil matters.

South Africa.— In Cape Colony and Natal the appellate courts are the supreme courts, subject to further appeal in certain cases to the king in council. The superior courts of Cape Colony are empowered to review the proceedings of all inferior courts in the colony and its dependencies in cases where no appeal lies. There was for a time an appeal from the High Court of Orange

River Colony to the supreme court of the Transvaal, and from that court (whether acting for its own colony or on appeal from the Orange Colony), an appeal to the king in council. In other colonies the provisions as to appeal follow more or less closely the lines of English law and procedure as to appeals, and in all cases the ultimate appeal is to the king in council.

United States.- — In the American courts the term ” appeal ” covers (1) a removal of a cause to a higher court for retrial on all the questions of law or fact involved, or (2) taking up points of law only by proceedings in error, for revision by a higher court. Decrees in admiralty, bankruptcy and equity, in the federal courts, are the subjects of an appeal; judgments in actions at law, of a writ of error. On an equity appeal the evidence taken at the original hearing is reported at length to the appellate court, and it has the right to review the conclusions of fact reached by the court below and come to different ones. This, however, is seldom done, the appeal being almost always decided on points of law based upon the conclusions of fact reached in the original hearing. In admiralty appeals the conclusions of fact reached by the trial court are specially set forth, and are final.

” Appeal ” in many of the states is the general term for reviewing any judgment of an inferior court on assignments of error. It is also often used to signify a mode of reviewing pro- ceedings of municipal bodies, affecting the interests of particular persons, e.g. in matters of licences or assessments.

In criminal prosecutions an appeal, or writ of error on points of law, is almost everywhere allowed by statute to the defendant, and often to the state. (United States v. Sanges, 144 United States Reports, 310; State v. Lee, 65 Connecticut Reports, 265.)

By the constitution of the United States the Supreme Court is vested with ” appellate jurisdiction, both as to law and fact, with such exceptions, and under such regulations, as the Congress shall make.” This provision is held

not to create but only to authorize the creation of the jurisdiction. In the words of Chancellor Kent, " If congress had not provided any rule to regulate the proceedings in appeal, the court could not exercise an appellate jurisdiction: and, if a rule be provided, the court could not depart from it." In pursuance of this principle, the Supreme Court decided in Clarke v. Bazadone that a writ of error did not lie to that court from a court of the United States territory north-west of the Ohio, because the act had not authorized an appeal or writ of error from such a court (Commentaries, i. 324). The appellate jurisdiction of the court is now regulated by title 13 chap. ii. of the Revised Statutes of the United States (1873), §§ 690-710; and by the acts enumerated at p. 001 of the Revised Statutes, United States, 1873 to 1801. Under these statutes the Supreme Court may entertain appeals from the highest court of a state of the Union, but only (1) where the state court has decided against the validity of a treaty or statute of the United States, or of an authority exercised under the United States; (2) where a state court has affirmed the validity of a statute, or of an authority exercised which has been challenged on the ground of repugnance to the constitution, laws or treaties of the United States; (3) where the state court has decided against the existence of a title, right, privilege, or immunity claimed or set up under the constitution of, or under any statute, treaty, commission or authority of the United States.

The appeal from state courts is by writ of error, i.e. on law only; and applies as well in criminal as in civil cases. The Supreme Court will not act unless the federal question was raised in the court below (Chicago U. S. Mail Co. v. McGuire, 1904, 196, U.S. 128). The circuit court of appeals, established in 1891, deals with appeals from the district and circuit courts of the United States, except where other provision is made, e.g. where the jurisdiction of the court appealed from is in question; in prize causes and convictipns of capital crimes (U.S. Statutes, 1801. c. 54. § 5) ; in cases involving the construction or application jr the constitution; in cases arising in district or circuit courts involving the constitutional questions already stated as subject of appeal from state courts.

The review by the circuit court of appeals is effected by appeal or by writ of error, and its decision is final, with certain

exceptions but with power to certify cases to the Supreme Court for instructions (1891, c. 511, § 6).

The Supreme Court hears appeals from the circuit court of appeals within the limits above stated, and appeals from the circuit and district courts in cases in which an appeal does not lie to the circuit court of appeals, and has power to issue a certiorari to transfer a case from the circuit court of Appeals. (W. F. C.)

APPEARANCE (from Lat. apparere, to appear), in law, the coming into court of either of the parties to a suit; the formal act by which a defendant submits himself to the jurisdiction of the court. The defendant in an action in the High Court of England enters his appearance to the writ of summons by delivering, either at the central office of the Supreme Court, or a district registry, a written memorandum either giving his solicitor's name or stating that he defends in person. He must also give notice to the plaintiff of his appearance, which ought, according to the time limited by the writ, to be within eight days after service; a defendant may, however, appear any time before judgment. The Rules of the Supreme Court, orders xii. and xiii., regulate the procedure with respect to the entering of an appearance, the giving of notice, the limit of time, the setting aside and the general effect of default of appearance. In county courts there is no appearance other than the coming into court of the parties to the suit. In criminal cases the accused appears in person. In civil cases infants appear by their guardians ad litem; lunatics by their committee; com- panies by a solicitor; friendly societies by the trustee or other officer appointed to sue or be sued on behalf thereof.

APPENDICITIS, the modern medical term for inflammation of that part of the intestine which is known as the " appendix." Though not a new disease, there can be no doubt that it is far commoner than it used to be, though the explanation of this increased frequency is not yet forthcoming. Amongst the virulent micro-organisms associated with the disease no one specific germ has hitherto been found. It may be remarked that the theories that influenza, or the use of preserved foods, may be connected with the disease as cause and effect, have supporters. Sometimes the disease is due to the impaction of a pin, shot-corn, tooth-brush bristle, or fish-bone in the appendix, which has set up inflammation and ulceration. In many cases a patch of mortification with perforation of the appendix is caused by the presence of a hard faecal concretion, or " stercolith," which from its size, shape and appearance has been mistaken by a casual observer for a date-stone or cherry-stone.

Apart from the fact of the more frequent occurrence of appendicitis, the disease is now better understood and more promptly recognized. It was formerly included under the term " perityphlitis "—that is, inflammation connected with the caecum or blind portion of the large intestine. But in the vast majority of cases the inflammation begins in the appendix, not in the intestine proper. It is apt to extend and set up a localized peritonitis, which in the worst cases may become general.

Appendicitis is more often met with in the young than the old, and in boys rather than girls; and in some families there is a strange predisposition towards it. It is often started by a chill, or by over-exertion, and sometimes

the attack follows a blow or strain, or some other direct injury, after which the virulent micro-organisms seize on the mucous membrane and involve the appendix in acute inflammation.

The appendix is a narrow tube, about the size of a goose-quill, with an average length of 3 in. It terminates in a blunt point, and from its worm-like shape is called vermiformis. It is an appendage of the large intestine, into which it opens, and is regarded as the degenerate relic, surviving in man and other mammals, of an earlier form of intestine. Foreign bodies passing down the intestinal canal may find their way into the appendix and lodge there. Frequently the diseased appendix is found blocked by hard faeces or undigested particles of food, such a» nuts, fibrous vegetable matter, and other imperfectly masticated substances; inflammation may occur, however, without the presence of any impacted material. The appendix may be

twisted, bent, or otherwise strangulated, or its orifice may be blocked, so that the tube is distended with mucus which can find no outlet; or ulceration of tuberculous or malignant origin may occur. Inflammation started in the appendix is liable to spread to the peritoneum, and herein lies the gravity of the affection and the indication for treatment. The symptoms vary from " indigestion," and slight pain and sickness, which pass off in a few short days, to an exceedingly violent illness, which may cause death in a few hours. Pain is usually first felt in the belly, low down on the right side or across the region of the navel; sometimes, however, it is diffuse, and at other times it is scarcely complained of. There is some fever, the temperature rising to ioi° or 102 F., with nausea, and very likely with vomiting. The abdomen is tender to pressure, and the tenderness may be referred to the spot mentioned above. Some swelling may also be made out in that region. The attack may last for two, three or four days, and then subside. There are, however, other cases less well defined, in which the mischief pursues a latent course, producing little more than a vague abdominal uneasiness, until it suddenly advances into a violent stage. In some chronic cases the trouble continues, on and off, for months or even for years.

On paper it is easy to arrange cases of appendicitis into three classes — catarrhal, ulcerative and mortifying — but in actual

practice this is neither desirable nor possible. Such classification is based upon the symptoms, and in appendicitis symptoms may be actually

misleading. The three conditions to which the surgeon chiefly looks for guidance are the aspect of the patient, the rate of his pulse and the degree of fever as shown by the ther- mometer. But in certain cases of appendicitis, though the sur- geon knows intuitively, or, at least, suspects, that the general condition is extremely serious, the patient looks fairly well and says that he is not in pain, his pulse-rate being but little quick- ened and his temperature being but slightly above normal. Nevertheless, when the surgeon has opened the belly in the appendix region, he finds the appendix swollen, perforated end mortified, and lying in a stinking abscess, whilst inflammation has already spread to the neighbouring coils of intestine. Unfortunately, the surgeon can no more tell what he is going to find at his operation in some of these cases than he can foretell the course which any particular case is going to run.

We may most usefully give here the symptoms as they are likely to be found in an ordinary case of appendicitis, and as they may be observed by one who is not a member of the medical profession, in a way that may prove helpful to him when circumstances have awakened his interest in the disease.

The case taken shall be that of a boy at school, for, as already stated, boys are more prone to the disease than girls. The boy has had, may be, occasional attacks of " indigestion " which have duly passed away under the influence of aperient medicines, and, being heated at play, he has sat down upon the cold ground. Or he has got wet through or over-tired during a long walk or ride. At any rate, his vital powers have been suddenly lowered, and the micro-organisms teeming in his bowel have seized upon the lining membrane of the appendix. He feels out of sorts, and if he manages to eat a meal he very likely vomits it soon after, for the whole nervous system of his abdomen is disturbed by the local inflammation. The act of vomiting gives slight relief, however, and probably he begins to complain of pains in his head as well as in his abdomen, and possibly he has an attack of shivering — the result of disturbance of his general nervous system. By this time he may be attacked with intense pain in

Large Intestine showing Ver- miform Appendix (v.a.) and Caecum ©.

the part of his abdomen a little above the middle of the right groin, and at that spot there may be a tenderness, and a feeling of resistance may be made out by the gentle pressure of the finger. In order to relax the pressure upon the tender area he probably lies with his right thigh slightly bent. By this time he may look ill, his face being slightly flushed, or pale and anxious. If the clinical thermometer is placed under his tongue, the index may rise a degree or two, perhaps several degrees, above normal, and his pulse may be quickened to 00 or 100 beats a minute. Perhaps it is a good

deal quicker than this. Later, the skin of the lower part of the right side of the abdomen may be flushed or reddened.

This clinical picture leaves no room for doubt. The boy has an attack of acute septic inflammation of his appendix. Let it be that the symptoms have come on quickly, and that the affection is not more than ten or twelve hours old; no one can tell precisely what course the disease is going to run. It may be that with rest in bed, constant fomentations, and absolute starvation, the inflammation will subside; but it is just as likely that in spite of this judicious treatment the symptoms will go from bad to worse, and that a belated operation will fail to rescue the boy from a general peritonitis which may end fatally. But at present, so far as one can tell, the disease is still limited to the appendix. And what, at this moment, is the best line of treatment? Some practitioners would answer — " Let the acute attack settle down,and then, after a week or ten days, when everything is quiet, remove the appendix, for statistics show that when the operation is done in the quiet interval the results are extremely favourable, whilst if it is done in the acute stage the outlook is not so bright." This is quite right. But one cannot be sure that the " quiet interval " will ever arrive. The case in question may be one of those which rapidly go on from bad to worse, and mortification and perforation of the appendix having taken place over some hard faecal concretion, general peritonitis is inevitable, with distension of the bowel and hopeless blood-poisoning. If it were certain that the attack of appendicitis would subside and become quiescent, it would be wise to wait. But it too often happens that the first attack is, indeed, the last. Acute appendicitis is one thing; relapsing; appendicitis is another. The latter condition is very manageable.

Inasmuch, then, as it is impossible to know what direction the disease will take, whether to quiescence or to disaster, it is for the greatest good in the greatest number of cases that the inflamed appendix be removed by operation whilst the disease is still limited to the appendix. It is highly probable that if every available hospital surgeon were asked if he had ever had cause to regret having advised early operation in a case of appendicitis the answer would be "No "; on the other hand, every surgeon would be able to recall cases in which delay had been followed by disaster — which an early resort to operation would, in all probability, have prevented.

If the disease is going to assume the severe form, all the symptoms, as a rule, increase in severity. The facial expression becomes more anxious, and the accumulation of gas in the paralysed intestine causes an increase in the abdominal disten- sion, so that the patient lies with his knees drawn up. The vomiting continues. The pulse quickens to 1 20 or 140 a minute, and the temperature rises, perhaps to 104 F. The swelling and tenderness increase on the right side of the abdomen, and if the abscess does not find

escape externally it probably bursts into the general peritoneal cavity, and the patient becomes bathed in profuse sweat, the result of blood-poisoning. Death is likely to follow within two days, the result of blood-poisoning and exhaustion.

Catarrhal and Relapsing Appendicitis. — Some cases of appendi- citis run a mild course, giving rise to no worse symptoms, perhaps, than those of " indigestion " and nausea, with a feeling of general discomfort in the abdomen, and, probably, some local tenderness. The attack may be preceded or accompanied by constipation. The administration of a mild aperient or an enema, rest, starvation and fomentation will probably put matters right again — at any rate for a time.

This form of the disease may be due to the presence of " bolted," unchewed or indigestible food in that part of the large intestine into which the appendix opens. And these mild recurrent attacks may sometimes be got rid of altogether by having the teeth put in order, and by inducing the individual to choose his food with discretion, to chew it carefully, to take his meals regularly and to eat slowly.

Obviously, these attacks are very different from those of the acute septic form of the disease described above, though there is no telling that one of them may not develop into the acute form. Some of the mild attacks are due to a kink in the appendix, or to some other condition which temporarily prevents the secretions of the appendix from finding their way into the large intestine. Others of them are caused by a passing catarrhal inflammation of the lining of the appendix and have a distant resemblance to a recurring " sore throat."

After undergoing one or two of these mild attacks the patient would be well advised to have his appendix removed when it has once more got into the " quiet stage." Experience abundantly shows that the operation can then be performed with but slight disturbance of the patient, and with the smallest possible amount of risk. And until his vulnerable appendix has been removed he is never safe.

In the chronic form of the disease though the patient is never desperately ill he is never quite well. He has pains and dis- comfort in the abdomen, with slight tenderness and nausea, with " indigestion," as he may call it. And as one can never tell when the smouldering inflammation may break out into con- flagration, he is well advised to submit himself to operation without

further delay. To carry about a diseased appendix is to run the constant risk of being laid up at a time most inconvenient, as when travelling or when staying in some place where skilled assistance is far distant or absolutely unobtainable. But having made up his mind that the appendix had better be removed, the patient can choose time, place and surgeon, and, having undergone a week's careful training for the ordeal, can safely count on being back at work again in a month or six weeks' time.

As regards treatment, the greatest safety consists in the prompt removal of the inflamed appendix, and statistics show that if the operation can be done in the first or second day of even an acute attack, the result is generally favourable— that is to say, if the appendix can be removed whilst the disease is still shut up within its tissues. But in some cases ulceration and perforation, or mortification, may have taken place over a hard faecal concretion within the first twenty-four or forty-eight hours, and. the septic germs having been let loose, peritonitis may have already set in, and operation may be followed by dis- appointment. Still, if the case had been left unoperated on, no other result could have been expected. It was not to the operation, but to the intensely acute disease that the calamity must be attributed.

Nature is marvellously clever in some of these cases in shutting off the area of the disease by glueing together the neighbouring coils of intestine, the limited local peritonitis causing the tissues to build themselves into a wall which securely shuts in the abscess cavity. But in other cases she seems helpless, no barrier being formed for limiting the area of disturbance. In such a case it is inevitable that disappointment must result from the surgeon delaying operation in the hope that delimitation might take place. And when at last he makes his incision he sees that the disease has had so long a start that his own chance of success is but a poor one. In a less severe attack, under the influence' of rest, starvation and fomentation, and in cases of chronic and of relapsing disease, the surgeon may watch and wait and choose his own time for operating. But when the symptoms are steadily increasing in severity he should urge an immediate incision. When, as often happens, the inflammation begins suddenly and severely, and, under the influence of treatment, steadily quiets down, the surgeon does well to delay operation. But in a fort- night or so, when everything has become once more quiet, he will urge the removal of the appendix, for this one attack is

more than likely to be the forerunner of other attacks if the diseased appendix is left.

The most serious cases are those in which the aspect, the pulse, and the temperature of the patient fail to give warning of a very advanced state of disease. Every surgeon of experience has met with cases in which, though

there is nothing pointing to the fact that the patient is on the brink of a disaster, the operation has shown that the appendix is mortified, and that it is surrounded with abundant foul matter. It is then that he regrets not having operated a day or two earlier. Consequently it is a good rule to operate in all doubtful cases. In cases in which one happens to know that previous attacks have passed off under palliative treatment, there is no need for immediate operation; the quiet interval may be safely waited for. But in cases in which there is " no history," and in which the surgeon has nothing to guide him, the greatest safety is in prompt operation.

If an attack of acute appendicitis is allowed to take its course unoperated on, abscess forms in the peritoneal cavity in the region of the appendix, but if already inflammation has happily glued the intestines together around that area, the pus is confined within definite limits. But as the abscess increases in size the demand for its evacuation becomes urgent. The pus, under the influence of a natural law, seeks its escape by the path of least resistance; sometimes this is into the intestine, and occasionally into the bladder. The most satisfactory course which it can take is through the wall of the abdomen and out above the right groin. As it is making its way in this direction the skin over that part becomes red, swollen, hot and tender, and the tissues between it and the skin become swollen and brawny. Rarely is fluctuation to be made out until the pus has worked its way close to the surface. Later, ulceration takes place in the undermined skin, and the stinking contents of the abscess escape, greatly to the relief of the patient. But long before this could happen the surgeon should have made an incision through the inflamed tissues in order to give nature some greatly needed help. For in many cases she allows the pus blindly to discover that the course of least resistance is not towards the surface of the abdomen but through the inflammatory barrier formed by the adherent coils of bowel, and so into the general peritoneal cavity. This unfortunate issue may give temporary relief to the patient, so that he says that he feels much better, and that his pain has nearly gone. But though his temperature may fall, his pulse is apt to quicken — an ominous coupling of symptoms; the paralysed bowels become further distended, so that the lungs are pressed upon and breathing is embarrassed ; hiccough comes on ; and whether operation is now resorted to or not, a fatal end is highly probable. In other cases, the escaping pus finds its way up towards the liver and forms an abscess below the base of the lungs.

If operation is performed when appendicitis has run on to the formation of abscess, and the diseased appendix presents itself, it should of course be removed; but if it does not present itself the surgeon should abstain from making a determined search for it, as in so doing he may break down the barrier which nature has provided, and thus himself become the means of spreading a septic peritonitis. Nor should he attempt to make clean the foul

abscess cavity. All that he should do is to provide for efficient drainage. A large proportion of these cases do extremely well with incision and drainage, and in the subsequent healing of the cavity the wreckage of the appendix either under- goes disintegration or is rendered harmless for further anxiety.

In some cases, however, the damaged appendix remains as a smouldering ember, ready at any moment to cause further con- flagration. This is made manifest by lingering pains, and by tenderness and warnings after the abscess has healed, and the patient will be well advised to have what is left of the appendix removed by operation at a time of quiescence. The operation, however, may turn out to be a very difficult one. Sometimes the wound by which the abscess has been evacuated, by nature or by art, refuses to heal 4 completely, a little discharge of a faecal odour continuing to escape. The small wound leads into a

faecal fistula, and a bent probe passed along it would probably find its way into the bowel. The wound is likely to close of itself in due course; but if after many weeks of disappointment it still continues to discharge, the surgeon may advise an operation for its obliteration.

It occasionally happens that after operation the scar of the wound in the abdominal wall yields under the pressure from within, and a bulging of the intestines beneath the skin occurs. This is called a ventral hernia, and if the patient cannot be made comfortable by wearing a truss with a large flat pad, an operation may be deemed advisable.

If, in a case of appendicitis, for one reason or another operation is to be delayed, what treatment should be resorted to ? The patient should be put to bed with his knees resting over a pillow, and a large fomentation under oil silk should be laid over the lower part of the abdomen. No food should be given beyond an occasional sip of hot water. Purgatives should not be administered, as this would be to set in movement an inflamed piece of bowel. If the case is not acute, a large enema of soap and water with turpentine may be given, or, possibly, a dose of castor oil by the mouth. As a rule, however, it is unwise to set the bowels in vigorous action .until the diseased appendix has been removed. No opium should be given.

Acute intestinal obstruction, cancer of the intestine, inflam- mation of the ovary, typhoid fever and renal and gallstone colic, are affections which are apt to be mistaken for appendicitis. The first of these resembles it most

closely, and diagnosis is sometimes impossible without resort to operation. And it is a fortunate thing that, when error of diagnosis has been made, the operation which was designed for dealing with an inflamed appendix may be directed with equal advantage to the morbid condition which is found on opening the abdomen. In typhoid fever the characteristic temperature, the general condition of the patient, and the presence of delirium are differentiating signs of importance; in renal and gallstone colic the situation and the more paroxysmal character of the pain are usually distinctive. (E. O.)*

APPENDICULATA, a zoological name introduced by E. Ray Lankester (preface to the English edition of C. Gegenbaur's Comparative Anatomy), and employed by the same writer in the oth edition of this encyclopaedia (article "Zoology") to denote the eighth phylum, or major division, of coelomate animals. The animals thus associated, the Rotifera, Chaetopoda and Arthro- poda, are composed of a larger or smaller number of hollow rings, each ring possessing typically a pair of hollow lateral appendages, moved by intrinsic muscles and penetrated by blood-spaces.

APPENDINI, FRANCESCO MARIA (1768-1837), Italian historian and philologist, was born at Poirino, near Turin, on the 4th of November 1768. Educated at Rome, he took orders and was sent to Ragusa, where he was appointed professor of rhetoric. When the French seized Ragusa, Napoleon placed Appendini at the head of the Ragusan academy. After the Austrian Occupation he was appointed principal of a college at Zara, where he died in 1837. Appendini's chief work was his Nolizie I storico-critiche sulle Antichita, Storia, e Letter atura dei Ragusci (1802-1803).

APPENZELL, one of the cantons of north-east Switzerland, entirely surrounded by the canton of St Gall; both were formed out of the dominions of the prince abbots of St Gall, whence the name Appenzell (abbatis cello). It is an alpine region, particu- larly in its south portion, where rises the Alpstein limestone range (culminating in the Santis, 8216 ft.), though towards the north the surface is composed rather of green hills, separating green hollows in which nestle neat villages and small towns. It is mainly watered by two streams that descend from the Santis, the Urnasch joining the Sitter (on which is the capital, Appenzell), which later flows into the Thur. There are light railways from Appenzell to St Gall either (i2§.m.) past Gais.or (20J m.) past Herisau, as well aslines from St Gall to Trogen (6 m.) and from Rorschach to Heiden (4J m.). Since 1597 it has been divided, for religious reasons, into two half-cantons, which are quite independent of each other, and differ in many points.

The north and west portion or Ausser Rhoden has a total area of 93-6 sq. m. (of which 90-6 are classed as "productive"; forests covering 22-5 sq. m.

and glaciers -038 sq. m.), with a population (in 1900) of 55,281, mainly German-speaking, and containing 49,797 Protestants as against 5418 Romanists. Its political capital is Trogen (q.v.), though the largest town is Herisau (q.v.), while Teufen has 4595 inhabitants, and Heiden (3745 inhabitants) in the north-east corner is the most frequented of the many goats' whey cure resorts for which the entire canton is .famous (Urnasch and Gais are also in Ausser Rhoden). This half-canton is divided into three administrative districts, comprising twenty communes, and is mainly industrial,the manu- facture of cotton goods, muslins, and embroidery being very flourishing. It sends one member (elected by the Landsgemeinde) to the federal Stdnderalh and three to the federal Nationalrath (elected by a direct popular vote).

The south or more mountainous portion of Appenzell forms the half - canton of Appenzell, Inner Rhoden. It has a total area of 66-7 sq. m. (of which 62-8 sq. m. are classed as " productive," forests covering 12-8 sq. m. and glaciers -38 sq. m.), and a total population of 13,499, practically all German-speaking, and all but 833 Romanists. Its political capital is Appenzell (q.v.), which is also the largest village, while Weissbad (near it) and Gonten are the best-known goats' whey cure resorts. Embroidery and muslins are made in this half-canton, though wholly at home by the work-people. But it is very largely pastoral, containing 168 mountain pastures or "alps," maintaining each summer 4000 cows, and of an estimated capital value of 2,682,955 francs (the figures for Ausser Rhoden are respectively 100 alps, 2800 cows, and 1,749,900 francs). Inner Rhoden is extremely conservative, and has the reputation of always rejecting any federal Referen- dum. For similar reasons it has preserved many old customs and costumes, those of the women being very elaborate and picturesque, while the herdsmen have retained their festival attire of red waistcoats, embroidered braces and canary-coloured shorts. It sends one member (named by the Landsgemeinde) to the federal Standerath, and one also to the federal Nationalrath, while it forms but a single administrative district, though divided into six communes.

To the outer world the canton of Appenzell is best known by its institution of Lands gemeinden, or primitive democratic assemblies held in the open air, in which every male citizen (not being disqualified) over twenty years of age must (under a money penalty) appear personally: each half canton has such an assembly of its own, that of Inner Rhoden always meeting at Appenzell, and that of Ausser Rhoden in the odd years at Hundwil (near Herisau) and in the even years at Trogen. This institution is of immemorial antiquity, and the meetings in either case are always held on the last Sunday in April. The Lands gemeinde is the supreme legislative authority, and elects both the executive (in Inner Rhoden composed of nine members and called Standeskommission, and in Ausser Rhoden of seven members

and called Regierungsrath) and the president or Landammann; in each half-canton there is also a sort of standing committee (composed of the members of the executive and representatives from the communes — in Inner Rhoden one member per 250 or fraction over 125 of the population, and in Ausser Rhoden one member per 1000 of the inhabitants) which prepares business for the Landsgemeinde and decides minor matters; in Inner Rhoden it is named the Grossrath and in Ausser Rhoden the Kantonsrath. As various old-fashioned ceremonies are observed at the meetings and the members each appear with his girded sword, the sight of a meeting of the Landsgemeinde is most striking and interesting. The existing constitution of Inner Rhoden dates mainly from 1872, and that of Ausser Rhoden from 1876.

By the middle of the nth century the abbots of St Gall had established their power in the land later called Appenzell, which, too, became thoroughly teufonized, its early inhabitants having probably been romanized Raetians-. But as early as 1377, this portion of the abbots' domains formed an alliance with the Swabian free imperial cities and adopted a constitution of its own. The repeated attempts of the abbots to put down ttys

independence of their rule were defeated in the battles of Vbgelin- segg (1403), north-west of Trogen, and of the Stoss (1405), the pass leading from Gais over to Altstatten in the Rhine valley. In 141 1 Appenzell was placed under the "protection" of the Swiss Confederation, of which, in 1452, it became an " allied member," and in 1513 a full member. Religious differences broke up the land after the Reformation into two portions, each called Rhoden, a term that in the singular is said to mean a " clearing," and occurs in 1070, long before the final separation. From 1 798 to 1 803 Appenzell, with the other domains of the abbot of St Gall, was formed into the canton Santis of the Helvetic Republic, but in 1803, on the creation of the new canton of St Gall, shrank back within its former boundaries. The oldest codes of the laws and customs of the land date from 1409 and 1585, the original MS. of the latter (called the " Silver Book " from its silver clasps) being still used in Inner Rhoden when, at the close of the annual Lands gemeinde, the newly elected Landatn- mann first takes the oath of office, and the assembled members then take that of obedience to him, in either case with uplifted right hands.

See also Appenzellische Jahrbilcher (3 series from 1854, Trogen); G. Baumberger, " Juhu-Juuhu " — Appenzellerland und Appen- zelkrleut' (Einsiedeln. 1903) ; J. G. Ebel, Schilderung d. Gebirgsvolker d. Schweiz,

vol. i. (Leipzig, 1798); W. Kobelt, Die Alpwirthschaft im Kant. App. Inner Rhoden (Soleure, 1899); I. B. Richman, Appenzell (London, 1895); H. Ryffel, Die schweiz. Landsgemeinden (Zurich, 1903); J. J. Tobler and A. Striiby, Die Alpwirthschaft im Kant. App. Atisser Rhoden (Soleure, 1900); J. C. Zellweger, Geschichte d. app. Volkes (to 1597), 6 vols in 11 parts (Trogen, 1830-1838); J.C. Zellweger, junior, Der Kant. App. (Trogen, 1867); A. Tobler, Das Volkslied im Appenzellerland (Basel, 1906) ; J. J. Blumer, Stoats- und Rechtsgeschichle d. schweiz. Demokratien (3 vols. St Gall, 1850-1859). (W. A. B. C.)

APPENZELL, the political capital of the Inner Rhoden half of the Swiss canton of Appenzell. It is built in a smiling green hollow on the left bank of the Sitter stream, which is formed by the union of several mountain torrents descending from the Santis. By light railways it is 125 m. from St Gall past Gais or 20J m. past Herisau. Its chief streets are paved, but it is rather a large village than a town, though in 1900 it had 4574 inhabitants, practically all German-speaking and Romanists. It has a stately modern parish church (attached to a Gothic choir), a small but very ancient chapel of the abbots of St Gall (whose summer residence was this village), and two Capuchin convents (one for men, founded in 1588, and one for women, founded in 1613). Among the archives, kept in the sacristy of the church, are several banners captured by the Appenzellers in former days, among them one taken in 1406 at Imst, near Lanedeck, with the inscription Hundert Teufel, though popularly this number is multiplied a thousandfold. In the principal square the Lands gemeinde (or cantonal democratic assembly) is held annually in the open air on the last Sunday in April. The inhabitants are largely employed in the production of embroidery, though also engaged in various pastoral occupations. About 2 5 m. by road south-east of Appenzell is Weissbad, a well-known goat's whey cure establishment, while if hours above it is the quaint little chapel of Wildkirchli, built (1648) in a rock cavern, on the way to the Santis. (W. A. B. C.)

APPERCEPTION (Lat. ad and percipere, perceive), in psychology, a term used to describe the presentation of an object on which attention is fixed, in relation to the sum of consciousness previous to the presentation and the mind as a whole. The word was first used by Leibnitz, practically in the sense of the modern Attention (q.v.), by which an object is apprehended as " not-self " and yet in relation to the self. In Kantian terminology apperception is (1) transcendental — the perception of an object as involving the consciousness of the pure self as subject, and (2) empirical— the cognition of the self in its concrete existence. In (1) apperception is almost equivalent to self -consciousness; the existence of the ego may be more or less prominent, but it is always involved. According to J. F. Herbart {q.v.) apperception is that process by which an aggregate or" mass

" of presentations becomes systematized {a-p perceptions- system) by the accretion of new elements, either sense-given or

product of the inner workings of the mind. He thus emphasizes in apperception the connexion with the self as resulting from the sum of antecedent experience. Hence in education the teacher should fully acquaint himself with the mental develop- ment of the pupil, in order that he may make full use of what the pupil already knows.

Apperception is thus a general term for all mental processes in which a presentation is brought into connexion with an already existent and systematized mental conception, and thereby is classified, explained or, in a word, understood; e.g. a new scientific phenomenon is explained in the light of phenomena already analysed and classified. The whole in- telligent life of man is, consciously or unconsciously, a process of apperception, inasmuch as every act of attention involves the appercipient process.

See Karl Lange, Ueber Apperception (6th ed. revised, Leipzig, 1899; trans. E. E. Brown, Boston, 1893); G. F. Stout, Analytic Psychology (London, 1896), bk. ii. ch. viii., and in general textbooks of psychology; also Psychology.

APPERLEY, CHARLES JAMES (1 777-1843), English sports- man and sporting writer, better known as " Nimrod," the pseudonym under which he published his works on the chase and the turf, was born at Plasgronow, near Wrexham, in Denbigh- shire, in 1777. Between the years 1805 and 1820 he devoted himself to fox-hunting. About 182 1 he began to contribute to the Sporting Magazine, under the pseudonym of " Nimrod," a series of racy articles, which helped to double the circulation of the magazine in a year or two. The proprietor, Mr Pittman, kept for " Nimrod " a stud of hunters, and defrayed all expenses of his tours, besides giving him a handsome salary. The death of Mr Pittman, however, led to a law-suit with the proprietors of the magazine for money advanced, and Apperley, to avoid imprisonment, had to take up his residence near Calais (1830), where he supported himself by his writings. He died in London on the 19th of May 1843. The most important of his works are: Remarks on the Condition of Hunters, the Choice of Horses, &c. (1831); The Chase, the Turf, and the Road (originally written for the Quarterly Review), (1837); Memoirs of the Life of the Late John Mytton (1837); Nimrod's Northern Tour (1838); Nimrod Abroad (1842); The Horse and the Hound (a reprint from the seventh edition of the Encyclopaedia Britannica) (1842) ; Hunting Reminiscences (1843).

APPERT, BENJAMIN NICOLAS MARIE (1797-1847), French philanthropist, was born in Paris on the 10th of September 1797. While a

young man he introduced a system of mutual instruction into the regimental schools of the department of the Nord. The success which it obtained induced him to publish a Manual setting forth his system. While engaged in teaching prisoners at Montaigu, he fell under the suspicion of having connived at the escape of two of them, and was thrown into the prison of La Force. On his release he resolved to devote the rest of his life to bettering the condition of those whose lot he had for a time shared, and he travelled much over Europe for the purpose of studying the various systems of prison discipline, and wrote several books on the subject. After the revolution of 1830 he became secretary to Queen Marie Amelie, and organized the measures taken for the relief of the needy. He was decorated with the Legion of Honour in 1833.

His brother, Francois Appert (d. 1840), was the inventor of the method of preserving food by enclosing it in hermetically sealed tins; he left a work entitled Art de conserver les substances animates et vtgHables.

APPIAN (Gr. ‘ Airmavos) , of Alexandria, Roman historian, flourished during the reigns of Trajan, Hadrian and Antoninus Pius. He tells us that, after having filled the chief offices in his native place, he repaired to Rome, where he practised as an advocate. When advanced in years, he obtained, by the good offices of his friend Fronto, the dignity of imperial procurator — it is supposed in Egypt. His work (‘Pco/xtmcd) in twenty-four books, written in Greek, is rather a number of monographs than a connected history. It gives an account of various peoples and countries from the earliest times down to their incorporation

into the Roman empire. Besides a preface, there are extant eleven complete books and considerable fragments. In spite of its unattractive style, the work is very valuable, especially for the period of the civil wars.

Editio princeps, 1551; Schweighauser, 1785; Bekker, 1852; Mendelssohn, 1878-1905. English translations: by W. B., 1578 (black letter); J. D[avies], 1679; H. White, 1899 (Bohn’s Classical Library); bk. i. ed. by J. L. Strachan-Davidson, 1902.

APPIANI, ANDREA (1 754-181 7), the best fresco painter of his age, was born at Milan. He was made pensioned artist to the kingdom of Italy by Napoleon, but lost his allowance after the events of 1814 and fell into poverty. Correggio was his model, and his best pieces, which are in the church of Santa Maria presso San Celso and the royal palace at Milan,

almost rival those of his great master. He also painted Napoleon and the chief personages of his court. Among the most graceful of his oil- paintings are his " Venus and Love," and " Rinaldo in the Garden of Armida." He is known as " the elder," to distinguish him from his great-nephew Andrea Appiani (1817-1865), an historical painter at Rome. Other painters of the same name were Niccolo Appiani (fl. 1510) and Francesco Appiani (1704-

1792).

APPIA, VIA, a high-road leading from Rome to Campania and lower Italy, constructed in 312 B.C. by the censor Appius Claudius Caecus. It originally ran only as far as Capua, but was successively prolonged to Beneventum, Venusia, Tarentum and Brundusium, though at what dates is unknown. Probably it was extended as far as Beneventum not long after the colonization of this town in 268 B.C., and it seems to have reached Venusia before 190 B.C. Horace, in the journey to Brundusium described in Sat. i. 5, followed the Via Appia as far as Beneventum, but not beyond.

The original road was no doubt only gravelled (glarea strata) ; in 298 b.c. a footpath was laid saxo quadrato from the Porta Capena, by which it left Rome, to the temple of Mars, about 1 m. from the gate. Three years later, however, the whole road was paved with silex from the temple to Bovillae, and in 191 B.C. the first mile from the gate to the temple was similarly treated. The distance from Rome to Capua was 132 m. For the first few miles the road is flanked by an uninterrupted series of tombs and other buildings (see L. Canina, Via Appia, Rome, 1853). As far as Terracina it ran in an almost entirely straight line, even through the Alban Hills, where the gradients are steep. A remarkably fine embankment belonging to it still exists at Aricia. At Forum Appii it entered the Pomptine Marshes; that this portion (19 m. long, hence called Decennovium) belonged to the original road was proved by the discovery at Ad Medias (Mesa) of a milestone of about 250 B.C. (Ch. Hiilsen, in Rbmische Mitteilungen, 1889, 83; 1895, 301). A still older road ran along the foot of the Volscian mountains past Cora, Norba and Setia; this served as the post road until the end of the 18th century. At the time of Strabo and Horace, however, it was the practice to travel by canal from Forum Appii to Lucus Feroniae; to Nerva and Trajan were due the paving of the road and the repair of the bridges along this section. Theodoric in a.d. 486 ordered the execution of similar repairs, the success of which is recorded in inscriptions, but in the middle ages it was abandoned and impassable, and was only renewed by Pius VI. The older road crossed the back of the promontory at the foot of which Terracina stands; in imperial times, probably, the rock was cut away perpendicularly for a height of 120 ft. to allow the road to pass. Beyond Fundi it passed through the mountains to Formiae, the engineering of the road being noteworthy; and thence by Minturnae and Sinuessa (towns of

the Aurunci which had been conquered in 314 B.C.) 1 to Capua. The remains of the road in this first portion are particularly striking.

Between Capua and Beneventum, a distance of 32 m., the road passed near the defile of Caudium (see Caudine Forks). The modern highroad follows the ancient line, and remains of the

1 It is important to note how the Romans followed up every victory with a road.

latter, with the exception of three well-preserved bridges, which still serve for the modern highroad, are conspicuous by their absence. The portion of the road from Rome to Beneventum is described by Sir R. Colt Hoare, Classical Tour through Italy, 57 seq. (London, 1819). He was accompanied on his journey, made in 1789, by the artist Carlo Labruzzi, who executed a series $ of 226 drawings, the greater part of which have not been pub- lished; they are described by T. Ashby in Melanges de I Ecole Francaise de Rome (1903), p. 375 seq., and Atti del Congresso Inter- nazionale per le Scienze Storiche, vol. v. (Rome, 1904), p. 125 seq. From Beneventum to Brundusium by the Via Appia, through Venusia and Tarentum, was 202 m. A shorter route, but more fitted for mule traffic, though Horace drove along part of it, 2 ran by Aequum Tuticum, Aecae, Herdoniae, Canusium, Barium, and Gnatia (Strabo vi. 282); it was made into a main road bj Trajan, and took the name Via Traiana. The original road, too, adopted in imperial times a more devious but easier route by Aeclanum instead of by Trevicum. This was restored by Hadrian for the 15 m. between Beneventum and Aeclanum. Under Diocletian and Maximian a road (the Via Herculia) was constructed from Aequum Tuticum to Pons Aufidi near Venusia, where it crossed the Via Appia and went on into Lucania, passing through Potentia and Grumentum, and joining the Via Popilia near Nerulum. Though it must have lost much of its importance through the construction of the Via Traiana, the last portion from Tarentum to Brundusium was restored by Constantine about a.d. 315.

The Via Appia was the most famous of Roman roads ; Statius, Silvae, ii. 2. 12, calls it longarum regina viarum. It was administered under the empire by a curator of praetorian rank, as were the other important roads of Italy. A large number of milestones and other inscriptions relating to its repair at various times are known. See Ch. Hiilsen in Pauly-Wissowa, Realencyclopadie, ii. 238 seq. (Stutt- gart, 1896). (T. As.)

APPIN, a coast district of Argyllshire, Scotland, bounded W. by Loch Linnhe, S. by Loch Creran, E. by the districts of Bender- loch and Lome, and N. by Loch Leven. It lies north-east to south-west, and measures 14 m. in length by 7 m. in breadth. The scenery of the coast is extremely

beautiful, and inland the country is rugged and mountainous. The principal hills are the double peaks of Ben Vair (3362 ft. and 3284 ft.) and Creag Ghorm (2372 ft.) in the north, and Fraochie (2883 ft.), Meall Ban (2148 ft.) and Ben Mhic na Ceisich (2093 ft.) near the right flank of Glen Creran. The chief streams are the Coe and Laroch, flowing into Loch Leven, the Duror and Salachan flowing into Loch Linnhe, and the Iola and Creran flowing into Loch Creran. The leading industries comprise slate and granite quarries and lead mining. Ballachulish, Duror, Portnacroish, Appin and Port Appin are the principal villages. Ballachulish and Port Appin are ports of call for steamers, and the Caledonian railway company's branch line from Connel Ferry to Ballachulish runs through the coast land and has stations at Creagan, Appin, Duror, Kentallen and Ballachulish Ferry. Appin was the country of a branch of the Stewarts.

APPLAUSE (Lat. applaudere, to strike upon, clap), primarily the expression of approval by clapping of hands, &c; generally any expression of approval. The custom of applauding is doubt- less as old and as widespread as humanity, and the variety of its forms is limited only by the capacity for devising means of making a noise. Among civilized nations, however, it has at various times been subject to certain conventions. Thus the Romans had a set ritual of applause for public performances, expressing degrees of approval: snapping the finger and thumb, clapping with the flat or hollow palm, waving the flap of the toga,

2 From Beneventum he followed the older line of the Via Appia to Trevicum ; thence, leaving the main road at Aquilonia, he went to Ausculum (" quod versu dicere non est "), the mod. Ascoli Satriano, by a by-road, for the milestones which have been found there, though they probably belong to the Via Traiana, cannot be in their original position, but must have been transplanted thither (Th. Mommsen in Corp. Inscrip. Lat., ix. 1883, No. 6016) — and on to Herdoniae (why Mommsen says that he left Herdoniae on the left, op. cit. p. 592, is not clear), where he joined the line of the later'Via Traiana.

for which last the emperor Aurelian substituted a handkerchief (orarium), distributed to all Roman citizens (see Stole). In the theatre, at the close of the play, the chief actor called out " Valete et plaudite! ", and the audience, guided by an unofficial choregus, chaunted their applause antiphonally. This was often organized and paid for (Bottiger, Uber das Applaudieren im Theater bei den Alten, Leipz., 1822). When Christianity became fashionable the customs of the theatre were transferred to the

churches. Eusebius {Hist. Eccl. vii. 30) says that Paul of Samosata encouraged the congregation to applaud his preach- ing by waving linen cloths (odovais), and in the 4th and 5th centuries applause of the rhetoric of popular preachers had become an established custom. Though, however, applause may provide a healthy stimulus, its abuse has led to attempts at abolishing or restricting it even in theatres. The institution of the claque, people hired by performers to applaud them, has largely discredited the custom, and indiscriminate applause has been felt as an intolerable interruption to serious performances. The reverential spirit which abolished applause in church h?" tended to spread to the theatre and the concert-room, largtiy under the influence of the quasi-religious atmosphere of the Wagner performances at Baireuth. In Germany (e.g. the court theatres at Berlin) applause during the performance and " calling before the curtain " have been officially forbidden, but even in Germany this is felt to be in advance of public opinion. (See also Acclamation and Cheering.)

APPLE (a common Teut. word, A.S. aepl, aeppel, O.H.G. aphul, aphal, apfal, mod. Ger. Apfel), the fruit of PyrusMalus, belonging to the sub-order Pomaceae, of the natural order Rosaceae. It is one of the most widely cultivated and best-known and appreci- ated of fruits belonging to temperate climates. In its wild state it is known as the crab-apple, and is found generally distributed throughout Europe and western Asia, growing in as high a latitude as Trondhjem in Norway. The crabs of Siberia belong to different species of Pyrns. The apple-tree as cultivated is a moderate-sized tree with spreading branches, ovate, acutely serrated or crenated leaves, and flowers in corymbs. The fruit is too well known to need any description of its external character- istics. The apple is successfully cultivated in higher latitudes than any other fruit tree, growing up to 65 N., but notwith- standing this, its blossoms are more susceptible of injury from frost than the flowers of the peach or apricot. It comes into flower much later than these trees, and so avoids the night frost which would be fatal to its fruit-bearing. The apples which are grown in northern regions are, however, small, hard, and crabbed, the best fruit being produced in hot summer climates, such as Canada and the United States. Besides in Europe and America, the fruit is now cultivated at the Cape of Good Hope, in northern India and China, and in Australia and New Zealand.

Apples have been cultivated in Great Britain probably since the period of the Roman occupation, but the names of many varieties indicate a French or Dutch origin of much later date. In 1688 Ray enumerated seventy-eight varieties in cultivation in the neighbourhood of London, and now it is calculated that about 2000 kinds can be distinguished. According to the purposes for which they are suitable, they can be classed as — 1st, dessert; 2nd, culinary; and 3rd, cider apples. The principal dessert apples are the Pippins (pepins, seedlings), of which there are numerous varieties. As

culinary apples, besides Rennets and other dessert kinds, Codlins and Biffins are culti- vated. In England, Herefordshire and Devonshire are famous for the cultivation of apples, and in these counties the manufacture of cider (q.v.) is an important industry. Cider is also extensively prepared in Normandy and in Holland. Verjuice is the fermented juice of crab apples.

A large trade in the importation of apples is carried on in Britain, imports coming chiefly from French, Belgian and Dutch growers, and from the United States and British North America. Dried and pressed apples are imported from France for stewing, under the name of Normandy Pippins, and similarly prepared fruits come also from America.

The apple may be propagated by seeds to obtain stocks for grafting, and also for the production of new varieties. The established sorts are usually increased by grafting, the method called whip-grafting being preferred. The stocks should be at least as thick as the finger; and should be headed back to where the graft is to be fixed in January, unless the weather is frosty, but in any case before vegetation becomes active. The scions should be cut about the same time, and laid in firmly in a trench, in contact with the moist soil, until required.

The tree will thrive in any good well-drained soil, the best being a good mellow calcareous loam, while the less iron there is in the subsoil the better. The addition of marl to soils that are not naturally calcareous very much improves them. The trees are liable to canker in undrained soils or those of a hot sandy nature. Where the soil is not naturally rich enough, it should be well manured, but not to the extent of encouraging over-luxuriance. It is better to apply manure in the form of a compost than to use it in a fresh state or unmixed.

To form an orchard, standard trees should be planted at from 2 5 to 40 ft. between the rows, according to the fertility of the soil and other considerations. The trees should be selected with clean, straight, self-supporting stems, and the head should be shapely and symmetrical, with the main branches well balanced. In order to obtain such a stem, all the leaves on the first shoot from the graft or bud should be encouraged to grow, and in the second season the terminal bud should be allowed to develop a further leading shoot, while the lateral shoots should be allowed to grow, but so that they do not compete with the leader, on which the growth of leaves should be encouraged in order that they may give additional strength to the stem below them. The side shoots should be removed gradually ; so that the diminution of foliage in this direction may not exceed the increase made by the new branches and shoots of the upper portion. Dwarf pyramids, which occupy less space than open dwarfs, if not

allowed to grow tall, may be planted at from 10 to 12 ft. apart. Dwarf bush trees may be planted from 10 to 15 ft. apart, according to the variety and the soil. Dwarf bushes on the Paradise stock are both orna- mental and useful in small gardens, the trees being always conveniently under control. These bush trees, which must be on the proper stock — the French Paradise — may be planted at first 6 ft. apart, with the same distance between the rows, the space being afterwards increased, if desired, to 12 ft. apart, by removing every alternate row.

" Cordons " are trees trained to a single shoot, the laterals of which are kept spurred. They are usually trained horizontally, at about ij ft. from the ground, and may consist of one stem or of two, the stems in the latter case being trained in opposite directions. In cold districts the finer sorts of apples may be grown against walls as upright or oblique cordons. From these cordon trees very fine fruit may often be obtained. The apple may also be grown as an espalier tree, a form which does not require • much lateral space. The ordinary trained trees for espaliers and walls should be planted 20 ft. apart.

The fruit of the apple is produced on spurs which form on the branchlets of two years old and upwards, and continue fertile for a series of years. The principal pruning should be performed in summer, the young shoots if crowded being thinned out, and the superabundant laterals shortened by breaking them half through. The general winter pruning of the trees may take place any time from the beginning of November to the beginning of March, in open weather. The trees are rather subject to the attacks of the American blight, the white cottony substance found on the bark and developed by an insect (Eriosoma malt), somewhat similar to the green-fly of the garden, but not a true aphis. It may be removed by scrubbing with a hard brush, by painting the affected spots with any bland oil, or by washing them with dilute paraffin and soft soap. ;

The apple-blossom weevil (Anthonomus pomorum), a small reddish-brown beetle, often causes serious damage to the flowers. The female bores and lays an egg in the unopened bud, and the maggot feeds on the stamens and pistil. The weevil hibernates in the crannies of the bark or in the soil at the base of the trees,

and bandages of tarred cloth placed round the stem in spring will prevent the female from crawling up.

The codlin moth (Carpocapsa pomonana) lays its eggs in May in the calyx of the flowers. The young caterpillar, which is white with black head and neck, gnaws its way through the fruit, and pierces the rind. When nearly full grown it attacks the core, and the fruit soon drops. The insect emerges and spins its cocoon in a crack of the bark.

To check this disease the apples which fall before ripening should be promptly removed. A loosely made hay-band twisted round the stem about a foot from the ground is of use. The grubs will generally choose the bands in which to make their cocoon; at the end of the season the bands are collected and burned.

The following are a few of the most approved varieties of the apple tree, arranged in order of their ripening, with the months in which they are in use:—

Dessert Apples.

White Juneating July

Early Red Margaret Aug.

Irish Peach Aug.

Devonshire Quarrenden Aug., Sept.

Duchess of Oldenburg Aug., Sept.

Red Astrachan Sept.

Kerry Pippin Sept., Oct.

Peasgood's Nonesuch Sept.-Nov.

Sam Young Oct.-Dec.

King of the Pippins Oct.-Jan.

Cox s Orange Pippin Oct.-Feb.

Court of Wick Oct.-Mar.

Blenheim Pippin Nov.-Feb.

Sykehouse Russet Nov.-Feb.

Fearn's Pippin Nov.-Mar.

Mannington's Pearmain Nov.-Mar.

Margil Nov.-Mar.

Ribston Pippin Nov.-Mar.

Golden Pippin Nov.-Jan.

Reinette de Canada Nov.-Apr.

Ashmead's Kernel Nov.-Apr.

White Winter Calville (grown under glass) . Dec-Mar.

Braddick's Nonpareil Dec-Apr.

Court-pendu Plat Dec -Apr.

Northern Spy Dec-May

Cornish Gilliflower Dec-May

Scarlet Nonpareil Jan.-Mar.

Cockle's Pippin Jan.-Apr.

Lamb Abbey Pearmain Jan.-May

Old Nonpareil Jan.-May

Duke of Devonshire Feb.-May

Sturmer Pippin Feb.-June

Kitchen Apples.

Keswick Codlin . . . . . Aug.-Sept.

Lord Suffield Aug.-Sept.

Manks Codlin Aug.-Oct.

Ecklinville Seedling Aug.-Nov.

Stirling Castle Aug.-Nov.

New Hawthornden Sept.-Oct,

Stone's Seedling Sept.-Nov.

Emperor Alexander Sept.-Dec.

Waltham Abbey Seedling Sept.-Jan.

Cellini Oct., Nov.

Gravenstein Oct.-Dec.

Hawthornden Oct.-Dec.

Baumann's Red Winter Reinette . . Nov.-Mar.

Mere de Manage Oct.-Mar.

Beauty of Kent Oct.-Feb.

Yorkshire Greening Oct.-Feb.

Gloria Mundi . , Nov.-Jan.

Blenheim Pippin Nov.-Feb.

Tower of Glammis Nov.-Feb.

Warner's King Nov.-Mar.

Alfriston Nov.-Apr.

Northern Greening Nov.-Apr.

Reinette de Canada Nov.-Apr.

Bess Pool Nov.-May

Winter Queening Nov.-May

Lane's Prince Albert Oct.-May

Norfolk Beaufin . . . . Nov.-July

Apples for table use should have a sweet juicy pulp and rich aromatic flavour, while those suitable for cooking should possess the property of forming a uniform soft pulpy mass when boiled or baked. In their uncooked state they are not very digestible,

but when cooked they form a very safe and useful food, exercising a gentle

laxative influence.

According to Hutchison their composition is as follows: —

Fresh . Dried .

Water.

Pro- teid.

Ether Extract.

Carbo- hydrate.

Ash.

Cellu- lose.

Acids.

82-5 3&-2

0-4 1-4

o-5

3-0

12-5 49-1

0-4 1-8

2-7 4‘9

1-0

3-6

Many exotic fruits, having nothing in common with the apple ; are known by that name, e.g. the Balsam apple, Momordica Balsamina; the custard apple (q.v.), Anona reticulata; the egg apple, Solatium esculentum; the rose apple, various species of Eugenia; the pineapple (q.v.), Ananas sativus; the star apple, Chrysophyllum Cainito; and the apples of Sodom, Solanum sodomeum. (A. B.-R.)

APPLEBY, a market town and municipal borough, and the county town of Westmorland, England, in the Appleby parliamentary division, 276 m. N.N.W. from London, on the Midland and a branch of the North Eastern

railways. Pop. (iqoi) 1764. It is picturesquely placed in the valley of the Eden, which is richly wooded, and flanked on the north-east by spurs of Milburn Forest and Dufton and other fells, which rise up to 2600 ft. On a hill above the town stands the castle, retaining a fine Norman keep and surrounded by a double moat, now partly laid out as gardens. The remainder of the castle was rebuilt as a mansion in the 17th century. It was held for the royalists in the civil wars by Sir Philip Musgrave, and was the residence of Anne, countess of Pembroke, the last of the family of Clifford, which had great estates in this part of England. St Ann's hospital for thirteen poor women (1654) was of her foundation. The grammar school (1453) was refounded by Queen Elizabeth. The modern incorporation dates from 1885, with a mayor, four aldermen and twelve councillors. Area, 1876 acres.

Appleby is not mentioned in any Saxon records, but after the Conquest it rose to importance as the head of the barony of Appleby which extended over the eastern portion of the present county of Westmorland. This barony formed part of the province of Carlisle granted by Henry I. to Ranulf Meschin, who erected the castle at Appleby and made it his place of residence. Appleby is a borough by prescription, and the old charter of incorporation, granted in the first year of James II., was very shortly abandoned. In 1292 we find the mayor and commonalty claiming the right to elect a coroner and to have tolls of markets and fairs. In 1 68 5 the governing body comprised a mayor, aldermen, a town clerk, burgesses of the common council, a coroner and subordinate officers. An undated charter from Henry II. conceding to the burgesses the customs of York, Was confirmed in 1 John, 16 Henry III., 14 Edward I., and 5 Edward III. John granted the borough to the burgesses for a fee-farm rent. The impoverishment caused by the Scottish raids led to its seizure by Edward II. for arrears of payment, but Edward III. restored it on the same terms as before. Henry VIII. reduced the fee-farm rent from 20 marks to 2 marks, after an inquisition which found that Appleby was burnt by the Scots in 1388 and that part of it still lay in ruins. The town, however, never seems to have regained its prosperity, and 16th and 17th century writers speak of it as a poor and insignificant village. Appleby returned two members to parliament from 1295 until disfranchised by the Reform Act of 1832. The market and the St Lawrence fair are held by prescription. James I. granted an additional fair on the second Thursday in April. In the early 1 8th century Appleby was celebrated for the best corn-market in the country.

See Victoria County History, Westmorland; W. Hewitson, Appleby Charters (Cumberl. and Westm. Antiq. and Archaeol. Soc, Transac- tions, xi. 279-285; Kendal, 1891).

APPLETON, NATHAN (1779-1861) American merchant and politician,

was born in New Ipswich, New Hampshire, on the 6th of October 1779. He was educated in the New Ipswich Academy, and in 1794 entered mercantile life in Boston, in the employment of his brother, Samuel (1766-1853), a successful and benevolent man of business, with whom he was in partnership

from 1800 to 1800. He co-operated with Francis C.Lowell and others in introducing the power-loom and the manufacture of cotton on a large scale into the United States, a factory being established at Waltham, Massachusetts, in 1814, and another in 1822 at Lowell, Massachusetts, of which city he was one of the founders. He was a member of the general court of Massa- chusetts in 1816, 1821, 1822, 1824 and 1827, and in 1831-1833 and 1842 of the national House of Representatives, in which he was prominent as an advocate of protective duties. He died in Boston on the 14th of July 1861.

His son, Thomas Gold Appleton (181 2-1884), who graduated at Harvard in 1831, had some reputation as a writer, an artist and a patron of the fine arts, but was better known for his witticisms, one of which, the oft-quoted " Good Americans, when they die, go to Paris," is sometimes attributed to Oliver Wendell Holmes. He published some poems and, in prose, Nile Journal (1876), Syrian Sunshine (1877), Windfalls (1878), and Chequer-Work (1879).

See the memoir of Nathan Appleton by Robert C. Winthrop (Boston, 1861); and Susan Hale's Life and Letters of Thomas Gold Appleton (New York, 1885).

APPLETON, a city and the county-seat of Outagamie county, Wisconsin, U.S.A., on the lower Fox river, about 90 m. N. of Milwaukee. Pop. (1890) 11,869; {ˆ9°°) i5>o85, of whom 3605 were foreign-born; (1910, census) 16,773. It is served by the Chicago & North-Western, and the Chicago, Milwaukee & St Paul railways, and by steamboats on the Fox river, by means of which it meets lake transportation at De Pere arid Green Bay. Appleton was one of the first cities in the United States to have an electric street railway line in operation; and electric street railways now traverse the entire Fox river valley as far as Fond du Lac on the south and Green Bay on the north. The city is attractively laid out on high bluffs above the river. It has several beautiful parks, two hospitals, a number of fine churches and school buildings, and a public library. The city is the seat of Lawrence college (changed from university in 1908), an

interdenominational (originally a Methodist Episcopal) co-educational institution, founded in 1847 as the Lawrence Institute of Wisconsin and named in honour of Amos Adams Lawrence (1814-1886) of Boston, son of Amos Lawrence, and giver of $10,000 for the founding of the Institute. The college comprises an academy, a college of liberal arts, a school of expression, a school of commerce, schools of music and of art, and a school of correspondence; and in 1007-1908 had 33 instructors, 575 students and a library of 24,400 volumes. The Fox river furnishes about 10,000 h.p., which is largely utilized for the manufacture of paper (of which Appleton is one of the largest producers in the United States), wood-pulp, sulphite fibre, machinery, wire screens, woollen goods, knit goods, furni- ture, dyes and flour. The total value of factory products in 1905 was $6,672,457, an increase of 72-8 % over the product value of 1900. Appleton was first permanently settled in 1833, and was named in honour of Samuel Appleton of Massachusetts, who owned part of the original town plot. It was incorporated as a village in 1853, and received in 1857 a city charter, which was revised in 1887 and in 1905.

APPOGGIATURA (from Ital. appoggiare, to lean upon), a musical term for a melodic ornament, a grace-note prefixed to a principal note and printed in small character. The effect is to suspend the principal note, by taking away the time-value of the appoggiatura prefixed to it. There are two kinds, the long appoggiatura, now usually printed as played, and the short, where the suspension of the principal note is scarcely perceptible; this is often called acciatura, a word properly applied to an ornament now obsolete, in which a principal note in a melody is struck together with the note immediately below, the lower note being at once released and the other held on.

APPOINTMENT, POWER OF, in English law, an authority reserved by or limited to a person, to dispose, either wholly or partially, of real or personal property, either for his own benefit or for that of others. Thus if A settle property upon trustees to such uses as B shall by deed or will appoint and in default of

and until such appointment to the use of C and his heirs, B, though he has no interest in the property, can at any time appoint the property to any one he pleases, including himself, and C's interest which has hitherto been vested in him will be divested. In the above case A is said to be the donor, B the donee, and the persons in whose favour the appointment is exercised are called the appointees. Such powers are either general or limited. A general power is one which the appointor may exercise in favour of any person he pleases. It is obvious that such a power is very nearly equivalent to ownership, and consequently property which is the subject of a general power has been made to share the liabilities of ownership. By the

Judgments Act 1838 all hereditaments over which a judgment debtor has such a power may be seized by the sheriff under a writ of elegit, and by the Bankruptcy Act 1883 similar property will vest in the trustees of a bankrupt. By the Finance Act 1894 property of which the deceased had a general power of appoint- ment is subject to the payment of estate duty, even though the power has not been exercised. A limited power is one which can only be exercised in favour of certain specified persons or classes; such a power is frequently inserted in marriage settle- ments in which after life estates to the husband and wife a power is given to appoint among the children of the marriage. In such a case no appointment to any one but children of the marriage is valid. Formerly it was held that the intention of the donor of such a power was that each of the class which are the objects of the power should take some part of the fund, and from this arose the equitable doctrine of illusory appointments, by which the courts of equity set aside an appointment which was good at law on the ground that a merely nominal share had been appointed to one of the objects. The great difficulty of deciding what was a nominal or illusory share caused the passing of the Illusory Appointments Act of 1830, whereby it was enacted that no appointment should be set aside merely on the ground that a share appointed was illusory. It was still necessary, however, that some share should be appointed to each object, and consequently it was possible in the popular phrase to be " cut off with a shilling," but now by the Powers Amendment Act 1874 the appointor is no longer obliged to appoint a share to each object of the power.

It is a general rule that every circumstance required by the instrument creating the power to accompany the execution of it must be strictly observed. Thus it might be required that the appointment should be by an instrument witnessed by four witnesses, or that the consent in writing of some third party should be signified. The general rule, however, has been modified both by statute and by the rules of equity. By the Wills Act 1837 a will made pursuant to the requirements of that statute shall be a valid execution of a power of appointment by will, notwith- standing that some additional form or solemnity shall have been required by the instrument creating the power, and by the Wills Act 1 86 1 a will made out of the United Kingdom by a British subject according to the forms required by the law of the place where the will was made shall, as regards personal estate, be held to be well executed and admitted to probate ; consequently it has been held that an appointment made by such a will is a valid exercise of the power. As regards appointments by deed the Law of Property Amendment Act 1859 enacts that a deed attested by two witnesses shall, so far as execution and attesta- tion go, be a valid exercise of a power to appoint by deed. The courts of equity also will interfere in some cases of defective execution in order to carry out the intentions of the settlor. The

principle upon which the court acts is obscure, but the rule has been thus stated:—" Whenever a man having power over an estate, whether ownership or not, in discharge of moral or natural relations, shows an intention to execute such power, the court will operate upon the conscience of the heir (or of the persons entitled in default) to make him perfect this intention." Equity, however, only relieves against defects not of the essence of the power, such as the absence of seal or execution by will inste?td of deed, but where the defect is of the essence of the power, as where a consent is not obtained, equity will not assist,

11

nor will it relieve where a power to appoint by will is purported to be exercised by deed. A power of appointment if exercised must be exercised bona fide, otherwise it will be void as fraudu- lent; thus it has been frequently decided that where a father, having a limited power of appointment among his children, appoints the whole fund to an infant child, who is in no need of the appointment and who is ill, in the expectation of the death of the child whereby the fund will come to him as next of kin, such appointment is void as a fraud upon the power. Where an execution is partly fraudulent and partly valid the court will, if possible, separate the two and only revoke that which is fraudulent; if, however, the two parts are not separable the whole is void. The same rule is applied in cases of excessive execution where the power is exercised in favour of persons some of whom are and some of whom are not objects of the power. The doctrine of Election (q.v.) applies to appointments under powers, but there must be a gift of free and disposable property to the persons entitled in default of appointment.

The appointment must in law be read into the instrument creating the power in lieu of the power itself. Thus an appointor under a limited power cannot appoint to any person to whom the donor could not have appointed by reason of the rule against perpetuities, but this is not so in the case of a general power, for there the appointor is virtually owner of the property appointed. In applying this rule to appointments a distinction arises between powers created by deed and will, for a deed speaks from the date of its execution but a will from the death of the testator, and so limitations bad when the will was made may have become good when it comes into operation. Since the Conveyancing Act 1881 all powers may be released by the donees thereof, unless the power is coupled with a trust in respect of which there is a duty cast on the donee to exercise it; and this is so even though the donee gets a benefit by such release as one entitled in default of appointment, for this is not a fraud upon the power. (E. S. M. B.)

APPOMATTOX COURT HOUSE, a village of Appomattox county, Virginia, U.S.A., 25 m. E. of Lynchburg, in the S. part of the state. It is served by the Norfolk & Western railway. The village was the scene of the surrender of the Confederate Army of Northern Virginia under General Robert E. Lee to the Federal forces under Lieutenant-General U. S. Grant on Sunday the 9th of April 1865. The terms were: ” the officers to give their individual paroles not to take up arms against the government of the United States until properly exchanged, and each company or regimental commander to sign a like parole for the men of their commands,” . . . neither ” side arms of the officers nor their private horses or baggage ” to be sur- rendered; and, as many privates in the Confederate Army owned horses and mules, all horses and mules claimed by men in the. Confederate Army to be left in their

possession.

APPONYI, ALBERT, Count (1846-), Hungarian states- man, the most distinguished member of an ancient noble family, dating back to the 13th century, and son of the chancellor Gyorgy Apponyi (1808-1899) and the accomplished and saintly Countess Julia Sztaray, was born at Pesth on the 29th of May 1846. Educated at the Jesuit seminary at Kalksburg and at the universities of Vienna and Pesth, a long foreign tour completed his curriculum, and at Paris he made the acquaintance of Montalembert, a kindred spirit, whose influence on the young Apponyi was permanent. He entered parliament in 1872 as a liberal Catholic, attaching himself at first to the Deak party; but the feudal and ultramontane traditions of his family circle profoundly modified, though they could never destroy, his popular ideals. On the break up of the Deak party he attached himself to the conservative group which followed Baron Pal Senynyey (1824-1888) and eventually became its leader. Until 1905 Count Albert was constantly in opposition, but in May of that year he consented to take office in the second Wekerle ministry. A lofty and magnetic orator, his speeches were published at Budapest in 1896; and he is the author of an interesting dissertation, Esthetics and Politics, the Artist and the Statesman (Hung.) (Budapest, 1895).

APPORTIONMENT (Fr. apportionment; Med. Lat. appor- tionamentum; derived from Lat. portio, share), distribution or allotment in proper shares; a term used in law in a variety of senses. (1) Sometimes it is employed roughly and with no technical meaning to indicate the distribution of a benefit (e.g. salvage or damages under the Fatal Accidents Act 1846, § 2), or liability (e.g. general average contributions, or tithe rent-charge), or the incidence of a duty (e.g. obligations as to the maintenance of highways). (2) In its strict legal interpretation apportion- ment falls into two classes, " apportionment in respect of estate " and " apportionment in respect of time."

1. Apportionment in respect of Estate may result either from the act of the parties or from the operation of law. Where a lessee is evicted from, or surrenders or forfeits possession of part of the property leased to him, he becomes liable at common law to pay only a rent apportioned to the value of the interest which he still retains. So where the person entitled to the reversion of an estate assigns part of it, the right to an apportioned part of the rent incident to the whole reversion passes to his assignee. The lessee is not bound, however, by an apportionment of rent made upon the grant of part of the reversion unless it is made either with his consent or by the verdict of a jury. The assignee of the reversion of part of demised premises could not, at common law, re-enter for breach of a condition, inasmuch as a condition of re-entry in a lease could not at common law be apportioned.*

But this has now been altered by statute both in England (Law of Property Amendment Act 1859, § 3; Conveyancing Act 1881, § 1 2) and in many of the British colonies (e.g. Ontario, Rev. Stats., 1897, c. 170, § 9; Barbados, No. 12 of 1891, § 9). In the cases just mentioned there is apportionment in respect of estate by act of the parties.

Apportionment by operation of law may be brought about where by act of law a lease becomes inoperative as regards its subject- matter, or by the " act of God " (as, for instance, where part of an estate is submerged by the encroachments of the sea). To the same category belongs the apportionment of rent which takes place under various statutes (e.g. the Lands Clauses Consolidation Act 1845, § 119, when land is required for public purposes; the Agricultural Holdings Act 1883, § 41, in the case of a tenant from year to year receiving notice to quit part of a holding; and the Irish Land Act I9°3> § 61, apportionment of quit and crown rents).

2. Apportionment in respect of Time. — At common law, there was no apportionment of rent in respect of time. Such apportion- ment was, however, in cef tain cases allowed in England by the Distress for Rent Act 1737, and the Apportionment Act 1834, and is npw allowed generally under the Apportionment Act 1870. Under that statute (§ 2) all rents, annuities, dividends and other periodical payments in the nature of income are to be considered as accruing from day to day and to be apportionable in respect of time accordingly. It is provided, however, that the appor- tioned part of such rents, &c, shall only be payable or recover- able in the case of a continuing payment, when the entire portion of which it forms part itself becomes payable, and, in the case of a payment determined by re-entry, death or otherwise, only when the next entire portion would have been payable if it had not so determined (§ 3). Persons entitled to apportioned parts of rent have the same remedies for recovering them when payable as they would have had in respect of the entire rent; but a lessee is not to be liable for any apportioned part specifically. The rent is recoverable by the heir or other person who would, but for the apportionment, be entitled to the entire rent, and he holds it subject to distribution (§ 4). The Apportionment Act 1870 extends to payments not made under any instrument in writing (§2), but not to annual sums made payable in policies of insurance (§ 6). Apportionment under the act can be excluded by express stipulation.

The apportionment created by this statute is " apportionment in respect of time." The cases to which it applies are mainly cases of either (A) apportionment of rent due under leases where at a time between the dates fixed for payment the lessor or lessee dies, or some other alteration in the position of parties occurs; or (B) apportionment of income between the representatives of a limited owner and the remainder-man when the limited

determines at a time between the date when such income became due.

(A) With regard to the former of these classes, it may be noticed that although apportioned rent becomes payable only when the whole rent is due, the landlord, in the case of the bankruptcy of an ordinary tenant, may prove for a proportionate part of the rent up to the date of the receiving order (Bankruptcy Act 1883, Sched. ii. r. 19); and that a similar rule holds good in the winding up of a company (in re South Kensington Co-operative Stores, 1881, 17 Ch.D. 161); and further that the act of 1870 applies to the liability to pay, as well as to the right to receive, rent (in re Wilson, 1893, 62 L.J.Q.B. 628, 632). Accordingly where an assignment of a lease is made between two half-yearly rent-days, the assignee is not liable to pay the full amount of the half-year's rent falling due on the rent-day next after the date of the assignment, but only an appor- tioned part of that half-year's rent, computed from the last men- tioned date (Glass v. Patterson, 1902, 2 Ir.R. 660).

(B.) With regard to the apportionment of income, the only points requiring notice here are that all dividends payable by public companies are apportionable, whether paid at fixed periods or not, unless the payment is, in effect, a payment of capital (§ 5).

The Apportionment Act 1870 extends to Scotland and Ireland. It has been followed in many of the British colonies (e.g. Ontario, Rev. Stats., 1897, c. 170, §§ 4-8; New Zealand, No. 4 of 1886; Tasmania, No. 8 of 1871; Barbados, No. 12 of 1891, §§ 9-12). Similar legislation has been adopted in many of the states of the American Union, where, as in England, rent was not, at common law, apportionable as to time (Kent, Comm. iii. 469-472).

An equitable apportionment, apart from statute law, arises where property is bequeathed on trust to pay the income to a tenant for life and the reversion to others, and the realization of the property in the form of a fund capable of producing income is postponed for the benefit of the estate. In such cases there is an ultimate apportionment between the persons entitled to the income and those entitled to the capital of the accumulations for the period of such postponement. The rule followed is this: the proceeds, when realized, are apportionable between capital and income by ascertaining the sum which, put out and accumu- lated at 3 % per annum

from the day of the testator's death (with yearly rents and deducting income tax) would have pro- duced at the day of receipt the sum actually received. The sum so ascertained should be treated as capital and the residue as income. (In re Earl of Chesterfield's Trusts, 1883, 24 Ch.D. 643; In re Goodenough, 1895, 2 Ch. 537; Rowlls v. Bebb, 1900, 2 Ch. 107.)

In addition to the authorities cited in the text, see Stroud, Jtid. Diet. (2nd ed., London, 1903), s.v. "Apportion"; Bouvier, Law Diet. (London and Boston, 1897), s.v. "Apportionment"; Ruling Cases (London, 1895), tit. "Apportionment"; Fawcett, Landlord and Tenant (London, 1905), pp. 238 et seq.; Foa, Landlord and Tenant (3rd ed., London, 1901), pp. 112 et seq. (A. W. R.)

APPORTIONMENT BILL, an act passed by the Congress of the United States after each decennial census to determine the number of members which each state shall send to the House of Representatives. The ratio of representation fixed by

Census.

Apportionment.

Whole Number of

Repre- sentatives.

Year.

Population.

Year.

Ratio.

Constitution First Census Second Census Third Census Fourth Census Fifth Census Sixth Census Seventh Census Eighth Census Ninth Census Tenth Census Eleventh Census Twelfth Census

1790 1800 1810 1820 1830 1840 1850

i860

1870 1880 1890 1900

3,929,214

5,308,483

7,239,881

9,633,822

12,866,020

17,069,453

23,191,876

31,443,321

38,558,371

50,155,783

62,622,250

75,568,686

1789

1793 1803 1813 1823 1833 1843 1853 1863

1873 1883

1893 1903

30,000

33.000

33.ooo 35,ooo

40,000 47,700 70,680

93.423 127,381

131,425

i5i,9"

173,901 194,182

65 105 141 181 213 240 223

234 241 292 325 356 386

the original constitution was 1 to 30,000 of the free population, and the number of the members of the first House was 65. As the House would, at this ratio, have become unmanage- ably large, the ratio, which is first settled by Congress before

apportionment, has been raised after each census, as will be seen from the accompanying table.

The same term is applied to the acts passed by the state legislatures for correcting and redistributing the representation of the counties. Such acts are usually passed at decennial intervals, more often after the federal census, but the dates may vary in different states. The state representatives are usually apportioned among the several counties according to population and not by geographical position. The electoral districts so formed are expected to be equal in proportion to the number of inhabitants ; but this method has led to much abuse in the past, through the making of unequal districts for partisan purposes. (See Gerrymander.)

If a state has received an increase in the number of its repre- sentatives and its legislature does not pass an apportionment bill before the next congressional election, the votes of the whole state elect the additional members on a general ticket and they are called " congressmen-at-large."

APPRAISER (from Lat. appretiare, to value), one who sets a value upon property, real or personal. In England the business of an appraiser is usually combined with that of an auctioneer, while the word itself has given place, to a great extent, to that of "valuer." (See the articles Auctions and Auctioneers, and Valuation and Valuers.)

In the United States appraiser is a term often used to describe a person specially appointed by a judicial or quasi-judicial authority to put a valuation on property, e.g. on the items of an inventory of the estate of a deceased person or on land taken for public purposes by the right of eminent domain. Appraisers of imported goods and boards of general appraisers have ex- tensive functions in administering the customs laws of the United States. Merchant appraisers are sometimes appointed temporarily under the revenue laws to value where there is no resident appraiser without holding the office of appraiser (U.S. Rev. Stats. § 2609).

APPREHENSION (Lat. ad, to; prehendere, to seize), in psychology, a term applied to a mode of consciousness in which nothing is affirmed or denied of the object in question, but the mind is merely aware of (" seizes ") it. " Judgment " (says Reid, ed. Hamilton, i. p. 414) " is an act of the mind specifically different from simple apprehension or the bare conception of a thing "; and again, " Simple apprehension or conception can neither be true

nor false." This distinction provides for the large class of mental acts in which we are simply aware of or " take in " a number of familiar objects, about which we in general make no judgment unless our attention is suddenly called by a new feature. Or again two alternatives may be apprehended without any resultant judgment as to their re- spective merits. Similarly G. F. Stout points out that while we have a very vivid idea of a character or an incident in a work of fiction, we can hardly be said in any real sense to have any belief or to make any judgment as to its existence or truth. With this mental state may be compared the purely aesthetic contemplation of music, wherein apart from, say, a false note, the faculty of judgment is for the time inoperative. To these examples may be added the fact that one can fully understand an argument in all its bearings without in any way judging its validity.

Without going into the question fully, it may be pointed out that the distinction between judgment and apprehension is relative. In every kind of thought there is judgment of some sort in a greater or less degree of prominence. Judgment and thought are in fact psychologically distinguishable merely as different, though correlative, activities of consciousness. Professor Stout further, investigates the phenomena of apprehension, and comes to the conclusion that " it is possible to distinguish and identify a whole without apprehending any of its constituent details." On the other hand, if the attention

focuses itself for a time on the apprehended object, there is an expectation that such details will as it were emerge into consciousness. Hence he describes such apprehension as " implicit," and in so far as the implicit apprehension determines the order – of such emergence he describes it as "schematic." A good example of this process is the use of formulae in calculations; ordinarily the formula is used without question; if attention is fixed upon it, the steps by which it is shown to be universally applicable emerge and the " schema " is complete in detail.

With this result may be compared Kant's theory of appre- hension as a synthetic act (the " synthesis of apprehension ") by which the sensory elements of a perception are subjected to the formal conditions of time and space.

See G. F. Stout, Analytic Psychology (London, 1896) ; F. Brentano, Psychologie (bk. ii. ch. vii.), and Vom Ursprung sittlicher Erkennt- nis; B. Titchener, Outlines of Psychology (New York, 1902), and text-books of

psychology. Also Psychology.

APPRENTICESHIP (from Fr. apprendre, to learn), a contract whereby one person, called the master, binds himself to teach, and another, called the apprentice, undertakes to learn, some trade or profession, the apprentice serving his master for a certain time.

Roman law is silent on the subject on this contract, nor does it seem to have had any connexion with the division of the Roman citizens into tribes or colleges. So far as can be seen it arose in the middle ages, and formed an integral part of the system of trade gilds and corporations by which skilled labourers of all kinds sought protection against the feudal lords, and the main- tenance of those exclusive privileges with which in the interests of the public they were favoured. In those times it was believed that neither arts nor sciences would flourish unless such only were allowed to practise them as had given proofs of reasonable proficiency and were formed into bodies corporate, with certain powers of self-government and the exclusive monopoly of their respective arts within certain localities; and the medieval universitas (corporation) — whether of smiths and tailors or of scholars — included both such as were entitled to practise and teach and such as were in course of learning. The former were the masters, the latter the apprentices. Hence the term appren- tice was applied indifferently to such as were being taught a trade or a learned profession, and even to undergraduates or scholars who were qualifying themselves for the degree of doctor or master in the liberal arts. When barristers were first ap- pointed by Edward I. of England they were styled apprenticii ad legem — the serjeants-at-law being servientes ad legem; and these two terms corresponded respectively to the trade names of apprentices and journeymen. During the middle ages the term of apprenticeship was seven years, and this period was thought no more than sufficient to instruct the learner in his profession, craft or mystery under a properly qualified master, teacher or doctor— for these names were synonymous — and to reimburse the latter by service for the training received. After this the apprentice became himself a master and a member of the corporation, with full rights to practise the business and to. teach others in his turn; so also it would seem that undergraduates had to pass through a curriculum of seven years before they could attain the degree of doctor or master in the liberal arts. On the continent of Europe these rules were ob- served with considerable rigour, both in the learned professions and in those which we now designate as trades. In England they made their way more slowly and did not receive much countenance, there being always a jealousy of anything savour- ing of interference with the freedom of trade. Nevertheless the formation of gilds and companies of tradesmen in England dates probably from the 12th century, and the institution of apprentice- ships cannot be of much later date. In 1388 and 1405 it is noticed in acts of

parliament. By various subsequent statutes provisions were made for the regulation of the institution, and from them it appears that seven years was its ordinary and normal term in the absence of special arrangement. By a statute of 1562 this was made the law of the land, and it was

enacted that no person should exercise any " trade or mystery " without having served a seven years' apprenticeship. In no place did the apprentices become so formidable by their numbers and organization as in London. During the Great Rebellion they took an active part as a political body, and were conspicuous after the Restoration by being frequently engaged in tumults. It was probably owing to this circumstance, quite as much as to economic considerations of freedom of trade, that the act of Elizabeth never found much favour with the courts of law. Soon after the Great Rebellion we find the apprentice laws strongly reprobated by the judges, who endeavoured, on the theory that the act of Elizabeth could apply to no trades which were not in existence at its date, to limit its operation as far as possible. Such limitation of the act gave rise to many absurd anomalies and inconsistencies, e.g. that a coachmaker could not make his own wheels but must buy them of a wheelwright, while the latter might make both wheels and coaches, because coach- making was not a trade in England when the act of Elizabeth was passed. For the like reason the great textile and metal manufactures which arose at Manchester and Birmingham were held exempt from the operation of the statute. Concur- rently with the dislike to the apprentice laws which such anomalies generated, the doctrines of Adam Smith, that all monopolies or restrictions on the freedom of trade were in- jurious to the public interest, had gradually been making their way, and notwithstanding much opposition an act was passed in 1814 by which the statute of Elizabeth, in so far as it enacts that no person shall engage in any trade without a seven years' apprenticeship, was wholly repealed. The effect of this act was to give every person the fullest right to exercise any occupation or calling of a mechanical or trading kind for which he deemed himself qualified.

Apprenticeship, therefore, which was formerly a compulsory, now became a voluntary contract. In the case of the learned professions the principles and theories which gave birth to corporations with monopolies, and required apprenticeship or its equivalents, have — contrary to what has taken place in trade — been not only maintained but intensified; that is to say, not only have such bodies retained and even extended in some cases their exclusive privileges, but in general no one is allowed to practise in such professions unless his capabilities have been tested and approved by public authority. Thus no man is allowed to practise law or medicine in any of their branches who has not undergone the appropriate training by attendance at a university or by apprenticeship— sometimes by both combined — and passed certain examinations. Entrance to the church is

guarded by similar checks. In such instances the old principle — now generally abandoned in trade — of granting a monopoly to those possessing a certain standard of qualification is maintained in greater vigour than ever.

In some kinds of manufacture the old conditions have been modified by the subdivisions of labour or by the introduction of machinery, which have reduced the amount of skill which formerly was requisite, and thus they have passed out of the category of the higher skilled handicrafts, as only a very slight or short training is necessary to make an efficient worker; but a large number of the higher skilled trades remain which require a long period of training at the bench, and a careful inquiry into this subject has shown that in nearly all of such trades there is a scarcity of skilled workers, which is due to the falling off in the number of apprenticeships. Many persons qualified to form an opinion deplore that something in the nature of the old standard of qualification is not still applied to those trades, and consider that the only method of restoring a high standard of skill is by apprenticeship. The decay of apprenticeship in these trades is due, not to any inherent defect in the system, nor to its having been superseded by any other form of technical education, but to difficulties, especially in London and some other large towns, which place it beyond the reach of that class of persons who have the greatest need of it. Among these difficulties are: — first, insufficient organization, and secondly, want of funds to pay premiums where Such are required. These difficulties are

accentuated in London and some other large towns, but in many other districts apprenticeship is actively proceeded with. Efforts are being made, notably by the National Institution of Apprenticeship, to meet these difficulties. The Charity Com- missioners in their report for 1905 recognized the value of this institution, and stated that they would in future enable the trustees of charity endowments for apprenticeship to avail themselves of the practical co-operation of the institution. The modern trade unions, on the other hand, have done nothing to assist in restoring apprenticeship to its proper place; on the contrary, they have hampered it by restrictions which they have imposed, limiting the number of apprentices who may be taken. The result of fewer apprentices has been not only to lower the standard of skill in the higher trades, but to reduce the productive capacity of the artisans. The altered conditions now attending apprenticeship are, mainly, that the apprentice does not live with the master, and that the term is generally five years instead of a longer period ; but the principle remains precisely the same, and the fact that it is applied

more and more largely in Austria, Germany and other countries is an evidence of its necessity.

The contract of apprenticeship is generally created by in- denture, but any writing properly expressed and attested will do. The full consideration must be set out, and the instrument, whether a premium is paid or not, must be duly stamped, except in the case of parish apprentices and apprentices to the sea service (see Seamen, Laws Relating to). Where a charity or institution intervenes, it retains control over the indentures until the end of the term of apprenticeship, when the indenture should be cancelled and given up to the apprentice. Any one who is capable of making a contract can take an apprentice, and the law does not limit the number which may be taken by any master. Any person of legal capacity can bind himself as an apprentice, provided he is over seven years of age, though, as he is by the common law exempt from all liability ex contractu, it is usual for the apprentice's relations or friends to become bound for his service and good conduct during the period of his apprenticeship. The consent of the apprentice, however, must be expressed by his executing the indenture. No child under nine can be bound as a parish apprentice. The master must teach the apprentice the agreed trade or trades; should the master exercise two trades (which he has agreed to teach) and give up one, it would be good ground for dissolving the contract by the apprentice. An apprentice is not bound to work on Sundays, but he may be required to work on bank holidays. He cannot become a volun- teer (soldier) without his master's consent. It is usual in the indenture to state whether the apprentice is to be paid wages or otherwise. If the contract is to pay wages, no deduction can be made owing to illness or accident, unless it has been so provided for in the indentures. Nor is the apprentice liable for breakages or similar faults. The master has been supposed to have a right to administer moderate corporal punishment, though he may not delegate it. But this right is really obsolete. According to old custom a master provided proper food for his apprentices, and medical attendance when required; but the modern practice is for apprentices to reside with their parents or friends who maintain them. A master cannot assign indentures without the approval of the apprentice or such parties as are named in the contract for this purpose, even if he should transfer his business. The contract of apprenticeship may be dissolved by (1) efflux of time; (2) by death (if the master dies, some part of the premium is usually returnable, but if the apprentice dies no part is return- able) ; (3) by consent; (4) in case of grave misconduct; (5) under the Bankruptcy Act 1883, providing for discharge of the in- dentures of apprenticeship and for payment on account of premium. Disputes between master and apprentice, in cases where no premium has been paid, or where the premium does not exceed £25, are dealt with by courts of summary jurisdiction. Apprentices bound according to the " custom of

London," who are infants above the age of fourteen years and under twenty-one and unmarried, are responsible upon covenants contained in indentures txecuted by them just as if they were of full age. The term of apprenticeship is usually not less than four years.

Apprentices by the custom of London in agreements made at the Guildhall are subject to the jurisdiction of the chamberlain of London.

Parish apprentices are those bound out by guardians of the poor in England. By the Poor Relief Act 1601, overseers of the poor were empowered, with the consent of two justices, to put out poor children as apprentices " where they shall be convenient." Owing to the disinclination to receive such apprentices it became necessary to make the reception compulsory (1696), but this compulsion to receive them was abolished in 1844. Many statutes have been passed from time to time regulating the apprenticing of parish children, but it is now under the control of the Local Government Board, which issues rules specifying fully the manner in which such children are to be bound, assigned and maintained.

Authorities. — See 'E. Austin, Law Relating to Apprentices (1890); Addison, On Contracts (1905). For the state of apprentice- ship in European countries, and, more particularly in France, see Apprentissage, enquite et documents (Paris, 1904, Conseil Superieur du Travail, Ministere du Commerce, de 1' Industrie, des Postes et des Telegraphes, session de 1902). See also the literature issued by the National Institution of Apprenticeship, London. (J. S. B.)

APPROPRIATION (from Lat. appropriare, to set aside), the act of setting apart and applying to a particular use to the exclusion of all Other. In ecclesiastical law, appropriation is the perpetual annexation of an ecclesiastical benefice to the use of some spiritual corporation, either aggregate or sole. In the middle ages in England the custom grew up of the monasteries reserving to their own use the greater part of the tithes of their appropriated benefices, leaving only a small portion to their vicars in the parishes. On the dissolution of the monasteries these " great tithes " were often granted, with the monastic lands, to laymen, whose successors, known as " lay impropriators " or " lay rectors," still hold them, the system being known as impropriation. Appro- priation may be severed and the church become disappropriate, by the presentation of a clerk, properly instituted and inducted, or by the dissolution of the corporation possessing the benefice.

In the law of debtor and creditor, appropriation of payments is the application of a particular payment for the purpose of paying a particular debt. When a creditor has two debts due to him from the same debtor on

distinct accounts, the general law as to the appropriation of payments made by the debtor is that the debtor is entitled to apply the payments to such account as he thinks fit; solvitur in modum sohentis. In default of appropria- tion by the debtor the creditor is entitled to determine the application of the sums paid, and may appropriate them even to the discharge of debts barred by the Statute of Limitations. In default of appropriation by either debtor or creditor, the law implies an appropriation of the earlier payments to the earlier debts.

In constitutional law, appropriation is the assignment of money for a special purpose. In the United Kingdom an Appropriation Bill is a bill passed at the end of each session of parliament, enumerating the money grants made during the session, and appropriating the various sums, as voted by committee of supply, to the various purposes for which it is to be applied. The United States constitution (art. I. § 9) says: " No money shall be drawn from the treasury, but in consequence of appropriations made by law." Bills for appropriating money originate in the House of Representatives, but may be amended in the Senate.

APPURTENANCES (from late Lat. appertinentia, from appertinere, to appertain), a legal term for what belongs to and goes with something else, the accessories or things usually conjoined with the substantive matter in question.

APRAKSIN, THEDOR MATVYEEVICH (1671-1728), Russian soldier, began life as one of the pages of Tsar Theodore III., after whose death he served the little tsar Peter in the same capacity. The playf ellowship of the two lads resulted in a lifelong friendship. In his twenty-first year Apraksin was appointed governor of Archangel, then the most important commercially of all the Russian provinces, and built ships capable of weathering storms, to the great delight of the tsar. He won his colonelcy at the siege of Azov (1696). Ini7oohe was appointed chief of the admiralty,

in which post (from 1700 to 1706) his unusual technical ability was of great service. While Peter was combating Charles XII., Apraksin was constructing fleets, building fortresses and havens (Taganrog). In 1 707 he was transferred to Moscow. In 1708 he was appointed commander-in-chief in Ingria, to defend the new capital against the Swedes, whom he utterly routed, besides capturing Viborg in Carelia. He held the chief command in the Black Sea during the campaign of the Pruth (1711), and in 1713 materially assisted the conquest of Finland by his operations from the side

of the sea. In 1719-1720 he personally conducted the descents upon Sweden, ravaging that country mercilessly, and thus extorting the peace of Nystad, whereby she surrendered the best part of her Baltic provinces to Russia. For these great services he was made a senator and admiral-general of the empire. His last expedition was to Reval in 1726, to cover the town from an anticipated attack by the English government, with whom the relations of Russia at the beginning of the reign of Catharine I. were strained almost to breaking-point. Though frequently threatened with terrible penalties by Peter the Great for his incurable vice of peculation, Apraksin, nevertheless, contrived to save his head, though not his pocket, chiefly through the media- tion of the good-natured empress, Catharine, who remained his friend to the last, and whom he assisted to place on the throne on the death of Peter. Apraksin was the most genial and kind-hearted of all Peter's pupils. He is said to have never made an enemy. He died on the 10th of November 1728.

See R. Nisbet Bain, The Pupils of Peter the Great (London, 1897).

(R. N. B.)

APRICOT (from the Lat. praecox, or praecoquus, ripened early, coquere, to cook, or ripen; the English form, formerly " apricock " and " abrecox," comes through the Fr. abricot, from the Span, albaricoque, which was an adaptation of the Arabic al-burquk, itself a rendering of the late Gr. TrpeKOKua or irpaiicbKiov , adapted from the Latin; the derivation from in aprico coctus is a mere guess), the fruit of Prunus armeniaca, also called Armeniaca vulgaris. Under the former name it is regarded as a species of the genus to which the plums belong, the latter establishes it as a distinct genus of the natural order Rosaceae. The apricot is, like the plum, a stone fruit, cultivated generally throughout temperate regions, and used chiefly in the form of preserves and in tarts. The tree has long been cultivated in Armenia (hence the name Armeniaca); it is a native of north China and other parts of temperate Asia. It flowers very early in the season, and is a hardy tree, but the fruit will scarcely ripen in Britain unless the tree is trained against a wall. A great number of varieties of the apricot, as of most cultivated fruits, are distinguished by cultivators. The kernels of several varieties are edible, and in Egypt those of the Musch-Musch variety form a considerable article of commerce. The French liqueur Eau de noyaux is prepared from bitter apricot kernels. Large quantities of fruit are imported from France into the United Kingdom.

The apricot is propagated by budding on the mussel or common plum stock. The tree succeeds in good well-drained loamy soil, rather light than heavy. It is usually grown as a wall tree, the east and west aspects being preferred to the south, which induces mealiness in the fruit, though in Scotland the

best aspects are necessary. The most usual and best mode of training is the fan method. The fruit is produced on shoots of the preceding year, and on small close spurs formed on the two-year-old wood. The trees should be planted about 20 ft. apart. The summer pruning should begin early in June, at which period all the irregular fore- right and useless shoots are pinched off; and, shortly afterwards, those which remain are fastened to the wall. At the winter pruning all branches not duly furnished with spurs and fruit buds are removed. The young bearing shoots are moderately pruned at the points, care being, however, taken to leave a terminal shoot or leader to each branch. The most common error in the pruning of apricots is laying in the bearing shoots too thickly; the branches naturally diverge in fan training, and when they extend so as to be about 1 5 in. apart, a fresh branch should be laid in, to be again subdivided as required. The blossoms of the apricot open early in spring, but are more hardy than those of the

peach; the same means of protection when necessary may be employed for both. If the fruit sets too numerously, it is thinned out in June and in the beginning of July, the later thinnings being used for tarts. In the south of England, where the soil is suitable, the hardier sorts of apricot, as the Breda and Brussels, bear well as standard trees in favourable seasons. In such cases the trees may be planted from 20 to 25 ft. apart.

The ripening of the fruit of the apricot is accelerated by culture under glass, the trees being either planted out like peaches or grown in pots on the orchard-house system. They must be very gently excited, since they naturally bloom when the spring temperature is comparatively low. At first a maximum of 40 only must be permitted; after two or three weeks it may be raised to 45°, and later on to 50 and 55 , and thus continued till the trees are in flower, air being freely admitted, and the minimum or night temperature ranging from 40 to 45 . After the fruit is set the temperature should be gradually raised, being kept higher in clear weather than in dull. When the fruit has stoned, the temperature may be raised to 6o° or 65 by day and 60° by night; and for ripening off it may be allowed to reach 70 or 8o° by sun heat.

The Moorpark is one of the best and most useful sorts in cultiva- tion, and should be planted for all general purposes; the Peach is a very similar variety, not quite identical; and the Hemskerk is also similar, but hardier. The Large Early, which ripens in the end of July and beginning of August, and the Kaisha, a sweet-kemelled variety, which ripens in the middle of August, are also to be recommended. For standard trees in favourable localities the Breda and Brussels may be added.

APRIES ('A?rpi7js), the name by which Herodotus (ii. 161) and Diodorus (i. 68) designate Uehabre", OvaQpris (Pharaoh- Hophra), the fourth king

(counting from Psammetichus I.) of the twenty-sixth Egyptian dynasty. He reigned from 589 to 570 b.c. See Egypt and Amasis.

APRIL, the second month of the ancient Roman, and the fourth of the modern calendar, containing thirty days. The derivation of the name is uncertain. The traditional etymology from Lat. aperire, " to open," in allusion to its being the season when trees and flowers begin to " open," is supported by comparison with the modern Greek use of araiˆts (opening) for spring. This seems very possible, though, as all the Roman months were named, in honour of divinities, and as April was sacred to Venus, the Festum Veneris ei Fortunae Virilis being held on the first day, it has been suggested that Aprilis was originally her month Aphrilis, from her Greek name Aphrodite. Jacob Grimm suggests the name of a hypothetical god or hero, A per or Aprus. On the fourth and the five following days, games (Ludi Megalenses) were celebrated in honour of Cybele; on the fifth there was the Festum Fortunae Publicae; on the tenth (?) games in the circus, and on the nineteenth equestrian combats, in honour of Ceres; on the twenty-first — which was regarded as the birthday of Rome — the Vinalia urbana, when the wine of the previous autumn was first tasted; on the twenty- fifth, the Robigalia, for the averting of mildew; and on the twenty-eighth and four following days, the riotous Floralia. The Anglo-Saxons called April Osler-monath or Eostur-monalh, the period sacred to Eostre or Ostara, the pagan Saxon goddess of spring, from whose name is derived the modern Easter. St George's day is the twenty- third of the month; and St Mark's Eve, with its superstition that the ghosts of those who are doomed to die within the year will be seen to pass into the church, falls on the twenty-fourth. In China the symbolical ploughing of the earth by the emperor and princes of the blood takes place in their third month, which frequently corresponds to our April; and in Japan the feast of Dolls is celebrated in the same month. The " days of April " (journees d'avril) is a name appropriated in French history to a series of insurrections at Lyons, Paris and elsewhere, against the government of Louis Philippe in 1834, which led to violent repressive measures, and to a famous trial known as the proces d'avril.

See Chambers's Book of Days; Grimm's Geschichte der deutschen Sprache, Cap. " Monate""; also April-Fools' Day.

APRIL-FOOLS' DAY, or All-Fools' day, the name given to the 1 st of April in allusion to the custom of playing practical jokes on friends and neighbours on that day, or sending them on fools' errands. The origin of

this custom has been much disputed, and many ludicrous solutions have been suggested, e.g. that it is a farcical commemoration of Christ being sent from Annas to Caiaphas, from Caiaphas to Pilate, from Pilate to Herod, and from Herod back again to Pilate, the crucifixion having taken place about the 1st of April. What seems certain is that it is in some way or other a relic of those once universal festivities held at the vernal equinox, which, beginning on old New Year's day, the 25 th of March, ended on the 1st of April. This view gains support from the fact that the exact counterpart of April-fooling is found to have been an immemorial custom in India. The festival of the spring equinox is there termed the feast of Huli, the last day of which is the 31st of March, upon which the chief amusement is the befooling of people by sending them on fruitless errands. It has been plausibly suggested that Europe derived its April-fooling from the French. They were the first nation to adopt the reformed calendar, Charles IX. in 1564 decreeing that the year should begin with the 1st of January. Thus the New Year's gifts and visits of felicitation which had been the feature of the 1st of April became associated with the first day of January, and those who disliked the change were fair butts for those wits who amused themselves by sending mock presents and paying calls of pretended ceremony on the 1st of April. Though the 1st of April appears to have been anciently observed in Great Britain as a general festival, it was apparently not until the beginning of the 18th century that the making of April-fools was a common custom. In Scotland the custom was known as " hunting the gowk," i.e. the cuckoo, and April-fools were " April-gowks," the cuckoo being there, as it is in most lands, a term of contempt. In France the person befooled is known as poisson d'avril. This has been explained from the association of ideas arising from the fact that in April the sun quits the zodiacal sign of the fish. A far more natural explanation would seem to be that the April fish would be a young fish and therefore easily caught.

A PRIORI (Lat. a, from, prior, prius, that which is before, precedes), (1) a phrase used popularly of a judgment based on general considerations in the absence of particular evidence; (2) a logical term first used, apparently, by Albert of Saxony (14th century), though the theory which it denotes is as old as Aristotle. In the order of human knowledge the particular facts of experience come first and are the basis of generalized laws or causes (the Scholastic notiora nobis) ; but in the order of nature the latter rank first as the self-existent, fundamental truths of existence (notiora naturae). Thus to Aristotle the a priori argument is from law or cause to effect, as opposed to what we call a posteriori (posterior, subsequent, derived), from effect to cause. Since Kant the two phrases have become purely adjectival (instead of adverbial) with a technical controversial sense, closely allied to the Aristotelian, in relation to knowledge and judgments generally. A priori is applied to judgments which are regarded as independent of experience, and

belonging to the essence of thought; a posteriori to those which are derived from particular observations. The distinction is analogous to that between analysis and synthesis, deduction and induction (but there may be a synthesis of a priori judgments, cf. Kant's " Synthetic Judgment a priori "). Round this distinction a rather barren controversy has raged, and almost all modern philosophers have labelled themselves either " Intuitionalist " (a priori) or " Empiricist " (a posteriori) according to the view they take of knowledge. In fact, however, the rival schools are generally arguing at cross purposes; there is a knowledge based on particulars, and also a knowledge of laws or causes. But the two work in different spheres, and are complementary. The observation of isolated particulars gives not necessity, but merely strong probability; necessity is purely intellectual or " transcendental." If the empiricist denies the intellectual element in scientific knowledge, he must not claim absolute validity for his conclusions; but he may hold against the

intuitionalist that absolute laws are impossible to the human intellect. On the other hand, pure a priori knowledge can be nothing more than form without content (e.g. formal logic, the laws of thought). The simple fact at the bottom of the contro- versy is that in all empirical knowledge there is an intellectual element, without which there is no correlation of empirical data, and every judgment, however simple, postulates a correlation of some sort if only that between the predicate and its contra- dictory.

APRON (a corruption arising from a wrong division of " a napron " into " an apron," from the Fr. naperon, napperon, a diminutive of nappe, Lat. mappa, a napkin), an article of costume used to protect the front of the clothes. It forms part of the ceremonial dress of Freemasons. The " apron " worn by church dignitaries is a shortened cassock (q.v.). The word has many technical uses, as for the protecting slope in front of the sill of dock-gates, or at the foot of weirs.

APSARAS, in Hindu mythology, a female spirit of the clouds and waters. In the Rig-Veda there is one Apsaras, wife of Gandharva; in the later scriptures there are many Apsaras who act as the handmaidens of Indra and dance before his throne. They are able to change their form, and specially rule over the fortunes of gaming. One of their duties is to guide to paradise the heroes who fall in battle, whose wives they then become. They are distinguished as daivika ("divine") or laukika ("worldly").

APSE (Gr. axf/is, a fastening, especially the felloe of a wheel; Lat. absis), in architecture, a semicircular recess covered with a hemispherical vault. The term is applied also to the termina- tion to the choir, transept or aisle of any church which is either semicircular or polygonal in plan, whether vaulted or covered with a timber roof; a church is said to be "apsidal"

when it terminates in an apse.

The earliest example of an apse is found in the temple of Mars Ultor at Rome (2 B.C.), and it formed afterwards the favourite feature terminating the rear of any temple, and one which gave importance to the statue of the deity to whom the temple was dedicated. Its use by the Romans was not confined to the temples, as it is found in the palaces on the Palatine Hill, the great Thermae (Baths) and other monuments. In the civil basilicas the apse was screened off by columns, and constituted the court of justice. In the Ulpian (Trajan's) Basilica the apses at each end were of such great dimensions as to come better under the definition of hemicycles (q.v.). In these apses the floor was raised, and had an altar placed in the centre of its chord, where sacrifices were made prior to the sittings. The only other two Roman basilicas in which the semicircular apse can still be traced are that commenced by Maxentius and completed by Constantine at Rome and the basilica at Trier (Treves).

In the earliest Christian basilica, St Peter's at Rome, built 330 A.D., the apse, 57 ft. in diameter, raised above the confessio or crypt, was placed at the west end of the church. This orient- ation was originally followed in the churches of St Paul and St Lawrence (S. Lorenzo fuori le Mura), both outside the walls of Rome, and is found in most of the churches at Rome. On the other hand, in the Byzantine church, the apse was built at the east end of the church.

During the reign of Justin the Second (a.d. 565-574), owing to a change in the liturgy, two more apses were added, one on each side of the central apse. These in the Greek Church were provided not to hold altars but for ceremonial purposes. One of the earliest examples is found in the church of St Nicholas at Myra of the 6th century, and the basilica erected in the great court of the temple at Baalbek shows the triple apse. The earliest example in Rome is found in the church of Sta Maria in Cosmedin (772-795), built probably by Greek craftsmen, who had been exiled by the Iconoclasts. Other triapsal choirs are found in the cathedral of Parenzo (542 a.d.), in St Mark's, Venice, in Sta Fosca and the Duomo at Torcello, and in numerous examples throughout Italy and Germany. In central Syria there is one example only, at Kalat Seman, where the side apses were a later addition.

There is one important distinction to be drawn between the Byzantine and the Latin apses; they are both semicircular internally, but externally the

former are nearly always poly- gonal. It follows, therefore, that in those churches in Italy where the apse is polygonal externally, it is a sign of direct Byzantine influence. This is found in St Mark's, Venice; Sta Fosca, Torcello; Murano; nearly all the churches at Ravenna; and in the Crusaders' churches throughout Syria.

In the Coptic church in Egypt we find other characteristics; in the churches of the Red and White Monasteries, attributed

to St Helena, an unusual depth is given to the apse, in the walls of which niches are sunk; in the church of St John at Antinoe there are no fewer i than seven. Similar niches are found in the apses of St Mark's, Venice, built in a.d. 828, it is said in imitation of

Apse of the White Monastery.

St Mark's in Alexandria,

to receive the relics of St Mark brought over from there.

In a large number of the apses in the Coptic churches the seats round the apse with the bishop's throne in the centre are still preserved; of these the' best examples are at Abu Sargah, Al "Adra and Abu-s-Sifain. Unfortunately there are no remains of the fittings in the tribunes of the ancient Roman basilicas, but those in St Peter's at Rome, which were probably copied from them, are recorded in drawings, there being two or three rows of stone seats with the papal throne in the centre. It is possible also that some may still exist in the other early Christian basilicas at Rome, but there have been so many changes that it is not possible to trace them. In the cathedral of Parenzo in Istria (a.d. 532-535), the hemicycle of marble seats for the clergy with the episcopal chair in the centre still exists. A similar arrangement is found in the apse of the church of the 6th century attached to the church of St Helena in the island of Paros, where there are eight steep grades of semicircular stone seats with the bishop's chair in the centre. The aspect of the interior of this apse has in consequence very much the appearance of a Roman theatre. A third example, better known, exists at Torcello, with six concentric seats rising one above the other, and in the centre the episcopal chair with a flight of thirteen steps down in front of it.

In the basilica at Bethlehem, the east end of which was reconstructed probably in the 5th century, apses of similar dimensions to the eastern apse were built at the north and south end of the transept. The same disposition is found in the Coptic churches of the Red and White Monasteries just referred to, in the church of St Elias at Salonica (c. 1012), the cathedral of Echmiadzin in Armenia, at Vatopedi, Mt. Athos, and some other Byzantine

churches. An early example in France exists in the church of Germigny-des-Pres on the Loire (806; rebuilt 1868), where the three apses are horseshoe on plan, and the same is found in the church at Oberzell in the island of Reichenau, Lake of Constance, except that the eastern apse there is square. Small examples also are found at Querqueville and at St Wan- drille near Caudebec, both in Normandy, but the finest develop- ment takes place in the church of St Maria im Capitol at Cologne, where the aisles are carried round both the northern and southern apses. The same feature exists in the cathedral of Tournai in Belgium and the churches at Cambrai, Soissons and Valenciennes (the last destroyed at the Revolution) in France, and also in the cathedrals of Como and of Pisa in Italy. Without aisles, there are examples in the churches of the Apostles and of St Martin at Cologne; St Quirinus at Neuss; at Roermond; St Cross, Breslau; the cathedral of Bonn; and, at a later date, in the Marienkirche at Trier; S. Elizabeth at Marburg; the church of Sta Maria-del-Fiore at Florence; and the cathedral of Parma.

In consequence of a change made in the orientation of apses

in the 6th or 7th century, others were subsequently added at the west end of existing churches, and this is considered to have been the case at Canterbury; but in the German churches sometimes apses were built from the first at both ends, such as are shown on the manuscript plan of St Gall, of the 9th century. Western apses exist at Gernrode; Driibeck; Huyseburg; the Obermiinster of Regensburg; St Godehard in Hildesheim; the cathedrals of Worms and Trier; the Abbey church of Laach; the Minster at Bonn; and in St Pietro-in-Grado near Pisa.

The triapsal churches, to which we have referred, are those in which the side apses form the termination of the side aisles; but where there are transepts, the aisles are sometimes not continued beyond them, and the expansion of the transept to north and south gives more ample space for apses; of these there are many examples, as in the Abbey church of Laach in Germany; at Romsey; Christchurch, Hants; Gloucester, Ely, Norwich and Canterbury cathedrals, in England; and at St Georges de Bosch erville in France; sometimes there being space for two apses on each side.

In the beginning of the 13th century in France, the apses became radiating chapels outside the choir aisle, henceforth known as the chevet. These radiating chapels would seem to have been suggested in Norwich and Canterbury cathedrals, but the feature is essentially a French one and in England is found only in Westminster Abbey, into which it was intro- duced by Henry III., to whom the chevets of Amiens, Beauvais and Reims were probably well known. (R. P.'S.)

APSE and APSIDES, in mechanics, either of the two points of an orbit

which are nearest to and farthest from the centre of motion. They are called the lower or nearer, and the higher or more distant apsides respectively. The " line of apsides " is that which joins them, forming the major axis of the orbit.

APSINES of Gadara, a Greek rhetorician, who flourished during the 3rd century a.d. After studying at Smyrna, he taught at Athens, and gained such a reputation that he was raised to the consulship by the emperor Maximinus (235-238). He was the friend of Philostratus, the author of the Lives of the Sophists, who speaks of his wonderful memory and accuracy.- Two rhetorical treatises by him are extant: Tex"V froTopudi, a handbook of rhetoric greatly interpolated, a considerable por- tion being taken from the Rhetoric of Longinus; and a smaller work, Tlepl &txW-"'U!imvwv ■Kpo^Kijixa.Twv, on Propositions main- tained figuratively.

Editions by Bake, 1849; Spengel-Hammer in Rhetores Graeci, ii. (1894) '• see a l so Hammer, De Apsine Rhetore (1876) ; Volkmann, Rhetorik der Griechen und R'dmer (1885).

APT, a town of south-eastern France, in the department of Vaucluse, on the left bank of the Coulon, 41 m. E. of Avignon by rail. Pop. (1906) 4990. The town was formerly surrounded by massive ancient walls, but these have now been for the most part replaced by boulevards; many of its streets are narrow and irregular. The chief object of interest is the church of Sainte-Anne (once the cathedral), the building of which was begun about the year 1056 on the site of a much older edifice, but not completed until the latter half of the 17th century. Many Roman remains have been found in and near the town. A fine bridge, the Pont Julien, spanning the Coulon below the town, dates from the 2nd or 3rd century. A tribunal of first instance and a communal college are the chief public institutions. The chief manufactures are silk, confectionery and earthenware; and there is besides a considerable trade in fruit, grain and cattle. Apt was at one time the chief town of the Vulgientes, a Gallic tribe; it was destroyed by the Romans about 125 B.C. arid restored by Julius Caesar, who conferred upon it the title Apia Julia; it was much injured by the Lombards and the Saracens, but its fortifications were rebuilt by the counts of Provence. The bishopric, founded in the 3rd century, was suppressed in 1790.

APTERA (Greek for " wingless "), a term in zoological classi- fication applied by Linnaeus to various groups of wingless arthro- pods, including some of the insects, the centipedes, the millipedes, the Arachnida (scorpions, spiders, &c.) and the Crustacea. In

modern zoology the term has become restricted to the lowest order of the class Hexapoda or true insects. This order includes the bristle-tails and the springtails.

Many wingless insects— such as lice, fleas and certain ear- wigs and cockroaches — are placed in various orders together with winged insects to which they show evident relationships. In such cases the absence of wings must be regarded as secondary — due to a parasitic or other special manner of life. But the bristle-tails and springtails, which form the modern order Aptera, are all without any trace of wings, and, on account of

several remarkable archaic characters which they ex- hibit, there is reason for believing that they are primitively wingless — that they represent an early off- shoot which sprang from the ancestral stock of the Hexapoda before organs of flight had been acquired by the class.

Characters. — In addition to the complete absence of wings and of metamor- phosis, the Aptera are characterized by peculiar elongate mandibles (figs. 1, ~Mn.; 2, 4), with toothed apex and sub-apical grind- ing surface, like those of certain Crustacea; by the presence between" the mandibles and maxillae of a pair of appendages (superlinguae or maxil- lulae), fig. 1, Mxl., which are absent or vestigial in all other insects; and, in most genera, by the presence in the adult of abdominalappendagesused for locomotion, these latter varying in number from one to nine pairs. Among peculiarities of the internal organs the segmental arrangement of the ovaries in mOst members of the order is noteworthy. Many Aptera are covered with flattened scales like those of moths.

Classification. — The Aptera are divided into two divergent sub-orders, the Tkysanura (q.v.) or bristle-tails, and the Col- lembola or springtails. Thysanura. — The bristle- tails have an abdomen of eleven segments, the tenth usually carrying a pair of long many-jointed tail-feelers (cerci, fig. 1, x.); sometimes a median, jointed tail-appendage is also present. To these feelers the popular name is due. There may also be abdominal appendages — in the form of simple unjointed stylets (fig. 1, ii.-ix.), accompanied by paired eversible sacs, probably respiratory in function — on eight (or fewer) other abdominal segments. The head of a bristle-tail carries a pair of compound eyes and a pair of elongate many-jointed feelers.

The air-tube system is developed in varying degree in different bristle-tails, the number of pairs of spiracles being three (Cam- podea), nine (MachiHs), ten (Lepisma), or eleven (Japyx).

Four families of Thysanura are usually recognized. In the

From Knowledge.

Fig. 1. — A typical Thysanuran

(Machilis maritima). Female, ventral

view.

Mx l , Mx?, 1st and 2nd maxillae.

ii.x, Appendages on 2nd to 10th ab dominal segments. The ever- sible sacs on the abdominal segments are shown, some protruded and some retracted.

Ovp, Ovipositor.

Mn, Mandible, and Mxl. maxillula, dissected out of head.

Machilidae and Lepismidae (these two families are known as the Ectotrophi) the maxillae are like those of typical biting insects, and there is a median tail-bristle in addition to the paired cerci; while in the Campodeidae and Japygidae (which form the group Entotrophi) the jaws are apparently sunk in the head, through a deep inpushing at the mouth, and there is no median tail-bristle. The cerci in Japyx are not, as usual, jointed feelers, but strong, curved appendages forming a forceps as in earwigs.

Collembola. — In springtails, or Collembola, the jaws are sunk into the head, as in the entotrophous Thysanura; the head carries a pair of feelers with not more than six (usually four) segments, and there are eight (or fewer) distinct simple eyes on each side of the head (fig. 2, 1, 2). These are in some genera

From Carpenter, Proc. R. Dub. Soc. vol. xi.

Fig. 2. — Structure of Collembola.

1. Isotoma hibernica. Side view.

2. ,, Ocelli and post-antennal organ of right side.

with

3. ,, Tip of terminal antennal segment

antennal organ.

4. „ Mandible.

5. ,, Tip of left dens with mucro. Outer view

6. ,, Hind-foot with claws. X 240.

7. Entomobrya anomala. Catch.

like the single elements (ommatidia) of a compound insect eye, in others like simple ocelli. The abdomen consists of six segments only. The first of these usually carries a ventral tube, furnished with paired eversible sacs which assist the insects in walking on smooth surfaces, and perhaps serve also as organs for breathing. From the researches of V. Willem it appears that the viscid fluid which causes the adherence of the ventral tube is secreted by a pair of glands in the head whose ducts open into a superficial groove leading from the second maxillae backward to the tube on the first abdominal segment. The third abdominal segment usually carries a pair of short appendages whose basal segments are fused together; this is the " catch " (fig. 2, 7), whose function is to hold in place the " spring," which is formed by the fourth pair of abdominal appendages — also with fused basal segments. In most Collembola the spring appears to belong to the fifth abdominal somite, but Willem, by study of the muscles, has shown that it really belongs to the fourth. The fused basal segments of the appendages form the " manubrium " of the spring, which carries the two " dentes " (usually elongate

and flexible) , each with a " mucro " at its tip (fig. 2,5). The fifth abdominal segment is the genital, and the sixth the anal somite.

The spring serves the Collembola which possess it as an efficient leaping-organ (see Springtail). But in some genera it is greatly reduced and in many quite vestigial.

Most springtails are without air-tubes, and breathe through the general cuticle of the body. But in one family (Sminthuridae) a spiracle, opening on either side between the head and the prothorax, leads to a branching system of air-tubes. The Sminthuridae are further characterized by the globular abdomen, which shows but little external trace of segmentation, and by the well-developed spring.

In the Entomobryidae the body is elongate and clearly seg- mented, but the dorsal region (tergum) of the prothorax is much reduced and the head

downwardly directed; the spring is well developed. In the Achorutidae the head is forwardly directed, the tergum of the prothorax conspicuous, and the spring small or vestigial.

In many genera of springtails a curious post-antennal organ, consisting of sensory structures (often complex in form) sur- rounded by a firm ring, is to be noticed on the cuticle of the head between the eyes and the feelers. It may be of use as an organ of smell. Other sensory organs occur on the third and fourth anten- nal segments in the Achorutidae and, Entomobryidae (fig. 2, 3).

Distribution and Habits. — The Aptera are probably the most widely distributed of all insects. Among the bristle-tails we find the genus Machilis, represented in Europe (including the Faeroe Islands) and in Chile; while Campodea lives high on the mountains and in the deepest caves. The springtails have even a wider distribution. The genus Isotoma, for example, has some of its numerous species in regions so remote as Alaska, Franz Josef Land, the Sandwich Islands, the South Orkneys, Graham Land, Kerguelen and South Victoria Land. As it is unlikely that these delicate insects could be transported across sea- channels, their wide and discontinuous range suggests both their great antiquity and the former existence of continental tracts over which they may have travelled to their present stations.

Springtails and bristle-tails live in damp concealed places — under stones or tree-bark, in moss, and in the decaying vegetable or animal matter which serves as food for most of them. Some species, however, eat fresh plant-tissues. A species of bristle-tail {Machilis maritima) and quite a number of springtails haunt the sea-coast at or below high-water mark. In such localities many thousands of individuals may sometimes be found associ- ated together. The insect fauna of limestone caves both in Europe and North America is largely composed of Aptera, especially Collembola.

Geological History. — A supposed Thysanuran from the Silurian of New Brunswick has been described by G. F. Matthew, and another genus from the French Carboniferous by C. Brongniart. Not till the Tertiary do we find remains of Aptera in any quantity, species both of living and extinct genera being represented in the amber.

Development. — The embryonic development of several genera of Aptera, which has been carefully studied, will be more suitably described in comparison with that of other insects than here (see Hexapoda).

Bibliography. — The modern study of the Aptera may be said to date from the classical memoirs of T. Tullberg, " Sveriges Podu- rider," in Kongl.

Svensk Vetensk. Akad. Handl. x., 1872, and Sir J. Lubbock (Lord Avebury), " Monograph of the Collembola and Thysanura/' Ray_ Society, 1873. ln these, full references to the older literature will be found. Subsequently our knowledge of the Thysanura has been markedly advanced by J. T. Oudemans, Bijdrage tot de Kennis den Thysani-./a en Collembola (Amsterdam, 1888); B. Grassi. who published between 1885 and 1889 a series of memoirs entitled " I progenitori dei Miriapodi e degli Insetti," in the Atti Accad. di Sciens. Nat. Catania, and the Memor. R. Accad. dei Lincei; and V. WiMem, whose " Recherches sur les Collemboles et les Thy- sanoures," in Mem. Cour. Acad. Roy. Belgique, lviii., 1900, are indispensable to the student. In addition to this work of Willem, valuable anatomical papers on Collembola have been published by H. J. Hansen (Zoo/. Anz. xvi., 1893), J. W. Folsom (Bull. Mus. Comp. Anal. Han: xxxv., 1899), C. Bonier (Zool. Anz. win.. 1900), and K. Absolon (Zool. Anz. xxiii. and xxiv., 1900, 1901), the two

latter writers having paid especial attention to the peculiar post antennal and antennal sense-organs of springtails. Absolon has also written on the Collembola of caves. These writers, with H. Schott, C. Schaffer and others, have published many systematic papers on Collembola, as has F. Silvestri on Thysanura. British species are mentioned in Lubbock's monograph ; for recent additions see G. H. Carpenter and W. Evans (Proc. R. Phys. Soc. Edinb. xiv., 1899, and xv., 1903). (G. H. C.)

APTERAL (from the Gr. oirrepos, wingless, a-, privative and irrepov, a wing), an architectural term applied to amphiprostyle temples which have no columns on the sides; in the Ionic temple on the Acropolis at Athens known as Nike Apteros, the adjective is used, not as applying to the goddess of victory but to the absence of any peristyle on the sides.

APTIAN (Fr. Aplien, from Apt in Vaucluse, France), in geology, the term introduced in 1843 by A. d'Orbigny {Pal. France Cret. ii.) for the upper stage of the Lower Cretaceous rocks. In England it comprises the Lower Greensand and part of the Speeton beds; in France it is divided into two sub-stages, the I6wer, " Bedoulian," of Bedoule in Provence, with Hoplites deshayesei and Ancyloceras Mather oni; and an upper, " Gar- gasian," from Gargas near Apt, with Hoplites fur catus (Dufrenoyi) and Phylloceras Guettardi. To this stage belong the Toucasia limestone and Orbitolina marls of Spain; the Schrattenkalk (part) of the Alpine and Carpathian regions; and the Terebrirostra limestone of the same area. Parts of the Flysch of the eastern Alps, the Biancone of Lombardy, and argile scagliose of Emilia, are of Aptian age; so also are the " Trinity Beds " of North America. Deposits of bauxite occur in the Aptian hippurite lime- stone at Les Baux near Aries, and in the Pyrenees. The Aptian rocks are generally clays, marls and green glauconitic sands with occasional limestones. (See Greensand and

Cretaceous.)

APULEIUS, LUCIUS, Platonic philosopher and rhetorician, was born at Madaura in Numidia about a.d. 125. As the son of one of the principal officials, he received an excellent education, first at Carthage and subsequently at Athens. After leaving Athens he undertook a long course of travel, especially in the East, principally with the view of obtaining initiation into religious mysteries. Having practised for some time as an advocate at Rome, he returned to Africa. On a journey to Alexandria he fell sick at Oea (Tripoli), where he made the acquaintance of a rich widow, Aemilia Pudentilla, whom he subsequently married. The members of her family disapproved of the marriage, and indicted Apuleius on a charge of having gained her affections by magical arts. He easily established his innocence, and his spirited, highly entertaining, but inordinately long defence (Apologia or De Magia) before the proconsul Claudius Maximus is our principal authority for his biography. From allusions in his subsequent writings, and the mention of him by St Augustine, we gather that the remainder of his prosperous life was devoted to literature and philosophy. At Carthage he was elected provincial priest of the imperial cult, in which capacity he occupied a prominent position in the provincial council, had the duty of collecting and managing the funds for the temples of the cult, and the superintendence of the games in the amphitheatre. He lectured on philosophy and rhetoric, like the Greek sophists, apparently with success, since statues were erected in his honour at Carthage and elsewhere. The year of his death is not known.

The work on which the fame of Apuleius principally rests has little claim to originality. The Metamorphoses or Golden Ass (the latter title seems not to be the author's own, but to have been bestowed in compliment, just as the Libri Rerum Quoti- dianarum of Gaius were called Aurei) was founded on a narrative in the Metamorphoses of Lucius of Patrae, a work extant in the time of Photius. From Photius's account (impugned, however, by Wi eland and Courier), this book would seem to have consisted of a collection of marvellous stories, related in an inartistic fashion, and in perfect good faith. The literary capabilities of this particular narrative attracted the attention of Apuleius's contemporary, Lucian, who proceeded to work it up in his own manner, adhering, js Photius seems to indicate, very closely to the original, but giving it a comic and satiric turn. Apuleius

followed this rifacimento, making it, however, the groundwork of an elaborate romance, interspersed with numerous episodes, of which the

beautiful story of Cupid and Psyche is the most celebrated, and altering the denouement to suit the religious revival of which he was an apostle.

The adventures of the youthful hero in the form of an ass are much the same in both romances, but in Apuleius he is restored to human shape by the aid of Isis, into whose mysteries he is initiated, and finally becomes her priestess. The book is a remarkable illustration of the contemporary reaction against a period of scepticism, of the general appetite for miracle and magic, and of the influx of oriental and Egyptian ideas into the old theology. It is also composed with a well-marked literary aim, defined by Kretzschmann as the emulation of the Greek sophists, and the transplantation of their tours de force into the Latin language. Nothing, indeed, is more characteristic of Apuleius than his versatility, unless it be his ostentation and self- confidence in the display of it. The dignified, the ludicrous, the voluptuous, the horrible, succeed each other with bewildering rapidity; fancy and feeling are everywhere apparent, but not less so affectation, meretricious ornament, and that effort to say everything finely which prevents anything being said well. The Latinity has a strong African colouring, and is crammed with obsolete words, agreeably to the taste of the time. When these defects are mitigated or overlooked, the Golden Ass will be pro- nounced a most successful work, invaluable as an illustration of ancient manners, and full of entertainment from beginning to end. The most famous and poetically beautiful portion is the episode of Cupid and Psyche, adapted from a popular legend of which traces are found in most fairy mythologies, which explains the seeming incongruity of its being placed in the mouth of an old hag. The allegorical purport he has infused into it is his own, and entirely in the spirit of the Platonic philosophy. Don Quixote's adventure with the wine-skins, and Gil Bias's captivity among the robbers, are palpably borrowed from Apuleius; and several of the humorous episodes, probably current as popular stories long before his time, reappear in Boccaccio.

Of Apuleius's other writings, the Apology has been already mentioned. The Florida (probably meaning simply " anthology," without any reference to style) consists of a collection of excerpts from his declamations, ingenious but highly affected, and in general perfect examples of the sophistical art of saying nothing with emphasis. They deal with the most varied subjects, and are intended to exemplify the author's versatility. The pleasing little tract On the God of Socrates expounds the Platonic doctrine of beneficent daemons, an intermediate class between gods and men. Two books on Plato (De Platone et Ejus Dogmate) treat of his life, and his physical and ethical philosophy; a third, treating of logic, is generally considered spurious. The De Mundo is an adaptation of the Ilepi Ko

The character of Apuleius, as delineated by himself, is attrac- tive; he

appears vehement and passionate, but devoid of rancour; enterprising, munificent, genial and an enthusiast for the beautiful and good. His vanity and love of display are conspicuous, but are extenuated by a genuine thirst for know- ledge and a surprising versatility of attainments. He prided himself on his proficiency in both Greek and Latin. His place in letters is accidentally more important than his genius strictly entitles him to hold. He is the only extant example in Latin literature of an accomplished sophist in the good sense of the term. The loss of other ancient romances has secured him a peculiar influence on modern fiction; while his chronological position in a transitional period renders him at once the evening star of the Platonic, and the morning star of the Neo-Platonic philosophy.

Bibliography. — Complete works: Editio princeps, ed. Andreas (1469); Oudendorp (1786-1823); Hildebrand (1842); Helm (1905 et seq.) ; P. Thomas (vol. iii. 1908). Metamorphoses, Eyssenhardt (1869) , van der Vliet (1897). Psyche et Cupido, Jahn-Michaelis (1883) ; Beck (1902). Apologia, I. Casaubon (1594); Kriiger (1864); (with the Florida), van der Vliet (1900). Florida, Kriiger (1883). De Deo Socratis, Buckley (1844), Lutjohann (1878). De Platone et ejus Dog- mate, Goldbacher (1876) (including De Mundo and De Deo Socratis). For the relation between. Lucian's "Oms and the Metamorphoses of Apuleius, see Rohde, fiber Lucians Schrift Aovmh (1869), and Burger, De Lucio Patrensi (1887). On the style of Apuleius consult Kretzschmann, De Latinitate L. Apulei (1865), and Koziol, Der Stil des A. (1872). There is a complete English translation of the works of Apuleius in Bohn's Classical Library. The translations and imitations of the Golden Ass in modern languages are numerous: in English, by Adlington, 1566 and later eds. (reissued in the Tudor translations and Temple Classics), Taylor (1822) (including the philosophical works), Head (1851). Of the Cupid and Psyche episode there are recent translations by Robert Bridges (1895) (in verse), Stuttaford (1903) ; and it is beautifully introduced by Walter Pater into his Marius the Epicurean. This episode has afforded the subject of a drama to Thomas Heywood, and of narrative poems to Shakerley Marmion, Mrs. Tighe, and William Morris (in the Earthly Paradise).

APULIA (sometimes Appulia in manuscripts but never in inscriptions), the district inhabited in ancient times by the Apuli. Strictly a Samnite tribe (see Samnites) settled round Mount Garganus on the east coast of Italy (Strabo vi. 3. n), the Apuli mingled with the Iapygian tribes of that part of the coast (Dauni, Peucetii, Poediculi) who, like the Messapii, had come from Illyria, so that the name Apulia reached down to the border of the ancient Calabria. Almost the only monument of Samnite speech from the district is the famous Tabula Bantina from Bantia, a small city just inside the Peucetian part of Apulia, on the Lucanian border. This inscription is one of the latest and in some ways the most important monument of Oscan,

though showing what appear to be some southern peculiarities (see Osca lingua). Its date is almost certainly between 118 and 90 B.C., and it shows that Latin had not even then spread over the district (cf. Lucania). Far older than this are some coins from Ausculurri and Teate (later known as Teanum Apulum), of which the earliest belong to the 4th century B.C. Roman or Latin colonies were few, Luceria (planted 314 B.C.) in the north and Brundisium (soon after 268) being the chief. (See R. S. Conway, Italic Dialects, xxviii.-xxx. pp. 15 f.; and Mommsen's introduction to the opening sections of C.I.L. ix.) (R. S. C.)

The wars of the 4th and 3rd centuries B.C. brought a great part of the pastures of the Apulian plain into the hands of the Roman state, and a tax was paid on every head of cattle and every sheep, at first to the tax farmer and later to the imperial procurator. It was under the Romans that the system of migration for the flocks reached its full development, and the practice is still continued; the sheep- tracks (tratturi), 350 ft. wide, leading from the mountains of the Abruzzi to the plain of Apulia date in the main at least from the Roman period, and are mentioned in inscriptions. The plain, however, which once served as winter grazing ground for a million sheep, now gives pasture to about one-half of that number. 1 The shepherds, who were slaves, often gave considerable trouble; we hear that some 7000 of them, who had made the whole country unsafe, were condemned to death in 18.5 B.C. (Livy xxxix. 29). Sheep- farming on a large scale was no doubt detrimental to the interests of the towns. We hear of repeated risings, for the last time in the Social War. Even in the 4th century B.C. the then chief town of Apulia, Teate or Teanum Apulum (see above), suffered in this way. Luceria subsequently took its place, largely owing to its military importance; but under the Empire it was succeeded by Canusium.

The road system of Apulia, which touched all the important towns, consisted of three main lines, the Via Appia (see Appia, Via), the Via Traiana, and the coast road, running more or less parallel in an east-south-east direction. The first (the southern- most), coming east from Beneventum, entered Apulia at the Pons Aufidi, and ran through Venusia to Tarentum, and thence,

1 The migration was made compulsory by Alphonso I. in 1442, and remained so until 1865. Since that time the tratturi have been to some extent absorbed by private proprietors.

turning north-east, to Brundusium. The second, coming north- east from Beneventum, turned east at Aecae, and ran through Herdoniae, Canusium, Butuntum, Barium and Gnathia (Gnatia) to Brundusium. There was also a short cut from Butuntum to Gnathia through Caelia, keeping inland. The third parallel line ran to the north of the Via Traiana, in continuation of the road along the north-east coast of Picenum and Samnium; it entered Apu'ia near Larinum (whence a branch ran south to Bovianum Undecimanorum), and thence, keeping in the plain to the south of the Mons Garganus, rejoined the coast at Sipon- tum, where it received a branch road from the Via Traiana at Aecae, passing through Luceria and Arpi. It then passed through Barduli (where it was joined by a road from Canusium by way of Cannae) to Barium, where it joined the Via Traiana. From Barium a road probably ran direct to Caelia, and thence south-south-east to join the Via Appia some 25 m. north-west of Tarentum.

Barium was an important harbour, though less so than Brundusium and Tarentum, which, however, belonged to Calabria in the Roman sense. Apulia, with Calabria, formed the second region of Augustus, though we once find Calabria treated as a part of the third region, Lucania (C.I.L. ix. 2213). The Hannibalic and later wars had, Strabo tells us, destroyed the former prosperity of the country; in imperial times we hear little or nothing of it. Both were governed by a corrector from the time of Constantine onwards, but in 668 the Lombards conquered Calabria and Apulia, and it was then that the former name was transferred to Bruttium, the meaning of the latter being extended to include Calabria also. In the 10th century the greater part of this territory was recovered by the Byzantine emperors, whose governor was called Karairavos, a name which, under the corrupt form Capitanata, belonged to the province of Foggia till 1861. It was conquered by the Normans under William Bras-de-fer, who took the title of comes Apuliae in 1042 ; it was raised to a dukedom with Calabria by Robert Guiscard in 1059, and united to the Sicilian monarchy in 1 1 27. Many of the important towns possess fine Romanesque cathedrals, con- structed under the Normans and the Hohenstaufen rulers. It shared the subsequent fate of Sicily, becoming a part of the kingdom of the Two Sicilies in 1734, and being united with Italy in 1861.

Modern Apulia comprises the three provinces of Foggia, Bari and Lecce (the latter corresponding roughly with the ancient Calabria, which, however, extended somewhat farther Apulia. north inland), and is often known as Le Puglie; it stretches from Monte Gargano to the south-east ex- tremity of Italy, with an area of 7376 sq. m.; it is bounded on the north and east by the Adriatic, on the south-east by the Gulf of Taranto, on the south by Basilicata and on the west by Campania and the Abruzzi. The three provinces correspond to the three natural divisions into which it falls. That of Foggia, though it has mountains on the west and south-west

boundary, and the Monte Gargano at its north-east extremity, is in the main a great plain called the Tavoliere (chessboard) di Puglia, with considerable lagoons on its north and east coast. That of Bari, east-south-east of Foggia and divided from it by the Ofanto (Aufidus), the only considerable river of Apulia, 104 m. long, is a hilly district with a coast strip along which are the majority of the towns- — the lack of villages is especially noticeable; in the circondario of Barletta, the north-east portion of the province, there are only eleven communes, with a total population of 335,934- That of Lecce, to the east-south-east again, is a low flat limestone terrace.

The industries of Apulia are mainly pastoral or agricultural. Besides sheep, a considerable number of horses, cattle and swine are bred; while despite the lack of water, which is the great need of modern Apulia (in 1906 arrangements were made for a great aqueduct, to supply the three provinces from the head- waters of the Sele), cultivation is actively carried on, especially in the province of Bari, where grain, wine, olives, almonds, lemons, oranges, tobacco, &c, are produced in abundance, and the export of olive oil is attaining considerable importance. The

salt works of Margherita di Savoia produce large quantities of salt, and nitre is extracted near Molfetta.

Railway communications are fairly good, the main line from Bologna to Brindisi passing through the whole length of Apulia, by way of Foggia and Bari, and having branches from Foggia (the main railway centre of Apulia) to Benevento and Caserta, to Manfredonia, to Lucera and to Rocchetta S. Antonio (and thence to either Avellino, Potenza or Gioia del Colle), from Ofantino to Margherita di Savoia, from Barletta to Spinazzola (between Rocchetta S. Antonio and Gioia del Colle), from Bari to Putignano, and via Gioia del Colle to Taranto, and from Brindisi to Taranto, and to Lecce and Otranto; besides which, there is a steam tramway from Barletta to Bari via Andria.

The most important harbours of Apulia are Brindisi, Bari, Taranto, Barletta, Molfetta and Gallipoli. The export of olive oil to foreign countries from the province of Lecce in 1905 amounted to 1048 tons, as against 3395 in 1901; but that to home ports increased from 7077 to 9025 tons in the same period. The production of wine was 358,953 tons in 1905 as against 203,995 tons in 1901 (an exceptionally bad year) and 284,156 tons in 1902. Of this 211,872 tons were forwarded by rail and sea, in the proportion of five to two respectively, the rest being used for home consumption and as a reserve. The cultivation of oriental tobacco is extending in the province (see Consular Report, No. 3672, July 1906).

The population of the province of Foggia was 425,450 (1901) asagainst322, 758m 1 871, the 'chief towns being Foggia (53,151), Cerignola (34,195), S. Severo (30,040), Monte S. Angelo (21,870), S. Marco in Lamis (17,309), Lucera (17,515); that of Bari, 827,698 (1901) as against 604,540 in 1871, the chief towns being Bari (77,478), Andria (49,569), Barletta (42,022), Corato (41,573), Molfetta (40,135), Trani (31,800), Bisceglie (30,885), Bitonto (30,617), Canosa (24,169), Ruvo (23,776), Terlizzi (23,232), Altamura (22,729), Monopoli (22,545), Gioia del Colle (21,721); that of Lecce, 706,520 (1901) as against 493,594 in 1871, the chief towns being Taranto (60,733), Lecce (32,687), Brindisi (25,317), Martina Franca (25,007), Ostuni (22,997), Francavilla Fontana (20,422), Ceglie Messapica (16,867), Nardo (14,387), Galatina (14,071), Gallipoli (13,552), Manduria (13,113). (T. As.)

APUR& a river of western Venezuela, formed by the confluence of the Sarare and Uribante at 6° 45′ N. lat. and 71° W. long., and flowing eastward across the Venezuelan llanos to a junction with the Orinoco at about 7 40′ N. lat. and 66° 45′ W. long. Its drainage area includes the slopes of both the Colombian and Venezuelan Andes. It has a sluggish course across the llanos for about 300 m., and is navigable throughout its length. Its principal tributaries are the Caparro, Portuguesa arid Guarico on the north, and the Caucagua on the south. Its lateral channels on the south mingle with those of the Arauca for many miles, forming an extensive district subject to annual inundations.

APURIMAC, a river of central Peru, rising in the Laguna de Villafra in the western Cordilleras, 7 m. from Caylloma, a village in the department of Arequipa, and less than 100 m. from the Pacific coast. It flows first north-easterly, then north-westerly past Cuzco to the mouth of the Perene tributary, thence east and north to its junction with the Ucayali at io° 41′ S. lat., and 73° 34′ W. long. It is known as the Apurimae only down to the mouth of the Mantaro tributary, n°45′ S. lat. and 1325 ft. above sea-level. Thence to the mouth of the Perene (984 ft.) it is known as the Ene, and from that point to its junction with the Ucayali (859 ft.) as the Tambo.

APURIMAC, an interior department of southern Peru, bounded N. by the department of Ayacucho, E. by Cuzco, S. and W. by Cuzco and Ayacucho. Area, 8187 sq. m.; pop. (1896) 177,387. The department was created in 1873 and comprises five provinces. Its physical features and productions are very similar to those of Ayacucho (q.v.), with the exception that sugar-cane is cultivated with noteworthy success in the low valley of the province of Abancay. The capital, Abancay r no m. south-west of Cuzco, which is only a village in size but is rich in historical associations and Andahuaylas, in the north-west part of the department, are its principal towns.

APYREXIA (Gr. airvpe%ia, from d-, privative, irvpkacreiv, to be in a fever, irvp, fire, fever), in pathology, the normal interval or period of intermission in a fever.

'AQlBA BEN JOSEPH (c. 50-132), Jewish Palestinian rabbi, of the circle known as tana (q.v.). It is almost impossible to separate the true from the false in the numerous traditions respecting his lif e. He became the chief teacher in the rabbinical school of Jaffa, where, it is said, he had 24,000 scholars. What- ever their number, it seems certain that among them was the celebrated Rabbi Meir, and that through him and others 'Aqiba exerted a great influence on the development of the doctrines embodied in the Mishnah. He sided with Bar Cochebas in the last Jewish revolt against Rome, recognized him as the Messiah, and acted as his sword-bearer. Being taken prisoner by the Romans under Julius Severus, he was flayed alive with circum- stances of great cruelty, and met his fate, according to tradition, with marvellous steadfastness and composure. He is said by some to have been a hundred and twenty years old at the time of his death. He is one of the ten Jewish martyrs whose names occur in a penitential prayer still used in the synagogue service. 'Aqiba was among the first to systematize the Jewish tradition, and he paved the way for the compilation of the Mishnah. From his school emanated the Greek translation of the scriptures by Aquila.

AQUAE (Lat. for " waters "), a name given by the Romans to sites where mineral springs issued from the earth. Over a hundred can be identified, some declaring by their modern names their ancient use: Aix-les-Bains in Savoy (Aquae Sabaudicae), Aix-en-Provence (Aquae Sextiae), Aix-la-Chapelle or Aachen (Aquae Grani), &c. Only two occur in Britain: Aquae Suits — less correctly Aquae Solis — at Bath in Somerset, which was famous, and Buxton (called Aquae simply), which seems to have been far less important. Aquae Sulis was occupied by the Romans almost as soon as they entered the island in a.d. 43, and flourished till the end of the Roman period. It was frequented by soldiers quartered in Britain, by the Britons, and by visitors from north Gaul, and its name was known in Italy, though patients probably seldom travelled so far. Like most mineral springs known to the ancients, it was under the protec- tion of a local deity, the Celtic Sul, whom the Romans equated with their Minerva. Stately remains of its baths and temple have been found at various times, especially in 1790 and 1878 — 1895, and may still be seen there.

AQUAE CUTILIAE, a mineral spring in Italy, near the modern Cittaducale,

9 m. E. of Rieti. The lake near it was supposed by classical writers to be the central point of Italy, and was renowned for its floating islands, which, as in other cases, were formed from the partial petrification of plants by the mineral substances contained in the water. Considerable remains of baths may still be seen there – they were apparently resorted to by both Vespasian and Titus in their last illnesses, for both died there.

AQUAMARINE (Lat. aqua marina, " water of the sea "), a transparent variety of beryl (q.v.), having a delicate blue or bluish-green colour, suggestive of the tint of sea-water. It occurs at most localities which yield ordinary beryl, some of the finest coming from Russia. The gem-gravels of Ceylon contain aquamarine. Clear yellow beryl, such as occurs in Brazil, is sometimes called aquamarine chrysolite. When corundum presents the bluish tint of typical aquamarine, it is often termed Oriental aquamarine.

AQUARELLE (from Ital. acquarella, water-colour), a form of painting with thin water-colour or ink.

AQUARII, a name given to the Christians who substituted water for wine in the Eucharist. They were not a sect, for we find the practice widely in vogue at an early time, even among the orthodox. In Greek they were called Hydroparastatae, or those who offer water. Theodosius, in his persecuting edict of 382, classes them as a special sect with the Manicheans, who also eschewed wine. See Eucharist.

AQUARIUM (plural aquaria), the name given to a receptacle for a marine flora and fauna. Until comparatively recently,

aquaria were little more than domestic toys, or show-places of a popular character, but they have now not only assumed a profound scientific importance for the convenient study of anatomical and physiological problems in marine botany and zoology, but have also attained an economic value, as offering the best opportunities for that study of the habits and environ- ment of marketable food-fish without which no steps for the improvement of sea-fisheries can be safely taken. The numerous " zoological stations " which have sprung up, chiefly in Europe and the United States, but also in the British colonies and Japan, often endeavour to unite these two aims, and have in many cases become centres of experimental work in problems relating to fisheries, as well as in less directly practical subjects. Of these stations, the oldest and the most important is that at Naples, which, though designed for purely scientific objects, also en- courages popular study by means of a public aquarium. The following account (1002) of this station by Dr W. Giesbrecht, a member of the staff, will serve to show the methods and aims, and the complex and expensive equipment, of a modern aquarium: —

" The zoological station at Naples is an institution for the advancement of biological science— that is, of comparative anatomy, zoology, botany, physiology. It serves this end by providing the biologist with the various objects of his study and the necessary appliances; it is not a teaching institution. The station was founded by Dr Anton Dohrn, and opened in the spring of 1874; it is the oldest and largest of all biological stations, of which there are now about thirty in existence. Its two buildings are situated near the seashore in the western town park (Villa Nazionale) of Naples. The older and larger one, 33 metres long, 24 m. deep, 16 m. high, contains on the ground floor the aquarium, which is open to the public. On the first floor there is, facing south, the principal library, ornamented with fresco paintings, and, facing north, a large hall containing twelve working tables, several smaller rooms and the secretarial offices. On the second floor is the physiological laboratory, and on the third floor the small library, a hall with several working tables, and the dark rooms used in developing photographs. The ground floor of the smaller building, which was finished in 1887, contains the rooms in which the animals are delivered, sorted and pre- served, and the fishing tackle kept, together with the workshop of the engineer; on the first and second floors are workrooms, amongst others the botanical laboratory; on the third floor are store-rooms. In the basement of both buildings, which is con- tinued underneath the court, there are sea-water cisterns and filters, engines and store-rooms. The materials for study which the station offers to the biologist are specimens of marine animals and plants which abound in the western part of the Mediter- ranean, and especially in the Gulf of Naples. To obtain these, two screw-steamers and several rowing boats are required, which are moored in the harbour of Mergellina, situated close by. The larger steamer, 'Johannes Miiller' (15 m. long, 2\ m. wide, 1 m. draught), which can steam eight to ten English miles per hour, is provided with a steam dredge working to a depth of eighty fathoms. From the small steamer, ' Frank Balfour,' and the rowing boats, the fishing is done by means of tow-nets. Besides these there are fishermen and others who daily supply living material for study. The plankton (small floating animals) is distributed in the morning, other animals as required. The animals brought in by the fishermen are at once distributed amongst the biologists, whereas the material brought up by the dredges is placed in flat revolving wooden vessels, so as to give the smaller animals time to come out of their hiding-places. The students who work in the station have the first claim on specimens of plants and animals; but specimens are also sup- plied to museums, laboratories and schools, and to individuals engaged in original research elsewhere. Up to the present time about 4000 such parcels have been despatched, and not infre- quently live specimens of animals are sent to distant places. This side of the work has been of very great value to science. The principal appliances for study with which the station pro- vides the biologist are workrooms furnished with the apparatus

and chemicals necessary for anatomical research and physio- logical experiments and tanks. Every student receives a tank for his own special use. The large tanks of the principal aquarium are also at his disposal for purposes of observation and experiment if necessary.

" The water in the tanks is kept fresh by continual circulation, and is thus charged with the oxygen necessary to the life of the organisms. It is not pumped into the tanks directly from the sea, but from three large cisterns (containing 300 cubic metres), to which it again returns from the tanks. The water wasted or evaporated during this process is replaced by new water pumped into the cisterns directly from the sea. The water flows from the large cisterns into a smaller cistern, from which it is dis- tributed by means of an electric pump through vulcanite or lead pipes to the various tanks. The water with which the tanks on the upper floors are filled is first pumped into large wooden tanks placed beneath the roof, thence it flows, under almost constant pressure, into the tanks. The water circulated in this manner contains by far the largest number of such animals as are capable of living in captivity in good condition. Some of them even increase at an undesirable rate, and it some- times happens that young Mytilus or Ciona stop up the pipes; in laying these, therefore, due regard must be had to the arrange- ments for cleaning. For the cultivation of very delicate animals it is necessary to keep the water absolutely free from harmful bacteria; for this purpose large sand-filters have lately been- placed in the system, through which the water passes after leaving the cisterns. Each of the smaller cisterns, which are fixed in the workrooms, consist of two water-tanks, placed one above the other; their frames are of wrought iron and the walls gener- ally of glass. Vessels containing minute animals can be placed between these two tanks, receiving their water through a siphon from the upper tank ; the water afterwards flows away into the lower tank.

" The twenty-six tanks of the public aquarium (the largest of which contains 112 cubic metres of water) have stone walls, the front portion alone being made of glass. As the tanks hold a very large number of animals in proportion to the quantity of water, they require to be well aerated. The pipes through which the water is conducted are therefore placed above the surface of the water, and the fresh supply is driven through them under strong pressure. A large quantity of air in the form of fine bubbles is thus taken to the bottom of the tank and distributed through the entire mass of water. Should the organisms which it is desired to keep alive be very minute, there is a danger of their being washed away by the circulating water. To obviate this, either the water which flows away is

passed through a strainer, or the water is not changed at all, air being driven through it by means of an apparatus put into motion by the drinking-water supply.

" The library contains about 9000 volumes, which students use with the help of a slip catalogue, arranged according to authors. The station has published at intervals since 1879 two periodicals treating of the organisms of the Mediterranean. One is Fauna und Flora des Golfes von Neapel, the other MittheUungen aus der zoologischen Station zu Neapel. The former consists of mono- graphs in which special groups of animals and plants are most exhaustively treated and the Mediterranean species portrayed according to life in natural colours; up to the present time twenty-one zoological and five botanical monographs have ap- peared, making altogether 1200 4to sheets with about 400 plates. Of the MittheUungen, which contain smaller articles on organisms of the Mediterranean, fourteen volumes in 8vo have been pub- lished. The station also publishes a Zoologischer Jahresbericht, which at first treated of the entire field of zoology, but since 1886 has been confined principally to comparative anatomy and ontogeny; it appears eight to nine months after the end of the year reported. The Guide to the Aquarium, with its descriptions and numerous pictures, is meant to give the lay visitor an idea of the marine animal world.

"There are about forty officials, amongst them six zoologists, one physiologist, one secretary, two draughtsmen, one engineer.

The station is a private institution, open to biologists of all nations under the following conditions: there are agreements with the governments of Austria, Baden, Bavaria, Belgium, Hamburg, Holland, Hesse, Italy, Prussia, Russia, Saxony, Switzerland, Hungary, Wurttemberg, the province of Naples, and the universities of Cambridge, Oxford, Strassburg, Columbia College (New York), and the British Association for the Advance- ment of Science, the Smithsonian Institution, and a society of women in the United States of North America (formerly also with Bulgaria, Rumania, Spain, the Academy of Sciences in Berlin, Williams College, University of Pennsylvania), by virtue of which the governments and corporate bodies named have the right, on payment of £100 per annum, to send a worker to the station; this places at his disposal a ' table ' or workplace, furnished with all the necessary appliances and materials as set down in the agreement. At present there are agreements for thirty-three tables, and since the foundation of the station nearly 1200 biologists have worked there. The current expenses are paid out of the table-rents, the entrance fees to the public aquarium, and an annual subvention paid by the German empire."

In England a station on similar lines, but on a smaller scale, is maintained at Plymouth by the Marine Biological Association of the United Kingdom, with the help of subsidies from the government and the Fishmongers' Company.

Little difficulty is experienced in maintaining, breeding and rearing fresh-water animals in captivity, but for many various reasons it is only by unremitting attention and foresight that most marine animals can be kept even alive in aquaria, and very few indeed can be maintained in a condition healthy enough to breed. Much experience, however, has been gained of late years at considerable expense, both in England and abroad. In starting a marine aquarium of whatever size, it should be obvious that the first consideration must be a supply of the purest possible water, as free as may be, not only from land-drainage and sewage, but also from such suspended matters as chalk, fine sand or mud. This is most ideally and economically secured by placing the station a few feet above high-water mark, in as sheltered a position as possible, on a rocky coast, pumping from the sea to a large reservoir above the station, and allowing the water to circulate gently thence through the tanks by gravity (Banyuls). At an inland aquarium (Berlin, Hamburg), given pure water in the first instance, excellent if less complete results may never- theless, be obtained. The next consideration is the method by which oxygen is to be supplied to the organisms in the aquarium. Of the two methods hitherto in use, that of pumping a jet of air into tanks otherwise stagnant or nearly so (Brighton), while supplying sufficient oxygen, has so many other disadvantages, that it has not been employed regularly in any of the more modern aquaria. It is, however, still useful in aerating quite small bodies of water in which hardy and minute organisms can be isolated and kept under control. In the other method, now in general use, a fine jet of water under pressure falls on to the surface of the tank; this carries down with it a more than sufficient air-supply, analysis showing in some cases a higher percentage of oxygen in aquarium water than in the open sea.

The water supply is best effected by gravity from reservoirs placed above the tanks, but may be also achieved by direct pumping from low reservoirs or from the sea to the tanks. Provided that an unlimited supply of pure water can be obtained cheaply, the overflow from the tanks is best run to waste; but in aquaria less fortunately placed, it returns to a storage low-level reservoir, from which it is again pumped, thus circulating round and round (Naples, Plymouth). The storage reservoirs should be in all cases very large in comparison with the bulk of water in circulation; if practicable, they should be excavated in rock, and lined with the best cement. Thera is no reason why they should not be shallow, exposed to light and air, and cultivated as rock -pools by the introduction of seaweeds and small animals, but they must then be screened from rain, cold and

dust. The pumps used in circulation will be less likely to kill minute animals if of the plunger or ram type, rather than

rotary, and should be of gun-metal' or one of the new bronze- alloys which take a patina in salt water. For the circulating pipes many materials have been tried. Vulcanite is not only expensive and brittle, but has other disadvantages; common iron pipes, coated internally with cement or asphalt or glazed internally, with all unions and joints cemented, have been used with more or less success. Probably best of all is common lead piping, the joints being served with red-lead; water should be circulated through such pipes till they become coated with in- soluble carbonate, for some time before animals are put into the tanks. For small installations glass may be used, the joints being made with marine glue or other suitable cement.

In building the tanks themselves, regard must be had to their special purposes. If intended for show-tanks for popular ad- miration, or for the study of large animals, they must be large with a plate-glass front; for ordinary scientific work small tanks with all sides opaque are preferable from every point of view. According to their character, size and position, fixed tanks may be of brickwork, masonry or rock, coated in each case with cement; asphalting the sides offers no particular advantages, and often gives rise to great trouble and expense. All materials, and especially the cements, must be of the finest quality procur- able. For smaller and movable tanks, slate slabs bolted or screwed together have some disadvantages, notably those of expense, weight and brittleness, but are often used. Better, cheaper and lighter, if less permanent, are tanks of wood bolted together, pitched internally. Glass bell-jars, useful in particular cases, should generally have their sides darkened, except when required for observation. Provision should always be made for cleaning every part of the tanks, pipes and reservoirs; all rock-work in tanks should therefore be removable. As regards the lighting of fixed tanks, it should always be directly from above. In all tanks with glass sides, whether large or small, as much light as possible should be kept from entering through the glass; otherwise, with a side-light, many animals become restless, and wear themselves out against the glass, affected by even so little light as comes through an opposite tank.

In cases where distance from the sea or other causes make it impracticable to allow the overflow from the tanks to run to waste, special precautions must be taken to keep the water pure. Chemically speaking, the chief character of the water in an aquarium circulation, when compared with

that of the open sea, lies in the excessive quantity of nitrogen present in various forms, and the reduced alkalinity; these two being probably connected. The excess of nitrogen is referable to dead animals, to waste food and to the excreta of the living organisms. The first two of these sources of contamination may be reduced by care and cleanliness, and by the maintenance of a flow of water sufficient to prevent the excessive accumulation of sediment in the tanks. The following experiment shows the rapid rise of nitrogen if unchecked. A tank with a considerable fauna was isolated from the general circulation and aerated by four air-jets, except during hours 124-166 t)f the experiment; column I. shows per 100,000 the nitrogen estimated as ammonia, column II. the total inorganic nitrogen: —

1. 11.

Sea-water at source of original

supply o-ool 0-003

Aquarium water in tank at com- mencement of experiment . . 0-012 0-400

After 22 i hours 0-020

75 , 0-025 1-200

„ 93 0-019

„ I2Ij ,, 0-OI2

,, I4I , 0-OI5 2-200

,,165 0-025

„ I69 0-025

,, 189 ,, 0-012

During this time the alkalinity was reduced to the equivalent of 30 mg. CaC0 3 per litre, ocean water having an alkalinity equivalent to 50-55 mg. per litre. It has been suggested that the organic nitrogen becomes oxidized into nitrous, then into nitric acid, which lowers the carbonate values. A great deal of reduction of this nitrogenous contamination can be effected by filtration,

a method first introduced successfully at Hamburg, where a most thriving aquarium has been maintained by the local Zoological Society for many years on the circulation principle, new water being added only to compensate for waste and evap- oration. The filters consist of open double

boxes, the inner having a bottom of perforated slate on which rests rough gravel; on the latter is fine gravel, then coarse, and finally fine sand. Filtration may be either upwards or downwards through the inner box to the outer. Such filters, intercalated between tanks and reservoir, have been shown by analysis to stop a very large proportion of nitrogenous matter. It is doubtful whether aquarium water will not always show an excess of nitrogenous compounds, but they must be kept down in every way possible. In small tanks, well lighted, seaweeds can be got to flourish in a way that has not been found practicable in large tanks with a circulation; these, with Lamellibranchs and small Crustacea as scavengers, will be found useful in this connexion. Slight or occasional circulation should be employed here also, to remove the film of dust and other matters, which otherwise covers the surface of the water and prevents due oxygenation.

In such small tanks for domestic use the fauna must be practically limited to bottom-living animals, but for purposes of research it is often desired to keep alive larval and other surface- swimming animals (plankton). In this case a further difficulty is presented, that of helping to suspend the animals in the water, and thus to avoid the exhaustion and death which soon follow their unaided efforts to keep off the bottom; this duty is effected in nature by specific gravity,, tide and surface current. In order to deal with this difficulty a simple but efficient apparatus has been devised by Mr E. T. Browne; a " plunger," generally a glass plate or filter funnel, moves slowly up and down in a bell-jar or other small tank, with a period of rest between each stroke; the motive power is obtained through a simple bucket- and-siphon arrangement worked by the overflow from other tanks. This apparatus (first used at the Plymouth Laboratory of the Marine Biological Association in 1897, and since introduced into similar institutions), by causing slight eddies in the water, keeps the floating fauna in suspension, and has proved very suc- cessful in rearing larvae and in similar work. (G. H. Fo.)

AQUARIUS (the "Water-bearer" or "Cup-bearer"), in astronomy, the eleventh sign of the zodiac (g.v.), situated between Capricornus and Pisces. Its symbol is ««, representing part of a stream of water, probably in allusion to the fact that when the sun is in this part of the heavens (January, February) the weather is rainy. It is also a constellation mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.); Ptolemy catalogued forty-five stars, Tycho Brahe forty-one, Hevelius forty-seven, t Aquarii is a well-defined binary, having both components of the fourth magnitude; it is probably of long period.*

AQUATINT (Lat. aqua, water, and tincta, dyed), a kind of etching (q.v.) which imitates washes with a brush. There are many ways of preparing a plate for aquatint, the following being recommended by P. G. Hamerton.

Have three different solu- tions of rosin in rectified alcohol, making them of various degrees of strength, but always thin enough to be quite fluid, the weakest solution being almost colourless. First pour the strongest solution on the plate. When it dries it will produce a granula- tion; and you may now bite as in ordinary etching for your darker tones, stopping out what the acid is not to operate upon, or you may use a brush charged with acid, perchloride of iron being a very good mordant for the purpose. After cleaning the plate, you proceed with the weaker solutions in the same way, the weakest giving the finest granulation for skies, distances, &c. The process requires a good deal of stopping-out, and some burnishing, scraping, &c, at last. Aquatint may be effectively used in combination with line etching, and still more harmoni- ously with soft ground etching in which the line imitates that of the lead pencil.

AQUAVIVA, CLAUDIO (1542-1615), fifth general of the Jesuits, the youngest son of the duke d'Altri, was born at Naples. He joined the Jesuits at Rome in 1 567, and his high administrative

gifts marked him out for the highest posts. He was soon nominated provincial of Naples and then of Rome; and during this office he offered to join the Jesuit mission to England that set out under Robert Parsons (q.v.) in the spring of 1580. The following year, being then only thirty-seven years old, he was elected, by a large majority, general of the society in succession to Mercurian, to the great surprise of Gregory XIII.; but the extraordinary political ability he displayed, and the vast increase that came to the Society during his long generalate, abundantly justified the votes of the electors. He, together with Lainez, may be regarded as the real founder of the Society as it is known to history. A born ruler, he secured all authority in his own hands, and insisted that those who prided themselves on their obedience should act up to the profession. In his first letter " On the happy increase of the Society " (25th of July 1581), he treats of the necessary qualifications for superiors, and points out that government should be directed not by the maxims of human wisdom but by those of supernatural prudence. He successfully quelled a revolt among the Spanish Jesuits, which was supported by Philip II., and he made use in this matter of Parsons. A more difficult task was the management of Sixtus V. , who was hostile to the Society. By consummate tact and bold- ness Aquaviva succeeded in playing the king against the pope, and Sixtus against Philip. For prudential reasons, he silenced Mariana, whose doctrine on tyrannicide had produced deep indignation in France; and he also appears to have discounten- anced the action of the French Jesuits in favour of the League,

and was thus able to secure solid advantages when Henry IV. overcame the confederacy. To him is due the Jesuit system of education in the book Ratio atque instilntio studiorum (Rome, 1586). But the Dominicans denounced it to the Inquisition, and it was condemned both in Spain and in Rome, on account of some opinions concerning the Thomist doctrines of the divine physical premotion in secondary causes and predestination. The incriminated chapters were withdrawn in the edition of 1591. In the fierce disputes that arose between the Jesuit theologians and the Dominicans on the subject of grace, Aquaviva managed, under Clement VIII. and Paul V., to save his party from a condemnation that at one time seemed probable. He died at Rome on the3ist of January 1615, leaving the Society numbering 13,000 members in 550 houses and 15 provinces. The sub- sequent influence exercised by the Jesuits, in their golden age, was largely due to the far-seeing policy of Aquaviva, who is undoubtedly the greatest general that has governed the Society. (E. Tn.)*

AQUEDUCT (Lat. aqua, water, and ducere, to lead; Gr. iiBpayoiyeiov, vhpayioyiov, virovo/jtos), a term properly including artificial works of every kind by means of which water is con- veyed from one place to another, but generally used in a more limited sense. It is, in fact, rarely employed except in cases where the work is of considerable magnitude and importance, and where the water flows naturally by gravitation. The most important purpose for which aqueducts are constructed is that of conveying pure water, from sources more or less distant, to large masses of population. Aqueducts are either below ground, on the surface, or raised on walls either solid or pierced with arches; to the last the term is often confined in popular language. The choice of method naturally depends on the contour of the country. I. Ancient Aqueducts.— -In Egypt, Babylonia and Assyria — flat countries traversed by big rivers and subject to floods — water was supplied by means of open canals with large basins. In Persia devices of all kinds were adopted according to the nature of the country. In relation to the achievements of Greece and Rome, the Phoenicians are the most important among pre-classical engineers. In Cyprus water was supplied to temples by rock-cut subterranean conduits carried across intervening valleys in siphons. Such conduits have been found near Citium, Amathus, &c. (Cesnola, Cyprus, pp. 187, 341). In Syria the most striking of Phoenician waterworks is the well of Ras-el-Ain near Tyre, which consisted of four strong octagonal towers through which rises to a height of 18 to 20 ft. the water from four deep artesian wells. The water thus accumulated was

Phoe- nician.

carried off in conduits to reservoirs near the shore, and thence in vessels or skins to the island. The aqueduct across to the island is, of course, of*

Roman work.

It is not possible in all cases to find a satisfactory date for the numerous conduits which have supplied Jerusalem; some probably go back to the times of the kings of Judah. Jerusa i eia . The principal reservoir consists of the three Pools of Solomon which supplied the old aqueduct; the highest is about 20 ft. above the middle one and 40 above the lowest. These pools collected the water from Ain Saleh and other springs, and sent it to the city by two conduits. The higher of these — ■ probably the older — Was partly a rock-cut canal, partly carried on masonry; the siphon-pipe system was adopted across the lower ground near Rachel's Tomb, where the pipe (15 in. wide) is formed of large pierced stones embedded in rubble masonry. The lower conduit is still complete; it winds so much as to be altogether some 20 m. long. Near the Birket-es-Sultan it passes over the valley of Hinnom on nine low arches and reaches the city on the hill above the Tyropeon valley. It enters the Haram enclosure at the Gate of the Chain (Bab es-Silsila), outside which is a basin 84 ft. by 42 by 24 deep. It is interesting to note in the case of the underground tunnel which brought water from the Virgin's Fountain to the pool of Siloam, that the two boring parties had no certain means of keeping the line; there is evidence that they had to make shafts to discover their position, and that ultimately the parties almost passed one another. Though the direct distance is 1100 ft., the length of the con- duit is over 1700 ft. Perrot and Chipiez incline to attribute the Pools of Solomon to the 'Asmonaeans, followed by Roman governors, whereas the earlier tunnels of the Kedron and Tyropeon valley may be Punic- Jewish (see also Palest. Explor. Fund Mem., " Jerusalem," pp. 346-365). Besides these conduits excavation has discovered traces of many other cisterns, tunnels and conduits of various kinds. Many of them point to periods of great prosperity and engineering enterprise which gave to the city a water-supply far superior to that which exists at present.

See the publications of the Palestine Exploration Fund; A. S. Murray's Handbook to Syria and Palestine (1903), pp. 63-67 ; Perrot and Chipiez, History of Art in Sardinia, Judaea, &fc. (Eng. trans., 1890), pp. 321 ff. ; other authorities quoted under Jerusalem.

The earliest attempts in Europe to solve the problems of water-supply were made by the Greeks, who perhaps derived their ideas from the Phoenicians. It has generally been held, partly on the strength of a passage in Strabo (v. 3. 8, p. 235), and partly owing to the comparative unimport- ance of the remains discovered, that the Greek works were altogether inferior to the Roman. Research in the Greek towns of Asia Minor, together with a juster appreciation of the remains as a whole, must be held to modify this view. Among the earliest examples of Greek work are the tunnels or emissaria which drained Lake Copais in Boeotia; these, though net strictly aqueducts,

were undoubtedly the precursors of such works, consisting as they did of subterranean tunnels {virbvop.oi) with vertical shafts (pea.Tiat,) , sixteen of which are still recognizable, the deepest being about 150 ft. They may be compared with that described by Polybius as conveying water from Taurus to Hecatompylos, and with numerous other remains in Asia Minor, Syria,. Phoenicia and Palmyra. Popular legend ascribed them to Cadmus, just as Argos referred the irrigation of its lands to Danaiis. They are undoubtedly of great antiquity.

The insufficiency of water, supplied by natural springs and cisterns hewn in the rock, which in an early age had satisfied the small communities of Greece, had become a pressing public question by the time of the Tyrants, of whom Polycrates of Samos and Peisistratus of Athens were distinguished for their wisdom and enterprise in this respect. The former obtained the services of Eupalinus, an engineer celebrated for the skill with which he had carried out the works for the water-supply oi Megara (see Athen. Mittheil. xxv., 1900, 23) under the direction of the Tyrant Theagenes (c. 625 B.C.). At Samos the difficulty lay in a hill which rose between the town and the water source. Through this hill Eupalinus cut a tunnel 8 ft. broad, 8 ft. high

and 4200 ft. long, building within the tunnel a channel 3 ft. broad and 11 ells deep. The water, flowing by an accurately reckoned declivity, and all along open to the fresh air, was received at the lower end by a conduit of masonry, and so led into the town, where it supplied fountains, pipes, baths, cloacae, &c, and ultimately passed into the harbour (Herod, iii. 60). In Athens, under the rule of the Peisistratids (c. 560-510 B.C.), a similarly extensive, if less difficult, series of works was completed to bring water from the neighbouring hills to supplement the inadequate supply from the springs. From Hymettus were two conduits passing under the bed of the Ilissus, most of the course being cut in the rock. Pentelicus, richer in water, supplied another conduit, which can still be traced from the modern village of Chalandri by the air shafts built several feet above the ground, and at a distance apart of 130-160 ft.; the diameter of these shafts is 4-5 ft., and the number of them still preserved is about sixty. Tributary channels conveyed into the main stream the waters of the district through which it passed. Outside Athens, those two conduits met in a large reservoir, from which the water was distributed by a ramification of underground channels throughout the city. These latter channels vary in form, being partly round, partly square, and generally walled with stone; the chief one is sufficiently

large for two men to pass in it. The precise location of the reservoir depends on the value of Dr Wilhelm Dorpfeld's theory as to the site of the Enneacrunus of Thucydides and Pausanias (see Athens: Topography and Antiquity). Dorpfeld places it south-west of the Acropolis, where there is a cistern connected with an aqueduct which passed under the theatre of Dionysus and on towards the Ilissus (see map under Athens). Others have placed it south of the Olympieum in the Ilissus bed. Beside these works water was brought from Pentelicus in an underground conduit begun by the emperor Hadrian and completed by Antoninus Pius. This aqueduct is still in use, having been repaired in 1869.

In Sicily, the works by which Empedocles, it is said, brought the water into the town of Selinus, are no longer visible; but it is probable that, like those of Syracuse, they consisted chiefly of tunnels and pipes laid under the ground. Syracuse was sup- plied by two aqueducts, one of which the Athenians destroyed (Thuc. vi. 100). One was fed by an affluent (the mod. Buttigliara) of the Anapus (mod. Anapo); it carried the water up to the top of Epipolae, where the channel was open, and thence down to the city and finally into the harbour. The other also ascends to the top of Epipolae, skirts the city on the north, and then proceeds along the coast. Its course is marked by rect- angular shafts (spiragli) at the bottom of which water is still visible.

An example of what appears to have been the earliest form of aqueduct in Greece was discovered in the island of Cos beside the fountain Burinna (mod. Fountain of Hippocrates) on Mount Oromedon. It consists of a bell-shaped chamber, built under- ground in the hill-side, to receive the water of the spring and keep it cool; a shaft from the top of the chamber supplied fresh air. From this reservoir the water was led by a subterranean channel, 114 ft. long and 65 ft. high. (J. M. M.)

In comparing Greek and Roman aqueducts, many writers have enlarged on the greatness of the latter as an example of Roman contempt for natural obstacles, or even of Roman ignorance of the laws of nature. Now, in the first place, the Romans were not unacquainted with the law that water finds its own level (see Pliny, Hist. Nat. xxxi. 57, " subit altitudinem exortus sui "), and took full advantage of it in the construction of lofty fountains and the supplying of the upper floors of houses. That they built aqueducts across valleys in preference to carrying pipes underground was due simply to economy. Pipes had to be made of lead which was weak, or of bronze which was expensive; and the Romans were not sufficiently expert in the casting of large pipes which would stand a very great pressure to employ them for the whole course of a great aqueduct. Secondly, the water was so ex- tremely hard that it was important that the channels should be readily accessible for repair as well as for the detection of leak-

Romaa.

age. 1 Moreover, as we shall see, the Roman aqueducts did not, in fact, preserve a straight line regardless of the configuration of the country. A striking example is the aqueduct of Nemausus (Nimes), the springs of which are some 10 m. from the town, though the actual distance traversed is about 25. Other devices, such as changing the level and then modifying the slope, and siphon arrangements of various kinds, were adopted (as in the aqueduct at Aspendus).

Sextus Julius Frontinus, appointed curator aquarum in a.d. 97, mentions in his treatise de aquaeductibus urbis Romae (on the aqueducts of the city of Rome) nine aqueducts as being in use in his time (the lengths of the aqueducts as given here follow his measurements). These are: (1) Aqua Appia, which took its rise between the 6th and 7th milestones of the Via Colla- tina, and measured from its source to the Porta Trigemina n Roman miles, of which all but about 300 ft. were below ground. It appears to have been the first important enterprise of the kind at Rome, and was the work of the censor Appius Claudius Caecus, from whom it derived its name. The date of its con- struction was 312 B.C. (2) Anio Vetus, constructed in 272-269 B.C. by the censor Manius Curius Dentatus. From its source near Tivoli, on the left side of the Anio, it flowed some 43 m., 2 of which only 1100 ft. was above ground. At the distance of 2 m. from Rome (Frontinus, i. 21), it parted into two courses, one of which led to the horti Asiniani, and was thence dis- tributed; while the other (rectus ductus) led by the temple of Spes to the Porta Esquilina. (3) Aqua Marcia, reconstructed in 1 860- 1 8 70 under the name of Acqua Pia or Marcia-Pia after Pius IX. (though from Tivoli to Rome the modern aqueduct takes an entirely different course), rising on the left side of the Via Valeria near the 36th milestone. It traversed 6if m., of which 54J were underground, and for the remaining distance was carried partly on substructions and partly on arches. It was the work of the praetor Quintus Marcius Rex (144-140 B.C.), not of Ancus Marcius, the fourth king of Rome, as Pliny (N.H. xxxi. 3) fancied, and took its name from its constructor. Its waters were celebrated for their coolness and excellent quality. Its volume was largely increased by Augustus, who added to it the Aqua Augusta; and it was repaired and restored by Titus, Septimus Severus, Caracalla and Diocletian. (4) Aqua Tepula, from its source (now known as Sorgente Preziosa) in the district of Tusculum, to Rome, was some 11 m. in length. The first portion of its course must have been almost entirely subter- ranean and is not now traceable. For the last 6| m. it ran on the same series of arches that carried the Aqua Marcia, but at a higher level. It was the work of the Censors Cn. Servilius Caepio and L. Cassius Longinus, and was completed in the year 125 B.C. Its water is warm (about 63 Fahr.) and not of the best quality. (5) The Aqua Julia, from a source 2 m. from that of

the Tepula, joined its course at the 10th milestone of the Via Latina. The combined stream, after a distance of 4 m., was received in a reservoir, and then once more divided into two channels. The entire length of the Julia was 155 m. It was constructed in the year 33 B.C. by M. Vipsanius Agrippa, who also built the (6) Aqua Virgo which, from its origin at a copious spring in a marsh on the Via Collatina, measured 14 m. in length; it was conveyed in a channel, partly under and partly above ground. It was begun in the year 3ˆ B.C. and was celebrated for the excellence of its waters. It was restored to use by Pius V. in 1570. (7) Aqua Alsietina or Augusta, the source of which is the Lacus Alsietinus (mod. Lago di Martignano) , to the north of Rome, was over 22 m. in length, of which 358 paces were on arches. It was the work of Augustus, probably with the object of furnishing water for his naumachia (a basin for sham sea-fights), and not for drinking purposes. Its course is

'There have been found at Caerwent, in Monmouthshire, clear traces of wooden pipes (internal diameter about 2 in.) which must have carried drinking-water, and almost certainly a pressure supply from the surrounding hills. Some patches of lead also have been found obviously nailed on to the pipes at points where they had burst (see Archaeologia, 1908).

2 This distance will not agree with the length given on some of the cippi (Lanciani, Bull. Com., 1899, 38).

unknown, as no remains of it exist, but an inscription relating to it is given in Notizie d. Scavi (1887), p. 182. (8, o) The Aqua Claudia and Anio Novus were two aqueducts begun by Caligula in a.d. 38 and completed by Claudius in a.d. 52. The springs of the former belonged to the same group as those of the Marcia, and were situated near the 38th milestone of the Via Sublacensis, not far from its divergence from the Via Valeria, while the original intake of the latter from the river Anio was 4 m. farther along the same road. As the water was thick it was collected in a purifying tank, and 4 m. below, a branch stream, the Rivus Herculaneus, was added to it. According to Frontinus, over 10 m. of the course of the Claudia and nearly 05 of that of the Anio Novus were above ground. Seven miles out of Rome they united and ran from that point into Rome, following a natural isthmus formed by a lava stream from the Alban volcano, upon a line of arches, which still forms one of the most conspicuous features of the Campagna. The original inscription of Claudius (a.d. 52) on the Porta Maggiore, by which the Aqua Claudia and Anio Novus crossed the Via Praenestina and

the Via Labicana, gives the length of the Aqua Claudia as 45 m., and that of the Anio Novus as 62 m. Frontinus, on the other hand, gives 46-406 m. {i.e. about 43 English miles) and 58-700 m. (i.e. about 54 English miles). Albertini (Milanges de I' Ecole Francaise, 1906, 305) explains the difference as due to the fact that Frontinus was calculating the length of the Claudia from the farthest spring, the Fons Albudinus, and that of the Anio Novus from the new intake constructed by Trajan in one of the three lakes constructed by Nero for the adornment of his villa above Subiaco. Two other inscriptions on the Porta Maggiore record restorations by Vespasian in a.d. 70, and by Titus in a.d. 80. That the aqueducts should be spoken of as vetustate dilapsi so soon after their construction is not a little surprising, and may be attrir buted either to hasty construction in order to complete them by a fixed date, or to jobbery by the imperial freedmen who under Claudius were especially powerful, or to the fact that a line of arches intended originally in all probability for the Aqua Claudia alone was made to carry the Anio Novus as well.

The size of the channels (specus) of the principal aqueducts varies considerably at different points of their course. The Anio Novus has the largest of them all, measuring 3 to 4 ft. wide and 9 ft. high to the top of the roof, which is pointed. They are lined with hard cement (opus signinum) containing fragments of broken brick. Those aqueducts of which the most con- spicuous remains exist in the neighbourhood of Rome are the four from the upper valley of the Anio, the two which took their supply and their name from the river itself, and the Marcia and the Claudia, which originated from the same group of springs, in the floor of the Anio valley 6 m. below Subiaco. Those of the Anio Vetus, which travelled at a considerably lower level than the other three, are the least conspicuous, while the Claudia and Anio Novus as a rule kept close together, the latter at the highest level of all. The ruins of bridges and substructions in the Anio valley down to Tivoli, though comparatively little known, are of great importance. In all the aqueducts the original con- struction of the bridges was in opus quadratum (masonry), while the substructions are in brick-faced concrete; but the bridges are as a rule strengthened (and often several times) with rein- forcing walls of concrete faced with opus reticulatum or. brick- work. Below Tivoli, where the Anio leaves its narrow valley, the aqueducts sweep round towards the Alban hills, and pass through some very difficult country between Tivoli and Galli- cano, alternately crossing ravines, some of which are as much as 300 ft. deep, and tunnelling through hills. 1

The engineering skill displayed is remarkable, and one wonders what instruments were employed — probably the so-called chorobates, an improvement upon the ordinary water-level (Vitruvius viii. 6), though this would be slow and complicated. The optical properties of glass lenses were,

however, unknown to

1 The course of the Aqua Claudia was considerably shortened by the cutting of a tunnel 3 m. long under the Monte Affliano in the time of Domitian (T. Ashby, in Papers of the British School at Rome, iii, 133).

the ancients, and the dioptra, or angle measure, was considered by Vitruvius less trustworthy than the chorobates for the planning of aqueducts (cf. E. Hultsch, s.v. in Pauly-Wissowa, Real- encyclopddie). The aqueducts as a rule were carried on separate bridges, though all four united at the Ponte Lupo, a huge structure, which after the addition of all the four, and with the inclusion of all the later strengthening walls that were found necessary in course of time, measures 105 ft. in height, 508 in length, and 46 in thickness at the bottom, without including the buttresses. From Gallicano onwards the course of these four aqueducts follows the lower slopes of the Alban Hills. Previous writers on the subject have been unable to determine their course, which is largely subterranean; but it can be followed step by step with the indications given by the presence of the calcareous deposit which was thrown out at the putei or shafts (which were, as a rule, placed at intervals of 240 ft., as were the cippi) when the specus was cleaned; and remains of bridges, though less important, owing to the less difficult char- acter of the country, are not entirely absent (cf. the works by T. Ashby cited in bibliography). 2 Near the 7th milestone of the Via Latina at Le Capanelle, the Aqua Claudia and Anio Novus emerge from their underground course, and run into Rome upon the long series of arches already mentioned, passing over the Porta Maggiore. The Claudia sent off an important branch from the Porta Maggiore over the Caelian to the Palatine but the main aqueduct soon reached its termination. A mile farther on the Aqua Marcia also, owing to the gradual slope of the ground towards Rome, begins to be supported on arches, which were also used to carry the Aqua Tepula and the Aqua Julia (of the two latter, before their junction with the Marcia, no remains exist above ground, but inscribed cippi of the last named and its underground channel have been found at Le Capanelle, and cippi also close to its springs, which are a little way above Grottaf errata at Gli Squarciarelli) . The Anio Vetus followed the same line, but kept underground (as was natural at the early period at which it was constructed) until the immediate neigh- bourhood of Rome, near the locality known as "ad Spem veterem " (from a temple of Spes, of which no remains are known) close to the Porta Maggiore. At this point, besides the aqueducts named, the Aqua Appia, as we are told by Frontinus, entered the city, and received an important branch, the Appia Augusta. No remains of either have been discovered outside the city.*

The Aqua Alexandrina must also have entered the city here, though its channel, which lay at some depth below ground, has not been discovered.

Considerable remains of its brick aqueducts exist in the district between the Via Praenestina and the Via Labicana.

Of the two aqueducts on the right bank of the Tiber, the Alsietina, as we have said, has no remains at all, while those of the Traiana are not of great importance. The line of the aqueducts was marked by cippi, inscribed (in the case of the Anio Vetus, Marcia, .Tepula, Julia and Virgo — those of the Claudia and Anio Novus are uninscribed, and those of the Traiana are differently worded) with the name of the aqueduct, the distance from the next cippus (generally 240 ft.) and the number, counting from Rome (not from the springs). These boundary stones were erected in pairs, to mark off the strip of land 30 ft. in width reserved for the aqueduct, and for the road or path which generally followed it. The shafts (putei) often stood, but not necessarily, at the same points as the cippi.

To these nine must be added the two following, constructed after Frontinus's time: (10) Aqua Traiana, from springs to the north-west of the Lacus Sabatinus (Lago di Bracciano), con- structed by Trajan in a.d. 109, about 36! English miles in length. It was restored by Paul V. in 161 1, who made use of and largely transformed the remains of the ancient aqueduct; he allowed some of the inferior water of the lake to flow into the channel, and it is thus no longer used for drinking, (n) Aqua Alexandrina,

2 About 3 m. south-east of this point the presence of large quan- tities of deposit and a sudden fall in the level of the channels seems to indicate the existence of settling tanks, of which no actual traces can be seen.

AQUEDUCT

Plate I.

. AQUA CLAUDIA, ROME.

Pholo, Altnari.

PONT DU GARD, NIMES (NEMAUSUS).

Photo, Neurdtin.

n. «4 a –

Plate II. %

AQUEDUCT

MatfiMMIMIilP»Mltft»-

-”’’’’#’ i.~ -jsm:

R0MAI4 AQUEDUCT AT SEGOVIA.

Photo, Laureal y Cia..

AQUEDUCT OF ROQUEFAVOUR, MARSEILLES. Early nineteenth century.

Photo, Brogi.

PISCINA MIRABILIS AT BAIAE.

AQUA MARCIA, ROME.

l’holo, Dr T. Ashby.

rising about 14 English miles from Rome, between the Via Prae- nestina and the Via Labicana, the work of Alexander Sev.erus (a.d. 226). The springs now supply the modern Acqua Felice, constructed by Sixtus V. in 1585, but the course of the latter is mainly subterranean and not identical with that of the former.

It is agreed that these eleven are all that were constructed. Procopius speaks of fourteen (and the Regionary catalogues mention others), but this number includes branch conduits. All the aqueducts ended in the city in huge castella or reservoirs for the purpose of distribution. Vitruvius recommends the division of these into three parts — one for the supply of fountains, &c, one for the public baths and one for private consumers. In the Piazza Vittorio Emmanuele at Rome there are still to be seen the remains of a large ornamental fountain built probably for the Aqua Julia by Domitian or Alexander Severus (Jordan-Htilsen, Topographic, i. 3350). Besides these main castella there were also many minor castella in various parts of the city for sub-distribu- tion. To allow the water to purify itself before being distributed in the city, filtering and settling tanks {piscinae limariae) were built outside the walls. These piscinae were covered in with a vaulted roof, and were sometimes on a very large scale, as in the example still preserved at Fermo, which consists of two stories, each having three oblong basins communicating with each other; or the Piscina Mirabilis at Baiae, which is covered in by a vaulted roof, supported on forty-eight pillars and perforated to permit the escape of foul air. Two stairs lead by forty steps to the bottom of the reservoir. In the middle of the

basin is a sinking to collect the deposit of the water. The walls and pillars are coated with a stucco so hard as to resist a tool.

The oversight of aqueducts was placed, in the times of the republic, under the aediles, who were not, however, the con- structors of them; of the four aqueducts built during this period, three are the work of censors, one (the Marcia) of a praetor. Under the empire this task devolved on special officials styled Curatores Aquarum, instituted by Augustus, who, as he himself says, " riyos aquarum omnium refecit " (in- scription on the arch by which the Aqua Marcia crossed the Via Tiburtina). (T. As.)

Among the aqueducts outside Italy, constructed in Roman times and existing still, the most remarkable are: (1) the aque- duct at Nimes (Nemausus), erected probably by Vipsanius Agrippa in the time of Augustus, which rose to 160 ft. The Pont du Gard, as this aqueduct is now called, consists of three tiers of arches across the valley of the river Gardon. In the lowest tier are six arches, of which one has a span of 75 ft., the others each 60 ft. In the second tier are eleven arches, each with a span of 75 ft. In the third tier are thirty-five smaller arches which carried the specus. As a bridge, the Pont du Gard has no rival for lightness and boldness of design among the existing remains of works of this class carried out in Roman times. (2) The aqueduct bridges at Segovia (Merckel, Ingenieurtechnik, pp. 566-568), Tarragona {ibid. 565-566), and Merida in Spain, the former being 2400 ft. long, with 109 arches of fine masonry, in two tiers, and reaching the height of 102 ft. The bridge at Tarragona is 876 ft. long and 83 ft. high. (3) At Mainz are the ruins of an aqueduct 7000 yds. long, about half of which is carried on from 500 to 600 pillars {Archaeological Journal, xlvii., 1890, pp. 211-214). This aqueduct was built by the XlVth legion and was for the use of the camp, not for the townspeople. For the similar aqueduct at Luynes see Arch. Journ. xlv. (1888), pp. 235-237. Similar witnesses of Roman occupation are to be seen in Dacia, Africa (see especially under Carthage), Greece and Asia Minor. (4) The aqueduct at Jouy-aux-Arches, near Metz, which originally extended across the Moselle, here very broad, conveyed to the city an abundance of excellent water from Gorze. From a large reservoir at the source of the aque- duct the water passed along subterranean channels built of hewn stone, and sufficiently spacious for a man to walk in them up- right. Similar channels received the water after it had crossed the Moselle by this bridge, at the distance of about 6 m. from Metz, and conveyed it to the city. The bridge consisted of only

one row of arches nearly 60 ft. high. The middle arches have given way under the force of the water, but the others are still perfectly solid. This

aqueduct is probably to be attributed to the latter half of the 4th century a.d. It is for the use of the town; hence its size. (5) One of the principal bridges of the aqueduct of Antioch in Syria is 700 ft. long, and at the deepest point 200 ft. high. The lower part consists almost entirely of solid wall, and the upper part of a series of arches with very massive pillars. The masonry and design are rude. The water supply was drawn from several springs at a place called Beit el- Ma (anc. Daphne) about 4 or 5 m. from Antioch. From these separate springs the water was conducted by channels of hewn stone into a main channel, similarly constructed, which traversed the rest of the distance, being carried across streams and valleys by means of arches or bridges. (6) At the village of Moris, about an hour's distance north-west from the town of Mytilene, is the bridge of an aqueduct, carried by massive pillars built of large hewn blocks of grey marble, and connected by means of three rows of arches, of which the uppermost is of brick. The bridge extended about 500 ft. in length, and at the deepest point was from 70 to 80 ft. high. Judged by the masonry and the graceful design, it has been thought to be a work of the age of Augustus. Remains of this aqueduct are to be seen at Larisson Lamarousia, an hour's distance from Moris, and at St Demetri, two hours and a half from Ayasos, on the road to Vasilika.

The whole subject of the ancient and medieval aqueducts of Asia Minor has been considered in great detail by G. Weber (" Wasserleitungen in kleinasiatischen Stadten," in the Jahrbuch des kaiserl. deutsch. archdolog. Inslit. xix., 1904; see also earlier articles in Jahrbuch, 1892, 1899). The aqueducts examined are those at Pergamum, Laodicea and Smyrna (in the earlier articles), and those at Metropolis (Ionia) , Tralles (Aidin) , Antioch-on-Maeander, Aphro- disias, Trapezopolis, Hierapolis, Apamea Cibotus and Antioch in Pisidia. In most of these cases it is difficult or even im- possible to decide whether the work is Hellenistic or Roman; to the Romans Weber inclines to attribute, e.g. those at Metro- polis, Tralles (perhaps), Aphrodisias; to the Greeks, e.g. those at Antioch-on-Maearider and Antioch in Pisidia. Since, there- fore, a detailed description of these remains does not provide material for any satisfactory generalizations as to the dis- tinctive features of Hellenistic and Roman work, it will be sufficient here to mention a few of the more interesting discoveries.

In the case of Metropolis, the aqueduct in the valley of the Astraeus consisted of an arcade about 13 to 16 ft. high. Nearer to the town in the hills there are distinct traces of a canal with brick walls. It is clear that the water could not have served more than the lower parts of the town, the acropolis of which is nearly 200 ft. above the level of the conduit. In the case of Tralles the water was supplied by a high pressure conduit and distributed from the acropolis, where there are the remains of a basin (13 ft. by 10) arched over with brick. The ancient aque- duct is to be distinguished from a later, probably Byzantine, canal conduit, the course of

which avoids the deeper depressions, crossed by the old aqueduct. Of the Antioch-on-Maf,ander aque- duct only a few clay-pipes remain, and the same is true of the aqueduct which was built by Carminius in the 2nd century a.d. to supply the community when reinforced by the amalgamation of Plarasa and Tauropolis; two of its basins are still distinguish- able, but the two water-towers which are still standing belong to a later Byzantine structure. Trapezopolis was supplied from Mt. Salbacus (Baba Dagh): some twenty stone-pipes have been found built into a low wall which varies from 3j to about 5 ft. wide. Of the pillars which carried the conduit-pipe to Antioch in Pisidia, nineteen are still standing. Each arch consists of eleven keystones; no cement was used. The con- duit, which was high-pressure, ends in a distributing tower and reservoir. (J. M. M.)

II. Medieval. — The aqueduct near Spoleto, w T hich now serves also as a bridge, is deserving of notice as an early instance of the use of the pointed arch, belonging as it docs to the 7th or 8th

Constanti- nople.

century. It has ten arches, remarkable for the elegance of their design and the airy lightness of their proportions, each over 66 ft. in span, and about 300 ft. in height.

The aqueduct of Pyrgos, near Constantinople, is a remarkable example of works of this class carried out in the later times of the Roman empire, and consisted of two branches. From this circumstance it was called Egri Kemer (" the Crooked Aqueduct "), to distinguish it from the Long Aqueduct, situated near the source of the waters. One of the branches extends 670 ft. in length, and is 106 ft. in height at the deepest part. It is composed of three tiers of arches, those in each row increasing in width from the bottom to the top — an arrangement very properly introduced with the view of saving materials without diminishing the strength of the work. The two upper rows consisted of arches of semicircles, the lower of Gothic arches; and this circumstance leads to the belief that the date of the structure is about the 10th century. The breadth of the building at the base was 21 ft., and it dimin- ished with a regular batter on each side to the top, where it was only n ft. The base also was protected by strong buttresses or counterforts, erected against each of the pillars. The other branch of the aqueduct was 300 ft. long, and consisted of twelve semicircular arches. This aqueduct serves to- convey to Con- stantinople the waters of the valley

of Belgrad, one of the principal sources from which the city is supplied. These are situated on the heights of Mount Haemus, the extremity of the Balkan Mountains, which overhangs the Black Sea. The water rises about 15 m. from the city, and between 3 and 4 m. west of the village of Belgrad, in three sources, which run in three deep and very confined valleys. These unite a little below the village, and then are collected into a large reservoir. After flowing a mile or two from this reservoir, the waters are aug- mented by two other streams, and conveyed by a channel of stone to the Crooked Aqueduct. From this they are conveyed to another" which is the Long Aqueduct; and then, with various accessions, into a third, termed the Aqueduct of Justinian. From this they enter a vaulted conduit, which skirts the hills on the left side of the valley, and crosses a broad valley 2 m. below the Aqueduct of Justinian, by means of an aqueduct, with two tiers of arches of a very beautiful construction. The conduit then proceeds onward in a circuitous route, till it reaches the reservoir of Egri Kapu, situated just without and on the walls of the city. From this the water is conducted to the various quarters of the city, and also to the reservoir of St Sophia, which supplies the seraglio of the grand signior. The Long Aqueduct (Usun Kemer) is more imposing by its extent than the Crooked one, but is far inferior in the regularity of design and disposition of the materials. It is evidently a work of the Turks. It con- sists of two tiers of arches, the lower being forty-eight in number, and the upper fifty. The whole length was about 2200 ft., and the height 80 ft. The aqueduct of Justinian (Muallak Kemer or " Hanging Aqueduct ") is without doubt one of the finest monuments which remain to us of the middle ages. It consists of two tiers of large pointed arches, pierced transversely. Those of the lower story have 55 ft. of span, the upper ones 40 ft. The piers are supported by strong buttresses, and at different heights they have little arches passing through them laterally, which relieve the deadness of the solid pillar. The length of this aqueduct is 720 ft. and the height 108 ft. This aqueduct has been attributed both to Constantine I. and to Justinian, the latter being perhaps the more probable.

Besides the waters of Belgrad, Constantinople was supplied from several other principal sources, one of which took its rise on the heights of the same mountains, 3 or 4 m. east of Belgrad. This was conveyed in a similar manner by an arched channel elevated, when it was necessary, on aqueduct bridges, till it reached the northern parts of the city. It was in the course of this aqueduct that the contrivance of the souterasi or hydraulic obelisks, described by Andreossy (on his voyage to the Black Sea, the account of the Thracian Bosporus), was constructed, which excited some attention, as being an improvement on the method of conducting water by aqueduct bridges. " The souterasi,"

says Andreossy, " are masses of masonry, having generally the form of a

truncated pyramid or an Egyptian obelisk. To foim a conduit with souterasi, we choose sources of water, the level of which is several feet higher than the reservoir by which it is to be distributed over the city. We bring the water from its sources in subterranean canals, slightly declining until we come to the borders of a valley or broken ground. We there raise on each side a souterasi, to which we adapt vertically leaden pipes of determinate diameters, placed parallel to the two opposite sides of the building. These pipes are disjoined at the upper part of the obelisk, which forms a sort of basin, with which the pipes are connected. The one permits the water to rise to the level from whence it had descended; by the other, the water descends from this level to the foot of the souterasi, where it enters another canal underground, which conducts it to a second and to a third souterasi, where it rises and again descends, as at the last station. Here a reservoir receives it and distributes it in different directions by orifices of which the discharge is known." Again he says, " it requires but little attention to perceive that this system of conducting tubes is nothing but a series of siphons open at their upper part, and communicating with each other. The expense of a conduit by souterasi is estimated at only one-fifth of that of an aqueduct with arcades." There seems to be really no advantage in these pyramids, further than as they serve the purpose of discharging tie air which collects in the pipes. They are in themselves an evident obstruction, and the water would flow more freely without any interruption of the kind. In regard to the leaden pipes, again, they would have required, with so little head pressure as is stated, to be used of very extra- ordinary dimensions to pass the same quantity of water as was discharged along the arched conduits (see also works quoted under Constantinople). The other principal source from which Constantinople is supplied, is from the high grounds 6 or 8 m. west of the town, from which it is conducted by conduits and arches, in the same manner as the others. The supply drawn from all these sources, as detailed by Andreossy, amounted to 400,000 cubic ft. per day. (A. S. M.; J. M. M.)

III. Modern Construction. — Where' towns are favourably situated the aqueduct may be very short and its cost bear a relatively small proportion to the total outlay upon a scheme of water supply, but where distant sources have to be ˆwˆt relied upon the cost of the aqueduct becomes one of the supp fy. most important features in the scheme, and the quantity of water obtainable must be considerable to justify the outlay. Hence it is that only very large towns can undertake the responsi- bility for this expenditure. In Great Britain it has in all large schemes become a condition that, when a town is permitted to go outside its own watershed, it shall, subject to a priority of a certain number of gallons per day per head of its own in- habitants, allow local authorities, any part of whose district is within a certain number of miles of the aqueduct, to take a supply on

reasonable terms. The first case in which this principle was adopted on a large scale was the Thirlmere scheme sanctioned by parliament in 1879, for augmenting the supply of Manchester. The previous supply was derived from a source only about 15 m. distant, and the cost of the aqueduct, chiefly cast-iron pipes, was insignificant compared with the cost of the impounding reservoirs. But Thirlmere is 96 m. distant from the service reservoir near Manchester, and the cost of the aqueduct was more than 90 % of the total cost. As a supply of about 50,000,000 gallons a day is available the outlay was justifiable, and the water is in fact very cheaply obtained. Liverpool derives a supply of about 40,000,000 gallons a day from the river Vyrnwy in North Wales, 68 m. distant, and Birmingham has constructed works for impounding water in Radnorshire, and con- veying it a distance of 74 m., the supply being about 75,000,000 gallons a day. In the year 1899 an act of parliament was passed authorizing the towns of Derby, Leicester, Sheffield and Notting- ham, jointly to obtain a supply of water from the head waters of the river Derwent in Derbyshire. Leicester is 60 m. distant from this source, and its share of the supply is about 10,000,000 gallons a day. For more than half the distance, however, the aqueduct

is common to Derby and Nottingham, which together are entitled to about 16,000,000 gallons a day, and the expense to Leicester is correspondingly reduced. These are the most important cases of long aqueducts in England, and all are subsequent to 1879. It is obvious, therefore, how greatly the design and construction of the aqueduct have grown in importance, and what care must be Exercised in order that the supply upon which such large populations depend may not be interrupted, and that the country through which such large volumes of water are conveyed may not be flooded in consequence of the failure of any of the works.

Practically only two types of aqueduct are used in England. The one is built of concrete, brickwork, &c, the other of cast-iron (or, in special circumstances, steel) pipes. In the Construe- f ormer ly p e t jj e wa t er SU rface coincides with the hydraulic gradient, and the conditions are those of an artificial river; the aqueduct must therefore be carefully graded throughout, so that the fall available between source and termination may be economically distributed. This condition requires that the ground in which the work is built shall be at the proper elevation; if at any point this is not the case, the aqueduct must be carried on a substructure built up to the required level. Such large structures are, however, extremely expensive, and require elaborate devices for maintaining water- tightness against the expansion and contraction of the masonry due to changes of temperature. They are now only used where their length is very short, as in cases where mountain streams have to be crossed, and even these short lengths are avoided by some engineers, who arrange that the aqueduct shall pass, wherever practicable, under the streams. Where wide valleys interrupt the course of the built aqueduct, or where the absence of high ground prevents the adoption of that type at any part of the route, the cast-iron pipes hereafter referred to are used.

The built aqueduct may be either in tunnel, or cut-and-cover, the latter term denoting the process of cutting the trench, building the floor, side-walls, and roof, and covering amrettaets. ˆ tn eart h, the surface of the ground being restored as before. For works conveying water for domestic supply, the aqueduct is in these days, in England, always covered. Where, as is usually the case, the water is derived from a tract of mountainous country, the tunnel work is some- times very heavy. In the case of the Thirlmere aqueduct, out of the first 13 m. the length of the tunnelled portions is 8 m., the longest tunnel being 3 m. in length. Conditions of time, and the character of the rock, usually require the use of machinery for driving, at any rate in the case of the longer tunnels. For the comparatively small tunnels required for aqueducts, two percus- sion drilling machines are usually mounted on a carriage, the motive power being derived from compressed air sent up the tunnel in pipes. The holes when driven are

charged with ex- plosives and fired. In the Thirlmere tunnels, driven through very hard Lower Silurian strata, the progress was about 13 yds. a week at each face, work being carried on continuously day and night for six days a week. Where the character of the country through which the aqueduct passes is much the same as that from which the supply is derived, the tunnels need not be lined with concrete, &c, more than is absolutely necessary for retaining the water and supporting w r eak places in the rock; the floor, however, is nearly always so treated. The lining, whether in tunnel or cut-and-cover, may be either of concrete, or brickwork, or of concrete faced with brickwork. To ensure the imperme- ability of work constructed with these materials is in practice somewhat difficult, and no matter how much care is taken by those supervising the workmen, and even by the workmen them- selves, it is impossible to guarantee entire freedom from trouble in this respect. With a wall only about 1 5 in. thick, any neglect is certain to make the work permeable; frequently the labourers do not distribute the broken stone and fine material of the con- crete uniformly, and no matter how excellent the design, the quality of materials, &c, a leak is sure to occur at such places (unless, indeed, the pressure of the outside water is superior and an inflow occurs). A further cause of trouble lies in the water which flows from the strata on to the concrete, and

washes away some of the cement upon which the work depends for its watertightness, before it has time to set. For this reason it is advisable to put in the floor before, and not after, the side- walls and arch have been built, otherwise the only outlet for the water in the strata is through the ground on which the floor has to be laid. Each length of about 20 ft. should be completely constructed before the next is begun, the water then having an easy exit at the leading end. Manholes, by which the aque- duct can be entered, are usually placed in the roof at convenient intervals; thus, in the case of the Thirlmere aqueduct, they occur at every quarter of a mile.

In some parts of America aqueducts are frequently constructed of wood, being then termed flumes. These are probably more extensively used in California than in any other part of the world, for conveying large quantities of water aqae aucts. which is required for hydraulic mining, for irrigation, for the supply of towns and for transporting timber. The flumes are frequently carried along precipitous mountain slopes, and across valleys, supported on trestles. In Fresno county, Cali- fornia, there is a flume 52 m. in length for transporting timber from the Sierra Nevada Mountains to the plain below; it has a rectangular V-shaped section, 3 ft. 7 in. wide at the top, and 21 in. deep vertically. The boards which form the sides are i; in. thick, and some of the trestlework is 130 ft. high. The steepest grade occurs where there is a fall of 730 ft. in a length of 3000 ft. About 9,000,000 ft. of timber were used in the construction. At San Diego

there is a flume 35 m. long for irrigation and domestic supply, the capacity being 50 ft. per second; it has 315 trestle bridges (the longest of which is that across Los Coches Creek, 1794 ft. in length and 65 ft. in height) and 8 tunnels, and the cost was $900,000. The great bench flume of the Highline canal, Colorado, is 2640 ft. in length, 28 ft. wide, and 7 ft. deep; the gradient is 5-28 ft. per mile, and the discharge 1 184 ft. per second.

As previously stated, the type of aqueduct built of concrete, &c, can only be adopted where the ground is sufficiently elevated to carry it, and where the quantity of water to be con- veyed makes it more economical than piping. Where iˆWa the falling contour is interrupted by valleys too wide piping. for a masonry structure above the surface of the ground, the detached portions of the built aqueduct must be connected by rows of pipes laid beneath, and following the main undulations of, the surface. In such cases the built aqueduct terminates in a chamber of sufficient size to enclose the mouths of the several pipes, which, thus charged, carry the water under the valley up to a corresponding chamber on the farther hillside from which the built aqueduct again carries on the supply. These connecting pipes are sometimes called siphons, although they have nothing whatever to do with the principle of a siphon, the water simply flowing into the pipe at one end and out at the other under the influence of gravity, and the pressure of the atmosphere being no element in the case. The pipes are almost always made of cast-iron, except in such cases as the lower part of some siphons, where the pressure is very great, or where they are for use abroad, when considerations of weight are of import- ance, and when they are made of rolled steel with riveted or welded seams. It is frequently necessary to lay them in deep cuttings, in which case cast-iron is much better adapted for sustaining a heavy weight of earth than the thinner steel, though the latter is more adapted to resist internal pressure. Mr D. Clarke (Trans. Am. Soc. C.E. vol. xxxviii. p. 93) gives some particulars of a riveted steel pipe 24 m. long, 33 to 42 in. diameter, varying in thickness from 0-22 in. to 0-375 m – After a length of 9 m. had been laid, and the trench refilled, it was found that the crown of the pipe had been flattened by an amount varying from 5 in. to 4 in. Steel pipes suffer more from corrosion than those made of cast-iron, and as the metal attacked is much thinner the strength is more seriously reduced. These considerations have prevented any general change from cast-iron to steel.

Mr. Clemens Herschel has made some interesting remarks (Proc. Inst. C.E. vol. cxv. p. 162) as to the circumstances in which steel

pipes have been found preferable to cast-iron. He says that it had been demonstrated by practice that cast-iron cannot compete with wrought-iron or steel pipes in the states west of the Rocky Moun- tains, on the Pacific slope. This is due to the absence of coal and iron ore in these states, and to the weight of the imported cast-iron pipes compared with steel pipes of equal capacity and strength. The works of the East Jersey Water Company for the supply of Newark, N.J., include a riveted steel conduit 48 in. in diameter and 21 m. long. This conduit is designed to resist only the pressure due to the hydraulic gradient, in contradistinction to that which would be due to the hydrostatic head, this arrangement saving 40% in the weight and cost of the pipes. For the supply of Rochester, N.Y., there is a riveted steel conduit 36 in. in diameter and 20 m. long; and for Allegheny City, Pennsylvania, there is a steel conduit 5 it. in diameter and nearly 10 m. long. The works for bringing the water from La Vigne and Verneuil to Paris include a steel main 5 ft. in diameter between St Cloud and Paris.

Cast-iron pipes rarely exceed 48 in. in diameter, and even this diameter is only practicable where the pressure of the water is low. In the Thirlmere aqueduct the greatest pressure is nearly 180 lb on the square inch, the pipes where this occurs being 40 in. in diameter and if in. thick. These large pipes, which are usually made in lengths of 12 ft., are generally cast with a socket at one end for receiving the spigot end of the next pipe, the annular space being run with lead, which is prevented from flowing into the interior of the pipe by a spring ring subsequently removed; the surface of the lead is then caulked all round the outside of the pipe. A wrought- iron ring is sometimes shrunk on the outer rim of the socket, pre- viously turned to receive it, in order to strengthen it against the wedging action of the caulking tool. Sometimes the pipes are cast as plain tubes and joined with double collars, which are run with lead as in the last case. The reason for adopting the latter type is that the stresses set up in the thicker metal of the socket by unequal cooling are thereby avoided, a very usual place for pipes to crack under pressure being at the back of the socket. The method of turning and boring a portion, slightly tapered, of spigot and socket so as to ensure a watertight junction by close annular metallic con- tact, is not suitable for large pipes, though very convenient for smaller diameters in even ground. Spherical joints are sometimes used where a line of main has to be laid under a large river or estuary, and where, therefore, the pipes must be jointed before being lowered into the previously dredged trench. This was the case at the Willam- ette river, Portland, Oregon, where a length of 2000 ft. was required. The pipes are of cast-iron 28 in. in diameter, I J in. thick, and 17 ft. long. The spigots were turned to a spherical surface of 20 in. radius outside, the inside of the sockets being of a radius f in. greater. After the insertion of the spigot into the socket, a ring, 3 in. deep, turned inside to correspond with the socket, was bolted to

the latter, the annular space then being run with lead. These pipes were laid on an inclined cradle, one end of which rested on the bed of the river and the other on a barge where the jointing was done ; as the pipes were jointed the barge was carefully advanced, thus trailing the pipes into the trench (Trans. Am. Soc. C.E. vol. xxxiii. p. 257). As may be conjectured from the pressure which they have to stand, very great care has to be taken in the manufacture and handling of cast-iron pipes of large diameter, a care which must be unfailing from the time of casting until they are jointed in their final position in the ground. They are cast vertically, socket downwards, so that the densest metal may be at the weakest part, and it is advisable to allow an extra head of metal of about 12 in., which is subsequently cut off in a lathe. An inspector representing the purchaser watches every detail of the manufacture, and if, after being measured in every part and weighed, they are found satisfactory they are proved with internal fluid pressure, oil being preferable to water for this purpose. While under pressure, they are rapped from end to end with a hand hammer of about 5 lb in weight, in order to discover defects. The wrought-iron rings are then,- if required, shrunk on to the sockets, and the pipes, after being made hot in a stove, are dipped vertically in a composition of pitch and oil, in order to preserve them from corrosion. All these operations are performed under cover. A record should be kept of the history of the pipe from the time it is cast to the time it is laid and jointed in the ground, giving the date, number, diameter, length, thickness, and propf pressure, with the name of the pipe-jointer whose work closes the record. Such a history sometimes enables the cause (which is often very obscure) of a burst in a pipe to be ascertained, the position of every pipe being recorded.

Cast-iron pipes, even when dipped in the composition referred to, suffer considerably from corrosion caused by the water, especially soft water, flowing through them. One pipe may be found in as good a condition as when made, while the next may be covered with nodules of rust. The effect of the rust is twofold; it reduces the area of the pipe, and also, in consequence of the resistance offered by the rough surface, retards the velocity of the water. These two results, expecially the latter, may seriously diminish the capability of discharge, and they should always be allowed for in deciding the diameter. Automatic scrapers are sometimes used with good results, but it is better to be independent of them as long as possible. In one case the discharge of pipes, 40 in. in diameter, was found after a period of about twelve years to have diminished at the rate

of about 1% per year; in another case, where the water was soft and where the pipes were 40 in. in diameter, the discharge was diminished by 7% in ten years. An account of the state of two cast-iron mains supplying Boston with water is given in the Trans. Am. Soc. C.E. vol. xxxv. p. 241. These pipes, which were laid in 1877, are 48 in. in diameter and 1800 ft. long.

When they were examined in 1894-1895, it was estimated that the tubercles of rust covered nearly one-third of the interior surfaces, the bottom ot the pipe being more encrusted than the sides and top. They had central points of attachment to the iron, at which no doubt the coating was defective, and from them the tubercles spread over the surface of the surrounding coating. In this case they were removed by hand, and the coating of the pipes was not injured in the process. Cast- iron pipes must not be laid in contact with cinders from a blast furnace with which roads are sometimes made, because these corrode the metal. Mr Russell Aitken {Proc. Inst. C.E. vol. cxv. p. 93) found in India that cast-iron pipes buried in the soil rapidly corroded, owing to the presence of nitric acid secreted by bacteria which attacked the iron. The large cast-iron pipes conveying the water from the Tansa reservoir to Bombay are laid above the surface of the ground. Cast-iron pipes of these large diameters have not been in existence sufficiently long to enable their life to be predicted. A main, 40 in. in diameter, conveying soft water, after being in existence fifty years at Manchester, was apparently as good as ever. In 1867 Mr J. B. Francis found that no apparent deterioration had taken place in a cast-iron main, 8 in. diameter, which was laid in the year 1828, a period of thirty-nine years {Trans. Soc. Am. C.E. vol. i. p. 26). These two instances are probably not exceptional.

Pipes in England are usually laid with not less than 2 ft. 6 in. of cover, in order that the water may not be frozen in a severe winter. Where they are laid in deep cutting they should be partly surrounded with concrete, so that they O fi a yiol may not be fractured by the weight of earth above them. Angles are turned by means of special bend pipes, the curves being made of as large a radius as convenient. In the case of the Thirlmere aqueduct, double socketed castings about 1 2 in. long (exclusive of the sockets) were used, the sockets being inclined to each other at the required angle. They were made to various angles, and for any particular curve several would be used connected by straight pipes 3 ft. long. As special castings are nearly double the price of the regular pipes, the cost was much diminished by making them as short as possible, while a curve, made up of the slight angles used, offered practi- cally no more impediment to the flow of water in consequence of its polygonal form, than would be the case had special bend pipes been used. In all cases of curves on a line of pipes under internal fluid pressure, there exists a resultant force tending to displace the pipes. When the curve is in a horizontal plane and the pipes are buried in the ground, the side of the pipe trench offers sufficient resistance to this force. Where, however, the pipes are above ground, or when the curve is in a vertical plane, it is necessary to anchor them in position. In the case of the Tansa aqueduct to Bombay, there is a curve of 500 ft. radius near Bassein Creek. At this point the hydrostatic head is about 250 ft., and the

engineer, Mr Clerke, mentions that a tendency to an outward movement of the line of pipes was observed. At the siphon under Kurla Creek the curves on the approaches as originally laid down were sharp, the hydrostatic head being there about 210 ft.; here the outward movement was so marked that it was considered advisable to realign the approaches with easier curves {Proc. Inst. C.E. vol. cxv. p. 34). In the case of the Thirlmere aqueduct the greatest hydrostatic pressure, 410 ft., occurs at the bridge over the river Lune, where the pipes are 40 in. in diameter, and in descending from the bridge make reverse angles of 31°. The displacing force at each of these angles amounts to 54 tons, and as the design includes five lines of pipes, it is obvious that the anchoring arrangements must be very efficient. The steel straps used for anchoring these and all other bends were curved to fit as closely as possible the castings to be anchored. Naturally the metal was not in perfect contact, but when the pipes were charged the disappearance of all the slight inequalities showed that the straps were fulfilling their intended purpose. At every summit on a line of pipes one or more valves must be placed in order to allow the escape of air, and they must also be provided on long level stretches, and at changes of gradient where the depth of the point of change below the hydraulic gradient is less than that at both

sides, causing what may be called a virtual summit. It is better to have too many than too few, as accumulations of air may cause an enormous diminution in the quantity of water delivered. In all depressions discharge valves should be placed for emptying the pipes when desired, and for letting off the sediment which accumulates at such points. Automatic valves are frequently placed at suitable distances for cutting off the supply in case of a burst. At the inlet mouth of the pipe they may depend for their action on the sudden lowering of the water (due to a burst in the pipe) in the chamber from which they draw their supply, causing a float to sink and set the closing arrangement in motion. Those on the line of main are started by the increased velocity in the water, caused by the burst on the pipe at a lower level. The water, when thus accelerated, is able to move a disk hung in the pipe at the end of a lever and weighted so as to resist the normal velocity; this lever releases a catch, and a door is then gradually revolved by weights until it entirely closes the pipe. Reflux valves on the ascending leg of a siphon prevent water from flowing back in case of a burst below them; they have doors hung on hinges, opening only in the normal direction of flow. Due allowance must be made, in the amount of head allotted to a pipe, for any head which may be absorbed by such mechanical arrangements as those described where they offer opposition to the flow of the water. These large mains require most careful and gradual filling with

water, and constant atten- tion must be given to the air-valves to see that the gutta-percha balls do not wedge themselves in the openings. A large mass of water, having a considerable velocity, may cause a great many bursts by water-ramming, due to the admission of the water at too great a speed. In places where iron is absent and timber plentiful, as in some parts of America, pipes, even of large diameter and in the most important cases, are sometimes made of wooden staves hooped with iron. A description of two of these will be found below.

The Thirlmere Aqueduct is capable of conveying 50,000,000 gallons a day from Thirlmere, in the English lake district, to Man- TMrtmere. cnest er. The total length of 96 m. is made up of 14 m. of tunnels, 37 m. of cut-and-cover, and 45 m. of cast- iron pipes, five rows of the latter being required. The tunnels where lined, and the cut-and-cover, are formed of concrete, and are 7 ft. in height and width, the usual thickness of the concrete being 15 in. The inclination is 20 in. per mile. The floor is flat from side to side, and the side-walls are 5 ft. high to the springing of the arch, which has a rise of 2 ft. The water from the lake is received in a circular well 65 ft. deep and 40 ft. in diameter, at the bottom of which there is a ring of wire-gauze strainers. Wherever the con- crete aqueduct is intersected by valleys, cast-iron pipes are laid; in the first instance only two of the five rows 40 in. in diameter were laid, the city not requiring its supply to be augmented by more than 20,000,000 gallons a day, but in 1907 it was decided to lay a third line. All the elaborate arrangements described above for stopping the water in case of a burst have been employed, and have perfectly fulfilled their duties in the few cases in which they have been called into action. The water is received in a service reservoir at Prestwich, near Manchester, from which it is supplied to the city. The supply from this source was begun in 1894. The total cost of the complete scheme may be taken at about £5,000,000, of which rather under £3,000,000 had been spent up to the date of the opening, at which time only one line of pipes had been laid.

The Vyrnwy Aqueduct was sanctioned by parliament in 1880 for the supply of Liverpool from North Wales, the quantity of water Vyrnwy. obtainable being at least 40,000,000 gallons a day. A tower built in the artificial lake from which the supply is derived, contains the inlet and arrangements for straining the water. The aqueduct is 68 m. in length, and for nearly the whole distance will consist of three lines of cast-iron pipes, two of which, varying in diameter from 42 in. to 39 in., are now in use. As the total fall between Vyrnwy and the termination at Prescot reservoirs is about 550 ft., arrangements had to be made to ensure that no part of the aqueduct be subjected to a greater pressure than is required for the actual discharge. Balancing reservoirs have therefore been con- structed at five points on the line, advantage being taken of high ground where available, so that the total pressure is broken up into sections. At one of these points,

where the ground level is no ft. below the hydraulic gradient, a circular tower is built, making a most imposing architectural feature in the landscape. At the cross- ing of the river Weaver, 100 ft. wide and 15 ft. deep, the three pipes, here made of steel, were connected together laterally, floated into position, and sunk into a dredged trench prepared to receive them. Under the river Mersey the pipes are carried in a tunnel, from which, during construction, the water was excluded by compressed air.

Denver Aqueduct. — The supply to Denver City, initiated by the Citizens Water Company in 1889, is derived from the Platte river, rising in the Rocky Mountains. The first aqueduct Denver. constructed is rather over 20 m. in length, of which a length of 16 J m. is made of wooden stave pipe, 30 in. in diameter. The maximum pressure is that due to 185 ft. of water; the average cost of the wooden pipe was $1-36! per foot, and the capability of discharge 8,400,000 gallons a day. Within a year of the completion of the first conduit, it became evident that another of still greater capacity was required. This was completed in April 1893; it is 34 in. in diameter and will deliver 16,000,000 gallons a day. By increasing the head upon the first pipe, the combined discharge is 30,000,000 gallons a day. An incident in obtaining a temporary supply, without waiting for the completion of the second pipe, was the construction of two wooden pipes, 13 in. in diameter, crossing a stream with a span of 104 ft., and having no support other than that derived from their arched form. One end of the arch is 24J ft. above the other end, and, when filled with water, the deflection with eight men on it was only f of an inch. A somewhat similar arch, 60 ft. span, occurs on the 34-in. pipe where it crosses a canal. Schuyler points out (Trans. Am. Soc. C.E. vol. xxxi. p. 148) that the fact that the entire water supply of a city of 150,000 inhabitants is conveyed in wooden mains, is so radical a departure from all precedents, that it is deserving of more than a passing notice. He says that it is manifestly and unreservedly successful, and has achieved an enormous saving in cost. The sum saved by the use of wooden, in preference to cast-iron pipes, is estimated at $1,100,000. It is perhaps necessary to state that the pipe is buried in the ground in the same way as metal pipes. The edges of the staves are dressed to the radius with a minute tongue i\ in. high on one edge of each stave, but with no corresponding groove in the next stave; its object is to ensure a close joint when the bands are tightened up. Leaks seldom or never occur along the longitudinal seams, but the end shrinkage caused troublesome joint leaks. The shrinkage in California redwood, which had seasoned 60 to 90 days before milling, was frequently as much as 3 in. in the 20 staves that formed the 34-in. pipe, and the space so formed had to be filled by a special closing stave. Metallic tongues, J in. deep, are inserted at the ends of abutting staves, in a straight saw cut. The bands, which are of mild steel, have a head at one end and a nut and washer at the other; the ends are brought together on a wrought-

iron shoe, against which the nut and washer set. The staves forming the lower half of the pipe are placed on an outside, and the top staves on an inside, mould. While the bands are being adjusted the pipe is rounded out to bring the staves out full, and the staves are carefully driven home on to the abutting staves. The spacing of the bands depends on circumstances, but is about 150 bands per 100 ft. With low heads the limit of spacing was fixed at 17 in. The outer surface of the pipe, when charged, shows moisture oozing slightly over the entire surface. This condition Schuyler considers an ideal one for perfect preservation, and the staves were kept as thin as possible to ensure its occurrence. Samples taken from pipes in use from three to nine years are quite sound, and it is concluded that the wood will last as long as cast-iron if the pipe is kept constantly charged. The bands are the only perishable portion, and their life is taken at from fifteen to twenty years. Other portions of the second conduit for a length of nearly 3 m. were formed of concrete piping, 38 in. diameter, formed on a mould in the trench, the thickness being 2 i to 3 in. So successful an instance of the use of wooden piping on a large scale is sure to lead to a large development of this type of aqueduct in districts where timber is plentiful and iron absent.

Pioneer Aqueduct, Utah. — The construction of the Pioneer Aque- duct, Utah, was begun in 1896 by the Pioneer Electric Power Company, near the city of Ogden, 35 m. north of Salt p/ OBeer Lake City. The storage reservoir, from which it draws Utah ‘ its water, will cover an area of 2000 acres, and contain about 15,000 million gallons of water. The aqueduct is a pipe 6 ft. in diameter, and of a total length of 6 m. ; for a distance of rather more than 5 m. it is formed of wooden staves, the remainder, where the head exceeds 117 ft., being of steel. It is laid in a trench and covered to a depth of 3 ft. The greatest pressure on the steel pipe is 200 ft per sq. in., and the thickness varies from § to \l in. The pipe was constructed according to the usual practice of marine boiler-work for high pressures, and each section, about 9 ft. long, was dipped in asphalt for an heur. These sections were supported on timber blocking, placed from 5 to 9 ft. apart, and consisting of three to six pieces of 6 × 6 in. timbers laid one on the top of the other; they were then riveted together in the ordinary way. The wooden stave-pipe is of the type successfully used in the Western States for many years, but its diameter is believed to be unequalled for any but short lengths. There were thirty-two staves in the circle, 2 in. in thickness, and about 20 ft. long, hooped with round steel rods f in. in diameter, each hoop being in two pieces. The pipe is supported at intervals of 8 ft. by sills 6 × 8 in. and 8 ft. long. The flow through it is 250 cubic ft. per second.

The Santa Ana Canal was constructed for irrigation purposes in California, and is designed to carry 240 cub. ft. of water per second (Trans. Am. Soc. C.E. vol. xxxiii. p. 99). The cross Saata Ana _ section of the flumes shows

an elliptical bottom and straight sides consisting of wooden staves held together by

iron and steel ribs. The width and depth are each 5 ft. 6 in., the intended depth of water being 5 ft. The staves are held by T-iron supports resting on wooden sills spaced 8 ft. apart, and are com- pressed together by a framework. They were caulked with oakum, on the top of which, to a third of the total depth, hot asphalt was run. The use of nails was altogether avoided except in parts of the framework, it being noticed that decay usually starts at nail-holes. It was found possible to make the flume absolutely watertight, and in case of repair being necessary at any part the framework is easily taken to pieces so that new staves can be inserted. The water in the flume has a velocity of 9-6 ft. per second. The Warm Springs, Deep, and Morton canons on the line are crossed by wooden stave pipes 52 in. in diameter, bound with round steel rods, and laid above the surface of the ground. The work is planned for two rows of pipes, each capable of carrying 123 cub. ft. per second; of these one so far has been laid. The lengths of the pipes at each of the three canons are 551, 964 and 756 ft. respectively, and the maximum head at any place is 160 ft. The pipes are not painted, and it has been suggested that they would suffer in their exposed position in case of a bush fire, a contingency to which, of course, flumes are also liable.

Aqueducts of New York. — There are three aqueducts in New York — the Old Croton Aqueduct (1837-1843), the Bronx River Conduit JV Y rk. (l88o_l88 5). an d the New Croton Aqueduct (1884-1893), o discharging respectively 95, 28, and 302 million U. S. gallons a day; their combined delivery is therefore 4255 million gallons a day. The Old Croton Aqueduct is about 41 m. in length, and was constructed as a masonry conduit, except at the Harlem and Manhattan valleys, where two lines of 36-in. pipe were used. The inclination of the former is at the rate of about 13 in. per mile. The area of the cross-section is 53-34 sq. ft., the height is 8 i ft., and the greatest width 7 ft. 5 in.; the roof is semicircular, the floor segmental, and the sides have a batter on the face of § in. per foot. The sides and invert are of concrete, faced with 4 in. of brickwork, the roof being entirely of brickwork. There is a bridge over the Harlem river 1450 ft. in length, consisting of fifteen semi- circular arches; its soffit is 100 ft. above high water, and its cost was $963,427. The construction of the New Croton Aqueduct was begun in 1885, and the works were sufficiently advanced by the 15th of July 1890 to allow the supply to be begun. The lengths of the various parts of the aqueduct are as follows : —

Miles. Tunnel 29-75

Cut-and-cover 1-12

Cast-iron pipes, 48 in. diameter, 8 rows . 2-38

Croton Inlet to Central Park

33-25

The length of tunnel under pressure (circular form) is 7-17 m., and that not under pressure (horse-shoe form) 23-70 m. The maximum pressure in the former is 55 lb per sq. in. The width and height of the horse-shoe form are each 13 ft. 7 in., and the diameter of the circular form (with the exception of two short lengths) is 12 ft. 3 in. The reason for constructing the aqueduct in tunnel for so long a distance was the enhanced value of the low-lying ground near the old aqueduct. The tunnel deviates from a straight line only for the purpose of intersecting a few transverse valleys at which it could be emptied. For 25 m. the gradient is 0-7 foot per mile; the tunnel is then depressed below the hydraulic gradient, the maximum depth being at the Harlem river, where it is 300 ft. below high water. The depth of the tunnel varies from 50 to 500 ft. from the surface of the ground. Forty-two shafts were sunk to facilitate driving, and in four cases where the surface of the ground is below the hydraulic gradient these are closed by watertight covers. The whole of the tunnel is lined with brickwork from I to 2 ft. in thickness, the voids behind the lining being filled with rubble-in-mortar. The entry to the old and new aqueducts is controlled by a gatehouse of elaborate and massive design, and the pipes which take up the supply at the end of the tunnel are also commanded by a gate-house. The aqueduct, where it passes under the Harlem river, is worthy of special notice. As it approaches the river it has a considerable fall, and eventually ends in a vertical shaft 12 ft. 3 in. in diameter (where the water has a fall of 174 ft.), from the bottom of which, at a depth of 300 ft. below high-water level, the tunnel under the river starts. The latter is circular in form, the diameter being 10 ft. 6 in., and the length is 1300 ft.; it terminates at the bottom of another vertical shaft also 12 ft. 3 in. in diameter. The depth of this shaft, measured from the floor of the lower tunnel to that of the upper tunnel leading away from it, is 321 ft.; it is continued up to the surface of the ground, though closed by double watertight covers a little above the level of the upper tunnel. Adjoining this shaft is another shaft of equal diameter, by means of which the water can be pumped out, and there is also a communication with the river above high-water level, so that the higher parts can be emptied by gravitation. The cost of the Old Croton Aqueduct was $11,500,000; that of the new aqueduct is not far short of $20,000,000.

The Nadrai Aqueduct Bridge, in India, opened at the end of 1889, is the largest structure of its kind in existence. It was built to carry the water of the Lower Ganges canal over the Kali Naddi, in connexion with the irrigation canals of the north-west provinces.

*In the year 1888-1889 this canal had 564 m. of main line, with 2050 m. of minor distributaries, and irrigated 519,022 acres of crops. The new bridge replaces one of much smaller size (five N . , spans of 35 ft.), which was completely destroyed by a high " aara * flood in July 1885. It gives the river a waterway of 21,000 sq. ft., and the canal a waterway of 1040 sq. ft., the latter representing a discharge of 4100 cub. ft. per second. Its length is 1310 ft., and it is carried on fifteen arches having a span of 60 ft. The width between the faces of the arches is 149 ft. The foundations below the river-bed have a depth of 52 ft., and the total height of the structure is 88 ft. It cost 44J lakhs of rupees, and occupied four years in building. The foundations consist of 268 circular brick cylinders, and the fifteen spans are arranged in three groups, divided by abutment piers; the latter are founded on a double row of 12-ft. cylinders, and the intermediate piers on a single row of 20-ft. cylinders, all the cylinders being hearted with hydraulic lime concrete filled in with skips. This aqueduct-bridge has a very fine appearance, owing to its massive proportions and design. (E. P. H.*)*

Authorities. — For ancient aqueducts in general : Curt Merckel, Die Ingenieurtechnik im Alterthum (Berlin, 1899) ; ch. vi. contains a very full account from the earliest Assyrian aqueducts onwards, with illustrations, measurements and an excellent bibliography. For Greek aqueducts see E. Curtius, " Uber stadtische Wasserbauten der Hellenen,," in Archaeologische Zeitung (1847); G. Weber (as above); papers in Athen. Mittheil. (Samos), 1877, (Enneacrunus) 1892, 1893, 1894, 1905, and articles on Athens, Pergamcm, &c. For Roman aqueducts: R. Lanciani, " I Commentari di Frontino intorno le acque e gli acquedotti," in Memorie dei Lincei, serie iii. vol. iv. (Rome, 1880), 215 sqq., and separately; C. Herschel, The Two Books on the Water Supply of the City of Rome of Sextus Julius Frontinus (Boston, 1899) ; T. Ashby in Classical Review (1902), 336, and articles in The Builder; cf. also the maps to T. Ashby 's " Classical Topography of the Roman Campagna," in Papers of the British School at Rome, i., iii., iv. (in progress).

For modern aqueducts, see Rickman's Life of Telford (1838); Schramke's New York Croton Aqueduct; Second Annual Report of the Department of Public Works of the City of New York in 1872; Report of the Aqueduct Commissioners (1887-1895), and The Water Supply of the City of New York (1896), by Wegmann; Memoir es sur Us eaux de Paris, presentes par le Prefet de la Seine au Conseil Municipal (1854 and 1858) ; Recherches statistiques sur les sources du bassin de la Seine, par M. Belgrand,

Ingenieur en chef des ponts et chaussees (1854) : " Descriptions of Mechanical Arrangements of the Manchester Waterworks," by John Frederic Bateman, F.R.S., Engineer-in-chief, from the Minutes of Proceedings of the Institution of Mechanical Engineers (1866); The Glasgow Waterworks, by James M. Gale, Member Inst. C.E. (1863 and 1864); The Report of the Royal Commission on Water Supply, and the Minutes of Evidence (1867 and 1868). For accounts of other aqueducts, see the Transac- tions of the Societies of Engineers in the different countries, and the Engineering Journals.

AQUILA ('AxvKas) , (1) a Jew from Rome, who with his wife Prisca or Priscilla had settled in Corinth, where Paul stayed with them (Acts xviii. 2, 3). They became Christians and fellow- workers with Paul, to whom they seem to have shown their devotion in some special way (Rom. xvi. 3, 4). (2) A native of Pontus, celebrated for a very literal and accurate translation of the Old Testament into Greek. Epiphanius (De Pond, et Mens. c. 1 5) preserves a tradition that he was a kinsman of the emperor Hadrian, who employed him in rebuilding Jerusalem (Aelia Capitolina, q.v.), and that he was converted to Christianity, but, on being reproved for practising pagan astrology, apostatized to Judaism. He is said also to have been a disciple of Rabbi 'Aqiba (d. a.d. 132), and seems to be referred to in Jewish writ- ings as o^"py. Aquila's version is said to have been used in place of the Septuagint in the synagogues. • The Christians generally disliked it, alleging without due grounds that it rendered the Messianic passages incorrectly, but Jerome and Origen speak in its praise. Origen incorporated it in his Hexapla.

It was thought that this was the only copy extant, but in 1897 fragments of two codices were brought to the Cambridge University Library. These have been published — the fragments containing 1 Kings xx. 7-17; 2 Kings xxiii. 12-27 by F. C. Burkitt in 1897, those containing parts of Psalms xc.-ciii. by C. Taylor in 1899. See F. C. Burkitt's article in the Jewish Encyclopaedia.

AQUILA, CASPAR [Kaspar Adlee] (1488-1560), German reformer, was born at Augsburg on the 7th of August 1488, educated there and at Ulm (1502), in Italy (he met Erasmus in Rome), at Bern (1508), Leipzig (1510) and Wittenberg (1513). According to his son, he entered- the ministry in August 1514, at Bern. He was for some time a military chaplain. In 1516 he became pastor of Jenga, near Augsburg. Openly proclaim- ing his adhesion to Luther's doctrine, he was imprisoned for

half a year (1520 or 1522) at Dillingen, by order of the bishop of Augsburg; a death sentence was commuted to banishment through the influence of Isabella, wife of Christian II. of Den- mark and sister of Charles V. Returning to Wittenberg he met Luther, acted as tutor to the sons of Franz von Sickingen at Ebernburg, taught Hebrew at Wittenberg, and aided Luther in his version of the Old Testament. The dates and particulars of his career are uncertain till 1527, when he became pastor at Saalfeld, and in 1528, superintendent. His Vehement opposition to the Augsburg Interim (1548) led him to take temporary shelter at Rudolstadt with Catherine, countess of Schwarzburg. In 1550 he was appointed dean of the Collegiatstift in Schmal- kalden. Here he had a controversy with Andreas Osiander. Restored to Saalfeld, not without opposition, in 1552, he remained there, still engaged in controversy, till his death on the 1 2 th of November 1560. He was twice married, and left four sons. He published numerous sermons, a few Old Testa- ment expositions and some controversial tracts.

See G. Kawerau, in A. Hauck's Realencyklopadie (1896) ; Allge- meine deutsche Biog. (1875); Lives by J. Avenarius (1718); J. G. Hillinger (1731); Chr. Schlegel (1737); Fr. Gensler (1816).

AQUILA, SERAFINO DELL (1466-1500), Italian poet and improvisatore, was born in 1466 at the town of Aquila, from which he took his name, and died in the year 1300- He spent several years at the courts of Cardinal Sforza and Ferdinand, duke of Calabria; but his principal patrons were the Borgias at Rome, from whom he received many favours. Aquila seems to have aimed at an imitation of Dante and Petrarch; and his poems, which were extravagantly praised during the author's lifetime, are occasionally of considerable merit. His reputation was in great measure due to his remarkable skill as an impro- visatore and musician. His works were printed at Venice in 1302, and there have been several subsequent editions.*

AQUILA, a city of the Abruzzi, Italy, the capital of the province of Aquila, and the seat of an archbishop, 2360 ft. above sea-level, 50 m. directly N.E. of Rome, and 143 m. by rail. Pop. (1001) town, 18,494; commune, 21,261. It lies on a hill in the wide valley of the Aterno, surrounded by mountains on all sides, the Gran Sasso d'ltalia being conspicuous on the north- east. It is a favourite summer resort of the Italians, but is cold and windy in winter. In the highest part of the town is the massive citadel, erected by the . Spanish viceroy Don Pedro de Toledo in 1534. The church of S. Bernardino di Siena (1472) has a fine Renaissance facade by Nicold Filotesio (commonly called Cola dell' Amatrice), and contains the monumental tomb of the saint, decorated with beautiful sculptures, and executed by Silvestro Ariscola in 1480. The church of S. Maria di Colle- maggio, just outside the town, has a very fine Romanesque facade of simple

design (1270-1280) in red and white marble, with three finely decorated portals and a rose-window above each. The two side doors are also fine. The interior contains the mausoleum of Pope Celestine V. (d. 1296) erected in 1317. Many smaller churches in the town have similar facades (S. Giusta, S. Silvestro, &c). The town also contains some fine palaces: the municipality has a museum, with a collection of Roman inscriptions and some illuminated service books. The Palazzi Dragonetti and Persichetti contain private collections of pictures. Outside the town is the Fontana idle novantanove cannelle, a fountain with ninety-nine jets distributed along three walls, constructed in 1272. Aquila has some trade in lace and saffron, and possesses other smaller industries. It was a uni- versity town in the middle ages, but most of its chairs have now been suppressed.

Aquila was founded by Conrad, son of the emperor Frederick II., about 1230, as a bulwark against the power of the papacy. It was destroyed by Manfred in 1239, but soon rebuilt by Charles I. of Anjou. Its walls were completed in 1316; and it maintained itself as an almost independent republic until it was subdued in 1521 by the Spaniards, who had become masters of the kingdom of Naples in 1303. It was twice sacked by the French in 1799.

See V. Bindi, Monumenti storici ed artistici degli Abruzzi (Naples, 1889), pp. 771 seq.

AQUILA, in astronomy, the " Eagle," sometimes named the " Vulture," a constellation of the northern hemisphere, men- tioned by Eudoxus (4th cent. B.C.) and Aratus (3rd cent. B.C.). Ptolemy catalogued nineteen stars jointly in this constellation and in the constellation Antinous, which was named in the reign of the emperor Hadrian (a.d. 1 17-138), but sometimes, and wrongly, attributed to Tycho Brahe, who catalogued twelve stars in Aquila and seven in Antinous; Hevelius determined twenty-three stars in the first, and nineteen in the second. The most brilliant star of this constellation, a-Aquilae or Altair, has a parallax of 0-23", and consequently is about eight times as bright as the sun; -q-Aquilae is a short-period variable, while Nova Aquilae is a " temporary " or " new " star, discovered by Mrs Fleming of Harvard in 1899.

AQUILA ROMANUS, a Latin grammarian who flourished in the second half of the 3rd century a.d. He was the author of an extant treatise De Figuris Sententiarum et Elocutionis, written as an instalment of a complete rhetorical handbook for the use of a young and eager correspondent. While recom- mending Demosthenes and Cicero as models, he takes his own examples almost exclusively from Cicero. His treatise is really adapted from that by Alexander, son of Numenius, as is expressly stated by Julius Rufinianus, who brought out a supplementary treatise, augmented by

material from other sources. Aquila's style is harsh and careless, and the Latin is inferior.

Halm; Rhetores Latini minores (1863) ; Wensch, De Aquila Romano

(1861).

AQUILEIA, an ancient town of Italy, at the head of the Adriatic at the edge of the lagoons, about 6 to. from the sea, on the river Natiso (mod. Natisone) , the course of which has changed somewhat since Roman times. It was founded by the Romans in 181 B.C. as a frontier fortress on the north-east, not far from the site where, two years before, Gaulish invaders had attempted to settle. The colony was led by two men of consular and one of praetorian rank, and 3000 pedites formed the bulk of the settlers. It was probably connected by road with Bononia in 175 B.C.; and subsequently with Genua in 148 B.C. by the Via Postumia, which ran through Cremona, Bedriacum and Altinum, joining the first-mentioned road at Concordia, while the con- struction of the Via Popilia from Ariminum to Ad Portum near Altinum in 132 B.C. improved the communications still further. In 169 B.C., 1300 more families were settled there as a rein- forcement to the garrison. The discovery of the goldfields near the modern Klagenfurt in 130 B.C. (Strabo iv. 208) brought it into notice, and it soon became a place of importance, not only owing to its strategic position, but as a centre of trade, especially in agricultural products. It also had, in later times at least, considerable brickfields. It was originally a Latin colony, but. became a municipium probably in 90 B.C. The customs boundary of Italy was close by in Cicero's day. It was plundered by the Iapydes under Augustus, but, in the period of peace which followed, was able to develop its resources. Augustus visited it during the Pannonian wars in 12-10 B.C. and it was the birthplace of Tiberius's son by Julia, in the latter year. It was the starting-point of several important roads lead- ing to the north-eastern portion of the empire — the road (Via Iulia Augusta) by Iulium Carnicum to Veldidena (mod. Wilten, near Innsbruck), from which branched off the road into Noricum, leading by Virunum (Klagenfurt) to Laurieum (Lorch) on the Danube, the road into Pannonia, leading to Emona (Laibach) 1 and Sirmium (Mitrowitz), the road to Tarsatica (near Fiume) and Siscia (Sissek), and that to Tergeste (Trieste) and the Istrian coast.

In the war against the Marcomanni in a.d. 167, the town was hard pressed; the fortifications had fallen into disrepair during the long peace. In a.d. 238, when the town took the side of the senate against the emperor Maximinus, they were hastily restored, and proved of sufficient strength to resist for several months, until Maximinus. himself was assassinated. The 4th century marks, however, the greatest importance of

.. x This road is described in detail by O. Cuntz in Jahreshefte des Osterr. Arch. Inst. v. (1902), Beiblatt, pp. 139 scq.

Aquileia; it became a naval station and, probably, the seat of the corrector Venetiarum et Histriae; a mint was established here, the coins of which are very numerous, and the bishop obtained the rank of patriarch. An imperial palace was constructed here, in which the emperors after the time of Diocletian frequently resided; and the city often played a part in the struggles between the rulers of the 4th century. At the end of the century, Ausonius enumerated it as the ninth among the great cities of the world, placing Rome, Mediolanum and Capua before it, and called it " moenibus et portu celeberrima." In a.d. 452, how- ever, it was destroyed by Attila, though it continued to exist until the .Lombard invasion of a.d. 568. After this the patri- archate was transferred to Grado. In 606 the diocese was divided into two parts, and the patriarchate of Aquileia, pro- tected by the Lombards, was revived, that of Grado being protected by the exarch of Ravenna and later by the doges of Venice. In 1027 and 1044 Patriarch Poppo of Aquileia entered and sacked Grado, and, though the pope reconfirmed the patri- arch of the latter in his dignities, the town never recovered, though it continued to be the seat of the patriarchate until its formal transference to Venice in 1450. The seat of the patri- archate of Aquileia had been transferred to Udine in 1238, but returned in 1420 when Venice annexed the territory of Udine. It was finally suppressed in 1751, and the sees of Udine and Gorizia (Gorz) established in its stead. Its buildings served as stone quarries for centuries, and no edifices of the Roman period remain above ground. Excavations have revealed one street and the north-west angle of the town walls, while the local museum contains over 2000 inscriptions, besides statues and other antiquities. The cathedral, a flat-roofed basilica, was erected by Patriarch Poppo in 103 1 on the site of an earlier church, and rebuilt about 1379 in the Gothic style by Patriarch Marquad. The narthex and baptistery belong to an earlier period. Of the palace of the patriarchs only two isolated columns remain standing. The modern village (pop. 2300) is rendered unhealthy by rice-fields.

See T. W. Jackson, Dalmatia, Istria and the Quarnero (Oxford, 1887), iii. 377 seq.; H. Maionica, Aquileia zur Romerzeit (Gorz, 1881), Fundkarte von Aquileia (Gorz, 1893), " Inschriften in Grado " (Roman inscriptions removed thither from Aquileia) in Jahreshefte des Osterr. Arch. Instituts, i. (1898), Beiblatt, 83, 125. (T. As.)

AQUILLIUS, MANIUS, Roman general, consul in 101 B.C. He successfully put down a revolt of the slaves under Athenion in Sicily. After his return, being accused of extortion, he was acquitted on account of his military services, although there was little doubt of his guilt. In 88 he acted as legate against Mithradates the Great, by whom he was defeated and taken prisoner. Mithradates treated him with great cruelty, and is said to have put him to death by pouring molten gold down his throat.

Diodorus Siculus xxxvi. 3; Appian, Mithrid. ii. 17. 21; Veil. Paterculus ii. 18; Cicero, Verres, iii. 54, De Officiis, ii. 14, Tusc. v. 5.

AQUINAS, THOMAS [Thomas of Aquin or Aquino], (c 1227- 1274), scholastic philosopher, known as Doctor Angelicus, Doctor Universalis, was of noble descent, and nearly allied to several of the royal houses of Europe. He was born in 1225 or 1227, at Roccasecca, the castle of his father Landulf, count of Aquino, in the territories of Naples. Having received his elementary education at the monastery of Monte Cassino, he studied for six years at the university of Naples, leaving it in his sixteenth year. While there he probably came under the influence of the Domini- cans, who were doing their utmost to enlist within their ranks the ablest young scholars of the age, for in spite of the opposition of his family, which was overcome only by the intervention of Pope Innocent IV., he assumed the habit of St Dominic in his seventeenth year.

His superiors, seeing his great aptitude for theological study, sent him to the Dominican school in Cologne, where Albertus Magnus was lecturing on philosophy and theology. In 1245 Albertus was called to Paris, and there Aquinas followed him, and remained with him for three years, at the end of which he graduated as bachelor of theology. In 1248 he returned to

Cologne with Albertus, and was appointed second lecturer and magister studentiutn. This year may be taken as the beginning of his literary activity and public life. Before he left Paris he had thrown himself with ardour into the controversy raging between the university and the Friar-Preachers respecting the liberty of teaching, resisting both by speeches and pamphlets the authorities of the university; and when the dispute was referred to the pope, the youthful Aquinas was chosen to defend his order, which he did with such success as to overcome the argu- ments of Guillaume de St Amour, the champion of the university, and one of the most celebrated men of the day. In 1257, along with his friend Bonaventura, he was created doctor of theology, and began to give courses of lectures upon this subject in Paris, and also in Rome and other towns in Italy. From this time onwards his life was one of incessant toil; he was continually engaged in the active service of his order, was frequently travel- ling upon long and tedious journeys, and was constantly consulted on affairs of state by the

reigning pontiff.

In 1263 we find him at the chapter of the Dominican order held in London. In 1268 he was lecturing now in Rome and now in Bologna, all the while engaged in the public business of the church. In 1271 he was again in Paris, lecturing to the students, managing the affairs of the church and consulted by the king, Louis VIII., his kinsman, on affairs of state. In 1272 the commands of the chief of his order and the request of King Charles brought him back to the professor's chair at Naples. All this time he was preaching every day, writing homilies, disputations, lectures, and finding time to work hard at his great work the Summa Theologiae. Such rewards as the church could bestow had been offered to him. He refused the archbishopric of Naples and the abbacy of Monte Cassino. In January 1274 he was summoned by Pope Gregory X. to attend the council convened at Lyons, to investigate and if possible settle the differences between the Greek and Latin churches. Though suffering from illness, he at once set out on the journey; finding his strength failing on the way, he was carried to the Cistercian monastery of Fossa Nuova, in the diocese of Terracina, where, after a lingering illness of seven weeks, he died on the 7th of March 1274, Dante (Purg. xx. 69) asserts that he was poisoned by order of Charles of Anjou. Villani (ix.218) quotes the belief, and the Anonimo Fiorentino describes the crime and its motive. But Muratori, reproducing the account given by one of Thomas's friends, gives no hint of foul play. Aquinas was canonized in 1323 by Pope John XXII., and in 1567 Pius V. ranked the festival of St Thomas with those of the four great Latin fathers, Ambrose, Augustine, Jerome and Gregory. No theologian save Augustine has had an equal influence on the theological thought and language of the Western Church, a fact which was strongly emphasized by Leo XIII. (q.v.) in his Encyclical of August 4, 1879, which directed the clergy to take the teachings of Aquinas as the basis of their theological position. In 1880 he was declared patron of all Roman Catholic educational establishments. In a monastery at Naples, near the cathedral of St Januarius, is still shown a cell in which he is said to have lived.

The writings of Thomas are of great importance for philosophy as well as for theology, for by nature and education he is the spirit of scholasticism incarnate. The principles on which his system rested were these. He held that there were two sources of knowledge — the mysteries of Christian faith and the truths of human reason. The distinction between these two was made emphatic by Aquinas, who is at pains, especially in his treatise Contra Gentiles, to make it plain that each is a distinct fountain of knowledge, but that revelation is the more important of the two. Revelation is a source of knowledge, rather than the manifestation in the world of a divine life, and its chief character- istic is that it presents men with mysteries, which are to be believed even when they cannot be understood.

Revelation is not Scripture alone, for Scripture taken by itself does not corre- spond exactly with his description; nor is it church tradition alone, for church tradition must so far rest on Scripture. Revela- tion is a divine source of knowledge, of which Scripture and church tradition arc the channels; and he who would rightly

understand theology must familiarize himself with Scripture, the teachings of the fathers, and the decisions of councils, in such a way as to be able to make part of himself, as it were, those channels along which this divine knowledge flowed. Aquinas's conception of reason is in some way parallel with his conception of revelation. Reason is in his idea not the individual reason, but the fountain of natural truth, whose chief channels are the various systems of heathen philosophy, and more especially the thoughts of Plato and the methods of Aristotle. Reason and revelation are separate sources of knowledge; and man can put himself in possession of each, because he can bring himself into relation to the church on the one hand, and the system of philo- sophy, or more strictly Aristotle, on the other. The conception will be made clearer when it is remembered that Aquinas, taught by the mysterious author of the writings of the pseudo-Dionysius, who so marvellously influenced medieval writers, sometimes spoke of a natural revelation, or of reason as a source of truths in themselves mysterious, and was always accustomed to say that reason as well as revelation contained two kinds of know- ledge. The first kind lay quite beyond the power of man to receive it, the second was within man's reach. In reason, as in revelation, man can only attain to the lower kind of knowledge; there is a higher kind which we may not hope to reach.

But while reason and revelation are two distinct sources of truths, the truths are not contradictory; for in the last resort they rest on one absolute truth — they come from the one source of knowledge, God, the Absolute One. Hence arises the compatibility of philosophy and theology which was the funda- mental axiom of scholasticism, and the possibility of a Summa Theologiae, which is a Summa Philosophiae as well. All the many writings of Thomas are preparatory to his great work the Summa Theologiae, and show us the progress of his mind training for this his life work. In the Summa Catholicae Fidei contra Gentiles he shows how a Christian theology is the sum and crown of all science. This work is in its design apologetic, and is meant to bring within the range of Christian thought all that is of value in Mahommedan science. He carefully establishes the necessity of revelation as a source of knowledge, not merely because it aids us in comprehending in a somewhat better way the truths already furnished by

reason, as some of the Arabian philosophers and Maimonides had acknowledged, but because it is the absolute source of our knowledge of the mysteries of the Christian faith ; and then he lays down the relations to be observed between reason and revelation, between philosophy and theology. This work, Contra Gentiles, may be taken as an elaborate exposition of the method of Aquinas. That method, however, implied a careful study and comprehension of the results which accrued to man from reason and revelation, and a thorough grasp of all that had been done by man in relation to those two sources of human knowledge; and so, in his preliminary writings, Thomas proceeds to master the two provinces. The results of revelation he found in the Holy Scriptures and in the writings of the fathers and the great theologians of the church; and his method was to proceed backwards. He began with Peter of Lombardy (who had reduced to theological order, in his famous book on the Sentences, the various authoritative statements of the church upon doctrine) in his In Quatuor Sententiarum P. Lombardi libros. Then came his deliverances upon undecided points in theology, in his XII. Quodlibeta Disputata, and his Quaestiones Disputatae. His Catena Aurea next appeared, which, under the form of a commentary on the Gospels, was really an exhaustive summary of the theological teaching of the greatest of the church fathers. This side of his preparation was finished by a close study of Scripture, the results of which are contained in his commentaries, In omnes Epistolas Divi Apostoli Expositio, his Super Isaiam et Jeremiam, and his In Psalmos. Turning now to the other side, we have evidence, not only from tradition but from his writings, that he was acquainted with Plato and the mystical Platonists; but he had the sagacity to perceive that Aristotle was the great representative of philosophy, and that his writings contained the best results and method which the natural reason had as yet

attained to. Accordingly Aquinas prepared himself on this side by commentaries on Aristotle's De Interpretation, on his Posterior Analytics, on the Metaphysics, the Physics, the De Anima, and on Aristotle's other psychological and physical writings, each commentary having for its aim to lay hold of the material and grasp the method contained and employed in each treatise. Fortified by this exhaustive preparation, Aquinas began his Summa Theologiae, which he intended to be the sum of all known learning, arranged according to the best method, and subor- dinate to the dictates of the church. Practically it came to be the theological dicta of the church, explained according to the philosophy of Aristotle and his Arabian commentators. The Summa is divided into three great parts, which shortly may be said to treat of God, Man and the God-Man. The first and the second parts are wholly the work of Aquinas, but of the third part only the first ninety quaestiones are his; the rest of it was finished in accordance with his designs. The first book, after a short introduction upon the nature

of theology as understood by Aquinas, proceeds in 119 questions to discuss the nature, attributes and relations of God; and this is not done as in a modern work on theology, but the questions raised in the physics of Aristotle find a place alongside of the statements of Scripture, while all subjects in any way related to the central theme are brought into the discourse. The second part is divided into two, which are quoted as Prima Secundae and Secunda Secundae. This second part has often been described as ethic, but this is scarcely true. The subject is man, treated as Aristotle does, according to his reXos, and so Aquinas discusses all the ethical, psychological and theological questions which arise; but any theological discussion upon man must be mainly ethical, and so a great proportion of the first part, and almost the whole of the second, has to do with ethical questions. In his ethical discus- sions (a full account of which is given under Ethics) Aquinas distinguishes theological from natural virtues and vices; the theological virtues are faith, hope and charity; the natural, justice, prudence and the like. The theological virtues are founded on faith, in opposition to the natural, which are founded on reason; and as faith with Aquinas is always belief in a pro- position, not trust in a personal Saviour, conformably with his idea that revelation is a new knowledge rather than a new life, the relation of unbelief to virtue is very strictly and narrowly laid down and enforced. The third part of the Summa is also divided into two parts, but by accident rather than by design. Aquinas died ere he had finished his great work, and what has been added to complete the scheme is appended as a Supple- mentum Tertiae Partis. In this third part Aquinas discusses the person, office and work of Christ, and had begun to discuss the sacraments, when death put an end to his labours.

The purely philosophical theories of Aquinas are explained in the article Scholasticism. In connexion with the problem of universals, he held that the diversity of individuals depends on the quantitative division of matter (materia signata), and in this way he attracted the criticism of the Scotists, who pointed out that this very matter is individual and determinate, and, therefore, itself requires explanation. In general, Aquinas maintained in different senses the real existence of universals ante rem, in re and post rem.

The best modern edition of the works of Aquinas is that prepared at the expense of Leo XIII. (Rome, 1882-1903). The Abbe Migne published a very useful edition of the Summa Theologiae, in four 8vo vols., as an appendix to his Patrologiae Cursus Completus; English editions, J. Rickaby (London, 1872), J. M. Ashley (London, 1888). See Acta Sand., vii. Martii ; A. Touron, La Vie de St Thomas d'Aquin, avec un expose de sa doctrine et de ses ouvrages (Paris, 1737); Karl Werner, Der Heilige Thomas von Aquino (1858) ; and R. B. Vaughan, St Thomas of Aquin, his Life and Labours (London, 1872) : other lives by P. Cavanagh (London, 1890); E.

Desmousseaux de Giure (Paris, 1888); M. Didot (Louvain, 1894). For the philosophy of Aquinas, see Albert Stockl, Geschichte der Philosophic des Mittelalters, ii. ; B. Haureau, De la philosophic scolastique, vol. ii. ; J. Frohschammer, Die Philos. d. Th. von A. (Leipzig, 1889); K. Prantl, Geschichte d. Logik, vol. iii. ; C. M. Schneider, Natur, Vernunft, Gotl (Regensburg, 1883), Das Wissen Gottes nach d. Lehre des Th. v. A. (4 vols. Regens- burg, 1884-1886), Die socialistische Staatsidee beleuchtet durch Th. v. A. (Paderborn, 1894); A. Harnack, Hist, of Dogma (trans. Wm.

Gilchrist, London, 1899); Ueberweg's History of Philosophy, vol. i. See also H. C. O'Neill, New Things and Old in St Thomas Aquinas (1909), with biography. (T. M. L. ; J. M. M.)

AQUINO, a town and episcopal see of Campania, Italy, in the province of Caserta; it is 56 m. N.W. by rail from the town of Caserta, and 75 m. N.W. of Cassino. Pop. (1901) 2672. The modern town, close to the ancient, is unimportant, though the canons of the cathedral have the privilege of wearing the mitre and cappa magna at great festivals. It is close to the site of the ancient Aquinum, a municipium in the time of Cicero, and made a colony by the Triumviri, the birthplace of Juvenal and of the emperor Pescennius Niger. The Via Latina traversed it; one of the gates through which it passed, now called Porta S. Lorenzo, is still well preserved, and there are remains within the walls (portions of which, built of large blocks of limestone, still remain) of two (so called) temples, a basilica and an amphitheatre (see R. Delbriick in Rom. Mitteilungen, 1903, p. 143). Outside, on the south is a well-preserved triumphal arch with composite capitals, and close to it the nth-century basilica of S. Maria Libera, a handsome building in the Romanesque style, but now roofless. Several Roman inscriptions are built into it, and many others that have been found indicate the ancient importance of the place, which, though it does not appear in early history, is vouched for by Cicero and Strabo. 1 A colony was planted hereby the Triumviri. St Thomas Aquinas was born in the castle of Roccasecca, 5 m. N.

See E. Grossi, Aquinum (Rome, 1907). (T. As.)

AQUITAINE, the name of an ancient province in France, the extent of which has varied considerably from time to time. About the time of Julius Caesar the name Aquilania was given to that part of Gaul lying between the Pyrenees and the Garonne, and its inhabitants were a race, or races,

distinct from the Celts. The name Aquitania is probably a form of Auscetani, which in its turn is a lengthened form of Ausces, and is thus cognate with the words Basque and Wasconia, i.e. Gascony. Although many of the tribes of Aquitania submitted to Julius Caesar, it was not until about 28 B.C. that the district was brought under the Roman yoke. In keeping with the Roman policy of denational- ization, the term Aquitania was extended, and under Augustus it included the whole of Gaul south and west of the Loire and the Allier, and thus ceased to possess ethnographical importance. In the 3rd century a.d. this larger Aquitania was divided into three parts: Aquitania Prima, the eastern part of the district between the Loire and the Garonne; Aquitania Secunda, the western part of the same district; and Aquitania Tertia, or N ovempopulana, the region between the Garonne and the Pyrenees, or the original Aquitania. The seats of government were respectively Bourges, Bordeaux and Eauze; the province contained twenty-six cities, and was in the diocese of Vienne. Like the rest of Gaul, Aquitania absorbed a large measure of Roman civilization, and this continued to distinguish the dis- trict down to a late period. In the 5th century the Visigoths established themselves in Aquitania Secunda, and also in parts of Aquitania Prima and Novempopulana, but after the defeat of their king Alaric II. by the Franks under Clovis in 507, they were supplanted by their conquerors. Clovis and his successors extended their authority nominally to the Pyrenees, but, as Guizot has remarked, " the conquest of Aquitania by Clovis left it almost as alien to the people and king of Franks as it had formerly been." Subsequently during the - Merovingian period it was contended for by the feeble rulers of the various Frankish kingdoms, and was frequently partitioned among them; but the Aquitanians had little difficulty in effectually resisting this authority, although they did not establish themselves as a separate kingdom. About 628, indeed, they gathered around Charibert, or Haribert, a brother of the Frankish king, Dagobert I., in the hope of national independence; but after his death in 630 they returned to their former condition. But this effort, although a failure, brought about a certain measure of concord between the two principal races inhabiting the district, and so prepared

1 According to H. Nissen, Ital. Landeskunde (Berlin, 1902), ii. 665, a road ran from here to Minturnae; but no traces of it are to be seen.

the way for the stubborn resistance which, subsequently, the Aquitanians were able to offer to the Franks.

The first line of dukes began about 660 with one Felix, who, like his successor, Lupus, probably owned allegiance to the Frankish kings, and whose seat of government was Toulouse. About the end of the 7 th century an adventurer named Odo, or Eudes, made himself master of this region. Attacked by the Saracens he inflicted on them a crushing defeat, but when

they reappeared, he was obliged to invoke the aid of Charles Martel, who, as the price of his support, claimed and received the homage of his ally. Odo was succeeded by his son Hunald, who after carrying on a wax against the Franks under Pippin the Short, retired to a convent, leaving both the kingdom and the conflict to Waifer, or Guaifer. For some years Waifer strenuously carried on an unequal struggle with the Franks, but he was assassinated in 768, and with him perished the national independence, although not the national individuality, of the Aquitanians. In 781 Charlemagne bestowed Aquitaine upon his young son, Louis, and as Louis was generally described as a king, Aquitaine is referred to during the Carolingian period as a kingdom, and not as a duchy. When Louis succeeded Charlemagne as emperor in 814, he granted Aquitaine to his son Pippin, on whose death in 838 the Aquitanians chose his son Pippin II. (d. 865) as their king. The emperor Louis I., however, opposed this arrangement and gave the kingdom to his youngest son Charles, afterwards the emperor Charles the Bald. Now followed a time of confusion and conflict which resulted eventually in the success of Charles, although from 845 to 852 Pippin was in possession of the kingdom. In 852 Pippin was imprisoned by Charles the Bald, who soon afterwards gave to the Aquitanians his own son Charles as their king. On the death of the younger Charles in 866, his brother Louis the Stammerer succeeded to the kingdom, and when, in 877, Louis became king of the Franks, Aquitaine was united to the Frankish crown.

A new period now begins in the history of Aquitaine. By a treaty made in 845 between Charles the Bald and Pippin II. the kingdom had been diminished by the loss of Poitou, Sain- tonge and Angoumois, which had been given to Rainulf I., count of Poitiers. Somewhat earlier than this date the title of duke of the Aquitanians had been revived, and this was now borne by Rainulf, although it was also claimed by the counts of Toulouse. The new duchy of Aquitaine, comprising the three dis- tricts already mentioned, remained in the hands of Rainulf's successors, in spite of some trouble with their Frankish over- lords, until 893 when Count Rainulf II. was poisoned 'by order of King Charles III. the Simple. Charles then bestowed the duchy upon William the Pious, count of Auvergne, the founder of the abbey of Cluny, who was succeeded in 918 by his nephew, Count William II., who died in 926. A succession of dukes followed, one of whom, William IV., fought against Hugh Capet, king of France, and another of whom, William V., called the Great, was able considerably to strengthen and extend his authority, although he failed in his attempt to secure the Lom- bard crown. William's duchy almost reached the limits of the Roman Aquitania Prima and Secunda, but did not stretch south of the Garonne, a district which was in the possession of the Gascons. William died in 1030, and the names of William VI. (d. 1038), Odo or Eudes (d.

1039), who joinedGascony to his duchy, William VII. and William VIII. bring us down to William IX. (d, 1127), who succeeded in 1087, and made himself famous as a crusader and a troubadour. William X. (d. 113.7.) married his daughter Eleanor to Louis VII., king of France, and Aquitaine went as her dowry. When Eleanor was divorced from Louis and was married in 1152 to Henry II. of England the duchy passed to her new husband, who, having suppressed a revolt there, gave it to his son Richard. When Richard died in 1 199, it reverted to Eleanor, and on her death five years later, was united to the English crown and henceforward followed the fortunes of the English possessions in France. Aquitaine as it came to the English kings stretched as of old from the Loire to the Pyrenees, but its extent was curtailed on the

south-east by the wide lands of the counts of Toulouse. The name Guienne, a corruption of Aquitaine, seems to have come into use about the 10th century, and the subsequent history of Aquitaine is merged in that of Gascony (q.v.) and Guienne (q.v.).

See E. Desjardins, Geographic hisloriquc et administrative de la Gaule romaine (Paris, 1876, 93); A. Luchaire, Les Origines lin- guistiques de V Aquitaine (Paris, 1877) ; A. Longnon, Geographic de la Gaule au VI' siecle (Paris, 1876); A. Perroud, Les Origines du premier duche d' Aquitaine (Paris, 1881) ; and E. Mabille, Le Royaume d' Aquitaine el ses marches sous les Carlovingiens (Paris, 1870).

ARABESQUE, a word meaning simply " Arabian," but technically used for a certain form of decorative design in flowing lines intertwined; hence comes the more metaphorical use of this word, whether in nature or in morals, indicating a fantastic or complicated interweaving of lines against a back- ground. In decorative design the term is historically a misnomer. It is applied to the grotesque decoration derived from Roman remains of the early time of the empire, not to any style derived from Arabian or Moorish work. Arabesque and Moresque are really distinct; the latter is from the Arabian style of orna- ment, developed by the Byzantine Greeks for their new masters, after the conquests of the followers of Mahomet; and the former is a term pretty well restricted to varieties of cinquecento de- coration, which have nothing in common with any Arabian examples in their details, but are a development derived from Greek and Roman grotesque designs, such as we find them in the remains of ancient palaces at Rome, and in ancient houses at Pompeii. These were reproduced by Raphael and his pupils in the decoration of some of the corridors of the

Loggie of the Vatican at Rome: grotesque is thus a better name for these decorations than Arabesque. This technical Arabesque, there- fore, is much more ancient than any Arabian or Moorish decora- tion, and has really nothing in common with it except the mere symmetrical principles of its arrangement. Pliny and Vitruvius give us no name for the extravagant decorative wall-painting in vogue in their time, to which the early Italian revivers of it seem to have given the designation of grotesque, because it, was first discovered in the arched or underground chambers (grotte) of Roman ruins — as in the golden house of Nero, or the baths of Titus. What really took place in the Italian revival was in some measure a supplanting of the Arabesque for the classical grotesque, still retaining the original Arabian designation, while the genuine Arabian art, the Saracenic, was distinguished as Moresque or Moorish. So it is now the original Arabesque that is called by its specific names of Saracenic, Moorish and Alham- bresque, while the term Arabesque is applied exclusively to the style developed from the debased classical grotesque of the Roman empire.

There is still much of the genuine Saracenic element in Re- naissance Arabesques, especially in that selected for book-borders and for silver-work, the details of which consist largely of the conventional Saracenic foliations. But the Arabesque developed in the Italian cinquecento work repudiated all the original Arabian elements and devices, and limited itself to the mani- pulating of the classical elements, of which the most prominent feature is ever the floriated or foliated scroll; and it is in this cinquecento decoration, whether in sculpture or in painting, that Arabesque has been perfected.

In the Saracenic, as the elder sister of the two styles, which was ingeniously developed by the Byzantine Greek artists for their Arabian masters in the early times of Mahommedan conquest, every natural object was proscribed; the artists were, therefore, reduced to making symmetrical designs from forms which should have no positive meaning; yet the Byzantine Greeks, who were Christians, managed to work even their own ecclesiastical symbols, in a disguised manner, into their tracery and diapers; as the lily, for instance. The cross was not so introduced; this, of course, was inadmissible; but neither was the crescent ever introduced into any of this early work in Damascus or Cairo. The crescent was itself not a Mahommedan device till after the conquest of Constantinople in 1453 a.d. The crescent, as the new moon, was the symbol of Byzantium; and it was only after

that capital of the Eastern empire fell into the hands of the Turks that this symbol was adopted by them. The crescent and the cross became antagonist standards, therefore, first in the 15th century. And the crescent is not an element of original Moorish decoration.

The Alhambra diapers and original Majolica (Majorca) ware afford admirable specimens of genuine Saracenic or Moorish decoration. A conventional floriage is common in these diapers; tracery also is a great feature in this work, in geometrical com- binations, whether rectilinear or curvilinear; and the designs are rich in colour; idolatry was in the reproduction of natural forms, not in the fanciful combination of natural colours. These curves and angles, therefore, or interfacings, chiefly in stucco, constitute the prominent elements of an Arabian ornamental design, combining also Arabic inscriptions; composed of a mass of foliation or floral forms conventionally disguised, as the ex- clusion of all natural images was the fundamental principle of the style in its purity. The Alhambra displays almost endless specimens of this peculiar work, all in relief, highly coloured, and profusely enriched with gold. The mosque of Tulun, in Cairo, a.d. 876, the known work of a Greek, affords the completest example of this art in its early time; and Sicily contains many remains of this same exquisite Saracenic decoration.

Such is the genuine Arabesque of the Arabs, but a very different style of design is implied by the Arabesque of the cinquecento, a purely classical ornamentation. This owes its origin to tlie excavation and recovery of ancient monuments, and was developed chiefly by the sculptors of the north, and the painters of central Italy; by the Lombardi of Venice, by Agostino Busti of Milan, by Bramante of Urbino, by Raphael, by Giulio Romano, and others of nearly equal merit. Very beautiful examples in sculpture of this cinquecento Arabesque are found in the churches of Venice, Verona and Brescia; in painting, the most complete specimens are those of the Vatican Loggie, and the Villa Madama at Rome and the ducal palaces at Mantua. The Vatican Arabesques, chiefly executed for Raphael by Giulio Romano, Gian Francesco Penni, and Gio- vanni da Udine, though beautiful as works of painting, are often very extravagant in their composition, ludicrous and sometimes aesthetically offensive; as are also many of the decorations of Pompeii. The main features of these designs are balanced scrolls in panels; or standards variously composed, but sym— metrically scrolled on either side, and on the tendrils of these scrolls are suspended or placed birds and animals, human figures and chimeras, of any or all kinds, or indeed any objects that may take the fancy of the artist. The most perfect specimens of cinquecento Arabesque are certainly found in sculpture. As specimens of exquisite work may be mentioned the Martinengo tomb, in the church of the Padri Riformati at Brescia, and the fagade of the church of Santa Maria dei Miracoli there, by the Lombardi; and many of the carvings of the Chateau de Gaillon, France — all of which fairly illustrate the beauties and capabilities of the style.

See also Wornum, Analysis of Ornament (1874). (R. N. W.)

ARABGIR, or Arabkir (Byz. Arabraces), a town of Turkey in Asia in the Mamuret el-Aziz or Kharput vilayet, situated near the confluence of the eastern and western Euphiates, but some miles from the right bank of the combined streams. Pop. about 20,000, of which the larger half is Mussulman. It is con- nected with Sivas by a chaussee, prolonged to the Euphrates. The inhabitants are enterprising and prosperous, many of them leaving their native city to push their fortunes elsewhere, while of those that remain the greater part is employed in the manu- facture of silk and cotton goods, or in the production of fruit. The present town was built at a comparatively recent date; but about 2 m. north-east is the old town, now called Eski-Shehr, given (c. 1021) to Senekherim of Armenia by the emperor Basil II. It contains the ruins of a castle and of several Seljuk mosques. The Armenian population suffered severely during the massacres of 1805. (D. G. H.)

25 +

ARABIA

[GEOGRAPHY

ARABIA, a peninsula in the south-west of Asia, lying between 34° 30′ and 12° 45′ N., and 32° 30′ and 6o° E., is bounded W. by the Red Sea, S. by the Gulf of Aden and the Indian Ocean, and E. by the Gulf of Oman and the Persian Gulf. Its northern or land boundary is more difficult to define; most authorities, however, agree in taking it from El Arish on the Mediterranean, along the southern border of Palestine, between the Dead Sea and the Gulf of Akaba, then bending northwards along the Syrian border nearly to Tadmur, thence eastwards to the edge of the Euphrates valley near Anah, and thence south-east to the mouth of the Shat el Arab at the head of the Persian Gulf, — the boundary so defined includes the northern desert, which belongs geographically to Arabia rather than to Syria; while on the same grounds lower Mesopotamia and Irak, although occupied by an Arab population, are excluded.

In shape, the peninsula forms a rough trapezium, with its greatest length from north-west to south-east. The length of its western side from Port Said to Aden is 1500 m.; its base from the Straits of Bab-el-Mandeb (or Bab al Mandab) to Ras el Had is 1300 m., its northern side from Port Said to the Euphrates 600 m.; its total area approximately 1,200,000 sq. m.

Geography

General Features. — In general terms Arabia may be described as a plateau sloping gently from south-west to north-east, and attaining its

greatest elevation in the extreme south-west. The western escarpment of the plateau rises steeply from the Red Sea littoral to a height of from 4000 to 8000 ft,, leaving a narrow belt of lowland rarely exceeding 30 m. in width between the shore and the foot-hills. On the north-east and east the plateau shelves gradually to the Euphrates and the Persian Gulf; only in the extreme east is this general easterly slope arrested by the lofty range of Jebel Akhdar, which from Ras Musandan to Ras el Had borders the coast of Oman.

Its chief characteristic is the bareness and aridity of its sur- face; one- third of the whole desert, and of the remainder only a small proportion is suited to settled life, owing to its scanty water-supply and uncertain rainfall. Its mountains are in- sufficient in elevation and extent to attract their full share of the monsoon rains, which fall so abundantly on the Abyssinian highlands on the other side of the Red Sea; for this reason Arabia has neither lakes nor forests to control the water-supply and prevent its too rapid dissipation, and the rivers are mere torrent beds sweeping down occasionally in heavy floods, but otherwise dry.

The country falls naturally into three main divisions, a northern, a central and a' southern; the first includes the area between the Midian coast on the west and the head of the Persian Gulf on the east, a desert tract throughout, stony in the north, sandy in the south, but furnishing at certain seasons excellent pasturage; its population is almost entirely nomad and pastoral. The central zone includes Hejaz (or Hijaz), Nejd and El Hasa; much of it is a dry, stony or sandy steppe, with few wells or watering-places, and only occupied by nomad tribes; but the great wadis which intersect it contain many fertile stretches of alluvial soil, where cultivation is possible and which support a considerable settled population, with several large towns and numerous villages.

The third or southern division contains the highland plateaus of Asir and Yemen in the west, and J. Akhdar in the east, which with a temperate climate, due to their great elevation and their proximity to the sea, deserve, if any part of Arabia does, the name of Arabia Felix — the population is settled and agri- cultural, and the soil, wherever the rainfall is sufficient, is pro- ductive. The Batina coast of Oman, irrigated by the mountain streams of J. Akhdar, is perhaps the most fertile district in the peninsula; Hadramut, too, contains many large and prosperous villages, and the torrents from the Yemen highlands fertilize several oases in the Tehama (or Tihama) or lowlands of the western and southern coast. These favourable conditions of soil and .climate, however, extend only a comparatively short distance into the interior, by far the larger part of which is covered by

the great southern desert, the Dahna, or Ruba el Khali, empty as its name

implies, and uninhabitable.

Exploration. — Before entering on a detailed description of the several provinces of Arabia, our sources of information will be briefly indicated. Except in the neighbourhood of Aden, no regular surveys exist, and professional work is limited to the marine surveys of the Indian government and the admiralty, which, while laying down the coast line with fair accuracy, give little or no topographical information inland. For the mapping of the whole vast interior, except in rare cases, no data exist beyond the itineraries of explorers, travellingas a rule under conditions which precluded the use of even the simplest surveying instru- ments. These journeys, naturally following the most frequented routes, often cover the same ground, while immense tracts, owing to their difficulty of access, remain unvisited by any European.

The region most thoroughly explored is Yemen, in the south- west corner of the peninsula, where the labours of a succession of travellers from Niebuhr in 1 761 to E. Glaser and R. Manzoni in 1887 have led to a fairly complete knowledge of all that part of the province west of the capital Sana; while in 1 902-1904 the operations of the Anglo-Turkish boundary commission permitted the execution of a systematic topographical survey of the British protectorate from the Red Sea to the Wadi Bana, 30 m. east of Aden. North of Yemen up to the Hejaz border the only authority is that of E. F. Jomard's map, published in 1839, based on the information given by the French officers employed with Ibrahim Pasha's army in Asir from 1824 to 1827, and of J. Halevy in Nejran. On the south coast expeditions have penetrated but a short distance, the most notable exceptions being those of L. Hirsch and J. T. Bent in 1887 to the Hadramut valley. S. B. Miles, J. R. Wellsted, and S. M. Zwemer have explored Oman in the extreme east; but the interior south of a line drawn from Taif to El Katr on the Persian Gulf is still virgin ground. In northern Arabia the Syrian desert and the great Nafud (Nefud) have been crossed by several travellers, though a large area remains unexplored in the north-east between Kasim and the gulf. In the centre, the journeys of W. Palgrave, C. Doughty, W. Blunt and C. Huber have done much to elucidate the main physical features of the country. Lastly, in the north- west the Sinai peninsula has been thoroughly explored, and the list of travellers who have visited the Holy Cities and traversed the main pilgrim routes through Hejaz is a fairly long one, though, owing to the difficulties peculiar to that region, the hydrography of southern Hejaz is still incompletely known.

The story of modern exploration begins with the despatch of C. Niebuhr's mission by the Danish government in 1761: After a year spent in Egypt and the Sinai peninsula Modern the party reached Jidda towards the end of 1762, and Bxpiora- after a short stay sailed on to Lohaia in the north of

Yemen, the exploration of which formed the principal object of the expedition; thence, travelling through the Tehama or lowlands, Niebuhr and his companions visited the towns of Bet el Fakih, Zubed and Mokha, then the great port for the coffee trade of Yemen. Continuing eastward they crossed the mountainous region and reached the highlands of Yemen at Uden, a small town and the centre of a district celebrated for its coffee. Thence proceeding eastwards to higher altitudes where coffee plantations give way to fields of wheat and barley, they reached the town of Jibla situated among a group of mountains exceeding 10,000 ft. above sea-level; and turning southwards to Taiz descended again to the Tehama via Hes and Zubed to Mokha. The mission, reduced in numbers by the death of its archaeologist, von Haven, again visited Taiz in June 1763, where after some delay permission was obtained to visit Sana, the capital of the province and the residence of the ruling sovereign or imam. The route lay by Jibla, passing the foot of the lofty Jebel Sorak, where, in spite of illness, Forskal, the botanist of the party, was able to make a last excursion; a few days later he died at Yarim. The mission continued its march, passing Dhamar, the seat of a university of the Zedi sect, then frequented by 500 students. Thence four marches, generally over a stony plateau dominated by bare, sterile mountains, brought them to*

tioa in Yemen.

Sana, where they received a cordial welcome from the imam, el Mahdi Abbas.

The aspect of the city must have been nearly the same as at present; Niebuhr describes the enceinte flanked by towers, the citadel at the foot of J. Nukum which rises 1000 ft. above the valley, the fortress and palace of the imams, now replaced by the Turkish military hospital, the suburb of Bir el Azab with its scattered houses and gardens, the Jews' quarter and the village of Rauda, a few miles to the north in a fertile, irrigated plain which Niebuhr compares to that of Damascus. After a stay of ten days at Sana the mission set out again for Mokha, travel- ling by what is now the main route from the capital to Hodeda, through the rich coffee-bearing district of J. Haraz, and thence southward to Mokha, where they embarked for India. During the next year three other members of the party died, leaving Niebuhr the sole survivor. Returning to Arabia a year later, he visited Oman and the shores of the Persian Gulf, and travelling from Basra

through Syria and Palestine he reached Denmark in 1764 after four years' absence.

The period was perhaps specially favourable for a scientific mission of the sort. The outburst of fanaticism which convulsed Arabia twenty years later had not then reached Yemen, and Europeans, as such, were not exposed to any special danger. The travellers were thus able to move freely and to pursue their scientific enquiries without hindrance from either people or ruler. The results published in 1772 gave for the first time a comprehensive description not only of Yemen but of all Arabia; while the parts actually visited by Niebuhr were described with a fulness and accuracy of detail which left little or nothing for his successors to discover.

C. G. Ehrenberg and W. F. Hemprich in 1825 visited the Tehama and the islands off the coast, and in 1836 P. E. Botta Asir made an important journey in southern Yemen with

a view to botanical research, but the next advance in geographical knowledge in south Arabia was due to the French officers, M. 0. Tamisier, Chedufau and Mary, belonging to the Egyptian army in Asir; another Frenchman, L. Arnaud, formerly in the Egyptian service, was the first to visit the southern Jauf and to report on the rock-cut inscriptions and ruins of Marib, though it was not till 1869 that a competent archaeologist, J. Halevy, was able to carry out any Marib. complete exploration there. Starting from Sana, Halevy went north-eastward to El Madid, a town of 5000 inhabitants and the capital of the small district of Nihm; thence crossing a plateau, where he saw the ruins of numerous crenellated towers, he reached the village of Mijzar at the foot of J. Yam, on the borders of Jauf, a vast sandy plain, extending eastwards to El Jail and El Hazm, where Halevy made his most important discoveries of Sabaean inscriptions: here he explored Main, the ancient capital of the Minaeans, Kamna on the banks of the W. Kharid, the ancient Caminacum, and Kharibat el Beda, the Nesca of Pliny, where the Sabaean army was defeated by the Romans under Aelius Gallus in 24 B.C. From El Jail Halevy travelled northward, passing the oasis of Khab, and skirting the great desert, reached the fertile district of Nejran, where he found a colony of Jews, with whom he spent several weeks in the oasis of Makhlaf. An hour's march to the east he discovered at the village of Medinat el Mahud the ruins of the Nagra metropolis of Ptolemy. In June 1870 he at last reached the goal of his journey, Marib; here he explored the ruins of Medinat an Nahas (so called from its numerous inscriptions engraved on brass plates), and two hours to the east he found the famous dam constructed by the Himyarites across the W. Shibwan, on which the water-supply of their capital depended.

One other explorer has since visited Marib, the Austrian archaeologist, E. Glaser (1855-1908), who achieved more for science in Yemen than any traveller since Niebuhr. Under Turkish protection, he visited the territory of the Hashid and Bakil tribes north-east of Sana, and though their hostile attitude compelled him to return after reaching their first important town, Khamr, he had time to reconnoitre the plateau lying

between the two great wadis Kharid and Hirran, formerly covered with Himyaritic towns and villages; and to trace the course of these wadis to their junction at El Ish in the Dhu Husen country, and thence onward to the Jauf. In 1889 he succeeded, again under Turkish escort, in reaching Marib, where he obtained, during a stay of thirty days, a large number of new Himyaritic inscriptions. He was unable, however, to proceed farther east than his predecessors, and the problem of the Jauf drainage and its possible connexion with the upper part of the Hadramut valley still remains unsolved.

The earliest attempt to penetrate into the interior from the south coast was made in 1835 when Lieuts. C. Cruttenden and J. R. Wellsted of the " Palinurus," employed on the marine survey of the Arabian coast, visited the ruins J^ °™~ of Nakb (el Hajar) in the W. Mefat. The Himyaritic Hadramut. inscriptions found there and at Husn Ghurab near Mukalla, were the first records discovered of ancient Arabian civilization in Hadramut. Neither of these officers was able to follow up their discoveries, but in 1843 Adolph von Wrede landed at Mukalla and, adopting the character of a pilgrim to the shrine of the prophet Hud, made his way northward across the high plateau into the W. Duwan, one of the main southern tributaries of the Hadramut valley, and pushed on to the edge of the great southern desert; on his return to the W. Duwan his disguise was detected and he was obliged to return to Mukalla. Though he did not actually enter the main Hadra- mut valley, which lay to the east of his track, his journey estab- lished the existence of this populous and fertile district which had been reported to the officers of the " Palinurus " as lying between the coast range and the great desert to the north. This was at last visited in 1893 by L. Hirsch under the protection of the sultan of Mukalla, the head of the Kaiti family, and practically ruler of all Hadramut, with the exception of the towns of Saiyun and Tarim, which belong to the Kathiri tribe. Start- ing like von Wrede from Mukalla, Hirsch first visited the W. Duwan and found ancient ruins and inscriptions near the village of Hajren; thence he proceeded north-eastward to Hauta in the main valley, where he was hospitably received by the Kaiti sultan, and sent on to his deputy at Shibam. Here he procured a Kathiri escort and pushed on through Saiyun to Tarim, the former capital. After a very brief stay, however, he was com- pelled by the hostility of the people to return in haste to Shibam, from which he travelled by the W. bin Ali and W. Adim back to

Mukalla. J. Theodore Bent and his wife followed in the same track a few months later with a well-equipped party including a surveyor, Imam Sharif, lent by the Indian government, who made a very valuable survey of the country passed through. Both parties visited many sites where Himyaritic remains and inscrip- tions were found, but the hostile attitude of the natives, more particularly of the Seyyids, the religious hierarchy of Hadramut, prevented any adequate examination, and much of archaeological interest undoubtedly remains for future travellers to discover.

In Oman, where the conditions are more favourable, explorers have penetrated only a short distance from the coast. Niebuhr did not go inland from Muscat; the operations by a British Indian force on the Pirate coast in 1810 gave tianin' no opportunities for visiting the interior, and it was Oman. not till 1835 that J. R. Wellsted, who had already tried to penetrate into Hadramut from the south, landed at Muscat with the idea of reaching it from the north-east. Sailing thence to Sur near Ras el Had, he travelled southward through the country of the Bani bu Ali to the borders of the desert, then turning north-west up the Wadi Betha through a fertile, well-watered country, running up to the southern slopes of J. Akhdar, inhabited by a friendly people who seem to have welcomed him everywhere, he visited Ibra, Semed and Nizwa at the southern foot of the mountains. Owing to the disturbed state of the country, due to the presence of raiding parties from Nejd, Wellsted was unable to carry out his original intention of ex- ploring the country to the west, and after an excursion along the Batina coast to Sohar he returned to India.

In 1876 Colonel S. B. Miles, who had already done much to

advance geographical interests in south Arabia, continued Wellsted's work in Oman; starting from Sohar on the Batina coast he crossed the dividing range into the Dhahira, and reached Birema, one of its principal oases. His investigations show that the Dhahira contains many settlements, with an industrious agricultural population, and that the unexplored tract extending 250 m. west to the peninsula of El Katr is a desolate gravelly steppe, shelving gradually down to the salt marshes which border the shores of the gulf.

Leaving southern Arabia, we now come to the centre and north. The first

explorer to enter the sacred Hejaz with a

definite scientific object was the Spaniard, Badia y Expiora- Leblich, who, under the name of Ali Bey and claiming Hejaz. t0 De tne l ast representative of the Abbasid Caliphs,

arrived at Jidda in 1807, and performed the pilgrimage to Mecca. Besides giving to the world the first accurate descript tion of the holy city and the Haj ceremonies, he was the first to fix the position of Mecca by astronomical observations, and to describe the physical character of its surroundings. But the true pioneer of exploration in Hejaz was J. L. Burckhardt, who had already won a reputation as the discoverer of Petra, and whose experience of travel in Arab lands and knowledge of Arab life qualified him to pass as a Moslem, even in the headquarters of Islam. Burckhardt landed in Jidda in July 1814, when Mehemet Ali had already driven the Wahhabi invaders out of Hejaz, and was preparing for his farther advance against their stronghold in Nejd. He first visited Taif at the invitation of the pasha, thence he proceeded to Mecca, where he spent three months studying every detail of the topography of the holy places, and going through all the ceremonies incumbent on a Moslem pilgrim. In January 1815 he travelled to Medina by the western or coast route, and arrived there safely but broken in health by the hardships of the journey. His illness did not, however, prevent his seeing and recording everything of interest in Medina with the same care as at Mecca, though it compelled him to cut short the further journey he had proposed to himself, and to return by Yambu and the sea to Cairo, where he died only two years later.

His striking successor, Sir Richard Burton, covered nearly the same ground thirty-eight years afterwards. He, too, travelling as a Moslem pilgrim, noted the whole ritual of the pilgrimage with the same keen observation as Burckhardt, and while amplifying somewhat the latter's description of Medina, confirms the accuracy of his work there and at Mecca in almost every detail. Burton's topographical descriptions are fuller, and his march to Mecca from Medina by the eastern route led him over ground not traversed by any other explorer in Hejaz: this route leads at first south-east from Medina, and then south across the lava beds of the Harra, keeping throughout its length on the high plateau which forms the borderland between Hejaz and Nejd. His original intention had been after visiting Mecca to find his way across the peninsula to Oman, but the time at his disposal (as an Indian officer on leave) was insufficient for so extended a journey; and his further contributions to Arabian geography were not made until twenty-five years later, when he was deputed by the Egyptian government to examine the reported gold deposits of Midian. Traces of ancient workings were found in several places, but the ores did not contain gold in paying quantities. Interesting archaeological discoveries were made,

and a valuable topographical survey was carried out, covering the whole Midian coast from the head of the Gulf of Akaba to the mouth of the Wadi Hamd, and including both the Tehama range and the Hisma valley behind it; while the importance of the W. Hamd and the extent of the area drained by its tributaries was for the first time brought to light.

Burckhardt had hoped in 1815 that the advance of the Egyptian expedition would have given him the opportunity

to see something of Nejd, but he had already left Expiora- Arabia before the overthrow of the Wahhabi power We/tf. by Ibrahim Pasha had opened Nejd to travellers from

Hejaz, and though several European officers accom- panied the expedition, none of them left any record of his

experience. It is, however, to the Egyptian conquest that the first visit of a British traveller tc Nejd is due. The Indian government, wishing to enter into relations with Ibrahim Pasha, as de facto ruler of Nejd and El Hasa, with a view to putting down piracy in the Persian Gulf, which was seriously affecting Indian trade, sent a small mission under Captain G. F. Sadlier to congratulate the pasha on the success of the Egyptian arms, and no doubt with the ulterior object of obtaining a first-hand report on the real situation. On his arrival at Hofuf, Sadlier found that Ibrahim had already left Deraiya, but still hoping to intercept him before quitting Nejd, he followed up the retreat- ing Egyptians through Yemama, and Wushm to Ras in Kasim, where he caught up the main body of Ibrahim's army, though the pasha himself had gone on to Medina. Sadlier hesitated about going farther, but he was unable to obtain a safe conduct to Basra, or to return by the way he had come, and was com- pelled reluctantly to accompany the army to Medina. Here he at last met Ibrahim, but though courteously received, the interview had no results, and Sadlier soon after left for Yambu, whence he embarked for Jidda, and after another fruitless attempt to treat with Ibrahim, sailed for India. If the political results of the mission were nil, the value to geographical science was immense; for though no geographer himself, Sadlier's route across Arabia made it possible for the first time to locate the principal places in something like their proper relative positions; incidentally, too, it showed the practicability of a considerable body of regular troops crossing the deserts of Nejd even in the months of July and August.

Sadlier's route had left Jebel Shammar to one side; his successor, G. A. Wallin, was to make that the objective of his journey. Commissioned by Mehemet Ali to inform him about the situation in Nejd brought about by the rising power of Abdallah Ibn Rashid, Wallin left Cairo in April 1845,

and- crossing the pilgrim road at Ma'an, pushed on across the Syrian desert to the Wadi Sirhan and the Jauf oasis, where he halted during the hot summer months. From the wells of Shakik he crossed the waterless Nafud in four days to Jubba, and after a halt there in the nomad camps, he moved on to Hail, already a thriving town, and the capital of the Shammar state whose limits included all northern Arabia from Kasim to the Syrian border. After a stay in Hail, where he had every opportunity of observing the char- acter of the country and its inhabitants, and the hospitality and patriarchal, if sometimes stern, justice of its chief, he travelled on to Medina and Mecca, and returned thence to Cairo to report to his patron. Early in 1848 he again returned to Arabia, avoiding the long desert journey by landing at Muwela, thence striking inland to Tebuk on the pilgrim road, and re-enteririg Shammar territory at the oasis of Tema, he again visited Hail; and after spending a month there travelled northwards to Kerbela and Bagdad.

The effects of the Egyptian invasion had passed away, and central Arabia had settled down again under its native rulers when W. G. Palgrave made his adventurous journey through Nejd, and published the remarkable narrative Palgrave- a which has taken its place as the classic of Arabian t" r ˆeu. exploration. " Like Burton he was once an officer in the Indian army, but for some time before his journey he had been connected with the Jesuit mission in Syria. By training and temperament he was better qualified to appreciate and describe the social life of the people than their physical surroundings, and if the results of his great journey are disappointing to the geographer, his account of the society of the oasis towns, and of the remarkable men who were then ruling in Hail and Riad, must always possess an absorbing interest as a portrait of Arab life in its freest development.

Following Wallin's route across the desert by Ma'an and Jauf, Palgrave and his companion, a Syrian Christian, reached Hail in July 1862; here they were hospitably entertained by the amir Talal, nephew of the founder of the Ibn Rashid dynasty, and after some stay passed on with his countenance through Kasim to southern Nejd. Palgrave says little of the desert part of the journey or of its Bedouin inhabitants, but much of the

fertility of the oases and of the civility of the townsmen; and like other travellers in Nejd he speaks with enthusiasm of its bright, exhilarating climate. At Riad, Fesal, who had been in power since the Egyptian retirement, was still reigning; and the religious tyranny of Wahhabism prevailed, in marked con- trast to the liberal regime of Talal in Jebel Shammar. Still, Palgrave and his companions, though known as Christians, spent nearly two months in the capital without molestation, making short excursions in the neighbourhood, the most im- portant of which was to El Kharfa in Aflaj, the most southerly district of Nejd. Leaving Riad, they passed through Yemama, and across a strip of sandy desert to El Hasa where Palgrave found himself in more congenial surroundings. Finally, a voyage to the Oman coast and a brief stay there brought his adventures in Arabia to a successful ending.

Charles Doughty, the next Englishman to visit northern Arabia, though he covered little new ground, saw more of the desert life, and has described it more minutely and faithfully than any other explorer. Travelling down from Damascus in 1875 with the Haj caravan, he stopped at El Hajr, one of the pilgrim stations, with the intention of awaiting the return of the caravan arid in the meantime of exploring the rock-cut tombs of Medain Salih and El Ala. Having successfully completed his investigations and sent copies of inscriptions and drawings of the tombs to Renan in Paris, he determined to push on farther into the desert. Under the protection of a sheikh of the Fukara Bedouin he wandered over the whole of the border-land between Hejaz and Nejd. Visiting Tema, where among other ancient remains he discovered the famous inscribed stone, afterwards acquired by Huber for the Louvre. Next summer he went on to Hail and thence back to Khaibar, where the negro governor and townsmen, less tolerant than his former Bedouin hosts, ill-treated him and even threatened his life. Returning to Hail in the absence of the amir, he was expelled by the governor; he succeeded, however, in finding protection at Aneza, where he spent several months, and eventually after many hardships and perils found his way to the coast at Jidda.

Three years later Mr Wilfrid and Lady Anne Blunt made their expedition to J. Shammar. In their previous travels in Syria they had gained the confidence and friendship of a young sheikh whose family, though long settled at Tadmur, came originally from Nejd, and who was anxious to renew the connexion with his kinsmen by seeking a bride among them. In his company the Blunts set out from Damascus, and travelled across the Syrian desert by the Wadi Sirhan to Jauf. Here the sheikh found some of his relations and the matrimonial' alliance was soon arranged; but though the object of the journey had been attained, the Blunts were anxious to visit Hail and make the acquaintance of the amir Ibn Rashid, of whose might and generosity they daily heard from their hosts in Jauf. The long stretch of

waterless desert between Jauf and J. Shammar was crossed without difficulty, and the party was welcomed by the amir and hospit- ably entertained for a month, after which they travelled north- wards in company with the Persian pilgrim caravan returning to Kerbela and Bagdad.

In 1883 the French traveller, C. Huber, accompanied by the archaeologist, J. Euting, followed the same route from Damascus to H£l. The narrative of the last named forms a valuable supplement to that published by the Blunts, and together with Doughty's, furnishes as complete a picture as could be wished for of the social and political life of J. Shammar, and of the general nature of the country. Huber's journal, published after his death from his original notes, contains a mass of topographical and archaeological detail of the greatest scien- tific value: his routes and observations form, in fact, the first and only scientific data for the construction of the map of northern Arabia. To archaeology also his services were of equal importance, for, besides copying numerous inscriptions in the dis- trict between Hail and Tema, he succeeded in gaining possession of the since famous Tema stone, which ranks with the Moabite stone among the most valuable of Semitic inscriptions. From Hail Huber followed nearly in Doughty's track to Aneza and

thence across central Nejd to Mecca and Jidda, where he despatched his notes and copies of inscriptions. A month later, in July 1884, he was murdered by his guides a few marches north of Jidda, on his way back to Hail.

One other traveller visited Hail during the lifetime of the amir Mahommed — Baron E. Nolde — who arrived there in 1893, not long after the amir had by his victory over the combined forces of Riad and Kasim brought the whole of Nejd under his dominion. Nolde crossed the Nafud to Haiyania by a more direct track than that from Shakik to Jubba. The amir was away from his capital settling the affairs of his newly acquired territory; Nolde therefore, after a short halt at Hail, journeyed on to Ibn Rashid's camp somewhere in the neighbourhood of Shakra. Here he was on new ground, but unfortunately he gives little or no description of his route thither, or of his journey northwards by the Persian pilgrim road, already traversed by Huber in 1881. His narrative thus, while containing much of general interest on the climate and on the animal life of northern Arabia, its horses and camels in particular, adds little to those of his predecessors as regards topographical detail.

If the journeys detailed above be traced on the map they will be found to cover the northern half of the peninsula above the line Mecca-Hofuf, with a network of routes, aenerai which, though sometimes separated by wide intervals, results are still close enough to ensure that no important ofex-geographical feature can have been overlooked, P toTatif >n. especially in a country whose general character varies so little over wide areas. In the southern half, on the other hand, except in Nejran and Jauf, no European traveller has penetrated 100 m. in a direct line from the coast. The vast extent of the Dahna, or great southern desert, covering perhaps 250,000 sq. m., accounts for about a third of this area, but some of the most favoured districts in Arabia — Asir and northern Yemen — remain un-explored, and the hydrography of the Dawasir basin offers some interesting problems, while a great field remains for the archaeo- logist in the seat of the old Sabaean kingdom from Jauf to the Hadramut valley.

Topographical Details. — Beginning from the north-west, the Sinai peninsula belongs to Egypt, though geographically part of Arabia, it is bounded on the E. by a line drawn from Ar Rata, [a few miles E. of El Arish on the Mediterranean, to the head of the Gulf of Akaba; and on the W. by the Suez Canal; its length from El Arish to its most southern point is 240 m., and its breadth from Suez to Akaba is nearly 160 m. The greater part drains to the Mediterranean, from which the land rises gradually to the summit of the Tih plateau. The deep depression of Wadi Feran separates the Tih from the higher mass of Sinai (q.v.), in which J. Katherine attains a height of 8500 ft.; except in W. Feran there is little cultivable land, the greater part consisting of bare, rocky hills and sandy valleys, sparsely covered with tamarisk and acacia bushes. The Egyptian pilgrim road crosses the peninsula from Suez to Akaba, passing the post of An Nakhl, with a reservoir and a little cultivation, about half way; a steep descent leads down from the edge of the Tih plateau to Akaba.

The rest of the northern borderland is covered by the Syrian desert, extending from the borders of Palestine to the edge of the Euphrates valley. This tract, known as the Hamad, is a „ . gravelly plain unbroken by any considerable range of hills . y a ".*

or any continuous watercourse except the Wadi Hauran, aesert. which in rainy seasons forms a succession of pools from J. Hauran to the Euphrates. Its general slope is to the north-east from the volcanic plateau of the Harra south of J. Hauran to the edge of the Euphrates valley. The Wadi Sirhan, a broad depression some 500 ft. below the average level of the Hamad, crosses it from north-east to south-west between Hauran and Jauf; it has a nearly uniform height above sea-level of 1850 ft., and appears to be the bed of an inland sea rather than a true watercourse. Water is found in it a few feet below the surface, and a little cultivation is carried on at the small

oases of Kaf and Ithri, whence salt produced in the neigh- bouring salt lakes is exported. The W. Sirhan is continuous with the depression known as the Jauf, situated on the northern edge of the Nefud or Nafud, and the halfway station between Damascus and Hail; and it is possible that this depression continues eastward towards the Euphrates along a line a little north of the thirtieth parallel, where wells and pasturages are known to exist. Jauf is a small town consisting, at the time of the Blunts' visit in 1879, of not more than 500 houses. The town with its gardens, surrounded by a mud wall, covers a space of 2 m. in length by half a mile in width ; the basin in which it lies is barely 3 m. across, and except for the palm gardens and a few patches of corn, it is a dead flat of

II

Slnal Penin- sula.

q8

ARABIA

[GEOGRAPHY

white sand, closed in by high sandstone cliffs, beyond which lies the open desert. The oases of Sakaka and Kara are situated in a similar basin 15 m. to the east; the former a town of 10,000 inhabitants and somewhat larger than Jauf according to Huber.

A short distance south of Jauf the character of the desert changes abruptly from a level black expanse of gravel to the red sands of the Tbe Nafud. The northern edge of this great desert follows

Nafud ver y near 'y tne nne °f 'he thirtieth parallel, along which

it extends east and west for a length of some 400 m. ; its breadth from north to south is 200 m. Though almost waterless, it is in fact better wooded and richer in pasture than any part of the Hamad; the sand-hills are dotted with ghada, a species of tamarisk, and other bushes, and several grasses and succulent plants — among them the adar, on which sheep are said to feed for a month without requiring water — are found in abundance in good seasons. In the spring months, when their camels are in milk, the Bedouins care nothing for water, and wander far into the Nafud with their flocks in search of the green pasture which springs up everywhere after the winter rains. A few wells exist actually in the Nafud in the district called El Hajra, near its north-eastern border, and along its southern border, between J. Shammar and Tema, there are numerous wells and artificial as well as natural reservoirs resorted to by the nomad tribes.

Owing to the great extent of the Nafud desert, the formation of sand-dunes is exemplified on a proportionate scale. In many places longitudinal dunes are found exceeding a day's journey in length, the valleys between which take three or four hours to cross; but the most striking feature of the Nafud are the high crescent-shaped sand-hills, known locally as falk or falj, described by Blunt and Huber, who devoted some time to their investigation. The falks enclose a deep hollow (known as ka'r), the floor of which is often hard soil bare of sand, and from which the inner slopes of the falk rise as steeply as the sand will lie (about 50). On the summit of the falk there is generally a mound known as tas or barkhus composed of white sand which stands out conspicuously against the deep red of the surrounding deserts; the exterior slopes are comparatively gentle. The falks are singularly uniform in shape, but vary greatly in size; the largest were estimated by Huber and Euting at ijm. across and 330 ft. deep. They run in strings irregularly from east to west, corresponding in this with their individual direction, the convex face of the falk being towards the west, i.e. the direction of the prevailing wind, and the cusps to leeward. In the south of the Nafud, where Huber found the prevailing wind to be from the south, the falks are turned in that direction. Though perhaps subject to slight changes in the course of years, there is no doubt that these dunes are practically permanent features ; the more prominent ones serve as landmarks and have well-known distinctive names. The character of the vegetation which clothes their slopes shows that even superficial changes must be slight. The general level of the Nafud was found by Ruber's observations to be about 3000 ft. above sea-level; the highest point on the Jauf-Hail route is at Falk Alam, the rocky peaks of which rise 200 or 300 ft. above the surface of the sand. Other peaks cropping out of the Nafud are Jebel Tawil, near the wells of Shakik, and J. Abrak Rada, a long black ridge in the middle of the desert.

The high plateau which from J. Hauran southward forms the main watershed of the peninsula is covered in places by deep beds of lava, which from their hardness have preserved the underlying sandstones from degradation, and now stand up consider- ably above the general level. These tracts are known as harm; the most remarkable is the Harrat El Awerid, west of the Haj route from Tebuk to El Ala, a mountain mass 100 m. in length with an average height of over 5000 ft., and the highest summit of which, J. Anaz, exceeds 7000 ft. The harra east of Khaibar is also of considerable extent, and the same formation is found all along the Hejaz border from Medina to the Jebel el Kura, east of Mecca. The surface of the harra is extremely broken, forming a labyrinth of lava crags and blocks of every size; the whole region is sterile and almost waterless, and compared with the Nafud it produces little vegetation; but it is resorted to by the Bedouin in the spring and summer months when the air is always

fresh and cool. In winter it is cold and snow often lies for some time.

Hejaz, if we except the Taif district in the south, which is properly a part of the Yemen plateau, forms a well-marked physical division, „ . lying on the western slope of the peninsula, where that

1 ‘ slope is at its widest, between the Harra and the Red Sea.

A high range of granite hills, known as the Tehama range, the highest point of which, J. Shar, in Midian, exceeds 6500 ft., divides it longitudinally into a narrow littoral and a broader upland zone 2000 or 3000 ft. above the sea. Both are generally bare and un-

Broductive, the uplands, however, contain the fertile valleys of lhaibar and Medina, draining to the Wadi Hamd, the principal river system of western Arabia ; and the Wadi Jadid or Es Safra, rising in the Harra between Medina and Es Safina, which contain several settlements, of which the principal produce is dates. The quartz reefs which crop out in the granite ranges of the Tehama contain traces of gold. These and the ancient copper workings were investigated by Burton in 1877. The richer veins had evidently been long ago worked out, and nothing of sufficient value to justify further outlay was discovered. The coast-line is fringed with small

The Hairs.

islets and shoals and reefs, which make navigation dangerous. The only ports of importance are Yambu and Jidda, which serve respec- tively Medina and Mecca; they depend entirely on the pilgrim traffic to the holy cities, without which they could not exist.

The great central province of Nejd occupies all inner Arabia between the Nafud and the southern desert. Its northern part forms the basin of the Wadi Rumma, which, rising in the N ..

Khaibar harra, runs north-eastward across the whole ‘

width of Nejd, till it is lost in the sands of the eastern Nafud, north of Aneza. The greater portion of this region is an open steppe, sandy in places and in others dotted with low volcanic hills, but with occasional ground water and in favourable seasons furnishing support for a considerable pastoral population. Its elevation varies from about 5000 ft. in the west to 2500 ft. in the east. In Jebel Shammar, Kasim and Wushm, where the water in the wadi beds rises nearly to the ground level, numerous fertile oases are found with thriving villages and towns.

Jebel Shammar, from which the northern district of Nejd takes its name, is

a double range of mountains some 20 m. apart, rising sharply out of the desert in bare, granite cliffs. J. Aja, the western and higher of the two ranges, has a length of about 100 m. from north-east to south-west, where it merges into the high plateau extending from and continuous with the Khaibar harra. The highest point, J. Fara, near its north-eastern extremity, is about 4600 ft. above sea-level, or 1600 ft. above the town of Hail, which, like most of the larger villages, lies along the wadi bed at the foot of J. Aja. The town, which has risen with the fortunes of the Ibn Rashid family to be the capital of Upper Nejd, is at the mouth of the valley between the twin ranges, about 2 m. from the foot of J. Aja, and contained at the time of Nolde's visit in 1893 about 12,000 inhabitants.

The principal tributaries of the W. Rumma converge in lower Kasim, and at Aneza Doughty says its bed is 3 m. wide from bank to bank. Forty years before his visit a flood is said to have occurred, which passed down the river till it was blocked by sand-drifts at Thuwerat, 50 m. lower down, and for two years a lake stood nearly 100 m. long, crowded by waterfowl not known before in that desert country. Below this its course has not been followed by any Euro- pean traveller, but it may be inferred from the line of watering-places on the road to Kuwet, that it runs out to the Persian Gulf in tha t neighbourhood.

East of Kasim the land rises gradually to the high plateau culminat- ing in the ranges of Jebel Tuwek and J. Arid. The general direction of these hills is from north-west to south-east. On the west they rise somewhat steeply, exposing high cliffs of white limestone, which perhaps gave Palgrave the impression that the range is of greater absolute height than is actually the case. J. Tuwek in any case forms an important geographical feature in eastern Nejd, interrupting by a transverse barrier 200 m. in length the general north-easterly slope of the peninusla, and separating the basin of the W. Rumma from that of the other great river system of central Arabia, the Wadi Dawasir. The districts of Suderand Wushm lie on its northern side, Arid in the centre, and Aflaj, Harik and Yemama on its south, in the basin of the W. Dawasir; the whole of this hilly region of eastern Nejd is, perhaps, rather a rolling down country than truly moun- tainous, in which high pastures alternate with deep fertile valleys, supporting numerous villages with a large agricultural population. The W. Hanifa is its principal watercourse; its course is marked by an almost continuous series of palm groves and settlements, among which Deraiya the former, and Riad the present, capital of the Ibn Saud kingdom are the most extensive. Its lower course is uncertain, but it probably continues in a south-east direction to the districts of El Harik and Yemama when, joined by the drainage from Aflaj and the W. Dawasir, it runs eastward till it disappears in the belt of sandy desert 100 m. in width that forms the eastern boundary of Nejd, to reappear in the copious springs that fertilize El Hasa and the Bahrein

littoral.

As regards the unexplored southern region, Palgrave's informants in Aflaj, the most southerly district visited by him, stated that a day's march south of that place the Yemen road enters „ the W. Dawasir, up which it runs for ten days, perhaps B i ore j 200 m., to El Kura, a thinly peopled district on the borders „_/„„ ol of Asir; this accords with the information of the French s NeM. officers of the Egyptian army in that district, and with that ' of Halevy, who makes all the drainage from Nejran northward run to the same great wadi. Whether there be any second line of drainage in southern Nejd skirting the edge of the great desert and following the depression of the W. Yabrin must remain a matter of conjecture. Colonel Miles concluded, from his enquiries, that the low salt swamp, extending inland for some distance from Khor ed Duwan, in the bay east of E! Katr, was the outlet of an extensive drainage system which may well be continuous with the W. Yabrin and extend far into the interior, if not to Nejran itself.

East of Nejd a strip of sandy desert 50 m. in width extends almost continuously from the great Nafud to the Dahna. East of this again a succession of stony ridges running parallel to the coast ElHasa has to be crossed before El Hasa is reached. This province, which skirts the Persian Gulf from the mouth of the Euphrates to the frontiers of Oman, is low and hot ; its shores are flat, and with the exception of Kuwet at the north-west corner of

the gulf, it possesses no deep water port. North of Katif it is desert and only inhabited by nomads; at Katif, however, and throughout the district to the south bordering on the Gulf of Bahrein there are ample supplies of underground water, welling up in abundant springs often at a high temperature, and bringing fertility to an extensive district of which El Hofuf, a town of 15,000 to 20,000 inhabitants, is the most important centre.

South-western Arabia, from the twenty-first parallel down to the Gulf of Aden, including the Taif district of Hejaz, Asir and Yemen, South- forms one province geographically. Throughout its length western " consists of three zones, a narrow coastal strip, rarely Arabia. exceeding 20 m. in width, a central mountainous tract, embracing the great chain which runs parallel to the coast from near Taif to within 50 m. of Aden, and an inner

plateau falling gradually to the north-east till it merges in the Nejd steppes or the sands of the great desert.

The lowland strip or Tehama consists partly of a gravelly plain, the Khabt, covered sparsely with acacia and other desert shrubs and trees, and furnishing pasturage for large flocks of goats and camels ; and partly of sterile wastes of sand like the Ratnla, which extends on either side of Aden almost from the seashore to the foot of the hills. The Tehama is, however, by no means all desert, the mountain torrents where they debouch into the plain have formed considerable tracts of alluvial soil of the highest degree of fertility producing in that warm equable climate two and even three crops in the year. The flood-water is controlled by a system of dams and channels constructed so as to utilize every drop, and the extent of cultivation is limited more by the supply of water available than by the amount of suitable soil. These districts support a large settled population and several considerable towns, of which Bet el Fakih and Zubed in the western and Lahej in the southern Tehama, with 4000 to 6000 inhabitants, are the most important. There are signs that this coastal strip was until a geologically recent period below sea-level; and that the coast-line is still receding is evidenced by the history of the town of Muza, once a flourishing port, now 20 m. inland; while Bet el Fakih and Zubed, once important centres of the coffee trade, have lost their position through the silting up of the ports which formerly served them.

The jebel or mountain-land is, however, the typical Yemen, the Arabia Felix of the ancients. Deep valleys winding through the barren foothills lead gradually up to the higher mountains, and as the track ascends the scenery and vegetation change their character; the trees which line the banks of the wadi are overgrown with creepers, and the running stream is dammed at frequent intervals, and led off in artificial channels to irrigate the fields on either side ; the steeper parts of the road are paved with large stones, substanti- ally built villages, with their masonry towers or dars, crowning every height, replace the collection of mud walls and brushwood huts of the low country ; while tier above tier, terraced fields cover the hill slopes and attest the industry of the inhabitants and the fertility of their mountains. On the main route from Hodeda to Sana the first coffee plantations are reached at Usil, at an altitude of 4300 ft., and throughout the western slopes of the range up to an altitude of 7000 ft. it is the most important crop. Jebel Haraz, of which Manakha, a small town of 3000 inhabitants is the chief place, is described by Glaser as one vast coffee garden. Here the traveller ascending from the coast sees the first example of the jebel or high- land towns, with their high three-storeyed houses, built of quarried stone, their narrow facades pierced with small windows with white- washed borders and ornamented with varied arabesque patterns; each dar has the appearance of a small castle complete in itself, and the general effect is

rather that of a cluster of separate forts than of a town occupied by a united community.

The scenery in this mountain region is of the most varied descrip- tion; bare precipitous hill-sides seamed with dry, rocky water- courses give place with almost startling rapidity to fertile slopes, terraced literally for thousands of feet. General Haig in describing them says: " One can hardly realize the enormous labour, toil and perseverance that these represent; the terrace walls are usually 5 to 8 ft. in height, but towards the top of the mountains they are sometimes as much as 15 or 18 ft. ; they are built entirely of rough stone without mortar, and I reckon that on an average each wall retains not more than twice its own height in breadth, and I do not think I saw a single break in them unrepaired."

The highest summits as determined by actual survey are between 10,000 and 11,000 ft. above sea-level. J. Sabur, a conspicuous mass in the extreme south, is 9900 ft., with a fall to the Taiz valley of 5000 ft. ; farther north several points in the mountains above Ibb and Yarim attain a height of 10,500 ft., and J. Hadur, near the Sana-Hodeda road, exceeds 10,000 ft. From the crest of the range there is a short drop of 2000 or 3000 ft. to the broad open valleys which form the principal feature of the inner plateau. The town of Yarim lies near its southern extremity at an altitude of about 8000 ft. ; within a short distance are the sources of the W. Yakla, W. Bana and W. Zubed, running respectively east and south and west. The first named is a dry watercourse ultimately joining the basin of the W. Hadramut; the two others run for a long distance through fertile valleys and, like many of the wadis on the seaward side of the range, have perennial streams down to within a few miles of the sea. Sana, the capital of Yemen, lies in a broad valley 7300 ft.

above sea-level, sloping northwards to the W. Kharid which, with the Ghail Hirran, the sources of which are on the eastern slopes of J. Hadur, run north-eastward to the Jauf depression. The Arhab district, through which these two great wadis run, was formerly the centre of the Himyar kingdom ; cultivation is now only to be found in the lower parts on the borders of the watercourses, all above being naked rock from which every particle of soil has been denuded. In the higher parts there are fine plains where Glaser found numerous Himyaritic remains, and which he considers were undoubtedly cultivated formerly, but they have long fallen out of cultivation owing to denudation and desiccation — the impoverishment of the country from these causes is increasing. Eastward the plateau becomes still more sterile, and its elevation probably falls more rapidly till it reaches the level of the Jauf and Nejran valleys on the borders of the desert. The water-parting between central and southern Arabia seems to be somewhere to the south of Nejran, which, according to Halevy, drains northward to

the W. Dawasir, while the Jauf is either an isolated depression, or perhaps forms part of the Hadramut basin.

Farther north, in Asir, the plateau is more mountainous and contains many fertile valleys. Of these may be mentioned Khamis Mishet and the Wadi Shahran rising among the high Asir.

summits of the maritime chain, and the principal affluents of the Wadi Besha; the latter is a broad well- watered valley, with numerous scattered hamlets, four days' journey (perhaps 80 m.) from the crest of the range. Still farther north is the Wadi Taraba and its branches running down from the highland district of Zahran. The lower valleys produce dates in abundance, and at higher eleva- tions wheat, barley, millets and excellent fruit are grown, while juniper forests are said to cover the mountain slopes. In Yemen this tree was probably more common formerly; the place-name Arar, signifying juniper, is still often found where the tree no longer exists.

The western coast of Yemen, like that of Hejaz, is studded with shoals and islands, of which Perim in the Straits of Bab-el-Mandeb, Kamaran, the Turkish quarantine post, 40 m. north of coast of Hodeda, and the Farsan group, off the Abu Arish coast, Yemen. are the principal. Hodeda is the only port of any import- ance since the days of steamships began; the other ports, Mokha, Lohaia and Kanfuda merely share in the coasting trade. The south coast is free from the shoals that imperil the navigation of the Red Sea, and in Aden it possesses the only safe natural harbour on the route between Suez and India. Several isolated volcanic hills crop out on the shore line between Aden and the straits ; the most remark- able are J. Kharaz, 2500 ft., and J. Shamshan, 1700 ft., at the base of which Aden itself is built. In both of these the crater form is very clearly marked. A low maritime plain, similar to the Tehama of the western coast, extends for some 200 m. east of the Straits of Bab-el-Mandeb, backed by mountains rising to 7000 ft. or more; farther east the elevation of the highland decreases steadily, and in the Hadramut, north of Mukalla, does not much exceed ft a a ramu t 4000 ft. The mountain chain, too, is less distinctly marked, and becomes little more than the seaward escarpment of the plateau which intervenes between the coast and the Hadramut valley. This valley runs nearly east and west for a distance of 500 m. from the eastern slopes of the Yemen highlands to its mouth on the Mahra coast near Sihut. The greater part of it is desert, but a short stretch lying between the 48th and 50th meridians is well watered and exceptionally fertile. This begins a little to the east of Shabwa, the ancient capital, now half buried in the advancing sand, and for a distance of over 70 m. a succession of villages and towns surrounded by fields and date groves extends along the main valley and into the tributaries which join it from the south. Shibam, Saiyun and Tarim are towns of 6000 or more inhabitants, and Hajren and Haura

in the W. Duwan are among the larger villages. Him- yaritic remains have been found here and in the W. Mefat which enters the Gulf of Aden near Balhaf. A few small fishing villages or ports are scattered along the coast, but except Mukalla and Shihr none is of any importance.

The Gara coast was visited by the Bents, who went inland from Dhafar, one of the centres of the old frankincense trade, to the crest of the plateau. The narrow coastal strip seems to be moderately fertile, and the hills which in places come down to the seashore are covered with trees, among which the frankincense and other gum- bearing trees are found. On the plateau, which has an altitude of 4000 ft., there is good pasturage; inland the country slopes gently to a broad valley beyond which the view was bounded by the level horizon of the desert.

Oman (§.».) includes all the south-eastern corner of the peninsula. Its chief feature is the lofty range of J. Akhdar, 10,000 ft. above sea-level. Like the great range of western Arabia, it runs Oman parallel to the coast ; it differs, however, from the western range in that its fall on the landward side is as abrupt and nearly as great as on its seaward side. Its northern extremity, Ras Musandan, rises precipitously from the straits of Hormuz; farther south the range curves inland somewhat, leaving a narrow but fertile strip, known as the Batina coast, between it and the sea, and con- taining several populous towns and villages of which Sohar, Barka and Sib are the chief. Muscat, the capital of the province and the principal port on the coast, is surrounded on three sides by bare, rocky hills, and has the reputation of being the hottest place in

Arabia. Zwemer says the fertility of the highland region of J. Akhdar is wonderful and is in striking contrast to the barrenness of so much of the coast; water issues in perennial springs from many rocky clefts, and is carefully husbanded by the ingenuity of the people; underground channels, known here asfaluj, precisely similar to the kanat or karez of Persia and Afghanistan, are also largely used. The principal villages on the eastern slopes are Rustak, Nakhl and Semail in the well-watered valley of the same name ; on the western slopes are Tanuf and Nizwa, lying immediately below the highest summit of the range; Semed, Ibra and Bidiya in the W. Betha are all well-built villages with palm-groves and irrigated fields. In the north-west the Dhahira district sloping towards the Jewasimi coast is more steppe-like in character; but there two oases of great fertility are found, of

which Birema, visited by both Miles and Zwemer, supports a population of 15,000. West of Abu Dhabi a low flat steppe with no settled inhabitants extends up to the Katr peninsula, merging on the north into the saline marshes which border the Persian Gulf, and on the south into the desert.

The great desert known as the Dahna or the Rub'a el Khali (" the empty quarter ") is believed to cover all the interior of southern The Arabia from the borders of Yemen in the west to those

southern °f O man ln the east. Halevy in Nejran, Von Wrede in desert. Hadramut, and Wellsted in Oman reached its edge, though none of them actually entered it, and the guides accompanying them all concurred in describing it as uninhabitable and uncrossed by any track. Its northern fringe is no doubt fre- quented by the Bedouin tribes of southern Nejd after the rains, when its sands, like those of the northern desert, produce herbage; but towards the east, according to Burckhardt's information, it is quite without vegetation even in the winter and spring. The farthest habitable spot to the south of Nejd is the Wadi Yabrin, which L. Pelly heard of from the Ahl Murra Bedouins as once a fertile district, and which still produces dates, though, owing to malaria, it is now deserted; thence southward to the Hadramut valley no communication is known to exist.

[Geology. — The geological structure of Arabia is very similar to that of Egypt. The oldest rocks consist of granite and schist, penetrated by intrusive dykes, and upon this foundation rest the flat-lying sedimentary deposits, beginning with a sandstone like the Nubian sandstone of Egypt. In the northern part of Arabia the crystalline rocks form a broad area extending from the peninsula of Sinai eastwards to Hail and southwards at least as far as Mecca. Towards the north the crystalline floor is overlaid by the great sandstone series which covers nearly the whole of the country north of Hail. Upon the sandstone rest a few scattered outliers of lime- stone, probably of Cretaceous age, the largest of which occur near Jauf and east of Bureda. Over both sandstone and granite great sheets of lava have been poured, and these, protecting the softer beds beneath from further denudation, now stand up as the high plateaus and hills called harra. Volcanic cones still exist in large numbers, and the sheets of lava appear as fresh as any recent flows of Etna or Vesuvius. Arabian manuscripts describe an eruption on the harra near Medina in A.D. 1256. In the south of Arabia the crystalline floor appears at intervals along the southern coast and on the shores of the Gulf of Oman. At Marbat the granite is overlaid by sandstone, presumably the Nubian sandstone: this is followed by marls containing Cenomanian fossils; and these are overlaid by Upper Cretaceous limestones, upon which rest isolated patches of Alveolina limestone. Generally, however, the Cretaceous beds do not appear, and the greater part of southern Arabia seems to be formed of Alveolina and nummulite

limestones of Tertiary age. An extinct volcano occurs at Aden, and volcanic rocks are found at other places near the Straits of Bab-el-Mandeb. Throughout the whole of Arabia, so far as is known, the sedimentary beds show no signs of any but the most gentle folding. Faulting, however, is by no means absent, and some of the faults are of considerable magni- tude. The Gulf of Akaba is a strip of country which has been let down between two parallel faults, and several similar faulted troughs occur in the Sinai peninsula. The Red Sea itself is a great trough bounded by faults along each side.]

Climate. — Owing to its low latitude and generally arid surface, Arabia is on the whole one of the hottest regions of the earth; this is especially the case along the coasts of the Persian Gulf and the southern half of the Red Sea, where the moist heat throughout the year is almost intolerable to Europeans. In the interior of northern and central Arabia, however, where the average level of the country exceeds 3000 ft., the fiery heat of the summer days is followed by cool nights, and the winter climate is fresh and invigorating; while in the highlands of Asir and Yemen in the south-west, and of Oman in the east, the summer heat is never excessive, and the winters are, comparatively speaking, cold.

In the northern desert the temperature is subject to extreme variations. Nolde states that on the 1st of February 1893 in the desert north of Hail the thermometer fell from 78° a little before sunset to 18 a quarter of an hour after. The midday temperatures recorded by Huber at Hail during January and the first half of February average about 65 F., and water froze on several nights; at Medina the winters are cold and night frosts of frequent occur- rence, and these conditions prevail over all the western part of the Nejd plateau. In the east where the elevation is lower the climate is

warmer. In the elevated highland district which extends from Taif to within 50 m. of Aden, the summer heat is tempered by the monsoon winds, and the seasonal variation of temperature is less marked. From observations made at Sana by Manzoni, Deflers ar.d Glaser, the mean temperature for the year of that city at an altitude of 7300 ft. and in 15° 22′ N. appears to be 60° F. ; for July the mean maximum was 77 , mean minimum 54°; for January the figures were 62°and40° respectively, the lowest recorded temperature in 1878 was 26-6° on the 26th of January. At Aden at the sea-level the mean temperature for the year is 83°; the highest observed temperature in 1904 was 97-3°, the lowest 67-4°.

The rainfall throughout northern and central Arabia is chiefly in the winter months between October and April, and is scanty and irregular. Doughty states that in 1876 rain to wet the ground had not fallen for three years at Medain Salih ; in that year showers fell on the 29th of December and on

two days in January and again in March. After a very hot summer the bright weather changed to clouded skies on the 2nd of October, rain fell tempestuously the same evening, and there were showery days and nights till the 14th. The autumn rains fell that year abundantly in the Nafud towards Jauf, but very little in the basin of the W. Hamd (on the western slope). Doughty adds that the Nejd highlands between Kasim and Mecca are watered yearly by seasonable rains, which at Taif are expected about the end of August and last commonly from four to six weeks. This appears to be about the northern limit reached by the south-west monsoon, which from. June to September brings a fairly abundant rainfall to the Yemen highlands, though the Tehama remains almost entirely rainless. The rainfall is heaviest along the western fringe of the plateau, and penetrates inland in decreasing quantity over a zone which perhaps extends to 100 m. in width. In good seasons it is sufficient for the cultivation of the summer crop of millet, and for the supply of the perennial streams and springs, on which the irrigation of the winter crops of wheat and barley depend. The amount measured at Dhala at the extreme south of the plateau at an elevation of 4800 ft. was in 1902 as follows: — ■ June, 4-0 in.; July, 5-5; August, 5-8; September, 19. Only slight showers were recorded in the other months of the year. At higher elevations the rainfall is no doubt heavier ; Manzoni mentions that at Sana there was constant rain throughout August and September 1878, and that the thermometer during August did not reach 65°. In the Tehama occasional showers fall during the winter months; at Aden the average rainfall for the year is 2-97 in., but during 1904 only 0-5 in. was recorded. Snow falls on the Harra and on the Tehama range in northern Arabia, and Nolde records a fall of snow which lay on the Nafud on the 1st of February 1893. It also falls on J. Akhdar in Oman, but is very rarely known on the Yemen mountains, probably because the precipitation during the winter months is so slight.

The prevailing winds in northern Arabia as far as is known are from the west; along the southern coast they are from the east; at Sana there is generally a light breeze from the north-north-west from 9 to 11 A.M., from noon till 4 P.M. a steady and often strong wind blows from the south-south-east, which dies away later. The climate is extremely dry, but this is compensated for by the heavy mists which sweep up from the plains during the rainless months and exercise a most beneficial effect in the coffee-growing districts. This phenomenon is known as the sukhemani or amama. In the morning the Tehama, as seen from the mountain tops, appears buried in a sea of white cloud; towards noon the clouds drift up the mountain slopes and cover the summits with wreaths of light mist charged with moisture which condenses on the trees and vegetation; in the afternoon they disappear, and the evenings are generally clear and still.

Fauna. — The wild animals of Arabia are all of the desert-loving type :

antelopes and gazelles are found in small numbers throughout the peninsula ; the latter are similar to the chikara or ravine deer of India. The larger antelopes, so common on the African side of the Gulf of Aden, are not found, except one variety, the Oryx beatrix (called by the Arabs, wild cow) , which is an inhabitant of the Nafud between Tema and Hail; it is about the size of a donkey, white, and with long straight horns. Hares are numerous both in the desert and in cultivated tracts. In the Yemen mountains the wal, a wild goat with massive horns, similar to the Kashmir ibex, is found; monkeys also abound. Among smaller animals the jerboa and other descriptions of rat, and the wabar or cony are common; lizards and snakes are numerous, most of the latter being venomous. Hyenas, wolves and panthers are found in most parts of the country, and in the mountains the leopard and wild cat. Of birds the ostrich is found in the Nafud and in the W. Dawasir. Among game birds the bustard, guinea fowl, sand grouse (kata), blue rock, green pigeon, partridge, including a large chikor (akb) and a small species similar to the Punjab sisi ; quail and several kinds of duck and snipe are met with. In the cultivated parts of Yemen and Tehama small birds are very numerous, so also are birds of prey, vultures, kites and hawks.

Insectsof all sorts abound; scorpions, centipedes, spiders, and an ugly but harmless millipede known in Yemen as hablub are very common in summer. Ants and beetles too are very numerous, and anthills are prominent features in many places. Locusts appear in great swarms and do much damage ; fires are lighted at night

to attract them, an1 large quantities are caught and eaten by the poorer people. Bees are kept, and in Yemen and Hadramut the honey is exceptionally good.

Of domesticated animals the camel is far the most useful to the Arab. Owing to its endurance of thirst the long desert journeys which separate the populous centres are made practicable, Camel. anc j j n t [j e S p r j n g months, when green forage is plentiful in the desert, the Bedouins pitch their camps for long periods far from any water, and not only men but horses subsist on camel's milk. The Arabian camel belongs to the one-humped species, though there are many varieties differing in appearance as much as the thorough- bred race-horse from the English cart-horse. The ordinary load for a pack camel is about 400 lb, and in hot weather good

camels will march 20 to 25 m. daily and only require water every third or fourth day: in cool weather, with ample green fodder they can go twenty-five days or more without drinking. A good dalul or riding camel will carry his rider 100 m. a day for a week on end. Nolde gives an instance from his own experience of a camel rider covering 62 m. in seven hours. The pure-bred riding camel is only found in perfection in inner Arabia; for some unexplained reason when taken out of their own country or north of the 30th degree they rapidly degenerate.

The horse does not occupy the important position in the Bedouin economy that is popularly supposed. In Nejd the number of horses is, comparatively speaking, very small; the want of Horse. water in the Nafud where alone forage is obtainable,

and the absence of forage in the neighbourhood of the towns makes horse-breeding on a large scale impracticable there. Horses are in fact only kept by the principal sheiks, and by far the larger propor- tion of those now in Nejd are the property of the amir and his family. These are kept most of the year in the Nafud, five or ten days' march from Hail, where they find their own food on the desert herbage. When a raid is in contemplation, they are brought in and given a little barley for a few weeks. Reared in this way they are capable of marvellous endurance, marching during a raid twenty hours a day for eight or ten days together. As a rule, they are only mounted at the moment of attack, or in pursuit. Water and forage have to be carried for them on camels.

The great majority of the horses that come into the market as Arabs, are bred in the northern desert and in Mesopotamia, by the various sections of the Aneza and Shammar tribes, who emigrated from Nejd generations ago, taking with them the original Nejd stock. In size and appearance, and in everything but endurance, these northern horses are admittedly superior to the true Nejdi. A few of the latter are collected by dealers in the nomad camps and exported chiefly from Kuwet. The amir Mahommed Ibn Rashid used to send down about one hundred young horses yearly.

Asses of excellent quality are bred all over the country; they are much used as mounts by the richer townsmen. Except in the settled districts horned cattle are not numerous; they are similar to the Indian humped cattle, but are greatly superior in milking qualities. The great wealth of the Arabs is in their flocks of sheep and goats; they are led out to pasture soon after sunrise, and in the hotter months drink every second day. In the spring when the succulent ashub and adar grow plentifully in the desert, they go for weeks without drinking. They are milked once a day about sunset by the women (the men milk the camels), and a large proportion of the milk is made into samn, clarified butter, or marisi, dried curd. The wool is not of

much value, and is spun by the women and woven into rugs, and made up into saddlebags or into the black Bedouin tents.

Flora. — The flora of Arabia has been investigated by P. Forskal, the botanist of Niebuhr's mission, P. E. Botta, G. Schweinfurth and A. Deflers, to whose publications the technical reader is referred. Its general type approaches more closely to the African than to that of southern Asia. In the higher regions the principal trees are various species of fig, tamarind, carob and numerous kinds of cactiform Euphorbia, of which one, the Euphorbia arborea, grows to a height of 20 ft. Of Coniferae the juniper is found on the higher slopes of J. Sabur near Taiz, where Botta describes it as forming an extensive forest and growing to a large size; it is also found in the range overlooking the W. Madin, 50 m. W. of Aden. Considerable forests are said to exist in Asir, and Burton found a few fine speci- mens which he regarded as the remains of an old forest, on the Tehama range in Midian. On the rocky hill-sides in Yemen the Adenium Obesum is worthy of notice, with its enormous bulb-like stems and brilliant red flowers. Some fine aloes or agaves are also found. In the cultivated upland valleys all over Arabia the Zizyphus jujuba, called by some travellers lotus, grows to a large tree; its thorny branches are clipped yearly and used to fence the cornfields among which it grows. In the broad sandy wadi beds the tamarisk (athl) is everywhere found; its wood is used for making domestic implements of all sorts. Among fruit trees the vine, apricot, peach, apple, quince, fig and banana are cultivated in the highlands, and in the lower country the date palm flourishes, particularly throughout the central zone of Arabia, in Hejaz, Nejd and El Hasa, where it is the prime article of food. A hundred kinds of date are said to grow at Medina, of which the birni is considered the most wholesome; the halwa and the jalebi are the most delicately flavoured and sell at v«ry high rates; the khulas of El Hasa is also much esteemed.

Of cereals the common millets, dhura and dukhn, are grown in all parts of the country as the summer crop, and in the hot irrigated Tehama districts three crops are reaped in the year ; in the highlands maize, wheat and barley are grown to a limited extent as the winter crop, ripening at the end of March or in April. Among vegetables the common kinds grown include radishes, pumpkins, cucumbers, melons, potatoes, onions and leeks. Roses are grown in some places for the manufacture of atr, or attar of roses; mignonette, jasmine, thyme, lavender and other aromatic plants are favourites in Yemen, when the Arabs often stick a bunch in their head-dress.

Of the products special to Arabia coffee comes first ; it is nowhere found wild, and is believed to have been introduced from Abyssinia in the 6th century A. D. It thrives on the seaward slopes of the western range in the

zone of the tropical rains, at Coffee. altitudes between 4000 and 7000 ft. The principal centres of pro- duction are the upper valleys of the W. Surdad, between Kaukaban and Manakha, and particularly on J. Haraz; in the Wadi Zubed west of Uden; in Hajaria on the slopes of J. Sabur, and in the Yafa district north-east of Aden. It is planted in terraces on the mountain slopes; shady trees, such as tamarind and fig, are planted in the border as a protection from the sun, and the terraces are irrigated by channels led from a neighbouring rivulet or spring. The plants are raised from seedlings, and when six or seven weeks old they are transplanted in rows 4 to 6 ft. apart; they require watering twice a month, and bear in two to four years. The berries are dried in the sun and sent down to Hodeda or Aden, where they are subjected to a process for separating the husk from the bean; the result is about 50% of cleaned berries, bun soft, which is exported, and a residue of huskcr kishr, from which the Yemenis make their favourite beverage.

Another plant universally used as a stimulant in Southern Arabia is khat (Catha edulis). The best is grown on J. Sabur and the moun- tainous country round Taiz. It is a small bush propagated from cuttings which are left to grow for three years ; the leaves are then stripped, except a few buds which develop next year into young shoots, these being cut and sold in bunches under the name of khat mubarak; next year on the branches cut back new shoots grow; these are sold as khat malhani, or second-year kat, which commands the highest price. The bush is then left for three years, when the process is repeated. The leaves and young shoots are chewed; they have stimulating properties, comparable with those of the coca of Peru.

The aromatic gums for which Arabia was famed in ancient times are still produced, though the trade is a very small one. The tree from which myrrh is extracted grows in many places, but the industry is chiefly carried on at Suda, 60 m. north-north-east of Sana. Longitudinal slits are made in the bark, and the gum is caught in cups fixed beneath. The balsam of Mecca is produced in the same way, chiefly in the mountains near the W. Safra between Yambu and Medina.

The stony plains which cover so large a part of the country are often covered with acacia jungle, and in the dry water-courses a kind of wild palm, the dom, abounds, from the leaves of which baskets and mats are woven. Brushwood and rough pasturage of some sort is found almost everywhere, except in the neighbourhood of the larger settlements, where forage and firewood have to be brought in from long distances. The Nafud sands, too, are tufted in many places with bushes or small trees, and after the winter rains they produce excellent pasture.

Population. — The people, according to their own traditions, are derived from two stocks, the pure Arabs, descended from Kahtan or Joktan, fourth in descent from Shem; and the Mustarab or naturalized Arabs, from Ishmael. The former are represented at the present day by the inhabitants of Yemen, Hadramut and Oman, in general a settled agricultural population; the latter by those of Hejaz, Nejd, El Hasa, the Syrian desert and Mesopotamia, consisting of the Bedouin or pastoral tribes (see Arabs and Bedouins). This distinction between the characteristics of the two races is only true in a general sense, for a considerable population of true Bedouin origin has settled down to agricultural life in the oases of Hejaz and Nejd, while in southern Arabia the tribes dwelling on the fringe of the great desert have to a certain extent adopted the nomad life.

Both among the nomad and settled Arabs the organization is essentially tribal. The affairs of the tribe are administered by the sheiks, or heads of clans and families; the position of sheik in itself gives no real governing power, his word and counsel carry weight, but his influence depends on his own personal qualities. All matters affecting the community are discussed in the majlis or assembly, to which any tribesman has access; here, too, are brought the tribesmen's causes; both sides plead and judgment is given impartially, the loser is fined so many- head of small cattle or camels, which he must pay or go into

exile. Murder can be expiated by the payment of diya or blood- money, if the kinsmen of the murdered man consent; they may, however, claim the life of the murderer, and long and troublesome blood feuds often ensue, involving the relatives of both sides for generations.

Apart from the tribesmen there is in Hejaz and south Arabia a privileged, religious class, the Sharifs or Seyyids, who claim descent from Mahomet through his daughter Fatima. Until the Egyptian invasion in 1814 the Sharifs of Mecca were the recog- nized rulers of Hejaz, and though the Turks have attempted to suppress their importance, the Sharif still executes justice accord- ing to the Mahommedan law in the holy cities, though, nominally, as a Turkish official. In Yemen and Hadramut many villages are occupied exclusively by this religious hierarchy, who are known as Ashraf , Sada or Kudha (i.e. Sharifs, Seyyids or Kadhis) ; the religious affairs of the tribes are left in their hands; they do not, however, interfere in tribal matters generally, or join in fighting.

Below these two classes, which may be looked on as the priestly and the military castes, there is, especially in the settled districts, a large population of artisans and labourers, besides negro slaves and their descendants, slave or free. The population of Khaibar consists almost entirely of the latter, and in Hail Huber estimates the pure Arab inhabitants at only one-third of the whole. In the desert, too, there is a widely scattered tribe, the Salubi, which from its name (Salib, cross) is conjectured to be of early Christian origin; they are great hunters, killing ostriches and gazelles; the Arabs despise them as an inferior race, but do not harm them; they pay a small tax to the tribe under whose protection they live, and render service as labourers, for which they receive in the spring milk and cheese; at the date harvest they get wages in kind; with this, and the produce of the chase, they manage to exist in the desert without agriculture or flocks.

In southern Arabia the Jews form a large element in the town population. According to one authority their presence in Yemen dates from the time of Solomon, others say from the Ja Arabia, capture of Jerusalem by Nebuchadrezzar. Manzoni estimated their number in Sana in 1878 at 1700 out of a total population of 20,000; at Aden they are a numerous and wealthy community, with agents in most of the towns of Yemen. Even in remote Nejran, Halevy, himself a Jew, found a considerable colony of his co-religionists. They wear a distinctive garb and are not allowed to carry arms or live in the same quarter as Moslems. Another foreign element of considerable strength in the coast towns of Muscat, Aden and Jidda, is the British Indian trading class; many families of Indian origin also have settled at Mecca, having originally come as pilgrims.

Estimates of the population of Arabia vary enormously, and the figures given in the following table can only be regarded as a very rough approximation: —

Hejaz 300,000

Yemen and Asir 1,800,000

Nejd . . 1,000,000

Hadramut 150,000

Oman 1,000,000

El Hasa 300,000

Syrian desert and border …. 275,000

4,825,000

Communications. — The principal land routes in Arabia are those leading to the holy cities. In the present day the Syrian pilgrim route, or Darb el Haj, from Damascus to Medina and Mecca is the most used. The annual pilgrim caravan or haj, numbering some 6000 people with 10,000 pack animals, is escorted by a few Turkish irregulars known as agel; small fortified posts have been established at the regular halting-places some 30 m. apart, each furnished with a well and reservoir, and for the further protection of the haj, payments are made to the Bedouin tribes through whose territories the route passes. The road is a mere camel track across the desert, the chief places passed are Ma'an on the Syrian border, a station on the old Sabaean trade route to Petra, and Medain Salih, the site of the

rock-cut tombs and inscriptions first brought to notice by Doughty. From Medina the route usually followed descends the W. Safra to Badr Hunen, whence it keeps near the coast passing Rabigh and Khulesa to Mecca. The total distance, 1300 m., is covered in forty days.

The Egyptian pilgrim route from Cairo, across the Sinai peninsula and down the Midian coast to El Wijh, joins the Syrian route at Badr Hunen. It also was formerly provided with stations and reservoirs, but owing to the greater facilities of the sea journey from Suez to Jidda it is now little used. Another important route is that taken by the Persian or Shia pilgrims from Bagdad and Kerbela across the desert, by the wells of Lina, to Bureda in Kasim; thence across the steppes of western Nejd till it crosses the Hejaz border at the Ria Mecca, 50 m. north-east of the city. It lies almost entirely in the territory of the amir Ibn Rashid of J. Shammar, who derives a considerable revenue from the pilgrimage. The old reservoirs on this route attributed to Zubeda, wife of Harun al Rashid, were destroyed during the Wahhabi raids early in the 19th century, and have not been repaired. The Yemen pilgrim route, known as the Haj el Kabsi, led from Sada through Asir to Tail and Mecca, but it is no longer used.

The principal trade routes are those leading from Damascus to Jauf and across the Nafud to Hail. Other important routes leading to Nejd are those from Kuwet to Hail, and from El Hasa to Riad respectively. In the west and south the principal routes, other than those already mentioned, are from Yambu to Medina, from Jidda to Mecca, Hodeda to Sana, Aden to Sana, and from Mukalla to the Hadramut valley. Railway construction has begun in Arabia, and in 1908 the Hejaz line, intended to connect Damascus with Mecca, had reached Medina, 500 m. south of Ma'an. This line is of great strategical importance, as strengthen- ing the Turkish hold on the Red Sea provinces. But the principal means of commercial communication for a country like Arabia must always be by sea. Bahrein, Kuwet and Muscat are in steam communication with India, and the Persian Gulf ports; all the

great lines of steamships call at Aden on their way between Suez and the East, and regular services are maintained between Suez, Jidda, Hodeda and Aden, as well as to the ports on the African coast, while native coasting craft trade to the smaller ports on the Red Sea and Indian Ocean.

Commerce. — The total value of the trade of Aden for 1904 amounted to over £6,000,000. The imports to Jidda in the same year were £1,405,000, largely consisting of rice, wheat and other food stuffs from India; the exports, whioh have dwindled away in late years, amounted in 1904 to only £25,000. To balance the exports and imports specie was exported in the three years 1902-1904 amounting to £2,319,000; a large proportion of this was perhaps provided by cash brought into the country by pilgrims.

The pilgrim traffic increased largely in 1904 as compared with previous years; 74,600 persons landed at Jidda, 18,000 of whom were from British India, 13,000 from Java and the Straits Settle- ments, and the remainder from Turkish territory, Egypt and other countries: 235 out of a total of 334 steamships engaged in this traffic were British.

The trade of Hodeda, which contributes by far the largest share to that of Turkish Yemen, fell off considerably during the period from 1901-1905, chiefly owing to the disturbed state of the country. In the latter year the imports amounted to £467,000, and the exports to £451,000; coffee, the mainstay of Yemen trade, shows a serious decline from £302,000 in 1902 to £229,000 in 1904; this is attribut- able partly to the great increase of production in other countries, but mainly to the insecurity of the trade routes and the exorbitant transit dues levied by the Turkish administration.

Oman, through its chief port Muscat, had a total trade of about £550,000, two-thirds of which is due to imports and one-third to exports. The chief items of imports are arms and ammunition, rice, coffee and piece goods; the staple export is dates, which in a good year accounts for nearly half the total; much of the trade is in the hands of British Indians, and of the shipping 92% is British.

The principal trade centre of the Arabian side of the Persian Gulf is Bahrein; the total volume of trade of which amounted in 1904 to £1,900,000, nearly equally divided between imports and exports; rice, piece goods, &c, form the bulk of the former, while pearls are the most valuable part of the latter. (R. A. W.)

Antiquities Arabia cannot be said to be " destitute of antiquities," but the material for the "study of these is still very incomplete.

ANTIQUITIES]

The difficulties in the way of travelling in Arabia with a view to scientific investigation are such that little or nothing is being done, and the systematic work which has given such good results in Egypt, Palestine and Babylonia- Assyria is unknown in Arabia. Yet the passing notes of travellers from the time of Carsten Niebuhr show that antiquities are to be found.

Prehistoric Remains. — Since prehistoric remains must be studied where they are found, the difficulty in the way of ex- ploration makes itself severely felt. That such remains exist seems clear from the casual remarks of travellers. Thus Palgrave {Central and Eastern Arabia, vol. i. ch. 6) speaks of part of a circle of roughly shaped stones taken from the adjacent limestone mountains in the Nejd. Eight or nine of these stones still exist, some of them 15 ft. high. Two of them, 10 to 12 ft. apart, still bear their horizontal lintel. They are all without ornament. Palgrave compares them with the remains at Stonehenge and Karnak. Doughty {Arabia Deserta, vol. ii.), travelling in north- west Arabia, saw stones of granite in a row and " flagstones set edgewise " (though he does not regard these as religious), also " round heaps, perhaps barrows," and " dry-built round chambers," which may be ancient tombs. J. T. Bent {Southern Arabia, pp. 24 ff.) explored one of several mounds in Bahrein. It proved to be a tomb, and the remains in it are said to be Phoenician.

Castles and Walls. — In the south of Arabia, where an advanced civilization existed for centuries before the Christian era, the ruins of castles and city-walls are still in existence, and have been mentioned, though not examined carefully, by several travellers. In Yemen and Hadramut especially these ruins abound, and in some cases inscriptions seem to be still in situ. Great, castles are often mentioned in early Arabian literature. One in the neighbourhood of San'a was described as one of the wonders of the world by Qazwinl {Athdr ul-Bildd, p. 33, ed. Wiistenfeld, Gottingen, 1S47, cf. Journal of the German Oriental Society, vol. 7, pp. 472, 476, and for other castles vol. 10, pp. 20 ff.). The ruins of the city of Ma'rib, the old Sabaean capital, have been visited by Arnaud, Halevy and Glaser, but call for further description, as Arnaud confined himself to a description of the dike (see below), while Halevy and Glaser were interested chiefly in the inscriptions.

Wells and Dikes. — From the earliest times the conservation of water has been one of the serious cares of the Arabs. All over the country wells are to be found, and the masonry of some of them is undoubtedly ancient.

Inscriptions are still found in some of these in the south. The famous well Zemzem at Mecca is said to belong to the early times, when the eastern traffic passed from the south to the north-west of Arabia through the Hejaz, and to have been rediscovered shortly before the time of Mahomet. Among the most famous remains of Ma'rib are those of a great dike reminding one of the restored tanks familiar to visitors at Aden. These remains were first described by Arnaud {Journal asiatique, January 1874, with plan). Their importance was afterwards emphasized by Glaser's publication of two long inscriptions concerning their restoration in the 5th and 6th centuries a.d. (" Zwei Inschriften iiber den Dammbruch von Marib," in the Mitteilungen der V order asiatischen Gesellschaft, Berlin, 1897). Another dike about 150 yds. long was seen by W. B. Harris at Hirran in Yemen. Above it was a series of three tanks {A Journey through the Yemen, p. 279, London, 1893).

Stones and Bronzes. — The 19th century has brought to the museums of Europe (especially to London, Paris, Berlin and Vienna) a number of inscriptions in the languages of Minea and Saba, and a few in those of Hadramut and Katabania (Qatta- bania). These inscriptions are generally on limestone or marble or on tablets of bronze, and vary from a few inches to some feet in length and height. In some cases the originals have been brought to Europe, in other cases only squeezes of the inscrip- tions. The characters employed are apparently derived from the Phoenician (cf. Lidzbarski's Ephemeris, vol. i. pp. 109 ff.). The languages employed have been the subject of much study (cf. F. Hommel's Siid-arabische Chrestomathie, Munich, 1893), but the archaeological value of these remains has not been so

fully treated. Very many of them are votive inscriptions and contain little more than the names of gods and princes or private men. A few are historical, but being (with few and late excep- tions) undated, have given rise to much controversy among scholars. Their range seems to be from about 800 B.C. (or 1500 B.C. according to E. Glaser) to the 6th century a.d. Few are still in situ, the majority having been taken from their original positions and built into houses, mosques or wells of more recent date. Among these remains are altars, and bases for statues of gods or for golden images of animals dedicated to gods. The earlier stones are devoid of ornamentation, but the later stones and bronzes are sometimes ornamented with designs of leaves, flowers, ox-heads, men and women. Some bear figures of the conventionalized sacred tree with worshippers, similar to Babylonian designs. Besides these there are gravestones, stelae with human heads, fragments of limestone, architectural designs as well as bronze castings of camels, horses, mice, serpents, &c. (cf. D. H. M tiller's Sildarabische Alterthilmer im Kunsthistorischen Museum, Vienna, 1899, with plates).

Seals, Weights and Coins. — The Vienna Museum possesses a small number of seals and gems. The seals are inscribed with Sabaean writing and are of bronze, copper, silver and stone. The gems of onyx, carnelian and agate are later and bear various figures, and in some cases Arabic inscriptions. One or two weights are also in existence. A number of coins have been brought to the British Museum from Aden, San'a and Ma'rib. Others were purchased by G. Schlumberger in Constantinople; others have been brought to Europe by Glaser, and are now in the Vienna Museum. These are imitations of Greek models, while the inscriptions are in Sabaean characters (cf. B. V. Head, in the Numismatic Chronicle, 1878, pp. 273-284; G. Schlum- berger, Le Tresor de Sana, Paris, 1880; D. H. Miiller, op. cit. pp. 65 ff. and plates).

For the problem of Arabic antiquities in Rhodesia see Rhodesia and Zimbabwe. (G. W. T.)

History

Introduction. — Arabia is a land of Semites, and is supposed by some scholars to have been the original home of the Semitic peoples. Although this cannot be said to be proved, th« studies, linguistic and archaeological, of Semitic scholars have shown it to be probable. The dispersion from Arabia is easy to imagine. The migration into Babylonia was simple, as there are no natural boundaries to separate it from north-east Arabia, and similar migrations have taken place in historic times. That of the Aramaeans at an early period is likewise free from any natural hindrance. The connexion with Palestine has always been close; and the Abyssinian settlement is probably as late as the beginning of the Christian era. Of these migrations, however, history knows nothing, nor are they expressed in literature. Arabian literature has its own version of prehistoric times, but it is entirely legendary and apocryphal. It was, and still is, the custom of Arabian historians to begin with the creation of the world and tell the history from then to the time of which they are writing. Consequently even the more sober histories contain a mass of fables about early days. Many of these, taken in part from Jewish and Christian sources, find a place in the Koran. Of all these stories current at the time of Mahomet, the only ones of any value are the accounts of the " days of the Arabs," i.e. accounts of some famous inter-tribal battles in Arabia.

Authorities. — Until recently the Arab traditions were practi- cally the only source for the pre-Islamic history of Arabia. The Old Testament references to Arabs were obscure. The classical accounts of the invasion of Aelius Gallus in 26 B.C. threw little light on the state of Arabia at the time, still less on its past history. The Greek writers from Theophrastus in the 4th century.B.c to Ptolemy in the 2nd century a.d. mention many names of

Arabian peoples and describe the situation of their cities, but contribute little to their history, and that little could not be controlled. The same applies to the information of Pliny in his Natural History. In the 19th century the discovery and decipherment of the Assyrian inscriptions gave a slight glance into the relations between Arabs and Assyrians from the

8th century B.C. But the great contribution of the century to the early history of Arabia was the collecting and translating of numerous early Arabian inscriptions (cf. section Antiquities above), which have done service both by their own indication of a great civilization in Arabia for nearly (or more than) a thousand years before the Christian era, and by the new stimulus which they gave to the study and appreciation of the materials in the Assyrian inscriptions, the Old Testament, and the Greek and Roman writers. At the same time the facts that the inscriptions are undated until a late period, that few are historical in their contents, and for the most part yield only names of gods and rulers and domestic and religious details, and that our collection is still very incomplete, have led to much serious disagreement among scholars as to the reconstruction of the history of Arabia in the pre-Christian centuries.

All scholars, however, are agreed that the inscriptions reach as far back as the gth century B.C. (some say to the 16th) and prove the existence of at least four civilized kingdoms during these centuries. These are the kingdoms of Ma'In (Minaean), of Saba (Sabaean), of Hadramaut (Hadramut) and of Katabania (Katabanu) . Of the two latter little is known. That of Hadramut had kings from the time of the Minaeans to about a.d. 300, when it was conquered by Ethiopia. The limits of the kingdom of Katabania are not known, but it has its own inscriptions.

As to the Sabaean kingdom there is fair agreement among scholars. The inscriptions go back to 800 B.C. or earlier, and the same applies to the kingdom. A queen of this people (the " Queen of Sheba ") is said (1 Kings x.) to have visited Solomon about 950 B.C. There is, however, no mention of such a queen in the inscriptions. An Assyrian inscription mentions Ith'amara the Sabaean who paid tribute to Sargon in 715 B.C. At this time the Sabaeans must have been in north Arabia unless the in- scription refers to a northern colony of the southern Sabaeans. The former opinion is held by E. Glaser, who thinks that in the oth and 8th centuries they moved down along the west coast to the south, where they conquered the

Minaeans (see below). The Sabaean rule is generally divided into periods indicated by the titles given to their rulers. In the first of these ruled the Makarib, who seem to have been priest-kings. Their first capital was at Sirwah. Ten such rulers are mentioned in the inscriptions. Their rule extended from the 9th to the 6th century. The second period begins about 550 B.C. The rulers are known as " kings of Saba." Their capital was Ma'rib. The names of seventeen of these kings are known from the inscriptions. Their sway lasted until about 115 B.C., when they were succeeded by the Him- yarites. During this period they were engaged in constant strife with the neighbouring kingdoms of Hadramut and Katabania. The great prosperity of south-west Arabia at this time was due in large measure to the fact that the trade from India with Egypt came there by sea and then went by land up the west coast. This trade, however, was lost during this period, as the Ptolemies established an overland route from India to Alexandria. The connexion of Saba with the north, where the Nabataeans (q.v.) had existed from about 200 B.C., was now broken. The decay that followed caused a number of Sabaeans to migrate to other parts of Arabia.

The Minaean kingdom extended over the south Arabian Jauf, its chief cities being Karnau, Ma'In and Yathil. Some twenty-five kings are known from the inscriptions; of these twenty are known to be related to one another. Their history must thus cover several centuries. As inscriptions in the Minaean language are found in al-'Ula in north Arabia, it is probable that they had colonies in that district. With regard to their date opinion is very much divided; some, with E. Glaser and F. Hommel, maintaining that their kingdom existed prior to that of Saba, probably from about 1500 B.C. or earlier until the Sabaeans came from their home in the north and conquered them in the 9th century. Other scholars think, with D. H. Miiller, partly on palaeographical grounds (cf. M. Lidzbarski's Ephemeris, vol. i. pp. 109 seq., Giessen, 1902), that none of the inscriptions are earlier than about 800 B.C. and that the Minaean kingdom existed side by side with the Sabaean. It is curious that

the Sabaean inscriptions contain no mention of the Minaeans, though this may be due to the fact that very few of the inscrip- tions are historical in content.

About 115 B.C. the power over south Arabia passed from the Sabaeans to the Himyarites, a people from the extreme south- west of Arabia; and about this time the kingdom of Katabania came to an end. The title taken by the new rulers was " king of Saba and Raidan." Twenty-six kings of this period are known from the inscriptions, some of which are dated. In this period the Romans made their one attempt at direct interference in the affairs of Arabia. The invasion under Aelius Gallus was an absolute

failure, the expedition being betrayed by the guides and lost in the sands of the desert. During the latter part of this time the Abyssinians, who had earlier migrated from Arabia to the opposite coast of Africa, began to flow back to the south of Arabia, where they seem to have settled gradually and increased in importance until about a.d. 300, when they became strong enough to overturn the Himyarite kings and establish a dynasty of their own. The title assumed by them was " king of Saba, Raidan, Hadramut and Yemen." The Himyarites were, however, still active, and after a struggle succeeded in establish- ing a Jewish Sabaean kingdom, having previously accepted Judaism as their religion. Their best-known king was Dhu Nuwas. The struggle between them and the Abyssinians now became one of Judaism against Christianity. The persecution of the Christians was very severe (see E. Glaser's Die Abyssinier in Arabien und Afrika, Munich, 1895, and F. M. E. Pereira's Historia dos Martyr es de Nagran, Lisbon, 1899). Apparently for this reason Christian Abyssinia was supported from Byzantium in its attempts to regain power. These attempts were crowned with success in 525. Of the Christian Abyssinian kings in Arabia tradition tells of four, one only of whom is mentioned in inscrip- tions. The famous expedition of Abraha, the Abyssinian viceroy, against Mecca, took place in 570. Five years later the Persians, who had been called in by the opponents of Christianity, suc- ceeded in taking over the rule and in appointing governors over Yemen. (See further Ethiopia: The Axumite Kingdom.)

Hlra, Ghassan and Kinda. — Before passing to the time of Mahomet it is necessary to take account of three other Arabian powers, those of Hira, Ghassan and Kinda.

The kingdom of Hira (Hlra) was established in the boundary land between the Euphrates and the Arabian desert, a district renowned for its good air and extraordinary fertility. The chief town was Hira, a few miles south of the site of the later town of Kufa. The inhabitants of this land are said in Tabari's history to have been of three classes: — (1) The Tanukh (Tnuhs), who lived in tents and were made up of Arabs from the Tehama and Nejd, who had united in Bahrein to form a new tribe, and who migrated from there to Hira, probably at the beginning or middle of the 3rd century a.d., when the Arsacid power was growing weak. The Arabian historians relate their conflict with Zenobia. (2) The Tbad or Tbadites, who dwelt in the town of Hira in houses and so led a settled life. These were Christians, whose ecclesiastical language was Syriac, though the language of intercourse was Arabic. A Christian bishop of Hira is known to have attended a synod in 410. In the 5th century they became Nestorians. (3) Refugees of various tribes, who came into the land but did not belong to the Tanukh or the Tbad. There is no trustworthy information as to the earlier chiefs of this people. The dynasty of the Lakhmids, famed in Arabian history and literature, arose towards the end of the 3rd century and lasted

until about 602. The names of twenty kings are given by Hisham al-Kalbl in Tabari's history. Although so many of their subjects were Christian, the Lakhmids remained heathen until Nu'man, the last of the dynasty. The kingdom of Hira was never really independent, but always stood in a relation of dependence on Persia, probably receiving pay from it and employing Persian soldiers. At the height of its power it was able to render valuable aid to its suzerain. Much of its time was spent in wars with Rome and Ghassan. Its revenues were derived from the Bedouins of the surrounding lands as well as from its own subjects at home. About 602 the

Hira.

HISTORY]

ARABIA

265

Lakhmid dynasty fell, and the Persian Chosroes (Khosrau) II. appointed as governor an Arab of the tribe of Tai. Shortly after it came into relation with Islam.

See G. Rothstein's Die Dynastic der Lakhmiden in al-Hira (Berlin, 1899) ; Th. Noldeke's Geschichte der Perser und Araber zur Zeit der Sassaniden (Leiden, 1879).

In the beginning of the 6th century a.d. a dynasty known as the Jafnids, enter into the history alike of the Roman and Ohassaa Persian empires. They ruled over the tribe of Ghassan in the extreme north-west of Arabia, east of the Jordan, from near Petra in the south to the neighbourhood of Rosafa in the north-east. Of their origin little is known except that they came from the south. A part of the same tribe in- habited Yathrib (Medina) at the time of Mahomet. The first certain prince of the Jafnid house was Harith ibn Jabala, who, according to the chronicle of John Malalas, conquered Mondhir (Mundhir) of Hlra in 528. In the following year, according to Procopius, Justinian perceived the value of the Ghassanids as an outpost of the Roman empire, and as opponents of the Persian dependants of Hlra, and recognized Harith as king of the Arabs and patrician of the Roman empire. He was thus constantly engaged in battles against Hlra. In 541 he fought under Beli- sarius in Mesopotamia. After his death about 569 -or 570 the friendly relations with the West continued, but about 583 there was a breach. The Ghassanid kingdom split into sections each with its own prince. Some .passed under the sway of Persia, others preserved their freedom at the expense of their neighbours. At this point their history ceases to be mentioned in the Western chronicles. There

are references to the Ghassanid Nu'man in the poems of Nabigha. Arabian tradition tells of their prince Jabala ibn Aiham who accepted Islam, after fighting against it, but finding it too democratic, returned to Christianity and exile in the Roman empire. As Islam advanced, some of the Ghassanids retreated to Cappadocia, others accepted the new faith.

See Th. Noldeke, Die ghassanischen Fiirsten aus dem Hause Gafna's (Berlin, 1887).

In the last decade of the 5th century a new power arose in central Arabia. This was the tribe of Kinda under the sway of Kind a tne family of Aqil ul Murar, who came from the south.

They seem to have stood in much the same relation to the rulers of Yemen, as the people of Hlra to the Persians and the Ghassanids to Rome. Abraha in his invasion of the Hejaz was accompanied by chiefs of Kinda. Details of their history are not known, but they seem to have gained power at one time even over the Lakhmids of Hlra; and to have ruled over Bahrein as well as Yemama until the battle of Shi'b ul Jabala, when they lost this province to Hlra. The poet Amru'ul Qais was a member of the princely family of Kinda.

Outside the territory of the powers mentioned above, Arabia in the 6th century was in a state of political chaos. Bahrein,

inhabited chiefly by the Bani'Abd Qais and the Bani parts ot Bakr, was largely subject to Persian influence near Arabia. its coast, and a Persian governor, Sebocht, resided

in Hajar, its chief town. In Oman the Arabs, who were chiefly engaged in fishing and seafaring, were Azdites mixed with Persians. The ruling dynasty of Julanda in their capital Suhar lasted on till the Abbasid period. No Persian officials are mentioned in this country; whether Persians exercised authority over it is doubtful. On the west coast of Arabia the influence of the kingdom of Yemen was felt in varying degree according to the strength of the rulers of that land. Apart from this influence the Hejaz was simply a collection of cities each with its own government, while outside the cities the various tribes governed themselves and fought continual battles with one another.

Time of Mahomet. — Thus at the time of Mahomet's advent the country was peopled by various tribes, some more or less settled under the governments of south Arabia, Kinda, Hlra and Ghassan, these in turn depending on Abyssinia, Persia and Rome {i.e. Byzantium) ; others as in the Hejaz were ruled in smaller communities by members of leading

families, while

in various parts of the peninsula were wandering Arabs still maintaining the traditions of old family and tribal rule, forming no state, sometimes passing, as suited them, under the influence and protection of one or another of the greater powers. To these may be added a certain number of Jewish tribes and families deriving their origin partly from migrations from Palestine, partly from converts among the Arabs themselves. Mahomet appealed at once to religion and patriotism, or rather created a feeling for both. For Mahomet as a religious teacher and for the details of his career see Mahomet. It is enough here to outline his actions in so far as he attempted to create a united, and then a conquering, Arabia. Though the external conquests of the Arabs belong more properly to the period of the caliphate, yet they were the natural outcome of the prophet's ideas. His idea of Arabia for the Arabians could only be realized by summoning the great kings of the surrounding nations to recognize Islam; otherwise Abyssinia, Persia and Rome (Byzantium) would continue their former endeavours to influence and control the affairs of the peninsula. Tradition tells that a few years before his death he did actually send letters to the emperor Heraclius, to the negus of Abyssinia, the king of Persia, and Cyrus, patriarch of Alexandria, the " Mukaukis " of Egypt, summoning them to accept Islam and threatening them with punishment in case of refusal. But the task of carrying out these threats fell to the lot of his successors; the work of the prophet was to be the subjugat- ing and uniting of Arabia. This work, scarcely begun in Mecca, was really started after the migration to Medina by the forma- tion of a party of men — the Muhajirun (Refugees or Emigrants) and the Ansar (Helpers or Defenders) — who accepted Mahomet as their religious leader. As the necessity of overcoming his enemies became urgent, this party became military. A few successes in battle attracted to him men who were interested in fighting and who were willing to accept his religion as a condition of membership of his party, which soon began to assume a national form. Mahomet early found an excuse for attacking the Jews, who were naturally in the way of his schemes. The Bani Nadir were expelled, the Bani Quraiza slaughtered. By the time he had successfully stormed the rich Jewish town of Khaibar, he had found that it was better to allow industrious Jews to remain in Arabia as payers of tribute than to expel or kill them: this policy he followed afterwards. The capture of Mecca (630) was not only an evidence of his growing power, which induced Arabs throughout the peninsula to join him, but gave him a valu- able centre of pilgrimage, in which he was able by a politic adoption of some of the heathen Arabian ceremonies into his own rites to win men over the more easily to his own cause. At his death in 623 Mahomet left Arabia practically unified. It is true that rival prophets were leading rebellions in various parts of Arabia, that the tax-collectors were

not always paid, and that the warriors of the land were much distressed for want of work owing to the brotherhood of Arabs proclaimed by Mahomet. The tribes were a seething mass of restlessness, their old feuds ready to break out again. But they had realized that they had common interests. The power of the foreigner in Arabia was broken. Islam promised rich booty for those who fought and won, paradise for those who fell.

Early Caliphs. 1 1. Conquest. — One task of the early caliphs was to find an outlet for the restless fighting spirit. Abu Bekr (632-634), the first of these caliphs, was a man of simple life and profound faith. He understood the intention of Mahomet as to foreign nations, and set himself resolutely to carry it out in the face of much difficulty. Hence as soon as he assumed office he sent out the army already chosen to advance against the Romans in the north. The successful reduction of the rebels in Arabia enabled him in his first year to send his great general Khalid with his Arab warriors first against Persians, then against Romans. His early death prevented him from seeing the fruits of his policy. Under the second caliph Omar (634-644) the Persians were defeated at Kadesiya (Kadessia), and Irak was completely subdued and the new cities of Kufa and Basra were

1 For the general history of the succeeding period see Caliphate; Egypt: History, § "Mahommedan."

Institution otaavy.

founded (635). In the same year Damascus fell into the hands of the Arabs under Abu 'Ubaida. In 636 Jerusalem fell and received a visit from the caliph. Three years later the fateful step was taken of appointing Moawiya (Mu'awiyya) governor of Syria. In 640 'Amr-ibn-el-Ass (Amr ibn al-'As) invaded Egypt and the following year took Alexandria and founded Fostat (which later became Cairo). The victory at Nehavend in 641 over the Persians, the flight of the last Sassanid king and the capture of Rei or Rai (class. Rhagae) in 643 meant the entire subjugation of Persia and crowned the conquests of Omar's caliphate. The reign of the third caliph Othman (644-656) was marked by the beginning of that internal strife which was to ruin Arabia; but the foreign conquests continued. In the north the Moslem arms reached Armenia and Asia Minor; on the west they were successful as far as Carthage on the north coast of Africa. After the murder of Othman, 'Ali (656-661) became caliph, but Moawiya, governor of

Syria, soon rebelled on the pretext of avenging the death of Othman. After the battle of Siffin (657) arbitration was resorted to for the settlement of the rival claims. By a trick 'Ali was deposed (658), and the Omayyad dynasty was established with its capital at Damascus.

During these early years the Arabs had not only made con- quests by land, but had found an outlet for their energy at sea. In 640 Omar sent a fleet of boats across the Red Sea to protect the Moslems on the Abyssinian coast. The boats were wrecked. Omar was so terrified by this that when Moawiya applied to him for permission to use ships for an attack on the islands of the Levant, he resolutely refused. Othman was less careful, and allowed a fleet from Africa to help in the conquests of the Levant and Asia Minor. In 649 he sanctioned the establishment of a maritime service, on condition that it should be voluntary. Abu Qais, appointed admiral, showed its usefulness by the capture of Cyprus. In 652 Abu Sarh with a fleet from Egypt won a naval battle over the Byzantine fleet near Alexandria.

2. Internal A fairs. — In the meantime what had become of Arabia and its unification? The first task of Abu Bekr had been to reduce those rebels who threatened to destroy that unity even before it was fully established. This he did by the aid of the great general Khalid. First he swept down on the Bani Hanifa in Yemama, who with their rival prophet Mosailama (Mosailima) and 40,000 men were in arms. The battle of Yemama (633) was fierce and decisive. Mosailama was slain. The Bani Hanlfa returned to Islam. Bahrein was influenced by this battle, and the rebellion there, which was threatening, was crushed. Oman was reconquered by Huddhaifa, who became its governor. Ikrima settled Mahra. Muhajir, with the help of Ikrima, succeeded with difficulty, but thoroughly, in defeating Amr ibn Ma'dikarib and Qais ibn 'Abd Yaghuth in Yemen and Ashath ibn Qais in Hadramut. The Hejaz and Tehama were cleared of the plundering nomads by 'Attab and Tahir. At the end of the first year of his caliphate Abu Bekr saw Arabia united under Islam. The new national feeling demanded that all Arabs should be free men, so the caliph ordained that all Arab slaves should be freed on easy terms. The solidarity of Arabia survived the first foreign conquests. It was not intended that Arabs should settle in the conquered lands except as armies of occupation. Thus it was at first forbidden that Arabs should buy or possess land in these 'countries. Kufa was to be only a military camp, as was Fostat in Egypt. The taxes with the booty from conquests were to be sent to Arabia for distribution among the Moslems. Omar tried to prevent the advance of conquests lest Arabia should suffer. " I would rather the safety of my people than thousands of spoil and further conquest." But men could not be prevented from pouring out from their homes in search of new conquests and more booty. Many of those who went forth did not return. They acquired property and rank in the new lands. Kufa attracted chiefly men of south Arabia, Basra those of

the north. Both became great cities, each with a population of 1 50,000 to 200,000 Arabians. Yet so long as the caliphs lived in Medina, the capital of Arabia was the capital of the expanding Arabian empire. To it was brought a large

share of the booty. The caliphs were chosen there, and there the rules for the administration were framed. Thence went out the governors to their provinces. Omar was the great organizer of Arabian affairs. He compiled the Koran, instituted the civil list, regulated the military organization. He, too, desired that Mahomet's wish should be carried out and that Arabia should be purely Moslem. To this end he expelled the Christians from Nejran and gave them lands in Syria and Irak, where they were allowed to live in peace on payment of tribute. The Jews, too, were shortly after expelled from Khaibar. The secondary posi- tion that Arabia was beginning to assume in the Arabian empire is clearly marked in the progress of events during the caliphate of Othman. In his appointments to governorships and other offices, as well as in his distribution of spoil, Othman showed a marked preference for the members of his own tribe the Koreish (Quraish) and the members of his own family the Bani Omayya (Umayya). The other Arab tribes became increasingly jealous of the Koreish, while among the Koreish themselves the Hashi- mi-te family came to hate the Omayyad, which now had much power, although it had been among the last to accept Islam and never was very strict in its religious duties. But the quarrels which led to the murder of Othman were fomented not so much in Arabia as in Ktifa and Basra and Fostat. In these cities the rival parties were composed of the most energetic fighting men, who were brought into the most intimate contact with one another, and who kept up their quarrels from the home land. In Kufa a number of the Koreish had settled, and their arrogance became insupportable. The governors of all these towns were of Othman's own family. After some years of growing dissatisfac- tion deputies from these places came to Medina, and the result was the murder of the caliph. Syria alone remained loyal to the house of Omayya, and Othman had been advised to take refuge there, but had refused. Arabia itself counted for little in the strife. Yet its prestige was not altogether lost. After the murder the rebels \vere unwilling to return home until a new caliph had been chosen in the capital. The Egyptian rebels managed to gain most influence, and, in accordance with their desire, "All was appointed caliph by the citizens of Medina. But Medina itself was being corrupted by the constant influx of captives, who, employed at first as servants, soon became powerful enough to dictate to their masters. In the struggle that ensued upon the election of 'Ali, Arabia was involved. Ayesha, Talha and Zobair, who were strong in Mecca, succeeded in obtaining possession of Basra, but were defeated in 656 at the battle of the Camel (see Ali). In the south of Arabia 'Ali suc- ceeded in establishing his own governor in Yemen,

though the government treasure was carried off to Mecca. But the centre of strife was not to be Arabia. When 'All left Medina to secure Basra, he abandoned it as the capital of the Arabian empire. With the success of Moawiya Damascus became the capital of the caliphate (658) and Arabia became a mere grovince, though always of importance because of its possession, of the two sacred cities Mecca and Medina. Both these cities were secured by Moawiya in 660, and at the same time Yemen was punished for its adherence to 'All. The final blow to any political pretensions of Medina was dealt by the caliph when he had his son Yazld declared as his successor, thus taking away any claim on the part of the citizens of Medina to elect to the caliphate.

The Omayyads. — The early years of the Omayyads were years of constant strife in Arabia. The Kharijites who had opposed 'All on the ground that he had no right to allow the appeal to arbitration, were defeated at Nahrawan or Nahrwan (658), but those who escaped became fierce propagandists against the Koreish, some claiming that the caliph should be chosen by the Faithful from any tribe of the Arabs, some that there should be no caliph at all, that God alone was their ruler and that the government should be carried on by a council. They broke up into many sects, and were long a disturbing political force in Arabia as elsewhere. On the death of 'All his house was repre- sented by his two sons Hasan and H° sa in (Husain). Hasan soon made peace with Moawiya. On the accession of Yazid; Hosain refused homage and raised an army, but was slain at

Kerbela (680). 'Abdallah ibn Zobair (of the house of Hashim) immediately stepped forward in Mecca as the avenger of 'All's family and the champion of religion. The two sacred cities supported him. Medina was besieged and sacked by the troops of Yazid (682) and Mecca was besieged the following year. The siege was raised in the third month on the news of the death of Yazid, but not before the Ka'ba had been destroyed. "Abdallah remained in Mecca recognized as caliph in Arabia, and soon after in Egypt and even a part of Syria. He defeated the troops of Merwan I., but could not win the support of the Kharijites. In 691 Abdalmalik ('Abdul-Malik) determined to crush his rival and sent his general Hajjaj against Mecca. The siege was begun in March 692, and in October the city was taken and 'Abdallah slain. Abdalmalik was now supreme in Arabia and throughout the Moslem world. During the remaining years of the Omayyad dynasty (i.e. until 750) little is heard of Arabia in history. The conquests of Islam in Spain on the

one side and India on the other had little or no effect on it. It was merely a province.

The 'Abbasids. — The accession of Abul 'Abbas (of the house of Hashim) and the transference of the capital of the caliphate from Damascus to Kufa, then Anbar and soon after (in 760) to Bagdad meant still further degradation to Arabia and Arabs. From the beginning the 'Abbasids depended for help on Persians and Turks, and the chief offices of state were frequently filled with foreigners. In one thing only the Arabs conquered to the end; that was in their language. The study of Arabic was taken up by lexicographers, grammarians and poets (mostly of foreign origin) with a zeal rarely shown elsewhere. The old Arabian war spirit was dying. Although the Arabians, as a rule, were in favour of the Omayyad family, they could not affect the succes- sion of the 'Abbasids. They returned more and more to their old inter-tribal disputes. They formed now not only a mere branch of the empire of the caliphate, but a branch deriving little life from and giving less to the main stock. In 762 there was a rebellion in favour of a descendant of 'All, but it was put down with great severity by the army of the caliph Mansur. A more local 'Alyite revolt in Mecca and Medina was crushed in 785. In the contest between the two sons of Harun al Rashld all Arabia sided with Mamun (812). In 845-846 the lawless raids of Bedouin tribes compelled the caliph Wathiq to send his Turkish general Bogha, who was more successful in the north than in the centre and south of Arabia in restoring peace.

The Carmathians. — Towards the close of the 9th century Arabia was disturbed by the rise of a new movement which during the next hundred years dominated the peninsula, and at its close left it shattered never to be united again. In the year 880 Yemen was listening to the propaganda of the new sect of the Carmathians (q.v.) or followers of Hamdan Qarmat. Four years later these had become a public force. In 900 'Abu Sa'id al-Jannabi, who had been sent to Bahrein by Hamdan, had secured a large part of this province and had won the city of Katif (Ketif) which contained many Jews and Persians. The Arabs who lived more inland were mostly Bedouin who found the obligations of Islam irksome, and dtfTiot seem to have made a very vigorous opposition to the Carmathians who took Hajar the capital of Bahrein in 903. From this they made successful attacks on Yemama (Yamama), and attempts only partially successful at first at Oman. In 906 the court at Bagdad learned that these sectaries had gained almost all Yemen and were threatening Mecca and Medina. Abu Sa'id was assassinated (913) in his palace at Lahsa (which in 926 was fortified and became the Carmathian capital of Bahrein). His son Sa'id succeeded him, but proved too weak and was deposed and succeeded by his brother Abu Tahir. His success was constant and the caliphate was brought very low by him. In Arabia he subjugated Oman, and swooping down on the west in

929 he horrified the Moslem world by capturing Mecca and carrying off the sacred black stone to Bahrein. The Fatimite caliph 'Obaidallah (see Fati- Icites), to whom Abu Tahir professed allegiance, publicly wrote to him to restore the stone, but there is some reason to believe that he secretly encouraged him to retain it. In 939, however,

the stone was restored and pilgrimages to the holy cities were allowed to pass unmolested on payment of a tax. So long as Abu Tahir lived the Carmathians controlled Arabia. After his death, however, they quarrelled with the Fatimite rulers of Egypt (969) and began to lose their influence. In 985 they were completely defeated in Irak, and soon after lost control of the pilgrimages. man recovered its independence. Three years later Katif, at that time their chief city, was besieged and taken by a Bedouin sheik, and subsequently their political power in Arabia came to an end. It was significant that their power fell into the hands of Bedouins. Arabia was now com- pletely disorganized, and was only nominally subject to the caliphate. The attempt of Mahomet to unify Arabia had failed. The country was once more split up into small govern- ments, more or less independent, and groups of wandering tribes carrying on their petty feuds. Of the history of these during the next few centuries little is known, except in the case of the Hejaz. Here the presence of the sacred cities led writers to record their annals (cf. F. Wiistenfeld's Die Chroniken der Stadt Mekka, 4 vols., Leipzig, 1857-1861). The two cities were governed by Arabian nobles (sherlfs), often at feud with one another, recognizing formally the overlordship of the caliph at Bagdad or the caliph of Egypt. Thus in 966 the name of the caliph Moti was banished from the prayers at Mecca, and an 'Alyite took possession of the government of the city and recog- nized the Egyptian caliph as his master. About a century later (1075-1094) the 'Abbasid caliph was again recognized as spiritual head owing to the success in arms of his protector, the Seljuk Malik-Shah. With the fall of the Bagdad caliphate all attempts at control from that quarter came to an end. After the visit of the Sultan Bibars (1269) Mecca was governed by an amir de- pendent on Egypt. Outside the two cities anarchy prevailed, and the pilgrimage was frequently unsafe owing to marauding Bedouins. In 1517 the Osmanli Turkish sultan Sellm conquered Egypt, and having received the right of succession to the caliphate was solemnly presented by the sherif of Mecca with the keys of the city, and recognized as the spiritual head of Islam and ruler of the Hejaz. At the same time Yemen, which since the 9th century had been in the power of a number of small dynasties ruling in Zubed, San'a, Sa'da and Aden, passed into the hands of the Turk.

For the history of Yemen during this period cf. H. C. Kay, Omarah's History of Yaman (London, 1892), and S. Lane-Poole, The Mahommedan Dynasties, pp. 87-103 (Westminster, 1894). Little more than a century later (1630), a Yemen noble Khasim succeeded in expelling the Turk and

establishing a native imamate, which lasted until 1871. For descriptions of it in the 1 8th century cf. C. Niebuhr's accounts of his travels in Arabia in 1761.

Oman. — Since the separation from the caliphate (before 1000 a.d.) Oman had remained independent. For more than a century it was governed by five elected imams, who were chosen from the tribe of al-Azd and generally lived at Nizwa. After them the Bani Nebhan gained the upper hand and estab- lished a succession of kings (maliks) who governed from 11 54 to 1406. During this time the country was twice invaded by Persians. The " kings of Hormtiz " claimed authority over the coast land until the beginning of the 16th century. In 1435 the people rose against the tyranny of the Bani Nebhan and restored the imamate of the tribe al-Azd. In 1508 the Portu- guese under Albuquerque seized most of the east coast of Oman. In 1624 a new dynasty arose in the interior, when Nasir ibn Murshid of the Yariba (Ya'aruba) tribe (originally from Yemen) was elected imam and established his capital at Rustak. He was able to subdue the petty princes of the country, and the Portuguese were compelled to give up several towns and pay tribute for their residence at Muscat. About 1651 the Portuguese were finally expelled from this city, and about 1698 from the Omanite settlements on the east coast of Africa.

For the history of Oman from 661 to 1856 cf. G. P. Badger, History of the Imams and Seyyids of Oman by Salil-ibn-Razik (London, Hakluyt Society, 1871). (G. W. T.)

Wahhabi Movement. — Modern Arabian history begins with that of the Wahhabi movement in the middle of the 18th century. Its originator, Mahommed Ibn Abdul Wahhab, was born (1691)

at Ayana in Nejd, and after studying in Basra and Damascus, and making the pilgrimage to Mecca returned to his native country and settled down at Huremala near Deraiya. The abuses and corruptions which had overgrown the practice of orthodox Islam had deeply impressed him, and he set to work to combat them, and to inculcate on all good Moslems a return to the pure simplicity of their original faith. In 1742 Mahommed Ibn Saud, sheik of Deraiya, accepted his doctrines, and enforced them by his sword with such effect that before his death in 1765 the whole of eastern Nejd and El Hasa was converted to the faith of Abdul Wahhab, and accepted the

political supremacy of Ibn Saud. His son and successor, Abdul Aziz, in a rapid series of successful campaigns, extended his dominion and that of the reformed faith far beyond the limits of Nejd. His attacks on the pilgrim caravans, begun in 1783 and constantly repeated, startled the Mahommedan world, 1 and compelled the attention of the sultan, as the nominal protector of the faithful. In 1798 a Turkish force was sent from Bagdad into El Hasa, but was compelled to retreat without accomplishing anything, and its discomfiture added much to the renown of the Wahhabi power. In 1801 Saud, son of the amir Abdul Aziz, led an expedition to the Euphrates, and on the festival of Bairam, the 20th of April, stormed Kerbela, put the defenders to the sword, destroyed the sacred tomb, scattered the sacred relics and returned laden with the treasures, accumulated during centuries in the sanctuary of the Shia faith. Mecca itself was taken; plundering was for- bidden, but the tombs of the saints and all objects of veneration, were ruthlessly destroyed, and all ceremonies which seemed in the eye of the stern puritan conqueror to suggest the taint of idolatry were forbidden.

On the 14th of October 1802 the amir Abdul Aziz, at the age of eighty-two years, was murdered by a Shia fanatic when at prayers in the mosque of Deraiya, and Saud, who had for many years led the Wahhabi armies, became the reigning amir. In 1804 Medina was taken and with its fall all resistance ceased. The Wahhabi empire had now attained its zenith, a settled govern- ment was established able to enforce law and order in the desert and in the towns, and a spirit of Arabian nationality had grown up which bade fair to extend the Wahhabi dominion over all the Arab race. It already, however, bore within it the germ of decay, the accumulation of treasure in the capital had led to a corruption of the simple manners of the earlier times; the exhaustion of the tribes through the heavy blood tax had roused discontent among them; the plundering of the holy places, the attacks on the pilgrim caravans under the escort of Turkish soldiers, and finally, in 18 10, the desecration of the tomb of Mahomet and the removal of its costly treasures, raised a cry of dismay throughout the Mahommedan world, and made it clear even to the Turkish sultan that unless the Wahhabi power were crushed his claims to the caliphate were at an end.

But Turkey was herself fully occupied by affairs in Europe, and to Mehemet Ali, then pasha of Egypt, was deputed the task of bringing the Wahhabis into subjection. In October 1811 an expedition consisting of 10,000 men under Tusun Pasha, the pasha's son, a youth of sixteen, landed in Hejaz without opposi- tion. Saud with his main forces had started northwards to attack Bagdad, but returning at once he met and defeated Tusun with great loss and compelled him to retire. Medina and subsequently Mecca were eventually taken by the Egyptians, but in spite of continual reinforcements they could do little more than hold their own in

Hejaz. In 1813 Mehemet Ali was compelled to take the field himself with fresh troops, but was unable to achieve any decisive success, and in 1814 Tusun was again defeated beyond Taif. In May 1814 Saud died, and his son, Abdallah, attempted to negotiate, but Mehemet Ali refused all overtures, and in January 1815 advanced into Nejd, defeated the Wahhabi army and occupied Ras, then the chief town in Kasim. Terms of peace were made, but on the retirement of the Egyptians Abdallah refused to carry out the conditions agreed on, which

1 For further details of this period, see Egypt : History, " Mahom- medan Period," § 8.

included the return of the jewels plundered by his father, and another campaign had to be fought before his submission was obtained. Ibrahim Pasha replaced Tusun in command, and on reaching Arabia in September 1816 his first aim was to gain over the great Bedouin tribes holding the roads between Hejaz and his objective in Nejd; having thus secured his line of advance he pushed on boldly and defeated Abdallah at Wiya, where he put to death all prisoners taken; thence rapidly advancing, with contingents of the friendly Harb and Muter tribes in support of his regular troops, he laid siege to Ras; this place, however, held out and after a four months' siege he was com- pelled to give up the attack. Leaving it on one side he pushed on eastwards, took Aneza after six days' bombardment and occupied Bureda. Here he waited two months for reinforce- ments, and with his Bedouin contingent, strengthened by the adhesion of the Ateba and Bani Khalid tribes, advanced on Shakra in Wushm, which fell in January 1818 after a regular siege. After destroying Huremala and massacring its inhabit- ants, he arrived before Deraiya on the 14th of April 1818. For six months the siege went on with varying fortune, but at last the courage and determination of Ibrahim triumphed, and on the 9th of September, after a heroic resistance, Abdallah, with a remnant of four hundred men, was compelled to surrender. The Wahhabi leader was soon after sent to Constantinople, where, in spite of Mehemet Ali's intercession, he and the com- panions who had followed him in his captivity were condemned to death, and after being paraded through the city with ignominy for three days were finally beheaded.

Deraiya was razed to the ground and the principal towns of Nejd were compelled to admit Egyptian garrisons; but though the Arabs saw themselves powerless to stand before disciplined troops, the Egyptians, on the other hand, had to confess that without useless sacrifices they could not retain their hold on the interior.

In 1824 Turki, son of the unfortunate Abdallah, headed a rising which resulted in the re-establishment of the Wahhabi state with Riad as its new capital; and during the next ten years he consolidated his power, paying tribute to and under the nominal suzerainty of Egypt till his murder in 1834. His son, Fesal, succeeded him, but in 1836 on his refusal to pay tribute an Egyptian force was sent to depose him and he was taken prisoner and sent to Cairo, while a rival claimant, Khalid, was established as amir in Riad. Mehemet Ali and his son Ibrahim Pasha were, however, now committed to their conflict with Turkey for Syria and Asia Minor, and had no troops to spare for the thankless task of holding the Arabian deserts; the garrisons were gradually withdrawn, and in 1842 Fesal, who had escaped from his prison at Cairo reappeared and was every- where recognized as amir. The few remaining Egyptian troops were ejected from Riad, and with them all semblance of Egyptian or Turkish rule disappeared from central Arabia.

For a time it looked as if the supremacy of the Wahhabi empire was to be renewed; El Hasa, Harik, Kasim and Asir returned to their allegiance, but over Oman and Yemen Fesal never re-established his dominion, and the Bahrein sheiks with British support kept their independence.

A rival state had, however, arisen, under Abdallah Ibn Rashid in Jebel Shammar. Driven into exile owing to a feud between his family and the Ibn Ali, the leading family of the Shammar, Abdallah came to Riad in 1830, and was favourably received by the amir Turki. In 1834 he was with Fesal on an expedition against El Hasa when news came of the amir's murder by his cousin Masharah. By Abdallah's advice the expedition was abandoned; Fesal hastened back with all his forces to Riad, and invested the citadel where Masharah had taken refuge, but failed to gain possession of it, until Abdallah with two companions found his way into the palace, killed Masharah, and placed Fesal on the throne of his father. As a reward for his services Abdallah was appointed governor of Jebel Shammar, and had already established himself in Hail when the Egyptian expedition of 1836 removed Fesal temporarily from Nejd. During the exile of the latter he steadily

Iba Rashid.

consolidated his power, extending his influence more especially over the desert tribes, till on Fesal's return in 1842 he had created a state subject only in name to that of which Riad was the capital.

On the death of Abdallah in 1843, his son Talal succeeded. He set himself to work to establish law and order throughout the state, to arrange its finances, and to encourage the settlement in Hail of artificers and merchants from abroad; the building of the citadel and palace commenced by Mehemet Ali, and continued by Abdallah Ibn Rashid, was completed by Talal. The town walls were strengthened, new wells dug, gardens planted, mosques and schools built. His uncle Obed, to whom equally with Abdallah is due the foundation of the Ibn Rashid dynasty, . laboured to extend the Shammar boundaries. Khaibar, Tema and Jauf became tributary to Hail.

Though tolerant in religion Talal was careful to avoid the suspicion of lukewarmness towards the Wahhabi formulas. Luxury in clothing and the use of tobacco were prohibited; attendance at the mosque was enforced: any doubt as to his orthodoxy was silenced by the amount and regularity of the tribute sent by him to Riad. Equally guarded was his attitude to the Turkish authorities; it is not improbable that Talal had also entered into relations with the viceroy of Egypt to ensure his position in case of a collision with the Porte. During his twenty years' reign Jebel Shammar became a model state, where justice and security ruled in a manner before unheard of. Fesal may well have watched with jealous anxiety the growing strength of his neighbour's state as compared with his own, where all progress was arrested by the deadening tyranny of religious fanaticism.

On the nth of March 1868 Talal, smitten with an incurable malady, fell by his own hand and was succeeded by his brother Matab; after a brief reign he was murdered by his Utahom? ne Ph ews > tne e lder of whom, Bandar, became amir. medt Mahommed, the third son of the amir Abdallah, was at

the time absent-; with a view of getting his uncle into his power, Bandar invited him to return to Hail, and on his arrival went out to meet him accompanied by Hamud, son of Obed, and a small following. Warned by a hurried sign by Hamud that his life was in danger, Mahommed at once attacked Bandar, stabbed him and took possession of the citadel; a general massacre of all members of the house of Ibn Rashid followed, and next day

Mahommed appeared with his cousin Hamud in the market-place of Hail, and announced his assumption of the amirship. A strong and capable ruler, he soon established his authority over all northern and western Nejd, and in 1872 the opportunity arrived for his intervention in the east. In that year Abdallah, who had succeeded Fesal in Riad in 1867, was deposed, but with the assistance of Mahommed was reinstated; two years later, however, he was again deposed and forced to seek refuge at Hail, from which place he appealed for assistance to the Turkish authorities at Bagdad. Midhat Pasha, then governor-general, seized the occasion of asserting Turkish dominion on the Persian Gulf coast, and in 1875, in spite of British protests, occupied El Hasa and established a new province under the title of Nejd, with its headquarters at Hofuf , of which Abdallah was appointed governor. This was an event of some importance, as it con- situted the first Turkish claim to the sovereignty over Nejd abandoned by Egypt thirty-three years earlier. The Turks did not support their client by advancing into Nejd itself, and he and his rivals were left to fight out their battles among themselves. Turkey was indeed too much occupied by the war with Russia to pay much attention to Arab affairs, though a few years later she attempted to occupy Bahrein by a coup de- main, which was only frustrated by the action of a British gunboat.

Owing to the dissensions among the ruling family of Riad, che towns of eastern Nejd gradually reverted to their former condition of independence, but menaced in turn by the growing power of Hail, they formed a coalition under the leadership of Zamil, sheik of Aneza, and in the spring of 1801, Aneza, Bureda, Shakra, Ras and Riad assembled their contingents to contest

with Ibn Rashid the supremacy in Nejd. The latter had besides 20, 000 of his own south Shammar tribesmen, the whole strength of the Harb Bedouins, some 10,000 men, and an additional support of 1000 mounted men from his kinsmen, the northern Shammar from the Euphrates, while the Muter and Ateba tribes took part with the allies. The total strength of each side amounted to about 30,000 men. Zamil's forces held a strong position between Aneza and Bureda, and for over a month desultory fighting went on; finally an attack was made against the defenders' centre, covered by 20,000 camel riders; the men of Aneza broke and the whole allied forces fled in disorder; Zamil and his eldest son were killed, as were also two of the Ibn Saud family, while the remainder were taken prisoners. Aneza and Bureda surrendered the same day, and shortly after Ras, Shakra and Riad tendered their submission.

This victory placed the whole of northern and central Arabia under the supremacy of Mahommed Ibn Rashid, which he held undisputed during the rest of his life.

On his death in 1897 his nephew Abdul-Aziz, son of the murdered amir Matab, succeeded; during his reign a new element has been introduced into Nejd politics by the rising importance of Kuwet (Koweit) and the attempts hbtoty. of Turkey to obtain possession of its important harbour. In 1901 a quarrel arose between Sheik Mubarak of Kuwet and the amir of Hail whose cause was supported by Turkey. A force was equipped at Basra under Ahmad Feizi Pasha with the intention of occupying Kuwet; Mubarak thereupon appealed to Great Britain and action was taken which prevented the Turkish designs from being carried out. Kuwet was not formally placed under British protection, but it was officially announced by the government on the 5th of May 1903 " that the establishment of a naval base or fortified port in the Persian Gulf by any other power would be regarded as a very grave menace to British interests which would certainly be resisted with all the means at its disposal."

In the meantime Sheik Mubarak had found useful allies in the Muntafik Arabs from the lower Euphrates, and the Wahhabis of Riad; the latter under the amir Ibn Saud marched against Ibn Rashid, who at the instigation of the Porte had again threatened Kuwet (Koweit) , compelled him to retire to his own territory and took possession of the towns of Bureda and Aneza. Sheik Mubarak and his allies continued their advance, defeated Ibn Rashid in two engagements on the 22nd of July and the 26th of September 1904, and drove him back on his capital, Hail. The Porte now made another effort to assist its protege; two columns were despatched from Medina and Basra respectively, to relieve Hail, and drive out the Wahhabis. Ahmad Feizi Pasha, in command of the Basra column, 4200 strong, crossed the desert and reached the wells of Lina, 200 m. from Hail, on the 5th of March 1905; here, however, he received orders to halt and negotiate before proceeding farther. The Turkish government realized by this time the strength of the hostile combination, and in view of the serious state of affairs in Yemen, hesitated to undertake another campaign in the deserts of Nejd. Arrange- ments were accordingly made with the Wahhabis, and on the 10th of April Ahmad Feizi Pasha left Lina, ostensibly with the object of protecting the pilgrim road, and joined the Medina column by the end of the month. Bureda and Aneza were occupied without opposition, the rebellious sheiks amnestied by the sultan and loaded with gifts, and formal peace was made between the rival factions.

European influence was not felt in Arabia until the arrival of the Portuguese in the eastern seas, following on the discovery of the Cape route. In 1506 Hormuz was taken by Albuquerque, and Muscat and the coast of Oman (q.v.) history ot

were occupied by the Portuguese till 1650. In 1516 i n fi uence , their fleets appeared in the Red Sea and an unsuccessful attempt was made against Jidda; but the effective occupation of Yemen by the Turks in the next few years frustrated any designs the Portuguese may have had in S.W. Arabia. Even in Oman their hold on the country was limited to Muscat and the adjacent ports, while the interior was ruled by the old Yariba

(Ya-'aruba) dynasty from their capital at Rustak. The Persian occupation, which followed that of the Portuguese, came to an end in the middle of the 18th century, when Ahmad Ibn Said expelled the invaders and in 1759 established the Ghafari dynasty which still reigns in Oman. He was succeeded by his son, who in 1798 made a treaty with the East India Company with the object of excluding the French from Oman, and the connexion

with Great Britain was further strengthened during terventio'n tne ˆ on S reign of his grandson Sultan Said, 1804-1856. in Oman. During the earlier years of his reign he was constantly

at war with the Wahhabi empire', to which Oman became for a time tributary. The piracies committed by the Jawasimi Arabs in the gulf compelled the intervention of England, and in 1810 their strongholds were destroyed by a British-Indian expedition. The overthrow of the Wahhabis in 181 7 restored Sultan Said to independence; he equipped and armed on Western models a fleet built in Indian ports, and took possession of Sokotra and Zanzibar, as well as the Persian coast north of the straits of Hormuz as far east as Gwadur, while by his liberal policy at home Sohar, Barka and Muscat became prosperous commercial ports.

On his death in 1856 the kingdom was divided, Majld, a younger son, taking Zanzibar, while the two elder sons contested the succession to Oman. The eldest, Thuweni, with British support, finally obtained the throne, and in 1862 an engagement was entered into by the French and English governments re- specting the independence of the sultans of Oman. He was assassinated in 1866, and his successor, Seyyid Turki, reigned till 1 888. On his death several claimants disputed the succession ; ultimately his son Fesal was recognized by the British govern- ment, and was granted a subsidy from British-Indian revenues, in consideration of which he engaged not to cede any of his territory without the consent of the British

government; similar engagements have been entered into by the tribes who occupy the south coast from the borders of Oman westward to the straits of Bab-el-Mandeb.

The opening of the overland route to India again brought the west coast of Arabia into importance. Aden was occupied

by the British in 1839. The Hejaz coast and some sphere of °^ tne Yemen ports were still held by Mehemet Ali, influence, as viceroy of Egypt, but on his final withdrawal from

Arabia in 1845, Hejaz came under direct Turkish rule, and the conquest of Yemen in 1872 placed the whole Red Sea littoral (with the exception of the Midian coast, ceded by Egypt on the accession of Abbas Hilmi Pasha)under Ottoman administra- tion. The island of Perim at the southern entrance of the Red Sea has been a British possession since 1857, while the promontory of Shekh Said on the Arabian side of the strait is in Turkish occupation. In order to define the limits between Turkish territory and that of the independent Arab tribes in political relations with Great Britain, a joint commission of British and Turkish officers in 1 902-1 905 laid down a boundary line from Shekh Said to a point on the river Bana, 12 m. north-east of the small town of Kataba, from which it is continued in a north-easterly direction up to the great desert. This delimitation places the whole of southern Arabia, east of this line, within the British sphere of influence, which thus includes the district surrounding Aden (q.v.), the Hadramut and Oman with its dependencies.

The provinces of Hejaz and Yemen are each administered by a Turkish governor-general, with headquarters at Taif and Sana

respectively; the country is nominally divided up rule ^ into divisions and districts under minor officials, but

Turkish rule has never been acquiesced in by the inhabitants, and beyond the larger towns, all of which are held by strong garrisons, Turkish authority hardly exists. The powerful Bedouin tribes of Hejaz have always asserted their independence, and are only kept quiet by the large money payments made them by the sultan on the occasion of the annual pilgrimage to the holy cities. A large part of Asir and northern Yemen has never been visited by Turkish troops, and such revenues as are collected, mainly from

vexatious customs and transit duties, are quite insufficient to meet the salaries of the officials, while the troops, ill-fed and their pay indefinitely in arrears, live on the country as best they can.

A serious revolt broke out in Yemen in 1892. A Turkish detachment collecting taxes in the Bani Merwan lands north of Hodeda was destroyed by a body of Arabs. This reverse set all Yemen aflame; under the leadership Jevoit. of the imam, who had, since the Turkish occupation, lived in retirement at Sada, 120 m. north of the capital, the power- ful tribes between Asir and Sana advanced southwards, occupied the principal towns and besieged the few Turkish fortified posts that still held out. In many cases the garrisons, Arab troops from Syria, went over to the insurgents. Meanwhile, reinforce- ments under General Ahmad Feizi Pasha reached Hodeda, Manakha was retaken, Sana relieved, and by the end of January 1893 the country with the exception of the northern mountainous districts was reconquered.

A state of intermittent rebellion, however, continued, and in 1904 a general revolt took place with which the normal garrison of Yemen, the 7 th army corps, was quite unable to cope. The military posts were everywhere besieged, and Sana, the capital, was cut off from all communication with the coast. During February 1905 reinforcements were sent up which raised the garrison of Sana to a strength of eight battalions, and in March a further reinforcement of about the same strength arrived, and fought its way into the capital with the loss of almost all its guns and train. The position was then desperate, wholesale desertion and starvation had decimated the garrison, and three weeks later Ali Riza Pasha, the Turkish commander,, was com- pelled to surrender. The fall of Sana made a deep impression at Constantinople, every effort was made to hasten out reinforce- ments, the veteran Ahmad Feizi Pasha was nominated to the supreme command, and Anatolian troops in place of the unre- liable Syrian element were detailed. The scale of the operations may be judged from the fact that the total number of troops mobilized up to the beginning of July 1905 amounted to 126 battalions, 8 squadrons and 15 batteries; the rebel leader Mahommed Yahiya had at this time a following of 50,000.

By the end of June, Ahmad Feizi Pasha was in a position to advance on Manakha, where he organized an efficient transport, rallied the scattered remnants of Ali Riza's army, and with the newly arrived troops had by the middle of July a force of some 40 battalions available for the advance on Sana. He left Manakha on the 17 th of July, and after almost daily fighting reached Sana on the 30th of August; on the 31st he entered the city without serious opposition, the insurgents having retreated northward.

Authorities. — D. G. Hogarth, Penetration of A rabia (London, 1904) ; C. Niebuhr, Travels and Description of Arabia (Amsterdam, 1774) ; A. Zehme, Arabien und die Araber seit Hundert Jahren (Halle, I 875); J. L. Burckhardt, Travels in Arabia (London, 1829); R. F. Burton, Pilgrimage to El Medinah and Meccah (London, 1855), Midian revisited (1879); W. G.

Palgrave, Central and Eastern Arabia (London, 1865); C. Doughty, Arabia Deserta (Cambridge,' 1888), and an abridgment, containing mainly the personal narra- tive, under the title of Wanderings in Arabia (London, 1908) ; L. van den Berg, Le Hadramut et les colonies arabes, &c. (Batavia, 1885); C. Huber, Journal d'un voyage en Arabie (Paris, 1891); J. Euting, Reise in inner Arabien (Leiden, 1896); E. Nolde, Reise nach inner Arabien (Brunswick, 1895); L. Hirsch, Reise in Sud Arabien (Leiden, 1897); J. T. Bent, Southern Arabia (1895); R. Manzoni, II Yemen (Rome, 1884) ; A. Deflers, Voyage en Yemen (Paris, 1889); J. Halevy, Journal Asiatique (1872); Lady Anne Blunt, Pilgrimage to Nejd (London, 1881); E. Glaser, Petermann's Mitt. (1886, 1888 and 1889); W. B. Harris, Journey through Yemen (Edinburgh, 1893) ; J. R. Wellsted, Travels in Arabia (London, 1838); Capt. F. M. Hunter, Aden (London, 1877). Consult also Proc. R.G.S. and Geogr. Journal. For geology see H. J. Carter, " Memoir on the Geology of the South-East Coast of Arabia," Journ. Bombay Branch Roy. Asiat. Soc. vol. iv. pp. 21-96 (1852); Doughty's Arabia Deserta'; W. F. Hume, The Rift Valleys and Geology of Eastern Sinai (London, 1901). For ancient geography of Arabia :— A. Sprenger, Alte Geographic Arabiens (Berne, 1875); E. H. Bunbury, History of Ancient Geography (London, 1883); D. H. Muller, Hamd

LITERATURE]

ARABIA

271

Literature

The literature of Arabia has its origin in the songs, impro- visations, recitations and stories of the pre-Mahommedan Arabs. Of written literature in those days there was, so far as we know, none. But where books failed memory was strong and the power of retaining things heard was not confined to a professional class. At every festive meeting many could contribute a poem or a story, many could even improvise the one or the other. When members of different tribes met in peace (as at the fair of 'Ukaz) the most skilful reciters strove to maintain the honour of their own people, and a ready improviser was held in high esteem. The smartest epigrams, the fairest similes, the keenest satires, spoken or sung on such occasions, were treasured in the memory of the hearers and carried by them to their homes. But the experience of all peoples in that memory requires to be helped by form. Sentences became balanced and were made clear by some sort of definite ending. The simplest form of this in Arabian literature is the saj' or rhymed prose, in which the sentences are usually (though not always) short and end in a rhyme or assonance. Mahomet

used this form in many parts of the Koran (e.g. Sura, 81). The next step was the introduction of metre into the body of the sentence and the restriction of the passages to a definite length. This in its simplest form gave rise to the rajaz verses, where each half-line ends in the same rhyme and consists of three feet of the measure H – <-> – . Other metres were introduced later until sixteen altogether were re- cognized. In all forms the rhyme is the same throughout the poem, and is confined to the second half of the line except in the first line where the two halves rhyme. While, however, these measures were in early use, they were not systematically analysed or their rules enunciated until the time of Khalll ibn Ahmad in the 8th century. Two other features of Arabian poetry are probably connected with the necessity for aiding the memory. The first of these is the requirement that each line should have a complete sense in itself; this produces a certain jerkiness, and often led among the Arabs to displacement in the order of the lines in a long poem. The other feature, peculiar to the long poem (qasida, elegy), is that, whatever, its real object, whatever its metre, it has a regular scheme in the arrangement of its material. It begins with a description of the old camping- ground, before which the poet calls on his companion to stop, while he bewails the traces of those who have left for other places. Then he tells of his love and how be had suffered from it, how he had journeyed through the desert (this part often contains some of the most famous descriptions and praises of animals) until his beast became thin and worn-out. Then at last comes the real subject of the poem, usually the panegyric of some man of influence or wealth to whom the poet has come in hope of reward and before whom he recites the poem.

Poetry. — The influence of the poet in pre-Mahommedan days was very great. As his name, ash-Shd'ir, " the knowing man," indicates, he was supposed to have more than natural knowledge and power. Panegyric and satire (hija.') were his chief instru- ments. The praise of the tribe in well-chosen verses ennobled it throughout the land, a biting satire was enough to destroy its reputation (cf. I. Goldziher's Abhandlungen zur arabischen Philologie, i. pp. 1-105). Before Mahomet the ethics of the Arabs were summed up in muruwwa (custom). Hospitality, generosity, personal bravery were the subjects of praise; mean- ness and cowardice those of satire. The existence of poetry among the northern Arabs was known to the Greeks even in the 4th century (cf. St Nilos in Migne's Palrologia Graeca, vol. 79, col. 648, and Sozomen's Ecclesiastical History, bk. 6, ch. 38). Women as well as men composed and recited poems before the days of the Prophet (cf. L. Cheikho's Poetesses of the Jahiliyya, in Arabic, Beirut, 1897).

The transmission of early Arabic poetry has been very im- perfect. Many of the reciters were slain in battle, and it was not till the 8th to the 10th

centuries and even later that the earliest collections of these poems were made. Many have to be recovered from grammars, dictionaries, &c, where single

lines or groups of lines are quoted to illustrate the proper use of words, phrases or idioms. Moreover, many a reciter was not content to declaim the genuine verses of ancient poets, but interpolated some of his own composition, and the change of religion introduced by Islam led to the mutilation of many verses to suit the doctrines of the new creed. 1

The language of the poems, as of all the best Arabian literature, was that of the desert Arabs of central Arabia; and to use it aright was the ambition of poets and scholars even in the Abbasid period. For the man of the towns its vocabulary was too copious to be easily understood, and in the age of linguistic studies many commentaries were written to explain words and idioms.

Of the pre-Mahommedan poets the most famous were the six whose poems were collected by Asma'i about the beginning of the 9th century (ed. W. Ahlwardt, The Diwans of the Six Ancient Arabic Poets, London, 1870). Single poems of four of these — Amru-ul-Qais, Tarafa, Zuhair and 'Antara — appear in the Mo'allakat (q.v.). The other two were Nabigha (q.v.) and 'Alqama (q.v.). But besides these there were many others whose names were famous; such as Ta'abbata Sharran, a popular hero who recites his own adventures with great gusto; his companion Shanfara, whose fame rests on a fine poem which has been translated into French by de Sacy (in his Chrestomathie Arabe) and into English by G. Hughes (London, 1896); AUs ibn Hajar of the Bani Tamln, famous for his descriptions of weapons and hunting scenes (ed. R. Geyer, Vienna, 1892); Hatim Ta'i, renowned for his open-handed generosity as well as for his poetry (ed. F. Schulthess, Leipzig, 1897, with German translation); and 'Urwa ibn ul-Ward of the tribe of 'Abs, rival of Hatim in generosity as well as in poetry (ed. Th. Noldeke, G8ttingen, 1863). Among these early poets are found one Jew of repute, Samau'al (Samuel) ibn Adiya (cf. Th. Noldeke's Beitrage, pp. 52-86; art. s.v. " Samuel ibn Adiya" in Jewish Encyc. and authorities there quoted), and some Christians such as 'Adl'ibn Zaid of Hira, who sang alike of the pleasures of drink and of death (ed. by Louis Cheikho in his Les Pokes arabes chritiens, pp. 439-474, Beirut, 1890; in this work many Arabian poets are considered to be Christian without sufficient reason). One poet, a younger contemporary of Mahomet, has attracted much attention because his poems were religious and he was a mono- theist. This is Umayya ibn Abi-s-Salt, a Meccan who did not accept Islam and died in 630. His poems are discussed by F. Schulthess in the Orientalische Studien dedicated by Th. Noldeke, Giessen, 1906, and his relation to Mahomet by E. Power in the Melanges de la faculte orientale de I'universite Saint-

Joseph, Beirut, 1906). Mahomet's relation to the poets generally was one of antagonism because of their influence over the Arabs and their devotion to the old religion and customs. Ka'b ibn Zuhair, however, first condemned to death, then pardoned, later won great favour for himself by writing a panegyric of the Prophet (ed. G. Freytag, Halle, 1823). Another poet, A'sha (q.v.), followed his example. Labid (q.v.) and Hassan ibn Thabit (q.v.) were also contemporary. Among the poetesses of the time Khansa (q.v.) is supreme. In the scarcity of poets at this time two others deserve mention; Abu Mihjan, who made peace with Islam in 630 but was exiled for his love of wine, which he celebrated in his verse (ed. L. Abel, Leiden, 1887; cf. C. Land- berg's Primeurs arabes, 1, Leiden, 1886), and Jarwal ibn Aus, known as al-Hutai'a, a wandering poet whose keen satires led to his imprisonment by Omar (Poems, ed. by I. Goldziher in the Journal of the German Oriental Society, vols. 46 and 47).

Had the simplicity and religious severity of the first four caliphs continued in their successors, the fate of poetry would have been hard. Probably little but religious poetry would have been allowed. But the Omayyads (with one exception) were not religious men and, while preserving the outward forms of Islam, allowed full liberty to the pre-Islamic customs of the Arabs and the beliefs and practices of Christians. At the same time the

1 On the subject of transmission cf. Th. Noldeke's Beitrage zur Kenntniss der Poesie der alten Araber (Hanover, 1804); and W. Ahlwardt's Bemerkungen iiber die Aechtheit der alten arabischen Gedichte (Greifswald, 1872).

circumstances of the poet's life were altered. Poetry depended on patronage, and that was to be had now chiefly in the court of the caliph and the residences of his governors. Hence the centre of attraction was now the city with its interests, not the desert. Yet the old forms of poetry were kept. The qaslda still required the long introduction (see above), which was entirely occupied with the affairs of the desert. Thus poetry became more and more artificial, until in the Abbasid period poets arose who felt themselves strong enough to give up the worn-out forms and adopt others more suitable. The names of three great poets adorn the Omayyad period: Akhtal, Farazdaq and Jarir were contemporaries (see separate articles). The first was a Christian of the tribe of Taghlib, whose Christianity enabled him to write many verses which would have been impossible to a professing

Moslem. Protected by the caliph he employed the old weapons of satire to support them against the " Helpers " and to exalt his own tribe against the Qaisites. Farazdaq of the Bani Tamim, a good Moslem but loose in morals, lived chiefly in Medina and Kufa, and was renowned for his command of language. Jarir of another branch of the Bani Tamim lived in Irak and courted the favour of Hajjaj, its governor. His satires were so effective that he is said to have crushed forty-three rivals. His great efforts were against Farazdaq, who was supported by Akhtal (cf. The Naka'id of Jarir and al-Farazdaq, ed. A. A. Bevan, Leiden, 1906 foil.). Among many minor poets one woman is conspicuous. Laila ul-Akhyaliyya (d. 706) was married to a stranger. On the death of her lover in battle, she wrote numerous elegies bewailing him, and so became famous and devoted the rest of her life to the writing of verse. Two poets of the Koreish attained celebrity in Arabia itself at this time. Qais ur-Ruqayyat was the poet of "Abdallah ibn uz-Zubair (Abdallah ibn Zobair) and helped him until circumstances went against him, when he made his peace with the caliph. His poems are chiefly panegyrics and love songs (ed. N. Rhodonakis, Vienna, 1902). 'Umar ibn Abl Rabi'a (c. 643-719) was a wealthy man, who lived a life of ease in his native town of Mecca, and devoted himself to intrigues and writing love songs (ed. P. Schwarz, Leipzig, 1901-1902). His poems were very popular throughout Arabia. As a dweller in the town he was independent of the old forms of poetry, which controlled all others, but his influence among poets was not great enough to perpetuate the new style. One other short-lived movement of the Omayyad period should be mentioned. The rajaz poems (see above) had been a subordinate class generally used for improvisations in pre-Mahommedan times. In the 7 th and 8th centuries, however, a group of poets employed them more seriously. The most celebrated of these were 'Ajjaj and his son Ru'ba of the Bani Tamim (editions by W. Ahlwardt, Berlin, 1903; German trans, of Ru'ba's poems by Ahlwardt, Berlin, 1904).

With the establishment of the Abbasid dynasty, a new epoch in Arabian poetry began. The stereotyped beginning of the qasida had been recognized as antiquated and out of place in city life even in the Omayyad period (cf. Goldziher, Abhand- lungen, i. 144 ff.). This form had been ridiculed but now it lost its hold altogether, and was «nly employed occasionally by way of direct imitation of the antique. The rise of Persian influence made itself felt in much the same way as the Norman influence in England by bringing a newer refinement into poetry. Tribal feuds are no longer the main incentives to verse. Individual experiences of life and matters of human interest become more usual subjects. Cynicism, often followed by religion in a poet's later life, is common. The tumultuous mixture of interests and passions to be found in a city like Bagdad are the subjects of a poet's verse. One of the earliest of these poets, Muti' ibn Ayas, shows the new depth of personal feeling and refinement of expression. Bashshar ibn Burd (d. 783),

a blind poet of Persian descent, shows the ascendancy of Persian influence as he openly rails at the Arabs and makes clear his own leaning to the Persian religion. In the 8th century Abu Nuwas (q.v.) is the greatest poet of his time. His language has the purity of the desert, his morals are those of the city, his universalism is that of the man of the world. Abu-l-'Atahiya (q.v.), his contemporary, is fluent,

simple and often didactic. Muslim ibn ul-Walid (ed. de Goeje, Leiden, 1875), also contemporary, is more conservative of jld forms and given to panegyric and satire. In the 9th century two of the best-known poets — Abu Tammam (q.v.) and Buhturi (q.v.) — were renowned for their knowledge of old poetry (see Hamasa) and were influenced by it in their own verse. On the other hand Ibn ul-Mo'tazz (son of the caliph) was the writer of brilliant occasional verse, free of all imitation. In the 10th century the centre of interest is in the court of Saif ud-Daula (addaula) at Aleppo. Here in Motanabbi (q.v.) the claims of modern poetry not only to equal but to excel the ancient were put forward and in part at any rate recognized. Abu Firas (932-968) was a member of the family of Saif ud-Daula, a soldier whose poems have all the charm that comes from the fact that the writer has lived through the events he narrates (ed. by R. Dvorak, Leiden, 1895). Many Arabian writers count Motanabbi the last of the great poets. Yet Abu-l-'Ala ul-Ma'arri (q.v.) was original alike in his use of rhymes and in the philosophical nature of his poems. Ibn Farid (q.v.) is the greatest of the mystic poets, and Buslri (q.v.) wrote the most famous poem extant in praise of the Prophet. In the provinces of the caliphate there were many poets, who, however, seldom produced original work. Spain, however, produced Ibn 'Abdun (d. 1126), famous for the grace and finish of his style (ed. with commentary of Ibn Badrun by R. P. A. Dozy, Leiden, 1846). The Sicilian Ibn Hamdis (1048-1132) spent the last fifty years of his life in Spain (Diwan, ed. Moacada, Palermo, 1883; Canzoniere, ed. Schiaparelli, Rome, 1897). It was also apparently in this country that the strophe form was first used in Arabic poems (cf. M. Hartmann's Das arabische Strophengedicht, Weimar, 1897), and Ibn Quzman (12th century), a wandering singer, here first used the language of everyday life in the form of verse known as Zajal.

Anthologies. — As supplemental to the account of poetry may be mentioned here some of the chief collections of ancient verseˆ sometimes made for the sake of the poems themselves, sometimes to give a locus classicus for usages of grammar or lexicography, sometimes to illustrate ancient manners and customs. The earliest of these is the Mo'allakat (q.v.). In the 8th century Ibn Mofaddal compiled the collection named after him the Mofad- daliyat. From the 9th century we have the Hamasas of AbQ Tammam and Buhturi, and a collection of poems of the tribe Hudhail (second half ed. in part by J.G.L.Kosegarten, London, 1854; completed by

J. Wellhausen in Skizzen und Vorarbeiten, i'. Berlin, 1884). The numerous quotations of Ibn Qutaiba (q.v.) in the 'Uyun ul-Akhbdr (ed. C. Brockelmann, Strassburg, 1900 ff.) and the Book of Poetry and Poets (ed. M. J. de Goeje, Leiden, 1904) bring these works into this class. In the 10th century were compiled the Jamharat ash'ar al Arab, containing forty-nine poems (ed. Bulaq, 1890), the work al-'Iqd ul-Farld of Ibn'Abdr-r- Rabbihi (ed. Cairo, various years), and the greatest work of all this class, the Kitab ul-Aghdni (" Book of Songs ") (cf. Abu-l Faraj). The 12 th century contributes the Diwan Mukhtar&t ush-Shu'ara'i with fifty qasidas. The Khizdnat ul-Adab of Abdulqadir, written in the 17th century in the form of a com- mentary on verses cited in a grammar, contains much old verse (ed. 4 vols., Bulaq, 1882).

Belles-Lettres and Romances. — Mahomet in the Koran had made extensive use of saf or rhymed prose (see above). This form then dropped out of use almost entirely for some time. In the 10th century, however, it was revived, occurring almost simul- taneously in the Sermons of Ibn Nubata (946-984) and the Letters of Abu Bakr ul-Khwarizmi. Both have been published several times in the East. The epistolary style was further cultivated by Hamadhani (q.v.) and carried to perfection by Abu-1'Ala ul-Ma'arri. Hamadhani was also the first to Write in this rhymed prose a new form of work, the Maqama (" assembly "). The name arose from the fact that scholars were accustomed to assemble for the purpose of rivalling one another in orations showing their knowledge of Arabic language, proverb and verse. In the Maqdmas of Hamadhani a narrator describes how in various places he met a wandering scholar who in these assemblies puts all his rivals to shame by his eloquence/.

Each oration forms the substanceof a M aqdma, while the Maqamas themselves are united to one another by the constant meetings of narrator and scholar. Hariri (q.v.) quite eclipsed the fame of his predecessor in this department, and his Maqamas retain their influence over Arabian literature to the present day. As late as the 19th century the sheik Nasif ul YazijI (1800-187 1) distinguished himself by writing sixty clever Maqamas in the style of Hariri (ed. Beirut, 1856, 1872). While this class of literature had devoted itself chiefly to the finesses of the language, another set of works was given to meeting the requirements of moral education and the training of a gentleman. This, which is known as " Adab literature," is anecdotic in style with much quotation of early poetry and proverb. Thus government,

war, friendship, morality, piety, eloquence, are some of the titles under which Ibn Qutaiba groups his stories and verses in the 'Uyun ul Akhbdr. Jdhiz (q.v.) in the 9th century and Baihaqii (The Kildb al-Mahasin val-Masdwi, ed. F. Schwally, Giessen, 1900-1902) early in the 10th, wrote works of this class. A little later a Spaniard, Ibn 'Abdrabbihi (Abdi-r-Rabbihi), wrote his 'Iqd ul-Farid (see section Anthologies). The growth of city life in the Abbasid capital led to the desire for a new form of story, differing from the old tales of desert life. This was met in the first place by borrowing. In the 8th century Ibn Muqaffa", a convert from Mazdaism to Islam, translated the Pahlavi version of Bidpai's fables (itself a version of the Indian Pancha- tantra) into Arabic with the title Kalila wa Dimna (ed. Beirut, various years). Owing to the purity of its language and style it has remained a classic work. The Book of the 1001 Nights (Arabian Nights) also has its basis in translations from the Indian through the Persian, made as early as the 9th century. To these stories have been added others originating in Bagdad and Egypt and a few others, which were at first in independent circulation. The whole work seems to have taken its present form (with local variations) about the 13th century. Several other romances of considerable length are extant, such as the Story of 'Antar (ed. 32 vols., Cairo, 1869, &c, translated in part by Terrick Hamilton, 4 vols., London, 1820), and the Story of Saif ibn Dhi Yczen (ed. Cairo, 1892). (G. W. T.)

Historical Literature. — Arabian historians differ from all others in the unique form of their compositions. Each event is related in the words of eye-witnesses or contemporaries trans- mitted to the final narrator through a chain of intermediate reporters (rdints), each of whom passed on the original report to his successor. Often the same account is given in two or more slightly divergent forms, which have come down through different chains of reporters. Often, too, one event or one im- portant detail is told in several ways on the basis of several con- temporary statements transmitted to the final narrator through distinct lines of tradition. The writer, tfierefore, exercises no inde- pendent criticism except as regards the choice of authorities; for he rejects accounts of which the first author or one of the inter- mediate links seems to him unworthy of credit, and sometimes he states which of several accounts seems to him the best.

A second type of Arabian historiography is that in which an author combines the different traditions about one occurrence into one continuous narrative, but prefixes a statement as to the lines of authorities used and states which of them he mainly follows. In this case the writer recurs to the first method, already described, only when the different traditions are greatly at variance with one another. In yet a third type of history the old method is entirely forsaken and we have a continuous narrative only occasionally interrupted by citation of the authority for some particular

point. But the principle still is that what has been well said once need not be told again in other words. The writer, therefore, keeps as close as he can to the letter of his sources, so that quite a late writer often reproduces the very words of the first narrator.

From very early times story-tellers and singers found their subjects in the doughty deeds of the tribe on its forays, and sometimes in contests with foreign powers and in the impression produced by the wealth and might of the sovereigns of Persia and Constantinople. The appearance of the Prophet with the

great changes that ensued, the conquests that made the Arabs lords of half the civilized world, supplied a vast store of new matter for relations which men were never weary of hearing and recounting. They wished to know everything about the apostle of God. Every one who had known or seen him was questioned and was eager to answer. Moreover, the word of God in the Koran left many practical points undecided, and therefore it was of the highest importance to know exactly how the Prophet had spoken and acted in various circumstances. Where could this be better learned than at Medina, where he had lived so long and where the majority of his companions continued to live ? So at Medina a school was gradually formed, where the chief part of the traditions about Mahomet and his first successors took a form more or less fixed. Soon men began to assist memory by making notes, and pupils sought to take written jottings of what they had heard from their teachers. Thus by the close .of the 1 st century many dictata were already in circulation. For example, Hasan of Basra (d. 728 a.d.) had a great mass of such notes, and he was accused of sometimes passing off as oral tradition things he had really drawn from books; for oral tradition was still the one recognized authority, and it is related of more than one old scholar, and even of Hasan of Basra himself, that he directed his books to be burned at his death. The books were mere helps. Long after this date, when all scholars drew mainly from books, the old forms were still kept up. Tabari, for example, when he cites a book expresses himself as if he had heard what he quotes from the master with whom he read the passage or from whose copy he transcribed it. He even ex- presses himself in this wise: "'Omar b. Shabba has related to me in his book on the history of Basra." No independent book of the 1st century from the Flight (i.e. 622-719) has come down to us. It is told, however, that Moawiya summoned an old man named 'Abid ibn Sharya from Yemen to Damascus to tell him all he knew about ancient history and that he induced him to write down his information. This very likely formed the nucleus of a book which bore the name of that sheik and was much read in the 3rd century from the Flight. It seems to be lost now. But in the 2nd century (719-816) real books began to be composed. The materials were supplied in the first place by oral tradition, in the second by the dictata of

older scholars, and finally by various kinds of documents, such as treaties, letters, collections of poetry and genealogical lists. Genealogical studies had (become necessary through Omar's system of assigning state pensions to certain classes of persons according to their kinship with the Prophet, or their deserts during his lifetime. This subject received much attention even in the 1st century, but books about it were first written in the 2nd, the most famous being those of Ibn al-Kalbi (d. 763), of his son Hisham (d. 819), and of Al-Sharqi ibn al-Qutami. Genealogy, which often called for elucidations, led on to history. Baladhuri's excellent Ansdb al-Ashrdf (Genealogies of the Nobles) is a history of the Arabs on a genealogical plan.

The oldest extant history is the biography of the Prophet by Ibn Ishaq (d. 767). This work is generally trustworthy. Mahomet's life before he appeared as a prophet and the story of his ancestors are indeed mixed with many fables illustrated by spurious verses. But in Ibn Ishaq's day these fables were generally accepted as history — for many of them had been first related by contemporaries of Mahomet — and no one certainly thought it blameworthy to put pious verses in the mouth of the Prophet's forefathers, though, according to the Fihrist (p. 92), Ibn Ishaq was duped by others with regard to the poems he quotes. The original work of Ibn Ishaq seems to be lost. That which we possess is an edition of it by Ibn Hisham (d. 834) with additions and omissions (text ed. by F. Wiistenfeld, Gottingen, 1858-1860; German translation by Weil, Stuttgart, 1864).

The Life of the Prophet by Ibn Oqba (d. 758), based on the statements of two very trustworthy men, 'Urwa ibn az-Zubair (d. 713) and Az-zuhri (d. 742), was. still much read in Syria in the 14th century. Fragments of this have been edited by E. Sachau, Berlin, 1904. We fortunately possess the Book of the Campaigns of the Prophet by al-Waqidi (d. 822) and the

important Book of Classes of his disciple Ibn Sa'd (g.v.). WaqidI had much more copious materials than Ibn Ishaq, but gives way much more to a popular and sometimes romancing style of treatment. Nevertheless he sometimes helps us to recognize in Ibn Ishaq's narrative modifications of the genuine tradition made for a purpose, and the additional details he supplies set various events before us in a clearer light. Apart from this his chief merits lie in his studies on the subject of the traditional authorities, the results of which are given by Ibn Sa'd, and in his chronology, which is

often excellent. A special study of the traditions about the conquest of Syria made by M. J. de Goeje in 1864 (Mimoires sur la conquete de la Syrie, 2nd ed., Leiden, 1900), led to the conclusion that Waqidl's chronology is sound as regards the main events, and that later historians have gone astray by forsaking his guidance. This result has been confirmed by certain contemporary notices found by Th. Noldeke in 1874 in a Syriac MS. of the British Museum. And that Ibn Ishaq , agrees with WaqidI in certain main dates is important evidence for the trustworthiness of the former also. For the chronology before the year 10 of the Flight WaqidI did his best, but here, the material being defective, many of his conclusions are pre- carious. WaqidI had already a great library at his disposal. He is said to have had 600 chests of books, chiefly dictata written by or for himself, but in part real books by Abu Mikhnaf (d. 748), Ibn Ishaq (whom he uses but does not name), 'Awana (d. 764), Abu Mashar (d. 791) and other authors. Abu Mikhnaf left a great number of monographs on the chief events from the death of the Prophet to the caliphate of Walld II. These were much used by later writers, and we have many extracts from them, but none of the works themselves except a sort of romance based on his account of the death of Hosain (fjusain) of which Wiisten- feld has given a translation. With regard to the history of Irak in particular he was deemed to have the best information, and for this subject he is Tabarl's chief source, just as MadainI, a younger contemporary of WaqidI, is followed by preference in all that relates to Khorasan. Madainl's History of the Caliphs is the best, if not the oldest, published before Tabarl; but this book is known only by the excerpts given by later writers, particularly Baladhuri and Tabarl. From these we judge that he had great narrative power, with much clear and exact learning, and must be placed high as a critical historian. His plan was to record the various traditions about an event, choosing them with critical skill; sometimes, however, he fused the several traditions into a continuous narrative. A just estimate of the relative value of the historians can only be reached by careful comparison in detail. This has been essayed by Briinnow in his study on the Kharijites (Leiden, 1884), in which the narrative of Mubarrad in the Kamil is compared with the excerpts of MadainI given by Baladhuri and those of Abu Mikhnaf given by Tabarl. The conclusion reached is that Abu Mikhnaf and MadainI are both well informed and impartial.

Among the contemporaries of WaqidI and MadainI were Ibn Khidash (d. 838), the historian of the family Muhallab, whose work was one of Mubarrad's sources for the History of the Kharijites; Haitham ibn 'AdI (d. 822), whose works, though now lost, are often cited; and Saif ibn 'Omar at-Tamimi, whose book on the revolt of the tribes under Abu-Bekr and on the Mahommedan conquests was much used by Tabarl. His narratives are detailed and often tinged with romance, and he is certainly much inferior

to WaqidI in accuracy. Wellhausen has thoroughly examined the work of Saif in Skizzen und Vor- arbeiten, vi. Besides these are to be mentioned Abu "Ubaida (d. 825), who was celebrated as a philologist and wrote several historical monographs that are often cited, and AzraqI, whose excellent History of Mecca was published after his death by his grandson (d. 858). With these writers we pass into the 3rd century of Islam. But we have still an important point to notice in the 2nd century; for in it learned Persians began to take part in the creation of Arabic historical literature. Ibn Muqaffa' translated the great Book of Persian Kings, and others followed his example. Tabarl and his contemporaries, senior and junior, such as Ibn Qutaiba, Ya'qubl, Dlnawarl, preserve to us a good

part of the information about Persian history made known through such translations. 1 But even more important than the knowledge conveyed by these works was their influence on literary style and composition. Half a century later began versions from the Greek either direct or through the Syriac. The pieces translated were mostly philosophical; but the Arabs also learned something, however superficially, of ancient history.

The 3rd century (816-913) was far more productive than the 2nd. Abu "Ubaida was succeeded by Ibn al-A'rabl (d. 846), who in like manner was chiefly famous as a philologist, and who wrote about ancient poems and battles. Much that he wrote is quoted in Tabrlzl's commentary on the T} amasa, which is still richer in extracts from the historical elucidations of early poems given by ar-Riyashl (d. 871). Of special fame as a genealogist was Ibn Habib (d. 859), of whom we have a booklet on Arabian tribal names (ed. Wiistenfeld, 1850). AzraqI again was followed by Fakihl, who wrote a History of Mecca in 885, 2 and 'Omar b. Shabba (d. 876), who composed an excellent history of Basra, known to us only by excerpts. Of the works of Zubair b. Bakkar d . 870), one of Tabarl's teachers, a learned historian and genea- logist much consulted by later writers, there is a fragment in the Kopriilu library at Constantinople, and another in Gottingen, part of which has been made known by Wiistenfeld (Die Familie Al-Zobair, Gottingen, 1878). Ya'qubl (Ibn Wadih) wrote a short general history of much value (published by Houtsma, Leiden, 1883). About India he knows more than his prede- cessors and more than his successors down to Berunl. Ibn Khordadhbeh's historical works are lost. Ibn 'Abdalhakam (d. 871) wrote of the conquest of Egypt and the West. Extracts from this book are given by M'G. de Slane in his Histoire des Berberes, from which we gather that it was a medley of true tradition and romance, and must be reckoned, with the book of his slightly senior contemporary, the Spaniard Ibn Hablb, in the class of historical romances. A high place must be assigned to the historian Ibn Qutaiba or Kotaiba (d. 889), who wrote a very useful Handbook of History (ed. Wiistenfeld, Gottingen, 1850). Much more eminent is Baladhuri (d. 893), whose book on the Arab conquest (ed.

M. J. de Goeje, Leiden, 1865-1866) merits the special praise given to it by Mas'udI, and who also wrote a large work, the Ansab al-Ashraf. A contemporary, Ibn abl Tahir Taifur (d. 894), wrote on the Abbasid caliphs and was drawn on by Tabarl. The sixth part of his work is in the British Museum. The universal history of Dlnawarl (d. 896), entitled The Long Narratives, has been edited by Girgas (1887).

All these histories are more or less thrown into the shade by the great work of Tabarl (q.v.), whose fame has never faded from his own day to ours. The Annals (ed. M. de Goeje, Leiden, 1879-1901) are a general history from the creation to 302 a.h. (= a.d. 915). As a literary composition they do not rank very high, which may be due partly to the author's years, partly to the inequality of his sources, sometimes superabundant, sometimes defective, partly perhaps to the somewhat hasty condensa- tion of his original draft. Nevertheless the value of the book is very great: the author's selection of traditions is usually happy, and the episodes of most importance are treated with most fulness of detail, so that it deserves the high reputation it has enjoyed from the first. This reputation rose steadily; there were twenty copies (one of them written by Tabarl's own hand) in the library of the Fatimite caliph 'Aziz (latter half of the 4th century), whereas, when Saladin became lord of Egypt, the princely library contained 1200 copies (MaqrizI, i. 408 seq.).

The Annals soon came to be dealt with in various ways. They were published in shorter form with the omission of the names of authorities and of most of the poems cited; some passages quoted by later writers are not found even in the Leiden edition. On the other hand, some interpolations took place, one in the

1 For details see the introduction to Noldeke's translation of Tabarl's Geschichte der Perser und Araber zur Zeit der Sasaniden (Leiden, 1879).

2 Published in excerpt by Wiistenfeld along with AzraqI (Leipzig, I857-I859)-

author's lifetime and perhaps by his own hand. Then many- supplements were written, e.g. by Ferghani (not extant) and by Hamadhanl (partly preserved in Paris). 'Arib of Cordova made an abridgment, adding the history of the West and continuing the story to about 975. ' Ibn Mashkawaih wrote a history from the creation to 980, with the purpose of

drawing the lessons of the story, following Tabari closely, as far as his book is known, and seldom recurring to other sources before the reign of Moqtadir; what follows is his own composition and shows him to be a writer of talent. 2 In 963 an abridgment of the Annals was translated into Persian by Bal'ami, who, however, interwove many fables. 3 Ibn al-Athir (d. 1234) abridged the whole work, usually with judgment, but sometimes too hastily. Though he sometimes glided lightly over difficulties, his work is of service in fixing the text of Tabari. He also furnished a continuation to the year 1224. Later writers took Tabari as their main authority, but sometimes consulted other sources, and so add to our know- ledge — especially Ibn al-Jauzi (d. 1201), who adds many important details. These later historians had valuable help from the biographies of famous men and special histories of countries and cities, dynasties and princes, on which much labour was spent from the 4th century from the Flight onwards. The chief historians after Tabari may be briefly mentioned in chronological order. RazI (d. a.d. 932) wrote a History of Spain; Eutychius (d. 940) wrote Annals (ed. L. Cheikho, Paris, 1906), which are very important because he gives the Christian tradition; Suli (d. 946) wrote on the Abbasid caliphs, their viziers and court poets; Mas'udi (q.v.) composed various historical and geographical works (d. 956). Of Tabari's contem- porary Hamza Ispahan! (c. 940) we have the Annals (ed. Gott- waldt, St Petersburg, 1844); Ibn al-Qutlya wrote a History of Spain; Ibn Zulaq (d. 997) a History of Egypt; 'Otbi wrote the History of Mahmud of Ghazna, at whose court he lived (printed on the margin of the Egyptian edition of Ibn al-Athir) ; Tha'labi (d. 1036) wrote a well-known History of the Old Prophets; Abu Nu'aim al-Ispahani (d. 1039) wrote a History of Ispahan, chiefly of the scholars of that city; Tha'alibi (d. c. 1038) wrote, inter alia, a well-known History of the Poets of his Time, published at Damascus, 1887; Biruni (q.v.) (d. 1048) takes a high place among historians; Koda'i (d. 1062) wrote a Description of Egypt and also various historical pieces, of which some are extant; Ibn Sa'id of Cordova (d. 1070) wrote a View of the History of the Various Nations. Bagdad and its learned men found an ex- cellent historian in al-Khatib al-Baghdadi (d. io7i),and Spain in Ibn Hayan (d. 1076), and half a century later in Ibn Khaqan (d. 1 135) and Ibn Bassam (d. 1147). Sam'ani (d. 1167) wrote an excellent book on genealogies; 'Umara (d. 1175) wrote a History of Yemen (ed. H. C. Kay, London, 1892); Ibn 'Asaqir (d. 1 1 76) a History of Damascus and her Scholars, which is of great value, and exists in whole or in part in several libraries. The Biographical Dictionary of the Spaniard Ibn Pascual (d. 1182) and that of Dabbi, a somewhat junior contemporary, are edited in Codera's Bibliotheca Arab. Hisp. (1883-1885); Saladin found his historian in the famous Tmad uddln (d. 1201) (Arabic text, ed. C. Landberg, Leiden, 1888). Ibn ul-Jauzi, who died in the same year, has been already mentioned. Abdulwahid's History of the Almohades, written in 1224, was

published by Dozy (2nd ed., 1881). Abdullatif or Abdallatlf (d. 1232) is known by his writings about Egypt (trans, de Sacy, 1810); Ibn al-Athir (d. 1233) wrote, in addition to the Chronicle already mentioned, a Biographical Dictionary of Contemporaries of the Prophet. Qifti (d. 1248) is especially known by his History of Arabic Philologists. Sibt ibn al-Jauzi (d. 1256), grandson of the Ibn al-Jauzi already mentioned, wrote a great Chronicle, of which much the larger part still exists. Codera has edited (Madrid, 1886) Ibn al-'Abbar's (d. 1260) Biographical Lexicon, already

1 Of this work the Gotha Library has a portion containing 290-320 A.H., of which the part about the West has been printed by Dozy in the Bayon, and the rest was published at Leiden in 1897.

2 A fragment (198-251 a.h.) is printed in de Goeje, Fragm. Hist. Ar. (vol. ii., Leiden, 1871).

3 The first part was rendered into French by Dubeux in 1836. There is an excellent French translation by Zotenberg (1874).

known by Dozy's excerpts from it. Ibn al-'Adlm (d. 1262) is famed for his History of Aleppo, and Abu Shama (d. 1267) wrote a well-known History of Saladin and Nureddin, taking a great deal from Tmad uddin. Ibn abi Usaibia (d. 1269) wrote a History of Physicians, ed. A. Miüller. The History of Ibn al-' Amid (d. 1276), better known as Elmacin, was printed by Erpenius in 1625. Ibn Sa'id al-Maghribi (d. 1274 or 1286) is famous for his histories, but still more for his geographical writings. The noted theologian Nawawi (q.v.; d. 1278) wrote a Biographical Dictionary of the Worthies of the First Ages of Islam. Pre- eminent as a biographer is Ibn Khallikan (q.v.; d. 1282), whose much-used work was partly edited by de Slane and completely by Wiistenfeld (1835-1840), and translated into English by the former scholar (4 vols., 1843-1871).

Abu '1-Faraj, better known as Bar-Hebraeus (d. 1286), wrote, besides his Syriac Chronicle, an Arabic History of Dynasties (ed. E. Pocock, Oxford, 1663, Beirut, 1890). Ibn 'Adrian's History of Africa and Spain has been published by Dozy (2 vols., Leiden, 1848-1851), and the Qartas of Ibn abi Zar' by Tornberg (1843). One of the best-known of Arab writers is Abulfeda (d. 133 1) (q.v.). Not less famous is the great Encyclopaedia of his contemporary Nuwairi (d. 1332), but only extracts from it have been printed. Ibn Sayyid an-Nas (d. 1334) wrote a full biography of the Prophet; Mizzi (d. 1341) an extensive work on the men from whom traditions have been derived. We still possess, nearly complete, the great Chronicle of Dhahabi (d. 1347), a very learned biographer and historian. The geographical and his- torical Masalik al-Absar of Ibn Fadlallah (d. 1348) is known at present by extracts given by Quatremere and Amari. Ibn

al- Wardi (d. c. 1349), best known by his Cosmography, wrote a Chronicle which has been printed in Egypt. Safadi (d., 1363) got a great name as a biographer. Yafi'I (d. 1367) wrote a Chronicle of Islam and Lives of Saints. Subki (d. 1369) published Lives of the Theologians of the Shafi'ite School. Of Ibn Kathir's History the greatest part is extant. For the history of Spain and the Maghrib the writings of Ibn al-Khatib (d. 1374) are of acknowledged value. Another history, of which we possess the greater part, is the large work of Ibn al-Furat (d. 1404). Far superior to all these, however, is the famous Ibn Khaldun (q.v.) (d. 1406). Of the historical works of the famous lexicographer FairuzabadI (q.v.) (d. 1414) only a Life of the Prophet remains. Maqrizi (d. 1442) is the subject of a separate article; Ibn Hajar (d. 1448) is best known by his Biographical Dictionary of Contem- poraries of the Prophet, published in the Bibliotheca Indica. Ibn 'Arabshah (d. 1450) is known by his History of Timur (Leeuwarden, 1767). 'Aini (d. 1451) wrote a General History, still extant. Abu'l-Mahasin ibn Taghrlbirdi (d. 1469) wrote at length on the history of Egypt; the first two parts have been published by Juynboll and Matthes, Leiden, 1855-1861. Fliigel has published Ibn Kotlubogha's Biographies of the Hanifite Jurists. Ibn Shihna (d. 1485) wrote a History of Aleppo. Of Sakhawi we possess a bibliographical work on the historians. The polymath Suytiti (q.v.) (d. 1505) contributed a History of the Caliphs and many biographical pieces. SamhQdi's History of Medina is known through the excerpts of Wiistenfeld (1861). Ibn Iyas (d. 1524) wrote a History of Egypt, and Diarbekri (d. 1559) a Life of Mahomet. To these names must be added Maqqari (Makkari) (q.v.) and Hajji Khalifa (q.v.) (d. 1658). He made use of European sources, and with him Arabic historiography may be said to cease, though he had some unimportant successors.

A word must be said of the historical romances, the beginnings of which go back to the first centuries of Islam. The interest in all that concerned Mahomet and in the allusions of the Koran to old prophets and races led many professional narrators to choose these subjects. The increasing veneration paid to the Prophet and love for the marvellous soon gave rise to fables about his childhood, his visit to heaven, &c, which have found their way even into sober histories, just as many Jewish legends told by the converted Jew Ka'b al-Ahbar and by Wahb ibn Monabbih, and many fables about the old princes of Yemen told by 'Abid, are taken as genuine history (see, however, Mas'udi, iv. 88 seq.). A fresh field for romantic legend was found in the history of the

victories of Islam, the exploits of the first heroes of the faith, the fortunes of

‘ All and his house. Then, too, history was often expressly forged for party ends. The people accepted all this, and so a romantic tradition sprang up side by side with the historical, and had a literature of its own, the beginnings of which must be placed as early as the 2nd century of the Flight. The oldest specimens still extant are the fables about the conquest of Spain ascribed to Ibn Habib (d. 852) , and those about the conquest of Egypt and the West by Ibn “Abd al-Hakam (d. 871). In these truth and falsehood are mingled. But most of the extant literature of this kind is, in its present form, much more recent; e.g. the Story of the Death of Hosain by the pseudo-Abu Mikhnaf (translated by Wustenfeld) ; the Conquest of Syria by Abu Isma’Il al-Basrl (edited by Nassau Lees, Calcutta, 1854, and discussed by de Goeje, 1864); the pseudo-Waqidl (see Hamaker, De Expugna- Hone Memphidis et Alexandria^, Leiden, 1835); the pseudo-Ibn Qutaiha (see Dozy, Recherches) ; the book ascribed to A’sam Kufl, &c. Further inquiry into the origin of these works is called for, but some of them were plainly directed to stirring up fresh zeal against the Christians. In the 6th century of the Flight some of these books had gained so much authority that they were used as sources, and thus many untruths crept into accepted history (M. J. deG.;G. W. T.)

Geography. — The writing of geographical books naturally began with the description of the Moslem world, and that for practical purposes. Ibn Khordadhbeh, in the middle of the 9th century, wrote a Book of Roads and Provinces to give an account of the high- ways, the posting-stations and the revenues of the provinces. In the same century Ya’qubi wrote his Book of Countries, describing specially the great cities of the empire. A similar work describing the provinces in some detail was that of Qudama or Kodama (d. 922). Hamdani (q.v.) was led to write his great geography of Arabia by his love for the ancient history of his land. Muqaddasi (Mokad- dasi) at the end of the 10th century was one of the early travellers whose works were founded on their own observation. The study of Ptolemy’s geography led to a wider outlook, and the writing of works on geography (q.v.) in general. A third class of Arabian geographical works were those written to explain the names of places which occur in the older poets. Such books were written by Bakri (q.v.) and Yaqut (q.v.) 1

Grammar and Lexicography. — Arab tradition ascribes the first grammatical treatment of the language to Abu-1-Aswad ud-Du’all (latter half of the 7th century), but the certain beginnings of Arabic grammar are found a hundred years later. The Arabs from early times have always been proud of their language, but its systematic study seems to have arisen from contact with Persian and from the respect for the language of the Koran. In Irak the two towns of Basra and Kufa produced two rival schools of philologists. Bagdad soon had one of its own (cf. G. Fliigel’s Die grammatischen Schulen der Araber, Leipzig, 1862). Khalil ibn Ahmad

(718-791), an Arab from Oman, of the school of Basra, was the first to enunciate the laws of Arabic metre and the first to write a dictionary. His pupil Sibawaihi (q.v.), a Persian, wrote the grammar known simply as The Book, which is generally regarded in the East as authoritative and almost above criticism. Other members of the school of Basra were Abu 'Ubaida (q.v.), Asma'i (q.v.), Mubarrad (q.v.) and Ibn Duraid (q.v.). The school of Kufa claimed to pay more attention to the living language (spoken among the Bedouins) than to written laws of grammar. Among its teachers were Kisa'i, the tutor of Harun al-Rashid's sons, Ibn A'rabi, Ibn as-Sikkit (d. 857) and Ibn ul-Anbari (885-939). In the fourth century of Islam the two schools of Kufa and Basra declined in importance before the increasing power of Bagdad, where Ibn Qutaiba, Ibn Jinni (941-1002) and others carried on the work, but without the former rivalry of the older schools. Persia from the beginning of the 10th century pro- duced some outstanding students of Arabic. Hamadhani (d. 932) wrote a book of synonyms (ed. L. Cheikho, Beirut, 1885). Jauhari (q.v.) wrote his great dictionary the Sahah. Tha'alibi (q.v.) and Jurjani (q.v.) were almost contemporary, and a little later came Zamakhsharl (q.v.), whose philological works are almost as famous as his commentary on the Koran. The most important dictionaries of Arabic are late in origin. The immense work, Lisan ul Arab (ed. 20 vols., Bulaq, 1883-1889), was compiled by Ibn Manzur (1232-13 n), the Q&miis by Fairuzabadi, the Taj id' Arils (ed. 10 vols., Bulaq, 1890), founded on the Qdmus, by Murtada uz-Zabldl (1732-

Scientific Literature. — The literature of the various sciences is dealt with elsewhere. It is enough here to mention that such existed, and that it was not indigenous. It was in the early Abbasid period that the scientific works of Greece were translated into Arabic,

1 The chief Arabian geographical works have been edited by M. J. de Goeje in his Bibliotheca Geographorum arabicorum (Leiden, 1874 ff.).

Origin.

often through the Syriac, and at •che same time the influence of Sanskrit works made itself felt. Astronomy seems in this way to have come chiefly from India. The study of mathematics learned from Greece and India was developed by Arabian writers, who in turn became the teachers of Europe in the 16th century. Medical literature was indebted for its origin to the works of Galen and the medical school of Gondesapur. Many of the Arabian philosophers were also physicians and wrote on medicine. Chemistry proper was not understood, but Arabian writings on alchemy led Europe to it later. So also the literature of the animal world (cf. Damiri) is not zoological but legendary, and the works on minerals are practical and not scientific. See Arabian Philosophy and historical sections of such

scientific articles as Astronomy, &c. (G. W. T.)

ARABIAN PHILOSOPHY. What is known as " Arabian " philosophy owed to Arabia little more than its name and its language. It was a system of Greek thought, expressed in a Semitic tongue, and modified by Oriental influences, called into existence amongst the Moslem people by the patronage of their more liberal princes, and kept alive by the intrepidity and zeal of a small band of thinkers, who stood suspected and disliked in the eyes of their nation. Their chief claim to the notice of the historian of speculation comes from their warm reception of Greek philosophy when it had been banished from its original soil, and whilst western Europe was still too rude and ignorant to be its home (9th to 12th century).

In the course of that exile the traces of Semitic or Mahommedan influence gradually faded away, and the last of the line of Saracenic thinkers was a truer exponent of the one philosophy which they all professed to teach than the first. The whole movement is little else than a chapter in the history of Aristotelianism. That system of thought, after passing through the minds of those who saw it in the hazy light of an orientalized Platonism, and finding many laborious but narrow-purposed cultivators in the monastic schools of heretical Syria, was then brought into contact with the ideas and mental habits of Islam. But those in whom the two currents converged did not belong to the pure Arab race. Of the so- called Arabian philosophers of the East, al-Farabl, Ibn-Sina and al-Ghazall were natives of Khorasan, Bokhara and the outlying provinces of north-eastern Persia; whilst al-Kindi, the earliest of them, sprang from Basra, on the Persian Gulf, on the debatable ground between the Semite and the Aryan. In Spain, again, where Ibn-Bajja, Ibn-Tufail and Ibn Rushd rivalled or exceeded the fame of the Eastern schools, the Arabians of pure blood were few, and the Moorish ruling class was deeply intersected by Jewish colonies, and even by the natives of Christian Spain. Thus, alike at Bagdad and at Cordova, Arabian philosophy represents the temporary victory of exotic ideas and of subject races over the theological one-sidedness of Islam, and the illiterate simplicity of the early Saracens.

Islam had, it is true, a philosophy of its own among its theo- logians (see Mahommedan Religion). It was with them that the Moslem theology — the science of the word (Kaldm) — -first came into existence. Its professors, the Mutdkallimun (known in Hebrew as Medabberim, and as Loquentes in the Latin versions) , may be compared with the scholastic doctors of the Catholic Church. Driven in the first instance to speculation in theology by the needs of their natural reason, they came, in after days, when Greek philosophy had been naturalized in the Caliphate, to adapt its methods and doctrines to the support of their views. They employed a quasi-philosophical method, by which, accord- ing to Maimonides, they first

reflected how things ought to be in order to support, or at least not contradict, their opinions, and then, when their minds were made up with regard to this imaginary system, declared that the world was no otherwise constituted. The dogmas of creation and providence, of divine omnipotence, chiefly exercised them; and they sought to assert for God an immediate action in the making and the keeping of the world. Space they looked upon as pervaded by atoms possessing no quality or extension, and time was similarly divided into innumerable instants. Each change in the constitution of the atoms is a direct act of the Almighty. When the fire burns, or the water moistens, these terms merely express the habitual connexion which our senses perceive between one thing

and another. It is not the man that throws a stone who is its real mover: the supreme agent has for the moment created motion. If a living being die, it is because God has created the attribute of death; and the body remains dead, only because that attribute is unceasingly created. Thus, on the one hand, the object called the cause is denied to have any efficient power to produce the so-called effect; and, on the other hand, the regularities or laws of nature are explained to be direct inter- ferences by the Deity. The supposed uniformity and necessity of causation is only an effect of custom, and may be at any moment rescinded. In this way, by a theory which, according to Averroes, involves the negation of science, the Moslem theologians believed that they had exalted God beyond the limits of the metaphysical and scientific conceptions of law, form and matter; whilst they at the same time stood aloof from the vulgar doctrines, attributing a causality to things. Thus they deemed they had left a clear ground for the possibility of miracles.

But at least one point was common to the theological and the philosophical doctrine. Carrying out, it may be, the principles of the Neo-Platonists, they kept the sanctuary of the Deity securely guarded, and interposed between him and his creatures a spiritual order of potent principles, from the Intelligence, which is the first-born image of the great unity, to the Soul and Nature, which come later in the spiritual rank. Of God the philosophers said we could not tell what He is, but only what He is not. The highest point, beyond which strictly philosophical inquirers did not penetrate, was the active intellect, — a sort of soul of the world in Aristotelian garb — the principle which inspires and regulates the development of humanity, and in which lies the goal of perfection for the human spirit. In theo- logical language the active intellect is described as an angel. The inspirations which the prophet receives by angelic messengers are compared with the

irradiation of intellectual light, which the philosopher wins by contemplation of truth and increasing purity of life. But while the theologian incessantly postulated the agency of that God whose nature he deemed beyond the pale of science, the philosopher, following a purely human and natural aim, directed his efforts to the gradual elevation of his part of reason from its unformed state, and to its final union with the controlling intellect which moves and draws to itself the spirits of those who prepare themselves for its influences. The philo- sophers in their way, like the mystics of Persia (the Sufites) in another, tended towards a theory of the communion of man with the spiritual world, which may be considered a protest against the practical and almost prosaic definiteness of the creed of Mahomet.

Arabian philosophy, at the outset of its career in the 9th century, was able without difficulty to take possession of those resources for speculative thought which the Latins had barely achieved at the close of the 12th century by the slow process of rediscovering the Aristotelian logic from the commentaries and verses of Bogtius. What the Latins painfully accomplished, owing to their fragmentary and unintelligent acquaintance with ancient philosophy, was already done for the Arabians by the scholars of Syria. In the early centuries of the Christian era, both within and without the ranks of the church, the Platonic tone and method were paramount throughout the East. Their influence was felt in the creeds which formulated the orthodox dogmas in regard to the Trinity and the Incarnation. But in its later days the Neo-Platonist school came more and more to find in Aristotle the best exponent and interpreter of the philo- sopher whom they thought divine. It was in this spirit that Porphyry, Themistius and Joannes Philoponus composed their commentaries on the treatises of the Peripatetic system which, modified often unconsciously by the dominant ideas of its expositors, became in the 6th and 7th centuries the philosophy of the Eastern Church. But the instrument which, in the hands of John of Damascus (Dama.scenus), was made subservient to theological interests, became in the hands of others a dissolvent of the doctrines which had been reduced to shape under the pre- valence of the elder Platonism. Peripatetic studies became

the source of heresies; and conversely, the heretical sects prosecuted the study of Aristotle with peculiar zeal. The church of the Nestorians, and that of the Monophysites, in their several schools and monasteries, carried on from the 5th to the 8th century the study of the earlier part of the Organon, with almost the same means, purposes and results as were found among the Latin schoolmen of the earlier centuries. Up to the time when the religious zeal of the emperor Zeno put a stop to the Nestorian school at Edessa, this " Athens of Syria " was active in trans- lating and popularizing the Aristotelian logic. Their banishment from Edessa in 489 drove the

Nestorian scholars to Persia, where the Sassanid rulers gave them a welcome; and there they con- tinued their labours on the Organon. A new seminary of logic and theology sprang up at Nislbis, not far from the old locality; and at Gandisapora (or Nishapur), in the east of Persia, there arose a medical school, whence Greek medicine, and in its company Greek science and philosophy, ere long spread over the lands of Iran. Meanwhile the Monophysites had followed in the steps of the Nestorians, multiplying Syriac versions of the logical and medical science of the Greeks. Their school at Resaina is known from the name of Sergius, one of the first of these trans- lators, in the days of Justinian; and from their monasteries at Kinnesrln (Chalcis) issued numerous versions of the intro- ductory treatises of the Aristotelian logic. To the Isagoge of Porphyry, the Categories and the Hermeneutica of Aristotle, the labours of these Syrian schoolmen were confined. These they expounded, translated, epitomized and made the basis of their compilations, and the few who were bold enough to attempt the Analytics seem to have left their task unaccomplished.

The energy of the Monophysites, however, began to sink with the rise of the Moslem empire; and when philosophy revived amongst them in the 13 th century, in the person of Gregorius Bar-Hebraeus (Abulfaragius) (1226-1286), the revival was due to the example and influence of the Arabian thinkers. It was otherwise with the Nestorians. Gaining by means of their professional skill as physicians a high rank in the society of the Moslem world, the Nestorian scholars soon made Bagdad familiar with the knowledge of Greek philosophy and science which they possessed. But the narrow limits of the Syrian studies, which added to a scanty knowledge of Aristotle some acquaintance with his Syrian commentators, were soon passed by the curiosity and zeal of the students in the Caliphate. During the 8th and 9th centuries, rough but generally faithful versions of Aristotle's principal works were made into Syriac, and then from the Syriac into Arabic. The names of some of these translators, such as Johannitius (Hunain ibn-Ishaq), were heard eveain the Latin schools. By the labours of Hunain and his family the great body of Greek science, medical, astronomical and mathe- matical, became accessible to the Arab-speaking races. But for the next three centuries fresh versions, both of the philosopher and of his commentators, continued to succeed each other.

To the Arabians Aristotle represented and summed up Greek philosophy, even as Galen became to them the code of Greek medicine. They adopted the doctrine and system which the progress of human affairs had made the intellectual aliment of their Syrian guides. From first to last Arabian philosophers made no claim to originality; their aim was merely to propagate the truth of Peripateticism as it had been delivered to them. It was with them that the deification of Aristotle began; and from them the belief that in him human intelligence had reached its limit passed to the

later schoolmen (see Scholasticism). The progress amongst the Arabians on this side lies in a closer adherence to their text, a nearer approach to the bare exegesis of their author, and an increasing emancipation from control by the tenets of the popular religion.

Secular philosophy found its first entrance amongst the Saracens in the days of the early caliphs of the Abbasid dynasty, whose ways and thoughts had been moulded by their residence in Persia amid the influences of an older caliphate. creed, and of ideas which had in the last resort sprung from the Greeks. The seat of empire had been transferred to Bagdad, on the highway of Oriental commerce; and the distant

Khorasan became the favourite province of the caliph. Then was inaugurated the period of Persian supremacy, during which Islam was laid open to the full current of alien ideas and culture. The incitement came, however, not from the people, but from the prince: it was in the light of court favour that the colleges of Bagdad and Nishapur first came to attract students from every quarter, from the valleys of Andalusia as well as the upland plains of Transoxiana. Manstir, the second of the Abbasids, encouraged the appropriation of Greek science; but it was al-Ma'mun, the son of Harun al-Rashid, who deserves in the Mahommedan empire the same position of royal founder and benefactor which is held by Charlemagne in the history of the Latin schools. In his reign (813-833) Aristotle was first translated into Arabic. Orthodox Moslems, however, distrusted the course on which their chief had entered, and his philosophical proclivities became one ground for doubting as to his final salvation.

In the eastern provinces the chief names of Arabian philosophy are those known to the Latin schoolmen as Alkindius, Alfarabius, Avicenna and Algazel, or under forms resembling these. The first of these, Alkindius (see Kindi), flourished at the court of Bagdad in the first half of the 9th century. His claims to notice at the present day rest upon a few works on medicine, theology, music and natural science. With him begins that encyclopaedic character — the simultaneous cultivation of the whole field of investigation which is reflected from Aristotle on the Arabian school. In him too is found the union of Platonism and Aristo- telianism expressed in Neo-PIatonic terms. Towards the close of the 10th century the presentation of an entire scheme of knowledge, beginning with logic and mathematics, and ascending through the various departments of physical inquiry to the region of religious doctrine, was accomplished by a sdciety which had its

chief seat at Basra, the native town of al-Kindi. This society — the Brothers of Purity or Sincerity (Ikhwan us Safa'i) — divided into four orders, wrought in the interests of religion no less than of science; and though its attempt to compile an encyclopaedia of existing knowledge may have been premature, it yet contributed to spread abroad a desire for further information. The proposed reconciliation between science and faith was not accomplished, because the compromise could please neither party. The fifty-one treatises of which this encyclopaedia consists are interspersed with apologues in true Oriental style, and the idea of goodness, of moral per- fection, is as prominent an end in every discourse as it was in the alleged dream of al-Ma'mun. The materials of the work come chiefly from Aristotle, but they are conceived in a Platoniz- ing spirit, which places as the bond of all things a universal soul of the world with its partial or fragmentary souls. Con- temporary with this semi-religious and semi-philosophical society lived Alfarabius (see Farabi), who died in 950. His paraphrases of Aristotle formed the basis on which Avicenna constructed his system, and his logical treatises produced a permanent effect on the logic of the Latin scholars. He gave the tone and direction to nearly all subsequent speculations among the Arabians. His order and enumeration of the principles of being, his doctrine of the double aspect of intellect, and of the perfect beatitude which consists in the aggregation of noble minds when they are delivered from the separating barriers of individual bodies, present at least in germ the characteristic theory of Averroes. But al-Farabi was not always consistent in his views; a certain sobriety checked his speculative flights, and although holding that the true perfection of man is reached in this life by the elevation of the intellectual nature, he came towards the close to think the separate existence of intellect no better than a delusion.

Unquestionably the most illustrious name amongst the Oriental Moslems was Avicenna (980-1037). His rank in the Aviceaaa. me dieval world as a philosopher was far beneath his fame as a physician. Still, the logic of Albertus Magnus and succeeding doctors was largely indebted to him for its formulae. In logic Avicenna starts from distinguishing between the isolated concept and the judgment or assertion;

from which two primitive elements of knowledge there is arti- ficially generated a complete and scientific knowledge by the two processes of definition and syllogism. But the chief interest for the history of logic belongs to his doctrine in so far as it bears upon the nature and function of abstract ideas. The question had been suggested alike to East and West by Porphyry, and the Arabians were the first to approach the full statement of the problem. Farabi had pointed out that the universal and in- dividual are not distinguished from each other as understanding from the senses, but that both universal and individual are in one respect intellectual, just as in another connexion they play a part in perception. He had distinguished the

universal essence in its abstract nature, from the universal considered in relation to a number of singulars. These suggestions formed the basis of Avicenna's doctrine. The essences or forms — the intelligibilia which constitute the world of real knowledge — may be looked at in themselves (metaphysically) , or as embodied in the things of sense (physically), or as expressing the processes of thought (logically). The first of these three points of view deals with the form or idea as self-contained in the principles of its own being, apart from those connexions and distinctions which it receives in real (sensuous) science, and through the act of intellect. Secondly, the form may be looked at as the similarity evolved by a process of comparison, as the work of mental reflection, and in that way as essentially expressing a relation. When thus considered as the common features derived by examination from singular instances, it becomes a universal or common term strictly so called. It is intellect which first makes the abstract idea a true universal. Intellectus in formis agit universalitatem. In the third place, the form or essence may be looked upon as embodied in outward things (in singular ibus propriis), and thus it is the type more or less ' represented by the members of a natural kind. It is the designation of these outward things which forms the " first intention " of names; and it is only at a later stage, when thought comes to observe its own modes, that names, looked upon as predicables and universals, are taken in their " second intention." Logic deals with such second in- tentions. It does not consider the forms ante muUiplicitalem, i.e. as eternal ideas — nor in multiplicitate, i.e. as immersed in the matter of the phenomenal world — but post muUiplicitalem, i. e. as they exist in and for the intellect which has examined and compared. Logic does not come in contact with things, except as they are subject to modification by intellectual forms. In other words, universality, individuality and speciality are all equally modes of our comprehension or notion; their meaning consists in their setting forth the relations attaching to any object of our conception. In the mind, e.g., one form may be placed in reference to a multitude of things, and as thus related will be universal. The form animal, e.g., is an abstract intelligible or metaphysical idea. When an act of thought employs it as a schema to unify several species, it acquires its logical aspect (respectus) of generality; and the various living beings qualified to have the name animal applied to them constitute the natural class or kind. Avicenna's view of the universal may be com- pared with that of Abelard, which calls it " that whose nature it is to be predicated of several," as if the generality became explicit only in the act of predication, in the sermo or proposition, and not in the abstract, unrelated form or essence. The three modes of the universal before things, in things, and after things, spring from Arabian influence, but depart somewhat from his standpoint.

The place of Avicenna amongst Moslem philosophers is seen in the fact that

ShahrastanI takes him as the type of all, and that Ghazall's attack against philosophy is in reality almost entirely directed against Avicenna. His system is in the main a codifica- tion of Aristotle modified by fundamental views of Neo-Platonist origin, and it tends to be a compromise with theology. In order, for example, to maintain the necessity of creation, he taught that all things except God were admissible or possible in their own nature, but that certain of them were rendered necessary by the act of the creative first agent, — in other words, that the possible could be transformed into the necessary. Avicenna's

theory of the process of knowledge is an interesting part of his doctrine. Man has a rational soul, one face of which is turned towards the body, and, by the help of the higher aspect, acts as practical understanding; the other face lies open to the reception and acquisition of the intelligible forms, and its aim is to become a reasonable world, reproducing the forms of the universe and their intelligible order. In man there is only the susceptibility to reason, which is sustained and helped by the light of the active intellect. Man may prepare himself for this influx by removing the obstacles which prevent the union of the intellect with the human vessel destined for its reception. The stages of this process to the acquisition of mind are generally enumerated by Avicenna as four; in this part he follows not Aristotle, but the Greek commentator. The first stage is that of the hylic or material intellect, a state of mere potentiality, like that of a child for writing, before he has ever put pen to paper. The second stage is called in habitu; it is compared to the case of a child that has learned the elements of writing, when the bare possi- bility is on the way to be developed, and is seen to be real. In this period of half-trained reason, it appears as happy conjecture, not yet transformed into art or science proper. When the power of writing has been actualized, we have a parallel to the intellectus in aclu — the way of science and demonstration is entered. And when writing has been made a permanent accomplishment, or lasting property of the subject, to be taken up at will, it corresponds to the intellectus adeptus — the complete mastery of science. The whole process may be compared to the gradual illumination of a body naturally capable of receiving light. There are, however, grades of susceptibility to the active intellect, i.e. in theological language, to communication with God and his angels. Sometimes the receptivity is so vigorous in its affinity, that without teaching it rises at one step to the vision of truth, by a certain " holy force " above ordinary measure. (In this way philosophy tried to account for the phenomenon of prophecy, one of the ruling ideas of Islam.) But the active intellect is not merely influential on human souls. It is the universal giver of

forms in the world.

In several points Avicenna endeavoured to give a rationale of theological dogmas, particularly of prophetic rule, of miracles, divine providence and immortality. The permanence of in- dividual souls he supports by arguments borrowed from those of Plato. The existence of a prophet is shown to be a corollary from a belief in God as a moral governor, and the phenomena of miracles are required to evidence the genuineness of the prophetic mission. Thus Avicenna, like his predecessors, tried to harmonize the abstract forms of philosphy with the religious faith of his nation. But his arguments are generally vitiated by the fallacy of assuming what they profess to prove. His failure is made obvious by the attack of Ghazali on the tendencies and results of speculation.

To Ghazali (q.v.) it seemed that the study of secular philosophy had resulted in a general indifference to religion, and that the abazill. scepticism which concealed itself under a pretence of piety was destroying the life and purity of the nation. With these views he carried into the fields of philosophy the aims and spirit of the Moslem theologian. His restless life was the reflex of a mental history disturbed by prolonged agitation. Revolting, in the height of his success, against the current creed, he began to examine the foundations of knowledge. The senses are contradicted by one another, and disproved by reason. Reason, indeed, professes to furnish us with necessary truths; but what assurance have we that the verdicts of reason may not be reversed by some higher authority ? Ghazali then interrogated all the sects in succession to learn their criterion of truth. He first applied to the theological schoolmen, who grounded their religion on reason; but their aim was only to preserve the faith from heresy. He turned to the philosophers, and examined the accepted Aristotelianism in a treatise which has come down to us — The Destruction of the Philosophers. He assails them on twenty points of their mixed physical and meta- physical peripateticism, from the statement of which, in spite «f his pretended scepticism, we can deduce some very positive

metaphysical opinions of his own. He claims to have shown that the dogmas of the eternity of matter and the permanence of the world are false; that their description of the Deity as the demiurgos is unspiritual; that they fail to prove the existence, the unity, the simplicity, the incorporeality or the knowledge (both of species and accidents) of God; that their ascription of souls to the- celestial spheres is unproved; that their theory of causation, which attributes effects to the very natures of the causes, is false, for that all actions and events are to be ascribed to the Deity; and, finally, that they cannot establish the spirituality of the soul, nor prove its mortality. These criti- cisms disclose nothing like a sceptical state of mind, but rather a reversion from the metaphysical to the theological stage of

thought. He denies the intrinsic tendencies, or souls, by which the Aristotelians explained the motion of the spheres, because he ascribes their motion to God. The sceptic would have denied both. G. H. Lewes censures Renan for asserting of Ghazali's theory of causation—" Hume n'a rien dit plus." It is true that Ghazali maintains that the natural law according to which effects proceed inevitably from their causes is only custom, and that there is no necessary connexion between them. But while Hume absolutely denies the necessity, Ghazali merely removes it one stage farther back, and plants it in the mind of the Deity. This, of course, is not metaphysics, but theology. Having, as he believed, refuted the opinions of the philosophers, he next in- vestigated the pretensions of the Allegorists, who derived their doctrines from an imam. These Arabian ultramontanes had no word for the doubter. They could not, he says, even under- stand the problems they sought to resolve by the assumption of infallibility, and he turned again, in his despair, to the in- structors of his youth — the Sufis. In their mystical intuition of the laws of life, and absorption in the immanent Deity, he at last found peace. This shows the true character of the treatise which, alike in medieval and modern times, has been quoted as containing an exposition of his opinions. The work called The Tendencies of the Philosophers, translated in 1506, with the title Logica et Philosophia Algazelis Arabis, contains neither the logic nor the philosophy of Ghazali. It is a mere abstract or state- ment of the Peripatetic systems, and was made preliminary to that Destruction of which we have already spoken.

This indictment against liberal thought from the standpoint of the theological school was afterwards answered in Spain by Averroes; but in Bagdad it heralded the extinction of the light of philosophy. Moderate and compliant with the popular religion as Alfarabius and Avicenna had always been, as com- pared with their Spanish successor, they had equally failed to conciliate the popular spirit, and were classed in the same cate- gory with the heretic or the member of an immoral sect. The 1 2th century exhibits the decay of liberal intellectual activity in the Caliphate, and the gradual ascendancy of Turkish races animated with all the intolerance of semi-barbarian proselytes to the Mahommedan faith. Philosophy, which had only sprung up when the purely Arabian influences ceased to predominate, came to an end when the sceptre of the Moslem world passed away from the dynasty of Persia. Even in 1150 Bagdad had seen a library of philosophical books burned by command of the caliph Mostanjid; and in 1192 the same place might have wit- nessed a strange scene, in which the books of a physician were first publicly cursed, and then committed to the flames, while their owner was incarcerated. Thus, while the Latin church showed a marvellous receptivity for ethnic philosophy, and assimilated doctrines which it had at an earlier date declared impious, in Islam the theological system entrenched itself towards the end of the 12th century in

the narrow orthodoxy of the Asharites, and reduced the votaries of Greek philosophy to silence.

The same phenomena were repeated in Spain under the Mahommedan rulers of Andalusia and Morocco, with this difference, that the time of philosophical development . s ˆ was shorter, and the heights to which Spanish thinkers P

soared were greater. The reign of al-Hakam the Second (061- 976) inaugurated in Andalusia those scientific and philosophical

studies which were simultaneously prosecuted by the Society of Basra. From Cairo, Bagdad, Damascus and Alexandria, books both old and new were procured at any price for the library of the prince; twenty-seven free schools were opened in Cordova for the education of the poor; and intelligent knowledge was perhaps more widely diffused in Mahommedan Spain than in any other part of Europe at that day. The mosques of the city were filled with crowds who listened to lectures on science and literature, law and religion. But the future glory thus pro- mised was long postponed. The usurping successor of Hakam found it a politic step to request the most notable doctors of the sacred law to examine the royal library; and every book treat- ing of philosophy, astronomy and other forbidden topics was condemned to the flames. But the spirit of research, fostered by the fusion of races and the social and intellectual competition thus engendered, was not crushed by these proceedings; and for the next century and more the higher minds of Spain found in Damascus and Bagdad the intellectual aliment which they desired. At last, towards the close of the nth century, the long-pent spiritual energies of Mahommedan Spain burst forth in a brief series of illustrious men. Whilst the native Spaniards were narrowing the limits of the Moorish kingdoms, and whilst the generally fanatical dynasty of the Almohades might have been expected to repress speculation, the century preceding the close of Mahommedan sway saw philosophy cultivated by Avempace, Abubacer and Averroes. Even amongst the Almohades there were princes, such as Yusuf (who began his reign in 1163) and YaqQb Almanstir (who succeeded in 1184), who welcomed the philosopher at their courts and treated him as an intellectual compeer. But about 1195 the old distrust of philosophy revived; the philosophers were banished in disgrace; works on philosophical topics were ordered to be confiscated and burned; and the son of Almansur condemned a certain Ibn-Habib to death for the crime of philosophizing.

Arabian speculation in Spain was heralded by Avicebron or Ibn Gabirol (g.v.), a Jewish philosopher (1021-1058). About Avempace. a generation later the rank of Moslem thinkers was introduced by AbQ-Bakr Muhammad ibn Yahya, surnamed Ibn-Bajja, and known to the Latin world as Avem- pace. He was born at Saragossa, and died comparatively young at Fez in 1138. Besides commenting on various physical treatises of Aristotle's, he wrote some philosophical essays, notably one on the Republic or Regime of the Solitary, under- standing by that the organized system of rules, by obedience to which the individual may rise from the mere life of the senses to the perception of pure intelligible principles and may partici- pate in the divine thought which sustains the world. These rules for the individual are but the image or reflex of the political organization of the perfect or ideal state; and the man who strives to lead this life is called the solitary, not because he with- draws from society, but because, while in it, he guides himself by reference to a higher state, an ideal society. Avempace does not develop at any length this curious Platonic idea of the perfect state. His object is to discover the highest end of human life, and with this view he classifies the various activities of the human soul, rejects such as are material or animal, and then analyses the various spiritual forms to which the activities may be directed. He points out the graduated scale of such forms, through which the soul may rise, and shows that none are final or complete in themselves, except the pure intelligible forms, the ideas of ideas. These the intellect can grasp, and in so doing it becomes what he calls intellectus acquisitus, and is in a measure divine. This self-consciousness of pure reason is the highest object of human activity, and is to be attained by the speculative method. The intellect has in itself power to know ultimate truth and intelligence, and does not require a mystical illumination as Ghazall taught. Avempace's principles, it is clear, lead directly to the Averroistic doctrine of the unity of intellect, but the obscurity and incompleteness of the Regime do not permit us to judge how far he anticipated the later thinker. (See Munk, Melanges de phil. juive et arabe, pp. 383-410.)

The same theme was developed by Ibn.-Tufail (q.v.) in his

philosophical romance, called Hayy ibn-Yakdhan (the Living, Son of the Waking One), best known by Pococke's Latin version, as the Philosophus Autodidactus. It describes the process by which an isolated truth-seeker detaches himself from his lower passions, and raises himself above the material earth and the orbs of heaven to the forms which are the source of their movement, until he arrives at a union with the supreme intellect. The experiences of the religious mystic are paralleled with the ecstatic vision in which the philosophical hermit sees a world of pure intelligences, where birth and decease are unknown. It was this theory which Averroes (1126-1198), the last and most famous of the thinkers of Moslem Spain,

carried out to his doctrine of the unity of intellect.

For Aristotle the reverence of Averroes was unbounded, and to expound him was his chosen task. The uncritical re- ceptivity of his age, the defects of the Arabic versions, Averroes. the emphatic theism of his creed, and the rationalizing mysticism of same Oriental thought, may have sometimes led him astray, and given prominence to the less obvious features of Aristotelianism. But in his conception of the relation between philosophy and religion, Averroes had a light which the Latins were without. The science, falsely so called, of the several theological schools, their groundless distinctions and sophistical demonstrations, he regarded as the great source of heresy and scepticism. The allegorical interpretations and metaphysics which had been imported into religion had taken men's minds away from the plain sense of the Koran. God had declared a truth meet for all men, which needed no intellectual superiority to understand, in a tongue which each human soul could apprehend. Accordingly, the expositors of religious metaphysics, Ghazall included, are the enemies of true religion, because they make it a mere matter of syllogism. Averroes maintains that a return must be made to the words and teaching of the prophet; that science must not expend itself in dogma- tizing on the metaphysical consequences of fragments of doctrine for popular acceptance, but must proceed to reflect upon and examine the existing things of the world. Averroes, at the same time, condemns the attempts of those who tried to give demon- strative science where the mind was not capable of more than rhetoric: they harm religion by their mere negations, destroy- ing an old sensuous creed, but cannot build up a higher and intellectual faith.

In this spirit Averroes does not allow the fancied needs of theological reasoning to interfere with his study of Aristotle, whom he simply interprets as a truth-seeker. The points by which he told on Europe were all implicit in Aristotle, but Averroes set in relief what the original had left obscure, and emphasized things which the Christian theologian passed by or misconceived. Thus Averroes had a double effect. He was the great interpreter of Aristotle to the later Schoolmen. On the other hand, he came to represent those aspects of Peripateticism most alien to the spirit of Christendom; and the deeply religious Moslem gave his name to the anti-sacerdotal party, to the materialists, sceptics and atheists, who defied or undermined the dominant beliefs of the church.

On three points Averroes, like other Moslem thinkers, came specially into relation, real or supposed, with the religious creed, viz. the creation of the world, the divine knowledge of particular things, and the future of the human soul.

The real grandeur of Averroes is seen in his resolute prosecution of the

standpoint of science in matters of this world, and in his recognition that religion is not a branch of knowledge to be reduced to propositions and systems of dogma, but a personal and inward power, an individual truth which stands distinct from, but not contradictory to, the universalities of scientific law. In his science he followed the Greeks, and to the School- men he and his compatriots rightly seemed philosophers of the ancient world. He maintained alike the claim of demonstrative- science with its generalities for the few who could live in that ethereal world, and the claim of religion for all — the common life of each soul as an individual and personal consciousness. But theology, or the mixture of the two, he regarded as a source*

of evil to both — fostering the vain belief in a hostility of philo- sophers to religion, and meanwhile corrupting religion by a pseudo-science.

The latent nominalism of Aristotle only came gradually to be emphasized through the prominence which Christianity gave to the individual life, and, apart from passing notices as in Abelard, first found clear enunciation in the school of Duns Scotus. The Arabians, on the contrary, emphasized the idealist aspect which had been adopted and promoted by the Neo- Platonist commentators. Hence, to Averroes the eternity of the world finds its true expression in the eternity of God. The ceaseless movement of growth and change, which presents matter in form after form as a continual search after a finality which in time and movement is not and cannot be reached, represents only the aspect the world shows to the physicist and to the senses. In the eye of reason the full fruition of this desired finality is already and always attained; the actualization, in- visible to the senses, is achieved now and ever, and is thus beyond the element of time. This transcendent or abstract being is that which the world of nature is always seeking. He is thought or intellect, the actuality, of which movement is but the fragment- ary attainment in successive instants of time. Such a mind is not in the theological sense a creator, yet the onward move- ment is not the same as what some modern thinkers seem to mean by development. For the perfect and absolute, the con- summation of movement is not generated at any point in the process; it is an ideal end, which guides the operations of nature, and does not wait upon them for its achievement. God is the unchanging essence of the movement, and therefore its eternal cause.

A special application of this relation between the prior perfect, and the imperfect, which it influences, is found in the doctrine of the connexion of the abstract (transcendent) intellect with man. This transcendent mind is

sometimes connected with the moon, according to the theory of Aristotle, who assigned an imperishable matter to the sphere beyond the sublunary, and in general looked upon the celestial orbs as living and intelli- gent. Such an intellect, named active or productive, as being the author of the development of reason in man, is the permanent, eternal thought, which is the truth of the cosmic and physical movement. It is in man that the physical or sensible passes most evidently into the metaphysical and rational. Humanity is the chosen vessel in which the light of the intellect is revealed ; and so long as mankind lasts there must always be some indi- viduals destined to receive this light. What seems from the material point of view to be the acquisition of learning, study and a moral life, is from the higher point of view the manifesta- tion of the transcendent intellect in the individual. The pre- paration of the heart and faculties gives rise to a series of grades between the original predisposition and the full acquisition of actual intellect. These grades in the main resemble those given by Avicenna. But beyond these, Averroes claims as the highest bliss of the soul a union in this life with the actual intellect. The intellect, therefore, is one and continuous in all individuals, who differ only in the degree which their illumination has attained. Such was the Averroist doctrine of the unity of intellect — the eternal and universal nature of true intellectual life. By his interpreters it was transformed into a theory of one soul common to all mankind, and when thus corrupted conflicted not unreasonably with the doctrines of a future life, common to Islam and Christendom.

Averroes, rejected by his Moslem countrymen, found a hearing among the Jews, to whom Maimonides had shown the free paths of Greek speculation. In the cities of Languedoc and °PP° aents Provence, to which they had been driven by Spanish roism. fanaticism, the Jews no longer used the learned Arabic, and translations of the works of Averroes became necessary. His writings became the text-book of Levi ben Gerson at Perpignan, and of Moses of Narbonne. Meanwhile, before 1250, Averroes became accessible to the Latin Schoolmen by means of versions, accredited by the names of Michael Scot and others. William of Auvergne is the first Schoolman who

criticizes the doctrines of Averroes, not, however, by name. Albertus Magnus and St Thomas devote special treatises to an examination of the Averroist theory of the unity of intellect, which they labour to confute in order to establish the orthodoxy of Aristotle. But as -early as Aegidius Romanus (1247-1316), Averroes had been stamped as the patron of indifference to theological dogmas, and credited with the emancipation which was equally due to wider experience and the lessons of the Crusades. There had never been an absence of protest against the hierarchical doctrine. Berengar of Tours (nth century) had struggled in that interest, and with Abelard, in the 12th century, the revolt against authority in belief grew loud. The dialogue between a Christian, a Jew and a philosopher

suggested a com- parative estimate of religions, and placed the natural religion of the moral law above all positive revelations. Nihilists and naturalists, who deified logic and science at the expense of faith, were not unknown at Paris in the days of John of Salis- bury. In such a critical generation the words of Averroism found willing ears, and pupils who outran their teacher. Paris became the centre of a sceptical society, which the decrees of bishops and councils, and the enthusiasm of the orthodox doctors and knights-errant of Catholicism, were powerless to extinguish. At Oxford Averroes told more as the great commentator. In the days of Roger Bacon he had become an authority. Bacon, placing him beside Aristotle and Avicenna, recommends the study of Arabic as the only way of getting the knowledge which bad versions made almost hopeless. In Duns Scotus, Averroes and Aristotle are the unequalled masters of the science of proof; and he pronounces distinctly the separation between Catholic and philosophical truth, which became the watchword of Aver- roism. By the 14th century Averroism was the common leaven of philosophy; John Baconthorpe is the chief of Averroists, and Walter Burley has similar tendencies.

Meanwhile Averroism had come to be regarded by the great Dominican school as the arch-enemy of the truth. When the emperor Frederick II. consulted a Moslem free-thinker on the mysteries of the faith, when the phrase or legend of the " Three Impostors " presented in its most offensive form the scientific survey of the three laws of Moses, Christ and Mahomet, and when the characteristic doctrines of Averroes were misunder- stood, it soon followed that his name became the badge of the scoffer and the sceptic. What had begun with the subtle dis- putes of the universities of Paris, went on to the materialist teachers in the medical schools and the sceptical men of the world in the cities of northern Italy. The patricians of Venice and the lecturers of Padua made Averroism synonymous with doubt and criticism in theology, and with sarcasm against the hierarchy. Petrarch refuses to believe that any good thing can come out of Arabia, and speaks of Averroes as a mad dog barking against the church. In works of contemporary art Averroes is at one time the comrade of Mahomet and Antichrist; at another he lies with Arius and Sabellius, vanquished by the lance of St Thomas.

It was in the universities of north Italy that Averroism finally settled, and there for three centuries it continued as a stronghold of Scholasticism to resist the efforts of revived antiquity and of advancing science. Padua

The school of Padua.

became the seat of Averroist Aristotelianism; and, when Padua was conquered by Venice in 1405, the printers of the republic spread abroad

the teaching of the professors in the university. As early as 1300, at Padua, Petrus Aponensis, a notable expositor of medical theories, had betrayed a heterodoxy in faith; and John of Jandun, one of the pamphleteers on the side of Louis of Bavaria, was a keen follower of Averroes, whom he styles a " perfect and most glorious physicist." Urbanus of Bologna, Paul of Venice (d. 1428), and Cajetanus de Thienis (1387-1465), established by their lectures and their discussions the authority of Averroes; and a long list of manuscripts rests in the libraries of Lombardy to witness the diligence of these writers and their successors. Even a lady of Venice, Cassandra Fedele, in 1480, gained her laurels in defence of Averroist theses. With Pietro Pomponazzi (q.v.) in 1495, a brilliant epoch began

Summary-

tor the school of Padua. Questions of permanent and present interest took the place of outworn scholastic problems. The disputants ranged themselves under the rival commentators, Alexander and Averroes; and the immortality of the soul became the battle-ground of the two parties. Pomponazzi defended the Alexandrist doctrine of the utter mortality of the soul, whilst Agostino Nifo (q.v.), the Averroist, was entrusted by Leo X. with the task of defending the Catholic doctrine. The parties seemed to have changed when Averroism thus took the side of the church; but the change was probably due to compulsion. Nifo had edited the works of Averroes (1495-1497); but his expressions gave offence to the dominant theologians, and he had to save himself by distinguishing his personal faith from his editorial capacity. Alessandro Achillini, the persistent philo- sophical adversary of Pomponazzi, both at Padua and subse- quently at Bologna, attempted, along with other moderate but not brilliant Averroists, to accommodate their philosophical theory with the requirements of Catholicism. It was this com- paratively mild Averroism, reduced to the merely explanatory activity of a commentator, which continued to be the official dogma at Padua during the 16th century. Its typical repre- sentative is Marc-Antonio Zimara (d. i552),theauthorof arecon- ciliation between the tenets of Averroes and those of Aristotle.

Meanwhile, in 1497, Aristotle was for the first time expounded in Greek at Padua. Plato had long been the favourite study at Florence; and Humanists, like Erasmus, Ludovicus Vives and Nizolius, enamoured of the popular philo- sophy of Cicero and Quintilian, poured out the vials of their contempt on scholastic barbarism with its " impious and thrice- accursed Averroes." The editors of Averroes complain that the popular taste had

forsaken them for the Greek. Neverthe- less, while Fallopius, Vesalius and Galileo were claiming atten- tion to their discoveries, G. Zabarella, Francesco Piccolomini (1520-1604) and Cesare Cremonini (1550-1631) continued the traditions of Averroism, not without changes and additions. Cremonini, the last of them, died in 1631, after lecturing twelve years at Ferrara, and forty at Padua. The great educational value of Arabian philosophy for the later schoolmen consisted in its making them acquainted with an entire Aristotle. At the moment when it seemed as if everything had been made that could be made out of the fragments of Aristotle, and the compilations of Capella, Cassiodorus and others, and when mysticism and scepticism seemed the only resources left for the mind, the horizon of knowledge was suddenly widened by the acquisition of a complete Aristotle. Thus the mistakes inevitable in the isolated study of an imperfect Organon could not henceforth be made. The real bearing of old questions, and the meaninglessness of many disputes, were seen in the new conception of Aristotelianism given by the Metaphysics and other treatises. The former Realism and Nominalism were lifted into a higher phase by the principle of the universalizing action of intellect — Intellectus in formis agit universalitatem. The commentaries of the Arabians in this respect supplied nutriment more readily assimilated by the pupils than the pure text would have been.

Arabian philosophy, whilst it promoted the exegesis of Aristotle and increased his authority, was not less notable as the source of the separation between theology and philosophy. Speculation fell on irreligious paths. In many cases the heretical movement was due less to foreign example than to the indwelling tendencies of the dominant school of realism. But it is not less certain that the very considerable freedom of the Arabians from theological bias prepared the time when philosophy shook off its ecclesiastical vestments. In the hurry of first terror, the church struck Aristotle with the anathema launched against innovations in philosophy. The provincial council of Paris in 1209, which condemned Amalricus and his followers, as well as David of Dinant's works, forbade the study of Aristotle's Natural Philo- sophy and the Commentaries. In 1215 the same prohibition was repeated, specifying the Metaphysics and Physics, and the Commentaries by the Spaniard Mauritius (i.e. probably Averroes). Meanwhile Albertus Magnus and Thomas Aquinas, accepting

the exegetical services of the Arabians, did their best to contro- vert the obnoxious doctrine of the Intellect, and to defend the orthodoxy of Aristotle against the unholy glosses of infidels. But it is doubtful whether even they kept as pure from the infection of illegitimate doctrine as they supposed. The tide meanwhile flowed in stronger and stronger. In 1270 Etienne Tempier, bishop of Paris, supported by an assembly of theo- logians, anathematized thirteen propositions bearing the stamp of Arabian

authorship; but in 1277 the same views and others more directly offensive to Christians and theologians had to be censured again. Raymond Lully, in a dialogue with an infidel thinker, broke a lance in support of the orthodox doctrine, and carried on a crusade against the Arabians in every university; and a disciple of Thomas Aquinas drew up a list {De erroribus philosophorum) of the several delusions and errors of each of the thinkers from Kindi to Averroes. Strong in their conviction of the truth of Aristotelianism, the Arabians carried out their logical results in the theological field, and made the distinction of necessary and possible, of form and matter, the basis of con- clusions in the most momentous questions. They refused to accept the doctrine of creation because it conflicted with the explanation of forms as the necessary evolution of matter. They denied the particular providence of God, because knowledge in the divine sphere did not descend to singulars. They ex- cluded the Deity from all direct action upon the world, and substituted for a cosmic principle the active intellect, — thus holding a form of Pantheism. But all did not go the same length in their divergence from the popular creed.

The half-legendary accounts which attribute the introduction of Arabian science to Gerbert, afterwards Pope Sylvester II., to Constantinus Africanus and to Adelard of Bath, if they have any value, refer mainly to medical science and mathematics. It was not till about the middle of the 12th century that under the patronage of Raymond, archbishop of Toledo, a society of translators, with the archdeacon Dominicus Gundisalvi at their head, produced Latin versions of the Commentaries of Avicenna, and Ghazali, of the Fons Vitae of Avicebron, and of several Aristotelian treatises. The working translators were converted Jews, the best-known among them being Joannes Avendeath. With this effort began the chief translating epoch for Arabic works. Avicenna's Canon of Medicine was first translated into Latin by Gerard of Cremona (d. 1187), to whom versions of other medical and astronomical works are due. The movement towards introducing Arabian science and philosophy into Europe, however, culminated under the patronage of the emperor Frederick II. (1212-1250). Partly from superiority to the narrowness of his age, and partly in the interest of his struggle with the Papacy, this Malleus ecclesiae Romanae drew to his court those savants whose pursuits were discouraged by the church, and especially students in the forbidden lore of the Arabians. He is said to have pensioned Jews for purposes of translation. One of the scholars to whom Frederick gave a welcome was Michael Scot, the first translator of Averroes. Scot had sojourned at Toledo about 121 7, and had accomplished the versions of several astronomical and physical treatises, mainly, if we believe Roger Bacon, by the labours of a Jew named Andrew. But Bacon is apparently hypercritical in his estimate of the translators from the Arabic. Another protege of Frederick's was Hermann the German

(Alemannus), who, between the years 1243 and 1256, translated amongst other things a paraphrase of al-Farabi on the Rhetoric, and of Averroes on the Poetics and Ethics of Aristotle. Jewish scholars held an honourable place in transmitting the Arabian commentators to the schoolmen. It was amongst them, especially in Maimonides, that Aristo- telianism found refuge after the light of philosophy was ex- tinguished in Islam; and the Jewish family of the Ben-Tibbon were mainly instrumental in making Averroes known to southern France.

See S. Munk, Melanges de philosophic juive et arabe (Paris, 1859) ; E. Renan, De Philosophia Peripatetica apud Syros (1852), and Averroes et I'Averroisme (Paris, 3rd ed., 1867); Am. Jourdain, Recherches critiques sur I'dge et Vorigine des traductions latines d'Aristote (Paris, 2 me ed., 1843) ; B. Haureau, Philosophic scolastique

(Paris, 1850), tome i. p. 359; E. Vachefot, £cole d'Alexandrie (1846-1851), tome iii. p. 85; Schmolders, Documenta philosophiae Arabum (Bonn, 1836), and Essai sur les ecoles philosophtques chez les Arabes (Paris, 1842); Shahrastani, History of Religious and Philo- sophical Sects, in German translation by Haarbriicker (Halle, 1850- 1851); Dieterici, Streit zwischen Mensch und Thier (Berlin, 1858), and his other translations of the Encyclopaedia of the Brothers of Sincerity (1861 to 1872); T.'J. de Boer, The History of Philosophy in Islam (London, 1903) ; K. Prantl, Geschichte der Logik (Leipzig, 1861); and the Histories of Philosophy; also the literature under the biographies of philosophers mentioned. (W. W. ; G. W. T.)

ARABIAN SEA (anc. Mare Erythraeum) , the name applied to the portion of the Indian Ocean bounded E. by India, N. by Baluchistan and part of the southern Persian littoral, W. by Arabia, and S., approximately, by a line between Cape Guardafui, the north-east point of Somaliland, and Cape Comorin in India. It has two important branches — at the south-west the Gulf of Aden, connecting with the Red Sea through the strait of Bab-el-Mandeb; and at the north-west the Gulf of Oman, connecting with the Persian Gulf. Besides these larger ramifications, there are the Gulfs of Cambay and Kach on the Indian coast. An interest and importance belong to this sea as forming part of the chief highway between Europe and India. Its islands are few and insignificant, the chief being Sokotra, off the African, and the Laccadives, off the Indian coast.

ARABICI, a religious sect originating about the beginning of the 3rd

century, which is mentioned by Augustine (De Haeres. c. lxxxiii.), and called also 8uriTO\pvxlTai (" mortal-souled ") by John of Damascus (De Haeres. c. xc.) The name is given to the Arabians mentioned by Eusebius (Hist. Eccl. vi. 37), whose distinctive doctrine was a form of Christian materialism, showing itself in the belief that the soul perished and was restored to life along with the body. We may compare Tatian's view of the soul as a subtler variety of matter. According to Eusebius, they were convinced of their error by Origen, and renounced it at a council held about a.d. 246.

ARABI PASHA (c. 1839-), more correctly Ahmad 'Arabi, to which in later years he added the epithet al-Misrl, " the Egyptian," Egyptian soldier and revolutionary leader, was born in Lower Egypt in 1839 or 1840 of a fellah family. Having entered the army as a conscript he was made an officer by Said Pasha in 1862, and was employed in the transport department in the Abyssinian campaign of 1875 under Ismail Pasha. A charge of peculation, unproved, was made against him in con- nexion with this expedition and he was placed on half-pay. During this time he joined a secret society formed by Ali Rubi with the object of getting rid of Turkish officers from the Egyptian army. Arabi also attended lectures at the mosque El Azhar and acquired a reputation as an orator. In 1878 he was employed by Ismail in fomenting a disturbance against the ministry of Nubar, Rivers Wilson and de Blignieres, and received in payment a wife from Ismail's harem and the command of a regiment. This increased his influence with the secret society, which, under the feeble government of Tewfik Pasha and the Dual Control, began to agitate against Europeans. In all that followed Arabi was put forward as the leader of the discon- tented Egyptians; he was in reality little more than the mouth- piece and puppet of abler men such as Ali Rubi and Mahmud Sami. On the 1st of February 1881 Arabi and two other Egyptian colonels, summoned before a court-martial for acts of disobedience, were rescued by their soldiers, and the khedive was forced to dismiss his then minister of war in favour of Mahmud Sami. A military demonstration on the 8th of September 1881, led by Arabi, forced the khedive to increase the numbers and pay of the army, to substitute Sherif Pasha for Riaz Pasha as prime minister, and to convene an assembly of notables. Arabi became under-secretary for war at the beginning of 1882, but continued his intrigues. The assembly of notables claimed the right of voting the budget, and thus came into conflict with the foreign controllers who had been appointed to guard the interests of the bondholders in the management of the Egyptian finances. Sherif fell in February, Mahmud Sami became prime minister, and Arabi (created a pasha) minister of war. Arabi, after a brief fall from office,

acquired a dictatorial power that alarmed the British govern- ment. British and French warships went to Alexandria at the beginning of June; on the

nth of that month rioting in that city led to the sacrifice of many European fives. Order could only be restored through the intervention of Arabi, who now adopted a more- distinctly anti-European attitude. His arming of the forts at Alexandria was held to constitute a menace to the British fleet. On the refusal of France to co-operate, the British fleet bombarded the forts (nth July), and a British force, under Sir Garnet Wolseley, defeated Arabi on the 13th of September at Tel-el-Kebir. Arabi fled to Cairo where he sur- rendered, and was tried (3rd of December) for rebellion. In accordance with an understanding made with the British representative, Lord Dufferin, Arabi pleaded guilty, and sentence of death was immediately commuted to one of banishment for life to Ceylon. The same sentence was passed on Mahmud Sami and others. After Arabi's exile had lasted for nearly twenty years, however, the khedive Abbas II. exercised his prerogative of mercy, and in May 1901 Arabi was permitted to return to Egypt. Arabi, as has been said, was rather the figure- head than the inspirer of the movement of 1 881-188 2; and was probably more honest, as he was certainly less intelligent, than those whose tool, in a large measure, he was. The move- ment which he represented in the eye of Europe, whatever the motives of its leaders, " was in its essence a genuine revolt against misgovernment," l and it was a dim recognition of this fact which led Arabi to style himself " the Egyptian."

See Egypt: History; also the accounts of Arabi in Khedives and Pashas, by C. F. Moberly Bell (1884) ; and in Lord Cromer's Modern Egypt (1908).

ARABISTAN (formerly Khuzistan), a province of Persia, bounded on the S. by the Persian Gulf, on the W. by Turkish territory, on the N. by Luristan and on the E. by the Bakhtiari district and Fars. It has its modern name, signifying " land of the Arabs," from the Arabs who form the bulk of the population, and is subdivided into the districts of Muhamrah, Fellahiyeh (the old Dorak), Ram Hormuz (popularly known as Ramiz), Havizeh, Shushter and Dizful. It has a population of about 200,000 and pays a yearly revenue of about £30,000. The soil is very fertile, but since the dam over the Karun at Ahvaz was swept away and the numerous canals which diverted the waters of the river for irrigation became useless, a great part of the province is uncultivated, and most of the crops and produce depend for water on rainfall and wells. The climate is hot, and in the low-lying, swampy districts very unhealthy; the prevail- ing winds are north-west and south-east, the former hot and dry from the arid districts west of Mesopotamia, the latter bear- ing much moisture from the Persian Gulf and the Indian Ocean. The principal Arab tribes are the Kab (generally known as Chaab) and Beni Lam, the former mostly settled in towns and villages and by religion Shi'ites, the latter nomads and Sunnites. The staples of food are dates and fish in the south, elsewhere the produce of the herds and flocks and rice, wheat and barley. Other products are maize, cotton, silk

and indigo, and the manu- factures include carpets without pile, coarse woollens, cottons and silk nettings. Dyeing is extensively carried on in Dizful where most of the indigo is grown.

Khuzistan (meaning " the land of the Khuz ") was a part of the Biblical Elam; the classical Susiana, and appears in the great inscription of Darius as Uvaja.

ARABS, the name given to that branch of the Semitic race which from the earliest historic times inhabited the: south- western portion of the Arabian peninsula. The name, to-day the collective term for the overwhelming majority of the sur- viving Semitic peoples, was originally restricted to the nomad tribes who ranged the north of the peninsula east of Palestine and the Syro-Arabian desert. In this narrow sense " Arab " is used in the Assyrian inscriptions, in the Old Testament and in the Minaean inscriptions. Before the Christian era it had come to include all the inhabitants of the peninsula. This, it is suggested, may have been due to the fact that the " Arabs " 1 Lord Cromer in Egypt, No. 1, 1905, p. 2.

were the chief people near the Greek and Roman colonies in Syria and Mesopotamia. Classical writers use the term both in its local and general sense. The Arabs to-day occupy, besides Arabia, a part of Mesopotamia, the western shores of the Red Sea, the eastern coast of the Persian Gulf and the north of Africa. The finest type of the race is found in south Arabia among the Ariba Arabs, among the mountaineers of Hadramut and Yemen and among the Bedouin tribes roaming over the interior of central and northern Arabia. The Arabs of the coasts and those of Mesopotamia are hybrids, showing Turkish, Negroid and Hamitic crossings. The people of Syria and Palestine are hybrids of Arab, Phoenician and Jewish descent. The theory that early Arab settlements were made on the east coast of Africa as far as Sofala south of the Zambezi, is without foundation; the earliest Arab settlement on the east coast of Africa that can be proved is Magadoxo (Mukdishu) in the 10th century, and the ruined cities of Mashonaiand, once supposed to be the remains of Arab settlements, are now known to be of medieval African origin. On the East African coast-lands Arab influence is still considerable. Traces of the Arab type are met with in Asia Minor, the Caucasus, western Persia and India, while the influence of the Arab language and civiliza- tion is found in Europe (Malta and Spain), China and Central Asia.

The Arabs are at once the most ancient as they in many ways are the

purest surviving type of the true Semite. Certainly Ethnolozy ˆ e inhabitants of Yemen are not, and in historic times never were, pure Semites. Somali and other elements, generally described under the collective racial name of Hamitic, are clearly traceable; but the inland Arabs still present the nearest approach to the primitive Semitic type. The origin of the Arab race can only be a matter of conjecture. From the remotest historic times it has been divided into two branches, which from their geographical position it is simplest to call the North Arabians and the South Arabians. Arabic and Jewish tradition trace the descent of the latter from Joktan (Arabic Kahtan) son of Heber, of the former from Ishmael. The South Arabians — the older branch — were settled in the south-western part of the peninsula centuries before the uprise of the Ishmaelites. These latter include not only Ishmael's direct descendants through the twelve princes (Gen. xxv. 16), but the Edomites, Moabites, Ammonites, Midianites and other tribes. This ancient and undoubted division of the Arab race — roughly represented to-day by the universally adopted classification into Arabs proper and Bedouin Arabs (see Bedouins) — has caused much dispute among ethnologists. All authorities agree in declaring the race to be Semitic in the broadest ethnological signification of that term, but some thought they saw in this division of the race an indication of a dual origin. They asserted that the purer branch of the Arab family was represented by the sedentary Arabs who were of Hamitic (Biblical Cushite), i.e. African ancestry, and that the nomad Arabs were Arabs only by adoption, and were nearer akin to the true Semite as sons of Ishmael. Many arguments were adduced in support of this theory. (1) The unquestioned division in remote historic times of the Arab race, and the im- memorial hostility between the two branches. (2) The concur- rence of pre-Islamitic literature and records in representing the first settlement of the " pure " Arab as made in the extreme south-western part of the peninsula, near Aden. (3) The use of Himyar, " dusky " or " red " (suggesting African affinities), as the name sometimes for the ruling class, sometimes for the entire people. (4) The African affinities of the Himyaritic language. (5) The resemblance of the grammar of the Arabic now spoken by the " pure " Arabs, where it differs from that of the North, to the Abyssinian grammar. (6) The marked resemblance of the pre-Islamitic institutions of Yemen and its allied provinces — its monarchies, courts, armies and serfs — to the historical Africo-Egyptian type and even to modern Abys- sinia. (7) The physique of the " pure " Arab, the shape and size of the head, the slenderness of the lower limbs, all suggesting an African rather than an Asiatic origin. (8) The habits of the

people, viz. their sedentary rather than nomad occupations, their fondness for village life, for dancing, music and society, their cultivation of the soil, having more in common with African life than with that of the western

Asiatic continent. (9) The extreme facility of marriage which exists in all classes of the southern Arabs with the African races, the fecundity of such unions and the slightness or even total absence of any caste feeling between the dusky " pure " Arab and the still darker African, pointing to a community of origin. And further argu- ments were found in the characteristics of the Bedouins, their pastoral and nomad tendencies; the peculiarities of their idiom allied to the Hebrew; their strong clan feeling, their con- tinued resistance to anything like regal power or centralized organization.

Such, briefly, were the more important arguments; but latterly ethnologists are inclined to agree that there is little really to be said for the African ancestry theory and that the Arab race had its beginning in the deserts of south Arabia, that in short the true Arabs are aborigines.

Mahommedans call the centuries before the Prophet's birth waql-el jahiliya, " the time of ignorance," but the fact is that the Arab world has in some respects never since reached so high a level as it had in those days which it suits Moslems to paint in dreary colours. Writing was a fine art and poetry flourished. Eloquence was an accomplishment all strove to acquire, and each year there were assemblies, lasting sometimes a month, which were devoted to contests of skill among the orators and poets, to listen to whose friendly rivalry tribesmen journeyed long distances. Last, that surest index of a people's civilization — the treatment of women — contrasted very favourably with their position under the Koran. Women had rights and were respected. The veil and the harem system were unknown before Mahomet. According to Noldeke the Nabataean inscriptions and coins show that women held a high social position in northern Arabia, owning large estates and trading independently. Poly- andry and polygamy, it is true, were practised, but the right of divorce belonged to the woman as well as the man. Two kinds of marriage were celebrated. One was a purely personal con- tract, with no witnesses, the wife not leaving her home or passing under marital authority. The other was a formal marriage, the woman becoming subject to her husband by purchase or capture. Even captive women were not kept in slavery. Arabic wealth and culture had indeed thus early reached a stage which justified Professor Robertson Smith in writing, " In this period the name of Arab was associated to Western writers with ideas of effemi- nate indolence and peaceful opulence . . . the golden age of Yemen." But long before Mahomet's time this early Arab predominance was at an end, possibly due in great measure to the loss of the caravan trade through the increase of shipping. The abandonment of great cities and the ruin of many tribes contributed to the apparent nationalization of the Arab peoples. Though the traditional jealousy and hostility of the two branches, the Yemenites and Maadites or Ishmaelites, remained, the Arab world had attained by the levelling process of common

mis- fortune the superficial unity it presents to-day. The nation thus formed, never a nation in the strict sense of the word, was distinctively and thoroughly Semitic in character and language, and has remained unchanged to the present day. The sporadic brilliancy of the ancient Arab kingdoms gave place to a social and political lethargy, the continuation of which for many cen- turies made the uprise of Saracenic empires seem a miracle to a world ignorant of the Arab past. The Arab race up to Mahomet's day had been in the main pagan. Monotheism, if it ever prevailed, early gave place to sun and star worship, or simple idolatry. Professor Robertson Smith suggests that totemism was the earliest form of Arabian idolatry, and that each tribe had its sacred animal. This he supports by the fact that some tribal names were derived from those of animals, and that animal-worship was not unknown in Arabia. What seems certain is that Arab religion was of a complex hybrid nature, not much to be wondered at when one remembers that Arabia was the asylum of many religious refugees, Zoroastrians, Jews,

Christians. In the later pre-Islamitic times spirits, or jinns, as they were called, of which each tribe or family had its own, were worshipped, and there was but a vague idea of a Supreme Being. Images of the jinns to the number of 360, one for each day of the lunar year, were collected in the temple at Mecca, the chief seat of their worship. That worship was of a sanguinary nature. Human sacrifice was fairly frequent. Under the guise of religion female infanticide was a common practice. At Mecca the great object of worship was a plain black stone, and to it pilgrimages were made from every part of Arabia. This stone was so sacred to the Arabs that even Mahomet dared not dispense with it, and it remains the central object of sanctity in the Ka'ba to-day. The temples of the Sabaeans and the Minaeans were built east of their cities, a fact suggesting sun-worship, yet this is not believed to have been the cult of the Minaeans. Common to both was the worship of Attar, the male Ashtoreth.

With the appearance of Mahomet the Arabs took anew a place in the world's history.

Physically the Arabs are one of the strongest and noblest races of the world. Baron de Larrey, surgeon-general to Physique. Napoleon on his expedition to Egypt and Syria, writes: " Their physical structure is in all respects more perfect than that of Europeans; their organs of sense exquisitely acute, their size above the average of men in general, their figure robust and elegant, their colour brown; their in- telligence

proportionate to their physical perfection and without doubt superior, other things being equal, to that of other nations." The typical Arab face is of an oval form, lean- featured; the eyes a brilliant black, deep-set under bushy eyebrows; nose aquiline, forehead straight but not high. In body the Arab is muscular and long-limbed, but lean. De- formed individuals or dwarfs are rare among Arabs; nor, except leprosy, which is common, does any disease seem to be hereditary among them. They often suffer from ophthalmia, though not in the virulent Egyptian form. They are scrupulously clean in their persons, and take special care of their teeth, which are generally white and even. Simple and abstemious in their habits, they often reach an extreme yet healthy old age; nor is it common among them for the faculties of the mind to give way sooner than those of the body.

Thus, physically, they yield to few races, if any, of mankind; mentally, they surpass most, and are only kept back in the Character. marcn ˚f progress by the remarkable defect of or- ganizing power"and incapacity for combined action. Lax and imperfect as are their forms of government, it is with impatience that even these are borne; of the four caliphs who alone reigned — if reign theirs could be called — in Arabia proper, three died a violent death; and of the Wahhabi princes, the most genuine representatives in later times of pure Arab rule, almost all have met the same fate. The Arab face, which is not unkindly, but never smiling, expresses that dignity and gravity which are typical of the race. While the Arab is always polite, good-natured, manly and brave, he is also revengeful, cruel, untruthful and superstitious. Of the Arab nature Burck- hardt (other authorities, e.g. Barth and Rohlfs, are far less com- plimentary) wrote: " The Arab displays his manly character when he defends his guest at the peril of his own life, and submits to the reverses of fortune, to disappointment and distress, with the most patient resignation. He is distinguished from a Turk by the virtues of pity and gratitude. The Turk is cruel, the Arab of a more kind temper; he pities and supports the wretched, and never forgets the generosity shown to him even by an enemy." The Arab will lie and cheat and swear false oaths, but once his word is pledged he may be trusted to the last. There are some oaths such as Wallah (by Allah) which mean nothing, but such an oath as the threefold one with wa, bi and ta as particles of swearing the meanest thief will not break. In temper, or at least in the manifestation of it, the Arab is studiously calm; and he rarely so much as raises his voice in a dispute. But this outward tranquillity covers feelings alike keen and permanent; and the remembrance of a rash jest or injurious word, uttered

years before, leads only too often to that blood-revenge which is a sacred duty everywhere in Arabia.

There exist, however, marked tribal or almost semi-national diversities of character among the Arabs. Thus, the inhabitants of Hejaz are noted for

courtesy and blamed for fickleness; those of Nejd are distinguished by their stern tenacity and dignity of deportment; the nations of Yemen are gentle and pliant, but revengeful; those of Hasa and Oman cheerful and fond of sport, though at the same time turbulent and unsteady. Anything approaching to a game is rare in Nejd, and in the Hejaz religion and ,the yearly occurrence of the pilgrim ceremonies almost exclude all public diversions; but in Yemen the well-known game of the " jerid," or palm-stick, with dances and music is not rare. In Oman such amusements are still more frequent. Again in Yemen and Oman, coffee-houses, where people resort for conversation, and where public recitals, songs and other amusements are indulged in, stand open all day; while nothing of the sort is tolerated in Nejd. So too the ceremonies of circum- cision or marriage are occasions of gaiety and pastime on the coast, but not in the central provinces.

An Arab town, or even village, except it be the merest hamlet, is invariably walled round; but seldom is a stronger material than dried earth used; the walls are occasionally flanked by towers of like construction. A dry ditch and often surrounds the whole. The streets are irregular customs. and seldom parallel. The Arab, indeed, lacks an eye for the straight. The Arab carpenter cannot form a right angle; an Arab servant cannot place a cloth square on a table. The Ka'ba at Mecca has none of its sides or angles equal. The houses are of one or two storeys, rarely of three, with flat mud roofs, little windows and no external ornament. If the town be large, the expansion of one or two streets becomes a market- place, where are ranged a few shops of eatables, drugs, coffee, cottons or other goods. Many of these shops are kept by women. The chief mosque is always near the market-place; so is also the governor's residence, which, except in size and in being more or less fortified Arab fashion, does not differ from a private house. Drainage is unthought of; but the extreme dryness of the air obviates the inconvenience and disease that under other skies could not fail to ensue, and which in the damper climates of the coast make themselves seriously felt. But the streets are roughly swept every day, each householder taking care of the roadway that lies before his own door. Whitewash and colour are occasionally used in Yemen, Hejaz and Oman; elsewhere a light ochre tint, the colour of the sun-dried bricks, predominates, and gives an Arab town the appearance at a distance of a large dust-heap in the centre of the bright green ring of gardens and palm-groves. Baked bricks are unknown in Arabia, and stone buildings are rare, especially in Nejd. Palm branches and the like, woven in wattles, form the dwellings, of the poorer classes in the southern districts. Many Arab towns possess watch-towers, like huge round factory chimneys in appearance, built of sun-dried bricks, and varying in height from 50 to 100 ft. or even more. Indeed, two of these constructions at the town of Birkat-el-Mauj, in Oman, are said to be each

of 170 ft. in height, and that of Nezwah, in the same province, is reckoned at 140; but these are of stone.

The principal feature in the interior of an Arab house is the " kahwah " or coffee-room. It is a large apartment spread with mats, and sometimes furnished with carpets and a few cushions. At one end is a small furnace or fireplace for preparing coffee. In this room the men congregate; here guests are received, and even lodged; women rarely enter it, except at times when strangers are unlikely to be present. Some of these apartments are very spacious and supported by pillars; one wall is usually built transversely to the compass direction of the Ka'ba; it serves to facilitate the performance of prayer by those who may happen to be in the kahwah at the appointed times. The other rooms are ordinarily small.

The Arabs are proverbially hospitable. A stranger's arrival is often the occasion of an amicable dispute among the wealthier inhabitants as to who shall have the privilege of receiving him.

Arab cookery is of the simplest. Roughly-ground wheat cooked with butter; bread in thin cakes, prepared on a heated iron plate or against the walls of an open oven; a few vegetables, generally of the leguminous kinds; boiled mutton or camel's flesh, among the wealthy; dates and fruits — this is the menu of an ordinary meal. Rice is eaten by the rich and fish is common on the coasts. Tea, introduced only a few decades back, is now largely drunk. A food of which the Arabs are fond is locusts boiled in salt and water and then dried in the sun. They taste like stale shrimps, but there is a great sale for them. Spices are freely employed; butter much too largely for a European taste.

After eating, the hands are always washed, soap or the ashes of an alkaline plant being used. A covered censer with burning incense is then passed round, and each guest perfumes his hands, face, and sometimes his clothes; this censer serves also on first receptions and whenever special honour is intended. In Yemen and Oman scented water often does duty for it. Coffee, without milk or sugar, but flavoured with an aromatic seed brought from India, is served to all. This, too, is done on the occasion of a first welcome, when the cups often make two or three successive rounds; but, in fact, coffee is made and drunk at any time, as frequently as the desire for it may suggest itself; and each time fresh grains are sifted, roasted, pounded and boiled — a very laborious process, and one that requires in the better sort of establishments a special servant or slave for the work. Arabs generally

make but one solid meal a day — that of supper, soon after sunset. Even then they do not eat much, gluttony being rare among them, and even daintiness esteemed disgraceful. Wine, like other fermented drinks, is prohibited by the Koran, and is, in fact, very rarely taken, though the inhabitants of the mountains of Oman are said to indulge in it. On the coast spirits of the worst quality are sometimes procured; opium and hashish are sparingly indulged in. On the other hand, wherever Wahhabiism has left freedom of action, tobacco- smoking prevails; short pipes of clay, long pipes with large open bowls, or most frequently the water-pipe or " nar- ghileh," being used. The tobacco smoked is generally strong and is either brought from the neighbourhood of Bagdad or grown in the country itself. The strongest quality is that of Oman ; the leaf is broad and coarse, and retains its green colour even when dried; a few whiffs have been known to produce absolute stupor. The aversion of the Wahhabis to tobacco is well known; they entitle it " mukhzi " or "the shameful," and its use is punished with blows, as the public use of wine would be elsewhere.

In dress much variety prevails. The loose cotton drawers girded at the waist, which in hot climates do duty for trousers, are not often worn, even by the upper classes, in Nejd or Yemama, where a kind of silk dressing-gown is thrown over the long shirt; frequently, too, a brown or black cloak distinguishes the wealthier citizen; his head-dress is a handkerchief fastened round the head by a band. But in Hejaz, Yemen and Oman, turbans are by no means uncommon; the ordinary colour is white; they are worn over one or more skull- caps. Trousers also form part of the dress in the two former of these districts; and a voluminous sash, in which a dagger or an inkstand is stuck, is wrapped round the waist. The poorer folk, however, and the villagers often content themselves with a broad piece of cloth round the loins, and another across the shoulders. In Oman trousers are rare, but over the shirt a long gown, of peculiar and somewhat close-fitting cut, dyed yellow, is often worn. The women in these provinces commonly put on loose drawers and some add veils to their head-dresses; they are over-fond of ornaments (gold and silver); their hair is generally arranged in a long plait hanging down behind. All men allow their beards and moustaches full growth, though this is usually scanty. Most Arabs shave their heads, and indeed all, strictly speaking, ought by Mahommedan custom to do so. An Arab seldom or never dyes his hair. Sandals are worn more often than shoes; none but the very poorest go barefoot.

Slavery is still, as of old times, a recognized institution through-

Dress.

out Arabia; and an illicit traffic in blacks is carried on along the coasts of the Persian Gulf and the Red Sea. The slaves themselves were obtained

chiefly from the east African coast districts down as far as Zanzibar, but this source of supply was practically closed by the end of the 19th century. Slaves are usually employed in Arabia as herdsmen or as domestic servants, rarely in agricultural work; they also form a considerable portion of the bodyguards with which Eastern greatness loves to surround itself. Like their countrymen elsewhere, they readily embrace the religion of their masters and become zealous Mahommedans. Arab custom enfranchises a slave who has accepted Islam at the end of seven years of bondage, and when that period has arrived, the master, instead of exacting from his slave the price of freedom, generally, on giving him his liberty, adds the requisite means for support- ing himself and a family in comfort. Further, on every important occasion, such as a birth, circumcision, a marriage or a death, one or more of the household slaves are sure of acquiring their freedom. Hence Arabia has a considerable free black popula- tion; and these again, by inter-marriage with the whites around, have filled the land with a mulatto breed of every shade, till, in the eastern and southern provinces especially, a white skin is almost an exception. In Arabia no prejudice exists against negro alliances; no social or political line separates the African from the Arab. A negro may become a sheik, a kadi, an amir, or whatever his industry and his talents may render him capable of being. This is particularly so in Nejd, Yemen and Hadramut; in the Hejaz and the north a faint line of demarcation may be observed between the races.

The Arabs are good soldiers but poor generals. Personal courage, wonderful endurance of privation, fixity of purpose, and a contempt of death are qualities common to almost every race, tribe and clan that compose the qualities. Arab nation. In skirmishing and harassing they have few equals, while at close quarters they have often shown them- selves capable of maintaining, armed with swords and spears alone, a desperate struggle against guns and bayonets, neither giving nor receiving quarter. Nor are they wholly ignorant of tactics, their armies, when engaged in regular war, being divided into centre and wings, with skirmishers in front and a reserve behind, often screened at the outset of the engagement by the camels of the expedition. These animals, kneeling and ranged in long parallel rows, form a sort of entrenchment, from behind which the soldiers of the main body fire their matchlocks, while the front divisions, opening out, act on either flank of the enemy. This arrangement of troops may be traced in Arab records as far back as the 5th century, and was often exemplified during the Wahhabi wars.

Arab women are scarcely less distinguished for their bravery than the men. Records of armed heroines occur frequently to the chronicles or myths of the pre-Islamitic time; and in authen- tic history the Battle of the Camel, 656 a.d., where Ayesha, the wife of Mahomet, headed the charge, is only the first of a number of instances in which Arab amazons have taken,

sword in hand, no inconsiderable share in the wars and victories of Islam. Even now it is the custom for an Arab force to be always accompanied by some courageous maiden, who, mounted on a blackened camel, leads the onslaught, singing verses of encouragement for her own, of insult for the opposing tribe. Round her litter the fiercest of the battle rages, and her capture or death is the signal of utter rout; it is hers also to head the triumph after the victory of her clan.

There is little education, in the European sense of the word, in Arabia. Among the Bedouins there are no schools, and few, even of the most elementary character, in the towns or villages. Where they exist, little beyond the mechanical reading of the Koran, and the equally mechanical learning of it by rote, is taught. On the other hand, Arab male- children, brought up from early years among the grown-up men of the house or tent, learn more from their own parents and at home than is common in other countries; reading and writing are in most instances thus acquired, or rather

transmitted; besides such general principles of grammar and eloquence, often of poetry and history, as the elders themselves may be able to impart. To this family schooling too are due the good manners, politeness, and self-restraint that early dis- tinguish Arab children. In the very few instances where a public school of a higher class exists, writing, grammar and rhetoric sum up its teachings. Law and theology, in the narrow sense that both these words have in the Islamitic system, are explained in afternoon lectures given in most mosques; and some verses of the Koran, with one of the accepted commentaries, that of Baidawl for example, form the basis of the instruction. Great attention is paid to accuracy of grammar and purity of diction throughout Arabia; yet something of a dialectic differ- ence may be observed in the various districts. The purest Arabic, that which is as nearly as possible identical in the choice of words and in its inflections with the language of the Koran, is spoken in Nejd, and the best again of that in the province of Suder. Next in purity comes the Arabic of Shammar. Throughout the Hejaz in general, the language, though extremely elegant, is not equally correct; in el-Hasa, Bahrein and Oman it is de- cidedly influenced by the foreign element called Nabataean. In Yemen, as in other southern districts of the peninsula, Arabic merges insensibly into the Himyaritic or African dialect of Hadramut and Mahra. (See Semitic Languages.)

Bibliography. — Lieutenant Wellsted, Travels in Arabia (Lond., 1838) ; ”

Narrative of a Journey to the Ruins of Nakeb el Hajar " (Jour. R. Geog. Soc. vii. 20) ; Carsten Niebuhr, Travels through Arabia (transl. into English by Robert Heron, 2 vols., Edin., 1792); John Lewis Burckhardt, Travels in Arabia (2 vols., Lond., 1829); Notes on the Bedouins and Wahabis, (2 vols., Lond., 1830; in German, Weimar, 1831) ; C. J. Cruttendtn, Journal of an Excursion to Suna'a, the Capital of Yemen (Bombay, 1838); A. Sprenger, Die alte Geo- graphie Arabiens als Grundlage der Entwicklungsgeschichte des Semitismus (Berne, 1875) ; Sir Richard F. Burton, Personal Narra- tive of a Pilgrimage to El Medinah and Meccah (Lond., 1855); W. Robertson Smith, Kinship and Marriage in Early Arabia (Cam- bridge); E. Reclus, Les Arabes (Brussels, 1898); Lady Anne Blunt, A Pilgrimage to Nejd (2 vols., Lond., 1881) ; C. M. Doughty, Arabia Deserta (2 vols., 1888); Rev. S. M. Zwemer, Arabia: the Cradle of Islam (1900) ; Albrecht Zehme, Arabien und die Araber, seit hunderi Jahren (1875).

ARACAJtJ, a city and seaport of Brazil, capital of the state of Sergipe, 170 m. N.N.E. of Bahia, on the river Cotinguiba, or Cotindiba, 6 m. from the coast. The municipality, of which it forms a part, had a population in 1890 of 16,336, about two- thirds of whom lived in the city itself. Aracaju is a badly built town on the right bank of the river at the base of a ridge of low sand-hills and has the usual features of an unprogressive pro- vincial capital. Good limestone is quarried in its vicinity, and the country tributary to this port produces large quantities of sugar. Cotton is also grown, and the back country sends down hides and skins for shipment. The anchorage is good, but a dangerous bar at the mouth of the river prevents the entrance of vessels drawing more than 12 ft. The port is visited, there- fore, only by the smaller steamers of the coastwise lines. The river is navigable as far as the town of Maroim, about 10 m. beyond Aracaju. The city was founded in 1855.

ARACATY, or Aracat!, a city and port of Brazil, in the state of Ceara, 75 m. 3.E. of Fortaleza, on the river Jaguaribe, 8 m. from the sea. Pop. of the municipality (1890) 20,182, of whom about 12,000 belonged to the city. A dangerous bar at the mouth of the river permits the entrance only of the smaller coasting steamers, but the port is an important commercial centre, and exports considerable quantities of cotton, hides, manicoba, rubber, fruit, and palm wax.

ARACHNE, in Greek mythology, the daughter of Idmon of Colophon in Lydia, a dyer in purple. She had acquired such skill in the art of weaving that she ventured to challenge Athena. While the goddess took as subjects her quarrel with Poseidon as to the naming and possession of Attica, and the warning examples of those who ventured to pit themselves against the immortals, Arachne depicted the metamorphoses of the gods and their

amorous adventures. Her work was so perfect that Athena, enraeed at being unable to find any blemish in it, tore

it to pieces. Arachne hanged herself in despair; but the goddess out of pity loosened the rope, which became a cobweb, while Arachne herself was changed into a spider (Ovid, Metam. vi. 5-145). The story probably indicates the superiority of Asia over Greece in the textile arts.

ARACHNIDA, the zoological name given in 181 5 by Lamarck (Gr. apaxwi, a spider) to a class which he instituted for the reception of the spiders, scorpions and mites, previously classified by Linnaeus in the order Aptera of his great group Insecta. Lamarck at the same time founded the class Crustacea for the lobsters, crabs and water-fleas, also until then included in the order Aptera of Linnaeus. Lamarck included the Thysanura and the Myriapoda in his class Arachnida. The Insecta of Linnaeus was a group exactly equivalent to the Arthropoda founded a hundred years later by Siebold and Stannius. It was thus reduced by Lamarck in area, and made to comprise only the six-legged, wing-bearing " Insecta." For these Lamarck proposed the name Hexapoda; but that name has been little used, and they have retained to this day the title of the much larger Linnaean group, viz. Insecta. The position of the Arachnida in the great sub-phylum Arthropoda, according to recent ana- tomical and embryological researches, is explained in the article Arthropoda. The Arachnida form a distinct class or line of descent in the grade Euarthropoda, diverging (perhaps in common at the start with the Crustacea) from primitive Euar- thropods, which gave rise also to the separate lines of descent known as the classes Diplopoda, Crustacea, Chilopoda and Hexapoda.

Fig. 1. — Entosternum, entosternite or plastron of Limidus polyphemus, Latr. Dorsal surface. LAP, Left anterior process. PLR, Posterior lateral rod or

RAP, Right anterior process. tendon.

PhN, Pharyngeal notch. PLP, Posterior lateral process.

ALR, Anterior lateral rod or tendon. Natural size.

(From Lankester, Q. J. Mic. Sci., N.S. vol. xxiv., 1884.)

Limulus an Arachnid. — Modern views as to the classifica- tion and affinities of the Arachnida have been determined by the demonstration that Limulus and the extinct Eurypterines (Pterygotus, &c.) are Arachnida; that is to say, are identical in the structure and relation of so many important parts with Scorpio, whilst differing in those respects from other Arthropoda, that it is impossible to suppose that the identity is due to homo- plasy or

convergence, and the conclusion must be accepted that the resemblances arise from close genetic relationship. The view that Limulus, the king-crab, is an Arachnid was maintained as long ago as 1829 by Strauss-Diirckheim (1), on the ground of its possession of an internal cartilaginous sternum — also possessed by the Arachnida (see figs. 1, 2, 3, 4, 5 and 6) — and of the simi- larity of the disposition of the six leg-like appendages around the mouth in the two cases (see figs. 45 and 63). The evidence of the exact equivalence of the segmentation and appendages of Limulus and Scorpio, and of a number of remarkable points of agreement in structure, was furnished by Ray Lankester in an article published in 1881 (" Limulus an Arachnid," Quart. Journ. Micr. Sci. vol. xxi. N.S.), and in a series of subsequent memoirs, in which the structure of the entosternum, of the coxal glands, of the eyes, of ■ the veno-pericardiaj: muscles, of the

respiratory lamellae, and of other parts, was for the first time described, and in which the new facts discovered were shown uniformly to support the hypothesis that Limulus is an Arachnid. A list of these memoirs is given at the close of this article (2, 3, 4, 5 and IS). The Eurypterines (Gigantostraca) were included in the identification, although at that time they were supposed

PMP.

Fig. 2. — Ventral surface of the entosternum of Limulus Poly- phemus, Latr. Letters as in fig. I with the addition of NF, neural fossa protecting the aggregated ganglia of the central nervous sys- tem; PVP, left posterior ventral process; PMP, posterior median process. Natural size.

(From Lankester.)

to possess only five pairs of anterior or prosomatic appendages. They have now been shown to possess six pairs (fig. 47), as do Limulus and Scorpio.

The various comparisons previously made between the struc- ture of Limulus and the Eurypterines on the one hand, and that of a typical Arachnid, such as Scorpio, on the other, had been vitiated by erroneous notions as to the origin of the nerves supplying the anterior appendages of Limulus (which were finally removed by Alphonse Milne-Edwards in his beautiful memoir

(6) on the structure of that animal), and secondly by the errone- ous identification of the double sternal plates of Limulus, called " chilaria," by

Owen, with a pair of append- ages (7). Once the identity of the chilaria with the pentagonal sternal plate of the scorpion is recognized — an identification first insisted on by Lan- Fig. 3.— Entosternum of scorpion {Pal- kester— the whole amnaeus Indus, de Geer) ; dorsal surface, series of segments and asp, Paired anterior process of the sub- appendages in the two

*ˆSub-netalarch. f im * ls > LimuluS and*

ap, Anterior lateral process (same as RAP Scorpio, are seen to cor-

and LAP in fig. 1). respond most closely,

Imp, Lateral median process (same as ALR segment for segment,

and PLR of fig. 1) with anot her (see

pp, Posterior process (same as PLP in „ , „ ,L,*

n „ j). figs. 7 and 8). The

pf, Posterior flap or diaphragm of New- structure of the proso-

P ort – matic appendages or

«ji and m, Perforations of the diaphragm j i s also seen to pre-*

tor the passage 01 muscles. ° , ... r

DR, The paired dorsal ridges. sent manv significant

GC, Gastric canal or foramen. points of agreement

AC, Arterial canal or foramen. (see figures), but a curi- ous discrepancy existed

(After Lankester, loc.cti.) • t i . • , j .

in the six-jomted struc- ture of the limb in Limulus, which differed from the seven-jointed limb of Scorpio by the defect of one joint. R. I. Pocock of the British Museum has observed that in Limulus a marking exists on the fourth joint, which apparently indicates a previous

-DR.

e

division of this segment into two, and thus establishes the agree- ment of Limulus and Scorpio in this small feature of the number of segments in the legs (see fig. 11).

It is not desirable to occupy the limited space of this article by a full description of the limbs and segments of Limulus and Scorpio. The reader is referred to the complete series of figures here given, with their explanatory legends (figs. 12, 13, 14, 15). Certain matters, however, require comment and explanation to render the comparison intelligible. The tergites, or chitinized dorsal halves of the body rings, are fused to form a " prosomatic carapace," or carapace of the prosoma, in both Limulus and Scorpio (see figs. 7 and 8). This region corresponds in both cases to six somites, as indi- cated by the presence of six pairs of limbs. On the sur- face of the carapace there are in both animals a pair of central eyes with simple lens and a pair of lateral eye- tracts, which in Limulus consist of closely-aggregated simple eyes, forming a " com- pound " eye, whilst in Scorpio they present several separate small eyes. The

microscopic structure of the Fig. 4.— Ventral surface of the same central and the lateral eyes entosternum as that drawn in fig. 3. has been shown by Lankester Letters as in fig. 3 with the addition and A. G. Bourne (5) to f nc, neural canal or foramen, differ; but the lateral eyes of ,., t T , t , ...

Scorpio were shown by them (A < ter Lankesto . l °°- «■ >*

to be similar in structure to the lateral eyes of Limulus, and the central eyes of Scorpio to be identical in structure with the central eyes of Limulus (see below).

Following the prosoma is a region consisting of six segments (figs. 14 and 15), each carrying a pair of plate-like appendages in both Limulus and Scorpio. This region is called the mesosoma. The tergites of this region and those of the following region, the metasoma, are fused to form a second or posterior carapace in Limulus, whilst remaining free in Scorpio. The first pair of foli- aceous appendages in each animal is the genital operculum; beneath it are found the openings of the genital ducts. The second pair of mesosomatic append- ages in Scorpio are known as the " pectens." Each consists of an axis, bearing numerous blunt tooth-like pro- Fig. 5. — Entosternum of cesses arranged in a series. This is one of themygalomorphous represented in Limulus by the first gill- spiders; ventral surface, bearing appendage. The leaves (some Ph.N., pharyngeal notch. 150 in number) of the gill-book (see The posterior median pro- figure) correspond to the tooth-like C ess with its repetition of processes of the pectens of Scorpio, triangular segments closely The next four pairs of appendages (com- resembles the same process pleting the mesosomatic

series of six) j n Limulus. consist, in both Scorpio and Limulus,

of a base carrying each 130 to 150 (From Lankester, Ik. cU .) blood-holding, leaf-like plates, lying on

one another like the leaves of a book. Their minute structure is closely similar in the two cases; the leaf-like plates receive blood from the great sternal sinus, and serve as respiratory organs. The difference between the gill-books of Limulus and the lung-books of Scorpio depends on the fact that the latter are adapted to aerial respira- tion, while the former serve for aquatic respiration. The appendage carrying the gill-book stands out on the surface of the body in Limulus, and has other portions developed besides the gill-book and its base; it is fused with its fellow of the opposite side On the other hand, in

Scorpio, the gill-book-bearing ap- „ , _rw a a1 snrfarp of pendage has sunk below the surface, , f IG ” „ r^°^Lrnnm »« forming a recess or chamber for j £e «™ f^f.’ 6 ™”^ N aS itself, which communicates with the th , at draw f m , £■ 5- Ph – N – exterior by an oval or circular pharyngeal notch. ” Stigma ” (fig. 10, stg). That this t Alter Lankester. loc. at.)*

in-sinking has taken place, and that the lung-books or in-sunken gill-books of Scorpio really represent appendages (that is to say, limbs or parapodia) is proved by their developmental history (see

ARACHNIDA

289

figs. 17 and 18). They appear at first as outstanding processes on the surface of the body.

The exact mode in which the in-sinking of superficial outstanding limbs, carrying gill-lamellae, has historically taken place has been a matter of much speculation. It was to be hoped that the specimen of the Silurian scorpion (Palaeophonus) from Scotland, showing the ventral surface of the mesosoma (fig. 49), would throw light on this matter; but the specimen recently carefully studied by the writer and Pocock reveals neither gill-bearing limbs nor stigmata. The probability appears to be against an actual introversion of the appendage and its lamellae, as was at one time suggested by Lankester. It is probable that such an in-sinking as is shown in the

Fig. 7. — Diagram of the dorsal

oc, Lateral compound eyes.

oc', Central monomeniscous eyes.

PA, Post-anal spine.

I to VI, The six appendage- bearing somites of the pro- soma.

VII, Usually considered to be the tergum of the genital somite, but suggested by Pocock to be that of the other-

surface of Limulus polyphemus.

wise suppressed praegenital

somite. VIII to XIII, The six somites of

the mesosoma, each with a movable pleural spine and a pair of dorsal entopophysis or muscle-attaching ingrowths. XIV to XVIII, The confluent or unexpressed six somites of the metasoma.

[According to the system of numbering explained in the text, if VII is the tergum of the praegenital somite (as is probable) it should be labelled Prg without any number, and the somites VIII to XIII should be lettered 1 to 6, indicating that they are the six normal somites of the mesosoma; whilst XV to XVIII should be replaced by the numbers 7 to 12 — an additional suppressed segment (making up the typical six) being reckoned to the metasomatic fusion.] (From Lankester, Q. J. Micr. Set. vol. xxi., 1S81.)

accompanying diagram has taken place (fig. 15); but we are yet in need of evidence as to the exact equivalence of margins, axis, &c, obtaining between the lung-book of Scorpio and the gill-book of Limulus. Zoologists are familiar with many instances (fishes, crustaceans) in which the protective walls of a water-breathing organ or gill-apparatus become converted into an air-breathing organ or lung, but there is no other case known of the conversion of gill processes themselves into air-breathing plates.

The identification of the lung-books of Scorpio with the gill-books of Limulus is practically settled by the existence of the pectens in Scorpio (fig. 14, VIII) on the second mesosomatic somite. There is no doubt that these are parapodial or limb appendages, carrying numerous imbricated secondary processes, and therefore comparable in essential structure to the leaf-bearing plates of the second meso-

• Colo

cs

somatic somite of Limulus. They have remained unenclosed and projecting on the surface of the body, as once were the appendages of the four following somites. But they have lost their respiratory function. In non-aquatic life such an unprotected organ cannot subserve respiration. The " pectens " have become more firmly chitinized and probably somewhat altered in shape as compared with their condition in the aquatic ancestral scorpions. Their present function in scorpions is not ascertained. They are not specially sensitive under ordinary conditions, and may be touched or even pinched without causing any discomfort to the scorpion. It is probable that they acquire special sensibility at the breeding season and serve as " guides " in copulation. The shape of the legs and the absence of paired terminal claws in the Silurian Palaeophonus (see figs. 48 and 49) as compared with living scorpions (see fig. 10) show that the early oc.-, scorpions were aquatic, and we may hope some day in better-preserved specimens than , the two as yet discovered, to find the respira-'"" tory organs of those creatures in the con- dition of projecting appendages serving aquatic respiration somewhat as in Limulus, though not necessarily repeating the exact form of the broad plates of Limulus.*

It is important to note that the series of lamellae of the lung-book and the gill-book correspond exactly in structure, the narrow, flat blood-space in the lamellae being inter- rupted by pillar-like junctions of the two surfaces in both cases (see Lankester (4)), and the free surfaces of the adjacent lamellae being covered with a very delicate chitinous cuticle which is drawn out into delicate hairs and processes. The elongated axis which opens at the stigma in Scorpio and which can be cleared of soft, surrounding tissues and co- agulated blood so as to present the appearance of a limb axis carrying the book-like leaves of the lung is not really, as it would seem to be at first sight, the limb axis. That is neces- sarily a blood-holding structure and is obliterated and fused with soft tissues of the sternal region so that the lamellae cannot be detached and presented as standing out from it. The apparent axis or basal support of the scorpion's lung-books shown in the figures, is a false or secondary axis and merely a part of the infolded surface which forms the air-chamber. The maceration of the soft parts of a scorpion preserved in weak spirit; and the cleaning of the chitinized in-grown cuticle give rise to the false appearance of a limb axis carrying the lamellae. The margins of the lamellae of the scorpion's lung-book, which are lowermost in the figures (fig. 15) and appear to be free, are really those which are attached to the blood-holding axis. The true free ends are those nearest the stigma.

\

I -a fxn

ˆxra

307

XV

I XVI

zvn

xwn

PA

FiG. 8. — Diagram of the dorsal surface Passing on now from the mesosoma we of a scorpion to com- come in Scorpio to the metasoma of six pare with fig. 7. segments, the first of which is broad whilst Letters and Roman the rest are cylindrical. The last is perforated numerals as in fig. 7, by the anus and carries the post-anal spine excepting that VII or sting. The somites of the metasoma carry is here certainly the no parapodia. In Limulus the metasoma is tergum of the first practically suppressed. In the allied extinct somite of the mesa- Eurypterines it is well developed, and re- soma — the genital sembles that of Scorpio. In the embryo somite — and is not Limulus (fig, 42) the six somites of the a survival of the em- mesosoma are not fused to form a carapace bryonic praegenital at an early stage, and they are followed by somite. The anus (not three separately marked metasomatic somites; seen) is on the sternal the other three somites of the metasoma have surface, disappeared in Limulus, but are. represented (From Lankester, he. cit.) by the unsegmented prae-anal region. It is

probable that we have in the metasoma of Limulus a case of the dis- appearance of once clearly demarcated somites. It would be possible to suppose, on the other hand, that new somites are only heginning to make their appearance here. The balance of various considera- tions is against the latter hypothesis. Following the metasoma in Limulus, we have as in Scorpio the post-anal spine — in this case not a sting, but a powerful and important organ of locomotion, serving to turn the animal over when it has fallen upon its back. The nature of the post-anal spine has been strangely mis- interpreted by some writers. Owen (7) maintained that it repre- sented a number of coalesced somites, regardless cf its post-anal position and mode of development. The agreement of the grouping of the somites, of the form of the parapodia (appendages, limbs) in each region, of the position of the genital aperture and operculum, of the position and character of the eyes, and of the powerful post-anal spines not seen in other Arthropods, is very convincing as to the affinity

of Limulus and Scorpio. Perhaps the most important general agree- ment of Scorpio compared with Limulus and the Eurypterines is the division of the body into the three regions (or tagmata) — prosoma, mesosoma and metasoma — each consisting of six segments, the prosoma having leg-like appendages, the mesosoma having f oliaceous appendages, and the metasoma being destitute of appendages.

In 1893, some years after the identification of the somites of Limulus with those of Scorpio, thus indicated, had been published, zoologists were startled by the discovery by a Japanese zoologist, Kishinouye (8), of a seventh prosomatic somite in the embryo of Limulus longispina. This was seen in longitudinal sections, as shown in fig. 19. The simple identification of somite with somite in Limulus and Scorpio seemed to be threatened by this discovery. But in 1896 Dr August Brauer of Marburg (9) discovered in the embryo of Scorpio a seventh prosomatic somite (see VII PrG, figs. 17 and 18), or, if we please so to term it, a praegenital somite, hitherto unrecog- nized. In the case of Scorpio this segment is indicated in the embryo by the presence of a pair of rudimentary appendages, carried by a well-marked somite. As in Limulus, so in Scorpio, this unexpected somite and its appendages disappear in the course of development. In fact, more or less complete " excalation " of the somite takes place. Owing to its position it is convenient to term the somite which is excalated in Limulus and Scorpio " the praegenital somite." It appears not improbable that the sternal plates wedged in between

\a

Fig. 9. — Ventral view of the posterior carapace or meso-meta- somatic (opisthosomatic) fusion of Limulus polyphemus. The soft integument and limbs of the mesosoma have been removed as well as all the viscera and muscles, so that the inner surface of the terga of these somites with their entopophyses are seen. The unsegmented dense chitinous sternal plate of the metasoma (XIII to XVIII) is not removed. Letters as in fig. 7.

(After Lankester, loc. cii.).

the last pair of legs in both Scorpio and Limulus, viz. the pentagonal sternite of Scorpio (fig. 10) and the chilaria of Limulus (see figs. 13 and 20), may in part represent in the adult the sternum of the ex- calated praegenital somite. This has not been demonstrated by an actual following

out of the development, but the position of these pieces and the fact that they are (in Limulus) supplied by an in- dependent segmental nerve, favours the view that they may comprise the sternal area of the vanished praegenital somite. This inter- pretation, however, of the " metasternites " of Limulus and Scorpio is opposed by the coexistence in Thelyphonus (figs. 55, 57 and 58) of a similar metasternite with a complete praegenital somite. H. J. Hansen (10) has recognized that the " praegenital somite " persists in a rudimentary condition, forming a " waist " to the series of somites in the Pedipalpi and Araneae. The present writer is of opinion that it will be found most convenient to treat this evanescent somite as something special, and not to attempt to reckon it to either the prosoma or the mesosoma. These will then remain as typically composed each of six appendage-bearing somites — the prosoma comprising in addition the ocular prosthomere. 1 When the praegenital somite or traces of it are present it should not be called " the seventh prosomatic " or the " first mesosomatic," but simply the " praegenital somite." The first segment of the meso- soma of Scorpio and Limulus thus remains the first segment, and can be identified as such throughout the Eu-arachnida, carrying as it always does the genital apertures. But it is necessary to remember, in the light of recent discoveries, that the sixth prosomatic pair of appendages is carried on the seventh somite of the whole series, there being two prosthomeres or somites in front of the mouth, the first carrying the eyes, the second the chelicerae ; also that the first mesosomatic or genital somite is not the seventh or even the eighth of the whole series of somites which have been historically present,

1 See the article Aethropoda for the use of the term " prosthomere."

but is the ninth, owing to the presence or to the excalation of a praegenital somite. It seems that confusion and trouble will be best avoided by abstaining from the introduction of the non-evident somites, the ocular and the prae- genital, into the numerical nomenclature of the com- ponent somites of the three great body regions. We shall, therefore, ignoring the ocular somite, speak of the first, second; third, fourth, fifth and sixth leg-bearing somites of the pro- soma, and indicate the appendages by the Roman numerals, I, II, III, IV, V, VI, and whilst ignoring the praegenital somite we shall speak of the first, second, third, &c, somite of the mesosoma or opistho- soma (united mesosoma and metasoma) and indicate them by the Arabic numerals.

There are a number of other important points of structure besides those re- ferring to the somites and appendages in which Limulus agrees with Scorpio or other Arachnida and differs from other Arthro- poda. The chief of these are as follows: — Fig. 10. — Ventral view of a scorpion,

1. The Composition of the Palamnaeus indus, de Geer, to show Head (that is to say, of the the arrangement of the coxae of the anterior part of the pro- limbs, the sternal elements, genital soma) with especial Reference plate and pectens.

t °tte& : &\° ninFr ° nt °f. the M, Mouth behind the oval median Mouth.— It appears (see camerostome. Arthropoda) that there is j The chelicerae .

II, Ihe chelae.

Ill to VI, the four pairs of walking legs.

Vllgo, The genital somite or first

somite of the mesosoma with the

genital operculum (a fused pair of

limbs). VWlp, The pectiniferous somite. IXˆg to Xlls/g, the four pulmonary

somites.

■*ULsty*

embryological evidence of the existence of two somites in Arachnida which were originally post-oral, but have become prae-oral by adaptational shifting of the oral aperture. These forwardly-slipped somites prosthomeres."

are called

The first of" these has in me(The j metastern i te of

Arachmds as in other the prosoma behind all the coxae.

x, The sternum of the pectiniferous somite.

y, The broad first somite of the meta-

as in Arthropods, its pair of ap- pendages represented by the eyes. The second has for its pair of appendages the small pair of limbs which in all living Arachnids is either chelate or retrovert (as in spiders), and is known as the chelicerae. It is possible, as maintained by some writers (Patten and others), that the lobes of the cerebral nervous mass in Arach- nids indicate a larger number of prosthomeres as having fused in this region, but there is no embryological evidence at present which justifies us in assuming the existence in Arachnids of more than two prosthomeres. The position of the

chelicerae of Limulus and of the ganglionic nerve-masses from which they receive their nerve-supply, is closely similar to that of Fig. ii. — Third leg of Limulus poly- the same structures in phemus, showing the division of the fourth Scorpio. The cerebral segment of the leg by a groove S into mass is in Limulus more two, thus giving seven segments to the easily separated by dis- leg as in scorpion, section as a median lobe (From a drawing by Pocock.)

distinct from the laterally- placed ganglia of the cheliceral somite than is the case in Scorpio, but the relations are practically the same in the two forms. Formerly it was supposed that in Limulus both the chelicerae and the next following pair of appendages were prosthomerous, as in Crustacea, I but the dissections of Alphonse Milne-Edwards (6) demonstrated

the true limitations of the cerebrum, whilst embryological researches have done as much for Scorpio. Limulus thus agrees with Scorpio and differs from the Crustacea, in which there are three prostho- meres — one ocular and two carrying palpiform appendages. It is true that in the lower Crustacea (Apus, &c.) we have evidence of the gradual movement forward of the nerve-ganglia belonging to these

Fig. 12. — The prosomatic appendages of Limulus polyphemus (right) and Scorpio (left), Palamnaeus indus compared. The corre- sponding appendages are marked with the same Roman numeral. The Arabic numerals indicate the segments of the legs. cox, Coxa or basal segment of the ex 1 , The exopodite of the sixth

leg.

limb of Limulus.

stc, The sterno-coxal process or a, b, c, d, Movable processes on the

jaw-like up-growth of the coxa.

epc, The articulated movable

outgrowth of the coxa, called

the epi-coxite (present only in

III of the scorpion and III,

IV and V of Limulus).

same leg (see for some sug- gestions on the morphology of this leg, Pocock in Quart. Journ. Micr. Set. March 1901 ; see also fig. 50 below and explanation).

(From Lankester, loc. cit.)

palpiform appendages. But although in such lower Crustacea the nerve-ganglia of the third prosthomere have not fused with the anterior nerve-mass, there is no question as to the prae-oral position of two appendage-bearing somites in addition to the ocular prostho- mere. The Crustacea have, in fact, three prosthomeres in the head and the Arachnida only two, and Limulus agrees with the Arachnida in this respect and differs from the Crustacea. The central nervous systems of Limulus and of Scorpio present closer agreement in structure than can be found when a Crustacean is compared with either. The wide divarication of the lateral cords in the prosoma and their connexion by transverse commissures, together with the " attraction " of ganglia to the prosomatic ganglion group which

properly belong to hinder segments, are very nearly identical in the two animals. The form and disposition of the ganglion cells are also peculiar and closely similar in the two. (See Patten (42) for important observations on the neuromeres, &c, of Limulus and Scorpio.)

2. The Minute Structure of the Central Eyes and of the Lateral Eyes. — Limulus agrees with Scorpio not only in having a pair of central eyes and also lateral eyes, but in the microscopic structure of those organs, which differs in the central and lateral eyes respectively. The central eyes are " simple eyes," that is to say, have a single lens, and are hence called " monomeniscous." The lateral eyes are in Limulus " compound eyes," that is to say, consist of many lenses placed close together; beneath each lens is a complex of protoplasmic cells, in which the optic nerve terminates. Each such unit is termed an " ommatidium." The lateral eyes of Scorpio consist of groups of separate small lenses each with its ommatidium, but they do not form a continuous compound eye as in Limulus. The ommatidium (soft structure beneath the lens-unit of a compound eye) is very simple in both

Scorpio and Limulus. It consists of a single layer of cells, continuous with those which secrete the general chitinous covering of the prosoma. The cells of the ommatidium are a good deal larger than the neighbouring common cells of the epidermis. They secrete the knob-like lens (fig. 22). But they also receive the nerve fibres of the optic nerve. They are at the same time both optic nerve-end cells, that is to say, retina cells, and corneagen cells or secretors of the chitinous lens-like cornea. In Limulus (fig. 23) each ommatidium has a peculiar ganglion cell developed in a central position, whilst the »/

ommatidium of the lateral eyelets of Scorpio shows small intermediate cells between the larger nerve – end cells. The struc- ture of the lateral eye of Limulus was first described by Grenacher, and further and more accurately by Lankester and Bourne (5) and by Watase ; that of Scorpio by Lan- kester and Bourne, Fig. 13. — Diagrams of the meta-sternite si, who showed that with genital operculum op, and the first lamelli- the statements of gerous pair of appendages ga, with uniting von Graber were sternal element st of Scorpio (left) and Limulus erroneous, and (right).

that the lateral (From Lankester, ta;. «U

eyes ot Scorpio

have a single cell-layered or " monostichous " ommatidium like that of Limulus. Watase has shown, in a very convincing way, how by deepening the pit-like set of cells beneath a simple lens the more com- plex ommatidia of the compound eyes of Crustacea and Hexapoda may be derived from such a condition as that presented in the lateral eyes of Limulus and Scorpio. (For details the reader is referred to Watase (11) and to Lankester and Bourne (5).) The structure of the central eyes of Scorpio and spiders and also of Limulus differs essentially from that of the lateral eyes in having two layers of cells (hence called diplostichous) beneath the lens, separated from one another by a membrane (figs. 24 and 25). The upper layer is the corneagen and secretes the lens, the lower is the retinal layer. The mass of soft cell-structures beneath a large lens of a central eye is called an " ommatoeum." It shows in Scorpio and Limulus a tendency to segregate into minor groups or " ommatidia." It is found that in embryological growth the retinal layer of the central eyes forms as a separate pouch, which is pushed in laterally beneath the corneagen layer from the epidermic cell layer. Hence it is in origin double, and consists of a true retinal layer and a post-retinal layer (fig. 24, B), though these are not separated by a membrane. Accordingly the diplostichous ommatoeum or soft tissue of the Arachnid's central eye should strictly be called " triplostichous," since the deep layer is itself doubled or folded. The retinal cells of both the lateral and central eyes of Limulus and Scorpio produce

cuticular structures on their sides; each such piece is a rhabdomere and a number (five or ten) uniting form a rhabdom (fig. 26). In the specialized ommatidia of the compound eyes of Crustacea and Hexapods the rhabdom is an important structure. 1 It is a very significant fact that the lateral and central eyes of Limulus and Scorpio not only agree each with each in regard to their mono- stichous and diplostichous structure, but also in the formation in both classes of eyes of rhabdomeres and rhabdoms in which the component pieces are five or a multiple of five (fig. 26). Whilst each unit of the lateral eye of Limulus has a rhabdom of ten 8 pieces

1 See fig. 12 in the article Arthropoda.

2 Though ten is the prevailing number of retinula cells and rhabdo- meres in the lateral eye of Limulus, Watase states that they may be as few as nine and as many as eighteen.

forming a star-like chitinous centre in section, each lateral eye of Scorpio has several rhabdoms of five or less rhabdomeres, indicating that the Limulus lateral eye-unit is more specialized than the detached lateral eyelet of Scorpio, so as to present a coincidence of one lens with one rhabdom. Numerous rhabdomeres (grouped as rhabdoms in Limulus) are found in the retinal layer of the central eyes also. Whilst Limulus agrees thus closely with Scorpio in regard to the

Fig. 14. — The first three pairs of mesosomatic appendages of Scorpio and Limulus compared.

gp, Genital pore.

epst, Epistigmatic sclerite.

stg, Stigma or orifice of the hollow

tendons of the branchial plates of

Limulus.

(4).

Soc.

VII, The genital operculum.

VIII, The pectens of Scorpio and the first branchial plate of Limulus.

IX, The first pair of lung-books of Scorpio and the second branchial plate of Limulus.

(After Lankester, 7oc. cil.)

eyes, it is to be noted that no Crustacean has structures corre- sponding to the peculiar diplostichous central eyes, though these occur again (with differences in detail) in Hexapoda. Possibly, however, an investigation of the development of the median eyes of some Crustacea(Apus,Palaemon)may prove them to be diplostichous in origin.

3. The so-called " Coxal Glands." — In 1882 {Proc. Roy. No. 221) Lankester described under the name "coxal glands" a pair of brilliantly white oviform bodies lying in the Scorpion's prosoma immediately above the coxae of the fifth and sixth pairs of legs (fig. 27). These bodies had been erroneously supposed by Newport (12) and other observers to be glandular outgrowths of the ali- mentary canal. They are really excretory glands, and communicate with the exterior by a very minute aperture on the posterior face of the coxa of the fifth limb on each side. When examined with the microscope, by means of the usual section method, they are seen to consist of a labyrinthine tube lined with peculiar cells, each cell having a deep vertically striated border on the surface farthest from the lumen, as is seen in the cells of some renal organs. The coils and branches of the tube are packed by connective tissue and blood spaces. A similar pair of coxal glands, lobate instead of ovoid in shape, was described by Lankester in Mygale, and it was also shown by him that the structures in Limulus called " brick-red glands " by Packard have the same structure and position as the coxal glands of Scorpio and Mygale. In Limulus these organs consist each of four horizontal lobes lying on the coxal margin of the second, third, fourth, and fifth prosomatic limbs, the four lobes being connected to one another by a transverse piece or stem (fig. 28). Microscopically their structure is the same in essentials as that of the coxal glands of Scorpio (13). Coxal glands have since been recognized and described in other Arachnida. In 1900 it was shown that the coxal gland of Limulus is provided with a very delicate thin-walled coiled duct which opens, even in the adult condition, by a minute pore on the coxa of the fifth leg (Patten and Hazen, 13a). Previously to this, Lankester's pupil Gulland had shown (1885) that in the embryo the coxal gland is a comparatively simple tube, which opens to the exterior in this position and by its other extremity into a coelomic space. Similar observations were made by Laurie (17) in Lankester's laboratory (1890) with regard to the early condition of the coxal gland of Scorpio, and by Bertkau (41) as to that of the spider Atypus. H. M. Bernard (13b) showed that the

opening remains in the adult scorpion. In all the embryonic or permanent opening is on the coxa of the fifth pair of prosomatic limbs. Thus an organ newly discovered in Scorpio was found to have its counterpart in Limulus.

The name " coxal gland " needs to be carefully distinguished from " crural gland," with which it is apt to be confused. The crural glands, which occur in many terrestrial Arthropods, are epidermal in origin and totally distinct from the coxal glands. The coxal glands of the Arachnida are structures of the same nature as the green glands of the higher Crustacea and the so-called " shell glands " of the Entomostraca. The latter open at the base of the fifth pair of limbs of the Crustacean, just as the coxal glands open on the coxal joint of the fifth pair of limbs of the Arachnid. Both belong to the category of " coelomoducts," namely, tubular or funnel-like portions of the coelom opening to the exterior in pairs in each somite (potentially,) and usually persisting in only a few somites as either "urocoels" (renal organs) or "gonocoets" (genital tubes). In Peripatus they occur in every somite of the body. They have till recently been very generally identified with the nephridia of Chaetopod worms, but there is good reason for con- sidering the true nephridia (typified by the nephridia of the earthworm) as a distinct class of organs (see Lankester in vol. ii. chap. iii. of A Treatise on Zoology, 1900). The genital ducts of Arthropoda are, like the green glands, shell glands and coxal glands, to be re- garded as coelomoducts (gonocoels). The coxal glands do not establish any special connexion between Limulus and Scorpio, since thay also occur in the same somite in the lower Crustacea, but it is to be noted that the coxal glands of Limulus are in minute structure and probably in function more like those of Arachnids than those of Crustacea.

4. The Entosternites and their Minute Structure. — Strauss- Durckheim (1) was the first to insist on the affinity between Limulus and the Arachnids, indicated by the presence of a free suspended entosternum or plastron or entosternite in both. We have figured here (figs. 1 to 6) the entosternites of Limulus, Scorpio and Mygale. Lankester some years ago made a special study of the histology (3) of these entosternites for the purpose of comparison, and also ascertained the relations of the very numerous muscles which are inserted into them The entosternites are cartilaginous in texture, but they have neither the chemical character nor the microscopic structure of the hyaline cartilage of Vertebrates. They yield chitin in place of chondrin or gelatin — as does also the cartilage of the Cephalopod's endoskeleton. In microscopic structure they all present the closest agreement with one another. We find a firm, homogeneous or sparsely fibrillated matrix in which are embedded

Fig. 15. — The remaining three pairs of mesosomatic appendages of Scorpio and Limulus. Letters as in fig. 14. /130 indicates that there are

130 lamellae in the scorpion's lung-book, whilst /150 indicates that 150 similar lamellae are counted in the gill of Limulus.

(After Lankester, loc. cil.)

nucleated cells (corpuscles of protoplasm) arranged in rows of three, six or eight, parallel with the adjacent lines of fibrillation.

A minute entosternite having the above-described structure is found in the Crustacean Apus between the bases of the mandibles, and also in the Decapoda in a similar position, but in no Crustacean does it attain to any size or importance. On the other hand, the entosternite of the Arachnida is a very large and important feature

jn the structure of the prosoma, and must play an important part in the economy of these organisms. In Limulus (figs. I and 2) it has as many as twenty-five pairs of muscles attached to it, coming

Fig. 16. — Diagram to show the way in which an outgrowing gill – process bearing blood-holding lamellae, may give rise, if the sternal body wall sinks inwards, to a lung-chamber with air-holding lamellae.

I is the embryonic condi- tion.

bs, Blood sinus.

L is the condition of out- growth with gl, gill lamellae.

A is the condition of in- sinking of the sternal surface and consequent enclosure of the Iamel- ligerous surface of the appendage in a chamber with narrow orifice — the pulmonary air – holding chamber.

pi, Pulmonary lamellae.

bs, Blood sinus.

(After Kingsiey.)

to it from the bases of the surrounding limbs and from the dorsal carapace and from the pharynx. It consists of an oblong plate 2 in. in length and 1 in breadth, with a pair of tendinous outgrowths standing out from it at right angles on each side. It "floats"

between the prosomatic nerve

— sgc centres and the alimentary ".'_ obi canal. In each somite of the

— I mesosoma is a small, free ento- "2 ". sternite having a similar posi-

jl tion, but below or ventral to

the nerve cords, and having a

— IV smaller number of muscles

— v attached to it. The entoster- ... ,,j nite was probably in origin

*J vtip r R ar * °^ tne fibrous connective*

PrGoS^ 1 .L:j^ – JL_g^"TT"" J.:: t tissue lying close to the integu-

abp 2 ._.L..'.-^QL^> '7 "~ J 1 ment of the sternal surface —

a ^' .....u. < ~wL- E'"~T giving attachment to muscles

f i. : J_A_K"'vr'"" ^r corresponding more or less to*

"?, •V"^tr^I' 'i. vi, those at present attached to*

*^.j V- -M. ^ Jfe" " jT * it. It became isolated and*

*V—ft*o»— /■ a in detached, why or with what*

advantage to the organism it

_ _ , , .is difficult to say, and at that

Fig 17.— Embryo of scorpion iod q{ Arachmdan deve i op . ventral V1 ew showing somites and £ ent the great ventra , ner £ e appendages. cords occupied a more lateral

sgc, Frontal groove. position than they do at

sa, Rudiment of lateral eyes. present. We know that such

obi, Camerostome (upper lip). a lateral position of the nerve

so, Sense-organ of Patten. cords preceded the median

PrGabp 1 , Rudiment of the appen- position in both Arthropoda

dage of the praegenital somite an d Chaetopoda. Subse-

which disappears. quently to the floating off of

abp 1 , Rudiment of the right half of the entosternite the approxi-

the genital operculum. ” mation of the nerve cords took

abp 3 , Rudiment of the right pecten. place in the prosoma, and thus abp i to abp 1 . Rudiments of the four they were able to take up a

appendages which carry the pul- position below the entosternite.

monary lamellae. In the mesosoma the approxi-

I to VI, Rudiments of the six limbs mation had occurred before the

of the prosoma. entosternites were formed.

VIIPrG, The evanescent praegenital In the scorpion (figs. 3 and 4)

somite. the entosternite has tough

VIII, The first mesosomatic somite membrane – like outgrowths or genital somite. which connect . it with the

IX, The second mesosomatic somite body-wall, both dorsally and or pectiniferous somite. ventrally forming an oblique

X to XIII, The four pulmoniferous diaphragm, cutting off the somites. _ _ cavity of the prosoma from

XIV, The first metasomatic somite, that of the mesosoma. It was (After Brauer, Zeiisch. wiss. Zool. vol. lix., described by Newport as ” the l895 ‘ diaphragm.” Only the central

and horizontal parts of this structure correspond precisely to the ento-sterniteof Limulus : the right and left anterior processes (marked ap in figs. 3 and 4, and RAP, LAP, in figs. I and 2) correspond in the two animals, and the median lateral process Imp of the scorpion represents the tendinous outgrowths ALR, PLR of Limulus. The scorpion’s

J?i~- -”•

*^”-r_.l_*

_J.i^?..:.

*•fe}-^*

■•','■.■.•■.....

c-^s

hcj.,., „.

*•—1'**

;K-.~

< >

V.. _.

WMi$?Mt0i:

..VIIPrG

go ■ VIII

Km •IX .abp . abp* . abp" .abp"*

Fig. 18. — Portion of a simi- lar embryo at a later stage of growth. The praegenital somite, VII PrG, is still present, but has lost its rudimentary appendages; the genital operculum, left half; Km, the left pecten; abp 1 to abp 7 , the rudimentary appendages of the lung-sacs.

(After Brauer, loc. cil.)

entosternite gives rise to outgrowths, besides the great posterior flaps, pf, which form the diaphragm, unrepresented in Limulus. These are a ventral arch forming a neural canal through which the great nerve cords pass (figs. 3 and 4, snp), and further a dorsal gastric canal and arterial canal which transmit the alimentary tract and the dorsal artery respectively (figs. 3 and 4, GC, DR).

In Limulus small entosternites are found in each somite of the appendage-bearing mesosoma, and we find in Scorpio, in the only somite of the mesosoma which has a well- developed pair of appendages, that of the pectens, a small entosternite with ten pairs of muscles inserted into it. The supra-pectinal entosternite lies ventral to the nerve cords.

In Mygale (figs. 5 and 6) the form of the entosternite is more like that of Limulus than is that of Scorpio. The anterior notch Ph.N. is similar to that in Limulus, whilst the imbri- cate triangular pieces of the posterior median

region resemble the similarly- placed structures of Limulus in a striking manner.

It must be confessed that we are singularly ignorant as to the functional significance of these remarkable organs g° t — the entosternites. Their movement in an upward or downward direction in Limulus and Mygale must exert a pumping action on the blood con- tained in the dorsal arteries and the ventral veins respectively. In Scorpio the completion of the horizontal plate by oblique flaps, so as to form an actual diaphragm shutting off the cavity of the prosoma from the rest of the body, possibly gives to the organs contained in the anterior chamber a physiological advantage in respect of the supply of arterial blood and its separa- tion from the venous blood of the mesosoma. Possibly the move- ment of the diaphragm may determine the passage of air into or out of the lung-sacs. Muscular fibres connected with the suctorial pharynx are in Limulus inserted into the entosternite, and the activity of the two organs may be correlated.

5. The Blood and the Blood- , -. r r .

vascular System.— The blood fluids eˆly embryo of Limulus longi- of Limulus and Scorpio are very s p? a . < showing seven transverse similar. Not only are the blood divisions in the region of the corpuscles of Limulus more like unsegmented anterior carapace, in form and granulation to those The seventh, VII, is anterior to of Scorpio than to those of any the genital operculum, op, and Crustacean, but the fluid is in ls the cav »ty of the praegenital both animals strongly impreg- somlt f ™ hlch ls moT ? . or le f s nated with the blue-coloured completely suppressed in sub- respiratory proteid, haemocyanin. sequent development, possibly This body occurs also in the blood ‘ nd T lcate d by the area marked of Crustacea and of Molluscs, but VH in £s- 7 and by the great its abundance in both Limulus entopophyses of the prosomatic and Scorpio is very marked, and cara P ace –

*gives to the freshly-shed blood a , fAtter Kishinouye J mm. Sri. Coll. °, – ,• 11 !• *. Japan, vol. v., 1802.)*

*strong indigo-blue tint. * ‘*

The great dorsal contractile vessel or ” heart ” of Limulus is closely similar to that of Scorpio; its ostia or incurrent orifices are

Fig. 20. — View of the ventral surface of the mid-line of the prosomatic region si of Limulus polyphemus. The coxae of the five pairs of limbs following the cheli’ cerae were arranged in a series on each side between

the mouth, M, and the meta – sternites, mets.

sf, The sub-frontal median sclerite. M Ch, The chelicerae.

cam, The camerostome or upper lip. M, The mouth.

pmst, The promesosternal sclerite 01 chitinous plate, unpaired. mets mets, The right and left metasternites (corresponding to the similarly placed pentagonal sternite of Scorpio). Natural size.

(After Lankester.)

placed in the same somites as those of Scorpio, but there is one additional posterior pair. The origin of the paired arteries from the

op gapp

Fig. 19. — Section through

pmst

heart differs in Limulus from the arrangement obtaining in Scorpio, in that a pair of lateral commissural arteries exist in Limulus (as described by Alphonse Milne-Edwards (6)) leading to a suppression of the more primitive direct connexion of the four pairs of posterior

Fig. 21. — Development of the lateral eyes of a scorpion, h, Epi- dermic cell-layer; mes, mesoblastic connective tissue; n, nerves; II, III, IV, V, depressions of the epidermis in each of which a cuticular lens will be formed.

(From Korscheit and Heider, after Laurie.)

lateral arteries and of the great median posterior arteries with the heart itself (fig. 29). The arterial system is very completely developed in both Limulus and Scorpio, branching repeatedly until minute arterioles are formed, not to be distinguished from true capillaries;

lens

nerv.f

Fig. 22. — Section through the lateral eye of Euscorpius italicus. lens,

Cuticular lens. nerv.c, Retinal cells (nerve- end cells). rhabd, Rhabdomes. nerv.f, Nerve fibres of the

optic nerve. int, Intermediate cells (lying between the bases of the retinal cells). (After Lankester and Bourne from Parker and Haswell's Text- book of Zoology, Macmillan& Co.)

these open into irregular swollen vessels which are the veins or venous sinuses. A very remarkable feature in Limulus, first described by Owen, is the close accompaniment of the prosomatic nerve centres and nerves by arteries, so close indeed that the great ganglion mass and its out-running nerves are actually sunk in or invested by

Fig. 23. — Section through a portion of the lateral eye of Limulus, showing three ommatidia — A, B and C. hyp, The epidermic cell-layer (so-called hypodermis), the cells of which increase in volume below each lens, /, and become nerve-end cells or retinula-cells, rt ; in A, the letters rh point to a rhabdomere secreted by the cell rt; c, the peculiar central spherical cell; n, nerve fibres; mes, mesoblastic skeletal tissue; ch, chitinous cuticle.

(From Korscheit and Heider after Watase.)

arteries. The connexion is not so intimate in Scorpio, but is never- theless a very close one, closer than we find in any other Arthropods in which the arterial system is well developed, e.g. the Myriapoda and some of the arthrostracous Crustacea. It seems that there is a primitive tendency in the Arthropoda for the arteries to accompany the nerve cords, and a " supra-spinal " artery — that is to say, an

artery in close relation to the ventral nerve cords — has been described in several cases. On the other hand, in many Arthropods, especially those which possess tracheae, the arteries do not have a long course, but soon open into wide blood sinuses. Scorpio certainly comes nearer to Limulus in the high development of its arterial system, and the intimate relation of the anterior aorta and its branches to the nerve centres and great nerves, than does any other Arthropod. An arrangement of great functional importance in regard to the venous system must now be described, which was shown in 1883. by Lankester to be common to Limulus and Scorpio. This arrangement has not hitherto been detected in any other class than the Arachnida, and if it should ultimately prove to be peculiar to that group, would have considerable weight as a proof of the close genetic affinity of Limulus and Scorpio.

A

Fig. 24. — Diagrams of the development and adult structure of one of the

paired central eyes of a scorpion.

A, Early condition before the lens is deposited, showing the folding of the epidermic cell-layer into three.

B, Diagram showing the nature of this infolding.

C, Section through the fully formed eye. h, Epidermic cell-layer.

r, The retinal portion of the same which, owing to the infolding, lies

between gl, the corneagen or lens-forming portion, and pr, the

post-retinal or capsular portion or fold. /, Cuticular lens. g, Line separating lens from the lens-forming or corneagen cells of

the epidermis. n, Nerve fibres. rh, Rhabdomeres.

[How the inversion of the nerve-end-cells and their connexion with the nerve-fibres is to be reconciled with the condition found in the adult, or with that of the monostichous eye, has not hitherto been explained.]

(From Korscheit and Heider.)

The great pericardial sinus is strongly developed in both animals. Its walls are fibrous and complete, and it holds a considerable volume of blood when the heart itself is contracted. Opening in pairs in each somite, right and left into the pericardial sinus are large veins, which bring the blood respectively from the gill-books and the lung- books to that chamber, whence it passes by the ostia into the heart. The blood is brought to the respiratory organs in both cases by a great venous collecting sinus having a ventral median position. In both animals the wall of the pericardial sinus is connected by vertical muscular bands to the wall of the ventral venous sinus (its lateral ex- pansions around the lung-books in Scorpio) in each somite through which the pericardium passes. There are seven pairs of these veno- pericardiac vertical muscles in Scorpio, and eight in Limulus (see figs. 30, 31, 32). It is obvious that the contraction of these muscles

must cause a depression of the floor of the pericardium and a rising of the roof of the ventral blood sinus, and a consequent increase of volume and flow of blood to each. Whether the pericardium and the ventral sinus are made to expand simultaneously or all the move- ment is made by one only

of the surfaces concerned, must depend on conditions of tension. In any case it is clear that we have in these muscles an apparatus for causing the blood to flow differentially in increased volume into either the pericardium, through the veins leading from the respiratory organs, or from the body generally into the great sinuses which bring the blood to the respiratory organs. These muscles act so as to pump the blood through the respiratory organs.

It is not surprising that with so highly developed an arterial system Limulus and Scorpio should have a highly developed mechan- ism for determining the flow of blood to the respiratory organs. That this is, so to speak, a need of animals with localized respiratory

cen> iiss.

FlG. 25. — Section through one of the central eyes of a young Limulus.

. ..:.. 1 1 j tj a ‘ ..1. li

lt, Cuticular or corneous lens. ret, Retinula cells.

ky, Epidermic cell-layer. nf, Nerve fibres.

corn. Its corneagen portion im- con. tiss, Connective tissue (meso- mediately underlying the lens. blastic skeletal tissue).

(After Lankester and Bourne, Q. J. Mic. Set., 1883.)

organs is seen by the existence of provisions serving a similar purpose in other animals, e.g. the branchial hearts of the Cephalopoda.

The veno-pericardiac muscles of Scorpio were seen and figured by Newport but not described by him. Those of Limulus were described and figured by Alphonse Milne-Edwards, but he called them merely ” transparent ligaments,” and did not discover their muscular structure. They are figured and their importance for the first time recognized in the memoir on the muscular and skeletal systems of Limulus and Scorpio by Lankester, Beck and Bourne (4).

6. Alimentary Canal and Gastric Glands. — The alimentary canal in Scorpio, as in Limulus, is provided with a powerful suctorial pharynx, in the working of which extrinsic muscles take a part. The mouth is relatively smaller in Scorpio than in Limulus — in fact is minute, as it is in all the terrestrial Arachnida which suck the juices of either animals or plants. In both, the alimentary canal takes a straight course from the pharynx (which bends under it downwards and backwards towards the mouth in Limulus)

to the anus, and is a simple, narrow, cylindrical tube (fig. 33). The only point in which the gut of Limulus resembles that of Scorpio rather than that of any of the Crustacea, is in possessing more than a single pair of ducts or lateral outgrowths connected with ramified gastric glands or gastric caeca. Limulus has two pairs of these, Scorpio as many as six pairs. The Crustacea never have more than one pair. The minute microscopic structure of the gastric glands in the two animals is practically identical. The functions of these gastric diverticula have never been carefully investigated. It is very probable that in Scorpio they do not serve merely to secrete a digestive fluid (shown in other Arthropoda to resemble the pancreatic fluid), but that they

also become distended by the juices of the prey sucked in by the scorpion—as certainly must occur in the case of the simple unbranched gastric caeca of the spiders.

The most important difference which exists between the structure of Limulus and that of Scorpio is found in the hinder region of the alimentary canal. Scorpio is here provided with a single or double pair of renal excretory tubes, which have been identified by earlier authors with the Malpighian tubes of the Hexapod and Myriapod insects. Limulus is devoid of any such tubes. We shall revert to this subject below.

rit/

rhab. D

Fig. 26.

A, Diagram of a retinula of the central eye of a scorpion con- sisting of five retina-cells {ret), with adherent branched pig- ment cells {pig).

B, Rhabdom of the same, con- sisting of five confluent rhab- domeres.

C, Transverse section of the

rhabdom of a retinula of the scorpion's central eye, showing its five constituent rhabdo- meres as rays of a star. D, Transverse section of a retinula of the lateral eye of Limulus, showing ten retinula cells {ret), each bearing a rhabdomere {rhab).*

(After Lankester.) '

7. Ovaries and Spermaries: Gonocoels and Gonoducts.- — The scorpion is remarkable for having the specialized portion of coelom from the walls of which egg-cells or sperm-cells are developed according to sex, in the form

of a simple but extensive network. It is not a pair of simple tubes, nor of dendriform tubes, but a closed network. The same fact is true of Limulus, as was shown by Owen (7)

Fig. 27. — Diagram showing the position of the cojeal glands of a scorpion, Buthus australis, Lin. , in relation to the legs, dia- phragm (entosternal flap), and the gastric caeca. I to 6, The bases of the six pro- somatic limbs.

A, prosomatic gastric gland (sometimes called salivary).

B, Coxal gland.

C, Diaphragm of Newport = fib- rous flap of the entosternum.

D, Mesosomatic gastric caeca (so-called liver).

E, Alimentary canal.

(From Lankester, Q. J. Mic. Set., vol. xxiv. N.S. p. 152.)

in regard to the ovary, and by Benham (14) in regard to the testis. This is a very definite and remarkable agreement, since such a reticular gonocoel is not found in Crustacea (except in the male Apus). Moreover, there is a significant agreement in the character of the spermatozoa of Limulus and Scorpio. The Crustacea are — with the exception of the Cirrhipedia — remarkable for having stiff, motionless spermatozoids. In Limulus Lankester found (IS) the spermatozoa to possess active flagelliform " tails," and to resemble very closely those of Scorpio which, as are those of most terrestrial Arthropoda, are a.-tively motile. This is a microscopic point of agreement, but is none the less significant.

In regard to the important structures concerned with the fertiliza- tion of the egg, Limulus and Scorpio differ entirely from one another.

The eggs of Limulus are fertilized in the sea after they have been laid. Scorpio, being a terrestrial animal, fertilizes by copulation. The male possesses elaborate copulatory structures of a chitinous nature, and the eggs are fertilized in the female without even quitting the place where they are formed on the wall of the reticular gonocoel. The female scorpion is viviparous, and the young are produced in a highly developed condition as fully formed scorpions.

Differences between Limulus and Scorpio. — We have now passed in review the principal structural features in which Limulus agrees with Scorpio and differs from other Arthropoda. There remains for consideration the one important structural difference between the two animals. Limulus agrees with the majority of the Crustacea in being destitute of renal excretory caeca or tubes opening into the hinder part of the gut. Scorpio, on the other hand, in common

Fig. 28. — The right coxal gland of Limulus polyphemus, Latr.

a to a 6 , Posterior borders of the chitinous bases of the coxae of the second, third, fourth and fifth prosomatic limbs.*

b, Longitudinal lobe or stolon of the coxal gland.

c. Its four transverse lobes or outgrowths corresponding to the four coxae.

(From Lankester, loc. cit , Packard.)

after

with all air-breathing Arthropoda except Peripatus, possesses these tubules, which are often called Malpighian tubes. A great deal has been made of this difference by some writers. It has been considered by them as proving that Limulus, in spite of all its special agreements with Scorpio (which, however, have scarcely been appreciated by the writers in question), really belongs to the Crustacean line of descent, whilst Scorpio, by possessing Malpighian tubes, is declared to be unmistakably tied together with the other Arachnida to the tracheate Arthropods, the Hexapods, Diplopods, and Chilopods, which all possess Malpighian tubes.

It must be pointed out that the presence or absence of such renal excretory tubes opening into the intestine appears to be a question

Fig. 29. — Diagram of the arterial system of A, Scorpio, and B, Limulus. The Roman numerals indicate the body somites and the two figures are adjusted for comparison. ce, Cerebral arteries; sp, supra – spinal or medullary artery; c, caudal artery; /, lateral anastomotic artery of Limulus. The figure B also shows the peculiar neural investiture formed by the cerebral arteries in Limulus and the derivation from this of the arteries to the limbs, III, IV, VI, whereas in Scorpio the latter have a separate origin from the anterior aorta.

(From Lankester, Arachnid.)

'Limulus an

of adaptation to the changed physiological conditions of respiration, and not of morphological significance, since a pair of renal excretory tubes of this nature is found in certain Amphipod Crustacea (Talor- chestia, &c.) which have abandoned a purely aquatic life. This view has been accepted and supported by Professors Korschelt and Heider (16). An important fact in its favour was discovered by Laurie (17), who investigated the embryology of two species of Scorpio under Lankester's direction. It appears that the Malpighian tubes of Scorpio are developed from the mesenteron, viz. that portion of the gut which is formed by the hypoblast, whereas in Hexapod insects the similar caecal tubes are developed from the proctodaeum or in-pushed portion of the gut which is formed from epiblast. In fact it is not possible to maintain that the renal excretory tubes of the gut are of one common origin in the Arthropoda. They have appeared independently in connexion with a change in the excretion of nitrogenous waste in Arachnids, Crustacea, and the other classes of Arthropoda when aerial, as opposed to aquatic, respiration has been established— and they have been formed in some cases from the mesenteron, in other cases from the proctodaeum. Their appearance in the air-breathing Arachnids does not separate those forms from the water-breathing Arachnids which are devoid of them,

any more than does their appearance in certain Amphipoda separate those Crustaceans from the other members of the class.

Further, it is pointed out by Korschelt and Heider that the hinder portion of the gut frequently acts in Arthropoda as an organ of nitrogenous excretion in the absence of any special excretory tubules, and that the production of such caeca from its surface in separate lines of descent does not involve any elaborate or unlikely process of growth. In other words, the Malpighian tubes of the terrestrial Arachnida are homoplastic with those of Hexapoda and Myriapoda, and not homogenetic with them. We are compelled to take a similar view of the agreement between the tracheal air-tubes of Arachnida and other tracheate Arthropods. They are homoplasts (see 18) one of another, and do not owe their existence in the various classes compared to a common inheritance of an ancestral tracheal system.

Conclusions arising from the Close Affinity of Limulus and Scorpio. — When we consider the relationships of the various classes of Arthropoda, having accepted and established the fact of the close genetic affinity of Limulus and Scorpio, we are led to important conclusions. In such a consideration we have to make use not only of the fact just mentioned, but of three im- portant generalizations which serve as it were as implements for the proper estimation of the relationships of any series of organic forms. First of all there is the generalization that the relationships of the various forms of animals (or of plants) to one another is that of the ultimate twigs

of a much-branch- ing genealogical tree. Secondly, identity of structure in two or- ganisms does not necessarily indicate that the identical structure has been inherited from an ancestor common to the two organisms compared (homo- geny), but may be due to independent development of a like structure in two different lines of descent (homoplasy). Thirdly, those members of a group which, whilst exhibiting undoubted structural characters indicative of their proper assign- ment to that group, yet are simpler than and inferior in elaboration of their organization to other members of the group, are not necessarily representa- tives of the earlier and primitive phases in the development of the group — but are very often examples of retrogressive change or degeneration. The second and third implements of analysis above cited are of the nature of cautionsorchecks. Agreements

Fig. 30. — View from below of a scorpion (Buthus occitanus) opened and dissected so as to show the pericardium with its muscles, the lateral arteries, and the tergo-sternal muscles. PRO, Prosoma. dpm, Dorsoˆplastral muscle. art, Lateral artery. tsm 1 , Tergo-sternal muscle (la- belled dv in fig. 31) of the second (pectiniferous) mesoso- matic somite ; this is the most anterior pair of the series of six, none are present in the genital somite. tsm, Tergo-sternal muscle of the fifth mesosomatic somite. tsm 6 , Tergo-sternal muscle of the enlarged first metasomatic somite. Per, Pericardium. VPM 1 to VPM 7 , The series of seven pairs of veno-pericardiac muscles (labelled pv in fig. 31). There is some reason to admit the existence of another more anterior pair of these muscles in Scorpio; this would make the number exactly correspond with the number in Limulus.*

(After Lankester, Trans. Zool. Soc. vol. xi., IC83.)

are not necessarily due to

common inheritance; simplicity is not necessarily primitive and

ancestral.

On the other hand, we must not rashly set down agreements as due to " homoplasy " or " convergence of development " if we find two or three or more concurrent agreements. The prob- ability is against agreement being due to homoplasy when the agreement involves a number of really separate (not correlated) coincidences. Whilst the chances are in favour of some one homoplastic coincidence or structural agreement occurring between some member or other of a large group a and some member or other of a large group b, the matter is very different

ARACHNIDA

when by such an initial coincidence the two members have been particularized. The chances against these two selected members exhibiting another really independent homoplastic agreement are enormous: let us say 10,000 to 1. The chances against yet another coincidence are a hundred million to one, and against yet one more " coincidence " they are the square of a hundred million to one. Homoplasy can only be assumed when the co- incidence is of a simple nature, and is such as may be reasonably supposed to have arisen by the action of like selective conditions upon like material in two separate lines of descent. 1

So, too, degeneration is not to be lightly assumed as the ex- planation of a simplicity of structure. There is a very definite criterion of the simplicity due to degeneration, which can in most cases be applied. Degenerative simplicity is never uni- formly distributed over all the structures of the organism. It affects many or nearly all the structures of the body, but leaves some, it may be only one, at a high level of elaboration and complexity. Ancestral simplicity is more uniform, and does not co-exist with specialization and elaboration of a single organ. Further: degeneration cannot be inferred safely by the examina- tion of an isolated case; usually we obtain a series of forms indicating the steps of a change in structure — and what we have to decide is whether the movement has been from the simple to the more complex, or from the more complex to the simple. The feathers of a peacock afford a convenient example of primitive and degenerative simplicity. The highest point of elaboration in colour, pattern and form is shown by the great eye-painted tail feathers. From these we can pass by gradual transitions in two directions, viz. either to the simple lateral tail feathers with a few rami only, developed only on one side of the shaft and of uniform metallic coloration — or to the simple contour feathers of small size, with the usual symmetrical series of numerous rami right and left of the shaft and no remarkable colouring. The one-sided specialization and the peculiar metallic colouring of the lateral tail feathers mark them as the extreme terms of a degenerative series, whilst the symmetry, likeness of constituent parts inter se, and absence of specialized pigment, as well as the fact that they differ little from any average feather of birds in general, mark the contour feather as primitively simple, and as the starting-point from which the highly elabor- ated eye-painted tail feather has gradually evolved.

Applying these principles to the consideration of the Arach- nida, we arrive at the conclusion that the smaller and simpler Arachnids are not the more primitive, but that the Acari or mites are, in fact, a degenerate group. This was maintained by Lankester in 1878 (19), again in 1881 (20); it was subsequently announced as a novelty by Claus in 1885 (21). Though the

aquatic members of a class of animals are in some instances derived from terrestrial forms, the usual transition is from an aquatic ancestry to more recent land-living forms. There is no doubt, from a consideration of the facts of structure, that the aquatic water-breathing Arachnids, represented in the past by the Eurypterines and to-day by the sole survivor Limulus, have preceded the terrestrial air-breathing forms of that group. Hence we see at once that the better-known Arachnida form a series, leading from Limulus-like aquatic creatures through scorpions, spiders and harvest-men, to the degenerate Acari or mites. The spiders are specialized and reduced in apparent complexity, as compared with the scorpions, but they cannot be regarded as degenerate since the concentration of structure which occurs in them results in greater efficiency and power than are exhibited by the scorpion. The determination of the relative degree of perfection of organization attained by two animals

1 A great deal of superfluous hypothesis has lately been put forward in the name of " the principle of convergence of characters " by a certain school of palaeontologists. The horse is supposed by these writers to have originated by separate lines of descent in the Old World and the New, from five-toed ancestors! And the important consequences following from the demonstration of the identity in structure of Limulus and Scorpio are evaded by arbitrary and even phantastic invocations of a mysterious transcendental force which brings about " convergence " irrespective of heredity and selection. Morphology becomes a farce when such assumptions are made. (E. R. L.)

compared is difficult when we introduce, as seems inevitable, the question of efficiency and power, and do not confine the question to the perfection of morphological development. We have no measure of the degree of power manifested by various animals— though it would be possible to arrive at some con- clusions as to how that " power " should be estimated. It is not possible here to discuss that matter further. We must be content to point out that it seems that the spiders, the pedipalps, and

aunt-.

ad. ""< PV

py py.t py**

pvt pv 9

. pv'

dv' ~ t& dv' s'ig'

sUg-

After Beck, Trans. Zool. Soc. vol. xi., 1883.

Fig. 31. — Diagram of a lateral view of a longitudinal section of a scorpion.

d, Chelicera. ad, Muscle from carapace to en-

ch, Chela. tosternum.

cam, Camerostome. md, Muscle from tergite of genital

m. Mouth. somite to entosternum (same

ent, Entosternum. as dpm in fig. 30).

p, Pecten. dv 1 to dv 6 , Dorso- ventral muscles

stig 1 , First pulmonary aperture. (same as the series labelled tsm

stig 4 , Fourth pulmonary aper- in hg. 30).

ture. pv 1 to pv 7 , The seven veno-peri-

dam, Muscle from carapace to a cardiac muscles of the right

praeoral entosclerite. side (labelled VPM in fig. 30).

other large Arachnids have not been derived from the scorpions directly, but have independently developed from aquatic ancestors, and from one of these independent groups — probably through the harvest-men from the spiders — the Acari have finally resulted.

After Benham, Trans. Zool. Soc. vol. si., 1883.

Fig. 32. — Diagram of a lateral view of a longitudinal section of

Limulus.

Sue, Suctorial pharynx. al, Alimentary canal. Ph, Pharynx. M, Mouth. Est, Entosternum. VS, Ventral venous sinus. chi, Chilaria. go, Genital operculum. br l to 6r b , Branchial append- ages, met, Unsegmented metasoma.

entapo-

Entap 4 , Fourth dorsal physis of left side.

tsm, Tergo-sternal muscles, six pairs as in Scorpio (labelled dv in fig. 31).

VPM 1 to VPM, The eight pairs of veno-pericardiac muscles (labelled pv in fig. 31). VPM 1 is probably represented in Scorpio, though not marked in figs. 30 and 31.*

Leaving that question for consideration in connexion with the systematic statement of the characters of the various groups of Arachnida which follows on p. 299, it is well now to consider the following question, viz., seeing that Limulus and Scorpio are such highly developed and specialized forms, and that they seem to constitute as it were the first and second steps in the series of recognized Arachnida — what do we know, or what are we led to suppose with regard to the more primitive Arachnida from which the Eurypterines and Limulus and Scorpio have sprung ? Do we know in the recent or fossil condition any such primitive Arachnids? Such a question is not only legitimate, but prompted by the analogy of at least one other great class of Arthropods. The great Arthropod class, the Crustacea, presents to the zoologist at the present day an immense ranjje of forms,

comprising the primitive phyllopods, the minute copepods, the parasitic cirrhipedes and the powerful crabs and lobsters, and the highly elaborated sand-hoppers and slaters. It has been insisted, by those who accepted Lankester's original doctrine of the direct or genetic affinity of the Chaetopoda and Arthro- poda, that Apus and Branchipus really come very near to the ancestral forms which connected those two great branches of Appendiculate (Parapodiate) animals. On the other hand, the land crabs are at an immense distance from these simple forms.

The record of the Crustacean family- tree is, in fact, a fairly complete ,jf J \|;' w one — the lower primitive members " if-. °^ tne g rou P are still represented

_ '..'•■ c' by living forms in great abundance, f A In the case of the Arachnida, if we [_ f s 2 have to start their genealogical ~ " history with Limulus and Scorpio, we are much in the same position as we should be in dealing with the Crustacea, were the whole of the Entomostraca and the whole of the Arthrostraca wiped out of existence and record. There is no possibility of doubt that the series of forms corresponding in the Arachnidan line of descent, to the forms dis- tinguished in the Crustacean line of descent as the lower grade — the Entomostraca — have . ceased to exist, and not only so, but have left little evidence in the form of fossils as*

to their former existence and nature. It must, however, be admitted as probable that we should find some evidence, in ancient rocks or in the deep sea, of the early more primitive Arachnids. And it must be remembered that such forms must be expected to exhibit, when found, differences from Limulus and Scorpio as great as those which separate Apus and Cancer. The existing Arachnida, like the higher Crustacea, are " nomomeristic," that is to say, have a fixed typical number of somites to the body. Further, they are like the higher Crustacea, " somatotagmic," that is to say, they have this limited set of somites grouped in three (or more) " tagmata " or regions of a fixed number of similarly modified somites — each tagma differing in the modi- fication of its fixed number of somites from that characterizing a neigh- bouring " tagma." The most primitive among the lower Crus- tacea, on the other hand, for

From Lankester, "Limulu3 an Arachnid."

Fig. 33. — The alimentary

canal and gastric glands of

a scorpion (A) and of

Limulus (B).

£y, Muscular suctorial en- largement of the pharynx.

sal, Prosomatic pair of gas- tric caeca in Scorpio, called salivary glands by some writers.

c 1 , and c 2 , The anterior two pairs of gastric caeca and ducts of the meso- somatic region.

c', c and c 6 , Caeca and ducts of Scorpio not represented in Limulus.*

M, The Malpighian or renal caecal diverticula of Scorpio.

pro, The proctodaeum or portion of gut leading to anus and formed embryo- logically by an inversion of the epiblast at that orifice.

example, the Phyllopoda, have not a fixed number of somites, some genera — even allied species — have more, some less, within wide limits; they are " anomomeristic." They also, as is generally the case with anomomeristic animals, do not exhibit any con- formity to a fixed plan of " tagmatism " or division of the somites of the body into regions sharply marked off from one another; the head or prosomatic tagma is followed by a trunk consisting of somites which either graduate in character as we pass along

the series or exhibit a large variety in different genera, families and orders, of grouping of the somites. They are anomotagmic, as well as anomomeristic.

When it is admitted — as seems to be reasonable — that the primitive Arachnida would, like the primitive Crustacea, be

anomomeristic and anomotagmic, we shall not demand of claimants for the rank of primitive Arachnids agreement with Limulus and Scorpio in respect of the exact number of their somites and the exact grouping of those somites; and when we see how diverse are the modifications of the branches of the appendages both in Arachnida and in other classes of Arthropoda (?.».), we shall not over-estimate a difference in the form of this or that appendage exhibited by the claimant as compared with the higher Arachnids. With those considerations in mind, the claim of the extinct group of the trilobites to be considered as representatives of the lower and more primitive steps in the Arachnidan genealogy must, it seems, receive a favourable judg- ment. They differ from the Crustacea in that they have only a single pair of prae-oral appendages, the second pair being definitely developed as mandibles. This fact renders their association with the Crustacea impossible, if classification is to be the expression of genetic affinity inferred from structural coincidence. On the contrary, this particular point is one in which they agree with the higher Arachnida. But little is known of the structure of these extinct animals; we are therefore compelled to deal with such special points of resemblance and difference as their remains still exhibit. They had lateral eyes ' which resemble no known eyes so closely as the lateral eyes of Limulus. The general form and structure of their prosomatic carapace are in many striking features identical with that of Limulus. The trilobation of the head and body — due to the expansion and flattening of the sides or "pleura" of the tegu- mentary skeleton— is so closely repeated in the young of Limulus that the latter has been called " the trilobite stage " of Limulus (fig. 42 compared with fig. 41). No Crustacean exhibits this trilobite form. But most important of the evidences presented by the trilobites of affinity with Limulus, and therefore with the Arachnida, is the tendency less marked in some, strongly carried out in others, to form a pygidial or telsonic shield — a fusion of the posterior somites of the body, which is precisely identical in character with the metasomatic carapace of Limulus. When to this is added the fact that a post-anal spine is developed to a large size in some trilobites (fig. 38), like that of Limulus and Scorpio, and that lateral spines on the pleura of the somites are frequent as in Limulus, and that neither metasomatic fusion of somites nor post-anal spine, nor lateral pleural spines are found in any Crustacean, nor all three together in any Arthropod besides the trilobites and Limulus — the claim of the trilobites to be considered as representing one order of a lower grade of Arachnida,

comparable to the grade Entomostraca of the Crustacea, seems to be established.

The fact that the single pair of prae-oral appendages of trilobites, known only as yet in one genus, is in that particular case a pair of uni-ramose antennae — does not render the associa- tion of trilobites and Arachnids improbable. Although the prae-oral pair of appendages in the higher Arachnida is usually chelate, it is not always so ; in spiders it is not so ; nor in many Acari. The bi-ramose structure of the post-oral limbs, demonstrated by Beecher in the trilobite Triarthrus, is no more inconsistent with its claim to be a primitive Arachnid than is the foliaceous modification of the limbs in Phyllopods inconsistent with their relationship to the Arthrostracous Crustaceans such as Gammarus and Oniscus.

Thus, then, it seems that we have in the trilobites the repre- sentatives of the lower phases of the Arachnidan pedigree. The simple anomomeristic trilobite, with its equi-formal somites and equi-formal appendages, is one term of the series which ends in the even more simple but degenerate Acari. Between the two and at the highest point of the arc, so far as morphological differentiation is concerned, stands the scorpion; near to it in the trilobite's direction (that is, on the ascending side) are Limulus and the Eurypterines— with a long gap, due to oblitera- tion of the record, separating them from the trilobite. On the

1 A pair of round tubercles on the lab'am (camerostome or hypo stoma) of several species of Trilobites has been described and held to be a pair of eyes (22). Sense-organs in a similar position were discovered in Limulus by Patten (42) in 1894.

other side — tending downwards from the scorpion towards the Acari — are the Pedipalpi, the spiders, the book-scorpions, the harvest-men and the water-mites.

The strange nobody-crabs or Pycnogonids occupy a place on the ascending half of the arc below the Eurypterines and Limulus. They are strangely modified and degenerate, but seem to be (as explained in the systematic review) the remnant of an Arach- nidan group holding the same relation to the scorpions which the Laemodipoda hold to the Podophthalmate Crustacea.

We have now to offer a classification of the Arachnida and to pass in review the larger groups, with a brief statement of their structural

characteristic^.

In the bibliography at the close of this article (referred to by leaded arabic numerals in brackets throughout these 'pages), the titles of works are given which contain detailed information as to the genera and species of each order or sub-order, their geographical distribution and their habits and economy so far as they have been ascertained. The limits of space do not permit of a fuller treatment of those matters here.

Tabular Classification 1 of the Arachnida.

Class. ARACHNIDA. Grade A. ANOMOMERISTICA. Sub-Class. TRILOBITAE.

Orders. Not satisfactorily determined.

Grade B. NOMOMERISTICA.

Sub-Class I. PANTOPODA. Order 1. Nymphonomorpha. „ 2. Ascorhynchomorpha. „ 3. Pycnogonomorpha. Sub-Class H. EU-ARACHNIDA.

Grade a. delobranchia, Lankester [vel hydro-

PNEUSTEA, Pocock).

Order 1. Xiphosura. „ 2. Gigantostraca.

Grade b. embolobranchia, Lankester (vel aero-

PNEUSTEA, Pocock).

Section a. Pectinifera. Order 1. Scorpionidea.

Sub-order a. Apoxypoda. ,, b. Dionychopoda.

Section /3. Epectinata. Order 2. Pedipalpi.

Sub-order a. Uropygi.

Tribe 1. Urotricha. 2. Tartarides. Sub-order b. Amblypygi. Order 3. Araneae.

Sub-order a. Mesothelae. „ b. Opisthothelae.

Tribe 1. Mygalomorphae. 2. Arachnomorphae. Order 4. Palpigradi (= Microthelyphonidae). Order 5. Solifugae (=Mycetophorae). Order 6.

Pseudoscorpiones (=Chelonethi). Sub-order a. Panctenodactyli. ,, b. Hemictenodactyli. Order 7. Podogona (=Ricinulei). Order 8. Opiliones.

Sub-order a. Laniatores. „ b. Palpatores. „ c. Anepignathi. Order 9. Rhynchostomi (= Acari). Sub-order a. Notostigmata. „ b. Cryptostigmata. „ c. Metastigmata. „ d. Prostigmata. „ e. Astigmata. ,, /. Vermiformia. „ g. Tetrapoda.

Class. ARACHNIDA. — Euarthropoda having two prosthomeres (somites which have passed from a post-oral to a prae-oral position), the appendages of the first represented by eyes, of the second by solitary rami which are rarely antenniform, more usually chelate. A tendency is exhibited to the formation of a metasomatic as well as a prosomatic carapace by fusion of the tergal surfaces of the somites. Intermediate somites forming a mesosoma occur, but tend to fuse superficially with the metasomatic carapace or to become co-ordinated with the somites of the metasoma, whether fused or distinct to form one region, the opisthosoma (abdomen of authors). In the most highly developed forms the two anterior divisions

(tagmata) of the body, prosoma and mesosoma, each exhibit six pairs of limbs, pediform and plate-like respectively, whilst the metasoma consists of six limbless somites and a post-anal spine. The genital apertures are placed in the first somite following the prosoma, excepting where a praegenital somite, usually suppressed, is retained. Little is known of the form of the appendages in the lowest archaic Arachnida, but the tendency of those of the proso- matic somites has been (as in the Crustacea) to pass from a generalized bi-ramose or multi-ramose form to that of uni-ramose antennae, chelae and walking legs.

The Arachnida are divisible into two grades of structure — accord- ing to the fixity or non-fixity of the number of somites building up the body : —

Grade A {of the Arachnida). ANOMOMERISTICA.— Extinct archaic Arachnida, in which (as in the EntomostracOus Crustacea) the number of well-developed somites may be more or less than eighteen and may be grouped only as head (prosoma) and trunk or may be further differentiated. A telsonic tergal shield of greater or less size is always present, which may be imperfectly divided into well-marked but immovable tergites indicating incompletely differ- entiated somites. The single pair of palpiform appendages in front of the mouth has been found in one instance to be antenniform, whilst the numerous post-oral appendages in the same genus were bi-ramose. The position of the genital apertures is not known. Compound lateral eyes present ; median eyes wanting. The body and head have the two pleural regions of each somite flattened and expanded on

either side of the true gut-holding body-axis. Hence the name of the sub-class signifying tri-lobed, a condition realized also in the Xiphosurous Arachnids. The members of this group, whilst resembling the lower Crustacea (as all lower groups of a branching genealogical tree must do), differ from them essentially in that the head exhibits only one prosthomere (in addition to the eye-bearing prosthomere) with palpiform appendages (as in all Arachnida) instead of two. The Anomomeristic Arachnida form a single sub-class, of which only imperfect fossil remains are known.

Sub-class (of the Andmomeristica) . TRILOBITAE. — The single sub-class Trilobitae constitutes the grade Anomomeristica. It has been variously divided into orders by a number of writers. The greater or less evolution and specialization of the metasomatic carapace appears to be the most important basis for classification — but this has not been made use of in the latest attempts at drawing up a system of the Trilobites. The form of the middle and lateral regions of the prosomatic shield has been used, and an excessive importance attached to the demarcation of certain areas in that structure. Sutures are stated to mark off some of these pieces, but in the proper sense of that term as applied to the skeletal structures of the Vertebrata, no sutures exist in the chitinous cuticle of Arthro- poda. That any partial fusion of originally distinct chitinous plates takes place in the cephalic shield of Trilobites, comparable to the partial fusion of bony pieces by suture in Vertebrata, is a suggestion contrary to fact.

The Trilobites are known only as fossils, mostly Silurian and prae-Silurian ; a few are found in Carboniferous and Permian strata. As many as two thousand species are known. Genera with small metasomatic carapace, consisting of three to six fused segments distinctly marked though not separated by soft membrane, are Harpes, Paradoxid.es and Triarthrus (fig. 34). In Calymene, Homa- lonotus and Phacops (fig. 38) from six to sixteen segments are clearly marked by ridges and grooves in the metasomatic tagma, whilst in Illaenus the shield so formed is large but no somites are marked out on its surface. In this genus ten free somites (mesosoma) occur between the prosomatic and metasomatic carapaces. Asaphus and Megalaspis (fig. 39) are similarly constituted. In Agnostus (hg; 4°) the anterior and posterior carapaces constitute almost the entire body, the two carapaces being connected by a mid-region of only two free somites. It has been held that the forms with a small number of somites marked in the posterior carapace and numerous free somites between the anterior and posterior carapace, must be considered as anterior to those in which a great number of posterior somites are traceable in the metasomatic carapace, and that those in which the traces of distinct somites in the posterior or meta- somatic carapace are most completely absent must be regarded as derived from those in which somites are well marked in the posterior

1 The writer is indebted to R. I. Pocock, assistant in the Natural History departments of the British Museum, for valuable assistance in the preparation of this article and for the classification and de- finition of the groups of Eu-arachnida here given. The general scheme and some of the details have been brought by the writer into agreement with the views maintained in this article. Pocock accepts those views in all essential points and has, as a special student of the Arachnida, given to them valuable expansion and confirmation. The writer also desires to express his thanks to Messrs. Macmillan & Co. for permission to use figs.22,43,44 and 45, which are taken from Parker and Haswell's Text-book of Zoology ; and to Messrs. Swan Sonnenschein & Co. for the loan of several figures from the trans- lations published by them of the admirable treatise on Embryology by Professors Korschelt and Heider; also to the publishers of the treatise on Palaeontology by Professor Zittel, Herr Oldenbourg and The Macmillan Co., New York, for several cuts of extinct forms.

carapace and similar in appearance to the free somites. The genus Agnostus, which belongs to the last category, occurs abundantly in

Cambrian strata and is one of the earliest forms known. This would lead to the supposition that the great develop- ment of metasomatic carapace is a primitive and not a late character, were it not for the fact that Paradoxides and A tops, with an incon- spicuous telsonic cara- pace and numerous free somites, are also Cam- brian in age, the latter indeed anterior in horizon to Agnostus.

On the other hand, it may well be doubted whether the pygidial or posterior carapace is primarily due to a fusion of the tergites of somites which were previously movable and well de- veloped. The posterior carapace of the Trilo- bites and of Limulus is probably enough in origin a telsonic cara- pace — that is to say, is the tergum of the last segment of the body which carries the anus. From the front of this region new segments are produced in the first instance, and are added during growth to the existing series. This telson may enlarge, it may possibly even be- come internally and sternally developed as partially separate som- ites, and the tergum may remain without trace of somite forma- tion, or, as appears to be the case in Limulus, the telson gives rise to a few well-marked som- ites (mesosoma and two others) and then en- larges without further trace of segmentation, whilst the chitinous integument which de- velops in increasing thickness on the terga as growth advances welds together the un- segmented telson and the somites in front of it, which were previ- ously marked by separate tergal

thicken- ings. It must always be Fig. 34. — Restoration of Triarthrus remembered that we are Becki, Green, as determined by Beecher "able (especially in the from specimens obtained from the Utica case of fossilized mtegu- Slates (Ordovician), New York. A, dorsal; ments) to attach an B, ventral surface. In the latter the single unwarranted mterpre- pair of antennae springing up from each tation to the mere side of the camerostome or hypostome or discontinuity or con- upper lip-lobe are seen. Four pairs of tinuity of the thickened appendages besides these are seen to belong plates of chitinous to the cephalic tergum. All the append- cuticle on the back of ages are pediform and bi-ramose ; all have an Arthropod. These a prominent gnathobase, and in all the plates may fuse, and yet exopodite carries a comb-like series of the somites to which secondary processes. they belong may remain

(After Beecher, from Zittel.) distinct, and each have

its pair of appendages well developed. On the other hand, an unusually large tergal plate, whether terminal or in the series, is not always due to fusion of the dorsal plates of once-separate somites, but is often a case of growth and enlargement of a single somite without formation

of any trace of a new somite. For the literature of Trilobites see

(22).*

Grade B {of the Arachnida) NOMOMERISTICA.—Arachmda in which, excluding from consideration the eye-bearing prostho- mere, the somites are primarily (that is to say, in the common

Q

Fig. 35-— Triarthrus Becki, Green, a, Restored thoracic limbs in transverse section of the animal; b, section across a posterior somite ; c, section across one of the sub-terminal somites.

(After Beecher.) ancestor of the grade) grouped in three regions of six — (a) the " prosoma " with palpiform appendages, (b) the " mesosoma " with plate-like appendages, and © the " metasoma " with suppressed

Fig. 36. — Triarthrus Becki, Green. Fig. 37. — Deiphon Forbesii,

Dorsal view of second thoracic leg Barr. One of the Cheiru-

with and without setae, en, Inner ridae. Silurian Bohemia,

ramus ; ex, Outer ramus. (From Zittel's Palaeontology.) (After Beecher.)

appendages. A somite placed between the prosoma and mesosoma — the prae-genital somite — appears to have belonged originally to the prosomatic series (which with its ocular prosthomere and palpi-

Fig. 38. — Dalmanites limulurus, Green. One of the Phacopidae, from the Silurian, New York. (From Zittel.)

Fig. 39. — Megalaspis extenuatus. One of the Asaphidae allied to Illaenus, from the Ordovician of East Gothland, Sweden. (From Zittel).

form limbs [Pantopoda], would thus consist of eight somites), but to have been gradually reduced. In living Arachnids, excepting the Pantopoda, it is either fused (with loss of its appendages) with the prosoma (Limulus, 1 Scorpio), after embryonic appearance, or is

1 Pocock suggests that the area marked vii. in the outline figure of the dorsal view of Limulus (fig. 7) may be the tergum of the suppressed prae-genital somite. Embryological evidence must settle whether this is so or not.

retained as a rudimentary, separate, detached somite in front of the mesosoma, or disappears altogether (excalation). The atrophy and total disappearance of ancestrally well-marked somites fre-

FiG.40. — Fourstagesin B CD /r-‘^K tne development of the

trilobite Agnostus nudus. A, Youngest stage with no mesosomatic somites ; B and C, stages with two mesosomatic somites be- tween the prosomatic and telsonic carapaces ; D, adult condition, still with only two free mesosoma tic somites. (From Korschelt and Heider.)

quently take place (as in all Arthropoda) at the posterior extremity

of the body, whilst excalation of somites may occur at the constricted

areas which often separate adjacent ” regions,” though there are

A B C very few instances in

which it has been recog- nized. Concentration of the cfrgan-systems by fusion of neighbouring regions (prosoma, meso- soma, metasoma), pre-viously distinct, has frequently occurred, together with oblitera- tion of the muscular and chitinous structures indicative of distinct somites. This concentra- tion and obliteration of somites, often accom- panied by

dislocation of important segmental structures (such as ap- pendages and nerve- ganglia), may lead to highly developed speci- alization (individuation, H. Spencer), as in the Araneae and Opiliones, and, on the other hand, may terminate in simpli- fication and degenera- tion, as in the Acari.

The most important general change which has affected the struc- ture of the nomomeristic Arachnida in the course of their historic develop- ment is the transition from an aquatic to a terrestrial life. This has been accompanied by the conversion of the lamelliform gill-plates into lamelliform lung-plates, and later the development from the lung-chambers, and at independent sites, of tracheae or air-tubes (by adaptation of the vasifactive tissue of the blood-vessels) similar to those independently developed in A B

Fig. 42. — So-called " trilobite stage " of Limulus polyphemus. A, Dorsal; B, ventral view.

(From Korschelt and Heider, after Leuckart.)

Peripatus, Diplopoda, Hexapoda and Chilopoda. Probably tracheae have developed independently by the same process in several groups of tracheate Arachnids. The nomomeristic Arachnids comprise two sub-classes — one a very small degenerate offshoot from early ances- tors; the other, the great bulk of the class.

Sub- Class I. (of the Nomomeristica). PANTOPODA.— Nomo- meristic Arachnids, in which the somites corresponding to mesosoma and metasoma have entirely aborted. The seventh, and sometimes the eighth, leg-bearing somite is present and has its leg-like append- ages fully developed. Monomeniscous eyes with a double (really triple) cell-layer formed by invagination, as in the Eu-arachnida, are present. The Pantopcda stand in the same relation to Limulus and Scorpio that Cyamw: holds to the thoracostracous Crustacea.

From Korschelt and Heider, after Barrande. Fig. 41. — Five stages in the develop- ment of the trilobite Sao hirsuta.

A, Youngest stage.

B, Older stage with distinct pygidial carapace.

C, Stage with two free mesosomatic somites between the prosomatic and telsonic carapaces.

D, Stage with seven free intermediate somites.

E, Stage with twelve free somites; the telsonic carapace has not increased in size.

a, Lateral eye.

g, So-called facial "suture" (not really a

suture). p, Telsonic carapace.

The reduction of the organism to seven leg-bearing somites, of which the first pair, as in so many Eu-arachnida, are chelate, is a form of degeneration connected with a peculiar quasi-parasitic habit re- sembling that of the crustacean Laemodipoda. The genital pores are situate at the base of the 7th pair of limbs, and may be repeated

From Parker and Harwell's Texi-book oj Zoology, after Hoek. Fig. 43. — One of the Nymphonomorphous Pantopoda, Nymphon hispidum, showing the seven pairs of appendages 1 to 7; ab, the rudimentary opisthosoma ; s, the mouth-bearing proboscis.

on the 4th, 5th, and 6th. In all known Pantopoda the size of the body is quite minute as compared with that of the limbs : the ali- mentary canal sends a long caecum into each leg (cf. the Araneae) and the genital products are developed in gonocoels also placed in the legs.

The Pantopoda are divided into three orders, the characters of which are dependent on variation in the presence of the full number of legs.

Order 1 (of the Pantopoda). Nymphonomorpha, Pocock (nov.) (fig- 43)- — In primitive forms belonging to the family Nymphonidae the full complement of appendages is retained — the 1st (mandibular), the 2nd (palpiform), and the 3rd (ovigerous) pairs being well de- veloped in both sexes. In certain derivative forms constituting the family Pallenidae, however, the appendages of the 2nd pair are either rudimentary or atrophied altogether.

Two families: 1. Nymphonidae (genus Nymphon), and 2. Palleni- dae (genus Pallene).

Order 2. Ascorhynchomorpha, Pocock (nov.).— Appendages of the 2nd and 3rd pairs retained and developed, as in the more primi- tive types ot Nymphonomorpha ; but those of the 1st pair are either rudimentary, as in the Ascorhynchidae, or atrophied, as in the Colossendeidae. In the latter a further specialization is shown in the fusion of the body segments.

Two families: 1. Ascorhynchidae (genera Ascorhynchus and Ammolkea);

2. Colossendeidae (genera Colossendeis' and Disco- arachne).

Order 3. Pycnogonomorpha, Pocock (nov.). — Derivative forms in which the reduction in number of the anterior appendages is carried farther than in the other orders, reaching its extreme in the Pycno- gonidae, where the 1st and 2nd pairs are absent in both sexes, and the 3rd pair also are absent in the female. In the Hannoniidae, however^ which resemble the Pycnogonidae in the absence of the 3rd pair in the female and of the 2nd pair in both sexes, the 1st pair are retained in both sexes.

Two families: 1. Hannoniidae (genus Hannonia) ; 2. Pycno- gonidae (genera Pycnogonum and Phoxichilus).

Remarks. — The Pantopoda are not known in the fossil condition. They are entirely marine, and are not uncommon in tne coralline zone of the sea-coast. The species are few, not more than fifty (23). Some large species of peculiar genera are taken at great depths. Their movements are extremely sluggish. They are especially remarkable for the small size o"f the body and the extension of viscera into the legs. Their structure is eminently that of degenerate forms. Many frequent growths of coralline Algae and hydroid polyps, upon the juices of which they feed, and in some cases a species of gall is produced in hydroids by the penetration of the larval Pantopod into the tissues of the polyp.

Sub-Class II. (of the Nomomeristic Arachnida). EU-ARACH- NIDA.— These start from highly developed and specialized aquatic branchiferous forms, exhibiting a prosoma with six pediform pairs of appendages, an intermediate prae-genital somite, a mesosoma of six somites bearing lamelliform pairs of appendages, and a metasoma of six somites devoid of appendages, and the last provided with a post-anal spine. Median eyes are present, which are mono- meniscous, with distinct retinal and corneagenous cell-layers, and placed centrally on the prosoma. Lateral eyes also may be present, arranged in lateral groups, and having a single or double cell-layer beneath the lens. The first pair of limbs is often chelate or prehensile, rarely antenniform ; whilst the second, third and fourth may also be chelate, or may be simple palps or walking legs.

An internal skeletal plate, the so-called " entosternite " of fibro-cartilaginous tissue, to which many muscles are attached, is placed between the nerve-cords and the alimentary tract in the prosoma of the larger forms (Limulus, Scorpio, Mygale). In the same and other leading forms a pair of

much-coiled glandular tubes, the coxal glands (coelomocoels in origin), is found with a duct opening on the coxa of the fifth pair of appendages of the prosoma. The vascular system is highly developed (in the non-degenerate forms) ; large arterial branches closely accompany or envelop the chief nerves; capillaries are well developed. The blood-corpuscles are large amoe- biform cells, and the blood-plasma is coloured blue by haemocyanin.

The alimentary canal is uncoiled and cylindrical, and gives rise laterally to large gastric glands, which are more than a single pair in number (two to six pairs), and may assume the form of simple caeca. The mouth is minute and the pharynx is always suctorial, never gizzard-like. The gonadial tubes (gonocoels or gonadial coelom) are originally reticular and paired, though they may be reduced to a simpler condition. They open on the first somite of the mesosoma. In the numerous degenerate forms simplification occurs by obliteration of the demarcations of somites and the fusion of body-regions, together with a gradual suppression of the lamelliferous respiratory organs and the substitution for them of tracheae, which, in their turn, in the smaller and most reduced members of the group, may also disappear.

The Eu-arachnida are divided into two grades with reference to the condition of the respiratory organs as adapted to aquatic or terrestrial life.

Grade a (of the Eu-arachnida). delobranchia (Hydropheustea) .

Mesosomatic segments furnished with large plate-like appendages, the 1st pair acting as the genital operculum, the remaining pairs being provided with branchial lamellae fitted for breathing oxygen dissolved in water. The prae-genital somite partially or wholly obliterated in the adult. The mouth lying far back, so that the basal segments of all the prosomatic appendages, excepting those of the 1st pair, are capable of acting as masticatory organs. Lateral eyes consisting of a densely packed group of eye-units (" compound " eyes).

*Order 1. Xiphosura. — The prae-genital somite fuses in the embryo with the prosoma and disappears (see fig. 19). Not free- swimming, none of the prosomatic appendages modified to act as paddles ; segments of the mesosoma and metasoma (= opisthosoma) not more than ten in number, distinct or coalesced. Family — Limulidae (Limulus). ,, *Belinuridae {Beiinurus, Aglaspis, Prestwichia) . ,, "Hemiaspidae (Hemiaspis, Bunodes).*

Remarks. — The Xiphosura are marine in habit, frequenting the shore. They are represented at the present day by the single genus Limulus (figs. 44 and 45; also figs. 7, 9, 11, to 15 and 26), often termed the king-crab, which occurs on the American coast of the

Fig. 44. — Dorsal view of Limulus polyphemus, Latr.

(From Parker and Haswell, Text-book of Zoology, after Leuckart.)

Atlantic Ocean, but not on its eastern coasts, and on the Asiatic coast of the Pacific. The Atlantic species (L, polyphemus) is common on the coasts of the United States, and is known as the king-crab or horse-shoe crab. A single specimen was found in the harbour of

Copenhagen in the 18th century, having presumably been carried over by a ship to which it clung.

A species of Limulus is found in the Buntersandstein of the Vosges ; L. Walchi is abundant in the Oolitic lithographic slates of Bavaria.

The genera Beiinurus, Aglaspis, Prestwichia, Hemiaspis and Bunodes consist of small forms which occur in Palaeozoic rocks.

ceph

Fig. 45. — Ventral view of Limulus poly- phemus.

1′ to 6, The six proso- matic pairs of appen- dages.

abd, the solid opistho- ... — opcrc somatic carapace.

tels, the post-anal spine (not the telson as the lettering would seem to imply, but only

.abd

its post-anal por- ._- teh tion).

operc, the fused first pair of mesosomatic appendages forming the genital oper- culum.

(From Parker and Haswell, Text-book of Zoology, after Leuckart.)

In none of them are the appendages known, but in the form of the two carapaces and the presence of free somites they are distinctly intermediate between Limulus and the Trilobitae. The young form of Limulus itself (fig. 40) is also similar to a Trilobite so far as its segmentation and trilobation are concerned. The lateral eyes of Limulus appear to be identical in structure and position with those of certain Trilobitae.

Order2. Gigantostraca (figs. 46, 47). — Free-swimming forms, with the appendages of the 6th or 5th and 6th pairs flattened or lengthened

Fig. 46. — Eury- pterus Fischeri, Eichwald. Silu- rian of Rootzikil. Restoration after Schmidt. The

dorsal aspect is presented show- ing the prosomatic shield with paired compound eyes and the proso- matic appendages II. to VI. The small first pair of appendages is con- cealed from view by the carapace. 1 to 12 are the somites of the opisthosoma ; 13, the post-anal spine.

(From Zittel's Text- book of Palaeontology, The Macmillan Co., New York, 1896.)

to act as oars; segments of mesosoma and metasoma (= opistho- soma), twelve in number.

Appendages of anterior pair very large and chelate.

Sub-order Pterygotomorpha, Pterygotidae {Pterygotus). Appendages of anterior pair minute and chelate.

(Stylonuridae (Stylonurus) . Sub-order Eurypteromorpha ■] Eurypteridae {Eurypterus, (Slimonia).

Remarks. — The Gigantostraca are frequently spoken of as " the Eurypterines." Not more than thirty species are known. They became extinct in Palaeozoic times, and are chiefly found in the Upper Silurian, though extending upwards as far as the Carbon- iferous. They may be regarded as " macrourous " Xiphosura ; that is to say, Xiphosura in which the nomomeristic number of eighteen

From Zittel's Palaeontology.

Fig. 47. — Pterygotus osiliensis, Schmidt. Silurian of Rooteikil. Restoration of the ventral surface, about a third natural size, after Schmidt.

Camerostome or epistoma. m, Chilarium or metasternite of

the prosoma (so-called meta-

stoma). oc, The compound eyes.

I to 8, Segments of the sixth prosomatic appendage.

I' to V, First five opisthosomatic

somites. 7', Sixth opisthosomatic somite.

[Observe the powerful gnathobases of the sixth pair of prosomatic limbs and the median plates behind m. The dotted line on somite I indicates the position of the genital operculum which was probably provided with branchial lamellae.]

well-developed somites is present and the posterior ones form a long tail-like region of the body. There still appears to be some doubt whether in the sub-order Eurypteromorpha the first pair of proso- matic appendages (fig. 46) is atrophied, or whether, if present, it has the form of a pair of tactile palps or of minute chelae. Though there are indications of lamelliform respiratory appendages on mesoso- matic somites following that bearing the genital operculum, we cannot be said to have any proper knowledge as to such appendages, and further evidence with regard to them is much to be desired. (For literature see Zittel, 22.)*

Grade b (of the Eu-arachnida). embolobranchia (Aeropneustea).

In primitive forms the respiratory lamellae of the appendages of the 3rd, 4th, 5th and 6th, or of the 1st and 2nd mesosomatic somites are sunk beneath the surface of the body, and become adapted to breathe atmospheric oxygen, forming the leaves of the so-called lung-books. In specialized forms these pulmonary sacs are wholly or partly replaced by tracheal tubes. The appendages of the meso- soma generally suppressed ; in the more primitive forms one or two pairs may be retained as organs subservient to reproduction or silk- spinning. Mouth situated more forwards than in Delobranchia, no share in mastication being taken by the basal segments of the 5th and 6th pairs of prosomatic appendages. Lateral eyes, when present, represented by separate ocelli.

The prae-genital somite, after appearing in the embryo, either is obliterated (Scorpio, Galeodes, Opilio and others) or is retained as a reduced narrow region of the body, the " waist," between prosoma and mesosoma. It is represented by a full-sized tergal plate in the Pseudo-scorpiones.

Section a. Pectinifera. — The primitive distinction between the mesosoma and the metasoma retained, the latter consisting of six somites and the former of six somites in the adult, each of which is furnished during growth with a pair of appendages. Including the prae-genital somite (fig. 16), which is suppressed in the adult,

there are thirteen somites behind the prosoma. The appendages of the 1st and 2nd mesosomatic somites persisting as the genital oper- culum and pectones respectively, those of the 3rd, 4th, 5th and 6th somites (? in

Palaeophonus) sinking below the surface during growth in connexion with the forma- tion of the four pairs of pulmonary sacs (see fig. 17). Lateral eyes monostichous.

Order 1. Scorpiones. — Prosoma covered by a single dorsal shield, bearing typically median and lateral eyes; its sternal elements reduced to a single plate lodged between or behind the basal segments of the 5th and 6th pairs of appendages. Appendages of 1st pairjtri-segmented, chelate; of 2nd pair chelate, with their basal segments subserving mastication; of 3rd, 4th, 5th and 6th pairs similar in form and function, except that in recent and Carbon- iferous forms the basal segments of the 3rd and 4th are provided with sterno-coxal (maxillary) lobes, those of the 4th pair meeting in the middle line and underlying the mouth. The five posterior somites of the meta- soma constricted to form a " tail," the post-anal sclerite persisting as a weapon of offence and provided with a pair of poison glands (see figs. 8, 10, 12, 13, 14, 15, 21 and 22).

Sub-order Apoxypoda. — The 3rd, 4th, 5th and 6th pairs of append- ages short, stout, tapering, the segments about as wide as long, except the apical, which is distally slender, pointed, slightly curved, and without distinct movable claws.

Family — Palaeophonidae, Palaeo- phonus (figs. 48 and 49).

Sub-order Dionychopoda. — The 3rd

Restored after Thorell's indications by R. I. Pocock.

Fig. 48. — Dorsal view of a restoration of Palaeophonus nuncius, Thorell. The Silu- rian scorpion from Gothland.

4th, 5th and 6th pairs of appendages slender, not evenly tapering, the segments longer than wide ; the apical segment short, distally truncate, and provided with a pair of movable claws. Basal segments of the 5th and 6th pairs of appendages abutting against the sternum of the prosoma (see fig. 10 and figs. 51, 52 and 53).

Family — Pandinidae (Pandinus, Opisthophthalmus, Urodacus). Vejovidae (Vaejovis, Jurus, Euscorpius, Broteas). Bothriuridae (Boihriurus, Cercophonius) . Buthidae (Buthus, Centrums).

**Cyclophthalmidae (Cyclophthalmus) (Carbon-*

**Eoscorpiidae {Eoscorpius, Centromachus) (iferous. Remarks on the Order Scorpiones. — The Scorpion is one of the great animals of ancient lore and tradition. It and the crab are*

Fig. 49. — Ventral view of a restoration of Palaeophonus Hunteri, Pocock, the Silurian scorpion from Lesmahagow, Scotland. Restored by R. I. Pocock. The meeting of the coxae of all the prosomatic limbs in front of the penta- gonal sternum; the space for a genital operculum; the pair of pectens, and the absence of any evidence of pulmonary stigmata are noticeable in this specimen. •

(See Pocock, Quart. Jour. Micr. Sci., 1901.)

the only two invertebrates which had impressed the minds of early men sufficiently to be raised to the dignity of astronomical represen- tation. It is all the more remarkable that the scorpion proves to be the oldest animal form of high elaboration which has persisted to the present day. In the Upper Silurian two specimens of a scorpion have been found (figs. 48, 49), one in Gothland and one in Scotland,

which would be recognized at once as true scorpions by a child or a savage. The Silurian scorpion Palaeophonus, differs, so far as obvious points are concerned, from a modern scorpion only in the thickness of its legs and in their terminating in strong spike-like joints, instead of being slight and provided with a pair of terminal claws. The legs of the modern scorpion (fig. 10 : fig. 51) are those of a terrestrial Arthropod, such as a beetle; whilst those of the Silurian scorpion are the legs of an aquatic Arthropod, such as a crab or lobster. It is probable that the Silurian scorpion was an aquatic animal, and that its respiratory lamellae were still projecting from the surface of the body to serve as branchiae. No trace of "stigmata," the

Fig. 50. — Comparison of the sixth prosomatic limb of a recent scorpion (B), of Palaeophonus ©, and of CI Limulus (A), showing their agreement in the number of segments; in the exist- ence of a movable spine, Sp, at the distal border of the fifth segment ; in the correspondence of the two claws at the free end of the # limb of Scorpio with two / spines similarly placed in Limulus; and, lastly, in the correspondence of the three talon-like spines car- ried on the distal margin of segment six of recent scorpions with the four larger but similarly situated spines on the leg of Limulus; s, groove dividing the anky- ci losed segments 4 and 5 of the Limulus leg into two. (After Pocock, Q.J . Mic. Set., 1901.)

orifices of the lung-chambers of modern scorpions, can be found in the Scottish specimen of Palaeophonus, which presents the ventral surface of the animal to view. On the other hand, no trace of re- spiratory appendages

excepting the pectens can be detected in the specimen (see fig. 49).

Fossil scorpions of the modern type are found in the Coal Measures. At the present day scorpions of various genera are found in all the warm regions of the world. In Europe they occur as far north as Bavaria and the south of France. The largest species measure 9 in. from the front of the head to the end of the sting, and occur in tropical India and Africa. Between 200 and 300 species are known.

' t,,s 2S5S*

From Lankester, Journ. Linn. Soc. Zool. vol. xvi., 1881.

Fig. 51. — Drawing from life of the desert scorpion, Buthusaustralis, Lin., from Biskra, N. Africa.

The scorpions use their large chelae for seizing prey and for fighting with one another. They never use the sting when (as frequently happens) they attack another scorpion, because, as was ascertained by A. G. Bourne (24), the poison exuded by the sting has no in- jurious effect on another scorpion nor on the scorpion itself. The stories of a scorpion stinging itself to death when placed in a circle of burning coals are due to erroneous observation. When placed in such a position the scorpion faints and becomes inert. It is found (Bourne, 24) that some species of scorpion faint at a temperature of 40 Cent. They recover on being removed to cooler conditions. A scorpion having seized its prey (usually a large insect, or small reptile or mammal) with the large chelae brings its tailover its head, and deliberately punctures the struggling victim twice with its sting (fig. 52). The poison of the sting is similar to snake-poison

juices

(Calmette), and rapidly paralyses animals which are not immune to it. It is probably only sickly adults or young children of the human race who can be actually killed by a scorpion's sting. When the scorpion has paralysed its prey in this way, the two short cheli- cerae are brought into play (fig. 53). By the crushing action of their

Cincers, and an alternate backward and forward movement, they ring the soft blood-holding tissues of the victim close to the minute pin-hole aperture which is the scorpion's mouth. The muscles acting on the bulb-like pharynx now set up a pump- ing action (see Huxley, 26) ; and the matter, excepting such as is reduced to powder — are sucked into the scorpion's alimentary canal. A scorpion appears to prefer for its food another scorpion, and will suck out the juices of an individual as large as itself. When this has taken place, the gorged scorpion becomes distended and tense in the mesosomatic

region. It is certain that the absorbed juices do not occupy the alimentary canal alone, but pass also into its caecal off-sets which are the ducts of the gastric glands (see fig. 33).

From Lankester, Journ. Linn. Soc.

Fig. 53. — The same scorpion carrying the now paralysed fly held in its chelicerae, the chelae liberated for attack and defence. Drawn from life.

From Lankester, Journ. Linn. Soc.

Fig. 52. — Drawing from life of the Italian scorpion Euscorpius italicus, Herbst, holding a blue-bottle fly with its left chela, and carefully piercing it be- tween head and thorax with its sting. Two insertions of the sting are effected and the fly is instantly paralysed by the poison so introduced into its body.

All Arachnida, including Limulus, feed by suctorial action in essentially the same way as Scorpio.

Scorpions of various species have been observed to make a hissing noise when disturbed, or even when not disturbed. The sound is produced by stridulating organs developed on the basal joints of the limbs, which differ in position and character in different genera (see Pocock, 27). Scorpions copulate with the ventral surfaces in contact. The eggs are fertilized, practically in the ovary, and de- velop in situ. The young are born fully formed and are carried by the mother on her back. As many as thirty have been counted in a brood. For information as to the embryology of scorpions, the reader is referred to the works named in the bibliography below. Scorpions do not possess spinning organs nor form either snares or nests, so far as is known. But some species inhabiting sandy deserts form extensive burrows. The fifth pair of prosomatic appendages is used by these scorpions when burrowing, to kick back the sand as the burrow is excavated by the great chelae.

References to works dealing with the taxonomy and geographical distribution of scorpions are given at the end of this article (28).

Section 0. Epectinata. — The primitive distinction between the mesosoma and the metasoma wholly or almost wholly obliterated, the two regions uniting to form an opisthosoma, which never consists of more than twelve somites and never bears appendages or breath- ing-organs behind the 4th somite. The breathing-organs of the opisthosoma, when present, represented by two pairs of stigmata, opening either upon the 1st and 2nd (Pedipalpi) or the 2nd and 3rd somites (Solifugae, Pseudo-scorpiones), or by a single pair Upon the 3rd (? 2nd) somite (Opiliones) of the opisthosoma, there

being rarely an additional stigma on the 4th (some Solifugae). The appendages of the 2nd somite of the opisthosoma absent, rarely minute and bud- like (some Amblypygi), never pectiniform. A prae-genital somite is often present either in a reduced condition forming a waist (Pedi- palpi, Araneae, Palpigradi) or as a full-sized tergal plate (Pseudo- scorpiones) ; in some it is entirely atrophied (Solifugae, Holosomata, and Rhynchostomi). Lateral eyes when present diplostichous.

Remarks. — The Epectinate Arachnids do not stand so close to. the aquatic ancestors of the Embolobranchia as do the Pectiniferous scorpions. At the same time we are not justified in supposing that the scorpions stand in any way as an intermediate grade between any of the existing Epectinata and the Delobranchia. It is probable that the Pedipalpi, Araneae, and Podogona have been separately evolved as distinct lines of descent from the ancient aquatic Arach- nida. The Holosomata and Rhynchostomi are probably offshoots from the stem of the Araneae, and it is not unlikely (in view of the structure of the prosomatic somites of the Tartarides) that the Solifugae are connected in origin with the Pedipalpi. The appear ance of tracheae in place of lung-sacs cannot be regarded as a start- ing-point for a new line of descent comprising all the tracheate forms ;

tracheae seem to have developed independently in different lines of descent. On the whole, the Epectinata are highly specialized and degenerate forms, though there are few, if any, animals which surpass the spiders in rapidity of movement, deadliness of attack and constructive instincts.

Order 2. Pedipalpi (figs. 54 to 59). — Appendages of 1st pair bisegmented, without poison gland; of 2nd pair prehensile, their basal segments underlying the proboscis, and furnished with sterno-

From Lankester, Q. J. Mic. Sci. N.S. vol. xxi., 1S81.

Fig. 54. — Thelyphonus, one of the Pedipalpi.

A, Ventral view.

I, Chelicera (detached).

II, Chelae.

III, Palpiform limb.

IV to VI, The walking legs.

stc, Sterno-coxal process (gnatho- base) of the chelae.

rf 1 , Anterior sternal plate of the prosoma.

sV-, Posterior sternal plate of the prosoma.

pregen, Position of the prae- genital somite (not seen).

/, /, Position of the two pul- monary sacs of the right side.

I to 11, Somites of the opistho-

soma (mesosoma plus meta-

soma). msg, Stigmata of the tergo-

sternal muscles. an, Anus. B, Dorsal view of the opistho-

soma of the same. pregen, The prae-genital somite. p, The tergal stigmata of the

tergo-sternal muscles. paf, Post-anal segmented fila- ment corresponding to the post-anal spine of Limulus.

coxal (maxillary) process, the apical segment tipped with a single movable or immovable claw ; appendages of 3rd pair different from the remainder, tactile in function, with at least the apical segment many-jointed and clawless. The ventral surface of the prosoma bears prosternal, metasternal and usually mesosternal chitine- plates (fig. 55). A narrow prae-genital somite is present between opisthosoma and prosoma (figs. 55, 57). Opisthosoma consisting of eleven somites, almost wholly without visible appendages. Intro- mittent organ of male beneath the genital operculum (= sternum of the 1st somite of opisthosoma).

Fig. 55. — Thelyphonus sp. Ventral view of the anterior portion of the body to show the three prosomatic sternal plates a, b, c, and the rudimentary sternal element of the prae- genital somite ; opisth 1 , first somite of the opistho- soma.

(From a drawing made by Pickard – Cambridge, tinder the direction of R. I. Pocock.)

Note. — The possibility of another interpretation of the anterior somites of the mesosoma and the prae-genital somite must be borne in mind. Possibly, though not probably, the somites carrying the two lung-sacs correspond to

the first two lung-bearing somites of Scorpio, and it is the genital opening which has shifted. The same caution applies in the case of the Araneae. Excalation of one or of

opistho 1

opistho 2

m

two anterior mesosomatic somites, besides the prae-genital somite, would then have to be supposed to have occurred also.

Sub-order a. Uropygi. — Prosoma longer than wide, its sternal area very narrow, furnished with a large prosternal and metasternal plate, and often with a small mesosternal sclerite. Appendages of 2nd pair with their basal segments united in the middle line and incapable of lateral a

movement; append- .•'"

ages of 3rd pair with only the apical seg- ment many-jointed. Opisthosoma with- out trace of append- ages ; its posterior somites narrowed to form a movable tail for the support of the post – anal sclerite, which has no poison glands.

tricha.— Do'rsal area FlG.56— Thelyphonus assamensis^ Ventral of prosoma covered surfaceoftheanteriorregionoftheopisthosoma, with a single shield the somite being pushed upwards and for-

*(? two in Geralin war d s so as to expose the subjacent structures. ura), bearing median °^° x – First somite of the opisthosoma; and lateral eyes. °P*f» 2, second do. ; g genital aperture ; Post anal sclerite '• ed S es of the lamellae of the lung-books ; m, modified as a long, stigmata of tergo-sternal muscles, many-jointed feeler. _ (Original drawing by Pocock.)*

Appendages of 2nd pair folding in a horizontal plane, completely chelate, the claw immovably united to the sixth segment. Respiratory organs present in the form of pulmonary sacs.

*Family — Thelyphonidae {Thelyphonus (fig. 54), Hypoctonus, *Geralinura).*

Tribe 2. Tartarides. — Small degenerate forms with the dorsal area of the prosoma furnished with two shields, a larger in front covering the anterior four somites, and a smaller behind covering the 5th and 6th somites; the latter generally subdivided into a right and left portion. There is also a pair

of narrow tergal sclerites interposed between the anterior and posterior shields. Eyes evan- escent or absent. Appendages of 2nd pair folding in a vertical plane, not chelate, the claw long and movable. Post-anal sclerite short and undivided. No distinct respiratory stigmata behind the sterna of the 1st and 2nd somites of the opisthosoma.

Family — Hubbardiidae {Schizomus, Hubbardia) (figs. 57-59).

A

- prae-gen

n opisth

pa •

Fig. 57. — Schizomus crassi- caudatus, one of the Tartarid Pedipalpi. Ventral view of a female with the appendages cut short near the base.

a, Prosternum of prosoma.

b, Metasternum of prosoma. prae-gen, The prae-genital

somite.

I opisth, First somite of the opisthosoma.

II opisth, Eleventh somite of the opisthosoma.

pa, Post-anal lobe of the female

(compare the jointed filament

in Thelyphonus, fig. 54).

(Original drawing by Pickard-Cam- bridge, directed by Pocock.)

Sub-order b. Amblypygi. — Prosoma wider than long, covered above by a single shield bearing median and lateral eyes, which have diplostichous ommatea. Sternal area broad, with prosternal, two mesosternal, and metasternal plates, the prosternum projecting forwards beneath the coxae of the 2nd pair of appendages. Append- ages of 2nd pair folding in a horizontal plane ; their basal segments

Fig. 58. — Schizomus crassi- caudatus, a Tartarid Pedipalp. Dorsal view of a male with the appendages cut short. I to VI. The prosomatic ap- pendages.

a, Anterior plate.

b, Posterior plate of the proso- matic carapace.

prae-gen, Tergum of the prae- genital somite. II, The eleventh somite of the

opisthosoma. pa, Post-anal lobe of the male — a conical body with narrow basal stalk.

(Original as preceding.)

freely movable; claw free or fused ; basal segments of 4th and 5th pairs widely separated by the sternal area ; appendages of 3rd pair with all the segments except the proximal three, forming a many- jointed flagellum. Opisthosoma without post-anal sclerite and posterior caudal elongation : with frequently a pair of small lobate II III IV V VI

Fig. 59. — Schizomus crassicaudatus, one of the Pedipalpi. Lateral view of a male. II to VI, the prosomatic appendages, the first being concealed (see fig. 58); 5, the fifth, and 11, the eleventh tergites of the opisthosoma ; pa, the conical post-anal lobe.

(Original as preceding.)

appendages on the sternum of the 3rd somite. Respiratory organs, as in Urotricha.

Family — Phrynichidae (Phrynichus, Damon). ,, Admetidae (Admetus, Heterophrynus) .

,, Charontidae (Charon, Sarax).

*(Family ?) — *Graeophonus. Remarks. — The Pedipalpi are confined to the tropics and warmer temperate regions of both hemispheres. Fossil forms occur in the Carboniferous. The small forms known as Schizomus and Hub- bardia are of special interest from a morphological point of view. The Pedipalpi have no poison glands. (Reference to literature*

(29).)

Order 3. Araneae (figs. 60 to 64). — Prosoma covered with a single shield and typically furnished with median and lateral eyes of diplostichous structure, as in the Amblypygi. The sternal surface wide, continuously

chitinized, but with prosternal and metasternal

Fig. 60. — Liphistius desultor, Schiodte, one of the Araneae Meso- thelae. Dorsal view. I to VI, the prosomatic appendages; 4,5,6, the fourth, fifth and sixth tergites of the opisthosoma. Between the bases of the sixth pair cf limbs and behind the prosomatic cara- pace is seen the tergite of the small prae-genital somite. (Original by Pickard-Cambridge and Pocock.)

elements generally distinguishable at the anterior and posterior ends respectively of the large mesosternurn. Presternum underlying the proboscis. Appendages of 1st pair have two segments, as in Pedipalpi, but are furnished with poison gland, and are retroverts. Appendages of 2nd pair not underlying the mouth, but freely movable and, except in primitive forms, furnished with a maxillary lobe ; the rest of the limb like the legs, tipped with a single claw and quite un- modified (except in $). Remaining pairs of appendages similar in form and function, each tipped with two or three claws. Opistho- soma when segmented showing the same number of somites as in the Pedipalpi ; usually unsegmented, the prae-genital somite constricted to form the waist ; the appendages of its 3rd and 4th somites re- tained as spinning mammillae. Respiratory organs (see fig. 63,$ tg) , as

in the Amblypygi, or with the posterior pair, rarely the anterior pair as well, replaced by tracheal tubes. Intromittent organ of male in the apical segment of the 2nd prosomatic appendage.

Sub-order a. Mesothelae (see figs. 60 to 62). — Opisthosoma dis- tinctly segmented, furnished with 1 1 tergal plates, as in the Ambly- pygi; the ventral surface of the 1st and 2nd somites with large sternal plates, covering the genital aperture and the two pairs of Fig. 61. — Liphistius desultor. Ventral view with the prosomatic appendages cut short excepting the chelicerae (1) whose sharp retroverts are seen. Between the bases of the prosomatic limbs an anterior and a posterior sternal plate (black) are seen. I, The sternum of the first opis- thosomatic or genital somite covering the genital aperture and the first pair of lung- sacs. In front of it the narrow waist is formed by the soft sternal area of the praegenital somite; 2, the sternite of the second opisthosomatic somite covering the posterior pair of lung-sacs; 3 and 4, the spinning appendages (limbs) of the opisthosoma; a, inner, b, outer ramus of the appendage ; 1 1 , sternite of the eleventh 11 somite of the opisthosoma: in front of it other rudimentary sternites; an, anus.

(Original as above.)

pulmonary sacs, the sternal plates from the 6th to the nth somites represented by integumental ridges, weakly chitinized in the middle. The

two pairs of spinning appendages retain their primitive position in the middle of the lower surface of the opisthosoma far in advance of the anus on the 3rd and 4th somites, each appendage consisting of a stout, many-jointed outer branch and a slender, unsegmented inner branch. Prosoma as in the Mygalomorphae, except that the mesosternal area is long and narrow.

*Family — Liphistiidae (Liphistius, *Arthrolycosa).*

Sub-order b. Opisthothelae (see fig. 63). — Opisthosoma without trace of separate terga and sterna, the segmentation merely repre- sented posteriorly by slight integumental folds and the sterna of the 1st and 2nd somites by the opercular plates of the pulmonary sacs. The spinning appendages migrate to the posterior end of the opis- thosoma and take up a position close to the anus; the inner branches of the anterior pair either atrophy or are represented homogenetically by a plate, the cribellum, or by an undivided membranous lobe, the colulus.

Tribe I. Mygalomorphae. — The plane of the articulation of the appendages of the 1st pair to the prosoma (the retrovert) vertical, the basal segment pro- jecting straight forwards at its proximal end, the distal segment or fang closing backwards in a direction subparallel to the long axis of the body. Two pairs of pulmonary sacs.

Families — Thera- phosidae (Avicularia, Poecilotheria). Bary- chelidae (Barychelus, Plagiobothrus). Dipluri- dae (Diplura, Macro- thele). Ctenizidae (Cteniza, Nemesia). Atypidae (Atypus, Calommata).

Tribe 2. Arachno-

I II III IV Prosoma

praegen 1234 11

Fig. 62. -ˆLiphistius desultor. Lateral view. I to VI, Appendages of the prosoma cut

off at the base. 0, Ocular tubercle. praegen, The prae-genital somite. I and 2, Sternites of the first and second opisthosomatic somites. morpna C e.~Theirane'of 3 and 4, Appendages of the third and fourth the articulation of the °P?sthosomatic somites which are the spinning organs, and in this genus occupy their primitive position instead of mi- grating to the anal region as in other spiders. 5, Tergite of the fifth opisthosomatic

somite. 11, Eleventh opisthosomatic somite; an, Anus.

(Original.)

appendages of the 1st pair to the prosoma horizontal, the basal segment projecting ver- tically downwards, at least at its proximal end, the distal segment or fang closing inwards nearly or quite at right angles to the long axis of the body. The posterior pulmonary sacs (except in Hypochilus) replaced by tracheal tubes ; the anterior and posterior pairs replaced by tracheal tubes in the Caponiidae.

Principal families — Hypochilidae (Hypochilus). Dysderidae (Dys- dera, Segestria). Caponiidae (Caponia, Nops). Filistatidae (Fihs- tata). Uloboridae (Uloborus, Dinopis). Argiapidae (Nephila, Gasteracantha). Pholcidae (Pholcus , . Artema) . Agelenidae (Tegen- aria). Lycosidae (Lycosa). Clubionidae (Clubiona, Olios, Sparassus) Gnaphosidae (Gnaphosa, Hemiclaea). Thomisidae (Thomisus). Attidae (Salticus). Urocteidae (Uroctea). Eresidae (Eresus).

Remarks on the Araneae. — The Spiders are the most numerous

and diversified group of the Arachnida; about 2000 species are known. No noteworthy fossil spiders are known; the best-pre- served are in amber of Oligocene age. Protolycosa and Arthrolycosa occur in the Carboniferous. Morphologically, the spiders are re- markable for the concentration and specialization of their structure, which is accompanied with high physiological efficiency. The larger species of Bird's Nest Spiders {Avicularia) , the opisthosoma of which is as large as a bantam's egg, undoubtedly attack young birds, and M'Cook gives an account of the capture in its web by an ordinary house spider of a small mouse. The " retrovert " or bent-back

— Ventral view of mygalomorphous

of

Fig. 63 a male spider. I to VI, The six pairs

prosomatic appendages.

a, Copulatory apparatus of the second appendage.

b, Process of the fifth joint of the third appendage.

M, Mouth.

pro, Prosternite of the pro- soma.

mes, Mesosternite of the pro- soma : observe the contact of the coxae of the sixth pair of limbs behind it; compare Liphistius (fig. 61) where this does not occur.

stg, Lung aperture.

gn, Genital aperture.

a, Anus with a pair of back- wardly migrated spinning appendages on each side of it ; compare the posi- tion of these appendages in Liphistius (fig. 61).

(From Lankester, "Limulus an Arachnid.")

first pair of appendages is provided with a poison gland opening on the fang or terminal segment. Spiders form at least two kinds of constructions — snares for the capture of prey and nests for the preservation of the young. The latter are only formed by the female, which is a larger and more powerful animal than the male. Like the scorpions the spiders have a special tendency to cannibalism, and accordingly the male, in approaching the female for the purpose of fertilizing her, is liable to be fallen upon and sucked dry by the object of his attentions. The sperm is removed by the male from the genital aperture into a special receptacle on the terminal segment

Fig. 64. — Liphistius desultor. Under side of the uplifted genital or first opisthosomatic somite of the female; g, genital aperture; p, pitted plate, probably a gland for the secretion of adhesive material for the eggs; /, the edges of the lamellae of the lung-books of the first pair.

(Original drawing by Pocock.)

of the 2nd prosomatic appendage. Thus held out at some distance from the body, it is cautiously advanced by the male spider to the genital aperture of the female.

For an account of the courtship and dancing of spiders, of their webs and floating lines, the reader is referred to the works of M'Cook (30) and the Peckhams (31), whilst an excellent account of the nests of trap-door spiders is given by Moggridge (32). References to systematic works will also be found at the end of this article (33).

Order 4. Palpigradi = Microthelyqhonidae (see fig. 65). — Prosoma covered above by three oiates, a larger representing the dorsal ele- ments of the first four somites, and two smaller representing the dorsal elements of the 5th and 6th.

Its ventral surface provided with one prosternal, two mesosternal and one metasternal plate. Appendages of 1st pair consisting of three segments, completely chelate, without poison gland; of 2nd pair slender : leg-like, tipped with three claws, the faasal segment without sterno-coxal process taking no share in mastication, and

widely separated from its fellow of the opposite side; 3rd, 4th, 5th and 6th appendages similar in form to the 2nd and to each other.

Proboscis free, not supported from below by either the presternum or the basal segments of the appendages of the 2nd pair.

Opisthosoma consisting of only ten somites, which have no tergal and sternal elements, the prae-genital somite contracted to form a " waist," as in the Pedipalpi; the last three narrowed to form a

II

i Ml

3 4 56789 10

Opisthosoma

{ \ J prae-i 2 I IIlIIIVVVIgcK Prosoma

Fig. 65. — Koenenia mirabilis, Grassi, one of the Palpigradi. A, Ventral view of prosoma and B, Dorsal view. I to VI, pro- of anterior region of opistho- somatic appendages; I opisth, soma with the appendages cut genital somite (first opisthoso- matic somite).

off near the base ; a and b, prosternites ; c, mesosternite; and d, metasternite of the prosoma; /, ventral surface of the prae-genital somite; g, sternite of the genital somite (first opisthosomatic somite).

C, Lateral view, I to VI, pro- somatic appendages ; a,b,c, the three tergal plates of the prosoma; prae-gen, the prae- genital somite; 1 to 10, the ten somites of the opisthosoma.

D, Chelicera.

(Original drawing by Pocock and Pickard-Cambridge, after Hansen and

S6rensen.)

caudal support for the many-jointed flagelliform telson, as in the Urotricha. Respiratory organs atrophied.

Family — Koeneniidae {Koenenia).

Remarks. — An extremely remarkable minute form originally described by Grassi (34) from Sicily, and since further described by Hansen (35). Recently the genus has been found in Texas, U.S.A. Only one genus of the order is known.

Order 5. Solifugae = Mycetophorae (see figs. 66 to 69). — Dorsal area of prosoma covered with three distinct plates, two smaller representing the terga of the 5th and 6th somites, and a larger representing those of the anterior four somites, although the reduced terga of the 3rd and 4th are traceable behind the larger plate. The latter bears a pair of median eyes and obsolete lateral eyes on each side. Sternal elements of prosoma almost entirely absent, traces of a presternum and metasternum alone remaining. Rostrum free, not supported by either the presternum or the basal segments of the appendages. Appendages of 1st pair large, chelate, bisegmented, articulated to the sides of the head-shield ; appendages of 2nd pair simple, pediform, with protrusible (? suctorial) organ, and no claws at the tip ; their basal segments united in the middle line and fur- nished with sterno-coxal process. Remaining pairs of appendages with their basal segments immovably fixed to the sternal surface, similar in form, the posterior three pairs furnished with two claws supported on long stalks; the basal segments of the 6th pair bearing five pairs of tactile sensory organs or malleoli. The prae-genital somite is suppressed. Opisthosoma composed of ten somites. Respiratory organs tracheal, opening upon the ventral surface of the 2nd and 3rd, and sometimes also of the 4th somite of the opistho- soma. A supplementary pair of tracheae opening behind the basal segment of the 4th appendage of the prosoma.

(? Intromittent organ of male lodged on the dorsal side of the 1st pair of prosomatic appendages.)

Families — Hexisopodidae (Hexisopus). Solpugidae {Solpuga, Rhagodes). Galeodidae (Galeodes).

Remarks. — These most strange-looking Arachnids occur in warmer temperate, and tropical regions of Asia, Africa and America. Their

anatomy has not been studied, as yet, by means of freshly-killed material, and is imperfectly known, though the presence of the coxal

Fig. 66. — Galeodes sp., one of the Solifugae. Ven- tral view to show legs and somites. I to VI, The six leg-bearing

somites of the prosoma. opisth I, First or genital somite of the opistho- soma. ge, Site of the genital

aperture. st, Thoracic tracheal

aperture. P, Anterior tracheal aper- ture of the opisthosoma in somite 2 of the opistho- soma. I 3 , Tracheal aperture in somite 3 of the opistho- soma. a, Anus.

(From Lankester, " Limulus and Arachnid.")

opisth

at the base

I to VI, Prosomatic append- ages.

s, Prosomatic stigma or aper ture of the tracheal system

aperture g. 2, Second opisthosomatic ster-

nite covering the second

pair of tracheal apertures

spi. sp2, The third pair of tracheal

apertures. 10, The tenth opisthosomatic

somite. an, The anal aperture.

Fig. 67. — Galeodes sp., one Fig. 68. — Galeodes sp., one of the of the Solifugae. Ventral view Solifugae. Dorsal view, with the appendages cut off r to V I, Bases of the prosomatic

appendages.

0, Eyes. a, Lateral region of the cephalic plate

to which the first pair of append- ages are articulated. I, First opisthosomatic ster- b, Cephalic plate with median eye. nite covering the

genital c, Dorsal element of somites bearing

third and fourth pairs of append- ages.

d, Second plate of the prosoma with fifth pair of appendages.

e, Third or hindermost plate of the prosoma beneath which the sixth pair of legs is articulated.

1, 2, 9, 10, First, second, ninth and tenth somites of the opisthosoma.

an, Anus.

(Original.)

(Original by Pickard-Cambridge and Pocock.)

glands was determined by Macleod in 1884. The proportionately enormous chelae (chelicerae) of the first pair of appendages are not provided with poison glands ; their bite is not venomous.

Galeodes has been made the means of a comparison between the structure of the Arachnida and Hexapod insects by Haeckel and other writers, and it was at one time suggested that there was a genetic affinity between the two groups — through Galeodes, or extinct forms similar to it. The segmentation of the prosoma and the form of the appendages bear a homoplastic similarity to the head, pro-, meso-, and meta-thorax of a Hexapod with mandibles, maxillary palps and three pairs of walking legs ; while the opistho-

S' 5" 2 1 VI V S IV III II I

Opisthosoma Prosoma

Fig. 69. — Galeodes sp., one of the Solifugae. I to VI, The six prosomatic limbs carrying appendage VI. The

cut short. prae-genital somite is absent.

0, The eyes. 1, First somite of the opistho-

b, c, Demarcated areae of the soma.

cephalic or first prosomatic 2, Second do.

platecorrespondingrespectively S, Prosomatic tracheal aperture

to appendages I, II, III, and to appendage IV (see fig. 68).

, Second plate of the prosoma- carrying appendage V.

1 Third plate of the prosoma-

between legs IV and V. S' and S",Opisthosomatic tracheal

apertures. 10, Tenth opisthosomatic somite. an, Anus.

(Original.)

soma agrees in form and number of somites with the abdomen of a Hexapod, and the tracheal stigmata present certain agreements in the two cases. Reference to literature (36).

Order 6. Pseudoscorpiones = Chelonethi, also called Chernetidia (see figs. 70, 71, 72). — Prosoma covered by a single dorsal shield, at most furnished with one or two diplostichous lateral eyes; sternal elements obliterated or almost obliterated. Appendages of the 1st

prae-genˆ..

Fig. 70. — Garypus litoralis, one of the Pseudoscorpiones. Ventral view.

1 to VI, Prosomatic appendages.

0, Sterno-coxal process of the basal segment of the second appendage.

1 , Sternite of the genital or first opis- thosomatic somite ; the prae-geni- tal somite, though represented by a tergum, has no separate sternal plate.

2 and 3, Sternites of the second and third somites of the opisthosoma, each showing a tracheal stigma.

10 and 1 1 , Sternites of the tenth and eleventh somites of the opistho- soma.

an, Anus.

(Original by Pocock and Pickard-Cambridge.)

pair bisegmented completely chelate, furnished with peculiar organs, the serrula and the lamina. Appendages of 2nd pair very large and completely chelate, their basal segments meeting in the middle line, as in the Uropygi, and provided in front with membranous lip-like processes underlying the proboscis. Appendages of the 3rd, 4th, 5th and 6th pairs similar in form

and function, tipped with two claws, their basal segments in contact in the median ventral line. The prae-genital somite wide, not constricted, with large tergal plate, but with its sternal plate small or inconspicuous. Opisthosoma

Fig. 71. — Garypus litoralis, one of the Pseudoscorpiones. Dorsal view.

I to VI, The prosomatic ap- pendages.

0, Eyes.

prae-gen, Prae-genital somite.

1, Tergite of the genital or first opisthosomatic somite.

10, Tergite of the tenth somite of the opistho- soma.

11, The evanescent eleventh somite of the opisthosoma.

an, Anus.

(Original.)

composed, at least in many cases, of eleven somites, the nth somite very small, often hidden within the 10th. Respiratory organs in the form of tracheal tubes opening by a pair of stigmata in the 2nd and 3rd somites of the opisthosoma. Intromittent organ of male beneath sternum of the 1st somite of the opisthosoma.

Sub-order a. Panctenodactyli. — Dorsal plate of prosoma (carapace) narrowed in front; the appendages of the 1st pair small, much narrower, taken together, than the posterior border of the carapace. Serrula on movable digit of appendages of 1st pair fixed throughout its length, and broader at its proximal than at its distal end; the immovable digit with an external process.

Family — Cheliferidae (Chelifer (figs. 70, 71, 72), Chiridium). ,, Garypidae (Gary pus).

Sub-order b. Hemictenodactyli. — Dorsal plate of prosoma scarcely narrowed in front; the appendages of the 1st pair large, not much narrower, taken together, than the posterior border of the carapace.

o prac-gm 123

! : : : !

I II III IV V VI!

Prosoma

Opisthosoma

Fig. 72. — Garypus litoralis, one of the Pseudoscorpiones. Lateral view. I to VI, Basal segments of the 2, 3, 10, The second, third and six prosomatic

appendages. . tenth somites of the opistho-

0, Eyes. soma.

prae-gen, Tergite of the prae- n, The minute eleventh somite ; genital somite. [somite, an, The anus.

1, Genital or first opisthosomatic

(Original.)

The serrula or the movable digit free at its distal end, narrowed at the base ; no external lamina on the immovable digit. Family — Obisiidae (Obisium, Pseudobisium).

„ Chthoniidae (Chthonius, Tridenckthonius) .

Remarks. — The book-scorpions — so called because they were, in old times, found not unfrequently in libraries — are found in rotten wood and under stones. The similarity of the form of their append- ages to those of the scorpions suggests that they are a degenerate group derived from the latter, but the large size of the prae-genital somite in them would indicate a connexion with forms preceding the scorpions. Reference to literature (37).

Order 7. Podogona = Ricinulei (see figs. 73 to 76). — Dorsal area of prosoma furnished with two shields, a larger behind represent- ing, probably, the tergal elements of the somites, and a smaller in front, which is freely articulated to the former and folds over the

Fig. 73. — Cryptostemma Karschii, one of the Podogona. Dorsal view of male- Ill to VI, The third, fourth, fifth followed by the opisthosoma of and sixth appendages of the four visible somites, prosoma. an, Orifice within which the caudal

a, Movable (hinged) sclerite (so- segments are withdrawn, called hood) overhanging the E, Extremity of the fifth append- first pair of appendages. age of the male modified to h, Fused terga of the prosoma subserve copulation.

(Original drawing by Focock and Pickard-Cambridge.) appendages of the 1st pair. Ventral area without distinct sternal plates. Appendages of 1st pair, bi-segmented, completely chelate. Appendages of 2nd pair, with their basal segments uniting in the middle line below the mouth, weakly chelate at apex. Appendages of 3rd, 4th, 5th and 6th pairs similar in form; their basal segments in contact in the middle line and immovably welded, except those of the 3rd pair, which have been pushed aside so that the bases of the

2nd and 4th pairs are in contact with each other. A movable membranous joint between the prosoma and the opisthosoma, the generative aperture opening upon the ventral side of the membrane. Prae-genital somite suppressed ; the opisthosma consisting of nine segments, whereof the first and second are almost suppressed and concealed within the joint between the prosoma and the opistho- soma; the following four large and manifest, and the remaining

three minute and forming a slender generally-retracted tail like that of Thelyphonus. Respiratory organs tracheal, opening by a pair of spiracles in the prosoma above the base of the fifth appendage on

Fig. 74. — Cryptostemma Karschii. anterior aspect of the prosoma with the " hood " removed. I to IV, first to fourth appendages of the prosoma ; a, basal segment of the second pair of appendages meeting its fellow in the middle line (see fig. 75).

(Original drawing by Pocock and Pickard-Cambridge.)

each side. Intromittent organ of male placed at the distal end of the appendage of the 5th pair.

Family — Cryptostemmidae (Cryptostemma, Poliochera), Car- boniferous. Remarks on the Podogona. — The name given to this small but remarkable group has reference to the position of the male intro- mittent organ (fig. 73, e). They are small degenerate animals with a relatively firm integument. Not more than four species and twice that number of specimens are known. They have been found

Fig. 75. — Cryptostemma Karschii, one of the Podogona. Ventral view. I to VI, The six pairs of appendages of

the prosoma, the last three cut short. I, 2, 3, 4, The four somites of the opis- thosoma.

a, Visible hood overhanging the first pair of appendages.

b, Position of the genital orifice.

c, Part of 3rd appendage.

d, Fourth segment of 2nd appendage. Observe that the basal segment of appendage III does not meet its fellow in the middle line.

(Original drawing by Pocock and Pickard- Cambridge.)

in West Africa and South America. A fact of special interest in regard to them is that the genus Poliochera, from the Coal Measures, appears to be a member of the same group. The name Crypto- stemma, given to the first-known genus of the order, described by Guerin-Meneville, refers to the supposed concealment of the eyes by the movable cephalic sclerite. Reference to litera- ture (38).

Order 8. Opiliones(see fig. 77).— Dorsal area of prosoma covered by a single shield usually bearing a pair of eyes. Sternal elements much reduced. Appendages of 1st pair large, three segmented and completely chelate; of 2nd pair either simple and pediform, or prehensile and subchelate; of remaining four pairs,

similar in form, ambulatory in function; riu. /o.- WJP »»— the basal segment of the 2nd, 3rd and ˆ or «»- *? Xtr ? m *LnH sometimes of the 4 th pairs of appendages the fifth pair of append- fumished with sterno-coxal (maxillary) ages of the female for lobe. Opisthosoma confluent throughout comparison with that of*

its breadth with the prosoma, with the the male E m – fi S- 73- dorsal plate of which its anterior tergal

plates are more or less fused; at most ten opisthosomatic somites traceable; the generative aperture thrust far forwards between the basal segments of the 6th appendages. Prae-genital somite suppressed. Respiratory organs tracheal, opening by a pair of stig- mata situated immediately behind the basal segments of the 6th pair of appendages on what is probably the sternum of the 2nd opisthosomatic somite and also in some cases upon the 5th segment of the legs. _ ..

Intromittent organ of male lying within the genital orifice. Sub-order a. Laniatores. — Orifice of foetid glands opening above the coxa of the 4th appendage, not raised upon a tubercle. Orifice of coxal gland situated just behind that of the foetid gland. Sternal plate of prosoma long and narrow, with a distinct prosternal element underlying the mouth. Coxae of 4th, 5th and 6th appendages immovable. Appendages of 2nd pair, strong, usually prehensile and spiny. Genital orifice covered by an operculum.

Families — Gonoleptidae (Gonoleptes, Goniasoma).

Biantidae (Biantes).

Oncopodidae (Oncopus, Pelitnus).

Trioenonychidae (Trioenonyx, A cumontia) . Sub-order b. Palpatores. — Orifice of foetid glands opening above the coxa of the 3rd appendage, not

raised upon a tubercle. Orifice of coxal gland situated between the coxae of the 5th and 6th append- ages. Sternal plate of prosoma usually short and wide, rarely longer than broad ; with a larger or smaller prosternal element underlying the mouth. Coxae of 3rd, 4th, 5th and 6th appendages movable

Fig. 76. — Cryptostemma

or immovable. Appendages of 2nd pair weak, pediform not pre- hensile. Genital orifice covered by an operculum.

Families — Phalangiidae (Phalangium, Gagrella).

Ischyropsalidae (Ischyropsalis, Taracus). Nemastomidae (Nemastoma). Trogulidae (Trogulus, Anelasmocephalus) . Sub-order c. Cyphophthalmi (Anepignathi). — Orifice of foetid glands opening on a tubercle situated near the lateral border of the carapace above the base of the 5th appendage. Orifice of coxal gland probably- situated at base of coxa of 5th appendage; sternal plate of proscma minute or absent; no prosternal element under- lying the mouth. Coxae of 5th and 6th, and usually also of 4th appendages immovable. Appendages of 2nd pair weak, pediform, not prehensile. Genital orifice not covered by an operculum. Families — Sironidae (Siro, Pettalus). Stylocellidae (Stylocellus) . Remarks on the Opiliones.— -These include the harvest-men, some- times called also daddy-long-legs, with round undivided bodies and very long, easily-detached legs. The intromittent organs of the male are remarkable for their complexity and elaboration. The confluence of the regions of the body and the dislocation of apertures from their typical position are results of degeneration. The Opiliones seem to lead on from the Spiders to the Mites. Reference to litera- ture (39).

Apparently related to the Opiliones are two extinct groups, the Anthracomarti and Phalangiotarbi, which are not known to have survived the Carboniferous period. In the Anthracomarti the

Fig. 77. — Stylocellus sumatranus, one of the

j Opiliones; after Thorell.

II Enlarged.

in A, Dorsal view; I to VI,

*Iv the six prosomatic ap- ~*V pendages.*

yi B, Ventral view of the prosoma and of the first somite of the opistho- soma, with the append- ages I to VI cut off at the base; a, tracheal stigma; mx, maxillary processes of the coxae of the 3rd pair of append- ages ; g.genitalaperture.

C, Ventral surface of the prosoma and opistho- soma; a, tracheal stigma; 6, last somite.

D, Lateral view of the 1st and 2nd pair of ap- pendages.

E, Lateral view of the whole body and two 1st appendages, show- ing the fusion of the dorsal elements of the prosoma into a single plate, and of those of the opisthosoma into an imperfectly seg- mented plate continuous with that of the prosoma.

opisthosoma was movably articulated to the prosoma, and consisted of from eight to ten segments furnished with movable lateral plates, the anal segment being overlapped dorsally by a laminate expansion of the preceding segment. The carapace of the prosoma was un- segmented and often bore a pair of eyes. The appendages of the 2nd pair were slender and pediform; those of the 3rd, 4th, 5th and 6th pairs were similar in form and ambulatory in function with their basal segments arranged round a sternal area as in the order Araneae. The best-known genera were Anthracomartus and Eophognus.

In the Phalangiotarbi the appendages resembled those of the Anthracomarti, except that the basal segments of the last four pairs were usually approximated in the middle line leaving a long and narrow sternal area between ; and the carapace of the prosoma was unsegmented. The prosoma and opisthosoma were broadly con- fluent and probably immovably welded together. The opisthosoma consisted of eight or nine segments, whereof the anterior five or six were very short in the dorsal region, and the posterior three ex- ceptionally large with the anal orifice terminal.

Several genera have been established, the best-characterized being Geraphognus and Architarbus.

Order 9. Rhynchostomi = Acari (see fig. 78). — Degenerate Arach- nids resembling the Opiliones in many structural points, but chiefly distinguishable from them by the following features: — The basal segments of the appendages of the 2nd pair are united in the middle line behind the mouth, those of the 3rd, 4th, 5th and 6th pairs are widely separated and not provided with sterno-coxal (maxillary) lobes, and take no share in

mastication; the respiratory stig- mata, when present, belong to the prosoma, and the primitive segmentation of the opisthosoma has entirely or almost entirely disappeared.

Sub-order a. Notostigmata. — Opisthosoma consisting of ten segments denned by integumental grooves, each of the anterior four

of these furnished with a single pair of dorsally-placed spiracles or tracheal stigmata.

Family — Opilioacaridae {Opilioacarus) . Sub-order b. Cryptostigmata. — Integument hard, strengthened by a continuously chitinized dorsal and ventral sclerite. Tracheae typically opening by stigmata situated in the articular sockets (acetabula) of the 3rd, 4th, 5th and 6th pairs of appendages. Family — Oribatidae (Oribata, Nothrus, Hoplophora). Sub-order c. Metastigmata. — Integument mostly like that of the Cryptostigmata. Tracheae opening by a pair of stigmata situated above and behind the base of the 4th or 5th or 6th pair of appendages. Families — Gamasidae (Gamasus, Pteroptus). Argasidae (Argas, Ornithodoros) . Ixodidae {Ixodes, Rhipicephalus). Sub-order d. Prostigmata. — Integument soft, strengthened by special sclerites, those on the ventral surface of the prosoma appar- ently representing the basal segments of the legs embedded in the skin. Tracheae, except in the aquatic species in which they are atrophied, opening by a pair of stigmata situated close to or above the base of the appendages of the 1st pair (mandibles).

Families — Trombidiidae (Trombidium, Tetranychus). Hydrachnidae (Hydrachna, A tax). Halacaridae {Halacarus, Leptognathus). Bdellidae (Bdella, Eupodes). Sub-order e. Astigmata. — Degenerate, mostly parasitic forms approaching the Prostigmata in the development of integumental

Fig. 78. — Holothyrus nitidis simus, one of the Acari ; after Thorell.

A, Lateral view with appendages III to VI removed; 1, plate covering the whole dorsal area, representing the fused tergal sclerites of the prosoma and opisthosoma; 2, similarly-formed ventral plate; 3, tracheal stigma.

B, Dorsal view of the same animal; II to VI, 2nd to 6th pairs of appendages. The 1st pair of appendages both in this and in C are retracted.

C, Ventral view of the same; II to VI as in B; a, genital orifice; b, anus; c, united basal segments of the second pair of append- ages; d, basal segment of the 6th prosomatic appendage of the right side. The rest of the appendage, as also of app. Ill, IV and V, has been cut away.

sclerites and the softness of the skin, but with the respiratory system absent.

Families — Tyroglyphidae (Tyroglyphus, Rhizoglyphus) . Sarcoptidae (Sarcoptes, Analges).

Sub-order/. Vermiformia. — Degenerate atracheate parasitic forms with the body produced posteriorly into an annulated caudal pro- longation, and the 3rd, 4th, 5th and >6th pairs of appendages short and only three-jointed.

Family — Demodicidae (Demodex).

Sub-order g. Tetrapoda. — Degenerate atracheate gall-mites in which the body is produced posteriorly and annulated, as in Demodex, but in which the appendages of the 3rd and 4th pairs are long and normally segmented and those of the 5th and 6th pairs entirely absent. Family — Eriophyidae (Eriophyes, Phyllocoptes).

Remarks on the Rhynchostomi. — The Acari include a number of forms which are of importance and special interest on account of their parasitic habits. The ticks (Ixodes) are not only injurious as blood-suckers, but are now credited with carrying the germs of Texas cattle-fever, just as mosquitoes carry those of malaria. The itch-insect (Sarcoptes scabiei) is a well-known human parasite, so minute that it was not discovered until the end of the 18th century, and " the itch " was treated medicinally as a rash. The female burrows in the epidermis much as the female trap-door spider burrows in turf in order to make a nest in which to rear her young. The male does not burrow, but wanders freely on the surface of the skin. Demodex folliculorum is also a common parasite of the sebaceous

glands of the skin of the face in man, and is frequent in the skin of the dog. Many Acari are parasitic on marine and freshwater molluscs, and others are found on the feathers of birds and the hair of mammals. Others have a special faculty of consuming dry, powdery vegetable and animal refuse, and are liable to multiply in manufactured products of this nature, such as mouldy cheese. A species of Acarus is recorded as infesting a store of powdered strychnine and feeding on that drug, so poisonous to larger organisms. Reference to literature (40).

Authorities cited by numbers in the text. — 1. Strauss-Diirckheim (as reported by M M . Riester and Sanson in an append ix to the sixth volume of the French translation of Meckel's Anatomy, 1829); 2. Lankester, " Limulusan Arachnid," Quart. Journ. Micr. Sci. vol. xxi. N.S., 1881 ; 3. Idem, " On the Skeletotrophic Tissues of Limulus, Scorpio and Mygale,"

Quart. Journ. Micr. Sci. vol. xxiv. N.S., 1884; 4. Idem, Trans. Zool. Soc. vol. xi., 1883 ; S. Lankester and A.G. Bourne, "Eyes of Limulus and Scorpio," Quart. Journ. Micr. Sci. vol. xxiii. N.S., Jan. 1883; 6. Milne-Edwards, A., " Recherches sur l'anatomie des Limules," Ann. Sci. Nat. 5th Series, Zoologie, vol. xvii., 1873; 7. Owen, Richard, " Anatomy of the King-Crab, " Trans. Linn. Soc. Lond., vol. xxviii., 1872; 8. Kishinouye, "Development of Limulus longispina," Journal of the Science College of Japan, vol. v., 1892; 9. firauer, " Development of Scorpion," Zeitschrift fur wiss. Zoologie, vol. lix., 1895; 10. Hansen, H. J., "Organs and Characters in Different Orders of Arachnida," Entomol. Meddel. vol. iv. pp. 137- 149; 11. Watase, " On the Morphology of the Compound Eyes of Arthropods," Studies from the Biolog. Lab. Johns Hopkins University, vol. iv. pp 287-334; 12. Newport, George, " Nervous and Circula- tory Systems in Myriapoda and Macrourous Arachnids," Phil. Trans. Roy. Soc, 1843; 13. Lankester, " Coxal Glands of Limulus, Scorpio and Mygale," Quart. Journ. Micr. Sci. vol. xxiv. N.S., 1884; 13a. W. Patten and A. P. Hazen, " Development of the Coxal Glands of Limulus," Journ. of Morphology, vol. xvi., 1900; 13b. Bernard, " Coxal Glands of Scorpio," Ann. and Mag. Nat. Hist. vol. xii., 1893, p. 55; 14. Benham, " Testis of Limulus," Trans. Linn. Soc, 1882; IS. Lankester, " Mobility of the Spermatozoa of Limulus," Quart. Journ. Micr. Sci. vol. xviii. N.S., 1878; l6. Korschelt and Heider, Entwickelungsgeschichte (Jena, 1892), ibique citata; 17. Laurie, M., " The Embryology of a Scorpion,' Quart. Journ. Micr. Sci. vol. xxxi. N.S., 1890, and " On Development of Scorpio fulvipes," ibid. vol. xxxii., 1891; 18. Lankester (Homoplasy and Homogeny), "On the Use of the term Homology in Modern Zoology," Ann. and Mag. Nat. Hist., 1870; 19. Idem, " Degeneration, a Chapter in Darwinism," 1878, reprinted in the Advancement of Science (Macmillan, 1890);

20. Idem, "Limulus an Arachnid," Q. J. Micr. Sci. vol. xxi. N.S. ;

21. Claus, " Degeneration of the Acari and Classification of Arthro- poda," Anzeiger d. k. k. Akad. Wissen. Wien, 1885 ; see also Ann. and Mag. Nat. Hist. (5) vol. xvii., 1886, p. 364, and vol. xix. p. 225;

22. Lindstrom, G., " Researches on the Visual Organs of the Trilo- bites," K. Svenska Vet. Akad. Handl. xxxiv. No. 8, pp. 1-86, Pis. i.vi., 1901 ; 22. Zittel, American edition of his Palaeontology (the Mac millan Co., New York), where ample references to the literature of Trilobitae and Eurypteridae will be found; also references to literature of fossil Scorpions and Spiders; 23. Hoek, " Report on the Pycnogonida," Challenger Expedition Reports, 1881; Meinert, " Pycnogonida of the 'Danish Ingolf Expedition," vol. iii., 1899; Morgan, " Embryology and Phylogeny of the Pycnogonids," Biol. Lab. Baltimore, vol. v., 1891; 24. Bourne, A. G., "The Reputed Suicide of the Scorpion," Proc. Roy. Soc, vol. xlii. pp. 17-22; 25.*

Lankester, " Notes on some Habits of Scorpions," Journ. Linn. Soc. Zool. vol. xvi. p. 455, 1882; 26. Huxley, ' Pharynx of Scorpion," Quart. Journ. Micr. Sci. vol. viii. (old series), i860, p. 250; 27. Pocock, " How and Why Scorpions hiss," Natural Science, vol. ix., 1896; cf. idem, " Stridulating Organs of Spiders," Ann. and Mag. Nat. Hist. (6), xvi. pp. 230-233; 28. Kraepelin, Das Thierreich (Scorpiones et Pedipalpi) (Berlin, 1899); Peters, " Eine neue Ein- theilung der Skorpione," Mon. Akad. Wiss. Berlin, 1861 ; Pocock, " Classification of Scorpions," Ann. and Mag. Nat. Hist. (6) xii., 1893; Thorell and Lindstrom, " On a Silurian Scorpion," Kbngl. Svens. Vet. Akad. Hand!, xxi. No. 9, 1885; 29. Cambridge, O. P., " A New Family (Tartarides) and Genus of Thelyphonidea, " Ann. and Mag. Nat. Hist. (4) x., 1872, p. 413; Cook, " Hubbardia, a New Genus of Pedipalpi," Proc Entom. Soc Washington, vol. iv., 1899; Thorell, " Tartarides, &c." Ann. Mus. Genova, vol. xxvii., 1889; 30. M'Cook, American Spiders and their Spinning Work (3 vols.; Philadelphia, 1889-1893) ; 31. Peckham, " On Sexual Selection in Spiders," Occasional Papers Nat. Hist. Soc. Wisconsin, vol. i. pp. 1-113, '889; 32. Moggridge, Harvesting Ants and Trap-Door Spiders (1873) ; 33. Bertkau, Ph., Arch.f. Naturgesch. vol. xlviii. pp. 316-362 ; Idem, same journal, 1875, p. 235, and 1878, p. 351; Cambridge, O. P., " Araneidea " in Biologia Centr. Americana, vols. i. and ii. (London, 1899) ; Keyserling, Spinnen Amerikas (Nuremberg, 1880-1892); Pocock, " Liphistius and the Classification of Spiders," Ann. and Mag. Nat. Hist. (6) x., 1892; Simon, Hist. nat. des Araignees, vols. i. and ii., 1892, 1897; Wagner, "L'Industrie des Araneina," Mem. Acad. St-Petersbourg; Idem, " La Mue des Araignees," Ann. Sci. Nat. vol. vi. ; 34. Grassi, G. B. " Intorno ad un nuovo Aracnide artrogastro (Koenenia mirabilis) &c." Boll. Soc. Ent. Hal. vol. xviii., j886; 35. H. J. Hansen and Sorensen,

" The Order Palpigradi, Thorell {Koenenia), and its Relationships with other Arachnida," Ent. Tidskr. vol. xviii. pp. 233-240, 1898; Kraepelin, Das Thierreich (Berlin, 1901); 36. Bernard. " Compar. Morphol. of the Galeodidae," Trans. Linn. Soc. Zool. vol. vi., 1896, ibique citata; Dufour, " Galeodes," Mim. pres. Acad. Sci. Paris, vol. xvii., 1862; Kraepelin, Das Thierreich (Berlin, 1901); Pocock, " Taxonomy of Solifugae," Ann. and Mag. Nat. Hist. vol. xx. ; 37. Balzan, " Voyage au Venezuela (Pseudoscorpiones)," Ann. Soc. Entom. France, 1891, pp. 497-522; 38. Guerin-Meneville, Rev. Zool., 1838, p. 11; Karsch, " Ueber Cryptostemma Guer." Berliner entom. Zeitschrift, xxxviii. pp. 25-32, 1892; Thorell, "On an apparently new Arachnid belonging to the family Cryptostemmidae," Westv. Bihang Svenska Vet. Akad. Handligar, vol. xvii. No. 9, 1892; 39. Hansen and Sorensen, On Two Orders of Arachnida (Cambridge, 1904); Sorensen, " Opiliones laniatores ," Nat. Tidskr. (3) vol. xiv., 1884; Thorell, " Opilioni," Ann. Mus. Genova, vol. viii., 1876; 40. Berlese, "

Acari, &c, in Italia reperta " (Padova, 1892); Canes- trini, Acarofauna Italiana (Padova, 1885) ; Canestrini and Kramer, " Demodicidae and Sarcoptidae " in Das Thierreich (Berlin, 1899); Michael, " British Oribatidae," Ray Soc; Idem, " Oribatidae " in Das Thierreich (Berlin, 1898) ; Idem, " Progress and Present State of Knowledge of Acari," Journ. Roy. Micr. Soc, 1894; Nalepa, " Phytoptidae," Das Thierreich (Berlin, 1898); Trouessart, "Classi- fication des Acariens," Rev. Sci. Nat. de I'ouest, p. 289, 1892 ; Wagner, Embryonal Entwick, von Ixodes (St Petersburg, 1893) ; 41. Bertkau, Ph., " Coxaldrusen der Arachniden," Sitzb. Niederl. Gesettsch., 1885; 42. Patten, W., " Brain and Sense Organs of Limulus," Quart. Journ. Mic. Sci. vol. xxxv., 1894; see also his " Origin of Vertebrates from Arachnids," ibid. vol. xxxi.

Authorities not cited by numbers in the text : — Lung-books: — Berteaux, " Le Poumon des Arachnides," La Cellule, vol. v. 1891 ; Jawarowski, " Die Entwick. d. sogen. Lunge bei der Arachniden," Zeitsch. wiss. Zool. vol. lviii., 1-894; Macleod, " Recherches sur la structure et la signification de 1 appareil res- piratoire des Arachnides," Arch. d. Biologie. vol. v., 1884; Schneider, A., " Melanges arachnologiques," in Tablettes zoologiques, vol. ii. p. 135, 1892; Simmons, " Development of Lung in Spiders," Amer. Journ. Science, vol. xlviii., 1894. Coxal glands: — Bertkau, "Ueber die Coxaldrusen der Arachniden," Sitzb. d. Niederl. Gesellsch., 1885; Loman, " Altes und neues tiber das Nephridium (die Coxal- driise) der Arachniden," Byd. tot de Dierkunde, vol. xiv., 1887; Macleod, " Glande coxale chez les Galeodes," Bull. Acad. Belg. (3) vol. viii., 1884; Pelseneer, " On the Coxal Glands of Mygale," Proc. Zool. Soc, 1885; Tower, " The External Opening of the brick-red Glands of Limulus," Zool. Anzeiger, vol. xviii. p. 471, 1895. Ento- sternite: — Schimkewitsch, " Bau und Entwick. des Endosternitesder Arachniden," Zool. Jahrb., Anal. Abtheil.,vol.viii.,i894. Embryology: — Balfour, " Development of the Araneina," Q. J. Micr. Sci. vol. xx., 1880; Kingsley, " The Embryology of Limulus," Journ. Morphology, vols. vii. and viii.; Kishinouye, " Development of Araneina," Journ. Coll. Sci. Univ. of Japan, vol. iv., 1890; Locy, " Development of Agelena," Bull. Mus. Harvard, vol. xii., 1885; Metchnikoff, " Em- bryologie d. Scorpion," Zeit. wiss. Zool. vol. xxi., 1871 ; Idem, " Embryol. Chelifer," Zeit. wiss. Zool. vol. xxi., 1871; Schimkewitsch, " Developpement des Araignees," Archives d. Biologie, vol. vi. 1887. Sense organs: — Bertkau, " Sinnesorgane der Spinnen," Arch.f. mikros. Anat. vol. xxvii. p. 589, 1886; Graber, Unicor- neale Tracheaten Auge," Arch. f. mikr. Anat. vol. xvii., 1879; Grenacher, Gehororgane der Arthropoden (Gottingen, 1879); Kishi- nouye, " Lateral Eyes of Spiders," Zool. Anz. vol. xiv. p. 381, 1-891 ; Purcell," Phalangiden Augen," Zool. Anzeiger, vol. xv. p. 461.

General works on Arachnida: — Blanchard, " Les Arachnides" in L'

Organisation du regne animal; Gaubert, " Recherches sur les Arachnides," Ann. Sci. Nat. (7) vol. xiii., 1892; Koch, C, Die Arachniden (16 vols., Nuremberg, 1831-1848); Koch, Keyserling and Sorensen, Die Arachniden Austr aliens (Nuremberg, 1871-1890); Pocock, Arachnida of British India (London, 1900) ; Idem, " On African Arachnida," in Proc Zool. Soc. and Ann. and Mag. Nat. Hist., 1897-1900; Simon, Les Arachnides de la France (7 vols., Paris, 1874-1881); Thorell, "Arachnida from the Oriental Region," Ann. Mus. Genova, 1877-1899. (E. R. L.)

ARAD, or 6-Arad, a town of Hungary, capital of the county of the same name, 159 m. S.E. of Budapest by rail. Pop. (1900) 53,903. It is situated on the right bank of the river Maros, and consists of the inner town and five suburbs. Arad is a modern- built town, and contains many handsome private and public build- ings, including a cathedral. It is the seat of a Greek-Orthodox bishop, and possesses a Greek-Orthodox theological seminary, two training schobls for teachers — one Hungarian, and the other Rumanian — and a conservatoire for music. The town played an important part in the Hungarian revolution of 1848-49, and possesses a museum containing relics of this war of inde- pendence. One of the public squares contains a martyrs' monument, erected in memory of ths thirteen Hungarian generals shot here on the 6th of October 1849, by order of the Austrian general Haynau. It consists of a colossal figure of

Hungary, with four allegorical groups, and medallions of the executed generals. Arad is an important railway junction, and has become the largest industrial and commercial centre of south-eastern Hungary. Its principal industries are: dis- tilling, milling, machinery-making, leather-working and saw- milling. A large trade is carried on in grain, flour, alcohol, cattle and wood. Arad was a fortified place, and was captured by the Turks during the wars of the 17th century, and kept by them till the end of that century. The new fortress, built in 1763, although small, was formidable, and played a great role during the Hungarian struggle for independence in 1849. Bravely defended by the Austrian general Berger until the 1st of July 1849, it was then captured by the Hungarian rebels, who made it their headquarters during the latter part of the insurrection. It was from it that Kossuth issued his famous proclamation (nth August 1849) , and it was here that he handed over the supreme military and civil power to Gorgei. The fortress was recaptured shortly after the surrender of Gorgei to the Russians at Vilagos. The fortress is now used as an ammunition depot.

The town of Uj-Arad, i.e. New Arad (pop. 6124), situated on the opposite bank of the Maros, is practically a suburb of Arad, with which it is connected by a bridge. The town was founded during the Turkish wars of the 17 th century. The works erected by the Turks for the capture of the fortress of Arad formed the nucleus of the new town.

Vilagos, the town where the famous capitulation of Gorgei to the Russians took place on the 13th of August 1849, lies 21 m. by rail north-east of Arad.

ARAEOSTYLE (Gr. apatos, weak or widely spaced, and orDXos, column), an architectural term for the intercolumniation (g.v.) given to those temples where the columns had only timber architraves to carry.

ARAEOSYSTYLE (Gr. dpcuos, widely spaced, and avarvXos, with columns set close together), an architectural term applied to a colonnade, in which the intercolumniation (q.v.) is alternately wide and narrow, as in the case of the western porch of St Paul's cathedral and the east front of the Louvre by Perrault.

ARAGO, DOMINIQUE FRANQOIS JEAN (1786-1853), French physicist, was born on the 26th of February 1786, at Estagel, a small village near Perpignan, in the department of the eastern Pyrenees. He was the eldest of four brothers. Jean (1788- 1836) emigrated to America and became a general in the Mexican army. Jacques Etienne Victor (1799-1855) took part in L. C. de S. de Freycinet's exploring voyage in the " Uranie " from 1817 to 1821, and on his return to France devoted himself to journalism and the drama. The fourth brother, fitienne Vincent (1802-1892), is said to have collaborated with H. de Balzac in the Hiritiere de Birague, and from 1822 to 1847 wrote a great number of light dramatic pieces, mostly in collaboration. A strong republican, he was obliged to leave France in 1849, but returned after the amnesty of 1859. In 1879 he was nominated director of the Luxembourg museum.

Showing decided military tastes Francois Arago was sent to the municipal college of Perpignan, where he began to study mathematics in preparation for the entrance examination of the polytechnic school. Within two years and a half he had mastered all the subjects prescribed for examination, and a great deal more, and, on going up for examination at Toulouse, he astounded his examiner by his knowledge of Lagrange. Towards the close of 1803 he entered the polytechnic school, with the artillery service as the aim of his ambition, and in 1804, through the advice and recommendation of S. D. Poisson, he received the appointment of secretary to the Observatory of Paris. He now became acquainted with Laplace, and through his influence was commissioned, with J. B. Biot, to complete the

meridional measurements which had been begun by J. B. J. Delambre, and interrupted since the death of P. F. A. Mechain (1744-1804). The two left Paris in 1806 and began operations among the mountains of Spain, but Biot returned to Paris after they had determined the latitude of Forrnentera, the southernmost point to which they were to carry the survey,

leaving Arago to make the geodetical connexion of Majorca with Ivica and with Forrnentera.

The adventures and difficulties of the latter were now only beginning. The political ferment caused by the entrance of the French into Spain extended to these islands, and the ignorant populace began to suspect that Arago's movements and his blazing fires on the top of Mount Galatzo were telegraphic signals to the invading army. Ultimately they became so in- furiated that he was obliged to cause himself to be incarcerated in the fortress of Belver in June 1808. On the 28th of July he managed to escape from the island in a fishing-boat, and after an adventurous voyage he reached Algiers on the 3rd of August. Thence he procured a passage in a vessel bound for Marseilles, but on the 16th of August, just as the vessel was nearing Mar- seilles, it fell into the hands of a Spanish corsair. With the rest of the crew, Arago was taken to Rosas, and imprisoned first in a windmill, and afterwards in the fortress of that seaport, until the town fell into the hands of the French, when the prisoners were transferred to Palamos. After fully three months' imprison- ment they were released on the demand of the dey of Algiers, and again set sail for Marseilles on the 28th of November, but when within sight of their port they were driven back by a northerly wind to Bougie on the coast of Africa. Transport to Algiers by sea from this place would have occasioned a weary stay of three months; Arago, therefore, set out for it by land under conduct of a Mahommedan priest, and reached it on Christmas day. After six months' stay in Algiers he once again, on the 21st of June 1809, set sail for Marseilles, where he had to undergo a monotonous and inhospitable quarantine in the lazaretto, before his difficulties were over. The first letter he received, while in the lazaretto, was from A. von Humboldt; and this was the origin of a connexion which, in Arago's words, " lasted over forty years without a single cloud ever having troubled it."

Through all these vicissitudes Arago had succeeded in preserv- ing the records of his survey; and his first act on his return home was to deposit them in the Bureau des Longitudes at Paris. As a reward for his adventurous conduct in the cause of science, he was in September 1809 elected a member of the Academy of Sciences, in room of J. B. L. Lalande, at the re- markably early age of twenty-three, and before the close of the same year he was chosen by the council of the polytechnic school to succeed G. Monge in the chair of analytical geometry. About the same time

he was named by the emperor one of the astronomers of the Royal Observatory, which was accordingly his residence till his death, and it was in this capacity that he delivered his remarkably successful series of popular lectures on astronomy, which were continued from 1812 to 1845.

In 1816, along with Gay-Lussac, he started the Annales de chimie et de physique, and in 18 18 or 18 19 he proceeded along with Biot to execute geodetic operations on the coasts of France, England and Scotland. They measured the length of the seconds-pendulum at Leith, and in Unst, one of the Shetland isles, the results of the observations being published in 182 1, along with those made in Spain. Arago was elected a member of the Board of Longitude immediately afterwards, and contri- buted to each of its Annuals, for about twenty-two years, important scientific notices on astronomy and meteorology and occasionally on civil engineering, as well as interesting memoirs of members of the Academy.

In 1830, Arago, who always professed liberal opinions of the extreme republican type, was elected a member of the chamber of deputies for the Lower Seine, and he employed his splendid gifts of eloquence and scientific knowledge in all questions con- nected with public education, the rewards of inventors, and the encouragement of the mechanical and practical sciences. Many of the most creditable national enterprises, dating from this period, are due to his advocacy — such as the reward to L. J. M. Daguerre for the invention of . photography, the grant for the publication of the works of P. Fermat and Laplace, the acquisition of the museum of Cluny, the development of railways and electric telegraphs, the improvement of the

navigation of the Seine, and the boring of the artesian wells at Grenelle.

In the year 1830 also he was appointed director of the Observ- atory, and as a member of the chamber of deputies he was able to obtain grants of money for rebuilding it in part, and for the addition of magnificent instruments. In the same year, too, he was chosen perpetual secretary of the Academy of Sciences, in room of J. B. J. Fourier. Arago threw his whole soul into its service, and by his faculty of making friends he gained at once for it and for himself a world-wide reputation. As perpetual secretary it fell to him to pronounce historical eloges on deceased members; and for this duty his rapidity and facility of thought, his happy piquancy of style, and his extensive knowledge peculiarly adapted him.

In 1834 he again visited England, to attend the meeting of the British

Association at Edinburgh. From this time till 1848 he led a life of comparative quiet — not the quiet of inactivity, however, for his incessant labours within the Academy and the Observatory produced a multitude of contributions to all depart- ments of physical science, — but on the fall of Louis Philippe he left his laboratory to join in forming the provisional govern- ment. He was entrusted with the discharge of two important functions, that had never before been united in one person, viz. the ministry of war and of marine; and in the latter capacity he effected some salutary reforms, such as the improvement of rations in the navy and the abolition of flogging. He also abolished political oaths of all kinds, and, against an array of moneyed interests, succeeded in procuring the abolition of negro slavery in the French colonies.

In the beginning of May 1852, when the government of Louis Napoleon required an oath of allegiance from all its functionaries, Arago peremptorily refused, and sent in his resignation of his post as astronomer at the Bureau des Longi- tudes. This, however, the prince president, to his credit, de- clined to accept, and made " an exception in favour of a savant whose works had thrown lustre on France, and whose existence his government would regret to embitter." But the tenure of office thus granted did not prove of long duration. Arago was now on his death-bed, under a complication of diseases, induced, no doubt, by the hardships and labours of his earlier years. In the summer of 1853 he was advised by his physicians to try the effect of his native air, and he accordingly set out for the eastern Pyrenees. But the change was unavailing, and after a lingering illness, in which he suffered first from diabetes, then from Bright's disease, complicated by dropsy, he died in Paris on the 2nd of October 1853.

Arago's fame as an experimenter and discoverer rests mainly on his contributions to magnetism and still more to optics. He found that a magnetic needle, made to oscillate over non- ferruginous surfaces, such as water, glass, copper, &c, falls more rapidly in the extent of its oscillations according as it is more or less approached to the surface. This discovery, which gained him the Copley medal of the Royal Society in 1825, was followed by another, that a rotating plate of copper tends to communicate its motion to a magnetic needle suspended over it ("magnetism of rotation"). Arago is also fairly entitled to be regarded as having proved the long-suspected connexion between the aurora borealis and the variations of the magnetic elements.

In optics we owe to him not only important optical discoveries of his own, but the credit of stimulating the genius of A. J. Fresnel, with whose history, as well as with that of E. L. Malus and of Thomas Young, this part of his life is closely interwoven. Shortly after the beginning of the 19th century the labours of these three philosophers were shaping the modern doctrine of

the undulatory theory of light. Fresnel's arguments in favour of that theory found little favour with Laplace, Poisson and Biot, the champions of the emission theory; but they were ardently espoused by Humboldt and by Arago, who had been appointed by the Academy to report on the paper. This was the foundation of an intimate friendship between Arago and Fresnel, and of a determination to carry on together further

researches in this subject, which led to the enunciation of the fundamental laws of the polarization of light known by their names (see Polarization). As a result of this work Arago constructed a polariscope, which he used for some interesting observations on the polarization of the light of the sky. To him is also due the discovery of the power of rotatory polarization exhibited by quartz, and last of all, among his many contri- butions to the support of the undulatory hypothesis, comes the experimentum cruris which he proposed to carry out for comparing directly the velocity of light in air and in water or glass. On the emission theory the velocity should be acceler- ated by an increase of density in the medium; on the wave theory, it should be retarded. In 1838 he communicated to the Academy the details of his apparatus, which utilized the re- volving mirrors employed by Sir C. Wheatstone in 1835 for measuring the velocity of the electric discharge; but owing to the great care required in the carrying out of the project, and to the interruption to his labours caused by the revolution of 1848, it was the spring of 1850 before he was ready to put his idea to the test; and then his eyesight suddenly gave way. Before his death, however, the retardation of light in denser media was demonstrated by the experiments of H. L. Fizeau and J. B. L. Foucault, which, with improvements in detail, were based on the plan proposed by him.

Arago's CEuvres were published after his death under the direction of J. A. Barral, in 17 vols., 8vo, 1854-1862; also separately his Astronomie populaire, in 4 vols.; Notices biographiques, in 3 vols.; Notices scientifiques, in 5 vols. ; Voyages scientifiques, in I vol. ; Memoires scientifiques, in 2 vols. ; Melanges, in I vol. ; and Tables analytiques et documents importants (with portrait), in I vol. English translations of the following portions of his works have appeared : — Treatise on Comets, by C. Gold, C.B. (London, 1833) ; also translated by Smyth and Grant (London, 1 861) ; Hist, eloge of James Watt, by James Muirhead (London, 1839); also translated, with notes, by Lord Brougham; Popular Lectures on Astronomy, by Walter Kelly and Rev. L. Tomlinson (London, 1854) ; also translated by Dr W. H. Smyth and Prof. R. Grant, 2 vols. (London, 1855); Arago's Auto- biography, translated by the Rev. Baden Powell (London, 1855, 1858); Arago's Meteorological Essays, with introduction by Hum- boldt, translated under the superintendence of Colonel Sabine (London, 1855), and Arago's Biographies of Scientific Men, trans- lated by Smyth, Powell and Grant, 8vo (London, 1857).

ARAGON, or Arragon (in Span. Aragon), a captaincy- general, and formerly a kingdom of Spain; bounded on the N. by the Pyrenees, which separate it from France, on the E. by Catalonia and Valencia, S. by Valencia, and W. by the two Castiles and Navarre. Pop. (1900) 912,711; area, 18,294 sq. m. Aragon was divided in 1833 into the provinces of Huesca, Teruel and Saragossa; an account of its modern condition is therefore given under these names, which have not, however, superseded the older designation in popular usage.

Aragon consists of a central plain, edged by mountain ranges. On the south, east and west, these ranges, though wild and rugged, are of no great elevation, but on the north the Pyrenees attain their greatest altitude in the peaks of Aneto (11,168 ft.) and Monte Perdido (10,998 ft.) — also known as Las Tres Sorores, and, in French, as Mont Perdu. The central pass over the Pyrenees is the Port de Canfranc, on the line between Saragossa and Pau. Aragon is divided by the river Ebro (q.v.) , which flows through it in a south-easterly direction, into two nearly equal parts, known as Trans-ibero and Cis-ibero. The Ebro is the prin- cipal river, and receives from the north, in its passage through the province, the Arba, the Gallego and the united waters of the Cinca, Esera, Noguera Ribagorzana, Noguera Pallaresa and Segre — the last three belonging to Catalonia. From the south it receives the Jalon and Jiloca (or Xalon and Xiloca) and the Guadalope. The Imperial Canal of Aragon, which was begun by the emperor Charles V. in 1529, but remained un- finished for nearly two hundred years, extends from Tudela to El Burgo de Ebro, a distance of 80 m. ; it has a depth of 9 ft., and an average breadth of 69, and is navigable for vessels of about 80 tons. The Royal Canal of Tauste, which lies along the north side of the Ebro, was cut for purposes of irrigation, and gives fertility to the district. Two leagues north-north east of Albar- racin is the remarkable fountain called Cella, 3700 ft. above the

sea, which forms the source of the Jiloca; and between this river and the Sierra Molina is an extensive lake called Gallocanta, covering about 6000 acres. The climate is characterized by extreme heat in the summer and cold in the winter; among the mountains the snowfall is heavy, and thunderstorms are frequent, but there is comparatively little rain.

Within a recent geological period, central Aragon was un- doubtedly submerged by the sea, and the parched chalky soil remains saturated with salt, while many of the smaller streams run brackish. As the mountains of Valencia and Catalonia effectually bar out the fertilizing moisture of the

sea-winds, much of the province is a sheer wilderness, stony, ash-coloured, scarred with dry watercourses, and destitute of any vegetation except thin grass and heaths. In contrast with the splendid fertility of Valencia or the south of France, the landscape of this region, like the rest of central Spain, seems almost a con- tinuation of the north African desert area. There are, however, extensive oak, pine and beech forests in the highlands, and many beautiful oases in the deeply sunk valleys, and along the rivers, especially beside the Ebro, which is, therefore, often called the " Nile of Aragon." In such oases the flora is exceedingly rich. Wheat, maize, rice, oil, flax and hemp, of fine quality, are grown in considerable quantities; as well as saffron, madder, liquorice, sumach, and a variety of fruits. Merino wool is one of the chief products.

In purity of race the Aragonese are probably equal to the Castilians, to whom, rather than to the Catalans or Valencians, they are also allied in character. The dress of the women is less distinctive than that of the men, who wear a picturesque black and white costume, with knee-breeches, a brilliantly coloured sash, black hempen sandals, and a handkerchief wound round the head.

Three counties — Sobrarbe, situated near the headwaters of the Cinca, Aragon, to the west, and Ribagorza or Ribagorca, to the east — are indicated by tradition and the earliest chronicles as the cradle of the Aragonese monarchy. These districts were never wholly subdued when the Moors overran the country (711-713). Sobrarbe especially was for a time the headquarters of the Christian defence in eastern Spain. About 1035, Sancho III. the Great, ruler of the newly established kingdom of Navarre, which included the three counties above mentioned, bequeathed them to Gonzalez and Ramiro, his sons. Ramiro soon rid himself of his rival, and welded Sobrarbe, Ribagorza and Aragon into a single kingdom, which thenceforward grew rapidly in size and power and shared with Castile the chief part in the struggle against the Moors. The history of this period, which was terminated by the union of Castile and Aragon under Ferdinand and Isabella in 1479, is given, along with a full account of the very interesting constitution of Aragon, under Spain (q.v.). At the height of its power under James I. (1213-1276), the kingdom included Valencia, Catalonia, the Balearic Islands and the considerable territory of Montpellier in France; while Peter III. (1276-1285) added Sicily to his dominions.

The literature relating to Aragon is very extensive. See, in addition to the works cited in the article Spain (section History), " Les Archives d'Aragon et de Navarre," by L. Cadier, in Bibliotheque de V&cole des Chartes, 49 (Paris, 1888). Among the more important original authorities, the following may be selected: — for general history, Anales de la corona de

Aragon, by G. Curita, 3rd ed. in 7 folio volumes (Saragossa, 1668-1671; 1st ed. 1562-1580); — for ecclesiastical history, Teatro historico de las iglesias de Aragon (Pamplona, 1770-1807); for economic history, Historic, de la economiapolitica de Aragon, by I. J. de Asso y del Rio (Saragossa, 1798). For the constitution and laws of Aragon, see Origines del Justicia de Aragon, &c, by J. Ribera Tarrago (Saragossa, 1897), and Instituciones y reyes de Aragon, by V. Balaguer (Madrid, 1896). The topography, inhabitants, art, products, &c, of the kingdom are described in a volume of the series Espana entitled Aragdn, by J. M. Quadrado (Barcelona, 1886).

ARAGONITE, one of the mineral forms of calcium carbonate (CaC0 3), the other form being the more common mineral calcite. It crystallizes in the orthorhombic system, and the crystals are either prismatic or acicular in habit. Simple crystals are, how- ever, rare; twinning on the prism planes {M in the figures) being a characteristic feature of the mineral (fig. 1). This

M

M

M

!M

Fig. 1.

Fig. 2.

twinning is usually often repeated on the same plane (fig. 2), and gives rise to striations on the terminal faces (k) of the crystals; often, also, three crystals are twinned together on two of the prism planes of one of them, producing an apparently hexagonal prism. The mineral is colourless, white or yellowish, transparent or translucent, has a vitreous lustre, and, in fact, is not unlike calcite in general appearance. It may, however, always be readily distinguished from calcite by the absence of any marked cleavage, and by its greater hardness (H. = 3|— 4) and specific gravity (2-93); further, it is optically biaxial, whilst calcite is uniaxial. It is brittle and has a subconchoidal fracture ; on a fractured surface the lustre is decidedly resinous in character.

The mineral was first found, as reddish twinned crystals with the form of six-sided prisms, at Molina in Aragon, Spain, where

it occurs with gypsum and

*small crystals of ferruginous yl5*T* \— – k -/ /*

quartz in a red clay. It is ^' '■ ^^ k

from this locality that the

mineral takes its name,

which was originally spelt

arragonite. Fine groups of

crystals of the same habit

are found in the sulphur

deposits of Girgenti in

Sicily; also at Herren-

grund near Neusohl in

Hungary. At many other

localities the mineral takes the form of radiating groups of

acicular crystals, such as those from the haematite mines of

west Cumberland: beautiful feathery forms have been found

in a limestone cave in the Transvaal. Fibrous forms are also

common. A peculiar coralloidal variety known as flosferri

(" flower of iron ") consists of radially arranged fibres:

magnificent snow-white specimens of this variety have long

been known from the iron mines of Eisenetz in Styria. The

calcareous secretions of many groups of invertebrate animals

consist of aragonite (calcite is also common); pearls may be

specially cited as an example.

Aragonite is a member of the isomorphous group of minerals comprising witherite ($BaC0_3$), strontianite ($SrC0_3$), cerussite ($PbC0_3$) and

bromlite ((Ba, Ca)C0 3); and crystals of aragonite sometimes contain small amounts of strontium or lead. A variety known as tarnowitzite, from Tarnowitz in Silesia, contains about 5 % of lead carbonate.

Aragonite is the more unstable of the two modifications of calcium carbonate. A crystal of aragonite when heated becomes converted into a granular aggregate of calcite individuals: altered crystals of this kind (paramorphs) are not infrequently met with in nature, whilst in fossil shells the original nacreous layer of aragonite has invariably been altered to calcite. From a solution of calcium carbonate in water containing carbon dioxide crystals of calcite are deposited at the ordinary tem- perature, but from a warm solution aragonite crystallizes out. The thermal springs of Carlsbad deposit spherical concretions of aragonite, forming masses known as pisolite or Sprudelstein. (L. J. S.)

ARAGUA, one of the smaller states of Venezuela under the redivision of 1904, lying principally within the parallel ranges of the Venezuelan Cordillera, and comprising some of the most fertile and healthful valleys of the republic. It is bounded E. by the Federal District and Maturin, S. by Guarico and W. by Zamora and Carabobo. Pop. (1905, est.) 152,364. Aragua has a short coast-line on the Caribbean west of the Federal District, but has no port of consequence. Cattle, swine and goats are raised, and the state produces coffee, sugar, cacao, beans, cereals and cheese. The climate of the higher valleys is sub- tropical, the mean annual temperature ranging from 74 to 80° F. The capital, La Victoria (pop. 7800), is situated in the fertile Aragua valley, 1558 ft. above sea-level and 36 m. south-west of Caracas. Other important towns are Barbacoas (pop. 13,109) on the left bank of the Guarico in a highly fertile region, Ciudad de Cura and Maracay (pop. 7500), 56 m. west-south-west of

Caracas near the north-east shore of Lake Valencia. The last two towns are on the railway between Caracas and Valencia.

ARAGUAYA, Araguay or Araguia, a river of Brazil and principal affluent of the Tocantins, rising in the Serra do Cayapo, where it is known as the Rio Grande, and flowing in a north by east direction to a junction with the Tocantins at Sao Joao do Araguaya, or Sao Joao das Duas Barras. Its upper course forms the boundary line between Goyaz and Matto Grosso. The river divides into two branches at about 13 20′ S. lat., and unites again at io° 30’, forming the large island of Santa Anna or Bananal. The eastern branch, called the Furo, is the one used by boats, as the main

channel is obstructed by rapids. Its principal affluent is the Rio das Mortes, which rises in the Serra de Sao Jeronymo, near Cuyaba, Matto Grosso, and is utilized by boatmen going to Para. Of other affluents, the Bonito, Gargas, Cristallino and Tapirape on the west, and the Pitombas, Claro, Vermelho, Tucupa. and Chavante on the east, nothing definite is known as the country is still largely unexplored. The Araguaya has a course of 1080 m., considerable stretches of which are navigable for small river steamers, but as the river below Santa Anna Island is interrupted by reefs and rapids in two places — one having a fall of 85 ft. in 18 m., and the other a fall of 50 ft. in 12 m. — it affords no practicable outlet for the products of the state. It was explored in part by Henri Coudreau in 1897.

See Coudreau's Voyage au Tocantins-Araguaya (Paris, 1897).

ARAKAN, a division of Lower Burma. It consists of a strip of country running along the eastern seaboard of the Bay of Bengal, from the Naaf estuary, on the borders of Chittagong, to Cape Negrais. Length from northern extremity to Cape Negrais, about 400 m.; greatest breadth in the northern part, 90 m., gradually diminishing towards the south, as it is hemmed in by the Arakan Yoma mountains, until, in the extreme south, it tapers away to a narrow strip not more than 15 m. across. The coast is studded with islands, the most important of which are Cheduba, Ramree and Shahpura. The division has its head- quarters at Akyab and consists of four districts — namely, Akyab, Northern Arakan Hill Tracts, Sandoway and Kyaukpyu, formerly called Ramree. Its area is 18,540 sq. m. The popu- lation at the time of the British occupation in 1826 did not exceed 100,000. In 1831 it amounted to 173,000; in 1839 to 248,000, and in 1901 to 762,102.

The principal rivers of Arakan are — (1) the Naaf estuary, in the north, which forms the boundary between the division and Chittagong; (2) the Myu river, an arm of the sea, running a course almost parallel with the coast for about 50 m.; (3) the Koladaing river, rising near the Blue mountain, in the extreme north-east, and falling into the Bay of Bengal a few miles south of the Myu river, navigable by vessels of from 300 to 400 tons burden for a distance of 40 m. inland; and (4) the Lemyu river, a considerable stream falling into the bay a few miles south of the Koladaing. Farther to the south, owing to the nearness of the range which bounds Arakan on the east, the rivers are of but little importance. These are the Talak and the Aeng, navigable by boats; and the Sandoway, the Taungup and the Gwa streams, the latter of which alone has any importance, owing to its mouth forming a good port of call or haven for vessels of from 9 to 10 ft. draught. There are several passes over the Yoma mountains, the easiest being that called the Aeng route, leading from the village of that name into Upper Burma. The staple crop of the province is rice, along with

cotton, tobacco, sugar, hemp and indigo. The forests produce abundance of excellent oak and teak timber.

The natives of Arakan trace their history as far back as 2666 B.C., and give a lineal succession of 227 native princes down to modern times. According to them, their empire had at one period far wider limits, and extended over Ava, part of China, and a portion of Bengal. This extension of their empire is not, however, corroborated by known facts in history. At different times the Moguls and Pegus carried their arms into the heart of the country. The Portuguese, during the era of their greatness in Asia, gained a temporary establishment in Arakan; but in 1782 the province was finally conquered by the Burmese, from

which period until its cession to the British in 1826, under the treaty of Yandaboo, its history forms part of that of Burma. The old city of Arakan, formerly the capital of the province, is situated on an inferior branch of the Koladaing river. Its remoteness from the ports and harbours of the country, com- bined with the extreme unhealthiness of its situation, have led to its gradual decay subsequently to the formation of the com- paratively recent settlement of Akyab, which place is now the chief town of the province. The old city (now Myohaung) lies 50 m. north-east of Akyab. The Maghs, who form nearly the whole population of the province, follow the Buddhist doctrines, which are universally professed throughout Burma. The priests are selected from all classes of men, and one of their chief employ- ments is the education of children. Instruction is consequently widely diffused, and few persons, it is said, can be found in the province who are unable to read. The qualifications for entering into the priestly order are good conduct and a fair measure of learning — such conduct at least as is good according to Buddhist tenets, and such learning as is esteemed among their votaries.

The Arakanese are of Burmese origin, but separated from the parent stock by the Arakan Yoma mountains, and they have a dialect and customs of their own. Though conquered by the Burmese, they have remained distinct from their conquerors.

The Northern Arakan Hill Tracts district is under a super- intendent, who is usually a police officer, with headquarters at Paletwa. The area of the Hill Tracts is 5233 sq. m. ; pop. (1901) 20,682. (J. G. Sc.)

ARAKCHEEV, ALEKSYEI ANDREEVICH, Count (1760- 1834), Russian soldier and statesman, was descended from an ancient family of Great Novgorod. From his mother, Elizabeth Vitlitsaya, he inherited most of his characteristics, an insatiable love of work, an almost pedantic love of order and the most rigorous sense of duty. In 1788 he entered the corps of noble

cadets in the artillery and engineering department, where his ability, especially in mathematics, soon attracted attention. In July 1 791 he was made an adjutant on the staff of Count N. I. Saltuikov, who (September 1792) recommended him to the cesarevich Paul Petrovich as the artillery officer most capable of reorganizing the army corps maintained by the prince at Gatchina. Arakcheev speedily won the entire confidence of Paul by his scrupulous zeal and undeniable technical ability. His inexorable discipline (magnified into cruelty by later legends) soon made the Gatchina corps a model for the rest of the Russian army. On the accession of Paul to the throne Arak- cheev' was promptly summoned to St Petersburg, appointed military commandant in the capital, and major-general in the grenadier battalion of the Preobrazhenskoe Guard. On the 1 2th of December 1796, he received the ribbon of St Anne and a rich estate at Gruzina in the government of Novgorod, the only substantial gift ever accepted by him during the whole of his career. At the coronation (5th of April 1797) Paul created him a baron, and he was subsequently made quartermaster- general and colonel of the whole Preobrazhenskoe Guard. It was to Arakcheev that Paul entrusted the reorganization of the army, which during the latter days of Catherine had fallen into a state of disorder and demoralization. Arakcheev remorselessly applied the iron Gatchina discipline to the whole of the imperial forces, beginning with the Guards. He soon became generally detested by the army, but pursued his course unflinchingly and introduced many indispensable hygienic reforms. " Clean barracks are healthy barracks," was his motto. Nevertheless, the opposition of the officers proved too strong for him, and on the 18th of March 1798 he was dismissed from all his appoint- ments. Arakcheev's first disgrace only lasted six months. On the nth of August he was received back into favour, speedily reinstated in all his former offices, and on the 5th of May 1799 was created a count, the emperor himself selecting the motto: " Devoted, not servile." Five months later he was again in disgrace, the emperor dismissing him on the strength of a denunciation subsequently proved to be false. It was a fatal step on Paul's part, for everything goes to prove that he would never have been assassinated had Arakcheev continued by his

side. During the earlier years of Alexander, Arakcheev was completely overlooked. Only on the 27th of April 1803, was the count recalled to St Petersburg, and employed as inspector- general of the artillery. His wise and thorough reorganization of the whole department contributed essentially to the victories of the Russians during the Napoleonic wars. All critics agree, indeed, that the Arakcheev administration was the golden era

of the Russian artillery. The activity of the inexhaustible inspector knew no bounds, and he neglected nothing which could possibly improve this arm. His principal reforms were the subdivision of the artillery divisions into separate inde- pendent units, the formation of artillery brigades, the establishment of a committee of instruction (1808), and the publishing of an Artillery Journal. At Austerlitz he had the satisfaction of witnessing the actual results of his artillery reforms. The commissariat scandals which came to light after the peace of Tilsit convinced the emperor that nothing short of the stern and incorruptible energy of Arakcheev could reach the sources of the evil, and in January 1808 he was appointed inspector-general and war minister. When, on the outbreak of the Swedish war of 1809, the emperor ordered the army to take advantage of an unusually severe frost and cross the ice of the Gulf of Finland, it was only the presence of Arakcheev that compelled an un- willing general and a semi-mutinous army to begin a campaign which ended in the conquest of Finland. On the institution of the "Imperial Council" (1st of January 1810), Arakcheev was made a member of the council of ministers and a senator, while still retaining the war office. Subsequently Alexander was alienated from him owing to the intrigues of the count's enemies, who hated him for his severity and regarded him as a dangerous reactionary. The alienation was not, however, for long. It is true, Arakcheev took no active part in the war of 1812, but all the correspondence and despatches relating to it passed through his hands, and he was the emperor's inseparable companion during the whole course of it. At Paris (31st of March 1814) Alexander, with his own hand, wrote the ukaz appointing him a field-marshal, but he refused the dignity, accepting, instead, a miniature portrait of his master. From this time Alexander's confidence in Arakcheev steadily increased, and the emperor imparted to him, first of all, his many projects of reform, especially his project of military colonies, the carrying out of the details of which was committed to Arakcheev (1824). The failure of the scheme was due not to any fault of the count, but to the inefficiency and insubordination of the district officers. In Alexander's last years Arakcheev was not merely his chief counsellor, but his dearest friend, to whom he submitted all his projects for consideration and revision. The most interesting of these projects was the plan for the emancipation of the peasantry (1818). On the accession of Nicholas I., Arakcheev, thoroughly broken in health, gradually restricted his immense sphere of activity, and on the 26th of April 1826, resigned all his offices and retired to Carlsbad. The 50,000 roubles presented to him by the emperor as a parting gift he at once handed to the Pavlovsk Institute for the education of the daughters of poor gentlemen. His last days he spent on his estate at Gruzina, carefully collecting all his memorials of Alexander, whose memory he most piously cherished. He also set aside 25,000 roubles for the author of the best biography of his imperial friend. Arak- cheev died on the 21st of April

1834, with his eyes fixed to the last on the late emperor's portrait. " I have now done every- thing," he said, " so I can go and make my report to the emperor Alexander." In 1806 he had married Natalia Khomutova, but they lived apart, and he had no children by her.

See Vasily Ratch, Memorials of Count Arakcheev (Rus.) (St Peters- burg, 1864); Mikhail Ivanovich Semevsky, Count Arakcheev and the Military Colonies (Rus.) (St Petersburg, 1871); Theodor Schie- mann, Gesch. Russland's unter Kaiser Nikolaus I., vol. i., Alex- ander I., &c. (Berlin, 1904). (R. N. B.)

ARAL, a lake or inland sea in the west of Asia, situated between lat. 43 30′ and 46 51′ N., and long. 58 13′ and 6i° 56′ E. It was known to the ancient Arab and Persian geographers as the Sea of Khwarizm or Kharezm, from the neigh- bouring district of the Chorasmians, and derives its present name

from the Kirghiz designation of Aral-denghiz, or Sea of Islands. In virtue of its area (26,233 sq.m.) it is the fourth largest inland sea of the world. It has nearly the same length as width, namely about 170 m., if its northern gulf (Kichkineh-denghiz) is left out of account. Its depth is insignificant, the maximum being 220 ft. in a depression in the north-west, and the mean depth only 50 ft., so that notwithstanding its area it contains only eleven times as much water as the Lake of Geneva. Its altitude is 242! ft. above the Caspian, i.e. about 155 ft. above the ocean. The lake is surrounded on the north by steppes; on the west by the rocky plateau of Ust-Urt, which separates it from the Caspian; on the south by the alluvial district of Khiva; and on the east by the Kyzyl-kum, or Red Sand Desert. On the north the shores are comparatively low, and the coast-line is broken by a number of irregular bays, of which the most important are those of Sary-chaganak and Paskevich. On the west an almost unbroken wall of rock extends from Chernychev Bay south- wards, rising towards the middle to 500 ft. The southern coast is occupied by the delta of the Oxus (Jihun, Amu-darya), one of the arms of which, the Laudan, forms a swamp, 80 m. long and 20 broad, before it discharges into the sea. The only other tributary of any size that the sea receives is the Jaxartes (Sihun, Syr-darya) which enters towards the northern extremity of the east coast, and is suspected to be shifting its embouchure more and more to the north. This river, as well as the Amu, conveys vast quantities of sediment into the lake; the delta of the Syr-darya increased by 13! sq. m. between 1847 and 1900. The eastern coast is fringed with multitudes of small islands, and other islands, some of considerable size, are situated in the open towards the north and west. Kug-Aral, the largest, lies opposite the mouth of the Syr-darya, cutting off the Kichkineh- denghiz or Little Sea. The next largest island is the Nikolai, nearly in the middle. Navigation is dangerous owing to the frequency and

violence of the storms, and the almost total absence of shelter. The north-east wind is the most prevalent, and sometimes blows for months together. The only other craft, except the steamships of the Russians, that venture on the waters, are the flat-bottomed boats of the Kirghiz.

In regard to the period of the formation of the Aral there were formerly two theories. According to Sir H. C. Rawlinson (Proc. Roy. Geog. Soc, March 1867) the disturbances which produced the present lake took place in the course of the middle ages; while Sir Roderick Murchison contended (Joum. of Roy. Geog. Soc, 1867, p. cxliv. &c.) that the Caspian and Aral existed as separate seas before and during all the historic period, and that the main course of the rivers Jaxartes and Oxus was deter- mined in a prehistoric era. The former based his opinion largely on historical evidence, and the latter trusted principally to geological data. There is no doubt that in recent historical times Lake Aral had a much greater extension than it has at the present time, and that its area is now diminishing. This is, of course, due to the excess of evaporation over the amount of water supplied by its two feeders, the Amu-darya and the Syr- darya, both of which are seriously drawn upon for irrigation in all the oases they flow through. Old shore lines and other indications point to the level of the lake having once been 50 ft. above the existing level. Nevertheless the general desiccation is subject to temporary fluctuations, which appear to corre- spond to the periods recently suggested by Eduard Bruckner (b. 1862); for, whereas the lake diminished and shrank during 1850-1880, since the latter year it has been rising again. Islands which were formerly connected with the shore are now some distance away from it and entirely surrounded by water. More- over, on a graduated level, put down in 1874, there was a per- manent rise of nearly 4 ft. by 1901. The temperature at the bottom was found (1 900-1 902) by Emil Berg to be 33-8° Fahr., while that of the surface varied from 44-5° to 80-5° between May and September; the mean surface temperature for July was 75°. The salinity of the water is much less than that of the ocean, containing only 1-05% of salt, and the lake freezes every year for a great distance from its shores. The opinion that Lake Aral periodically disappeared, which was for a long

time countenanced by Western geographers, loses more and more probability now that it is evident that at a relatively recent period the Caspian Sea extended much farther eastward than it does now, and that Lake Aral communicated with it through the Sary-kamysh depression. The present writer is even inclined to think that, besides this southern communication with the Caspian, Lake Aral may have been, even in

historical times, connected with the Mortvyi Kultuk (Tsarevich) Gulf of the Caspian, discharging part of its water into that sea through a depression of the Ust-Urt plateau, which is marked by a chain of lakes (Chumyshty, Asmantai). In this case it might have been easily confounded with a gulf of the Caspian (as by Jenkin- son). That the level of Lake Aral was much higher in post- Pliocene times is proved by the discovery of shells of its char- acteristic species of Peclen and Mytilus in the Kara-kum Desert, 33 m. south of the lake and at an altitude of 70 ft. above its present level, and perhaps even up to 200 ft. (by Syevertsov).

The fish of Lake Aral belong to fresh-water species, and in some of its rapid tributaries the interesting Scaphirhynchus, which represents a survival from the Tertiary epoch, is found. The fishing is very productive, the fish being exported to Turkes- tan, Merv and Russia. The shores of the lake are uninhabited; the nearest settlements are Kazala, 55 m. east, on the Syr, and Chimbai and Kungrad in the delta of the Amu.

Authorities. — Maksheev's " Description of Lake Aral," and Kaulbars' " Delta of the Amu," in Zapiski of Russ. Geogr. Soc, 1st series, v., and new series, ix. ; Grimm's Studies of the Aral- Caspian Expedition; Nikolsky's " Fishing in Lake Aral," in Izvestia, Russ. Geogr. Soc, 1887; Prof. Mushketov, Turkestan, vol. i. (1886), which contains bibliographical references; Rosier, Die Aralseefrage (1873); Wood, The Shores of the Aral Lake (1876); and Berg in Izvestia, Turkestan Branch of Russian Geog. Soc. (vol. iii., Tashkent, 1902). (P. A. K.)

ARAM, EUGENE (1704-1750), English scholar, but more famous as the murderer celebrated by Hood in his ballad, the Dream of Eugene Aram, and by Bulwer Lytton in his romance of Eugene Aram, was born of humble parents at Ramsgill, Yorkshire, in 1704. He received little education at school, but manifested an intense desire for learning. While still young, he married and settled as a schoolmaster at Netherdale, and during the years he spent there, he taught himself both Latin and Greek. In 1734 he removed to Knaresborough, where he remained as schoolmaster till 1745. In that year a man named Daniel Clark, an intimate friend of Aram, after obtaining a con- siderable quantity of goods from some of the tradesmen in the town, suddenly disappeared. Suspicions of being concerned in this swindling transaction fell upon Aram. His garden was searched, and some of the goods found there. As, however, there was not evidence sufficient to convict him of any crime, he was discharged, and soon after set out for London, leaving his wife behind. For several years he travelled through parts of England, acting as usher in a number of schools, and settled finally at Lynn, in Norfolk. During his travels he had amassed considerable materials for a work he had projected on etymology, to be entitled a Comparative Lexicon of the English, Latin, Greek, Hebrew and Celtic

Languages. He was undoubtedly an original philologist, who realized, what was then not yet admitted by scholars, the affinity of the Celtic language to the other languages of Europe, and could dispute the then accepted belief that Latin was derived from Greek. Aram's writings show that he had grasped the right idea on the subject of the Indo-European character of the Celtic language, which was not established till J. C. Prichard published his book, Eastern Origin of the Celtic Nations, in 1831. But he was not destined to live in history as the pioneer of a new philology. In February 1758 a skeleton was dug up at Knaresborough, and some suspicion arose that it might be Clark's. Aram's wife had more than once hinted that her husband and a man named Houseman knew the secret of Clark's disappearance. Houseman was at once arrested and confronted with the bones that had been found. He affirmed his innocence, and, taking up one of the bones, said, " This is no more Dan Clark's bone than it is mine." His manner in saying this roused suspicion that he knew more of Clark's disappearance

than he was willing to admit. He was again examined, and confessed that he had been present at the murder of Clark by Aram and another man, Terry, of whom nothing further is heard. He also gave information as to the place where the body had been buried in St Robert's Cave, a well-known spot near Knares- borough. A skeleton was dug up here, and Aram was im- mediately arrested, and sent to York for trial. Houseman was admitted as evidence against him. Aram conducted his own defence, and did not attempt to overthrow Houseman's evidence, although there were some discrepancies in that; but made a skilful attack on the fallibility of circumstantial evidence in general, and particularly of evidence drawn from the discovery of bones. He brought forward several instances where bones had been found in caves, and tried to show that the bones found in St Robert's Cave were probably those of some hermit who had taken up his abode there. He was found guilty, and con- demned to be executed on the 6th of August 1759, three days after his trial. While in his cell he confessed his guilt, and threw some light on the motives for his crime, by asserting that he had discovered a criminal intimacy between Clark and his own wife. On the night before his execution he made an unsuccessful attempt at suicide by opening the veins in his arm.

ARAMAIC LANGUAGES, a class of languages so called from Aram, a geographical term, which in old Semitic usage desig- nates nearly the same districts as the Greek word Syria. Aram, however, does not include Palestine, while it comprehends Mesopotamia (Heb. Aram of two rivers), a region which the Greeks frequently distinguish from Syria proper. Thus the Aramaic languages may be geographically defined as the Semitic dialects originally current in Mesopotamia and the regions extending south-west from the Euphrates to Palestine. (See Semitic Languages; Syriac; Targum.)

ARANDA, PEDRO PABLO ABARCA DE BOLEA, Count of (1719-1798), Spanish minister and general, was born at the castle of Sietamo, a lordship of his family near Huesca in Aragon, on the 1st of August 1 7 19. The house of Abarca was very ancient, a fact of which Don Pedro, who never forgot that he was a " rico hombre " (noble) of Aragon, was deeply conscious. He was educated partly at Bologna and partly at the military school of Parma. In 1740 he entered the army as captain in the regiment " Castilla," of which his father was proprietary colonel. On the death of his father he became colonel, and served in the Italian campaigns of the War of the Austrian Succession. In 1749 he married Dona Ana, daughter of the 9th duke of Hijar, by whom he had one son, who died young, and a daughter. During the following years he travelled and visited the camp of Frederick the Great, whose system of drill he admired and afterwards introduced into the Spanish army. After a short period of diplomatic service in Portugal, where his exacting temper made it impossible for him to agree with the premier, Pombal, he returned to Madrid, was made a knight of the Golden Fleece, and director-general of artillery — a post which he threw up, together with his rank of lieutenant-general, because • he was not allowed to punish certain fraudulent contractors. The king, Ferdinand VI., exiled him to his estates, but Charles III. on his accession took him into favour. He was again employed in diplomacy, and then appointed to command an army against Portugal in 1763. In 1764 he was made governor of Valencia. When in 1766 the king was driven from his capital in a riot, he summoned Aranda to Madrid and made him president of the council, and captain-general of New Castile. Until 1773 Aranda was the most important minister in Spain. He restored order and aided the king most materially in his work of administrative reform. But his great achievements, which gave him a high reputation throughout Europe with the philosophical and anti- clerical parties, were his expulsion of the Jesuits, whom the king considered responsible for the riot of 1766, and the active part he took in the suppression of the order. Aranda had come much under foreign influence by his education and his travels, and had acquired the reputation of being a confirmed sceptic. By Voltaire and the Encyclopaedists he was erected into a hero from whom great things were expected. His ability, his

remarkable capacity for work, and his popularity made him in- dispensable to the king. But he was a trying servant, for his temper was captious and his tongue sarcastic, while his aristo- cratic arrogance led him to display an offensive contempt for the golillas (the stiff c'ollars), as he called the lawyers and public servants whom the king preferred to choose as

ministers, and he permitted himself an amazing freedom of language with his sovereign. At last Charles III. sent him as ambassador to Paris in a disguised disgrace. Aranda held this position till 1787, but in Paris he was chiefly known for his oddities of manner and for perpetual wrangling with the French on small points of etiquette. He resigned his post for private reasons. In the reign of Charles IV., with whom he had been on familiar terms during the life of the old king, he was for a very short time prime minister in 1792. In reality he was merely used as a screen by the queen Maria Louisa and her favourite Godoy. His open sympathy with the French Revolution brought him into collision with the violent reaction produced in Spain by the excesses of the Jacobins, while his temper, which had become perfectly uncontrollable with age, made him insufferable to the king. After his removal from office he was imprisoned for a short time at Granada, and was threatened with a trial by the Inquisition. The proceedings did not go beyond the preliminary stage, and Aranda died at Epila on the 9th of January 1798.

See Don Jacobo de la Pezuela in the Revista de Espana, vol. xxv. (1872); Don Antonio M a . Fabie, in the Diccionario general de politico, y administration of Don E. Suarez Inclan (Madrid, 1868), vol. i. ; M. Morel Fatio, Etudes sur I'Espagne (2nd series, Paris, 1890). (D. H.)

ARAN ISLANDS, or South Aran, three islands lying across Galway Bay, on the west coast of Ireland, in a south-easterly direction, forming a kind of natural breakwater. They belong to the county Galway, and their population in 1901 was 2863. They are called respectively — beginning with the northernmost ■ — Inishmore (or Aranmore), the Great Island; Inishmaan, the Middle Island; and Inisheer, the Eastern Island. The first has an elevation of 354 ft., the second of 259, and the third of 202. Their formation is carboniferous limestone. These islands are remarkable for a number of architectural remains of a very early date. In Inishmore there stand, on a cliff 220 ft. high, large remains of a circular cyclopean tower, called Dun-Aengus, ascribed to the Fir-bolg or Belgae; or, individually, to the first of three brothers, Aengus, Conchobar and Nil, who reached Aran Islands from Scotland in the 1st century a.d. There are seven other similar structures in the group. Inishmore also bears the name of Aran-na-naomh, Aran-of-the-Saints, from the number of religious recluses who took up their abode in it, and gave a celebrity to the holy wells, altars and shrines, to which many are still attracted. No less, indeed, than twenty buildings of ecclesiastical or monastic character have been enumerated in the three islands. On Inishmore are remains of the abbey of Killenda. Christianity was introduced in the 5th century, and Aran soon became one of the most famous island-resorts of religious teachers and ascetics. The extraordinary fame of the foundations here has been inferred from the inscription " VII. Romani " on a stone in the church Teampull Brecain on Inish- more,

attributed to disciples from Rome. The total area of the islands is 11,579 acres. The Congested Districts Board made many efforts to improve the condition of the inhabitants, especi- ally by introducing better methods of fishing. A curing station is established at Killeany, the harbour of Inishmore.

ARANJUEZ (perhaps the ancient Ara Jovis), a town of central Spain, in the province of Madrid, 30 m. S. of Madrid, on the left bank of the river Tagus, at the junction of the main southern railways to Madrid, and at the western terminus of the Aranjuez- Cuenca railway. Pop. (1900) 12,670. Aranjuez occupies part of a wide valley, about 1500 ft. above the sea. Its formal, straight streets, crossing one another regularly at right angles, and its uniform, two-storeyed houses were built in imitation of the Dutch style, under the direction of Jeronimo, marquis de Grimaldi (1716-1788), ambassador of Charles III. at the Hague. A rapid in the Tagus, artificially converted into a weir, renders irrigation easy, and has thus created an oasis in the midst of the

barren plateau of New Castile. On every side the town is sur- rounded by royal parks and woods of sycamores, plane-trees and elms, often of extraordinary size. The prevalence of the dark English elms, first introduced into the country and planted here by order of Philip II. (1527-1598), gives to the Aranjuez district a character wholly distinct from that of other Spanish landscapes; and at an early period, despite the unhealthy climate, and especially the oppressive summer heat, which often approaches ioo° F., Aranjuez became a favourite residence of the Spanish court. In the 14th and 15th centuries, the master of the Order of Santiago had a country seat here, which passed, along with the mastership, into the possession of the crown of Spain in w;22. Its successive occupants, from the emperor Charles V. (1500-1558) down to Ferdinand VII. (1784-1833), modified it according to their respective tastes. The larger palace was built by Pedro Caro for Philip V. (1683-1746), in the French style of the period. It overlooks the Jardin de la Isla, a beautiful garden laid out for Philip II. on an island in the Tagus, which forms the scene of Schiller's famous drama Don Carlos. The Casa del Labrador, or Labourer's Cottage, as it is called, is a smaller palace built by Charles IV. in 1803, and full of elaborate ornamentation. The chief local industry is farming, and an annual fair is held in September for the sale of live stock. Great attention is given to the rearing of horses and mules, and the royal stud used to be remarkable for the beauty of its cream-coloured breed. The treaty of 1 7 7 2 between France and Spain was concluded at Aranjuez, which afterwards suffered severely from the French during the Peninsular War. Here, also, in 1808, the insurrection broke out which ended in the abdication of Charles IV.

For a fuller description of Aranjuez see D.S. Vinas y Rey, Aranjuez (Madrid, 1890) ; F. Nard, Guia de Aranjuez, su historia y description (Madrid, 1851), (illustrated); Alvarez de Quindos, Description historica del real bosque y casa de Aranjuez (Madrid, 1804).

ARANY, JANOS (1817-1882), the greatest poet of Hungary after Petofi, was born at Nagy-Szalonta on the 2nd of March 1817, the son of Gyorgy Arany and Sara Megyeri; his people were small Calvinist yeomen of noble origin, whose property consisted of a rush-thatched cottage and a tiny plot of land. An only son, late born, seeing no companions of his own age, hearing' nothing but the voices of his parents and the hymns and prayers in the little Calvinist chapel, Arany grew up a grave and gentle, but by no means an ignorant child. His precocity was remarkable. At six years of age he went to school at Szalonta, where he read everything he could lay his hands upon in Hungarian and Latin. From 1832 to 1836 Arany was a preceptor at Kis-Ujszallas and Debreczen, still a voracious reader with a wider field before him, for he had by this time taught himself French and German. Tiring of the monotony of a scholastic life, he joined a troupe of travelling actors. The hardships he suffered were as nothing compared with the pangs of conscience which plagued him when he thought of the despair of his father, who had meant to make a pastor of this prodigal son, to whom both church and college now seemed for ever closed. At last he borrowed sixpence from the stage-manager and returned home, carrying all his property tied up in a hand- kerchief. Shortly after his home-coming his mother died and his father became stone-blind. Arany at once resolved that it was his duty never to leave his father again, and a conrectorship which he obtained at this time enabled them to live in modest comfort. In 1840 he obtained a notaryship also, and the same year married Juliana Ercsey, the penniless orphan daughter of an advocate. The next few happy years were devoted to his profession and a good deal of miscellaneous reading, especially of Shakespeare (he learnt English in order to compare the original with his well-thumbed German version) and Homer. Meanwhile the reactionaries of Vienna were goading the Magyar Liberals into revolt, and Arany found a safety-valve for his growing indignation by composing a satirical poem in hex- ameters, entitled " The Lost Constitution." The Kisfaludy Society, the great literary association of Hungary, about this time happened to advertise a prize for the best satire on current

events. Arany sent in his work, and shortly afterwards was awarded the 25-gulden prize (7 th of February 1846) by the society, which then advertised another prize for the best Magyar epic poem. Arany won this

also with his Toldi (the first part of the present trilogy), and immediately found himself famous. All eyes were instantly turned towards the poor country notary, and Petofi was the first to greet him as a brother. In February of the following year Arany was elected a member of the Kisfaludy Society. In the memorable year 1848 the people of Szalonta elected him their deputy to the Hungarian parliament. But neither now nor subsequently (1861, 1869) would he accept a parliamentary mandate. He wrote many articles, however, in the gazette Nepbardlja, an organ of the Magyar government, and served in the field as a national guard for eight or ten weeks. In 1849 he was in the civil service of the revolutionary government, and after the final catastrophe returned to his native place, living as best he could on his small savings till 1850, when Lajos Tisza, the father of Kalman Tisza, the future prime minister, invited him to his castle at Geszt to teach his son Domokos the art of poetry. In the following year Arany was elected professor of Hungarian literature and language at the Nagy-Koros gymnasium. He also attempted to write another epic poem, but the time was not favourable for such an under- taking. The miserable condition of his country, and his own very precarious situation, weighed heavily upon his sensitive soul, and he suffered severely both in mind and body. On the other hand reflection on past events made clear to him not only the sufferings but the defects and follies of the national heroes, and from henceforth, for the first time, we notice a bitterly humorous vein in his writings. Thus Bolond Istok, the first canto of which he completed in 1850, is full of sub-acrid merri- ment. During his nine years' residence at Nagy-Kbros, Arany first seriously turned his attention to the Magyar ballad, and not only composed some of the most beautiful ballads in the language, but wrote two priceless dissertations on the technique of the ballad in general: " Something concerning assonance " (1854), and " On Hungarian National Versification " (1856).

When the Hungarian Academy opened its doors again after a ten years' cessation, Arany was elected a member (15th of December 1858). On the 15th of July i860 he was elected director of the revived Kisfaludy Society, and went to Pest. In November, the same year, he started Szipirodalmi Figyelo, a monthly review better known by its later name, Koszeru, which did much for Magyar criticism and literature. He also edited the principal publications of the society, including its notable translation of Shakespeare's Dramatic Works, to which he con- tributed the Midsummer Night's Dream (1864), Hamlet and King John (1867). The same year he won the Nadasdy prize of the Academy with his poem "Death of Buda." From 1865 to 1879 he was the secretary of the Hungarian Academy.

Domestic affliction, ill-health and his official duties made these years comparatively unproductive, but he issued an edition of his collected poems in 1867, and in 1880 won the Karacsonyi prize with his translation of the

Comedies of Aristophanes (1880). In 1879 he completed his epic trilogy by publishing The Love of Toldi and Toldi' s Evening, which were received with universal enthusiasm. He died suddenly on the 24th of October 1882. The first edition of his collected works, in 8 volumes, was pub- lished in 1884-1885.

Arany reformed Hungarian literature. Hitherto classical and romantic successively, like other European literatures, he first gave it a national direction. He compelled the poetry of art to draw nearer to life and nature, extended its boundaries and made it more generally intelligible and popular. He wrote not for one class or school but for the whole nation. He introduced the popular element into literature, but at the same time elevated and ennobled it. What Petofi had done for lyrical he did for epic poetry. Yet there were great differences between them. Petofi was more subjective, more individual; Arany was more objective and national. As a lyric poet Petofi naturally gave expression to present moods and feelings; as an epic poet Arany plunged into the past. He took his standpoint on tradition.

His art was essentially rooted in the character of the whole nation and its glorious history. His genius was unusually rich and versatile; his artistic conscience always alert and sober. His taste was extraordinarily developed and absolutely sure. To say nothing of his other great qualities, he is certainly the most artistic of all the Magyar poets.

See Posthumous Writings and Correspondence of A rany, edited by Laszlo Arany (Hung.), (Budapest, 1887-1889) ; article " Arany," in A Pallas Nagy Lexikona, Kot 2 (Budapest, 1893) ; Mor Gaal, Life of Jdnos Arany (Hung.), (Budapest, 1898); L. GyOngyosy, Jdnos Arany's Life and Works (Hung.), (Budapest, 1901). Translations from Arany : The Legend of the Wondrous Hunt (canto 6 of Buda's Death), by D. Butler (London, 1881); Toldi, poeme en 12 chants (Paris, 1895); Dichtungen (Leipzig, 1880); Kbnig Buda's Tod (Leipzig, 1879); Balladen (Vienna, 1886). (R. N. B.)

ARAPAHO (possibly from the Pawnee for " trader "), a tribe of North American Indians of Algonquian stock. They formerly ranged over the central portion of the plains between the Platte and Arkansas. They were a brave, warlike, predatory tribe. With the Sioux and Cheyennes they waged unremitting warfare upon the Utes. The southern divisions of the tribe were placed (1867) on a reservation in the west of Indian Territory (now Oklahoma), while the northern are in western Wyoming. The southern section sold their reservations in 1892 and became American citizens. The Arapahos number in all some 2000.

See Indians, North American; H. R. Schoolcraft, History of the Indian

Tribes of the United States (1851-1857, 6 vols.) ; Handbook of American Indians, ed. F. W. Hodge (Washington, 1907).

ARARAT (Armen. Massis, Turk. Egri Dagh, i.e. " Painful Mountain," Pers. Koh-i-Nuh, i.e. " Mountain of Noah,"), the name given to the culminating point of the Armenian plateau which rises to a height of 17,000 ft. above the sea. The massif of Ararat rises on the north and east out of the alluvial plain of the Aras, here from 2500 ft. to 3000 ft. above the sea, and on the south-west sinks into the plateau of Bayezid, about 4500 ft. It is thus isolated on all sides but the north-west, where a col about 6900 ft. high connects it with a long ridge of volcanic mountains. Out of the massif rise two peaks, " their bases confluent at a height of 8800 ft., their summits about 7 m. apart." The higher, Great Ararat, is " a huge broad-shouldered mass, more of a dome than a cone "; the lower, Little Ararat, 12,840 ft. on which the territories of the tsar, the sultan, and the shah meet, is " an elegant cone or pyramid, rising with steep, smooth, regular sides into a comparatively sharp peak " (Bryce). On the north and west the slopes of Great Ararat are covered with glittering fields of unbroken neve. The only true glacier is on the north- east side, at the bottom of a large chasm which runs into the heart of the mountain. The great height of the snow-line,- 14,000 ft., is due to the small rainfall and the upward rush of dry air from the plain of the Araxes. The middle zone of Ararat, 5000-11,500 ft., is covered with good pasture, the upper and lower zones are for the most part sterile. Whether the tradition which makes Ararat the resting-place of Noah's Ark is of any historical value or not, there is at least poetical fitness in the hypothesis, inasmuch as this mountain is about equally distant from the Black Sea and the Caspian, from the Mediterranean and the Persian Gulf. Another tradition — accepted by the Kurds, Syrians and Nestorians — fixes on Mount Judi, in the south of Armenia, on the left bank of the Tigris, near Jezire, as the Ark's resting-place. There so-called genuine relics of the ark were exhibited, and a monastery and mosque of commemoration were built; but the monastery was destroyed by lightning in 776 a.d., and the tradition has declined in credit. Round Mount Ararat, however, gather many traditions connected with the Deluge. The garden of Eden is placed in the valley of the Araxes; Marand is the burial-place of Noah's wife; at Arghuri, a village near the great chasm, was the spot where Noah planted the first vineyard, and here were shown Noah's vine and the monastery of St James, until village and monastery were over- whelmed by a fall of rock, ice and snow, shaken down by an earthquake in 1840. According to the Babylonian account, the resting-place of the Ark was " on the Mountain of Nizir," which some writers have identified with Mount Rowanduz, and others with Mount Elburz, near Teheran.

From the Armenian plateau, Ararat rises in a graceful isolated cone far into the region of perennial snow. It was long believed by the Armenian monks that no one was permitted to reach the " secret top " of Ararat with its sacred remains, but on the 27th of September 1829, Dr. Johann Jacob Parrot (1 792-1 840) of Dorpat, a German in the employment of Russia, set foot on the " dome of eternal ice." Ararat has since been ascended by S. Aftonomov (1834 and 1843); M. Wagner and W. H. Abich (1845); J. Chodzko, N. W. Chanykov, P. H. Moritz and a party of Cossacks in the service of the Russian government (1850); Stuart (1856); Monteith (1856); D. W. Freshfield (1868); James Bryce (1876); A. V. Markov (1888); P. Pashtukhov and H. B. Lynch (1893). Mr Freshfield thus described the moun- tain: — "It stands perfectly isolated from all the other ranges, with the still more perfect cone of Little Ararat (a typical volcano) at its side. Seen thus early in the season (May), with at least 9000 ft. of snow on its slopes, from a distance and height well calculated to permit the eye to take in its true proportions, we agreed that no single mountain we know presented such a magnificent and impressive appearance as the Armenian Giant." There are a number of glaciers in the upper portion, and the climate of the whole district is very severe. The greater part of the mountain is destitute of trees, but the lower Ararat is clothed with birches. The fauna and flora are both comparatively meagre.

Both Great and Little Ararat consist entirely of volcanic rocks, chiefly andesites and pyroxene andesites, with some obsidian. No crater now exists at the summit of either, but well-formed para- sitic cones occur upon their flanks. There are no certain historic records of any eruption. The earthquake and fall of rock which destroyed the village of Arghuri in 1840 may have been caused by a volcanic explosion, but the evidence is unsatisfactory.

The name of Ararat also applies to the Assyrian Urardhu, the country in which the Ark rested after the Deluge (Gen. viii. 4), and to which the murderers of Sennacherib fled (2 Kings xix. 37; Isaiah xxxvii. 38). The name Urardhu, originally that of a principality which included Mount Ararat and the plain of the Araxes, is given in Assyrian inscriptions from the 9th century b. c. downwards to a kingdom that at one time included the greater part of the later Armenia. The native name of the kingdom was Biainas, and its capital was Dhuspas, now Van. The first king, Sarduris I. (c. 833 B.C.), subdued the country of the Upper Euphrates and Tigris. His inscriptions are written in cuneiform, in Assyrian, whilst those of his successors are in cuneiform, in their own language, which, is neither Aryan nor Semitic. The kings of Biainas extended their kingdom eastward and westward, and defeated the Assyrians and Hittites. But Sarduris II. was

overthrown by Tiglath Pileser III. (743 B.C.), and driven north of the Araxes, where he made Armavir, Armauria, his capital. Interesting specimens of Biainian art have been found on the site of the palace of Rusas II., near Van. Shortly after 645 B.C. the kingdom fell, possibly conquered by Cyaxares, and a way was thus opened for the immigration of the Aryan Armenians. The name Ararat is unknown to the Armenians of the present day. The limits of the Biblical Ararat are not known, but they must have included the lofty Armenian plateau which overlooks the plain of the Araxes on the north, and that of Mesopotamia on the south. It is only natural that the highest and most striking mountain in the district should have been regarded as that upon which the Ark rested, and that the old name of the country should have been transferred to it.

See also H. B. Lynch, Armenia (1901); Sayce, "Cuneiform Inscriptions of Lake Van," in Journal of Royal Asiatic Society, vols. xiv., xx. and xxvi. ; Maspero, Histoire ancienne des peuples de V Orient classique, tome iii., Les Empires (Paris, 1899); J. Bryce, Transcaucasia and Ararat (4th ed., 1896); D. W. Freshfield, Travels in the Central Caucasus and Bashan (1869) ; Parrot, Reise zum Ararat (1834); Wagner, Reise nach dem Ararat (1848); Abich, Die Besteigung des Ararat (1849); articles "Ararat," in Hastings' Dictionary of the Bible, and the Encyclopaedia Biblica. (C. W. W.)

ARARAT, a municipal town of Ripon county, Victoria, Australia, 130 m. by rail W.N.W. of Melbourne. Pop. (1901) 3580. It lies at an elevation of 1028 ft. towards the western extremity of the Great Dividing range. It is the commercial

centre of the north-western grain and wool-producing district and is also noted for its quartz and alluvial gold-mines. Excellent wine is made, and flour-milling, leather- working, brick and candle making and soap-boiling are the chief industries. The district also yields the best timber in great quantity. Granite, hluestone, limestone and slate abound in. the neighbourhood.

ARAROBA POWDER, a drug occurring in the form of a yellowish-brown powder, varying considerably in tint, which derives an alternative name — Goa powder — from the Portuguese colony of Goa, where it appears to have been introduced about the year 1852. The tree which yields it is the Andira Araroba of the natural order Leguminosae. It is met with in great abund- ance in certain forests in the province of Bahia, preferring as a rule low and humid spots. The tree is from 80 to 100 ft. high and has large imparipinnate leaves, the leaflets of which are oblong, about i| in. long and f in. broad, and somewhat truncate at the apex. The flowers are papilionaceous, of a purple colour and arranged in panicles. The Goa

powder or araroba is con- tained in the trunk, filling crevices in the heartwood. It is a morbid product in the tree, and yields to hot chloroform 50% of a substance known officially as chrysarobin, which has a definite therapeutic value and is contained in most modern pharmacopoeias. It occurs as a micro-crystalline, odourless, tasteless powder, very slightly soluble in either water or alcohol; it also occurs in rhubarb root. This complex mixture con- tains pure chrysarobin (C15H12O3), di-chrysarobin methylether (CsoHzjOrOCIL), di-chrysarobin (C30H24O7). Chrysarobin is a methyl trioxyanthracene and exists as a glucoside in the plant, but is gradually oxidized to chrysophanic acid (a dioxy-methyl anthraquinone) and glucose. This strikes a blood-red colour in alkaline solutions, and may therefore cause much alarm if administered to a patient whose urine is alkaline. The British pharmacopoeia has an ointment containing one part of chrysa- robin and 24 of benzoated lard.

Both internally and externally the drug is a powerful irritant. The general practice amongst modern dermatologists is to use only chrysophanic acid, which may be applied externally and given by the mouth in doses of about one grain in cases of psoriasis and chronic eczema. The drug is a feeble parasiticide, and has been used locally in the treatment of ringworm. It stains the skin — and linen— a deep yellow or brown, a coloration which may be removed by caustic alkali in weak solution.

ARAS, the anc. Araxes, and the Phasis of Xenophon (Turk, and Arab. Ras, Armen. Yerash, Georg. Rashki), a river which rises south of Erzerum, in the Bingeul-dagh, and flows east through the province of Erzerum, across the Pasin plateau, and then through Russian Armenia, passing between Mount Ararat and Erivan, and forming" the Russo-Persian frontier. Its course is about 600 m. long; its principal tributary is the Zanga, which flows by Erivan and drains Lake Gokcha or Sevanga. It is a rapid and muddy stream, dangerous to cross when swollen by the melting of the snows in Armenia, but fordable in its ordinary state. It formerly joined the Kura; but in 1897 it changed its lower course, and now runs direct to the Kizil-agach Bay of the Caspian. On an island in its bed stood Artaxata, the capital of Armenia from 180 B.C. to a.d. 50.

ARASON, JON (1484-1551), Icelandic bishop and poet, became a priest about 1504, and having attracted the notice of Gottskalk, bishop of Holar, was sent by that prelate on two missions to Norway. In 1522 he succeeded Gottskalk in the see of Holar, but he was soon driven out by the other Icelandic bishop, Ogmund of Skalholt. His exile, however, was brief, and some years after his return he became involved in a dispute with his sovereign, Christian III., king of Denmark, because he refused to further the progress of Lutheranism in the island. Then in 1548, when a large number of the islanders had accepted the reformed doctrines, Arason and Ogmund

joined their forces and attacked the Lutherans. Civil war broke out, and in 1551 the bishop of Holar and two of his sons were captured and executed. Arason, who was the last Roman Catholic bishop in Iceland, is celebrated as a poet, and as the man who introduced printing into the island.

*ARATOR, of Liguria, a Christian poet, who lived during the 6th century. He was an orphan, and owed his early education *o Lauren tius, archbishop of Milan, and Ennodius, bishop of Pa via, who took great interest in him. After completing his studies, he practised with success as an advocate, and was appointed to an influential post at the court of Athalaric, king of the Ostrogoths. About 540, he quitted the service of the state, took orders and was elected sub-deacon of the Roman Church. He gained the favour of Pope Vigilius, to whom he dedicated his De Actibus Apostolorum (written about 544), which was much admired in the middle ages. The poem, consisting of some 2500 hexa- meters, is of little merit, being full of mystical and allegorical interpretations and long-winded digressions; the versification, except for certain eccentricities in prosody, is generally correct.*

Text by Hiibner, 1850. See Leimbach, " Der Dichter Arator," in Theologische Studien und Kritik (1873); Manitius, Geschichte der christlich-lateinischen Poesie (1891).

ARATUS, Greek statesman, was born at Sicyon in 271 B.C., and educated at Argos after the death of his father, at the hands of Abantidas, tyrant of Sicyon. When twenty years old Aratus delivered Sicyon from its tyrant by a bold coup de main. By enrolling it in the Achaean League {q.v.) he secured it against Macedonia, and with funds received from Ptolemy Philadelphus he pacified the returned exiles. Ever anxious to extend the league, in which after 245 he was general almost every second year, Aratus took Corinth by surprise (243), and with mingled threats and persuasion won over other cities, notably Megalopolis (233) and Argos (229), whose tyrants abdicated voluntarily. He fought successfully against the Aetolians (241), and in 228 induced the Macedonian commander to evacuate Attica. But when Cleomenes III. (q.v.) opened hostilities, Aratus sustained several reverses, and was badly defeated near Dyme (226 or 225). Rather than admit Cleomenes as chief of the league, where he might have upset the existing timocracy, Aratus opposed all attempts at mediation. As plenipotentiary in 224 he called in Antigonus Doson of Macedonia, and helped to recover Corinth and Argos and to crush Cleomenes at Sellasia, but at the same time sacrificed the independence of the league. In 220-219

tne Aetolians defeated him in Arcadia and harried the Peloponnese unchecked. When Philip V. of Macedon came to expel these marauders, Aratus became the king's adviser, and averted a treacherous attack on Messene (215); before long, however, he lost favour and in 213 was poisoned. The Sicyonians accorded him hero-worship as a " son of Asclepius." To Aratus is due the credit of having made the Achaean League an effective instru- ment against tyrants and foreign enemies. But his military incapacity and his blind hatred of democratic reform went far to undo his work.

Polybius (ii.-viii.) follows the Memoirs which Aratus wrote to justify his statesmanship, — Plutarch (Aratus and Cleomenes) used this same source and the hostile account of Phylarchus; Paus. ii. 10; see Neumeyer, Aratos von Sikyon (Leipzig, 1886).

(M. O. B. C.)

ARATUS, of Soli in Cilicia, Greek didactic poet, a contem- porary of Callimachus and Theocritus, was born about 315 B.C. He was invited (about 276) to the court of Antigonus Gonatas of Macedonia, where he wrote his most famous poem, ˆcuvo/ieva (Appearances, or Phenomena). He then spent some time with Antiochus I. of Syria; but subsequently returned to Macedonia, where he died about 245. Aratus's only extant works are two short poems, or two fragments of his one poem, written in hexameters; an imitation of a prose work on astronomy by Eudoxus of Cnidus, and Aioar} fj.ua (on weather signs), chiefly from Theophrastus. The work has all the characteristics of the Alexandrian school of poetry. Although Aratus was ignorant of astronomy, his poem attracted the favourable notice of distinguished specialists, such as Hipparchus, who wrote com- mentaries upon it. Amongst the Romans it enjoyed a high reputation (Ovid, Amores, i. 15, 16). Cicero, Caesar Germanicus and Avienus translated it; the two last versions and fragments of Cicero's are still extant. Quintilian (Instil, x. 1, 55) is less enthusiastic. Virgil has imitated the Prognostica to some extent

11. 11

in the Georgics. One verse from the opening invocation to Zeus has become famous from being quoted by St Paul (Acts xvii. 28). Several accounts of his life are extant, by anonymous Greek writers.

Editio princeps, 1499; Buhle, 1793; Maass, 1893; Aratea (1892), Commentariorum in Aratum Reliquiae (1898), by the same. English translations: Lamb, 1848; Poste, 1880; R. Brown, 1885; Prince, 1895. On recently discovered fragments, see H. I. Bell, in Classical Quarterly, April

1907; also Berliner Klassikertexte, Heft v. 1, pp. 47-54.

ARAUCANIA, the name of a large territory of Chile, South America, S. of the Bio-bio river, belonging to the Araucanian Indians (see below) at the time of their independence of Spanish and Chilean authority. The loss of their political independence has been followed by that of the greater part of their territory, which has been divided up into the Chilean provinces of Arauco,- Bio-bio, Malleco and Cautin, and the Indians, much reduced in number, now live in the wooded recesses of the three provinces last named.

ARAUCANIANS (or Atjca), a tribal group of South American Indians in southern Chile (see above). Physically a fine race, their hardiness and bravery enabled them successfully to resist the Incas in the 15 th century. Their government was by four toquis or princes, independent of one another, but confederates against foreign enemies. Each tetrarchy was divided into five provinces, ruled by five chiefs called apo-ulmen; and each province into nine districts, governed by as many ulmcn, who were subject to the apo-ulmen, as the latter were to the toquis. These various chiefs (who all bore the title of ulmen) composed the aristocracy of the country. They held their dignities by hereditary descent in the male line, and in the order of primogeniture. The supreme power of each tetrarchy resided in a council of the ulmen, who assembled annually in a large plain. The resolutions of this council were subject to popular assent. The chiefs, indeed, were little more than leaders in war; for the right of private revenge limited their authority in judicial matters; and they received no taxes. Their laws were merely traditional customs. War was declared by the council, messengers bearing arrows dipped in blood being sent to all parts of the country to summon the men to arms. From the time of the first Spanish invasion (1535) the Araucanians made a vigorous resistance, and after worsting the best soldiers and the best generals of Spain for two centuries obtained an acknowledgment of their independence. Their success was due as much to their readiness in adopting their enemy's methods of warfare as to their bravery. Realizing the inefficiency of their old missiles when opposed to musket balls, they laid aside their bows, and armed themselves with spears, swords or other weapons fitted for close combat. Their practice was to advance rapidly within such a distance of the Spaniards as would not leave the latter time to reload after firing. Here they received without shrinking a. volley, which was certain to destroy a number of them, and then rushing forward in close order, fought their enemies hand to hand.

The Araucanians believe in a supreme being, and in many subordinate spirits, good and bad. They believe also in omens and divination, but they have neither temples nor idols, nor religious rites. Very few have become Roman Catholics. They believe in a future state, and have a confused tradition respecting a deluge, from which some persons were saved on a

high mountain. They divide the year into twelve months of thirty days, and add five days by intercalation. They esteem poetry and eloquence, but can scarcely be induced to learn reading or writing.

The tribal divisions have little or no organization. Some 50,000 in number, they spend a nomad existence wandering from pasture to pasture, living in low skin tents, their herds providing their food. They still preserve their warlike nature, though in 1870 they formally recognized Chilean rule. In 1861 Antoine de Tounens (1820-1878), a French adventurer in Chile, proclaimed himself king of Araucania under the title of Orelie Antoine I., and tried to obtain subscriptions from France to support his enterprise. But his pretensions were ludicrous; he was quickly captured by the Chileans and sent back to France (1862) as a madman; and though he made one more abortive effort in 1874

to recover his " kingdom," and occupied his pen in magnifying his achievements, nobody took him seriously except a few of the deluded Indians.

See Domeyko, Araucania y sus habitantes (Santiago, 1846); de Ginoux, " Le Chili et les Araucans," in Bull, de la soc. de geogr. (1852); E. R. Smith, Araucanians (New York, 1855); J. T. Medina, Los aborjenes de Chile (Santiago, 1882) ; A. Polakowsky, Die heutigen Araukanen, Globus No. 74 (Brunswick, 1898).

ARAUCARIA, a genus of coniferous trees included in the tribe Araucarineae. They are magnificent evergreen trees, with apparently whorled branches, and stiff, flattened, pointed leaves, found in Brazil and Chile, Polynesia and Australia. The name of the genus is derived from Arauco, the name of the district in southern Chile where the trees were first discovered. Araucaria imbricata, the Chile pine, or " monkey puzzle," was introduced into Britain in 1796. It is largely cultivated, and usually stands the winter of Britain ; but in some years, when the temperature fell very low, the trees have suffered much. Care should be taken in planting to select a spot somewhat elevated and well drained. The tree grows to the height of 1 50 f t. in the Cordilleras of Chile. The cones are from 8 to 8ˆ in. broad, and 7 to 75 in. long. The wood of the tree is hard and durable. This is the only species which can be cultivated in the open air in Britain. Araucaria brasiliana, the Brazil pine, is a native of the mountains of southern Brazil, and was introduced into Britain in 1819. It is not so hardy as A. imbricata, and requires protection during winter. It is grown in

conservatories for half-hardy plants. Araucaria excelsa, the Norfolk Island pine, a native of Norfolk Island and New Caledonia, was discovered during Captain Cook's second voyage, and introduced into Britain by Sir Joseph Banks in 1793. It cannot be grown in the open air in Britain, as it requires protection from frost, and is more tender than the Brazilian pine. It is a majestic tree, sometimes attaining a height of more than 220 ft. The scales of its cones are winged, and have a hook at the apex. Araucaria Cunninghami, the Moreton Bay pine, is a tall tree abundant on the shores of Moreton Bay, Australia, and found through the littoral region of Queensland to Cape York Peninsula, also in New Guinea. It requires protection in England during the winter. Araucaria Bidwilli, the Bunya-Bunya pine, found on the mountains of southern Queensland, between the rivers Brisbane and Burnett, at 27 S. lat., is a noble tree, attaining a height of 100 to 150 ft., with a straight trunk and white wood. It bears cones as large as a man's head. Its seeds are very large, and are used as food by the natives. Araucaria Rulei, which is a tree of New Caledonia, attains a height of 50 or 60 ft. Araucaria Cookii, also a native of New Caledonia, attains a height of 150 ft. It is found also in the Isle of Pines, and in the New Hebrides. The tree has a remarkable appearance, due to shedding its primary branches for about five-sixths of its height and replacing them by a small bushy growth, the whole resembling a tall column crowned with foliage, suggesting to its discoverer, Captain Cook, a tall column of basalt.

ARAUCO, a coast province of southern Chile, bounded N., E. and S. by the provinces of Concepci6n, Bio-bio, Malleco and Cautin. Area, 2458 sq. m.; pop. (est. 1902) 70,635. The province originally covered the once independent Indian territory of Araucania (q.v.), but this was afterwards divided into four provinces. It is devoted largely to agricultural pursuits. The capital Lebu (pop. in 1902, 3178) is situated on the coast about 55 m. south of Conception, with which it is connected by rail.

ARAVALLI HILLS, a range of mountains in India, running for 300 m. in a north-easterly direction, through the Rajputana states and the British district of Ajmere-Merwara, situated between 24 and 27° 10′ N. lat., and between 72 and 75° E. long. They consist of a series of ridges and peaks, with a breadth varying from 6 to 60 m. and an elevation of 1000 to 3000 ft., the highest point being Mount Abu, rising to 5653 ft., near the south-western extremity of the range. Geologically they belong to the primitive formation — granite, compact dark blue slate, gneiss and syenite. The dazzling white effect of their peaks is produced, not by snow, as among the Himalayas, but by enormous

masses of vitreous rose-coloured quartz. On the north their drainage forms the Luni and Sakhi rivers, which fall into the Gulf of Cutch. To the south, their drainage supplies two distinct river systems, one of which debouches

in comparatively small streams on the Gulf of Cambay, while the other unites to form the Chambal river, a great southern tributary of the Jumna, flowing thence via the Ganges, into the Bay of Bengal on the other side of India. The Aravalli hills are for the most part bare of cultivation, and even of jungle. Many of them are mere heaps of sand and stone; others consist of huge masses of quartz. The valleys between the ridges are generally sandy deserts, with an occasional oasis of cultivation. At long intervals, however, a fertile tract marks some great natural line of drainage, and among such valleys Ajmere city, with its lake, stands conspicuous. The hills are inhabited by a very sparse population of Mhairs, an aboriginal race. For long these people formed a difficult problem to the British government. Previously to the British occupation of India they had been accustomed to live, almost destitute of clothing, by the produce of their herds, by the chase and by plunder. But Ajmere having been ceded to the East India Company in 1818, the Mhair country was soon afterwards brought under British influence, and the predatory instincts of the people were at the same time controlled and utilized by forming them into a Merwara battalion. As the peaceful results of British rule developed, and the old feuds between the Mhairs and their Rajput neighbours died out, the Mhair battalion was transformed into a police force. The Aravalli mountaineers strongly objected to this change, and pleaded a long period of loyal usefulness to the state. They were accordingly again erected into a military battalion and brought upon the roll of the British army. Under Lord Kitchener's scheme of 1903 they were entitled the 50th Merwara Infantry. The Aravalli hills send off rocky ridges in a north-easterly direction through the states of Alwar and Jaipur, which from time to time reappear in the form of isolated hills and broken rocky elevations to near Delhi.

ARAWAK (" meal-eaters," in reference to cassava, their staple food), a tribe of South American Indians of Dutch and British Guiana. The Arawaks have given their name to a linguistic stock of South America, the Arawakan, which includes many once powerful tribes. The Arawakans were once numerous, their tribes stretching from southern Brazil and Bolivia to Central America, occupying the whole of the West Indies and having settlements on the Florida seaboard. They were found by the Spaniards in Haiti and possibly in the Bahamas, but the Caribs had expelled them from most of the islands. The Arawaks proper were physically an undersized, weakly people, peaceable agriculturists, by far the most civilized of all Guiana peoples, being skilful weavers and workers in stone and gold. The chief tribes which may be called Arawakan are the Anti, Arawak, Barre, Goajiro, Guana, Manaos, Maneteneri, Maipuri, Maranho, Moxo, Passe, Piro and Taruma.

See Everard F. im Thurn, Among the Indians of Guiana (London,

1883).

ARBACES, according to Ctesias (Diodor. ii. 24 ff. 32),' one of the generals of Sardanapalus, king of Assyria and founder of the Median empire about 830 B.C. But Ctesias's whole history of the Assyrian and Median empires is absolutely fabulous; his Arbaces and his successors are not historical personages. From the inscriptions of Sargon of Assyria we know one " Arbaku Dynast of Arnashia " as one of forty-five chiefs of Median districts who paid tribute to Sargon in 713 B.C. See Media. (Ed. M.)

ARBE (Serbo-Croatian Rab), an island in the Adriatic Sea, forming the northernmost point of Dalmatia, Austria. Pop. (1900) 4441. Arbe is 13 m. long; its greatest breadth is 5 m. The capital, which bears the same name, is a walled town, remarkable, even among the Dalmatian cities, for its beauty. It occupies a steep ridge jutting out from the west coast. At the seaward end of this promontory is the 13th- century cathedral; behind which the belfries of four churches, at least as ancient, rise in- a row along the crest of the ridge; while behind these, again, are the castle and a background of desolate hills. Many of the houses are roofless and untenanted;

for, after five centuries of prosperity under Venetian or Hungarian rule, an outbreak of plague in 1456 swept away the majority of the townsfolk, and ruined the survivors. Some of the old palaces are, nevertheless, of considerable interest; one especially as the birthplace of the celebrated philosopher, Marc Antonio de Dominis. Fishing and agriculture constitute the chief re- sources of the islanders, whose ancient silk industry is still maintained. In 1018 the yearly tribute due to Venice was fixed at ten pounds of silk or five pounds of gold.

ARBELA (Arba'il, i.e. "Four-god-city"), an ancient town in Adiabene, the capital in Assyrian and pre-Assyrian times of the country between the greater and lesser Zab, and seat of an important cult of Ishtar. The battle in which Alexander >verthrew Darius in 331 B.C., though named in the old books after Arbela, was probably fought at Gaugamela, some 60 m. away (Yorck von Wartenburg, Kurze Ubersicht der Feldziige A. des Gr.). The modern town of Erbil or Arbil, in the vilayet of Mosul, is about 40 m. from Mosul on the road to Bagdad. The greater part of the town, which seems at one time to have been very large, is situated on an artificial mound about 150 ft. high . It became the seat of the Ayyubite sultan Saladin in 1 1 84 ; was bequeathed in 1233 to the caliphs of Bagdad; was

plundered by the Mongols in 1236 and in 1393 by Timur, and was taken in 1732 by the Persians under Nadir Shah. In the 14th century the Christians were almost exterminated. The population, which varies from 2000 to 6000, is chiefly composed of Kurds.

The ruins of another Arbela (Irbid, Beth-Arbel) in Palestine, situated near the west shore of the Sea of Galilee, a little north of its centre, are not in themselves of high interest, but the site is noteworthy through its connexion with the neighbouring caves in the lofty flank of the Wadi Hamam, above which Arbela stood. These caves (called by the Arabs Kulat ibn Ma'an) are apparently natural, but were enlarged and fortified. They were used by the inhabitants of Arbela as a place of refuge from the army of Bacchides, general of Demetrius III., king of Syria, and were the resort of bandits in the reign of Herod the Great. He laid siege to them, and his men could only gain access to the caves by being let down from above. The caves were also fortified against the Romans by Josephus.

ARBER, EDWARD (1836-), English man of letters, was born in London on the 4th of December 1836. From 1854 to 1878 he was a clerk in the admiralty; from 1878 to 1881 lecturer on English, under Prof. H. Morley, at University College; and from 1881 to 1894 professor of English at Mason College, Birmingham. From 1894 he lived in London as emeritus pro- fessor, being also a fellow of King's College. In 1905 he received the honorary degree of D. Litt. at Oxford. He married in 1869, and had two sons, one of them, E. A. N. Arber, becoming demonstrator in palaeobotany at Cambridge. As a scholarly editor Professor Arber's services to English literature are memor- able. His name is associated particularly with the series of " English Reprints " (1868-1880), by which an accurate text of the works of many English authors, formerly only accessible in rare or expensive editions, was placed within reach of the general public. Among the thirty volumes of the series were Gosson's School of Abuse, Ascham's Toxophilus, Tottel's Mis- cellany, Naunton's Fragmenta Regalia, &c. It was followed by the " English Scholar's Library " (16 vols.) which included the Works (1884) of Captain John Smith, governor of Virginia, and the Poems (1882) of Richard Barnfield. In his English Gamer (8 vols. 187.7-1896) he made an admirable collection of rare old tracts and poems; in 1 899-1 901 he issued British Anthologies (10 vols.), and in 1907 began a series called A Christian Library. He also accomplished single-handed the editing of two vast, and invaluable, English bibliographies: A Transcript of the Registers of the Stationers' Company, 1553-1640 (1875-1894), and The Term Catalogues. 1668-ijog; with a number for Easter Term iyn (1904-1906), edited from the quarterly lists of the book- sellers.

ARBITRAGE, the term applied to the system of equalizing prices in different commercial centres by buying in the cheaper market and selling in

the dearer. These transactions, or their

converse, are mainly confined to stocks and shares, foreign exchanges and bullion; and are for the most part carried on between London and other European capitals and largely with New York. When prices in London are affected by financial or political causes, all other markets are sooner or later influenced, as London is the banking and financial centre for the commerce of the world. It may, however, also occur that some local event of importance initiates a rise or fall in a particular market which must ultimately affect other countries. For instance, a crisis in France would immediately depress all French securities, and by exciting the fears of capitalists would stimulate transfers of funds and raise all the exchanges against France.

In ordinary times those engaged in arbitrage operate with a very small margin of profit. The great improvement in postal, telegraphic and telephonic communication enables operators to close transactions with amazing rapidity, while competition reduces the margin of profit to a minimum. Operations in American stocks and shares are carried on between London and New York on a vast scale, while transactions in African mining shares are undertaken to a considerable extent between London and Paris. The frequent fluctuations in the prices of the latter securities offer a large and fruitful field to bold operators possessed of large resources, while those who have small means often succumb in a commercial crisis. As regards foreign exchange and bullion, arbitrage operators stand on a fairly safe foundation, the fluctuations being slight and involving little or no risk, although they yield a very small margin of profit. Arbitrage operations are for these reasons resorted to frequently by one country in supplying the requirements of another. The slightest advantage in any market is put to profit, and as the margin in ordinary exchange transactions is minute, the ability to operate in this cross fashion renders business possible, which would otherwise be impracticable. To give concrete instances of the working of arbitrage the following may be cited: —

On the 2 1 st of May 1906 the exchange on London in Vienna was telegraphed from that city 24 kronen 4! cents; London, requiring to purchase remittances, found that Antwerp had some Vienna to sell, and arranged to buy there. The transac- tions worked out as follows: — The direct exchange in Antwerp on London being 25-255, and Antwerp's selling price of Vienna being 105 francs for 100 kronen, on dividing 25-255 by 105 an exchange of 24-05! was obtained or \ cent cheaper than the direct exchange between Vienna and London.

Again a portion of the proceeds of the Russian loan of 1906 had to be

remitted to Berlin from Paris. Having exhausted local balances in Berlin, Paris on one side, and Berlin on the other, sought to prevent gold shipments from Berlin, and thus cause stringency in that money market. On the 2istof May 1906 Berlin was therefore seeking to sell Paris in London at 81-35 marks for 100 francs, and draw on London for the proceeds at 20-50. This transaction produced a parity between the exchanges of 25-20, which left a small margin in London.

Two instances of arbitrage of stocks are the following: — On the 24th of March 1906, Japanese exchequer bonds, series 2 and 3, were bought in Tokio at 93! and were paid for by telegraphic transfer at 24I pence per yen, and were sold in London the same day at 94 for payment on arrival of bonds. It took five weeks for the transmission of the bonds to London, where they were dealt in on the fixed basis of exchange, namely 24J pence per yen. The London price works out thus: 93-25 X 24-375 .

24-50

to which must be added the loss of interest, as the firm in London paid cash on the 24th of March for the telegraphic transfer, and did not recover payment until the arrival of the bonds from Tokio five weeks later. The following is a computation of the transaction: —

London price 9 2 '77

Five weeks at 5 % . -. . . . . -45 English stamp \ % on nominal amount . . . -50 Insurance 1% -12

- = 92-77.

93-84

324

ARBITRATION

This sum represents the net cost to the arbitrage house in London, and the money paid on the 28th of April left a profit of about T 8 ? %. The bonds being " to bearer " insurance was necessary for the safety in this, as in all similar transactions.

In the next example, however, this expense was unnecessary, the bonds being " inscribed." On the 21st of May 1906 American Steel common shares were sold for cash in New York at 4It\ dollars per share, and were bought in London at 42ˆ for the account day, May 31st. These figures are explained by the fact that transactions in the United States stocks and

shares are on the fixed basis of five dollars per pound sterling, while as regards payments in New York the exchange varies daily. Rail- way shares are generally 100 dollars each. In the London market, however, five shares of 100 dollars would be £100 nominal. These shares, therefore, cost in London, at the purchase price of 42 j, £42: 4: 5. The money realized in New York for five shares at 41-r was 205-93 dollars. A cheque on London was bought at 4 dollars 85J cents, realizing £42 : 8 : 9. It should be noted that the shares in these cases are generally lent by the New York correspondent, thus saving loss of interest. The resulting profit in this particular instance was 4s. 4d. for each five shares, divided between the London and New York arbitrage firms. Arbitrage operations with distant countries such as India are large and mainly profitable. Arbitrage with India consists cmefly in buying bills of exchange in London, such as India Council rupee bills amounting to about 16 millions sterling annually, and commercial bills drawn against goods exported to India. The counter-operation consists in purchasing in India, for short or long delivery, sterling bills drawn against exports to Great Britain of Indian produce, such as cotton, tea, indigo, jute and wheat. These operations greatly facilitate trade and the moving of produce from the interior of India to the seaports. Without this assistance Great Britain's enormous trade could not be carried on, and she would have to revert to the primitive system of barter. The same advantages are afforded to her vast trade with China and Japan, with the material difference that the supply of government council bills is confined to the Indian trade. The balance of trade with all countries is generally settled by specie shipments; hence, with the Far East, silver and gold play an important part in arbitrage.

It will thus be seen that arbitrage fills a useful place in com- merce; the profits are small because the competition is great; nevertheless huge transactions employing thousands of clerks result from this system.

The literature of the subject is extremely meagre. Lord Goschen's Theory of Foreign Exchanges(London, 1866) is general and theoretical, but throws great light upon particular aspects of the philosophy of arbitrage, without touching specially on the details of the subject itself. The principal other works are: Kelly's Cambist (181 1, 1835); Otto Swoboda, Die kaufmdnnische Arbitrage (Berlin, 1873), and Borse und Actien (Cologne, 1869); Coquelinet Guillaumin, Dictionnaire de Veconomie politique (Paris, 1 851-1853) ; Ottomar Haupt, London Arbitrageur (London, 1870) ; Charles le Touze, Traite iheorique et pratique du change (Paris, 1868); Tate, Modern Cambist (London, 1868); Simon Spitzer, ' Ueber Miinz- und Arbi- tragenrechnung (Vienna, 1872); J. W. Gilbart, Principles and Prac- tice of Banking (London, 1871); G. Clare, The A B C of Foreign Exchanges (2nd ed., 1895); Money Market Primer and Key to the Exchanges (2nd ed., 1900) ; J. Pallain, Les Changes Hrangers et les prix (Paris, 1905).

(Sw.)

ARBITRATION (Lat. arbitrari, to examine or judge), a term derived from the nomenclature of Roman law, and applied to an arrangement for taking, and abiding by, the judgment of a selected person in some disputed matter, instead of carrying it to the established courts of justice. In disputes between states, arbitration has long played an important part (see Arbitration, International). The present article is restricted to arbitration under municipal law; but a separate article is also devoted to the use of arbitration in labour disputes (see Arbitration and Conciliation).

Roman Law. — Arrangements for avoiding the delay and expense of litigation, and referring a dispute to friends or neutral persons, are a natural practice, of which traces may be found in any state of society; but it is from Roman Law that we derive arbitration as a system which has found its way into the

practice of European nations in general, and has even evaded the dislike of the English common lawyers to the civil law. The praetor, who had the arrangement of all trials or private suits and the formal appointment of judges for them, referred the great majority of such cases for decision to a judge who was styled usually judex but sometimes arbiter. The phrase judex arbiterve frequently occurs. The judex and the arbiter had the same functions, and apparently the only express basis for the distinction between the two words is that there might be several arbitri but never more than one judex in a cause. The term arbiter seems, however, to have been sometimes used when the referee had a certain degree of latitude, and was en- titled to give weight to equitable considerations (Roby, Inst. Rom. Law u i. 318; Hunter, Roman Law (1897), p. 48; and see Cicero pro Rose. Com. 4, ss. 10-13; Gaius, Inst. iv. s. 163). Apart from this system of compulsory reference by the praetor, Roman law recognized a voluntary reference (compromissum) to an arbiter or arbitrator by the parties themselves. The arbitrator ex compromisso sumptus had no coercive jurisdiction, and in order to make his award effective, the agreement of reference was confirmed by a stipulation and usually provided a penalty {poena, pecunia compromisso) in case of disobedience. The sum agreed on by way of penalty might be either specific or unliquidated, e.g. " whatever the matter may be worth " (Dig. iv., tit. 8, s. 28). The arbitrator ex compromisso sumptus, like the judicial arbiter, was expected to take account of equitable considerations in coming to a decision. If three arbitrators were appointed, a majority could decide; in case of two being appointed and not agreeing, the praetor would compel them to choose a third (Roby, ubi sup., i. 320, 321 ; Dig. iv., tit. 8, s. 17). As in English law, it was necessary that the award should cover all the points submitted (Dig. iv., tit. 8, s. 21).

Law of England. — The law of England as to arbitration is now practically summed up in the Arbitration Act of 1889. This statute is an express code as to proceedings in all arbitration, but " criminal proceedings by the crown " cannot be referred under it (ss. 13, 14). The statute subdivides its subject-matter into two headings. I. References by consent out of court; II. References under order of court.

(1) Here the first matter to be dealt with is the submission. A submission is defined as a written agreement (it need not be signed by both parties) to submit present or future differences References to arbitration, whether a particular arbitrator is by consent named in it or not. The capacity of a person to agree out ˚f to arbitration, or to act as arbitrator, depends on the general law of contract. A submission by an infant is not void, but is voidable at his option (see Infant). A counsel has a general authority to deal with the conduct of an action, which includes authority to refer it to arbitration, but he has no authority to refer an action against the wishes of his client, or on terms different from those which his client has sanctioned; and if he does so, the reference may be set aside, although the limit put by the client on his counsel's authority is not made known to the other side when the reference is agreed upon (Neale v. Gordon Lennox, 1902, A.C. 465). The committee of a lunatic, with the sanction of the judge in lunacy, may refer disputes to arbitration. As an arbitrator is chosen by the parties themselves the question of his eligibility is of comparatively minor importance; and where an arbitrator has been chosen by both parties, the courts are reluctant to set the appointment aside. This question has arisen chiefly in contracts, for works, which frequently contain a provision that the engineer shall be the arbitrator, in any dispute between the contractor and his own employer. The practical result is to make the engineer judge in his own cause. But the courts will not in such cases prevent the engineer from acting, where the contractor was aware of the facts when he signed the contract, and there is no reason to believe that the engineer will be unfair (Ives and Barker v. Willans, 1894, 2 Ch. 478). Even the fact that he has expressed an opinion on matters in dispute will not of itself disqualify him (Hailiday v. Hamilton's Trustees, 1903, 5 Fraser, 800). So, too, where a barrister was appointed arbitrator, the

court refused to stop the arbitration on the mere ground that he was the client of a firm of solicitors, the conduct of one of whom was in question {Bright v. River Plate Construction Co., 1900, 2 Ch. 835).

Under the law prior to the act of 1889 (a) an agreement to refer disputes

generally, without naming the arbitrators, was always irrevocable, and an action lay for the breach of it, although the court could not compel either of the parties to proceed under it; (b) an agreement to refer to a particular arbi- trator was revocable, and if one of the parties revoked that particular arbitrator's authority he could not be compelled to submit to it; (c) when, however, the parties had got their tribunal fixed, and were proceeding to carry out the agreement to refer, the act 9 and 10 Will. III. c. 15 provided that the submission might be made a rule of court, a provision which gave the court power to assist the parties in the trial of the case, and to enforce the award of the arbitrators; (d) the statute 3 and 4 Will. IV. c. 42 (s. 39) put an end to the power to revoke the authority of a particular arbitrator after the reference to him had been made a rule of court; and — a liability which existed also under the act of 9 and 10 Will. III. c. 15 — any person revoking the appointment of an arbitrator after the submission had been made a rule of court might be attached. The Arbi- tration Act 1889 provides that a submission, unless a contrary intention is expressed in it, is irrevocable except by leave of the court or a judge, and is to have the same effect in all respects as if it had been made an order of court. The object of this enact- ment was to save the expense of making a submission a rule of court by treating it as having been so made, and it leaves the law in this position, that while the authority of an arbitrator, once appointed, is irrevocable, there is no power — any more than there was under the old law — to compel an unwilling party to proceed to a reference, except in cases specially provided for by sections 5 and 6 of the act of 1889. The former of these sections deals with the power of the court, the latter with the power of the parties to a reference, to appoint an arbitrator in certain circumstances. Section 5 provides that where a reference is to be to a single arbitrator, and all the parties do not concur in appointing one, or an appointed arbitrator refuses to act or becomes incapable of acting, or where the parties or two arbi- trators fail, when necessary, to appoint an umpire or third arbitrator, or such umpire or arbitrator when appointed refuses to act, or becomes incapable of acting, and the default is not rectified after seven clear days' notice, the court may supply the vacancy. Under section 6, where a reference is to two arbi- trators, one to be appointed by each party, and either the appointed arbitrator refuses to act, or becomes incapable of acting, and the party appointing him fails, after seven clear days' notice, to supply the vacancy, or such party fails, after similar notice, to make an original appointment, a binding appointment (subject to the power of the court to set it aside) may be made by the other party to the reference. The court may compel parties to carry out an arbitration, not only in the above cases by directly appointing an arbitrator, &c, or by allowing one appointed by a party to proceed alone with the reference, but also indirectly by staying any proceedings before the legal tribunals to determine matters which come within the scope of the arbitration. Where

the agreement to refer stipulates that the submission of a dispute to arbitration shall be a con- dition precedent to the right to bring an action in regard to it, an action does not lie until the arbitration has been held and an award made, and it is usual in such cases not to apply for a stay of proceedings, but to plead the agreement as a bar to the action (Viney v. Bignold, 1887, 20 Q.B.D. 172). The court will refuse to stay proceedings where the subject-matter of the liti- gation falls outside the scope of the reference, or there is some serious objection to the fitness of the arbitrator, or some other good reason of the kind exists.

An arbitrator is not liable to be sued for want of skill or for negligence in conducting the arbitration (Pappa v. Rose, 1872, L.R. 7 C.P. 525). When a building contract provides that a certificate of the architect, showing the final balance due to the

contractor, shall be conclusive evidence of the works having been duly completed, the architect occupies the position of an arbitrator, and enjoys the same immunity from liability for negligence in the discharge of his functions (Chambers v. Gold- thorpe, 1901, 1 Q.B. 624). An arbitrator cannot be compelled to act unless he is a party to the submission.

An arbitrator (and the following observations apply mutatis mutandis to an umpire after he has entered on his duties) has power to administer oaths to, or take the affirmations of, the parties and their witnesses; and any person who wilfully and corruptly gives false evidence before him may be prosecuted and punished for perjury (Arbitration Act 1889, sched. i. and s. 22). At any stage in the reference he may, and shall if he be required by the court, state in the form of a special case for the opinion of the court any question of law arising in the arbitration. The arbitrator may also state his award in whole or in part as a special case (ib. s. 19), and may correct in an award any clerical mistake or error arising from an accidental slip or omission. The costs of the reference and the award — which, under sched. i. of the act, must be in writing, unless the submission otherwise provides — are in the arbitrator's discretion, and he has a lien on the award and the submission for his fees, for which — if there is an express or implied promise to pay them — he can also sue (Crampton v. Ridley, 1887, 20 Q.B.D. 48). An arbitrator or umpire ought not, however, to state his award in such a way as to deprive the parties of their right to challenge the amount charged by him for his services; and accordingly where an umpire fixed for his award a lump sum as costs, including therein his own and the arbitrators' fees, the award was re- mitted back to him to state how much he allotted to himself and how much to the arbitrators (in Re Gilbert v. Wright, 1904, 20 Times L.R. 164). But in the absence of evidence to show that the fees charged by arbitrators or umpire are extortionate, or unfair and unreasonable, the courts will not interfere with them (Llandrindod

Wells Water Co. v. Hawksley, 1904, 20 Times L.R. 241).

If there is no express provision on the point in the submission, an award under the Arbitration Act 1889 must be made within three months after the arbitrator has entered on the reference, or been called upon to act by notice in writing from any party to the submission. The time may, however, be extended by the arbitrator or by the court. An umpire is required to make his award within one month after the original or extended time appointed for making the award of the arbitrators has expired, or any later day to which he may enlarge it. The court may by order remit an award to the arbitrators or umpire for reconsideration, in which case the reconsidered award must be made within three months after the date of the order.

An award must be intra vires: it must dispose of all the points referred; and it must be final, except as regards certain matters of valuation, &c. (see in Re Stringer and Riley Brothers, 1901, 1 K.B. 105). An award may, however, be set aside where the arbitrator has misconducted himself (an arbitrator may also be removed by the court on the ground of misconduct), or where it is ultra vires, or lacks any of the other requisites — above mentioned — of a valid award, or where the arbitrator has been wilfully deceived by one of the parties, or some such state of things exists. An award may, by leave of the court, be enforced in the same manner as a judgment or decree to the same effect. Under the Revenue Act 1906, s. 9, a uniform duty of ten shillings is payable on awards in England or Ireland, and on decreets arbitral in Scotland.

Provisions for the arbitration of special classes of disputes are contained in many acts of parliament, e.g. the Local Government Acts 1888, 1894, the Agricultural Holdings (England) Acts 1883 to 1906, the Small Holdings and Allotments Act 1907, the Light Rail- ways Act 1896, the Housing of the Working Classes Act 1890, the Workmen's Compensation Act 1906, &c.

The Conciliation Act 1896 provides machinery for the prevention and settlement of trade disputes, and in 1892 a chamber of arbitra- tion for business disputes was established by the joint action of the corporation of the city of London and the London chamber of commerce. At the time when the London chamber of arbitration

order of court.

was established, there was considerable dissatisfaction among the

mercantile community with the delays that occurred in the disposal of commercial cases before the ordinary tribunals. But the special provision made by the judges in 1895 f° r the prompt trial of com- mercial causes to a large extent destroyed the raison d'etre of the chamber of arbitration, and it did not attain any great measure of success.

(2) The court or a judge may refer any question arising in any cause or matter to an official or special referee, whose References report may be enforced like a judgment or order to under the same effect. This power may be exercised whether the parties desire it or not. The official referees are salaried officers of court. The remuneration of special referees is determined by the court or judge. An entire action may be referred, if all parties consent, or if it involves any pro- longed examination of documents, or scientific or local examina- tion, or consists wholly or partly of matters of account.

Scots Law. — The Arbitration (Scotland) Act 1894, unlike the English Arbitration Act 1889, did not codify the previously existing law, and it becomes necessary, therefore, to deal with that law in some detail. It differs in important particulars from the law of England. Although (as in England apart from the Arbitration Act 1889) there is nothing to prevent a verbal reference, submissions are generally not merely written but are effected by deed. The deed of submission first defines the terms of the. reference, the name or names of the arbiters or arbitrators, and the " oversman " or umpire, whose decision in the event of the arbiters differing in opinion is to be final. Formerly, where no oversman was named in the sub- mission, and no power given to the arbiters to name one, the pro- ceedings were abortive if the arbiters disagreed, unless the parties consented to a nomination. But under the Arbitration (Scotland) Act 1894, s. 4, where arbiters differ in opinion, they, or, if they fail to agree on the point, the court, on the application of either party, may nominate an oversman whose decision is to be final. The deed of submission next gives to the arbiters the necessary powers for disposing of the matters referred (e.g. powers to summon witnesses, to administer oaths and to award expenses), and specifies the time within which the " decreet arbitral " is to be pronounced. If this date is left blank, practice has limited the arbiter's power of deciding to a year and a day, unless, having express or clearly implied power in the submission, he exercises this power, or the parties expressly or tacitly agree to its prorogation. The deed of submission then goes on to provide that the parties bind themselves, under a stipulated penalty to abide by the decreet arbitral, that, in the event of the death of either of them, the submission shall continue in force against their heirs and representatives, and that they consent to the regis- tration, for preservation and execution, both of the deed itself and of the decreet arbitral. The power to enforce the award depends on this last provision. Under the common law of Scotland, a sub-

mission of future disputes or differences to an arbiter, or arbiters, unnamed, was ineffectual except where the agreement to refer did not contemplate the decision of proper disputes between the parties but the adjustment of some condition, or the liquidation of some obligation, contained in the contract of which the agreement to submit formed a part. And by the Arbitration (Scotland) Act 1894, s. 1 , an agreement to refer to arbitration is not invalid by reason of the reference being to a person not named, or to be named by another, or to a person merely described as the holder for the time being of any office or appointment. An arbiter who has accepted office may be compelled by an action in court of session to proceed with his duty unless he has sufficient cause, such as ill-health or supervening interest, for renouncing. The court may name a sole arbiter, where provision is made for one only and the parties cannot agree (Arbitra- tion [Scotland] Act 1894, s. 2); and may name an arbiter where a party having the right or duty to nominate one of two arbiters will not exercise it (ib. s. 3). Scots law as to the requisites of a valid award is practically identical with the law of England. The grounds of reduction of a decreet arbitral are "corruption," "bribery," "false hold " (Scots Act of Regulations 1695, s. 25). An attempt was made to include, under the expression " constructive corruption," among these statutory grounds of reduction, irregular conduct on the part of an arbitrator, with no suggestion of any corrupt motive. But it was definitely overruled by the House of Lords (Adams v. Great North of Scotland Railway Co., 1891, A.C. 31). The statutory definition of the grounds of reduction was intended, however, merely to put an end to the practice which had previously obtained of reviewing awards on their merits, and it does not prevent the courts from setting aside an award where the arbitrator has exceeded his jurisdiction, or disregarded any one of the expressed conditions of the submission, or been guilty of misconduct. A private arbiter cannot demand remuneration except in virtue of contract, or by implication from the nature of the work done, or if the reference is in pursuance of some statutory enactment (e.g. the Lands Clauses [Scotland] Act 1845, s. 32).

Judicial References have been long known to the law of Scotland. When an action is in court the parties may at any stage withdraw

it from judicial determination, and refer it to arbitration. This is done by minute of reference to which the court interpones its authority. When the award is issued it becomes the judgment of the court. The court has no power to compel parties to enter into a reference of this kind, >nd it is doubtful whether counsel can bind their clients in such a matter. A judicial reference falls like the other by the elapse of a year; and the court cannot review the award on the ground of miscarriage. By the Court of Session Act 1850, s. 50, a provision is introduced whereby parties to an action in the supreme court may refer judicially any issue for trial to one, three, five or

seven persons, who shall sit as a jury, and decide by a majority.

Law of Ireland. — The Common Law Procedure Act (Ireland) 1856, which is incorporated by s. 60 of the Supreme Court of Judi- cature Act (Ireland) 1877, and thereby made applicable to all divisions of the High Court of Justice, provides, on the lines of the English Common Law Procedure Act 1854, for the conduct of arbitrations and the enforcement of awards. Irish statute law, like that of England and Scotland, contains numerous provisions for arbitration under special enactments.

Indian and Colonial Law. — The provisions of the English Arbitra- tion Act 1889 have in substance been adopted by the Indian Legisla- ture (see Act ix. of 1899), and by many of the colonies (see, e.g., Act No. 13 of 1895, Western Australia; No. 24 of 1898, Natal; c. 20 of 1899, Bahamas; No. 10 of 1895, Gibraltar; No. 29 of 1898, Cape of Good Hope : s. 7 of this last statute excludes from submission to arbitration criminal cases, so far as prosecution and punishment are concerned, and, without the special leave of the court, matters relating to status, matrimonial causes, and matters affecting minors or other perons under legal disability ; Trinidad and Tobago, No. 35 of 1898).

United States. — The common law and statute law of the United States as to arbitration bear a general resemblance to the law of England.

All controversies of a civil nature, and any question of personal injury on which a suit for damages will lie, although it may also be indictable, may be referred to arbitration; but crimes, and perhaps actions on penal statutes by VoI "° tar y common informers may not. The submission may be missions. effected sometimes by parol, sometimes by written instrument, sometimes by deed or deed poll. Capacity to refer depends on the general law of contractual capacity. The law of England as to the capacity to act as an arbitrator and as to objections to an arbitrator on the ground of interest has been closely followed by the American courts. The same observation applies as to the requisites of an award, the mode of its enforce- ment and the grounds on which it will be set aside. The arbitrator has a lien on the award for his fees ; and — a point of difference from the English law — he may sue for them without an express promise to pay (cf. Goodoil v. Cooley, 1854, 29 New Hamp. 48) . At common law, a submission is generally revocable at any time before award; and it is also, in the absence of stipulation to the contrary, revoked by the death of one of the parties. Provision has been made in Pennsylvania for com- pulsory arbitration by an act of the 16th of June 1836 (see Pepper and Lewis, Pennsylvania Digest, tit. " arbitration ").

The rules of court also of many of the states of the United States provide

for reference through the intervention of the court at any stage in the progress of a litigation. J ˆ efer ˆ aces Such submissions are usually declared irrevocable by court. the rules providing for them.

In addition to voluntary submissions and references by rules of court there are in America, as in the United Kingdom, various statutes which provide for arbitration in particular cases. Most of these statutes are founded on the 9 and ar &,ˆ' y 10 Will. III., c. 15, and 3 and 4 Will. IV. c. 42, s. 49, tions. " by which it is allowed to refer a matter in dispute (not then in court) to arbitrators, and agree that the submission be made a rule of court. This agreement, being proved on the oath of one of the witnesses thereto, is enforced as if it had been made at first a rule of court" (Bouvier, Law Diet. s.v. "Arbitra tion").

Ample provision is made in America for the arbitration of labour disputes.

Law of France. — Voluntary arbitration has always been recognized in France. In cases of mercantile partnerships, arbitration was formerly compulsory; but in 1856 (law of the 17th of July 1856) jurisdiction in disputes between parties was conferred on the Tribunals of Commerce (as to which see Code de Commerce, arts.

615 et seq.), and arbitration at the present time is purely voluntary. The subject is very fully dealt with in the Code de Procedure Civile (arts. 1003-1028). The submission to arbitration (comprotnis) must, on pain or nullity, be acted upon within three months from its date (art. 1007). The submission terminates (i.) by the death, refusal, resignation or inability to act of one of the arbitrators; (ii.) by the expiration of the period agreed upon, or of three months if no time had been fixed; (iii.) by the disagreement of two arbitrators, unless power be reserved to them to appoint an umpire (art. 1012). An arbitrator cannot resign if he has once commenced to act, and can only be relieved on some ground arising subsequently to the sub- mission (art. 1014). Each party to the arbitration is required to produce his evidence at least fifteen days before the expiration of the period fixed by the submission (art. 1016). If the arbitrators, differing in opinion, cannot agree upon an umpire (Hers arbitre), the president of the Tribunal of Commerce will appoint one, on the application of either party (art. 1017). The umpire is required to give his decision within one month of his acceptance of the appoint- ment; before making his award, he must confer with the previous arbitrators who disagreed (art. 1018). Arbitrators and umpire must proceed according to

the ordinary rules of law, unless they are specially empowered by the submission to proceed as amiables compositeurs (art. 1019). The award is rendered executory by an order of the president of the Civil Tribunal of First Instance (art. 1020). Awards cannot be set up against third parties (art. 1022), or attacked by way of opposition. An a.ppeal against an award lies to the Civil Tribunal of First Instance, or to the court of appeal, according as the subject-matter, in the absence of arbitration, would have been within the jurisdiction of the justice of the peace, or of the Civil Tribunal of First Instance (art. 1023). In the manu- facturing towns of France, there are also boards of umpires (Conseils de Pmd' homines) to deal with trade disputes between masters and workmen belonging to certain specified trades.

Other Foreign Laws. — The provisions of French law as to arbitra- tion are in force in Belgium [Code de Proc. Civ., arts. 1003 et seq.) ; and a convention (8th of July 1899) between France and Belgium regulates, inter alia, the mutual enforcement of awards. The law of France has also been reproduced in substance in the Netherlands (Cede of Civil Procedure, arts. 620 et seq.). The German Imperial Code of Procedure did not create any system of arbitration in civil cases. But this omission was supplied in Prussia by a law of the 29th of March 1879, which provided for the appointment, in each commune, of an arbitrator (Schiedsmann) before whom conciliation proceedings in contentious matters might be conducted. The pro- cedure was gratuitous and voluntary; and the functions of the arbitrator were not judicial; he merely recorded the arrangement arrived at, or the refusal of conciliation. This law was followed in Brunswick by a law of the 2nd of July 1896, and in Baden by a law of the 16th of April 1886. In Luxemburg, compulsory arbitration in matters affecting commercial partnerships was abolished in 1879 (law of the 16th of April 1879). A system of conciliation, similar to the Prussian, exists in Italy (laws of the 16th of June 1892, and the 26th of December 1892) and in some of the Swiss cantons (law of the 29th of April 1883). Spain (Code of Civil Proc, arts. 1003-1028; Civil Code, arts. 1 820-1 821) and Sweden^and Norway (law of the 28th of October 1887) have followed the r rench law. In Portugal, provision has been made for the creation in important industrial centres, on the application of the administrative corporations, of boards of conciliation (decrees of the 14th of August 1889, and the 1 8th of May 1893).

Authorities. — Russell, Arbitration (London, 1906); Annual Practice (London, yearly); Redman, Arbitration (London, 1897); Crewe, Arbitration Act of i88g (London, 1898); Pollock, On Arbi- trators (London, 1906). As to Scots law: Bell, On Arbitration (2nd ed., Edinburgh, 1877); Erskine, Principles (20th ed., Edin- burgh, 1903). As to American law: Morse, Law of Arbitration (Boston, 1872). As to foreign

law generally: the texts of the laws cited, and the Annuaire de legislation ctrangere. (A. W. R.)

ARBITRATION, INTERNATIONAL. International arbitra- tion is a proceeding in which two nations refer their differences to one or more selected persons, who, after affording to each party an opportunity of being heard, pronounce judgment on the matters at issue. It is understood, unless otherwise expressed, that the judgment shall be in accordance wdth the law by which civilized nations have agreed to be bound, whenever such law is applicable. Some authorities, notably the eminent Swiss jurist, J. K. Bluntschli, consider that unless this tacit condition is complied with, the award may be set aside. This would, however, be highly inconvenient since international law has never been codified. A fresh arbitration might have to be entered on to decide (1) what the law was, (2) whether it applied to the matter in hand. Arbitration differs from Mediation (q.v.) in so far as it is a judicial act, whereas Mediation involves no decision, but merely advice and suggestions to those who invoke its aid.

Arbitral Tribunals. — An international arbitrator may be the chief of a friendly power, or he may be a private individual. When he is an emperor, a king, or a president of a republic, it is not expected that he will act personally; he may appoint a delegate or delegates to act on his behalf, and avail himself of their labours and views, the ultimate decision being his only in name. In this respect international arbitration differs from civil arbitration, since a private arbitrator cannot delegate his office without express authority. The analogy between the two fails to hold good in another respect also. In civil arbitration, the decision or award may be made a rule of court, after which it becomes enforceable by writ of execution against person or property. An international award cannot be enforced directly; in other words it has no legal sanction behind it. Its obligation rests on the good faith of the parties to the reference, and on the fact that, with the help of a world-wide press, public opinion can always be brought to bear on any state that seeks to evade its moral duty. The obligation of an ordinary treaty rests on precisely the same foundations. Where there are two or any other even number of arbitrators, provision is usually made for an umpire (French sur-arbitre) . The umpire may be chosen by the arbitrators themselves or nominated by a neutral power. In the " Alabama " arbitration five arbitrators were nominated by the president of the United States, the queen of England, the king of Italy, the president of the Swiss Confederation, and the emperor of Brazil respectively. In the Bering Sea arbitration there were seven arbitrators, two nominated by Great Britain, two by the United States, and the remaining three by the president of the French Republic, the king of Italy, and the king of Sweden and Norway respectively. In neither of these cases was there an umpire; nor was any necessary, since the decision, if not

unanimous, lay with the majority. (See separate articles on Bering Sea Arbitration and "Alabama" Arbitration.)

Arbitral tribunals may have to deal with questions either of law or fact, or of both combined. When they have to deal with law only, that is to say, to lay down a principle or decide a question of liability, their functions are judicial or quasi-judicial, and the result is arbitration proper. Where they have to deal with facts only, e.g. the evaluation of pecuniary claims, their functions are administrative rather than judicial, and the term commission is applied to them. " Mixed commissions," so called because they are composed of representatives of the parties in difference, have been frequently resorted to for delimitation of frontiers, and for settling the indemnities to be paid to the subjects of neutral powers in respect of losses sustained by non-combatants in times of war or civil insurrection. The two earliest of these were nominated in 1794 under the treaty negotiated by Lord Grenville with Mr John Jay, commonly called the " Jay Treaty," their tasks being (1) to define the boundary between Canada and the United States which had been agreed to by the treaty signed at Paris in 1783; (2) to estimate the amount to be paid by Great Britain and the United States to each other in respect of illegal captures or condemnation of vessels during the war of the American Revolution.

Although arbitrations proper may be thus distinguished .from " mixed commissions," it must not be supposed that any hard or fast theoretical line can be drawn between them. Arbitrators strictly so called may (as in the " Alabama " case) proceed to award damages after they have decided the question of liability; whilst " mixed commissions," before awarding damages, usually have to decide whether the pecuniary claims made are or are not well founded.

Awards. — International awards, as already pointed out, differ from civil awards in having no legal sanction by which they can be enforced. On the other hand, they resemble civil awards in that they may be set aside, i.e. ignored, for sufficient reason, as, for example, if the tribunal has not acted in good faith, or has not given to each party an opportunity of being heard, or has exceeded its jurisdiction. An instance under the last head occurred in 1831, when it was referred to the king of the Netherlands as sole arbitrator to fix the north-eastern boundary of the state of Maine. The king's representatives

were unable to draw the frontier line by reason of the imperfection of the maps then in existence, and he therefore directed a further survey. This direction was beyond the terms of the reference, and the award, when made, was repudiated by the United States as void for excess. The point in dispute was only finally disposed of by the Webster-Ashburton treaty of

1842.

Subject-matter.— The history of international arbitration is dealt with in the article Peace, where treaties of general arbitra- tion are discussed, both those which embrace all future differences thereafter to arise between the contracting parties, and also those more limited conventions which aim at the settlement of all future differences in regard to particular subjects, e.g. commerce or navigation. The rapid growth of international arbitration in recent times may be gathered from the following figures. Between 1820 and 1840, there were eight such instances; between 1840 and i860, there were thirty; between i860 and 1880, forty-four; between 1880 and 1900, ninety. Of the governments which were parties in these several cases Great Britain heads the list in point of numbers, the United States of America being a good second. France, Portugal, Spain and the Netherlands are the European states next in order. The present article is concerned Exclusively with arbitration in regard to such existing differences as are capable of precise statement and of prompt adjustment. These differences may be arranged in two main groups: —

(a) Those which have arisen between state and state in their sovereign capacities;

(b) Those in which one state has made a demand upon another state, ostensibly in its sovereign capacity, but really on behalf of some individual, or set of individuals, whose interests it was bound to protect.

To group (a) belong territorial differences in regard to ownership of land and rights of fishing at sea; to group (b) belong pecuniary claims in respect of acts wrongfully done to one or more subjects of one state by, or with the authority of, another state. To enumerate even a tenth part of the successful arbitrations in recent times' would occupy too much space. Some prominent examples (dealt with elsewhere under their appropriate titles) are the dispute between the United States and Great Britain respecting the " Alabama " and other vessels employed by the Confederate government during the American Civil War (award in 1872); that between the same powers respecting the fur-seal fishery in Bering Sea (award in 1893); that between Great Britain and Venezuela respecting the boundary of British Guiana (award in 1899) ; tnat between Great Britain, the United States

and Portugal respecting the Delagoa railway (award in 1900); that between Great Britain and the United States respecting the boundary of Alaska (award in 1903). The long-standing New- foundland fishery dispute with France (finally settled in 1904) is dealt with under Newfoundland. Other examples are shortly noticed in the tables on p. 329, which although by no means exhaustive, sufficiently indicate the scope and trend of arbitra- tion during the years covered. The cases decided by the perma- nent tribunal at the Hague established in 1900 are not included in these tables. They are separately discussed later.

The Hague Tribunal. — The establishment of a permanent tribunal at the Hague, pursuant to the Peace convention of 1899, marks a momentous epoch in the history of international arbitra- tion. This tribunal realized an idea put forward by Jeremy Bentham towards the close of the 18th century, advocated by James Mill in the middle of the 19th century, and worked out later by Mr Dudley Field in America, by Dr Goldschmidt in Germany, and by Sir Edmund Hornby and Mr Leone Levi in England. The credit of the realization is due, in the first place, to the tsar of Russia, who initiated the Hague Conference of 1899, and, in the second place to Lord Pauncefote (then Sir Julian Pauncefote, British ambassador at Washington), who urged before a committee of the conference the importance of organizing a permanent international court, the service of which should be called into requisition at will, and who also submitted an outline of the mode in which such a court might be formed.

The pious fund of the Call- fornias.

The result was embodied in the following articles of the Con- vention, signed on behalf of sixteen of the assembled powers on the 29th of July 1899.

(Art. 23). Each of the signatory powers is to designate within three months from the ratification of the convention four persons at the most, of recognized competence in international law, enjoying the highest moral consideration, and willing to accept the duties of arbitrators. Two or more powers may agree to nominate one or more members in common, or the same person may be nominated by different powers. Members of the court are to be appointed for six years and may be re-nominated. (Art. 25). The signatory powers desiring to apply to the tribunal for the settlement of a difference between them are to notify the same to the arbitrators. The arbitrators who are to determine this difference are, unless otherwise specially agreed, to be chosen from the general list of members in the following manner: — each party is to name two arbitrators, and these are to choose a chief arbitrator or umpire (sur-arbitre). If the votes are equally divided the selection of the chief arbitrator is to be entrusted to a third'

power to be named by the parties. (Art. 26). The tribunal is to sit at the Hague when practicable, unless the parties otherwise agree. (Art. 27). " The signatory powers consider it a duty in the event of an acute conflict threatening to break out between two or more of them to remind these latter that the permanent court is open to them. This action is only to be considered as an exercise of good offices." Several of the powers nominated members of the permanent court pursuant to Art. 25, quoted above, those nominated on behalf of Great Britain being Lord Pauncefote, Sir Edward Malet, Sir Edward Fry and Professor Westlake. On the death of Lord Pauncefote, Major- General Sir John C. Ardagh was appointed in his place.

Hague Cases. — (1) The first case decided by the Hague court was concerned with the " Pious Fund of the Calif ornias." A fund bearing this name was formed in the 1 8th century for the purpose of converting to the Catholic faith the native Indians of Upper and Lower California, both of which then belonged to Mexico, and of maintaining a Catholic priesthood there. By a decree of 1842 this fund was transferred to the public treasury of Mexico, the Mexican government undertaking to pay interest thereon in perpetuity in furtherance of the design of the original donors. After the sale of Upper California to the United States, effected by the treaty of Guadalupe Hidalgo (1848), the Mexican government refused to pay the proportion of the interest to which Upper California was entitled. The question of liability was then referred to commissioners appointed by each state, and, on their failing to agree, to Sir Edward Thornton, British minister at Washington, who by his award, in 1875, found there was due from Mexico to Upper California, or rather to the bishops there as administrators of the fund, an arrear of interest amounting to nearly $100,000, which was directed to be paid in gold. This award was carried out, but payment of the current interest was again withheld as from the 24th of October 1868. Claim was thereupon made on Mexico by the United States on behalf of the bishops, but without success. Ultimately, in May 1902, an agreement was come to be- tween the two governments which provided for the settlement of the dispute by the Hague tribunal. The points to be determined were (1) whether the matter was res judicata by reason of Sir E. Thornton's award; (2) whether, if not, the claim for the interest was just. The arbitrators selected by the United States were Sir E. Fry and Professor F. de Martens, and by Mexico, Professor Asser and Professor de Savornin Lohman, both of Amsterdam. These four (none of whom, it will be observed, was of the nationality of either party in difference) chose for their umpire Professor Matzen, of Copenhagen, president of the Landsthing there. In October 1902, the court decided both questions in the affirmative, awarding the payment by Mexico of the annual sum claimed, not in gold, but en monnaie ayant cours legal au Mexique. The direction to pay in gold made by Sir E. Thornton was held to

be referable only to the mode of the execu- tion of the award, and therefore not to be chose jugee.

(2) The second arbitration before the Hague court was more important than the first, not only because so many of the great powers were concerned in it, but also because it brought Qrea< about the discontinuance of acts of war. The facts may BrWa y ffl be stated shortly thus. By three several protocols signed Q erma ' ny at Washington in February 1903, it was agreed that an 4jtaty certain claims by Great Britain, Germany and Italy, on versus behalf of their respective subjects against the Venezuelan Venezuela, government should be referred to three mixed commissions, and that for the purpose of securing the payment of these claims 30 % of the customs revenues at the ports of La Guayra and Puerto Caballo should be remitted in monthly instalments to the repre- sentative of the Bank of England at Caracas. Prior to the date of these protocols, an attempt had been made by Great Britain, Germany and Italy to enforce their claims by blockade, and a further question arose as between these three powers on the one hand, and the United States of America, France, Spain, Belgium, the Netherlands, Sweden and Norway, and Mexico (all of whom had claims against Venezuela, but had abstained from hostile action) on the other hand, as to whether the blockading powers were entitled to preferential treatment. By three several protocols signed in May

1903 this question was agreed to be submitted to the Hague court, three members of which were to be named as arbitrators by the tsar of Russia, but no arbitrator was to be a subject or citizen of any of the signatory or creditor powers. The arbitrators named

Dates of

Date

agreement

Parties.

Arbitrating Authority.

Subject-Matter.

of

to refer.

award.

Table I.

Territorial Disputes {Ownership).

1857

Holland and Ven- ezuela

Queen of Spain

Island of Aves in Venezuela

1865

1869

Great Britain and

President of United

Island of Bulama on West

1870

Portugal

States

Coast of Africa

1872

Great Britain and

President of French

Delagoa Bay (part of), Inyack

1875

Portugal

Republic

and Elephant Is. ,S.E. Africa

1876

Argentine Republic

President of United

Territory between the Verde

1878

and Paraguay

States

and the Pilcomayo river of Paraguay Islets and guano deposits on

1885

Great Britain and

Mixed Commission

1886

Germany

S.W. Coast of Africa

1886

Bulgaria and Servia

Mixed Commission

Territory near the village of Bregovo

1887

1902

Austria and

Mixed Commission

Territory in the district of

1902

Hungary

(with President of Swiss Federal tri- bunal as u/npire)

Upper Tatra

Table II.

Delimitation of Frontiers.

1869

Great Britain and

Lieutenant Governor

The southern boundary of the

1870

the Transvaal

of Natal

S. African Republic

1871

Great Britain and the United States

The German Emperor

The San Juan water bound- ary

1872

1873

Italy and Switzer- land

Mixed Commission (with U. S. Minister at Rome as umpire)

The Canton of Ticino

1874

1885

Great Britain and Russia

Mixed Commission

North-western Afghanistan

1887

1890

France and Holland

Tsar of Russia

French Guiana and Dutch Guiana

1891

1895

Great Britain and Portugal

President of the Italian Court of Appeal

Manicaland

1897

1897

France and Brazil

President of the Swiss Confedera- tion

King of Italy

River Yapoe named in the Treaty of Utrecht 1813

1900

1901

Great Britain and

Brazil Great Britain and

British Guiana

1904

1903

King of Italy

Barotseland

1905

Portugal

Table III.

Pecuniary

Claims in respect of Seizures and Arrests.

1851

United States and

President of French

Seizure of the American priva-

1852

Portugal

Republic

teer " General Armstrong "

1863

Great Britain and Brazil

King of the Belgians

Arrest of three British officers of the ship " La Forte "

1863

1863

Great Britain and Peru

Senate of Hamburg

Arrest at Callao of Capt. Melville White, a British subject

1864

1870

United States and Spain

Mixed Commission

The American S.S. ” Col. Lloyd Aspinwall ”

1870

1873

Japan and Peru

Tsar of Russia

The Peruvian barque ” Maria

Luz ” The American S.S. “Montijo”

1875

1874

United States and

Mixed Commission

1875

Colombia

1879

France and Nica- ragua

French Court of Cassation

The French ship ” Le Phare ”

1880

1885

United States and

Italian Minister at

The American S.S. ” The

1885

Spain

Madrid

Masonic ”

1888

United States and

British Minister at

The S.S. ” Benjamin Frank-

1890

Denmark

Athens

lin ” and the barque ” Catherine Augusta ”

1895

Great Britain and

Tsar of Russia, who

Arrest of the master of the

1897

the Netherlands

delegated his duties to Professor F. de

” Costa Rica ” packet (a British subject)

Martens

Great

Britain,

France

and

Germany

versus

Japan.

turned

by the tsar were M. Muraviev, minister of justice and attorney- general of the Russian empire; Professor Lammasch, member of the Upper House of the Austrian parliament; and M. de Martens, then member of the council of the ministry of foreign affairs at St Petersburg. The arbitrators by their award in February 1904 decided unanimously in favour of the blockading powers and

ordered payment of their claims out of the 30 % of the receipts at the two Venezuelan ports which had been set apart to meet them.

(3) The third case before the Hague court was heard in 1904-

1905. A controversy not amenable to ordinary diplomatic methodsarose between Great Britain, France and Germany on the one hand and Japan on the other hand as to the legality of a house- tax imposed by Japan on certain subjects of those powers who held leases in perpetuity. The question upon the true construction of certain treaties between theEuropean powers and Japan which had been made a few years previously. By three protocols signed at Tokyo in August 1902 this question was agreed to be submitted to arbitrators, members of the court at the Hague, one -to be chosen by each party with power to name an umpire. The arbitrators chosen were M. Renault, professor of the law faculty in Paris, and M. Montono, the Japanese envoy to the French capital. They named as their umpire and president M. Gram, ex-minister of the state of Norway. In May 1905, an award was pro- nounced by the majority (M. Gram and M. Renault) in favour of the European contention, M. Montono dissenting both from the

conclusion of his colleagues and from the reasons on which it was based.

(4) Barely two months had elapsed since the date of the last award when the Hague court was again called into requisition. The scene of dispute this time was on the S.E. coast of Arabia. Muscat, the capital of the kingdom of Oman on that coast, is ruled by a sultan, whose independence both Great Britain and France had, in March 1862, " reciprocally engaged to respect." Notwithstanding this, the French republic had issued to certain native dhows, owned by subjects of the sultan, papers authorizing them to fly the French flag, not only on the Oman littoral but in the Red Sea. A question thereupon arose as to the manner in which the privileges thereby purported to be conferred affected the jurisdiction of the sultan over such dhows, the masters of which, as was alleged, used their immunity from search for thepurpose of carrying on contraband trade in slaves, arms and ammunition. In October 1904 the two governments agreed to refer this question to the Hague court. Chief Justice Melville W. Fuller, of the Supreme Court of the United States, was named as arbitrator on the part of Great Britain, M. de Savornin Lohman, who had acted in the case of the Californias (No. 1), as arbitrator on the part of France. The choice of an umpire was entrusted to the king of Italy. He named Professor Lam- masch, who, as we have seen, had acted in the arbitration with Venezuela in 1903.

A unanimous award was made in August 1905. It was held that although generally speaking every sovereign may decide to whom he will accord the right to fly his flag, yet in this case such right was limited by the general act of the Brussels conference of July 1890 relative to the African slave trade, an act which was ratified by France on the 2nd of June 1892 ; that accordingly the owners and master of dhows who had been authorized by France to fly the French flag before the last-named date retained this authorization

Great Britain and the French Hag at Muscat.

so long as France chose to renew it, but that after that date such authorization was improper unless the guarantees could establish that they had been treated by France as her proteges within the meaning of that term as explained in a treaty of 1863 between France and Morocco. A further point decided was that the owners or master of dhows duly authorized to fly the French flag within the ruling of the first point, did not enjoy, in consequence of that fact, any such right of extra-territoriality as wouid exempt them from the sovereignty and jurisdiction of the sultan. Such

exemption would be contrary to the engagement to respect the independence of the sultan solemnly made in 1862.

Arbitral Procedure. — Not the least of the benefits of the Hague convention of 1899 (strengthened by that of 1907) is that it con- tains rules of procedure which furnish a guide for all arbitrations whether conducted before the Hague court or not. These may be summarized as follows: — The initial step is the making by the parties of a special agreement clearly defining the subject of the dispute. The next is the choice of the arbitrators and of an umpire if the number of arbitrators is even. Each party then by its agents prepares and presents its case in a narrative or argu- mentative form, annexing thereto all relevant documents. The cases so presented are interchanged by transmission to the opposite party. The hearing consists in the discussion of the matters contained in the several cases, and is conducted under the direction of the president who is either the umpire, or, if there is no umpire, one of the arbitrators. The members of the tribunal have the right of putting questions to the counsel and agents of the parties and to demand from them explanation of doubtful points. The arbitral judgment is read out at a public sitting of the tribunal, the counsel and agents having been duly summoned to hear it. Any application for a revision of the award must be based on the discovery of new evidence of such a nature as to exercise a decisive influence on the judgment and unknown up to the time when the hearing was closed, both to the tribunal itself and to the party asking for the revision. These general rules are universally applicable, but each case may require that special rules should be added to them. These each tribunal must make for itself.

One special and necessary rule is in regard to the language to be employed. This rule must vary according to convenience and is therefore made ad hoc. In case No. 1 noted above, the court allowed English or French to be spoken according to the nation- ality of the counsel engaged. The judgment was delivered in French only. In case No. 2 it was agreed that the written and printed memoranda should be in English but might be accom- panied by a translation into the language of the power on whose behalf they were put in. The oral discussion was either in English or French as happened to be convenient. The judgment was drawn up in both languages. In case No. 3 French was the official language throughout, but the parties were allowed to make any communication to the tribunal, in French, English, German or Japanese. In case No. 4 French was again the official language, but the counsel and agents of both parties were allowed to address the tribunal in English. The protocols and the judgment were drawn up in French accompanied by an official English translation.

Limits of International Arbitration. — Of the numerous treaties for general arbitration which have been made during the 20th century that between

Great Britain and France (I903) is a type. This treaty contains reservations of all questions involving the vital interests, the independence or the honour of the contracting parties. The language of the reservation is open to more interpre- tations than one. What, for instance, is meant by the phrase "national independence" in this connexion? If it be taken in its strict acceptation of autonomous state sovereignty, the exception is somewhat of a truism. No self-respecting power would, of course, consent to submit to arbitration a question of life or death. This would be as if two men were to agree to draw lots as to which should commit suicide in order to avoid fighting a duel. On the other hand, if the exception be taken to exclude all questions which, when decided adversely to a state, impose a restraint on its freedom of action, then the exception would seem to exclude such a question as the true interpretation of an ambiguous treaty, a subject with which experience shows

international arbitration is well fitted to deal. Again, we may ask, what is meant by the phrase " national honour "? It was thought at one time that the honour of a nation could only be vindicated by war, though all that had happened was the slighting of its flag, or of its accredited representative, during some sudden ebullition of local feeling. France once nearly broke off peaceful relations with Spain because her ambassador at London was assigned a place below the Spanish ambassador, and on another occasion she despatched troops into Italy because her ambassador at Rome had been insulted by the friends and partisans of the pope. The truth is that the extent to which national honour is involved depends on factors which have nothing to do with the immediate subject of complaint. So long as general good feeling subsists between two nations, neither will easily take offence at any discourteous act of the other. But when a deep-seated antagonism is concealed beneath an unruffled surface, the most trivial incident will bring it to the light of day. " Outraged national honour " is a highly elastic phrase. It may serve as a pretext for a serious quarrel whether the alleged " outrage " be great or small.

The prospects of the expansion of international arbitration will be more clearly perceived if we classify afresh all state differences under two heads: — (1) those which have a legal character, (2) tjhose which have a political character. Under " legal differences" may be ranged such as are capable of being decided, when once the facts are ascertained, by settled, recog- nized rules, or by rules not settled nor recognized, but (as in- the " Alabama " case) taken so to be for the purpose in hand. Boun- dary cases and cases of indemnity for losses sustained by non-com- batants in time of war, of which several instances have already been mentioned, belong to this class. To the same class belong those cases in which the arbitrators have to adapt the provisions of an old treaty to new and altered circumstances, somewhat in the way in which English courts of justice apply the doctrine of " cy-

pres." " Political differences " on the other hand, are such as affect states in their, external relations, or in relation to their subjects or dependants who may be in revolt against them. Some of these differences may be slight, while others may be vital, or (which amounts to the same thing) may seem to the parties to be so. All differences falling under the first of these two general heads appear to be suitable for international arbitra- tion. Differences falling under the second general head are, for the most part, unsuitable, and may only be adjusted (if at all) through the mediation of a friendly power.

The interesting problem of the future is — are we to regard this classification as fixed or as merely transitory? The answer depends on several considerations which can only be glanced at here. It may be that, just as the usages of civilized nations have slowly crystallized into international law, so there may come a time when the political principles that govern states in relation to each other will be so clearly defined and so generally accepted as to acquire something of a legal or quasi-legal character. If they do, they will pass the line which at present separates arbitrable from non-arbitrable matter. This is the juridical aspect of the problem. But there is also an economic side to it by reason of the conditions of modern warfare. Already the nations are groaning under the burdens of militarism, and are for ever diverting energies that might be employed in the furtherance of useful productive work to purposes of an opposite character. The interruption of maritime intercourse, the stagnation of industry and trade, the rise in the price of the necessaries of life, the impossibility of adequately providing for the families of those — call them reservists, " landwehr," or what you will — who are torn away from their daily toil to serve in the tented field, — these are considerations that may well make us pause before we abandon a peaceful solution and appeal to brute force. Lastly, there is the moral aspect of the problem. In order that inter- national arbitration may do its perfect work, it is not enough to set up a standing tribunal, whether at the Hague or elsewhere, and to equip it with elaborate rules of procedure. Tribunals and rules are, after all, only machinery. If this machinery is to act smoothly we must improve our motive power, the source of

which is human passion and sentiment. Although religious animosities between Christian nations have died out, although dynasties may now rise and fall without raising half Europe to arms, the springs of warlike enterprise are still to be found in commercial jealousies, in imperialistic ambitions and in the doctrine of the survival of the fittest which lends

scientific support to both. These must one and all be cleared away before we can enter on that era of universal peace towards the attainment of which the tsar of Russia declared, in his famous circular of 1898, the efforts of all governments should be directed. Meanwhile it is legitimate to share the hope expressed by President Roosevelt in his message to Congress of December 1905 that some future Hague conference may succeed in making arbitration the custom- ary method of settling international disputes in all save the few classes of cases indicated above, and that — to quote Mr Roosevelt's words — " these classes may themselves be as sharply defined and rigidly limited as the governmental and social development of the world will for the time being permit."

Authorities. — Among special treatises are: Kamarowsky, Le Tribunal international (traduit par Serge de Westman) (Paris, 1887) ; Rouard de Card, Les Destinees de I'arbitrage international, depuis la sentence vendue par le tribunal de Geneve (Paris, 1892) ; Michel Revon, V Arbitrage international (Paris, 1892); Ferdinand Dreyfus, U Arbi- trage international (Paris, 1894) (where the earlier authorities are collected) ; A. Merignhac, Traite de I'arbitrage international (Paris, 1895) ; Le Chevalier Descamps, Essai sur I' organisation de I'arbitrage international (Bruxelles, 1896); Feraud-Giraud, Des Traites d 'arbi- trage international general et permanent, Revue de droit international (Bruxelles. 1897); Pasicrisie International, by Senator H. Lafon- taine (Berne, 1902) ; Recueils d'actes et protocols de la cour permanente d' Arbitrage, Langenhuysen Frercs, the Hague.

Of works in English there is a singular dearth. The most important is by an American. J. B. Moore. History of the International Arbitra- tions to which the United States has been a Party (Washington, 1898). The appendices to this work (which is in six volumes) contain, with much other matter of great value, full historical notes of arbitrations between other powers. Arbitration and mediation will be found briefly noticed in Phillimore's International Law, in Sir Henry Maine's Lectures, delivered in Cambridge in 1887; in W. E. Hall's International Law, and more at length in an interesting paper contributed by John Westlake to the International Journal of Ethics, October 1896, which its author has reprinted privately. A London journal, The Herald of Peace and International Arbitration, issued some years ago a list of instances in which arbitration or mediation had been successfully resorted to during the 19th century. David Dudley Field, of New York, subsequently enlarged this list, which has bˆeen continued under the title International Tribunals, by Dr W. Evans Darby, and is published, along with the texts of several projects for general arbitration, at the offices of the Peace Society, 47 New Broad Street, London. (M. H. C.)

ARBITRATION AND CONCILIATION. The terms "arbitra- tion and

conciliation " as employed in this article, are used to describe a group of methods of settling disputes between employers and work-people or among two or more sets of work-people, of which the common feature is the intervention of some outside party not directly affected by the dispute. If the parties agree beforehand to abide by the award of the third party, the mode of settlement is described as " arbitration." If there be no such agreement, but the offices of the mediator are used to promote an amicable arrangement between the parties themselves, the process is described as " conciliation." The third party may be one or more disinterested individuals, or a joint-board repre- sentative of the parties or of other bodies or persons.

The process here termed " arbitration " is rarely an arbitra- tion in the strict legal sense of the term (at least in the United Kingdom), because of the defective legal personality of the associations or groups of individuals who are usually parties to labour disputes, and the consequent absence in the great majority of cases of a valid legal " submission " of the difference to arbitration. Whether or not trade unions of employers or workmen in the United Kingdom are capable of entering through their agents into contracts which are legally binding on their members it is fairly certain that the great majority of the agree- ments actually made by the representatives of employers and workmen to submit a dispute to the decision of a third party are of no legal force except as regards the actual signatories. Broadly speaking, therefore, the provisions of the Arbitration Act 1889, which consolidated ths law relating to arbitration

in general, would as a rule have no application to the settlement of collective disputes between employers and workmen, even if the act had not been expressly excluded by section 3 of the Conciliation Act of 1896 in the case of disputes to which that act applies. Besides the absence of a legal "submission," labour arbitrations differ from ordinary arbitrations in the fact that the questions referred often (though by no means always) relate to the terms on which future contracts shall be made, whereas the vast majority of ordinary arbitrations relate to questions arising out of existing contracts. The defective " per- sonality " of the parties to labour disputes also prevents the enforcement of an award by legal penalties. Since, however, difficulties of enforcement affect not only settlements arrived at by arbitration, but all agreements between bodies of employers and work-people with regard to the terms of employment, they are most appropriately considered at a later stage of this article.

The term "conciliation" is ordinarily used to cover a large number of methods of settlement, shading off in the one direction into " arbitration " and in the other into ordinary direct negotia- tion between the parties. In some cases conciliation only differs from arbitration in the absence of a previous agreement to accept the award. The German " Gewerbegerichten,

" when dealing with labour disputes, communicate a decision to both parties, who must notify their acceptance or otherwise (see below). Some of the state boards in America take similar action. The conciliation boards established under the New Zealand Arbitra- tion Act of 1894 (see below) make recommendations, though either side may decline to accept them and may appeal to the court of arbitration, which in that colony has compulsory powers. Most frequently, however, in Great Britain, the mediating party abstains from pronouncing a definite judgment of his own, but confines himself to friendly suggestions with a view of removing obstacles to an agreement between the parties. On the other hand, it is not easy to define how far the " outside party " must be independent of the parties to the dispute, in order that the method of settlement may be properly described as " conciliation." There is a sense in which a friendly conversa- tion between an employer or his manager and a deputation of aggrieved workmen is rightly described as " conciliation," but such an interview would certainly not be covered by the term as ordinarily used at the present day. Again, when the parties are represented by agents (e.g. the officials of an employers' association an,d of a trade union) the actual negotiators or some of them may not personally be affected by the particular dispute, and may often exercise some of the functions of the mediator or conciliator in a manner not clearly to be distinguished from the action of an outside party. It seems best, however, to exclude such negotiations from our purview so long as those between whom they are carried on merely act as the authorized agents for the parties affected. In the same way, a meeting arranged ad hoc between delegates of an employers' association and a trade union, for the purpose of arranging differences as to the terms on which the members of the association shall employ members of the union is not usually classed as " con- ciliation," unless the meeting is held in the presence of an independent chairman or conciliator, or in pursuance of a permanent agreement between the associations laying down the procedure for the settlement of disputes. If, however, the dispute is considered and arranged not by a casual meeting between two committees and deputations appointed ad hoc, but by a permanently organized " joint committee " or board with a constitution, rules of procedure and officers of its own, the process of settlement is by ordinary usage described as "conciliation," even though the board be entirely representative of the persons engaged in the industry. Such joint boards, as will be seen, play a most important part in conciliation at the present day, and they almost always have attached to them some machinery for the ultimate decision by arbitration of questions on which they fail to agree. Another form of conciliation is that in which the mediating board represents a wider group of industries than those affected by the dispute (e.g. the London

and other " district " boards referred to below). Moreover, in some of the most important cases of settlement of disputes by conciliation, the mediating party has not been a permanent board but a disinterested individual, e.g. the mayor, county court judge, government official or member of parliament. As will be seen below, the Conciliation Act now provides for the appointment of " conciliators " by the Board of Trade.

Voluntary trade boards, however (i.e. permanent joint boards representing employers and work-people in particular trades), are at once the most firmly established and the most important agencies in Great Britain for the prevention and settlement of labour disputes. Among the earliest of such bodies was the board of arbitration in the Macclesfield silk trade, formed in 1849, in imitation of the French " Conseils de Prud'hommes," but which only lasted four years. The first board, however, which attained any degree of permanent success was that estab- lished for the hosiery and glove trade in Nottingham in i860, through the efforts of A. J. Mundella. In 1864 a board was established in the Wolverhampton building trades, with Rupert Kettle as chairman, and in 1868 boards were formed for the pottery trade, the Leicester hosiery trade and the Nottingham lace trade. In 1869 there was formed one of the most important of the still existing boards, viz. the board of arbitration and conciliation in the manufactured iron and steel trades of the north of England, with which the names of Rupert Kettle, David Dale and others are associated. In 1872 and 1873 joint committees were formed in the Durham and Northumberland coal trades to deal with local questions. The Leicester boot and shoe trade board, the first of an elaborate system of local boards in this trade, was founded in 1875. From about 1870 onwards there was a great movement for the establishment of " sliding scales " in the coal and iron and steel trades, which by regulating wages automatically rendered unnecessary the settlement of general wages by conciliation or arbitration. These sliding scales, however, usually had attached to them joint committees for dealing with disputed questions. A sliding scale arranged by David Dale was attached to the manufactured iron trade board in 1 87 1. A sliding scale for the Cleveland blast furnacemen came into force in 1879. Sliding scales were also adopted in the coal trade in many districts, e.g. South Wales (1875), Durham (1877) and Northumberland (1879). The movement was, however, followed by a reaction, and several of the sliding scales in the coal trade were terminated between 1887 and 1889. In 1902 the last surviving sliding scale in the coal trade, viz. in South Wales, ceased to exist and was replaced by a conciliation board.

The formation on a large scale of conciliation boards in the coal trade to fix the rate of wages dates from the great miners' dispute of 1893, one of the terms of settlement agreed to at the conference held at the foreign office under Lord Rosebery being the formation of a conciliation board covering the districts affected. Northumberland followed in 1894, Durham in 1895, Scotland in 1900 and South Wales in 1903.

In 1907 an important scheme for the formation of conciliation boards for railway companies and their employees was adopted as the result of the action taken by the president of the Board of Trade to prevent a general strike of railway servants in that year. Under this scheme separate boards (sectional and general) were to be formed for the employees of each railway company which adhered to the scheme, with provision for reference in case of a deadlock to an umpire.

The first general district board to be formed was that estab- lished in London in 1890, through the London chamber of commerce, as a sequel to the Mansion House committee which mediated in the great London dock strike of 1889. The example was followed by several large towns, but the action taken by the boards in most of these provincial districts has been very limited.

In addition there are two boards composed of representatives of co-operators and trade-unionists for the settlement of disputes arising between co-operative societies and their employees.

The most typical form of machinery for the settlement of

*disputes by voluntary conciliation is a joint board consisting of equal numbers of representatives of employers and employed. The members of the board are usually Constitu- elected by the associations of employers and workmen, /unctions though in some cases (e.g. in the manufactured iron of voiun- trade board) the workmen's representatives are elected **pr conm not by their trade union but by meetings of workmen C u'^^ n employed at the various works. The chairman may be an independent person, or, more usually, a representative of the employers, the vice-chairman being a representative of the work- men. In the arbitration and conciliation boards in the boot and shoe trade, provision is made by which the chair may be occupied by representatives of the employers and workmen in alternate years. An independent chairman usually has a casting vote, which practically makes him an umpire in case of equal voting, but where there is no outside chairman there is often provision for reference of cases on which the board cannot agree to an umpire, who may either be a permanent officer of the board elected for a period of time (as in the case of several of the boards in the boot and shoe trade), or selected ad hoc by the board or*

appointed by some outside person or body. Thus the choice of the permanent chairman or umpire of the miners' conciliation board, formed in pursuance of the settlement of the coal dispute of 1893 by Lord Rosebery, was left to the speaker of the House of Commons. The nomination of umpires under the Railway Agreement of 1907 was left to the speaker and the master of the rolls. Since the passing of the Conciliation Act, several conciliation boards have provided in their rules for the appointment of umpires by the Board of Trade.

Conciliation boards constituted as described above usually have rules providing that there shall always be equality of voting as between employer and workmen, in spite of the casual absence of individuals on one side or the other. In order to expedite business it is sometimes provided that all questions shall be first considered by a sub-committee, with power to settle them by agreement before coming before the full board. Boards of conciliation and arbitration conforming more or less to the above type exist in the coal, iron and steel, boot and shoe and other industries in the United Kingdom. A somewhat different form of organization has prevailed in the cotton-spinning trade (since the dispute of 1892-1893) and in the engineering trade (since the engineering dispute of 1897-1898). In these important industries there are no permanent boards for the settlement of general questions, but elaborate agreements are in force between the employers' and workmen's organizations which among other things prescribe the mode in which questions at issue shall be dealt with and if possible settled. In the first place, if the question cannot be settled between the employer and his work- men, it is dealt with by the local associations or committees or their officials, and failing a settlement in this manner, is referred to a joint meeting of the executive committees of the two associations. In neither agreement is there any provision for the ultimate decision of unsettled questions by arbitration. The agreement in the cotton trade is known as the " Brooklands Agreement," and a large number of questions have been amicably settled under its provisions. In the building trade, it is very customary for the local " working rules," agreed to mutually by employers and employed in particular districts, to contain " conciliation rules " providing for the reference of disputed questions to a joint committee with or without an ultimate reference to arbitration. Yet another form of voluntary board is the " district board," consisting in most cases of representatives elected in equal numbers by the local chamber of commerce and trades council respectively. In the case, however, of the London Conciliation Board the workmen's representatives are elected, twelve by specially summoned meetings of trade union delegates and two by co-optation. The functions of district boards are to deal with disputes in any trade which may occur within their districts, and of course they can only take action with the consent of both parties to the dispute, in this

respect differing from the majority of " trade " boards, which, as a rule, are empowered by the agreement under which they are constituted

to deal with 'jv'jstions on the application of either party. Another interesting type of board is that representing two or more groups of workmen and sometimes their employers, with tb». object of settling " demarcation " disputes between the groups of workmen (i.e. questions as to the limits of the work vhich each group may claim to perform). Examples of such boards are those representing shipwrights and joiners on the Clyde, Tyne and elsewhere. While the arrangements for volun- tary conciliation and arbitration differ in this way in various industries, there is an equally wide variation in the character and range of questions which the boards are empowered to determine. For example, some boards in the coal trade (e.g. the concilia- tion boards in Northumberland and the so-called " Federated Districts ") deal solely with the general rate of wages. Others, e.g. the " joint committee " in Northumberland and Durham, confine their attention solely to local questions not affecting the counties as a whole. The Durham conciliation board deals with any general or county questions. This distinction between "general" and "local" questions corresponds nearly, though not entirely, to the distinction often drawn between questions of the terms of future employment and of the interpretation of existing agreements. Some conciliation boards are unlimited as regards the scope of the questions which they may consider. This was formerly the case with the boards in the boot and shoe trade, but under the " terms of settlement " of the dispute in 1895 drawn up at the Board of Trade, certain classes of questions (e.g. the employment of particular individuals, the adoption of piece-work or time-work, &c.) were wholly or partially withdrawn from their consideration, and any decision of a board contravening the " terms of settlement " is null and void. A special feature in the procedure for conciliation and arbitration in the boot and shoe trade, is the deposit by each party of £1000 with trustees, as a financial guarantee for the performance of agreements and awards. A certain class of conciliation boards, mostly in the Midland metal trades, were attached to " alliances " of employers and employed, having for their object the regulation of produc- tion and of prices (e.g. the Bedstead Trade Wages Board). None of these alliances, however, have survived.

At all events up to the year 1896, the development of arbi- tration and conciliation as methods of settling labour disputes Legisla- m tne United Kingdom was entirely independent of tioa in the any legislation. Previously to the Conciliation Act of United j ggg several attempts had been made by

parliament to Kingdom. p romo ˆ e arbitration and conciliation, but with little or no practical result, and the act of 1896 repealed all previous legislation on the subject, at the same time excluding the opera- tion of the Arbitration Act of 1889 from the settlement of "any difference or dispute to which this act applies." The laws repealed by the Conciliation Act need only a few words of mention. Dur- ing the 1 8th century the fixing of wages by magistrates under the Elizabethan legislation gradually decayed, and acts of 1745 and 1757 gave summary jurisdiction to justices of the peace to determine disputes between masters and servants in certain circumstances, although no rate of wages had been fixed that year by the justices of the peace of the shire. These and other laws, relating specially to disputes in the cotton-weaving trade, were consolidated and amended by the Arbitration Act of 1824. This act seems chiefly to have been aimed at disputes relating to piece-work in the textile trades, though applicable to other disputes arising out of a wages contract. It expressly excluded, however, the fixing of a rate of wages or price of labour or work- manship at which the workmen should in future be paid unless with the mutual consent of both master and workmen. The act gave compulsory powers of settling the disputes to which it relates on application of either party to a court of arbitrators represent- ing employers and workmen nominated by a magistrate. The award could be enforced by distress or imprisonment. The act was subsequently amended in detail, and by the " Councils of Conciliation " Act of 1867 power was given to the home secretary to license "equitable councils of conciliation and arbitration", equally representative of masters and workmen, who should thereupon have the powers conferred by the act of 1824. The

act contains provisions for the appointment of conciliation committees, and other details which are of little interest seeing that the act was never put into operation. Another amendment of the act of 1824 was made by the Arbitration (Masters and Workmen) Act of 1872, which contemplated the conclusion of agreements between employers and employed, designating some board of arbitration by which disputes included within the scope of the former acts should be determined. A master or workman should be deemed to be bound by an agreement under the act, if he accepted a printed copy of the agreement and did not re- pudiate it within forty-eight hours. Like the previous legislation, however, the act of 1872 was inoperative. The evidence given before the Royal Commission on Labour (1891-1894) disclosed the existence of a considerable body of opinion in favour of some further action by the state for the prevention or settlement of labour disputes, and some impetus was given to the movement by the settlement through official mediation of several important disputes, e.g. the great coal-miners' dispute of 1893 by a con- ference presided over by Lord Rosebery, the cab-drivers' dispute of 1894 by the mediation of the home

secretary (H. H. Asquith), and the boot and shoe trade dispute of 1895 by a Board of Trade conference under the chairmanship of Sir Courtenay Boyle. In these, and a few other less important cases, the intervention of the Board of Trade or other department took place without any special statutory sanctic.n. The Conciliation Act passed in 1896 was framed with a view to giving express authorization to such action in the future.

This act is of a purely voluntary character. Its most import- ant provisions are those of section 2, empowering the Board of Trade in cases " where a difference exists or is apprehended between any employer, or any class of employers, and workmen, or between different classes of workmen," to take certain steps to promote a settlement of the difference. They may of their own initiative hold an inquiry or endeavour to arrange a meeting between the parties under a chairman mutually agreed on or appointed from the outside, and on the application of either party they may appoint a conciliator or a board of conciliation who shall communicate with the parties and endeavour to bring about a settlement and report their proceedings to the Board of Trade. On the application of both parties the Board of Trade may appoint an arbitrator. In all cases the Board of Trade has discretion as to the action to be taken, and there is no pro- vision either for compelling the parties to accept their mediation or to abide by any agreement effected through their intervention. There are other provisions in the act providing for the registration of voluntary conciliation boards, and for the promotion by the Board of Trade of the formation of such boards in districts and trades in which they are deficient. During the first eleven years after the passage of the act the number of cases arising under section 2 (providing for action by the Board of Trade for the settlement of actual or apprehended disputes) averaged twenty- one per annum, and the number of settlements effected fifteen. In the remaining'cases the Board of Trade either/efused to entertain the application or failed to effect a settlement, or the disputes were settled between the parties during the negotiations. About three-quarters of the settlements were effected by arbitration and one-quarter by conciliation. A number of voluntary con- ciliation boards formed or reorganized since the passing of the act provide in their rules for an appeal to the Board of Trade to appoint an umpire in case of a deadlock. At least thirty-six trade boards are known to have already adopted this course. The figures given above show that the Conciliation Act of 1896 has not, like previous legislation, been a dead letter, though the number of actual disputes settled is small compared with the total number annually recorded.

Arbitration and conciliation in labour disputes as practised in the United Kingdom are entirely voluntary, both as regards the initiation and conduct of the negotiations and the carrying out of the agreement resulting therefrom. torZom- 3 In all these respects arbitration, though terminating

pulsion. in what is called a binding award, is on precisely the same legal footing as conciliation, which results in a mutual

agreement. Various proposals have been made (and in some cases carried into effect in certain countries) for introducing an element of compulsion into this class of proceeding. There are three stages at which compulsion may conceivably be intro- duced, (i) The parties may be compelled by law to submit their dispute to some tribunal or board of conciliation; (2) the board of conciliation or arbitration may have power to compel the attendance of witnesses and the production of documents; (3) the parties may be compelled to observe the award of the board of arbitration. The most far-reaching schemes of com- pulsory arbitration in force in any country are those in force in New Zealand and certain states in Australia. Bills have been introduced into the British House of Commons for clothing voluntary boards of conciliation and arbitration, under certain conditions, with powers to require attendance of witnesses and production of documents, without, however, compelling the parties to submit their disputes to these boards or to abide by their decisions. In the United Kingdom, however, more attention has recently been given to the question of strengthen- ing the sanction for the carrying out of awards and agreements than of compelling the parties to enter into such arrangements. An interesting step towards the solution of the difficulty of en- forcement in certain cases is perhaps afforded by the provisions of the terms of settlement of the dispute in the boot and shoe trade drawn up at the Board of Trade in 1895. Under this agree- ment £1000 was deposited by each party with trustees, who were directed by the trust-deed to pay over to either party, out of the money deposited by the other, any sum which might be awarded as damages by the umpire named in the deed, for the breach of the agreement or of any award made by an arbitration board in consonance with it. Very few claims for damages have been sustained under this agreement. Nevertheless it cannot be doubted that the pecuniary liability of the parties has given stability to the work of the local arbitration boards, and the satisfaction of both sides with the arrangement is shown by the fact that the trust-deed which lapsed in 1900 has been several times renewed by common agreement for successive periods of two years, and is now in force for an indefinite period subject to six months' notice from either side. Theoretically a trust- deed of this kind can only offer a guarantee up to the point at which the original deposit on one side or the other is exhausted, as it is impossible to compel either party to renew the deposit. A proposal was made by the duke of Devonshire and certain of his colleagues on the Royal Commission on Labour for empower- ing

associations of employers and employed to acquire, if they desired it, sufficient legal personality and corporate character to enable them to sue each other or their own members for breach of agreement. This would give the association aggrieved .by a breach of award the power of suing the defaulting organization to recover damages out of their corporate funds, while each association could exact penalties from its members for such a breach. For this reason the suggestion has met with a good deal of support by many interested in arbitration and conciliation, but has been steadily opposed by representatives of the trade unions. The question is not free from difficulties. The object of the change would be to convert what are at present only morally binding understandings into legally enforceable contracts. But apart from the possibility that some of such contracts would be held by the courts to be void as being " in restraint of trade," the tendency might be to give a strict legal interpretation to working agreements which might deprive them of some of their effectiveness for the settlement of the conditions of future con- tracts between employers and workmen, while possibly deter- ring associations from entering into such agreements for fear of litigation. Individuals, moreover, could avoid liability by leaving their associations. In practice the cases of repudiation or .breach of an award or agreement are not common. In countries like New Zealand, where the parties are compelled to submit their differences to arbitration, some of the above objections do not apply.

The following statistics are based on the reports of the Labour department of the Board of Trade. The numter of boards of

conciliation and arbitration known to be in existence in the United Kingdom is nearly 200, but a good many of these do little or no active work. Only about one-third

Statistics of existing

of these boards deal with actual cases in any one agencies. year, the active boards being mainly connected with mining, iron and steel, engineering and shipbuilding, boot and shoe and building trades. During the ten years 1897-1906 the total number of cases considered by these boards averaged about 1500 annually, of which they have settled about half, the remainder having been withdrawn, referred back or other- wise settled. About three-quarters of the cases settled were determined by the boards themselves and only one-quarter by umpires. The great majority of the cases settled were purely local questions. Thus more than half the total were dealt with by the " joint committees " in the Northumberland and Dur- ham coal trades, which confine their action to local questions, such as fixing the " hewing prices " for new seams. The great majority of the cases settled did not actually involve stoppage of work, the most useful work of these permanent

boards being the prevention rather than the settlement of strikes and lock-outs. A certain number of disputes are settled every year by the mediation or arbitration of disinterested individuals, e.g. the local mayor or county court judge.

The extent to which the methods of arbitration and concilia- tion can be expected to afford a substitute for strikes and lock- outs is one on which opinions differ very widely. The difficulties arising from the impossibility of enforcing F ^^ and agreements or awards by legal process have already u m it s . been discussed. Apart from these, however, it is evident that both methods imply that the parties, especially the work- people, are organized at least to the extent of being capable of negotiating through agents. In some industries (e.g. agriculture or domestic service) this preliminary condition is not satisfied; in others the men's leaders possess little more than consultative powers, and employers may hesitate to deal either directly or through a third party with individuals or committees who have so little authority over those whom they claim to repi.esent. And even where the trade organizations are strong, some em- ployers refuse in any way to recognize the representative char- acter of the men's officials. The question of the " recognition " of trade unions by employers is a frequent cause of disputes (see Strikes and Lock-outs.) It may be observed, however, that it often occurs that in cases in which both employers and employed are organized into associations which are accustomed to deal with each other, one or both parties entertain a strong objection to the intervention of any outside mediator, or to the submission of differences to an arbitrator. Thus the engineering employers in 1897 were opposed to any outside intervention, though ready to negotiate with the delegates chosen by the men. On the other hand, the cotton operatives have more than once opposed the proposal of the employers to refer the rate of wages to arbitration, and throughout the great miners' dispute of 1893 the opposition to arbitration came from the men. Naturally, the party whose organization is the stronger is usually the less inclined to admit outside intervention. , But there have also been cases in which employers, who refused to deal directly with trade union officials, have been willing to negotiate with a mediator who was well known to be in communication with these officials, e.g. in the case of the Railway Settlement of 1907.

Apart, however, from the disinclination of one or both parties to allow of any outside intervention, we have to consider how far the nature of the questions in dispute may in any particular case put limits to the applicability of conciliation or arbitration as a method of settlement. Since conciliation is only a general term for the action of a third party in overcoming the obstacles to the conclusion of an agreement by the parties themselves, there is no class of questions which admit of settlement by direct negotiation which may not equally be settled by this method,

provided of course that there is an adequate supply of sufficiently skilful mediators. As regards arbitration the case is somewhat different, seeing that in this case the parties agree to be bound by the ! award of a third party. For the success

of arbitration, therefore, it is important that the general principles which should govern the settlement of the particular question at issue should be admitted by both sides. Thus in the manu- factured iron trade in the north of England, it has throughout been understood that wages should depend on the prices realized, and the only question which an arbitrator has usually had to decide has been how far the state of prices at the time warranted a particular change of wage. On the other hand, there are many questions on which disputes arise (e.g. the employment of non- union labour, the restriction of piece-work, &c.) on which there is frequently no common agreement as to principles, and an arbitrator may be at a loss to know what considerations he is to take into account in determining his award. Generally speak- ing, employers are averse from submitting to a third party ques- tions involving discipline and the management of their business, while in some trades workmen have shown themselves opposed to allowing an arbitrator to reduce wages beyond a certain point which they wish to regard as a guaranteed " minimum."

Another objection on the part of some employers and work- men to unrestricted arbitration is its alleged tendency to multiply disputes by providing an easy way of solving them without recourse to strikes or lock-outs, and so diminishing the sense of responsibility in the party advancing the claims. It is also sometimes contended that arbitrators, not being governed in their decisions by a definite code of principles, may tend to " split the difference," so as to satisfy both sides even when the demands on one side or the other are wholly unwarranted. This, it is said, encourages the formulation of demands purposely put high in order to admit of being cut down by an arbitrator. One of the chief practical difficulties in the way of the success- ful working of permanent boards of conciliation, consisting of equal numbers of employers and employed, with an umpire in case of deadlock, is the difficulty of inducing business men whose time is fully occupied to devote the necessary time to the work of the boards, especially when either side has it in its power to compel recourse to the umpire, and so render the work of the conciliation board fruitless. In spite of all these difficulties the practice of arranging differences by conciliation and arbitra- tion is undoubtedly spreading, and it is to be remembered that even in cases in which theoretically a basis for arbitration can scarcely be said to exist,

recourse to that method may often serve a useful purpose in putting an end to a deadlock of which both parties are tired, though neither cares to own itself beaten.

New Zealand. — The New Zealand Industrial Conciliation and Arbitration Act 1894 is important as the first practical attempt of any importance to enforce compulsory arbitration in trade disputes. The original act was amended by several subsequent measures, and the law has been more than once consolidated. The law provides for the incorporation of associa- tions of employers or workmen under the title of industrial unions, and for the creation in each district of a joint conciliation board, elected by these industrial unions, with an impartial chairman elected by the board, to which a dispute may be re- ferred by any party, a strike or lock-out being thenceforth illegal. If the recommendation of the conciliation board is not accepted by either party, the matter goes to a court of arbitration con- sisting of two persons representing employers and workmen respectively, and a judge of the supreme court. Up to 1901 disputes were ordinarily required to go first to a board of con- ciliation except by agreement of the parties, but now either party may carry a dispute direct to the arbitration court. The amendment was adopted because it was found in practice that the great majority of cases went ultimately to the arbitra- tion court, and conciliation board proceedings were often mere waste of time. The award of the court is enforceable by legal process, financial penalties up to £500 being recoverable from defaulting associations or individuals. If the property of an association is insufficient to pay the penalty, its members are individually liable up to £10 each. It is the duty of factory inspectors to see that awards are obeyed. The law provides for

the extension of awards to related trades, to employers entering the industry hereafter, and in some cases to a whole industry.

The above is only an outline of the principal provisions of this law, under which questions of wages, hours and the relations of employers and workmen generally in New Zealand (q.v.) in- dustries became practically the subject of state regulation. The act must more properly be judged as a measure for the state regulation of industry, but as a method of putting an end to labour disputes its success has only been partial.

Australia. — The laws which are practically operative in Aus- tralia with respect to arbitration and conciliation are all based with modifications on the New Zealand system. The first com- pulsory arbitration act passed in Australia was the New South Wales Act of 1901. The principal points of difference between this and the New Zealand act are that the conciliation procedure is entirely omitted, the New South Wales measure being purely an arbitration act. The arbitration court has greater power over

unorganized trades than in New Zealand, and the scope of its awards is greatly enlarged by its power to declare any condition of labour to be common rule of an industry, and thus binding on all existing and future employers and work-people in that industry. In Western Australia laws were passed in 1900 and 1902 which practically adopted the New Zealand legislation with certain modifications in detail.

In 1904 the commonwealth of Australia passed a compulsory arbitration law based mainly on those in force in New Zealand and New South Wales, and applicable to disputes affecting more than one Australian state. The arbitration court is empowered to require any dispute within its cognizance to be referred to it by the state authority proposing to deal with it. There are other Australian laws which, though unrepealed (e.g. the South Australian Act of 1894), are a dead-letter. Generally speaking, the Australasian laws on arbitration and conciliation are more stringent and far-reaching than any others in the world.

Canada. — In 1900 a conciliation act was passed by the Domin- ion parliament resembling the United Kingdom act in most of its features, and in 1903 the Canadian Railway Labour Disputes Act made special provision for the reference, of railway disputes to a conciliation board and (failing settlement) to a court of arbitration.

This act was consolidated with the Conciliation Act 1900 during 1906 in an act respecting conciliation and labour, and in March 1907 the Industrial Disputes Investigation Act became law by which machinery is set up for the constitution of a board, on the application of either side to a dispute in mines and industries connected with public utilities, whenever a strike involving more than ten employees is threatened. The pro- visions of the act may be extended to other industries and rail- way companies, and their employees may take action under either the Conciliation and Labour Act or the Industrial Dis- putes Investigation Act. Under the Investigation Act it is unlawful for any employer to cause a lock-out, or for an em- ployee to go on strike on account of any dispute prior to or dur- ing a reference of such dispute to a board constituted under the act, or prior to or during a reference under the provisions con- cerning railway disputes under the Conciliation and Labour Act. There is nothing, however, in the act to prevent a strike or lock-out taking place after the dispute has been investigated.

France. — The French Conciliation and Arbitration Law of December 1892 provides that either party to a labour dispute may apply to the juge de paix of the canton, who informs the other party of the application. If they concur within three days, a joint committee of conciliation is formed of not more than five representatives of each party, which meets in the presence of

the juge de paix, who, however, has no vote. If no agreement results the parties are invited to appoint arbitrators. If such arbitrators are appointed and cannot agree on an umpire, the president of the civil tribunal appoints an umpire. In the case of an actual strike, in the absence of an application from either party it is the duty of the juge de paix to invite the parties to proceed to conciliation or arbitration. The results of the action of the juge de paix and of the conciliation committee are placarded by the mayors of the communes affected. The law leaves the

parties entirely free to accept or reject the services of the juge de paix.

During the ten years 1897-1906 the act was put in force in 1809 cases — viz. 916 on application of workmen; 49 of employers; 40 of both sides; and 804 without application. Altogether 616 disputes were settled — 549 by conciliation and 67 by arbitration.

Germany. — In several continental European countries, courts or boards are established by law to settle cases arising out of existing labour contracts, — e.g. the French " Conseils de Prud'- hommes," the Italian " Probi-Viri," and the German "Gewer- begerichten," — and some of the questions which come before these bodies are such as might be dealt with in England by voluntary boards or joint committees. The majority, however, are disputes between individuals as to wages due, &c, which would be determined in the United Kingdom by a court of summary jurisdiction. It is noteworthy, however, that the German industrial courts (Gewerbegerichten) are empowered under certain conditions to offer their services to mediate between the parties to an ordinary labour dispute. The main law is that of 1890 which was amended in 1901. In the case of a strike or lock-out the court must intervene on application of both parties, and may do so of its own initiative or on the invitation of one side. The conciliation board for this purpose consists under the amending law of 1901 of the president of the court and four or more representatives named by the parties in equal numbers but not concerned in the dispute. Failing appointment by the parties the president appoints them. Fail- ing a settlement at a conference between the parties in the presence of the president and assessors of the court, the court arrives at a decision on the merits of the dispute which is com- municated to the parties, who are allowed a certain time within which to notify their acceptance or rejection. The court has no power to compel the observance of its decision, but in certain cases it may fine a witness for non-attendance. In the first five years after the passage of the amending law of 1901 (viz. 1902-1906)

there were 1139 applications for the intervention of the industrial courts: 492 agreements were brought about and 107 decisions were pronounced by the courts, of which 64 were accepted by both parties. ˆ

Switzerland. — The canton of Geneva enacted a law in 1900 providing for the settlement by negotiation, conciliation or arbitration of the general terms of employment in a trade, subject, however, to special arrangements between employers and workmen in particular cases. The negotiations take place between delegates chosen by the associations of employers and employed, or failing them, by meetings summoned by the council of state on sufficient applications. Failing settlement, the council of state, on application from either party, is to appoint one or more conciliators from its members, and if this fail the central committee of the Prud'kommes, together with the delegates of employers and workmen, is to form a board of arbitration, whose decision is binding. Any collective sus- pension of work is illegal during the period covered by the award or agreement. Up to the end of 1904 only seven cases occurred of application of the law to industrial differences. In Basel (town) a law providing for voluntary conciliation by means of boards of employers and workmen with an independent chairman appointed ad hoc by the council of state of the canton, has been in force since 1897, but it remained practically unused until 1902. In the period from January 1902 to May 1905, 18 disputes were dealt with and 10 settled under this law. A similar law was adopted in St Gall in 1902. In the three years 1902-1904, 10 disputes were dealt with and 3 settled.

Sweden. — By a law which came into force on the 1st of January 1907, Sweden was divided into seven districts and in each district a conciliator was appointed by the crown. The conciliator must reside within his district and his principal duty is to promote the settlement of disputes between employers and work-people or between members of either class among themselves. He is also on request to advise and otherwise assist employers and work- people in framing agreements affecting the conditions of labour

if and so far as agreements are designed to promote good relations between the two classes and to obviate stoppages of work.

United States. — In the United States several states have legislated on the subject of conciliation and arbitration, among the first of such acts being the " Wallace " Act of 1883, in Pennsylvania, which, however, was almost inoperative. Al- together, 24 states have made constitutional or statutory pro- vision for mediation in trade disputes, of which 17 contemplate the formation of permanent state boards. The only state laws which require notice are those of Massachusetts and New York providing for the formation of state boards of arbitration. The Massachusetts board, founded

in 1886, consists of one employer, one employed and one independent person chosen by both. The New York board (1886) consists of two representatives of different political parties, and one member of a. bona fide trade organiza- tion within the state. In both states it is the duty of the board, with or without application from the parties, to proceed to the spot where a labour dispute has occurred, and to endeavour to promote a settlement. The parties may decline its services, but the board is empowered to issue a report, and on application from either side to hold an inquiry and publish its decision, which (in Massachusetts) is binding for six months, unless sixty days' notice to the contrary is given by one side to the other. Several states, including Massachusetts and New York, provide not only for state boards, but also for local boards.

In Massachusetts, during 1906, the state board dealt with 1 58 disputes. Of these the board was appealed to as arbitrator in 95 cases. Awards were rendered in 80 cases, 12 cases were withdrawn and 3 cases were still pending at the end of the year. In New York the number of cases dealt with is much smaller.

Federal legislation can only touch the question of arbitration and conciliation so far as regards disputes affecting commerce between different states. Thus an act of June 1898 provides that in a dispute involving serious interruption of business on railways engaged in inter-state commerce, the chairman of the Inter-State Commerce Commission and the commissioner of labour shall, on application of either party, endeavour to effect a settlement, or to induce the parties to submit the dispute to arbitration. While an arbitration under the act is pending a strike or lock-out is unlawful.

Authorities. — For the recent development of arbitration and conciliation in the United Kingdom, see the Annual Reports of the Labour Department of the Board of Trade on Strikes and Lock-outs from 1888 onwards. Since 1890 these reports have contained special appendices on the work of arbitration boards. See also the Labour Gazette (the monthly journal of the Labour Department) from 1893 onward, and the Report on Rules of Voluntary Conciliation and Arbitration Boards and Joint Committees. The Reports of the Royal Commission on Labour (1 891-1894) contain much valuable informa- tion on the subject. For the working of the Conciliation Act see the Reports of the Board of Trade on their proceedings under the Conciliation Act 1896. For the earlier history in the United King- dom: Crompton, Industrial Conciliation (1876); Price, Industrial Peace (1887). For foreign and colonial developments: the third Abstract of Foreign Labour Statistics (1906), issued by the Board of Trade; Report on Government Industrial Arbitration, by L. W. Hatch (Bulletin of Bureau of Labour of United States Department of Commerce and Labour, September 1905); the

report of the French Office du Travail, De la conciliation et de Varbitrage dans les conftits collectifs entre patrons et ouvriers en France et a I'etranger (1893); the Annual Reports of the same Department on Strikes, Lock- outs and Arbitration; the Reports of the Massachusetts and New York State Arbitration Boards, and of the New Zealand Depart- ment of Labour; and the Labour Gazette. See also the following general works: N. P. Gilman, Methods of Industrial Peace (Boston, 1904) ; A. C. Pigou, Principles and Methods of Industrial Peace (1905)- (X.)

ARBOGAST (d. 394), a barbarian officer in the Roman army, at the end of the 4th century. His nationality is uncertain, but Zosimus, Eunapius and Sulpicius Alexander (a Gallo- Roman historian quoted by Gregory of Tours) all refer to him as a Frank. Having served with distinction against the Goths in Thrace, he was sent by Theodosius in 388 against Maximus, who had usurped the empire of the west and had murdered Gratian. His complete success, which resulted in the destruction of Maximus and his sons and the pacification of Gaul, led Theodosius to appoint him chief minister for his young brother-in-law

Valentinian II. His rule was most energetic; but while he favoured the barbarians in the imperial service, and appointed them to high office, Valentinian, openly jealous of his minister, sought to surround himself with Romans. As an offset to this, Arbogast allied himself with the pagan element in Rome, while Valentinian was strictly orthodox. In 392 Valentinian was secretly put to death at Vienne (in Gaul), and Arbogast, naming as his successor Eugenius, a rhetorician, descended into Italy to meet the expedition which Theodosius was heading against him. He proclaimed himself the champion of the old Roman gods, and as a response to the appeal of Ambrose, is said to have threatened to stable his horses in the cathedral of Milan, and to force the monks to fight in his army. His defeat in the hard- fought battle of the Frigidus saved Italy from these dangers. Theodosius, after a two days' fight, gained the victory by the treachery of one of Arbogast's generals, sent to cut off his retreat. Eugenius was captured and executed, but Arbogast escaped to the mountains, where however he slew himself three days afterwards (8th of September 394). Although we have only most distorted narratives upon which to rely — pagan eulogy and Christian denunciation — Arbogast appears to have been one of the greatest soldiers of the later empire, and a statesman of no mean rank. His energy, and his apparent disdain for the effete civilization which he protected, but which did not affect his character, make his personality one of the most interesting of the 4th century.

See T. Hodgkin, Italy and her Invaders (1880), vol. i. chap. ii.

ARBOIS, a town of eastern France, in the department of Jura, on the Cuisance, 29 m. N.N.E. of Lons-le-Saunier by rail. Pop. (1906) 3454. The town is the seat of the tribunal of first instance of the arrondissement of Poligny, and has a communal college. The church of St Just, founded in the 10th century, .has good wood-carving. An Ursuline convent, built in 1764, serves as hotel de ville and law court, and a church of the 14th century is used as a market. There is an old chateau of the dukes of Burgundy. Arbois is well known for its red and white wines, and has saw-mills, tanneries and market gardens, and manufactures paper, oil and casks.

ARBOIS DE JUBAINVILLE, MARIE HENRI D' (1827-1910), French historian and philologist, was born at Nancy on the 5th of December 1827. In 1851 he left the Ecole des Chartes with the degree of palaeographic archivist. He was placed in control of the departmental archives of Aube, and remained in that position until 1880, when he retired on a pension. He pub- lished several volumes of inventorial abstracts, a Repertoire archeologique du departement in 1861; a valuable Histoire des dues et comics de Champagne depuis le VI" siecle- jusqu'a la fin du XI', which was published between 1859 and 1869 (8 vols.), and in 1880 an instructive monograph upon Les Inlendants de Champagne. But already he had become attracted towards the study of the most ancient inhabitants of Gaul; in 1870 he brought out an Elude sur la diclinaison des noms propres dans la langue franque a I'epoque merovingienne; and in 1877 a learned work upon Les Premiers Habitants de I'Europe (2nd edition in 2 vols. 1889 and 1894). Next he con- centrated his efforts upon the field of Celtic languages, literature and law, in which he soon became an authority. Appointed in 1882 to the newly founded professorial chair of Celtic at the College de France, he began the Cours de litterature celtique which in 1908 extended to twelve volumes. For this he himself edited the following works: Introduction a l' etude de la litterature celtique (1883); L' Epopee celtique en Irlande (1892); Etudes sur le droit celtique (1895); ar >d Les Principaux Auteurs de I'antiquite a consulter sur I'histoire des Celtes (1902). He was among the first in France to enter upon the study of the most ancient monuments of Irish literature with a solid philological preparation and without empty prejudices. We owe to him also Les Celtes depuis les temps les plus recules jusqu'a I' an 100 avant noire ere (1904), and a study of comparative law in La Famille celtique (1905). Numerous detailed studies upon the Gaulish names of persons and places took synthetic form in the Recherches sur Vorigine de la proprUU foncicre (1890), which

illumined one of the most interesting aspects of the Roman occupation of Gaul. The Recueil de mimoires concernant la litterature et I'histoire

celtiques, made by the most notable among his disciples on the occasion of his seventy-eighth birth- day (1906), was a well-deserved tribute to his persevering and fruitful industry. He died in February 1910. (C. B.)*

ARBOR DAY, the name applied in the United States of America to a day appointed for the public planting of trees (see Arbour). Originating, or at least being first successfully put into operation, in Nebraska in 1872 through the instrument- ality of J. Sterling Morton, then president of the state Board of Agriculture, it received the official sanction of the state by the proclamation of Governor R. W. Furnas in 1874 and by the enactment in 1885 of a law establishing it as a legal holiday in Nebraska. The movement spread rapidly throughout the United States until with hardly an exception every state and territory celebrates such a day either as a legal or a school holiday. The time of celebration varies in different states — sometimes even in different localities in the same state — but April or early May is the rule in the northern states, and February, January and December are the months in various southern states. A like practice has been introduced in New Zealand.

See N. H. Egleston, Arbor Day: Its History and Observance (Washington, 1896), Robert W. Furnas, Arbor Day (Lincoln, Neb., 1888), and R. H. Schaufner (ed.), Arbor Day (New York, 1909).

ARBORETUM, the name given to that part of a garden or park which is reserved for the growth and display of trees. The term, in this reitricted sense, was seemingly first so employed in 1838 by J. C. Loudon, in his book upon arboreta and fruit trees. Professor Bayley Balfour, F.R.S., the Regius Keeper of the Royal Botanic Garden in Edinburgh, has described an arboretum as a living collection of species and varieties of trees and shrubs arranged after some definite method — it may be properties, or uses, or some other principle — but usually after that of natural likeness. The plants are intended to be specimens showing the habit of the tree or shrub, and the collection is essentially an educational one. According to another point of view, an arboretum should be constructed with regard to picturesque beauty rather than systematically, although it is admitted that for scientific purposes a systematic arrangement is a sine qua non. In this more general respect, an arboretum or woodland affords shelter, improves local climate, renovates bad soils, conceals objects unpleasing to the eye, heightens the effect of what is agreeable and graceful, and adds value, artistic and other, to the landscape. What Loudon called the " gardenesque " school of landscape naturally makes particular use of trees. By common consent the arboretum in the Royal Botanical Gardens at Kew is one of the finest in the world. Its beginnings may be traced back to 1762, when, at the suggestion of Lord Bute, the duke of Argyll's trees and shrubs were removed from Whitton Place, near Hounslow, to adorn the princess of Wales's

garden at Kew. The duke's collection was famous for its cedars, pines and firs. Most of the trees of that date have perished, but the survivors embrace some of the finest of their kind in the gardens. The botanical gardens at Kew were thrown open to the public in 1841 under the directorate of Sir W'illiam Hooker. Including the arboretum, their total area did not then exceed n acres. Four years later the pleasure grounds and gardens at Kew occupied by the king of Hanover were given to the nation and placed under the care of Sir William for the express purpose of being converted into an arboretum. Hooker rose to the occasion and, zealously reinforced by his son and successor, Sir Joseph, established a collection which rapidly grew in richness and importance. It is perhaps the largest collection of hardy trees and shrubs known, comprising some 4500 species and botanical varieties. A large proportion of the total acreage (288) of the Gardens is monopolized by the arboretum. Of the more specialized public arboreta in the United Kingdom the next to Kew are those in the Royal Botanic Garden in Edinburgh and the Glasnevin Garden in Dublin. The collection of trees in the Botanic Garden at Cam- bridge is also one of respectable proportions. There is a small but very select collection of trees at Oxford, the oldest botanical

garden in Great Britain, which was founded in 1632. In the United States the Arnold Arboretum at Boston ranks with Kew for size and completeness. It takes its name from its donor, the friend of Emerson. It was originally a well-timbered park, which, by later additions, now covers 222 acres. Practically, it forms part of the park system so characteristic of the city, being situated only 4 m. from the centre of population. There is a fine arboretum in the botanical gardens at Ottawa, in Canada (65 acres). On the continent of Europe the classic example is still the Jardin des Planles in Paris, where, however, system lends more of formality than of beauty to the general effect. The collection of trees and shrubs at Schonbrunn, near Vienna, is an extensive one. At Dahlem near Berlin the new Kgl. Neuer Bolanischer Garten has been laid out with a view to the accom- modation of a very large collection of hardy trees and shrubs. There are now many large collections of hardy trees and shrubs in private parks and gardens throughout the British Islands, the interest taken in them by their proprietors having largely increased in recent years. Rich men collect trees, as they do paintings or books. They spare neither pains nor money in acquiring specimens, even from distant lands, to which they often send out expert collectors at their own expense. This, too, the Royal Horticultural Society was once, wont to-do, with valuable results, as in the case of David Douglas's remarkable expedition to North America in 1823-1824. It will be

remembered that when the laird of Dumbiedikes lay dying (Scott's Heart of Midlothian, chap, viii.) he gave his son one bit of advice which Bacon himself could not have bettered. " Jock," said the old reprobate, " when ye hae naething else to do; ye may be aye sticking in a tree; it will be growing, Jock, when ye're sleeping." Sir Walter assures us that a Scots earl took this maxim so seriously to heart that he planted a large tract of country with trees, a practice which in these days is promoted by the English and Royal Scottish Arboricultural Societies.

ARBORICULTURE (Lat. arbor, a tree), the science and art of tree-cultivation. The culture of those plants which supply the food of man or nourish the domestic animals must have exclusively occupied his attention for many ages; whilst the timber employed in houses, ships and machines, or for fuel, was found in the native woods. Hence, though the culture of fruit- trees, and occasionally of ornamental trees and shrubs, was practised by the Egyptians, Greeks and Romans, the cultivation of timber-trees on a large scale only took place in modern times. In the days of Charlemagne, the greater part of France and Germany was covered with immense forests; and one of the benefits conferred on France by that prince was the rooting up of portions of these forests throughout the country, and substituting orchards or vineyards. Artificial plantations appear to have been formed in Germany sooner than in any other country, apparently as early as the 15th century. In Britain planting was begun, though sparingly, a century later. After the extensive transfers of property on the seizure of the church lands by Henry VIII., much timber was sold by the new owners, and the quantity thus thrown into the market so lowered its price, as Hollingshed informs us, that the builders of cottages, who had formerly employed willow and other cheap and common woods, now built them of the best oak. The demand for timber constantly increased, and the need of an extended surface of arable land arising at the same time, the natural forests became greatly circumscribed, till at last timber began to be imported, and the proprietors of land to think, first of protecting their native woods, afterwards of enclosing waste ground and allowing it to become covered with self-sown seedlings, and ultimately of sowing acorns and mast in such enclosures, or of filling them with young plants collected in the woods — a practice which exists in Sussex and other parts of England even now. Planting, however, was not general in England till the beginning of the 17th century, when the introduction of trees was facilitated by the interchange of plants by means of botanic gardens, which, in that century, were first established in different countries. Evelyn's Sylva, the first edition of which appeared in 1664, rendered an extremely im- portant service to arboriculture; and there is no doubt that the

ornamental plantations in which England surpasses all other countries are in some measure the result of his enthusiasm. In consequence of a scarcity

of timber for naval purposes, and the increased expense during the Napoleonic war of obtaining foreign supplies, planting received a great stimulus in Britain in the early part of the 19th century. After the peace of 181 5 the rage for planting with a view to profit subsided; but there was a grow- ing taste for the introduction of trees and shrubs from foreign countries, and for their cultivation for ornament and use. The profusion of trees and shrubs planted around suburban villas and country mansions, as well as in town squares and public parks, shows how much arboriculture is an object of pleasure to the people. While isolated trees and old hedgerows are disappearing before steam cultivation, the advantages of shelter from well- arranged plantations are more fully appreciated; and more attention is paid to the principles of forest conservancy both at home and abroad. In all thickly peopled countries the forests have long ceased to supply the necessities of the inhabitants by natural reproduction; and it has become needful to form plantations either by government or by private enterprise, for the growth of timber, and in some cases for climatic amelioration. This subject is, however, dealt with more fully under Forests and Forestry (q.v.); and the separate articles on the various sorts of tree may be consulted for details as to each.

ARBOR VITAE (Tree of Life), a name given by Clusius to species of Thuja. The name Thuja, which was adopted by Linnaeus from the Thuya of Tournefort, seems to be derived from the Greek word 6vos, signifying sacrifice, probably because the resin procured from the plant was used as incense. The plants belong to the natural order Coniferae, tribe Cupressineae (Cypresses). Thuja occidentalis is the Western or American arbor vitae, the Cupressus Arbor Vilae of old authors. It is a native of North America, and ranges from Canada to the moun- tains of Virginia and Carolina. It is a moderate-sized tree, and was introduced into Britain before 1597, when it was mentioned in Gerard's Herbal. In its native country it attains a height of about 50 ft. The leaves are small and imbricate, and are borne on flattened branches, which are apt to be mistaken for the leaves. When bruised the leaves give out an aromatic odour. The flowers appear early in spring, and the fruit is ripened about the end of September. In Britain the plant is a hardy evergreen, and can only be looked upon as a large shrub or low tree. It is often cut so as to form hedges in gardens. The wood is very durable and useful for outdoor work, such as fencing, posts, etc. Another species of arbor vitae is Thuja orientalis, known also as Biota orientalis. The latter generic name is derived from the Greek adjective ftiooros, formed from /3£os, life, probably in connexion with the name " tree of life." This is the Eastern or Chinese arbor vitae. It is a native of China. It was cultivated in the Chelsea Physick Garden in 1752, and was believed to have been sent to Europe by French missionaries. It has roundish cones, with numerous scales and

wingless seeds. The leaves, which have a pungent aromatic odour, are said to yield a yellow dye. There are numerous varieties of this plant in cultivation, one of the most remarkable of which is the variety pendula, with long, flexible, hanging, cord-like branches; it was discovered in Japan about 1776 by Carl Peter Thunberg, a pupil of Linnaeus, who made valuable collections at the Cape of Good Hope, in the Dutch East Indies and in Japan. The variety pygmaea forms a small bush a few inches high.

Thuja gigantea, the red or canoe cedar, a native of north-western America from southern Alaska to north California, is the finest species, the trunk rising from a massive base to the height of 1 50 to 200 ft. It was not introduced to Britain till 1853. It is one of the handsomest of conifers, forming an elongated cone of foliage, which in some gardens has already reached 70 or 80 ft. in height. It thrives in most kinds of soils. The timber is easily worked and used for construction, especially where exposed to the weather.

ARBOS, FERNANDEZ (1863-), Spanish violinist and composer, was born in Madrid, and trained at the conservatoire there, and later at Brussels and at Berlin under Joachim. He became a professor at Hamburg and then at Madrid, becoming

famous meanwhile as one of the finest violinists of the day; and after visiting England in 1890 and establishing his reputation there, he became professor at the Royal College of Music in London. As a composer he is best known by his violin pieces, and by a comic opera, El Ccnlro de la Ticrra (1895).

ARBOUR, or Arbor (originally ” herber ” or ” erber,” O. Fr. herbicr, from Lat. herbarium, a collection of herbs, herba, grass; the word came to be spelt ” arber ” through its pronuncia- tion, as in the case of Derby, and by the 16th century was written ” arbour,” helped by a confusion of derivation from Lat. arbor, a tree, and by change of meaning), a grass-plot or lawn, a herb-garden, or orchard, and a shady bower of interlaced trees, or climbing plants trained on lattice-work. The application of the word has shifted from the grass-covered ground, the proper meaning, to the covering of trees overhead. ” Arbor ” (from the Latin for ” tree “) is a term applied to the spindle of a wheel, particularly in clock-making.

ARBROATH, or Aberbrothock, a royal, municipal and police burgh, and seaport of Forfarshire, Scotland. It is situated at the mouth of Brothock

water, 17 m. N.E. of Dundee by the North British railway, which has a branch to Forfar, via Guthrie, on the Caledonian railway. Pop. (1891) 22, 821; (1901) 22,398. The town is under the jurisdiction of a provost, bailies and council, and, with Brechin, Forfar, Inverbervie and Montrose, returns one member to parliament. The leading industries include the manufacture of sailcloth, canvas and coarse linens, tanning, boot and shoe making, and bleaching, besides engineer- ing works, iron foundries, chemical works, shipbuilding and fisheries. The harbour, originally constructed and maintained by the abbots, by an agreement between the burgesses and John Gedy, the abbot in 1394, was replaced by one more com- modious in 1725, which in turn was enlarged and improved in 1844. The older portion was converted into a wet dock in 1877, and the entrance and bar of the new harbour were deepened. A signal tower, 50 ft. high, communicates with the Bell Rock (q.v.) lighthouse on the Inchcape Rock, 12 m. south-east of Arbroath, celebrated in Southey's ballad. The principal public buildings are the town-hall, a somewhat ornate market house, the gildhall, the public hall, the infirmary, the antiquarian museum (including some Valuable fossil remains) and the public and mechanics' libraries. The parish church dates from 1570, but has been much altered, and the spire was added in 1831. The ruins of a mag- nificent abbey, once one of the richest foundations in Scotland, stand in High Street. It was founded by William the Lion in 1 1 78 for Tironesian Benedictines from Kelso, and consecrated in 1197, being dedicated to St Thomas Becket, whom the king had met at the English court. It was William's only personal foundation, and he was buried within its precincts in 1214. Its style was mainly Early English, the western gable Norman. The cruciform church measured 276 ft. long by 160 ft. wide, and was a structure of singular beauty and splendour. The remains include the vestry, the southern transept (the famous rose window of which is still entire), part of the chancel, the southern wall of the nave, part of the entrance towers and the western doorway. It was here that the parliament met which on the 6th of April 1320 addressed to the pope the notable letter, asserting the independence of their country and reciting in eloquent terms the services which their " lord and sovereign " Robert Bruce had rendered to Scotland. The last of the abbots was Cardinal Beaton, who succeeded his uncle James when the latter became archbishop of St Andrews. At the Reformation the abbey was dismantled and afterwards allowed to go to ruin. Part of the secular buildings still stand, and the abbot's house, or Abbey House as it is now called, is inhabited. Arbroath was created a royal burgh in 11 86, and its charter of 1599 is preserved. King John exempted it from " toll and custom" in every part of England excepting London. Arbroath is " Fairport " of Scott's A ntiquary, and Auchmithie, 3 m. north-east ('" Musselcrag " of the same romance), is a quaint old-fashioned place, where the men earn a precarious living by fishing. On each side of the village the coast scenery is

remarkably picturesque, the rugged cliffs — reaching in the promontory of Red Head, the scene of a thrilling

incident in the Antiquary, a height of 267 ft. — containing many curiously shaped caves and archways which attract large numbers of visitors. At the 14th-century church of St Vigeans, 1 m. north of Arbroath, stands one of the most interesting of the sculptured stones of Scotland, with what is thought to be the only legible inscription in the Pictish tongue. The parish— originally called Aberbrothock and now incorporated with Arbroath for administrative purposes — takes its name from a saint or hermit whose chapel was situated at Grange of Conon, 35 m. north-west. Two miles west by south are the quarries of Carmyllie, the ter- minus of a branch line from Arbroath, which was the first light railway in Scotland and was opened in 1900.

ARBUTHNOT, ALEXANDER (1538-1583), Scottish ecclesiastic and poet, educated at St Andrews and Bourges, was in 1569 elected principal of King's College, Aberdeen, which office he retained until his death. He played an active part in the stirring church politics of the period, and was twice moderator of the kirk, and a member of the commission of inquiry into the condition of the university of St Andrews (1583). The " correctness " of his attitude on all public questions won for him the commendation of Catholic writers; he is not included in Nicol Burne's list of " periurit apostatis "; but his policy and influence were misliked by James VI. , who, when the Assembly had elected Arbuthnot to the charge of the church of St Andrews, ordered him to return to his duties at King's College. He had been for some time minister of Arbuthnott in Kincardineshire. His extant works are (a) three poems, " The Praises of Wemen " (224 lines), "On Luve" (iodines), and "The Miseries of a Pure Scholar" (189 lines), and (b) a Latin account of the Arbuthnot family, Originis et Incrementi Arbuthnoticae Familiae Descriptio Historica (still in MS.), of which an English continuation, by the father of Dr John Arbuthnot, is preserved in the Advocates' Library, Edinburgh. The praise of the fair sex in the first poem is exceptional in the literature of his age; and its geniality may help us to understand the author's popularity with his contemporaries. Arbuthnot must not be confused with his con- temporary and namesake, the Edinburgh printer, who produced the first edition of Buchanan's History of Scotland in 1582. Some have discovered in the publication of this work a false clue to James's resentment against the principal of King's College.

The particulars of Arbuthnot's life are found in Calderwood, Spottiswood, and other Church historians, and in Scott's Fasti Ecclesiae Scoticanae. The poems are printed in Pinkerton's Ancient Scottish Poems (1786), i. pp. 138-155.

ARBUTHNOT, JOHN (1667-1735), British physician and author, was born at Arbuthnott, Kincardineshire, and baptized on the 29th of April 1667. His father, Alexander Arbuthnot, was an episcopalian minister who was deprived of his living in 1689 by his patron, Viscount Arbuthnott, for refusing to con- form to the Presbyterian system. After his death, in 1691, John went to London, where he lived in the house of a learned linen-draper, William Pate, and supported himself by teaching mathematics. In 1692 he published Of the Laws of Chance . . . , based on the Latin version, De Ratociniis in ludo aleae, of a Dutch treatise by Christiaan Huygens. In 1692 he entered University College, Oxford, as a fellow-commoner, acting as private tutor to Edward Jefferys; and in 1696 he graduated M.D. at St Andrews university. In An Examination of Dr Woodward's Account of the Deluge (1697) he confuted an extraordinary theory advanced by Dr William Woodward. An Essay on the Usefulness of Mathematical Learning followed in 1701, and in 1704 he became a fellow of the Royal Society. He had the good fortune to be called in at Epsom to prescribe for Prince George of Denmark, and in 1705 he was made physician extraordinary to Queen Anne. Four years later he became royal physician in ordinary, and in 171c he was elected fellow of the Royal College of Physicians. Arbuthnot's ready wit and varied learning made him very valuable to the Tory party. He was a close friend of Jonathan Swift and of Alexander Pope, and Lord Chesterfield says that even the generous acknowledgment they made of his assistance fell short of their real indebtedness. He had no jealousy of his fame as an author, and his abundant imagination was always

at the service of his friends. In 1712 appeared "Law is a Bottomless Pit, Exemplify'd in the case of the Lord Strutt, John Bull, Nicholas Frog and Lewis Baboon, who spent all they had in a law-suit. Printed from a Manuscript found in the Cabinet of the famous Sir Humphrey Polesworth." This was the first of a series of five pamphlets advocating the conclusion of peace. Arbuthnot describes the confusion after the death of the Lord Strutt (Charles II. of Spain) , and the quarrels between the greedy tradespeople (the allies). These put their cause into the hands of the attorney, Humphrey Hocus (the duke of Marl- borough), who does all he can to prolong the struggle. The five tracts are printed in two parts as the " History of John Bull " in the Miscellanies in Prose and Verse (1727, preface signed by Pope and Swift). Arbuthnot fixed the popular conception of John Bull, though it is not certain that he originated the character, and the lively satire is still amusing reading. It was often asserted at the time that Swift wrote these pamphlets, but both he and Pope refer to Arbuthnot as the sole author. In

the autumn of the same year he published a second satire, " Proposals for printing a very Curious Discourse in Two Volumes in Quarto, entitled, tyevdoXoyia HoKmnri; or, A Treatise of the Art of Political Lying," best known by its sub-title. This ironical piece of work was not so popular as " John Bull." " 'Tis very pretty," says Swift, " but not so obvious to be understood." Arbuthnot advises that a lie should not be contradicted by the truth, but by another judicious lie. " So there was not long ago a gentleman, who affirmed that the treaty with France for bringing popery and slavery into .England was signed the 15th of September, to which another answered very judiciously, not by opposing truth to his lie, that there was no such treaty; but that, to his certain knowledge, there were many things in that treaty not yet adjusted."

Arbuthnot was one of the leading spirits in the Scriblerus Club, the members of which were to collaborate in a universal satire on the abuses of learning. The Memoirs of the extraordinary Life, Works, and Discoveries of Martinus Scriblerus, of which only the first book was finished, first printed in Pope's Works (1741), was chiefly the work of Arbuthnot, who is at his best in the whimsical account of the birth and education of Martin. Swift, writing on the 3rd of July 1714 to Arbuthnot, says: — "To talk of Martin in any hands but yours, is a folly. You every day give better hints than all of us together could do in a twelve- month: and to say the truth, Pope who first thought of the hint has no genius at all to it, to my mind; Gay is too young: Parnell has some ideas of it, but is idle; I could put together, and lard, and strike out well enough, but all that relates to the sciences must be from you."

The death of Queen Anne put an end to Arbuthnot's position at court, but he still had an extensive practice, and in 1727 he delivered the Harveian oration before the Royal College of Physicians. Lord Chesterfield and William Pulteney were his patients and friends; also Mrs Howard (Lady Suffolk) and William Congreve. His friendship with Swift was constant and intimate; he was friend and adviser to Gay; and Pope wrote (2nd of August 1 734) that in a friendship of twenty years he had found no one reason of complaint from him. Arbuthnot's youngest son, who had just completed his education, died in December 1 73 1. He never quite recovered his former spirits and health after this shock. On the 17th of July 1734 he wrote to Pope: " A recovery in my case, and at my age, is impossible; the kindest wish of my friends is Euthanasia." In January 1735 was published the " Epistle to Dr Arbuthnot," which forms the prologue to Pope's satires. He died on the 27th of February 1735 at his house in Cork Street, London.

Among Arbuthnot's other works are: — An Argument for Divine Providence, taken from the constant regularity observed in the Births of both sexes (Phil. Trans, of the Royal Soc, 1710); " Virgilius Restauratus,"

printed in the second edition of Pope's Dunciad (172Q); A n Essay concerning the Effects of A ir on Human Bodies (1733); An Essay concerning the Nature of Ailments . . . (1731); and a valuable Table of Ancient Coins, Weights and Measures (1727), which is an enlargement of an earlier treatise

(1 705) . He had a share in the unsuccessful farce of Three Hours after Marriage, printed with Gay's name on the title-page (171 7). Some pieces printed in A Supplement to Dr Swift's and Mr Pope's Works . . . ,1739) are there asserted to be Arbuth- not's. The Miscellaneous Works of the late Dr Arbuthnot were published at Glasgow in an unauthorized edition in 1751. This includes many spurious pieces.

See The Life and Works of John Arbuthnot (1892), by George A. Aitken.

ARCACHON, a coast town of south-western France, in the department of Gironde, 37 m. W.S.W. of Bordeaux on the Southern railway. Pop. (1906) 9006. Arcachon is situated on the southern border of the lagoon of Arcachon at the foot of dunes covered with splendid pine-woods. It comprises two distinct parts, the summer town, extending for 2\ m. along the shore, and bordered by a firm sandy beach, frequented by bathers, and the winter town, farther inland, consisting of numerous villas scattered amongst the pines.

Owing to the mildness of its climate the winter town is a resort for consumptive patients. The principal industries are oyster-breeding, which is conducted on a very large scale, and fishing. The port has trade with Spain and England.

ARCADE, in architecture, a range of arches, supported either by columns or piers; isolated in the case of those separating the nave of a church from the aisles, or forming the front of a covered ambulatory, as in the cloisters in Italy and Sicily, round the Ducal Palace or the Square of St Mark's, Venice, round the courts of the palaces in Italy, or in Paris round the Palais-Royal and the Place des Vosges. The earliest examples known are those of the Tabularium, the theatre of Marcellus, and the Colosseum, in Rome. In the palace of Diocletian at Spalato the principal street had an arcade on either side, the arches of which rested direct on the capital without any intervening

Fig.

Fig. 2.-

-Arcade, St John's, Devizes.

1. — Arcade, Westminster Abbey.

entablature or impost block. The term is also applied to the galleries, employed decoratively, on the facades of the Italian churches, and carried round the apses where they are known as eaves-galleries. Sometimes these arcades project from the wall sufficiently to allow of a passage behind, and sometimes they are

From Rickman's Styles o] Architecture, by permission of Parker & Co.

Fig. 3. — Triforium at Beverley, built into and form part of the wall; in the latter case, they are known as blind or wall arcades; and they were constantly employed to decorate the lower part of the walls of the aisles and the choir-aisles in English churches. Externally, blind arcades are more often found in Italy and Sicily, but there are examples in

England at Canterbury, Ely, Peterborough, Norwich, St John's (Chester), Colchester and elsewhere. Internally, the oldest example is that of the~old refectory in Westminster Abbey (fig. 1). Sometimes the design is varied with interlacing arches as in St John's, Devizes (fig. 2), and Beverley Minster (fig. 3). In Sicily and the south of Italy these interlacing arcades are the special characteristic of the Saracenic work there found, and their origin may be found in the interlaced arches of the Mosque of Cordova in Spain. In the cathedral of Palermo and at Monreale they are carried round the apses at the east end. At Caserta- Vecchia, in South Italy, they decorate the lantern over the crossing, and at Amalfi the turrets on the north-west campanile.

The term is also applied to the covered passages which form thoroughfares from one street to another, as in the Burlington Arcade, London; in Paris such an arcade is usually called passage, and in Italy galleria. (R. P. S.)

ARCADELT, or Archadelt, JACOB (c. 1514-c. 1556), a Netherlands composer, of the early part of the Golden Age. In 1539 he left a position at Florence to teach the choristers of St Peter's, Rome, and became one of the papal singers in 1540. He was a prolific church composer, but the works published in his Italian time consist entirely of madrigals, five books of which, published at Venice, probably gave a great stimulus to the beginnings of the Venetian school of composition. In 1555 he left Italy and entered the service of Cardinal Charles of Lorraine, duke of Guise, and after this published three volumes of masses, besides contributing motets to

various collections. The Ave Maria, ascribed to him and transcribed as a pianoforte piece by Liszt, does not seem to be traced to an earlier source than its edition by Sir Henry Bishop, which has possibly the same kind of origin in Arcadelt as the hymn tune " Palestrina " has in the delicate and subtle Gloria of Palestrina's Magnificat Quinli Toni, the fifth in his first Book of Magnificats.

ARCADIA, a district of Greece, forming the central plateau of Peloponnesus. Shut off from the coast lands on all sides by mountain barriers, which rise in the northernpeaks of Erymanthus (mod. Olonos) to 7400, of Cyllene (Ziria) to 7900, in the southern corner buttresses of Parthenium and Lycaeum to more than 5000 ft., this inland plateau is again divided by numerous subsidiary ranges. In eastern or " locked " Arcadia these heights run in parallel courses intersected by cross-ridges, enclosing a series of upland plains whose waters have no egress save by underground channels or zerethra. The western country is more open, with isolated mountain-groups and winding valleys, where the Alpheus with its tributaries the Ladon and Erymanthus drains off in a complex river-system the overflow from all Arcadia. The ancient inhabitants were a nation of shepherds and huntsmen, worshipping Pan, Hermes and Artemis, primitive nature-deities. The difficulties of communication and especially the lack of a seaboard seriously hindered intercourse with the rest of Greece. Consequently the same population, whose origins Greek tradition removed back into the world's earliest days, heH the land throughout historic times, without even an admixture of Dorian immigrants. Their customs and dialect persisted, the latter maintaining a peculiar resemblance to that of the equally conservative Cypriotes. Thus Arcadia lagged behind the general development of Greece, and its political importance was small owing to chronic feuds between the townships (notably between Mantineia and Tegea) and the readiness of its youth for mercenary service abroad.

The importance of Arcadia in Greek history was due to its position between Sparta and the Isthmus. Unable to force their way through Argolis, the Lacedaemonians early set them- selves to secure the passage through the central plateau. The resistance of single cities, and the temporary union of the Arcadians during the second Messenian war, did not defer the complete subjugation of the land beyond the 6th century. In later times revolts were easily stirred up among individual cities, but a united national movement was rarely concerted. Most of these rebellions were easily quelled by Sparta, though in 469 and again in 420 the disaffected cities, backed by Argos, formed a dangerous coalition and came near to establishing their inde-

pendence. A more whole-hearted attempt at union in 371 after the battle of Leuctra resulted in the formation of a political league out of an old

religious synod, and the foundation of a federal capital in a commanding strategic position (see Megalo- polis). But a severe defeat at the hands of Sparta in 368 (the " tearless battle ") and the recrudescence of internal discord soon paralysed this movement. The new fortress of Megalopolis, instead of supplying a centre of national life, merely accentuated the mutual jealousy of the cities. During the Hellenistic age Megalopolis stood staunchly by Macedonia; the rest of Arcadia rebelled against Antipater (330, 323) and Antigonus Gonatas (266) . Similarly the various cities were divided in their allegiance between the Achaean and the Aetolian leagues, with the result that Arcadia became the battleground of these confederacies, or fell a prey to Sparta and Macedonia. These conflicts seem to have worn out the land, which already in Roman times had fallen into decay. An influx of Slavonic settlers in the 8th century a.d. checked the depopulation for a while, but Arcadia suffered severely from the constant quarrels of its Frankish barons (1205-1460). The succeeding centuries of Turkish rule, combined with an Albanian immigration, raised the prosperity of the land, but in the Wars of Independence the strategic importance of Arcadia once more made it a centre of conflict. In modern times the population remains sparse, and pending the complete restoration of the water conduits the soil is unpro- ductive. The modern department of Arcadia extends to the Gulf of Nauplia with a sea-coast of about 40 m.

Authorities.— Strabo pp. 388 sq. ; Pausanias viii. ; W. M. Leake, Travels in the Morea (London, 1830), chs. iii., iv., xi.-xviii., xxiii.-xxvi. ; E. Curtius, Peloponnesos (Gotha, 1851), i. 153-178; H. F. Tozer, Geography of Greece (London, 1873), pp. 287-292; E. A. Freeman, Federal Government (ed. 1893, London), ch. iv. § 3; B. V. Head, Historia Numorum (Oxford, 1887), pp. 372-373; B. Niese in Hermes (1899), pp. 520 f. (M. O. B. C.)

ARCADIUS (378-408), Roman emperor, the elder son of Theodosius the Great, was created Augustus in 383, and suc- ceeded his father in 395 along with his brother Honorius. The empire was divided between them, Honorius governing the two western prefectures (Gaul and Italy), Arcadius the two eastern (the Orient and Illyricum). Both were feeble, and, in Gibbon's phrase, slumbered on their thrones, leaving the government to others. Arcadius submitted at first to the guidance of the praetorian prefect Rufinus, and, after his murder (end of 395) by the troops, to the counsels of the eunuch Eutropius (executed end of 399). His consort Eudoxia (daughter of a Frank general, Bauto), a woman of strong will, exercised great influence over him; she died in 404. In the last year of his reign, Anthemius (praetorian prefect) was the chief adviser and support of the throne. The first years of the reign were marked by the rav- aging of the Greek peninsula by the West Goths under Alaric (q.v.) in 395-396. The movement of the Goth Gainas (who held the post of master of soldiers) in

399-400 is less famous but was more dangerous. At that time there were two rival political parties at Constantinople, the " Roman " party led by Aurelian (son of Taurus), praetorian prefect, and supported by the empress and a Germanizing and Arianizing party led by Aurelian's brother (possibly Caesarius, praetorian prefect in 400). Gainas entered into a close league with the latter; fomented a Gothic rebellion in Phrygia; and forced the emperor to put Eutropius to death. For some months he and the party which he supported were supreme in Constantinople. He was, however, finally forced to leave, and having plundered for some time in Thrace was captured and killed by the loyal Goth Fravitta. The Roman party recovered its power; Aurelian was again praetorian prefect in 402; and the Germanization which was to befall the western world was averted from the east. Another import- ant question was decided in this reign, the relation of the patriarch of Constantinople to the emperor. The struggle between the court and the patriarch John Chrysostom (q.v.), who assumed an independent attitude and gravely offended the empress by his sermons against the worldliness and frivolity of the court, with open allusions to herself, resulted in his fall and exile (404). This virtually determined the subordination of the patriarch

of Constantinople to the emperor. The rivalry of the see of Alexandria with Constantinople was also displayed in the con- test, Theophilus, patriarch of Alexandria, assisting the court in bringing about the fall of Chrysostom. Throughout the reign of Arcadius there was estrangement and jealousy between the two brothers or their governments. The principal ground of this hostility was probably dissatisfaction on both sides with the territorial partition. The line had been drawn east of Dalmatia. The ministers of Arcadius desired to annex Dalmatia to his portion, while the general Stilicho, who was supreme in the west, wished to wrest from the eastern realm the prefecture of Illyricum or a considerable part of it. His designs were un- successful, and during the reign of Theodosius II., son of Arcadius (who died in 408), Dalmatia was transferred to the dominion of the eastern ruler.

Authorities. — Ancient: Fragments of Eunapius and Olympio- dorus (in Miiller's Fragmenta Historicorum Graecorum, vol. iv.) ; fragments of Philostorgius, Socrates, Sozomen, Zosimus, Synesius of Cyrene (" The Egyptian "), Claudian. Modern: Gibbon's Decline and Fall, vol. iii., ed. Bury; J. B. Bury, Later Roman Empire, vol. i. (1889); T. Hodgkin, Italy and her Invaders, vol. i. (ed. 2, 1892); Giildenpenning, Geschichte des ostrbmischen Reiches unter den Kaisern Arcadius und Theodosius II.

(1885).

ARCADIUS, of Antioch, Greek grammarian, flourished in the 2nd century a.d. According to Suidas, he wrote treatises on orthography and syntax, and an onomaticon (vocabulary), described as a wonderful production. An epitome of the great work of Herodian on general prosody in twenty books, wrongly attributed to Arcadius, is probably the work of Theodosius of Alexandria or a grammarian named Aristodemus. This epitome (Ilept Tbvccv) only includes nineteen books of the original work; the twentieth is the work of a forger of the 16th century. Although meagre and carelessly put together, it is valuable, since it preserves the order of the original and thus affords a trustworthy foundation for its reconstruction.

Text by Barker, 1823; Schmidt, i860; see also Galland, De Arcadii qui fertur libro de accentibus (1882).

ARCELLA (C. G. Ehrenberg), a genus of lobose Rhizopoda, characterized by a chitinous plano-convex shell, the circular aperture central on the flat ventral face, and more than one nucleus and contractile vacuole. It can develop vacuoles, or rather fine bubbles of carbonic acid gas in its cytoplasm, to float up to the surface of the water.

ARCESILAUS (316-241 B.C.), a Greek philosopher and founder of the New, or Middle, Academy (see Academy, Greek). ‘ Born at Pitane in Aeolis, he was trained by Autolycus, the mathe- matician, and later at Athens by Theophrastus and Crantor, by whom he was led to join the Academy. He subsequently became intimate with Polemon and Crates, whom he succeeded as head of the school. Diogenes Laertius says that he died of excessive drinking, but the testimony of others (e.g. Cleanthes) and his own precepts discredit the story, and he is known to have been much respected by the Athenians. His doctrines, which must be gathered from the writings of others (Cicero, • Acad. i. 12, iv. 24; De Orat. iii. 18; Diogenes Laertius iv. 28; Sextus Empiricus, Adv. Math. vii. 150, Pyrrh. Hyp. i. 233), represent an attack on the Stoic

See R. Brodeisen, De Arcesila philosopho (1821); Aug. Geffers, De Arcesila (1842); Ritter and Preller, Hist, phiios. grace. (1898); Ed. Zeller, Phil. d. Griech. (iii. 1448); and general works under Scepticism.

ARCH, JOSEPH (1826-), English politician, founder of the National Agricultural Labourers’ Union, was born at Barford,

a village in Warwickshire, on the 10th of November 1826. His parents belonged to the labouring class. He inherited a strong sentiment of independence from his mother; and his objections to the social homage

expected by those whom the catechism boldly styled his " betters " made him an " agitator." Having educated himself by unremitting exertions, and acquired fluency of speech as a Methodist local preacher, he founded in 1872 the National Agricultural Labourers' Union, of which he was president. A rise then came in the wages of agricultural labourers, but this had the unforeseen effect of destroying the union; for the labourers, deeming their object gained, ceased to " agitate." Mr Arch nevertheless retained sufficient popularity to be re- turned to parliament for north-west Norfolk in 1885; and although defeated next year owing to his advocacy of Irish Home Rule, he regained his seat in 1892, and held it in 1895, retiring in 1900. He was deservedly respected in the House of Commons; seldom has an agitator been so little of a demagogue. A biography written by himself or under his direction, and edited by Lady Warwick (1898), tells the story of his career.

ARCH, 1 in building, a constructional arrangement of blocks of any hard material, so disposed on the lines of some curve that they give mutua' support one to the other.

The blocks, which are technically known as voussoirs, should be of a wedge shape, the_centre or top block (see fig. 1, A) being the keystone A; the lower blocks B B which rest on the support- ing pier are the springers, the upper surface of which is called the

skewback, C C; the side blocks, as D, are termed the haunches. The lower surface or soffit of the arch is the intrados, E, and the upper surface the extrados, F. The rise of the arch is the distance from the springing to the soffit, G, the width between the springers is called the span, H, and the radius I. The triangular spaces between the arches are termed spandrils, K.

The arch is employed for two purposes: — (1) to span an opening in a wall and support the superstructure; (2) when continuous to form a vault known as a barrel or waggon vault.

The arch has been used from time immemorial by every nation, but owing to the tendency of the upper portion to sink, especially when bearing any superincumbent weight, it requires strong lateral support, and it is for this reason that in the earliest examples in unburnt brick at Nippur in Chaldaea, c. 4000 B.C., and at Rakakna (Requaqna) and Dendera in Egypt, 3500-3000 B.C., it was employed only below the level of the ground which served as an abutment on either side.

In the building of an arch, the voussoirs have to be temporarily

1 The ultimate derivation of " arch " is the Latin arcus, a bow, or arch, in

origin meaning something bent, from. which through the French is also derived " arc," a curve. In French there are two words arche, one meaning a chest or coffer, from Latin area (arcere, to keep close), hence the English "ark"; the other meaning a vaulted arch, such as that of a bridge, and derived from a Low Latin corruption of arcus, into area (du Cange, Glossarium, s.v.). The word "arch," prefixed to names of offices, seen in " archbishop," " archdeacon," " archduke," &c, means " principal " or " chief," and comes from the Greek prefix apx- or 6-pxi- from apxav, to begin, lead, or rule; it is also prefixed to other words, and usually with words implying hatred or detestation, such as " arch-fiend ", " arch-scoundrel " ; it is from an adaptation of this use, as seen in such expressions as " arch-rogue," extended to " arch-look," " arch- face," that the word comes to mean a mischievous, roguish expression of face or demeanour.

supported, until the keystone is inserted. This at the present day is effected by means of centreing an assemblage of timbers framed together, with its upper surface of the same form as the arch required; the voussoirs are laid on the centreing till the ring of the arch is completed. In the case of arches of small span, such as the early examples referred to, limited to about 6 ft., such centreing might be dispensed with in various ways, but it is difficult to see how the arches of the great entrance gateways, shown in the Assyrian bas-reliefs, could have been built without temporary support of some kind. In those days, when any amount of labour could be obtained, even the erection of a temporary wall might have been less costly than the employment of timber, of which there was great scarcity.

The Assyrian tradition would seem to have descended first to the Parthian builders, who in the palace of El Hadr built semi- circular arches with regular voussoirs decoratively treated. The Sassanians who followed them employed the elliptical or egg- shaped arch, of which the lower part was built in horizontal courses up to about one-third of the height, which lessened the span of the arched portion.

In Europe the earliest arches were those built by the Etruscans, either over canals (see article Architecture: Etruscan), or in the entrance gateways of their towns. The skew-arch in the gateway at Perugia shows great knowledge in its execution. From the Etruscans the adoption of the arch passed to the Romans, who certainly employed centreing of some kind, but always economized its use, as is clearly shown by Choisy. Al- though their walls from the Augustan age were built in concrete, arches of brick were

always turned over their entrance doorways, sometimes in two or three rings. The Romans utilized the arch in other ways, sometimes burying it in their concrete construc- tion, as in their vaults, and sometimes introducing it as a veneer only, as in the Pantheon. In their monumental structures in stone, the arch was sometimes built with regular voussoirs, i.e. with a semicircular extrados, and sometimes with the joint carried far beyond. The latter was not done in the early ex- amples of the Tabularium and the Theatre of Marcellus, but in the Colosseum and all the arches of triumph the joints run through the spandrils, notwithstanding the recognition of the arch proper by its moulded archivolt.

Although the value of the pointed arch as a stronger con- structional feature than the semicircular (owing to the tendency to sink in the keystone of the latter) had been recognized by the Assyrian builders, who employed it in their drains, it was not used systematically as an architectural feature till the 9th century, in the mosque of Tulun at Cairo; it seems to have been regarded by the Mahommedans as an emblem of their faith, and its use spread through Syria to Persia, was brought to Sicily from Egypt, and was taken back by the Sicilian masons to Palestine and em- ployed throughout theCrusaders'churches during thei 2th century. As the pointed arch had already, for constructional reasons, been employed in Perigord from the commencement of the nth century, it does not follow that the Crusaders brought it from Palestine, but there is no doubt that its universal employment in France early in the 1 2th century may have been partly due to its adoption in the Crusaders' churches. At first in Gothic work both the semicircular and pointed arches were used simultane- ously in the same building, the larger arches being pointed, the smaller ones and windows being semicircular. The great value of the pointed arch in vaulting is described in the article Vault.

We have suggested that the pointed arch became an emblem of Mahommedan faith, and it was introduced in India but' not as a constructive feature, for the Hindus objected to the arch, which they say never sleeps, meaning that it is always exerting a thrust which tends to its destruction. In India therefore it was built in horizontal courses with vertical slabs leaning against one another to form the apex. The Moors of north Africa, however, never employed it, preferring the horseshoe arch which they brought into Spain and developed in the mosque of Cordova. In the additions made to this mosque the prayer chamber was enriched by the caliph Mansur, who, to eke out the height, raised arch upon arch. In the Alhambra it appears in the decorative

plaster work, and travels northwards into the south of France, where at Le Puy and elsewhere it is found decorating doorways and windows; in England it was employed towards the end of the 12 th century.

About the middle of the 14th century at Gloucester the four- centred pointed arch was introduced, which became afterwards the leading characteristic feature of the Tudor style. In France they adopted the three-centred arch in the 15th century.

The ogee arch was the natural result of the development of tracery in the commencement of the 14th century, and in Gloucester (about 13 10) the foliations were run one into the other without the enclosing circles. About the middle of the 14th century, in the arcade of the first storey of the ducal palace in Venice, flowing tracery is found, from which the ogee arch there was probably derived, as throughout Venice it becomes the favourite feature in domestic architecture of that and the succeeding century.

The arches are of various forms as follows; —

2. Semicircular arch, the centre of which is in the same line with its springers.

3. Segmental arch, where the centre is be- low the springing.

4. Horseshoe arch, with the centre above the springing ; em- ployed in Moorish architecture.

5. Stilted arches, where the centre is below the springing, but the sides are carried down vertically.

6. Equilateral point- ed arches, described from two centres, the radius being the whole width of the arch.

7. Drop arches, with centres within the arch.

8. Lancet arches, with centres outside the arch.

9. Three centre arches, employed in French Flamboyant.

10. Four centre arches, employed in the Perpendicular and Tudor periods.

n. Ogee arches, with curves of counter flex- ure, found in English Decorated and French Flamboyant.

12. Pointed horse- shoe arches, found in the mosque of Tulun, Cairo, 9th century.

13. Pointed foiled arches, in the arcades of Beverley Minster (c. 1230) and Netley Abbey.

14. Cusped arch; Christchurch Priory, Hants.

15. Multifoil cusped arch, invented by the Moors at Cordova in the 10th century.

16. Flat arch, where the soffit is horizontal and sometimes slightly cambered (dotted line).

17. Upright elliptical arch, sometimes called the egg-shaped arch, employed in Egyptian and Sassanian archi- tecture.

YTTT7 7

16

344

ARCHAEOLOGY

<^^^>

20

18. TheTuscanarch, where the extrados takes the form of a pointed arch.

19. The joggled arch used in medieval chimneypieces and in Mahommedan archi- tecture.

20. The discharging or relieving arch, built above the architrave or lintel to take off the weight of the super- structure.

21. The relieving arch as used in Egypt, in the pyramid of Cheops; and in Saxon architecture, where it was built with Roman bricks or tiles, or con- sisted of two sloping slabs of stone.

WWII/

19

21

(R. P. S.)

ARCHAEOLOGY (from Gr. apxaia, ancient things, and "hoyos, theory or science), a general term for the study of antiquities. The precise application of the term has varied from time to time with the progress of knowledge, according to' the character of the subjects investigated and the purpose for which they were studied. At one time it was thought improper to use it in relation to any but the artistic remains of Greece and Rome, i.e. the so-

called classical archaeology (now dealt with in this encyclopaedia under the headings of Greek Art and Roman Art) ; but of late years it has commonly been accepted as including the whole range of ancient human activity, from the first traceable appearance of man on the earth to the middle ages. It may thus be conceived how vast a field archaeology embraces, and how intimately it is connected with the sciences of geology (q.v .) and anthropology (q.v.) , while it naturally includes within its borders the consideration of all the civilizations of ancient times. In dealing with so vast a subject, it becomes necessary to distinguish. The archaeology of zoological species constitutes the sphere of palaeontology (q.v.), while that of botanical species is dealt with as palaeobotany (q.v.) ; and every different science thus has its archaeological side. For practical purposes it is now convenient to separate the sphere of archaeology in its relation to the study of the purely artistic character of ancient remains, from that of the investigation of these remains as an instrument for arriving at conclusions as to the political and social history of the nations of antiquity; and in this work the former is regarded primarily as " art " and dealt with in the articles devoted to the history of art or the separate arts, while " archaeology " is particularly regarded as the study of the evidences for the history of mankind, whether or not the remains are themselves artistically and aesthetically valuable. In this sense a knowledge of the archaeology is part of the materials from which every historical article in this encyclopaedia is constructed, and in recent years no subject has been more fertile in yielding information than " archaeology," as representing the work of trained excavators and students of antiquity in all parts of the world, but notably in the countries round the Mediterranean. It is for its services in illuminating the days before those of documentary history and for checking and reinforcing the evidence of the raw material (the " unwritten history " of architecture, tombs, art-products, &c.) , that recent archaeological work has been so notable. The work of the literary critic and historian has been amplified by the spade-work of the expert excavator and explorer to an extent undreamt of by former generations; and ancient remains, instead of being treated merely as interesting objects of art, have been forced to give up their secret to the historian, as evidence for the period, character and affiliations of the peoples who produced and used them. The increase of precise knowledge of the past, due to greater opportunities of topographical research, more care and observa- tion in dealing with ancient remains and improved methods of studying them in museums (q.v.) and collections, has led to

nary period.

more accurate reading of results by a comparison of views, under the auspices of learned societies and institutions, thus raising archaeology from among the more empirical branches of learning into the region of the more

exact sciences. This change has improved not only the status of archaeology but also its material, for the higher standard of work now demanded necessarily acts as a deterrent on the poorly equipped worker, and the tendency is for the general result to be of a higher quality.

The archaeological details concerning all subjects which have their " unwritten history " are dealt with in the separate articles in this work, including the ancient civilizations of Assyria, Egypt and other countries and peoples, while the articles on separate sites where excavations have been particularly note- worthy may be referred to for their special interest; see also Anthropology; Ethnology, &c. It remains here to deal generally with the early conditions of the prehistoric ancient world in their broader aspects, which constitute the starting- place for the archaeologist in various parts of the world at different times, and the foundations of our present understanding of the primitive epochs in the history of man.

The beginning of archaeology, as the study of pre-documentary history, may be broadly held to follow on the last of the geological periods, viz., the Quaternary, though it is claimed, and with some reason, that traces of man have been found Quater- in deposits of the preceding or Tertiary period. Although there is no valid reason against the existence of Tertiary man, it must be confessed that the evidence in favour of the belief is of a very inconclusive and unconvincing kind. The discussion has been mainly confined to the two questions (1) whether the deposit containing the relics was without doubt of Tertiary times, and (2) whether the objects found showed undoubted signs of human workmanship. Vast quantities of material have been brought forward, and endless discussions have taken place, but hitherto without carrying entire conviction to the minds of the more serious and cautious students of prehistoric archaeology. A chronic difficulty, and one which can never be entirely removed, is our ignorance of the precise methods of nature's working. It is an obvious fact, that natural forces, such as glacial action, earthquakes, landslips and the like, must crush and chip flints and break up animal remains, grinding and scratching them in masses of gravel or sand. If it were possible to determine with precision what – were the peculiarities of the flint or bone, thus altered by natural agencies, it would be easy to separate them from others purposely made by man to serve some useful end. Our present knowledge, however, does not allow us to go so far in dealing with the ruder early attempts of man to fabricate weapons or implements. Even the one feature that is commonly held to determine human agency, the " bulb of percussion," cannot be considered satisfactory, with- out collateral evidence of some kind. Flint breaks with what is called a conchoidal fracture, as do many other substances, such as glass. Thus on the face of a flint flake, at the end where the blow was delivered to detach it from the nodule, is seen a lump or bulb, which is usually regarded as evidence of human work-

manship. To produce such a bulb it is necessary to deliver a somewhat heavy blow of a peculiar kind at a particular point of a flattened surface; and the operation requires a certain amount of practice. The fulfilment of all the necessary conditions might well be a rare occurrence in nature, and the bulb of percussion has come to be regarded as the hall-mark of human manufacture; but recent investigations have shown that the intervention of man is not necessary and that natural forces frequently produce a similar result. When, therefore, it is a question whether or no a group of rude flints are of human workmanship, evidence of design or purpose in their forms must be established. If this be found, and in addition if a number of flints, all having this character of design, be found together, then and then only is it safe to admit them into the domain of archaeo- logy. There can be no doubt that much time and energy have been wasted, and a number of intelligent workers have been fruitlessly occupied in following up archaeological will-o'the wisps, through neglecting this elementary precaution.

Whether or no man produced flint implements before Quater- nary times, it would seem to be a necessity that he should have BoMhic P asse d through an earlier stage, before arriving at the precision of workmanship and the fixed types found in the old Stone Age deposits known as palaeolithic. It is now claimed that this earlier and ruder stage has actually been discovered in what are known as the Plateau-gravels of Kent, in Belgium, and even in Egypt, and the name of eolithic (17&S, dawn, \i6os, stone) has been bestowed upon them. The controversy as to the human character has been very keen, some alleging that the fractured edges and even the definite and fairly constant types are entirely produced by natural forces. Sir Joseph Prestwich in England, and Alfred Rutot in Belgium, the latter arguing from his own discoveries in that country, have strongly supported the artificial character of the relics. On the other hand it is pointed out that the existence of these implements on the high levels of Kent furnished confirmation of Sir Joseph Prestwich's theory of the submergence of the district, and that his support was thus somewhat biassed, while the geological conditions in Belgium are not quite comparable with those of the Kent plateau; and the Belgian evidence, whatever it may be worth in itself, is of no avail as corroboration of the Kentish case. It is to be regretted that the conditions are not more convincing, for, as stated above, they agree fairly well with the evolution theory of man's handiwork, and if they could be accepted, would carry back the evidences to a more remote time when the physical features of Kent were of a very different character. The critics of eoliths have brought forward some facts that at first sight would seem to

be of a very damag- ing nature. It was observed that in the process of cement manufacture the flints that had passed through a rotary machine in which they were violently struck by its teeth or knocked against each other, possessed just those features that were claimed as indisputable proof of man's handiwork, and that even the forms were the same. These statements have, of course, been met by counter-statements equally forcible, and the matter may still be considered to be in suspense. The great struggle, therefore, is now more closely restricted to the nature of the chipping than as to the quasi-geological question, and if the solution is ever to be found, it will be by means of a closer examination and a better understanding of the difference between intentional and accidental flaking.

On reaching the Palaeolithic period we come to firmer ground and to evidence that is more certain and generally accepted. This evidence is fundamentally geological, inasmuch as the age of the archaeological remains is dependent upon that of the beds in which they are found. That they were deposited at the same time is now no longer ques- tioned. The flints are found to have the same colour and surface characteristics as the unworked nodules among which they lie, and are generally rolled and abraded in the same way. This in itself suffices to show that the worked and unworked flints were deposited in their present stratigraphical position at the same time. The remote age of the beds themselves is demonstrated by the presence of bones of animals either now extinct or found only in far distant latitudes, such as the mammoth, reindeer, rhinoceros, &c, and in some cases these bones are found in such relative positions as to prove they were deposited with the flesh still adhering to them, and also that the animal was contemporary with the makers of the flint implements. Evidence of a somewhat different kind is pro- vided for the palaeolithic period by certain caverns that have been discovered in England and on the continent. In these limestone caves palaeolithic man has lived, slept, eaten his food and made his tools and weapons. Much of his handiwork has been left, with the bones of animals on which he lived, scattered upon the floor of the cave, and has been sealed up by the infiltration of lime-charged water, so that the deposit re- mains, untouched to our own day, below an impermeable bed of stalagmite. In such circumstances there can be no doubt of the contemporaneous character of the remains, natural or artificial, if found on the same level. Moreover, so far as type

is a criterion of age, the flint tools found in the cave deposits tend to confirm the date assigned to those of the river-gravels.

It is fairly certain that about the middle of the Tertiary period the northern hemisphere possessed a temperate climate, such that even the polar regions

were habitable. But the physical aspect of northern Europe was very different from that of Quaternary times. North of a line drawn roughly from southern England to St Petersburg all was sea. It was during the latter half of the Tertiary period that the continent assumed its present general form, though even in Pleistocene (Quaternary) times England and Ireland formed part of it. The great change of climate from temperate to arctic conditions during the latter half of the Tertiary period has been interpreted in various ways, no one of which is yet universally accepted. There can be little doubt, however, that no single cause was responsible for so com- plete a change. There may have been some alteration in the relative positions of the earth and the sun, which would con- ceivably have produced it; but what is practically certain is that the physical geography of northern Europe was affected by considerable difference in level, and it is clear that the raising of mountain ranges and the general elevation of the continent must necessarily have reacted on the climatic conditions. If in the later Tertiary time we find that the Alps, the Carpathians and the Caucasus have come into existence, it is not surprising to find that these huge condensers have brought about a humid con- dition of the continent to such an extent that this phase has been called the Pluvial Age. The humidity, however, was in some ways only a secondary result of the protrusion of high mountain ranges. The primary cause of the physical conditions that we now find in the valleys and plains was the formation of glaciers. These rivers of ice descending far into the lower levels during the winter months, melted during the summer, causing enor- mous volumes of water to rush through the valleys and over the plains, carrying with it masses of mud and boulders which were left stranded sometimes at immense distances. The in- tensity and force of the rivers thus formed would depend upon two factors, first the extent of the watershed, and secondly, the height of the mountains from which the water was derived. The result of increasing cold was that in course of time the northern hemisphere was surmounted by a cap of ice, of immense thickness (about 6000 ft.) in the Scandinavian area and gradually becoming thinner towards the south, but at no time does it seem to have extended quite to the south of England. This is proved by the absence of boulder-clay (glacial mud) in the districts south of London. These arctic conditions were not, however, continuous, but alternated with periods of a much less rigorous temperature during what has been called the Ice Age. Remains both of mammals and plants have been found, under conditions that are held to prove this alternation.

Such being the natural forces at work remodelling the surface of the earth,' forces of such gigantic power as to be almost inconceivable in these more placid times, it can easily be under- stood how, in the course of the many thousands of years before the Quaternary period, when the surface of the globe attained its present aspect, the powerful river-systems of Europe wore

their beds deep into the solid rocks. In some cases in Europe tte erosive power of the river has worn through its bed to such an extent that the present stream is some hundreds of feet lower than its forerunner in palaeolithic times. From various causes, however, the rivers did not always wear for themselves a deep channel, but spread themselves over a wide area. This seems to have been the case with the Thames near London: the river-bed is not of any great depth, but at various periods it has occupied the space between Clapton on the north- east and Clapham on the south-west. It must not be assumed that the whole of this area of 7 m. or more was filled by the river at any one time, but rather that during the course of the palaeolithic period the river had its bed somewhere between these two limits. For instance, it is probable that at one period the bank of the Thames was at a point nearly midway between the northern and southern limits, where Gray's Inn Road now stands. It was here that the earliest recorded palaeolithic

implement (now in the British Museum) was found towards the close of the 17th century in association with mammoth bones. But it is safe to say that the Thames was a very much wider and more imposing river in palaeolithic times than it is now, when its average width at London is under 300 yds. As, in the course of ages, it changed its bed and by degrees lessened in size and volume, it would leave, on the terraces formed on its banks, the deposits of brick-earth and gravel brought down by the Stream, and it is on these terraces that the relics of palaeolithic man are found, sometimes in great quantities. It will be obvious from the nature of the case that the highest terraces, and those farthest apart, should contain the earliest implements; but it is by no means easy in the present state of the land surface and with our present knowledge, to place the remains in their relative sequence. More accurate observation, and a better understand- ing of the conditions under which these deposits were made, should solve many such problems. Much light has been thrown upon many points by Worthington Smith, who has excavated with great care two palaeolithic floors at Clapton and at Cad- dington near Dunstable. The latter discovery was of quite exceptional interest as confirming the geological evidence by that of archaeology. In this case the original level at which palaeolithic man had worked was clearly defined, and was prolific of dark-grey implements, which had evidently been made on the spot, as Smith found that many of the flakes could be replaced on the blocks or cores from which they had been struck by palaeolithic man; there were also the flint hammers that had been used in the operation. Above the floor was a layer of brick-earth, again covered by contorted drift, in which also implements

occurred, but of a very different kind from those found below. In place of being sharp and unabraded, and with the refuse flakes accompanying them, they were rolled and disfigured, of an ochreous tint, and evidently had been trans- ported in the drift from a much higher level now no longer existing, as the site where they occurred is the highest in the vicinity, about 500-600 ft. above sea-level. Here then we have a clear case of palaeolithic man being compelled to abandon his working place on the lower level by the descent of the waters containing the products of his own forerunners, probably then very remote. In this case the sequence of the various strata may be considered certain, and the remains thus accurately determined and correlated are naturally of extreme value and importance. But even this does not enable us to diagnose another discover}' unless the internal evidence is equally clear and conclusive. One point of importance that may be noted is that the older abraded implements were mostly of the usual drift type, while the more recent ones from the "floor" con- tained forms more highly developed and elaborated, such as occur in the French caves. Explorations of this kind, carefully conducted in a strictly scientific spirit by men of training and intelligence, are the only means by which real progress will be made in this puzzling branch of archaeology.

Although many problems yet remain to be solved in England, its small area, and the relatively large number of workers, have together sufficed to put the main facts of the earlier stages of man's existence on a fairly satisfactory basis. In France, owing to the richness of the results, a great number of trained and ardent workers have made equal, if not better, progress. But unfortunately the real scientific spirit is not invariably found. Not so long ago an apparently serious writer in a well-known scientific magazine gave a detailed account of his studies in primitive methods and explained at great length his attempts at the manufacture of flint and stone implements. He found by the processes he adopted that it was much more easy for him to produce a polished implement than one merely flaked. From this fact he seriously argued that a great mistake had been made in the relative ages of the neolithic and palaeo- lithic periods, and that the former must necessarily be the older of the two. The evidence of geological position and of the mammalian remains accompanying the obviously older flints was entirely disregarded, just as on the other hand it was for- gotten that in regard to neolithic remains the proofs were in every

way in favour of a relatively modern origin. Such attempts not only bring the serious study of early man into disrepute, but tend to retard the progress of real knowledge and are therefore to be deplored and when possible discouraged.

Caves (

Several circumstances conspire to give a special interest to Kent's cavern, and not the least is the fact that the age and appearance of the various strata indicate that it has been the home or the refuge of human beings at all ages even up to medieval times, and perhaps from a period even more remote than is the case elsewhere. In the black mould that formed the uppermost layer were found fragments of medieval pottery, and relatively in close proximity were ancient British and Roman remains as well as relics of the earliest days of metallurgy, in the shape of bronze fragments. The two thousand years or more that may have separated the oldest from the most modern of these later products, is as nothing in comparison with the immense intervals that lie between the earliest of them and the infinitely more remote period when gigantic mammals first inhabited the cave. Attempts have been made from time to time to express in years what the interval must have been: but as the computations have differed by hundreds of thousands of years, according to the method adopted, it is scarcely wise to do more than speculate. Beneath the black mould, containing what may be called the recent remains, was a layer of stalag- mite, some feet in thickness; and under this at one place was a great quantity of charcoal, which has been w r ith good reason assumed to show the site of fireplaces. A quantity of implements of palaeolithic type was found, but the main layer at this level consisted of a reddish clay known as cave-earth, and in this deposit were implements both of flint and horn, as well as bones of extinct animals. The flint implements were mostly of the usual river-drift type, but some were of types generally con- fined to cave-deposits of this period; while the barbed harpoon

heads, and more especially a bone needle, were definitely of the cave class, so well represented in the caves of Dordogne. Again, below the cave-earth was a breccia formed of limestone and sand- stone pebbles cemented together by a calcareous paste. In this also were found implements and bones of bears.

The succession of strata indicated above may be taken as typical of the caverns used by palaeolithic man, the breccia and stalagmite flooring being in themselves proof of a very considerable age, while the association in the former, or under the latter, of remains of human handiwork, with bones of extinct animals, may be safely taken to show contemporaneous existence.

Once the mind has fairly grasped the fact that man was living at so remote a time, it is a simple and natural conclusion that he should have provided himself with weapons and tools more or less rudely fashioned from the

stones he found ready to his hand. The analogy of the recently extinct Tasmanian is sufficient to show that even the meanest savage is not without such aids. But the caves of France, of the same palaeolithic period, and used by men theoretically in the same stage of culture, bring before us a race of artists of first-rate capacity, who for accuracy of observation, and for skill in indicating the character and peculiar- ities of the animals around them, have never been surpassed. Such a statement sounds like a contradiction in terms. We are dealing with human beings whose intellect, to judge by their physical characters, should be on a level with that of the Fuegian or the Australian black, and far below that of the Maori or the Sandwich Islander. Yet none of these gentle and relatively cultured brown races produced anything in the nature of art that can in any sense be compared with the masterly drawings or sculptures of the cave-men of France. The best-known of the engravings, that of the mammoth on a piece of ivory, is in the Jardin des Plantes in Paris. It is evidently intended to be nothing more than a sketch, the lines of the finely curved tusks being repeated several times in the desire for accuracy. But the heavy lumbering walk of the ponderous beast, his attitude, and even the character of the hairy hide, are all shown or suggested with a skill and freedom that not only denotes daily familiarity with the thing represented, but a most complete mastery of the art of translating the idea into simple line. This mammoth-drawing is probably the most important and monumental of its class, but there are many others that possess artistic qualities not less remarkable, while they have in addition a grace and beauty of line not less astonishing. One of these, in the British Museum, the head of an ibex-like creature, is outlined with a decision and refinement that can scarcely be surpassed, and many other sketches in horn or stone in the same collection show a keen appreciation of the characteristic features of the different animals as well as a masterly deftness in the handling of the graving-tool. If we are forced to marvel at the graphic skill of the cave-men, their sculptures in the round are on a still higher plane, as may be seen in the figures of reindeer in ivory in the British Museum. While they are not highly finished, they show a complete understanding of the animal's peculiar forms and contours, which are rendered in a direct, unhesitating way that should betoken a long period of artistic training and an executive power uncommon at any time. These drawings and sculptures have always been appreciated and even regarded as being of a much more advanced style than was to be expected among men who are always classed in the lower grades of culture. But enough stress has not hitherto been laid on the artistic quality of the work, which would be considered fine at any time in the world's history. This high artistic level was attained by a race of men whom we cannot credit with any great intellectual equipment; men, moreover, who were engaged in a daily struggle for the barest necessaries of life, in a trying climate and surrounded by a fauna whose means of

attack and defence were infinitely superior to their own. There are many astonishing problems in archaeology, but none so badly in need of solution. Had the discovery been confined to a single drawing or even to a single site, fraud or a misreading of the conditions might have been alleged, but the case is very different. The drawings

and sculptures have been found generally enough in France to demonstrate that such artistic power was fairly common, while the question of the authenticity and period of the discoveries has long since been satisfactorily settled. It is true that the climatic conditions in pleistocene France were more favourable to man than was the case farther north, but even an agreeable climate does not necessarily produce an artistic race; if it, were so, the Polynesians would probably be the greatest artists the world has ever seen. The physical remains of palaeolithic man, even when found under unquestionable conditions, are, however, so scanty, that it is unlikely that the important ques- tion of the race or races inhabiting central and northern Europe will ever be settled by their means. The evidence at present is in favour of two very different types, one dwarfish and brutal (Canstadt), the other more advanced and noble in physical character (Cro-Magnon). To the latter were due the artistic productions, and until further physical evidence is forth- coming recourse must be had to the most minute examination of the objects themselves and to accurate observation of the conditions under which they are found. So far as our present materials go, these are the only means by which more light may be thrown on the many problems of early man.

In spite of the unquestioned and unquestionable character of palaeolithic discoveries in general, it must not be assumed that there has been an absence of falsification, forgery, and what the French call " mystification "; on the contrary, such attempts to meet the demand have been common enough. Apart from Edward Simpson, who was notorious as " Flint Jack " in the middle of the 19th century, many others, both in England and on the continent of Europe, have devoted themselves to this peculiar industry. Boucher de Perthes tried to conquer the scepticism of some of his friends who doubted the human origin of the Abbeville flints, by unwisely offering his workmen a reward for the discovery of human bones in the same beds. The Moulin Quignon jaw was accordingly produced, and became the subject of much controversy; but the evidence finally showed that it had originally come from elsewhere. The cave drawings also have found their imitators in modern times. One Meillet, a man of education, took a special pleasure in the production of spurious examples, and even published an account of his pretended discoveries. But here, as in all the attempts at imitation of the cave drawings, the modern efforts were betrayed by their poor artistic quality, and a comparison of the new discoveries with the old was generally enough to disclose the forgery. Two drawings on bone of a

wolf and a bear, declared to have been found in a cave at Thayingen in Switzerland, were afterwards shown to have been copied from a child's picture-book. In Switzerland also a brisk trade was carried on some years ago in false antiquities said to come from the Lake-dwellings; and fantastic types of tools and implements were placed on the market. In Italy, too, a lively discussion has taken place of late years over the authenticity of curiously shaped flint implements from the neighbourhood of Verona; while America has provided similar food for discussion in the well-known Lenape stone and the Calaveras skull. The former bears drawings of the French cave type, while the latter if genuine would carry back the story of man in the American continent before Pliocene times.

An apparent break in the continuity of man's history in Europe occurs at the end of the palaeolithic period. Attempts have been made to bridge the gap by means of a " mesolithic " period (yuecros, middle) ; but it would uthid

not seem probable that the missing links will occur at all events so far north as Britain. We leave palaeolithic man in a cold climate, surrounded by a somewhat mixed fauna that formed his prey. We know him as a hunter and artist, but the remains show that he had no knowledge of pottery till towards the close of the period. Among the humbler arts he practised at least sewing, and lived in caves or took shelter at the base of overhanging rocks; but like the Australian, he frequently camped in the open. His successor of the later Stone Age (neolithic) we find to be a very different character and with very

different surroundings. The configuration of the land in which he lived is practically the same as we now see it. The severe arctic conditions with the appropriate fauna had entirely dis- appeared, and the introduction of new arts must have radically changed his daily life. The most important of these are the training of domestic animals, agriculture, and the development of pottery. What were the burial rites of palaeolithic man we have at present no means of knowing, but for his neolithic successor we know that these were matters of great moment. The abundance of arrowheads of flint indicate the common use of the bow and arrow as a weapon, while the art of weaving marks an immense stride in the direction of comfort and civilization. Of the form and construction of his dwelling we have only a limited knowledge, derived with some uncertainty from the analogy of the dwellings for the dead (barrows) and more cer- tainly from the remains of the villages found erected on piles on the shores of lakes.

A much-debated question arises here that cannot be passed over. The changes just mentioned are not such as would be produced by internal causes alone. Much of the evidence is in favour of neolithic man being an immigrant, coming into northern and central Europe long after palaeolithic man and his character- istic fauna had disappeared. Where did the earlier race go and who are its modern representatives, if any? The answers to this question are many. W. Boyd Dawkins is of opinion that the reindeer was followed by man in its journey to the north after the retreating glaciers, and that the modern representative of palaeolithic man is the Eskimo. His arguments are ingenious but unconvincing; they mainly consist in the similarity of the habits of both races in using harpoons and implements of similar form and make, their power of carving and drawing on bone, the absence of pottery, disregard of the dead, &c. As to the positive evidence, it is almost enough to say that the Eskimo, like the cave-men, used the material nearest to hand that served their purpose, and that nothing is more remarkable than the similarity of primitive weapons used by widely separated peoples; while the negative evidence as to the absence of pottery is of little value; their conditions of life would allow them neither to make it nor keep it. Till recently we had no evidence at all of the treatment of the dead by palaeolithic man, but this is no longer the case; the discoveries in the Grottes de Grimaldi, Monaco, show several methods of burial, near a hearth, or in rude stone cists (see Dr Verneau in V Anthropologic, xvii. 291). A stronger argument would be furnished if it could be shown that by his physical character the Eskimo is an intruder in his present home, and is unrelated to his neighbours. But this has not yet been done, and the skulls of the Eskimo do not resemble any of those hitherto found in the caves. In fact, what evidence there is on the subject is rather against than in favour of the wanderings northward of the inhabitants of the caves. There are indications, on the other hand, that in the south of France, in the Pyrenees, the reindeer was in existence, with man, at a later period than that of the caves, while the type of skull is that of Cro-Magnon. Here, therefore, it may be that something like a bridging of the gap between palaeolithic and neolithic times may be forthcoming. But it still remains to be found, and for the present we must be content with uncertainty.

The neolithic period has often been loosely called the age of polished stone, from the fact that in no case has a polished or Neolithic g roun< l stone implement been found in a palaeolithic deposit. The term is not only loose but inaccurate. In the first place, there is no reason why the cave-men should not be found to have polished a stone implement on occasion, for they habitually polished their weapons of bone. Secondly, neolithic man was by no means uniform in his methods; he polished or ground the surfaces of such tools or weapons as would be improved by the process; but to take a common instance, he found that the efficacy of his arrow-point

was sufficient when chipped only, and polishing is only occasionally found, as in Ireland. Many other implements also are found in neolithic times with no trace of grinding and yet with every appearance of being complete.

The most trustworthy evidence with regard to this and the succeeding archaeological periods is to be found in the grave- mounds. For the earlier part of the neolithic age, however, these are by no means fruitful of relics. From their shape they are called in England " long barrows " to distinguish them from the round barrows which belong to a succeeding time, though evidence is being accumulated to show that this division is not of universal application. Long barrows are by no means of such frequent occurrence in Britain as the round variety; they are most common in Wiltshire, Gloucestershire and Dorset, and occur as far north as Caithness. Some of them contain within the mound a stone chamber, at times with a gallery leading to it, and in the chamber the interment or interments took place. Similar barrows have been found on the continent of Europe, and both in Britain and abroad have one feature in common, viz. that no metal, with possibly the exception of gold, has ever been found in them. This similarity of burial custom, though it may conceivably indicate intercourse, certainly does not prove identity of race, as has been sometimes claimed. The type of skulls found in the interment is clear evidence against such an assumption.

In Britain, the burials were at times by inhumation only, and occasionally a great number of bodies were interred in the same barrow: at others, cremation had preceded burial. Another remarkable feature is that in many instances it is certain from the relative position of the bones of the unburnt burials that the corpse had been allowed to decay before the burial took place. This curious practice is known among many savage tribes of the present day. Its occurrence in Britain has been adduced in favour of the prevalence of cannibalism at this time, and not altogether without reason. While metal is entirely absent in the long barrows (and in fact relics of any kind are very rarely found), it is significant that in the succeeding round barrows also metal occurs but seldom, and then always of the types attributed to the earliest part of the Bronze Age. When, therefore, the mound pottery is of a class that may well be anterior to metal, and no metal is found with the burial, it is not unreasonable to assign such barrows to the Stone Age. A similar argument may be applied to the stone implements, but in the opposite direction. Many stone implements are found either isolated, or perhaps with no other relics that serve to fix their period. The material alone is often considered sufficient evidence of their being before the age of metals; but it is at any rate quite certain that a large number of stone axes, more particularly those with a socket for the handle, belong really to the Bronze Age. This uncertainty makes any account of the neolithic age difficult, unless the material is taken as the main basis.

Neolithic man, like his forerunners, still recognized that flint and allied stones provided the best material for his cutting and piercing implements, though he made use to a great extent of other hard stones that came ready to his hand. The mining of flint was undertaken on a large scale, and great care was taken to get down to the layer containing the best quality. In Norfolk, at Grime's Graves, and in Sussex, at Cissbury near Worthing, the flint shafts have been carefully explored by William Green j well, General Pitt-Rivers and others. The system was to sink two shafts some little distance apart and deep enough to reach the desired flint-bed, and the two shafts were then joined by a gallery at the bottom. At Grime's Graves large numbers of deer's horns were found, which had evidently been used as picks, as is proved by the marks found in the chalk walls; and the horn had been trimmed for the purpose. Cups of chalk were also found in the galleries and were believed to have been used as lamps. At Cissbury great quantities of unfinished and defective implements were found in the work, as well as horn tools, as in Norfolk. At such factories the primitive appliances correspond very closely with those in use among existing savages. The pebble was used as a hammer or an anvil, and the more delicate flaking was done by pressure with a piece of horn rather than by blows. Naturally enough the number of completed implements found in these factories is small; the finished tools would be bartered at once and carried away from the factory. All th?

ARCHAEOLOGY

Plate L

PALAEOLITHIC PERIOD, i. French Drift. 2. English Drift. 3. French transition (Le Moustier). 4. French Cave Period. 5. English Cave Period.

Plate II.

ARCHAEOLOGY

SCULPTURE '.AND ENGRAVINGS OF THE CAVE PERIOD. FROM DORDOGNE, FRANCE.

ARCHAEOLOGY

Plate III.

,l!

WALL-PAINTINGS OF THE CAVE PERIOD, CAVERN OF ALTAMIRA, SANTANDER, SPAIN.

&ˆ9ˆisf

■fˆCv:

;>$Uv >-ˆi

/i ai

OUTLINE OF WALL-PAINTINGS, ALTAMIRA, LENGTH ABOUT 45 FT. (cf. Painting, Plate I.)*

By permission, from La Caverne d'Allamira by Cartailhac and Breuil, Monaco. 1006.

Plate IV.

ARCHAEOLOGY

NEOLITHIC PERIOD.

I. Flint and stone implements, England. 2. Flint arrow-heads, England. 3. Arrow-heads, Ireland. 4. Flint and stone implements, Denmark. 5. Flint implements, France. 6. Flint implements, Egypt.

animal remains found in these pits belong to present geological conditions, thus emphasizing what has been stated above, that the absence of polished implements is no evidence for great age. Many other factories have been found in Britain, in Ireland and on the continent of Europe: at Grovehurst in Kent, at Stourpaine near Blandford, at Whitepark Bay, county Antrim, and in Belgium at Spiennes. Among the North American Indians the method would seem to have been somewhat different. After journeying to the site of a suitable quality of stone, they did not always complete the implements on the spot, but made a number of oval chipped disks of good stone which they carried away and worked up into the required implements at their leisure. These disks bear a strong likeness to some of the ovate implements from the Drift in Europe; in fact, but for the difference of surface condition or patina, they would be identical.

While the severe climatic conditions that preceded the neolithic age restricted the presence of man to the more temperate parts of the globe, it may be assumed that in neolithic times there was nothing to prevent him from occupying the greater part of the earth's surface, short of the

neighbourhood of the two poles. Thus it may be expected that an age of stone will be found, if looked for, in every part of the globe. So far as our present knowledge goes, all is in favour of the use of stone before metals, in all countries. The one material requires no special treatment before being adapted to man's use, while the other demands considerable knowledge, even if reasoning power have but little place in the process. Thus the probabilities are here borne out by the facts. In the extensive " kitchen-middens " of Japan are found great numbers of chert implements mixed with pottery of a primitive type, recalling that of European early Bronze Age barrows, while the succeeding periods of metal are equally clear. Even in the Far East, therefore, the same sequence is to be observed. In China, the conditions are more obscure. The superstitious regard for ancestors has prevented the exploration of ancient tombs in that country, and thus systematic search has been impossible, while the precise details of the discovery of such relics as have come to light are difficult to obtain. In spite of the assertion that China had no Stone Age, it is surely more probable, in the absence of exact knowledge, that she fol- lowed the normal course. Modern territorial divisions, more especially if they are independent of the natural physical con- ditions of the land, such as mountain ranges, great rivers and the like, have but little value in considering the race problems of remote ages. If, therefore, we find that, in the countries bordering on what is now the Chinese empire, the ancient inhabitants followed the same broad lines of culture that are evident elsewhere, it is easy to believe that China too was normal in this respect. The negroes and Bantu races of Africa also were thought to have passed direct to the use of iron, perhaps owing to the existence on the Nile of a civilization of great antiquity, which enabled them to pass over the intervening stages. In- herently improbable, this is now known not to have been the case. Stone implements, whether ground or merely chipped, have been discovered on the Congo, and more recently on the Zambezi. It is quite true that in both cases they are found in superficial deposits, and may be of any age. But here again the probabilities are greatly in favour of their having been in use before iron was known. While stone tools, such as knives or arrow-heads, may possess qualities that render them superior to bronze or copper, it is certain that once the working of iron was understood, its superiority to stone would at once be perceived, and the stone tools be discarded. There can be little doubt that investigations in Central Africa will demonstrate that the same course was followed there as elsewhere. In South Africa, in Egypt and in Somaliland large quantities of stone implements have been discovered, and of the great age of most of them there can be no doubt. Some from the banks of the Nile have even been claimed as "eolithic"; but here, as in Europe, We can only say that the case is not proven: General Pitt-Rivers did good service in Egypt by discovering among the stratified gravels near Thebes a number of rude flints bearing unmistake-

able signs of human workmanship, but he described them merely as of " palaeolithic type," and deplored the absence of mammalian remains in the gravels. At the same time he pointed out that the bulk of the implements claimed as palaeolithic (and, it may be, correctly) are found on the surface, and therefore cannot be dissociated from the surface types; hence form alone cannot be trusted to determine age. Further, we are by no means well informed as to the value of patination in flints found on the surface in Egypt. The depth and intensity of the patina- tion would no doubt have a direct relation to the age of the implement, if only it could be proved that all of them had been equally subjected to the conditions that produced the discolora- tion. But this is clearly impossible. Some implements may conceivably have been continuously on the surface of the desert from the time they were made, and have been acted upon by the sun and air for many thousands of years, while others, though of equal age, may have been covered by sand or otherwise protected for a large part of the intervening centuries. Patina- tion, therefore, like form, can only claim a conditional value. It is at the best an uncertain indication of age, as great age may be possible without it. Similarly, in Somaliland, the condition of the implements is very curious, and in some re- spects puzzling, while their forms resemble those from the Drift in Europe. But as to the climatic conditions we know nothing, and it is therefore useless to speculate on the condition of the stones; as to the geology we know next to nothing, and no mammalian remains give us a helping hand, while the form alone is a dangerous foundation for argument.

Investigations in the more remote parts of the world, though they may occasionally produce some startling novelty in the history of mankind, can scarcely be expected to furnish the same trustworthy continuous story as is to Europe be found in the European area. Here history provides America. us with a fairly truthful account of what has happened for a period varying from two to three thousand years, or in some places even longer, and we are thus able to judge whether particular discoveries come into the historical stage or not. In more primitive lands where history (if there be any) partakes more of the character of mythical tradition, the task of defining the period to which particular discoveries belong is rendered much more difficult. In America, where history may be said to have begun five hundred years ago, such a feat is of course impossible, until a great deal of work on comparative lines has been accom- plished. The accounts of the civilization of Mexico and Peru at the time of the Spanish conquest show a state of culture which in some respects must have put the Spaniards to shame, while in others it was primitive in the extreme. As regards internal communications, the working of gold and copper, and the manufacture and decoration of pottery, these American kingdoms were on a level with all but the most advanced nations; but of history in the true sense of the word they

have none. In spite of this, it is by no means a hopeless task to disentangle the apparent confusion of their archaeology. It is now fairly well known what were the races or tribes that inhabited particular districts, and it is thus easy to make a corpus of the types adopted by the various peoples. This is the first certain step in the application of archaeological method. By degrees, as these types become familiar to the trained eye, it will not be difficult to arrange them in a progressive series, from the earliest in style to the latest. That this will be done by the archaeologists of the American continent, even with the present scanty materials, there can be little doubt. Numbers of young and enthusiastic workers have now had a good training in exploration in historical lands, and will usefully employ their experience on the antiquities of their own country. But if once a key be found to the andent Mexican inscriptions, so plentifully scattered through the ancient monuments, it may be that enlightenment will come even more suddenly and more surely. The one problem that is of the greatest interest still awaits solution, viz. whether there is any relation, in culture or more remotely in race, between the inhabitants of ancient America and those of Europe or Asia. One thing is certain, that if there be any connexion, it is of

infinite remoteness. But it is at any rate noteworthy that the same designs, patterns and even games are found in ancient Mexico and in India or China; and whether these resemblances arise from relations between the peoples using them or from accident, is a problem well worth investigation.

In countries like Scandinavia or Switzerland, the story of the early ages is clear and comparatively free from complications. The one by its remoteness was left to develop with but little help from the rest of Europe up to historical times; the other, protected on so many sides by its mountain ranges, seems to have enjoyed a peaceful existence during the Stone and Bronze Ages. A community of fishermen and agriculturists, they led a calm domestic life on the edges of their many lakes where they constructed dwellings on piles with only a gangway to the shore, to prevent the attacks of predatory animals. The practice of building houses in lakes was a common one not only in Switzerland, but also in Britain and in Ireland, as in modern times among the natives of New Guinea. Besides securing the safety of the inhabitants, it had the not unimportant advantage of being more healthy; all refuse of food and other useless matter could at once be thrown into the water where it would be harmless. A similar form of dwelling is the Irish " crannog," constructed on an island or shoal in a lake, in some cases artificially heightened so as to bring it above water. These crannogs were probably inhabited in Ireland up to comparatively

recent times, if one may judge by the remains found on the sites.

It must not be forgotten that although the neolithic period had many phases, yet its duration is in no way comparable to the incalculable length of the palaeolithic age. For a variety of reasons it is thought that one of the earliest stages of neolithic times is represented by the now well-known kitchen-middens (refuse-heaps) of Denmark. These heaps are often of great size, sometimes reaching 10 ft. in height, and nearly 350 yds. in length. Here along the coast line the natives of Denmark lived, apparently building their huts upon the mounds and cooking their food upon hearths of stone. The conditions of their daily- life would seem to have resembled those of the natives of Tierra del Fuego. Their implements of flint seem to have been chipped only, and it is conjectured that the few polished and more highly finished implements that have been found in the middens are importations from more cultured tribes living inland. Their food was in very great part composed of shell-fish, though they evidently caught and ate various kinds of deer, boar and a variety of carnivorous animals. The race which made these mounds is believed to have been akin to the Lapps, and their dwellings can hardly have been anything more than the rudest protection from the weather. The Swiss lake-dwellers were far more advanced, even in the Stone Age; their dwellings were elaborately planned and constructed, and remains of them have been plentifully found in the various Swiss lakes. Various forms of construction were adopted: in one the foundations consisted of poles driven into the bed of the lake; in others a kind of framework simply rested on the bottom, and in a third, the substructure was formed of layers of sticks reaching from the bottom of the lake up to the surface. The walls were of wattle, closed up with clay to keep out the weather; the hearths were of stone slabs, and the floors of clay well trodden down. Practi- cally the same type of dwelling seems to have continued through the Stone and Bronze Ages, though on some sites no metal whatever is found and it is therefore assumed that these are of the earlier period. These people cultivated the land, growing wheat and barley; they were also hunters and fishermen, capable of manufacturing pottery without the aid of the wheel, which had not yet come into use so far north; and they wove mats and garments, while ropes and netting are plentiful. Their tools and weapons were made of stone, and to a great extent of deer's horn. Human remains are hardly ever found on the sites of the lake-dwellings, and it is therefore uncertain what were the social affinities of the people; but the evidence of the sites is in favour of the same race being continuous into the Bronze Age, when their condition was more comfortable, as is shown by the abundant remains of domesticated animals.

Among the most notable and obvious relics of pre-historic times, both in Britain and in many other countries such as Spain, Portugal, France and

even India, are gigantic circles and avenues of stone and dolmens (see Stone Monu- „%” ** ments). These enduring monuments have excited the wonder of countless generations, and lent themselves to superstitious practices down to modern times. But the precise purpose for which they were erected and even the period to which they belonged, had never been definitely settled. They had been called burial places of great chiefs, and not unnaturally had been thought by others to have been temples or places of primitive worship used by the Druids, who moreover were often credited with their erection. Obviously such a question called for settlement, and the British Association in the year 1898 appointed a committee to investigate these stone circles with a view to ascertaining their age. Operations were begun at the well-known circle of Arbor Low, south of Buxton in Derbyshire; careful excavations were made through the ditch and the encircling mound and also within the circle, and although the evidence was not of the most complete kind, yet the committee came to the conclusion that the circle belonged to the end of the neolithic age. At Arbor Low all the stones are now lying on the ground (although, to judge from the other circles in England, they were certainly once upright), and the opportunities for surveying were thereby much diminished. It is a fortunate circumstance, therefore, that the fall of one of the stones at Stonehenge (q.v.) at the end of the 19th century, and the increas- ingly perilous state of some of the others, caused the owner, with the advice of the Society of Antiquaries of London, to undertake the raising of the great leaning stone in the interior of the circle. The work was superintended by W. Gowland, F.S.A., who made special investigations during the necessary digging, for the purpose of recovering any remains of man’s handiwork that had been left by the builders of the monument. In this he was very successful, finding in the course of the very limited excavation at the base of the monolith, a great number of stone mauls or hammers that corresponded so nearly with the bruised surfaces of the monoliths, that there can be no doubt of their having been used to dress the standing stones.*

From a review of all the evidence of an archaeological nature that was to be obtained, Gowland came to the conclusion that the construction of Stonehenge belonged to the latter part of the neolithic age. No trace of a metal implement occurred in any of the debris. This would of itself be an interesting fact, but it became infinitely more interesting from researches in quite another direction, which brought corroborative evidence of a curious kind. For many years Sir Norman Lockyer and Prof. Penrose were engaged in examining the orientation of temples in Egypt and Greece, with a view to determining on what astronomical principle, if any, the plans had been laid down. With a rectangular plan, and with portions of the interior still well defined, they were able by elaborate calculation to deter- mine that the temples had been definitely planned with relation to the rising or setting of

the sun or of a particular star. Having been successful in these investigations they proceeded to apply the test to Stonehenge. The experiment was made on the longest day in the year 1901 . Owing to a gradual change in the obliquity of the earth's orbit, the point of sunrise on corresponding days of each year is not constant; and though the difference is hardly perceptible from year to year, in the course of centuries it becomes great enough for use as a measure of time. Enough remains of the monument to show the direction of sunrise at the time that Stonehenge was erected, it being always assumed that the coincidence of the main axis with the central line of the Avenue was designed with reference to sunrise on the longest day of the year. At the date of the experiment it was found that the sun had shifted nearly two diameters in the interval, and this variation gives a date of about 1680 B.C., which practi- cally confirms the verdict of archaeology and seems to prove, moreover, that Stonehenge was a temple of the sun.

Stonehenge therefore may be taken as marking for Britain the close of the neolithic period and heralding the dawn of a new

era, in which the inhabitants of the British Isles first acquired the art of working metal.

There is reason to believe that the transition from the use of stone to that of bronze was not due to the peaceful advance of civilization, but rather to the irruption of an Aryan A race from the south-east of Europe into the countries

to the west and north. Of these people the Celts are to someextent the representatives at a somewhat more recentperiod. Here, however, we are dealing with terms the precise meaning of which is not yet generally admitted, and which, moreover, have too intimate a relation to the problems of philology to be fully discussed here (see Indo-European). The term Aryan (q.v.) itself is not free from objections. It was held by Max Miiller to relate to a language and a civilization that took its rise in Central Asia, while others now contend that, although it is the mother language of the Sanskrit, Greek, Latin, Teutonic and Celtic languages, it might equally well have originated in Europe. However this may be, and even this brief statement shows how wide a field the arguments would cover, there can be little doubt that the Bronze Age Celts were of this stock, and that in course of time they gradually spread their language and culture over a large part of Europe. Whether or no the knowledge of bronze started from one or

more centres, it gradually spread from the south-east of Europe until it reached Scandinavia; the dates being roughly in Crete, 3000 B.C.; in Sicily, 2500 B.C.; in central France, 2000 B.C.; in Britain and in Scandinavia 1800 B.C. The appearance of the Celts in Britain is indicated by the presence of the round barrows. They were a fairly tall, short-headed race, using cremation and also inhumation in their burials, skilful in the manufacture of pottery and of the simpler forms of bronze implements, and freely using bone, jet, and at times amber, while gold was well known and evidently greatly esteemed. In the early centuries of the Bronze Age, swords, spears and shields were apparently quite unknown, the principal metallic products being flat axes, simple knives or daggers, and small tools or ornaments. In the burial places the bodies, if unburnt, are nearly always found in a crouching position, as if in the attitude of sleep; if cremated, the burnt bones are generally enshrined in an urn under the tumulus, the burial being sometimes in a cist formed of large stones. The pottery vessels are remarkable in more ways than one. In the first place they would seem to have been specially made for the burial rites, for whenever domestic pottery has been found, it is of quite a different character, unornamentcd and simple in outline. It must be confessed, however, that this latter is by no means common. The sepulchral vessels are at times highly decorated, and sometimes of great size. They are invariably hand made, and though they are by no means well fired they are never sun-dried, as is often said to be the case. A common kind of decoration is produced by impressing twisted cords in the damp clay, and this is believed with some reason to have had its origin in the practice of winding cords round the unbaked vessel to prevent distortion before or during the process of firing. That operation would of course burn away the cord and leave only its impression on the urn. Other forms of ornament are also used, incised lines in rudely geometrical designs, impressions of the end of a stick, and at times rows of hollows produced by the finger or thumb. The method of the burial, beyond giving an insight into the art of the period, also helps us to realize to some extent the ideas of primitive man. The underlying reason for careful and ceremonial burial is not always readily understood, apart from a knowledge of the ritual, such as existed in ancient Egypt. But in the Bronze Age in Britain it was the custom to bury with the dead not only carefully made vessels which doubtless contained food for the journey to the lower world, but also the ornaments and weapons of the deceased. Often the bones of a pig have been found in the grave, doubtless representing part of the provender which could not conveniently be placed in the so-called food-vessel. Such practices indicate with a fair amount of certainty a belief in a future life in another world, where probably the conditions were thought to be much the same as in this. The burial of

the weapons and other property of a dead man is, however, not always due

to the belief that he may need them in some future state. The reason may well be that it would be thought un- lucky for a survivor to use them.

Just as the neolithic age was immeasurably shorter than the palaeolithic, but was notable for great improvements in the arts of life, so the Bronze Age in its turn was shorter than the neolithic age, and again witnessed even more marked advance in culture. It is in fact an illustration of the truism that each step in knowledge renders all that follow less laborious; but it is not easy to understand how the transition from stone to metal came about, nor why bronze came to be the chosen metal rather than iron. Bronze, in the first place, is a composite metal, a mixture of copper and tin, while iron can be at once reduced from its ores; indeed, in the form of meteoric iron, it is already metallic, and needs but a hammer to produce what- ever form may be wanted. From the archaeological point of view, there is, however, good reason for believing that bronze preceded iron. The forms of axes that are without doubt the earliest, are in outline much the same as the stone prototype, b.eing only thinner in proportion. Then again, iron implements are never found on the earlier sites, and if they had been in existence some of them certainly would remain: further, at the end of the Bronze Age it is found that the forms of weapons in that metal are exactly copied in iron, as, for instance, at Hall- statt (q.v.) in the Salzkammergut, the famous cemetery which best illustrates the passage from the use of bronze to that of iron. It has been claimed that bronze was preceded by copper, a sequence which seems inherently probable; and whether or no it was general enough or enduring enough to constitute a period, there can be no reasonable doubt that in the Mediterranean area, and in central Europe, as well as in Ireland, great numbers of implements were made of copper alone without any appreci- able admixture of tin. The casting of pure copper presents certain difficulties, in that the metal is not adapted for anything but a mould open to the air, and this would limit its utility, until the discovery that tin in a certain proportion (roughly 1 : 9) not only made the resulting metal much harder and better fitted for cutting-tools and weapons, but at the same time rendered possible the use of closed moulds.

There are thus two problems in connexion with the history of the Bronze Age. How was the metal discovered ? And by whom or where ? As to the first, it must be remembered that in some parts of the world, e.g. in China and in Cornwall, copper and tin are found together, and it may well be that tin was first accidentally included as an impurity, which, had it been noticed, would have been eliminated. Once it was found to produce a more useful metal, the blend would be deliberately made, and repeated trials would eventually demonstrate the most suitable proportion of one metal to the other. The question of where it was first discovered is one that is not likely to be answered with certainty, but the one essential is the presence of the two metals in one and the same locality. Tin does not exist in either

Egypt or Mesopotamia, although bronze articles from the fourth and third millennium respectively B.C. have been found in these countries. The tin to produce the mere metal must have come from some foreign country; and the choice seems to be very small. Spain at the other end of the Mediterranean is unlikely, and Britain still more so; central Asia, Asia Minor, or China again seem too remote; for the spread of metallurgy from these centres would imply a trade connexion nearly 4000 B.C. In later times, later perhaps by 3000 years, Spain and Britain were undoubtedly among the chief sources of the tin supply of Europe and of the Mediterranean generally; but it will long remain a problem where bronze was first produced. There is indeed, no real necessity for confining its origin to a single locality; it is easily conceivable that the invention occurred independently in more places than one.

The history of early metallurgy has been carefully studied by W. Gowland, who communicated the results of his researches to the Society of Antiquaries of London in 1899. In his opinion the ores from which copper was first obtained by smelting were

originally found as pebbles or boulders in the beds of streams, where man in the Stone Age had been accustomed to search for stones to convert into implements; and in the same way the beds of rivers were for a long subsequent period the only sources of tin. Actual mining belongs in his opinion to a far later period, and naturally had its origin in the discovery of outcrops of the metal on the surface. By the simple application of fire, lumps of ore were reduced to a smaller size, and were then prepared for smelting by further reduction to the condition of a coarse powder. This latter process was carried out in the same way that grain was crushed between two stones; and stone-mills, doubtless used for the purpose, have been found in ancient workings in Wales. The next stage would be the furnace, and there can be little doubt that this would be of the simplest kind, merely a hole in the ground with the fire covering the metal, and with nothing but a natural draught. But Gow- land holds that even with these singularly inadequate appliances, copper could be smelted from the surface ores, though the output would naturally be of the most uncertain and intermittent character, depending, as it must have done, on the wind. And until the discovery of bellows or some other method of increasing the draught of air, no progress could be made in this direction. With regard to the resulting metal, viz. copper, we have certain knowledge. From time to time there are found in the earth in Britain and elsewhere, hoards of fragmentary or imperfect bronze implements, portions of axes, swords,

rings, &c, all of which have been failures in castings. These hoards are assumed to have been gathered together by the bronze founders to be recast into perfect and useful implements. Now, frequently associated with these hoards are portions of cakes of pure copper, originally circular in shape, flat on one face and convex on the other, like a lens with one flat face. The form of these cakes is in itself a fair proof of the prevalence of the method of smelting described above, as it is quite clear that the convex face of the cake followed the contour of the hole in the ground above which the fire was placed. The cakes are generally found broken up into small handy blocks. This can only be done in one way, viz. by watching the cake, after the fire and slag has been raked off it, until it is on the point of becoming solid, when it is quickly pulled out of the hole and broken up. It will be noted that while the implements in these founders' hoards are invariably of bronze, the cakes are as invariably of copper. This is at first sight puzzling, until it is realized that these founders probably carried the tin necessary for forming bronze m the form of ore, and that tin ore in its pure state is a snuff- coloured powder very easily overlooked when lying on the earth, which it might very nearly resemble in colour, though it would be much heavier. Thus it is probable that in many such dis- coveries the tin ore has accompanied the copper cakes and bronze fragments, but has hitherto eluded the eyes of the finder. Not only have we this conclusive evidence of the methods by which Bronze Age man produced his raw material, but the discovery of crucibles and moulds takes us a step further towards the finished implements. The crucibles are generally simple bowls of thick clay with an extension of the lip at one side to pour out the molten metal. Several of these, with plentiful traces of metal still remaining in them, were found by the brothers Siret in the Bronze Age settlement at El Argar in Murcia. In the same place also were found moulds of stone for the casting of simple triangular axes. These were of the class known as open moulds, one stone being hollowed to the desired form, the other half being simply a flat cover, with no relation to the form of the implement to be produced. From the nature of the metal, such a mould is the only kind in which the casting of an efficient copper implement would be possible; and among the objects discovered by the Sirets were articles in plenty of pure copper.

Much has been written in support of the theory that the bronze tools and implements found in this or that country must have been importations from southern and more highly civilized lands. More particularly has this been alleged with regard to Britain, which, lying as it did on the extreme limit of the ancient

world, was regarded as being dependent on the continent for the more complex weapons. The constant discovery, however, of these hoards of rough metal, as well as of moulds of the highest finish for casting swords, daggers, celts, and almost every kind of ancient bronze implement and

weapon known to us, provides a conclusive proof of the contrary. The occurrence of a foreign type of implement is so rare as to be a source of especial grati- fication to the collector who secures it; and it may be taken that, in general terms, all the bronze swords, daggers and spears found in Britain were of home manufacture. Relations with the continent, however, did exist, as is shown by the occurrence of an Irish type of gold ornament in France and Scandinavia, and by the similarity of ornamental motives in the British Isles and elsewhere. Among the continental races it is natural to find intercommunication more common, owing to the absence of natural barriers. The weapons of the Bronze Age were swords, spears, daggers and axes (celts), though the last would be equally well adapted for more peaceful purposes. The swords were usually of a narrow leaf shape, cast with the handle in one piece, the mounting of the grip and the pommel being added. For perfection of workmanship the weapons of this period have never been surpassed, and the skill of adjustment in the moulds, the fine and equal quality of the metal, and the flawless con- dition of the surfaces still excite wonder among the most expert of modern founders. The cutting edges of swords and " celts " were often, if not always, hammered to serve the double purpose of hardening that part of the weapon and sharpening the edge. In the case of the axe-heads (celts), this hammering had a dis- tinct influence on the evolution of the form of the implement. The earliest celts, whether of copper or bronze, were in form, copies of their stone prototypes, and curiously enough exactly like the ordinary woodman's axe of to-day, but of course without the socket for the handle. Hammering rendered the cutting edge both broader and thinner, giving it at the same time a curved outline. This widened curve eventually became an ornamenta\ feature, the two ends of the cutting edge becoming curved points and adding greatly to the elegance of the outline. Later, the other edges were finished by hammering also, at times in a simple ornamental fashion; and whether for greater rigidity or for some other reason, flanges were produced in the same way on those edges, which again affected the ultimate form of the celt. The early flat celt was no doubt simply fixed in a per- forated wooden handle, which would naturally tend to split if wielded with any vigour. The side-flanges were in course of time utilized to prevent this, by allowing the use of a different form of handle. In place of the simple straight handle, a branch was cut with an elbow-joint, and its shorter limb then divided into two prongs, between which the metal passed, while the flanges, beaten up from the edges, overlapped the two forks; and no doubt a lashing of sinew was added to render the whole secure. This made a good serviceable tool or weapon, and prevented the splitting of the handle; but still another step was taken. The flanges on the edges met over the prong of the handle on either side, while the upper end of the celt itself eventually became a mere septum dividing the two openings. This septum was finally judged to be useless, and done away with; and the celt was cast

with one hollow only for the re- ception of the ends of the handle; thus the flat celt became, by a natural process of evolution and improvement, a socketed celt. It is a curious fact, however, that the modern form of axe where the handle passes through a socket in the metal itself does not seem to have been much in favour in the Bronze Age, although it was a stone form that certainly survived into the succeeding period.

This and other shortcomings in what must have been the universal weapon and implement of the race, were remedied from time to time by various improvements in the form of the bronze axe-head and the method of hafting; and the various stages of development, from the flat blade of copper or bronze to the socketed implement and even to a pattern now in use, can still be traced in the Bronze Age specimens that have come down to us.

ARCHAEOLOGY

Plate V.

SEPULCHRAL POTTERY, BRITISH ISLES

(BRONZE AGE).

1-3, Drinking cups or beakers. 4-9, Food vessels.

10-12, Cinerary urns.

SEPULCHRAL POTTERY FROM THE CONTINENT OF EUROPE (NEOLITHIC, BRONZE, AND IRON AGES).

STAGES IN THE EVOLUTION OF THE CELT OR IMPLEMENT OF CHISEL FORM. (1) From stone to metallic form. (2) Growth of the stop ridge to palstave. (3) Growth of the wings to socket-celt.

IT. 352-

By permission, from the British Museum Guide to (lie Bronze A&c.

Plate VI.

ARCHAEOLOGY

I. Bronze shield with red enamel ornaments, found in the Thames near Battersea; about 31 in. long.

Chariot burial of a Gaulish chief, Somme Bionne, Marne, France.

Bronze mounted wooden bucket found in a pit burial at Aylesford.

Early Iron Age.

The objects here represented are all in the

British Museum.

By permission, from the British Museum Guide to Ike Early Iron Age.

Horned bronze helmet with traces of enamel ornament, found in the Thames near Waterloo Bridge.

Ireland.

With the discovery of iron as the ideal metal for cutting implements and weapons, we enter into the millennium before the Christian era; for roughly speaking, the develop- ronage. mcn {. f tne civilization associated with the gradual substitution of iron for bronze began about iooo B.C. Again we look towards the south-east of Europe for the earliest evidence of this great advance; from that quarter it gradually spread over the whole continent, reaching the more northern parts about five hundred years later. In Egypt, the home of a mar- vellous civilization at a very early time, the conditions were different, and there is reason to suppose that iron was known there long before it was in use on the northern side of the Medi- terranean. Our knowledge of the dates at which iron was first known in parts of Asia is still very limited, and further discoveries must be awaited.

The archaeology of Ireland presents features in many respects different from those of the rest of the British Islands in the Stone and Bronze Ages. Such affinities in style as are traceable connect it rather with Scotland than with any part of the south, a fact doubtless due to proximity as well as in part to race connexions. A special feature is the astonishing quantity of gold that was produced in Ireland during the early Bronze Age. The frequent discovery of gold ornaments of this time has enriched to a surprising degree the museum of the Royal Irish Academy in Dublin, while many private and public collections both in Ireland and elsewhere contain a considerable number of similar relics. If these represented the total wealth of gold of the Bronze Age the amount would probably exceed that of any ancient period in any country, except perhaps the republic of Colombia in South America. But the known remains can only be a small proportion of the original wealth. Vast quantities must have been discovered from

medieval times onwards, nearly all of which would be melted down, owing to the ignorance of the finders or to the uncertainty of ownership. Further, it may be taken as certain that there still remains in the earth a great mass of the metal which may or may not be dis- covered at some future time. If it were by any means possible to estimate what these united categories would amount to, the result would scarcely be credited. It is well known that gold has been, and still is, found in Ireland; but it is hard to believe that there were no richer deposits than are now known. It is at any rate certain that the rivers were worked as late as the opening centuries of our era. In the Bronze Age the most characteristic ornaments were penannular objects of all sizes from a small finger ring up to an armlet, generally known as " ring money " from the difficulty of assigning a definite use to the whole series; and the flat, crescent-shaped, diadem-like objects called "lunulae," which are perhaps even more definitely characteristic of Ireland. Such objects of gold, if ornamented at all, are, like some of the flat axe-heads, engraved with simple geometrical patterns, lozenge-shaped chequers and the like, a type of decoration in itself easily determined as being of the Bronze Age, but bearing at the same time an interesting and very curious analogy to remains of the same period from the Iberian Peninsula, more especially from Portugal. If any overland culture-relations existed between the two countries, it would be only reasonable to expect the occurrence of the objects in question in the inter- vening districts. But so far nothing of the kind has been discovered. Moreover, had it been an isolated instance of resemblance it might be negligible, but an equally odd similarity is found in the fact that the Irish were in the habit of grinding the faces of their flint arrow-heads, an apparently useless refine- ment, while the Portuguese of the early Bronze Age did the same. Again, the dolmens of Ireland bear a distinct resemblance to those of Spain and Portugal, while the French dolmens, with few exceptions in the north, have a different character. These curious points are in favour of the tradition that the original inhabitants of Ireland were of Iberian origin, and further, that they did not come overland but by sea, and there are indeed signs of extensive navigation in the Bronze Age of northern Europe. It was perhaps in the middle of our Bronze Age, say about iooo B.C., that this Iberian race was supplanted by the

Celts, who took a considerable time to emerge from their native barbarism. It is, at any rate, fairly certain that for some hundreds of years previous to this Celtic invasion, Ireland was an enormously rich country, supplying not only herself, but also Britain and part of the Atlantic seaboard with gold. The fact became eventually an ingrained tradition in the history of the country, subsisting in Irish literature for centuries after the Christian era. Such natural wealth must have produced in these early times a marked effect on the relations and culture of these Iberian Irish, and one might

reasonably expect a much higher level of luxury and wealth than is indicated by the remains commonly found. With the opportunities provided by communi- cation with the continent, and the interchange of goods, with all the chances of benefiting by ideas current among other races, it is astonishing that Ireland did not play a more prominent part in Europe, more than a thousand years before the Christian era.

While gold as a metal was known in Europe, even before copper, it is a curious fact that silver was almost unknown, and hardly ever used. One of the most interesting sites for the metal, at about the same period of which we have Medi- just been speaking in Ireland, was the Mediterranean ^^ coast of Spain. Here in the neighbourhood of Almeria have been found remains of a large and apparently prosperous population ranging from the Stone Age to the end of the Bronze Age, with houses and tombs, besides the fortifications rendered necessary, in the later period, by their possession of the rare and precious metal, silver. Rare it certainly was, for the quantity found was exceedingly small, tiny slender rings for the fingers or the ears, and rivets to hold the axe-blade in its handle; but nothing to compare with the lavish richness of the American mines. The interesting race who occupied these dwellings and finally were laid to rest in the adjoining graves were evidently connected more or less closely with the peoples inhabiting the eastern coasts of the Mediterranean.

Recent discoveries in the central Mediterranean area not only furnish new and trustworthy (though none the less surprising) dates in ancient history, but may also bridge the distance between the Levant and the Pillars of Hercules. The results achieved by Arthur Evans and other distinguished explorers in Crete (q.v.) opened a new chapter in the history of European civilization, and may fitly be compared with the excavation of Troy, Mycenae and Tiryns by Schliemann some thirty years before. The progress of archaeology in the interval can be well tested by a comparison of the discussions to which the two series of discoveries gave rise. The mistaken attributions and unfor- tunate animosities in connexion with earlier excavations are almost forgotten, while the brilliant discoveries in the island of King Minos have not only themselves been made on scientific principles, but are illumined by the splendid revelation of the civilizations of the Mycenaean and the pre-Mycenaean era.

A great change indeed took place in the methods of classical study during the last decade of the 19th century, a change which affected the entire character of future classical classical research. It was formerly the common habit among students and professors of archaeology to confine their attention and their interests entirely to classical texts and even to classical sites, rejecting as outside the scope of their studies anything that was not manifestly beautiful as art. Whatever was primi- tive in its aspect, or

wanting in the familiar characteristics that had for centuries been associated with Greek art, was either rejected entirely or at any rate relegated to a second place, as having but a poor claim to be classed with objects of the finer periods. The result was necessarily misleading. The unin- structed majority very naturally regarded the art of Pheidian times as a thing of supernatural growth, which had been be- stowed by divine favour upon a chosen spot on the earth, without a human parentage, and almost without leaving any descendants. The evolutionary methods of other branches of science, however, were by degrees brought to bear upon the sacred precincts of pure Greek art. It was found that the crude products of the second millennium B.C., the formless images evolved by the uncultured dwellers in the Mediterranean area more than a

thousand years before the time of Pheidias, were in truth the prototypes of the creations of himself and his contemporaries. This step being taken, the rest became easy. The most common- place and ordinary relics were collected with as much avidity as they had formerly been rejected, in the belief that their simple forms would aid in the elucidation of their more complex and highly elaborated descendants. This minute attention, more- over, was not only given to the works of man, but even the remains of humanity received the attention . they merited. It has been rightly thought, during recent years, that the question of race was a factor that deserved treatment in dealing with works of art of early times; and that natural evolution due to man's tendency to change with time, might not be sufficient to account for the differences of type observed in human remains from the same country. For this reason, not only the objects associated with the burial have been preserved, but also the skeleton itself. This has been examined, measurements taken and recorded for comparison, and inferences made, sometimes of a surprising character. For example, if a cemetery be found with a preponderance of tall, long-headed skeletons in a district where the prevailing , type of skeleton is short and brachy- cephalic (short-headed), the observer may reasonably expect a different kind of burial-furniture, and suspect an intruding race. In this particular respect, archaeology owes a signal debt to physical anthropology and to anthropological methods in general. The combination of the two is far more likely to lead to a reasonable and satisfactory conclusion than would be possible if the one branch of science had been pursued alone.

When once the existence of abundant remains of prehistoric man had been

admitted, and their study had received recog- nition as a branch of science, the evidence supplied ethnology. ˆY tne relics themselves and by their relation to extinct or existing animals would have sufficed to give a considerable insight into the conditions of primitive life. But, fortunately, corroborative evidence of the most useful kind was at hand, and has been of the greatest service in solving what might otherwise have been insoluble problems. Though the progress of civilization, and more especially the ever in- creasing rapidity of communication, are rapidly changing the habits of life among the primitive peoples in various parts of the world, yet till past the middle of the ioth century, a certain number of tribes, if not races, were still in the Stone Age. Even at the present day stone-using tribes still exist, although by chance metal may be known to them. The importance of the study of their conditions of life and their technical processes, and of the collecting of their implements for the express purpose of illustrating prehistoric man, was recognized by Henry Christy (1810-1865), who had made extensive investigations and col- lected relics in conjunction with Edouard Lartet in the now famous caverns of the Dordogne, at a time when such explora- tions were somewhat of a novelty; and concurrently he formed a large collection of the productions of existing savage peoples, both collections after his death passing to the British Museum, his intention being that the one should elucidate the ether. (It is only fair to his memory, however, to state here that, by his express wish, the most important of the relics that he had obtained from the Dordogne caves were returned to France where they now are. Such instances of international courtesy are rare enough to deserve mention.) The value and interest of such a series can scarcely be over-rated. Almost till the 20th century, the Indians of North America, the Australian and Tasmanian natives, as well as those of New Zealand and the many archipelagoes of the Pacific, were, if not ignorant of the use of metals, at least habitually using stone where civilized man would use metal. The Maori made his war club of jade and the pounders for preparing his food of stone. The Australian had his stone axe-blade; and low as he stands in the culture scale, his spear-heads are chipped with an exquisite precision. The Papuan of inland New Guinea is still making his weapons of stone and wood; while until quite recently the North American Indian was making his delicate stone arrow-points, and the Solomon islander his beautiful polished stone axe-blades.

The knowledge gained by the study of a large series of such objects enables us to fill up very many gaps in the story of early man as told by his own remains. In fact, in this respect, the value of the comparison is much greater than could reasonably be expected; for, whatever may be the reason, nothing is more marked than the extraordinary similarity of stone implements at all times and over the whole world. An arrow-point made by a Patagonian Indian, one from a Japanese shell mound, and a third of the

Stone Age from Ireland, are found to be practically identical. Whether it is that the same material and the same necessity naturally produce a like result, or whether there has existed throughout a continuity of type, is a question that will never be satisfactorily answered. The results, however, are of eminently practical value. The arrow-heads of neolithic man, which arc found by hundreds all over Europe, may be seen fixed in their shafts in the hands of an American Indian; rude pieces of quartz, which unmounted would escape notice as implements, are seen to make excellent tools when mounted in a handle by the Australian black, while flakes of slate find a use when mounted as skinning -knives by the Eskimo.

Now that the narrower conception of archaeology as a minor branch of classical studies has been given up, the new science has gradually won its way to universal recognition; and anthropology, a still wider subject but in many s< ˆjL points closely allied to the scientific study of ancient remains, has still more recently found favour at all the leading universities, and practical measures have been taken to establish the study on a firm and scientific basis. Apart from this official encouragement, much has been done towards the systema- tization and teaching of archaeology by practical . excavators, whose pupils have attained considerable numbers and celebrity. Something has been done, too, in the national and provincial museums, to present the relics of past ages in an intelligible manner, so that the collections no longer consist of curiosities but of documents rich in instruction and interest even to the general visitor.- The progress of photography, as well as the improvement and cheapening of methods of illustration, have also assisted enormously in the advance of archaeology; and similarly, the antiquities exhibited in museums and private collections to illustrate and amplify written records, . have in the last generation received much attention on their own account, and have reacted in various ways on the teaching of ancient history. In some countries a further step in general education has been taken, and the lamentable waste of archaeological material arrested to some extent by the distribution of pictures and diagrams among schools and institutions, to call attention to the more ordinary local types, and to encourage those who are likely to discover them in the soil to save them from destruction and render them available for scientific study. A certain familiarity on the part of the young with the mere appearance of antiquities that come to light continually and are almost as often discarded or destroyed, would probably result in valuable additions being made to the available data.

Bibliography. — The most useful general works are thef ollowing:— Salomon Reinach, Epoque des alluvions el des cavernes (Musee de St Germain); Hoernes, Der diluviale Mcnsch in Europa; Sir John Evans, Stone Implements of Great Britain, and Bronze Implements of Great Britain; Boyd Dawkins, Cave-hunting, and Early Man in Britain; Greenwell, British

Barrows; W. G. Smith, Man the Primeval Savage; James Geikie, Prehistoric Europe; Mortillet, Le Prehislorique; Robert Munro, Lake Dwellings of Europe; Ridge- way, Early Age of Greece; Jos. Anderson, Scotland in Pagan Times; the works of Oscar Montelius and Sophus Miiller; L'Anthropologie, Materiaux pour I'histoire primitive de I'homme; Christy and Lartet, Reliquiae Aquitanicae; A. Michaelis, A Century of Archaeological Dis- covery (Eng. trans., 1908). See also Anthropology, and authorities mentioned there; Stone Age; Bronze Age; Iron Age, &c. ; Geology ; and the articles on different countries and sites.

(C. H. Rd.)

ARCHAEOPTERYX. The name of Arckaeopteryx lithographica was based by Hermann von Meyer upon a feather (Gr.7rrepu£, wing) found in 1861 in the lithographic. slate quarries of Solenhofen in Bavaria, the geological horizon being that of the Kimmeridge clay of the Upper Oolite or Jurassic system. In the same year and at the same place was discovered the specimen (figs. 1 and 3)

now in the British Museum, named by Andreas Wagner Gripho- saurus. Sir R. Owen has described it as A . macroura. Stimu- lated by the high price paid by the British Museum, the quarry owners diligently searched, and in 1872 another, much finer, preserved specimen was found. This was bought by K. W.

Fig. I. — The British Museum specimen.

v. Siemens, who presented it to the Berlin Museum. The late W. Dames has written an excellent monograph on it.

Archaeopteryx was a bird, without any doubt, but still with so many low, essentially reptilian characters that it forms a link between these two classes. About the size of a rook, its most

iWWK'liH. 1

ww.

::;f'ij'ii;iii: , |i[image] i !!i| i iif ,, »i | s , sHsii

!i»P!J!ii;!i;R

Fig. 2. — The specimen in the Museum fiir Naturkunde, Berlin. After a photograph taken from a cast.

obvious peculiarity is the long reptilian tail, composed of 20 vertebrae and not ending in a pygostyle. The last dozen verte- brae each carry a pair of well-developed typical quills. Upon these features of the tail E. Kaeckel established the subclass Saururae, containing solely Archaeopteryx, in opposition to the Ornithurae, comprising all the other birds. Herein he has been followed by raany zoologists. However, the fact that various

recent birds possess the same kind of caudal skeleton, likewise without a pygostyle, although reduced to at least 13 vertebrae, shows that the two terms do not express a fundamental difference. The importance of Archaeopteryx justifies the following descriptive detail. Vertebral column composed of about 50 vertebrae, viz. 10-11 cervical, 12-n thoracic, 2 lumbar, 5-6 sacral, and 20 or 21 caudal, with a total caudal length of the Berlin specimen of 7 in. The cervical and thoracic vertebrae seem to be biconcave; the cervical ribs are much reduced and were apparently still movable; the thoracic ribs are devoid of uncinate processes. Paired abdominal ribs are doubtful. Scarcely anything is known of the sternum, and little of the shoulder-girdle, except the very stout furcula; scapula typically bird-like. Humerus about 2-| in. long, with a strong crista lateralis, which indicates a strongly developed great pectoral muscle and hence, by inference, the presence of a keel to the sternum. Radius and ulna typically avine, 2-1 in. in length. Carpus with two separate bones. The hand skeleton consists of 3 completely separate metacarpals, each carrying a com-

Fig. 3. — Tail of British Museum specimen.

plete, likewise free, finger; the shortened thumb with 2, the index with 3, the third with 4 phalanges; each finger with a curved claw. The whole wing is consequently, although essentially avine, still reptilian in the unfused state of the metacarpals and the numbers of the phalanges. The pelvis is imperfectly known. The preacetabular portion of the ilium is shorter than the posterior half. The hind-limb is typically avine, with intertarsal joint, distally reduced fibula, and the three elongated metatarsals which show already considerable anchylosis; reduction of the toes to four, with 2, 3, 4 and 5 phalanges; the hallux is separate, and as usual in recent birds posterior in position. Skull bird-like, except that the short bill cannot have been enclosed in a horny rhamphotheca, since the upper jaw shows a row of 13, the lower jaw 3 conical teeth, all implanted in distinct sockets.

The remiges and rectrices indicate perfect feathers, with shaft and complete vanes which were so neatly finished that they must have possessed typical

radii and hooklets. Some of the quills measure fully 5 in. in length. Six or seven remiges were attached to the hand, ten to the ulna.

It is idle to speculate on the habits of this earliest of known birds. That it could fly is certain, and the feet show it to have

been well adapted to arboreal life. The clawed slender fingers did not make Archaeopteryx any more quadrupedal or bat-like in its habits than is a kestrel hawk, with its equally large, or even larger thumb-claw.

Bibliography. — H. v. Meyer, Neues Jahrb.f. Mineralog. (1861), p. 679; Sir R. Owen, " On the Archaeopteryx von Meyer …" Phil. Trans., 1863, pp. 33-47, pis. i.-iv. ; T. H. Huxley, " Remarks on the Skeleton of the Archaeopteryx and on the relations of the bird to the reptile," Ceol. Mag. i., 1864, pp. 55-57; C. Vogt, " L'Archaeo- pteryx macrura," Revue sclent, de la France et de Vetranger, 1879, pp. 241-248; VV. Dames, " fiber Archaeopteryx," Palaeontol. Abhandl. ii. (Berlin, 1884); Idem, " fJber Brustbein Schulter- und Beckengiirtel der Archaeopteryx," Math, naturw. Milth. Berlin, vii. (1897), pp. 476-492. (H. F. G.)

• ARCHAISM (adj. "archaic"; from Gr. apxcuos, old), an old-fashioned usage, or the deliberate employment of an out-of- date and ancient mode of expression.

ARCHANGEL (Archangelsk), a government of European Russia, bounded N. by the White Sea and Arctic Ocean, W. by Finland and Olonets, S. by Vologda, and E. by the Ural mountains. It comprehends the islands of Novaya-Zemlya, Vaygach and Kolguev, and the peninsula of Kola. Its area is 331,505 sq. m., and its population in 1867 was 275,779 an d in 1897, 349,943. The part which lies within the Arctic Circle is very desolate and sterile, consisting chiefly of sand and reindeer moss. The winter is long and severe, and even in summer the soil is frozen. The rivers (Tuloma, Onega, Dvina,- Mezen and Pechora) are closed in September and scarcely thaw before July. The Kola peninsula is, however, diversified by hills exceeding 3000 ft. in altitude and by large lakes (e.g. Imandra), and its coast enjoys a much more genial climate. South of the Arctic Circle the greater part of the country is covered with forests, intermingled with lakes and morasses, though in places there is excellent pasturage. Here the spring is moist, with cold, frosty nights; the summer a succession of long foggy days; the autumn again moist. The rivers are closed from October to April. The inhabitants of the northern districts — nomad tribes of Samoyedes, Zyryans, Lapps, and

the Finnish tribes of Karelians and Chudes — support themselves by fishing and hunting. In the southern districts hemp and flax are raised, but grain crops are little cultivated, so that the bark of trees has often to be ground up to eke out the scanty supply of flour. Potatoes are grown as far north as 65 . Shipbuilding is carried on, and the forests yield timber, pitch and tar. Excellent cattle are raised in the district of Kholmogory on the Dvina, veal being supplied to St Petersburg. Gold is found in the districts of Kola, naphtha and salt in those of Kem and Pinega, and lignite in Mezen. Sulphurous springs exist in the districts of Kholmogory and Shenkursk. The industry and commerce are noticed below in the article on the town Archangel, which is the capital. The government is divided into nine districts, the chief towns of which are — ■ Alexandrovsk or Kola (pop. 300), Archangel (q.v.), Kem (1825), Kholmogory (1465), Mezen (2040), Novaya-Zemlya (island), Pechora, Pinega (1000) and Shenkursk (1308).

See A. P. Engelhardt, A Russian Province of the North (Eng. trans., by H. Cooke, 1899).

ARCHANGEL (Archangelsk), chief town of the government of Archangel, Russia, at the head of the delta of the Dvina, on the right bank of the river, in lat. 64 32′ N. and long. 4o°33′ E. Pop. (1867) 19,936; (1897) 20,933. As early as the 10th century, if not earlier, the Norsemen frequented this part of the world (Bjarmeland) on trading expeditions; the best-known is that made by Ottar or Othere between 880 and 900 and described (or translated) by Alfred the Great, king of England. The modern town dates, however, from the visit of the English voyager, Richard Chancellor, in 1553. An English factory was erected on the lower Dvina soon after that date, and in 1584 a fort was built, around which the town grew up. Archangel was for long the only seaport of Russia (or Muscovy). The tsar Boris Godunov (1598-1605) threw the trade open to all nations; and the chief participants in it were England, Holland and Germany. In 1668-1684 the great bazaar and trading hall was built, principally by Tatar prisoners. In 1691-1700 the exports to England averaged £112,210 annually. After Peter the Great

made St Petersburg the capital of his dominions (1702), he placed Archangel' under vexatious commercial disabilities, and consequently its trade declined. In 1762 it was granted the same privileges as St Petersburg, and since then it has gradually recovered its former prosperity. It is the seat of a bishop, and has a cathedral (1709-1743), a museum, the monastery of the Archangel Michael (whence the city gets its name), an ecclesiastical seminary, a school of navigation and a naval hospital. Linen, leather, canvas, cordage, mats, tallow, potash and beer are manufactured. There is a lively trade with St Petersburg, and the sea-borne exports, which consist chiefly of timber, flax, linseed, oats, flour, pitch, tar, skins and

mats, amount in value to about 1 J millions sterling annually (82! % for timber), but the imports (mostly fish) are worth only about^ 200,000. A fish fair is held every year on the 1st (15th) of Septe^- 1^:. Archangel communicates with the interior of Russia by ri "j.nd-'canal, and has a railway line (5 2 2 m.) to Yaroslavl. The Labour, deepened to 18 j ft., is about a mile below the city, and is accessible from May to October. About 12 m. lower down there are a government dockyard and merchants' warehouses. A new military harbour, Alexandrovsk or Port Catherine, has been made on Catherine (Ekaterininsk) Bay, on the Murman coast of the Kola peninsula. The shortest day at Archangel has only 3 hrs. 12 min., the longest 2r hrs. 48 min. of daylight.

ARCHBALD, a borough of Lackawanna county, Pennsylvania, U.S.A., in the N.E. part of the state, 10 m. N.E. of Scranton. Pop. (1890) 4032; (1900) 5396; (1869 foreign-born); (1910) 7194. It is served by the Delaware & Hudson, and the New York, Ontario & Western railways, and by an interurban electric fine. It is about 900 ft. above sea-level; in the vicinity are extensive deposits of anthracite coal, the mining and breaking of which is the principal industry; silk throwing and weaving is another industry of the borough. At Archbald is a large glacial " pot hole," about 20 ft. in diameter and 40 ft. in depth. Arch- bald, named in honour of James Archbald, formerly chief engineer of the Delaware & Hudson railway, was a part of Blakely township (incorporated in 1818) until 1877, when it became a borough.

ARCHBISHOP (Lat. archiepiscopus, from Gr. apxi&rlffKoiros) , in the Christian Church, the title of a bishop of superior rank, implying usually jurisdiction over other bishops, but no superi- ority of order over them. The functions of the archbishop, as at present exercised, developed out of those of the metropolitan (q.v.); though the title of archbishop, when it first appeared, implied no metropolitan jurisdiction. Nor are the terms inter- changeable now; for not all metropolitans are archbishops, 1 nor all archbishops metropolitans. The title seems to have been introduced first in the East, in the 4th century, as an honorary distinction implying no superiority of jurisdiction. Its first recorded use is by Athanasius, bishop of Alexandria, who applied it to his predecessor Alexander as a mark of respect. In the same way Gregory of Nazianzus bestowed it upon Athanasius himself. In the next century its use would seem to have been more common as the title of bishops of important sees ; for several archbishops are stated to have been present at the council of Chalcedon in 4 5 1 . In the Western Church the title was hardly known before the 7th century, and did not become common until the Carolingian emperors revived the right of the metro- politans to summon provincial synods. The metropolitans now commonly assumed the title of archbishop to mark their pre- eminence over the other bishops; at the same time the obligation

imposed upon them, mainly at the instance of St Boniface, to receive the pallium (q.v.) from Rome, definitely marked the defeat of their claim to exercise metropolitan jurisdiction independently of the pope.

At the present day, the title of archbishop is retained in the Roman Catholic Church, the various oriental churches, the Anglican Church, and certain branches of the Lutheran (Evangelical) Church.

1 In the Roman Church it is safe to say that all metropolitans are archbishops. In, e.g., the Scottish and American episcopal churches, however, the metropolitan is the senior bishop pro tern.

In the Roman Catholic Church the powers of the archbishop are considerably less extensive than they were in the middle ages.

According to the medieval canon law, based on the Catholic decretals, and codified in the 13 th century in the Church. Corpus juris canonici, by which the earlier powers

of metropolitans had been greatly curtailed, the powers of the archbishop consisted in the right (1) to confirm and consecrate suffragan bishops; (2) to summon and preside over provincial synods; (3) to superintend the suffragans and visit their dioceses, as well as to censure and punish bishops in the interests of discipline, the right of deprivation, however, being reserved to the pope; (4) to act as a court of appeal from the diocesan courts; (5) to exercise the jus devolutionis , i.e. present to benefices in the gift of bishops, if these neglect their duty in this respect. These rights were greatly curtailed by the council of Trent. The confirmation and consecration of bishops (q.v.) is now reserved to the Holy See. The summoning of provincial synods, which was made obligatory every three years by the council, was long neglected, but is now more common wherever the political conditions, e.g. in the United States, Great Britain and France, are favourable. The disciplinary powers of the archbishop, on the other hand, can scarcely be said to survive. The right to hold a visitation of a suffragan's diocese or to issue censures against him was, by Sess. xxiv. c. 3 de ref., of the council of Trent, made dependent upon the consent of the provincial synod after cause shown (causa cognita et probata) ; and the only two powers left to the archbishop in this respect are to watch over the diocesan seminaries and to compel the residence of the bishop in his diocese. The right of the arch- bishop to exercise a certain disciplinary power over the regular orders is possessed by him, not as

archbishop, but as the delegate ad hoc of the pope. Finally, the function of the archbishop as judge in a court of appeal, though it still subsists, is of little practical importance now that the clergy, in civil matters, are universally subject to the secular courts.

Besides archbishops who are metropolitans there are in the Roman Catholic Church others who have no metropolitan jurisdiction. Such are the titular archbishops in partibus, and certain archbishops of Italian sees who have no bishops under them. Archbishops rank immediately after patriarchs and have the same precedence as primates. The right to wear the pallium is confined to those archbishops who are not merely titular. It must be applied for, either in person or by proxy, at Rome by the archbishop within three months of his consecration or enthronement, and, before receiving it, he must take the oaths of fidelity and obedience to the Holy See. Until the pallium is granted, the archbishop is known only as archbishop-elect, and is not empowered to exercise his potestas ordinis in the archdiocese nor to summon the provincial synod and exercise the jurisdiction dependent upon this. He may, however, exer- cise his purely episcopal functions. The special ensign of his office is the cross, crux erecta or gestatoria, carried before him on solemn occasions (see Cross).

In the Orthodox and other churches of the East the title of archbishop is of far more common occurrence than in the West,

and is less consistently associated with metropolitan Church. functions. Thus in Greece there are eleven archbishops

to thirteen bishops, the archbishop of Athens alone being metropolitan; in Cyprus, where there are four bishops and only one archbishop, all five are of metropolitan rank.

In the Protestant churches of continental Europe the title of archbishop has fallen into almost complete disuse. It is, however,

still borne by the Lutheran bishop of Upsala, who is Church!" metropolitan of Sweden, and by the Lutheran bishop

of Abo in Finland. In Prussia the title has occasionally been bestowed by the king on general superintendents of the Lutheran church, as in 1829, when Frederick William III. gave it to his friend and spiritual adviser, the celebrated preacher, Ludwig Ernst Borowski (1740-1831), general superintendent of Prussia (181 2) and bishop (1816).

In the Church of England and its sister and daughter churches the position of the archbishop is defined by the medieval

canon law as confirmed or modified by statute since the Reformation. It is, therefore, as regards both the potestas ordinis and jurisdiction, substantially the same as in the Roman Catholic Church, save as modified on the EaSand! one hand by the substitution of the supremacy of the crown for that of the Holy See, and on the other by the restric- tions imposed by the council of Trent.

The ecclesiastical government of the Church of England is divided between two archbishops — the archbishop of Canterbury, who is " primate of all England " and metropolitan of the pro- vince of Canterbury, and the archbishop of York, who is " primate of England " and metropolitan of the province of York. The jurisdiction of the archbishop of Canterbury as primate of all England extends in certain matters into the province of York. He exercised the jurisdiction of legatus natus of the pope through- out all England before the Reformation, and since that event he has been empowered, by 25 Hen. VIII. c. 21, to exercise certain powers of dispensation in cases formerly sued for in the court of Rome. Under this statute the archbishop continues to grant special licences to marry, which are valid in both pro- vinces; he appoints notaries public, who may practise in both provinces; and he grants dispensations to clerks to hold more than one benefice, subject to certain restrictions which have been imposed by later statutes. The archbishop also continues to grant degrees in the faculties of theology, music and law, which are known as Lambeth degrees. His power to grant degrees in medicine, qualifying the recipients to practise, was practically restrained by the Medical Act 1858.

The archbishop of Canterbury exercises the twofold juris- diction of a metropolitan and a diocesan bishop. As metro- politan he is the guardian of the spiritualities of every vacant see within the province, he presents to all benefices which fall vacant during the vacancy of the see, and through his special commissary exercises the ordinary jurisdiction of a bishop within the vacant diocese. He exercises also an appellate juris- diction over each bishop, which, in cases of licensed curates, he exercises personally under the Pluralities Act 1838; but his ordinary appellate jurisdiction is exercised by the judge of the Arches court (see Arches, Court or). The archbishop had formerly exclusive jurisdiction in all causes of wills and intes- tacies, where parties died having personal property in more than one diocese of the province of Canterbury, and he had concurrent jurisdiction in other cases. This jurisdiction, which he exercised through the judge of the Prerogative court, was transferred to the crown by the Court of Probate Act 1857. The Arches court was also the court of appeal from the consistory courts of the bishops of the province in all testamentary and matri- monial causes. The matrimonial jurisdiction was transferred to the crown by the Matrimonial Causes Act 1857. The court of Audience, in which the archbishop presided personally, attended by his vicar-general, and

sometimes by episcopal assessors, has fallen into desuetude. The vicar-general, however, exercises jurisdiction in matters' of ordinary marriage licences and of institutions to benefices. The master of the faculties regulates the appointment of notaries public, and all dispen- sations which fall under 25 Hen. VIII. c. 21.

A right very rarely exercised by the archbishop of Canterbury, but one of great importance, is that of the visitation and de- privation of inferior bishops. Since there is no example of the archbishop of York exercising or being reputed to have such disciplinary jurisdiction over his suffragans, 1 and this right could, according to the canon law cited above, in the middle ages only be exercised normally in concert with the provincial synod, it would seem to be a survival of the special jurisdiction enjoyed by the pre-Reformation archbishop as legatus natus of the pope. It was somewhat freely exercised by Cranmer and his successors immediately after the Reformation; but the main precedent now relied upon is that of Dr Watson, bishop of St Davids, who was deprived in 1695 by Archbishop Tennison for simony and

1 Unless the case of the claim of Mark, bishop of Carlisle, to be tried by his ordinary instead of by a temporal court, be a precedent (Phillimore, Eccles. Law, p. 74, ed. 1895).

other offences, the legality of the sentence being finally confirmed by the House of Lords on the 25th of January 1705. It was proved in the course of the long argument in this case that the archbishop of Canterbury had undoubtedly exercised such inde- pendent power of visitation both before and after the Refor- mation; and it was on this precedent that in 1888 the judicial committee of the privy council mainly relied in deciding that the archbishop had the right to cite before him the bishop of Lincoln (Dr Edward King), who was accused of certain irregular ritual practices. The trial began on the 12th of February 1889 before the archbishop and certain assessors, the protest of Dr King, based on the claim that he could only be tried in a pro- vincial synod, being overruled by Archbishop Benson on the grounds above stated. The main importance of the " Lincoln Judgment," delivered on the 21st of November 1890, is that it set a new precedent for the effective jurisdiction of the arch- bishop, based on the ancient canon law, and so did something towards the establishment of a purely " spiritual " court, the absence of which had been one of the main grievances of a large body of the clergy.

It is the privilege of the archbishop of Canterbury to crown the kings and queens of England. He is entitled to consecrate all the bishops within his province and was formerly entitled, upon consecrating a bishop, to select a benefice within his diocese at his option for one of his chaplains, but this practice was indirectly abolished by 3 and 4 Vict. c. in, § 42. He is entitled to nominate eight chaplains, who had formerly certain statutory privileges, which are now abolished. He is ex officio an ecclesiastical commissioner for England, and has by statute the right of nominating one of the salaried ecclesiastical com- missioners.

The archbishop exercises the ordinary jurisdiction of a bishop over his diocese through his consistory court at Canterbury, the judge of which court is styled the commissary-general of the city and diocese of Canterbury. The archbishop holds a visitation of his diocese personally every' three years, and he is the only diocesan who has kept up the triennial visitation of the dean and chapter of his cathedral. 1 The archbishop of Canterbury takes precedence immediately after princes of the blood royal and over every peer of parliament, including the lord chancellor.

The archbishop of York has immediate spiritual jurisdiction as metropolitan in the case of all vacant sees within the province of York, analogous to that which is exercised by the archbishop of Canterbury within the province of Canterbury. He has also an appellate jurisdiction of an analogous character, which he exercises through his provincial court, whilst his diocesan jurisdiction is exercised through his consistorial court, the judges of both courts being nominated by the archbishop. His ancient testamentary and matrimonial jurisdiction was transferred to the crown by the same statutes which divested the see of Canterbury of its jurisdiction in similar matters. It is the privilege of the archbishop of York to crown the queen consort and to be her perpetual chaplain. The archbishop of York takes precedence over all subjects of the crown not of royal blood, but after the lord high chancellor of England. He is ex officio an ecclesiastical commissioner for England (see further England, Church of).

" The Church of Ireland had at the time of the Act of Union four archbishops, who took their titles from Armagh, Dublin, Cashel and Tuam. By acts of 1833 and 1834, the metropolitans of Cashel and of Tuam were reduced to the status of diocesan bishops. The two archbishoprics of Armagh and Dublin are maintained in the disestablished Church of Ireland.

The title archbishop has been used in certain of the colonial churches, e.g. Australia, South Africa, Canada, and the West Indies, since 1893, when it was assumed by the metropolitans of Canada and Rupert's Land (see Anglican Communion).

1 The court of Peculiars is no longer held, inasmuch as the peculiars have been placed by acts of parliament under the ordinary juris- diction of the bishops of the respective dioceses in which they are situated.

Archbishops have the title of His (or Your) Grace and Most Reverend Father in God.

See Hinschius, System des kaiholischen Kirchenrechts (Berlin, 1869), also article " Erzbischof," in Hauck, Realencyklopddie (1898) ; Phillimore, The Ecclesiastical Law of the Church of England, and authorities there cited. (W. A. P.)

ARCHCHANCELLOR (Lat. Archicancellarius; Ger. Erz- kanzler), or chief chancellor, a title given to the highest dignitary of the Holy Roman Empire, and also used occasion- ally during the middle ages to denote an official who supervised the work of chancellors or notaries.

In the 9th century Hincmar, archbishop of Reims, in his work, De ordine palatii et regni, speaks of a summus cancellarius, evidently an official at the court of the Carolingian emperors and kings. A charter of the emperor Lothair I. dated 844 refers to Agilmar, archbishop of Vienne, as archchancellor, and there are several other references to archchancellors in various chronicles. This office existed in the German kingdom of Otto the Great, and about this time it appears to have become an appanage of the archbishopric of Mainz. When the Empire was restored by Otto in 962, a separate chancery seems to have been organized for Italian affairs, and early in the nth century the office of archchancellor for the kingdom of Italy was in the hands of the archbishop of Cologne. The theory was that all the imperial business in Germany was supervised by the elector of Mainz, and for Italy by the elector of Cologne. However, the duties, of archchancellor for Italy were generally discharged by deputy, and after the virtual separation of Italy and Germany, the title alone was retained by the elector. When the kingdom of Burgundy or Aries was acquired by the emperor Conrad II. in 1032 it is possible that a separate chancery was established for this kingdom. However this may be, during the 12th century the elector of Trier took the title of archchancellor for the king- dom of Aries, although it is doubtful if he ever performed any duties in connexion with this office. This threefold division of the office of imperial archchancellor was acknowledged in 1 356 by the Golden Bull of the emperor Charles IV., but the duties of the office were performed by the elector of Mainz. The office in this form was part of the constitution of the Empire until 1803 when the archbishopric of Mainz was secularized. The last elector, Karl Theodor von Dalberg, however, retained the title of archchancellor until the dissolution of the Empire in 1806. H. Reincke in Der alte Reichstag und der neue Bundesrai (Tubingen, 1906) points out a

marked resemblance between the medieval archchancellor and the German imperial chancellor of the present day.

See du Cadge, Glossarium, s. "Archicancellarius"; and Chan- cellor.

ARCHDEACON (Lat. archidiaconus, Gr. apxifoanovos) , a high official of the Christian Church. The office of archdeacon is of great antiquity. So early as the 4th century it is mentioned as an established office, and it is probable that it was in existence in the 3rd. Originally the archdeacon was, as the name implies, the chief of the deacons attached to the bishop's cathedral, his duty being, besides preaching, to supervise the deacons and their work, i.e. more especially the care of the sick and the arrangement of the externals of divine worship. Even thus early their close relation to the bishop and their employment in matters of episcopal administration gave them, though only in deacons' orders, great importance, which continually developed. In the East, in the 5th century, the archdeacons were already charged with the proof of the qualifications of candidates for ordination ; they attended the bishops at ecclesiastical synods, and sometimes acted as their representatives; they shared in the administration of sees during a vacancy. In the West, in the 6th and 7th centuries, besides the original functions of their office, arch- deacons had certain well-defined rights of visitation and super- vision, being responsible for the good order of the lower clergy, the upkeep of ecclesiastical buildings and the safe-guarding of the church furniture — functions which involved a considerable discip- linary power. During the 8th and 9th centuries the office tended to become more and more exclusively purely administrative,

the archdeacon by his visitations relieving the bishop of the minutiae of government and keeping him informed in detail of the condition of his diocese. The archdeacon had thus become, on the one hand, the oculus episcopi, but on the other hand, armed as he was with powers of imposing penance and, in case of stubborn disobedience, of excommunicating offenders, his power tended more and more to grow at the bishop's expense. This process received a great impulse from the erection in the nth and 12th centuries of defined territorial jurisdictions for the archdeacons, who had hitherto been itinerant representatives of the central power of the diocese. The dioceses were now mapped out into several archdeaconries {archidiaconatus) , which corresponded with the political divisions of the countries; and these denned spheres, in accordance with the prevailing feudal tendencies of the age, gradually came to be regarded as inde- pendent centres of jurisdiction. 1 The bishops, now increasingly absorbed in

secular affairs, were content with a somewhat theoretical power of control, while the archdeacons rigorously asserted an independent position which implied great power and possibilities of wealth. The custom, moreover, had grown up of bestowing the coveted office of archdeacon on the provosts, deans and canons of the cathedral churches, and the archdeacons were thus involved in the struggle of the chapters against the episcopal authority. By the 12th century the archdeacon had become practically independent of the bishop, whose consent was only required in certain specified cases.

The power of the archdeacon reached its zenith at the outset of the 13th century. Innocent III. describes him as judex ordinarius, and he possesses m his own right the powers of visitation, of holding courts and imposing penalties, of deciding in matrimonial causes and cases of disputed jurisdiction, of testing candidates for orders, of inducting into benefices. He has the right to certain procurations, and to appoint and depose archpriests and rural deans. And these powers he may exercise through delegated officiates. His jurisdiction has become, in fact, not subordinate to, but co-ordinate with that of the bishop. Yet, so far as orders were concerned, he remained a deacon; and if archdeacons were often priests, this was because priests who were members of chapters were appointed to the office.

From the 13th century onward a reaction set in. The power of the archdeacons rested upon custom and prescription, not upon the canon law; and though the bishops could not break, they could circumvent it. This they did by appointing new officials to exercise in their name the rights still reserved to them, or to which they laid claim. These were the officiates: the officiates Joranei, whose jurisdiction was parallel with that of the archdeacons, and the officiates principales and vicars-general, who presided over the courts of appeal. The clergy having thus another authority, and one moreover more canonical, to appeal to, the power of the archdeacons gradually declined; and, so far as the Roman Catholic Church is concerned, it received its death-blow from the council of Trent (1564), which withdrew all matrimonial and criminal causes from the competence of the archdeacons, forbade them to pronounce excommunications, and allowed them only to hold visitations in connexion with those of the bishop and with his consent. These decrees were not, indeed, at once universally enforced; but the convulsions of the Revolutionary epoch and the religious reorganization that followed completed the work. In the Roman Church to-day the office of archdeacon is merely titular, his sole function being to present the candidates for ordination to the bishop. The title, indeed, hardly exists save in Italy, where the archdeacon is no more than a dignified member of a chapter, who takes rank after the bishop. The ancient functions of the archdeacon are exercised by the vicar-general. In the Lutheran church the title Archidiakonus is given in some places to the senior assistant pastor of a church.

1 Archdeaconries were, indeed, sometimes treated as ordinary fiefs and were held as such by laymen. Thus Ordericus Vitalis says that " (Fulk) granted to the monks the archdeaconry which he and his predecessors held in fee of the archbishop of Rouen " {Hist. Eccl. iii. 12).

In the Church of England, on the other hand, the office of archdeacon, which was first introduced at the Norman conquest, survives, with many of its ancient duties and prerogatives. Since 1836 there have been at least two archdeaconries in each diocese, and in some dioceses there are four archdeacons. The archdeacons are appointed by their respective bishops, and they are, by an act of 1840, required to have been six full years in priest's orders. The functions of the archdeacon are in the present day ancillary in a general way to those of the bishop of the diocese. It is his especial duty to inspect the churches within his archdeaconry, to see that the fabrics are kept in repair, and to hold annual visitations of the clergy and church- wardens of each parish, for the purpose of ascertaining that the clergy are in residence, of admitting the newly elected church- wardens into office, and of receiving the presentments of the outgoing churchwardens. It is his privilege to present all candidates for ordination to the bishop of the diocese. It is his duty also to induct the clergy of his archdeaconry into the temporalities of their benefices after they have been instituted into the spiritualities by the bishop or his vicar-general. Every archdeacon is entitled to appoint an official to preside over his archidiaconal court, from which there is an appeal to the con- sistory court of the bishop. The archdeacons are ex officio members of the convocations of their respective provinces.

It is the privilege of the archdeacon of Canterbury to induct the archbishop and all the bishops of the province of Canterbury into their respective bishoprics, and this he does in the case of a bishop under a mandate from the archbishop of Canterbury, direct- ing him to induct the bishop into the real, actual, and corporal possession of the bishopric, and to install and to enthrone him; and in the case of the archbishop, under an analogous mandate from the dean and chapter of Canterbury, as being guardians of the spiritualities during the vacancy of the archiepiscopal see. In the colonies there are two or more archdeacons in each diocese, and their functions correspond to those of English archdeacons. In the Episcopal church of America the office of archdeacon exists in only one or two dioceses.

See Hinschius, Kirchenrecht, ii., §§ 86, 87; Schroder, Die Entwick- lung des Archdiakonats bis zum 11. Jahrhundert (Munich, 1890); Wetzer and Welte, Kirchenlexikon (Freiburg-im-Breisgau, 1882- 1901); Herzog-Hauck, Realencyklopiidie (ed. 1896); Phillimore, Ecclesiastical Law, part ii. chap. v. (London, 1895). (W. A. P.)

ARCHDUKE (Lat. archidux, Ger. Erzherzog), a title peculiar now to the Austrian royal family. According to Selden it denotes " an excellency or pre-eminence only, not a superiority or power over other dukes, as in archbishop it doth over other bishops." Yet in this latter sense it would seem to have been assumed by Bruno of Saxony, archbishop of Cologne, and duke of Lorraine (953-965), when he divided his duchy into the duke-doms of Upper and Lower Lorraine. The designation was, however, exceedingly rare during the middle ages. The title of archduke of Lorraine ceased with the circumstances which had produced it. The later dynasties of Brabant and Lorraine, when these fiefs became hereditary, bore only" the title of duke. The house of Habsburg, therefore, did not acquire this title with the inheritance of the dukes of Lorraine. Nor does it occur in any of the charters granted to the dukes of Austria by the emperors; though in that creating the first duke of Austria the archiduces palatii, i.e. the principal dukes of the court, are men- tioned. The " Archidux Au striae, seu Austriae inferioris 'i is spoken of by Abbot Rudolph (d. 1138) in his chronicles of the abbey of St Trond (Gesta Abbalum Trudonensium) but this is no more than a rhetorical flourish, and the title of " archduke palatine " (Pfalz-Erzherzog) was, in fact, assumed first by Duke Rudolph IV. (d. 1365), and was one of the rights and privileges included in his famous forgery of the year 1358, the privilegium maius, which purported to have been bestowed by the emperor Frederick I. on the dukes of Austria in extension of the genuine privilegium minus of n 56, granted to the margrave Henry II. Rudolph IV. used the title on his seals and charters till he was compelled to desist by the emperor Charles IV. The title was also assumed for a time, probably on the strength of the privilegium maius, by Duke Ernest of Styria (d. 1424) ; but it

did not legally belong to the house of Habsburg until 1453, when Duke Ernest's son, the emperor Frederick III. (Frederick V., duke of Styria and Carinthia, 1424-1493, of Austria, 1463- 1493), confirmed the privilegium mains and conferred the title of archduke of Austria on his son Maximilian and his heirs. The title archduke (or archduchess) is now borne by all members of the Austrian imperial house.

See John Selden, Titles of Honor (1672) ; Antonius Matthaeus, De nobiiitate, de principibus, de ducibus, &c, libri quatuor (Amsterdam and Leiden, 1696, lib. i. cap. 6) ; Pfeffel, Abrege chronologique de I'hist. el du droit public d' Allemagne (Paris, 1766) ; Brinckmeier, Glossarium diplomaticum, &c. (1850-1863, 2 vols.); J. F. Joachim, " Abhand- lung von dem Titel ' Erzherzog,' welchen das HausOesterreich fiihrt," in

Prufende Gesellschaft zu Halle, 7; F. Wachter, art. " Erzherzog," in Allgetn. Encykl. der Wissenschaften u. Kilnste (1842, pub. by Ersch and Gruber) ; A. Huber, Ueber die Entstehungszeit der oester- reichischen Freiheitsbriefe (Vienna, i860); W. Erben, Das Privi- legium Friedrichs I. fur das Herzogtum Osterreich (Vienna, 1902).

ARCHEAN SYSTEM (from apxn, beginning), in geology. Below the lowest distinctly fossiliferous strata, that is, below those Cambrian rocks which bear the Olenellus fauna, there lies a great mass of stratified, metamorphic and igneous rock, to which the non-committal epithet " pre-Cambrian " is often applied; and indeed in not a few instances this general term is sufficiently precise for the present state of our knowledge.

Distribution 6f

Archean Rocks

.Emery Valker «C

Nevertheless there are large tracts, both in the Old World and in the New, in which a subdivision of this assemblage of ancient rocks is not only possible but desirable. It is quite clear in certain regions that there is a lowermost group with a prevailing granitoid, gneissic and schistose facies, mainly of igneous origin, above which there are one or several groups bearing a distinctly sedimentary aspect. It is to this lowermost gneissic group that the term " Archean " may be conveniently limited.

Thus, while the name " pre-Cambrian " may be used to indicate all these very old rocks whenever there is still any difficulty in subdividing them further, it is an advantage to have a special appellation for the oldest group where this can be distinguished.

- *It must be pointed out that the term " Archean " has- been used as a synonym for pre-Cambrian; and that the expressions Azoic (from a-, privative; foji7, life), Eozoic (from t)ws, daWn), and Fundamental Complex, have been employed in somewhat the same sense. Archeozoic has been proposed by American writers to apply to the lowest pre-Cambrian rocks with the same significance as " Archean " in the restricted sense employed here; but it is perhaps safer to avoid any reference to the supposed stage of life development where all direct evidence is non-existent. The so-called " Azoic " rocks have already been made to yield evidence of life, and there is no reason to presuppose the impossibility of finding other records of still earlier organisms.*

The prevailing rocks of the Archean system are igneous, with

metamorphosed varieties of the same; sedimentary rocks, distinctly recognizable as such, are scarce, though highly meta- morphosed rocks supposed to be sediments, in some regions, take an important place.

There are several features which are peculiarly characteristic of the Archean rocks: — (1) the extraordinary complexity of the assemblage of igneous materials; (2) the extreme metamorphism and deformation which nearly all the rocks have suffered; and (3) the inextricable intermixture of igneous rocks with those for which a sedimentary origin is postulated. Wherever the Archean rocks have been closely examined two great groups of rocks are distinguishable, an older, schistose group and a younger, granitoid and gneissic group. For many years the latter was supposed to be the older, hence the epithets " primi- tive " or " fundamental " were applied to it. Now, however, it has been shown, both in Europe and in North America, that in certain regions a schistose series is penetrated by a gneissose series and when this occurs the schists must be the older. But bearing in mind the difficulties of interpretation, it is not at all unreasonable to assume that there may yet be regions where the gneissose rocks are the oldest; for where no schistose series is present there may be no criterion for estimating the age of the granites and gneisses. The exceedingly great difficulties which lie in the way of every attempt to unravel the history of an Archean rock-complex cannot be too forcibly emphasized; for to be able to demonstrate the order of events and succession of rocks we should at least know whether we are dealing with sediments, flows of volcanic material, or intrusions, yet in many instances this cannot be done. In some areas the gradual passage of highly foliated and metamorphosed schists may be traced into comparatively unaltered arkoses, greywackes, conglomer- ates; or into volcanic lava-flows, pyro-clastic rocks or dikes; or again through a gneissose rock into a granite or a gabbro; but the districts wherein these relationships have been thoroughly worked out are very few.

This much may be said, that where the Archean ystem has been most carefully studied, there appears to be (1) a schistose series, of itself by no means simple but containing the foliated equivalents of sedimentary and igneous rocks; into this series a gneissose group (2) has been intruded in the form of batholites, great sheets and sills with accompanying intrusional prolonga tions into the schists; subsequently, into the gneisses and schists, after they had been further deformed, sheared and foliated, another set (3) of dikes or thin sheet-like intrusions penetrated. All this, namely, the formation of sediments, the outpouring of volcanic rocks, their repeated deformation by powerful dynamic agencies and then their penetration by dik§s and sheets had been completed and erosion had been at work upon the hardened and exposed rocks, before the earliest pre- Cambrian sediment was deposited.

There has been much premature speculation as to the nature and origin of these very ancient rocks. The prevalence of regular foliation with layers of different mineral composition, producing a close resemblance to bedding, has led some to imagine that the gneisses and schists were themselves the product of the primeval oceans, a supposition that is no longer worthy of further dis- cussion. Others have supposed that the gneisses were largely produced by the resorption and fusion of older sediments in the molten interior of the earth; there is no evidence that this has taken place upon an extended scale, though there is reason to believe that something of this kind has happened in places, and there is in the hypothesis nothing radically untenable. In one way the sedimentary schists have undoubtedly been incorporated within the gneissose mass, namely, by the extremely thorough and intimate penetration of the former by the latter along planes of foliation; and when a complex mass such as this has been further sheared and metamorphosed, a uniform gneiss appears to result from the intermixture.

A not uncommon cause of the' apparently bedded arrange- ment of layers of different mineralogical composition may be traced to the original differentiation of the granitoid magma into different mineral-sheets. When these mineralogically

iifferent layers were forced into other rocks, sometimes before the complete consolidation of the former and sometimes subsequent to it, in the generally metamorphosed condition of the whole, it is easy to see a superficial resemblance to bedding.

The Archean rocks have frequently been spoken of as the original crust of the earth; but even granting a cooling molten globe with a first-formed stony surface, it is tolerably clear that such a crust has nowhere yet been found, nor is it ever likely to be discovered. The very earliest recognizable sediments are the result of the destruction of still earlier exposures of rock; the oldest known volcanic rocks were poured upon a surface we can no longer distinguish, and as for the great granitoid masses, they could only have been formed under the pressure of superincumbent masses of material. The earliest known sediments must have been deep in the zones of shearing and rock flowage before the first pre- Cambrian denudation. The time required for these changes is difficult to conceive.

As regards the life of the Archean, or, as some call it, the " Archeozoic " period, we know nothing. The presence of car- bonaceous shale and

graphitic schists as well as of the altered sedi- mentary iron ores has been taken as indicative of vegetable life. Similarly, the occurrence of limestones suggests the existence of organic activity, but direct evidence is wanting. Much interest naturally attaches to this remote period, and when Sir William E. Logan in 1854 found the foraminifera-like Eozoon Canadense, high hopes of further discoveries were entertained, but the inorganic nature of this structure has since been clearly proved.

Distribution. — It is generally assumed that the Archean rocks underlie all the younger formations over the whole globe, and presumably this is the only system that does so. Naturally, the area of its outcrop is limited, for, directly or indirectly, all the younger rock groups must rest upon it.

It has been estimated that Archean rocks appear at the surface over one-fifth of the land area (omitting coverings of superficial drifts). This estimate is no more than the roughest approximation, and is liable at any time to revision as our knowledge of little-known regions is increased. It must ever be borne in mind that the presence of a gneissose or schistose complex does not in itself imply the Archean age of such a set of rocks. Local manifestations of a similar petrological fades may and do appear which are of vastly inferior geological age; and unless there is unequivocal evidence that such rocks lie beneath the oldest fossil-bearing strata, there can be no absolute certainty as to their antiquity. It is more than likely that certain occurrences of gneiss and schist, at present regarded as. Archean, may prove on fuller examination to be metamorphosed representatives of younger periods.

Britain. — The most important exposure of Archean rocks in Britain is in the north-west of Scotland, where they form the mainland in Sutherland and Ross-shire, and appear also in the outer Hebrides. Their great development in the isle of Lewis has given rise to the term " Lewisian " (Hebridean), by which the gneisses of this region are now generally known. The Lewisian series comprises two great groups of rocks, (1) the so-called " fundamental complex," an assemblage of acid, basic and intermediate irruptive rocks, associated together in a complex of extraordinary intricacy, and (2) a series of dikes, which like the rocks they traverse, show every gradation from ultra-basic to ultra-acid types. But the above bald statement conveys no idea of the complexity of the series, for before the " funda-mental complex " had been pierced by the later dike system it had been subjected to severe dynamo-metamorphism and many of the massive rocks had been folded, thrust and sheared, and a very general state of foliation had been produced. Nor was this all, for after the intrusion of the dikes, great movements brought about vertical dislocations, and thrust planes, which traversed the rocks at all angles, accompanied by still further internal shearing and superinduced foliation.

In the valley of Loch Maree and thence south-westward into Glenelg, a series of mica-schists, quartz-schists, saccharoid limestones and graphitic schists has been regarded as a group of sedimentary origin through which the Lewisian rocks have been irrupted.

In England several small masses of gneiss, notably at Primrose Hill on the VYrekin, Shropshire, in the Malvern hills, and on the island of Anglesey in North Wales, are supposed to correspond with the Lewisian of Scotland.

North America. — In this continent there is a great development of

Archean rocks in Canada. On the eastern side it covers nearly the whole of the Labrador peninsula, and extends into Baffin Bay and possibly over much of Greenland ; a broad tract unites the great lake region with Labrador, and from the same region, by way of the Mackenzie valley, a similar tract extends in a north-westerly direction to the Arctic Ocean. This northern (Canadian) area of Archean includes portions of the states of Minnesota, Michigan, Wisconsin and the Adirondack region of New York. On the western side of the continent a series of disconnected exposures of Archean rocks runs downwards in a narrow belt from Alaska to New Mexico; and on the eastern side a similar belt reaches from Newfoundland to Alabama.

Much attention is now being given to the more scattered exposures of Archean rocks, but the best-known area is the classical ground in the vicinity of Lake Superior and Lake Huron and in the Ottawa gneiss region of Canada. Some of the more important districts are the following: —

Rainy Lake district, Canada: The Archean rocks here consist of altered diorites and diabases (the lower Keewatin series) and black hornblende schists (probably altered igneous rocks), with mica gneisses which are perhaps of sedimentary origin.

The Mona and Kitichi schists; metamorphosed lava and tuffs, with serpentine and dolomite, probably derived from peridotites; there are also gneissic granites and syenites.

In the Menominee region of Michigan and Wisconsin, theQuinnesec schist series mainly consist of schistose quartz porphyry with associated gneisses.

In the Mesaba district of Minnesota the Archean consists of a complex of more or less foliated igneous rocks mostly basic in character.

The Archean of the Vermilion district of Minnesota comprises the Soudan formation, an altered sedimentary series with banded cherts, jasper and magnetite schists; the iron ores are extensively mined. At the base is a

conglomerate containing pebbles from the formation below, the Ely greenstone, which is made up of altered basalts and andesites, generally in a schistose condition, but occasionally ex- hibiting spherulitic structures. Into these two formations a series of granites have been intruded.

Europe. — In Scandinavia, as in Scotland, the pre-Cambrian is represented by an earlier and a later series of rocks of which the former (Grundfjeldet, Urberget) may be taken to be the equivalent of the Lewisian gneisses. This assemblage of coarse red and grey banded gneisses, with associated granulites and many varieties of acid, basic and intermediate rocks in a gneissose condition, is inti- mately related to a highly metamorphosed sedimentary series comprising limestones, quartzites and schists, which, as in Scotland, is apparently older than the gneisses. Similar rocks occur in Sweden and Finland.

In Bavaria and Bohemia the Archean is divisible into a lower red gneiss, a comparatively simple series, called by C. W. von Gtimbel the "gneiss of Bojan " ; and an upper, grey gneiss with other schistose rocks, serpentine and graphitic limestone, termed by the same author the " Hercynian gneiss."

In Brittany a gneissose and schistose igneous series lies at the base of the pre-Cambrian. The pre-Cambrian cores of the eastern and central Pyrenees, consisting of gneiss, schists and altered limestones, are presumably of Archean age.

Asia, Australia, &c. — In northern China, mica-gneisses and granite-gneisses with associated schists may be regarded as Archean. In India the system is represented by the Bundelkhand gneiss and the central older gneisses of the Himalayas. In Japan, in the Abukuma plateau, there is much granite, gneiss and schist which may be of this age. In Australia, similar rocks are recognized as Archean in South Australia and Westralia, and they are estimated to cover an area of no less than 20,000 sq. m. ; in Tasmania they are well developed on the western side. Although a great area is occupied by crystalline rocks in New Zealand, the Archean age of any portion of the series is not yet satisfactorily established ; the lower granites and gneisses may belong to this period. Africa contains enormous tracts of crystalline gneisses, granites and schists, and some of these are almost certainly of Archean age ; but in the present state of our knowledge it is impossible to speak more exactly.

References. — A good general account of the Archean system will be found in Sir A. Geikie's Text Book of Geology, vol. ii., 4th ed." (1903), and in T. C. Chamberlin and R. D. Salisbury's Geology, vol. ii. (1906) ; these volumes contain references to all important literature. (J. A. H.)

ARCHELAUS OF CAPPADOCIA (1st century B.C.), general of Mithradates the Great in the war against Rome. In 87 B.C. he was sent to Greece with a large army and fleet, and occupied the Peiraeus after three days' fighting with Bruttius Sura, prefect of Macedonia, who in the previous year had defeated Mithra- dates' fleet under Metrophanes and captured the island of Sciathus. Here he was besieged by Sulla, compelled to with- draw into Boeotia, and completely defeated at Chaeroneia (86). A fresh army was sent by Mithradates, but Archelaus was again defeated at Orchomenus, after a two davs' battle (85). On the

conclusion of peace, Archelaus, finding that he had incurred the suspicion of Mithradates, deserted to the Romans, by whom he was well received. Nothing further is known of him.

Appian, Mithrid. 30, 49, 56, 64; Plutarch, Sulla, 11, 16-19, 20 > 23 ; Lucullus, 8.

Archelaus, king of Egypt, was his son. In 56 B.C. he married Berenice, daughter of Ptolemy Auletes, queen of Egypt, but his reign only lasted six months. He was defeated by Aulus Gabinius and slain (55).

See Strabo xii. p. 558, xvii. p. 796; Dio Gassius xxxix. 57-58; Cicero. Pro Rabirio, 8; Hirtius (?), Bell. Alex. 66; also Ptolemies.

Archelaus, king of Cappadocia, was grandson of the last named. In 41 B.C. (according to others, 34), he was made king of Cappadocia by Mark Antony, whom, however, he deserted after the battle of Actium. Octavian enlarged his kingdom by the addition of part of Cilicia and Lesser Armenia. He was not popular with his subjects, who even brought an accusation against him in Rome, on which occasion he was defended by Tiberius. Subsequently he was accused by Tiberius, when emperor, of endeavouring to stir up a revolution, and died in confinement at Rome (a.d. 17). Cappadocia was then made a Roman province. Archelaus was said to have been the author of a geographical work, and to have written treatises On Stones and Rivers.

Strabo xii. p. 540; Suetonius, Tiberius, 37, Caligula, 1; Dio Cassius xlix. 32-51 ; Tacitus, Ann. ii. 42.

ARCHELAUS, king of Judaea, was the son of Herod the Great. He received the kingdom of Judaea by the last will of his father, though a previous will had bequeathed it to his brother Antipas. He was proclaimed king by the

army, but declined to assume the title until he had submitted his claims to Augustus at Rome. Before setting out, he quelled with the utmost cruelty a sedition of the Pharisees, slaying nearly 3000 of them. At Rome he was opposed by Antipas and by many of the Jews, who feared his cruelty; but Augustus allotted to him the greater part of the kingdom (Judaea, Samaria, Ituraea) with the title of ethnarch. He married Glaphyra, the widow of his brother Alexander, though his wife and her second husband, Juba, king of Maure- tania, were alive. This violation of the Mosaic law and his continued cruelty roused the Jews, who complained to Augustus. Archelaus was deposed (a.d. 7) and banished to Vienne. The date of his death is unknown.

Archelaus is mentioned in Matt. ii. 22, and the parable of Luke xix. n f. probably refers to his journey to Rome.

See Schiirer, Gesch. des jiidischen Volkes, i. 449-453.

(J. H. A. H.)

ARCHELAUS, king of Macedonia (413-399 B.C.), was the son of Perdiccas and a slave mother. He obtained the throne by murdering his uncle, his cousin and his half-brother, the legiti- mate heir, but proved a capable and beneficent ruler. He fortified cities, constructed roads and organized the army. He endeavoured to spread among his people the refinements of Greek civilization, and invited to his court, which he removed from Aegae to Pella, many celebrated men, amongst them Zeuxis, Timotheus, Euripides and Agathon. In 399 he was killed by one of his favourites while hunting; according to another account he was the victim of a conspiracy.

Diodorus Siculus xiii. 49, xiv. 37; Thucydides ii. 100. See Macedonia.

ARCHELAUS OF MILETUS, Greek philosopher of the 5th century B.C., was born probably at Athens, though Diogenes Laertius (ii. 16) says at Miletus. He was a pupil of Anaxagoras, and is said by Ion of Chios {ap. Diog. Laert. ii. 23) to have been the teacher of Socrates. Some argue that this is probably only an attempt to connect Socrates with the Ionian school; others (e.g. Gomperz, Greek Thinkers) uphold the story. There is similar difference of opinion as regards the statement that Archelaus formulated certain ethical doctrines. In general, he followed Anaxagoras, but in his cosmology he went back to the earlier Ionians. He postulated primitive Matter, identical with air and mingled with Mind, thus avoiding the dualism of Anaxagoras. Out of this conscious " air," by a process of thickening and thinning, arose cold and warmth, or water and fire, the one passive, the other active. The earth and the heavenly bodies are formed

from mud, the product of fire and water, from which springs also man, at first in his lower forms. Man differs from animals by the possession of the moral and artistic faculty. No fragments of Archelaus remain; his doctrines have to be extracted from Diogenes Laertius, Simplicius, Plutarch and Hippolytus.

See Ionian School; for his ethical theories see T. Gomperz, Greek Thinkers (Eng. trans., 1901), vol. i. p. 402.

ARCHENHOLZ, JOHANN WILHELM VON (1743-1812), German historian, was born at Langfuhr, a suburb of Danzig, on the 3rd of

September 1743. From the Berlin Cadet school he passed into the Prussian army at the age of sixteen, and took part in the last campaigns of the Seven Years' War. Retiring from military service, on account of his wounds, with the rank of captain in 1763, he travelled for sixteen years and visited nearly all the countries of Europe, and resided in England for ten years (1769-1779). Returning to Germany in 1780, he obtained a lay canonry at the cathedral of Magdeburg, and immediately entered upon a literary career by publishing the periodical Litteratur- und Vblkerkunde (Leipzig, 1782-1791). This was followed in 1785 by England und Italien (2nd ed., Leipzig, 1787), in which he gives a remarkably unprejudiced ap- preciation of English political and social institutions. Between 1789 and 1798 he published his Annalen der britischen Geschichle (20 vols). But the work by which he is best known to fame is his brilliantly written history of the Seven Years' War, Ge- schichle des siebenjdhrigen Krieges (first published in the Berliner historisches Taschenbuch of 1787, and later in 2 vols., Berlin, ! 793; 13th ed., Leipzig, 1892). This work, though as regards the main facts and details it only follows other writers, is still a useful source of information upon the epoch with which it deals. In 1792 Archenholz removed to Hamburg, and there, from 1792 to 181 2, edited the journal Minerva, which had a great reputation for its literary, historical and political informa- tion. Archenholz died at his country seat, Oyendorf, near Hamburg, on the 28th of February 181 2.

ARCHER, WILLIAM (1856-), English critic, was born at Perth on the 23rd of September 1856, and was educated at Edinburgh University. He became a leader-writer on the Edinburgh Evening News in 1875, and after a year in Australia returned to Edinburgh. In 1879 he became dramatic critic of the London Figaro, and in 1884 of the World. In London he soon took a prominent literary place. Mr Archer had much to do with introducing Ibsen to the English public by his translation of The Pillars of Society, produced at the Gaiety Theatre, London, in 1880. He also translated, alone or in collaboration, other productions of the Scandinavian stage: Ibsen's Doll's House (1889), Master Builder (1893); Edvard Brandes's A Visit (1892); Ibsen's Peer Gyrtt (1892); Little Eyolf (1895); and John Gabriel Borkman (1897); and he edited Henrik Ibsen's Prose Dramas (5 vols., 1890-1891). Among his critical works are: — English Dramatists of To-day (1882); Masks or Faces? (1888); five vols, of critical notices reprinted, The Theatrical World (1893- 1897); America To-day, Observations and Reflections; Poets of the Younger Generation (1901); Real Conversations (1904).

ARCHERMUS, a Chian sculptor of the middle of the 6th century B.C. His father Micciades, and his sons, Bupalus and Athenis, were all sculptors of marble, using doubtless the fine marble of their native land. The school excelled in draped female figures. Archermus is said by a scholiast (on

Aristophanes' Birds, v. 573) to have been the first to represent Victory and Love with wings. This statement gives especial interest to a discovery made at Delos of a basis signed by Micciades and Archermus which was connected with a winged female figure in rapid motion (see Greek Art), a figure naturally at first regarded as the Victory of Archermus. Unfortunately further investigation has discredited the notion that the statue belongs to the basis, which seems rather to have supported a sphinx.

ARCHERY, the art and practice of shooting with the bow (arcus) and arrow, or with crossbow and bolts. Though these weapons are by no means widely used amongst savage tribes of the present day, their origin is lost in the mists of antiquity.

Amongst the great peoples of ancient history the Egyptians were the first and the most famous of archers, relying on the bow as their principal weapon in war. Their bows were iuwar. somewhat shorter than a man, and their arrows varied between 2 ft. and 2 ft. 8 in. in length. Here, as elsewhere, fiint heads for arrows were by no means rare, but bronze was the usual material employed. The Biblical bow was of reed, wood or horn, and the Israelites used it freely both in war (Gen. xlviii. 22) and in the chase (xxi. 20). The Assyrians also were a nation of archers. Amongst the Greeks of the historic period archery was not much in evidence, in spite of the tradition of Teucer, Ulysses and many other archers of the Iliad and Odyssey. The Cretans, however, supplied Greek armies with the bowmen required. In the " Ten Thousand " figured two hundred Cretan bowmen of Sosias' corps. Riistow and Kochly {Geschichte des griechischen Kriegwesens, p. 131) estimate the range of the Cretan bow at eighty to one hundred paces, as compared with the sling-bullet's forty or fifty, and the javelin's thirty to forty. The Romans as a nation were, equally with the Greeks,indifferent to archery; in their legions the archer element was furnished by Cretans and Asiatics. On the other hand nearly all Asiatic and derived nations were famous bowmen, from the nations who fought under Xerxes' banner onwards. The Persian, Scythian and Parthian bow was far more efficient than the Cretan, though the latter was not wanting in the heterogeneous armies of the East. The sagittarii, three thousand strong, who fought in the Pharsalian campaign, were drawn from Crete, Pontus, Syria, &c. But the Roman view of archery was radically altered when the old legionary system perished at Adrianople (a.d. 378). After this time the armies of the empire consisted in great part of horse-archers. Their missiles, we are told, pierced cuirass and shield with ease, and they shot equally well dismounted and at the gallop. These troops, combined with heavy

cavalry and themselves not unprovided with armour, played a decisive part in the Roman victories of the age of Belisarius and Narses. The destruction of the Franks at Casilinum (a.d. 554) was practi- cally the work of the horse-archers.

In the main, the nations whose migrations altered the face of Europe were not aichers. Only with the Welsh, the Scandi- navians, and the peoples in touch with the Eastern empire was the bow a favourite weapon. The edicts of Charlemagne could not succeed in making archery popular in his dominions, and Abbot Ebles, the defender of Paris in 886, is almost the only instance of a skilled archer in the European records of the time. The sagas, on the other hand, have much to say as to the feats of northern heroes with the bow. With English, French and Germans the bow was the weapon of the poorest military classes. The Norman archers, who doubtless preserved the traditions of their Danish ancestors, were in the forefront of William's line at Hastings (1066), but contemporary evidence points conclusively to the short bow, drawn to the chest, as the weapon used on this occasion. The combat of Bourgtheroulde in n 24 shows that the Normans still combined heavy cavalry and archers as at Hastings. Horse-archers too (contrary to the usual belief) were here employed by the English.

Yet the " Assize of Arms " of 1181 does not mention the bow, and Richard I. was at great pains to procure crossbowmen for the Crusades. The crossbow had from about the 10th century gradually become the principal missile weapon in Europe, in spite of the fact that it was condemned by the Lateran Council of 1139. As early as 1270 in France, and rather later in Spain, the master of the crossbowmen had become a great dignitary, and in Spain the weapon was used by a corps d'elite of men of gentle birth, who, with their gay apparel, were a picturesque feature of continental armies of the period. But the Genoese, Pisans and Venetians were the peoples which employed the crossbow most of all. Many thousand Genoese crossbowmen were present at Crecy.

It was in the Crusades that the crossbow made its reputation, opposing heavier weight and greater accuracy to the missiles of the horse-archers, who invariably constituted the greatest and most important part of the Asiatic armies. So little change in

warfare had centuries brought about that a crusading force in 1 104 perished at Carrhae, on the same ground and before the same mounted-archer tactics, as the army of Crassus in 55 B.C. But individually the crusading crossbowman was infinitely superior to the Turkish or Egyptian horse-archer.

England, which was to become the country of archers par excellence, long retained the old short bow of Hastings, and the far more efficient crossbow was only used as a rule by mercenaries, such as the celebrated Falkes de Breaute use- and his men in the reign of John. South Wales, it seems certain, eventually produced the famous long-bow. In Ireland, in Henry II. 's time, Strongbow made great use of Welsh bowmen, whom he mounted for purposes of guerrilla warfare, and eventually the prowess of Welsh archers taught Edward I. the value of the hitherto discredited arm. At Falkirk (q.v.), once for all, the long-bow proved its worth, and thenceforward for centuries it was the principal weapon of English soldiers. By 1339, archers had come to be half of the whole mass of foot- men, and later the proportion was greatly increased. In 1360 Edward III. mounted his archers, as Strongbow had done. The long-bow was about 5 ft., and its shaft a cloth-yard long. Shot by a Welsh archer, a shaft had penetrated an oak door (at Abergavenny in ir82) 4 in. thick and the head stood out a hand's breadth on the inner side. Drawn to the right ear, the bow was naturally capable of long shooting, and in Henry VIII. 's time practice at a less range than one furlong was forbidden. In rapidity it was the equal of the short bow and the superior of the crossbow, which weapon, indeed, it surpassed in all respects. Falkirk, and still more Crecy, Poitiers and Agincourt, made the English archers the most celebrated infantry in Europe, and the kings of England, in whatever else they differed from each other, were, from Edward II. to Henry VIII., at one in the matter of archery. In 1363 Edward III. commanded the general practice of archery on Sundays and holidays, all other sports being forbidden. The provisions of this act were from time to time re-issued, particularly in the well-known act of Henry VIII. The price of bows and arrows was also regulated in the reign of Edward III., and Richard III. ordained that for every ton of certain goods imported ten yew-bows should be imported also, while at the same time long-bows of unusual size were admitted free of duty. In order to prevent the too rapid consumption of yew for bow-staves, bowyers were ordered to make four bows of wych-hazel, ash or elm to one of yew, and only the best and most useful men were allowed to possess yew- bows. Distant and exposed counties were provided for by making bowyers, fletchers, &c, liable (unless freemen of the city ■of London) to be ordered to any point where their services might be required. In Scotland and Ireland also, considerable atten- tion was paid to archery. In 1478 archery was encouraged in Ireland by statute, and James I. and James IV. of Scotland, in particular, did their best to stimulate the interest of their subjects in the bow, whose powers they had felt in so many battles from Falkirk to Homildon Hill.

The introduction of hand-firearms was naturally fatal to the bow as a warlike weapon, but the conservatism of the English, and the non-

professional character of wars waged by them, added to the technical deficiencies of early firearms, made the process of change in England very gradual. The mercenary or professional element was naturally the first to adopt the new weapons. At Pont de l'Arche in 1418 the English had " petits canons " (which seem to have been hand guns), and during the latter part of the Hundred Years' War their use became more and more frequent. The crossbow soon disappeared from the more professional armies of the continent. Charles the Bold had, before the battle of Morat (1476), ten thousand coulevrines a main. But in the hands of local forces the crossbow lingered on, at least in rural France, until about 1630. Its last appearance in war was in the hands of the Chinese at Taku (i860). But the long-bow, an incom- parably finer weapon, endured as one of the principal arms of the English soldier until about 1590. Edward IV. entered London after the battle of Barnet with 500 "smokie gunners"

Decline

weapon.

(foreign mercenaries), but at that engagement Warwick's centre consisted solely of bows and bills (1471). The new weapons gradually made their way, but even in 1588, the year of the Armada, the local forces of Devonshire comprised 800 bows to 1600 " shot/' and 800 bills to 800 pikes. But the Armada year saw the last appearance of the English archer, and the same county in 1598 provides neither archers nor billmen, while in the professional army in Ireland these weapons had long given way to musket and caliver, pike and halberd. Archers appeared in civilized warfare as late as 1807, when fifteen hundred " baskiers," horse-archers, clad in chain armour, fought against Napoleon in Poland.

As a weapon of the chase the bow was in its various forms employed even more than in war. The rise of archery as a sport in England was, of course, a consequence of its military value, which caused it to be so heartily encouraged by all English sovereigns.

The Japanese were from their earliest times great archers, and the bow was the weapon par excellence of their soldiers. Japan ˆ e standard length of the bow (usually bamboo) was

7 ft. 6 in., of the arrow 3 ft. to 3 ft. 9 in. Numerous feats of archery are

recorded to have taken place in the " thirty- three span " halls of Kioto and Tokyo, where the archer had to shoot the whole length of a very low corridor, 128 yds. long. Wada Daihachi in the 17th century shot 8133 arrows down the corridor in twenty-four consecutive hours, averaging five shots a minute, and in 1852 a modern archer made 5583 successful shots in twenty hours, or over four a minute.

The Pastime of Archery.— The use of the bow and arrow as a pastime naturally accompanied their use as weapons of war, but when the gun began to supersede the bow the pastime lost its popularity. Charles II., however, and his queen, Catherine of Braganza, interested themselves in English archery, the queen in 1676 presenting a silver badge or shield to the " Marshall of the Fraternity of Archers," which badge, once the property of the Finsbury Archers, was transferred to the keeping of the Royal Toxo philite Society, when in 1841 the two clubs combined. The Toxophilite Society was founded in 1781; for though in the north archery had long been practised, its resuscitation in the south really dates from the formation of this club by Sir Ashton Lever. This society received the title of " Royal " in 1847, though it had long been patronized by royalty. It is an error to suppose that the Finsbury Archers were connected with the Archers' division of the Hon. Artillery Company, but many members of the Toxophilite Society joined that division, and used its ground for shooting, securing, however, a London ground of their own in the district where Gower Street, W.C., now is. When this ground became unavailable, the shooting probably took place at Highbury, and later in 1820, on Lord's cricket ground, the present ground in the Inner Circle of Regent's Park, near the Botanical Gardens, not being acquired till 1833. The society may be regarded as the most important body connected with archery, most of the leading. archers belonging to it, though the Grand National Archery Society controls the public meetings. Among its more important events is the shooting of 144 arrows at 100 yds. for the Crunder Cup and Bugle. In the early days of the club targets of different sizes were used at the different ranges, and the scores were recorded in money (e.g. " Mr Elwin, 86 hits, £5: 5:6 "). The Woodmen of Arden can claim an almost equal antiquity, having been founded — some say "revived" — in 1785. The number of members is limited to 80; at one time there were 81, Sir Robert Peel having been elected as a super- numerary by way of compliment. The headquarters of the Woodmen are at Meriden in Warwickshire; the club has a nominal authority over vert and venison, whence its officers bear appropriate names — warden, master-forester and verderers; and the annual meeting is called the Wardmote. The master- forester, or captain for the year, is the maker of the first "gold " at the annual target; he who makes the second is the senior verderer. The club devotes itself to the old-fashioned clout- shooting at long ranges, reckoned by " scores," nine score

meaning 180 yds., and so on. (Vide " Clout-shooting " infra.) The chief matches in which the Woodmen engage are those against the Royal Company of Scottish Archers. The Royal British Bowmen date back to the end of the 18th century. Like many others, during the Napoleonic war they suspended opera- tions, revived when peace was made. The club was finally dissolved in 1880. The Royal Kentish Bowmen were founded in 1785, but did not survive the war. John O'Gaunt's Bowmen, who still meet at Lancaster, were revived, not created, at the same time, and still flourish. The Herefordshire Bowmen only shoot at 60 yds., while the West Berks Society is limited to twelve members, who meet at each other's houses, except for their Autumn Handicap, shot on the Toxophilite Grounds — 216 arrows at 100 yds. The Royal Company of Archers is the chief Scottish society. Originally a semi-military body consti- tuted in 1676, it practised archery as a pastime from the time of its foundation, several meetings being held in the first few years of its existence. It devoted itself to " rovers," or long- range shooting at the " clout," among its most interesting trophies being the " Musselburgh Arrow," first shot for in 1603, possibly even earlier, in that town; the competition was then open to all comers, for archery was long popular in Scotland, especially at Kilwinning, the headquarters of popinjay (q.v.) shooting. Other prizes are the " Peebles Silver Arrow," dating back to 1626, the " Edinburgh Silver Arrow " (1709), the " Sel- kirk Arrow," a very ancient prize, the " Dalhousie Sword," the " Hopetoun Royal Commemoration Prize," and others, shot for at ranges of 180 or 200 yds. The most curious is the " Goose Medal." Originally a goose was buried in a butt with only its head visible, and this was the archers' mark; now a small glass globe is substituted. The " Popingo (Popinjay) Medal," for which a stuffed parrot was once used as the mark, is now con- tested at the ordinary butts. The Kilwinning Society of Archers, founded in 1688, did not disband till 1870; the Irvine Toxo- philites flourished from 1814 till about 1867. But of all societies the Grand National Archery Society, regulating the great meetings, though comparatively young, is the most important. Various open meetings were already in existence, but in 1844 a few leading archers projected a Grand National Meeting, which was held in York in that year and in 1845 and 1846, and subse- quently in other places. But the society did not exist as such till 1861, after the rnceting held at Liverpool, since when, not- withstanding some financial troubles, it has been the legislative and managing body of English archery. The chief meetings are the "Championship," the " Leamington and Midland Counties," the " Crystal Palace," the " Grand Western " and the " Grand Northern." For some years a "Scottish Grand National" was held, but fell into abeyance. The " Scorton Arrow " is no longer shot for in the Yorkshire village of that name, but the meeting, held regularly in the county, dates back to 1673 by record, and is probably far older. The silver arrow and the captaincy' are

awarded to the man who makes the first gold; the silver bugle and lieutenancy to the first red; the gold medal to most hits, and a horn spoon to the last white.

In the United States archery has had a limited popularity. The only one of the early clubs that lasted long was the " United Bowmen of Philadelphia," founded in 1828, but defunct in 1859. There was a revival twenty years later, when a National Association was formed; and various meetings were held annually and championships instituted, but there was never any popular enthusiasm for the sport, though it showed signs of increasing favour towards the end of the 19th century. The longer ranges are not greatly favoured by American archers, though at some meetings the regulation "York Round" (vide infra under "Targets ") and the " National " are shot. Other rounds are the "Potomac," 24 arrows at 80, 24 at 70, and 24 at 60 yds.; the "Double American," 60 arrows each at 60, 50 and 40 yds.; and the "Double Columbia," for ladies, 48 each at 50, 40 and 30 yds. In team matches ladies shoot 96 arrows at 50 yds., gentle- men 96 at 60.

The Bow. — As used in the pastime of archery the length of the bows does not vary much, though it bears some relation to the length

of the arrow and the length of the arrow to the strength of the archer, to which the weight of the bow has to be adapted. The proper weight of a bow is the number of ft which, attached to the string, will draw a full-length arrow to its head. For men's bows the drawing-power varies from 40 to 60 ft, anything above this being extreme; ladies' bows draw from 24 to 32 ft. Estimating 50 ft as a fair average, such a bow would be 6 ft. 1 in. long for a 30-in., 6 ft. for a 28-in., and 5 ft. 11 in. for a 27-in. arrow, but the height as well as the strength of the archer have to be considered. Similarly a lady's bow on the average measures about 5 ft. 6 in. and her arrows 25 in. Modern bows are either made entirely of yew (occasionally of other woods), when they are called " self-bows," or of a com- bination of woods, when they are called " backed-bows." Self-bows are rarely or never made in a single stave, owing to the difficulty of obtaining true and flawless wood of the necessary length; hence two staves joined by a double fish-joint, which forms the centre of the bow, are used, tested and adjusted so that they may be as equally elastic as possible. The best yew is imported from Italy and Spain, and is allowed to season for three years before it is made into a bow, which again is not used till it is two years older. In backed-bows the belly, the rounded part nearest to the string, is generally but not

necessarily made of yew, the back, or flat part, of yew (the best), hickory, lance or other woods, glued together in strips. The centre of the bow, for about 1 8 in. , should be stiff and resisting, then tapering off gradually to the horns in which the string is fitted, the greatest care being taken that the two limbs are uniform. The bow of self- yew is generally considered more agreeable to handle and has a better " cast," throwing the arrow more smoothly and with less jar, and since no glued parts are exposed, it is less liable to injury from wet. On the other hand, " crysals " (tiny cracks, which are apt to extend) are more frequent in this class of bow. Self-yew bows cost £8 or £io, where a good backed-bow can be bought for about half that. The self-bow is more sensitive than other bows, and its work is mostly done during the last few inches of the pull, where the backed-bow pulls evenly throughout. The backed-bow should be perfectly straight in the back, but after use often loses its shape either by " following the string," i.e. getting bent inwards on the string-side, or by becoming " reflex " (bending the opposite way). Self-bows are even more apt to lose their shape than backed-bows, as there is no hard wood to counteract the natural grain. A bow that is strongly reflexed at the ends is known as a " Cupid's bow." To form the handle the wood of the bow is left thick in the centre, and braid, leather or indiarubber is wound round it to give a better grip.

The String and Stringing. — The string is made of three strands of hemp, dressed with a preparation of glue, and should be perfectly round, smooth and not frayed, as a broken string may result in a broken bow. The string, at its centre, is 6 in. from the belly of the man's bow; 5 in. in the lady's bow. The clenched fist with the thumb upright was the old, rough and ready estimate, known as " fist-mele." For a few inches above and below the nocking point the string is lapped with carpet-thread to save it from fraying by contact with the arm ; the nocking point being made by another lapping of filoselle silk, so that the string may exactly fit the nock of the arrow. When a bow is properly strung the string should be longitudinally along the middle of the belly.

Arrows and Nocking. — The parts of the arrow are the shaft, the " nock " or notch, the " pile " or point, and the feathers. The shaft is made of seasoned red deal, and may be " self " or " footed." Most arrows are " footed," i.e. a piece of hard wood to which the pile is attached is spliced to the deal shaft, which should be perfectly straight and stiff. The shaft is made in several shapes. Most archers prefer the " parallel " pattern — the shaft being the same size from nock to pile; the next is the " barrelled," the shape being thick in the centre and tapering towards the ends. The " bob-tail " diminishes from the pile to the nock; the " chested " tapers from the middle to the pile. The pile should not be taper but cylindrical, " broadshouldered " where the point begins. The nock is cut square. There are three feathers, the body feathers of a turkey or peacock being the best.

They should all curve the same way, are about 1 \ in. long and \ in. deep, with the ends near the nock either square, or balloon-shaped. The weight of an arrow is its weight in new English silver; a five-shilling arrow is heavy for a man's bow, while four- shillings is light. A 28-in. arrow for a 50- lb bow may weigh four-and- ninepence; a 27-in. arrow four-and-sixpence. This may serve as a rough standard.

Other Implements. — The archer uses finger-tips, or a " tab " of leather, to protect the fingers against the string, and a leather " bracer " to protect the left arm from its blow. Quivers are not now used except by ladies. A special box for carrying bows and arrows about ; a proper cupboard, known as an " ascham," in which they may be kept at home in a dry, even temperature, not too hot ; and a baize or leather case for use on the ground, are important minor articles of equipment.

Targets, Scoring and Handicapping. — The targets, 4 ft. in diameter, are made of straw 3 to 4 in. thick, and are supported sloping slightly backwards by an iron stand. The faces are of floor-cloth painted with concentric rings, 4! in. each in breadth. The outer ring, white, counts one point; the next, black, three; the next, blue, five; the next, red, seven; and the next, gold — a complete circle of 4ˆ in.

radius — nine. The exact centre of the gold is called the " pin-hole." The targets are set up in pairs, facing each other, the distances for men being 100, 80 and 60 yds.; for ladies, 60 and 50; for con- venience, 5 yds. are added to allow for a shooting-line that distance in front of each target. The centre of the gold should be 4 ft. from the ground. Each archer shoots three arrows — an " end " — at one target ; they then cross over and mark the scores. If an arrow cuts two rings, the archer is credited with the value of the higher one. In matches a " York Round " or a " St George's Round " is usually shot by men, the former consisting of 144 arrows, 72 at 100 yds., 48 at 80 yds., and 24 at 60 yds., the latter of 36 arrows at each of these distances. One York Round only is shot on a day ; a double York Round is shot, one on each day, at the more important meetings. Ladies usually shoot the " National Round " of 48 arrows at 60 yds. and 24 at 50 yds. At most meetings the prizes are awarded on the gross scores; at others, including the Championship meeting, on points, two points for the highest score on the round and two for most hits on the round, one point each for highest score and most hits at each of the three ranges, ten points in all. Ladies' scores are calculated similarly. To decide the Championship, the Grand National Archery Society passed a rule in 1894 that " The Champion prizes shall be awarded to the archer gaining the greatest number of points, provided that those for gross hits or gross score are included; any points won by other archers shall be redistributed among those gaining the points for gross hits or gross score." Handicapping may be

done by " rings," the winner of a first prize not being allowed to count "whites" at subsequent meetings, and "blacks" and " blues " being lost for further successes. Better methods are (i)'to deduct a percentage from the gross score of successful shooters, (2) to handicap by points, as in other pastimes, or (3) to rate a shooter according to the average of his last year's performances, re-rating him monthly, or at convenient intervals, the system being to add his average of the current year to his average of last year, and divide the sum by two to form his new rating.

Clout and Long Distance Shooting. — This form of archery is chiefly supported by the Woodmen of Arden and the Royal Company. At 100 yds., the target (smaller by 4 in. than the usual one, but with an inner white circle instead of the blue) is set up against a butt only 18 in. from the ground, but for nine-score, ten-score, and twelve- score shooting it is a white target, 2 ft. 6 in. in diameter, with a black centre. The target, the centre and the arrow that hits the centre are each known as a " clout." Hits and misses are signalled by a marker stationed, rather perilously, by the side of the butt. The target is sloped backwards to an angle of 60°, with rings marked round it on the ground at distances of 1 J ft., 3 ft., 6 ft. and 9 ft., a hit in the outer ring counting one, and in the next two, and so on, the clout or centre counting six. For the longer ranges lighter arrows are used. The Scotti°h clout was a piece of canvas, stretched on a frame; the range 1 80 or 200 yds.; all arrows counted one that were within 24 ft. of the target, the clout counting two. Modern archers have paid scant attention to mere distance-shooting, which is an art of its own, but their experiments prove that with a fairly heavy bow, say 60 ft or 63 ft, and a long light arrow, known as a " flight arrow," a good archer should be able to reach 300 or 310 yds. With a heavier bow, properly under control, 50 or 60 yds. might be added to this by a strong man. These experiments seem to be verified by a quotation from Shakespeare (Henry IV. Act iii. Sc. 2) : " A' would have clapped i' the clout and twelve score, and carried you a forehand shaft a fourteen and fourteen and a half," i.e. 286 or 290 yds. Instances are recorded of Englishmen shooting 340 and 360 yds., but in 1795 Mahmoud Effendi of the Turkish embassy shot 482 yds. with a Turkish bow, and Sultan Selim 972. The Turk, however, used a Turkish bow and a 14-in. arrow, with a grooved rest on his left arm along which the arrow passed, to com- pensate for the difference between the draw of the bow and the shortness of the arrow. The diplomatist's shot is supported by good evidence, but the sultan's is regarded as improbable at least.

Championship and Scores. — The British championship meetings, instituted in 1844, are conducted under the laws of the Grand National Archery Society: the prizes, apart from the Challenge prizes, are given in money, there being also a rule that any one who makes three golds at one end receives a shilling from all others of the same sex who are shooting. The

most notable champion was Horace A. Ford (d. 1880), who held the title for eleven consecutive years, 1849 to 1859 inclusive, and again in 1867. He made a four- figure score at four other championship meetings, his highest, 125! (in 1857) for 245 hits being unapproached. To him the modern scientific practice of archery must largely be attributed, together with its improvement and its popularity. The names of G. Edwards, Major C. Hawkins Fisher, H. H. Palairet, C. E. Nesham, and G. E. S. Fryer, are also notable as champions. Among ladies Mrs Horniblow was champion for eleven years between 1852 and 1881, Miss Legh for nineteen years between 1880 and 1908; Mrs Piers Legh, Miss Betham and Mrs Bowly claim the title on four occasions. Mrs Bowly's score of 823 (1894) was the highest made for the champion- ship till Miss Legh made 825 with 143 hits — only one arrow missed altogether — in 1898 ; beating her own record with a score of 841 (143 hits) in 1904. It should not be forgotten that as the champion- ship is awarded by points, the highest score does not necessarily win.

See Roger Ascham, Toxophilus (1545), edited by Edward Arber (London, 1868); The Arte of Warre, by William Garrard (London 1591); The Arte of Archerie, by Gervase Markham (London, 1634); Ancient and Modern Methods of Arrow Release, by E. S. Morse (1885); The English Bowman, by T. Roberts (London, 1801); A Treatise on Archery, by Thomas Waring (London, 9th ed., 1832); The Theory and Practice of Archery, by Horace A. Ford (new ed., London, 1887); Archery, by C. J. Longman and H. Walrond (Bad- minton Library, London, 1894). (W. J. F.)

ARCHES, COURT OF, the English ecclesiastical court of appeal of the archbishop of Canterbury, as metropolitan of the province. of Canterbury, from all the consistory and commissary courts in the province. It derives its name from its ancient place of judicature, which was in the church of Beata Maria de Arcubus — St Mary-le-Bow or St Mary of the Arches, " by reason of the steeple thereof raised at the top with stone pillars in fashion like a bow bent archwise." This parish was the chief of thirteen locally situated within the diocese of London but exempt from the bishop's jurisdiction, and it was no doubt owing to this circumstance that it was selected originally as the place of judicature for the archbishop's court. The proper designation of the judge is official principal of the Arches court, but by custom he came to be styled the dean of the Arches, a title belonging formerly to the chief official of the subordinate court. ' Originally, the official principal exercised metropolitan jurisdiction, while the dean of the Arches exercised the " peculiar " jurisdiction. The jurisdictions called "

peculiars " at one time numbered nearly 300 in England. They were originally introduced by the pope for the purpose of curtailing the bishop's legitimate auth- ority within his diocese; " an object which," says Phillimore, " they certainly attained, to the great confusion of ecclesiastical jurisdiction for many years." The dean of the Arches originally had jurisdiction over the thirteen London parishes above men- tioned, but as the official principal was often absent as ambassador on the continent, he became his substitute, and gradually the two offices were blended together. The original office of the dean of the Arches may now be regarded as extinct, though the title is still popularly used, for no dean of the Arches has been appointed eo nomine for several centuries, and by an act of 1838 bishops have jurisdiction over all peculiars within their diocese. The judge of the Arches court was until 1874 appointed by the archbishop of Canterbury by patent which, when confirmed by the dean and chapter of Canterbury, conferred the office for the life of the holder. He took the oaths of office required by the 127th canon. But by the Public Worship Regulation Act 1874 the two archbishops were empowered, subject to the approval of the sovereign by sign-manual, from time to time to appoint a practising barrister of ten years' standing, or a person who had been a judge of one of the superior courts (being a member of the Church of England) to be, during good behaviour, a judge for the purpose of exercising jurisdiction under that act, and it was enacted (sec. 7) that on a vacancy occurring in the office of official principal of the Arches court the judge should become ex officio such official principal. In this way the late Lord Penzance became dean on the retirement of Sir Robert Philli- more in 1875. Lord Penzance received in 1878 a supplemental patent as dean from Archbishop Tait, but did not otherwise fulfil the conditions observed on the appointment of his pre- decessors. On Lord Penzance's retirement in 1 899, his successor, Sir Arthur Charles, received a patent from the archbishop of Canterbury as official principal of the Arches court, and he took the oaths of office according to the practice before the Public Worship Regulation Act. He was subsequently and separately appointed judge under that act. Sir A. Charles resigned in 1903 and was succeeded by Sir L. T. Dibdin, who qualified in the same way as his immediate predecessor. The official principal of the Arches court is the only ecclesiastical judge who is em- powered to pass a sentence of deprivation against a clerk in holy orders. The appeals from the decisions of the Arches court were formerly made to the king in chancery, but they are now by statute addressed to the king in council, and they are heard before the judicial committee of the privy council. By an act of Henry VIII. (Ecclesiastical Jurisdiction Act 1532) the Arches court is empowered to hear, in the first instance, such suits as

are sent up to it by letters of request from the consistorial courts of the bishops of the province of Canterbury, and by the Church Discipline Act

1840, this jurisdiction is continued to it, and it is further empowered to accept letters of request from the bishops of the province of Canterbury after they have issued commissions of inquiry under that statute, and the commissioners have made their report.

The Arches court was also the court of appeal from the con- sistory courts of the bishops of the province in all testamentary and matrimonial causes. The matrimonial jurisdiction was transferred to the crown by the Matrimonial Causes Act 1857. Under the Clergy Discipline Act 1892 an appeal lies from the judgment of a consistory court under that act, in respect of fact by leave of the appellate court, and in respect of law without leave, to either the Arches court or the judicial committee of the privy council at the option of the appellant. Under the Benefices Act 1898 the official principal of the archbishop is recjuired to institute a presentee to a benefice if the tribunal constituted under that act decides that there is no valid ground for refusing institution and the bishop of the diocese notwith-standing fails to institute him. After the College of Advocates was incorporated and had established itself in Doctors' Commons, the archbishop's court of appeal, as well as his prerogative court, were usually held in the hall of the College of Advocates, but after the destruction of the buildings of the college, the court of appeal held its sittings, for the most part, in Westminster Hall. For many years past there has been but little business in the Arches court, mainly owing to the unwillingness of a large number of the clergy to recognize the jurisdiction of what they deny to be any longer a spiritual court, and the consistent use by the bishops of their right of veto in the case of prosecutions under the Public Worship Regulation Act. On the rare occasions when a sitting of the court is necessary, it is held in the library of Lambeth Palace, or at the Church House, Westminster.

ARCHESTRATUS, of Syracuse or Gela, a Greek poet, who flourished about 330 B.C. After travelling extensively in search of foreign delicacies for the table, he embodied the result in a humorous poem called 'Hdviradeia, afterwards freely trans- lated by Ennius under the title Heduphagetica. About 300 lines of this gastronomical poem are preserved in Athenaeus. The writer, who has been styled the Hesiod or Theognis of gluttons, parodies the style of the old gnomic poets; chief attention is paid to details concerning fish.

Ribbeck, Archestrati Reliquiae (1877); Brandt, Corpusculum Poesis Epicae Graecae ludibundae, i. 1888; Schmid, De Archestrati Gelensis Fragmentis (1896).

ARCHIAC, ETIENNE JULES ADOLPHE DESMIER DE SAINT SIMON, Vicomte d' (i 802-1 868), French geologist and palaeontologist, was born

at Reims on the 24th of September 1802. He was educated in the Military School of St Cyr, and served for nine years as a cavalry officer until 1830, when he retired from the service. Prior to this he had published an historical romance; but now geology came to occupy his chief attention. In his earlier scientific works, which date from 1835, he described the Tertiary and Cretaceous formations of France, Belgium and England, and dealt especially with the distribution of fossils geographically and in sequence. Later on he investi- gated the Carboniferous, Devonian and Silurian formations. His great work, Histoire des progres de la geologic, 1834-1859, was published in 8 volumes at Paris (1847-1860). In 1853 the Wollaston Medal of the Geological Society was awarded to him. In the same year, with Jules Haime (1824-1856), he published a monograph on the Nummulitic formation of India. In 1857 he was elected a member of the Academy of Sciences, and in 1861 he was appointed professor of palaeontology in the Museum d'Histoire Naturelle in Paris. Of later works his Paltontologie stratigraphique, in 3 vols. (1864-1865); his Geologie et paUon- tologie (1866); and his palaeontological contributions to de Tchihatcheff's Asie mineure (1866), may be specially mentioned.

He died on the 24th of December 1868.

See Notice sur les travaux scientifiques du vicomte d'Archiac, par A. Gaudry (Meulan, 1874); Extrait du Bull. Soc. Geol. de France, ser. 3, t. ii. p. 230 (1874).

ARCHIASˆ-ARCHILOCHUS

3(>7

*ARCHIAS, AULUS LICINIUS, Greek poet, was born at Antioch in Syria 120 B.C. In 102, his reputation having been already established, especially as an improvisatore, he came to Rome, where he was well received amongst the highest and most influential families. His chief patron was Lucullus, whose gentile name he assumed. In 93 he visited Sicily with his patron, on which occasion he received the citizenship of Heracleia, one of the federate towns, and indirectly, by the provisions of the lex Plautia Papiria, that of Rome. In 61 he was accused by a certain Gratius of having assumed the citizenship illegally; and Cicero successfully defended him in his speech Pro Archia. This speech, which furnishes nearly all the information concern- ing Archias, states that he had celebrated the deeds of Marius and Lucullus in the Cimbrian and Mithradatic wars, and that he was engaged upon a poem of which the events of Cicero's consulship formed the subject. The Greek Anthology contains thirty-five epigrams under the name of Archias, but it is doubtful how many of these (if any) are the work of the poet of Antioch. Cicero, Pro Archia; T. Reinach, De Archia Poeta (1890). **

ARCHIDAMUS, the name of five kings of Sparta, of the Eurypontid house.

1. The son and successor of Anaxidamus. His reign, which began soon after the close of the second Messenian War, is said to have been quiet and uneventful (Pausanias iii. 7 . 6) .

2. The son of Zeuxidamus, reigned 476-427 B.C. (but see Leotychides). He succeeded his grandfather Leotychides upon the banishment of the latter, his father having already died. His coolness and presence of mind are said to have saved the Spartan state from destruction on the occasion of the great ' earthquake of 464 (Diodorus xi. 63; Plutarch, Cimon, 16), but this story must be regarded as at least doubtful. He was a friend of Pericles and a man of prudence and moderation. During the negotiations which preceded the Peloponnesian War he did his best to prevent, or at least to postpone, the inevitable struggle, but was overruled by the war party. He invaded Attica at the head of the Peloponnesian forces in the summers of 431, 430 and 428, and in 429 conducted operations against Plataea. He died probably in 427, certainly before the summer of 426, when we find his son Agis on the throne.

Herod, vi. 71; Thuc. i. 79— iii. 1; Plut. Pericles, 29. 33; Diodorus xi. 48-xii. 52.

3. The son and successor of Agesilaus II., reigned 360-338 B.C. During his father's later years he proved himself a brave and capable officer. In 371 he led the relief force which was sent to aid the survivors of the battle of Leuctra. Four years later he captured Caryae, ravaged the territory of the Parrhasii and defeated the Arcadians, Argives and Messenians in the " tearless battle," so called because the victory did not cost the Spartans a single life. In 364, however, he sustained a severe reverse in attempting to relieve a besieged Spartan garrison at Cromnus in south-western Arcadia. He showed great heroism in the defence of Sparta against Epaminondas immediately before the battle of Mantineia (362). He supported the Phocians during the Sacred War (355-346), moved, no doubt, largely by the hatred of Thebes which he had inherited from his father: he also led the Spartan forces in the conflicts with the Thebans and their allies which arose out of the Spartan attempt to break up the city of Megalopolis. Finally he was sent with a mercenary army to Italy to protect the Tarentines against the attacks of Lucanians or Messapians: he fell together with the greater part of his force at Mandonion 1 on the same day as that on which the battle of Chaeronea was fought.

Xen. Hell. v. 4, vi. 4, vii. 1. 4, 5; Plut. Agis, 3, Camillas, 19, Agesilaus, 25, 33, 34, 40; Pausanias iii. 10, vi. 4; Diodorus xv. 54, 72, xvi. 24, 39, 59, 62, 88.

4. The son of Eudamidas I., grandson of Archidamus III. The dates of his accession and death are unknown. In 294 B.C. he was defeated at Mantineia by Demetrius Poliorcetes, who invaded Laconia, gained a second victory close to Sparta, and was on the point of taking the city itself when he was called

1 So Plut. Agis, 3 (all MSS.). Following Cellarius, some authori- ties read Manduria or Mandyrium.

away by the news of the successes of Lysimachus and Ptolemy in Asia Minor and Cyprus.

Plut. Agis, 3, Demetrius, 35; Pausanias, i. 13. 6, vii. 8. 5; Niese, Gesch. der griech. u. makedon. Siaaten, i. 363.

5. The son of Eudamidas II., grandson of Archidamus IV., brother of Agis IV. On his brother's murder he fled to Messenia (241 B.C.). In 227 he was recalled by Cleomenes III., who was then reigning without a colleague, but shortly after his return he was assassinated. Polybius accuses Cleomenes of the murder, but Plutarch is probably right in saying that it was the work of those who had caused the death of Agis, and feared his brother's vengeance.

Plutarch, Cleomenes, i. 5 ; Polybius v. 37, viii. I ; Niese, op. cil. ii. 304,311. (M. N. T.)

ARCHIL (a corruption of " orchil," Ital. oricello, the origin of which is unknown) , a purple dye obtained from various species of lichens. Archil can be extracted from many species of the genera Roccella, Lecanora, Umbilicaria, Parmelia and others, but in practice two species of Roccella — R. tinctoria and R. fuciformis — are almost exclusively used. These, under the name of " orchella weed " or " dyer's moss," are obtained from Angola, on the west coast of Africa, where the most valuable kinds are gathered; from Cape Verde Islands; from Lima, on the west coast of South America; and from the Malabar coast of India. The colouring properties of the lichens do not exist in them ready formed, but are developed by the treatment to which they are subjected. A small proportion of a colourless, crystalline principle, termed orcinol (a dioxy toluene), is found in some, and in all a series of acid substances, erythric, lecanoric acids, &c. Orcinol in presence of oxygen and ammonia takes up nitrogen and becomes changed into a purple substance, orceine (C7H7NO3), which is essentially the basis of all lichen dyes. Two other colouring-matters, azoerythin and erythro- leinic acid, are sometimes present. Archil is prepared for the dyer's use in the form of a " liquor " (archil) and a " paste " (persis), and the latter, when dried and finely powdered, forms the " cudbear " of

commerce, a dye formerly manufactured in Scotland from a native lichen, Lecanora tartarea. The manu- facturing process consists in washing the weeds, which are then ground up with water to a thick paste. If archil paste is to be made this paste is mixed with a strong ammoniacal solution, and agitated in an iron cylinder heated by steam to about 140 F. till the desired shade is developed — a process which occupies several days. In the preparation of archil liquor the principles which yield the dye are separated from the ligneous tissue of the lichens, agitated with a hot ammoniacal solution, and exposed to the action of air. When potassium or sodium carbonate is added, a blue dye known as litmus, much used as an " indicator," is produced. French purple or lime lake is a lichen dye prepared by a modification of the archil process, and is a more brilliant and durable colour than the other. The dyeing of worsted and home-spun cloth with lichen dyes was formerly a very common domestic employment in Scotland; and to this day, in some of the outer islands, worsted continues to be dyed with " crottle," the name given to the lichens employed.

ARCHILOCHUS, Greek lyric poet and writer of lampoons, was born at Paros, one of the Cyclades islands. The date of his birth is uncertain, but he probably flourished about 650 B.C.; according to some, about forty years earlier but certainly not before the reign of Gyges (687-652), whom he mentions in a well-known fragment. His father, Telesicles, who was of noble family, had conducted a colony to Thasos, in obedience to the command of the Delphic oracle. To this island Archilochus himself, hard pressed by poverty, afterwards removed. Another reason for leaving his native place was personal disappointment and indignation at the treatment he had received from Lycambes, a citizen of Paros, who had promised him his daughter Neobule in marriage, but had afterwards withdrawn his consent. Archi- lochus, taking advantage of the licence allowed at the feasts of Demeter, poured out his wounded feelings in unmerciful satire. He accused Lycambes of perjury, and his daughters of leading

the most abandoned lives. Such was the effect produced by his verses, that Lycambes and his daughters are said to have hanged themselves. At Thasos the poet passed some unhappy years; his hopes of wealth were disappointed; according to him, Thasos was the meeting-place of the calamities of all Hellas. The inhabitants were frequently involved in quarrels with their neighbours, and in a war against the Saians — a Thracian tribe — he threw away his shield and fled from the field of battle. He does not seem to have felt the disgrace very keenly, for, like Alcaeus and Horace, he commemorates the event in a fragment in which he

congratulates himself on having saved his life, and says he can easily procure another shield. After leaving Thasos, he is said to have visited Sparta, but to have been at once banished from that city on account of his cowardice and the licentious character of his works (Valerius Maximus vi. 3, externa 1). He next visited Siris, in lower Italy, a city of which he speaks very favourably. He then returned to his native place, and was slain in a battle against the Naxians by one Calondas or Corax, who was cursed by the oracle for having slain a servant of the Muses.

The writings of Archilochus consisted of elegies, hymns — one of which used to be sung by the victors in the Olympic games (Pindar, Olympia, ix. 1) — and of poems in the iambic and trochaic measures. To him certainly we owe the invention of iambic poetry and its application to the purposes of satire. The only previous measures in Greek poetry had been the epic hexameter, and its offshoot the elegiac metre; but the slow measured structure of hexameter verse was utterly unsuited to express the quick, light motions of satire. Archilochus made use of the iambus and the trochee, and organized them into the two forms of metre known as the iambic trimeter and the trochaic tetra- meter. The trochaic metre he generally used for subjects of a serious nature; the iambic for satires. He was also the first to make use of the arrangement of verses called the epode. Horace in his metres to a great extent follows Archilochus {Epistles, i. 19. 23-35). All ancient authorities unite in praising the poems of Archilochus, in terms which appear exaggerated (Longinus xiii. 3 ; Dio Chrysostom, Orationes, xxxiii. ; Quintilian x. i. 60; Cicero, Orator, i.). His verses seem certainly to have possessed strength, flexibility, nervous vigour, and, beyond everything else, impetuous vehemence and energy. Horace (Ars Poetica, 79) speaks of the " rage " of Archilochus, and Hadrian calls his verses " raging iambics." By his countrymen he was reverenced as the equal of Homer, and statues of these two poets were dedicated on the same day.

His poems were written in the old Ionic dialect. Fragments in Bergk, Poetae Lyrici Graeci; Liebel, Archilochi Reliquiae (1818); A. Hauvette-Besnault, Archiloque, sa vie et ses poesies (1905).

ARCHIMANDRITE (from Gr. apxˆv, a ruler, and y.avbpa, a fold or monastery), a title in the Greek Church applied to a superior abbot, who has the supervision of several abbots and monasteries, or to the abbot of some specially great and im- portant monastery, the title for an ordinary abbot being hegu- menos. The title occurs for the first time in a letter to Epiphanius, prefixed to his Panarium (c. 375), but the Lausiac History of Palladius may be evidence that it was in common use in the 4th century as applied to Pachomius (q.v.). In Russia the bishops are commonly selected from the archimandrites. The word occurs in the Regula Columbani (c. 7), and du Cange gives a few other cases of its use in Latin documents, but it

never came into vogue in the West. Owing to intercourse with Greek and Slavonic Christianity, the title is sometimes to be met with in southern Italy and Sicily, and in Hungary and Poland.

See the article in the Dictionnaire d' archeologie chretienne et de liturgie.

ARCHIMEDES (c. 287-212 B.C.), Greek mathematician and inventor, was born at Syracuse, in Sicily. He was the son of Pheidias, an astronomer, and was on intimate terms with, if not related to, Hiero, king of Syracuse, and Gelo his son. He studied at Alexandria and doubtless met there Conon of Samos, whom he admired as a mathematician and cherished as a friend, and to whom he was in the habit of communicating his discoveries before publication. On his return to his native city he devoted himself to mathematical research. He himself set no value on I

the ingenious mechanical contrivances which made him famous, regarding them as beneath the dignity of pure science and even declining to leave any written record of them except in the case of the aa,LpoTroi.ta (Sphere-making), as to which see below. As, however, these machines impressed the popular imagination, they naturally figure largely in the traditions about him. Thus he devised for Hiero engines of war which almost terrified the Romans, and which protracted the siege of Syracuse for three years. There is a story that he constructed a burning mirror which set the Roman ships on fire when they were within a bow- shot of the wall. This has been discredited because it is not mentioned by Polybius, Livy or Plutarch; but it is probable that Archimedes had constructed some such burning instrument, though the connexion of it with the destruction of the Roman fleet is more than doubtful. More important, as being doubtless connected with the discovery of the principle in hydrostatics which bears his name and the foundation by him of that whole science, is the story of Hiero's reference to him of the question whether a crown made for him and purporting to be of gold, did not actually contain a proportion of silver. According to one story, Archimedes was puzzled till one day, as he was stepping into a bath and observed the water running over, it occurred to him that the excess of bulk occasioned by the in- troduction of alloy could be measured by putting the crown and an equal weight of gold separately into a vessel filled with water, and observing the difference of overflow. He was so overjoyed when this happy thought struck him that he ran home without his clothes, shouting evpr\Ka., eupijxa, " I have found it, I have found it." Similarly his pioneer work in mechanics is illustrated by the story of his having said 56s lioi irov arSi /ecu klvSi ttjv yrp> (or as another version has it, in his dialect, wa /3£> /cat kivui rav yap), " Give me a place to stand and I (will) move the earth." Hiero asked him to give an illustration of his contention that a very great weight could be moved by a very small force. He is said to have fixed on a large and fully laden ship and to have used a*

mechanical device by which Hiero was enabled to move it by himself: but accounts differ as to the particular mechanical powers employed. The water-screw which he invented (see below) was probably devised in Egypt for the purpose of irrigating fields.

Archimedes died at the capture of Syracuse by Marcellus, 212 B.C. In the general massacre which followed the fall of the city, Archimedes, while engaged in drawing a mathematical figure on the sand, was run through the body by a Roman soldier. No blame attaches to the Roman general, Marcellus, since he had given orders to his men to spare the house and person of the sage; and in the midst of his triumph he lamented the death of so illustrious a person, directed an honourable burial to be given him, and befriended his surviving relatives. In accordance with the expressed desire of the philosopher, his tomb was marked by the figure of a sphere inscribed in a cylinder, the discovery of the relation between the volumes of a sphere and its circumscribing cylinder being regarded by him as his most valuable achievement. When Cicero was quaestor in Sicily (75 B.C.), he found the tomb of Archimedes, near the Agrigentine gate, overgrown with thorns and briers. " Thus," says Cicero (Tusc. Disp. v. c. 23, § 64), " would this most famous and once most learned city of Greece have remained a stranger to the tomb of one of its most ingenious citizens, had it not been discovered by a man of Arpinum."

Works. — The range and importance of the scientific labours of Archimedes will be best understood from a brief account of those writings which have come down to us; and it need only be added that his greatest work was in geometry, where he so extended the method of exhaustion as originated by Eudoxus, and followed by Euclid, that it became in his hands, though purely geometrical in form, actually equivalent in several cases to integration, as expounded in the first chapters of our text-books on the integral calculus. This remark applies to the finding of the area of a parabolic segment (mechanical solution) and of a spiral, the surface and volume of a sphere and of a segment thereof, and the volume of any segments of the solids of revolution of the second degree.

The extant treatises are as follows : —

(1) On the Sphere and Cylinder (Ilepi vaipas xai icuXicSpou). This treatise is in two books, dedicated to Dositheus, and deals

with the dimensions of spheres, cones, " solid rhombi " and cy- linders, all

demonstrated in a strictly geometrical method. The first book contains forty-four propositions, and those in which the most important results are finally obtained are: 13 (surface of right cylinder), 14, 15 (surface of right cone), 33 (surface of sphere), 34 (volume of sphere and its relation to that of circumscribing cylinder), 42, 43 (surface of segment of sphere), 44 (volume of sector of sphere). The second book is in nine propositions, eight of which deal with segments of spheres and include the problems of cutting a given sphere by a plane so that (a) the surfaces, (b) the volumes, of the segments are in a given ratio (Props. 3, 4), and of constructing a segment of a sphere similar to one given segment and having (a) its volume, (t) its surface, equal to that of another (5, 6).

(2) The Measurement of the Circle (K6

(3) On Conoids and Spheroids (Ilepi Kuvoeiftkoiv /cot o – $aipoeiSeco»') is a treatise in thirty-two propositions, on the solids generated by the revolution of the conic sections about their axes, the main results being the comparisons of the volume of any segment cut off by a plane with that of a cone having the same base and axis (Props. 21, 22 for the paraboloid, 25, 26 for the hyperboloid, and 27-32 for the spheroid).

(4) On Spirals (Ilepi iXUwv) is a book of twenty-eight proposi- tions. Propositions 1-11 are preliminary, 13-20 contain tangential properties of the curve now known as the spiral of Archimedes, and 21-28 show how to express the area included between any portion of the curve and the radii vectores to its extremities.

(5) On the Equilibrium of Planes or Centres of Gravity of Planes (Ilepi «ri7re6a>p iooppoiri&v ^ Ktvrpa fiapwv ejmrkSwv). This con- sists of two books, and may be called the foundation of theoretical mechanics, for the previous contributions of Aristotle were com- paratively vague and unscientific. In the first book there are fifteen propositions, with seven postulates; and demonstrations are given, much the same as those still employed, of the centres of gravity (1) of any two weights, (2) of any parallelogram, (3) of any triangle, (4) of any trapezium. The second book in ten propositions is devoted to the finding the centres of gravity (1) of a parabolic segment, (2) of the area included between any two parallel chords and the portions of the curve intercepted by them.

(6) The Quadrature of the Parabola (TeTpayoiviands irapaffoXfis) is a book in twenty-four propositions, containing two demonstrations that the area of any segment of a parabola is J of the triangle which has the same base as the segment and equal height. The first (a mechanical proof) begins, after some preliminary propositions on the parabola, in Prop. 6, ending with an integration in Prop. 16. The second (a geometrical proof) is

expounded in Props. 17-24.

(7) On Floating Bodies (Ilepi dxovufvav) is a treatise in two books, the first of which establishes the general principles of hydro- statics, and the second discusses with the greatest completeness the positions of rest and stability of a right segment of a paraboloid of revolution floating in a fluid.

(8) The Psammites {tyaiiixLriis, Lat. Arenarius, or sand reckoner), a small treatise, addressed to Gelo, the eldest son of Hiero, expound- ing, as applied to reckoning the number of grains of sand that could be contained in a sphere of the size of our " universe," a system of naming large numbers according to " orders " and " periods " which would enable any number to be expressed up to that which we should write with 1 followed by 80,000 ciphers!

(9) A Collection of Lemmas, consisting of fifteen propositions in plane geometry. This has come down to us through a Latin version of an Arabic manuscript; it cannot, however, have been written by Archimedes in its present form, as his name is quoted in it more than once.

Lastly, Archimedes is credited with the famous Cattle-Problem. enunciated in the epigram edited by G. E. Lessing] in 1773, which purports to have been sent by Archimedes to the mathematicians at Alexandria in a letter to Eratosthenes. Of lost works by Archimedes we can identify the following: (1) investigations on polyhedra mentioned by Pappus; (2) 'Apxai, Principles, a book addressed to Zeuxippus and dealing with the naming of numbers on the system explained in the Sand Reckoner; (3) Ilepi fvyuv, On balances or levers; (4) KevTpojSapixa, On centres of gravity; (5) Ka.TowTpt.Ka., an optical work from which Theon of Alexandria quotes a remark about refraction; (6) 'E

Bibliography. — The editio princeps of the works of Archimedes, with the commentary of Eutocius, is that printed at Basel, in 1544, in Greek and Latin, by Hervagius. D. Rivault's edition (Paris, 1615) gave the enunciations in Greek and the proofs in Latin some-

what retouched. A Latin version of them was published by Isaac Barrow in 1675 (London, 4to) ; Nicolas Tartaglia published in Latin the treatises on Centres of Gravity, on the Quadrature of the Parabola, on the Measurement of the Circle, and on Floating Bodies, i. (Venice, 1543); Trojanus Curtius published the two books on Floating Bodies in 1565 after Tartaglia's death; Frederic Com- mandine edited the Aldine edition of 1558, 4to, which contains Circuli Dimensio, De Lineis Spiralibus, Quadratura Paraboles, De Conoidibus et Spheroidibus , and De numero Arenae; and in 1565 the same mathematician published the two books De

Us quae vehuntur in aqua. J. Torelli's monumental edition of the works with the commentaries of Eutocius, published at Oxford in 1792, folio, remained the best Greek text until the definitive text edited, with Eutocius' commentaries, Latin translation, &c, by J. L. Heiberg (Leipzig, 1 880-1 881) superseded it. The Arenarius and Dimensio Circuli, with Eutocius' commentary on the latter, were edited by Wallis with Latin translation and notes in 1678 (Oxford), and the A renarius was also published in English by George Anderson (London, 1784), with useful notes and illustrations. The first modern transla- tion of the works is the French edition published by F. Peyrard (Paris, 1808, 2 vols. 8vo.). A valuable German translation with notes, by E. Nizze, was published at Stralsund in 1824. There is a complete edition in modern notation by T. L. Heath {The Works of Archimedes, Cambridge, 1897). On Archimedes himself, see Plutarch's Life of Marcellus. (T. L. H.)

ARCHIMEDES, SCREW OF, a machine for raising water, said to have been invented by Archimedes, for the purpose of removing water from the hold of a large ship that had been built by King Hiero II. of Syracuse. It consists of a water-tight cylinder, enclosing a chamber walled off by spiral divisions running from end to end, inclined to the horizon, with its lower open end placed in the water to be raised. The water, while occupying the lowest portion in each successive division of the spiral chamber, is lifted mechanically by the turning of the machine. Other forms have the spiral revolving free in a fixed cylinder, or consist simply of a tube wound spirally about a cylindrical axis. The same principle is sometimes used in machines for handling wheat, &c. (see Conveyors).

ARCHIPELAGO, a name now applied to any island-studded sea, but originally the distinctive designation of what is now generally known as the Aegean Sea (Myaiov neXayos), its ancient name having been revived. Several etymologies have been proposed: e.g. (1) it is a corruption of the ancient name, Egeopelago; (2) it is from the modern Greek, 'A7to irk\ayo, the Holy Sea; (3) it arose at the time of the Latin empire, and means the Sea of the Kingdom (Archi); (4) it is a translation of the Turkish name, Ak Denghiz, Argon Pelagos, the White Sea; (5) it is simply Archipelagus, Italian, arcipelago, the ohief sea. For the Grecian Archipelago see Aegean Sea. Other archipelagoes are described in their respective places.

ARCHIPPUS, an Athenian poet of the Old Comedy, who flourished towards the end of the 5th century B.C. His most famous play was the Fishes, in which he satirized the fondness of the Athenian epicures for fish. The Alexandrian critics attributed to him the authorship of four plays previously assigned to Aristophanes. Archippus was ridiculed by his con- temporaries for his fondness for playing upon words (Schol. on Aristophanes, Wasps, 481).

Titles and fragments of six plays are preserved, for which see T. Kock, Comicorum Atticorum Fragmenta, i. (1880) ; or A. Meineke, Poetarum Comicorum Graecorum Fragmenta (1855).

ARCHITECTURE (Lat. architectura, from the Gr. apxirknTUV , a master-builder) , the art of building in such a way as to accord with principles determined, not merely by the ends the edifice is intended to serve, but by high considerations of beauty and harmony (see Fine Arts). It cannot be defined as the art of building simply, or even of building well. So far as mere ex- cellence of construction is concerned, see Building and its allied articles. The end of building as such is convenience, use, irrespective of appearance; and the employment of materials to this end is regulated by the mechanical principles of the constructive art. The end of architecture as an art, on the other hand, is so to arrange the plan, masses and enrichments of a structure as to impart to it interest, beauty, grandeur, unity, power. Architecture thus necessitates the possession by the builder of gifts of imagination as well as of technical skill, and

in all works of architecture properly so called these elements must exist, and be harmoniously combined.

Like the other arts, architecture did not spring into existence at an early period of man's history. The ideas of symmetry and proportion which are afterwards embodied in material structures could not be evolved until at least a moderate degree of civiliza- tion had been attained, while the efforts of primitive man in the construction of dwellings must have been at first determined solely by his physical wants. Only after these had been pro- vided for, and materials amassed on which his imagination might exercise itself, would he begin to plan and erect structures, possessing not only utility, but also grandeur and beauty. It may be well to enumerate briefly the elements which in com- bination form the architectural perfection of a building. These elements have been very variously determined by different authorities. Vitruvius, the only ancient writer on the art whose works have come down to us, lays down three qualities as in- dispensable in a fine building: Firmitas, Utilitas, Venustas, stabilty, utility, beauty. From an architectural point of view the last is the principal, though not the sole element; and, accordingly, the theory of architecture is occupied for the most part with aesthetic considerations, or the principles of beauty in designing. Of such principles or qualities the following appear to be the most important: size, harmony, proportion, symmetry, ornament and colour. All other elements may be reduced under one or other of these

heads.

With regard to the first quality, it is clear that, as the feeling of power is a source of the keenest pleasure, size, or vastness of proportion, will not only excite in the mind of man the feelings of awe with which he regards the sublime in nature, but will impress him with a deep sense of the majesty of human power. It is, therefore, a double source of pleasure. The feelings with which we regard the Pyramids of Egypt, the great hall of columns at Karnak, the Pantheon, or the Basilica of Maxentius at Rome, the Trilithon at Baalbek, the choir of Beauvais cathedral, or the Arc de l'Etoile at Paris, sufficiently attest the truth of this quality, size, which is even better appreciated when the buildings are contemplated simply as masses, without being disturbed by the consideration of the details.

Proportion itself depends essentially upon the employment of mathematical ratios in the dimensions of a building. It is a curious but significant fact that such proportions as those of an exact cube, or of two cubes placed side by side — dimensions increasing by one-half (e.g., 20 ft. high, 30 wide and 45 long) — or the ratios of the base, perpendicular and hypotenuse of a right-angled triangle (e.g. 3, 4, 5, or their multiples) — please the eye more than dimensions taken at random. No defect is more glaring or more unpleasant than want of proportion. The Gothic architects appear to have been guided in their designs by proportions based on the equilateral triangle.

By harmony is meant the general balancing of the several parts of the design. It is proportion applied to the mutual relations of the details. Thus, supported parts should have an adequate ratio to their supports, and the same should be the case with solids and voids. Due attention to proportion and harmony gives the appearance of stability and repose which is indispensable to a really fine building. Symmetry is uniformity in plan, and, when not carried to excess, is un- doubtedly effective. But a building too rigorously symmetrical is apt to appear cold and tasteless. Such symmetry of general plan, with diversity of detail, as is presented to us in leaves, animals, and other natural objects, is probably the just medium between the excesses of two opposing schools.

Next to general beauty or grandeur of form in a building comes architectural ornament. Ornament, of course, may be used to excess, and as a general rule it should be confined to the decoration of constructive parts of the fabric; but, on the other hand, a total absence or a paucity of ornament betokens an unpleasing poverty. Ornaments may be divided into two classes — mouldings and the sculptured representation of natural or fanciful objects. Mouldings, no doubt, originated, first, in oimply taking off the edge of anything that might be in the way,

as the edge of a square post, and then sinking the chamfer in hollows of various forms; and thence were developed the systems of mouldings we now find in all styles and periods. Each of these has its own system; and so well are their char- acteristics understood, that from an examination of them a skilful architect will not only tell the period in which any building has been erected, but will even give an estimate of its probable size, as professors of physiology will construct an animal from the examination of a single bone. Mouldings require to be carefully studied, for nothing offends an educated eye like a confusion of mouldings, such as Roman forms in Greek work, or Early English in that of the Tudor period. The same remark applies to sculptured ornaments. They should be neither too numerous nor too few, and above all, they should be consistent. The carved ox skulls, for instance, which are appropriate in a temple of Vesta or of Fortune would be very incongruous on a Christian church.

Colour must be regarded as a subsidiary element in architec- ture, and although it seems almost indispensable and has always been extensively employed in interiors, it is doubtful how far external colouring is desirable. Some contend that only local colouring, i.e. the colour of the materials, should be admitted; but there seems no reason why any colour should not be used, provided it be employed with discretion and kept subordinate to the form or outline.

Origin of the Art. — The origin of the art of architecture is to be found in the endeavours of man to provide for his physical wants; in the earliest days the cave, the hut and the tent may have given shelter to those who devoted themselves to hunting and fishing, to agriculture and to a pastoral and nomadic life, and in many cases still afford the only shelter from the weather. There can be no doubt, however, that climate and the materials at hand affect the forms of the primitive buildings; thus, in the two earliest settlements of mankind, in Chaldaea and Egypt, where wood was scarce, the heat in the day-time intense, and the only material which could be obtained was the alluvial clay, brought down by the rivers in both those countries, they shaped this into bricks, which, dried in the sun, enabled them to build rude huts, giving them the required shelter. These may have been circular or rectangular on plan, with the bricks laid in horizontal courses, one projecting over the other, till the walls met at the top. The next advance in Egypt was made by the employment of the trunks of the palm tree as a lintel over the doorway, to support the wall above, and to cover over the hut and carry the flat roof of earth which is found down to the present day in all hot countries. Evidence of this system of construction is found in some of the earliest rock-cut tombs at Giza, where the actual dwelling of the deceased was reproduced in the tomb, and from these reproductions we gather that the corners, or quoins of the hut were protected by stems of the douva plant, bound together in rolls by the leaves,

which, in the form of torus rolls, were also carried across the top of the wall. Down to the present day the huts of the fellahs are built in the same way, and, surmounted as they are by pigeon-cots, bear so strong a resemblance to the pylons and the walls of the temples as at all events to suggest, if not to prove, that in their origin these stone erections were copies of unburnt brick structures. From long exposure in the sun, these bricks acquire a hardness and compactness not much inferior to some of the softer qualities of stone, but they are unable to sustain much pressure; conse- quently it is necessary to make the walls thicker at the bottom than at the top, and it is this which results in the batter or raking sides of all the unburnt brick walls. The same raking sides are found in all their mastabas, or tombs, sometimes built in un- burnt brick and sometimes in stone, in the latter case being simple reproductions of the former. In some of the early mastabas, built in brick, either to vary the monotony of the mass and decorate the walls, or to ensure greater care in their construction, vertical brick pilasters are provided, forming sunk panels. These form the principal decoration, as reproduced in stone, of an endless number of tombs, some of which are in the British Museum. At the top of each panel they carve a portion

of trunk necessary to support the walls of brick, and over the doorway a similar feature. In Chaldaea the same decorative features are found in the stage towers which constituted their temples, and broad projecting buttresses, indented panels and other features, originally constructive, form the decorations of the Assyrian palaces. There also, built in the same material, unburnt brick, the walls have a similar batter, though they were faced with burnt bricks. In later times in Greece and Asia Minor, where wood was plentiful, the stone architecture suggests its timber origin, and though unburnt brick was still employed for the mass of the walls, the remains in Crete and the representa- tions in painting, &c, show that it was encased in timber framing, so that the raking walls were no longer a necessary element in their structure. The clearest proofs of original timber construction are shown in the rock-cut tombs of Lycia, where the ground sill, vertical posts, cross beams, purlins and roof joists are all direct imitations of structures originally erected in wood.

The numerous relics of structures left by primeval man have generally little or no architectural value; and the only interesting problem regarding them — the determination of their date and purpose and of the degree of

civilization which they manifest — falls within the province of archaeology (see Archaeology; Barrow; Lake-Dwellings; Stone Monuments).

Technical terms in architecture will be found separately explained under their own headings in this work, and in this article a general acquaintance with them is assumed. A number of architectural subjects are also considered in detail in separate articles; see, for instance, Capital; Column; Design; Order; and such headings as Abbey; Aqueduct; Arch; Basilica; Baths; Bridges; Catacomb; Crypt; Dome; Mosque; Palace; Pyramid ; Temple ; Theatre ; &c. , &c. Also such general articles on national art as China: Art; Egypt: Art and Archaeology; Greek Art; Roman Art; &c, and the sections on archi- tecture and buildings under the headings of countries and towns. In the remainder of this article the general history of the evolu- tion of the art of architecture will be considered in various sections, associated with the nations and periods from which the leading historic styles are chronologically derived, in so far as the dominant influences on the art, and not the purely local characteristics of countries outside the main current of its history, are concerned; but the opportunity is taken to treat with some attempt at comprehensiveness the leading features of the architectural history of those countries and peoples which are intimately connected with the development of modern architecture.

These consecutive sections are as follows: — Egyptian Assyrian Persian Greek Parthian Sassanian Etruscan Roman Byzantine Early Christian

Early Christian Work in Central Syria Coptic Church in Egypt Romanesque and Gothic in — Italy France Spain England Germany

Belgium and Holland Renaissance : Introduction Italy France Spain England Germany

Belgium and Holland Mahommedan Finally, a section on what can only be collectively termed Modern architecture deals with the main lines of the later developments down to the present day in the architectural history of different countries. (R. P. S.)

Egyptian Architecture

Although structures discovered in Chaldaea, at Tello and Nippur, seeming to date back to the fifth millennium B.C., suggest that the earlier settlements of mankind were in the valley of the Tigris and Euphrates, north of the Persian Gulf, it is to Egypt that we must turn for the most ancient records of monumental architecture (see also Egypt: Art and Archaeology). The proximity of the ranges of hills (the Arabian and Libyan chains) to the Nile, and the facilities which that river afforded for the

transport of the material quarried in them, enabled the Egyptians at a very early period to reproduce in stone those structures in unburnt brick to which we have already referred.

Although the great founder of the first Egyptian monarchy is reputed to be Menes, the Thinite who traditionally founded the capital at Memphis, he was preceded, according to Flinders Petrie, by an earlier invading race coming from the south, who established a monarchy at This near Abydos, having entered the country by the Kosseir road from the Red Sea; and this may account for the early tradition that it was the Ethiopians who founded the earliest dynastic race, " Ethiopians " being a wide term which may embrace several races.

Egyptian architecture is usually described under the principal periods in which it was developed. They are as follows 1 : — (A) the Memphite kingdom, whose capital was at Memphis, south-west of Cairo, the Royal Domain extending south some 30 to 40 m. ; (B) the first Theban kingdom with Thebes as the capital ; this covers three dynasties. Then follows an interregnum of five dynasties, when the invasion of the Hyksos took place ; this was architecturally unproductive. On the expulsion of the Hyksos there followed © the second Theban kingdom, consisting of three dynasties, under whose reign the finest temples were erected throughout the country. After 1 102 followed six dynasties (1102-525 B.C.), with capitals at Sais, Tanis and Bubastis, when the decadence of art and power took place. Then followed the Persian invasion, 525-331 B.C., which was destructive instead of being reproductive. On the defeat of the Persians by Alexander the Great, and after his death in 323 B.C., was founded (D) the Ptolemaic kingdom, with Alexandria as the capital. A great revival of art then took place, which to a certain extent was carried on under the Roman occupation from 27 B.C., and lasted about 300 years.

With the exception of a small temple, found by Petrie in front of the' temple of Medum, and the so-called " Temple of the Sphinx," the only monuments remaining of the Memphite kingdom are the Pyramids, which were built by the kings as their tombs, and the mastabas, in which the members of the royal family and of the priests and chiefs were buried. The mastaba (Arabic for " bench “) was a tomb, oblong in plan, with battering side and a flat roof, containing various chambers, of which the, principal were (1) the Chapel for offerings, (2) the Serdab, in which the Ka or double of the deceased was deposited, and (3) the well, always excavated - in the rock, in which the mummy was placed.

The three best-known pyramids are those situated about 7 m. south-west of Cairo, which were built by the second, third and fourth kings of the fourth dynasty, — Khufu (c. 3969-3908 B.C.), Khafra (c. 3908-3845 B.C.), and

Menkaura (c. 3845-3784 B.C.), who are better known as Cheops, Cephren and Mycerinus. The first of these is the largest and most remarkable in its construction and setting out. The pyramid of Cephren was slightly smaller, and that of Mycerinus still more so, compensated for by a casing in granite. The dimensions and other details are given in the article Pyramids. From the purely architectural point of view they are the least im- pressive of masses, and their immense size is not realized until on a close approach.

The temple of the Sphinx, attributed to Cephren, is T-shaped in plan, with two rows of square piers down the vertical and one row down the cross portion. These carried a flat roof of stone. The temple is remarkable for the splendid finish given to the granite piers, and to the alabaster slabs which cased the rock in which it had ■been partially excavated (but see Egypt: History, I.).

The Serapeum at Sakkara, in which the sacred bulls were embalmed and buried, the tomb of Ti (a fifth dynasty courtier), and the tombs of the kings and queens of Thebes, have no special architectural features which call for description here.

We pass on to the first Theban kingdom, the eighth king of which, Nebhepre Menthotp III., built the temple lately discovered on the south side of the temple at Deir-el-Bahri, of which it is the prototype. It was a sepulchral temple, and being built on rising ground was approached by flights of steps. In the centre was a solid mass of masonry which, it is thought by some authorities, was crowned by a pyramid. This was surrounded by a double portico with square piers in the outer range, and octagonal piers in the inner range, there being a wall between the two ranges.

The earliest tombs in which the column (q.v.) appears, as an archi- tectural feature, are those at Beni Hasan, attributed to the period of Senwosri (formerly read Usertesen) I., the second king of the twelfth dynasty. These are carved in'the solid rock. There are two

1 For the various chronological systems proposed see Egypt: Chronology.

types, the Polygonal column, sometimes in error calied the Proto- doric, which was cut in t'le rock in imitation of a wooden column, and a second variety known as the Lotus column, which is employed inside, supporting

the rock-cut roof, but having such slender pro- portions as to suggest that it was copied from the posts of a porch, round which the Lotus plant had been tied.

The culminating period of the Egyptian style begins with the kings of the eighteenth dynasty, their principal capital being Thebes, described by Herodotus as the " City with the Hundred Gates "; and although the execution of the masonry is inferior to that of the older dynasties, the grandeur of the conception of their temples, and the wealth displayed in their realization entitle Thebes to the most important position in the history of the Egyptian style, especi- ally as the temples there grouped on both sides of the river exceed in number and dimensions the whole of the other temples throughout Egypt. This to a certain extent may possibly be due to the distance of Thebes from the Mediterranean, which has contributed to their preservation from invaders. We have already referred to the probable origin of the peculiar batter or raking side given to the walls of the pylons and temples, with the Torus moulding surrounding the same and crowned with the cavetto cornice. What, however, is more remarkable is the fact that, once accepted as an important and characteristic feature, it should never have been departed from, and that down to and during the Roman occupation the same batter is found in all the temples, though constructively there was no necessity for it. The strict adherence to tradition may possibly account for this, but it has resulted in a magnificent repose possessed by these structures, which seem built to last till eternity/'

An avenue with sphinxes on both sides form's the approach to the temple. These avenues were sometimes of considerable length, as in the case of that reaching from Karnak to Luxor, which is I J m.

long. The leading features of the temple (see fig. i) were: — (A) The pylon, consisting of two pyramidal masses of masonry crowned with a cavetto cornice, united in the centre by an immense doorway, in front of which on either side were seated figures of the king and obelisks.

(B) A great open court surrounded by peristyles on two or three sides.

(C) A great hall with a range of columns down the centre on either side, forming what in European architecture would be known as nave and aisles, with additional aisles on each side; these had columns of less height than those first mentioned, so as to allow of a clerestory, lighting the central avenue. (D) Smaller halls with their flat roofs carried by columns. And finally (E) the sanctuary, with

Eassage round giving access to the alls occupied by the priest. Broadly speaking, the temples bear considerable resemblance to one another (see

Temple), except in dimensions. There is one im- portant distinction, however, to be drawn between the Theban temples and those built under the Ptolemaic rule. In these latter the halls are not enclosed between pylons, but left open on the side of the entrance court with screens in between the columns, the hall being lighted from above the screens. The temples of Edfu, Esna and Dendera are thus arranged.

The great temple of Karnak (fig. 2) differs from the type just described, in that it was the work of many successive monarchs. Thus the sanctuary, built in granite, and the surrounding chambers, were erected by Senwosri (Usertesen) I. of the twelfth dynasty. In front of this, on the west side, pylons were added by Tethmosis (Thothmes, Tahutmes) I. (1541-1516), enclosing a hall, in the walls of which were Osirid figures. In front of this a third pylon was added, which Seti (Sethos) I. utilized as one of the enclosures of the great hall of columns (fig. 3), measuring 170 ft. deep by 329 ft. wide, having added a fourth pylon on the other side to enclose it. Again in front of this was the great open court with porticoes on two sides, and a great pylon, forming the entrance. In the rear of all these buildings, and some distance beyond the sanctuary, Tethmosis III. (IS03-I449) built a great colonnaded hall with other halls round, considered to have been a palace. All these structures form a part only of the great temple, on the right and left of which (i.e. to the north-east and south-west) were other temples preceded by pylons and connected one with the other by avenues df sphinxes. Though of small size comparatively, one of the best preserved is the temple of Chons, built by Rameses III. It was from this temple that an

1 = 1

CD

□ Fig. 1. -Plan of the □ ; — 1 Templeof Chons. q

A, Pylon.

B, Great court.

C, Hall of columns.

D, Priest's hall.

E, Sanctuary.

avenue of sphinxes led to the temple of Luxor, which was begun by Amenophis III. (1414-1379 B.C.), and completed by Rameses II.

(1300-1234).

On the opposite or west bank of the Nile are the temple of Medinet Abu, the Ramesseum, the temples of Kurna and of Deir-el-Bahri ; the last being a sepulchral temple, which, built on rising ground, had flights of steps leading to the higher level (fig. 4), and porticoes with square piers at the foot of each terrace. In the rear on the right- hand side was found an altar, the only example of its kind known in

A. first Propylon.

B. Great Court with Colonnades in centr.*

C. Second Propylon.

D. Hall of Columns.

E. Third Propylon.

F. Fourth' Propylon.

G. Hall with Osirid figuns, H. Granite Sanctuary and

adjoining chambers, Z. Open Area K. Columnar Edifice of

Tethmosis III

(XVlIIth. Dynasty). L. Temple of Rameses III,

(XXth. Dynasty).

M.Temple of Sethos II, (XlXth. Dynasty).

a. Sculptures of Sethos I. (XIXIH. Dynasty).

b. Sculptures of Sheshonk (XXllnd. Dynasty).

c Sculptures of Rameses It, (XlXth. Dynasty

d. Small Obelisks,

e. Large Obelisks,

f. Pillars of Senwosrt I. f XI Ilk. Dynasty .

g. Hall of Ancestors,

PLAN OF KARNAK

from Murray's Handbook (or Egypt, by permission of Mr. Edward

Stanford.

FlG. 2.

Egypt. The halls behind this and the portico of the right flank had polygonal columns.

In the palace of Tell el-Amarna, built shortly before 1350 B.C. by the heretic king Akhenaton (whose name was originally Amenophis IV.), and discovered by Petrie, there were no special architectural developments, but the painted decoration of the walls and pavements assumed a literal interpretation of natural forms of plants and foliage and of birds and animals, recalling to some extent that found at Cnossus in Crete.

Ascending the river from Cairo, the first temples of which im- portant remains exist are the two at Abydos. One of these has an exceptional plan, with seven sanctuaries in the rear. It was built by Seti I., and consists of an outer portico with square piers, a hall

with two rows of columns down to the centre, and a second hall with three rows of columns. These halls are placed longitudinally to give access to the seven sanctuaries. The second temple is of the ordinary type, with pylon, court with portico on all four sides, two halls of columns, and three sanctuaries in the rear. The next temple is that of Dendera, commenced under the second Ptolemy but not completed until the reign of Nero. It has been completely excavated, and

Fig. 3.-

-Section through Hall of Columns, Karnak. o, Clerestory window.

retains the whole of its external walls. Above Thebes is the temple of Esna, of which the hall of columns only has been cleared out. The capitals of the front belong to the lotus-bud type, and those of the interior are carved with many varieties of river plant. The temple of Edfu is the best preserved in Egypt. Its plan (fig. 5) would seem to have been determined from the first, and it is singular to note that it presents the traditional type of plan, which in the Theban examples was evolved from additions made by successive monarchs. In dimensions it is but little inferior to these. Its pylon (fig. 6) is 250 ft. wide and 150 ft. high; the first court has porticoes on three sides.

The great hall of columns, all of which here are of the same height, is lighted from above (fig. 7), the screen facing the court. Then follow the second hall of columns, two vestibules, and the sanctuary, surrounded by a passage giving access to the priest's rooms round. The temple of Kom Ombo, which comes next, was dedicated to two deities, and had therefore two sanctuaries.

The temples of Philae owe much of their beauty and picturesque- ness to the island on which they are situated; their plans, and that of the long porticoes in front of the pylons of the great temple, being fitted to the irregularity of the site. In the first court is a well-preserved example of the Mammeisi temple (see Temple), the sanctuary and other rooms in which are entirely enclosed in a peristyle. It was built by Ptolemy Euergetes (247-222 B.C.). A second monarch of the same name (about 125 B.C.) built the pavilion on the north side of the island, known as " Pharaoh's bed," the roof

Fig. 5

CHmMajlHtrt Detr-d-Boliari.lv permission °" J CHuu-icha. Leipzig*

Fig. 4. — Temple of Deir-el-Bahri, conjectural restoration by Prof. E. Brune.

of which was covered with stone slabs, resting on timber beams. In consequence of the building of the Assuan dam all these temples are submerged for the greater part of the year. The principal temples between Philae and the second cataract are: — Dabod, of which little remains; Kartassi; Kalabsha, still preserving its pylon and great hall of columns; the Bet el-Wali, in which are two ancient polygonal columns ; Gerf Husen, partially cut in the rock ; Dakka;

Wadi es-Sebu'a ; and lastly Abu Simbel. Owing to the proximity

of the ranges of hills to the Nile, there was no room for the ordinary

type of temple at Abu Simbel, so that those founded here by Rameses

the Great (c. 1300-1234 B.C.) were

excavated in the rock. In the

place of the pylon the side of the

cliff was worked off, leaving in

relief four immense seated figures,

66 ft. high. The first hall had

three aisles, divided by four piers

on each side, in front of which

Osirid figures (18 ft. high) were

carved ; beyond was a second hall,

vestibule and sanctuary. The

long rectangular chambers on

each side are provided with

benches cut in the rock. The

depth of the temple is 90 ft.

There is a second temple of

smaller size which faces the Nile. We have already referred to

the lotus columns at Beni Hasan;

these, when employed construc-

tionally to carry stone roofs,

assumed a far more solid appear- ance, and the stems of the lotus

plant carved in the earlier ex- amples were omitted in the later,

in order to give more surface for

intaglio carving. The capital and

its neck still retain the lotus buds

and the bands which tied them

round the column. In the central

avenues of the great halls the

columns had bell capitals, the

decoration of which was based on

the flower of the papyrus. There

are a few examples of the palm

capital, often carved in granite,

which date from an early period.

Commencing with the Ptolemaic

revival the capitals assume a

much greater variety of form,

their decoration being based on

river plants; but here again the

lotus plant, which seems still to

be the favourite type, pre- dominates, the buds in various

degrees of their growth alternat- ing one with the other. All these varieties of form are described

in the article Capital, but two or three may be mentioned here,

as they depart from the usual type. The Hathor-headed capital, with faces on all four sides, and sur- mounted with a miniature shrine, is found at Dendera, Philae and other temples of the Ptolemaic or Roman periods; one of the earliest examples, but without the shrine, dates back to Tethmosis III. (1503-1449 B.C.). As a distinct type of pier decoration, the Osirid figures at Medinet Abu, at Karnak, Gerf Husen, Abu Simbel and other temples, constitute important features : the figure is carved in front of the pier and does not serve any con- structive function.

With the exception of the great building in the rear of the temple at Karnak, built by Tethmosis 111., and the pavilion of Medinet Abu on the west bank of the Nile at Thebes, no palatial residences of any importance have yet been found, from which it might be inferred that the king, being the head of the Egyptian religion, occupied with his family the sacred precincts of the temple; but large as these temple enclosures are, there would have been no room for the immense army of attendants and servants

re- quired in an Oriental court. Moreover, the darkness of the halls and the rigid

enclosures would have made a residence in them anything but

cheerful. There are two instances where, in consequence of the subsequent desertion of the site, remains have been found of ancient

towns. At Tell el-Amarna, built by the heretic king, Akhenaton, portions of the houses remain, and at Kahun, in the Fayum, Petrie discovered the walls of a town which, erected for the overseers and

workmen employed in the construction of the pyramid of Mahun,

Plan of the Temple of Edfu. AA, Pylon.

B, Entrance door.

C, Great Court.

D, Hall of Columns.

E, Second Hall.

F, Hall of the Altar.

G, Hall of the Centre. H, Sanctuary.

KK, Storerooms.

built by Senwosri (Usertesen) II. (2684-2666 B.C.), was abandoned when the pyramid was completed. The houses were all built in unburnt brick, and in those cases where the rooms exceeded 8 or 9 ft. in width, columns in stone or wood were employed to assist in carry- ing the roof, which was constructed of beams carrying smaller timbers covered over with a flat roof of mud. The plans of the houses

Fig 6. — Exterior of the Pylon of the Temple of Edfu.

were not unlike those found in Pompeii, with open courts and porticoes and no external windows. The streets ran at right angles to one another, and

the houses varied in size from the workman's hut, of one room, to the overseer's house with several rooms and courts; the principal residence, in the centre, occupied by the governor of the town, being of still larger dimensions.

Further knowledge of the Egyptian dwellings is chiefly derived from the " soul-houses " recently discovered by Petrie, and from the paintings in the tombs, which suggest that they corresponded to that class of residence which in Rome was known as a villa, viz. a series of detached buildings built in immense enclosures, with porticoes round, groves of trees, artificial lakes, &c. The walls, gates and buildings were all built probably in un-burnt brick, and the whole site, if on the borders of the river, raised on great mounds. In this respect they accord with the houses of the fellah at the present day, which are raised on the accumulation of centuries, for when, owing to the rise of the Nile, the houses succumb to the moisture creeping up, another house is built on the top. The representations in paintings show that the houses were chiefly built in unburnt brick, and they sometimes were of two or three storeys

p IG _ Facade ' n ne 'g nt > with windows in the upper floors,

of the Great Hall anc ' a ˆ at ro °ˆ w ' tn a kind of dormer known of Columns of the as tne M umul > turned towards the north-west Ptolemaic temple at to ventilate the house. The paintings fre- jjjfy quentlv represent the store-rooms, or granaries;

and the preservation of those built by Rameses the Great, in the rear of the Ramesseum at Thebes, as granaries to hold corn, enables us to follow their construction. These granaries consist of a series of long cellars, about 12 to 14 ft. wide, placed side by side, and roofed over ' with elliptical barrel vaults. The_ reason for the elliptical form and the method of their construction is given in the article Vault (q.v.).

The pavilion of Medinet Abu was built in stone, and consequently has been preserved more or less complete to our day. It consisted of three storeys with a flat roof and battlement round, said to be in imitation of those on a Syrian fortress, as they are quite unlike anything else in Egypt. The floors were in wood, but there are traces of a stone staircase. The windows, of large size, were filled with thin stone slabs pierced with vertical slits, like those of the hall of columns at Karnak. (R. P. S.)

Assyrian Apxhitecture

About 3800 B.C. the earlier inhabitants of Chaldaea or Babylonia were invaded and absorbed by a Semitic race, whose first monarch was Sargon

of Agade (Akkad). 1800 years later, emigrations took place northward, and founded Nineveh on the banks of the Tigris, about 250 m. north of Babylon. 1200 years later, the Assyrians began building the magnificent series of palaces from which were brought the winged man-headed bulls and the sculptured slabs now in the British Museum. The leading characteristics of the style, and the nature of the structures, temples and palaces, evolved by the Chaldaeans (or first Babylonian empire), the Assyrians, and the new Babylonian empire, are similar; they are best known by those

which represent a culmination of the style in north Mesopotamia, and are therefore described here.

By a singular coincidence the remains of the oldest building found at Nippur (Niffar), in lower Mesopotamia, bear a close resem- blance to the oldest pyramid in Egypt, Medum, before it received its final casing. The latter, however, is known to have been a tomb, whereas the structure at Nippur was a temple, which took the form of a ziggurat or stage tower. It consisted of several storeys built one over the other, the upper storey in each case being set back behind the lower, in order to leave a terrace all round. In some cases the terrace was wider in front, to give space for staircases ascending from storey to storey. In consequence of the extreme flatness of the country and its liability to sudden inundations, it became necessary, when erecting buildings of any kind, to raise them on mounds of earth. The more important the structure, the higher was it deemed necessary to raise it, so as to make it the most conspicuous feature in the landscape. The result is that from Abu Shahrain, the most southern town, to Akarkuf (Aqarquf), 220 m. north, there are a series of immense mounds, sometimes nearly a mile in diameter, and rising to a height of 200 ft., crowned with the remains of towns, which, notwithstanding the thirty centuries more or less during which they have been exposed to the torrential rains and the destructive agencies of man, form still the most prominent features in the country. The structures which were raised on the mound, i.e. the temples and palaces with their enclosure walls, were all built with bricks made of the alluvial clay of the country, shaped in wooden moulds and dried in the heat of the sun, a heat so intense that they acquired sometimes the hardness of the inferior qualities of stone. The walls of the temples, palaces and enclosures had the same batter as that already referred to in the preceding section on Egypt. In the latter country they were reproduced in stone, of which there were many quarries on either side of the Nile; in Chaldaea they were obliged to content themselves with the preserva- tion of their ziggurats by outer casings of burnt brick and with pavements of tiles for their terraces. In order to vary the monotony of their temple walls, and perhaps to give them greater strength, they built vertical bands or buttresses at intervals, or they sank panels in the walls to two

depths, a natural decoration to which brick work lends itself; and these two methods, which were employed in early times, were followed by the Assyrians in the palaces of Nimrud, Nineveh and Khorsabad.

The earlier settlements were those founded between the mouths of the Tigris and the Euphrates, on what was then the shore of the Persian Gulf, now some 140 m. farther south. The principal towns where the remains of ziggurats have been found, all on the borders of the Euphrates, beginning with the most southern, are: — Abu Shahrain (Eridu) ; Mugheir (Ur of the Chaldees) ; Senkera (? Ellasar or Larsa) ; Warka (Erech) ; Tello (Eninnu) ; Nippur; Birs Nimrud (Borsippa) ; Babil (Babylon) ; El Ohemir (Kish) ; Abu Habba (Sippara) ; and Akarkuf (Durkurigalsu).

Although the ziggurats at Warka, Nippur and Tello are probably of older foundation, the great temple of Borsippa at Birs Nimrud is in better preservation, having been restored or rebuilt by Nebuchadrezzar, and may be taken as a typical example. The ground storey was 272 ft. square, and, according to Fergusson, 45 ft. high. The upper storeys or stages receded back, one behind the other, so as to leave a terrace all round. Although it is not possible to trace more than four storeys, it is known from the description on a cylinder found on the site that there were seven storeys, dedicated to the planets, each coloured with the special tint prescribed. The total height was about 160 ft., and on the top was a shrine dedicated to the god Nebo. An invaluable record of the researches which have been made during the last three centuries or more is given in H. V. Hilprecht's Explorations in Bible Lands during the igth Century. Two or three of them might be mentioned here. At Warka Mr Kenneth Loftus uncovered a wall, strengthened by buttresses 15 ft. wide and projecting 18 in., between which were panels filled with a series of semicircular shafts side by side, both buttresses and shafts being decorated with geometrical patterns consisting of small earthenware cones embedded in the wall, the ends of which were enamelled in various colours. The design of these patterns is so unlike anything found in Assyrian work, but bears so close a resem- blance to the geometrical designs carved on the columns at Diarbekr ascribed to the Parthians, that this wall may have been built at a much later period ; and this becomes the more probable in view of the discoveries made subsequently at Tello and Nippur, where Parthian palaces have been found, crowning the summits of the ancient Chaldaean mounds. In both these towns the researches made in later years have been carried out far more methodically than previously, and, following the example of Schliemann, excava- tions have been made to great depths, careful notes being taken of the strata shown by the platforms at different levels. At Tello, de Sarzac discovered the magnificent collection of statues of diorite now in the Louvre, one of them (unfortunately headless) of Gudea, priest-king and architect of Lagash, seated and carrying on his lap a tablet, on which is

engraved the plan of a fortified enclosure, whilst a divided scale and a stylos are carved in relief near the upper and right-hand side. A silver inlaid vase of Entemena, also priest- king of Lagash (about 3950 B.C.), and other treasures, were found on the same site.

At Nippur (the ancient Calneh) the research undertaken by the university of Pennsylvania resulted in the discovery, under a ziggurat dated from 4000-4500 B.C., of a barrel-vaulted tunnel, in the floor of which were found terra-cotta drain pipes with flanged mouths. At a later date (3750 B.C.) Naram-Sin, the son of Sargon, had built over the older ziggurat a loftier and larger temple, above which was a third built by Ur Gur (2500 B.C.), which still retained its burnt brick casing, 5 ft. thick. Crowning all these was the Parthian palace mentioned in the section on Parthian architecture below. The result of these researches has not only carried back the date of the earlier settlements to a prehistoric period quite unknown, but has suggested that if similar researches are carried out in other well-known mounds, among which the great city of Babylon should be counted as the most important, further revelations may still be made.

But we have now to pass to the principal cities of the Assyrian monarchy on the river Tigris. At Nineveh, the capital, which is about 250 m. north of Babylon, the remains of three palaces have been found, those of Sennacherib (705-681 B.C.), Esarhaddon (681- 668 B.C.), and Assurbanipal (668-626 B.C.). At Nimrud (the ancient

*.. .mu^******

From TV. e History & Hall, Lid.

Fig.

of Art in Chaidaea and Assyria, by permission of Chapman

-Plan of the Palace at Khorsabad.

A, Principal courtyard. E, Official residences.

B, The harem. F, The king's residence.

C, The offices. G, The ziggurat or tgmple. DD, The halls of state.

Calah, founded by Assur), 20 m. south of Nineveh, are also three palaces, one (the earliest known) built by Assurnazirpal (885-860 B.C.), the others by Shalmaneser II. (860-825 B.C.) and Esarhaddon. At Balawat, 10 m. east of Nineveh, was a second palace of Shal- maneser II., and at Khorsabad, 10 m. north-east of Nineveh, the palace (fig. 8) built by Sargon 722-705 B.C.), which was situated on the banks of the Khanser, a tributary of the Tigris. As this palace is one of the most extensive of those hitherto explored, its descrip- tion will best give the general idea of the plan and conception of an Assyrian palace.

The palace was built on an immense platform, made of sun-dried bricks, enclosed in masonry, and covering an area of nearly one million square feet, raised 48 ft. above the town level. The principal front of the palace measured 900 ft., there being a terrace in front. The approach was probably by a double inclined ramp which chariots and hoises could mount. A central and two side portals (fig. 9), flanked with winged human-headed bulls (now in the British Museum), led to the principal courtyard (A), measuring 300 ft. by 240 ft. The block (B) on the left of the court, containing smaller courts and rooms, constituted the harem; that on the right the offices © ; those in the rear the halls of state (DDD), the residences of the officers of the court (E), the king's private apartments (F) being on the left, facing the ziggurat or temple (G). In the extreme rear were other state rooms with terraces probably laid out as gardens and commanding a view of the river and country beyond.

As there must have been nearly 700 rooms in the palace, the destination of the greater number of which it would be difficult to determine, it will be sufficient to refer only to those state rooms in which the principal sculptured slabs were found, and which decorated the lower 9 ft. of the walls. The two chief factors to be noted are (1) the great length of the halls compared with their width, the chief hall being 150 ft. long and 30 ft. wide, and (2) the immense thickness of the walls, which measured 28 ft. The only

Fig. 9. — Entrance gateway, Palace of Khorsabad.

reason for walls of this thickness would be to resist the thrust of a vault, and as La Place, the French explorer, found many blocks of earth of great size, the soffits of which were covered with stucco and had apparently fallen from a height, he was led to the conclusion, now generally accepted, that these halls were vaulted. These dis- coveries, and the fact that in none of the palaces excavated has a single foundation of the base of any column been found, quite dispose of Fergusson's restoration, which was based on the palaces of Persepolis. Moreover, the two climates are entirely different. In the mountainous country of Persia the breezes might be welcomed, but in

Mesopotamia the heat is so intense that every precaution

Fig. 10.-

-Bas-relief of group of buildings at Kuyunjik. (After Layard.)

has to be taken to protect the inmates of the house or palace. Thick walls and vaults were a necessity in Nineveh, and even the windows or openings must have been of small dimensions. No windows have been found, nor are any shown on the bas-reliefs, except on the upper parts of towers. It is possible therefore that the light was admitted through terra-cotta pipes or cylinders, of which many were found on the site, and this is the modern system of lighting the dome in the East. Although no remains have ever been found of domes in any of the Assyrian palaces, the representation of many domical

forms is given in a bas-relief found at Kuyunjik (fig. 10), suggesting that the dome was often employed to roof over their halls.

Reference has already been made to the bas-reliefs which decorated the lower portion of the great halls; the less important rooms had their walls covered with stucco and painted. Externally the archi- tectural decoration was of the simplest kind; the lower portion of the walls was faced with stone; and the monumental portals, in addition to the winged bulls which flanked them, had deep archivolts in coloured enamels on glazed brick, with figures and rosettes in bright colours. A similar decoration would seem to have been applied to the crenellated battlements, which crowned all the exterior walls, as also those of the courts. The buttresses inside the courts, and the towers which flanked the chief entrance, were decorated with vertical semicircular mouldings of brick. This system of decoration is also found in the ziggurats or observatories behind the harem, where the three lower storeys still exist. A winding ramp was carried round this tower, the storeys of which were set back one behind the other, the burnt brick paving of the

human-headed bulls which flank the portals of the propylaea. From Media it would seem to have derived the great halls of columns and the porticoes of the palaces, so clearly described by Polybius (x. 24) as existing at Ecbatana; the principal difference being that the columns of the stoas and peristyle, which there consisted of cedar and cypress covered with silver

plates, were in the Persian palaces built of stone. The ephemeral nature of the one material, and the intrinsic value of the other, are sufficient to account for their entire disappearance; but as Ecbatana was occupied by Darius and Xerxes as one of their principal cities, the stone column, bases and capitals, which still exist there, may be regarded as part of the restoration and rebuilding of the palace ; and as they are similar to those found at Persepolis and Susa, it is fair to assume that the source of the first inspiration of Persian architecture came from the Medians, especially as Cyrus, the first king, was brought up at the court of Astyages, the last Median monarch.

The earliest Persian palace, of which but scanty remains have been found, was built at Pasargadae by Cyrus. There is sufficient,

ramp and the crenellated battlements forming a parapet, portions of which are still in situ.

Although not unknown in either Chaldaea or Assyria, the stone column, according to Perrot and Cbipiez, found no place in those structures of crude brick of which the real architecture of Mesopo- tamia consisted. Only one example in stone, in which the shaft and capital together are 3 ft. 4 in. in height, has been found. Two bases of similar design to the capital are supposed to have supported wooden columns carrying an awning. There are representations in the bas-reliefs of kiosks in a garden, the columns in which, with volute capitals, are supposed to have been of wood sheathed in metal, and on the bronze bands of the Balawat gates in the British Museum are representations of the interior of a house with wood columns and bracket capitals, and several awnings carried by posts. Small windows are shown in some of the bas-reliefs, with balustrades of small columns, which were doubtless copied from the ivory plaques found at Nimrud and now in the British Museum. (R. p. S.)

Persian Architecture

The origin of Persian architecture must be sought for in that of the two earlier dynasties, — the Assyrian and Median, to whose empire the Persian monarchy succeeded by conquest in 560 B.C. From the former, it borrowed the raised platform on which their palaces were built, the broad flights of steps leading up to them and the winged

however, to show that it was of the simplest kind, and consisted of a central hall, the roof of which was carried by two rows of stone columns, 30 ft. high, and porticoes in antis on two if not on three sides.

The great platform, also at Pasargadae, known as the Takht-i- Suleiman,

or throne of Solomon, covered an area of about 40,000 sq. ft., and is remarkable for the beauty of its masonry and the large stones of which it is built. These are all sunk round the edge, being the earliest example of what is known as " drafted masonry," which at Jerusalem and Hebron gives so magnificent an effect to the great walls of the temple enclosures. No remains have ever been traced on this platform of the palace which it was probably built to support.

We pass on therefore to Persepolis, the most important of the Persian cities, if we may judge by the remains still existing there. Here, as at Pasargadae, builders availed themselves of a natural rocky platform, at the foot of a range of hills, which they raised in parts and enclosed with a stone wall. Here the masonry is not drafted, and the stones are not always laid in horizontal courses, but they are shaped and fitted to one another with the greatest accuracy, and are secured by metal clamps. The plan (fig. 11) shows the general configuration of the platform on which the palaces of Persepolis are built, which covered an area of about 1,600,000 sq. ft. The principal approach to it was at the north-west end, up a magnificent flight of steps (A) with a double ramp, the steps being 22 ft. wide, with a tread of 15 in. and a rise of 4, so that they could be

ascended by horses. The first building opposite this staircase was the entrance gateway or propylaea (B), a square hall, with four columns carrying the roof and with portals in the front and rear flanked by winged bulls. The earliest palace on the platform (D) is that which was built by Darius, 521 B.C. It was rectangular on plan, raised on a platform approached by two flights of steps, and consisted of an entrance portico of eight columns, in two rows of four placed in antis, between square chambers, in which were prob- ably staircases leading to the roof. This portico led to the great hall, square on plan, whose roof was carried by sixteen columns in four rows. This hall was lighted by two windows on each side of the central doorway, all of which, being in stone, still exist, the lintels and jambs of both doors and windows being monolithic. The walls between these features, having been built in unburnt brick, or in rubble masonry with clay mortar, have long since disappeared. There were other rooms on each side of the hall and an open court in the rear. The bases of the columns of the portico still remain in situ, as also one of the antae in solid masonry; and as these in their relative position and height are in exact accordance with those

Fig. 12. — The Tomb of Darius, cut in the cliff at Nakshi Rustam, near Persepolis.

represented on the tomb of Darius (fig. 12) and other tombs carved in the rock near Persepolis (q.v.), there is no difficulty in forming a fairly accurate conjectural restoration of the same. In the repre- sentation of this palace, as shown on the tomb, and above the portico, has been sculptured the great throne of Darius, on which he sat, rendering adoration to the Sun god.

All the other palaces on the site, built or added to by various monarchs and at different periods, preserve very much the same plan, consisting always of a great square hall, the roof of which was carried by columns, with one or more porticoes round, and smaller rooms and courts in the rear. In one of the palaces (G) the roof was carried by 100 columns in ten rows of ten each. The most important building, however, and one which from its extent, height and magnifi- cence, is one of the most stupendous works of antiquity, is the great palace of Xerxes ©, which, though it consists only of a great central hall and three porticoes, covered an area of over 100,000 sq. ft., greater than any European cathedral, those of Milan and St Peter's at Rome alone excepted.

It was built on a platform raised 10 ft. above the terrace and approached by four flights of steps on the north side, the principal entrance. The columns of the porticoes and of the great hall were 65 ft. high, including base and capital. In the east and west porticoes the capitals consist only of the double bull or griffin; the cross corbels on their backs, similar to those shown on the tomb of Darius, have disappeared, being probably in wood. In the north or entrance

portico, and in the great hall, the capitals are of a much more elaborated nature, as under the double capital was a composition of Ionic capitals set on end, and below that the calix and pendant leaves of the lotus plant. It can only be supposed that Xerxes, thinking the columns of the east portico required more decoration, instructed his architects to add some to those of the entrance portico and hall, and that they copied some of the spoils brought from Branchidae and others from Egypt.

Fig. 13 shows the plan of the palace according to the researches of Mr Weld Blundell, who found the traces of the walls surrounding the great hall and of the square chambers at the angles, and also proved that the lines of the drains as shown in Coste's and Texier's plans were incorrect. M. Dieulafoy also traced the existence of walls enclosing the Apadana at Susa

from the paving of the hall and the portico which stopped on the lines of the wall. The plan of

From R. P. Spiers's Architecture, East and West.

Fig. 13. — Plan of the ̂Hall of Xerxes.

the palace at Susa was similar to that of the palace of Xerxes, except that on the side facing the garden facing south the apadana or throne room was left open. M. Dieulafoy's discoveries at Susa of the frieze of archers, the frieze of the lions, and other decorations of the walls flanking the staircase, all executed in bright coloured enamels on concrete blocks, revealed the exceptional beauty of the decoration both externally and internally applied to the Persian palaces.

The only other monumental works of Persian architecture are the tombs; to those cut in the solid rock, of which there are some examples, we have already referred. The most ancient tomb is that erected to Cyrus the Elder at Pasargadae, and consists of a small shrine or cella in masonry raised on a series of steps, inspired (accord- ing to Fergusson) by the ziggurat or terrace-temples of Assyria, but on a small scale. The tomb was surrounded on three sides by porticoes of columns. There are two other tombs, one at Persepolis and one at Pasargadae — small square towers with an entrance opening high up on one side, sunk panels in the stone, and a dentil cornice, copied from early Ionian buildings. (R. P. S.)

Greek Architecture

Prehistoric Period. — We have now to retrace our steps and go back to the prehistoric period of Greek architecture, to the origin and early development of that style which sowed the seed and deter- mined the future form and growth of all subsequent European art.

The discoveries in Crete and Argolis have shown that Greek architecture owes much less than was at one time supposed to Egyptian and Chaldaean architecture; and although from very early times there may have been a commercial exchange between the several countries, the objects imported suggested only new and various schemes of decorative design, and exercised no influence on the development of architectural style. The remains of the palaceat Cnossus in Crete, together with the representations in fresco painting and other decorative objects, show that whilst the lower part of the walls under the level of the ground and up to a height of 5 ft. above were all built in well-worked masonry, the upper portions were con- structed in unburnt brick with timber framing, which not only gave strength and solidity to the walls, but carried the cross beams and timbers of intermediate floors and the roof, and further, that the walls were always vertical, which was not the case in Egypt or Chaldaea.

The principal remains discovered by Dr Arthur J. Evans (see Crete) are described by him as belonging to the later Minoan age, from which it may be inferred they are the result of same

centuries of previous development. What, however, is most remark- able is the admirable planning of the whole palace, the bringing together, under one roof and in proper and regular intercommunica- tion, of the numerous services, which in a palace are somewhat complicated. The palace measured about 400 ft. square, and was built round an open court, nearly 200 ft. long by 90 ft. wide; as the same arrangement was found at Phaestus, excavated by the Italian archaeologists, it may be assumed to have been the Cretan plan. It was built on the crest of a hill, and in the western or highest portion was the court entrance from the agora to the megaron or throne- room, and the halls of the officers of the state. In the lower portion facing the east (the rooms in which were two storeys below the level of the court on account of the slope of the hill) was the private suite of apartments of the king and queen. All the services of the palace were at. the north end of the palace, where the entrance gateway to the central court was situated. This northern entrance, Dr Evans points out, " represents the main point of intercourse between the palace and the city on the one hand and the port on the other." This is the only part of the palace in which there is evidence of some kind of fortification, as the road of access is dominated by a tower or bastion. Other provisions also in the plan of the western entrance suggest that its passage was guarded to some extent. In this respect the palace of Tiryns, excavated by Dr Schliemann, presents an entirely different aspect; the whole stronghold bears a singular resemblance to a fortified castle of the middle ages; a high wall from 24 to 50 ft. thick surrounded the acropolis, and the inclined paths of approach and the double gateways gave that protection at. Tiryns which at Cnossus was assured, as Dr Evans remarks, by the bulwarks of the Minoan navy. The area on the spur of the hiH, on which the citadel of Tiryns was placed, was very much smaller, but if we accept the forecourt at Tiryns as equivalent to the great central court at Cnossus, there are great similarities in the plans of the two palaces. The propylaca, the altar court, the portico, and the megaron are found in both, and those details which are missing in the one are found in the other. The discoveries at Cnossus have enabled Dr Evans to reconstitute the timber columns, of which the bases only were found at Tiryns, and the spur walls of the portico of the megaron and the sills of the doorways at Tiryns give some clue to the restoration of similar features at Cnossus; and if in the latter palace we find the origin of the Doric column, at Tiryns is found that of the antae and of the door linings, further substantiated by the careful analysis made by Dr Dorpfeld of the Heraeum at Olympia.

The reconstruction by Dr Evans of the timber columns at Cnossus, which tapered from the top downwards, the lower diameter being about six-sevenths of the upper, has little historical importance (see Order), so that we may now pass on to the next early monument of importance, the tomb of Agamemnon, the principal and the best preserved of the beehive tombs found at Mycenae and in other parts of Greece. This tomb consists of three parts, the dromos or open entrance passage, the tholos or circular portion domed over, and a smaller chamber excavated in the rock and entered from the larger one. The tomb was subterranean, the masonry being concealed beneath a large mound of earth. The domed part, 48 ft. 6 in. in diameter and 45 ft. high, is built in horizontal courses of stone, which project one over the other till they meet at the top. Subse- quently the projecting edges were dressed down, so that the section through the dome is nearly that of an equilateral triangle. Notwith- standing the great thickness of the lintel (3 ft.) over the entrance doorway, the Mycenaeans left a triangular void over, to take off the superincumbent weight, subsequently (it is supposed) filled with sculpture, as in the Lions' Gate at Mycenae. The doorway was flanked by semi-detached columns 20 ft. high, the shafts of which tapered downwards like those reconstituted at Cnossus; the shafts rested on a base of three steps, and carried a capital with echinus and abacus. These shafts carried a lintel which has now dis- appeared ; the wall above was set back, and was at one time faced with stone slabs carved with spiral and other patterns, of which there are fragments in various museums, the most important remains being those of the shafts, of which the greater part, which was brought over to England in the beginning of the 19th century by the 2nd marquess of Sligo, was presented by the 5th marquess to the British Museum in 1905. These shafts, as also the echinus moulding of the capitals, are richly carved with the chevron and spirals, probably copied from the brass sheathing of wood columns and doorways referred to by Homer.

The Archaic Period. — The buildings just referred to belong to what is known as the prehistoric age in Greece ; the dispersion of the tribes by invaders from the north about 1 100 B.C. destroyed the Mycenaean civilization, and some centuries have to pass before we reach the results of the new development. Among the invaders the Dorians would seem to have been the chief leaders, who eventually became supreme. They brought with them from Olympus the worship of Apollo, so that henceforth the sanctuary of the god takes the place of the megaron of the king. From Greece the Dorians spread their colonies through the Greek islands and southern Italy. Later they passed on to Sicily and founded Syracuse, and subse- quently Selinus and Agrigentum (Acragas). The prosperity of all these colonies is shown in the splendid temples which they built in stone, the remains of many of which have lasted to our day.

The earliest Greek temple of which remains have been discovered 1 is that of the Heraeum at Olympia, ascribed to about 1000 B.C. Its plan (fig. 14) shows that the enclosure of the sanctuary and its porticoes in a peristyle had already been found necessary, if only to protect the walls of the cella, built in unburnt brick on a stone plinth; further, that the antae of the portico and the dressings of the entrance were in wood; and, following Pausanias' statement relative to the wood column in the opisthodomos, all the columns of the peristyle were in that material, gradually replaced by stone columns as they decayed, evidenced by the character of their capitals, which in style date from the 6th century B.C. to Roman times. The ephemeral nature of the materials employed in this and other early temples, and the risk of fire, must have naturally led to the desire to render the Greek sanctuaries more perman- ent by the employment of stone. But the Greeks were always timid as regards the bearing value of that material, and would seem to have imagined that unless the blocks were of megalithic dimensions it was impossible to build in stone. This may be gathered from the remains of the earliest example found, the temple of Apollo in the island of Ortygia, Syracuse, where the mono- lith columns had widely projecting capitals, the abaci of which were set so close together that the intercolumniation was less than one diameter of the column.

Following the temple of Apollo at Syracuse is the temple of Corinth, ascribed to 650 b.c, of which seven columns remain in situ, all monoliths, and the Olym- pieum at Syracuse. Nearly contemporary with the latter is one of the temples at Selinus in Sicily, 630 B.C., remarkable for the archaic nature of its sculp- tured metopes. Of later date there are five or six other temples in Selinus, all overthrown by earth- quakes; the temple of Athena at Syracuse, which having been converted into a church is in fair pre- servation; an unfinished temple at Segesta; and A, six at Agrigentum, built D.

Scale of Feet

From Curtius and Adler's Olympia, by permission of Behrend & Co.

Fig. 14. — Plan of the Heraeum. Peristyle; B, Pronaos; C, Naos; Opisthodomus; E, Base of statue on the brow of a hill facing of Hermes, the sea, one of which was so large that it was necessary to build in walls between the columns.

In Magna Graecia, in the acropolis at Tarentum, are the remains of a 7th century temple and three at Paestum about a century later in date. In one of these, the temple of Poseidon (figs. 15 and 16) the columns which carried the ceiling and roof over the cella are still standing; these are in two stages superimposedwith an architrave between them, and although there

are no traces in this instance of a gallery, they serve to render more intelligible Pausanias' description of that which existed in the temple of Zeus at Olympia.

The temple of Assus in Asia Minor is an early example remarkable for its sculptured architrave, the only one known, and in the temple of Aphaea in Aegina (g.v.) we find the immediate predecessor of the Parthenon, if we may judge by its sculpture and the proportions of its columns.

So far we have only referred to the early temples of the Doric order; of the origin and development of those of the Ionic order far less is known. The earliest examples are those of the temple of Apollo at Naucratis in Egypt, and of the archaic temple of Diana at Ephesus, both about 560 B.C. The remains of the latter,_ dis- covered by Wood, are now in the British Museum; they consist of two capitals, one with a portion of a shaft in good preservation; the sculptured drum and the base' of one of the columns, inscribed with the name of Croesus, who is known to have contributed to it;

1 Except, possibly, the earliest of those at Sparta (q.v.). — Ed.

two other bases, and the cornice or cymatium. The treasury of the Cnidians at Delphi was Ionic, judging by the carved ornament en- riching the cornice and architraves, and in the Naxian votive column we have another early example of an early voluted capital.

The tombs of Tantalais, near Smyrna, and of Alyattes, near Sardis, belong to the same date as those we shall find in Etruria. The Harpy tomb, now in the British Museum, built after 547 B.C., is the predecessor of many other Lycian tombs of the 5th and 4th centuries, to which we return.

As already pointed out, in the temple of Hera at Olympia (10th century B.C.), we find the complete plan of an hexastyle peripteral Greek temple, where columns originally in wood supported a wood architrave and superstructure protected by terra-cotta plaques and roofed over with tiles. The temple of Apollo at Syracuse, and the temple at Corinth (7th century B.C.) represent the earliest examples in stone, and in the temple of Poseidon at Paestum (6th century) are preserved the columns of the cella which carried the ceiling and

roof. The structural development therefore of the temple was com- pleted,

and no great constructional improvements reveal themselves after 550 B.C. The next century would seem to have been chiefly directed to the beautifying and refining of the features already prescribed, and it was the tradi- tional respect for, and the con- servative adherence to, the older type, which led the architects to the production of such master- pieces as the Parthenon and the Erechtheum, which would have been impossible but for the careful and logical progression of pre- ceding centuries.

The Parthenon (q.v.) at Athens represents the highest type of perfection, not only in its con- ception but in its realization. It is only necessary here to give a general description. It was designed by Ictinus in collabora- tion with Callicrates, and built on the south side of the Acropolis on a foundation carried down to the solid rock. The temple, com- menced in 454 B.C. and completed in 438 B.C., was of the Doric order and raised on a stylobate of three steps; it had eight columns in front and rear and was surrounded Fig. 15. — Plan of the Temple of by a peristyle, there being twenty Poseidon at Paestum. columns on the^ flanks. It con-

tained two divisions; the eastern chamber was originally known as the Hekatompedos (temple of 100 ft.), that being the dimension of the cella of the ancient temple which it was built to replace. The chamber on the western side was called the Parthenon {i.e. chamber of the virgin). All the principal lines of the building had delicate curves. The entablature rose about 3 in. in the middle to correct an optical illusion caused by the sloping lines of the pediment, which gave to the horizontal cornice the appearance of having sunk in the centre. The stylobate had therefore to be similarly curved so that the columns should be all of the same height. The columns are not all equidistant, those nearer the angle being closer together than the others, which gave a greater appearance of strength to the temple; this was increased by a slight inclination inwards of all the columns. In order to correct another optical illusion, which causes the shaft of a column, when it diminishes as it rises, and is formed with absolute straight lines, to appear hollow or concave, an increment known as the entasis was given to the column, about one-third up the shaft. The columns were not monoliths, like those of the earliest stone temples mentioned above ; they were built in several^ drums, so closely fitted together that the joint would be imperceptible but for the slight discoloration of the marble. The setting of the lowest drum of these columns on the curved stylobate, with the slight inclination of the column, must have been a work of an extra- ordinary nature, only possible with such a material as Pentelic marble. The cella or naos was built to enshrine the chryselephantine statue of Athena by Pheidias. In order to carry the ceiling and roof there was a range of columns on each side of the cella returning round the end. These columns probably carried an upper range as in the temple of Poseidon at Paestum. The tympana of the two pediments and all the metopes were enriched with

the finest sculpture, and were realized, designed, and executed by Pheidias and his pupils. On the upper part of the cella wall and under the peristyle was the Panathenaic frieze, of which, as also of the other sculptures, the British Museum possesses the finest examples.

The Propylaea (q.v.), designed by Mnesicles and built 437-432 B.C., was the only entrance to the Acropolis. It was of the Doric order,

and consisted of a portico of six columns, the two centre ones being wider apart, to allow of the road through, up which the chariots and beasts for sacrifices ascended. The columns carrying the marble ceiling of the vestibule were of the Ionic order; beyond them the wall was pierced by three doorways, and on the other side and facing east was another portico of six columns. The front entrance was flanked on the left hand by a chamber known as the Pinacotheca, and on the right by a chamber intended probably to be a replica but subsequently curtailed in size in consequence of the proximity of another temple.

The Erechtheum on the north side of the Acropolis occupied the site of three older shrines, which may account for its irregular plan. The eastern portion was the temple of Athena Polias, with a portico of six columns of the Ionic order. At a lower level on the north side was a portico of six columns (four in front and two at the sides) leading to the shrine of Erechtheus; the west front of this shrine had originally a frontispiece of four columns in antis raised on a podium ; subsequently during the Roman occupation these columns were taken down and reproduced as semi-detached columns with windows between. On the west side was a court in which was the olive tree and the shrine of Pandrosus (Pandroseion). At the south- west angle was the well-known portico or tribune of the Caryatides. There was a small entrance through the podium at the side, and stairs leading down to the shrine of Erechtheus.

The only other building remaining on the Acropolis is the temple of Nike Apteros, raised on a lofty substructure south-west of the propylaea. It also was of the Ionic order, and belonged to the type known as " amphiprostyle," with a portico of four columns in the

mˆ

From a photo by Brogi.

Fig. 16. — Temple of Poseidon at Paestum.

front and rear but no peristyle. The term " apteros " applied to the temple and not to the goddess of victory.

In 430 B.C., shortly after the completion of the Parthenon, Ictinus was employed to design the temple of Apollo Epicurius, at Bassae, in Arcadia. This temple externally was of the Doric order, but, being built in local stone, no attempt was made to introduce those refinements which are found in the Parthenon. In the rear of the cella is a second sanctuary with a doorway facing east; it was probably the site of an ancient temple which had to be preserved, and this may account for the fact that the temple runs north and south. The cella is flanked by five columns of the Ionic order which are connected by spur walls to the cella wall. These columns carry an architrave, frieze richly sculptured with figure subjects, cornice and wall above rising to the roof. There was no ceiling therefore, and the interior was probably lighted through pierced Parian marble tiles, of which three examples were found. The Corinthian capital found on the site is supposed by Cockerell to have belonged to the shaft between the two cellas.

The same architect, Ictinus, was employed in 420 B.C. to rebuild the hall of the mysteries at Eleusis on a larger scale. The hall was 185 ft. square, and its ceiling and roof were carried by seven rows of columns with six in each row. The propylaea, which gave access to the sacred enclosure at Eleusis, was copied from the propylaea at Athens. The so-called lesser propylaea had some connexion with , the mysteries.

The temple of Zeus at Olympia had much in common with the Parthenon, being nearly contemporaneous, built to enshrine a second chryselephantine statue by Pheidias, and in plan having a similar arrangement of columns inside the cella; the lower range of columns (according to Pausanias) supported a gallery round, so that privileged visitors could approach nearer to the statue. The temple, however, was built in the local conglomerate stone covered with a thin coat of stucco and painted.

Of circular temples there are two examples known, the Philippeion at Olympia and the Tholos at Epidaurus. The latter had, inside the cella, a peristyle of Corinthian columns, the capitals of which are of great beauty and represent in their design the transition

between those of the monument of Lysicrates and the temple of Zeus Olympius at Athens.

In the sacred enclosures of the Greek sanctuaries were other smaller temples or shrines, altars, statues and treasuries, the latter being built by

the various cities, from which pilgrimages were made, to contain their treasures. At Olympia there were ten or eleven, the remains of some of which are of great interest. Of the treasury of the Cnidians at Delphi, discovered by the French, so much has been found that it has been possible to evolve a complete conjectural restoration in plaster, now in the Louvre. Its sculpture and the rich carving of its architectural features show that it was Ionian in character. In front was a portico-in-antis, in which the caryatide figures standing on pedestals took the place of columns. These are the earliest examples known of caryatide figures, and they precede those of the Erechtheum by about a century.

The most important temple in Asia Minor was the temple of Diana (Artemis) at Ephesus (356-334 B.C.). The archaic temple was burnt in 356, and was immediately rebuilt with greater splendour from the designs of Paeonius. The site of the temple was discovered by Wood in 1869, and the remains brought over to the British Museum in 1875. There were 100 columns, 36 of which (according to Pliny) were sculptured, and it was probably on account of the magnificence of the sculpture that this temple was included among the seven wonders of the world. The sculptured bases are of two kinds, square and circular, in the latter case being the lower drums of the columns. Examples of both are in the British Museum, and several

Fig. 17. — Lycian Tomb of Telmessus.

conjectural restorations have been made, among which that of Dr A. S. Murray has been generally accepted, but recent researches (1905) suggest that it remains still an unsolved problem.

The temple of Apollo Didymaeus, near Miletus, was the largest temple in Asia Minor, and its erection followed that of the temple at Ephesus, Paeonius and Daphnis of Miletus being the architects. The temple was decastyle, dipteral, with pronaos and vestibule, but no opisthodomos. The cella was so wide (75 ft.) that it remained open to the sky. The bases of the columns were elaborately carved with ornament, as if in rivalry with the temple of Diana. Both these temples were of the Ionic order, as also were those of Athena Polias at Priene (340 B.C.), many of the capitals of which are in the British Museum, and the temples of Aphrodite at Aphrodisias and Cybele at Sardis.

The mausoleum at Halicarnassus, also of the Ionic order, built by Queen Artemisia in memory of her husband Mausolus, who died in 353 B.C., was, according to Pliny, recorded as one of the seven wonders of the world, probably on account of the eminence of the sculptors employed, Bryaxis, Leochares, Timotheus, Scopas and Pythius. Pliny's description is somewhat

vague, so that its actual design is a problem not yet solved. Professor Cockerell's restoration is in accord with the description, but does not quite agree with the actual remains brought over by Newton and deposited in the British Museum. If the Nereid monument and the tombs at Cnidus and Mylasa be taken as suggesting the design, the peristyle (pteron) of thirty-six columns of the Ionic order with entablature stood on a lofty podium, richly decorated with bands of sculpture, and was crowned by a pyramid which, according to Pliny, " contracted itself by twenty-four steps into the summit of a meta." The steps found are not high enough to constitute a meta, and it is possible therefore that, according to Mr J. J. Stevenson, these steps were over the peristyle only, and that the lofty steps which constituted the meta

were in the centre, carried by the inner row of columns. The magnificent sculpture of the Macedonian period has in recent times been demonstrated by the discovery of the marble sarcophagi found at Sidon by Hamdi Bey and now in the museum at Constantinople.

The Lycian tombs, of which there are many hundreds carved in the rock in the south of Asia Minor, are copies of timber structures, based on the stone architecture of the neighbouring Greek cities (fig. 17). The Paiafaor Payava tomb (375-362 B.c.),foundatXanthus and now in the British Museum, is apparently a copy, cut in the solid rock, of a portable shrine, in which the wood construction is clearly defined.

Capitals of the Greek Corinthian order have been found at Bassae, Epidaurus, Olympia and Miletus, but the earliest example of the complete order is represented in the Choragic monument of Lysicrates at Athens.

The most important example of the Greek Corinthian order is that of the temple of Jupiter Olympius at Athens, begun in 174 B.C., but not completed till the time of Hadrian, a.d. 117. The temple was 135 ft. wide and 354 ft. long, built entirely in Pentelic marble, the columns being 56 ft. high. There were eight columns in front and a double peristyle round.

The two porches of the Tower of the Winds at Athens (c. 75 B.C.) had Corinthian capitals. The upper part of the tower, which was octagonal in plan, was sculptured with figures representing the winds.

The Greek houses discovered at Delosand Priene were very simple and unpretentious, but the palace near Palatitza in Macedonia, discovered by Messrs Heuzey and Daumet, would seem to have been of a very sumptuous character. The front of the palace measured 250 ft. In the centre was a vestibule flanked with Ionic columns on either side, leading to a throne room at one time richly decorated with marble, and with numerous other

halls on either side. The date is ascribed to the middle of the 4th century B.C.

In selecting the sites for their theatres, the Greeks always utilized the slope of a hill, in which they could cut out the cavea, and thus save the expense of raising a structure to carry the seats, at the same time obtaining a beautiful prospect for the background. The theatre of Dionysus at Athens was discovered and excavated in 1864, and has fortunately preserved all the seats round the orchestra, sixty-seven in number, all in Pentelic marble, with the names inscribed thereon of the priests and dignitaries who occupied them. The largest theatre was at Megalopolis, with an auditorium 474 ft. in diameter. The most perfect, so far as the seats are concerned, is the theatre at Epidaurus, with a diameter of 415 ft. Other theatres are known at Dodona in Greece, Pergamum and Tralles in Asia Minor, and Syracuse and Segesta in Sicily. (R. P. S.)

Parthian Architecture

The architecture of the Parthian dynasty, who from 250 B.C. to A.D. 226 occupied the greater part of Mesopotamia, their empire in 160 B.C. extending over 480,000 sq. m., was quite unknown until Sir A. H. Layard, following in the steps of Ross and Ainsworth, visited and measured the plan of the palace at Hatra (el Hadr) about 30 m. south of Mosul ; the architecture of this palace shows that, on the one hand, the Parthians carried on the traditions of the barrel vault of the Assyrian palace, and on the other, from their contact with Hellenistic methods of building, had acquired considerable knowledge in the working of ashlar masonry.

El Hadr is first mentioned in history as having been unsuccessfully besieged by Trajan in A.D. 116, and it is recorded to have been a walled town containing a temple of the sun, celebrated for the value of its offerings. The temple referred to is probably the large square building at the back of the palace, as above the door- way is a rich frieze carved with griffins, similar to those found at Warka by Loftus, together with large quantities of Parthian coins. The remains (fig. 18) consist of a block of 380 ft. frontage, facing east, and 128 ft. deep, subdivided by walls of great thickness, running at right angles to the main front, and built in an immense court, divided down the centre by a wall, separating that portion on the south side, where the temple was situated, from that on the north side, which constituted the king's palace. The seven subdivisions of the different widths were all covered with semi-circular barrel vaults which, being built side by side, mutually resisted the thrust, the outer walls being of greater thickness, with the same object. In the centre of the south block was an immense hall 49 ft. wide and 98 ft. deep, which formed the vestibule to the temple in the rear; this vestibule was flanked by a series of three smaller halls on either

side, over which there was probably a second floor. On the palace or north side were

Fig. 18. — Plan of Palace of el Hadr.

A, Throne or reception room.

B, Large hall, or

C, Entrance hall of temple.

D, Temple.

two great aiwans or reception halls. The main front (fig. 19) was built in finely jointed ashlar masonry with semicircular attached shafts between the entrance doorways, which had semicircular heads, every third voussoir of the three larger doors being decorated by busts in strong relief with a headgear similar to that shown on Parthian coins ; other carvings, with the acanthus leaf, belonged to that type of Syrio-Greek work, of which Loftus found so many

Scale of Feer

30 40 50

Fig. 19. — Portion of front of Palace of el Hadr.

examples at Warka (Loftus, Chaldaea, Susiana, p. 225). In the great mosque of Diarbekr are two wings at the north and south ends respectively, which are said to have been Parthian palaces built by Tigranes, 74 B.C. ; they have evidently been rearranged or rebuilt at various times, the columns with their capitals and the entablature having been utilized again. The shafts of the columns of the upper storey are richly carved with geometrical patterns similar to those found by Loftus at Warka.

The American researches at Nippur have resulted in the discovery on the top of the mounds of the remains of a Parthian palace; and the disposition of its plan (fig. 20), and the style of the columns of

From Prof. H. V. Hilprecht's Exploration in Bible Lands, by permission of A. J. Holman & Co. and T. & T. Clark.

Fig. 20. — Plan of the Parthian Palace at Nippur.

the peristylar court, show so strong a resemblance to Greek work as to suggest the same Hellenistic influence as in the palace of el Hadr. Having no stone, however, they were obliged to build up these columns at Nippur with sections in brick, covered afterwards with stucco. The columns diminished at the top to about one-fifth of the lower diameter, and would seem to have had an entasis, as the lower portion up to one-third of the height is nearly vertical. A similar palace was discovered at Tello by the French archaeo- logists, and the bases of some of the brick columns are in the Louvre. (R. P. S.)

Sassanian Architecture

Although, on the overthrow of the Parthian dynasty' in a.d. 226, the monarchs of the Sassanian dynasty succeeded to the immense Parthian empire, the earliest building found, according to Fergusson, is that at Serbistan, to which he ascribes the date a.d. 380. The palace (fig. 21), which measures 130 ft. frontage and 143 ft. deep, with an internal court, shows so great an advance in the arrange- ments of its plan as to suggest considerable acquaintance with Roman work. The fine ashlar work of el-Hadr is no longer adhered to, and in its place we find rubble masonry with thick mortar joints, the walls being covered afterwards, both externally and internally, with stucco. While the barrel vault is still retained for the chief entrance porches, it is of elliptical section, and the central hall is covered with a dome, a feature probably handed down from the Assyrians, such as is shown in the bas-relief (fig. 10) from Kuyunjik, now in the British Museum. In order to carry a dome, circular on plan, over a square hall, it was necessary to arch across the angles, and here to a certain extent the Sassanians were at fault, as they

did not know how to build pendentives, and the construction of these

are of the most irregular kind. As, however, their mortar had

excellent tenacious properties, these pendentives still remain in situ

(fig. 22), and their defects were probably hidden under the stucco.

In the halls which flank the building on either side, however, they

displayed considerable knowledge of construction. Instead of having

enormously thick walls to resist the thrust of their vaults, to which

we have already drawn attention in the Assyrian work and at el

Hadr, they built piers at intervals, covering over the spaces between them, with semi-domes on which the walls carrying the vaults are supported, so that they lessened the span of the vault and brought the thrust well within the wall.

This, however, lessened the width of the hall, so they replaced the lower portions of the piers by the columns, leaving a passage round.

It is possible that this idea was partly derived from the great Roman halls of the thermae (baths), where the vault is brought forward on columns; but it was an improvement to leave a passage behind. The elliptical sections given to all the barrel vaults may have been the traditional method derived from Assyria, of which, however, no remains exist. In the article VAULTtherewillbefoundareason

Plan.

Section in lines BC, DE, FG of plan. Fig. 21 and Fig. 22. — The Palace of Serbistan.

why these elliptical sections were adopted (see also below in the description

of the great hall at Ctesipbon). In the palace of Firuzabad, attributed by Fergusson to Peroz (Firuz)' (a.d. 459- 485), the plan (fig. 23) follows more closely the disposition of the Assyrian palaces, and we return again to the thick walls, which might incline us to give a later date to Serbistan, except that in the pendentives carrying the three great domes in the centre of the palace at Firuzabad they show greater knowledge in their construction. The angles of the square hall are vaulted, with a series of concentric arches, each ring as it rises being brought forward, the object being to save centreing, because each ring rested on the ring beneath it. The plan is a rectangular parallelogram with a frontage of 180 ft. and a depth of 333 ft., more than double, therefore, of the size of Serbistan. An immense entrance hall in the centre of the main front is flanked on each side bv two halls placed at right angles to it, so as to resist the thrust of the elliptical barrel vaults of the entrance hall. This hall leads to a series of three square halls, side by side, each surmounted by a dome carried on pendentives. Beyond is an open court, the smaller rooms round all covered with barrel vaults. Here, as in Serbistan, the material employed is rubble masonry with thick joints of mortar, and fortunately portions of the stucco with which this Sassanian masonry was covered remain both externally and internally. As there are no windows of any sort, the wall surface of the exterior has been FiG.23.— PlanofthePalace decorated with semi – circular at- at Firuzabad.

tached shafts and panelling between,

which recall the primitive decorations found in the early Chaldaean temples, except that arches are carried at the top across the sunk panels. Internally an attempt has been made to copy the decoration of the Persian doorway, which represents a kind of renaissance of the ancient style. But instead of the lintel the arch has been intro- duced, and the ornament in stucco representing the Persian cavetto cornice shows imperfect knowledge of the original and is clumsily worked. The niches also, in the main front, have been copied from

IS (SD

{MB iM wmi

3 82

ARCHITECTURE

[ETRUSCAN

the windows which flank the doorway in the Persian palace. But they are decorative only, and are too shallow to serve any purpose.

If there has been some difficulty in determining the exact date of Firuzabad, that of the third great palace, at Ctesiphon, on the borders of the Tigris, is known to have been built by Chosroes I. in a.d. 550. Owing probably to its proximity to Bagdad, from which it lies about 25 m. distant, it is much better known than the other examples we have quoted; but while they are constructed in rubble masonry, Ctesiphon is built of brick, because we have now returned to the alluvial plain where no stone could be procured. The only portion of the palace which still exists is that which was built in burnt brick, and this far exceeds in dimensions Serbistan and Firuzabad. Its main front measured 312 ft.; its height was about 115 ft.; and its depth 175 ft. The plan is very simple, and consisted of an aiwan or immense hall, 86 ft. in width and 163 ft. long, covered with an elliptical barrel vault, the thrust of which is counteracted by five long halls on each side, also covered with barrel vaults and probably used as guard chambers or stores. The great hall was open in the front, and constituted an immense portal, 83 ft. wide and 95 ft. to the crown of the arch. The springing of the vault is 40 ft. from the ground, but up to about 26 ft. above the springing the walls are built in horizontal courses projecting inwards as they rise, so that the actual width of the vaulted portion (fig. 24) has been diminished

From Dieulafoy's V Art Antique, by permission of Morel et Cie. Fig. 24. — The Great Hall at Ctesiphon.

one-sixth and measures only about 71 ft. The crown of the vault is 9 ft. thick, the walls at the base being 23 ft. The bricks or tiles of which the vault is built are, like those at Thebes, laid flat-wise, and there is also a similar inclination of the rings of brick-work, which are about 10° out of the vertical. This leads fo the conclusion that this immense vault was built without centreing, as the tenacious quality of the mortar would probably be sufficient to hold each tile in its position until the ring was complete. In the building of the arch of the great portal other precautions were taken ; bond timbers 23 ft. long and in five rows, one above the other, were carried through the wall from front to back. The lower portion of the arch (5 ft. in height) was built with bricks placed flat-wise; the upper portion (4 ft. in height) in the usual way, viz. right angles to the face. The reason for this change was probably that the upper portions might be carved, as they have been, with a series of semi-circular cusps.

The decoration of the flanks of this great central portal is of the most bewildering description. There has evidently been a desire to give a monumental character to the main front. With this idea in view they would seem to have attempted to reproduce Roman features, such as are found decorating the fronts of the various amphitheatres of the Empire. But the semi-circular shafts which form the decoration do not come one over the other on the several

storeys, and there is a reckless employment of blank arcades distributed over the surface.

There are remains of two other palaces at Imamzade and Tag Iran, and in Moab a small example, the Hall of Rabboth Ammon, supposed to have been erected for Chosroes II. during the subjugation of Palestine, which is richly decorated with carving, probably by Syrio-Greek artists, with a mixture of Greek, Jewish and Sassanian details. At Takibostan and Behistun (Bisutun), some 200 m. north-east of Ctesiphon, are some remarkable Sassanian capitals and panels (published in Flandin and Coste's Voyage en Perse, 1851, Paris). (R. p. S.)

Etruscan Architecture

Although our acquaintance with Etruscan architecture is confined chiefly to the entrance gateways and the walls of towns, and to tombs, it forms a very important link between the East and the West. Though little is known of the history of Etruria (q.v.), the influence which her people exerted on Roman architecture, lasting down to the period when Greece was overrun and plundered of her treasures, was so great that it would be difficult to follow the origin of Roman architecture without some inquiry into the work of its immediate predecessor. The, theory put forward by Fergusson, as to the migra- tion of the Etruscans from Asia Minor in the 12th or 1 1 th century B.C., is substantiated by the resemblance of the tumuli in the latter country, such as those at Tantalais, on the northern shore of the gulf of Smyrna, and that of Alyattes near Sardis, as compared with the Regulini Galeassi tomb at Cervetri and the Cucumella tomb at Vulci, in all cases consisting of a sepulchral chamber buried under an immense mound surrounded by a podium in stone. The chamber was covered over with masonry, laid in horizontal courses, each stone projecting slightly over the one below. The same system of con- struction prevailed in the bee-hive tombs of Greece, except that the latter were always circular on plan, whilst these cited above were rectangular. Similar methods of construction are found at Tusculum and in a gateway at Arpino. In all these cases the projecting courses were worked off on the completion of the tomb, in Greece and at Tusculum and Arpino following a curve, and in the Regulini Galeassi tomb a raking line.

The earliest example known of the arched vault, with regular voussoirs in stone, is found in the canal of the Marta near Graviscae, ascribed to the 7th century. The vault is 14 ft. in span, with voussoirs from 5 to 6 ft. in depth. In the tomb of Pythagoras near Cortona, with a span of about 10 ft., only four voussoirs were em- ployed. In the Cloaca Maxima at Rome the vault (now ascribed by Commendatore Boni to the 1st century B.C.) ia built with three concentric rings of voussoirs. In all these cases the thrust of

the arch was amply resisted as they were constructed under ground, and in the entrance gateways at Volterra, Perugia and Falerii a similar resistance was given by the immense walls in which they were built.

We have already referred to one class of tomb in which the sepul- chral chamber, built above the ground, was covered over with a mound of earth ; there is a second class, carved out of the solid rock, in which we find the same treatment as that described in connexion with Egypt. The tomb represents, in its internal arrangements and in its decorations, the earthly dwelling of the defunct (compare the Egyptian " soul-houses "). The ceilings are carved in imitation cf the horizontal beams and slanting rafters of the roof, the former carried by square piers with capitals; one well-known tomb at Corneto (fig. 25) represents the atrium of an Etruscan house, which corresponds with the description given by Vitruvius of the cavaedia displuviata, in which there was a small opening at the top, known as the compluvium, the roof sloping down on all four sides.

The paintings which decorate these tombs have very much the same character as those which are found on what were thought to have been Etruscan, but are now generally considered as Greek vases, the principal difference being that instead of allegorical subjects, domestic scenes recalling the life of the deceased are represented. In a tomb at Cervetri the walls and piers were carved with representations of the helmets, swords and other accoutrements of a soldier, and also the mirrors and jewelry of his wife, even the kitchen utensils being included, so as to give the complete fittings of the house they occupied. In two examples at Castel D'Asso the rock has been cut away on all sides, leaving a rectangular block, crowned with reverse mouldings.

Scarcely any remains in situ of Etruscan temples have been found, and the description given by Vitruvius is very scanty. Of late years, however, in the British Museum and in the museums at Florence and Rome, a large amount of material has been brought together, from which it is possible to make some kind of conjectural restoration. This has been facilitated by the discoveries made at Olympia, Delphi and elsewhere in Greece, showing the important function which terra-cotta served in the protection and decoration of the timber roofs of the Greek temples and treasuries. The cornices, antefixae, pendant slabs and other decorative features in terra-cotta, found on the sites of the Etruscan temples, show that the timber construction of their roofs was protected in the same way; and although Vitruvius (bk. iii. ch. 2) considered the temple of Ceres at Rome to be clumsy and heavy, and its roofs low and wide, in comparison with the purer examples of Greek architecture, the remains of terra-cotta found at Civita Castellana (the ancient

Falerii), at Luna, Telamon and Lanuvium (the latter in the British Museum), show that in their modelling and colour they must have possessed considerable decorative effect, and when raised on an eminence, as in the case of the temple of Jupiter on the Capitol, formed striking features of importance, enriched as they were with gilding. There is one feature in the Etruscan examples which seems to have been peculiar to their temples, viz. the pendant slabs hung round the eaves to protect the walls ; these latter were probably covered with stucco and decorated with paintings. The lower

Fig. 25. — The Corneto Tomb.

portions of many of these slabs were decorated in relief and in colour at the back, showing that they were exposed to view below the soffit of the projecting eaves.

Owing to the ephemeral nature of the materials employed in the building of the walls of Etruscan temples, viz. unburned brick or rubble masonry with clay mortar, the roofs being in timber, little is known of their general design; the terra-cotta decorations are, however, fortunately in good preservation, and suggest that although the Etruscan temple, architecturally speaking, was not of a very monumental character, its external decoration and colour added considerably to its effect. (R. P. S.)

Roman Architecture

The rebuilding of Rome, which began in the reign of Augustus, and was carried on by his successors to a much greater extent, has caused the destruction of nearly all those examples of early work to which the student, working out the history of a style, would turn. There are, however, a few early buildings still existing, and these are of value as showing the extremely simple nature of their design. The temple of Fortuna Virilis (so-called) in the Forum Boarium, attributed to the beginning of the 1st century B.C., shows the great difference between Greek and Roman temples. Like the Etruscan temple, it is raised on a podium, and approached by a flight of steps. The Etruscan cella is dispensed with ; and what may be looked upon as the semblance of a Greek peristyle is retained in the semi-detached columns which are carried round the walls of the cella. To the entrance portico, however, the ‘Roman architect attached great importance, and we find here that one-third of the whole length of the temple is given up to the

portico. The Tabularium built by Lutatius Catulus (78 B.C.) is a second example of early work. On a lofty substructure, built of peperino stone, was raised an arcade, which formed a passage from one side of the capitol to the other, and here we find the earliest example of the use of the Classic order, as a decorative feature only, applied to the face of a wall. The arcade consists of a series of arches with intermediate semi-detached Doric columnˆ carrying an entablature. The architectural design of the substructure is of the simplest kind, depending for its effect only on the size of the stones employed and the finish given to the masonry. The same remark applies to the few remains left of the Forum Julium (47 B.C.), where an additional decorative effect was produced by the bevelled edge worked round all the stones, producing the effect of rusticated masonry.

If, however, the remains are few, the records of classical writers show that already before the beginning of the 1st century B.C. the influence of Greece had been shown in the transformation of the Forum, the embanking of the river Tiber, the erection of numerous porticoes throughout the Campus Martius, and of basilicas, one of which, rebuilt by Paulus Aemilius in 50 B.C., was remarkable for its monolithic columns of pavonazetto marble; and further that on the Palatine hill were various mansions, the courts and peristyles of which were richly decorated with marble.

The boast of Augustus that he found Reme built of brick and left

it in marble is true in a sense, but not in the way it is usually inter- preted. He greatly encouraged the use of marble — the temple of Venus in the forum of Julius Caesar is said to have been, built entirely of that material — but as a rule marble was only used as a facing. This, however, led to the substitution of solid concrete for the core of walls, in place of the unburnt brick which up to that time had been employed. On this subject the writings of Vitruvius, the Roman architect, are of the greatest value, as they describe clearly not only the materials used at this time (about 30 B.C.), but the different methods of building walls (see Rome). The material which contributed more than any other to the magnificent concep- tions of the Roman Imperial style was that known as pozzolana, a volcanic earth which, mixed with lime, formed an hydraulic cement of great cohesion and strength. Not only the walls but the vaults were built in this pozzolana concrete, and formed one solid mass. Bricks were employed in arches, on the quoins of walls, occasionally in bond courses, and in the constructional vaults as ribs, in order to relieve the centreing of the weight until the pozzolana concrete had been poured in and had consolidated. The bricks employed in these ribs, and for the voussoirs of arches, were of the kind we should describe as tiles, being about 2 ft. square and 2 in. thick. Bricks also of smaller size and triangular in shape were used for the facing of walls, the triangular portions being embedded into the concrete walls.

The Romans themselves do not seem to have realized the tenacious properties of this pozzolana cement which, when employed for the foundation of temples, formed a solid mass capable of bearing as much weight as the rock itself. They feared also the thrust of the immense vaults over their halls, and always provided crosswalls to counteract the same, as shown in the plan of all the thermae; when, however, they had discovered the secret of covering over large spaces with a permanent casing indestructible by fire, it not only gave an impetus to the great works in Rome, but led to a new type of plan, which spread all through the Empire, varied only by the difference in materials and in labour. In this respect the Romans always availed themselves of the resources of the country, which they turned to the best account. As pozzolana was not to be found in North Africa or Syria, they had to trust to the excellent qualities of the Roman mortar, but even in Syria, where stone was plentiful and could be obtained in great dimensions, when they attempted to erect vaults of great span similar to those in Rome, these probably collapsed before the building was finished, and were replaced by roofs in wood.

In the styles hitherto described the gradual development has been traced to their primitive, culminating and decadent periods. This is not called for in a description of the Roman style of architecture, which to a certain extent appeared phoenix-like in its highest development under Augustus. Roman orders in the Augustan age had reached their culminating development. The capitals of the portico of the Pantheon (27 B.C.), or of the temple of Mars Ultor (2 B.C.), constitute the finest examples of the Corinthian order, whilst those of later temples show a falling off in style. It was only in the application of the orders that new combinations presented themselves, and this can be better understood when we refer to the monuments themselves. The description of the Roman orders, with the subsequent modifications, is given in the article Order. It is necessary, however, here to draw attention to two very important developments which the Roman architect introduced as regards the orders : firstly, their employment as decorative features in combina- tion with the arcade, known as composite arcades, and secondly, their superposition one above the other in storeys. The earliest example of the first class is that found in the Tabularium as it now exists; of the second class the Colosseum and the theatre of Mar- cellus are the best known examples. In principle the practice must be condemned, for the employment of the column and entablature, which was designed by the Greek architect as an independent constructive feature, in a purely decorative sense stuck on the face of a wall, is contrary to good taste, but it is impossible not to recog- nize in its application to the Colosseum the value of the scale which it has given to the whole structure, a scale which would have been entirely lost if the building had been treated as one storey. The superposition of the orders as exemplified in the Roman theatres and

amphitheatres throughout the Empire constitutes the greatest development made in the style, and it is one which, from the Italian revivalists down to our time, has had more influence in the design of monumental work than any other Roman innovation.

In the preceding sections it has been necessary to confine our descriptions, in the case of Egypt and Greece, more or less to temples and tombs, and in that of Assyria to palaces, but in Roman archi- tecture the monuments are not only of the most extensive and varied kinds, but in some parts of the Empire they become modified by the requirements of the country, so that a tabulated list alone would occupy a considerable space. The following are the principal subdivisions : The Roman forum (see Rome) ; the colonnaded streets in Syria and elsewhere, and temple enclosures; temples (q.v.), rectangular and circular; basilicas (q.v.); theatres (q.v.) and amphi- theatres (q.v.) ; thermae or baths (q.v.) ; entrance gateways and triumph arches (see Triumphal Arch) ; memorial buildings and tombs, aqueducts (q.v.) and bridges (q.v.), palatial architecture (see Palace) ; domestic architecture (see House).

The Forum Romanum under the Republic would seem to have served several purposes. The principal temples and important public burldings occupied sites round it, and up to the time of Julius Caesar there were shops on both sides : it was also used as a "hippo- drome and served for combats and other displays. Under the Empire, however, these were relegated to the amphitheatre and the theatre, markets were provided for elsewhere, and the forum became the chief centre for the temples, basilicas, courts of law and exchanges. But already in the time of Julius Caesar the Forum Romanum had become too small, and others were built by succeeding emperors. In order to find room for these, not only were numerous crowded sites cleared, but vast portions of the Quirinal hill were cut away to make place for them. The Fora added were those of Julius Caesar, Augustus, Trajan, Nerva and Vespasian. Outside Rome, in pro- vincial towns and in Africa and Syria, the Forum was generally built on the intersection of the two main streets, and was surrounded by porticoes, temples and civic monuments.

Colonnaded Streets. — We gather from some Roman authors that in early days the Campus Martius was laid out with porticoes. All these features have disappeared, but there are still some existing in Syria, North Africa

and Asia Minor, which are known as colon- naded streets. The most important of these are found in Palmyra, where the street was 70 ft. wide with a central avenue open to the sky and side avenues roofed over with stone. The columns employed were of the Corinthian order, 31 ft. high, and formed a peristyle on each side of the street, which was nearly a mile in length. The triple archway in this street is still one of the finest examples of Roman architecture. At Gerasa, the colonnaded streets had columns of the Ionic order, the street being 1800 ft. long, with other streets at right angles to it; similar streets are found at Amman, Bosra, Kanawat, &c. At Pompeiopolis, in Asia Minor, are still many streets of columns, and in North Africa the French archaeologists have traced numerous others.

Temple Enclosures. — In Rome the great cost, and the difficulty of obtaining large sites, restricted the size of the enclosures of the temples; this was to a certain extent compensated for by the magnificence of the porticoes surrounding them. The most important was that built by Hadrian, measuring 480 ft. by 330 ft., to enclose the double temples of Venus and Rome. The portico of Octavia measures 400 ft. by 370 ft., enclosing two temples, and the portico of the Argonauts, which enclosed the temple of Neptune, was about 300 ft. square. These dimensions, however, are far exceeded by those of the enclosures in Syria and Asia Minor. The court of the temple of the Sun at Palmyra was raised on an artificial platform 16 ft. high, and measured 735 ft. by 725 ft., with an enclosure wall oi 74 ft. on the west and 67 ft. high or the other three sides.

At Baalbek the platform was raised 25 ft. above the ground, the dimensions being 400 ft. wide and 900 ft. deep. At Damascus the enclosure of the temple of the Sun has been traced, and it extended to about 1000 ft. square. Simiiar enclosures are found at Gerasa, Amman and other Syrian towns. In Asia Minor, at Aizani the plat- form was 520 by 480 ft., raised about 20 ft., and in Africa the French have found the remains of similar enclosures.

Roman Temples. — The Romans, following the Etruscan custom, invariably raised their temples on a podium with a flight of steps on the main front. Their temples were not orientated, and being regarded more as monuments than religious structures occupied prominent sites facing the Forum or some great avenue. Much importance was attached to the entrance portico, which was deeper than those in Greek temples, and the peristyle when it existed was rarely carried round the back. On the other hand the cella exceeded in span those of the Greek temples, as the Roman, being acquainted with the principle of trussing timbers, could roof over wider spaces. The principal temples in Rome, of which remains still exist, are those of Fortuna Virilis, Mars Ultor, Castor, Neptune, Antoninus and Faustina, Concord, Vespasian, Saturn and portions of the double temples of

Venus and Rome. At Pompeii are the temples of Jupiter and Apollo, at Cora the temple of Mercury, and in France, the Maison Carree at Nimes and the temple at Vienne. In Syria are the temples of Jupiter at Baalbek, of the Sun at Palmyra and Gerasa, and in Spalato the temple of Aesculapius.

Of circular temples the chief are the Pantheon at Rome, the temple of Vesta on the Forum, of Mater Matuta, so-called, on the Forum Boarium, the temple of Vesta at Tivoli, of Jupiter at Spalato and of Venus at Baalbek.

Of the rectangular temples the Maison Carree at Nimes is the most perfect example existing (fig. 26). It was built by Antoninus Pius, and dedicated to his adopted sons Lucius and Martius. This temple, 59 ft, by 117 ft., is of the Corinthian order, hexastyle, pseudoperipteral, with a portico three columns deep, and is raised on a podium 12 ft. high. The next best preserved example is the temple of Jupiter at Baalbek, also of the Corinthian order, octastyle, peripteral, with a deep portico, and a cella richly decorated with three-quarter detached shafts of the Corinthian order.

Of the circular temples the Pantheon is the most remarkable. It was built by Hadrian, and consists of an immense rotunda 142 ft. in diameter, govered with a hemispherical dome 140 ft. high. Its walls are 20 ft. thick, and have alternately semicircular and rect- angular recesses in them. In the centre of the dome is a circular opening 30 ft. in diameter open to the sky, the only source from

which the light is obtained. The rotunda is preceded by a portico, originally built by Agrippa as the front of the rectangular temple erected by him, taken down and re-erected after the completion of the rotunda, with the omission of the two outer cclumns. In other words Agrippa's portico was decastyle ; the actual portico is octastyle.

Basilicas. — The earliest example of which remains exist is that of the Basilica Julia on the Forum, the complete plan of which is now exposed to view. It consisted of a central hall measuring 255 ft. by 60 ft., surrounded by a double aisle of arches carried on piers, which were covered with groined vaults. The Basilica Ulpia built by Trajan was similar in plan, but in the place of the piers were monolith columns, with Corinthian capitals carrying an entablature, with an upper storey forming a gallery round.

The third great basilica, commenced by Maxentius and completed by Constantine, differs entirely from the two above mentioned. It

Scale of Yards

J. 1 1 L

Scale of Yards

Fig. 26. — Elevation and plan of the Maison Carree, Nimes.

followed the design and construction of the Tepidarium of the Roman thermae, and consisted of a hall 275 ft. long by 82 ft. wide and 114 ft. high, covered with an intersecting barrel vault with deep recesses on each side which communicated one with the other by arched openings and constituted the aisles.

Theatres. — The only example in Rome is the theatre of Marcellus, built by Augustus 13 B.C., and one of the purest examples of Roman architecture. Amongst the best preserved examples is the theatre of Orange in the south of France, the stage of which was 203 ft. long. In the theatre at Taormina in Sicily are still preserved some of the columns which decorated the rear wall of the stage. The theatre of Herodes Atticus at Athens (a.d. 160) retains portions of its enclosure walls and some of the marble seats. There are two theatres in Pompeii where the seats and the stage are in fair preservation. Other examples in Asia Minor are at Aizani, Side, Telmessus, Alinda, and in Syria at Amman, Gerasa, Shuhba and Beisan.

Amphitheatres. — The largest amphitheatre' is that known as the Colosseum, commenced by Vespasian in a.d. 72, continued by Titus and dedicated by the latter in a.d. 80. This refers to the three lowet

storeys, for the topmost storey was not erected until the first part of the 3rd century, when it was completed by Severus Alexander and Gordianus. The building is elliptical in plan and measures 620 ft. for the major axis and 513 ft. for the minor axis. There were eighty entrances, two of which were reserved for the emperor and his suite. The Cavea (q.v.) was divided into four ranges of seats; the whole of the exterior and the principal corridors were built in travertine stone, and all other corridors, staircases and substructures in concrete. Externally the wall was divided into four storeys, the three lower ones with arcades divided by semi-detached columns of the Tuscan, the Ionic and the Corinthian orders respectively. The walls of the topmost storey were decorated with pilasters of the Corinthian order, the only openings there being small windows, to light the corridors and the upper range of seats. Among other amphitheatres the best preserved are those found at Capua, Verona, and Pompeii in Italy; at El Jem in North Africa; at Pola in Istria, and at Aries and Nimes in France.

The Thermae or Imperial Baths. — The term thermae is given to the immense bathing establishments which were built by the emperors to ingratiate themselves with the people. Of the ordinary baths (Balneae) there were numerous examples not only in Rome but at Pompeii and throughout the Empire. The thermae were devoted not only to baths but to gymnastic pursuits of every kind, and being the resorts of the poets, philosophers and statesmen of the day, contained numerous halls where discussions and orations could take place. The plans of these thermae were measured by Palladio about 1560, at a time when they were in far better preservation and more extensive than they are to-day. They have, however, been measured since by some of the French Grand Prix students; and Blouet's work on the Thermae of Caracalla (1828) and Paulin's on the Thermae of Diocletian (1890) give accurate drawings as well as conjectural restorations which are of the greatest value. The earliest thermae were those built by Agrippa (20 B.C.) in the Campus Martius, and of others those of Titus and Trajan are the best preserved; plans can be found in Cameron's Baths (1775).

Entrance Gateways and Arches of Triumph. — As the entrance gateways were sometimes erected to commemorate some important event, we have grouped these together, the real difference being that the arch of triumph was an isolated feature and served no utilitarian purpose, whereas the entrance gateway constituted part of the external walls of the city and could be opened and closed at will. Of the latter those at Verona, Susa, Perugia and Aosta in Italy, Autun in France, and the Porta Nigra at Treves (Trier) are the best known, but there are also numerous examples throughout Syria and North Africa. The arches of triumph offered a fine scope for decoration with bas-reliefs setting forth the principal events of the campaign; the representation on coins also suggests that they were looked upon as pedestals to carry large groups of sculpture. The best known examples are those of Titus, Septimius Severus and Constantine at Rome, of Trajan at Ancona, and, in France, at Orange, St Remi and Reims. There were numerous examples throughout North Africa and Syria, of which the arch of Caracalla at Tebessa in the former and the great gateway of Palmyra in Syria are the best preserved.

Memorial Buildings and Tombs. — Columns of victory constituted another type of memorial, and the shafts of the columns of Trajan and Marcus Aurelius in Rome lent themselves to a better representa- tion of the records of victory than those which could be obtained in the panels of a triumphal arch. Other columns erected are those of Antoninus Pius in Rome, a column at Alexandria, and others in France and Italy.

If the Romans derived from the Etruscans a custom of erecting tombs in memory of the dead, they did not follow on the same lines, for whilst the

Etruscans always excavated the tomb in the lolid rock, constituting a more lasting memorial, the Romans regarded them as monumental features and lined the routes of the via sacra of their towns with them. The earliest example remaining is that of Caecilia Metella (58 B.C.), of which the upper portion, ;onsisting of a circular drum 93 ft. in diameter, remains. Of the tomb of Hadrian the core only exists in the castle of Sant' Angelo. From the descriptions given it must have been a work of great magnificence. The tombs known as Columbaria (q.v.) were always below ground, but in some cases an upper storey was built above them consisting of a small temple, and these flanked the Via Appia in large numbers. At Pompeii outside the Herculaneum Gate the Via Appia was lined on both sides with tombs of varied design, and with exedrae or circular seats in marble, provided for the use of those visiting the tombs. The tombs in Syria form a very large and important series, the earliest perhaps being those in Palmyra, where they took the form of lofty towers, from 70 to 90 ft. high, externally simple as regards their design, but in the several storeys inside profusely decorated with Corinthian pilasters and coffered ceilings in stone. The tombs in Jerusalem built in the 1st century of our era are partly excavated in the rock and partly erected. The most important were those known as the tomb of Absalom, the tomb of St James, and the tombs of the judges and the kings, all cut in the solid rock. In central Syria some of the tombs are excavated in the rock, and over them are built a group of two or more columns held together by their entablatures. The most important series are the tombs at Petra, all cut in the side of cliffs and of elaborate

design. The sculptor, being free from the restriction of construction, realized his conception much in the same way as a scene-painter produces a theatrical background.

Aqueducts and Bridges. — Although at the present day aqueducts and bridges would be classed under the head of engineering works, those built by the Romans are so fine in their conception and design that they take their place as monuments. The Pont-du-Gard near Nimes, and the aqueducts of Segovia, Tarragona and Merida in Spain, and some of those in or near Rome, are of the simplest design, depending for their effect on their magnificent construction, their dimensions both in length and height, and the scale given in the ranges of arches one above the other. Few of the Roman bridges have lasted to our day; the bridges of Augustus at Rimini and of Alcantara in Spain may be taken as types of the design, in which we note that there are no architectural superfluities; the quality of the design depends on the graceful proportion of the arches and the fine masonry in which they are built.

Palatial Architecture. — By far the most magnificent group of palaces are those which were erected by the Caesars on the Palatine hill at Rome.

Commenced by Augustus and added to by his suc- cessors down to the reign of Severus, they cover an area considerably over 1,000,000 sq. ft., and comprise an immense series of great halls, throne room, banqueting hall, basilicas, peristylar courts, temple, libraries, schools, barracks, a stadium and separate suites for princes and courtiers. The service of the palace would seem to have been carried on in vaulted corridors in several storeys, some of which on the north side, overlooking the Circus Maximus, must have been over 100 ft. in height. Except under the Villa Mills, the greater part of the plan has been traced ; and large remains of mosaic pavements have been found in situ, and in the approaches, vaulted halls, some still retaining their stucco decoration.

A similar variety of groups of every description of structure is found at Tivoli, but spread over a very much larger area. The villa of Hadrian extended over 7 m. ; the works there were probably begun about a.d. 123, the first portion being his own residential palace. In addition to the numerous halls, courts, libraries, &c, Hadrian attempted to reproduce some of the most remarkable monu- ments which he had seen during his long travels; the Stadium, Palaestra, Odeum, the two theatres, the artificial lake, Canopus and other features were, however, constructed in the Roman style. Built on a ridge between two valleys, the several buildings occupied various levels, so that immense terraces and flights of stairs existed throughout the site and, combined with the natural scenery, must have been of extraordinary beauty.

The palace of Diocletian at Spalato, to which he retired after his abdication, constituted a fortress, three of its walls being protected by towers, the fourth on the south by the sea.. For an account of its well-preserved remains see Spalato. The emperor's own residence was on the south side, and had a gallery 520 ft. long overlooking the sea. The two main streets, with arcades on each side and crossing one another, divided the whole palace into four sections. One of these streets crossed from gate to gate, the other from the north gate led to the entrance into the palace of the emperor.

Private Houses. — The entire absence of the remains of the private houses of Rome, with the single exception of the house of Livia on the Palatine, would have left us with a very poor insight into their design were it not for the discovery of Pompeii (q.v.) and Hercu- laneum (q.v.). The descriptions given by Pliny of the lavish ex- travagance in the Roman houses, and the employment of various Greek marbles in the shape of monolith columns and panelling of walls, are substantiated by those which are found in the Pantheon, in the palaces on the Palatine, and in Hadrian's villa at Tivoli; and these compared with what is found at Pompeii show that the latter was only a provincial town of second or third-rate importance, where painted

imitations took the place of real marbles, and where the wall paintings were very inferior to those which have been discovered in Rome. (R. P. S.)

Byzantine Architecture

The term " Byzantine " is applied to the style of architecture which was developed in Byzantium after Constantine had transferred the capital of the Roman empire to that city in a.d. 324.

It is not possible, in the early ages of any style which is based on preceding or contemporaneous styles, to draw any hard and fast line of demarcation; and already before the Peace of the Church, a gradual transformation in the Roman style had been taking place, even in Rome itself. Thus the arch had gradually been taking the place of the lintel, either frankly as a relieving arch above it (portico of Pantheon), or introduced in the frieze just above the architrave (San Lorenzo), or by the conversion of the architrave into a flat arch by dividing it into voussoirs, as in the Forum Julium at Rome or in the temple of Jupiter at Baalbek. In the palace built by Diocletian at Spalato, the architrave or lintel of the Golden Gate is built with several voussoirs, and the pressure is further relieved by an arch thrown across above it. Long before this, however, and already in the 2nd century a.d. in Syria, this relieving arch had been moulded and decorated, with the result of emphasizing it as a new architec- tural feature. In this same palace at Spalato, in order to obtain a wider opening in the centre of the portico, leading to the throne room, it was spanned by an arch, round which were carried the

mouldings of the whole entablature, viz. architrave, frieze and cornice. At a still earlier date in Syria the same had been done in the Propylaea of the temple at Damascus (a,d. 151) and other examples are found in North Africa.

Now when Constantine transferred the capital to Byzantium, he is said to have imported immense quantities of monolith columns from Rome, and also workmen to carry out the embellishments of the new capital; for his work there was not confined to churches, but included amphitheatres, palaces, thermae and other public buildings. Owing to the haste with which these were built, and in some cases probably to the ephemeral materials employed, for the roofs of the churches were only in timber, all these early works have been swept away ; but there remain two structures at least,

which are said to date from Constantine's time, viz. the Binbirderek or cistern of a thousand columns, and the Yeri-Batan-Serai, both in Constantinople. As one of the first tasks a Roman emperor set himself to perform was the provision of an ample supply of water, of which Byzantium was much in need, there is every reason to suppose that they are correctly attributed to Constantine's time. If so, as the construction of their vaults is quite different from that employed by the Romans, it suggests that there already existed in the East a traditional method of building vaults of which theemperor availed himself ; and, although it is not possible to trace all the earlier developments, the traditional art of the East, found throughout Syria and Asia Minor, must from the first have wrought great changes in the architectural style, and in some measure this would account for the comparatively shcrt period of two centuries which elapsed between the foundation of the new empire and the culminating period of the style under Justinian in ad. 532-558.

Constantine is said to have built three churches in Palestine, but these have either disappeared or have been reconstructed since; an early basilican church is that of St John Studius (the Baptist) in Constantinople, dating from a.d. 463, and though it shows, but little deviation from classic examples, in the design and vigorous execution of the carving in the capitals and the entablature we find the germ of the new style. The next typical example is that found in the church of St Demetrius at Salonica, a basilican church with atrium in front, a narthex, nave and double aisles, with capacious galleries on the first floor for women, and an apsidal termination to the nave. Instead of the classic entablature, the monolithic columns of the nave carry arches both on the ground and upper storeys ; above the capitals, however, we find a new feature known as the dosseret, already employed in the two cisterns referred to, a cubical block projecting beyond the capital on each side and enabling it to carry a thicker wall above. In later examples, when the aisles were vaulted, the dosseret served a still more important purpose, in carrying the springing of the vaults. The nave and aisles of this church of St Demetrius were covered with timber roofs, as the architects had neither the knowledge, the skill, nor perhaps the materials to build vaults, so as to render the whole church indestructible by fire. <

One of the first attempts at this (though the early date given is disputed) would seem to have been made at Hierapolis, on the borders of Phrygia in Asia Minor, where there are two churches

covered with barrel vaults carried on transverse ribs across the nave, the thrust of which was met by carrying up solid walls on each side, these walls being pierced with open- ings so as to form aisles on the ground floor and galleries above. The same system was carried out a century earlier in

central Syria, where, in consequence of the absence of timber, the buildings had to be roofed with slabs of stone carried on archesacrossthenave. It is probable that in course of time other examples will be found in Asia Minor, giving a more definite clue to the next development, which we find in the work of Justinian, who would seem to have recognized that the employment iff timber or combustible materutls was fatal to the long duration of such buildings. Accord- ingly in the first church which he built (fig. 27), that of SS. Sergius and Bacchus (a.d. 527), the whole building is vaulted; the church is about 100 ft. square, with a narthex on one side. The central portion of the church is octagonal (52 ft. wide), and is covered by a dome, carried on arches across the eight sides, which are filled in with columns on two storeys. These are recessed on the diagonal lines, forming apses. The vault is divided into thirty-two zones, the zones being alternately flat and concave.

We now pass to Justinian's greatest work, the jchurch of St Sophia (fig. 28), begun in 532 and dedicated in 537, which marks the highest development of the Byzantine style and became the modef on which all Greek churches, and even the mosques built by

Scale of Feet o 10 zo 30 405060

Fig. 27. — Plan of SS. Sergius and Bacchus.

the Mahommedans in Constantinople, from the 15th century on- wards, were based. The architects employed were Anthemius of Tralles and Isidorus of Miletus, and the problem they had to solve was that of carrying a dome 107 ft. in diameter on four arches. The four arches formed a square on plan, and between them were built spherical pendentives, which, overhanging the angles, reduced the centre to a circle on which the dome was built. This dome fell down in 555, and when rebuilt was raised higher and pierced round its lower part with forty circular-headed windows, which give an extraordinary lightness to the structure. At the east and west ends are immense apses, the full width of the dome, which are again subdivided into three smaller apses. The north and south arches are filled with lofty columns carrying arches opening into the aisle on the ground storey and a gallery on the upper storey, the walls above being pierced with windows of immense size. The church was built in brick, and internally the walls were encased with thin slabs of precious marble up to a great height (fig. 29). The walls and vault above were covered with mosaics on a gold ground, which, as they represented Christian subjects, were all covered over with stucco by the Turks

Fig. 28. — Plan of St Sophia.

after the taking of Constantinople. During the restoration in the middle of the 19th century, when it became necessary to strip off the stucco, these mosaics were all drawn and published by Salzen- burg, and they were covered again with plaster to prevent their destruction by the Turks. The columns of the whole church on the ground floor are of porphyry, and on the upper storey of verd antique. The length of the church from entrance door to eastern apse is 260 ft.; in width, including the aisles, it measures 238 ft., and it measures 175 ft. to the apex of the dome. The columns and arches give scale to the small apses, the small apses to the larger ones, and the latter to the dome, so that its immense size is grasped from the first. The lighting is admirably distributed, and the rich decoration of the marble slabs, the monolith columns, the elaborate carving of the capitals, the beautiful marble inlays of the spandrils above the arches, and the glimpse here and there of some of the mosaic, which shows through the stucco, give to this church an effect which is unparalleled by any other interior in the world. The narthex or entrance vestibule forms a magnificent hall 240 ft. in length, equally richly decorated. Externally the building has little pretensions to architectural beauty, but its dimensions and varied outline, with the groups of smaller and larger apses and domes, make it an impressive structure, to which the Turkish minarets, though ungainly, add picturesqueness.

In a.d. 536 a second important church was begun by Theodora, the church of the Holy Apostles, which was destroyed in 1454 by order of Mahommed II. to build his mosque. The design of this church is_known only from the clear description given by Procopius,

the historian who has transmitted to us the record of Justinian's work, and its chief interest to us now is that it forms the model on which the church of St Mark at Venice was based, when it was restored, added to, and almost rebuilt about 1063.

The church of St Sophia was not only the finest of its kind at the time of its erection, but no building approaching it has ever been built since in the Byzantine style, nor does much seem to have been done for two or three centuries afterwards. At the same time the erection of new churches must have been going on, because there are certain changes in design, the results probably of many trials. The difficulty of obtaining sufficient light in domes of small diameter led to the windows being placed in vertical drums, of

which the earliest example is that of the western dome of St Irene at Constantinople, rebuilt a.d. 718-740. This simplified the construction and externally added to the effect of the church. The greatest change, however, which took place, arose in consequence of the comparatively small dimensions given to the central dome, which rendered it necessary to provide more space in another way, by increasing the area on each side, so that the plan developed into what is known as the Greek cross, in which the four arms are almost equal in dimensions to the central dome, and were covered with barrel vaults which amply resisted its thrust. In front of the church a narthex and sometimes an exonarthex was added, which was of greater width than the church itself, as in the churches (both in Constantinople) of the Theotokos and of Chora (a.d. 1080). The latter, better known as the

Fig. 29. — Cross section of the interior of St Sophia.

" mosaic mosque," on account of its splendid decoration in that material, is of special interest, because in the five arches of its facade we find the same design as that which originally constituted the front ol the lower part of St Mark's at Venice, before it was encrusted with the marble casing and the plethora of marble columns and capitals brought over from Constantinople.

Sometimes an additional church was built adjoining the first church and dedicated to the immaculate Virgin, as in the church of St Mary Panachrantos, Constantinople, the church of St Luke of Stiris, Phocis, and the church in the island of Paros. In the last- named church the apse still retains its marble seats, rising one above the other, with the bishop's throne in the centre. In addition to the churches already mentioned in Constantinople, there are still some which have been appropriated by the Turks and utilized as mosques. At Mount Athos there are a large number of Greek churches, ranging from the 10th to the i6ch centuries, which are attached to the monasteries. At Athens one of the most beautiful examples is preserved in the Catholicon or cathedral, the materials of which were taken from older classical buildings. This cathedral measures only 40 ft. by 25 ft., and is now overpowered by the new cathedral erected close by.

The external design of the Byzantine churches, as a rule, is extremely simple, but it owes its quality to the fact that its features are those which arise out of the natural construction of the church. The domes, the semi-domes over the apses, and the barrel vaults over other parts of the church, appear externally as well as internally, and as they are all covered with lead or with tdes, laid direct on the vaults, they give character to the design and an extremely picturesque effect. The same principle is observed in the doorways and windows, to which importance is given by accentuating their constructive

features. The arches, always in brick, are of two orders or rings of arches set one behind the other, and the voussoirs, alternately in brick and stone, have the most pleasing effect. The same simple treatment is given to the walls by the horizontal courses of bricks or tiles, alternating with the stone courses. In the apse of the church of the Apostles at Salonica, variety is given by the interlacing of brick patterns. This elaboration of the surface decoration is carried still further in the palace of Hebdomon at Blachernae, in Constantinople, built by Constantine Porphyrogenitus (913-949), where the spandrils of the arches are inlaid with a mosaic of bricks in various colours arranged in various patterns.

There would seem to have been a revival in the nth century, possibly a reflex of that which was taking place in Europe, and it is to this period we owe the churches of St Luke in Phocis, the church at Daphne, and the churches of St Nicodemus and St Theodore in Athens. The finest example of brick patterns is that which is found in the church of St Luke of Stiris, attached to the monastery in the province of Phocis, north of the Gulf of Corinth, of which an admir- able monograph was published in 1901 by the committee of the British School at Athens, illustrated by measured drawings of the plans, elevations, sections and mosaics by Messrs Schultz and Barnsley, with a detailed description. The church of St Luke of Stiris is one of those already referred to, where a second church dedicated to the Holy Virgin has been added, but in this case, according to Messrs Schultz and Barnsley, on the site of a more ancient church of which the narthex alone was retained. The plan of the great church differs from the ordinary Greek cross in that the arms of the cross are of much less width than the central domed square, and arches being thrown across the angles carry eight pendentives instead of four. On the east side the Diaconicon and Prothesis are included in the width of the domed portion instead of forming the eastern termination of the aisles. The churches at Daphne in Attica and of St Nicodemus at Athens have a similar plan.

The decoration of the smaller church of St Luke of Stiris is of the most elaborate character, bright patterns of infinite variety alternating with the brick courses, and as blocks of marble, removed from the site of the old city near, were available, they have been utilized in various parts of the structure and richly carved. The church at Mistra in the Peloponnesus, 13th century, built in the side of a hill, is one of the most picturesque examples, and is almost the only example in which a tower is to be found.

Armenia. — One other phase of the Byzantine style has still to be mentioned, the development of church architecture in Armenia, which follows very much on the same lines as that of the Greek church, with a central dome on the crossing, a narthex at the west end and a triapsal east end. In two churches at Echmiadzin and Kutais there are transeptal apses

in addition to those at the east end. One of the differences to be noted is that the domes and roofs are generally in stone externally, and this has led to another change; the domes, though hemispherical inside, have conical roofs over them. There is also a greater admixture of styles, the Persian, Byzantine and Romanesque phases entering into the design; the last was probably derived from the churches of central Syria, as the Armenians were the only race who seem to have penetrated there, and the finest example, at Kalat Seman, was at one time in their possession. The church at Dighur near Ani, of the 7th century, also probably owes its classical details to the work in central Syria. The most important example of the Armenian style is found in the cathedral at Ani, the capital of Armenia, dating from a.d. ioio. In this church pointed arches and coupled piers are found, with all the characteristics of a complete pointed-arch style, which, as Fergusson remarks, " might be found in Italy or Sicily in the 12th or 14th century." Externally the walls are decorated with lofty blind arcades similar to those in the cathedral at Pisa and other churches in the same town, which are probably fifty years later. The elaborate fret carving of the window dressings and hcod moulds are probably borrowed from the tile decoration found in Persia.

Russia. — The architecture of Russia is only a somewhat degraded version of the style of the Byzantine empire. The earliest buildings of importance are the cathedrals of Kiev and Novgorod, 1019-1054. The original church of Kiev consisted of nave, with triple aisles each side, the piers in which are of enormous size, a transept and square bays of the choir beyond, each with deep apsidal chapels. Externally the chief features are the bulbous domes adopted from the Tatars, which sometimes assume great dimensions. Internally, the chief feature is the Iconostasis, which corresponds to the English rood screen, except that in Russia it forms a complete separation between the church and the sanctuary with its altar.

One of the most remarkable churches is that of St Basil at Moscow (1 534-1 584), which in plan looks like a central hall, surrounded by eight other halls of smaller dimensions, all separated one from the

other by vaulted corridors ; this arrangement is not intelligible until one sees the exterior view, which accounts for the plan ; each one of these halls is crowned by lofty towers with bulbous domes, the centre one rising above all the others and terminated with an octagonal roof, probably derived

from the Armenian conical roof. The oldest and most interesting church in Moscow is the church of the Assumption (1479), where the tsars are always crowned; but as it measures only 74 ft. by 50 ft., it is virtually little more than a chapel; the plan is that of a Greek cross with central dome and four others over the angles. One other church deserves mention — at Curtea de Argesh, in Rumania. It was built in 1517-1526, and though small (90 by 50 ft.), is built entirely of stone, instead of brick covered with stucco, as is the case with the churches in Moscow. The interior has been entirely sacrificed to the exterior, the domes being raised to an extravagant height. The relative proportion of width of nave to height of dome in St Sophia at Constantinople is about one to two; in the church at Curtea de Argesh it is about one to five; and yet there can be little doubt the design was made by one of those Armenian architects who seem to have been always employed at Constantinople, and who presumably based their designs there on St Sophia as regards its principal features. Here, however, he was working for Tatar employers who attached more importance to display than to good proportion. In general design the church is based on Armenian work. The elaborately carved panels and disks are copied from the inlays in the mosques in Damascus and of Sultan Hassan at Cairo, and the stalactite cornices and capitals of the columns are transcripts of the Mahommedan style of Constantinople, which was derived from the style developed by the Seljuks.

We were only able to point to a single example of a tower in the Byzantine style, but in Russia the towers not only constitute the principal accessory to the church but were necessary adjuncts, in order to provide accommodation for bells, the casting of which has at all times formed one of the most important crafts in Russia. The chief examples, all in Moscow, are the tower attached to the church of the Assumption; the tower of Boris, inside the Kremlin; and that erected over the sacred gate of the same. But they abound throughout Russia, and in some cases form important features in the principal elevations on either side of the narthex. (R. P. S.)

Early Christian Architecture Of the earliest examples of the housing of the Christian church few remains exist, owing partly to their destruction from time to time by imperial edicts, and partly to the fact that in most cases they were only oratories of a small and unpretending nature, which, immediately after the Peace of the Church, were rebuilt of greater size and with increased magnificence. In Rome itself, the principal religious centre was that which was found in the catacombs (q.v.), almost the only resort in times of persecution. In the houses of the wealthy Romans who had been converted, rooms were set apart for the reception of the faithful, and these may have been increased in size by the addition of side aisles. At all events, either in Rome or in the East, where greater freedom of worship was observed, the requirements of the religious had already resulted in a

traditional type of plan, which may account for the similarity of all the great churches built by Constantine. It has often been assumed that the great Roman basilicas, if not actually utilized by the Christians, were copied so far as their design is concerned. This, however, is not borne out by the facts, there being very little similarity between the first churches built and the two great Roman basilicas, the Ulpian basilica and that built by Constantine; the latter was roofed with an immense vault, an imperishable covering, not attempted till two centuries later in Byzantium, and the former had its entrance in the centre of the longer side, and the tribunes at either end were divided off from the basilica by a double aisle of columns. The basilica plan was adopted because it was the simplest and most economical building of large size which could be erected, having an immense central area or nave well lighted by clerestory windows, and single or double aisles to divide the two sexes, and further because the immense supply of columns which could be taken from existing temples or porticoes enabled the architect to provide at small cost the colonnades or arcades between the nave and the aisles. On the other hand, there is no doubt that the temples, for which there was no further use, were largely appropriated, not only in Italy but in Greece, Sicily and elsewhere, and it is to this appropriation that we owe the preservation of the Parthenon, the Erechtheum and the temple of Theseus at Athens. There are some cases in which it is interesting to note the changes which were made to convert the temple into a church. In the temple of Athena at Syracuse, walls were built in between the columns of the peristyle, the cella was appropriated for the nave, and arcades were cut through the cella walls to communicate with the peristyle, so as to constitute the aisles. In the temple of Aphrodisias, in Asia Minor, a further development occurred. The walls of the cella were taken down, a wall was built outside the columns of the peristyle to form aisles, and the columns of the east and west end were taken down and placed in line with the others, in order to increase the length of the church.

The earliest Christian basilica built in Rome was the Lateran, which has, however, been so completely transformed in subsequent rebuildings as to have lost its original character. The next in date

was that of the old St Peter's, which was taken down in 1506, in consequence of its ruinous condition, in order to make way for the present cathedral, begun by Pope Julius II. It was of considerable size, covering an area of 73,000 ft. Its plan consisted of an atrium, or open court, having a fountain in the centre, and arcades round ; a nave, 275 ft. long and 77 ft. wide, with double aisles on each side; a transept, 270 ft. long by 54 ft. wide; and a semi-circular apse or tribune with a radius of 27 ft. : the high altar being in the centre of its choir, and ranges of marble seats and the papal throne in the middle, corresponding to the benches and the judge's seat of the Roman tribune. The nave, therefore, with its double aisles, was

similar to that of the Ulpian basilica, but the aisles were not returned across the east end, and at the west end, in their place, was the great triumphal arch opening into the transept. The monolith columns of the nave and their capitals (together 40 ft. high) were all taken from ancient buildings, as also were those of the aisle arcades and in the atrium.

The basilica of St Paul, outside the walls, was originally of com- paratively small dimensions, with its apse at the west end; in A.D. 386 the church was rebuilt on a plan similar to St Peter's, with nave and double aisles, divided by columns carrying arches, transept and apse. In the Lateran basilica, StPeter's, Santa Maria Maggiore, and St Lawrence (outside the walls), the columns of the nave were close-set (i.e. with narrow intercolumniations) and supported architraves, but in St Paul (outside the walls) the columns of the second church (a.d. 386) were wider apart and carried arches. The same feature is found in the church of St Agnes, founded A.D. 324, but rebuilt 620-640; here the arcade is carried across the west end and there are galleries above, the arches being carried on dosseret blocks above the capitals ; these are also found in the galleries over the western end of St Lawrence, added by Honorius (a.d. 620-640) ; the dosseret, a Byzantine feature, being derived either from Ravenna or from the East. In the church of Santa Maria-in-Cosmedin (a.d. 772-795) another Byzantine feature appears in the triple apse at the east end, the earliest example in Europe. In this church, as also in those of San Clemente and San Prassede, piers are built at intervals to carry the arcades separating the nave and aisles. Those in the latter, however, were probably added when the great arches were thrown across the nave. The church of San Clemente was built in 1 108, above a much older church dating from 385 and restored later ; it is almost the only church in Rome which has pre- served its atrium intact ; the internal arrangement of the church also is different from that found elsewhere, the choir, enclosed with marble piers and screens removed from the lower church and erected in front of the tribune, dating from A.D. 514-523. The mosaics executed in 11 12 are in fine preservation.

Other early churches in Rome are those of Santa Pudenziana (335); San Pietro-in-Vincoli (442), with Doric columns in the nave; SS. Quattro Coronati (450); Santa Sabina (450), an interesting church on account of the marble inlaid decoration in the arch spandrils of the nave, which date from 824; San Prassede (817), with arches thrown across the nave later; San Vincenzo ed Anastasio alle Tre Fontane (626) ; and Santa Maria in Domnica, where there are galleries over the aisles and across the east end as in St Agnes.

Hitherto we have said little about the architectural design, the fact being that externally these churches had the appearance of barns ; it is only in a few cases, notably in St Peter's, that the principal fronts were decorated

with mosaics. The magnificent materials employed internally, the monolith marble columns, the enrichment of the apse and the triumphal arch with mosaics, and probably the painting and gilding of the ceiling or roof, gave to the early basilican churches in Rome that splendour which characterizes those in Byzantium and in Ravenna.

With the exception of the baptistery attached to St John Lateran, and the so-called tomb of Santa Constantia, both erected by Con- stantine, the circular form of church was not adopted in Rome; there is one remarkable circular building of great size, San Stefano Rotondo, at one time thought to have been a Roman market, but now known to have been erected by Pope Simplicius (468-482). It consisted of a central circular nave, 44 ft. in diameter, and double aisles round. In the arcade dividing the aisles the arches are carried on dosserets, the earliest known example of this feature in Rome.

Although inferior in size, the two churches of S. Apollinare Nuovo, built by Theodoric (493-525) and Sant' Apollinare-in-Classe (538- 549), both in Ravenna, have the special advantage that they were constructed in new materials, there being no ancient Roman temples there to pull down. The ordinary basilican plan was adhered to, but as the architects and workmen came from Constantinople, they incorporated in the building various details of the Byzantine style, with which they were best acquainted. Thus the contour of the mouldings, the carrying of the capitals and imposts, the dosseret above the capital, and the scheme of decoration of the interior with marble casing on the lower portion of the walls and mosaic above, are all Byzantine. Externally the churches are extremely plain, the wall surfaces of the nave and aisle walls being varied by blind arcades.

The earliest building in Ravenna is the tomb of Galla Placidia, built 450, a small cruciform structure with a dome on pendentives over the centre, perhaps the earliest example known. The baptistery of St John, which was attached to the cathedral built by Archbishop

Ursus (380), now destroyed, is a plain octagonal building, 40 ft. in diameter, originally with a timber roof; when in 451 it was deter- mined to replace this by a vault, in order to resist the thrust, the upper part of the walls was brought forward on arches and corbels, and the interior richly decorated with paintings, stucco reliefs and mosaics in the dome. The most

interesting building in Ravenna, however, from many points of view, is the church of San Vitale (fig. 30), built 539-547, its plan and design being based on the church of SS. Sergius and Bacchus at Constantinople. The propor- tions of the interior of St Sergius are much finer than those in San Vitale, where the dome is raised too high; the timber roofs also of San Vitale have deprived the church externally of that fine archi- tectural effect found in Byzantine churches. In order to lighten the dome, its shell was built with hollow pots, the end of one fitted into the mouth of the other. The interior of the church is of great beauty, owing to the alternating of the piers carrying the eight arches with the columns set back in apsidal recesses. Unfortunately the church has been much restored, but the magnificent mosaics in the choir and the variety of design shown in the capitals and dosserets render

Scale of Feet o 10 20 30 40 50 60 70 8a

Fig. 30. — Plan of S. Vitale, Ravenna.

this church, though small, one of the most attractive in Italy. One other Ravenna building must be mentioned, though it would be difficult to know under what style to class it. The tomb of Theodoric, having a decagonal plan in two storeys, the lower one vaulted at the upper storey, set back to allow of a " terrace " round, once sheltered by a small arcade, and covered by a single stone 35 ft. in diameter, belongs to no definite style; the mouldings of

As Dalmatia and Istria both formed part of Theodoric's kingdom, we find there the same Byzantine influence as that which was asserted in Ravenna, in both cases the work being done by artists and masons from Constantinople. There is not much left in Dal- matia, but in Istria are two important examples, — the churches at Parenzo (535-543) and Grado (571-586). Like the two churches in Ravenna, they are basilican in plan, with apses, semi-circular internally and polygonal externally, the latter being a characteristic found in all the churches in Europe which were influenced directly by Byzantine custom. Although the monolith columns were derived from ancient Roman buildings, all the capitals were specially carved for the two churches, and they have the same variety of design and in many cases are identical with those in San Vitale, Sant' Apollinare Nuovo, Sant' Apollinare-in-Classe, and those brought over from Constantinople, which now decorate St Mark's at Venice internally as well as externally. The decoration of the lower part of the walls internally with marble slabs, and the upper portion and apsidal vaults with mosaic, follows on the same lines as those at Ravenna and Constantinople. The church at Parenzo still retains its baptistery and atrium, from which fragments of the mosaics which originally decorated the west front can be seen. The church

at Aquileia was rebuilt in the nth century, and the Duomo of Trieste has been so altered as to lose its original Byzantine character. (R. P. S.)

Early Christian Work in Central Syria

Contemporaneously with the early developments of the Christian churches just described, another line of treatment was being evolved in central Syria, which would seem to have been quite independent of the others, though at first sight it bears considerable resemblance to the Byzantine style, and for that reason was probably classed

and described under that head by Fergusson. But the leading characteristic of the Byzantine style is the dome over the centre of the church round which all other features are grouped, whereas in central Syria, with the exception of two examples — one a circular, the other a polygonal church — there are no domes. There is considerable Greek feeling in the mouldings and carvings of the capitals, but that is probably due to the fact that the masons were originally of Greek extraction. A comparison, for instance, of the design and carving of the largest church in central Syria, the famous building erected round the column of St Simeon Stylites at Kalat-Seman, dating from the 6th century, with any Byzantine church of the same date, shows very little resemblance, because the former was inspired more or less directly by the Roman remains in the country. A similar inspiration is found in the churches of St Trophime at Aries and St Gilles in the south of France, and at Autun and Langres in Burgundy. Both were founded on Roman work, and the mouldings of the pediments and archivolts and the fluting of the pilasters at Kalat- Seman, of the 6th century, are identical with what is found, quite independently, in Provence and Burgundy in the nth and 12th centuries. There is, however, another special characteristic found in the masonry of the churches in central Syria, which is peculiar to the whole of Palestine, and is found in the earliest remains there, as also in Roman work, and to a certain extent in much of the Mahommedan construction and in that of the Crusaders, viz. its megalithic qualities. Instead of building an arch in several vous- soirs, they preferred to do it in three or five only, and sometimes would cut the whole arch out of a single vertical slab. If they employed voussoirs, they were not content with ordinary depth, shown by the archivolt mouldings, but made them three or four times as deep.

The masons, in fact, would seem to have retained the traditional Phoenician custom of the country to employ the largest stones they were able to quarry, transport and raise on the building. Subse- quently, in working down the masonry, they reproduced the archi- tectural features they found in Roman buildings; this was done, however, without any knowledge as to their constructional origin or meaning; thus, in copying a

Roman pilaster, the capital and part of the shaft would be worked out of one stone, and the lower part of the shaft and the base out of another. It is only from this point of view that we can account for the peculiar development given to the decoration of their later work, where archivolts, wood mould- ings and window dressings are iooked upon as simply surface decoration to be applied round doorways and windows, without any reference to the jointing of the masonry.

The immense series of monuments, civil as well as religious existing throughout central Syria, were almost entirely unknown before the publication of the marquis of Vogue's work, La Syrie centrale, in 1865-1867. This work, illustrated with measured plans, sections and elevations, with perspective views, and accompanied by detailed descriptions of the various buildings, forms an invaluable record of an architectural style, more or less completely developed, which flourished from the 3rd to the beginning of the 7th century. An American archaeological expedition made further investigations in 1899-1900, and its report, written by Mr H. C. Butler, contains additional plans and a large number of photogravures, which bear testimony to the truth and accuracy of the engraved plates of the marquis de Vogue. The preservation of these central Syrian remains, more or less intact, is considered to have been due either to the desertion of all the towns in which they were situated by the in- habitants at the time of the Mahommedan invasion, or, according to Mr H. C. Butler, to the deforesting of the whole country about the commencement of the 7th century.

The monuments and buildings illustrated may be divided into three classes, — ecclesiastical, including monasteries; civil and domestic; and tombs. It is in the two first that the principal interest is centred.

Churches. — The earliest of these date from the end of the 4th century, and the latest inscription on a church is 609, so that a little over 200 years includes the whole series. With one or two small exceptions all the churches follow the basilican plan, with nave and aisles separated by arcades, the arches of which are carried by columns, four arches on each side in the smaller churches, ten in the largest. The churches are all orientated, and have generally a semi-circular apse, and occasionally a square or rectangular sanctuary at the east end, on either side of which are square chambers, — the diaconicon, reserved for the priests, on the south side, and the prothesis, on the north side, in which the offerings of the faithful were deposited. Except in the earliest churches, the entrance was generally at the west end, and was sometimes preceded by a porch. In addition to the west entrance, there were sometimes doorways leading direct into the north and south aisles, with projecting porticoes. About the middle of the 6th century a change was made in the design of the arcades in the nave, and

rectangular piers with arches of wide span were substituted for the ordinary arcade with columns. The effect as shown in the engravings and photogravures is so fine that it is strange that the scheme was never adopted in the earlier Romanesque churches of Europe. The two more important examples are at Kalb-Lauzeh (fig. 31) and Ruweiha, but three or four others are known, and this plan was adopted in the basilica erected in the great court of the temple at Baalbek. All

the churches are built in fine ashlar masonry, with moulded archi- volts and architraves to doorways and windows, and moulded string courses and cornices of simple design. The principal decora- tion externally is found in the hood-mould or label round the windows, continued as a string-course and carried round other windows, and sometimes terminating in a disk with cross in centre. These hood-moulds are occasionally richly carved. All the churches in central Syria had open timber roofs which have now disappeared ; this is proved by the sinkings in the end walls to receive the purlins, and the corbels provided to carry the tie beams. The apses were always covered with semi-domes. The three most important churches were those of Turmanin, Kalb-Lauzeh and Kalat- Seman. The plans of the two first are similar, except that in Turmanin the nave arcade is of the ordinary type, with seven arches carried on columns, while in Kalb-Lauzeh (fig. 32) there are three wide arches on each side carried on two rectangular piers and responds. Both have entrance porches (fig. 33), which are flanked by angle buildings carried up as towers in three storeys; these probably contained wooden stair- cases to ascend to an open gallery, which consisted of four columns in-antis between the angle towers above the porch. The north and south walls were quite plain, except for window and door dressings and string courses; the apse was richly decorated, with wall shafts superimposed between the windows, and carrying a Fig. 31. — Plan of Church projecting cornice with alternate corbels, of Kalb-Lauzeh. The church at Ruweiha has a similar

plan to that at Kalb-Lauzeh, but two transverse arches in stone are thrown across the nave, resting on abutments attached to the nave piers.

The most remarkable example and by far the largest is the great basilica at Kalat-Seman (fig. 34), which was erected round the pillar on which St Simeon Stylites spent thirty years of his life. The base of the pillar stands in the centre of an immense octagonal court open to the sky. The plan consists

of nave, transept and choir, all with side aisles, separated in the centre by the octagonal court which constitutes the crossing. The nave built on the side of a hill is raised on a crypt, and the principal entrance would seem to have

Fig. 32. — Interior of the Church of Kalb-Lauzeh.

been through the porch of the north transept, which occupies the full width of transept and aisles. There were, however, in addition two doorways with porches to each aisle, as well as portico and doors to the north transept. At the eastern end were three apses, the two outer ones, facing the aisles, being additions in the second half of the 6th century. St Simeon died in 459, and the church was probably begun shortly afterwards, but not completed till the 6th century. The archivolts of the great arches on each side of the

octagonal court consist of architrave, frieze and cornice, copied from the arch of the propylaea at Baalbek or other Roman work. Here, as in the great southern porch, the classic nature of the details is remarkable, the pilasters are all fluted, and the modillion and dentil, derived from Roman models, exist throughout. On the other hand, the carving of the foliage was certainly executed by Greek artists, and the well-known Byzantine capital, with the leaves

Fig. 33. — Church of Turmanin.

bending under the influence of the wind, is here reproduced. The great apse externally retains its decoration with superimposed shafts and cornice, as in Turmanin and Kalb-Lauzeh.

The monastery of Kalat-Seman was built on the south side of the great church, and many of the rooms had roofs of slabs of stone carried on arches across the room, a method of construction univers- ally found in the Hauran, where the absence of timber necessitated this more permanent method of construction. The monasteries

Fig. 34. — Plan of Church of Kalat-Seman.

differ from the domestic work in being much plainer, and, instead of columns in the porticoes, having invariably square piers of stone.

Among circular churches, the walls of the cathedral at Bozra are gone, so that the conjectural restoration shown in de Vogue's work is purely speculative, but in the church at Ezra (510) the central octagon is covered by a high dome of elliptical section. An aisle is carried round the octagon with similar recesses on the diagonal lines,

the whole being enclosed in a square ; in the apse at the east end the seats of the tribune are still preserved.

Domestic Work. — The domestic work in central Syria is, in a way, even more remarkable than the ecclesiastical. Broadly speaking, there are two types of plan — those found in the towns and grouped together, and those which, with increased area, constituted a villa. At El Barah the average house occupied a site of about 80 ft. by 60 ft., of which about 30 ft. in width was occupied by an open court ; facing this court, which was enclosed with high walls, is an open colonnade on two floors, which always faces south, occupies the whole front (80 ft.) of the house, and is the only means of approach to the rooms in the rear, three on each floor, side by side. In the centre of these rooms, 14 ft. wide each, an arch is thrown across on each floor, which carries slabs of stone covering the first floor and the roof; the upper storey was reached probably by a timber staircase, now gone, but in poorer dwellings an external flight of steps in stone led to an upper floor. All the houses face the same way. The colonnade of the house consisted of about fifteen columns on each storey. Each column, including its capital and base, was cut out of a single stone ; on the upper storey, between the columns, are stone vertical slabs forming a balustrade; the houses are all built in fine ashlar masonry with architraves and cornices to doors and windows, a luxury which in England could rarely be indulged in for ordinary houses. At El Barah, in an area of about 250 ft. by 150 ft. as shown by de Vogue, there are about 100 monolith columns, 12 ft. high, on the ground storey, alone. In a villa at El Barah the open court is surrounded on three sides by buildings, those at the east end of considerable extent and in three storeys. A smaller example at Mujeleia has two courts, one of them being for stables and other services; otherwise the residence of the proprietor is similar to the one above described. Here and there the fantasy of the artist has been allowed to revel in the carving of the balustrades, door lintels, &c. The capitals are of endless design, and show interpretations of Ionic and Corinthian capitals, in some cases not dissimilar to the Byzantine versions in St Mark's at Venice.

Hostelries and public baths are amongst other civil buildings which are recognizable, the hostelries in some cases being attached to the monasteries.

Tombs. — The principal tombs are either excavated in the rock, with an open court in front and an entrance portico, like the tombs of the kings at

Jerusalem, and sometimes a superstructure of columns or a podium raised above them; or again they are built in masonry, and take the form of sepulchral chapels; in the latter case, if many sarcophagi have to be deposited, and the chapel is of great length, arches are thrown across, about 6 ft. centre to centre, to support the slabs of stone with which they are covered. This carries on the traditional custom of the Roman temples in Syria, the roofs of which, in stone, were similarly supported. Sometimes there will be two storeys, the upper one covered with a dome. Those which are peculiar to the country' are square tombs, with a pyramidal stone roof all built in horizontal courses, and either enclosed with a peristyle all round, on one or two storeys, or having a portico in front with flat stone roof. The cornices, string courses and lintels of the doors of these tombs of the 4th and 5th centuries, are enriched with carving, showing strong Byzantine influence, though probably due to the employment of Greek artists. (R. P. S.)

The Coptic Church in Egypt

The earliest places of Christian worship in Egypt were probably only chapels or oratories of small dimensions attached to the monasteries, which were spread throughout the country ; a wholesale destruction of these took place at various times, more especially by the order of Severus, about 200 B.C., so that no remains have come down to us. The most ancient examples known are those which are attributed to the empress Helena, of which there are important portions preserved in the churches of the White and Red monasteries at the foot of the Libyan hills near Suhag.

Although the plan of the Coptic church is generally basilican, i.e. consists of nave and aisles, it is probable that they were not copied from Roman examples, but were based on expansions of the first oratories built, to which aisles had afterwards been added. There are no long transepts, as in the early Christian basilicas of St Peter's at Rome, and of St Paul outside the walls, and there is only one example of a cruciform church with a dome in the centre following the Byzantine plan. Even at an early period the nave and aisles were covered sometimes with barrel vaults, either semicircular or elliptical. The Coptic church was always orientated with the sanctuaries at the east end. The aisles were returned round the west end and had galleries above for women. Sometimes the western aisle has been walled up to form a narthex ; in many cases a narthex was built, but, in consequence of the persecution to which the Copts were subject at the hands of the Moslems, its three doors have been blocked up and a separate small entrance provided. The narthex was the place for penitents, but was sometimes used for baptism by total immersion, there being epiphany tanks sunk in the floor of the churches at Old Cairo, known as Abu Serga, Abu-s-Sifain (Abu Sefen) and El Adra ; these are now boarded over, as total

immersion is no longer practised.

There are a few exceptions to the basilican plan; and in four examples (two in Cairo and two at Deir-Mar-Antonios in the eastern

desert by the Gulf of Suez) there are three aisles of equal widths, divided one from the other by two rows of columns with three in each row, thus dividing the roof into twelve square compartments, each of which is covered with a dome.

The sanctuaries at the east end, as developed in the Coptic church, differ in some particulars from those of any other religious structures. There are always three chapels or sanctuaries, with an altar in each, the central chapel being known as the Haikal. The chapels are more often square than apsidal, and are always surmounted by a complete dome, a peculiarity not found out of Egypt. The seats of the tribune are still preserved in a large number of the sanctuaries, and there are probably more examples in Egypt than in all Europe, if Russia and Mount Athos be excepted. Those of Abu-Serga, El Adra and Abu-s-Sifain, with three concentric rows of seats and a throne in the centre, are the most important; but even in the square sanctuaries the tradition is retained, and seats are ranged against the east wall, and in one case (at Anba-Bish6i) three steps are carried across, and behind them is a segmental tribune of three steps, with throne in the centre.

The most remarkable Coptic churches in Egypt are those of the Deir-el-Abiad (the White monastery) and the Deir-el-Akhmar (the Red monastery) at Suhag. These were of great size, measuring about 240 ft. by 130 ft. with vaulted narthex, nave and aisles separated by two rows of monolith columns taken from ancient buildings, twelve in each row and probably roofed over in timber, and three apses, directed respectively towards the east, north and south. These apses are unusually deep and have five niches in each, in two storeya separated by superimposed columns. In the church of St John at Antinoe there are seven niches. A similar arrangement is found in the three apses, placed side by side, in the more ancient portion of St Mark's, Venice, built a.d. 820, and said to have been copied front St Mark's at Alexandria. There is no external architecture in the Coptic churches; they are all masked with immense enclosure walls, so as to escape attention. The walls of the interior still preserve a great portion of the paintings of scriptural subjects; the screens dividing off the Haikal and other chapels from the choir are of great beauty, and evidently formed the models from which the panelled woodwork, doors and pulpits of the Mahommedan mosques have been copied and reproduced by Copts.

Illustrations are given in A. J. Butler's Ancient Coptic Churches of Egypt (1884); Wladimir de Bock's Materiaux archeologiques de I'Eeypte

chretienne (1901) ; and A. Gayet's L'art coptique.

(R. P. S.)

Romanesque and Gothic Architecture in Italy

" Romanesque " is the broad generic term adopted about the beginning of the 19th century by French archaeologists in order to bring under one head all the various phases of the round- arched Christian style, hitherto known as Lombard and Byzantine Romanesque in Italy, Rhenish in Germany, " Romane " and Norman in France, Saxon and Norman in England, &c. In character, as well as in time, the Romanesque lies between the Roman and the Gothic or Pointed style, but its first manifesta- tion in Italy has already been described in the section on " Early Christian Architecture," and it. only remains to deal with the subsequent development from the age of Charlemagne, .which marks an epoch in the history of architecture, and from which period examples are to be found in every country.

In consequence of the lack of homogeneousness in the Roman- esque style as developed in Italy, owing to the mixture of styles, and the difficulty of tracing the precise influence of any one race in buildings frequently added to, restored or rebuilt, their description will be more easily followed if a geographical sub- division be made, the simplest being Northern or Lombard Romanesque, Central Romanesque and Southern Romanesque; after the latter would follow the Sicilian Romanesque, which, owing to the Saracenic craftsman, constitutes a type by itself. This leaves still one other phase to be noted, the influence recognized in northern Italy of the architectural style of the Eastern Empire at Byzantium, either direct or through Istria and Dalmatia. In the churches at Ravenna, this influence has already been referred to in the section on " Early Christian Architecture," but it appears again in the church of St Mark at Venice, and in much of its domestic architecture, so that it is necessary to recognize another term,, that of " Byzantine Romanesque."

Northern or Lombard Romanesque. — Although the materials for forming an adequate notion of the earlier work of the Lombards are very scanty, after their conversion to the Catholic faith the Church probably exercised a powerful influence in their architectural work. Under Liutprand, towards the close of the 8th century, an order

known as the Magistri Commacini was established, to whom were given the privileges of freemen in the Lombard State. These Commacini, so named from the island in the lake of Como whence they sprang, were trained masons and builders, who in the 9th and 10th century would seem to have carried the Lombard style through north and south Italy, Germany and portions of France. It was at one time assumed that they had influenced the church architecture throughout Europe, but this is not borne out by the evidence of the buildings themselves, except in the Rhenish provinces and in the districts on the slope of the Harz Mountains, where in sculpture a strange mixture is found of monstrous animals with Scandinavian interlaced patterns and Byzantine foliage, bearing a close resemblance to the early sculpture in Sant' Ambrogio at Milan and San Michele at Pavia (Plate V., fig. 72). Although the earliest Lombard buildings in Italy (such as those of San Salvatore in Brescia, San Vincenzo-in- Prato at Milan, the church of Agliate and Santa Maria delle Caccie at Pavia) were basilican in plan with nave and aisles, there are some instances in which the adoption of a transept has produced the Latin cross plan (e.g. San Michele at Pavia, Sant' Antonino at Piacenza, San Nazaro-Grande at Milan, and the cathedrals of Parma and Modena), though to what extent this is due to subsequent rebuilding is not known. In the early basilicas above mentioned, the columns, carrying the arcades between nave and aisles, were taken from earlier buildings, while the capitals, where not Roman, were either rude imitations of Roman, or Byzantine in style. The roofs were always in wood, and the exteriors of the simplest descrip- tion. In the external decoration, however, of the apses of the churches of San Vincenzo-in-Prato, Santa Maria delle Caccie, the church at Agliate and the ancient portion of S. Ambrogio at Milan, we find the germ of that decorative feature which (afterwards developed into the eaves-gallery) became throughout Italy and on the Rhine the most beautiful and characteristic element of the Lombard style. In order to lighten the wall above the hemispherical vault of the apse, a series of niches was sunk within the arches of the corbel table, which gave to the cornice that deep shadow where it was most wanted for effect. In addition to the churches above named, similar niches are found in the baptisteries of Novara and Arsago, the Duomo Vecchio at Brescia and the church of San Nazaro Grande at Milan. Towards the close of the nth century, the imposts of these niches take the form of isolated piers, with a narrow gallery behind, and eventually small shafts with capitals are substituted for the piers, producing the eaves-galleries of the apses, which in Santa Maria Maggiore at Bergamo (1137) and the cathedral of Piacenza are the forerunners of numerous others in Italy, and in the churches of Cologne, Bonn, Bacharach and other examples on the Rhine, constitute their most important external decoration.

In the apses of San Vincenzo-in-Prato and of the church at Agliate (both of

the 9th century) there is another decorative feature, destined afterwards to become one of the most important methods of breaking up or subdividing the wall surface, i.e. the thin pilasterstrips, which, at regular intervals, rise from the lower part of the wall to the corbel table of the cornice.

The two most important churches of the Lombard Romanesque style are those of Sant' Ambrogio at Milan and S. Michele at Pavia, their importance being increased by the fact that they probably represent the earliest examples of the solution of the great problem which was exercising the minds of the church

C builders towards the end of the nth

century, the vaulting of the nave. In the original church, of the 9th century, , •.. '.: ,- . -._ ::••„.• |^h the nave and aisles of Sant' Ambrogio /■^l **jki\ J I were divided in the usual way with \^P/^i^£^V ■■■ arcades, and were covered with open timber roofs. In the rebuilding of the church (fig. 35) the nave (38 ft. wide) was divided into four square bays, and compound piers of large dimensions were built, to carry the transverse and diagonal ribs of the new vault. To resist the thrust, the walls across the aisles were built up to the roof, and had external buttresses; the diagonal ribs, instead of following the elliptical curve which the intersection of the Roman semicircular barrel-vault gave to the groin, were made semicircular, so that the web or vaulting surface which rested on these ribs rose upwards towards the centre of the bay, giving a distinct domical form to the vault. The aisles, being half the width of the nave, were divided into eight compartments, two to each bay of the nave, and were covered both in the ground storey and the triforium with intersecting groin vaults. When this rebuilding took place, the front of the church was brought forward, bearing a narthex, and the arcades of the atrium were rebuilt in*

Fig. 35. — Plan of S. Ambrogio.

the first years of the 12th century. The triple apse, to the external decoration of which we have called attention, the crypt underneath, and the south campanile, are the only remains of the 9th century church. The campanile on the north side was built 1125-1149, and the decoration with pilaster strips, semi-detached shafts, and arched corbel table, is repeated on the facade of the church and on the arcade round the atrium. In the rebuilding, portions of the sculptural decoration of the 9th century church were utilized; this would appear to have been a Lombard custom, as in the church of San Michele the lower part of the main front is encrusted with sculptured decoration taken from the earlier churches built on the site. These ancient sculptures are of special interest, as they constitute the best records of the rude Lombard work of the 8th and 9th centuries, and are

intermingled with Byzantine scroll work and interlaced patterns. If the plan of Sant' Ambrogio, with its comparatively thin enclosure walls, suggests its original construction as an ordinary basilica, this is not the case with San Michele (fig. 36), where all the external walls are of great thickness, showing that from the first it was intended to vault the whole structure. The church is much smaller than Sant' Ambrogio, there being originally only two square bays to the nave (in the 15th century the vaults were rebuilt with four bays) ; the transept, however, projects widely beyond the aisles, and as there is another bay given to the choir in front of the apse, the area of the two churches is about the same. The existing church was

Fig. 36. — Plan of San Michele, Pavia.

probably begun shortly after the destructive earthquake of 1 1 17, and was consecrated in 1 132. In Sant' Ambrogio the transverse and diagonal arches spring from just above the triforium floor, so that there was no room for clerestory windows, and consequently the interior is dark. In San Michele the ribs rise from the level of the top of the triforium arcades, and two clerestory windows are provided to each bay. The crossing of the nave and transept is covered with a dome, carried on squinches, which dates from the first building. The dome over the fourth bay of Sant' Ambrogio replaced the original vault about the beginning of the 13th century.

The cathedral of Novara, originally of the ordinary basilica type of the 10th century with timber roofs, was reconstructed in the nth century, compound piers being built to carry the transverse and diagonal ribs, and walls built across the outer aisles to resist the thrust; on the other hand SS. Pietro and Paolo at Bologna is a 12th century church, which was designed from the first to be vaulted. To these, and still belonging to the basilican plan, must be added San Pietro in Cielo d'oro (1136) and San Teodoro, both in Pavia; S. Evasio at Casale-Monferrato, having a comparatively narrow nave with double aisles on either side and a very remarkable narthex or porch: S. Lorenzo at Verona (lately restored), which in the 12th century was rebuilt with compound piers to carry a vault (the apse and the two remarkable circular towers in the west front belong to the ancient church) ; and Sant' Abbondio at Como, often restored and partly rebuilt, retaining, however, some of the original sculpture of the early Lombard period.

Of churches built on the plan of the Latin cross, examples are Sant' Antonino at Piacenza, with an octagonal lantern towerover the crossing; Parma cathedral (c. 11 75), with an octagonal pointed dome over the crossing; Modena cathedral, rebuilt and consecrated

Plate I.

Photo, Anderson-

Fig. 63— ST MARK'S, VENICE.

'Plate II.

ARCHITECTURE

PJtafo, Nettrdein.

p IG- 64.— AMIENS CATHEDRAL.

Photo F. Frith & Co.

Fig. 65.— BURGOS CATHEDRAL.

!i fff

.fJT

"-.'■"«^. 66 ._ ST PAUL'S, LONDON.*

Photo. F. Frith & Co. „

Fig. 67.— ELY CATHEDRAL.

ITALIAN ROMANESQUE]

ARCHITECTURE

393

in 1 1 84 ; San Nazaro-Grande at Milan ; and San Lanf ranco at Pavia, the two latter without aisles.

Reference has already been made to the eaves-galleries of the apses of the Lombard churches. A similar gallery was carried across the main front, rising with the slope of the roof, as in San Michele, Pavia; also on the west fronts of San Pietro in Cielo d'oro and San Lanfranco, at Pavia; and in the cathedrals of Parma and Piaccnza. In all these cases the galleries are not quite continuous, vertical buttresses or groups of shafts or single shafts being carried up through them to the corbel tables. In S. Ambrogio at Milan the central original lantern is surrounded with two tiers of galleries. The finest example of their employment, however, is in the magnificent central tower of the Cistercian church at Chiaravalle, near Milan, where the two

lower storeys form the drum of the internal dome, the two storeys above are set back, and the upper storey consists of a lofty octagonal tower wittti conical spire.

One of the serious defects in the front of the church of San Michele at Pavia is that it forms a mask, and takes no cognizance of the aisle roofs, which are at a lower level, and the same is found in San Pietro-in-Cielo d'oro at Pavia. This mask is carried to an absurd extent in the church of Santa Maria della Pieve at Arezzo, in which, above the ground storey of the arcades, are three galleries forming strong horizontal lines, which suggest the numerous floors of a civic building instead of the vertical subdivisions of a church. This defect is not found in the church of San Zeno at Verona, which is one of the finest of the Lombard churches; the church is basilican in plan, the nave being divided into five bays with compound piers, as in Sant' Ambrogio, as if it were intended to vault it ; this, however, was never done, but stone arches arc thrown across the two western- most bays of the nave as if to carry the root (now concealed by a wooden ceiling). The facade is of marble and sandstone, with pilaster-strips rising from the base to the arched corbel table, and the outline of th" nave and aisles is preserved in the front, in which all the mouldings and carving are of the utmost delicacy. Both here and in the cathedral are fine examples of those projecting porches, the columns ot which are carried on the backs of lions or other beasts. At Piacenza, Parma, Mantua, Bergamo and Modena are porches of a similar kind, and in the cathedral of Modena the columns which support the balcony on the entrance to the crypt are all carried on the backs of lions. The cathedral of Verona has suffered so much from rebuilding and restoration that little remains of the earlier structure, but the apse of the choir, decorated with a close set range of pilaster-strips, with bases and Corinthian capitals and crowned with a highly enriched entablature, is quite unique in its design.

Among circular buildings, the Rotonda at Brescia was at one time considered to date from the 8th century, owing to its massive construction and the simplicity and plainness of its external design. Later discoveries, however, have shown that the early date can only be given to the crypt of San Filasterio situated to the eastward of the Rotonda. The church of Santo Sepolcro at Bologna, as its name implies, is one of those reproductions of the church of the Holy Sepulchre at Jerusalem which were built by the Templars during the crusades. Of much earlier date is the circular church of San Tommaso-in-Limine, an early Lombard work of the 9th century, to which period belong also the baptisteries of Albenga, Arsago, Biella, Galliano and Asti. One of the most beautiful examples is the baptistery of Santa Maria at Gravedona, at the northern end of the lake of Como, built in black and white marble. The plan is unusual, and consists of a square with circular apses on three sides.

Byzantine Romanesque. — Although in the first basilican church of St Mark at Venice, erected in 929 to receive the relics of the saint recovered from St Mark's in Alexandria, the capitals of the columns and other decorative accessories showed Greek influence, its trans- formation into a five-domed Byzantine structure was not begun till about the middle of the nth century. The date given by Cattanco is 1063, the same year in which the cathedral of Pisa was begun; it is probable, however, that the scheme had already been in con- templation for some years, as the problem was not an easy one to solve, owing to the restrictions of the site, and to the desire to reproduce in some way the leading features of the church of the Holy Apostles at Constantinople. This church was destroyed in 1464, but its description by Procopius is so clear, and corresponds so closely with St Mark's, completed towards the end of the nth century, as to leave little doubt about the source of its inspiration. From what has already been said with reference to the great changes made when it was proposed to vault the early Lombard basilican churches, those of equal importance which were carried out in St Mark's will be better understood. The nave was divided into three square bays (fig. 37), with additional bays on the north and south to form tran- septs; the five square bays thus obtained were covered with domes carried on pendentives, as in St Sophia at Constantinople, and on wide transverse barrel vaults; the domes over the north and south transepts and the choir were of slightly less dimensions than those over the nave and crossing, in consequence of the limitations in area caused by the chapel of St Theodore on the north, the ducal palace on the south, and the ancient apse of the original basilica which it was desired to retain. In the reconstruction, many of the old columns, capitals and parapets were utilized again in the arcades carrying the galleries and in the balustrades over them. Externally the brick walls were decorated with blind arcades and niches of Lombard

style, and all the roof vaults were covered with lead as in Constanti- nople. The subsequent decoration of the exterior took two centuries to carry out, not including the florid work of later date. There is no precedent in the East for the superimposed columns and capitals exported from Constantinople and Syria which now decorate the north, south and west fronts (Plate I., fig. 63), though the materials were all of the finest Byzantine type. Internally, the mosaic decora- tion of the domes, vaults and the upper part of the walls, was carried out by Greek artists from Constantinople, who probably also were employed for the marble panelling of the lower part of the walls. The marble casing of the front was certainly executed by Constanti- nopolitan artists, since the moulded string known as the " Venetian dentil " is a direct reproduction of that in St Sophia. At a later date the domes were all surmounted by lanterns in wood, covered with lead, and the roofs were all raised. So far, therefore, the build- ing departs

from its prototype, the church of the Apostles. A similar transformation took place in the church of Santa Fosca at

I Ancient umrlt prior to 1083.

1 Oomenico Contarini, 1063-tOTI.

/•Decoration (Marble Mosaics), V00-T350.

I Work done about 1300.

1 Renaissance.

*Scale of Feet ? 5 *.° 2 9′ 3? 4° 5° 6° 7° < *° 9° l oo*

A. Chapel of St. Isidort,

B. Baptistery.

C. Treasury.

D. Chapel of St.Zem

From R. P. Spiers's Architecture, East and West.

Fig. 37.— Plan of St Mark's, Venice.

Torcello, where a single large dome was contemplated over the centre of the original basilican church, but was never built. The cathedral of Torcello and the church at Murano are richly decorated with carved panels, capitals, choir screens and other features, either imported from the East or reproduced by Greek artists or Italians trained in the style. The influence of St Mark's in this respect extended far and wide on the east coast of Italy ; and at Pomposa, Ancona, and as far south as Brindisi, Byzantine details can be traced everywhere. The designs of the churches of San Ciriaco at Ancona and of Sant' Antonio at Padua were both based on St Mark's. Sant' Antonio's had six domes, there being two over the nave; and in all cases the domes were surmounted by domes in timber like those of St Mark's.

In domestic work, Venice is richer in Byzantine architecture than Constantinople, for with the exception of the Hebdomon palace the continual fires there have destroyed all the earlier palaces and houses. The Fondaco-dei-Turchi, built probably in the nth century, is one of the most remarkable; the front on the great canal is 160 ft. long, having a lofty arcade with ten stilted arches on the ground storey and an arcade of eighteen arches above ; the pavilion wings at the east end are in three storeys, with blind arcades and windows pierced in the central arcade. The whole was built in brick encased with marble, with panels or disks enriched with bas-reliefs or coloured marbles. A second example is found in the Palazzo Loredan, having

similar arcades, stilted arches and marble panelling; and there are two others, one on the Grand Canal and the other on the Rio-Ca- Foscari. Throughout Venice the decoration of these Byzantine palaces would seem to have influenced those of later date; for the Venetian dentil, interlaced scroll-work and string courses, with the Byzantine pendant leaf, are found intermingled with Gothic work, even down to the 15th century, and the same to a certain extent is found at Padua, Verona and Vicenza.

Central Romanesque. — -The builders in the centre of Italy would seem to have followed more closely the Roman basilican plan, for in two of the earliest churches, Santa Maria Fuorcivitas at Lucca f and San Paolo a Ripa d'Arno at Pisa, the T-shaped plan of St Peter's and St Paul's, with widely projecting transepts, was adopted; the difference also between the north and central developments is very marked, as in the place of the massive stone walls, compound piers, and internal and external buttresses deemed necessary to resist the thrusts of the great vaults, and the low clerestory of the northern churches, those in the south retain the light arcades with classic columns, the wooden roofs, and the high clerestory of the Roman basilicas. Instead of the vigorous sculpture of the Lombards in the Tuscan churches, marbles of various colours take its place, the carving being more refined in character and much quieter in effect.

The earliest church now existing is that of San Frediano at Lucca, dating from the end of the 7th century. Originally it was a five- aisled basilica, with an eastern apse, but when it was included within the walls in the nth century the apse and the entrance doorway changed places, and a fine eaves-gallery was carried round the new apse; the outer aisles were also transformed into chapels. So many of the churches in Pisa and Lucca had new fronts given to them in the nth or 12th century, that it is interesting to find, in the church of San Pietro-in-Grado at Pisa, an example in which the external decoration with pilaster strips and arched corbel tables is retained, showing that in the 9th century, when that church was built, the Lombard style prevailed there. Other early churches are those of San Casciano (9th century), San Nicola and San Frediano (1007), all in Pisa.

Of early foundation, but probably rebuilt in the nth century, are two interesting churches in Toscanella, Santa Maria and San Pietro; they are both basilican on plan, but the easternmost bay is twice the width of the other arches of the arcade, and is divided from the nave by a triumphal

arch. In both churches the floor of the transept is raised some feet above the nave, and a crypt occupies the whole space below it.

One of the earliest and most perfect examples of this subdivision is the church of San Miniato, on a hill overlooking Florence. . The church was rebuilt in 1013, and some of the Roman capitals of the earlier building are incorporated in the new one. It is divided into nave and aisles by an arcade of nine arches, and every third support consists of a compound pier with four semi-detached shafts, one of which, on each side of the nave, rises to the level of the summit of the arcade and carries a massive transverse arch to support the roof. The east end of the church, occupying the last three bays of the arcade, is raised 1 1 ft. above the floor of the nave, over a vaulted crypt extending the whole width of the church and carried under the eastern apse. The interior of the church, which is covered over with an open timber roof, painted in colour and gilded, is decorated with inlaid patterns of black and white marble of conventional design, and the same scheme is adopted in the main facade, enriching the panels of the blind arcade on the lower storey, and above an extremely classic design of Corinthian pilasters, entablature and pediment.

As none of the facades of the Pisan churches was built before the middle of the nth century, it is possible that Buschetto, the architect of the cathedral of Pisa, may have profited by the scheme suggested in the lower storey of San Miniato ; if so he departed from its classic proportions. There are seven blind arcades in the lower storey of the Pisan cathedral, the arcades are loftier, and the position of the side doors which open into the inner aisle on each side is of much better effect. The cathedral was begun in 1063, the year following the brilliant capture of Palermo by the Pisans, when they returned in triumph with immense spoils. In plan it consists of a Latin cross, with double aisles on either side of the nave extending to the east end, a central apse, transepts with single aisles on each side, and north and south transepted apses (fig. 38). The nave arcade, with its Corinthian capitals and monolith stone columns, is of exceptional boldness, and as it is carried across the transept up to the east end (a length of 320 ft.) it forms a continuous line greater than that in any other cathedral. The crossing is covered by a dome, elliptical on plan, being from east to west the length of the transept and aisles. The result is unfortunate, and detracts both externally and internally from its beauty ; otherwise the exterior decoration, which must have been schemed out in its entirety from the beginning (with the exception of the dome, which is of later design), has the most satisfactory and pleasing effect. The lofty blind arcade of the lower storey and the open gallery above on the facade (the latter represented by a blind arcade), are carried round the whole building, and the horizontal lines of the galleries of the upper storeys accord with the roofs of the aisles and nave respectively and the blind arcade of the clerestory. The

walls are faced within and without with white and grey marble, and the combination of sculpture and inlay

which enriches the arcades of the facades gives an additional attrac- tion to the building. The cathedral is sometimes quoted as Byzantine in style, but its plan and design are of widely different character from those of any building found in the East, and the mosaics, which constitute the finest decorative element in that style, were not added till the 14th century, and formed no part of the architect Buschetto's scheme.

The Baptistery, begun in 1153, was not completed till towards the close of the 13th century, when important alterations were made in the design to bring it into accordance with the new Gothic style. The crocketed gables, and the upper gallery, substituted for the arcades, which followed on the lines of those in the cathedral, have taken away the quiet repose found in the latter; the lower storey,

Fig. 38.

however, with its lofty blind arcades, similar to those of the cathedral, and the principal doorway, are of great beauty. The central area of the baptistery, which is surrounded by aisles and triforium gallery, is covered by a conical dome; internally as well as ex- ternally this can never have been a beautiful feature, and the additions of the 13th century have made it one of the ugliest roofs in existence.

The Campanile or leaning tower was begun in 1 1 74. Owing, however, to the treacherous nature of the ground, the piles driven in to support the tower gave way on the south side, so that, when only 35 ft. above the ground, a settlement was noticed, and slight additions in height were made from time to time in order to obtain a horizontal level for the stone courses; but this was without avail, and on the completion of the third gallery above the ground storey the work was suspended for many years. In 1350 it was re- commenced, three more gallery storeys were added, and the upper or belfry stage was set back in the inner wall. The tower is now 1 78 ft. high, and overhangs nearly 14 ft. on the south side; its design is made to'harmonize with the cathedral.but shows much less refinement and grace.

The Campo Santo, an immense rectangular court 350 ft. long by 70 ft. wide, surrounded by a cloister 35 ft. wide, was begun in 1280; the details

are refined, but the poverty in the design of the tracery with which the arcades were fitted in at a much later date detracts from its interest, which is now mainly concerned with the beautiful frescoes which decorate its walls.

As might have been expected, the cathedral of Pisa set the model not only for the restoration of existing churches but also for new ones, in Pisa itself and also at Lucca, Pistoia and Prato. In Pisa, the church of San Paolo a Ripa d'Arno was rebuilt about 1060, possibly by the architect of the cathedral; San Pietro-in-Vincoli and San Nicola date from the early years of the 12th century. At Lucca the churches of Santa Giulia, San Giusto, San Martino, San Michele, and the restored front of Santa Maria Fuorcivitas, are the principal examples in which the Pisan cathedral has suggested the design; and at Pistoia we can point to the cathedral, Sant' Andrea, San Pietro and San Giovanni Fuorcivitas, the latter with a south wall decorated with three stages of blind arcades of great richness. The cathedral of Lucca was either restored or rebuilt at the beginning of the 14th century, and has a distinctly Gothic effect. The lower storey of the facade presents the unusual feature of an open porch across the whole front with three great archways. This porch with the three galleries above was added to the cathedral at the beginning of the 13th century.

Southern Romanesque. — The influences exerted in the early development of the Romanesque style in the south of Italy are much more complicated than in the north, since two new elements come into the field, the Norman and Saracenic. Of early work very little remains, owing to the general rebuilding in the nth century; what is more remarkable, there is scarcely any trace of the result of the Byzantine occupation for so many centuries; the only exception being the church of San Gregorio at Bari, a small basilican structure in which the arches of the arcades separating the nave from the aisles are stilted like those of the Fondaco-dei-Turchi at Venice.

One of the chief characteristics noticeable in the plan is the almost universal adoption of a transept projecting north and south slightly beyond the aisle walls, and in some cases raised over a crypt, as in the churches at Toscanella. Since, however, there is no

choir bay, and the central apse opens direct into the transept, the plan is not that of the Latin cross. The most complete development of this arrangement is found in the cathedral and in the church of San Nicola at Bari (fig. 39) ; both being basilican churches with a triumphal arch opening into the transept, — in this respect similar to the churches of St Peter and St Paul at Rome, except that the transepts project only slightly, beyond the aisles. There is one peculiarity in both these churches, as also in that of the cathedral at Molfetta. East of the transept, and at the north and

south sides, are towers, between which is carried a wall which hides the apse, the only indication of its existence being the round arched window, which lights it. A similar arrangement exists in the cathedrals of Giovenazzo, Bitetto and Bitonto. The central bay of the transept of the cathedral at Bari is sur- mounted by an octagonal drum, the dome within which is carried on squinches; a similar dome was projected in San Nicola, but never built. In the cathedral at Bari, as also in San Nicola, the lofty nave is covered with a timber roof, and has an arcade on the ground storey and a fine triforium and clerestory windows above.

Externally these churches depend for their effect more on their fine masonry than on any decorative treatment; the blind arcades of the lower storey have very little projection, and the pilaster strips which in the Lombard churches break up the wall surface are not found here ; the arched corbel table is freely employed but rarely the open gallery. There is one remarkable example in Bitonto cathedral; above the aisle chapels, and approached from the triforium, is an open gallery, the arches of which rest on widely projecting capitals sculptured with animals and foliage, half Lom- bardic and half Byzantine in style. The small shafts supporting these capitals are of infinite variety of design, with spirals, chevrons, fluting and vertical mouldings of many kinds.

The cathedral at Molfetta is in plan quite different from those already described, and consists of square bays with aisles, transept and apse, having domes over the nave and crossing. The Byzantine influence here comes in, but it is much more pronounced in La Cattolica at Stilo, a small church square on plan with four columns carrying the superstructure, which consists of a central and four

Scale of Feet

10 w « jo 50

Fig. 39. — Plan of S. Nicola at Bari.

domes on the angles. Other domed churches are those of the Immaculata at Trani; San Sabino, Canosa; and San Marco, Rossano. The lower part of the cathedral at Troja shows the direct influence of the cathedral at Pisa. The cathedral at Trani has the same plan as the churches at Bari, except that the earlier apses are not enclosed. The cathedral of Salerno retains still the fine atrium by Robert Guiscard in 1077. In the cathedrals of Acerenza, Aversa and Venosa, the French chevet was introduced towards the end of the 12th century.

In the magnificent octagonal tower which encloses the dome on the crossing

in the cathedral of Caserta-Vecchia, we find the interlacing blind arcades of the Norman architecture in Sicily, as also in the cathedral at Amalfi. The porches, entrance doorways and windows being the chief decorative feature of the south Italian churches, were enriched with splendid sculptures. So were the pulpits of the cathedrals of Sessa, Ravello, Salerno and Troja, the rich mosaic inlays at Sessa, Ravello and Salerno according in design with the Cosmati work in Rome, though they possibly had an earlier origin in Sicily.

Sicilian Romanesque. — Although the earliest remains in Sicily date from the Norman occupation of the island, they are so permeated with Saracenic detail as to leave no doubt that the conqueror employed the native workmen, who for two centuries at all events had been building for the Mahommedans, and therefore, whether Arab or Greek, had been reproducing the same style as that found in Egypt or North Africa.

It is possible that, so far as the Norman palaces of the 12th century are concerned, they were based on those built under the Saracenic rule, but the requirements of a mosque and of a church are entirely different, and therefore in the earliest church existing (San Giovanni- dei-Leprosi, at Palermo, built by Robert Guiscard in A.D. 1071) we find a completely developed Christian structure, having nave, aisles and transepts, with a dome over the crossing and three apses. The next church, at Troina (1078), was similar on plan, but had three square wings at the east end instead of apses. The next two churches, La Martorana and San Cataldo (1129), at Palermo, followed the plan of the Greek church, with four columns carrying the superstructure and three domes over the nave bays carried on Saracenic squinches, similar to those in San Giovanni-dei-Leprosi. San Giovanni-degli-Eremiti (T-shaped on plan) has no aisles, but carries domes over the nave and three smaller domes on the transept. The most important feature found in all these churches is the pointed arch, of Saracenic origin imported from the East, which was employed for the nave, arcades, the crossing, and in the squinches carrying the domes. The blind arcades which decorate the walls of San Cataldo and of the Norman palaces — La Favara, the Torre della Ninfa, La Ziza and La Cuba (all in or near Palermo), — in two or three orders, and sometimes (as in the Favara palace) of great height, have all pointed arches and no impost mouldings or capitals. The distinguishing characteristic of these blind arcades (and the same is found in the open arcades) is the very slight projection of the outer order of arch.

The finest early example of Norman architecture in Sicily is the Cappella Palatina, at Palermo, consecrated in 1 140, and attached to the palace. The plan consists of nave, aisles, transept and triple apse, the arches, all pointed and stilted, being carried on monolith columns of granite and

marble alternately. The nave is covered over with a timber roof with stalactitic coves and coffered ceiling, richly decorated in colour and gilded, the borders of the panels bearing Arabic inscriptions in Cufic characters. Similar inscriptions exist on the upper part of the walls of the Cuba and Ziza palaces, proving that they were built by Saracenic workmen. The plans of the cathedrals of Palermo, Messina (destroyed 1908), Cefalu and Monreale are all similar, with nave and aisles separated by arcades, in which the arches are all pointed and stilted, transepts projecting north and south beyond the aisle walls, and square bays beyond, with apsidal terminations. That of Palermo has much suffered from restorations, but the cathedral of Monreale is in perfect condi- tion. It was begun in 1 176 and consecrated in 1182. The pro- portions of the arcade are much finer than in the Cappella Palatina, where the stilted arch was of the same height as the shaft of the columns, whereas here it is only half the height. The columns are all of granite with extremely fine capitals, some of which were taken from ancient buildings. All the roofs are in wood, with coffered ceilings richly decorated in gold and colour. The walls to a height of 22 ft. are all lined with slabs of marble with mosaic friezes, and all the surfaces of walls and arches are covered above with mosaics representing scenes from the Old and New Testaments, while in the apse at the east end a gigantic figure of Christ dominates the whole church. The same is found at Cefalu, where the mosaic decorations, however, are confined to the apses. Externally the walls are com- paratively plain, the decoration being confined to the east end, where the three apses are covered with a series of blind intersecting arcades of pointed arches. This class of enrichment prevails through- out the great Sicilian churches, and extends sometimes to the smaller churches, as that of the Chiesa-dei-Vespri. Of the conventual build- ings attached to the cathedral of Monreale, which occupied an immense site, there remain only the cloisters, about 140 ft. square, enclosed by an arcade with pointed arches carried on coupled columns, the shafts of which are elaborately carved and inlaid with

mosaic ; the capitals are of the most varied design and of exquisite execution.

Italian Gothic. — Italy is poorer than any other country in examples of the transition from round arched to pointed arched buildings. The use of the pointed arch was accepted at last as a necessity, and cannot be said ever to have been welcomed. The first buildings in which it is seen worked out fully

in detail are those of Niccola Pisano, and but few examples exist of good Gothic work earlier than his time. The elaborately arcaded and sculptured west front of Ferrara cathedral is a screen to an early building. The cathedral and other churches at Genoa are certainly exquisite works, but they appear to owe their internal design rather to the influence of (perhaps) Sicilian taste than north Italian, and the exquisite beauty of the west front owes a good deal, at any rate, to French influence, softened, refined and decorated by the extreme taste of an Italian architect. The feature which most marks all Italian Gothic is the indifference to the true use of the pointed arch. Everywhere arches were constructed which could not have stood for a day had they not been held together by iron rods. There was none of that sense of the unities of art which made a northerner so jealous to maintain the proper relations of all parts of his structure. In Niccola Pisano's works the arch mould rarely fits the capital on which it rests. The proportions of buttresses to the apparent work to be done by them are bad and clumsy. The window traceries look like bad copies of some northern tracery, only once seen in a hurry by an indifferent workman. There is no life, or development, or progress in the work. If we look at the ground-plans of Italian Gothic churches, we shall find nothing whatever to delight us. The columns are widely spaced, so as to diminish the number of vaulting bays, and to make the proportions of the oblong aisle vaulting bay very ungainly. Clustered shafts are almost unknown, the columns being plain cylinders with poorly sculptured capitals. There are no triforium galleries, and the clerestory is generally very insignificant. In short, a comparison of the best Gothic works in Italy with the most moderate French or English work would show at once how vast its inferiority must be allowed to be. Still there were beauties which ought not to be forgotten or passed over. Such were the beautiful cloisters, whose arcades are carried on delicate coupled shafts, — e.g. in St John Lateran and St Paul's at Rome. Such also were the porches and monuments at Verona and elsewhere ; and the campaniles, — both those in Rome, divided by a number of string- courses into a number of storeys, and those of the north, where there are hardly any horizontal divisions, and the whole effort is to give an unbroken vertical effect ; or that unequalled campanile, the tower of the cathedral at Florence by Giotto, where one sees in ordered proportion, accurately adjusted, line upon line, and storey upon storey, perhaps the most carefully wrought-out work in all Europe.

The Italian architects were before all others devoted to the display of colour in their works. St Mark's had led the way in this, but, throughout the peninsula, the bountiful plenty of nature in the provision of materials was seconded by the zeal of the artist. They were also distinguished for their use of brick. Just as in parts of Germany, France, Spain and England, there were large districts in which no stone could be had without the greatest

labour and trouble; and here the reality and readiness which always marked the medieval workman led to his at once availing himself of the natural material, and making a feature of his brickwork.

The Gothic of Italy has, it must be admitted, no such grand works to show as more northern countries have. Allowance has to be made at every turn for some incompleteness or awkwardness of plan, design or construction. There is no attempt to emulate the beauties of the best French plans. Milan cathedral, magnificent as its scale and material make it, is clumsy and awkward both in plan and section, though its vast size makes it impressive internally. San Francesco, Assisi, is only a moderately good early German Gothic church, converted into splendour by its painted decorations. At Orvieto a splendid west front is put, without any proper adjustment, against a church whose merit is mainly that it is large and in parts beautifully coloured.

The finest Gothic interiors are of the class of which the Frari at Venice and Sant' Anastasia at Verona are examples. They are simple vaulted cruciform churches, with aisles and chapels on the east side of the transepts. But even in these the designs of the various parts in detail are poor and meagre, and only redeemed from failure by the picturesque monuments built against their walls, by the work of the painter, and by their furniture. In fine, Gothic art was never really understood in Italy, and, consequently, never reached to perfection.

Whilst the Pointed style was almost exclusively known and prac- tised in northern Europe, the Italians were but slowly improving in their Gothic style ; and the improvement was more evinced in their secular than in their ecclesiastical structures. Florence, Bologna, Vicenza, Udine, Genoa, and, above all, Venice, contain palaces and mansions of the 12th, 13th, 14th and 15th centuries, which for simplicity, utility and beauty far excel most of those in the same and other places of the three following centuries. The contemporary churches do not exhibit the same degree of improvement in style that is conspicuous in these domestic works, for there are no works in Europe more worthy of study and admiration than the Ducal Palace at Venice, and some of the older works of the same class, and even

of earlier date. The town halls of Perugia, Piacenza and Siena, and many houses in these cities, and at Corneto, Amalfi, Asti, Orvieto and Lucca, the fountains of Perugia and Viterbo, and the monuments at Bologna, Verona and Arezzo, may be named as evidence of the interest which the national art affords to the architectural student even in Italy, as late as the end of the 14th century; but after this it gradually gave way to the new style, though in some instances its influence may be traced even when it had been overborne by it. (R. P. S.)

Romanesque and Gothic Architecture in France

Most generally, Romanesque art is thought of as that period of art which followed and partook of the nature of Roman art and yet was too far removed from it to be classed as Roman. The difference, however, was not merely one of decay; it is rather in positive factors that we shall find the true characteristics of the style. Its formation was parallel to the development of the Romance languages, and like them it acquired barbaric elements.

In Rome itself hardly any, if any, contributions were made to its growth, and there as late as the 12 th century the early Christian form of basilican church continued to be built. It may, perhaps, best be conceived as a Germano-Roman product, for even in Spain and north Italy, which became such strong centres of the art, the Visigoths and Lombards provided the Teutonic element. Besides this change of " blood " in the style, there is another element of change in the influences obtained from the more rapidly developed art of the East. This influence indeed was so strong and constant that, having it in view, we might almost describe the Romanesque style as Germano- Byzantine.

In the 6th and 7th centuries we have, on the one hand, the almost pure traditional early Christian art of Rome and indeed of western Europe, and on the other the direct establishment of matured Byzantine art at Ravenna, Parenzo, Naples and even in Rome. Then followed the mixture of these and of barbaric elements in the formation of several preJR.omanesque varieties, one of which has been named Italo-Byzantine. It was not until the age of Charlemagne that a centre was established strong enough for the formation of a new western school which should persist. From this time a progressive style was developed which led straight forward to the Gothic, and it is this movement which is best called Romanesque. This art was a perfect ferment of striving and experiment, of gathering and even of research; Roman, Byzantine and Saxon elements entered into its com- position. It is probable also, as a result of Saracenic pressure on Syria, Asia Minor, North Africa and Spain, that artists, " bringing their crafts with them," drew together from still remoter parts to gain the protection of the great ruler of the West and to help in the formation of Carolingian art. With the disintegration of the empire of Charlemagne many local schools arose in Germany, France and Lombardy, which — especially after the year 1000, when there appears to have been a renewed burst of building energy — resulted in considerable differentiation of styles. The centre of energy seems to have been now here, now there, yet with all the differences there was a general resemblance over the whole field. Until the exact date of a very large number of monuments is more perfectly established, it will be impossible to trace out exactly the intricate windings of the line of advance. In fact there

are two conflicting sides to the question presented by Romanesque art. In the first place we have to consider the several schools in regard to a standard of absolute attainment, and in the second as relative to the line of persistence and to the formation of Gothic, which was so largely the culmina- tion, and then the decay, of the forces present in Romanesque art. Some of the most beautiful and complete of the Romanesque schools contributed least, some of the most inchoate gave the most, to that which was to be.

The most important existing monument of the age of Charlemagne is the cathedral of Aix-la-Chapelle (see fig. 44) , which was being built in the year 800. It has an octagonal central area, covered by a dome and surrounded with two storeys of aisles both completely vaulted. The interior surface of the dome was encrusted with mosaic. Another important work of about the same time is the church of Germigny-des-Pres near Orleans, which also is of the " central type," having a square tower above four piers surrounded

ARCHITECTURE

Plate IIL

Fig. 69— INTERIOR OF ST PETER'S, ROME.

Plate IV.

ARCHITECTURE

Photo, Koch.

Fig. 70.— TOWN HALL, BREMEN.

Photo, liro s i.

Fig. 71.— VENDRAMINI PALACE. VENICE.

FRENCH GOTHIC]

ARCHITECTURE

397

by an aisle with semicircular apses in the centre of each external wall, the apse to the east having a mosaic.

From the 9th to the nth century the great problem worked out was that of perfecting the standard plans of large churches. In the MS. plan of the

monastic church of St Gall, drawn about 820, we find a great nave with aisles, apsidal terminations both to the east and the west, transepts and probably a central tower (cf. the abbey church of Saint-Riquier near Abbeville, built c. 8oo, of which a slight representation has been preserved). In St Martin at Tours was probably evolved the most perfect type of plan, that with an ambu- latory and radiating chapels surrounding the eastern apse. A magnificent church of this form was built here at the beginning of the 1 1 th century , but not for the first time. Excavations have shown that the plan was probably suggested by a still earlier church in which five tomb-niches surrounded the central apse and tomb of St Martin. At Jumieges (begun 1040) it has recently been found that the plan terminated to the east with parallel apses, as at St Albans in England ; this is a second important type. A third type is that in which the transepts as well as the east end are finished with apses, like St Mary-in-the-Capitol at Cologne.

When we come to the developed Romanesque of the end of the nth century, we find not only several French varieties, but strong schools in Lombardy and on the Rhine. Without distinguishing too minutely, four broad types representing schools of the east and west, north and south (or rather north-east, north-west, south-east and south-west) of France, may be spoken of, and all of these were engaged in the task of completely covering with vaults large churches of basilican plan — the typical problem of this period. In the east of France we have a school represented by the monastic church of Tournus, where the nave was vaulted by a series of compartments placed transversely to the axis of the church. This church, which has a plan of the type of St Martin's at Tours, was begun in 1019, but the nave vaults were not reached until after 1066. This style of vaulting persisted in Burgundy, and from thsnce it spread to Foun- tains Abbey in England, where it is found over the aisles. The most beautiful class of buildings in eastern France is that of which the church at Issoire is the most perfect example. The external walls are here ornamented with patterns countercharged in light and dark stone. The wonderful church at Le Puy also belongs to this group, but here strong Moorish influence is to be traced. The inlays were probably derived from a late Gallo-Roman source. Counter- charging of stones of two colours was a favourite method of building in Romanesque churches erected between 1 100 and 1 150. We find it at Vezelay, a magnificent abbey church of Burgundy, at Le Mans cathedral, and as far north-west as Exeter and Worcester. In the west (south-west) the most prominent school was that of Perigord, of which the church of St Front, Perigueux, may be taken as the example. St Front was rebuilt after a fire in 1120, but there are many earlier specimens, two of the most important being at Angouleme (1105-1128) and Fontevrault. This school applied a series of domes of eastern fashion not only at the centre but over the whole extent of the church. St Front so closely resembles St Mark's, Venice, that it

must be derived from it or from some similar eastern church. The method largely influenced the Angevin school of vaulting, but it does not seem to have been effective as a protec- tion from the weather. Some examples were covered by external roofs, as was St Front itself at a late time. St Ours at Loches, originally a small church covered by domes, had spire-like pyramids substituted for them when the church was enlarged about 1 168.

The third class of vaulting we may for symmetry's sake associate with the south, though it is found widely distributed. The chapel in the Tower of London is an example, and its true centre' seems to be the Auvergne. The vaults of this type run along with the axis of the space to be covered. In the case of large churches the central span is frequently supported by quadrant vaults leaning against it on either side. One of the most noble churches in which the central span is covered by such a barrel vault is that of St Savin near Poitiers, where very much has been preserved of the com- plete series of paintings which once adorned it and the walls beneath.

The most characteristic buildings of the south are the churches of Moissac, St Trophime at Aries, St Gilles near Nimes and St James of Compostella, where there is much sculpture of a Lombardic type. There was a great revival of sculpture, going together with a study of the antique, in Lombardy at the end of the nth century. Wiligelmus, who later worked at San Zeno, Verona, signed some sculptures at Modena in 1099.

Of the schools of the north, Normandy took the lead. It was adventurous, if somewhat barbaric. It derived much from Germany and gave much to the Gothic style. About the middle of the nth century the Normans began to experiment with cross-groined vaults and their application to the church problem. This from the first contained an important possibility of future development, in that it allowed of windows of considerable height being placed in the lunettes of these vaults. Soon a very great step in advance was made by the invention or application of diagonal ribs under the inter- section of the plain groined vault. This association of strengthening ribs in a cross form to each bay of the structure forms the ogive, the characteristic form from which the alternative name to Gothic, "ogival," has been derived. The first instance we know of the use of this system is at Durham cathedral, where the aisles of the east

end were so covered about 1093, and where the high vault erected about 1 104ˆ was almost certainly of the same kind. Another outcome of the genius of Norman builders seems to have been the donjon or keep type of castle.

The word " Gothic " was applied by Italian writers of the Renaissance to buildings later than Roman, which in some cases (e.g. Theodoric's works at Ravenna) might be properly so named. What we now call Gothic the same

writers called Modern. Later the word came to mean the art which filled the whole interval between the Roman period and the Renaissance, and then last of all, when the Byzantine and Romanesque forms of art were defined, Gothic became the art which intervened between the Romanesque era and the Renaissance.

As remarked above, Gothic architecture is to a large extent the crown of Romanesque. It is agreed that its chief element of construction was the ogival vaulting which was being widely used by Romanesque builders in the first half of the 12th century; and pointed arches appeared as early.

The eminent architect, G. E. Street, writing 1 of what we have called the standard plan of great 12th-century churches, says, " In whatever way the early chevets (as the French term them) grew up there is no doubt that they contain the germ of the magnificent chevets in the complete Gothic churches of the north of France." Architecture of the middle ages having been con- tinuously developed, it is necessarily somewhat arbitrary to mark off any given period; all are agreed, however, that about the year 1 150 there was a time of rapid change towards a slen- derer and more energetic type of building, and the forms which followed for about four centuries we now call Gothic. The special character which the architecture of this period took was partially conditioned by the fact that the expanding power of the French kingdom, with its centre at Paris, was situated in a particular artistic environment. The body of ideas on which it for the most part worked was furnished by the Romanesque art of north France, the German borderland and Burgundy. A great contributory cause was the immense monastic activity of the time, and the need of- accomplishing large results with limited means resulted in a casting aside of old ornamental commonplaces and in innovations of planning and structure. This was especially the case with the Cistercian order, which carried certain transitional Gothic forms of building into England, Germany, Italy and Spain. If, however, we make the transition to Gothic date from the first use of " ogival " vaults in north- west Europe, then Durham cathedral is, so far as we now know, the earliest example of the transitional style. The next step, the appearance of Gothic itself, may best be held to date from the systematic but not exclusive use of pointed arches in associa- tion with ogival vaults about the middle of the 12th century.

At this time was waged a war of domination amongst the styles, a war which resulted not necessarily in the victory of the most beautiful nor even of the strongest, but one in which political and geographical considerations had much to do with the decision. When the French kingdom took the lead in western civilization, it was settled that a northern form of art, one which had perforce to make a chief element of the window, should be followed out. The consequent development of the window is, after all, as the first

observers thought, the great mark of the mature style. As to the position of France in the movement, Mr Street may again be quoted: — " When once the Gothic style was well established, the zeal with which the work of building was pursued in France was almost incredibly great. A series of churches exists there within short distances of each other, so superb in all their features that it is impossible to contest their superiority to any corresponding group of buildings. The old Domaine Royale is that in which French art is seen in its perfection. Notre Dame, Paris, is a monument second to nothing in the world; but for completeness in all its parts it would be better to cite the cathedral of Chartres, a short description of which must suffice as an explanation of what French art at its zenith was. The plan has a nave with aisles, transepts with aisles on each side, a choir with two aisles all round it, and chapels beyond them. There are two immense steeples 1 Article " Architecture," Ency. Brit., 9th ed.

at the west end, two towers to each transept and two towers at the junction of the choir with its apse. The doorways are triple at the west end, whilst to each transept is a vast triple porch in front of the three doorways. The whole of these doorways are covered with sculpture, much of it refined, spirited and interesting in the highest degree. You enter and find the interior surpassing even the exterior. The order of the columns and arches, and of all the details, is so noble and simple that no fault can be found with it. The whole is admirably executed; and, finally, every window throughout its vast interior is full of the richest glass coeval with the fabric. As compared with English churches of the same class, there are striking differences. The French architects aimed at greater height, greater size, but much less effect of length. Their roofs were so lofty that it was almost impossible for them to build steeples which should have the sort of effect that ours have. The turret on Amiens cathedral is nearly as lofty as Salisbury spire, but is only a turret; and so throughout. Few French churches afford the exquisite complete views of the exterior which English churches do; but, on the other hand, their, interiors are more majestic, and man I feels himself smaller and more insignificant in them than in ours. The palm must certainly be given to them above all others. There is no country richer in examples of architecture than France. The student who wishes to understand what it was possible for a country to do in the way of creating monuments of its grandeur, would find in almost every part of the country, at every turn and in great profusion, works of the rarest interest and beauty. The 19th century may be the consummation of all, but the

evidences of its existence to posterity will not be one- tenth in number of those which such a reign as that of Philip Augustus has left us, whilst none of them will come up to the high standard which in his time was invariably reached."

The remarks which have been made as to the variation in style visible in various parts of the same country, apply with more force, perhaps, in what we now call France than to any other part of Europe. For the purposes of complete study it would be necessary to keep distinct from each other in the mind the following important divisions: — (1) Provence and Auvergne; (2) Aquitaine; (3) Burgundy; (4) Anjou and Poitou; (5) Brittany; (6) Normandy; (7) the lle-de-France and Picardy; (8) Champagne; and, finally, (9) the eastern border-land (neither quite German nor quite French in its character), the meeting- point of the two very different developments of French and German art. Speaking generally, it is safe to say that Gothic architecture was never brought to its highest perfection in any portion of the south of France. Aquitaine, Auvergne and Provence were too wedded to classic traditions to excel in an art which seems to have required for its perfection no sort of looking back to such a past. Hence there is no Gothic work in the south for which it is possible to feel the same admiration and enthusiasm as must be felt by every artist in presence of the great works of the north. In Anjou this is less the case; but even there the art is extremely inferior to that which is seen in Normandy and the lle-de-France. Brittany may be dismissed from considera- tion, as being, like Cornwall, so provincial and so cut off from neighbours, that its art could not fail to be very local, and without much influence outside its own borders.

There are examples of true Gothic outside its proper habitat, almost pure French works being found as far south as Laon and Burgos, as far east as Strassburg and Lausanne and as far north as Canterbury and Cologne. Westminister Abbey was pro- foundly influenced by direct study of French work. Normandy, Burgundy, and the land as far north as Tournay seem to have shared in the work of transition; but the Gothic area proper is the lle-de-France with Picardy and Champagne, then Burgundy, Normandy and England.

Four remarkable buildings best represent the early phase of the Gothicstyle, theabbey church of StDenis, and thecathedralsof Noyon, Senlis and Sens. The first was begun in 1137, and the choir was consecrated in 1 143. The few parts of this work which remain are sufficient to show how stately and yet fresh the whole work must have been. Npyon cathedral, begun after a fire which occurred in 1 13 1, had its choir consecrated in 1157. The cathedral of Senlis was

begun in 1 155. Sens cathedral, begun about the same time, or even earlier,

is the first of the great cathedrals. Many other buildings belong to the first years of the style ; such are the abbey churches of St Remi at Reims, Notre Dame at Chalons and St Germain-des- Pres, Paris. The choir of this last was consecrated in 1163, and in the same year Notre Dame, Paris, was begun This mighty building, although very complete, was altered as to its effect by the substitu- tion, early in the 13th century, of large two-light windows for the earlier lancets of the clerestory. The sculptures of the west front are exquisite. Laon cathedral, another of the great churches, is of about the same age as Notre Dame. It also has beautiful sculpture in its western porches, but its most marked characteristic is the group of six great and romantic towers which flank the fronts to the west, the north and the south. In the 13th century, the church was ex- tended to the east and the original chevet was destroyed. From the evidence furnished by fine double-staged chapels to the transepts, it is most probable that three similar chapels were set about the ambulatory of the apse, the upper chapels opening from the fine vaulted triforium. Such an arrangement existed at the noble church of Valenciennes, now destroyed, but well recorded. At the end of the 12th century Chartres cathedral was begun, perhaps its most notable constructive feature being the high development that the flying buttresses have here attained. It was followed in the early years of the 13th century by Rouen cathedral, which derived much from its prototype. St Omer, a fine early church, in. turn followed Rouen.

The second stage of Gothic, introducing the traceried window, was opened by the building of the cathedral of Reims, begun in 121 1. This is in every way one of the most perfect of cathedrals, as well for its sculpture and glass as for its structure. Reims was followed by the still greater cathedral at Amiens (fig. 40), which was begun in 1220 at the west front, so that the superb sculpture (Plate II., fig. 64) of the porches is earlier than that of Reims. Beauvais cathedral was begun in 1247 on a still vaster scale, and with an ambition that o'erleaped itself. Auxerre cathe- dral, and the very beautiful collegiate churches of St Quentin and Semur, also followed Reims. Two other cathedrals of the first rank which must be men- tioned are those of Bourges and Le Mans, each of these having double aisles about the apse, with a large clerestory to the inner one of the two, above which rises the great clerestory. This scheme is one of the great feats of Gothic construction. Le Mans again furnished the most highly developed form of chevet planning (fig. 41). On this point Mr Street may again be cited. " It was in the plan- ning of the apse, with its surrounding aisles and chapels, that all their ingenuity and science were displayed. A simple apse is easy enough of construction, but directly it is surrounded by an aisle or aisles, with chapels again beyond them, the difficulties are great. The bays of the circular aisle,

instead of being square, are very much wider on one side than the other,

and it is most difficult to fit the vaulting to the unequal space. In order to get over this, various plans were tried. At Notre Dame, Paris, the vaulting bays were all triangular on plan, so that the points of support might be twice as many on the outside line of the circle as on the inside. But this was rather an unsightly con- trivance, and was not often repeated, though at Bourges there is something of the same sort. At Le Mans the aisle vaulting bays are alternately triangular and square; and this is, perhaps, the best arrangement of all, as the latter are true and square, and none of the lines of the vault are twisted or distorted in the slightest degree. The arrangement of the chapels round the apse was equally varied. Usually they are too crowded in effect; and, perhaps, the most beautiful plan is that of Rouen cathedral, where there are only three chapels with unoccupied bays between, affording much greater relief and variety of lighting than the commoner plan which provided a chapel to every bay. The planning and design of the chevet is the great glory of the French medieval school. When the same thing was attempted, as at Westminster, or by the Germans at Cologne, it was evidently a copy, and usually an inferior copy, of French work. No English works led up to Westminster Abbey, and no_ German works to the cathedral at Cologne."

Fig. 40. — Plan of Cathedral at Amiens.

The variety in the planning of the chevets must be remarked. There might be only one chapel opening from the semicircular ambulatory, as at Langres, Sens, Auxerre, Bayeux and Lausanne. Canterbury cathedral, designed by William of Sens, is perhaps the most perfect example. There were three separated chapels, as at Rouen, St Omer, Semur, &c, or there might be five filling the whole space, which became the general later scheme. Chartres furnishes an intermediate plan, in having the alternate chapels much shallower than the others. The chapels might be circular or polygonal or alternately square and round. Of the last the cathedral of Toledo is a wonderful example. The plan with parallel apses also continued in use, as at the beautiful abbey church at Dijon and St Urbain at Troyes. Apsidal transepts were built at Noyon, Soissons and Valenciennes.

Another stage of development was reached with the building of the Sainte Chapelle in Paris, begun in 1244. With this work the Gothic system reached complete maturity. Here for the first time large traceried windows seem to have been perfected, and, moreover, the structure was so organized

into a series of wide window spaces, only divided by strong far-projecting buttress piers, that the stained glass ideal found full expression and the building became a lantern for its display.

During the next half-century the influence of the Sainte Chapelle is to be traced everywhere, and its system of construction was developed to the furthest possible point in St Urbain at Troyes, begun in 1260. Exploration of the Gothic theory of structure could be carried no further. From this point the style turned in on

Fig. 41. — Cathedral of Le Mans. East end and Chevet.

itself, becoming more unreasonably intricate, artificial and manner- ized. One of the finest examples of the style of the early 14th century is the eastern limb of St Ouen, Rouen; Troyes cathedral is also an important example of later work. As Mr Street says: " Later French architecture ran a very similar course to that in England. The 13th century was that in which it was seen at its best. In the 14th the same sort of change took place as elsewhere; and art was beautiful, but it was too much an evidence of skilf ulness and adroit- ness. It was harder and colder also than English work of the same age; and when it fell, it did so before the inroads of a taste for what has been called Flamboyant architecture, — a gay and meretricious style which trusted to ornament for all its effect, and, in spite of many beauties, had none of the sturdy magnificence of much of our English Perpendicular style."

M. Enlart has recently accepted the view that the germs of flamboyancy in the later French Gothic are to be found in the flowing curvilinear forms of early 14th-century work in England.

Up to the middle of the 16th century, magnificent works in the national style were still being executed. St Vulfran at Abbeville, St Maclou in Rouen, and the facade of the cathedral of Rouen, may be mentioned ; some of the last works were the immense transepts of Beauvais cathedral and the facade of Tours.

We have necessarily spoken most of churches, but the palaces, castles and civic buildings form another great class hardly less interesting. The castles of Coucy and Chateau Gaillard may rival any cathedral. Among civic buildings may be mentioned the palais de justice at Rouen and the h6tel de ville at Compiegne, both late but beautiful and impressive types. The royal palace of Paris is now represented by the Sainte Chapelle, but accounts of its splendid hall and general arrangements have been preserved. At Poitiers is still extant the hall of the palace of the counts of Poitou; at Laon the episcopal palace is almost entire ; there are considerable remains of the

bishops' palaces of Beauvais, Evreux, Rouen, Reims: and the pope's palace at Avignon must also be mentioned in this connexion.

The most perfect existing great houses of the middle ages are those of Jacques Cceur at Bourges and of the abbot of Cluny in Paris. A large number of fine houses on a small scale, dating from the 12th and 13th centuries, are still preserved at Beauvais, Auxerre, Chartres, Cordes, &c. The house of the musicians at Reims, c. 1280, is adorned by a series of seated life-sized figures playing instruments, in sculpture of a very high order. A good and concise account of the smaller houses in France is given in Hudson Turner's Some Account of Domestic Architecture, and in C. Enlart's Manuel d'archeologie, the best and most recent survey of the whole field of medieval antiquities in France. (W. R. L.)

Romanesque and Gothic Architecture in Spain What strikes the architectural student most forcibly in Spain is the concurrent existence of two schools of art during the best part of the middle ages. The Moors invaded Spain in 711, and were not finally expelled from Granada until 1492. During the whole of this period they were engaged, with more or less success, in contests for superiority with the Christian natives. In those portions of the country which they held longest, and with the firmest hand, they enforced their own customs and taste in art almost to the exclusion of all other work. Where their rule was not permanent their artistic influence was still felt, and even beyond what were ever the boundaries of their dominion, there are still to be seen in Gothic buildings some traces of acquaint- ance with Arabic art not seen elsewhere in Europe, with the exception, perhaps, of the southern part of the Italian peninsula, and there differing much in its development. The mosque of Cordova in the 9th century, the Alcazar and Giralda at Seville in the 13th, the Court of Lions in the Alhambra in the 14th, several houses in Toledo in the 15th century, are examples of what the Moors were building during the period of the middle ages in which the best Gothic buildings were being erected. Some portions of Spain were never conquered by the Moors. These were the greater part of Aragon, Navarre, Asturias, Biscay and the northern portion of Galicia. Toledo was retaken by the Christians in 1085, Tarragona in 1089, Saragossa in n 18, Lerida in 1 149, Valencia in 1238 and Seville in 1248. In the districts occupied by the Moors Gothic architecture had no natural growth, whilst even in those which were not held by them the arts of war were of necessity so much more thought of than those of peace, that the services of foreign architects were made use of to an extent unequalled in any other part of Europe.

Of early Christian buildings erected from the 9th to the nth century remains of some twenty to thirty are known, and there are probably others which will be found when the communications in the country become more

extended. The most interesting of these is Santa Maria de Naranco near Oviedo, originally built in 848 as part of a palace. It consisted of a rectangular hall, 42 ft. long and 16 ft. wide, with entrance doorways in the centre of each side, and at each end an arcade of three arches, carried on piers and coupled columns, which led to an open loggia from which the hall was lighted. Fifty to sixty years later it was converted into a church by blocking up the end of the east loggia. The church is remarkable for its barrel vault, built in fine masonry, and for the knowledge that is displayed in meeting its thrust. Internally, in order to lessen the span, the upper part of the walls is brought forward and carried on a series of arches on each side, which are supported on piers consisting of four coupled columns, virtually constituting an interior abutment. Externally, the thrust is met by buttresses, features not found in France until about a century and a half later. All the columns are spiral-fluted, and a twisted-cord torus-moulding decorates the capitals and other features in the church. The transverse ribs of the hall, which are of slight projection, are carried on broad bands with disks in the spandrils of the arches, the disks having badges in the centre, and being bordered, as well as the bands, with twisted cords. Underneath the church is a spacious vaulted crypt, which was built as a cellar or basement storey, to raise and give more importance to the palace. The twisted cord seems to have been a favourite device in all the early churches, and is extensively employed in the decoration of San Miguel de Lino, a small church about a quarter of a mile from Santa Maria de Naranco and coeval with that church. Externally the church of San Miguel has all the character of a Byzantine church ; the windows in the front are pierced with Moorish tracery, probably brought there by those Christians who were flying to the sanctuaries of Asturias from the incursions of the Moors. In another church, about 15 m. south of Oviedo, Santa Christina de Leon, all the attached staffs are decorated with spiral fluting. The choir is raised, and approached by steps on either side through a screen of three arches, of the type known as Transennae in the earlier Christian of Rome. Here, as

in Santa Maria de Naranco, the church is covered with a barrel vault with similar constructive and decorative features. Externally the buttresses are in great profusion, there being two to each bay. The screen, the pierced marble slabs between the columns carrying it, and the decoration of the capitals, all show Byzantine influence. Other early churches are those of San Pablo del Campo (930) and San Pedro de las Puellas, both in

Barcelona, the fine church at the village of Priesca near Villaviciosa (915), the monastery of Valdedios (893) and that of San Salvador (1218), in which, notwithstanding its late date, there is a distinct Moorish influence. This influence is also to be noticed in the north of Spain, although it was never occupied by the Moors. Thus in the earliest church known, at Banos de Cerrato near Palencia (founded in 662, but restored in 711), there is a horse-shoe barrel vault over the square apse. Again in San Miguel de Escalada (913) near Leon, there are horse-shoe arches in the nave, and the three apses are horse-shoe on plan. San Pedro at Zamora is a vaulted church with horse-shoe arches in the nave, but otherwise Byzantine in style. In the church of Corpus Christi at Segovia the nave is Moorish in style, and the octagonal columns of the nave have capitals with fir cones, as in the well-known Santa Maria la Blanca at Toledo, originally a synagogue. The most remarkable church of all, so far as Moorish style is concerned, is the church of the monastery of Santiago de Penalva, near Villafranca del Vierzo, built between 931 and 951, and therefore coeval 'with Cordova. The church is 40 ft. long by 20 ft. wide, covered by a barrel vault with transverse horse-shoe arch in the centre carrying the same. At each end is an apse with horse-shoe arches carried on marble shafts with Byzantine capitals. Though of later date, there is another interesting Romanesque example in the Templars' church of La Vera Cruz at Segovia (1204), which is twelve-sided with three apses, and in the centre has a chapel built in imitation of the Holy Sepulchre at Jerusalem.

The buildings which come next in point of date are all evidently derived from or erected by the architects of those which were at the time being built in the south of France. These churches are uniform in plan, with central lanterns and three eastern apses. The nave has usually a waggon or barrel vault, supported by quadrant vaults in the aisles, and the steeples are frequently polygonal in plan. If these churches are compared with examples like that of the cathedral at Carcassonne on the other side of the Pyrenees, their identity in style will at once be seen. A still more remarkable evidence of similarity has been pointed out between the church of St Sernin, Toulouse, and the cathedral of Santiago. The plan, proportions and general design of the two churches are identical. Here we see a noble ground-plan, consisting of nave with aisles, transepts, central lantern and chevet, consisting of an apsidal choir, with a surrounding aisle and chapels opening into it at intervals. This example is the more remarkable, inasmuch as the early Spanish architects very rarely built a regular chevel, and almost always pre- ferred the simpler plan of apsidal chapels on either side of the choir. And its magnificent scale and perfect preservation to the present day combine to make it one of the most interesting architectural relics in the country.

Among the more remarkable buildings of the 12th and the begin- ning ci

the 13th century are San Isidoro, Leon; San Vicente, Avila; several churches in Segovia; and the old cathedral at Lerida. They are much more uniform in character than are the churches of the same period in the various provinces of France, and the developments in style, where they are seen at all, seldom have much appearance of being natural local developments. This, indeed, is the most marked feature of Spanish architecture in all periods of its history. In such a country it might have been expected that many interesting local developments would have been seen; but of these there are but one or two that deserve notice. One of them is illus- trated admirably in the church of San Millan, Segovia, where beyond the aisles of the nave are open cloisters or aisles arcaded on the outside, and opening by doors into the aisles of the nave. A similar external south portico exists in San Miguel de Escalada, already referred to, Santo Domingo, Burgos, and San Esteban at Segovia. It would be difficult to devise a more charming arrange- ment for buildings in a hot country, whilst at the same time the architectural effect is in the highest degree beautiful. The uni- versality of the central tower and lantern has been already men- tioned. This was often polygonal, and its use led to the erection of some lanterns or domes of almost unique beauty and interest. The old cathedral at Salamanca, the church at Toro and the cathedral of Zamora, all deserve most careful study on this score. Their lanterns are almost too lofty in proportion to be properly called domes, and yet their treatment inside and outside suggests a very beautiful form of raised dome. They are carried on pointed arches, and are circular in plan internally and octagonal on the exterior, the angles of the octagon being filled with large turrets, which add much to the beauty of the design, and greatly also to its strength. Between the supporting arches and the vault there are, at Salamanca, two tiers of arcades continued all round the lantern, the lower one pierced with four, and the upper with twelve lights, and the vault or dome is decorated with ribs radiating from the centre. On the exterior the effect is rather that of a low steeple covered with a stone roof with spherical sides than of a dome, but the design is so novel and so suggestive, that it is well worth detailed description. Nothing

can be more happy than the way in which the light is admitted, whilst it is also to be noted that the whole work is of stone, and that there is nothing in the design but what is essentially permanent and monumental in construction. The only other Spanish develop- ment is the introduction, to a very moderate extent, of features derived from the practice of the Moorish architects. This is, how- ever, much less seen than might have been expected, and is usually confined to some small feature of detail, such, e.g. as the carving of a boss, or the filling in of small tracery in circular windows, where it would in no way clash with the generally Christian character of the art.

The debateable period of transition which is usually so interesting is very sterile in Spain. A good model once adopted from the French was adhered to with but little modification, and it was not till the 13th-century style was well established in France and England that any introduction of its features is seen here; and then, again, it is the work of foreign architects imported for the work and occasion, bringing with them a fully developed style to which nothing whatever in Spain itself led up by a natural or evident development. The three great Spanish churches of this period are the cathedrals of Toledo, Leon and Burgos (Plate II., fig. 65). Those of Siguenza, Lerida and Tarragona, fine as they are, illustrate the art of the 12th rather than of the 13th century, but these three great churches are perfect Early Pointed works, and most complete in all their parts. The cathedral of Toledo is one of the most nobly designed churches in Europe. In dimensions it is surpassed only by the cathedrals of Milan and Seville, whilst in beauty of plan it leaves both those great churches far behind. The chevet, in which two broad aisles are carried round the apse with chapels alternately square and apsidal opening out of them, is perhaps the most perfect of all the schemes we know. It is as if the French chevets, all of which were more or less tentative in their plan, had culminated in this grand work to which they had led the way. The architectural detail of this great church is generally on a par with the beauty and grandeur of its plan, but is perhaps surpassed by the somewhat later church at Leon. Here we have a church built by architects whose sole idea was the erection of a building with as few and small points of support as possible, and with the largest possible amount of window opening. It was the work of men whose art had been formed in a country where as much sun and light as possible were necessary, and is quite unsuited for such a country as Spain. Nevertheless it is a building of rare beauty and delicacy of design. Burgos, better known than either of the others, is inferior in scale and interest, and its character has been much altered by added works more or less Rococo in character, so that it is only by analysis and investigation that the 13th-century church is still seen under and behind the more modern excrescences.

The next period is again marked by work which seems to be that of foreigners. The fully developed Middle Pointed or Geometrical Gothic is indeed very uniform all over Europe. Here, however, its efforts were neither grand in scale nor interesting. Some of the church furniture, as, e.g. the choir screens at Toledo, and some of the cloisters, are among the best features. The work is all correct, tame and academical, and has none of the dignity, power and interest which marked the earlier Spanish buildings. Towards the end of the 14th century the work of Spanish architects becomes infinitely more interesting. The country was free from trouble with the Moors; it was rich and prosperous, and certainly its buildings at this

period were so numerous, so grand and so original, that they cannot be too much praised. Moreover, they were carefully designed to suit the requirements of the climate, and also with a sole view to the accommodation conveniently of enormous congregations, all within sight of the preacher or the altar. This last development seems to have been very much the work of a great architect of Majorca, Jayme Fabre by name. The grandest works of his school are still to be seen in Catalonia. Their churches are so vast in their dimensions that the largest French and English buildings seem to be small by comparison, and being invariably covered with stone vaults, they cannot be compared to the great wooden-roofed churches of the preaching orders in Italy and elsewhere, in which the only approach is made to their magnificent dimensions. The cathedral of Gerona is the most remarkable example. Here the choir is planned like the French chevet with an aisle and chapels round it, arid opens with three lofty arches into the east wall of a nave which measures no less than 73 ft. in the clear, and is covered with a stone vaulted ceiling. In Barcelona there are several churches of very similar description; at Manresa another, but with aisles to its nave; and at Palma in Majorca one of the same plan as the last, but of even much larger dimensions. Perhaps there is no effort of any local school of architects more worthy of study and respect than this Catalonian work of the 14th and 15th centuries. Such a happy combination of noble design and proportions with entirely practical objects places its author among the very greatest architects of any time. It is one thing to develop patiently step by step from the work of one's fathers in art, quite another to strike out an entirely new form by a new combination of the old elements. In comparison with the works just mentioned the other great Spanish churches of the 15th century are uninteresting. But still their scale is grand and though their detail is over-elaborated and not beautiful, it is impossible to deny the superb effect of the interior of such churches as those of Seville, Segovia and Salamanca (new cathedral). They

ARCHITECTURE

Plate V.

Photo, A linari.

Fig. 72— DOOR OF SAN MICHELE, PAVIA.

Photo, Lacoste,

Fig. 73.— UNIVERSITY, SALAMANCA.

Fig. 74.— TOWN HALL, SEVILLE.

PlAIE VI.

Photo, F. Frith & Co.

Fig. 76. -WOLLATON HALL.

UMoujui

Fig. 77— HAMPTON COURT.

are very similar in their character, their columns are formed by the prolongation of the reedy mouldings of the arches, their window traceries are poorly designed, and their roofs are covered with a complex multitude of lierne ribs. Yet the scale is fine, the admission of light, generally high up and in sparing quantity, is artistic, and much of the furniture is either picturesque or interesting. The tout ensemble is generally very striking, even where the architectural purist is apt to grumble at the shortcomings of most of the detail.

The remarks which have been made so far have been confined to the fabrics of the churches of Spain. It would be easy to add largely to them by reference to the furniture which still so often adorns them, unaltered even if uncared for; to the monuments of the mighty dead ; to the sculpture which frequently adorns the doorways and screens; and to the cloisters, chapter-houses and other dependent buildings, which add so much charm in every way to them. Besides this, there are very numerous castles, often planned on the grandest scale, and some, if not very many, interesting remains of domestic houses and palaces; and most of these, being to some extent flavoured by the neighbourhood of Moorish architects, have more character of their own than has been accorded to the churches. Finally, there are considerable tracts of country in which brick was the only material used ; and it is curious that this is almost always more or less Moorish in the character of its detail. The Moors were great brickmakers. Their elaborate reticulated enrichments were easily executed in it, and the example set by them was, of course, more likely to be followed by Spaniards than that of the nearest French brick building district in the region of Toulouse. The brick towers are often very picturesque ; several are to be seen at Toledo, others at Saragossa, and, perhaps the most graceful of all, in the old city of Tarazona in Aragon, where the proportions are extremely lofty, the face of the walls everywhere adorned with sunk panels, arcading, or ornamental

brickwork, and at the base there is a bold battered slope which gives a great air of strength and stability to the whole. On the whole, it must be concluded that the medieval architecture of Spain from the 12th century is of less interest than that of most other countries, because its development was hardly ever a national one. The architects were imported at one time from France, at another from the Low Countries, and they brought with them all their own local fashions, and carried them into execution in the strictest manner; and it was not till the end of the 14th century, and even then only in Catalonia, that any build- ings which could be called really Spanish in their character were erected. (R. P. S.)

Romanesque and Gothic Architecture in England

Pre-Conquest. — The. history of English architecture before the Norman Conquest is still only imperfectly known. Its parentage is triple; Roman, Celtic and Teutonic. To the first belongs the general building tradition of the Romanized West, and the influ- ence of the mission of Augustine at the end of the 6th century, and of such men as Wilfrid in the 7th. The Celtic element is due to the Scottish (Irish) church, which never gained much hold on the south of England, while the Teutonic influence shows itself in the later developments, which are allied to the early buildings of kindred peoples in Germany. Fragments of existing early churches have been attributed to the time of the Roman occupation, but all are doubtful, with the exception of the remains of what is believed to have been a Christian church excavated at Silchester in 1892. This was a basilica of ordinary form, comprising an apse with western orientation, nave and aisles, transepts of slight projection, and narthex. Augustine's cathedral church of Canterbury, which he had learned ' was originally constructed by the labours of Roman believers (Bede), was also a basilica with western apse; its eastern apse and confessio beneath were probably a later addition. Remains of early churches are found on several sites where churches are recorded to have been built during the missionary period. Of these, Reculver (c. 670) and Brixworth (c. 680) have aisled naves and eastern apses. At Brixworth a square bay intervenes between the apse and the nave. St Pancras, Canterbury, of the time of Augustine, Rochester (604), and Lyminge (founded 633). show unaisled naves of relatively wide proportion, with eastern apses of stilted curve. In some of these churches there was a triple arcade in front of the sanctuary,, in place of the usual " triumphal arch." The technique shows Roman influence, and Roman materials are largely used. The existing crypts of Hexham and Ripon were built by Wilfrid, c. 675. The descrip- tion of Wilfrid's church at Hexham gives the impression of an elaborate structure (columnis variis et porticibus multis suffultam) . Wilfrid also built at Hexham a church of central plan, with

projections (porticus) on the four sides, a type of which no example has survived in England. Escomb (Durham) and parts of Monkwearmouth and Jarrow, which are attributed to the same period, have plans of an entirely different type — a relatively long and narrow nave, with small square-ended chancel — a plan, usually attributed to Celtic influence, which is most extensively represented in churches recognized as Saxon.

The evolution of the characteristic features of pre-Conquest architecture was slow, and was doubtless greatly hindered by the invasions of the Northmen from the end of the 8th century onward, but germs of the fully developed style are to be found in the earliest buildings. The western tower, usually of tall and slender proportion, was developed from the western porch found at St Pancras, Canter- bury, and Monkwearmouth ; sometimes, as in the latter church, actually raised over the older porch. The lateral chapels of St Pancras, which existed also in the Saxon cathedral of Canterbury, were developed into a transept, culminating in the cruciform plan with central tower. The characteristic " long-and-short " work, which consists of tall upright stones alternating with stones bedded flat bonding into the rubble work of the wall, has its prototype in the western arch of the porch of Monkwearmouth, and in the jambs of the chancel arch at Escomb. Sometimes the flat stones are cut back on the face, so that the plaster which covered the rubble extended up to the line of the upright stones, thus giving the quoin the appearance of a narrow pilaster. The repetition of these pilasters on the face of the walling constitutes rib-work, and these ribs are frequently connected by semicircular or so-called " triangular " arches, forming a kind of rude arcading (Earls Barton, Barton-on- Humber.) Windows in the earliest Saxon work are generally wide in proportion, and splayed on the inside only ; in the later work they commonly have splays both on the inside and outside. Doorways have square jambs, without splay or rebate; sometimes the jambs of doorways and windows are inclined, as in early buildings in Ireland. Imposts to doorways, tower arches or chancel arches are often square projecting blocks, sometimes chamfered on the lower edge. The mid-wall shaft is a characteristic feature in the belfry openings of Saxon towers; it supports an impost or through-stone, of the full thickness of the wall, which receives the semicircular arches over the openings. The method is analogous to that commonly found in northern Italy and the Rhineland. Sometimes the mid-wall shaft is a baluster, turned in a lathe. In some of the later belfry openings, a capital intervenes between the mid-wall shaft and the impost. The dating of buildings of this style is at present a matter of con- siderable difficulty, but certain points, such as the development of the cruciform plan, are useful for comparison. A fully developed cross church was built at Romsey in 969, having also a single axial western tower, and this seems to have been the normal type of a large church in the later years of the style. Cruciform plans, not yet fully

developed, are found at Deerhurst, Breamore and St Mary in the castle at Dover, and fully developed at Norton (Durham) and Stow (Lincolnshire). The most advanced detail which occurs in pre-Conquest buildings is the recessing of arches in orders. But for the Conquest, English architecture might have developed some- what, on the lines of contemporary work in Germany. It must be remembered, however, that, although the Norman Conquest marks the beginning of a new epoch in English architecture, the Norman manner had already been introduced into England under Edward the Confessor, as is proved by the considerable remains of that king's work at Westminster Abbey.

The succeeding periods of English architecture have been divided into so-called "styles" or "periods," though it should be recognized that all such hard and fast divisions are purely artificial, and that, apart from the objection that they exaggerate the importance of mere details, they tend to obscure the fact that the history of Gothic architecture is a history of continuous development. The following classifications, those of Thomas Rickman and Edmund Sharpe, are in most general use for the present by such students as are not content with a nomenclature based on simple chronology: —

Rickman. Sharpe.

1066-1189 Norman. 1066-1145 Norman.

1145-1190 Transitional.

1189-1307 Early English. 1190-1245 Lancet.

1245-1315 Geometrical.

1307-1377 Decorated. 1315-1360 Curvilinear.

1377-1546 Perpendicular. 1360-1550 Rectilinear.

Norman Conquest to c. 11 50. — At the time of the Conquest of England, the Norman school was already one of the most ad- vanced Romanesque schools of western Europe. Its marked individuality and logical character are clearly expressed in the abbey churches of Jumieges and St Etienne and Sainte-Trinite at Caen, and it quickly supplanted the less advanced Romanesque

manner of the conquered English. As soon as the conqueror had made himself master in his new kingdom, cathedral and abbey churches were rebuilt on a scale hitherto unknown either in Normandy or England. As the effect of the Norman Conquest was to incorporate the church in England more closely with western Christendom, so its effect on architecture was to bring it into line with the best continental achievement of its time. The immense energy of the Norman bishops and abbots gave such a stimulus to architecture that by the close of the nth century, England, rather than Normandy, had become the real foyer of the Norman school.

The plans of the larger churches show greater development in the length of choir, transept and nave than was usual in Normandy. Many follow the type of choir plan generally represented in the contemporary churches of Normandy which have survived — a central apse, flanked by an apse terminating each aisle, but the two bays usual in the Norman churches frequently became four in England. The Confessor's church of Westminster seems to have had an ambulatory with radiating chapels, a plan which, although rare in the surviving churches of Normandy, was adopted in several of the more important English churches (St Augustine's, Canterbury ; Winchester; Worcester; Gloucester; Bury St Edmunds; Norwich; Tewkesbury). Some of these have great vaulted crypts extending under the choir and its aisles. The transept, generally of consider- able length, has one or more apsidal chapels on the east side of each arm, or an eastern aisle, or even (as at Winchester and Ely) both eastern and western aisles. The lantern-towes over the crossing was a characteristic feature in England, as in Normandy. Frequently the nave was of great length, extending to twelve bays at Winchester, thirteen at Ely, and fourteen at Norwich. Some churches, as Ely, Bury St Edmunds, and later Peterborough (Plate VIII., fig. 81), show a western transept, with corresponding development of the west front. Two western towers are most usual, but Ely (Plate II., fig. 67), and, originally Winchester, had the single western tower, a survival from pre-Conquest times, which is found also in number- less parish churches. In their general design, the Norman churches show great skill in composition, and in the logical expression of structure, and sure grasp of the problems to be solved. The sub- ordination of arches (arches built in rings, or orders, recessed one within the other) was carried further than in other Romanesque schools, and with this went the subordination of the pier, planned with a shaft to receive each order of the semicircular arch. Sometimes the shafted piers of the great arcades alternate with cylindrical (or later with octagonal) pillars; sometimes, as at Gloucester and Tewkesbury, all the pillars are cylindrical. The triforium usually has a single wide semicircular arched opening, enclosing two or more minor semicircular arches springing from detached shafts. Usually the aisle wall is carried up

to form a complete triforium storey, unvaulted, and Jighted by windows in the outer wall. The clerestory has a single window in each bay, with a wall passage between the window and an internal arcade, usually of three semicircular arches on shafts, the central arch being wider than the side arches. Most frequently naves and transepts were unvaulted, and finished with wood ceilings, while the aisles were covered with groined vaults of rubble, on transverse arches. The general design of the greater churches indicates, however, that the Norman builders were aiming at a completely vaulted structure. The half-barrel vault over the triforium of Gloucester, and the transverse arches over the triforium of Chichester, seem to be constructed to afford the necessary abut- ment to vaults over the choir, such indeed as still exist over some choirs in Normandy built before the end of the nth century. The problem was only successfully solved by the introduction of the diagonal rib, which completed the structural membering of the vault. Durham, begun in 1093 (n g- 4 2)> is the earliest example in England of this important innovation, and it precedes by some quarter of a century the earliest ribbed vaults of the lle-de-France. The abutting arches under the roof of its triforium are actually rudimentary flying- buttresses, and we have here all the essential elements of Gothic architecture, except the pointed arch, which is only systematically used in h-nglish vaulted construction from about the middle of the 1 2th century. The decorative forms of the earlier buildings of the Norman school are severely simple. Arches, which at first were usually unmoulded, soon received effective mouldings of rolls and hollows, continuing a tradition of the latest pre-Conquest architec- ture. Two types of capitals are found in the earlier buildings after the Conquest ; the volute capital, descended from the Corinthian, which was the normal type in Normandy; and the cubic or cushion capital, formed by the penetration of a segment of a sphere, or segments of cones, with a cube, a type which, appearing earlier in England than in Normandy, was doubtless derived from pre-Conquest models, and in the 12th century developed into the scalloped capital. The decoration of wall-surfaces by arcades, frequently of inter- secting semicircular arches, is characteristic of the Norman school. Windows are splayed in the interior, and in the more important buildings are enriched with shafts and moulded arches. Ornamenta- tion is frequently concentrated on the doorways, which are often of many orders, with a shaft under each order. Based chiefly on

geometric forms, such as the chevron or zigzag, star, fret and cable, the decoration becomes richer and more refined as the 12th century advances, though in sculpture the Norman was less advanced than some other Romanesque schools.

The foregoing generalization applies more particularly to the greater churches, but numberless parish churches present similar characteristics. Chancels are sometimes apsidal, but by far the most prevalent type of plan

is the aisleless oblong nave and square-ended

Scale of Feet

3 10 20304050 607080′

From Rickman's Styles oj Architecture, by permission of Parker & Co. Fig. 42. — Plan of Durham Cathedral.

chancel, with or without a western tower. Other types of aisleless plans are the cruciform church with central tower, or simply nave and chancel with central tower. Even where subsequent alterations and rebuildings have destroyed almost everything, the influence of these plans on the later work is the key to a right understanding of the history of the greater number of English medieval churches.

12th Century {second half) . — The second half of the 1 2th century is the period of transition par excellence — of transition from Romanesque to Gothic. The school of the lle-de-France, which up to c. 11 20 was one of the most backward of the Romanesque schools, had made enormous progress when the ambulatory of Suger's church of Saint-Denis was built (1 140-1 144), and thence- forth it continued to lead the way. There is no doubt that, from the middle of the 12th century, English architecture was continuously influenced by the lle-de-France, for the most part through Normandy, but it must be considered to be a develop- ment on parallel lines, with strongly marked characteristics of its own, and not merely as an importation of forms already developed elsewhere. At the same time, the influence of the Cistercian revival was considerable, not so much in the introduc- tion of foreign forms as in the direction of simplicity and severity, which acted as a valuable check to the prevalent tendency to exaggerate the importance of surface decoration.

The substitution of the square east-end for the apse in the plans of the greater churches, already effected at Romsey, was furthered by the simple plans of the Cistercian churches. The altar spaces pro- vided by the radiating chapels of the French chevet were in England obtained by returning the aisles across the square east-end of the choir, or by an eastern tra rssect. The latter occurs first here in

" the glorious choir of Conrad " of the beginning of the 12th century at

Canterbury, which affords also the first example of the eastward extension of the choir, which became so characteristic a feature of English planning. The reconstruction of Conrad's choir after the fire of 1 1 74 led to a further extension eastward, with the eastern chapel, which was adopted in many of the greater churches, either in the form of a lower building, sometimes of three spans, eastward of the east gable, or of an extension of the choir itself to its full height. The work of William of Sens at Canterbury(ii75-ii78)was naturally more French in character than other contemporary works in England, but the work of his successor, William the Englishman (1179-1184), shows the beginnings of what became the characteristically English manner of the 13th century.

The second half of the 12th century was a period of rapid develop- ment of architectural forms in the direction of increased elegance and refinement. The pointed arch, employed at first for the arches of construction, entirely superseded the semicircular arch in doorways, windows and arcades by the end of the century, and its adoption finally solved the problem of vaulted construction. The abutting arches under the triforium roofs of the earlier churches were developed into flying buttresses above the roofs, springing from buttresses of increased projection, and weighted by pinnacles. Mouldings became more graceful and subtle in their profiles. Capitals reverted to the volute type, transformed and refined. The massive Romanesque pier was gradually developed into the lighter Gothic pier, in which detached shafts were extensively adopted. The use of Purbeck marble for these shafts must be considered in relation to the painted decoration of the wall-surfaces, which, although now almost entirely lost, was an important factor in the internal effect.

ijth Century (first half). — The last decade of the 12th century marks the achievement of a fully developed Gothic style, with strongly marked national individuality. During the 13th century, English Gothic follows the same general course of evolution as that of northern France, but the parallelism is less close than in the preceding century.

St Hugh's choir at Lincoln (begun 1192) had indeed an apse, with ambulatory and radiating chapels, though its plan does not appear to have been controlled by the vaulting as in the French chevets, and what there is of French influence seems to have come rather through Canterbury than by a more direct route. This choir has the eastern transept which characterizes several of the greater churches of the first half of the 13th century — Salisbury (fig. 43), Beverley, Worcester, Rochester, Southwell. The square eastern termination, the less ambitious height, and the comparatively simple buttress- system, combine to give the English Gothic cathedral an air of greater repose than is found in the magnificent triumphs of French Gothic art. In its structural system, too, English Gothic retained something

of the Romanesque treatment of wall-surface; the sup- pression of the wall, and the concentration of the masonry in the pier, was never carried so far as in the complete Gothic of France. The general tendency during the 13th century, as in the 12th, was in the direction of increased lightness and elegance. The employ- ment of detached shafts, and the extensive use of marble (generally Purbeck) for these shafts, is a distinguishing feature of the first half of the century. The vaulting system is fully developed; the most usual form is the simple quadripartite, but the tendency to introduce additional ribs (tiercerons) and ridge-ribs already makes its appear- ance in the nave of Lincoln and the presbytery of Ely (Plate VIII., fig. 82), to be yet further developed in the second half of the century. Capitals are cither simply moulded, an elaboration of the plain bell capitals of the latter part of the 12th century, or finely sculptured, with conventional, or "stiff-leaved," foliage of the crocket type. The use of the circular abacus, begun in the preceding century, entirely supersedes the square abacus, which was retained in France. Mouldings are profiled with great refinement, the alternation of rounds and hollows producing effective contrasts of light and shade, and the far more complicated profiles of arch mouldings provide another feature which distinguishes English work of this period from French. Windows of single pointed lights, the so-called " lancet," though frequently by no means sharply pointed, are the prevalent type, grouped in pairs, triplets, &c, and arranged in tiers in the large gables, or sometimes with only a single group of tall lights, like the " five sisters " of the north transept of York. Few works are more admirably designed than some of the towers of this period. Probably the greatest excellence ever attained in English art of the 13th century was reached in the great Yorkshire abbeys; for purity of general design, excellence of construction, and beauty of detail, they are unsurpassed by the work of any other period.

13th Century (second half) . — The grouping together of " lancet" windows, the piercing of the wall above them with foiled circles, and the combination of the whole under an enclosing arch, soon led to the introduction of tracery, for which the design of earlier triforium arcades had also afforded a suggestion.

Bar-tracery appears just before the middle of the 13th century, and the great tracery window filling the whole width of a bay, or

the entire gable-end, soon becomes a most characteristic feature. The earlier tracery windows show only simple geometrical forms, foiled arches to the heads of the lights, and foiled circles above, of which the abbey-church and the chapter-houses of Westminster and Salisbury afford most beautiful examples. In some particulars, such as its chevet plan and its comparatively great height, West- minster approaches more nearly to the French type than other English churches of the 13th century, but its details

are character- istically English and of great beauty. In the last quarter of the century, pointed trefoils or quatrefoils are largely used in tracery, and the foliations frequently form the lines of the tracery, without enclosing circles. Contemporary with this change is the gradual

ir

Fig. 43. — Plan of Salisbury Cathedral.

absorption of the triforium into the clerestory, of which Southwell and Pershore are precocious examples. Contemporary also was the adoption of an excessively naturalistic type of foliage. The art of masonry and stone-cutting was rapidly developed. The detached shaft, always structurally weak, was abandoned for the pier with engaged shafts separated by mouldings. The mouldings of arches become less deeply undercut, and the greater use of the fillet tends to give a more liney effect. The whole practice of art was growing more scholarly, perhaps, but at trie same time it was more conscious, and the cleverness of the mason was almost as often suggested as the noble character of his work.

14th Century (first half). — The juxtaposition of the foliations without enclosing circles in tracery windows produced curves of contraflexure, which led insensibly to the complete substitu- tion of flowing lines for geometrical forms in tracery.

Flowing tracery makes its appearance in England about 13 10, and lasts some fifty years. Up to the end of the 13th century, window tracery had developed in France and England on parallel lines, though the English work was always slightly behind France in point of date. All this is changed with the adoption of flowing tracery in England ; its development was purely national, and owed nothing to France. Indeed, the French flamboyant only makes its appearance at the time when flowing tracery was being abandoned in England. Not only window traceries, but mouldings, carvings and other details are changed in character. The ogee form is used in arches, in wall-arcades of great beauty and elaboration, as in the Lady-chapel at Ely, and in the canopies of tombs, such as the magnificent Percy tomb at Beverley. Niches and arcades are richly ornamented, and small decorative buttresses are used in the jambs of doorways, windows and niches. The moulded capital is still used, along with the capital with a continuous convex band of wavy foliage. Many of the most beautiful English towers and spires date from this period, the work of which is perhaps seen at its best in the parish churches of south Lincolnshire.

[SCOTTISH AND IRISH

From Middle of 14th Century. — The over-elaboration of flowing tracery inevitably led to a reaction. The beauty of the lines of the tracery had controlled everything, and the resulting forms of the openings, which presented serious difficulties for the glass painter, had been a secondary consideration. Hence an endeav- our to return to a simpler and more dignified, if more mechanical, style of building. The splendid exuberance of the earlier 14th century style gave way to the introduction of vigorous, straight, vertical and horizontal lines.

The beginnings of the new manner are to be seen in the south transept of Gloucester before 1337. After the great interruption of building works caused by the Black Death of 1349 and its recurrence in following years, the so-called " Perpendicular " style became general all over the country. The preference for straight in place of flowing lines became more and more developed. Doorways and arches were enclosed within well-defined square outlines; walls were decorated by panelling in rectangular divisions; vertical lines were emphasized by the addition of pinnacles, and buttresses were used as mere decorations, while horizontal lines were multiplied in string-courses, parapets and window transoms. Capitals were fre- quently omitted, and the mouldings of arches were continued down the piers. The use of the depressed " four-centred " arch became common. Vaulting, which had already been enriched by the multiplication of ribs, was further complicated by cross-ribs (liernes), subdividing the simple spaces naturally produced by the inter- section of necessary ribs into panels; these, again, were filled with tracery. The fan-vault was developed by. giving to all the ribs the same curvature; the outline of the fan is bounded by a horizontal circular rib, and its effect is that of a solid of revolution upon whose surface panels are sunk. The cloister of Gloucester presents the earliest and perhaps the most beautiful example. Finally, the builders displayed their mechanical skill by introducing pendants, as in Henry VII. 's chapel at Westminster. This latest period of English Gothic was a purely national development of which it has been too much the fashion to speak disparagingly ; for it is futile to call such works as the nave of Winchester or the choir and Lady-chapel of Gloucester "debased." Perhaps the worst that can be said of this period is that there was too great a love of display, and too much mechanical repetition, but it is none the less true that it is to the 15th century that a very large number of English parish churches owe their fine effect. East Anglia and Somersetshire possess some of the choicest examples, and few things can be more beautiful than the central towers of Gloucester and Canterbury, and the towers of the Somersetshire churches. The open timber roofs, as, for instance, those of the East Anglian churches,

are superb, while many of the churches of this period are still full of interesting furniture and decoration. Finally, a word must be said of the wealth of interesting examples of domestic architecture, which yet count among the ornaments of the country.

After the middle of the 16th century the practice of Gothic archi- tecture virtually died out, though traces of its influence, especially in rural districts, were hardly lost until the end of the 17th century. Good, sound, soiid and simple forms, well constructed by men who respected themselves and their work, and did not build only for the passing hour, were still popular and general, so that the vernacular architecture to a late period was often good and never absolutely uninteresting.

Scotland. — A few words will suffice for Scottish and Irish archi- tecture, since the development in these countries followed much the same course of change as in England.

The earliest ecclesiastical structures which still survive in Scotland follow the same general type as those of Ireland. The monastic foundations of Queen Margaret and her sons introduced into Scotland the Norman manner then universal in England. The best examples, such as the nave of Dunfermline, which is an obvious inspiration from Durham, Kelso of the later 12th century, and the parish churches of Dalmeny and Leuchars, present the same characteristics as are found in English churches of somewhat earlier dates than the buildings in question, and some Romanesque forms survive to a later period than in England. In the 13th century, too, the style of the Scottish churches corresponds very closely with that of England, though the details are generally simpler, and the structures are smaller. It is naturally allied most closely with the north of England, where Cistercian influence in the direction of simplicity and severity had been exercised with the best results. The transept of Dryburgh, the choir and crypt of Glasgow cathedral, the nave of Dunblane, the choir of Brechin, and later Elgin cathedral, exhibit the style at its purest and best. The disturbed condition of the country during the 14th century was unfavourable to architecture, and when building revived at the beginning of the 1 5th century its sty le became more national. During the first half of the 15th century, it shows a certain borrowing from English architecture of the flowing-tracery period. Later, many features are borrowed both from England and France, and architecture develops in picturesque and interesting fashion. Melrose is one of the most characteristic, as it certainly is one of the most charming of Scottish buildings; its earlier parts bQi a close resemblance to the earlier 14th-century work at York,*

while its later parts show more similarity to English " Perpendicular" than is common in Scotland. One of the most characteristic features of Scottish

architecture in the 15th century is the pointed barrel vault, which directly supports the stone flagged roof. French in- fluence is seen in the employment of the polygonal apse for the termination of choirs, and in some approaches to Flamboyant tracery. The details of the later Gothic churches have but slight connexion either with France or England, and show a curious revival of earlier motives. The semicircular arch is in frequent use, and the " nail-head " and " dog-tooth " ornament, as well as the use of detached shafts, are revived. One of the most remarkable buildings of the 15th century in Scotland is the collegiate church of Roslin, which has a pointed barrel vault over its choir, with trans- verse barrel vaults over the aisles, and is distinguished by the extreme richness of its decoration.

The domestic remains in Scotland aj-e full of picturesque beauty and magnificence. They are a distinctly national class of buildings of great solidity, and much was sacrificed by their builders to the genius of the picturesque. They can only be classed with the latest Gothic buildings of other countries, but the mode of design shown in them lasted much later than the late Gothic style did in England. The vast height to which their walls were carried, the picturesque use made of circular towers, the freedom with which buildings were planned at various angles of contact to each other, and the general simplicity of the ordinary wall, are their most distinct characteristics. Ireland.— The chief interest of the medieval architecture of Ireland belongs to the buildings which were erected before the English conquest of the 12th century. The early monastic settle- ments seem to have resembled the primitive Celtic fortresses, and consisted of a series of huts or cells, surrounded by an enclosing wall. The so-called " bee-hive " cell, which goes back to pre-Christian times, was built of rough stone rubble without mortar, and roofed in the same manner by corbelling over the courses of masonry. Some of these were certainly dwellings, but others were oratories. The largest of those in Skellig Michael is four-sided, and from this type the stone-roofed church of oblong plan was developed. The later type, with oblong nave and small square-ended chancel, retained much of the character of these primitive structures, and their barrel vaults were sometimes independent of the stone roof-covering, a system which lasted into the 12th and 13th centuries. A certain megalithic character, and the inclined jambs of doorway openings, are marked features of these early churches. The round towers so frequently associated with them are believed to be not earlier than the 9th century. Before the introduction of Norman forms, Ireland possessed a Romanesque style of her own, characterized by the survival of horizontal forms and their incorporation into the round-arched style, the retention of the inclined jambs of doorways, rich surface decoration, and the use of certain ornamental motives of earlier Celtic origin. King Cormac's chapel at Cashel is one of the best examples of the

imported Norman manner of the 12th century, and here we find much of the influence of the earlier native style. The English conquest may be said to have been the introduction to Ireland of Gothic art, and it was the local variety of western England and south Wales which the conquerors introduced. Among the buildings erected by the English in Ireland, Kilkenny cathedral and the two 13th-century cathedrals of Dublin — Christ Church and St Patrick's — are the most remarkable, but there are many others. Their style is most plainly that of the English conqueror, with no concession to, or consideration of, earlier Irish forms of art. The result of the conquest was that the native style of construction was never applied to large buildings, though it did not at once disappear, as is witnessed by the church St Doulough near Malahide, which appears to be a 14th-century building. The characteristic features of later medieval Irish buildings, such as the stepped battlements, the retention of flowing lines in the tracery, and the peculiar treat- ment of crockets, are matters of no great importance in the history of architecture, and indeed it is hardly to be expected that a country with so stormy a history could have given rise to any systematic developments. Of the monastic remains those of the friaries are the most numerous, Ireland having many more friars' churches to show than England, but such peculiarities as they possess belong rather to the order than to any local influences. (J. Bn.)

Romanesque and Gothic Architecture in Germany With the exception of the church built at Treves (Trier) by the empress Helena, of which small portions can still be traced in the cathedral, there are no remains of earlier date than the tomb-house built by Charlemagne at Aachen (Aix-la-Chapelle), which, though much restored in the 19th century, is still in good preservation. It consists (fig. 44) of an octagonal domed hall surrounded by aisles in two storeys, both vaulted; externally the structure is a polygon of sixteen sides, about 105 ft. in diameter, and it was preceded by a porch flanked by turrets. It is thought to have been copied from S. Vitale at Ravenna, but there are many essential differences. The same design was repeated at Ottmarsheim and Essen, and a simpler version exists at Nijmwegen in the Netherlands, also built by Charlemagne. Although no remains exist of the monastery of St Gall in Switzerland (see Abbey), built in the beginning of the 9th century, a valuable manuscript plan was found in the 17th century, in its library, which would seem to have been a design for a complete

monastery. It contains features which are peculiar to the early German churches and are rarely found elsewhere, and is therefore of considerable interest, suggesting that some of the accessories of a monastery, supposed to have been the result of subsequent develop- ment, were all clearly set forth at this early period. The plan shows an eastern apse with a crypt, and a choir in front; a western apse, nave and aisles, with a series of altars down the latter; and on the west side, but detached from the apse, two circular towers with staircases in them. Unfortunately there are no churches remaining of the same date from which we might judge how far these arrange- ments were followed ; but there are three early churches in the island of Reichenau on the Lake of Constance, in one of which, Mittelzell, is a western apse with staircases (here built up into a central tower), nave, and aisles with altars at the side between every window. The eastern portion has been rebuilt. At Oberzell, at the south end of the island, is a vaulted crypt, which dates from the end of the loth century. In the third and much smaller church, Unterzell, there was no crypt, but three eastern apses and a western apse, which was destroyed when the present nave was built. At Gernrode in the Harz is a church with western and eastern apses with vaulted crypts underneath (one of which dates from 960 when the church was founded), and circular towers with staircases in them on either side of the western apse. The church was completed about a century later. In the arcade between the nave and aisles piers alternate -Plan of Cathedral w ' tn tne columns. Alternating piers are found also in Quedlinburg (the crypt of which dates from 936 and the church above about 1030) and many other early churches. Western apses exist at Drubeck, Dbenstadt, Treves, Huyseberg, St Michael and St Godehard at Hildesheim, Mainz, the Obermunster at Regensburg, Laach, Worms, andat a later date at Naumbergand Bamberg, showing that it was a feature generally accepted in early and late periods. It has, however, one great defect, that of depriving the west end of the church of those magnificent porches which are the glory of the churches of France; the cathedral of Spires (Speyer), the church at Limburg near Diirkheim, the cathedrals of Erfurt and Regensburg, being the few examples where a dignified entrance is given ; and further, that on entering the church from the side, one is distracted by the rivalry of the two apses, and it is only when turning the back on one or the other that one is able to judge of the monumental.effect of the interior.

The greater number of the churches above mentioned were covered over with open timber roofs or flat ceilings ; but the problem

Scale of Feel

Fig. 44-

at Aix-la-Chapelle.

Fig. 45. — Plan of Cathedral at Mainz.

Fig. 46. — Plan of Cathedral at Worms.

to be solved in Germany, as well as in Italy, was that of vaulting over the nave, and the cathedrals of Spires, Worms and Mainz

(fig. 45) are the three most important churches in which this was accomplished. The dates of their vaults have never been quite settled; that of Spires would seem to have been the earliest built, probably after 1162, when the church was seriously damaged by a conflagration, and the vault is groined only. In Worms (fig. 46) and Mainz there are diagonal moulded ribs, which suggest a later date. Although of great height and width, the absence of a triforium gallery in these cathedrals is a serious defect, as it deprives the interior of that scale which the smaller arcades in such a gallery give to the nave arcade below and the clerestory above, and of those horizontal lines given by string courses which are entirely wanting in these churches. Seeing that in some of the earlier churches, as at Gernrode, St Ursula (Cologne), and Nieder-Lahnstein, the tri- forium had already been introduced, and that it was repeated in the later examples at Limburg on the Lahn, Bacharach, Andernach, Bonn, Sinzig, and St Gereon (Cologne), it is difficult to understand why, in the three great typical German Romanesque churches, they should have been omitted. Exter- nally the design is extremely fine, owing to the grouping of the many towers at the west and on either side of the transept or choir. In this respect the cathedral of Mainz is the most superb structure in Germany, and to the cathedral of Spires with its fine entrance porch (fig. 47) must be given the second place.

One of the most perfect examples of the Rhenish-Romanesque styles is the church of the abbey of Laach, completed shortly after the middle of the 12 th century. The eastern part of the church resembles the ordinary type, but at the west end there is a narrow transept flanked by circular towers, and a western apse enclosed in an atrium with cloisters round, which forms the entrance to the church. The sculptures in the capitals of the atrium are of the finest description and repre- sent the perfected type of the German p IGi 47. — pi an D f Cathedral Romanesque style. In addition to the a t Spires,

two circular towers flanking the west

transept, a square tower rises in the centre of the west front, two square towers flank the choir and a crystal lantern crowns the crossing of the main transept, and the grouping of all these features is very fine and

picturesque in effect. A small church at Rosheim in Alsace is quite Lombardic in its exterior design, the pilaster strips and arched corbel tables being almost identical. The same applies to the church at Marmoutier, but the towers flanking the main front and the square tower on the crossing of the western transept produce a composition which one looks for in vain in the greater number of the churches in Italy.

In describing the Lombardic churches of North Italy, reference has been made to the probable origin of the eaves-gallery, best represented in the eastern apse of Santa Maria Maggiore, Bergamo. This feature was largely adopted throughout the Rhine churches, and in the Apostles' church and St Martin's at Cologne receives its fullest development, being in addition to the eastern apse carried round the apses of the north and south transepts, which in these two churches and in St-Mary-in-the-Capitol, also in Cologne, constitute a special treatment. In the Apostles' church, where round towers are built at the junction of the three apses, the effect is extremely pleasing. In the church at Bonn, the single apse is flanked by two lofty towers which give great importance to the east front.

The steeples of the same period have a character of their own. They are either square or octangular in plan, arcaded or pierced with windows, and roofed with gables or with spires rising out of the gables.

One peculiarity found in some of the German churches, and specially those in the north-east, is that the nave and aisles are of the same height. To these the term Hallenkirchen is given. This type of design is very grand internally, owing to the vast height of the piers ana arches. It also dispenses with the necessity for flying buttresses, as the aisles, which are only half the width of the nave, carry the thrust of the vault direct to the external buttresses. The nave, however, is not so well lighted, though the aisle windows are sometimes of stupendous height. The principal examples are those of the church of St Stephen, Vienna, where both nave and aisles are carried over with one vast roof; at Munster, the Wiesenkirche at Soest; St Lawrence, Nuremberg; St Martin's, Landshut; Munich cathedral, and others.

St Gereon (1200-1227) and St Cunibert (1205-1248), in Cologne, besides churches at Naumburg, Limburg and Gelnhausen, in which the pointed arch is employed, are almost the only transitional examples in Germany, and respond to work of a century earlier in France. Toward the end of the 13th century the Romanesque style was supplanted by a style which in no way grew out of it, but was

rather an imitation of a foreign style, the earliest examples being in the Liebfrauenkirche at Treves (1227-1243), and the churches at Marburg (1235-1283) and Altenberg (1255-1301). In the latter church is a French chevet with seven apsidal chapels. This brings us to the great typical cathedral of Germany at Cologne (fig. 48), which had the advantages of having been designed at the best age and completed on the original design, so that with small exceptions a uniformity of style reigns throughout it. It was begun in 1270 and apparently based on the plan of Amiens, the transepts however having an additional bay each, and the two first bays of the nave having thicker piers so as to carry the enormous towers and spires which flank the chief facade. The principal defect of the building is its relative shortness, owing to its disproportionate height. This has always been felt in the interior, and now that the lofty buildings

Fig. 48. — Plan of Cathedral at Cologne, all round have been taken down, isolating the cathedral on all sides, it has the appearance of an overgrown monster. The length of the cathedral is 468 ft., 17 ft. less than the cathedral at Ulm, the longest in Germany. The height of the nave vault is 155 ft., and as the width is only 41-6 (about one in four) the proportion is very unpleasing. There is also a certain mechanical finish throughout the design, which renders it far less poetical than the great French cathedrals. Where, however, it excels is in the extraordinary vigour of its execution, the depth of the mouldings, and the projection given to the leading architectural features ; and in this respect, when com- pared with St Ouen at Rouen, about fifty years later, the latter (which is even more mechanical in its setting out) looks wire-drawn and poor. The twin spires of the facade rise to the height of 510 ft. ; they were completed only in the latter part of the 19th century, and would have gained in breadth of effect if there had been some plain surfaces left. In this respect the spire of Freiburg cathedral, which is simple in outline and detail, is finer, and gains in contrast on account of the simpler masonry of the lower part of the tower. The spire at Ulm cathedral, only recently terminated, rises to the height of 530 ft. In both these cases the single tower is preferable

to the double towers of Cologne, when elaborated to the same extent, as they are in all these examples; and perhaps that is one of the reasons why the spires of Strassburg and Antwerp cathedrals are more satisfactory, as the twin towers were never built. The front of Strassburg cathedral (1277-1318), by Erwin von Steinbach, is too much cut up by vertical lines of masonry, owing to the tours-de- force in tracery of which the German mason was so fond. On the whole the most beautiful of German spires is

that of St Stephen's at Vienna, and one of its advantages would seem to be that its transition from the square base to the octagon is so well marked in the design that it is difficult to say where the tower ends and the spire begins. The strong horizontal courses under the spires of Strassburg or Freiburg are defects from this point of view.

In domestic architecture nothing remains of the palace at Aix-la- Chapelle, but at Lorsch near Mannheim is the entrance gateway of the convent which was dedicated by Charlemagne in 774. It is in two storeys, in the lower one three semicircular arches flanked by columns with extremely classic capitals. The upper storey is decorated with what might have been described as a blind arcade, except that instead of arches are triangular spaces similar to some windows found in Saxon architecture; the whole gateway being crowned with a classic cornice. The palaces at Goslar (1050) and Dankwarderode in Brunswick (1150-1170) still preserve their great halls, and in the palace built (1 130-1 150) by the emperor Frederick I. at Gelnhausen there remain portions extremely fine and vigorous in style, and showing a strong Byzantine influence. The largest and most important castle is that of the Wartburg at Eisenach, which is in complete preservation.

To sum up, the German Complete Gothic is essentially national in its complete character. It has many and obvious defects. From the first there is conspicuous in it that love of lines, and that desire to play with geometrical figures, which in time degenerated into work more full of conceit and triviality than that of any school of medieval artists. These conceits are worked out most elaborately in the traceries of windows and panelling. The finest early examples are in the cathedral at Minden; a little later, perhaps, the best series is in the cloister of Constance cathedral; and of the latest description the examples are innumerable. But it is worth observing that they rarely at any time have any ogee lines. They are severely geometrical and regular in their form, and quite unlike our own late Middle Pointed, or the French Flamboyant. In sculpture the Germans did not shine. They, like the English, did not introduce it with profusion, though they were very prone to the representations of effigies of the deceased as monuments.

In one or two respects, however, Germany is still possessed of a wealth of medieval examples, such as is hardly to be paralleled in Europe. The vast collection of brick buildings, for instance, is un- equalled. If a line be drawn due east and west, and passing through Berlin, the whole of the plain lying to the north, and extending from Russia to Holland, is destitute of stone, and the medieval architects, who always availed themselves of the material which was most natural in the district, built all over this vast extent of country almost entirely in brick. The examples of their works in this humble material are not at all confined to ecclesiastical works; houses,

castles, town-halls, town walls and gateways, are so plentiful and so invariably picturesque and striking in their character, that it is impossible to pass a harsh verdict on the architects who left behind them such extraordinary examples of their skill and fertility of resource.

This development is largely due to the fact that all these countries in north-east Germany were connected and very much influenced by the confederation of the Hanse towns, and hence the similarity in the design of all their buildings. Although some of the earliest buildings date from the 12th century, the chief development took place in the 14th and 15th centuries, and in the 16th century formed the basis of the transitional works of the Renaissance. The principal Hanse towns are Hamburg, Liibeck and Danzig. The chief buildings in Hamburg were destroyed by the fire in 1842, and it is in Liibeck that the most important churches are to be found. The church of St Mary (Marienkirche) , 1304, is the most striking on account of its dimensions, 346 ft. in length, the nave being 123 ft. high, with two western towers 407 ft. high. Great scale is given to the building in consequence of the small material (brick) used, and some of the windows in this or other churches are nearly 100 ft. in height, with lofty mullions, all in moulded brick. The Dom or cathedral of Liibeck, though slightly larger, is not so good in design, but has a remarkable north porch in richly moulded brick, with marble shafts and carved capitals. In the church of St Catherine the choir is raised above a lofty vaulted crypt, similar to examples in some of the Italian churches. The Marienkirche at Danzig (1345-1503), built by a grand master of the Teutonic knights, to whom the chief development of the architecture of north-east Germany is largely due, is one of those examples already mentioned as Hallenkirchen. The nave, aisles, side chapels, transept and aisles, and choir with square east end, are all of the same height; as the church Is 280 ft. long and 125 ft. wide, with a transept 200 ft. long, the effect is that of one stupendous hall, but as the light is only obtained through the windows of the side chapels, the interior, though impressive, is somewhat gloomy. The same is found in the choir of the Franciscan church at Salzburg, where five slender piers, 70 ft. in height and

4 ft. in diameter, carry the vault over an area 160 ft. long by 66 ft. wide. Right up in the north of Germany, in Pomerania, are many fine examples in brick and sometimes of great size, such as those at Stralsund, Stettin, Stargard, Pasewalk, and in the island of Riigen. The Marienkirche at

Stralsund, owing to its massive construction and picturesque grouping, is an interesting example. Its western transept or narthex with tower in centre is a common type of the churches in Pomerania, and though very inferior in design is a version of those which in England are seen in Ely and Peterborough cathedrals.

In the entrance gateways to the towns and in domestic archi- tecture north Germany is very rich ; the palace of the grand master of the Teutonic Order at Marienburg is a vast and imposing structure in brick (1276-1335), in which the chapter house of the grand master, with its fan-vaulted roof, resting on a single pillar of granite in the centre, and the entrance porch of the church richly carved in brick, are among the finest examples executed in that material. (R. P. S.)

Romanesque and Gothic in Belgium and Holland Of early Romanesque work neither Belgium nor Holland retains any examples; for with the exception of the small building at Nijmwegen built by Charlemagne, there are no churches prior to the nth century, and at first the influence in Belgium would seem to have come from Lombardy, through the Rhine Provinces. As all her large churches are built in the centres of her most important towns, it is probable that the older examples were pulled down to make way for others more in accordance with the increasing wealth

and population. In the 13th century they came under the influence of the great Gothic movement in France, and two or three of their cathedrals compare favourably with the French cathedrals. The finest example of earlier date is that of the cathedral of Tournai (fig. 49), the nave of which was buiit in the second half of the nth century, to which a transept with north and south apses and aisles round them was added about the middle of the 12th century. These latter features are contem- poraneous with similar ex- amples at Cologne, and the idea of the plan may have been taken from them; exter- nally, however, they differ so widely that the design may be looked upon as an original conception, though the nave arcades, triforium storey, and clerestory resemble the con- temporaneous work in Nor- mandy. The original choir was pulled down in the 14th century, and a magnificent chevet of the French type erected in its place. The grouping of the towers which flank the transept, with the central lantern, the apses, and lofty choir, is extremely fine (fig. 50). The sculptures on the west front, dating from the 12th to the 16th century, protected by a portico of the late 15th century, are of remarkable interest and in good preservation. They are in three tiers, the two lowest consisting of bas-reliefs, the upper tier with life-size figures in niches, resting on corbels. The Romanesque tower of the church of St Jacques in the same town, with angle turrets, is a picturesque and well-designed structure.

Other early examples are those of St Bartholomew at Liege (a.d. 1015) and the churches at Roermonde and St Servais at Maastricht, both belonging to Holland. The latter is an extremely fine example, which recalls the work at Cologne, and in its great western narthex follows on the lines of the German churches at Gernrode, Corvey and Brunswick.

Among other churches of later date are St Gudule at Brussels, with Gothic 13th century choir and a 14th century nave with great circular pillars, the west front of later date, approached by a lotty flight of steps, having a very fine effect; Ste Croix at Liege, with a western apse; St Martin at Ypres and St Bavon at Ghent, both with 13th-century choir %nd 14th-century nave; Tongres, 13th century with great circular pillars and an early Romanesque cloister; Notre Dame de Pamele at Oudenarde; and Notre Dame at Bruges, 14th century. Of 15th and 16th century work (for the Gothic style lasted without any trace of the Renaissance till the middle of the 16th century) are St Gommaire at Lierre (1425-1557); St Martin, Alost (1498); St Jacques, Antwerp; and St Martin and St Jacques,

Fig. 49.

-Plan of Cathedral at Tournai.

both at Liege. The largest in area, and in that sense the most im- portant church in Belgium, is Notre Dame at Antwerp (misnamed the cathedral). It was begun in 1352, but not completed till the 16th century, so that it possesses many transitional features. It is one of the few churches with three aisles on each side of the nave, the outer aisle being nearly as wide as the nave, which is too narrow to have a fine effect. Only one of the two spires of the west front is built, perhaps to its advantage; the upper portion presents in its pierced stone spires one of those remarkable tours-de-force of which masons are so proud, and having a simple substructure it gains by contrast with and is much superior to the spires of Cologne, Vienna and Ulm.

Among the most remarkable features in these Belgian churches are the rood screens, the earliest of which is in the church of St

Fig. 50. — Tournai Cathedral.

Peter at Lo,uvain, dating from 1400, in rich Flamboyant Gothic, retaining all its statues. In the church at Dixmuiden, St Gommaire at Lierre (1534), and in Notre Dame, Walcourt (1531), are other examples all in perfect preservation; the last is said to have been given by the emperor Charles V., and in the same church is a lofty tabernacle in Flamboyant Gothic.

Owing to the comparatively late date of many of the Belgian churches, they

are all more or less unfinished, as the religious fervour of the citizens who built them would seem to have changed in favour of their town halls and civic buildings immediately connected with trade. The Cloth Hall at Ypres (1200-1334) with a frontage of 460 ft., three storeys high with a lofty central tower and a hall on the upper storey 435 ft. long, one of the finest buildings of the period in Europe; Les Halles at Bruges, originally built as a cloth hall, also with a lofty central tower; and a simple example at Malines, are the earliest buildings of this type.

There follow a series of magnificent town halls, of which that at Brussels is the largest, but the tower not being quite in the centre of its facade gives it a lopsided appearance. There is no tower to the town hall at Louvain (1448-1469), but this is compensated for by the angle turrets, and the design is far bolder. In both these examples the vertical lines are too strongly accentuated, and seeing that they are in two or three storeys, the latter should have been maintained in the design of the facades. In this respect the town hall of Oudenarde (1 527-1 535) is more truthful, and as a result is far superior to them ; the tower also is in the centre of the principal front, which at all events is better than at Brussels, though as a matter of composition it would have been more effective and picturesque if it

had been placed at one end of the facade. In the town hall at Mons there is no tower, but a fine upper storey with ten windows filled with good tracery. Of the town hall at Ghent only one half is Gothic (1480-1482), as it was not completed till a century later, and though overladen with Flamboyant ornament it has fine qualities in its design. Although but few examples still exist of the Gothic structures belonging io the various gilds, owing to their having been rebuilt in the Renaissance style, those of the Bateliers at Ghent (1531), and of the Fishmongers at Malines (1519), bear witness in the rich decoration to the wealth of these corporations.

Holland is extremely poor in church architecture, but there are two examples which should be noted, at Utrecht and Bois-le-Duc ('s Hertogenbosch). Of the former only the choir exists. It is of great height (115 ft.), and belongs to the finest period of Gothic architecture (1251-1267). The nave was destroyed by a hurricane in 1674, and so seriously damaged that it was all taken down (a wall being built to enclose the choir) and an open square left between it and the lofty west tower. The

cathedral of St John at Bois-le- Duc, though founded in 1300, was rebuilt in the Flamboyant period (1419-1497). It is of great length (4O0 ft.) with a fine chevet, and possessed originally a magnificent rood screen in the early Renais- sance style (1625) ; this seemed to the burghers to be out of keeping with the Gothic church, so it was taken down and sold to the South Kensington Museum, being replaced by a very poor example in Modern Gothic.

There is only one Gothic town hall of importance in Holland, that at Middleburg (1468), a fine example, and quite equal to those in Belgium. The ground and upper floors are kept distinct, and as the wall surface of these lower storeys is in plain masonry, the traceried windows and the canopied niches (all of which retain their statues) gain by the contrast. There is a small picturesque specimen at Gouda, and at Leeuwarden in the house of correction (Kanselary) a rich example in brick and stone, with a remarkable stepped gable in the centre having statues on its steps.

Both in Belgium and Holland there are numerous examples of domestic architecture in brick with quoins and tracery in stone, in both cases alternating with brick courses and arch voussoirs and with infinite variety of design. (R. P. S.)

The Renaissance Style: Introduction

The causes which led to the evolution of the Renaissance style in Italy in the 15th century were many and diverse. The principal impulse was that derived from the revival of classical literature. Already in the 14th century the coming movement was showing itself in the works of the painters and sculptors, especially the latter, owing to the influence of the classic sculpture which abounded throughout Italy. Thus in , the tomb of St Dominic (1221) at Bologna, the pulpits of Pisa (1260) and Siena (1268), and in the fountain of Perugia (1277-1280) by Niccola Pisano and his son Giovanni, all the figures would seem to have been inspired in their character by those found in Roman sarcophagi. A classic treatment is noticeable in the doorway of the Baptistery of Florence by Andrea Pisano (1330), probably influenced by Giotto, in whose paintings are found the representa- tion of imaginary buildings in which Gothic and Classic details are mixed up together. The time for its full development, how- ever, did not come till the following century, when, with the papal throne again firmly established under Martin V., the amelioration of the city of Rome was commenced, and discoveries were made which awakened an archaeological interest fostered by the Medici at Florence, who not only became enthusiastic collectors of ancient works of art, but promoted the study of the antique figure. In addition to the acquisition of marbles and bronzes, ancient manuscripts of classic writers were sought for and supplied by

Greek exiles who seemed to have foreseen the breaking up of the eastern empire; everything, therefore, at the beginning of the 1 5th century fostered the spread of the new movement. Accordingly, when a great architect like Brunelleschi, who for fifteen years had been making a special study of the ancient monuments in Rome and who possessed in addition great scientific knowledge, brought forward his proposals for the completion of the cathedral built by Arnolfo di Lapo, and showed how the existing substructure could be covered over with a dome like the Pantheon at Rome, his designs were accepted by the town council of Florence, and in 1420 he was entrusted with the work. Subsequently he carried wit other works, in which pure classic architectural forms are the chief characteristics. There were, however, other causes which not only promoted the encouragement of the revival, but extended

it to other countries, though at a later period; the most im- portant of these was the invention of printing (1453), which in a sense revolutionized art, not so much in its enabling classical literature to be more extensively studied and known, as in its taking away to a certain extent from the painter and sculptor and indirectly the architect one of their principal missions, so far as ecclesiastical architecture is concerned. Henceforth these who had hitherto taught their lessons in sculpture, painting stained glass and fresco, could, through the printed book, bring them more immediately before and directly to mankind. Victor Hugo's pithy saying, " ceci luera cela; le livre tuera I'gglise," expressed not only the fall of architecture from the position it occupied as the principal teacher, but to a certain extent the change in the channel by which religious teachers and the writers of the day, the poets and philosophers, could best make their works known.

With the invention of printing came the partial cessation of fresco painting, stained glass and sculpture, which subsequently came to be regarded more as decorative adjuncts than as having educational functions. But this transfer from the Church to the Book, the extinction of the one by the other, led to another important change. Henceforth the architect or master-mason, as he was then known, could no longer count on the co-operation of the various craftsmen, men often of greater culture than himself ; and the individuality of the man, which has sometimes been put forward as a gain to humanity, was a loss so far as architecture is concerned, since it was scarcely possible that the imagination and conceptions of a single individual, however brilliant they might be, could ever reach to the high level of the joint product of many minds, or that there could be the same natural expression in what had hitherto been the traditional work of centuries.

In France the introduction of the Revival resulted at first in a transitional period during which classic details gradually crept in, displacing the Gothic.

In Italy this does not seem to have been the case to the same extent. It is true that in Florence and Venice, where an independent style existed, the new buildings in their general principles of design were, copied from the old, but with no mixture of details as in France; in Brunelleschi's church, Santo Spirito at Florence, the capitals and details are all pure Italian, as pure as if they had been carried out in the 3rd or 4th century, the fact being that already before the 15th century the craftsman's work was approaching the new move- ment, and this was facilitated by the numerous remains still existing of Roman architecture. In the four or five years Brunelleschi spent in Rome, he had the opportunity of studying a far larger number of Roman buildings than are preserved at the present day, so that the purity of style in the work which he carried out in Florence was due to his previous training; the same is found in Alberti's work, and with these two great men leading the way it is not surprising that throughout the earlier Renaissance period in Italy we find a classic perfection of detail which it took half a century to develop in other countries.

It is difficult to say what might have been its ultimate develop- ment if another discovery had not been made about 1452, that of the manuscript of Vitruvius, a Roman architect who lived in the time of the emperor Augustus; his work on architec- ture gives an admirable description of the building materials employed in his day (c. 25 B.C.), and among other subjects, a series of rules regulating the employment of the various orders and their correct proportions. These rules were based on the descriptions which Vitruvius had studied of Greek temples, but as he was not acquainted with the examples quoted, never having been in Greece or even in south Italy at Paestum, his knowledge was confined to the architectural monuments then existing in Rome. Vitruvius's manuscript, entitled De re aedi- ficatoria, was illustrated by drawings, none- of which have however been preserved; when therefore in subsequent years translations of the architectural portion' of the manuscript were printed and published by various Italian architects, among whom Vignola and Palladio were the more important, they were accompanied by woodcuts representing their interpretation of the lost illustrations, and thus copybooks of the orders were

published, with more or less fidelity to those of existing Roman monuments, in which attempts were made to adhere to the rules laid down by Vitruvius. In Rome and other parts of Italy, where ancient monuments or portions of

them still remained in situ, architects could study their details and base their designs on them, but in other countries they were bound to follow the copybook, and thus they lost that originality and freedom of design which characterizes the earlier work of the Renaissance.

On the other hand, there is no doubt that the publications of Vignola and Palladio, based as they were on the remains of ancient Rome, then much better preserved than at the present day, tended to maintain a high standard in the employment of the Classic orders, with correct proportions and details; so much so, that in referring to the influence which those works exerted from the middle of the 16th century in France and Spain, and during the 17th and 18th centuries in England and to a certain extent in Spain, Germany and the Netherlands, it is generally spoken of as the introduction of the pure Italian style. The tendency, however, of such hard and fast rules leads eventually to an excess in the opposite direction, and the works of Borromini in Italy and Churriguera in Spain in the middle of the 17 th century resulted in the production of what is generally referred to as the Rococo style. This style was fostered in France by the attempts to reproduce, externally and in stone, ornamental decoration of a type which is only fitted for internal work in stucco, and in Germany and the Netherlands by repro- ductions of fantastic designs published in copybooks, which led to the bastard style of the Zwinger palace in Dresden and the Dutch architecture of the 18th century. Vignola's work on the five orders was published in 1563, and Palladio's in 1570; they were preceded by a publication of Serlio's in 1 540, giving examples of various architectural compositions, and to him is probably due the introduction of the pure Italian style in the Louvre in 1546. They were followed by other authors, as Scamozzi in Italy, Philibert de l'Orme in France, and, at a later date, Sir William Chambers in England.

The term given to the earlier Renaissance or transition work in Italy is the Cinque-cento style, though sometimes that title is given to buildings erected in the 16th century; in France it is known as the Francois I. style, in Spain as the Plateresque or Silversmiths' style, and in England as the Elizabethan and Jacobean styles.

There is still another and very important difference to be noted between the styles of the middle ages and those of the Renaissance. Although the names of the designers in the former are occasion- ally known and have been handed down to us, they were only partially responsible, as the works were carried out by other crafts- men working on traditional lines, whereas in the latter they are of much more importance because of the independent thought and study of the individual; and though to a certain extent the development of each man's work may have been influenced by others working in the same direction, his special object was to acquire personal

fame and by his own fancy or predilection to produce what he conceived to be an original work peculiar to himself. Consequently in our description the name of the architect who designed a particular building, as well as the date of its erection, are necessarily given to show the progress made in his studies or otherwise. (R. P. S.)

Renaissance Architecture in Italy

In the styles hitherto described a chronological order has been followed, as far as possible, in order to show the gradual develop- ment of the style; that course is adopted here to a certain extent, when dealing with the Renaissance, though the introduction of the personal element, to which reference has been made, brings in a change of some importance. Henceforth the career of the individual has to be taken into consideration, and at times it may be an advantage when describing a building by an - architect of eminence to mention other works by him, and so depart from the chronological sequence.

Ecclesiastical. — The classic revival in Italy, though foreshadowed in other branches of art, as in painting and sculpture, and also to

a marked degree in literature, was virtually introduced by one great man, Filippo Brunelleschi of Florence, who, trained as a sculptor, and disappointed with his want of success in the competi- tion held in 1403 for the bronze gates of the baptistery at Florence, determined to devote himself to architecture, possibly in the hope that he might some day be able to solve the great problem of erecting over the crossing of Arnolfo di Lapo's great cathedral the dome projected by the latter but never executed. Having spent some years in Rome, Brunelleschi returned to his native town about 1410, with a profound knowledge of classic architecture and of Roman construction, as shown in the Pantheon, the thermae, Colosseum and other remains, then in much better preservation than at the present day. Some years passed in the production of various schemes and in deliberations with the council of Florence, but eventually in 1420 the completion of the cathedral was entrusted to him, and he undertook to construct the dome without centreing, and to raise it on a drum so as to give it greater importance than Arnolfo had contemplated, as shown in the fresco of the Spanish chapel of Santa Maria Novella, Florence. The dome as projected by Brunelleschi was of considerable size, being 130 ft. in diameter and 135 ft. from the cornice to the eye of the dome, including the drum on which it was raised; it was octagonal in plan, and built with an inner and outer casing partly in brick, with angle and two intermediate ribs on each face, which were in stone. The construction of the dome was completed in 1434; but the lantern, built on the basis of the model he had made, was not carried out till 1462, some years after his death. Brunelleschi 's other

works in Florence consisted of the church of San Lorenzo, which he rebuilt in 1425 after a fire, and the church of Santo Spirito (1433), a very remarkable building, the design of which was based on the medieval basilicas of Rome, with such modifica- tions in plan and section as his knowledge of ancient Roman work suggested. This church consists of nave, transept and choir, with aisles all round, the centre or crossing being covered with a dome on pendentives, which henceforth became the chief characteristic in all the Renaissance churches. Brunelleschi's earliest work was the Pazzi chapel, an original conception which is more remarkable for the pure classic feeling and refinement in all its details than for the design. The weakness of the archivolt round the central archway, and the mass of panelled wall carried on columns (far too slight in their dimensions), detract seriously from the effect of the facade; internally the structural function of the pilasters is not sufficiently maintained, and instead of a simple hemispherical dome, as in the cathedral, a quasi-Gothic type was built, with twelve ribs and scalloped cells, which destroys its dignity.

Brunelleschi was followed by another great Florentine architect, Leon Battista Alberti, who was also a great mathematician and a scholar, and further promoted the study of classic architecture by writing a treatise in Latin, Opus praestantissimum de re aedificatoria, which was based partly on that of Vitruvius and was published in 1485,ˆ after his death, accompanied by illustrations. The first building with which he was connected was the church of San Fran- cesco at Rimini, to which in 1440 he added the front. In this he was evidently inspired by the Roman triumphal arch in that city, and his interpretation of it, to meet the requirements in its facade which were imposed upon him by the existing nave, was admirable. Unfortunately the principal front was never completed, but on the south_ side he designed a series of recesses to hold the sarcophagi containing the remains of the friends of his client, Sigismondo Malatesta, the effect of which is simple and grand. Alberti's largest work, the church of Sant' Andrea at Mantua (1472), in which the nave, transept and choir are all covered with barrel vaults, recalls the vaulted corridors of the Colosseum. There are no aisles, but a series of rectangular chapels on each side, the division walls of which act as buttresses to resist the thrust of the great vault. The lofty arched openings to the chapels, separated by Corinthian pilasters with entablature supporting the coffered vault and a central dome (since rebuilt), complete the structure, which has served since as the model for all the Renaissance churches of the same type. The principal front is not satisfactory, as it takes no cognizance of the width of the nave, and the side doors have no use or meaning ; here Alberti seems to have been led astray in his triumphal arch treatment, which is inferior to his scheme for the church at Rimini.

In 1462 Michelozzo, another Florentine architect, built the chapel of St Peter at the east end of the church of Sant' Eustorgio, Milan. Externally it has little attraction, but internally the dome, with its magnificent frieze of winged angels in relief with a painted back- ground of arcades and other accessories, is the most beautiful composition of the Renaissance. Michelozzo's first work was the Dominican monastery and church of San Marco at Florence (1439- I45 2). but he is better known for his secular work, to which we shall return.

The next great architect chronologically is Bramante d" Urbino, to whom was entrusted the commencement of the church of St Peter at Rome. His first important work was the church of Santa Maria della Consolazione at Todi (1472), which consists of a square nave with immense semicircular apses, one on each side. The nave is covered with a dome raised on a drum, and carried on pendentives, and the apses with hemispherical vaults butt against the nave walls and form externally a very fine group. Bramante was the architect of the chapel in the cloisters of San Pietro-in-Montorio, Rome (1472),

• small circular building covered with a dome and surrounded with a peristyle of columns of the Doric order; and of the dome of the church of Santa Maria delle Grazie in Milan, as also of the three apses, which are decorated with pilasters and baluster shafts with circular medallions enclosing busts, all in terra cotta. Before passing to his work at St Peter's there are some other early churches we must notice. The Certosa, near Pavia, was begun in 1396, and in one sense suggests the revival of classic architecture, in that all its arches have semicircular heads. The magnificent facade of the church was commenced in 1473 from the designs of Borgognone, a Milanese architect: it is one of the few examples in Italy of large size in which the transition is noticeable, for although there are no Gothic details the design follows that of the middle ages, and instead of great pilasters of the Corinthian order, buttresses with niches containing statues divide the facade and accentuate the internal divisions of the church; the open galleries above the entrance doorway crossing the upper storey of the central portion are all derived from well-known Lombardic features. The upper part of the facade is inferior to the lower, Borgognone's design having been departed from. The enrichment of the whole front, from the lower plinth to the string course under the first gallery, with bas-reliefs, panelled pilasters, niches, medallions and other decorative acces- sories, all

in white marble, so completely covers the whole surface that scarcely any portion is left plain, which to a certain extent detracts from its effect as a whole ; but there is an endless variety of design, and the baluster or candelabrum shafts dividing the windows and the friezes and cresting above their cornices, are ofgreat beauty. The circular rose window above, with its enclosing frontispiece of later date, shows the coming influence of the later Italian style. The cloisters adjoining are surrounded with a light arcade, with enrichments in the spandrils and frieze, all in terra cotta.

The cathedral of Como is also a transitional example, where buttresses are employed all round the church, and it is only in the finials which surmount them, the great projecting cornice which crowns the structure, and the doorways and windows, that we find classical details; the doorways recall the porches of the Lombard churches, and are of great beauty in design, the south doorway being said to be by Bramante. Another example, remarkable for its elaborately carved front and porch, is the church of Santa Maria dei Miracoli at Brescia (1487-1490) by Ludovici Beretta, which both externally and internally is one of the richest specimens of the early Italian Renaissance. The church dedicated to Santa Maria dei Miracoli in Venice (1481-1489), by Pietro Lombardo, is another transitional example in which the Byzantine influence of St Mark's is recognizable in the semicircular pediments of its facade and of the exterior of the chancel, and Lombardic influence in its external decorations with pilaster strips and blind arcades. The interior is one of the gems of the Renaissance, on account of its splendid decoration with marble linings and fine cinque-cento carv- ing. Similar semicircular pediments are found in the facade of the church of San Zaccharia at Venice (1515), but are purely decorative because the roof behind is not semicircular like that of the Miracoli. The decoration of the main front, here all in marble, is of an entirely different design, and is subdivided into a series of storeys, the lower panelled, the first storey with arcades and the upper ones with pilasters. An earlier example (1461) in San Bernardino at Perugia is of a far higher standard, and its enrichment with bas-reliefs by the Florentine sculptor Agostino di Duccio (c. 1418-c. 1490) gives it the first place for its conception and execution. Among others, the church of Spirito Santo, Bologna, in terra cotta; the church of Santa Giustina, Padua (1532); the sacristy of San Satiro, Milan (1479), by Bramante; and the sacristy of the church of Santo Spirito, Florence (1489-1496), by Sangallo, are all interesting examples of the early Renaissance in Italy.

In 1505, on the advice of Michelangelo, Bramante was instructed to prepare designs for a new church in Rome dedicated to St Peter to take the place of the early basilica, which, built in haste, began to show serious signs of failure. Already, fifty years earlier, Pope Nicholas V. had commenced a new building, the erection of 'which was stopped by his death

in 1454. The scheme was revived by Julius II., and the foundation stone of the new structure was laid in 1506. On Bramante's death in 1514, Raphael, Peruzzi and Sangallo were successively appointed, and the last named prepared a new design, which, however, was not carried out, as he found it necessary first to strengthen the piers of the dome provided by Bramante and to remedy the defects of his successors. In 1546 Michelangelo, then seventy-two years of age, was entrusted with the continuance of the work, and he made radical changes, chiefly in the design of the dome. Comparison of the plans of Bramante and Sangallo with that actually carried out by Michelangelo shows that he not only increased the size of the piers to carry his dome, but the outer walls of the north, south and west apses and omitted the aisles which surrounded the latter (fig. 51) He would seem to have availed himself of the foundation walls already built and ot Bramante s piers to carry the dome, which had been raised "£ i° t , he .,S? rnice ' but otherwise the architectural features of the whole building externally and internally were carried out from Michelangelo s own designs. Sangallo had suggested for the ex- terior a series of superimposed orders with three storeys- Michel-

angelo elected to have one order only with an attic storey. The building gained thereby in dignity, but it lost in scale, for the huge pilasters of the Corinthian order (87 ft. high) look considerably smaller, in spite of the two storeys of windows between them. These windows also, which from their design are apparently about 10 to 12 ft. high, actually measure 20 ft. in height. The same defect exists in the interior, where the Corinthian order, over 100 ft. in height to the top of the cornice (Plate III., fig. 69), calls for a similar increase in the dimensions of all the sculptured decorations; the figures in the spandrils being 20 ft. high, and the cherubs support- ing the holy water spouts 10 ft. Otherwise the scheme realizes the conception which Bramante proposed from the first, viz. to raise the dome of the Pantheon on the top of the basilica of Constantine ;

Fig. 51. — Plan of St Peter's at Rome.

the latter being represented by the magnificent barrel vault (75 ft. in span) of the nave, transepts and choir; the former by the great hemispherical dome, 140 ft. in diameter, which, including the drum, is 162 ft. from the top of the cornice above the pendentives to the soffit of the dome. The dome is built in two shells with connecting ribs on the same principle as Brunelleschi's dome in Florence, and was nearly completed before Michelangelo's death in 1563, and the lantern in 1590 from the model which he had made. In 1605 the east end of the old basilica was taken down, and three more bays were added, thus converting the Greek cross of Michelangelo's design into the Latin cross originally conceived by Bramante. The nave and the eastern vestibule were completed in 1620, and

the great semicircular portico was added by Bernini in 1667. The immense height of the east facade, and its prolongation in front of Michel- angelo's chief feature, the dome, hides the design of a great portion of the latter, so that it can only be seen either from a great distance

(Plate III., fig. 68), or from behind the western apse, where the relative grouping with the great apses can be properly appreciated. A second well-known work by Michelangelo is the new sacristy of the church of San Lorenzo, Florence (1 523-1 529), designed to contain the monuments of Giuliano and Lorenzo de' Medici, the architectural design of which is poor.

Antonio di Sangallo was the architect of the church of San Biagio at Montepulciano (1518), with a cruciform plan, and dome in the centre, and a campanile at the south-west angle somewhat similar to those of Wren in London.

The church of Santa Maria – di – Carignano (1552) at Genoa, by Galeazzo Alessi, is finely situated but unsatisfactory in its design, the lower part being stunted in its proportions and its order to a different scale from that in the campanile towers and the dome. The most beautiful interior is that of the Annunziata in the same town, by Giacomo della Porta (1587) ; the arches of its nave arcade are carried on Corinthian columns of. marble, of fine proportion, and the nave is covered with a barrel vault with penetrations admitting the light from clerestory windows. The churches of San Giorgio Maggiore (1556-1579), San Francesco della Vigna ("1562), and II Redentore (1577), all in Venice, were designed by Palladio, the interior of the fatter being the finest; the facade of the first named is the best-proportioned, but whether its design is due to Palladio, or to Scamozzi, who built it in 1610, is not known. A far finer church in its picturesque grouping and the originality of its design is that of Santa Maria della Salute on the Grand Canal (1631), by Baldassare Longhena; the church is octagonal on plan, with aisles round, giving access to six recesses with altars and to an important eastern chapel with central dome. The central octagon is covered with a lofty dome with immense corbel buttresses of vigorous and fine design. The entrance portal of the west front is perhaps the best example of the period in Italy. Longhena also designed the Santa Maria degli Scalzi (1680), completed by Sardi in 1689, the latter being responsible for the heavy front of San Salvatore (1663), as also of the rich but somewhat debased church, in the Jesuit style, Santa Maria Zobenigo

(1680-1683).

Secular Architecture. — In the application of the leading features of classical architectural design to palaces and mansions, the Italians had a much easier field on which to exercise their originality, as the requirements were very different from those which obtained in the middle ages. Moreover, the classic style lent itself more readily to the horizontal lines given by string courses, cornices and ranges of windows, which naturally exist in dwelling-houses on account of the various storeys. As in ecclesiastical, so in secular architecture, the first introduction of the Revival takes place in Florence, which was then the principal art centre of Italy, and the earliest examples are in a sense transitional, in that they are based on the earlier medieval work. As in the Palazzo Vecchio (1298) in Florence, and the Ricciarelli palace at Volterra (c. 1320), the rusticated masonry which gives them so fine a character forms the chief characteristic of the Riccardi and Strozzi palaces, the only changes being the substitution of a classic cornice of considerable projection in the place of the machi-colations of the Palazzo Vecchio, and the employment of circular arches in the windows in the place of the pointed and curved arches.

The earliest example, the Riccardi palace (1430), by Michelozzo (fig. 52), built for Cosimo de' Medici, is certainly the finest, owing partly to its size but more especially to the magnificent bossed and rusticated masonry of the ground storey and the bold projecting cornice, which crowns so admirably the whole structure. The lower two storeys of the main front of the Pitti palace were built by Brunelleschi in 1435, the return wings and court not being carried out till after 1550 from the designs of Ammanati; compared with the other Tuscan palaces the cornice is extremely poor and the whole front too monotonous. The beautiful court of the Palazzo Vecchio was reconstructed and decorated by Michelozzo in 1434. The Strozzi palace (1489), by Benedetto da Maiano and S. Pollajuolo, (Cronaca), comes next to the Riccardi as regards general design, but in comparison with it the windows are too small, and the want of a much bolder rustication, as provided in the latter, is much felt. Other examples of the same type are the Gondi (1481) and the Antinori palaces, by G. di Sangallo, and the Casa Larderel, all in Florence; the Spanochi (1470) and the Piccolomini (1460) palaces in Siena, and the Piccolomini palace (1490) in Pienza. In the Guadagni palace at Florence, by S. Pollajuolo, there is a third storey, consisting of an open gallery, which gives the depth of shadow otherwise afforded by the projecting cornice. In the Ruccellai palace (1460), by Alberti, the design is spoilt by the introduction of the classic pilasters at regular intervals on each storey, which suggest no structural object and have too little projection to give any effect of light and shade, so that it is only on account of the purity of their details that they are worth notice. The Pandolphini palace, the design of which is attributed

to Raphael, carried out after his death by Sangallo, is a simple and unpretentious building of fine proportions : the Pall Mall facade of Sir Charles Barry's Travellers' Club in London is a reproduction of this palace. The Bartolini palace (1520), by Baccio d' Agnolo, is said to have been the first astylar example in which the Classic orders were employed only to decorate the entrance door and windows, but this had already been done in 1488 in the Scuola di San Marco in Venice.

Throughout the greater part of the 15th century, the Venetian

Gothic style still held its own in the palaces of Venice, so that it is only towards the close of the century we find the first actual results of the Classic Revival. The earlier palaces may be looked upon as transitional work, in which Gothic principles rule the design while the details are borrowed from classic sources. The intimate acquaintance with the proportions of the Classic orders and their ornamental detail shows that the designers of the earliest Renaissance palaces must have acquired their knowledge outside Venice. Among these designers we find the names of members of the Lombardi family (which, as the name suggests, come from Lombardy), who for three or four generations, either as architects or sculptors, would seem to have been the chief founders of the Renaissance style in Venice. One of these, Pietro Lombardo, has already been referred to as the designer of the church of the Miracoli, and to him is due the Vend- ramini-Calerghi palace on the Grand Canal (Plate IV., fig. 71), built

From a photo by Alinari.

Fig. 52.-

-Riccardi Palace, Florence.

in 1 48 1, which in some respects is the finest example in Venice. It should be observed that all these palaces on the Grand Canal have an architectural frontage only, the flanks being built in plain masonry or brick stuccoed over, and with very poor, if any, dressings to the windows. This is well exemplified in the Vendramini palace, where there are gardens on each side, showing the total want of correlation between the rich architectural front and the poverty of the flanks.

In a still earlier example, the Dario palace, one of the flanks borders on a side canal, so that its brick construction, partly covered with stucco, contrasts strangely with the rich marbles encrusting the main front. In the Dario palace the transition from Gothic to Renaissance is more clearly seen, as the only changes made are the substitution of circular window-heads for the Ogee Venetian arch, the projecting cornice with modillions,

and more or less pure classic details. In the Vendramini palace the employment of the orders, to break up or subdivide the wall surface, has become a recognized treatment, based on the theatre of Marcellus and the Colosseum at Rome. On the ground storey there are panelled pilasters only, but on the first and second storeys three-quarter detached columns of the Corinthian order are employed, and the entablature is doubled in height with a bold projecting cornice, so as to crown properly the whole building.

The semicircular-headed windows of the palace are filled with moulded tracery carried on columns in the centre of each, which must be looked upon as the classic version of the arcade of the Ducal palace. This feature is found in other early Renaissance work in Venice, as in the Scuola de San Rocco (1517), and the Cornaro Spinelli palace (1480). In the latter, probably also by Pietro Lombardo, there are pilasters only on the groins of the main front, and the window-heads are enclosed in square-headed frames. In the Scuola de San Marco (1488), by Lombardo, we find another type of window, single and lofty, with pilaster. strips each side carrying an entablature with pediment. The same window decoration is found on the south and west fronts of the court of the Ducal palace and the external south front, and also in the Camerlenghi palace (1525), by Bergamasco and in other examples of early 16th-century work. In the Scuola de San Rocco the columnar decoration assumes much greater importance, and, in imitation of the triumphal arches of Septimus Severus and Constantine in Rome, the column is completely detached, with a wall-respond behind. Among other examples to be noted are the Cornaro-della-Grande palace (1532), by Sansovino, which is very inferior to his other work in Venice; the Grimani palace (1554), by San Michele (who also designed the fortifications of the Lido) ; the Zecca or mint (1537), the small loggetta (1540) at the foot of the campanile of St Mark's and now destroyed, and the Procuratie Nuove (completed by Scamozzi in 1584), all by Sansovino; the Balbi palace (1582), by Vittoria; and the Ponte Rialto (1588), by Antonio da Ponte. Sansovino's greatest work in Venice was the library of St Marks, which was commenced in 1531 ; in this he has shown not only remarkable powers of design but great boldness in the projection of his columns, cornices and other architectural features. The upper frieze has been increased in height, so as to admit of the introduction of small windows to light an upper storey, and this gives much greater importance and dignity to the entabla- ture crowning the whole structure. Two of the most imposing palaces on the Grand Canal, but of later date, are the

Pesaro (1679) and the Rezzonico (1680), both by Longhena, the architect of the Salute church. The former is too much overcharged with ornament, but it has one advantage, the classic superimposed orders of the main front being repeated on the flank overlooking the side canal, with pilasters substituted for the detached columns of the main front. The Rezzonico palace is much quieter in design, and finer in its proportions, but even there the cherubs in the spandrils are too pronounced in their relief.

In Rome there are no important examples of the 15th century, with the exception of the so-called " Venetian palace," which stiU retains externally the features of the feudal castle, such as machico- lations, small windows and rusticated masonry. This was owing probably to the comparative poverty of the city, which had to recover from the disasters of the 14th century. The earliest example of the Renaissance is that of the Cancellaria palace (1495-1505), by Bramante, the architect of the church at Todi; this was followed by a second and less important example, the Giraud or Torlonia palace (1506). The former is an immense block, 300 ft. long and 76 ft. high, in three storeys, with coursed masonry and slightly bevelled joints, the upper two storeys decorated with Corinthian pilasters of slight projection and crowned with a poor cornice, so that its general effect is very monotonous, and the design is only relieved by the purity of its details, such as those of the window and balcony on the return flank. In 1506 Bramante was instructed to carry out the court of the Vatican, of which the great hemicycle at one end, designed in imitation of similar features in the Roman thermae, is an extremely fine example; to what extent he was responsible for the court of the Loggie, decorated by Raphael, is not known. The Villa Farnesina (1506), best known for its fresco decorations by Raphael and his pupils; the Ossoli palace (1525); and the Massimi palace (1532-1536), with magnificent interiors, were all built by Baldassare Peruzzi. The finest example in Rome is the Farnese palace, commenced in 1530 from the designs of Antonio di Sangallo; the design is astylar, as the employment of the orders is confined to the window dressings, the angles of the front having rusticated quoins; the upper storey, with the magnificent cornice which crowns the whole building, was designed by Michel- angelo, and in the upper storey he introduced a feature borrowed from the Roman thermae, brackets supporting the three-quarter detached columns flanking the windows. The brilliance of the design is not confined to the exterior, and the entrance vestibule and the great central court are the finest examples in Rome. Here the upper storey added by Michelangelo is inferior to the two lower storeys by Sangallo.

The museum in the Capitol at Rome, by Michelangelo (1546), is one of those examples in which the principles of design are violated by the suppression of the horizontal divisions of the storeys which it should have been an object to emphasize. By carrying immense Corinthian pilasters

through the ground and first storeys, Michel- angelo, it is true, obtained the entablature of the order as the chief crowning feature, and so far the result is a success, but in other hands it led to the decadence of the style. Among other examples in Rome which should be mentioned are the Villa Madama by Giulio Romano (1524); the Nicolini palace (1526) by Giacomo Sansovino; the Villa Medici (1540) by Annibale Lippi; the Chigi palace (1562) by G. de la Porta; the Spada palace (1564) by Mazzoni; the Quirinal

palace (1574) by Fontana (the architect who raised the obelisk in the Piazza di San Pietro) ; and the Borghese palace (1590) by Martino Lunghi.

We now return to about the middle of the 16th century, to the period when the great architects Barozzi da Vignola and Andrea Palladio of Vicenza commenced their career, and by their works and publications exercised a great and important influence on European architecture.

The villa of Pope Julius (1550), and the Costa palace, Rome, are good examples of Vignola's style, always very pure and of good proportions, but his principal work was that of the Caprarola palace (1555-1559), about 30 m. from Rome, which he built for the cardinal Alessandro Farnese. The plan is pentagonal with a central circular court, and it is raised on a lofty terrace; the palace is in two storeys with rusticated quoins to the angle wings, and the Doric and Ionic orders, superimposed, separating arcades on the lower storeys and windows on the upper. The arcade of the central court is of admirable proportions and detail, second only to that of the Farnese palace.

Palladio in his earlier career measured and drew many of the remains of ancient Rome, and more particularly the thermae (the drawings of which are in the Burlington-Devonshire Collection), but he does not seem to have carried out any buildings there. His most important work, and the one which established his reputation, is that known as the basilica at Vicenza (1545-1549), which he enclosed with an arcaded loggia in two storeys of fine design and proportion, and extremely vigorous in its details. He built a large number of palaces in his native town, among which the Tiene (1550) and the Colleone Porto are the simplest and best, the latter being the model on which the front of Old Burlington House (London) was rebuilt in 1716. In the Valmarana, the Consiglio and the Casa del Diavolo he departed from his principles, in carrying the Corinthian pilasters through two floors, and by returning the cornice round the order he destroyed its value as a crowning feature. Among other works of his are the Chiericate (1560), Trissino (1582) and Barbarano (1570) palaces; the Olympic theatre (1580), which was completed after his death; and the Rotonda Capra near

Vicenza, reproduced by Lord Burlington at Chiswick.

Though he laid down no rules for the guidance of others, the works of San Michele are superior to those of Palladio, with the exception, perhaps, of the basilica at Vicenza and the library at Venice. In the Bevilacqua palace (1527), at Verona, there is far greater variety of design than in Palladio's work, and the Pompei palace (1530) and the two gateways at Verona (1533 and 1552) are all bold and simple designs. In the same town is an extremely beautiful example of the early Renaissance, the Loggia del Consiglio (1476) by Fra Giocondo; a similar example with open gallery on the ground storey exists at Padua, where there is also the Giustiniani palace (1524) by Falcon- etto, an interesting example of a master not much known. The town hall of Brescia (1492) was built from the designs of Tommaso Formentone, who employed for the carving of the medallions on the lower storey, and the pilasters with their capitals and the friezes, various artists of high merit, so that the building takes its rank as one of the finest in north Italy, but independently of their collabora- tion the design of the first floor is in design and execution equal to Greek work. The upper storey and its circular windows are said to have been added by Palladio, and they are so commonplace and out of scale that by contrast they increase the artistic value of Formentone's work.

The so-called Palazzo de' Diamanti at Ferrara, built in 1493 for Sigismondo d' Este, is decorated externally with a peculiar kind of rustication, in which the square face of the stones is bevelled towards the centre in imitation of diamond facets : the quoins of the palace have panelled pilasters richly carved, and similar pilasters flank the entrance door; the windows, with simple architrave mouldings and cornices on ground storey and pediments on the first storey, constitute the only architectural features of a novel treatment.

At Bologna there are two or three palaces of interest, — the Bevil- acqua by Nardi (1484), chiefly remarkable for its central court surrounded with arcades, there being two arches on the upper storey to one on the lower, which presents a pleasant contrast and gives scale to the latter; the Fava palace (1484), in which on one side of the court are elaborately carved corbels carrying arches supporting an upper wall; and the Albergati palace (1521), by Peruzzi, in which the architectural decoration is confined to the entrance door- way windows flanked with pilasters and cornices in pediments and the entablatures of the ground and upper storeys, all the features being in stone on a background of simple brick construction. The Casa Tacconi is similarly treated. Many of the streets in Bologna have arcades on which the upper part of the house is built, and there is an endless variety in the capitals of these arcades.

If the palaces of Genoa are disappointing as regards their external design, this is in some measure compensated for by the magnificence of their entrance vestibules, which (with the staircases and the arcades in the courts beyond) are built in white marble, and have probably suggested the title of the " marble palaces of Genoa." Manyof these palaces are situated in narrow streets, so that no general view can be obtained of them, which may account for their exterior being erected in inferior materials with stucco facing. The ground storey of the palaces is almost always raised about 6 to 8 ft. above the street level,

so that the first flight of steps leading up to the court forms a prominent feature in every palace; the ceilings of the entrance vestibule are also mostly decorated with arabesque work in stucco, or with painted devices, &c. The palaces in the town are lofty, and as a rule crowned with fine cornices, and there are no examples of pilasters being carried through the floors ; the palaces and villas in the vicinity of Genoa are of less height, and owe much of their magnificence to the terraces on which they are erected. They have no special qualities except in slight variations of the external wall surface decoration, consisting of the applied orders on the several storeys. Among the best examples are the Palazzo Cataldi, formerly Palazzo Carega (1560), in which there are no pilasters, but rusticated quoins at the angles and windows with moulded dressings and pediments. The entrance vestibules of the Durazzo-Pallavicini, Rcsso (1558) and Balbi (1610) palaces are in each case their finest features. The Pallavicini palace, and the Pallavicini, Spinola, Giustiniani and Durazzo villas, are all fairly well designed and in good proportions, but with no original treatment. Two of the palaces are flanked by open loggias with arcades, from which fine views are obtained, giving them a special character; that of the Durazzo palace being on the first floor, and of the Doria Tursi on the ground storey. The University (1623) and the Ducal palaces have very magnificent entrance vestibules, the former with lions on the lower ramp of the staircase.

Many of the finest palaces at Genoa are by Galeazzo Alessi, but in none of them has he approached the design of the Marino or municipal palace at Milan, in which he produced a remarkable work; the • internal courtyard surrounded with arcades carried on coupled columns is an original combination which is not excelled in any other court in Italy, and the exterior fagades are very fine.

The internal courtyard of the hospital at Milan (243 ft. by 220 ft.), with an arcade in two storeys, was designed by Bramante and begun in 1457; only one side was completed by him, but in 1621, in conse- quence of a large benefaction, the remainder was completed by Ricchini according to the original design; the proportions of the arcade are extremely pleasing, and it forms now one of the chief monuments of the town. Ricchini was the architect of the Litta palace, one of the largest in Milan.

There still remains to be mentioned one of the early examples of the Renaissance, the triumphal arch which was erected in 1470 at Naples to commemorate the entry of Alphonso of Aragon into the town. It is built against the walls of the old castle in four storeys, and connected with bas-reliefs and statues. The largest palace in Italy, that of the Caserta at Naples, with a frontage of 766 ft., built in 1752 by Vanvitelli, is one of the most monotonous designs, rivalled in that respect only by the Escurial in Spain. (R. P. S.)

Renaissance Architecture in France

The classical revival of the 15 th century in Italy was too important a movement to have remained long without its influence extending to other countries. In France this was accelerated by the campaigns of Charles VIII., Louis XII. and Francis I., which led to the revelation of the artistic treasures in Italy; the result being the importation of great numbers of Italian craftsmen, who would seem to have been employed in the carving of decorative architectural accessories, such as the panels and capitals of pilasters, niches and canopies, corbels, friezes, &c, either in tombs, as for instance in those of Charles of Anjou at Le Mans (1472) and at Solesmes (1498), of Francis, duke of Brittany (1501), and of the children of Charles VIII. (1506) at Tours, and of Cardinal d'Amboise in Rouen cathedral, the figures in all these cases being carved by French sculptors. They were also employed in architectural buildings, where the design and execution were by French master-masons, and the Italians were called in to carve the details, as in the choir screens of Chartres, Albi and Limoges cathedrals, the portal of St. Michel at Dijon, the eastern chapels of St Pierre at Caen, and numerous other churches throughout France; or for mansions like the Hotel d'AUuye at Blois, the Hotel d'Allemand at Bourges, and the chateaux of Meillant (1503), Chateaudun and Nantouillet (1519). The great centre of the artistic regeneration was at first at Tours, so that in Touraine, and generally on the borders of the Loire and the Cher at Amboise, Blois, Gaillon, Chenon- ceaux, Azay-le-Rideau and Chambord, are found the principal examples; later, Francis I. transferred the court to Paris, and the chateau of Madrid, and the palaces of Fontainebleau, St Germain-en-Laye, and the Louvre, follow the change. In all these chateaux the Italian craftsman would seem to have been under the direction of the

master-mason or architect, because the whole scheme of the design and its execution is French, and only the decoration Italian. In cases where the Italian was not called

in, the Gothic flamboyant style flourishes in full vigour with no suggestion of foreign influence, as in the palais de justice at Rouen, the church of Brou (Am), 1505-1532, the Hotel de Cluny, Paris, and the rood-screen oi the church of the Madeleine at Troyes (1531).

Between the last phase of Flrmboyant Gothic and the intro- duction of the pure Italian Revival there existed a transitional period, known generally as the " Francis I. style," which may be subdivided under three heads:— the Valois period, comprising the reigns of Charles VIII. and Louis XII. (1483-1515); the Francis I. period (1515-1547); and the Henry II. aˆd Catherine de' Medici period (1 547-1 589). The first two are characterized by the lofty roofs, dormers and chimneys, by circular or square towers at the angles of the main building with decorative machi- colations and hourds, by buttresses set anglewise, which rui: up into the cornice, and square-headed windows with mullions and transoms. In the second period the machicolations are con- verted into corbels carrying semicircular arcaded niches in which shells are carved; the buttresses become pilasters with Renaissance capitals; and the Gothic detail, which in the first period is mixed up with the Renaissance, disappears altogether. In the third period Italian design begins to exert its influence in the regular interspacing of the pilasters or columns with due proportion of height to diameter, in the completion of the order with the regular entablature, and its employment generally in a more structural manner than in the earlier work.

The two first periods are well represented in the chateau of Blois, where, in the east wing built by Louis XII., square-headed windows alternate with three central arches, the buttresses are set anglewise running into the cornice, and pillars and angle shafts are carved with chevrons, spiral fiutings, or cinque-cento arabesque; the cornices of the towers containing staircases project and are carried on arched niches supported on corbels (the new interpretation of the machicola- tions of the feudal castle) ; above the cornice is a balustrade with pierced flamboyant tracery, and the dormer windows retain their Gothic detail. In the north wing of Francis I. all these Gothic ornamental details disappear, and are replaced by the Renaissance. Panels and pilasters take the place of the buttresses — the panels sometimes enriched with cinque-cento arabesque; shells are carved in the arched niches of the cornice, and modillions and dentil courses are introduced; the balustrade is pierced with flowing Renaissance foliage interspersed with the salamanders and coronets; the same high roofs are maintained, but the dormer windows and chimneys, still Gothic in design, are entirely clothed with Renaissance detail.

The finest feature of the facade of this north wing, facing the court, is the magnificent polygonal staircase tower in its centre (Plate VIII., fig.ˆ 84) ; four great piers rise from ground to cornice, between which the rising balustrade is fitted; the whole feature Gothic in design, but Renaissance in all its details. The splendid carving of the panels of the piers and the niches with their canopies was prob- ably done by Italian artists. The figures in these niches are said to be by Jean Goujon. The great dormers and chimneys have not the refinement in their design which characterizes the lower portion, and may be of later date. The north front of the chateau is raised on the foundation walls of the old castle, part of which is encased in it, and this may account for the slight irregularities in the widths of the bays. The design differsˆ from that of the south front, the windows all being recessed behind three-centre arched openings; the open loggia at the top, which is admirable in effect, is a subsequent alteration.

Before passing to the Louvre and Tuileries, representing the third period, we must refer to some other important early chateaux and buildings. Some of these, such as the chateaux of Madrid and Gaillon, are known chiefly from du Cerceau's work, as they were destroyed at the Revolution. Of the latter building, the entrance gateway is still in situ; there are some portions in the court of the Ecole des Beaux-Arts at Paris, consisting of a second entrance gateway, a portico and some large panels. The gateway shows a singular mixture of Gothic and Renaissance; the centre portion, with the gateway and great niche over, is debased classic, the side portions retaining the buttresses, mouldings, panels and other features belonging to the latest phase of Flamboyant Gothic.

Of buildings still existing, the hotel de ville of Orleans (1497) is a good example of early transition work, in which Gothic and Renaissance work is intermingled, and it is interesting to compare it with the h6tel de ville at Beaugency, built by the same architect, Viart, some twenty-five years later. There is the same principle in design, much improved in the later example, but all the Gothic details have disappeared.

In the chateau of Chenonceaux (1515-1524) we find a compromise between the two styles; Gothic corbels, piers and three-centre arches are employed, varied with debased classic mouldings, shells and capitals; here, as at Azay-le-Rideau (1520), the chateau was

not transformed like those at Langeais and Rochefoucauld, where what was externally a 14th-century castle developed internally into a 16th-century mansion; both Chenonceaux and Azay-le-Rideau were built as residences, and yet in both are displayed those features which belong to the fortified castle; at the angles of the main structure in both cases are circular towers, in the latter case crowned with machicolations and hourds, which, however, are purely decora- tive, pierced with windows, and broken at intervals with dormer windows, a feature which gives it the aspect of an attic storey. The lofty roofs and conical terminations to these angle towers, with dormer and chimney, give the same picturesque aspect to the grouping as that which was afforded in the fortified castle, where, however, they originated in the necessity for defence. The entrance portals of both chateaux are beautiful features, absolutely Gothic in design, and only transformed by cinque-cento detail.

In the chateau of Chambord (1526) we find the same defensive features introduced, in the shape of great circular towers at the angles, but here with more reason, as the chateau was intended more for display than habitation. The chateau itself, about 200 ft. square, has circular towers at the angles, and in the centre a spiral staircase wfch double flight, leading to great halls on each side, which give access to the comparatively small rooms in the angles of the square and the towers beyond, and to the roof, which would seem to have been the chief attraction, as there is a fine view therefrom; and the elaborate octagonal lantern over the staircase, the dormer windows, chimneys and lanterns on the conical roofs of the towers, are all elaborately carved. There are three storeys to the building, sub-divided horizontally by string courses, and terminated with a fine cornice carrying a balustrade, and vertically by a series of pilasters of the Corinthian order. The varied outline of this building, with the alternation of blank panels and windows between the pilasters, relieves what migh t otherwise have been its monotony. The chateau is situated on the east side of a great court measuring about goo ft. by 370 ft., with a moat all round. To the right and left of the central block the walls are carved up three storeys, and an attic, with open arcades inside, leading to the angle towers of the enclosure. At a later period Louis XIV. continued the unfinished structure by a one- storey building round. The carving of the capitals, corbels and other decorative work was all done by Italian artists, under the direction of some architect whose name is not known.

One of the gems of Francis I.'s work is the small hunting lodge originally built at Moret near Fontainebleau, to which at one time the king thought of adding, before he began his great palace there. This was taken down in 1826, and re-erected in the Cours-la-Reine at Paris. Though small, it is the purest example of the first Renais- sance. Other examples are the hotel de ville of Paray-le-Monial (1526); the Hotel dAnjou at Angers (1530), built

by Pierre de Pince; the Hotel Bernuy at Toulouse (1530); the H6tel d'Ecoville at Caen (1532); the Manoir of Francis I. at Orleans; the Hotel Bourgtheroulde at Rouen (1520-1532) and other buildings opposite Rouen cathedral, and what remains of the chateau known as the Manoir d'Ango (1525) at Varengeville, near Dieppe. The chateau of St Germain-en-Laye (1539-1544), the upper half of which is built in brick, belongs also to the early period, as also the h6tel de ville at Paris, built in 1533 by Domenico da Cortona, an Italian, who after spending some thirty years in France would seem to have caught the spirit of the French Renaissance so well as to be able to produce one of the most remarkable examples of the Francis I. style. In the existing building the original design has been copied from the building burnt down by the Communists in 1871.

From this we pass to the palace at Fontainebleau, begun by Francis I. in 1526, to which there have been so many subsequent additions and alterations that it is difficult to differentiate between them. The building owes its picturesque effect more to its irregular plan (as portions of an earlier structure were enclosed in it) than to any brilliant conceptions on the part of its architect. There is an endless variety of charming detail in the capitals, corbels and other decorative features, but the employment of pilaster strips purely as decorative features (without any such structural property as that in the Porte Doree at the Cour Ovale) suggests that the Italian architect Serlio, to whom sometimes the work is ascribed, certainly had nothing to do with it.

On the other hand, there is every reason to believe that the designs made by Pierre Lescot for the Louvre, begun in 1546, were, as regards their style, largely based on the principles set forth in Serlio's work on architecture, published in 1540. The south-west angle of the court of the Louvre is the earliest example of the third period of the Renaissance, in which the orders are employed in correct proportions with columns or pedestals carrying entablatures with mouldings based on classic precedent. The portion built from Lescot's designs (Plate VIII., fig. 83) consists of the nine bays on the east and north sides, the latter not being completed till 1574, as the workmen would seem to have been transferred to the building of the Tuileries, begun in 1564.

The Corinthian order is employed for the ground and first storeys and an attic storey above, in which the pilaster capitals run into the bedmcld of the upper cornice. Of the nine bays, the central and side bays are twice the width of the others, and project slightly with the cornices breaking round them ; this feature, and the crowning of the western bays with a segmental pediment, give a variety to

the design, which otherwise might have become monotonous by its repetition of similar features. The balustrade also is replaced by the cheneau, a cresting in stone, which hereafter is found in nearly all French buildings. The sculptor, Jean Goujon, would seem to have worked in complete harmony with the architect, thus producing what will always be considered as one of the chef-d 'ceuvres of French architecture.

The architect employed by Catherine de' Medici for the Tuileries was Philibert de l'Orme, who combined the taste of the architect with the scientific knowledge of the engineer. Only a portion of his design was carried out, and of that much disappeared in the 17th century, when his dormer windows were taken down and replaced by a second storey and an attic. Bullant and du Cerceau also added buildings on each side.

The Tuileries were built about 500 yds. from the Louvre, and Catherine de' Medici conceived the idea of connecting the two. The work, which began with the " Petite Galerie," with the south wing, as far as the Pavilion Lesdiguieres, was started in 1566, being of one storey only. The mezzanine and upper storey were not completed till the beginning of the 17th century. In 1603 the remainder of the south front and the Pavillon-de-Flore were completed by Jacques Androuet du Cerceau.

Of Philibert de l'Orme's work at Anet (1549), only the entrance gateway, the left-hand side of court, and the chapel remain, suffi- cient, however, to show that he had already at that early date mastered the principles of the Italian Revivalists. The chapel is in its way a remarkable design, but the hemispherical dome, pierced by elliptical winding arches inside, is not happy in its effect. The, frontispiece which he created opposite the entrance, now in the court of the Ecole des Beaux-Arts in Paris, shows great refinement in its details, but proportionally errs in many points. De l'Orme built also the bridge and gallery on the river Cher, forming an addition to the chateau of Chenonceaux.

Amongst other work of this period are the additions made by Bullant to the chateau de Chantilly, where he traversed the principles of classic design by running Corinthian pilasters through two storeys and cutting through the cornice of his dormer windows. At ficouen (1550) he destroyed the scale of the earlier buildings of 1532 by raising in front of the left wing of the court four lofty Corinthian columns with entablature complete, which he copied from the temple of Castor in Rome.

Among the early Renaissance work are the chateau of Ancy le Franc (Yonne), Italian in character, which may be by Serlio (1546) ; the H6tel d'Assezat at Toulouse (1555), in which there is a strong resemblance to the court of the Louvre; the houses at Orleans, known as those of Agnes Sorel, Jeanne d'Arc and Diane de Poitiers (1552); and there is other work at Caen, Rouen, Toulouse, Dijon, Chinon, Perigueux, Cahors, Rodez, Beauvais and Amiens, dating up to the close of the 16th century. In this list might also be in- cluded the fine town hall of La Rochelle, the H6tel Lamoignon in the rue des Francs-Bourgeois, Paris (1580), and the Hotel de Vogue at Dijon, which retained the Renaissance character, though built in the first year of the 17th century.

In the reigns of Henry IV. and Louis XIII. the first work of importance in Paris is that of the Place Royale, now the Place des Vosges; in this brick was largely employed, and the conjunction of brick and stone gave a decorative effect which dispensed with the necessity of employing the Classic orders. At Fontainebleau, where Henry IV. made large additions, the same mixture of brick and stone is found in the Galerie des Cerfs, and

in the great service court {cour des cuisines). The example set was followed largely through the country, and numerous mansions and private houses in brick and stone still exist. Henry IV. 's most important work at Fontainebleau is the Porte Dauphine, of which the lower part, with rusticated columns and courses of masonry, does not quite accord in scale or character with the superstructure, in which is put some of the best work of the century.

Except perhaps for the monotony of the rusticated masonry which is spread all over the building, the palace of the Luxembourg, by Salomon de Brosse (1615), is an important work, in which he was probably instructed by Marie de' Medici to reproduce the general effect of the Pitti palace at Florence. The three storeys of the main block are well proportioned, but the absence of a boldly projecting cornice, such as is found in the Riccardi and Strozzi palaces, is a defect ; the same architect reconstructed the great hall of the palace of justice at Paris, burnt in 1871 but now rebuilt to the same design.

In 1629 the building subsequently known as the Palais Royal was begun from the designs of Lemercier; but it has been so materially altered since that scarcely anything remains of his design, though the works carried out from his designs at the Louvre were of the greatest

Eossible importance. The court of the latter, as begun by Pierre escot, was of small dimensions, corresponding with that of the palace of Philip Augustus, but Lemercier proposed to quadruple its dimensions. It is not certain whether he built the lower portion of the Pavilion d'Horloge, but he designed the upper part, with the caryatid figures sculptured by Jacques Sarrazin. On the north side of this pavilion he built a wing similar in length and design to that of Pierre Lescot, and continued the wing along the north side to the centre pavilion; this was continued by Levau, the architect of Louis XIV., round the other sides of the court. His design for the

east front, however, did not recommend itself to the king or to his minister Colbert, and a competition was held, the first place being given to the design by a physician, Dr Perrauit. Prior to its being begun, however, Bernini was sent for, and he submitted other designs, fortunately not carried out, as they would have destroyed the court of the Louvre. In 1665 the works were begun on the design of Perrauit, a grandiose frontispiece

which appealed to Louis X IV. , but in which no cognizance had been taken of the various rooms against which it was built; consequently no windows could be opened, and it forms now a useless peristyle. Moreover it was so much wider than the original building that on the north side it became necessary to add a new front. Fortunately the example set by Perrauit of coupling columns together has rarely been followed since in France, so that in the Garde-Meuble on the south side of the Place de la Concorde, by Gabriel, we return again to the original classic peristyle. The works undertaken at the Louvre progressed but slowly, in consequence of the greater interest taken by Louis XIV. in the palace he was building at Versailles, an extension of the hunting-box built by his father Louis XIII. , which he insisted should be maintained and incorporated as the central feature in the new building. But as it was comparatively small in dimensions, of simple design, and in brick and stone, it was quite unfit to become the central feature of the main front of the largest palace in Europe. To make it worse, the new wings built on either side were lofty and of more importance architecturally, and as they projected some 300 ft. in advance of the earlier building, they reduced it to still greater insignificance. But even then the architect, Jules Hardouin Mansart, might have redeemed his reputation by buildings of greater interest than those which now exist. The back elevation of the central block is 330 ft. wide, the returns 280 ft., and the length of the wings on each side 500 ft. ; in other words he had nearly 1900 ft. run of facade, and it is simply a repetition of the same bays from one end to the other, in three storeys all of the same height, the lower one with semicircular arched openings, the first floor decorated with pilasters on columns of the Ionic order, and an attic storey above with balustrade. The slight projection given to the central and side bays of each block, just sufficient to allow of columns in the first floor as decorative features instead of pilasters, is of no value in fronts of such great dimensions. The great galleries inside have the same monotonous design as in the facades, relieved only by the rich decoration in the first case and the splendid masonry in the latter. There is one saving clause in the main front, the chapel by R. de Cotte on the right-hand side being externally and internally a fine structure, and the best ecclesiastical example of the period.

Among other buildings of the 17th century are those begun by Cardinal Mazarin in the rue de Richelieu, which now constitute the National library; the H6tel de Toulouse (1626), now the Bank of France; the Hotel de Sully (1630), by du Cerceau; the H6tel de Beauvais (1654), by le Pautre; the H6tel Lambert (also by le Pautre),-in the lie St Louis; the chateau at Maisons, near St Germain-en-Laye, by Francois Mansart (1656); the Institute of France (1662), by Levau; two triumphal arches, of St Denis (1672), by Blondel, and St Martin (1674) by Bullet; the H6tel des

Invalides (1670), by Bruant; the Place des Victoires and the Place Vendome (1695-1699), by Jules Hardouin Mansart, in which a series of large nouses are grouped together in one design; the Trianon at Versailles (1676), and the chateau of Marly (1682), both by J. H. Mansart; and important monumental buildings in the principal provincial cities, such as Lyons, Bordeaux, Nantes and Tours.

In the 1 8th century those which are worthy of note are the H6tel Soubise (1706), now' the "Archives Nationajes " ; the fountain in the rue de Crenelle, a fine composition; the Ecole Militaire (1752), by Gabriel; the Ecole de Medecine (1769), byGondouin; the mint (1772), by Antoine; the Place de la Concorde, with the Garde- Meuble, by Gabriel (1765); the H6tel de Salm, now the Legion of Honour; the Place Stanislas at Nancy (1738-1766), in which are grouped the town hall, archbishop's palace, theatre and other public buildings, with triumphal arch and avenues leading to the palace of the duke Stanislaus (with magnificent wrought-iron enclosures and gates by Jean Lamour, the greatest craftsman of the century); the theatre at Bordeaux by Louis; and the Odeon, Paris

(1789).

The ecclesiastical architecture of the French Renaissance comes at the end of our description owing to the far greater importance of the palaces, mansions and public monuments, and also because in the beginning of the 16th century France found herself in posses- sion of a much larger number of cathedrals and large churches than she could maintain. Some of these are still unfinished, so that her first efforts would seem to have been directed to the completion of those already begun rather than to the erection of new ones, St Eustache in Paris being nearly the only exception of importance prior to the 17th century.

We have from time to time dwelt upon the important consideration which must not be lost sight of, viz. that nearly all the buildings erected in France up to the accession of Henry IV. were conceived and carried out in the spirit of the Flamboyant Gothic style, cinque- cento details mixed up with Gothic at first, then superseding them, and even when the influence of the Italian revivalists began to exert itself, still retaining much of her traditional methods of design.

If this was the case in civil architecture, it was naturally more pronounced in the additions made to ecclesiastical structures, and the gradual development of the style may be more easily followed in the la'tter. These are, however, so numerous, and they are so uni- versally spread throughout France, that only a few of the most interesting examples can be here given; for instance, the porch of St Michel at Dijon; the upper part of the western

towers of the cathedrals of Orleans and Tours; the three eastern chapels of St Jacques, Dieppe, built at the cost of Jean Ango, a celebrated merchant-prince of Dieppe, to whose chateau at Varengeville we have already referred; the eastern chapels of St Peter's, Caen, from the designs of Hector Sohier (1521), both internally and externally of great interest; the west end of the church at Vetheuil (Seine-et-Oise) ; the magnificent work of the west front and tower of the church at Gisors; the upper part of the west front of the cathedral at Angers ; the portals of the church at Auxonne (Fichot) ; the chdir at Tillieres; the lantern of the church of St Peter, Coutances (1541); the porch of the Dalbade at Toulouse; and the north front of the church of Ste Clotilde at Les Andelys, which dates from the age of Henry II.

The church of St Eustache at Paris, begun in 1533, but not com- pleted till the end of the century, is a large cruciform Gothic structure with lofty double aisles on each side and carried round the choir, and rectangular chapels round the whole building, excepting the west end. Structurally also it possesses all the most characteristic features of the Gothic church, with nave arcades carried on com- pound piers, triforium and clerestory, vaulted throughout, and flying buttresses outside. Close examination shows that all the details are of the early cinque-cento work, panelled pilasters of varying proportions, but with Renaissance capitals, corbels, niches and canopies all grouped together in a Gothic manner, and quite opposed to the principles of the Italian revivalists; what is more remarkable is that though long before its completion these principles had already borne fruit in the Louvre and Tuileries, the original conception was adhered to, and the portals of the north and south transepts (the last features added, with the exception of the ugly west front of the 18th century) still retain the character of the early French Renaissance.

In St £tienne-du-Mont, sometimes claimed as a second example, the church is Flamboyant Gothic throughout, the chief additions being the magnificent rood-screen of 1600, and the west portal, in which the banded columns of the Bourbon period form the chief features.

Coming to churches of later date, Salomon de Brosse (e. 1565- 1627), the architect of the Luxembourg palace, added in 1616 a fresh front to the church of St Gervais, finely proportioned and of pure Italian design, which contrasts favourably with the Jesuits' church of St Paul and St Louis (1627-1641), overladen with rococo orna- ment; then came the churches of the Sorbonne (1629), by Jacques Lemercier, and of the Val-de-Grace (1645), by Francois Mansart, the dome of the latter, though small, being a fine design ; the church of the Invalides, also by Mansart, the dome of which is the most graceful in France; the cathedral of Nancy (1703-1742), by Jules Hardouin Mansart and Germain Boffrand (1667-1754), the

principal front of which is flanked by two towers with octagonal lanterns which group so well with the central portion (of the usual design, in two stages with pilasters and coupled columns, carrying a third stage with circular pediment) that it is unfortunate it should be almost the only example of its kind; and lastly the church of Ste Genevieve, better known as the Pantheon (1755). by Jacques Germain Soufflot (1713-1780), the dome of which is based largely on that of St Peter's in Rome. The main building with its great portico is a simple and fine piece of design, and unlike St Peter's the dome is well seen from every point of view; the decoration of its walls with paintings by Puvis de Chavannes and other French artists has now rendered the interior one of the most interesting in France. (R- P- S.)

Renaissance Architecture in Spain

In Spain, as in France, the revival of classic architecture was engrafted on the Flamboyant style of the country, influenced here and there by Moorish work, so that the earlier examples of Spanish Renaissance constitute a transitional style which lasted till the accession of Philip II. (1558), who introduced what was then considered to be the purer Italian style of Palladio and Vignola. This, however, did not seem to have had much attraction for the Spaniards, owing to its coldness and formality, so that in the latter half of the 17 th century a reaction took place in favour of the most depraved and decadent architecture in existence.

The magnificence of the earlier Renaissance work, which was introduced into Spain when she was at the zenith of her power, and (owing to the discovery of a new world) the possessor of enormous wealth,has scarcely yet been recognized,in consequence of the greater attraction of the Moorish architecture; there is

no doubt that its exuberant richness in the 16th century de- rives its inspiration from the latter, and especially so in patios or courts found in every class of building, ecclesiastical as well as civil. There is still, however, another characteristic in the early Renaissance of Spain, which is not found in Italy or France, and which again owes its source to Moorish work, where the external walls and towers consist of simple plain masonry, and the rich decoration, generally in stucco brilliantly coloured and gilded, is confined to the courts and to the interiors of their magnificent halls. The Italian

method of decorating the external front of the palaces with flat pilasters of the various orders placed at regular intervals, the windows and doors forming features of second-rate importance, was not followed by the architects of the Spanish Renaissance, who retained the simple plain masonry and reserved their decorations for the entrance doorways and windows, emphasizing therefore these features, and by contrast increasing their value and interest.

Instead also of the huge cornicione which the Italians employed to give the shadows required to emphasize the crowning features of their palaces, the Spanish architects preferred to obtain a similar effect by an open arcaded upper storey, which, as Fer- gusson remarks, " forms one of the most pleasing architectural features that can be applied to palatial architecture, giving lightness combined with shadow exactly where wanted for effect and where they can be applied without any apparent interfer- ence with solidity." These galleries would seem to have been provided to serve as promenades to the occupants of the palace, and more especially for the ladies when it would have been unwise or imprudent for them to venture into the streets. There is one well-known example in France, in the chateau of Blois, which is so attractive a feature that it is singular it has not been more often adopted.

Instead also of the monotonous balustrade, which is invariably found in Italy, the Spanish architects introduced richly carved crestings, with finials at regular intervals, a feature probably borrowed from Flamboyant Gothic and Moorish.

The three periods into which the architectural phases of the Renaissance style in Spain are divided are: — (i) The Plateresque or Silversmiths' work, from the conquest of Granada to the reign of Philip II. (2) The purer Italian style, called by the Spanish the Greco-Roman, though it has no Greek elements in its design, being based on the worts of Palladio and Vignola. This style prevailed until the end of the 17th century. (3) The Rococo or Churrigueresque style, so called from the name of the architect, Jose Churriguera (d. 1725), the chief leader of the movement, which lasted for about 100 years.

Ecclesiastical Architecture. — The cathedral of Granada, built from the designs of Diego de Siloe, is the earliest example of the Renais- sance in Spain, and in some respects the most remarkable, not only for its plan, in which there is an entirely new feature, but for the scheme adopted in the vaulting, which covers the whole church, and shows that its architect had studied the earlier Gothic churches, and was well acquainted with the principles of thrust and counter- thrust developed in them. The cathedral is 400 ft. long by 230 ft. wide, and therefore of the first class as far as size is

concerned. The western portion consists of nave and double aisles on each side, the outer aisle being carried round the whole church and giving access to the chapels which enclose the building. The principal feature of the cathedral is at the east end, where the place of the ordinary apse is occupied by a great circular area, 70 ft. in diameter, crowned by a lofty dome, in the centre of which in a flood of light stands the high altar. The vista from the nave through the great arch (37 ft. 6 in. wide and 97 ft. high) is extremely fine, and it is strange that it should be the only example of its kind. The west front was completed at a later date ; the only feature of it belonging to the original church being the north-west tower, which, in its design, resembles the south-west tower of the church at Gisors in France. There are two other important Renaissance cathedrals at Jaen and Valladolid. The latter was built from a design of Juan de Badajoz in 1585 but never completed. On the south side of the cathedral is the chapel in which the Catholic kings lie buried, where there are two fine marble tombs enclosed by the reja or wrought-iron screen partly gilt, forged in 1522 by Maestre Bartholome. The sagrario or parish church, also on the south side, is a small version of the scheme of design employed in the cathedral.

In Spain, as in France, magnificent portals have been added to cathedrals and churches, and these are amongst the finest works of the Renaissance period. The more remarkable of these are the

portals of the cathedral of Malaga, a deeply recessed porch, enriched with slender shafts and niches between; of Santa Engracia at Saragossa ; and of Santo Domingo and the cathedral at Salamanca. Externally the Renaissance domes over the crossings of Spanish cathedrals are poor, but this is compensated for by the lofty steeples which form striking features. The western towers of the cathedral at Valladolid ; the tower of the Seo in Saragossa, which bears some resemblance to Wren's steeples in the setting back of the several storeys and the crowning with octagonal lanterns ; the tower of the cathedral Del Pilar at Saragossa, and that at Santiago, are all interesting examples of the Spanish Renaissance.

One of the most beautiful features of the Spanish Renaissance is found in the magnificent rejas or wrought-iron grilles, richly gilt, which form the enclosures of the chapels. Besides the example at Granada, others are found at Seville, where is the masterpiece of Sancho Munoz (1528); at Palencia (1582); Cuenca (1557), where there are three fine examples; Toledo; Salamanca; and other cathedrals. The iron pulpit at Avila, the eagle lectern at Cuenca and the staircase railing at Burgos are all remarkable works in metal.

Secular Architecture. — With the exception of the magnificent portals, the finest works of the Renaissance in Spain as in France are to be found in the

secular buildings, but with this difference, that the best examples in France are those built in the country or in comparatively small provincial towns, whereas in Spain they are all in the midst of the larger towns, and further they are not confined to palaces and ch&teaux; monasteries and universities coming in for an equal share in the great architectural development.

The characteristic style of the Spanish architecture of the Renais- sance period is due probably to the influence of the earlier Moorish work, where the value of the rich Alhambresque decorations in the entrance doorways and windows, and the patios or courts, is enhanced by contrast with the plain masonry of their walls and towers. This influence had already been felt in the Spanish flamboyant Gothic panelling and tracery; when translated into Renaissance, and probably, at first,, executed by Italian artists, it displayed a variety and beauty in its design scarcely inferior to some of the best work in Italy. And this development, taking place at a time when Spain was overflowing with wealth, resulted in that exuberant richness we find in the entrance doorways and windows, the external galleries of the upper storey, and the rich cresting surmounting the cornice.

Comparison with the contemporary and even earlier work in Italy, where the principal thought of the architect would seem to have been to break the wall surface by an unmeaning series of flat pilasters, and then fill in the windows as features of secondary importance, will show that the Spanish architect recognized more fully the true principle of design, and although, in the profiles of their mouldings, and the execution of the sculpture decorating their pilasters and friezes, Spanish work in contrast with Italian looks somewhat coarse, in general picturesqueness it is far in advance of the palaces of Rome, Florence, and even Venice, and has not yet received the recognition which it deserves.

The earliest palace built in the Renaissance style is that which adjoins the Alhambra at Granada, and was begun by the emperor Charles V. for his own residence in 1527, but never completed. The building is nearly an exact square of 205 ft., with a great circular court in the centre, nearly 100 ft. in diameter. This central court was enclosed by a colonnade with Doric columns, and an upper storey with columns of the Ionic order. From the unfinished con- dition of the palace and the absence of roofs, it is difficult to decide what the form of the latter might have been. But the design, begun by Pedro Machuca and continued by Alonso Berruguete (1480- 1561), is so remarkable that it ought to be better known. Its proximity to the Alhambra, however, deprives it of the attention which otherwise it deserves for the purity of its details and for its good proportion.

A second palace, the Alcazar at Toledo, was begun in 1540 by Charles II.,

but little else than the bare walls remain, as it was destroyed by fire in 1886, after having been twice rebuilt. In its design it belongs to the true Spanish type of the Renaissance, with the simple ashlar masonry of its walls and the accentuation of the principal entrance doorway and the windows. In this palace also the plan is square, about 1 10 ft., with a square courtyard (240 ft.).

The third palace built, the Escorial, some 20 m. to the north-east of Madrid, is the most renowned — more, however, on account of its immense size than for its design. It was built for Philip II. and begun in 1563 from the designs of Juan Bautista de Toledo, being completed by his pupil, Juan deHerrera, in 1584. The principal front is 680 ft. in width, the depth of the palace 540 ft., with the king's residence in the rear. The plan is a fine conception, and consists of a large entrance court in the centre, with the church in the rear, having on the right the Colegio and on the left the monastery, with numerous courts in each case. The church is 320 ft. long by 220 ft. wide, the principal portion being the intersection of the nave and transept, which is covered by a dome. The coro is placed above the entrance vestibule, which is 100 ft. long and 27 ft. high, im- perfectly lighted, but by contrast emphasizing the dimensions and the splendour of the church beyond. Externally the grouping is fine; the lofty towers at the angles, the central composition of the ' main front, and at the rear of the court the front of the church

with its corner towers and the great dome, all form an exceedingly picturesque group, and it is only when one begins to examine the work in detail that its poverty in design reveals itself. Instead of accentuating the windows of the principal storeys and giving them appropriate dressings, the fronts are pierced with innumerable windows, which give the appearance of a factory, and the angle towers, nine storeys high, look like ordinary " sky-scrapers," without any of the dignity and importance which the architectural design of a palace requires. The same applies to the great entrance courts five storeys high with an attic, all of the most commonplace design. Internally the church is fine, but it is dwarfed by the immense size of the Doric pilasters, 62 ft. high, all in plain stone masonry, the coldness of which is emphasized by the rich colouring of the vaulted ceilings and the elaboration of the pavement, all in coloured marbles. The palace is regarded by the Spaniards as the Versailles of Spain, and if it had been possible to have interchanged some of the features, to transfer to Versailles

some of the towers, and to break up.the wall surface of the Escorial with the superimposed order of pilasters, which became monotonous by their repetition at Versailles, both palaces would have gained.

The palace at Madrid is the last of the series, and although it was begun at a much later period, by Philip V. in 1737, from the designs of the Italian architect Sachetti, it is a fine and simple composition, consisting of a lofty ground storey with coursed masonry, carrying semi-detached columns of the Ionic order, rising through three storeys, the whole crowned by an entablature and a bold balustrade. The slightly projecting wings at each end of the main front and the central frontispiece give that variety and play of light and shade of which one regrets the absence in the Cancellaria palace at Rome.

We must, however, retrace our steps to the beginning of the 16th century, to take up the early buildings of the style; the palace of the Conde de Monterey at Salamanca, built in 1530 from the designs of Alonso de Covarrubias, is a fine example. The masonry of the ground and first floors is of the simplest character, the decora- tion being confined to the entrance doorways and to the windows of the important rooms. It is on the second floor that the design becomes enriched with an open arcade and entablature above, crowned with a rich cresting. In the wings at the angles, and in the central block, the buildings are carried up an additional storey, the plain masonry of which gives value to the open galleries between. On these wings and the central block are other galleries crowned with entablature and cresting. These features therefore form towers, which break the sky-line. There is still another treatment peculiar to the Spanish Renaissance, in which the example of the Moorish palaces would seem to have been followed, viz. the elaborate carving of the pilasters and their capitals, of the panelling and the horizontal friezes, which is extremely minute and finished in the lower storeys, but increases in scale and projection towards the upper storeys. This is very notable in the entrance gateway of the university of Salamanca (Plate V. , fig. 73) , where the carved arabesque in the panelling above the doors is of the finest description, equal to what might be found in cabinet work, whilst that of the upper portion immediately under the cornice is at least twice the scale of that below and is in bold relief.

The principal buildings characteristic of the Spanish Renaissance, in chronological order, are: — the hospital of Santa Cruz at Toledo, built in 1 504-1 5 14, and the Hospicio de los Reyes at Santiago (1504), both from the designs of Enrique de Egas, the former with a magnificent portal rising through two storeys and a gallery with an open arcade above; the Irish college at Salamanca, built (1521) from the designs of Pedro de Ibarra, Alonso de Covarrubias, and Berruguete; the convent of San Marcos, Leon,

by Juan de Badajoz (1 514—1545) — here, however, the whole facade is panelled out in imitation of late Gothic work, Renaissance pilasters and devices taking the place of the buttresses set angle-wise and flamboyant panelling; the Colegio de San Ildefonso at Alcala de Henares (formerly the seat of the university), built in 1557-1584 by Rodrigo Gil de Ontanon.

Of municipal buildings the Lonja or exchange at Toledo (1551)., built in brick-work, is somewhat Florentine in style.

The town hall of Seville (1 527-1 532), by Diego de Riaiio and Martin Garuza, may be taken as the most gorgeous example in Spain (Plate V., fig. 74). The front facing the square is very simple, compared with the facade in the street at the rear, and here again we find, in the ornamental carving of the windows and door mould- ings on the ground floor, a different scale from that adopted on the first floor, where the shafts are enriched with a superabundance of carved ornament in strong relief. There is still one other feature of great importance in Spain, the magnificent galleries of the patios or courts found in all the important buildings. It is from these galleries that access is obtained to the rooms on the first floor. They have sometimes arcades on the first floor, and columns with bracket - capitals on the upper storey. There is an infinite variety of design in these capitals, the brackets on each side of which lessen the bearing of the architrave.

The earliest Renaissance example of these patiog (1525) is in the Irish college at Salamanca; it was carved by Berruguete, Alonso de Covarrubias being the architect. In the same town is the Casa de la Salinas, another example with fine sculpture. In the Casa Polentina (1550) at Avila, and the Casa de Miranda at Burgos, columns with

bracket-capitals are employed on both storeys. Rich examples are found in the Casa de la Infanta and Casa Zaporta (1580), both at Saragossa. Of late examples the patio of the Lonja at Seville by Juan de Herrera resembles in its style the courtyard of the Farnese palace at Rome; and the same style obtains in the court of the Escorial, built at a time when the purer Italian style was introduced into Spain. These courts, though cold in design, compared with the earlier Renaissance type, are of fine proportion. Two other examples are found in the bishop's palace at Alcala de Henares, one of which has a magnificent staircase. (R. P. S.)

Renaissance Architecture in England In England, as in France, the influence of the Classic Revival was first seen in connexion with tombs and church work, though not nearly to the same extent as in France, where

throughout the country the work of the Italian sculptor is to be found not only in churches but in country mansions. On the other hand, two if not three of the Italian artists who came over to England were men of some reputation, such as Pietro Torrigiano, a Florentine sculptor who was invited over by Henry VIII. and entrusted with the tomb of Henry VII. in Westminster Abbey (1512-1518), and executed the tomb of John Young (in terra- cotta) in the Rolls chapel (1 5 16) . Another Italian was Giovanni da Maiano, who was also a Florentine, who modelled the busts of the emperors in the terra-cotta medallions over the entrance gates at Hampton Court, and probably the panel flanked by Corinthian pilasters, in which are modelled the arms of Cardinal Wolsey, also in terra-cotta. Benedetto da Rovezzano (1478- c. 1552), and Toto del Nunziata, Italian artists of note, were also employed in England, the first on the tomb of Cardinal Wolsey (now destroyed), and the second on the palace of Nonsuch, built by Henry VIII., which was pulled down in 1670. Other early Renaissance work is found at Christchurch Priory, in the Salisbury Chantry (1529), the design of which is Gothic and some of the details Italian, and in the tombs of the countess of Richmond in Westminster Abbey (15 19), of the earl of Arundel in Arundel church, Sussex, of Henry, Lord Marney, at Layer Marney (1525), of the duke of Richmond (1537) and the duchess of Norfolk (1572) in Framlingham church; and of Queen Anne of Cleves (1557) in Westminster Abbey, attributed to Haveus of Cleves. The sedilia (in terra-cotta) of Wymondham church, Norfolk, the choir screen at St Cross, and Bishop Gardiner's chantry, Winchester, and the vaulted roof of Bishop West's chapel at Ely, all show the direct influence of the Italian cinque-cento style. The most beautiful example in England of Italian wood- work is the organ screen in King's College chapel, Cambridge (1 534-1 539), which, except for the coats of arms, the roses, port- cullis and other English emblems, might be in some Italian church, so perfect is its design and execution. Of early domestic work, Sutton Place (1 523-1525), near Guildford, Surrey, is a good example of transition work. The design is Tudor, but the window mullions and panels inserted throughout the structure, which is built in brick, are all enriched with cinque-cento details in terra-cotta, and probably executed by Italian craftsmen. Similar enrichments in the same material are found decorating the entrance tower (1522-1525) at Layer Marney, Essex.

Nearly all the examples above mentioned come within the first half of the 16th century. Passing into the second half and dealing with domestic architecture, we find the history of the introduction of classic work into England more complicated than in other countries, because in addition to the Italian, we have French, Flemish and German influences to reckon with, and it is sometimes difficult to decide from which source the features are borrowed. There were, however, two still more important

considerations to be taken into account — firstly, the extremely conservative character of the English people, who were satisfied with the traditional work of the country, and the methods by which it was parried out, and secondly, the great progress in design which was made during the Elizabethan period, resulting in a phase which was peculiarly English and did not lend itself easily to classic embellishment.

Already in the last phase of Gothic work, to which the title of Tudor is generally given, important changes were being made in the planning of the larger country mansions, and features

were introduced which seemed to give an impetus towards their further development.

The most important of these features were the following: — the bow window, rectangular or polygonal, of which the earliest examples date from the reign of Edward IV. (1461-1483), such as Eltham Palace in Kent, Cowdray Castle in Sussex, and Thornbury Castle in Gloucestershire, and at a later period at Hampton Court ; octagonal towers or turrets flanking the entrance gateway at each end of the main front; the projecting forward of the side wings so as to get bfctter light to the rooms in them by having windows on both sides, sficb projections varying the otherwise monotonous effect of a uni- form facade without breaks ; the long gallery (generally on an upper floor), which was an important characteristic of the Elizabethan house; and last but not least, the adherence to the type of old Tudor window, with its moulded mullions and transoms but with square head.

One of the first modifications was the introduction of semicircular bow windows, as in Kirby Hall, Northamptonshire, followed by a second example at Burton Agnes in Yorkshire (1602-1610), and a third at Lilford Hall in Northamptonshire (1635). They were carried up through three storeys at Kirby Hall, the upper storey in [the roof; three storeys at Burton Agnes with balcony and balustrade; and two storeys at Lilford Hall — these features being extremely simple but fine in effect, and the windows with moulded mullions and transoms lending themselves naturally to the curve.

The projecting bays and bow windows seemed to have such an attraction for the builders of these country mansions that at Burton Agnes (with a rectangular plan of 120 ft. by 80 ft.) there are no fewer than thirteen of

them, which break up the wall surface and give a picturesque group externally, whilst internally they add to the fine effect of the rooms. At Barlborough Hall, Derbyshire, with a frontage of 80 ft., there is a central rectangular bay forming the entrance porch and carried up above the roof, and two large octagonal bow windows which rise as towers with an extra storey. In all these mansions the only influence which the Revival seems to have exerted was in the introduction of an entablature, which sometimes takes the place of the Gothic string course, balustrades which crown the building, but with no projecting cornice, and gables with curved outlines and Renaissance panels or scrolls. The fact is that, with prominent features so widely differing from those which were represented on the perspective drawings attached to the earlier publications of the five orders, such as those of Serlio (1537) and Vredeman de Vries of Antwerp (1577), the only course left open to the master-mason was to decorate the principal entrance with columns and pilasters of the Classic orders, sometimes superposed one upon the other.

To the further development of this singular introduction of the Classic orders we shall return; for the moment it will be better to follow a chronological sequence and take up the principal examples of the country mansion, some of which were from the first intended to be Classic buildings. Of the house built at Gorhambury in Hertfordshire (1563) for Sir Nicholas Bacon, the father of Lord Bacon, too little remains to render its design intelligible, except that it still retains in its lofty window the Tudor pointed arch ; but in Longleat in Wiltshire, built by Sir John Thynne (1567-1580), we have a typical example, the design of which departs from the English type, though it would seem to have been carried out according to the traditional custom of entrusting the whole work to a master- mason, and furnishing him with sketch designs of some kind suggest- ing the required arrangements of the plan, the principal features of the exterior elevation and the internal disposition. This custom was adhered to far into the 18th century at Oxford and Cambridge, where the alterations and additions to some of the colleges, such as the chapel of Clare College, Cambridge (1763), were carried out by master-masons or builders who were supplied with sketch designs and sometimes even the materials for the buildings they had to carry out, notwithstanding the existence of properly trained architects, who from the first half of the 17th century were usually entrusted with the preparation of the necessary designs for new structures of any considerable importance.

The name of the designer of Longleat is not known; the master- mason was Robert Smithson, who in 1580 went to Wollaton in Nottinghamshire and constructed the mansion there. Longleat is so Italian in style that it must have been conceived by some one who had been in Italy, because it departs from the usual English type. The plan is rectangular, with a frontage of 220

ft. by 180 ft. deep, an entrance porch in the centre, with two projecting bays on each side carried up through the three storeys, and three similar bays on the flanks. The whole block is crowned with a parapet, the centre

Cortion of which is pierced with a balustrade, but the main cornice ears no resemblance to the Italian feature, being only that of the entablature of the upper order. The projecting bays are decorated with pilasters of the Doric, Ionic and Corinthian orders, each with its

E roper entablature. These classic features would seem to have een copied from a work by John Shute, painter and architect, who had been sent to Italy by the duke of Northumberland in 1551, and in 1563 brought out his Chief Groundes of Architecture, the first practical work published in English on architecture. Shute died in the same year, but two other editions appeared in 1579 and 1584,

which shows that it must have had an extensive circulation and probably exercised the greatest influence on English architecture. A second book on the orders, already referred to as published in JS77 by J an Vredeman de Vries of Antwerp, was not of the same type, for instead of confining his work, like Shute and Serlio, to a simple representation of the Classic orders, he introduced, on the shafts of his columns and on the pedestals, designs of the most debased rococo type, with additional plates suggesting their applica- tion to various buildings. Robert Smithson, or his client Sir Fr. Willoughby, apparently obtained a copy of this book, and the result is seen (Plate VI., fig. 76) in the mansion built at Wollaton (1580- 1588), in which we find the first examples of elaborately decorated pedestals; crestings on the angle towers, the design of which is known as strap-work; and medallions with busts in them, enclosed with twisted curves similar to those which flowers and leaves take when thrown into the fire. The plan and the scheme of the design of Wollaton. is, however, so far superior to the usual type, that it may fairly be ascribed to John Thorpe, an architect or surveyor, of whose drawings there is a large collection in the Soane Museum, represent- ing many of the more important mansions of the Elizabethan era; some of his own design, others either plans measured from existing buildings upon which he was called in to report or copies from other sources, and some reproduced from published works such as Vrede- man de Vries's pattern book and Androuet du Cerceau's Des plus excellents bastiments de France (1576).

To John Thorpe is also attributed the design of Kirby Hall (1570-1572) in Northamptonshire, in which the plan of the feudal castle with great central court is still retained. This court is symmetrically designed, and was evidently considered to be the principal feature, the decoration being far richer than that of the exterior of the building.

Amongst other important mansions are Moreton Old Hall (1550- 1559. partly rebuilt in 1602; see House, Plate III., fig. II) in Cheshire, a fine house in half-timber; Kuole House, Kent (1570), possibly also designed by John Thorpe; Charlecote Hall (1572) near Stratford-on-A von ; Burleigh House, Northamptonshire (1575), the most remarkable feature in which is the great tower in the court- yard, decorated with the Doric, Ionic and Corinthian orders super- posed, the design apparently suggested by a similar feature in the chateau of Anet, France (published in du Cerceau) ; Apethorpe Hall, Northamptonshire (1580); Montacute House, Somersetshire (1580-1600); Castle Ashby, Northamptonshire (1583-1589); Brereton Hall, Cheshire (1575-1586), in brick and stone; Westwood Park, Worcestershire (1590); Wakehurst Place, Sussex (1590); Hardwick Hall, Derbyshire (1590-1597); Longford Castle, Wiltshire (1591-1612); Cobham Hall, Kent (1594); Dorton House, Bucking- hamshire (1596); Speke Hall, Lancashire (1598), partly in half- timber work; Holland House, Kensington (1606; wings and arcades, 1624); Bolsover Castle, Derbyshire (1607-1613); Charlton House, Kent (1607); Bramshill, Hampshire (1607-1612), an interesting example of Jacobean architecture; Hatfield, Hertfordshire (1608- 161 1), with an extremely fine courtyard (north side" in brick and stone, 1621); Audley End, Essex (1610-1616), a great portion of which was afterwards pulled down; Ham House, Surrey (1610), chiefly in brick; Pinkie House, at Musselburgh in Midlothian (1613); Aston Hall near Birmingham (1618-1635); Blickling Hall, Norfolk (1619); Heriot's hospital, Edinburgh (1628-1659); and Lanhydroc, Cornwall (1636-1641), which brings us down to the period of the pure Italian Revival introduced by Inigo Jones.

We have already referred to the reproduction of the Classic orders, superposed as an enrichment of the principal entrance doorways. In addition to Burton Agnes and Burleigh House, there are endless examples in mansions and country houses, but the most remarkable are those at Oxford : in the old Schools, where coupled columns flank the entrance gateway with the five orders superposed, and in Merton and Wadham Colleges, with four orders (the Tuscan being omitted), in neither case taking any cognizance of the levels of windows or string courses of the earlier building to which they ,were applied, or serving any structural purpose. The orders were all taken from one of the pattern books, and in the Schools and in Merton College the rococo ornament and strap-work found in Vrede- man de Vries's work were copied with more or less fidelity to the original. There are, however, two or three buildings ˆNorthampton- shire which are free from rococo work, and in their design form a pleasant contrast, as much to the elaboration of the buildings just described as to the cold formality of the works of the later Italian style. Lyveden new buildings (1577), the Triangular Lodge at Rushton, and the Market House at

Rothwell, are all examples in which the orders from Serlio or John Shute are faithfully repre- sented, and are of a refined character; in the first named the en- tablatures only of the orders are introduced. In Rushton Hall (1595) the cresting of the bow windows shows the evil influence of Vredeman de Vries's pattern-book and of numerous designs by him and other Belgian artists, which were printed at the Plantin press. Two other publications of a similar rococo type were brought out in Germany, one by Cammermayer (1564) and the other by Dietterlin (1594), both at Nuremberg; neither of them would seem to have been much known in England, but indirectly through German craftsmen they may have influenced some of the work of the Jacobean period, and more particularly the chimney pieces and the ceilings

of the gallery and other important rooms in which strap-work is found. Among the finer examples of ceilings of early date are those of Knole, Kent; Haddon Hall, Derbyshire; Sizergh Hall, Westmor- land; South Wraxall Manor House, Wiltshire; the Red Lodge, Bristol; Chastleton House; and Canons Ashby — in the last three with pendants. Two of the best-designed ceilings of modest dimen- sions are those of the Reindeer Inn at Banbury and the Star Inn at Great Yarmouth. The principal decorative feature of the reception rooms was the chimney-piece, rising from floor to ceiling, in early examples being very simple — as those at Broughton House and Lacock Abbey — but at a later date overlaid with rococo strap-work ornament and misshapen figures, as at South Wraxall and Castle Ashby. One of the most beautiful chimney-pieces is in the ball- room at Knole, probably of Flemish design, but at Cobham Hall, Hardwick, Hatfield and Bolsover Castle are fine examples in which different-coloured marbles are employed, there being a remarkable series at the last-named place.

The long gallery has already been incidentally mentioned. Its origin has never been clearly explained; it was generally situated in an upper storey, and may have been for exercise, like the eaves galleries in Spain. The dimensions were sometimes remarkable ; one at Ampthill (no longer existing) was 245 ft. long; and a second at Audley End, 220 ft. long and 34 ft. wide. Of moderate length, the best known are those of Haddon Hall, with rich wainscotting carried up to the ceiling, Hardwick, Knole, Longleat, Blickling Hall and Sutton Place, Surrey.

In early work the staircases were occasionally in stone with circular or

rectangular newels, but the more general type was that known as the open well staircase, with balustrade and newels in timber. Of these the more remarkable examples are those at Hat- field; Benthall Hall, Shropshire; Sydenham House, Devonshire; Charterhouse, London; Ockwells Manor House, Berkshire; Blickling, Norfolk; and the Old Star Inn at Lewes, Sussex.

One of the important features in the old halls was the screen separating the hall from the passage, over the latter being a gallery ; the front of the screen facing the hall was considered to be its chief decoration, and was accordingly enriched with columns of the Classic orders, and balustrade or cresting over. The screens of Charter- house (London), Trinity College (Cambridge), Wadham College (Oxford), and the Middle Temple Hall (London), are remarkable for their design and execution. The great hammer-beam roof (1562- 1572) in the last named is the finest example of the Renaissance in existence (see Roofs, Plate I., fig. 25).

With the exception of chantry or other chapels added to existing buildings, there was only one church built in the period we are now describing, St John's at Leeds. This church is divided down the centre by an arcade of pointed arches, virtually constituting a double nave, and the rood-screen is carried through both. The window tracery and the arcade show how the master-mason adhered to the traditional Gothic style, but the rood-screen, notwithstanding its rococo decoration, is a fine Jacobean work, eclipsed only by the magnificent example at Croscombe, which, with the pulpit and other church accessories, dating from 1616, constitutes the most complete example of that period.

The pure Italian style, as it is sometimes called, was introduced into France probably by Serlio, and the result of its first influence

is shown in the Louvre, begun in 1546. It entered Jones. Spain about 20 years later, under the rule of Philip II.,

and Germany about the same time, creating about 100 years later a reaction in Spain in favour of a less cold and formal style, and scarcely taking any root in Germany. In England its first appearance does not take place till 1610, when Inigo Jones, after his second visit to Rome, designed an immense palace, measuring 11 50 ft. by 900 ft., of which the only portion built was the Banqueting House in Whitehall (Plate VI., fig. 75); a fine design, in which the emphasizing of the central portion by columns in place of pilasters is an original treatment not found in Italy, but of excellent effect. Unfortunately many subsequent designs of Inigo Jones were either not carried out or have since been destroyed; but nothing approached this admirable work in Whitehall.

Among his buildings still remaining are St Paul's, Covent Garden (1631), a simple and massive structure which requires perhaps an Italian sun to make it cheerful ; York Stairs Water-gate (1626) ; the front of Wilton House, near Salisbury (1633); the Queen's House, Greenwich (1617), a very poor design; Coleshill, Berkshire; Raynham Park, Norfolk, with weakly-designed gables and an entrance doorway with curved broken pediment, which can scarcely be regarded as pure Italian; and Ashburnham House, Westminster (the staircase of which is extremely fine), carried out after his death by his pupil John Webb, who, at Thorpe Hall, near Peterborough (1656), shows that he possessed some of his master's qualities in his employment of simple and bold details.

Sir Christopher Wren, who follows, was by far the greatest

architect of the Italian school, though curiously enough he had never been in Italy. His first work was the library of Pembroke College, Cambridge (1663-1664), followed by the wrea.

Sheldonian theatre at Oxford, in the construction of the roof of which, with a span of 68 ft., he showed his great scientific knowledge. In 1665 he went to Paris, where he stopped six months studying the architectural buildings there and in its vicinity, and where he came across Bernini, whose designs for destroying the old Louvre (fortunately not carried out) were being started. On his return Wren occupied himself with designs for the rebuilding of the old St Paul's, but these were rendered useless by the great fire of the 22nd of September 1666, which opened out his future career. His plan for the reconstruc- tion of the city was not followed, owing to the opposition of the owners of the sites, but he began plans for the rebuilding of the churches and of St Paul's cathedral. In his treatment of the former, where he was obliged to limit himself to the old sites, often very irregular, and in most cases to the old foundations, he adopted, perhaps quite unconsciously, one of the principles of ancient Roman architecture, and made the central feature the key of his plan, fitting the aisles, vestries, porches, &c, into what remained of the site; this central feature varied according to its extent and proportions, and sometimes from a desire to work out a new problem. The central dome was a favourite conception, the finest example of which is that of St Stephen's, Walbrook (1676); other domed churches are St Mary-at-Hill, St Mildred's, Bread Street, St Mary Abchurch (1681), where the dome virtually covers the whole area of the church, and St Swithin's, Cannon Street, an octagonal example. In St Anne and St Agnes, Aldersgate, the crossing is covered with an inter- secting barrel vault; and in this small church, about 52 ft. square with four supporting columns, he manages to get nave, transept and choir with aisles in the angles. In those churches where there was sufficient length, the ordinary arrangement of nave and aisle is adopted, with an elliptical barrel vault over the nave,

sometimes intersected and lighted from clerestory windows, the finest example of these being St Bride's, Fleet Street; other examples are St Mary-le-Bow (Cheapside), Christ- church (Newgate) and St Andrew's (Holborn). In St James's, Piccadilly, of which the site was a new one, the plan of nave and aisles with galleries over, and a fine internal design with barrel-vaulted ceiling, was adopted; the exterior is very simple, which suggests that Wren attached much more importance to the interior. It should be pointed out that in all these cases, the vaults, to which we have referred, were in lath and plaster, and consequently covered over with slate roofs, and as a rule the exteriors (which are rarely visible) were deemed to be of less importance. This is, however, made up for by the position selected for the towers, and in their varied design those of St Mary-le-Bow, St Bride's (Fleet Street) and St Magnus (London Bridge) are perhaps the finest of a most remarkable series.

The foundation stone of St Paul's cathedral was laid in 1675, and the lantern was finished in 17 10. The silhouette of the dome (Plate II., fig. 66), which is, of course, its principal feature, is far superior to those of St Peter's at Rome, or the Invalides or Pantheon at Paris, and the problem of its construction with the central lantern was solved much more satisfactorily than in any other example. Wren realized that the attempt to render a dome beautiful internally as well as externally could only be obtained by having three shells in its construction; the inner one for inside effect, the outer one to give greater prominence externally, and the third, of conical form, to support the lantern.

In plan, Wren's design (fig. 53) was in accordance with the tradi- tional arrangement of an English cathedral, with nave, north and south transepts and choir, in all cases with side aisles, and a small apse to the choir. The great dome over the crossing is, like the octagon at Ely, of the same width as nave and aisles together. It resembles the plan of that cathedral also in the four great arches opening into nave, transepts and choir, with smaller arches between. Instead of the great barrel vault of St Peter's, Rome, Wren intro- duced a series of cupolas over the main arms of the cathedral, which enabled him to light the same with clerestory windows; these are not visible on the exterior, as they are masked by the upper storey which Wren carried round the whole structure, in order, probably, to give it greater height and importance; by its weight, however, it serves to resist the thrust of the vaults transmitted by buttresses across the aisles. The grouping of the two lanterns on the west front

with the central dome is extremely fine; the west portico is not satisfactory, but the semicircular porticoes of the north and south transepts are very beautiful features. Greater importance is given to the cathedral by raising it on a podium about 12 ft. above the level of the pavement outside, which enables the crypt under the whole cathedral to be lighted by side windows.

The principal examples of the churches which followed are those of St George's, Bloomsbury; St Mary Woolnoth; Christ Church, Spitalfields, by Nicholas Hawksmoor; and St Mary- le- Strand (1 7 1 4) , and St Martin's-in-the-Fields (1 72 1) , by James Gibbs. Gibbs's interiors are second only to those of Wren, while Hawksmoor's are very' weak ; in both cases, however, the exteriors are finely designed. Amongst subsequent works are St John's, Westminster, and St Philips, Birmingham (1710), by Thomas Archer; St George's, Hanover Square (1713-1714), by John James; All Saints' church, Oxford, by Dean Aldrich; St Giles-in-the-Fields (1731), by Henry Flitcroft; and St Leonard's, Shoreditch (1736), by George Dance.

Scale of Feet

100

Fig. 53. — Plan of St Paul's Cathedral, London.

Sir Christopher Wren's chief monumental work was Greenwich hospital, in the arrangement of which he had to include the Queen's House, and a block already begun on the west side. His solution was of the most brilliant kind, and seen from the river the grouping of the several blocks with the colonnade and cupolas of the two central ones is admirable.

Wren's next great work was the alterations and additions to Hampton Court palace, begun in 1689, the east front facing the park (Plate VI., fig. 77), the south front facing the river, the fountain court and the colonnade opposite the great hall. Chelsea hospital (1682-1692), the south front (now destroyed) to Christ's hospital (1692), and Winchester school (1684-1687), are all examples in brick with stone quoins, cornices, door and window dressings, which show how Wren managed with simple materials to give a monu- mental effect. The library which he built in Trinity College, Cambridge (1678), with arcades on two storeys divided by three- quarter detached columns of the Doric and Ionic orders, is based on the same principle of design as those in the court of the Farnese

palace at Rome by Sangallo, a part of the palace which is not likely to have been known by him.

The results of the Italian Revival in domestic architecture were not altogether satisfactory, for although it is sometimes claimed that the style was adapted by its architects to the traditional require- ments and customs of the English people, the contrary will be found if they are compared with the work of the 16th century. The chief aim seems to have been generally to produce a great displa'y of Classic features, which, even supposing they followed more closely the ancient models, were quite superfluous and generally interfered with the lighting of the chief rooms, which were sacrificed to them. In fact there are many cases in which one cannot help feeling how much better the effect would be if the great porticoes rising through two storeys were removed. This is specially the case in Sir John Vanbrugh's mansion, Seaton Delaval, in Northumberland (1720); his other works, Blenheim (1714) and Castle Howard (1702), are vulgarized also by the employment of the large orders. The same defect exists in Stoneleigh Abbey, Leamington, where the orders carried up through two and three storeys respectively destroy the scale of the whole structure.

Among other mansions, the principal examples are Houghton in Norfolk (1723), a fine work, the villa at Mereworth in imitation of the Villa Capra near Vicenza, and the front of old Burlington House (1718), copied from the Porto palace at Vicenza, by Colin Campbell; Holkham in Norfolk and Devonshire House, London, by William Kent; Ditchley in Oxfordshire, and Milton House near Peter- borough, by Gibbs; Chesterfield House, London, by Isaac Ware; Went worth House in Yorkshire (1740), and Woburn Abbey in Bedfordshire (1747), by Henry Flitcroft; Spencer House, London (1762), by John Vardy; Prior Park and various works in Bath by John Wood; the Mansion House, London, by George Dance; Wardour in Wiltshire, Kedleston Hall in Derbyshire, and Worksop in Nottinghamshire (1763), by James Paine; Gopsall Hall, Ely House, Dover Street, London (1772), and Heveringham Hall in Suffolk, by Sir Robert Taylor, to whose munificence we owe the Taylor Buildings at Oxford; Harewood House in Yorkshire (1760), Lytham Hall in Lancashire, and (part of) Wentworth House in Yorkshire, by John Carr; and Luton Hoo (1767), now largely reconstructed, and Sion House (1761), the best-known mansions by Robert Adam, who with his brothers built the Adelphi and many houses in London. Adam designed a type of decoration in stucco for ceilings and mantelpieces, the dies of which are still in existence and are utilized extensively in modern houses. His labours were not confined to buildings, but extended to their decoration, furniture and fittings.

The works of Sir William Chambers were of a most varied nature, but his fame is chiefly based on Somerset House in the Strand, London (1776), with its facade facing the river, a magnificent work second only to Inigo Jones's Whitehall, but infinitely more exten- sive and difficult to design. He was also the author of a work on The Decorative Part of Civil Architecture,

which is still the standard work on the subject in England. His pupil, James Gandon, won the first gold medal given by the Royal Academy in 1769, arid his principal work was the Custom House in Dublin (1781). Newgate prison (1770), a remarkable building now destroyed, was the chief work carried out by George Dance, jun.

Other buildings not yet mentioned are the Alcove and Banqueting Hall (Orangery) of Kensington Palace, by Wren; the Radcliffe library, Oxford, by Gibbs, an extremely fine work both externally and internally; Queen's College, Oxford, by Hawksmoor; the county hall, Northampton, by Sir Roger Norwich; the town hall, Abingdon (1677), designer unknown; the Ashmolean museum, Oxford (1677), by T. Wood; Clare College, Cambridge, and St Catherine's Hall, Cambridge (1640-1679), by Thomas and Robert Grumboll, master-masons; the custom house, King's Lynn (1681), by Henry Bell; Nottingham Castle, designed by the duke of New-castle in 1674 and carried out by March, his clerk of works— the central portion is finely proportioned, and it is only in the pilasters at the quoins that one recognizes the amateur; two houses in Caven- dish Square, London (1717), on the north side, by John James; Lord Burlington's villa (1740) at Chiswick, by William Kent, which with its internal decorations is still perfect ; the celebrated Palladian Bridge at Wilton, by_ R. Morris; and last but not least, in conse- quence of its great influence on modern architecture, Sparrowe's house at Ipswich (1567-1662), the timber oriel windows of which are now so often reproduced. (R. P. S.)

Renaissance Architecture in Germany The classical revival does not seem to have taken root in Germany much before the middle of the 16th century, some forty to fifty years later than in France, from which country it is said to have been introduced, and in some of the early work there is a. great similarity to French examples, but without the refinement and variety of detail which one finds in the chateaux of the Loire and in many of the French towns. In the rood-screen of the cathedral at Hildesheim (1546), the court of the town hall at Gorlitz (1534), the portal of the Petershof at Halberstadt

(1552), and the entrance gateway of the castle at Brieg (1553), pne is able to recognize certain ornamental details and a similar superposition of pilasters in several storeys to that which is found in various towns in Normandy and on the Loire. In both countries the new style was engrafted

on the last phase of the Gothic period, so forming at first a transitional style, which lasted about fifty years. Thus the lofty roofs which prevailed in the 15th century are developed further, but with this great divergence in the two countries. In France there are rarely gable ends, in Germany they are not only the chief character- istic feature of the main front, but are introduced in the side elevations in the shape of immense dormers with two or three storeys and rising the full height of the roof, as in the castle at Hamelschenburg near Hameln. Throughout Germany, therefore, the gable end and the dormer gable became the chief features on which they lavished all their ornamental designs, the main walls of the building being as a rule either in plain masonry, rubble masonry with stucco facing, or brick and stone. Other promi- nent features are the octagonal and circular oriel windows rising through two or three storeys at the corners of their buildings — rectangular bow windows in two or three storeys, which were allowed apparently to encroach on the pavement, and octagonal turrets or towers instead of circular as in France. In the vicinity of the Harz mountains, where timber was plentiful, a large proportion of the factories, houses and even public buildings, are erected in half-timber work with elaborate carving of the door and window jambs, projecting corbels, &c. At Hildesheim, Wernigerode, Goslar, &c, these structures are sometimes of immense size and richly decorated. Among early examples in stone, the porch added to the town hall of Cologne (1571), the projecting wings of the town halls at Halber- stadt and Lemgo (1565), and the town halls at Posen (1550), Altenburg (1562-1567) and Rothenburg (1572-1590), are all picturesque examples more or less refined in design. In the last- named example the purer Italian style has exercised its influence in the principal doorway and In the arcaded gallery on the east front. This same influence shows itself in the courtyard of the town hall at Nuremberg, where the arcades of the two upper storeys might be taken for those of the courts of the palaces at Rome.

Amongst other 16th-century work there are two entrance gates at Danzig, the Hohe Tor (1588), a fine massive structure, and the Langgasse Tor (1600), more or less pure Italian in style. At Augsburg, the arsenal (1603-1607), by the architect Elias Holl (1573- 1646), is of a bold and original design, and the town hall has magnifi- cent ceilings and wainscotting round the walls of the principal halls. This brings us to the castle of Heidelberg (Plate VII., figs. 78, 79 and 80), which is looked upon by the Germans as the chef d'ceuvre of the Renaissance in Germany. As seen from the great court it forms an interesting study, there being the work of three periods: in the centre the picturesque group of the older building (c. 1525), on the right the Otto-Heinrichs-Bau (1 556-1 559), and on the left the Friedrichs-Bau (1602-1607). Of the two the latter is the finer. The architect of the Otto-Heinrichs-Bau would seem to have been undecided

whether to give greater prominence and projection to his pilasters and cornices or to his windows with their dressings and pediments, so he has compromised the matter by making them both about the same, and the effect is most monotonous. In the Friedrichs-Bau, which is a remarkable work, the pilasters are of great projection, with bold cornices and simple windows well set back, while the tracery of the ground-floor windows is a pleasant relief from the constant repetition of pilaster window dressings. The gables also of the Friedrichs-Bau break the horizontal sky-line agreeably. A more minute examination of the decorative details, however, betrays the advent of a peculiar rococo style of a most debased type, which throughout the 17th century spread through Germany, and the repetition of the same details suggests that it was copied from some of the pattern books which were published towards the end of the 16th century, comprising heterogeneous designs for title pages, door heads, frontispieces, and even extending to new versions of the orders, which apparently appealed to the German mason and saved him the trouble of invention. These books, compiled by de Vries and Dietterlin, emanated from the Low Countries, and their influence extended to England during the Elizabethan period. At all events in Germany it would seem to have arrested the purer Italian work, which we have already noticed, and hence- forth in the gable ends one finds the most extraordinary accumula- tion of distorted forms which, though sometimes picturesque, disfigure the German work of the 17th century. An exception might perhaps be made in favour of the Peller'sche Haus in Nurem-

berg (1625), one of the best houses of modest dimensions in Germany. The facade in the Aegidien-Platz is a fine composition ; inside is a very picturesque court and staircase, and the painted ceiling and the wainscotting of one of the rooms in woods of different colours, though not very pure in style, are of excellent design and execution.

Some of the most characteristic work of this type exists at Hameln, where the fagades of the Rattenfangerhaus (1602), the Hochzeitshaus (1610), and many other buildings, are covered with the most extra- ordinary devices, leaving scarcely a foot of plain masonry as a relief. The south front of the town hall of Bremen (1612) is in the same style (Plate IV., fig. 70), relieved, however, by the fine large windows of the great hall and the arcade in front, in which there is some picturesque detail. Later in the century the degradation increases until it reaches its climax in the Zwinger palace at Dresden (1711), the most terrible rococo work ever conceived, if we except some of the Churrigueresque work in Spain.

Among the most pleasing features in Germany are the fountains which abound in every town; of these there are good examples at Tubingen, Prague, Hildesheim, Ulm, Nuremberg, already famed for its Gothic

fountains, Mainz and Rothenburg. In the latter town, built on an eminence, they are of great importance for the supply of the town, and some of them are extremely picturesque and of good design.

Up to the present we have said nothing about the ecclesiastical buildings in Germany, for the reason that the period between the Reformation and the conclusion of the Thirty Years' War was not favourable to church building. The only example worth mentioning is the church of St Michael at Munich (1 583-1597), and that more for its plan than for its architecture. It has a wide nave covered with a barrel vault, and a series of chapels forming semicircular recesses on each side, the walls between acting as buttresses to the great vault. The transept is not deep enough to have any architectural value, but if at the east end there had been only an apse it would have been a better termination than the long choir. The Liebfrauen- kirche at Dresden (1726-1745) has a good plan, but internally is arranged like a theatre with pit, tiers of boxes, and a gallery, all in the worst possible taste, and externally the dome is far too high and destroys the scale of the lower part of the church. An elliptical dome is never a pleasing object, and in the church of St Charles Borromeo, at Vienna, there are no other features to redeem its ugliness. The Marienkirche at Wolfenbiittel (1608-1622) has a fine Italian portal; its side elevation is spoilt by the series of gable dormers, which are of no possible use, as the church (of the Hallen- kirchen type) is well lighted through the aisle windows. The portal of the Schlosskapelle (1555) at Dresden is a fine work in the Italian style; and lastly the church at Biickeburg, in a late debased style, is redeemed only by the fact that it is. built in fine masonry and that the joints run through all the rococo details. (R. P. S.)

Renaissance Architecture in Belgium and Holland

The Gothic development in the 15th century in Belgium, as evidenced in her magnificent town halls and other public buildings, not only supplied her requirements in the century following, but hindered the introduction of the Classic Revival, so that it is not till the second half of the 16th century that we find in the town hall of Antwerp a building which is perhaps more Italian in design than any work in Germany. There are, how- ever, a few instances of earlier Renaissance, such as the Salm Inn (1534) at Malines; the magnificent chimneypiece, by Conrad van Noremberger of Namur, in the council chamber of the palais de justice at Bruges (1529); and the palais de justice of Liege (1533), formerly the bishop's palace, in the court of which are features suggesting a Spanish influence. The influence of the cinque-cento style of Italy may be noticed in the tomb of the count de Borgnival (1533) in the cathedral of Breda, and in the choir stalls of the church at Enkhuisen on the borders of the Zuyder Zee, both in Holland, and in the choir stalls of the cathedral of Ypres in Belgium; the carving of

these bears so close a resemblance to cinque-cento work in design and execution that one might conclude they were the work of Italian artists, but their authors are known to have been Flemish, who must, however, have studied in Italy. Again, in the stained-glass windows of the church of St Jacques at Liege, the details are all cinque-cento, with circular arches on columns, festoons of leaves and other ornament, all apparently derived from Italian sources, but necessarily executed by Flemish painters, as stained-glass windows of that type are not often found in Italian churches.

Of public buildings in Belgium, the most noted example is that of the town hall at Antwerp, designed by Cornelius deVriendt (1564). It has a frontage of over 300 ft. facing the Grande Place, and is an imposing structure in foui storeys, arcaded on the lower storey and the classic orders above, with mullioned windows between on the

three other storeys, the uppermost storey being an open loggia, which gives that depth of shadow obtained in Italy by a projecting cornice. It is almost the only building in Belgium without the usual gable, the centre block being carried up above the eaves and terminated with an entablature supporting at each end a huge obelisk, and in the centre what looks like the miniature representa- tion of a church. The only other classic building is the Renaissance portion of the town hall at Ghent, which is very inferior to the older Gothic portion.

What is wanting in the town halls, however, is amply replaced by the magnificence of the houses built for the various gilds, as for instance those of the Fishmongers at Malines (1580), of the Brewers, the Archers, the Tanners and the Cordeliers (rope-makers) at Ant- werp, and, in the Grande Place at Brussels, the gilds of the Butchers, the Archers, the Skippers (the gable end of which represents the stern of a vessel with four cannons protruding), the Carpenters and others. Besides these, and especially in Antwerp, are to be found a very large series of warehouses, which in the richness of their decoration and their monumental appearance vie with the gilds in the evolution of a distinct style of Renaissance architecture — a type from which the architect of the present day might derive more inspiration than from the modest brick houses of Queen Anne's time.

In domestic architecture, the best-preserved example of the 16th and 17th centuries is the Musee Plantin at Antwerp, the earliest portion of which

dates from 1535. This was bought by Ch. Plantin, who was employed by Philip of Spain to print all the breviaries and missals for Spain and the Netherlands; the fortune thus acquired enabled him and his successors to purchase from time to time adjoining properties which they rebuilt in the style of the earlier buildings. After 1637 the buildings followed the style of the period, but up to that date they were all erected in brick with stone courses and window dressings round a central court. Internally the whole of the ancient fittings are retained, including those of the old shop, the show-rooms, reception rooms and the residential portion of the house, with the wainscotting and Spanish leather on the walls above, panelled ceilings, chimney-pieces, stained glass, &c, the most complete representation of the domestic style of Belgium.

Of ecclesiastical architecture in the Renaissance style there are scarcely any examples worth noting. The towˆl of the church of St Charles Borromeo at Antwerp (1595-1610) is a fine composition similar in many respects to Wren's steeples, and the nave of St Anne's church at Bruges is of simple design and good proportion. The Belgian churches are noted for their immense pulpits, sometimes in marble and of a somewhat degraded style. The finest features in them are the magnificent rood-screens, in which the tradition of the Gothic examples already quoted seems to have been handed down. In the cathedral at Tournai is a fine specimen by Cornelius de Vriendt of Antwerp (1572), and there is a second at Nieuport, both similar in design to the example from Bois-le-Duc now in the Victoria and Albert Museum; and in the church of St Leonard at Leau is a tabernacle in stone, over 50 ft. high, in seven stages, with numerous figures by Cornelius de Vriendt (1550).

In Holland, nearly all the principal buildings of the Renaissance date from the time of her greatest prosperity when the Dutch threw off their allegiance to the Spanish throne (1565). With the exception of the palace at Amsterdam (1648-1655), an immense structure in stone with no architectural pretensions, there are no buildings in Holland in which the influence of the purer style of the Italian revival can be traced. Internally the great hall of the palace and the staircase in the Louis XIV. style are fine examples of that period.

The earliest Renaissance town hall is that of the Hague (1564), situated at the angle of two streets, which is an extremely picturesque building, in fact one of the few in which the architect has known how to group the principal features of his design. The Renaissance addition made to the old town hall of Haarlem is a characteristic example of the Dutch style. The walls are in red brick, the decora- tive portions, consisting of superimposed pilasters with mullioned and transomed windows, cornices and gable end, all being in stone. Inside this portion of the town hall, which is now a gallery and

museum, is an ancient hall (not often shown to visitors) in which all the decorations and fittings date from the 17th century. There is a second example of an ancient hall in the Stadthuis at Kampen, one of the dead cities of the Zuyder Zee, which served originally as a court of justice, and retains all its fittings of the 16th century, including a magnificent chimneypiece in stone, some 25 ft. high and dated 1543.

The town hall at Bolsward in Friesland is another typical specimen of Dutch architecture, in which the red brick, alternating with stone courses running through the semi-detached columns which decorate the main front, has given variety to the usual treatment of such features. The external double flight of steps with elaborate balus- trade, and the twisted columns which flank the principal doorway, are extremely picturesque, if not quite in accordance with the principles of Palladio or Vignola.

A similar flight of steps with balustrade forms the approach to the entrance doorway (on the first floor) of the town hall at Leiden, where the rich decoration of the centre block and its lofty gable is emphasized by contrast with the plain design of the chief front.

In the three chief cities in Holland, the Hague, Amsterdam and Rotterdam, there are few buildings remaining of 17th-century work,

so that they must be sought in the south at Dordrecht and Delft, or in the north at Leiden, Haarlem, Alkmaar, Hoorn, Enkhuisen, or, crossing the Zuyder Zee into Friesland, in Leeuwarden, Bolsward, Kampen and Zwolle, the dead cities. In all these towns ancient buildings have been preserved, there being no resaon to pull them down. Of the entrance gateways at Hoorn there is an example left, of which the lower portion might be taken for a Roman triumphal arch, so closely does it adhere to the design of those monuments, extending even to a long Latin inscription in the frieze. The tower (1531-1652), built to protect the entrance to the harbour, has no gateway. There are some old buildings in Kampen, in one of which the entrance gateway is a simple and fine composition in brick and stone, the chief characteristics of the gateways here being the enormously high roofs of the circular towers flanking them. A finer and more picturesque grouping of roofs exists in the entrance gateway (Amsterdam Gate) at Haarlem, which is perhaps, however, eclipsed by those of the Waaghuis at Amsterdam with its seven conical roofs.

The Waaghuisen, or weighing-houses for cheeses, are, next to the town halls, the most important buildings in Holland, and in fact vie with them in richness of design. The example at Alkmaar possesses not only an imposing front with gable in three storeys, but a lofty tower with belfry. At Deventer the main building is late Gothic (1528), in brick and stone, with an

external double flight of steps and balustrades added in 1643.

The Fleesch Halle (meat-market) at Haarlem, also in brick and etone, is of a very rococo style, but notwithstanding all its vagaries presents a most picturesque appearance.

The domestic architecture of Holland and the shop fronts retain more of their original dispositions than will be found in any other country. At Hoorn, Enkhuisen and other towns, there has virtually been no change during the last 200 years. In the more flourishing towns aS Amsterdam and Rotterdam, the increasing prosperity of the inhabitants led them in the latter portion of the 17th and in the 1 8th centuries to adapt features borrowed from the French work of Louis XIV. and Louis XV., without, however, their refinement, luxuriance or variety, so that although substantial structures they are extremely monotonous in general effect. (R. P. S.)

Mahommedan Architecture

Before proceeding with " modern architecture," to which the styles now discussed have gradually led us, we have still another important architectural style to describe, in Mahomme- dan architecture. The term " Mahommedan " has been selected in preference to " Saracenic," because it includes a much wider field, and enables us to bring in many developments which could not well come under the latter title. It was the Mahommedan religion which prescribed the plan and the features of the mosques, and it was the restriction of that faith which led to the principal characteristics of the style. The term " Saracenic " could hardly be applied to the architecture of Spain, Persia or Turkey.

The earliest mosques at Mecca and Medina, which have long since passed away, were probably of the simplest kind; there were no directions on the subject in the Koran, and, as Fergusson remarks, had the religion been confined to its native land, it is probable that no mosques worthy of the name would have ever been erected. In the first half-century of their conquest in Egypt and Syria the Mahommedans contented themselves with desecrated churches and other buildings, and it was only when they came among the temple- building nations that they seemed to have felt the necessity of providing some visible monument of their religion. The first require- ment was a structure of some kind, which should indicate to the faithful the direction of Mecca, towards which, at stated times, they were to turn and pray. The earliest mosque, built by Omar at Jerusalem, no longer exists, but in the mosque of 'Amr at Cairo (fig. 54), founded in 643 and probably restored or added to at various times, we find the characteristic features which form the base of the plans of all subsequent

mosques. These features consist of (a) a wall built at right angles to a line drawn towards Mecca, in which, sunk in the wall, was a niche indicating the direction towards which the faithful should turn; (ft) a covered space for shelter from the sun or inclement weather, which was known as the prayer chamber; (c) in front of the prayer chamber, a large open court, in which there was a fountain for ablution; and (d) a covered approach on either side_ of these courts and from the entrance. The materials employed in the earlier mosque were all taken from ancient struc- tures, Egyptian, Roman and Byeantine, but so arranged as to constitute the elements of a new style. The columns employed were not always of sufficient size, and therefore in order to obtain a greater height, above the capitals were square dies, carrying ranges of arches, all running in the direction of Mecca; to resist the thrust, wood ties were built in under the arches, so that the structure was of the lightest appearance. The same principle was observed in the mosque of Kairawan, in Tunisia (675), and in the mosque of Cordova (786-985), copied from it. Similar wooden ties are found in the mosque of El Aksa and the Dome of the Rock at

Jerusalem (built 691), so that they became one of the characteristics of the style. For constructional reasons, however, this method of building was not always adhered to, and in the mosque of Tulun (fig- 55 J > n Cairo (879), the first mosque in Egypt, built of original materials, we find an important departure. The arcades, instead of running at right angles to the Mecca wall, are built parallel with it, on account of the great thrust of the arches, all built in brick (fig. 56). The wood ties would have been quite insufficient to resist the thrust, and in the case of this mosque were probably used to carry lanterns. The mosque of Tulun is the earliest example in which the pointed arch appears throughout, and it forms the leading and most char- acteristic constructional feature of the style in its subsequent developments in every country, except in Barbary and Spain, where the circular-headed horse-shoe arch seems to be preferred. As it is also the earliest mosque in which the decoration applied is that which was by inference laid down in the Koran, some allusion to the restrictions therein contained, and the consequent result, may not be out of place. The representation of nature in any form was absolutely forbidden, and this applied generally to foliage of all kinds, and plants, the representation of birds or animals, and above

*1 * •*

- *○ p*

*FlaTT 7? 77 . . w ». n *. » * n*

*+ ii a i: 1 * |j H a ii ii H*

:'• !: '" ii 1 I :': ii : i ':'■ ::

*».-» * * * I * n t *»'n*

i:Siia.i:ni'c :; ti : ui:ai!ri : vii '■■ '■'

» .« « ; a

i| H II jLJUL

**, ji » w **

i_JL

:

- **.*

ii

!• S

Open Court

- *1*

Fig. 54. — Plan of Mosque of 'Amr. Old Cairo.

1. Kibla.

2. Mimbar.

3. Tomb of 'Amr.

4. Dakka.

5. Fountain for Ablution.

6. Rooms built later.

7. Minaret.

8. Latrines.

all of the human figure. The only exceptions to the rule would seem to be those found in the very conventional representations of lions carved over the gateways of Cairo and Jerusalem and in the courts of the Alhambra. It was this restriction which produced the ex- tremely beautiful conventional patterns which are carried round the arches of the mosque of Tulun, and are found in the friezes, string- courses and the capitals of the shafts, and when these patterns form the background of the text of the Koran in high relief, in the splendid Arabic characters, it would be difficult to find a more beautiful decorative scheme in the absence of natural forms. As the mosque of Tulun was built by a Coptic architect, and its decoration is evidently the result of many years of previous developments, it is probably to the Copts that its evolution was due. The second type of decoration is that which is given by geometrical forms, and either in pavements or wall decorations in marble, or in the framing of woodwork in ceilings, or in doorways, the most elaborate and beautiful combinations were produced. The third type of decoration is one which in a sense is found in the origin of most styles, but which, restricted as the Mahommedans were to con- ventional representations, received a development of far greater importance, and in one of its forms — that known as stalactite vaulting — constitutes the one feature in the style which is not found in any other, and which, from the western coast of Spain to the east of India, at once differentiates it from any other style.

A complete account, with illustrations of the origin of the stalactite will be found in the Journal of the Royal Institute of British A rchitects (1898). The earliest example is found in the tomb of Zobeide, the favourite wife of Harun al-Rashid, at Bagdad, built at the end of

the 8th century. This tomb, octagonal in plan, and of modest dimensions, was vaulted over by a series of niches in nine stages or levels rising one above the other, and brought forward on the inside, so that the ninth course completed the covering of the tomb. It was built in this way to save centreing, each niche when completed being self-supporting. There is a second tomb at Bagdad, of later date — the tomb of Ezekiel, — constructed in the same way, except that in each stage the niches are built not one over the other but astride between the two, and this is the way in which in subsequent developments it always appears to have been built. Its application to the pendentives of the portals of the mosque at Tabriz and Sultaniya was the next development; and when some two centuries later it is found in Europe, in the palaces of the Ziza at Palermo, dating from about the beginning of the nth century, it has lost its brick constructive

origin, and, being cut in slabs of stone, has become simply a decorative feature. Its earliest example in Egypt is in the tomb of ash-Shafi'I at Cairo, built by Saladin about 1240. Here and in all subsequent examples throughout Egypt and Syria it is always carved in stone. In the Alhambra another material was employed, the elaborate vaults being built with a series of small

From Coste's Architecture Arabe en Caire.

Fig. 55. — Plan of Mosque of Tulun, Cairo.

moulds in stucco. In the ceilings of the mosques at Cairo it was frequently carved in wood, and consequently lost all trace of its origin.

Two other decorative features, but having a constructive origin, are (1) the alternating of courses of stone of different colour, probably derived from Byzantine work, where bands ot brick were employed; and (2) the elaborate forms given to the voussoirs of the arches of the Mecca niche.

Having now described the principles which ruled the plans of the mosques and formed the motifs of their architectural design, it remains to take the principal examples in the various countries where the style was developed.

Although the tendency of modern research points to Persia as the country in which the first development of the art took place, and we have already referred to two tombs at Bagdad, in which the earliest examples of a stalactite vault are found, so far as remains are concerned nothing can be traced earlier than the work of Ghazan Khan (1294), whose mosque at Tabriz, half in ruins, is the earliest example.

It is to Egypt therefore we turn first. There still exist- — and sometimes in good preservation — mosques and other buildings in Cairo of every period showing the development of the Mahommedan style, from the 9th to the 17th century. Owing to the magnificent material at their command — for unfortunately more of it was taken from the ancient Egyptian monuments than from the quarries — a much purer style was evolved than in Persia; and owing to the absence of rain those ephemeral structures built in brick and covered with stucco, which in other countries would long have passed away, retained the crispness of their flowing ornament, which is still as sharp and well defined as when executed. We have already referred

to two of the earlier mosques, those of 'Amr in Old Cairo and of Tulun. The next in date, and built also in brick, is the mosque El Hakim (c. 1003). The mosque of El Azhar (" the Splendid ") was founded about 970, but entirely rebuilt in 1270 and enlarged in 1470. It is the university, and its Liwan or prayer chamber is the largest in Cairo, there being 380 columns carrying its roof.

The mosque of al-Zahir (founded 1264) is now occupied as barracks. In one of its entrance porches the arches are decorated with the well-known zigzag or chevron ornament, and a second porch with cushion voussoirs, features found elsewhere only in Sicily, so that the mosque was probably built by masons brought from thence. Then follows a series of mosques: Kalaun (1287); al-Nasir (1299-1303);

and 69 ft. wide, a greater span than any Gothic cathedral, and only exceeded in dimensions by the great hall of the palace at Ctesiphon built by the Sassanian dynasty. The mosque covers a large area, and would seem to have been occupied by four religious sects, whose rooms, situated on the outer side, are lighted by windows in eight or ten storeys, giving the appearance of a factory. Its entrance portal, 60 ft. to 70 ft. high, is the finest in Egypt, and is only exceeded in dimensions by those of the Persian and Indian mosques. The vestibule is covered by a dome with stalactite pendentives, and is perhaps the most complete and perfect example in Cairo. Beyond the prayer chamber is the tomb of the founder, which is covered by a dome. This, according to Poole, was not originally a feature in

Fig. 56.— Court of the Mosque of Tulun, Cairo. (From Coste.)

Merdani (1338); all based on the same plan as those described with a large courtyard surrounded by porticoes. The mosque of al-Nasir has a portal with clustered piers and pointed and moulded orders. This is said to have been brought over as a trophy from Acre, but it is more probable that Syrian masons were imported to carry on the style introduced by the Crusaders.

The mosque of Sultan Hasan (1357-1360) marks an important change in the scheme of its plan, which served afterwards as a

Fig. 57.— Plan of the Mosque of the Sultan Hasan.

future model (fig. 57). _ It consists of a central court, 117 ft. by 105 ft. open to the sky, and instead of the covered porticoes on each side there are immense recesses covered over with pointed vaults. The prayer chamber is 90 ft. deep, 90 ft. high to the apex of the vault

Saracenic mosques. A dome, he says, has nothing to do with prayer and therefore nothing with a mosque. It is simply the roof of a tomb, and only exists when there is at least a tomb to be covered. The greater number of the mosques in and outside Cairo are mausoleums, which accounts for the large number of domes found there.

Of the tombs of the caliphs, outside Cairo, the most important is the tomb of ash-Shafi'i, reputed to have been built by Saladin but now quite changed by restoration. The tomb of Barkuk, in which the courtyard plan of Sultan Hasan is retained, has porticoes round it, which are of much more solid construction than those in earlier examples, and carry small domes. The two great domes on the east side and the minarets on the west are among the finest in Cairo. The tomb-mosque of Kait Bey (c. 1 470), though comparatively small, is the finest in design and most elegant of its type in Egypt. Here the central court is covered by a cupola lantern (fig. 58), and the ceiling over the prayer chamber and other recesses is framed in timber and elaborately painted and gilded. The tomb is at the south-east corner, and is covered with a dome in stone, beautifully carved with conventional designs. In some of the mosques by the side of the portal is a fountain enclosed with bronze grilles, and above it a small room sometimes used as a school with open arcades on two sides. This feature in the mosque of Kait Bey, with the portal on its right, the lofty minaret beyond, and the great dome at the farther end, makes it the most picturesque in aspect of any Cairene mosque. (For plan see Mosque, fig. 3.)

It was in Egypt that the minaret received its highest development. The earliest example is that of the mosque of Tulun, which is of unusual shape, and has winding round it an inclined plane or staircase of easy ascent which can be made on horseback. The original design of this scheme was probably derived from the mosque of Samara, a town 60 m. north of Bagdad, where the minaret built c. 850 has a spiral ascent round it, recalling that of the Assyrian ziggurat as at Khorsabad. The general design of the Cairo minarets would seem to have been universally adhered to from the 12th century onwards, but the upper storeys are all varied in detail, there being virtually no two alike. As a rule the lower portion of the minaret forms part of the main wall of the mosque, and was carried up square a few feel

ARCHITECTURE

Plate VII.

Photo, L. L. Paris.

.Fig. 78.— HEIDELBERG CASTLE, FRIEDRICHSBAU.

Photo, L.L.Paris. ‘

Fig. 79.-HEIDELBERG CASTLE, OTTO-HEINRICHSBAU.

Photo L. L. Paris.

Fig. 80— HEIDELBERG CASTLE, OTTO-HEINRICHSBAU.

Plate VIII.

ARCHITECTURE

Photo, Neurdein.

Fig. 83.— THE LOUVRE— PA VILLON HENRI II. {Portion of Lescot’s work on left.)

Photo, Neurdein.

Fig. 84.— GRAND STAIRWAY, CHATEAU OF BLOIS.

MAHOMMEDAN]

ARCHITECTURE

4ˆ5

above the cresting. It then became octagonal on plan, the sides decorated with niches or geometrical ornaments in bold relief. This, the first independent storey, was crowned by a stalactite cornice carrying the balcony (fig. 59), from which the muezzin (call- to-prayer) was chanted. In the early and fine examples the balus- trade round it consisted of vertical posts with panels between, pierced with geometric ornaments, and all in stone. The second storey, also octagonal, was set back sufficiently to allow a passage round, and this was crowned by a similar stalactite cornice and balustrade. A third storey, sometimes circular on plan, completed the tower, which was crowned with a bulbous terminal. In one of the mosques, that of El Azhar, the first storey is square on plan, and the second storey has twin towers with lofty bulbous finials. The elaboration of the carved ornament on the various storeys of the minarets is of considerable beauty. Among the most remarkable, other than those already referred to, are the minarets of the mosque of al-Bordeni, of Kalaun, al-Nazir, Mu’ayyad (built on the semi- circular bastion wall of the Zuwela Gate), Sultan Barkuk (1348), and numerous other mosques or tombs outside Cairo.

The earlier domes were quite plain, hemispherical, with buttresses

Fig. 58. — Interior of Kait Bey Mosque. (From Coste.)

round the base, similar to those of St Sophia at Constantinople. In the later domes it was found that by raising the upper portion so as to take the form in section of a pointed arch, they could be built in horizontal courses of masonry up to about two-thirds of their height, the upper portion forming a lid without any thrust. It is probably owing to this method of construction that they still exist in such large numbers. The outer surfaces are decorated in various ways with geometrical designs, star patterns, chevrons, diapers, &c. Domes built in brick were covered with stucco and divided up into godroons.

We have already referred to the lofty portal of the mosque of Sultan Hasan ; portals of smaller dimensions form the principal entrance to all the mosques and private houses. The recessed portion rises to twice or three times the height of the door, and its pointed or cusped head is always filled by a rich stalactite vault.

The descriptions of the disposition of plan, and the principles which have governed the plans of the Cairene mosques, apply equally to those in Syria, so that it now only remains necessary to quote the chief examples. Of these the earliest is the Dome of the Rock, incorrectly called the mosque of Omar, which was built by Abdalmalik in 691, partly with materials taken from the buildings destroyed by Chosroes. At first it consisted of a central area en- closing the sacred rock, covered with a dome and with aisles round carried on columns and piers, and like the smaller Dome of the Chain open all round, but the climate of Syria is very different from that

in Egypt, and consequently at a later period (813-833) the sultan Mamun built the walls which now enclose the whole structure. Many restorations have taken place since, and the dome with its rich internal decoration is attributed to Saladin (1189). The magnificent Persian tiles which encase the walls, the marble casing of some of the piers, and the stained glass, form part of the works of Suleiman (1520-1560).

The great mosque of Damascus occupied the site of an ancient church dedicated to St John the Baptist, which for a time was divided between the Christians and the Mahommedans. But in 705 the caliph al-Walid took possession of the whole church, which he rebuilt, retaining, however, the whole of the south wall, portions of which belonged to a Roman temple. This, which by chance happened to face south, became the Mecca wall, the niche being sunk in one of the doorways of the original temple. Its plan, therefore, is a variation of those we have already described. It consists of a transept with dome over the centre, three aisles of equal width, running both east and west, and a great court on the north side surrounded by

arcades. The great transept is virtually the prayer chamber. The new building was erected by Byzantine masons sent from Constantinople, and decorated with marbles and mosaic by Greek artists. The mosque was almost entirely destroyed by fire in 1893, but has since been rebuilt.

The mosque of Et Aksa in the sacred enclosure in Jerusalem, and south of the Dome of the Rock, was commenced by Abdalmalik

Fig. 59. — Exterior of Kait Bey Mosque, Cairo. (From Coste.)

(691), who used up materials taken from the church of St Mary, built by Justinian on Mount Sion, which had been destroyed by Chosroes. There have been so many restorations and rebuildings since, owing to destructive earthquakes and other causes, that it is difficult to give the precise dates of the various portions. The columns of the nave and aisles are extremely stunted in proportion, and their capitals are of a very debased type, copied by inferior artists from Byzantine models. They carry immense wood beams cased, and above them a range of pointed arches, among the earliest examples used throughout a mosque, and probably dating from the rebuilding (774-785). The Crusaders made various additions in the rear, but the great entrance porch is said to have been added by Saladin, after 1187, and was built probably by Christian masons who were allowed to remain in the country.

The numerous minarets at Jerusalem and Damascus in general design follow those of Egypt, but instead of the incised work are generally encased with marble in geometric patterns.

The great mosque at Mecca, from which it was thought at one time the plan of the Egyptian and other mosques was taken, is necessarily different from all others, because the Ka'ba or Holy Stone, towards which all the niches in all other mosques turn, stood in its centre. The arcades which surround the court were nearly all rebuilt in the i'7th century, as the whole mosque was washed away by a torrent in 1626.

The mosque of Kairawan in Tunisia was built in 675. It occupies an area of 427 ft. deep and 225 ft. wide, with a prayer chamber at the Mecca end of 17 aisles and II bays deep, more than twice, therefore, that of 'Amr in Old Cairo. The columns to the prayer chamber,

all taken from ancient buildings, are 22 ft. high in the central aisle and 15 ft. in all the others. They carry horse-shoe arches, which, as in the mosque of 'Amr, are all tied together by wood beams inserted at the springing of the arches.

The mosque of Cordova was built by Abdarrahman (Abd-ar- Rahman) in 786-789 in imitation of the mosque of Kairawan. There were eleven aisles of twenty-one bays, the centre one slightly wider than the other. The materials»were taken from earlier build- ings, and, as the columns and caps were not considered high enough, above the horse-shoe arches are built a second row of arches which carry the barrel vaults. To this mosque Hakim added twelve more bays in depth at the Mecca end (962) , and in 985 Mansur added eigh t more aisles of thirty-three bays on the east side. Part of the open court on the north side dates from Abdarrahman's foundation (690) and part from Mansur.

In the mosque of Cordova we find the earliest example of the cusped arch, in the additions made by Hakim in 961 ; in order to obtain a greater height above the columns, it became necessary to employ the expedient of raising arch above arch in order to obtain the height they required for the ceilings ; and as these arches formed purely decorative features, which might otherwise have become monotonous, variety was given by introducing the cusped form of

arch and interlacing them one within the other. It is probably this elaborate design which sug- gested the plaster decorations of the screens above the arches in the court of the Alhambra. Though commenced in 1245, the existing palace of the Alhambra was built in the first half of the 14th century, at a time when the style was fully developed. There are two great courts at right angles to one another, the most important of which was the Court of the Lions, so called from the fountain in the centre, with twelve conventional representa- tions of that animal carrying the basins. This court is surrounded by an arcade with stilted arches carried on slender marble columns with extremely rich decoration above, partly in stucco painted and gilt. The hall of the Aben- cerrages (35 ft. square) has a polygonal dome covered with arabesque (fig. 60). Two other halls are roofed with lofty stalac- tite vaults of great intricacy, richly gilded and of remarkable effect (fig. 61), but the employ- ment of stucco instead of stone, as in Egypt, has led to an abuse in the wealth of enrichment, which is only partly redeemed by the plain masonry of the towers and walls enclosing the palace. The Giralda at Seville is the only example of a tower, but it does not seem to have served the purpose of a minaret.

With the exception of the tombs of Zobeide and Ezekiel near Bagdad, and a hospital at Erzerum of the 12th century, built by the Seljukian dynasty, the

Mahommedan style in Persia dates from the 13th century, i.e. if Ghazan Khan built the mosque at Tabriz in 1294. The plan is that of a Byzantine church with a central dome, aisles and sanctuary. The portal consists of a lofty niche vaulted with semi-domes and stalactite pendentives, similar in many respects to the well-known example of Sultan Hasan in Cairo, built sixty years later. It is built in brick and covered internally and externally with glazed bricks of various colours, wrought into most intricate patterns with interlacing ornament and with Cufic inscriptions. The dazzling and perfect beauty in point of colour is not to be surpassed, but from the architectural point of view it possesses the fatal sin of not showing its construction. The bricks and tiles are only a veneer, and though in certain features (such as the portal and the dome) the construction is at least suggested, the tendency is to trust to decoration alone to produce architectural effects. (But see Tabriz.)

The great mosque at Isfahan (1585) is a good illustration of the danger attending a too free use of surface decoration. Strip the walls of their tiles, and nothing is left except square box-like forms with pointed arched openings of different form. The interior, how- ever, owing to the variety of its features, and the varied play of light and shade given in the hemispherical vaults of its transepts and

Fig. 60. — Capital and Spring- ing of Arch, from the Hall of Abencerrages, Alhambra.

niches and the vaulted aisles, constitutes one of the most beautiful monuments of Mahommedan art.

Apart from the great development of Mahommedan architecture in India (see Indian Architecture), there remains now to be described only one other phase of the style, that found in Constantinople.

Prior to the conquest of Constantinople in 1445, two mosques were built by the Turks at Brusa in Asia Minor. The plan of Ulu Jami, the great mosque, follows the original courtyard type. Yeshil .Tami, the Green mosque (1430), built on the site of a Byzantine church, is cruciform on plan. In both of them the Persian influence is shown, in the magnificent towers with which they are covered, the marble casing and the stalactite vaults.

After the conquest of Constantinople, the supreme beauty of St Sophia, and the adaptability of its plan to the requirements of the Mahommedan faith, caused it to be accepted as the model on which all the new mosques were based. The first two erected were the Bayezid (1497-1515) and the Selim mosques (1520-1526). In the former the dome and its pendentives are carried on octagonal piers, and the dome, 108 ft. in diameter, is greater

than in any subsequent example. The finest mosque, and the example in which we find the complete development of the Turkish style, is that erected by

Fig. 61. — Pendentive, from the Court of the Lions, Alhambra.

Suleiman the Magnificent in 1550-1555. This mosque, designed by Sinan, an Armenian architect, is still quite perfect. The plan follows very closely its model, St Sophia, and consists of a central dome, 86 ft. in diameter and 156 ft. high, carried on pendentives, resting on great arches which are slightly pointed, with great apses on the east and west sides, and three smaller apses in each, the arches of which are all circular. The principal change in design is that found in the north and south walls, under the arches carrying the dome; in St Sophia they were subdivided into two storeys with galleries overlooking the church, but in the Suleimanic mosque the galleries are set back in the outer aisles, and the screen walls consist of a wide central and two side pointed arches, and voussoirs alternately of black and white marble. The tympana above this is pierced with eighteen windows filled with geometric tracery. Stalactite work is employed in the pendentive of the smaller apses and in the capitals of the columns carrying the pointed arches. The columns are of porphyry, the shafts, 28 ft. high, being taken from the Hippodrome and probably brought originally from Egypt. The walls are cased with marble up to the springing of the dome, but the magnificent mosaics of St Sophia are here replaced by vulgar colouring and plaster decoration of a rococo style, due probably to recent restorations. ■ The mosque is preceded by a forecourt, surrounded by an arcade on all sides and containing a fountain, and in the garden in the rear is the tomb of the founder and his wife.

The Shah-Zadeh mosque, known as the prince's mosque, was also built by Sultan Suleiman, from the designs of Sinan, the same

Armenian architect who built ttie Suleimanic mosque. Here, instead of confining the great apses to the east and west sides, they are introduced on the north and south sides in place of the screen, and produce a monotonous and poor effect. The same design is found in the Ahmedin mosque, built 1608, and with the same result. Externally, however, they are both fine, owing to the variety of domes, semi-domes and other curved forms of roof.

The minarets of the Turkish mosques are very inferior to those of Cairo.

They are of great height, generally semicircular, with narrow balconies round the upper part, and crowned with ex- tinguisher roofs. To a certain extent, however, they contrast very well with the domes and semi-domes of St Sophia and those of the mosques built by the Turks.

In the mosque of Osman, built 1748-1757, we find the first trace of Western influence in its rococo design, but here, as in the mosque of Mehemet Ali in Cairo, built in 1837, the scheme is so good that, notwithstanding the great falling off in design, and, in the latter mosque, the construction, the effect of the interior is very fine.

Amongst other architectural features, the fountains in the court- yards of the mosques and those which decorate the public squares are extremely pleasing in design. The latter are square on plan with polygonal angles, elaborate niches with stalactite heads, with overhanging eaves on each side; the ornament is very varied and the colour sometimes very attractive. The roofs have sometimes most picturesque outlines. (R. P. S.)

Modern Architecture The beginning of the 19th century may be considered to mark the beginning of the modern era in architecture. The 19th century is the period par excellence of architectural " revivals." The great Renaissance movement in Italy already described was something more than a mere revival. It was a new spirit

rather Roman than Greek); the impetus to it was probably _ given by the "Elgin marbles"; Stuart and Revett's great work on the Antiquities of Athens had been issued a good while previously, the three first volumes being dated respectively 1762, 1787 and 1794; but the appearance of the fourth volume in 1816 was no doubt influenced by the transportation to London of the Elgin marbles, and the sensation created by them. One of the first architectural results was the erection, at an immense cost in comparison with its size, of the church of St Pancras in London (1819-1822), designed by Inwood, who published a fine and still valuable monograph on the Erechtheum, and showed his enthusiasm for Greek architecture by copying the Erechtheum order and doorways for his facade, and erecting over it a tower composed of the Temple of the Winds with an octagonal imitation of the monument of Lysicrates imposed above it. This use of Greek monuments was architecturally absurd, though at the time it was no doubt the offspring of a genuine enthusiasm.

A better use was made of the study of Greek architecture by William Wilkins (1778-1839), who was in his way a great architect, and whose University College (1827-1828), as de- signed by him, was a noble and dignified building, of which he only carried out the central block with the cupola and portico. The wings were somewhat altered from his design but

not materially spoiled, but the university authorities permitted the vandalism of erecting a low building as a partial return of the quadrangle on the fourth side, for the purposes of a mechanical

Bank of Ireland, Dublin.

affecting the whole of art and literature and life, not an archi- tectural movement only; and as far as architecture is concerned it was not a mere imitative revival. The great Italian architects of the Renaissance, as well as Wren, Vanbrugh and Hawksmoor in England, however they drew their inspiration from antique models, were for the most part original architects; they put the ancient materials to new uses of their own. The tendency of the 19th-century revivals, on the other hand, except in France, was distinctly imitative in a sense in which the architecture of the great Renaissance period was not. Correctness of imitation, in the English Gothic revival especially, was an avowed object; and conformity to precedent became, in fact, except with one or two individual architects, almost the admitted test of excellence. The earliest classical London building of note in the 19th century is Soane'e Bank of England, which as a matter of date Classical belongs in fact to the end of the 18th century; but its revival la architect lived well into the 19th century, and the bank British ma y b e classed with this section of the subject. Soane ttct ˆ tm had to make something architectural out of the walls of a very extended building of only one storey, in which external windows were not admissible; and he did so by applying a classical columnar order to the walls and introducing sham window architraves. The latter are indefensible, and weaken the expression of the building; the columnar order was the received method at the time of making a building (as was supposed) " architectural," and the building has grace and dignity, and could hardly be taken for anything except a bank, although a more robust and massive treatment would have been more expressive of the function of the building, as a kind of fortress for the storage of money. It was only some years later that the Greek revival took some hold of English architects (the Bank of England is

laboratory, which ruined the appearance of the building. 1 Wilkins's other well-known work is the National Gallery (1832- 1 838) , which he was not allowed to carry out exactly as he wished, and in which the cupola and the "pepperpots" are exceedingly poor and weak. But his details, especially the profiles of his mouldings, are admirably refined, and show the influence of a close study of Greek work. Among other prominent English archi- tects of the classic revival in England are Sir Robert Smirke and Decimus Burton (1800-1881). To Burton we owe the Constitu- tion Hill arch and the Hyde Park screen. The latter is a very graceful erection of its kind; the arch has never been completed by the quadriga group which the architect intended as its crown- ing feature, though for many years it was allowed to be

disfigured by the colossal equestrian statue of Wellington, completely out of scale and crushing the structure. Smirke is kept in memory by his fine facade of the British Museum, which has been much criticized for its "useless" colonnades and the wasted space under them. The criticism is hardly just; for classic colonnades have at least some affinity with the purposes of a museum of antique art, and it conveys the impression of being a frontis- piece to a building containing something of permanent value and importance. The early classic revival set its mark also, in a very fine and unmistakable manner, on the capital of the sister island. Dublin is almost a museum of fine classic buildings of the period, among which the most remarkable is the present Bank of Ireland (fig. 85), originally begun as the Parliament House. _ The beginning of the building belongs to the 18th 1 Wilkins made two designs for the whole building; one leaving the quadrangle entirely open on the fourth side, towards the street: the other showing a low open colonnaded screen connecting the ends of the two wings. He never for a moment contemplated closing in the quadrangle by buildings on the fourth side.

century, but it was not completed in its present form till 1805, and was the work of five successive architects, only one of them, James Gandon (1743-1823), a man of the first importance; but it was Gandon who in 1790 did most to give the building its effective outline on plan, by introducing one of the curved quadrant walls, the building being subsequently finished in accordance with this suggestion. It is a remarkable combination of symmetry and picturesqueness, and as a one-storey classic building is far superior to Soane's Bank of England, with which a comparison is naturally suggested. Gandon's custom house, with its fine central cupola, is another notable example. Edin- burgh too can show examples of the classic revival, and bears the title of " modern Athens " as much from her architectural experiments as from her intellectual claims; she illustrates the application of Greek architecture to modern buildings in two really fine examples, the Royal Institution by W. H. Playfair (1789-1857), and the high school by Thomas Hamilton (1784- 1858). It was a pity that she added to these the collection of curiosities on the Calton Hill.

Fig. 86. — Liverpool Branch of the Bank of England. (Cockerell.)

But before we quit the classic revival in England, there are two architects to

be named who came a little later in the day, living in fact into the time of the Gothic revival, who were superior to any of the earlier classic practitioners : Harvey Lonsdale Elmes and C. R. Cockerell. Elmes, who died very young, seems to have been as completely a born architectural genius as Wren, and his great work, St. George's Hall at Liverpool, has done more than any other building in the world to glorify the memory of the classic revival. Granting all that may be said as to the unsuitability of Greek architecture to the English climate, one can hardly complain of any movement in architecture which gave the opportunity for the production of so grand an architec- tural monument. It is true that it is badly planned and lighted, and the exterior and interior do not agree with each other (the exterior is Greek, and the great hall is Roman); but if from our present point of view it is a mistake, it is certainly one of the finest mistakes ever made in architecture. Cockerell, who completed the interior of the building after Elmes's death, was an architect permeated with the principles and feeling of Greek architecture, who brought to his work a refinement of taste and perception in regard to detail which has rarely been equalled and never surpassed. Perhaps the very best example of his scholarly taste in the application of classic architecture to modern uses is to be found in his facade to the branch Bank of England at Liverpool (fig. 86).

From a photo by W. A. Mansell & Co.

Fig. 87.— Royal Theatre, Berlin. (Schinkel.)

*In Germany, and especially at Berlin and Munich, the Greek revival took hold of architecture in the early part of the century in a more decisive but also in a more academical spirit than in England. The movement is connected re fJ^j*i_ more especially with the name of one eminent architect, Germany. Karl Friedrich Schinkel, who must have been a man of genius to have so impressed his taste on his generation as he did in Berlin, where he was regarded as the great and central*

From a photograph by W. A. Mansell & Co.

Fig. 88. — Nikolai Kirche, Potsdam.

(Schinkel.)

power in the architecture of his day; yet his buildings are marked by learning and academical correctness rather than original genius. Elmes's St George's Hall, already referred to as one great English work of the classic revival, is by no means a mere piece of academical architecture; it exhibits in some of its details a great deal of originality, and in its general design a remarkably fine feeling for architectural grouping. In par- ticular, the solid

masses and the heavy square columns at the

MODERN]

ARCHITECTURE

Plate IX.

,

*, ^_, . ,,. * — ‘. r v,” -^— ^™*

. i §’» i !

rnfnf»;w.

^—mraoi

.. ‘ ■-■ ‘ •

*‘■ft»Jl s J*MMilJjllL***::-*

Photo, Beer.

Fig. 115.— PARLIAMENT BUILDINGS, BUDAPEST. (STEINDL.)

i3

‘3

Fig. 116— PARLIAMENT BUILDINGS, VIENNA. (HANSEN.)

*PHcto, Linde. II. 4*8.*

Fig. 117— PARLIAMENT BUILDINGS, BERLIN. (WALLOT.)

Plate X.

ARCHITECTURE

[MODERN

Photo, F.G.O

Fig. ii8.— HOUSES OF PARLIAMENT, LONDON. (BARRY.)

Photo, Emery Walker.

Fig. 119— SCOTLAND YARD, LONDON. (SHAW.)

ends of his building, which seem like Greek architecture treated with Egyptian feeling, give support to, while they form a most effective contrast with, the richer and more delicate Corinthian order of the central portion. The only work of Schinkel's which shows something of the same feeling for contrast in architectural composition is one of his smaller buildings, the Konigswache or Royal Guard-house, in which a Doric colonnaded portico is effectively flanked and supported by two great masses of plain wall. But in general Schinkel does not seem to have known what to do with the angles of his buildings, or to have realized the value of mass as a support to his colonnades. This is strikingly exemplified in his museum at Berlin, where the tall narrow piers at the angles have a very weak effect, and are quite inadequate as a support to the long open colonnade. His Royal theatre also (fig. 87), though the central portico is fine, is monotonous and weak in its two-storeyed repetition of the small order in the wings, and it has also the fault (which it shares, no doubt, with a great many theatres, large and small) that its exterior design gives no hintof the theatre form ; it might just as well be a museum. His Nikolai Kirche

(183 0-18 3 7) at Potsdam (fig. 88), which has con- siderable celeb- rity, though not so merelyacadem- ical in character, and in fact pos- sessed of a certain originality, has a fault of another kind, in its entire lack of architec- tural unity; the dome does not seem to belong to or to have any

*Connexion With From *■ Photograph by Ferd. Finsterlin.*

the substructure, FlG – 89.— Propylaea at

while the portico is quite out of scale with the great block of building in its rear, and looks like a subsequent addition. The fault of the Schinkel school of architecture is an almost total want of what may be called architectural life; it is an artificial production of the studio. The same kind of cold classicism pre- vailed at Munich, where Leo von Klenze (1784-1864), though a lesser man than Schinkel, played somewhat the same part as the latter played at Berlin. His Propylaea (fig. 89), in which Greek and Egyptian influences are combined, is a characteristic example of his cold and scholastic style. His well-known Ruhmeshalle, with its boldly projecting colonnaded wings and the colossal statue of Bavaria in front of it, is in its way a fine architectural con- ception — perhaps finer and more consistent

in its kind than any one work of Schinkel, though he evidently did not exercise so wide an influence on the German art of his day. A third eminent name in the German classic revival is that of Gottfried Semper (1803-1879), somewhat later in date (Schinkel was born in 1781), but more or less of the same school. Semper practised successively at Dresden and at Zurich, but finally settled in Vienna, where, however, he did not live to see the execution of his two most important designs, the museum and the Hofburg theatre, which were carried out by Baron Karl von Hasenauer (1833-1894) from his designs, or approximately so. Semper's theatre at Dresden, however, shows that he could recognize the practical basis of architecture, as the expression of plan, in a way that Schinkel could not; for in that building he frankly adopted the curve of the auditorium as the motif for his exterior design, thus producing a building which is obviously a theatre, and could not be taken for anything else, and putting some of

that life into it which is so much wanting in Schinkel's rigid classicalities.

In spite of the Romanizing influence of the First Empire, the classic revival did not leave by any means so academical a stamp on French as on German architecture of the early period of the century. French architects in the

French classicism.

main have always had too much original genius to be entirely taken captive by a general movement of this kind. There is the weak classicism of Bernard Poyet's facade to the chamber of deputies, a very poor affair; and there are two important buildings in the guise of Roman peripteral temples, devoted respectively to business and to religion — the Bourse, by Alexandre Theodore Brongniart (1739-1813), and the Made- leine, begun under Napoleon, as a " Temple de la Gloire," by Pierre Vignon (1763-1828), and completed as a church in 1841 by Jean Jacques Huve (1783-1852). Both of these are very well carried out externally, and enable us to judge of what would be the effect of a Roman temple of the kind. It must

be admitted that the plain oblong mass of theBourse has really been very much im- proved by the recent addition of the two wings, carried out by Cavel, though there was a great deal of opposition at first to medd- ling with so cele- brated a building. U n f o r t u nately, the exterior of the Bourse is a mere piece of architec- tural scenery, quite unconnected with the internal object and ar- rangement of the Munich. (Von Klenze.) building. The

Madeleine is a really fine exterior in its way; if a modern church was to put on the guise of a pagan temple, the task could hardly have been better

carried out; and the interior might have been as fine if properly treated, but it has little artistic relation with the noble exterior, and is spoiled by poor architectural treatment and bad ornament. The church of St Vincent de Paul, by Jacques Ignace Hittorff (179 2-1 867), an architect who was one of the most learned students of Greek architecture of his day, is another im- portant example of the French classical church of the period (Plate XII., fig. 125). In this the interior is more consistent with the exterior than is the case in the Madeleine; and by adding a tower at each angle of the facade, above the colonnaded portico, the architect gave it more the expression of a church, which the Madeleine wants. In the Arc de l'Etoile, by Jean Francois T, Chalgrin (1739-1811), we have a really great, even sublime work, which, though suggested by the Roman triumphal arches, is no mere copy, but bears the impress of the French genius in its details as well as in Francois Rude's grand sculptures on the east face, while its great scale places it above everything else of the kind in the world. It is only after ascending the interior and seeing the vaults carrying the roof that one fully realizes what a stupendous piece of work this is. Under Napoleon there was at least no jerry-building. 1

1 A remarkable instance of this is shown by the railway viaduct at Passy, a large and monumental piece of work in itself, which is built along the centre of the roadway of Napoleon's bridge. It was- at first proposed to have a steel railway viaduct parallel with the old bridge, but it was found that the latter, both in respect of solidity and spacious dimensions, would fully bear the erection of the railway viaduct along its centre.

Barry's " common' sense " style, In England.

Returning to the consideration of architecture in England, we come, at about the close of the classic revival, to the name of the man who was undoubtedly the most remarkable English architect since Wren, Sir Charles Barry. To class him, as some would do, with the classic revival, would be a misapprehension. Barry was no revivalist ; he never attempted to recreate Greek architecture on English soil. He adopted for most of his works what has been called,for want of a better name, the Italian style, which may really rather be called the common-sense style of a civilized society. The two first works which brought him into notice, the Travellers' and Reform clubs in London, were no doubt based on special Italian models, the Pandolfini and Farnese palaces; but a consideration of his whole career

shows that he was in fact

Fig. 90.— Halifax Town Hall. (Barry.)

anything but a copyist. The comparison of him with Wren is justified by the fact that he was, like Wren, a born architect, in the sense that he grasped every problem presented to him from the true architect's point of view; with both of them architecture was not the dressing up of an exterior, but the fashioning of a building as a conception based on plan and section as well as on the desire to secure a certain external appearance; and, like Wren, he never failed to grasp the true requirements of a site and to adapt his architectural conception to it; a power perfectly different from that of merely producing agreeable elevations in this or that adopted style. Though very careful of his detail, he did not rely on detail, but on the general conception of an architectural scheme. This power was never so remarkably shown as in his grand scheme, unhappily never carried out, for the concentration of all the British government offices in one great architectural ensemble, which was to extend,

on the west of Parliament Street and Whitehall, from Great George Street nearly to Charing Cross, the whole of the buildings to be carried out as one design, distributed into quadrangles, each of which was to be connected with one department of the administration, while all would have internal communication. Had this great idea been carried out we might at the present day have found some of the detail of the building unsatisfying to our taste, as we often find the detail in some of Wren's buildings, but we should have had a grand architectural achievement which would have made London pre-eminent among the capitals of the world. Nothing so great had been proposed in England since Inigo Jones's plan for Whitehall Palace, which also survives only in drawings, except the one noble bit of classic architecture known as the Banqueting House (Plate VI., fig. 75). It was one of the greatest misfortunes to London as a capital city that the government of the day could not rise to the height of Barry's ambitious scheme, in which there was nothing financially insuperable, since it was all designed to be carried out by portions at a time, as funds could be spared; but each government office built would in that way have been one step towards the completion of a great central idea; whereas the nation now spends the same money in erecting detached government buildings which have no architectural connexion with each other.

Barry's two clubs before mentioned are almost ideals of club architecture — the architecture of a civilized society; his Bridge- water House is a building on a larger scale of the same type. That he had architectural ideas less staid and sober than these is shown, however, by the remarkable tower and spire of the Halifax Town Hall (fig. 90), his last work, which he did

not live to see carried out, in which he contrived with remarkable success to give the Gothic spirit and multiplicity of effect to a tower which is nevertheless classic in detail. This tower is one of the most original and striking things in modern English architecture and shows how Barry's architectural ideas were developing up to the close of his life.

Barry's great building, the Houses of Parliament (Plate X., fig. 118), with which his name will always be more especially associated, comes accidentally, though not by natural development nor by his own choice, under the head of the Gothic revival. The style of Tudor Gothic was dictated to the competitors, apparently from a mistaken idea that the building ought to " harmonize " with the architecture of Henry VII. 's chapel adjacent to the site. Had Barry been left to himself, there is no doubt that the Houses of Parliament, with the same main characteristics of plan and grouping, would have been of a classic type of detail, and would possibly have been a still finer building than it is; and since the choice of the Gothic style in this case was not a direct .consequence of the Gothic revival movement, it may be considered separately from that. The architectural greatness of the building consists, in the first place, in the grand yet simple scheme of Barry's plan, with the octagon hall in the centre, as the meeting-point for the public, the two chambers to north and south, and the access to the committee- rooms and other departments subordinate to the chambers. The plan (fig. 91) in itself is a stroke of genius, and has been more or less imitated in buildings for similar purposes all over the world ; the most important example, the Parliament House of Budapest (Plate IX., fig. 115 a n d tig- 92), being almost a literal copy of Barry's plan. Thus, as in all great architecture, the plan is the basis of the whole scheme, and upon it is built up a most picturesque and expressive grouping, arising directly out of the plan. The two towers are most happily contrasted, as expressive of their differing purposes; the Victoria Tower is the symbol of the State entrance, a piece of archi- tectural display solely for the sake of a grand effect; the Clock Tower is a utilitarian structure, a lofty stalk to carry a great clock high in the air; the two are differentiated accordingly, and the placing of them at opposite ends of the structure has the fortunate effect of indicating, from a distance, the extent of the plan. The graceful spire in the centre offers an effective contrast to the masses of the two towers, while forming the outward architectural expression of the octagon hall, which is, as it were, the keystone of the plan.

The detail is another consideration. Barry, having had a style forced upon him (most unwisely), which he had not studied much and with which he was not much in sympathy, associated Pugin with him to design a good deal of the detail; exactly how much is not certainly known; probably Pugin was responsible for all the interior detail and fittings; the exterior detail may have been only suggested or sketched by him. On this ground

absurd attempts have been made, by people who do not seem to understand what architecture in the true sense means, to claim for Pugin what they call the " artistic merit " of the Houses of Parliament. The artistic merit consists in the whole plan, conception and grouping, which

MODERN]

ARCHITECTURE

43 i

«) ij 4J CJ rt

en < t-< to !> «

r^ r~oo c» qo oo oo oo oo oo

o

*« !D^^ IB *i- *V. *« X “^*

D do o a>

m i« «j . rt

- a a° « a oo en > ffl to

are entirely Barry’s, and which represent something beyond Pugin’s grasp ; the detail is in fact the weak element in the building. That Pugin’s Gothic detail is better than Barry’s would have been is very likely the case; but had Barry been left unfettered to work out the detail in his own school, the result would probably have been still better. Even as it is, however, the Houses of Parliament is one of the finest buildings in the world, ancient or modern, and it is to be regretted that Englishmen generally seem to be so little aware of this.

We may now turn to consider the Gothic Revival movement itself, of which Pugin was one of the most important pioneers. New ideas, however, as to the importance of Gothic architecture had been in the air before he came on the scene, and Revival ° Q u i te early in the century John Britton’s Architectural England. Antiquities of Great Britain and Cathedral Antiquities, with their beautiful steel engravings by Le Keux, had done much to call attention to the neglected beauty of English medieval churches; and Thomas Rickman’s remarkable and (for its day) masterly analysis of the variations of style in Gothic archi- tecture, which first appeared in 1817, and went through edition after edition in succeeding years, gave the first intelligent direction to the study of the subject. Pugin supplied to the movement

building. The result has been gently but effectively satirized by Browning in ” Bishop Blougram’s Apology “: —

” It’s different preaching in Basilicas To doing duty in some masterpiece

Like this of brother Pugin's, bless his heart. I doubt if they're half-baked, those chalk rosettes, Ciphers and stucco-twiddlings everywhere ; It's just like breathing in a limekiln, eh?"

It is too true; and there is something pathetic in Pugin's career, in this passionate and sincere pursuit after a revival of the medieval spirit in life and in architecture — a pursuit which towards the close of his life he himself evidently more than half suspected to have been a fallacy.

The full tide of the Gothic revival is connected more especially with the name of Sir Gilbert Scott. He was hardly a pure enthusiast like Pugin; he was a shrewd man of the world, the commencement of whose professional career coincided with the rising tide of ecclesiological reform, and he had the ability to make the best of the opportunity. He appears to have had, even as a child, an inborn interest in church architecture and in

Fig. 92. — Plan of the Parliament House, Budapest. (Steindl.)

not analysis, but passion. He had the merit of having perceived, when quite a youth, that one thing wanted was better craftsman- ship, and that craftsmanship in the medieval period was some- thing very different from what it was in the' early Victorian period; he set up an atelier of craftsmen, and was the real pioneer of what may be called the Arts and Crafts movement in England. An enthusiast by nature, he flung his whole soul into the task of reviving, as he believed, the glory of English medieval architecture; nothing else in architecture was worth thinking of; Classic and Renaissance were only worth sarcasm. The result in his works was a curious inconsistency. Pugin was not in the true sense a great architect; his mind was not practical enough to grasp an architectural problem as a whole, plan and building combined; in fact, he was no master of plan, and does not seem to have troubled himself much about it. But he had a remarkable perception of interior effect; whenever you go into one of his churches you recognize the desire to realize the greatest effect of height, the most soaring effect of lines, possible within the actual vertical measurements. But in his passion for this soaring expression he seems to have entirely lost sight of the essential quality of solidity and genuineness of material in the medieval architecture which he was trying to emulate or to outvie. So long as he could get his effect of height, his poetic interior, he was content to have thin walls and plaster vaults and ornaments; or, in other words, he spent upon height ■what should first have been spent upon solid and monumental

Gothic detail (witness the description, in his Memoirs, of his astonishment and interest, at the age of eleven, at the first sight of capitals of the Early English type), and he acquired by un- remitting study a knowledge of

English Gothic architecture in its every detail which few architects have ever equalled. His numerous churches were, intentionally and confessedly, as close reproductions as possible of medieval architecture, generally that of the Early Decorated period; and if it were desirable that modern church architecture should consist in the reproduction of medieval churches, the task could not have been carried out with more learning and exactitude than it was by him. It was this minute and accurate knowledge of medieval church archi- tecture which made him such a power when the idea of restoring English cathedrals became popular. He had an acquired instinct in tracing out the existence of details which had been overlaid by modern repairs or plasterwork; in going over a cathedral to decide on a scheme of restoration he seemed to know it as an anatomist knows the suggestions of a fossil skeleton; and in the course of his restorations he unearthed many points in the architectural history of the buildings which but for him would never have been elucidated. We now recognize that much of this " restoration " was a mistake, which destroyed the real interest of the cathedrals; and it is unhappily a mistake which cannot be undone. But the violent reproaches which have been heaped upon Scott's memory on this account are rather unjust. It is forgotten that he was doing what at the time every one

considered to be the right thing; cathedral bodies vied with each other in restoration, and were enthusiastic in the cause; there were' few if any dissenting voices; and in regard to the interiors of the cathedrals which were in modern use as places of worship, much that he did really required to be done to put them into decent condition. His churches have ceased to be interesting now, as is usually the case with copied architecture; but when they were built they were exactly what every one wanted and was asking'for. And he produced at all events one original work which is a great deal better than it is now the fashion to think — the Albert Memorial. It is injured by the statue, for which the commission went to the wrong sculptor; but Scott's idea of producing, as he phrased it, " a shrine on a great scale," was really a fine one, and finely carried out. The most important objection to it is one which popular criticism does not recognize, viz. that the vault is tied by concealed iron ties, and would hardly be safe without them. But apart from that it is a fine conception, and Scott was right in regarding it as his best work.

G. E. Street, who was a pupil of Scott, was a greater enthusiast for

medieval architecture (which, with him, as with Pugin, included medieval religion) than even Scott, and an architect of greater force and individuality. He was especially devoted to the early Transitional type of Gothic, and in all his buildings there is apparent the feeling for the solidity and monumental character, and the reticence in the use of ornament, which is characteristic of the Transitional period. His churches are noteworthy for their monumental character; and he had a remarkable faculty for giving an appearance of scale and dignity to the interiors of comparatively small churches. Hence his modern-medieval churches retain their interest more than Scott's, but in respect of secular architecture his taste was hopelessly medievalized, and his great building, the law courts in London, can only be regarded as a costly failure; it is not even beautiful except in regard to some good detail; it is badly planned; and the one fine interior feature, the great vaulted hall,is rendered useless by not being on the same floor with the courts, so that instead of being a salle des pas perdus it is a desert. Street's career is a warning how real architectural talent and vigour may be stultified by a sentimental adherence to a past phase of architecture. No modern architect had more fully penetrated the spirit of Gothic architecture, and his nave of Bristol cathedral is as good as genuine medieval work, and might pass for such when time-worn ; but that is rather archaeology than architecture.

The competition for the law courts was one of the great architectural events of the middle of the century, and made or raised the reputation even of some of the unsuccessful com- petitors. Edward Barry (the son of Sir Charles) gained the first place for " plan," which the advisers of the government had foolishly separated from " design" (as if the plan of a building could be considered apart from the architectural conception!), giving first marks for plan, and second for design. E. Barry therefore had really gained the competition, " design," which was awarded to Street, counting second; but Street managed to push him out, and it is a nemesis on him for this by no means loyal proceeding that the building he contrived to get entirely into his own hands has served to injure rather than benefit his reputation. William Burges (1827-1881), an ardent devotee of French early Gothic, produced a design in that style, which, though quite unsuitable practically, is a greater evidence of architectural power than is furnished by any of his executed buildings. J. P. Seddon (1828-1906), an old adherent of Rossetti and the pre-Raphaelite brotherhood, an architect of genius who never got his opportunity, produced a design which was wildly picturesque in appearance but in reality more practical than might be thought at first sight, and his proposal for a great Record tower for housing official records was a really fine and original idea.

Among the ecclesiastical buildings of the Gothic revival those of William Butterfield (1814-1900), much less numerous than those of Scott and

Street, have a special interest as the work of a revival architect who was something more than a

mere archaeologist. All Saints, Margaret Street (1859), is the production of an architectural artist using medieval materials to carry out a conception of his own, and hence, like Babbacombe church and others by the same hand, it has an interest for the present day which Scott's churches have not. His Keble College chapel rather failed from an exaggeration of the use of poly-chromatic materials, which in some of his other churches he had used with moderation and with good effect. J. L. Pearson was another distinguished architect of the later period of the Gothic revival who was able to put something of his own into modern Gothic churches. No one was more learned in medieval archi- tecture than he was; and as of Street's nave of Bristol, so we may say of Pearson's nave of Truro, that it is as good as medieval Gothic; indeed Truro nave is finer in character than some of the ancient cathedral naves, and represents pure Gothic at its best. But in the exteriors of his churches, as at Truro and in the churches of Kilburn and Red Lion Square, Pearson evolved a Gothic of his own which is Pearsonesque and not merely archaeological. James Brooks (18 25-1901) also deserves an honoured place in the chronicle of the Gothic revival for being the first to show how large town churches might be erected in brick (fig. 93), in which largeness of scale and a certain grandeur

Fig. 93. — Exterior of modern English Church. (James Brooks.)

of effect could be obtained without extravagant cost, and in which it was practically demonstrated that architecture in the true Gothic spirit could be produced without depending on ornament.

Alfred Waterhouse began his remarkable career as an adherent of the Gothic revival, and merits separate mention inasmuch as he was the only one of the Gothic revivalists who from the first set himself to adapt Gothic to secular uses and to make out of it a modern Gothic manner of his own. His first success was made with the Manchester law courts, a design more purely Gothic than his later works, and an admirably planned building (the only good point in the national law courts plan, the access to the public galleries, is taken from it); his special style was more developed in the Manchester town hall, a building typical both of the defects and merits of his secular Gothic style. This style of his received the compliment, for a good many years, of an immense amount of imitation; in fact, during that earlier period of his work it may be said to have influenced every secular building that was erected in the medieval style all over England. His Gothic detail was, however, not very refined, and he has been subject to the same kind of retrospective injustice which has fallen on Scott, critics in both instances forgetting that what they do not like now was what every one

liked then, and could not have enough of. Waterhouse was a master of plan, and a man of immense business and administra- tive ability, without which he could not have carried out the

number of great building schemes which fell into his hands, and he had much more of the qualities of a great architect than are to be found in the works of some of his latter-day critics. His later works, one or two of which will be referred to, do not come under the head of the Gothic revival. , In France, the Gothic revival, which so strongly affected the whole school of English architecture for thirty or forty years, took little hold. Its most remarkable monument is the church of Ste Clotilde at Paris, built about the middle of the century from the designs of Ballu. In size it equals a second-class cathedral, and is a fine monument, though it does not show that complete knowledge of medieval Gothic which we find in the churches of Scott, Street, Pearson and G. F. Bodley. But as with the Classic, so with the Gothic revival — the leading French architects of the period had too much personal architec- tural feeling to be carried along in the wake of a " movement." Two very important Paris churches, built just after the middle of the century, illustrate well this independence of spirit. The one is the domed church of St Augustin in the Boulevard Malesherbes (Plate XII., fig. 122), designed by Victor Baltard (1805-1874). It may be called a Classic church treated in a quasi- Byzantine manner. A remarkable point about it is that, standing between the divergence of two streets at an acute, angle, the outer walls of the nave follow the line of the two streets, the church thus expanding towards the centre; internally the colonnades are parallel, the chapels outside of them increasing in depth from the entrance of the nave towards the centre — a very clever device for reconciling exterior and interior effect. The other church referred to, built about the same time, is La Trinite (Plate XII., fig. 123) by Theodore Ballu (1817-1885)— a church which is Renaissance in detail and yet distinctly Gothic in its general effect and in the multiplicity of its detail, somewhat recalling in this sense Barry's Halifax tower before referred to. The sense in which there has really been a general movement in church architecture in France has been in the direction of a kind of modernized Byzantine, of which one of the earliest and best examples is the church of St Pierre de Montrouge, by Joseph Auguste E. Vaudremer (Plate XII., fig. 124). A later and more important example is the cathedra] of Marseilles, by Leon Vaudoyer

(1803-1872) and Henry Esperandieu (1820-1874), a mingling of Romanesque and Byzantine, and in many respects a fine building (Plate XIII., fig. 126). This modern feeling in favour of a Byzantine type of church architecture culminated in the great church of the Sacre Cceur on Montmartre, at Paris, begun in the early 'eighties from the designs of Paul Abadie (1812-1884). This grand building stands on a most effective site, and is of a monumental solidity seldom met with in modern architecture; it is more pure and consistent in style than many of the smaller churches of the same school of architecture. These latter are not for the most part very attractive; they represent in general a kind of Frenchified Byzantine detail which exhibits neither Byzantine spirit nor French grace and finish; and on the whole it may be said that church architecture is the field in which the French architects of the 19th century were least successful.

As regards secular buildings, on the other hand, the Paris of the middle portion of the 19th century can show some of the most unquestionable architectural successes of the period. The modern portions of the Palais de Justice by Louis Joseph Due (180 2-1879) — not Viollet-le-Duc,asis often mistakenly asserted in guide-books — and of the Ecole des Beaux-Arts, by Jacques Felix Duban (1 797-1870) , are among the best examples of the application of classic forms qf architecture to modern buildings; and the Bibliotheque Ste Genevieve (Plate XIII., fig. 128), by Henri Labrouste (1801-1875), was in its day (about 1850) a new creation in applied classic architecture; a building in which the exterior design was entirely subservient to and expressive of the require- ments of a library, a large portion of the wall being left unpierced for the storage of books, windows being only inserted where they did not interfere with this object; and the manner in which these walls are treated so as to produce a decorative architectural effect without having recourse to sham colonnades and sham window openings, was entirely new at the time in modern work.

It is instructive to compare this design with that of the Bank of England, as examples of the right and the wrong way of treating buildings in which much blank wall space was required. The new buildings of the Louvre (Plate XIV., fig. 129), built under Napoleon III. from the designs of Louis Tullius Joachim Visconti (1791-1853), are not to be passed over, though they have too much of the showy and flaunting character which belonged to both the society and the art of the Second Empire; a fault which also destroys some of the value of the Grand Opera house, a remarkable work by a remarkable architect (Jean Louis Charles Gamier), and typical, more than any other structure, of the epoch in which it was built. Some of its effect it owes to the admirable painting and sculpture with which it is decorated, but the grand staircase is a fine architectural conception (see Garnier).

In England and in the United States, the last quarter of the 19th century was a period of unusual interest and activity in architectural development. While other nations have Recent been content to carry on their architecture, for the English most part, on the old scholastic lines which had been archi- prevalent since the Renaissance, in the two countries re ‘

named there has been manifest a spirit of unrest, of critical inquiry into the basis and objects of architecture; an aspiration to make new and original creations in or applications of the art, without example in any other period in the modern history of architecture. In England, the ” note ” — heard with increasing shrillness of crescendo towards the very last year of the centuiy — was the cry for originality, for throwing off the trammels of the past, for rendering architecture more truly a direct expression of the conditions of practical requirement and of structure. This was no doubt to some extent the effect of a reaction. During the greater part of the century architectural strength, as has been already shown, had been spent in revivals of past styles. Churches indeed, up to the close of the century, continued to be built, for the most part, in revived Gothic; but this was owing to special clerical influence, which saw in Gothic a style specially consecrated to church architecture, and would be satisfied, as a rule, with nothing else. Efforts have been made by architects to modify the medieval church plan into something more prac- tically suited to modern congregational worship, by a system of reducing the side aisles to mere narrow passages for access to the seats, thus retaining the architectural effect of the arcade, while keeping it out of the way of the seated congregation; and there have been occasional reversions to the ancient Christian basilica type of plan, or sometimes, as in the church in Davies Street, London, attempts to treat a church in a manner entirely independent of architectural precedent; but in the main, Gothic has continued to rule for churches. Apart from this special class of building, however, revived Gothic began to droop during the ‘seventies. All had been copied that could be copied, and the result, to the architectural mind, was not satisfaction but satiety. Gothic began to be regarded as ” played out.” The immediate result, however, was not an organized attempt to think for ourselves, and make our own style, but a recourse to another class of precedent, represented in the type of early 18th-century building which became known as ” Queen tt Anne,” and which, like Gothic before it, was now to Anne.” be recommended as ” essentially English,” as in fact it is. It can hardly, however, be called an architectural style; it would have no right to figure in any work illustrating the great architectural styles of the world. It was, in fact, the last dying phase of the English Renaissance; the architecture of the classic order reduced to a threadbare condition, treated very simply and in plain materials, in many cases shorn of its columnar features, and reflecting faithfully enough the prim rationalistic taste in literature and art

of the England of the 18th century. Though not to be dignified as a style, it was, however, a recogniz- able and consistent manner in building; it made extensive use of brick, a material inexpensive and at the same time very well suited to the English climate and atmosphere; and it was generally carried out in very solid proportions, and with very good workmanship. To a generation tired of imitating a great

MODERN]

ARCHITECTURE

Plate XL

Photo, Valentwe<3 Sons, LHtnaee.*

Fig. 120.— NATURAL HISTORY MUSEUM, SOUTH KENSINGTON. (WATERHOUSE.)

H

Fig. 121— LAW COURTS, BRUSSELS. (POELAERT.)

Plate XII.

ARCHITECTURE

[MODERN

Flioto, Neurdein.

Fig. 122.— CHURCH OF ST AUGUSTIN, PARIS. (BALTARD.)

Photo, Neurdein.

Fig. 123— CHURCH OF LA TRINITE, PARIS. (BALLU.)

Plwto, A . Levy.

Fig. 124.— CHURCH OF ST PIERRE DE MONTROUGE, PARIS. (VAUDREMER.)

Photo, Neurdein,

Fig. 125— CHURCH OF ST VINCENT DE PAUL, PARIS. (HITTORFF.)

MODERN]

ARCHITECTURE

style at second hand, this unpretending and simple model was a welcome relief, and led to the erection of a considerable num- ber of modern buildings, dwelling-houses especially, the obvious

Fig. 94. — Chelsea Town Hall. (J. M. Brydon.)

aim of which was to look as like 18th-century buildings as possible. A typical example is the large London house by Norman Shaw, at the corner of Queen's Gate and Imperial Institute Road. The Chelsea town hall (fig. 94), by J. M. Brydon (1840-1901), is a good example of a public building in the revived Queen Anne style.

A change of front from copying a great style like the medieval to copying what is at best a bastard one, if a style at all, might not seem to promise very much for the emancipation of modern architecture; yet there turned out to be one element of progress in it, resting on the fact that the comparatively simple detail of the 18th-century buildings formed a kind of vernacular of building workmanship, which could be comprehended and carried out by good artisans as a recognized tradition. Now to reduce architecture to good sound building and good workmanship seemed to promise at any rate a better basis to work upon than the mere imitation of classic or medieval detail; it might conceivably furnish a new starting-point. This was the element of life in the Queen Anne revival, and it had, as we shall see, an influence beyond the circle of the special revivers of the style. But almost con- currently with, or following hard upon, the " Queen Anne " movement arose the idea of a modern archi- tecture, founded on a free and unfettered treatment of the materials of our earlier Renaissance architecture, as illustrated in buildings of the Stuart period. This new ideal was styled " free classic," and it gave the prevailing tone to English archi- tecture for the last fifteen years of the century, though it had its commencement in certain characteristic buildings a good many years earlier than that. In 1873, for instance, there arose a com- paratively small front in Leadenhall Street, under the name of " New Zealand Chambers " (fig. 95), designed by Norman Shaw, which excited more attention, and had more influence on contemporary architecture than many a building of far greater size and importance. This represented the playful and picturesque possibilities of " free classic." Its more restrained and refined achievements were early exemplified in G. F. Bodley's design for the front of the London School Board offices on the Thames Embankment, 1 a comparatively small building which also exercised a considerable influ- ence. There were no details here, however, but what could be found in Stuart (or, as it is more often called, Jacobean) architecture, but the building, and the prominence of its architect's name, helped to draw

attention to the possibilities of the style, and it has been

1 The western half of the present front ; the design was duplicated afterwards, on the extension of the building, but Bodley originated it.

discovered that free classic is susceptible of a great deal of original treatment based on Renaissance elements. As an example we may cite a street front built some twenty years later by another academician-architect, viz. the offices of the Chartered Accountants in the City, by J. Belcher. More dignified and more monumental than New Zealand Chambers, more original than the School Board offices, this front contains some details and a general treatment which may be said to be absolutely new; it affords another example of a piece of street architecture which attracted a great deal of attention, and has had an effect quite disproportionate to its size and importance as a building; and it gives a general measure of the progress of the " free classic " idea. During the last decade of the century " free classic " was almost the recognized style in English architecture, and has been illustrated in many town halls and other large and important buildings, among which the Imperial Institute is a prominent example (fig. 96).

Concurrently with this tendency towards a free classic style there has arisen another movement which has had a considerable influence on English architecture, viz. an increased perception of the importance of decorative arts — ■ arts > sculpture, painting, mosaic, etc. — in alliance with architecture, and of the architect and the decorative artist

"Free classic

Fig. 95. — New Zealand Chambers. (R. Norman Shaw, R.A.)

working together and in harmony. This is no more than what has long been understood and acted on in France, but it has been a new light to modern English architecture, in which, until a comparatively recent period, decorative painting was hardly

thought of, and decorative sculpture, where it was introduced, was too often, or indeed generally, the mere work of some trading firm of masons. But of late years sculpture has taken a far more prominent place in connexion with architecture; it has become a habit with the best architects

to rely largely on the introduction of appropriate and symbolic sculpture to add to the interest of their buildings, and to associate with them eminent sculptors, who, instead of regarding their work only in the light of isolated statues or groups for the exhibition room and the art gallery, are willing to give their best efforts to produce high-class sculpture for the decoration of an architectural design which forms the framework to it.

Notice should be taken, however, of another movement in

Fig. 96. — Staircase, Imperial Institute. (Collcutt.)

English architecture during the closing years of the 19th century.

Reference has already been made to one idea which ™anship~ P rom P ted the culture of the " Queen Anne " type of Ideal. architecture: that it presented a simple vernacular of

construction and detail, in which solid workmanship was a more prominent element than elaboration of what is known as architectural style. To a small group of clever and enthusiastic architects of the younger generation it appeared that this idea of reducing architecture to the common-sense of construction might be carried still further; that as all the revivals of styles since the Renaissance had failed to give per- manent satisfaction and had tended to reduce architecture to a learned imitation of the work of former epochs, the real chance for giving life to architecture as a modern art was to throw aside all the conventionally accepted insignia of architec- tural style — columns, pilasters, cornices, buttresses, etc. — and to begin over again with mere workmanship— wall-building and carpentry — and trust that in process of time a new decorative detail would be evolved, indebted to no precedent. The building artisans, in fact, were collectively to take the place of the architect and the form of the building to be evolved by a natural process of growth. This was a favourite idea also with William Morris, who insisted that medieval art — the only art which he recognized as of any value (Greek, Roman and Renaissance being alike contemptible in his eyes) — was essentially an art of the people,

and that in fact it was the modern architects who stood in the way of our having a genuine architecture of the 19th century. Considering how much of merely formal, conventional and soul- less architecture has been produced in our time under the guidance of the professional architect, it is impossible to deny that there is an element of truth in this reasoning; at all events, that there have been a good many modern architects who have done more harm than good to architecture. But when we come to follow out this reasoning to its logical results, it is obvious that there are serious flaws in it. Morris's idea that medieval architecture alone was worthy the

name, we may, of course, dismiss at once; it was the prejudice of a man of genius whose sympathies, both in matters social and artistic, were narrow. Nor can we regard the medieval cathedrals as artisan's architecture. The name of " architect " may have been unknown, but that the personage was present in some guise, the very individuality and variety of our English cathedrals attest. Peterborough front was no mere mason's conception. And when we come to consider modern conditions of building, it is perfectly obvious that with the complicated practical requirements of modern building, in regard to planning, heating, ventilation, etc., the planning of the whole in a complete set of drawings, before the building is begun, is an absolute necessity. We are no longer in medieval times; modern conditions require the modern architect. The real cause of failure, as far as modern architecture is a failure, lies partly in the fact that it is practised too much as a profession or business, too little as an art; partly in the deadening effect of public indifference to art in Britain. If the public really desired great and impressive works of architecture they would have them; but neither the British public nor its mouthpiece the government, care anything about it. Their highest ambition is to get convenient and economical buildings. And as to the theory of the new school, that we should throw overboard all precedent in architectural detail, that is intellectually impossible. We are not made so that we can invent everything de novo, or escape the effect on our minds of what has preceded us; the attempt can only lead to baldness or eccentricity. Every great style of architecture of the past has, in fact, been evolved from the detail of preceding styles; and some of the ablest and most earnest architects of the present day are, indeed, urging the desirability of clinging to traditional forms in regard to detail, as a means of maintaining the continuity of the art. This does not by any means imply the absence of original architecture; there is scope for endless origination in the plan and the general design of a building. The .Houses of Parliament is a prominent example. The detail is a reproduction of Tudor detail, but the plan and the general conception are absolutely original, and resemble those of no other pre-existing building in the world.

It is necessary to take account of all these movements of opinion and principle in English architecture to appreciate properly its position and prospects at the time with which we are here dealing. Turning now from England states. to the United States, which, as already observed, is the only other important country in which there has been a general new movement in architecture, we find, singular to say, that the course of development has in America been almost the reverse of what has taken place in England. The rapidity of architectural development in America, it may be observed, since about 1875, has been something astonishing; there is no parallel to it anywhere else. Before then the currently accepted architecture of the American Republic was little more than a bad repetition of the English

Gothic and Classic types of revived architecture. At the present day no nation, except perhaps France, takes so keen an interest in architecture and produces so many noteworthy buildings; and it may be observed that in the United States the public and the official authorities seem really to have some enthusiasm on the subject, and to desire fine buildings. But the stirring of the dry bones began in America where it ended in England. The first symptoms of an original spirit operating in American architecture showed themselves in domestic architecture, in town and country houses, the latter especially; and the form which the movement took

was a desire to escape conventional architectural detail and to return to the simplest form of mere building; rock-faced masonry, sometimes of materials picked up on the site; chimneys which were plain shafts of masonry or brickwork; woodwork simply hewn and squared; but the whole arranged with a view to picturesque effect (figs. 97 and 98). This form of American

rvnrrrTT'

^^aS^^seiS _ . — =: — – — ■ -^ -. ——- „j

Fig. 97. — American Type of Country-House Architecture.

house became an incident in the course of modern architecture; it even had a recognizable influence on English architects. About the same time an impetus of a more special nature was given to American architecture by a man of genius, H. H. Richardson, who, falling back on Romanesque and Byzantine types of architecture as a somewhat unworked field, evolved

Fig.

-American Seaside Villa. (Bruce Price.)

from them a type of architectural treatment so distinctly his own (though its origines were of course quite traceable) that he came very near the credit of having personally invented a style; at all events he invented a manner, which was so largely admired and imitated that for some ten or fifteen years American archi- tecture showed a distinct tendency to become "Richardsonesque"

Fig. 99. — Crane Public Library, Quincy, Mass. (H. H. Richardson.)

(see also Plate XVI., fig. 137). As with all architectural fashions, however, people got tired of this, and the influence of another very able American architect, Richard M. Hunt, coupled perhaps with the proverbial philo-Gallic tendencies of the modern American, led to the American architects, during the last decade of the 19th century, throwing themselves almost entirely into the arms, as it were, of France; seeking their education as

far as possible in Paris, and adopting the theory and practice of the Ecole des Beaux-Arts so completely that it is often impossible to distinguish their designs, and even their methods of drawing, from those of French architects brought up in the strictest regime of the "Ecole." By this French movement' the Americans have, on the one hand, shared the advantages and the influence of what is undoubtedly the most complete school of architectural training in the world; but, on the other hand, they have foregone the opportunity which might have been afforded them of developing a school or style of their own, influenced by the circumstances of their own requirements, climate and materials. Figs. 133 and 134, Plate XV., show examples of recent American architecture of the European classic type. Thus, in the two countries which in this period have shown the most activity and restlessness in their architec- tural aspirations, and given the most original thought to the subject, England has constantly tended towards throwing off the yoke of precedent and escaping from the limits of a scholastic style; while America, commencing her era of architectural emancipation with an attempt at first principles and simple but picturesque building, has ended by a pretty general adoption of the highly-developed scholastic system of another country. The contrast is certainly a curious one. Only one original contribution to the art has been made by America in recent days — one arising directly out of practical conditions, viz. the " high buildings " in cities; a form of architecture which may be said to have originated in the fact that New York is built on a peninsula, and extension of the city is only possible vertically and not hori- zontally. The tower-like buildings (see Plate XV., fig. 131, and Steel Construction, Plate II., figs. 3 and 4), served internally by lifts, to which this condition of things has given rise, form a really new contribution to architecture, and have been handled by some of the American architects in a very effective manner; though, unfortunately, the rage for rapid building in the cities of the United States has led to the adoption of the false archi- tectural system of running up such structures in the form of a steel framing, cased with a mere skin of masonry or terra-cotta, for appearance' sake, which in reality depends for its stability on the steel framing. It must be admitted, however, to be a new contribution to architecture, and renders New York, as seen from the harbour, a " towered city " in a sense not realized by the poet.

Some sketch of the state of recent architectural thought or endeavour in England seemed essential to the subject, since it is there that what may be

called the philosophy of architecture has been most debated, and that thought „2f has had the most obvious and most direct effect on architectural style and movement. That this has been the case has no doubt been largely due to the influence of Ruskin, who, though his architectural judgment was on many points faulty and absurd in the extreme, had at any rate the effect of set- ting people thinking — not without result. In other countries architecture continued to pursue, up to the close of the century, the scholastic ideal impressed upon it by the Renaissance, without exciting doubt or controversy unless in a very occasional and partial manner, and without any changes save those minor ones arising from changing habits of execution and use of material. In Germany there appears to be a certain tendency to a greater freedom in the use of the materials of classic architecture, a certain relaxation of the bonds of scholasticism; but it has hardly assumed such proportions as to be ranked as a new movement in architecture.

The last years of the 19th century witnessed the progress to an advanced stage of the most remarkable piece of English church architecture of the period, the Roman Catholic cathedral at Westminster, by J. H. Bentley (1839- ˆhunhes. 1902), a building which is not a Gothic revival, but goes back to earlier (Byzantine) precedents; not, however, without a considerable element of novelty and originality in the design, especially in some of the exterior detail. The interior was intended for decoration in applied marble and mosaic, yet even as a shell of brickwork, with its solid domes and the

immense masses of the piers, it is one of the most impressive and monumental interiors of modern date.

In ordinary church architecture, though there is still a good deal of mere imitation medieval work carried out, England has not been without examples of a new and original application of Gothic materials. The interior of the church of St Clare, Liverpool, by Mr Leonard Stokes (fig. ioo), is a good example of the modified treatment of the three-aisled medieval plan already referred to, the side aisles being reduced to passages; and also of the tendency in recent years to simplify the treatment of Gothic, in contrast to the florid and over-carved churches of the Gothic revival. The churches of James Brooks, as already

Fig. ioo. — Interior, St Clare's, Liverpool. (Leonard Stokes.)

noted, have shown many examples of a solid plain treatment of Gothic, yet with a great deal of character; and J. D. Sedding (1838-1801) built some showing great originality, among which the interior of his church of the Holy Redeemer, Clerkenwell, affords also an interesting example of the modern free treat- ment of forms derived from classic architecture.

The event of most importance in English church architecture at the beginning of the 20th century was the commencement of a modern cathedral at Liverpool. In the early 'eighties the proposal for a cathedral had led to an important competition between three sets of invited architects, Sir William Emerson, Messrs Bodley and Garner and James Brooks. Nothing, however, resulted, except the production of three very fine sets of drawings. Subsequently the subject was taken up again with more energy, and a sketch competition invited for a cathedral on a new site (the one originally intended being no longer

available); from among the sketch competitors five were invited to join in a final competition, viz. Messrs Austin and Paley, C. A. Nicholson, Gilbert Scott (grandson of Sir Gilbert Scott), Malcolm Stark and W. J. Tapper. Mr Scott's design was selected (May 1903) and the building of it commenced not long after. It is a design in revived Gothic, of the orthodox type as to detail, though containing some points of decided originality in the general treatment. The condition proposed in the first instance by the committee, that the designs sent in must be in the Gothic style, ga"f rise to a strong protest, in the architectural journals and elsewhere, on the ground that the revival of ancient styles was a mistaken and exploded fallacy; and in deference to this expression of opinion the committee officially withdrew the limitation as to style. That, in view of their obvious bias, they would confine their selection to designs in the Gothic style, was, however, a foregone conclusion. It is much to be regretted that the opportunity was not taken to evolve a modern and Protestant type of cathedral, with a central area and a dome as its principal feature.

In the architecture of public buildings one of the earliest incidents in this latest period was the completion of the Albert Hall, which, though the work of an engineer, and commonplace in detail, is Bagiish in the main a fine and novel architectural con- buiidines ception, and a practical success (considering its abnormal size) as a building for musical perform- ances. Had its constructor been bold enough to roof it with a solid masonry dome, with an " eye " in the centre (as in the Pantheon) instead of a huge dish-cover of glass and iron, there would have been little to find fault with in its general conception. It was also the first modern English building of importance to be decorated externally with symbolical figure composition,

in the shape of the large frieze in coarse mosaic of terra-cotta, which is carried round the upper portion of the exterior, and which, if not very interesting in detail, at all events fulfils very well its purpose as a piece of decorative effect. The subject of the govern- ment offices in London forms in itself an important chapter in recent architectural history. The home and foreign office block was finished in 1874; a sumptuous, but weak and ill-planned building designed by Scott, invito. Minerva, in a style alien to his own predilections. In 1884 took place the great competition for the war and admiralty offices conjointly, won by a commonplace but admirably drawn design, presenting some good points in planning. The building was to stand between Whitehall and St James's Park, with a front both ways. The competition came to nothing, and the successful architects were eventually employed to build the new admiralty as it now stands, a mean and commonplace building with no street frontage, in which economy was the main consideration, and totally discreditable to the greatest naval power in the world. In 1898-1899 it was at last resolved to build a war office and other government offices much needed, and an irregular site opposite the Horse Guards was selected for the war office and one in Great George Street for the others. In this case there was no competition, but the government selected two architects after inquiry as to their works ("classic" architecture being a sine qua non); W. Young (d. 1900) for the war office, and J. M. Brydon for the Great George Street block. The war office site is inadequate and totally unsymmetrical, the boundary of the building being settled by the boundary of the street curb, and the inner court- yards are of very mean proportions compared with the great courtyard of the home and foreign office. Both architects produced grandiose designs, but in regard to the war office at least the government threw away a great opportunity.

There can only be further enumerated a few of the more important buildings erected in England during the later years

MODERN

ARCHITECTURE

Plate XIII.

fhoto, Neurdein.

Fig. 126— CATHEDRAL, MARSEILLES. (VAUDOYER AND ESPERANDIEU.)

Fig. 127.— MAIRIE, Xth ARROND1SSEMENT, PARIS. (ROUYER.)

*Fke*i,A.Livy.*

Fig. 128.— BIBLIOTHEQUE STE GENEVIEVE, PARIS. (LABROUSTE.)

Plate XIV.

ARCHITECTURE

[MODERN

FIwto.L.L. Paris.

Fig. 129.— PAVILLON RICHELIEU, THE LOUVRE, PARIS. (VISCONTI.)

Photo, Neurdein.

Fig. 130.— PETIT PALAIS, PARIS. (GIRAULT.)

MODERN]

ARCHITECTURE

439

of the 19th century, and mention made of the general course which architecture has taken in regard to special classes of buildings. The Natural History Museum (Plate XI., fig. 120), completed in 1881 by Alfred Waterhouse, may stand as a type

■f — a — □ — a — cr— q — u — a — □ — D — p 1 ” — ■ — •” .SUGGESTED •C°8HIDOIt-TO DINING HALL-

Fig. 101. — Plan of a Master’s House, New Christ’s Hospital. (Webb and Bell.)

of the taste for the employment of terra-cotta, with all its dangerous facilities in ornamental detail, of which that architect specially set the example. Detail is certainly overdone here, but the building is strikingly original; a point not to be over-

which has been extensively imitated; a refined variety of free classic, always quiet and delicate in detail, though perhaps rather wanting in architectonic force. The next great archi- tectural competition was that for the completion of the South Kensington Museum, the bare brick exterior of which, waiting for architectural completion, had long been a national disgrace. The competition produced some fine and striking designs, some of them perhaps more so than the selected one by Sir Aston Webb, whose fine plan, however, justified the selection. Another competition which excited general interest was that in 1894, for the rebuilding on a country site of

Christ's

Fig. 102.-

-Sheffield Town Hall. (Mountford.)

looked in these days of architectural copying. The Imperial Institute, the result of a competition among six selected archi- tects, represents also a type of architecture which its architect, T. E. Collcutt, maybe said to have matured for himself, and

Fig. 103. — Oxford Town Hall. (Hare.)

Hospital schools, also gained by Aston Webb (in collaboration with Ingress Bell), by a design which, in its arrangement of schoolhouses in detached blocks (fig. 101), but in a symmetrical grouping, opened up a new idea in public-school planning, and struck a blow at the picturesque but insanitary quadrangle system. Among notable public buildings o'f the period ought to be mentioned Norman Shaw's New Scotland Yard, built in a style neither classic nor Gothic, but partaking of the elements of both (Plate X., fig. 119). A competition in 1908 for the design of the new county hall for the London County Council, to be " English Renaissance " in style, was won by a young architect, till then unknown, Mr Ralph Knott.

In recent years there has been a great movement for building town halls; towns rather vying with each other in this way. Of late nearly all of these have been carried out in some variety of free classic. Among the more important in point of scale is that of Sheffield, by E. W. Mountford (1856-1908) (fig. 102); among smaller ones, those of Oxford, by H. T. Hare (fig. 103) ;

and Colchester, by John Belcher, are particularly good examples of recent architecture of this class, the former distinguished also by an exceptionally good plan. The merit of excellent planning also belongs to Aston Webb and Ingress Bell's Birmingham law courts, one of the modern terra-cotta buildings of somewhat too florid detail, though picturesque as a whole. Among public halls the M'Ewan Hall at Edinburgh, completed in 1898 from the designs of Sir Rowand Anderson, deserves mention as one of the most original and most care- fully designed of recent buildings in Great Britain.

The various new buildings erected in connexion with the university of ■"• "^ Oxford, those by T. G. Jackson (b.

1835) especially, form an important incident in modern English archi- tecture. Mr Jackson succeeded to a remarkable degree in design- ing new

buildings which are in harmony with the old architecture of the university city; sometimes perhaps a little too imitative of it, but at any rate he has the credit of having added rather

extensively to Oxford without spoiling it; while his school buildings in different parts of the country have a refinement and domesticity of feeling which is the true note of school archi- tecture. Among buildings of an educational class, the move in technical education has led to the erection of a good many large polytechnic and similar institutions, which in many cases have been well treated architecturally; the Northampton Institute at Clerkenwell (fig. 104), by Mountford, being perhaps one of the

Fig. 104. — Northampton Institute, Clerkenwell. (Mountford.)

boldest and most effective of recent public buildings. In the building of hospitals and asylums much has been done, and great progress made in the direction of hygienic and practical planning and construction, but the tendency has been (perhaps rightly) towards making this practical efficiency the main consideration and reducing architectural treatment to the simplest character. St Thomas's hospital at Lambeth exemplifies the treatment of hospital architecture at the commencement of the last quarter of the 19th century; the separate pavilion system had been already adopted on'practical grounds, but the building is treated

Fig. 105. — Cragside. (R. Norman Shaw.)

in a sumptuous architectural style, as if representing so many detached mansions — a treatment which woul i now be deprecated as an expenditure foreign to the main purpose of the building. One recent hospital, however, that at Birmingham, by W. Henman, combining architectural effect with the latest hygienic improvements, was the first large hospital in Great Britain in which the system of mechanical ventilation was completely and consistently carried out.

In theatre building there has been an immense improvement in regard to planning, ventilation and fireproof construction, but little to note in an architectural sense, since theatres in England are never designed by eminent architects, the financial and practical aspects being alone considered.

In domestic architecture the tendency has been to quit picturesque

irregularity for a more formal and more dignified treatment. Such a house as Norman Shaw's " Cragside," built in the earlier part of our period (fig. 105), however its picturesque

treatment may still be admired, would hardly be built now on a large scale; its architect himself has of late years shown a preference for a symmetrical and regular treatment of BnS J lstl house architecture sometimes to the extent of making domestic the mansion look too like a barrack. In street archi- and street tecture, however, the tendency has been towards a f™ more characteristic and more picturesque treatment; nor is there any class of building in which the improvement in English architecture has been more marked and more unques- tionable. Many of the new residential streets in the west end of London present a really picturesque ensemble, and many shops and other commercial street buildings have been erected with

Fig. 106. — London City & Midland Bank, Ludgate Hill Branch. (Collcutt.)

admirable fronts from the designs of some of the best architects of the day. Norman Shaw's building at the corner of St James's Street and Pall Mall was one of the first, and is still one of the best examples of modern street architecture, though surpassed by the same architect's more recent building opposite, at the south-west angle of St James's Street — one of the finest and most monumental examples of street architecture in London. Among other examples may be cited T. E. Collcutt's London City & Midland Bank in Ludgate Hill (fig. 106) and R. Blom- field's narrow house-front in Buckingham Gate (fig. 107). The introduction of sculpture in street fronts is also beginning to receive attention; and a simple house-front recently erected in Margaret Street, London, from the design of Beresford Pite (fig. 108), is an excellent example of the use of sculpture in

connexion with ordinary street architecture. It is significant of the increased attention accorded to street architecture, that the most important architectural event in England at the very close of the 19th century, was the outlay of £2000 by the London County Council, in fees to eight architects for designs for the front of the proposed new streets of Kingsway and Aldwych. The idea was to treat these streets as comprehensive architectural designs with a certain unity of effect. Unfortunately this idea

Fig. 107. — House in Buckingham Gate, London. (R. Blomfield.)

was abandoned for merely commercial reasons, it being feared that there would be a difficulty in letting the sites if tenants were required to conform their frontages to a general design. In the case of Aldwych, which is a crescent street, this decision was fatal. A crescent loses all its effect unless treated as a complete and symmetrical architectural design.

The competition for the Queen Victoria Memorial, consisting of a processional road from Whitehall to Buckingham Palace, culminating in a sculptural trophy in front of the palace, attracted a great deal of attention in 1901. Of the five invited competitors — Sir Aston Webb (b. 1849), T. G. Jackson, Ernest George (b. 1839), Sir Thomas Drew (b. 1838), and Sir Rowand Anderson (b. 1834) the two latter representing Ireland and Scotland respectively, — Sir Aston Webb's design was selected, and unquestionably showed the best and most effective manner of laying out the road, as well as a very pleasing architectural treatment of the semicircular forecourt in front of the palace, with pavilions and fountain-basins symmetrically spaced; but some of this was subsequently sacrificed on grounds of economy. The building, a triumphal arch flanked by pavilions,

forming the entry to the processional road from Whitehall, is a dignified design.

In France, still the leading artistic nation of the world, the art of architecture has been in a most flourishing and most active state in the most recent period. It is true that there Recent is not the same variety as in modern English archi- French tecture, nor have there been the same discussions and archi- experiments in regard to the true aim and course of architecture which have excited so much interest in England; because the French architects, unlike the English, know exactly what they want. They have a " school " of architecture; they adhere to the scholastic or academic theory of architecture as an art founded on the study of classic models; and on this basis their architects receive the most thorough training of any in the world. This predominance of the academic theory deprives their architecture, no doubt, of a good deal of the element of variety and picturesqueness; a French architect pur sang, in fact, never attempts the picturesque, unless in a country residence, and then the results are such that one wishes the attempt had not been made. But, on the other hand, modern French archi- tecture at its best has a dignity and style about it which no other nation at present reaches, and which goes far to atone for a certain degree of sameness and repetition in its motives; and living under a govern- ment which recognizes the import- ance of national architecture, and is willing to spejid public money liberally on it (with the full appro- bation of its public), the French architects have opportunities which English ones but seldom enjoy — the predominant aim with a British government

being to see how little they can spend on a public building. The two great Paris exhibitions of 1889 and 1900 may be regarded as important events in connexion with architecture, for even the temporary

*buildings erected for them showed -••—■■ˆ ˆasata***

an amount of architectural interest gsfti””””””” and originality which could be met Fig. 108.— House in Mar- with nowhere else, and which in each garet Street, London. (Beres- case left its mark behind it, though f° r(i Pite.) with a difference; for while in the 1889 exhibition the main object was to treat temporary structures — iron and concrete and terra-cotta — in an undisguised but artistic manner, in those of the 1900 exhibition the effort was to create an architectural coup d’xil of apparently monumental structures of which the actual construction was disguised. In spite of some eccentricities the amount of invention and originality shown in these temporary buildings was most remarkable; but fortunately the exhibition left something more permanent behind it in the shape of the two art-palaces and the new bridge over the Seine. The two palaces are triumphs of modern classic architecture; the larger one (by MM. Thomas, Louvet and Deglane) is to some extent spoiled by the apparently unavoidable glass roof; the smaller one, by M. Girault, escapes this drawback, and, still more refined than its greater opposite, is one of the most beautiful buildings of modern times; the central portion is shown in Plate XIV., fig. 130. The architectural pylons, with their accompanying ■ sculpture, which flank the entries to the bridge, are worthy of the best period of French Renaissance. Thus much, at least, has the 1900 exhibition done for architecture.*

[MODERN

At the beginning of the last quarter of the 19th century stands one of the most important of modern French buildings, the Paris hotel de ville, commenced shortly after the war, from the designs of MM. Ballu and Deperthes, planned on an immense scale, and on the stateliest and most monumental lines: the plan is given in fig. 109. The central block is, externally, a

Fig. 109. — Plan of H6tel de Ville, Paris.

A, Salle des Fetes.

B, Salle a manger.

F, Salle des Cariatides.

G, General Secretary.

C, Salons de Reception. H, Prefect.

D, Council Chamber.

E, Grand Staircase.

K, Committee Rooms. L, Public Works.

M, Corridor.

N, President of Council

O, Library.

P, Refreshment Room.

restoration of the old hotel de ville, the remainder carried out in an analogous but somewhat more modern style. The interior has been the scene of sumptuous pictorial decoration, in which all the first artists of the day were employed — unfortunately in too scattered a manner and on no pre- dominant or consistent scheme. One of the most characteristic architectural efforts of the French has consisted in the erection of the various smaller ho tels-de- ville or mairies, in the city and suburban districts of the capital; as at Pan tin, Lilas, Suresnes and in various arrondissements within the city proper (Plate XIII., fig. 127). Nothing shows the quality of modern French architecture better, or perhaps more favourably, than this | series of district town halls; all have a dis- tinctly municipal character and a certain family resemblance of style amid their diversity of details; all are refined speci- mens of pre-eminently civilized architecture. Among the greater architectural efforts of France is the immense block of the new Sorbonne, by M. Nenot, a building sufficient in itself for an architectural reputation. Among smaller French buildings of peculiar merit may be mentioned the Musee Galliera, in the Trocadero quarter of Paris, designed by M. Ginain — a work of pure art in archi- tecture such as we should nowadays look for in vain out of France; the Ecole de Medecine, by the same refined architect (fig. no); and the chapel in rue Jean Goujon (Guilbert), erected as a memorial to the victims of the bazaar fire, again a notable instance of a work of pure thought in architecture — a new conception out of old materials. The new Opera Comique (Bernier) should also be mentioned, the rather disappointing result of a competition which excited great interest at the time. Street architecture has been carried out of late in Paris in a sumptuous style, with

great stone fronts

and a profusion of carved ornament, such as we know nothing of in England; and though there is a rather monotonous repetition of the same style and character throughout the new or newly built streets, it is impossible to deny the effect of palatial dignity they impart to the city. In the matter of country houses the French architect is less fortunate; when he attempts what he regards as the rural picturesque, his good taste seems entirely to desert him, and the maison de campagne is generally a mere riot of gimcrack bargeboards and finials. In Paris, the taste for the contortions of what is called art nouveau has led to the erection, here and there, of ugly and eccentric fronts with preposterous ornamental details; but the invasion of this element is only partial and will probably not prove other than a passing phase.

The great military success of Germany in 1870, and the founding of the German empire, gave, as is usual in such crises, a decided impetus to public aermaay. architecture, of which the central and most important visible sign is the German Houses of Parlia- ment (Plate IX., fig. 117), by Paul Wallot (b. 1841), whose design was selected in a competition. There is something essentially German in the quality of this national building; classic architecture minus its refine- ment. The detail is coarse; the finish of the end pavilions of the principal front absolutely unmeaning — mere architectural rodomontade; the central cupola of glass and iron, on a square plan, probably the ugliest central feature on any great building in Europe; and yet there is undeniable power about the whole thing; it is the characteristic product of a conquering nation not reticent in its triumph. The new cathedral at Berlin, by Julius Raschdorff (b. 1823), is the other most important German work of the period (fig. in); a building very striking and unusual in plan, but absolutely commonplace in its archi- tectural detail; school classic of the most ordinary type, without even any of those elements of originality which are to be found in the Houses of Parliament. A curious feature in the plan (fig. 112) is that the building, alone of any cathedral we can recall, has its principal general entrance at the side, the end entrance being reserved for a special

Fig. no. — Ecole de Medecine, Paris. (Ginain.)

imperial cortege on special occasions, the cathedral also serving the second purpose of an imperial mausoleum. Theatre building has been carried on very largely in Germany,and among its productions the Lessing theatre at Berlin (fig. 113) (Hermann von der Hude and Julius Hennicke, d. 1892) is a favourable example of German

classic at its best, besides being, like most modern German theatres, very well planned (fig. 1 14). Hamburg has had its new municipal buildings (Grotjan), a florid Renaissance building with a central tower, showing in its general effect and grouping a good deal of Gothic feeling. Mention may also be made of the Im- perial law courts (Reichsgerichtsgebaude) at Leipzig, designed by Ludwig Hoffmann (b. 1852) and finished in 1895, a building

Other countries.

genius in architecture, who had the good fortune to be appre- ciated and given a free hand by his government. The design is based on classic architecture, but with a treatment so com- pletely individual as to remove it almost entirely from the category of imitative or revival architecture; some- what fantastic it may be, but as an original architectural creation it stands almost alone among modern public buildings. In Vienna the scholastic classic style has been retained with much more purity and refinement than in the German capital, and the Parliament Houses (Plate IX., fig. 116), by Theophil Hansen (1813-1891), if they show no originality of detail, have the merit of original and very effective grouping. Budapest, on the other hand, which has almost sprung into existence since 1875

Fig. hi. — Cathedral at Berlin. (Raschdorff.)

with no more charm about it, externally, than the Berlin Parlia- ment Houses, but with some good interior effects. The new post offices in Germany have been an important undertaking, and are, at all events, buildings of more mark than those in England. There has also been a great deal of new development in street architecture, which shows an immense variety, and a constantly evident determination to do something striking; but

Fig. 113. — Lessing Theatre, Berlin. (Von der Hude and Hennicke.)

we find in it neither the dignity of Parisian street architecture nor the refinement of modern London work; there is an element of the bombastic about it.

No modern building on the European continent is more remarkable than the Brussels law courts (Plate XL, fig. 121) from the designs of Joseph Poelaert (1816-1879), an original

Fig. 112.- — Plan of Cathedral at Berlin.

as the rival of the Austrian capital, has erected a great Parliament building of florid character (Plate IX., fig. 115), in a style in which the Gothic element is prevalent, though the central feature is a dome. The plan (see fig. 92) is obviously based on that of the Westminster building; the exterior design, however, has the merit of clearly indicating the position of the two Chambers as part of the architectural design, the want of which is the one serious de- fect of Barry's noble struc- ture. In Italy modern architecture is at a very low ebb; the one great work of this period was the building of the facade to the Duomo at Florence, from the design of de Fabris, who did not live to see its completion. As the completion in modern times of a building of world-wide fame, it is a work of considerable in- terest, and, on the whole, not unworthy of its posi- tion; that it should harmonize quite satis- factorily with the ancient structure was hardly to be expected. It was prob- ably the completion of this facade which led the city of Milan to start a great architectural com- petition, in the early

Fig.

114. — Plan of Lessing Theatre, Berlin.

'eighties, for the erection of a new facade to its celebrated cathedral, not because the facade had never been completed, but because it had been spoiled and patched with bad 18th-century work. The ambition was a legitimate one, and the competition, open to all the world, excited the greatest interest; but the young Italian architect, Brentano, to whom the first premium

was awarded, died shortly afterwards, and other causes, partly financial, led to the postponement of the scheme, though it is understood that there is still an intention of carrying out Brentano's design under the direction of the official architectural department of the city.

In summing up the present position of modern architecture, it may be said that architecture is now a more cosmopolitan art than it has been at any previous period. The elusion. separate development of a national style has become in the present day almost an impossibility. Increased means of communication have brought all civilized nations into close touch with each other's tastes and ideas, with the natural consequence that the treatment of a special class of building in any one country will not differ very materially from its treatment in another; though there are nuances of

local taste in detail, in manner of execution, in the materials used. And the civilized countries have almost with one consent returned, in the main, to the adoption of a school of architecture based on classic types. The taste for medievalism is dying out even in Great Britain, which has been its chief stronghold.

What course the future of modern architecture will take it is not easy to prophesy. What is quite certain is that it is now an individual art, each important building being the production, not of an unconsciously pursued national style, but of a personal designer. As far as there is a ruling consensus in architectural taste, this will tend to become, like dress and manners, more and more cosmopolitan; and it seems probable that it will be based more or less on the types left us by Classic and Renaissance architecture. There are, however, two influences which may have a definite effect on the architecture of the near future. One of these is the possible greater rapprochement between architecture and engineering, of which there are already some signs to be seen; architects will learn more of the kind of struc- tural problems which are now almost the exclusive province of the engineer, and there will be a demand that engineering works shall be treated, as they well may be, with some of the refinement and expression of architecture. The other influence lies in the closer connexion, which is already taking place, between architecture and the allied arts, so that an important building will be regarded and treated as a field for the application of decorative sculpture and painting of the highest class, and as being incomplete without these. It is in this closer union of architecture with the other arts that there lies the best hope for the architecture of the future.

Authorities. — The literature of architecture as a modern art is limited, the most important publications of recent times being mainly devoted to the study and illustration of ancient architecture. The following, however, may be named : — James Fergusson, History of Modern Architecture (2nd ed., London, 1873); T. G. Jackson, Modern Gothic Architecture (London, 1873); J. T. Micklethwaite, Modern Parish Churches (London, 1874) ; E. R. Robson, School Architecture (London, 1874); J- J- Stevenson, House Architecture (London, 1880) ; E. E. Viollet-le-Duc, How to Build a House (London, 1874); Lectures on Architecture (London, 1881); H. C. Burdett, Hospitals and Asylums of the World (London, 1892-1893); Professor Oswald Kuhn, Kranke'nhduser (Stuttgart, 1897); E. O. . Sachs, Modern Opera-Houses and Theatres (London, 1897-1899); E. Wyndham Tarn, The Mechanics of Architecture (London, 1893); R. Norman Shaw, R.A., T. G. Jackson, R.A., and others, Architecture, a Profession or an Art (London, 1892); W. H. White, The Architect and his Artists (London, 1892); Architecture and Public Buildings in Paris and London (London, 1884); H. H. Statham, Architecture for General Readers (London, 1895); Modern Architecture (London, 1898); Herrmann Muthesius, Die englische

Baukunst der Gegenwart (Berlin and Leipzig, 1900) ; Der Architekten Verein zu Berlin, Berlin und Seine Bauten (Berlin, 1896). The real literature of modern architecture, however, is-to be found mainly in the articles and illustrations in the best periodical architectural publications of various countries. Among these Italy has none worth mention, and France, with all her architectural enthusiasm, has had no first- class architectural periodical since the extinction, about 1890, of the Revue generate de V architecture, conducted for more than fifty years by the late Cesar Daly, and in its day the first periodical of its class in the world. Among the best periodical publications are: The Architectural Record (quarterly), (New York); The Architectural Review (monthly), (Boston); the Allgemeine Bauzeitung (quarterly), (Vienna); the Berlin Architeklurwelt (monthly), (Berlin); The Builder (weekly), (London); La Construction moderne (weekly), (Paris). (H. H. S.)

ARCHITRAVE (from Lat. arcus, an arch, and trabs, trabem, a beam), an architectural term for the chief beam which carries the superstructure and rests immediately on the columns. In the ordinary entablature it is the lowest of the three divisions, the other two being the frieze and the cornice (see Order). The term is also applied to the moulded frame of a doorway.

ARCHIVE (Lat. archivum, a transliteration of Gr. apxeiov, an official building), a term (generally used in the plural " archives "), properly denoting the building in which are kept the records, charters and other papers belonging to any state, community or family, but now generally applied to the documents themselves (see Record).

ARCHIVOLT (from Lat. arcus, an arch, and volta, a vault), an architectural term applied to the mouldings of an architrave, when carried round an arched opening.

ARCHON (iipxoiv, ruler), the title of the highest magistrate in many ancient Greek states. It is only in Athens that we have any detailed knowledge of the office, and even in this one case the evidence presents problems of the first importance which are incapable of decisive solution. There is no doubt, that the archons represented the ancient kings, whose absolutism, under conditions which we can only infer, yielded in process of time to the power of the noble families, supported no doubt by the fight- ing force of the state. As to the process by which this change was effected there are two accounts. Traditionally, the monarchy after the death of Codrus (? io68 B.C.) gave place to the life archon whose tenure of office was limited afterwards to ten years and then to one year. Aristotle's Constitution of Athens (q.v.) speaks of five stages: (1) the institution of the polemarch who took over the military duties of the king; (2) the institution of the archon to relieve the king of his civil duties; (3) the tenure of office was reduced to

ten years (?752 B.C.); (4) the office was taken from the " royal " clan and thrown open to all Eupa- tridae (? 712 B.C.); (5) office was made annual, and to the existing three offices were added the six thesmothetae whose duty it was to record judicial decisions. The value of this latter account is, of course, debatable, but it is at least compatible with the general trend of development from hereditary absolutism, civil, military and religious, in the person of the " king," to a con- stitutional oligarchy. The change was clearly effected by the devolution of the military and civil powers of the king to the polemarch and the archon, while the archon basileus (or king) retained control of state religion. It is equally clear that owing to the predominating importance of civil affairs, the archon became the chief state official and gave his name to the year (hence archon eponymus) .' It should be noticed that the analogy which has often been suggested between the early history of the archonship at Athens, and such cases as the mayors of the palace in French history, or the tycoon (shogun) and mikado in Japanese history, is misleading. In these cases it is the old royal house that retains the royal title and the semblance of power, while the real authority passes into new hands. In Athens, the new civil office is vested in the old royal family, while the old title along with its religious functions is transferred. The early history of the thesmothetae is not clear, but this much is certain that there is no adequate reason for supposing, as many historians do, that in early times, they, with the three chief archons, con- stituted a collective or collegiate magistracy. It is true Thucy- dides (i. 126) states that, in the time of the Cylonian conspiracy (? 632 B.C.), " the nine archons were {i.e. collectively) the principal officials," but at the same time the responsibility for the action then taken attached to the Alcmaeonidae alone, because one of their number, Megacles, was at that time the archon {i.e. responsibility was personal, not collective). Again, the Con- stitution of Athens says that down to Solon's time the archons had no official residence, but that afterwards they used the Thesmotheteion. It is a reasonable inference from this statement that the thesmothetae had previously sat together apart from the superior archons and that it was only after Solon that col- legiate responsibility began.

Evolution of the Office. — The history of the democratization of the archonship is beset with equal difficulty. In the early days,

MODERN]

ARCHITECTURE

Plate XV.

Copyright igoi 6y Detroit Photographic Co.

Fig. 131.— "FLAT-IRON" BUILDING, NEW YORK. (For method of construction, see Steel Construc- tion, and Plate II., Fig. 4, of that article.)

Copyright ifjos by Detroit Publishing Co.

Fig. 134.— THE UNIVERSITY CLUB, NEW YORK.

the importance of the office (confined as it was to the highest class) must have been immense; there was no audit, no written law, no executive council. The popular assembly was ill- organized and probably summoned by the archons themselves. The only control came from the Areopagus which elected them and would generally be favourably disposed, and from the fact that the military and civil powers were not vested in the same hands. Although the institution of the popular courts by Solon had within it the germ of democratic supremacy, it is clear that the immediate result was small; thus, in the next decade anarchia was continuous and Damasias held the archonship for more than two years in defiance of the new constitution; the prolonged dissension in this matter shows that the office of archon still retained its supreme importance. Gradually, however, the archonship lost its power, especially in judicial matters, until it retained merely the right of holding the pre- liminary investigation and the formal direction of the popular courts. Its administrative powers, save those wielded by the polemarch (see below and cf. Strategus), dwindled away into matters of routine. We know that Peisistratus ruled by con- trolling the archonship, which was always held by members of his family, and the archonship of Isagoras was clearly an important party victory; we know further the names of three important men who held the office between Cleisthenes' reform and the Persian War (Hipparchus, Themistocles (q.v.), Aristides) from which we infer that the office was still the prize of party competition. On the other hand, after 487 B.C. the list of archons contains no name of importance. Presumably this is due to the growing importance of the Strategus and to the institution of sortition (see below), which, whether as cause or effect, is presumably by the sth century indicative of diminished importance. There can, on these assumptions, be no doubt that, from the early years of the 5th century B.C., the archonship was of practically no importance. Furthermore we find that (probably after the

Persian War) the office is thrown open to the second class, and finally in 457 B.C. we meet an archon, Mnesi- theides, of the third, or Zeugite, class. Plutarch (Aristides, 22) says that after the great struggle of the Persian War Aristides threw open the office to all the citizens. But in fact the members of the fourth class were not formally admitted even in the 4th century (though by a fiction they were allowed to pose for the time as Zeugites). Furthermore it is not till 457 that even a Zeugite archon is known, according to the Constitution of Athens (c. 26), which dates the change as five years after the death of Ephialtes and does not connect it with Aristides.

Sortition. — The next question constitutes perhaps the most important problem in Greek political development. At what date was election by lot, or sortition, introduced for the archon- ship? From the Constitution of Athens (c. 22) we gather that from the fall of the Tyranny to 487 B.C. the archons were alperoi, not k\ijpwtoL (i.e. chosen by vote, not by lot), and that in 487, limited sortition was introduced, whereby fifty candidates were elected by each tribe, and from these the archons and their " secretary " were chosen by lot. But against this must be set the statement by the same authority that this double method was part of the Solonian reform. The solution of the dilemma is a matter of inference. Three indications favour the former view: (1) the "anarchia" which occurred so often between Solon and Peisistratus shows that the office was at that time a question of party (i.e. elective); (2) the statement that Solon invented sortition for the office is put as the basis of a comparison (6dev, crqixtiov) and, therefore, may fairly be regarded as a hypothesis; (3) there is no indication that the change made in 487 B.C. was a return to an obsolete method, and on the same argument it is odd that Solon's alleged system should not have been revived at the end of the Tyranny. On the other hand Herodotus (vi. 109) states that, in 490, before the battle of Marathon, the polemarch was chosen by lot. If this be true, it follows that the office of polemarch must have lost its military importance, which was not the case, inasmuch as the polemarch at Marathon gave the casting vote in favour of immediate battle. Whether, therefore, Solon or Aristides was the first to introduce

sortition, it is perfectly clear that the lot was not used between the Tyranny and 487 B.C. and that after 487 the lot was always used (see J.E. Sandys, Constitution of Athens c. 8 note 1, c. 22 § 5, note) ; in fact, at a date not known the mixed system of Aristides gave place to double sortition, in which the first nomination also was by lot. To enter here into the theory of the lot is impossible. It should, however, be observed that in the somewhat material atmosphere of constitutional Athens the religious significance of the lot had vanished; no important office in the 5th and 4th centuries was entrusted to its decision. The real effect of sortition was to equalize the chances of rich and poor without civil strife. Now it is perfectly clear that it

could not have been this object which impelled Solon to introduce sortition; for in his time the archonship was not open to the lower classes, and, therefore, election was more democratic than sortition, whereas later the case was reversed. It should further be mentioned that, before the discovery of the Aristotelian Constitution in 1 89 1 , Grote, C. F. Hermann, Busolt and others had maintained that the lot was not used in Athens before the time of Cleisthenes ; and in spite of the treatise, it must be admitted that there is no satisfactory evidence, historical or inferential, that their theory was unsound.

Qualifications and Functions. — It remains to give a brief analysis of the qualifications and functions of the archons after the year 487 B.C. After election (in the time of Aristotle in the month Anthesterion; in the 3rd century in Munychion) a short time had to elapse before entering on office to allow of the dokimasia (examination of fitness). In this the whole life of the nominee was investigated, and each had to prove that he was physically without flaw. Failure to pass the scrutiny involved a certain loss of civic rights (e.g. that of addressing the people". The successful candidate had to take an oath to the people (that he would not take bribes, &c.) and to go through certain preliminary rites. Any citizen could bring an impeachment (eisangelia) against the archons. Any delinquency involved a trial before the Heliaea. Finally an examination took place at the end of the year of office, when each archon had to answer for his actions with person and possessions; till then he could not leave the country, be adopted into another family, dispose of his property, nor receive any " crown of honour." A similar investigation took place with regard to the assessors (paredri) whom the three senior archons chose to assist them. The archons at the end of their year of office (some say on entering upon office) became members of the Areopagus, which was, therefore, a body composed of ex-archons of tried probity and wisdom. The archons as a body retained some duties such as the appointment of jurymen, the sortition of the athlothetae, &c. (but see Gilbert's Antiquities, Eng. trans., p. 251, n. 1). On entering upon office the archon (archon eponymus) made proclamation by his herald that he would not interfere with private property. His official residence was the Prytaneum where he presided over all questions of family, e.g. the protection of parents against children and vice versa, protection of widows, wardship of heiresses and orphans, divorce; in religious matters he superintended the Dionysia, the Thargelia, the processions in honour' of Zeus the Saviour and Asclepius. The archon basileus superintended the holy places, the mysteries, the Lampadephoria (Torch race), &c, questions of national religion and certain cases of bloodguiltiness. His official residence was the Stoa Basileios, and his wife, as officially representing the wife of Dionysus, was called Basilinna. The polemarch, who was at any rate titular commander down to about 487*

B.C. (see above; and Herod, vi. 109, foSe/coros \pt}4 > iSo6pos) , became in the 5th century a sort of consul who watched over the rights of resident aliens (metoeci) in their family and legal affairs. He offered sacrifices to Artemis Agrotera and Enyalios, superintended epitaphia and arranged for the annual honours paid to the tyrannicides. His official residence was the Epilyceum (formerly called the Polemarcheion) .

Bibliography. — G. Gilbert, Constitutional Antiquities (Eng. trans., 1895) ; Eduard Meyer's Geschichte des Alterthums, ii. sect. 228 ; A. H. J. Greenidge, Handbook of Greek Constitutional Hist. (1895); J. W. Headlam, Election by Lot in Athens (Camb., 1891); and authorities quoted under Greece: History, ancient, and Athens: History. (J. M. M.)

ARCHPRIEST (Lat. archipresbyter, Gr. apxnr pea fivr epos), in the Christian Church, originally the title of the chief of the priests in a diocese. The office appears as early as the 4th cent- ury as that of the priest who presided over the presbyters of the diocese and assisted the bishop in matters of public worship, much as the archdeacon helped him in administrative affairs. Where, as in Germany, the dioceses were of vast extent, these were divided into several archpresbyterates. Out of these developed the rural deaneries, the office of archpriest being ultimately merged in that of rural dean, with which it became synonymous. It thus became strictly subordinate to the jurisdiction of the archdeacon. In Rome itself, as the office of archdeacon grew into that of cardinal-camerlengo, so that of archpriest of St Peter's developed into that of the cardinal-vicar. In England from 1598 until the appointment of a vicar-apostolic in 1623 the Roman Catholic clergy were placed by the pope under an " archpriest " as superior of the English mission. In the Lutheran Church in Germany the title archpriest {Erz- priester) was in some cases long retained as the equivalent of that of superintendent, sometimes also still called dean (Dechant), his functions being much the same as those of the rural dean.

ARCHYTAS (c. 428-347 B.C.), of Tarentum, Greek philosopher and scientist of the Pythagorean school, famous as the intimate friend of Plato, was the son of Mnesagoras or Histiaeus. Equally distinguishedin natural science,philosophyand the administration of civic affairs, he takes a high place among the versatile savants of the ancient Greek world. He was a man of high character and benevolent disposition, a fine flute-player, and a generous master to his slaves, for whose children he invented the rattle. He took a prominent part in state affairs, and, contrary to precedent, was seven times elected commander of the army. Under his leadership,

Tarentum fought with unvarying success against the Messapii, Lucania and even Syracuse. After a life of high intellectual achievement and uninterrupted public service, he was drowned (according to a tradition suggested by Horace, Odes, i. 28) on a voyage across the Adriatic, and was buried, as we are told, at Matinum in Apulia. He is described as the eighth leader of the Pythagorean school, and was a pupil (not the teacher, as some have maintained) of Philolaus. In mathematics, he was the first to draw up a methodical treatment of mechanics with the aid of geometry; he first distinguished harmonic progression from arithmetical and geometrical pro- gressions. As a geometer he is classed by Eudemus, the greatest ancient authority, among those who " have enriched the science with original theorems, and given it a really sound arrangement." He evolved an ingenious solution of the duplication of the cube, which shows considerable knowledge of the generation of cylinders and cones. The theory of proportion, and the study of acoustics and music were considerably advanced by his investigations. He was said to be the inventor of a kind of flying-machine, a wooden pigeon balanced by a weight suspended from a pulley, and set in motion by compressed air escaping from a valve. 1 Fragments of his ethical and metaphysical writings are quoted by Stobaeus, Simplicius and others. To portions of these Aristotle has been supposed to have been indebted for his doc- trine of the categories and some of his chief ethical theories. It is, however, certain that these fragments are mainly forgeries, attributable to the eclecticism of the 1st or 2nd century a.d., of which the chief characteristic was a desire to father later doctrines on the old masters. Such fragments as seem to be authentic are of small philosophical value. It is important to notice that Archytas must have been famous as a philosopher, inasmuch as Aristotle wrote a special treatise (not extant) On the Philosophy of Archytas. Some positive idea of his specu- lations may be derived from two of his observations: the one in which he notices that the parts of animals and plants are in general rounded in form, and the other dealing with the sense of hearing, which, in virtue of its limited receptivity, he compares

1 If this be the proper translation of Aulus Gellius, Nodes Atticae, x. 12. .9," . . . simulacrum columbae e ligno . . . factum; ita erat ■scilicet libramentis suspensum et aura spiritus inclusa atque occulta concitum." (See Aeronautics.)

with vessels, which when filled can hold no more. Two important principles are illustrated by these thoughts, (1) that there is no absolute distinction between the organic and the inorganic, and (2) that the argument from final causes is no explanation of phenomena. Archytas may be quoted as an example of Plato's perfect ruler, the philosopher-king, who combines practical sagacity with high character and philosophic insight.

See G. Hartenstein, De Arch. Tar. frag. (Leipzig, 1833) ; O. F. Gruppe, Uber d. Frag. d. Arch. (1840); F. Beckmann, De Pythag. reliq. (Berlin, 1844, 1850); Egger, De Arch. Tar. vit., op. phit.; Ed. Zeller, Phil. d. Griech. ; Theodor Gomperz, Greek Thinkers, ii. 259 (Eng. trans. G. G. Berry, Lond., 1905); G. J. Allman, Greek Geometry from Thales to Euclid (1889) ; Florian Cajori, History of Mathematics (New York, 1894); M. Cantor, Gesch. d. gr. Math. (1894 foil.). The mathematical fragments are collected by Fr. Blass, Melanges Graux (Paris, 1884). For Pythagorean mathematics see further Pythagoras.

ARCIS-SUR-AUBE, a town of eastern France, capital of an arrondissement in the department of Aube, on the left bank of the Aube, 23 m. N. of Troyes on the Eastern railway to Chalons- sur-Marne. Pop. (1906) 2803. Fires in 1719, 1727 and 1814 destroyed the ancient buildings, and it is now a town built in modern style with wide and regular streets. A chateau of the 1 8th century occupies the site of an older one in which Diana of Poitiers, mistress of Henry II., resided. The only other building of interest is the church, which dates from the 15th century. In front of it there is a statue of Danton, a native of the town. Arcis-sur-Aube has a tribunal of first instance. Its industries include -important hosiery manufactures, and it carries on trade in grain and coal. The town communicates with Paris by means of the Aube, which becomes navigable at this point.

A battle was fought here on the 20th and 21st of March 1814 between Napoleon and the Austro-Russian army under Schwarzenberg (see Napoleonic Campaigns) .

ARCOLA, a village of northern Italy, 16 m. E.S.E. of Verona, on the Alpone stream, near its confluence with the Adige below Verona. The village gives its name to the three days' battle of Areola (15th, 16th and 17th of November 1796), in which the French, under General Napoleon Bonaparte, defeated the Aus- trians commanded by Allvintzy (see French Revolutionary Wars).

ARCOS DE LA FRONTERA, a town of southern Spain, in the province of Cadiz ; on the right bank of the river Guadalete, which flows past Santa Maria into the Bay of Cadiz. Pop. (1900) 13,926. The town occupies a ridge of sandstone, washed on three sides by the river, and commanding fine views of the lofty peak of San Cristobal, on the east, and the fertile Guadalete valley, celebrated in ancient Spanish ballads for its horses. At the highest point of the ridge is a Gothic church with a fine gateway, and a modern tower overlooking the town. The fame of its ten bells dates from the wars between Spaniards and Moors in which " Arcos of the Frontier " received its name. After its capture by Alphonso the Wise of Castile (1252-1284), the town was a Christian stronghold on the borders of

Moorish territory. Another church contains several Moorish banners, taken in 1483 at the battle of Zahara, a neighbouring village. The ruined citadel, the theatre, and the palace of the dukes of Arcos are the only other noteworthy buildings. Roman remains have been found in the vicinity, and the ridge of Arcos is honeycombed with rock-hewn chambers, said to be ancient cave-dwellings.

See Galeria de Arcobricenses illustres (Arcos, 1892), and Riqueza y cultura de Arcos de la Frontera (Arcos, 1898) ; both by M. Mancheno y Olivares.

ARCOSOLIUM (from Lat. arcus, arch, and solium, a sarco- phagus), an architectural term applied to an arched recess used as a burial place in a catacomb (q.v.).

ARCOT, the name of a city and two districts of British India in the presidency of Madras. Arcot city is the principal town in the district of North Arcot. It. occupies a very prominent place in the history of the British conquest of India, but it has now lost its manufactures and trade and preserves only a few mosques and tombs as traces of its former grandeur. It is a station on the line of railway from Madras to Beypur, but has ceased to be

a military cantonment. The most famous episode in its history is the capture and defence of Arcot by Clive. In the middle of the 1 8th century, during the war between the rival claimants to the throne of the Carnatic, Mahommed Ali and Chanda Sahib, the English supported the claims of the former and the French those of the latter. In order to divert the attention of Chanda Sahib and his French auxiliaries from the siege of Trichinopoly, Clive suggested an attack upon Arcot and offered to command the expedition. His offer was accepted; but the only force which could be spared to him was 200 Europeans and 300 native troops to attack a fort garrisoned by 1100 men. The place, however, was abandoned without a struggle and Clive took possession of the fortress. The expedition produced the desired effect; Chanda Sahib was obliged to detach a large force of 10,000 men to recapture the city, and the pressure on the English garrison at Trichinopoly was removed. Arcot was afterwards captured by the French; but in 1760 was retaken by Colonel Coote after the battle of Wandiwash. It was also taken by Hyder Ah when that invader ravaged the Carnatic in 1780, and held by him for some time. The town of Arcot, together with the whole of the territory of the Carnatic, passed into the

hands of the British in 1801, upon the formal resignation of the government by the nawab, Azim-ud-daula, who received a liberal pension.

The district of North Arcot is bounded on the N. by the districts of Cuddapah and Nellore; on the E. by the district of Chingleput; on the S. by the districts of South Arcot and Salem; and on the W. by the Mysore territory. The area of North Arcot is 7386 sq. m., and the population in 1001 was 2,207,712, showing an increase of 4% in the decade. The aspect of the country, in the eastern and southern parts, is flat and uninteresting; but the western parts, where it runs along the foot of the Eastern Ghats, as well as all the country northwards from Trivellam to Tripali and the Karkambadi Pass, are moun- tainous, with an agreeable diversity of scenery. The elevated platform in the west of the district is comparatively cool, being 2000 ft. above the level of the sea, with a mean maximum of the thermometer in the hottest weather of 88°. The hills are com- posed principally of granite and'syenite, and have little vegetation. Patches of stunted jungle here and there diversify their rugged and barren aspect; but they abound in minerals, especially copper and iron ores. The narrow valleys between the hills are very fertile, having a rich soil and an abundant water-supply even in the driest seasons. The principal river in the district is the Palar, which rises in Mysore, and flows through North Arcot from west to east past -the towns of Vellore and Arcot, into the neighbouring district of Chingleput, eventually falling into the sea at Sadras. Although a considerable stream in the rainy season, and often impassable, the bed is dry or nearly so during the rest of the year. Other smaller rivers of the district are the Paini, which passes near Chittore and falls into the Palar, the Sonamukhi and the Chayaur. These streams are all dry during the hot season, but in the rains they flow freely and replenish the numerous tanks and irrigation channels. The administrative headquarters are at Chittore, but the largest towns are Vellore (the military station), Tirupati (a great religious centre), and Walla japet and Kalahasti (the two chief places of trade).

The district of South Arcot is bounded on the N. by the dis- tricts of North Arcot and Chingleput; on the E. by the French territory of Pondicherry and the Bay of Bengal; on the S. by the British districts of Tanjore and Trichinopoly; and on the VV. by the British district of Salem. It contains an area of 5217 sq. m.; and its population in 1901 was 2,349,804, showing an increase of 9 % in the decade. The aspect of the district resembles that of other parts of the Coromandel coast. It is low and sandy near the sea, and for the most part level till near the western border, where ranges of hills form the boundary between this and the neighbouring district of Salem. These ranges are in some parts about 5000 ft. high, with solitary hills scattered about the district. In the western tracts, dense patches of jungle furnish covert to tigers, leopards, bears and monkeys. The principal

river is the Coleroon which forms the southern boundary

of the district, separating it from Trichinopoly. This river is abundantly supplied with water during the greater part of the year, and two irrigating channels distribute its waters through the district. The other rivers are the Vellar, Pennar, and Gada- lum, all of which are used for irrigation purposes. Numerous small irrigation channels lead off from them, by means of which a considerable area of waste land has been brought under culti- vation. Under the East India Company, a commercial resident was stationed at Cuddalore, and the Company's weavers were encouraged by many privileges. The manufacture and export of native cloth have now been almost entirely superseded by the introduction of European piece goods. The chief seaport of the district of South Arcot is Cuddalore, close to the site of Fort St David. The principal crops in both districts are rice, millet, other food grains, oil-seeds and indigo.

ARCTIC (Gr. "Ap/cTos, the Bear, the northern constellation of Ursa Major), the epithet applied to the region round the North Pole, covering the area (both ocean and lands) where the characteristic polar conditions of climate, &c, obtain. The Arctic Circle is drawn at 66° 30′ N. (see Polar Regions).

ARCTINUS, of Miletus, one of the earliest poets of Greece and contributors to the epic cycle. He flourished probably about 744 B.C. (01. 7). His poems are lost, but an idea of them can be gained from the Chrestomathy written by Proclus the Neo-Platonist of the 5th century or by a grammarian of the same name in the time of the Antonines. The Aethiopis {Aidioirls), in five books, was so called from the Aethiopian Memnon, who became the ally of the Trojans after the death of Hector. As the opening shows, it took up the narrative from the close of the Iliad. It begins with the famous deeds and death of the Amazon Penthesileia, and concludes with the death and burial of Achilles and the dispute between Ajax and Odysseus for his arms. The title thus only applied to part of the poem. The Sack of Troy (TXiou nepcrts) gives the stories of the wooden horse, Sinon, and Laocoon, the capture of the city, and the departure of the Greeks under the wrath of Athene at the outrage of Ajax on Cassandra. The Little Iliad ('Iykxs yutxpa) of Lesches formed the transition between the Aethiopis and the Sack of Troy.

Kinkel, Epicorum Graecorum Fragmenta (1877); Welcker, Der epische Cyclus; Miiller, History of the Literature of Ancient Greece; Lang, Homer and the Epic (1893) ; Monro, Journal of Hellenic Studies (1883); T. W. Allen in Classical Quarterly, April 1908, pp. 82 foil.

ARCTURUS, the brightest star in the northern hemisphere, situated in the

constellation Bootes (q.v.) in an almost direct line with the tail (f and r\) of the constellation Ursa Major (Great Bear); hence its derivation from the Gr. apKros, bear, and oBpos, guard. Arcturus has been supposed to be referred to in various passages of the Hebrew Bible; the Vulgate reads Arcturus for stars mentioned in Job ix. 9, xxxvii. 9, xxxviii. 31, as well as Amos v. 8. Other versions, as also modern authorities, have preferred, e.g., Orion, the Pleiades, the Scorpion, the Great B ear (cf . A mos in the ' 'International Critical Comment. " series,and G. Schiaparelli, Astronomy in the O.T., Eng. trans., Oxford, 1905, ch. iv.) . According to one of the Greek legends about Areas, son of Lycaon, king of Arcadia, he was killed by his father and his flesh was served up in a banquet to Zeus, who was indignant at the crime and restored him to life. Subsequently Areas, when hunting, chanced to pursue his mother Callisto, who had been transformed into a bear, as far as the temple of Lycaean Zeus; to prevent the crime of matricide Zeus transported them both to the heavens (Ovid, Metam. ii. 410), where Callisto became the constellation Ursa Major, and Areas the star Arcturus (see Lycaon and Callisto).

ARCUEIL, a town of northern France, in the department of Seine, on the Bievre, 2§ m. N.E. of Sceaux on the railway from Paris to Limours. Pop. (1906) 8660. The town has an interest- ing church dating from the 13th to the 15th century. It takes its name from a Roman aqueduct, the Arcus Juliani (Arculi), some traces of which still remain. In 1613-1624 a bridge-aqueduct over 1300 ft. long was constructed to convey water from the spring of Rungis some 4 m. south of Arcueii, across the Bievre to the Luxembourg palace in Paris. In 1868-187 2

another aqueduct, still longer, was superimposed above that of the 17 th century, forming part of the system conveying water from the river Vanne to Paris. The two together reach a height of about 155 ft. Bleaching, and the manufacture of bottle capsules, patent leather and other articles are carried on at Arcueil ; and there are important stone-quarries.

ARCULF, a Gallican bishop and pilgrim-traveller, who visited the Levant about 680, and was the earliest Christian traveller and observer of any importance in the Nearer East after the rise of Islam. On his return he was driven by contrary winds to Britain, and so came to Iona, where he related his experiences to his host, the abbot Adamnan (679-704). This narrative, as written out by Adamnan, was presented to Aldfrith the Wise, last of the great Northumbrian kings, at York about 701, and came to the knowledge of Bede, who inserted a brief summary of the same in his Ecclesiastical

History of the English Nation, and also drew up a separate and longer digest which obtained great popularity throughout the middle ages as a standard guide-book (the so-called Libellus de locis Sanctis) to the Holy Places of Syria. Arculf is the first to mention the column at Jerusalem, which claimed to mark the exact centre of the Inhabited Earth, and later became one of the favourite Palestine wonders. Besides a valuable account of the principal sacred sites of Judaea, Samaria and Galilee as they existed in the 7th century, he also gives important information as to Alexandria and Constantinople, briefly describes Damascus and Tyre, the Nile and the Lipari volcanoes, and refers to the caliph Moawiya I . (a.d. 661-680), whom he pictures as befriending Christians and rescuing the " sudarium " of Christ from the Jews. Arculf's record is especially useful from its plans, drawn from personal observation by the traveller himself, of the churches of the Holy Sepulchre and of Mount Sion in Jerusalem, of the Ascension on Olivet and of Jacob's well at Sichem. It is also a useful witness to the prosperity and trade of Alexandria after the Moslem conquest: it tells us how the Pharos was still lit up every night; and it gives us (from Constantinople) the first form of the story of St George which ever seems to have attracted notice in Britain.

Thirteen MSS. of the original Arculf-Adamnan narrative exist, and fully 100 of Bede's abridgment: of the former, the most im- portant, containing all the plans, are (1) Bern, Canton Library, 582, of 9th cent.; (2) Paris, National Library, Lat. 13,048, of 9th cent. ; a third MS., London, B. Mus., Cotton, Tib. D. V., of 8th-9th cents., though damaged by fire and lacking the illustrations, is of value for the text, being the oldest of all. Among editions the first is of 1619, by Gretser; the best, that of 1877, by Tobler, in Itinera et De- scriptiones Terrae Sanctae; we may also mention that of 1870, by Delpit, in his Essai sur les anciens pilerinages & Jerusalem; see also Delpit's remarks upon Arculf in the same work, pp. 260-304; Beazley, Dawn of Modern Geography, i. 131-40 (1897).

ARDASHIR, the modern form of the Persian royal name Artaxerxes (q.v.), "he whose empire is excellent." After the three Achaemenian kings of this name, it occurs in Armenia, in the shortened form Artaxias (Armenian, Artashes or Artaxes), and among the dynasts of Persia who maintained their inde- pendence during the Parthian period (see Persis) . One of these, (1) Artaxerxes or Ardashir I. (in his Greek inscriptions he calls himself Artaxares, and the same form occurs in Agathias ii. 25, iv. 24), became the founder of the New-Persian or Sassanian empire. Of his reign we have only very scanty information, as the Greek and Roman authors mention only his victory over the Parthians and his wars with Rome. A trustworthy tradition about the origin of his power, from Persian sources, has been preserved by the Arabic historian Tabari (Th. Noldeke, Ge- schichtc der Perser und Araber zur Zeit der Sasaniden, aus der arabischen Chronik des

Tabari, 1879). He was the second son of Papak (Babek), the offspring of Sassan (Sasan), after whom the dynasty is named. Papak had made himself king of the district of lstak.hr (in the neighbourhood of Persepolis, which had fallen to ruins). After the death of Papak and his oldest son Shapur (Shahpuhr, Sapores), Ardashir made himself king (probably a.d. 212), put his other brothers to death and began war against the neighbouring dynasts of Persis. When he had conquered a great part of Persis and Carmania, the Parthian king Artabanus

IV. interfered. But he was defeated in three battles and at last killed (a.d. 226). Ardashir now considered himself sovereign of the whole empire of the Parthians and called himself " King of Kings of the Iranians." But his aspirations went farther. In Persis the traditions of the Achaemenian empire had always been alive, as the name of Ardashir himself shows, and with them the national religion of Zoroaster. Ardashir, who was a zealous worshipper of Ahuramazda and in intimate connexion with the magian priests, established the orthodox Zoroastrian creed as the official religion of his new kingdom, persecuted the infidels, and tried to restore the old Persian empire, which under the Achae- menids had extended over the whole of Asia from the Aegean Sea to the Indus. At the same time he put down the local dynasts and tried to create a strong concentrated power. His empire is thus quite different in character from the Parthian kingdom of the Arsacids, which had no national and religious basis but leant towards Hellenism, and whose organization had always been very loose. Ardashir extirpated the whole race of the Arsacids, with the exception of those princes who had found refuge in Armenia, and in many wars, in which, however, as the Persian tradition shows, he occasionally suffered heavy defeats, he succeeded in subjugating the greater part of Iran, Susiana and Babylonia. The Parthian capital Ctesiphon (q.v.) remained the principal residence of the Sassanian kingdom, by the side of the national metropolis Istakhr, which was too far out of the way to become the centre of administration. Opposite to Ctesiphon, on the right bank of the Tigris, Ardashir restored Seleucia under the name of Weh-Ardashir. The attempt to conquer Mesopotamia, Armenia and Cappadocia led to a war with Rome, in which he was repelled by Alexander Severus (a.d. 233). Before his death (a.d. 241) Ardashir associated with himself on the throne his son Shapur, who successfully continued his work.

Under the tombs of Darius I. at Persepolis, on the surface of the rock, Ardashir has sculptured his image and that of the god Ahuramazda (Ormuzd or Ormazd). Both are on horseback; the god is giving the diadem to the king. Under the horse of the king lies a defeated enemy, the Parthian king Artaban; under the horse of Ormuzd, the devil Ahriman, with two snakes rising from his head. In the bilingual inscription (Greek and Pahlavi), Ardashir I. calls himself "the Mazdayasnian [i.e. " worshipperof

Ahuramazda "] god Artaxares, king of the kings of the Arianes (Iranians), of godly origin, son of the god Papak the king." (See Sir R. Ker Porter, Travels (1821-1822), i. 548 foil.; Flandin et Coste, Voyage en Perse, iv. 182; F. Stolze and J. C. Andreas, Persepolis, pi. 116; Marcel Dieulafoy, V Art antique de la Perse, 1 884-1 889, v. pi. 14). A similar inscription and sculpture is on a rock near Gur (Firuzabad) in Persia. On his coins he has the same titles (in Pahlavi) . We see that he, like his father and his successors, were worshipped as gods, probably as incarnations of a secondary deity of the Persian creed.

Like the history of the founder of the Achaemenian empire, that of Ardashir has from the beginning been overgrown with legends; like Cyrus he is the son of a shepherd, his future greatness is predicted by dreams and visions, and by the calcula- tions of astronomers he becomes a servant at the court of King Artabanus and then flies to Persia and begins the rebellion; he fights with the great dragon, the enemy of god, &c. A Pahlavi text, which contains this legend, has been translated by Noldeke (Geschichte des Artachshir i Papakan, 1879). On the same tradition the account of Firdousi in the Shahnama is based; it occurs also, with some variations, in Agathias ii. 26 f. Another work, which contained religious and moral admonitions which were put into the mouth of the king, has not come down to us. On the other hand the genealogy of Ardashir has of course been connected with the Achaemenids, on whose behalf he exacts vengeance from the Parthians, and with the legendary kings of old Iran.

(2) Ardashir II. (379-383). Under the reign of his brother Shapur II. he had been governor (king) of Adiabene, where he persecuted the Christians. After Shapur's death, he was raised to the throne by the magnates, although more than seventy years old. Having tried to make himself independent from the court,

and having executed some of the grandees, he was deposed after a reign of four years.

(3) Ardashir III. (628-630), son of Kavadh II., was raised to the throne as a boy of seven years, but was killed two years afterwards by his general, Shahrbaraz. (Ed. M.)

ARDEA, a town of the Rutuli in Latium, 3 m. from the S.W. coast, where its harbour (Castrum Inui) lay, at the mouth of the stream now known as Fosso dell' Incastro, and 23 m. S. of Rome by the Via Ardeatina. It was

founded, according to legend, either by a son of Odysseus and Circe, or by Danae, the mother of Perseus. It was one of the oldest of the coast cities of Latium, and a place of considerable importance; accord- ing to tradition the Ardeatines and Zacynthians joined in the foundation of Saguntum in Spain. It was the capital of Turnus, the opponent of Aeneas. It was conquered by Tarquinius Superbus, and appears as a Roman possession in the treaty with Carthage of 509 b.c, though it was later one of the thirty cities of the Latin league. In 445 b.c. an unfair decision by the Romans in a frontier dispute with Aricia led, according to the Roman historians, to a rising; the town became a Latin colony 442 B.C., and shortly afterwards it appears as the place of exile of Camillus. It had the charge of the common shrine of Venus in Lavinium. It was devastated by the Samnites, was one of the 12 Latin colonies that refused in 209 b.c. to provide more soldiers, and was in 186 used as a state prison, like Alba and Setia. In imperial times the unhealthiness of the place led to its rapid decline, though it remained a colony. In the forests of the neighbourhood the imperial elephants were kept. A road, the Via Ardeatina, led to Ardea direct from Rome; the gate by which it left the Servian wall was the Porta Naevia; a large tomb behind the baths of Caracalla lay on its course. The gate by which it left the Aurelian wall has been obliterated by the bastion of Antonio da Sangallo (Ch. Hulsen in Romische Mitteilungen, 1894, 320).

The site of the primitive city, which later became the citadel, is occupied by the modern town; it is situated at the end of a long plateau between two valleys, and protected by perpendicular tufa cliffs some 60 ft. high on all sides except the north-east, where it joins the plateau. Here it is defended by a fine wall of opus quadratum of tufa, in alternate courses of headers and stretchers. Within its area are scanty remains of the podium of a temple and of buildings of the imperial period. The road entering it from the south-west is deeply cut in the rock. The area of the place was apparently twice extended, a further portion of the narrow plateau, which now bears the name of Civita Vecchia, being each time taken in and defended by a mound and ditch; the nearer and better-preserved is about J m. from the city and measures some 2000 ft. long, 133 ft. wide and 66 ft. high, the ditch being some 80 ft. wide. The second, \ m. farther north-east, is smaller. In the cliffs below the plateau to the north are early rock habitations, and upon the plateau primitive Latin pottery has been found. In 1900 a group of tombs cut in the rock was examined; they are outside the farther mound and ditch, and belong, therefore, to the period after the second extension of the city.

See O. Richter, in Annali dell' Istituto (1884), 90; J. H. Parker in Archaeologia, xlix. 169 (1885); A. Pasqui, in Notizie degli scavi, (1900) 53- (T. As.)

ARDEBIL, or Ardabil, chief town of a district, or sub- province, of same name, of the province of Azerbaijan in north- western Persia, in lat. 38 14′ N., and long. 48 21′ E., and at an elevation of 4500 ft. It is situated on the Baluk Su (Fish river), a tributary of the Kara Su (Black river), which flows northwards to the Aras, and in a fertile plain bounded on the west by Mount Savelan, a volcanic cone with an altitude of 15,792 ft. (Russian triangulation) , and on the east by the Talish mountains (9000 ft.). Ardebil has a population of about 10,000, and post and telegraph offices. Its trade, principally in the hands of Armenians, is still important, but is chiefly a transit trade between Russia and Persia by way of Astara, a port on the Caspian 30 m. north-east of Ardebil. It is surrounded by a ruinous mud wall flanked by towers; a quarter of a mile east of it stands a mud fort, 180 yds. square, constructed according

to European system of fortification. Inside the city are the famous sepulchres and shrines of Shaikh Safi ud-din and his descendant Shah Ismail I. (1502- 15 24) the first Shiah shah of Persia and founder of the Safavi dynasty. Plans and photo- graphs of the shrines were taken in 1897 by Dr F. Sarre of Berlin and published in 1901 (Denkmctler Persischer Baukunst; 65 large folio plates).

European and Chinese merchants resided at Ardebil in the middle ages, and for a long time the city was a great emporium for central Asian and Indian merchandise, which was forwarded to Europe via Tabriz, Trebizond and the Black Sea, and also by way of the Caucasus and the Volga. Since the beginning of the 1 6th century, when Persia fell under the sway of the Safavis, the place has been much frequented by pilgrims who come to pay their devotions at the shrine of Shaikh Safi. This shrine is a richly endowed establishment with mosques and college attached, and had a fine library containing many rare and valuable MSS. presented by Shah Abbas I. at the beginning of the 17th century, and mostly carried off by the Russians in 1828 and placed in the library at St Petersburg. The grand carpet which had covered the floor of one of the mosques for three centuries was purchased by a traveller about 1890 for £100, and was finally acquired by the South Kensington Museum for many thousands. This beautiful carpet measures 34 ft. by 17 ft. 6 in., and contains 380 hand-tied knots in the square inch, which gives over 32,500,000 knots to the whole carpet (W. Griggs, Asian Carpet Designs). (A. H.-S.)

ARDECHE, an inland department of south-eastern France, formed in 1790 from the Vivarais, a district of Languedoc. Pop. (1906) 347,140. Area, 2145 sq. m. It is bounded N.W. by the department of Loire, E. by the Rhone which divides it from Isere and Drome, S. by Gard and W. by

Lozere and Haute- Loire. The surface of Ardeche is almost entirely covered by the Cevennes mountains, the main chain, continued in the Boutieres mountains, forming its western boundary. Its centre is traversed from south-east to north-west by the Coiron range which extends from the Rhone to the Mont Mezenc (5755 ft.), the highest point in the department, and the oldest of its many volcanoes. These mountains separate the southern half of the department, which comprises the basin of the Ardeche, from the northern half which is watered by numerous smaller tributaries of the Rhone, the chief of which are the Erieux and the Doux. A few rivers belong to the Atlantic side of the watershed, the chief being the Loire, which rises on the western borders of the depart- ment, and the Allier, which for a short distance separates it from Lozere. Nearly all the rivers of the department are of torrential swiftness and subject to sudden floods. The scenery through which they flow is often of great beauty and grandeur. Natural curiosities are the Pont d'Arc, over the Ardeche, and the Chaussee des Geants, near Vals. The climate in the valley of the Rhone is, in general, warm, and sometimes very hot; but westward, as the elevation increases, the cold becomes more intense and the winters longer. Some districts, especially in summer, are liable to sudden alterations in the temperature. Rye, wheat and potatoes are the chief crops cultivated. Good red and white wines are grown in the hilly region bordering the Rhone valley, the white wine of St Peray being highly esteemed. The principal fruits are the chestnut, which is largely exported, the olive and the walnut. In the rearing of silk-worms, Ardeche ranks second to Gard among French departments, and great numbers of mulberry trees are grown for the purposes of this industry. The many goats and sheep of Ardeche make it one of the chief sources of supply of skins for glove-making. Mines of coal, iron, lead and zinc are worked, and the quarries furnish hydraulic lime (Le Teil) and other products. Besides flour-mills, distilleries and saw-mills, there are important silk-mills and leather-works and paper-factories. Annonay is the principal industrial town. The department exports wine, cattle, lime, mineral waters, silk, paper, &c. Hot springs are numerous, and some of them, as those of Vals, St Lauren t-les-Bains, Celles and Neyrac, are largely resorted to. Ardeche is served by the Paris-Lyon-Mediterranee railway and has some 43 m.

of navigable waterway. The department is divided into the arrondissements of Privas, Largentiere and Tournon, with 31 cantons and 342 communes. It forms the diocese of Viviers and part of the archiepiscopal province of

Avignon. It is in the region of the XV. arm)' corps, and within the circumscription of the academie (educational division) of Grenoble. Its court of appeal is at Nimes. Privas, the capital, Annonay, Aubenas, Largentiere and Tournon are the principal towns. Bourg-St Andeol, Thines, Melas and Cruas have interesting Romanesque churches. Mazan has remains of a Cistercian abbey founded in the 12th century to which its vast church belongs. Viviers is an old town with a church of various styles of architecture and several old houses.

ARDEE, a market-town of Co. Louth, Ireland, in the south parliamentary division, on the river Dee, 48 m. N. by W. from Dublin on a branch of the Great Northern railway. Pop. (iooi) 1883. It has some trade in grain and basket-making. The town is of high antiquity, and its name (Ather-dee) is taken to signify the ford of the Dee. A form Ath-Firdia, however, is connected with the ancient story of the warrior Cuchullain of Ulster, who, while defending the ford against the men of Con- naught, was forced to slay many with whom he was on friendly terms, and among them the warrior Firdia,. whom he regarded with special affection. A castle of the lords of the manor was built early in the 14th century, and remains, as does another adjacent fortified building of the same period. Roger de Peppart, lord of the manor early in the 13th century, founded the present Protestant church and a house of Crutched Friars. There was also a house of Carmelite Friars, but neither of these remains. Ardee received its first recorded charter in 1377. It had a full share in the several Irish wars, being sacked by Edward Bruce (1315) and by O'Neill (1538); and it was taken by the Irish and recaptured by the English in the wars of 1641, and was occupied later by the forces of James II. and of William III. It returned two members to the Irish parliament. A large rath, or encampment, with remains of fortifications, stands to the south of the town.

ARDEN, FOREST OF, a district in the north of Warwickshire, England, the " woodland " as opposed to the " felden," or "fielden," i.e. open country, in the south, the river Avon sep- arating the two. Originally it was part of a forest tract of far wider extent than that within the confines of the county, and now, though lacking the true character of a forest, it is still unusually well wooded. The undulating surface ranges for the most part from 250 to 500 ft. in elevation. Wide lands in this district were held in the time of Edward the Confessor by Alwin, whose son Thurkill of .Warwick, or "of Arden," founded the family of the Warwickshire Ardens who in Queen Elizabeth's time still held several of the manors ascribed to Thurkill in Domesday. Shakespeare, whose mother Mary Arden claimed to be of this family, knew the district well, living as he did at Stratford; and its natural characteristics, then still unchanged, inspired his pictures of forest life in As You Like It. The name of the Forest of Arden, besides remaining a convenient designa- tion of a well-marked physical area, is preserved in

such place- names as Henley-in-Arden and Hampton-in-Arden.

ARDENNES, a district covering some portion of the ancient forest of Ardenne, and extending over the Belgian province of Luxemburg, part of the grand duchy, and the French depart- ment of Ardennes. Bruzen Lamartiniere states in his Diction- naire Geographique that the Gauls and Bretons called it by a word signifying " the forest," which was turned into Latin as Arduenna silva, and he thinks it quite probable that the name was really derived from the Celtic word ardu (dark, obscure). The Arduenna Silva was the most extensive forest of Gaul, and Caesar {Bello Gallico, lib. vi. cap. 29) describes it as extending from the Rhine and the confines of the Treviri as far as the limits of the Nervii. In book v. the Roman conqueror describes his campaign against Indutiomarus and the Treviri in the Ardenne forest. Strabo gave it still greater extent, treating it as covering the whole region from the Rhine to the North Sea. It is safer to give it the more reasonable dimensions of Caesar, and to accept the verdict of later commentators that it never

extended west of the Scheldt. At the division of the empire of Charlemagne between the three sons of Louis the Debonnaire, effected by the pact of Verdun in 843, the forest had become a district and is called therein pagus Arduensis. It was part of the division that fell to Lothair, and several of the charters of 843 expressly specify certain towns as being situated in this pagus. In the 10th century the district had become a comitatus, subject to the powerful count of Verdun, who changed his style to that of count of Ardenne.

The Belgian Ardennes may be said now to extend from the Meuse above Dinant on the west to the grand duchy of Luxem- burg and Rhenish Prussia as far north as the Baraque de Michel on the east, and from a line drawn eastward from Dinant through Marche, Durbuy and Stavelot to the Hautes Fagnes on the north, to the French frontier roughly marked by the Semois valley in the south. Within these limits there are still some of the finest woods in Europe, which seem to have come down to us almost intact from the days of the Arduenna of Caesar. Notable among these portions of the great forest are the woods of St Hubert, the woods round La Roche, and those of the Amerois, Herbeumont, and Chiny on the Semois. In the grand duchy the forest has almost entirely disappeared, but owing to the compulsory law of replanting in Belgium this fate does not seem likely to attend the Belgian Ardennes.

In addition to being a forest the Ardennes is a plateau, and it offers to the geologist a most interesting field of investigation. The greater part of the Ardennes is occupied by a large area of Devonian beds, through which rise the Cambrian masses of Rocroi and Stavelot, and a few others of smaller

size. Upon the folded slates and schists which constitute these inliers the Devonian rests with marked unconformity; but north of the ridge of Condroz Ordovician and Silurian beds make their appearance. Near Dinant carboniferous beds are infolded among the Devonian. Along the northern margin lies the intensely folded belt which constitutes the coalfield of Namur, and, beneath the overlying Mesozoic beds, is continued to the Boulonnais, Dover and beyond. The southern boundary of this belt is formed by a great thrust-plane, the faille du midi, along which the Devonian beds of the south have been thrust over the carboniferous beds of the coalfield.

The Ardennes are the holiday ground of the Belgian people, and much of this region is still unknown except to the few persons who by a happy chance have discovered its remoter and hitherto well-guarded charms. There is still an immense quantity of wild game to be found in the Ardennes, including red and roe deer, wild boar, &c. The shooting is preserved either by the few great landed proprietors left in the country, or by the communes, who let the right of shooting to individuals. Occasionally it is still stated in the press that wolves have been seen in the Ardennes, but this is a mere fiction. The last wolf was destroyed there in the 18th century.

ARDENNES, a department of France on the N.E. frontier, deriving its name from that of the forest, and formed in 1790 from parts of Champagne, Picardy and Hainault. Pop. (1906) 317,505. Area, 2028 sq. m. It is bounded N. and N.E. by Belgium, E. by the department of Meuse, S. by that of Marne, and W. by that of Aisne. In shape it is quadrilateral with a cape-like prolongation into Belgium on the north. The slope of the department is from north-east to south-west, though its longest river, the Meuse, entering it in the south-east, pursues a winding course of in m. in a north-westerly, and after- wards through deep gorges in a northerly, direction. The other principal river, the Aisne, crosses the southern border and takes a northerly, then a westerly course, separating the region known as Champagne Pouilleuse from the more elevated plateau of Argonne which forms the central zone of the department and stretches to the left bank of the Meuse. The highest points of the department are found in the wooded highlands of the Ardennes which, with an altitude varying between 980 and 1640 ft., cover the north and north-east. The climate is comparatively mild in the south-west, but becomes colder and more rainy towards the north and north-east. Agriculture is carried on to

most advantage in the Champagne and Argonne. Wheat and oats are the

predominant cereals. Potatoes, rye, lucerne and other kinds of forage are also important crops. Pasturage is found chiefly on the banks of the Aisne and Meuse and on the plateau of Rocroi in the north. Horse-raising is carried on in the neighbourhood of Buzancy in the south, and at Bourg-Fidele in the north. Fruit-growing is confined to the west and central districts. The working of slate is very important, especially in the neighbourhood of Fumay, and quarries pro- ducing freestone, lime-stone and other minerals are found in several places. Flour-mills, saw-mills, sugar-works, dis- tilleries and leather-works are scattered over the department, but iron-founding and various branches of metal-working which are active along the valley of the Meuse (Nouzon, &c.) are the chief industries. To these may be added wool-weaving, centred at Sedan, and minor industries such as the manufacture of basket-work, wooden shoes, &c. Coal and raw wool are pro- minent imports, while iron goods, cloth, timber, live-stock, alcohol and the products of the soil are exported. Various branches of the Eastern railway traverse the department. The Meuse is canalized within the department, and the Canal des Ardennes, uniting that river with the Aisne, and the lateral canal of the Aisne are together about 65 m. long. Ardennes is divided into five arrondissements: Mezieres, Rocroi, Rethel, Vouziers and Sedan, with 31 cantons and 503 communes. The department forms part of the ecclesiastical province of Reims and of the circumscriptions of the appeal-court of Nancy and the VI. army corps. In educational matters, it is included in the academic (educational area) of Lille. Mezieres, the capital, Charleville, Rocroi, Sedan and Rethel are the chief towns, Outside them its finest examples of architecture are the churches of Mouzon (13th century) and Vouziers (15th century).

ARDGLASS (" Green Height "), a small town of Co. Down, Ireland, in the east parliamentary division, at the head of a rocky bay, in a picturesque situation between two hills, 32 m. S. by E. of Belfast on a branch of the Belfast & Co. Down railway. Pop. (1001) 501. Soon after the Norman invasion it became of the first importance as a port, a fact attested by the remains of no fewer than five castles in close proximity, which give the town a picturesque aspect. There are also an ancient church crowning the eastern hill, and a curious fortified ware- house (called the New Works), dating probably from the 14th century, when a trading company was established here under a grant from Henry IV. Ardglass was a royal burgh and sent a representative to the Irish parliament. The chief industry is the herring fishery. Ships of 500 tons may enter the harbour at all times. In summer Ardglass is a frequented resort of visitors ; good bathing and a golf links contribute to its attractions.

ARDITI, LUIGI (1822-1903), Italian musical composer and conductor, was born in Piedmont, and studied music at the Conservatoire in Milan,

starting professionally as a violinist, and touring with Bottesini, the double-bass player, in the United States in 1847. He began composing at an early age, and in 1840 produced an overture, followed by an opera / Briganti in 1841, and other works. He paid frequent visits to America, conducting the opera in New York, where he produced his La Spia in 1856. In 1858 he became conductor of the opera at Her Majesty's theatre in London, and both in London and abroad he became famous in this capacity, having the reputation of being Madame Patti's favourite conductor. His vocal waltz 77 Bacio was often sung by her. In 1896 he published his Reminiscences , and after a long and active musical life he died at Brighton on the 1st of May 1903.

ARDMORE, a township and the county-seat of Carter county, Oklahoma, U. S. A., just S. of the Arbuckle Mountains, about 120 m. S. by E. of Guthrie. Pop. (1900) 5681; (1907) 8759 (2122 being negroes, and 108 Indians); (1910) 8618. It is served by the Chicago, Rock Island & Pacific, the St Louis & San Francisco, and the Gulf, Colorado & Santa Fe railways. Ardmore is the market-town and distributing point for the surrounding agricultural region, which is the home of a large part of the Chickasaw and Choctaw nations. It is situated

890 ft. above the sea in a cotton and grain producing region, in which cattle are raised and fruit and vegetables grown; coal, oil, natural gas and rock asphalt (which is used for paving the streets of Ardmore) are found in the vicinity. Ardmore is an important cotton market, and has cotton gins, a cotton compress, machine shops, bridge works, foundries, bottling works and manufactories of cotton-seed oil, brick, concrete, flour, brooms, mattresses and dressed lumber. At Ardmore are the Saint Agnes Academy, a Catholic school for girls, and Saint Agnes College for boys, a conservatory of music, Hargrove College, and the Selvidge Commercial College. Near Ardmore is a summer school on the Chautauqua (q.v.) system. Ardmore was founded in 1887, and was incorporated in 1898.

ARDRES, a town of northern France in the department of Pas-de-Calais, 10J m. by rail S.S.E. of Calais, with which it is also connected by a canal. Pop. (1906) 1269. The " Field of the Cloth of Gold," where Henry VIII. of England and Francis I. of France met in 1520, was at Balinghem in the immediate neighbourhood. The town is an important market for cattle.

ARDROSSAN, a seaport, burgh of barony, and police burgh of Ayrshire, Scotland, 32 m. from Glasgow by the Glasgow & South-Western railway, and 29ˆ m. by the Lanarkshire & Ayrshire branch of the Caledonian railway. Pop. (1901) 6077. The rise of Ardrossan was due to the enterprise of Hugh, 1 2 th earl of Eglinton, who began the construction of the present town and harbour in 1806. The harbour was intended to be in

connexion with a canal from Glasgow to Ardrossan, but this was only completed as far as Johnstone. Owing to the costliness of the undertaking, and the death of the earl in 1819, the works were suspended after an outlay of £100,000, but his successor completed the scheme on a reduced scale at an expense of another £100,000. The dock accommodation has since been consider- ably extended, and the town enjoys great prosperity. Steamers run every week-day to Arran and Belfast, and during summer there is a service also to Douglas in the Isle of Man. The exports consist principally of coal and iron from collieries and iron- works in the neighbourhood; and the imports of timber, ores and general goods. Shipbuilding thrives and the fisheries are important. The town is governed by a provost and council.

Saltcoats (pop. 8120), a mile to the south, is a popular sea- side resort, with a brisk trade, due to its proximity to Ardrossan and Stevenston; the making of salt, once a leading industry, has ceased.

Ardrossan dates from an early period. The name Arthur of Ardrossan is found in connexion with a charter dated 1226; and Sir Fergus of Ardrossan accompanied Edward Bruce in his Irish expedition in 1316, and in 1320 signed the appeal to the pope, made by the barons of Scotland, against the aggressions of England. The family of Ardrossan is now merged, by marriage, in that of the earl of Eglinton and Winton. The castle where Wallace surprised the English garrison and threw their corpses into the dungeon, grimly styled " Wallace's Larder," was finally destroyed by Cromwell, who is said to have used part of its masonry for the construction of the fort at Ayr; but its ruins still exist.

AREA, a Latin word, originally meaning a threshing-floor, namely a raised space in a field exposed on all sides to the wind; now applied in English (1) to a plot of ground on which a structure is to be erected, (2) to the court or sunk space in the front or rear of a building, (3) to the superficial space covered by a district, country, &c, or by a building or court.

ARECIBO, a city and port on the north coast of Porto Rico, at the mouth of a small stream called the Rio Grande de Arecibo, and contiguous to one of the most fertile regions of the island. Pop. (1899) 8008; of the tributary district, about 30,000; (1910) 9612. It is connected with San Juan, Mayaguezand Ponce by railway. It is a well-built and active commercial city, and has a large export trade in coffee and sugar. The harbour is an open roadstead, very dangerous to shipping in northerly winds, and the discharge and loading of cargoes is effected by means of lighters at considerable risk and expense. Arecibo was founded in 1788.

AREMBER6, or Arenberg, formerly a German duchy of the Holy Roman Empire in the circle of the Rhine Palatinate, between Julich and Cologne, and now belonging to the Prussian administrative district of Coblenz. The hamlet of Aremberg is at the foot of a basalt hill 2067 ft. high, on the summit of which are the ruins of the castle which was the original seat of the family of Aremberg.

The lords of Aremberg first appear early in the 12th century, but had died out in the male line by 1279. From the marriage of the heiress Mathilda (1282-1299) with Engelbert II., count of La Marck (d. 1328), sprang two sons. The elder of these, Adolf II, (d. 1347), inherited the countship of La Marck; the second, Engelbert III. (d. 1387), the lordship of Aremberg, which he increased by his marriage with Marie de Looz, heiress of Lumain. The lordship of Aremberg remained in his family till 1547, when it passed, by his marriage with Margaret, sister of the childless Robert III., to John of Barbancon, of the great house of Ligne, who assumed the name and arms of Aremberg, and was created a count of the Empire by Charles V. He was governor of Friesland, and for a while commanded the Spanish and Catholic forces against the " beggars," falling at the battle of Heiligerlee in 1568. His son Charles (d. 1618) greatly in- creased the possessions of the house by his marriage with Ann of Croy, heiress of Croy and of Chimay-Aerschot, and in 1576 was made prince of the Empire by Maximilian II. His grandson, Philip Francis, was made duke in 1644 by the emperor Ferdinand III., and was succeeded by his brother Charles Eugene (d. 1681), who married Marie Henriette de Vergy de Cusance, heiress of Perwez (d. 1700). Their son, Duke Philip Charles Francis, was killed in 1691 fighting against the Turks, and was succeeded by Leopold (1754), a distinguished soldier of the War of the Spanish Succession, and patron of Rousseau and Voltaire. His son Charles (d. 1778) was an Austrian field-marshal during the Seven Years' War, and married Louise Margaret of La Marck-Lumain, heiress of the countship of Schleiden and lordship of Saffenberg. By the peace of Luneville (February 1801), the next duke, Louis Engelbert, lost the greater part of his ancestral domain, but received in compensation Meppen and Recklinghausen. On the establishment of the con- federation of the Rhine, his son Prosper Louis (to whom, becoming blind, he had ceded his domains in 1803) became a member (1806), and showed great devotion to the interests of France; but in 1810 he. lost his sovereignty, Napoleon incor- porating Meppen with France and Recklinghausen with the grand -duchy of Berg, and indemnifying him by a rent of 240,702 francs. In 1815 he received back his possessions, which were mediatized by the congress of Vienna, Recklinghausen falling to Prussia and Meppen to Hanover. On account of the one portion he became a peer of the Westphalian estates, and by the other a member of the upper

house in Hanover. George IV. of England (9th May 1826) elevated the duke's Hanoverian possessions to a dukedom under the title of Aremberg Meppen. His brother Auguste Raymond, Comte de la Marck (1753-1833), became famous during the early stages of the French Revolution for his friendship with Mirabeau (q.v.). Duke Prosper Louis died in 1861, and was succeeded by his son Engelbert (d. 1875), who was followed in his turn by his son Engelbert (b. 1872).

The duke of Aremberg is one of the wealthiest of the great continental nobles. His feudal domain in Germany covers an area of over 1100 sq. m., besides which he has large estates in Belgium and France. The duke has residences in Brussels, where he has a famous collection of pictures, and at the chateau of Klemenswerth near Meppen.

ARENA (Lat. for " sand ") I , the central area of an amphitheatre on which the gladiatorial displays took place, its name being derived from the sand with which it was covered. The word is applied sometimes to any level open space on which spectacles take place.

ARENDAL, a seaport of Norway, in Nedenaes ami (county), on the south coast, 46 m. N.E. from Christiansand. Pop. (1900) 11,155. It r ' ses picturesquely above the mouth of the river Nid,

with a good harbour protected by an island from the open waters of the Skagerrack. The town itself occupies several islets, and some of the houses are supported above the water on piles. The chief exports are timber (very largely exported to Great Britain), wood-pulp, sealskins and felspar. In 1879 Arendal ranked second (after Chris tiania) as a ship-owning port; in 1899 it had dropped to the fifth place. In and near the town are factories for wood-pulp, paper, cotton and joinery; and at Fevig, 8 m. north-east, a shipbuilding yard and engineering works. The neighbourhood is remarkable for the number of beautiful and rare minerals found there; one of these, a variety of epidote, was formerly called Arendalite. Louis Philippe stayed here for some time during his exile.

ARENIG GROUP, in geology, the name now applied by British geologists to the lowest stage of the Ordovician System in Britain. The term was first used by Adam Sedgwick in 1847 with reference to the " Arenig Ashes and Porphyries " in the neighbourhood of Arenig Fawr, in Merioneth, North Wales.

The rock-succession in the Arenig district has been recognized by W. G. Fearnsides {" On the Geology of Arenig Fawr and Moel Llanfnant," Q.J.G.S. vol. lxi., 1905, pp. 608-640, with maps) as follows: — _,.

ii o \ Dicranograptus — shales.

< 3-§ 1 Derfel or Orthis — limestone.

U r Rhyolitic ashes = Upper "1 Upper Ashes

Massive ashes = Middle l of

Acid andesitic ashes = Lower | Arenig.

Daerfawr Shales. Zone of Didymograptus Murchisoni.

Platy ashes) Lower Ashes of Arenig

-Great Agglomerate) (Hypersthene Andesites).

Olchfa or Bifidus — shales (Didymograptus bifidus).

Filltirgerig or Hirundo Beds) mdymograptus kirundo.

*Erwent or Ogygta — limestone) J * r ■*

I Didymograptus

o

T3

_0

■3 O.

Is'

1—1

,»o,

Llyfnant or ■ Extensus — flags Basal Grit

extensus.

(unconformity)

The above succession is divisible into: (1) a lower series of gritty and calcareous sediments, the " Arenig Series," as. it is now understood; (2) a middle series, mainly volcanic, with shales, the " Llandeilo Series"; and (3) the shales and lime- stones of the Bala or Caradoc Stage. It was to the middle series (2) that Sedgwick first applied the term " Arenig."

In the typical region and in North Wales generally the Arenig series appears to be unconformable upon the Cambrian rocks; this is not the case in South Wal es. The Arenig series is represented in North Wales by the Garth grit and Ty-Obry beds, by the Shelve series of the Corndon district, the Skiddaw slates of the Lake District, the Ballantrae group of Ayrshire, and by the Ribband series of slates and shales in Wicklow and Wexford. It may be mentioned here that the " Llanvirn " Series of H, Hicks was equivalent to the bifidus-shalzs and the Lower Llandeilo Series.

References. — Adam Sedgwick, Synopsis of the Classification of the British Palaeozoic Rocks (1885); Sir A. Ramsay, "North Wales," Geol. Survey Memoir, vol. iii. ; C. Lapworth, Ann. Mag. Nat. Hist. vol. vi., 1880; G. A.

J. Cole and C. V. Jennings, Q.J.G.S. vol. xlv., 1889; C. V. Jennings and G. J. Williams, ibid. vol. xlvii., 1891; Messrs Crosfield and Skeat, ibid. vol. Hi., 1896; G. L. Elles, Geol. Mag., 1904; T. E. Marr and T. Roberts, Q.J.G.S., 1885; H. Hicks, ibid. vol. xxxi., 1875. See also Ordovician. (J. A. H.)

AREOI, or Areoiti, a secret society which originated in Tahiti and later extended its influence to other South Pacific islands. To its ranks both sexes were admitted. The society was primarily of a religious character. Members styled them- selves descendants of Oro-Tetifa, the Polynesian god, and were divided into seven or more grades, each having its characteristic tattooing. Chiefs were at once qualified for the highest grade, but ordinary members attained promotion only through initiatory rites. The Areois enjoyed great privileges, and were considered as depositaries of knowledge and as mediators between God and man. They were feared, too, as ministers of the taboo and were entitled to pronounce a kind of excommunication for offences against its rules. The chief religious purpose of the society was the worship of the generative powers of nature, and the ritual and ceremonies of initiation were grossly licentious. But the

Areois were also a social force. They aimed at communism in all things. The women members were common property; the period of cohabitation was limited to three days, and the female Areois were bound by oath at initiation to strangle at birth any child born to them. If, however, the infant was allowed to survive half an hour only, it was spared; but to have the right of keeping it the mother must find a male Areoi willing to adopt it. The Areois travelled about, devoting their whole time to feasting, dancing (the chief dance of the women being the grossly indecent Timorodeementionedby Captain Cook), and debauchery, varied by elaborate realistic stage presentments of the lives and loves of gods and legendary heroes.

AREOPAGUS ("Apeios IM70S), a bare, rocky hill, 370 ft. high, immediately west of the northern rim of the acropolis of Athens. The ancients interpreted the name as " Hill of Ares." Though accepted by some modern scholars, this derivation of the word is rendered improbable by the fact that Ares was not worshipped on the Areopagus. A more reasonable explanation connects the name with Arae, " Curses," commonly known as Semnae, " Awful Goddesses," whose shrine was a cave at the foot of the hill, of which they were the guardian deities (Aeschyl. Eumen. 417, 804; Schol. on Lucian, vol. iii. p. 68, ed. Jacobitz; Paus. i. 28. 6).

The Boule, or Council, of the Areopagus (17 kv 'ApeiC}) Uayia PovKr]), named after the hill, is to be compared in origin and fundamental character with the council of chiefs or elders which we find among the earliest Germans, Celts, Romans, and other primitive peoples. Under the kings of Athens it must have closely resembled the Boule of elders described by Homer; and there can be no doubt that it was the chief factor in the work of transforming the kingship into an aristocracy, in which it was to be supreme. It was composed of ex-archons. Aristotle attributes to it for the period of aristocracy the appointment to all offices {Ath. Pol. viii. 2), the chief work of administration, and the right to fine or otherwise punish in cases, not only of violation of laws, but also of immorality (ibid. iii. 6; cf. Isoc. vii. 46; Androtion and Philochorus, in Müller, Frag. Hist. Graec. i. 387. 17, 394. 60). x This evidence is corroborated by the remnants of political power left to it in later time, after its importance had been greatly curtailed, and by the designation Boule, which in itself indicates that the body so termed was once a state council. In a passage bearing incidentally upon the early constitution of Athens, Thucydides (i. 126. 8) informs us that at the time of the Cylonian insurrection the Athenians, we may suppose in their assembly ('EK/cXijoxa), commissioned the archons with absolute power to deal with the trouble at their discretion. From this passage, if we accept the Aristotelian view as to the early supremacy of the Areopagitic council, we must infer that a modification of the aristocracy in a popular direction had at that time already taken place.

In addition to its political functions, the council from the time of Draco, if not earlier, exercised jurisdiction in certain cases of homicide (see below, ad fin.). The assumption that in their criminal jurisdiction the Areopagites were called Ephetae till after the legislation of Draco (cf. Philoch. 58, in Miiller, ibid. 394) would explain the otherwise obscure circumstances that, according to Plutarch (Sol. 19), Draco (q.v.) in his laws mentioned only the Ephetae, and that Pollux (viii. 125) included the Areopagus among the localities in which sat the Ephetae. 2 The same assumption would supply a reason for

1 Neither Herodotus nor Thucydides tells us anything as to its powers : but their silence on this point need not surprise us, as they had no especial occasion for referring to the subject, and in general it may be said that before the 4th century B.C. writers took little interest in the constitutional history of the remote past. The state- ment of Thucydides (i. 126. 8) that at the time of the Cylonian insurrection the nine archons attended to a great part of the business of government does not contradict the Aristotelian view, for their administration may well have been under Areopagitic supervision (see also Akchox) ; and, as is stated in the text, the supremacy of the council may have already suffered considerable limitation. The Eumenides of Aeschylus is a glorification of the institution,

though for obvious reasons it is there represented as an essentially judicial body.

1 it is possible also to explain the alleged absence of reference to

the notion entertained by many writers of later time that the Areopagitic council was instituted by Solon (q.v.) — a notion partly explained also by the desire of political thinkers to ascribe to Solon the making of a complete constitution. Conformably with the view here presented we may suppose that the name " Boule of the Areopagus " developed from the simple term " Boule " in order to distinguish it from the new Boule (q.v), or Council of Four Hundred. The popular reforms of Solon (594 B.C.), so far as they were carried into effect, tended practi- cally to limit the Council of the Areopagus, though constitutionally it retained all its earlier powers and functions, augmented by the right to try persons accused of conspiracy against the state (Arist. Ath. Pol. viii. 4). In the exercise of its duty as the protector of the laws it must have had power to inhibit in the Four Hundred, or in the Ecclesia, a measure which it judged unconstitutional or in any way prejudicial to the state, and in the levy of fines for violation of law or moral usage it remained irresponsible. As censor of the conduct of citizens it inquired into every man's source of income and punished the idle (Plut. Sol. 22).

The tyrants (560-510 B.C.) left to the council its cognizance of murder cases (Demosth. xxiii. 66; Arist. Ath. Pol. xvi. 8) and probably the nominal enjoyment of all its prerogatives; but their method of filling the archonship with their own kinsmen and creatures gradually converted the Areopagites into willing supporters of tyranny. Though hostile, therefore, to the policy of Cleisthenes, their council seems to have suffered no direct abridgment of power from his reforms. After his legislation it gradually changed character and political sentiment by the annual admission of ex-archons who had held office under a popular constitution. In 487 B.C., however, the introduction of the lot as a part of the process of filling the archonship (see Archon) began to undermine its ability. This deterioration was necessarily slow; it could not have advanced far in 480 B.C., when on the eve of the battle of Salamis, as we are informed (Arist. Polit. viii. 4, p. 1304a, 17; Ath. Pol. xxiii. 25; Plut. Them. '10; Cic. Off. i. 22, 75), the council of the Areopagus succeeded in manning the fleet by providing pay for the seamen, thereby regaining the confidence and respect of the people: The patriotic action of the council and its attendant popularity enabled it to recover considerable administrative control, which it continued to exercise for the next eighteen years, although its deterioration in ability, becoming every year more noticeable, as well as the rapid rise of democratic ideas, prevented it from fully re-establishing the supremacy which Aristotle, with some exaggeration, attributes to it for this period. Its prestige was seriously

undermined by the conduct of individual members, whose corrupt use of power was exposed and punished by Ephialtes, the democratic leader. Following up this advantage, Ephialtes (462 B.C.), and less prominently Archestratus and Pericles (q.v.), proposed and carried measures for the transfer of most of its functions to the Council of Five Hundred, the Ecclesia, and the popular courts of law (Arist. Ath. Pol. xxv. 2, xxvii. 1, xxxv. 2; Plut. Per. 9). Among these functions were probably jurisdiction in cases of impiety, the supervision of magistrates and the censorship of the morals of citizens, the inhibition of illegal and unconstitutional resolutions in the Five Hundred and the Ecclesia, the examination into the fitness of candidates for office, and the collection of rents from the sacred property (cf. Wilamowitz-Mollendorff, Arist. u. Ath. ii. 186-197; Busolt, Grieck. Gesch. (2nd ed.) iii. 269-294; G. Gilbert, Const. Antiq. of Sparta and Athens, Eng. trans., 154 f.). It retained

the Areopagitic council in the Draconian laws by the supposition that Solon, while leaving untouched the Draconian laws concerned with the cases of homicide which came before the Ephetae, substi- tuted a law of his own regarding wilful murder, which fell within the jurisdiction of the Areopagites. This view finds strong support in the circumstance that the copy of the Draconian laws (C.I. A . i. 61) , made in pursuance of a decree of the people of the year 409-408 B.C., does not contain the provision for cases of premeditated homicide; cf. G. de Sanctis, 'At6U, 135. The relation of the Ephetae to the court of the Areopagus is obscure; cf. Philippi, Der Areopag und die Epheten (Berlin, 1874); Busolt, Griechische Geschichte (2nd ed.), ii. 138 ff.

jurisdiction in cases of homicide and the care of sacred olive trees. From this time to the establishment of the Thirty (462- 404 B.C.) the Areopagitic council, degraded still further by the opening of the archonship to the Zeugitae (457 B.C.) and by the absolute use of the lot in filling the office, was a political nullity. The first indication of a revival of its prestige is to be traced in the action attributed to it by Lysias during the siege of Athens (404 B.C.) (in Eratosth. 69: irparroixnjs fitv rrjs tv 'Apdcg Tf.ay < # fiov \rjs aoirripla). After the surrender of Athens and the appointment of the Thirty, the repeal of the laws of Ephialtes and Archestratus prepared the way for the rehabilitation of the council as guardian of the constitution by the restored democracy (Arist. Ath. Pol. xxxv. 2; decree of Tisamenus, in Andoc. i. 84; cf . Din. i. 9) . Although under the new conditions the Areopagites could not hope to recover their full supremacy, they did exercise considerable political influence, especially in crises. In the time of

Demosthenes, accordingly, we find them annulling the election of individuals to offices for which they were unfit (Plut. Phoc. 16), exercising during a crisis a disciplinary power extending to life and death over all the Athenians " in conformity with ancestral law," procuring the banishment of one, the racking of another, and the infliction of capital punishment on several of the citizens. This authority seems to have been delegated to them by the assembly with reference either to individual cases or temporarily to the whole body of Athenians (Din. i. 10, 62 f.; Aeschin. iii. 252; Lye. Leoc. 52; Demosth. xviii. 132 f.; Plut. Demosth. 14). Religion, too, was their care (Pseud. Demosth. lix. 80 f.). Lycurgus (ibid.) even goes so far as to claim chat by their action during the crisis after Chaeroneia they had saved the state. After the period of the great orators their influence continued to grow. Demetrius of Phalerum empowered them to assist the gynaeconomi in supervising festivals held in private houses {Philoch. in Miiller, ibid. i. 408. 143). Under Roman supremacy in addition to earlier functions they had jurisdiction in cases of forgery, tampering with the standard measures, and probably other high crimes, the supervision of buildings, and the care of religion and of education (Cic. Fam. xiii. 1; Alt. v. 9; Tac. Ann. ii. 55; Plut. Cic. 24; C.I.G. i. 123. 9; C.I. A. ii. 476; iii. 703, 714, 716; Acts xvii. 19). Their council acquired, too, in conjunction with the assembly, with or without the co- operation of the Five Hundred (or Six Hundred), the right to pass decrees and to represent their city in foreign relations (CI. A. iii. 10, 31, 40, 41, 454, 457, 458). From the overthrow of the Thirty to the end of their history they enjoyed a high reputation for ability and integrity (Isoc. vii.; Demosth. xxiii. 65 f.; Val. Max. viii. 1. Amb. 2; Gell. xii. 7; Lucian, Bis Ace. iv. 12. 14). About a.d. 400 their council came to an end (Theo- doret, Curat, ix. 55).

With regard to the jurisdiction of the council in cases of homicide, the procedure, so far as it may be gathered from the orators and other sources, was as follows: — accusations were brought by relatives within the circle of brothers' and sisters' children, supported by the wider kin and the phratry (Demosth. xliii. 57). On receiving the accusation the king-archon by proclamation warned the accused to keep away from temples and other places forbidden to such persons. He made three investigations of the case in the three successive months, and brought it to trial in the fourth month. As he was forbidden to hand a case over to his successor, it resulted that in the last three months of the year no accusations of homicide could be brought (Ant. vi. 42). After the examination he assigned the case to the proper court, and presided over it during the trial, which took place in the open air, that the judges and the accuser might not be polluted by being brought under the same roof with the offender (Ant. v. n). The accuser and the accused, standing on two white stones termed " Relentlessness " ('AvalSeia) and " Outrage " ("Tj3pis) respectively (Paus. i. 28. 5), bound

them- selves to the truth by most solemn oaths (Demosth. xxiii. 68). Each was allowed two speeches, and the trial lasted three days. After the first speech the accused, unless charged with parricide, was at liberty to withdraw into exile (Poll. viii. 117). If con- demned, he lost his life, and his property was confiscated. A

tie vote acquitted (Aeschyl. Eumen. 735; Ant. v. 51; Aeschin. iii. 252). See further Greek Law.

Authorities. — Among other works may be mentioned E. Dugit, Htude sur I'Areopage athenien (Paris, 1867); E. Caillemer, " Areo- pagus," in Daremberg et Saglio, Diet. d. Antiq. grecq. et rom. (Paris, 1873) i. 395-404; A. Philippi, Areopag und Epheten (Berlin, 1874)'. The discovery of the Aristotelian " Constitution of Athens " (Ath. Pol.) has largely rendered obsolete all works published before 1891. See Hermann-Thumser, Griechische Staatsalterttimer (6th ed., Frei- burg, 1892), 365-371, 387-391, 788; U. von Wilamowitz-Mollendorff, Aristoteles und Athen (Berlin, 1893), ii. 186-200; J. J. Terwen, De Areopago Atheniensium Quaestiones Variae (Utrecht, 1894); G. Gilbert, Constitutional Antiquities of Athens and Sparta (Eng. trans., London and New York, 1895), 114, 122, 137, 154,282; F. Cauer, "Aischylos und der Areopag," in Rhein. Mus. (1895), N.F. i. 348- 356; Wachsmuth and Thalheim, s.v. " Areios pagos " in Pauly- Wissowa, Realencycl. d. kl. Altertumswiss. (Stuttgart, 1896), ii. 627- 633; ;G. de Sanctis, 'AtSU, Storia delta Repubblica Ateniese (Rome, 1898); L. Ziehen, " Drakontische Gesetzgebung," in Rhein. Mus. (1899), N.F. liv. 321-344. See also Cleisthenes; Perici.es and Athens. (G. W. B.)

AREQUIPA, a coast department of southern Peru, bounded N. by the departments of Ayacucho and Cuzco, E. by Puno and Moquegua, S. and W. by Moquegua and the Pacific. It is divided into seven provinces. Area, 21,947 sq. m.; pop. (1896) 229,007. It is traversed by an important railway line from Mollendo (Islay) to Puno, on Lake Titicaca, 325 m. long, with extensions to Santa Rosa, Peru and La Paz, Bolivia. The highest point reached by this line is 14,660 ft. The department includes an arid, sand-covered region on the coast traversed by deep gorges formed by river courses, and a partly barren, mountainous region inland composed of the high Cordillera and its spurs toward the coast, between which are numerous highly fertile valleys watered by streams from the snow-clad peaks. These produce cotton, rice, sugar-cane, wheat, coffee, Indian corn, barley, potatoes and fruit. The mountainous region is rich in minerals, and there is a valuable deposit of borax near the capital, Arequipa.

AREQUIPA, a city of southern Peru, capital of the depart- ment of the same name, about 90 m. N.E. by N. of its seaport Mollendo (107 m. by

rail), and near the south-west foot of the volcano Misti which rises to a height of 19,029 ft. above sea-level. The population was estimated at 35,000 in 1896. The city is provided with a tram line, and is connected with the coast at Mollendo (Islay) by a railway 107 m. long, and with Puno, on Lake Titicaca, by an extension of the same line 218 m. long. The city occupies a green, fertile valley of the Rio Chile, 7753 ft. above the sea, surrounded by an arid, barren desert. It is built on the usual rectangular plan and the streets are wide and well paved. The edifices in general are low, and are massively built with thick walls and domed ceilings to resist earthquakes, and lessen the danger from falling masonry. The material used is a soft, porous magnesian limestone, which is well adapted to the purpose in view. Arequipa is the seat of a bishopric created in 1609-1612, and possesses a comparatively modern cathedral, its predecessor having been destroyed by fire in 1849. It has several large churches, and formerly possessed five monasteries and three nunneries, which have been closed and their edifices devoted to educational and other public purposes. The religious element has always been a dominating factor in the life of the city. A university, founded in 1825, three colleges, one of them dating from colonial times, a medical school, and a public library, founded in 1821, are distinguishing features of the city, which has always taken high rank in Peru for its learning and liberalism, as well as for its political restlessness. The city's water-supply is derived from the Chile river and is considered dangerous to new arrivals because of the quantity of saline and organic matter contained. The climate is temperate and healthy, and the fertile valley (10 m. long by 5 m. wide) surrounding the city produces an abundance of cereals, fruits and vegetables common to both hot and temperate regions. Pears and strawberries grow side by side with oranges and granadillas, and are noted for their size and flavour. The trade of the city is principally in Bolivian products — mineral ores, alpaca wool, &c. — but it also receives and exports the products of the neighbouring

Peruvian provinces, and the output of the borax deposits in the neighbourhood. Arequipa was founded by Pizarro in 1540, and has been the scene of many events of importance in the history of Peru. It was greatly damaged in the earthquakes of 1582, 1609, 1784 and 1868, particularly in the last. It was captured by the Chileans in 1883, near the close of the war between Chile and Peru.

ARES, in ancient Greek mythology, the god of war, or rather of battle, son of Zeus and Hera. (For the Roman god, identified with Ares, see Mars.) As contrasted with Athena, who added to her other attributes that of being the

goddess of well-con- ducted military operations, he personifies brute strength and the wild rage of conflict. His delight is in war and bloodshed; he loves fighting for fighting's sake, and takes the side of the one or the other combatant indifferently, regardless of the justice of the cause. His quarrelsomeness was regarded as inherited from his mother, and it may have been only as an illustration of the perpetual strife between Zeus and Hera that Ares was accounted their son. According to a later tradition, he was the son of Hera (Juno) alone, who became pregnant by touching a certain flower (Ovid, Fasti, v. 255). All the gods, even Zeus, hate him, but his bitterest enemy is Athena, who fells him to the ground with a huge stone. Splendidly armed, he goes to battle, sometimes on foot, sometimes in the war chariot made ready by his sons Deimos and Phobos (Panic and Fear) by whom he is usually accompanied. In his train also are found Enyo, the goddess of war who delights in bloodshed and the destruction of cities; his sister, Eris, goddess of fighting and strife; and the Keres, goddesses of death, whose function it is especially to roam the battle-field, carrying off the dead to Hades. In later accounts (and even in the Odyssey) Ares' character is some- what toned down; thus, in the " Homeric " hymn to Ares, he is addressed as the assistant of Themis (Justice), the enemy of tyrants, and leader of the just. It is to be noted, however, that in this little poem he is to some extent confounded with the planet named after him (Ares, or Mars).

The primitive character of Ares has been much discussed. He is a god of storms; a god of light or a solar god; a chthonian god, one of the deities of the subterranean world, who could bring prosperity as well as ruin upon men, although in time his destructive qualities obscured the others. In this last aspect he was one of the chief gods of the Thracians, amongst whom his home was placed even in the time of Homer. In Scythia an old iron sword served as the symbol of the god, to which yearly sacrifices of cattle and horses were made, and in earlier times (as apparently also at Sparta) human victims, selected from prisoners of war, were offered. Thus Ares developed into the god of war, in which character he made his way into Greece. This theory may have been nothing more than an instance of the Greek tendency to assign a northern or " hyperborean " home to deities in whose character something analogous to the stormy elements of nature was found. But it appears that the Thracians and Scythians in historical times (Herodotus i. 59) worshipped chiefly a war god, and that certain Thracian settle- ments, formed in Greece in prehistoric times, left behind them traces of the worship of a god whom the Greeks called Ares. The story of his imprisonment for thirteen months by the Aloïidae (Iliad, v. 385) points to the conquest of this chthonian destroyer of the fields by the arts of peace, especially agriculture, of which the grain-fed sons of Aloeus (the thresher) are the personification.

In Homer Ares is the lover of Aphrodite, the wife of Hephaestus, who catches them together in a net and holds them up to the ridicule of the gods. In what appears to be a very early develop- ment of her character, Aphrodite also was a war goddess, known under the name of Areia; and in Thebes, the most important seat of the worship of Ares, she is his wife, and bears him Eros and Anteros, Deimos and Phobos, and Harmonia, wife of Cadmus, the founder of the city (Hesiod, Theog. 933). In the legend of Cadmus and his family Ares plays a prominent part. His worship was not so widely spread over Greece as that of other gods, although he was honoured here and there with festivals

and sacrifices. Thus, at Sparta, under the name of Theritas, he was offered young dogs and even human beings. The Dio- scuri were said to have brought his image from Colchis to Laconia, where it was set up in an old sanctuary on the road from Sparta to Therapnae. At Athens, he had a temple at the foot of the Areopagus, with a statue by Alcamenes. It was here, according to the legend, that he was tried and acquitted by a council of the gods for the murder of Halirrhothius, who had violated Alcippe, the daughter of Ares by Agraulos. The figure of Ares appears in various stories of ancient mythology. Thus, he engages in combat with Heracles on two occasions to avenge the death of his son Cycnus; once Zeus separates the combatants by a flash of lightning, but in the second encounter he is severely wounded by his adversary, who has the active support of Athena; maddened by jealousy, he changes himself into the boar which slew Adonis, the favourite of Aphrodite; and stirs up the war between the Lapithae and Centaurs. His attributes were the spear and the burning torch, symbolical of the devastation caused by war (in ancient times the hurling of a torch was the signal for the commencement of hostilities). The animals sacred to him were the dog and the- vulture.

The worship of Ares being less general throughout Greece than that of the gods of peace, the number of statues of him is small; those of Ares-Mars, among the Romans, are more frequent. Previous to the 5th century B.C. he was represented as full- bearded, grim-featured and in full armour. From that time, apparently under the influence of Athenian sculptors, he was conceived as the ideal of a youthful warrior, and was for a time associated with Aphrodite and Eros. He then appears as a vigorous youth, beardless, with curly hair, broad head and stalwart shoulders, with helmet and chlamys. In the Villa Ludovisi statue (after the style of Lysippus) he appears seated, in an attitude of thought; his arms are laid aside, and Eros peeps out at his feet. In the Borghese Ares (also taken for Achilles) he is standing, his only armour being the helmet on his head. He also appears in many other groups, with Aphrodite, in marble and on engraved gems of Roman times. But before this grouping had recommended itself to the Romans, with their legend of Mars and Rhea Silvia, the Greek Ares had

again become under Macedonian influence a bearded, armed and powerful god.

Authorities.— H. D. Muller, Ares (1848) ; H. W. Stoll, Ober die urspriingliche Bedeutung des A. und der Athene (1881); F. A. Voigt, " Beitrage zur Mythologie des Ares und Athena " in Leipziger Studien, iv. 1881 ; W. H. Roscher, Studien zur vergleichenden Mytho- logie, i., 1873; C. Tumpel, Ares und Aphrodite (1880); articles in Pauly-Wissowa's Realencyclopadie, Roscher's Lexikon der Mytho- logie, and Daremberg and Saglio's Dictionnaire des Antiquites (s.v. Mars) ; Preller, Griechische Mythologie.

ARETAEUS, of Cappadocia, a Greek physician, who lived at Rome in the second half of the 2nd century a.d. We possess two treatises by him, each in four books, in the Ionic dialect: On the Causes and Indications of Acute and Chronic Diseases, and On their Treatment. His work, was founded on that of Archigenes; like him, he belonged to the eclectic school, but did not ignore the theories of the " Pneumatics," who made the heart the seat of life and of the soul.

Editions by Kiihn (1828), Ermerius (1848). English translations : Wigan (1723); Moffat (1786); Reynolds (1837); Adams (1856). See Locher, Aretaeus aus Kappadocien (1847).

ARETAS (Arab. Haritha), the Greek form of a name borne by kings of the Nabataeans resident at Petra in Arabia. (1) A king in the time of Antiochus IV. Epiphanes (2 Mace. v. 8). (2) The father-in-law of Herod Antipas (Jos. Ant. xviii. 5. 1, 3). In 2 Cor. xi. 3.2 he is described as ruler of Damascus (q.v.) at the time of Paul's conversion. Herod Antipas had married a daughter of Aretas, but afterwards discarded her in favour of Herodias. This led to a war with Aretas in which Antipas was defeated.

An Aretas is mentioned in 1 Mace. xv. 22, but the true reading is probably Ariarathes (king of Cappadocia). See Nabataeans. •

ARETE (O. Fr. areste, Lat. arista, ear of corn, fish-bone or spine), a ridge or sharp edge; a French term used in Switzerland

to denote the sharp bayonet-like edge of a mountain (such as the Matterhorn), that slopes steeply upward with two precipitous sides meeting in a long ascending ridge. Hence the word has passed into common use to denote any sharp mountain edge denuded by frost action above the

snowline, where the con- sequent angular ridges give the characteristic " house-roof structure " of these altitudes.

ARETHAS (c. 860-940), Byzantine theological writer and scholar, archbishop of Caesarea in Cappadocia, was born at Patrae. He was the author of a Greek commentary on the Apocalypse, avowedly based upon that of Andrew, his pre- decessor in the archbishopric. In spite of its author's modest estimate, Arethas's work is by no means a slavish compilation; it contains additions from other sources, and especial care has been taken in verifying the references. His interest was not, however, confined to theological literature; he annotated the margins of his classical texts with numerous scholia (many of which are preserved), and had several MSS. copied at his own expense, amongst them the Codex Clarkianus of Plato (brought to England from the monastery of St John in Patmos), and the Dorvillian MS. of Euclid (now at Oxford).

Most divergent opinions have been held as to the time in which Arethas lived ; the reasons for the dates given above will be found succinctly stated in the article " Aretas," by A. Julicher in Pauly- Wissowa's Realencyclopddie der klassischen Altertutnswissenschaft (1896). The text of the commentary is given in Migne, Patrologia Graeca, cvi. ; see also O. Gebhardt and A. Harnack, Texte und Vntersuchungen zur Geschichte der altchristlichen Litt. i. pp. 36-46 (1882), and Vita Euthymii (patriarch of Constantinople, d. 917), ed. C. de Boor (1888); H. Wace, Dictionary of Christian Biography, i. ; C. Krumbacher, Geschichte der byzantinischen Litteratur (1897); G. Heinrici in Herzog-Hauck, Realencyklopddie (1897).

ARETHUSA, in Greek mythology, a nymph who gave her name to a spring in Elis and to another in the island of Ortygia near Syracuse. According to Pausanias (v. 7. 2), Alpheus, a mighty hunter, was enamoured of Arethusa, one of the retinue of Artemis; Arethusa fled to Ortygia, where she was changed into a spring; Alpheus, in the form of a river, made his way beneath the sea, and united his waters with those of the spring. In Ovid (Metam. v. 572 foil.), Arethusa, while bathing in the Alpheus, was seen and pursued by the river god in human form; Artemis changed her into a spring, which, flowing underground,

emerged at Ortygia. In the earlier form of the legend, it is Artemis, not Arethusa, who is the object of the god's affections, and escapes by smearing her face with mire, so that he fails to recognize her (see L. R. Farnell, Cults of the Greek States, ii. 428) . The probable origin of the story is the part traditionally taken in the foundation of Syracuse by the Iamidae of Olympia, who identified the spring Arethusa with their own river Alpheus, And the nymph with Artemis Alpheiaia, who was worshipped at Ortygia. The subterranean passage of the Alpheus in the upper part of its course (confirmed by modern explorers), and the freshness of the water of Arethusa in spite of its proximity to the sea, led to the belief that it was the outlet of the river. Further, according to Strabo (vi. p. 270), during the sacrifice of oxen at Olympia the waters of Arethusa were disturbed, and a cup thrown into the Alpheus would reappear in Ortygia. In Virgil (Eel. x. 1) Arethusa is addressed as a divinity of poetical inspiration, like one of the Muses, who were themselves originally nymphs of springs.

For Arethusa on Syracusan coins, see B. V. Head, Historia Numorum, pp. 151, 155.

ARETINO, PIETRO (1492-1556), Italian author, was born in 1492 at Arezzo in Tuscany, from which place he took his name. He is said to have been the natural son of Luigi Bacci, a gentle- man of the town. He received little education, and lived for some years poor and neglected, picking up such scraps of infor- mation as he could. When very young he was banished from Arezzo on account of a satirical sonnet which he composed against indulgences. He went to Perugia, where for some time he worked as a bookbinder, and continued to distinguish himself by his daring attacks

upon religion. After some years' wandering through parts of Italy he reached Rome, where his talents, wit and impudence commended him to the papal court. This

favour, however, he lost in 1523 by writing a set of obscene sonnets, to accompany an equally immoral series of drawings by the great painter, Giulio Romano. He left Rome and was received by Giovanni de' Medici, who introduced him at Milan to Francis I. of France. He gained the good graces of that monarch, and received handsome presents from him. Shortly after this Aretino attempted to regain the favour of the pope, but, having come to Rome, he composed a sonnet against a rival in some low amour, and in return was assaulted and severely wounded. He could obtain no redress from the pope, and returned to Giovanni de' Medici. On the death of the latter in December 1526, he withdrew to Venice, where he afterwards continued to reside. He spent his time here in writing comedies, sonnets, licentious dialogues, and a few devotional and religious works. He led a profligate life, and procured funds to satisfy his needs by writing sycophantish letters to all the nobles and princes with whom he was acquainted. This plan proved eminently successful, for large sums were given him, apparently from fear of his satire. So great did Aretino 's pride grow, that he styled himself the " divine," and the " scourge of princes," He died in 1556, according to some accounts by falling from his chair in a fit of laughter caused by hearing some indecent story of his sisters. The reputation of Aretino in his own time rested chiefly on his satirical sonnets or burlesques; but his comedies, five in number, are now considered the best of his works. His letters, of which a great number have been printed, are also commended for their style. The dialogues and the licentious sonnets have been translated into French, under the title Academie des Dames.

AREZZO (anc. Arretium), a town and episcopal see of Tuscany, Italy, the capital of the province of Arezzo, 54 m. S.E. of Florence by rail. Pop. (1901) town, 16,780; commune, 46,926. It is an attractive town, situated on the slope of a hill 840 to 970 ft. above sea-level, in a fertile district. The walls by which it is surrounded were erected in 1320 by Guido Tarlati di Pietramala, its warlike bishop, who died in 1327, and is buried in the cathedral; they were reconstructed by Cosimo I. de' Medici between 1541 and 1568, on which occasion the bronze statues of Pallas and the Chimaera, now at Florence, were discovered. The town itself is fan-shaped, the streets, which contain some fine old houses with projecting eaves and many towers, radiating from the citadel (Eortezza), which was constructed in 1502, and dismantled by the French in 1800. The cathedral, close by, is a fine specimen of Italian Gothic begun in 1277, but not completed internally until 1511, while the facade was not begun until 1 880. The interior is spacious and contains some fine 14th-century sculptures, those

of the high altar, which contains the tomb of St Donatus, the patron saint of Arezzo, being the best; very good stained-glass windows of the beginning of the 16th century by Guillaume de Marcillat, and some terra-cotta reliefs by Andrea della Robbia. Arjother fine church is S. Maria della Pieve, having a campanile and a facade of 1216, the latter with three open colonnades running for its whole length above the doors. The interior was restored to its original style in 1863-1865. The Romanesque choir and apse belong to the nth century, the rest of the interior is con- temporary with the facade. In the square behind the church is a colonnade designed by Vasari. In the cloisters of S. Bernardo, on the site of the ancient amphitheatre, is a remarkable view of medieval Rome. S. Francesco contains famous frescoes by Piero de' Franceschi, representing scenes from the legend of the Holy Cross, and others by Spinello Aretino, a pupil of Giotto. There are several other frescoes by the latter in S. Domenico. Among the Renaissance buildings the churches of S. Maria delle Grazie and the Santissima Annunziata may be noted. The collection of majolica in the municipal museum is very fine, and so is that of the Funghini family. In the middle ages Arezzo was generally on the Ghibelline side; it succumbed to Florence in 1289 at the battle of Campaldino, but at the end of the century recovered its strength under the Tarlati family. In 1336 it became subject to Florence for six years, and after intestine struggles, finally came under her rule in 1384. Among the natives of Arezzo the most famous are the Benedictine monk Guido of Arezzo, the inventor

of the modem system of musical notation (died c. 1050), the poet Petrarch, Pietro Aretino, the satirist (1492-1556), and Vasari, famous for his lives of Italian painters. The town never possessed a distinct school of artists.

See C. Signorini, Arezzo, Cittd.yProvin.cia, Guida illustrate (Arezzo, 1904). (T. As,)

ARGALI, the Tatar name of the great wild sheep, Ovis ammon, of the Altai and other parts of Siberia. Standing as high as a large donkey, the argali is the finest of all the wild sheep, the horns of the rams, although of inferior length, being more massive than those of Ovis poll of the Pamirs. There are several local races of argali, among which O. ammon hodgsoni of Ladak and Tibet is one of the best known. There are likewise several nearly related central Asian species, such as O. sairensis and 0. lUtledalei. (See Sheep.)

ARGAO, a town on the east coast of Cebu, Philippine Islands, 36 m.

S.S.W. of the town of Cebu. Pop. (1903) 35,448. Large quantities of a superior quality of cacao are produced in the vicinity, and rice and Indian corn are other important products. A limited amount of cotton is raised and woven into cloth. The language is Cebu-Visayan. Argao was founded in 1608. ,

ARGAUM, a village of British India in the Akola district of the Central Provinces, 32 m. north of Akola. The village is mem- orable for an action which took place on the 28th of November 1803 between the British army, commanded by Major-General Wellesley (afterwards duke of Wellington), and the Mahrattas under Sindhia and the raja of Berar, in which the latter were defeated with great loss. A medal struck in England in 1851 commemorates the victory.

ARGEI, the name given by the ancient Romans to a number of rush puppets (24 or 27 according to the reading of Varro, de Ling, lat. vii. 44, or 30 according to Dionysius i. 38) resembling men tied hand and foot, which were taken down to the ancient bridge over the Tiber {pons sublicius) on the 14th of May by the ponti- fices and magistrates, with the flaminica Dialis in mourning guise, and there thrown into the Tiber by the Vestal virgins. There were also in various parts of the four Servian regions of the city anumberof sacella Argeorum (chapels), round whicha procession seems to have gone on the 17th of, March (Varro, L.L. v. 46-54; Jordan, Rom. Topogr. vol. ii. 603), and it has been conjectured that the puppets were kept in these chapels until the time came for them to be cast into the river. The Romans had no historical explanation of these curious rites, and neither the theories of their scholars nor the beliefs of the common people, who fancied that the puppets were substitutes for old men who used at one time to be sacrificed to the river, are worth serious consideration. Recently two explanations have been given: (1) that of W. Mannhardt, who by comparing numerous examples of similar customs among other European peoples arrived at the con- clusion that the rite was of extreme antiquity and of dramatic rather than sacrificial character, and that its object was possibly to procure rain; (2) that of Wissowa, who refuses to date it farther back than the latter half of the 3rd century B.C., and sees in it the yearly representation of an original sacrifice of twenty- seven captive Greeks (taking Argei as a Latin form of ‘ Apyeioi) by drowning in the Tiber. This second theory is, however, not borne out by any Roman historical record.

See Wissowa’s arguments in the article ” Argei ” in his edition of Pauly’s Realencyclopadie. For the other view see W. Mannhardt, Antike Wald und Feldkulte, 178 foil.; W. W. Fowler, Roman Festi- vals, pp. in foil. (W. W. F.)*

ARGELANDER, FRIEDRICH WILHELM AUGUST (1799- 1875), German

astronomer, was born at Memel on the 22nd of March 1709. He studied at the university of Konigsberg, and was attracted to astronomy by F. W. Bessel, whose assistant he became (October 1, 1820). His treatise on the path of the great comet of 181 1 appeared in 1822; he was, in 1823, entrusted with the direction of the observatory at Abo; and he exchanged it for a similar charge at Helsingfors in 1832. His admirable investigation of the sun's motion in space was published in 1837; and in the same year he was appointed professor of astronomy in the university of Bonn, where he died on the 17th of February 1875. He also published Observations Astrono-

micae Aboae Factae (3 vols., 1830-1832); DLX Slettarum Fixarum Positiones Mediae (1835); and the first seven volumes of Astronomische Beobachtungen auf der Sternwarte zu Bonn (1 846-1869) , containing his observations of northern and southern star-zones, and his great Durchmusterung (vols, iii.v., 1859 1862) of 324,198 stars, from the north pole to -z" Dec. The corresponding atlas was issued in 1863. His observations (begun in 1838) and discussions of variable stars were embodied in vol. vii. of the same series.

See E. Schonfeld in Vierteljahrsschrift der Astronomischen Gesell- schaft, x. pp. 150-178.

ARGENS, JEAN BAPTISTE DE BOYER, Marquis d' (1704-1771), was born at Aix in Provence on the 24th of June 1704. He entered the army at the age of fifteen, and after a dissipated and adventurous youth settled for a time at Amster- dam, where he wrote some historical compilations and began his more famous Lettres juives (The Hague, 6 vols., 1738-1742), Lettres chinoises (The Hague, 6 vols., 1739-1472), and Lettres cabalistiques (2nd ed., 7 vols., 1769); also the Memoires secrets de la ripublique des lettres (7 vols., 1 743-1478), afterwards revised and augmented as Histoire de V esprit humam (Berlin, 14 vols., 1765-1768). He was invited by Prince Frederick (afterwards Frederick the Great) to Potsdam, and received high honours at court; but Frederick was bitterly offended by his marrying a Berlin actress, Mile Cochois. Argens returned to France in 1769, and died near Toulon on the nth of January 1771.

ARGENSOLA, LUPERCIO LEONARDO DE (1559-1613), Spanish dramatist and poet, was baptized at Barbastro on the 14th of December 1559. He was educated at the universities of Huesca and Saragossa, becoming secretary to the duke de Villahermosa in 1585. He was appointed historiographer of Aragon in 1599, and in 1610 accompanied the count de Lemos to Naples, where he died in March 1613. His tragedies — Filis, Isabela and Alejandra-~a.re said by Cervantes to have "filled all who heard them with admiration, delight and interest "; Filis is lost, and Isabela

and Alejandro, which were not printed till 1772, are ponderous imitations of Seneca. Argensola's poems were published with those of his brother in 1634; they consist of excellent translations from the Latin poets, and of original satires. His " echoing sonnets "- — such as Despues que al mundo el rey dvoino vino — lend themselves to parody; but his diction is singularly pure.

His brother, Bartolome Leonardo de Argensola (1562- 1631), Spanish poet and historian, was baptized at Barbastro on the 26th of August 1562, studied at Huesca, took orders, and was presented to the rectory of Villahermosa in 1588. He was attached to the suite of the count de Lemos, viceroy of Naples, in 1610, and succeeded his brother as historiographer of Aragon in 1613. He died at Saragossa on the 4th of February 1631. His principal prose works are the Conquista de las Islas Molucas (1609), and a supplement to Zurita's Anales de AfagOn, which was published in 1630. His poems (1634), like those dfhis elder brother, are admirably finished examples of pungent wit. His commentaries on contemporary events, and his Alteraciones popular es, dealing with a Saragossa rising in 1591, are lost. An interesting life of this writer by Father Miguel Mir precedes a reprint of the Conquista de'las Islas Molucas, issued at Saragossa in 1891.

ARGENSON, the name, derived from an old hamlet situated in what is now the department of Indre-et-Loire, of a French family which produced some prominent statesmen, soldiers and men of letters.

Rene de Voyer, seigneur d'Argenson (1596-1651), French statesman, was born on the 21st of November 1596. He was a lawyer by profession, and became successively avocat, councillor at the parlement of Paris, mattre des requites, and councillor of state. Cardinal Richelieu entrusted him with several missions as inspector and intendant of the forces. In 1623 he was appointed intendant of justice, police and finance in Auvergne, and in 1632 held similar office in Limousin, where he remained till 1637. After the death of Louis XIII. (1643) he retained his administrative posts, was intendant of the forces at Toulon

(1646), commissary of the king at the estates of Languedoc (1647), and intendant of Guienne (1648), and showed great capacity in defending the authority of the crown against the rebels of the Fronde. After his wife's death he took orders (February 1651), but did not cease to take part in affairs of state. In 1651 he was appointed by Mazarin ambassador at Venice, where he died on the 14th of July 165 1.

His son, Marc Rene de Voyer, comte d'Argenson (1623- 1700), was born at Blois on the 13th of December 1623. He also was a lawyer, being councillor at the parlement of Rouen (1642) and maitre des requites. He attended his father in all his duties and succeeded him at the embassy at Venice. In 1655 he returned from his embassy, ruined, and lost favour with Mazarin, who removed him from his office of councillor of state. He then gave up public affairs and retired to his estates, where he occupied himself with good works. In September 1656 he entered the Company of the Holy Sacrament, a secret society for the diffusion of the Catholic religion. Besides writing the Annals of the society, he composed many pious works, which were destroyed in the fire at the Louvre in 187 1. Some of his correspondence with the once famous letter- writer, Jean Louis Guez de Balzac (1597-1654), has been published. He died in May 1700, leaving two sons, Marc Rene (see below), and Francois Elie(i656-i728), who became archbishop of Bordeaux.

See Fr. Rabbe, " Compagnie du Saint-Sacrement," in the Revue historique (Nov. 1899); Beauchet-Filleau, Les Annates de la com- pagnie du Saint-Sacrement (Paris, 1900) ; R. Allier, La Cabale des devots (Paris, 1902).

Marc Rene de Voyer, marquis de Paulmy and marquis d'Argenson' (1652-1721), son of the preceding, was born at Venice on the 4th of November 1652. He became avocat in 1669, and lieutenant-general in the sinichaussee of Angouleme (1679). After the death of Colbert, who disliked his family, he went to Paris and married Marguerite Lefevre de Caumartin, a kins- woman of the comptroller-general Pontchartrain. This was the beginning of his fortunes. He became successively maitre des requites (1694), member of the conseil des prises (prize court) (I 695), procureur-gtntral of the commission of inquest into false titles of nobility (1696), and finally lieutenant-general of police (1697). This last office, whith had previously been filled by N. G. de la Reynie, was very important. It not only gave him the control of the police, but also the supervision of the corporations, printing press, and provisioning of Paris. All contraventions of the police regulations came under his jurisdiction, and his authority was arbitrary and absolute. Fortunately, he had, in Saint-Simon's phrase, "a nice discernment as to the degree of rigour or leniency required for every case that came before him, being ever inclined to the mildest measures, but possessed of the faculty of making the most innocent tremble before him; courageous, bold, audacious in quelling ententes, and consequently the master of the people." During the twenty-one years that he exercised this office he was a party to every private and state secret; in fact, he had a share in every event of any importance in the history of Paris. He was the familiar friend of the king, who delighted in scandalous police reports; he was patronized by the duke of Orleans; he was supported by the Jesuits at court; and he was feared by all. He organized the supply of food in Paris

during the severe winter of 1709, apd endeavoured, but with little success, to run to earth the libellers of the government. He directed the destruc- tion of the Jansenist monastery of Port Royal (1709), a pro- ceeding which provoked many protests and pamphlets. Under the regency, the Chambre de Justice, assembled to inquire into the malpractices of the financiers, suspected d'Argenson and arrested his clerks, but dared not lay the blame on him. On the 28th of January 17 18 he voluntarily resigned the office of lieutenant-general of police for those of keeper of the seals — in the place of the chancellor d'Aguesseau — and president of the council of finance. He was appointed by the regent to suppress the resistance of the parlements and to reorganize the finances, and was in great measure responsible for permitting John Law to apply his financial system, though he soon quarrelled

with Law and intrigued to bring about his downfall. The regent threw the blame for the outcome of Law's schemes on d'Argenson, who was forced to resign his position in the council of finance (January 1720). By way of compensation he was created inspector-general of the police of the whole kingdom, but had to resign his office of keeper of the seals (June 1720). He died on the 8th of May 1721, the people of Paris throwing taunts and stones at his coffin and accusing him of having ruined the kingdom. In 1 7 16 he had been created an honorary member of theAcademie des Sciences and, in 1 7 1 8, a member of the French Academy.

See the contemporary memoirs, especially those of Saint-Simon (de Boislisle's ed.), Dangeau and Math. Marais; Barbier's Journal; " Correspondance administrative sous Louis XIV." in Coll. des doc. ined. sur I'histoire de France, edited by G. B. Depping (1850-1855); Correspondance des controleurs-generaux des finances, pub. by de Bois- lisle (1873-1900) ; Correspondance de M. de Marville avec M. de Maurepas (1896-1897); Rapports de police de Rene d'Argenson, pub. by P. Cottin (Paris, undated) ; P. Clement, La police sous Louis XIV. (1873).

Rene Louis de Voyer de Paulmy, marquis d'Argenson (1694-17 57), eldest son of the preceding, was a lawyer, and held successively the posts of councillor at the parlement (17 16), mattredes requites (17 18), councillor of state (1719), and intendant of justice, police and finance in Hainaut. During his five years' tenure of the last office he was mainly employed in provisioning the troops, who were suffering from the economic confusion resulting from Law's system. He returned to court in 1724 to exercise his functions as councillor of state. At that time he had the reputation of being a conscientious man, but ill adapted to intrigue, and was nicknamed " la b6te." He entered into relations with the philosophers, and was won over to the ideas of reform. He was the friend of Voltaire, who had been a fellow-student of his at the Jesuit college Louis-le-grand, and frequented the Club

de l'Entresol, the history of which he wrote in his memoirs. It was then that he prepared his Considirations sur le gouvernement de la France, which was published posthu- mously by his son. He was also the friend and counsellor of the minister G. L. de Chauvelin. In May 1 744 he was appointed member of the council of finance, and in November of the same year the king chose him as secretary of state for foreign affairs, his brother, the comte d'Argenson (see below), being at the same time secretary of state for war. France was at that time engaged in the War of the Austrian Succession, and the government had been placed by Louis XV. virtually in the hands of the two brothers. The marquis d'Argenson endeavoured to reform the system of international relations. He dreamed of a " European Republic," and wished to establish arbitration between nations in pursuance of the ideas of his friend the abbe de Saint-Pierre. But he failed to realize any part of his projects. The generals negotiated in opposition to his instructions; his colleagues laid the blame on him; the intrigues of the courtiers passed unnoticed by him; whilst the secret diplomacy of the king neutralized his initiative. He concluded the marriage of the dauphin to the daughter of Augustus III., king of Poland, but was unable to prevent the election of the grand-duke of Tuscany as emperor in 1745. On the 10th of January 1747 the king thanked him for his services. He then retired into private life, eschewed the court, associated with Voltaire, Condillac and d'Alembert, and spent his declining years in working at the Academie des Inscriptions, of which he was appointed president by the king in 1747, and revising his Mimoires. Voltaire, in one of his letters, declared him to be " the best citizen that had ever tasted the ministry." He died on the 26th of January 1757.

He left a large number of manuscript works, of which his son, Antoine Rene (1722-1787), known as the marquis de Paulmy, published the Considerations sur le gouvernement de France (Amsterdam, 1764) and Essais dans le gout de ceux de Montaigne (ib. 1785). The latter, which contains many useful biographical notes and portraits of his contemporaries, was republished in 1787 a.sLoisirs d'un ministre d'ttat. Argenson's most important work, however, is his Mtmoires, covering in great detail the years 1725 to 1756, with an introductory part giving his recollec- tions since the year 1696. They are, as they were intended to be,

valuable " materials for the history of his time." There are two important editions, the first, with some letters, not elsewhere published, by the marquis d'Argenson, his great-grand-nephew (5 vols., Paris, 1S57 et seq.); the second, more correct, but less complete, published by J. B. Rathery, for

the Societe de l'Histoire de France (9 vols., Paris, 1859 et seq.). The other works of the marquis d'Argenson, in MS., were destroyed in the fire at the Louvre library in 187 1.

See Sainte-Beuve, Causeries du lundi (vols. xii. and xiv.) ; Le- vasseur. " Le Marquis dArgenson " in the Memoires de V Academie des Sciences Morales et Politiques (vol. lxxxvii., 1868) ; and, especially, E. Zevort, Le Marquis d' Argenson et le ministere des affaires etrangeres (Paris, 1880). See also G. de R. de Flassan, Ilistoire de la diplomatic francaise (2nd ed., 181 1) ; Voltaire, Siecle de Louis XV.; E. Boutaric, Correspondance secrete inedite de Louis XV. (1866); E. Champion, " Le Marquis d'Argenson," in the Revolution francaise (vol. xxxvi., 1899); A. Alem, D'Argenson economiste (Paris, 1899); Arthur Ogle, The Marquis d'Argenson (1893).

Marc Pierre de Voyer de Paulmy, comte d'Argenson (1696-1764), younger brother of the preceding, was born on the 1 6th of August 1696. Following the family tradition he studied law and was councillor at the parlement of Paris. He suc- ceeded his father as lieutenant-general of police in Paris, but held the post only five months (January 26 to June 30, 1720). He then received the office of intendant of Tours, and resumed the lieutenancy of police in 1722. On the 2nd of January 1724 he was appointed councillor of state. He gained the confidence of the regent Orleans, administering his fortune and living with his son till 1737. During this period he opened his salon to the philosophers Chaulieu, la Fare and Voltaire, and collaborated in the legislative labours of the chancellor d'Aguesseau. In March 1737 d'Argenson was appointed director of the censorship of books, in which post he showed sufficiently liberal views to gain the approval of writers — a rare thing in the reign of Louis XV. He only retained this post for a year. He became president of the grand council (November 1738), intendant of the gSniralite of Paris (August 1740), was admitted to the king's council (August 1742), and in January 1743 was appointed secretary of state for war in succession to the baron de Breteuil. As minister for war he had a heavy task; the French armies engaged in the War of the Austrian Succession were disorganized, and the retreat from Prague had produced a disastrous effect. After consulting with Marshal Saxe, he began the reform of the new armies. To assist recruiting, he revived the old institution of local militias, which, however, did not come up to his expecta- tion. In the spring of 1744 three armies were able to resume the offensive in the Netherlands, Germany and Italy, and in the following year France won the battle of Fontenoy, at which d'Argenson was present. After the peace in 1748 he occupied himself with the important work of recasting the French army on the model of the Prussian. He unified the types of cannon, grouped the grenadiers into separate regiments, and founded the Ecole Militaire for the training of officers (1751). An edict of the 1st of November 1751 granted patents of nobility to all who had the rank of

general officer. In addition to his duties as minister of war he had the supervision of the printing, postal administration and general administration of Paris. He was responsible for the arrangement of the promenade of the Champs Elysees and for the plan of the present Place de la Concorde. He was exceedingly popular, and, although the court favourites hated him, he had the support of the king. Nevertheless, after the attempt of R. F. Damiens to assassinate the king, Louis abandoned d'Argenson to the machinations of the court favourites and dismissed both him and his colleague, J. B. de Machault d'Arnouville (February 1757). D'Argenson was exiled to his estates at Les Ormes near Saumur, but he had previously found posts for his brother, the marquis d'Argenson, as minister of foreign affairs, for his son Marc Rene as master of the horse, and for his nephew Marc Antoine Rene as commissary of war. From the time of his exile he lived in the society of savants and philosophers. He had been elected member of the Academie des Inscriptions in 1749. Diderot and d'Alembert dedicated the Encyclopedic to him, and Voltaire, C. J. F. Henault, and J. F Marmcntel openly visited him in his exile. After the

death of Madame de Pompadour he obtained permission to return to Paris, and died a few days after his return, on the 22nd of August 1764.

Marc Antoine Rene de Voyer, marquis de Paulmy d'Argenson (1722-1787), nephew of the preceding and son of Rene Louis, was born at Valenciennes on the 22nd of November 1722. Appointed councillor at the parlement (1744), and matlre des requeies (1747), he was associated with his father in the ministry of foreign affairs and with his uncle in the ministry of war, and, in recognition of this experience, was commissioned to inspect the troops and fortifications and sent on embassy to Switzerland (1748). In 1751 his uncle recognized him as his deputy and made over to him the reversion of the secretariate of war. He then worked on the great reform of the army, and after the dismissal of his uncle became minister of war (February 1757). But the outbreak of the Seven Years' War made this post exceedingly difficult to hold, and he resigned on the 23 rd of March 1758. He was ambassador to Poland from 1762 to 1764, but failed to procure the nomination of the French candidate to that throne. From 1766 to 1770 he was ambassador at Venice. Failing to obtain the embassy at Rome, he retired at the age of forty-eight and devoted the rest of his life to indulging his tastes for history and biography. He brought together a large library, very rich in French poetry and romance, and undertook various publications with the help of his librarian. In 1775 he began his Bibliotheque universelle des romans, of which forty volumes appeared within three years, but subsequently handed over the publication to other editors. His great work, Melanges tire's d'une grande bibliotheque, was published in 65 volumes (Paris, 1 779-1 788). At his death he forbade his library to be dispersed: it was bought by the comte d'Artois (afterwards

Charles X.) and formed the nucleus of the present Bibliotheque de l'Arsenal at Paris (the marquis having been governor of the arsenal). He died on the 13th of August 1787.

See contemporary memoirs; also Dacier's eulogium in the Academie des Inscriptions et Belles-Lettres (November 1788); and Sainte-Beuve, Causeries du lundi (vol. xii.).

Marc Rene, marquis de Voyer de Paulmy d'Argenson (1721-1782), known as the marquis de Voyer, son of Marc Pierre de Voyer, the minister of war, was born in Paris on the 20th of September 1721. He served in the army of Italy and the army of Flanders in the War of the Austrian Succession, arid was mestre de camp (proprietary colonel) of the regiment of Berry cavalry at the battle of Fontenoy (May 10, 1745), where he was promoted brigadier. He was associated with his father in his work of reorganizing the army, was made inspector of cavalry and dragoons (1749), and succeeded his father as master of the horse (1752). He introduced English horses into France. He was lieutenant-general of Upper Alsace in 1753 and governor of Vincennes in 1754, and served afterwards under Soubise in the Seven Years' War. He was wounded at Crefeld in 1758, and was promoted lieutenant-general (1 759). He followed his father into exile at Les Ormes (1763), and in the last years of the reign of Louis XV. sided with the malcontents headed by Choiseul; but on the rupture with England he rejoined the service of the king (1775). He was appointed inspector of the sea-board, and put the roadstead of the island of Aix in a state of defence during the American War of Independence. He caught marsh-fever while attempting to drain the marshes of Rochefort, and died at Les Ormes on the 18th of September 1782.

Marc Rene Marie de Voyer de Paulmy, marquis d'Argen- son (1771-1842), son of the preceding, was born in Paris in September 1771. He was brought up by his father's cousin, the marquis de Paulmy, governor of the arsenal, and was made lieutenant of dragoons in 1 789. Although, at the age of eighteen, he had succeeded to several estates and a large fortune, he em- braced the revolutionary cause, joining the army of the North as Lafayette's aide-de-camp and remaining with it even after Lafayette's defection. Leaving France to take one of his sisters to England, he was denounced on his return as a royalist con- spirator, on the charge of having in his possession portraits of the royal family. He then went to live in Touraine, married

the widow of Prince Victor de Broglie, and saved her and her children from proscription. He introduced new agricultural instruments and processes on his estates, and installed machinery imported from England in his ironworks in Alsace. He was an enthusiastic adherent of Napoleon, by whom he was appointed in May 1809 prefect of Deux-N£thes. He helped to repel the English invasion of the islands of South Beveland and Walcheren (August 1809), and afterwards directed the defence works of Antwerp, but resigned this post (March 1813) in consequence of the complaints of the inhabitants and the exacting demands of the emperor. In May 1814 he refused the prefecture of Marseilles offered to him by the Bourbons, but was elected deputy from Belfort in 181 5 during the Hundred Days. On the 5th of July 1815 he took part in the declaration protesting against any tampering with the immutable rights of the nation. He was a member of the Chambre introwiable, where he became one of the orators of the democratic party. He was one of the founders of the journal Le censeur europien and of the Club de la liberie de la presse, and was an uncompromising opponent of reaction. Not re-elected in 1824 on account of his liberal ideas, he returned to the chamber under the Martignac ministry (1828), and resolutely persisted in his championship of the liberty of the press and of public worship. On the death of his wife he voluntarily renounced his mandate (July 1829), and hailed the revolution of 1830 with great satisfaction. On the 3rd of November 1830 he was elected to the chamber as deputy from Chatellerault, and took the oath, adding, however, the reservation " subject to the progress of the public reason." His independent attitude resulted in his defeat in the following year at the Chatellerault election, but he was returned for Strassburg. He wished the incidence of the taxes to be arranged according to social condition, and advocated a single tax pro- portionate to income like the English income tax. He harped incessantly on this idea in his speeches and articles (see his letters in La Tribune of June 20, 1832). Although he was a proprietor of ironworks he opposed the protectionist laws, which he con- sidered injurious to the workmen. He became the mouthpiece of the advanced ideas; subsidized the opposition newspapers, especially the National; received into his house F. M. Buonar- roti, who in 1796 had been implicated in the conspiracy of "Gracchus" Babeuf (?.».); and became a member of the committee of the Society of the Rights of Man. He was even sued in the courts for a pamphlet called Boutade d'un hemme riche A sentiments populaires, and delivered a speech to the jury in which he displayed very daring social theories. But he gradually grew discouraged and retired from public affairs, refusing even municipal office, and living in seclusion at La Grange in the forest of Guerche, where he devoted his inventive faculty to devising agricultural improvements. He subsequently returned to Paris, where he died on the 1st of August 1842.

Charles Marc Rene de Voyer, marquis d'Argenson (1 796-1862), son of the preceding, was born at Boulogne-sur- Spine on the 20th of April 1796. He concerned himself little with politics. He was, however, a member of the council- general of Vienne for six years, but was expelled from it in 1840 in consequence of his advanced ideas and his relations with the Opposition. In 1848 he was elected deputy from Vienne to the Constituent Assembly by 12,000 votes. He was an active member of the Archaeological Society of Touraine and the Society of Antiquaries of the West, and wrote learned works for these bodies. He collaborated in preparing the archives of the scientific congress at Tours in 1847; brought out two editions of the MSS. of his great-grand-uncle, the minister of foreign affairs under Louis XV., under the title Mimoires du marquis d'Argenson, one in 1825, and the other, in 5 vols., in 1857- 1858; and published Discours et opinions de mon pere, M. Voyer d'Argenson (2 vols., 1845). He died on the 31st of Juy 1862.

ARGENTAN, a town of north-western France, capital of an arrondissement in the department of Orne, 27 m. N.N.W. of Alencon on the railway from Le Mans to Caen. Pop. (1906) 507 2. It is situated on the slope of a hill on the right bank of the Orne at its confluence with the Ure. The town has remains of

old fortifications, among them the Tour Marguerite, and a chateau, now used as a law-court, dating from the 15th century. The church of St Germain (15th, 16th and 17th centuries) has several features of architectural beauty, notably the sculptured northern portal, and the central and western towers. The church of St Martin, dating from the 15th century, has good stained glass. The handsome modern town-hall contains among other institutions the tribunal of commerce, the museum and the library. Argentan is the seat of a sub-prefect, has a tribunal of first instance and a communal college. Leather-working and the manufacture of stained glass are leading industries. There are quarries of limestone in the vicinity. Argentan was a viscounty from the nth century onwards; it was often taken and pillaged. During the Religious Wars it remained attached to the Catholic party. Frangois Eudes de Mezeray, the historian, was born near the town, and a monument has been erected to his memory.

ARGENTEUIL, a town of northern France in the department of Seine-et-Oise, on the Seine, 5 m. N.W. of the fortifications of Paris by the railway from Paris to Mantes. Pop. (1906) 17,330. Argenteuil grew up round a monastery, which, dating from a.d. 656, was by Charlemagne changed into a nunnery; it was afterwards famous for its connexion with Heloise (see Abelard), and on her expulsion in n 29 was again turned into a monastery. Asparagus, figs, and wine of medium quality are grown in the district; and heavy iron goods, chemical products, clocks and plaster are among the

manufactures.

ARGENTINA, or the Argentine Republic (officially, Re- publica Argentina) , a country occupying the greater part of the southern extremity of South America. It is of wedge shape, extending from 21 55′ S. to the most southerly point of the island of Tierra del Fuego in 55 2′ 30″ S., while its extremes of longitude are 53 40′ on the Brazilian frontier and 73° 17′ 30″ W. on the Chilean frontier. Its length from north to south is 2285 statute miles, and its greatest width about 930 m. It is the second largest political division of the continent, having an area of 1,083,596 sq. m. (Gotha measurement). It is bounded N. by Bolivia and Paraguay, E. by Paraguay, Brazil, Uruguay and the Atlantic, W. by Chile, and S. by the converging lines of the Atlantic and Chile.

Boundaries. — At different times Argentina has been engaged in disputes over boundary lines with every one of her neighbours, that with Chile being only settled in 1902. Beginning at the estuary of the Rio de la Plata, the boundary line ascends the Uruguay river, on the eastern side of the strategically important island of Martin Garcia, to the mouth of the. Pequiry, thence under the award of President Grover Cleveland in 1894 up that small river to its source and in a direct line to the source of the Santo Antonio, a small tributary of the Iguassu, thence down the Santo Antonio and Iguassu to the upper Parana, which forms the southern boundary of Paraguay. From the confluence of the upper Parana and Paraguay the line ascends the latter to the mouth of the Pilcomayo, which river, under the award of Presi- dent R. B. Hayes in 1878, forms the boundary between Argentina and Paraguay from the Paraguay river north-west to the Bolivian frontier. In accordance with the Argentine-Bolivian treaty of 1889 the boundary line between these republics con- tinues up the Pilcomayo to the 22nd parallel, thence west to the Tarija river, which it follows down to the Bermejo, thence up the latter to its source, and westerly through the Quiaca ravine and across to a point on the San Juan river opposite Esmoraca. From this point it ascends the San Juan south and west to the Cerro de Granadas, and thence south-west to Cerro Incahuasi and Cerro Zapalegui on the Chilean frontier. The boundary with Chile, extending across more than 32 lat, had been the cause of disputes for many years, which at times led /to costly preparations for war. The debts of the two nations resulted largely from this one cause. In 1881 a treaty was signed which provided that the boundary line should follow the highest crests of the Andes forming the watershed as far south as the 52nd parallel, thence east to the 70th meridian and south-east to Cape Dungeness at the eastern entrance to the Straits of Magellan. Crossing the Straits the line should follow

the meridian of 68° 44', south to Beagle Channel, and thence east to the Atlantic, giving Argentina the eastern part of the Tierra del Fuego and Staten Island. By this agreement Argentina was confirmed in the possession of the greater part of Patagonia, while Chile gained control of the Straits of Magellan, much adjacent territory on the north, the larger part of Tierra del Fuego and all the neighbouring islands south and west.

When the attempt was made to mark this boundary the commissioners were unable to agree on a line across the Puna de Atacama in the north, where parallel ranges enclosing a high arid plateau without any clearly defined drainage to the Atlantic or Pacific, gave an opportunity for conflicting claims. In the south the broken character of the Cordillera, pierced in places by large rivers flowing into the Pacific and having their upper drainage basins on the eastern side of the line of highest crests, gave rise to unforeseen and very difficult questions. Finally, under a convention of the 17th of April 1896, these conflicting claims were submitted to arbitration. In 1899 a mixed commission with Hon. W. I. Buchanan, United States minister at Buenos Aires, serving as arbitrator, reached a decision on the Atacama line north of 26 52′ 45″ S. lat., which was a compromise though it gave the greater part of the territory to Argentina. The line starts at the intersection of the 23rd parallel with the 67th meridian and runs south-westerly and southerly to the mountain and volcano summits of Rincon, Socompa, Llullaillaco, Azufre, Aguas Blancas and Sierra Nevada, thence to the initial point of the British award. (See Geogr. Jour., 1899, xiv. 322-323.) The line south of 26 5 2′ 45″ S. lat. had been located by the commissioners of the two republics with the exception of four sections. These were referred to the arbitration of Queen Victoria, and, after a careful survey under the direction of Sir Thomas H. Holdich, the award was rendered by King Edward VII. in 1902. {See Geogr. Jour., 1903, xxi. 45-50.) In the first section the line starts from a pillar erected in the San Francisco pass, about 26 50′ S. lat., and follows the water-parting south- ward to the highest peak of the Tres Cruces mountains in J7 o'45"S.lat.,68°49′5″W.long. In the second, the line runs from 40 2′ S. lat., 71 40′ 36″ W. long., along the wdter-parting to the southern termination of the Cerro Perihueico in the valley of the Huahum river, thence across that river, 71 40′ 36″ W. long., and along the water-parting around the upper basin of the Huahum to a junction with the line previously determined. In the third and longest section, the line starts from a pillar erected in the Perez Rosales pass, near Lake Nahuel-Huapi, and follows the water-parting southward to the highest point of Mt. Tronador, and thence in a very tortuous course along local water-partings and across the Chilean rivers Manso, Puelo, Fetaleufu, Palena, Pico and Aisen, and the lakes Buenos Aires, Pueyrred6n and San Martin, to avoid the inclusion

of Argentine settlements within Chilean territory, to the Cerro Fitzroy and continental water- parting north-west of Lake Viedma, between 49 and 50 S. lat. The northern half of this line does not run far from the 72nd meridian, except in 44 30′ S. where it turns eastward nearly a degree to include the upper valley of the Frias river in Chilean territory, but south of the 49th parallel it curves westward to give Argentina sole possession of lakes Viedma and Argentino. The fourth section, which was made particularly difficult of solution by the extension inland of the Pacific coast inlets and sounds and by the Chilean colonies located there, was adjusted by running the line eastward from the point of divergence in 50 50′ S. lat. along the Sierra Baguales, thence south and south- east to the 52nd parallel, crossing several streams and following the crests of the Cerro Cazador. The Chilean settlement of Ultima Esperanza (Last Hope), over which there had been much controversy, remains under Chilean jurisdiction.

Physical Geography. — For purposes of surface description, Argen- tina may be divided primarily into three great divisions — the mountainous zone and tablelands of the west, extending the full length of the republic; the great plains of the east, extending from the Pilcomayo to the Rio Negro; and the desolate, arid steppes of Patagonia. The first covers from one-third to one-fourth of the width of the country between the Bolivian frontier and the Rio Negro, and comprises the elevated Cordilleras and their plateaus, with flanking ranges and spurs toward the east. In the extreme

north, extending southward from the great Bolivian highlands, there are several parallel ranges, the most prominent of which are : the Sierra de Santa Catalina, from which the detached Cachi, Gulumpaji and Famatina ranges project southward ; and the Sierra de Santa Victoria, south of which are the Zenta, Aconquija, Ambato and Ancaste ranges. These minor ranges, excepting the Zenta, are separated from the Andean masses by comparatively low depressions and are usually described as distinct ranges; topographically, how- ever, they seem to form a continuation of the ranges running south- ward from the Santa Victoria and forming the eastern rampart of the great central plateau of which the Puna de Atacama covers a large part. The elevated plateaus between these ranges are semi- arid and inhospitable, and are covered with extensive saline basins, which become lagoons in the wet season and morasses or dry salt- pans in the dry season. These saline basins extend down to the lower terraces of C6rdoba, Mendoza and La Pampa. Flanking this great widening of the Andes on the south-east are the three short parallel ranges of C6rdoba, belonging to another and older formation. North of them is the great saline depression, known as the " salinas grandes," 6^3 ft. above sea-level, where it is crossed by a railway; north-east is another extensive saline basin enclosing the " Mar Chiquita " (of Cordoba) and the morasses into which the waters of the

Rio Saladillo disappear ; and on the north are the more elevated plains, partly saline, of western Cordoba, which separate this isolated group of mountains from the Andean spurs of Rioia and San Luis. The eastern ranges parallel to the Andes are here broken into detached extensions and spurs, which soon disappear in the elevated western pampas, and the Andes contract south of Aconcagua to a single range, which descends gradually to the great plains of La Pampa and Neuquen. The lower terrace of this great mountainous region, with elevations ranging from 1000 to 1500 ft., is in reality the western margin of the great Argentine plain, and may be traced from Oran (1017 ft.) near the Bolivian frontier southward through Tucuman (1476 ft.), Frias (1 129 ft.), C6rdoba (1279 ft.), Rio Cuarto (1358 ft.), Paunero (1250 ft.), and thence westward and southward through still unsettled regions to the Rio Negro at the confluence of the Neuquen and Limay.

The Argentine part of the great La Plata plain extends from the Pilcomayo south to the Rio Negro, and from the lower terraces of the Andes eastward to the Uruguay and Atlantic. In the north the plain is known as the Gran Chaco, and includes the country between the Pilcomayo and Salado del Norte and an extensive depression immediately north of the latter river, believed to be the undisturbed bottom of the ancient Pampean sea. The northern part of the Gran Chaco is partly wooded and swampy, and as the slope eastward is very gentle and the rivers much obstructed by sand bars, floating trees and vegetation, large areas are regularly flooded during rainy seasons. South of the Bermejo the land is more elevated and drier, though large depressions covered with marshy lagoons are to be found, similar to those farther north. The forests here are heavier. Still farther south and south-west there are open grassy plains and large areas covered with salt-pans. The general elevation of the Chaco varies from 600 to 800 ft. above sea-level. The Argentine " mesopotamia," between the Parana and Uruguay rivers, belongs in great measure to this same region, being partly wooded, flat and swampy in the north (Corrientes), but higher and undulating in the south (Entre Rios). The Misiones territory of the extreme north-east belongs to the older highlands of Brazil, is densely wooded, and has ranges of hills sometimes rising to a height of 1000 to 1300 ft.

The remainder of the great Argentine plain is the treeless, grassy pampa _ (Quichua for " level spaces "), apparently a dead level, but in reality rising gradually from the Atlantic westward toward the Andes. Evidence of this is to be found in the altitudes of the stations on the Buenos Aires and Pacific railway running a littla north of west across the pampas to Mendoza. The average elevation of Buenos Aires is about 65 ft.; of Mercedes, 70 m. westward, 132 ft.; of Junin (160 m.), 267 ft.; and of Paunero (400 m.) it is 1250 ft., showing an average rise of about 3 ft. in a mile. The apparently uniform level of the pampas is much broken along its southern margin by

the Tandil and Ventana sierras, and by ranges of hills and low mountains in the southern and western parts of the territory of La Pampa. Extensive depressions also are found, some of which are subject to inundations, as along the lower Salado in Buenos Aires and along the lower courses of the Colorado and Negro. In the extreme west, which is as yet but slightly explored and settled, there is an extensive depressed area, largely saline in character, which drains into lakes and morasses, having no outlet to the ocean. The rainfall is under 6 in. annually, but the drainage from the eastern slopes of the Andes is large enough to meet the loss from evaporation and keep these inland lakes from drying up. At an early period this depressed area drained southward to the Colorado, and the bed of the old outlet can still be traced. The rivers belonging to this inland drainage system are the Vermejo, San Juan and Desaguadero, with their affluents, and their southward flow can be traced from about 28 ° S. lat. to the great lagoons and morasses between 36 and 37° S. lat. in the western'part of La Pampa territory. Some of the principal affluents are the Vinchina and Jachal, oj Zanjon, which flow into the Vermejo, the Patos, which flows into the San Juan, and the Mendoza, Tunuyan and Diamante which*

flow into the Desaguadero, all of these being Andean snow-fed rivers. The Desaguadero also receives the outflow of the Laguna Bebedero, an intensely saline lake of western San Luis. The lower course of the Desaguadero is known as the Salado because of the brackish character of its water. Another considerable river flowing into the same great morass is the Atuel, which rises in the Andes not far south of the Diamante. (A description of the Patagonian part of Argentina will be found under Patagonia.)

Rivers and Lakes. — The hydrography of Argentina is of the simplest character. The three great rivers that form the La Plata system — the Paraguay, Parana and Uruguay — have their sources in the highlands of Brazil and flow southward through a great continental depression, two of them forming eastern boundary lines, and one of them, the Parana, flowing across the eastern part of the republic. The northern part of Argentina, therefore, drains eastward from the mountains to these rivers, except where some great inland depression gives rise to a drainage having no outlet to the sea, and except, also, in the " mesopotamia " region, where small streams flow westward into the Parana and eastward into the Uruguay. The largest of the rivers through which Argentina drains into the Plata system are the Pilcomayo, which rises in Bolivia and flows south-east along the Argentine frontier for about 400 m. ; the Bermejo, which rises on the northern frontier and flows south-east into the Paraguay; and the Salado del Norte

(called Rio del Jura- mento in its upper course), which rises on the high mountain slopes of western Salta and flows south-east into the Parana. Another river of this class is the Carcarafial, about 300 m. long, formed by the confluence of the Tercero and Cuarto, whose sources are in the Sierra de Cordoba; it flows eastward across the pampas, and dis- charges into the Parana at Gaboto, about 40 m. above Rosario. Other small rivers rising in the Cordoba sierras are the Primero and Segundo, which flow into the lagoons of north-east Cordoba, and the Quinto, which flows south-easterly into the lagoons and morasses of southern Cordoba. The Lujan rises near Mercedes, province of Buenos Aires, is about 150 m. long, and flows north-easterly into the Parana delta. Many smaller streams discharge into the Paraguay and Parana from the west, some of them wholly dependent upon the rains, and drying up during long droughts. The Argentine " mesopotamia " is well watered by a large number of small streams flowing north and west into the Parana, and east into the Uruguay. The largest of these are the Corrientes, Feliciano and Gualeguay of the western slope, and the Aguapey and Mirifiay of the eastern. None of the tributaries of the La Plata system thus far mentioned is navigable except the lower Pilcomayo and Bermejo for a few miles. These Chaco rivers are obstructed by sand bars and snags, which could be removed only by an expenditure of money unwarranted by the present population and traffic. In the southern pampa region there are many small streams, flowing into the La Plata estuary and the Atlantic; most of these are unknown by name outside the republic. The largest and only important river is the Salado del Sua, which rises in the north-west corner of the province of Buenos Aires and flows south-east for a distance of 360 m. into the bay of Samborombon. On the southern margin of the pampas are the Colorado and Negro, both large, navigable rivers flowing entirely across the republic from the Andes to the Atlantic. Many of the rivers of Argentina, as implied by their names (Salado and Saladillo), are saline or brackish in character, and are of slight use in the pastoral and agricultural industries of the country. The lakes of Argentina are exceptionally numerous, although comparatively few are large enough to merit a name on the ordinary general map. They vary from shallow, saline lagoons in the north-western plateaus, to great, picturesque, snow-fed lakes in the Andean foothills of Patagonia. The province of Buenos Aires has more than 600 lakes, the great majority small, and some brackish. The La Pampa territory also is dotted with small lakes. The Bebedero, in San Luis, and Porongos, in C6rdoba, and others, are shallow, saline lakes which receive the drainage of a considerable area and have no outlet. The large saline Mar Chiquita, of Cordoba, is fed from the Sierra de C6rdoba and has no outlet. In the northern part of Corrientes there is a large area of swamps and shallow lagoons which are believed to be slowly drying up.

Harbours. — Although having a great extent of coast-line, Argen- tina has

but few really good harbours. The two most frequented by ocean-going vessels are Buenos Aires and Ensenada (La Plata), both of which have been constructed at great expense to overcome natural disadvantages. Perhaps the best natural harbour of the republic is that of Bahia Blanca, a large bay of good depth, sheltered by islands, and 534 m. by sea south of Buenos Aires; here the government is building a naval station and port called Puerto Militar or Puerto Belgrano, and little dredging is needed to render the harbour accessible to the largest ocean-going vessels. About 100 m. south of Bahia Blanca is the sheltered bay of San Bias, which may become of commercial importance, and between the 42nd and 43rd parallels are the land-locked bays of San Jose and Nueva (Golfo Nuevo) — the first as yet unused; on the latter is Puerto Madryn, 838 m. from Buenos Aires, the outlet for the Welsh colony of Chubut. Other small harbours on the lower Patagonian, coast are not prominent, owing to lack of population. An occasional Argentine steamer visits these ports in the interests of colonists. The be6t-known among them are Puerto Deseado

(Port Desire) at the mouth of the Deseado river (1253 m.), Santa Cruz, at the mouth of the Santa Cruz river (1481 m.), and Ushuaia, on Beagle Channel, Tierra del Fuego. North of Buenos Aires, on the Parana river, is the port of Rosario, the outlet for a rich agri- cultural district, ranking next to the federal capital in importance. Other river ports, of less importance, are Concordia on the Uruguay river, San Nicolas and Campana on the Parana river, Santa Fe on the Salado, a few miles from the Parana, the city of Parana on the Parana river, and Gualeguay on the Gualeguay river.

*Geology. — The Pampas of Argentina are generally covered by loess. The Cordillera, which bounds them on the west, is formed of folded beds, while the Sierras which rise in their midst, consist mainly of gneiss, granite and schist. In the western Sierras, which are more or less closely attached to the main chain of the Cordillera, Cambrian and Silurian fossils have been found at ceveral places. These older beds are overlaid, especially in the western part of the country, by a sandstone series which contains thin seams of coal and many remains of plants. At Bajo de Velis, in San Luis, the plants belong to the *' Glossopteris flora," which is so widely spread in South Africa, India and Australia, and the beds are correlated with the Karharbari series of India (Permian or Permo-Carboni- ferous). Elsewhere the plants generally indicate a higher horizon and are considered to correspond with the Rhaetic of Europe. Jurassic beds are known only in the Cordillera itself, and the Cre- taceous beds, which occur in the west of the country, are of freshwater origin. As far west, therefore, as the Cordillera, there is no evidence that any part of the region was ever beneath the sea in Mesozoic times, and the plant-remains indicate a land connexion with Africa. This view is supported by Neumayr's comparison of Jurassic faunas throughout the world. The Lower Tertiary consists largely of reddish*

sandstones resting upon the old rocks of the Cordillera and of the Sierras. Towards the east they lie at a lower level ; but in the Andes they reach a height of nearly 10,000 ft., and are strongly folded, showing that the elevation of the chain was not completed until after their deposition. The marine facies of the later Tertiaries is confined to the neighbourhood of the coast, and was probably formed after the elevation of the Andes; but inland, freshwater deposits of this period are met with, especially in Patagonia. Con- temporaneous volcanic rocks are associated with the Ordovician beds and with the Rhaetic sandstones in several places. During the Tertiary period the great volcanoes of the Andes were formed, and there were smaller eruptions in the Sierras. The principal rocks are andesites, but trachytes and basalts are also common. Great masses of granite, syenite and diorite were intruded at this period, and send tongues even into the andesitic tuffs.

Silver, gold, lead and copper ores occur in many localities. They are found chiefly in the neighbourhood of the eruptive masses of the hilly regions. (See also Andes.) 1

Climate. — The great extent of Argentina in latitude — about 33° — and its range in altitude from sea-level westward to the permanently snow-covered peaks of the Andes, give it a highly diversified climate, which is further modified by prevailing winds and mountain barriers. The temperature and rainfall are governed by conditions different from those in corresponding latitudes of the northern hemisphere. Southern Patagonia and Tierra del Fuego, for instance, although they correspond in latitude to Labrador, are made habitable and an excellent sheep-grazing country by the southerly equatorial current along the continental coast. The climate, however, is colder than the corresponding latitudes of western Europe, because of the pre- vailing westerly winds, chilled in crossing the Andes. In the extreme north-west an elevated region, whose aridity is caused by the " blanketing " influence of the eastern Andean ranges, extends southward to Mendoza. The northern part of the republic, east of the mountains, is subject to the oscillatory movements of the south-east trade winds, which cause a division of the year into wet and dry seasons. Farther south, in Patagonia, the prevailing wind is westerly, in which case the Andes again " blanket "an extensive region and deprive it of rain, turning it into an arid desolate steppe. Below this region, where the Andean barrier is low and broken, the moist westerly winds sweep over the land freely and give it a large rainfall, good pastures and a vigorous forest growth. If the republic be divided into sections by east and west lines, diversities of climate in the same latitude appear. In the extreme north a little over a degree and a half of territory lies within the torrid zone, extending from the Pilcomayo about 500 m. westward to the Chilean frontier; its eastern end is in the low, wooded plain of the Gran Chaco, where the mean annual temperature is

73 F., and the annual rainfall is 63 in.; but on the arid, elevated plateau at its western extremity the temperature falls below 57° F., and the rainfall has diminished to 2 in. The character of the soil changes from the alluvial lowlands of the Gran Chaco, covered with forests of palms and other tropical vegetation, to the sandy, saline wastes of the Puna de Atacama, almost barren of vegetation and overshadowed by permanently

1 For the geology of Argentina, see Stelzner, Beitrage zur geologie der argentinischen Republik (Cassel and Berlin, 1885); Brackebusch, Mapa geologico del Interiore de la Republica Argentina (Gotha, 1892) ; Valentin, Bosquejo geologico de la Argentina (Buenos Aires, 1897); Hauthal, " Beitrage zur Geologie der argentinischen Provinz Buenos Aires," Peterm. Mitt. vol. 1., 1904, pp. 83-92, 112-117, pi. vi.

t. Artigas

2. Salto

3. Rivera

4. Paysandu

5. Tacdaremfco

6. £10 tfegm

7. Duwtno

B. Gen-Q Largo 9, Treinta-y-Tre: ic. Soriano 1 j,, Flares

12. Florida.

13. Colonia

14. San i/ose

15. Montevideo

16. Caneiones

17. M'nas

18. Matdanado

19. Rochet

Longitude W. of Greenwich So 1*

snow-crowned peaks. Between the 30th and 31st parallels, a region essentially sub-tropical in character, the temperature ranges from 66° on the eastern plains to 62-5° in Cordoba and 64° F. on the higher, arid, sun-parched tablelands of San Juan. The rainfall, which varies between 39 and 47 in. in Entre Rios, decreases to 27 in. in Cordoba and 2 in. in San Juan. The republic has a width of about 745 m. at this point, three-fourths of which is a comparatively level alluvial plain, and the remainder an arid plateau broken by mountain ranges. In the vicinity of Buenos Aires the climatic conditions vary very little from those of the pampa region ; the mean annual tempera- ture is about 63 ” (maximum 104 ; minimum 32°), and the annual rainfall is 34 in. ; snow is rarely seen. South of the pampa region, on the 40th parallel, the mean temperature varies only slightly in the 370 m. from the mouth of the Colorado to the Andes, ranging from 57 to 55 ; but the rainfall increases from 8 in. on the coast to 16 in. on the east slope of the Cordillera. This section is near the northern border of the arid Patagonian steppes. In Tierra del Fuego (lat. 53° to 55), the climatic conditions are in strong contrast to those of the north. Here the mean temperature is between 46 and 48 in summer and 36 and 38 in winter, rains are frequent, and snow falls every month in the year. The central and southern parts of the island and the neighbouring Staten Island are exceptionally rainy, the latter having 251 j rainy days in the year. The precipitation of rain, snow and hail is about 55 in.

The prevailing winds through this southern region are westerly, being moist below the 52nd parallel, and dry between it and the 40th parallel. In the north and on the pampas the north wind is hot and depressing, while the south wind is cool and refreshing. The north wind usually terminates with a thunderstorm or with a pampero, a cold south-west wind from the Andes which blows with great violence, causes a fall in temperature of 15 to 20°, and is most frequent from June to November — the southern winter and spring. In the Andean region, a dry, hot wind from the north or north-west, called the Zonda, blows with great intensity, especially in September-October, and causes much discomfort and suffering. It is followed by a cold south wind which often lowers the temperature 25 . The climate of the pampas is temperate and healthy, and is admirably suited to agricultural and pastoral pursuits. Its greatest defect is the cold southerly and westerly storms, which cause great losses in cattle and sheep. The Patagonian coast-line and mountainous region are also healthy, having a dry and bracingclimate. In the north, how- ever, the hot lowlands are malarial and

unsuited to north European settlement, while the dry, elevated plateaus are celebrated for their healthiness, those of Catamarca having an excellent reputation as a sanatorium for sufferers from pulmonary and bronchial diseases.

Flora. — The flora of Argentina should be studied according to natural zones corresponding to the physical divisions of the country — the rich tropical and sub-tropical regions of the north, the treeless pampas of the centre, the desert steppes of the south,, and the arid plateaus of the north-west. The vegetation of each region has its distinctive character, modified here and there by elevation, irrigation from mountain streams, and by the saline character of the soil. In the extreme south, where an Arctic vegetation is found, the pastures are rich, and the forests, largely of the Antarctic beech (Fagus antarctica), are vigorous wherever the rainfall is %eavy. The greater part of Patagonia is comparatively barren and has no arboreal growth, except in the well-watered valleys of the Andean foothills. The water-courses and depressions of the shingly steppes afford pasturage sufficient for the guanaco, and in places support a thorny vegetation of low growth and starved appearance. The Antarctic beech and Winter's bark (Drimys Winteri) are found at intervals along the Andes to the northern limits of this zone. The pampas, which cover so large a part of the republic, have no native trees whatever, and no woods except the scrubby growth of the delta islands of the Parana, and a fringe of low thorn-bushes along the Atlantic coast south to Mar Chiquita and south of the Tandil sierra, which, strictly speaking, does not belong to this region. The great plains are covered with edible grasses, divided into two classes, pasto duro (hard grass) and pasto blando, or tierno (soft grass) — the former tall, coarse, nutritious and suitable for horses and cattle, and the latter tender grasses and herbs, including clovers, suitable for sheep and cattle. The so-called " pampas-grass " (Gynerium argenteum) is not found at all on the dry lands, but in the wet grounds of the south and south-west. The pasto duro is largely composed of the genera Stipa and Melica. In the dry, saline regions of the west and north-west, where the rainfall is slight, there are large thickets of low-growing, thorny bushes, poor in foliage. The pre-dominating species is the chanar (Gurliaca decorticans) , which pro- duces an edible berry, and occurs from the Rio Negro to the northern limits of the republic. Huge cacti are also characteristic of this region. On the lower slopes of the Andes are found oak, beech, cedar, Winter's bark, pine (Araucaria imbricata), laurel and calden (Prosopis algarobilla) . The provinces of Santa Fe, Cordoba and Santiago del Estero are only partially wooded ; large areas of plains are intermingled with scrubby forests of algarrobo (Prosopis), quebracho-bianco (Aspido-sperma quebracho), tala (Celtis tola, Sellowiana, acuminata), acacias and other genera. T n Tucuman and eastern Salta the same division into forests and open plains

exists, but the former are of denser growth and contain walnut, cedar, laurel, tripa (Machaerium fertile) and quebracho-colorado

{Loxopterygium Lorentzii). The territories of 'the Gran Chaco, however, are covered with a characteristic tropical vegetation, in which the palm predominates, but intermingled south of the Bermejo with heavy growths of algarrobo, quebracho-colorado, urunday (A stronium fraxinifolium) , lapacho (Tecoma curialis) and palosanto (Guayacum officinalis), all esteemed for hardness and fineness of grain. Other palms abound, such as the pindo (Cocos australis), mbocaya (Cocos sclerocarpa) and the yatai (Cocos yatai), but the predominating species north of the Bermejo is the caranday or Brazilian wax-palm (Copernicia cerifera), which has varied uses. The forest habit in this region is close association of species, and there are " palmares," " algarrobales," " chanarales," &c, and among these open pasture lands, giving to a distant landscape a park-like appearance. In the " mesopotamia " region the flora is similar to that of the southern Chaco, but in the Misiones it approxi- mates more to that of the neighbouring Brazilian highlands. Among the marvellous changes wrought in Argentina by the advent of European civilization, is the creation of a new flora by the intro- duction of useful trees and plants from every part of the world. Indian corn, quinoa, mandioca, possibly the potato, cotton and various fruits, including the strawberry, were already known to the aborigines, but with the conqueror came wheat, barley, oats, flax, many kinds of vegetables, apples, peaches, apricots, pears, grapes, figs, oranges and lemons, together with alfalfa and new grasses for the plains. The Australian eucalyptus is now grown in many places, and there are groves of the paradise or paraiso tree (Melia azedarach) on the formerly treeless pampa. The cereals of Europe are a source of increasing wealth to the nation, and alfalfa promises new prosperity for pastoral industries.

Fauna. — The Argentine fauna, like its flora, has been greatly influenced by the character and position of the pampas. Whatever it may have been in remote geological periods, it is now extremely limited both in size and numbers. Of the indigenous fauna, the tapir of the north and the guanaco of the west and south are the largest of the animals. The pampas were almost destitute of animal life before the horses and cattle of the Spanish invaders were there turned out to graze, and the puma and jaguar never came there until the herds of European cattle attracted them. The timid viscacha (Lagostomus trichodactylus) , living in colonies, often with the burrow- ing owl, and digging deep under ground like the American prairie dog, was almost the only quadruped to be seen upon these immense open plains. The fox, of which several species exist, probably never ventured far into the plain, for it afforded him no shelter. Immense flocks of gulls were probably attracted to it then as now by its insect life, and its lagoons and streams teemed with aquatic birds. The occupation of this region by

Europeans, and the introduction of horses, asses, cattle, sheep, goats and swine, have completely changed its aspect and character. On the Patagonian steppes there are comparatively few species of animals. Among them are the puma (Felis concolor), a smaller variety of the jaguar (Felts onca), the wolf, the fox, the Patagonian hare (Dolichotis patagonica) and two species of wild cat. The huge glyptodon once inhabited this region, which now possesses the smallest armadillo known, the " quir- quincho " or Dasypus minutus. The guanaco (Auchenia), which ranges from Tierra del Fuego to the Bolivian highlands, finds com- parative safety in these uninhabitable solitudes, and is still numerous. The " nandu " or American ostrich (Rhea americana), inhabiting the pampas and open plains of the Chaco, has in Patagonia a smaller counterpart (Rhea Darwinii), which is never seen north of the Rio Negro. On the arid plateaus of the north-west, the guanaco and vicuna are still to be found, though less frequently, together with a smaller "species of viscacha (Lagidium cuvieri) . The greatest develop- ment of the Argentine fauna, however, is in the warm, wooded regions of the north and north-east, where many animals are of the same species as those in the neighbouring territories of Brazil. Several species of monkeys inhabit the forests from the Parana to the Bolivian frontier. Pumas, jaguars and one or two species of wild cat are numerous, as also the Argentine wolf and two of three species of fox. The coati, marten, skunk and otter (Lutra para- nensis) are widely distributed. Three species of deer are common. In the Chaco the tapir or anta (Tapir americanus) still finds a safe retreat, and the peccary (Dycotyles torquatus) ranges from C6rdoba north to the Bolivian frontier. The capybara (Hydrochoerus capy< bara) is also numerous in this region. Of birds the number of species greatly exceeds that of the mammals, including the rhea of the pampas and condor of the Andes, and the tiny, brilliant-hued humming-birds of the tropical North. Vultures and hawks are well represented, but perhaps the most numerous of all are the parrots, of which there are six or seven species. The reptilians are represented in the Parana by the jacare (Alligator sclerops), and on land by the " iguana " (Teius teguexim, Podinema teguixin), and some species of' lizard. Serpents are numerous, but only two are described as poisonous, the cascavel (rattlesnake) and the " vibora de la cruz " (Trigonocephalus alternatus) . l

1 Interesting details 1 of the Argentine fauna may be found in Darwin's Voyage of the Beagle; W. H. Hudson's Idle Days in Pata- gonia, and Naturalist in the La Plata; G. Pelleschi's Eight Months on the Gran Chaco; R. Napp's Argentine Republic; and de Moussy's Confederation argentine.

Population. — In population Argentina ranks second among the republics of South America, having outstripped, during the last quarter of the 19th century, the once more populous states of Colombia and Peru. During the first half of the 19th century civil war and despotic government seriously restricted the natural growth of the country, but since the definite organization of the republic in i860 and the settlement of disturbing political controversies, the population had increased rapidly. Climate and a fertile soil have been important elements in this growth. According to the first national census of 1869 the population was 1,830,214. The census of 1895 increased this total to 3,954,9 1 1 , exclusive of wild Indians and a percentage for omissions customarily used in South American census returns. In 1904 official estimates, based on immigration and emigration returns and upon registered births and deaths, both of which are admittedly defective, showed a population increased to 5,410,028, and a small diminution in the rate of annual increase from 1895 to 1904 as compared with 1869-1895. The birth-rate is excep- tionally high, largely because of the immigrant population, the greater part of which is concentrated in or near the large cities. In the rural districts of the northern provinces, the increase in population is much less than in the central provinces, the conditions of fife being less favourable. According to the official returns, 1 the over-sea immigration for the forty-seven years 1857-1903 aggregated 2,872,588, while the departure of emigrants during the same period was 1,066,480, showing a net addition to the population of 1,806,108. A considerable per- centage of these arrivals and departures represents seasonal labourers, who come out from Europe solely for the Argentine wheat harvest and should not be classed as immigrants. Unfavourable political and economic conditions of a temporary character influence the emigration movement. During the years 1880-1889, when the country enjoyed exceptional prosperity, the arrivals numbered 1,020,907 and the departures only 175,038, but in 1890-1899, a period of financial depression following the extravagant Celman administration, the arrivals were 928,865 and the departures 552,175. Another disturbing influence has been the high protective tariffs, adopted during the closing years of the century, which increased the costs of living more rapidly than the wages for labour, and compelled thousands of immigrants to seek employment elsewhere. The influence of such legislation on unsettled immigrant labourers may be seen in the number of Italians who periodically migrate from Argentina to Brazil, and vice versa, seeking to better their condition. Of the immigrant arrivals for the forty-seven years given, 1,331,536 were Italians, 414,973 Spaniards, 170,293 French, 37,953 Austrians, 35,435 British, 30,699 Germans, 25,775 Swiss, 19,521 Belgians, and the others of diverse nationalities, so that Argentina is in no danger of losing her Latin character through immigration. This large influx of Europeans, however, is modifying the population by reducing the Indian and mestizo elements to a

minority, although they are still numerous in the mesopotamian, northern and north-western provinces. The language is Spanish.

Science and Literature. — Though the university of Cordoba is the oldest but one in South America, it has made no con- spicuous contribution to Argentine literature beyond the his- torical works of its famous rector, Gregorio Funes (1 749-1830). This university was founded in 1621 and the university of Buenos Aires in 1821, but although Bonpland and some other European scientists were members of the faculty of Buenos Aires in its early years, neither there nor at Cordoba was any marked attention given to the natural sciences until President Sarmiento (official term, 1868-1874) initiated scientific instruction at the university of Cordoba under the eminent German naturalist, Dr Hermann Burmeister (1807-1892), and founded the National Observatory at Cordoba and placed it under the direction of

1 There are two distinct statistical offices compiling immigration returns and their totals do not agree, owing in part to the traffic between Buenos Aires and Montevideo. Another report gives the arrivals in 1904 as 125,567 and the departures 38,923. Of the arrivals 67,598 were Italians and 39,851 Spaniards. The total for the years 1859-1904 was 3,166,073 and the departures 1,239,064, showing a net gain of 1,927,009.

the noted American astronomer, Benjamin Apthorp Gould (1824-1896). Both of these men made important contributions to science, and rendered an inestimable service to the country) not only through their publications but also through the interest they aroused in scientific research. A bureau of meteorology was afterwards created at Cordoba which has rendered valuable service. Dr Burmeister was afterwards placed in charge of the provincial museum of Buenos Aires, and devoted himself to the acquisition of a collection of fossil remains, now in the La Plata museum, which ranks among the best of the world. Not only has scientific study advanced at the university of Buenos Aires, but scientific research is promoting the development of the country; examples are the geographical explorations of the Andean frontier, and especially of the Patagonian Andes, by Francisco P. Moreno. In literature Argentina is still under the spell of Bohemianism and dilettanteism. Exceptions are the admirable biographies of Manuel Belgrano (d. 1820) and San Martin, important contributions to the history of the country and of the war of independence, by ex-President Bartolome Mitre (1821-1906). Buenos Aires has some excellent daily journals, but the tone of the press in general is sensational. The number of newspapers published is large, especially in Buenos Aires, where in 1902 the total, including sundry periodi- cals, was 183.

Political Divisions and Towns. — The chief political divisions of the

republic consist of one federal district, 14 provinces and 10 territories, the last in great part dating from the settlement of the territorial controversies with Chile. For purposes of local administration the provinces are divided into departments. The names, area and population of the provinces and territories are as follows: —

Administrative Divisions.

Provinces — Federal Capital Buenos Aires . Santa Fe . Entre Rios Corrientes. Cofdoba . San Luis . Santiago del Estero Mendoza . San Juan . Rioja

Catamarca Tucuman . Salta . Jujuy.

Territories — Misiones . Formosa . Chaco Pampa Neuquen . Rio Negro Chubut Santa Cruz Tierra del Fuego Los Andes

Total …. Gotha computations of 1902 with corrections for boun- dary changes .

Area, sq. m.

72

H7,778

50,916 28,784 32,580 62,160 28,535 39,764 56,502 33,715 34,546 47,531 8,926 62,184 18,977

11,282 41,402

52,741 56,320 42,345 75,924 93,427 109,142 8,299 21,989

1,135,840

1,083,596

Pop.

1895-

663,854 921,168 397,188 292,019 239,618 351,223 81,450 161,502 116,136

84,251

69,502

90,161

215,742

118,015

49,713

33,163

4,829

10,422

25,914

14-517

9,241

3,748

1,058

477

3,954-9H

Pop. est. for 1904.

979,235

1,312,953

640,755

367,006

299,479 465,464

97,458 186,206 159,780

99,955

82,099

103,082

263,079

136,059

55,450

38,755 6,094

13,937 52,150 18,022 18,648 9,060

1,793 1,411 2,095

5,410,028

The principal towns, with estimated population for 1905, are as follows: Buenos Aires (1,025,653), Rosario (129,121), La Plata (85,000), Tucuman (55,000), Cordoba (43,000), Sante F6 (33,200), Mendoza (32,000), Parana (27,000), Salta (18,000), Corrientes (18,000), Chivilcoy (15,000), GualeguaycM (13,300), San Nicolas (13,000), Concordia (11,700), San Juan (11,500), Rio Cuarto (10,800), San Luis (10,500), Barracas al Sud (10,200).

Communications. — The development of railways in Argentina, which dates from 1857 when the construction of the Buenos Aires Western was begun, was at first slow and hesitating, but after 1880 it went forward rapidly. Official corruption and speculation have led to some unsound ventures, but in the great majority of cases the

lines constructed have been beneficial and productive. The principal centres of the system are Buenos Aires, Rosario and Bahia Blanca, with La Plata as a secondary centre to the former, and from these the lines radiate westward and northward. The creation of a com- mercial port at Bahia Blanca and the development of the territories of La Pampa, Rio Negro and Neuquen, have given an impetus to railway construction in that region, and new lines are being extended toward the promising districts among the Andean foothills. Begin- ning with 6 m. in 1857, the railway mileage of the republic increased to 1563 m. in 1880, 5865 m. in 1890, 7752 m. in 1891, 10,304 m. in 1901, and 12,274 m. in 1906, with 1794 m. under construction. The greater development of railway construction between 1885 and 1891 was due, principally, to the dubious concessions of interest guarantees by the Celman administration, and also to the fever of speculation. Some of these lines resulted disastrously. The Transandine

tine, designed to open railway communication between Buenos Aires and Valparaiso, was so far completed early in 1909 that on the Argentine side only the summit tunnel, 2 m. 127 yds. long, remained to be finished. The piercing was completed in Nov. 1909, but in the meantime passengers were conveyed by road over the pass. The gauge is broken at Mendoza, the Buenos Aires and Pacific having a gauge of 5 ft. 6 in. and the Transandine of one metre.

Tramway lines, which date from 1870, are to be found in all important towns. Those of Buenos Aires, Rosario and La Plata are owned by public companies. According to the census returns of 1895, the total mileage was 496 m., representing a capital expenditure of $84,044,581 paper. Electric traction was first used in Buenos Aires in 1897, since when nearly all the lines of that city have been reconstructed to meet its requirements, and subways are contem- plated to relieve the congested street traffic of the central districts ; the companies contribute 6 % of their gross receipts to the munici- pality, besides paying $50 per annum per square on each single track in paved streets, 5 per thousand on the value of their property, and 33 % ˚f the cost of street repaving and renewals.

The telegraph lines of Argentina are subject to the national telegraph law of 1875, the international telegraph conventions, and special conventions with Brazil and Uruguay. In 1902 the total length of wires strung was 28,125 m. ; in 1906 it had been increased to 34,080 m. The national lines extend from Buenos Aires north to La Quiaca on the Bolivian frontier (1180 m.), and south to Cape Virgenes (1926 m.), at the entrance to the Straits of Magellan. Telegraphic communication with Europe is effected by cables laid along the Uruguayan and Brazilian coasts, and by the Brazilian land lines to connect with transatlantic cables from Pernambuco. Communication with the United States is effected by land lines to Valparaiso, and thence by a cable along the west coast. The service is governed by the international telegraph regulations, but is subject to local inspection and interruption in times of political disorder.

The postal and telegraph services are administered by the national government, and are under the immediate supervision of the minister of the interior. Argentina has been a member of the Postal Union since 1878. Owing to the great distances which must be covered, and also to the defective means of communication in sparsely settled districts, the costs of the postal service in Argentina are unavoidably high in relation to the receipts.

Shipping. — Although Argentina has an extensive coast-line, and one of the great fluvial systems of the world, the tonnage of steamers and sailing vessels flying her flag is comparatively small. In 1898 the list comprised

only 1416 sailing vessels of all classes, from 10 tons up, with a total tonnage of 118,894 tons, and 222 steamships, of 36,323 tons. There has been but slight improvement since that date. There are excellent fishing grounds on the coast, but they have had no appreciable influence in developing a commerical marine. The steamships under the national flag are almost wholly engaged in the traffic between Buenos Aires and Montevideo, the river traffic, and port services.

Agriculture. — In 1878 the production of wheat was insufficient for home consumption, the amount of Indian corn grown barely Live stock covered local necessities, and the only market for live stock 4Ci ' was in the slaughtering establishments, where the meat

was cut into strips and cured, making the so-called " jerked beef " for the Brazilian and Cuban markets. But three years later a new economic development began. In 1881 President Roca offered for public purchase by auction the lands in the south- west of the province of Buenos Aires, the Pampa Central, and the Neuquen district, these lands having been rendered habitable after the campaign of 1878 against the Indians. The upset (reserve) price was £80 sterling per square league of 6669 acres, and, as the lands were quickly sold, an expansion of the pastoral industry immediately ensued. The demand for animals for stock-breeding purposes sent up prices, and this acted as a stimulus to other branches of trade, so that, as peace under the Roca regime seemed assured, a steady flow of immigration from Italy set in. The development of the pastoral industry of Argentina from that time to the end of the century was remarkable. In 1878 the number of cattle was 12,000,000; of sheep, 65,000,000; and of horses, 4,000,000; in 1899 the numbers were — cattle, 25,000,000; sheep, 89,000,000; and horses, about 4,500,000. Originally the cattle were nearly all of the long-horned Spanish breed and of little value for their meat, except to the saladero establishments. Gradually Durham, Short-

horn, Hereford and other stock were introduced to improve the native breeds, with results so satisfactory that now herds of three- quarters-bred cattle are to be found in all parts of the country. Holstein, Jersey and other well-known dairy breeds were imported for the new industries of butter- and cheese-making. Not only has the breed of cattle been improved, but the system of grazing has completely altered. Vast areas of land have been ploughed and sown with lucerne (alfalfa) ; magnificent permanent pasturage has been created where there were coarse and hard grasses in former days, and Argentina has been able to add baled hay to her list of exports. In 1889 the first shipment of Argentine cattle, consisting altogether of 1930 steers, was sent to England. The results of these first experiments were not encouraging, owing mainly to the poor class of animals, but the

exporters persevered, and the business steadily grew in value and importance, until in 1898 the number of live cattle shipped was 359,296, which then decreased to 119,189 in 1901, because of the foot-and-mouth disease. In 1906 the export of live stock was prohibited for that reason. Large quantities of frozen and preserved meat are exported, profitable prices being realized. Dairy-farming is making rapid strides, and the develop- ment of sheep-farming has been remarkable. In 1878, 65,000,000 sheep yielded 230,000,000 lb weight of wool, or an average per sheep o£ .about 2,2 ft- In the season of 1 899-1900 the wool exports weighed 420,000,000 lb, and averaged more than 5 lb per sheep. The extra weight of fleece was owing to the large importation of better breeds. The export, moreover, of live sheep and of frozen mutton to Europe has become an important factor in the trade of Argentina. In 1892 the number of live sheep shipped for foreign ports was 40,000; in

1898 the export reached a total of 577,813, which in 1901 fell off to 25,746. In 1892 the frozen mutton exported was 25,500 tons, and this had increased in 1901 to 63,013 tons.

The advance made in agricultural industry also is of very great importance. In 1872 the cultivated area was about 1,430,000 acres; in 1895, 12,083,000 acres; in 1901, 17,465,973 acres. In Crops.

1899 the wheat exports exceeded 50,000,000 bushels, and ‘ the Indian corn 40,000,000 bushels. The area under wheat in 1901 was 8,351,843 acres; Indian corn, 3,102,140 acres; linseed, 1,512,340 acres; alfalfa, 3,088,929 acres. The farming industry is not, however, on a satisfactory basis. No national lands in accessible districts are available for the application of a homestead law, and the farmer too often has no interest in the land beyond the growing crops, a percentage of the harvest being the rent charged by the owner of the property. This system is mischievous, since, if a few, consecutive bad seasons occur, the farmer moves to some more favoured spot ; while, on the other hand, a succession of good years tends to increase rents. The principal wheat and Indian corn pro- ducing districts lie in the provinces of Santa Fe, Buenos Aires, Cordoba and Entre Rios, and the average yield of wheat throughout the country is about 12 bushels to the acre. Little attention is paid to methods of cultivation, and the farmer has no resources to help him if the cereal crops fail. In the Andean provinces of Mendoza, San Juan, Catamarca and Rioja viticulture attracts much attention, and the area in vineyards in 1901 was 109,546 acres, only 18 % of which was outside the four provinces named. Wine is manufactured in large quantities, but the output is not sufficient to meet the home demand. In the provinces of Tucuman, Salta and Jujuy the main industry is sugar growing and manufacture. In 190 1 the production of sugar was 151,639 tons, of which 58,000 tons were exported. The sugar

manufacture, however, is a protected and bounty-fed industry, and the 51 sugar mills in operation in 1901 are a heavy tax upon consumers and taxpayers. Other products are tobacco, olives, castor-oil, peanuts, canary-seed, barley, rye, fruit and vegetables.

The pastoral and agricultural industries have been hampered by fluctuations in the value of the currency, farm products being sold at a gold value for the equivalent in paper, while labourers are paid in currency. The existing system of taxation also presses heavily upon the provinces, as may be seen from the fact that the national, provincial and municipal exactions together amount to £"j per head of population, while the total value of the exports in 1898 was only £6 in round numbers. The guia tax on the transport of stock from one province to another, which has been declared unconstitutional in the courts, is still enforced, and is a vexatious tax upon the stock-raiser, while the consumption, or octroi, tax in Buenos Aires and other cities is a heavy burden upon small producers.

Manufactures. — Manufacturing enterprise in Argentina, favoured by the protection of a high tariff, made noticeable progress in the national capital during the closing years of the last century, espe- cially in those small industries which commanded a secure market. The principal classes of products affected are foods, wearing apparel, building materials, furniture, &c, chemical products, printing and allied trades, and sundry others, such as cigars, matches, tanning, paints, &c. In some manufactures the raw material is imported partly manufactured, such as thread for weaving. The lack of coal in Argentina greatly increases the difficulty and cost of maintaining these industries, and high prices of the products result. Electric power generated by steam is now commonly used in Buenos Aires and other large cities for driving light machinery.

Commerce. — The rapid development of the foreign trade of the republic since 1881 is due to settled internal conditions and to the

prime necessity to the commercial world of many Argentine products, such as beef, mutton, hides, wool, wheat and Indian corn. Efforts to hasten this development have created some serious financial and industrial crises, and have burdened the country with heavy debts and taxes. During the decade 1881-1890 great sums of European capital were invested in railways and other undertakings, encouraged by the grant of interest guarantees and by state mortgage bank loans in the form of cedulas, nominally secured on landed property. In 1890 the crisis came, the mortgage banks failed, credits

were contracted, the value of property declined, defaults were common, imports decreased, and the losses to the country were enormous. The constant fluctuations in the value of the currency, then much depreciated, intensified the distress and complicated the situation. Recovery required years, although made easier by the sound and steady development of the pastoral and agricultural industries, which were slightly affected by the crisis; and the steadily increasing volume of exports, mainly foodstuffs and other staples, saved the situation. There have been some changes in commercial methods since 1890, the retailer, and sometimes the consumer, importing direct to save intermediate commission charges. Such transactions are made easy by the foreign banks established in all the large cities of the republic. The conversion law of 1899, which gave a fixed gold value to the currency (44 centavos gold for each 190 centavos paper), has had beneficial influence on commercial trans- actions, through the elimination of daily fluctuations in the value of the currency, and the commercial and financial situation has been steadily improved, notwithstanding heavy taxation and tariff re- strictions. The import trade shows the largest totals in foodstuffs, wines and liquors, textiles and raw materials for their manufacture, wood and its manufactures, iron and its manufactures, paper and cardboard, glass and ceramic wares. The official valuation of imports, which is arbitrary and incorrect, was $164,569,884 gold in 1889, fell off to $67,207,780 in 1891, but gradually increased to $205,154,420 in 1905. The exports, which are almost wholly of agricultural and pastoral products, increased from $103,219,000 in 1891 to $322,843,841 in 1905.

Government. — The present constitution of Argentina dates from the 25th of September i860. The legislative power is vested in a congress of two chambers — the senate, composed of 30 members (two from each province and two from the capital) , elected by the provincial legislatures and by a special body of electors in the capital for a term of nine years; and the chamber of deputies, of 120 members (1906), elected for four years by direct vote of the people, one deputy for every 33,000 inhabitants. To the chamber of deputies exclusively belongs the initiation of all laws relating to the raising of money and the conscription of troops. It has also the exclusive right to impeach the president, vice-president, cabinet ministers, and federal judges before the senate. The executive power is exercised by the president, elected by presidential electors from each province chosen by direct vote of the people. The president and vice- president are voted for by separate tickets. The system closely resembles that followed in the United States. The president must be a native citizen of Argentina, a Roman Catholic, not under thirty years of age, and must have an annual income of at least $2000. His term of office is six years, and neither he nor the vice-president is eligible for the next presidential term. All laws are sanctioned

and promulgated by the president, who is invested with the veto power, which can be overruled only by a two-thirds vote. The president, with the advice and consent of the senate, appoints judges, diplomatic agents, governors of territories, and officers of the army and navy above the rank of colonel. All other officers and officials he appoints and pro- motes without the consent of the senate. The cabinet is com- posed of eight ministers— the heads of the government depart- ments of the interior, foreign affairs, finance, war, marine, justice, agriculture, and public works. They are appointed by and may be removed by the president.

Justice is administered by a supreme federal court of five judges and an attorney-general, which is also a court of appeal, four courts of appeal, with three judges each, located in Buenos Aires, La Plata, Parana and C6rdoba, arid by a number of inferior and local courts. Each province has also its own judicial system. Trial by jury is established by the constitution, but never practised. Civil and criminal courts are both corrupt and dilatory. In May 1899 the minister of justice stated in the chamber of deputies that the machinery of the courts in the country was antiquated, unwieldy and incapable of performing its duties; that 50,000 cases were then waiting decision in the

minor courts, and 10,000 in the federal division; and that a reconstruction of the judiciary and the judicial system had become necessary. In June 1899 he sent his project for the reorganization of the legal procedure to congress, but no action was then taken beyond referring the bill to a committee for examination and report. The proceedings are, with but few exceptions, written, and the procedure is a survival of the anti- quated Spanish system.

Under the constitution, the provinces retain all the powers not delegated to the federal government. Each province has its own constitution, which must be republican in form and in harmony with that of the nation. Each elects its governor, legislators and provincial functionaries of all classes, without the intervention of the federal government. Each has its own judicial system, and enacts laws relating to the administration of justice, the distribution and imposition of taxes, and all matters affecting the province. All the public acts and judicial decisions of one province have full legal effect and authority in all the others. In cases of armed resistance to a provincial government, the national government exercises the right to intervene by the appointment of an interventor, who becomes the executive head of the province until order is restored. The terri- tories are under the direct control of the national government .

Army. — The military service of the republic was reorganized in 1901, and is compulsory for all citizens between the ages of 20 and 45. The army

consists of: (1) The Line, comprising the Active and Reserve, in which all citizens 20 to 28 years of age are obliged to serve; (2) the National Guard, comprising citizens of 28 to 40 years; (3) the Territorial Guard, comprising those 40 to 45 years. Conscripts of 20 years of age have to serve two years, three months each year. The active or stand- ing army comprises 18 battalions of infantry, 12 regiments of cavalry, 8 regiments of artillery, and 4 battalions of engineers. A military school, with 125 cadets, is maintained at San Martin, near the national capital, and a training school for non-com- missioned officers in the capital itself. Compulsory attendance of young men at national guard drills is enforced for at least two months of the year, under penalty of enforced service in the Line. In 1906 the president announced that permission had been given by the German emperor for 30 Argentine officers to enter the German army each year and to serve eighteen months, and also for five officers to attend the Berlin Military Academy. The equipment of the standing army is thoroughly modern, the infantry being provided with Mauser rifles and the artillery with Krupp batteries.

Navy. — The disputes with Chile during the closing years of the 19th century led to a large increase in the navy, but in 1902 a treaty between the two countries provided for the restriction of further armaments for the next four years. The naval vessels then under construction were accordingly sold, but in 1906 both countries, influenced apparently by the action of Brazil, gave large orders in Europe for new vessels. At the time when further armaments were suspended, the effective strength of the Argentine navy consisted of 3 ironclads, 6 first-class armoured cruisers, 2 monitors (old), 4 second-class cruisers, 2 torpedo cruisers, 3 destroyers, 3 high-sea torpedo boats, 14 river torpedo boats, 1 training ship, 5 transports, and various auxiliary vessels. Two of these first-class cruisers were sold to Japan. The armament included 394 guns of all calibres, 6 of which were of 250 millimetres, 4 of 240, and 12 of 200. There are about 320 officers in active service, and the total personnel ranges from 5000 to 6000 men. The service is not popular, and it is recruited by means of conscription from the national guard, the term of service being two years. These conscripts number about 2000 a year. In addition, there is a corps of coast artillery numbering 450 men, from which garrisons are drawn for the military port, Zarate arsenal and naval prison. The govern- ment maintains a naval school at Flores, a school of mechanics in Buenos Aires, an artillery school on the cruiser " Pata- gonia," and a school for torpedo practice at La Plata. The naval arsenal is situated on the " north basin " of the Buenos Aires port, and the military port at Bahia Blanca is provided

with a dry dock of the largest size, and extensive repair shops. There is also a dockyard arid torpedo arsenal at La Plata, an artillery depot at Zarate, above Buenos Aires, and naval depots on the island of Martin Garcia and at Tigre, on the Lujan river.

Education. — Primary education is free and secular, and is compulsory for children of 6 to 14 years. In the national capital and territories it is supervised by a national council of education with the assistance of local school boards; in the 14 provinces it is under provincial control. Secondary in- struction is also free, but is not compulsory. It is under the control of the national government, which in 1902 maintained 19 colleges. Of these colleges four are in Buenos Aires, one in each province, and one in Conception del Uruguay. For the instruction of teachers the republic has 28 normal schools, as follows: three in the national capital; one in Parana, three (regional) in Corrientes, San Luis and Catamarca; 14 for female teachers in the provincial capitals; and seven for either sex in the larger towns of the provinces of Buenos Aires, Santa Fe, Cordoba and San Luis. The normal schools, maintained by the state on a secular basis, were founded by President Sarmiento, who engaged experienced teachers in the United States to direct them; their work is excellent; notably, their model primary schools. For higher and professional education there are two national universities at Buenos Aires and Cordoba, and three provincial universities, at La Plata, Santa Fe and Parana, which comprise faculties of law, medicine and engineering, in addition to the usual courses in arts and science. To meet the needs of technical and industrial education there are a school of mines at San Juan, a school of viticulture at Mendoza, an agronomic and veterinary school at La Plata, several agricultural and pastoral schools, and commercial schools in Buenos Aires, Rosario, Bahia Blanca and Concordia. Schools of art and conservatories of music are also maintained in the large cities, where there are, besides, many private schools. Secular educa- tion has been vigorously opposed by strict churchmen, and efforts have been made to maintain separate schools under church control. The national government has founded several scholarships (some in art) for study abroad. The total school population of Argentina in 1900 (6 to 14 years) was 994,089, of which 45 % attended school, and 13 % of those not attending were able to read and write. The illiterate school population was about 41 %, and of those of 15 years and over 54 % were illiterate. Of the whole population over 6 years, 50-5 % were illiterate.

Religion. — The Argentine constitution recognizes the Roman Catholic religion as that of the state, but tolerates all others. The state controls all ecclesiastical appointments, decides on the passing or rejection of all decrees of the Holy See, and provides an annual subsidy for maintenance of the churches and clergy. Churches and chapels are founded and

maintained by religious orders and private gift as well. At the head of the Argentine hierarchy are one archbishop and five suffragan bishops, who have five seminaries for the education of the priesthood. From statistics of 1895 it appears that in each 1000 of population 991 are Roman Catholics, 7 Protestants, and 2 Jews, the Jews being entirely of Russian origin, sent into the republic since 1891 by the Jewish Colonization Association under the provisions of the Hirsch legacy; from 1895 to 1908 the number of Jews in Argentina increased from 6085 to about

30,000.

Finance. — The revenue of the republic is derived mainly from customs and excise, and the largest item of expenditure is the service of the public debt. Since 189 1 the national budgets have been calculated in both gold and currency, and both receipts and ex- penditures have been carried out in this dual system. The collection of a part of the import duties in gold has served to give the govern- ment the gold it requires for certain expenditures, but it has compli- cated returns and accounts and increased the burden of taxation. According to a compilation of statistical returns published by Dr Francisco Latzina in 1901, the national revenues and expenditures for the 37 years from 1864 to 1900, inclusive, reduced to a common standard, show a total deficit for that period of $408,260,795 gold, which has been met by external and internal loans, and by a

continued increase in the scope and rate of taxation. The growth of the annual budget is shown by a comparison of the following years : —

Total Revenue. Total Expenditure.

1864 . . . $7,005,328 gold. $7,119,931 gold.

1880 . . . 19,594,306 ,, 26,919,295 „

1890 . . 73,150,856 „ 95,363,854 »

\ 62,045,458 paper. I 104,501,614 paper.

(37,998,704 gold. (23,644,543 gold.

,439,000 paper. (105,581,680 paper.

h ” ” ”

1900 1905

1 j/,

63,

(43,

461,324 gold.

24,865,016 gold.

The bane of Argentine finance has been the extravagant and un- scrupulous use of national credit for the promotion of schemes calculated to benefit individuals rather than the public. The large increase in military expenditures during the disputes with Chile also proved a heavy burden, and in the continued strife with Brazil for naval superiority this burden could not fail to be increased greatly. A very considerable percentage of Argentina's population of five to six millions is hopelessly poor and unprogressive, and cannot be expected to bear its share of the burden. To meet these expenditures there are a high tariff on imported merchandise, and excise and stamp taxes of a far-reaching and often vexatious character. Nothing is permitted to escape taxation, and duplicated taxes on the same thing are frequent. In Argentina these burdens bear heavily upon the labouring classes, and in years of depression they send away by thousands immigrants unable to meet the high costs of living. For the year 1900 the total expenditures of the national government, 14 provincial governments, and 16 principal cities, were estimated to have been $208,811,925 paper, which is equivalent to $91,877,247 gold, or (at $5.04 per pound stg.) to £18,229,612, 10s. The popu- lation that year was estimated to be 4,794,149, from which it is seen that the annual costs of government were no less than £3,1 6s. for each man, woman, and child in the republic. About 71 %'of this charge was on account of national expenditures, and 29 % provincial and municipal expenditures. Had the expenses of all the small towns and rural communities been included, the total would be in excess of $20 gold, or £4, per capita.

In 1889 the public debt of the republic amounted to about £24,000,000, but the financial difficu'ties which immediately followed that year, and the continuance of excessive expenditures, forced the debt up to approximately £128,000,000 during the next ten years. In the year 1905 the outstanding and authorized debt of the republic was as follows : —

External debt (July 31, 1905):

National loans

Provincial loans and others, assumed .

National cedulas

Total

Consolidated Internal debt (Dec. 31, 1904):

Gold $16,544,000

Paper 79,174,400

£42,297

30,395: 11,763.

,050 916 923

£84,456,889

£10,178,718

669

Total service on funded debt, i905,$24,375,o67 gold

and $15,914,335 paper £6,225

Floating debt £259,170

Treasury bills (Apr. 30, 1905) . 275,220

Unpaid bills, $3,332,594, paper . 288,560

£822

950

The paper currency forms an important part of the internal debt, and has been a fruitful source of trouble to the country. Few countries have suffered more from a depreciated currency than Argentina. During the era of so-called " prosperity " between 1881 and 1890 an enormous amount of bank notes were issued under various authorizations, especially that of the " free banking law " of 1887. During this period the bank-note circulation was increased to $161,700,000, and two mortgage banks — the National Hypothec- ary Bank and the Provincial Mortgage Bank (of Buenos Aires) — flooded the country with $509,000,000 of cedulas (hypothecary bonds). When the crash came and the national treasury was found to be without resources to meet current expenses, further issues of $110,000,000 in currency were made. The free-banking law which permitted the issue of notes by provincial banks was primarily responsible for this situation.

Under the provisions of this law the provinces were authorized to borrow specie abroad and deposit the same with the national government as security for their issues. These loans aggregated £27,000,000. The Celman administration, in violation of the trust, then sold the specie and squandered the proceeds, leaving the provincial bank notes without guarantee and value. The national government has since assumed responsibility for all these provincial loans abroad. As on previous occasions, the great depreciation in the value of the currency has led to a repudia- tion of part of its nominal value. This depreciation reached its maximum in October 1891 ($460.82 paper for $100 gold), and remained between that figure and $264 during the next six years. To check these prejudicial fluctuations and to prevent too great a fall in the price of gold (to repeat a popular misconception), a

conversion law was adopted on the 3 1 st of October 1 899, which provided that the outstanding circulation should be redeemed at the rate of 44 centavos gold for each 100 centavos paper, the official rate for gold being 227-27. Provisions were also made for the creation of a special conversion fund in specie to guarantee the circulation, which fund reached a total of $100,000,000 in March 1906. These measures have served to give greater stability to the value of the circulating medium, and to prevent the ruinous losses caused by a constant fluctuation in value, but the rate established prevents the further appreciation of the currency. On the 18th of January 1906 the currency in circulation amounted to $502,420,485, which is more than $95 per capita. (A. J. L.)

History

The first Europeans who visited the' river Plate were a party of Spanish explorers in search of a south-west passage to the East Indies. Their leader, Juan Diaz de Solis, landing in- cautiously in 1 5 16 on the north coast with a few attendants to parley with a body of Charrua Indians, was suddenly attacked by them and was killed, together with a number of his followers. This untoward disaster led to the abandonment of the expedition, which forthwith returned to Spain, bringing with them the news of the discovery of a fresh-water sea. Four years later (1520) the Portuguese seaman, Ferdinand Magellan, entered the estuary in his celebrated voyage round the world, undertaken in the service of the king of Spain (Charles I., better known as the emperor Charles V.). Magellan, as soon as he had satisfied

himself that there was no passage to the west, left the river without landing.

The first attempt to penetrate by way of the river Plate and its affluents inland, with a view to effecting settlements in the interior, was made in 1526 by Sebastian Cabot. This great navigator had already won renown in the service of Henry VII. of England by his voyage to the coast of North America in company with his father, Giovanni. Caboto or Cabot (see Cabot, John). Sebastian Cabot had in 1519 deserted England for Spain, and had received from King Charles the post of pilot-major formerly held by Juan de Solis. In 1526 he was sent out in command of an expedition fitted out for the purpose of determining by astronomical observations the exact line of demarcation, under the treaty of Tordesillas, between the coloniz- ing spheres of Spain and Portugal, and of conveying settlers to the Moluccas. Arrived in the river Plate in 1527, rumours reached Cabot of mineral wealth and a rich and civilized empire in the far interior, and he resolved to abandon surveying for exploration. He built a fort a short distance up the river Uruguay, and despatched one of his lieutenants, Juan Alvarez Ramon, with a separate party upon an expedition up stream. This expedition was assailed by the Gharruas and forced to return on foot, their leader himself being killed. Cabot, with a large following, entered the Parana and established a settle- ment just above the mouth of the river Carcarafial, to which he gave the name of San Espiritu, among the Timbu Indians, with whom he formed friendly relations. He continued the ascent of the Parana as far as the rapids of Apipe, and finding his course barred in this direction, he afterwards explored the river Para- guay, which he mounted as far as the mouth of the affluent called by the Indians Lepeti, now the river Bermejo. His party was here fiercely attacked by the Agaces or Payagu& Indians, and suffered severely. Cabot in his voyage had seen many silver ornaments in the possession of the Timbu and Guarani Indians. Some specimens of these trinkets he sent back to Spain with a report of his discoveries. The arrival of these first-fruits of the mineral wealth of the southern continent gained for the estuary of the Paranfi. the name which it has since borne, that of Rio de la Plata, the silver river. As Cabot was descending the stream to his settlement of San Espiritu, he encountered an expedition which had been despatched from Spain for the express purpose of exploring the river discovered by Solis, under the command of Diego Garcia. Finding that he had been forestalled, Garcia resolved to return home. Cabot himself, after an absence of more than three years, came back in 1530, and applied to Charles V. for means to open up com- munications with Peru by way of the river Bermejo. The

emperor's resources were, however, absorbed by his struggle for European supremacy with Francis I. of France, and he was obliged to leave the enterprise of South American discoveries to his wealthy nobles. Cabot's colony at San Espiritu did not long survive his departure; an attempt of the

chief of the Timbus to gain possession of one of the Spanish ladies of the settlement led to a treacherous massacre of the garrison.

Two years after the return of Cabot, the news of Francisco Pizarro's marvellous conquest of Peru reached Europe (1532), and stirred many an adventurous spirit to strive to emulate his good fortune. Among these was Pedro de Mendoza, a Basque nobleman. He obtained from Charles V. a grant (asiento) of two hundred leagues of the coast from the boundary of the Portuguese possessions southward towards the Straits of Magellan, and the inland country which lay behind it. Mendoza undertook to conquer and settle the territory at his own charges, certain profits being reserved to the crown. In August 1534 the adelantado, or governor, sailed from San Lucar, at the head of the largest and wealthiest expedition that had ever left Europe for the New World. In January 1535 he entered the river Plate, where he followed the northern shore to the island of San Gabriel, and then crossing over he landed by a little stream, still called Riachuelo. The name of Buenos Aires was given to the country by Sancho del Aires™ Campo, brother-in-law of the adelantado, who first stepped ashore. Here, on the 2nd of February, Mendoza laid the' foundations of a settlement which in honour of the day he named Santa Maria de Buenos Aires. Mendoza, after some fierce encounters with the Indians, now proceeded up the Parana, and built a fort, which he called Corpus Christi, near the site of Cabot's former settlement of San Espiritu. The expedition, which originally numbered 2500 men, was reduced by deaths at the hands of the Indians, by disease and privation, within a year to less than 500 men. From Corpus Christi, Mendoza sent out various bodies to explore the interior in the direction of Peru, but without much success, and at length, thoroughly discouraged and broken in health, he abandoned his enterprise, and returned to Spain in 1537.

A portion of one of the expeditions he despatched, under Juan de Ayolas, pushing up the Paraguay, is said to have reached the south-east districts of Peru, but while returning laden with booty, was attacked by the Payagua, Indians, and every man perished. The other portion, which had stayed behind as a reserve under Domingos Irala, had better fortunes. Finding their comrades did not return, Irala and his companions determined to descend the river, and on their downward journey opposite the mouth of the river Pilcomayo, finding a suitable site for colonizing, they founded (1536) what pKpved to be the first permanent Spanish settlement in the interior of South America, 'the future city of Asuncion (15th August 1536).

In the meantime the colony at Buenos Aires had been dragging on a miserable existence, and after terrible sufferings from famine and from the ceaseless attacks of the Indians, the re- maining settlers abandoned the

place and made their way up the river first to Corpus Christi, then to Asuncion. Here, by the emperor's orders, the assembled Spaniards proceeded to the election of a captain-general, and their choice fell almost unanimously on Domingos Martinez de Irala, who was proclaimed captain-general of the Rio de la Plata (August 1538). In 1542 the settlement of Buenos Aires was re-established by an expedition sent for the purpose from Spain, under a tried adelantado, Cabeza de Vaca. This able leader, eager to reach Asuncion as quickly as possible, sent on his ships to the river Plate, but himself with a small following marched overland from Santa Catherina on the coast of Brazil to join Irala. His doings at Asuncion belong, however, not to the history of Argentina, but of Paraguay. Suffice it to say that differences with Iisdk eventually led to his arrest, and to his being sent back to Spain to answer to the charges brought against him for maladministration. The second settlement made by his expedition at Buenos Aires was even less successful and

Irala.

ARGENTINA

long-lived than the first. Exposed to the incessant attacks of the savages, the piace was a second time abandoned, February

1543-

Forty years were now to elapse before any further efforts were made by the Spaniards to colonize any part of the territory of the river Plate and lower Parana. In 1573 Juan aaray" ˆ e Garay, at the head of an expedition despatched from Asuncion, founded the city of Santa Fe near the abandoned settlements of San Espiritu and Corpus Christi. Seven years later (1580), when the new colony had been firmly established, Juan de Garay proceeded southwards, and made the third attempt to build a city on the site of Buenos Aires; and despite the determined hostility of the Querendi Indians he succeeded in finally gaining a complete mastery over them. In a desperate battle, the natives were defeated with great slaughter, and the territory surrounding the town was divided into ranches, in which the conquered natives had to labour. The new town received from Garay the name of Ciudod de la Sanlissima Trinidad, while its port retained the old appellation of Santa Maria de Buenos Aires. It was endowed by its founder with a cabildo (corporation) and full Spanish municipal privileges. Garay, when on his way to Santa Fe, was unfortunately murdered by a party of Indians, Minuas (Mimas), three years later, while incautiously sleeping on the river bank near the ruins of San Espiritu. The new settlement, however, continued to prosper, and the cattle and horses brought from Europe multiplied and spread over the plains of the Pampas.

In the meantime the Spaniards had penetrated into the interior of what is now the Argentine Republic, and established themselves on the eastern slopes of the Andes. la 1553 an ex- pedition from Peru made their way through the mountain region and founded the city of Santiago del Estero, that of Tucuman in 1565, and that of Cordoba in 1573. Another expedition from Chile, under Garcia Hurtado de Mendoza, crossed the Cordillera in 1559, and having defeated the Araucanian Indians, made a settlement which from the name of the leader was called Mendoza. In 1620 Buenos Aires was separated from the authority of the government established at Asuncion, and was made the seat of a government extending over Mendoza, Santa Fe, Entre Rios and Corrientes, but at the same time remained like the government of Paraguay at Asuncion, and that of the province of Tucuman, which had Cordoba as its capital, subject to the authority of the viceroyalty of Peru.

Thus at the opening of the 17th century, after many adven- turous efforts,

and the expenditure of many lives and much E // 0/ treasure, the Spaniards found themselves securely Spanish established on the river Plate, and had planted a colonial number of centres of trade and colonization in the system. interior. Unfortunately, in no part of the Spanish oversea possessions did the restrictive legislation of the home government operate more harshly or disadvantageously to the interests of the colony; it was a more effective hindrance to the development of its resources and the spread of civilization over the country, than the hostility of the Indians. Cabot had urged the feasibility of opening an easier channel for trade with the interior of Peru through the river Plate and its tributaries, than that by way of the West Indies and Panama; and now that his views were able to be realized, the interests of the merchants of Seville and of Lima, who had secured a monopoly of the trade by the route of the isthmus, were allowed to destroy the threatened rivalry of that by the river Plate. Never in the history of colonization has a mother country pursued so relent- lessly a policy more selfish and short-sighted. Spanish legis- lation was not satisfied with endeavouring to exclude all Euro- pean nations except Spain from trading with the West Indies, but it sought to limit all commerce to one particular route, and it forbade any trade being transacted by way of the river Plate, thus enacting the most flagrant injustice towards the people it had encouraged to settle in the latter country. The strongest protests were raised, but the utmost they could effect was that, in 1618, permission was granted to export from Buenos Aires two shiploads of produce a year. But the Spanish government

was not content with the prohibition of sea-borne commerce. To prevent internal trade with Peru a custom-house was set up at Cordoba to levy a duty of 50 % on everything in transit to and from the river Plate. In 1665 the relaxation of this system was brought about by the continual remonstrances of the people, but for more than a century afterwards (until 1776) the policy of exclusion was enforced. This naturally question. led to a contraband trade of considerable dimensions. The English, after the treaty of Utrecht (1715) held the contract (asiento) for supplying the Spanish-American colonies with negro slaves. Among other places the slave ships regularly visited Buenos Aires, and despite the efforts of the Spanish authorities, contrived both to smuggle in and carry away a quantity of goods. This illicit commerce went on steadily till 1739, when it led to an outbreak of war between England and Spain, which put an end to the asiento. The Portuguese were even worse offenders, for in 1680 they made a settlement on the north of the river Plate, right opposite to Buenos Aires, named Colohia, which with one or two short intervals, remained in their hands till 1777. From this port foreign merchandise found its way duty free into the Spanish provinces of Buenos Aires, Tucuman and Paraguay, and even into the interior of Peru. The con- tinual encroachments of the

Portuguese at length led the Spanish government to take the important step of making Buenos Aires the seat of a viceroyalty with jurisdiction over the territories of the present republics of Bolivia, Paraguay, Uruguay and the Argentine Confederation (1776). At the same time all this country was opened to Spanish trade even with Peru, and the development of its resources, so long thwarted, was allowed comparatively free play. Pedro de Zeballos, the first viceroy, took with him from Spain a large military force with which he finally expelled the Portuguese from the banks of the river Plate.

The wars of the French Revolution, in which Spain was allied with France against Great Britain, interrupted the growing prosperity of Buenos Aires. On the 1 7 th of June 1 806 General William Beresford landed with a body of Effects of troops from a British fleet under the command of Sir wan Home Popham, and obtained possession of Buenos Aires. But a French officer, Jacques de Liniers, gathered together a large force with which he enclosed the British within the walls, and finally, on the 12th of August, by a successful assault, forced Beresford and his troops to surrender. In July 1807 another British force of eight thousand men under General Whitelock endeavoured to regain possession of Buenos Aires, but strenuous preparations had been made for resistance, and after fierce street fighting the invading army, after suffering severe losses, was compelled to capitulate. The colonists, who had achieved their two great successes without any aid from the home government, were naturally elated, and began to feel a new sense of self-reliance and confidence in their own resources. The successful defence of Buenos Aires accentuated the growing feeling of dissatisfaction with the Spanish connexion, which was soon to lead to open insurrection. The establishment of the Napoleonic dynasty at Madrid was the actual cause which brought about the disturbances which were to end in separation. Liniers was viceroy on the arrival of the news of the crowning of Joseph Bonaparte as king of Spain, but as a Frenchman he was distrusted and was deposed by the adherents of Ferdinand VII. The central junta at Seville, acting in the name of Ferdinand, appointed Balthasar de Cisneros to be viceroy in his place. He entered upon the duties of his office on the 19th of July 1809, and at first he gained popularity by acceding to the urgent appeals of the people and throwing open the trade of the country to all nations. But his measures speedily gave dissatisfaction to the Argentine or Creole party, who had long chafed under the disabilities of Spanish rule, and who now felt themselves no longer bound by ties of loyalty to a country which was in the possession of the French armies.

On the 25th of May 1810 a great armed assembly met at Buenos Aires and a provisional junta was formed to supersede the authority of the viceroy and carry on the government. The acts of the new government ran in the name of Ferdinand VII.,

but the step taken was a revolutionary one, and the 25th of May has ever since been regarded as the birthday of Argen- tine independence. The most prominent leader of for/iKfc- t ˆ le J unta was ‘ ts secretary Mariano Moreno (1778- pcndence. 181 1), who with a number of other active supporters of the patriot cause succeeded in raising a considerable force of Buenos Aireans to maintain, arms in hand, their nation- alist and anti-Spanish doctrines. An attempt of the Spanish party to make Balthasar de Cisneros president of the junta failed, and the ex-viceroy retired to Montevideo. A sanguinary struggle between the party of independence and the adherents of Spain spread over the whole country, and was carried on with varying fortune. Foremost among the leaders of the revolutionary armies were Manuel Belgrano, and after March 181 2 General Jose de San Martin, an officer who had gained experience against the French in the Peninsular War. A state of disorder, almost of anarchy, reigned in the provinces, but on the 25th of March 1816 a congress of deputies was assembled at Tucuman, who named Don Martin Pueyrredon supreme director, and on the 9th of July the separation of the united provinces of the Rio de la Plata was formally proclaimed, and comparative order was re-established in the country; Buenos Aires was declared the seat of the government. The jealousy of the provinces, however, against the capital led to a series of disturbances, and for many years continual civil war devastated every part of the country. Bolivia, Paraguay and Uruguay rose in armed revolt, and finally established themselves as separate republics, whilst the city of Buenos Aires itself was torn with faction and the scene of many a sanguinary fight.

From 1816, however, the independence of the Argentine Republic was assured, and success attended the South Americans in their contest with the royal armies. The combined *T “b-” C f° rces of Buenos Aires and Chile defeated the Spaniards Ushed. at Chacabuco in 1817, and at Maipii in 1818; and from Chile the victorious general Jose de San Martin led his troops into Peru, where on the 9th of July 1821, he made a triumphal entry into Lima, which had been the chief stronghold of the Spanish power, having from the time of its foundation by Pizarro been the seat of government of a viceroyalty which at one time extended to the river Plate. A general congress was assembled at Buenos Aires on the 1st of March 1822, of representatives from all the liberated provinces, and a general amnesty was decreed, though the war was not over until the 9th of December 1824, when the republican forces gained the final, victory of Ayacucho, in the Peruvian border-land. The Spanish government did not, however, formally acknowledge the in- dependence of the country until the

year 1842. On the 23rd of January 1825, a national constitution for the federal states, which formed the Argentine Republic, was decreed; and on the 2nd of February of the same year Sir Woodbine Parish, acting under the instructions of George Canning, signed a commercial treaty in Buenos Aires, by which the British government acknowledged the independence of the country. It had already been recognized by the United States of America two years previously.

In 1826 Bernardo Rivadavia was elected president of the confederation. His policy was to establish a strong central Unitarians government, and he became the head of a party known and as Unitarians in contradistinction to their opponents,

Federal- w jj were styled Federalists, their aim being to main- tain to the utmost the local autonomy of the various provinces. Under the government of Rivadavia the people of Buenos Aires became involved, practically single-handed, in a war with Brazil in defence of the Banda Oriental, which had been seized by the imperial forces (see Uruguay). The Brazilians were defeated, notably at Ituzaingo, and in 1827 the war issued in the independence of Uruguay. Rivadavia's term of office was likewise memorable for the constitution of the 24th of December 1826, passed by the constituent congress of all the provinces, by which the bonds which united the confederated states of the Argentine Republic were strengthened. This project of closer union met, however, with much opposition both at Buenos Aires and the provinces. Rivadavia resigned, and Vicente Lopez,

a Federalist, was elected to succeed him, but was speedily dis- placed by Manuel Dorrego (1827), another representative of the same party. The carrying out of Federalist principles led, however, to the formation in the republic of a number of quasi- independent military states, and Dorrego only ruled in Buenos Aires. After the conclusion of the peace with Brazil, the Uni- tarians placed themselves under the leadership of General Juan de Lavalle, the victor of Ituzaingo. Lavalle, at the head of a division of troops, drove Dorrego from Buenos Aires, pursued him into the interior, and captured him. He was shot (December 9, 1828), by the order of Lavalle, and during the year 1828 the country was given up to the horrors of civil war.

On the death of Dorrego, a remarkable man, Juan Manuel de Rosas, became the Federalist chief. In 1829 he defeated Lavalle, made himself master of Buenos Aires, and in the course of the next three years made his authority recognized dictator. after much fighting throughout the provinces. The Unitarians were relentlessly hunted down and a veritable reign of terror ensued. Rosas gradually concentrated all power in his own hands, and was hailed by the populace as a saviour of the state. In 1835, with the

title of governor and captain- general, he acquired dictatorial powers, and all public authority passed into his hands. This dictatorship of Rosas continued until 1852. In every department of administration and of government he was supreme. He was exceedingly jealous of foreign interference, and quarrelled with France on questions connected with the rights of foreign residents. Buenos Aires was in 1838 blockaded by a French fleet; but Rosas stood firm. A formidable revolt took place in 1839 under General Lavalle, who had returned to the country accompanied by a number of banished Unitarians. In 1840 he invaded Buenos Aires at the head of troops raised chiefly in the province of Entre Rios; but he was defeated at Santa Fe, then at Lujan, and finally was captured in Jujuy and shot, 1841. The rule of Rosas was now one of tyranny and almost incessant bloodshed in Buenos Aires, while his partisans, foremost amongst whom was General Ignacio Oribe, endeavoured to exterminate the Unitarians throughout the provinces. The scene of slaughter was extended to the Banda Oriental by the attempt of Oribe, with the support of Rosas, and of Justo Jose de Urquiza, governor of Entre Rios, to establish himself as president of that republic (see Uruguay), where the existing government was hostile to Rosas and sheltered all political refugees from the country under his despotic rule. The siege of Montevideo led to a joint intervention of England and France. Buenos Aires was blockaded by the combined English and French fleets, September 1845, which landed a force to open the passage up the Parana to Paraguay, which had been declared closed to foreigners by Rosas. A convention was signed in 1849, which secured the free navigation of the Parana and the independence of the Banda Oriental. The downfall of Rosas was at last brought about by the instrumentality of Justo Jose de Urquiza, who as governor of Entre Rios, had for many years been one of his strongest supporters. The breach between the two men which led to open collision took place in 1846. The first efforts of Urquiza to rouse the country against the oppressor were unsuccessful, but in 1851 he concluded an alliance with Brazil, to which Uruguay afterwards adhered. A large army of twenty-four thousand men was collected at Montevideo, and on the 8th of January 1852 the allied forces crossed the Parana and the road to Buenos Aires lay open before them. Rosas met the allies at the head of a body of troops fully equal in numbers to their own, but was crushingly routed, February 3rd, at Monte Caseros, about 10 m. from the capital. The dictator fled for refuge to the British legation, from whence he was conveyed on board H.B.M.S. " Locust," which carried him into exile.

A provisional government was formed under Urquiza, and the Brazilian and Uruguayan troops withdrew. He summoned all the provincial governors at San Nicolas in the province of Buenos Aires, and on the 31st of May they pro- president. claimed a new constitution, with Urquiza as

provi- sional director of the Argentine nation. A constituent congress, in which each province had equal representation, was duly

elected, and in order to provide against the predominance of Buenos Aires, it was determined that Sante Fe should be the place of session. But this did not suit the portenos, as the people of Buenos Aires were called, and the province refused to take any part in the congressional proceedings. But Urquiza

was a man of different temperament from Rosas, and Aires when he found that Buenos Aires refused to submit

to his authority, he declined to use force. The con-

aad the provinces.

gress had (May i, 1853) appointed Urquiza president of the confederation, and he established the seat of government at Parana. The province of Buenos Aires was recognized as an independent state, and under the enlightened administration of Doctor Obligado made rapid strides in commercial prosperity. The two sections of the Argentine nation contrived to exist as separate governments without an open breach of the peace until 1859, when the long-continued tension led to the outbreak of hostilities. The army of the portenos, commanded by Colonel Bartolome Mitre, was defeated at Cepeda by the confederate forces under Urquiza, and Buenos Aires agreed to re-enter the confederation (November n, 1859). Urquiza at this juncture resigned the presidency, and Doctor Santiago Derqui was elected president of the fourteen provinces with the seat of government at Parana; while Urquiza became once more governor of Entre Rios, and Mitre was appointed governor of Buenos Aires.

The struggle for supremacy between Buenos Aires and the provinces had, however, to be fought out, and hostilities once

more broke out in 1861. The armies of the opposing president parties, under Generals Mitre and Urquiza respectively,

met at Pavon in the province of Santa Fe (September 17). The battle ended in the disastrous defeat of the provincial forces; General Mitre used his victory in a spirit of modera- tion and sincere patriotism. He was elected president of the Argentine confederation and did his utmost to settle the questions which had led to so many civil wars, on a permanent and sound

basis. The constitution of 1853 was maintained, but Buenos Aires became the seat of federal government without ceasing to be a provincial capital. Causes of friction still remained, but they did not develop into open quarrels, for Mitre was content to leave Urquiza in his province of Entre Rios, and the other administrators (caudillos) in their several governments, a large measure of autonomy, trusting that the position and growing commercial importance of Buenos Aires would inevitably tend to make the federal capital the real centre of power of the republic. In 1865 the Argentines were forced into war with Paraguay through the overbearing attitude of the president Francisco Solano Lopez. The dictator of Paraguay had quarrelled with Brazil for its intervention m the internal affairs of Uruguay,

and he demanded free passage for his troops across

the Argentine province of Corrientes. This Mitre

refused, and alliance was formed between Argentina, Brazil and Uruguay, for joint action against Lopez. General Mitre became commander-in-chief of the combined armies for the invasion of Paraguay and was absent for several years in the field. The struggle was severe and attended by heavy losses, and it was not until 1870 that the Paraguayans were conquered, Lopez killed, and peace concluded (see Paraguay). Meanwhile, disturbances had broken out in the interior of Argentina (1867), which compelled Mitre to relinquish his command in Paraguay, and to call back a large part of the Argentine forces to suppress the insurrection. The rebels had hoped for assistance from Urquiza, but the powerful governor of Entre Rios maintained the peace in his province, which under his firm and beneficent rule had greatly prospered, and the revolutionary movement was quickly subdued.

In 1868 the term of General Mitre came to an end, and Doctor Domingo Faustino Sarmiento, a native of San Juan, was quietly

elected to succeed him. His conduct of affairs was president, broad-minded and upright, and was characterized

by earnest efforts to promote education and to develop the resources of the country. His period of office was marked by the rapid advance of Buenos Aires in population and pros- perity, and by an expansion of trade that was unfortunately

Paraguay war.

accompanied by financial extravagance. The war with Paraguay left a legacy of disputes concerning boundaries which almost led to war between

the two victorious allies, Argentina and Brazil, but by the exertions of Mitre, who was sent at the close of 1872 as special envoy to Rio, a settlement was arrived at and friendly relations restored. The month of April 1870 saw an insurrection in Entre Rios headed by the caudillo, Lopez Jordan. Urquiza was assassinated, and the provincial legislature, through fear, at once proclaimed Lopez Jordan governor. The federal government refused to acknowledge the new governor, and troops were despatched by Sarmiento against Entre Rios. The contest lasted with varying success for more than a year, but finally Lopez Jordan was completely defeated and driven into exile.

The presidential election of 1874 resolved itself, as so often before, into a struggle between the provincials and the portenos (Buenos Aires). The candidate of the former, Dr Nicolas Avellaneda, triumphed over General Mitre, pres u e „t, not without suspicions of tampering with the returns; and the unsuccessful party appealed to arms. The new president, however, who was installed in office on the 12th of October, took active steps to suppress the revolution, which never assumed a really serious character. The government troops gained two decisive victories over the insurgents under Generals Mitre and Arredondo, and they were compelled to surrender at discretion. But though peace was for a time restored, the old causes of soreness and dissension remained unappeased, and as the time for the next presidential election began to draw near, it became more and more evident that a critical struggle was at hand, and that the people of Buenos Aires, supported by the province of Corrientes, were determined to bring to an issue the question as to what position Buenos Aires was to hold for the future with regard to the remaining provinces of the confederation. It was evident that the president intended to use all the influence which the party in power could exercise, to secure the return of General Julio Roca, who had distinguished himself in 1878 by a successful campaign against the warlike Indian tribes bordering on the Andes. The portenos on their part were determined to resist this policy to the utmost. Mass meetings were held, and a committee was appointed for the purpose of considering what action should be taken to defeat the ambitious designs of the provincials. Under the direction of this committee, the association known as the " Tiro Nacional " was formed, with the avowed TVac/o/jaA object of training the able-bodied citizens of Buenos Aires in military exercises and creating a volunteer army, ready for service if called upon, to withstand by force the pretensions of their opponents. The establishment of the Tiro Nacional Was enthusiastically received by all classes in Buenos Aires, the men turning out regularly to drill, and the women aiding the movement by collecting subscriptions for the purpose of arma- ment and other necessaries. On the 13th of February 1880, the minister of war, Dr Carlos Pellegrini, summoned the principal officers connected with the Tiro Nacional, General

Bartolome' Mitre, his brother Emilio, Colonel Julio Campos, Colonel Hilario Lagos and others, and warned them that as officers of the national army they owed obedience to the national govern- ment, and would be severely punished if concerned in any revolutionary outbreak against the constituted authorities. The reply to this threat was the immediate resignation of their com- missions by all the officers connected with the Tiro Nacional. Two days later, the national government occupied, with a strong force of infantry and artillery, the parade ground at Palermo used by the Buenos Aires volunteers for drill purposes. A great meeting of citizens was then called and marched through the streets. President Avellaneda was frightened at the results of his action, and to avoid a collision ordered the troops to be withdrawn. Negotiations were now opened by the government with the provincial authorities for the disarmament of the city and province of Buenos Aires, but they led to nothing. Matters became still further strained on account of the outrages com- mitted by the national troops, and such was the bitterness of

feeling developed between the two factions, that an appeal to arms became inevitable.

In the month of June 1880, President Avellaneda and his ministers left Buenos Aires, and this act was considered by the

porteno leaders equivalent to a declaration of war. JZOfa. ° The national government and the twelve provinces

forming the Cordoba League, were ranged on one side; the city and province of Buenos Aires and the province of Corrientes on the other. The national troops were well armed with Remington rifles, provided with abundant ammunition, equipped with artillery and supported by the fleet. In the city and province of Buenos Aires, plenty of volunteers offered their services, and an army of some twenty-five thousand men was quickly raised, but they were armed with old-fashioned weapons and there was only a limited supply of ammunition. Feverish attempts were made to remedy the lack of warlike stores, but difficulty was experienced on account of the fleet blockading the entrance to the river. After several skirmishes, the national army commanded by General Roca, containing many troops seasoned in Indian campaigns, assaulted the portenos posted

before Buenos Aires, and after two days' hard fighting Fallot (20th and 21st July) forced its way into the town. 4jˆ fc On 23rd July the surrender

of the city was demanded

and obtained. The terms of the surrender were that all the leaders of the revolution should be removed from posi- tions of authority, all government employees implicated in the movement dismissed, and the force in the province and city of Buenos Aires at once disarmed and disbanded. The power of Buenos Aires was thus completely broken and at the mercy of the Cordoba League. The portenos were no longer in a position to nominate a candidate in opposition to General Julio Roca, who was duly elected. He assumed office in October 1880.

Hitherto General Roca had been regarded only in his capacity as a soldier, and not from the point of view of an administrator.

In the campaigns against the Indians in the south- presldeat west °f t ˆ e province of Buenos Aires and the valley of

the Rio Negro he had gained much prestige; the victory over Buenos Aires added to his fame, and secured his authority in the outlying provincial centres. One of the first notable acts of the Roca administration was to declare the city of Buenos Aires the property of the national government. This separation of the city from the province, and its federalization had been one of the chief aims of the Cordoba League, and was the natural consequence of the crushing defeat inflicted on the portenos. As a sequel to this step, in 1884 the town of La Plata was declared to "be the capital of the province of Buenos Aires, and the pro- vincial administration was moved to that place. This federal- ization of the capital has proved to be a most important factor in binding together the different parts of the confederation, and in promoting the evolution of an Argentine nation out of a loosely cemented union of a number of semi-independent states. Considering the circumstances in which General Roca assumed office, it must be admitted that he showed great moderation and used the practically absolute power that he possessed to establish a strong central government, and to initiate a national policy, which aimed at furthering the prosperity and develop- ment of the whole country. He was able by the influence he exerted to keep down the internal dissensions and insurrectionary outbreaks which had so greatly impeded for many years the development of the vast natural resources of the republic. With this object he had promoted the extension of railways so as to link the provinces with the great port of Buenos Aires, and to provide at the same time facilities for the rapid despatch of military forces to disturbed districts. Unfortunately the last two years of Roca's term of office were marked by two grave errors, which subsequently caused widespread suffering and distress throughout the country. The first of these mistakes was a measure making (January 1885) the currency inconvertible for a period of two years. This act, which was

only decided upon after much hesitation, had a most deleterious effect upon the national credit. The second was the nomination of Dr Miguel Juarez Celman for the presidential term commencing in October

1886. The nomination was brought about by the Cordoba clique, and Roca lacked the moral courage to oppose the decision of this group, though he was well aware that Celman, who was his brother-in-law, was neither intellectually nor morally fitted for the post.

No sooner had President Juarez Celman come into power towards the close of 1886, than the respectable portion of the community began to feel alarmed at the methods practised by the new president in his conduct of

Celman president.

public affairs. At first it was hoped that the influence of General Roca would serve to check any serious extravagance on the part of Celman. This hope, however, was doomed to disappointment, and before many months had elapsed it was clear that the president would listen to no prudent counsels from Roca or from any one else. The men of the old Cordoba League became dominant in all branches of the government, and carpet-bagging politicians occupied every official post. In their hurry to obtain wealth, this crowd of office-mongers from the provinces lent themselves to all kinds of bribery and corrup- tion. The public credit was pledged at home and abroad to fill the pockets of the adventurers, and the wildest excesses were committed under the guise of administrative acts. What followed in the second and third years of the Celman administration can only adequately be described as a debauchery of the national honour, of the national resources, of the rights of Argentines as citizens of the republic. Buenos Aires was still prostrate under the crushing blow of the misfortunes of 1880, and lacked strength and power of organization necessary to raise any effective protest against the proceedings of Celman and his friends when the true character of these proceedings was first understood. The conduct of public affairs, however, at length became so scandalous, that action on the part of the more sober- minded and conservative sections was seen to be absolutely imperative if the country was to be saved from speedy and certain ruin. In 1889 the association of the " Union Civica " was founded, and the organization undertaken hy Dr Leandro Alem, Dr Aristobulo del Valle, Dr Ber- C i vlca . nardo Irigoyen, Dr Vicente Lopez, Dr Lucio Lopez, Dr Oscar Lilliedale and other leading citizens. The un-tiring energy and zeal of Leandro Alem fitted him for being the chief organizer of a movement into which he threw himself heart and soul. Mass meetings were held in Buenos Aires, and it fell specially to the lot of Dr del Valle, who was an able orator as well as a sincere patriot, to expose the irresponsible and corrupt character of the administration, and the terrible

dangers that threatened the republic through its reckless extravagance and financial improvidence. Subsidiary clubs affiliated to the central administration were formed throughout the length and breadth of the country, and millions of leaflets and pamphlets were distributed broadcast to explain the importance of the movement. President Celman underrated the strength of the new opposition, and relied upon his armed forces promptly to suppress any signs of open hostility. No change was made in official methods, and the condition of affairs drifted from bad to worse, until the temper of the people, so long and so sorely tried, showed plainly that the situation had become insufferable. The Union Civica then decided to make a bold bid for freedom by attempting forcibly to eject Celman and his clique from office. On the night of the 26th of July 1890 the Union Civica called its members to arms. It was joined by some regiments of the regular army and received the support of the fleet. Barricades were thrown up in the principal streets, and the surrounding houses were occupied by the insurgents. Two days of desultory street fighting ensued, during which the fleet began to bombard the city, but was compelled to desist by the interference of foreign men-of-war, on the ground that the bombardment was causing unnecessary damage to the life and property of non-combatants. A suspension of hostilities then took place, and negotiations were opened between the contending parties. Celman, acting upon the advice of General Roca, who recognized ' the strength of public opinion in the outbreak, placed his resig- nation in the hands of congress on the 31st of. July. A scene of

intense enthusiasm followed, and Buenos Aires was en fete for the following three days. The vice-president of the confedera- tion, Carlos Pellegrini, who had been minister of war under presidents Avellaneda and Roca and had had much adminis- trative experience, succeeded without opposition to the vacant post.

Much satisfaction was shown in Europe at the fall of President Celman, for investors had suffered heavily by the way in which

the resources of Argentina had been dissipated by oresfcfenl a corru Pt government, and hopes were entertained

that the uprising of public opinion against his finan- cial methods signified a more honest conduct of the national affairs in the future. Great expectations were entertained of the ability of President Pellegrini to establish a sound administration, and he succeeded in forming a ministry

which gave general satisfaction throughout the country. General Roca was induced to undertake the duties of minister of the interior, and his influence in the provinces was sufficient to check any attempts to stir up disturbances at Cordoba or else- where. The most onerous post of all, that of minister of finance, was confided to Dr Vicente Lopez, who, though he was not of marked financial ability, was at least a man of untiring industry and of a personal integrity that was above suspicion. But the economic and financial situation was one of almost hopeless embarrassment and confusion, and Pellegrini proved himself incapable of grappling with it. Instead of facing the difficulties, the president preferred to put off the day of reckoning by flooding the country with inconvertible notes, with the result that the financial crisis became more and more aggravated. Through the rapid depreciation of Argentine credit, the great firm of Baring Brothers, the financial agents of the government in London, became so heavily involved that they were forced into liquidation, November 1890. The consequences of this catastrophe were felt far and wide, and in the spring of 1891 both the Banco Nacional and the Banco de la provincia de Buenos Aires were unable to meet their obligations. Amidst this sea of financial troubles the government drifted helplessly on, without showing any inclination or capacity to initiate a strong policy of reform in the methods of administration which had done so much to ruin the country.

It is little wonder that, in these circumstances, the choice of a successor to Pellegrini, whose term of office expired in 1892, should have been felt to possess peculiar importance. General Bartolome Mitre was proposed by the portenos as their candi- date. He had been absent from Argentina on a journey to Europe, and on his return in April 1891, a popular reception was given to him at which 50,000 persons attended. A petition was presented to him begging him to be a candidate for the presidency, and with some reluctance the veteran leader gave his consent. His partisans, however, found themselves con- fronted by a compact provincial party, who proposed to put forward the other strong man of the republic, General Roca, to oppose him. But the two generals were equally averse to a contest d outrance, which could only end in civil war. They met accordingly at a conference known as El Acuerdo, and it was arranged that both should withdraw, and that a non-party candidate should be selected who should receive the support of them both. The choice fell upon Dr Saenz Pena, a judge of the supreme court, and a man universally respected, who had never taken any part in political life. This compact aroused the bitter enmity of Dr Leandro Alem, who did his utmost to stir up the Union Civica to a campaign against the neutral candidate. Finding that the more conservative section of the union would not follow him, Alem formed a new association to which he gave the name of Union Civica Radical. Such was his energy, that soon a network of branches of the Union Civica Radical

was organized throughout the republic, and Dr Ber- nardo Irigoyen was put forward as a rival candidate to Dr Saenz Pena. But Alem was not content with constitutional opposition to the Acuerdo, and his movement soon assumed the character of a revolutionary propaganda against the national government. His violence gave Pellegrini the opportunity of taking active

steps to preserve the peace. In April 1892 Alem and his chief colleagues were arrested and sent into exile.

In the following month (May), the presidential elections were held; Dr Saenz Pena was declared duly elected, and Dr Jose Uriburu, the minister in Chile, was chosen as vice-president.

The idea of Dr Saenz Pena was to conduct the government on common sense and non-partisan lines, in fact to translate into practical politics the principles which underlay the compromise of the Acuerdo. He was a straight- ■ Sa ° forward and honourable man, who tried his best to do president. his duty in a position that had been forced upon him, and was in no sense of the word his own seeking. No sooner, however, was he installed in office than difficulties began to crop up on all sides, and he quickly discovered that to attempt to govern without the aid of a majority in congress was practically impossible. He had had no experience of political life, and he refused to create the support he needed by using his presidential prerogative to build up a political majority. Obstruction met his well-meant efforts to promote the general good, and before twelve months of the presidential term had run public affairs were at a deadlock. Dr Alem, who had been permitted to return from exile, was not slow to profit by the occasion. Embittered by his treatment in 1892, he openly preached the advisability of an armed rising to overthrow the existing administration. Public opinion had been outraged by the immunity with which the governors of certain provinces, and more particularly Dr Julio Costa, the governor of the province of Buenos Aires, had been allowed to maintain local forces, by the aid of which they exacted the payment of illegal taxes and exercised other acts of injustice and oppression. A number of officers of the army and navy agreed to lend assistance to a revolutionary outbreak, and towards the end of July 1893 matters came to a head. The population of Buenos Aires assembled in armed bodies with the avowed intention of ejecting the governor from office, and electing in his stead a man who would give them a just adminis- tration. The president was for some time in doubt whether he had any right to intervene in provincial affairs, but eventually troops were despatched to La Plata. There was no serious fighting. Negotiations were soon opened which quickly led to the resignation of Costa, and the return of the insurgents to their homes. While these disturbances were taking place in the province of Buenos Aires, another revolutionary rising was in progress in Santa Fe. Here the efforts of

Dr Alem succeeded in supplying a large body of rebels with arms and ammuni- tion, and he was able, by a bold attack, to seize the town of Rosario and there establish the revolutionary headquarters. This capture so alarmed the national government that a force was sent under the command of Roca to put down the insurrection. The revolt speedily collapsed before this redoubtable commander, and Alem and the other leaders surrendered. They were sen- tenced to banishment in Staten Island at the pleasure of the federal government.

But the suppression of disorder did not relieve the tension between the congress and the executive. During the whole of the 1894 session, the attitude of senators and deputies alike was one of pronounced hostility to the president. All his acts were opposed, legislation was at a standstill and every effort was made to force Dr Saenz Pena to resign. But although he ex- perienced the utmost difficulty in forming a cabinet, the president was obstinate in his determination to retain office without identifying himself with any party. A definite issue was therefore sought by the congress on which to join battle, and it arose out of the death sentences which had been pronounced on certain naval and military officers who had been implicated in the Santa Fe outbreak. The president had made up his mind that the sentence must be carried out; the congress by a great majority were resolved not to permit the death penalty to be inflicted. It was a one-sided struggle, for without the consent of the congress the president could not raise any money for supplies, and congress refused to vote the budget. But heavy expenses had been incurred in putting down revolutionary movements in various parts of the provinces, and war with Chile

was threatened upon the question of a dispute concerning the boundaries between the two republics. In January 1895 a special session of congress was summoned to take into con- sideration the financial proposals of the government, which included an increase in the naval and military estimates. Con- gress, however, had now got their opportunity, and they used the time of national stress to bring increased pressure to bear upon the president. On the 21st of January Dr Saenz Pefia at last perceived that his position was untenable, and he handed in his resignation. It was accepted at once by the chambers, and the vice-president, Dr Jose Uriburu, became president of the republic for the three years and nine months of Pefia's term which remained unexpired.

Uriburu was neither a politician nor a statesman, but had spent the greater portion of his life abroad in the diplomatic service. His knowledge of

foreign affairs was, however, I™ , peculiarly useful at a juncture when boundary ques- tions were the subjects that chiefly attracted public attention. After disputes with Brazil, extending over fifteen years, about the territory of " Misiones," the matter had been submitted to the arbitration of the president of the United States. In March 1895 President Cleveland gave his decision, which was wholly favourable to the contention of Brazil. The Argentine government, though disappointed at the result, accepted the award loyally. The boundary dispute with Chile, to which reference has already been made, was of a more serious character. The dispute was of old standing. Already in 1884 a protocol had been signed between the con- tending parties, by which it was agreed that the frontier should follow the line where " the highest peaks of the Andine ranges divide the watershed." This definition unfortunately ignored the fact that the Andes do not run from north to south in one continuous line, but are separated into cordilleras with valleys between them, and covering in their total breadth a considerable extent of country. Difference of opinion, therefore, arose as to the interpretation of the protocol, the Argentines insisting that the boundary should run from highest peak to highest peak, the Chileans that it should follow the highest points of the watershed. The quarrel at length became acute, and on both sides the populace clamoured from time to time for an appeal to arms, and the resources of both countries were squandered in military and naval preparations for a struggle. Nevertheless despite these obstacles, President Uriburu did some- thing during his term of office to relieve the nation's financial difficulties. In 1896 a bill was passed by congress, which authorized the state by the issue of national bonds to assume the provincial external indebtedness. This proof of the desire of the Argentine government to meet honestly all its obligations did much to restore its credit abroad. Uriburu found in 1897 the financial position so far improved that he was able to resume cash payments on the entire foreign debt.

*In 1898 there was another presidential election. Public opinion, excited by the prospect of a war with Chile, naturally supported the candidature of General Roca, and he * oc " was elected without opposition (12th October 1898).*

The first question which he had to handle was the Chilean boundary dispute. During the last months of President Uriburu's administration, matters had reached a climax, especi- ally in connexion with the delimitation in a district known as the Puna de Atacama. In August an ultimatum was received from Chile demanding arbitration. After some hesitation, on the advice of Roca the Argentines agreed to the demand, and peace was maintained. The principle of arbitration being accepted, the conditions were quickly arranged. The question of the Puna de Atacama was referred to a tribunal composed of the United States minister to

Argentina and of one Argentine and one Chilean delegate; that of the southern frontier in Patagonia to the British crown. One of the first steps of Presi- dent Roca, after his accession to office, was to arrange a meeting with the president of Chile at the Straits of Magellan. At their conference all difficulties were discussed and settled, and an undertaking was given on both sides to put a stop to warlike

preparations. The decision of the representative of the United States was given in April 1899. Although the Chileans pro- fessed dissatisfaction, no active opposition was raised, and the terms were duly ratified. In his message to congress, on the 1st of May 1899, General Roca spoke strongly of the immediate necessity of a reform in the methods of administering justice, the expediency of a revision of the electoral law, and the im- perative need of a reconstruction of the department of public instruction. The administration of justice, he declared, had fallen to so low an ebb as to be practically non-existent. By the powerful influence of the president, government measures were sanctioned by the legislature dealing with the abuses which had been condemned. On the 31st of August of the same year a series of proposals upon the currency question was submitted to congress by the president, whose real object was to counteract the too rapid appreciation of the inconvertible paper money. The official value of the dollar was fixed at 44 cents gold for all government purposes. The violent fluctuations in the value of the paper dollar, which caused so much damage to trade and industry, were thus checked. In October 1900 Dr Manuel Campos Salles, president of Brazil, paid a visit to Buenos Aires, and was received with great demonstrations of friendliness. The aggressive attitude of Chile towards Bolivia was causing considerable anxiety, and Argentina and Brazil wished to show that they were united in opposing a policy which aimed at acquiring an extension of territory by force of arms. The feeling of enmity between Chile and Argentina was indeed anything but extinct. The delay of the arbitration tribunal in London in giving its decision in the matter of the disputed boundary in Patagonia led to a crop of wild rumours being disseminated, and to a revival of animosity between the two peoples. In December 1901 warlike preparations were being carried on in both states, and the outbreak of active hostilities appeared to be imminent. At the critical moment the British government, urged to move in the matter by the British residents in both countries, who feared that war would mean the financial ruin of both Chile and Argentina, used its utmost influence both at Santiago and Buenos Aires to allay the misunder- standings; and negotiations were set on foot which ended in a treaty for the cessation of further armaments being signed, June 1902. The award of King Edward VII. upon the de- limitation of the boundary was given a few months later, and was received without controversy and ratified by both governments.

To the calm resourcefulness and level-headedness of President Roca at a

very difficult and critical juncture must be largely ascribed the preservation of peace, and the permanent removal of a dispute that had aroused so much irritation. His term of office came to an end in 1904, when Dr Manuel Quintana was elected president and Dr Jose Figueroa Alcorta n alatana vice-president, both having Roca's support. Dr and Quintana at the time of his election was sixty-four Alcorta years of age. He proved a hard-working progressive P resldents – president, who did much for the development of communications and the opening up of the interior of the country. He died amidst general regret in March 1906, and was succeeded by Dr Alcorta for the remaining years of his term. (G. E.)

Authorities. — C. E. Akers, Argentine, Patagonian and Chilian Sketches (London, 1893), and A History Of South America 1854-1904 (New York, 1905) ; Theodore Child, The Spanish-American Republics (London, 1891) ; Sir T. H. Holdich, The Countries of the King's Award (London, 1904) ; W. H. Hudson, The Naturalist in La Plata (London, 1892), and Idle Days in Patagonia (London, 1893); A. H. Keane and C. R. Markham, Central and South America, in Stanford's "Compendium of Geography and Travel" (London, 1901); G. E. Church, " Argentine Geography and the Ancient Pampean Sea " (Geogr. Journal, xii. p. 386); " South America: an Outline of its Physical Geography " {Geogr. Journal, xvii. p. 333) ; Dr Karl Karger, Landwirtschaft und Kolonisation im spanischen Amerika (2 vols., Leipzig, 1901) ; F. P. Moreno, " Explorations in Patagonia " (Geogr. Journal, xiv. pp. 241, 354); Carlos Lix Klett, Estudios sobre produccion, comercio, finanzas e interesses generales de la Republica Argentina (2 vols., Buenos Aires, 1900); G. Carrasco, El crecimiento de la poblacion de la Republica Argentina comparado con el de las principales naciones 1890-1903 (Buenos Aires, 1904) ; C. M. Urien

and C. Colombo, Geografia Argentina (Buenos Aires, 1905); E. von Rosen, Archaeological Researches on the Frontier of Argentina and Bolivia 1901-1902 (Stockholm, 1904) ; Arturo B. Carranza, Con- stitution National y Constituciones Provinciates Vigentes .(Buenos Aires, 1898); Angelo de Gubernatis, L' Argentina (Firenze, 1898); Meliton Gonzales, El Gran Chaco Argentino (Buenos Aires, 1890); John Grant & Sons, The Argentine Year Book (Buenos Aires, 1902 et seq.); Francis Latzina, Diccionario Geografico Argentino (Buenos Aires, 1891); Geographie de la Republique Argentine (Buenos Aires, 1890); V Agriculture et I'Elevage dans la Republique Argentine (Paris, 1889) ; Bartolome Mitre, Historia de San Martin y de la Emancipation Sud-Americana, segun nuevos documentos (3 vols., Buenos Aires, 1887); Historia de Belgrano y de la

Independencia Argentina (3 vols., Buenos Aires, 1883); Felipe Soldan, Diccionario Geografico Estadislico National Argentino (Buenos Aires, 1885); Thomas A. Turner, Argentina and the Argentines (New York and London, 1892); Estanislao S. Zeballos, Description Amena de la Republica Argentina (3 vols., Buenos Aires, 1881); Anuario de la Direcion General de Estadistica 1898 (Buenos Aires, 1899); Charles Wiener, La Republique Argentine (Paris, 1899); Segundo Censo Republica Argentina (3 vols., Buenos Aires, 1898); Handbook of the Argentine Republic (Bureau of the American Republics, Washington, 1892-1903). (A. J. L.)

ARGENTINE, a former city of Wyandotte county, Kansa, U. S. A., since igio a part of Kansas City, on the S. bank of the Kansas river, just above its mouth. Pop. (1890) 4732; (1900) 5878, of whom 623 were foreign-born and 603 of negro descent; (1905, state census) 6053. It is served by the Atchison, Topeka & Santa Fe railway, which maintains here yards and machine shops. The streets of the city run irregularly up the steep face of the river bluffs. Its chief industrial estab- lishment is that of the United Zinc and Chemical Company, which has here one of the largest plants of its kind in the country. There are large grain interests. The site was platted in 1880, and the city was first incorporated in 1882 and again, as a city of the second class, in 1889.*

ARGENTITE, a mineral which belongs to the galena group, and is cubic silver sulphide (Ag 2 S) . It is occasionally found as un- even cubes and octahedra, but more often as dendritic or earthy masses, with a blackish lead-grey colour and metallic lustre. The cubic cleavage, which is so prominent a feature in galena, is here present only in traces. The mineral is perfectly sectile and has a shining streak; hardness 2-5, specific gravity 7-3. It occurs in mineral veins, and when found in large masses, as in Mexico and in the Comstock lode in Nevada, it forms an im- portant ore of silver. The mineral was mentioned so long ago as 1529 by G. Agricola, but the name argentite (from the Lat. argentum, " silver ") was not used till 1845 and is due to W. von Haidinger. Old names for the species are Glaserz, silver- glance and vitreous silver. A cupriferous variety, from Jalpa in Tabasco, Mexico, is known as jalpaite. Acanthite is a supposed dimorphous form, crystallizing in the orthorhombic system, but it is probable that the crystals are really distorted crystals of argentite. (L. J. S.)

ARGENTON, a town of western France, in the department of Indre, on the Creuse, 19 m. S.S.W. of Chateauroux on the Orleans railway. Pop. (1906) 5638. The river is crossed by two bridges, and its banks are bordered by picturesque old houses. There are numerous tanneries, and the manufacture of boots and shoes and linen goods is carried on. The site of the ancient Argento- magus lies a little to the north.

ARGHANDAB, a river of Afghanistan, about 250 m. in length. It rises in the Hazara country north-west of Ghazni, and flowing south-west falls into the Helmund 20 m. below Girishk. Very little is known about its upper course. It is said to be shallow, and to run nearly dry in height of summer; but when its depth exceeds 3 ft. its great rapidity makes it a serious obstacle to travellers. In its lower course it is much used for irrigation, and the valley is cultivated and populous; yet the water is said to be somewhat brackish. It is doubtful whether the ancient Arachotus is to be identified with the Arghandab or with its chief confluent the Tarnak, which joins it on the left about 30 m. S. \V. of Kandahar. The two rivers run nearly parallel, inclosing the backbone of the Ghilzai plateau. The Tarnak is much the shorter (length about 200 m.) and less copious. The ruins at Ulan Robat, supposed to represent the city Arach- osia, are in its basin: and the lake known as Ab-i-Istada, the

most probable representative of Lake Arachotus, is near the head of the Tarnak, though not communicating with it. The Tarnak is dammed for irrigation at intervals, and in the hot season almost exhausted. There is a good deal of cultivation along the river, but few villages. The high road from Kabul to Kandahar passes this way (another reason for supposing the Tarnak to be Arachotus), and the people live off the road to avoid the onerous duties of hospitality.

ARGHOUL, Arghool, or Arghul (in the Egyptian hiero- glyphs, As or As-it), 1 an ancient and modern Egyptian and Arab wood-wind instrument, with cylindrical bore and single reed mouthpiece of the clarinet type. The arghoul consists of two reed pipes of unequal lengths bound together by means of waxed thread, so that the two mouthpieces lie side by side, and can be taken by the performer into his mouth at the same time. The mouthpiece consists of a reed having a small tongue detached by means of a longitudinal slit which forms the beating reed, as in the clarinet mouthpiece. The shorter pipe has six holes on which the melody is played; the three upper holes being covered by the fingers of the right hand, and the lower by those of the left hand. The longer pipe has no lateral holes; it is a

■*irt yry*

■*ˆaˆrWg*

W3

(From Edward William Lane's An Account oj the Manners and Customs of the Modern Egyptians.)

Modern Arghoul, 3 ft. 2\ in. long.

drone pipe with one note only, which, however, can be varied by the addition of extra lengths of reed. In the illustration all three lengths are shown in use. An arghoftl belonging to the collection of the Conservatoire Royal at Brussels, described by Victor Mahillbn in his catalogue 2 (No. 113), gives the following scale : —

Short Pipe. Drone Pipe.

j^Jm-

=3=

=3=

^

01234

Holes uncovered.

ithout ad- With shortest With short- With long- ditional joint, additional est and est addi- joint. medium ad- lionai ditional joints, joint.

The total length of the shorter pipe, including the mouthpiece, is 0-435 m -! of the longer pipe, without additional joints, °'SSS m – An Egyptian arghoul, 8 presented by the khedive to the Victoria and Albert Museum, measures 4 ft. 8j in,

For further information see Victor Loret, L'Egyple au temps des Pharaons (Paris, 18S9), 8vo, pp. 139, 143, 144; G. A. Villoteau, Description historique technique et litteraire des instruments de musique des orientaux {Description de VEgypte, Paris, 1823, tome X "L pp. 456-473)- (K. S.)

ARGOL, the commercial name of crude tartar (q.v.). It is a semi-crystalline deposit which forms on wine vats, and is generally grey or red in colour.

ARGON (from the Gr. &-, privative, and epyov, work; hence meaning " inert "), a gaseous constituent of atmospheric air. For more than a hundred years before 1894 it had been supposed that the composition of the atmosphere was thoroughly known. Beyond variable quantities of moisture and traces of carbonic acid, hydrogen, ammonia, &c, the only constituents recognized were nitrogen and oxygen. The analysis of air was conducted by determining the amount of oxygen present and assum- ing the remainder to be nitrogen. Since the time of Henry Cavendish no one seemed even to have asked the question whether the residue was, in truth, all capable of conversion into nitric acid.

The manner in which this condition of complacent ignorance came to be disturbed is instructive. Observations undertaken mainly in the interest of Prout's law, and extending over many years, had been conducted to determine afresh the densities of the principal gases—hydrogen, oxygen and nitrogen. In the latter case, the first preparations were according to the

1 See Victor Loret, " Les fMtes egyptiennes antiques," Journal Asiatique, 8eme serie, tome xiv., Paris, 1889, pp. 129, 130 and 132.

2 Catalogue descriptif et analytique du musee du Conservatoire Royal de Bruxelles (Ghent, 1880), p. 141.

3 A Descriptive Catalogue of the Musical Instruments in the South Kensington Museum. l>y Carl Engel (London, 1874), p. 143.

convenient method devised by Vernon Harcourt, in which air charged with ammonia is passed over red-hot copper. Under the influence of the heat the atmospheric oxygen, unites with the hydrogen of the ammonia, and when the excess of the latter is removed with sulphuric acid, the gas properly desiccated should be pure nitrogen, derived in part from the ammonia, but principally from the air. A few concordant determinations of density having been effected, the question was at first regarded as disposed of, until the thought occurred that it might be desir- able to try also the more usual method of preparation in which the oxygen is removed by actual oxidation of copper without the aid of ammonia. Determinations made thus were equally concordant among themselves, but the resulting density was about ToVff P art greater than that found by Harcourt's method (Rayleigh, Nature, vol. xlvi. p. 512, 1892). Subsequently when oxygen was substituted for air in the first method, so that all (instead of about one-seventh part) of the nitrogen was derived from ammonia, the difference rose to 5 %. Further experiment only brought out more clearly the diversity of the gases hitherto assumed to be identical. Whatever were the means employed to rid air of accompanying oxygen, a uniform value of the density was arrived at, and this value was 5 % greater than that apper-taining to nitrogen extracted from compounds such as nitrous oxide, ammonia and ammonium nitrite. No impurity, consist- ing of any known substance, could be discovered capable of explaining an excessive weight in the one case, or a deficiency in the other. Storage for eight months did not disturb the density of the chemically extracted gas, nor had the silent electric discharge'any influence upon either quality. (" On an Anomaly encountered in determining the Density of Nitrogen Gas," Proc. Roy. Soc,

April 1894.)

At this stage it became clear that the complication depended upon some hitherto unknown body, and probability inclined to the existence of a gas in the atmosphere heavier than nitrogen, and remaining unacted upon during the removal of the oxygen —a conclusion afterwards fully established by Lord Rayleigh and Sir William Ramsay. The question which now pressed was as to the character of the evidence for the universally accepted view that the so-called nitrogen of the atmosphere was all of one kind, that the nitrogen of the air was the same as the nitrogen of nitre. Reference to Cavendish showed that he had already raised this question in the most distinct manner, and indeed, to a certain extent, resolved it. In his memoir of 1785 he writes: —

" As far as the experiments hitherto published extend, we scarcely know more of the phlogisticated part of our atmosphere than that it is not diminished by lime-water, caustic alkalies, or nitrous air; that it is unfit to support fire or maintain life in animals; and that its specific gravity is not much less than that of common air; so that, though the nitrous acid, by being united to phlogiston, is con- verted into air possessed of these properties, and consequently, though it was reasonable to suppose, that part at least of the phlo- gisticated air of the atmosphere consists of this acid united to phlogiston, yet it may fairly be doubted whether the whole is of this kind, or whether there are not in reality many different substances confounded together by us under the name of phlogisticated air. I therefore made an experiment to determine whether the whole of a given portion of the phlogisticated air of the atmosphere could be reduced to nitrous acid, or whether there was not a part of a different nature to the rest which would refuse to undergo that change. The foregoing experiments indeed, in some measure, decided this point, as much the greatest part of air let up into the tube lost its elasticity; yet, as some remained unabsorbed, it did not appear for certain whether that was of the same nature as the rest or not. For this purpose I diminished a similar mixture of dephlogisticated [oxygen] and common air, in the same manner as before [by sparks over alkali] , till it was reduced to a small part of its original bulk. I then, in order to decompound as much as I could of the phlogisticated air [nitrogen] which remained in the tube, added some dephlogisticated air to it and continued the spark until no further diminution took place. Having by these means condensed as much as I could of the phlogisticated air, I let up some solution of liver of sulphur to absorb the dephlogisticated air; after which only a small bubble of air remained unabsorbed, which certainly was not more than T ??s of the bulk of the dephlogisticated air let up into the tube; so that, if there be any part of the dephlogisticated air of our atmosphere which differs from the rest, and cannot be reduced to nitrous acid, we may safely conclude that it is not more than ,J, part of the whole."

Although, as was natural, Cavendish was satisfied with his result, and does not decide whether the small residue was genuine, it is probable that his residue was really of a different kind from the main bulk of the " phlogisticated air," and contained the gas afterwards named argon.

The announcement to the British Association in 1894 by Rayleigh and Ramsay of a new gas in the atmosphere was received with a good deal of scepticism. Some doubted the discovery of a new gas altogether, while others denied that it was present in the atmosphere. Yet there was nothing incon- sistent with any previously ascertained fact in the asserted presence of 1 % of a non-oxidizable gas about half as heavy again as nitrogen. The nearest approach to a difficulty lay in the behaviour of liquid air, from which it was supposed, as the event proved erroneously, that such a constituent would separate itself in the solid form. The evidence of the existence of a new gas (named Argon on account of its chemical inertness), and a statement of many of its properties, were communicated to the Royal Society (see Phil. Trans, clxxxvi. p. 187) by the dis- coverers in January 1895. The isolation of the new substance by removal of nitrogen from air was effected by two distinct methods. Of these the first is merely a development of that of Cavendish. The gases were contained in a test-tube A (fig. 1) standing oyer a large .quantity of weak alkali B, and the current was con- veyed in wires insulated by U-shaped glass tubes CC passing through the liquid and round the mouth of the test-tube. The inner platinum ends DD of the wire may be sealed into the glass insulating tubes, but reliance should not be placed upon these sealings. In order to secure tight- ness in spite of cracks, mercury was placed in the bends. With a battery of five Grove cells and a Ruhmkorff coil of medium size, a somewhat short spark, or arc, of about 5 mm. was found to be more favourable than a longer one. When the mixed gases were in the right propor- tion, the rate of absorption was about 30 c.c. per hour, about thirty times as fast as Cavendish could work with the elec- trical machine of his day. Where it is available, an alternat- ing electric current is much superior to a battery and break. This combination, introduced by W. Spottiswoode, allows the absorption in the apparatus of fig. 1 to be raised to about 80 c.c. per hour, and the method is very convenient for the purification of small quantities of argon and for determinations of the amount present in various samples of gas, e.g. in the gases expelled from solution in water. A convenient adjunct to this apparatus is a small voltameter, with the aid of which oxygen or hydrogen can be introduced at pleasure. The gradual elimination of the nitrogen is tested at a moment's notice with a miniature spectro- scope. For this purpose a small Leyden jar is connected as usual to the secondary terminals, and if necessary the force of the discharge is moderated by the insertion of resistance in the primary circuit. When with a fairly wide slit the yellow line is no longer visible, the residual nitrogen

may be considered to have fallen below 2 or 3 %. During this stage the oxygen should be in considerable excess. When the yellow line of nitrogen has disappeared, and no further contraction seems to be in progress, theoxygen maybe removed by cautious introduction of hydrogen. The spectrum may now be further examined with a more powerful instrument. The most conspicuous group in the argon spectrum at atmospheric pressure is that first recorded by A. Schuster (fig. 2). Water vapour and excess of oxygen in moderation do not interfere seriously with its visibility^ It is of interest to note that the argon spectrum may be fully developed by operating upon a miniature scale, starting with only 5 c.c. of air (Phil. Mag. vol. i. p. 103, 1901).

The development of Cavendish's method upon a large scale

Fig. 1.

ARGON

41-1 f

1 1

involves arrangements different from what would at first be expected. The transformer working from a public supply should give about 6000 volts on open circuit, although when the electric flame is established the voltage on the platinums is only from 1600 to 2000. No sufficient advantage is attained by raising the pressure of the gases above atmosphere, but a capacious vessel is necessary. This may consist of a glass sphere of 50 litres' capacity, into the neck of which, presented downwards, the necessary tubes are fitted. The whole of the interior surface is washed with a fountain of alkali, kept in circulation by means of a small centrifugal pump. In this apparatus, and with about one horse-power utilized at the transformer, the absorption of gas is 21 litres per hour ("The Oxidation of Nitrogen Gas," Trans. Chem. Soc, 1897).

In one experiment, specially undertaken for the sake of measurement, the total air employed was 9250 c.c, and the oxygen consumed, manipulated with the aid of partially de- aerated water, amounted to 10,820 c.c. The oxygen contained in the air would be 1942 c.c; so that the quantities of atmo- spheric nitrogen and of total oxygen which enter into combination would be 7308 c.c. and 12,762 c.c. respectively. This corresponds to N-f-i-75 O, the oxygen being decidedly in excess of the pro- portion required to form nitrous acid. The argon ultimately found was 75-0 c.c, or a little more than 1 % of the atmospheric nitrogen used. A subsequent determination over mercury by A. M. Kellas (Proc. Roy. Soc. lix. p. 66,

1895) gave 1-186 c.c. as the amount of argon present in 100 c.c. of mixed atmospheric nitrogen and argon. In the earlier stages of the inquiry, when it was important to meet the doubts which had been expressed as to the presence of the new gas in the atmosphere, blank experiments were executed in which air was replaced by nitrogen from ammonium nitrite. The residual argon, derived doubtless from_the water used to manipulate the gases, was but a small y 44 4S 4f y 48 49 Sooo

Argon

Zinc

Hydrogren

H7

V

-» Red

Fig. 2.

fraction of what would have been obtained from a corresponding quantity of air.

The other method by which nitrogen may be absorbed on a considerable scale is by the aid of magnesium. The metal in the form of thin turnings is charged into hard glass or iron tubes heated to a full red in a combustion furnace. Into this air, previously deprived of oxygen by red-hot copper and thoroughly dried, is led in a continuous stream. At this temperature the nitrogen combines with the magnesium, and thus the argon is concentrated. A still more potent absorption is afforded by calcium prepared in situ by heating a mixture of magnesium dust with thoroughly dehydrated quick-lime. The density of argon, prepared and purified by magnesium, was found by Sir William Ramsay to be 19-941 on the = i6 scale. The volume actually weighed was 163 c.c. Subsequently large-scale operations with the same apparatus as had been used for the principal gases gave an almost identical result (19-940) for argon prepared with oxygen.

Argon is soluble in water at 12 C. to about 4-0%, that is, it is about 2ˆ times more soluble than nitrogen. We should thus expect to find it in increased proportion in the dissolved gases of rain-water. Experiment has confirmed this anticipation. The weight of a mixture of argon and nitrogen prepared from the dissolved gases showed an excess of 24 mg. over the weight of true nitrogen, the corresponding excess for the atmospheric mixture being only n mg. Argon is contained in the gases liberated by many

thermal springs, but not in special quantity. The gas collected from the King's Spring at Bath gave only \ %, i.e. half the atmospheric proportion.

The most remarkable physical property of argon relates to

the constant known as the ratio of specific heats. When a gas is warmed one degree, the heat which must be supplied depends upon whether the operation is conducted at a constant volume or at a constant pressure, being greater in the latter case. The ratio of specific heats of the principal gases is 1-4, which, accord- ing to the kinetic theory, is an indication that an important fraction of the energy absorbed is devoted to rotation or vibration. If, as for Boscovitch points, the whole energy is translatory, the ratio of specific heats must be 1-67. This is precisely the number found from the velocity of sound in argon as determined by Kundt's method, and it leaves no room for any sensible energy of rotatory or vibrational motion. The same value had previously been found for mercury vapour by Kundt and Warburg, and had been regarded as confirmatory of the mon- atomic character attributed on chemical grounds to the mercury molecule. It may be added that helium has the same character as argon in respect of specific heats (Ramsay, Proc. Roy. Soc. 1. p. 86, 1895).

The refractivity of argon is -961 of that of air. This low refractivity is noteworthy as strongly antagonistic to the view, at one time favoured by eminent chemists that argon was a condensed form of nitrogen represented by N3. The viscosity of argon is 1-21, referred to air, somewhat higher than for oxygen, which stands at the head of the list of the principal gases (" Oh some Physical Properties of Argon and Helium," Proc. Roy. Soc. vol. lix. p. 198, 1896).

The spectrum shows remarkable peculiarities. According to circumstances, the colour of the light obtained from a Plucker vacuum tube changes " from red to a rich steel blue," to use the words of Crookes, who first described the phenomenon. A third spectrum is distinguished by J. M. Eder and Edward Valenta. The red spectrum is obtained at moderately low pressures (5 mm.) by the use of a Ruhmkorff coil without a jar or air-gap. The red lines at 7056 and 6965 (Crookes) are characteristic. The blue spectrum is best seen at a somewhat lower pressure (1 mm. to 2-5 mm.), and usually requires a Leyden jar to be connected to the secondary terminals. In some conditions very small causes effect a transition from the one spectrum to the other. The course of electrical events attending the operation of a Ruhmkorff coil being extremely complicated, special interest attaches to some experiments conducted by John Trowbridge and T. W. Richards, in which the source of power was a secondary battery of 5000 cells. At a pressure of 1 mm. the red glow of argon was readily obtained with a voltage of 2000, but not with much less. After the discharge was once

started, the difference of potentials at the terminals of the tube varied from 630 volts upwards.

The introduction of a capacity between the terminals of the Geissler tube, for example two plates of metal 1600 sq. cm. in area separated by a glass plate I cm, thick, made no difference in the red glow so long as the connexions were good and the condenser was quiet. As soon as a spark-gap was introduced, or the condenser began to emit the humming sound peculiar to it, the beautiful blue glow so characteristic of argon immediately appeared. (Phil. Mag. xliii. p. 77. I897-)*

The behaviour of argon at low temperatures was investigated by K. S. Olszewski (Phil. Trans., 1895, p. 253). The following results are extracted from the table given by him : — ;

Name.

Critical Tempera- ture, Cent.

Critical

Pressure,

Atmos.

Boiling Point, Cent.

Freezing Point, Cent.

Nitrogen. Argon Oxygen .

— 146-0

— I2I-0

-H8-8

35-o

50-6 50-8

-194.4 -187-0 -182-7

— 214-0

-189-6

?

The smallness of the interval between the boiling and freezing points is noteworthy.

From the manner of its preparation it was clear at an early stage that argon would not combine with magnesium or calcium at a red heat, nor under the influence of the electric discharge with oxygen, hydrogen or nitrogen. Numerous other, attempts to induce combination also failed. Nor does it appear that any well-defined compound of argon has yet been prepared. It was

found, however, by M. P. E. Berthelot that under the influence of the silent electric discharge, a mixture of benzene vapour and argon underwent contraction, with formation of a gummy product from which the argon could be recovered.

The facts detailed in the original memoir led to the conclusion that argon was an element or a mixture of elements, but the question between these alternatives was left open. The behaviour on liquefaction, however, seemed to prove that in the latter case either the proportion of the subordinate constituents was small, or else that the various constituents were but little contrasted. An attempt, somewhat later, by Ramsay and J. Norman Collie to separate argon by diffusion into two parts, which should have different densities or refractivities, led to no distinct effect. More recently Ramsay and M. W. Travers have obtained evidence of the existence in the atmosphere of three new gases, besides helium, to which have been assigned the names of neon, krypton and xenon. These gases agree with argon in respect of the ratio of the specific heats and in being non-oxidizable under the electric spark. As originally denned, argon included small proportions of these gases, but it is now preferable to limit the name to the principal constituent and to regard the newer gases as ” companions of argon.” The physical constants associated with the name will scarcely be changed, since the proportion of the ” companions ” is so small. Sir William Ramsay considers that probably the volume of all of them taken together does not exceed ˆTˆh P art OI that of the argon. The physical properties of these gases are given in the following table (Proc. Roy. Soc. lxvii. p. 331, 1900): —

Helium.

Neon.

Argon.

Krypton.

Xenon.

Refractivities

•1238

•2345

•968

1-449

2-364

(air = i)

Densities

1-98

997

19-96

40-88

64

(0 = i6)

Boiling points

c. 6 C1

?

86-9″

121-33°

163-9°

at 760 mm.

abs.

abs.

abs.

abs.

Critical tem-

?

below

155-6°

210-5°

287-7°

peratures

68° abs.

abs.

abs.

abs.

Critical pres-

?

40-2

41-24

43-5

sures

metres.

metres.

metres.

Weight of ice.

>

}

I-2I2

2-155

3-52

of liquid

gm.

gm.

gm.

The glow obtained in vacuum tubes is highly characteristic, whether as seen directly or as analysed by the spectroscope.

Now that liquid air is available in many laboratories, it forms an advantageous starting-point in the preparation of argon. Being less volatile than nitrogen, argon accumulates relatively as liquid air evaporates. That the proportion of oxygen in- creases at the same time is little or no drawback. The following analyses (Rayleigh, Phil. Mag., June 1903) of the vapour arising from liquid air at various stages of the evaporation will give an idea of the course of events: —

Percentage of Oxygen.

Percentage of Argon.

Argon as a Percentage

of the Nitrogen and

Argon.

30 43 64

75 90

1-3

2-0 2-0 2-1 2-0

1-9

3-5 5-6

8-4

20-0

(R-)

ARGONAUTS (‘kpyovavrai., the sailors of the”Argo”),in Greek legend a band of heroes who took part in the Argonautic ex- pedition under the command of Jason, to fetch the golden fleece. This task had been imposed on Jason by his uncle Pelias (q.v.), who had usurped the throne of Iolcus in Thessaly, which rightfully belonged to Jason’s father Aeson. The story of the fleece was as follows. Jason’s uncle Athamas had two children, Phrixus and Helle, by his wife Nephele, the cloud goddess. But after a time he became enamoured of Ino, the daughter of Cadmus, .and neglected Nephele, who disappeared in anger. Ino, who hated the children of Nephele, persuaded Athamas, 1 Sir James Dewar, Compt. Rend. (1904), 139, 261 and 241.

by means of a false oracle, to offer Phrixus as a sacrifice, as the only means of alleviating a famine which she herself had caused by ordering the grain to be secretly roasted before it was sown. But before the sacrifice the shade of Nephele appeared to Phrixus, bringing a ram with a golden fleece on which he and his sister Helle endeavoured to escape over the sea. Helle fell off and was drowned in the strait, which after her was called the Hellespont. Phrixus, however, reached the other side in safety, and proceeding by land to Aea in Colchis on the farther shore of the Euxine Sea, sacrificed the ram, and hung up its fleece in the grove of Ares, where it was guarded by a sleepless dragon.

Jason, having undertaken the quest of the fleece, called upon the noblest heroes of Greece to take part in the expedition. According to the original story, the crew consisted of the chief members of Jason’s own race, the Minyae. But when the legend became common property, other and better-known heroes were added to their number — Orpheus, Castor and Polydeuees (Pollux), Zetes and Calais, the winged sons of Boreas, Meleager, Theseus, Heracles. The crew was supposed to consist of fifty, agreeing in number with the fifty oars of the ” Argo,” so called from its builder Argos, the son of Phrixus, or from apyos (swift). It was a larger vessel than had ever been seen before, built of pine- wood that never rotted from Moutit Pelion. The goddess Athena herself superintended its construction, and inserted in the prow a piece of oak from Dodona, which

was endowed with the power of speaking and delivering oracles. The outward course of the " Argo " was the same as that of the Greek traders, whose settlements as early as the 6th century B.C. dotted the southern shores of the Euxine. The first landing-place was the island of Lemnos, which was occupied only by women, who had put to death their fathers, husbands and brothers. Here the Argonauts remained some months, until they were persuaded by Heracles to leave. It is known from Herodotus (iv. 145) that the Minyae had formed settlements at Lemnos at a very early date. Proceeding up the Hellespont, they sailed to the country of the Doliones, by whose king, Cyzicus, they were hospitably received. After their departure, being driven back to the same place by a storm, they were attacked by the Doliones, who did not recognize them, and in a battle which took place Cyzicus was killed by Jason. After Cyzicus had been duly mourned and buried, the Argonauts proceeded along the coast of Mysia, where occurred the incident of Heracles and Hylas (q.v.). On reaching the country of the Bebryces, they again landed to get water, and were challenged by the king, Amycus, to match him with a boxer. Polydeuees came forward, and in the end overpowered his adversary, and bound him to a tree, or according to others, slew him. At the entrance to the Euxine, at Salmydessus on the coast of Thrace, they met Phineus, the blind and aged king whose food was being constantly polluted by the Harpies. He knew the course to Colchis, and offered to tell it, if the Argonauts would free him from the Harpies. This was done by the winged sons of Boreas, and Phineus now told them their course, and that the way to pass through the Symplegades or Cyanean rocks — two cliffs which moved on their bases and crushed whatever sought to pass — was first to fly a pigeon through, and when the cliffs, having closed on the pigeon, began to retire to each side, to row the " Argo " swiftly through. His advice was successfully followed, and the " Argo " made the passage unscathed, except for trifling damage to the stern. From that time the rocks became fixed and never closed again. The next halting-places were the country of the Maryandini, where the helmsman Tiphys died, and the land of the Amazons on the banks of the Thermodon. At the island of Aretias they drove away the Stymphalian birds, who used their feathers of brass as arrows. Here they found and took on board the four sons of Phrixus who, after their father's death, had been sent by Aeetes, king of Colchis, to fetch the treasures of Orchomenus, but had been driven by a storm upon the island. Passing near Mount Caucasus, they heard the groans of Prometheus and the flapping of the wings of the eagle which gnawed his liver. They now reached their goal, the river Phasis, and the following morning Jason repaired to the palace of Aeetes, and demanded

the golden fleece. Aeetes required of Jason that he should first yoke to a plough his bulls, given him by Hephaestus, which snorted fire and had hoofs of brass, and with them plough the field of Ares. That done, the field was to be sown with the dragons' teeth brought by Phrixus, from which armed men were to spring. Successful so far by means of the mixture which Medea, daughter of Aeetes, had given him as proof against fire and sword, Jason was next allowed to approach the dragon which watched the fleece ; Medea soothed the monster with another mixture, and Jason became master of the fleece. Then the voyage homeward began, Medea accompanying Jason, and Aeetes pursuing them. To delay him and obtain escape, Medea dismembered her young brother Absyrtus, whom she had taken with her, and cast his limbs about in the sea for his father to pick up. Her plan suc- ceeded, and while Aeetes was burying the remains of his son at Tomi, Jason and Medea escaped. In another account Absyrtus had grown to manhood then, and met his death in an encounter with Jason, in pursuit of whom he had been sent. Of the home- ward course various accounts are given. In the oldest (Pindar) the " Argo " sailed along the river Phasis into the eastern Oceanus, round Asia to the south coast of Libya, thence to the mythical lake Tritonis, after being carried twelve days over land through Libya, and thence again to Iolcus. Hecataeus of Miletus (Schol. Apollon. Rhod. iv. 259) suggested that from the Oceanus it may have sailed into the Nile, and so to the Mediterranean. Others, like Sophocles, described the return voyage as differing from the outward course only in taking the northern instead of the southern shore of the Euxine. Some (pseudo-Orpheus) supposed that the Argonauts had sailed up the river Tanais, passed into another river, and by it reached the North Sea, returning to the Mediterranean by the Pillars of Hercules. Again, others (Apollonius Rhodius) laid down the course as up the Danube (Ister), from it into the Adriatic by a supposed mouth of that river, and on to Corcyra, where a storm overtook them. Next they sailed up the Eridanus into the Rhodanus, passing through the country of the Celts and Ligurians to the Stoechades, then to the island of Aethalia (Elba), finally reaching the Tyrrhenian Sea and the island cf Circe, who absolved them from the murder of Absyrtus. Then they passed safely through Scylla and Charybdis, past the Sirens, through the Planctae, over the island of the Sun, Trinacria and on to Corcyra again, the land of the Phaeacians, where Jason and Medea held their nuptials. They had sighted the coast of Peloponnesus when a storm overtook them and drove them to the coast of Libya, where they were saved from a quicksand by the local nymphs. The " Argo " was now carried twelve days and twelve nights to the Hesperides, and thence to lake Tritonis (where the seer Mopsus died), whence Triton conducted them to the Medi- terranean. At Crete the brazen Talos, who would not permit them to land, was killed by the Dioscuri. At Anaphe, one of the Sporades, they were saved from a storm by Apollo. Finally, they reached Iolcus, and

the " Argo " was placed in a groove sacred to Poseidon on the isthmus of Corinth. Jason's death, it is said, was afterwards caused by part of the stern giving way and falling upon him.

The story of the expedition of the Argonauts is very old. Homer was acquainted with it and speaks of the "Argo" as well known to all men; the wanderings of Odysseus may have been partly founded on its voyage. Pindar, in the fourth Pythian ode. gives the oldest detailed account of it. In Greek, there are also extant the Argonautica of Apollonius Rhodius and the pseudo-Orpheus (4th century A.D.), and the account in Apollodorus (i. 9), based on the best extant authorities; in Latin, the imitation of Apollonius (a free translation or adaptation of whose Argonautica was made by Terentius Varro Atacinus in the time of Cicero) by Valerius Flaccus. In ancient times the expedi- tion was regarded as a historical fact, an incident in the opening up of the Euxine to Greek commerce and colonization. Its object was the acquisition of gold, which was caught by the inhabitants of Colchis in fleeces as it was washed down the rivers. Suidas says that the fleece was a book written on parchment, which taught how to make gold by chemical processes. The rationalists

explained the ram on which Phrixus crossed the sea as the name or ornament of the ship on which he escaped. Several interpreta- tions of the legend have been put forward by modern scholars. According to C. O. Miiller, it had its origin in the worship of Zeus Laphystius; the fleece is the pledge of reconciliation; Jason is a propitiating god of health, Medea a goddess akin to Hera; Aeetes is connected with, the Colchian sun-worship. Forchhammer saw in it an old nature symbolism; Jason, the god of healing and fruitfulness, brought the fleece — the fertilizing rain-cloud — to the western land that was parched by the heat of the sun. Others treat it as a solar myth; the ram is the light of the sun, the flight of Phrixus and the death of Helle signify its setting, the recovery of the fleece its rising again.

There are numerous treatises on the subject: F. Vater, Der Argonautenzug (1845); J. Stender, De Argonautarum Expeditione (1874); D. Kennerknecht, De Argonautarum Fabula (1886); M. Groeger, De Argonautarum Fabularum Ilistoria (1889); see also Grote, History of Greece, part i. ch. 13; Preller, Griechische Mytho- logie; articles in Pauly-Wissowa's Realencyclopadie, Roscher's Lexikon der Mythologie, and Daremberg and Saglio's Dictionnaire des Antiquites.

ARGONNE, a rocky forest-clad plateau in the north-east of France, extending along the borders of Lorraine and Cham- pagne, and forming part of the departments of Ardennes, Meuse and Marne. The Argonne stretches from S.S.E. to N.N.W., a distance of 63 m. with an average breadth of 1 9 m. , and an average height of 1150 ft. It forms the

connecting-link between the plateaus of Haute Marne and the Ardennes, and is bounded E. by the Meuse and W. by the Ante and the Aisne, which rises in its southern plateau. The valleys of the Aire and other rivers traverse it longitudinally, a fact to which its importance as a bulwark of north-eastern France is largely due. Of the numerous forests which clothe both slopes of the plateau, the chief is that of Argonne, which extends for 25 m. between the Aire and the Aisne.

For Dumouriez's Argonne campaign in 1792, see French Revolu- tionary Wars. r

ARGOS, the name of several ancient Greek cities or districts, but specially appropriated in historic times to the chief town in eastern Peloponnese, whence the peninsula of Argolis derives its name. The Argeia, or territory of Argos proper, consisted of a shelving plain at the head of the Gulf of Argolis, enclosed between the eastern wall of the Arcadian plateau and the central highlands of Argolis. The waters of this valley (Inachus, Chara- drus, Erasinus), when properly regulated, favoured the growth of excellent crops, and the capital standing only 3 m. from the sea was well placed for Levantine trade; Hence Argos was perhaps the earliest town of importance in Greece; the legends indicate its high antiquity and its early intercourse with foreign countries (Egypt, Lycia, &c). Though eclipsed in the Homeric age, when it appears as the seat of Diomedes, by the later foundation of Mycenae, it regained its predominance after the invasion of the Dorians (q.v.), who seem to have occupied this site in considerable force. In accordance with the tradition which assigned the portion to the eldest-born of the Heracleid conquerors, Argos was for some centuries the leading power in Peloponnesus. There is good evidence that its sway extended originally over the entire Argolis peninsula, the land east of Parnon, Cythera, Aegina and Sicyon. Under King Pheidon the Argive empire embraced all eastern Peloponnesus, and its influence spread even to the western districts.

This supremacy was first challenged about the 8th century by Sparta. Though organized on similar lines, with a citizen population divided into three Dorian tribes (and one containing other elements), with a class of Perioeci (neighbouring depend- ents) and of serfs, the Argives had no more constant foe than their Lacedaemonian kinsmen. In a protracted struggle for the possession of the eastern seaboard of Laconia in spite of the victory at Hysiae (apparently in 669), they were gradually driven back, until by 550 they had lost the whole coast strip of Cynuria. A later attempt to retrieve this loss resulted in a crushing defeat near Tiryns at the hands of King Cleomenes I. (probably in 495) , which so weakened the Argives that they had to open the franchise to their Perioeci. By this time they

had also lost control over the other cities of Argolis, which they never succeeded in recovering. Partly in consequence of its defeat, partly out of jealousy against Sparta, Argos took no part in the war against Xerxes. Indeed on this, as on later occasions, its relations with Persia seem to have been friendly. About 470 the conflict with Sparta was renewed in concert with the Arcadians, but all that the .Argives could achieve was to destroy their revolted dependencies of Mycenae and Tiryns (468 or 464). In 461 they contracted an alliance with Athens, thus renewing a connexion established by Peisistratus (q.v.). In spite of this league Argos made no headway against Sparta, and in 451 con sented to a truce. A more important result of Athenian inter- vention was the substitution of the democratic government for the oligarchy which had succeeded the early monarchy; at any rate forty years later we find that Argos possessed complete democratic institutions.

During the early Peloponnesian War Argos remained neutral ; after the break-up of the Spartan confederacy consequent upon the peace of Nicias the alliance of this state, with its unimpaired resources and flourishing commerce, was courted on all sides. By throwing in her lot with the Peloponnesian democracies and Athens, Argos seriously endangered Sparta's supremacy, but the defeat of Mantineia (418) and a successful rising of the Argive oligarchs spoilt this chance. The speedily restored democracy put little heart into the conflict, and beyond sending mercenary detachments, lent Athens no further help in the war (see Peloponnesian War).

At the outset of the 4th century, Argos, with a population and resources equalling those of Athens, took a prominent part in the Corinthian League against Sparta. In 394 the Argives helped to garrison Corinth, and the latter state seems for a while to have been annexed by them. But the peace of Antalcidas (q.v.) dissolved this connexion, and barred Argive pretensions to control all Argolis. After the battle of Leuctra Argos ex- perienced a political crisis; the oligarchs attempted a revo- lution, but were put down by their opponents with such vin- dictiveness that 1200 of them are said to have been executed (370). The democracy consistently supported the victorious Thebans against Sparta, figuring with a large contingent on the decisive field of Mantineia (362). When pressed in turn by their old foes the Argives were among the first to call in Philip of Macedon, who reinstated them in Cynuria after becoming master of Greece. In the Lamian War Argos was induced to side with the patriots against Macedonia; after its capture by Cassander from Polyperchon (317)

it fell in 303 into the hands of Demetrius Poliorcetes. In 272 the Argives joined Sparta in resisting the ambition of King Pyrrhus of Epirus, whose death ensued in an unsuccessful night attack upon the city. They passed instead into the power of Antigonus Gonatas of Macedonia, who maintained his control by means of tyrants. After several unavailing attempts Aratus (q.v.) contrived to win Argos for the Achaean League (229), in which it remained save during a brief occupation by the Spartans Cleomenes III. (q.v.) and Nabis (224 and 196).

The Roman conquest of Achaea enhanced the prosperity of Argos by removing the trade competition of Corinth. Under the Empire, Argos was the headquarters of the Achaean synod, and continued to be a resort of Roman merchants. Though plundered by the Goths in a.d. 267 and 395 it retained some of its commerce and culture in Byzantine days. The town was captured by the Franks in 1210; after 1246 it was held in fief by the rulers of Athens. In later centuries it became the scene of frequent conflicts between the Venetians and the Turks, and on two occasions (1397 and 1500) its population was massacred by the latter. Repeopled with Albanian settlers, Argos was chosen as seat of the Greek national assembly in the wars of independence. Its citadel was courageously defended by the patriots (1822); in 1825 the city was burnt to the ground by Ibrahim Pasha. The present town of 10,000 inhabitants is a purely agricultural settlement. The Argive plain, though not yet sufficiently reclaimed, yields good crops of corn, rice and tobacco.

In the early days of Greece the Argives enjoyed high repute for their musical talent. Their school of bronze sculpture, whose first famous exponent was Ageladas (Hagelaidas), the reputed master of Pheidias, reached its climax towards the end of the 5th century in the atelier of Polyclitus (q.v.) and his pupils. To this period also belongs the hew Heraeum (see below), one of the most splendid temples of Greece.

Remains of the early city are still visible on the Larissa acropolis, which towers 900 ft. high to the north-west of the town. A few courses of the ancient ramparts appear under the double enceinte of the surviving medieval fortress. An aque- duct of Greek times is represented by some fragments on the south-western edge. In the slope above the town was hewn a theatre equalling that of Athens in size. The Aspis or smaller citadel to the north-east has revealed traces of an earlyMycenaean settlement; the Deiras or ridge connecting the two heights contains a prehistoric cemetery.

Authorities. — Herodotus, Thucydides, Xenophon; Plutarch, Pyrrhus, 30-34; Strabo pp. 373-374; Pausanias ii. 15-24; W. M. Leake, Travels in the Morea (London, 1835), "• cn s. 19-22 ; E. Curtius, Peloponnesos (Gotha, 1851), ii. 350-364; H. F. Tozer, Geography of Greece (London,

1873), pp. 292-294; J. K. Kophiniotis, 'laropia toO "Apyovs (Athens, 1892-1893); W. Vollgraff in Bulletin de Corre- spondance Hellenique (1904, pp. 364-399; 1906, pp. I-45; 1907, pp. 139-184). (M.O.B.C.)

The Argive Heraeum. — Since 1892 investigation has added considerably to our knowledge concerning the Argive Heraeum or Heraion, the temple of Hera, which stood, according to Pausanias, " on one of the lower slopes of Euboea." The term Euboea did not designate the eminence upon which the Heraeum is placed, or the mountain-top behind the Heraeum only, but, as Pausanias distinctly indicates, the group of foothills of the hilly district adjoining the mountain. When once we admit that this designated not only the mountain, which is 1730 ft. high, but also the hilly district adjoining it, the general scale of distance for this site grows larger. The territory of the Heraeum was divided into three parts, namely Euboea, Acraea and Prosymna. Pausanias tells us that the Heraeum is 15 stadia from Mycenae. Strabo, on the other hand, says that the Heraeum was 40 stadia from Argos and 10 from Mycenae. Both authors underestimate the distance from Mycenae, which is about 25 stadia, or a little more than 3 m., while the distance from Argos is 45 stadia, or a little more than 5 m. The distance from the Heraeum to the ancient Midea is slightly greater than to Mycenae, while that from the Heraeum to Tiryns is about 6 m. The Argive Heraeum was the most important centre of Hera and Juno worship in the ancient world; it always remained the chief sanctuary of the Argive district, and was in all probability the earliest site of civilized life in the country inhabited by the Argive people. In fact, whereas the site of Hissarlik, the ancient Troy, is not in Greece proper, but in Asia Minor, and can thus not furnish the most direct evidence for the earliest Hellenic civilization as such; and whereas Tiryns, Mycenae, and the city of Argos, each represent only one definite period in the successive stages of civilization, the Argive Heraeum, holding the central site of early civilization in Greece proper, not only retained its import- ance during the three periods marked by the supremacy of Tiryns, Mycenae and the city of Argos, but in all probability antedated them as a centre of civilized Argive life. These con- ditions alone account for the extreme archaeological importance of this ancient sanctuary.

According to tradition the Heraeum was founded by Phoro- neus at least thirteen generations before Agamemnon and the Achaeans ruled. It is highly probable that before it became important merely as a temple, it was the fortified centre uniting the Argive people dwelling in the plain, the citadel which was superseded in this function by Tiryns. There is ample evidence to show that it was the chief sanctuary during the Tirynthian period. When Mycenae was built under the Perseiids it was still the chief sanctuary for that. centre, which superseded Tiryns in its dominance over the district, and which this temple clearly antedated in construction.

According to the Dictys Cretensis, it was at this Heraeum that Agamemnon assembled the leaders

before setting out for Troy. In the period of Dorian supremacy, in spite of the new cults which were introduced by these people, the Heraeum maintained its supreme importance: it was here that the tablets recording the succession of priestesses were kept which served as a chronological standard for the Argive people, and even far beyond their borders; 'and it was here that Pheidon deposited the 6fie\i

We learn from Strabo that the Heraeum was the joint sanctuary for Mycenae and Argos. But in the 5th century the city of Argos vanquished the Mycenaeans, and from that time onwards the city of Argos becomes the political centre of the district, while the Heraeum remains the religious centre. And frhen in the year 423 B.C., through the negligence of the priestess Chryseis. the old temple was burnt down, the Argives erected a splendid new temple, built by Eupolemos, in which was placed the great gold and ivory statue of Hera, by the sculptor Polyclitus,

the Cyclopean wall and below it were found traces of small houses of the rudest, earliest masonry which are pre-Mycenaean, if not pre-Cyclopean.

We then descend to the second terrace, in the centre of which the' substructure of the great second temple was revealed, together with so much of the walls, as well as the several archi- tectural members forming the superstructure, that it has been possible for E. L. Tilton to design a complete restoration of the temple. On the northern side of this terrace, between the second temple and the Cyclopean supporting wall, a long stoa or colon- nade runs from east to west abutting at the west end in structures which evidently contained a well-house and waterworks; while at the eastern end of this stoa a number of chambers were erected against the hill, in front of which were placed statues and inscriptions, the bases for which are still extant. At the eastern- most end of this second terrace a large hall with three rows of columns in the interior, with a porch and entrance at the west

Plan of the Heraeum (surveyed and drawn by Edward L. Tilton). I. Old Temple. IV. East Building. VII. West Building. X. Lower Stoa.

II. Stoa. V. 5th-Century Temple. , VIII. North- West Building. XI. Phylakeion.

Ill- Stoa. VI. South Stoa. IX. Roman Building. A, B, C, D, E, F, Cisterns.

tue contemporary and rival of Pheidias, which was one of the inost perfect works of sculpture in antiquity. Pausanias describes the temple and its contents (ii. 17), and in his time he still saw the ruins of the older burnt temple above the temple of Eupolemos.

All these facts have been verified and illustrated by the jxcavations of the American Archaeological Institute and School of Athens, which were carried on from 1892 to 1895. In 1854 A. R. Rhangabe made tentative excavations on this site, digging a trench along the north and east sides of the second temple. Of these excavations no trace was to be seen when those of 1892 were begun. The excavations have shown that the sanctuary, instead of consisting of but one temple with the ruins of the older one above it, contained at least eleven separate buildings, occupying an area of about 975 ft. by 325.

On the uppermost terrace, defined by the great Cyclopean supporting wall, exactly as described by Pausanias, the excava- tions revealed a layer of ashes and charred wood, below which were found numerous objects of earliest date, together with some remains of the walls resting on a polygonal platform— all forming part of the earliest temple. Immediately adjoining

end facing the temple, is built upon elaborate supporting walls of good masonry.

Below the second terrace at the south-west end a large and complicated building, with an open courtyard surrounded on three sides by a colonnade and with chambers opening out towards the north, may have served as a gymnasium or a sanatorium. It is of good early Greek architecture, earlier than the second temple. A curious, ruder building to the north of this and to the west of the second terrace is probably of much earlier date, perhaps of the Mycenaean period, and may have served as propylaea.

Immediately below the second temple at the foot of the eleva- tion on which this temple stands, towards the south, and thus facing the city of Argos, a splendid stoa or colonnade, to which large flights of steps lead, was erected about the time of the building of the second temple. It is a part of the great plan to give worthy access to the temple from the city of Argos. To the east of this large flights of steps lead up to the temple proper.

At the western extremity of the whole site, immediately beside the river-bed, we again have a huge stoa running round two sides of a square, which

was no doubt connected with the functions of this sanctuary as a health resort, especially for women, the goddess

ir

Hera presiding over and protecting married life and childbirth. Finally, immediately. to the north of this western stoa there is an extensive house of Roman times also connected with baths.

While the buildings give archaeological evidence for every period of Greek life and history from the pre-Mycenaean period down to Roman times, the topography itself shows that the Heraeum must have been constructed before Mycenae and without any regard to it. The foothills which it occupies form the western boundary to the Argive plain as it stretches down towards the sea in the Gulf of Nauplia. While it was thus probably chosen as the earliest site for a citadel facing the sea, its second period points towards Tiryns and Midea. It could not have been built as the sanctuary of Mycenae, which was placed farther up towards the north-west in the hills, and could not be seen from the Heraeum, its inhabitants again not being able to see their sanctuary. The west building, the traces of bridges and roads, show that at one time it did hold some relation to Mycenae; but this was long after its foundation or the building of the huge Cyclopean supporting wall which is coeval with the walls of Tiryns, these again being earlier than those of Mycenae. There are, moreover, traces of still more primitive walls, built of rude small stones placed one upon the other without mortar, which are in character earlier than those of Tiryns, and have their parallel in the lowest layers of Hissarlik.

Bearing out the evidence of tradition as well as architecture, the numerous finds of individual objects in terra-cotta figurines, vases, bronzes, engraved stones, &c, point to organized civilized life on this site many generations before Mycenae was built, a fortiori before the life as depicted by Homer flourished— nay, before, as tradition has it, under Proetus the walls of Tiryns were erected. We are aided in forming some estimate of the chronological sequence preceding the Mycenaean age, as suggested by the finds of the Heraeum, in the new distribution which Dorpfeld has been led to make of the chronological stratifica- tion of Hissarlik. For the layer, which he now assigns to the Mycenaean period, is the sixth stratum from below. Now, as some of the remains at the Heraeum correspond to the two lowest layers of Hissarlik, the evidence of the Argive temple leads us far beyond the date assigned to the Mycenaean age, and at least into the

second millennium B.C. (see also Aegean Civilization). As to its chronological relation to the Cretan sites — Cnossus, Phaestus, &c, and the "Minoan" civilization as determined by Dr A.Evans, see the discussion under Crete.

This sanctuary still holds a position of central importance as illustrating the art of the highest period in Greek history, namely, the art of the 5th century B.C. under the great sculptor Poly- clitus. Though the excavations in the second temple have clearly revealed the outlines of the base upon which the great gold and ivory statue of Hera stood, it is needless to say that no trace of the statue itself has been found. From Pausanias we learn that " the image of Hera is seated and is of colossal size: it is made of gold and ivory, and is the work of Poly- clitus." Based on the computations made by the architect of the American excavations, E. L. Tilton, on the ground of the height of the nave, the total height of the image, including the base and the top of the throne, would be about 26 ft., the seated figure of the goddess herself about 18 ft. It is probable that the face, neck, arms and feet were of ivory, while the rest of the figure was draped in gold. Like the Olympian Zeus of Pheidias, Hera was seated on an elaborately decorated throne, holding in her left hand the sceptre, surmounted in her case by the cuckoo (as that of Zeus had an eagle), and in her right, instead of an elaborate figure of Victory (such as the Athena Parthenos and the Olympian Zeus held), simply a pomegranate. The crown was adorned with figures of Graces and the Seasons. A Roman imperial coin of Antoninus Pius shows us on a reduced scale the general composition of the figure; while contemporary Argive coins of the 5th century give a fairly adequate rendering of the head. A further attempt has been made to identify the head in a beautiful marble bust in the British Museum hitherto known as Bacchus (Waldstein, Journal of Hellenic Studies, vol. xxi., 1901, pp. 30 seq.)

We also learn from Pausanias that the temple was decorated with." sculptures over the columns, representing some the birth of Zeus and the battle of the gods and giants, others the Trojan War and the taking of Ilium." It was formerly supposed that the phrase " over the columns" pointed to the existence of sculp- tured metopes, but no pedimental groups. Finds made in the excavations, however, have shown that the temple also had pedi- mental groups. Besides numerous fragments of nude and draped figures belonging to pedimental statues, a well-preserved and very beautiful head of a female divinity, probably Hera, as well as a draped female torso of excellent workmanship, both belong- ing to the pediments, have been discovered. Of the metopes also a great number of fragments have been found, together with two almost complete metopes, the one containing the torso of a nude warrior in perfect preservation, as well as ten well-preserved heads. These statues bear the same relation to the sculptor

Polyclitus which the Parthenon marbles hold to Pheidias; and the excavations have thus yielded most important material for the illustration of the Argive art of Polyclitus in the 5th century B.C.

*See Waldstein, The Argive Heraeum (vol. i., Boston and New York, 1902; vol. ii., the Vases by J. C. Hoppin, the Bronzes by H. F. de Cosa, 1905); Excavations of the American School of Athens at the Heraion of Argos (1892); and numerous reports and articles in the American Archaeological Journal since 1892. (C W. *)*

ARGOSTOLI (anc. Cephallenia) , the capital of Cephalonia (one of the Ionian islands), and the seat of a bishop of the Greek church. Pop. about 10,000. It possesses an excellent harbour, a quay a mile in length, and a fine bridge. Shipbuilding and silk-spinning are carried on. Near at hand are the ruins of Cranii, which afford fine examples of Greek military architecture; and at the west side of the harbour there is a curious stream, flowing from the sea, and employed to drive mills before losing itself in caverns inland.

See Sir C. Fellows'g Journal of an Excursion in Asia Minor in 1838, and Wiebel's Die Insel Kephalonia und die Meermuhlen von Argostoli (Hamburg, 1873).

ARGOSY (a corruption, by transposition of letters, of the name of the seaport Ragusa), the term originally for a carrack or merchant ship from Ragusa and other Adriatic ports, now used poetically of any vessel carrying rich merchandise. In English writings of the 16th century the seaport named is variously spelt Ragusa, Aragouse or Aragosa, and ships coming thence were named Ragusyes, Arguzes and Argosies; the last form surviving and passing into literature. The incorrect derivation from Jason's ship, the " Argo," is of modern origin.

ARGUIN, an island, (identified by some writers with Hanno's Cerne), off the west coast of Africa, a little south of Cape Blanco, in 20 25′ N., 16 37′ W. It is some 4 m. long by 25 broad, produces gum-arabic, and is the seat of a lucrative turtle-fishery. Off the island, which was discovered by the Portuguese in the 15th century, are extensive and very dangerous reefs. Arguin was occupied in turn by Portuguese, Dutch, English and French; and to France it now belongs. The aridity of the soil and the bad anchorage prevent a permanent settlement. The fishery is mostly carried on by inhabitants of the Canary Isles. In July 1816 the French frigate " Medusa," which carried officers on their way to Senegal to take possession of that country for France, was wrecked off Arguin, 350 lives being lost. .
ARGUMENT, a word meaning "proof," "evidence," corre- sponding in English to the Latin word argumentum, from which it is derived; the

originating Latin verb arguere, to make clear, from which comes the English " argue," is from a root meaning bright, appearing in Greek apyos, white. From its primary sense are derived such applications of the word as a chain of reasoning, a fact or reason given to support a proposition, a discussion of the evidence or reasons for or against some theory or proposition and the like. More particularly " argument " means a synopsis of the contents of a book, the outline of a novel, play, &c. In logic it is used for the middle term in a syllogism, and for many species of fallacies, such as the argumentum ad hominem, ad baculum, &c. (see Fallacy). In mathematics the term has received special meanings ; in mathematical tables

the " argument " is the quantity upon which the other quantities in the table are made to depend; in the theory of complex variables, e.g. such as a--ib where » = V-i, the "argument" (or "amplitude") is the angle 8 given by tan 6 =b/a. In astronomy, the term is used in connexion with the Ptolemaic theory to denote the angular distance on the epicycle of a planet from the true apogee of the epicycle; and the " equation to the argument " is the angle subtended at the earth by the distance of a planet from the centre of the epicycle.

ARGUS, in ancient Greek mythology, the son of Inachus, Agenor or Arestor, or, according to others, an earth-born hero (autochthon). He was called Panoptes (all-seeing), from having eyes all over his body. After performing several feats of valour, he was appointed by Hera to watch the cow into which Io had been transformed. While doing this he was slain by Hermes, who stoned him to death, or put him to sleep by playing on the flute and then cut off his head. His eyes were transferred by Hera to the tail of the peacock. Argus with his countless eyes originally denoted the starry heavens (Apollodorus ii. 1; Aeschylus, P. V. 569; Ovid, Metam. i. 264).

Another Argus, the old dog of Odysseus, who recognized his master on his return to Ithaca, figures in one of the best-known incidents in Homer's Odyssey (xvii. 291-326).

ARGYLL, EARLS AND DUKES OF. The rise of this family of Scottish peers, originally the Campbells of Lochow, and first ennobled as Barons Campbell, is referred to in the article Argyll- shire.

Archibald Campbell, 5th earl of Argyll (1530-1573), was the elder son of

Archibald, 4th earl of Argyll (d. 1558), and a grandson of Colin, the 3rd earl (d. 1530). His great-grandfather was the 2nd earl, Archibald, who was killed at Flodden in 15 13, and this nobleman's father was Colin, Lord Campbell (d. 1493), the founder of the greatness of the Campbell family, who was created earl of Argyll in 1457. With Lord James Stuart, afterwards the regent Murray, the 5th earl of Argyll became an adherent of John Knox about 1556, and like his father was one of the most influential members of the party of religious reform, signing what was probably the first " godly band " in December 1557. As one of the " lords of the congregation " he was one of James Stuart's principal lieutenants during the warfare between the reformers and the regent, Mary of Lorraine; and later with Murray he advised and supported Mary queen of Scots, who regarded him with great favour. It was about this time that William Cecil, afterwards Lord Burghley, referred to Argyll as " a goodly gentleman universally honoured of all Scotland." Owing to his friendship with Mary, Argyll was separated from the party of Knox, but he forsook the queen when she deter- mined to marry Lord Darnley; he was, however, again on Mary's side after Queen Elizabeth's refusal to aid Murray in 1565. Argyll was probably an accomplice in the murder of Rizzio; he was certainly a consenting party to that of Darnley, and then separating himself from Murray he commanded Mary's soldiers after her escape from Lochleven, and by his want of courage and resolution was partly responsible for her defeat at Langside in May 1568. Soon afterwards he made his peace with Murray, but it is possible that he was accessory to the regent's murder in 1570. After this event Argyll became lord high chancellor of Scotland, and he died on the 12th of September 1573. His first wife was an illegitimate daughter of James V., and he was thus half-brother-in-law to Mary and to Murray. His relations with her were not harmonious; he was accused of adultery, and in 1568 he performed a public penance at Stirling.

He left no children, and on his death his half-brother Colin (d. 1584) became 6th earl of Argyll. This nobleman, whose life was partly spent in feuds with the regent Morton, died in October I584. He was succeeded as 7 th earl by his young son Archibald (1 576-1638), who became a Roman Catholic, fought for Philip III. of Spain in Flanders, whither he had gone to avoid his creditors, and, having entrusted the care of his estates to his son, died in London.

Archibald Campbell, 1st marquess and 8th earl of Argyll (1607-1661), eldest son of Archibald, 7th earl, by his first wife,

Lady Anne Douglas, daughter of William, 1st earl of Morton, was born in 1607 1 and educated at St Andrews University, where he matriculated on the 15th of January 1622. He had early in life, as Lord Lome, been entrusted with the possession of the Argyll estates when his father

renounced Protestantism and took service with Philip of Spain; and he exercised over his clan an authority almost absolute, disposing of a force of 20,00c retainers, and being, according to Baillie, " by far the most powerful subject in the kingdom." On the outbreak of the religious dispute between the king and Scotland in 1637 his support was eagerly desired by Charles I. He had been made a privy councillor in 1628, and in 1638 the king summoned him, together with Tra- quair and Roxburgh, to London; but he refused to be won over, openly and courageously warned Charles against his despotic ecclesiastical policy, and showed great hostility towards Laud. In consequence a secret commission was given to the earl of Antrim to invade Argyllshire and stir up the Macdonalds against the Campbells, a wild and foolish project which completely miscarried. Argyll, who inherited the title by the death of his father in 1638, had originally no preference for Presbyterianism, but now definitely took the side of the Covenanters in defence of the national religion and liberties. He continued to attend the meetings of the Assembly after its dissolution by the marquess oi Hamilton, when Episcopacy was abolished. In 1639 he sent a statement to Laud, and subsequently to the king, defending the Assembly's action; and raising a body of troops he seized Hamilton's castle of Brodick in Arran. After the pacification of Berwick he carried a motion, in opposition to Montrose, by which the estates secured to themselves the election of the lords of the articles, who had formerly been nominated by the king, a fundamental change in the Scottish constitution, whereby the management of public affairs was entrusted to a representative body and withdrawn from the control of the crown. An attempt by the king to deprive him of his office as justiciary of Argyll and Tarbet failed, and on the prorogation of the parliament by Charles, in May 1640, Argyll moved that it should continue its sittings and that the government and safety of the kingdom should be secured by a committee of the estates, of which, though not a member, he was himself the guiding spirit. In June he was entrusted with a " commission of fire and sword " against the royalists in Atholl and Angus, which, after succeeding in entrap- ping the earl of Atholl, he carried out with completeness and some cruelty. It was on this occasion that took place the burning of " the bonnie house of Airlie." By this time the personal rivalry and difference in opinion between Montrose and Argyll had led to an open breach. The former arranged that on the occasion of Charles's approaching visit to Scotland, Argyll should be accused of high treason in the parliament. The plot, how- ever, was disclosed, and Montrose with others was imprisoned. Accordingly when the king arrived he found himself deprived of every remnant of influence and authority. It only remained for Charles to make a series of concessions. He transferred the control over judicial and political appointments to the parlia- ment, created Argyll a marquess (1641) with a pension of £1000 a year, and returned home, having in Clarendon's words " made a perfect deed of gift of that

kingdom." Meanwhile the king's policy of peace and concession had, as usual, been rudely and treacherously interrupted by a resort to force, an unsuccessful attempt, known as the " incident," being made to kidnap Argyll, Hamilton and Lanark. Argyll was mainly instrumental at this crisis in keeping the national party faithful to what was to him evidently the common cause, and in accomplishing the alliance with the Long Parliament in 1643. In January 1644 he accompanied the Scottish army into England as a member of the committee of both kingdoms and in command of a troop of horse, but was soon in March compelled to return to suppress royalist movements in the north and to defend his own territories. He compelled Huntly to retreat in April, and in July advanced to meet the Irish troops now landed in Argyllshire, which were acting in conjunction with Montrose, who had put himself at the

1 The date of 1598, previously accepted, is shown by Willcock to be incorrect.

head of the royalist forces in Scotland. A campaign followed in the north in which neither general succeeded in obtaining any advantage over the other, or even in engaging battle. Argyll then returned to Edinburgh, threw up his commission, and retired to Inveraray Castle. Thither Montrose unexpectedly followed him in December, compelled him to flee to Roseneath, and devastated his territories. On the 2nd of February 1645, when following Montrose northwards, Argyll was surprised by him at Inverlochy and witnessed from his barge on the lake, to which he had retired owing to a dislocated arm, a fearful slaughter of his troops, which included 1 500 of the Campbells. He arrived at Edinburgh on the 12th of February and was again present at Montrose's further great victory on the 15th of August at Kilsyth, whence he escaped to Newcastle. Argyll was at last delivered from his formidable antagonist by Montrose's final defeat at Philiphaugh on the 1 2th of September. In 1646 he was sent to negotiate with the king at Newcastle after his surrender to the Scottish army, when he endeavoured to moderate the demands of the parliament and at the same time to persuade the king to accept them. On the 7th of July 1646 he was appointed a member of the Assembly of Divines.

Up to this point the statesmanship of Argyll had been highly successful. The national liberties and religion of Scotland had been defended and guaranteed, and the power of the king in Scotland reduced to a mere shadow. In addition, these privi- leges had been still further secured by. the alliance with the English opposition, and by the subsequent triumph of the

parliament and Presbyterianism in the neighbouring kingdom. The sovereign himself, after vainly contending in arms, was a prisoner in their midst. But Argyll's influence could not survive the rupture of the alliance between the two nations on which his whole policy was constructed. He opposed in vain the secret treaty now concluded between the king and the Scots against the parliament, and while Hamilton "marched into England and was defeated by Cromwell at Preston, Argyll, after a narrow escape from a surprise at Stirling, joined the Whiggamores, a body of Covenanters at Edinburgh; and, supported by Loudon, Leven and Leslie, he established a new government, which welcomed Cromwell on his arrival there on the 4th of October. This alliance, however, was at once destroyed by the execution of Charles I., which excited universal horror in Scotland. In the series of tangled incidents which followed, Argyll lost control of the national policy. He describes himself at this period as " a distracted man . . . in a distracted time " whose " remedies . . . had the quite contrary operation." He supported the invitation from the Covenanters to Charles II. to land in Scotland, gazed upon the captured Montrose, bound on a cart on his way to execution at Edinburgh, and subsequently, when Charles II. came to Scotland, having signed the Covenant and repudiated Montrose, Argyll remained at the head of the administration. After the defeat of Dunbar, Charles retained his support by the promise of a dukedom and the Garter, and an attempt was made by Argyll to marry the king to his daughter. On the 1st of January 1651 he placed the crown on Charles's head at Scone, But his power had now passed to the Hamilton party. He strongly opposed, but was unable to prevent, the expedition into England, and in the subsequent reduction of Scotland, after having held out in Inveraray Castle for nearly a year, was at last surprised in August 1632 and submitted to the Commonwealth. His ruin was then complete. His policy had failed, his power had vanished. In his estate he was hopelessly in debt, and on terms of such violent hostility with his eldest son as to be obliged to demand a garrison in his house for his protection. During his visit to Monk at Dalkeith in 1654 to complain of this, he was subjected to much persona] insult from his creditors, and on visiting London in September 1655 to obtain money due to him from the Scottish parliament, he was arrested for debt, though soon liberated. In Richard Cromwell's parliament of 1659 Argyll sat as member for Aberdeenshire. At the Restoration he presented himself at Whitehall, but was at once arrested by order of Charles and placed in the Tower (1 660) , being sent to Edinburgh to stand his trial for high treason. He was acquitted of com-

plicity in the death of Charles I., and his escape from the whole charge seemed imminent, but the arrival of a packet of letters written by Argyll to Monk showed conclusively his collaboration with Cromwell's government, particularly in the suppression of Glencairn's royalist rising in 1652. He

was immediately sentenced to death, his execution by beheading taking place on the 27th of May 1661, before even the death warrant had been signed by the king. His head was placed on the same spike upon the west end of the Tolbooth on which that of Montrose had previously been exposed, and his body was buried at the Holy Loch, where the head was also deposited in 1664. A monument was erected to his memory in St Giles's church in Edinburgh in 1895.

While imprisoned in the Tower he wrote Instructions to a Son (1661; reprinted in 1689 and 1743). Some of his speeches, including the one delivered on the scaffold, were published and are printed in the Harleian Miscellany. He married Lady Margaret Douglas, daughter of William, 2nd earl of Morton, and had two sons and four daughters.

See also the Life and Times of Archibald Marquis of Argyll (1903), by John Willcock, who prints for the first time the six incriminating letters to Monk; Eng. Hist. Review, xviii. 369 and 624; Scottish History Society, vol. xvii. (1894) ; Charles II. and Scotland in 1650, ed. by S. R. Gardiner, and vol. xviii. (1895) ; History of Scotland, by A. Lang, vol. iii. (1904).

Archibald Campbell, 9th earl of Argyll (1620-1683), eldest son of the 8th earl, studied abroad, and at the age of thirteen was appointed captain in the Scottish regiment serving in France under his uncle the earl of Irvine. He returned home at the close of 1649, an d was made captain of Charles II.'s life guards on the king's arrival in Scotland in 1650. He declared himself a royalist in opposition to his father, with the view, as some said, of securing the family estates in any event. He fought at Dunbar on the 3rd of September 1650, and after the battle of Worcester joined Glencairn in the Highlands. Bitter disputes arose, and on the 2nd of January 1654 Lome, quitting his troops, fled to avoid arrest. In 1655 he submitted to Monk. He appears, however, to have maintained communications with Charles, and on his refusal to take the oath renouncing allegiance to the Stuarts in 1657 he was imprisoned, remaining in confine- ment probably till a short time before the Restoration. He was then well received at court by Charles II. After the execu- tion of his father, he endeavoured to obtain the restitution of his forfeited estates and title, but having incautiously attacked certain members of the government in letters which were made public, he was indicted at Edinburgh on the capital charge of " leasing-making " and was sentenced to death on the 26th of August. He remained a prisoner in Edinburgh Castle till the 4th of June 1663, when the sentence was cancelled and he was re-created earl and restored to his estates. He disapproved of the severities practised upon the Covenanters in the west, and in 1671 pleaded for milder methods. His staunch Protest- antism rendered him exceedingly obnoxious to James, duke of York, who in 1680 arrived as high commissioner in Scotland and at once expressed his

jealousy of Argyll's immense terri- torial influence. Argyll moved the re-enactment of " all the acts against popery " omitted on James's account, and opposed the exemption of the royal family from the test, though allowing it in the case of James. In signing the test himself, in its final form both ambiguous and self-contradictory, he made the reservation " so far as consistent with itself and the Protestant faith," and declined to engage himself not'to promote any altera- tion of advantage in church or state. On his refusal to record his oath in writing and to sign it, he was dismissed from the Scottish privy council, and on the 9th of November 1681 was accused of treason, a charge which Halifax declared openly in England "they would not hang a dog upon." A trial followed, a scandalous exhibition of illegality and injustice, at the close of which Argyll was sentenced to death and to the forfeiture of his estates. Shortly afterwards, ' through the instrumentality of his step-daughter, Sophia Lindsay, he succeeded in making his escape, and after some adventures retired to Holland. His subsequent movements are uncertain, but he appears to have

again visited London, and was in correspondence with the Rye House plotters and proposing to head a rebellion in Scotland in 1683. In 1685 he joined the conspiracy in Holland to set Monmouth on the throne instead of James II., arriving in Orkney on the 6th of May and making his way to his own country. But his clansmen refused to join him, and whatever small chances of success remained were destroyed by constant and paralysing disputes. His ships and ammunition were captured, and after some aimless wanderings he found himself deserted, with but one companion, Major Fullerton. On the 18th of June he was taken prisoner at Inchinnan and arrived at Edinburgh on the 20th, where he was paraded through the streets and put in irons in the castle. James ordered his summary execution on the 29th, and it was carried out by beheading on the following day, on the old charge of 1681. His head was exposed on the west side of the Tolbooth, where his father's and Montrose's had also been exhibited, his body finding its final place of burial at Inveraray.

By his first wife, Lady Mary Stewart, daughter of the 4th earl of Moray (Murray), he had four sons and three daughters.

See Argyll Papers (1834) ; Letters from Archibald, gth Karl of At gyle, to the Duke of Lauderdale (1829) ; Hist. MSS. Comm. vi. Rep. 606; Life of Mr Donald Cargile, by P. Walker, pp. 45 et seq.; The 3rd Part of the Protestant Plot . . . and a Brief Account of the Case of the Earl of Argyle (1682); Sir George Mackenzie's Hist, of Scotland, p. 70; and J. Willcock,

A Scots Earl in Covenanting Times (1908).

Archibald Campbell, 1st duke of Argyll (?i6si-i703), was the eldest son of the 9th earl. He tried to get his father's attainder reversed by seeking the king's favour, but being un- successful he went over to the Hague and joined William of Orange as an active promoter of the revolution of 1688. In spite of the attainder, he was admitted in 1689 to the convention of the Scottish estates as earl of Argyll, and he was deputed, with Sir James Montgomery and Sir John Dalrymple, to present the crown to William III. in its name, and to tender him the coronation oath. In 1600 an act was passed restoring his title and estates, and it was in connexion with the refusal of the Macdonalds of Glencoe to join in the submission to him that he organized the terrible massacre which has made his name notorious. In 1696 he was made a lord of the treasury, and his political services were rewarded in 1701 by his being created duke of Argyll. He had two sons by his wife Elizabeth, daughter of Sir Lionel Talmash, John (the 2nd duke) and Archibald (the 3rd duke).

John Campbell, 2nd duke of Argyll and duke of Greenwich (1678-1743), was born on the 10th of October 1678. He entered the army in 1694, and in 1701 was promoted to the command of a regiment. On the death of his father in 1703, he was ap- pointed a member of the privy council, and at the same time colonel of the Scotch horse guards, and one of the extraordinary lords of session. In return for his services in promoting the Union, he was created (1705) a peer of England, by the titles of baron of Chatham and earl of Greenwich, and in 1710 was made a knight of the Garter. He first distinguished himself in a military capacity at the battle of Oudenarde (1708), where he served as a brigadier-general; and was afterwards present under the duke of Marlborough at the sieges of Lille, Ghent, Bruges and Tournay, and did remarkable service at the battle of Malplaquet in 1709. He was very popular with the troops, and his rivalry with Marlborough on this account is thought to have been the cause of the enmity shown by Argyll afterwards to his old commander. In 17 n he was sent to take command in Spain ; but being seized with a violent fever at Barcelona, and disappointed of supplies from home, he returned to England. Having a seat in the House of Lords, and being gifted with an extraordinary power of oratory, he censured the measures of the ministry with such freedom that all his places were disposed of to other noblemen; but at the accession of George I. he recovered his influence. On the breaking out of the rebellion in 1715 he was appointed commander-in-chief of the forces in North Britain, and was principally instrumental in effecting the total extinc- tion of the rebellion in Scotland without much bloodshed. He arrived in London early in March 1716, and at first stood high

in the favour of the king, but in a few months was stripped of his offices.

This disgrace, however, did not deter him from the discharge of his parliamentary duties; he supported the bill for the impeachment of Bishop Atterbury, and lent his aid to his countrymen by opposing the bill for punishing the city of Edinburgh for the Porteous riot. In the beginning of the year 1 7 19 he was again admitted into favour, appointed lord steward of the household, and, in April following, created duke of Green- wich; he held various offices in succession, and in 1735 was made a field marshal. He continued in the administration till after the accession of George II., when, in April 1740, a violent speech against the government led again to his dismissal from office. He was soon restored on a change of the ministry, but disapproving the measures of the new administration, and apparently disappointed at not being given the command of the army, he shortly resigned all his posts, and spent the rest of his life in privacy and retirement. He died on the 4th of October 1743. A monument by Roubillac was erected to his memory in Westminster Abbey. He was twice married, and by his second wife, Jane Warburton, had five daughters; his Scottish titles passed to his brother, but his English titles became extinct, and though his eldest daughter was created baroness of Greenwich in 1767 this title also became extinct on her death in 1794.

Archibald Campbell, 3rd duke of Argyll (1682-1761), was born at Ham House in Surrey, in June 1682. On his father being created a duke, he joined the army, and served for a short time under the duke of Marlborough. In 1705 he was appointed treasurer of Scotland, and in the following year was one of the commissioners for treating of the Union; on the consummation of which, having been raised to the peerage of Scotland as earl of Islay, he was chosen one of the sixteen peers for Scotland in the first parliament of Great Britain. In 171 1 he was called to the privy council, and commanded the royal army at the battle of Sheriffmuir in 1715- He was appointed keeper of the privy seal in 1721, and was afterwards entrusted with the principal management of Scottish affairs to an extent which caused him to be called " king of Scotland." In 1733 he was made keeper of the great seal, an office which he held till his death. He succeeded to the dukedom in 1743. Both as earl of Islay and as duke of Argyll he was prominently connected (with Duncan Forbes of Culloden) with the movement for consolidating Scottish loyalty by the formation of locally recruited highland regiments. The duke was eminent not only for his political abilities, but also for his literary accomplishments, and he collected one of the most valuable private libraries in Great Britain. He died suddenly on the 15th of April 1761. He was married but had no legitimate issue, and his English property was left to a Mrs Williams, by whom he had a son, William Campbell.

The succession now passed to the descendants of the younger son of the 9th earl, the Campbells of Mamore; the 4th duke died in 1770, and was

succeeded by his son John, the 5th duke (1723- 1806). He was a soldier who had fought at Dettingen and Culloden, and became colonel of the 42nd regiment (Black Watch), and eventually a field marshal. He sat in the House of Commons for Glasgow from 1744 to 1761, when on his father's succession to the dukedom he became legally disqualified, as courtesy marquess of Lome, for a Scottish constituency; he could sit, however, for an English one, and was returned for Dover, which he represented till 1766, when he was created an English peer as Baron Sundridge, the title by which till 1892 the dukes of Argyll sat in the House of Lords. The 5th duke was an active landlord, and was the first president of the Highland and Agricultural Society. In 1759 he had married the widowed duchess of Hamilton (the beautiful Elizabeth Gunning), by whom he had two sons and two daughters. The eldest of his sons, George (d. 1841), became 6th duke, and on his death was succeeded as 7th duke by his brother John (1777-1847), who from 1799-1822 sat in parliament as member for Argyllshire. He was thrice married, and by his second wife, Joan Glassell (d. 1828), had two sons, the eldest of whom (b. 1821) died

in 1837, and two daughters, the second of whom died in infancy.

George John Douglas Campbell, 8th duke (1823-1900), the second son of the 7th duke, was born on the 30th of April 1823, and succeeded his father in April 1847. He had already obtained notice as a writer of pamphlets on the disruption of the Church of Scotland, whiah he strove to avert, and he rapidly became prominent on the Liberal side in parliamentary politics. He was a frequent and eloquent speaker in the House of Lords, and sat as lord privy seal (1852) and postmaster-general (1855) in the cabinets of Lord Aberdeen and Lord Palmerston. In Mr Gladstone's cabinet of 1868 he was secretary of state for India, and somewhat infelicitously signalized his term of office by his refusal, against the advice of the Indian government, to promise the amir of Afghanistan support against Russian aggression, a course which threw that ruler into the arms of Russia and was followed by the second Afghan War. His eminence alike as a great Scottish noble, and as a British states- man, was accentuated in 1871 when his son, the marquess of Lome, married Princess Louise, the fourth daughter of Queen Victoria; but in the political world few memorable acts on his part call for record except his resignation of the office of lord privy seal, which he held in Mr Gladstone's administration of 1880, from his inability to assent to the Irish land legislation of 1 88 1. He opposed the Home Rule Bill with equal vigour, though Mr Gladstone subsequently stated that, among all the old colleagues who dissented from

his course, the duke was the only one whose personal relations with him remained entirely unchanged. Detached from party, the duke took an independent position, and for many years spoke his mind with great freedom in letters to The Times on public questions, especially such as concerned the rights or interests of landowners. He was no less active on scientific questions in their relation to religion, which he earnestly strove to reconcile with the progress of discovery. With this aim he published The Reign of Law (1866), Primeval Man (1869), The Unity of Nature (1884), The Unseen Founda- tions of Society (1893), and other essays. He also wrote on the Eastern question, with especial reference to India, the history and antiquities of Iona, patronage in the Church of Scotland, and many other subjects. The duke (to whose Scottish title was added a dukedom of the United Kingdom in 1892) died on the 24th of April 1900. He was thrice married: first (1844) to a daughter of the second duke of Sutherland (d. 1878); secondly (1881) to a daughter of Bishop Claughton of St Albans (d. 1894); and thirdly (1895) to Ina Erskine M'Neill. Few men of the duke's era displayed more versatility of intellect, and he was remarkable among the men of his time for his lofty eloquence.

He was succeeded as 9th duke by his eldest son John Douglas Sutherland Campbell (1845-), whose marriage in 1871 to H.R.H. Princess Louise gave him a special prominence in English public life. He was governor-general of Canada from 1878 to 1883; member of parliament for South Manchester, in the Unionist interest, 1895 to 1900; and he also became known as a writer both in prose and verse. In 1907 he published his reminiscences, Pages from the Past.

See the Autobiography and Memoirs of the 8th duke, edited by his widow (1906), which is full of interesting historical and personal detail. (P. C. Y.; H. Ch.)

ARGYLLSHIRE, a county on the west coast of Scotland, the second largest in the country, embracing a large tract of country on the mainland and a number of the Hebrides or Western Isles. The mainland portion is bounded N. by Inverness-shire; E. by Perth and Dumbarton, Loch Long and the Firth of Clyde; S. by the North Channel (Irish Sea); and W. by the Atlantic. Its area is 1,990,471 acres or 3 no sq. m. The principal districts are Ardnamurchan on the Atlantic, Ardnamurchan Point being the most westerly headland of Scotland; Morven or Morvern, bounded by Loch Sunart, the Sound of Mull and Loch Linnhe; Appin, on Loch Linnhe, with piers at Ballachulish and Port Appin; Benderloch, lying between Loch Creran and Loch Etive; Lome, surrounding Loch Etive and giving the title of marquess to the Campbells; Argyll, in the middle of the shire, containing

Inveraray Castle and furnishing the titles of earl and duke to the Campbells; Cowall, between Loch Fyne and the Firth of Clyde, in which lie Dunoon and other favourite holiday resorts; Knapdale between the Sound of Jura and Loch Fyne; and Kintyre or Cantyre, a long narrow peninsula (which, at the isthmus of Tarbert, is little more than 1 m. wide), the southern- most point of which is known as the Mull, the nearest part of Scotland to the coast of Ireland, only 13 m. distant.

There are no navigable rivers. The two principal mountain streams are the Orchy and Awe. The Orchy flows from Loch Tulla through Glen Orchy, and falls into the north-eastern end of Loch Awe; and the Awe drains the loch at its north-western extremity, discharging into Loch Etive. Among other streams are the Add, Aray, Coe or Cona, Creran, Douglas, Eachaig, Etive, Euchar, Feochan, Finart, Fyne, Kinglass, Nell, Ruel, Shiel, Shira, Strae and Uisge-Dhu. The county is remarkable for the numerous sea-lochs which deeply indent the coast, the principal being Loch Long (with its branches Loch Goil and the Holy Loch), Loch Striven (Rothesay's " weather glass "), Loch Riddon, Loch Fyne (with Loch Gilp and Loch Gair), Lochs Tarbert, Killisport, Swin, Crinan, Craignish, Melfort, Feochan, Etive,

Linnhe (with its branches Loch Creran, Loch Leven and Loch Eil) and Sunart. There are also a large number of inland lakes, the total area of which is about 25,000 acres. Of these the principal are Lochs Awe, Avich, Eck, Lydoch and Shiel. The principal islands are Mull, Islay, Jura, Colonsay, Lismore, Tyree, Coll, Gigha, Luing and Kerrera. Besides these there are the two small but interesting islands of Staffa and Iona. The mountains are so many as to give the shire a markedly rugged character. Some of them are among the loftiest in the kingdom, as Ben Cruachan with its summit of twin pyramids (3689 ft.), Ben More, in- Mull' (3172), Ben Ima (3318), Buachaille Etive (3345), Ben Bui (3106), Ben Lui (or Loy), on the confines of the shires of Perth and Argyll (3708), Ben Starav near the head of Loch Etive (3541), and Ben Arthur, called from its shape " The Cobbler " (2891), on the borders of Dumbartonshire. There are many picturesque glens, of which the best-known are Glen Aray, Glen Croe, Glen Etive, Glendaruel, Glen Lochy (" the wearisome glen" —some 10 m. of bare hills and boulders — between Tyndrum and Dalmally),Glen Strae,Hell's Glen (off Lech Goil) and Glencoe, the scene of the massacre in 1692. The waterfalls of Cruachan are beautiful; and those of Connel, which are more in the nature of rapids, caused by the rush of the ebbing tide over the rocky bar at the narrowing mouth of Loch Etive, have been made cele- brated by Ossian, who called them " the Falls of Lora." In several of the glens, as Glen Aray, small falls may be seen, enhanced in beauty when the rivers are in flood. Pre-eminently Argyll is the shire of the sportsman. The lovely Western Isles provide endless enjoyment for the yachtsman; the lochs and rivers abound with salmon and trout; the deer forests and grouse moors are second to none in Scotland.

Geology. — The mainland portion of the county consists chiefly of the metamorphic rocks of the Eastern Highlands, nearly all the sub- divisions of that series (see Scotland: Geology) being represented. They form parallel belts of varying width trending north-east and south-west. The slates and phyllites referred to the lowest group occur along the shore at Dunoon, and are followed by the Beinn Bheula grits and albite schists, forming nearly all the highest ground in Cowall between Loch Fyne and the Firth of Clyde and the greater part of Kintyre. The green beds, Glensluan mica-schists and Loch Tay limestones are developed in Glendaruel, and have been traced north-east to Glen Fyne and at intervals south-west to Campbeltown. The next prominent zone is that of the Ardrishaig phyllites, with quartzites in the lower portion and soft phyllites in the upper part, which cover a belt from 3 to 6 m. across, stretching from Glen Shira by Inveraray and Ardrishaig to south Knapdale.

Next in order come the Easdale slates, phyllites with thin dark limestone, the main limestone of Loch Awe and the pebbly quartzite (Schiehallion), which are repeated by innumerable folds and spread northwards to Loch

Linnhe and westwards to Jura and Islay. The slates of this horizon have been largely quarried at Easdale and Ballachulish, and this main limestone is typically developed near Loch Awe, near Kilmartin, on the islands of Lismore and Shuna, and in Islay between Bridgend and Portaskaig. The quartzites of this series form the highest hills in the south of Islay, occupy nearly the whole of Jura, and are continued in the mainland, where, by

means of the rapid isoclinal folding, they form lenticular masses. In Islay and at various localities on the mainland a conglomerate occurs at or near the base of the quartzites, which contains frag- ments of the underlying rocks and boulders of granite not now found in place in that region.

On the mainland, on the north side of the compound synclinal folding of Loch Awe, the Ardrishaig phyllites reappear at Craignish near Kilmartin, and the quartzites of this group are supposed to come to the surface again in Glencoe, not far from the outcrop of the Schiehallion quartzite.

The metamorijhic rocks are associated with bands of epidiorite which have shared in the folding and metamorphism of the region. These are largely developed near Loch Awe, in Knapdale, and on the south-east coast of Islay. They have been usually regarded as intrusive, but south of Tayvallich on the mainland, lavas and tuffs, which have escaped deformation, occur in the Easdale slates and the pebbly limestone.

The Lower Old Red Sandstone, chiefly composed of volcanic rocks — lavas and tuffs— rests unconformably on the metamorphic series. These rocks cover a wide area in Lome between Loch Melfort. Oban and the Pass of Brander, and they reappear in the lofty mountains on both sides of Glencoe. Representatives of this formation are found in Kintyre, south of Campbeltown, where the sediments prevail. The intrusive igneous rocks belonging to this period are widely distributed and form conspicuous features. The plutonic masses are represented by the granite of Ben Cruachan, by the diorite of Gleann Domhainn, and by the kentallenite (a basic rock related to the monxonites), near Ballachulish. Throughout the Lome volcanic plateau there are numerous dykes of porphyrite which likewise traverse the schists and part of the Ben Cruachan granite. Sheets of quartz-porphyry, lamprophyre and diorite are also represented, the first of these types being quarried at Crarae on the north shore of Loch Fyne.

The Upper Old Red Sandstone forms isolated patches resting unconformably on all older rocks, on the west coast of Kintyre, and

between Campbeltown and Southend. In the district of Campbeltown these red sandstones and cornstones are followed by the volcanic rocks of the Calciferous Sandstone series, which lie to the south of the depression at Machrihanish, and are succeeded by the lower limestones and coals of the Carboniferous Limestone series.

On the north and south shores of the promontory of Ardnamurchan there are small patches of Jurassic strata ranging from the Lower Lias to the Oxford Clay, and in Morvern on the shores of Loch Aline representatives of the Upper Greensand are covered by the basaltic lavas of Tertiary age. The acid and basic plutonic rocks (gabbros and granophyres) of Tertiary time occur in Ardnamurchan. A striking geological feature of the county is the number of dolerite and basalt dykes trending in a north-west direction, which are referred to the same period of intrusion. There is, however, another group of dolerite dykes running east and west near Dunoon and elsewhere, which are cut by the former and are probably of older date.

Lead veins occur at Strontian which have yielded a number of minerals, including sphalerite, fluorite, strontianite, harmotone, brewsterite and pilolite. Near Inveraray, nickeliferous ore has been obtained at two localities.

Climate. — The rainfall is very abundant. At Oban, the average annual amount is 64-18 in.; in Glen Fyne, 104-11 in.; at the bridge of Orchy, 113-62 in., and at Upper Glencoe 127-65. The prevailing winds, as observed near Crinan, are south-west and south-east, and next in frequency are the north-west and north-east. The average yearly temperature is 48 F.

Agriculture. — Argyllshire was formerly partly covered with natural forests, remains of which, consisting chiefly of oak, ash, pine and birch, are still visible in the mosses; but, owing to the clearance of the ground for the introduction of sheep, and to past neglect of planting, the county is now remarkable for its lack of wood, except in the neighbourhood of Inveraray, where there are extensive and flourishing plantations, and a few other places. Replanting, however, has been carried on. Most of the county is unfitted for agriculture; but many districts afford fine pasturage for mountain sheep ; and some of . the valleys, such as Glendaruel, are very fertile. The chief crop is oats; there is a little barley, but no wheat. The shire is one of those where the crofting system exists, but it is by no means universal. It is predominant in Tyree arid the western district of the mainland, but elsewhere farms of moderate size are the rule. The cattle, though small, are equal to any other breed in the kingdom, and are marketed in large numbers in the south. Dairy farming is carried on to some extent in the southern parts of Kintyre where there is a large*

proportion of arable land. In the higfler tracts sheep have taken the place of cattle with

excellent results. The black-faced is the species most generally reared.

Industries. — Whisky is manufactured at Campbeltown, in Islay, at Oban, Ardrishaig and elsewhere. Gunpowder is made atKames(KylesofBute), Melfort and Furnace. Coarse woollens are made for home use; but fishing is the most important industry, Loch Fyne being famous for its herrings. The season lasts from June to January, but white fishing is carried on at one or other of the ports all the year round. Slate and granite quarrying and some coal-mining are the only other industries of any consequence.

Communications. — Owing partly to the paucity of trading industries and partly to the fact that, owing to its greatly indented coast-line, no place in the shire is more than 12 m. from the sea, the railway mileage in the county is very small. The Tyndrum to Oban section of the Caledonian railway com- pany's system is within the county limits; a small portion of the track of the North British railway company's line to Mallaig skirts the extreme west of the shire, and the Caledonian line from Oban to Ballachulish serves the northern coast districts of the Argyllshire mainland. In connexion with this last route mention should be made of the cantilever bridge crossing the Falls of Lora with a span of 500 ft. at a height of 125 ft. above the water-way. The chief means of communication is by steamers, which maintain regular intercourse between Glasgow and various parts of the coast. In order to avoid the circuitous passage round the Mull of Kintyre the Crinan Canal, across the isthmus from Ardrishaig to Loch Crinan, a distance of 9 m., was constructed in 1 793-1801, at a cost of £142,000. It has 15 locks, an average depth of 10 ft., a surface width of 66 ft., and bottom width of 30 ft., is navigable by vessels of 200 tons, and runs through a district of remarkable beauty. Another canal unites Campbeltown with Dalavaddy. In summer the mails for the islands and the great bulk of the tourist traffic by the MacBrayne fleet is conveyed through the Crinan Canal, tran- shipment being effected at Ardrishaig and Crinan. Throughout the year goods traffic between the Clyde and elsewhere and the West Highland ports is conveyed by deep-sea steamers round the Mull. Before the advent of railways the shire contained many famous coaching routes, but now coaches only run during the tourist season, either in connexion with train and steamer, or in districts still not served by either.

Population and Government. — Owing to emigration, chiefly to Canada, the population has declined, almost without a break, since 1831, when it was 100,973, to 74,085 in 1891 and 73,642 in 1901, in which year there were 24 persons to the sq. m. In 1901 the number of Gaelic-speaking persons was 34,224, of whom 3313 spoke Gaelic only. The chief towns are

Campbeltown (population in 1901, 8286), Dunoon (6779) and Oban (5427), with Ardrishaig (1285), Ballachulish (1143), Lochgilphead (1313) and Tarbert (1697). The county returns a member to parliament. Inveraray, Campbeltown and Oban belong to the Ayr district group of parliamentary burghs. Argyllshire is a sheriffdom, and there are resident sheriffs- substitute at Inveraray, Campbeltown and Oban; courts are held also at Tobermory, Lochgilphead, Bowmore in Islay, and Dunodn. Both Presbyterian bodies are strongly repre- sented; there are Roman Catholic and (Anglican) Episcopal bishops of Argyll and the Isles, and there is a Roman Catholic pro-cathedral at Oban. Campbeltown, Dunoon and Oban have secondary schools, Tarbert public school has a secondary de- partment, and several other schools earn grants for giving higher education. Part of the " residue " grant is spent by the county council on classes of navigation and other subjects in various schools, short courses in agriculture for farnˆp, and in providing bursaries.

History. — The early history of Argyll (Airergaidheal) is very obscure. At the close of the 5th century Fergus, son of Ere, a descendant of Conor II., airdrigh or high king of Ireland, came over with a band of Irish Scots and established himself in Argyll and Kintyre. Nothing more is known till, in the days of Conall I., the descendant of Fergus in the fourth generation, St Columba

appears. Conall died in 574, and Columba was mainly instru- mental in establishing his first cousin, Aidan, founder of the Dalriad kingdom and ancestor of the royal house of Scotland, in power. In the 8th century Argyll, with the Western Islands and Man, fell under the power of the Norsemen until, in the 12th century, Somerled (or Somhairle), a descendant of Colla- Uais, airdrigh of Ireland (327-331), succeeded in ousting them and established his authority, not only as thane of Argyll, but also in Kintyre and the Western Islands. Somerled died in 1 164 and his descendants maintained themselves in Argyll and the islands, between the conflicting claims of the kings of Scotland, Norway and Man, until the end of the 15th century.

Up to 1222 Argyll had formed an independent Celtic prince- dom; but in that year it was reduced by Alexander II., the Scottish king, to a sheriffdom, and was henceforth regarded as an integral part of Scotland. Among the various clans in Argyll, the Campbells of Loch Awe, a branch of the clan McArthur, now began to come to the fore, though the mainland was still chiefly in the possession of the MacDougals. The position of the

lords of the house of Somerled was now curious, since they were feudatories of the king of Norway for the isles and of the king of Scotland for Argyll. Their policy in the wars between the two powers was a masterly neutrality. Thus, during the expedition of Alexander II. to the Western Isles in 1249, Ewan (Eoghan), lord of Argyll, refused to fight against the Norwegians; in 1263 the same Ewan refused to join Haakon of Norway in attacking Alexander III. Forty years later the clansmen of Argyll, mainly MacDougals, were warring on the side of Edward of England against Robert Bruce, by whom they were badly beaten on Loch Awe in 1300. The clansmen o A the house of Somerled in the isles, on the other hand, the MacDorfil&s, remained loyal to Scotland in spite of the persuasions of Jonn of Argyll, appointed admiral of Edward II. 's western fie et; and, under their chief Angus Og, they contributed much to the victory of Bannockburn. The alliance of John, earl of Ross and lord of the Isles, with Edward IV. of England in 1461 led to the breaking of the power of the house of Somerled, and in 1478 John was forced to resign Ross to the crown and, two years later, his lordships of Knapdale and Kintyre as well. In Argyll itself the Campbells had already made the first step to supremacy through the marriage of Colin, grandson of Sir Duncan Campbell of Lochow, first Lord Campbell, with Isabel Stewart, eldest of the three co-heiresses of John, third lord of Lome. He acquired the greater part of the lands of the other sisters by purchase, and the lordship of Lome from Walter their uncle, the heir in tail male, by an exchange for lands in Perthshire. In 1457 he was created, by James II., earl of Argyll. He died on the 10th of May 1493. From him dates the greatness of the house of the earls and dukes of Argyll (q.v.), whose history belongs to that of Scotland. The house of Somerled survives in two main branches— that of Macdonald of the Isles, Alexander Macdonald (d. 1795) having been raised to the peerage in 1776, and that of the Macdonnells, earls of Antrim in Ireland. The principal clans in Argyll, besides those already mentioned, were the Macleans, the Stewarts of Appin, the Macquarries and the Macdonalds of Glencoe, and the Macfarlanes of Glencroe. The Campbells are still very numerous in the county.

Argyllshire men have made few contributions to English literature. For long the natives spoke Gaelic only and their bards sang in Gaelic (see Celt: Literature: Scottish). Near Inistrynich on the north-eastern shore of Loch Awe stands the monumental cairn erected in honour of Duncan Ban Mclntyre (1724-1812), the most popular of modern Gaelic bards. But the romantic beauty of the country has made it a favourite setting for the themes of many poets and story-tellers, from " Ossian " and Sir Walter Scott to Robert Louis Stevenson, while not a few men distinguished in affairs or in learning have been natives of the county.

The antiquities comprise monoliths, circles of standing stones, crannogs and

cairns. In almost all the burying-grounds — as at Campbeltown, Keil, Soroby, Kilchousland, Kilmun — there

are specimens of sculptured crosses and slabs. Besides the famous ecclesiastical remains at Iona {q.v.), there are ruins of a Cistercian priory in Oronsay, and of a church founded in the 12 th century by Somerled, thane of Argyll, at Saddell. Among castles may be mentioned Dunstaffnage, Ardtornish, Skipness, Kilchurn (beloved of painters), Ardchonnel, Dunolly, Stalker, Dunderaw and Carrick.

Authorities. — The (Eighth) Duke of Argyll, Commercial Prin- ciples Applied to the Hire of Land (London, 1877) ; Crofts and Farms in the Hebrides (Edinburgh, 1883); Iona (Edinburgh, 1889); Scot- land as it Was and Is (Edinburgh, 1887), House of Argyll (Glasgow, 1871); A. Brown, Memorials of Argyllshire (Greenock, 1889); Harvie-Brown and Buckley, Vertebrate Fauna of Argyll and the Inner Hebrides (Edinburgh, 1892); D. Clerk, " On the Agriculture of the County of Argyll " {Trans, of H. and A. Soc, 1878) ; T. Gray, Week at Oban (Edinburgh, 1881); Stewart, Collection of Views of Campbeltown. For antiquities see The Sculptured Stones of Scotland, vol. ii., published by the Spalding Club, and Capt. T. P. White's Archaeological Sketches in Kintyre and Proc. Antia. Soc. of Scotland, vols, iv., v., viii.

ARGYRODITE, a mineral which is of interest as being that in which the element germanium was discovered by C. Winkler in 1886. It is a silver sulpho-germanate, Ag 8 GeS6, and crystal- lizes in the cubic system. The crystals have the form of the octahedron or rhombic dodecahedron, and are frequently twinned. The botryoidal crusts of small indistinct crystals first found in a silver mine at Freiberg in Saxony were originally thought to be monoclinic, but were afterwards proved to be identical with the more distinctly developed crystals recently found in Bolivia. The colour is iron-black with a purplish tinge, and the lustre metallic. There is no cleavage; hardness 2 \, specific gravity 6-2. It is of interest to note that the Freiberg mineral was long ago imperfectly described by A. Breithaupt under the name Plusinglanz, and that the Bolivian crystals were incorrectly described in 1849 as crystallized brongniardite. The name argyrodite is from the Greek apyvpuih-qs, rich in silver.

Isomorphous with argyrodite is the corresponding tin compound AgsSnSˆ also found in Bolivia as cubic crystals, and known by the name canfieldite. Other Bolivian crystals are intermediate in composition between argyrodite and canfieldite. (L. J. S.)

ARGYROKASTRO, or Argyrocastron (Turkish, Ergeri; Albanian, Ergir Castri), a town of southern Albania, Turkey, in the vilayet of Iannina. Pop.

(1900) about 1 1 ,000. Argyrokastro is finely situated 1060 ft. above sea-level, on the eastern slopes of the Acroceraunian mountains, and near the left bank of the river Dhrynos, a left-hand tributary of the Viossa. It is the capital of a sanjak bearing the same name, and was formerly important as the headquarters of the local Moslem aristocracy, partly owing to the mountainous and easily defensible nature of the district. It contains the ruins of an imposing castellated fort. A fine kind of snuff, known as fuli, is manufactured here. Argyrokastro has been variously identified with the ancient Hadrianopolis and Antigonea. In the 18th century it is said to have contained 20,000 inhabitants, but it was almost de- populated by plague in 1814. Albanian Moslems constitute the greater part of the population.

ARGYROPULUS, or Argyroptjlo, JOHN (c. 1416-1486), Greek humanist, one of the earliest promoters of the revival of learning in the West, was born in Constantinople, and became a teacher there, Constantine Lascaris being his pupil. He then appears to have crossed over to Italy, and taught in Padua in 1434, being subsequently made rector of the university. About 1441 he returned to Constantinople, but after its capture by the Turks, again took refuge in Italy. About 1456 he was invited to Florence by Cosimo de'Medici, and was there appointed professor of Greek in the university. In 147 1, on the outbreak of the plague, he removed to Rome, where he continued to act as a teacher of Greek till his death. Among his scholars were Angelus Politianus and Johann- Reuchlin. His principal works were translations of the following portions of Aristotle, — Categoriae, De Inter pretatione, Analytica Posterior a, Physica, De Caelo, De Anima, Metaphysica, Ethica Nicomachea, Politico;

and an Expositio Ethicorum Aristotelis. Several of his writings

exist still in manuscript.

See Humphrey Hody, De Graecis Illustribus, 1742, and Smith's Dictionary of Greek and Roman Biography, s.v. Joannes.

ARIA (Ital. for "air"), a musical term, equivalent to the English " air," signifying a melody apart from the harmony, but especially a musical composition for a single voice or instrument, with an accompaniment of other voices or instruments.

The aria originally developed from the expansion of a single vocal melody, generally on the lines of what is known as binary form (see Sonata and Sonata Forms). Accordingly, while the germs of aria form may be traceable

in the highest developments of folk-song, the aria as a definite art-form could not exist before the middle of the 17th century; because up to that time the whole organization of music was based upon polyphonic principles which left no room for the development of melody for melody's sake. When at the beginning of the 17th century the Monodists (see Harmony and Monteverde) inaugurated a new era and showed in their first experiments the enormous possibilities latent in their new art of accompanying single voices by instru- ments, it was natural that for many years the mere suggestiveness and variety of their experiments should suffice to retain the attention of contemporary listeners, without any real artistic coherence in the works as wholes. But, even at the outset, mere novelty of harmony, however poignant its emotional expression, was felt by the profounder spirits of the new art to be an untrustworthy guide to progress. And Monteverde's famous lament of the deserted Ariadne is one of many early examples that appeal to an elementary sense of form by making the last phrase identical with the first. As instrumental music grew, and the modern sense of key became strong and consistent, composers felt themselves more and more able to appeal to that sense of harmonically consistent melody which has asserted itself in folk-music before the history of harmonic music may be said to have begun. The technique of solo singers grew as rapidly as that of solo players, and composers soon found their chief musical interest in doing justice to both. In Sir Hubert Parry's work, The Music of the 17th Century (Oxford History of Music, vol. iii.), will be found numerous illustrations of the early development of aria forms, from their first indications in Monteverde's instinctive struggles after coherence, to their complete maturity in the works of Alessandro Scarlatti.

By Scarlatti's time it was thoroughly established that the binary form of melody was that which could best be expanded into a form which should do justice both to singers and to the players who accompanied them. Thus the aria became on a small scale the prototype of the Concerto; and under that heading will accordingly be found all that need be said as to the relation between the instrumental ritornello and the material of the voice part in an aria.

So far we have spoken only of the main body of the aria; but the addition of a middle section with a da Capo, which constitutes the universal 18th-century da Capo form of aria, adds a very simple new principle to the essential scheme without really modifying it. A typical aria of the Scarlatti or Handelian type is a very large melody in binary form, delivered by the voice, which expands it with florid perorations before each cadence (and sometimes also with florid preludes); while relief is given to the voice, further spaciousness to the form, and justice done to the accompaniment, by the addition of an instrumental ritornello containing the gist of the melody not only at the beginning and end, but also in suitable shorter

forms at the principal intermediate cadences in foreign keys. A smaller scheme of the same kind in a new group of related keys, but generally without much new material, is then appended as a middle section after which follows the main section da Capo. The result is generally a piece of music of cpnsiderable length, in a form which cannot fail to be effective and coherent; and there is little cause for wonder in the extent to which it dominated 18th-century music. It was not, however, invariable. In the Cavaiina we find a form too small for the da Capo; and in the oratorios of Handel and the choral works of Bach we find

a majority of arias in a larger form which evades the possibility of exact repetition.

The aria forms are profoundly influenced by the difference between the Sonata style and the style of Bach and Handel. But the scale of the form is inevitably small, and in any opera an aria is hardly possible except in a situation which is a tableau rather than an action. Consequently there is no such difference between the form of the classical operatic aria of Mozart and that of the Handelian type as there is between sonata music and suite music. The scale, however, has become too large for the da Capo, which was in any case too rigid to survive in music designed to intensify a dramatic situation instead of to distract attention from it. The necessary change of style was so success- fully achieved that, until Wagner succeeded in devising music that moved absolutely pari passu with his drama, the aria remained as the central formal principle in dramatic music; and few things in artistic evolution are more interesting than the extent to which Mozart's predecessor, the great dramatic reformer Gluck, profited by the essential resources of his pet aversion, the aria style, when he had not only purged it of what had become the stereotyped ideas of ritornellos and vocal flourishes, but animated it by the new sense of dramatic climax to which the sonata style appealed.

In modern opera the aria is almost always out of place, and the forms in which definite melodies nowadays appear are rather those of the song in its limited sense as that of a poem in formal stanzas all set to the same music. In other words, a song in a modern opera tends to be something which would be sung even if the drama had to be performed as a play without music; whereas a classical aria would in non-musical drama be a soliloquy. This can be shown by works at such opposite poles of musical and dramatic technique as Bizet's Carmen and the later works of Wagner. In Carmen the librettist has so managed that, if his work were performed as a play, almost the whole of it would have to be sung; and the one exception of musical importance is the developed soliloquy of Micaela in the third act, which, although treated in no old-fashioned or commonplace spirit by the composer, is the one thing in the opera which sounds " operatic."

In the later works of Wagner those passages in which we can successfully detach complete melodies from their context have, one and all, dramatically the aspect of songs and not of soli- loquies. Siegmund sings the song of Spring to his sister-bride; Mime teaches Siegfried lessons of gratitude in nursery rhymes; and the whole story of the Meistersinger is a series of opportunities for song-singing.

The distinctions and gradations between aria and song are of great aesthetic importance, but their history would carry us too far. The distinction is obviously of the same import- ance as that between dramatic and lyric poetry. Beethoven's Adelaide is a famous example of what is called a song when it is really entirely in aria style; while the operas of Mozart and Weber naturally contain in appropriate situations many numbers which really are songs. The composers themselves generally give appropriate names. Thus Mozart, in Figaro, calls " Non so piu cosa son " an aria, because of its free style, though Cherubino actually sings it as a song he has just invented; while " Voi che sapete," being more purely lyric, is called Canzona.

The term aria form is applied, . generally most inaccurately, to all kinds of slow cantabile instrumental music of which the general design can be traced to the operatic aria. Mozart, for example, is very fond of slow movements in large binary form without development, and this is constantly called aria-form, though the term ought certainly to be restricted to such examples as have some traits of the aria style, such as the first slow move- ment in the great serenade in B flat. At all events, until writers on music have agreed to give the term some more accurate use, it is as well to avoid it and its cognate version, Lied-form, alto- gether in speaking of instrumental music.

The air or aria in a suite is a short binary movement in a flowing rhythm in common or duple time and by no means of the broadly tunelike quality which its name would seem to imply. (D. F. T.)

ARIADNE (in Greek mythology), was the daughter of Minos, king of Crete, and Pasiphae, the daughter of Helios the Sun-god. When Theseus landed on the island to slay the Minotaur (q.v.), Ariadne fell in love with him, and gave him a clue of thread to guide him through the mazes of the labyrinth. After he had slain the monster, Theseus carried her off, but, according to Homer (Odyssey, xi. 322) she was slain by Artemis at the request of Dionysus in the island of Dia near Cnossus, before she could reach Athens

with Theseus. In the later legend, she was abandoned, while asleep on the island of Naxos, by Theseus, who had fallen a victim to the charms of Aegle (Plutarch, Theseus, 20; Diodorus, iv. 60, 61). Her abandonment and awakening are celebrated in the beautiful Epithalamium of Catullus. On Naxos she is discovered by Dionysus on his return from India, who is enchanted with her beauty, and marries her when she awakes. She receives a crown as a bridal gift, which is placed amongst the stars, while she herself is honoured as a goddess (Ovid, Metam. viii. 152, Fasti, hi. 459).

The name probably means "very holy" = apt- ayvri; another (Cretan) form 'ApiSriXa (= (pavepa) indicates the return to a " bright " season of nature. Ariadne is the personification of spring. In keeping with this, her festivals at Naxos present a double character; the one, full of mourning and sadness, represents her death or abandonment by Theseus, the other, full of joy and revelry, celebrates her awakening from sleep and marriage with Dionysus. Thus nature sleeps and dies during winter, to awake in springtime to a life of renewed luxuriance. With this may be compared the festivals of Adonis and Osiris and the myth of Persephone. Theseus himself was said to have founded a festival at Athens in honour of Ariadne and Dionysus after his return from Crete. The story of Dionysus and Ariadne was a favourite subject for reliefs and wall-paintings. Most commonly Ariadne is represented asleep on the shore at Naxos, while Dionysus, attended by satyrs and bacchanals, gazes admiringly upon her; sometimes they are seated side by side under a spreading vine. The scene where she is holding the clue to Theseus occurs on a very early vase in the British Museum. There is a statue of the sleeping Ariadne in the Vatican Museum.

Kanter, De Ariadne (1879); Pallat, De Fabula Ariadnea (1891).

ARIANO DI PUGLIA, a town and episcopal see, which, de- spite its name, now belongs to Campania, Italy, in the province of Avellino, 1509 ft. above sea-level, on the railway between Benevento and Foggia, 24 m. E. of the former by rail. Pop. (1901) town, 8384; commune, 17,653. It lies in the centre of a fertile district, but has no buildings of importance, as it has often been devastated by earthquakes. A considerable part of the population still dwells in caves. It has been supposed to occupy the site of Aequum Tuticum, an ancient Samnite town, which became a post-station on the Via Traiana l in Roman times; but this should probably be sought at S. Eleuterio 5j m. north. It was a military position of some importance in the middle ages. Thirteen miles south-south-east is the Sorgente Mefita, identical with the pools of Ampsanctus (q.v.). (T. As.)

ARIAS MONTANO, BENITO (1527-1598), Spanish Orientalist and editor of the Antwerp Polyglot, was born at Fregenal de la Sierra, in Estremadura, in 1527. After studying at the uni- versities of Seville and Alcala, he took

orders about the year 1559 and in 1562 he was appointed consulting' theologian to the council of Trent. He retired to Pefia de Aracena in 1 564, wrote his commentary on the minor prophets (1571), and was sent to Antwerp by Philip II. to edit the polyglot Bible projected by Christopher Plantin. The work appeared in 8 volumes folio, between 1568 and 1573. Le6n de Castro, a professor at Sala- manca, thereon brought charges of heresy against Arias Montano, who was finally acquitted after a visit to Rome in 1575-1576. He was appointed royal chaplain, but withdrew to Pefia de Aracena from 1579 to 1583; he resigned the chaplaincy in 1584,

1 This has generally been supposed to be the place referred to by Horace (Sat. i. 5. 87), as one which the metre would not allow him to mention by name; but H.-Nissen (Halische Landeskunde, Berlin, 1902, ii. 845) proposes Ausculum instead.

and went into complete seclusion at Santiago de la Espada in Seville, where he died in 1598.

He is the subject of an Elogio histdrico by Tomas Gonzalez Car- vajal in the Memorias de la Real Academia de la Historia (Madrid, 1832), vol. vii.

ARICA (San Marcos de Arica), a town and port of the Chilean-governed province of Tacna, situated in 18 28′ 08″ S. lat. and 70 20′ 46″ W. long. It is the port for Tacna, the capital of the province, 38 m. distant, with which it is connected by rail, and is the outlet for a large and productive mining district. Arica at one time had a population of 30,000 and enjoyed much prosperity, but through civil war, earthquakes and conquest, its population had dwindled to 2853 in 1895 and 2824 in 1902. The great earthquake of 1868, followed by a tidal wave, nearly destroyed the town and shipping. Arica was captured, looted and burned by the Chileans in 1880, and in accordance with the terms of the treaty of Ancon (1883) should have been returned to Peru in 1894, but this was not done. Late in 1906 the town again suffered severely from an earthquake.

ARICIA (mod. Ariccia), an ancient city of Latium, on the Via Appia, 16 m. S.E. of Rome. The old town, or at any rate its acropolis, now occupied by the modern town, lay high (1350 ft. above sea-level) above the circular Valle Aricciana, which is probably an extinct volcanic crater; some remains of its fortifica- tions, consisting of a mound of earth supported on each side by a wall of rectangular blocks of peperino stone, have been discovered (D. Marchetti, in Notizie degli scan, 1892, 52). The lower town was situated on the north edge of the valley, close to the Via Appia, which descended into the valley from the modern Albano, and re-ascended partly upon very fine substructions of opus quadratum, some 200 yds. in length, to the modern Genzano. Remains of the walls of the lower town, of the cella of a

temple built of blocks of peperino, and also of later buildings in brick- work and opus reticulatum, connected with the post-station (Aricia being the first important station out of Rome, cf . Horace, Sat. i. 5. 1, Egressum magna me excepit Aricia Roma hospitio modico) on the highroad, may still be seen (cf. T. Ashby in Melanges de I'Scole jrancaise de Rome, 1903, 399). Aricia was one of the oldest cities of Latium, and appears as a serious opponent of Rome at the end of the period of the kings and beginning of the republic. In 338 B.C. it was conquered by C. Maenius and became a civitas sine suffragio, but was soon given full rights. Even in the imperial period its chief magistrate was styled dictator, and its council senatus, and it preserved its own calendar of festivals. Its vegetables and wine were famous, and the district is still fertile. (T. As.)

ARICINI, the ancient inhabitants of Aricia (q.v.), the form of the name ranking them with the Sidicini, Marrucini (q.v.), &c, as one of the communities belonging probably to the earlier or Volscian stratum of population on the west side of Italy, who were absorbed by the Sabine or Latin immigrants. Special interest attaches to this trace of their earlier origin, because of the famous cult of Diana Nemorensis, whose temple in the forest close by Aricia, beside the lacus Nemorensis, was served by " the priest who slew the slayer, and shall himself be slain "; that is to say, the priest, who was called rex Nemorensis, held office only so long as he could defend himself from any stronger rival. This cult, which is unique in Italy, is picturesquely described in the opening chapter of J. G. Frazer's Golden Bough (2nd ed., 1900) where full references will be found. Of these references the most important are, perhaps, Strabo v. 3. 12; Ovid, Fasti, iii. 263-272; and Suetonius, Calig. 35, whose wording indicates that the old-world custom was dying out in the 1st century a.d. It is a reasonable conjecture that this extraordinary relic of barbarism was characteristic of the earlier stratum of the population who presumably called themselves Arid.

On the anthropological aspect of the cult, see also A. B. Cook, Class. Rev. xvi., 1902, p. 365, where the whole evidence is very fully collected; and Frazer's Studies in the Early History of Kingship (1907), where he accepts Cook's criticism of his own earlier theory. (R. S. C.)

ARIEGE, an inland department of southern France, bounded S. by Spain, W. and N. by the department of Haute- Garonne, N.E. and E. by Aude, and S.E. by Pyrenees-Orientales. ll

embraces the old countship of Foix, and a portion of Langue- doc and Gascony. Area, 1893 sq. m. Pop. (1906) 205,684. Ariege is for the most part mountainous. Its southern border is occupied by the snow-clad peaks of the eastern Pyrenees, the highest of which within the department is the Pic de Montcalm (10,512 ft.). Communication with Spain is afforded by a large number of ports or cols, which are, however, for the most part difficult paths, and only practicable for a few months in the year. Farther to the north two lesser ranges running parallel to the main chain traverse the centre of the department from south- east to north-west. The more southerly, the Montagne de Tabe, contains, at its south-eastern end, several heights between 7200 and 9200 ft., while the Montagnes de Plantaurel to the north of Foix are of lesser altitude. These latter divide the fertile alluvial plains of the north from the mountains of the centre and south. The department is intersected by torrents belonging to the Garonne basin — the Salat, the Arize, which, near Mas d'Azil, flows through a subterranean gallery, the Ariege and the Hers. The climate is mild in the south, but naturally very severe among the mountains. Generally speaking, the arable land, which is chiefly occupied by small holdings, is confined to the lowlands. Wheat, maize and potatoes are the chief crops. Good vineyards and market gardens are found in the neighbour- hood of Pamiers in the north. Flax and hemp are also cultivated. The mountains afford excellent pasture, and a considerable number of cattle, sheep and swine are reared. Poultry- and bee- farming flourish. Forests cover more than one-third of the department and harbour wild boars and even bears. Game, birds of prey and fish are plentiful. There is abundance of minerals, including lead, copper, manganese and especially iron. Grindstones, building-stone, talc, gypsum, marble and phosphates are also produced. Warm mineral springs of note are found at Ax, Aulus and Ussat. Pamiers and St Girons are the most im- portant industrial towns. Iron founding and forging, which have their chief centre at Pamiers, are principal industries. Flour- milling, paper-making and cloth-weaving may also be mentioned. Ariege is served by the Southern railway. It forms the diocese of Pamiers and belongs to the ecclesiastical province of Toulouse. It is within the circumscriptions of the academie (educational division) and of the court of appeal of Toulouse and of the XVII. army corps. Its capital is Foix; it comprises the arrondisse- ments of Foix, St Girons and Pamiers, with 20 cantons and 338 communes. Foix, Pamiers, St Girons and St Lizier-de-Cou- serans are the more noteworthy towns. Mention may also be made of Mirepoix, once the seat of a bishopric, and possessing a cathe- dral (15th and 16th centuries) with a remarkable Gothic spire.

ARIES (" The Ram "), in astronomy, the first sign of the zodiac (q.v.), denoted by the sign ˚p, in imitation of a ram's head. The name is probably to be associated with the fact that when the sun is in this part of the

heavens (in spring) sheep bring forth their young; this finds a parallel in Aquarius, when there is much rain. It is also a constellation, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.); Ptolemy catalogued eighteen stars, Tycho Brahe twenty-one, and Hevelius twenty-seven. According to a Greek myth, Nephele, mother of Phrixus and Hellc, gave her son a ram with a golden fleece. To avoid the evil designs of Hera, their stepmother, Phrixus and Helle fled on the back of the ram, and reaching the sea, attempted to cross. Helle fell from the ram and was drowned (hence the Hellespont) ; Phrixus, having arrived in Colchis and been kindly received by the king, Aeetes, sacrificed the ram to Zeus, to whom he also dedicated the fleece, which was afterwards carried away by Jason. Zeus placed the ram in the heavens as the constellation.

ARIKARA, or Aricara (from ariki, horn), a tribe of North American Indians of Caddoan stock. They are now settled with the Hidatsas and the Mandans on the Fort Berthold Reservation, North Dakota. They originally lived in the Platte Valley, Nebraska, with the Pawnees, to whom they are related. They number about 400.

See Handbook of American Indians, ed. F. W. Hodge (Washington,

1907.)

ARIMASPI, an ancient people in the extreme N.E. of Scythia (q.v.), probably the eastern Altai. All accounts of them go back to a poem by Aristeas of Proconnesus, from whom Herodotus (iii. 116, iv. 27) drew his information. They were supposed to be one-eyed (hence their Scythian name), and to steal gold from the griffins that guarded it. In art they are usually represented as richly dressed Asiatics, picturesquely grouped with their griffin foes; the subject is often described by poets from Aeschylus to Milton. They are so nearly mythical that it is impossible to insist on the usual identification with the ancestors of the Huns. Their gold was probably real, as gold still comes from the Altai.

ARIMINUM (mod. Rimini), a city of Aemilia, on the N.E. coast of Italy, 69 m. S.E. of Bononia. It was founded by the Umbrians, but in 268 B.C. became a Roman colony with Latin rights. It was reached from Rome by the Via Flaminia, con- structed in 220 B.C., and from that time onwards was the bulwark of the Roman power in Cisalpine Gaul, to which province it even gave its name. Its harbour was of some importance, but is now silted up, the sea having receded. The remains of its moles were destroyed in 1807-1809. Ariminum became a place of considerable traffic owing to the construction of the Via Aemilia (187 B.C.) and the Via Popilia (132 B.C.), and is frequently men- tioned by ancient authors. In 90 B.C. it acquired Roman citizen- ship, but in 82 B.C. having been held by the partisans of

Marius, it was plundered by those of Sulla (who probably made the Rubicon the frontier of Italy instead of the Aesis), and a mili- tary colony settled there. Caesar occupied it in 49 B.C. after his crossing of the Rubicon. It was one of the eighteen richest cities of Italy which the triumviri selected as a reward for their troops. In 27 B.C. Augustus planted new colonists there, and divided the city into seven vici after the model of Rome, from which the names of the vici were borrowed. He also restored the Via Flaminia (Mon. Ancyr. c. 20) from Rome to Ariminum. At the entrance to the latter the senate erected, in his honour, a triumphal arch which is still extant — a fine simple monument with a single opening. At the other end of the decumanus maximus or main street (3000 Roman ft. in length) is a fine bridge over the Ariminus (mod. Marecchia) begun by Augustus and completed by Tiberius in a.d. 20. It has five wide arches, the central one having a span of 35 ft., and is well preserved. Both it and the arch are built of Istrian stone. The present Piazza Giulio Cesare marks the site of the ancient forum. The remains of the amphitheatre are scanty; many of its stones have gone to build the city wall, which must, therefore, at the earliest belong to the end of the classical period. In a.d. 1 Augustus's grandson Gaius Caesar had all the streets of Ariminum paved. In a.d. 69 the town was attacked by the partisans of Vespasian, and was frequently besieged in the Gothic wars. It was one of the five seaports which remained Byzantine until the time of Pippin. (See Rimini.)

See A. Tonini, Storia delta Citta di Rimini (Rimini, 1848-1862).

(T. As.)

ARIOBARZANES, the name of three ancient kings or satraps of Pontus, and of three kings of Cappadocia and a Persian satrap.

Of the Pontic rulers two are most famous. (1) The son of Mithradates I., who revolted against Artaxerxes in 362 B.C. and may be regarded as the founder of the kingdom of Pontus (q.v.). According to Demosthenes he and his three sons received from the Athenians the honour of citizenship. (2) The son of Mithra- dates III., who reigned c. 266-240 B.C., and was one of those who enlisted the help of the invading Gauls (see Galatia).

Of the Cappadocian rulers the best-known one (" Philo- Romaeus " on the coins) reigned nominally from 93 to 63 B.C., but was three times expelled by Mithradates the Great and as often reinstated by Roman generals. Soon after the third occasion he formally abdicated in favour of his son Ariobarzanes " Philopator," of whom we gather only that he was murdered some time before 51. His son Ariobarzanes, called " Eusebes " and " Philo-Romaeus," earned the gratitude of Cicero during his proconsulate in Cilicia, and fought for Pompeyin the civil

wars, but was afterwards received with honour by Julius Caesar, who subsequently reinstated him when expelled by Pharnaces of Pontus. In 42 B.C. Brutus and Cassius declared him a traitor, invaded his territory and put him to death.

The Persian satrap of this name unsuccessfully opposed Alex- ander the Great on his way to Persepolis (331 B.C.).

ARION, of Methymna, in Lesbos, a semi-legendary poet and musician, friend of Periander, tyrant of Corinth. He flourished about 625 B.C. Several of the ancients ascribe to him the in- vention of the dithyramb and of dithyrambic poetry; it is probable, however, that his real service was confined to the organization of that verse, and the conversion of it from a mere drunken song, used in the Dionysiac revels, to a measured antistrophic hymn, sung by a trained body of performers. The name Cycleus given to his father indicates the connexion of the son with the " cyclic " or circular chorus which was the origin of tragedy. According to Suidas he composed a number of songs and proems; none of these is extant; the fragment of a hymn to Poseidon attributed to him (Aelian, Hist. ytw.xii.45) i s spurious and was probably written in Attica in the time of Euripides. Nothing is known of the life of Arion, with the exception of the beautiful story first told by Herodotus (i. 23) and elaborated and embellished by subsequent writers. According to Herodotus, Arion being desirous of exhibiting his skill in foreign countries left Corinth, and travelled through Sicily and parts of Italy, where he gained great fame and amassed a large sum of money. At Taras (Tarentum) he embarked for his homeward voyage in a Corinthian vessel. The sight of his treasure roused the cupidity of the sailors, who resolved to possess themselves of it by putting him to death. In answer to his entreaties that they would spare his life, they insisted that he should either die by his own hand on shipboard or cast himself into the sea. Arion chose the latter, and as a last favour begged permission to sing a parting song. The sailors, desirous of hearing so famous a musician, consented, and the poet, standing on the deck of the ship, in full minstrel's attire, sang a dirge accompanied by his lyre. He then threw himself overboard; but instead of perishing, he was miraculously borne up in safety by a dolphin, supposed to have been charmed by the music. Thus he was conveyed to Taenarum, whence he proceeded to Corinth, arriving before the ship from Tarentum. Immediately on his arrival Arion related his story to Periander, who was at first incredulous, but eventually learned the truth by a stratagem. Summoning the sailors, he demanded what had become of the poet. They affirmed that he had

remained behind at Tarentum; upon which they were suddenly confronted by Arion himself, arrayed in the same garments in which he had leapt overboard. The sailors confessed their guilt and were punished. Arion's lyre and the dolphin were translated to the stars. Herodotus and Pausanias (iii. 25. 7) both refer to a brass figure at Taenarum which was supposed to represent Arion seated on the dolphin's back. But this story is only one of several in which the dolphin appears as saving the lives of favoured heroes. For instance, it is curious that Taras, the mythical founder of Tarentum, is said to have been conveyed in this manner from Taenarum to Tarentum. On Tarentine coins a man and dolphin appear, and hence it may be thought that the monument at Taenarum represented Taras and not Arion. At the same time the connexion of Apollo with the dolphin must not be forgotten. Under this form the god appeared when he founded the celebrated oracle at Delphi, the name of which commemorates the circumstance. He was also the god of music, the special preserver of poets, and to him the lyre was sacred.

Among the numerous modern versions of the story, particular mention may be made of the pretty ballad by A. W. Schlegel ; see also Lehrs, Populate Aufsdtze aus dem Alterthum (1844-1846) Clement, Arion (1" " s

ARIOSTO, LODOVICO (1474-1533) Italian poet, was born at Reggio, in Lombardy, on the 8th of September 1474. His father was Niccolo Ariosto, commander of the citadel of Reggio. He showed a strong inclination to poetry from his earliest years, but was obliged by his father to study the law — a pursuit in which he lost five of the best years of his life. Allowed at last to

follow his inclination, he applied himself to the study of the classics under Gregorio da Spoleto. But after a short time, during which he read the best Latin authors, he was deprived of his teacher by Gregorio's removal to France as tutor of Francesco Sforza. Ariosto thus lost the opportunity of learning Greek, as he intended. His father dying soon after, he was compelled to forego his literary occupations to undertake the management of the family, whose affairs were embarrassed, and to provide for his nine brothers and sisters, one of whom was a cripple. He wrote, however, about this time some comedies in prose and a few lyrical pieces. Some of these attracted the notice of the, cardinal Ippolito d'Este, who took the young poet under his patronage and appointed him one of the gentlemen of his household. This prince usurped the character of a patron of literature, whilst the only reward which the poet received for having dedicated to him the Orlando Furioso, was the question, " Where did you find so many stories, Master Ludovic ?" The poet himself tells us that the cardinal was ungrateful; deplores the time which he spent under his yoke; and adds, that if he received some niggardly pension, it was not to reward him for his

poetry, which the prelate despised, but to make some just compensation for the poet's running like a messenger, with the risk of his life, at his eminence's pleasure. Nor was even this miserable pittance regularly paid during the period that the poet enjoyed it. The cardinal went to Hungary in 1518, and wished Ariosto to accompany him. The poet excused himself, pleading ill health, his love of study, the care of his private affairs and the age of his mother, whom it would have been disgraceful to leave. His excuses were not received, and even an interview was denied him. Ariosto then boldly said, that if his eminence thought to have bought a slave by assigning him the scanty pension of 75 crowns a year, he was mistaken and might withdraw his boon — which it seems the cardinal did.

The cardinal's brother, Alphonso, duke of Ferrara, now took the poet under his patronage. This was but an act of simple justice, Ariosto having already distinguished himself as a diplomatist, chiefly on the occasion of two visits to Rome as ambassador to Pope Julius II. The fatigue of one of these hurried journeys brought on a complaint from which he never recovered; and on his second mission he was nearly killed by order of the violent pope, who happened at the time to be much incensed against the duke of Ferrara. On account of the war, his salary of only 84 crowns a year was suspended, and it was withdrawn altogether after the peace; in consequence of which Ariosto asked the duke either to provide for him, or to allow him to seek employment elsewhere. A province, situated on the wildest heights of the Apennines, being then without a governor, Ariosto received the appointment, which he held for three years. The office was no sinecure. The province was distracted by factions and banditti, the governor had not the requisite means to enforce his authority and the duke did little to support his minister. Yet it is said that Ariosto's government satisfied both the sover- eign and the people confided to his care; and a story is added of his having, when walking out alone, fallen in with a party of banditti, whose chief, on discovering that his captive was the author of Orlando Furioso, humbly apologized for not having immediately shown him the respect which was due to his rank. Although he had little reason to be satisfied with his office, he refused an embassy to Pope Clement VII. offered to him by the secretary of the duke, and spent the remainder of his life at Ferrara, writing comedies, superintending their performance as well as the construction of a theatre, and correcting his Orlando Furioso, of which the complete edition was published only a year before his death. He died of consumption oi the 6th of June 1533.*

That Ariosto was honoured and respected by the first men of his age is a fact; that most of the princes of Italy showed him great partiality is equally true; but it is not less so that their patronage was limited to kind words. It is not known that he ever received any substantial mark of their love for literature; he lived and died poor. He proudly wrote on the entrance of a

house built by himself,

" Parva, sed apta mihi, sed nulli obnoxia, sed non Sordida, parta meo sed tamen aere domus;"

which serves to show the incorrectness of the assertion of flatterers, followed by Tiraboschi, that the duke of Ferrara built that house for him. The only one who seems to have given anything to Ariosto as a reward for his poetical talent was the marquess del Vasto, who assigned him an annuity of ioo crowns on the revenues of Casteleone in Lombardy; but it was only paid, if ever, from the end of 1 53 1 . That he was crowned as poet by Charles V. seems untrue, although a diploma may have been issued to that effect by the emperor.

The character of Ariosto seems to have been fully and justly delineated by Gabriele, his brother: —

" Ornabat pietas et grata modestia Vatem, Sancta fides, dictique memor, munitaque recto Justitia, et nullo patientia victa labore, Et constans virtus animi, et dementia mitis, Ambitione procul pulsa, fastusque tumore."

His satires, in which we see him before us such as he was, show that there was no flattery in this portrait. In these com- positions we are struck with the noble independence of the poet. He loved liberty with a most jealous fondness. His disposition was changeable withal, as he himself very frankly confesses in his Latin verses, as well as in the satires.

" Hoc olim ingenio vitales hausimus auras, Multa cito ut placeant, displicitura brevi. Non in amore modo mens haec, sed in omnibus impar Ipsa sibi longa non retinenda mora."

Hence he never would bind himself, either by going into orders, or by marrying, till towards the end of his life, when he espoused Alessandra, widow of Tito Strozzi. He had no issue by his wife, but he left two natural sons by different mothers.

His Latin poems do not perhaps deserve to be noticed: in the age of Flaminio, Vida, Fracastoro and Sannazaro, better things were due from a poet like Ariosto. His lyrical composi- tions show the poet, although they do not seem worthy of his powers. His comedies, of which he wrote four, besides one which he left unfinished, are avowedly imitated from Plautus and Terence; and although native critics may admire in them the elegance

of the diction, the liveliness of the dialogue and the novelty of some scenes, few will feel interest either in the subject or in the characters, and it is hard to approve the immoral passages by which they are disfigured, however grateful these might be to the audiences and patrons of theatrical representa- tions in Ariosto's own day.

Of all the works of Ariosto, the most solid monument of his fame is the Orlando Furioso, the extraordinary merits of which have cast into oblivion the numberless romance poems which inundated Italy during the 15th, 16th and 17th centuries.

The popularity which an earlier poem on the same theme, Orlando Innamorato, by Boiardo, enjoyed in Ariosto's time, cannot be well conceived, now that the enthusiasm of the crusades, and the interest which was attached to a war against the Moslems, have passed away. Boiardo wrote and read his poem at the court of Ferrara, but died before he was able to finish it. Many poets undertook the difficult task of its com- pletion; but it was reserved for Ariosto both to finish and to surpass, his original. Boiardo did not, perhaps, yield to Ariosto either in vigour or in richness of imagination, but he lived in a less refined age, and died before he was able to recast or even finish the poetical romance which he had written under the impulse of his exuberant fancy. Ariosto, on the other hand, united to a powerful imagination an elegant and cultivated taste. He began to write his great poem about 1503, and after having consulted the first men of the age of Leo X., he published it in 1 516, in only 40 cantos (extended afterwards to 46); and up to the moment of his death never ceased to correct and improve both the subject and the style. It is in this latter quality that he excels, and for which he had assigned him the name of Divino Lodovico. Even when he jests, he never compromises his dignity; and in pathetic description or narrative he excites the reader's deepest feelings. In his machinery he displays a vivacity of fancy with which no other poet can vie; but he

never lets his fancy carry him so far as to omit to employ, with an art peculiar to himself, those simple and natural pencil- strokes which, by imparting to the most extraordinary feats a colour of reality, satisfy the reason without disenchanting the imagination. The death of Zerbino, the complaints of Isabella, the effects of discord among the Saracens, the flight of Astolfo to the moon, the passion which causes Orlando's madness, teem with beauties of every variety. The supposition that the poem is not connected throughout is wholly unfounded; there is a connexion which, with a little attention, will become evident. The love of Ruggero and Bradamante forms the main subject of the Furioso; every part of it, except some episodes, depend upon this subject; and the poem ends with their marriage.

The first complete edition of the Orlando Furioso was published at Ferrara in 1532, as noted above. The edition of Morali (Milan, 1818) follows the text of the 1532 edition with great correctness. Of editions published in England, those of Baskerville (Birmingham, !773) an d Panizzi (London, 1834) are the most important. The indifferent translations into English of Sir John Harrington (1591) and John Hoole (1783) have been superseded by the spirited render- ing of W. Stewart Rose (1823). See also E. Gardner, Ariosto: the Prince of Court Poets (1906).

ARISTAENETUS, Greek epistolographer, flourished in the 5th or 6th century a.d. He was formerly identified with Aris- taenetus of Nicaea (the friend of Symmachus), who perished in an earthquake at Nicomedia, a.d. 358, but internal evidence points to a much later date. Under his name two books of love stories, in the form of letters, are extant; the subjects are borrowed from the erotic elegies of such Alexandrian writers as Callimachus, and the language is a patchwork of phrases from Plato, Lucian, Alciphron and others. The stories are feeble and insipid, and full of strange and improbable incidents.

Text: Boissonade (1822); Hercher, Epistolographi Graeci (1873). English translations: Boyer (1701); Thomas Brown (1715); R. B. Sheridan and Halked (1771 and later).

ARISTAEUS, a divinity whose worship was widely spread throughout ancient Greece, but concerning whom the myths are somewhat obscure. The account most generally received connects him specially with Thessaly. Apollo carried off from Mount Pelion the nymph Cyrene, daughter or granddaughter of the river-god Peneus, and conveyed her to Libya, where she gave birth to Aristaeus. From this circumstance the town of Cyrene took its name. The child was at first handed over to the care of the Hours, or the nymph Melissa and the centaur Cheiron. He afterwards left Libya and went to Thebes, where he received instruction from the Muses in the arts of healing and prophecy, and married Autonoe, daughter of Cadmus, by whom he had several children, among others, the unfortunate Actaeon. He is said to have visited Ceos, where, by erecting a temple to Zeus Icmaeus (the giver of moisture), he freed the inhabitants from a terrible drought. The islanders worshipped him, and occa- sionally identified him with Zeus, calling him Zeus Aristaeus. After travelling through many of the Aegean islands, through Sicily, Sardinia and Magna Graecia, everywhere conferring benefits and receiving divine honours, Aristaeus reached Thrace, where he was initiated into the mysteries of Dionysus, and finally disappeared near Mount Haemus. While in Thrace he is said to have caused the death of Eurydice, who was bitten by a snake while fleeing from him. Aristaeus was essentially a benevolent deity; he was worshipped as the first who introduced the cultivation of bees (Virgil, Georg. iv. 315-558),

and of the vine and olive; he was the protector of herdsmen and hunters; he warded off the evil effects of the dog-star; he possessed the arts of healing and prophecy. He was often identified with Zeus, Apollo and Dionysus. In ancient sculptures and coins he is represented as a young man, habited like a shepherd, and sometimes carrying a sheep on his shoulders. Coins of Ceos exhibit the head of Aristaeus and Sirius in the form of a dog crowned with rays.

Pindar, Pythia, ix. 5-65 ; Apollonius Rhodius, schol. on ii. 498, 500; Diodorus, iv. 81.

ARISTAGORAS (d. 497 B.C.), brother-in-law and cousin of Histiaeus, tyrant of Miletus. While Histiaeus was practically a prisoner at the court of Darius, he acted as regent in Miletus.

In 500 B.C. he persuaded the Persians to join him in an attack upon Naxos, but he quarrelled with Megabates, the Persian commander, who warned the inhabitants of the island, and the expedition failed. Finding himself the object of Persian sus- picion, Aristagoras, instigated by a message from Histiaeus, raised the standard of revolt in Miletus, though it seems likely that this step had been under consideration for some time (see Ionia). After the complete failure of the Ionian revolt he emigrated to Myrcinus in Thrace. Here he fell in battle (497), while attacking Ennea Hodoi (afterwards Amphipolis) on the Strymon, which belonged to the Edonians, a Thracian tribe. The aid given to him by Athens and Eretria, and the burning of Sardis, were the immediate cause of the invasion of Greece by Darius.

See Herodotus v. 30-51, 97-126; Thucydides iv. 102; Diodorus xii. 68 ; for a more favourable view see G. B. Grundy, Great Persian War (London, 1901).

ARISTANDER, of Telmessus in Lycia, was the favourite soothsayer of Alexander the Great, who consulted him on all occasions. After the death of the monarch, when his body had lain unburied for thirty days, Aristander procured its burial by foretelling that the country in which it was interred would be the most prosperous in the world. He is frequently mentioned by the historians who wrote about Alexander, and was probably the author of a work on prodigies, which is referred to by Pliny (Nat. Hist. xvii. 38) and Lucian.

Philopatris, 21; Arrian, Anabasis, ii. 26, iii. 2, iv. 4; Plutarch, Alexander;

Curtius iv. 2, 6, 15, vii. 7.

ARISTARCHUS, of Samos, Greek astronomer, flourished about 250 B.C. He is famous as having been the first to maintain that the earth moves round the sun. On this account he was accused of impiety by the Stoic Cleanthes, just as Galileo, in later years, was attacked by the theologians. His only extant work is a short treatise (with a commentary by Pappus) On the Magnitudes and Distances of the Sun and Moon. His method of estimating the relative lunar and solar distances is geometri- cally correct, though the instrumental means at his command rendered his data erroneous. Although the heliocentric system is not mentioned in the treatise, a quotation in the Arenarius of Archimedes from a work of Aristarchus proves that he anti- cipated the great discovery of Copernicus. Further, Copernicus could not have known of Aristarchus's doctrine, since Archi- medes's work was not published till after Copernicus's death. Aristarchus is also said to have invented two sun-dials, one hemi- spherical, the so-called scaphion, the other plane.

Editio princeps by Wallis (1688); Fortia d'Urban (1810); Nizze (1856). See Bergk-Hinrichs, Aristarchus von Samos (1883) ; Tannery, Aristarque de Samos; also Astronomy.

ARISTARCHUS, of Samothrace (c. 220-143 B.C.), Greek gram- marian and critic, flourished about 155. He settled early in Alexandria, where he studied under Aristophanes of Byzantium, whom he succeeded as librarian of the museum. On the accession of the tyrant Ptolemy Physcon (his former pupil), he found his life in danger and withdrew to Cyprus, where he died from dropsy, hastened, it is said, by voluntary starvation, at the age of 72. Aristarchus founded a school of philologists, called after him " Aristarcheans," which long nourished in Alexandria and afterwards at Rome. He is said to have written 800 com- mentaries alone, without reckoning special treatises. He edited Hesiod, Pindar, Aeschylus, Sophocles and other authors; but his chief fame rests on his critical and exegetical edition of Homer, practically the foundation of our present recension. In the time of Augustus, two Aristarcheans, Didymus and Aris- tonicus, undertook the revision of his work, and the extracts from these two writers in the Venetian scholia to the Iliad give an idea of Aristarchus's Homeric labours. To obtain a thoroughly correct text, he marked with an obelus the lines he considered spurious ; other signs were used by him to indicate notes, varieties of reading, repetitions and interpolations. He arranged the Iliad and the Odyssey in twenty-four books as we now have them. As a commentator his principle was that the author should explain himself, without recourse to allegorical interpretation; in grammar, he laid chief stress on analogy

and uniformity of usage and construction. His views were opposed by Crates of Mallus, who wrote a treatise Utpl 'Avca/iaXias, especially directed against them.

See Lehrs, De Aristarchi Stud. Homericis (3rd ed., 1882) ; Ludwich, A ristarchs homerische Textcritik (1 884) ; especially Sandys, Hist, of Class. Schol. (ed. 1906), vol. i. with authorities; also Homer.

ARISTEAS, a somewhat mythical personage in ancient Greece, said to have lived in the time of Cyrus and Croesus, or, according to some, ca. 690 B.C. We are chiefly indebted to Herodotus (iv. 13-15) for our knowledge of him and his poem Arimaspeia. He belonged to a noble family of Proconnesus, an island colony from Miletus in the Propontis, and was sup- posed to be inspired by Apollo. He travelled through the countries north and east of the Euxine, and visited the Hyper- boreans, Issedonians and Arimaspians, who fought against the gold-guarding griffins. An important historical fact which seems to be indicated in his poem is the rush of barbarian hordes towards Europe under pressure from their neighbours. Twelve lines of the poem are preserved in Tzetzes and Longinus. Wonderful stories are told of Aristeas. At Proconnesus, he fell dead in a shop; simultaneously a traveller declared he had spoken with him near Cyzicus; his body vanished; six years afterwards, he returned. Again disappearing, 240 years later he was at Metapontum, and commanded the inhabitants to raise a statue to himself and an altar to Apollo, whom he had ac- companied in the form of a raven, at the founding of the city. According to Suidas, Aristeas also wrote a prose theogony. The genuineness of his works is disputed by Dionysius of Halicarnassus.

See Tournier, De Aristea Proconneso(i&6$) ; Macan,H<2<. iv.14 note.

ARISTEAS, the pseudonymous author of a famous Letter in which is described, in legendary form, the origin of the Greek translation of the Old Testament known as the Septuagint (q.v.). Aristeas represents himself as a Gentile Greek, but was really an Alexandrian Jew who lived under one of the later Ptolemies. Though the Letter is unauthentic, it is now recognized as a useful source of information concerning both Egyptian and Palestinian affairs in the 2nd and possibly in the 3rd century B.C.

An English translation, based on a critical Greek text, was pub- lished by H. St J. Thackeray in the Jewish Quarterly Review, vol. xv. There are two modern editions of the Greek, one by the last named (in Swete's Introduction to the Old Testament in Creek, Cambridge, 1900), the other by P. Wendland (Leipzig, 1900).

ARISTIDES [' Apio-TilSijs] (c. 530-468 B.C.), Athenian statesman, called

" the Just," was the son of Lysimachus, and a member of a family of moderate fortune. Of his early life we are told merely that he became a follower of the statesman Cleisthenes and sided with the aristocratic party in Athenian politics. He first comes into notice as strategus in command of his native tribe Antiochis at Marathon, and it was no doubt in consequence of the distinction which he then achieved that he was elected chief archon for the ensuing year (489-488). In pursuance of his conservative policy which aimed at maintaining Athens as a land power, he was one of the chief opponents of the naval policy of Themistocles (q.v.). The conflict between the two leaders ended in the ostracism of Aristides, at a date variously given between 485 and 482. It is said that, on this occasion, a voter, who did not know him, came up to him, and giving him his sherd, desired him to write upon it the name of Aristides. The latter asked if Aristides had wronged him. " No," was the reply, " and I do not even know him, but it irritates me to hear him everywhere called the just."

Early in 480 Aristides profited by the decree recalling the post-Marathonian exiles to help in the defence of Athens against the Persian invaders, and was elected strategus for the year 480-479. In the campaign of Salamis he rendered loyal support to Themistocles, and crowned the victory by landing Athenian infantry on the island of Psyttaleia and annihilating the Persian garrison stationed there (see Salamis). In 479 he was re-elected strategus, and invested with special powers as commander of the Athenian contingent at Plataea; he is also said to have judiciously suppressed a conspiracy among some oligarchic malcontents in the army, and to have played a prominent part

in arranging for the celebration of the victory. In 478 or 477 Aristides was in command of the Athenian squadron off Byzantium, and so far won the confidence of the Ionian allies that, after revolting from the Spartan admiral Pausanias, they offered him the chief command and left him with absolute discretion in fixing the contributions of the newly formed confederacy (see Delian League). His assessment was universally accepted as equitable, and continued as the basis of taxation for the greater part of the league's duration; it was probably from this that he won the title of " the Just." Aristides soon left the command of the fleet to his friend Cimon (q.v.), but continued to hold a predominant position in Athens. At first he seems to have remained on good terms with Themistocles, whom he is said to have helped in outwitting the Spartans over the rebuilding of the walls of Athens. But in spite of state- ments in which ancient authors have represented Aristides as a democratic reformer, it is certain that the period

following the Persian wars during which he shaped Athenian policy was one of conservative reaction. (For the theory based on Plutarch, Aristid. 22, that Aristides after Plataea threw open the archon- ship to all the citizens, see Archon.)

He is said by some authorities to have died at Athens, by others on a journey to the Euxine sea. The date of his death is given by Nepos as 468; at any rate he lived to witness the ostracism of Themistocles, towards whom he always displayed a generous conduct, but had died before the rise of Pericles. His estate seems to have suffered severely from the Persian invasions, for apparently he did not leave enough money to defray the expenses of his burial, and it is known that his descendants even in the 4th century received state pensions. (See Athens; Themistocles.)

Authorities. — Herodotus viii. 79-81, 95; ix. 28; " Constitution of Athens" (Alh. Pol.), 22-24, 4 1 ! Plutarch, Aristides; Cornelius Nepos, Vita Aristidis. See also E. Meyer, Geschichte des Altertums (Stuttgart, 1901), iii. pp. 481, 492. In the absence of positive information the 4th-century writers (on whom Plutarch and Nepos mainly rely) seized upon his surname of " Just," and wove round it a number of anecdotes more picturesque than historical. Herodotus is practically our only trustworthy authority. (M. O. B. C.)

ARISTIDES, of Miletus, generally regarded as the father of Greek prose romance, flourished 150-100 B.C. He wrote six books of erotic M ilesian Tales (MiAjjoxa/c a), which enjoyed great popularity, and were subsequently translated into Latin by Cornelius Sisenna (110-67 B.C.). They are lost, with the excep- tion of a few fragments, but the story of the Ephesian matron in Petronius gives an idea of their nature. They have been compared with the old French fabliaux and the tales of Boccaccio.

Plutarch, Crassus, 32; Ovid, Tristia, ii. 413, 443; Miiller, Frag- menta Historicorum Graecorum, iv.

ARISTIDES, of Thebes, a Greek painter of the 4th century B.C. He is said to have excelled in expression. For example, a picture of his representing a dying mother's fear lest her infant should suck death from her breast was much celebrated. He also painted one of Alexander's battles. One of his pictures is said to have been bought by King Attalus for 100 talents (more than £20,000).

ARISTIDES, AELIUS, surnamed Theodorus, Greek rheto- rician and sophist, son of Eudaemon, a priest of Zeus, was born at Hadriani in Mysia, a.d. 117 (or 129). He studied under Herodes Atticus of Athens, Polemon of Smyrna, and Alexander of Cotyaeum, in whose honour he composed a

funeral oration still extant. In the practice of his calling he travelled through Greece, Italy, Egypt and Asia, and in many places the in- habitants erected statues to him in recognition of his talents. In 156 he was attacked by an illness which lasted thirteen years, the nature of which has caused considerable speculation. How- ever, it in no way interfered with his studies; in fact, they were prescribed as part of his cure. Aristides' favourite place of residence was Smyrna. In 178, when it was destroyed by an earthquake, he wrote an account of the disaster to Aurelius, which deeply affected the emperor and induced him to rebuild the city. The grateful inhabitants set up a statue in honour of

Aristides, and styled him the " builder " of Smyrna. He refused all honours from them except that of priest of Asclepius, which office he held till his death, about 189. The extant works of Aristides consist of two small rhetorical treatises and fifty-five declamations, some not really speeches at all. The treatises are on political and simple speech, in which he takes Demosthenes and Xenophon as models for illustration; some critics attribute these to a later compiler (Spengel, Rhetor es Graeci). The six Sacred Discourses have attracted some attention. They give a full account of his protracted illness, including a mass of super- stitious details of visions, dreams and wonderful cures, which the god Asclepius ordered him to record. These cures, from his account, offer similarities to the effects produced by hypnotism. The speeches proper are epideictic or show speeches — on certain gods, panegyrics of the emperor and individual cities (Smyrna, Rome); justificatory — the attack on Plato's Gorgias in defence of rhetoric and the four statesmen, Thucydides, Miltiades, Pericles, Cimon; symbouleutic or political, the subjects being taken from the past history of free Greece — the Sicilian expedi- tion, peace negotiations with Sparta, the political situation after the battle of Leuctra. The Panathenaicus and Encomium of Rome were actually delivered, the former imitated from Isocrates. The Leplinea — the genuineness of which is disputed- — contrast unfavourably with the speech of Demosthenes. Aristides' works were highly esteemed by his contemporaries; they were much used for school instruction, and distinguished rhetoricians wrote commentaries upon them. His style, formed on the best models, is generally clear and correct, though sometimes obscured by rhetorical ornamentation; his subjects being mainly fictitious, the cause possessed no living interest, and his attention was concentrated on form and diction.

Editio princeps (52 declamations only) (1517); Dindorf (1829); Keil (1899); Sandys, Hist, of Class. Schol. i. 312 (ed. 1906).

ARISTIDES, QUINTILIANUS, the author of an ancient treatise on music, who lived probably in the third century a.d. According to Meibomius, in whose collection (Antiq. Musicae Auc. Septem, 1652) this work is printed,

it contains everything on music that is to be found in antiquity. (See Pauly-Wissowa, Realencyc. ii. 894.)

*ARISTIDES, APOLOGY OF. Until 1878 our knowledge of the early Christian writer Aristides was confined to the statement of Eusebius that he was an Athenian philosopher, who presented an apology " concerning the faith " to the emperor Hadrian. In that year, however, the Mechitharists of S. Lazzaro at Venice published a fragment in Armenian * from the beginning of the apology; and in 1889 Dr Rendel Harris found the whole of it in a Syriac version on Mount Sinai. While his edition was passing through the press, it was observed by the present writer that all the while the work had been in our hands in Greek, though in a slightly abbreviated form, as it had been imbedded as a speech in a religious novel written about the 6th century, and entitled " The Life of Barlaam and Josaphat." The discovery of the Syriac version reopened the question of the date of the work. For although its title there corresponds to that given by the Armenian fragment and by Eusebius, it begins with a formal inscription to " the emperor Titus Hadrianus Antoninus Augustus Pius "; and Dr R. Harris is followed by Harnack and others in supposing that it was only through a careless reading of this inscription that the work was supposed to have been addressed to Hadrian. If this be the case, it must be placed somewhere in the long reign of Antoninus Pius (138-161). There are, however, no internal grounds for rejecting the thrice- attested dedication to Hadrian his predecessor, and the picture of primitive Christian life which is here found points to the earlier rather than to the later date. It is possible that the Apology was read to Hadrian in person when he visited Athens, and that the Syriac inscription was prefixed by a scribe on the analogy of Justin's Apology, a mistake being made in the amplification of Hadrian's name.*

The Apology opens thus: "I, king, by the providence of God came into the world; and having beheld the heaven, and the earth, and the sea, the sun and moon, and all besides, I

1 Codex Venet. ann., 981, and Codex Etchmlaz. of the nth century.

marvelled at their orderly disposition; and seeing the world and all things in it, that it is moved by compulsion, I understood that He that moveth and governeth it is God. For whatsoever moveth is stronger than that which is moved, and whatsoever governeth is stronger than that which is governed." Having briefly spoken of the divine nature in the terms of Greek philosophy, Aristides proceeds to ask which of all the races of men have at all

partaken of the truth about God. Here we have the first attempt at a systematic comparison of ancient religions. For the purpose of his inquiry he adopts an obvious threefold division into idolaters, Jews and Christians. Idolaters, or, as he more gently terms them in addressing the emperor, " those who worship what among you are said to be gods," he subdivides into the three great world-civilizations — Chaldeans, Greeks and Egyptians. He chooses this order so as to work up to a climax of error and absurdity in heathen worship. The direct nature- worship of the Chaldeans is shown to be false because its objects are works of the Creator, fashioned for the use of men. They obey fixed laws and have no power over themselves. " The Greeks have erred worse than the Chaldeans . . . calling those gods who are no gods, according to their evil lusts, in order that having these as advocates of their wickedness they may commit adultery, and plunder and kill, and do the worst of deeds." The gods of Olympus are challenged one by one, and shown to be either vile or helpless, or both at once. A heaven of quarrelling divinities cannot inspire a reasonable worship. These gods are not even respectable; how can they be adorable ? " The Egyptians have erred worse than all the nations; for they were not content with the worships of the Chaldeans and Greeks, but introduced, moreover, as gods even brute beasts of the dry land and of the waters, and plants and herbs. . . . Though they see their gods eaten by others and by men, and burned, and slain, and rotting, they do not understand concerning them that they are no gods."

Throughout the whole of the argument there is strong common- sense and a stern severity unrelieved by conscious humour. Aristides is engaged in a real contest; he strikes hard blows, and gives no quarter. He cannot see, as Justin and Clement see, a striving after truth, a feeling after God, in the older religions, or even in the philosophies of Greece. He has no patience with attempts to find a deeper meaning in the stories of the gods. " Do they say that one nature underlies these diverse forms ? Then why does god hate god, or god kill god ? Do they say that the histories are mythical ? Then the gods themselves are myths, and nothing more."

The Jews are briefly treated. After a reference to their descent from Abraham and their sojourn in Egypt, Aristides praises them for their worship of the one God, the Almighty Creator; but blames them as worshipping angels, and observing " sabbaths and new moons, and the unleavened bread, and the great fast, and circumcision, and cleanness of meats." He then proceeds to the description of the Christians. He begins with a statement which, when purged of glosses by a comparison of the three forms in which it survives, reads thus: " Now the Christians reckon their race from the Lord Jesus Christ; and He is confessed to be the Son of God Most High. Having by the Holy Spirit come down from heaven, and having been born of a Hebrew virgin, He took flesh and appeared unto

men, to call them back from their error of many gods ; and having completed His wonderful dispensation, He was pierced by the Jews, and after three days He revived and went up to heaven. And the glory of His coming thou canst learn, O king, from that which is called among them the evangelic scripture, if thou wilt read it. He had twelve disciples, who after His ascent into heaven went forth into the provinces of the world and taught His greatness; whence they who at this day believe their preaching are called Christians." This passage contains striking correspondences with the second section of the Apostles' Creed. The attribution of the Crucifixion to the Jews appears in several 2nd-century documents; Justin actually uses the words " He was pierced by you " in his dialogue with Trypho the Jew.

" These are they," he proceeds, " who beyond all the nations

of the earth have found the truth: for they know God as Creator and Maker of all things, and they worship no other god beside Him; for they have His commandments graven on their hearts,

and these they keep in expectation of the world to come

Whatsoever they would not should be done unto them, they do not to another. . . . He that hath supplieth him that hath not without grudging: if they see a stranger they bring him under their roof, and rejoice over him, as over a brother indeed, for they call not one another brethren after the flesh, but after the spirit. They are ready for Christ's sake to give up their own lives; for His commandments they securely keep, living holily and right- eously, according as the Lord their God hath commanded them, giving thanks to Him at all hours, over all their food and drink, and the rest of their good things." This simple description is fuller in the Syriac, but the additional details must be accepted with caution: for while it is likely that the monk who appro- priated the Greek may have cut it down to meet the exigencies of his romance, it is the habit of certain Syriac translators to elaborate their originals. After asserting that " this is the way of truth," and again referring for further information to " the writings of the Christians," he says: " And truly this is a new race, and there is something divine mingled with it." At the close we have a passage which is found only in the Syriac, but which is shown by internal evidence to contain original elements: " The Greeks, because they practise foul things . . . turn the ridicule of their foulness upon the Christians. " This is an allusion to the charges of Thyestean banquets and other immoralities, which the early apologists constantly rebut. "But the Christians offer up prayers for them, that they may turn from their error; and when one of them turns, he is ashamed before the Christians of the deeds that were done by him, and he confesses to God saying: ' In ignorance I did these things '; and he cleanses his heart, and his sins are forgiven him, because he did them in ignorance

in former time, when he was blaspheming the true knowledge of the Christians."

These last words point to the use in the composition of this Apology of a lost apocryphal work of very early date, The Preach- ing of Peter. This book is known to us chiefly by quotations in Clement of Alexandria: it was widely circulated, and at one time claimed a place within the Canon. It was used by the Gnostic Heracleon and probably by the unknown writer of the epistle to Diognetus. From the fragments which survive we see that it contained: (i) a description of the nature of God, which closely corresponds with Arist. i., followed by (2) a warning not to worship according to the Greeks, with an exposure of various forms of idolatry; (3) a warning not to worship according to the Jews — although they alone think they know the true God — for they worship angels and are superstitious about moons and sabbaths, and feasts, comp. Arist. xiv.; (4) a description of the Christians as being " a third race," and worshipping God in " a new way " through Christ; (5) a proof of Christianity from Jewish prophecy; (6) a promise of forgiveness to Jews and Gentiles who should turn to Christ, because they had sinned " in ignorance " in the former time. Now all these points, except the proof from Jewish prophecy, are taken up and worked out by Aristides with a frequent use of the actual language of The Preaching of Peter. A criterion is thus given us for the reconstruction of the Apology, where the Greek which we have has been abbreviated, and we are enabled to claim with certainty- some passages of the Syriac which might otherwise be suspected as interpolations.

The style of the Apology is exceedingly simple. It is curiously misdescribed by Jerome, who never can have seen it, as " Apolo- geticum pro Christianis contextum philosophorum sententiis." Its merits are its recognition of the helplessness of the old heathenism to satisfy human aspiration after the divine, and the impressive simplicity with which it presents the unfailing argument of the lives of Christians.

The student may consult The Apology of Aristides, Syriac text and translation (J. R. Harris), with an appendix containing the Greek text, Texts and Studies, i. 1 (1891), and a critical discussion by R. Seeberg in Zahn's Forschungen, v. 2 (1893) ; also, brief

discussions by A. Harnack, Altchristl. Litteratur, i. 96 ff., Chronologie, i. 271 ff., where references to other writers may be found. The Epistola ad omnes philosophos and the Homily on the Penitent Thief, ascribed by

Armenian tradition to Aristides, are really of 5th-century origin. Trans, of Apology by W. S. Walford (1909). (J. A. R.)

ARISTIPPUS (c. 435-356 B.C.), Greek philosopher, the founder of the Cyrenaic school, was the son of Aritadas, a merchant of Cyrene. At an early age he came to Athens, and was induced to remain by the fame of Socrates, whose pupil he became. Subsequently he travelled through a number of Grecian cities, and finally settled in Cyrene, where he founded his school. His philosophy was eminently practical (see Cyrenaics). Starting from the two Socratic principles of virtue and happiness, he emphasized the second, and made pleasure the criterion of life. That he held to be good which gives the maximum of pleasure. In pursuance of this he indulged in all forms of external luxury. At the same time he remained thoroughly master of himself and had the self-control to refrain or to enjoy. Diogenes Laertius (ii. 65), quoting Phanias the peripatetic, says that he received money for his teaching, and Aristotle (Met. ii. 2) expressly calls him a sophist. Diogenes further states that he wrote several treatises, but none have survived. The five letters attributed to him are undoubtedly spurious. His daughter Arete, and her son Aristippus (urirpoSidaKTOS, " pupil of his mother "), carried on the school after his death. A cosmopolitan on principle, and a convinced disbeliever in the ethics of his day, he comes very near to modern empiricism and especially to the modern Hedonist school.

ARISTO or Ariston, of Chios (c. 250 B.C.), a Stoic philosopher and pupil of Zeno. He differed from Zeno on many points, and approximated more closely to the Cynic school. He was eloquent (hence his nickname " the Siren ") but controversial in tone. He despised logic, and rejected the philosophy of nature as beyond the powers of man. Ethics alone he considered worthy of study, and in that only general and theoretical questions. He rejected Zeno's doctrine of desirable things, inter- mediate between virtue and vice. There is only one virtue — ■ a clear, intelligent, healthy state of mind (hygeia). Aristo is frequently confounded with another philosopher of the same name, Ariston of Iulis, in Ceos, who, about 230 B.C., succeeded Lyco as scholarch of the Peripatetics. (See Stoics.)

ARISTO, of Pella, a Jewish Christian writer of the middle of the 2nd century, who like Hegesippus (q.v.) represents a school of thought more liberal than that of the Pharisaic and Essene Ebionites to which the decline of Jewish Christianity mainly led. Aristo is cited by Eusebius (Hist. Eccl. iv. 6. 3) for a decree of Hadrian respecting the Jews, but he is best known as the writer of a Dialogue (between Papiscus, an Alexandrian Jew, and Jason, who represents the author) on the witness of prophecy to Jesus Christ, which was approvingly defended by Origen against the reproaches of Celsus. The little book was perhaps used by Justin Martyr in his own

Dialogue with Trypho, and probably also by Tertullian and Cyprian, but it has not been preserved.

The literature is cited in G. Kriiger's Early Christian Literature, pp. 104 f.

ARISTOBULUS, of Cassandreia, Greek historian, accompanied Alexander the Great on his campaigns, of which he wrote an account, mainly geographical and ethnological. His work was largely used by Arrian.

Miiller, Historicorum Graecorum Fragmenta; Schone, De Rerum Alexandri Magni Scriptoribus (1870).

ARISTOBULUS, of Paneas (c. 160 B.C.), a Jewish philosopher of the Peripatetic school. Gercke places him in the time of Ptolemy X. Philometor (end of 2nd century), Anatolius in that of Ptolemy II. Philadelphus, but the middle of the 2nd century is more probable. He was among the earliest of the Jewish- Alexandrian philosophers whose aim was to reconcile and identify Greek philosophical conceptions with the Jewish religion. Only a few fragments of his work, apparently entitled Comment- aries on the Writings of Moses, are quoted by Clement, Eusebius and other theological writers, but they suffice to show its object. He endeavoured to prove that early Greek philosophers had

borrowed largely from certain parts of Scripture, and quoted from Linus, Orpheus, Musaeus and others, passages which strongly resemble the Mosaic writings. These passages, however, were obvious forgeries. It is suggested that the name Aristo- bulus was taken from 2 Mace. i. 10. The hypothesis (Schlatter, Das neugefundene hebraische Stuck des Sirach) that it was from Aristobulus that the philosophy of Ecclesiasticus was derived is not generally accepted.

See E. Schiirer, History of the Jewish People (Eng. trans., 1890- 1891), ii. 237 seq. ; article Alexandrian School: Philosophy; and s.v. " Aristobulus " in Jewish Encyclopedia (Paul Wendland).

ARISTOCRACY (Gr. apio-ros, best; Kparia, government), etymologically, the " rule of the best," a form of government variously defined and appreciated at different times and by different authorities. In Greek political philosophy, aristocracy is the government of those who most nearly attain to the ideal of human perfection. Thus Plato in the Republic advocates the rule of the " philosopher-king " who, in the social scheme, is analogous to Reason in the intellectual, and alone is qualified to control the active principles, i.e. the fighting population and the artisans or workers. Aristocracy is thus the government by those who are superior both morally and intellectually, and, therefore, govern directly in the interests of

the governed, as a good doctor works for the good of his patient. Aristotle classified good governments under three heads — monarchy, aristocracy and commonwealth (xoXireia), to which he opposed the three perverted forms — tyranny or absolutism, oligarchy and democracy or mob-rule. The distinction between aristocracy and oligarchy, which are both necessarily the rule of the few, is that whereas the few apiaroi will govern unselfishly, the oligarchs, being the few wealthy ("plutocracy" in modern terminology), will allow their personal interests to predominate. While Plato's aristocracy might be the rule of the wise and benevolent despot, Aristotle's is necessarily the rule of the few.

Historically aristocracy develops from primitive monarchy by the gradual progressive limitation of the regal authority. This process is effected primarily by the nobles who have hitherto formed the council of the king (an excellent example will be found in Athenian politics, see Archon), whose triple prerogative — religious, military and judicial— is vested, e.g., in a magistracy of three. These are either members of the royal house or the heads of noble families, and are elected for life or periodically by their peers, i.e. by the old royal council (cf. the Areopagus at Athens, the Senate at Rome), now the sovereign power. In practice this council depends primarily on a birth qualification, and thus has always been more or less inferior to the Aristotelian ideal; it is, by definition, an " oligarchy " of birth, and is recruited from the noble families, generally by the addition of emeritus magistrates. From the earliest times, therefore, the word " aristocracy " became practically synonymous with " oligarchy," and as such it is now generally used in opposition to democracy (which similarly took the place of Aristotle's 7ro\tT«ta), in which the ultimate sovereignty resides in the whole citizen body.

The aristocracy of which we know most in ancient Greece was that of Athens prior to the reforms of Cleisthenes, but all the Greek city-states passed through a period of aristocratic or oligarchic government. Rome, between the regal and the imperial periods, was always more or less under the aristocratic government of the senate, in spite of the gradual growth of democratic institutions (the Lat. optimates is the equivalent of aptorot). There is, however, one feature which distinguishes these aristocracies from those of modern states, namely, that they were all slave-owning. The original relation of the slave- population, which in many cases outnumbered the free citizens, cannot always be discovered. But in some cases we know that the slaves were the original inhabitants who had been overcome by an influx of racially different invaders (cf. Sparta with its Helots) ; in others they were captives taken in war. Hence even the- most democratic states of antiquity were so far aristocratic that the larger proportion of the inhabitants had no voice in the government. In the second place this relation gave rise to a philosophic doctrine, held even by

Aristotle, that there were

peoples who were inferior by nature and adapted to submission (4>bou dov\oi); such people had no "virtue" in the technical civic sense, and were properly occupied in performing the menial functions of society, under the control of the apicrrw. Thus, combined with the criteria of descent, civic status and the ownership of the land, there was the further idea of intellectual and social superiority. These qualifications were naturally, in course of time, shared by an increasingly large number of the lower class who broke down the barriers of wealth and education. From this stage the transition is easy to the aristocracy of wealth, such as we find at Carthage and later at Venice, in periods when the importance of commerce was paramount and mercantile pursuits had cast off the stigma of inferiority (in Gr. fiavavaia).

It is important at this stage to distinguish between aristocracy and the feudal governments of medieval Europe. In these it is true that certain power was exercised by a small number of families, at the expense of the majority. But under this system each noble governed in a particular area and within strict limitations imposed by his sovereign; no sovereign authority was vested in the nobles collectively.

Under the conditions of the present day the distinction of aristocracy, democracy and monarchy cannot be rigidly maintained from a purely governmental point of view. In no case does the sovereign power in a state reside any longer in an aristocracy, and the word has acquired a social rather than a political sense as practically equivalent to " nobility," though the distinction is sometimes drawn between the " aristocracy of birth " and the " aristocracy of wealth." Modern history, however, furnishes many examples of government in the hands of an aristocracy. Such were the aristocratic republics of Venice, Genoa and the Dutch Netherlands, and those of the free imperial cities in Germany, Such, too, in practice though not in theory, was the government of Great Britain from the Revolution of 1689 to the Reform Bill of 1832. The French nobles of the Ancien Regime, denounced as " aristocrats " by the Revolution- ists, had no share as such in government, but enjoyed exceptional privileges (e.g. exemption from taxation). This privileged posi- tion is still enjoyed by the heads of the German mediatized families of the " High Nobility." In Great Britain, on the other hand, though the aristocratic principle is still represented in the constitution by the House of Lords, the "aristocracy" generally, apart from the peers, has no special privileges.

ARISTODEMUS (8th century B.C.), semi-legendary ruler of Messenia in the time of the first Messenian War. Tradition relates that, after some six years' fighting, the Messenians were forced to retire to the fortified summit of Ithome. The Delphic oracle bade them sacrifice a virgin of the house of Aepytus. Aristodemus offered his own daughter, and when her lover, hoping to save her life, declared that she was no longer a maiden, he slew her with his own hand to prove the assertion false. In the thirteenth year of the war, Euphaes, the Messenian king, died. As he left no children, popular election was resorted to, and Aristodemus was chosen as his successor, though the national soothsayers objected to him as the murderer of his daughter. As a ruler he was mild and conciliatory. He was victorious in the pitched battle fought at the foot of Ithome in the fifth year of his reign, a battle in which the Messenians, reinforced by the entire Arcadian levy and picked contingents from Argos and Sicyon, defeated the combined Spartan and Corinthian forces. Shortly afterwards, however, led by unfavour- able omens to despair of final success, he killed himself on his daughter's tomb. Though little is known of his life and the chronology is uncertain, yet Aristodemus may fairly be regarded as a historical character. His reign is dated 731-724 B.C. by Pausanias, and this may be taken as approximately correct, though Duncker (History of Greece, Eng. trans., ii. p. 69) inclines to place it eight years later.

Pausanias iv. 9-13 is practically our only authority. He followed as his chief source the prose history of Myron of Priene, an untrust- worthy writer, probably of the 2nd century B.C. ; hence a good deal of his story must be regarded as fanciful, though we cannot distinguish accurately between the true and the fictitious. (M. N. T.)

ARISTOLOCHIA (Gr. apurros, best, Xoxeto, child-birth, in allusion to its repute in promoting child-birth), a genus of shrubs or herbs of the natural order Aristolochiaceae, often with climb- ing stems, found chiefly in the tropics. The flower forms a tube inflated at the base. A. Clematitis, birthwort, is a central and southern European species, found sometimes in England appar- ently wild on ruins and similar places, but not a native. A. Sipho, Dutchman's pipe, or pipe vine, is a climber, native in the woods of the Atlantic United States, and grown in Europe as a garden plant. The flower is bent like a pipe.

A member of the same order is the asarabacca (Asarum euro- paeum), a small creeping herb with kidney-shaped leaves and small purplish bell-shaped flowers. It is a native of the woods of Europe and north temperate Asia, and occurs wild in some English counties. It was formerly grown for medicinal pur- poses, the underground stem having cathartic and emetic properties. An allied species, A. canadense, is the Canadian snake-root, a native of Canada and the Atlantic United States.

ARISTOMENES, of Andania, the semi-legendary hero of the second Messenian war. He was a member of the Aepytid family, the son of Nicomedes (or, according to another version, of Pyrrhus) and Nicoteleia, and took a prominent part in stirring up the revolt against Sparta and securing the co-operation of Argos and Arcadia. He showed such heroism in the first en- counter, at Derae, that the crown was offered him, but he would accept only the title of commander-in-chief. His daring is illustrated by the story that he came by night to the temple of Athene " of the Brazen House " at Sparta, and there set up his shield with the inscription, "Dedicated to the goddess by Aristomenes from the Spartans." His prowess contributed largely to the Messenian victory over the Spartan and Corinthian forces at " The Boar's Barrow " in the plain of Stenyclarus, but in the following year the treachery of the Arcadian king Aristocrates caused the Messenians to suffer a crushing defeat at " The Great Trench." Aristomenes and the survivors retired to the mountain stronghold of Eira, where they defied the Spartans for eleven years. On one of his raids he and fifty of his companions were captured and thrown into the Caeadas, the chasm on Mt. Taygetus into which criminals were cast. Aristo- menes alone was saved, and soon reappeared at Eira: legend told how he was upheld in his fall by an eagle and escaped by grasping the tail of a fox, which led him to the hole by which it had entered. On another occasion he was captured during a truce by some Cretan auxiliaries of the Spartans, and was released only by the devotion of a Messenian girl who afterwards became his daughter-in-law. At length Eira was betrayed to the Spartans (668 B.C. according to Pausanias), and after a heroic resistance Aristomenes and his followers had to evacuate Messenia and seek a temporary refuge with their Arcadian allies. A desperate plan to seize Sparta itself was foiled by Aristocrates, who paid with his life for his treachery. Aristo- menes retired to Ialysus in Rhodes, where Damagetus, his son-in-law, was king, and died there while planning a journey to Sardis and Ecbatana to seek aid from the Lydian and Median sovereigns (Pausanias iv. 14-24). Another tradition represents him as captured and slain by the Spartans during the war (Pliny, Nat. Hist. xi. 187; Val. Maximus i. 8, 15; Steph. Byzant. s.v. 'Kvhavia). Though there seems to be no conclusive reason for doubting the existence of Aristomenes, his history, as related by Pausanias, following mainly the Messeniaca of the Cretan epic poet Rhianus (about 230 B.C.), is evidently largely interwoven with fictions. These probably arose after the foundation of Messene in 369 B.C. Aristomenes' statue was set up in the stadium there: his bones were fetched from Rhodes and placed in a tomb surmounted by a column (Paus. iv. 32. 3, 6); and more than five centuries later we still find heroic honours paid to him, and his exploits a popular subject of song (ib. iv. 14. 7; 16. 6).

For further details see Pausanias iv. ; Polyaenus ii. 31; G. Grote, History of

Greece, pt. ii. chap. vii. ; M. Duncker, History of Greece, Eng. trans., book iv. chap, viii.; A. Holm, History of Greece, Eng. trans., vol. i. chap. xvi. (M. N. T.)

ARISTONICUS, of Alexandria, Greek grammarian, lived during the reigns of Augustus and Tiberius. He taught at Rome and wrote commentaries and grammatical treatises. His chief work was Hepl ~Zrmtuav 'Onrjpov, in which he gave an account of the " critical marks " inserted by Aristarchus in the margin of his recension of the text of the Iliad and Odyssey. Important frag- ments are preserved in the scholia of the Venetian Codex A of the Iliad.

Friedlander, Aristonici TItpl "Z-qntiwr 'Wiabos reliquiae (1853) ; Carnuth, A ristonici Ilepi Sij/xetcov '0&vootia.s reliquiae (1869).

ARISTOPHANES (c. 448-385 B.C. 1), the great comic dramatist and poet of Athens. His birth-year is uncertain. He is known to have been about the same age as Eupolis, and is said to have been " almost a boy " when his first comedy (The Banqueters) was brought out in 427 B.C. His father Philippus was a land- owner in Aegina. Aristophanes was an Athenian citizen of the tribe Pandionis, and the deme Cydathene. The stories which made him a native ot Camirus in Rhodes or of the Egyptian Naucratis, had probably no other foundation than an indictment for usur- pation of civic rights (£evlas ypacpri) which appears to have been more than once laid against him by Cleon. His three sons — ■ Philippus, Araros and Nicostratus — were all comic poets. Philippus, the eldest, was a rival of Eubulus, who began to ex- hibit in 376 B.C. Araros brought out two of his father's latest comedies — the Cocalus and the Aeolosicon, and in 375 began to exhibit works of his own. Nicostratus, the youngest, is assigned by Athenaeus to the Middle Comedy, but belongs, as is shown by some of the names and characters of his pieces, to the New Comedy also.*

Although tragedy and comedy had their common origin in the festivals of Dionysus, the regular establishment of tragedy at Athens preceded by half a century that of comedy. The Old Comedy may be said to have lasted about eighty years (470- 390 B.C.), and to have flourished about fifty-six (460-404 B.C.). Of the forty poets who are named as having illustrated it the chief were Cratinus, Eupolis and Aristophanes. The Middle Comedy covers a period of about seventy years (390-320 B.C.), its chief poets being Antiphanes, Alexis, Theopompus and Strattis. The New Comedy was in vigour for about seventy years (320-250 B.C.) , having for its foremost

representatives Menander, Philemon and Diphilus. The Old Comedy was possible only for a thorough democracy. Its essence was a satirical censorship, unsparing in personalities, of public and of private life — of morality, of statesmanship, of education, of literature, of social usage — in a word, of everything which had an interest for the city or which could amuse the citizens. Preserving all the free- dom of banter and of riotous fun to which its origin gave it an historical right, it aimed at associating with this a strong practical purpose — the expression of a democratic public opinion in such a form that no misconduct or folly could altogether disregard it. That licentiousness, that grossness of allusion which too often disfigures it, was, it should be remembered, exacted by the sentiment of the Dionysiac festivals, as much as a decorous cheerfulness is expected at the holiday times of other worships. This was the popular element. Without this the entertainment would have been found flat and unseasonable. But for a comic poet of the higher calibre the consciousness of a recognized power which he could exert, and the desire to use this power for the good of the city, must always have been the uppermost feelings. At Athens the poet of the Old Comedy had an influence analogous, perhaps, rather to that of the journalist than to that of the modern dramatist. But the established type of Dionysiac comedy gave him an instrument such as no public satirist has ever wielded. When Moliere wished to brand hypocrisy he could only make his Tartuffe the central figure of a regular drama, developed by a regular process to a just catastrophe. He had no choice between touching too lightly and using sus- tained force to make a profound impression. The Athenian dramatist of the Old Comedy worked under no such limitations

1 [The dates in the text, as given by Jebb, are retained. According to R. G. Kent, Classical Review (April 1905, April 1906), Aristophanes was born in 455, and died in 375 B.C.]

‘ of form. The wildest flights of extravagance were permitted to him. Nothing bound him to a dangerous emphasis or a wearisome insistence. He could deal the keenest thrust, or make the most earnest appeal, and at the next moment — if his instinct told him that it was time to change the subject — vary the serious strain by burlesque. He had, in short, an incom- parable scope for trenchant satire directed by sure tact.

Aristophanes is for us the representative of the Old Comedy. But his genius, while it includes, also transcends the genius of the Old Comedy. He can denounce the frauds of a Cleon, he can vindicate the duty of Athens to herself and to her allies, with a stinging scorn and a force of patriotic indignation which makes the poet almost forgotten in the citizen. He can banter Euripides with an ingenuity of light mockery which makes it seem for the time as if the leading Aristophanic trait was the art of seeing all things from their prosaic side. Yet it is neither in the denunciation nor in

the mockery that he is most individual. His truest and highest faculty is revealed by those wonderful bits of lyric writing in which he soars above everything that can move laughter or tears, and makes the clear air thrill with the notes of a song as free, as musical and as wild as that of the nightingale invoked by his own chorus in the Birds. The speech of Dikaios Logos in the Clouds, the praises of country life in the Peace, the serenade in the Ecclesiazusae, the songs of the Spartan and Athenian maidens in the Lysistrata, above all, perhaps, the chorus in the Frogs, the beautiful chant of the Initiated, — these passages, and such as these, are the true glories of Aristophanes. They are the strains, not of an artist, but of one who warbles for pure gladness of heart in some place made bright by the presence of a god. Nothing else in Greek poetry has quite this wild sweetness of the woods. Of modern poets Shakespeare alone, perhaps, has it in combination with a like richness and fertility of fancy.

Fifty-four 2 comedies were ascribed to Aristophanes. Forty- three of these are allowed as genuine by Bergk. Eleven only are extant. These eleven form a running commentary on the outer and the inner life of Athens during thirty -six years. They may be ranged under three periods. The first, extending to 420 B.C., includes those plays in which Aristophanes uses an absolutely unrestrained freedom of political satire. The second ends with the year 405. Its productions are distinguished from those of the earlier time by a certain degree of reticence and caution. The third period, down to 388 B.C., comprises two plays in which the transition to the character of the Middle Comedy is well marked, not merely by disuse of the parabasis, but by general self-restraint.

I. First Period. (1) 425 B.C. The Acharnians. — Since the defeat in Boeotia the peace party at Athens had gained ground, and in this play Aristophanes seeks to strengthen their hands. Dicaeopolis, an honest countryman, is determined to make peace with Sparta on his own account, not deterred by the angry men of Acharnae, who crave vengeance for the devastation of their vineyards. He sends to Sparta for samples of peace ; and he is so much pleased with the flavour of the Thirty Years' sample that he at once concludes a treaty for himself and his family. All the blessings of life descend on him ; while Lamachus, the leader of the war party, is smarting from cold, snow and wounds.

(2) 424 B.C. The Knights. — Three years before, in his Baby- lonians, Aristophanes had assailed Cleon as the typical dema- gogue. In this play he continues the attack. The Demos, or State, is represented by an old man who has put himself and his household into the Bands of a rascally Paphlagonian steward. Nicias and Demosthenes, slaves of Demos, contrive that the Paphlagonian shall be supplanted in their master's favour by a sausage-seller. No sooner has Demos been thus rescued than his

youthfulness and his good sense return together.

(3) 423 B.C. The Clouds (the first edition; a second edition was brought out in 422 B.C.). — This play would be correctly described as an attack on the new spirit of intellectual inquiry and culture rather than on a school or class. Two classes of

2 [Or " forty-four " (reading p&' for v&' in Suidas).]

thinkers or teachers are, however, specially satirized under the general name of " Sophist " (v. 331)—!. The Physical Philo- sophers — indicated by allusions to the doctrines of Anaxagoras, Heraclitus and Diogenes of Apollonia. 2. The professed teachers of rhetoric, belles lettres, &c, such as Protagoras and Prodicus. Socrates is taken as the type of the entire tendency. A youth named Pheidippides— obviously meant for Alcibiades — is sent by his father to Socrates to be cured of his dissolute propensities. Under the discipline of Socrates the youth becomes accomplished in dishonesty and impiety. The conclusion of the play shows the indignant father preparing to burn up the philosopher and his hall of contemplation.

(4) 422 B.C. The Wasps. — This comedy, which suggested Les Plaideurs to Racine, is a satire on the Athenian love of litigation. The strength of demagogy, while it lay chiefly in the ecclesia, lay partly also in the paid dicasteries. From this point of view the Wasps may be regarded as supplementing the Knights. Philocleon (admirer of Cleon), an old man, has a passion for law- suits—a passion which his son, Bdelycleon (detester of Cleon) fails to check, until he hits upon the device of turning the house into a law-court, and paying his father for absence from the public suits. The house-dog steals a Sicilian cheese; the old man is enabled to gratify his taste by trying the case, and, by an oversight, acquits the defendant. In the second half of the play a change comes over the dream of Philocleon; from liti- gation he turns to literature and music, and is congratulated by the chorus on his happy conversion.

(5) 421 B.C. 1 The Peace. — In its advocacy of peace with Sparta, this play, acted at the Great Dionysia shortly before the con- clusion of the treaty, continues the purpose of the Acharnians. Trygaeus, a distressed Athenian, soars to the sky on a beetle's back. There he finds the gods engaged in pounding the Greek states in a mortar. In order to stop this, he frees the goddess Peace from a well in which she is imprisoned. The pestle and mortar are laid aside by the gods, and Trygaeus marries one of the

handmaids of Peace.

II. Second Period. (6) 414 B.C. The Birds. — Peisthetaerus, an enterprising Athenian, and his friend Euelpides persuade the birds to build a city — •" Cloud-Cuckoo-borough " — in mid-air, so as to cut off the gods from men. The plan succeeds; the gods send envoys to treat with the birds; and Peisthetaerus marries Basileia, daughter of Zeus. Some have found in the Birds a complete historical allegory of the Sicilian expedition; others, a general satire on the prevalence at Athens of head- strong caprice over law and order; others, merely an aspiration towards a new and purified Athens — a dream to which the poet had turned from his hope for a revival of the Athens of the past. In another view, the piece is mainly a protest against the religious fanaticism which the incident of the Hermae had called forth.

(7) 411 B.C. The Lysistrata. — This play was brought out during the earlier stages of those intrigues which led to the revolution of the Four Hundred. It appeared shortly before Peisander had arrived in Athens from the camp at Samos for the purpose of organizing the oligarchic policy. The Lysistrata expresses the popular desire for peace at any cost. As the men can do nothing, the women take the question into their own hands, occupy the citadel, and bring the citizens to surrender.

(8) 41 1 B.C. The Thesmophoriazusae (Priestesses of Demeter). — This came out three months later than the Lysistrata, during the reign of terror established by the oligarchic conspirators, but before their blow had been struck. The political meaning of the play lies in the absence of political allusion. Fear silences even comedy. Only women and Euripides are satirized. Euri- pides is accused and condemned at the female festival of the Thesmophoria.

(9) 405 B.C. The Frogs. — This piece was brought out just when Athens had made her last effort in the Peloponnesian War, eight months before the battle of Aegospotami, and about fifteen months before the taking of Athens by Lysander. It may be considered as an attempt to distract men's minds from public affairs. It is a literary criticism. Aeschylus and Euripides

1 SeeE. Curtius, Hist, of Greece, iii. (Eng. trans, p. 275).

were both lately dead. Athens is beggared of poets; and Diony- sus goes down to Hades to bring back a poet. Aeschylus and Euripides contend in the under-world for the throne of tragedy; and the victory is at last awarded to Aeschylus.

III. Third Period. 2 (10) 393 B.C. 2 The Ecclesiazusde (women in parliament).— The women, disguised as men, steal into the ecclesia, and

succeed in decreeing a new constitution. At this time the demagogue Agyrrhius led the assembly; and the play is, in fact, a satire on the general demoralization of public life.

(11) 388 B.C. The Plutus (Wealth).— The first edition of the play had appeared in 408 B.C., being a symbolical represen- tation of the fact that the victories won by Alcibiades in the Hellespont had brought back the god of wealth to the treasure- chamber of the Parthenon. In its extant form the Plutus is simply a moral allegory. Chremylus, a worthy but poor man, falls in with a blind and aged wanderer, who proves to be the god of wealth. Asclepius restores eyesight to Plutus; whereupon all the just are made rich ahd all the unjust are reduced to poverty.

Among the lost plays, the following are the chief of which anything is known:—

1. The Banqueters (AairaXets), 427 B.C. — A satire on young Athens. A father has two sons; one is brought up in the good old school, another in the tricky subtleties of the new; and the contrast of results is the chief theme.

2. The Babylonians, 426 B.C. — Under this name the subject -allies of Athens are represented as " Babylonians " — barbarian slaves, employed to grind in the mill. The oppression of the allies by the demagogues — a topic often touched elsewhere — was, then, the main subject of the piece, in which Aristophanes is said to have attacked especially the system of appointing to offices by lot. The comedy is memorable as opening that Aristophanic war upon Cleon which was continued in the Knights and the Wasps.

The Merchantmen, The Farmers, The Preliminary Contest (Proagon), and possibly the Old Age {Geras), belonged to the First Period. The Geras is assigned by Silvern to 422 B.C., and is supposed to have been a picture of dotage similar to that in the Knights. A comedy called The Islands is conjectured to have dealt with the sufferings imposed by the war on the insular tributaries. The Triphales was probably a satire on Alcibiades; the Storks, on the tragic poet Patrocles.

In the Aeolosicon — produced by his son Araros in 387 B.C.— Aristophanes probably parodied the Aeolus of Euripides. The Cocalus is thought to have been a parody of the legend, according to which a Sicilian king of that name slew Minos.

A sympathetic reader of Aristophanes can hardly fail to per- ceive that, while his political and intellectual tendencies are well marked, his opinions,

in so far as they colour his comedies, are too indefinite to reward, or indeed to tolerate, analysis. Aristo- phanes was a natural conservative. His ideal was the Athens of the Persian wars. He disapproved the policy which had made Athenian empire irksome to the allies and formidable to Greece ; he detested the vulgarity and the violence of mob-rule; he clave to the old worship of the gods; he regarded the new ideas of education as a tissue of imposture and impiety. How far he was from clearness or precision of view in regard to the intellectual revolution which was going forward, appears from the Clouds, in which thinkers and literary workers who had absolutely nothing in common are treated with sweeping ridicule as prophets of a common heresy. Aristophanes is one of the men for whom opinion is mainly a matter of feeling, not of reason. His imagina- tive susceptibility gave him a warm and loyal love for the traditional glories of Athens, however dim the past to which they belonged; a horror of what was ugly or ignoble in the present; a keen perception of what was offensive or absurd in pretension. The broad preferences and dislikes thus generated were enough not only to point the moral of comedy, but to make hint, in many cases, a really useful censor for the city. The service which he could render in this way was, however, only negative. He could hardly be, in any positive sense, a political or a moral teacher for Athens. His rooted antipathy to in- tellectual progress, while it affords easy and wide scope for his wit, must after all, lower his intellectual rank. The great minds are not the enemies of ideas. But as a mocker — to use the word which seems most closely to describe him on this side — he is incomparable for the union of subtlety with riot of the comic 2 [The date is uncertain; others give 392 and 389.]

imagination. As a poet, he is immortal. And, among Athenian poets, he has it for his distinctive characteristic that he is inspired less by that Greek genius which never allows fancy to escape from the control of defining, though spiritualizing, reason, than by such ethereal rapture of the unfettered fancy as lifts Shake- speare or Shelley above it, —

" Pouring his full heart In profuse strains of unpremeditated art.'

Bibliography. — Editio princeps (Aldine, Venice, 1498), by Marcus Musurus (not including the Lysistrata and Thesmophoria- zusae); S. Bergler (ed. P. Burmann, 1760); Invernizi-Beck- Dindorf (1794-1834); I. Bekker (1829); H. A. Holden (expurgated text, 1868), with Onomasticon (new ed., 1902); F. H. M. Blaydes (1880-1893), and critical edition (1886); J. van Leeuwen (1893 foil.); F. \V. Hall and E. M. Geldart (text,

1900-1901), with the fragment (from the Oxyrhynchus papyri) of a dialogue between two women concerning a leathern phallus, perhaps from Aristophanes. There is a complete edition of the valuable scholia by F. Diibner (1842, Didot series), with the anonymous biographies of the poet; of the Ravenna MS. by A. Martin (1883), and W. G. Rutherford (1896-1905). Among English translations mention may be made of those of \Y. J. Hickie (prose, in Bohn's Classical Library) ; (verse) J. Hookham Frere, five plays; T. Mitchell, four plays; and, above all, B. B. Rogers, a brilliant work of exceptional merit., There is a concordance to the plays and fragments by H. Dunbar (1883). On Aristophanes generally see H. Miiller-Strubing, Aristophanes und die historische Kritik (1873); the article by G. Kaibel in Pauly- Wissowa's Realencyclopiidie, ii. 1 (1896); A. Couat, Aristophane et I'ancienne comidie attique (1889); E. Deschanel, Etudes sur Aristo- phane (3rd ed., 1892) ; G. Dantu, Opinions et critiques a" Aristophane sur le mouvcment politique et intellectual a Athenes (Paris, 1907). For the numerous editions and translations of separate plays in English and other languages see the introductions to Blaydes's edition, and, for the literature, the introduction to W. J. M. Starkie's edition of the Wasps (1897) ; W. Engelmann, Scriptores Graeci (1880) ; and " Bericht iiber die Literatur der griechischen Komodie aus den Jahren 1892-1901 " in C. Bursian's Jahresbericht iiber die Fortschritte der classischen Altertumswissenschaft, cxvi. (1904). (R. C. J.)

ARISTOPHANES, of Byzantium, Greek critic and grammarian, was born about 257 B.C. He removed early to Alexandria, where he studied under Zenodotus and Callimachus. At the age of sixty he was appointed chief librarian of the museum. He died about 185-180 B.C. Aristophanes chiefly devoted himself to the poets, especially Homer, who had already been edited by his master Zenodotus. He also edited Hesiod, the chief lyric, tragic and comic poets, arranged Plato's dialogues in trilogies, and abridged Aristotle's Nature of Animals. His arguments to the plays of Aristophanes and the tragedians are in great part preserved. His works on Athenian courtesans, masks and proverbs were the results of his study of Attic comedy. He further commented on the HLpaKes of Callimachus, a sort of history of Greek literature. As a lexicographer, Aristophanes compiled collections of foreign and unusual words and expressions, and special lists (words denoting relationship, modes of address). As a grammarian, he founded a scientific school, and in his Analogy systematically explained the various forms. He introduced critical signs — except the obelus; punctuation prosodiacal, and accentual marks were probably already in use. The foundation of the so-called Alexandrian " canon " was also due to his impulse(Sandys, Hist. Class. Schol., ed. 1906, i. 129 f.).*

Nauck, Aristophanis Byzantii Grammatici Fragmenta (1848).

ARISTOTLE (384-322 B.C.), the great Greek philosopher, was born at Stagira, on the Strymonic Gulf, and hence called " the Stagirite." Dionysius of Halicarnassus, in his Epistle on Demo- sthenes and Aristotle (chap. 5), gives the following sketch of his life: — Aristotle ('Apwtot£\t;s) was the son of Nicomachus, who traced back his descent and his art to Machaon,son of Aesculapius ; his mother being Phaestis, a descendant of one of those who carried the colony from Chalcis to Stagira. He was born in the 99th Olympiad in the archonship at Athens of Diotrephes (384-383), three years before Demosthenes. In the archonship of Polyzelus (367-366), after the death of his father, in his eighteenth year, he came to Athens, and having joined Plato spent twenty years with him. On the death of Plato (May 347) in the archonship of Theophilus (348-347) he departed to Hermias, tyrant of Atarneus, and, after three years' stay, during the archonship of Eubulus

(345-344) he moved to Mitylene, whence he went to Philip of Macedon in the archonship of Pythodotus (343-342), and spent eight years with him as tutor of Alexander. After the death of Philip (336), in the archonship of Euaenetus (335-334), he returned to Athens and kept a school in the Lyceum for twelve years. In the thirteenth, after the death of Alexander (June 323) in the archonship of Cephisodorus (323-322), having departed to Chalcis, he died of disease (322), after a life of three-and-sixty years.

I. Aristotle's Life

This account is practically repeated by Diogenes Laertius in his Life of Aristotle, on the authority of the Chronicles of Apollodorus, who lived in the 2nd century B.C. Starting then from this tradition, near enough to the time, we can confidently divide Aristotle's career into four periods: his youth under his parents till his eighteenth year; his philosophical education under Plato at Athens till his thirty-eighth year; his travels in the Greek world till his fiftieth year; and his philosophical teaching in the Lyceum till his departure to Chalcis and his death in his sixty- third year. But when we descend from generals to particulars, we become less certain, and must here content ourselves with few details.

Aristotle from the first profited by having a father who, being physician to Amyntas II., king of Macedon, and one of the Asclepiads who, according to Galen, practised their sons in dis- section, both prepared the way for his son's influence at the Macedonian court, and gave him a bias to medicine and biology, which certainly led to his belief in nature and natural science, and perhaps induced him to practise medicine, as he did, accord- ing to his enemies, Timaeus and Epicurus, when he first went to Athens. At Athens in his second period for some twenty years he acquired the further advantage of balancing natural science by metaphysics and morals in the course of

reading Plato's writings and of hearing Plato's unwritten dogmas (cf. h> rots Xeyo/xkvois ayp&4>ois Soynaaiv, At. Physics, iv. 2, 209 b 15, Berlin ed.). He was an earnest, appreciative, independent student. The master is said to have called his pupil the intellect of the school and his house a reader's. He is also said to have complained that his pupil spurned him as colts do their mothers. Aristotle, however, always revered Plato's memory (Nic. Ethics, i. 6), and even in criticizing his master counted himself enough of a Platonist to cite Plato's doctrines as what "we say" (cf. {fraub, Metaphysics, i. 9, 990 b 16). At the same time, he must have learnt much from other contemporaries at Athens, especially from astronomers such as Eudoxus and Callippus, and from orators such as Isocrates and Demosthenes. He also attacked Isocrates, according to Cicero, and perhaps even set up a rival school of rhetoric. At any rate he had pupils of his own, such as Eudemus of Cyprus, Theodectes and Hermias, books of his own, especially dialogues, and even to some extent his own philosophy, while he was still a pupil of Plato.

Well grounded in his boyhood, and thoroughly educated in his manhood, Aristotle, after Plato's death, had the further advan- tage of travel in his third period, when he was in his prime. The appointment of Plato's nephew, Speusippus, to succeed his uncle in the Academy induced Aristotle and Xenocrates to leave Athens together and repair to the court of Hermias. Aristotle admired Hermias, and married his friend's sister or niece, Pythias, by whom he had his daughter Pythias. After the tragic death of Hermias, he retired for a time to Mitylene, and in 343-342 was summoned to Macedon by Philip to teach Alexander, who was then a boy of thirteen. According to Cicero (De Oratore, iii. 41), Philip wished his son, then a boy of thirteen, to receive from Aristotle " agendi praecepta et eloquendi." Aristotle is said to have written on monarchy and on colonies for Alexander; and the pupil is said to have slept with his master's edition of Homer under his pillow, and to have respected him, until from hatred of Aristotle's tactless relative, Callisthenes, who was done to death in 328, he turned at last against Aristotle himself. Aristotle had power to teach, and Alexander to learn. Still we must not exaggerate the result. Dionysius must have spoken too strongly

when he says that Aristotle was tutor of Alexander for eight years; for in 340, when Philip went to war with Byzantium, Alexander became regent at home, at the age of sixteen. From this date Aristotle probably spent much time at his paternal house in his native city at Stagira as a patriotic citizen. Philip had sacked it in 348 : Aristotle induced him or his son to restore it,

made for it a new constitution, and in return was celebrated in a festival after his death. All these vicissitudes made him a man of the world, drew him out of the philosophical circle at Athens, and gave him leisure to develop his philosophy. Besides Alexander he had other pupils: Callisthenes, Cassander, Marsyas, Phanias, and Theophrastus of Eresus, who is said to have had land at Stagira. He also continued the writings begun in his second period; and the Macedonian kings have the glory of having assisted the Stagirite philosopher with the means of conducting his researches in the History of Animals.

At last, in his fourth period, after the accession of Alexander, Aristotle at fifty returned to Athens and became the head of his own school in the Lyceum, a gymnasium near the temple of Apollo Lyceius in the suburbs. The master and his scholars were called Peripatetics (ol ev r\Kpoap.kvuiv) a duty of according to the defects of the investiga- tion consideration, to its discoveries much gratitude " (Sophisti- cal Elenchi, 34, 184 b 6) . In short, Aristotle was at once a student, a reader, a lecturer, a writer and a book collector. He was, says Strabo (608), the first we knew who collected books and taught the kings in Egypt the arrangement of a library. In his library no doubt were books of others, but also his own. There we must figure to ourselves the philosopher, constantly referring to his autograph rolls; entering references and cross-references; cor- recting, rewriting, collecting and arranging them according to their subjects; showing as well as reading them to his pupils; with little thought of publication, but with his whole soul con- centrated on being and truth.

On his first visit to Athens, during which occurred the fatal battle of Mantineia (362 B.C.), Aristotle had seen the confusion of Greece becoming the opportunity of Macedon under Philip; and on his second visit he was supported at Athens by the complete domination of Macedon under Alexander. Having witnessed the unjust exactions of a democracy at Athens, the dwindling population of an oligarchy at Sparta, and the oppressive selfish- ness of new tyrannies throughout the Greek world, he condemned the actual constitutions of the Greek states as deviations (irapeic- /Mereis) directed merely to the good of the government; and he contemplated a right constitution (opdi) iroXtreta), which might be either a commonwealth, an aristocracy or a monarchy, directed to the general good; but he preferred the monarchy of one man, pre-eminent in virtue above the rest, as the best of all governments (Nicomachean Ethics, viii. 10; Politics, T 14-18). Moreover, by adding (Politics, H 7, 1327 b 29-33) that the Greek

race could govern the world by obtaining one constitution (fjuas Tvyx a – vov xoXireios), he indicated some leaning to a universal monarchy under such a king as Alexander. On the whole, however, he adhered to the Greek

city-state (7ro\ts), partly perhaps out of patriotism to his own Stagira. Averse at all events to the Athenian democracy, leaning towards Macedonian monarchy, and resting on Macedonian power, he maintained himself in his school at Athens, so long as he was supported by the friendship of Antipater,,the Macedonian regent in Alexander's absence. But on Alexander's sudden death in 323, when Athens in the Lamian war tried to reassert her freedom against Antipater, Aristotle found himself in danger. He was accused of impiety on the absurd charge of deifying the tyrant Hermias; and, remembering the fate of Socrates, he retired to Chalcis in Euboea. There, away from his school, in 3 2 2 he died. (A tomb has been found in our time inscribed with the name of Biote, daughter of Aristotle. But is this our Aristotle ?)

Such is our scanty knowledge of Aristotle's life, which seems to have been prosperous by inheritance and position, and happy by work and philosophy. His will, which was quoted by Her- mippus, and, as afterwards quoted by Diogenes Laertius, has come down to us, though perhaps not complete, supplies some further details, as follows: — Antipater is to be executor with others. Nicanor is to marry Pythias, Aristotle's daughter, and to take charge of Nicomachus his son. Theophrastus is to be one of the executors if he will and can, and if Nicanor should die to act instead, if he will, in reference to Pythias. The executors and Nicanor are to take charge of Herpyllis, " because," in the words of the testator, " she has been good to me," and to allow her to reside either in the lodging by the garden at Chalcis or in the paternal house at Stagira. They are to provide for the slaves, who in some cases are to be freed. They are to see after the dedication of four images by Gryllion of Nicanor, Proxenus, Nicanor's mother and Arimnestus. They are to dedicate an image of Aristotle's mother, and to see that the bones of his wife Pythias are, as she ordered, taken up and buried with him. On this will we may remark that Proxenus is said to have been Aristotle's guardian after the death of his father, and to have been the father of Nicanor;: that Herpyllis of Stagira was the mother of Nicomachus by Aristotle; and that Arimnestus was the brother of Aristotle, who also had a sister, Arimneste. Every clause breathes the philosopher's humanity.

II. Development prom Platonism

Turning now from the man to the philosopher as we know him best in his extant writings (see Aristoteles, ed. Bekker, Berlin, 1 83 1, the pages of which we use for our quotations), we find, instead of the general dialogues of Plato, special didactic treatises, and a fundamental difference of philosophy, so great as to have divided philosophers into opposite camps, and made Coleridge say that everybody is born either a Platonist or an Aristotelian. Platonism is the doctrine that the individuals we call things

only become, but a thing is always.one universal form beyond many individuals, e.g. one good beyond seeming goods; and that without supernatural forms, which are models of individuals, there is nothing, no being, no knowing, no good. Aristotelianism is the contrary doctrine: a thing is always a separate individual, a substance (owia), natural such as earth or supernatural such as God; and without these individual substances, which have attributes and universals belonging to them, there is nothing, to be, to know, to be good. Philosophic differences are best felt by their practical effects: philosophically, Platonism is a philosophy of universal forms, Aristotelianism a philosophy of individual substances: practically, Plato makes us think first of the super- natural and the kingdom of heaven, Aristotle of the natural and the whole world.

So diametrical a difference could not have arisen at once. For, though Aristotle was different from Plato, and brought with him from Stagira a Greek and Ionic but colonial origin, a medical descent and tendency, and a matter-of-fact worldly kind of character, nevertheless on coming to Athens as pupil of Plato he must have begun with his master's philosophy. What then in

more detail was the philosophy which the pupil learnt from the master? When Aristotle at the age of eighteen came to Athens, Plato, at the age of sixty-two, had probably written all his dialogues except the Laws; and in the course of the remaining twenty years of his life and teaching, he expounded " the so- called unwritten dogmas " in his lectures on the Good. There was therefore a written Platonism for Aristotle to read, and an unwritten Platonism which he actually heard.

To begin with the written philosophy of the Dialogues. Individual so-called things neither are nor are not, but become: the real thing is always one universal form beyond the many in- dividuals, e.g. the one beautiful beyond all beautiful individuals; and each form (i5ea) is a model which causes individuals by par- ticipation to become like, but not the same as, itself. Above all forms stands the form of the good, which is the cause of all other forms being, and through them of all individuals becoming. The creator, or the divine intellect, with a view to the form of the good, and taking all forms as models, creates in a receptacle (vtoSoxV, Plato, Timaeus, 49 a) individual impressions which are called things but really change and become without attaining the permanence of being. Knowledge resides not in sense but in reason, which, on the suggestion of sensations of changing individuals, apprehends, or (to be precise) is reminded of, real universal

forms, and, by first ascending from less to more general until it arrives at the form of good and then descending from this unconditional principle to the less general, becomes science and philosophy, using as its method the dialectic which gives and receives questions and answers between man and man. Happi- ness in this world consists proximately in virtue as a harmony between the three parts, rational, spirited and appetitive, of our souls, and ultimately in living according to the form of the good; but there is a far higher happiness, when the immortal soul, divesting itself of body and passions and senses, rises from earth to heaven and contemplates pure forms by pure reason. Such in brief is the Platonism of the written dialogues; where the main doctrine of forms is confessedly advanced never as a dogma but always as a hypothesis, in which there are difficulties, but without which Plato can explain neither being, nor truth nor goodness, because throughout he denies the being of individual things. In the unwritten lectures of his old age, he developed this formal into a mathematical metaphysics. In order to explain the unity and variety of the world, the one universal form and the many individuals, and how the one good is the main cause of everything, he placed as it were at the back of his own doctrine of forms a Pythagorean mathematical philosophy. He supposed that the one and the two, which is indeterminate, and is the great and little, are opposite principles or causes. Identifying the form of the good with the one, he supposed that the one, by combining with the indeterminate two, causes a plurality of forms, which like every combination of one and two are numbers but peculiar in being incommensurate with one another, so that each form is not a mathematical number ((ia9iHia.Tt.Kds apiQuos), but a formal number (ei5?jTiK6s apidfios). Further he sup- posed that in its turn each form, or formal number, is a limited one which, by combining again with the indeterminate two, causes a plurality of individuals. Hence finally he concluded that the good as the one combining with the indeterminate two is directly the cause of all forms as formal numbers, and indirectly through them all of the multitude of individuals in the world.

Aristotle knew Plato, was present at his lectures on the Good, wrote a report of them (7rept rayadov), and described this latter philosophy of Plato in his Metaphysics. Modern critics, who were not present and knew neither, often accuse Aristotle of mis- representing Plato. But Heracleides and Hestiacus, Speusippus and Xenocrates were also present and wrote similar reports. What is more, both Speusippus and Xenocrates founded their own philosophies on this very Pythagoreanism of Plato. Speu- sippus as president of the Academy from 347 to 339 taught that the one and the many are principles, while abolishing forms and reducing the good from cause to effect. Xenocrates as president from 339 onwards taught that the one and many are principles,

only without distinguishing mathematical from formal numbers. Aristotle's critics hardly realize that for the rest of his life he had to live and to struggle with a formal and a mathematical Platonism, which exaggerated first universals and attributes and afterwards the quantitative attributes, one and many, into substantial things and real causes.

Aristotle had no sympathy with the unwritten dogmas of Plato. But with the written dialogues of Plato he always continued to agree almost as much as he disagreed. Like Plato, he believed in real universals, real essences, real causes; he believed in the unity of the universal, and in the immateriality of essences; he believed in the good, and that there is a good of the universe; he believed that God is a living being, eternal and best, who is a supernatural cause of the motions and changes of the natural world, and that essences and matter are also necessary causes; he believed in the divine intelligence and in the immor- tality of our intelligent souls; he believed in knowledge going from sense to reason, that science requires ascent to principles and is descent from principles, and that dialectic is useful to science; he believed in happiness involving virtue, and in moral virtue being a control of passions by reason, while the highest happiness is speculative wisdom. All these inspiring meta- ' physical and moral doctrines the pupil accepted from his master's dialogues, and throughout his life adhered to the general spirit of realism without materialism pervading the Platonic philosophy. But what he refused to believe with Plato was that reality is not here, but only above; and what he maintained against Plato was that it is both, and that universals and forms, one and many, the good, are real but not separate realities. This deep metaphysical divergence was the prime cause of the transition from Platonism to Aristotelianism.

Fragmenta Aristotelis. — Aristotle's originality soon asserted itself in early writings, of which fragments have come down to us, and have been collected by Rose (see the Berlin edition of Aristotle's works, or more readily in the Teubner series, which we shall use for our quotations). Many, no doubt, are spurious; but some are genuine, and a few perhaps cited in Aristotle's extant works. Some are dialogues, others didactic worksi A special interest attaches to the dialogues written after the manner of Plato but with Aristotle as principal interlocutor; and some of these, e.g. the wepl woii\tuiv and the Eudemus, seem to have been published. It is not always certain which were dialogues, which didactic like Aristotle's later works; but by comparing those which were certainly dialogues with their companions in the list of Aristotle's books as given by Diogenes Laertius, we may conclude with Bernays that the books occurring first in that list were dialogues. Hence we may perhaps accept as genuine the following: —

1. Dialogues: —

■*Kepi bucaioovvqs : On justice.*

wepl woiiituiv. On poets (perhaps cited in Poetics, 15,

1454 b 18, ev tois eic5e5op.evois Xoyois). wepl cJK\o(TO(j)las: On philosophy (perhaps cited in Physics,

ii ; 2, 194 a 35-36). wepl iro~hiTiKov: A politician. wepl pTiTopi.Krjs fj TpvXKos: On rhetoric. wporptwriKov. An exhortation to philosophy (probably

in dialogue, because it is the model of Cicero's dialogue

Hortensivs). EuSjj/uos rj wepl tyvxvs'- On soul (perhaps cited in Be

Anima, i. 4, 407 b 29, ical tois ev kolv<3 yevofxe.vQi.%

X6"yoi.s).

2. Didactic writings: —

(1) Metaphysical: — :

■*Kepi rayadov: On the good (probably not a dialogue*

but a report of Plato's lectures). 7rept iSe&v: On forms.

(2) Political:— '

wepl fHa

5°4

ARISTOTLE

(3) Rhetorical: —

t«x^s tt)s QeodiKTov avvayoryv'- The Theodectea (cited

in the Preface to the Rhetoric to Alexander (chap. i.)i

and as to. 9eo5«weta in the Rhetoric (iii. 9, 1410 b2),

rexy&v avvayaiyv'- A historical collection of arts of

rhetoric.

Difficult as it is to determine when Aristotle wrote all these various works,

some of them indicate their dates. Gryllus, celebrated in the dialogue on rhetoric, was Xenophon's son who fell at Mantineia in 362; and Eudemus of Cyprus, lamented in the dialogue on soul, died in Sicily in 352. These then were probably written before Plato died in 347 ; and so probably were most of the dialogues, precisely because they were imitations of the dialogues of Plato. Among the didactic writings, the rapt rayadov would probably belong to the same time, because it was Aristotle's report of Plato's lectures. On the other hand, the two political works, if written for Alexander, would be after 343-342 when Philip made Aristotle his tutor. So probably were the rhetorical works, especially the Theodectea; since both politics and oratory were the subjects which the father wanted the tutor to teach his son, and, when Alexander came to Phaselis, he is said by Plutarch (Alexander, 17) to have decorated the statue of Theodectes in honour of his association with the man through Aristotle and philosophy. On the whole, then, it seems as if Aristotle began with dialogues during his second period under Plato, but gradually came to prefer writing didactic works, especially in the third period after Plato's death, and in connexion with Alexander.

These early writings show clearly how Aristotle came to depart from Plato. In the first place as regards style, though the Stagirite pupil Aristotle could never rival his Attic master in literary form, yet he did a signal service to philosophy in gradually passing from the vague generalities of the dialogue to the scientific precision of the didactic treatise. The philosophy of Plato is dialogue trying to become science; that of Aristotle science retaining traces of dialectic. Secondly as regards subject- matter, even in his early writings Aristotle tends to widen the scope of philosophic inquiry, so as not only to embrace meta- physics and politics, but also to encourage rhetoric and poetics, which Plato tended to discourage or limit. Thirdly as regards doc-trines, the surpassing interest of these early writings is that they show the pupil partly agreeing, partly disagreeing, with his master. The Eudemus and Protrepticus are with Plato; the dialogues on Philosophy and the treatise on Forms are against Plato.

The Eudemus, on the soul (Fragmenta, 37 seq.), must have been in style and thought the most Platonic of all the Aristotelian writings. Plato's theory of the soul and its immortality was not the ordinary Greek view derived from Homer, who regarded the body as the self, the soul as a shade having a future state but an obscure existence, and stamped that view on the hearts of his countrymen, and affected Aristotle himself. After Homer there had come to Greece the new view that the soul is more real than the body, that it is imprisoned in the carcase as a prison-house, that it is capable of enjoying a happier life freed from the body, and that it can transmigrate from body to body. This strange, exotic, ascetic view was adopted by some philosophers, and especially by the Pythagoreans, and so transmitted to

Plato. Aristotle in the Eudemus, written about 352, when he was thirty-two, also believed in it. Accordingly, the soul of Eudemus, when it left his body, is said to be returning home: the soul is made subject to the casting of lots, and in coming from the other world to this it is supposed to forget its former visions: but its disembodied life is regarded as its natural life in a better world. The Eudemus also contained a celebrated passage, preserved by Plutarch (Consolat. ad Apoll. 27; Fragm. 44). Here we can read the young Aristotle, writing in the form of the dialogue like Plato, avoiding hiatus like Isocrates, and justifying the praises accorded to his style by Cicero, Quintilian and Dionysius. It shows how nearly the pupil could imitate his master's dialogues, and still more how exactly he at first embraced his master's doctrines. It makes Silenus, captured by Midas, say that the best of all things is not to have been born, and the next best, having been born, to die as soon as possible. Nothing could be more like Plato's Phaedo, or more unlike Aristotle's later work on the Soul, which entirely rejects transmigration and allows the next life to sink into the background.

Hardly less Platonic is the Protrepticus (Fragm. 50 seq.), an exhortation to philosophy which, according to Zeno the Stoic, was studied by his master Crates. It is an exhortation, whose point is that the chief good is philosophy, the contemplation of the universe by divine and immortal intellect. This is indeed a doctrine of

Platonic ethics from which Aristotle in his later days never swerved. But in the Protrepticus he goes on to say that seeming goods, such as strength, size, beauty, honours, opinions, are iriere illusion (ta), worthless and ridiculous, as we should know if we had Lyncean eyes to compare them with the vision of the eternal. This indifference to goods of body and estate is quite Platonic, but is very different from Aristotle's later ethical doctrine that such goods, though not the essence, are nevertheless necessary conditions of happiness. Finally, in the spirit of Plato's Phaedo and the dialogue Eudemus, the Protrepticus holds that the soul is bound to the sentient members of the body as prisoners in Etruria are bound face to face with corpses ; whereas the later view of the De Anima is that the soul is the vital principle of the body and the body the necessary organ of the soul.

Thus we find that at first, under the influence of his master, Aristotle held somewhat ascetic views on soul and body and on goods of body and estate, entirely opposed both in psychology and in ethics to the moderate doctrines of his later writings. This perhaps is one reason why Cicero, who had Aristotle's early writings, saw no differ- ence between the Academy and the Peripatetics (A cad. Post, i. 4,

17-18).

On the other hand, the dialogue on Philosophy (wepl i\oao4>ias, Fragm. I seq.) strikingly exhibits the origin of Aristotle's divergence from Platonism, and that too in Plato's lifetime. The young son of a doctor from the colonies proved too fond of this world to stomach his Athenian master's philosophy of the supernatural. Accordingly in this dialogue he attacked Plato's fundamental position, both in its written and in its unwritten presentment, as a hypothesis both of forms and of formal numbers. First, he attacked the hypothesis of forms (rf/v tQv iSt&v vroB&nv, Fragm. 8) , exclaiming in his dialogues, according to Proclus, that he could not sympathize with the dogma even if it should be thought that he was opposing it out of contentiousness; while Plutarch says that his attacks on the forms by means of his exoteric dialogues were thought by some persons more contentious than philosophical, as presuming to disdain Plato's philosophy : so far was he, says Plutarch, from following it. Secondly, in the same dialogue (Fragm. 9), according to Syrianus, he disagreed with the hypothesis of formal numbers (toU eldriTucoU &pt0noU). If, wrote Aristotle, the forms are another sort of number, not mathematical, there would be no understanding of it. Lastly, in the same dialogue (Fragm. 18 seq.) he revealed his emphasis on nature by contending that the universe is uncreate and indestructible. According to Plato, God caused the natural world to become: according to Aristotle it is eternal. This eternity of the world became one of his characteristic doctrines, and subsequently enabled him to explain how essences can be eternal without being separate from this world which is also eternal (cf. Metaph. Z 8), Thus early did Aristotle begin, even in Plato's lifetime, to oppose Plato's hypothesis of supernatural forms, and advance his own hypothesis of the eternity of the world.

He made another attack on Platonism in the didactic work vtpl IS(Qv) (Fragm. 185 seq.), contending that the Platonic arguments prove not forms (ISiai) but only things common (tA. naiva): Here, according to Alexander the commentator, he first brought against Plato the argument of" the third man " (6 rpiros fij/tfp&nros) ; that, if there is the form, one man beyond many men, there will be a third man predicated of both man and men, and a fourth predi- cated of all three, and so on to infinity (Fragm. 188). Here, too, he examined the hypothesis of Eudoxus that things are caused by mixture of forms, a hypothesis which formed a kind of transition to his own later views, but failed to satisfy him on account of its diffi- culties. Lastly, in the didactic work vtpiT&yadov (Fragm. 27 seq.), containing his report of Plato's lectures on the Good, he was dealing with the same mathematical metaphysics which in his dialogue on Philosophy he criticized for converting forms into formal numbers. Aristoxenus, at the beginning of the second book of the Harmonics, gives a graphic account of the astonishment caused by these lectures of Plato, and of their effect oh the lectures of Aristotle. In contend- ing, as Aristotle's pupil, that a teacher

should begin by proposing his subject, he tells us how Aristotle used to relate that most of Plato's hearers came expecting to get something about human goods and happiness, but that when the discourses turned out to be all about mathematics, with the conclusion that good is one, it appeared to them a paradox, which some despised and others condemned. The reason, he adds, was that they were not informed by Plato before- hand; and for this very reason, Aristotle, as he told Aristoxenus himself, used to prepare his hearers by informing them of the nature of the subject. From this rare personal reminiscence we see at a glance that the mind of Plato and the mind of Aristotle were so different, that their philosophies must diverge ; the one towards the supernatural, the abstract, the discursive, and the other towards the natural, the substantial, the scientific.

Aristotle then even in the second period of his life, while Plato was still alive, began to differ from him in metaphysics. He rejected the Platonic hypothesis of forms, and affirmed that they are not separate but common, without however as yet having advanced to a constructive metaphysics of his own; while at the same time, after having at first adopted his master's dialectical treatment of meta- physical problems, he soon passed from dialogues to didactic works, which had the result of separating metaphysics from dialectic. The

all-important consequence of this first departure from Platonism was that Aristotle became and remained primarily a metaphysician. After Plato's death, coming to his third period he made a further departure from Platonism in his didactic works on politics and rhetoric, written in connexion with Alexander and Theodectes. Those on politics (Fragm. 646-648) were designed to instruct Alexander on monarchy and on colonization; and in them Aristotle agreed with Plato in assigning a moral object to the state, but departed from him by saying that a king need not be a philosopher, as Plato had said in the Republic, but does need to listen to philosophers. Still more marked was his departure from Plato as regards rhetoric. Plato in the Gorgias, (501 a) had contended that rhetoric is not an art but an empirical practice (rpi/Sij «ai epireipla) ; Aristotle in the Gryllus (Fragm. 68-69), written in his second period, took according to Quintilian a similar view. But in his third period, in the Theodectea (Fragm. 125 seq.), rhetoric is treated as an art, and is laid out somewhat in the manner of his later Art of Rhetoric ; while he also showed his interest in the subject by writing a history of other arts of rhetoric called rexv&v o-vvayoiyri (Fragm. 136 seq.). Further, in treating rhetoric as an art in the Theodectea he was forced into a conclusion, which carried him

far beyond Plato's rigid notions of proof and of passion : he concluded that it is the work of an orator to use persuasion, and to arouse the passions (to to ira$i)8tayeipaL'), e.g. anger and pity (ib. 133-134). Nor could he treat poetry as he is said to have done without the same result.

On the whole then, in his early dialectical and didactic writings, of which mere fragments remain, Aristotle had already diverged from Plato, and first of all in metaphysics. During his master's life, in the second period of his own life, he protested against the Platonic hypothesis of forms, formal numbers and the one as the good, and tended to separate metaphysics from dialectic by beginning to pass from dialogues to didactic works. After his master's death, in the third period of his own life, and during his connexion with Alexander, but before the final con- struction of his philosophy into a system, he was tending to write more and more in the didactic style; to separate from dialectic, not only metaphysics, but also politics, rhetoric and poetry; to admit by the side of philosophy the arts of persuasive language; to think it part of their legitimate work to rouse the passions; and in all these ways to depart from the ascetic rigidity of the philo- sophy of Plato, so as to prepare for the tolerant spirit of his own, and especially for his ethical doctrine that virtue consists not in suppressing but in moderating almost all human passions. In both periods, too, as we shall find in the sequel, he was already occupied in composing some of the extant writings which were afterwards to form parts of his final philosophical system. But as yet he had given no sign of system, and — what is surprising — no trace of logic. Aristotle was primarily a metaphysician against Plato; a metaphysician before he was a logician; a metaphysician who made what he called primary philosophy (■KpoiTT) <\>Ckoia.) the starting-point of his philosophical development, and ultimately of his philosophical system.

III. Composition or his Extant Works The system which was taught by Aristotle at Athens in the fourth period of his life, and which is now known as the Aristo- telian philosophy, is contained not in fragments but in extant books. It will be best then to give at once a list of these extant works, following the traditional order in which they have long been arranged, and marking with a dagger (t) those which are now usually considered not to be genuine, though not always with sufficient reason.

A. Logical

1. Ka-rˆyopiai: Categoriae: On simple expressions signifying different kinds of things and capable of predication [probably an early work of Aristotle, accepting species and genera as "secondary substances " in deference to Plato's teaching].

2. irepl 'EpM'ji'tias: De interpretations. On language as expression of mind, and especially on the enunciation or assertion (a-Kixftavait, iTa/xicTucds X670S) [rejected by Andronicus according to Alexander; but probably an early work of Aristotle, based on Plato's analysis of the sentence into noun and verb].

3. 'AvaXuriKo irporepa : Analytica Priora: On syllogism, with a view to demonstration.

4. 'KvaKvTiKa. vartpa.: Analytica Posteriora: On demonstration, or demonstrative or scientific syllogism (air6Sei£is, avoSeiKTiKos ij tTUOTijuovLKos auWoyt.o-p.6s).

5. Totiko: Topica: On dialectical syllogism (SioXe/cTiicos X\o7«rMos), so called from consisting mainly of commonplaces (riiroi, loci), or general sources of argument.

6. 2o#io-TiKo2 eXeYx ' : Sophistici Elenchi: On sophistic (o-o0io-tik6s) or eristic syllogism (ipioTiKos trvWoyurtios), so called from the fallacies used by sophists in refutation (eXeYx°s) of their opponents.

[Numbers 1-6 were afterwards grouped together as the Organon.]

B'. Physical

*1. *L>(TtKT> d/cpdao-ts: Physica Auscultaiio: On Nature as cause of change, and the general principles of natural science.*

2. wept obpavov : De coelo: On astronomy, &c.

3. irepl ytvkaeois Kal

4. MereapoXoyiKa : Meteorologica : On sublunary changes.

5.f irepl Kotrpov: De mundo: On the universe. [Supposed by Zeller to belong to the latter half of the 1st century B.C.]

6. irepl \pvxns- De anima: On soul, conjoined with organic body.

7. irepl aiaBrjaeus Kal aiadifT&v. De sensu et sensili: On sense and objects of sense.

8. irepl p,vr)pris Kal avapvqaeas: De memoria et reminiscentia: On memory and recollection.

9. irtpl Bxvou k

10. irepl ‘evvirvlwv : De insomniis : On dreams.

11. irepl ttjs Ka$’ virvov pavriKijs, or Irepl paVTIKTJS T7JS ev TOtS

virvois: De divinatione per somnum : On prophecy in sleep.

12. Tepl pLaKpofiioTrjTos not (3paxvpi6rijTos: De longitudine et brevitate vitae: On length and shortness of life.

13. irepl peoTrjTos Kal yijpais Kal irepl ˆoitjs Kal Gavarov: De juventute et seneclute et de vita et morte: On youth and age, and on life and death.

14. irtpl avairmijs: De respiratione: On respiration. [Numbers 7-14 are grouped together as Parva naluralia.]

I5.f?rep£ irvebparos: De spiritu: On innate spirit (spiritus vitalis).

16. irepl ra £t£a Itrropiai: Historia animalium: Description of facts about animals, i.e. their organs, &c.

17. irepl fawn iiopiwv. De partibus animalium: Philosophy of the causes of the facts about animals, i.e. their functions.

18. f irepl tyuv Kivqoews: De animalium motione: On the motion of animals. [Ascribed to the school of Theophrastus and Strato by Zeller.]

19. irepl fˆwK iropeias : De animalium incessu : On the going of animals.

20. TrepJ f

2l.f irepl xpup-bToiv : De coloribus: On colours. [Ascribed to the school of Theophrastus and Strato by Zeller.]

22.f irepl aKovoTur: De audibilibus. [Ascribed to the school of Theophrastus and Strato by Zeller.]

23. f &vo-ioyvwpoviKa : Physiognomonica: On physiognomy, and the sympathy of body and soul.

24.| irepl vTtiv : De plantis : On plants. [Not Aristotle’s work on this subject.]

25. t irepl Bavpaaiav aKovapaToiv : De mirabilibus auscultationibus : On phenomena chiefly connected with natural history.

26.f “illrixapiKa: Quaestiones mechanicae: Mechanical questions.

C. Miscellaneous

I.f IIpo/3Xi7Mo.Ta : Problemata: Problems on various subjects [gradually collected by the Peripatetics from partly Aristotelian materials, according to Zeller].

2.f irepl aropLuv ypap.y.&v: De insecabilibus lineis: On indivisible lines. [Ascribed to Theophrastus, or his time, by Zeller.]

3.f avepuv diveis Kal irpoai)yoplai: Ventorum situs et appella- tiones : A fragment on the winds.

4-| irepl 'B.evotpavovs, irepl Zijycavos, irepl Topyiov: De Xenophane y Zenone et Gorgia : On Xenophanes, Zeno and Gorgias.

D. Primary Philosophy or Theology or Wisdom

Ta peri, to 0wnKa: Metaphysica: On being as being and its properties, its causes and principles, and on God as the motive motor of the world.

E. Practical

1. 'H0ikA NiKopaxeia : Ethica Nicomachea: On the good of the individual.

2.f 'HOiKa peyaXa : Magna Moralia: On the same subject. [According to Zeller, an abstract of the Nicomachean and the Eudemian Ethics, tending to follow the latter, but possibly an early draft of the Nicomachean Ethics.]

3.f 'H$iKa TSiSiipLa or irpds J&iiS-qpov : Ethica ad Eudentum : On the same subject. [Usually supposed to be written by Eudemus, but possibly an early draft of the Nicomachean Ethics.]

4.| irepl aperdv Kal Kauav : De virtutibus et vitiis : On virtues and vices. [An eclectic work of the 1st century B.C., half Academic and half Peripatetic, according to Zeller.]

5. IloXiriKd: De re publica: Politics, on the good of the state.

6.f OUovoptKa : De cura rei familiaris : Economics, on the good of the family. [The first book a work of the school of Theophrastus or Eudemus, the second later Peripatetic, according to Zeller.]

F. Art

i. rkx v n 'Tiyropudi: Ars rhetorical On the art of oratory.

2. f 'y-nropiKri irpbs : 'AXefapSpop : Rhetorica ad Alexandrum : On the same subject. [Ascribed to Anaximenes of Lampsacus (fl. 365, Diodorus xv. 76) by Petrus Victorius, and Spengel, but possibly an earlier rhetoric by Aristotle.]

3. ntpl UoiriTiKTjs: De poetica: On the art of poetry [fragmentary].

G. Historical 'k8i\valav ToXirela: De republica Atheniensium : On the Constitution of Athens. [One of the HoKirtiai, said to have been 158 at least, the genuineness of which is attested by the defence which Polybius (xii.) makes of Aristotle's history of the Epizephyrian Locrians against Timaeus, Aristotle's contemporary and critic. Hitherto, only fragments have come down to us (cf. Fragm. 381-603). The present treatise, without however its beginning and end, written on a papyrus discovered in Egypt and now in the British Museum, was first edited by F. G. Kenyon 1890-1891.] (See the article Constitution of Athens.)

The Difficulty. — The genuineness of the Aristotelian works, as Leibnitz truly said {De Stilo Phil. Nizolii, xxx.), is ascertained by the conspicuous harmony of their theories, and by their uniform method of swift subtlety. Nevertheless difficulties lurk beneath their general unity of thought and style. In style they are not quite the same: now they are brief and now diffuse: sometimes they are carelessly written, sometimes so carefully as to avoid hiatus, e.g. the Metaphysics A, and parts of the De Coelo and Parva Naturalia, which in this respect resemble the fragment quoted by Plutarch from the early dialogue Eudemus (Fragm. 44). They aiso appear to contain displacements, interpolations, prefaces such as that to the Meteor ologica, and appendices such as that to the Sophistical Elenchi, which may have been added. An Aristotelian work often goes on continu- ously at first, and then becomes disappointing by suddenly introducing discussions which break the connexion or are even inconsistent with the beginning; as in the Posterior Analytics, which, after developing a theory of demonstration from necessary principles, suddenly makes the admission, which is also the main theory of science in the Metaphysics, that demonstration is about either the necessary or the contingent, from principles either necessary or contingent, only not accidental. At times order is followed by disorder, as in the Politics. Again, there are re- petitions and double versions, e.g. these of the Physics, vii., and those of the De Anima, ii., discovered by Torstrik; or two discussions of the same subject, e.g. of pleasure in the Nico- machean Ethics, vii. and x.; or several treatises on the same subject very like one another, viz. the Nicomachean Ethics, the Eudemian Ethics and the Magna Moralia; or, strangest of all, a consecutive treatise and other discourses amalgamated, e.g. in the Metaphysics, where a systematic theory of being running through several books (B, T, E, Z, H, G) is preceded, interrupted and followed by other discussions of the subject. Further, there are frequently several titles of the same work or of different parts of it. Sometimes diagrams (8iay paal or VTroypatpai) are mentioned, and sometimes given (e.g. in De Interp. 13, 22 a 22; Nicomachean Ethics, ii. 7; Eudemian Ethics, ii. 3), but sometimes only implied (e.g. in Hist. An. i. 17, 497 a 32; iii. 1, 510 a 30; iv. 1, 525 a 9). The different works are more or

less connected by a system of references, which give rise to difficulties, especially when they are cross-references: for example, the Analytics and Topics quote one another: so do the Physics and the Meta- physics; the De Vita and De Respiratione and the De Partibus Animalium; this latter treatise and the De Animalium Incessu; the De Interpretation and the De Anima. A late work may quote an earlier; but how, it may be asked, can the earlier reciprocally quote the later ?

Besides these difficulties in and between the works there are others beyond them. On the one hand, there is the curious story given partly by Strabo (608-609) and partly in Plutarch's Sulla (c. 26), that Aristotle's successor Theophrastus left the books of both to their joint pupil, Neleus of Scepsis, where they were hidden in a cellar, till in Sulla's time they were sold to Apellicon, who made new copies, transferred after Apellicon's death by Sulla to Rome, and there edited and published by Tyrannio and Andronicus. On the other hand, there are the curious and

puzzling catalogues of Aristotelian books, one given by Diogenes Laertius, another by an anonymous commentator (perhaps Hesychius of Miletus) quoted in the notes of Gilles Menage on Diogenes Laertius, and known as " Anonymus Menagii," and a third copied by two Arabian writers from Ptolemy, perhaps King Ptolemy Philadelphus, son of the founder of the library at Alexandria. (See Rose, Fragm. pp. 1-22.) But the extraordinary thing is that, without exactly agreeing among themselves, the catalogues give titles which do not agree well with the Aristotelian works as we have them. A title in some cases suits a given work or a part of it; but in other cases there are no titles for works which exist, or titles for works which do not exist.

These difficulties are complicated by various hypotheses concerning the composition of the Aristotelian works. Zeller supposes that, though Aristotle may have made preparations for his philosophical system beforehand, still the properly didactic treatises composing it almost all belong to the last period of his life, i.e. from 335-334 to 322; and from the references of one work to another Zeller has further suggested a chronological order of composition during this period of twelve years, beginning with the treatises on Logic and Physics, and ending with that on Metaphysics. There is a further hypothesis that the Aristotelian works were not originally treatises, but notes of lectures either for or by his pupils. This easily passes into the further and still more sceptical hypothesis that the works, as we have them, under Aristotle's name, are rather the works of the Peripatetic school, from Aristotle, Theophrastus and Eudemus downwards. " We cannot assert with certainty," says R. Shute in his History of the Aristotelian Writings (p. 1 76), " that we have even got throughout a treatise in the exact words of Aristotle, though we may be pretty clear that we have a fair representation

of his thought. The unity of style observable may belong quite as much to the school and the method as to the individual." This sceptical conclusion, the contrary of that drawn by Leibnitz from the harmony of thought and style pervading the works, shows us that the Homeric question has been followed by the Aristotelian question.

The Solution. — Such hypotheses attend to Aristotle's philo- sophy to the neglect of his life. He was really, as we have seen, a prolific writer from the time when he was a young man under Plato's guidance at Athens; beginning with dialogues in the manner of his master, but afterwards preferring to write didactic works during the prime of his own life between thirty-eight and fifty (347-335-334), and with the further advantage of leisure at Atarneus and Mitylene, in Macedonia and at home in Stagira. When at fifty he returned to Athens, as head of the Peripatetic school, he no doubt wrote much of his extant philosophy during the twelve remaining years of his life (335-322). But he was then a busy teacher, was growing old, and suffered from a disease in the stomach for a considerable time before it proved fatal at the age of sixty-three. It is therefore improbable that he could between fifty and sixty-three have written almost the whole of the many books on many subjects constituting that grand philosophical system which is one of the most wonderful works of man. It is far more probable that he was previously composing them at his leisure and in the vigour of manhood, precisely as his contemporary Demosthenes composed all his great speeches except the De Corona before he was fifty.

Turning to Aristotle's own works, we immediately light upon a surprise: Aristotle began his extant scientific works during Plato's lifetime. By a curious coincidence, in two different works he mentions two different events as contemporary with the time of writing, one in 357 and the other in 356. In the Politics (E 10, 1312 b 10), he mentions as now (vvv) Dion's expedition to Sicily which occurred in 357. In the Meteorologica (iii. 1, 371 a 30), he mentions as now (vvv) the burning of the temple at Ephesus, which occurred in 356. To save his hypo- thesis of late composition, Zeller resorts to the vagueness of the word " now " (vvv). But Aristotle is graphically describing isolated events, and could hardly speak of events of 357 and 356 as happening " now " in or near 335. Moreover, these two works contain further proofs that they were both begun earlier than this

date. The Politics (B 10) mentions as having happened lately (recoo-Ti) the expedition of Phalaecus to Crete, which occurred towards the end of the Sacred War in 346. The Meteorologica (T 7) mentions the comet of

*341. It is true that the Politics also mentions much later events, e.g. the assassination of Philip which took place in 336 (E 10, 1311 b 1-3). Indeed, the whole truth about this great work is that it remained unfinished at Aristotle's death. But what of that ? The logical conclusion is that Aristotle began writing it as early as 357, and continued writing it in 346, in 336, and so on till he died. Similarly, he began the Meteorologica as early as 356 and was still writing it in 341. Both books were commenced some years before Plato's death: both were works of many years: both were destined to form parts of the Aristotelian system of philosophy. It follows that Aristotle, from early manhood, not only wrote dialogues and didactic works, surviving only in fragments, but also began some of the philosophical works which are still parts of his extant writings. He continued these and no doubt began others during the prime of his life. Having thus slowly matured his separate writings, he was the better able to combine them more and more into a system, in his last years. No doubt, however, he went on writing and rewriting well into the last period of his life; for example, the recently discovered 'Adrivaiwv iroXtreia mentions on the one hand (c. 54) the archonship of Cephisophon (329-328), on the other hand (c. 46) triremes and quadriremes but without quinqueremes, which first appeared at Athens in 325-324; and as it mentions nothing later it probably received its final touches between 329 and 324. But it may have been begun long before, and received additions and changes. However early Aristotle began a book, so long as he kept the manuscript, he could always change it. Finally he died without completing some of his works, such as the Politics, and notably that work of his whole philosophic career and foundation of his whole philosophy — the Metaphysics — which, projected in his early criticism of Plato's philosophy of universal forms, gradually developed into his positive philosophy of individual substances, but remained unfinished after all. **

On the whole, then, Aristotle was writing his extant works very gradually for some thirty-five years (357-322), like Herodotus (iv. 30) contemplated additions, continued writing them more or less together, not so much successively as simultaneously, and had not finished writing at his death.

There is a curious characteristic connected with this gradual composition. An Aristotelian treatise frequently has the appear- ance of being a collection of smaller discourses (X6701), as, e.g., K. L. Michelet has remarked.

This is obvious enough in the Metaphysics: it has two open- ings (Books A and a) ; then comes a nearly consecutive theory of being (B, T, E, Z, H, 0), but interrupted by a philosophical lexicon A; afterwards follows a theory of unity (1); then a summary of previous books and of doctrines from the Physics (K) ; next a new beginning about being, and, what is

wanted to com- plete the system, a theory of God in relation to the world (A) ; finally a criticism of mathematical metaphysics (M, N), in which the argument against Plato (A 9) is repeated almost word for word (M 4-5). The Metaphysics is clearly a compilation formed from essays or discourses; and it illustrates another character- istic of Aristotle's gradual method of composition. It refers back to passages "in the first discourses" {tv rots irpcorois \6ym.s) — an expression not uncommon in Aristotelian writings. Some- times the reference is to the beginning of the whole treatise; e.g. Met. B 2,997 b 3 _ 5> referring back to A 6 and 9 about Platonic forms. Sometimes, on the other hand, the reference only goes back to a previous part of a given topic, e.g. Met. 61, 1045 b 27-32, referring back to Z 1, or at the earliest to T 2. On either alternative, however, " the first discourses " mentioned may have originally been a separate discourse; for Book T begins quite fresh with the definition of the science of being, long afterwards called " Metaphysics," and Book Z begins Aristotle's fundamental doctrine of substance.

Another indication of a treatise having arisen out of separate discourses is its consistingof different parts imperfectly connected.

Thus the Niconiachean Ethics begins by identifying the good with happiness {ev5a.ifj.ovLa), and happiness with virtuous action. But when it comes to the moral virtues (Book iii. 6), a new motive of the " honourable " (rod koXoO eveKa) is suddenly introduced without preparation, where one would expect the original motive of happiness. Then at the end of the moral virtues justice is treated at inordinate length, and in a different manner from the others, which are regarded as means between two vices, whereas justice appears as a mean only because it is of the middle between too much and too little. Later, the discussion on friendship (Books viii.-ix.) is again inordinate in length, and it stands alone. Lastly, pleasure, after having been first defined (Book vii.) as an activity, is treated over again (Book x.) as an end beyond activity, with a warning against confusing activity and pleasure. The probability is that the Nicomachean Ethics is a collection of separate discourses worked up into a tolerably systematic treatise; and the interesting point is that these discourses correspond to separate titles in the list of Diogenes Laertius (irepl Ka\ov, irepl dacaiwv, irepl i\las, irepl rjdovrjs, and irepl rjbovuiv). The same list also refers to tentative notes (v-Kop.vqp.aT a einx ei P r lt iaTiK h); an d the commentators speak of ethical notes (i7#ik& into pvrj para). Indeed, they some- times divide Aristotle's works into notes (viropvqparuia) and compilations (cvvray pariKa) . How can it be doubted that in the gradual composition of his works Aristotle began with notes (viropvqpaTa) and discourses (X6701), and proceeded to treatises {■w pay pardai) ? He would even be drawn into this process by his writing materials, which were papyrus rolls of some magni- tude; he would tend to write discourses on

separate rolls, and then fasten them together in a bundle into a treatise.

If then Aristotle was for some thirty-five years gradually and simultaneously composing manuscript discourses into treatises and treatises into a system, he was pursuing a process which solves beforehand the very difficulties which have since been found in his writings. He could very easily write in different styles at different times, now avoiding hiatus and now not, some- times writing diffusely and sometimes briefly, partly polishing and partly leaving in the rough, according to the subject, his own state of health or humour, his age, and the degree to which he had developed a given topic; and all this even in the same manu- script as well as in different manuscripts, so that a difference of style between different parts of a work or between different works, explicable by one being earlier than another, does not prove either to be not genuine. As he might write, so might he think differently in his long career. To put one extreme case, about the soul he could think at first in the Endemus like Plato that it is imprisoned in the body, and long afterwards in the De Anima like himself that it is the immateriate essence of the material bodily organism. Again, he might be inconsistent; now, for example, calling a universal a substance in deference to Plato, and now denying that a universal can be a substance in consequence of his own doctrine that every substance is an individual; and so as to contradict himself in the same treatise, though not in the same breath or at the same moment of thinking. Again, in developing his discourses into larger treatises he might fall into dislocations; although it must be remembered that these are often inventions of critics who do not understand the argument, as when they make out that the treat- ment of reciprocal justice in the Ethics (v. 5-6) needs rearrange- ment through their not noticing that, according to Aristotle, reciprocal justice, being the fairness of a commercial bargain, is not part of absolute or political justice, but is part of analogical or economical justice. Or he might make repetitions, as in the same book, where he twice applies the principle, that so far as the agent does the patient suffers, first to the corrective justice of the law court (Eth. v. 4) in order to prove that in a wrong the injurer gains as much as the injured loses, and immediately afterwards to the reciprocal justice of commerce (ib. 5) in order to prove that in a bargain a house must be exchanged for as many shoes as equal it in value. Or he might himself, without double versions, repeat the same argument with a different shade of meaning; as when in the Nic. Ethics (vii. 4) he first argues that incontinence

about such natural pleasures as that of gain is only modified incontinence,

a sign (as causa cognoscendi) of which is that it is not so bad as incontinence about carnal pleasures, and then argues that, because (as causa essendi) it is only modified incontinence, therefore it is not so bad. Or he might return again and again to the same point with a difference: there is a good instance in his conclusion that the speculative life is the highest happiness; which he first infers because it is the life of man's highest and divine faculty, intelligence (ii76b-ii78a8),then after an interval infers a second time because our speculative life is an imitation of that of God (1 1 78 b 7-3 2) , and finally after another interval infers a third time, because it will make man most dear to God (1179 a 22-32). Or, extending himself as it were still more, he might write two drafts, or double versions of his own, on the same subject; e.g. Physics, vii. and De Anima, ii. Or he might, going still further, in his long literary career write two or more treatises on the same subject, different and even more or less inconsistent with each other, as we shall find in the sequel. Finally, having a great number of discourses and treatises, containing all those small blemishes, around him in his library, and determined to collect, consolidate and connect them into a philosophical system, Ae would naturally be often taking them down from their places to consult and compare one with another, and as naturally enter in them references one to the other, and cross-references between one another. Thus he would enter in the Metaphysics a reference to the Physics, and in the Physics a reference to the Metaphysics, precisely because both were manuscripts in his library. For the same purpose of connexion he would be tempted to add a preface to a book like the Meteor ologica. In order to refer back to the Physics, the De Coelo, and the De Generatione, this work begins by stating that the first causes of all nature and all natural motion, the stars ordered according to celestial motion and the bodily elements with their transmutations, and generation and corrup- tion have all been discussed; and by adding that there remains to complete this investigation, what previous investigators called meteorology. To suppose this preface, presupposing many sciences, to have been written in 356, when the Meteorologica had been already commenced, would be absurd; but equally absurd would it be to reject that date on account of the preface, which even a modern author often writes long after his book. Nor is it at all absurd to suppose that,long after he began the Meteorologica, Aristotle himself added the preface in the process of gathering his general treatises on natural science into a system. So he might afterwards add the preface to the De Interpretation, in order to connect it with the De Anima, though written afterwards, in order to connect his treatises on mind and on its expression. So also he might add the appendix to the Sophistical Elenchi, long after he had written that book, and perhaps, to judge from its being a general claim to have discovered the syllogism, when the founder of logic had more or less realized that he had written a number of connected treatises on reasoning.

The Question of Publication. — There is still another point which would facilitate Aristotle's gradual composition of discourses into treatises and treatises into a system; there was no occasion for him to publish his manuscripts beyond his school. Printing has accustomed us to publication, and misled us into applying to ancient times the modern method of bringing out one book after another at definite dates by the same author. But Greek authors contemplated works rather than books. Some of the greatest authors were not even writers: Homer, Aesop, Thales, Socrates. Some who were writers were driven to publish by the occasion; and after the orders of government, which were occasionally published to be obeyed; occasional poems, such as the poems of Solon, the odes of Pindar and the plays of the dramatists, which all had a political significance, were probably the first writings to be published or, rather, recited and acted, from written copies. With them came philosophical poems, such as those of Xenophanes and Empedocles; the epical history of Herodotus; the dramatic philosophy of Plato. On a larger scale speeches written by orators to be delivered by litigants were published and encouraged publication; and, as the Attic orators were his contemporaries, publication had become pretty common in the

time of Aristotle, who speaks of many bundles (Setr/ms) of judicial speeches by Isocrates being hawked about by the book- sellers {Fragm. 140).

No doubt then Aristotle's library contained published copies of the works of other authors, as well as the autographs of his own. It does not follow that his own works went beyond his library and his school. Publication to the world is designed for readers, who at all times have demanded popular literature rather than serious philosophy such as that of Aristotle. Accordingly it becomes a difficult question, how far Aristotle's works were published in his lifetime. In answering it we must be careful to exclude any evidence which refers to Aristotle as a man, not as a writer, or refers to him as a writer but does not prove publication while he was alive.

Beginning then with his early writings, which are now lost, the dialogues On Poetry and the Eudemus were probably the pub- lished discourses to which Aristotle himself refers {Poetics, 15; De Anima, i. 4); and the dialogue Protrepticus was known to the Cynic Crates, pupil of Diogenes and master of Zeno {Fragm. 50), but not necessarily in Aristotle's lifetime, as Crates was still alive in 307. Again, Aristotle's early rhetorical instructions and perhaps writings, as well as his opinion that a collection of proverbs is not worth while, must have been known outside Aristotle's rhetorical school to the orator Cephisodorus, pupil of Isocrates and master of Demosthenes, for him to be able to write in his Replies to Aristotle {ev reus irpos ' ApioToreXrjv avriypaQais) an admired defence of Isocrates

(Dionys. H. De Isoc. 18). But this early dialectic and rhetoric, being popular, would tend to be published. History comes nearer to philosophy; and Aristotle's Constitutions were known to his enemy Timaeus, who attacked him for disparaging the descent of the Locrians of Italy, according to Polybius (xii.), who defended Aristotle. But as Timaeus brought his history down to 264 B.C. (Polyb. i. 5), and therefore might have got his information after Aristotle's death, we cannot be sure that any of the Constitutions were published in the author's lifetime. We are equally at a loss to prove that Aristotle pub- lished his philosophy. He had, like all the great, many enemies, personal and philosophical; but in his lifetime they attacked the man, not his philosophy. In the Megarian school, first Eubulides quarrelled with him and calumniated him (Diog. Laert. ii. 109) in his lifetime; but the attack was on his life, not on his writings: afterwards Stilpo wrote a dialogue ('Apio-rtAqs), which may have been a criticism of the Aristotelian philosophy from the Megarian point of view; but he outlived Aristotle thirty years. In the absence of any confirmation, " the current philosophe- mata " {to. hyKvic\ia <£tXo

There is therefore no contemporary proof that Aristotle published any part of his mature philosophical system in his life- time. It is true that a book of Andronicus, as reported by Aulus Gellius (xx. 5), contained a correspondence between Alexander and Aristotle in which the pupil complained that his master had published his " acroatic discourses " {tovs aKpoanKovs twp \6ywv). But ancient letters are proverbially forgeries, and in the three hundred years which elapsed between the supposed corre^ spondence and the time of Andronicus there was plenty of time for the forgery of these letters. But even if the correspondence is genuine, " acroatic discourses " must be taken to mean what Alexander would mean by them in the time of Aristotle, and not what they had come to mean by the time of Andronicus. Alexander meant those discourses which Aristotle, when he was his tutor, intended for the ears of himself and his fellow-pupils; such as the early political works on Monarchy and on Colonies, and the early rhetorical works, the Theodectea, the Collection oj

Arts, and possibly the Rhetoric to Alexander, in the preface to which the writer actually says to Alexander : " You wrote to me that nobody else should receive this book." These few early works may have been published, and contrary to the wishes of Alexander, without affecting Aristotle's later system. But even so, Alexander's complaint would not justify writers three centuries later in taking Alexander to have referred to mature scientific writings, which were not addressed, and not much known, to him, the

conqueror of Asia; although by the times of Andronicus and Aulus Gellius, Aristotle's scientific writings were all called acroatic, or acroamatic, or sometimes esoteric, in distinction from exoteric— a distinction altogether unknown to Aristotle, and therefore to Alexander. In the absence of any contemporary evidence, we cannot believe that Aristotle in his lifetime published any, much less all, of his scientific books. The conclusion then is that Aristotle on the one hand to some extent published his early dialectical and rhetorical writings, because they were popular, though now they are lost, but on the other hand did not publish any of the extant historical and philosophical works which belong to his mature system, because they were best adapted to his philosophical pupils in the Peripatetic school. The object of the philosopher was not the applause of the public but the truth of things. Now this conclusion has an important bearing on the composition of Aristotle's writings and on the difficulties which have been found in them. If he had like a modern author brought out each of his extant philosophical works on a definite day of publication, he would not have been able to change them without a second edition, which in the case of serious writings so little in demand would not be worth while. But as he did not publish them, but kept the unpublished manu- scripts together in his library and used them in his school, he was able to do with them as he pleased down to the very end of his life, and so gradually to consolidate his many works into one system.

While Aristotle did not publish his philosophical works to the world, he freely communicated them to the Peripatetic school. They are not mere lectures ; but he used them for lectures: he allowed his pupils to read them in his library, and probably to take copies from them. He also used diagrams, which are sometimes incorporated in his works, but sometimes are only mentioned, and were no doubt used for purposes of teaching. He also availed himself of his pupils' co-operation, as we may judge from his description in the Ethics (x. 7) of the speculative philosopher who, though he is self-sufficing, is better having co-operators ((rvvtpyovs txoiv). From an early time he had a tendency to address his writings to his friends. For example, he addressed the Theodectea to his pupil Theodectes; and even in ancient times a doubt arose whether it was a work of the master or the pupil. It was certainly by Aristotle, because it contained the triple grammatical division of words into noun, verb and conjunction, which the history of grammar recognized as his discovery. But we may explain the share of Theodectes by supposing that he had a hand in the work (cf. Dionys. H. De Comp. Verb. 2; Quintilian i. 4. 18). Similarly in astronomy, Aristotle used the assistance of Eudoxus and Callippus. Indeed, throughout his writings he shows a constant wish to avail himself of what is true in the opinions of others, whether they are philosophers, or poets or ordinary people expressing their thoughts in sayings and proverbs. AVith one of his

pupils in particular, Theophrastus, who was born about 370 and therefore was some fifteen years younger than himself, he had a long and intimate connexion; and the work of the pupil bears so close a resemblance to that of his master, that, even when he questions Aristotle's opinions (as he often does) , he seems to be writing in an Aristotelian atmosphere; while he shows the same acuteness in raising difficulties, and has caught something of the same encyclo- paedic genius. Another pupil, Eudemus of Rhodes, wrote and thought so like his master as to induce Simplicius to call him the most genuine of Aristotle's companions (6 yvriaiwraTOS r&v 'AptoToreXow tTtdpwv) . It is probable that this extraordinary resemblance is due to the pupils having actually assisted their master; and this supposition enables Us to surmount a diffi-

culty we feel in reading Aristotle's works. How otherwise, we wonder, could one man writing alone and with so few predecessors compose the first systematic treatises on the psychology of the mental powers and on the logic of reasoning, the first natural history of animals, and the first civil history of one hundred and fifty-eight constitutions, in addition to authoritative treatises on metaphysics, biology, ethics, politics, rhetoric and poetry; in all penetrating to the very essence of the subject, and, what is most wonderful, describing more facts than any other man has ever done on so many subjects ?

The Uncompleted Works.— Such then was the method of composition by which Aristotle began in early manhood to write his philosophical works, continued them gradually and simultaneously, combined shorter discourses into longer treatises, compared and connected them, kept them together in his library without publishing them, communicated them to his school, used the co-operation of his best pupils, and finally succeeded in combining many mature writings into one harmonious system. Nevertheless, being a man, he did not quite succeed. He left some unfinished; such as the Categories, in which the main part on categories is not finished, while the last part, afterwards called postpredicaments, is probably not his, the Politics and the Poetics. He left others imperfectly arranged, and some of the most important, the Metaphysics, the Politics and the logical writings. Of the imperfect arrangement of the Metaphysics we have already spoken; and we shall speak of that of his logical writings when we come to the order of his whole system. At present the Politics will supply us with a conspicuous example of the imperfect arrangement of some, as well as of the gradual composition of all, of Aristotle's extant writings.

The Politics was begun as early as 357, yet not finished in 322. It betrays its origin from separate discourses. First comes a general theory of constitutions, right and wrong (Books A,B,r); and this part is afterwards referred to as " the first discourses " h rdls irp&Tois X67ots). Then follows

the treatment of oli- garchy, democracy, commonwealth and tyranny, and of the various powers of government (A), and independent investiga- tion of revolution, and of the means of preserving states (E), and a further treatment of democracy and oligarchy, and of the different offices of the state (Z), and finally a return to the dis- cussion of the right form of constitution (H, 9). But A and Z are a group interrupted by E, and H and 9 are another group unconnected with the previous group and with E, and are also distinguished in style by avoiding hiatus. Further, the group (A, Z) and the group (H, 9) are both unfinished. Finally the group (A, Z), the book (E) and the group (H, 9), though unconnected with one another, are all connected though im- perfectly with " the first discourses " (A,B,r). This complicated arrangement may be represented in the following diagram: —

a, b, r,

A, Z

E

H, 9

The simplest explanation is that Aristotle began by writing separate discourses, four at least, on political subjects; that he continued to write them and perhaps tried to combine them: but that in the end he failed and left the Politics unfinished and in disorder. But modern commentators, possessed by the fallacy that Aristotle like a modern author must from the first have comtemplated a whole treatise in a regular order for definite publication, lose themselves in vain disputes as to whether to go by the traditional order of books indicated by their letters and known to have existed as early as the abstract (given in Stobaeus, Eel. ii. 7) ascribed to Didymus (1st century a.d.), or to put the group H, 9, as more connected with A, B, V, before the group A, Z, and this group before the book E. It is agreed, says Zeller, that the traditional order contradicts the original plan. But what right have we to say that Aristotle had an original plan?*

The incomplete state in which Aristotle left the Metaphysics, the Politics and his logical works, brings us to the hard question how much he did, and how much his Peripatetic followers did

to his writings after his death. To answer it we should have to go far beyond Aristotle. But two corollaries follow from our present investigation of his extant writings; the first, that it was the long continuance of the

Peripatetic school which gradually caused the publication, and in some cases the forgery, of the separate writings; and the second, that his Peripatetic successors arranged and edited some of Aristotle's writings, and gradually arrived by the time of Andronicus, the eleventh from Aristotle, at an order of the whole body of writings forming the system. Now, it is probable that the arrangement of the works which we are considering was done by the Peripatetic successors of Aristotle. There is nothing indeed in the Metaphysics to show whether he left it in isolated treatises or in its present disorder; and nothing in the Politics. On the other hand, in the case of Jogic, it is certain that he did not combine his works on the subject into one whole, but that the Peripatetics afterwards put them together as organic, and made them the parts of logic as an organon, as they are treated by An,dronicus. Perhaps something similar occurred to the Metaphysics, as Alexander imputed its redaction to Eudemus, and the majority of ancient commentators attributed its second opening (Book a) to Pasicles, nephew of Eudemus. Again, it is not unlikely that the Politics was arranged in the traditional order of books by Theophrastus, and that this is the meaning of the curious title occurring in the list of Aristotle's works as given by Diogenes Laertius, ttoXitiktjs &Kpo&paarov a'ji'y'S'e's'^'ri', which agrees with the Politics in having eight books. Although, however, we may concede that such great works as the Metaphysics, the Politics and the logical writings did not receive their present form from Aristotle himself, that concession does not deprive Aristotle of the author- ship, but only of the arrangement of those works. On the contrary, Theophrastus and Eudemus, his immediate followers, both wrote works presupposing Aristotle's Metaphysics and his logical works, and Dicaearchus, their contemporary, used his Politics for his own Tripoliticus. It was Aristotle himself then who wrote these works, whether he arranged them or not; and if he wrote the incomplete works, then a fortiori he wrote the completed works except those which are proved spurious, and practically consummated the Aristotelian system, which, as Leibnitz said, by its unity of thought and style evinces its own genuineness and individuality. We must not exaggerate the school and underrate the individual, especially such an individual. What he mainly wanted was the time, the leisure and the labour, which we have supposed to have been given to the gradual composition of the extant Aristotelian writings. Aristotle, asked where dwell the Muses, answered, " In the souls of those who love work."

IV. Earlier and Later Writings

Aristotle's quotations of his other books and of historical facts only inform us at best of the dates of isolated passages, and cannot decide the dates and sequences of whole philosophical books which occupied him for many years. Is there then any way of discriminating between early and late works ? There is the evidence of the influences under which the books were

written. This evidence applies to the whole Aristotelian literature includ- ing the fragments. As to the fragments, we are safe in saying that the early dialogues in the manner of Plato were written under the influence of Plato, and that the subsequent didactic writings connected with Alexander were written more under the influence of Philip and Alexander. Turning to the extant writings, we find that some are more under the influence of Plato, while others are more original and Aristotelian. Also some writings are more rudimentary than others on the same subject; and some have the appearance of being first drafts of others. By these differences we can do something to distinguish between earlier and later philosophical works; and also vindicate as genuine some works , which have been considered spurious because they do not agree in style or in matter with his most mature philosophy. In thirty-five years of literary composition, Aristotle had plenty of time to change, because any man can differ from himself at different times.

On these principles, we regard as early genuine philosophical works of Aristotle, (i) the Categories; (2) the De Inter pretatione; (3) the Eudemian Ethics and Magna Moralia; (4) the Rhetoric to Alexander,

1. The Categories (Karrffopiai). — This short discourse turns on Aristotle's fundamental doctrine of individual substances, with- out which there is nothing. He arrives at it from a classification of categories, by which he here means " things stated in no combination " (ra Kara fji.ri5tp.Lav ovpnfhoKriv \ey6fitva.) or what we should call " names," capable of becoming predicates (KaTrjyopovneva, Karriyopiai,). " Every name," says he (chap. 4), " signifies either substance or something quantitative, or quali- tative, or relative, or somewhere, or sometimes, or that it is in a position, or in a condition, or active or passive." He immediately adds that, by the combination of these names with one another, affirmation or negation arises. The categories then are names signifying things capable of becoming predicates in a proposition. Next he proceeds to substances (omlai), which he divides into primary (xpeorat) and secondary (Sevrepcu). " Substance," says he (chap. 5), " which is properly, primarily and especially so called, is that which is neither a predicate of a subject nor inherent in a subject; for example, a particular man, or a particular horse. Secondary substances so called are the species in which are the primarily called substances, and the genera of these species: for example, a particular man is in a species, man, the genus of which is animal: these then are called secondary substances, man and animal." Having made these subdivisions of substance, he thereupon reduces secondary substances and all the rest of the categories to belongings of individual or primary substances. " All other things," says he, " are either predicates of primary substances as subjects " (k.o.6′ inroKapivoiv t&v irparrwp owi&v) " or inherent in them as subjects " {kv vroKHnkvcus avrais). He explains that

species and genus are predicates of, and that other categories (e.g. the quality of colour) are inherent in, some individual substance such as a particular man. Then follows his conclusion : " without primary substances it is impossible for anything to be " (ju.17 ovcrSiv ovv t&v wpwroiv ovcruhv adbvarov to>v ixWuv n elvai. Cat. s, 2 b 5-6).

Things are individual substances, without which there is nothing — this is the fundamental point of Aristotelianism, as against Platonism, of which the fundamental point is that things are universal forms without which there becomes nothing. The world, according to Aristotle, consists of substances, each of which is a separate individual, this man, this horse, this animal, this plant, this earth, this water, this air, this fire; in the heavens that moon, that sun, those stars; above all, God. On the other hand, a universal species or genus of substances is a predicate which, as well as everything else in all the other cate- gories, always belongs to some individual substance or other as subject, and has no separate being. In full, then, a substance is a separate individual, having universals, and things in all other categories, inseparably belonging to it. The individual substance Socrates, for example, is a man and an animal (omla), tall, (irocov), white (ttolov), a husband (irpos ti), in the market (iroO), yesterday (ivore), sitting (KtiadaC), armed (execv), talking (iroieiv), listening (7rd<7xeti'). Aristotelianism is this philosophy of substantial things.

The doctrine that all things are substances which are separate individuals, stated in the Categories, is expanded in the Metaphysics. Both works arrive at it from the classification of categories, which is the same in both ; except that in the former the categories are treated rather as a logical classification of names signifying things, in the latter rather as a metaphysical classification of things. In neither, however, are they a grammatical classification of words by their structure ; and in neither are they a psychological classification of notions or general conceptions (vornj-ara) , such as they after- wards became in Kant's Critique and the post-Kantian idealism. Moreover, even in the Categories as names signifying distinct things they imply distinct things; and hence the Categories, as well as the Metaphysics, draws the metaphysical conclusion that individual substances are the things without which there is nothing else, and thereby lays the positive foundation of the philosophy running through all the extant Aristotelian writings.

Again, according to both works, an individual substance is a

subject, a universal its predicate; and they have in common the Aristotelian metaphysics, which differs greatly from the modern logic of subject and predicate. Subject {inronelnti>ov) originally meant a real thing which is the basis of something, and was used by Aristotle both for a thing to which something belongs and for a name of which another is asserted: accordingly " predicate " (KtkT7\yopoi>ntvov) came with him to mean something really belonging (mapx° v) to a substance as real subject, as well as a name capable of being asserted of a name as a nominal subject. In other words, to him subject meant real as well as nominal subject, and predicate meant real as well as nominal predicate; whereas modern logic has gradually reduced both to the nominal terms of a proposition. Accordingly, when he said that a substance is a subject, he meant a real subject; and when he said that a universal species or genus is a predicate, he meant that it is a real predicate belonging to a real subject, which is always some individual substance of the kind. It follows that Aristotelianism in the Categories and in the Metaphysics is a realism both of individuals and of universals; of individual substances as real subjects, and of universals as real predicates.

Lastly, the two works agree in reducing the Categories to substance and its belongings (for a.pxovra) . According u> both, it is always some substance, such as Socrates, which is quantitative, qualitative, relative, somewhere, some time, placed, conditioned, active, passive; so that all things in all other categories are attributes which are belongings of substances. There are therefore two kinds of belonging's, universals and attributes; and in both cases belonging in the sense of having no being but the being of the substance.

In brief then the common ground of the Categories and the Meta- physics is the fundamental position that all things are substances having belonging to them universals and attributes, which have no separate being as Plato falsely supposed.

This essential agreement suffices to show that the Categories and the Metaphysics are the result of one mind. Nevertheless, there is a deep difference between them in detail, which may be expressed by saying that the Categories is nearer to Platonism. We have seen how anxious Aristotle was to be considered one of the Platonists, how reluctant he was to depart from Plato's hypothesis of forms, and how, in denying the separability, he retained the Platonic belief in the reality and even in the unity of the universal. We have now to see that, in writing the Categories, on the one hand he carried his differ- ences from his master further than he had done in his early criticisms by insisting that individual substances are not only real, but are the very things which sustain the universal; but on the other hand, he clung to further relics of the Platonic theory, and it is those which

differentiate the Categories and the Metaphysics.

In the first place, in the Categories the belonging of things in other categories to individual substances in the first category is not so well developed. A distinction (chap. 2) is drawn between things which are predicates of a subject («o8′ virondp.tvov) and things which inhere in a subject {iv Won.ti.ij.tvi> >) ; and, while universals are called predicates of a subject, things in a subordinate category, i.e. attri- butes such as colour (xpdiia) in the qualitative, are said to inhere in a subject. It is true that the work gives only a negative definition of the inherent, namely, that it does not inhere as a part and cannot exist apart from that in which it inheres (1 a 24-25), and it admits that what is inheren t may sometimes also be a predicate (chap. 5,2 a 27-34) • The commentators explain this to mean that an attribute as indi- vidual is inherent, as universal is a predicate. But even so the Categories concludes that everything is either a predicate of, or inherent in, a substance; and the view that this colour belongs to this substance only in the sense of being in it, not of it, leaves the impression that, like a Platonic form, it is an entity rather in than of an individual substance, though even in the Categories Aristotle is careful to deny its separability. The hypothesis of inherence gives an inadequate account of the dependence of an attribute on a sub- stance, and is a kind of half-way house between separation and predication.

On the other hand, in the Metaphysics, the distinction between inherence and predication disappears; and what is mere, the relation of an attribute to a substance is regarded as so close that an attribute is merely the substance modified. ” The thing itself and the thing affected,” says Aristotle, ” are in a way the same; e.g. Socrates and Socrates musical ” {Met. A 29, 1024 b 30-31). Consequently, all attributes, as well as universals, belong as predicates of individual substances as subjects, according to the Metaphysics, and also accord- ing to the most authoritative works of Aristotle, such as the Posterior Analytics, where (cf. i. 4, 22) an attribute (

the reality of individual substances, the Categories (chap. 5) admits that universal species and genera can be called substances, whereas the Metaphysics (Z 13) denies that a universal can be a substance at all.

It is evident that in the category of substance, as Aristotle per- ceived, substance is predicate of substance, e.g. Socrates {oiiaia) is a man {oiiaia), and an animal {oiala). The question then arises, what sort of substance can be predicate; and in the Categories Aristotle gave an answer, which would have been impossible, if he had not, under Plato’s influence, accepted both the unity and the substantiality of the universal. What he said in consequence was that the substance in the predicate is not an

individual substance, e.g. this man or this animal, because such a primary substance is not a predicate; but that the species man or the genus animal is the substance which is the predicate of Socrates the subject {Cat. 5, 3 a 36 seq.). Finding then that substances are real predicates, and supposing that in that case they must be species or genera, he could not avoid the conclusion that some substances are species or genera, which were therefore called by him " secondary substances," and by his Latin followers substantiae univer sales. It is true that this con- clusion gave him some misgivings, because he recognized that it is a characteristic of a substance to signify an individual {rb&t n), which a species or a genus does not signify {ib. 5, 3 b 10-21). Never- theless, in the Categories, he did not venture to deny that in the category of substance a universal species {e.g. man), or genus {e.g. animal), is itself a substance. On the other hand, in the Metaphysics (Z 13), he distinctly denies that any universal can be a substance, on the ground that a substance is a subject, whereas a universal is a predicate and a belonging of a subject, from which it follows as he says that no universal is a substance, and no substance universal. Here again the Categories forms a kind of transition from Platonism to the Metaphysics which is the reverse: to call universals " secondary substances " is half way between Plato's calling them the only substances and Aristotle's denial in the Metaphysics that they are substances at all.

What conclusion are we to draw from these differences between the Categories and the Metaphysics ? The only logical conclusion is that the Categories, being nearer to Plato on the nature of attributes, and still nearer on the relation of universals to substances, is earlier than the Metaphysics. There are difficulties no doubt in drawing this conclusion; because the Metaphysics, though it denies that uni- versals can be substances, and does not allow species and genera to be called " secondary substances," nevertheless falls itself into calling a universal essence {to rl fjv elvai) a substance — and that too in the very book where it is proved that no universal can be a sub- stance. But this lapse only shows how powerful a dominion Plato exercised over Aristotle's soul to the last; for it arises out of the pupil still accepting from his master the unity of the universal though now applying it, not to classes, but to essences. The argument about essences in the Metaphysics is as follows : — Since a separate individual, e.g. Socrates, is a substance, and he is essentially a rational animal, then his essence, being what he is, is a substance; for we cannot affirm that Socrates is a substance and then deny that this rational animal is a substance {Met. Z 3). Now, according to the unity of a universal asserted by Plato and accepted by Aristotle, the universal essence of species, being one and the same for all individuals of the kind, is the same as the essence of each individual: e.g. the rational animal in the human species and in Socrates is one and the same; "for the essence is

indivisible" {aro/xov yap to e'Sos, Met. Z 8, 1034 a 8)- It follows that we must call this selfsame essence, at once individual and universal, substance — a conclusion, however, which Aristotle never drew in so many words, though he continued always to call essence substance, and definition a knowledge of substance.

There is therefore a history of Aristotle's metaphysical views, corresponding to his gradual method of composition. It is as follows : —

(i) Negative rejection of Plato's hypothesis of forms and formal numbers, and reduction of forms to the common in the early dialogue irtpl #iXov.

(2) Positive assertion of the doctrine that things are individual substances in the Categories, but with the admission that attributes sometimes inhere in substance without being predicates of it, and that universal species and genera are " secondary substances."

(3) Expansion of the doctrine that things are individual substances in the Metaphysics, coupled with the reduction of all attributes to predicates, and the direct denial of universal substances; but never- theless calling the universal essence of a species of substances substance, because the individual essence of an individual substance really is that substance, and the universal essence of the whole species is supposed to be indivisible and therefore identical with the in- dividual essence of any individual of the species.

2. The De Inter pretatione. — Another example of Aristotle's gradual desertion of Plato is exhibited by the De Inter pretatione as compared with the Prior Analytics, and it shows another gradual history in Aristotle's philosophy, namely, the develop- ment of subject, predicate and copula, in his logic.

The short discourse on the expression of thought by language {irepl 'Epjmjvetas, De Inter pretatione) is based on the Platonic

division of the sentence (\A70s) into noun and verb (bvoixa and prj/xa). Its point is to separate the enunciative sentence, or that in which there is truth or falsity, from other sentences; and then, dismissing the rest to rhetoric or poetry (where we should say grammar) , to discuss the enunciative sentence(d-7ro<ˆai'TtK6s \6yos), or enunciation (avoˆa-wis) , or what we should call the proposi- tion (De Int. chap. 4). Here Aristotle, starting from the previous grammar of sentences in general, proceeded, for

the first time in philosophical literature, to disengage the logic of the proposition, or that sentence which can alone be true or false, whereby it alorie enters into reasoning. But in spite of this great logical achieve- ment, he continued throughout the discourse to accept Plato's grammatical analysis of all sentences into noun and verb, which indeed applies to the proposition as a sentence but does not give its particular elements. The first part of the work confines itself strictly to noun and verb, or the form of proposition called secundi adjacentis. Afterwards (chap. 10) proceeding to the opposition of propositions, he adds the form called lertii adjacentis, in a passage which is the first appearance, or rather adumbration, of the verb of being as a copula. In the form secundi adjacentis we only get oppositions, such as the following: —

man is — man is not

not-man is— not-man is not

In the form lertii adjacentis the oppositions, becoming more complex, are doubled, as follows: —

man is just — man is not just

man is non-just — man is not non-just

not-man is just — not-man is not just

not-man is non-j ust— not-man is not non-just.

The words introducing this form (orav 51 to ecm rplrov ■KpocKarriyoprJTa.1, chap. 10, 19 b 19), which are the origin of the phrase lertii adjacentis, disengage the verb of being (&rn) partially but not entirely, because they still treat it as an extra part of the predicate, and not as a distinct copula. Nor does the work get further than the analysis of some propositions into noun and verb with " is " added to the predicated verb; an analysis, however, which was a great logical discovery and led Aristotle further to the remark that "is" does not mean "exists"; e.g. "Homer is a poet " does not mean " Homer exists " (De Int. chap. n).

How then did Aristotle get further in the logical analysis of the proposition? Not in the De Interpretation, but in the Prior Analytics. The first adumbration was forced upon him in the former work by his theory of opposition; the complete appear- ance in the latter work by his theory of syllogism. In analysing the syllogism, he first says that a premiss is an affirmative or negative sentence, and then that a term is that into which a premiss is dissolved, i.e. predicate and subject, combined or divided by being and not being (Pr. An.i. 1). Here, for the first time in logical

literature, subject and predicate suddenly appear as terms, or extremes, with the verb of being (to etvai) or not being (to ˆ17 etv(u) completely disengaged from both, but con- necting them as a copula. Why here? Because the crossing of terms in a syllogism requires it. In the syllogism " Every man is mortal and Socrates is a man," if in the minor premiss the copula " is " were not disengaged from the predicate " man," there would not be one middle term " man " in the two premisses. It is not necessary in every proposition, but it is necessary in the arrangement of a syllogism, to extricate the terms of its proposi- tions from the copula; e.g. mortal — man — Socrates.

This important difference between the De Interpretation and the Prior A nalytics can only be explained by supposing that the former is the earlier treatise. It is nearer to Plato's analysis of the sentence, and no logician would have gone back to it, after the Prior Analytics. It is not spurious, as some have supposed, nor later than the De Anima, as Zeller thought, but Aristotle in an earlier frame of mind.

Moreover we can make a history of Aristotle's thought and gradual composition thus:

(1) Earlier acceptance in the De Interpretation of Plato's grammatical analysis of the sentence into noun and verb (secundi adjacentis) but gradually disengaging the proposition, and after-

wards introducing the verb of being as a third thing added (tertium adjacens) to the predicated verb, for the purpose of opposition.

(2) Later logical analysis in the Prior Analytics of the proposi- tion as premiss into subject, predicate and copula, for the purpose of syllogism; but without insisting that the original form is illogical.

3. The Eudemian Ethics and Magna M or alia in relation to the Nicomachean Ethics.— Under the name of Aristotle, three treatises on the good of man have come down to us, 'Hduca NtKo/ˆdxew (irpos NiKojuaxcw, Porphyry), 'IWiko. Ei>5ijjiuci (irpos 'Evdrj/Mv, Porphyry), and 'H0i/c& /xe'ya.'Ka; so like one another that there seems no tenable hypothesis except that they are the manuscript writings of one man. Nevertheless, the most usual hypothesis is that, while the Nicomachean Ethics (E.N.) was written by Aristotle to Nicomachus, the Eudemian (E.E.) was written, not to, but by, Eudemus, and the Magna Moralia (M.M.) was written by some early disciple before the introduction of Stoic and Academic elements into the Peripatetic school. The question is further complicated by the fact that three Nico- machean books (E.N. v.-vii.) and three Eudemian (E. E. A-Z) are common to the two treatises, and by the

consequent question whether, on the hypothesis of different authorship, the common books, as we may style them, were written for the Nicomachean by Aristotle, or for the Eudemian Ethics by Eudemus, or some by one and some by the other author. Against the " Chorizontes," who have advanced various hypotheses on all these points with- out convincing one another, it may be objected that they have not considered Aristotle's method of gradual and simultaneous composition of manuscripts within the Peripatetic school. We have to remember the traces of his separate discourses, and his own double versions; and that, as in ancient times Simplicius, who had two versions of the Physics, Book vii., suggested that both were early versions of Book viii. on the same subject, so in modern times Torstrik, having discovered that there were two versions of the De Anima, Book ii., suggested that both were by Aristotle. Above all, we must consider our present point that Platonic influence is a sign of earliness in an Aristotelian work; and generally, the same man may both think and write differently at different times, especially if, like Aristotle, he has been a prolific author.

These considerations make it probable that the author of all three treatises was Aristotle himself; while the analysis of the treatises favours the hypothesis that he wrote the Eudemian Ethics and the Magna Moralia more or less together as the rudimentary first drafts of the mature Nicomachean Ethics.

As the Platonic philosophy was primarily moral, and its meta- physics a theory of the moral order of the universe, Aristotle from the first must have mastered the Platonic ethics. At first he adopted the somewhat ascetic views of his master about soul and body, and about goods of body and estate; but before Plato's death he had rejected the hypothesis of forms, formal numbers and the form of the good identified with the one, by which Plato tried to explain moral phenomena; while his studies and teach- ing on rhetoric and poetry soon began to make him take a more tolerant view than Plato did of men's passions. Throughout his whole subsequent life, however, he retained the fundamental doctrine, which he had learnt from Plato, and Plato from Socrates, that virtue is essential to happiness. Twice over this tenet, which makes Socrates, Plato and Aristotle one ethical school, inspired Aristotle to attempt poetry: first, in the Elegy to Eudemus of Cyprus, in which, referring to either Socrates or Plato, he praises the man who first showed clearly that a good and happy man are the same (Fragm. 673); and secondly, in the Hymn in memory of Hermias, beginning " Virtue, difficult to the human race, noblest pursuit in life " (ib. 675). Moreover, the successors of Plato in the Academy, Speusippus and Xenocrates, showed the same belief in the essentiality of virtue. The question which divided them was what the good is. Speusippus took the ascetic view that the good is a perfect condition of neutrality between two

contrary evils, pain and pleasure. Xenocrates took the tolerant view that it is the possession of appropriate

virtue and noble actions, requiring as conditions bodily and external goods. Aristotle was opposed to Speusippus, and nearly agreed with Xenocrates. According to him, the good is activity of soul in accordance with virtue in a mature life, requiring as conditions bodily and external goods of fortune; and virtue is a mean state of the passions. It is probable that when, after Plato's death and the accession of Speusippus in 347, Aristotle with Xenocrates left Athens to visit his former pupil Hermias, the three discussed this moderate system of Ethics in which the two philosophers nearly agreed. At any rate, it was adopted in each of the three moral treatises which pass under the name of Aristotle.

*The three treatises are in very close agreement throughout, and in the following details. The good of Ethics is human good; and human good is happiness, not the universal good or form of the good to which Plato subordinated human happiness. Happiness is activity of soul according to virtue in a mature life : it requires other goods only as conditions. The soul is partly irrational, partly rational; and therefore there are two kinds of virtue. Moral virtue, which is that of the irrational desires so far as they are obedient to reason, is a purposive habit in the mean. The motive of the moral virtues is the honourable (to koKov, honestum). As the rational is either deliberative or scientific, either practical or speculative intellect, there are two virtues of the intellect — prudence of the deliberative or practical, and wisdom of the scientific or speculative, intellect. The right reason by which moral virtue is determined is prudence, which is determined in its turn by wisdom. Pleasure is a psychical state, and is not a generation in the body supplying a defect and establishing a natural condition, but an activity of a natural condition of the soul. It should be specially noted that this doctrine like the rest is common to the three treatises: in Book vii. of the Nicomachean, which is Z of the Eudemian, pleasure is defined as ivkpytia -njs Kara boiv c£eo>s a.vepnrob'KTTOs (chap. 12, 1153 a I 4″ I 5) » and in the Magna Moralia as 1) nivqais avrov Kai 17 evkpyua. (ii. 7, 1204 b 28; cf. 1205 b 20-28). It is plain from the context that in the former definition " the natural condition " (r/ /caret b *£«) refers to the soul which, while the body is regenerated, remains unimpaired (cf. 1152 b 35 seq., 1 154 b 15 seq.) ; and in the latter definition the thing (avrov), whose " motion, that is activity " is spoken of, is the part of the soul with which we feel pleased.*

Down then to their common definition of pleasure as activity the three treatises present a harmonious system of morals, consistently with one another, and with the general philosophy of Aristotle. In particular, the theory that pleasure is activity (ivipyeia) is the theory of two of his most authoritative works. In the De Anima (iii. 7, 431 a 10-12), being pleased and pained are defined by him as acting to (hvepyeiv) by a sensitive mean" in relation to good or evil as such. In the Metaphysics (A 7, 1072 b 16), in discussing the occu- pation of God, he says " his pleasure is activity," or " his activity is pleasure," according to a difference of readings which makes no difference to the identification of pleasure and activity (evipyaa). As then we find this identification of pleasure with activity in the Metaphysics and in the De Anima, as well as in the Nicomachean Ethics, the Eudemian Ethics and the Magna Moralia, the only logical conclusion, from which there is no escape, is that, so far as the treat- ment of pleasure goes, any Aristotelian treatise which defines it as activity is genuine. There is no reason for doubting that the Nico- machean Ethics to the end of Book vii., the Eudemian Ethics to the end of Book Z, and the Magna Moralia as far as Book ii. chap. 7, were all three written by Aristotle.

Why then doubt at all ? It is because the Nicomachean Ethics contains a second discourse on pleasure (x. 1-5), in which the author, while agreeing with the previous treatment of the subject that pleasure is not a bodily generation, even when accompanied by it, but something psychical, nevertheless defines it (x. 4, 1174 b 31-33) not as an activity, but as a supervening end (kin.yˆyvbp.tvbv ti reXos) perfecting an activity (reXeiot tt \v ivipytiav). He allows indeed that activity and pleasure are very closely related; that a pleasure of sense or thought perfects an act of sensation or of think- ing, depends on it, and is so inseparably conjoined with it as to raise a doubt whether pleasure is end of life or life end of pleasure, and even whether the activity is the same as the pleasure. But he disposes of this doubt in a very emphatic and significant manner. " Pleasure," says he, " does not seem to be thinking or perceiving ; for it is absurd : but on account of not being separated from them, it appears to some persons to be the same." Now it is not likely that Aristotle either, after having so often identified pleasure with activity, would say that the identification is absurd though it appears true to some persons, of whom he would in that case be one, or, having once disengaged the pleasure of perceiving and thinking from the acts of perceiving and thinking, would go backwards and confuse them. It is more likely that Aristotle identified pleasure with activity in the De Anima, the Metaphysics and the three moral treatises, as we have seen; but that afterwards some subsequent Peripatetic, considering that the pleasure of perceiving or thinking is not the same as perceiving or thinking, declared the previous identification of pleasure with activity absurd. At any rate, if we are to choose, it is the identification that,

is Aristotle's, and the distinction not Aristotle's. Moreover, the distinction between activity and pleasure in the tenth book is really fatal to the consistency of the whole Nicomachean Ethics, which started in the first book with the identification of happiness and virtuous activity. For if the pleasure of virtuous activity is a super- vening end beyond the activity, it becomes a supervening end beyond the happiness of virtuous activity, which thus ceases to be the final end. Nevertheless, the distinction between activity and pleasure is true. Some unknown Peripatetic detected a flaw in the Nico- machean Ethics when he said that pleasure is a supervening end beyond activity, and, if he had gone on to add that happiness is also a supervening end beyond the virtuous activities which are necessary to produce it, he would have destroyed the foundation of his own founder's Ethics.

It is further remarkable that the Nicomachean Ethics proceeds to a different conclusion. After the intrusion of this second discourse on pleasure, it goes on (E.N. x. 6-fin.) to the famous theory that the highest happiness is the speculative life of intellect or wisdom as divine, but that happiness as human also includes the practical life of combining prudence and moral virtue ; and that, while both lives need external goods as necessaries, the practical life also requires them as instruments of moral action. The treatise concludes with the means of making men virtuous ; contending that virtue requires habituation, habituation law, law legislative art, and legislative art politics: Ethics thus passes into Politics. The Eudemian Ethics proceeds to its conclusion (E.E. H 13-15) differently, with the consideration of (1) good fortune (tbrvxia), and (2) gentlemanliness (KaXonayaBla). Good fortune it divides into two kinds, both irrational; one divine, according to impulse, and more continuous; the other contrary to impulse and not continuous. Gentlemanliness it regards as perfect virtue, containing all particular virtues, and all goods for the sake of the honourable. Finally, it concludes with the limit (opos) of goods. First it finds the limit of goods of fortune in that desire ana possession of them which will conduce to the con- templation of God, whereas that which prevents the service and contemplation of God is bad. Then it adds that the best limit of the soul is as little as possible to perceive the other part of the soul (i.e. desire). Finally, the treatise concludes with saying that the limit of gentlemanliness has thus been stated, meaning that its limit is the service and contemplation of God and the control of desire by reason. The Magna Moralia (M.M. ii. 8-10) on these points is unlike the Nicomachean, and like the Eudemian Ethics in discussing good fortune and gentlemanliness, but it discusses them in a more worldly way. On good fortune (ii. 8), after recognizing the neces- sity of external goods to happiness, it denies that fortune is due to divine grace, and simply defines it as irrational nature (0X070 0&o-ts).*

Gentlemanliness (ii. 9) it regards as perfect virtue, and defines the gentleman as the man to whom really good things are good and really honourable things honourable. It then adds (ii. 10) that acting according to right reason is when the irrational part of the soul does not hinder the rational part of intellect from doing its work. Thereupon it proceeds to a discourse on friendship, which in the Nicomachean and Eudemian Ethics is discussed in an earlier position, but breaks off unfinished.

On the whole, the three moral treatises proceed on very similar lines down to the common identification of pleasure with activity, and then diverge. From this point the Eudemian Ethics and the Magna Moralia become more like one another than like the Nico- machean Ethics. They also become less like one another than before : for the treatment of good fortune, gentlemanliness, and their limit is more theological in the Eudemian Ethics than in the Magna Moralia.

How are the resemblances and differences of the three to be explained? By Aristotle's gradual method of composition. All three are great works, contributing to the origin of the independent science of Ethics. But the Eudemian Ethics and the Magna Moralia are more rudimentary than the Nicomachean Ethics, which as it were seems to absorb them except in the conclusion. They are, in short, neither independent works, nor mere commentaries, but Aristotle's first drafts of his Ethics.

In the Ethics to Eudemus, as Porphyry properly called the Eudemian Ethics, Aristotle in the first four books successively investi- gates happiness, virtue, the voluntary and the particular moral virtues, in the same order and in the same letter and spirit as in his Ethics to Nicomachus. But the investigations are never so good. They are all such rudiments as Aristotle might well polish into the more developed expositions in the first four books of the Nico- machean Ethics. On the other hand, nobody would have gone back afterwards on his masterly treatment of happiness, in the first book, or of virtue in the second, or of the voluntary in the third, or of the particular virtues in the third and fourth to write the sketchy accounts of the Eudemian Ethics.*

Again, these sketches are rough preparations for the subsequent books common to the two treatises. It is true, as Dr Henry Jackson has pointed out, though with some exaggeration, that the Eudemian agrees in detail rather better than the Nicomachean treatment of the voluntary with the subsequent discussion of injury (E.E. A = E.N. v. 8)_; and, as Th. H. Fritzsche remarks, the distinction between politics, and economics, and prudence in the Eudemian Ethics (A 8) is a closer anticipation of the subsequent triple distinction oi

practical science (E.E. E = E.N. vi 8). On the other hand, there are still more fundamental points in which the first three books of the Eudemian Ethics are a very inadequate preparation for the common books. Notably its treatment of prudence ((j>p6vr)poi/iipbvqai.t) and wisdom (<7oLa), which is the main point of the common books, and one of Aristotle's main points against Plato's philosophy.

Curiously enough, although little is made of it, this distinction, absent from the earlier books, is present in the final book H of the Eudemian Ethics (cf. 1246 b 4 seq., 1248 a 35, 1249 b 14) ; and probably therefore this part was a separate discourse. Meanwhile, however, the truth about the Eudemian Ethics in general is that it was an earlier rudimentary sketch written by Aristotle, when he was still struggling, without quite succeeding, to get over Plato's view that there is one philosophical knowledge of universal good, by which not only the dialectician and mathematician must explain the being and becoming of the world, but also the individual and the statesman guide the life of man. Indeed, the final proof that the Eudemian Ethics is earlier than the Nicomachean is the very fact that it is more under Platonic influence. In the first place, the reason why the account of prudence begins by confusing the speculative with the practical is that the Eudemian Ethics starts from Plato's Philebus, where, without differentiating speculative and practical knowledge, Plato asks how far good is prudence ((frpovnais) , how far pleasure (r/Sovri) ; and in the Eudemian Ethics Aristotle asks the same question, adding virtue (dperij) in order to correct the Socratic confusion of virtue with prudence. Secondly, the Eudemian Ethics, while not agreeing with Plato's Republic that the just can be happy by justice alone, does not assign to the external goods of good fortune (evrvxia) the prominence accorded to them in the Nicomachean Ethics as the necessary conditions of all virtue, and the instruments of moral virtue. Thirdly, the emphasis of the Eudemian Ethics on the perfect virtue of gentlemanliness (ka)*>Kaya0ia.) is a decidedly old-fashioned trait, which descended to Aristotle from the Greek notion of a gentleman who does his duty to his state (cf. Herodotus i. 30, Thucydides iv. 40) and to his God (Xenophon, Symp. iv. 49) through Plato, who in the Gorgias (470 e) says that the gentleman is happy, and in the Republic (489 e) imputes to him the love of truth essential to philosophy. Moreover, when Plato goes on (ib. 505 b) to identify the form of good, without which nothing is good, with the gentlemanly thing (KaKbv ko.1 ayaddp), without which any possession is worthless, he inspired into the author of the

Eudemian Ethics the very limit (opos) of good fortune and gentlemanliness with which it concludes, only without Plato's elevation of the good into the form of the good. In the Nicomachean Ethics the old notion, we gladly see, survives (cf. i. 8) : virtuous actions are gentlemanly actions, and happiness accordingly is being at our best and noblest and pleasantest (apurrov ko.1 KaWurrov ko.1 ijdKTTov). But gentlemanliness is no longer called perfect virtue, as in the Eudemian Ethics : its place has been taken by justice, which is perfect virtue to one's neighbour, by prudence which unites all the moral virtues, and by wisdom which is the highest virtue. Accordingly, in the end the old ideal of gentlemanliness is displaced by the new ideal of the speculative and practical life.

Lastly, the Eudemian Ethics derives from Platonism a strong theological bias, especially in its conclusion (H 14-15). The opposi- tion of divine good fortune according to impulse to that which is contrary to impulse reminds us of Plato's point in the Phaedrus that there is a divine as well as a diseased madness. The determination of the limit of good fortune and of gentlemanliness by looking to the ruler, God, who governs as the end for which prudence gives its orders, and the conclusion that the best limit is the most conducive to the service and contemplation of God, presents the Deity and man's relation to him as a final and objective standard more definitely in the Eudemian than in the Nicomachean Ethics, which only goes so far as to say that man's highest end is the speculative wisdom which is divine, like God, dearest to God.

Because, then, it is very like, but more rudimentary and more Platonic, we conclude that the Eudemian is an earlier draft of the Nicomachean Ethics, written by Aristotle when he was still in process of transition from Plato's ethics to his own.

The Magna Moralia contains similar evidence of being earlier than the Nicomachean Ethics. It treats the same subjects, but always in a m'ore rudimentary manner; and its remarks are always such as would precede rather than follow the masterly expositions, of the Nicomachean Ethics. This inferiority applies also to its treatment not only of the early part (i. 1-33 corresponding to E.N. i.-iv.), but also of the middle part (i. 34-ii. 7 corresponding to E.N. v.-vii. = E.E. A-Z). In dealing with justice, it does not make it clear, as the Nicomachean Ethics (Book v.) does, that even universal justice is virtue towards another (M.M. i. 34, 1193 b 1-15), and it omits altogether the division into distributive and corrective justice. In dealing with what the Nicomachean. Ethics (Book vi.) calls intelr lectual virtues, but the Magna Moralia (i. 5, 35) virtues of the rational part of the soul, and right reason, it distinguishes (i. 35, 1 196 b 34-36) science, prudence, intelligence, wisdom, apprehension (vw6\y4/i.s) , in a rough manner very inferior to the classification of science, art, prudence,

intelligence, wisdom, all of which are co- ordinate states of attaining truth, in the Nicomachean Ethics (vi. 3). It distinguishes prudence (tfrpbvriois) and wisdom (aoia) as the respective virtues of deliberative and scientific reason; and on the whole its account of prudence (cf. M.M. i. 5) is more consistent than that of the Eudemian Ethics. In these points it is a better prepara- tion for the Nicomachean Ethics. But it falls into the confusion of first saying that praise is for moral virtues, and not for virtues of the reason, whether prudence or wisdom (M.M. i. 5, 1185 b 8-12), and afterwards arguing that prudence is a virtue, precisely because it is praised (i. 35, 1197 a 16-18). In dealing with continence and incontin- ence, the same doubts and solutions occur as in the Nicomachean Ethics (Book vii. =E.E. Z), but sometimes confusing doubts and solutions together, instead of first proposing all the doubts and then supplying the solutions as in the Nicomachean Ethics. Such rudi- mentary and imperfect sketches would be quite excusable in a first draft, but inexcusable and incredible after the Nicomachean Ethics had been written.

It has another characteristic which points to its being an early work of Aristotle, when he was still under the influence of Plato's style; namely its approximation to dialogue. It asks direct questions (e.g. 5td ri; M.M. i. 1 repeatedly, 12; ii. 6, 7), incorporates direct statements of others (e.g. i\ai, i. 12, 13; ii. 3, 6, 7), alternates direct objections and answers (i. 34), and introduces conversations between the author and others, expressed interrogatively, indicatively and even imperatively(dXX' Ipet pot, t& ?roTa Siatrafacrov iyieiva hoTiv: i- 35, 1 196 b 10; cf. ii. 10, 1208 a 20-22). The whole treatise inclines to run into dialogue. It is also Platonic, like the Endemian Ethics, in making little of external goods in the account of good fortune (ii. 8), and inemphasizing the perfect virtue of gentlemanli- ness (ii. _9)- Indeed, in some respects it is more like the Eudemian, though in the main more like the Nicomachean Ethics. In the first book, it has the Eudemian distinction between prudence, virtue and pleasure (i. 3, 1184 b 5-6);' but does not make so much of it as the distinction between prudence and wisdom blurred in the Eudemian but defined in the Nicomachean Ethics. In the second book, it runs parallel to the Eudemian Ethics in placing good fortune and gentle- manliness (ii. 8-9), where the Nicomachean Ethics places the specu- lative and the practical life; but it omits the theological element by denying that good fortune is divine grace, and by submitting gentlemanliness to no standard but that of right reason, when the irrational part of the soul does not hinder the rational part, or intellect (vovs), from doing its work.

Because, then, the Magna Moralia is very like the Nicomachean Ethics, but more rudimentary, nearer to the Platonic dialogues in style and. to a less degree in matter, and also like the Eudemian Ethics, we conclude that it is also like that treatise in having been written as an earlier draft Of the

Nicomachean Ethics by Aristotle himself.

The hypothesis that the Eudemian Ethics, and by consequence the Magna Moralia, ar.e later than Aristotle has arisen from a simple misconception, continued in a Scholium attributed to Aspasius, who lived in the 2nd century a.d. Nicomachean means " addressed to Nicomachus," and Eudemian "addressed to Eudemus "; but, as Cicero thought that the Nicomachean Ethics was written by Nico- machus, so the author of the Scholium thought that the Eudemian Ethics, at least so far as the first account of pleasure goes, was written by Eudemus. He only thought so, however, because Aristotle could not have written both accounts of pleasure; and, taking for granted that Aristotle had written the second account of pleasure in the Nicomachean Ethics (Book x.), he concluded that the first account (Book vii.) was not the work of Aristotle, but of Eudemus (Comm. in Ar. (Berlin) xix. p. 151). We have seen reason to reverse this argument: Aristotle did write the first account in Book vii., because it contains his usual theory; and, if we must choose, he did not write the second account in Book x. In this way, too, we get a historical development of the theory of pleasure : Plato and Speu- sippus said it is generation (cf. Plato's Philebus) : Aristotle said it is psychical activity sometimes requiring bodily generation, sometimes not (E.N. vn. = E.E.Z): Aristotle, or some Aristotelian, afterwards said that it is a supervening end completing an activity (E.N. x.). Secondly, some modern commentators, starting from the false conclu- sion that the definition of pleasure as activity (E.N. vii. = E.E.Z) is by Eudemus, and supposing without proof that he was also author of

the first three books of the Eudemian Ethics, have further asserted that these are a better introduction than the first four books of the Nicomachean Ethics to the books common to both treatises (E.N. Books v.-vii. = E.£. Books A-Z), and have concluded that Eudemus wrote these common books. But we have seen that Aristotle wrote the first three books of the Eudemian as an earlier draft of the Nicomachean Ethics; so that, even so far as they form a better introduction, this will not prove the common books to be by Eudemus. Again, those first three books are a better introduction only in details; whereas in regard to the all-important subject of prudence as distinct from wisdom, they are so bad an introduction that the common book which discusses that subject at large (E.N. Book vi. = E.E. Book E) must be rather founded on the first four books of Aristotle's Nicomachean Ethics. Further, as Aristotle wrote both the first three Eudemian and the first four Nicomachean books, there is no reason why sometimes one,

sometimes the other, should not be the best introduction to the common books by the same author. Finally, the common books are so integral a part of the Aristotelian system of philosophy that they cannot be disengaged from it : the book on justice (E.N. v.) quotes and is quoted in the Politics (cf. 1 130 b 28, 1280 a 16, 1261 a 30) ; the book on intellectual virtues (E.N. vi.) quotes (vi. 3) the Posterior Analytics, i. 2, and is quoted in the Metaphysics (A 1) ; and we have seen that the book (E.N. vii.) which defines pleasure as activity is simply stating an Aristotelian commonplace. Thirdly, in order to prove that the Eudemian Ethics was by Eudemus, it is said that in its first part it contemplates that there must be a limit (opos) for virtue as a mean (E.E. B 5, 1222 b 7-8), in its middle part it criticizes the Nicomachean Ethics for not being clear about this limit (E.E. E 1), and in the end it alone assigns this limit, in the service and contem- plation of God (E.E H 15, 1249 b 16 seq.). This argument is subtle, but over-subtle. The Eudemian and the Nicomachean treatments of this subject do not really differ. In the Nicomachean as in the Eudemian Ethics the limit above moral virtue is right reason, or prudence, which is right reason on such matters ; and above prudence wisdom, for which prudence gives its orders; while wisdom is the intelligence and science of the most venerable objects, of the most divine, and of God. After this agreement, there is a shade of differ- ence. While the Eudemian Ethics in a more theological vein emphasizes God, the object of wisdom as the end for which prudence gives its orders, the Nicomachean Ethics in a more humanizing spirit emphasizes wisdom itself, the speculative activity, as that end, and afterwards as the highest happiness, because activity of the divine power of intellect, because an imitation of the activity of God, because most dear to God. This is too fine a distinction to found a difference of authorship. Beneath it, and behind the curious hesita- tion which in dealing with mysteries Aristotle shows between the divine and the human, his three moral treatises agree that wisdom is a science of things divine, which the Nicomachean Ethics (vi. 7) defines as science and intelligence of the most venerable things, the Magna Moralia (i. 35) regards as that which is concerned with the eternal and the divine, and the Eudemian Ethics (H 15) elevates into the service and contemplation of God.

Aristotle then wrote three moral treatises, which agree in the fundamental doctrines that happiness requires external fortune, but is activity of soul according to virtue, rising from morality through prudence to wisdom, or that science of the divine which constitutes the theology of his Metaphysics. Surely, the harmony of these three moral gospels proves that Aristotle wrote them, and wrote the Eudemian Ethics and the Magna Moralia as preludes to the Nicomachean Ethics. When did he begin? We do not know; but there is a pathetic suggestiveness in a passage in the Magna Moralia (i. 35), where he says, "Clever even a bad man is called; as Mentor was

thought clever, but prudent he was not." Mentor was the treacherous contriver of the death of Hermias (345-344 B.C.). Was this passage written when Aristotle was mourning for his friend?

4. The Rhetoric to Alexander. — This is one of a series of works emanating from Aristotle's early studies in rhetoric, beginning with the Gryllus, continuing in the Theodectea and the Collection of Arts, all of which are lost except some fragments; while among the extant Aristotelian writings as they stand we still possess the Rhetoric to Alexander ('Ptjtopikj) irpbs 'WkfavSpov) and the Rhetoric (T«x>"? 'PyTopuci)). But the Rhetoric to Alexander was considered spurious by Erasmus, for the inadequate reasons that it has a preface and is not mentioned in the list of Diogenes Laertius, and was assigned by Petrus Victorius, in his preface to the Rhetoric, to Anaximenes. It remained for Spengel to entitle the work Anaximenis Ars Rhetorica in his edition of 1847, and thus substitute for the name of the philosopher Aristotle that of the sophist Anaximenes on his title-page. We have therefore to ask, first who was the author, and secondly what is the relation

of the Rhetoric to Alexander to the Rhetoric, which nowadays alone passes for genuine.

After a dedicatory epistle to Alexander (chap. 1) the opening of the treatise itself (chap. 2) is as follows : — " There are three genera of political speeches; one deliberative, one declamatory, one forensic: their species are seven; hortative, dissuasive, laudatory, vituperative, accusatory, defensive, critical." This brief sentence is enough to prove the work genuine, because it was Aristotle who first distinguished the three genera (cf. Rhet. i. 3; Quintilian iii. 4, 1. 7, 1), by separating the declamatory (k-wv&tixruibv) from the deliberative (dri firry opiKop, avufiovKtvnKbv) and judicial (diicavucbv) ; whereas his rival Isocrates had con- sidered that laudation and vituperation, which Aristotle elevated into species of declamation, run through every kind (Quintilian iv. 4), and Anaximenes recognized only the deliberative and the judicial (Dionys. H. de Isaeo, 19). In order, however, to impute the whole work to Anaximenes, Spengel took one of the most inexcusable steps ever taken in the history of scholarship. With- out any manuscript authority he altered the very first words " three genera " (rpla yevrf) into " two genera " (8vo ykvr}), and omitted the words "one declamatory" (rb 8e~ eKiZtiKTiiibv). Quintilian (iii. 4) imputes to Anaximenes two genera, deliberative and judicial, and seven species, " hortandi, dehortandi, laudandi, vituperandi, accusandi, defendendi, exquirendi, quod iˆerao-riKov dicit." But the author of this rhetoric most certainly recognized three genera (rpla yevrj), since, besides the deliberative and judicial, the declamatory genus constantly appears in the work (chaps. 2 init., 4, 7, 18, 36, cf. ovk ay&vos dXX' kiriSeiˆtoss evena

1440 613); and, if the terms for it are not always the same, this is just what one would expect in a new discovery. Moreover, he could recognize seven species in the Rhetoric to Alexander, though he recognized only six in the Rhetoric, provided the two works were not written at the same time; and as a matter of fact even in the Rhetoric to Alexander the seventh or critical species (kˆtraanKov) is in process of disappearing (cf. chap. 37). As then Anaximenes did not, but Aristotle did, recognize three genera, and as Aristotle could as well as Anaximenes recognize seven species, the evidence is overwhelming that the Rhetoric to Alexander is the work not of Anaximenes, but of Aristotle; on the condition that its date is not that of Aristotle's confessedly genuine Rhetoric.

There is a second and even stronger evidence that the Rhetoric to Alexander is a genuine work of Aristotle. It divides (chap. 8) evidences (irioreis) into two kinds (1) evidence from arguments, actions and men (at fiiv hi- abroiv roiv \bywv ical r&v irpa£ea)v kcu twv avdpinraiv) ; (2) adventitious evidences (at 5′ ewideroi rdis Xeyofievois Kal rots •Kpo.rrop.kvois). The former are immediately enumerated as probabilities (eUoTa), examples (irapaSdyfiara), proofs (reic(ir)pid) , considerations (evdvixr)nara) , maxims (yv£>nai.), signs (arnma), refutations (e \e7xoi); the latter as opinion of the speaker (86£a rod \eyopros), witnesses (/mprupiai), tortures (fHacavoi), oaths (opkol). It is confessed by Spengel himself that these two kinds of evidences are the two kinds recognized in Aristotle's Rhetoric as (1) artificial (ivrexvot. irioreis) and (2) inartificial (arexvoi Tricrreis). Now, from the outset of his Rhetoric Aristotle himself claims to be the first to distinguish between artificial evidences from arguments and other evidences which he regards as mere additions; and he complains that the composers of arts of speaking had neglected the former for the latter. In particular, rhetoricians appeared to him to have neglected argument in comparison with passion. No doubt, rational evidences had appeared in books of rhetoric, as we see from Plato's Phaedrus, 266-267,where we find proofs,probabilities, refutation and maxim, but mixed up with other evidences. Xhe point of Aristotle was to draw a line between rational and other evidences, to insist on the former, and in fact to found a logic of rhetoric. But if in the Rhetoric to Alexander, not he, but Anaxi- menes, had already performed this great achievement, Aristotle would have been the meanest of mankind; for the logic of rhetoric would have been really the work of Anaximenes the sophist, but falsely claimed by Aristotle the philosopher. As we cannot without a tittle of evidence accept such a consequence,

we conclude that Aristotle formulated the distinction between argumentative and adventitious, artificial and inartificial evi- dences, both in the Rhetoric to Alexander and in the Rhetoric; and that the former as well as the latter is a genuine work of Aristotle, the founder of the logic of rhetoric.

What is the relation between these two genuine Rhetorics? The last event mentioned in the Rhetoric to Alexander occurred in 340, the last in the Rhetoric is the common peace (xoihij tip-hvn) made between Alexander and the Greeks in 336 (Rhet. ii. 23, 1399 b 12). The former treatise (chap. 9), under the head of examples (wapaSdy /jiara), gives historical examples of the unexpected in war for the years 403, 371, 358, concluding with the yeaf 340, in which the Corinthians, coming with nine triremes to the assistance of the Syracusans, defeated the Carthaginians who were blockading Syracuse with 150 ships. Spengel, indeed, tries to bring the latest date in the book down to 330 ; but it is by absurdly supposing that the author could not have got the commonplace, " one ought to criticize not bitterly but gently," except from Demosthenes, De Corona (§ 265). We may take it then that the last date in the Rhetoric to Alexander is 340; and by a curious coincidence 340 was the year when, on Philip's marching against Byzantium, Alexander was left behind as regent and keeper of the seal, and distinguished himself so greatly that Philip was only too glad that the Macedonians called Alexander king (Plutarch, Alexander, 9). It is possible then that Aristotle may have written the dedication to Alexander about 340 and treated him as if he were king in the dedicatory epistle. At the same time, as such prefaces are often forgeries, not prejudic- ing the body of the treatise, it does not really matter whether Aristotle actually dedicated his work to Alexander in that epistle about that year or not. If he did, then the Rhetoric to Alexander in 340 was at least four years prior to the Rhetoric, which was as late as 336. If he did not, the question still remains, what is the internal relation between these two genuine Rhetorics ? It will turn out most important.

The relation between the two Rhetorics turns on their treatment of rational, argumentative, artificial evidences. Each of them, the probability (chap. 8), the example (chap. 9), the proof (chap. 10), the consideration (chap, n), the maxim (chap. 12), the sign (chap. 13), the refutation (chap. 14), though very like what it is in the Rhetoric, receives in the Rhetoric to Alexander a definition slightly different from the definition in the Rhetoric, which it must be remembered is also the definition in the Prior Analytics. Strange as this point is, it is still stranger that not one of these internal evidences is brought into relation with induction and deduction. Example (irapadeiyna) is not called rhetorical induction, and consideration (kvBiinrina) is not called rhetorical syllogism, as they are in the Rhetoric, and in the Analytics. Induction {tTrayuyii) and syllogism {ovWcy icr/ibs) ,

the general forms of inference, do not occur in the Rhetoric to Alexander. In fact, this interesting treatise contains a rudimentary treatment of rational evidences in rhetoric and is therefore earlier than the Rhetoric, which exhibits a developed analysis of these rational evidences as special logical forms. Together, the earlier and the later Rhetoric show us the logic of rhetoric in the making, going on about 340, the last date of the Rhetoric to Alexander, and more developed in or after 336 B.C., the last date of the Rhetoric.

Nor is this all: the earlier Rhetoric to Alexander and the later Rhetoric show us logic itself in the making. We have already said that Aristotle was primarily a metaphysician. He gradually became a logician out of his previous studies : out of metaphysics, for with him being is always the basis of thinking, and common. principles, such as that of contradiction, are axioms of things before axioms of thought, while categories are primarily things signified by names; out of the mathematics of the Pythagoreans and the Platbnists, which taught him the nature of demonstration; out of the physics, of which he imbibed the first draughts from his father, which taught him induction from sense and the modification of strict demonstration to suit facts ; out of the dialectic between man and man which provided him with beautiful examples of inference in the Socratic dialogues of Xenophon and Plato; out of the rhetoric addressed to large audiences, which with dialectic called his attention to probable inferences; out of the grammar taught with rhetoric and poetics which led him to the logic of the proposition. We cannot write a history of the varied origin of logic, beyond putting the rudimentary logic of the proposition in the De Interpretations before the less rudimentary theory of categories as significant names capable of becoming predicates in the Categories, and before the maturer analysis of the syllogism in the Analytics. But at any rate the process was gradual; and Aristotle was advanced in metaphysics, mathematics, physics, dialectics, rhetoric and poetics, before he became the founder of logic.

V. Order of the Philosophical Writings Some of Aristotle's philosophical writings then are earlier than other:,; because they show more Platonic influence, and are more rudimentary; e.g. the Categories earlier than some parts of the Metaphysics, because under the influence of Platonic forms it talks of inherent attributes, and allows secondary substances

which are universal; the De Interpretatione earlier than the Analytics, because in it the Platonic analysis of the sentence into noun and verb is retained for the proposition; the Eudemian Ethics and the Magna Moralia earlier than the Nicomachean Ethics, because they are rudimentary sketches of it, and the one written rather in the theological spirit, the other rather in the dialectical style, of Plato; and the Rhetoric to Alexander earlier than the Rhetoric, because it contains a rudimentary theory of the

rational evidences afterwards developed into a logic of rhetoric in the Rhetoric and Analytics.

It is tempting to think that we can carry out the chronological order of the philosophical writings in detail. But in the gradual process of composition, by which a work once begun was kept going with the rest, although a work such as the Politics (begun in 357) was begun early, and some works more rudimentary came earlier than others, the general body of writings was so kept together in Aristotle's library, and so simultaneously elaborated and consolidated into a system that it soen becomes impossible to put one before another.

Zeller, indeed, has attempted an exact order of succession: —

1 . The logical treatises.

2. The Physics, De Coelo, De Generatione et Corruptione,

Meteorologica.

3. Historia Animalium, De Anima, Parva Naturalia, De Partibus

Animalium, De Animalium Incessu, De Generatione Animalium.

4. Ethics and Politics.

5. Poetics and Rhetoric.

6. Metaphysics (unfinished).

But Zeller does not give enough weight either to the evidence of early composition contained in the Politics and Meteorology, or to the evidence of subsequent contemporaneous composition contained in the cross-references, e.g between the Physics and the Metaphysics. On the other hand he gives too much weight to the references from one book to another, which Aristotle could have entered into his manuscripts at any time before his death. Moreover, the arrange- ment sometimes breaks down: for example, though on the whole the logical books are quoted without quoting the rest, the De Inter- pretatione (chap. 1) quotes the.De Anima, and therefore is falsely taken by Zeller against its own internal evidence to be subsequent to it and consequently to the other logical books. Again, the Meteorologica (iii. 2, 372 b 9) quotes the De Sensu (c. 3), and therefore, on Zeller's arguments, ought to follow one of the Parva Naturalia. Lastly, though the Metaphysics often quotes the Physics, and is therefore regarded as being subsequent, it is itself quoted in the Physics (i. 8, 191 b 29), and therefore ought to be regarded as antecedent. Zeller tries to get over this difficulty of

cross-reference by detaching Meta- physics, Book A, from the rest and placing it before the Physics. But this violent and arbitrary remedy is only partial. The truth is that the Metaphysics both precedes and follows the Physics, because it had been all along occupying Aristotle ever since he began to differ from Plato's metaphysical views and indeed forms a kind of

Cresupposed basis of his whole system. So generally, the references ackwards and forwards, and the cross-references, are really evidences that Aristotle mainly wrote his works not successively but simul- taneously, and entered references as and when he pleased, because he had not published them.

. There are two kinds of quotations in Aristotle's extant works, the quotation of another book, and the quotation of a historical fact. While the former is useless to determine the sequence of books written simultaneously, the latter is insufficient to determine a complete chronological order. When Aristotle, e.g. in the Politics, quotes an event as now («/»), he was writing about it at that, time; and when he quotes another event as lately (veuari) he was writing about it shortly after that time; but he might have been writing the rest of the Politics both before and after either event. When he quotes the last event mentioned in the book, e.g. in the Rhetoric (ii. 23, 1399 b I2)_ the " common peace " of Greece under Alexander in 336, he was writing as late as that date, but he might also have been writing the Rhetoric both before it and after it. When he quotes what persons used to say in the past, e.g. Plato and Speusippus in the' Ethics, Eudoxus and Callippus in the Metaphysics, he was writing these passages after the deaths of these -persons; but he might have been also writing the Ethics and the Metaphysics both beforehand and afterwards. Lastly, when he is silent about a historical fact, the argument from silence is evidence only when he could not have failed to mention it; as, for example, in the Constitution of Athens, when he could not have failed to mention quinqueremes and other facts after 325-324. But this is in a historical work; whereas the argu- ment from silence about historical facts in a philosophical work can seldom apply.

The chronological order therefore is not sufficiently detailed to be the real order of Aristotelian writings. Secondly, the traditional order, which for nearly 2000 years has descended from the edition of Andronicus to the Berlin edition, is satisfactory in details, but

unsatisfactory in system. It gives too much weight to Aristotle's logic, and

too little to his metaphysics, on account of two prejudices of the commentators which led them to place both logic and physics before metaphysics. Aristotle rightly used all the sciences of his day, and especially his own physics, as a basis of his metaphysics. For example, at the very outset he refers to the Physics (ii. 2) for his use of the four causes, material, efficient, formal and final, in the Mela- physics (A 2). This and other applications of the science of nature to the science of all being induced the commentators to adopt this order, and entitle the science of being the Sequel to the Physics (ri /xeri. tA vt7i.Ka). But Aristotle knew nothing of this title, the first known use of which was by Nicolaus Damascenus, a younger contemporary of Andronicus, the editor of the Aristotelian writings, and Andronicus was probably the originator of the title, and of the order. On the other hand, Aristotle entitles the science of all being " Primary Philosophy " (tp&tt) i\oia) , and the science of physical being " Secondary Philosophy " (Sevrepa i\ola) , which suggests that his order is from Metaphysics to Physics, the reverse of his editor's order from Physics to Metaphysics. Thus the traditional order puts Physics before Metaphysics without Aristotle's authority. With some more. show of authority it puts Logic before Metaphysics. Aristotle, on introducing the principle of contradiction (Met. V 3), which belongs to Metaphysics as an axiom of being, says that those who attempt to discuss the question of accepting this axiom, do so on account of their ignorance of Analytics, which they ought to know beforehand (irpotiriaTafiivovs}. He means that the logical analysis of demonstration in the Analytics would teach them beforehand that there cannot be demonstration, though there must be induction, of an axiom, or any other principle; whereas, if they are not logically pre- pared for metaphysics, they will expect a demonstration of the axiom, as Heraclitus, the Heraclitean Cratylus and the Sophist Protagoras actually did, — and in vain. Acting on this hint, not Aristotle but the Peripatetics inferred that all logic is an instrument (ipyavov) of all sciences; and by the time of Andronicus, who was one of them and sometimes called " the eleventh from Aristotle," the order, Logic- Physics-Metaphysics, had become established pretty much as we have it now. It is, however, not the real order for studying the philosophy of Aristotle, because there is more Metaphysics in his Physics than Physics in his Metaphysics, and more Metaphysics in his Logic than Logic in his Metaphysics. The commentators themselves were doubt- ful about the order: Boethus proposed to begin with Physics, and some of the Platonists with Ethics or Mathematics; while Andronicus pre- ferred to put Logic first as Organon (Scholia, 25 b 34 seq.). None of the parties to the dispute had the authority of Aristotle. What do we find in his works? Primary philosophy, Metaphysics, the science of being, is the solid foundation of all parts of his philosophical system ; not only in the Physics, but also in the De Coelo (i. 8, 277 b 10), in the De Generatione (i. 3, 318 a 6; ii. 10, 336

b 29), in the De Aninta (i. 1, 403 a 28, cf. b 16), in the De ParlibusAnimalium (i. 1, 641 a 35), in the Nicotnachean Ethics (i. 6, 1096 b 30), in the De Interpretation (5, 17 a 14); and in short throughout his extant works. The reason is that Aristotle was primarily a metaphysician half for and half against Plato, occupied himself with metaphysics all his philosophical life, made the science of things the universal basis of all sciences without destroying their independence, and so gradually brought round philosophy from universal forms to individual substances. The traditional order of the Aristotelian writings, still continued in the Berlin edition, beginning with the logical writings on page 1, proceeding to the physical writings on page 184, and postponing the Metaphysics to page 980, is not the real order of Aristotle's philosophy.

The real order of Aristotle's philosophy is that of Aristotle's mind, revealed in his writings, and by the general view of think- ing, science, philosophy and all learning therein contained. He classified thinking (Met. E 1) and science (Topics, vi. 6) by the three operations of speculation (deuipia), practice (-n-paijis) and production (woiqcns} , and made the following subdivisions: —

I. Speculative: about things; subdivided (Met. E 1; De An. i. 1) into: —

i. Primary Philosophy, Theology, also called

Wisdom, about things as things, ii. Mathematical Philosophy, about quantitative

things in the abstract, iii. Physical Philosophy, about things as changing, and therefore about natural substances or bodies, composed of matter and essence.

II. Practical or Political Philosophy, or philosophy of things human (cf. E.N. x. 9-fin.): about human good; sub- divided (E.N. vi. 8, cf. E.E. A 8, 1218 b 13) into:— i. Ethics, about the good of the individual, ii. Economics, about the good of the family, iii. Politics, about the general good of the state.

III. Productive, or Art (tˆxˆ): about works produced; sub- divided (Met. A. i, 981 b 17-20) into: —

1. Necessary (irpos ravaykai a), e.g. medicine.

ii. Fine (irpos 5ia.ywyqv) , e.g. poetry.

Aristotle calls all these investigations sciences (exwrrij/iat) :

but he' also uses the term " sciences " in a narrower sense in consequence of a classification of their objects, which pervades his writings, into things necessary and things contingent, as follows . —

(A) The necessary (to ˆ17 kv8ex°t>w'ov a\ws ex £ «0. what must be; subdivided into: —

(1) Absolutely (dirX&) : , e.g. the mathematical.

(2) Hypothetieally (e£ wroOkcrtois) , e.g. matter necessary as means to an end.

(B) The contingent (to ev5exonevov a\o>s extw), what may be; subdivided into:—

(1) The usual (to o>s kirl to tto\v) or natural (t6 4>vo-ikov), e.g. a man grows grey.

(2) The accidental (to KarAavfjijiefiriKos), e.g. a man sits or not.

Now, according to Aristotle, science in the narrow sense is concerned only with the absolutely necessary (E.N. iii. 3), and in the classification would stop at mathematics, which we still call exact science: in the wide sense, on the other hand, it extends to the whole of the necessary and to the usual contingent, but excludes the accidental (Met. E 2), and would in the classification include not only metaphysics and mathematics, but also physics, ethics, economics, politics, necessary and fine art; or in short all speculative, practical and productive thinking of a system- atic kind. Hence the Posterior Analytics, which is Aristotle's authoritative logic of science, is of peculiar interest because, after beginning by defining science as investigating necessary objects from necessary principles (i. 4), it proceeds to say that it is either of the necessary qr of the usual though not of the accidental (i. 29), and' to admit that its principles are some necessary and some contingent (i. 32, 88 b 7). Philosophy (i'cu dewp-qTUiai, nadrifxaTiKr], (pvmKri, deo- \oyucfi), and, to all three practical philosophies, as we see from the constant use of the phrase " political philosopher " in the Ethics; and in short applies it to all sciences except productive science or art. With him, as with the Greeks generally, the problems of philosophy are the nature and origin of being and of good: it is

not as with too many of us a mere science of mind. –

Aristotle's view of thinking in science and philosophy is essen- tially comprehensive; but it is not so wide as to become indefinite. According to him, science at its widest selects a special subject, e.g. number in arithmetic, magnitude in geometry, stars in astronomy, a man's good in ethics; concentrates itself on the causes and appropriate principles of its subject, especially the definition of the subject and its species by their essences or formal causes; and after an inductive intelligence of those principles proceeds by a deductive demonstration from definitions to consequences: philosophy is simply a desire of this definite knowledge of causes and effects. Beyond philosophy, not beyond science, there is art; and beyond philosophy and science there is history, the description of facts preparatory to philosophy, the investigation of causes (cf. Pr. An. i. 30); and this may be natural history, preparatory to natural philosophy, as in the History of Animals preparatory to the De Partibus Animalium, or what we call civil history, preparatory to political philosophy, as in the 158 Constitutions more or less preparatory to the Politics.

Wide as is all his knowledge of facts and causes, it does not appear to Aristotle to be the whole of learning and the show of it. Beyond knowledge lies opinion, beyond discovery disputation, beyond philosophy and science dialectic between man and man, which was much practised by the Greeks in the dialogues of Socrates, Plato, the Megarians and Aristotle himself in his early manhood. With Plato, who thought that the interrogation of

man is the best instrument of truth, dialectic was exaggerated into a universal science of everything that is. Aristotle, on the other hand, learnt to distinguish dialectic (SiaXeKTuoi) from science (forwrˆ/Mj); in that it has no definite subject, else it would not ask questions (Post. An. i. n, 77 a 31-33); in that for appropriate principles it substitutes the probabilities of authority (to. evdoˆa) which are the opinions of all, or of the majority, or of the wise (Top. i. 1, 100 b 21-23) ; and in that it is not like science a deduction from true and primary principles of a definite subject to true consequences, but a deduction from opinion to opinion, which may be true or false. Sophistry appeared to him to be like it, except that it is a fallacious deduction either from merely apparent probabilities in its matter or itself merely apparently syllogistic in its form '(cf. Topics, i. 1). Moreover, he compared dialectic and sophistry, on account of their generality, with primary philosophy in the Metaphysics (T 2, 1004 b 17-26); to the effect that ail three concern themselves with all things, but

that about everything metaphysics is scientific, dialectic tentative, sophistry apparent, not real. He means that a sophist like Protagoras will teach superficially anything as wisdom for money; and that even a dialectician like Plato will write a dialogue, such as the Republic, nominally about justice, but really about all things from the generality 6f the form of good, instead of from appropriate moral principles; but that a primary philosopher selects as a definite subject all things as such without interfering with the special sciences of different things each in its kind (Met. T 1), and investigates the axioms or common principles of things as things (ib. 3), without pretending, like Plato, to deduce from any common principle the special principles of each science (Post. An. i. 9, 32). Aristotle at once maintains the primacy of metaphysics and vindicates the independence of the special sciences. He is at the same time the only Greek philosopher who clearly discriminated discovery and disputation, science and dialectic, the knowledge of a definite subject from its appropriate principles and the discussion of anything whatever from opinions and authority. On one side he places science and philosophy, on the other dialectic and, sophistry.

Such is the great mind of Aristotle manifested in the large map of learning, by which we have now to determine the order of his extant philosophical writings, with a view to studying them in their real order, which is neither chronological nor traditional, but philosophical and scientific. Turning over the pages of the Berlin edition, but passing over works which are perhaps spurious, we should put first and foremost speculative philosophy, and therein the primary philosophy of his Metaphysics (980 a 21- 1093 b 29); then the secondary philosophy of his Physics, followed by his other physical works, general and biological, including among the latter the Historia Animalium as prepara- tory to the De Partibus Animalium, and the De Anima and Parva Naturalia, which he called " physical " but we call " psycho- logical " (184 a 10-967 b 27) ; next, the practical philosophy of the Ethics, including the Eudemian Ethics and the Magna Moralia as earlier and the Nicomachean Ethics as later (1094-1249 b 25), and of the Politics (1252-1342), with the addition of the newly discovered Athenian Constitution as ancillary to it; finally, the productive science, or art, of the Rhetoric, including the earlier Rhetoric to Alexander and the later Rhetorical Art, and of the Poetics, which was unfinished (1354-end). This is the real order of Aristotle's system, based on his own theory and classification of sciences.

But what has become of Logic, with which the traditional order of Andronicus begins Aristotle's works (1-148 b 8)? So far from coming first, Logic comes nowhere in his classification of science. Aristotle was the founder of Logic; because, though others, and especially Plato, had made occasional remarks about reason (\670s); Aristotle \Wls the first to conceive it as a definite subject of investigation. As he says at the end of

the Sophistical Elenchi on the syllogism, he had no predecessor, but took pains and laboured a long time in investigating it. Nobody, not even Plato, had discovered that the process of deduction is a combina- tion of premisses (eruXXiryur/ios) to produce a new conclusion. Aristotle, who made this great discovery, must have had great

difficulty in developing the new investigation of reasoning pro- cesses out of dialectic, rhetoric, poetics, grammar, metaphysics, mathematics, physics and ethics; and in disengaging it from other kinds of learning. He got so far as gradually to write short discourses and long treatises, which we, not he, now arrange in the order of the Categories or names; the De Interpretatione on propositions; the Analytics, Prior on syllogism, Posterior on scientific syllogism; the Topics on dialectical syllogism; the Sophistici Elenchi on eristical or sophistical syllogism; and, except that he had hardly a logic of induction, he covered the ground. But after all this original research he got no further. First, he did not combine all these works into a system. He may have laid out the sequence of syllogisms from the Analytics onwards; but how about the Categories and the De Interpretatione ? Secondly, he made no division of logic. In the Categories he distinguished names and propositions for the sake of the classification of names; in the De Interpretatione he distinguished nouns and verbs from sentences with a view to the enunciative sentence: in the Analytics he analysed the syllogism into premisses and premisses into terms and copula, for the purpose of syllogism. But he never called any of these a division of all logic. Thirdly, he had no one name for logic. In the Posterior Analytics (i. 22, 84 a 7-8) he distinguishes two modes of investigation, analytically (avdXvrui&s) and logically (X070C&). But " analytical " means scientific inference from appropriate principles, and " logical " means dialectical inference from general considerations; and the former gives its name to the Analytics, the latter suits the Topics, while neither analytic nor logic is a name for all the works afterwards called logic. Fourthly, and consequently, he gave no place to any science embracing the whole of those works in his classification of science, but merely threw out the hint that we should know analytics before questioning the acceptance of the axioms of being (Met. V 3).

It is a commentator's blunder to suppose that the founder of logic elaborated it into a system, and then applied it to the sciences. He really left the Peripatetics to combine his scattered discourses and treatises into a system, to call it logic, and logic Organon, and to put it first as the instrument of sciences; and it was the Stoics who first called logic a science, and assigned it the first place in their triple classification of science into logic, physics, ethics. Would Aristotle have consented? Would he not rather have given the first place to primary philosophy?

Dialectic was distinguished from science by Aristotle. Is logic, then, according to him, not science but dialectic ? The word logic- ally (Xo-yocSs) means the same as dialectically (SiaXeKrixas). But the general discussion of opinions, signified by both words, is only a subordinate part of Aristotle's profound investigation of the whole process of reasoning. The Analytics, the most important part, so far from being dialectic or logic in that narrow sense, is called by him not logic but analytic science (avaXuriKri iiririjs vvv Oeapias, De Int. 6, 17 a 7), as science. In fact, as to the Categories as well as the De Inter pretatione, we are at a complete loss. But about the Topics we may venture to make the suggestion that, as in describing consciousness . Aristotle says we perceive that we perceive, and understand that we understand, and as he calls Analytics a science of sciences, so he might have called the Topics a dialectical investigation of dialectic. Now, this suggestion derives support from his own description of the allied art of Rhetoric. " Rhetoric is counterpart to dialectic " is the first sentence of the Rhetoric; and the reason is that both are con- cerned with common objects of no definite science. Afterwards dia- lectic and rhetoric are said to differ from other arts in taking either side of a question (i. 1, 1355 a 33-35) ; rhetoric, since its artificial evi- dences involve characters, passions and reasoning, is called a kind of offshoot of dialectic and morals, and a copy of dialectic, because neither is a science of anything definite, but both faculties (bvvhpitis) of providing arguments (i. 2, 1356 a 33) ; and, since rhetorical argu- ments are examples and enthymemes analysed in the Analytics, rhetoric is finally regarded as a compound of analytic science and of

morals, while it is like dialectical and sophistic arguments (i. 4, 1359 b

2-17).

As then Aristotle himself regarded rhetoric as partly science and partly dialectic, perhaps he would have said that his works on reason- ing are some science and others not, and that, while the investigation of syllogism with a view to scientific syllogism in the Analytics is analytic science, the investigation of dialectical syllogism, in the Topics, with its abuse, eristical syllogism, in the Sophistici Elenchi, is dialectic. At any rate, these miscellaneous works on reasoning have no right to stand first in Aristotle's writings under any one name, logic or Organon. As he neither put them together, nor on any one definite plan, we are left to convenience; and the most convenient place is with the psychology of the De Anima.

As for dialectic itself, it would have been represented by Aristotle's early dialogues, had they not been lost except a few fragments But none of his extant writings is so much dialectic, like a Platonic dia- logue. They contain however many relics of dialectic. The Rhetoric is declared by him to be partly dialectic. The Topics is at least an investigation of dialectic, which has had an immense influence on the method of argument. The Magna Moralia almost runs into dialogue. Besides, all the extant works, though apparently didactic, are full of dialectical matter in the way of opinions (\tybp.tva) , difficulties and doubts {tt.Troprnia.Ta, airopiou), solutions (\io-eis), and of dialectical style in the way of conversational expressions. It is probable also that the "extraneous discourses " (01 iˆwrepiKol Xo-yoi) sometimes mentioned in them here mean dialectical discussions of a subject from opinions extraneous to its nature, as opposed to scientific deduction from its appropriate principles. From the eight passages, which refer to the extraneous discourses, we find (1) that Platonic forms were made by them matters of common talk (retfptXTrrat, Met. M 1, 1076 a 28) ; (2) that time was made by them matter of doubts, which in this case are Aristotle's own doubts (Phys. iv. 10, 217 b 31-218 a 30) ; (3) that the discussions of Platonic forms in them and in philosophical discourses were different (E.E. i. 8, 1217 b 22) ; (4) that the ordinary distinction between goods of mind, body and estate is one which we make (itatpovptBa) in them (E.E. ii. 1, 1218 b 34) ; (5) that in them appeared the division of soul into irrational and rational, used by Aristotle (E.N. i. 13, 1 102 a 26), and attributed to Plato; (6) that the distinction between action and production accepted by Aristotle ap- peared in them (E.N. vi. 4, 1 140 a 3) ; (7) that a distinction between certain kinds of rule is one which we make often (5ioptf6,ue0a . . . toXXoms) in them (Pol. T6, 1278 b 31); (8) that a discussion about the best life, used by Aristotle, was made in them (Pol. H 1, 1323 a 22). On the whole, the interpretation which best suits all the pas- sages is that extraneous discourses mean any extra-scientific dia- lectical discussions, oral or written, occurring in dialogues by Plato, or by Aristotle, or by anybody else, or in ordinary conversation, on any subject under the sun.*

Among all the eight passages mentioned above, the most valuable is that from the Eudemian Ethics (A 8), which discriminates extrane- ous discourses and philosophical («u iv tois tfwTepucois X6701S icai iv rots Kara i\oaciav, 1217 b 22-23); an d it is preceded (A 6, >2i6 b 35-37 a 17), by a similar distinction between foreign discourses (aWorpioi X6701) and discourses appropriate to the thing (oUttoi Xoyot toO Trpa.ypa.Tos), which marks even better the opposition intended between dialectic and philosophy. Now, as in all eight passages Aristotle speaks, somewhat disparagingly, of " even (krtp'nraTov) ; (3) divided his books in the same manner; (4) defended himself against Alexander's letter, complain ing that

it was not right to his pupils to have published his acroa- matic works, by replying in a letter that they were published and not published, because they are intelligible only to those who heard them. Gellius then quotes this correspondence, also given by Plutarch, and quotes it ex Andronici philosophi libro. The answer to the first three points is that Aristotle did not make any distinction between exoteric and acroamatic, and was not likely to have any longer taught his exoteric dialogues when he was teaching his mature philosophy at Athens, but may have alternated the teaching of the latter between

the more abstruse and the more popular parts which had gradually come to be called "exoteric." As regards the last point, the authority of Andronicus proves that he at all events did not exaggerate his own share in publishing Aristotle's works; but it does not prove either that this correspondence between Alexander and Aristotle took place, or that Aristotle called his philosophical writings acroamatic, or that he had published them wholesale to the world.

The . literary career of Aristotle falls into three periods. (1) The early period; when he was writing and publishing exoteric dialogues, but also tending to write didactic works, and beginning his scientific writings, e.g. the Politics in 357, the Meleorologica in 356. (2) The immature period; when he was continuing his didactic and scientific works, and composing first drafts, e.g. the Categories, the Eudemian Ethics, the Magna Moralia, the Rhetoric to Alexander. (3) The mature period; when he was finishing his scientific works, completing his system, and not publishing it but teaching it in the Peripatetic school; when he would teach not his early dialogues, nor his immature writings and first drafts, but mature works, e.g. the Metaphysics, the Nicomachean Ethics, the Rhetoric; and above all teach his whole system as far as possible in the real order of his classifica- tion of science.

VI. The Aristotelian Philosophy We have now (1) sketched the life of Aristotle as a reader and a writer from early manhood; (2) have watched him as a Platonist, partly imitating but gradually emancipating himself from his master to form a philosophy of his own; (3) have traced the gradual composition of his writings from Plato's time onwards; (4) have distinguished earlier, more Platonic and rudimentary, from later, more independent and mature, writings; (5) have founded the real order of his writings, not on chronology, nor on tradition, but on his classification of science and learning. It remains to answer the final question:— What is the Aristotelian philosophy, which its author gradually formed with so much labour? Here we have only room for its spirit, which we shall try to give as if he were himself speaking to us, as head of the Peripatetic school at Athens, and holding no longer the early views of his dialogues, or the

immature views of such treatises as the Categories, but only his mature views, such as he expresses in the Metaphysics. Aristotle was primarily a metaphysician, a philosopher of things, who uses the objective method of proceed- ing from being to thinking. We shall begin therefore with that primary philosophy which is the real basis of his philosophy, and proceed in the order of his classification of science to give his chief doctrines on: —

(1) Speculative philosophy, metaphysical and physical,

including his psychology, and with it his logic.

(2) Practical philosophy, ethics and politics.

(3) Productive science, or art.

Things are substances (ovcriai), each of which is a separate individual (xupiarov, roSe tl, koM' 'hiao-rov) and is variously affected as quantified, qualified, related, active, passive and so forth, in categories of things which are attributes (o-vufitfiiiKtrra.), different from the category of substance, but real only as predi- cates belonging to some substance, and are in fact only the substance itself affected (avro ireirov96s). The essence of each substance, being what it is (t6 tL eon, to t'i r\v dvai), is that substance; e.g. this rational animal, Socrates. Substances are so similar that the individuals of a species are even the same in essence or substance, e.g. Callias and Socrates differ in matter but are the same in essence, as rational animals. The universal (rd nadokov) is real only as one predicate belonging to many individual substances: it is therefore not a substance. There are then no separate universal forms, as Plato supposed. There are attributes and universals, real as belonging to individual substances, whose being is their being. The mind, especially in mathematics, abstracts numbers, motions, relations, causes, essences, ends, kinds; and it over-abstracts things mentally separate into things really separate. But reality consists only of individual substances, numerous, moving, related, active as efficient causes, passive as material causes, essences as formal causes, ends as final causes, and in classes which are real

universals only as real predicates of individual substances. Such is Aristotle's realism of individuals and universals, con- tained in his primary philosophy, as expressed in the Metaphysics, especially in Book Z, his authoritative pronouncement on being and substance.

The individual substances, of which the universe is composed, fall into

three great irreducible kinds : nature, God, man.

I. Nature. — The obvious substances are natural substances or bodies (cfrvaiKai ovaiai, aw par a) , e.g. animals, plants, water, earth, moon, sun, stars. Each natural substance is a compound (oijvderov, avvdtn) ovala) of essence and matter; its essence (el&os, nopv, to tL «m, to tL t\v elvai) being its actual substance, its matter (v\ri) not; its essence being determinate, its matter not; its essence being immateriate, its matter conjoined with the essence; its essence being one in all individuals of a species, its matter different in each individual; its essence being cause of uniformity, its matter cause of accident. At the same time, matter is not nothing, but something, which, though not sub- stance, is potentially substance; and it is either proximate to the substance, or primary; proximate, as a substance which is potentially different, e.g. wood potentially a table; primary, as an indeterminate something which is a substratum capable of becoming natural substances, of which it is always one; and it is primarily the matter of earth, water, air, fire, the four simple bodies (cbrXa awp-ara) with natural rectilineal motions in the terrestrial world (De Gen. et Cor. ii. i seq.); while aether (aiBfjp) is a fifth simple body, with natural circular motion, being the element of the stars (to tCsv aarpwv crovxfiov) in the celestial world. Each natural substance is a formal cause, as being what it is; a material cause, as having passive power to be changed; an efficient cause, as having active power to change, by com- municating the selfsame essence into different matter so as to produce therein a homogeneous effect in the same species; and a final cause, as an end to be realized. Moreover, though each natural substance is corruptible (

II. God. — Nature is but one kind of being (iv yap ti ykvos rod ovtos ■/) (/ > iwis, Mel. r 3, 1005 a 34). Above all natural sub- stances, the objects of natural science, there stands a super- natural substance, the object of metaphysics as theology. Nature's boundary is the outer sphere of the fixed stars, which is eternally moved day after day in a uniform circle round the earth. Now, an actual cause is required for an actual effect. Therefore, there must be a prime mover of that prime movable, and equally eternal and uniform. That prime mover is God, who is not the creator, but the mover directly of the heavens, and indirectly through the planets of sublunary substances. But God is no mechanical mover. He moves as motive (mm 5ˆ us kpiipjtvov, Met. A 7, 1072 b 3) ; He is the efficient only as the final cause of nature. For God is a living being, eternal, very good (fciJov atdiov apurrov, ib. 1072 b 29). While nature aims at Him as design, as an end, a motive, a final cause, God's occupa- tion (Siayoiyrj) is intelligence (vbt]ois) ; and since essence, not indeed in all being, but in being understood, becomes identical with intelligence, God in understanding essence is understanding Himself; and in short, God's intelligence is at once

intelligence of Himself, of essence and of intelligence, — /ecu iarw y voytris votjeyeois vbriois (Met. A 7, 1074 b 34). But at the same time the essence of good exists not only in God and God's intelligence on the one hand, but also on the other hand on a declining scale in

nature, as both in a general and in his army; but rather in God, and more in some parts of nature than in others. Thus even God is a substance, a separate individual, whose differentiating essence is to be a living being, eternal and very good ; He is however the only substance whose essence is entirely without matter and unconjoined with matter; and therefore He is a substance, not because He has or is a substratum beneath attributes, but wholly because He is a separate individual, different both from nature and men, yet the final good of the whole universe. Such is Aristotle's theological realism without materialism and the oiigin of all spiritualistic realism, contained in his Metaphysics (A 6-end).

III. Man. — There is a third kind of substance, combining something both of the natural and of the divine: we men are that privileged species. Each man is a substance, like any other, only because he is a separate individual. Like any natural substance, he is composed of matter and immateriate essence. But natural substances are inorganic and organic; and a man is an organic substance composed of an organic body (bpyavuibv 0-Cip.a) as matter, and a soul (ipvxn) as essence, which is the primary actuality of an organic body capable of life (£0)17). Still a man is not the only organism; and every organism has a soul, whose immediate organ is the spirit (TeeD/m), a body which: — analogous to a body diviner than the four so-called elements, namely the aether, the element of the stars — gives to the organism its non- terrestrial vital heat, whether it be a plant or an animal. In an ascending scale, a plant is an organism with a nutritive soul; an animal is a higher organism with a nutritive, sensitive, orectic and locomotive soul; a man is the highest organism with a nutritive, sensitive, orectic, locomotive and rational soul. What differentiates man from other natural and organic sub- stances, and approximates him to a supernatural substance, God, is reason (X670S) , or intellect (vovs) . Now, though only one of the powers of the soul, intellect alone of these powers has no bodily organ; it alone is immortal: it alone is divine. While the soul is propagated, like any other essence, by the efficient, which is the seed, to the matter, which is the germ, of the embryo man, intellect alone enters from without (dvpadev), and is alone divine (Bttov, not deos), because its activity communicates with no bodily activity (De Gen. ii. 3, 736-737). A man then is a third kind of substance, like a natural substance in bodily matter, like a supernatural substance in divine reason or intellect. Such is Aristotle's dual, or rather triple, realism, continued in his De Anima and other biological writings, especially De Generatione Animalium, ii. .

There are three points about a man's life which both connect him with, and distinguish him from, God. Gpd's occupation is speculative; man's is speculation, practice and production.

I. Speculation (Btoipia). — Since things are individuals, and there is nothing, and nothing universal, beyond them, there are two kinds of knowledge (yiwis), sense (a'crffyoW) of individuals, intellect- (nods) of universals. Both powers know by being passively receptive of essence propagated by an efficient cause; but, while in sense the efficient cause is an external object (i£w0ev), in intelligence it is active intellect (vovs rcf woieii>) propagating its essence in passive intellect (vovs vadrinKos). Nevertheless, without sense there is no knowledge. Sense receives from the external world an essence, e.g. of white, which is really universal as well as individual, but apprehends it only as individual, e.g. this white substance: intellect thereupon discovers the universal essence but only in the individuals of sense. This intellectual discovery requires sensation and retention of sensation; so that sense (a.?

This is the origin of knowledge, psychologically regarded (in the De Anima). Logically regarded, the origin of all teaching and learning of an intellectual kind is a process of induction (evayuyii} from par- ticulars to universal, and of syllogism (o-uXXo-yicrˆAs) from universal to further particulars; induction, whenever it starts from sense, becomes the origin of scientific knowledge (liritrrv/uij) ; while there is also a third process of example (xapdSei7jna) from particular to particular, which produces only persuasion. In acquiring scientific knowledge, syllogism cannot start from universals without induction, nor induction acquireuniversals without sense. At the same time, there are three species of syllogism, scientific, dialectical and eristical or sophistical; and in consequence there are different ways of acquiring premisses. In order to acquire the knowledge of the true and primary principles of scientific knowledge, and especially the

intelligence of the universal essence of the subject, which is always true, the process of knowledge consists of (1) sense (al

2. Practice (irpaˆis). — In this natural world of real substances, human good is not an imitation of a supernatural universal form of the good, but is human happiness; and this good is the same both of the individual as a part and of the state as a whole. Ethics then is a kind of Politics. But in Ethics a man's individual good is his own happiness; and his happiness is no mere state, but an activity of soul according to virtue in a mature life, requiring

as conditions moderate bodily and external goods of fortune; his virtue is (1) moxal virtue, which is acquired by habituation, and is a purposive habit of per- forming actions in the mean determined by right reason or prudence; requiring him, not to exclude, but to moderate his desires; and (2) intellectual virtue, which is either prudence of practical, or wisdom of speculative intellect; and his happiness is a kind of ascending scale of virtuous activities, in which moral virtue is limited by prudence, and prudence by wisdom; so that the speculative life of wisdom is the happiest and most divine, and the practical life of prudence and moral virtue secondary and human. Good fortune in moderation is also required as a condition of his happiness. Must we then, on ac- count of misfortunes, look with Solon at the end, and call no man happy till he is dead? Or is this altogether absurd for us who say that happiness is an activity? Virtuous activities determine happi- ness, and a virtuous man is happy in this life, in spite of misfortunes unless they be too great ; while after death he will not feel the mis- fortunes of the living so much as to change his happiness. Still, for perfect happiness a man should prefer the speculative life of divine intellect, and immortalize (iSavarl^av) as far as possible. For intellect is what mainly makes a man what he is, and is divine and immortal.

To turn from Ethics to Politics, the good of the individual on a small scale becomes on a large scale the good of the citizen and the state, whose end should be no far-off form of good, and no- mere guarantee of rights, but the happiness of virtuous action, the life according to virtue, which is the general good of the citizen. Hence, the citizen of the best state is he who has the power and the purpose to be governed and govern for the sake of the life according to virtue. A right government is one which aims at the general good, whereas any government which aims at its own good is a deviation. Hence governments are to be arranged from best to worst in the following order :—

I. Right governments (dpdal iroXiraai), aiming at the general good: —

i. Monarchy, of one excelling in virtue: ii. Aristocracy, of a class excelling

in virtue: iii. Commonwealth, of the majority excelling in virtue. II. Deviations (xapec/Jdo-eis). aiming at the good of the govern- ment: —

i. Democracy, aiming at the good of the majority: ii. Oligarchy, aiming at the good of the few : iii. Tyranny, aiming at the good of one. Such is Aristotle's practical philosophy, contained in his matured Nicomachean Ethics, and his unfinished Politics.

3. Production (ttoijjo-is) . — Production differs from practice in being an activity (evtpyiLa; e.g. building) which is always a means to a work (tpyov; e.g. a house) beyond itself. Productive science,

or art, is an intellectual habit of true reasoning from appropriate principles, acquired from experiences, and applied to the production of the work which is the end of the art. All the arts are therefore at once rational and productive. They are either for necessity {e.g. medicine) or for occupation (e.g. poetry), the former being inferior to the latter. Rhetoric is a faculty on any subject of investigating what may be persuasive (inSavop), which is the work of no other art; its means are artificial and inartificial evidences (jrto-Teis), and, among artificial evidences, especially the logical arguments of example and enthymeme. Poetry is the art of producing represen- tations; (1) in words, rhythm and harmony (ip/jtovla, " hnrmony " in the original sense) ; (2) of men like ourselves, or better as in tragedy, or worse as in comedy; (3) by means of narrative as in epic, or by action as in the drama. The cause of poetry is man's instinct of re- presentation and his love of representations caused by the pleasure of learning. Comedy is representation of meninferiorin being ludicrous: epic is like tragedy a representation of superior men, but by means of narrative and unlimited in time: tragedy is a representation of an action superior and complete, in a day if possible, by means of action, and accomplishing by pity and fear the purgation of such passions (Poetics, 1449 b 24). Music is a part of moral education; and for this end we should use the most moral harmonies. But music has also other ends and uses, and on the whole four; namely amuse- ment, virtue, occupation and purgation of the affections; for some men are liable more than others to pity and fear and enthusiasm, but from sacred melodies we see them, when they have heard those which act orgiastically on the soul, becoming settled by a kind of medicine and purgation (ica8ap

Aristotle, even in this sketch of his system, shows himself to be the philosopher of facts, who can best of all men bear criticism; and indeed it must be confessed that he retained many errors of Platonism and laid himself open to the following objections. Two substances, being individuals, e.g. Socrates and Callias, are in no way the same, but only similar, even in essence, e.g. Socrates is one rational animal, Callias another. A universal, e.g. the species man, is not predicate of many individuals (ei> Kara

iroW&v, Post. An. i. 11), but a whole number oi similar individuals, e.g. all men; and not a whole species, but only an individual, is a predicate of such individual, e.g. Socrates is a man, not all men, and one white thing, not all white things. Consequently, a species or genus is not a substance, as Aristotle says it is in the Categories (incon- sistently with his own doctrine of substances), but a whole number of substances, e.g. all men, all animals. Similarly, the universal essence of a species is not one and the same as each individual essence, but is the whole number of similar individual essences of the similar individuals of the species, e.g. all rational animals. Consequently, the universal essence of a species of substances is not one and the same eternal essence in all the individuals of a species but only similar, and is not substance as Aristotle calls it in the Metaphysics, incon- sistently with his own doctrine- of substance, but is a whole number of similar substances, e.g. all rational animals which are what all men are. Hence again, the natural world of species and essences is not eternal, but only endures as long as there are individual substances. Hence, moreover, a natural substance or body as an efficient cause or force causes an effect on another, not by propagating one eternal essence of a species into the matter of the other, but so far as we really understand force, by their reciprocally preventing one another from occupying the same place at the same moment on account of the mutual resistance of any two bodies. The essence of a natural substance, e.g. wood, is not immateriate, but is the whole body as what it is. The matter of a natural substance is not a primary matter which is one indeterminate substratum of all natural substances, but is only one body as able to be changed by a force which is another substance able to change it, e.g. a seed becoming wood, wood becoming coal, &c. A natural substance or body, therefore, is not a heterogeneous compound of essence and matter, but is essence as what it is, matter as able passively to be changed, force as able actively to change. The simple bodies which are the matter of the rest are not terrestrial earth, water, air, fire,

and a different celestial aether, but whatever elementary bodies natural scienr.e, starting anew from mechanics and chemistry, may determine to be the matter of all other bodies whatever. Nature does not aim at God as end, but God, thinking and willing ends, produces and acts on nature. Soul is not an immateriate essence of an organic body capable, but an immateri- ate conscious substance within an organic body. Sensation is not the reception of the selfsame essence of an external body, but one's perception of one's sentient organism as affected, and especially of its organs resisting one another, e.g. one's lips, hands, &c, preventing one another from occupying the same place at the same moment within one's organism.

Intelligence does not differ from sense by having no bodily organ, but the nervous system is the bodily organ of both. Intelligence is not active intellect propagating universal essence in passive intellect, but only logical inference starting from sense, and both requiring nervous body and conscious soul. It is not always a true appre- hension of essence, but often, especially in physical matter, such as sound or heat or light, takes superficial effects to be the essence of the thing. Aristotle did not altogether solve the question, What is, and scarcely solved at all the question, How do we know the external world?

We might continue to object. But at bottom there remains the fundamental position of Aristotelianism, that all things are substances, individuals separate though related; that some things are attributes, real only as being some individual substance somehow affected, or, as we should say, modified or determined; and that without individual substances there is nothing, and nothing universal apart from individuals. There remains too the consequence that there are different substances, separate from but related to one another; and these substances of three irreducible kinds, natural, supernatural, human. Aristotelian- ism has to be considered against the philosophy which preceded it and against the philosophy which has since followed it. Platon- ism preceded it, and was the metaphysical doctrine that all things are supernatural — forms, gods, souls. Idealism has since followed it, and is the metaphysical doctrine that all things are mind and states of mind. Aristotelianism intervenes between ancient Platonism and modern Idealism, and is the metaphysical doctrine that all things are substances, natural and supernatural and human. It is a philosophy of substantial things, standing as a via media between a philosophy of the supernatural and a philosophy of mind. There are three alternatives, which may be put as questions which every thinker must ask himself. Are the things which surround me in what I call the environment, — the men, the animals, the plants, the ground, the stones, the water, the air, the moon, the sun, the stars and God — are they shadows, unsubstantial things, as formerly Platonism made all things to be except the supernatural world of forms, gods and souls? Or are they, as modern Idealism says, mind and states of mind? Or are they really substances separate from, though related to, myself, who am also a substance? The Aristotelian answer is — " Yes, all things are substances, but not all supernatural, nor all mental; for some are natural substances, or bodies "; and by that answer Aristotelianism stands or falls.

Literature. — The Aristotelian philosophy is to be studied, first in Aristotle's works, which are the best commentaries on one another; the best complete edition is the Berlin edition (i83i-i87o),by Bekker and Brandis, in which also are the fragments collected by V. Rose, the scholia collected by Brandis, and the index compiled by Bonitz. After reading the remains of

the Peripatetic school, the Greek commentators should be further studied in this edition. The Latin commentators, the Arabians and the schoolmen show how Aristotle has been the chief author of modern culture ; while the vindication of modern independence comes out in his critics, the greatest of whom were Roger and Francis Bacon. Since the modern discovery of the science of motion by Galileo which changed natural science, and the modern revolution of philosophy by Descartes Which changed meta-physics, the study of Aristotle has become less universal ; but it did not die out, and received a fresh stimulus especially from Julius Pacius, who going back through G. Zabarella to the Arabians, and himself gifted with great logical powers, always deserves study in his editions of the Organon and the Physics, and in his Doctrinae Peripateticae. In more recent times, as part of the growing conviction of the essen- tiality of everything Greek, Aristotle has received marked attention. In France there are the works of Cousin (1835), Felix Ravaisson, who

wrote on the Metaphysics (1837-1846), and Barthelemy St Hilaire, who translated the O'ganon and other works (1844 seq.). In Germany there has been a host of commentaries, among which we may mention the Organon edited (1844-1846) by F. Th. Waitz (not so well as by Pacius), the De Anima edited (1833) by F. A. Trendelen- burg and later by A. Torstrik, the Historia Animalium by H. Aubert and F. Wimmer (1868), the Ethics by K. L. Michelet (1827), the Metaphysics by A. Schwegler (1847) and (best of all) by H. Bonitz (1848), who is the most faithful of all commentators, because to great industry and acumen he adds the rare gift of confessing when he does not understand, and when he does not know what Aristotle might have thought. With Aristotle s works before one, with the Index Aristotelicus, and the edition and translation of the Metaphysics by Bonitz on one side, and Zeller's Die Philosophic der Griechen, ii. 2, " Aristoteles " (trans, by Costelloe and Muirhead), on the other side, one can go a considerable way towards understanding the foundations of Aristotelianism.

In England scholars tend to take up certain parts of Aristotle's philosophy. Grote indeed intended to write a general account of Aristotle like that of Plato; but his Aristotle went little further than the logical writings. From Cambridge we have J. W. Blakesley's Life of Aristotle, E. M. Cope's Rhetoric, Dr Henry Jackson's Nico- machean Ethics, v., S. H. Butcher's Poetics, Hicks's De Anima, J. E. Sandys's Athenian Constitution, Jebb's Rhetoric (ed. Sandys). Oxford in particular, since the beginning of the 19th century, has kept alive the study of Aristotle. E. Cardwell in his edition of the Nicomachean Ethics (1828) had the wisdom to found his text on the Laurentian Manuscript (Kb) ; E. Poste wrote translations of the Posterior Analytics and Sophistici Elenchi; R. Congreve edited the Politics; A. Grant edited the Nicomachean Ethics; E. Wallace translated and annotated the

De Anima; B. Jowett translated the Politics; W. L. Newman has edited the Politics in four volumes; Dr Ogle has translated the De Partibus Animalium, with notes; R. Shute wrote a History of the Aristotelian Writings; Professor J A. Stewart has written Notes on the Nicomachean Ethics; Professor J. Burnet has issued an annotated edition of the Nicomachean Ethics, and W. D. Ross has translated the Meta- physics. All these are, or were, Oxford men; and it remains to mention two others: I. Bywater, who as an Aristotelian scholar has done much for the improvement of Bekker's text, especially of the Nicomachean Ethics and the Poetics; and F. G. Kenyon, who has the proud distinction of having been the first modern editor of the 'A6i)vaioiv voXirela. (T. Ca.)

ARISTOXENUS, of Tarentum (4th century B.C.), a Greek peripatetic philosopher, and writer on music and rhythm. He was taught first by his father Spintharus, a pupil of Socrates, and later by the Pythagoreans, Lamprus of Erythrae and Xeno- philus, from whom he learned the theory of music. Finally he studied under Aristotle at Athens, and was deeply annoyed, it is said, when Theophrastus was appointed head of the school on Aristotle's death. His writings, said to have numbered four hundred and fifty-three, were in the style of Aristotle, and dealt with philosophy, ethics and music. The empirical tendency of his thought is shown in his theory that the soul is related to the body as harmony to the parts of a musical instrument. We have no evidence as to the method by which he deduced this theory (cf. T. Gomperz, Greek Thinkers, Eng. trans. 1905, vol. iii. p. 43). In music he held that the notes of the scale are to be judged, not as the Pythagoreans held, by mathematical ratio, but by the ear. The only work of his that has come down to us is the three books of the Elements of Harmony (pvOfuKa oroix«ia) > an incomplete musical treatise. Grenfell and Hunt's Oxyrhynchus Papyri (vol. i., 1898) contains' a five-column fragment of a treatise on metre ; probably this treatise of Aristoxenus.

The best edition is by Paul Marquard, with German translation and full commentary, Die harmonischen Fragmentedes Aristoxenus (Berlin, 1868). The fragments are also given in C.W. Miiller, Frag. Hist. Graec, ii. 269 sqq.; and R Westphal, Melik und Rhythmik d. klass. Helle- nenthums (2nd vol. edited by F. Saran, Leipzig, 1893). Eng. trans, by H. S. Macran (Oxford, 1902). See also W. L. Mahne, Diatribe de Aristoxeno (Amsterdam, 1793); B. Brill, Aristoxenus' rhythmische und metrische Messungen (1871) ; R. Westphal, Griechische Rhythmik und Harmonik (Leipzig, 1867); L. Laloy, AristoxenedeTarenteet la musique de Vanliquile (Paris,i904). See Peripatetics, Pythagoras {Music) and art. " Greek Music" in Grove's Diet, of Music (1904). For the Oxyrhynchus fragment see Classical Review (January 1898), and C. van Jan in Bursian's Jahresbericht, civ. (1901).

ARISUGAWA, the name of one of the royal families of Japan, going back to the seventh son of the mikado Go-Yozei (d. 1638). After the revolution of 1868, when the mikado Mutsu-hito was restored, his uncle, Prince Taruhito Arisugawa (1835-1895), became commander-in-chief, and in 1875 president of the senate.

ARITHMETIC

*5*3*

After his suppression of the Satsuma rebellion he was made a field-marshal, and he was chief of the staff in the war with China (1894-95). His younger brother, Prince Takehito Arisugawa (b. 1862), was from 1879 to 1882 in the British navy, serving in the Channel Squadron, and studied at the Naval College, Greenwich. In the Chino-Japanese War of 1894-95 ne was in command of a cruiser, and subsequently became admiral-superintendent at Yokosuka. Prince Arisugawa represented Japan in England together with Marquis Ito at the Diamond Jubilee (1897), and in 1905 was again received there as the king's guest.

ARITHMETIC (Gr. apidfirfTinr), sc. rixvr\, the art of counting, from apiQuos, number), the art of dealing with numerical quantities in their numerical relations.

1. Arithmetic is usually divided into Abstract Arithmetic and Concrete Arithmetic, the former dealing with numbers and the latter with concrete objects. This distinction, however, might be misleading. In stating that the sum of nd. and 9d. is is. 8d. we do not mean that nine pennies when added to eleven pennies produce a shilling and eight pennies. The sum of money corre- sponding to 1 id. may in fact be made up of coins in several different ways, so that the symbol " nd." cannot be taken as denoting any definite concrete objects. The arithmetical fact is that n and 9 may be regrouped as 12 and 8, and the statement " nd. + od. = is. 8d." is only an arithmetical statement in so far as each of the three expressions denotes a numerical quantity

(§11).

2. The various stages in the study of arithmetic may be arranged in different ways, and the arrangement adopted must be influenced by the purpose in view. There are three main purposes, the practical, the educational, and the scientific; i.e. the subject may be studied with a view to technical skill in deal- ing with the arithmetical problems that arise in actual life, or for the sake of its general influence on mental development, or as an elementary stage in mathematical study.

3. The practical aspect is an important one. The daily activities of the great mass of the adult population, in countries where commodities are sold at definite prices for definite quantities, include calculations which have often to be per- formed rapidly, on data orally given, and leading in general to results which can only be approximate; and almost every branch of manufacture or commerce has its own range of applications of arithmetic. Arithmetic as a school subject has been largely regarded from this point of view.

4. From the educational point of view, the value of arithmetic has usually been regarded as consisting in the stress it lays on accuracy. This aspect of the matter, however, belongs mainly to the period when arithmetic was studied almost entirely for commercial purposes; and even then accuracy was not found always to harmonize with actuality. The development of physical science has tended to emphasize an exactly opposite aspect, viz. the impossibility, outside a certain limited range of subjects, of ever obtaining absolute accuracy, and the consequent importance of not wasting time in attempting to obtain results beyond a certain degree of approximation.

5. As a branch of mathematics, arithmetic may be treated logically, psychologically, or historically. All these aspects are of importance to the teacher: the logical, in order that he may know the end which he seeks to attain; the psychological, that he may know how best to attain this end ; and the historical, for the light that history throws on psychology.

1 The logical arrangement of the subject is not the best for elementary study. The division into abstract and concrete, for instance, is logical, if the former is taken as relating to number and the latter to numerical quantity (§ 11). But the result of a rigid application of this principle would be that the calculation of the cost of 3 lb of tea at 2s. a lb would be deferred until after the study of logarithms. The psychological treatment recognizes the fact that the concrete precedes the abstract and that the abstract is based on the concrete; and it also recognizes the futility of attempting a strictly continuous development of the subject.

On the other hand, logical analysis is necessary if the subject is to be understood. As an illustration, we may take the ele- mentary processes of addition, subtraction, multiplication and division. These are still called in text-books the " four simple rules "; but this name ignores certain essential differences, (i) If we consider that we are dealing- with numerical quantities, we must recognize the fact that, while addition and subtrac- tion might in the first instance be limited to such quantities, multiplication and division necessarily introduce the idea of pure number, (ii) If on the other hand we regard ourselves as dealing with pure number throughout, then, as

multiplication is continued addition, we ought to include in our classification involution as continued multiplication. Or we might say that, since multiplication is a form of addition, and division a form of subtraction, there are really only two fundamental processes, viz. addition and subtraction, (iii) The inclusion of the four processes under one general head fails to indicate the essential difference between addition and multiplication, as direct pro- cesses, on the one hand, and subtraction and division, as inverse processes, on the other (§ 59).

6. The present article deals mainly with the principles of the subject, for which a logical arrangement is on the whole the more convenient. It is not suggested that this is the proper order to be adopted by the teacher.

I. Number

7. Ordinal and Cardinal Numbers. — One of the primary dis- tinctions in the use of number is between ordinal and cardinal numbers, or rather between the ordinal and the cardinal aspects of number. The usual statement is that one, two, three, . . . are cardinal numbers, and first, second, third, . . . are ordinal numbers. This , however, is an incomplete statement ; the words one, two, three, . . . and the corresponding symbols 1, 2, 3, . . . or I, II, III, . . . are used sometimes as ordinals, i.e. to denote the place of an individual in a series, and sometimes as cardinals, i.e. to denote the total number since the commencement of the series.

On the whole, the ordinal use is perhaps the more common. Thus " 100 " on a page of a book does not mean that the page is 100 times the page numbered 1, but merely that it is the page after 99. Even in commercial transactions, in dealing with sums of money, the statement of an amount often has reference to the last item added rather than to a total; and geometrical measurements are practically ordinal (§ 26).

For ordinal purposes we use, as symbols, not only figures, such as 1, 2, 3, . . . but also letters, as a,b,c, . . . Thus the pages of a book may be numbered 1, 2, 3, . . . and the chapters I, II, III, . . . but the sheets are lettered A, B, C, ... Figures and letters may even be used in combination; thus 16 may be followed by 16a and 166, and these by 17, and in such a case the ordinal 100 does not correspond with the total (cardinal) number up to this point.

Arithmetic is supposed to deal with cardinal, not with ordinal numbers; but it will be found that actual numeration, beyond about three or four, is based on the ordinal aspect of number, and that a scientific treatment of the subject usually requires a return to this fundamental basis.

One difference between the treatment of ordinal and of cardinal numbers may be noted. Where a number is expressed in terms of various denominations, a cardinal number usually begins with the largest denomination, and an ordinal number with the smallest. Thus we speak of one thousand eight hundred and seventy-six, and represent it by MDCCCLXXVI or 1876; but we should speak of the third day of August 1876, and repre- sent it by 3. 8. 1876. It might appear as if the writing of 1876 was an exception to this rule; but in reality 1876, when used in this way, is partly cardinal and partly ordinal, the first three figures being cardinal and the last ordinal. To make the year completely ordinal, we should have to describe it as the 6th year of the 8th decade of the 9th century of the 2nd millennium; i.e. we should represent the date by 3. 8. 6. 8. 9. 2, the total number of years, months and days completed being 1875. 7. 2.

In using an ordinal we direct our attention to a term of a series, while in using a cardinal we direct our attention to the interval between two terms. The total number in the series is the sum of the two cardinal numbers obtained by counting up to any interval from the beginning and from the end respectively; but if we take the ordinal numbers from the beginning and from the end we count one term twice over. Hence, if there are 365 days in a year, the 100th day from the beginning is the 266th, not the 265th, from the end.

8. Meaning of Names of Numbers. — What do we mean by any particular number, e.g. by seven, or by two hundred and fifty- three ? We can define two as one and one, and three as one and one and one; but we obviously cannot continue this method for ever. For the definition of large numbers we may employ either of two methods, which will be "called the grouping method and the counting method.

(i) Method of Grouping. — The first method consists in defining the first few numbers, and forming larger numbers by groups or aggregates, formed partly by multiplication and partly by addition. Thus, on the denary system (§ 16) we can give inde- pendent definitions to the numbers up to ten, and then regard (e.g.) fifty-three as a composite number made up of five tens and three ones. Or, on the quinary -binary system, we need only give independent definitions to the numbers up to five; the numbers six, seven,. . . can then be regarded us five and one, five and two, . . . , a fresh series being started when we get to five and five or ten. The grouping method introduces multiplication into the definition of large numbers; but this, from

the teacher's point of view, is not now such a serious objection as it was in the days when children were introduced to millions and billions before they had any idea of elementary arithmetical processes.

(ii) Method of Counting. — The second method consists in taking a series of names or symbols for the first few numbers, and then repeating these according to a regular system for Successive numbers, so that each number is defined by reference to the number immediately preceding it in the series. Thus two still means one and one, but three means two and one, not one and one and one. Similarly two hundred and fifty-three does not mean two hundreds, five tens and three ones, but one more than two hundred and fifty-two; and the number which is called one hundred is not defined as ten tens, but as one more than ninety- nine.

9. Concrete and Abstract Numbers. — Number is concrete or abstract according as it does or does not relate to particular objects. On the whole, the grouping method refers mainly to concrete numbers and the counting method to abstract numbers. If we sort objects into groups of ten, and find that there are five groups of ten with' three over, we regard the five and the three as names for the actual sets of groups or of individuals. The three, for instance, are regarded as a whole when we name them three. If, however, we count these three as one, two, three, then the number of times we count is an abstract number. Thus number in the abstract is the number of times that the act of counting is performed in any particular case. This, however, is a description, not a definition, and we still want a definition for " number " in the phrase " number of times."

10. Definition of " Number."— Suppose we fix on a certain sequence of names " one," " two," " three," . . . , or symbols such as 1, 2, 3, . . . ; this sequence being always the same. If we take a set of concrete objects, and name them in succession " one," " two," " three," . . . , naming each once and once only, we shall not get beyond a certain name, e.g. " six." Then, in saying that the number of objects is six, what we mean is that the name of the last object named is six. We therefore only require a definite law for the formation of the successive names or symbols. The symbols 1, 2,. . .9,10, . . . , for instance, are formed according to a definite law; and in giving 253 as the number of a set of objects we mean that if we attach to them the symbols 1, 2, 3, . . . in succession, according to this law, the symbol attached to the last object will be 253. If we say that this act of attach- ing a symbol has been performed 253 times, then 253 is an abstract (or pure) number.

Underlying this definition is a certain assumption, viz. that if we take the objects in a different order, the last symbol attached will still be 253. This, in an elementary treatment of the subject, must be regarded as axiomatic;

but it is really a simple case of mathematical induction. (See Algebra.) If we take two objects A and B, it is obvious that whether we take them as A, B, or as B, A, we shall in each case get the sequence 1, 2. Suppose this were true for, say, eight objects, marked r to 8. Then, if we introduce another object anywhere in the series, all those coming after it will be displaced so that each will have the mark formerly attached to the next following; and the last will- therefore be 9 instead of 8. This is true, whatever the arrangement of the original objects may be, and wherever the new one is introduced; and therefore, if the theorem is true for 8, it is true for 9. But it is true for 2; therefore it is true for 3; therefore for 4, and so on.

11. Numerical Quantities. — If the term number is confined to number in the abstract, then number in the concrete may be described as numerical quantity. Thus £3 denotes £1 taken 3 times. The £1 is termed the unit, A numerical quantity, therefore, represents a certain unit, taken a certain number of times. If we take £3 twice, we get £6; and if we take 3s. twice, we get 6s., i.e. 6 times is. Thus arithmetical processes deal with numerical quantities by dealing with numbers, provided the unit is the same throughout. If we retain the unit, the arithmetic is > concrete; if we ignore it, the arithmetic is abstract. But in the latter case it must always be understood that there is some unit concerned, and the results have no meaning until the unit is reintroduced.

II. Notation, Numeration and Number-Ideation

12. Terms used. — The representation of numbers by spoken sounds is called numeration; their representation by written signs is called notation. The systems adopted for numeration and for notation do not always agree with one another; nor do they always correspond with the idea which the numbers subjectively present. This latter presentation may, in the absence of any accepted term, be called number-ideation; this word covering not only the perception or recognition of particular numbers; but also the formation of a number-concept.

13. Notation of Numbers. — The system which is now almost universally in use amongst civilized nations for representing cardinal numbers is the Hindu, sometimes incorrectly called the Arabic, system. The essential features which distinguish this from other systems are (1) the limitation of the number of different symbols, only ten being used, however large the number to be represented may be; (2) the use of the zero to indicate the absence of number; and (3) the principle of local value, by which a symbol in effect represents different numbers, according to its position. The symbols denoting a number are called its digits.

A brief account of the development of the system will be found under Numeral. Here we are concerned with the principle, the explanation of which is different according as we proceed on the grouping or the counting system.

(i) On the grouping system we may in the first instance con- sider that we have separate symbols for numbers from " one " to " nine," but that when we reach ten objects we put them in a group and denote this group by the symbol used for " one," but printed in a different type or written of a different size or (in teaching) of a different colour. Similarly when we get to ten tens we denote them by a new representation of the figure denot- ing one. Thus we may have:

ones 1 2345678 tens 12345678 hundreds, / 1 2 3 4 5 6 7 8) &c

&c.

9 9 9

&c.

On this principle 24 would represent twenty-four, 24 two hundred and forty, and 24 two hundred and four. To prevent confusion the zero or " nought " is introduced, so that the succes-i sive figures, beginning from the right, may represent ones, tens, hundreds, . . . We then have, e.g., 240 to denote two hundreds and four tens; and we may now adopt a uniform type for all the figures, writing this 240.

(ii) On the counting system we may consider that we have a

series of objects (represented in the adjoining diagram by dots),

and that we attach to these objects in succession the

1 J symbols 1, 2, 3, 4, 5, 6, 7, 8, 9, o, repeating this series

, , indefinitely. There is as yet no distinction between

: the first object marked 1 and the second object marked

I 1. We can, however, attach to the o's the same sym-

: bols, 1, 2, ... o in succession, in a separate column,

° # repeating the series indefinitely ; then do the same with

io • every o of this new series; and so on. Any particular

1 • object is then defined completely by the combination

2 • of the symbols last written down in each series; and

*3 * this combination of symbols can equally be used to : denote the number of objects up to and including the ■ last one (§ 10).*

In writing down a number in excess of 1000 it is (except where the number represents a particular year) usual in England and America to group the figures in sets of three, starting from the right, and to mark off the sets by commas. On the continent of Europe the figures are taken in sets of three, but are merely spaced, the comma being used at the end of a number to denote the commencement of a decimal.

The zero, called " nought," is of course a different thing from the letter O of the alphabet, but there may be a historical connexion between them (§ 79). It is perhaps interesting to note that the latter-day telephone operator calls 1907 " nineteen seven " instead of " nineteen nought seven."

14. Direction of the Number-Series. — There is no settled convention as to the direction in which the series of symbols denoting the successive numbers one, two, three, ... is to be written.

(i) If the numbers were written down in succession, they would naturally proceed from left to right, thus: — 1,2,3,. • • This system, however, would require that in passing to " double figures " the figure denoting tens should be written either above or below the figure denoting ones, e.g.

1

i, 2, . . . , 8, 9, o, 1, 2, . . . or 1, 2 8, 9, o, 1, 2, . . .

1

The placing of the tens-figure to the left of the ones-figure will not seem natural unless the number-series runs either up or down.

(ii) In writing down any particular number, the successive powers of ten are written from right to left, e.g. 5,462,198 is (6) (5) (4) (3) (*) (1) (°)

5 4 6 2 1 9 8

the small figures in brackets indicating the successive powers. On the other

hand, in writing decimals, the sequence (of negative powers) is from left to right.

(iii) In making out lists, schedules, mathematical tables (e.g. a multiplication-table), statistical tables, &c, the numbers are written vertically downwards. In tbe case of lists and schedules the numbers are only ordinals; but in the case of mathematical or statistical tables they are usually regarded as cardinals, though, when they represent values of a continuous quantity, they must be regarded as ordinals (§§ 26, 93).

(iv) In graphic representation measurements are usually made upwards; the adoption of this direction resting on certain deeply rooted ideas (§ 23).

This question of direction is of importance in reference to the development of useful number-forms (§ 23); and the existence of the two methods mentioned under (iii) and (iv) above produces confusion in comparing numerical tabulation with graphical representation. It is generally accepted that the horizontal direction of increase, where a horizontal direction is necessary, should be from left to right; but uniformity as regards vertical direction could only be attained either by printing mathe- matical tables upwards or by taking " downwards," instead of " upwards," as the " positive " direction for graphical purposes. 200 The downwards direction will be taken in this article as 5° the normal one for succession of numbers (e.g. in multipli-

t cation), and, where the arrangement is horizontal, it is to

253 be understood that this is for convenience of printing. It ˆ should be noticed that, in writing the components of a

number 253 as 200, 50 and 3, each component beneath the next larger one, we are really adopting the downwards principle, since the figures which make up 253 will on this principle be success- ively 2, 5 and 3 (§ 13 (ii)).

15. Roman Numerals. — Although the Roman numerals are no longer in use for representing cardinal numbers, except in certain special cases (e.g. clock-faces, milestones and chemists' prescriptions), they are still used for ordinals.

The system differs completely from the Hindu system. There are no single symbols for two, three, &c; but numbers are represented by combinations of symbols for one, five, ten, fifty, one hundred, five hundred, &c, the numbers which have single symbols, viz. I, V, X, L, C, D, M, proceeding by multiples of five and two alternately. Thus 1878 is MDCCCLXXVIII, i.e. thousand five-hundred hundred hundred hundred fifty ten ten five one one one.

The system is therefore essentially a cardinal and grouping one, i.e. it represents a number as the sum of sets of other numbers. It is therefore remarkable that it should now only be used for ordinal purposes, while the Hindu system, which is ordinal in its nature, since a single series is constantly repeated, is used almost exclusively for cardinal numbers. This fact seems to illustrate the truth that the counting principle is the fundamental one, to which the interpretation of grouped numbers must ultimately be referred.

The normal process of writing the larger numbers on the left is in certain cases modified in the Roman system by writing a number in front of a larger one to denote subtraction. Thus four, originally written IIII, was later written IV. This may have been due to one or both of two causes; a primitive tendency to refer numbers, in numeration, to the nearest large number (§ 24 (iv)), and the difficulty of perceiving the number of a group of objects beyond about three (§22). Similarly IX, XL and XC were written for nine, forty and ninety respectively. These, however, were later developments.

16. Scales of Notation. — In the Hindu system the numbering proceeds by tens, tens of tens, &c; thus the figure in the fifth place; counting from the right, denotes the product of the corre- sponding number by four tens in

succession. The notation is then said to be in the scale of which ten is the base, or in the denary scale. The Roman system, except for the use of symbols for five, fifty, &c, is also in the denary scale, though expressed in a different way. The introduction of these other symbols produces a compound scale, which may be called a quinary- binary, or, less correctly, a quinary-denary scale.

The figures used in the Hindu notation might be used to express numbers in any other scale than the denary, provided new symbols were introduced if the base of the scale exceeded ten. Thus 1878 in the quinary binary scale would be 1131213, and 1828 would be 1130213; the meaning of these is seen at once by comparison with MDCCCLXXVIII and MDCCCXXVIII. Similarly the number which in the denary scale is 215 would in the quaternary scale (base 4) be 3 113, being equal to 3.4.4.4+- I.4.4+I-4+3-.

The use of the denary scale in notation is due to its use in numeration (§ 18); this again being due (as exemplified by the use of the word digit) to the primitive use of the fingers for count- ing. If mankind had had six fingers on each hand and six toes on each foot, we should be using a duodenary scale (base twelve), which would have been far more convenient.

17. Notation of Numerical Quantities. — Over a large part of the civilized world the introduction of the metric system (§ 118) haS caused the notation of all numerical quantities to be in the denary scale. In Great Britain and her colonies, however, and in the United States, other systems of notation still survive, though there is none which is consistently in one scale, other than the denary. The method is to form quantities into groups, and these again into larger groups; but the number of groups making one of the next largest groups varies as we proceed along the scale. The successive groups or units thus formed are called denomina- tions. Thus twelve pennies make a shilling, and twenty shillings a pound, while the penny is itself divided into four farthings (or

two halfpennies). There are, therefore, four denominations, the bases for conversion of one denomination into the next being successively four (or two), twelve and twenty. Within each denomination, however, the denary notation is employed exclusively, e.g. " twelve shillings " is denoted by 1 2s.

The diversity of scales appears to be due mainly to four causes: (i) the tendency to group into scores (§ 20); (ii) the tendency to subdivide into twelve; (iii) the tendency to sub- divide into two or four, with repetitions, making subdivision into sixteen or sixty-four; and (iv) the independent adoption of different units for measuring the same kind of magnitude.

Where there is a division into sixteen parts, a binary scale may be formed by dividing into groups of two, four or eight. Thus the weights ordinarily in use for measuring from \ oz. up to 2 lb give the basis for a binary scale up to not more than eight figures, only o and 1 being used. The points of the compass might similarly be expressed by numbers in a binary scale; but the numbers would be ordinal, and the expressions would be analogous to those of decimals rather than to those of whole numbers.

In order to apply arithmetical processes to a quantity expressed in two or more denominations, we must first express it in terms of

a single denomination by means of a varying scale of notation.

(20) (12)

Thus £254, 13s. 6d. may be written £254 « 13s. » 6d.; each of the numbers in brackets indicating the number of units in one denomination that go to form a unit in the next higher denomination. To express the quantity in terms of £, it ought

(20) (12) ˆ

to be written £254 « 13 1 6; this would mean £254 ∼ˆ or

£(254 + -ˆ+), and therefore would involve a fractional

number.

A quantity expressed in two or more denominations is usually called a compound number or compound quantity. The former term is obviously incorrect, since a quantity is not a number; and the latter is not very suggestive. For agreement with the terminology of fractional numbers (§ 62) we shall describe such a quantity as a mixed quantity. The letters or symbols descriptive of each denomination are visually placed after or (in actual calculations) above the figures denoting the numbers of the corresponding units; but in a few cases, e.g. in the case of £, the symbol is placed before the figures. There would be great convenience in a general adoption of this latter method; the combination of the two methods in such an expression as £123, 1 6s. 4jd. is especially awkward.

18. Numeration. — The names of numbers are almost wholly based on the denary scale; thus eighteen means eight and ten, and twenty-four means twice ten and four. The words eleven and twelve have been supposed to suggest etymologically a denary basis (see, however, Numeral).

Two exceptions, however, may be noted.

(i) The use of dozen, gross (= dozen dozen), and great gross \ «= dozen gross) indicates an attempt at a duodenary basis. But the system has never spread; and the word " dozen " itself is based on the denary scale.

(ii) The score (twenty) has been used as a basis, but to an even more limited extent. There is no essential difference, however, between this and the denary basis. As the latter is due to finger-reckoning, so the use of the fingers and the toes produced a vigesimal scale. Examples of this are given in § 20; it is worthy of notice that the vigesimal (or, rather, quinary-quater- nary) system was used by the Mayas of Yucatan, and also, in a more perfect form, by the Nahuatl (Aztecs) of Mexico.

The number ten having been taken as the basis of numeration, there are various methods that might consistently be adopted for naming large numbers.

(i) We might merely name the figures contained in the number. This method is often adopted in practical life, even as regards mixed quantities; thus £57,593, 16s. 4d. would be read as five seven, five nine three, sixteen and four pence.

(ii) The word ten might be introduced, &.g. 593 would be five ten ten ninety (= nine ten) and three.

(iii) Names might be given to the successive powers of ten, up to the point to which numeration of ones is likely to go. Partial applications of this method are found in many languages.

(iv) A compromise between the last two methods would be to have names for the series of numbers, beginning with ten, each of which is the " square " of the preceding one. This would in effect be analysing numbers into components of the form a. io 6 where a is less than 10, and the index b is expressed in the binary scale, e.g. 7,000,000 would be 7.io 4 .io 2 , and 700,000 would be 7.io 4 .io 1 .

The British method is a mixture of the last two, but with an index-scale which is partly ternary and partly binary. There are separate names for ten, ten times ten (= hundred) , and ten times ten times ten (= thousand) ; but the next single name is million, representing a thousand

times a thousand. The next name is billion, which in Great Britain properly means a million million, and in the United States (as in France) a thousand million.

19. Discrepancies between Numeration and Notation. — Although numeration and notation are both ostensibly on the denary system, they are not always exactly parallel. The following are a few of the discrepancies.

(i) A set of written symbols is sometimes read in more than one way, while on the other hand two different sets of symbols (at any rate if denoting numerical quantities) may be read in the same way. Thus 1820 might be read as one thousand eight hundred and twenty if it represented a number of men, but it would be read as eighteen hundred and twenty if it represented a year of the Christian era; while is. 6d. and i8d. might both be read as eighteenpence. As regards the first of these two examples, however, it would be more correct to write 1,820 for the former of the two meanings (cf. § 13).

(ii) The symbols 11 and \i are read as eleven and twelve, not (except in elementary teaching) as ten-one and ten-two.

(iii) The names of the numbers next following these, up to 19 inclusive, only faintly suggest a ten. This difficulty is not always recognized by teachers, who forget that they themselves had to be told that eighteen means eight-and-ien.

(iv) Even beyond twenty, up to a hundred, the word ten is not used in numeration, e.g. we say thirty-four, not three ten four.

(v) The rule that the greater number comes first is not uni- versally observed in numeration. It is not observed, for instance, in the names of numbers from 13 to 19; nor was it in the names from which eleven and twelve are derived. Beyond twenty it is usually, but not always, observed; we sometimes instead of twenty-four say four and twenty. (This latter is the universal system in German, up to 100, and for any portion of 100 in numbers beyond 100.)

20. Other Methods of Numeration and Notation. — It is only possible here to make a brief mention of systems other than those now ordinarily in use.

(i) Vigesimal Scale.~ The system of counting by twenties instead of by tens has existed itt many countries; and, though there is no corresponding notation, it still exhibits itself in the names of numbers. This is the case, for instance, in the Celtic languages; and the Breton or Gaulish names have affected the Latin system, so that the French names for some numbers are

on the vigesimal system. This system also appears in the Danish numerals. In English the use of the word score to represent twenty — e.g. in " threescore and ten " for seventy — is super- imposed on the denary system, and has never formed an essential part of the language. The word, like dozen and couple, is still in use, but rather in a vague than in a precise sense.

(ii) Roman System. — The Roman notation has been explained above (§ 15). Though convenient for exhibiting the composition of any particular number, it was inconvenient for purposes of calculation; and in fact calculation was entirely (or almost en- tirely) performed by means of the abacus (q.v.). The numeration was in the denary scale, so that it did not agree absolutely with the notation. The principle of subtraction from a higher number, which appeared in notation, also appeared in numeration, but not for exactly the same numbers or in exactly the same way; thus XVIII was two-from-twenty, and the next number was one- from-twenty, but it was written XIX, not IXX.

(iii) Other Systems of Antiquity. — The Egyptian notation was purely denary, the only separate signs being those for 1, 10, 100, &c. The ordinary notation of the Babylonians was denary, but they also used a sexagesimal scale, i.e. a scale whose base was 60. The Hebrews had a notation containing separate signs (the letters of the alphabet) for numbers from 1 to 10, thenfor multiplies of 10 up to 100, and then for multiples of 100 up to 400, and later up to 1000.

The earliest Greek system of notation was similar to the Roman, except that the symbols for 50, 500, &c, were more complicated. Later, a system similar to the Hebrew was adopted, and extended by reproducing the first nine symbols of the series, preceded by accents, to denote multiplication by 1000.

On the island of Ceylon there still exists, or existed till recently, a system which combines some of the characteristics of the later Greek (or Semitic) and the modern European notation; and it is conjectured that this was the original Hindu system.

For a further account of the above systems see Numeral, and the authorities quoted at the end of the present article.

21. The Number-Concept. — It is probable that very few people have any definite mental presentation of individual numbers (i.e. numbers proceeding

by differences of one) beyond 100, or at any rate beyond 144. Larger numbers are grasped by forming numbers into groups or by treating some large number as a unit. A person would appreciate the difference between 93,000,000 m. and 94,000,000 m. as the distance of the centre of the sun from the centre of the earth at a particular moment; but he cer- tainly would not appreciate the relative difference between 93,000,000 m. and 93,000 001 m. In order to get an idea of 93,000,000, he must take a million as his unit. Similarly, in the metric system he cannot mentally compare two units, one of which is 1000 times the other. The metre and the kilometre, for instance, or the metre and the millimetre, are not directly comparable; but the metre can be conceived as containing 100 centimetres.

On the other hand, it would seem that, for most educated people, sixteen and seventeen or twenty-six and twenty-seven, and even eighty-six and eighty-seven, are single numbers, just as six and seven are, and are not made up of groups of tens and ones. In other words, the denary scale, though adopted in notation and in numeration, does not arise in the corresponding mental concept until we get beyond 100.

Again, in the use of decimals, it is unusual to give less than two figures. Thus 3-142 or 3-14 would be quite intelligible; but 3-1 does not convey such a good idea to most people as either 3 T V or 3- 10, i.e. as an expression denoting a fraction or a percentage..

There appears therefore to be a tendency to use some larger number than ten as a basis for grouping into new units or for subdivision into parts. The Babylonians adopted 60 for both these purposes, thus giving us the sexagesimal division of angles and of time.

This view is supported, not only by the intelligibility of percentages to ordinary persons, but also by the tendency, noted above (§ 19), to group years into centuries, and to avoid the use of thousands. Thus 1876 is not 1 thousand, 8 hundred, 7 tens and 6, but 18 hundred and 76, each of the numbers 18 and 76 being named as if it were a single number. It is also in accord- ance with what is so far known about number-forms (§ 23) .

If there is this tendency to adopt 100 as a basis instead of 10, the teaching of decimals might sometimes be simplified by proceeding from percentages to percentages of percentages, i.e. by commencing with centesimals instead of with decimals.

22. Perception of Number. — In using material objects as a basis for developing the number-concept, it must be remembered that it is only when there are a few objects that their number can be perceived without either counting or the performance of some arithmetical process such as addition.

If four coins are laid on a table, close together, they can (by most adults) be seen to be four, without counting; but seven coins have to be separated mentally into two groups, the numbers of which are added, or one group has to be seen and the remaining objects counted, before the number is known to be seven.

The actual limit of the number that can be " seen " — i.e. seen without counting or adding — depends for any individual on the shape and arrangement of the objects, but under similar conditions it is not the same for all individuals. It has been suggested that as many as six objects can be seen at once; but this is probably only the case with few people, and with them only when the objects have a certain geometrical arrangement. The limit for most adults, under favourable conditions, is about four. Under certain conditions it is less; thus IIII, the old Roman notation for four, is difficult to distinguish from III, and this may have been the main reason for replacing it by IV (§ 15).

In the case of young children the limit is probably two. That this was also the limit in the case of primitive races, and that the classification of things was into one, two and many, before any definite process of counting (e.g. by the fingers) came to be adopted, is clear from the use of the " dual number " in language, and from the way in which the names for three and four are often based on those for one and two. With the individual, as with the race, the limit of the number that can be seen gradually increases up to four or five.

The statement that a number of objects can be seen to be three or four is not to be taken as implying that there is a simultaneous perception of all the objects. The attention may be directed in succession to the different objects, so that the perception is rhythmical; the distinctive rhythm thus aiding the perception of the particular number.

In consequence of this limitation of the power of perception of number, it is practically impossible to use a pure denary scale in elementary number-teaching. If a quinary-binary system (such as would naturally fit in with counting on the fingers) is not adopted, teachers unconsciously resort to a binary-quinary system. This is commonly done where cubes are used; thus seven is represented by three pairs of cubes, with a single cube at the top.

23. Visualization of the Series. — A striking fact, in reference to ideas of number, is the existence of number-forms, i.e. of definite arrangements, on an imagined plane or in space, of the mental representations of the successive numbers from 1 onwards. The proportion of persons in whom number-forms exist has been variously estimated ; but there is reason to believe that the forms arise at a very early stage of childhood, and that

they did at some time exist in many individuals who have afterwards forgotten them. Those persons who possess them are also apt to make spatial arrangements of days of the week or the month, months of the year, the letters of the alphabet, &c. ; and it is practically certain that only children would make such arrangements of letters of the alphabet. The forms seem to result from a general tendency to visualization as an aid to memory; the letter-forms may in the first instance be quite as frequent as the number- forms, but they vanish in early childhood, being of no practical value, while the number-forms continue as an aid to arithmetical work.

The forms are varied, and have few points in common; but the following tendencies are indicated.

(i) In the majority of cases the numbers lie on a continuous (but possibly zigzag) line.

(ii) There is nearly always (at any rate in English cases) a break in direction at 12. From 1 to 12 the numbers sometimes lie in the circumference of a circle, an arrangement obviously suggested by a clock-face; in these cases the series usually mounts upwards from 12. In a large number of cases, however, the direction is steadily upwards from 1 to 12, then changing. In some cases the initial direction is from right to left or from left to right; but there are very few in which it is downwards.

(iii) The multiples of 10 are usually strongly marked; but special stress is also laid on other important numbers, e.g. the multiples of 12.

(iv) The series sometimes goes up to very high numbers, but sometimes stops at 100, or even earlier.. It is not stated, in most cases, whether all the numbers within the limits of the series have definite positions, or whether there are only certain numbers which form an essential part of the figure, while others only

exist potentially. Probably the latter is almost universally the case.

These forms are developed spontaneously, without suggestion from outside. The possibility of replacing them by a standard form, which could be utilized for performing arithmetical opera- tions, is worthy of consideration; some of the difficulties in the way of standardization have already been indicated (§ 14). The general tendency to prefer an upward direction is important; and our current phraseology suggests that this is the

direction which increase is naturally regarded as taking. Thus we speak of counting up to a certain number; and similarly mathematicians speak of high and ascending powers, while engineers speak of high pressure, high speed, high power, &c. This tendency is probably aided by the use of bricks or cubes in elementary number-teaching.

24. Primitive Ideas of Number. — The names of numbers give an idea of the way in which the idea of number has developed. Where civilization is at all advanced, there are usually certain names, the origin of which cannot be traced; but, as we go farther back, these become fewer, and the names, are found to be composed on certain systems. The systems are varied, and it is impossible to lay down any absolute laws, but the following seem to be the main conclusions.

(i) Amongst some of the lowest tribes, as (with a few excep- tions) amongst animals, the only differentiation is between one and many, or between one, two and many, or between one, two, three and many. As it becomes necessary to use higher but still small numbers, they are formed by combinations of one and two, or perhaps of three with one or two. Thus many of the Austral- asian and South American tribes use only one and two; seven, for instance, would be two two two one.

(ii) Beyond ten, and in many cases beyond five, the names have reference to the use of the fingers, and sometimes of the toes, for counting; and the scale may be quinary, denary or vigesimal, according as one hand, the pair of hands, or the hands and feet, are taken as the new unit. Five may be signified by the word for hand; and either ten or twenty by the word for man. Or the words signifying these numbers may have reference to the com- pletion of some act of counting. Between five andten; or beyond ten, the names may be due to combinations, e.g. 16 may be $10+5+1$; or they may be the actual names of the fingers 'last counted.

(iii) There are a few, but only a few, cases in which the number 6 or 8 is named as twice 3 or twice 4; and there are also a few cases in which 7, 8 and 9 are named as $6+1$, $6+2$ and $6+3$. In the large majority of cases the numbers 6, 7, 8 and 9 are $5+1$, $5+2$, $5+3$ and $5+4$, being named either directly from their composition in this way or as the fingers on the second hand.

(iv) There is a certain tendency to name 4, 9, 14 and 19 as being one short of 5, 10, 15 and 20 respectively; the principle being thus the same as that of the Roman IV, IX, &c. It is possible that at an early stage the number of the fingers on one hand or on the two hands together was only thought of vaguely as a large number in comparison with 2 or 3, and that the number did not attain definiteness until it was linked up with the smaller by

insertion of the intermediate ones; and the Unking up might take place in both directions.

(v) In a few cases the names of certain small numbers are the names of objects which present these numbers in some conspicuous way. Thus the word used by the Abipones to denote 5 was the name of a certain hide of five colours. It has been suggested that names of this kind may have been the origin of the numeral words of different races; but it is improbable that direct visual perception would lead to a name for a number unless a name based on a process of counting had previously been given to it.

25. Growth of the Number-Concept.— The general principle that the development of the individual follows the development of the race holds good to a certain extent in the. case of the number- concept, but it is modified by the existence of language dealing with concepts which are beyond the reach of the child, and also, of course, by the direct attempts at instruction. One result is the formation of a number-series as a mere succession of names

without any corresponding ideas of number; the series not being necessarily correct.

When numbering begins, the names of the successive numbers are attached to the individual objects; thus the numbers are originally ordinal, not cardinal.

The conception of number as cardinal, i.e. as something belong- ing to a group of objects as a whole, is a comparatively late one, and does not arise until the idea of a whole consisting of its parts has been formed. This is the quantitative aspect of number.

The development from the name-series to the quantitative conception is aided by the numbering of material objects and the performance of elementary processes of comparison, addition, &c, with them. It may also be aided, to a certain extent, by the tendency to find rhythms in sequences of sounds. This tendency is common in adults as well as in children; the strokes of a clock may, for instance, be grouped into fours, and thus eleven is represented as two fours and three. Finger-counting is of course natural to children, and leads to grouping into fives, and ulti- mately to an understanding of the denary system of notation.

26. Representation of Geometrical Magnitude by Number. — The application of arithmetical methods to geometrical measure- ment presents some difficulty. In reality there is a transition from a cardinal to an ordinal system, but to an ordinal system which does not agree with the original

ordinal system from which the cardinal system was derived. To see this, we may represent ordinal numbers by the ordinary numerals 1, 2, 3, . . . and cardinal numbers by the Roman I, II, III, . . . Then in the earliest stage each object counted is indivisible; either we are ‘ counting it as a whole, or we are not , . . , counting it at all. The symbols 1, 2, „ 3, . . . then refer to the individual

objects, as in fig. 1 ; this is the primary ordinal stage. Figs. 2 and 3 represent the cardinal stage; fig. 2

I

2

3

•

I

•

11 • in

1 1

n

Fig. 3.

Hi Fig. 2.

showing how the I, II, III, . . . denote the successively larger groups of objects, while fig. 3 shows how the name II of the whole is determined by the name 2 of the last one counted.

When now we pass to geometrical measurement, each ” one ” is a thing which is itself divisible, and it cannot be said that at any moment we are counting it ; it is only when one is completed that we can count it. The names 1, 2, 3, . . . for the individual objects cease to have an intelligible meaning, and measurement is effected by the cardinal numbers I, II, III, . . . , as in fig. 4.’

in

Fig. 5.

Fig. 4.

These cardinal numbers have now, however, come to denote individual points in the line of measurement, i.e. the points of separation of the individual units of length. The point III in fig. 4 does not include the point II in the same way that the number III includes the number II in fig. 2, and the points must therefore be denoted by the ordinal numbers 1, 2, 3, . . . as in fig. 5, the zero o falling into its natural place immediately before the commencement of the first unit.

Thus, while arithmetical numbering refers to units, geometrical numbering does not refer to units but to the intervals between units.

III. Arithmetic or Integral Numbers

(i.) Preliminary <

27. Equality and Identity.— There is a certain difference between the use of words referring to equality and identity in

*arithmetic and in algebra respectively; what' is an equality in the former becoming an identity in the latter. Thus the state- ment that 4 times 3 is equal to 3 times 4, or, in abbreviated form, 4X3 = 3X4(1 28), is a statement not of identity but of equality; i.e. 4X3 and 3X4 mean different things, but the operations which they denote produce the same result. But in algebra a X b = *= bXa is called an identity, in the sense that it is true whatever a and b may be; while »XX=A is called an equation, as being true, when n and A are given, for one value only of X. Similarly the numbers represented by -^ and ^ are not identical, but are equal.*

28. Symbols of Operation. — The failure to observe the distinc- tion between an identity and an equality often leads to loose reasoning; and in order to prevent this it is important that definite meanings should be attached to all symbols of operation, and especially to those which represent elementary operations. The symbols – and 5 mean respectively that the first quantity mentioned is to be reduced or divided by the second; but there is some vagueness about + and X. In the present article a+b will mean that a is taken first, and b added to it; but aXb will mean that b is taken first, and is then multiplied by a. In the case of numbers the X may be replaced by a dot; thus 4.3 means 4 times 3. When it is necessary to write the multiplicand before the multiplier, the symbol x will be used, so that bxa will mean the same as aX&.

29. Axioms. — There are certain statements that are some- times regarded as axiomatic; e.g. that if equals are added to equals the results are equal, or that if A is greater than B then A + X is greater than B + X. Such statements, however, are capableof logical proof , and are generalizations of results obtained empirically at an elementary stage; they therefore belong more properly to the laws of arithmetic (§ 58).

(ii.) Sums and Differences.

30. Addition and Subtraction. — Addition is the process of expressing (in numeration or notation) a whole, the parts of which have already been expressed; while, if a whole has been expressed and also a part or parts, subtraction is the process of expressing the remainder.

Except with very small numbers, addition and subtraction, on the grouping system, involve analysis and rearrangement. Thus the sum of 8 and 7 cannot be expressed as ones; we can either form the whole, and regroup it as 10 and 5, or we can split up tjie 7 into 2 and 5, and add the 2 to the 8 to form 10, thus getting 8 + 7 = 8 + (2 + 5) = (8 + 2) + 5 = 10 + 5 = 15. For larger numbers the rearrangement is more extensive; thus 24 + 31 = (20 + 4) + (30 + 1) = (20 + 30) + (4 + 1) = 50 + 5 = 55, the process be- ing still more complicated when the ones together make more than ten. Similarly we cannot subtract 8 from 15, if 15 means 1 ten + 5 ones; we must either write 15 — 8 = (io + 5) — 8 = (10— 8) + 5 = 2 + 5 = 7, or else resolve the 15 into an inexpressible number of ones, and then subtract 8 of them, leaving 7.

Numerical quantities, to be added or subtracted, must be in the same denomination; we cannot, for instance, add 55 shillings and 100 pence, any more than we can add 3 yards and 2 metres.

31. Relative Position in the Series. — The above method of dealing with addition and subtraction is synthetic, and is appropriate to the grouping method of dealing with number. We commence with processes, and see what they lead to; and thus get an idea of sums and differences. If we adopted the counting method, we should proceed in a different way, our method being analytic.

One number is less or greater than another, according as the symbol (or ordinal) of the former comes earlier or later than that of the latter in the number-series. Thus (writing ordinals in light type, and cardinals in heavy type) 9 comes after 4, and therefore 9 is greater than 4. To find how much greater, we compare two series, in one of which we go up to 9, while in the other we stop at 4 and then recommence our counting. The series are shown below, the numbers being placed horizontally for convenience of

printing, instead of vertically (§ 14) : —

123456789 1 2 3 4 1 2 3 4 5

This exhibits 9 as the sum of 4 and 5; it being understood that the sum of 4 and 5 means that we add 5 to 4. That this gives the same result as adding 4 to 5 may be seen by reckoning the series backwards.

It is convenient to introduce the zero; thus

0123456789 012345

indicates that after getting to 4 we make a fresh start from 4 as our zero.

To subtract, we may proceed in either of two ways. The subtraction of 4 from 9 may mean either " What has to be added to 4 in order to makeup a total of 9," or " To what has 4 to be added in order to make up a total of 9." For the former meaning we count forwards, till we get to 4, and then make a new count, parallel with the continuation of the old series, and see at what number we arrive when we get to 9. This corresponds to the concrete method, in which we have 9 objects, take away 4 of them, and recount the remainder. The alternative method is to retrace the steps of addition, i.e. to count backwards, treating 9 of one (the standard) series as corresponding with 4 of the other, and finding which number of the former corresponds with o of the latter. This is a more advanced method, which leads easily to the idea of negative quantities, if the subtraction is such that we have to go behind the o of the standard series.

32. Mixed Quantities. — The application of the above principles, and of similar principles with regard to multiplication and division, to numerical quantities expressed in any of the diverse British denominations, presents no theoretical difficulty if the successive denominations are regarded as constituting a varying scale of notation (§17). Thus the expression 2 ft. 3 in. implies that in counting inches we use o to eleven instead of o to 9 as our first repeating series, so that we put down 1 for the next denomination when we get to twelve instead of when we get to ten. Similarly 3 yds. 2 ft. means

yds. 01 2 3

ft. 012012012012 The practical difficulty, of course, is that the addition of two numbers produces different results according to the scale in which we are for the moment proceeding; thus the sum of 9 and 8 is 17, 15, 13 or n according as we are dealing with shillings, pence, pounds (avoirdupois) or ounces. The difficulty may be minimized by using the notation explained in § 17.

(iii.) Multiples, Submultiples and Quotients.

33. Multiplication and Division are the names given to certain numerical processes which have to be performed in order to find the result of certain arithmetical operations. Each process may arise out of either of two distinct operations; but the terminology is based on the processes, not on the operations to which they belong, and the latter are not always clearly understood.

34. Repetition and Subdivision. — Multiplication occurs when a certain number or numerical quantity is treated as a unit (■§ 11), and is taken a certain number of times. It therefore arises in one or other of two ways, according as the unit or the number exists first in consciousness. If pennies are arranged in groups of five, the total amounts arranged are successively once 5d., twice sd., three times sd., . . .; which are written iXsd., 2Xsd., 3X5d., . . . (§ 28). This process is repetition, and the quantities 1 Xsd., 2Xsd., 3X5d., . . . are the successive multiples of sd. If, on the other hand, we have a sum of 5s., and treat a shilling as being equivalent to twelve pence, the 5s. is equivalent to 5 X i2d.; here the multiplication arises out of a subdivision of the original unit is. into i2d.

Although multiplication may arise in either of these two ways, the actual process in each case is performed by commencing with the unit and taking it the necessary number of times. In the above case of subdivision, for instance, each of the 5 shillings is separately converted into pence, so that we do in fact find in succession once i2d., twice i2d., . . . ; i.e. we find the multiples of 1 2d. up to 5 times.

The result of the multiplication is called the product of the unit by the number of times it is taken.

35. Diagram of Multiplication. — The process of multiplication is performed in order to obtain such results as the following: — If 1 boy receives 7 apples, then 3 boys receive 21 apples; or

If is. is equivalent to I2d., then 5s. is equivalent to 6od. The essential portions of these statements, from the arith- metical point of view, may be exhibited in the form of the diagrams A and B : —

A B

1 boy

7 apples

3 boys

21 apples

is.

I2d.

Ss.

6od.

or more briefly, as in C or C and D or D': — C CD

7 apples

I

■*3*

7 apples

21 apples

21 apples

I

I2d.

5

6od.

D' I2d.

tod.

the general arrangement of the diagram being as shown in E or E':—

E E'

Unit

I

Unit

Number

Product

Number

Product

Multiplication is therefore equivalent to completion of the diagram by entry of the product.

36. Multiple-Tables. — The diagram C or D of § 35 is part of a complete table giving the successive multiples of the particular unit. If we take several different units, and write down their successive multiples in parallel columns, preceded by the number- series, we obtain a multiple-table such as the following: — –

‘ ‘

2

9

is. 5d.

3 yds. 2 ft.

17359

2

2

4

18

2S. iod.

7 yds. 1 ft.

34718

3

3

6

27

4s. 3d.

1 1 yds. ft.

52077

4

4

8

36

5s. 8d.

14 yds. 2 ft.

69436

5

5

10

45

7s. id.

18 yds. 1 ft.

86795

It is to be considered that each column may extend downwards indefinitely.

37. Successive Multiplication. — In multiplication by repetition the unit is itself usually a multiple of some other unit, i.e. it is a product which is taken as a new unit. When this new unit has been multiplied by a number, we can again take the product as a unit for the purpose of another multiplication; and so on indefinitely. Similarly where multiplication has arisen out of the subdivision of a unit into smaller units, we can again subdivide these smaller units. Thus we get successive multiplication; but it represents quite different operations according as it is due to repetition, in

the sense of § 34, or to subdivision, and these operations will be exhibited by different diagrams. Of the two diagrams below, A exhibits the successive multiplication of £3 by 20, 12 and 4, and B the successive reduction of £3 to shillings, pence and farthings. The principle on which the diagrams are constructed is obvious from § 35. It should be noticed that in multiplying £3 by 20 we find the value of 20.3, but that in

reducing £3 to shillings, since each £ becomes 20s., we find the value of 3.20.

A S

1

£3

1

20

£60

I

12

£720

4

£2880

id.

4f.

is.

I2d.

£1

20s.

£3

60s.

72od.

288of.

38. Submultiples. — The relation of a unit to its successive multiples as shown in a multiple-table is expressed by saying that it is a submultiple of the multiples, the successive sub- multiples being one-half, one-third, one-fourth, . . . Thus, in the diagram of §36, is. 5d. is one-half of 2s. iod., one-third of 4s. 3d., one-fourth of ss. 8d., . . . ; these being written " j of 2s. iod.," " i of 48. 3d.," " i of S s. 8d," . . .

The relation of submultiple is the converse of that of multiple; thus if a is £ of b, then b is 5 times a. The determination of a sub- multiple is therefore equivalent to completion of the diagram E or E' of § 35 by entry of the unit, when the number of times it is taken, and the product, are given. The operation is the converse or repetition; it is usually called partition, as representing division into a number of equal shares.

39. Quotients. — The converse of subdivision is the formation of units into groups, each constituting a larger unit; the number of the groups so formed out of a definite number of the original units is called a quotient. The determination of a quotient is equivalent to completion of the diagram by entry of the number when the unit and the product are given. There is no satisfactory name for the operation, as distinguished from partition; it is sometimes called measuring, but this implies an equality in the original units, which is not an essential feature of the operation.

*40. Division. — From the commutative law for multiplication, which shows that 3X4d. = 4X3d. = i2d., it follows that the number of pence in one-fourth of i2d. is equal to the quotient when 1 2 pence are formed into units of 4d. ; each of these numbers being said to be obtained by dividing 1 2 by 4. The term division is therefore used in text-books to describe the two processes described in §§ 38 and 39; the product mentioned in § 34 is the dividend, the number or the unit, whichever is given, is called the divisor, and the unit or number which is to be found is called the quotient. The symbol 4 is used to denote both kinds of division; thus A r n denotes the unit, n of which make up A,*and A-=-B denotes the number of times that B has to be taken to make up A. In the present article this confusion is avoided by writing the*

former as – of A.

Methods of division are considered later (§§ 106-108).

41. Diagrams of Division. — Since we write from left to right or downwards, it may be convenient for division to interchange the rows or

the columns of the multiplication-diagram. Thus the uncompleted diagram for partition is F or G, while for measuring it is usually H; the vacant compartment being for the unit in

F

G

H

K

1

Number

Product

Unit

1

I2d.

IS.

Number

Product

1

Product

6od.

F or G, and for the number in H. In some cases it may be con- venient in measuring to show both the units, as in K. . 42. Successive Division may be performed as the converse, of successive multiplication. The diagrams A and B below are the converse (with a slight alteration) of the corresponding diagrams

in § 37; A representing the determination of -fa of ˆ of I of 2880 farthings, and B the conversion of 2880 farthings into £. A B

4

288of.

12

1

720f.

20

I

6of.

-

3f-

20s.

£1

I2d.

IS.

4f-

id.

288of.

72od.

60s.

£3

(iv.) Properties of Numbers. (A) Properties not depending on the Scale of Notation. 43. Powers, Roots and Logarithms. — The standard series 1, 2, 3, ... is obtained by successive additions of 1 to the number last found. If instead of commencing with 1 and making successive additions of 1 we commence with any number such as 3 and make successive multiplications by 3, we get a series 3, o, 27, . . . as shown below the line in the margin. The first mem-

o i=3° nf>

ber of the series is 3 ; the second is the product of

1 3 = 3′ n 1 two numbers, each equal to 3 ; the third is the pro-

2 9=3 2 » 2 duct of three numbers, each equal to 3; and so on. 3 « 7 = 3 < " 4 These are written 3 1 (or 3), 3, 3 3 , 3 4 , . . . where . . . n p denotes the product of p numbers, each equal to]] '. ', 11. If we write nP = n, then, if any two of the three*

numbers n, p, n are known, the third is determinate. If we know n and p, p is called the index, and n, » 2 , . . . n p are called the first power, second power, . . . pth power of n, the series itself being called the power-series. The second power and third power are usually called the square and cube respectively. If we know p and N, n is called the pth root of N,'so that n is the second (or square) root of n 1 , the third (or cube) root of n 3 , the fourth root of n 4 , . . . If we know » and N, then p is the logarithm of n to base n.

The calculation of powers (i.e. of N when n and p are given) is involution; the calculation of roots (i.e. of n when p and N are given) is evolution; the calculation of logarithms (i.e. of p whenw and N are given) has no special name.

Involution is a direct process, consisting of successive multipli- cations; the other two are inverse processes. The calculation of a logarithm can be performed by successive divisions; evolution requires special methods.

The above definitions of logarithms, &c, relate to cases in which w and p are whole numbers, and are generalized later.

44. Law of Indices. — If we multiply n" by ««, we multiply the product of p «'s by the product of q n's, and the result is therefore n T +°. Similarly, if we divide n" by n", where q is less than p, the result is n v – q . Thus multiplication and division in the power-series correspond to addition and subtraction in the index-series, and vice versa.

If we divide n by n p , the quotient is of course 1. This should be written «°. Thus we may make the power-series commence with 1 , if we make the index-series commence with o. The added terms are shown above the line in the diagram in § 43.*

45. Factors, Primes and Prime Factors. — If we take the suc- cessive multiples of 2, 3, . . . t

as in § 36, and place each 2 2

multiple opposite the same 3 3

number in the original series, 4 4 4

we get an arrangement as g ‘ 6 g] ‘ _ ^ ‘ ‘ ” ‘

in the adjoining diagram. If 7 7 . .

any number N occurs in the 8 8 8 8

vertical series commencing 9 9

with a number n (other than IZ ”’ “.

1) then n is said to be a factor 12 12 12 12 12 . .

of N. Thus 2, 3 and 6 are

factors of 6; and 2, 3, 4, 6

and 12 are factors of 12. A number (other than 1) which has no factor except itself is

called a prime number, or, more briefly, a prime. Thus 2, 3, 5, 7 and 1 1 are primes, for each of these occurs twice only in the table. A number (other than 1) which is not a prime number is called a composite number.

If a number is a factor of another number, it is a factor of any multiple of that number. Hence, if a number has factors, one at least of these must be a prime. Thus 12 has 6 for a factor; but 6 is not a prime, one of its factors being 2 ; and therefore 2 must also be a factor of 12. Dividing 12 by 2, we get a submultiple 6, which again has a prime 2 as a factor. Thus any number which is not itself a prime is the product of several factors, each of which is a prime, e.g. 12 is the product of 2, 2 and 3. These are called prime factors.

The following are the most important properties of numbers in reference to factors: —

(i) If a number is a factor of another number, it is a factor of any multiple of that number.

(ii) If a number is a factor of two numbers, it is a factor of their sum or (if they are unequal) of their difference. (The words in brackets are inserted to avoid the difficulty, at this stage, of saying that every number is a factor

of o, though it is of course true that o. » = o, whatever n may be.)

(iii) A number can be resolved into prime factors in one way only, no account being taken of their relative order. Thus 12 = 2X2X3 = 2X3X2 = 3X2X2, but this is regarded as one way only. If any prime occurs more than once, it is usual to write the number of times of occurrence as an index; thus

*144=2X2X2X2X3X3 = 2*3-*

The number 1 is usually included amongst the primes; but, if this is done, the last paragraph requires modification, since 144 could be expressed as 1. 2 4 . 3 2 , or as i 2 . 2. 3 2 , or as i". 2*. 3 2 , where p might be anything.*

If two numbers have no factor in common (except 1) each is said to be prime to the other.

The multiples of 2 (including 1.2) are called even numbers; other numbers are odd numbers.

46. Greatest Common Divisor. — If we resolve two numbers into their prime factors, we can find their Greatest Common Divisor or Highest Common Factor (written G.C.D. or G.C.F. or H.C.F.), i.e. the greatest number which is a factor of both. Thus 144= 2 3 2 , and 756 = 2 2 3^ 7, and therefore the G.C.D. of 144 and 7561s 2* 3 2 =36. If we require the G.C.D. of two numbers, and cannot resolve them into their prime factors, we use a pro- cess described in the text-books. The process depends on (ii) of § 45, in the extended form that, if x is a factor of a and b, it is a factor of pa-qb, where p and q are any integers.*

The G.C.D. of three or more numbers is found in the same way.

*47. Least Common Multiple.— The Least Common Multiple, or L.CiM., of tWo numbers, is the least number of which they are both factors. Thus, since 144=2'**. 3 2 , and 756 = 2** s 3 7, the L.C.M. of 144 and 756 is 2* 3'. 7. It is clear, from comparison with the last paragraph, that the product of the G.C.D. and the L.C.M. of two numbers is equal to the product of the numbers themselves. This gives a rule for finding the L.C.M. of two numbers. But we cannot apply it to finding the L.C.M. of three or more numbers; if we cannot resolve the numbers into their prime factors, we must find the L.C.M. of the first two, then the L.C.M. of this and the next number, and so on.*

(B) Properties depending on the Scale of Notation.

48. Tests of Divisibility.— The following are the principal rules for testing whether particular numbers are factors of a given number. The number is divisible —

(i) by 10 if it ends in o;

(ii) by 5 if it ends in o or 5 ;

(iii) by 2 if the last digit is even;

(iv) by 4 if the number made up of the last two digits is divisible by 4;

(v) by 8 if the number made up of the last three digits is divisible by 8;

(vi) by 9 if the sum of the digits is divisible by 9;

(vii) by 3 if the sum of the digits is divisible by 3 ;

(viii) by n if the difference between the sum of the ist, 3rd, 5th, . . . digits and the sum at the 2nd, 4th, 6th, . . . is zero or divisible by 11.

(ix) To find whether a number is divisible by 7, ij or 13, arrange the number in groups of three figures, beginning from the end, treat each group as a separate! number,, and then find the difference between the sum of the ist, 3rd, ... pf these numbers and the sum of the 2nd, 4th, , . . Then,. if this difference is zero or is divisible by 7, n or 13, the original number is also so divisible; and conversely. For example, 31521 gives 521—31 "=490, and therefore is divisible by 7, but not by 11 or 13.

49. Casting out Nines is a process based on (vi) of the last paragraph. The remainder when a number is divided by 19 is equal to the remainder when the sum of its> digits is divided by 9. Also, if the remainders when two numbers arq divided by 9 are respectively a and b, the remainder when their product is divided by 9 is the same as the remainder when a.b is divided by 9. This gives a rule for testing multiplication, .which is found in most text-books. It is doubtful, however, whether such a rule, giving a test which is necessarily incomplete, is of much educational value.

(v.) Relative Magnitude. _

50. Fractions. — A fraction of a quantity is a suhmultiple, or a multiple of a submultiple, of that quantity. Thus, since 3 X is. sd. =4S. 3d., is, sd. may be denoted by J of 4s. 3d. ; and any multiple of is. sd., denoted

bywXis. sd.,:may also be

denoted by – of 4s. 3d.

We therefore use ” – of A

to mean that A, and then multiply

we find a quantity X such that aXX

Xbyn.

n It must be noted (i) that this is a definition of “- of, “not a

definition of ” -,”’ arid (ii) that it is not necessary that n should be

less than a.

5 1 . Subdivision of Submultiple. — By f of A we mean: 5 times the unit, 7 times which is A. If we regard this unit as being 4 times a lesser unit, then A_is 7.4 times this lesser unit, and 4 of A is 5.4

times the lesser unit. Hence f of A is equal to “^ of A; and, conversely, $£ of A is equal to f oi A. Similarly each of these is equal to 5~ of A. Hence the value of a fraction is not altered by substituting for the numerator and denominator the corresponding numbers in any other column of a multiple-table

(§ 36). If we write rqr in the form J^ we may say that the value of a fraction is not altered by multiplying or dividing the numerator and denominator by any number.

52. Fraction of a Fraction. — To find V of 4, of A we must convert f of A into 4 times some unit. This is done by the pre- ceding paragraph. For ^ of A = = ^ of A = ?~ of A; i.e. it is 4 times a unit which is itself 5 times another unit, 7,4 times, which is A. Hence, taking the former unit 1 1 times instead of 4 times,*

Yof f of A = tU^of A. 1

. 7-4 .

A fraction of a fraction is sometimes called a compound

fraction.

53. Comparison, Addition and Subtraction of Fractions. — The quantities f

of A and ˆ of A are expressed in terma of different units. To compare them, or to add or subtract them, we must express them in terms of the same unit: Thus, taking ˆ of A as the unit, we have (§51)

I of A = |£of A; f of A = f| of" A. Hence the former is greater than the latter; their sum is.-f£of A; and their difference is -ˆg of A.

Thus the fractions must be reduced to a common denominator. This denominator must, if the fractions are in their lowest terms (§ 54). he a multiple of each of the denominators; it is usually most convenient that it should be their L.C.M. (§47).

54. Fraction in its Lowest Terms.— A fraction is said to be in its lowest terms when its numerator and denominator have no common

I

7 d.

10

5s. iod.

24

14s.

factor; or to be reduced to its lowest terms when it is replaced by such a fraction. : Thus ˆ\ of A is said to be reduced to its lowest terms when it is replaced by T 4 T of A. It is important always to bear in mind that T \ of A is not the same as -fy of A, though it is equal to it. ' 55. Diagram of Fractional Relation. — To find -j-f of 14s. we have to take 10 of the units, 24 of which make up 14s. Hence the required amount will, in the multiple-table of § 36, be opposite 10 in the column in which the amount opposite 24 is 14s. ; the quantity at the head of this column, representing the unit, will be found to be 7d. The elements of the multiple-table with which we are concerned are shown in the diagram in the margin. This diagram serves equally for the two statements that (i) -|-jf of 14s. is 5s. iod., (ii) If of 5s. iod! is 14s. The two statements are in fact merely different aspects of a single relation, considered in the next section.

56. Ratio. — If we omit the two upper compartments of the diagram in the last section, • we obtain the diagram A. This ˆ diagram exhibits a relation between the two

amounts 5s. rod. and 14s. on the one hand, and the numbers 10 and 24 of

the standard series on the other, which is expressed by say- ing that 5s. iod. is to 14s. in the ratio of 10 to 24, or that 14s. is to 5s. rod. in the ratio of 24 to 10. If we had taken is. 2d. instead of 7d. as the unit for the second column, we should have obtained the diagram B. Thus we must regard the ratio of a to b as being the same as the ratio of c to d, if the fractions

are equal. For this reason the ratio of a to J is sometimes written T , but

10 '

5s. iod.

24

; I4S.

B

5

5s. iod.

12

14s. ;

b and d

2s. rod.

8s. 6d.

7 yds. 1 ft.

22 yds.

reason a b' the more correct method is to write it a: o.

If two quantities or numbers P and Q are to each other in the ratio of p to q, it is clear from the diagram that p times Q=

q times P, so that Q = p of P.

57. Proportion. — If from any two columns in the table of § 36 we remove the numbers or quantities in any two rows, we get

a diagram such as that here shown. The pair of compartments on either side may, as here, contain numerical quantities, or may contain numbers.

But the two pairs of compartments will correspond to a single pair of numbers, e.g> 2 and 6, in the standard series, so that,. denoting them by M, N and P, Q respectively, M w.ill be to N in the same ratio that P is to Q. This is expressed by saying that M is to N as P to Q, the relation being written M :N ::P :Q; the four quantities are .then said tobe in proportion ipr to be proportionals.

This is the most general expression of the relative magnitude of two quantities; i.e. the relation expressed by proportion includes the relations expressed by multiple, submultiple, fraction and ratio.

If M and N are respectively m and n times a unit, and P and Q are respectively p and q times a unit, then the quantities are in proportion if mq =t np ; and conversely.

IV. Laws of Arithmetic , 58. Laws of Arithmetic. — The arithmetical processes which we have considered in reference to positive integral numbers are subject to the following laws: —

(i) Equalities and Inequalities.— The following are sometimes called Axioms (§ 29), but their truth should be proved, even if at an early stage it is assumed- The symbols ” > ” and ” < " mean respectively " is greater than " and "is less than." The numbers represented by a, b, c, x and m are all supposed to be positive.

‘ M .

P

N .

,Q

ARITHMETIC

533

(a) If a = b, and b = c, then a = c;

(b) If a — b, then a+x=b+x, and a—x — b—x;

(c) If a> J, then a+ #>6+;c, and a— x>b— x;

(d) If o<6, then a+x

(e) If a = &, then ma=mb, and a-i-m=b-i-m; (/) If a>6, then ma>mb, and a-j-»i>&-=-m; (g) If a

(ii) Associative Law for Additions and Subtractions. — This law includes the rule of signs, that a—(b—c) = a — b+c; and it states that, subject to this, successive operations of addition or sub- traction may be grouped in sets in any way; e.g.a— b+c+d+e — f = a-{b-c) + {d+e-f).

(iii) Commutative Law for Additions and Subtractions, that additions and subtractions may be performed in any order; e.g. a — b+c+d = a+c — b+d = a+d+c — b.

(iv) Associative Law for Multiplications and Divisions. — This law includes a rule, similar to the rule of signs, to the effect that a-7-{b-i-c)=a J hbxc; and it states that, subject to this, successive operations of multiplication or division may be grouped in sets in any way; e.g. a-i-bxcxdxe-i-f=a-i-{b- : rc)x(dxe-i-f).

(v) Commutative Law for Multiplications and Divisions, that multiplications and divisions may be performed in any order: e.g. a-7-bxcxd = axc-r-bxd — axdxc-i-b.

(vi) Distributive Law, that multiplications and divisions may be distributed over additions and subtractions, e.g. that m{a+b — c)=m.a+m.b — m.c, or that (a+b — e)-f- #=(a-h n)+ (J-s-!»)-(c-s-»).

In the case of (ii), (iii) and (vi), the letters d, b,c, . . . may denote either numbers or numerical quantities, while m and n denote numbers; in the case of (iv) and (v) the letters denote numbers only.

59. Results of Inverse Operations. — Addition, multiplication and involution are direct processes; and, if we start with positive integers, we continue with positive integers throughout. But, in attempting the inverse processes of subtraction, division, and either evolution or determination of index, the data may be such that a process cannot be performed. We can, however, denote the result of the process by a symbol, and deal with this symbol according to the laws of arithmetic. In this way we arrive at (i) negative numbers, (ii) fractional numbers, (iii) surds, (iv) logarithms (in the ordinary sense of the word).

60. Simple Formulae. — The following are some simple formulae which follow from the laws stated in § 58.

(i) (a + b+c+ . . .) (p+q+r+ . . .)<=={ap+aq+ar+ ...) + (bp +bq+br+ . . .) + {cp+cq+cr+ . . .) + . . . ; i.e. the' pro- duct of two or more numbers, each of which Consists of two or more parts, is the sum of the products of each part of the one with each part of the other.

(ii) {a + b) (a — b) = a 2 — b 2 ; i.e. the product of the sum and the

difference of two numbers is equal to the difference of their squares.

(iii) (a + />) 2 = a 2 +2a6 + ft l = ˆ+(2a+&)&. V. Negative Numbers

61. Negative Numbers may be regarded as resulting from the commutative law for addition and subtraction. According to this law, 10+3 + 6— 7= 10+3 — 7+6 = 3 + 6 — 7 + io = &c. But,ifwe write the expression as 3 — 7 + 6+10, this means that we must first subtract 7 from 3. This cannot be done; but the result of the subtraction, if it could be done, is something which, when 6 is added to it, becomes 3 — 7+6 = 3+6 — 7 = 2. The result of 3 — 7 is the same as that of 0—4; and we may write it " —4," and call it a negative number, if by this we mean something possessing the property that —4+4 = 0.

This, of course, is unintelligible on the grouping system of treating number; on the counting system it merely means that we count backwards from o, just as we might count inches back- wards from a point marked o on a scale. It should be remembered that the counting is performed with something as unit. If this unit is A, then what we are really considering is — 4A; and this means, not that A is multiplied by —4, but that A is multiplied by 4, and the product is taken negatively. It would therefore be better, in some ways, to retain the unit throughout, and to describe — 4A as a negative quantity, in order to avoid confusion

Ones. Sixths, o

with the " negative numbers ": with which operations are per- formed in formal algebra.

The positive quantity or number obtained from a negative quantity or number by omitting the " — " is called its numerical value.

VI. Fractional and Decimal Numbers

62. Fractional Numbers. — According to the definition in § 50 the quantity denoted by |- of A is made up of a number, 3, and a

unit, which is one-sixth of A. Similarly -2 of A, -ˆof A, —'of A,

■ *' J n ' n ' n '*

. . . mean quantities which are respectively p times, q times r times, . . .the unit, n of which make up A. Thus any arith- metical processes which can be applied to the numbers p, q, r,

. . . can be applied to £, 3., ˆ . . . , the denominator tl remaining unaltered.

If we denote the unit — of A by X, then A is n times X, and

*£ of n times X is * times X; i.e. £ of « times is * times.*

n ■ ■ .. n ‘

Hence, so long as the denominator remains unaltered, we can

*deal with *, $■, — , ... exactly as if they were numbers, any*

operations being performed on the numerators. The expressions

£ 1 L are then fractional numbers, their relation to

n’ n> n’ J

*ordinary or integral numbers being that * times n times is equal*

to p times. ,

This relation is of exactly the same kind as the relation of the

successive digits in numbers expressed in a scale of notation whose base is n. Hence we can treat the fractional numbers which have any one denominator as

constituting a number-series, as shown in the

2 adjoining diagram. The result of taking 13 sixths

3 of A is, then seen to be the same as the result of

4 taking twice A and one-sixth of A, so that we may

5 regard Jg 3 – as being equal to 2 J. A fractional

1 j number is called a proper fraction or an improper

2 fraction according as the numerator is or is not

3 less than the denominator; and an expression .4 S uch. as a£ is called a, mixed number. An im-

2 q proper fraction is therefore equal either to an

1 integer or to a mixed number. It will be seen from § 17 that ,a mixed

number corresponds with what is there called a mixed quantity. Thus £3, 17s. is a mixed quantity, being ex- pressed in pounds and shillings; to express it in terms of pounds only we must write it £3ˆ0-

63. Fractional Numbers with different Denominators.— Ii we divided the unit into halves, and these new units into thirds, we

should get sixths of the original unit, as

A shown in A; while, if we divided the

Ones. Halves. Sixths, unit into thirds, and these new units

o o . into halves, we should again get sixths,

1 but as shown in B. The series of halves

in the one case, and of thirds in the

1 other, are entirely different series of

2 fractional numbers, but we can com-

1 o o p are them by putting each in its proper

position in relation to the seriesof sixths. \ Thus f is equal to |, and f is equal to V", and conversely; in other words, any fractional number is equivalent to the B fractional number obtained by multi-

Ones. Thirds. Sixths, plying or dividing the numerator and o o o denominator by any integer. We can

thus find fractional numbers equivalent to the sum or difference of any two fractional numbers. The process is the same as that of finding the sum or differ- ence of 3 sixpences and 5 fourpences; we cannot subtract 3 sixpenny-bits from 5 fourpenny-bits, but we can ex- press each as an equivalent number of

pence, and then perform the subtraction. Generally, to find the sum or difference of two or more fractional numbers, we must replace them by other fractional numbers having the same denominator; it is usually most convenient to take as this denominator the L.C.M. of the original fractional numbers (cf.

§ S3)-

64. Complex Fractions. — A fraction (or fractional number), the numerator or denominator of which is a fractional number, is called a complex fraction (or fractional number), to distinguish it from a simple fraction, which is a fraction having integers for

numerator and denominator. Thus 777. of A means that we take

a unit X such that 113 times X is equal to A, and then take sf times X. To simplify this, we take a new unit Y, which is § of X.

Then A is 34 times Y, and •j L pT of A is 1 7 times Y, i.e. it is 5 of A.

65. Multiplication of Fractional Numbers. — To multiply fbyf is to take f times |. It has already been explained (§ 62) that f times is an operation such that f times 7 times is equal to 5 times. Hence we must express $, which itself means f times, as being 7 times something. This is done by multiplying both numerator

and denominator by 7 ; i.e. f is equal to ~, which is the same

.8 – . 7-3 ■

thing as 7 times r-r 8 5J3 ” A

times

Hence f times f = -f ‘ times 7 times T”7 = 5

_ , 7 ,. The rule for multiplying a. fractional number

by a fractional number is therefore the same as the rule for finding a fraction of a fraction.

66. Division of Fractional Numbers.— To divide $ by f is to find a number {i.e. a fractional number) * such that f times x is equal to f . But £ times f times * is, by the last section, equal to x. Hence x is equal to £ times $. Thus to divide by a fractional number we must multiply by the number obtained by inter- changing the numerator and the denominator, i.e. by the recipro- cal of the original number.

If we divide 1 by { we obtain, by this rule, -J. Thus the reciprocal of a number may be defined as the number: obtained by dividing 1 by it. This definition applies whether the original number is integral or fractional.

By means of the present and the preceding sections the rule given in § 63

can be extended to the statement that a fractional number is equal to the number obtained by multiplying its numerator and its denominator by any fractional number.

67. Negative Fractional Numbers. — We can obtain negative fractional numbers in the same way that we obtain negative integral numbers ; thus — f or — f A means that f or 4 A is taken negatively.

68. Genesis of Fractional Numbers. — A fractional number may be regarded as the result of a measuring division (§ 39) which cannot be performed exactly. Thus we cannot divide 3 in. by 11 in. exactly, i.e. we cannot express 3 in. as an integral multiple of 11 in. ; but, by extending the meaning of" times " as in § 62, we can say that 3 in. is tV times 11 in., and therefore call T 3 r the quotient when 3 in. is divided by 1 1 in. Hence, if p and n are

numbers, – is sometimes regarded as denoting the result of dividing p by n, whether p and n are integral or fractional (mixed numbers being included in fractional).

The idea and properties of a fractional number having been explained, we' may now call it, for brevity, a fraction. Thus " I of A " no longer means two of the units, three of which make up A; it means that A is multiplied by the fraction \, i.e. it means the same thing as " \ times A."

69. Percentage— In order to deal, by way of comparison or addition or subtraction, with fractions which have different denominators, it is necessary to reduce them to a common denominator. To avoid this difficulty, in practical life, it is usual to confine our operations to fractions which have a certain standard denominator. Thus (§ 79) the Romans reckoned in twelfths, and the Babylonians in sixtieths; the former method supplied a basis for division by 2, 3, 4, 6 or 12, and the latter for division by 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, or 60. The modern method is to deal with fractions which have 100 as denominator;

such fractions are called percentages. They only apply accurately to divisions by 2, 4, 5, 10, 20, 25 or 50; but they have the con- venience of fitting in with the denary scale of notation, and they can be extended to other divisions by using a mixed number as numerator. One-fortieth, for instance, can be expressed as

yˆTj, which is called 25 per cent., and usually written 25 %. Similarly 35 % is equal to one-thirtieth.

If the numerator is a multiple of 5, the fraction represents twentieths. This is convenient, e.g. for expressing rates in the pound; thus 15 % denotes the

process of taking 3s. for every £1, i.e. a rate of 3s. in the £.

In applications to money " per cent." sometimes means " per £100." Thus "£3, 17s. 6d. per cent." is really the complex

fraction 20 .

100

70. Decimal Notation of Percentage. — An integral percentage, i.e. a simple fraction with 100 for denominator, can be expressed by writing the.two figures of the numerator (or, if there is only one figure, this figure preceded by o) with a dot or " point " before them; thus -76 means 76 %, or ˆV If there is an integral number to be taken as well as a percentage, this number is written in front of the point; thus 23-76 X A means 23 times A, with 76 % of A. We might therefore denote 76 % by 0-76.

If as our unit we take X= jo's of A = i % of A, the above quantity might equally be written 2376 X = Vov ˚f A; i.e. 23-76 X A is equal to 2376 % of A.

71. Approximate Expression by Percentage. — When a fraction cannot be expressed by an integral percentage, it can be so expressed approximately, by taking the nearest integer to the numerator of an equal fraction having 100 for its denominator.

Thus 7 = 7ˆ5, so that 1. is approximately equal to 14%; and

7 = 75ˆ, which is approximately equal to 29 %. The difference

between this approximate percentage and the true value is less than \ %, i. e. is less than -j-J-j. If the numerator of the fraction consists of an integer and

5— e.g. in the case of g = 757} — it is uncertain whether we should take the next lowest or the next highest integer. It is best in such cases to retain the 5; thus we can write f = 37f % = -375.

72. Addition and Subtraction of Percentages. — The sum or difference of two percentages is expressed by the sum or difference of the numbers expressing the two percentages.

73. Percentage of a Percentage. — Since 37 % of 1 is expressed by ˚'37> 37 % ˚f 1 % (i-C- of o-oi) might similarly be expressed by 0-00-37. The second point, however, is omitted, so that we write it 0-0037 or 0037, this expression meaning fife of tJt = tAV¥

On the same principle, since 37 % of 45 % is equal to -/oV of i 4 6 o = iVWV= iVV+CtoV of tot), we can express it by -1665; and 3 % of 2 % can be expressed by 0006. Hence, to find a percent age of a percentage, we multiply the two numbers, put o's in front if necessary to make up four figures (not counting fractions), and prefix the point.

74. Decimal Fractions. — The percentage-notation can be extended to any fraction which has any power of 10 for its denominator. Thus i can be written -153 and iVVoVo can be written -15300. These two fractions are equal to each other, and also to -1530. A fraction written in this way is called a decimal fraction; or we might define a decimal fraction as a fraction having a power of 10 for its denominator, there being a special notation for writing such fractions.

A mixed number, the fractional part of which is a decimal fraction, is expressed by writing the integral part in front of the point, which is called the decimal point. Thus 2 7To 5 o iJ o Q o~can be written 27-1530. This number, expressed in terms of the fraction to 000 ° r – oooi, would be 271530. Hence the successive figures after the decimal point have the same relation to each other and to the figures before the point as if the point did not exist. The point merely indicates the denomination in which the number is expressed: the above number, expressed in terms

of ˆji would be 271-530, but expressed in terms of 100 it would be

•■271530-

Fractions other than decimal fractions are usually called vulgar fractions.

75. Decimal Numbers. — Instead of regarding the 153 in 27 153 as meaning iVoV> we may regard the different figures in the expression as denoting numbers in the successive orders of submultiples of 1 on a denary scale. Thus, on the grouping system, 27-153 will mean 2.io+7+i/io+5/io 2 +3/io 3 , while on the counting system it will mean the result of counting through the tens to 2, then through the ones to 7, then through tenths to 1, and so on. A number made up in this way may be called a decimal number, or, more briefly, a decimal. It will be seen that the definition includes integral numbers.

76. Sums and Differences of Decimals. — To add or subtract decimals, we must reduce them to the same denomination, i.e. if one has more figures after the decimal point than the other, we must add sufficient o's to the

latter to make the numbers of figures equal. Thus, to add 5-413 to 3-8, we must write the latter as 3-800. Or we may treat the former as the sum of 5-4 and -013, and recombine the -013 with the sum of 3-8 and

5-4-

77. Product of Decimals. — To multiply two decimals exactly, we multiply them as if the point were absent, and then insert it so that the number of figures after the point in the product shall be equal to the sum of the numbers of figures after the points in the original decimals.

In actual practice, however, decimals only represent approxi- mations, and the process has to be modified (§ in).

78. Division by Decimal. — To divide one decimal by another, we must reduce them to the same denomination, as explained in § 76, and then omit the decimal points. Thus 5-413-ˆ3-8 =

?m + im = 5413 + 3800.

79. Historical Development of Fractions and Decimals. — The fractions used in ancient times were mainly of two kinds: unit- fractions, i.e. fractions representing aliquot parts (§ 103), and fractions with a definite denominator.

The Egyptians as a rule used only unit-fractions, other fractions being expressed as the sum of unit-fractions. The only known exception was the use of | as a single fraction. Except in the case of $ and \, the fraction was expressed by the denomin- ator, with a special symbol above it.

The Babylonians expressed numbers less than 1 by the numer- ator of a fraction with denominator 60; the numerator only being written. The choice of 60 appears to have been connected with the reckoning of the year as 360 days; it is perpetuated in the present subdivision of angles.

The Greeks originally used unit-fractions, like the Egyptians; later they introduced the sexagesimal fractions of the Baby- lonians, extending the system to four or more successive subdivisions of the unit representing a degree. They also, but apparently still later and only occasionally, used fractions of the modern kind. In the sexagesimal system the numerators of the successive fractions (the denominators of which were the suc- cessive powers of 60) were followed by ‘,”,”’, ””, the denominator not being written. This notation survives in reference to the minute (‘) and second (“) of angular measurement, and has been extended, by analogy, to the foot (‘) and inch (“). Since £ repre- sented 60, and was the next letter, the latter appears to have been used to denote absence of one of the fractions;

but it is not clear that our present sign for zero was actually derived from this. In the case of fractions of the more general kind, the numerator was written first with ‘, and then the denominator, followed by “, was written twice. A different method was used by Diophantus, accents being omitted, and the denominator being written above and to the right of the numerator.

The Romans commonly used fractions with denominator 1 2 ; these were described as unciae (ounces) , being twelfths of the as (pound).

The modern system of placing the numerator above the denominator is due to the Hindus; but the dividing line is a later invention. Various systems were tried before the present

notation came to be generally accepted.

1

instance, the continued sum 4 r-rrr g x 7 v s

Under one system, for – would be denoted

by

this is somewhat similar in principle to a decimal

7 5′

notation, but with digits taken in the reverse order.

Hindu treatises on arithmetic show the use of fractions, containing a power of 10 as denominator, as early as the begin- ning of the 6th century a.d. There was, however, no develop- ment in the direction of decimals in the modern sense, and the Arabs, by whom the Hindu notation of integers was brought to Europe, mainly used the sexagesimal division in the ‘ ” ”’ notation. Even where the decimal notation would seem to arise naturally, as in the case of ‘ approximate extraction of a square root, the portion which might have been expressed as a decimal was converted into sexagesimal fractions. It was not until a.d. 1585 that a decimal notation was published by Simon Stevinus of Bruges. It is worthy of notice that the invention of this notation appears to have been due to practical needs, being required for the purpose of computation of compound interest. The present decimal notation, which is a development of that of Stevinus, was first used in 161 7 by H. Briggs, the computer of logarithms.

80. Fractions of Concrete Quantities. — The British systems of coinage, weights, lengths, &c, afford many examples of the use of fractions. These

may be divided into three classes, as follows: —

(i) The fraction of a concrete quantity may itself not exist as a concrete quantity, but be represented by a token. Thus, if we take a shilling as a unit, we may divide it into 12 or 48 smaller units; but corresponding coins are not really portions of a shilling, but objects which help us in counting. Similarly we may take the farthing as a unit, and invent smaller units, represented either by tokens or by no material objects at all. Ten marks, for instance, might be taken as equivalent to a farthing; but 13 marks are not equivalent to anything except one farthing and three out of the ten acts of counting required to arrive at another farthing.

(ii) In the second class of cases the fraction of the unit quantity is a quantity of the same kind, but cannot be determined with absolute exactness. Weights come in this class. The ounce, for instance, is one-sixteenth of the pound, but it is impossible to find 16 objects such that their weights shall be exactly equal and that the sum of their weights shall be exactly equal to the weight of the standard pound.

(iii) Finally, there are the cases of linear measurement, where it is theoretically possible to find, by geometrical methods, an exact submultiple of a given unit, but both the unit and the submultiple are not really concrete objects, but are spatial relations embodied in objects.

Of these three classes, the first is the least abstract and the last the most abstract. The first only involves number and counting. The second involves the idea of equality as a necessary characteristic of the units or subunits that are used. The third involves also the idea of continuity and therefore of unlimited subdivision. In weighing an object with ounce-weights the fact that it weighs more than 1 lb 3 oz. but less than 1 lb 4 oz. does not of itself suggest the necessity or possibility of subdivision of the ounce for purposes of greater accuracy. But in measuring a distance we may find that it is " between " two distances differing by a unit of the lowest denomination used, and a subdivision of this unit follows naturally.

VII. Approximation

81. Approximate Character of Numbers. — The numbers (integral or decimal) by which we represent the results of arith- metical operations are often only approximately correct. All numbers, for instance, which represent physical measurements,are limited in their accuracy not only by our powers of measurement but also by the accuracy of the measure we use as our unit. Also most fractions cannot be expressed exactly as decimals; and this is also the case for surds and logarithms, as well as for the numbers expressing certain ratios which arise out of geometrical relation?

Even where numbers are supposed to be exact, calculations based on them can often only be approximate. We might, for instance, calculate the exact cost of 3 ft 5 oz. of meat at o|d. a ft, but there are no coins in which we could pay this exact amount.

When the result of any arithmetical operation or operations is represented approximately but not exactly by a number, the excess (positive or negative) of this number over the number which would express the result exactly is called the error.

82. Degree of Accuracy. — There are three principal ways of expressing the degree of accuracy of any number, i.e. the extent to which it is equal to the number it is intended to represent.

(i) A number can be correct to so many places of decimals. This means (cf. § 71) that the number differs from the true value by less than one-half of the unit represented by 1 in the last place of decimals. For instance, • 143 represents -7 correct to 3 places of decimals, since it differs from it by less than -0005. The final figure, in a case like this, is said to be corrected.

This method is not good for comparative purposes. Thus • 143 and 14-286 represent respectively \ and x ˆ to the same number of places of decimals, but the latter is obviously more exact than the former.

(ii) A number can be correct to so many significant figures. The significant figures of a number are those which commence with the first figure other than zero in the number; thus the significant figures of 13-027 and of -00013027 are the same.

This is the usual method; but the relative accuracy of two numbers expressed to the same number of significant figures depends to a certain extent on the magnitude of the first figure. Thus -14286 and -85714 represent \ and f correct to 5 significant figures; but the latter is relatively more accurate than the former. For the former shows only that \ lies between -142855 and ■142865, or, as it is better expressed, between -142855 and •142865; but the latter shows that f lies between -857135 and -857145, and therefore that \ lies between -14285ˆ and •14285-1V

In either of the above cases, and generally in any case where a number is known to be within a certain limit on each side of the stated value, the limit of error is expressed by the sign = *= . Thus the former of the above two statements would give \ = •14286 = 1 = -000005. It should be observed

that the numerical value of the error is to be subtracted from or added to the stated value according as the error is positive or negative:

(iii) The limit of error can be expressed as a fraction of the number as stated. Thus ˆ=-143= = = -0005 can be written i = – 143(1 ± ?l«)-

83. Accuracy after Arithmetical Operations. — If the numbers which are the subject of operations are not all exact, the accuracy of the result requires special investigation in each case.

Additions and subtractions are simple. If, for instance, the values of a and b, correct to two places of decimals, are 3-58 and 1-34, then 2-24, as the value of a— b, is not necessarily correct to two places. The limit of error of each being = ± = -005, the limit of error of their sum or difference is ± -oi.

For multiplication we make use of the formula (§60 (i)) (c'= > =a) (b'±P) = a'b'+a[3±(a'(3+b'a.). If a' and b' are the stated values, and = a and == [3 the respective limits of error, we ought strictly to take a'b'--a.fi as the product, with a limit of error= < = (a'fi+b'a). In practice, however, both a/3 and a certain portion of a'b' are small in comparison with a' (3 and b'a, and we therefore re- place a'b' + afi by an approximate value, and increase the limit of error so as to cover the further error thus introduced. In the case of the two numbers given in the last paragraph, the product lies between 3-575Xi-335 = 4-772025 and 3-585 Xi-345 = 4-82i825. We might take the product as (3-58Xi-34)-f-(-oos) 2 = 4-797225, the limits of error being = > = -oo5(3-58-r-i-34) = =*= -0246; but it is more convenient to write it in such a form as 4-797= -025 or*

4-80= = = -03.

If the number of decimal places to which a result is to be accurate is determined beforehand, it is usually not necessary in the actual working to go to more than two or three places

beyond this. At the close of the work the extra figures are dropped, the last figure which remains being corrected (§82 (i)) if necessary.

VIII. Suites and Logarithms

84. Roots and Surds. — The ˆ>th root of a number (§43) may, if the number is an integer, be found by expressing it in terms of its prime factors; or, if it is not an integer, by expressing it as a fraction in its lowest terms, and finding the pth roots of the numerator and of the denominator separately. Thus to find the cube root of 1728, we write it in the form 2 6

.3 3 , and find that its cube root is 2 2 .3 = i2; cr, to find the cube root of 1-728, we

write it as ffiff = *ii$ = 2 A ‘ and find that the cube root is

2 ,*l o

j = i-2. Similarly the cube root of 2197 is 13. But we cannot

find any number whose cube is 2000.

It is, however, possible to find a number whose cube shall approximate as closely as we please to 2000. Thus the cubes of 12-5 and of 12-6 are respectively 1953-125 and 2000-376, so that the number whose cube differs as little as possible from 2000 is somewhere between 12-5 and 12-6. Again the cube of 12-59 is 1995-616979, so that the number lies between 12-59 an d 12-60. We may therefore consider that there is some number x whose cube is 2000, and we can find this number to any degree of accuracy that we please,

A number of this kind is called a surd; the surd which is the pth root of n is written >/N,. but if the index is 2 it is usually omitted, so that the square root of N is written VN.

85. Surd as a Power. — We have seen (§§ 43,44) that, if we take the successive powers of a number N, commencing with 1, they may be written N°, N 1 , N 2 , N 3 , . . . , the series of indices being the standard series; and we have also seen (§ 44) that multi- plication of any two of these numbers corresponds to addition of their indices. Hence we may insert in the power-series numbers with fractional indices, provided that the multiplication of these numbers follows the same law. The number denoted by N* will therefore be such that N*XN4xNS = N* + * + 5 = N; i.e. it will be the cube root of N. By analogy with the notation of fractional numbers, N 3 will be N^^N^XN*; and, generally, Nl will mean the product of p numbers, the product of q of which is equal to N. Thus N s will not mean the same as N*, but will mean the square of N s ; but this will be equal to N J , i.e. (VN) 2 =-v’N.

86. Multiplication and Division of Surds. — To add or subtract fractional numbers, we must reduce them to a common denomin- ator ; and similarly, to multiply or divide surds, we must express them as power-numbers with the same index. Thus ^2 XV 5 = 2’X5’=26X5′ = 4=Xi25 i = 5oo J = V5oo.

87. Antilogarithms.- — If we take a fixed number, e.g. 2, as base, and take as indices the successive decimal numbers to any particu- lar number of

places of decimals, we get a series of antilogarithms of the indices to this base. Thus, if we go to two places of decimals, we have as th« integral series the numbers 1, 2, 4, 8, . . . which are the values of 2 , 2 1 , 2 2 , . . . and we insert within this series the successive powers of x, where x is such that x""> = 2. We thus get the numbers 2- 01 , 2- 02 , 2- 03 , . . . , which are the anti- logarithms of -or, -02, 03, . . . to base 2 ; the first antilogarithm being 2 00 = 1, which is thus the antilogarithm of o to this (or any other) base. The series is formed by successive multiplication, and any antilogarithm to a larger number of decimal places is formed from it in the same way by multiplication. If, for instance, we have found 2- 31 , then the value of 2- 316 is found from it by multiplying by the 6th power of the 1 oooth root of 2.

For practical purposes the number taken as base is 10; the convenience of this being that the increase of the index by an integer means multiplication by the corresponding power of 10ˆ i.e. it means a shifting of the decimal point. In the same way, by dividing by powers of 10 we may get negative indices.

88. Logarithms. — If N is the antilogarithm of p to the base a, i.e. if N = a', then p is called the logarithm of N to the base a, and is written log„N. As the table of antilogarithms is formed by successive multiplications, so the logarithm of any given

ARITHMETIC

537

IS.

I2d.

£i

20s.

£153, 7s. 4d.

3067s. 4d.

368o8d.

number is in theory found by successive divisions. Thus, to find the logarithm of a number to base 2, the number being greater than 1, we first divide repeatedly by 2 until we get a number between 1 and 2; then divide repeatedly by l0 \2 until we get a number between 1 and 10 V2; then

divide repeatedly by 100 V2; and so on. If, for instance, we find that the number is approxi- mately equal to 2 3 X (l0 V2) 5 X (100 V2) 7 X (1000 V2) 4 , it may be written 2 3 – 674 , and its logarithm to base 2 is 3-574-

For a further explanation of logarithms, and for an explanation of the treatment of cases in which an antilogarithm is less than 1, see Logarithm.

For practical purposes logarithms are usually calculated to base 10, so that logio 10= 1, log w 100= 2, &c.

IX. Units

89. Change of Denomination of a numerical quantity is usually called reduction, so that this term covers, e.g., the expression of £153, 7s. 4d. as shillings and pence and also the expression of 3067s. 4d. as £, s. and d.

The usual statement is that to express £153, 7s. as shillings we multiply 153 by 20 and add 7. This, as already explained (§37), is incorrect. £153 denotes 153 units, each of which is £1 or 20s.; and therefore we must multiply 20s. by 153 and add 7s., i.e. multiply 20 by 153 (the unit being now is.) and add 7. This is the expression of the process on the grouping method. On the

counting method we have

A a scale with every 20th

shilling marked as a £; there are 153 of these 20's, and 7 over.

The simplest case, in which the quantity can be expressed as an integral number of the largest units involved, has already been considered (§§ 37, 42). The same method can be applied in other cases by regarding a quantity expressed in several de- nominations as a fractional number of units of the largest denomination men- to be taken as meaning 7i%s., but

The reduction of £153, 7s. 4d. to pence,

and of 368o8d. to £, s. d., on this principle, is shown in diagrams A and B above.

For reduction of pounds to shillings, or shillings to pounds, we must consider that we have a multiple-table (§ 36) in which the multiples of £1 and of 20s. are arranged in parallel columns; and similarly for shillings and pence.

90. Change of Unit. — The statement "£153 = 30605." is not a statement of equality of the same kind as the statement " 153X20=3060," but only a statement of equivalence for certain purposes; in other words, it does not convey an absolute truth. It is therefore of interest to see whether we cannot replace it by an absolute truth.

To do this, consider what the ordinary processes of multipli- cation and division mean in reference to concrete objects. If we want to give, to 5 boys, 4 apples each, we are said to multiply 4 apples by 5. We cannot multiply 4 apples by 5 boys, for then we should get 20 " boy-apples," an expression which has no meaning. Or, again, to distribute 20 apples amongst 5 boys, we are not regarded as dividing 20 apples by 5 boys, but as divid- ing 20 apples by the number 5. The multiplication or division here involves the omission of the unit " boy," and the operation is incomplete. The complete operation, in each case, is as follows.

(i) In the case of multiplication we commence with the conception of the number " 5 " and the unit " boy "; and we then convert this unit into 4 apples, and thus obtain the result,

B

20s.

£1

I2d.

IS.

368o8d.

3067s. 4d.

£153, 7s- 4d.

tioned; thus 7s. 4d. i £0, 7s.4d. as£o^-(§i7)

20 apples. The conversion of the unit may be represented as multiplication by a factor ^ fc , so that the operation is

Vboy 65 × 5 b °y s = 5 X ^boy 63 X ! boy= 5X4 apples = 20 apples.

Similarly, to convert £153 into shillings we must multiply it by a

P 20s. ,

factor -jy' so that we get

20S 20S

-£T X £i53 – iS3 X -jf X £1 = 153 X 20s. =3o6os. Hence we can only regard £153 as being equal to 3060s. if we regard this converting factor as unity.

(ii) In the case of partition we can express the complete opera- tion if we extend the meaning of division so as to enable us to .... „ r 20 apples 4 apples

divide 20 apples by 5 boys. We thus get , ˆ oys = j ˆ, oy >

which means that the distribution can be effected by distributing at the rate of 4 apples per boy. The converting factor mentioned under (i) therefore represents a rate; and partition, applied to concrete cases, leads to a rate.

In reference to the use of the sign X with the converting factor, 7 lb it should be observed that "7-jb X " symbolizes the replacing of

so many times 4 lb by the same number of times 7 lb, while " jX " symbolizes the replacing of 4 times something by 7 times that something.

X. Arithmetical Reasoning

91. Correspondence of Series of Numbers. — In §§ 33-42 we have dealt with the parallelism of the original number-series with a series consisting of the corresponding multiples of some unit, whether a number or a numerical quantity; and the relations arising out of multiplication, division, &c, have been exhibited by diagrams comprising pairs of corresponding terms of the two series. This, however, is only a particular case of the correspondence of two series. In considering addition, for instance, we have introduced two parallel series, each being the original number- series, but the two being placed in different positions. If we add 1,2,3, ... to 6, we obtain a series 7,8,9, . . . , the terms of which correspond with those of the original series 1,2,3, . . .

Again, in §§61-75 and 84-88 we have considered various kinds of numbers other than those in the original number-series. In general, these have involved two of the original numbers, e.g. 5 s involves 5 and 3, and log 2 8 involves 2 and 8. In some cases, however, e.g. in the case of negative numbers and reciprocals, only one is involved; and there might be three or more, as in the case of a number expressed by (a+b) n . If all but one of these con- stituent elements are settled beforehand, e.g. if we take the num- bers 5, 5 2 ,5 S , ■ • -, or the numbers 3 Vi, 3 V 2, 3 >/3, . . . or log M i-

ooi, log 10 1-002, logio 1-003 … we obtain a series in which each term corresponds with a term of the original number-series.*

This correspondence is usually shown by tabulation, i.e. by the formation of a table in which the original series is shown in one

column, and each term of the second series is placed in a second column op- posite the corresponding term of the first series, each column being headed by a description of its contents. It is sometimes convenient to begin the first series with o, and even to give the series of nega- tive numbers; in most cases, however, these latter are regarded as belonging to a different series, and they need not be considered here. The diagrams, A, B, C are simple forms of tables; A giving a sum-series, B a multiple-series, and C a series of square roots, calculated approximately.

92. Correspondence of Numerical Quantities. — Again, in § 89, we have considered cases of multiple-tables of numerical quantities, where each quantity in one series is equivalent to the corresponding quantity in the other series. We might extend this principle to cases in which the terms of two series, whether of numbers or

A

B

C

n

6+n

n

\n

n

v«

6

•000

I

7

1

4

1

I -000

2

8

2

8

2

1-414

3

9

3

12

3

1-732

538

ARITHMETIC

of numerical quantities, merely correspond with each other, the correspondence being the result of some relation. The volume

D

Length of edge in inches.

Volume

of

cube.

o

Nil.

i

I cub. in.

2

8 cub. in.

3

27 cub. in.

of a cube, for instance, bears a certain relation to the length of an edge of the cube. This relation is not one of pro- portion; but it may nevertheless be expressed by tabulation, as shown at D. 93. Interpolation. — In most cases the quantity in the second column may be regarded as increasing or decreasing continuously as the number in the first column increases, and it has inter- mediate values corresponding to inter- mediate (i.e. fractional or decimal) numbers not shown in the table. The table in such cases is not, and cannot be, complete, even up to the number to which it goes. For instance, a cube whose edge is if in. has a definite volume, viz.' 3! cub. in. The determination of any such intermediate value is performed by Interpolation (q.v.).

In treating a fractional number, or the corresponding value of the quantity in the second column, as intermediate, we are in effect regarding the numbers 1, 2, 3, . . . , and the corresponding numbers in the second column, as denoting points between which other numbers lie, i.e. we are regarding the numbers as ordinal, not cardinal. The transition is similar to that which arises in the case of geometrical measurement (§ 26), and it is an essential feature of all reasoning with regard to continuous quantity, such as we have to deal with in real life.

94. Nature of Arithmetical Reasoning. — The simplest form of arithmetical reasoning consists in the determination of the term in one series corresponding to a given term in another series, when the relation between the two series is given; and it implies, though it does not necessarily involve,

the establishment of each series as a whole by determination of its unit. A method involving the determination of the unit is called a unitary method. When the unit is not determined, the reasoning is algebraical rather than arithmetical. If, for instance, three terms of a proportion are given, the fourth can be obtained by the relation given at the end of § 57, this relation being then called the Rule of Three; but this is equivalent to the use of an algebraical formula.

More complicated forms of arithmetical reasoning involve the use of series, each term in which corresponds to particular terms in two or more series jointly; and cases of this kind are usually dealt with by special methods, or by means of algebraical formulae. The old-fashioned problems about the amount of work done by particular numbers of men, women and boys, are of this kind, and really involve the solution of simultaneous equations. They are not suitable for elementary purposes, as the arithmetical relations involved are complicated and difficult to grasp.

XI. Methods of Calculation (i.)' Exact Calculation.

95. Working from Left. — It is desirable, wherever possible, to perform operations on numbers or numerical quantities from the left, rather than from the right. There are several reasons for this. In the first place, an operation then corresponds more closely, at an elementary stage, with the concrete process which it represents. If, for instance, we had one sum of £3, 15s. gd. and another of £2, 6s. 5d., we should add them by putting the coins of each denomination together and commencing the addition with the £. In the second place, this method fixes the attention at once on the larger, and therefore more important, parts of the quantities concerned, and thus prevents arithmetical processes from becoming too abstract in character. In the third place, it is a better preparation for dealing with approximate calculations. Finally, experience shows that certain operations in which the result is written down at once — e.g. addition or subtraction of two numbers or quantities, and multiplication by some small numbers — are with a little practice performed more quickly and more accurately from left to right.

96. Addition. — There is no difference in principle between addition (or subtraction) of numbers and addition (or subtraction) of numerical quantities. In each case the grouping system involves rearrangement, which implies the commutative law, while the counting system requires the expression of a quantity in different denominations to be regarded as a notation in a varying scale(§§ 17,32). We need therefore consider numerical quantities only, our results being applicable to numbers by regarding the digits as representing multiples of units in different denominations.

When the result of addition in one denomination can be partly expressed in another denomination, the process is technically called carrying. The name is a bad one, since it does not corre- spond with any ordinary meaning of the verb. It would be better described as exchanging, by analogy with the " changing " of subtraction. When, e.g., we find that the sum of 17s. and 18s. is 35s., we take out 20 of the 35 shillings, and exchange them for £1.

To add from the left, we have to look ahead to see whether the next addition will require an exchange. Thus, in adding £3, 17s. od. to £2, 18s. od., we write down the sum of £3 and £2 as £6, not as £5, and the sum of 17s. and 18s. as 15s., not as 35s.

When three or more numbers or quantities are added together, the result should always be checked by adding both upwards and downwards. It is also useful to look out for pairs of numbers or quantities which make 1 of the next denomination, e.g. 7 and 3, or 8d. and 4d.

97. Subtraction. — To subtract £3, 5s. 4d. from £9, 7s. 8d., on the grouping system, we split up each quantity into its denomina- tions, perform the subtractions independently, and then regroup the results as the " remainder " £6, 2s. 4d. On the counting system we can count either forwards or backwards, and we can work either from the left or from the right. If we count forwards we find that to convert £3, 5s. 4d. into £9, 7s. 8d. we must successively add £6, 2s. and 4d. if we work from the left, or 4d., 2s. and £6 if we work from the right. The intermediate values obtained by the successive additions are different according as we work from the left or from the right, being £9, 5s. 4d. and £9, 7s. 4d. in the one case, and £3, 5s. 8d. and £3, 7s. 8d. in the other. If we count backwards, the intermediate values are £3, 7s. 8d. and £3, 5s. 8d. in the one case, and £9, 7s. 4d. and £9, 5s. 4d. in the other.

The determination of each element in the remainder involves reference to an addition-table. Thus to subtract 5s. from 7s. we refer to an addition-table giving the sum of any two quantities, each of which is one of the series os., is., ... 19s.

Subtraction by counting forward is called complementary addition.

To subtract £3, 5s. 8d. from £9, 10s. 4d., on the grouping system, we must change is. out of the 10s. into i2d., so that we subtract £3, 5s. 8d. from £9, 9s, i6d. On the counting system it will be found that, in determining the number of shillings in the remainder, we subtract 5s. from 9s. if we count forwards, working from the left, or backwards, working from the right; while, if we count backwards, working from the, left, or forwards, working from the right, the subtraction is of 6s. from 10s. In the first two cases the

successive values (in direct or reverse order) are £3, 5s. 8d., £9, 5s. 8d., £9, 9s. 8d. and £9, 10s. 4d.; while in the last two cases they are £9, 10s. 4d., £3, 10s. 4d., £3, 6s. 4d. and £3, 5s. 8d.

In subtracting from the left, we look ahead to see whether a 1 in any denomination must be reserved for changing; thus in subtracting 274 from 637 we should put down 2 from 6 as 3, not as 4, and 7 from 3 as 6.

98. Multiplication-Table. — For multiplication and division we use a multiplication-table, which is a multiple-table, arranged as explained in § 36, and giving the successive multiples, up to 9 times or further, of the numbers from 1 (or better, from o) to 10, 1 2 or 20. The column (vertical) headed 3 will give the multiples of 3, while the row (horizontal) commencing with 3 will give the values of 3 X 1, 3 X 2, ... To multiply by 3 we use the row. To divide by 3, in the sense of partition, we also use the row; but to divide by 3 as a unit we use the column.

99. Multiplication by a Small Number. — The idea of a large

multiple of a small number is simpler than that of a small multiple of a large number, but the calculation of the latter is easier. It is therefore convenient, in finding the product of two numbers, to take the smaller as the multiplier.

To find 3 times 427, we apply the distributive Jaw (§ 58 (vi)) that3-427 =3(400+ 2o+7)=3.4oo+3. 20+3. 7. This, if we regard 3.427 as 427+427+427, is a direct consequence of the com- mutative law for addition (§ 58 (iii)), which enables us to add separately the hundreds, the tens and the ones. To find 3.400, we treat 100 as the unit (as in addition), so that 3.400 = 3.4.100 = 12.100= 1200; and similarly for 3.20. These are examples of the associative law for multiplication (§ 58 (iv)).

100. Special Cases. — The following are some special rules: — (i) To multiply by 5, multiply by 10 and divide by 2. (And

conversely, to divide by 5, we multiply by 2 and divide by 10.)

(ii) In multiplying by 2, from the left, add 1 if the next figure of the multiplicand is 5, 6, 7, 8 or 9.

(iii) In multiplying by 3, from the left, add 1 when the next figures are not less than 33 . . . 334 and not greater than 66 . . . 666, and 2 when they

are 66 . . . 667 and upwards.

(iv) To multiply by 7, 8, 9, n or 12, treat the multiplier as 10-3, 10-2, 10-1, 10+ 1 or 10+ 2; and similarly for 13, 17, 18, 19, &c.

(v) To multiply by 4 or 6, we can either multiply from the left by 2 and then by 2 or 3, or multiply from the right by 4 or 6; or we can treat the multiplier as 5 — 1 or 5+1.

101. Multiplication by a Large Number. — When both the numbers are large, we split up one of them, preferably the multiplier, into separate portions. Thus 231.4273 = (200+30+ 1) 4273 = 200.4273+30.4273 + 1.4273. This gives the partial products, the sum of which is the complete product. The process is shown fully in A below, —

A B C

4273

4273

I- 04273

2 – O8546 3- I2819

200

30

I

854600 128190

4273

231

8546

12819

4273

231

987063

987063

and more concisely in B. To multiply 4273 by 200, we use the commutative law, which gives 200.4273 = 2X100X4273 = 2X4273X100 = 8546X100 = 854600; and similarly for 30.4273. In B the terminal o's of the partial products are omitted. It is usually convenient to make out a preliminary table of multiples up to 10 times; the table being checked at 5 times (§ 100) and at 10 times.

The main difficulty is in the correct placing of the curtailed partial products. The first step is to regard the product of two numbers as containing as many digits as the two numbers put together. The table of multiples will then be as in C. The next •step is to arrange the multiplier and the multiplicand above the partial products. For elementary work the multiplicand may come immediately after the multiplier, as in D; the last figure of each partial product then comes immediately under the corresponding figure of the multiplier. A better method, which leads D E

231

427323 -r

0854:6 128:19

04b73

231

0987-063

4273 231

08546 12819 04273

0987063

up to the multiplication of decimals and of approximate values of numbers, is to place the first figure of the multiplier under the first figure of the multiplicand, as in E; the first figure of each partial product will then come under the corresponding figure of the multiplier.

102. Contracted Multiplication. — The partial products are sometimes omitted; the process saves time in writing, but is not easy. The principle is that, e.g., (a. io 2 +6. 10+c) (p. io 2 q. 10

I

427

6

427

2

427

69174

r) = ap. io i + (aq + bp)io !l + (ar + bq + cp) io 2 + (br + cq) io + ef. Hence the digits are multiplied in pairs, and grouped according to the power of 10 which each product contains. A method of performing the process is shown here for the case of 162.427. The principle is that 162.427 = 100.427 + 60.427 + 2.427 = 1.42700 + 6.4270 + 2.427; but, instead of writing down the separate products, we (in effect) write 42700, 4270 and 427 in separate rows, with the multipliers 1, 6, 2 in the margin, and then multiply each number in each column by the corre- sponding multiplier in the margin, making allowance for any figures to be " carried." Thus the second figure (from the right) is given by 1 + 2.2 + 6.7 = 47, the 1 being carried.

103. Aliquot Parts. — For multiplication by a proper fraction or a decimal, it is sometimes convenient, especially when we are dealing with mixed quantities, to convert the multiplier into the sum or difference of a number of fractions, each of which has 1 as its numerator. Such fractions are called aliquot parts (from Lat. aliquot, some, several). This can usually be done in a good many ways. Thusf = i-|,andalso = | + |, andi5% = -i5 = T V + -2V = £ — TiV = 5 + T 1 o- The fractions should generally be chosen so that each part of the product may be obtained from an earlier part by a comparatively simple division. Thus l + ˆV – ttV is a simpler expression for T \ than f + 'sV

The process may sometimes be applied two or three times in succession; thus A = -H = (i— i) (1-3), and it = f-ii =

(i-l) (i + tM-

104. Practice. — The above is a particular case of the method caDed practice, but the nomenclature of the method is confusing. There are two kinds of practice, simple practice and compound practice, but the latter is the simpler of the two. To find the cost of 2 lb 8 oz. of butter at is. 2d. a lb, we multiply is. 2d. by 2 T \ = 25. This straightforward process is called "compound" practice. " Simple " practice involves an application of the

commutative law. To find the cost of n articles at £a, 6s. ed. each, we express £a, bs. cd. in the form £(a+f), where / is a fraction (or the sum of several fractions) ; we then say that the cost, being nX£(a+f), is equal to (a+/)X£», and apply the method of compound practice, i.e. the method of aliquot parts.

105. Multiplication of a Mixed Number. — When a mixed quantity or a mixed number has to be multiplied by a large number, it is sometimes convenient to express the former in terms of one only of its denominations. Thus, to multiply £7, 13s. 6d. by 469, we may express the former in any of the way s £7 -67 5 , W 7 – of £i) 1535S., 153'Ss., 307 sixpences, or 1842 pence. Expression in £ and decimals of £1 is usually recommended, but it depends on circumstances whether some other method may not be simpler.

A sum of money cannot be expressed exactly as a decimal of £1 unless it is a multiple of f d. A rule for approximate conver- sion is that is. = -05 of £1, and that 2|d. = -oi of £1. For accurate conversion we write -i£ for each 2s., and -ooi£ for each farthing beyond 2s. , their number being firstin creased by one twenty-fourth.

106. Division. — Of the two kinds of division, although the idea of partition is perhaps the more elementary, the process of measuring is the easier to perform, since it is equivalent to a

series of subtractions. Starting from the dividend, we in theory keep on subtracting the unit, and count the number of subtractions that have to be performed until nothing is left. In actual practice, of course, we subtract large multiples at a time. Thus, to divide 987063 by 427, we reverse the procedure of § 101, but with inter- mediate stages. We first construct the multiple-table C, and then subtract successively 200 times, 30 times and 1 times; these numbers being the par- tial quotients. The theory of the pro- cess is shown fully in F. Treating x as the unknown quotient corresponding to the original dividend,

«

F

4273

X

0987063

200

0854600

X -200

132463

30

128190

x – 230

04273

1

04273

x-231

0000

54Q

ARITHMETIC

we obtain successive dividends corresponding to quotients x — 200, x — 230 and £ — 231. The original dividend is written as 0987063, since its initial figures are greater than those of the divisor; if the dividend had commenced with (e.g.) 3 … it would not have been necessary to insert the initial o. At each stage of the division the number of digits in the reduced dividend is decreased by one. The final dividend being 0000, we have «— 231 = 0, and therefore x= 231.

107. Methods of Division. — What are described as different methods of division (by a single divisor) are mainly different methods of writing the successive figures occurring in the process. In long division the divisor is put on the left of the dividend, and the quotient on the right; and each partial product, with the remainder after its subtraction, is shown in full. In short division the divisor and the quotient are placed respec- tively on the left of and below the dividend, and the partial products and remainders are not shown at all. The Austrian method (sometimes called in Great Britain the Italian method) differs from these in two respects. The first, and most important, is that the quotient is placed above the dividend. The second, which is not essential to the method, is that the remainders are shown, but not the partial products; the remainders being obtained by working from the right, and using complementary addition. It is doubtful whether the

brevity of this latter process really compensates for its greater difficulty.

The advantage of the Austrian arrangement of the quotient

G H

4273

0987063 08546

4273 2

0987063 08546

lies in the indication it gives of the true value of each partial quotient. A modification of the method, corresponding with D of § 101, is shown in G; the fact that the partial product 08546 is followed by two blank spaces shows that the figure 2 represents a partial quotient 200. An alternative arrangement, corresponding to E of § 101, and suited for more advanced work, is shown in H.

108. Division with Remainder. — It has so far been assumed that the division can be performed exactly, i.e. without leaving an ultimate remainder. Where this is not the case, difficulties are apt to arise, which are mainly due to failure to distinguish between the two kinds of division. If we say that the division of 4id. by 12 gives quotient 3d. with remainder 5d., we are speaking loosely; for in fact we only distribute 36d. out of the 4id., the other 3d. remaining undistributed. It can only be distributed by a subdivision of the unit; i.e. the true result of the division is 3j 5 2d. On the other hand, we can quite well express the result of dividing 4id. by is (= i2d.) as 3 with sd. (not " 5 ") over, for this is only stating that 4id. = 3s. sd.; though the result might be more exactly expressed as 3i\s.

Division with a remainder has thus a certain air of unreality, which is accentuated when the division is performed by means of factors (§ 42). If we have to divide 935 by 240, taking 12 and 20

as factors, the result will depend on the fact that, in the notation

(20) (12)

of § 17, 935 = 3 "17" ii- In incomplete partition the quotient is 3, and the remainders 11 and 17 are in effect disregarded; if, after finding the quotient 3, we want to know what remainder would be produced by a direct division, the simplest method is to multiply 3 by 240 and subtract the result from 935. In complete

partition the successive quotients are 77 \ and 3-jr i =3lio-

Division in the sense of measuring leads to such a result as 933d. = £3, 17s. nd.; we may, if we please, express the 17s. nd. as 2i5d., but there is no particular reason why we should do so.

109. Division by a Mixed Number. — To divide by ,a mixed number, when the quotient is seen to be large, it usually saves time to express the divisor as either a simple fraction or a decimal of a unit of one of the denominations. Exact division by a mixed number is not often required in real life; where approximate

division is required (e.g. in determining the rate of a " dividend '■), approximate expression of the divisor in terms of the largest unit is sufficient.

no. Calculation of Square Root. — The calculation of the square root of a number depends on the formula (iii) of § 60. To find the square root of N, we first find some number a whose square is less than N, and subtract a 2 from N. If the complete square root is a--b, the remainder after subtracting a 2 is (2a+b)b. We there- fore guess b by dividing the remainder by 20, and form the product (20+6) b. If this is equal to the remainder, we have found the square root. If it exceeds the square root, we must alter the value of b, so as to get a product which does not exceed the remainder. If the product is less than the remainder, we get a new remainder, which is N—(a+&) 2 ; we then assume the full square root to be c, so that the new remainder is equal to (2a--2b--c) c, and try to find c in the same way as we tried to find b.

An analogous method of finding cube root, based on the formula for (a +b) 3 , used to be given in text-books, but it is of no practical use. To find a root other than a square root we can use logarithms, as explained in § 113.

(ii.) Approximate Calculation. in. Multiplication. — When we have to multiply two numbers, and the product is only required, or can only be approximately correct, to a certain number of significant figures, we need only work to two or three more figures (§83), and then correct the final figure in the result by means of the superfluous figures.

A common method is to reverse the digits in one of the numbers; but this is only appropriate to the old-fashioned method of writing down products from the right. A better method is to ignore the positions of the decimal points, and multiply the numbers as if they were decimals between -i and i-o. The method E of § 101 being adopted, the multiplicand and the

multiplier are written with a space after as many digits (of each) as will be required in the product (on the principle explained in §101); and the multiplication is performed from the left, two extra figures being kept in. Thus, to multiply 27-343 by 3-1415927 to one decimal place, we require 2+1 + 1 = 4 figures in the product. The result is 085-9 = 85-9, the position of the decimal point being determined by counting the figures before the decimal points in the original numbers.

112. Division. — In the same way, in performing approximate division, we can at a certain stage begin to abbreviate the divisor, taking off one figure (but with correction of the final figure of the, partial product) at each stage. Thus, to divide 85-9 by 3-1415927 to two places of decimals, we in effect divide -0859 by •3J415927 to four places of decimals. In the work, as here shown, a o is inserted in front of the 859, on the principle explained in § 106. The result of the

division is 27-34.

113. Logarithms. — Multiplication, division, involution and evolution, when the results cannot be exact, are usually most simply performed, at any rate to a first approximation, by means of a table of logarithms. Thus, to find the square root of 2, we have log V2 = log (2») = § log 2. We take out log 2 from the table, halve it, and then find from the table the number oi which this is the logarithm. (See Logarithm.) The slide-rule (see Calculating Machines) is a simple apparatus for the mechanical application of the methods of logarithms.

When a first approximation has been obtained in this way, further approximations can be obtained in various ways. Thus ? having found \2= 1-414 approximately, we write -J 2 = 1-414+6, whence 2 = (i-4i4) 2 +(2-8i8)0+0 2 . Since 2 is less than J of

2734 3

3141 59

0820 29

027 34

10 94

27

14

2

0859

3 Hi 5927

2734

0859 00 0628 32

230

68

219

9i

10

77

9

42

1 35 1 26

ARITHMETIC

541

(•ooi) 1 , we can obtain three more figures approximately by dividing 2 — (i-4i4) 2 by 2-818.

114. Binomial Theorem. — More generally, if we have obtained a as an approximate value for the ˆ> th root of N, the binomial theorem gives as an approximate formula f VN = a+0, where N = a p +pa e ~ 1 d.

115. Series. — A number can often be expressed by a series of terms, such that by taking successive terms we obtain successively closer approximations. A decimal is of course a series of this kind, e.g. 314159 . . . means 3 + i/io+4/io 2 +i/io 3 +5/io 4 + o/io 5 + ... A series of aliquot parts is another kind, e.g. 3-1416 is a little less than 3+t — Tin- Recurring Decimals are a particular kind of series, which arise

from the expression of a fraction as a decimal. If the denomin- ator of the

fraction, when it is in its lowest terms, contains any other prime factors than 2 and 5, it cannot be expressed exactly as a decimal; but after a certain point a definite series of figures will constantly recur. The interest of these series is, however, mainly theoretical.

116. Continued Products. — Instead of being expressed as the sum of a series of terms, a number may be expressed as the product of a series of factors, which become successively more and more nearly equal to 1. For example,

*3-i4i6 = 3Xi§*e=3XilB=3XifXfHJ=3(i+ 2 V)(i-J6Vff). Hence, to multiply by 3-1416, we can multiply by 34, and sub- tract is 1 ,) a (= -0004) of the result; or, to divide by 3-1416, we can divide by 3 , then subtract -fa of the result, and then add t?W of the new result.*

117. Continued Fractions. — The theory of continued fractions (q.v.) gives a method of expressing a number, in certain cases, as a continued product. A continued fraction, of the kind we

are considering, is an expression of the form a-\ —

b+-

c+ d+ &c. where b, c,d, . . . are integers, and a is an integer or zero. The

expression is usually written, for compactness, a+ fr: ˆrx jt; &c.

The numbers a, b, c, d, . . . are called the quotients.

Any exact fraction can be expressed as a continued fraction, and there are methods for expressing as continued fractions certain other numbers, e.g. square roots, whose values cannot be expressed exactly as fractions.

The successive values p ° T l > • • •, obtained by taking

account of the successive quotients, are called convergent, i.e. convergents to the true value. The following are the main properties of the convergents.

(i) If we precede the series of convergents by y and %, then the numerator (or denominator) of each term of the series

I h f

06 + 1

, after the first two, is found by multiplying

the numerator (or denominator) of the last preceding term by the corresponding quotient and adding the numerator (or denom- inator) of the term before that. If a is zero, we may regard r

as the first convergent, and precede the series by ˆ and f.

(ii) Each convergent is a fraction in its lowest terms.

(iii) The convergents are alternately less and greater than the true value.

(iv) Each convergent is nearer to the true value than any other fraction whose denominator is less than that of the convergent.

*(v) The difference of two successive convergents is the recipro- cal of the product of their denominators; e.g. — £ — — =, and abc+c+a _ ab + i _ -1 ° * 10*

bc + i b b(bc + i)'

It follows from these last three properties that if the successive

*convergents are 2-» > '••• *ˆ c number can be expressed*

in the form />, (1+ˆ) (. l ~pˆ> (– 1 +pˆ> ••• > and that if we go up to the factor iˆ-r— – — the product of these factors differs from the true value of the number by less than ± — — ■•

ynynH-l

In certain cases two or more factors can be combined so as to produce an expression of the form iˆ, where k is an integer.

For instance, 3-1415927 = 3(1+ˆ7) (1-2TT06) C 1 + 333- 113) •• ■> but the last two of these factors may be combined as (1 — 22-I). Hence 3-1415927 = f-f I ||-ff . . .

XII. Applications (i.) Systems of Measures. 1

118. Metric System. — The metric system was adopted in France at the end of the 18th century. The system is decimal throughout. The principal units of length, weight and volume are the metre, gramme (or gram) and litre. Other units are derived from these by multiplication or division by powers of 10, the names being denoted by prefixes. The prefixes for multipli- cation by 10, io 2 , io 3 and io 4 are deca-, hecto-, kilo- and myria-, and those for division by 10, io 2 and io 3 are deci-, centi- and milli-; the former being derived from Greek, and the latter from Latin. Thus kilogramme means 1000 grammes, and centimetre means yˆ-j of a metre.

There are also certain special units, such as the hectare, which is equal to a square hectometre, and the micron, which is yˆo” of a millimetre.

The metre and the gramme are defined by standard measures preserved at Paris. The litre is equal to a cubic decimetre. The gramme was intended to be equal to the weight of a cubic centi- metre of pure water at a certain temperature, but the equality is only approximate.

The metric system is now in use in the greater part of the civilized world, but some of the measures retain the names of old disused measures. In Germany, for instance, the Pfund is 5 kilogramme, and is approximately equal to iyVb English.

119. British Systems. — The British systems have various origins, and are still subject to variations caused by local usage 6r by the usage of particular businesses. The following tables are given as illustrations of the arrangement adopted elsewhere in this article; the entries in any column denote multiples or sub- multiples of the unit stated at the head of the column, and the entries in any row give the expression of one unit in term of the other units.

Length

Inch.

Foot.

Yard.

Chain.

Furlong.

Mile.

1

A

A

tH

tAu

ˆ

e 5 5 «

12

1

i

A

■*6 in*

tAd

36

3

1

1

22

Yin

tAtt

792

66

22

I

1

1

so

7920

660

220

IO

1

i

63360

5280

1760

80

8

I

Weight (Avoirdupois)

Ounce.

Pound.

Stone.

Quarter.

Hundred- weight.

Ton.

1

1 6

sibf

sir

1

T7 5

ysiw

16

I

A

A

*if**

‘22ns

224

14

1

1 2

1

8

165

448

28

2

1

1

A

1792

112

8

4

1

A

3S 8 4o

2240

160

80

20

1

(Also 7000 grains = 1 lb avoirdupois.) 120. Change of System. — It is sometimes necessary, when a quantity is expressed in one system, to express it in another, 1 See also Weights and Measures.

542

ARIUS

The following are the ratios of some of the units; each unit is expressed approximately as a decimal of the other, and their ratio is shown as a continued product (§ 116), a few of the corre- sponding convergents to the continued fraction (§ 117) being added in brackets. It must be remembered that the number expressing any quantity in terms of a unit is inversely proportional to the magnitude of the unit, i.e. the number of new units is to be found by multiplying the number of old units by the ratio of the old unit to the new unit.

Yard

Metre

Inch

_ 9144 _1_0000._1JL.384._82.25../'1 1 32 t.4 US)

— 1 000 — 1 0936— 1 2 385 8224 U ifif ~ 7 6i 2 5 77

S-. 1 &

1 6 5 1

10 5 0″ ■

= 25400_L0 _ 5 . . _

*Centimetre * u ° ° ° ~ »‘9 ” – “5 “*””&*

Milp

1 > 1 ” c 1_6 9 8 _ 1JU) _ 8 . 1 8.5 . 2 3 6 9

Kilometre ~ _1 o”o~~o”o~ — 6 2 it — 5″ f84 2368 Square yard _ 8361 _ 10 ooo_j 30 6.1525(Square metre ~ Vo

Hectare

Quart

Litre

Pound

Kilogramme

._4_0_47 –

lOOOS –

10000.

2 4Ti r ■

.85.

St

iO

21

. J.1JL6 5. 1 Q_O0J . ‘10000— 8 7 9ff ‘

.8..1..7J…8J_J6

“7 176 8 9 75-

(Ml, W). (i,!, W).*

f5 5 1 2 5 01 (f 1 TZi 9 3 9)-

(ifllri).

4536_ LA0OJl_l.l_0.4S_4..i9_ Sill (1 ,5, _44 £0_N 1D000 — 2.2 046 — U

11 ¥85ˆ 2 9 3 9 2 •• VJ > T f;9 7.T6 $)■

(ii.) Special Applications.,

i2i. Commercial Arithmetic. — This term covers practically all dealings with money which involve the application of the prin- ciple of proportion. A simple class of cases is that which deals with equivalence of sums of money in different currencies; these cases really come under § 1 20. In other cases we are concerned with a proportion stated as a numerical percentage, or as a money percentage (i.e. a sum of money per £100), or as a rate in the £ or the shilling. The following are some examples. Percentage: Brokerage, commission, discount, dividend, interest, investment, profit and loss. Rate in the £: Discount, dividend, rates, taxes. Rate in the shilling: Discount.

Text-books on arithmetic usually contain explanations of the chief commercial transactions in which arithmetical calculations arise; it will be sufficient in the present article to deal with interest and discount, and to give some notes on percentages and rates in the £. Insurance and Annuities are matters of general importance, which are dealt with elsewhere under their own headings.

122. Percentages and Rates in the £. — In dealing with percent- ages and rates it is important to notice whether the sum which is expressed as a percentage of a rate on another sum is a part of or an addition to that sum, or whether they are independent of one another. Income tax, for instance, is calculated on income, and is in the nature of a deduction from the income; but local rates are calculated in proportion to certain other payments, actual or potential, and could without absurdity exceed 20s. in the £.

It is also important to note that if the increase or decrease of an amount A by a certain percentage produces B, it will require a different percentage to decrease or increase B to A. Thus, if B is 20% less than A, A is 25% greater than B.

123. Interest is usually calculated yearly or half-yearly, at a certain rate per cent, on the principal. In legal documents the rate is sometimes expressed as a certain sum of money ” per centum per annum “; here ” centum ” must be taken to mean “£ioo.» _

Simple interest arises where unpaid interest accumulates as a debt not itself bearing interest; but, if this debt bears interest, the total, i.e. interest and interest on interest, is called compound interest. If toor is the rate per cent, per annum, the simple interest on £A for n years is £nrA, and the compound interest (supposing interest payable yearly) is £[(1 +r)”— i]A.

If n is large, the compound interest is most easily calculated by means of logarithms.

124. Discount is of various kinds. Tradesmen allow discount for ready money, this being usually at so much in the shilling or £. Discount may be allowed twice in succession off quoted prices; in such cases the second discount is off the reduced price, and there- fore it is not correct to add the two rates of discount together. Thus a discount of 20%, followed by a further discount of 25%,

gives a total discount of 40%, not 45%, off the original amount. When an amount will fall due at some future date, the present value of the debt is found by deducting discount at some rate per cent, for the intervening period, in the same way as interest to be added is calculated. This discount, of course, is not equal to the interest which the present value would produce at that rate of interest, but is rather greater, so that the present value as calculated in this way is less than the theoretical present value.

125. Applications to Physics are numerous, but are usually only of special interest. A case of general interest is the meas- urement of temperature. The graduation of a thermometer is determined by the freezing-point and the boiling-point of water, the interval between these being divided into a certain number of degrees, representing equal increases of temperature. On the Fahrenheit scale the points are respectively 32 and 212°; on the Centigrade scale they are o° and ioo°; and on the Reaumur they are o° and 80°. From these data a temperature as measured on one scale can be expressed on either of the other two scales.

126. Averages occur in statistics, economics, &c. An average is found by adding together several measurements of the same kind and dividing by the number of measurements. In calcu- lating an average it should be observed that the addition of any numerical quantity (positive or negative) to each of the measure- ments produces the addition of the same quantity to the average, so that the calculation may often be simplified by taking some particular measurement as a new zero from which to measure.

Authorities. — For the history of the subject, see W. W. R. Ball, Short History of Mathematics (1901), and F. Cajori, History of Ele- mentary Mathematics (1896) ; or more detailed information in M. Cantor, Vorlesungen iiber Geschichte der Mathematik (1894-1901). L. C.Conant, The Number- Concept (1896), gives a very full account of systems of numeration. For the latter, and for systems of notation, reference may also be made to Peacock's article " Arithmetic " in the Encyclopaedia Metropolitana, which contains a detailed account of the Greek system. F. Galton, Inquiries into Human Faculty (1883), contains the first account of

number-forms; for further examples and references see D. E. Phillips, " Genesis of Number-Forms," American Journal of Psychology, vol. viii. (1897). There are very few works dealing adequately but simply with the principles of arithmetic. Homersham Cox, Principles of Arithmetic C1885), is brief and lucid, but is out of print. The P sychology'of Number, by J A. McLellan and J. Dewey (1895), contains valuable suggestions (some of which have been utilized in the present article), but it deals only with number as the measure of quantity, and requires to be read critically. This work contains references to Grube's system, which has been much discussed in America : for a brief explanation, see L. Seeley, The Grube Method of Teaching A rithmetic (1890). Onthe teaching of arithmetic, and of elementary mathematics generally, see J. W. A. Young, The Teaching of Mathematics in the Elementary and the Secondary School (1907) ; D. E. Smith, The Teaching of Elementary Mathematics (1900), also contains an interesting general sketch ; W. P. Turnbull, The Teaching of Arithmetic (1903), is more elaborate. E. M. Langley, A Treatise on Computation (1895), has notes on approximate and abbreviated calculation. Text-books on arithmetic in general and on particular applications are numerous, and any list would soon be out of date. Recent English works have been influenced by the brief Report on the Teaching of Elementary Mathematics, issued by the Mathematical Association (1905) ; but this is critical rather than con- structive. The Association has also issued a Report on the Teaching of Mathematics in Preparatory Schools (1907). In the United States of America the Report of the Committee of Ten on secondary school studies (1 893) and the Report of the Committee of Fifteen on elementary education (1893-1894), both issued by the United States Bureau of Education, have attracted a good deal of attention. Sir O. Lodge, Easy Mathematics, chiefly Arithmetic (1905), treats the subject broadly in its practical aspects. The student who is interested in elementary teaching should consult the annual bibliographies in the Pedagogical Seminary; an article by D. E. Phillips in vol. v. (October 1 897) contains references to works dealing with the psycho- logical aspect of number. For an account of German methods, see W- King, Report on Teaching of Arithmetic and Mathematics in the Higher Schools of Germany (1903). (W. F. Sh.)

ARIUS ("Apetos), a name celebrated in ecclesiastical history, not so much on account of the personality of its bearer as of the " Arian " controversy which he provoked. Our knowledge of Arius is scanty, and nothing certain is known of his birth or of his early training. Epiphanius of Salamis, in his well-known treatise against eighty heresies (Haer. lxix. 3), calls him a Libyan by birth, and if the statement of Sozomen, a church historian of the 5th century, is to be trusted, he was, as a member of the Alexandrian church, connected with the Meletian schism (see

Meletius of Lycopolis), and on this account excommunicated by Peter of Alexandria, who had ordained him deacon. After the death of Peter (November 25, 311), he was received into communion by Peter's successor, Achillas, elevated to the presbytery, and put in charge of one of the great city churches, Baucalis, where he continued to discharge his duties with apparent faithfulness and industry after the accession of Alexander. This bishop also held him in high repute. Theodoret (Hist. Eccl. i. 2) indeed does not hesitate to say that Arius was chagrined because Alexander, instead of himself, had been appointed to the see of Alexandria, and that the beginning of his heretical attitude is, in consequence, to be attributed to discontent and envy. But this must be rejected, for it is a common explanation of heretical movements with the early church historians, and there is no evidence for it in the original sources. However, Arius was ambitious. Epiphanius, Using older documents, describes him as a man inflamed with his own opinionativeness, of a soft and smooth address, calculated to persuade and attract, especially women: " in no time he had drawn away seven hundred virgins from the church to his party. " When the controversy broke out, Arius was an old man. The real causes of the controversy lay in differences as to dogma. Arius had received his theological education in the school of the presbyter Lucian of Antioch, a learned man, and distinguished especially as a biblical scholar. The latter was a follower of Paul of Samosata, bishop of Antioch, who had been excommunicated in 269, but his theology differed from that of his master in a fundamental point. Paul, starting with the con- viction that the One God cannot appear substantially (ovaiia&m) on earth, and, consequently, that he cannot have become a person in Jesus Christ, had taught that God had filled the man Jesus with his Logos (aotpia) or Power (5vva.fj.Ls). Lucian, on the other hand, presisted in holding that the Logos became a person in Christ. But since he shared the above-mentioned belief of his master, nothing remained for him but to see in the Logos a second essence, created by God before the world, which came down to earth and took upon itself a human body. In this body the Logos filled the place of the intellectual or spiritual principle. Lucian's Christ, then, was not " perfect man," for that which constituted in him the personal element was a divine essence; nor was he " perfect God," for the divine essence having become a person was other than the One God, and of a nature foreign to him. It is this idea which Arius took up and interpreted unin- telligently. His doctrinal position is explained in his letters to his patron Eusebius, bishop of the imperial city of Nicomedia, and to Alexander of Alexandria, and in the fragments of the poem in which he set forth his dogmas, which bears the enig- matic title of " Thalia " (0a\eia), used in Homer, in the sense of " a goodly banquet," most unjustly ridiculed by Athanasius as an imitation

of the licentious style of the drinking-songs of the Egyptian Sotades (270 B.C.). From these writings it can.even nowadays be seen clearly that the principal object which he had in view was firmly to establish the unity and simplicity of the eternal God. However far the Son may surpass other created beings, he remains himself a created being, to whom the Father before all time gave an existence formed out of not being (t£ owe ovrcov); hence the name of Exoukantians sometimes given to Arius's followers. On the other hand, Arius affirmed of the Son that he was " perfect God, only-begotten " (tXˆptjs deos novo- ytvr)s); that through him God made the worlds (aiives, ages); that he was the product or offspring of the Father, and yjBt not as one among things made (yivvrjua aXX' ov\ ws iv ryu ytytvr)(iiv

For years the controversy may have been fermenting in the college of presbyters at Alexandria. Sozomen relates that Alexander only interfered after being charged with remissness in leaving Arius so long to disturb the faith of the church. Accord- ing to the general supposition, the negotiations which led to the excommunication of Arius and his followers among the presbyters and deacons took place in 318 or 319, but there are good reasons for assigning the outbreak of the controversy to the time follow- ing the overthrow «f Licinius by Constantine, i.e. to the year 323. In any case, from this time events followed one another to a speedy conclusion. Arius was not without adherents, even outside Alexandria. Those bishops who, like him, had passed through the school of Lucian were not inclined to let him fall without a struggle, as they recognized in the views of their fellow-student their own doctrine, only set forth in a somewhat radical fashion. In addressing to Eusebius of Nicomedia a request for his help, Arius ended with the words: " Be mindful of our adversity, thou faithful comrade of Lucian's school (avWovKiaviarvs)" ', and Eusebius entered the lists energetically on his behalf. But Alexander too was active; by means of a circular letter he published abroad the excommunication of his presbyter, and the controversy excited more and more general interest.

It reached even the ears of Constantine. Now sole emperor, he saw in the one Catholic church the best means of counter- acting the movement in his vast empire towards disintegration; and he at once realized how dangerous dogmatic squabbles might prove to its unity. His letter, preserved by the imperial bio- grapher, Eusebius of Caesarea, is a state document inspired by a wisely conciliatory policy; it made out both parties to be equally in the right and in the wrong, at the same time giving them both to understand that such questions, the meaning of which would be grasped only by the few, had better not be brought into public discussion; it was advisable to come to an agreement where the difference of opinion was not fundamental. This well-meaning attempt at reconciliation, betraying as it did no very deep understanding of the question, came to nothing. No course

was left for the emperor except to obtain a general decision. This took, place at. the fist oecumenical council, which was convened in Nicaea (q.v.) in 325. After various turns in the controversy, it was finally dicided, against Arius, that the Son was "of the same substance" (fywowtos) with the Father, and all thought of his being created or even subordinate had to be excluded. Constantine accepted the decision of the council and resolved to uphold it Arius and the two bishops of Marmarica Ptolemais, who refused to subscribe the creed, were excommunicated and banished to Illyria, and even Eusebius, of Nicomedia, who accepted the creed, but not its anathemas, was exiled to Gaul. Alexander returned to his see triumphant, but died soon after, and was succeeded by Athanasius (q.v.), his deacon, with whose indomitable fortitude and strange vicissitudes the further course of the controversy is bound up.*

It only remains for us here to sketch what is known of the future career of Arius and the Aryans. Although defeated at the council of Nicaea, the Arians were hy'' no means subdued. Constantine while strongly disposed at 'first to enforce the Nicene decrees, was gradually won to a more conciliatory policy by the influence especially of Eusebius of Caesarea and Eusebius of Nicomedia, the latter of whorA. returned from exile in 328 and won the ear of' the emperor, whom he baptized on his death-bed. In 330 even Arius was recalled from banishment. Athanasius, on the other hand, was banished to Treves in 335. During his absence Arius returned to Alexandria, but even now the people are said to have raised a fierce riot against the heretic. In 336 the emperor wasiorced to summon him to Constantinople. Bishop Alexander reluctantly assented to receive him once more into the bosom of the church, but before the act of admission was completed, Arius was suddenly taken ill while walking in the streets, and died in a few moments. His death seems to have exercised no influence worth speaking of on the course of events. His theological radicalism had in any case neverf ound many convinced adherents. It was mainly the opposition to the Homoousios, as a formula*

open to heretical misinterpretation, and not borne out by Holy Writ, which kept together the large party known as Semiarians, who under the leadership of the two Eusebiuses carried on, the strife against the Nicenes and especially Athanasius. Under the sons of Constantine Christian bishops in numberless synods cursed one another turn by turn. In the western half of the empire Arianism found no foothold, and even the despotic will of Constantius, sole emperor after 351, succeeded only for the moment in subduing the bishops exiled for the sake of their belief. In the east, on the

other hand, the Semiarians had for long the upper hand. They soon split up into different groups, according as they came to stand nearer to or farther from the original position of Arius. The actual centre was formed by the Homoii, who only spoke generally of a likeness (dftoiorris) of the Son to the Father; to the left of them were the Anotnoii, who, with Arius, held the Son to be unlike (avdpoios) the Father; to the right, the Homoiousians who, taking as their catchword " likeness of nature " (o/khottjs kkt' ovaiav), thought that they could preserve the religious content of the Nicene formula with- out having to adopt the formula itself. Since this, party in the course of years came morn and more into sympathy with the representatives of the Nicene party, the Homoousians, and notably with Athanasius, the much-disputed formula became more and more popular, till the council summoned in 381 at Constantinople, under the auspices of Theodosius the Great, recognized the Nicene doctrine as the only orthodox one. Arianism, which had lifted up its head, again under the emperor Valens, was thereby thrust out of the state church. It lived to flourish anew among the Germanic tribes at the time of the great migrations. Goths, Vandals, Suebi, Burgundians and Lango- bardi embraced it; here too as a distinctive national type of Christianity it perished before the growth of medieval Catholi- cism, and the name of Arian ceased to represent a definite form of Christian doctrine within the church, or a definite party outside it.

The best account of the proceedings, both political and theological, may be found in the following books:— H. M. Gwatkin, Studies of Arianism (2nd edit., Cambridge, i960); A. Harnack, History of Dogma (Eng. trans., 1894-1899); J. F. Bethune-Baker, An Intro- duction to the Early History of Christian Doctrine (London, 1903) ; W. Bright, The Age of the Fathers (London, 1903). Cardinal Newman's celebrated Arians of the Fourth Century is interesting more from the controversial than from the historical point of view. See also Paavo Snellman, Der Anfang des arianischen Streites (Helsingfors, 1904) ; Sigismund Rogala, Die Anfahge des arianischen Streites (Paderborn, 1907). (G. K.)

ARIZONA (from the Spanish-Indian Arieonac, of unknown meaning, — possibly " few springs,"' — the name of an 1 8th-century mining camp in the Santa Cruz valley, just S. of the present border of Arizona), a State on the S.W. border of the United States of America, lying between 31° 20′ and 37 N. lat. and ioo° 2′ and 114 45′ W. long. It is bounded N. by Utah, E. by New Mexico, S. by Mexico and W. by California and Nevada, the Colorado river separating it from Calif ornia and in part from Nevada. On the W. is the – Great B asin. Arizona itself is mostly included in the great arid mountainous uplift of the Rocky Mountain region, and partly within the desert plain region of the Gulf of California, or Open Basin region. The whole state lies on the south-western exposure of a great roof whose crest, along the continental divide in western New .Mexico, pitches southward. Its

altitudes vary from 12,800ft. tolessthan 100 ft. above the sea. Of its total area of 113,956 sq. m. (water surf ace, 116 sq. m.), approximately 39,000 lie below 3000 ft., 27,000 from 3000 to 5000 ft., and 47,000 above 5000 ft.

Physical Features. — Three characteristic physiographic regions are distinctly marked: first the great Colorado Plateau, some 45, 000 sq. m. in area, embracing ail the regiowN. and E. of a line drawn from the Grand Wash Cliffs in the N.W. corner of the state to its E. border near Clifton; next a broad zone of compacted mountain ranges with a southern limit of similar trend; and lastly a region of desert plains, occupying somewhat more than the S.W. quarter of the state. The plateau region has an average elevation of 6000-8000 ft. eastward, but it is much broken down in the west. The plateau is hot a plain. Itis

dominated by high mountains, gashed by superb canyons of rivers, scarred with dry gullies and washes, the beds of inter- mittent streams, varied with great shallow basins, sunken deserts, dreary levels, bold buttes, picturesque mesas, forests and rare verdant bits of valley. In the N.W. there is a giddy drop, into the tremendous cut of the Grand Canyon (q.v.) of the Colorado river. The surf ace in general is rolling, with a gentle slope north- ward, arid drains through the Little Colorado (or Colorado Chi qui to), Rio Puerco and other streams in to the Grand Canyon. Along the Colorado is the Painted Desert, remarkable for the bright colours — red, brown, blue, purple, yellow and white — of its sandstones, shales and clays. Within the desert is a petri- fied forest, the most remarkable in the United States. The trees are of mesozoic time, though mostly washed down to the foot of the mesas in which they were once embedded, and lying now amid deposits of a later age. Blocks and logs of agate, chalce- dony, jasper, opal, and other silicate deposits lie in hundreds over an area of 60 sq. in. The forest is now protected as a national reserve against vandalism and commercialism. Every- where are evidences of water and wind erosion, of desiccation and differential weathering. This is the history of the mesas, which are the most characteristic scenic feature of the highlands. The marks of volcanic action, particularly lava-flows, are also abundant and widely scattered.*

Separating the plateau from the mountain region is an abrupt transition slope, often deeply eroded, crossing the entire state as has been indicated. In localities the : slope is a true escarpment falling 150 and even 250 ft. per mile. In the Aubrey Cliffs and along the Mogollon mesa, which for about 200 m. parts the waters of the Gila and the Little Colorado; it often has an elevation of 1000 to 2000 ft., and the ascent is impracticable through long distances to the most daring climber. , It is not of course every- where so remarkable, or even distinct, and especially after its trend turns southward W. of Clifton itis much broken dowri and obscured by*

erosion and lava deposits. The mountain region has a width of 70 to 150 m., and is filled with short parallel ranges trending parallel to the plateau escarpment. Many of the mountains • are extinct volcanoes. In the San Francisco mountains, in the north central part of the state, three peaks rise to from 10,000 to 12,794 ft.; three others are above 9000 ft.; all are eruptive cones, and among the lesser summits are old cinder cones. The S.E. corner o! Arizona is a region of greatly eroded ranges and gentle aggraded valleys. This moun- tain zone has an. average elevation of not less than 4000 ft., while in places its crests are 5000 ft. above the plains below. The line dividing the two regions runs roughly from Nogales on the Mexican border, past Tucson, Floreiice and Phoenix to Needles (California) , onithe W. boundary. These plains, the third or desert region of the state, have their mountains also, but they are lower, and they are not compacted; the plains near the mountain region slope toward the Gulf of California across wide valleys separated by isolated ranges, then across broad desert stretches traversed by rocky ridges, and finally there is no obstruction to the slope at all. Small parts of the desert along the Mexican boundary are shifting, sand:

Climate. — As may be inferred from the physical description, Arizona has a wide variety of local climates. In general it is characterized by wonderfully clear airland extraordinarily > low humidity. The scanty rainfall is distributed from July to April, with marked: excess from July to September and a lesser maxi- mum in December. May and June are very dry. Of ten during a month, sometimes for several months, no rain falls over the greatest part of Arizona Very little, rain comes from, the Pacific or the Gulf of California, the mountains and desert, as well as the adverse winds, making it impossible. Rain and snow fall usually from clouds blown from the Gulf of Mexico and not wholly dried in Texas. The mountainous areas are the only ones of adequate precipitation; the northern slope of the Colorado Plateau is almost destitute of water; the region of least pre- cipitation is the "desert" region. The mean annual rainfall varies from amounts of 2 to 5-5 in. at various points in the lower gulf valley,- and on the western border to amounts of 25 to*

ARIZONA

Scale, 1:3,160,000

English Miles

Indian Reserves

County Seats

County Boundaries

\tgi”

ijlle-‘

*ˆ ‘ – V * – J? ;? ˆ — $*V*

*I 5 * <%.• V > Mt.Loga«S jB \fiJtof J**

N a v a j jo

o Jiff. Wifton ?rBcandon’*

Canyonˆ

HI.

a’

z 4

s Chlonde T WX™y l y

Acme

■logman. \ A r- y

.V„.rf I .g-aJpoiˆCStton—*

desert r ._ . =i».....ˆ?....

Nicdoitsoi JjFi Shinomu Pealt

V N ,v,jo juba • R fe s e r#v e

2whf, H’dLad—. ‘SuHualpai I Ind.# ”

c white iorui- c v< t- ˆ **

S Hms Wr >’ -ˆ\ˆ. Reserve ˆ –

*■ˆ M*o qui, i*

• Rums of ‘•&■{

■}ai«D««!”,,p Polacca -ˆ Orajbi / • Keam ‘ s;

Toreyao jˆ~ˆCanyon

3&

***V(Black Fallˆ j A< 4,„ me „ (W ,. – S«AOir.HE«**

‘he Crossingˆ

*r *

Cress Mi

*Keedles3«L \%%£ >_ˆ » ..**wfc**ˆˆˆˆ Cedar *”!•*£* “e /Veed/es*

Seligman

♦ % ˆV™” ,l! Vv”’ ElagstaffU«» *ˆ,w»\X$*

■J – \ Kock\>! \ . 1 U V.Xˆ

Amil Hoch . Butte ftiqedar GUde ./ J W(] ‘

*,l*t«o _ˆ-ˆ. Jˆ —■” y .tofigfellop*

_ˆ»wMiS»«gˆ«asis™j 9/ J

_ Pottery’MIl XTˆ -fC’ifefe Butte 1

•iˆy Allantown1§

X

**ffi .SVinslowiJ*

damana ˆ“trifled Forest

_ blbrpok /

?>\i bant/on Butteˆi

,Wo6dniff.y).-” ,

A St/ V

Snowflake’

7!

/ J*

>St.

Pinedal'eˆ : j- d °„ s \J?"ˆ_ r ˆR.chvllel

Wictcnburg Vulturt . 'ullin Vol. Its. «e'

Halfway fe >-£\3\t ˆ

>nowllaKe'? • ' oˆ ei ; TohniH

< jˆr~-ˆ <£3/lor(t Coacbofˆ J Jotins|

:•— aˆ«rˆ.l.J.. *»K5 -wi-KtfT -ˆ – I ■■ ■ ' – ? Tea ˆ_— – y—y. \x —•>_
Stern ˆQ

Jontoi

£ˆlj W V Springervilleˆ fˆ: Pinetop

«

*

W«» IVater

t j' , te« M A

■%, Cathtdral ˆS,

>fa„ % i »g»»"

gVAV Tkffeserwo/r

'orrlstownT;ˆˆ

- Ulw-flˆfeWˆtToTt 165 * ' fnffs CmwnJ'k.L '• Bt*cltˆGlpbe

»rii„ˆ„KXiv-sr_

Arlln K tofiJ3vˆ «C-eyeˆˆ««4L NT S Tˆ-V. (C'Valr,

ias V friSjS* ,. . ˆ-_ ˆ . „-fˆ°»» yˆ?»T (Mil A R#Se""fi .-ˆˆV,»» 1

"ˆˆ'fc 1-ˆrˆf/ .f. s w

c*.

/7 Cf#«ˆ Ni Xsfiˆrio V— ˆ,

% Castle Oomeˆ Af. U”:™{Z~i£?.* \

ˆ

‘ 8. ˆrSisW ‘VˆMetˆalfQcˆSOrovf .Ttomˆˆ HCSCliftonl

! Matthewsˆ N. ˆy, Sanchj

ˆ, p V’ˆ< Eomta\/K es t

v ˆV i.*i- -.“J, -53 ˆ Hookers

CvRlllitoJ -5 (? P Butte “jˆo f P S Redingion j ~

~ j \,P00l Pd S V/

” I ˆ7 s

o gfAiiillFlafii. ‘% ‘ nsonl ˆ.Cochise ” .

Oraidon -5- PBSL

•arce ˆ -c, • ° rˆ%

?/ o/rfVA* ■ Greatervjlle \ciack Diamoiˆˆ >T> ˆxoRuckcr ˆp

Emery Walker sC

ARIZONA

5‘4S

30 in. in the mountains. The highest recorded maximum in Arizona is 35 in. The proportion of perfectly clear days in the year varies at different points from a half to two-thirds; of the rest not more than half are without brilliant sunshine part of the day. Local thunderstorms and cloud-bursts are a characteristic phenomenon, inundating limited areas and transforming dried-up streams into muddy torrents carrying boulders and debris. Often in the plateau country the dry under- air absorbs the rain as it falls; and rarely in the Hopi Country do flooded gullies ” run through ” to the Little Colorado. The country of the cliff-dwellers in the N.E. is desert -like. Only points high in altitude catch much rain. Mountain snows feed the Gila, the Little Colorado, and the Colorado rivers. The Colorado, apart from the Gila, draws little water from Arizona. The mountain zone W. of Prescott drains into the Colorado, and to the S. and E. into the Gila; and the latter

is by far the heavier drainage in volume. The floods come in May and June, and during the wet season the rivers, all with steep beds in their upper courses, wash along detritus that lower down narrows, and on smaller streams almost chokes, their courses. These gradients enable the inconstant streams tributary to the Colorado to carve their canyons, some of which are in themselves very remarkable, though insignificant beside the Grand Canyon. Many streams that are turned in spring or by summer cloud-bursts into torrents are normally mere water films or dry gulches. Even the Gila is dry in its bed part of the year at its mouth near Yuma. From the Gila to the southern boundary the parched land gives no water to the sea, and the international boundary runs in part through a true desert. In the hot season there is almost no surface water. Artesian wells are used in places, as in the stock country of the Baboquivari valley.

The temperature of Arizona is somewhat higher than that of points of equal latitude on the Atlantic and Gulf of Mexico coasts. In the mountains on the plateau it ranges from that of the temperate zone to that of regions of perpetual snow; S. of the mountains it ranges from temperate heats in the foothills to semi-tropic heat in the lower valleys 6f the Gila and Colorado. The average annual temperature over the region N. of 34′ N. is about 55°; that of the region S. is about 68°. The warmest region is the lower Gila valley. Here the hottest temperature of the year hovers around 130 , the mean for the hottest month (July) is about 98°, and the mean for the year is from 68. 9°- 74. 4° F. at different points. Some parts of the Santa Cruz valley are equally hot. In the hottest (western) portions of the true desert on the Mexican border the daily maximum tempera- ture is about no° F. ; but owing to the rapid radiation in the dry, clear, cloudless air the temperature frequently falls 40-50° in the night. The coldest points on the high plateau have annual means as low as 45-48°, and a mean for the coldest month at times below 20° F. The range from high to low extreme on the plateau may be as great as 125°, but in the S.W. it is only about 70-80° F. The daily variation (not uncommonly 60° F.) is of course greatest in the most arid regions, where radiation is most rapid. And of all Arizona it should be said that owing to the extreme dryness of the air, evaporation from moist surfaces is very rapid, 1 so that the high temperatures here are decidedly less oppressive than much lower temperatures in a humid atmosphere. The great difference between absolute and sensible temperature is a very important climatic characteristic of Arizona. Generally speaking, during two-thirds' of the year the temperature is really delightful; the nights are cool, the morning^ bracing, the days mild though splendid. Intense heat prevails in July, August and September. In lowness of humidity (mean annual relative humidity at Yuma about 39, at Phoenix 36.7, at Tucson 37.8) and clarity of atmosphere, southern Arizona rivals Upper Egypt and other famous arid health resorts.

Fauna and Flora. — Within the borders of Arizona are areas representative of every life zone save the humid tropical. From

1 At Yuma, Phoenix and Tucson, the records of twenty-six, eighteen and fifteen years respectively show a rate of evaporation 35-2, 12-7. and 7-7 times as great as the mean annual rainfall, which was 2-84 in., 7-06 in. and 11-7 in. for the places named.

the summit of the San Francisco Mountains one may pass rapidly through all these down into' the Painted Desert. The Boreal- Canadian, Transition and Upper Sonoran embrace the highlands. Coyotes are very common; wild 1 Cats and mountain lions are fairly plentiful. Deer and antelope are represented by various species. Prairie-dogs, jack-rabbits, crows and occasional ravens, quail, grouse, pheasants and wild tuTkeys are also noteworthy in a rather scant animal life. Characteristic forms of the Upper Sonoran zone are the burrowing owl, Nevada sage- thrush, sage- thrasher and special species of orioles, kangaroo rats, mice, rabbits and squirrels. The Lower Sonoran covers the greatest part of southern and western Arizona, as well as the immediate valleys of the Colorado and Little Colorado rivers. Its animal life is in the main distinguished in species only from that of the Upper Sonoran belt, including among birds, the desert sparrow, desert thrasher, mocking-bird, hooded oriole; and among mammals small nocturnal species of kangaroo rats, pocket mice, mice and bats. Jaguars occasionally stray into Arizona from Mexico. Lizards and toads are conspicuous in the more desert areas. Snakes are not numerous. The Gila-monster, tarantula, the scorpion and thelyphonuS, scolopender and julus occur in some localities in the rainy season. The Arid -Tropical zone is represented by a narrow belt along the lower Colorado river, with a short arm extending into the valley of the Gila. The country is so arid that it supports only desert birds and mammals. Camels were very successfully employed as pack animals on the Tule desert in the palmy days of Virginia City, Nevada, before the advent of railways.

The general conditions of distribution of the fauna of Arizona are shown even more distinctly by the flora. There are firs and spruces on the mountains, characteristic of the Boreal zone; pines characteristic of the Transition zone; pinon juniper, greasewood and the universally conspicuous sage-brush, characteristic of the Upper Sonoran zone. In the Lower Sonoran belt, soapweed, acacias (Palo Verde or Par kins onia torreyana) , agaves, yuccas and dasylirions, the creosote bush and mesquite tree, candle wood, and about seventy -five species of cactuses — among them omnipresent opuntiae and great columnar " Chayas " — make up a striking vegetation, which in its colours of dull grey and olive harmonizes

well with the rigidity and forbidding barrenness of the plains.' It has exercised profound influence upon the industries, arts, faiths and general culture of the Indians. In places the giant cactus grows in groves, attaining a height of 40 and even 50 ft. The mesquite varies in size from a tangled thorny shrub td a spreading tree as much as 3 ft. in diameter and 50 ft. high; it is normally perhaps half as high, and 6-8 in. in diameter. Enduring hardily great extremes of heat and moisture, it is throughout the arid South-west the most important, and in many localities the only important, native tree. From the great juicy, leafless, branchless stalk of the yucca, soap is prepared, and strong fibres useful in making paper, rope and fabrics. The fibre of the agave is also made into rope and its juice into pulque. The canaigre grows wild and is also cultivated. It is easy to exaggerate greatly the barrenness of an arid country. There are fine indigenous grasses that spring up over the mesas after the Summer rains, furnishing range for live-stock; some are extraordinarily independent of the rainfall. In the most arid' regions there is a small growth of green in the rainy season, and a rich display of small wild-flowers, as well as the enormous flower clusters of the yucca, arAI blooms in pink and orange, crimson, yellow and scarlet of the giant cactus and its fellows. Even in the Mexican border, desert oak, juniper and manzanita cover the mountains, and there is & vigorous though short-lived growth of grasses and flower from' July to October. The cliff-dweller country supports a scant vegetation — a few cottonwood in the washes, a few cedars on the mesas.

Continuous forest areas are scant. A fair variety of trees — cottonwood, sycamore, ■. ash, willow, walnut and cherry — grow in thickets in the canyons, and each mountain range is a forest area. Rainfall varying with the altitude, the lower timber line below which precipitation is insufficient to sustain a growth of trees is about 7000 ft., and the upper timber line about 11,500 ft

11

54-6

ARIZONA

Oaks, juniper, pinon, cedars, yellow pine, fir and spruce grow on the mountains and over large areas oi the plateau country. 1 The Coconino forest is one of the largest unbroken pine forests (about 6000 sq. m.) in the United States. Since 1898 about 86 % of the wooded lands have been made reservations, and work has been done also to preserve the forest areas in the mountains in the south-east, from which there are few streams of permanent flow to the enclosing arid valleys.

Soil. — The soils in the southern part of Arizona are mainly sandy loams, varying from light loam to heavy, close adobe; on the plateaus is what is known as " mesa " soil; and along the rivers are limited overflow plains of fine sediment — especially along the Colorado and the river Verde. These soils are in general rich, but deficient in nitrogen and somewhat in humus; and in limited areas white alkaline salts are injuriously in excess. Virgin soils are densely compact. By far the most useful crops are leguminous green manures, especially alfalfa, which grows four to seven cuttings in a year and as a soil flocculator and nitrogen-storer has proved of the greatest value. The greatest obstacle to agriculture is lack of water. Artesian wells are much used in the south-east. For the reservation of the water-partings — in the past considerably denuded by lumbermen and ranchmen — the increase of the forest areas, and the creation of reservoirs along the rivers, to control their erratic flow 2 and impound their flood waste for purposes of irrigation, much has been done by the national government. The irrigated areas are only little spots along the permanent streams. In 1900 the farm area was only 2.7% of the total area of the state and only 0-31% was actually improved (including Indian reservations, 0-35%; In 1906, 092% was cultivated); of the land actually under crops, 88- 5% was irrigated. The improved acreage more than quin- tupled from 1880 to 1900. The total irrigated area in 1900 was 185,000 acres and in 1902, 247,250 acres. The increase in land values by irrigation from 1890 to 1900 is estimated at $3,500,000. A reservoir was begun in 1904 just below the junction of the Tonto and the Salt with capacity to store 1,330,000 acre-ft. for irrigation, and develop also an electric power sufficient to pump underground water for an additional 50,000 acres at the lowest estimate 3 of lands lying too high for supply by gravity. Another important undertaking begun about the same time was the throwing of an East Indian weir dam (the only one in the United States) across the Colorado near Yuma, and the confine- ment of both sides of the lower Gila and Colorado with levees.

Agriculture. — Strawberries and Sahara dates; alfalfa, wheat, barley, corn and sorghum; oranges, lemons, wine grapes, limes, olives, figs, dates, peanuts and sweet potatoes; yams and sugar beets, show the range of agricultural products. The date palm fruits well; figs grow luxuriantly, though requiring much irri- gation; almonds do well if protected from spring frosts; sea- island cotton grows in the finest grades, but is not of commercial importance. The country about Yuma is particularly suited to subtropical fruits. Temperate fruits — peaches, pears, apples, apricots and small fruits — do excellently; as do all important vegetables. The fruit industry is becoming more and more important. Farming is very intensive, and crop follows crop in swift succession; in 1905 the yield of barley per acre, 44 bushels, was greater than in any other state or territory, as was

the farm price per bushel on the 1st of December, 81 cents; the average yield per acre of hay was the highest in the Union in

1903, 3-46 tons, the general average being 1-54 tons, was fourth in

1904, 2-71 tons (Utah 3- 54, Idaho 3-07, Nevada 3-04), the general average being 1-52 tons, and was highest in 1905, 3-75 tons, the general average for the country being 1-54 tons; and in the same three years the average value per acre of hay was greater in Arizona than in any other state of the Union, being $35-78 in

1 The San Francisco yellow pine forest, with an area of some 4700 sq. m., is the finest forest of the arid south-west.

4 The combined flow of the Salt and Verde varies from 100 to more than 10,000 cub. ft. per second.

‘ The dam locks a narrow canyon. The height is 284 ft., the water rising 230 ft. against it. The storage capacity is exceeded by prob- ably but one reservoir in the world — the Wachusett reservoir near Boston.

1903, $40-22 in 1904, and $46-39 in 1905, the general averages fof the country being $13-93, $13-23 and $13-11 respectively, for the three years. Of the total farm acreage of the state 97-6% were held in 1900 by the whites; and of these 80-2 % owned in whole or in part the land they cultivated.

Stock-raising is a leading industry, but it has probably attained its full development. The over-stocking of the ranges has caused much loss in the past, and the almost total eradication of fine native grasses over extended areas. Of the neat cattle (7,042,635) almost 98 , and of the sheep (861,761) almost 100, were in 1900 pastured wholly or in part upon the public domain. The extension of national forest reserves and the regulations enforced by the United States government for the preservation of the ranges have put limits to the industry. In 1900 the value of live-stock represented 15-7% of the capital invested in agriculture; the value of animals sold or slaughtered for food ($3,204,758) was half the total value of all farm products ($6,997,097). Ostrich farms have been successfully established in the Salt river valley since 1893; in 1907 there were six farms in the Salt river valley, on which there were about 1354 birds; the most successful food for the ostrich is alfalfa.

Minerals. — Mining is the leading industry of Arizona. Contrary to venerable traditions there is no evidence that mining was practised beyond the most inconsiderable extent by aborigines, Spanish conquistadores, or Jesuits. In 1738 an extraordinary deposit of silver nuggets, quickly

exhausted (1741), was discovered at Arizonac. At the end of the 18th century the Mexicans considerably developed the nines in the south-east. The second half of the 1 9th century witnessed several great finds; first, of gold placers on the lower Gila and Colorado (1858-1869); later, of lodes at Tombstone, which flourished from 1879-1886, then decayed, but in 1905 had again become the centre of important mining interests; and still later the develop- ment of copper mines at Jerome and around Bisbe. Several of the Arizona copper mines are among the greatest of the world. The Copper Queen at Bisbee from 1880- 190 2 produced 378,047,210 lb of crude copper, which was practically the total output of the territory till after 1900, when other valuable mines were opened; the Globe, Morenci and Jerome districts are secondary to Bisbee. Important mines of gold and silver, con- siderable deposits of wolframite, valuable ores of» molybdenum and vanadium, and quarries of onyx marble, are also worked. Low-grade coal deposits occur in the east central part of the state and near the junction of the Gila and San Pedro rivers. Some fine gems of peridot, garnet and turquoise have been found. The mineral products of Arizona for 1907 were valued at $s6,753,65o;ofwhich$5 1, 3 55,687 (more than thatofanyotherstate) was the value of copper; $2,664,000, gold; and $1,916,000, silver. In 1907 the legislature passed an elaborate act providing for the taxation of mines, its principal clause being that the basis of valuation for taxation in each year be one-fourth of the output of the mines in question for the next preceding year.*

Manufactures. — The manufacturing industries are of relatively slight importance, though considerable promise attends the experiments with canaigre as a source of tannin. The Navaho and Moqui Indians make woollen blankets and rugs and the Pimas baskets. Onyx marbles of local source are polished at Phoenix. The capital invested in manufacturing industries increased from $9,51 7,573 in 1900 to $14,395,654 in 1905, or Si‘3%> an d the value of products from $20,438,987 in 1900 to $28,083,192 in 1905, or 37-4%. Of the total product in 1905 the product of the principal industry, the smelting and refining of copper ($22,761,981), represented 811%; it was 9-4% of all the smelting and refining of copper done in the United States in that year. The other manufactures were of much less importance, the principal ones being cars and general shop construction, including repairs by steam railway companies ($1,329,308), lumber and timber products ($960,778), and flour and grist mill products ($743,124).

Two transcontinental railway systems, the Southern Pacific and Santa Fe, were built across Arizona in 1878-1883. They are connected by one line, and a feeder runs S. into Sonora.

ARIZONA

The railway mileage of Arizona on the ist of January 1908 was 1935-35 m –

Population. — The population of Arizona in 1880 was 40.440; in 1890, 59,620; in 1900, 122,931 (including 28,623 reservation Indians not counted before); in 1910, 204,354. The native population is of the most diverse origin; the foreign element is equally heterogeneous, but more than half (in 1900, 14,172 out of 24,28,, foreign-born) are Mexicans, many of whom are not permanent residents; after 1900, immigrants were largely mine labourers, and included Slavonians and Italians. The largest towns in 1900 were Tucson, Phoenix, which is the capital, Prescott (pop. 3559), Jerome (pop. 1890, 250; in 1900, 2861); Winslow (pop. 1890, 363; in 1900, 1305), Nogales (pop. 1900. 1761), and Bisbee. The last was an insignificant mining camp in 1880, still unincorporated in 1900, but with an estimated population of 6000 in 1904. It is crowded picturesquely into several narrow confluent ravines. Railway connexion with El Paso was established in 1902. Douglas is another growing camp.

Over thirty Indian tribes are represented in the Indian schools of Arizona. The more important are the Hualapais or Apache- Yumas; the Mohaves; the Yavapais or Apache-Mohaves; the Yumas, whose lesser neighbours on the lower Colorado are the most primitive Indians of the United States in habits; the Maricopas; the Pimas and Papagoes, who figure much in early Arizona history, and who are superior in intelligence, adaptability, application and character; the Hopis or Moquis, possessed of the same good qualities and notably temperate and provident, famous for their prehistoric culture (Tusuyan) ; the Navaho. and the kindred Apaches, perhaps the most relentless and savage of Indian warriors. All the Indians of Arizona live on reservations save the few non-tribal Indians taxed and treated as active citizens. Even the Apaches after being whipped by relentless war into temporary submission have been bound by treaties which the gifts, vices and virtues of the reservation system have tempted them to observe. The Pimas and Papagoes were early converted by the Spaniards, and retain to-day a smattering of Christianity plentifully alloyed with paganism. Apaches. Pimas. Papagoes have been employed by the United States on great irrigation works, and have proved industrious and faithful labourers. In 1900 there were 1836 taxed Indians, 26,480 reservation Indians not taxed, and in addition many friendly Papagoes unenumerated.

In 1906 the Indian population was estimated as being 14 % of the whole population of Arizona, and that they are singularly law- abiding is argued from the fact that in the same year the Indians furnished only 3 % of the

convicts in the territorial prison.

Government and Education. — Arizona became a territory of the first (or practically autonomous) class in 1863. Her organic law thereafter until 19 10 consisted of various sections of the Revised Statutes' of the United States. From the beginning she had a territorial legislature. Congress retained ultimately direct control of all government, administration being in the hands of resident officials appointed by the president and Senate. Special mention must be made of the secret police, the Arizona Rangers, organized in 1901 to police the cattle ranges; they are " fearless men, trained in riding, roping, trailing and shooting," a force whose personnel is not known to the general public. The legis- lature repealed the law licensing public gambling in 1907; enacted a law requiring the payment of $300 per annum as licence fee by retail liquor dealers; and provided for juvenile courts and probationary control of children. In 1907 the total tax valuation of property was $77,705,251; the net debt of the territory $1,022,972, and that of counties and towns $3,123,275. The receipts of the territorial treasury for the year ending on the 30th of June 1907 were $687,386, and the disbursements for the same period were $601,568. A homestead provision (1901) exempts from liability for debts (except mortgages or liens placed before the homestead claim) any homestead belonging to the head of a family, existing in one compact body and valued at not more than $2500; such a homestead a married man may not sell, lease or put a lien on without his wife's consent. Personal property to the value of $500 is exempt from the same liability,

The public school system was established in 1 8 7 1 . A compulsory attendance law applies to children between 6 and 14 years of age, but it is not generally obeyed by the Mexican element of popu- lation. In 1907 there was an enrolment of 24,962 out of 33,167 children of school age ; there were six high schools — three new in 1906; and the average number of school days was 128-4. In the fiscal year ending June 1907, the total receipts for schools were $697,762, and the expenditures were $701,102. Illiteracy is high, amounting in 1900 to 23-1 % of native males, above 21 years of age, and 30-5 % of foreign males, principally because of the large number of Indians, Chinese, Japanese and Mexicans in the state. There are two normal schools at Tempe (1886) and Flagstaff (1899), a university at Tucson with an agricultural experiment station that has done much for the industries of Arizona; there is a considerable number of Indian schools, the largest of which are maintained by the national government, and the funds of the university come largely from the same source. The first juvenile reform school, called the Territorial Industrial school, was opened in 1903 at Benson. The territorial prison, formerly at Yuma, was abandoned for a modern building at Florence, Pinal county; and a hospital for the insane is 3 m. from Phoenix.

History. — The history of the South-west is full of interest to the archaeologist. A prehistoric culture widely distributed has left abundant traces. Pueblo ruins are plentiful in the basins of the Gila and Colorado rivers and their tributaries. Geographical conditions and a hard struggle against nature fixed the character of this " aridian " culture, and determined its migrations; the onslaughts of nomad Indians determined the sedentary civiliza- tion of the cliff dwellers. A co-operative social economy is evidenced by the traces of great public works, such as canals many miles in length. The pueblos of the Gila valley are held to be older than those of the Colorado. Casa Grande, 15 m. S.E. of a railway station of the same name on the Southern Pacific railway, is the most remarkable of plain ruins in the South-west, the only one of its type in the United States. It resembles the Casa Grande ruin of Chihuahua, Mexico, with its walls of sun- dried puddled clay, and its area of rooms, courts and plazas, surrounded by a wall. It was already a ruin when discovered in 1694 by the Jesuit father Kino. John Russel Bartlett described it in 1854, and in 1889 Congress voted that it be protected as a government reservation; in 1892 it was set apart by the government. Excavations were made there in 1906-1907 by Dr J. Walter Fewkes. Migration was northward. The valleys of the Salt river and its affluents, the Agua Fria, Verde and Tonto, are strewn with aboriginal remains; but especially important in migrations of culture was the Little Colorado. A very con- siderable population must have lived once in this valley. It is represented to-day by the still undeserted habitats of Zurii (in New Mexico) and Tusayan; the Moquis, after the Zunis, are in customs and traditions the best survival of the ancient civilization.

Arizona north of the Gila, save for a very limited and inter- mittent missionary effort and for scant exploring expeditions, was practically unknown to the whites until well after the beginning of American rule. The Santa Cruz valley, however, has much older annals of a past that charms by its picturesque contrasts with the present. Arizona history begins with the arrival in Sonora in 1536 of Alvar Nunez Cabeza de Vaca, who, although he had not entered Arizona or New Mexico, had heard of them, and by his stories incited the Spaniards to explore the unknown north in hope of wealth. Marcos de Niza, a Franciscan friar to whom the first reconnaissance was entrusted, was the first Spaniard to enter the limits of Arizona. He crossed the south-eastern corner to Zuni in 1539, passing through the Santa Cruz valley; and F. V. de Coronado (q.v.) was led by Fray Marcos over the same route in 1540; while Hernando Alarcon explored the Gulf of California and the lower Colorado river. Members of Coronado's expedition explored the Moqui country and reached the Grand Canyon, and after this a succession of remarkable and heroic explorations followed through the century; which however accomplished little

and embellishing rather than clearing up its mysteries. All this has left traces in still living myths about the early history of the South-west. Early in the 1 7th century considerable progress had been made in Christianizing the Pimas, Papagoes and Moquis. Following 1680 came a great Indian revolt in New Mexico and Arizona, and thereafter the Moquis remained independent of Spanish and Christian domination, although visited fitfully by rival Jesuits and Franciscans. In 1732 (possibly in 1720) regular Jesuit missions were founded at Bac (known as an Indian rancheria since the 17th century) and at Guevavi. The region south of the Gila had already been repeatedly explored. In the second half of the century there was a presidio at Tubac (whose name first appears 1752) and some half-dozen pueblos de visita, including the Indian settlement of Tucson.

A few errors should be corrected and some credit given with reference to this early period. The Inquisition never had any jurisdiction whatever over the Indians; compulsory labour by the Indians was never legalized except on the missions, and the law was little violated; they were never compelled to work mines; of mining by the Indians for precious metals there is no evidence; nor by the Jesuits (expelled in 1767, after which their missions and other properties were held by the Franciscans), except to a small extent about the presidio of Tubac, although they did some prospecting. Persistent traditions have greatly exaggerated the former prosperity of the old South-west. The Spaniards probably provoked some inter-tribal intercourse among the Indians, and did something among some tribes for agriculture. Their own farms and settlements, save in the immediate vicinity of the presidio, were often plundered and abandoned, and such settlement as there was was confined to the Santa Cruz valley. From about 1790 to 1822 was a period of peace with the Apaches and of comparative prosperity for church and state. The fine Indian mission church at Bac, long abandoned and neglected, dates from the last decade of the 18th century. The establishment of a presidio at Tucson in 1776 marks its beginning as a Spanish settlement.

The decay of the military power of the presidios during the Mexican war of independence, the expulsion of loyal Spaniards — notably friars — and the renewal of Apache wars, led to the temporary abandonment of all settlements except Tubac and Tucson. The church practically forsook the field about 1828.

American traders and explorers first penetrated Arizona in the first quarter of the 1 9th century. As a result of the Mexican War, New Mexico, which then included all Arizona north of the Gila, was ceded to the United States. California gold discoveries drew particular attention to the country south of the Gila, which was wanted also for a transcontinental railway route. This strip, known as the " Gadsden Purchase " (see Gadsden, James), was bought in 1854 by the United States, which took possession in 1856. This portion was also added to New Mexico. The Mexicans, pressed by the Apaches, had, in 1848, abandoned even Tubac and Tamacacori, first a visita of Guevavi, and after 1784 a mission. The progress of American settlement was interrupted by the Civil War, which caused the withdrawal of the troops and was the occasion for the outbreak of prolonged Indian wars.

Meanwhile a convention at Tucson in 1856 sent a delegate to Congress and petitioned for independent territorial government. This movement and others that followed were ignored by Congress owing to its division over the general slavery question, and especially the belief of northern members that the control of Arizona was an object of the pro-slavery party. A convention held in April i860 at Tucson undertook to" ordain and establish," of its own motion, a provisional constitution until Congress should " organize a territorial government." This provisional territory constituted all New Mexico south of 34 40′ N. Officials were appointed and New Mexican legislation for the Arizona counties ignored, but nothing further was done. In 1861 it was occupied by a Texan force, declared for the Confederacy, and sent a delegate (who was not admitted) to the Confederate congress. That body in January 1862 passed a formal act organizing the territory, including in it New Mexico, but in May 1862 the Texans were driven out by a Union force from California. By

act of the 24th of February 1863 Congress organized Arizona territory as the country west of 109 W. long. In December an itinerant government sent out complete from Washington crossed the Arizona line and effected a formal organization. The territorial capital was first at Prescott (1863-1867), then at Tucson (1867-1877), again at Prescott (187 7-1889), and finally at Phoenix (since 1889).

There have been boundary difficulties with every contiguous state or territory. The early period of American rule was extremely unsettled. The California gold discoveries and over- land travel directed many prospecting adventurers to Arizona. For some years there was considerable sentiment favouring filibustering in Sonora. The Indian wars, breeding a habit of dependence on force, and the heterogeneous elements of cattle thieves, Sonoran cowboys, mine labourers and adventurers led to one of the worst periods of American border history. But since about 1880 there is nothing

to chronicle but a continued growth in population and prosperity. Agitation for statehood became prominent in territorial politics for some years. In accordance with an act of Congress, approved on the 16th of June 1906, the inhabitants of Arizona and New Mexico voted on the 6th of November 1 906 on the question of uniting the territories into a single state to be called Arizona; the vote of New Mexico was favourable to union and statehood, but these were defeated by the vote of Arizona (16,265 against, and 31,41 for statehood). In June 1910 the President approved an enabling act providing for the admission of Arizona and New Mexico as separate states.

Bibliography.- — For the Colorado river and the Grand Canyon see those articles; for the Sonoran boundary region, Report of the Boundary Commission upon the Boundaries between the United States and Mexico (3 vols., Washington, 1898-1899, also as Senate Docu- ment No. 247, vols. 23-25, 55 Congress, 2 Session) ; for the petrified forest of the Painted Desert, L. F. Ward in Smithsonian Institution Annual Rep., 1899; for the rest of the area, Various reports in the U.S. Geological Survey publications, bibliography in Bulletin Nos. 100, 177. — Fauna and Flora: U.S. Department of Agriculture, North American Fauna, No. 3 (1890), No. 7 (1893); U.S. Biological Survey, Bulletin No. 10 (1898) ; publications of the Desert Botanical Laboratory at Tucson; also titles under archaeology below, particularly Bandelier's " Final Report." — Climate, Soil, Agriculture: U.S. Department of Agriculture, Climate and Crop Service, Arizona, monthly reports, annual summaries; Arizona Agricultural Experiment Station, Bulletins. — Mineral Industries : U.S. Geological Survey publications, consult bibliographies; The Mineral Industry, annual (New York and London). — Government : Arizona Revised Statutes (Phoenix, 1887); Report of the Governor of Arizona Territory to the Secretary of the Interior, annual. — Archae- ology: An abundance of materials in the Annual Report, U.S. Bureau of Ethnology for different years; consult also especially A. F. A. Bandelier, " Contributions to the History of the South- western Portion of the United States," in Archaeological Institute of America, Papers, American Series, vol. 5 (Cambridge, 1890); " Final Report of Investigations among the Indians of the South- western United States," ib. vols. 3 and 4 (Cambridge, 1890-1892); other material may be found in Smithsonian Institution, Annual Report, 1896, 1897, &c, and many important papers by J. W. Fewkes, F. W. Hodge, C. Mendeleff and others in the American Anthropologist and Journal of American Ethnology. — History : H. H. Bancroft, History of Arizona and New Mexico (San Francisco, 1887) ; A. F. A. Bandelier, " Historical Introduction to Studies among the Sedentary Indians of New Mexico," in Archaeological Institute of America, Papers, American Series, vol. 1 (Boston, 1881) ; The Gilded Man (El Dorado) and

other Papers (New York, 1893) ; G. P. Winship, ” The Coronado Expedition,” in U.S. Bureau of Ethnology, 14th Annual Report (1892-1893), pp. 339-613, with an abundant literature to which this may be the guide. The traditional errors respecting the early history of the Spanish South-west are fully exposed in the works of Bancroft and Bandelier, whose conclusions are supported by E. Coues, On the Trail of a Spanish Pioneer, Francisco Garces (2 vols. New York, 1900).

ARJUNA, in Hindu mythology, a semi-divine hero of the Mahabharata. He was the third son of Pandu, son of Indra. His character as sketched in the great epic is of the noblest kind. He is the central figure of that portion of the epic known as the Bhagwad-gita, where he is represented as horrified at the impend- ing slaughter of a battle and as being comforted by Krishna.

ARK (a word common to Teutonic languages, cf. Ger. Arche, adapted from the Lat. area, chest, cf. arcere, to shut up, enclose),, a chest, basket or box. The Hebrew word tebah, translated in the A.V. by ” ark,” is used in the Old Testament (1) of the box made

of bulrushes in which Pharaoh’s daughter found the infant Moses (Exodus ii. 3), and (2) of the great vessel or ship in which Noah took refuge during the flood (Genesis vi.-ix.).

Noah’s Ark. — According to the story in Genesis, Noah’s ark was large enough to contain his family and representatives of each kind of animal. Its dimensions are given as 300 cubits long, 50 cubits broad and 30 cubits high (cubit = 18-22 in.). It was made of ” gopher ” wood, which has been variously identified with cypress, pine and cedar. Before the days of the ” higher criticism ” and the rise of the modern scientific views as to the origin of species, there was much discussion among the learned, and many ingenious and curious theories were advanced, as to the number of the animals and the space necessary for their reception, with elaborate calculations as to the subdivisions of the ark and the quantities of food, &c, required to be stored. It may be interesting to recall the account given in the first edition of the Encyclopaedia Britannica (1771), which contained a summary of some of these various views (substantially repeated up to the publication of the eighth edition, 1853). ” Some have thought the dimensions of the ark as given by Moses too scanty . . . and hence an argument has been drawn against the authority of the relation. To solve this difficulty many of the ancient Fathers and the modern critics have been put to miserable shifts. But Buteo and Kircher have proved geometrically

that, taking the cubit of a foot and a half, the ark was abundantly sufficient for all the animals supposed to be lodged in it. Snellius computes the ark to Have been above half an acre in area . . . and Dr Arbuthnot computes it to have been 81,062 tuns . . . if we come to a calcu- lation the number of species of animals will be found much less than is generally imagined, not amounting to a hundred species of quadrupeds, nor to two hundred of birds. . . . Zoologists usually reckon but an hundred and seventy species in all." The progress of the " higher criticism," and the gradual surrender of attempts to square scientific facts with a literal interpretation of the Bible, are indicated in the shorter account given in the eighth edition, which concludes as follows: — " the insuperable diffi- culties connected with the belief that all the existing species of animals were provided for in the ark, are obviated by adopting the suggestion of Bishop Stillingfleet, approved by Matthew Poole, Pye Smith, le Clerc, Rossenmiiller and others, that the deluge did not extend beyond the region of the earth then inhabited, and that only the animals of that region were pre- served in the ark." The first edition also gives an engraving of the ark (repeated in the editions up to the fifth), in shape like a long roofed box, floating on the waters; the animals are seen in separate stalls. By the time of the ninth edition (1875) precise details are no longer considered worthy of inclusion ; and the age of scientific comparative mythology has been reached.

For a comparative study of the occurrence of the ark in the various deluge myths, in the present edition, see Deluge; Cosmogony ; Babylonia and Assyria.

The Ark of the Law, in the Jewish synagogue, is a chest or cupboard containing the scrolls of the Torah (Pentateuch), and is placed against or in the wall in the direction of Jerusalem. It forms one of the most decorative features of the synagogue, and often takes an architectural design, with columns, arches and a dome. There is a fine example in the synagogue at Great St Helens, London. (X.)

Ark of the Covenant, Ark of the Revelation, Ark of the Testimony, are the full names of the sacred chest of acacia wood overlaid with gold which the Israelites took with them on their journey into Palestine. The Biblical narratives reveal traces of a considerable development in the traditions regarding this sacred object, and those which furnish the most complete detail are of post-exilic date when the original ark had been lost. The fuller titles of the ark originate in the belief that it contained the " covenant " {Urith) or "testimony" {'eduth), the technical terms for the Decalogue (q.v.) ; primarily, however, it would seem to have been called "the ark of Yahweh" (or "Elohim"), or simply "the ark." The word itself {iron) designates an ordinary chest (cp. Gen. 1. 26 ; 2 Kings xii. 10) , and the (late) description of its appear- ance represents it as an oblong box 2$

cubits long, i§ cubits in

breadth and height (roughly 1-2 by -75 metres). It was lined within and without with gold, and through four golden rings were placed staves of acacia wood, by means of which it was carried. A slab of the same metal (the so-called " mercy-seat," kapporeth, Gr. hilasterion) covered the top, and this was surmounted by two Cherubim (Ex. xxv. 10-22, xxxvii. 1-9). The latter, however, are not mentioned in earlier passages (Deut. x. 1, 3), and would naturally increase the weight of the ark, which, according to 2 Sam. xv. 29, could be carried by two men.

The ark was borne by the Levites (Deut. x. 8), and the latest narratives amplify the statement with a wealth of detail char- acteristic of the post-exilic interest in this order. (See Levites.) An interesting passage relating the commencement of an Israelite journey vividly illustrates the power of the sacred object. As the ark started, it was hailed with the cry," Arise, Yahweh, let thine enemies be scattered, let them that hate thee flee from before thee," and when it came to rest, the cry again rang out, " Return, O Yahweh, to the myriads of families of Israel" (Num. x. 33-36). This saying appears to imply a settled life in Canaan, but both affirm the warlike significance of Yahweh and the ark. Thus it is the permanent pledge of Yahweh's gracious presence; it guides the people on their journey and leads them to victory. It is no mere receptacle, but a sacrosanct object as much to be feared as Yahweh himself. To presume to fight without it was to invite defeat, and on one notable occasion the Israelites attempted to attack their enemy north of Kadesh without its aid, and were, defeated (Num. xiv. 44 sq.). There are many gaps in its history, and although at the crossing of the Jordan and at the fall of Jericho the ark figures prominently (Josh. iii. sq., vi. sq.), it is unaccountably missing in stories of greater national moment. Once it is found at Bethel (Judges xx. 27 sq.). It is met with again at Shiloh, where it is under the care of Eli and his sons, descendants of an ancient family of priests (1 Sam. ii. 28; cp. Josh, xviii. 1). After a great defeat of Israel by the Philistines it was brought into the field, but was captured by the enemy. The trophy was set up in the Philistine temple of Ashdod, but vin- dicated its superiority by overthrowing the god Dagon. A plague smote the city, and when it was removed to Ekron, pestilence followed in its wake. After taking counsel the Philistines placed the ark with a votive offering upon a new cart drawn by two cows. The beasts went of their own accord to Beth-shemesh, where it remained in the field of a certain Joshua. Again a disaster happened through some obscure cause, and seventy of the sons of Jeconiah were smitten (1 Sam. vi. 19, R.V., margin). Thence it was removed to the house of Abinadab of Kirjath-jearim, who consecrated his son to its service (1 Sam. iv.-vii. 1). For many years the ark remained untouched — apparently forgotten. Shiloh disappears from history; neither Saul nor even Samuel, whose youth had

been spent with it, takes any further thought of it. After a remarkable period of obscurity, the ark enters suddenly into the history of David (2 Sam. vi.). Some time after the capture of Jerusalem the ark was brought from Baal-Judah, but at the threshing-floor of Nacon (an unintelligible name) Abinadab's son Uzzah laid hands upon it and was struck down for his impiety. On this account the place is said to have received the name Perez-Uzzah (" breach of Uzzah "). It was taken into the house of Obed-edom the Gittite {i.e. of Gath), and brought a blessing upon his house during the three months that it remained there. Finally the king had it conveyed to the city of David, where a tent was prepared to shelter it. Once at Jerusalem, it seems to have lost its unique value as the token of Yahweh's presence; its importance was apparently merged with that of the Temple which Solomon built. The foundation of the capital would pave the way for the belief that the national god had taken a permanent dwelling-place in the royal seat. The prophets themselves lay no weight upon the ark as the central point of Jerusalem's holiness. The real Deuteronomic code does not mention it, and to Jeremiah (iii. 16) it was a thing of no consequence. Later, in the age of the priestly schools, the ark received much attention, although it must obviously be very doubtful how far a true recollection of its history has survived. But nowhere is any light thrown upon its fate. The invasion of Shishak, the

capture of Jerusalem by Joash (2 Kings xiv. 13,14), the troublous reign of Manasseh, the destruction of Jerusalem by Nebuchad- rezzar, have found each its supporters. The wild legends of its preservation at the taking of Jerusalem (2 Mace. ii. and else- where) only show that the popular mind was unable to share the view that the ark was an obsolete relic. More poetical is the tradition that the ark was raised to heaven, there to remain till the coming of the Messiah, a thought which embodies the spiritual idea that a heavenly pledge of God's covenant and faithfulness had superseded the earthly symbol. 1

A critical examination of the history of the Israelite ark renders it far from certain that the object was originally the peculiar possession of all Israel. Many different traditions have gathered around the story of the Exodus, and the ark was not the only divinely sent guide or forerunner which led the Israelites. Its presence at Shiloh, and its prominence in the life of Joshua, support the view that it was the palladium of the Joseph tribes, but the traditions in question conflict with others. The account of the commencement of the ark's journey associates it with Moses and his kin (Num. x. 29 sqq.) — that is, with the south Palestinian clans with which

the term " Levites " appears to be closely connected. (See Levites.) A distinct movement direct into Judah is implied by certain old traditions (see Caleb), but this is subordinated to the more comprehensive account of the journey round by the east of the Jordan. (See Exodus, The.) The narratives in 1 Sam. iv.vi. stand on a plane by themselves, and the gap between them and 2 Sam. vi. has not been satis factorily fixed. But it is not certain that the two belong to the same cycle of tradition; Kirjath-jearim and Baal-Judah are identified only in later writings, and the behaviour of Saul's daughter (2 Sam. vi. 15 sqq.) may conceivably imply that the ark was an unknown object to Benjamites. It is of course possible that the ark was originally the sacred shrine of the clans which came direct to Judah, and that the traditions in 1 Sam. iv.vi., Josh.iii. sqq. are of secondary origin, and are to be associated with its appearance at Shiloh, the fall of which place, although attri buted to the' time of Samuel, is apparently regarded by Jeremiah (xxvi. 6) as a recent event. Of these two divergent traditions, it would seem that the one which associates it with the kin of Moses and David may be traced farther in those late narratives which connect the ark closely with the Levites and even attribute its workmanship to Bezalel, a Calebite (Ex. xxxi. 2; 1 Chron. ii. 19 sqq.) . The tradition in Psalms exxxii. 6 of the search for the ark at Jaar (Kirjath-jearim) and Ephratah is not clear; but a comparison with 1 Chron. ii. 50 seems to show that it recognized the " Calebite " origin of the ark.

See, on this, S.A.Cook, Critical Notes on 0. T. History (Index s.v.), and, for other views, Kosters, Theol. Tijd. xxvii. 361 sqq. ; Cheyne, Encyc. Bib. " Ark "; G. Westphal, Yahwes Wohnstdtten, pp. 55 sqq., 85 sqq. (Giessen, 1908).

Whether the ark originally contained some symbol of Yahweh or not has been the subject of much discussion. Thus, it has been held that it contained stone fetishes (meteoric stones and the like) from Yahweh's original abode on Sinai or Horeb. As the palladium of the Joseph tribes, it has even been suggested that the bones of Joseph were treasured in the ark. Others have regarded it as an empty portable throne, 2 or as a receptacle for sacred serpents (analogies in Frazer, Pausanias, iv. pp.292, 344). That it contained the tables of the law (Deut. x. 2 ; 1 Kings viii. 9) was the later Israelite view, and the subsequent development is illustrated in Heb. ix. 4. It is enough to decide that the ark represented in some way or other the presence of Yahweh and that the safety of his followers depended upon its security (analogies in Frazer, Paus. x. p. 283). The Semitic world affords many examples of the belief that a man's religion was part of his political connexion and that the change of nationality involved

1 Cp. Rev. xi. 19, and W. R. Smith, Old Test, in Jew. Church, Index. For later traditional material, see Buxtorf, De Area Foederis (Basel, 1659).

1 But see Budde, Expos. Times (1898), pp. 398 sqq. ; Theolog. Stud. u. Krit. (1906), pp. 489-507. The possibility must be conceded that there were several arks in the course of Hebrew history and that separate tribes or groups of tribes had their own sacred object.

change of cul't. He who leaves his land to enter another, leaves his god and is influenced by the religion of his new home (1 Sam. xxvi. i9;Ruthi. i6sqq.), but strangers know not "the cult of the God of the land " (2 Kings xvii. 26). No nation willingly changes its god (Jer. ii. n), and there are means whereby the follower of- Yahweh may continue his worship even when outside Yahweh's land (2 Kings v. 17). When a people migrate they may take with them their god, and if they conceive him to be a spiritual being who cannot be represented by an image, they may desire a symbolical expression of or, rather, a substitute for his presence. Accordingly the conception of the ark must be based in the first instance upon the beliefs of the particular clans or tribes whose sacred object it was.

See further, W. R. Smith, Religion of the Semites, p. 37 ; Schwally, Kriegsaltertiimer, i. p. 9; Revue biblique (1903), pp. 249 sqq. ; and on the ark, generally, in addition to the literature already cited, Kautzsch, Hastings' Diet. Bible, v. p. 628; A. R. S. Kennedy, Century Bible: Samuel {Appendix); E. Meyer, Die Israeliten, Index s.v. " Lade,"; and R. H. Kennett, Enc. of Rel. and Ethics. (S. A. C.)

ARKANSAS, a river of the United States of America, rising in the mountains of central Colorado, near Leadville, in lat. 39 20′ N., long. 106 15′ W., and emptying into the Mississippi, at Napoleon, Arkansas, in lat. 33° 40′ N. Its total length is about 2000 m., and its drainage basin (greater than that of the Upper Mississippi) about 185,000 sq. m. It is the greatest western affluent of the Missouri-Mississippi system. It rises in a pocket of lofty peaks at an altitude of 10,400 ft. on a sharply sloping plateau, down which it courses as a mountain torrent, dropping 4625 ft. in 120 m. At Canyon City it passes out of the Rockies through the Grand Canyon of the Arkansas; then turn- ing eastward, and soon a turbid, shallow stream, depositing its mountain detritus, it flows with steadily lessening gradient and velocity in a broad, meandering bed across the prairies and low- lands of eastern Colorado, Kansas, Oklahoma and Arkansas, shifting its direction sharply to the south-east in central Kansas. The Arkansas ordinarily receives little water from its tributaries save in time of floods. In topography and characteristics and in the difficulties of its regulation the Arkansas is in many ways typical of the rivers in the arid regions of the western states. The gradient below the mountains averages 7-5 ft. per mile between Canyon City and Wichita, Kansas (543 m.), about 1-5 ft. between Wichita and Little Rock (659 m.), and 0-65 of afoot from Little Rock to the mouth (173 m.). The shores are sand, clay or loam

throughout some 1300 m., with very rare rock ridges or rapids, and the banks rise low above ordinary water. The waters are constantly rising and falling, and almost never is the discharge at any point uniform. Every year there are, normally, two distinct periods of high water; one an early freshet due mainly to the heavy winter rainfall on the lower river, when the upper river is still frozen hard; the other in the late spring, due to the setting in of rains along the upper courses also, and to the melting of the snow in the mountains. The lowest waters are from August to December. In the summer there are sometimes violent floods due to cloud-bursts. Everywhere along the river there is a never-ending variation of velocity and discharge, and an equally ceaseless transformation of the river's bed and contour. These changes become revolutionary in times of flood. All these characteristics are accentuated below Little Rock. The depth of water at this point has been known to vary from 27 ft. to only half -a-foot, and the discharge to fall to n 70 cub. ft. per second. There is often no more than 1 • 5 f t. of water, and far below Little Rock a depth of 3 ft. on crossings is not infrequent. In many places there are different channels for high and low water, the latter being partly filled by each freshet, and recut after each subsidence; and the river meanders tortuously through the alluvial bottom in scores of great bends, loops and cut-offs. It is estimated that the eating and caving of the shore below Little Rock averages 7-64 acres per mile every year (as against 1-99 acres above Little Rock). By way of the White river cut-off the Arkansas finds an additional outlet through the valley of that river in times of high water, and the White, when the current in its natural channel is deadened by the backwaters of the Mississippi, finds an outlet by the same cut-off through the valley

of the Arkansas. This backwater, where it meets and checks the current of the Arkansas, occasions the precipitation of enormous alluvial deposits, and vast quantities of snags. The banks 'are disintegrated along this part of the river and built up again on the opposite side to their original height in the extraordinarily short time of two or three years, the channel remaining all the while narrow. At the mouth of the White, the Arkansas and the Mississippi the level of recurrent floods is 6 or 8 ft. above the timber-bearing soil along the banks, and all along the lower river the country is liable to overflow; and as the land back- ward from the stream slopes downward from the banks heaped up by successive flood-deposits, each overflow creates along the river a fringe of swamps. These features, although exaggerated in the portion of the river now in question, are qualitatively characteristic of its entire course below the mountains.

Up to the 30th of June 1907 the government -of the United States expended $2,384,557 on improvements along the Arkansas. Almost half of this sum was required for snagging operations alone. There is a considerable traffic on the river within the borders of Arkansas in miscellaneous freights, and a slight passenger movement. The river is rarely navigable above Fort Smith, and during a considerable part of the year not above Pine Bluff. Steamer service is maintained the year round between this point and Memphis. Ordinarily there are some 400 m. of channel open to steamers part of the year, and in time of high flood considerably more. To the mouth of the Grand river (460 m.) the river is open about four months in a year for vessels of 4 ft. draft and about eight months for vessels of 2 ft. draft.

Bibliography. — General descriptions of different portions of the river are indicated in the Index to the Reports of the Chief of Engineers, U. S. Army (many volumes, 1879-1900). See also H. Gannett, Profiles of Rivers in the U. S.(V. S. Geolog. Survey, 1 901) ; Greenleaf, "Western Floods," in Engin. Mag. xii. 945-958; U. S. Geolog. Survey, Bull. 140; I. C. Russell, Rivers of North America (1898); T. J. Vivian, Transportation, Rivers of the Miss. Valley (U. S. Census, 1890, special Rp.).

ARKANSAS, one of the South Central states of the United States of America, situated between 89 40′ N. and 94 42′ W., bounded N. by Missouri, E. by the Mississippi river, separating it from Tennessee and Mississippi, and W. by Texas and Okla- homa. Its area is 53,335 sq. m., of which 810 are water surface.

Arkansas lies in the drainage basin of the lower Mississippi, and has a remarkable river system. The Arkansas bisects the state from W. to E. ; along its valley lie the oldest and largest settle- ments of the state. Nine other considerable streams drain the state; of these, the Red, the Ouachita, the White and the St Francis are the most important. There are a number of swamps and bayous in the eastern part.

Physical Features. — The surface of Arkansas is the most diversified of that of any state in the central Mississippi valley. It rises, sloping upward toward the N.W., from an average elevation of less than 300 ft. in the south-east to heights of 2000 ft. and more in the north-western quarter. There are four physiographic regions: two of highlands; one of river valley plain separating the two highland areas; while the fourth is a region of hills, lowlands and scanty prairie. The last covers the E. half of the state, and is part of the Gulf or coastal plain province of the United States. If a line be drawn from the point where the Red river cuts the western boundary to where the Black cuts the northern, E: of it is the Gulf plain and W. of it are the highlands (over 500 ft.) and the mineral regions of the

state. They are divided by the valley of the Arkansas river into two regions, which are also structurally different. South of the river are the Ouachita Mountains, and north of it are the Boston Mountains. The Ouachita Mountains are characterized by close folding and faulting. Their southern edge is covered with cretaceous deposits, and their eastern edge is covered as well with the tertiary deposits of the Gulf plains. The Arkansas valley is marked by wide and open folding. The Boston Mountains are substantially a continuation of the Ozark dome of Missouri. Their northern border is marked by an escarpment of 500 to 700 ft. in height. The trend is from E. to W. between

Batesville and Wagoner, Oklahoma. In structure they are monoclinical, their rocks — sandstones and shales — being laid southward and blending on that side with the Arkansas valley region. The entire region is very much dissected by streams, and the topography is characteristically of a terrace and escarp- ment type. In the highlands N. of the Arkansas the country is very irregularly broken ; S. of the river the hills lie less capriciously in short, high ranges, with low, fertile valleys between them. The Ouachitas extend 200 m., from within Oklahoma (near Atoka) to central Arkansas, near Little Rock. They are characterized by long, low ridges bearing generally W.-E., with wide, flat valleys. Near the western boundary of the state they attain a maximum altitude of 2900 ft. above the sea, and 2000 ft. above the valleys of the Arkansas and Red river; falling in elevation eastward (as westward) to 500-700 ft. at their eastern end. Five peaks rise above 2000 ft. Magazine Mountain, 2833 ft. above the sea-level and 2350 ft. above the surrounding country, is the highest point between the Alleghanies and the Rockies. Altitudes of 2250 ft. are attained in the Boston Mountains, which are the highest portion of the Ozark uplift, and the most picturesque. The streams are vigor- ous, and in their lower courses flow in deep-cut gorges, 500 to 1000 ft. deep, almost deserving the name of canyons. The main streams are tortuous, and their dendritic tributaries have cut the region into ridges. The mountains do not fill the N.W. quarter of the state, and are separated from a lower, greatly eroded highland region on their N. by a bold escarpment 500 to 1000 ft. in height. Along the upper course of the White river in the Bostons and in the country about Hot Springs in the Ouachitas is found the most beautiful scenery of the highlands; few regions are more beautiful. The valley region embraces the bottom-lands along the Mississippi, and up the Arkansas as far as Pine Bluff, and the cypress swamp country of the St Francis.

Climate. — The climate of the state is " southern," owing to the influence of the Gulf of Mexico. The mean temperatures for the different seasons are normally about 41-6°, 61 -1°, 78-8° and 61-9° F. for winter, spring, summer arid autumn respectively. The normal mean precipitations are about 11-7, 14-5, 10-5 and 10.2 in. for the same seasons. The extreme

range of the monthly isotherms crossing the state is from about 35° in winter to 8i° F. in summer, and the range of annual isotherms from about 54 to 6o° F. That is, the variation of mean annual temperatures for different parts of the state is only 6° F. The variation of the mean annual temperature for the entire state is only 4 (from 59° to 63 F.). The variation of precipitation is as great as 30 in. (from 34 to 64 in.) according to locality. There is little snow, no severe winter cold, and no summer drought. Sheltered valleys in the interior produce spring crops three or four weeks earlier than is usual in Kansas. The climate is generally healthy.

Flora. — Arkansas lies in the humid, or Austroriparian, area of the Lower Austral life-zone, except the highlands of the ˆOzark uplift and Ouachita Mountains, which belong to the humid, or Carolinian, area of the Upper Austral. The state possesses a rich fauna and flora. From an economic standpoint its forests deserve special mention. The forest lands of the state include four-fifths of its area, and three-fourths are actually covered by standing timber. Valuable trees are of great variety: cotton- wood, poplar, catalpa, red cedar, sweet-gum, birch-eye, sassafras, persimmon, ash, elm, sycamore, maple, a variety of pines, pecan, locust, dogwood, hickory, various oaks, beech, walnut and cypress are all abundant. There are one hundred and twenty- nine native species of trees. The yellow pine, the white oak and the cypress are the most valuable growths. The northern woods are mainly hard; the yellow pine is most characteristic of the heavy woods of the south central counties; and magnifi- cent cypress abounds in the north-east. Hard woods grow even on the alluvial lands. " The hard-wood forests of the state are hardly surpassed in variety and richness, and contain inestimable bodies of the finest oak, walnut, hickory and ash timber " (U.S. Census, 1870 and 1900). The growth on the alluvial bottoms and the lower uplands in the E. is extraordinarily vigorous. The leading species of the Appalachian woodland maintain their

full vigour of growth nearer to the margin of forest growth in this part of the Mississippi valley than in any other part of the United States; and some species, such as the holly, the osage orange and the pecan, attain their fullest growth in Arkansas {Shaler). There are two Federal forest reserves (4968 sq. m.).

Soil. — The soils of Arkansas are of peculiar variety. That of the highlands is mostly but a thin covering,: and their larger portion is relatively poorly fitted for agriculture. The uplands are generally fertile. Their poor soils are distinctively sandy, those of the lowlands clayey; but these elements are

usually found combined in rich loams characterized by the predominance of one or the other constituent. Finally the alluvial bottoms are of wonderful richness.

Agriculture. — This variety of soils, a considerable range of moderate altitudes and favourable factors of heat and moisture promote a rich diversity in agriculture. Arkansas is predomin- antly an agricultural state. The farm area of i860 was only 28-2 % of the whole area of the state, that of 1900 (16,636,719 acres) was 49 % ; and while only a fifth of this farm area was actually improved in i860, two-fifths were improved in 1900; thus, the part of the state's area actually cultivated approxi mately quadrupled in four decades. The value of products in 1900 ($796 millions) was 44 % of the total farm values ($181-4 millions). The rise in average value of farm lands since 1870 has not been a fifth of the increase of the aggregate value of all farm property.*

The Civil War wrought a havoc from which a full recovery was hardly reached before 1 890. The economic evolution of the state since Reconstruction has been in the main that common to all the old slave states developing from the plantation system of ante-bellum days, somewhat diversified and complicated by the special features of a young and border community. The farms of Arkansas increased in number 357-8 %, in area 73-7 % and in total true (as distinguished from tax) valuation about 53-8 % between i860 and 1900; the decade of most extraordinary growth being that of 1870-1880. Thus Arkansas has shared that fall in the average size of farms common to all sections of the Union (save the north central) since 1850, but especially marked since the Civil War in the " Cotton States," owing to the sub- division of large holdings with the introduction of the tenant system. The rapidity of the movement has not been excep- tional in Arkansas, but the size of its average farm, less in 1850 than that of the other cotton states, was in 1900, 93-1 acres (108-8 for white farmers alone, 49-0 for blacks alone), which was even less than that of the North Atlantic states (96-5 acres, the smallest sectional unit of the Union). The percentage of farms worked by owners fell from 69-1 % in 1880 to 54-6% in 1900; the difference of the balances or 14-5 % indicates the increase of tenant holdings, two-thirds of these being for shares.

It is interesting to compare in this matter the whites and the negroes. In actual numbers the white farmers heavily predomin- ate, whether as owners, tenants for cash or tenants on shares; but if we look at the numbers within each race holding by these respective tenures (65-0, 8-7 and 26-3 % respectively for whites; 25'6, 33-7 and 40-7 % for negroes, in 1900), we see the lesser independence of the negro farmer. The cotton counties, which are the counties of densest coloured habitancy, exemplify this fact with great clearness. The few negroes in the white counties of the

uplands are much better off than those in the cotton low- lands; more than three times as large a part of them owners; the poorer element is segregated in the cotton region. In Arkansas, as elsewhere in the south, negro tenants, like white tenants, are more efficient than owners working their own lands. The black farmer is in bondage to cotton; for him still " Cotton is King." He gives it four-fifths of his land; while his white rival allows it only a quarter of his, less by half than the area he gives to live-stock, dairying, hay and grains. At Sunnyside, on the west bank of the Mississippi, negro tenant farmers have been practically forced out of business by Italians, who produced in 1 890-1 904 more than twice as much lint cotton per working hand, and 70 % more per acre. The general place of the negro in agriculture is shown also by the fact that more than four-fifths

of the farm acreage and farm values of the state are in the hands of the whites. The white farmer gives an outlay in labour and fertilizers on his farm greater by 61-4% than the black, gathers a produce greater by 22-5%, and possesses a farm of a value 53"5% greater (Census, 1900).

Cotton is the leading product. It absorbs about a third of the area under crops, and its returns ($28,000,000 in 1899) are about a half of the value of all crops. A part of the cotton lands of Arkansas are among the richest in the south. Other distinctively southern products (tobacco, &c.) are of no importance in Arkansas. Cereals are given more than twice as much acreage as cotton, but yield only a third as great aggregate returns, Indian corn being much the most remunerative; about three-fourths of the cereal acreage are given to its cultivation, and it ranks after cotton in value of harvest. 1 For all the other staple agricultural products of the central states the showing of Arkansas is uni- formly good, but not noteworthy. But its rank as a fruit- growing country is exceptional. Plums, prunes, peaches, pears and grapes are cultivated very generally over the western half of the state (grapes in the east also), but with greatest success in the south-west; apples prosper best in the north-west. Small berries are a very important product. All fruits are of the finest quality. For apples the state makes probably a finer showing than that of any other state except Oregon. About ninety varieties are habitually entered in national competitions. The fruit industry generally has developed with extreme rapidity.

Manufactures. — Although Arkansas is rich in minerals and in forests, in 1900 only 2 % of its population were engaged in manu- facturing. But the development has been rapid; the value of products multiplied seven times, the wages paid nine, and the capital invested twelve, in the years 1880-1900; and the increase in the same categories from 1900-1905 was 35, 42-8 and 82-4 % respectively. 2 It must be noted as characteristic of the state that of the total manufactures in 1905, 80-3 % were pro- duced in rural districts (83-7 in 1900). About two- thirds of the increase between

1890 and 1900 was in the lumber industry which was of slight importance before the former year; it repre sented more than half the total value of the manufactures oi the state in 1905 (output, 1905, $28,065,171 and of mill products $3>786,772 additional); in the value of lumber and timber products the state ranked sixth among the states of the United States in 1900, and seventh in 1905. After the lumber and timber industry ranked in 1905 the manufacture of cotton-seed oil and cake ($4,939,919) and flour and grist milling. Cotton ginning increased 739 % from 1890 to 1900.

Minerals.— The progress of coal-mining has been a striking feature of the state's economy since 1880. The field extends from Oklahoma eastward' to central Arkansas, along both sides of the Arkansas river. A production of 5000 tons (short) in 1882 became 542,000 tons in 1891 and 2,229,172 tons in 1903 — a maximum for the state up to 1905; in 1907 the yield was 2,670,438 tons, valued at $4,473,693 ; the value of the product increased more than eight-fold in 1886-1900. The United States Geological Survey estimates that three-fourths of the coal area (over 1700 sq. m.) can made commercially productive. Apart from coal the great and varied mineral wealth of the state has been only slightly utilized. The great zinc and lead area along the northern border in the plateau portion of the Ozark region has proved a disappointment in development; the iron areas have hardly been touched, and the product of the exceptionally promising deposits of manganese lost ground after 1890 before

1 For 1906 the Yearbook of the U. S. Department of Agriculture reported the following statistics for Arkansas: — Indian corn, 52,802,659 bu., valued at $24,817,207; oats 3>783j7°6 bu., valued at $1,589,157; wheat, 1,915,250 bu., valued at $1,436,438; rice, 131,446 bu., valued at $111,724; rye, 23,652 bu., valued at $19,631; potatoes, 1,666,960 bu., valued at $1,116,863; hay, 113,49! tons, valued at $1,123,561.

2 The special census of the manufacturing industry for 1905 was concerned only with the establishment conducted under the so- called " factory system "; for purposes of comparison the figures for 1900 have been reduced to the same standard, and this fact should be borne in mind with regard to the percentages of increase given above.

the output of Virginia and Georgia. Among the products of the rich stone quarries of the state, only that of abrasive stones is important in the markets of the Union; the novaculites of Arkansas are among the finest

whetstones in the world. Deposits of true chalk are utilized in the manufacture of Portland cement for local markets. The chalk region lies in the S. E. part of the state, S. of the Ouachita Mountains. Bauxite was discovered in the state in 1887, and the product increased from 5045 long tons in 1899 to 50,267 long tons in 1906, the production for the whole country in 1899 being 35,280 long tons and in 1906 75,332 long tons. The only other states in which bauxite was produced during the period were Alabama and Georgia, which in this respect have greatly declined in importance relatively to Arkansas. Extremely valuable and varied marls, kaolins and clays, fuller's earth, asphaltum and mineral waters show special promise in the state's industry. In 1906 diamonds were found in a peridotite dike in Pike county 25 m. S. E. of Murfreesboro; this is the first place in North America where diamonds have been found in situ, and not in glacial deposit or in river gravel.

Communications. — The rivers afford for light craft (of not over 3 ft. draft) about 3000 m. of navigable waters, a river system unequalled in extent by that of any other state. The labours of the United States government have much extended and very greatly improved this navigation, materially lessening also the frequency and havoc of floods along the rich bottom-lands through which the rivers plough a tortuous way in the eastern and southern portions of the state. As a result of these improve- ments land and timber values have markedly risen, and great impetus has been given to traffic on the rivers, which carry a large part of the cotton, lumber, coal, stone, hay and miscel- laneous freights of the state. The greatest of these internal improvements is the St Francis levee, from New Madrid, Missouri, to the mouth of the St Francis, 212 m. along the Mississippi; an area of 3500 sq. m., of exceptional fertility, is here reclaimed at a cost of about $1500 per sq. m. (as compared with $10,000 per sq. m. for the 2500 sq. m. reclaimed by the Nile works at Assuan and Assiut). Whether with regard to area or population, Arkansas is also relatively well supplied with railways (4,472-8 m. at the end of 1907). A state railway commission controls transportation rates, which are also somewhat checked by the competition of river freights. There is also a considerable passenger traffic on the Arkansas.

Population. — The population in 1910 was 1,574,449. The growth in 1880-1900 is shown by the following table: — –

Census Year.

Total Pop.

%White Pop.

%Negro Pop.

Average per sq. m.

% Increase by decades.

Total.

Whites.

Negroes.

1880 1890 1900

802,525 1,128,211 1.31 1.564

73-7 72-6 72-0

26-3 27-4 28-0

21-5 25-0

65-6 40-6 163

63-3 38-4 1 5 ‘4

72-4 46-6 187

In 1900 the rank of the state in total population was twenty-fifth, and in negro population tenth. The proportion of the coloured element steadily rose from n % in 1820 to 28 %in 1900, at which time there were more than a dozen counties along the border of the Mississippi and- lower Arkansas in which the negroes numbered 50 to 89 % of the total. They have never been a large element in the highland counties; it was these counties which were most strongly Unionist at the time of the Civil War, and which to-day are the region of diversified industry. About a ninth of the state’s population is gathered into towns of more than 2000 inhabitants. Fort Smith (pop. 11,587 in 1900), Little Rock, the state capital (38,307), and Pine Bluff (11,496) lie in the valley of the Arkansas. In 1900 a dozen other towns had a population exceeding 2500, the most important being Hot Springs (9973), Helena (5550), Texarkana (4914), Jonesboro (4508), Fayetteville (4061), Eureka Springs (3572), Mena (3423) and Paragould (3324). Foreign blood has only very slightly permeated the state; negroes and -native whites of native parents make up more than 95 % of its population. , Immigration is almost entirely from other southern states. The strongest religious sects are the Methodists and Baptists.

Government. — The present constitution of the state dates from 1874 (with amendments). Few features mark it off from the usual type of such documents. The governor holds office for two years; he has the pardoning and veto power, but his veto may be overridden by a simple majority in each house of the whole number elected to that house (a provision unusual among the state constitutions of the Union). There is no lieutenant-governor. The legislature is bicameral, senators holding office for four years, representatives (about thrice as numerous) for two. The length of the regular biennial legislative sessions is limited to sixty days, but by a vote of two-thirds of the members elected to each house the length of any session may be extended. Special sessions may be called by the governor. A majority of the members elected to each of the two houses suffices to propose a constitutional amendment, which the people may then accept by a mere majority of all votes cast at an election for the legis- lature (an unusually democratic provision) ; no more than three amendments, however, can be proposed or submitted at the same time. The supreme court has five members, elected by the people for eight years; they are re-eligible. The population of the state entitles it to seven representatives in the national House of Representatives, and to nine votes in the Electoral College (census of 1900). Elections of members of the state legislature and of Congress are not held at the same time — a very unusual provision. Elections are by Australian ballot; the constitution prescribes that no law shall " be enacted whereby the right to vote at any election shall be made to depend upon any previous registration of the elector's name " (extremely unusual). The qualifications for suffrage include one year's residence in the state, six months in the county, and one month in the voting district, next before election; idiots, insane persons, convicts, Indians not taxed, minors and women are disqualified; aliens who have declared their intention to become citizens of the United States vote on the same terms as actual citizens. An amendment of 1893 requires the exhibition of a poll-tax receipt by every voter (except those " who make satisfactory proof that they have attained the age of twenty-one years since the time of assessing taxes next preceding " the election). There is nothing in the constitution or laws of Arkansas with any apparent tendency to disfranchise the negroes; there are statutory provisions (1866- 186 7) against intermarriage of the races and constitutional and statutory (1886-1887) provisions for separate schools, a " Jim Crow " law (1891) requires railways to provide separate cars for negroes, and a law (1893) provides for separate railway waiting-rooms for negroes. Giving or accepting a challenge to a duel bars from office, but this survival of the ante-bellum social life is to-day only reminiscent. Declared atheists are similarly disqualified. There is no constitutional provision for a census. Marriage is pronounced a civil contract A law for compulsory education was passed in 1909.

Finance. — The constitution makes 1 % on the assessed valua- tion of property a maximum limit of state taxation for ordinary expenses, but by an amendment of 1906 the legislature may levy three mills on the dollar per annum for common schools; and may " authorize school districts to levy by a vote of the qualified electors of such district a tax not to exceed seven mills on the dollar in any year for school purposes." The state debt in 1874 was $12,108,247, of which about $9,370,000 was incurred after the Civil War for internal improvement schemes. This new debt was practically repudiated in 1875 by a decision of the supreme court, and completely set aside in 1884 by constitutional amendment. Until 1900, when an adjustment of the matter was reached, there was also another disputed debt to the national government, owing to the collapse in 1839 of a so-called Real Estate Bank of Arkansas, in which the state had invested more than $500,000 paid to it by the United States in exchange for Arkansas bonds to be held as an investment for the Smithsonian Institution, on which bonds the state defaulted after 1839. If the unac- knowledged debt be included (as it often is; and hence the necessity of reference to it), very few states — and those all western or southern — have a heavier burden per capita. But the acknowledged debt was in 1907 only $1,250,500, and this is

not a true debt, being a permanent school fund that is not to be paid off; of this total in 3 % bonds, $1,134,500 is held by the common schools and $116,000 by the state university. In net combined state and local debt, Arkansas ranks very low among the states of the Union. The hired labourer suffers from the " truck " system, taking his pay in board and living, in goods, in trade on his employer's credit at the village store; the inde- pendent farmer suffers in his turn from unlimited credit at the same store, where he secures everything on the credit of his future crops; and if he is reduced to borrow money, he secures it by vesting the title to his property temporarily in his creditor. His legal protections under such " title bonds " are much slighter than under mortgages. Homesteads belonging to the head of a family and containing 80 to 160 acres (according to value) if in the country, or a lot of j to cne acre (according to value), if in town, village or city, are exempt from liability for debts, excepting liens for purchase money, improvements or taxes. A married man may not sell or mortgage a homestead without his wife's consent.

Education. — The legal beginnings of a public school system date from 1843; i n x 867 the first tax was imposed for its support. Only white children were regarded by the laws before Reconstruc- tion days. There are

now separate race schools, with terms of equal length, and offering like facilities; the number of white and coloured teachers employed is approximately in the same proportion to the number of attending children of the respective races; in negro districts two out of three school directors are usually negroes. " The coloured race as a whole go to the schools as regularly and as numerously in proportion as do the whites " (Shinn). Of the current expenses of the common schools about three-fourths is borne by the localities; the state distri- butes its contribution annually among the counties. There is also a permanent school fund derived wholly from land grants from the national government. The total expenditure for the schools is creditable to the state; but before 1909 hardly half the school population attended; and in general the rural conditions of the state, the shortness of the school terms and the dependence of the schools primarily upon local funds and local supervision, make the schools of inadequate and quite varying excellence. The average expenditure in 1906 for tuition per child enrolled was $4-93, and the average length of the school term was only eighty-one days. In June 1906 there were 1102 school houses in thestatevaluedat$iooorless. In 1 905-1906 the Peabody Board gave $2000 to aid rural schools, and in general it has done much for the improvement of country public schools throughout the state. In 1906 an amendment to the state constitution, greatly increasing the tax resources available for educational work, was passed by a large popular vote. The University of Arkansas was opened at Fayetteville in 1 8 7 2 . The law and medical faculties are at Little Rock. A branch "normal school, established 1873-1875 at Pine Bluff, provides for coloured students, who enjoy the same opportunities for work, and are accorded the same degrees, as the students at Fayetteville; they are about a fourth as numerous. In 1905-1906 there were 497 students in the college of liberal arts, sciences and engineering, 548 in the preparatory school and 26 in the conservatory of music and arts, all in Fayetteville; 171 in the medical school and 46 in the law school in Little Rock; and 240 in the branch normal college at Pine Bluff. The university and the normal school are supported by the Morrill Fund and by state appropriations. The state still suffered in 1906 from the lack of a separate and special training school for teachers; but in 1907 the legislature voted to establish a state normal school. Of the Morrill Fund (see Morrill, Justin Smith), three-elevenths goes to the normal school. The agricultural experiment station of the university dates from 1887. The financial support of the university has been light, about three-fifths coming from the United States government. Besides the university there are about a score of denominational colleges or academies, of which half-a-dozen are for coloured students. Among the large denominational colleges are Philander Smith College, Little Rock (Methodist Episcopal, 1877); Ouachita College, Arkadel;>hia (Baptist, 1886); Hcndrix

College, Conway (Methodist Episcopal, South, 1884); and Arkansas College, Batesville (Presbyterian, 1872). There are few libraries in Arkansas. In this matter her showing has long been among the very poorest in the Union relatively to her population. Daily papers are few in number. The state charitable institu- tions—insane asylum, deaf-mute and blind institutes — and the penitentiary, are at Little Rock.

Local government is of the ordinary southern county type, without noteworthy variations. Municipal corporations rest upon a general state law, not upon individual charters. The liquor question is left by the state to county (i.e. including " local," or town) option, and prohibition is the most common county law, the alternative being high-licence.

History. — The first settlement by Europeans in Arkansas was made in 1686 by the French at Arkansas Post (later the residence of the French and Spanish governors, important as a trading post in the earlier days of the American occupation, and the first territorial capital, 1819-1820). In 1720 a grant on the Arkansas was made to John Law. In 1762 the territory passed to Spain, in 1780 back to France, and in 1803 to the United States as a part of the " Louisiana Purchase." Save in the beginnings of western frontier trade, and in a great mass of litigation left to the courts of later years by the curious and uncertain methods of land delimitation that prevailed among the French and Spanish colon- ists, the pre-American period of occupation has slight connexions with the later period, and scant historical importance.

From 1804 to 181 2 what is now Arkansas was part of the district (and then the territory) of Louisiana, and from 181 2 to 1819 of the territory of Missouri. Its earliest county organiza- tions date from this time. It was erected successively into a territory of the first and second class by acts of Congress of the 2nd of March 1819 and the 21st of April 1820. By act of the 15th of June 1836 it was admitted into the Union as a slave state.

There is little of general interest in the history of ante-bellum days. Economic life centred in the slave plantation, and there was remarkable development up to the Civil War. The decade 1819-1829 saw the first newspaper (1819), the beginning of steam- boating on Arkansas rivers, and the first weekly mail from the east. Trade was largely confined to the rivers and freighting for Sarite F6 and Salt Lake before the war, but the first railway entered the state in 1853. Social life was sluggish in some ways and wild 'in others. An unhappy propensity to duelling, the origin in Arkansas of the bowie-knife, — from an alleged use of which Arkansas received the nickname, which it has always retained, of the "toothpick state," — and other backwoods .associations gave the state a reputation which to some extent has survived in spite of many years of sober history.

The questions of the conduct of territorial affairs do not seem to have been contested systematically on national party lines until about 1825. The government of Arkansas before the Civil War was always in the hands of a few families closely intermarried. From the beginning the state has been unswervingly Democratic, save in the Reconstruction years, though often with heavy Whig or Republican minorities.

In February 1861 the people of Arkansas voted to hold a convention to consider the state of public affairs. The conven- tion assembled on the 4th of March. Secession resolutions were defeated, and it was voted to submit to the people the question whether there should be " co-operation " through the Lincoln government, or " secession." The plan was endorsed of holding a convention of all the states to settle the slavery question, and delegates were chosen to the proposed Border State Convention that was to meet at Frankfort, Kentucky, on the 27 th of May. Then came the fall of Fort Sumter and the proclamation of President Lincoln calling for troops to put down rebellion. The governor of Arkansas curtly refused its quota. A quick surge of ill-feeling, all the bitterer on account of the divided sentiments of the people, chilled loyalty to the Union. The convention re- assembled on call of the governor, and on the 6th of May, with a single dissentient voice, passed an ordinance of secession. It then repealed its former vote submitting the question of secession

to the people. On the 16th of May Arkansas became one of the Confederate States of America.

In the years of war that followed, a very large proportion of the able-bodied men of the state served in the armies of the Confederacy ; several regiments, some of coloured troops, served the Union. Union sentiment was strongest in the north. In 1862-1863 various victories threw more than half the state, mainly the north and east, under the Federal arms. Accordingly, under a proclamation of the president, citizens within the conquered districts were authorized to renew allegiance to the Union, and a special election was ordered for March 1864, to reorganize the state government. But meanwhile, a convention of delegates chosen mainly at polls opened at the army posts, assembled in January 1864, abolished slavery, repudiated secession and the secession war debt, and revised in minor details the constitution of 1836, restricting the suffrage to whites. This new fundamental law was promptly adopted by the people, i.e. by its friends, who alone voted. But the representatives of Arkansas under this constitution were never admitted to Congress. • The Federal and

Confederate forces controlled at this time different parts of the state; there was some ebb and flow of military fortune in 1864, and for a short time two rival govern- ments. Chaotic conditions followed the war. The fifteenth legislature (April 1864 to April 1865) ratified the Thirteenth Amendment, and passed laws against " bush- whacking," a term used in the Civil War for guerilla warfare, especially as carried on by pretended neutrals. Local militia, protecting none who refused to join in the common defence, and all serving " not as soldiers but as farmers mutually pledged to protect each other from the depredations of outlaws who infest the state," strove to secure such public order as was necessary to the gathering of crops, so as " to prevent the starvation of the citizens " (governor's circular, 1865). Strugglingin these difficulties, the government of the state was upset by the first Reconstruction Act. The governor in these years (1865-1868) was a Republican, the caster of the single Union vote in the convention of 1861; but the sixteenth legislature (1866-1867) was largely Democratic. It undertook to determine the rights of persons of African descent, and regrettable conflicts followed. The first Reconstruction Act having declared that " no legal state government or adequate protection for life or property " existed in the " rebel states," Arkansas was included in one of the military districts established by Congress. A registration of voters, predominantly whites, was at once carried through, and delegates were chosen for another constitu- tional convention, which met at Little Rock in January 1868. The secessionist element was voluntarily or perforce excluded. This convention ratified the Fourteenth Amendment, and framed the third constitution of the state, which was adopted by a small majority at a popular election, marred by various irregularities, in March 1868. By its provisions negroes secured full political rights, and all whites who had been excluded from registration for ihe election of delegates to the convention were now practically stripped of political privileges. The organization of Arkansas being now acceptable to Congress, a bill admitting it to the Union was passed over President Johnson's veto, and on the 22nd of June 1868 the admission was consummated.

Arkansas now became for several years Republican, and suffered considerably from the rule of the " carpet-baggers." The debt of the state was increased about $9,375,000 from 1868 to 1874, largely for railroad and levee schemes; much of the money was misappropriated, and in a case involving the payment of railway aid bonds the action of the legislature in pledging the credit of the state was held nugatory by the state supreme court in 1875 on the ground that, contrary to the constitution, the bond issue had never been referred to popular vote. An amendment to the constitution approved by a popular vote in 1884 provided that the General Assembly should " have no power to levy any tax, or make any appropriation, to pay " any of the bonds issued by legislative action in

1868, 1869 and 1871. The current expenses of the state in the years of Reconstruction were also enormously increased. The climax of the Reconstruction period was the so- called Baxter-Brooks war.

Elisha Baxter (1827-1899) was the regular Republican candi- date for governor in 1872. He was opposed by a disaffected Republican faction known as " brindletails," or, as they called themselves, "reformers," led by Joseph Brooks (1821-1877), an d supported by the Democrats. Baxter was irregularly elected. The election was contested, and his choice was confirmed by the legislature, the court of last resort in such cases. He soon showed a willingness to rule as a non-partisan, and favoured the re-enfranchisement of white citizens. This would have put the Democrats again in power, and they rallied to Baxter, while the Brooks party now assumed the name of " regulars," and received the support of the " carpet-bag " and negro elements. After Baxter had been a year in office Brooks received a judgment of ouster against him from a state circuit judge, and got possession of the public buildings (April 1874). The state flew to arms. The legislature called for Federal intervention (May 1874), and Federal troops maintained neutrality while investigations were conducted by a committee sent out by Congress. As a result, President Grant pronounced for Baxter, and the Brooks forces disbanded.

The chief result was another convention. In 1873 the article of the constitution which had disfranchised the whites was repealed, and the Democrats thus regained power. By an over- whelming majority the people now voted for another convention, which (July to October 1874) framed the present constitution. It removed all disfranchisement, and embraced equitable amnesty and exemption features. It also took away all patronage from the governor, reduced his term to two years, forbade him to proclaim martial law or suspend the writ of habeas corpus, and abolished all registration laws: all these provisions being reflec- tions of Reconstruction struggles. The people ratified the new constitution on the 13th of October 1874. After Reconstruc- tion the state again became Democratic, and the main interest of its history has been the progress of economic development.

The following is a list of the territorial and state governors of Arkansas : —

Territorial. James Miller 1 1819-1825

George Izard 1825-1828

John Pope 2 1829-1835

William S. Fulton 1835-1836

Stale.

James S. Conway 1836-1840 Democrat

Archibald Yell 3 1840-1844

Thomas S. Drew 4 1844-1849 „

John S. Roane 1849-1852 ,,

Elias N. Conway …. 1852-1860 ,,

Henry M. Rector 5 . . . . . 1860-1862 „

Harris Flannigan 6 …. 1862-1865 ,,

Isaac Murphy 7 1864-1868 Republican

C. H. Smith 8 1867-1868

Powell Clayton 1868-187 1 „

Ozra A. Hadley 9 1871-1873

Elisha Baxter 1873-1874 ,,

August H. Garland …. 1874-1877 Democrat

William R. Miller 1877-1881

Thomas J. Churchill …. 1881-1883 „

James H. Berry 1883-1885 „

Simon P. Hughes 1885-1889 „

James P. Eagle 1889-1893 „

1 During this period Robert Crittenden, the secretary of the territory, was frequently the acting governor.

2 Robert Crittenden was acting governor in 1828-1829.

3 Samuel Adams was acting governor from the 29th of April to the 9th of November 1844.

4 R. C. Byrd was acting governor from the nth of January to the 19th of April 1849.

5 Thomas Fletcher was acting governor from the 4th to the 15th of

November 1862.

8 Confederate governor.

7 Union governor.

8 United States military (sub) governor.

9 Acting governor.

55&

ARKANSAS CITY— ARKWRIGHT

State-

-continued.

William M. Fishback

. 1803-1805

Democrat

James P. Clarke .

. 1895-1897

?j

Daniel W. Jones .

. 1897-1901

> >

Jefferson Davis

. 1901-1907

J?

John S. Little

1907-1908

?j

X. O. Pindall, Acting

Gov. .

. 1908

ty

George W. Donaghey

. 1909

>i ■

Bibliography. — Information regarding the resources, climate, population and industries of Arkansas should be sought in the volumes of the United States Census, United States Department of Agriculture and the United States Geological Survey (for the last two there are various bibliographical guides) ; consult also the publications of the Arkansas (Agricultural) Experiment Station (at Fayetteville), the reports of the state horticulturist, the biennial reports of the state treasurer, of the auditor, arid of the Bureau of Mines, Manufactures and Agriculture (all published at Little Rock).

The constitutional documents may best be consulted in the latest compiled Statutes of the state. See also J. H. Shinn, Education in Arkansas (U.S. Bur. of Education, 1900) ; W. F. Pope, Early Days in Arkansas (Little Rock, 1895); and F. Hempstead, Pictorial History of Arkansas (St Louis, 1890). Similar to the last in popular character, vast in bulk and loose in method, are a series of Bio- graphical and Pictorial Histories, covering the different sections of the state (1 vol. by J. Hallum, Albany, 1887; four others compiled anonymously, Chicago, 1889-1891). For the Reconstruction period see especially the Poland Report in House Rp. No. 2, 43 Cong. 2 Sess., vol. i. (1874), and John M. Harrell's The Brooks and Baxter War: A History of the Reconstruction Period in Arkansas (St Louis, Missouri, 1893), which is frankly in favour of Baxter; also a paper by B. S. Johnson in vol. ii. (1908) of the Publications of the Arkansas Historical Association.

ARKANSAS CITY, a city of Cowley county, Kansas, U.S.A., situated near the S. boundary of the state, in the fork of the Arkansas and Walnut rivers. Pop. (1890) 8347; (1900) 6140, of whom 302 were negroes; (1905) 7634; (1910) 7508. The city is served by the Atchison, Topeka & Santa Fe, the Missouri Pacific, the St Louis & San Francisco, the Midland Valley and the Kansas South-Western railways. To the south is the Chilocco Indian school (in Key county, Oklahoma), established by the U.S. government in 1884. A canal joining the Arkansas and Walnut ri versf

urnishes good water power. The manufactories include flour mills, packing establishments, a creamery and a paint factory. The city is situated in the midst of a rich agricultural region and is a supply centre for southern Kansas and Oklahoma, with large jobbing interests. The municipality owns and operates the water- works. Arkansas City, first known as Creswell, was settled in 1870, was chartered as a city under its present name in 1872 and was rechartered in 1880.

ARKLOW, a seaport and market town of Co. Wicklow, Ireland, in the east parliamentary division, 49 m. S. of Dublin, by the Dublin & South-Eastern railway. Pop. (1901) 4944. Sea- fisheries are prosecuted, and there are oyster-beds on the coast, but the produce requires to be freed from a peculiar flavour by the purer waters of the Welsh and English coast before it is fit for food. The produce of the copper and lead mines of the Vale of Avoca is shipped from the port. There are cordite and explosives works, established by Messrs Kynoch of Birmingham, England. In 1882 an act was passed providing for the improvement of the harbour and for the appointment of harbour commissioners. The town hall and the Protestant church (1899) were gifts of the earl of Carysfort, in whose property the town is situated. There are slight ruins of an ancient castle of the Ormondes, demolished in 1649 by Cromwell. On the 9th of June 1798 the Irish insurgents, attacking the town, were defeated by the royal troops near Arklow Bridge, and their leader, Father Michael Murphy, was killed.

ARKWRIGHT, SIR RICHARD (1732-1792), English inventor, was born at Preston in Lancashire, on the 23rd of December 1732, of parents in humble circumstances. He was the youngest of thirteen children, and received but a very indifferent education. After serving his apprenticeship in his native town, he established himself as a barber at Bolton about 1750, and later amassed a little property from dealing in human hair and dyeing it by a process of his own. This business he gave up about 1767 in order to devote himself to the construction of the spinning frame. The spinning jenny, which was patented by James Hargreaves (d. 1778), a carpenter of Blackburn, Lancashire, in 1770, though

he had invented it some years earlier, gave the means of spinning twenty or thirty threads at once with no more labour than had previously been required to spin a single thread. The thread spun by the jenny could not, however, be used except as weft, being destitute of the firmness or hardness required in the longitudinal threads or warp. Arkwright supplied this deficiency by the invention of the spinning-frame, which spins a vast number of threads of any degree of fineness and hardness.

The precise date of the invention is not known; but in 1767 he employed John Kay, a watchmaker at Warrington, to assist him in the preparation of

the parts of his machine, and he took out a patent for it in 1769. The first model was set up in the parlour of the house belonging to the free grammar school at Preston. This invention having been brought to a fairly advanced stage, he removed to Nottingham in 1768, accompanied by Kay and John Smalley of Preston, and there erected his first spinning mill, which was worked by horses. But his operations were at first greatly fettered by want of capital, until Jedediah Strutt (q.v.) , having satisfied himself of the value of the machines, entered with his partner, Samuel Need, into partnership with him, and enabled him in 1771 to build a second factory, on a much larger scale, at Cromford in Derbyshire, the machinery of which was turned by a water-wheel. A fresh patent, taken out in 1775, covered several additional improvements in the processes of carding, roving and spinning. As the value of his processes became known, he began to be troubled with infringements of his patents, and in 1 781 he took action in the courts to vindicate his rights. In the first case, against Colonel Mordaunt, who was supported by a combination of manufacturers, the decision was unfavourable to him, on the sole ground that the description of the machinery in the specification was obscure and indistinct. In consequence he prepared a " case," which he at one time intended to lay before parliament, as the foundation of an application for an act for relief. But this intention was subsequently abandoned ; and in a new trial (Arkwright v. Nightingale) in February 1785, the presiding judge having expressed himself favourably with respect to the sufficiency of the specification, a verdict was given for Arkwright. On this, as on the former trial, nothing was stated against the originality of the invention.

In consequence of these conflicting verdicts, the whole matter was brought, by a writ of scire facias, before the court of King's Bench, to have the validity of the patent finally settled, and it was not till this third trial, which took place in June 1785, that Arkwright's claim to the inventions which formed the subject of the patent was disputed. To support this new allegation, Arkwright's opponents brought forward, for the first time, Thomas Highs, or Hayes, a reed-maker at Bolton, who stated that he had invented a machine for spinning by rollers previously to 1768, and that he had employed the watchmaker Kay to make a model of that machine. Kay himself was produced to prove that he had communicated that model to Arkwright, and that this was the real source of all his pretended inventions. Having no idea that any attempt was to be made to overturn the patent on this new ground, Arkwright's counsel were not prepared with evidence to repel this statement, and the verdict went against him. On a motion for a new trial on the 10th of November of the same year it was stated that he was furnished'with affidavits contradicting the evidence that had been given by Kay and others with respect to the originality of the invention; but the court refused to grant a new trial, on the ground that, what- ever might

be the fact as to the question of originality, the deficiency in the specification was enough to sustain the verdict, and the cancellation of the patents was ordered a few days afterwards. His fortunes, however, were not thereby seriously affected, for by this time his business capacity and organizing skill had enabled him to consolidate his position, in spite of the difficulties he had encountered not only from rival manufacturers but also from the working classes, who in 1779 displayed their antipathy to labour-saving appliances by destroying a large mill he had erected near Chorley.

Though a man of great personal strength, Arkwright never enjoyed good health, and throughout his career of invention and

discovery he laboured under a severe asthmatic affection. A complication of disorders at length terminated his. life on the 3Td or August 1792, at his works at Gromford. He was knighted in 1786 when he presented a congratulatory address from the wapentake of Wirksworth to George III., on his escape from the attempt on his life by Margaret Nicholson.

ARLES, a town of south-eastern France, capital of an arron- dissement in the department of Bouches-du-Rh6ne, 54 m. N.W. of Marseilles by rail. Pop. (1906) 16,191. A canal unites Aries with the harbour of Bouc on the Mediterranean. Aries stands on the left bank of the Rhone, just below the point at which the river divides to form its delta. A tubular bridge unites it with the suburb of Trinquetaille on the opposite bank. The town is hemmed in on the east by the railway line from Lyons to Marseilles, on the south by the Canal de Craponne. Its streets are narrow and irregular, and, away from the promenades which border it on the south, there is little animation. In the centre of the town stand the Place de la Republique, a spacious square overlooked by the hotel de ville, the museum, and the old cathedral of St Trophime, the finest Romanesque church in Provence. Founded in the 7th century, St Trophime has been several times rebuilt, and was restored in 1870. Its chief portal, which dates from the 12 th century, is a masterpiece of graceful arrangement and rich carving. The interior, plain in itself, contains interesting sculpture. The choir opens into a beautiful cloister, the massive vaulting of which is supported on heavy piers adorned with statuary, between which intervene slender columns arranged in pairs and surmounted by delicately carved capitals. Two of the galleries are Romanesque, while two are Gothic. Aries has two other churches of the Romanesque period, and others of later date. The hotel de ville, a building of the 17th century, contains the library. Its clock tower, sur- mounted by a statue of Mars, dates from the previous century. The museum, occupying an old Gothic church, is particularly rich in Roman remains and in early Christian sarcophagi; there is also a museum of Provengal curiosities. The tribunal of commerce and the communal college are the chief public institu- tions. Aries is not a busy town and its port is of little importance. There are, however, flour mills, oil and soap works, and the Paris-Lyon-Mediterranee Railway Company have large work- shops. Sheep-breeding is a considerable industry in the vicinity. The women of Aries have long enjoyed a reputation for marked beauty, but the distinctive type is fast disappearing owing to their intermarriage with strangers who have immigrated to the town.

Aries still possesses many monuments of Roman architecture and art, the most remarkable being the ruins of an amphitheatre (the Arenes). capable of containing 25,000 spectators, which, in the nth and 12th centuries, was flanked with massive towers, of which three are still standing. There are also a theatre, in which, besides the famous Venus of Aries, discovered in 1651, many other remains have been found; an ancient obelisk of a single block, 47 ft. high, standing since 1676 in the Place de la Republique; the ruins of the palace of Constantine, the forum, the thermae and the remains of the Roman ramparts and of aqueducts. There is, besides, a Roman cemetery known as the Aliscamps (Ely six Campi), consisting of a short avenue once bordered by tombs, of which a few still remain.

The ancient town, A relate, was an important place at the time of the invasion of Julius Caesar, who made it a settlement for his veterans. It was pillaged in a.d. 270, but restored and embellished by Constantine, who made it his principal residence, and founded what is now the suburb of Trinquetaille. Under Honorius, it became the seat of the prefecture of the Gauls and one of the foremost cities in the western empire. Its bishopric founded by St Trophimus in the 1st century, was in the 5th century the primatial see of Gaul; it was suppressed in 1790. After the fall of the Roman empire the city passed into the power of the Visigoths, and rapidly declined. It was plundered in 730 by the Saracens, but in the 10th century became the capital of the kingdom of Aries (see below). In the 12th century it was a free city, governed by a podesta and consuls after the model of the Italian republics, which it also emulated in I

commerce and navigation. In 1 251 it submitted to Charles I. of Anjou, and from that time onwards followed the fortunes of Provence. A number of ecclesiastical synods have been held at Aries, as in 314 (see below), 354, 452 and 475.

See V. Clair, Monuments d' Aries (1837) ; J. J. Estrangin, Description de la ville d' Aries (1845) ;- : E. Beissier, Le Pays a" Aries (1889) ; Roger Peyre, Nimes, Aries, Orange (1903). (R. Tr.)

Synod of Aries (3 14) . — As negotiations held at Rome in October 313 had failed to settle the dispute between the Catholics and the Donatists, the emperor Constantine summoned the first general council of his western half of the empire to meet at Aries by the 1 st of August following. The attempt of Seeck to date the synod 316 presupposes that the emperor was present in person, which is highly improbable. Thirty-three bishops are included in the most authentic list of signatures, among them three from Britain, — York, London and " Colonia Londinensium " (probably a corrup- tion of Lindensium, Ot Lincoln, rather than of Legionensium or Caerleon-On-Usk). The twentyˆ two canons deal chiefly with the discipline of clergy and

people. Husbands of adulterous wives are advised not to remarry during the lifetime of the guilty party. Reiteration of baptism in the name of the Trinity is forbidden. For the consecration of a bishop at least three bishops are required. It is noteworthy that British representatives assented to Canon I., providing that Easter be everywhere celebrated on the same day: the later divergence between Rome and the Celtic church is due to improvements in the supputatio Romana adopted at Rome in 343 and subsequently.

For the canons see Mansi ii. 471 ff. ; Bruns ii. 107 ff. ; Lauchert 26 ff. See also W. Smith and S. Cheetham, Dictionary oj Christian Antiquities (Boston, 1875), ■• H 1 ff- (contains also notices of later synods at Aries); W. Bright, Chapters of Early English Church History (2nd edition, Oxford, 1888), 9 f. ; Herzog-Hauck, Realency- klopadie (3rd edition), ii- 59, x. 238 ff. ; W. Moller, Kirchengeschichte (2nd edition by H. von Schubert, Tubingen, 1902), i. 417. For full titles see Council. (w. W. R.)*

ARLES, kingdom or, the name given to the kingdom formed about 933 by the union of the old kingdoms of Provence (q.v) or Cisjurane Burgundy, and Burgundy (q.v.) Transjurane, and bequeathed in 1032 by its last sovereign, Rudolph III., to the emperor Conrad IL ; It comprised the countship of Burgundy (Franche-Comte), part of which is now Switzerland (the dioceses of Geneva, Lausanne, Sion and part of that of Basel), the Lyonnais, and. the whole of the territory bounded by the Alps, the Mediterranean and the Rhone; on the right bank of the Rhone it further included the Vivarais. It is only after the end of the 12th century that the name " kingdom of Aries" is applied to this district; formerly it was known generally as the kingdom of Burgundy, but under the Empire the name of Burgundy came to be limited more and more to the countship of Burgundy, and the districts lying beyond the Jura. The authority of Rudolph III. over the chief lords of the land, the count of Burgundy and the count of Maurienne, founder of the house of Savoy, was already merely nominal, and the Franconian emperors (1039- 1 1 2 5) , whose visits to the country were rare and of short duration, did not establish their power any more firmly. During the first fifty years of their domination they could rely on the support of the ecclesiastical feudatories, who generally favoured their cause, but the investiture struggle, in which the prelates of the kingdom of Aries mostly sided with the pope, deprived the Germanic sovereigns even of this support. The emperors, on the other hand, realized early that their absence from the country was a grave source of weakness; in 1043 Henry III. conferred on Rudolph, count of Rheinfelden (afterwards duke of Swabia), the title of dux et rector Burgundiae, giving him authority over the barons of the northern part of the kingdom of Aries. Towards the middle of the 12th century Lothair II. revived this system, conferring the rectorate on Conrad of Zahringen, in whose family it remained hereditary

up to the death of the last representative of the house, ; Berthold V., in 1218; and it was the lords of Zahringen who were foremost in defending the cause of the Empire against its chief adversaries, the counts of Burgundy. In the time of the Swabian emperors, the Germanic sovereignty in the kingdom of Aries was again, during almost the whole period,

merely nominal, and it was only in consequence of fortuitous circumstances that certain of the heads of the Empire were able to exercise a real authority in these parts. Frederick I., by his marriage with Beatrix (1156), had become uncontested master of the countship of Burgundy; Frederick II., who was more powerful in Italy than his predecessors had been, and was extend- ing his activities into the countries of the Levant, found Provence more accessible to his influence, thanks to the commercial relations existing between the great cities of this country and Italy and the East. Moreover, the heretics and enemies of the church, who were numerous in the south, upheld the emperor in his struggle against the pope. Henry VII. also, thanks to his good relations with the princes of Savoy, succeeded in exercising a certain influence over a part of the kingdom of Aries. The emperors further tried to make their power more effective by delegating it, first to a viceroy, William of Baux, prince of Orange (12 15), then to an imperial vicar, William of Montferrat (1220), who was succeeded by Henry of Revello and William of Manupello. In spite of this, the history of the kingdom of Aries in the 13th century, and still more in the 14th, is distinguished particularly by the decline of the imperial authority and the progress of French influence in the country. In 1246 the marriage of Charles, the brother of Saint Louis, with Beatrice, the heiress to the countship of Provence, caused Provence to pass into the hands of the house of Anjou, and many plans were made to win the whole of the kingdom for a prince of this house. At the beginning of the 14th century the bishops of Lyons and Viviers recognized the suzerainty of the king of France, and in 1343 Humbert II., dauphin of Viennois, made a compact with the French king Philip VI. that on his death his inheritance should pass to a son or a grandson of the French king. Humbert, who was perhaps the most powerful noble in Aries, was induced to take this step as he had just lost his only son, and Philip had already cast covetous eyes on his lands. Then in 1349, being in want of money, he agreed to sell his possessions outright, and thus Viennois, or Dauphine, passed into the hands of Philip's grand- son, afterwards King Charles V. The emperor Charles IV. took an active part in the affairs of the kingdom, but without any con- sistent policy, and in 1378 he, in turn, ceded the imperial vicariate of the kingdom to the dauphin, afterwards King Charles VI. This date may be taken as

marking the end of the history of the kingdom of Aries, considered as an independent territorial area.

See the monumental work of P. Fournier, Le Royqume d' Aries et de Vienne (Paris, 1890); Leroux, Recherches critiques sur les relations politiques cfe la France avec I'Allemagne de 1292 d. 1378 (Paris, 1882). For the early history of the kingdom, L. Jacob, Le Royaume de Bour- gogne sous les empereurs franconiens (1038-1129), (Paris, 1906). The question of the nature and extent of the rights of the Empire over the kingdom of Aries has given rise, ever since the 1 6th century, to numerous juridical polemics; the chief dissertations published on this subject are indicated in A. Leroux, Bibliographic Acs conflits entre la France et VEmpire (Paris, 1902). (R. Po.)

ARLINGTON, HENRY BENNET, Earl or (1618-1685), English statesman, son of Sir John Bennet of Dawley, Middlesex, and of Dorothy Crofts, was baptized at Little Saxham, Suffolk, in 1618, and was educated at Westminster school and Christ Church, Oxford. He gained some distinction as a scholar and a poet, and was originally destined for holy orders. In 1643 he was secretary to Lord Digby at Oxford, and was employed as a messenger between the queen and Ormonde in Ireland. Subse- quently he took up arms for the king, and received a wound in the skirmish at Andover in 1644, the scar of which remained on his face through life. 1 And after the defeat of the royal cause he travelled m France and Italy, joined the exiled royal- family in 1650, and in 1654 became official secretary to James on Charles's recommendation, who had already been attracted by his "pleasant and agreeable humour." 2 In March 1657 he was knighted, and the same year was sent as Charles's agent to Madrid, where he remained, endeavouring to obtain assistance for the royal cause, till after the Restoration. On his return to England in 1 661 he was made keeper of the privy purse, and became the

• See his portrait in the earl of Arlington's Letters to Sir W. Temple, by Tho. Babington (1701).

1 Clarendon's Life and Continuation, 397.

prime favourite. One of his duties was the procuring and management of the royal mistresses, in which his success gained him great credit. Allying himself with Lady Castlemaine, he encouraged Charles's increasing dis]ike to Clarendon; and he was made secretary of state in October 1662 in spite of the opposi- tion of Clarendon, who had to find him a seat in parliament. He represented Callington from 1661 till 1665, but appears never to have taken part in debate. He served subsequently on the committees for explaining the Irish Act of Settlement and for Tangiers. In 1663 he

obtained a peerage as Baron Arlington of Arlington, or Harlington, in Middlesex, and in 1667 was appointed one of the postmasters-general. The control of foreign affairs was entrusted to him, and he was chiefly responsible for the attack on the Smyrna fleet and for the first Dutch War. In 1665 he advised Charles to grant liberty of conscience, but this was merely a concession to gain money during the war; and he showed great activity later in oppressing the nonconformists. On the death of Southampton, whose administration he had attacked, his great ambition, the treasurership, was not satisfied; and on the fall of Clarendon, against whom he had intrigued, he did not, though becoming a member of the Cabal ministry, obtain the supreme influence which he had expected; for Buckingham first snared, and soon surpassed him, in the royal favour. With Buckingham a sharp rivalry sprang up, and they only combined forces when endeavouring to bring about some evil measure, such as the ruin of the great Ormonde, who was an opponent of their policy and their schemes. Another object of jealousy to Arlington was Sir William Temple, who achieved a great popular success in 1668 by the conclusion of the Triple Alliance; Arlington endeavoured to procure his removal to Madrid, and entered with alacrity into Charles's plans for destroying the whole policy embodied in the treaty, and for making terms with France. He refused a bribe from Louis XIV., but allowed his wife to accept a gift of 10,000 crowns 3 ; in 1670 he was the only minister besides the Roman Catholic Clifford to whom the first secret treaty of Dover (May 1670), one clause of which provided for Charles's declaration of his conversion to Romanism, was confided (see Charles II.); and he was the chief actor in the deception practised upon the rest of the council. 4 He supported several other pernicious measures — the scheme for rendering the king's power absolute by force of arms; the " stop of the exchequer," involving a repudiation of the state debt in 1672; and the declaration of indulgence the same year, " that we might keep all quiet at home whilst we are busy abroad." 5 On the 22nd of April 1672 he was created an earl, and on the 15th of June obtained the Garter; the same month he proceeded with Buckingham on a mission, first to William at the Hague, and afterwards to Louis at Utrecht, endeavouring to force upon the Dutch terms of peace which were indignantly refused. But Arlington's support of the court policy was entirely subordinate to personal interests; and after the appointment of Clifford in November 1672 to the treasurership, his jealousy and mortification, together with his alarm at the violent opposition aroused in parliament, caused him to veer over to the other side. He advised Charles in March 1673 to submit the legality of the declaration of indulgence to the House of Lords, and supported the Test Act of the same year, which compelled Clifford to resign. He joined the Dutch party, and in order to make his peace with his new allies, disclosed the secret treaty of Dover to the staunch Protestants Ormonde and Shaftesbury. 6 Arlington had,

however, lost the confidence of all parties, and these efforts to procure support met with little success. On the 15th of January 1674 he was impeached by the Commons, the specific charges being "popery," corruption and the betrayal of his trust — Buckingham in his own defence having accused him the day before of being the chief instigator of the French and anti-Protestant policy, of the scheme of governing by

3 Memoirs of Great Britain and Ireland, by Sir John Dalrymple (1790), i. 125.

4 Ibid. 114 et seq.

5 Arlington to Sir B. Gascoyn, in J. T. Brown's Miscellanea Aulica

(1702), 66.

6 On the authority of Colbert, 20th November 1673 ; Dalrymple's Memoirs, i. 131.

the army, of responsibility for the Dutch War, and of embezzle- ment. But the motion for his removal, owing chiefly to the influence of his brother-in-law, the popular Lord Ossory, was rejected by 166 votes to 127. His escape could not, however, prevent his fall, and he resigned the secretaryship on the nth of September 1674, being appointed lord chamberlain instead. In 1675 he made another attempt to gain favour with the parlia- ment by supporting measures against France and against the Roman Catholics, and by joining in the pressure put upon Charles to remove James from the court. In November he went on a mission to the Hague, with the popular objects of effecting a peace and of concluding an alliance with William and James's daughter Mary. In this he entirely failed, and he returned home completely discredited. He had again been disappointed of the treasurership when Danby succeeded Clifford; Charles having declared " that he had too much kindness for him to let him have it, for he was not fit for the office." 1 His intrigues with dis- contented persons in parliament to stir up an opposition to his successful rival came to nothing. From this time, though lingering on at court, he possessed no influence, and was treated with scanty respect. It was safe to ridicule his person and behaviour, and it became a common jest for ' ' some courtier to put a black patch upon his nose and strut about with a white staff in his hand in order to make the king merry at his expense." 2 He was appointed a commissioner of the treasury in March 1679, was included in Sir William Temple's new modelled council the same year, and was a member of the inner cabinet

which was almost immediately formed. In 1681 he was made lord lieutenant of Suffolk. He died on the 28th of July 1685, and was buried at Euston, where he had bought a large estate and had carried out extensive building operations. His residence in London wasGoring House, on the site of which was built the present Arlington Street.

Arlington was a typical statesman of the Restoration, possess- ing outwardly an' attractive personality, and according to Sir W. Temple " the greatest skill of court and the best turns of art in particular conversation," 3 but thoroughly unscrupulous and self-seeking, without a spark of patriotism, faithless even to a bad cause, and regarding public office solely as a means of procuring pleasure and profit. His knowledge of foreign affairs and of foreign languages, gained during his residence abroad, was considerable, but long absence from England had also taught him a cosmopolitan indifference to constitutions and religions, and a careless disregard for English public opinion and the essential interests of the country. According to Clarendon, he " knew no more of the constitution and laws of England than he did of China, nor had he in truth a care or tenderness for church or state, but believed France was the best pattern in the world." 4 He was one of the chief promoters of the attempt to reintroduce into England arbitrary government after the French model, not because he imagined an absolute monarchy essential to the well- being and security of the state, but because undersuch an adminis- tration the favourites of a king enjoyed far greater privileges and profits than under a constitutional government. Of the same egotistical character was his religion, towards which his atti- tude was similar to that of Charles II. himself. He was credited with having inclined the king towards Romanism. Before the Restoration he had attended mass with the king abroad, and in opposition to Lord Bristol had urged Charles to declare publicly his conversion in order to obtain the long-expected succour from the foreign powers. But his religion sat lightly upon him as it did upon his master, and it was often convenient to disguise it. Like the king he continued to profess and practise Protestantism, and spent large sums in restoring the church at Euston; and, unlike Clifford, he took the Test in 1673 and remained in office, successfully concealing his faith till on his deathbed, when he declared himself an adherent of Roman Catholicism. 5

1 James's statement in Macpherson's Orig. Pap. i. 67.

s Eachard's History of England (1720), 911.

3 Memoirs of W. Temple, ed. by T. P. Courtenay, ii. 27.

4 Life and Con. 404.

5 Cf. North's Examen, 26; Dalrymple's Mem. (1790) i. 40; Pepys's Diary (Feb. 17, 1663); Cal. of Clarendon St. Pap. iii. 295; T. Carte's Life of ike Duke of Ormonde (1851), iv. 109.

He married Isabella of Beerwaert, daughter of Louis of Nassau, by whom he had one daughter, Isabella, who married Henry, duke of Grafton, the natural son of Charles II. and Lady Castlemaine.

Authorities. — In addition to those mentioned above, see Bio- graphia Britannica (Kippis), accurate and careful, but too partial, and written without complete knowledge of Arlington's career; Wood's Fasti Oxonienses (Bliss), ii. 274; Hist, of Great Britain by J. Macpherson (1776), i. 132-133; Lauderdale Papers (Camden Soc. N.S., vols. 34, 36, 38), and MSS. in Brit. Mus. ; Original Letters of Sir R. Fanshaw (1724); Letters from the Secretaries of Stale to Francis Parry (1817); Add. MSS. Brit. Mus. indexes; Cal. of State Pap. Dom., and Hist. MSS. Comm. — MSS. of Marquis of Ormonde, and Duke of Buccleugh at Montagu House, ii. 49. (P. C. Y.)

ARLINGTON, a township of Middlesex county in E. Massa- chusetts, U.S.A. Pop. (1890) 5629; (1900) 8603, of whom 2387 were foreign-born; (1910 census) 11,187 Area, 5! sq. m. It is served by the Boston & Maine railway. It has pleasant residential villages (Arlington, Arlington Heights, &c.) with attractive environs, and there is an excellent public library (the Robbins library). At Arlington Heights there are several well-known sanatoriums. Spy Pond (about 100 acres) is one of the prettiest bodies of water in the vicinity of Boston. Arlington is an important centre for market-gardening (in hot-houses), and along Mill Brook, in the township, are several factories, including chrome works, a large mill and a manufactory of pianoforte cases. In 1762 Arlington was made a " precinct " of Cambridge (of which it was a part from 1635 to 1807) under the name of Menotomy. In 1807 it became a separate township under the name (retained until 1867) of West Cambridge.

See B. and W. R. Cutter,Historyofthe Town of Arlington . . .1637- 1879 (Boston, 1880); and C. S. Parker, The Town of Arlington, Past and Present (Arlington, 1907).

ARLON, the chief town of the Belgian province of Luxemburg, situated on a hill about 1240 ft. above the sea. Pop. (1904) 10,894. It is a very ancient town, and in the time of the Romans was called Orolaunum, being a station on the Antoninian way connecting Reims and Treves. Authorities dispute as to the origin of the name, some tracing it to Ara Lunae, a temple of Diana having been erected here, while others more plausibly derive it from the Celtic words ar (mount) and lun (wooded). Nowadays the woods

have disappeared, and Arlon is chiefly notable for the extensive views obtainable from the church of St Donat which crowns the peak. Arlon is no longer fortified. When Vauban by order of Louis XIV. turned it into a fortress in 1671 great damage was done to the old Roman wall, the foundations of which were practically intact. In the local museum are many Roman antiquities collected on the spot, including several large sculptural stones similar to the celebrated monument at Igel near Treves. In the middle ages Arlon was the seat of a powerful countship (later marquisate), held after 1235 by the dukes of Luxemburg. As an important strategic position it was several times seized by the French, e.g. in 1647 and 1651.

ARM (a common Teutonic word; the Indo-European root is ar, to join or fit; cf. the Lat. armus, shoulder, and the plural word arma, weapons, Gr. apjuos, joint, and the reduplicated apapioKeiv, to join), the human upper limb from the shoulder to the wrist, and the fore limb of an animal. (See Anatomy: Superficial and Artistic, and Skeleton: Appendicular.) The word is also used of any projecting limb, as of a crane, or balance, of a branch of a tree, and so, in a transferred sense, of the branch of a river or a nerve. Through the Fr. armes, from the Lat. arma, and so in English usually in the plural " arms," comes the use of the word for weapons of offence and defence, and in many expressions such as " men-at-arms," " assault-at-arms," and the like, and for the various branches, artillery, cavalry, infantry, of which an army is composed, the " arms of the service." " Arms " or " armorial bearings " are the heraldic devices displayed by knights in battle on the defensive armour or embroidered on the surcoat worn over the armour and hence called " coats of arms." These became hereditary and thus are borne by families, and similar insignia are used by nations, cities, episcopal sees and corporations generally. (See Heraldry.)

ARMADA, THE. The Spanish or Invincible Armada was the great fleet (in Spanish, armada) sent against England by Philip II. in 1 588. The marquis of Santa Cruz, to whom the command had first been given, died on the 9th of February 1588 (according to the Gregorian calendar then used by Spain; on the 31st of January by the Julian calendar used in England ; the other dates given in this article will be in Old Style, or Julian calendar). Santa Cruz was succeeded by Don Alonso Perez de Guzman, duke of Medina Sidonia, a noble of large estate, but of no experience or capacity, who took the command unwillingly, and only on the reiterated order of the king. The fleet was collected at Lisbon, after many delays, and sailed on the 20th of May 1588. Its nominal strength was 132 vessels, of 59,190 tons, carrying 21,621 soldiers and 8066 sailors. But from a third to a half

of the vessels were transports, galleys or very small boats, and some of them never reached the Channel. The effective force was far below the paper strength. On the 10th of June, when the Armada had rounded Cape Finisterre, it was scattered by squalls. Some of the vessels went on to the appointed rendezvous at the Scilly Isles, but the majority anchored on the north coast of Spain. Medina Sidonia, who found many defects in his fleet, did not finally sail till the 12 th of July. On the English side all the royal navy, and such armed merchant ships as could be obtained from the ports, had been collected under the command of the lord high admiral Howard of Effingham, who had with him Hawkins, Drake and Frobisher as subordinate admirals. The number of vessels is put at 197, but the majority were very small. It is impossible to state with confidence what were the relative numbers of guns carried by the two fleets. The Spaniards had more pieces, but their gunnery was inferior. The English fleet carried 16,000 or 17,000 men, of whom the large majority were sailors. About 100 of their ships were at Plymouth with the lord high admiral. The others were in the Downs with Lord Henry Seymour and Sir William Winter, to co-operate with a Dutch squadron under Justinus of Nassau in blockading the Flemish ports, then occupied by the Spanish army of the duke of Parma. The object was to prevent the proposed junction of the forces of Medina Sidonia and Parma. On the 20th of July the Armada was seen off the Lizard. It sailed past Plymouth, and was followed by the English fleet. The Spaniards, who were heavy sailers, and were hampered by the transports, were much harassed by the more active English, and were defeated in all their attempts to board, which it was their wish to do in order to make use of their superior numbers of men. The flagship of the squadron of Andalucia, " Nuestra Senora del Rosario," com- manded by Don Pedro de Valdes, was crippled, fell behind and had to surrender. On the 25th of July, when the fleets were near the Isle of Wight, a shift of the wind offered the Spaniards a chance of bringing on a close action, but it soon changed again. The English fleet, of which part had been in some danger, escaped uninjured, and the Spaniards stood on. They anchored on the 26th of July at Calais. The duke of Medina Sidonia now sent an officer to Parma, calling on him to come to sea and join in a landing on the shore of England. But Parma could not leave port in face of Justinus of Nassau's squadron. While these messages were going and coming, Lord Howard had been joined by Lord Henry Seymour and Sir William Winter from the Downs. A council of war was held, to decide on the measures to be taken to assail the Spaniards at Calais. The course taken was to send fireships among them. On the night of the 28th of July the fireships were sent in, and produced an utter panic in the Armada. Most of the Spanish vessels slipped their cables and ran to sea. Others weighed anchor, and escaped in a more orderly style. One great vessel ran ashore and was taken possession of by the English, who were however compelled to give her up by the French governor of Calais. On the

29th of July the scattered Spaniards, who were quite unable to restore order, were attacked by the English off Gravelines. The engage- ment was hot, and, though the English did not succeed in taking any of the Spaniards, they destroyed some of them, and their superiority in sailing force and gunnery was now so obvious that the duke of Medina Sidonia lost heart. His large vessels were

indeed so helpless that only a timely shift of the wind saved many of them from drifting on to the banks of Flanders. Officers and men alike were completely discouraged. It was now recognized that an invasion of England could not be carried out in face of the more active English fleet and the proved impossibility of bringing about the proposed union with Parma's army. Suggestions were made that the Armada should sail to Hamburg, refit there, and renew the attack. But by this time the Spanish force was incapable of energetic action. Medina Sidonia and his council could think of nothing but of a return to Spain. As the wind was westerly, and the English fleet barred the way, it was im- possible to sail down the Channel. The only alternative was to take the route between the north of Scotland and Norway. So the Armada sailed to the north. Lord Howard followed, after detaching Lord Henry Seymour to remain in the Downs. He watched the Spaniards to the Firth of Forth. The English had at that time little knowledge of the seas beyond the Firth, and they were beginning to run short of food and ammunition. On the 2nd of August, therefore, they gave up the pursuit. Medina Sidonia continued to the north, till his pilots told him that it was safe to turn to the west. Up to this time the loss of the Spaniards in ships had not been considerable. If the weather had been that of a normal summer, they would probably have reached home with no greater loss of men than was usually inflicted on all fleets of the age by scurvy and fever. But the summer of 1588 was marked by a succession of gales of unprecedented violence. The damaged and weakened Spanish ships, which were from the first greatly undermanned in sailors, were unable to contend with the storms. It is not possible to give the details of the disasters which overtook them. Nineteen of them are known to have been wrecked on the coasts of Scotland and Ireland. The crews who fell into the hands of the English officers in Ireland were put to the sword. Many more of them disappeared at sea. Of the: total number of the vessels originally collected for the invasion of England one-half, if not more, perished, and the crews of those which escaped were terribly diminished by scurvy and starvation.

The failure of the Armada was mainly due to its own interior weakness; and as a military operation the English victory was less glorious than some other less renowned achievements of the British fleet. But the repulse of the great Spanish armament was an event of the first historical importance. It marked the final failure of King Philip II. of Spain to establish the

supremacy of the Habsburg dynasty and of the Church of Rome, which he considered as being in a peculiar sense his charge, in Europe. From that time forward no serious attempt to invade England was, or could be, made. It became therefore the unconquerable supporter of that part of Europe which had thrown off the authority of the pope. The Armada had much of the character of a crusade. Though Philip II. had political reasons for hostility to Queen Elizabeth, they were so intimately bound up with the struggle between the Reformation and the Counter Reformation that the secular and the religious elements of the conflict cannot be separated from one another. The struggle was therefore not one between armed forces in national rivalry alone. It was a trial of strength between two widely different conceptions of life and of the state — between the medieval and the modern worlds. The volunteers of all ranks who came forward in large numbers on both sides were fighting for a religious cause as well as for the interests of their respective

peoples.

Authorities. — The English side of the story of the Armada can best be studied in the State Papers relating to the Defeat of the Spanish Armada, edited by Sir J. K. Laughton, and printed for the Navy Records Society (London, 1894). The Spanish side will be found in La Armada Invencible, by Captain Cesareo Fernandez Duro (Madrid, 1884). Froude summarized the work of Captain Fernandez Duro in his brilliant Spanish Story of the Armada (London, 1892). (D. H.)

ARMADILLO, the Spanish designation for the small mail-clad Central and South American mammals of the order Edentata, constituting the family Dasypodidae. The armature consists.of a bony case, partly composed of solid buckler-like plates, and partly of movable transverse bands, the latter differing in number with

the species, and giving to the body a considerable degree of flexibility. The bony plates are overlain by horny scales. Armadillos are omnivorous, feeding on roots, insects, worms, reptiles and carrion, and are mostly, though not universally,

Peba Armadillo (Tatusia novemcincta) .

nocturnal. They are harmless and inoffensive creatures, offering no resistance when caught; their principal means of escape being the extraordinary rapidity with which they burrow in the ground, and the

tenacity with which they retain their hold in their subterranean retreats. Notwithstanding the shortness of their limbs they run with rapidity. Most of the species are esteemed good eating by the natives of the countries in which they live. They are all inhabitants of the open plains or the forests of the tropical and temperate parts of South America, with the exception of a few species which range as far north as Texas. The largest species is the giant armadillo {Priodon gigas), measuring nearly a yard long, from the forests of Surinam and Brazil; while one of the smallest is Dasypus minulus, a near ally of the larger D. sexcinctus. The peba {Tatusia novemcincta) represents a group with a large number of movable bands in the armour; while the apar (Tolypeutes tricinctus) and the other members of the same genus are remarkable for their power of rolling themselves up into balls. For the distinctive characters of these and the other genera see Edentata.

ARMAGEDDON, a name occurring in the Authorized Version of the English Bible in Rev. xvj. 16. The Revised Version has Harmagedon. The form is commonly regarded as the Greek equivalent of the Hebrew har megiddon, the mountain district of Megiddo. The writer is describing the place where the last decisive battle was to be fought at the Day of Judgment, and Harmagedon may have been chosen as the name because the district about Megiddo had been on several occasions the scene of great battles (cf. Judg. iv. 6 ff., v. 19). It has, however, been suggested in the Zeitschrift fiir die Alttestamentliche Wissen- schaft, vii. 170 (1887), that the name is for har migdo, " his fruit- ful mountain " — the mountain land of Israel. Prof. Cheyne (Encyc. Bibl. S.v.) again, following suggestions of H. Gunkel, H. Zimmern and P. Jensen, compares the dragon of the Apocalypse with the Babylonian Tiamat, thinks that some myth is referred to, and finds the fiaytdwv of 'ApuayeSwv in the divine name 'YttTeMj.iya.dwi>> a Babylonian god of the underworld. The name of the place where Tiamat was defeated by Marduk perhaps included that of a god of the underworld. (See Antichrist.) From the application of the word Armageddon to the great battle of the End of Time comes the use of the phrase " an Armageddon " to express any great slaughter or final conflict.

ARMAGH, an inland county of Ireland, in the province of Ulster, bounded N. by Lough Neagh, E. by Co. Down, S. by Louth and W. by Monaghan and Tyrone. The area is 327,704 acres, or about si 2 sq. m. The general surface of the county is gently undulating and pleasantly diversified; but in the northern extremity, on the borders of Lough Neagh, there is a considerable tract of low, marshy land, and the southern border of the county

is occupied by a barren range of hills, the highest of which, Slieve Gullion, attains an elevation of 1 893 ft. In the western portion of the county are

the Few Mountains, a chain of abrupt hills mostly incapable of cultivation. The county is well watered by numerous streams. The principal are the Callan, the Tynan and the Tallwater, flowing into the Blackwater, which, after forming the boundary between this county and Tyrone, empties itself into the south-western angle of Lough Neagh. The Tara and New- town-Hamilton, the Creggan and the Fleury, flow into the bay of Dundalk. The Cam or Camlin joins the Bann, which, crossing the north-western corner of the county, falls into Lough Neagh to the east of the Blackwater. The Newry Canal, communicating with Carlingford Lough at Warrenpoint, 6 m. below Newry, proceeds northward through Co. Armagh for about 21 rr., joining the Bann at Whitecoat. The Ulster Canal begins at Charlemont on the river Blackwater, near its junction with Lough Neagh, proceeding through the western border of the county, and passing thence to the south-west by Monaghan and Clones into Upper Lough Erne, after a course of 48 m. Part of Lough Neagh is in the county, and there are many small loughs, such as Gullion, Cam and Ross.

Geology. — The flat shore of Lough Neagh in the north is due to the thick deposit of pale-coloured clays with lignites, which are probably of Pliocene age, and indicate a reduction of the area of the lake in still later times. Between this lowland and Armagh city, the early Cainozoic basalts form slightly higher ground, while on the west a strip of Trias appears, overlying Carboniferous Limestone. A rough conglomerate containing blocks of this latter rock forms the hills on which Armagh itself is built; this outlier is probably Permian. The Carboniferous Limestone beneath it and around it is red-brown instead of grey, and is famous for its richness in fish remains. A hummocky irregular country spreads southward, where the Silurian axis is encountered, in continuation of the southern uplands of Scotland. Slates and fine-grained sandstones appear here freely through the glacial drift. In the south the granite core of this upland is revealed, and is quarried extensively about Bessbrook. It is penetrated by far younger intrusive masses at Slieve Gullion and Forkill. These rocks, which include some highly siliceous lavas, form part of the Eocene series that is so conspicuously displayed above Carlingford in Co. Louth. Lead-veins have been worked in various parts of the county from time to time.

Industries. — The soil of the northern portion of the county is a rich brown loam, on a substratum of clay or graveL Towards Charlemont there is much reclaimable bog resting on a limestone substratum. The eastern portion of the county is generally of a light friable soil; the southern portion rocky and barren, with but little bog except in the neighbourhood of Newtown-Hamilton. The climate of Armagh is considered to be one of the most genial in Ireland, and less rain is supposed to fall in this than in any other county. Only about one-twentieth of the land is naturally barren, and Armagh offers a relatively large area of cultivable soil. Agriculture,

however, is not far advanced, yet owing to the linen industry the inhabitants are generally in circumstances of comparative comfort. The principal crops are oats and potatoes, but all grain crops are decreasing, and flai, formerly grown to a considerable extent, is now practically neglected. The acreage under pasture slightly exceeds that of tillage. Cattle, sheep, pigs and poultry show a general increase in numbers. The principal manufacture, and that which has given a peculiar tone to the character of the population, is that of linen, though it has some- what declined in modern times. It is not necessary to the promotion of this manufacture that the spinners and weavers should be congregated in large towns, or united in crowded and unwholesome factories. On the contrary, most of its branches can be carried on in the cottages of the peasantry. The men devote to the loom those hours which are not required for the cultivation of their little farms; the women spin and reel the yarn during the intervals of their other domestic occupations. Smooth lawns, pure springs and the open sky are necessary for perfecting the bleaching process. Hence the numerous bleachers dwell in the country with their assistants and machinery. Such is the effect

of this combination of agricultural occupations with domestic manufactures . that the farmers are more than competent to supply the resident population of the county with vegetable, though not with animal food; and some of the less crowded and less productive parts of Ulster receive from Armagh a con- siderable supply of oats, barley and flour. Apples are grown in such quantities as to entitle the county to the title applied to it, the orchard of Ireland.

Communications are monopolized by the Great Northern rail- way company, whose main line from Belfast divides at Portadown, sending off lines to Omagh, to Clones and to Dublin. A branch from Omagh joins the Dublin line to Goraghwood, and from this line there is a branch to Newry in Co. Down. An electric tram way connects Bessbrook, a town with important linen manu- factures and granite quarries, with Newry.

Population and Administration. — The population (72,286 in 1891 ;■ 65,619 in 1901) shows a heavy decrease, though emigration affects it less seriously than the majority of Irish counties. Of the total about 45% are Roman Catholics, 32% Protestant Episcopalians, and 16 % Presbyterians, the Roman Catholic faith prevailing in the mountainous districts and the Protestant in the towns and lowlands. About 74 % of the whole constitutes the rural population. The chief towns are Armagh (a city and the county

town, pop. 7588), Lurgan (11,782), Portadown (10,092), Tanderagee (1427), Bessbrook (2977) and Keady (1466). Armagh is divided into eight baronies, and contains twenty-five parishes and parts of parishes, the greater number of which are in the Protestant and Roman Catholic dioceses of Armagh, and a few in the Roman Catholic diocese of Dromore. The constabulary has its headquarters at Armagh, the county being divided into five districts. Assizes are held at Armagh, and quarter sessions at Armagh, Ballybot, Lurgan, Markethill and Newtown-Hamilton. The parliamentary divisions are three: mid, north and south, each returning one member.

History and Antiquities. — Armagh, together with Louth, Monaghan and some smaller districts, formed part of a territory called Orgial or Urial, which was long subject to the occasional incursions of the Danes. The county was made shire ground in 1586, and called Armagh after the city by Sir John Perrott. When James I. proceeded to plant with English and Scottish colonists the vast tracts escheated to the crown in Ulster, the whole of the arable and pasture land in Armagh, estimated at 77,800 acres, was to have been allotted in sixty-one portions. Nineteen of these, comprising 22,180 acres, were to have been allotted to the church, and forty- two, amounting to 55,620 acres, to English and Scottish colonists, servitors, native Irish and four corporate towns — the swordsmen to be dispersed throughout Connaught and Munster. This project was not strictly adhered to in Co. Armagh, nor were the Irish swordsmen or soldiers transplanted into Connaught and Munster from this and some other counties. The antiquities consist of cairns and tumuli ; the remains of the fortress of Emain near the city of Armagh (q.v.) , once the residence of the kings of Ulster ; and Danes Cast, an extensive fortification in the south-east of the county, near Poyntzpass, extending into Co. Down. Spears, battle-axes, collars, rings, amulets, medals of gold, ornaments of silver, jet and amber, &c, have also been found in various places. The religious houses were at Armagh, Killevy, KiJmore, Strad- hailloyse and Tahenny. Of military antiquities the most remark- able are Tyrone's ditches, near Poyntzpass; and the pass of Moyry, the entry into the county from the south, which was fiercely contested by the Irish in 1595 and 1600, is defended by a castle. The summit of Slieve Gullion is crowned by a large cairn, which forms the roof of a singular cavern of artificial construction, probably an early burial-place.

ARMAGH, a city and market town, and the county town of Co. Armagh, Ireland, in the mid parliamentary division, 895 m. N.N.W. of Dublin by the Great Northern railway, at the junction of the Belfast-Clones line. Pop. (1901) 7588. It is said to derive its name of Ard-macha, the Hill of Macha, from Queen Macha of the Golden Hair, who flourished in the middle of the 4th century B.C.. but earlier it was named from its situation on the sides of a

steep hill called Drumsailech, or the Hill of Sallows, which rises in the midst of a fertile plain near the Callan stream. Of high antiquity, and, like many other Irish towns, claiming (with considerable probability) to have been founded by St Patrick in the 5th century, it long possessed the more important distinc- tion of being the metropolis of Ireland; and, as the seat of a flourishing college, was greatly frequented by students from other lands, among whom the English and Scots were said to have been so numerous as to give the name of Trian-Sassanagh, or Saxon Street, to one of the quarters of the city. St Patrick's bell, long preserved at Armagh, the oldest Irish relic of its kind, is now, with its shrine of the year 109 1, preserved in the museum of the Royal Irish Academy at Dublin. Of a synod that was held at Armagh as early as 448, there is an interesting memorial in the Book of Armagh, an Irish MS. dating about a.d. 800. Exposed to the successive calamities of the Danish incursions, the English conquest and the English wars, and at last deserted by its bishops, who retired to Drogheda, the venerable city sank into an insignificant collection of cabins, with a dilapidated cathedral. From this state of decay, however, it was raised, in the second half of. the 18th century, by the unwearied exertions of Arch-bishop Richard Robinson, 1st Lord Rokeby (1709-1794), which, seconded by similar devotion on the part of succeeding archbishops of the Beresford family, notably Archbishop Lord John George Beresford (1773-1862), made of Armagh one of the best built and most respectable towns in the country. As the ecclesiastical metropolis and seat of an archbishop (Primate of all Ireland) in both the Protestant and Roman organizations, it possesses two cathedrals and two archiepiscopal palaces. As the county town Armagh has a court-house, a prison, a lunatic asylum and a county infirmary. Besides these there is a fever hospital, erected by Lord John George Beresford; a college, which Primate Robinson was anxious to raise to the rank of a university; a public library founded by him, an observatory, which has become famous from the efficiency of its astronomers; a number of churches and schools, and barracks. Almost all the buildings are built of the limestone of the district, but the Anglican cathedral is of red sandstone. It stands boldly on the top of the hill, a cruciform structure dating from the 13th, but practically rebuilt in the 18th century, in accordance with its original plan. The Roman Catholic cathedral is in the Decorated style, and was consecrated in 1873. Armagh was a parliamentary borough until 1885; and, having been incorporated in 1613, so remained until 1835. The administration is in the hands of an urban district council. Two miles W. of Armagh is Emain, Emania, or Navan Fort, with large entrenchments and mounds, the site of a royal palace of Ulster, founded by that Queen Macha who gave her name to the city. In a.d. 335 it was destroyed during the inroad on the defeat of the king of Ulster by the three brothers Colla, cousins of Muredach, king of Ireland. Armagh itself fell before the king Brian Boroime, who was buried

here; and before Edward Bruce in 13 15, while previous to the English war after the Reformation, it had witnessed the struggles of Shane O'Neill

(1564).

ARMAGNAC, formerly a province of France and the most important fief of Gascony, now wholly comprised in the depart- ment of Gers (q.v.). In the 15th century, when it attained its greatest extent, it included, besides Armagnac, the neighbouring territories of Fezensac, Fezensaguet, Pardiac, Pays de Gaure, Riviere Basse, Eauzan and Lomagne, and stretched from the Garonne to the Adour. Armagnac is a region of hills ranging to a height of 1000 ft., watered by the river Gers and other rivers which descend fanwise from the plateau of Lannemezan. On the slope of its hills grow the grapes from which the famous Armagnac brandy is made. In Roman Gaul this territory formed part of the diocese of Auch (civitas Ausciorum), which corresponded roughly with the later duchy of Gascony (q.v.). About the end of the 9th century Fezensac (comitatus Fedentiacus), in circum- stances of which no trustworthy record remains, was erected into an hereditary countship. This latter was in its turn divided, the south-western portion becoming, about 960, the countship of Armagnac (pagus Armaniacus). The domain of

this countship, at first very limited in extent, continued steadily to increase in size, and about 1140 Count Gerald III. added the whole of Fezensac to his possessions. Under the English rule the counts of Armagnac were turbulent and untrustworthy vassals; and the administration of the Black Prince, tending to favour the towns of Aquitaine at the expense of the nobles, drove them to the side of France. The complaint against the English prince which Count John I., in defiance of the treaty of Bretigny, himself carried to Paris, was the principal cause of the resumption of hostilities of 1369, and of the incessant defeats sustained by the English until the accession of their king Henry V.

At that moment Count Bernard VII. was all-powerful at the French court; and Charles of Orleans, in order to be able to avenge his father, Louis of Orleans, who had been assassinated in 1407 by John the Fearless, duke of Burgundy, married Bonne, Bernard's daughter. This was the origin of the political party known as " the Armagnacs." With the object of combating the duke of Burgundy's preponderant influence, a league was formed at Gien, including the duke of Orleans and his father-in- law, the dukes of Berry, Bourbon and Brittany, the count of Alencon and all the other

discontented nobles. Bernard VII. ravaged the environs of Paris; and the treaty of Bicetre (November 2, 1410) only suspended hostilities for a few months, war breaking out afresh in the spring of 141 1. Paris sided with the duke of Burgundy, and at his instigation Charles VII. collected an army to besiege the allies in Bourges. The peace of Bourges, confirmed at Auxerre on the 22nd of August, put an end to the war. Paris was dominated at that time by the party of the " butchers," or Cabochiens, which had been organized and armed by the count of Saint-Pol, brother-in-law of John the Fearless. But their excesses, and in particular the Cabochien ordinance of the 25th of May 141 3, aroused public indignation; a reaction took place, and in the month of August the Armagnacs in their turn became masters of the government and of the king. The duke of Burgundy, besieged in Arras, only obtained peace (treaty of Arras, September 4, 1414), on condition of not returning to Paris.

Several months later Henry V. declared war against France; and when, in August 1415, the English landed in Normandy, the Armagnacs and Burgundians united against them, but were defeated in the battle of Agincourt (October 25, 1415). John the Fearless then began negotiations with the English, while Bernard VII., appointed constable in place of the count of Saint- Pol, who had been killed at Agincourt, returned to defend Paris. However, the excesses committed by the Armagnacs incensed the populace, and John the Fearless, who was ravaging the surround- ing districts, re-entered the capital on the 29th of May 1418, in consequence of the treason of Perrinet Leclerc. On the 12th of June Bernard VII. and the members of his party were massacred. From this time onward the Armagnac party, with the dauphin, afterwards King Charles VII., at its head, was the national party, while the Burgundians united with the English. This division in France continued until the treaty of Arras, on the 21st of September 1435. The rivalry of the Burgundians and Armagnacs brought terrible disasters upon France, and for many years after- wards the name of " Armagnacs " was bestowed upon the bands of adventurers who were as much to be feared as the Grandes Compagnies of the preceding age.

In 1444-45 the emperor Frederick III. of Germany obtained from Charles VII. a large army of Armagnacs to enforce his claims in Switzerland, and the war which ensued took the name of the Armagnac war (Armagnakcnkrieg). In Germany the name of the foreigners, who were completely defeated in the battle of St Jakob on the Birs, not far from Basel, was mockingly corrupted into 'Anne Jacken, Poor Jackets, or Arme Gecken, Poor Fools.

On the death of Charles of Armagnac, in 1497, the countship was united to the crown by King Charles VII., but was again bestowed on Charles, the

nephew of that count, by Francis I., who at the same time gave him his sister Margaret in marriage. After the death of her husband, by whom she had no children, she married Henry of Albret, king of Navarre; and thus the count-

ship of Armagnac came back to the French crown along with the other dominions of Henry IV. In 1645 Louis XIV. erected a countship of Armagnac in favour of Henry of Lorraine, count of Harcojirt, in whose family it continued till the Revolution. James of Armagnac, grandson of Bernard VII., was made duke of Nemours in 1462, and was succeeded in the dukedom by his second son, John, who died without issue, and his third son, Louis, in whom the house of Armagnac became extinct in 1503.

In 1789 Armagnac was a province forming part of the Gouvernement-general of Guienne and Gascony; it was divided into two parts, High or White Armagnac, with Auch for capital, and Low or Black Armagnac. At the Revolution the whole of the original Armagnac was included in the department of Gers.

For authorities see U. Chevalier, Repertoire des sources hist, du moyen age, s. Armagnac (Montbeliard, 1894). For the Armagnacs see Paul Dognon, " Les Armagnacs et les Bourguignons, le comte de Foix et le dauphin en Languedoc " (1416-1420) \yv Annates du Midi (1889) ; Rameau, "Guerre des Armagnacs dans leMaconnais " (1418-1435) in the Rev. soc. lit. de l'Ain (1884); Berthold Zeller, Les Armagnacs et les Bourguignons, la Commune de 1413 ; E. Wiilcker, Urkunden und Schreiben betreffend den Zug der Armagnaken (Frankfort, 1873);

:, 1873); 1889).

Witte, Die Armagnaken im Elsass, 143Q-1445 (Strassburg,

ARMATOLES (Gr. apuarooXos, a man-at-arms), the name given to some Greeks who discharged certain military and police functions under the Turkish government. When the Turks under SultanMahommedll. conquered Greecein the 1 5th century, many of the Greeks fled into the mountainous districts of Macedonia and northern Greece, and maintained a harassing warfare with the conquerors of their country. These men were called Klephts (modern Gr. kX€(/>tt?s, ancient Kktirrˆns, a thief, a brigand), and during the 16th century the Turkish pashas came to terms with some of them, and these men were allowed to retain their local customs, and were confirmed in the possession of certain districts, while in return they undertook some duties, such as the custody of the highroads. Those who accepted these terms were called armatoles, and the districts in which they lived armatoliks. Strengthened by a considerable number of Christian

Albanians, they rendered good service in defending Greece, and to some extent repressed the ravages of the Klephts; but their power and independence were disliked by the Turks. After the peace of Belgrade in 1739 (between Austria and Turkey), the Turkish government sought to weaken the position of the armatoles. Their privileges were restricted, Mahommedan Albanians were introduced into the armatoliks, and towards the end of the 18th century their numbers were seriously reduced. Irritated by this policy the armatoles rendered considerable service to Ali Pasha of Iannina in his struggle with the Turks in 1820-22, and afforded valuable assistance to their countrymen during the Greek war of independence in 1830.

ARMATURE (from Lat. armahira, armour), a covering for defence. In zoology the word is used of the bony shell of the armadillo. In architecture it is applied to the iron stays by which the lead lights are secured in windows. (See Stanchion and Saddle: Saddle-Bars.) In magnetism Dr William Gilbert applied the term to the piece of soft iron with which he " armed " or capped the lodestone in order to increase its power. It is also used for the " keeper " or piece of iron which is placed across the poles of a horse-shoe magnet, and held in place by magnetic attraction, in order to complete the magnetic circuit and preserve the magnetism of the steel; and hence, in dynamo-electric machinery, for the portion which is attracted by the electro- magnet, as the moving part of an electric motor, or, by extension, the moving part of a dynamo (

ARMAVIR. (1) The ruins of the old capital of Armenia, on the S.E. slope of the extinct volcano Ala-geuz, according to legend, built by Armais, a grandson of Haik, in 1980 B.C., and the capital of the Armenian kings till the 2nd century a.d. Now a small village, Tapadibi, occupies its seat. (2) A district town of Russia, northern Caucasia, province of Kuban, on Kuban river, and on the main line of the Caucasian railway, 40 m. by rail west of Stavropol, built in 1848 for the settlement of Armenian mountaineers, and now a well-built, growing town with 8000 inhabitants, the merchants of which carry on a lively trade.

ARMENIA (old Persian Armina, Armenian Hayasdan, or Hayq) , the popular modern name of a district south of the Caucasus and Black Sea, which formed part of the ancient Armenian kingdom. The name, which first occurs in the cunei- form inscriptions of Darius Hystaspis, supplanted the earlier Urardhu, or Ararat, but its origin is unknown. In its widest extent Armenia stretched from 37° to 49 ° E. long., and from 37J to 415°

N. lat.; but this area was never, or only for a brief period, united under one king. Armenia is now divided between Persia, Russia and Turkey, and the three boundaries have a common point on Little Ararat.

Geographically, Armenia is a continuation westward of the great Iranian plateau. On the north it-descends abruptly to the Black Sea; on the south it breaks down in rugged terraces to the lowlands of Mesopotamia; and on the east and west it sinks more gradually to the lower plateaus of Persia and Asia Minor. Above the general level of the plateau, 6000 ft., rise bare ranges of mountains, which run from north-east to south-west at an altitude of 8000-12,000 ft., and culminate in Ararat, 17,000 ft. Between the ranges are broad elevated valleys, through which the rivers of the plateau flow before entering the rugged gorges that convey their waters to lower levels. Geologically, Armenia consists of archaic rocks upon which, towards the north, are superimposed Palaeozoic, and towards the south later sedi- mentary rocks. The last have been pierced by volcanic out-bursts that extend southward to Lake Van. Amongst the higher mountains are the two Ararats; Ala-geuz Dagh, north of the Aras; Bingeul Dagh, south of Erzerum; and the peaks near Lake Van. The rivers are the Euphrates, Tigris, Aras, Churuk Su (Chorokh) and Kelkit Irmak, all rising on the plateau. The more important lakes are Van, 5100 ft., about twice the size of the Lake of Geneva, and Urmia, 4000 ft., both salt; Gokcha or Sevan, 5870 ft., discharging into the Aras; and Chaldir, into the Kars Chai. The aspect of the plateau is dreary and monotonous. The valleys are wide expanses of arable land, and the hills are for the most part grass-covered and treeless. But the gorges of the Euphrates and Tigris, and their tributaries, cannot be surpassed in wildness and grandeur. The climate is varied. In the higher districts the winter is long and the cold severe; whilst the summer is short, dry and hot. In Erzerum the temperature ranges from 22 to 84 F., and snow sometimes falls in June. In the valley of the Aras, and in the western and southern districts, the climate is more moderate. Most of the towns lie high, from 4000 to 6000 ft. The villages are usually built on gentle slopes, in which the houses are partially excavated as a protection against the severity of the weather. Many of the early towns were on of near the Araxes, and amongst their ruins are the remains of churches which throw light on the history of Christian archi tecture in the East. Armenia is rich in mineral wealth, and there are many hot and cold mineral springs. The vegetation varies according to the locality. Cereals and hardy fruits grow on the higher ground, whilst rice is cultivated in the hot, well-watered valley of the Araxes. The summer is so hot that the vine grows at much higher altitudes than it does in western Europe, and the cotton tree and all southern fruit trees are cultivated in the deeper valleys. On the fine pasture lands which now support the flocks of the Kurds, the horses and mules, so celebrated in ancient times, were reared. Trout are found in the

rivers, and a small herring in Lake Van. The country abounds in romantic scenery; that of the district of Ararat especially has been celebrated by patriotic historians like Moses of Chorene and Lazarus of Pharb.

Population. — Accurate statistics cannot be obtained; but it is estimated that in the nine vilayets, which include Turkish Armenia^ there are 925,000 Gregorian, Roman Catholic and Protestant Armenians, 645,000 other Christians, 100,000 Jews, Gypsies, &c, and 4,460,000 Moslems. The Armenians, taking the most favourable estimate, are in a majority in ninekazas or sub-districts only (seven near Van, and two near Mush) out of 1 59. In Russian Armenia there are 960,000 Armenians, and in Persian Armenia 130,000. According to an estimate made by General Zelenyi for the Caucasus Geographical Society {Zapiski, vol. xviii., Tiflis, 1896, with map), the population of the nine Turkish

vilayets, Erzerum, Van, Bitlis, Kharput (Mamuret-el-Aziz). Diarbekr, Sivas, Aleppo, Adana and Trebizond, was 6,000,000 (Armenians, 913,875, or 15 %; other Christians, 632,875, or 11 %; and Moslems, 4,453,250, or 74). In the first five vilayets which contain most of the Armenians, the population was 2,642,000 (Armenians, 633,250, or 24; other Christians, 179,875, or 7%; and Moslems, 1,828,875, or 69%); and in the seven Armenian kazas the population was 282,375 (Armenians, 184,875, or 65%; otherChristians, 1000, or 0.3 % ; and Moslems, 96,500, or 34- 7 %). In 1897 there were 970,656 Armenians in Russia, of whom 827,634 were in the provinces of Erivan, Elisavetpol and Tiflis.

The total number of Armenians is estimated at 2,900,000 (in Turkey, i;soo,oco; Russia, 1,000,000; Persia, 150,000; Europe, America and East Indies, 250,000).

History. — The history of Armenia has been largely influenced by its physical features. The isolation of the valleys, especially in winter, encouraged a tendency to separation, which invariably showed itself when the central power was weak. The rugged mountains have always been the home of hardy mountaineers impatient of control, and the sanctuary to which the lowlanders fled for safety in times of invasion. The country stands as an open doorway between the East and the West. Through its long valleys run the roads that connect the Iranian plateau with the fertile lands and protected harbours of Asia Minor, and for its possession nations have contended from the remotest past.

The original inhabitants of Armenia are unknown, but, about the middle of the 9th century B.C., the mass of the people belonged to that great family of tribes which seems to have been Et /, nology- spread over western Asia and to have had a common non-Aryan language. Mixed with these proto-

Armenians, there was an important Semitic element of Assyrian and Hebrew origin. In the 7th century B.C., between 640 and 600, the country was conquered by an Aryan people, who imposed their language, and possibly their name, upon the vanquished, and formed a military aristocracy that was constantly recruited from Persia and Parthia. Politically the two races soon amalgamated, but, except in the towns, there was apparently little intermarriage, for the peasants in certain districts closely resemble the proto- Armenians, as depicted on their monuments. After the Arab and Seljuk invasions, there was a large emigration of Aryan and Semitic Armenians to Constantinople and Cilicia; and all that remained of the aristocracy was swept away by the Mongols and Tatars. This perhaps explains the diversity of type and char^ acteristics amongst the modern Armenians. In the recesses of Mount Taurus the peasants are tall, handsome, though somewhat sharp-featured, agile and brave. In Armenia and Asia Minor they are robust, thick-set and coarse-featured, with straight black hair and large hooked noses. They are good cultivators of the soil, but are poor, superstitious, ignorant and unambitious, and they live in semi-subterranean houses as their ancestors did 800 years B.C. The townsmen, especially in the large towns, have more regular features — often of the Persian type. They are skilled artisans, bankers and merchants, and are remarkable for their industry, their quick intelligence, their aptitude for business, and for that enterprising spirit which led their ancestors, in Roman times, to trade with Scythia, China and India. The upper classes are polished and well educated, and many have occupied high positions in the public service in Turkey, Russia, Persia and Egypt. The Armenians are essentially an Oriental people, possessing, like the Jews, whom they resemble in their exclusiveness and widespread dispersion, a remarkable tenacity of race and faculty of adaptation to circumstances. They are frugal, sober, industrious and intelligent, and their sturdiness of character has enabled them to preserve their nationality and religion under the sorest trials. They are strongly attached to old manners and customs, but have also a real desire for progress which is full of promise. On the other hand they are greedy of gain, quarrelsome in small matters, self-seeking and wanting in stability; and they are gifted -with a tendency to exaggeration and a love of intrigue which has had an unfortunate influence on their history. They are deeply separated by religious differences, and their mutual jealousies, their inordinate vanity

ARMENIA

Q Longitude Kast 42 of Greenwich ~£)

E

EmeryWalkcr se-

their versatility and their cosmopolitan character must always be an obstacle to the realization of the dreams of the nationalists. The want of courage and self-reliance, the deficiency in truth and honesty sometimes noticed in connexion with them, are doubtless due to long servitude under an unsympathetic government.

The early history of Armenia, more or less mythical, is partly based on traditions of the Biainian kings (see Ararat), and is

interwoven with the Bible narrative, of which a know- kJngdom. ledge was possibly obtained from captive Jews settled

in the country by Assyrian and Babylonian monarchs. The legendary kings are but faint echoes of the kings of Biainas; the story of Semiramis and Ara is but another form of the myth of Venus and Adonis; and tradition has clothed Tigranes, the reputed friend of Cyrus, with the transient glory of the opponent of Lucullus. The fall of the Biainian kingdom, perhaps over-thrown by Cyaxares, was apparently soon followed by an immi- gration of Aryan (Medo-Persian) races, including the progenitors of the Armenians. But they spread slowly, for the "Ten Thousand," when crossing the plateau to Trebizond, 401-400 B.C., met no Armenians after leaving the villages four days' march beyond the Teleboas, now Kara Su. Under the Medes and Persians Armenia was a satrapy governed by a member of the reigning family; and after the battle of Arbela, 331 B.C., it was ruled by Persian governors appointed by Alexander and his successors. Ardvates, 317-284 B.C., freed himself from Seleucid control; and after the defeat of Antiochus the Great by the Romans, 190 B.C., Artaxias (Ardashes), and Zadriades, the governors of Armenia Major and Armenia Minor, became inde-pendent kings, with the concurrence of Rome. (See Tigranes.) Artaxias established his capital at Artaxata on the Araxes, and his most celebrated successor was Tigranes (Dikran), 94-56 B.C.,

the son-in-law of Mithradates VI., the Great. Tigranes founded a new capital, Tigrariocerta, in northern Mesopotamia, which he modelled on Nineveh and Babylon, and peopled with Greek and other captives. Here, and at Antioch, he played the part of "great king " in Asia until his refusal to surrender his father-in- law involved him in war with Rome. Defeated, 69 B.C., by Lucullus beneath the walls of his capital, he surrendered his conquests to Pompey, 66 B.C., who had driven Mithradates across the Phasis, and was permitted to hold Armenia as a vassal state of Rome.

The campaigns of Lucullus an3 Pompey brought Rome into delicate relations with Parthia. Armenia, although politically dependent upon Rome, was connected with Parthia by geographical position, a common language and faith, / a " e / r intermarriage and similarity of arms and

dress. It had Empire. never been Hellenized, as the provinces of Asia Minor had been; the Roman provincial system was never applied to it; and the policy of Rome towards it was never consistent. The country became the field upon which the East and West contended for mastery, and the struggle ended for a time in the partition of Armenia, a.d. 387, between Rome and Persia. The Roman portion was soon added to the Diocesis Pontica. The Persian portion, Pers-Armenia, remained a vassal State under an Arsacid prince until 428. It was afterwards governed by Persian arid Armenian noblemen selected by the " great king," and entitled marzbans. Before the partition, Tiridates, converted by St Gregory, " the Illuminator," had established Christianity as the religion of the state, and set an example followed later by Con- stantine. After the partition, the invention of the Armenian alphabet, and the translation of the Bible into the vernacular, 410, drew the Armenians together, and the discontinuance of

Greek in the Holy Offices relaxed the ecclesiastical dependence on Constantinople, which ceased entirely when the Patriarch, 491, refused to accept the decrees of the council of Chalcedon. The rule of the marzbans was marked by relentless persecution of the Christians, forced conversions to Magism, frequent insurrections and the rise to importance of the great families founded by men of Assyrian, Parthian, Persian, Syrian and Jewish origin, and in some cases of royal blood, who had been governors of districts,. or holders of fiefs under the Arsacids. Amongst the marzbans were Jewish Bagratids and Persian Mamegonians; and one of the latter family, Vartan, made himself independent (571-578), with Byzantine aid. In 632 the victories of Heraclius restored Armenia to the Byzantines; but the war that followed the Arab invasion, 636, left the country in the hands of the caliphs, who set over it Arab and Armenian governors (ostikans). One of the governors, the Bagratid Ashod I., was crowned king of Armenia by the caliph Motamid, 885, and founded a dynasty which ended with Kagig II. in 1079. A little later the Ardzrunian Kagig, gover- nor of Vaspuragan or Van, was crowned king of that province by the caliph Moktadir, 908, and his descendants ruled at Van and Sivas until 1080. The Bagratids founded dynasties at Kars, 962-1080, and in Georgia, which they held until its absorption, 1801, by Russia. From 984 to 1085 the country from Diarbekr to Melasgerd was ruled under the suzerainty first of Arabs then of Byzantines and Seljuks, by the Mervanid dynasty of Kurds, called princes of Abahuni ('ATaxovvfjs). The Arab invasion drove many Armenian noblemen to Constantinople, where they inter- married with the old Roman families or became soldiers of for- tune. Artavasdes, an Arsacid, usurped the Byzantine throne for two years; Leo V., an

Ardzrunian, and John Zimisces, became emperors; whilst Manuel, the Mamegonian, and others were amongst the best generals of the empire. In 991, and again in 102 1, Basil II. invaded Armenia, and in the latter year Senek- herim, king of Vaspuragan, exchanged his kingdom for Sivas and its territory, where he settled down with many Armenian emigrants. Basil's policy was to make the great Armenian fortresses, garrisoned by imperial troops, the first line of defence on his eastern frontier; but it failed in the hands of his feeble successors, who thought more of converting heretical Armenia than of defending its frontier. The king of Ani, Kagig II., was compelled to exchange his kingdom for estates in Cappadocia. The country was raided by Seljuks and harried by Byzantine soldiers, and the miseries of the people were regarded as gain to the Orthodox church. After the defeat and capture of Romanus IV. by Alp Arslan, 1071, Armenia formed part of the Seljuk empire until it split up, 1157, into petty states, ruled by Arabs, Kurds and Seljuks, who were in turn swept away by the Mongol invasion, 1235. For more than three centuries after the appearance of the Seljuks, Armenia was traversed by a long

succession of nomad tribes whose one aim was to secure partition. 8°°^ pasturage foi» their flocks on their way to the

richer lands of Asia Minor. The cultivators were driven from the plains, agriculture was destroyed, and the country was seriously impoverished when its ruin was completed by the ravages and wholesale butcheries of Timur. Many Armenians fled to the mountains, where they embraced Islam, and inter- married with the Kurds, or purchased security by paying black- mail to Kurdish chiefs. Others migrated to Cappadocia or to Cilicia, where the Bagratid Rhupen had founded, 1080, a small principality which, gradually extending its limits, became the kingdom of Lesser Armenia. This Christian kingdom in the midst of Moslem states, hostile to the Byzantines, giving valuable support to the leaders of the crusades, and trading with the great commercial cities of Italy, had a stormy existence of about 300 years. Internal disorders, due to attempts by the later Lusignan kings to make their subjects conform to the Roman Church, facilitated its conquest by Egypt, 1375. The memory of Kiligia (Cilicia) is enshrined in a popular song, and at Zeitun, in the recesses of Mount Taurus, a small Armenian community has hitherto maintained almost complete independence. After the death of Timur, Armenia formed part of the territories of the Turkoman dynasties of Ak- and Kara-Kuyunli, and under their

milder rule the seat of the Catholicus, which, during the Seljuk invasion, had been moved first to Sivas, and then to Lesser Armenia, was re-established, 1441, at Echmiadzin.

In 1514, the Persian campaign of Selim I. gave Armenia to the Osmanli

Turks, and its reorganization was entrusted to Idris, the historian, who was a Kurd of Bitlis. Idris found the rich arable lands almost deserted, and the mountains Turkey bristling with the castles of independent chieftains, of Kurd, Arab and Armenian descent, between whom there were long-standing feuds. He compelled the Kurds to settle on the vacant lands, and divided the country into small sanjaks which in the plains were governed by Turkish officials, and in the mountains by local chiefs. This policy gave rest to the country, but favoured the growth of Kurd influence and power, which by 1 534 had spread westwards to Angora. . Armenia was invaded by the Persians in 1575, and again in 1604, when Shah Abbas transplanted many thousand Armenians from Julfa to his new capital Isfahan. In 1639, the province of Erivan, which included Echmiadzin, was assigned by treaty to Persia, and it remained in her hands until it passed to Russia, 1828, under the treaty of Turkman-chai. The Turko-Russian War of 1828-29, which advanced the Russian frontier to the Arpa Chai, was followed by a large emigration of Armenians from Turkish to Russian territory, and a smaller exodus took place after the war of 1877-78, which gave Ba'tum, Ardahan and Kars to Russia. In 1834 the independent power of the Kurds in Armenia was greatly curtailed; and risings under Bedr Khan Bey in 1843, and Sheik Obeidullah in 1880, were firmly suppressed.

After the capture of Constantinople, 1453, Mahommed II. organized his non-Moslem subjects in communities, or millets, under ecclesiastical chiefs to whom he gave absolute authority in civil and religious matters, and in criminal Anˆ n f" offences that did not come under the Moslem religious ans. law. Under this system the Armenian bishop of Brusa, who was appointed patriarch of Constantinople by the sultan, became the civil, and practically the ecclesiastical head of his community (Ermeni millet), and a recognized officer of the imperial government with the rank of vizier. He was assisted by a council of bishops and clergy, and was represented in each province by a bishop. This imperium in imperio secured to the Armenians a recognized position before the law, the free enjoy- ment of their religion, the possession of their churches and monasteries, and the right to educate their children and manage their municipal affairs. It also encouraged the growth of a community life, which eventually gave birth to an intense longing for national life. On the other hand it degraded the priesthood. The priests became political leaders rather than spiritual guides, and sought promotion by bribery and intrigue. Education was neglected and discouraged, servility and treachery were developed, and in less than a century the people had become depraved and degraded to an almost incredible extent. After the issue, 1839, of the hatt-i-sherif of Giil-khaneh, the tradesmen and artisans of the capital freed themselves from clerical control. Under regulations, approved by the sultan in 1862, the patriarch remained the official representative of the community, but all real power

passed into the hands of clerical and lay councils elected by a representative assembly of 140 members. The " community," which excluded Roman Catholics and Protestants, was soon called the " nation," " domestic " became " national " affairs, and the " representative " the " national " assembly.

The connexion of " Lesser Armenia "with the Western powers led to the formation, 1335, of an Armenian fraternity, " the Unionists," which adopted the dogmas of the Roman church, and at the council of Florence, 1439, was catholics. entitled the " United Armenian Church." Under the millet system the unionists were frequently persecuted by the patriarchs, but this ended in 1830, when, at the intervention of France, they were made a community (Katoluk millet), with their own ecclesiastical head. The Roman Catholics, through the works issued by the Mechitharists at Venice, have greatly promoted the progress of education and the development of Armenian literature. They are most numerous at Constantinople, Angora and Smyrna.

The Protestant movement, initiated at Constantinople by American missionaries in 1831, was opposed by the patriarchs

and Russia. In 1846 the patriarch anathematized all tanis. ' Armenians with Protestant sympathies, and this led

to the formation of the " Evangelical Church of the Armenians," which was made, after much opposition from France and Russia, a community (Protestant millet), at the instance of the British ambassador. The missionaries afterwards founded colleges on the Bosporus, at Kharput, Marsivan and Aintab, to supply the needs of higher university education, and they opened good schools for both sexes at all their stations. Everywhere they supplied the people with pure, wholesome literature, and repre- sented progress and religious liberty.

When Abd-ul-Hamid came to the throne of Turkey in 1876, the condition of the Armenians was better than it had ever been under

the Osmanlis; but with the close of the war of 1877-78 Armenian came the " Armenian Question." By the treaty of San question. Stefano, Turkey engaged to Russia to carry out reforms

" in the provinces inhabited by the Armenians, and to guarantee their security against the Kurds and Circassians." By the treaty of Berlin, 13th

of July 1878, a like engagement to the six signatory powers was substituted for that to Russia. By the Cyprus convention, 4th of June 1878, the sultan promised Great Britain to introduce necessary reforms " for the protection of the Christians and other subjects of the Porte " in the Turkish territories in Asia. The Berlin treaty encouraged the Armenians to look to the powers, and not to Russia for protection; and the convention, which did not mention the Armenians, was regarded as placing them under the special protection of Great Britain. This impression was strengthened by the action of England at Berlin in insisting that Russia should evacuate the occupied territory before reforms were introduced, and so removing the only security for their introduction. The presentation of identic and collective notes to the Porte by the powers, in 1880, produced no result, and in 1882 it was apparent that Turkey would only yield to compulsion. In 1881 a circular note from the British ministry to the five powers was evasively answered, and in 1883 Prince Bismarck intimated to the British government that Germany cared nothing about Armenian reforms and that the matter had better be allowed to drop. Russia had changed her policy towards the Armenians, and the other powers were indifferent. The so-called " Concert of Europe " was at an end, but British ministries continued to call the attention of the sultan to his obligations under the treaty of Berlin.

Russia began to interest herself in the Armenians when she acquired Georgia in 1801; but it was not until 1828-1829 that

any appreciable number of them became her subjects. policy " She found them necessary to the development of her

new territories, and allowed them much freedom. They were permitted, within certain limits, to develop their national life; many became wealthy, and many rose to high positions in the military and civil service of the state. After the war of 1877-78 the Russian consuls in Turkey encouraged the formation of patriotic committees in Armenia, and a project was formed to create a separate state, under the supremacy of Russia, which was to include Russian, Persian and Turkish Armenia. The project was favoured by Loris-Melikov, then all-powerful in Russia, but in 1881 Alexander II. was assassinated, and shortly afterwards a strongly anti-Armenian policy was adopted. The schools were closed, the use of the Armenian language was dis- couraged, and attempts were made to Russify the Armenians and bring them within the pale of the Russian Church. All hope of practical self-government under Russian protection now ceased, and the Armenians of Tiflis turned their attention to Turkish Armenia. They had seen the success of the Slav committees in treating disturbances in the Balkans, and became the moving spirit in the attempts to produce similar troubles in Armenia. Russia made no real effort to check the action of her Armenian subjects, and after 1884 she steadily opposed any active

inter- ference by Great Britain in favour of the Turkish Armenians. When Echmiadzin passed to Russia, in 1828, the Catholicus began to claim spiritual jurisdiction over the whole Armenian Church,

and the submission of the patriarch of Constantinople was obtained by Russia when she helped the sultan against Mehemet Ali. Subsequently Russia secured the submission of the independent catholicus of Sis, and thus acquired a power of interference in Armenian affairs in all parts of the world. During 1900 Russia showed renewed interest in Turkish Armenia by securing the right to construct all railways in it, and in the Armenians by pressing the Porte to restore order and introduce reforms.

The Berlin treaty was a disappointment to the Gregorian Armenians, who had hoped that Armenia and Cilicia would have been formed into an autonomous province administered by Christians. But the formation of such a province was impossible. The Gregorians were scattered over the empire, and, except in a few small districts, were nowhere in a majority. Nor were they bound together by any community of thought or sentiment. The Turkish-speaking Armenians of the south could scarcely converse with the Armenian-speaking people of the north; and the ignorant mountaineers of the east had nothing in common, except religion, with the highly educated townsmen of Constantinople and Smyrna. After the change in yo„ajy Russian policy and the failure of the powers to secure movement reforms, the advanced party amongst the Armenians, some of whom had been educated in Europe and been deeply affected by the fiee thought and Nihilistic tendencies of the day, determined to secure their object by the production of disturb- ances such as those that had given birth to Bulgaria. Societies were formed at Tiflis and in several European capitals for the circulation of pamphlets and newspapers, and secret societies, such as the Huntchagist, were instituted for more revolutionary methods. An active propaganda was carried on in Turkish Armenia by emissaries, who tried to introduce arms and explo- sives, and represented the ordinary incidents of Turkish misrule to Europe as serious atrocities. The revolutionary movement was joined by some of the younger men, who formed local committees on the Nihilist plan, but it was strongly opposed by the Armenian clergy and the American missionaries, who saw the impossibility of success; and its irreligious tendency and the self-seeking ambition of its leaders made it unacceptable to the mass of the people. Exasperated at their failure, the emissaries organized attacks on individuals, wrote threatening letters, and at last posted revolutionary placards, 5th of January 1893, at Yuzgat, and on the walls of the American College at Marsivan. In the last case the object of the Huntchagists was to compromise the missionaries, and in this they succeeded. The Americans were accused of issuing the placards; two Armenian professors were imprisoned ; and the girls' school was burned down. Outbreaks, easily suppressed, followed at

Kaisarieh and other places.

One of the revolutionary dreams was to make the ancient Daron the centre of a new Armenia. But the movement met with no encouragement, either amongst the prosperous peasants on the rich plain of Mush or in the mountain villages of Sasun. In the summer of 1893, an emissary was captured near Mush, and the governor, hoping to secure others, ordered the Kurdish Irregular Horse to raid the mountain district. The Armenians drove off the Kurds, 1 and, when attacked in the spring of 1894, again held their own. The vali now called up regular troops from Erzingan; and the sultan issued a firman calling upon all loyal subjects to aid in suppressing the revolt. A massacre of a most brutal character, in which Turkish soldiers took part, followed; and aroused deep indignation in Europe. In November 1894 a Turkish commission of inquiry was sent to Armenia, and was accompanied by the consular delegates of Great Britain, France and Russia, who elicited the fact that there had been no attempt

1 The Armenians and Kurds have lived together from the earliest times. The adoption of Islam by the latter, and by many Armenians, divided the people sharply into Christian and Moslem, and placed the Christian in a position of inferiority. But the relations between the two sects were not unfriendly previously to the Russian campaigns in Persia and Turkey. After 1829 the relations became less friendly; and later, when the Armenians attracted the sympathies of the European powers after the war of 1877-78, they became bitterly hostile.

at revolt to justify the action of the authorities. Throughout 1894 the state of the country bordered upon anarchy, and during the winter of 1 894-1 895 the British government, with lukewarm support from France and Russia, pressed for adminis- trative reforms in the vilayets of Erzerum, Van, Bitlis, Sivas, Memuret-el-Aziz (Kharput) and Diarbekr. The Porte made counter-proposals, and officials concerned in the Sasun massacres were decorated and rewarded. On the nth of May 1895 the three powers presented to the sultan a complicated scheme of reforms which was more calculated to increase than to lessen the difficulties connected with the government of Armenia; but it was the only one to which Russia would agree. The sultan delayed his answer. Great Britain was in favour of coercion, but Russia, when sounded, replied that she " would certainly not join in any coercive measures " and she was supported by France. At this moment, 21st of June 1895, Lord Rosebery's cabinet resigned, and when Lord Salisbury's government resumed the negotiations in August, the sultan

appealed to France and Russia against England. During the negotiations the secret societies had not been inactive. Disturbances occurred at Tarsus; Armenians who did not espouse the " national " cause were murdered; the life of the patriarch was threatened; and a report was circu- lated that the British ambassador wished some Armenians killed to give him an excuse for bringing the fleet to Constantinople. On the 1st of October 1895 a number of Armenians, some armed, went in procession with a petition to the Porte and were ordered by the police to disperse. Shots were, fired, and a riot occurred in which many Armenian and some Moslem lives were lost. The British ambassador now pressed the scheme of reforms upon the sultan, who accepted it on the 1 7 th of October. Meanwhile there had been a massacre at Trebizond (October 8), in which armed men from Constantinople took part, and it had become evident that no united action on the part of the powers was to be feared. The sultan refused to publish the scheme of reforms, and massacre followed massacre in Armenia in quick succession until the 1st of January 1896. Nothing was done. Russia refused to agree to any measure of coercion, and declared (December 19) that she would take no action except such as was needed for the protection of foreigners. Great Britain was not prepared to act alone. In the summer of 1896 (June 14-22) there were massacres at Van, Egin, and Niksar; and on the 26th of August the Imperial Ottoman Bank at Constantinople was seized by revolutionists as a demonstration against the Christian powers who had left the Armenians to their fate. The project was known to the Porte, and the rabble, previously armed and instructed, were at once turned loose in the streets. Two days' massacre followed, during which from 6000 to 7000 Gregorian Armenians perished.

The massacres were apparently organized and carried out in accordance with a well-considered plan. They occurred, except The mas- ' n six P^ aces ' in tne vilayets to which the scheme of gac,^ reforms was to apply. At Trebizond they took place just before the sultan accepted that scheme, and after his acceptance of it they spread rapidly. They were confined to Gregorian and Protestant Armenians. The Roman Catholics were protected by France, the Greek Christians by Russia. The massacre of Syrians, Jacobites and Chaldees at Urfa and else- where formed no part of the original plan. Orders were given to protect foreigners, and in some cases guards were placed over their houses. The damage to the American buildings at Kharput was due to direct disobedience of orders. The attacks on the bazars were made without warning, during business hours, when the men were in their shops and the women in their houses. Explicit promises were given, in some instances, that there would be no danger to those who opened their shops, but they were deliberately broken. Nearly all those who, from their wealth, education and influence, would have had a share in the govern- ment under the scheme of reforms, were killed and their

families ruined by the destruction of their property. Where any attempt at defence was made the slaughter was greatest. The only successful resistance was at Zeitun, where the people received honourable terms after three months' fighting. In some towns

the troops and police took an active part in the massacres. At Kharput artillery was used- In some the slaughter commenced and ended by bugle-cal'l, and in a few instances the Armenians were disarmed beforehand. Wherever a superior official or army officer intervened the massacre at once ceased, and wherever a governor stood firm there was no disturbance. The actual perpetrators of the massacres were the local Moslems, aided by Lazis, Kurds and Circassians. A large majority of the Moslems disapproved of the massacres, and many Armenians were saved by Moslem friends. But the lower orders were excited by reports that the Armenians, supported by the European powers, were plotting the overthrow of the sultan; and their cupidity was aroused by the prospect of wiping out their heavy debts tp Armenian pedlars and merchants. No one was punished for the massacres, and many of those implicated in them were rewarded. In some districts, especially in the Kharput vilayet, the cry of " Islam or death " was raised. Gregorianpriests and Protestant pastors were tortured, but preferred death to apostasy. Men and women were killed in prison and in churches in cold blood. Churches, monasteries, schools and houses were plundered and destroyed. In some places there was evidence of the previous activity of secret societies, in others none. The number of those who perished, excluding Constantinople, was 20,000 to 25,000.' Many were forced to embrace Islam, and numbers were reduced to poverty. The destruction of property was enormous, the hardest-working and best tax-paying element in the country was destroyed, or impoverished, and where the breadwinners were killed the women and children were left destitute. Efforts by Great Britain and the United States to alleviate the distress were opposed by the authorities, but met with some success. After the massacres the number of students in the American schools and colleges increased, and many Gregorian Armenians became Roman Catholics in order to obtain the protection of France. : The Armenian revolutionary societies continued their pro- paganda down to the granting of the Turkish constitution in 1908; and meanwhile further massacres occurred here and there, notably at Mush (1904) and Van (1908).

See Abich, Geologie d. armenischen Hochlandes (Wien, 1882); Bishop, Journeys in Persia and Kurdistan {Land., 1891); Bliss, Turkey and the Armenian Atrocities (Lond., 1896); Bryce, Trans- caucasia and Ararat (4th ed., Lond., 1896); De Coursous, La Rebellion armenienne (Paris, 1895); Lepsius, Armenia and Europe (Lond., 1897); Murray, Handbook for Asia Minor (Lond., 1895); Parly. Papers, Turkey, I. (1895); Turkey, I., II. (1896); Supan, "Die Verbreitung d. Armenier in der asiatischen

Tiirkei, u. in Transkaukasien," in Pet. Mitt. vol. xlii. (1896); Tozer, Turkish Armenia and Eastern Asia Minor (Lond., l88i>; Cholet, Armeftie, Kurdistan, et Mesopotamie (1892); Lynch, Armenia (2 vols., 1901).

(C. W. W.)

ARMENIAN CHURCH. No trustworthy account exists of the evangelization of Armenia, for the legend of King Abgar's correspondence with Christ, even if it contained any historical truth, only relates to Edessa and Syriac Christianity. That the Armenians appropriated from the Syrians this, as well as the stories of Bartholomew and Thaddeus (the Syriac Addai), was merely an avowal on their part that Edessa was the centre from which the faith radiated over theirland. In the 4th century and later the liturgy was still read in Syriac in parts of Armenia, and the New Testament, the history of Eusebius, the homilies of Aphraates, the works of St Ephraem and many other early books were translated from Syriac, from which tongue most of their ecclesiological terms were derived. The earliest notice of an organized church in Armenia is in Eusebius, H, E. vi. 46, to the effect that Dionysius of Alexandria c. 250 sent a letter to Meru'zanes, bishop of the brethren in Armenia. There were many Christians in Melitene at the time of the Decian persecution in a.d. 250, and two bishops from Great Armenia were present at the council of Nice in 325. King Tiridates (c. a.d. 238-314) had already been baptized some time after 261 by Gregory the Illuminator. The latter was ordained priest and appointed catholicus or exarch of the church of Great Armenia by Leontius, bishop of Caesarea in Cappadocia. This one fact is certain amidst the fables which soon. obscured the history of this great missionary.

1 According to some estimates the number killed was .50,000 or more.

Thus the church of Great Armenia began as a province of the Cappadocian see. But there was a tradition of a line of bishops earlier than Gregory' in Siuniq, a region east of Ararat along the Araxes (Aras), which in early times claimed to be independ- ent of the catholicus. The Adoptianist bishop Archelaus, who opposed the entry of Mani into Armenia under Probus c. 277, was also perhaps a Syriac -speaking bishop of Pers-Armenia. Almost the earliest document revealing anything of the inner organiza- tion and condition of the Armenian church in the Nicene age is the epistle of Macarius, bishop of Jerusalem, to the Armenian bishop Verthanes, written between 325 and 335 and preserved in Armenian. Its genuineness has been unreasonably suspected. It insists on the erection of fonts; on distinction of

grades among the ordained clergy; on not postponing baptism too long; on bishops and priests alone, and not deacons, being allowed to baptize and lay hands on or confirm the baptized; on avoiding communion with Arians; on the use of unleavened bread in the Sacrament, &c. We learn from it that the bishop of Basen and Bagrevand was an Arian at that time. By the year 450 these two districts already had separate bishops of their own. The letter of Macarius, therefore, if a forgery, must be a' very early one. 1 The Armenians must, like the Georgians a little later, have set store by the opinion of the bishop of Jerusalem, or they would not have sent to consult him. It was equally from Jerusalem that they subsequently adopted their lectionary and arrangement of the Christian year; and a oth-century copy of this lectionary in the Paris library preserves to us precious details of the liturgical usages of Jerusalem in the 4th century. We can trace the presence of Armenian convents on the Mount of Olives as early as the 5th century.

Tradition represents the conversion of Great Armenia under Gregory and Tiridates as a sort of triumphant march, in which the temples of the demons and their records were destroyed wholesale, and their undefended sites instantly converted into Christian churches. The questions arise: how was the tran- sition from old to new effected? and what was the type of teaching dominant in the new church? Armenian tradition, confirmed by nearly contemporary Greek sources, answers the first question. The old order went on, but under new names. The priestly families, we learn, hearing that the God preached by Gregory needed not sacrifice, sent to the king a deputation and asked how they were to live, if they became Christians; for until then the priests and their families had lived off the portions of the animal victims and other offerings reserved to them by pagan custom. Gregory replied that, if they would join the new religion, not only should the sacrifices continue, but they should have larger perquisites then ever. The priestly families then went over en masse. How far the older sacrificial rules resembled the levitical law we do not know, but in the canons of Sahak, c. 430, the priests already receive the levitical portions of the victims; and we find that animals are being sacrificed every Sunday, on the feast days which at first were few, in fulfilment of private vows, in expiation of the sins of the living, and still more of those of the dead. No one might kill his own meat and deprive the priest of his due; but this rule did not apply to the chase. The earliest Armenian rituals contain ample services for the conduct of an agape (q.v.) or love feast held in the church off sacrificial meat. The victim was slaughtered by the priest in the church porch before the crucifix, after it had been ritually wreathed and given the holy salt, by licking which it appropri- ated a sacramental purity or efficacy previously conveyed into the salt by exorcisms and consecration. In the canons of Sahak the priest is represented as eating the sins of the people in these repasts.

1 If a forgery, why should this letter have been assigned to Macarius, a comparatively obscure person whose name is not even found in the menaea of the Eastern church ? But convincing proof of its authen- ticity lies in Macarius' reference to himself as merely archbishop of Jerusalem, and his avowal that he was unwilling to advise the Armenians, " being oppressed by the weakness of the authority con- ceded him by the weighty usages of the church." Jerusalem was only allowed to rank as a patriarchate in 451, and the seventh canon of Nice subordinated the see to that of Caesarea in Palestine. To this decree Macarius somewhat bitterly alludes.

It is easy to underrate the importance in religion of a change of names. The old sacrificial hymns were probably obscene and certainly nonsensical, and the substitution for them of the psalms, and of lections of the prophets and New Testament, was an enormous gain. We do not know precisely how the euchar- istic rite was adjusted to these sacrificial meals; but, in the canons of Sahak, 1 Cor. xi. 17-34 is interpreted of these meals, which were known as the Dominical (suppers). The Eucharist was, therefore, long associated with the matal or animal victim, and only in the 8th century do we hear of an interval of time being left between the fleshly and the spiritual sacrifices, as the two rites were then called. The Basilian service of the Eucharist was used in the 5th century, but superseded later on by a Byzantine rite which will be found translated in F. E. Bright- man's Eastern Liturgies. The Eucharist was no doubt the one important sacrifice in the minds of the clergy who had attended the schools of Constantinople and Alexandria; yet the heart of the people remained in their ancient blood-offerings, and as late as the 1 2th century they were prone to deny that the mass could expiate the sins of the dead unless accompanied by the sacrifice of an animal. Perhaps even to-day the worst fate that can befall a villager after death is to be deprived, not of commemoration in the mass, but of the victim slain for his sins. The keenest spiritual weapon of the Armenian priest was ever a threat not to offer the matal for a man when he died.

Another survival in the Armenian church was the hereditary priesthood. None but a scion of a priestly family could become a deacon, elder or bishop. Accordingly the primacy remained in the family of Gregory until about 374, when the king Pap or Bab murdered Nerses, who had been ordained by Eusebius of Caesarea (362-370) and was over-zealous in implanting in Armenia the canons about celibacy, marriage, fasting, hospices and monastic life which Basil had established in Cappaddcia. It may be remarked that Gregory's own family was a cadet branch of the Arsacid kin which had occupied the thrones of Persia, Bactria, Armenia and Georgia. His primacy therefore was in itself a survival of an earlier age when king and priest were one. He was in fact a rex sacrificulus , and later on, when the Arsacid dynasty fell in Armenia c. a.d. 428, the Armenian catholicus became the symbol of national unity and the rallying- point of

patriotism. The line of Gregory was restored in 390 in the person of Isaac or Sahak, son of Nerses, and his patriarchate was the golden age of Armenian literature. But by this time the autonomy of the Armenian church was thoroughly established. On the death of Nerses the right of saying grace at the royal meals, which was the essence of the catholicate, was transferred by the king, in despite of the Greeks, to the priestly family of Albianus, and thenceforth no Armenian catholicus went to Caesarea for ordination. The ties with Greek official Christendom were snapped for ever, and in subsequent ages the doctrinal preferences of the Armenians were usually determined more by antagonism to the Greeks than by reflection. If they accepted the council of Ephesus in 430 and joined in the condemnation of Nestorius, it was rather because the Sassanid kings of Persia, who thirsted for the reconquest of Armenia, favoured Nestorianism, a form of doctrine current in Persia and rejected in Byzantium. But later on, about 480, and throughout the following centuries, the Armenians rejected the decrees of Chalcedon and held that the assertion of two natures in Christ was a relapse into the heresy of Nestor. From the close of the 5th century the Armenians have remained monophysite, like the Copts and Abyssinians, and have only broken the record with occasional short interludes of ortho- doxy, as when in 633 the emperor Heraclius forced reunion on them, under a catholicus named Esdras, at a council held in Erzerum. Even then all parties were careful not to mention Chalcedon. The march of Arab conquest kept the Armenians friendly to Byzantium for a few years; but in 718- the catholicus John of Odsun ascended the throne and at the council of Manaz- kert in 728 repeated and confirmed the anathemas against Chalcedon and the tome of Leo, that had been first pronounced by the catholicus Babken in 491 at a synod held in Valarshapat by the united Armenian, Georgian or Iberian, and Albanian churches.

57°

ARMENIAN CHURCH

The Armenians marked their complete disruption with the Greeks by starting an era of their own at the synod of Dvin. The era began on the nth of July 552, and their year is vague, that is to say, it does not intercalate a day in February every fourth year, like the Julian calendar.

The two churches of Iberia and Albania at first depended on the Armenian for ordination of their primates or catholici, and in large part owed their first constitution to Armenian missionaries sent by Gregory the Illuminator. The Iberians still reverence as saints the Armenian doctors of the 5th century, but as early as 552 they began to resent the dictatorial methods of the Armenians, as well might a proud race of mountaineers who never

wholly lost their political independence; and they broke off their allegiance to the Armenian see very soon afterwards, accepted Chalcedon and joined the Byzantine church. The Albanians of the Caucasus were also converted in the age of Gregory, early in the 4th century, and were loyal to the Armenians in the great struggle against Mazdaism in the 5th; but broke away for a time towards 600, and chose a patriarch without sending him to Armenia for ordination. Eventually this interesting church was engulfed by the rising tide of Mahommedan conquest, but not before one of their bishops, named Israel, had converted (677-703) the Huns who lay to the north of the Caspian and had translated the Bible and liturgies into their language. If the Albanian and Hunnish versions could be found, they would be of the greatest linguistic importance.

The mother church of Armenia was established by Gregory at Ashtishat in the province of Taron, on the site of the great temple of Wahagn, whose festival on the seventh of the month Sahmi was reconsecrated to John the Baptist and Athenogenes, an Armenian martyr and Greek hymn writer. The first of Navasard, the Armenian new year's day, was the feast of a god Vanatur or Wanadur (who answered to Zei)s £«nos) in the holy pilgrim city of Bagawan. His day was reconsecrated to the Baptist, whose relics were brought to Bagawan. The feast of Anahite, the Armenian Venus and spouse of the chief god Aramazd, was in the same way rededicated to the Virgin Mary, who for long was not very clearly distinguished by the Armenians from the virgin mother church. The old cult of sacred stones and trees by an easy transition became cross-worship, but a cross was not sacred until the Christ had been, by priestly prayer and invocation, transferred into it.

What was the earliest doctrine of the churches of Armenia? If we could believe the fathers of the 5th and succeeding cen- turies Nicene orthodoxy prevailed in their country from the first; and in the 5 th century they certainly chose for translation the works of orthodox fathers alone, such as Chrysostom, Basil, Gregory of Nyssa and Gregory Nazianzen, Cyril of Jerusalem and Cyril of Alexandria, Athanasius, Julius of Rome, Hippolytus, Irenaeus, avoiding Origen and other fathers who were becoming suspect. However, we do hear of versions of Nestorian writers like Diodore of Tarsus being in circulation, and the Disputation of Archelaus proves that the current orthodoxy of eastern Armenia was Adoptianist, if not Ebionite in tone. The Persian Armenians as late as the 6th century had not heard of the faith of Nicaea, and only then received it from the catholicus Babken. They sent a copy of their old creed to Babken, and it closely resembles the Adoptianist creed of Archelaus, the gist of which was that Jesus, until his thirtieth year, was a man mortal like other men; then, because he was righteous above all others, he was promoted to the honour and name of Son of God. He received the title by grace, but was

not equal to God the Father. Because the Spirit worked with him, he was able to vanquish Satan and all desires, and because of his righteousness and good works he was made worthy of grace and became a Temple of God the Word, which came down from heaven in Jordan, dwelt in him and through him wrought miracles. From such a standpoint the baptism of Jesus was the moment of the divine incarnation. The man righteous above all others was then reborn of. the Spirit, was illuminated, was spiritually anointed, became the Christ and Son of God. In effect the fathers of the Armenian church often fell back into such language, far removed as it is from orthodoxy; and they em-

phasized the importance of thebaptismal feast of the Epiphany on the 6th of January by refusing to accept the feast of the physical birth of the 25th of December. As late as 1165 their patriarch Nerses defends the Armenian custom of keeping Christmas on the 6th of January on the express ground that as he was born after the flesh from the Virgin, so he was born by way of baptism from the Jordan. The custom from the first, he says, had been to feast on one and the same day the two births, much as they differed in sacramental import and in point of time. We see how deep the early Adoptianism had struck its roots, when a primate of the 12th century could still appeal to the baptismal regeneration of Jesus. The same Nerses held that the second Adam, Jesus Christ, received a new body and nature and the sevenfold grace of the Spirit in the Jordan. The Armenian doctors also taught that John by laying hands on Jesus and ordaining him at his baptism sacramentally transferred to him the three graces or charismata of kingship, prophecy and priest- hood which had belonged to ancient Israel. After baptism, if not before, the flesh of Christ was incorruptible. It consisted of ethereal fire, and he was not subject to the ordinary phenomena of digestion, secretions and evacuations.

Monastic institutions were hardly introduced in Armenia before the 5th century, though Christian rest-houses had been erected along the high-roads long before and are mentioned in the Disputation of Archelaus. The Armenians called them wanq, and out of them grew the monasteries. The monks were, strictly speaking, penitents wearing the cowl, and not allowed to take a part in church government. This belonged to the elders. At first there was no separate episcopal ordination, and the one rite of elder or priest (Armen. Qahanay, Heb. cohen) sufficed. There were also deacons, half-deacons and readers. Besides these there was a class of wardapets or teachers, answering to the didascalos of the earliest church, whose province it was to guard the doctrine and for whom no rite of ordination is found in the older rituals.

A few other peculiarities of Armenian church usage or belief deserve notice. In baptism the rubric ordains that the baptized be plunged three times in

the font in commemoration of the entombment during three days of the Lord. In the West trine immersion was generally held to be symbolic of the triune name of " Father, Son and Holy Ghost." This name the Armenians have used, at least since the year 700; before which date their fathers often speak of baptism into the death of Christ as the one essential. As late as about 1300 a traveller hostile to the Armenians reported to the pope that he had witnessed baptisms without any trinitarian invocation in as many as three hundred parish churches.

The paschal lamb is now eaten on Sunday, but until the nth century, and even later, it was eaten with the Eucharist at a Lord's Supper celebrated on the evening of Maundy Thursday after the rite of pedilavium or washing of feet. On the morning of the same day the penitents were released from their fast.

The rite of extreme unction was introduced in the crusading epoch, although it was already usual to anoint the bodies of dead priests. The worship of images never seems to have taken root among Armenians; indeed they supplied the Greek world with iconoclast soldiers and emperors. The worship of crosses into which the Spirit or Christ had been inserted by the priest must have satisfied the religious needs of a people who, save in archi- tecture, showed little artistic faculty. In their older rituals we find a rite for blessing a painted church, but no word of statues. Frescoes in their churches are rare, and mostly too high up for veneration to be paid to them.

On certain days the cross was washed, and the water in which it had been washed was a sovereign charm for curing sickness in men and animals and for bringing fertility to the land.

In the older rituals we find a rite of exhomologesis, for restoring those who had sinned after baptism. It was a medicine of sin that could only be used once and not a second time. In form it is a rehearsal of the first baptismal rite, but with omission of the water. It involved like the first rite open confession and repentance, and absolution by the church. In a later and less rigorous age this rite was abridged and adjusted to constant

repetition, in such wise that a sinner could be restored to grace not once only, but as often as the clergy chose to accept his repentance and confession. Thus the whole development of the penitentiary system is traceable in the MSS.

The confession of a dying man might be taken by any layman present, and written down in order to be shown to the priest when he arrived. It then was the duty of the latter to supplicate for his forgiveness, and administer to him the Eucharist.

The clergy of all grades were originally married. The parish priests, or white clergy, are so still, except some of the Latinizing ones. But since the 12th century, or even earlier, the higher clergy, i.e. patriarchs and bishops, have taken monkish vows and worn the cowl.

There were abortive attempts to unite the Armenian church with the Byzantine in the 9th century under the patriarch Photius, and again late in the 12th under the emperor Manuel Comnenus, when a joint council met at Romkla, near Tarsus, but ended in nothing (a.d. 1170). Neither could the Armenians keep on good terms even with the Syriac monophysites. From the age of the crusades on, the Armenians of Cilicia, whose patriarch sat at Sis, improved their acquaintance with Rome; and more than one of their patriarchs adopted the Roman faith, at least in words. Dominican missions went to Armenia, and in 1328 under their auspices was formed a regular order called the United Brethren, the forerunners of the Uniats of the present day, who have convents at Venice and Vienna, a college in Rome and a numerous following in Turkey. They retain their Armenian liturgies and rites, pruned to suit the Vatican standards of ortho- doxy, and they recognize the pope as head of the church.

The patriarchs of Great Armenia first resided at Ashtishat, on the Araxes. From 478 to 931 they occupied Dvin in the same neighbourhood, then Aghthamar, an island in the Lake of Van, 931-967, the city of Ani, 992-1054, where are still visible the magnificent ruins of their churches and palaces. Since 1441 the chief catholicus has sat at Echmiadzin, the convent of Valar- shapat, now part of Russian Armenia. A rival catholicus, with a small following, still has his cathedral and see at Sis. The catho- licus of Valarshapat is nominally chosen by all Armenians. A synod of bishops, monks and doctors meets regularly to transact under his eye the business of the convent and the oecumenical affairs of the church; but its decisions are subject to the veto of a Russian procurator. There are Armenian patriarchs, subject to the spiritual jurisdiction of Echmiadzin, in Constantinople and Jerusalem. In the latter place the Armenians occupy a convent on Mount Sion, and keep up in the churches of the Sepulchre and of Bethlehem their own distinct rites and feasts, the only ones there which at all resemble those of the 4th century.

The following list of councils was compiled by John, catholicus about the year 728, and read at the council of Manazkert, when the dogmatic and disciplinary attitude of the Armenian church was defined once and for all:

—

1. In twentieth year of catholicate of Gregory and thirty- seventh of Trdat, the king, on return of Aristaces from council of Nice, bringing the Nicene creed and canoi.s.

2. Council held by St Nerses on his return from the council of the 1 50 fathers at Constantinople against Macedonius.

3. Held by St Sahak and Mesrop on receipt of letters from Proclusand Cyril after the council of Ephesus, when the " Glory in the Highest " was adopted. Held against Nestorianism.

4. Held by Joseph, disciple of Mashdotz (Mesrop) and St Sahak, in Shahapiwan in the sixth year of King Yazkert (i.e. Yazdegerd) of Persia, for the regulation of the church. Forty bishops pre- sent. (The Massalians were anathematized.)

5. Held by Babken, catholicus, in the City-plain (i.e. Dvin), in the 18th year of King Kavat (i.e. Kavadh), against the heresy of Acacius and Barsuma (Bar-sauma), the friends of Nestorius. The true (Nicene) faith was sent to the Armenians of the farther East (shortly afterwards a slightly different creed was adopted, identical with a pseudo-Athanasian symbol used by Evagrius of Pontus and given in Greek in Patr. Gr. xxvi. Col.

1232).

6. At the beginning of the Armenian era, held by Nerses in

Dvin, in the fourth year of his catholicate, in the fourteenth of Chosroes' reign and in the fourteenth of Justinian Caesar. Held against Chalcedon, uniting the Baptism and Christmas feasts on the 6th of January (Epiphany), declaring for mono- physitism, and adopting in the Trisagion the words " who wast crucified for us." This settlement lasted for about seventy-four years.

7. After the retaking of Jerusalem and recovery of the Cross from the Persians in the eighteenth year of his "reign, Heraclius called a mixed council at Karin (Theodosiopolis) of Greeks and Armenians under Ezr (Esdras) , catholicus, at which the preceding council of Dvin was cursed, its reforms repudiated and the confession of Chalcedon adopted. This remained the official attitude of the Armenian church until the catholicate of Elias (703-7 1 7) . John, catholicus, denies to Ezr's meeting the name of council, and so makes his own the seventh.

8. Under John, catholicus, in Manazkert, in the one hundred and

seventieth year of the Armenian era (= a.d. 728) under the presidency of Gregory Asharuni Chorepiscopos (Gregory Asheruni). All the Armenian bishops attended, as also the metropolitan of Urhha (Edessa), Jacobite bishops of Gartman, of Nfrkert, Amasia, by command of the archbishop of Antioch. Chalcedon was repudiated afresh, union with the Jacobites instituted, use of water and leaven in the Eucharist condemned, the five days' preliminary fast before Lent restored, Saturday as well as Sunday made a day of feasting and synaxis, any but the orthodox excluded from the Maundy Thursday Communion, the first communion of the new catechumens; union of the Baptismal and Christmas feasts was restored, and the faithful forbidden to fast on Fridays from Easter until Pentecost. In general these rules have been observed in the Armenian church ever since.

For list of authorities on the Armenian church see the works enumerated at the end of Armenian Language and Literature. For the relations of the Armenian church to the Persian kings see Persia: Ancient History, section viii. §§ 2 and 3. (F. C. C.)

ARMENIAN LANGUAGE AND LITERATURE. The Arme- nian language belongs to the group called Indo-European, of which the Iranic and Indie tongues formed one branch, and Greek, Albanian, Italian, Celtic, Germanic suvge. and Baltic-Slavonic dialects the other great branch. Unlike most of these, Armenian lost its genders long before the year a.d. 400, when the existing literature begins. Modern Persian similarly has lost gender; and in both cases the liberation must have been due to attrition of other tongues which had a different system of gender or none at all. So the Armenians were ever in contact on the north with the Iberians of the Caucasus who had none, and with the Semitic races on the south and east which had other ways of forming genders than the Indo-European tongues.

From the original Armenian stock can be readily distinguished a mass of Old and Middle Persian loan-words. These are so numerous that for a time Armenian was classed as an Iranian tongue. For more than a thousand years, say until a.d. 640, Armenia was an appanage of the realm of the Persians and Parthians. Until a.d. 428 the Armenian throne was occupied by a younger branch of the Arsacid dynasty that ruled in Persia until the advent of the Sassanids (c. a.d. 226), and the internal polity and court administration of Armenia were modelled on the Persian or Parthian. Accordingly over 200 proper and personal names in Armenia were Old Persian, as well as 700 names of things. If we count in the derivative forms of these words we get at least 2000 Old Persian words. Often the same Persian word was borrowed twice over in an earlier and later form at an interval of centuries, just as in English we inherit a word direct or have taken it from Latin, and have also assimilated from French a later form of the same. The Persian influence in Armenian was already strong as early

as 400 B.C., when Xenophon used a Persian interpreter to converse. In some of the Armenian villages they answered him in Persian. The Persian loan-words already present in Armenian as early as a.d. 400 mirror the earlier political and social life of Armenia. Thus many of their kings and nobles had Persian names; Persian also were most

words used in connexion with horses and the chase, with war and army, with dress, trade and coinage, calendar, weights and measures, with court and political institutions, with music, medicine, school, education, literature and the arts. Many everyday words were of the same origin, e.g. the words for village, desert, building and build, need, rich or liberal, arm (of body), rod or goad, face, opposite, wicked, unfriendly, discontented, difficult, daughter, eulogy, a youth, wary, enjoy, unhappy, volition, voluntary, unwilling, blind, cautious, blood-kin, coquet with, slumber, humble, mad, grace or favour, memory or atten- tion, grandfather, old woman, prepared, duty, necessary, end, endless, superior, confident, mistake, warmth, heat, glory. The language of their old religion was mainly Persian, but in the 4th century they derived numerous ecclesiological words from the Syrians, from whom by way of Edessa and Nisibis Christianity penetrated eastern Armenia. The language of the garden and the names of plants were also Persian. They had their own numerals, but the words for one thousand and for ten thousand are Persian.

Yet more indicative of the extent of the Persian influence is the adoption of the adjectival ending -akan and zan, added to purely Armenian words; also of the preposition ham, answering to con in " conjoin," " conspire," added to purely Armenian words, as in hambarnam, I take away, and hamboir, a kiss, a word which, strange to say, the Iberians in turn borrowed from the Armenians. From Persia also the Armenians took their names for surround ing races, e.g. Tatshik or Tajik, first for Arab and then for Turk, Ariq for Persians, Kapkoh for Caucasus, Hrazdan, Vaspuragan, &c. The Armenians call themselves Hay, plural Hayq; their country Hayasdan. The Iberians they called Virq or Wirq (where q marks the plural), the Medes Marq, the Cappadocians Gamirq (Cimmerians), the Greeks Y fines or Ionians; Ararat they call Masis, the Euphrates the Aradsan, the Tigris Teglath, Erzerum is Karin, Edessa Urhha, Nisibis Mdsbin, Ctesiphon Tizbon, &c.

When the Persian and other loan-words are removed, a stock remains of native words and forms governed by other phonetic laws than those which govern the Aryan, i.e. Indian and Iranic, branch of the Indo-European tongues. Armenian appears to be a half-way dialect between the Aryan

branch and Slavo-lettic. Much, however, in Armenian philology remains unexplained. For example the plural of nouns, pronouns and the first and second persons plural of verbs are all formed by adding a q or k, which has no parallel in any Indo-Germanic tongue. The genitive plural again is formed by adding a tz or c, and the same consonant characterizes the composite aorist and the conjunctive. In all three cases it is unexplained. In the verbs the termination m for the first singular at once explains itself, and the n of the third plural is the Indo-Germanic nti. But not so the second person singular ending in s, e.g. berem, I bear, beres, thou bearest. This has a superficial likeness to the I.-G. esi in bheresi, " thou bearest." Yet we should expect the s between vowels to vanish, and give us in Armenian bere. Perhaps, therefore, an old variant of esi, similar to the Greek katri, lies behind the Armenian es, thou art. and the es in beres, thou bearest. In any case it is clear that many of the oldest forms which Armenian shared with other Indo-Germanic dialects were lost and replaced by forms of which the origin is obscure. Perhaps a closer study of Mingrelian and Georgian will explain some of these peculiarities, for these and their cognate tongues must have had a wider range in the 7 th and 8th centuries B.C. than they had later when clear history begins. The attempts made by S. Bugge to assimilate Old Armenian to Etruscan, and by P. Jensen to explain from it the Hittite inscrip- tions, appear to be fanciful. There is a large Semitic influence traceable in Armenian due to their early contact with the Syriac- speaking peoples to the south and east of them, and later to the Arab conquest. Much remains to be done in the way of collecting Armenian dialects, for which task there are written materials as far back as tha. 12 th century over and above the work to be done by an intelligent traveller armed with a phonograph. Two main dialects of Armenian are distinguishable to-day, that of Ararat and Tiflis, and that of Stambul and the coast cities of

Asia Minor. The latter is much overlaid with Tatar or Turkish words, and the Tatar order of words distinguishes the modern Armenian sentence from the ancient.

It remains to say that classical Armenian resembles rather the modern idiom of Van than of western Armenia. It was a plastic and noble language, capable of rendering faithfully; yet not servilely, the Greek Bible and Greek fathers. Often the Armenian translators, and especially after the 5th century, rendered word for word, preserving the order of the Greek. This literalness, though unpleasing from a literary standpoint, gives to many of their ancient versions the value almost of a Greek codex of the age in which the version was made. The same literalness also characterizes their translations from Syriac.

The Armenians had a temple literature of their own, which was destroyed

in the 4th and 5th centuries by the Christian clergy, so thoroughly that barely twenty lines of it literature. survive in the history of Moses of Khoren (Chorerie). Their Christian literature begins about 400 with the invention of the Armenian alphabet by Mesrop. This was probably an older alphabet to which Mesrop merely added vowels; but, in order to pacify the Greek ecclesiastics and the emperor Theodosius the Less, the Armenians concocted a story that it had been divinely revealed. Once their alphabet perfected, the catholicus Sahak formed a school of translators who were sent to Edessa, Athens, Constantinople, Alexandria, Antioch, Caesarea in Cappadocia,; and elsewhere, to procure codices both in Syriac and Greek and translate them. From Syriac were made the first version of the New Testament, the version of Eusebius' History and his Life of Constantine (unless this be from the original Greek) , the homilies of Aphraates, the Acts of Gurias and Samuna, the works of Ephrem Syrus(partly published in four volumes by the Mechithar- ists of Venice). They include the commentaries on the Diates- saron and the Paulines, Laboubna and History of Addai, the Syriac canons of the Apostles.

*From the original Greek were rendered in the 5th century the following authors and works. An asterisk is prefixed to those which have been printed: — *Eusebius' Chronicon; *Philo's lost commentaries on Genesis and Exodus, and his lost treatises on Providence and Animals, as well as a great number of his works still preserved in Greek; *the entire Bible (the New Testament is a recension after Antiochene Greek texts of an older version made from the oldest Syriac text); *the Alexander romance of the pseudo-Callisthenes; * Epistles and Acts of Ignatius of Antioch; *many homilies of Gregory Thaumaturgus; *Athan- asius (a large number of works, many of them wrongly attributed); Irenaeus, Adversus Haereses and Ad Marcianum (recently found); *Hippolytus' commentaries on the Song of Songs and Daniel, and many fragments; *Timotheus' life of Athanasius; Theophilus of Alexandria, various homilies; *Eusebius of Gabala or Severianus, fifteen Homilies; *Cyril of Jerusalem, Catecheses and Letter to Constantine; *Wisdom of Ahikar; *the Apology of Aristides; Gregory of Nazianzus, thirty- four Homilies; *Nonnus' work on Gregory (perhaps a version of 6th century); Basil of Caesarea, *Hexaemeron, fifteen Homilies on faith, epistle to Terentius, ascetic writings and canons, on the Holy Spirit, to Cledonius, &c. Helladius of Caesarea's life of Basil; Gregory of Nyssa's treatise on the Beatitudes, and many other homilies, Commentaries on Song of Songs, *On Human Nature (Nemesius), panegyrics on sundry Martyrs, and other works (but some of these versions belong to the beginning of the 8th century) ; Epiphanius of Salamis, Com- mentary on the Gospels, *0n weights and measures, *Physiologus, canons and many homilies; Evagrius of Pontus, Homilies and Ascetic works, Letters to Melania, &c; John Chfysostom, *Homilies and Prayers, in very beautiful*

*language; *Proclus, patriarch of Constantinople, many homilies; *Nilus the Ascete, On the Eight Spirits of Evil; *Josephus, On the. Jewish War; Dionysius of Alexandria, * Against Paul of Samosata and other fragments: Acacius, bishop of Melitene, *Le.tters to Sahak; Julius of Rome (fragments); Zenobius, Homilies (? from Syriac); the History of Julius Africanus was perhaps also translated in this century, but it is lost. To the 5th century belong the versions of the*

*Nicene canons, of which the Armenian text as preserved is barely intelligible, of the eucharistic rites called of *Basil, *Chrysostom, *Ignatius and others; also the *Hours or Breviary, the *Rites of Ordination, Baptism, of the making and release of Penitents, of Epiphany, and perhaps the many rites of animal sacrifice, for these are partly originals, partly versions of lost Greek texts. A mass of martyrs' acts were also rendered in this century, including parts of the lost collection made by Eusebius. Among these the *Acts and Apology of Apollonius restore a lost 2nd- century text. The *Canons of Sahak also purport to be trans- lated from a Greek original about the year 330.*

*The Armenians were so busy in this century translating Greek and Syriac fathers that they have left little that is original. Still a number of historical works survive: *Faustus of Byzantium relates the events of the period a.o. 344-392 in a work instinct with life and racy of the soil. It was perhaps first composed in Greek, but it gives a faithful picture of the court of the petty sovereigns of Armenia, of the political organization, of the blood feuds of the clans, of the planting of Christianity. Procopius preserves some fragments of the Greek.*

*The *Hislory of Taron, by Zenobius of Glak, is a somewhat legendary account of Gregory the Illuminator, and may have been written in Syriac in the 5th, though it was only Armenized in a later century.*

**Elisaeus Wardapet wrote a history of Wardan (Vardan), and of the war waged for their faith by the Armenians against the Sassanids. He was an eye-witness of this struggle, and gives a good account of the contemporary Mazdaism which the Persians tried to force on the Armenians. *Lazar of Pharp wrote a history embracing the events of the 5th century up to the year 485, as a continuation of the work of Faustus.*

**A history of St Gregory and of the conversion of Armenia by Agathangelus is preserved in Greek, Armenian and Arabic. The Arabic*

edited by Professor Marr of St Petersburg seems to be the oldest form of text. The Greek is a rendering of the Armenian. It is a compilation, and the second part which contains the Acts of Gregory and of St Rhipsima seems wholly legendary. The Greek and Armenian texts were edited together by Lagarde.

The History of Armenia by Moses of Khoren (Chorene) relates events up. to about the year 450. It is a compilation, devoid of historical method, value or veracity, from all sorts of previous authors, mostly from those which already existed in an Armenian dress. Some critics put down the date of composition as low *as about 700, and it was certainly retouched in the late 6th century.*

**A long volume of rhetorical exercises, based on Aphthonius, is also ascribed to Moses of Khoren, and appears to be of the 5th century. The *geography which passes under his name may belong to the 7th century. Various homilies of Moses survive, as also of Elisaeus.*

*Gorium wrote in this century a *Life of Mesrop, and Eznik a * Refutation of the Sects, based largely on antecedent Greek works. The sects in question are Paganism, Mazdaism, Greek Philosophy and Manicheism. A volume of *homilies under the name of Gregory the Illuminator, but not his, also belongs to this century, and a series of ascetic discourses attributed to John Mandakuni, who was patriarch 478-500.*

*Or the 6th and 7th centuries few works survive except anony- mous versions of the *Acts of Thomas (perhaps from the Syriac), of the *Acts of Peter and Paul, *of John (pseudo-Prochorus), *of Bartholomew, and of other apostles; also of *the Acts of Paul and Thekla, *of Titus, *of the Protevangel, *of the Testa- ments of the patriarchs, of the *Gospel of Nicodemus, or Acts of Pilate, of the *Book of Adam, of the *Deaths of the Prophets, of the *History of Baruch, of the *Apocalypses of Paul and of the Virgin Mary, of the *Acts of Sylvester, and of an enormous number of other similar apocryphs. Some of these may be of the 5th century. Two volumes of these apocryphs of the Old and New Testaments have recently been published at Venice. To these centuries belong also the versions of the Acts of the council of Ephesus, of Gangra, Laodicea and of other councils. To the*

*late 7th century belong the *calendarial works of Ananiah of Shirak, who also has left a *chronicon compiled from Eusebius, Andreas of Crete, Hippolytus and other sources. In the *Letter~ book of the Patriarchs, lately printed at Tiflis, are to be found a number of controversial monophysite tracts of these and the succeeding three centuries; important for church history. It includes a mass of documents relative to the churches of Iberia*

*and Albania. The chief literary monument of the 7th century is the history of the wars of Heraclius and of the early Mahommedan conquests in Asia Minor, by the bishop Sebeos, who was an eye- witness. The *history of the Albanians of the Caucasus, by Moses Kalankatuatzi, also belongs to the end of this century. To the middle of the 7 th century also belong the translations of Aristotle's treatises *On the Categories, and *On Interpretation, and of *Porphyry's Isagoge, as well as of voluminous Greek commentaries on these books; the version of the *Grammar of Dionysius Thrax and an incomplete Euclid. The translator was one David called the Invincible, who also wrote mono- physite tracts. At the end of this 7 th century one Philo of Tirak is supposed to have made the version of the *History of Socrates, unless indeed it Was made earlier. To this century also seems to belong the Armenian version of a *history of the Iberians, by Djuansher, a work full of valuable information.*

*The early 8th century was a time of great literary activity. Gregory Asheruni wrote an important *commentary on the Jerusalem Lectionary, and his friend *John the catholicus (717- 728) commentaries on the other liturgical works of his church; he also collected all existing canon law, Greek Or Armenian, respected in his church, wrote *against the Paulicians and Docetae, and composed many beautiful hymns. *Leoncius the priest has left a history of the first caliphs, and Stephanus, bishop of Siunik, translated the ""controversial works of Cyril of Alexandria (whose Glaphyra and commentaries, however, seem to have been translated at an earlier period). He also translated the works of Dionysius the Areopagite, commented on the Armenian breviary and wrote hymns.*

In the 9th century Zachariah, catholicus, the correspondent of Photius, wrote many eloquent homilies for the various church feasts. Shapuh Bagratuni wrote a history of his age, now lost. Mashtotz, catholicus, collected in one volume the Armenian rituals.

*In the 10th century (c. 925) the catholicus John VI. issued his *history of Armenia, and Thomas Artsruni a *history Of his clan carried up to the year 936. Ananias of Mok (943-965) wrote a great work against the Paulicians, unfortunately lost. Chosroes wrote a Commentary on the eucharistic rites and breviary, *Mesrop a history of Nerses the Great ; *Stephen of Asolik wrote a history of the world, and a commentary on Jeremiah; * Gregory of Narek his famous meditations and hymns; Samuel Kamrdjt- soretzi a commentary on the Lectionary based on Gregory Asheruni.*

*In the nth century the catholicus Gregory translated many Acts of Martyrs, and John Kozerhn wrote a history, now lost, as well as a work on the Armenian calendar; Stephen Asolik a *history of Armenia up to the year*

*1004; *Aristaces of Lastiverd a valuable history of the conquest of Armenia by the Seljuk caliphs. We may also mention a *monophysite work against the Greek doctor Theopistus by Paul of Taron; *Ietters and poems of Gregory Magistros, who also was the translator of the *Laws, Timaeus and other dialogues of Plato.*

*The 12th century saw many remarkable writers, mostly in Cilician Armenia, viz. Nerses the Graceful (d. 1165), author of an * Elegy on the taking of Edessa, of Voluminous hymns, of long ""Pastoral Letters and Synodal orations of value for the historian of eastern churches. *Samuel of Ani composed a chronicle up to 1 1 79. Nerses of Lambron, archbishop of Tarsus, left a *Synodal oration, a *Commentary on the liturgy, &c, and his contempo- rary Gregory of Tlay an *Elegy on the capture of Jerusalem, and various *dogmatic works. In this century the *history of Michael the Syrian was translated; Ignatius and Sargis com- posed Commentaries on Luke and *the catholic epistles, and *Matthew of Edessa a valuable history of the years 952-i'i3'6,*

*continued up to 1176 by Gregory the priest. Mechithar (Mekhitar) Kosh (d. 1207) wrote an elegant *Book of Fables, and compiled a *corpus of civil and canon law (partly from Byzantine codes).*

*In the 13 th century the following works or authors are to be noticed: — *history of Kiriakos of Ganzak, which contains much about the Mongols, Georgians and Albanians; *Malakia the monk's history of the Tatars up to 1 272 ; *Chronicle of Mechithar of Ani (fragmentary); *Vahram's rhymed chronicle of the kings of Lesser Armenia; *history of the world, by Vartan, up to 1 269. In this century mostly falls the redaction of a large fable literature, recently edited in three volumes by Professor Marr of St Petersburg.*

*14th century: *history of Siunik, by Stephen Orbelian, archbishop of that province 1287-1304; *Sempat's chronicle of Lesser Armenia (952-1274), carried on by a continuator to 1331; *Mechithar of Airivanq, a chronography; *Hethoum's account of the Tatars, and chronography of the years 1076- 1307, John of Orotn (d. 1388) compiled commentaries on John's gospel and the Paulines, and wrote homilies and monophysite works; his disciple Gregory of Dathev (b. 1340) compiled a *Summa theologiae called the Book of Questions, in the style of the Summa of Aquinas, which had been translated into Armenian c. 1330, as were a little later the *Summa of Albertus and works of other schoolmen.*

*15th century: *History of Tamerlane, by Thomas of Medsoph, carried up to 1447.*

*17th century, Araqel of Tabriz wrote a *history of the Persian invasions of Armenia in the years 1602-1661.*

*In the above list are not included a number of medical, astrological, calendarial and philological or lexicographic works, mostly written during or since the Cilician or crusading epoch. The hymns used in Armenian worship rarely go back to the 5th century; and they were still few in number and brief in length when Nerses the Graceful and his contemporaries more than doubled their number and bulk in the 12th century. Most Armenian poems embody acrostics, and their poets began to rhyme in the 8th century or thereabouts. Since the 1 5th century a certain number of profane poets have arisen, whose work is less jejune on the whole than that of the hymn and canticle writers of an earlier age. Gregory Magistros (d. 1058) abridged the whole of the Old and New Testaments in a ""rhyming poem, and set a fashion to later writers. Such works as *Barlaam and Josaphat, the * History of the Seven Sages, the *Wisdom of Ahikar, the * Tale of the City of Bronze, were freely turned into verse in the 13th and following centuries.*

It will be realized from the above enumeration of works written in each century that Armenian literature was purely monkish. There was no epic or romance literature; although this was not lacking in the contiguous country of Georgia, where there seem to have always been knights and ladies willing to read and keep alive a literature of poetry and narrative, not altogether suitable for monks, and more akin to Persian literature.

Other forms of faith than the orthodox had a hold in Armenia, particularly the Nestorian and the Manichean. Sundry works of Mani were translated in the year 588, but are lost. Perhaps certain works of Diodore of Tarsus survive, but the orthodox monks were so vigilant that there is little chance of finding any other monuments than those of the stereotyped orthodoxy.

The 1 6th century saw the first books printed in Armenian. A press was set up at Venice in 1 565, and the psalms and breviary were printed. In 1 584 the Roman propaganda began its issue of Armenian books with a Gregorian calendar. In the 1 7 th century presses were working at Lembourg, Milan, Paris, Isfahan (where in 1640 a large folio of the Lives of the Fathers of the Desert appeared), in Leghorn, Amsterdam (where in 1664 the first edition of the Hymn-book, in 1666 the first Bible, and in 1667 the first Ritual were printed), Marseilles, Constantinople ', Leipzig and Padua.

The press which has done most in printing Armenian authors is that of the Mechitharists of Venice. Here in 1836 was issued a magnificent thesaurus of the Armenian language, with the Latin

and Greek equivalents of each word. At that time there was no dictionary of any language and literature to be compared with this for exhaustiveness and accuracy. There are now Armenian presses all over the world, reprinting old books or issuing new works, often translations of modern writers, English, French, Russian and German.

*The chief collections of, old Armenian MSS. are : at the convent of *Echmiadzin at Valarshapat; at Stambul in the library of the fathers of St Anthony; at Venice in the Mechitharist convent of San Lazaro; at the "Mechitharist convent in Vienna; in the *Royal library at Vienna; in the *Paris Bibliotheque Nationale; in the Vatican library; in the British Museum; in the *Bodleian; in the Rylands library; in the *Berlin and *Munich libraries; *in Tubingen; in St Petersburg, and in the *Lazarev institute at Moscow; at New Joulfa, the Armenian suburb of Isfahan. Private collections have been made by Mr Rendel Harris in Birmingham (presented to the university of Leiden) ; at Parham and elsewhere. A printed catalogue exists of those marked with an asterisk.*

Authorities. — F. Combefis, Historia MonothelitarumCPa.r\s,i6ˆS>) ; Arshak Ter Mikelian, Die armen. Kirche, iv. bis zum xiii. Jahr- hundert (Leipzig, 1892); H. Gelzer, " Die Anfange der armenischen Kirche" in the Berichte der Koniglich. Sachsischen Gesellschaft der Wissenschaften: Historisch-philologische Classe (1895), p. 171; Gut- schmid, Kleine Schriften (Leipzig, 1892), t. iii. ; Langlois, Collection d'historiens armeniens (Paris, 1867) (the translations often careless) ; E. W. Brooks, The Syriac Chronicle known as Zachariah of Mitylene (London, 1899), p. 24; Dulaurier, Recherches sur la chronologie armenienne (Paris, 1859) ; Agop Manandian, Beitrage zur albanischen Geschichte (Leipzig, 1897); G. Owsepian, Die Entstehungsgeschichte des Monotheletismus (Leipzig, 1897) ; Cardinal Angelo Mai, Nova SS. patrum bibliotheca, 6 vols. (Rome, 1844-1871), vol. ii. contains Latin version of Armenian canons; Hergenrother, Photius (Regensburg, 1867); Tchamchian, History of Armenia (in Armenian at Venice and English abridged translation entitled M. Chamich by John Audall, Calcutta, 1827); Domini Joannis Onziensis, Opera Latine (Venice, 1834) ; Nersetis Clajensis, Opera omnia Latine (Venice, 1833) I A. Papadopoulos-Kerameus in the Recueil de la societe orthodoxe de Palestine (St Petersburg, 1892) (Armenian correspond- ence with Photius translated) ; Enthymius Zigabenus, Panoplia, Patrol. Gr. vol. 130, col. 1173; E. Dulaurier, Histoire de Veglise armen. (Paris, 1857) ; le Quien, Oriens chrislianus ; Mansi, Concilia, vol. 25; Steph. Azarian, Ecclesiae Armenae Traditio (Rome, 1870); A. Balgy, Historia doctrinae

catholicae inter Armenos (Vienna, 1878) ; Clemens Galanus, Conciliatio Ecclesiae Armenae cum Romana (Rome, 1690); L. Alishan, Sissouan, contree de VArmenie (Venice, 1893), in Armenian, but also in French translation; Recueil d'actes relatifs aux Armeniens (3 vols., Moscow, 1833) ; St Martin, Memoires historiques sur VArmenie (Paris, 1818); V. Langlois, Voyage dans la Cilicie (Paris, 1861) ; H. G. O. Dwight, Christianity in Turkey (London, 1854); De Damas, Coup d'xil stir VArmenie (Lyon, 1887); H. F. B. Lynch, Armenia (2 vols., London, 1902); J. Issaverdens, Armenia, Ecclesiastical History (Venice, 1875); E. Dulaurier, Historiens armeniens des Croisades (Paris) ; Giovanni de Serpos, Compendio Storico (Venice, 1786); Garabed Chahnazarian, Esquisse de V histoire de VArmenie (Paris, 1856); Gelzer, " Armenien " in Herrog-Hauck, Realencyklopddie fur protestantische Theologie (ed. 3, Leipzig, 1897); Hefele, Hist, of Councils, vols. 3 and 9 ; F. Neve, L'Armenie chretienne (Paris) ; P. Hunanian, Histoire des conciles d 'Orient (Vienna, 1847); Gr. Chalathianz, Apocryphes (Moscow, 1897), and other works; Brosset, Collection d'historiens armeniens (St Petersburg, 1874), and numerous otker works by the same author; J. Catergian, De fidei symbolo quo Armenii utuntur (Vienna, 1893); Ricaut, The present state of the Greek and Armenian Churches (London, 1679) ; H. Denzinger, Ritus orientalium (Wiirzburg, 1863); Fred. C. Cony- beare, Rituale Armenorum (Oxford, 1905); F. E. Brightman, Eastern Liturgies (Oxford, 1896) ; P. Vetter, Chosroae magni explicatio missae (Freiburg-im-Breisgau, 1880); L. Petit, articles on Armenian re- ligious history, councils, literature, creed and disciplire in Diction, de theologie catholique, cols. 1888-1968; F. C. Conybeare, " The Armenian canons of St Sahak " in the American Journal of Theology (Chicago, 1898), p. 828; C. F. Neumann, Geschichte der armenischen Literatur (Leipzig, 1836); Simon Weber, Die katholische Kirche in Armenien (Freiburg-im-Breisgau, 1903); Sukias Somal, Quadro delta Storia Letter aria di Armenia (Venice, 1829); M. V. Ermoni, " L'Armenie " in Revue de V orient chretien (for year 1896) ; F. Tour- nebize, " Histoire de TArmenie " (ib. 1902-3-4-5); R. P. D. Girard, " Les Madag " (ib. for year 1902); H. Hiibschmann, Armenische Studien and Grammatik (Leipzig, 1883 and 1895). Grammars by Petermann (in Porta Orientalium Linguarum series), by Prof. Meillet of Paris, by Prof. N. Marr of St Petersburg (in Russian), by Joseph Karst(of the Cilician dialect). Texts of most of the Armenian fathers and historians have been printed by the Mechitharists of San Lazaro, Venice, and are readily procurable at thˆir convent. (F. C. C.)

ARMENTIERES, a town of northern France, in the depart- ment of Nord,

on the Lys, 13 m. W.N.W. of Lille on the Northern railway from that city to Dunkirk. Pop. (1906) 25,408. The chief building is the hotel de ville with a 17th-century belfry. There are communal colleges for girls and boys, a board of trade- arbitrators, a chamber of commerce and a national technical school. The town is an important centre for the spinning and weaving of flax and cotton; bleaching, dyeing and the manu- facture of machinery are among the other industries. Its industrial prosperity dates from the middle ages, when, however, woollen, not cotton, goods were the staple product.

ARMET (diminutive of Fr. arme), a form of helmet, which was developed out of existing forms in the latter part of the 15th century. It was round in shape, and often had a narrow ridge or comb along the top. It had a pivoted or hinged vizor and nose- piece, and complete chin, neck and cheek protection, closely con- nected with the gorget. It is distinguished from the basinet by its roundness, and by the fact that it protects the neck and chin by strong plates, instead of a " camail " or loose collar of mail; from the salade and heaume by its close fit and skull-cap shape; and from the various forms of vizored burgonets by the absence of the projecting brim. It remained in use until the final abandon- ment of the complete closed head-piece.

ARMFELT, GUSTAF MAURITZ, Count (1757-1814), son of Charles II. 's general, Carl Gustaf Armfelt, was born in Finland on the 31st of March 1757. In 1774 he became an ensign in the guards, but his frivolity provoked the displeasure of Gustavus III. and he thought it prudent to go abroad. Subsequently, however, (1780) he met the king again at Spa and completely won the monarch's favour by his natural amiability, intelligence and brilliant social gifts. Henceforth his fortune was made. At first he was the maitre des plaisirs of the Swedish court, but it was not long before more serious affairs were entrusted to him. He took part in the negotiations with Catherine II. (1783) and with the Danish government (1787), and during the Russian war of 1788-90 he was one of the king's most trusted and active counsellors. He also displayed great valour in the field. In 1788 when the Danes unexpectedly invaded Sweden and threatened Gothenburg, it was Armfelt who under the king's directions organized the Dalecarlian levies and led them to victory. He remained absolutely faithful to Gustavus when nearly the whole of the nobility fell away from him ; brilliantly distinguished himself in the later phases of the Russian war; and was the Swedish pleni- potentiary at the conclusion of the peace of Verela. During the last years of Gustavus III. his influence was paramount, though he protested against his master's headstrong championship of the Bourbons. On his deathbed Gustavus III. (1792) committed the care of his infant son to Armfelt and appointed him a member of the council of regency; but the anti-Gustavian duke-regent Charles sent Armfelt as Swedish ambassador to

Naples to get rid of him. From Naples Armfelt communicated with Catherine II., urging her to bring about by means of a military demonstration a change in the Swedish government in favour of the Gustavians. The plot was discovered by the regent's spies, and Armfelt only escaped from the man-of-war sent to Naples to seize him, with the assistance of Queen Caroline. He now fled to Russia, where he was interned at Kaluga, while at home he was condemned to confiscation and death as a traitor, and his unjustly accused mistress Magdalena Rudenschold was publicly whipped to gratify an old grudge of the regent's. When Gustavus IV. attained his majority, Armfelt was completely rehabilitated and sent as Swedish ambassador to Vienna (1802), but was obliged to quit that post two years later for sharply attacking the Austrian government's attitude towards Bonaparte. From 1805 to 1807 he was commander-in-chief of the Swedish forces in Pomerania, where he displayed great ability and retarded the conquest of the duchy as long as it was humanly possible. On his return home, he was appointed commander-in-chief on the Norwegian frontier, but could do nothing owing to the ordres, contre-ordres et desordres of his lunatic master. He would have nothing to say to the revolutionaries who in 1809 deposed Gustavus IV. and his whole family. Armfelt was the most courageous of the supporters of

the crown prince Gustavus, and when Bernadotte was elected resolved to retire to Finland. His departure was accelerated by a decree of expulsion as a conspirator (181 1). Over the im- pressionable Alexander I. of Russia, Armfelt exercised almost as great an influence as Czartoryski, especially as regards Finnish affairs. He contributed more than any one else to the erection of the grand-duchy into an autonomous state, and was its first and best governor-general. The plan of the Russian defensive campaigns is, with great probability, also attributed to him, and he gained Alexander over to the plan of uniting Norway with Sweden. He died at Tsarskoe Selo on the 19th of August 1814. See Robert Nisbet Bain, Gustavus III. vol. ii. (London, 1895) ; Elof Tegner, Gustaf Mauritz Armfelt (Stockholm, 1883-1887). (R. N. B.)

ARMIDALE, a town in Sandon county, New South Wales, Australia, 313 m. by rail N. of Sydney. Pop. (1901) 4249. It lies at an elevation of 3313 ft., in a picturesque mountainous district, for the most part pastoral and agricultural, though it contains some alluvial gold diggings. Antimony is found in large quantities near the town. Armidale is a cathedral town, being the seat of a Roman Catholic bishop and belonging to the joint Anglican diocese of Grafton; Armidale St Peter's, the Anglican cathedral, and St Mary's, the Rqman Catholic, are both fine buildings. The town is the centre of great educational activity, its schools including the New England girls' school, St Patrick's college, the high school, the Ursuline convent and state schools. Armidale became a municipality in 1863.

ARMILLA, Armil or Armillary Sphere (from the Lat. armilla, a bracelet), an instrument used in astronomy. In its simplest form, consisting of a ring fixed in the plane of the equator, the armilla is one of the most ancient of astronomical instruments. Slightly developed, it was crossed by another ring fixed in the plane of the meridian. The first was an equinoctial, the second a solstitial armilla. Shadows were used as indices of the sun's position, in combination with angular divisions. When several rings or circles were combined representing £he great circles of the heavens, the instrument became an armillary sphere. Armillae are said to have been in early use in China. Eratosthenes (276-196 B.C.) used most probably a solstitial armilla for measuring the obliquity of the ecliptic. Hipparchus (160-125 B.C.) probably used an armillary sphere of four rings. Ptolemy (c. a.d. 107-161) describes his instrument in the Syntaxis (book v. chap, i.), and it is of great interest as an example of the armillary sphere passing into the spherical astrolabe. It consisted of a graduated circle inside which another could slide, carrying two small tubes diametrically opposite, the instrument being kept vertical by a plumb-line.

Zenith

From M. Blundeville's Treatise of the first principles oj Cosmography and specially of the Spheare.

Armillary Sphere. A-D. 1636.

No material advance was made on Ptolemy's instrument until Tycho Brahe, whose elaborate armillary spheres passing into astrolabes are figured in his Astronwtiae Inslauratae Mechanica.

The armillary sphere survives as useful for teaching, and may be described as a skeleton celestial globe, the series of rings representing the great circles of the heavens, and revolving on an axis within a horizon. With the earth as centre such a sphere is known as Ptolemaic; with the sun as centre, as Copernican.

The designer of the instrument shown no doubt thought that the north pole might suitably have the same ornament as was used to mark N. on the compass card, and so surmounted it with the fteur-de-lys, traditionally chosen for that purpose on the compass by Flavio Gioja in honour of Charles of Anjou, king of Sicily and Naples.

Armillary spheres occur in many old sculptures, paintings and engravings;

and from these sources we know that they were made for suspension, for resting on the ground or on a table, for holding by a short handle, or either for holding or for resting on a stand.

Authorities. — Tycho Brahe, Aslronomiae Instauratae Mechanica; M. Blundeviile, his Exercises; N. Bion, Traite des instrumens de mathimatique; also L' Usage des globes celestes; Sedillot, Memoire sur les instrumens; J. B. Delambre, Histoire de I'astronomie ancienne; R. Grant, History of Physical Astronomy. (M. L. H.)

ARMINIUS, the Latinized form of the name of Hermann, or more probably AemIn (17 b.c.-a.d. 21), the German national hero. He was a son of a certain Segimer, a prince of the tribe of the Cherusci, and in early life served with distinction as an officer in the Roman armies. Returning to his own people he found them chafing under the yoke of the Roman governor, Quintilius Varus; he entertained for them hopes of freedom, and cautiously inducing neighbouring tribes to join his standard he led the rebellion which broke out in the autumn of a.d. 9. Heavily laden with baggage the troops of Varus were decoyed into the fastnesses of the Teutoburger Wald, and there attacked, the completeness of the barbarian victory being attested by the virtual annihilation of three legions, by the voluntary death of Varus, and by the terror which reigned in Rome when the news of the defeat became known, a terror which found utterance in the emperor's despairing cry: "Varus, give me. back my legions! " Then in a.d. 15 Germanicus Caesar led the Romans against Arminius, and captured his wife, Thusnelda. An indecisive battle was fought in the Teutoburger Wald, where Germanicus narrowly escaped the fate of Varus, and in the following year Arminius was defeated. The hero's later years were spent in fighting against Marbod, prince of the Marcomanni, and in disputes with his own people occasioned probably by his desire to found a powerful kingdom. He was murdered in a.d. 21.

In 1875 a great monument to Arminius was completed. This stands on the Grotenburg mountain near Detmold. Klopstock and other poets have used his exploits as material for dramas.

Much discussion has taken place with regard to the exact spot in the Teutoburger Wald where the great battle between Arminius and Varus was fought. There is an immense literature on this subject, and the following may be consulted: — T. Mommsen, Die Ortlichkeit der Varusschlacht (1885); E. Meyer, Untersuchungen uber die Schlacht im Teutoburger Walde (1893) ; A. Wilms, Die Schlacht im Teutoburger Walde (1899); F. Knoke, Das Schlachtfeld im Teutoburger Walde (1899); E. Diinzelmann, Der Schauplatz der Varusschlacht (1889); and P. Hofer, Die Varusschlacht (1888). For more general accounts of Arminius see: Tacitus, Annals, edited

by H. Furneaux (1884-1891); O. Kemmer, Arminius (1893); F. W. Fischer, Arm-in und die Romer (1893); W. Uhl, Das Portrait des Arminius (1898); and F. Knoke, Die Kriegszuge des Germanicus in Deutschland (1887).

ARMINIUS, JACOBUS (1560-1609), Dutch theologian, author of the modified reformed theology that receives its name of Arminian from him, was born at Oudewater, South Holland, on the 10th of October 1560. Arminius is a Latinized form of his patronymic Hermanns or Hermansen. His father, Hermann Jakobs, a cutler, died while he was an infant, leaving a widow and three children. Theodorus Aemilius, a priest, who had turned Protestant, adopting Jakob, sent him to school at Utrecht, but died when his charge was in his fifteenth year. Rudolf Snellius (Snel van Roijen, 1 546-1613), the mathematician, a native of Oudewater, then a professor at Marburg, happening at the time to visit his early home, met the boy, saw promise in him and undertook his maintenance and education. But hardly was he settled at Marburg when the news came that the Spaniards had

besieged and taken Oudewater, and murdered its inhabitants almost without exception. Arminius hurried home, but only to find all his relatives slain. In February the same year (1575), the university of Leiden had been founded, and thither, by the kindness of friends, Arminius was sent to study theology. The six years he remained at Leiden (1576-1582) were years of active and innovating thought in Holland. The War of Independence had started conflicting tendencies in men's minds. To some it seemed to illustrate the necessity of the state tolerating only one religion, but to others the necessity of the state tolerating all. Dirck Coornhert argued, in private conferences and public disputations, that it was wrong to punish heretics, and his great opponents were, as a rule, the ministers, who maintained that there was no room for more than one religion in a state. Caspar. Koolhaes, the heroic minister of Leiden— its first lecturer, too, in divinity — pleaded against a too rigid uniformity, for such an agreement on " fundamentals " as had allowed Reformed, Lutherans and Anabaptists to unite. Leiden had been happy, too, in its first professors. There taught in theology Guillaume Feuguieres or Feuguereius (d. 1613), a mild divine, who had written a treatise on persuasion in religion, urging that as to it " men could be led, not driven "; Lambert Danaeus, who deserves remembrance as the first to discuss Christian ethics scientifically, apart from dogmatics; Johannes Drusius, the Orientalist, one of the most enlightened and advanced scholars of his day, settled later at Franeker; Johann Kolmann the younger, best known by his saying that high Calvinism made God " both a tyrant and an executioner." Snellius, Arminius's old patron, now removed to Leiden, expounded the Ramist philosophy, and did his best to start his students on the search after truth, unimpeded by the authority of Aristotle. Under these men and influences,

Arminius studied with signal success; and the promise he gave induced the merchants' gild of Amsterdam to bear the further expenses of his education. In 1582 he went to Geneva, studied there awhile under Theodore Beza, but had soon, owing to his active advocacy of the Ramist philosophy, to remove to Basel. After a short but brilliant career there he turned to Geneva, studied for three years, travelled, in 1586, in Italy, heard Giacomo Zarabella (1 533-1 589) lecture on philosophy in Padua, visited Rome, and, open-minded enough to see its good as well as its evil, was suspected by the stern Dutch Calvinists of "popish" leanings. Next year he was called to Amsterdam, and there, in 1588, was ordained. He soon acquired the reputa- tion of being a good preacher arid faithful pastor., He was com- missioned to organize the educational system of the city, and is said to have done it well. He greatly distinguished himself by fidelity to duty during a plague that devastated Amsterdam in 1602. In 1603 he was called, in succession to Franz Junius, to a theological professorship at Leiden, which he held till his death on the 19 th of October 1609.

Arminius is best known as the founder of the anti-Calvinistic school in Reformed theology, which created the Remonstrant Church in Holland (see Remonstrants), and contributed to form the Arminian tendency or party in England. He was a man of mild and liberal spirit, broadened by varied culture, constitu- tionally averse from narrow views and enforced uniformity. He lived in a period of severe systematizing. The Reformed strengthened itself against the Roman Catholic theology by working itself, on the one hand, into vigorous logical consistency, and supporting itself, on the other, on the supreme authority of the Scriptures. Calvin's first principle, the absolute Sovereignty of God, had been so applied as to make the divine decree determine alike the acts and the destinies of men; and his formal principle had been so construed as to invest his system with the authority of the source whence it professed to have been drawn. Calvinism had become, towards the close of the 16 th century, supreme in Holland, but the very rigour of the uniformity it exacted pro- voked a reaction. Coornhert could not plead for the toleration of heretics without assailing the dominant Calvinism, and so he opposed a conditional to its unconditional predestination. The two ministers of Delft, who had debated the point with him, had, the better to turn his arguments^ descended from the

sUpralapsarian to the infralapsarian position, i.e. made the divine decree, instead of precede and determine, succeed the Fall. This seemed to the high Calvinists of Holland a grave heresy. Arminius, fresh from Geneva,

familiar with the dialectics of Beza, appeared to many the man able to speak the needed word, and so, in 1589, he was simultaneously invited by the ecclesiastical court of Amsterdam to refute Coornhert, and by Martin Lydius, pro- fessor at Franeker, to combat the two infralapsarian ministers of Delft. Thus led to confront the questions of necessity and free will, his own views became unsettled, and the further he pursued his inquiries the more he was inclined to assert the freedom of man and limit the range of the unconditional decrees of God. This change became gradually more apparent in his preaching and in his conferences with his clerical associates, and occasioned much controversy in the ecclesiastical courts where, however, he successfully defended his position. The controversy was embittered and the differences sharpened by his appointment to the professorship at Leiden. He had as colleague Franz Gomarus, a strong supralapsarian, perfervid, irrepressible; and their collisions, personal, official, political, tended to develop and define their respective positions.

Arminius died, worn out by uncongenial controversy and ecclesiastical persecution, before his system had been elaborated into the logical consistency it attained in the hands of his celebrated successor, Simon Episcopius; but though inchoate in detail, it was in its principles clear and coherent enough. These may be thus stated:

1. The decree of God is, when it concerns His own actions, absolute, but when it concerns man's, conditional, i.e. the decree relative to the Saviour to be appointed and the salvation to be provided is absolute, but the decree relative to the persons saved or condemned is made to depend on the acts — belief and repent- ance in the one case, unbelief and impenitence in the other — of the persons themselves.

2. The providence or government of God, while sovereign, is exercised in harmony with the nature of the creatures governed, i.e. the sovereignty of God is so exercised as to be compatible with the freedom of man.

3. Man is by original nature, through the assistance of divine grace, free, able to will and perform the right; but is in his fallen state, of and by himself, unable to do so; he needs to be regener- ated in all his powers before he can do what is good and pleasing to God.

4. Divine grace originates, maintains and perfects all the good in man, so much so that he cannot, though regenerate, conceive, will or do any good thing without it.

5. The saints possess, by the grace of the Holy Spirit, sufficient strength to persevere to the end in spite of sin and the flesh, but may so decline from sound doctrine as to cause divine grace to be ineffectual.

6. Every believer may be assured of his own salvation.

7. It is possible for a regenerate man to live without sin. Arminius's works are mostly occasional treatises drawn from

him by controversial emergencies, but- they everywhere exhibit a calm, well-furnished, undogmatic and progressive mind. He was essentially an amiable man, who hated the zeal for an impossible orthodoxy that constrained " the church to institute a search after crimes which 'have not betrayed an existence, yea, and to drag into open contentions those who are meditating no evil." His friend Peter Bertius, who pronounced his funeral oration, closed it with these words: " There lived a man whom it was not possible for those who knew him sufficiently to esteem; those who entertained no esteem for him are such as never knew him well enough to appreciate his merits."

The works of Arminius (in Latin) were published in a single quarto volume at Leiden in 1629, at Frankfort in 1631 and 1635. Two volumes of an English translation, with copious notes, by James Nichols, were published at London, 1 825-1 828; three volumes (complete) at Buffalo, 1853. A life was written by Caspar Brandt, son of Gerard Brandt, the historian of the Dutch reformation, and published in 1724; republished and annotated by J. L. Mosheim in 1725; and translated into English by the Rev. John Guthrie, 1854. James Nichols also wrote a life (London, 1843).

n. 19

ARMISTICE (from Lat. arma, arms, and sistere, to stop), a suspension of hostilities by mutual agreement between two nations at war, or their respective forces. An armistice may be either general or particular; in the first case there is a complete cessation of hostile operations in every part of the dominions of the belligerent powers; in the second there is merely a temporary truce between two contending armies, or between a besieged fortress and the force besieging it. Such a temporary truce, when for a very limited period and for a special purpose, e.g. the collection of the wounded and the burial of the dead, is termed a suspension of arms. A general armistice cannot be concluded by the commanders-in-chief unless special authority has been previously delegated to them by their respective governments; otherwise any arrangement entered into by them requires subse- quent ratification by the supreme powers of the states. A partial truce may be concluded by the officers of the respective powers, without any special authority from their governments, wherever, from the . nature and extent of the commands they exercise, their duties could not be efficiently discharged without their possession of such a power. The conduct of belligerent parties during an armistice is usually regulated in modern

warfare by express agreement between the parties, but where this is not the case the following general conditions may be laid down. (1) Each party may do, within the limits prescribed by the truce, whatever he could have done in time of peace For example, he can raise troops, collect stores, receive reinforcements and fortify places that are not actually in a state of siege. (2) Neither party can take advantage of the armistice to do what he could not have done had military operations continued. Thus he cannot throw provisions or reinforcements into a besieged town, and neither besiegers nor besieged are at liberty to repair their fortifications or erect new works. (3) All things contained in places the possession of which was contested, must remain in the state in which they were before the armistice began. Any infringe- ment by either party of the conditions of the truce entitles the other to recommence hostile operations without previous intimation.

ARMOIRE, the French name (cf. Almery) given to a tall movable cupboard, or "wardrobe," with one or more doors. It has varied considerably in shape and size, and the decoration of its doors and sides has faithfully represented mutations of fashion and modifications of use. It was originally exceedingly massive and found its chief decoration in elaborate hinges and locks of beaten iron. The finer ecclesiastical armoires or aumbries which have come down to us— Used in churches for the safe custody of vestments, eucharistic vessels, reliquaries and other precious objects — are usually painted, sometimes even upon the interior, with sacred subjects or with incidents from the lives of the saints. The cathedrals of Bayeux and Noyon contain famous examples; the most typical English one is in York minster. By the end of the 14th century, when the carpenter and the wood-carver had acquired a better mastery of their material, the taste for painted surfaces appears to have given place to the vogue of carving, and the simple rectangular panels gradually became sculptured with a simple motive, such as the linen-fold or parchment patterns. In the treasury of St Germain l'Auxerrois the ends of the 15th- century armoires are treated in this way. In that and the two following centuries the keys and the escutcheons of the locks became highly ornamental; usually in forged iron, they were occasionally made of more precious metals. By slow degrees the shape of this receptacle changed — from breadth was evolved height, and the tall form of armoire became characteristic. The Renaissance exercised a notable effect upon this, as upon so many other varieties of furniture. It became less obviously and aggressively a thing of utility; its proportions shrank from the massive to the elegant; its artistic effectiveness was vastly enhanced by its division into an upper and a lower part. En- riched with columns and pilasters, its panels carved with mythology, its canopied niches filled with sculptured statuettes, and terminating with a rich cornice and perhaps a broken pediment, it was

widely removed in appearance, if not in purpose, from the uncompromising iron-mounted receptacle of earlier

generations. During the 16th century, when the surging im- pulses of the Renaissance had died away, the armoire relapsed into plainness, its proportions increased, and it was again con- structed in one piece. Ere long, however, it grew more sump- tuous than ever. Boulle encrusted it with marqueterie from designs by Berain; it glowed with dmorini, with the torches and arrows of Cupid, with the garlands which he weaves for his captives, and when allusiveness left a corner vacant, it was filled with arabesques in ebony or ivory, in brass or white metal. While the royal palaces and the hotels of the great nobility were filled with those costly splendours, the ordinary cabinetmaker continued to construct his modest pieces, and by the middle of the 1 8th century the armoire was found in every French house, ample in width and high in proportion to the lofty rooms of the period. It is not to be supposed that so useful a piece of furniture was confined to France. It was used, more or less, throughout a considerable part of Europe, but it was distinctively Gallic nevertheless, and never became thoroughly acclimatized else- where until about the beginning of the 19th century, when it developed into the glass-fronted wardrobe which is now an essential detail in the plenishing of the bed-chamber, not merely in France and England, but in many other countries. The armoire a glace was known and occasionally made in France as far back as the middle of the 18th century, and almost the earliest mention of it connects it with the scandalous relations of the Marechal de Richelieu and the beautiful fermiere gtn&rale, Mme de la Popeliniere, who had one made to mask a secret door. In the conventional and not very attractive wardrobe of commerce it is difficult to descry the gracious characteristics of the armoire of the Renaissance or the 17 th century, and it is not altogether surprising that Theodore de Banville should have condemned one of the most solidly useful of household necessaries as a " hideous monster."

ARMORICA (Aremorica), the Roman name, derived from two Celtic words meaning the " seaside " (ar, on, and mor, sea), for the land of the Armorici, roughly the peninsula of Brittany. At the time of the Roman advance on Gaul there were five principal tribes in Armorica, the Namneti, the Veneti, the Osismii, the Curiosolitae and the Redones. It was subdued by Caesar, who entirely destroyed the seafaring tribe of its south coast, the Veneti. Under the Empire it formed part of the province of Gallia

Lugudunensis (Lugdunensis). It contained hardly any towns, though many large country houses, and was perhaps less Romanized than the rest of Gaul. In and after the later part of the 5th century it received many Celtic immigrants from the British Isles, fleeing (it is said) from the Saxons; and the Celtic dialect which the Bretons still speak is thought to owe its origin to these immigrants. (See further Brittany.)

ARMOUR, PHILIP DANFORTH (1832-1901), American merchant and philanthropist, was boxn in Stockbridge, New York, on the 16th of May 1832. He was educated at Cazenovia Academy, Cazenovia, N.Y., worked for several years on his father's farm, and in 1852 with a small party went overland to California, a large part of the journey being made on foot. Here during the next four years he laid the foundations of his fortune. In 1856 he became associated with his friend, Frederick S. Miles, in a wholesale grocery and commission business at Milwaukee, In 1863 he became the head of the firm of Armour, Plankington & Co. , pork packers, whose headquarters were at Milwaukee. He also obtained a large interest in the firm H. O. Armour & Co., which was founded by his brother, Herman Ossian Armour (1837-1901), and which, starting as a grain commission business, in 1868 established also a large pork-packing plant. Of this firm, the name of which was changed to Armour & Co. in 1870, he became the head in 1875, and thereafter the business made such rapid progress that in 1901 as many as 11,000 hands were employed. Besides contributing to many charitable enterprises, Armour founded the Armour Institute of Technology at Chicago in 1892 and the Armour Flats in Chicago, built for the purpose of supplying at a low rental good homes for working men and their families. He also contributed liberally to the Armour Mission in Chicago, which was founded in 1881 by his brother, Joseph

Armour. At the time of his death, on the 6th of January 1901, Philip D. Armour's private fortune was supposed to exceed

$50,000,000.

ARMOUR PLATES. The earliest recorded proposal to employ armour for ships of war (for body armour, &c, see Arms and Armour) appears to have been made in England by Sir William Congreve in 1805. In The Times of the 20th torVhfps. of February of that year reference is made to Congreve's designs for an armoured, floating mortar battery which the in- ventor considered would be proof against artillery fire. Among Congreve's unpublished papers there is also a suggestion for armour-plating the embrasures of casemates. Nothing, however, seems to have come of these proposals, and a similar lack of appreciation befell the next advocate of armour, John Stevens of New Jersey, U.S.A., who submitted the plans of an armoured vessel to Congress in 181 2. The Stevens family, however,

continued to work at the subject, and by 1841 had determined by actual experiment the thickness of wrought-iron armour which was proof against the projectiles then in use. The necessity for armouring ships as a protection against shell fire was again pointed out by General Paixhans in 1841, and in 1845 History Dupuy de Lome had prepared the designs of an armoured frigate for the French government. During the period between 1827 and 1854, experiments in connexion with the proposed application of armour to both ships and forts were carried out in England, the United States and France, but the question did not get beyond the experimental stage until the latter year, when armoured floating batteries were laid down in all three countries, probably as the immediate outcome of the destruction of the Turkish fleet by shell fire at Sinope on the 30th of November 1853.

Three of the French floating batteries were in action at the bombardment of Kinburn in 1855, where they achieved a con- spicuous success, silencing the Russian forts after a four hours' engagement, during which they themselves, although frequently struck, were practically uninjured, their loss in personnel being but trifling. To quote Very: " This comparatively insignificant action, which had little if any effect upon the course of the Crimean War, changed the whole condition of armour for naval use from one of speculation to one of actual and constant necessity." The military application of armour for the protec- tion of guns mounted in permanent fortifications followed. Its development, however, took rather a different course, and the question of armour generally is of less importance for the military engineer than for the naval constructor. For the employment of armour in ship construction and in permanent works on land, see the articles Shipbuilding; Fortification and Siegecrajt; the present article is concerned solely with the actual armour itself.

The earliest armour, both for ships and forts, was made of wrought iron, and was disposed either in a single thickness or in successive layers sandwiched with wood or concrete. Such armour is now wholly obsolete, though examples tioa and " of it may still be found' in a few forts of early date, testing. The chief application of armour in modern land defences is in the form of shields for the protection of guns mounted en barbette. Examples of such shields are shown in figs. 1 and 2. Fig. 1 shows a 4-s-in.-steel shield for the U.S.A. government, face-hardened by the Harvey process, to which reference is made below. It was attacked by 5-in. and 6-in. armour-piercing shot, and proved capable of keeping out the 5-in. up to a striking velocity of nearly 1800 ft. per second, but was defeated by a 6-in. capped A.P. shot with a striking velocity of 1842 ft. per second. The mounting was not seriously damaged by the firing, but could be operated after the impact of one 3-2-in., five 5-in. and three 6-in. projectiles. Fig. 2 shows a gun-shield, manufactured by Messrs Hadfield of Sheffield, after attack by 4-i-in., 4-7-01. and 6-in. armour-piercing and other projectiles.

The limit of the shield's resistance was just reached by an uncapped 4-7-in. A.P. shell with a striking velocity of 2128 ft. per second. The shield (the average maximum thickness of which was 5-8 in.) showed great toughness, and although subjected to a

severe battering, and occasionally outmatched by the attacking projectiles, developed no visible crack. It is chiefly remarkable for the fact that it was cast and not forged. As is evident from the fringing around the hole made by the 6-in. A. P. shell, the shield was not face-hardened. A more highly developed form of the gun-shield is to be found in the armoured cupola, which has been employed to a very considerable extent in permanent fortifications, and whose use is still strongly advocated by continental European military engineers. The majority of the cupolas to be found in continental forts are not, however, of very recent date, those erected in 1894 at Molsheim near Strassburg being comparatively modern instances. Any cupolas constructed nowadays would be of steel, either forged or .cast, and. would probably be face-hardened, but a large number of those extant are of compound or even of iron armour. Many of those on sea- fronts are made of chilled cast iron. Such armour, which was introduced by Gruson of Magdeburg in 1868, is extremely hard, and cannot be perforated, but must be destroyed by fracture. It is thus the antithesis of wrought iron, which, when of good quality, docs not break up under the impact of the shot but yields by perforation. Armour of the Gruson type is well adapted for curved surfaces such as cupolas, which on account of their shape are scarcely liable to receive a direct hit, except at distant ranges, and its extreme hardness would greatly assist it to throw off shot striking obliquely, which have naturally a tendency to glance. Chilled iron, on account of its liability to break up when subjected to a continuous bombardment by the armour-piercing steel projectiles of guns of even medium calibre, was usually considered unsuitable for employment in inland forts, where wrought iron, mild steel or compound armour was preferred. On the other hand , as pointed out by the late Captain C. Orde Browne, R.A., it was admirably adapted to resist the few rounds that the heavy guns of battleships might be expected to deliver during an attack of comparatively limited duration.

Chilled iron was never employed for naval purposes, and warship armour continued to be made exclusively of wrought iron until 1876 when steel was introduced by Schneider. In an important trial at Spezzia in that year the superiority in resisting power of steel to wrought iron was conclusively proved, but, on the other hand, steel showed a great tendency to through-

cracking, a defect which led Messrs Cammell of Sheffield in 1877 to introduce compound armour consisting of a steel surface in intimate union with a wrought-iron foundation plate. In Cammell plates, which were made by the Wilson process, the steel face was formed by running molten steel on to a white-hot foundation plate of iron, while in the compound plates, made by Messrs John Brown & Co. according to the patent of J. D. Ellis, a thin steel surface plate was cemented on to the wrought-iron founda- tion by running in molten steel between. Compound armour possessed the advantages of a harder face than was then possible in a homogeneous steel plate, while, on the other hand, the back was softer and less liable to crack. Its weak point was the liability of the surface plate to crack through under fire and become detached from its iron backing. The manufacture of steel, however, continued to improve, so that in 1890 we find steel plates being made which were comparatively free from liability to through-cracking, while their power to resist perfora- tion was somewhat greater than that of the best compound. The difference, however, was at no time very marked, and between 1880 and 1890 the resistance to perforation of either steel or compound as compared with wrought iron may be taken as about 1-3 to 1.

Compound armour required to be well backed to bring out its best qualities, and there is a case on record in 1883 when a 12-in. Cammell plate weighing 105 tons, backed by granite, stopped a 16-in. Palliser shot with a striking energy of nearly 30,000 foot tons and a calculated perforation of 25 inches of wrought iron. As steel improved, efforts were made to impart an even greater hardness to the actual surface or skin of compound armour, and, with this object in view, Captain T. J. Tresidder, C.M.G., patented in 1887 a method of chilling the heated surface of a plate by means of jets of water under pressure. By this method

it was found possible to obtain a degree of hardness which was prevented in ordinary plunging by the formation of a layer of steam between the water and the heated surface of the plate. Compound plates face-hardened on this system gave excellent results, and forged-steel armour-piercing projectiles were in some cases broken up on their surfaces as if they had been merely chilled iron. Attempts were also made to increase the toughness of the back by the substitution of mild nickel steel for wrought iron. The inherent defect of compound armour, however — its want of homogeneity, — remained, and in the year 1891 H. A. Harvey of Newark, N.J., introduced a process whereby an all steel plate could be face-hardened in such a way that the advaiv tages of the compound principle were obtained in a homogeneous plate. The process in question consisted in carburizing or cementing the surface of a steel plate by keeping it for a fortnight or so at a high temperature in contact with finely divided charcoal, so that the heated surface absorbed a certain amount of carbon, which penetrated to a considerable depth, thus causing a difference in

chemical composition between the front and back of the plate. After it had been left a sufficient time in the cementation furnace, the plate was withdrawn and allowed to cool slowly until it reached a dull red heat, when it was suddenly chilled by the application of water, but by a less perfect method than that employed by Tresidder. Steel plates treated by the Harvey and Tresidder processes, which shortly became combined, possessed about twice the resisting power of wrought iron. The figure of merit, or resistance to penetration as compared with wrought iron, varied with the thickness of the plate, being rather more than 2 with plates from 6 to 8 in. thick and rather less for the thicker plates. In 1889 Schneider introduced the use of nickel in steel for armour plates, and in 1891 or 1892 the St Chamond works employed a nickel steel to which was added a small percentage of chromium.

All modern armour contains nickel in percentages varying from 3 to Si and from i-oto 2-0% of chromium is also employed as a general rule. Nickel in the above quantities adds greatly to the toughness as well as to the hardness of steel, while chromium enables it to absorb carbon to a greater depth during cementa- tion, and increases its susceptibility to tempering, besides con- ducing to a tough fibrous condition in the body of a plate. Alloy steels of this nature appear to be very susceptible to thermal treatment, by suitable variation of which,, with or without oil quenching, the physical condition of the same steel may be made to vary to an extraordinary extent, a peculiarity which is turned to good account in the manufacture of the modern armour plate.

The principal modern process is that introduced by Krupp in 1893. Although it is stated that a few firms both in Great Britain and in other countries use special processes of their own, it is probable that they differ only in detail from the Krupp process, which has been adopted by the great majority of makers. Krupp plates are made of nickel-chrome steel and undergo a special heat treatment during manufacture which is briefly described below. They can either be cemented or, as was usual in England until about 1902 in the case of the thinner plates (4 in. and under) and those used for curved structures such as casemates, non-cemented. They are in either case face-hardened by chilling. Messrs Krupp have, however, cemented plates of 3 in. and upward since 1895. Although the full process is now applied to plates of as little as ‘2 in. in thickness, there is some difference of opinion between manufacturers as to the value of cementing these very thin plates. The simple Harvey process is still employed to some extent in the case of plates between 5 and 3 in. in thickness, and excellent results are also stated to have been obtained with plates from 2 to 4 in. in thickness, manufactured from a special steel by the process patented by M. Charpy of the St Jacques steel works at Montlucon. A Krupp cemented (K.C.) plate is not perhaps harder as regards surface than a good Harveyed

plate, but the depth of hard face is greater, and the plate is very much tougher in the back, a quality which is of particular importance in the thicker plates. The figure of merit varies, as in Harveyed plates, with the thickness of the armour, being about 2-7 in the case of good 6-in. plates

while for the thicker plates the value gradually falls off to about 2 -3 in the case of 1 2-in. armour. This figure of merit is as against uncapped armour-piercing shot of approximately the same calibre as the thickness of the plate. The resisting power of the non-cemented Krupp plates is usually regarded as being consider- ably less than that of the cemented plates, and may be taken on an average to be 2-25 times that of wrought iron.

Figs. 3, 4 and 5 are illustrations of good cemented plates of the Krupp type. Fig. 3 shows an n-8-in. plate, tried by Messrs Krupp in 1895, after attack by three 12-in. steel armour-piercing projectiles of from 712-7 to 716-1 lb in weight. In the third round the striking velocity of the projectile was 1993 ft. per second, the calculated perforation of wrought iron by Tresidder's formula being 25-9 in. The attack was successfully resisted, all the projectiles being broken up without effecting perforation, while there were no serious cracks. The figure of merit of the plate was thus well in excess of 2-2. The great toughness of the plate is perhaps even more remarkable than its hardness; its width was only 6-28 ft., so that each shot head formed a wedge of approximately one-sixth of its width. The excellence of the metal which is capable of withstanding such a strain is apparent.

Fig. 4 is of a 9-in. K.C. plate, made by Messrs Armstrong, Whitworth & Co. for the Japanese government, after undergoing an unusually severe official test. The fourth round was capable of perforating 22 in. of wrought iron, so that the figure of merit of the plate must have been considerably in excess of 2-45, as there were no through-cracks, and the limit of resistance was far from being reached.

Fig. 5 shows the front of an excellent 6-in. cemented plate of Messrs Beardmore's manufacture, tried at Eskmeals on the nth of October 1901. It withstood the attack of four armour-piercing 6-in. shot of 100 lb weight, with striking velocities varying from 1996 to 2177 ft. per second. Its limit of resistance was just passed by the fifth round in which the striking velocity was no less than 2261 ft. per second. The projectile, which broke up in passing through the plate, did not get through the skin plate behind the wood backing, and evidently had no surplus energy left. The figure of merit of this plate was between 2-6 and 2-8, but was evidently much closer

to the latter than to the former figure. A sixth round fired with a Johnson capped shot weighing 105-9 lb easily perforated both plate and backing with a striking velocity of 1945 ft. per second, thus reducing the figure of merit of the plate to below 2-2 and illustrating very clearly the advan- tage given by capping the point of an armour-piercing projectile-. There were no through-cracks in the plate after this severe trial, the back being evidently as tough as the face was hard.

Fig. 6 shows a 3 -in. K.N.C. plate of Messrs Vickers, Sons & Maxim's manufacture, tested privately by the firm in November 1905. It proved to be of unusual excellence, its limit of resistance being just reached by a 125-lb armour-piercing shell of 3 in. calibre with a striking velocity of 2558 ft. per second, a result which, even if the projectiles used were not relatively of the same perforating power as those used in the proof of 6-in. and thicker plates, shows that its resisting power was very great. At a low estimate its figure of merit against 3-in. A. P. shot may be taken as about 2-6, which is exceptionally high for a non-cemented, or indeed for any but the best K.C. plates.

The plate also withstood the attack of a 4-7-in. service pattern steel armour-piercing shell of 45 lb weight striking the unbacked portion with a velocity of 1599 ft. per second, and was only just beaten by a similar shell with a velocity of 1630 ft. per second. The effect of all the above-mentioned rounds is shown in the photograph. The same plate subsequently kept out two 6-in. common shell filled up to weight with salt and plugged, with striking velocities of 141 2 and 1739 ft. per second respectively, the former being against the unbacked and the latter against the backed half of the plate, — the only effect on the plate being that round 6 caused a fragment of the right-hand top corner of the plate to break off, and round 7 started a few surface cracks between the points of impact of rounds 1, 2 and 3.

Within the limitations referred to below, the resisting power of all hard-faced plates is very much reduced when the armour-

piercing projectiles used in the attack are capped, the average figure of merit of Krupp cemented plates not being more than 2 against capped shot as.compared with about 2 • 5 against uncapped. So long ago as 1878 it was suggested by Lt.-Col. (then Captain) T. English, R.E., that armour-piercing projectiles would be assisted in attacking compound plates if caps of wrought iron could be fitted to their points. Experiments at Shoeburyness, however, did not show that any advantage was gained by this device, and nothing further was heard of the cap until 1894, when experiments carried out in Russia with so-called " magnetic " shot against plates of Harveyed steel showed that the perforating power of an armour-

piercing projectile was considerably augmented where hard-faced plates were concerned, if its point were protected by a cap of wrought iron or mild steel. The conditions of the Russian results (and of subsequent trials in various parts of the world which have confirmed them) differed considerably from the earlier English ones. The material of both projectiles and plates differed, as did also the velocities employed — the low velocities in the earlier trials probablyi contributing in large measure to the non-success of the cap. The cap, as now used, consists of a thimble of comparatively soft steel of from 3 to 5 % of the weight of the projectile, attached to the point of the latter either by solder or by being pressed hydraulically or otherwise into grooves or indentations in the head. Its function appears to be to support the point on impact, and so to enable it to get unbroken through the hard face layers of the plate. Once through the cemented portion with its point intact, a projectile which is strong enough to remain undeformed, will usually perforate the plate by a true boring action if its striking velocity be high enough. In the case of the uncapped projectile, on the other hand, the point is almost invariably crushed against the hard face and driven back as a wedge into the body of the projectile, which is thus set up so that, instead of boring, it acts as a punch and dislodges or tends to dislodge a coned plug or disk of metal, the greatest diameter of which may be as much as four times the calibre of the projectile. The dis- proportion between the maximum diameter of the disk and that of the projectile is particularly marked when the calibre of the latter is much in excess of the thickness of the plate. When plate and projectile are equally matched, e.g. 6″ versus 6”, the plug of metal dislodged may be roughly cylindrical in shape, and its diameter not greatly in excess of that of the projectile. In all cases the greatest width of the plug or disk is at the back of the plate.

A stout and rigid backing evidently assists a plate very much more against this class of attack than against the perforating attack of a capped shot. Fig. 7 shows the back of a 6-in. plate attacked in 1898, and affords an excellent illustration of the difference in action of capped and uncapped projectiles. In round 7 the star-shaped opening made by the point of a capped shot boring its way through is seen, while rounds 2, 3, 4 and 5 show disks of plate partially dislodged by uncapped projectiles. The perforating action of capped armour-piercing projectiles is even better shown in fig. 8, which shows a 250-mm. (9-8 in.) Krupp plate after attack by 150-mm. (5-9 in.) capped A.P. shot. In rounds 5 and 6 the projectiles, with striking velocities of 2302 and 2281 ft. per second, perforated. Round 7, with a striking velocity of 2244 ft. per second, just got its point through and rebounded, while round 8, with a striking velocity of 2232, lodged in the plate. In many cases a capped projectile punches out a plug, usually more or less cylindrical in shape and of about the same diameter as the

projectile, from a plate, and does not defeat it by a true boring action. In such cases it will probably be found that the projectile has been broken up, and that only the head, set up and in a more or less crushed condition, has got through the plate. This peculiarity of action can best be accounted for by attributing either abnormal excellence to the plate or to that portion of it concerned — for plates sometimes vary considerably and are not of uniform hardness throughout, — or comparative inferiority to the projectile. Whichever way it may be, what has happened appears to be that after the cap has given the point sufficient support to get it through the very hard

ARMOUR PLATES

Plate I.

Plate II.

ARMOUR PLATES

ARMOUR PLATES

surface layers, the point has been flattened in the region of extreme hardness and toughness combined, which exists immediately behind the deeply carburized surface. The action from this point becomes a punching one, and the extra strain tends to break up the projectile, so that the latter gets through wholly or partially, in a broken condition, driving a plug of plate in front of it. At low striking velocities, probably in the neighbourhood of 1700 ft. per second, the cap fails to act, and no advantage is given by it to the shot. This is probably because the velocity is sufficiently low to give the cap time to expand and so fail to grip the point as the latter is forced into it. The cap also fails as a rule to benefit the projectile when the angle of incidence is more than 30 to the normal.

The laws governing the resistance of armour to perforation have been the subject of investigation for many years, and a considerable number of formulae have been put resistance, forward by means of which the thickness of armour perforable by any given projectile at any given striking velocity may -be calculated. Although in some cases based on very different theoretical considerations, there is a general agreement among them as far as perforation proper is concerned, and Tresidder's formula for the perforation of wrought iron, $P = wv'/dA$, may be taken as typical. Here / represents the thickness perforable in inches, w the weight of the projectile in pounds, v its velocity in foot seconds, d its diameter in inches and a the constant given by $\log a = 8\text{-}8410$.

For the perforation of Harveyed or Krupp cemented armour by capped armour-piercing shot, this formula may be employed in conjunction with a suitable constant according to the nature of armour attacked. In the case of K. C. armour the formula becomes f = vrtflj^dk. A useful rough rule is tjd = 21/1900.

Hard armour, such as chilled cast iron, cannot be perforated but must be destroyed by fracture, and its destruction is appar- ently dependent solely upon the striking energy of the projectile And independent of its diameter.- The punching of hard-faced armour by uncapped projectiles is intermediate in character between perforation and cracking, but approaches the former more nearly than the latter. The formula most used in England in this case is Krupp's formula for K.C., viz. ^= W/rfA 1 , where t,w,v and d are the same as before, and log k l — 6-3532. This, if we assume the sectional density (w/d 3) of projectiles to be constant and equal to 0-46, reduces to the very handy rule of thumb tld = vJ22oo, which, within the limits of striking velocity obtainable under service conditions, is sufficiently accurate for practical purposes. For oblique attack up to an angle of 30 to the normal, the same formula may be employed, / sec0 being substituted for t, where d is the angle of incidence and t the normal thickness of the plate attacked. More exact results would be obtained, however, by the use of Tresidder's W.I. formula, given above, in conjunction with a suitable figure of merit, according to the nature and thickness of the plate. It should be remembered in this connexion that the figure of merit of a plate against a punching attack falls off very much when the thickness of the plate is considerably less than the calibre of the attacking projectile. For example, the F.M. of a 6-in. plate may be 2-6 against 6-in. uncapped A.P. projectiles, but only 2-2 against o- 2-in. projectiles of the same character. In the case of the perforating action of capped projectiles, on the other hand, the ratio of d and t does not appear to affect the F.M. to any great extent, though according to Tresidder, the latter is inclined to fall when d is considerably less than /, which is the exact opposite of what happens with punching.

Another method of measuring the quality of armour, which is largely employed upon the continent of Europe, is by the ratio, r, between the velocity requisite to perforate any given plate and that needed to pierce a plate of mild steel of the same thickness, according to the formula of Commandant Jacob de Marre, viz. D=Ae°7a°' 76 //> ' 5 where e= the thickness of the plate in centi- metres,

becomes v=A 1 t°'ld " !5 /w°' > , in which log A 1 = 3 0094; in this form it constitutes the basis of the ballistic tests for the accept ance of armour plates for the U.S. navy.

Common shell, which are not strong enough to remain unde- formed on impact, derive little benefit from the cap and usually defeat a plate by punching rather than by perforation. Their punching power may be taken roughly as about f that of an uncapped armour-piercing shot. Shells filled with high explosives, unless special arrangements are made to deaden the bursting charge and So obviate detonation upon impact, are only effective against the thinnest armour.

With regard to manufacture, a brief account of the Krupp process as applied in one of the great English armour plate works (omitting confidential details of temperature, &c.) will illustrate the great complexity of treatment tacture. which the modern armour plate has to undergo before its remarkable qualities of combined hardness and toughness can be developed. The composition of the steel probably differs slightly with the manufacturer, and also with the thickness of the armour, but it will usually contain from 3 to 4 % of nickel, from i-o to 2-0 % of chromium and about 0-25 to 0-35 % of carbon, together with from 0-3 to o- 7 % of manganese. After being cast, the ingot is first heated to a uniform degree of temperature throughout its mass and then generally forged under the hydraulic forging press. It is then reheated and passed through the rolls. After rolling, the plate is allowed to cool, and is then subjected to a thermal treatment preparatory to surfacing and cutting. Its surface is then freed from scale and planed. After planing, the plate is passed into the cementation furnace, where its face remains for some weeks in contact with specially prepared carbon, the temperature being gradually raised to that required for cementation and as gradually lowered after that is effected. After cementation the plate is heated to a certain temperature and is then plunged into an oil bath in order to toughen it. After withdrawal from the oil bath, the plate is cooled, reheated to a lower temperature, quenched again in water, reheated and passed to the bending press, where it is bent to shape while hot, proper allowance being made for the slight change of curve which takes place on the final chilling. After bending it is again heated and then allowed to get cold, when the final machining, drilling and cutting are carried out. The plate is now placed in a furnace and differentially heated so that the face is raised to a higher temperature than the back. After being thus heated for a certain period the plate is withdrawn, and both back and face are douched simultaneously with jets of cold water under pressure, the result being that the face is left glass-hard while the back is in the toughest condition possible for such hard steel.

The cast-steel armour made by Hadfield has already been alluded to. That made by Krupp (the only other maker at present of this class of armour) is of face-hardened nickel steel. A 5-o-in. plate of this material tried in 1902 had a figure of merit of more than 2-2 against uncapped 5-9-in. armour-piercing projectiles of 112 lb in weight. The main advantage of cast armour

is that it is well adapted to armoured structures of complicated design and of varying thickness, which it would be difficult or impossible to forge in one piece. It should also be cheaper than forged armour, and, should time be a consideration, could probably be turned out more quickly; on the other hand, it is improbable that heavy castings such as would be required could be as regular in quality and as free from flaws as is possible when forged material is used, and it is unlikely that the average resistance to attack of cast-steel armour will ever be equal to that of the best forged steel.

Of recent years there has been a considerable demand for thin steel plating proof against small-arm bullets at close ranges. This class of steel is used for field-gun shields and for Defence sap shields, to afford cover for men in field-works, against for armoured trains, motor-cars and ambulances, and amaU- also very largely for armouring shallow-draught river- arms. gunboats. Holtzer made chrome steel breastplates in 1890, 0-158 in. of which was proof against the o-43-im hard lead bullet 1 of the Gras rifle at 10 metres range, while 0-236 in. was proof

against the 032-in. 231-grain Lebel bullet at the same distance, the striking velocities being approximately 1490 and 2070 ft. per second respectively. The bullet-proof steel made by Messrs Cammell, Laird & Co. in Great Britain may be taken as typical of that produced by the best modern manufacturers. It is proof against the 215-grain Lee-Enfield bullet of 0-303 in. calibre striking directly, as under:

Range. Thickness ofPlate. Striking Velocity. 10 yards 0-187 inch 2050 f.s.

100 „ 0-167 „ 1865 „

560 „ 0-080 „ 1080 „

The weight of the o-o8-in. plating is only 3-2 lb per sq. ft. The material is stated to be readily adaptable to the ordinary operation of bending, machining, drilling, &c, and is thus very suitable for the purposes indicated above. (W. E. E.)

ARMS AND ARMOUR (Lat. arma, from the Aryan root ar, to join or fit; cf. Gr. apfibs, joint; the form armour, from Lat. armatura, should strictly be armure). Under this heading are included weapons of offence (arms)

and defensive equipment (armour). The history of the development of arms and armour begins with that of the human race; indeed, combined with domestic implements, the most primitive weapons which have been found constitute the most important, if not the only, tangible evidence on which the history of primitive man is based. It is largely from the materials and characteristics of the weapons and utensils found in caves, tombs and various strata of the earth's crust, coupled with geological considerations, that the ethnological and chronological classifications of prehistoric man have been deduced. For a detailed account of this classifica- tion and the evidence see Archaeology; Bronze Age; Flint Implements, &c, and articles on special weapons.

Offensive weapons may be classified roughly, according to their shape (i.e. the kind of blow or wound which they are intended to inflict), and the way in which they are used, as follows: — (1) Arms which are wielded by hand at close quarters. These are subdivided into (a) cleaving weapons, e.g. axes; (b) crushing, e.g. clubs, maces and all hammer- like arms; (c) thrusting, e.g. pointed swords and daggers;

(d) cutting, e.g. sabres (such weapons frequently combine both the cut and the thrust, e.g. swords with both edge and point) ;

(e) those weapons represented by the spear, lance, pike, &c, which deal a thrusting blow but are distinguished from .(c) by their greater length. (2) Purely missile weapons, e.g. darts, javelins and spears. Frequently these weapons are used also at close quarters as thrusting weapons; the typical example of these is the medium-length spear of not more than about 6 ft. in length. (3) Arms which discharge missiles, e.g. bows, catapults and fire-arms generally. (See Archery and section Fire-arms below.) The weapons in (2) and (3) are designed to avoid hand- to-hand fighting.

Weapons are also classified in a variety of other ways. Thus we have small-arms, i.e. all weapons in classes (1) and (2) with those in (3) which do not require carriages. Side-arms are those which, when not in use, are worn at the side, e.g. daggers, swords, bayonets. Armes blanches is a term used for offensive weapons of iron and steel which are used at close quarters.

Defensive armour consists of body armour, protections for the head and the limbs, and various types of shield.

1. Stone Age. — One of the chief problems which have per- plexed archaeologists is that of finding a criterion which will enable them to distinguish the most primitive products

s ory ‘ of human skill from similar objects whose form is due to the forces of nature. It is often impossible to say precisely whether a rough piece of flint is to be regarded as a weapon (except so far as it could be used as a missile) or merely as a fragment of rock. Passing over these doubtful cases, we come first to indubitable examples of weapons deliberately fashioned in stone for offensive purposes. The use of stone weapons appears to have been universally characteristic of the earliest races of mankind, as it is still distinctive of those savage races which are most nearly allied to primitive man. These weapons were naturally simple in form and structure. The earliest

Fig. i.-

-Leaf-shaped Flint Dagger.

examples (Palaeolithic) found in river-drift gravel in various parts of Europe are merely chipped flints, celts, &c. Later on we find polished implements (Neolithic) progressively more elaborate in design and workmanship, such as socketed stones with wooden handles and knives or daggers of flaked flint with handles. Besides flint the commonest materials are diorite, greenstone, serpentine and indurated clay-slate; there are also weapons of horn and bone (daggers and spear-heads). Spear-heads and arrow-points (leaf-shaped, lozenge-shaped, tanged and tri- angular) were chipped in flint with such skill as to be little inferior to their metal successors. They have accurately flaked barbs and tangs, and in some cases their edges are minutely chipped. The heads appear to have been fastened to the shafts by vegetable fibre and bitumen. Knifeˆdaggers of flint, though practically of one single type, exhibit much variety of form. They vary in size also, but seldom exceed 1 2 in. in length. They are sometimes obtuse-edged like a scraping-tool, sometimes delicately chipped to a straight edge, while the flakes are so regularly removed from the convex part of the blade as to give a wavy surface, and the corners of the handle are delicately crimped. The daggers attain their highest perfection in the short, leaf - shaped form— the precursor of the leaf shaped sword which is peculiarly characteristic o'f the Bronze Age, — and the curved knives found especially in Great Britain and Russia, and also in Egypt. The precise object Of the sharpening of both convex and con cave edges in the curved variety is not clear. There have also been found sling-stones, and, in Scotland and Ireland, balls of stone with their " surfaces divided into a number of more or less projecting circles with channels between them." These latter, Sir John Evans suggests, were attached to a thong which passed through the surface channels, and used like the bolas of South America. The weapon could thus deal a blow at close quarters, or could be thrown so as to entangle the limbs of an enemy. Of defensive, armour of stone there is none. The only approxi- mation is to be found in the small rectangular plates of slate, &c, perforated with holes at the corners, which are supposed to have been bound on to the arm to protect it from the recoil of the bow-string. Similar wristlets or bracers are in use among the Eskimos (of bone) and in India (of ivory). These plates measure generally about 4 in. by 15 in.

2. Bronze Age. — It is impossible to assign any date as the beginning, of the Bronze Age; indeed, archaeology has shown that the adoption of metal for weapons was very gradual. TJie stone weapon perseveres alongside the bronze, and there exist stone axes which, by their shape, suggest that they have been copied from metal axes. In the earliest interments in which the weapons deposited with the dead are of other materials than stone, a peculiar form of bronze dagger occurs. It consists of a

Fig. 2. — Leaf-shaped Bronze Sword.

well-finished, thin, knife-like blade, usually about 6 in. in length, broad at the hilt and tapering to the point, and attached to the handle by massive rivets of bronze. It has been found associated with stone celts; both of the roughly chipped and the highly polished kind, showing that these had not been entirely disused when bronze became available. A later type of bronze dagger is a broad, heavy, curved weapon, usually from 9 to 1 5 in. in length, with massive rivets for attachment to an equally massive handle. The leaf-shaped sword, however, is the characteristic weapon of the Bronze Age. It is found all over Europe, from Lapland to the Mediterranean. No warlike weapon of any period is more graceful in form or more beautifully finished. The finish seems to have been given in the mould without the aid of hammer or file, the edge being formed by suddenly reducing the thickness of the metal, so as to produce a narrow border of extreme thinness along

both sides of the blade from hilt to point. The handle-plate and blade were cast in one piece, and the handle itself was formed by- side plates of bone, horn or wood, riveted through the handle- plates. There was no guard, and the weapon, though short, was well balanced, but more fitted for stabbing and thrusting than for cutting with the edge. The Scandinavian variety is not so decidedly leaf-shaped, and is longer and heavier than the common British form; and instead of a handle-plate, it was furnished with a tang on which a round, flat-topped handle was fastened, like that of the modern Highland dirk, sometimes surmounted by a crescent-like ornamen-t of bronze. A narrow, rapier-shaped variety, tapering from hilt to point, was made without a handle- plate, and attached to the hilt by rivets like the bronze daggers already mentioned. This form is more common in the British Isles than in Scandinavia, and is most abundant in Ireland. The spear-heads of the Bronze Age present a considerable variety of form, though the leaf-shaped predominates, and barbed examples are extremely rare. Some British weapons of this form occasion- ally reach a length of 27 in. The larger varieties are often beautifully designed, having segmental openings on both sides of the central ridge of the blade, and elaborately ornamented with

Fig. 3. — Bronze Spear-Head, length 19 inches.

chevron patterns of chased or inlaid work both on the socket and blade. Arrow-points are much rarer in bronze than in flint. In all probability the

flint arrow-point (which was equally effective and much more easily replaced when lost) continued to be used throughout the Bronze Age. Shields of bronze, circular, with hammered-up bosses, concentric ridges and rows of studs, were held in the hand by a central handle underneath the boss. The transition period between the Bronze and Iron Ages in central Europe is well defined by the 1 occurrence of iron swords, which are simple copies of the leaf-shaped weapon, sometimes with flat handle-plate of bronze. These have been found associated with articles assigned to the 3rd or 4th century B.C.

An important distinction between the characteristic bronze swords peculiar to southern peoples and the swords both of iron and of bronze found together in the Hallstatt cemeteries weapons. (m tne Salzkarnmergut, Austria, ancient Noricum) is that whereas the former invariably have short handles (21 to 25 in.), the latter are provided with handles from 3 to 3 \ in. long, terminating in a round or oval pommel; the grip of one of the bronze swords even reaches a length of 4 in. The hilts are decorated with ivory, amber, wood, bronze, horn, and the decoration of blade and scabbard is often elaborate. The length of these swords is sometimes as much as 30 to 33 in. Again at La Tene on Lake Neuchatel iron swords have been found to the number of one hundred, with handles of 4 to 7J in. long and a total length varying from 30 to 38 in. Similar remains have been found in France at Bibracte and Alesia, and even in Ireland (cf. Munro, The Luke-dwellings of Europe, pp. 282, 383).

The occurrence at Hallstatt of bronze swords together with iron, having the characteristic long handle, has led to the hypo- thesis that the graves are those of an immigrant (probably Celtic) people of northern extraction which had conquered and overlaid a smaller-framed Bronze Age people, and had introduced the use of iron while continuing to use the bronze of their predecessors with the necessary modifications. This theory derived from tangible remains is corroborated by literary evidence. Thus Polybius (ii. 33, iii. 114) describes the Celtic peoples as fighting with a long pointless iron sword, which easily bent and was in any case too large to be used easily in a melee.

The graves at Hallstatt yielded in addition to these important swords a much larger number of spears. Of these two only were of bronze, the head of the larger being 73 in. long. The much more numerous iron heads range up to as much as 2 ft. in length, and are all fastened to the shaft by rivets. All the arrow-heads

found are of bronze, while of the axes the great majority are of iron ; a few have iron edges fitted in a bed of bronze.

These examples are sufficient to show that the transition from bronze to iron was very slow. The fact that they were found in a district which is known to have been directly in the line of march pursued by invaders from the north tends to confirm the theory that the introduction of iron was the work of such invaders.

See Sir John Evans, A ncient Stone Implements (2nd. ed., 1897), Bronze Implements; W. Ridgeway, Early Age of Greece; and works quoted under Archaeology.

3. Early Greek Weapons. — The character of the weapons used by the early peoples of the Aegean in the periods known as Minoan, Mycenaean and Homeric is a problem which has given rise of recent years to much discussion. The Mycenaean controversy is an important part of the Homeric Homeric. question as a whole, and the various theories of the weapons used in the Trojan War hinge en wider theories as to the date and authorship of the Homeric poems. One widely accepted hypothesis, based on the important monograph by Dr Wolfgang Reichel, tjber homerische Waff en. Archdologische Unlersuchungen (Vienna, 1894), is that the Homeric heroes, like those who created the civilization known as Mycenaean, had no defensive armour except the Mycenaean shield, and used weapons of bronze. This view is derived to a great extent from the Homeric poems them- selves, in which the metal most frequently mentioned is xaXxos (bronze), and involves the assumption that all passages which describe the use of corslets, breastplates, small shields and greaves are later interpolations. It is maintained on the other hand (e.g. by Prof. W. Ridgeway, Early Age of Greece, i. chap. 3), that the Homeric Achaeans (whom he regards as the descendants of the central European peoples, the makers of the Hallstatt iron swords) were far advanced into the Iron Age, and that the use of bronze weapons is merely another instance of the fact that the introduction of a new element does not necessarily banish the older. This theory would separate the Homeric from the Mycenaean altogether, and is part of a much more comprehensive ethnological hypothesis. According to another hypothesis, the Homeric poems are true descriptions of a single age, or, in other words, the weapons of the Homeric age were far more diverse and elaborate than is supposed by Reichel.

Very few traces of iron have been found in the Mycenaean settlements, nor have any examples of body armour been found except the ceremonial gold breastplates at Mycenae. The Mycenaean soldiers carried apparently a bronze spear, a bronze sword and a bow and arrows. The arrow-heads are first of obsidian and later of bronze. It would appear that only the chief warriors used spear and shield, while the majority fought with bows. The swords found at Mycenae are two-edged, of rigid bronze, and as long as 3 ft. or even more; from representations of battles it would peem that they

were perhaps used for thrusting mainly. They are highly ornamented and some have hilts of wood, bone or ivory, or even gold mounting. Later swords became shorter and of a type like that of early iron swords found in Greece. Moreover in a few cases there have been found in pre- Mycenaean (late Minoan III.) tombs a few examples of short iron swords together with bronze remains. All Mycenaean spears are of bronze and, apparently, their shafts, unlike the Homeric, had no butt-piece. In the absence of any metal helmets in the tombs we may perhaps assume that the Mycenaean helmet was a leather cap, possibly strengthened with tusks, such as appears in Homer {Iliad, x.) also. The Mycenaean shield (generally, perhaps, made of leather) has given rise to much controversy, which hinges largely on the interpretation of the evidence provided by the representation on the Warrior Vase and the Painted Stele from Mycenae and pottery found at Tiryns. Professor Ridgeway regards these as describing post-Mycenaean conditions, and maintains that the true Mycenaean shield was always long (from neck to feet), and that it was either in the form of a figure-of-eight targe, or rectangular and sometimes incurved like the section of a cylinder; whereas the Homeric shield was round (e.g. nvMrepos, ewcu/cXos, &c). Dr Reichel's followers believe that the Homeric shield was long ("like a tower") and

incurved in the centre like the Mycenaean, that Homer knew nothing of the small round shield, and that the epithets implying roundness used in the poems are to be explained as meaning " well-balanced " or as late interpolations. On the whole we must conclude that the Mycenaean age is by no means a single homogeneous whole (see Aegean Civilization), and that the weapons are not exclusively of bronze, nor of any single type.

The Homeric warrior in full armour, according to the Homeric poems, wore: (i) shield (ao-irk, ctclkos), (2) greaves (KVTiffides), (3) band (f £,ua), (4) belt (fcov), (6) helmet (icopvs), (7) breastplate (dup-qg), (8) sword (£i$os). The \aiarfiov was a protection worn by the archers in place of a shield. According to the usual view, the Homeric shield was, as we have seen, bent in about half way up each side (in the form of a figure-of-eight) to give freedom to the arms, and large enough to protect the whole body. The two curves were held rigid by two Wooden (probably) staves inside. It was composed of layers of ox-hide overlaid with bronze, forming a boss in the centre, and sometimes had studs upon it. Reichel's view is that it was the weight of these huge shields which led to the use of the chariot as a means of going rapidly from one part of the field to another (though Professor Ridgeway and others contest this, and Helbig mentions more than

one case of long journeys on foot under shield), and further that the round shield is entirely unknown to Homer. This large shield was clearly the natural protection against showers of missiles, rather than against enemies fighting with the sword.

The greaves were, no doubt, generally of hide, protected the leg all round, and were fastened at the knee with cords. On the other hand Mycenaean bronze greaves have been found at Enkomi (Cyprus) and at Glassinatz (Glasinac), and therefore it is not necessary, following Reichel, to cut out Homer's references to the " bronze-greaved " Achaeans (Iliad, vii. 41), a phrase which has been taken as evidence for regarding the passage as spurious. The tin greaves of Achilles are obviously exceptional.

The thorex again is the subject of controversy. Reichel, arguing that the great shield rendered any breastplate unneces- sary, regarded the word as a general term for body clothing, but Ridgeway strongly maintains the older theory that it was a bronze breastplate, and Andrew Lang points out that, on Reichel's theory, a word which originally meant the " breast " was transferred to mean " loin-cloth " (which, to judge from the artistic representations, was all that the Mycenaean warrior wore), and subsequently in historic times returned to its natural use for the breastplate — a most unlikely evolution. The passages in Homer which describe it as a breastplate are regarded by Reichel's school as later interpolations. Gilbert Murray thinks that the Homeric poems must be regarded as belonging to differ- ent periods of development, and therefore attributes the more elaborate armour to the " surface " (late Ionian) stratum. The zoma was probably a loin-cloth, and the mitre a metal band about a foot wide in front and narrow behind to protect the lower part of the body. As a matter of fact, however, the big shield does not exclude the use of body armour, and it is quite likely that the Homeric warrior wore a bronze corslet, i.e. a somewhat improved form of the \ivodwpr)%, or stiffened shirt. On the other hand, it is probable, as we gather from the poems, that this corslet was not strong enough to do more than stop a spent spear. The chiton was worn over the mitre, and reached the knees; it was held to the body by the zoster, a metal-plated belt. Helmets were both of metal on leather, and of leather throughout; the crests were of horsehair (not of metal like the later Greek helmets) and there were no cheek-pieces.

The sword has already been mentioned. Ridgeway, in spite of the almost invariable mention of bronze as the material of the Homeric weapons, believes that it was generally of iron, but, while the presence of iron in the Homeric age is admitted in the case of implements, it is generally held that weapons were all of bronze. Except for one arrow-head {Iliad, iv. 123), and the mace of Areithoiis, mentioned as a unique example by Nestor {Iliad, vii. 141), no reference to an iron weapon proper occurs in the

Homeric poems. Put the sword was used only when the favourite spear or javelin had failed to decide the contest.

It must be admitted that the problem of pre-Homeric armour and Homeric armour must always be largely a matter of inference, based on a comparative study of the evidence literary and archaeo- logical. Unless we are prepared to adopt the theory that the Homeric poems consist of a mosaic of interpolation informed by an archaizing editor, we must assume that they describe a single period of transition intermediate between the Mycenaean prime and the dawn of history proper. In this case we shall believe that the Homeric warrior has so far adapted to changing conditions the simple appliances of the Mycenaean that he has evolved a feeble corslet with minor pieces of body armour, while retaining the big double-bellied shield as a protection against the arrows which are still the chief weapon of the rank and file and are even used on occasion by the chiefs. If we further believe that the iron at his disposal was similar to that used by the Celts of Polybius, it is natural to believe also that he preferred the harder bronze for his weapons, though iron was common for domestic and other implements.

On early Greek arms in general see, besides Reichel and Ridgeway op. cit.: A. Lang, Homer and his Age (London, 1906; and criticisms in Classical Review, February 1907); G. G. A. Murray, The Rise of the Greek Epic (Oxford, 1907), chap, vi,; R. M. Burrows, Dis- coveries in Crete (2nd ed., London, 1907) ; Leaf and Bayfield, Iliad, i.-xii. Appendix A (follows Reichel) ; W. Helbig, Homerische Epos (1884 and 1899), and La Question mycenienne (1896); C. Robert, Studien zur Ilias (Berlin, 1901); Chr. Tsountas and J. I. Manatt, The Mycenaean Age (1897); V. Berard, Les Pheniciens et I'Odyssee (Paris, 1902); Cauer, Grundfrager d. Homerkritik (Leipzig, 1895); much valuable discussion will be found in articles in Journ. Hell, Stud., Classical Rev. and Journ. of Anthropol. Instil. ; see also editions of Iliad, and Odyssey (espec. D. B. Monro), and works quoted under Aegean Civilization ; Homer ; Mycenae.

4. Greek, Historical. — The equipment does not differ generic- ally from that described in the Homeric poems, except when we come to the reforms of the Macedonians. The hoplites, who formed the main army, wore helmet, body armour, greaves and shield, and fought with pike and sword. The helmets were (1) the Corinthian, which covered the face to the chin, with slits for the eyes, and often had no plume or crest; (2) the Athenian, which did not cover the face (though sometimes it had cheek- plates which could be turned up if necessary) , had crests, some- times triple, with plumes of feathers, horsehair or leather; (3) a steel cap (ttTXos) without crest, plumes or cheek-plates. The last seems to have been most common in the Spartan army. The body armour consisted of breast and back plates fastened together by thongs or straps and buckles; sometimes poverty

compelled a man to be content with a leather jerkin (o-iro\a.s) partly strengthened by metal plates, or even a quilted linen or stuffed shirt. Greaves were of pliant bronze fastened at the back above the ankle and below the knee. Shields were of the small round or oval type, adapted to the new conditions in which the bow and arrow had given place to hand-to-hand fighting. They were held by means of two handles (oxava) , the left hand being thrust through the first and grasping the second. In the 5th and 4th centuries the shield bore a device or initial representing the state and also the individual's own crest. The hoplite's pike, about 8 ft. long, unlike the Homeric weapon, was hardly ever thrown. In the Macedonian phalanx a pike (aapiaaa), certainly 18 ft., and perhaps later in the 3rd and 2nd centuries even 24 ft. long, was introduced. The sword was straight, sharp-pointed, short, sometimes less than 20 in., and rarely more than 2 ft. long. It was double-edged and used for both cut and thrust. A less common type was the p.kx

The cavalry were heavy-armed like the hoplites except that they carried a smaller shield, or, more usually, none at all. They were armed with a lance which they wielded freely (i.e. not " in rest ") and occasionally threw.- The Macedonian cavalry had a o-kpioaa. The light-armed (yvp,vfJTes, ˆlXo'l) were (1) Lkovtio-tox, armed with a javelin (3 to 5 ft. long) and a small shield; (2) to|6toi, archers; and (3) o-£v8ovrJTai, slingers, whose missiles

*were balls of lead, stones and hardened clay pellets. Between the heavy and the light armed were the peltasts. The pelta, from which they took the name, was a light shield or target, made of skin or leather on a wooden or wickerwork frame. The Athenian Iphicrates armed them with linen corslet and a larger spear and sword than those of the hoplites; he also invented a new footgear (called after him iphicratides) to replace the older greaves. **

5. Roman. — The equipment of the Roman soldier, like the organization of the army (see Roman Army), passed through a great number of changes, and it is quite impossible to summarize it as a single subject. In the period of the kings the legion was the old Greek phalanx with Greek armour; the front ranks wore the Greek panoply and fought with long spears and the circular Argolic shield. The early Roman sword, like that of the Greeks, Egyptians and Etruscans, was of bronze. We have no direct statement as to its form, but in all probability it was of the ordinary leaf-shape. We gather from the monuments that, in the 1st century B.C., the Roman sword was short, worn on the right side (except by officers, who carried no shield), suspended from a shoulder-belt (balteus) or a waist-belt (cingulum), and

reach- ing from the hollow of the back to the middle of the thigh, thus representing a length of from 22 in. to 2 ft. The blade was straight, double-edged, obtusely-pointed. On the Trajan column (a.d. 114) it is considerably longer, and under the Flavian emperors the long, single-edged spatha appears fre- quently along with the short sword.

The second period ending with the Punic wars witnessed a change. The hastati and the principes are both heavily armed, but the round shield has given way to the oblong {scutum), except for one-third of the hastati who bore only the spear and the light javelin (gaesa). The third period — that described by Polybius — is characterized by greater complexity of armour, due no doubt in part to the experience gained in conflicts with a wider range of peoples, and in part to the assimilation of the methods peculiar to the new Italian allies. Thus we find the skirmishers (velites) armed with a light javelin 3 ft. long and $ in. thick, with an iron point 9 in. long; this point was so fragile that it was rendered useless by the first cast. For defence they wore a hide-covered headpiece and a round buckler 3 ft. in diameter. The heavy-armed carried a scutum formed of two boards glued together, covered with canvas and skin, and incurved into the shape of a half-cylinder; its upper and lower edges were strengthened with iron rims and its centre with a boss (umbo). A greave was worn on the right leg, and the helmet was of bronze with a crest of three feathers. The wealthier soldiers wore the full cuirass of chain armour (lorica), the poorer a brass plate 9 in. square. For offence they carried a sword and two javelins. The former was the Spanish weapon, straight, double-edged and pointed, for both thrust and cut, in place of the old Greek sword.

The characteristic weapon, however, was the pilum (Gr. boobs). The form of this weapon and the mode of using it have been minutely described by Polybius (vi. 23), but his description has been much misunderstood in consequence of the rarity of repre- sentations or remains of the pilum. It is shown on a monument of St Remy, in Provence, assigned to the age of the first emperors, and in a bas-relief at Mainz, on the grave-stone of Quintus Petilius Secundus, a soldier of the 15th legion. A specimen of the actual weapon is in the museum at Wiesbaden. It is a javelin with a stout iron head (7 in.), carried on an iron rod, about 20 in. in length, which terminates in a tang for insertion in the wooden shaft. As represented on the monuments, the iron part of the weapon is about one-third of its entire length (6$ ft.). It was used primarily as a missile. When the point pierced the shield the weight of the stave pulled the shield downwards and rendered it useless. At close quarters it answered all the purposes, offensive and defensive, of the modern bayonet when " fixed." Vegetius, in his Rei militaris instituta, describes it in a modified form as used in the armies of the lower empire, and in a still more modified form it reappears as the " argon " of the Franks. This equipment was characteristic of hastati,

principes and triarii

(save that the latter used the hasta instead of the pilum) . W» thus see how great is the change from the time when the hastati were the light-armed (from hasta) of the Greek phalanx.*

The cavalry, which had originally been protected only by a light ox-hide shield and the most fragile spears, adopted, about Polybius 's time, the full Greek equipment of buckler, strong spear and breastplate.

In thelastperiod of the republic the pilum became the universal weapon of the heavy-armed, while the auxiliaries (all foreigners, the velites having disappeared) used the hasta and the long single- edged sword (spatha). Under the empire the heavy-armed, according to Josephus, had helmet, cuirass, a long sword worn on the left side, and a dagger on the right, pilum and scutum. The special detachment detailed to attend the commander had a round shield (clipeus) and a long spear. The cavalry wore armour like that of the infantry, with a broadsword, a buckler slung from the horse's side, a long pole for thrusting, and several javelins, almost as large as spears, in a sheath or quiver. Arrian, writing of a period some fifty years later, gives further particulars from which we gather that of the cavalry some were bowmen, some polemen, 'while others wielded lances and axes.

For the arms and armour of other peoples of antiquity see e.g. Persia: History, Ancient, section v. " The Persian Empire of the Achaemenids " ; Britain, Anglo-Saxon, section v. "Warfare"; Etruria; Egypt, &c. (J. M. M.)

6. English from the Norman Conquest. — It is unnecessary here to trace in detail the history of European armour in the middle ages and after, but its use and fashion in England may illustrate the broad lines of the gradual perfection and the hurried abandon- ment of the ancient war-harness. Each country gave its armour something of the national character, the Spanish harness being touched with the Moorish taste, the Italian with the classical note borrowed from the monuments of old time, and the German with the Teutonic feeling for the grotesque.

To understand the development of English arms and armour it is well for us to consider carefully the fashion of these things at the time of that landmark of history, the Norman mfr- Conquest. Poets, chroniclers and law-makers give century us material for their description, and in the great Bayeux embroidery of Bayeux, with its more than six hundred tapestry. lively figures, we have pictured all the circumstances of war. We find that weapons and war gear have advanced little or nothing beyond the age which saw the Dacian warrior armed from crown to foot. A knight is

reckoned fully armed if he have helmet, hawberk and shield; his weapons are sword and lance, although he sometimes carries axe or mace and, more rarely, a bo'w. The coat of fence, which the Norman called hawberk and the English byrnie, hangs from neck to knee, the sleeves loose and covering the elbow only, the skirt slit before and behind for ease in the saddle. The Bayeux artists (see fig. 4) commonly show these skirts as though they were short breeches, the hawberk taking the fashion at first sight of a man's swimming dress, but other authorities set us right, and to- wards the end of the tapestry we see men stripping hawberks from the slain by pulling them over the head. Back and front are so much alike that he who armed Duke William for the fight slipped on the armour hind side before, an omen that he should change his state of a duke for that of a king. The hawberk might be mail of woven rings, of rings sewn upon leather or cotton, of overlapping scales of leather, horn or iron, of that jazerant work which was formed of little plates sewn to canvas or linen, or of thick cotton and old linen padded and quilted in lozenges, square? qx lines, There are indications that the

Fig. 4.-

-From the Bayeux Tapestry.

hawberk was sometimes reinforced at the breast probably by a small oblong plate fastened underneath. Its weight is shown in the scene where William's men carry arms to the ships, each hawberk being borne between two men upon a pole thrust through the sleeves.

The helmet is a brimless and pointed cap, either all of metal or of leather or even wood framed and strengthened with metal. Its characteristic piece is the guard which protects the nose and brow from swinging cuts, so disguising the knight that William must needs take off his helmet to show his men that he had not fallen. Such a nasal appears in a 10th-century illumination; at the time of the Conquest it was all but universal. It grows rare and all but disappears in the 13th century, although examples are found to the end of the middle ages. The helmet is laced under the chin, and under it the knight often wore a hood of mail or quilting which covered the top of the head, the ears and neck, but left the chin free — in two or three cases he has this hood without the helmet. A close coif was probably worn beneath it when it was of ringed mail, to spare the fretting of the metal on the head.

The knights' legs are shown in most cases as unprotected save by stout hose

or leg-bands: only in two or three instances does the tapestry picture a warrior with armed legs, and it is perhaps significant of the rarity of this defence that the duke is so armed. The feet are covered only by the leather boot, the heels having prick spurs.

Broad-bladed swords with cross-hilts of straight or drooping quills are fastened with a strap and buckle girdle to the left side. They have a short grip, and the blade would seem to be from 25 to 3 ft. in length. The chieftain unarmed in his house is often seen with unbuckled and sheathed sword sceptre-wise in his hands, carrying it as an Indian raja will nurse his sheathed tulwar. The ash spears brandished or couched by the knights as they charge seem from 7 to 8 or 9 ft. in length. In a few cases a three-forked pennon flutters at the end. The axe, a weapon which the Normans, in spite of their Norse ancestry, do not carry in the battle, is of the type called the Danish axe, long- shafted, the large blade boldly curved out. Maces, such as that with which the bishop of Bayeux rallies his young men, seem knotted clubs of simple form. Short and strong bows are drawn to the breast by the Norman archers.

Of the shields in the fight, four or five borne by the English are of the old English form — large, round bucklers of linden-wood, bossed and ribbed with iron. For the rest the horsemen bear the Norman shield, kite-shaped, with tapering foot, and long enough to carry a dead warrior from the field. On the inner side are straps for the hand to grip and a long strap allowed the knight to hang the shield from his neck. Let us note that although wyvern-like monsters, crosses, roundels and other devices appear on these shields, none of them has any indication of true armory, whose origins must be placed in the next century.

The 1 2 th century, although an age of riding and warring, affects but little the fashion of armour. The picture of a king on his seal may well stand for the full-armed knight of his age, but Henry Beauclerc, Stephen and Henry II. are shown in harness not much unlike that of the Bayeux needlework. But the sleeve of the hawberk goes to the wrist, and the kite shield grows less, Stephen's shield being 30 in. long at the most. On Stephen's second seal the mail hood is drawn over the point of the chin, and Henry II. 's seals show the chin covered to the lips. At least one seal of this king has the legs and feet armed with hose of ringed mail, probably secured by lacing at the back of the leg as a modern boot is laced. The first seal of Richard Lionheart marks an important movement. His hawberk, hood and hose clothe him, like his father, from crown to toe, and to this equipment he adds gloves of mail. Under the hawberk flows out to the heels the skirt of a long gown slit in front. But helm and shield are the most remarkable points. The shield has become flatter at the top, and at last the shield of an English king bears those armorial devices whose beginnings are seen elsewhere a

generation before. The earlier seal has the shield with a rampant lion ramping to the sinister side and closely

12th ceatery.

resembling that on the shield of Philip of Alsace, long believed to be the earliest example of true armory. But the shield in the second seal bears the three leopards which have been ever since the arms of the kings of England, and from this time to the end of the middle ages armorial devices become the common decora- tions of the knight's shield, coat, saddle and horse-trapper. The helmet of the first seal is a high thimble-topped cap, without a nasal guard, but the second has the king's head covered with the great helm, barrel-shaped and reinforced in front with a flat ventaile pierced in slits for the sight. This helm is crested with a semicircular ridge from which spring two wings, or rows of feathers fan-wise. On its side the ridge bears a single leopard, the forerunner of the coming crests.

For 13th-century arms, although but poor scraps remain of original material, we have authority in plenty — pictures, seals and carving, and, above all, the effigies in stone or .„. brass which give us each visible link, strap and orna- century. ment. All these have for a commentary chronicles, poems and account books, so that the history of armour may be followed in detail.

The long, sleeveless surcoat seen over King John's mail on his broad seal goes through the century and is often embroidered with arms. The shield becomes flat-topped the better to receive armorial charges. The great helm is common, although many knights on the day of battle like better the freedom of the mail hood with a steel cap worn over or under its crown, keeping for the tourney-yard the great helm which towards the century-end begins to carry its towering crest. Great variety is seen in the forms of the flat or round-topped helm, some being in one piece, pierced for sight and air, others having hinged or movable ventailes. At the end of the century a sugar-loaf type is the established form. The knight's hawberk is worn over a gambeson of linen, quilted linen or cotton, which lesser men wear with a steel cap for all defence. Breast and back plates also are some- times borne under the hawberk, and the first plates in sight at last appear in those knee-cops which protect the joining of the upper and lower hose, and in a few examples of bainbergs or greaves of metal or leather. At the end of Henry III.'s reign we have the admirable illustrations of a manuscript of Matthew Paris's Lives of the Of as, with many pictures of knights. (See fig 5.) Here we see knights with knee-cop and greave and a

From The Ancestor, by permission of A. Constable & Co. Ltd. Fig. 5.— Knights' Armour, c. 1250.

plenty of curious headpieces, the plain mail hood and mail hoods with a plate ventaile to cover the face, barrel-helms and round- topped helms and even round- topped helmets with the Norman nose-guard.

In the last half of the 13th century appears the curious defence known as alettes. This name is given to a pair of leather plates generally oblong in form and tagged to the back of the shoulder. As a rule they are borne to display the wearer's arms, but being sometimes plain they may have had some slight defensive value, covering a weak spot at the armpit and turning a sweeping sword-cut at the neck. They . disappear in the earlier years of Edward III.

Surcoat, shield and trapper have the arms of their owner. The rowel-spur makes a rare appearance. Weapons change little.

Nth lentury,

although the sword is often longer and heavier. Richard I. had favoured the cross-bow, in spite of papal denunciations of that weapon hateful to God, and its use is common through all the 13th century, after which it makes way for the national weapon ef the long-bow.

In the 14th century, the high-day of chivalry, the age of Crecy and Poitiers, of the Black Prince and Chandos, the age which saw enrolled the noble company of the Garter, the art of the armourer and weapon-smith strides forward. At its beginning we see many knights still clad in chain mail with no visible plate. At its end the knight is often locked in plates from head to foot, no chainwork showing save the camail edge under the helm and the fringe of the mail skirt or hawberk.

Before the first quarter of the 14th century is past many of these plates are in common use. Sir John de Creke's brass, about I3 2 5~i33°, is a fair example (fig. 6). His helmet is a basinet, pointed at the top, probably worn over a com- plete hood of mail flowing to the mid-breast. This hood was soon to lose its crown, the later basinets having the camail, a defence of mail covering neck, cheeks and chin and secured to the basinet with eyelet holes and loops through which a lace was passed. A rerebrace of plate defends the outer side of the upper arm, plain elbow-cops the elbow, and round bosses in the form of leopard heads guard the shoulder and the crook of the elbow. The fore-arm is covered with the plates of a vambrace which appears from under the hawberk sleeve. Large and decorated knee-cops cover the knees, ridged greaves the shins, and the upper part of the

foot from pointed toe to ankle is fenced with those articulated and overlapping plates the per- fection of which in the next century enabled the full-harnessed knight to move his body as freely as might an unarmed man. Under the plates the mail hose show themselves and the heels have rowelled spurs. He has a haw- berk of mail whose front skirt ends in a point between the knees, the loose sleeves between wrist and elbow. Under this is a haketon of some soft material whose folds fall to a line above the height of the knee. Over the hawberk is a garment, perhaps of leather with a dagged skirt- edge, and over this again is a sleeveless gambeson or pour- point of leather or quilted work, studded and enriched. Over all is the sleeveless surcoat, the skirt before cut squarely off at the height of the fork of the leg, the skirt behind falling to below the knee. The loose folds of this surcoat are gathered at the waist by a narrow belt, the sword hanging from a broader belt carried across the hip. Before 1350 the long surcoat of the 13th century was still further shortened, the tails being cut off squarely with the front. The fate of Sir John Chandos, who in 1369 stumbled on a slippery road, his long coat " armed with his arms " becoming tangled with his legs, points to the fact that an old soldier might cling to an old fashion.

The desire for a better defence than a steel cap and camail and a less cumbrous one than the great helm, in which the knight rode half stifled and half blind, brought in as a fighting headpiece the basinet with a movable viser. This is found throughout this century, disappearing in the next when the salet and its varieties displaced it. But there were many knights who still fought with the great helm covering basinet and camail, a fact which speaks eloquently of the mighty blows given in this warlike age. The many monumental brasses of the last half of the 14th century show us for the most part knights in basinet and camail with the face exposed, but their heads are commonly pillowed on the great helm and in any case the viser would hinder the artist's desire to show the knight's features. The fully-armed man of the latter half of the 14th century

Fig. 6. — Brassof Sir John de Creke.

From Waller's Monu- mental Brasses.

Fig. 7. — Brass of Sir John de Foxley.

From Waller's Monumental Brasses.

seems to have worn a rounded breastplate and a back-plate over his chain hawberk. Chaucer's Sir Thopas must always be cited for the defences of this age, the hero wearing the quilted haketon next his shirt, and over that the habergeon, a lesser hawberk of chain mail. His last defence is a fine hawberk " full strong of plate " showing that " hawberk " some- times

served as a word for the body plates. Over all this is the " cote-armure " or surcoat. Many passages from the chroni- clers show that the three coats of fence one over the other were in common use in the field, and Froissart tells a tale of a knight struck by a dart in such wise that the head pierced through his plates, his coat of mail and his haketon stuffed with twisted silk. The surcoat in the age of Edward III. became a scanty garment sitting tightly to the body, laced up the back or sides, the close skirts ending at the fork of the leg with a dagged or slittered edge. The waistbelt is rarely in sight, but the broad belt across the hips, on which the dagger comes to hang as a balance to the sword, grows richer and heavier, the best work of the goldsmith or silversmith being spent upon it. Arms and legs and feet become cased in plate of

steel or studded leather, and before the mid-century the shoulder-plates, like the steel shoes, are of overlapping pieces and the elbow also moves easily under the same defence. (See fig. 7.)

Such harness, ever growing more beautiful in its rich details, serves our champions until the beginning of the 15th century, when the fashion begins to turn. The scanty surcoat tends to disappear. It may be that during the bitter feuds and fierce slaughters of the Wars of the Roses men were unwilling to display on their breasts the bearings by which their mortal foe might know them afar. The horseman's shield went with the surcoat, its disuse hastened by the perfection of armour, and the banners of leaders remained as the only armorial signs commonly seen in war. But at jousts and tourneys, where personal distinction was eagerly sought, the loose tabard, which, after the middle of the century, bore the arms of the wearer on back, front and both sleeves, was still to be seen, with the crest of parchment or leather towering above >■ helm whose mantle, from the ribbon-like strip of the early 13th century, had grown into a fluttering cloak with wildly slittered edge streaming out behind the charging knight.

When a score of years of this 15th century had run we find the knight closed in with plates, no edge of chain mail remaining in sight. The surcoat being gone we see him armed in breast and back plate, his loins covered by a skirt of " tonlets," as the defence of overlapping hori- zontal bands comes to be named (fig. 8). The chain camail has gone out of fashion, the basinet continuing itself with a chin and cheek plate which joins a gorget of plate covering the collar-bone, a movable viser shutting in the whole head with steel. The gussets of chain mail sewn into the leathern or fustian doublet worn below the body armour are unseen even at the gap at the hollow of the arm where the plates must be allowed to move freely, for a little plate, round, oval or oblong, is tagged to each side to fence the weak point. These plates often differ in size and shape one from the other, the sword-arm side carrying the smaller one.

15th century.

Fig. 8.— Brass of Sir John Lisle at Thruxton.

Soon after this the six or eight " tonlets " grow fewer, being continued on the lower edge by the so-called tuilles, small plates strapped to the tonlets and swinging with the movement of the legs. A fine suit of armour is shown in the monument of Count Otto IV. of Henneberg (fig. 9). Knightly armour takes perhaps

Fig. 9. — Gothic Style of Armour. Monument of Count Otto IV. of Henneberg.

its last expression of perfection in such a noble harness as that worn by Richard Beauchamp, earl of Warwick, whose armed effigy was wrought between 1451 and 1454 (fig. 10). In this we see the characteristic feature of the great elbow-cops, whose channelled and fluted edges overlapping vambrace and rerebrace become monstrous fan-like shapes in the brass of Richard Quartremayns, graven about 1460. At this time the harness of the left shoulder is often notably reinforced, as compared with that of the sword-arm shoulder. Towards the latter part of the century chain mail reappears as a skirt or breech of mail, showing itself under the diminished tonlets, and, when helm and gorget are removed, as a high-standing collar. The articulation by overlapping plates extends even to the breastplate, whose front is thus in two or more pieces. Very long-necked rowel-spurs are often found, and the toes of the sabbatons or steel shoes are sharply pointed. The characteristic helmet of the latter half of the century is the salet or salade, a large steel cap, whose edge is carried out from the brows and still more boldly at the back of the neck.

Knights abandon the great helm in war, but it is perfected for use in the tilt-yard, taking for that purpose an enormous size, to enable two good inches of stuffing to come between head or face and the steel plate. Such a helm sits well down on the shoulders, to which it is locked before and behind by strong buckles or rivets. The note of the 15th century in armour is that of fantastically elaborate forms boldly outlined and a splendour of colour which gained much from the custom of wearing over the full harness short cloaks or rich coats turned up with furs, or from another fashion of covering the body plates or brigandines with rich velvets studded with gold. The details of the harness take a thousand curious shapes, and even amongst the simpler jacks and steel caps of the archers the same glorious

variety is seen.

If the note of the 15th century be variety of form, that of the 16th century, the last important chapter in the history of armour, is surface decoration, • the harness of great folk atoning in some measure for loss of the beautiful medieval sense of line by elabor- ate enrichment. Plain engraving, niello, russet work, golden inlay and beaten ornament are common methods of enrichment. The great plume of ostrich feathers flows from the helmet crown of leaders in war. As in the reign of Edward III., costume's fashion affects From stofonfojionummha the forms of armour, the broad toe of the

Henry VIII. shoe being imitated in steel, as the wide fluted skirts of the so-called Maximilian armour imitate the German fashion in civil dress which the Imperial host popularized through northern Europe (fig. 11). These skirts have been called " lamboys " by modern writers on military antiquities, but the

16th century.

Fig. 10. — Brass of Richard Beauchamp, earl of Warwick.

lllfflia

S tut*

ft

flm

sssS

JR5Jj||^3||g|||fi0J|gi9|i

MM

gf§§P

Vh r

-\MMk

at'ku

All

■*lili-iia"*

— SSiLa jotwhIW

Jj IliffiSrtf

^^^P\@) *

pSˆs-mSt £5 J

[Ic3j|

ˆs? < < * >

ˆ as =l6

W?mii > !mHig/g/

JjSeSb

i=£ˆ£

From Hewitt's Arms and Armour.

Fig. 11. — Meeting of Henry VIII. and Maximilian.

word seems an antiquarianism of no value, apparently a mis- reading of the word " jambeis " in some early document. So many notable examples of the armour of this 16th century are accessible in European collections, other illustrations occurring in great plenty, that its details call for little discussion; a fine and characteristic suit is that by the famous English armourer, Jacob Topf (fig. 12), which belonged to Sir Christopher Hatton. Into this century the arquebusier marches, demanding a chief place in the line of battle, although it is a common error that the improvement in fire-arms drove out the fully armed warrior, whose plates gave him no protection. Until the rifle came to the soldier's hands, plate armour could easily be made shot-proof.

It was driven from the field by the new strategy which asked for long marches and rapid movements of armies. This century's armour for the tilt-yard gives such protection to the champion, with its many reinforcing pieces, that unless the caged helm were used — the same which cost Henry II. of France his life — the risks of the tilt-yard must have fallen much below those of the polo-field. The horse with crinet, chafron and bards of steel was

as well covered from harm.

Before the end of the 1 6th century the full suit of war harness is an antique survival. Long boots take the place of greaves and steel shoes, and early in the 16th century the military pedants are heard to bewail the common laying aside of other pieces. The mounted cavalier — cuirassierorpistolier — might take the field, even as late as the Great Rebellion,armed at all points save the backs of the thighs and the legs below the knee; but a combed and brimmed cap, breast and back plate and tassets equipped the pikeman, and the musketeer would march without any metal on him save his headpiece, for it was soon found that heavily armed mus- keteers, after a long trudge through summer dust or winter mud, were readier to rest than to shoot. Everywhere there was revolt against the burden of plates, and as early as 1593 Sir Richard Hawkins found that his adven- turers would not use -Suit by Jacob Topf, nearly eve n the light corslets

. 0mP ;· e th S eTcc d a ?e. S " 0t bd0nB t0 Provided by him " es-

teeming a pot of wine a better defence." Gervase Markham, in his Souldier's Accidence of 1645, asks that at least the captain of cuirassiers should be armed " at all peeces, cap a pee, " but he would have found few such captains, and Markham is a great praiser of noble old custom. The famous figure of a pikeman of 1668 (fig. 13) in Elton's Art Military has steel cap, corslet and tassets, but he stands for a fashion dead or dying. The last noteworthy helmet was what is now termed the lobster-tail helmet, a headpiece with round top, flat brim before, a broad articulated brim behind, cheek-pieces hanging by straps and a grate of upright bars to cover the face, some having in place of the grate a movable nose-guard to be raised or lowered at will. The close resemblance of this helmet to that worn by the Japanese, with whom the Dutch were then trading, is worth remark, although each of the two pieces seems to have had its separate origin. Thus, save for a steel cap here and a corslet there, especially to be found amongst the guards

Fig. 12.-

Fig. 13. — Pikeman

From The Compleat Body of

the Art Military, Elton (1668).

of sovereigns who must cling to something of antique tradition, armour departs out of the civilized world.

When in the reign of Queen Victoria her mounted guardsmen were given back their breast and back plates, the last piece of body armour had been the tiny gilt crescent worn at the throat by officers of foot, which crescent was the _”” T °*

shrunken symbol of that great gorget of plate that came in with the 1 5th century. The shining plates of the Guards are parade pieces only, but a curious revival of an old defence was carried by English cavalry in the field at the end of the 19th century, when small gussets of chain mail were attached to the shoulders of certain cavalrymen as a defence against sword cuts. Through all the age of modern warfare inventors have pressed the claims of various bullet-proof breastplates, but where they have been effective against rifle fire their weight has made them too heavy an addition to the soldier’s burden. (See, however, Armour Plates, ad fin.) Last of all we may reckon those secret coats of mail which are said to be worn on occasion by modern rulers in dread of the assassin. The London detective department has such coats of fence in its armoury ; and on the other side it may be remembered that the Kelly gang of bushrangers, driven to bay, were found to have forged suits of plate for them- selves out of sheets of boiler-iron.

Ancient arms and armour are now eagerly sought by European and American collectors, and high prices are paid down for every noteworthy piece. The supply is assisted by the efforts of many forgers of false pieces, the most cunning of whom bring all archaeological skill to their aid, and few great national or private collections are free from some example of this industry. For the genuine pieces competition runs high. Suits of plate of the earliest period may be sought in vain, and the greatest collectors may hardly hope for such a panoply of the late Gothic period as that which is the ornament of the Wallace collection. Even this famous harness is not wholly free from suspicion of restoration. Armour of the latter half of the 16th century, however, often appears in the sale- rooms and is found in many private collections, although the ” ancestral armour ” which decorates so many ancient halls in England is generally the plates and pots which served the pike- men of the 17th-century militia.

It is not hard to understand this scarcity of ancient pieces. In the first place it must be remembered that the fully armed man was always a rare figure in war, and only the rich could engage in the costly follies of the later tournaments. The novelists have done much to encourage the belief that most men of gentle rank rode to the wars lance in hand, locked up in full harness of plate; but the country gentleman, serving as light horseman or mounted archer, would hold himself well armed had he a quilted jack or

brigandine and a basinet or salet. Men armed cap a pee crowd the illuminations of chronicle books, the artists having the same tastes as the boy who decorates his Latin grammar with battles which are hand-to-hand conflicts of epauletted generals. Monuments and brasses also show these fully armed men, but here again we must recognize the tendency which made the last of the cheap miniaturists endow their clients lavishly with heavy watch-chains and rings. As late as the 18th century the portrait painters drew their military or naval sitters in the breastplates and pauldrons, vambraces and rerebraces of an earlier age. Ancient wills and inventories, save those of great folk or military adventurers, have scanty reference to complete harnesses. Ringed hauberks, in a damp northern climate, will not survive

by Lieut-Col.

Collec- tions.

long neglect, and many of them must have been cut in pieces for burnishers or for the mail skirts and gussets attached to the later arming doublets. As the fashion of plate armour changed, the smith might adapt an old harness to the new taste, but more often it would be cast aside. Men to whom the sight of a steel coat called up the business of their daily life wasted no senti- mentality over an obsolete piece. The early antiquaries might have saved us many priceless things, but it was not until a few virtuosi of the 18th century were taken with the Gothic fancy that popular archaeology dealt with aught but Greek statuary and Roman inscriptions. The 19th century was well advanced before an interest in medieval antiquities became common amongst educated men, and for most contemporaries of Dr Johnson a medieval helm was a barbarous curiosity exciting the same measure of mild interest as does the Zulu knobkerry seen by us as we pass a pawnbroker's window. (O. Ba.)

7. Fire-arms. (For the development of cannon, see Artillery and Ordnance.) — Hand-cannons appear almost simultaneously with the larger bombards. They were mad« by the Flemings in the 14th century. An early instance of the use of hand fire-arms in England is the siege of Huntercombe Manor in 137 5. These were simply small cannon, provided with a stock of wood, and fired by the application of a match to the" touch-hole. During the 15th century the hand-gun was steadily improved, and its use became more general. Edward IV., landing in England in 147 1 to reconquer his throne, brought with him a force of Burgundian hand-gun men (mercenaries), and

in 1476 the Swiss at Morat had no less than 6000 of their men thus armed. The prototype of the modern military weapon is the arquebus (g.v.), a form of which was afterwards called in England the caliver. Various dates are given for the introduction of the arquebus, which owed many of its details to the perfected cross- bow which it superseded. The Spanish army in the Italian wars at the beginning of the 16th century was the first to make full and effective use of the new weapon, and thus to make the fire action of infantry a serious factor in the decision of battles. The Spaniards also took the next step in advance. The musket (g.v.) was heavier and more powerful than the arquebus, and, in the hands of the duke of Alva's army in the Netherlands, so conclusively proved its superiority that it at once replaced its rival in the armies of Europe. Both the arquebus and the musket had a touch-hole on the right side of the barrel, with a pan for the priming, with which a lighted quick match was brought in contact by pressing a trigger. The musket, on account of its weight, was provided with a long rest, forked in the upper part and furnished with a spike to stick in the ground. The matchlock (long-barrelled matchlocks are still used by various uncivilized peoples, notably in India) was the typical weapon of the soldier for two centuries. The class of hand; fire-arms provided with an arrangement for striking a spark j to ignite the powder charge begins with the tvheel-lock. This Ujck was in- vented at Nuremberg in 1 5 1 5, but was seldom applied to the arque- bus and musket on account of the costliness of its mechanism and the uncertainty of its action. The early forms of flint-lock (snaphance) were open to the same objections, and the fire-lock (as the flint-lock was usually called) remained for many years after its introduction the armament of special troops only, till about the beginning of the 18th century it finally superseded the old matchlock. Thenceforward the fire-lock (called familiarly in England " Brown Bess ") formed with the bayonet (g.v.) the armament of all infantry, and the fire-arms carried by other troops were constructed on the same principle. Flint-lock muskets were supplanted about 1830- 1840 by the percussion musket, in which a fulminate cap was used. A Scottish clergy-man, Alexander Forsyth, invented this method of ignition in 1807, but it was not till 1820 that it began to come into general use. (See Gun.) The system of firing the charge by a fulmin- ate was followed by the invention of the needle-gun (q.v.). The muzzle-loading rifle, employed by special troops since about 1800, came into general use in the armies of Europe about 1854-1860. It was superseded, as a result of the success of the needle-gun in the war of 1866, by the breech-loading rifle, this in its turn giving

way to the magazine rifle about 1886-1890. (See Rifle.) Neither breech-loaders nor revolvers, however, are inventions of modern date. Both were known in Germany as early as the close of the 1 5th century. There are in

the Musee d' Artillerie at Paris wheel- lock arquebuses of the 16th century which are breech-loaders; and there is, in the Tower armoury, a revolver with the old matchlock, the'date of which is about 1 5 50. A German arquebus of the 1 6th century, in the museum of Sigmaringen, is a revolver of seven barrels. Nor is rifling a new thing in fire-arms, for there was a rifled arquebus of the 1 5th century, in which the balls were driven home by a mallet, and a patent was taken out in England for rifling in 1635. All these systems were thus known at an early period in the history of fire-arms, but for want of the minutely accurate workmanship required and, above all, of a satisfactory firing arrangement, they were left in an undeveloped state until modern times. The earliest pistols were merely shorter hand- guns, modified for mounted men, and provided with a straight stock which was held against the breastplate (poitrinal or petronel). The long-barrelled pistol was the typical weapon of the cavalry of the 1 6th century. (See Cavalry.) With the revival of shock tactics initiated by Gustavus Adolphus the length of the pistol barrel became less and less, and its stock was then shaped for the hand alone. (See Pistol.) (C. F. A.)

ARMSTEAD, HENRY HUGH (1828-1905), English sculptor, was first trained as a silversmith, and achieved the highest excellence with the " St George's Vase " and the " Outram Shield." He rose to the front rank among contemporary sculptors, his chief works being the external sculptural decorations of the colonial office in Whitehall, the sculptures on the southern and eastern sides of the podium of the Albert Memorial, the large fountain at King's College, Cambridge, and numerous effigies, such as " Bishop Wilberforce " at Winchester, and " Lord John Thynne " at Westminster, with smaller por- traiture and much ideal work. His sense of style and nobility was remarkable; and he was besides gifted with a fine power of design and draughtsmanship, which he put to good use in his early years for book illustration. He was elected associate of the Royal Academy in 1875 an d a full member in 1880.

ARMSTRONG, ARCHIBALD (d. 1672), court jester, called " Archy," was a native of Scotland or of Cumberland, and according to tradition first distinguished himself as a sheep- stealer; afterwards he entered the service of James VI., with whom he became a favourite. When the king succeeded to the English throne, Archy was appointed court jester. In 161 1 he was granted a pension of two shillings a day, and in 1617 he accompanied James on his visit to Scotland. His influence was considerable and he was greatly courted and flattered, but his success appears to have turned his head. He became presumptu- ous, insolent and mischievous, excited foolish jealousies between the king and Henry, prince of Wales, and was much disliked by the members of the court. In 1623 he accompanied Prince Charles and Buckingham in their adventure into Spain, where he was much

caressed and favoured by the Spanish court and, according to his own account, was granted a pension. His conduct here became more intolerable than ever. He rallied the infanta on the defeat of the Armada and censured the conduct of the expedition to Buckingham's face. Buckingham declared he would have him hanged, to which the jester replied that " dukes had often been hanged for insolence but never fools for talking." On his return he gained some complimentary allusions from Ben Jonson by his attacks upon the Spanish marriage. He retained his post on the accession of Charles I., and accumulated a con- siderable fortune, including the grant by the king of 1000 acres inTreland. After the death of Buckingham in 1628, whom he declared " the greatest enemy of three kings," the principal object of his dislike and rude jests was Laud, whom he openly vilified and ridiculed. He pronounced the following grace at Whitehall in Laud's presence: " Great praise be given to God and little laud to the devil," and after the news of the rebellion in Scotland in 1637 he greeted Laud on his way to the council chamber at Whitehall with: " Who's fool now ? Does not your

Grace hear the news from Stirling about the liturgy ? " On Laud's complaint to the council, Archy was sentenced the same day " to have his coat pulled over his head and be discharged the king's service and banished the king's court." He settled in London as a money-lender, and many complaints were made to the privy council and House of Lords of his sharp practices. In 164 1 on the occasion of Laud's arrest, he enjoyed a .mean revenge by publishing Archy' s Dream; sometimes Jester to his Majeslie, but exiled the Court by Canterburie's malice. Subsequently he resided at Arthuret in Cumberland, according to some accounts his birthplace, where he possessed an estate, and where he died in 1672, his burial taking place en the 1st of April. He was twice married, his second wife being Sybilla Bell. There is no record of any legal offspring, but the baptism of a " base son " of Archibald Armstrong is entered in the parish register of the 17th of December 1643. A Banquet of Jests: A change of Cheare, published about 1630, a collection chiefly of dull, stale jokes, is attributed to him, and with still less reason probably A choice Banquet of Witty Jests . . . Being an. addition to Archee's Jests, taken out of his Closet but never published in his Lifetime

(1660).

ARMSTRONG, JOHN (1709-1779), British physician and writer, was born about 1709 at Castletown, Roxburghshire, where his father was

parish minister. He graduated M.D. (1732) at Edinburgh University, and soon afterwards settled in London, where he paid more attention to literature than to medicine. He was, in 1746, appointed one of the physicians to the military hospital behind Buckingham House; and, in 1760, physician to the army in Germany, an appointment which he held till the peace of 1763, when he retired on half-pay. For many years he was closely associated with John Wilkes, but quarrelled with him in 1763. He died on the 7th of September 1779. Armstrong's first publication, an anonymous one, entitled An Essay for A bridging the Study of Physic (1735), was a satire on the ignorance of the apothecaries and medical men of his day. This was followed two years after by the Economy of Love, a poem the indecency of which damaged his professional practice. In 1744 appeared his Art of Preserving Health, a very successful didactic poem, and the one production on which his literary reputation rests. His Miscellanies (1770) contains some shorter poems displaying considerable humour.

ARMSTRONG, JOHN (1738-1843), American soldier, diplo- matist and political leader, born at Carlisle, Pennsylvania, on the 25th of November 1758. His father, also named John Armstrong (1725-1795), a native of the north of Ireland, who had emigrated to the Pennsylvania frontier between 1745 and 1748, served successively as a brigadier-general in the Continental army (1776-77), as brigadier-general and then major-general of the Pennsylvania militia (1777-83), during the War of Independ- ence, and was a member of the Continental Congress in 1779- 1780 and again in 1 787-1 788. The son studied for a time at the College of New Jersey (now Princeton University), and served as a major in the War of Independence. In March 1783, while the Continental army was stationed at Newburgh (q.v.), New York, he wrote and issued, anonymously, the famous " Newburgh Addresses." In 1784 he led a force of Pennsylvania militia against the Connecticut settlers in Wyoming Valley, and treated them in such a high-handed manner as to incur the disapproval even of the Pennsylvania legislature. In 1789 he married the sister of Chancellor Robert R. Livingston of New York, and removed to New York city, where his own ability and his family connexion gave him great political influence. In 1801-2 and aˆain in 1803-4 he was a member of the United States Senate. From 1804 to 1810 he was the United States minister to France, and in March 1806 he was joined with James Bowdoin as a special minister to treat through France with Spain concerning the acquisition of Florida, Spanish spoliations of American commerce, and the " Louisiana " boundary. During the War of 181 2, he was a brigadier-general in the United States army from July 1812 until January 1813, and from then until August 1814 secretary of war in the cabinet of President Madison, when his unpopularity forced him to resign. " In spite of Armstrong's

services, abilities and experience," says Henry Adams, " some- thing in his

character always created distrust. He had every advantage of education, social and political connexion, ability and self-confidence; . . . but he suffered from the reputation of indolence and intrigue." Nevertheless, he " introduced into the army an energy wholly new," an energy the results of which were apparent " for half a century." After his resignation he lived in retirement at Red Hook, New York, where he died on the 1 st of April 1843. He published Notices of the War of 18 12 (2 vols., 1836; new ed., 1840), the value of which is greatly impaired by its obvious partiality.

The best account of Armstrong's career as minister to France and as secretary of war may be found in Henry Adams's History of the United Stales, 1801-1817 (9 vols., New York, 1889-1890).

ARMSTRONG, SAMUEL CHAPMAN (1839-1893), American soldier, philanthropist and educator, was born on Maui, one of the Hawaiian Islands, on the 30th of January 1839, his parents Richard and Clarissa Armstrong, being American missionaries. He was educated at the Punahou school in Honolulu, at Oahu College, into which the Punahou school developed in 1852, and at Williams College, Williamstown, Massachusetts, where he graduated in 1862. He served in the Civil War, on the Union side, from 1862 to 1865, rising in the volunteer service to the? regular rank of colonel and the brevet rank of brigadier-general, and, after December 1863, acted as one of the officers of the coloured troops commanded by General William Birney. In November 1865 he was honourably mustered out of the volunteer service. His experience as commander of negro troops had added to his interest, always strong, in the negroes of the south, and in March 1866 he became superintendent of the Ninth District of Virginia, under the Freedman's Bureau, with headquarters near Fort Monroe. While in this position he became convinced that the only permanent solution of the manifold difficulties which the f reedmen encountered lay in their moral and industrial education. He remained in the educational department of the Bureau until this work came to an end in 1872; though five years earlier, at Hampton, Virginia, near Fort Monroe, he had founded, with the aid principally of the American Missionary Association, an industrial school for negroes, Hampton Institute, which was formally opened in 1868, and at the head of which he remained until his death, there, on the nth of May 1893. After 1878 Indians were also admitted to the Institute, and during the last fifteen years of his life Armstrong took a deep interest in the " Indian question." Much of his time after 1868 was spent in the Northern and Eastern states, whither he went to raise funds for the Institute. See Samuel Chapman Armstrong, a Biographical Study (New York, 1904), by his daughter, Edith Armstrong Talbot.

His brother, William N. Armstrong, was attorney-general in the cabinet of

the Hawaiian king Kalakaua I. He ac- companied that monarch on a prolonged foreign tour in 1881, visiting Japan, China, Siam, India, Europe and the United States, and in 1904 published an amusing account of the journey, called Round the World with a King.

ARMSTRONG, WILLIAM GEORGE ARMSTRONG, Baron (1810-1900), British inventor, founder of the Elswick manufac- turing works, was born on the 26th of November 1810, at New- castle-on-Tyne, and was educated at a school in Bisnop Auckland. The profession which he adopted was that of a solicitor, and from 1833 to 1847 ne was engaged in active practice in Newcastle as a member of the firm of Donkin, Stable & Armstrong. His sympathies, however, were always with mechanical and scientific pursuits, and several of his inventions date from a time anterior to his final abandonment of the law. In 1841-1843 he published several papers on the electricity of effluent steam. This subject he was led to study by the experience of a colliery engineman, who noticed that he received a sharp shock on exposing one hand to a jet of steam issuing from a boiler with which his other hand was in contact, and the inquiry was followed by the invention of the " hydro-electric " machine, a powerful generator of electricity, which was thought worthy of careful investigation by Faraday. The question of the utilization of water-power

had engaged his attention even earlier, and in 1839 he invented an improved rotary water motor. Soon afterwards he designed a hydraulic crane, which contained the germ of all the hydraulic machinery for which he and Elswick were subsequently to become famous. This machine depended simply on the pressure of water acting directly in a cylinder on a piston, which was con- nected with suitable multiplying gear. In the first example, which was erected on the quay at Newcastle in 1846, the necessary pressure was obtained from the ordinary water mains of the town; but the merits and advantages of the device soon became widely appreciated, and a demand arose for the erection of cranes in positions where the pressure afforded by the mains was insufficient. Of course pressure could always be obtained by the aid of special reservoirs, but to build these was not always de- sirable, or even practicable. Hence, when in 1850 a hydraulic installation was required for a new ferry station at New Holland, on the Humber estuary, the absence of water mains of any kind, coupled with the prohibitive cost of a special reservoir owing to the character of the soil, impelled him to invent a fresh piece of apparatus, the " accumulator," which consists of a large cylinder containing a piston that can be loaded to give any desired pressure, the water being pumped in

below it by a steam-engine or other prime mover. This simple device may be looked upon as the crown of the hydraulic system, since by its various modifications the installation of hydraulic power became possible in almost any situation. In particular, it was rendered practicable on board ship, and its application to the manipulation of heavy naval guns and other purposes on warships was not the least important of Armstrong's achievements.

The Elswick works were originally founded for the manufacture of this hydraulic machinery, but it was not long before they became the birthplace of a revolution in gunmaking; indeed, could nothing more be placed to Armstrong's credit than their establishment, his name would still be worthy of remembrance. Modern artillery dates from about 1855, when Armstrong's first gun made its appearance. This weapon embodied all the essential features which distinguish the ordnance of to-day from the cannon of the middle ages — it was built up of rings of metal shrunk upon an inner steel barrel; it was loaded at the breech; it was rifled; and it threw, not a round ball, but an elongated projectile with ogival head. The guns constructed on this principle yielded such excellent results, both in range and accuracy, that they were adopted by the British government in 1859, Armstrong himself being appointed engineer of rifled ordnance and receiving the honour of knighthood. At the same time the Elswick Ordnance Company was formed to manufacture the guns under the supervision of Armstrong, who, however, had no financial interest in the concern; it was merged in the Elswick Engineering Works four years later. Great Britain thus originated a principle of gun construction which has since been universally followed, and obtained an armament superior to that possessed by any other country at that time. But while there was no doubt as to the shooting capacities of these guns, defects in the breech mechanism soon became equally patent, and in a few years caused a reversion to muzzle-loading. Armstrong resigned his position in 1863, and for seventeen years the govern- ment adhered to the older method of loading, in spite of the improvements which experiment and research at Elswick and elsewhere had during that period produced in the mechanism and performance of heavy guns. But at last Armstrong's results could no longer be ignored; and wire-wound breech- loading guns were received back into the service in 1880. The use of steel wire for the construction of guns was one of Arm-strong's early ideas. He perceived that to coil many turns of thin wire round an inner barrel was a logical extension of the large hooped method already mentioned, and in conjunction with I. K. Brunei, was preparing to put the plan to practical test when the discovery that it had already been patented caused him to abandon his intention, until about 1877. This incident well illustrates the ground of his objection to the British system of patent law, which he looked upon as calculated to strifle Invention and impede progress; the patentees in this case did

not manage to make a practical success of their invention themselves, but the existence of prior patents was sufficient to turn him aside from a path which conducted him to valuable results when afterwards, owing to the expiry of those patents, he was free to pursue it as he pleased.

Lord Armstrong, who was raised to the peerage in 1887, was the author of A Visit to Egypt (1873), and Electric Movement in Air and Water (1897), besides many professional papers. He died on the 27 th of December 1900, at Rothbury, Northumber- land. His title became extinct, but his grand-nephew and heir, W. H. A. F. Watson-Armstrong (b. 1863), was in 1903 created Baron Armstrong of Bamburgh and Cragside.

ARMY (from Fr. armee, Lat. armata), a considerable body of men armed and organized for the purpose of warfare on land (Ger. Armee), or the whole armed force at the disposal of a state or person for the same purpose (Ger. fleer = host). The appli- cation of the term is sometimes restricted to the permanent, active or regular forces of a state. The history of the develop- ment of the army systems of the world is dealt with in this article in sections 1 to 38, being followed by sections 39 to 59 on the characteristics of present-day armies. The remainder of the article is devoted to sections on the history of the principal armies of Europe, and that of the United States. For the Japanese Army see Japan, and for the existing condition of the army in each country see imder the country heading.

General History

1. Early Armies. — It is only with the evolution of the speci- ally military function in a tribe or nation, expressed by the separation of a warrior-class, that the history of armies (as now understood) commences. Numerous savage tribes of the present day possess military organizations based on this system, but it first appears in the history of civilization amongst the Egyptians. By the earliest laws of Egypt, provision was made for the support of the warriors. The exploits of her armies under the legendary Sesostris cannot be regarded as historical, but it appears certain that the country possessed an army, capable of waging war in a regular fashion, and divided thus early into separate arms, these being chariots, infantry and archers. The systems of the Assyrians and Babylonians present no particular features of interest, save that horsemen, as distinct from charioteers, appear on the scene. The first historical instance of a military organization resembling those of modern times is that of the Persian empire.

2. Persia. — Drawn from a hardy and nomadic race, the armies of Persia at first consisted mainly of cavalry, and owed much of their success to the

consequent ease and rapidity of their movements. The warlike Persians constantly extended their power by fresh conquests, and for some time remained a dis- tinctly conquering and military race, attaining their highest power under Cyrus and Cambyses. Cyrus seems to have been the founder of a comprehensive military organization, of which we gather details from Xenophon and other writers. To each province was allotted a certain number of soldiers as standing army. These troops, formed originally of native Persians only, were called the king's troops. They comprised two classes, the one devoted exclusively to garrisoning towns and castles, the other distributed throughout the country. To each province was appointed a military commander, responsible for the number and efficiency of the troops in his district, while the civil governor was answerable for their subsistence and pay. Annual musters were held, either by the king in person or by generals deputed for the purpose and invested with full powers. This organization seems to have fully answered its original purpose, that of holding a vast empire acquired by conquest and promptly repelling inroads or putting down insurrections. But when a great foreign war was contemplated, the standing army was aug- mented by a levy throughout the empire. The extent of the empire made such a levy a matter of time, and the heterogeneous and unorganized mass of men of all nations so brought together was a source of weakness rather than strength. Indeed, the vast hosts over which the Greeks gained their victories comprised

but a small proportion of the true Persians. The cavalry alone seems to have retained its national character, and with it something of its high reputation, even to the days of Alexander.

3. Greece. — The Homeric armies were tribal levies of foot, armed with spear, sword, bow, &c, and commanded by the chiefs in their war-chariots. In historic times all this is changed. Greece becomes a congeries of city-states, each with its own citizen-militia. Federal armies and permanent troops are rare, the former owing to the centrifugal tendency of Greek politics, the latter because the " tyrannies," which must have relied very largely on standing armies to maintain themselves, had ultimately given way to democratic institutions. But the citizen-militia of Athens or Sparta resembled rather a modern " nation in arms " than an auxiliary force. Service was com- pulsory in almost all states, and as the young men began their career as soldiers with a continuous training of two or three years, Hellenic armies, like those of modern Europe, consisted of men who had undergone a thorough initial training and were subsequently called up as required. Cavalry, as always in the broken country of the Peloponnesus,

was not of great importance, and it is only when the theatre of Greek history is extended to the plains of Thessaly that the mounted men become numerous. In the 4U1 century the mainstay of Greek armies was the hoplite (inrXirris), the heavy-armed infantryman who fought in the corps de bataille; the light troops were men who could not provide the full equipment of the hoplite, rather than soldiers trained for certain special duties such as skirmishing. The fighting formation was that of the phalanx, a solid corps of hoplites armed with long spears. The armies were recruited for each war by calling up one or more classes of men in reserve according to age. It was the duty and privilege of the free citizen to bear arms; the slaves were rarely trusted with weapons.

4. Sparta. — So much is common to the various states. In Sparta the idea of the nation in arms was more thoroughly carried out than in any other state in the history of civilization. In other states the individual citizen often lived the life of a soldier, here the nation lived the life of a regiment. Private homes resembled the " married quarters " of a modern army; the unmarried men lived entirely in barracks. Military exer- cises were only interrupted by actual service in the field, and the whole life of a man of military age was devoted to them. Under these circumstances, the Spartans maintained a practi- cally unchallenged supremacy over the armies of other Greek states; sometimes their superiority was so great that, like the Spanish regulars in the early part of the Dutch War of Inde- pendence, they destroyed their enemies with insignificant loss to themselves. The surrender of a Spartan detachment, hope- lessly cut off from all assistance, and the victory of a body of well-trained and handy light infantry over a closed battalion of Spartiates were events so unusual as seriously to affect the course of Greek history.

5. Greek Mercenaries. — The military system of the 4th century was not called upon to provide armies for continuous service on distant expeditions. When, after the earlier campaigns of the Peloponnesian War, the necessity for such expeditions arose, the system was often strained almost to breaking 'point, (e.g. in the case of the Athenian expedition to Syracuse), and ultimately the states of Greece were driven to choose between unprofitable expenditure of the lives of citizens and recruiting from other sources. Mercenaries serving as light troops, and particularly as peltasts (a new form of disciplined " light in- fantry ") soon appeared. The corps de bataille remained for long the old phalanx of citizen hoplites. But the heavy losses of many years told severely on the resources of every state, and ultimately non-national recruits — adventurers and soldiers of fortune, broken men who had lost their possessions in the wars, political refugees, runaway slaves, &c. — found their way even into the ranks of the hoplites, and Athens at one great crisis (407) enlisted slaves, with the promise of citizenship as their reward. The Arcadians, like the Scots and the Swiss in

modern history, furnished the most numerous contingent to the new

professional armies. A truly national army was indeed to appear once more in the history of the Peloponnesus, but in the mean- time the professional soldier held the field. The old bond of strict citizenship once broken, the career of the soldier of fortune was open to the adventurous Greek. Taenarum and Corinth became regular entrepots for mercenaries. The younger Cyrus raised his army for the invasion of Persia precisely as the em- perors Maximilian and Charles V. raised regiments of Lands- knechte — by the issue of recruiting commissions to captains of reputation. This army became the famous Ten Thousand. It was a marching city-state, its members not desperate adventurers, but men with the calm self-respect of Greek civilization. On the fall of its generals, it chose the best officers of the army to command, and obeyed implicitly. Cheirisophus the Spartan and Xenophon the Athenian, whom they chose, were not plausible demagogues; they were line officers, who, suddenly promoted to the chief command under circumstances of almost over whelming difficulty, proved capable of achieving the impossible. The merit of- choosing such leaders is not the least title to fame of the Ten Thousand mercenary Greek hoplites. About the same time Iphicrates with a body of mercenary peltasts destroyed a mora or corps of Spartan hoplites (391 B.C.).

6. Epaminondas. — Not many years after this, Spartan oppression roused the Theban revolt, and the Theban revolt became the Theban hegemony. The army which achieved this under the leadership of Epaminondas, one of the great captains of history, had already given proofs of its valour against Xenophon and the Cyreian veterans. Still earlier it had won the great victory of Delium (424 B.C.).

It was organized, as were the professional armies, on the accepted model of the old armies, viz. the phalangite order, but the addition of peltasts now made a Theban army, unlike the Spartans, capable of operating in broken country as well as in the plain. The new tactics of the phalanx, introduced by Epaminondas, embodied, for the first time in the history of war, the modern principle of local superiority of force, and suggested to Frederick the Great the famous " oblique order of battle." Further, the cavalry was more numerous and better led than that of Peloponnesian states. The professional armies had well understood the management of cavalry; Xenophon's handbook of the subject is not without value in the 20th century. In Greek armies the dearth of horses and the consequent numerical weak- ness of the cavalry prevented the bold use of the arm on the battlefield (see Cavalry). But Thebes had always to deal with nations which possessed numerous horsemen. Jason of Pherae, for instance, put into the field against Thebes many thousands of Thessalian horse; and thus at the battle of Tegyra in 375 the Theban cavalry under Pelopidas, aided

by the corps d' elite of infantry called the Sacred Band, carried all before them. At Leuctra Epaminondas won a glorious victory by the use of his " oblique order " tactics; the same methods achieved the secondgreatvictoryofMantineia (362 B.c.)at which Epaminondas fell. Pelopidas had already been slain in a battle against the Thessalians, and there was no leader to carry on their work. But the new Greek system was yet to gain its greatest triumphs under Alexander the Great.

7. Alexander. — The reforms of Alexander's father, Philip of Macedon, may most justly be compared to those of Frederick William I. in Prussia. Philip had lived at Thebes as a hostage, and had known Iphicrates, Epaminondas and Pelopidas. He grafted the Theban system of tactics on to the Macedonian system of organization. That the latter — a complete territorial system— was efficient was shown by the fact that Philip's blow was always struck before his enemies were ready to meet it. That the new Greek tactics, properly used, were superior to the old was once more demonstrated at Chaeronea (338 B.C.), where the Macedonian infantry militia fought in phalanx, and the cavalry, led by the young Alexander, delivered the last crushing blow. On his accession, like Frederick the Great, Alexander inherited a well-trained and numerous army, and was not slow to use it. The invasion of Asia was carried out by an army of the Greek pattern, formed both of Hellenes and of

non-Hellenes on an exceedingly strong Macedonian nucleus. Alexander's own guard was composed of picked horse and foot. The infantry of the line comprised Macedonian and Greek hop- lites, the Macedonians being subdivided into heavy and medium troops. These fought in a grand phalanx, which was subdivided into units corresponding to the modern divisions, brigades and regiments, the fighting formation being normally a line of battalion masses. The arm of the infantry was the 1 8-foot pike (sarissa). The peltasts, Macedonian and Greek, were numerous and well trained, and there was the usual mass of irregular light troops, bowmen, slingers, &c. The cavalry included the Guard (ayijiia), a body of heavy cavalry composed of chosen Mace- donians, the line cavalry of Macedonia (ercupoi) and Thessaly, the numerous small contingents of the Greek states, mercenary corps and light lancers for outpost work. The final blow and the gathering of the fruits of victory were now for the first time the work of the mounted arm. The solid phalanx was almost unbreakable in the earlier stages of the battle, but after a long infantry fight the horsemen had their chance. In former wars they were too few and too poorly mounted to avail themselves of it, and decisive victories were in

*consequence rarely achieved in battles of Greek versus Greek. * Under Epaminondas, and still more under Philip and Alexander, the cavalry was strong enough for its new work. Battles are now ended by the shock action of mounted men, and in Alexander's time it is noted as a novelty that the cavalry carried out the pursuit of a beaten army. There were further, in Alexander's army, artillerymen with a battering train, engineers and departmental troops, and also a medical service, an improvement attributed to Jason of Pherae. The victories of this army, in close order and in open, over every kind of enemy and on every sort of terrain, produced the Hellenistic world, and in that achievement the history of Greek armies closes, for after the return of the greater part of the Europeans to their homes the armies of Alexander and his successors, while preserving much of the old form, become more and more orientalized.*

The decisive step was taken in 323, when a picked contingent of Persians, armed mainly with missile weapons, was drafted into the phalanx, in which henceforward they formed the middle ranks of each file of sixteen men. But, like the third rank of Prussian infantry up to 1888, they normally fought as skirmishers in advance, falling into their place behind the pikes of the Mace- donian file-leaders only if required for the decisive assault. The new method, of course, depended for success on the steadiness of the thin three-deep line of Macedonians thus left as the line of battle. Alexander's veterans were indeed to be trusted, but as time went on, and little by little the war-trained Greeks left the service, it became less and less safe to array the Hellenistic army in this shallow and articulated order of battle. The purely formal organization of the phalanx sixteen deep became thus the actual tactical formation, and around this solid mass of 16,384 men gathered the heterogeneous levies of a typical oriental army. Pyrrhus, king of Epirus, retained far more of the tradition of Alexander's system than his contemporaries farther east, yet his phalanx, comparatively light and mobile as it was, achieved victories over the Roman legion only at the cost of self-destruction. Even elephants quickly became a necessary adjunct to Hellenistic armies.

8. Carthage. — The military systems of the Jews present few features of unusual interest. The expedient of calling out successive contingents from the different tribes, in order to ensure continuity in military operations, should, however, be noticed. David and Solomon possessed numerous permanent troops which served as guards and garrisons; in principle this organ- ization was identical with that of the Persians, and that of Europe in the 16th and 17th centuries. Particular interest attaches to the Carthaginian military forces of the 3rd century B.C. Rarely has any army achieved such renown in the short spare or sixty years (264-202 B.C.). Carthage produced a aeries of great generals, culminating in Hannibal, who is marked out, even by the little that is known of him, as the equal of

Napoleon. But Napoleon was supported by a national army,

Hannibal and his predecessors were condemned to work with armies of mercenaries. For. the first time in the world's history war is a matter with which the civil population has no concern. The merchants of Carthage fought only in the last extremity; the wars in which their markets were extended were conducted by non-national forces and directed by the few Carthaginian citizens who possessed military aptitudes. The civil authorities displayed towards their instruments a spirit of hatred for which it is difficult to find a parallel. Unsuccessful leaders were crucified, the mercenary soldiers were cheated of their pay, and broke out into a mutiny which shook the empire of Carthage to its foundations. But the magnetism of a leader's personality infused a corporate military spirit into these heterogeneous Punic armies, and history has never witnessed so complete an illustration of the power of pure and unaided esprit de corps as in the case of Hannibal's army in Italy, which, composed as it was of Spaniards, Africans, Gauls, Numidians, Italians and soldiers of fortune of every country, was yet welded by him into thorough efficiency. The army of Italy was as great in its last fight at Zama as the army of Spain at Rocroi; its victories of the Trebia, Trasimene and Cannae were so appalling that, two hundred years later, the leader to whom these soldiers devoted their lives was still, to a Roman, the " dire " Hannibal.

In their formal organization the Carthaginian armies re- sembled the new Greek model, and indeed they were created in the first instance by Xanthippus, a Spartan soldier in the service of Carthage, who was called upon to raise and train an army when the Romans were actually at the gates of Carthage, and justified his methods in the brilliant victory of Tunis (255 B.C.). For the solid Macedonian phalanx of 16,000 spears Xanthippus substituted a line of heavy battalions equal in its aggregate power of resistance to the older form, and far more flexible. The triumphs of the cavalry arm in Hannibal's battles far excelled those of Alexander's horsemen. Hannibal chose his fighting ground whenever possible with a view to using their full power, first to defeat the hostile cavalry, then to ride down the shaken infantry masses, and finally to pursue an fond. At Cannae, the greatest disaster ever suffered by the Romans, the decisive blow and the slaughter were the work of Hannibal's line cavalry, the relentless pursuit that of his light horse. But a professional long-service army has always the greatest diffi- culty in making good its losses, and in the present case it was wholly unable to do so. Even Hannibal failed at last before the sustained efforts of the citizen army of Rome.

9. Roman Army under the Republic. — The earliest organiza- tion of the Roman army is attributed to Romulus, who formed it on the tribal principle, each of the three tribes contributing its contingent of horse and

foot. But it was to Servius Tullius that Rome owed, traditionally, the complete classification of her citizen-soldiers. For the details of the Roman military system, see Roman Army. During the earlier period of Roman history the army was drawn entirely from the first classes of the population, who served without pay and provided their own arms and armour. The wealthiest men (equites) furnished the cavalry, the remainder the infantry, while the poorer classes either fought as light troops or escaped altogether the privilege and burden of military service. Each " legion " of 3000 heavy foot was at first formed in a solid phalanx. The introduction of the elastic and handy three-line formation with intervals (similar in many respects to Alexander's) was brought about by the Gallic wars, and is attributed to M. Furius Camillus, who also, during the siege of Veii, introduced the practice of paying the soldiers, and thus removed the chief obstacle to the employment of the poorer classes. The new order of battle was fully developed in the Pyrrhic Wars, and the typical army of the Republic mav be taken as dating from the latter part of the 3rd century B.C. The legionary was still possessed of a property qualification, but it had become relatively small. An annual levy was made at Rome to provide for the campaign of the year. Discipline was severe, and the rewards appealed as much to the soldier's honour as to his desire of gain. A legion now consisted of three lines (Hastati, Pxincipes, Triarii), each line composed of men of

similar age and experience, and was further subdivided into thirty " maniples," each of two " centuries." The normal establishment of 300 cavalry, 3000 heavy and 1 200 light infantry was still maintained, though in practice these figures were often exceeded. In place of the old light-armed and somewhat inferior rorarii, the new velites performed light infantry duties (211 B.C.), at the same time retaining their place in the maniples, of which they formed the last ranks (compare the Macedonian phalanx as reorganized in 323, § 7 above). The 300 cavalry of the legion were trained for shock action. But the strength of the Roman army lay in the heavy legionary infantry of citizens. The thirty maniples of each legion stood in three lines of battle, but the most notable point of their formation was that each maniple stood by itself on its own small manceuvre-area, free to take ground to front or flank. To the Roman legion was added a legion of allies, somewhat differently organized and possessing more cavalry, and the whole force was called a " double legion " or briefly a " legion." A consul's army consisted nominally of two double legions, but in the Punic wars military exigencies rather than custom dictated the numbers of the army, and the two consulsat Cannae (216B.C.) commanded two

double consular armies, or eight double legions.

10. Characteristics of the Roman Army. — Such in outline was the Roman military organization at the time when it was put to the severe test of the Second Punic War. Its elements were good, its military skill superior to that of any other army of ancient history, while its organization was on the whole far better than any that had gone before. The handy formation of maniples at open order was unique in the ancient world, and it did not reappear in history up to the advent of Gustavus Adol- phus. In this formation, in which everything was entrusted to the skill of subordinates and the individual courage of the rank and file, the Romans met and withstood with success every type of impact, from the ponderous shock of the Macedonian phalanx and the dangerous rush of Celtic savages to the charge of ele- phants. Yet it was no particular virtue in the actual form employed that carried the Roman arms to so many victories. There would have been positive danger in thus articulating the legion had it been composed of any but the most trustworthy soldiers. To swiftness and precision of manoeuvre they added a dogged obstinacy over which nothing but overwhelming disaster prevailed. It is, therefore, not unnatural to ask wherein the system which produced these soldiers failed, as it did within a century after the battle of Zama. The greatest defect was the want of a single military command. The civil magistrates of Rome were ex officio leaders of her armies, and though no Roman officer lacked military training, the views of a consul or praetor were almost invariably influenced by the programme of his political party. When, as sometimes happened, the men under their command sided in the political differences of their leaders, all real control came to an end. The soldiers of the Republic hardly ever forgot that they were citizens with voting powers; they served as a rule only during a campaign; and, while there could be little question as to their patriotism and stubbornness, they lacked almost entirely that esprit de corps which is found only amongst the members of a body having a permanent cor- porate existence. Thus they had the vices as well as the virtues of a nation in arms, and they fell still further short of the ideal because of the dubious and precarious tenure of their generals' commands. The great officers were usually sent home at the end of a campaign, to be replaced by their elected successors, and they showed all the hesitation and fear of responsibility usually found in a temporary commander. Above all, when two armies, each under its own consul or praetor, acted together, the command was either divided or exercised on alternate days.

11. Roman Empire. — The essential weaknesses of militia forces and the accidental circumstances of that under con- sideration led, even in earlier times, to the adoption of various expedients which for a time obviated the evils to which allusion has been made. But a change of far greater importance followed the final exploits of the armies of the old system. The

increasing dominions of the Republic, the spread of wealth and luxury,

the gradual decadence of the old Roman ideas, all tended to produce an army more suited to the needs of the newer time than the citizen militia of the 3rd century. Permanent troops were a necessity; the rich, in their newly acquired dislike of personal effort, ceased to bear their share in the routine life of the army, and thus the proletariat began to join the legions with the express intention of taking to a military career. The actual change from the old regime to the new was in the main the work of Gaius Marius. The urgent demand for men at the time of the Teutonic invasions caused the service to be thrown open to all Roman citizens irrespective of census. The new territories furnished cavalry, better and more numerous than the old equites, and light troops of various kinds to replace the velites. Only the heavy foot remained a purely Italian force, and the spread of the Roman citizenship gradually abolished the distinction between a Roman and an allied legion. The higher classes had repeatedly shown themselves unwilling to serve under plebeians (e.g. Varro and Flaminius); Marius preferred to have as soldiers men who did not despise him as an inferior. Under all these influences for good or for evil, the standing army was developed in the first half of the 1st century B.C. The tactical changes in the legion indicate its altered character. The small maniples gave way to heavy " cohorts," ten cohorts forming the legion ; as in the Napoleonic wars, light and handy formations became denser and more rigid with the progressive decadence in moral of the rank and file. It is more significant still that in the days of Marius the annual oath of allegiance taken by the soldier came to be replaced by a personal vow, taken once and for all, of loyalty to the general. Ubi bene, ibi patria was an expression of the new spirit of the army, and Caesar had but to address his men as quirites (civilians) to quell a mutiny. Hastati, principes and triarii were now merely expressions in drill and tactics. But perhaps the most important of all these changes was the growth of regimental spirit and tradition. The legions were now numbered throughout the army, and the Tenth Legion has remained a classic instance of a " crack " corps. The moral of the Roman army was founded no longer on patriotism, but on professional pride and esprit de corps.

With this military system Rome passed through the era of the Civil Wars, at the end of which Augustus found himself with forty-five legions on his hands. As soon as possible he carried through a great reorganization, by which, after ruthlessly rejecting inferior elements, he obtained a smaller picked force of twenty-five legions, with numerous auxiliary forces. These were permanently stationed in the frontier provinces of the Empire, while Italy was garrisoned by the Praetorian cohorts, and thus was formed a regular long-service army, the strength of which has been estimated at 300,000 men. But these measures, temporarily successful, produced in the end an army which not only was perpetually at variance with the civil

populations it was supposed to protect, but frequently murdered the emperors to whom it had swern allegiance when it raised them to the throne. The evil fame of the Italian cohorts has survived in the phrase " praetorianism " used to imply a venal military despotism. The citizens gradually ceased to bear arms, and the practice of self-mutilation became common. The inevitable denouement was delayed from time to time by the work of an energetic prince. But the ever-increasing inefficiency and factiousness of the legions, and the evanescence of all military spirit in the civil population, made it easy for the barbarians, when once the frontier was broken through, to overrun the decadent Empire. The end came when the Gothic heavy horse annihilated the legions of Valens at Adrianople (a.d. 37S).

There was now no resource but to take the barbarians into Roman pay. Under the name of foederati, the Gothic mercenary cavalry played the most conspicuous part in the succeeding wars of the Empire, and began the reign of the heavy cavalry arm, which lasted for almost a thousand years. Even so soon as within six years of the death of Valens twenty thousand Gothic horse decided a great battle in the emperor's favour. These men, however, became turbulent and factious, and it was not until the emperor Leo I. had regenerated the native Roman soldier

that the balance was maintained between the national and the hired warrior. The work of this emperor and of his successors found eventual expression in the victories of Belisarius and Narses, in which the Romans, in the new r61e of horse-archers, so well combined their efforts with those of the foederati that neither the heavy cavalry of the Goths nor the phalanx of Frankish infantry proved to be capable of resisting the imperial forces. At the battle of Casilinum (553) Roman foot-archers and infantry bore no small part of the work. It was thus in the Eastern Empire that the Roman military spirit revived, and the Byzantine army, as evolved from the system of Justinian, became eventually the sole example of a fully organized service to be found in medieval history.

12. The " Dark Ages." — In western Europe all traces of Roman military institutions quickly died out, and the conquerors of the new kingdoms developed fresh systems from the simple tribal levy. The men of the plains were horsemen, those of marsh and moor were foot, and the four greater peoples retained these original characteristics long after the conquest had been completed. In organization the Lombards and Franks, Visigoths and English scarcely differed. The whole military population formed the mass of

the army, the chiefs and their personal retainers the elite. The Lombards and the Visigoths w,ere natur- ally cavalry; the Franks and the English were, equally naturally, infantry, and the armies of the Merovingian kings differed but little from the English fyrd with which Off a and Penda fought their battles. But in these nations the use of horses and armour, at first confined to kings and great chiefs, gradually spread downwards to the ever-growing classes of thegns, comites, &c. Finally, under Charlemagne were developed the general lines of the military organization which eventually became feudalism. For his distant wars he required an efficient and mobile army. Hence successive " capitularies " were issued dealing with matters of recruiting, organization, discipline and field service work. Very noticeable are his system of forts (burgi) with garrisons, his military train of artillery and supplies, and the reappearance of the ancient principle that three or four men should equip and maintain one of themselves as a warrior. These and other measures taken by him tended to produce a strong veteran army, very different in efficiency from the tumultuary levy, to which recourse was had only in the last resort. While war (as a whole) was not yet an art, fighting (from the indi- vidual's point of view) had certainly become a special function; after Charlemagne's time the typical feudal army, composed of well-equipped cavalry and ill-armed peasantry serving on foot, rapidly developed. Enemies such as Danes and Magyars could only be dealt with by mounted men who could ride round them, compel them to fight, and annihilate them by the shock of the charge; consequently the practice of leaving the infantry in rear, and even at home, grew up almost as a part of the feudal system of warfare. England, however, sought a different remedy, and thus diverged from the continental methods. This remedy was the creation of a fleet, and, the later Danish wars being there carried out, not by bands of mounted raiders, but by large armies of military settlers, infantry retained its premier position in England up to the day of Hastings. Even the thegns, who there, as abroad, were the mainstay of the army, were heavy- armed infantry. The only contribution made by Canute to the military organization of England was the retention of a picked force of hus carles (household troops) when the rest of the army with which he had conquered his realm was sent back to Scandi- navia. At Hastings, the forces of Harold consisted wholly of infantry. The English array was composed of the king and his personal friends, the hus carles, and the contingents of the fyrd under the local thegns; though better armed, they were organized after the manner of their forefathers. On that field there perished the best infantry in Europe, and henceforward for three centuries there was no serious rival to challenge the predominance of the heavy cavalry.

13. The Byzantines (cf. article Roman Empire, Later). — While the west of Europe was evolving feudalism, the Byzantine empire was acquiring an

army and military system scarcely

surpassed by any of those of antiquity and not often equalled up to the most modern times. The foederati disappeared after the time of Justinian, and by a.d. 600 the army had become at once professional and national. For generations, regiments had had a corporate existence. Now brigades and divisions also appeared in war, and, somewhat later, in peace likewise. With the disappearance of the barbarians, the army became one homogeneous service, minutely systematized, and generally resembling an army in the modern sense of the word. The militia of the frontier districts performed efficiently the service of surveillance, and the field forces of disciplined regulars were moved and employed in accordance with well-reasoned principles of war; their maintenance was provided for by a scutage, levied, in lieu of service, on the central provinces of the empire. Later, a complete territorial system of recruiting and command was introduced. Each " theme " (military district) had its own regular garrison, and furnished a field division of some 5000 picked troopers for a campaign in any theatre of war. Provision having been made in peace for a depot system, all weakly men and horses could be left behind, and local duties handed over to second line troops; thus the field forces were practically always on a war footing. Beside the " themes " under their generals, there were certain districts on the frontiers, called " clissuras," placed under chosen officers, and specially organized for emergency service. The corps of officers in the Byzantine army was recruited from the highest classes, and there were many families (e.g. that from which came the celebrated Nicephorus Phocas) in which soldiering was the traditional career. The rank and file were either military settlers or men of the yeoman class, and in either case had a personal interest in the safety of the theme which prevented friction between soldiers and civilians. The principal arm was, of course, cavalry, and infantry was employed only in special duties. Engineer, train and medical services were maintained in each theme. Of the ensemble of the Byzantine army it has been said that " the art of war as it was understood at Constantinople . . . was the only system of real merit existing. No western nation could have afforded such a training to its officers till the 16th or . . . 17th century." The vitality of such an army remained intact long after the rest of the empire had begun to decay, and though the old army practically ceased to exist after the great disaster of Manzikert. (1071), the barbarians and other mercenaries who formed the new service were organized, drilled and trained to the same pitch of military efficiency. Indeed the greatest tactical triumph of the Byzantine system (Calavryta, 1079) was won by an army already largely composed of foreigners. But mercenaries in the end developed praetorianism, as usual, and at last they actually mutinied, in the presence of the enemy, for higher pay (Constantinople, 1 204) .

14. Feudalism. — From the military point of view the change under feudalism was very remarkable. For the first time in the history of western Europe there appears, in however rough a form, a systematized obligation to serve in arms, regulated on a territorial basis. That army organization in the modern sense • — organization for tactics and command — did not develop in any degree commensurate with the development of military administration, was due to the peculiar characteristics of the feudal system, and the virtues and weaknesses of medieval armies were its natural outcome. Personal bravery, the primary virtue of the soldier, could not be wanting in the members of a military class, the mitier of which was war and manly exercises. Pride of caste, ambition and knightly emulation, all helped to raise to a high standard the individual efficiency of the feudal cavalier. But the gravest faults of the system, considered as an army organization, were directly due to this personal element. Indiscipline, impatience of superior control, and dangerous knight-errantry, together with the absence of any chain of command, prevented the feudal cavalry from achieving results at all proportionate to the effort expended and the potentialities of a force with so many soldierly qualities. If such defects were habitually found in the best elements of the army— the feudal tenants and subtenants who formed the heavy cavalry arm —

little could be expected of the despised and ill-armed foot- soldiery of the levy. The swift raids of the Danes and others (see above) had created a precedent which in French and German wars was almost invariably followed. The feudal levy rarely appeared at all on the battlefield, and when it was thus employed it was ridden down by the hostile knights, and even by those of its own party, without offering more than the feeblest re-sistance. Above all, one disadvantage, common to all classes of feudal soldiers, made an army so composed quite untrustworthy. The service which a king was able to exact from his feudatories was so slight (varying from one month to three in the year) that no military operation which was at all likely to be prolonged could be undertaken with any hope of success.

15. Medieval Mercenaries. — It was natural, therefore, that a sovereign who contemplated a great war should employ mer- cenaries. These were usually foreigners, as practically all national forces served on feudal terms. While the greater lords rode with him on all his expeditions, the bulk of his army consisted of pro- fessional soldiers, paid by the levy of sculage imposed upon the feudal tenantry. There had always been soldiers of fortune. William's host at Hastings contained many such men; later, the Flemings who invaded England in the days of Henry I. sang to each other

—

” Hop, hop, Willeken, hop! England is mine and thine,” — and from all the evidence it is clear that in earlier days the hired soldiers were adventurers seeking lands and homes. But these men usually proved tobe most undesirable subjects,and sovereigns soon began to pay a money wage for the services of mercenaries properly so called. Such were the troops which figured in English history under Stephen. Such troops, moreover, formed the main part of the armies of the early Plantagenets. They were, as a matter of course, armed and armoured like the knights, with whom they formed the men-at-arms (gendarmes) of the army. Indeed, in the nth and 12th centuries, the typical army of France or the Empire contains a relatively small percentage of ” knights,” evidence of which fact may be found even in so fanciful a romance as Aucassin and Nicolete. It must be noted, however, that not all the mercenaries were heavy cavalry; the Brabancon pikeman and the Italian crossbowman (the value of whose weapon was universally recognized) often formed part of a feudal army.

16. Injantry in Feudal Times. — These mercenary foot soldiers came as a rule from districts in which the infantry arm had maintained its ancient predominance in unbroken continuity. The cities of Flanders and Brabant, and those of the Lombard plain, had escaped feudal interference with their methods of fighting, and their burgher militia had developed into solid bodies of heavy armed pikemen. These were very different from those of the feudal levy, and individual knightly bravery usually failed to make the slightest impression on a band of infantry held together by the stringent corporate feeling of a trade gild. The more adventurous of the young men, like those of the Greek cities, took service abroad and fought with credit in their customary manner. The reign of the ” Brabancon ” as a mer- cenary was indeed short, but he continued, in his own country, to fight in the old way, and his successor in the profession of arms, the Genoese crossbowman, was always highly valued. In England, moreover, the infantry of the old fyrd was not suffered to decay into a rabble of half-armed countrymen, and in France a burgher infantry was established by Louis VI. under the name of the milice des communes, with the idea of creating a counter- poise to the power of the feudatories. Feudalism, therefore, as a military system, was short-lived. Its limitations had always necessitated the employment of mercenaries, and in several places a solid infantry was coming into existence, which was drawn from the sturdy and self-respecting middle classes, and in a few generations was to prove itself a worthy opponent not only to the knight, but to the professional man-at-arms.

17. The Crusades. — It is an undoubted fact that the long wars of the Crusades produced, directly, but slight improvement in the feudal armies of

Europe. In the East large bodies of men were successfully kept under arms for a considerable period, but the

application of crusading methods to European war was altogether impracticable. In the first place, much of the permanent force of these armies was contributed by the military orders, which had no place in European political activities. Secondly, enthusiasm mitigated much of the evil of individualism. In the third place, there was no custom to limit the period of service, since the Crusaders had undertaken a definite task and would merely have stultified their own purpose in leaving the work only half done. There were, therefore, sharp contrasts between crusading and European armies. In the latter, systematization was confined to details of recruiting; in the armies of the Cross, men were from time to time obtained by the accident of religious fervour, while at the same time continuous service produced a relatively high system of tactical organization. Different conditions, therefore, produced different methods, and crusading unity and discipline could not have been imposed on an ordinary army, which indeed with its paid auxiliaries was fairly adequate for the somewhat desultory European wars of that time. The statement that the Crusaders had a direct influence on the revival of infantry is hardly susceptible of convincing demonstration, but it is at any rate beyond question that the social and economic results of the Crusades materially contributed to the downfall of the feudal knight, and in consequence to a rise in the relative importance of the middle classes. Further, not only were the Crusading knights compelled by their own want of numbers to rely on the good qualities of the foot, but the foot themselves were the " survivors of the fittest," for the weakly men died before they reached the Holy Land, and with them there were always knights who had lost their horses and could not obtain remounts. Moreover, when " simple " and " gentle " both took the Cross there could be no question of treating Crusaders as if they were the mere feudal levy. But the little direct influence of the whole of these wars upon military progress in Europe is shown clearly enough by the fact that at the very close of the Crusades a great battle was lost through knight-errantry of the true feudal type (Mansurah).

18. The Period of Transition (1200-1490). — Besides the infantry already mentioned, that of Scotland and that of the German cities fought with credit on many fields. Their arm was the pike, and they were always formed in solid masses (called in Scotland, schiltrons). The basis of the medieval commune being the suppression of the individual in the social unit, it was natural that the burgher infantry should fight " in serried ranks and in better order " than a line of individual knights, who, more- over, were almost powerless before walled cities. But these forces lacked offensive power, and it was left for the English archers, whose importance dates from the latter years of the 13th century, to show afresh, at Crecy,

Poitiers and Agincourt, the value of missile action. When properly supported by other arms, they proved themselves capable of meeting both the man-at-arms and the pikeman. The greatest importance attaches to the evolution of this idea of mutual support and combination. Once it was realized, war became an art, and armies became specially organized bodies of troops of different arms. It cannot be admitted, indeed, as has been claimed, that the 14th century had a scientific system of tactics, or that the campaign of Poitiers was arranged by the French " general staff." Nevertheless, during this century armies were steadily coming to consist of expert soldiers, to the exclusion of national levies and casual mercenaries. It,is true that, by his system of " indents," Edward IIL of England raised national armies of a professional type, but the English soldier thus enrolled, when discharged by his own sovereign, naturally sought similar employment elsew r here. This system produced, moreover, a class of unemployed soldiers, and these, with others who became adventurers from choice or necessity, and even with foreign troops, formed the armies which fought in the Wars of the Roses — armies which differed but slightly from others of the time. The natural result of these wars was to implant a hatred of soldiery in the heart of a nation which had formerly produced the best fighting men in Europe, a hatred which left a deep imprint on the constitutional and social life of the people. In

France, where Joan of Arc passed like a meteor across the military firmament, the idea of a national regular army took a practical form in the middle of the 15th century. Still, the forces thus brought into existence were not numerous, and the soldier of fortune, in spite of such experiences of his methods as those of the Wars of the Roses, was yet to attain the zenith of his career.

19. The Condottieri. — The immediate result of this confused period of destruction and reconstruction was the condottiere, who becomes important about 1300. In Italy, where the condottieri chiefly flourished, they were in demand owing to the want of feudal cavalry, and the inability of burgher infantry to undertake wars of aggression. The " free companies " (who served in great numbers in France and Spain as well as in Italy) were " military societies very much like trade-gilds," which (so to speak) were hawked from place to place by their managing directors, and hired temporarily by princes who needed their services. Unlike the older hirelings, they were permanently organized, and thus, with their experience and discipline, became the best troops in existence. But the carrying on of war " in the spirit of a handicraft " led to bloodless battles, indecisive campaigns,

and other unsatisfactory results, and the reign of the condottieri proper was over by 1400, subsequent free companies being raised on a more strictly national basis. With all their defects, however, they were the pioneers of modern organization. In the inextricable tangle of old and new methods which constitutes the military system of the 15th century, it is possible to discern three marked tendencies. One is the result of a purely military conception of the now special art of war, and its exposition as an art by men who devote their whole career to it. The second is the idea of a national army, resulting from many social, economical and political causes. The third is the tendency towards minuter organization and subdivision within the army. Whereas the individual feudatories had disliked the close supervision of a minor commander, and their army had in consequence remained always a loosely-knit unit, the men who made war into an art belonged to small bands or corps, and naturally began their organization from the lower units. Herein, therefore, was the germ of the regimental system of the present day..

20. The Swiss. — The best description of a typical European army at the opening of the new period of development is that of the French army in Italy in 1494, written by Paolo Giovio. He notes with surprise that the various corps of infantry and cavalry are distinct, the usual practice of the time being to combine one lancer, one archer, one groom, &c, into a small unit furnished and commanded by the lancer. There were Swiss and German infantry, armed with pike and halbert, with a few " shot," who marched in good order to music. There were the heavy men-at-arms (gendarmes), accompanied as of old by mounted archers, who, however, now fought independently. There were, further, Gascon slingers and crossbowmen, who had probably acquired, from contact with Spain, some of the lightness and dash of their neighbours. The artillery train was composed of 140 heavy pieces and a great number of lighter guns; these were then and for many generations thereafter a special arm outside the military establishments (see Artil- lery). In all this the only relic of the days of Crecy is the administrative combination of the men-at-arms and the horse archers, and even this is no longer practised in action. The most important element in the army is the heavy infantry of Swiss and Germans. The Swiss had for a century past gradually developed into the most formidable troops of the day. The wars of Zizka (q.v.) in Bohemia (1420) materially assisted in the downfall of the heavy cavalry; and the victories of the Swiss, beginning with Sempach (1382), had by 1480 proved that their solid battalions, armed with the long pike and the halberd, were practically invulnerable to all but missile and shock action combined. By fortune of war, they never met the English, who had shown the way to deal with the schiltron as early as Falkirk. So great was their confidence against ordinary troops, that on one occasion (1444) they detached 1600 men to

engage 50,000.

It was natural that a series of victories such as Granson, Morat and Nancy should place them in the forefront of the military nations of Europe. The whole people devoted itself thereupon to professional soldiering, particularly in the French service, and though their monopoly of mercenary employment lasted a short time only, they continued to furnish regiments to the armies of France, Spain and the Pope up to the most modern times. But their efficiency was thoroughly sapped by the growth of a mutinous and insubordinate spirit, the memory of which has survived in the proverb Point d'argent, point de Suisse, and inspired Machiavelli with the hatred of mercenaries which marks every page of his work on the art of war. One of their devices for extorting money was to appear at the muster with many more soldiers than had been contracted for by their em- ployers, who were forced to submit to this form of blackmail. At last the French, tired of these caprices, inflicted on the Swiss the crushing defeat of Marignan (q.v.), and their tactical system received its death-blow from the Spaniards at Pa via (1525).

2 1 . The Lands knechts. — The modern army owes far more of its organization and administrative methods to the Landsknechts ("men of the country," as distinct from foreigners) than to the Swiss. As the latter were traditionally the friends of France, so these Swabians were the mainstay of the Imperial armies, though both were mercenaries. The emperor Maximilian exerted himself to improve the new force, which soon became the model for military Europe. A corps of Landsknechts was usually raised by a system resembling that of " indents," commissions being issued by the sovereign to leaders of repute to enlist men. A " colour " (Fdhnlein) numbered usually about 400 men, a corps consisted of a varying number of colours, some corps having 12,000 men. From these troops, with their intense pride, esprit de corps and comradeship, there has come down to modern times much of present-day etiquette, interior economy and " regimental customs " — in other words, nearly all that is comprised in the " regimental " system. Amongst the most notable features of their system were the functions of the provost, who combined the modern offices of provost-marshal, transport and supply officer, and canteen manager; the disciplinary code, which admitted the right of the rank and file to judge offences touching the honour of the regiment; and the women who, lawfully or unlawfully attached to the soldiers, marched with the regiment and had a definite place in its corporate life. The conception of the regiment as the home of the soldier was thus realized in fact.

22. The Spanish Army. — The tendencies towards professional soldiering and towards subdivision had now pronounced them- selves. At the same time, while national armies, as dreamed of by Machiavelli; were not yet in

existence, two at least of the powers were beginning to work towards an ideal. This ideal was an army which was entirely at the disposal of its own sovereign, trained to the due professional standard, and organized in the best way found by experience to be applicable to military needs. On these bases was formed the old Spanish army which, from Pavia (1525) to Rocroi (1643), was held by common consent to be the finest service in existence. Almost immediately after emerging from the period of internal development, Spain found herself obliged to maintain an army for the Italian wars. In the first instance this was raised from amongst veterans of the war of Granada, who enlisted for an indefinite time. Probably the oldest line regiments in Europe are those descended from the famous tercios, whose formation marks the beginning of military establishments, just as the Landsknechts were the founders of military manners and customs. The great captains who led the new army soon assimilated the best points of the Swiss system, and it was the Spanish army which evolved the typical com- bination of pike and musket which flourished up to 1 700. Out- side the domain the tactics, it must be credited with an important contribution to the science of army organization, in the depot system, whereby the tercios in the field were continually " fed " and kept up to strength. The social position of the soldier was that of a gentleman, and the young nobles (who soon came to prefer the tercios to the cavalry service) thought it no shame,

when their commands were reduced, to " take a pike " in another regiment. The provost and his gallows were as much in evidence in a Spanish camp as in one of Landsknechts, but the comradeship and esprit de corps of a tercio were the admira- tion of all contemporary soldiers. With all its good qualities, however, this army was not truly national; men soon came from all the various nations ruled by the Habsburgs, and the soldier of fortune found employment in a tercio as readily as elsewhere. But it was a great gain that corps, as such, were fully recognized as belonging to the government, however shifting the personnel might be. Permanence of regimental existence had now been attained, though the universal acceptance and thorough appli- cation of the principle were still far distant. During the 16th century, the French regular army (originating in the compagnies d'ordonnance of 1445), which was always in existence, even when the Swiss and gendarmes were the best part of the field forces, underwent a considerable development, producing amongst other things the military terminology of the present day. But the wars of religion effectually checked all progress in the latter part of the century, and the European reputation of the French army dates only from the latter part of the Thirty

Years' War.

23. The Sixteenth Century. — The battle of St Quentin (1557) is usually taken as the date from which the last type of a purely mercenary arm (as distinct from corps) comes into prominence. " Brabancon " or " Swiss " implied pikemen without further qualification, the new term "Reiter" similarly implied mercenary cavalry fighting with the pistol. Heavy cavalry could disperse arquebusiers and musketeers, but it was helpless" against solid masses of pikemen; the Reiters solved the difficulty by the use of the pistol. They were well armoured and had little to fear from musket-balls. Arrayed in deep squadrons, therefore, they rode up to the pikes with impunity, and fired methodically dans le tas, each rank when it had discharged its pistols filing to the rear to reload. These Reiters were organized in squadrons of variable strength, and recruited in the same manner as were the Landsknechts. They were much inferior, however, to the latter in their discipline and general conduct, for cavalry had many more individual opportunities of plunder than the foot, and the rapacity and selfishness of the Reiters were consequently in marked contrast to the good order and mutual helpfulness in the field and in quarters which characterized the regimental system of the Landsknechts.

24. Dutch System. — The most interesting feature of the Dutch system, which was gradually evolved by the patriots in the long War of Independence, was its minute attention to detail. In the first years of the war, William the Silent had to depend, for field operations, on mutinous and inefficient mercenaries and on raw countrymen who had nothing but devotion to oppose to the discipline and skill of the best regular army in the world. Such troops were, from the point of view of soldiers like Alva, mere canaille, and the ludicrous ease with which their armies were destroyed (as at Jemmingen and Mookerheyde), at the cost of the lives of perhaps a dozen Spanish veterans, went far to justify this view. But, fortunately for the Dutch, their fortified towns were exceedingly numerous, and the individual bravery of citizen-militia, who were fighting for the lives of every soul within their walls, baffled time after time all the efforts of Alva's men. In the open, Spanish officers took incredible liberties with the enemy; once, at any rate, they marched for hours together along submerged embankments with hostile vessels firing into them from either side. Behind walls the Dutch were practically a match for the most furious valour of the assailants.

The insurgents' first important victory in the open field, that of Rymenant near Malines (1577), was won by the skill of " Bras de Fer," de la Noue, a veteran French general, and the stubbornness of the English contingent of the Dutch army — for England, from 1572 onwards, sent out an ever-increasing number of volunteers. This battle was soon followed by the great

defeat of Gembloux (1578), and William the Silent was not destined to see the rise of the Dutch army. Maurice of Nassau was the real organizer of victory. In the wreck of all feudal and burgher military institutions, he turned to the old

models of Xenophon, Polybius, Aelian and the rest. Drill, as rigid and as complicated as that of the Macedonian phalanx, came into vogue, the infantry was organized more strictly into companies and regiments, the cavalry into troops or cornets. The Reiter tactics of the pistol were followed by the latter, the former consisted of pikes, halberts and " shot." This form was generally followed in central Europe, as usual, without the spirit, but in Holland it was the greater trustworthiness of the rank and file that allowed of more flexible formations, and here we no longer see the foot of an army drawn up, as at Jemmingen, in one solid and immovable " square." In their own country and with the system best suited thereto, the Dutch, who moreover acquired greater skill and steadiness day by day, maintained their ground against all the efforts of a Parma and a Spinola. Indeed, it is the best tribute to the vitality of the Spanish system that the inevitable debdele was so long delayed. The campaigns of Spinola in Germany demonstrated that the " Dutch " system, as a system for general use, was at any rate no better than the system over which it had locally asserted its superiority, and the spirit, and not the form, of Maurice's practice achieved the ultimate victory of the Netherlanders. In the Thirty Years' War, the unsuccessful armies of Mansfeld and many others were modelled on the Dutch system, — the forces of Spinola, of Tilly and of Wallenstein, on the Spanish. In other words, these systems as such meant little; the discipline and spirit behind them, everything. Yet the contribution made by the Dutch system to the armies of to-day was not small; to Maurice and his comrades we owe, first the introduction of careful and accurate drill, and secondly the beginnings of an acknowledged science of war, the groundwork of both being the theory and practice of antiquity. The present method of "forming fours" in the British infantry is ultimately derived from Aelian, just as the first beats of the drums in a march represent the regimental calls of the Landsknechts, and the depots and the drafts for the service battalions date from the Italian wars of Spain.

25. The Thirty Years' War. — Hitherto all armies had been raised or reduced according to the military and political situation of the moment. Spain had indeed maintained a relatively high effective in peace, but elsewhere a few personal guards, small garrisons, and sometimes a small regular army to serve as a nucleus, constituted the only permanent forces kept under arms by sovereigns, though, in this era of perpetual wars, armies were almost always on a war footing. The expense of maintenance at that time practically forbade any other system than this, called in German Werbe-system, a term for which in English there is no nearer

equivalent than " enlistment " or " levy " system. It is worth noticing that this very system is identical in principle with that of the United States at the present day, viz., a small permanent force, inflated to any required size at the moment of need. The exceptional conditions of the Dutch army, indeed, secured for its regiments, a long life; yet when danger was finally over, a large portion of the army was at once reduced. The history of the British army from about 1740 to 1820 is a most striking, if belated, example of the Werbe-system in practice. But the Thirty Years' War naturally produced an unusual con- tinuity of service in corps raised about 1620-1630, and fifty years later the principle of the standing army was universally accepted. It is thus that the senior regiments of the Prussian and Austrian armies date from about 1630. At this time an event took place which was destined to have a profound influence on the military art. Gustavus Adolphus of Sweden landed in Germany with an army better organized, trained and equipped than any which had preceded it. This army, by its great victory of Breitenfeld (163 1), inaugurated the era of " modern " warfare, and it is to the system of Gustavus that the student must turn for the initial point of the progressive development which has produced the armies of to-day. Spanish and Dutch methods at once became as obsolete as those of the Landsknechts..

26. The Swedish Army. — The Swedish army was raised by a carefully regulated system of conscription, which was " preached in every pulpit in Sweden." There were indeed enlisted regiments of the usual type, and it would seem that Gustavus

obtained the best even of the soldiers of fortune. But the national regiments were raised on the Indelta system. Each officer and man, under this scheme, received a land grant within the territorial district of his corps, and each of these districts supplied recruits in numbers proportionate to its population. This curious mixture of feudal and modern methods produced the best elements of an army, which, aided by the tactical and technical improvements introduced by Gustavus, proved itself incomparably superior to its rivals. Of course the long and bloody campaigns of 1630-34 led to the admission of great numbers of mercenaries even into the Swedish corps; and German, Scottish and other regiments figured largely, not only in the armies of Duke Bernhard and his successors, but in the army of Gustavus' own lifetime. As early as 1632 one brigade of the army was distinguished by the title " Swedish," as alone containing no foreigners. Yet the framework was much the same as it had been in 1630. The battle-organization of two lines and two wings, which was typical of the later "

linear " tactics, began to supplant the system of the tercios. How cumbrous the latter had become by 1630 may be judged from any battle-plan of the period, and notably from that of Lutzen. Gustavus' cavalry fought four or three deep only, and depended as little as possible on the pistol. The work of riding down the pikes was indeed rendered easier by the improved tactical handiness of the musketeers, but it was fiery leading which alone compelled victory, for there were relatively few Swedish horse and many squadrons of Germans and others, who in themselves were far less likely to charge boldly than the " Pappenheimers " and other crack corps of the enemy. The infantry was of the highest class, and only on that condition could loose and supple lines be trusted to oppose the solid tercios of Tilly and Wallenstein. Cumbrous indeed these were, but by long practice they had acquired no small manoeuvring power, of which Breitenfeld affords a striking example. The Swedes, however, completely surpassed them. The progress thus made may be gauged from the fact that under Gustavus the largest closed body of infantry was less than 300 strong. Briefly, the genius of a great commander, the ardour of a born cavalry leader, better arms and better organization, carried the Swedes to the end of their career of victory, but how personal was the vis viva which inspired the army was quickly noticeable after the death of Gustavus. Even a Bernhard could, in the end, evoke no more heroism from a Swedish army than from any other, and the real Swedish troops fought their last battle at Nordlingen (1634). After this, little distinguished the " Swedish " forces from the general mass of the armies of the time, save their system, to which, and to its influence on the training of such leaders as Baner, Torstensson and Wrangel, all their later victories were due. So much of Gustavus' work survived even the carnage of Nordlingen, and his system always obtained better results, even with the heterogeneous troops of this later period, than any other of the time.

27. The English Civil War (see Great Rebellion). — The armies on either side which, about the same time, were fighting out the constitutional quarrel in England were essentially different from all those of the continent, though their formal organization was similar to that of the Swedes. The military expression of a national conscience had appeared rarely indeed in the Thirty Years' War, which was a means of livelihood for, rather than an assertion of principle by, those who engaged in it. In England, on the other hand, there were no mercenaries, and the whole character of the operations was settled by the burning desire of a true " nation in arms " to decide at once, by the arbitrament of battle, the vital points at issue. A German critic (Fritz Hoenig) has indicated Worcester as the prototype of Sedan; at any rate, battles of this kind invariably resulted in failure when entrusted to a "standing" army of the 18th cen- tury. But the national armies disappeared at the end of the struggle; after the

Restoration, English political aims became, so far as military activity was concerned, similar in scope and execution to those of the continent; and the example of Cromwell and the " New Model," which might have revolutionized

military Europe, passed away without having any marked influence on the armies of other nations.

28. Standing Armies. — Nine years after Nordlingen, the old Spanish army fought its last and most honourable battle at Rocroi. Its conquerors were the new French troops, whose victory created as great a sensation as Pavia and Cregy had done. Infusing a new military spirit into the formal organization of Gustavus' system, the French army was now to " set the fashion " for a century. France had been the first power to revive regular forces, and the famous " Picardie " regiment disputed for pre- cedence even with the old tercios. The country had emerged from the confusion of the past century with the foreign and domestic strength of a practically absolute central power. The Fronde continued the military history of the army from the end of the Thirty Years' War; and when the period of consolida- tion was finally closed, all was prepared for the introduction of a " standing army," practically always at war strength, and entirely at the disposal of the sovereign. The reorganization of the military establishments by Louvois may be taken as the formal date at which standing armies came into prominence (see historical sketch of the French army below). Other powers rapidly followed the lead of France, for the defects of enlisted troops had become very clear, and the possession of an army always ready for war was an obvious advantage in dynastic politics. The French proprietary system of regiments, and the general scheme of army administration which replaced it, may be taken as typical of the armies of other great powers in the time of Louis XIV.

29. Character of the Standing Armies. — A peculiar character was from the first imparted to the new organizations by the results of the Thirty Years' War. A well-founded horror of military barbarity had the effect of separating the soldier from the civilian by an impassable gulf. The drain of thirty years on the population, resources and finances of almost every country in middle Europe, everywhere limited the size of the new armies ; and the decision in 1648 of all questions save those of dynastic interest dictated the nature of their employment. The best soldiers of the time pronounced in favour of small field armies, for in the then state of communications and agriculture large forces proved in practice too cumbrous for good work. In every country, therefore, the army took the form of a professional body, nearly though not quite independent of extra recruits for war, set apart entirely from all contact with civil life, rigidly restricted as to conduct in peace and war, and employed mostly in the "

maintenance " of their superiors' private quarrels. Iron discipline produced splendid tenacity in action, and wholesale desertion at all times. In the Seven Years' War, for instance, the Austrians stated one-fifth of their total loss as due to desertion, and Thackeray's Barry Lyndon gives no untrue picture of the life of a soldier under the old regime. Further, since men were costly, rigid economy of their lives in action, and minute care for their feeding and shelter on the march, occupied a dispro- portionate amount of the attention of their generals. Armies necessarily moved slowly and remained concentrated to facilitate supply and to check desertion, and thus, when a commander had every unit of his troops within a short ride of his head- quarters, there was little need for intermediate general officers, and still less for a highly trained staff.

30. Organization in the 18th Century. — All armies were now almost equal in fighting value, and war was consequently reduced to a set of rules (not principles) , since superiority was only to be gained by methods, not by men. Soldiers such as Marlborough, who were superior to these jejune prescriptions, met indeed with uniform success. But the methods of the 18th century failed to receive full illustration, save by the accident of a great captain's direction, even amidst the circumstances for which they were designed. It is hardly to be wondered at, therefore, that they failed, when forced by a new phase of development to cope with events completely beyond their element. The inner organization was not markedly altered. Artillery was still out- side the normal organization of the line of battle, though in the period 1660-1740 much was done in all countries to improve

the material, and above all to turn the personnel into disciplined soldiers. Cavalry was organized in regiments and squadrons, and armed with sabre and pistol. Infantry had by 1703 begun to assume its three-deep line formation and the typical weapons of the arm, musket and bayonet. Regiments and battalions were the units of combat as well as organization. In the fight the company was entirely merged in the higher unit, but as an administrative body it still remained. As for the higher organ- ization, an army consisted simply of a greater or less number of battalions and squadrons, without, as a rule, intermediate commands and groupings. The army was arrayed as a whole in two lines of battle, with the infantry in the centre and the cavalry on the flanks, and an advanced guard; the so-called reserve consisting merely of troops not assigned to the regular commands. It was divided, for command in action, into right and left wings, both of cavalry and infantry, of each line. This was the famous " linear " organization, which in theory produced the maximum effort in the

minimum time, but in practice, handled by officers whose chief care was to avoid the expenditure of effort, achieved only negative results. To see its defects one need only suppose a battalion of the first line hard pressed by the enemy. A battalion of the second line was directly behind it, but there was no authority, less than that of the wing commander, which could order it up to support the first. All the conditions of the time were opposed to tactical subdivision, as the term is now understood. That the 18th century did not revive schiltrons was due to the new fire tactics, to which everything but control was sacrificed. This "control," as has been said, implied not so much command as police supervision. But far beyond any faults of organization and recruiting, the inherent vice of these armies was, as Machiavelli had pointed out two centuries pre- viously, and as Prussia was to learn to her cost in 1806, that once they were thoroughly defeated, the only thing left to be done was to make peace at once, since there was no other armed force capable of retrieving a failure.

31. Frederick the Great. — The military career of Frederick the Great is very different from those of his predecessors. With an army organized on the customary system, and trained and equipped, better indeed, but still on the same lines as those of his rivals, the king of Prussia achieved results out of all propor- tion to those imagined by contemporary soldiers. It is to his campaigns, therefore, that the student must refer for the real, if usually latent, possibilities of the army of the 18th century. The prime secret of his success lay in the fact that he was his own master, and responsible to no superior for the uses to which he put his men. This position had never, since the introduction of standing armies, been attained by any one, even Eugene and Leopold of Dessau being subject to the common restriction; and with this extraordinary advantage over his opponents, Frederick had further the firmness and ruthless energy of a great commander. Prussia, moreover, was more strictly organized than other countries, and there was relatively little of that opposition of local authorities to the movement of troops which was conspicuous in Austria. The military successes of Prussia, therefore, up to 1757, were not primarily due to the system and the formal tactics, but were the logical outcome of greater energy in the leading, and less friction in the administration, of her armies. But the conditions were totally different in 1758-1762, when the full force of the alliance against Prussia developed itself in four theatres of war. Frederick was driven back to the old methods of making war, and his men were no longer the soldiers of Leuthen and Hohenfriedberg. If discipline was severe before, it was merciless then; the king obtained men by force and fraud from every part of Germany, and had both to repress and to train them in the face of the enemy. That under such conditions, and with such men, the weaker party finally emerged triumphant, was indeed a startling phenomenon. Yet its result for soldiers was not the production of the national army, though the

dynastic forces had once more shown them- selves incapable of compassing decisive victories, nor yet the removal of the barrier between army and people, for the opera- tions of Frederick's recruiting agents made a lasting impression,

and, further, large numbers of men who had thought to make a profession of arms were turned adrift at the end of the war. On the contrary, all that the great and prolonged tour de force of these years produced was a tendency, quite in the spirit of the age, to make a formal science out of the art of war. Better working and better methods were less sought after than system- atization of the special practices of the most successful com- manders. Thus Frederick's methods, since 1758 essentially the same as those of others, were taken as the basis of the science now for the first time called " strategy," the fact that his opponents had also practised it without success being strangely ignored. Along with this came a mania for imitation. Prussian drill, uniforms and hair-powder were slavishly copied by every state, and for the next twenty years, and especially when the war-trained officers and men had left active service, the purest pedantry reigned in all the armies of Europe, including that of Prussia. One of the ablest of Frederick's subordinates wrote a book in which he urged that the cadence of the infantry step should be increased by one pace per minute. The only excep- tions to the universal prevalence of this spirit were in the Austrian army, which was saved from atrophy by its Turkish wars, and in a few British and French troops who served in the Ameri- can War of Independence. The British regiments were sent to die of fever in the West Indies; when the storm of the French Revolution broke over Europe, the Austrian army was the only stable element of resistance.

32. The French Revolution. — Very different were the armies of the Revolution. Europe, after being given over to professional soldiers for five hundred years, at last produced the modern system of the "nation in arms." The French volunteers of 1792 were a force by which the routine generals of the enemy, working with instruments and by rules designed for other conditions, were completely puzzled, and France gained a short respite. The year 1793 witnessed the most remarkable event that is recorded in the history of armies. Raw enthusiasm was replaced, after the disasters and defections which marked the beginning of the campaign, by a systematic and unsparing conscription, and the masses of men thus enrolled, inspired by ardent patriotism and directed by the ferocious energy of the Committee of Public Safety, met the disciplined formalists with an opposition before which the attack completely collapsed. It was less marvellous in fact than in appearance that this should be so. Not to mention the influence of pedantry and senility on the course of the operations, it may be admitted that Frederick and his army at their best would have been unable to accomplish the downfall of the now thoroughly roused French. Tactically,

the fire of the regulars' line caused the Revolutionary levies to melt away by thousands, but men were ready to fill the gaps. No complicated supply system bound the French to magazines and fortresses, for Europe could once more feed an army with- out convoys, and roads were now good and numerous. No fear of desertion kept them concentrated under canvas, for each man was personally concerned with the issue. If the allies tried to oppose them on an equal front, they were weak at all points, and the old organization had no provision for the working of a scattered army. While ten victorious campaigns had not carried Marlborough nearer to Paris than some marches beyond the Sambre, two campaigns now carried a French army to within a few miles of Vienna. It was obvious that, before such forces and such mobility, the old system was doomed, and with each successive failure the old armies became more discouraged. Napoleon's victories finally closed this chapter of military development, and by 1808 the only army left to represent it was the British. Even to this the Peninsular War opened a line of progress, which, if different in many essentials from continental practice, was in any case much more than a copy of an obsolete model.

33. The Conscription. — In 1793, at a moment when the danger to France was so great as to produce the rigorous emergency methods of the Reign of Terror, the combined enemies of the Republic had less than 300,000 men in the field between Basel and Dunkirk. On the other hand, the call of the " country in

danger " produced more than four times this number of men for the French armies within a few months. Louis XIV., even when all France had been awakened to warlike enthusiasm by a similar threat (1709), had not been able to put in the field more than one-fifth of this force. The methods of the great war minister Carnot were enforced by the ruthless committee, and when men's lives were safer before the bayonets of the allies than before the civh tribunals at home, there was no difficulty in enlisting the whole military spirit of France. There is therefore not much to be said as to the earliest application of the conscription, at least as regards its formal working, since any system possessing elasticity would equally have served the purpose. In the meanwhile, the older plans of organization had proved inadequate for dealing with such imposing masses of men. Even with disciplined soldiers they had long been known as applicable only to small armies, and the deficiencies of the French, with their consequences in tactics and strategy, soon produced the first illustrations of modern methods. Unable to meet the allies in the plain, they fought in broken

ground and on the widest possible front. This of course produced decentralization and subdivision; and it became absolutely necessary that each detachment on a front of battle 30 m. long (e.g. Stokach) should be properly commandedand self-sufficing. The army was therefore constituted in a number of divisions, each of two or more brigades with cavalry arid artillery sufficient for its own needs. It was even more important that each divisional general, with his own staff, should be a real commander, and not merely the supervisor of a section of the line of battle, for he was almost in the position that a commander-in-chief had formerly held. The need of generals was easily supplied when there was so wide a field of selection. For the allies the mere adoption of new forms was without result, since it was contrary both to tradition and to existing organization. The attempts which were made in this direction did not tend to mitigate the evils of inferior numbers and moral. The French soon followed up the divisional system with the further organ- ization of groups of divisions under specially selected general officers; this again quickly developed into the modern army corps.

34. Napoleon. — Revolutionary government, however, gave way in a few years to more ordinary institutions, and the spirit of French politics had become that of aggrandizement in the name of liberty. The ruthless application of the new principle of masses had been terribly costly, and the disasters of 1799 reawakened in the mass of the people the old dislike of war and service. Even before this it had been found necessary to frame a new act, the famous law proposed by General Jourdan (1798). With this the conscription for general service began. The legal term of five years was so far exceeded that the service came to be looked upon as a career, or servitude, for life; it was therefore both unavoidable and profitable to admit substi- tutes. Even in 1806 one quarter of Napoleon's conscripts failed to come up for duty. The Grande Armee thus from its inception contained elements of doubtful value, and only the tradition of victory and the 50 % of veterans still serving aided the genius of Napoleon to win the brilliant victories of 1805 and 1806. But these veterans were gradually eliminated by bloodshed and service exposure, and when, after the peace of Tilsit, " French " armies began to be recruited from all sorts of nations, decay had set in. As early as 1806 the emperor had had to " antici- pate " the conscription, that is, call up the conscripts before their time, and by 18 10 the percentage of absentees in France had grown to about 80, the remainder being largely those who lacked courage to oppose the authorities. Finally, the armies of Napoleon became masses of men of all nations fighting even more unwillingly than the armies of the old regime. Little success attended the emperor's attempt to convert a " nation in arms " into a great dynastic army. Considered as such, it had even fewer elements of solidity than the standing armies of the 18th century, for it lacked the

discipline which had made the regiments of Frederick invincible. After 1812 it was at- tacked by huge armies of patriots which possessed advantages

of organization and skilful direction that the levie en masse 01 1793 had lacked. Only the now fully developed genius and magnificent tenacity of Napoleon staved off for a time the debdcle which was as inevitable as had been that of the old regime.

35. The Grande Armie. — In 1805-1806, when the older spirit of the Revolution was already represented by. one-half only of French soldiers, the actual steadiness and manceuvring power of the Grande Armee had attained its highest level. The army at this time was organized into brigades, divisions and corps, the last-named unit being as a rule a marshal's command, and always completed as a small army with all the necessary arms and services. Several such corps (usually of unequal strength) formed the army. The greatest weakness of the organization, which was in other respects most pliant and adaptable, was the want of good staff-officers. The emperor had so far cowed his marshals that few of them could take the slightest individual responsibility, and the combatant staff- officers remained, as they had been in the 18th century, either confidential clerks or merely gallopers. No one but a Napoleon could have managed huge armies upon these terms ; in fact the marshals, from Berthier downwards, generally failed when in independent commands. Of the three arms, infantry and cavalry regiments were organized in much the same way as in Frederick's day, though tactical methods were very different, and discipline far inferior. The greatest advance had taken place in the artillery service. Field and horse batteries, as organized and disciplined units, had come into general use during the Revolutionary wars, and the division, corps and army commanders had always batteries assigned to their several commands as a permanent and integral part of the fighting troops. Napoleon himself, and his brilliant artillery officers Senarmont and Drouot, brought the arm to such a pitch of efficiency that it enabled him to win splendid victories almost by its own action. As a typical organization we may take the III. corps of Marshal Davout in 1806. This was formed of the following troops: —

Cavalry brigade — General Vialannes — three regiments, .1538 men. Corps artillery, 12 guns.

1st Division — General Morand — five infantry regiments in three brigades, 12 guns, 10,820 men.

2nd Division — General Friant — five regiments in three brigades, 8 guns, 8758 men.

3rd Division — General Gudin — four regiments in three brigades, 12 guns, 9077 men.

A comparison of this ordre de bataille with that of a modern army corps will show that the general idea of corps organization has undergone but slight modification since the days of Napoleon. More troops allotted to departmental duties, and additional engineers for the working of modern scientific aids, are the only new features in the formal organization of a corps in the 20th century. Yet the spirit of 1806 and that of 1906 were essentially different, and the story of the development of this difference through the 19th century closes for the present the history of progress in tactical organization.

36. The Wars of Liberation. — The Prussian defeat at Jena was followed by a national surrender so abject as to prove conclusively the eternal truth, that a divorce of armies from national interests is completely fatal to national well-being. But the oppression of the victors soon began to produce a spirit of ardent patriotism which, carefully directed by a small band of able soldiers, led in the end to a national uprising of a steadier and more lasting kind than that of the French Revolution. Prussia was compelled, by the rigorous treaty of peace, to keep a small force only under arms, and circumstances thus' drove her into the path of military development which she subsequently followed. The stipulation of the treaty was evaded by the Kriimper system, by which men were passed through the ranks as hastily as possible and dis- missed to the reserve, their places being taken by recruits. The regimental establishments were therefore mere cadres, and the personnel, recruited by universal service with few exemp- tions, ever-changing. This system depended on the willingness of the reserves to come up when called upon, and the arrogance of

the French was quite sufficient to ensure this. The denouement of the Napoleonic wars came too swiftly for the full development of the armed strength of Prussia on these lines; and at the outbreak of the Wars of Liberation a newly formed Landwehr and numerous volunteer corps took the field with no more training than the French had had in 1793. Still, the principles of universal service iallgemeine Wehrpflicht) and of the army reserve were, for the first time in modern history, systematically put into action, and modern military development has concerned itself more with the consolidation of the Kriimper system than with the creation of another. The debut of the new Prussian army was most unsuccessful, for Napoleon had now attained the highest point of soldierly skill, and managed to inflict

heavy defeats on the allies. But the Prussians were not discouraged; like the French in 1793 they took to broken ground, and managed to win combats against all leaders opposed to them except Napoleon himself. The Russian army formed a solid background for the Prussians, and in the end Austria joined the coalition. Recon- stituted on modern lines, the Austrian army in 1813, except in the higher leading, was probably the best-organized on the continent. After three desperate campaigns the Napoleonic regime came to an end, and men felt that there would be no such struggle again in their lifetime. Military Europe settled down into grooves along which it ran until 1 866. France, exhausted of its manhood, sought a field for military activities in colonial wars waged by long-service troops. The conscription was still in force, but the citizens served most unwillingly, and substitution produced a professional army, which as usual became a dynastic tool. Austria, always menaced with foreign war and internal disorder, maintained the best army in Europe. The British army, though employed far differently, retained substantially the Peninsular system.

37. European Armies i8i$-i8fo. — The events of the period 1815-1859 showed afresh that such long-service armies were incomparably the best form of military machine for the purpose of giving expression to a hostile " view " (not " feeling "). Austrian armies triumphed in Italy, French armies in Spain, Belgium, Algeria, Italy and Russia, British in innumerable and exacting colonial wars. Only the Prussian forces retained the characteristics of the levies of 1813, and the enthusiasm which had carried these through Leipzig and the other great battles was hardly to be expected of their sons, ranged on the side of despotism in the troubled times of 1 848-1 8 50. But the principle was not permitted to die out. The Bronnzell-Olmutz incident of 1850 (see Seven Weeks' War) showed that the organization of 1 813 was defective, and this was altered in spite of the fiercest opposition of all classes. Soon afterwards, and before the new Prussian army proved itself on a great battlefield, the American Civil War, a fiercer struggle than any of those which followed it in Europe, illustrated the capabilities and the weaknesses of voluntary-service troops. Here the hostile " view " was replaced by a hostile " feeling," and the battles of the disciplined enthusiasts on either side were of a very different kind from those of contemporary Europe. But, if the experiences of 1861-1865 proved that armies voluntarily enlisted "for the war " were capable of unexcelled feats of endurance, they proved further that such armies, whose discipline and training in peace were relatively little, or indeed wholly absent, were incapable of forcing a swift decision. The European " nation in arms," whatever its other failings, certainly achieved its task, or failed decisively to do so, in the shortest possible time. Only the special characteristics of the American theatre of war gave the Union and Confederate volunteers the space and time necessary for the creation of armies, and so the great

struggle in North America passed without affecting seriously the war ideas and preparations of Europe. The weakness of the staff work with which both sides were credited helped further to confirm the belief of the Prussians in their system, and in this instance they were justified by the immense superiority of their own general staff to that of any army in existence. It was in this particular that a corps of 1870 differed so essentially from a corps of Napoleon's time. The formal organization had

*not been altered save as the varying relative importance of the separate arms had dictated. The almost intangible spirit which animates the members of a general staff, causes them not merely to " think " — that was always in the quartermaster- general's department — but to " think alike," so that a few simple orders called " directives " sufficed to set armies in motion with a definite purpose before them, whereas formerly elaborate and detailed plans of battle had to be devised and distributed in order to achieve the object in view. A comparison of the number of orders and letters written by a marshal and by his chief of staff in Napoleon's time with similar documents in 1870 indicates clearly the changed position of the staff. In the Grande Armee and in the French army of 1870 the officers of the general staff were often absent entirely from the scene of action. * In Prussia the new staff system produced a far different result — indeed, the staff, rather than the Prussian military system, was the actual victor of 1870. Still, the system would probably have conquered in the end in any case, and other nations, convinced by events that their departure from the ideal of 1813, however convenient formerly, was no longer justified, promptly copied Prussia as exactly, and, as a matter of fact, as slavishly, as they had done after the Seven Years' War.*

38. Modern Developments. — Since 1870, then, with the single exception of Great Britain, all the major European powers have adopted the principle of compulsory short service with reserves. Along with this has come the fullest development of the terri- torial system (see below). The natural consequence therefore of the heavy work falling upon the shoulders of the Prussian officer, who had to instruct his men, was, in the first place, a general staff of the highest class, and in the second, a system of distributing the troops over the whole country in such a way that the regiments were permanently stationed in the district in which they recruited and from which they drew their reserves. Prussia realized that if the reservists were to be obtained when required the unit must be strictly localized; France, on the contrary, lost much time and spent much trouble, in the mobil- ization of 1870, in forwarding the reservists to a regiment distant, perhaps, 300 m. The Prussian system did not work satisfactorily at first, for until all the district staff-officers were trained in the same way there was great inequality in the efficiency of the various army corps, and central control, before the modern development of railways, was relatively slight. Further,

the mobilization must be completed, or nearly so, before concentration begins, and thus an active professional army, always at war strength, might annihilate the frontier corps before those in the interior were ready to move. But the advantages far outweighed the defects of the system, and, such professional armies having after 1870 disappeared, there was little to fear. Everywhere, therefore, save in Great Britain (for at that time the United States was hardly counted as a great military power, in spite of its two million war-trained veterans in civil life), the German model was followed, and is now followed, with but slight divergence. The period of reforms after the Prussian model (about 1873-1890) practically estab- lished the military systems which are treated below as those of the present day. The last quarter of the century witnessed a very great development of military forces, without important organic changes. The chief interest to the student of this' period lies in the severe competition between the great military powers for predominance in numbers, expressed usually in the reduction of the period of service with the colours to a minimum. The final results of this cannot well be predicted: it is enough to say that it is the Leitmotiv in the present stage in the develop- ment of armies. Below will be found short historical, sketches of various armies of the present day which are of interest in respect of their historical development. Details of existing forces are given in articles dealing with the several states to which they belong. Historical accounts of the armies of Japan and of Egypt will be found in the articles on those states. The Japanese wars of 1894-95 and 1904-5 contributed little to the history of military organization as a pure science. The

true lessons of this war were the demonstration of the wide applicability of the German methods, upon which exclusively the Japanese army had formed itself, and still more the first illustra- tion of the new moral force of nationalities as the decisive factor. The form of armies remained unaltered. Neither the events of the Boer War of 1890-1902 nor the Manchurian operations were held by European soldiers to warrant any serious modifications in organization. It is to the moral force alluded to above, rather than to mere technical improvements, that the best soldiers of Europe, and notably those of the French general staff (see the works of General H. Bonnal), have of late years devoted their most earnest attention.

Present-Day Armies

39. The main principles of all military organization as de- veloped in

history would seem to be national recruiting and allegiance, distinctive methods of training and administration, continuity of service and general homogeneity of form. The method of raising men is of course different in different states. In this regard armies may conveniently be classed as voluntarily en- listed, levied or conscript, and militia, represented respectively by the forces of Great Britain, Germany and Switzerland. It must not be forgotten, however, that voluntary troops may be and are maintained even in states in which the bulk of the army is levied by compulsion, and the simple militia obligation of defending the country is universally recognized.

40. Compulsory Service. — Universal liability to service (all- gemeine Wehrpflicht) draws into the active army all, or nearly all, the men of military age for a continuous period of short service, after which they pass successively to the reserve, the second and the third line troops (Landwehr, Landsturm, &c). In this way the greatest number of soldiers is obtained at the cheapest rate and the number of trained men in reserve available to keep the army up to strength is in theory that of the able- bodied manhood of the country. In practice the annual levy is, however, not exhaustive, and increased numerical strength is obtained by reducing the term of colour-service to a minimum. This may be less in a hard-worked conscript army than in one which depends upon the attractions of the service to induce recruits to join. In conscript armies, training for war is carried out with undeviating rigour. In these circumstances the recruits are too numerous and the time available is too limited for the work of training to be committed to a few selected instructors, and every officer has therefore to instruct his own men. The result is usually a corps of officers whose capacity is beyond question, while the general staff is composed of men whose ability is above a high general average. As to the rank and file, the men taken for service are in many respects the best of the nation, and this superiority is progressively enhanced, since increase of population is not often accompanied by a corresponding increase in the military establishments. In Germany in 1905, it is stated, nearly half the contingent was excused from serving in peace time, over and above the usual numbers exempted or medically rejected. The financial aspect of compulsory service may be summed up in a few words. The state does not offer a wage, the pay of the soldier is a mere trifle, and, for a given expendi- ture, at least three times as many men may be kept under arms as under any known " voluntary " system. Above all, the state has at its disposal for war an almost inexhaustible supply of trained soldiers. This aspect of compulsory service has indeed led its admirers sometimes to sacrifice quality to quantity; but, provided always that the regular training is adequate, it may be admitted that there is no limit to the numbers which are susceptible of useful employment. There are, however, many grave defects inherent in all

armies raised by compulsory levy (see Conscription, for a discussion of the chief economical and social questions involved). Most of the advantages of universal service result, not from the compulsory enlistment, but from the principle of short service and ieserves. But the cost of maintaining huge armies of the modern European type on the voluntary system would be entirely prohibitive, and those nations which have adopted the allgemeine Wehrpflicht have

done so with full cognizance of the evil as well as of the good points of the system.

The chief of these evils is the doubtful element which exists in all such armies. Under the merciless discipline of the old regime the most unwilling men feared their officers more than the enemy. Modern short service, however, demands the good-will of all ranks and may fail altogether to make recalcitrants into good soldiers, and it may be taken for granted that every conscript army contains many men who cannot be induced to fight. Herein lies the justification of the principle of " masses," and of reduced colour-service; by drawing into the ranks the maximum number of men, the government has an eventual residuum of the bravest men in the nation left in the ranks. What has been said of the officers of these armies cannot be applied to the non-commissioned officers. Their promotion is necessarily rapid, and the field of selection is restricted to those men who are willing to re-engage, i.e. to serve beyond their compulsory term of two or three years. Many men do so to avoid the struggles of civil life, and such " fugitive and cloistered virtue " scarcely fosters the moral strength required for com-mand. As the best men return to civil Hfe, there is no choice but to promote inferior men, and the latter, when invested with authority, not infrequently abuse it. Indeed in some armies the soldier regards his officer chiefly as his protector from the rapacity or cruelty of his sergeant or corporal. A true short- service army is almost incapable of being employed on peace service abroad; quite apart from other considerations, the cost of conveying to and from home annually one-third or one-half of the troops would be prohibitive. If, as must be the case, a professional force is maintained for oversea service many men would join it who would otherwise be serving as non-com- missioned officers at home and the prevailing difficulty would thus be enhanced. When colonial defence calls for relatively large numbers of men, i.e. an army, home resources are severely strained.

41. Conscription in the proper sense, i.e. selection by lot of a proportion of the able-bodied manhood of a country, is now rarely practised. The obvious unfairness of selection by lot has always had the result of admitting substitutes procured by those on whom the lot has fallen; hence the poorer classes are unduly burdened with the defence of the country, while the rich escape with a money payment. In practice, conscription in-

variably produces a professional long-service army in which each soldier is paid to discharge the obligations of several successive conscripts. Such an army is therefore a voluntary long-service army in the main, plus a proportion of the unwilling men found in every forced levy. The gravest disadvantage is, however, the fact that the bulk of the nation has not been through the regular army at all; it is almost impossible to maintain a large and costly standing army and at the same time to give a full training to auxiliary forces. The difference between a " national guard " such as that of the siege of Paris in 1870-71 and a Landwehr produced under the German system, was very wide. Regarded as a compromise between universal and voluntary service, conscription still maintains a precarious existence in Europe. As the cardinal principle of recruiting armies, it is completely obsolete.

42. Voluntary Service. — Existing voluntary armies have usually developed from armies of the old regime, and seem to owe their continued existence either to the fact that only com- paratively small armaments are maintained in peace, other and larger armies being specially recruited during a war (a modi- fication of. the " enlistment system "), or to the necessities of garrisoning colonial empires. The military advantages and disadvantages of voluntary service are naturally the faults and merits of the opposite system. The voluntary army is available for general service. It includes few unwilling soldiers, and its resultant advantage over an army of the ordinary type has been stated to be as high as 30 %. At all events, we need only examine military history to find that with conscript armies wholesale shirking is far from unknown. That loss from this cause does not paralyse operations as it paralysed those of the 18th century.

is due to the fact that such fugitives do not desert to the enemy, but reappear in the ranks of their own side; it must not there- fore be assumed that men have become braver because the " missing " are not so numerous. In colonial and savage warfare the superior personal qualities of the voluntary soldier often count for more than skill on the part of the officers. These' would be diminished by shortening the time of service, and this fact, with the expense of transport, entails that a reasonably long period must be spent with the colours. On the other hand, the provision of the large armies of modern warfare requires the maintenance of a reserve, and no reserve is possible if the whole period for which men will enlist is spent with the colours. The demand for long service in the individual, and for trained men in the aggregate, thus produces a compromise. The prin- ciple of long service, i.e. ten years or more with the colours, is not applicable to the

needs of the modern grande guerre; it gives neither great initial strength nor great reserves. The force thus produced is costly and not lightly to be risked; it affords rela- tively little opportunity for the training of officers, and tends to become a class apart from the rest of the population. On the other hand, such a force is the best possible army for foreign and colonial service. A state therefore which relies on voluntary enlistment for its forces at home and abroad, must either keep an army which is adaptable to both functions or maintain a separate service for each.

In a state where relatively small armaments are maintained in peace, voluntary armies are infinitely superior to any that could be obtained under any system of compulsion. The state can afford to give a good wage, and can therefore choose its recruits carefully. It can thus have either a few incomparable veteran soldiers (long-service), or a fairly large number of men of superior physique and intelligence, who have received an adequate short-service training. Even the youngest of such men are capable of good service, while the veterans are probably better soldiers than any to be found in conscript armies. This is, however, a special case. The raw material of any but a small voluntary army usually tends to be drawn from inferior sources; the cost of a larger force, paid the full wages of skilled labourers, would be very great, and numbers commensurate with those of an army of the other model could only be obtained at an exorbitant price. The short-service principle is therefore accepted. Here, however, as recruiting depends upon the good-will of the people, it is impossible to work the soldiers with any degree of rigour. Hence the voluntary soldier must serve longer than a conscript in order to attain the same proficiency. The reserve is thus weakened, and the total trained regular force diminished. Moreover, as fewer recruits are required annually, there is less work for the officers to do. In the par- ticular case of Great Britain it is practically certain that in future, reliance will be placed upon the auxiliary forces and the civil population for the provision of the enormous reserves required in a great war; this course is, however, only feasible in the case of an insular nation which has time to collect its strength for the final and decisive blow overseas. The application of the same principle to a continental military power depends on the capacity for stern and unflagging resistance displayed by the corps de couverture charged with the duty of gaining the time necessary for the development and concentration of the national masses. In Great Britain (except in the case of a surprise invasion) the place of this corps would be taken by " command of the sea." Abroad, the spirit of the exposed regiments them- selves furnishes the only guarantee, and this can hardly be calculated with sufficient certainty, under modern conditions, to justify the adoption of this new " enlistment system." Volun- tary service, therefore, with all its intrinsic merits, is only applicable to the conditions of a great war when the war reserve can be trained ad hoc.

43. The militia idea (see Militia) has been applied most com- pletely in Switzerland, which has no regulararmy, but trainsalmost the whole nation as a militia. The system, with many serious disadvantages, has the great merit that the maximum number of men receives a certain amount of training at a minimum cost

both to the state and to the individual. Mention should also be made of the system of augmenting the national forces by recruiting " foreign legions." This is, of course, a relic of the Werbe-system; it was practised habitually by the British governments of the 18th and early 10th centuries. " Hessians " figured conspicu- ously in the British armies in the American War of Independence, and the " King's German Legion " was only the best and most famous of many foreign corps in the service of George III. during the Revolutionary and Napoleonic wars. A new German Legion was raised during the Crimean War, but the almost universal adoption of the Krumper system has naturally put an end to the old method, for all the best recruits are now accounted for in the service of their own countries.

Army Organization

44. Arms of the Service. — Organization into " arms " is pro- duced by the multiplicity of the weapons used, their functions and their limitations. The " three arms " — a term universally applied to infantry (q.v.), cavalry (q.v.) and artillery (q.v.) — coexist owing to the fact that each can undertake functions which the others cannot properly fulfil. Thus cavalry can close with an enemy at the quickest pace, infantry can work in difficult ground, and artillery is effective at great ranges. Infantry indeed, having the power of engaging both at close quarters and at a distance, constitutes me chief part of a fighting force. Other " arms," such as mounted infantry, cyclists, engineers, &c, are again differentiated from the three chief arms by their proper functions. In deciding upon the establishment in peace, or the composition of a force for war, it is therefore necessary to settle beforehand the relative importance of these functions in carrying out the work in hand. Thus an army operating in Essex would be unusually strong in infantry, one on Salisbury Plain would possess a great number of guns, and an army operating on the South African veldt would consist very largely of mounted men. The normal European war has, however, naturally been taken as the basis upon which the relative proportions of the three arms are calculated. At the battle of Kolin (1757) the cavalry was more than half as strong as the infantry engaged. At Borodino (1812) there were 39 cavalry to 100 of other arms, and 5 guns per 1000 men. In 1870 the Germans had at the outset 7 cavalrymen to every 100 men of other arms, the French 10. As for guns, the German artillery had 3, the French 3ˆ per 1000 men. In more modern times the proportions have undergone some alteration, the artillery having been increased, and the cavalry brought nearer to the Napoleonic

standard. Thus the relative proportions, in peace time, now stand at 5 or 6 guns per 1000 men, and 16 cavalry soldiers to 100 men of other arms. It must be borne in mind that cavalry and artillery are maintained in peace at a higher effective than infantry, the strength of the latter being much inflated in war, while cavalry and artillery are not easily extemporized. Thus in the Manchurian campaign these proportions were very different. The Russian army on the eve of the battle of Mukden (20th of February 1905) consisted of 370 battalions, 142 squadrons and 1 S3 field batteries (1200 guns), with, in addition, over 200 heavy guns. The strength of this force, which was organized in three armies, was about 300,000 infantry and 18,000 cavalry and Cossacks, with 3J guns per 1000 men of other arms. The Japanese armies consisted of 300,000 infantry, 11,000 cavalry, 900 field and 170 heavy guns, the proportion of field artillery being i\ guns per 1000 men.

It is perhaps not superfluous to mention that all the smaller units in a modern army consist of one arm only. Formerly several dissimilar weapons were combined in the same unit. The knight with his four or five variously armed retainers constituted an example of this method of organization, which slowly died out as weapons became more uniform and their functions better defined.

45. Command. — The first essential of a good organization is to ensure that each member of the organized body, in his own sphere of action, should contribute his share to the achievement of the common ohject. Further, it is entirely beyond the power

of one man, or of a few, to control every action and provide for every want of a great number of individuals. The modern system of command, therefore, provides for a system of grades, in which, theoretically, officers of each grade control a group of the next lower units. A lieutenant-colonel, for instance, may be in charge of a group of eight companies, each of which is under a captain. In practice, all armies are permanently organized on these lines, up to the colonel's or lieutenant-colonel's command, and most of them are permanently divided into various higher units under general officers, the brigade, division and army corps. The almost invariable practice is to organize infantry into companies, battalions and regiments. Cavalry is divided into troops, squadrons and regiments. Artillery is organized in batteries, these being usually grouped in various ways. The other arms and departments are subdivided in the same general way. The commands of general officers are the brigade of infantry,

cavalry, and in some cases artillery, the division of two or more infantry brigades arid a force of artillery and mounted troops, or of cavalry and horse artillery, and the army corps of two or more divisions and " corps troops." Armies of several corps, and groups of armies are also formed.

46. A brigade is the command of a brigadier or major-general, or of a colonel. It consists almost invariably of one arm only. In armies of the old regime it was not usual to assign troops of all arms to the subordinate generftls. Hence the brigade is a much older form of organization than the division of all arms, and in fact dates from the 16th century. The, infantry brigade consists, in the British service, of the brigadier and his staff, four battalions of infantry, and adminstrative and medical units, the combatant strength being about 4000 men. In Germany and France the brigade is composed of the staff, and two regiments (6 battalions) with a total of over 6000 combatants at war strength. The cavalry brigade is sometimes formed of three, sometimes of two regiments; the number of squadrons to a regiment on service is usually four, exceptionally three, and rarely five and six. The " brigade " of artillery in Great Britain is a lieutenant-colonel's command, and the term here corresponds to the Abtheihmg of the German, and the groupe of the French armies (see Artillery). In Germany and France, however, an artillery brigade consists of two or more regiments, or twelve batteries at least, under the command of an artillery general officer.

47. A division is an organization containing troops of all arms. Since the virtual abolition of the " corps artillery " (see Artillery), the force of field artillery forming part of an infantry division is sometimes as high as 72 guns (Germany); in Great Britain the augmented division of 1906 has 54 field guns, 12 field howitzers, and 4 heavy guns, a fotal of 70. The term " infantry " division is, in strictness, no longer applicable, since such a unit is a miniature army corps of infantry, artillery and cavalry, with the necessary services for the supply of ammunition, food and forage, and for the care of the sick and wounded. A more exact title would be " army " division. In general it is composed, so far as combatants 'are concerned, of the divisional commander and his staff, two or more infantry brigades, a number of batteries of field artillery forming a regi- ment, brigade or group, a small force, varying from a squadron to a regiment, of cavalry (divisional cavalry) , with some engineers. The force of the old British division (1905) may be taken, on an average, as 10,000 men, increased in the 1906 reorganization to about 15,000 combatants. In other armies the fighting force of the division amounts to rather more than 14,000. The cavalry division (see Cavalry) is composed of the staff, two or three cavalry brigades, horse artillery, with perhaps mounted infantry, cyclists, or even light infantry in addition. In many, if not most, armies cavalry divisions are formed only in war. In the field the cavalry division is usually an independent unit with its own commander and staff. " Cavalry corps "

of several divisions have very rarely been formed in the past, a division having been regarded as the largest unit capable of being led by one man. There is, however, a growing tendency in favour of the corps organization, at any rate in war.

4&.Army Corps. — The " corps " of the 18th century was simply a large detachment, more or less complete in itself, organized for some particular purpose (e.g. to cover a siege), and placed for the time being under some general officer other than the chief commander. The modern army corps is a development from ' the division of all arms, which originated in the French Revolu- tionary wars. It is a unit of considerable strength, furnished with the due proportion of troops of all arms and of the auxiliary and medical services, and permanently placed under the com- mand of one general. The corps organization (though a corps d'armee was often spoken of as an armee) was used in Napoleon's army in all the campaigns of the Empire. It may be mentioned, as a curious feature of Napoleon's methods, that he invariably constituted each corps d'armee of a different strength, so that the enemy would not be able to estimate his force by the simple process of counting the corps flags which marked the marshals' headquarters. Thus in 181 2 he constituted one corps of 72,000 men, while another had but 18,000. After the fall of Napoleon a further advance was made. The adoption of universal service amongst the great military nations brought in its train the territorial organization, and the corps, representing a large district, soon became a unit of peace formation. For the smooth working of the new military system it was essential that the framework of the war army should exist in pe&ce. The Prussians were the first to bring the system to perfection; long before 1866 Prussia was permanently divided into army corps districts, all the troops of the III. army corps being Brandenburgers; all those of the VI. Silesians, and so on, though political reasons required, and to some extent still require, modifications of this principle in dealing with annexed territory (e.g. Hanover and Alsace-Lorraine). The events of 1866 and of 1870-71 caused the almost universal adoption of the army corps regional system. In the case of the British army, operating as it usually did in minor wars, and rarely having more than sixty or seventy thousand men on one theatre even in continental wars, there was less need of so large a unit as the corps. Not only was a British army small in numbers, but it preserved high traditions of discipline, and was sufficiently well trained to be susceptible as a unit to the impulse given by one man. Even where the term " corps " does appear in Peninsular annals, the implication is of a corps in the old sense of a grand detachment. Neither cavalry nor artillery was assigned to any of the British " corps " at Waterloo.

49. Constitution of the Army Corps. — In 1870-71 the III. German army corps (with which compare Marshal Davout's ordre de baiaille above)

consisted of the following combatant units: (a) staff; (b) two infantry divisions (4 brigades, 8 regiments or 24 battalions), with, in each division, a cavalry regiment, 4 batteries of artillery or 24 guns, and engineers; (c) corps troops, artillery (6 field batteries), pioneer battalion (engineers), train battalion (supply and transport). A rifle battalion was attached to one of the divisions.

This ordre de bataille was followed more or less generally by all countries up to the most modern times, but between 1890 and 1902 came a very considerable change in the point of view from which the corps was regarded as a fighting unit. This change was expressed in the abolition of the corps artillery. Formerly the corps commander controlled the greater part of the field artillery, as well as troops of other arms; at the present time he has a mere handful of troops. Unless battalions are taken from the divisions to form a corps reserve, the direct influence of the corps organization on the battle is due almost solely to the fact that the commander has at his disposal the special natures of artillery and also some horse artillery. Thus the (augmented) division is regarded by many as the fighting unit of the 20th, as the corps was that of the 19th century. In Europe there is even a tendency to substitute the ancient phrase " reserve artillery " for " corps artillery," showing that the role to be played by the corps batteries is subordinated to the operations of the masses of divisional artillery, the whole being subject, of course, to the technical supervision of the artillery general officer who accompanies the corps headquarters. Thus limited, the army corps has now

come to consist of the staff, two or more divisions, the corps or reserve artillery (of special batteries), a small force of "corps" cavalry, and various technical and departmental troops. The cavalry is never very numerous, owing to the demands of the independent cavalry divisions on the one hand and those of the divisional cavalry on the other. The engineers of an army corps include telegraph, balloon and pontoon units. Attached to the corps are reserves of munitions and supplies in ammunition columns, field parks, supply parks, &c. The term and the organ- ization were discontinued in England in 1906, on the augmenta- tion of the divisions and the assignment of certain former "corps troops" to the direct control of the army commanders. It should be noticed that the Japanese, who had no corps organization during the war of 1904-5, afterwards increased the strength of their divisions from 15,000 to 20,000; the augmented " division," with the above peace strength, becomes to all intents and purposes a corps, and the generals commanding divisions were in 1906

given the title of generals-in-chief.

50. Army. — The term ” army ” is applied, in war time, to any command of several army corps, or even of several divisions, operating under the orders of one commander-in-chief. The army in this sense (distinguished by a number or by a special title) varies, therefore, with circumstances. In the American Civil War, the Army of the Ohio consisted in 1864 only of the army staff and the XXIII. corps. At the other extreme we find that the German II. Army in 1870 consisted of seven army corps and two cavalry divisions, and the III. Army of six army corps and two cavalry divisions. The term ” army ” in this sense is therefore very elastic in its application, but it is generally held, that large groups of corps operating in one theatre of war should be subdivided into armies, and that the strength of an army should not exceed about 150,000 men, if indeed this figure is reached at all. This again depends upon circumstances. It might be advisable to divide a force of five corps into two armies, or on the other hand it might be impossible to find suitable leaders for more than two armies when half a million men were present for duty. In France, organization has been carried a step further. The bulk of the national forces is, in case of war, : organized into a ” group of armies ” under a commander, usually, i though incorrectly, called the generalissimo. This office, of course, does not exist in peace, but the insignia, the distinctive marks of the headquarters flag, &c, are stated in official publica- tions, and the names of the generalissimo and of his chief of staff are known. Under the generalissimo would be four or five army commanders, each with three or four army corps under him. Independent of this ” group of armies ” there would be other and minor ” armies ” where required.

51. Chief Command. — The leading of the ” group of armies ” referred to above does not, in France, imply the supreme com- mand, which would be exercised by the minister of war in Paris. The German system, on the other hand, is based upon the leader- ship of the national forces by the sovereign in person, and even though the headquarters of the ” supreme war lord ” (fiber ste Kriegsherr) are actually in the field in one theatre of operations, he directs the movements of the German armies in all quarters. Similarly, in 1864, General Grant accompanied and controlled as a ” group ” the Armies of the Potomac and the James, supervising at the same time the operations of other groups and armies. In the same campaign a subordinate general, Sherman, commanded a ” group ” consisting of the Armies of the Tennessee, the Cumberland and the Ohio. The question as to whether the supreme command and the command of the principal group of armies should be in the same hands is very difficult of solution. In practice, the method adopted in each case usually grows out of the military and political conditions. The advantage of the German method is that the supreme commander is in actual contact with the troops, and can therefore form an

accurate judgment of their powers. Under these conditions the risk of having cabinet strategy forced upon the generals is at its minimum, and more especially so if the supreme commander is the head of the state. On the other hand, his judgment is very liable to be influenced unduly by facts, coming under his own

notice, which may in reality have no more than a local signifi- cance. Further, the supreme commander is at the mercy of distant subordinates to a far greater degree than he would be if free to go from one army to another. Thus, in 1870 the king of Prussia's headquarters before Paris were subjected to such pressure from subordinate army commanders that on several occasions selected staff-officers had to be sent to examine, for the king's private information, the real state of things at the front. The conduct of operations by one group commander in the campaign of 1864 seemed, at a distance, so eccentric and dangerous that General Grant actually left his own group of armies and went in person to take over command at the threatened point. Balanced judgment is thus often impossible unless the supreme command is independent of, and in a position to exercise general supervision over, each and every group or army. At the other end of the scale is the system of command employed by the Turks in 1877, in which four armies, three of them being actually on the same theatre of war, were directed from Constantinople. This system may be condemned un- reservedly. It is recognized that, once the armies on either side have become seriously engaged, a commander-in-chief on the spot must direct them. Thus in 1904, while the Japanese and Russian armies were under the supreme command of their respective sovereigns, General Kuropatkin and Marshal Oya.ma personally commanded the chief groups of armies in the field. This is substantially the same as the system of the French army. It is therefore permissible to regard the system pursued by the Germans in 1870, and by the Union government in 1864, more as suited to special circumstances than as a general rule. As has been said above, the special feature of the German system of command is the personal leadership of the German emperor, and this brings the student at once to the consideration of another important part of the " superior leading."

52. The Chief of the General Staff 13, as his title implies, the chief staff officer of the service, and as such, he has duties of the highest possible importance, both in peace and war. For the general subject of staff duties see Staff. Here we are concerned only with the peculiar position of the chief of staff under a system in which the sovereign is the actual commander-in-chief. It is obvious in the first place that the sovereign may not be a great soldier, fitted by mental gifts, training and character to be placed at the head of an army of, perhaps, a million men. Allowing that it is imperative that, whatever he may be in himself, the sovereign should ex officio

command the armies, it is easy to see that the ablest general in these armies must be selected to act as his adviser, irrespective of rank, and seniority. This officer must therefore be assigned to a station beyond that of his army rank, and his orders are in fact those of the sovereign himself. Nor is it sufficient that he should occupy an unofficial position as adviser, or ad latus. If he were no more than this, the sovereign could act without his adviser being even aware of the action taken. As the staff is the machinery for the transmission of orders and des- patches, all orders of the commander-in-chief are signed by the chief of staff as a matter of course, and this position is therefore that in which the adviser has the necessary influence. The relations between the sovereign and his chief military adviser are thus of the first importance to the smooth working of the great military machine, and never have the possibilities of this apparently strange system been more fully exploited than by King William and his chief of staff von Moltke in 1866 and in 1870-71. It is not true to say that the king was the mere figurehead of the German armies, or that Moltke was the real commander-in-chief. Those who have said this forget that the sole responsibility for the consequences of every order lay with the king, and that it is precisely the fear of this responsibilty that haˆ made so many brilliant subordinates fail when in chief command. The characters of the two men supplemented each other, as also in the case of Bliicher and Gneisenau and that of Radetzky and Hess. Under these circumstances, the German system of command works, on the whole, smoothly. Matters would, however, be different if either of the two officers failed to realize their mutual interdependence, and the system is in any

case only required when the self-sufficing great soldier is not available for the chief executive command.

53. First and Second Lines.—Thz organization into arms and units is of course maintained in peace as well as for war. Military forces are further organized, in peace, into active and reserve troops, first and second lines, &c, according to the power pos- sessed by the executive over the men. Broadly speaking, the latter fall into three classes, regulars, auxiliary forces and irregular troops. The regulars or active troops are usually liable to serve at all times and in any country to which they may be sent. Auxiliary forces may be defined as all troops which undergo actual military training without being constantly under arms, and in Great Britain these were until 1908. repre- sented by the Militia, the Yeomanry and the Volunteers, and now by the Territorial Force and the Special Reserve. In a country in which recruiting is by voluntary enlistment the classification is, of course, very

different Lorn that prevailing in a conscript army. The various " lines " are usually composed of separate organizations; the men are recruited upon different engagements, and receive a varying amount of training. Of the men not permanently embodied, only the reserve of the active army has actually served a continuous term with the colours. Other troops, called by various appellations, of which " militia " may be taken as generic, go through their military training at intervals. The general lines of army organization in the case of a country recruiting by universal service are as follows: — The male population is divided into classes, by ages, and the total period of liability to service is usually about 25 years. Thus at any given time, assuming two years' colour- service, the men of 20 and 21 years of age would constitute the active army serving with the colours, those of, say, 22 and 23, the reserve. The Landwehr or second line army would consist of all men who had been through the active army and were now aged 24 to 36. The third line would similarly consist of men whose ages were between 36 and 44. Assuming the same annual levy, the active army would consist of 200,000 men, its reserve 200,000, the second line of 1,300,000, and the third of 800,000. Thus of 2,500,000 men liable to, and trained for, military service, 200,000 only would be under arms at any given time. The simple system here outlined is of course modified and compli- cated in practice owing to re-engagements by non-commissioned officers, the speedy dismissal to the reserve of intelligent and educated men, &c.

54. War Reserves. — In war, the reserves increase the field armies to 400,000 men, the whole or part of the second line is called up and formed into auxiliary regiments, brigades and divisions, and in case of necessity the third line is also called upon, though usually this is only in the last resort and for home defence only. The proportion of reservists to men with the colours varies of course with the length of service. Thus in France or Germany, with two years' service in force, half of the rank and file of a unit in war would be men recalled from civil life. The true military value of reservists is often questioned, and under certain circumstances it is probable that units would take the field at peace strength without waiting for their reserv- ists. The frontier guards of the continental military powers, which are expected to move at the earliest possible moment after hostilities have begun, are maintained at a higher effective than other units, and do not depend to any great extent on receiving reservists. The peace footing of cavalry and artillery units is similarly maintained at an artificial level. An operation of the nature of a coup de main would in any case be carried out by the troops available at the moment, however large might be the force required — twenty weak battalions would, in fact, be employed instead of ten strong ones. There is another class of troops, which may be called depot troops. These consist of officers and men left behind when the active corps

completed with reserves takes the field, and they have (a) to furnish drafts for the front — and (b) to form a nucleus upon which all later formations are built up. The troops of the second line undertake minor work, such as guarding railways, and also furnish drafts for the field army. Later, when they have been for some time

under arms, the second line troops are often employed by them- selves in first line. A year's training under war conditions should bring such troops to the highest efficiency. As for irregulars, they have real military value only when the various permanent establishments do not take up the whole fighting strength of the nation, and thus states having universal service armies do not, as a rule, contemplate the employment of com- batants other than those shown on the peace rolls. The status of irregulars is ill defined, but it is practically agreed that com- batants, over whose conduct the military authorities have no disciplinary power, should be denied the privileges of recognized soldiers, and put to death if captured. So drastic a procedure is naturally open to abuse and is not always expedient. Still, it is perfectly right that the same man shall not be allowed, for example, to shoot a sentry at one moment, and to claim the privileges of a harmless civilian at the next. The division into first, second and third lines follows generally from the above. The first line troops, in a conscript army, are the " active army " or regulars, permanently under arms in peace time, and its reserves, which are used on the outbreak of war to complete the existing units to full strength. The German terms Landwehr and Landsturm are often applied to armies of the second and the third lines.

55. The military characteristics of the various types of regular troops have been dealt with in considering the advantages and disadvantages of the several forms of recruiting. It only re- mains to give some indication of the advantages which such forces (irrespective of their time of service) possess over troops which only come up for training at intervals. Physically, the men with the colours are always superior to the rest, owing to their constant exercise and the regularity and order under which they live; as soldiers, they are more under the control of their officers, who are their leaders in daily life, in closer touch with army methods and discipline, and, as regards their formal training, they possess infinitely greater power of strategic and tactical manoeuvre. Their steadiness under fire is of course more to be relied upon than that of other troops. Wellington, speaking of the contrast between old and young soldiers (regulars), was of Opinion that the chief difference lay in the greater hardiness, power of endurance, and general campaigning qualities given by experience. This is of course more than ever true in respect of regular and auxiliary troops, as was strikingly demonstrated in the Spanish-American War. On the whole, it is true to say that only a regular army can endure defeat without dissolution, and that volunteers, reservists or militiamen fresh from civil life may win a victory

but cannot make the fullest use of it when won. At the same time, when they have been through one or two arduous campaigns, raw troops become to all intents and purposes equal to any regulars. On the other hand, the greatest military virtue of auxiliary forces is their enthusiasm. With this quality were won the great victories of 1792-94 in France, those of 1813 in Germany, and the beginnings of Italian unity at Calatafimi and Palermo. The earlier days of the American Civil War witnessed desperate fighting, of which Shiloh is the best example, between armies which had had but the slightest military training. In the same war the first battle of Bull Run illustrated what has been said above as to the weaknesses of unprofessional armies. Both sides, raw and un- trained, fought for a long time with the greatest determination, after which the defeated army was completely dissolved in rout and the victors quite unable to pursue. So far it is the relative military value of the professional soldier and the citizen-soldier that has been reviewed. A continental army of the French Or German stamp is differently constituted. It is, first of all, clear that the drilled citizen-soldier combines the qualities of training and enthusiasm. From this it follows that a hostile "feeling " as well as a hostile " view " must animate such an army if it is to do good service. If a modern " nation in arms " is engaged in a purely dynastic quarrel against a professional army of inferior strength, the result will probably be victory for the latter. But the active army of France or Germany constitutes but a small part of the " nation in arms," and the army for war is

composed in addition of men who have at some period in the past gone through a regular training. Herein lies the difference between continental and British auxiliary forces. In the French army, an ex-soldier during his ten years of reserve service was by the law of 1905 only liable for two months' training, and for the rest of his military career for two weeks' service only. The further reduction of this liability was proposed in 1907 and led to much controversy. The question of the value of auxiliary forces, then, as between the continous work of, say, English territorials, and the permanent though dwindling influence of an original period of active soldiering, is one of considerable importance. It is largely decided in any given case by the average age of the men in the ranks.

56. The transfer of troops from the state of peace to that of war is called mobilization. This is, of course, a matter which primarily depends on good administration, and its minutest details are in all states laid down beforehand. Reservists have to be summoned, and, on arrival, to be clothed and equipped out of stores maintained in peace. Officers and men of the

regular army on leave have to be recalled, the whole medically examined for physical fitness to serve, and a thousand details have to be worked out before the unit is ready to move to its concentration station. The concentration and the strategic deployment are, of course, dependent upon the circumstances of each war, and the peace organization ceases to be applicable. But throughout a war the depots at home, the recruiting districts of second-line troops, and above all the various arsenals, manufactories and offices controlled by the war department are continually at work in maintaining the troops in the field at proper strength and effectiveness.

57. Territorial System. — The feudal system was of course a territorial system in principle. Indeed, as has been shown above, a feudal army was chiefly at fault owing to the dislocation of the various levies. Concentration was equally the characteristic of the professional armies which succeeded those of feudalism, and only such militia forces as remained in existence preserved a local character. The origin of territorial recruiting for first- line troops is to be found in the " cantonal " system, said to have been introduced by Louis XIV., but brought to the greatest perfection in Prussia under Frederick William I. But long service and the absence of a reserve vitiated the system in practice, since losses had to be made good by general recruiting, and even the French Revolution may hardly be said to have produced the territorial system as we understand it to-day. It was only in the deliberate preparation of the Prussian army on short-service lines that we find the beginning of the " terri- torial system of dislocation and command. " This is so intimately connected with the general system of organization that it cannot be considered merely as a method of recruiting by districts. It may be defined as a system whereby, for purposes of command in peace, recruiting, and of organization generally, the country is divided into districts, which are again divided and subdivided as may be required. In a country in which universal service prevails, an army corps district is divided into divisional districts, these being made up of brigade and of regimental districts. Each of these units recruits, and is in peace usually stationed, in its own area; the artillery, cavalry and special arms are recruited for the corps throughout the whole allotted area, and stationed at various points within the same. Thus in the German army the III. army corps is composed entirely of Brandenburgers. The infantry of the corps is stationed in ten towns, the cavalry in four and the artillery in five. In countries which adhere to voluntary recruiting, the system, depending as it does on the calculable certainty of recruiting, is not so fully developed, but in Great Britain the auxiliary forces have been reorganized in divisions of all arms on a strictly territorial basis. The advantage of the system as carried into effect in Germany is obvious. Training is carried out with a minimum of friction and expense, as each unit has an ample area for training. Whilst the brigadiers can exercise general control over the

colonels, and the divisional generals over the brigadiers, there is little undue interference of superior authority in the work of each grade, and the men,

if soldiers by compulsion, at any rate are serving close to their own homes. Most of the reservists required on mobilization reside within a few miles of their barracks. Living in the midst of the civil population, the troops do not tend to become a class apart. Small garrisons are not, as foimerly, allowed to stagnate, since modern communications make supervision easy. Further, it must be borne in mind that the essence of the system is the organizationand training for war of the whole military population. Now so great a mass of men could not be administered except through this decentralization of authority, and the corollary of short service universally applied is the full territorial system, in which the whole enrolled strength of the district is subjected to the authority of the district commander. Practice, however, falls short of theory, and the dangers of drawing whole units from disaffected or unmilitary districts are often foreseen and discounted by distributing the recruits, non-regionally, amongst more or less distant regiments.

58. Army Administration. — The existing systems of command and organization, being usually based upon purely military considerations, have thus much, indeed almost all, in common. Administration differs from them in one important respect. While the methods of command and organization are the result of the accumulated experience of many armies through many hundred years, the central administration in each case is the product of the historical evolution of the particular country, and is dependent upon forms of government, constitutions and political parties. Thus France, after 1870, remodelled the organization of her forces in accordance with the methods which were presumed to have given Germany the victory, but the head-quarters staff at Paris is very different in all branches from that of Berlin. Great Britain adopted German tactics, and to some extent even uniform, but the Army Council has no counterpart in the administration of the German emperor's forces.

The first point for consideration, therefore, is, what is the ultimate, and what is the proximate, authority supervising the administration? The former is, in most countries, the people or its representatives in parliament, for it is in their power to stop supplies, and without money the whole military fabric must crumble. The constitutional chief of the army is the sovereign, or, in republics, the president, but in most countries the direct control of army matters by the representatives of the people extends over all affairs into which the well-being of the civil population, the expenditure of money, alleged miscarriages of military justice, &c, enter, and it is not unusual to find grand strategy, and even the technical deficiencies of a field-gun or rifle, the subject of interpellation and debate. The peculiar

influence of the sovereign is in what may be termed patronage (that is, the selection of officers to fill important positions and the general supervision of the officer-corps), and in the fact that loyalty is the foundation of the discipline and soldierly honour which it is the task of the officers to inculate into their men. In all cases the head of the state is ipso facto the head of the army. The difference between various systems may then be held to depend on the degree of power allowed to or held by him. This reacts upon the central administration of the army, and is the cause of the differences of system alluded to. For the civil chief of the executive is not necessarily a soldier, much less an expert and capable soldier; he must, therefore, be provided with technical advisers. The chief of the general staff is often the principal of these, though in some cases a special commander-in-chief, or the minister for war, or, as in France and England, a committee or council, has the duty of advising the executive on technical matters.

59. Branches of Administration. — In these circumstances the only general principle of army administration common to all systems is the division of the labour between two great branches. Military administration, in respect of the troops and material which it has to control, is divided between the departments of the War Office and the General Staff. In the staff work of subordinate units, e.g. army corps and divisions, the same classi- fication of duties is adopted, " general staff " duties being per- formed by one set of officers, " routine staff " duties by another.

The work of a General Staff may be taken as consisting in preparation for war, and this again, both in Great Britain and abroad, consists of military policy in all its branches, staff duties in war, the collection of intelligence, mobilization, plans of operations and concentration, training, military history and geography, and the preparation of war regulations. These subjects are usually subdivided into four or five groups, each of which is dealt with by a separate section of the general staff, the actual division of the work, of course, varying in different countries. Thus, the second section of the French staff deals with " the organization and tactics of foreign armies, study of foreign theatres of war, and military missions abroad." A War Office is concerned with peace administration and with the provision of men and material in war. Under the former cate- gory fall such matters as " routine " administration, finance, justice, recruiting, promotion of officers (though not always), barracks and buildings generally, armament,

equipment and clothing, &c, in fact all matters not directly relevant to the training of the troops for and the employment of the troops in war. In war, some of the functions of a war office are suspended, but on the other hand the work necessary for the provision of men and material to augment the army and to make good its losses is vastly increased. In 1870 the minister of war, von

and the quartermaster-general's branch, which supervises the provision and issue of supplies, stores and materiel of all kinds. Over and above these, provision has to be made for control of all the technical parts of administration, such as artillery and engineer services (in Great Britain, this, with a portion of the quartermaster-general's department, is under the-master- general of the ordnance) , and for military legislation, preparation of estimates, &c. These are, of course, special subjects, not directly belonging to the general administrative system. It is only requisite that the latter should be sufficiently elastic to admit of these departments being formed as required. How- ever these subordinate offices may be multiplied, the main work of the war office is in the two departments of the adjutant-general {personnel) and the quartermaster-general {materiel). Beyond and wholly distinct from these is the general staff, the creation of which is perhaps the most important, con- tribution of the past century to the pure science of military organization.

British Army

60. Prior to the Norman Conquest the armed force of England was essentially a national militia. Every freeman was bound to bear arms for the defence of the country, or for the maintenance

Comparative Strength of Various Armies (a) Compulsory Service (1906).

France.

Germany.

Russia.

Austria- Hungary.

Italy.

{ Annual Contingent for the Colours

Medically unfit and exempt

Excused from Service in Peace, able-bodied

Total of Men becoming liable for Service in 1907 .

230,000 90,000

222,000 127,000 291,000

254,000 120,000 606,000

128,000

57,000

285,000

83,000 110,000 122,000

320,000

540,000

980,000

470,000

315,000

Total Permanent Armed Force in Peace

610,000

(not includ- ing colonial troops)

610,000

1,226,000

356,000

269,000

First-Line Troops, war-strength (estimated) .... Second-Line Troops, war-strength (estimated) .... Numbers available in excess of these (estimated) ....

Total War Resources of all kinds

1,350,000

3;000,ooo

450,000

1,675,000 2,275,000 3,950,000

2,187,000 1 ,429,000 9,384,000

950,000 1,450,000 5,000,000

800,000 1,150,000 1,200,000

4,800,000

7,900,000

13,000,000

7,400,000

3,150,000

Annual Military Expenditure — total

Annual Military Expenditure — per head of population (approximate)

£27,720,000 13s. 9d.

£32,228,000 10s. 9d.

£36,080,000 5s- 3d-

£15,840,000 6s. 8d.

£11,280,000 6s. 5d.

(b) Authorized Establishments and Approximate Military Resources of the British Empire (1906-1907).

British

Regular

Army.

Reserves

for

■*Regular*

Army.

Auxiliary Forces.

Native

Troops

(Regular,

Reserve,

&c).

Colonial

Forces

(various).

Total.

■ *Great Britain*

Channel Islands, Malta, Bermuda, Colonies and Dependencies .

India

Canadian Forces

Australian Forces (including New Zealand)

South African Forces

Totals

117,000 65,000 75,000

120,000

■ •

500,000

6,000

30,000

46,000

70,000

(appr.)

20,000

(appr.)

202,000

30,000

59,000

(reserves)

737,000 101,000 307,000 105,000

70,000

20,000

257,000

120,000

672,000

202,000

89,000

1,340,000

Note. — Ex-soldiers of regular and auxiliary forces, still fit for service, and estimated levees en masse, are not counted. Enlistment chiefly voluntary.

(c) The Regular Army of the United States has a maximum authorized establishment (1906) of 60,000 enlisted men; the Organized Militia was at the same date 110,000 strong. Voluntary enlistment throughout. (See United States.) In 1906-1907 the total numbers available for a levee en masse were estimated at 13,000,000.

Roon, accompanied the headquarters in the field, but this arrangement did not work well, and will not be employed again. The chief duties other than those of the general staff fall into two classes, the " routine staff,"

administration or adjutant- general's branch, which deals with all matters affecting personnel,

of order. To give some organization and training to the levy, the several sheriffs had authority to call out the contingents of their shires for exercise. The " fyrd," as the levy was named, was available for home service only, and could not be moved even from its county except in the case of emergency; and it

was principally to repel oversea invasions that its services were, required. Yet even in those days the necessity of some more permanent force was felt, and bodies of paid troops were main- tained by the kings at their own cost. Thus Canute and his successors, and even some of the great earls kept up a household force (hiiscarlcs) . The English army at Hastings consisted of the fyrd and the corps of huscarles.

The English had fought on foot; but the mailed horseman had now become the chief factor in war, and the Conqueror introduced into England the system of tenure by knight-service familiar in Normandy. This was based on the unit of the feudal host, the constabularies of ten knights, the Conqueror granting lands in return for finding one or more of these units (in the case of great barons) or some fraction of them (in the case of lesser tenants). The obligation was to provide knights to serve, with horse and arms, for forty days in each year at their own charges. This obligation could be handed on by sub-enfeoffment through a whole series of under-tenants. The system being based, not on the duty of personal service, but on the obligation to supply one or more knights (or it might be only the fraction of a knight), it was early found convenient to commute this for a money payment known as " scutage " (see Knight Service and Scutage). This money enabled the king to hire mercenaries, or pay such of the feudal troops as were willing to serve beyond the usual time. From time to time proclamations and statutes were issued reminding the holders of knights' fees of their duties; but the immediate object was generally to raise money rather than to enforce personal service, which became more and more rare. The feudal system had not, however, abrogated the old Saxon levies, and from these arose two national institutions — the posse comilalus, liable to be called out by the sheriff to maintain the king's peace, and later the militia (q.v.). The posse comitatus, or power of the county, included all males able to bear arms, peers and spiritual men excepted; and though

primarily a police force it was also bound to assist in the defence of the country. This levy was organized by the Assize of Arms under Henry II. (1181), and subsequently under Edward I. (1285) by the so-called " Statute of Winchester," winch determined the numbers and description of weapons to be kept by each man according to his property, and also provided for their periodical inspection. The early Plantagenets made free use of mercenaries. But the weakness of the feudal system in England was preparing, through the 12th and 13th centuries, a nation in arms absolutely unique in the middle ages. The Scottish and Welsh wars were, of course, fought by the feudal levy, but this levy was far from being the mob of unwilling peasants usual abroad, and from the fyrd came the English archers, whose fame was established by Edward I.'s wars, and carried to the continent by Edward III. Edward III. realized that there was better material to be had in his own country than abroad, and the army with which he invaded France was an army of Jiational mercenaries, or, more simply, of English soldiers. The army at Crecy was composed exclusively of English, Welsh and Irish. From the pay list of the army at the siege of Calais (1346) it appears that all ranks, from the prince of Wales downward, were paid, no attempt being made to force even the feudal nobles to serve abroad at their own expense. These armies were raised mainly by contracts entered into " with some knight or gentleman expert in war, and of great revenue and livelihood in the country, to serve the' king in war with a number of men." Copies of the indentures executed when Henry V. raised his army for the invasion of France in 141 5 are in existence. Under these the contracting party agreed to serve the king abroad for one year, with a given number of men equipped according to agreement, and at a stipulated rate of pay. A certain sum was usually paid in advance, and in many cases the crown jewels and plate were given in pledge for the rest. The profession of arms seems to have been profitable. The pay of the soldier was high as compared with that of the ordinary labourer, and he had the prospect of a share of plunder in addition, so that it was not difficult to raise men where the commander had a good military reputation. Edward III. is said to have declined the services of numbers of foreign

mercenaries who wished to enrol under him in his wars against France.

The funds for the payment of these armies were provided partly from the royal revenues, partly from the fines paid in lieu of military service, and other fines arbitrarily imposed, and partly by grants from parliament. As the soldier's contract usually ended with the war, and the king had seldom funds to renew it even if he so wished, the armies disbanded of themselves at the close of each war. To secure the services of the soldier during his contract, acts were passed (18 Henry VI. c. 19; and 7 Henry VII. c 1) inflicting penalties for desertion; and in Edward VI. 's reign an act "

touching the true service of captains and soldiers " was passed, somewhat of the nature of a Mutiny Act.

61. It is difficult to summarize the history of the army between the Hundred Years' War and 1642. The final failure of the English arms in France was soon followed by the Wars of the Roses, and in the long period of civil strife the only national force remaining to England was the Calais garrison. Henry Vlil. was a soldier-king, but he shared the public feeling for the old bow and bill, and English armies which served abroad did not, it seems, win the respect of the advanced professional soldiers of the continent. In 15 19 the Venetian ambassador described the English forces as consisting of 150,000 men whose peculiar, though not exclusive, weapon was the long bow (Fortescue l. 117). The national levy made in 1588 to resist the Armada and the threat of invasion produced about 750 lancers (heavy- armed cavalry), 2000 light horse and 56,000 foot, beside 20,000 men employed in watching the coasts. The small proportion of mounted men is very remarkable in a country in which Cromwell was before long to illustrate the full power of cavalry on the battlefield. It is indeed not unfair to regard this army as a miscellaneous levy of inferior quality.

It was in cavalry that England was weakest, and by three different acts it was sought to improve the breed of horses, though the light horse of the northern counties had a good reputation, and even won the admiration of the emperor Charles V. Perhaps the best organized force in England at this time was the London volunteer association which ultimately became the Honourable Artillery Company. At Floddon the spirit of the old English yeomanry triumphed over the outward form of continental battalions which the Scots had adopted, and doubtless the great victory did much to retard military progress in England. The chief service of Henry VIII. to the British army was the for- mation of an artillery train, in which he took a special interest. Before he died the forces came to consist of a few permanent troops (the bodyguard and the fortress artillery service), the militia or general levy, which was for home, and indeed for county, service only, and the paid armies which were collected for a foreign war and disbanded at the conclusion of peace, and were recruited on the same principle of indents which had served in the Hundred Years' War. In the reign of Mary, the old Statute of Winchester was revised (1553), and the new act provided for a readjustment of the county contingents and in some degree for the rearmament of the militia. But, from the fall of Calais and the expedition to Havre up to the battle of the Dunes a century later, the intervention of British forces in foreign wars was always futile and generally disastrous. During this time, however, the numerous British regiments in the service of Holland learned, in the long war of Dutch independence, the art of war as it had developed on the continent since

1450, and assimilated the regimental system and the drill and armament of the best models. Thus it was that in 1642 there were many hundreds of trained and war-experienced officers and sergeants available for the armies of the king and the parliament. By this time bows and bills had long disappeared even from the militia, and the Thirty Years' War, which, even more than the Low Countries, offered a career for the adventurous man, contributed yet more trained officers and soldiers to the English and Scottish forces. So closely indeed was war now studied by Englishmen that the respective adherents of the Dutch and the Swedish systems quarrelled on the eve of the battle of Edgehill. Francis

and Horace Vere, Sir John Norris, and other Englishmen had become generals of European reputation. Skippon, Astley, Goring, Rupert, and many others soon to be famous were dis- tinguished as company and regimental officers in the battles and sieges of Germany and the Low Countries.

The home forces of England had, as has been said, little or nothing to revive their ancient renown. Instead, they had come to be regarded as a menace to the constitution. In Queen Elizabeth's time the demands of the Irish wars had led to frequent forced levies, and the occasional billeting of the troops in England also gave rise to murmurs, but the brilliancy and energy of her reign covered a great deal, and the peaceful policy of her successor removed all immediate cause of complaint. But after the accession of Charles I. we find the army a constant and principal source of dispute between the king and parliament, until under William III. it is finally established on a constitutional footing. Charles, wishing to support the Elector Palatine in the Thirty Years' War, raised an army of 10,000 men. He was already encumbered with debts, and the parliament refused all grants, on which he had recourse to forced loans. The army was sent to Spain, but returned without effecting anything, and was not disbanded, as usual, but billeted on the inhabitants. The billeting was the more deeply resented as it appeared that the troops were purposely billeted on those who had resisted the loan. Forced loans, billeting and martial law — all directly connected with the maintenance of the army — formed the main substance of the grievances set forth in the Petition of Right. In accepting this petition, Charles gave up the right to maintain an army without consent of parliament; and when in 1639 he wished to raise one to act against the rebellious Scots, parliament was called together, and its sanction obtained,

on the plea that the army was necessary for the defence of England. This army again became the source of dispute between the king and parliament, and finally both sides appealed to arms.

62. The first years of the Great Rebellion (g.v.) showed primarily the abundance of good officers produced by the wars on the continent, and in the second place the absolute inadequacy of the military system of the country; the commissions of array, militia ordinances, &c, had at last to give way to regular methods of enlistment and a central army administration. It was clear, at the same time, that when the struggle was one of principles and not of dynastic politics, excellent recruits, far different from the wretched levies who had been gathered together for the Spanish war, were to be had in any reasonable number. These causes combined to produce the " New Model " which, origin- ating in Cromwell's own cavalry and the London trained bands of foot, formed of picked men and officers, severely disciplined, and organized and administered in the right way, quickly proved its superiority over all other armies in the field, and in a few years raised its general to supreme civil power. The 1 5th of February 1645 was the birthday of the British standing army, and from its first concentration at Windsor Park dates the scarlet uniform. The men were for the most part voluntarily enlisted from existing corps, though deficiencies had immediately to be made good by impressment.

Four months later the New Model decided the quarrel of king and parliament at Naseby. When Cromwell, the first lieutenant- general and the second captain-general of the army, sent his veterans to take part in the wars of the continent they proved themselves a match for the best soldiers in Europe. On the restoration of the monarchy in 1660 the army, now some 80,000 strong, was disbanded. It had enforced the execution of Charles I., it had dissolved parliament, and England had been for years governed under a military regime. Thus the most popular measure of the Restoration was the dissolution of the army. Only Monk's regiment of foot(now the Coldstream Guards) survived to represent the New Model in the army of to-day. At the same time the troops (now regiments) of household cavalry, and the regiment of foot which afterwards became the Grenadier Guards, were formed, chiefly from Royalists, though the disbanded New Model contributed many experienced re- iruits. The permanent forces of the crown came to consist once

more of the " garrisons and guards," maintained by the king from the revenue allotted to him for carrying on the govern- ment of the country. The " garrisons " were commissioned to special fortresses — the Tower of London, Portsmouth, &c. The " guards " comprised the sovereign's bodyguards (" the yeomen of the guard " and " gentlemen-at-arms," who had existed since the times of Henry VII. and VIII.) , and the regiments

mentioned above. Even this small force, at first not exceeding 3000 men, was looked on with jealousy by parliament, and every attempt to increase it was opposed. The acquisition of Tangier and Bombay, as part of the dower of the infanta of Portugal, led to the formation of a troop of horse (now the 1st Royal Dragoons) and a regiment of infantry (the 2nd, now Queen's R.W. Surrey, regiment) for the protection of the former; and a regiment of infantry (afterwards transferred to the East India Company) to hold the latter (1661). These troops, not being stationed in the kingdom, created no distrust; but whenever, as on several occasions during Charles's reign, considerable armies were raised, they were mostly disbanded when the occasion ceased. Several regiments, however, were added to the permanent force, including Dumbarton's regiment (the 1st or Royal Scots, nicknamed Pontius Pilate's Bodyguard) — which had a long record of service in the armies of the continent, and represented the Scots brigade of Gustavus Adolphus's army — and the 3rd Buffs, representing the English regiments of the Dutch army and through them the volunteers of 1572, and on Charles's death in 1685 the total force of " guards and garrisons " had risen to 16,500, of whom about one-half formed what we should now call the standing army.

63. James II., an experienced soldier and sailor, was more obstinate than his predecessor in his efforts to increase the army, and Monmouth's rebellion afforded him the opportunity. A force of about 20,000 men was maintained in England, and a large camp formed at Hounslow. Eight cavalry and twelve infantry regiments (the senior of which was the 7 th " Royal " Fusiliers, formed on a new French model) were raised, and given the numbers which, with few exceptions, they still bear. James even proposed to disband the militia, which had not distinguished itself in the late rebellion, and further augment the standing army; and although the proposal was instantly rejected, he continued to add to the army till the Revolution deprived him of his throne. The army which he had raised was to a great extent disbanded, the Irish soldiers especially, whom he had introduced in large numbers on account of their religion, being all sent home.

The condition of the army immediately engaged the attention of parliament. The Bill of Rights had definitely established that " the raising or keeping of a standing army within the kingdom, unless it be by the consent of parliament, is against the law," and past experience made them very jealous of such a force. But civil war was imminent, foreign war certain; and William had only a few Dutch troops, and the remains of James's army, with which to meet the storm. Parliament therefore sanctioned a standing army, trusting to the checks established by the Bill of Rights and Act of Settlement, and by placing the pay of the army under the control of the Commons. An event soon showed the altered position of the

army. A regiment mutinied and declared for James. It was surrounded and compelled to lay down its arms; but William found himself without legal power to deal with the mutineers. He therefore applied to parliament, and in 1689 was passed the first Mutiny Act, which, after repeat- ing the provisions regarding the army inserted in the Bill of Rights, and declaring the illegality of martial law, gave power to the crown to deal with the offences of mutiny and desertion by courts-martial. From this event is often dated the history of the standing army as a constitutional force (but see Fortescue, British Army, i. 335).

64. Under William the army was considerably augmented. The old regiments of James's army were reorganized, retaining, however, their original numbers, and three of cavalry and eleven of infantry (numbered to the 28th) were added. In 1690 parlia- ment sanctioned a force of 62,000 men, further increased to

65,000 in 1691 ; but on peace being made in 1697 the Commons immediately passed resolutions to the effect that the land forces be reduced to 7000 men in England and 12,000 in Ireland. The War of the Spanish Succession quickly obliged Great Britain again to raise a large army, at one time exceeding 200,000 men; but of these the greater number were foreign troops engaged for the continental war. Fortescue (op. cit. i. 555) estimates the British forces at home and abroad as 70,000 men at the highest figure. After the peace of Utrecht the force was again reduced to 8000 men in Great Britain and 11,000 in the plantations (i.e. colonies) and abroad. From that time to the present the strength of the army has been determined by the annual votes of parliament, and though frequently the subject of warm debates in both houses, it has ceased to be a matter of dispute between the crown and parliament. The following table shows the fluctuations from that time onward — the peace years showing the average peace strength, the war years the maximum to which the forces were raised:—

Peace.

War.

Year.

Number.

Year.

Number

I750 .

• • 18,857

1745-

• 74,187

1793 •

• 17.013

1761 .

. 67,776

1822 .

• 71,790

1777 • •

• 90,734

1845 • •

. 100,011

1812 .

• 245,996

1857 • •

• 156,995

1856 .

• 275,079

1866 .

. 203,404

1858 . .

. 222,874

Note. — Prior to 1856 the British forces serving in India are not included.

During William's reign the small English army bore an honourable part in the wars against Louis XIV., and especially distinguished itself under the king at Steinkirk, Neerwinden and Namur. Twenty English regiments took part in the campaign of 1694. In the great wars of Queen Anne's reign the British army under Marlborough acquired a European reputation. The cavalry, which had called forth the admiration of Prince Eugene when passed in review before him after its long march across Germany (1704), especially distinguished itself in the battle of Blenheim, and Ramillies, Oudenarde and Malplaquet were added to the list of English victories. But the army as usual was reduced at once, and even the cadres of old regiments were disbanded, though the alarm of Jacobite insurrections soon brought about the re-creation of many of these. During the reign of the first and second Georges an artillery corps was organized, and the army further increased by five regiments of cavalry and thirty-five of infantry. Fresh laurels were won at Dettingen (1743), in which battle twenty English regiments took part; and though Fontenoy (q.v.) was a day of disaster for the English arms, it did not lower their reputation, but rather added to it. Six regiments of infantry won the chief glory of Prince Ferdinand's victory of Minden (q.v.) in 1759, and throughout the latter part of the Seven Years' War the British contingent of Ferdinand's army served with almost unvarying distinction in numerous actions. About this time the first English regiments were sent to India, and the 39th shared in Clive's victory at Plassey. During the first half of George III.'s reign the army was principally occupied in America; and though the conquest of Canada may be counted with pride among its exploits, this page in its history is certainly the darkest. English armies capitulated at Saratoga and at York- town, and the war ended by the evacuation of the revolted

or some of the officers, and recouped himself by selling the com- missions. This system— termed " raising men for rank " — was retained for many years, and originally helped to create the " purchase system " of promotion. For the maintenance of the regiment the colonel received an annual sum sufficient to cover the pay of the men, and the expenses of clothing and of recruiting. The colonel was given a " beating order," without which no enlistment was legal, and was responsible for maintain- ing his regiment at full strength. " Muster masters " were appointed to muster the regiments, and to see that the men for whom pay was drawn were really effective. Sometimes, when casualties were numerous, the allowance was insufficient to meet the cost of recruiting, and special grants were made. In war time

the ranks were also filled by released debtors, pardoned criminals, and impressed paupers and vagrants.- Where the men were raised by voluntary enlistment, the period of service was a matter of contract between the colonel and the soldier, and the engagement was usually for life; but exceptional levies were enlisted for the duration of war, or for periods of three or five years. As for the officers, the low rate of pay and the purchase system combined to exclude all but men of independent incomes. Appointments (except when in the gift of the colonel) were made by the king at home, and by the commander-in-chief abroad; even in Ireland the power of appointment rested with the local commander of the forces until the Union. The soldier was clothed by his colonel, the charge being defrayed from the " stock fund." The army lived in barracks, camps or billets. The barrack accommodation in Great Britain at the beginning of the 18th century only sufficed for five thousand men; and though it had gradually risen to twenty thousand in 1792, a large part of the army was constantly in camps and billets — the latter causing endless complaints and difficulties.

66. The first efforts of the army in the long war with France did not tend to raise its reputation amongst the armies of Europe. The campaigns of allied armies under the duke of York in the Netherlands, in which British contingents figured largely, were uniformly unsuccessful (1793-94 and 1799), though in this respect they resembled those of almost all soldiers who commanded against the " New French " army. The policy of the younger Pitt sent thousands of the best soldiers to un- profitable employment, and indeed to death, in the West Indies. At home the administration was corrupt and ineffective, and the people generally shared the contemptuous feeling towards the regular army which was then prevalent in Europe. But a better era began with the appointment of Frederick Augustus, duke of York, as commander-in-chief of the army. He did much to improve its organization, discipline and training, and was ably seconded by commanders of distinguished ability. Under Abercromby in Egypt, under Stuart at Maida, and under Lake, Wellesley and others in India, the British armies again attached victory to their standards, and made themselves feared and respected. . Later, Napoleon's threat of invading England excited her martial spirit to the highest pitch to which it had ever attained. Finally, her military glory was raised by the series of successful campaigns in the Peninsula, until it culminated in the great victory of Waterloo; and the army emerged from the war with the most solidly founded reputation of any in Europe.

The events of this period belong to the history of Europe,

states 0} America and the acknowiedgment of thejr independence.) and hS outside the province oi 'an a/tick deaiing on)/ with tbe 65. Before passing

to the great French Revolutionary wars, I army. The great augmentations required during the war were

effected partly by raising additional regiments, but principally by increasing the number of battalions, some regiments being given as many as four. On the conclusion of peace these battalions were reduced, but the regiments were retained, and

- . „ „ Revolutionary „„.„„

from which a fresh period in the history of the army may be dated, it will be well to review the general condition of the army in the preceding century, injured as it was by the distrust of parliament and departmental weakness and corruption which went far to neutralize the good work of the duke of Cumberland as commander-in-chief and of Pitt as war administrator. Regiments were raised almost as in the days of the Edwards. The crown contracted with a distinguished soldier, or gentleman of high position, who undertook to raise the men, receiving a certain sum as bounty-money for each recruit. In some cases, in lieu of money, the contractor received the nomination of all

the army was permanently increased from about twenty thousand, the usual peace establishment before the war, to an average of eighty thousand. The duke of York, on first appointment to the command, had introduced a uniform drill throughout the army, which was further modified according to Sir David Dundas's system in 1800; and, under the direction of Sir John Moore and others, a high perfection of drill was attained. At

the beginning of the war, the infantry, like that of the continental powers, was formed in three ranks; but a two-rank formation had been introduced in America and in India and gradually became general, and in 1809 was finally approved. In the Penin- sula the army was permanently organized in divisions, usually consisting of two brigades of three or four battalions each, and one or two batteries of artillery. The duke of Wellington had also brought the commissariat and the army transport to a high pitch of perfection, but in the long peace which followed these establishments were reduced or brokenup.

67. The period which elapsed between Waterloo and the Crimean War is marked by a number of Indian and. colonial wars, but by no organic

changes in the army, with perhaps the single exception of the Limited Service Act of 1847, by which enlistment for ten or twelve years, with power to re-engage to complete twenty-one, was substituted for the life enlistments hitherto in force. The army went to sleep on the laurels and recollections of the Peninsula. The duke of Wellington, for many years commander-in-chief, was too anxious to hide it away in the colonies in order to save it from further reductions or utter extinction, to attempt any great administrative reforms. The force which was sent to the Crimea in 1854 was an agglomeration of battalions, individually of the finest quality, but unused to work together, without trained staff, administrative departments or army organization of any kind. The lesson of the winter before Sevastopol was dearly bought, but was not thrown away. From that time successive war ministers and commanders-in- chief have laboured perseveringly at the difficult task of army organization and administration. Foremost in the work was Sidney Herbert (Lord Herbert of Lea), the soldier's friend, who fell a sacrifice to his labours (1861), but not before he had done much for the army. The whole system of administration was revised. In 1854 it was inconceivably complicated and cumbersome. The " secretary of state for war and colonies," sitting at the Colonial Office, had a general but vague control, practically limited to times of war. The " secretary at war " was the parliamentary representative of the army, and exercised a certain financial control, not extending, however, to the ordnance corps. The commander-in-chief was responsible to the sovereign alone in all matters connected with the discipline, command or patronage of the army, but to the secretary at war in financial matters. The master-general and board of ordnance were responsible for the supply of material on requisi- tion, but were otherwise independent, and had the artillery and engineers under them. The commissariat department had its headquarters at the treasury, and until 1852 the militia were under the home secretary. A number of minor subdepartments, more or less independent, also existed, causing endless confusion, correspondence and frequent collision. In 1854 the business of the colonies was separated from that of war, and the then secretary of state, the duke of Newcastle, assumed control over all the other administrative officers. In the following year the secretary of state was appointed secretary at war also, and the duties of the two offices amalgamated. The same year the commissariat office was transferred to the war department, and the Board of Ordnance abolished, its functions being divided between the commander-in-chief and the secretary of state. The minor departments were gradually absorbed, and the whole administra- tion divided under two great chiefs, sitting at the war office and Horse Guards respectively. In 1870 these two were welded . into one, and the war office now existing was constituted, Corresponding improvements were effected in every branch. The system of clothing the soldiers was altered, the contractu being taken from the colonels of

regiments, who received a money allowance instead, and the clothing supplied from government manufactories. The pay, food and general condition of the soldier were improved; reading and recreation rooms, libraries, gymnasia and facilities for games of all kinds being provided. Barracks (q.v.) were built on improved principles, and a large' permanent camp was formed at Aldershot, where considerable forces were collected and manoeuvred together. Various educa- tional establishments were opened, a staff college was established

for the instruction of officers wishing to qualify for the staff, and regimental schools were improved.

68. The Iridian Mutiny of 1857, followed by the transference of the government of India, led to important changes. The East India Company's white troops were amalgamated with the Queen's army, and the whole reorganized (see Indian Army below).

The fact that such difficulties as those of 1854 and 1857, not to speak of the disorders of 1848, had been surmounted by the weak, army which remained over from the reductions of forty years, coupled with the instantaneous and effective re- joinder to the threats of the French colonels in 1859 — the creation of the Volunteer Force — certainly lulled the nation and its repre- sentatives into a false sense of security. Thus the two obvious lessons Of the German successes of 1866 and 1870 — the power of a national army for offensive invasion, and the rapidity with which such an army when thoroughly organized could be moved — created the greatest sensation in England. The year 1870 is, therefore, of prime importance in the history of the regular forces of the crown. The strength of the home forces at different times between 1815 and 1870 is. given as follows (Biddulph, Lord Cardwell at the War Office) : —

Regulars.

Auxiliaries.

Field Guns.

1820

64,426

60,740

22

1830

50,876

34,6i4

30

1840

53.379

20,791

30

1850

68,538

29,868

70

i860

100,701

229,501

180

1870

89,051 ■ *(later 109,000)*

281,692

180

69. The period of reform commences therefore with 1870, and is connected indissolubly with the name of Edward, Lord Cardwell, secretary of state for war 1869-1874. In the matter of organization the result of his labours was seen in the perfectly arranged expedition to Ashanti (1874); as for recruiting, the introduction of short service and reserve enlistment together with many rearrangements of pay, &c, proved so far popular that the number of men annually enlisted was more than trebled (11,742 in 1869; 39,971 in 1885; 40,729 in 1898), and so far efficient that " Lord CardwelPs . . . system, with but small modification, gave us during the

Boer War 80,000 reservists, of whom 96 or 97 % were found efficient, and has enabled. us to keep, an army of. 150,000 regulars in the field lor 15 months" (Rt. Hon. St John Brodrick, House of Commons, 8th of March 1901). The localization of the army, subsequently completed by the territorial system of 1882, was commenced under Card- well's regime, and a measure which encountered much powerful opposition at the time, the abolition of the purchase of com- missions, was also effected by him (187 1). The .machinery of administration was improved, and autumn manoeuvres were practised on a scale hitherto unknown in England. In 1871 certain powers over the militia, formerly held by lords-lieutenant, were transferred to the crown, and the auxiliary forces were placed: directly under the generals commanding districts. In 1881 came an important change in the infantry of the line, which was entirely remodelled in two-battalion regiments bearing territorial titles. This measure (the " linked battalion " system) aroused great opposition; it was dictated chiefly by the neces- sity of maintaining the Indian and colonial garrisons at full strength, and was begun during Lord Cardwell's tenure of office, the principle being that each regiment should have one battalion at home and one abroad, the latter being fed by the former, which in its turn drew ,upon the reserve to complete it for war. The working of the system is to be considered as belonging to present practice rather than to history, and the reader is there- fore referred to the article United Kingdom. On these general lines the, army progressed up to 1899, when the Boer War called into the field on a distant theatre of war all the resources of the regular army, and in addition drew largely upon the existing auxiliary forces, and - even upon wholly untrained civilians, for the numbers required to make war in an area which

comprised nearly all Africa south of the Zambezi. As the result of this war (see Transvaal) successive schemes of reform were undertaken by the various war ministers, leading up to Mr Haldane's "territorial" scheme (1008), which put the organiza- tion of the forces in the United Kingdom (q.v.) on a new basis. Innovations had not been unknown in the period immediately preceding the war; as a single example we may take the develop- ment of the mounted infantry (q.v.) It was natural that the war itself, and especially a war of so peculiar a character, should intensify the spirit of innovation. The corresponding period in the German army lasted from 1871 to 1888, and such a period of unsettlement is indeed the common, practically the universal, result of a war on a large scale. Much

that was of value in the Prussian methods, faithfully and even slavishly copied by Great Britain as by others after 1870, was temporarily forgotten, but the pendulum swung back again, and the Russo-Japanese War led to the disappearance, so far as Europe was concerned, of many products of the period of doubt and controversy which followed the struggle in South Africa. Side by side with con- tinuous discussions of the greater questions of military policy, amongst these being many well-reasoned proposals for universal service, the technical and administrative efficiency of the service has undergone great improvement, and this appears to be of more real and permanent value than the greater part of the solutions given for the larger problems. The changes in the organization of the artillery afford the best evidence of this spirit of practical and technical reform. In the first place the old " royal regi- ment " was divided into two branches. The officers for the field and horse artillery stand now on one seniority list for promotion, the garrison, heavy and mountain batteries on another. In each branch important changes of organization have been also made. In the field branch, both for Royal Field and Royal Horse Artillery, the battery is no longer the one unit for all purposes. A lieutenant-colonel's command, the " brigade," has been created. It consists of a group, in the horse artillery of two, in the field artillery of three batteries. For the practical training of the horse and field artillery a large area of ground on the wild open country of Dartmoor, near Okehampton, has for some years been utilized. A similar school has been started at Glen Imaal in Ireland, and a new training ground has been opened on Salisbury Plain. Similarly, with the Royal Garrison Artillery a more perfect system has been devised for the regulation and practice of the fire of each fortress, in accordance with the vary- ing circumstances of its position, &c. A practice school for the garrison artillery has been established at Lydd, but the various coast fortresses themselves carry out regular practice with service ammunition.

Indian Army 70. Historically, the Indian army grew up in three distinct divisions, the Bengal, Madras and Bombay armies. This separa- tion was the natural result of the original foundation of separate settlements and factories in India; and each retains to the present day much of its old identity.

Bengal. — The English traders in Bengal were long restricted by the native princes to a military establishment of an ensign and 30 men; and this force may be taken as the germ of the Indian army. In 1681 Bengal received the first reinforcement from Madras, and two years later a company was sent from Madras, raising the little Bengalarmy to a strength of 250 Europeans. In 1695 native soldiers were first enlisted. In 1701-1702 the garrison of Calcutta consisted of 120 soldiers and seamen gunners. In 1756 occurred the defence of Calcutta against Suraj-ud-Dowlah, and the terrible tragedy of the Black Hole. The work of reconquest and punishment was carried out

by an expedition from Madras, and in the little force with which Clive gained the great victory of Plassey the Bengal army was represented by a few hundred men only (the British 39th, now Dorsetshire regiment, which was also present, was the first King's regiment sent to India, and bears the motto Primus in Indis) ; but from this date the military power of the Company rapidly increased. A company of artillery had been organized in 1748; and in 1757, shortly before Plassey, the 1st regiment of Bengal native infantry was raised. Next, in 1759 the native infantry was augmented, in 1760 dragoons were raised, and in 1763 the total forces amounted to 1500 Europeans and 12 battalions of native infantry (11,500 men). In 1765 the European infantry was divided into 3 regiments, and

the whole force was organized in 3 brigades, each consisting of 1 company of artillery, 1 regiment European infantry, 1 troop of native cavalry, and 7 battalions of sepoys. In 1 766, on the reduction of some money allowances, a number of officers of the Bengal army agreed to resign their commissions simultaneously. This dangerous combination was promptly put down by Clive, to whom the Bengal army may be said to owe its existence.

The constant wars and extensions of dominion of the next thirty years led to further augmentations; the number of brigades and of European regiments was increased to 6; and in 1794 the Bengal army numbered about 3500 Europeans and 24,000 natives.

71. Madras. — The first armed force in the Madras presidency was the little garrison of Armegon on the Coromandel coast, consisting of 28 soldiers. In 1644 Fort St George was built and garrisoned, and in 1653 Madras became a presidency. In 1745 the garrison of Fort St George consisted of 200 Europeans, while a similar number, with the addition of 200 " Topasses " (descendants of the Portu- guese), garrisoned Fort St David. In 1748 the various independent companies on the Coromandel coast and other places were con- solidated into the Madras European regiment. From this time the military history of the Madras army was full of incident, and it bore the principal part in Clive's victories of Arcot, Kavaripak and Plassey. In 1754 the 39th regiment of the Royal army was sent to Madras. In 1758 three others followed. In 1772 the Madras army numbered 3000 European infantry and 16,000 natives, and in 1784 the number of native troops had risen to 34,000.

72. Bombay. — The island of Bombay formed part of the marriage portion received by Charles II. with the infanta of Portugal, and in 1662 the Bombay regiment of Europeans was raised to defend it. In 1668 the island was granted to the Company, and the regiment af the same time transferred to them. In 1708 Bombay became a presidency, but it did not play so important a part as the others in the early extension of British

power, and its forces were not so rapidly developed. It is said, however, to have been the first to discipline native troops, and Bombay sepoys were sent to Madras in 1747, and took part in the battle of Plassey in 1757. In 1772 the Bombay army consisted of 2500 Europeans and 3500 sepoys, but in 1794, in consequence of the struggles with the Mahratta power, the native troops had been increased to 24,000.

73. Consolidation of the Army. — In 1796 a general reorganization took place. Hitherto the officers in each presidency had been borne on general " lists," according to branches of the service. These lists were now broken up and cadres of regiments formed. The colonels and lieutenant-colonels remained on separate lists, and an establishment of general officers was created, while the divisional commands were distributed between the royal and Company's officers. Further augmentations took place, consequent on the great extension of British supremacy. In 1798 the native infantry in India numbered 122 battalions. In 1808 the total force in India amounted to 24,500 Europeans and 154,500 natives.

The first half of the 19th century was filled with wars and annexa- tions and the army was steadily increased. Horse artillery was formed, and the artillery in general greatly augmented. " Irregular cavalry " was raised in Bengal and Bombay, and recruited from a better class of troopers, who received high pay and found their own horses and equipment. " Local forces " were raised in various parts from time to time, the most important being the Punjab irregular force (raised after the annexation of the Punjab in 1849), consisting of 3 field batteries, 5 regiments of cavalry, and 5 of infantry, and the Nagpur and Oudh irregular, forces. Another kind of force, which had been gradually formed, was that called " contingents " — troops raised by the protected native states. The strongest of these was that of Hyderabad, originally known as the nizam's army. Changes were also made in the organization of the army. Sanitary improvements were effected, manufacturing establishments instituted or increased, and the administration generally improved.

74. The Army before the Mutiny. — The officering and recruiting of the three armies were in all essentials similar. The officers were mainly supplied by the Company's military college at Addiscombe in Surrey (established in 1809), and by direct appointments. The Bengal army was recruited from Hindustan,' the infantry being mostly drawn from Oudh and the great Gangetic plains. The soldiers were chiefly high-caste Hindus, a sixth being Mahommedans. The cavalry was composed mainly of Mahommedans, recruited from Rohilkhand and the Gangetic Doab. The only other elements in the army were four Gurkha regiments, enlisted from Nepal, and the local Punjab irregular force. The Madras army was chiefly recruited from that presidency, or the native states connected with it, and

consisted of Mahommedans, Brahmans, and of the Mahratta, Tamil and Telugu peoples. The Bombay army was recruited from its own presidency, with some Hindustanis,, but chiefly formed of Mahrattas arid Mahommedans; the Bombay light cavalry mainly from Hindustan proper.*

Including the local and irregular troops (about 100,000 strong), the total strength amounted to 38,000 Europeans of all arms, with 276 field guns, and 348,000 native troops, .with 248 field guns, — truly a magnificent establishment, and, outwardly, worthy of the great empire which England had created for herself in the East, but in- wardly unsound, and on the very verge of the great mutiny of

1857-

6i6

ARMY

[CANADIAN

In 1856 the establishment in the several presidencies was as follows: —

Bengal.

Madras.

Bombay.

Total.

British Cavalry Regiments British Infantry Battalions Company's European Battalions European and Native Artillery

Battalions …. Native Infantry Battalions Native Cavalry Regiments

2

15

3

12

74 28

1 3 3

7 52

■*8*

1

4 3

5 29

3

4 22

9

24

155

39

An account of the events of 1857-58 will be found under Indian Mutiny. After the catastrophe the reorganization of the military forces on different lines was of course unavoidable. Fortunately, the armies of Madras and Bombay had been almost wholly untouched by the spirit of disaffection, and in the darkest days the Sikhs, though formerly enemies of the British, had not only remained faithful to them, but had rendered them powerful assistance.

75. The Reorganization. — By the autumn of 1 858 the mutiny was virtually crushed, and the task of reorganization commenced. On the 1st of September 1858 the East India Company ceased to rule, and Her Majesty's government took up the reins of power. On the important question of the army, the opinions and advice of the most distinguished soldiers and civilians were invited. Masses of reports and evidence were collected in India, and by a royal commission in England. On the report of this commission the new system was based. The local European army was abolished., and its personnel amalgamated with the royal army. The artillery became wholly British, with the exception of a few native mountain batteries. The total strength of the British troops, all of the royal army, was largely increased, while that of the native troops was largely diminished. Three distinct native armies — those of Bengal, Madras and Bombay — were still maintained. The reduced Indian armies consisted of cavalry and infantry only, with a very few artillery, distributed as follows: —

Battalions

Regiments

Infantry.

Cavalry.

Bengal

49

19

Madras

40

4

Bombay

3°

7

Punjab Force

12

6

Total … 131 36

There were also three sapper battalions, one to each army.

The Punjab force, which had 5 batteries of native artillery attached to it, continued under the Punjab government. In addition, the Hyderabad contingent of 4 cavalry, 6 infantry regiments and 4 batteries, and a local force in central India of 2 regiments cavalry and 6 infantry, were retained under the government of India. After all the arrangements had been completed the army of India consisted of 62,000 British and 125,000 native troops.

76. The Modern Army. — The college at Addiscombe was closed in i860, and the direct appointment of British officers to the Indian local forces ceased in 1861. In that year a staff corps was formed by royal warrant in

each presidency " to supply a body of officers for service in India, by whom various offices and appointments hitherto held by officers borne on the strength of the several corps in the Indian forces shall in future be held. Special rules were laid down. The corps was at first recruited partly from officers of the Company's service and partly from the royal army, holding staff appointments (the new regimental employment being considered as staff duty) and all kinds of political and civil posts; for the system established later see India : Army. The native artillery and sappers and miners were to be officered from the Royal Artillery and Royal Engineers. The only English warrant and non-commissioned officers now to be employed in the native army were to be those of the Royal Engineers with the sappers and miners.

A radical change in the regimental organization of all the native armies was effected in 1863. The Punjab Frontier Force was from the first organized on the irregular system, which was there seen at its best, as also were the new regiments raised during the Mutiny. This system was now applied to the whole army, each regiment and battalion having seven British officers attached to it for command and administrative duties, the immediate command of troops and companies being left to the native officers. Thus was the system reverted to, which was initiated by Clive, of a few British officers only being attached to each corps for the higher regimental duties of command and. control. Time had shown that this was more effective than the regular system instituted in 1 796 of British officers commanding troops and companies.

A new spirit was breathed into the army. The supremacy of the commandant was the main principle. He was less hampered by the unbending regulations enjoined upon the old regular regiments, had greater powers of reward and punishment, was in a position to assume larger responsibility and greater freedom of action, and was supported in the full exercise of his authority. The system made the officers.

Up to 1881 the native army underwent little change, but in that year 18 regiments of infantry and 4 of cavalry were broken up, almost the same total number of men being maintained in fewer and stronger regiments. The only reduction made in the British troops was in the Royal Artillery, which was diminished by II batteries. The events of 1885, however, on the Russo-Afghan frontier, led to augmentations. The 11 batteries Royal Artillery were brought back from England; each of the 9 British cavalry regiments in India received a fourth squadron ; each of the British infantry battalions was increased by 100 men, and 3 battalions were added. The native cavalry had a fourth squadron added to each regiment ; three of the four regiments broken up in 1881 were re-raised, while the native infantry was increased in regimental strength, and 9 new battalions raised composed of

Gurkhas, Sikhs and Punjabis. The addition in all amounted to 10,600 British and 21,200 native troops. In 1890 the strength of the army of India was 73,000 British and, including irregulars, 147,500 native troops. For the Indian volunteers, see Volunteers.

Many important changes took place between 1885 and 1904. Seven Madras infantry regiments were converted into regiments for service in Burma, composed of Gurkhas and hardy races from northern India; six Bengal and Bombay regiments were similarly converted into regiments of Punjabis, Pathans and Gurkhas; the native mountain batteries have been increased to ten ; a system of linked battalions has been introduced with the formation of regi- mental centres for mobilization; and reserves for infantry and mountain artillery have been formed. The number of British officers with each regiment has been increased to nine, and the two wing commands in battalions have been converted into 4 double-company commands of 250 men each, under a British commander, who is responsible to the commandant for their training and efficiency, the command of the companies being left to the native officers. This system, which is analogous to the squadron command in the cavalry, admits of closer individual attention to training, and distributes among the senior British regimental officers effective responsibility of a personal kind.

An addition (at the imperial expense) of five battalions of Sikhs, Punjabi Mahommedans, Jats and hillmen in northern India was made in 1900, as the result of India being called upon to furnish garrisons for Mauritius and other stations overseas.

The unification of the triplicate army departments in the different presidential armies was completed in 189 1, all being brought directly under the supreme government ; and the three separate staff corps of Bengal, Madras and Bombay were fused into one in 1891 as the Indian Staff Corps. The term " Indian Staff Corps " was in turn replaced by that of " Indian Army " in 1903. These measures

Prepared the way for the new system of army organization which, y authority of parliament, abolished divided control and placed the whole army of India under the governor-general and the commander-in-chief in India.

Canadian Forces 77. In the earliest European settlements in Canada, the necessity of protection against Indians caused the formation of a militia, ancyin 1665 companies were raised in every parish. The military history of the Canadian forces under French rule is full of incident, and they served not only against Indian raiders but also against the troops of Great Britain arid of her North American colonies. Six militia battalions took part in the

defence of Quebec in 1759, and even the transfer of Canada from the French to the British crown did not cause the disbandment of the existing forces. The French Canadians distinguished themselves not less than the British settlers in the War of American Independence, and in particular in the defence of Quebec against Montgomery and Arnold. In 1787 an ordinance was made whereby three battalions of the militia were permanently embodied, each contingent serving for two years, at the end of which time a fresh contingent relieved it, and after this a succession of laws and regulations were made with a view to complete organization of the force. The brunt of the fighting on the American frontier in the war of 1812 was borne very largely by the permanent force of three battalions and the fresh units called out, all these being militia corps. Up to 1828 a distinction had been made between the British and the French regiments: this was then abolished. The militia was again employed on active service during the disturbances of 1837, and the " Active Militia " in 1863 had grown to a strength of 25,000 men. The Fenian troubles of 1864 and 1866 caused the embodiment of the Canadian forces once more. In 1867 took place the unification of Canada, after which the whole force was completely organized on the basis of a militia act (1868). A department of Militia and Defence with a responsible minister was established, and the strength of the active militia of all arms was fixed at 40,000 rank and file. Two years later the militia furnished 6000 men to deal with the Fenian Raid of 1870, and took part in Colonel (Lord) Wolseley's Red River expedition. In 1871 a permanent force, serving the double purpose of a regular nucleus and an instructional cadre, was organized in two troops of cavalry, two batteries of artillery and one regiment of infantry, and in 1876 the Royal Military College of Canada was founded at Kingston. In 1885 the Riel rebellion was dealt with, and the important action of Batoche won, by the militia, without assistance from regular

troops. In the same year Canada contributed a force of voyageurs to the Nile expedition of Lord Wolseley ; the experience of these men was admittedly of great assistance in navigating the Rapids. The militia sent contingents of all arms to serve in the South African War, 1899-1902, including " Strathcona's Horse," a special corps, recruited almost entirely from the Active Militia and the North-west Mounted Police. The latter, a permanent constabulary of mounted riflemen, was formed in 1873.

After the South African War an extensive scheme of reorganization was

taken in hand, the command being exercised for two years (i902-i904)by Major-General Lord Dundonald, and subsequently by a militia council (Militia Act 1904), similar in constitution to the home Army Council. For details of the present military strength of Canada, see the article Canada.

Austrian Army

78. The Landsknecht infantry constituted the mainstay of the imperial armies in the 16th century. Maximilian I. and Charles V. are recorded to have marched and carried the " long pike " in their ranks. Maximilian also formed a corps of Kyrisser, who were the origin of the modern cuirassiers. It was not, however, until much later that the Austrian army came into existence as a permanent force. Rudolph II. formed a small standing force about 1600, but relied upon the " enlistment " system, like other sovereigns of the time, for the bulk of his armies. The Thirty Years' War produced the permanence of service which led in all the states of Europe to the rise of standing armies. In the Empire it was Wallenstein who first raised a distinctly imperial army of soldiers owing no duty but to the sovereign; and it was the suspicion that he intended to use this army, which was raised largely at his own expense, to further his own ends, that led to his assassination. From that time the regiments belonged no longer to their colonels, but to the emperor; and the oldest regiments in the present Austrian army date from the Thirty Years' War, at the close of which Austria had 19 infantry, 6 cuirassier and 1 dragoon regiments. The almost continuous wars of Austria against France and the Turks (from 1495 to 1S95 Austrian troops took part in 7000 actions of all sorts) led to a continuous increase in her establishments. The wars of the time of Montecucculi and of Eugene were followed by that of the Polish Succession, the two Turkish wars, and the three great struggles against Frederick the Great. Thus in 1763 the army had been almost continuously on active service for more than 100 years, in the course of which its organization had been modified in accordance with the lessons of each war. This, in conjunction with the fact that Austria took part in other Turkish campaigns subsequently, rendered this army the most formidable opponent of the forces of the French Revolution (1792). But the superior leading, organization and numbers of the emperor's forces were totally inadequate to the magnitude of the task of suppressing the Revolutionary forces, and though such victories as Neerwinden were sufficient proof of the efficiency and valour of the Austrians, they made no headway. In later campaigns, in which the enemy had acquired war experience, and the best of their officers had come to the front, the tide turned against the Imperialists even on the field of battle. The archduke Charles's victories of 1796 were more than counterbalanced by Bonaparte's Italian campaign, and the temporary success of 1799 ended at Marengo and Hohenlinden.

79. The Austrians, during the short peace which preceded the war of 1805, suffered, in consequence of all this, from a feeling of distrust, not merely in their leaders, but also in the whole system upon which the army was raised, organized and trained. This was substantially the same as that of the Seven Years' War time. Enlistment being voluntary and for long service, the numbers necessary to cope with the output of the French conscription could not be raised, and the inner history of the Austrian headquarters in the Ulm campaign shows that the dissensions and mutual distrust of the general officers had gone far towards the disintegration of an army which at that time had the most esprit de corps and the highest military qualities of any army in Europe. But the disasters of 1805 swept away good and bad alike in the abolition of the old system. Already the archduke Charles had designed a " nation in arms " after the French model, and on this basis the reconstruction

was begun. The conscription was put in force and the necessary numbers thus obtained; the administration was at the same time reformed and the organization and supply services brought into line with modern requirements. The war of 1809 surprised Austria in the midst of her reorganization, yet the new army fought with the greatest spirit. The invasion of Bavaria was by no means so leisurely as it had been in 1805, and the archduke Charles obtained one signal victory over Napoleon in person. Aspern and Wagram were most desperately contested, and though the archduke ceased to take part in the administration after 1809 the work went on steadily until, in 18 13, the Austrian armies worthily represented the combination of discipline with the " nation in arms " principle. Their intervention in the War of Liberation was decisive, and Austria, in spite of her territorial losses of the past years, put into the field well-drilled armies far exceeding in numbers those which had appeared in the wars of the Revolution. After the fall of Napoleon, Austria's hold on Italy necessitated the maintenance of a large army of occupation. This army, and in particular its cavalry, was admittedly the best in Europe, and, having to be ready to march at a few days' notice, it was saved from the deadening influence of undisturbed peace which affected every other service in Europe from 1815 to 1850.

80. The Austrian system has conserved much of the peculiar tone of the army of 1848, of which English readers may obtain a good idea from George Meredith's Vittoria. It was, however, a natural result of this that the army lost to some considerable extent the spirit of the " nation in arms " of 1809 and 1813. It was employed in dynastic wars, and the conscription was of course modified by substitution; thus, when the war of 1859 resulted unfavourably to the Austrians, the army began to lose confidence, precisely as had been the case in 1805. Once more, in 1866, an army animated by the purely professional spirit, which was itself weakened by

distrust, met a " nation in arms," and in this case a nation well trained in peace and armed with a breechloader. Bad staff work, and tactics which can only be described as those of pique, precipitated the disaster, and in seven weeks the victorious Prussians were almost at the gates of Vienna.

The result of the war, and of the constitutional changes about this time, was the re-adoption of the principles of 1806-1813, the abolition of conscription and long service in favour of universal service for a short term, and a thorough reform in the methods of command and staff work. It has been said of the Prussian army that " discipline is — the officers." This is more true of the " K.K." army 1 than of any other in Europe; the great bond of union between the heterogeneous levies of recruits of many races is the spirit of the corps of officers, which retains the personal and professional characteristics of the old army of Italy.

French Army

81. The French army (see for further details France: Law and Institutions) dates from the middle of the 15th century, at which time Charles VII. formed, from mercenaries who had served him in the Hundred Years' War, the compagnies d'ordon- nance, and thus laid the foundation of a national standing army. But the armies that followed the kings in their wars still consisted mainly of mercenaries, hired for the occasion; and the work of Charles and his successors was completely undone in the confusion of the religious wars. Louvois, was minister of Louis XIV., was the true creator of the French royal army. The organization of the first standing army is here given in some detail, as it served as a model for all armies for more than a century, and is also followed to some extent in our own times. Before the advent of Louvois, the forces were royal only in name. The army was a fortuitous concourse of regiments of horse and foot, each of which was the property of its colonel. The companies similarly

1 The phrase " K. und K." {Kaiserlich und Koniglich) is applied to all services common to the Austrian and Hungarian armies. " K.-K." {Kaiserlich-Koniglich) refers strictly only to the troops of Austria, the Hungarian army being known as the " K.Uug." (Royal Hungarian) service.

belonged to their captains, and, the state being then in no condi- tion to buy out these vested interests, superior control was almost illusory. Indeed, all the well-known devices for eluding such control, for instance, showing

imaginary men on the pay lists, can be traced to the French army of the 16th century. . A further difficulty lay in the existence of the offices called Colonel-General, Marshal-General and Grand Master of Artillery, between whom no common administration was possible. The grand master survived until 1743, but Louvois managed to suppress the other offices, and even to put one of his own subordinates into the office of grand master. Thus was assured direct royal control, exer- cised through the war minister. Louvois was unable indeed to overthrow the proprietary system, but he made stringent regulations against abuses, and confined it to the colonels (mcstre de camp in the cavalry) and the captains. Henceforward the colonel was a wealthy noble, with few duties beyond that of spending money freely and of exercising his court influence on behalf of his regiment. The real work of the service was done by the lieutenant-colonels and lieutenants, and the king and the minister recognized this on all occasions. Thus Vauban was given, as a reward for good service, a company in the " Picardie " regiment without purchase. Promotions from the ranks were very rare but not unknown, and all promotions were awarded according to merit except those to captain or colonel. One of the captains in a regiment was styled major, and acted as adjutant. This post was of course filled by selection and not by purchase. The grades of general officers were newly fixed by Louvois — the brigadier, -marichal de camp, lieutenant-general and marshal of France. The general principle was to give command, but not promotion, according to merit. The rank and file were recruited by voluntary enlistment for four years' service. The infantry company was maintained in peace at an effective of 60, except in the guards and the numerous foreign corps, in which the company was always at the war strength of 100 to 200 men. This arm was composed, in 1678, of the Gardes franc.aises, the Swiss guards, the old (vieux and pctits vieux) regiments of the line, of which the senior, " Picardie," claimed to be the oldest regiment in Europe, and the regiments raised under the new system. The regiment dn roi, which was deliberately made the model of all others and was commanded by the celebrated Martinet, was the senior of these latter. The whole infantry arm in 1678 numbered 320,000 field and garrison troops. The cavalry consisted of the Maison du Roi (which Louvois converted from a " show " corps to one of the highest discipline and valour), divided into the Gardes du Corps and the M ousquetaircs , the Gendarmerie (descended from the old feudal cavalry and the ordmmance companies) and the line cavalry, the whole being about 55,000 strong. There were also 10,000 dragoons. In addition to the regular army, the king could call out, in case of need, the ancient arriere-ban or levy, as was in fact done in 1674. On that occasion, however, it behaved badly, and it was not again employed. In 16SS Louvois organized a militia raised by ballot. This numbered 25,000 men and proved to be better, at any rate, than the arriere- ban. Many infantry regiments of the line were, as has been said,

foreign, and in 1678 the foreigners nvimbered 30,000, the greater part of these being Swiss.

82. The artillery had been an industrial concern rather than an arm of the service. In sieges a sum of money was paid for each piece put in battery, and the grand master was not subordinated to the war office. A nominee of Louvois, as has been said, filled the post at this time, and eventually Louvois formed companies of artillerymen, and finally the regiment of " Fusiliers " which Vauban described as the " finest regiment in the world." The engineer service, as organized by Vauban, was composed of engineers " inordinary," and of line officers especially employed in war. Louvois further introduced the system of magazines. To ensure the regular working of supply and transport, he instituted direct control by the central executive, and stored great quantities of food in the fortresses, thereby securing for the French armies a precision and certainty in military operations which had hitherto been wanting. The higher administration of the army, under the minister of war, fell into two branches,

that of the commissaries and that of the inspecting officers. The duties of the former resembled those of a modern " routine " staff — issue of equipment, checking of returns, &c. The latter exercised functions analogous to those of a general staff, super- vising the training and general efficiency of the troops. Louvois also created an excellent hospital service, mobile and stationary, founded the Hotel des Invalides in Paris for the maintenance of old soldiers, established cadet schools for the training of young officers, and stimulated bravery and good conduct by reviving and creating military orders of merit.

*8ˆ. Thelasthalf of the 1 7th century is a brilliant period in the annals of the French armies. Thoroughly organized, animated by the presence of the king, and led by such generals as Conde, Turenne, Luxembourg, Catinat and Vendome, they made head against coalitions which embraced nearly all the powers of Europe, and made Fra*nce the first military nation of Europe. The reverses of the later part of Louis XIV.'s reign were not of course without result upon the tone of the French army, and the campaigns of Marlborough and Eugene for a time diminished the repute in which the troops of Louis were held by other powers. Nevertheless the War of the Spanish Succession closed with French victories, and generals of the calibre of Villars and Berwick were not to be found in the service of every prince. The war of the Polish Succession in Germany and Italy reflected no discredit upon the French arms; and the German general staff, in its history of the wars of Frederick the Great, states that " in 1740 the French army was still regarded as the first in Europe." Since the death of Louvois very little had changed. The army was still governed as it had been by the great war minister, and some- thing had been done to reduce evils against which*

even he had been powerless. A royal regiment of artillery had come into existence, and the engineers were justly regarded as the most skilful in Europe. Certain alterations had been made in the organization of both the guard and the line, and the total strength of the French in peace was somewhat less than 200,000. Relatively to the numbers maintained in other states, it was thus as powerful as before. Indeed, only one feature of importance differentiated the French army from its contemporaries — the proportion of officers to men, which was one to eleven. In view of this, the spirit of the army was necessarily that of its officers, and these were by no means the equals of their predecessors of the time of Turenne or Luxembourg. Louvois' principle of employing professional soldiers for command and wealthy men for colonelcies and captaincies was not deliberately adopted, but inevitably grew out of the circumstances of the time. The system answered fairly whilst continual wars gave the professional soldiers opportunities for distinction and advancement. But in a long peace the captains of eighteen and colonels of twenty-three blocked all promotion, and there was no work save that of routine to be done. Under these conditions the best soldiers sought service in other countries, the remainder lived only for pleasure, whilst the titular chiefs of regiments and companies rarely appeared on parade. Madame de Genlis relates how, when young courtiers departed to join their regiments for a few weeks' duty, the ladies of the court decked them with favours, as if proceeding on a distant and perilous expedition.

On the other hand, the fact that the French armies required large drafts of militia to bring up their regular forces to war strength gave them a vitality which was unusual in armies of the time. Even in the time of Louis XIV. the military spirit of the country had arisen at the threat of invasion, and the French armies of 1709 fought far more desperately, as the casualty lists of the allies at Malplaquet showed, than those of 1703 or 1704. In the time of the Revolution the national spirit of the French army formed a rallying-point for the forces of order, whereas Prussia, whose army was completely independent of the people, lost all power of defending herself after a defeat in the field. It is difficult to summarize the conduct of the royal armies in the wars of 1740-63. With a few exceptions the superior leaders proved themselves incompetent, and in three great battles, at least, the troops suffered ignominious defeat (Dettingen 1743, Rossbach 1757, Minden 1759). On the other hand,

Marshal Saxe and others of the younger generals were excellent commanders, and Fontenoy was a victory of the first magnitude. The administration, however, was corrupt and inefficient, and the general reputation of the French armies fell so low that Frederick the Great once refused an important command to one of his generals on the ground that his experience had been gained only against French troops.

Under Louis XVT. things improved somewhat; the American War and the successes of Lafayette and Rochambeau revived a more warlike spirit. Instruction was more carefully attended to, and a good system of drill and tactics was elaborated at the camp of St Omer. Attempts were made to reform the adminis- tration. Artillery and engineer schools had come into existence, and the intellectual activity of the best officers was remarkable (see Max Jahns, Cesch. der Kriegswissenschaften, vol. iii. passim). But the Revolution soon broke over France, and the history of the royal army was henceforward carried on by that revolu- tionary army, which, under a new flag, was destined to raise the military fame of France to its greatest height.

84. If Louis was the creator of the royal army, Carnot was so of the revolutionary army. At the outbreak of the Revolution the royal army consisted of 224 infantry battalions, 7 regiments of artillery, and 62 regiments of cavalry, numbering about 173,000 in all, but capable of augmentation on war strength to 210.000. To this might be added about 60,000 militia (see Chuquet, Premiere invasion prussienne) .

The first step of the Constituent Assembly was the abrogation of an edict of 1781 whereby men of non-noble birth had been denied commissioned rank (1790). Thus, when many of the officers emigrated along with their fellows of the noblesse, trained non-commissioned officers, who would already have been officers save for this edict, were available to fill their places. The general scheme of reform (see Conscription) was less satis- factory, but the formation of a National Guard, comprising in theory the whole military population, was a step of the highest importance. At this time the titles of regiments were abandoned in favour of numbers, and the costly and dangerous Maison du Roi abolished. But voluntary enlistment soon failed; the old corps, which kept up their discipline, were depleted, and the men went to the volunteers, where work was less exacting and promotion more rapid. " Aussi fut-on," says a French writer, " reduit bicnlot a forcer I' engagement volontaire ei a imposer le choix du corps." The " first invasion " (July 1792) put an end to half-measures, and the country was declared " in danger." Even these measures, however, were purely designed to meet the emergency, and, after Valmy, enthusiasm waned to such a degree that, of a paper strength of 800,000 men (December 1792), only 112,000 of the line and 290,000 volunteers were actually present. The disasters of the following spring once more called for extreme energy, and 300,000

national guards were sent to the line, a step which was followed by a compulsory levee en masse; one million men were thus assembled to deal with the manifold dangers of civil and foreign war. France was saved by mere numbers and the driving energy of the Terrorists, not by discipline and organization. The latter was chaotic, and almost every element of success was wanting to the tumultuary levies of the year 1793 save a ferocious energy born of liberty and the guillotine. But under the Terrorist regime the army became the rallying-point of the nation, and when Lazare Carnot (q.v.) became minister of war a better organization and discipline began to appear. The amalgamation of the old army and the volunteers, which had been commenced but imperfectly carried out, was effected on a different and more thorough principle. The infantry was organized in demi-brigades of three battalions (usually one of the old army to two of volunteers). A permanent organization in divisions of all arms was introduced, and the ablest officers selected for the commands. Arsenals and manu- factories of warlike stores were created, schools of instruction were re-established; the republican forces were transformed from hordes to armies, well disciplined, organized and equipped. Later measures followed the same lines, and the artillery and engineers, which in 1790 were admittedly the best

in Europe and which owing to the roturier element in their officer cadres had not been disorganized' by the emigration, steadily improved. The infantry, and in a less degree the cavalry, became good and trustworthy soldiers, and the glorious campaigns of 1794, 1795 and 1796, which were the direct result of Carnot's administration, bore witness to the potentialities of the essentially modern system. But, great as was the triumph of 1796-97, the exhaustion of years of continuous warfare had made itself felt: the armies were reduced to mere skeletons, and no sufficient means existed of replenishing them, till in 1798 the conscription was introduced. From that time the whole male population of France was practically at her ruler's disposal ; and Napoleon had full scope for his genius in organizing these masses. His principal improvements were effected in the interval between the peace of Amiens and the war with the third coalition, while threatening the invasion of England. His armies were collected in large camps on the coasts of the Channel, and there received that organization which, with minor variations, they retained during all his campaigns, and which has since been copied by all European nations. The divisions had already given place to the army corps, and Napoleon completed the work of his predecessors. He withdrew the whole of the cavalry and a portion of the artillery from the divisions, and thus formed " corps troops " and cavalry and artillery reserves for the whole army. The grade of marshal of France was revived at Napoleon's coronation. At the same time, the operation of Jourdan's law, acquiesced in during times of

national danger and even during peace, soon found opposition when the conscripts realized that long foreign wars were to be their lot. It was not the actual losses of the field armies, great as these undoubtedly were, which led Napoleon in the full tide of his career to adopt the fatal practice of " anticipating " the conscription, but the steady increase in the number of refractaires, men who refused to come up for service. To hunt these men down, no less than forty thousand picked soldiers were engaged within the borders of France, and the actual French element in the armies of Napoleon grew less and less with every extension of the empire. Thus, in the Grand Army of 1809, about one- third of the corps of all arms were purely German, and in 181 2 the army which invaded Russia, 467,000 strong, included 280,000 foreigners. In other words, the million of men produced by the original conscription of 1793 had dwindled to about half that number (counting the various subsidiary armies in Spain, &c), and one hundred thousand of the best and sturdiest Frenchmen were engaged in a sort of civil war in France itself. The conscription was " anticipated " even in 1806, the conscripts for 1807 being called up before their time. As the later wars of the Empire closed one by one the foreign sources of recruiting, the conscription became more terrible every year, with the result that more rifractaires and more trusted soldiers to hunt them down were kept in non- effective employment. Finally the capacity for resistance was exhausted, and the army, from the marshals downward, showed that it had had enough.

85. One of the first acts of the Restoration was to abolish the. conscription, but it had again to be resorted to within three years. In 1818 the annual contingent was fixed at 40,000, and the period of service at six years; in 1824 the contingent was increased to 60,000, and in 1832 to 80,000. Of this, however, a part only, according to the requirements of the service, were enrolled; the remainder were sent home on leave or furlough. Up to 1855 certain exemptions were authorized, and substitution or exchange of lots amongst young men who had drawn was permitted, but the individual drawn was obliged either to serve personally or find a substitute. The long series of Algerian wars produced further changes, and in 1855 the law of " dotation " or exemption by payment was passed, and put an end to per- sonal substitution. The state now undertook to provide sub- stitutes for all who paid a fixed sum, and did so by high bounties to volunteers or to soldiers for re-engaging. Although the price of exemption was fixed as high as £92, on an aver- age 23,060 were claimed annually, and in 1859 as many as 42,000 were granted. Thus gradually the conscription became

{GERMAN”

rather subsidiary to voluntary enlistment, and in 1866, out of a total establishment of 400,000, only 120,000 were con- scripts. Changes had also taken place in the constitution of the army. On the Restoration its numbers were reduced to 150,000, the old regiments broken up and recast, and a royal guard created in place of the old imperial one. When the revolu- tion of July 1830 had driven Charles X. from his throne, the royal guard, which had made itself peculiarly obnoxious, was dissolved; and during Louis Philippe’s reign the army was augmented to about 240,000 with the colours. Under the Provisional Government of 1848 it was further increased, and in 1854, when France allied herself with England against Russia, the army was raised to 500,000 men. The imperial guard was re-created, and every effort made to revive the old Napoleonic traditions in the army. In 1859 Napoleon III. took the field as the champion and ally of Italy, and the victories of Montebello, Magenta and Solferino raised the reputation of the army to the highest pitch, and for a time made France the arbiter of Europe. But the campaign of 1866 suddenly made the world aware that a rival military power had arisen, which was prepared to dispute that supremacy.

Marshal Niel (q.v.), the then war minister, saw clearly that the organization which had with difficulty maintained 150,000 men in Italy, was no match for that which had within a month thrown 250,000 into the very heart of Austria, while waging a successful war on the Main against Bavaria and her allies. In 1867, therefore, he brought forward a measure for the re- organization of the army. This was to have been a true ” nation in arms ” based on universal service, and Niel calculated upon producing a first-line army 800,000 strong — half with the colours, half in reserve — with a separate army of the second line. But many years must elapse before the full effect of this principle of recruiting can be produced, as the army is incom- plete in some degree until the oldest reservist is a man who has been through the line training. Niel himself died within a year, and 1870 witnessed the complete ruin of the French army. The law of 1868 remained therefore no more than an expression of principle.

86. At the outbreak of the Franco-German War (q.v.) the French field troops consisted of 368 battalions, 252 squadrons, and 984 guns. The strength of the entire army on peace footing was 393,000 men; on war footing, 567,000. Disasters followed one another in rapid succession, and the bulk of this war-trained long-service army was captive in Germany within three months of the opening battle. But the spirit of the nation rose to the occasion as it had done in 1793. The next year’s contingent of recruits was called out and hastily trained. Fourth battalions were formed from the depot cadres, and organized into regiments de marche. The gardes

mobiles (Niel's creation) were mobilized, and by successive decrees and under various names nearly all the manhood of the country called to arms.

The regular troops raised as rigiments de marche, &c, amounted to 213,000 infantry, 12,000 cavalry and 10,000 artillery. The garde mobile exceeded 300,000, and the mobilized national guard exceeded 1,100,000 — of whom about 180,000 were actually in the field and 250,000 in Paris; the remainder preparing themselves in camps or depots for active work. Altogether the new formations amounted to nearly 1,700,000. Though, in the face of the now war-experienced well-led and disciplined Germans, their efforts failed, this cannot detract from the admiration which must be felt by every soldier for the patriotism of the people and the creative energy of their leaders, of whom Gambetta and Freycinet were the chief. After the war every Frenchman set himself to solve the army problem not less seriously than had every Prussian after Jena, and the reformed French army (see France) was the product of the period of national reconstruction. The adoption of the " universal service " principle of active army, reserves and second-line troops, the essential feature of which is the line training of every man, was almost as a matter of course the basis of the re- organization, for the want of a trained reserve was the most obvious cause of the disasters of " the terrible year."

German Army

87. The German army, strictly speaking, dates only from 1871, or at earliest 1866. Before the unification of the German empire or confederation, the several states possessed distinct armies, federal armies when required being formed from the contingents which the members of the union, like those of an ordinary alliance, engaged to furnish. The armies of the Holy Roman Empire were similarly formed from " single," " double," or " treble " contingents under the supreme command of specially appointed field marshals of the Empire. In the troubles of 1848 there was witnessed the curious spectacle of half of a victorious army being unable to pursue the enemy; this, being composed of " Prussian " as distinct from " federal contingent " troops, had to stop at the frontier of another state. The events of 1866 and 1870 put an end to all this, and to a very great extent to the separate armies of the old confederation, all being now re- modelled on Prussian lines. The Prussian army therefore is at once the most important and historically the most interesting of the forces of the German empire. . Its debut (about 1630) was not satisfactory, and in the Thirty Years' War troops of Sweden, of the Emperor, of the League, &c, plundered Brandenburg unharmed. The elector, when appealed to for protection, could but answer, "Que faire? lis ont des canons." The humiliations of this time, were, however, avenged by the troops of the next ruler of Brandenburg, called the Great Elector. The supposed invincibility of the Swedes did not

prevent him from inflicting upon them a severe defeat at Fehrbellin, and there- after the Prussian contingents which took part in the many European wars of the time acquitted themselves creditably. One of their generals was the famous Leopold of Anhalt-Dessau, and the reckless gallantry of this leader was conspicuous on many fields, from Blenheim to Malplaquet. But Leopold's greatest work was done in the years of peace (1715-40), during which Prussia was preparing the army with which Frederick the Great won his battles. He had introduced (about 1700) iron ramrods into the infantry service, and for over twenty years the Prussian infantry was drilled to a perfection which gave it a superiority of five to three over the best-drilled troops of the Austrian service, and still greater predominance over the French, which was then accounted the best in Europe. Frederick William I., king of Prussia, directed and supervised the creation of the new Prussian army, and Leopold was his principal assist- ant. In organization and methods of recruiting, as well as in tactical efficiency, the army of 1740 was equally pre-eminent. Then came the wars of Frederick the Great. It is not too much to say that the infantry won his earlier battles ; the cavalry had been neglected both by Frederick William and by Leopold, and Frederick wrote that " it was not worth the devil's while to fetch it away." But the predominance of the infantry was so far indisputable that Frederick was able to devote himself to the reorganization of the mounted arm, with results which appeared in the splendid victories of Hohenfriedberg, Rossbach, Leuthen and Zorndorf. But long before the close of the Seven Years' War the incomparable infantry of the old army had disappeared, to be replaced by foreigners, deserters and vagabonds of all kinds, not to mention the unwilling S#xon and other recruits forced into the king's service. The army of 200,000 men which Frederick bequeathed to his successor was indeed superb, and deserved to be the model of Europe. But with Frederick's death the genius which had animated it, and which alone gave value to such heterogeneous materials, was gone. The long peace had the customary effect of sapping the efficiency of the long-service troops. They still retained their imposing appearance and precision of movement, and overweening self- confidence. But in 1806, after two crushing defeats and a series of humiliating surrenders, Prussia found herself at the feet of the conqueror, shorn of half her territory, obliged to receive French troops in all her towns and fortresses, and only existing on sufferance. But in these very disasters were laid the seeds of her future greatness. By the treaty of Tilsit the Prussian army was limited to 43,060 men. This limitation suggested

to Scharnhorst " universal service " on the Kriimper l system already described (see § 36 above).

88. The bitter humiliation and suffering endured under the French yoke aroused a national spirit which was capable of any sacrifices. The civilian became eager to be trained to fight against the oppressor of his country; and when Prussia rose in 1813, the armies she poured into the field were no longer pro- fessional, but national armies, imperfectly trained and organized, but animated by a spirit which more than compensated for these defects. At the close of the war her rulers, with far-seeing sagacity, at once devoted themselves to organize on a permanent footing the system which had sprung up under the necessities and enthusiasm of the moment. Universal compulsory service, and a three years' term in the ranks, with further periods in the reserve and Landwehr, were then introduced; and though variations have subsequently been made in the distribution of time, the principles were substantially the same as those now in force. By the law of 1814 the periods of service were fixed at three years in the army, two in the reserve and fourteen in the Landwehr, and the annual contingent at 40,000 men. As the population increased, it was felt that the service was unequally distributed, pressing unnecessarily heavily on some, while others escaped altogether. Further, the experiences of Bronnzell and Olmiitz in 1850, and of 1859, when Prussia armed in anticipation of a war with France, aroused great doubts as to the efficiency of the Landwehr, which then formed the bulk of Prussia's forces, and of whom many had been as long as ten years away from the colours. At this time the French remark that the Prussian army was " a sort of militia " wa£ by no means untrue. Accord- ingly, by the law of i860 the annual contingent was fixed at 63,000, the period in the reserve was increased from two to four years, and that in the Landwehr reduced from fourteen to five, The total armed force thus remained nearly the same (12 con- tingents of 63,000, in place of 19 of 40,000), but the army and its reserves were more than doubled (increased from 5 X 40,000 to 7 X 63,000) while the Landwehr was proportionately reduced.

This change was not effected without great opposition, and led to a prolonged struggle between the king, guided by Bismarck, and the parliament. It required the victories of 1866 and 1870, and the position thereby won for Prussia, to reconcile the nation to the new law. The military alliance (1866) of Prussia with the other German states gave place in 1871 to the union of all the armies into the German army as it is to-day. Some retained their old peculiarities of uniform, and even more than this was allowed to Bavaria and to Saxony, but the whole army, which has been increased year by year to its present strength, is modelled on the Prussian part of it. The Prussian army corps are the Guard, and the line numbered I. to XL, and XV. to XVIII.

89. The Saxon Army formerly played a prominent part in all the wars of northern Europe, chiefly in connexion with Poland. In the War of the Austrian Succession the Saxon army played a prominent part, but in the end it suffered a heavy defeat in the battle of Kesselsdorf (1745). In the Seven Years' War Saxony was overrun by the Prussians almost without resistance, and the military forces of the country under Field Marshal Rutowski were forced to surrender en masse at Pirna (1756); the men were compelled by Frederick the Great to join the Prussian army, and fought, though most unwillingly, through the remainder of the war as Prussian soldiers. A few outlying regiments which had not been involved in the catastrophe served with the Austrians, and on one occasion at least, at Kolin, inflicted a severe blow on the Prussians. At the outbreak of the wars of the French Revolution the Saxon army was over 30,000 strong. It took part in the campaign of Jena on the side of the Prussians, and during the Napoleonic domination in Germany Saxony furnished strong contingents to the armies of Napoleon, who in return recognized her elector as king, and largely in- creased his territories. The newly made king remained faithful to Napoleon even in his reverses; but the army was too German

1 From Kriimperpferd", (cast horses attached to batteries, &c, for odd jobs), applied to the recruits in jest.

in feeling to fight willingly under the French flag. Their defection at Leipzig contributed not a little to the results of that bloody day. After the peace the king was shorn of a great part of his dominions, and the army was reconstituted on a smaller scale. In 1866 Saxony sided with Austria, and her army shared in the disasters of the brief campaign and the crowning defeat at Koniggratz. Under the crown prince's leadership, however, the Saxons distinguished themselves by their courage and steadiness wherever they were engaged. After the war Saxony became part of the North German Confederation, and in 1870- 187 1 her troops, under the command of the crown prince, formed the XII. corps of the great German army. They were assigned to the II. army of Prince Frederick Charles, and delivered the decisive attack on the French right at Gravelotte. Subsequently a IV. army was formed under the command of the crown prince, in which the XII. corps, now under Prince George of Saxony, served with unvarying credit in the campaign of Sedan and the siege of Paris. The Saxon army is now organized in every respect on Prussian lines, and forms two army corps (XII. at Dresden and XIX. at Leipzig) of the German army. The German emperor, in concert with the king of Saxony, names the officers for the higher commands. Saxony retains, however, her separate war ministry, budget, &c; and appointments and promotion to all but the highest commands are made by the king. The colours of the older Saxon forces, and especially the green of the tunics, are retained in many of the uniforms of the present day.

90. The Bavarian Army has perhaps the most continuous record of good service in the field of any of the minor German armies. The oldest regiments date from the Thirty Years' War, in which the veteran army of the Catholic league, commanded by Count Tilly and formed on the nucleus of the Bavarian army, played a con- spicuous part. Later in the war the Bavarian general, Count Mercy, proved himself a worthy opponent of Turenne and Conde. Hence- forward the Bavarians were engaged in almost every war between France and Austria, taking part successively in the wars of the Grand Alliance, the Spanish Succession (in which they came into conflict with the English), and the Polish and Austrian Succession wars. In pursuance of the traditional anti-Austrian policy, the troops of Bavaria, led by a distinguished Bavarian, Marshal (Prince) Wrede, served in the campaigns of 1805 to 1813 side by side with the French, and Napoleon made the electorate into a kingdom. But in 1813 Bavaria joined the Alliance, and Wrede tried to inter- cept the French on their retreat from Leipzig. Napoleon, however, inflicted a severe defeat on his old general at Hanau, and opened his road to France. In 1866 the Bavarians took part against Prussia, but owing to their dilatoriness in taking the field, the Prussians were able to beat them in detail. In 1870, reorganized to some extent on Prussian lines, they joined their former enemy in the war against France, and bore their full share in the glories and losses of the campaign, the II. Bavarian corps having suffered more heavily than any but the III. Prussian corps. The I. Bavarian corps dis- tinguished itself very greatly at Sedan and on the Loire. Bavaria still retains her separate war office and special organization, and the troops have been less affected by the Prussian influence than those of the other states. The Bavarian corps are numbered separately (I. Bav., Munich; II. Bav., Wiirzburg; III. Bav., Nuremberg), and the old light blue uniforms and other distinctive peculiarities of detail are still maintained.

91. Wurttemberj> furnishes one army corps (XIII.; headquarters, Stuttgart), organized, clothed and equipped in all respects like the Prussian army. Like the Bavarians, the Wurttembergers fought against the Prussians in 1866, but in 1870 made common cause with them against the French, and by the convention entered into the following year placed their army permanently under the command of the Prussian king as emperor. The emperor nominates to the highest commands, but the king of Wurttemberg retains the nomination and appointment of officers in the lower grades.

92. The old Hanoverian Army disappeared, of course, with the annexation of Hanover to Prussia in 1866, but it is still represented officially by certain regiments of the X. army corps, and, in one case at least, battle honours won by the King's German Legion in the British service are borne on German colours of to-day. The Hessian Army is now represented by the XXV. (Grand-ducal Hessian) division, which forms part of the XVIII. army

corps.

Italian Army

93. The old conscription law of. the kingdom of Sardinia is the basis of the military organization of Italy, as its constitu- tion is of that of the modern Italian kingdom. The Piedmontese have long borne a high reputation for their military qualities, a

reputation shared by the rulers of the house of Savoy (q.v.), many of whom showed special ability in preserving the inde- pendence of their small kingdom between two such powerful neighbours as France and Austria. During the wars of the French Revolution Piedmont was temporarily absorbed into the French republic and empire. The Italian troops who fought under Napoleon proved themselves, in many if not most cases, the best of the French allies, and Italy contributed large numbers of excellent general officers to the Grande Armee.

After 1815 various causes combined to place Piedmont (Sardinia) at the head of the national movement which agitated Italy during the ensuing thirty years, and bring her in direct antagonism to Austria. Charles Albert, her then ruler, had paid great attention to the army, and when Italy rose against Austria in 1848 he took the field with an excellent force of nearly 70,000 men. At the outset fortune favoured the arms of Italy; but the genius and energy of Radetzky, the veteran Austrian commander, turned the tide, and in the summer of 1849 after many battles the Piedmontese army was decisively defeated at Novara, and her king compelled to sue for peace. Charles Albert abdicated in favour of his son Victor Emanuel, a prince who had already distinguished himself by his personal gallantry in the field. Under his care the army soon re- covered its efficiency, and the force which joined the allied armies in the Crimea attracted general admiration from the excellence of its organization, equipment and discipline. In 1859 Piedmont again took up arms against Austria for the liberation of Italy; but this time she had the powerful assistance of France, and played but a subordinate part herself. In this campaign the Sardinian army was composed of one cavalry and five infantry divisions, and numbered about 60,000 combatants. By the peace of Viliafranca, Italy, with the exception of Venetia, was freed from the Austrians, and Lombardy was added to Piedmont. The revolutionary campaign of Garibaldi in the following year united the whole peninsula under the rule of Victor Emanuel, and in 1866, when Italy for the third time took up arms against Austria — this time as the ally of Prussia — her forces had risen to nearly 450,000, of whom about 270,000 actually took the field. But in quality these were far from being equal to the old Piedmontese army; and the northern army, under the personal command of the king, was decisively defeated at Custozza by the archduke Albert of Austria.

The existing organization of the Italian army is determined by the laws of 1873, which made universal liability to service the basis of recruiting. The

territorial system has not, however, been adopted at the same time, the materials of which the Italian army is com- posed varying so much that it was decided to blend the different types of soldiers so far as possible by causing them to serve together. The colonial wars in which Italian troops have taken part have been marked with great disasters, but relieved by the gallantry of the officers and the rank and file.

Russian Army 94. The history of the Russian army begins with the abolition of the Strelitz (g.v.) by Peter the Great in 1698, the nucleus of the new forces being four regiments of foot, two of which are well known to-day under their old titles of Preobrazhenski and Semenovski. Throughout the 18th century Russian military progress obeyed successive dynasties of western European models — first those of Prussia, then those of France. In the earlier part of the 19th century the army, used chiefly in wars against the revolutionary spirit, became, like others of that time, a dynastic force; subsequently the " nation in arms " principle reasserted itself, and on this basis has been carried out the reorganization of Russia's military power. The enormous development of this since 1874 is one of the most striking phenomena in recent military history. In 1892, in expectation of a general European war, whole armies were massed in the districts of Warsaw and Vilna, three-fifths of the entire forces being in position on the German and Austrian frontiers.

The Russo-Japanese War of 1904-5 is generally held to have proved that the fighting power of the Russian has in no way diminished in intrinsic value from that of the days of Zorndorf, Borodino and Sevastopol. The proverbial stubbornness of the rank and file is the distinctive quality of the armies of the tsar, and in view of the general adoption of two-years' service in other countries it is a matter for grave consideration whether, against European forces and in defence of their own homes, the Russians would not prove more than formidable antagonists to the men of more highly individualized races who are their probable opponents. Equally remarkable is the new power of redistribution possessed by Russia. Formerly it was usual to count upon one campaign at least elapsing before Russia could intervene effectively in European wars; much, in fact the greater part, of her losses in the Crimean War was due

to the enormous distances which had to be traversed on foot. Nowaˆ days the original equal distribution of the army over the country has been modified in accordance with the political needs of each moment. In 1892 the centre of gravity was shifted to Poland and Kiev, in 1904 the performances of the trans-Siberian railway in transporting troops to the seat of war in Manchuria excited the admiration of military Europe. The attitude of the army in the troubles which followed upon the Japanese War belongs to the history of Russia, not to that of military organization, and it

will be sufficient to say that the conduct of the " nation in arms " at times of political unrest may vary between the extremes of unquestioning obedience to authority and the most dangerous form of licence, examples of both being frequent in the history of nearly all national armies. A remarkable innovation in the modern history of this army is the conversion of the whole of the cavalry, except a few elite regiments, into dragoons of the old type. After the war of I904-5, however, this policy was reversed and the cavalry reformed on the usual model. The Cossacks still retain to a large extent the peculiarities of the light troops of the 18th century.

Spanish Army

95. The feudal sovereignties of medieval Spain differed but little, in their military organization, from other feudal states. As usual, mercenaries were the only forces on which reliance was placed for foreign wars. These troops called almugdvares (Arabic = scouts) won a great reputation on Italian and Greek battlefields of the 13th century, and with many transformations in name and character appeared from time to time up to the Peninsular War. Castile, however, had a military system very different from the rest. The forces of the kingdom were com- posed of local contingents similar to the English fyrd, pro- fessional soldiers who were paid followers of the great lords, and the heavy cavalry of the military orders. The groups of cities called Hermandades, while they existed, also had permanent forces in their pay. At the union of Castile and Aragon the Castilian methods received a more general application. The new Hermandad was partly a light cavalry, partly a police, and was organized in the ratio of one soldier to every hundred families. In the conquest of Grenada (1482-92) mesnadas or contingents were furnished by the crown, the nobles and the cities, and permanently kept in the field. The Hermandad served throughout the war as a matter of course. From the veterans of this war was drawn the army which in the Italian wars won its reputation as the first army in Europe.

In 1596 the home defence of Spain was reorganized and the ordenanza, or militia, which was then formed of all men not belonging to the still extant feudal contingents, was generally analogous to the system of " assizes at arms " in England. This ordenanza served in the Peninsular War.

96. With the Italian wars of the early 1 6th century came the development of the regular army ; a brief account of its place in the evolution of armies has been given above. Discipline, the feeling of comradeship and soldierly honour were the qualities which marked out the Spanish army as the model for others to follow, and for more than a century the Spanish army maintained its prestige as the first in Europe. The oldest regiments of the present Spanish army claiming descent from the tercios date from 1535.

An officer whose regiment was reduced commonly took a pike in some other corps (e.g. Tilly), the senor soldado was counted as a gentleman, and his wife and family received state allowances. Nor was this army open only to Spaniards. Walloons, Italians, Burgundians and other nationalities ruled over by the Habsburgs all contributed their quotas. But the career of the old army came to an end at Rocroi (1643), and after this the forces of the monarchy began more and more to conform to the French model.

97. The military history of Spain from 1650 to 1700 is full of incident, and in the long war of the Spanish Succession both the army and . the ordenanza found almost continuous employment. They were now organized, as were most other armies of Europe, on the lines of the French army, and in 1714 the old tercios, which had served in the Spanish Netherlands under Marlborough, were brought to Spain. The king's regiment " Zamora " of the present army descends from one of these which, as the tercio of Bovadilla, had been raised in 1580. The army underwent few changes of importance during the 18th century, and it is interesting to note that there were never less than three Irish regiments in the service. In 1808 the Irlanda, Ultonia (= Ulster) and Hibernia regiments had come to consist (as had similar corps in the French service before the Revolution) largely of native soldiers. At that time the Spanish army consisted of 119 Spanish and foreign (Swiss, Walloon and Irish) battalions, with 24 cavalry regiments and about 8000 artillery and engineers. There were further 51 battalions of militia, and the

total forces numbered actually 137,000. The part played by the – panish standing army in the Peninsular War was certainly wholly insignificant relatively to these figures. It must be borne in mind, however, that only continued wars can give real value to: long-service troops of the old style, and this advantage the Spanish regulars did not possess. Further, the general decadence of administration reacted in the usual way, the appointment of court favourites to high command was a flagrant evil, and all that can be urged. is that the best elements of the army behaved as well as did the Prussians of 1806, that the higher leading and the administration of the army in the field were both sufficiently weak to have ruined most armies, and that the men were drawn from the same country and the same classes which furnished the guerrilleros whom it became fashionable to exalt at the expense of the soldiers. In the later campaigns of Wellington, Spanish divisions did good service, and the corps of La

Romafia (a picked contingent of troops which had been sent before the war to Denmark at Napoleon's instance), though often defeated, always retained some cohesion and discipline. But the result of this war, the second French invasion, and the continued civil wars of the 19th century was the destruction of the old army, and the present army of Spain still bears traces of the confusion out of which it arose.

The most important changes were in 1870, when conscription was introduced, and in 1S72, when universal service was proposed in its place. The military virtues of the rank and -file and the devotion of the officers were conspicuously displayed in the Spanish-American War of 1898, and it cannot be claimed even for the Germans of 1870 that they fired so coolly and accurately as did the defenders of S. Juan and El Caney.

Turkish Army

98. The writers who have left the most complete and trust- worthy contemporary accounts of the Turkish army in the 14th and 15th centuries, when it reached the height of its most characteristic development, are Bertrandon de la Brocquiere, equerry to Philip the Good, duke of Burgundy, and Francesco Filelfo of Tolentino. Bertrandon, a professional soldier, visited Palestine in 1432, and returned overland in 1433, traversing the Balkan Peninsula by the main trade-route from Constantinople to Belgrade. He wrote an account of his journey for Philip: see Early Travels in Palestine, translated and edited by T. Wright (London, 1848). Filelfo served as secretary to the Venetian baylo at Constantinople, and recorded his observations in a series of letters (see Filelfo). Both ascribe the military, superiority of the Turks over the nations of western Europe to two facts — firstly to their possession of a well-organized standing army, an institution unknown elsewhere, and secondly to their far stricter discipline, itself a result of their military organ- ization and of the moral training afforded by Islam.

The regular troops comprised the Janissaries (q.v.), a corps of infantry recruited from captured sons of Christians, and trained to form a privileged caste of scientific soldiers and religious fanatics; and the Spahis, a body of cavalry similarly recruited, and armed with scimitar, mace and bow. Celibacy was one of the rules of this standing army, which, in its semi-monastic ideals and constitution, resembled the knightly orders of the West in their prime. The Janissaries numbered about 12,000, the Spahis about 8000. A second army of some 40,000 men, mostly mounted and armed like the Spahis, was feudal in character, and consisted chiefly of the personal followers of the Moslem nobility ; more than half its numbers were recruited in Europe. This force of 60,000 trained soldiers was accompanied by a horde of irregulars, levied chiefly among the barbarous mountaineers

of the Balkans and Asia Minor, and very ill-armed and ill-disciplined. Their numbers may be estimated at 140,000, for Bertrandon gives 200,000 as the total of the Turkish forces. Many 15th and 16th century writers give a smaller total, but refer only to the standing and feudal armies. Others place the total higher. Laonicus Chalcocondylas in his Turcica Historia states that at the siege of Constantinople in 1453 the siiltan, com- manded 400,000 troops, but most other eye-witnesses of the siege give a total varying from 150,000 to 300,000. Many Christian soldiers of fortune enlisted with the Turks as artillerists or engineers, and supplied them at Constantinople with the most powerful cannon of the age. Other Christians were compelled to serve as engineers or in the ranks. As late as 1683 a corps of Wallachians was forced to join the Turkish army before Vienna, and entrusted with the task of bridging the Danube. But in the J 8th and early 19th centuries the introduction of Christians tended to weaken the moral of the army already sapped by defeat; it was found impossible to maintain the discipline of the Janissaries, whose privileges had become a source of danger; and the feudal nobility became more and more inde- pendent of the sultan's authority. These three causes contributed to make reorganization inevitable.

The destruction of the Janissaries in 1826 marked the close of the

history, of the : old Turkish army; already the re-creation of the service on the accepted models of western Europe had been com- menced. This was still incomplete when the new force was called upon to meet the Russians in 1828, and though the army displayed its accustomed bravery, its defective organization and other causes led to its defeat. Since then the army has been almost as constantly on active service as the British; the Crimean War, the Russo- Turkish War of 1877 and the Greco-Turkish War of 1897 witnessed the employment of a large proportion of the sultan's available forces, while innumerable local revolts in different parts of the empire called for great exertions, and often for fierce fighting on the part of the troops locally in garrison and those sent up from the nearest provinces.

United States Army : 99. The regular army of the United States has always been small. From the first it has been a voluntary force, and until 1898 its chief work in peace was to furnish numerous small posts on the frontier and amongst the Indians, and to act as a reserve to the civil power in the great cities. In war-time the regular army, if, as was usually the case, it was insufficient in numbers for the task of subduing the enemy, formed the nucleus of large armies raised " for the war." In 1790 the rank and file of the army, as fixed by act of Congress, amounted to 12 16 men; and in 1 814 an English expedition of only 3500 men was able to seize and burn Washington, the capital of a country which even then numbered eight millions of inhabitants. In 1861, at the begin- ning of the Civil War, the

whole regular force amounted to about 15,300 men. In April of that year the president called out 75,000 volunteers for three months ; and in May a further call for 42,000 was made. In July a call for 500,000 men was authorized by Congress, and as even this vast force proved insufficient it "was found necessary to use a system of drafts In October 1863 a levy of 300,000 men was ordered, and in February 1864 a further call of 500,000 was made. Finally, in the beginning of 1865 two further levies, amounting in all to 500,000 men, Were ordered, but were only partially carried out in consequence of the cessation of hostilities. The total number of men called under arms by the government of the United States, between April 1861 and April 1865, amounted to 2,759,049, of whom 2,656,053 were actually embodied in the armies. If to these be added the 1,100,000 men embodied by the South during the same time, the total armed forces reach the enormous amount of nearly four millions, drawn from a population of only 32 millions — figures before which the celebrated uprising of the French nation in 1793, or the efforts of France and Germany in the Franco-German War, sink into insignificance. These 2,700,000 Federals were organized into volunteer regi- ments bearing state designations. The officers, except general and staff officers, were appointed by the governors of the re- spective states. The maximum authorized strength of the regular army never, during the war, exceeded 40,000 men; and the number in the field, especially towards the close of the war, Was very much less. The states, in order to obtain men to: fill their quotas, offered liberal bounties to induce men to enlist, and it therefore became very difficult to obtain recruits for the regular army, for which no bounties were given. The regular regiments accordingly dv/indled away to skeletons. The number of officers present was also much reduced, since many of them, while retaining their regular commissions, held higher rank in the volunteer army. After the close of the Civil Wat the volunteers were mustered out; and by the act of Congress of the 28th of July 1866 the line of the army was made to consist, of 10 regiments of cavalry of 12 troops each, 5 regL ments of artillery of 12 batteries each and 45 regiments oi infantry of 10 companies. The actual strength in August 1867 was 53,962. The act of the 3rd of March 1869 reduced the number of infantry regiments to 25 and the enlisted strength of the army to 35,036. The numbers were further reduced, without change in organization, to 32,788 in 1870 and to 25,000 in 1874. The latter number remained the maximum for twenty-four years.

In March 1898, in view of hostilities with Spain, the artillery was increased by 2 regiments, and, in April, 2 com- panies were added to each infantry regiment, giving it

3 battalions of 4 companies each. The strength of batteries, troops and companies was increased, the maximum enlisted strength reached during 1898 being over 63,000. A volunteer army was also organized. Of this army, 3 regiments of engineer troops, 3 of cavalry and 10 of infantry were United States volunteers, all the officers being commissioned by the president. The other organizations came from the states, the officers being appointed by the respective governors. As fast as they were organized and filled up, they were mustered into the service of the United States. The total number furnished for the war with Spain was 10,017 officers and 213,218 enlisted men. All general and staff officers were appointed by the president. Three hundred and eighty-seven officers of the regular army received volunteer commissions. After the conclusion of hostilities with Spain, the mustering out of the volunteers was begun, and by June 1899 all the volunteers, except those in the Philippines, were out of the service. The latter, as well as those serving elsewhere, having enlisted only for the war, were brought home and mustered out as soon as practicable.

The act of the 2nd of March 1899 added 2 batteries to each regiment of artillery. On the 2nd of February 1901 Congress passed an important bill providing for the reorganization and augmentation (max. 100,000) of the regular army, and other measures followed in the next years. (See United States.)

Minor Armies

100. Dutch and Belgian Armies. — The military power of the " United Provinces " dates its rise from the middle of the 1 6th century, when, after a long and sanguinary struggle, they succeeded in emancipating themselves from the yoke of Spain; and in the following century it received considerable development in conse- quence of the wars they had to maintain against Louis XIV. In 1702 they had in their pay upwards of 100,000 men, including many English and Scottish regiments, besides 30,000 in the service of the Dutch East India Company. But the slaughter of Malplaquet deprived the republic of the flower of the army. Its part in the War of the Austrian Succession was far from being as creditable as its earlier deeds, a Prussian army overran Holland in 1787 almost without opposition, and at the beginning of the wars of the French Revolution the army had fallen to 36,000 men. In 1795 Holland was conquered by the French under Pichegru, and in the course of the changes which ensued the army was entirely reorganized, and under French direction bore its share in the great wars of the empire.

With the fall of Napoleon and the reconstitution of the Nether- lands, the Dutch-Belgian army, formed of the troops of the now united countries, came into existence. The army fought at Waterloo, but was not destined to a long career, for the revolution of 1 830 brought about the separation of Belgium. A Dutch garrison under Baron Chasse, a distinguished veteran of the Napoleonic wars, defended Antwerp against the French under Marshal Gerard, and the Netherlands have been engaged in many arduous colonial wars in the East Indies. The Belgian army similarly has contributed officers and non-commissioned officers to the service of the Congo Free State.

101. Swiss Army. — The inhabitants of Switzerland were always a hardy and independent race, but their high military reputation dates from the middle of the 15th century, when the comparatively ill-armed and untrained mountaineers signally defeated Charles the Bold of Burgundy and the flower of the chivalry of Europe in the battles of Granson, Morat and Nancy. The Swabian war, towards the end of that century, and the Milanese war, at the begin- ning of the following one, added to the fame of the Swiss infantry, and made it the model on which that arm was formed all over Europe. The wealthier countries vied with each other in hiring them as mercenaries, and the poor but warlike Swiss found the profession of arms a lucrative one.

A brief account of the Swiss mercenaries will be found earlier in this article. Their fall was due in the end to their own indiscipline in the first place, and the rise of the Spanish standing army and its musketeers in the second. Yet it does not seem that themilitary reputation of the Swiss was discredited, even by reverses such as Marignan. On the contrary, they continued all through the 17th and 1 8th centuries to furnish whole regiments for the service of other countries, notably of France, and individuals, like Jomini in a later age, followed the career of the soldier of fortune everywhere. The most notable incident in the later military history of the Swiss, the heroic faithfulness of Louis XVI. 's Swiss guard, is proverbial, and has been commemorated with just pride by their countrymen. The French Revolutionary armies overran Switzerland, as they did all the small neighbouring states, and during Napoleon's career she had to submit to his rule, and furnish her contingent to his armies. On the fall of Napoleon she regained her independence, and returned to her old trade of furnishing soldiers to the sovereigns and powers of Europe. Charles X. of France had at one time as many as 17,000

Swiss in his pay ; Naples and Rome had each four regiments. The recruiting for these foreign services was openly acknowledged and encouraged by the government. The young Swiss engaged usually for a period of four or six years; they were formed in separate regiments, officered by countrymen of their own, and received a higher rate of pay than the national regiments;

and at the close of their engagement returned with their earnings to settle down on their paternal holdings. A series of revolutions, however, expelled them from France and Italy, and recently the advance of liberal ideas, and the creation of great national armies based on the principle of personal service, has destroyed their occupation. Switzerland is now remarkable in a military sense as being the only country that maintains no standing army (see Militia).

102. The Swedish Army can look back with pride to the days of Gustavus Adolphus and of Charles XII. The contributions made by it to the military science of the 17th century have been noticed above. The triumphs of the small and highly disciplined army of Charles were often such as to recall the similar victories of the Greeks under Alexander. The then nebulous armies of Russia and Poland re- sembled indeed the forces of Darius in the 4th century B.C., but Peter the Great succeeded at last in producing a true army, and the resistance of the Swedes collapsed under the weight of the vastly superior numbers then brought against them.

The Danish Army has a long and meritorious record of good service dating from the Thirty Years' War.

103. The existing Army of Portugal dates from the Peninsular War, when a considerable force of Portuguese, at one time exceeding 60,000 men, was organized under Marshal Beresford. Trained and partly officered by English officers, it proved itself not unworthy of its allies, and bore its full share in the series of campaigns and battles by which the French were ultimately expelled from Spain. At the peace the army numbered about 50,000 infantry and 5000 cavalry, formed on the English model, and all in the highest state of efficiency. This force was reduced in 1821, under the new constitutional government, to about one-half.

104. The Rumanian, Bulgarian and Servian armies are the youngest in Europe. The conduct of the Rumanians before Plevna in 1877 earned for them the respect of soldiers of all countries. Servia and Bulgaria came to war in 1885, and the Bulgarian soldiers, under the most adverse conditions, achieved splendid victories under the leadership of their own officers. In the crisis following the Austrian annexation of Bosnia-Herzegovina (1908-9), it seemed likely that the Servian forces might play an unexpectedly active part in war even wjth a strong power.

Bibliography. — Below are the titles of some of the more im- portant Works on the subject of armies. See also under biographical headings and articles dealing with the several arms, &c. A large proportion of the works mentioned below are concerned mainly with the development of strategy and tactics.

V. der Gpltz, Das Volk in Waffen (1883, new ed., 1898, English translation, P. A. Ashworth, Nation in Arms, London, 1887, new ed., 1907, French, Nation' armee, Paris, 1889); Jahns, Heeresver- fassung und Volkerleben (Berlin, 1885); Berndt, Die Zahl im Kriege (Vienna, 1895); F. N. Maude, Evolution of Modern Strategy (1903), Voluntary versus Compulsory Service (1897), and War and the World's Life (1907) ; Pierron, Methodes de guerre, vol. i. ; Jahns, Ceschichte der Krtegswissenschaften (an exhaustive bibliography, with critical notes) ; Troschke, Mil. Litteratur seit den Befreiungskriegen (Berlin, 1870) ; T. A. Dodge, Great Captains {Alexander, Hannibal, Caesar, Gustavus, Napoleon) ; Bronsart v. Schellendorf (Eng. trans., War Office, 1905) Duties of the General Staff; Fave, Histoire et tactique des trois armes (Liege, 1850) ; Maynert, Gesch. des Kriegswesens u. der Heeresverfassungen in Europa (Vienna, 1869); Jahns, Handbuch fur eine Geschichte des Kriegswesens v. der Urzeit bis zur Renaissance (Leipzig, 1 880) ; de la Barre Duparcq, Histoire de I' art de la guerre avant V usage de poudre (Paris, i860) ; Riistow and Kochly, Ge- schichte des griechischen Kriegswesens (Aarau, 1852); Kochly and Riistow, Grtechische Kriegsschriftsteller (Leipzig, 1855); Forster, in Hermes, xii. (1877) ; D. G. Hogarth, Philip and Alexander (London, 1897); Macdougall, Campaigns of Hannibal (London, 1858); Riistow, Heerwesen, &c, Julius Casars (Nordhausen, 1855); Organ der M. Wissensch. Verein of 1877 (Vienna); Polybius litera- ture of the 17th and 18th centuries; supplement to M.W.B., 1883; the works of Xenophon, Aelian, Arrian, Vegetius, Polybius, Caesar, &c. (see Kochly and Riistow: a collection was made in the 15th century, under the title Veteres de re militari scriptores, 1487) ; Oman, A History of the Art of War: Middle Ages (London, 1898); Delpech, La Tactique au XIII' siecle (Paris, 1886); Kohler, Die Eniwickelung des Kriegswesens v. 11. Jahrhdt. bis zu den Hussiten- kriegen (Breslau, 1886-1893); Ricotti, Storia delle Compagnie di Ventura (Turin, 1846); Steger, Gesch. Francesco Sforzas und d. Hal. Condottieri (Leipzig, 1865) ; J. A. Symonds, The Renaissance in Italy and The Age of the Despots ; A Brandenburg Mobilization of 1477 (German General Staff Monograph, No. 3) ; Palacky, "Kriegskunst der Bohmen," Zeitschrift bohmisch. Museums (Prague, 1828); George, Battles of English History (London, 1895); Biottot, Les Grands inspirSs devant la science; Jeanne d'A re (Paris, 1907); V. Ellger, Kriegswesen, &fc, der Eidgenossen, 14., 15., 16. Jahrhdt. (.1873); de la Chauvelays, Les Armies de Charles le Temeraire (Paris, 1879) ; Guillaume, Hist, des bandes d'ordonnance dans les

Pays-Bos (Brussels, 1873); the works of Froissart, de Brantflme,

Machiavelh, Lienhard Fronsperger (Kriegsbuch, 1570), de la Noue, du Bellay, &c; Villari, Life and Times of MachiaveUi (English version) ; " Die frommerv Landsknechte " {M. W. B., supplement, 1880); Kriegsbilder aus der Zeit der Landsknechte (Stuttgart, 1883); C. H. Firth, Cromwell's Army (London, 1902) ; Heilmann, Das Kriegswesen der Kaiserlichen und Schweden (Leipzig, 1850) ; C. Walton, History of the British Standing Army, 1660-1700 (London, 1894); E. A. Altnam in United Service Magazine, February 1907; Austrian official history of Prince Eugene's campaigns, &c. ; de la Barre Duparcq, Hist, milit. de la Prusse avant 1756 (Paris, 1857); Marsigli, L'Etat militaire de I'emp. ottoman (1732); Prussian Staff History of the Silesian wars; C. von B(inder)-K(rieglstein), Geist und Stoff im Kriege (Vienna, 1895) ; E. d'Hauterive, L'Armee sous la Revolution (Paris, 1894); C. Rousset, Les Volontaires de 1791-1794; Michelet, Les Soldats de la Revolution (Paris, 1878); publications of the French general staff on the Revolutionary and Napoleonic wars; H. Bonnal, Esprit de la guerre moderne (a series of studies in military history, 1 805-1 870); Paimblant du Rouil, La Division Durutte, les Refractaires, also supplement, M.W.B., 1890; "The French Conscription" (suppl. M.W.B., 1892); C. v. der Goltz, Von Rossbach bis Jena una Auerstddt (a new edition of the original Rossbach und Jena, Berlin, 1883) ; German General Staff Monograph, No. 10; M.W.B. supplements of 1845, 1846, 1847, 1854, 1855,1856, 1857, 1858, 1862, 1865, 1866, 1867, 1887; v. Duncker, Preussen wahrend der franz. Okkupation (1872); Archives of Prussian war ministry, publications of 1892 and 1896; histories of the wars of 1 866 and 1870; V. Chareton, Comme la Prusse a prepare sa revanche, 1806-1813 ; Reports of Col. Baron Stoffel, French' attache at Berlin (translation into English, War Office, London) ; Haxthausen, Les Forces militaires de la Prusse (Paris, 1853); de la Barre Duparcq, Eludes historiques generates et militaires sur la Prusse (Paris, 1854) '< Paixhans, Constitution militaire de la France (Paris, 1849) ; Due d'Aumale, Les Institutions militaires de la France (Paris, 1867); C. v. Decker, liber die Persbnlichkeit des preussischen Soldaten (Berlin, 1842) ; War Office, Army Book of the British Empire (London, 1893); M. Jahns, Das franzosische Heer von der grossen Revolution bis zur Gegenwart (Leipzig, 1873); Baron Kaulbars, The German Army (in Russian) [St Petersburg, 1890] ; Die Schweiz im 19. Jahr- hundert (Berne and Lausanne, 1899); Heimann, L'Afmte allemande (Paris, 1895) ; R. de l'Homme de Courbiere, Grundziige der deutschen Militarverwaltung (Berlin, 1882) ; G. F. R. Henderson, The Science of War (London, 1905) ; J. W. Fortescue, History of the British Army

(London, 1899) ; R. de l'Homme de Courbiere, Gesch. der

brandenburg-preussisch. Heeresverfassung (Berlin, 1852); Krippen- tagel and Kiistel, Die preuss. Armee von der dltesten Zeit bts zur Gegenwart

(Berlin, 1883) ; Gansauge, Das brandenbg.preuss. Kriegs wesen,i440,i640,i74o(Berliv, 1839); A.v.Boguslawksi,i?ie Landwehr, 1813-1893 (1893); A. R. v. Sichart, Gesch. d. k. hannover. Armee (Hanover, 1866); v. Reitzenstein, Die k. hannover. Kavallerie, 1631- 1866 (1892); Schlee, Zur Gesch. des hessischen Kriegswesens(Ka.$se\, 1 867) ; Leichtlen, Badens Kriegsverfassung (Carlsruhe, 18 15) ; v. Stad- linger, Gesch. des wiirttembergischen Kriegswesens (Stuttgart, 1858); Munich, Entviickelung der bayerischen Armee (Munich, 1864); official Gesch. d. k. bayer. Armee (Munich, 1901 onward); Wiirdinger, Kriegsgesckichte v. Bayern (Munich, 1868); H. Meynert, Gesch. des osterr. Kriegswesens (Vienna, 1852), Kriegswesen Ungarns (Vienna, 1876); Anger, Gesch. der K.-K. Armee (Vienna, -1886) j Beitrdge zur Gesch. des osterr. Heerwesens, 1754-1814 (Vienna, 1872) ; R. v. Ottenfeld and Teuber, Die osterr. Armee, 1700-1867 (Vienna, 1895); v. Wrede, Gesch. d. K. u. K. Wehrmacht (Vienna, 1902); May de Rainmoter, Histoire militaire de la Suisse (Lausanne, 1788) ; Cusachs y Barado, La Vida Militar en Espaila (Barcelona, 1888) ; Guillaume, Hist, de I'infanterie wallonne sous la maison d'Espagne (Brussels, 1876); A. Vitu, Histoire civile de Varmee (Paris, 1868); A. Pascal, Hist, de Varmee (Paris, 1847); L. Jablonski, L'Armee frangaise & travers les ages; C. Romagny, Hist, ginirale de Varmee nationale (Paris, 1893); E. Simond, Hist. mil. de la France; Susane, Hist, de I'infanterie, cavalerie, artillerie franQaises (Paris, 1874); Pere Daniel, Hist, des milices frangaises (1721) ; the official Historique

des corps de troupe (Paris, 1900); Cahu, Le Soldat francais

(Paris, 1876) ; J. Molard, Cent ans de Varmte francaise, 1789-1889 (Paris, 1890) ; v. Stein, Lehre vom Heerwesen (Stuttgart, 1872) ; du Verger de S. Thomas, V Italic et son armee, 1865 (Paris, 1866) ; " C. Martel." Military Italy (London, 1884); Sir R. Biddulph, Lord Card-well at theWar Office (London, 1904) ; Willoughby Verner, Military Life of the Duke of Cambridge (London, 1905) ; W. H. Daniel, The Military Forces of the Crown (London, 1902); War Office, Annual Report of the British Army; Broome, Rise and Progress of the Bengal Army (Calcutta, 1850); W. J. Wilson, Hist, of the Madras Army (London, 1882-1885); C. M. Clode, Military Forces of the Crown; Blume, Die Grundlage unserer Wehrkraft (Berlin, 1899); Spenser Wilkinson, The Brain of an Army (London, 1890 and 1895); v. Olberg, Die franzosische Armee im Exerzirplatz una im Felde (Berlin, 1861); Die Heere und Flotte der Gegenwart, ed. Zepelin (Berlin, 1896); Molard, Puissances militaires de VEurope (Paris, 1895); works of Montecucculi, Puysegur, Vauban, Feuquieres, Guibert, Folard, Guichard, Joly de Maizeroy, Frederick the Great, Marshal Saxe, the prince de Ligne, Napoleon, Carnot, Scharnhorst, Clause- witz, Napoleon III., Moltke, Hamley, &c.

The principal general military periodicals are:— English, Journal of the R. United Service Institution; United States, Journal of the Military Service Institution; French, Revue d' histoire and Revue des armies etrangeres (general staff) ; Rau and Lauth, L'Etat militaire des puissances (about every 4 years) ; Revue militaire generate, founded in 1907 by General Langlois; Aimanach du drapeau (a popular aide-memoire published annually) ; German, the Vierteljahrs- heft of the general staff: Militar-Wochenblatt (referred to above as M.W.B. — the supplements are of great value); von Lobell's Jahresberichte (annual detailed reports on the state, &c, of all armies —an English precis appears annually in the Journal of the R.U.S. Institution); Austrian, Streffleurs bst. Militar – Zeitschrift, with which was amalgamated (1907) the Organ d. militdrwissenschaft. Vereins. The British War Office issues from time to time handbooks dealing with foreign armies, and, quarterly since April 1907, a critical review and bibliography of recent military literature in the principal languages, under the name of Recent Publications of Military Interest. (C. F. A.)

ARNAL, ETIENNE (1794-1872), French actor, was born at Meulan, Seine-et-Oise, on the 1st of February 1794. After serving in the army, and working in a button factory, he took to the stage. His first appearance (1815) was in tragedy, and for some time he was unsuccessful; it was not until 1827 that he showed his real ability in comedy parts, especially in plays by Felix August Duvert (1795-1876) and Augustin Theodore Lauzanne (1805-1877), whose Cabinets particuliers (1832), Le Mari de la- dame de chceurs (1837), Passe minuit, L'Homme blase" (1843), La Clef dans ledos (1848), &c, contained parts written for him. He was twenty years at the Vaudeville, and completed at the various. Parisian theatres a stage career of nearly half a century. Arnal was the author of Epitre a boujfe (1840), which is reprinted in his volume of poetry, Boutades en vers (1861).

ARNALDUS DE VILLA NOVA, also called Arnaldus de Villanueva, Arnaldus Villanovanus or Arnaud de Ville- neuve (c. 1235-1313), alchemist, astrologer and physician, appears to have been of Spanish origin, and to have studied chemistry, medicine, physics, and also Arabian philosophy. After having lived at the court of Aragon, he went to Paris, where he gained a considerable reputation; but he incurred the enmity of the ecclesiastics and was forced to flee, finally finding an asylum in Sicily. About 13 13 he was summoned to Avignon by Pope Clement V., who was ill, but he died on the voyage. Many alchemical writings, including Thesaurus Thesaurorum or Rosarius Philosophorum, Novum Lumen, Flos Florum, and Speculum Alchimiae, are ascribed to him, but they are of very doubtful authenticity. Collected editions of them were published at Lyons in 1504 and 1532 (with a biography by Symphorianus Campegius) , at Basel in 1585, at Frankfort in 1603, and at Lyons in 1686. He is also the

reputed author of various medical works, including Breviarium Practicae.

See J. B. Haureau in the Histoire litteraire de la France (1881), vol. 28; E. Lalande, Arnaud de Villeneuve, sa vie et ses ceuvres (Paris, 1896). A list of writings is given by J. Ferguson in his Bibliotheca Chemica (1906). See also U. Chevalier, Repertoire des sources hist., &c, Bio-bibliographie (Paris, 1903).

ARNAUD, HENRI (1641-1721), pastor and general of the Vaudois or Waldensians of Piedmont, was born at Embrun. About 1650 his family returned to their native valley of Luserna, where Arnaud was educated at La Tour (the chief village), later visiting the college at Basel (1662 and 1668) and the Academy at Geneva (1666). He then returned home, and seems to have been pastor in several of the Vaudois valleys before attaining that position at La Tour (1685). He was thus the natural leader of his co-religionists after Victor Amadeus expelled them (1686) from their valleys, and most probably visited Holland, the ruler of which, William of Orange, certainly gave him help and money. Arnaud occupied himself with organizing his 3000 countrymen who had taken refuge in Switzerland, and who twice (1687-1688) attempted to regain their homes. The English revolution of 1688, and the election of William to the throne, encouraged the Vaudois to make yet another attempt. Furnished with detailed instructions from the veteran Josue Janavel (prevented by age from taking part in the expedition) Arnaud, with about 1000 followers, started (August 17, 1689) from near Nyon on the Lake of Geneva for the glorieuse rentrte. On the 27 th of August, the valiant band, after many hardships and dangers,

reached the Valley of St Martin, having passed by Sallanches and crossed the Col de Very (6506 ft.), the Enclave de la Fenetre (7425 ft.), the Col du Bonhomme (8147 ft), the Col du Mont Iseran (0085 ft.), the Grand Mont Cenis (6893 ft.), the Petit Mont Cenis (7166 ft.), the Col de Clapier (8173 ft.), the Col de Coteplane (7589 ft.), and the Col du Piz (8550 ft.). They soon took refuge in the lofty and secure rocky citadel of the Balsille, where they were besieged (October 24, 1689 to May 14, 1690) by the troops (about 4000 in number) of the king of France and the duke of Savoy. They maintained this natural fortress against many fierce attacks and during the whole of a winter. In particular, on the 2nd of May, one assault was defeated without the loss of a single man of Arnaud's small band. But another attack (May 14) was not so successful, so that Arnaud with- drew his force, under cover of a thick mist, and led them over the hills to the

valley of Angrogna, above La Tour. A month later the Vaudois were received into favour by the duke of Savoy, who had then abandoned his alliance with France for one with Great Britain and Holland. Hence for the next six years the Vaudois helped Savoy against France, though suffering much from the repeated attacks of the French troops. But by a clause in the treaty of peace of 1696, made public in 1698, Victor Amadeus again became hostile to the Vaudois, about 3000 of whom, with Arnaud, found a shelter in Protestant countries, mainly in Wiirttemberg, where Arnaud became the pastor of Dtirrmenz-Schonenberg, N.W. of Stuttgart (1699). Once again (1704-1706) the Vaudois aided the duke against France. Arnaud, however, took no part in the military opera- tions, though he visited England (1707) to obtain pecuniary aid from Queen Anne. He died at SchSnenberg (which was the! church hamlet of the parish of Diirrmenz) in 1 7 2 1 . It was during his retirement that he compiled from various documents by other hands his Histoire de la glorieuse rentrSe des Vaudois dans leurs vallees, which was published (probably at CasSel) in 17 10, with a dedication to Queen Anne. It was translated into English (1827) by H. Dyke Acland, and has also appeared in German and Dutch versions. A part of the original MS. is preserved in the Royal Library in Berlin.

See K. H. Klaiber, Henri Arnaud, ein Lebensbild (Stuttgart, 1880); A. de Rochas d'Aiglun, Les Vallees vaudoises (Paris, 1881); various chapters in the Bulletin du bicentenaire de la glorieuse reniree (Turin, 1889). (W. A. B. C.)

ARNAULD, the surname of a family of prominent French lawyers, chiefly remembered in connexion with the Jansenist troubles of the 17 th century. At their head was Antoine Arnauld (1560-1619), a leader of the Paris bar; in this capacity he delivered a famous philippic against the Jesuits in 1594, accusing them of gross disloyalty to the newly converted Henry IV. This speech was afterwards known as the original sin of the Arnaulds.

Of his twenty children several grew up to fight the Jesuits on more important matters. Five gave themselves up wholly to the church. Henri Arnauld (1597-1692), the seconct son, became bishop of Angers in 1649, and represented Jansenism on the episcopal Bench for as long as forty-three years. The youngest son, Antoine (1612-1694), was the most famous of Jansenist theologians (see below). The second daughter, Angelique (1591-1661), was abbess and reformer of Port Royal; here she was presently joined by her sister Agnes (1 593-1 671) and two younger sisters, both of whom died early.

Only two of Antoine's children married — Robert Arnauld d'Andilly (1 588-1674), the eldest son, and Catherine Le- maistre (1590-1651), the eldest daughter. But both of these ended their lives under the shadow of the

abbey. Andilly's five daughters all took the veil there; the second, Angelique de St Jean Arnauld d'Andilly (1624-1684) rose to be abbess, was a writer of no mean repute, and one of the most remarkable figures of the second generation of Jansenism. One of Andilly's sons became a hermit at Port Royal; the eldest, Antoine (161 5-1699), was first a soldier, afterwards a priest. As the Abbe Arnauld, he survives as author of some interesting Memoirs of his time. The second son, Simon Arnauld de Pomponne

(1616-1699), early entered public life. After holding various embassies, he rose to be foreign secretary to Louis XIV., and was created marquis de Pomponne. Lastly Madame Lemaistre and two of her sons became identified with Port Royal. On her husband's death she took the veil there. Her eldest son, Antoine Lemaistre (1608-1658), became the first of the soli- taires, or hermits of Port Royal. There he was joined by his younger brother, Isaac Lemaistre de Saci (1613-1684), who presently took holy orders, and became confessor to the hermits.

The Arnaulds' connexion with Port Royal (q.v.) — a convent of Cistercian nuns in the neighbourhood of Versailles — dated back to 1599, when the original Antoine secured the abbess's chair for his daughter Angelique, then a child of eight. About 1608 she started to reform her convent in the direction of its original Rule; but about 1623 she made the acquaintance of du Vergier (q.v.) and thenceforward began to move in a Jan- senist direction. Her later history is entirely bound up with the fortunes of that revival. Angelique's strength lay chiefly in her character. Her sister and collaborator, Agnes, was also a graceful writer; and her Letters, edited by Prosper Feugere (a, vols., Paris, 1858), throw most valuable light on the inner aims and aspirations of the Jansenist movement. The first relative to join their projects of reform was their nephew, Antoine Lemaistre, who threw up brilliant prospects at the bar to settle down at the Abbey gates (1638). Here he was presently joined by his brother, de Saci, and other hermits, who led an austere semi-monastic existence, though without taking any formal vow. In 1646 they were joined by their uncle, Arnauld d'Andilly, Wtherto a personage of seme importance at court and in the world; he was a special favourite of the queen regent, Anne of Austria, and had held various offices of dignity in the government. Uncle and nephews passed their time partly in ascetic exercises — though Andilly never pretended to vie in austerity with the younger men — partly in managing the convent estates, and partly in translating religious classics. Andilly put Josephus, St Augustine's Confessions, and many other works, into singularly delicate French. Lemaistre attacked the lives of the saints; in 1654 Saci set to work on a translation of the Bible. His labours were interrupted by the outbreak of persecution. In 1661 he was forced to go into hiding; in 1666 he was arrested, thrown into the Bastille, and kept there more than two years. Meanwhile his friends printed his trans- lation

of the New Testament — really in Holland, nominally at Mons in the Spanish Netherlands (1667). Hence it is usually known as. the Nouveau Testament de Mons. It found enthusi- astic friends and violent detractors. Bossuet approved its orthodoxy, but not its over-elaborate style; and it was de- structively criticized by Richard Simon, the founder of Biblical criticism in France. On the other hand it undoubtedly did much to popularize the Bible, and was bitterly attacked by the Jesuits on that ground.

By far the most distinguished of the family, however, was Antoine— le grand Arnauld, as contemporaries called him — the twentieth and youngest child of the original Antoine. Born in 1612, he was originally intended Ataauid. for the bar; but decided instead to study theology at the Sorbonne. Here he was brilliantly successful, and was on the high-road to preferment, when he came under the influence of du Vergier, and was drawn in the direction of Jansenism. His book, De la frSquente Communion (1643), did more than anything else to make the aims and ideals of this movement intelligible to the general public. Its appearance raised a violent storm, and Arnauld eventually withdrew into hiding; for more than twenty years he dared not make a public appearance in Paris. During all this time his pen was busy with innumerable Jansenist pamphlets. In 1655 two very outspoken Lettres a un due et pair on Jesuit methods in the confessional brought on a motion to expel him from the Sorbonne. This motion was the immediate cause of Pascal's Provincial Letters. Pascal, however, failed to save his friend; in February 1656 Arnauld was solemnly degraded. Twelve years later the tide of fortune turned. The so-called peace of Clement IX. put an end to

persecution. Arnauld emerged from his retirement, was most graciously received by Louis XIV., and treated almost as a popular hero. He now set to work with Nicole (q.v.) on a great work against the Calvinists: La Perpituiti de la foi catholiquc louchant Peucharistie. Ten years later, however, another storm of persecution burst. Arnauld was compelled to fly from France, and take refuge in the Netherlands, finally settling down at Brussels. Here the last sixteen years of his life were spent in incessant controversy with Jesuits, Calvinists and misbelievers of all kinds; here he died on the 8th of August 1694. His in- exhaustible energy is best expressed by his famous reply to Nicole, who complained of feeling tired. "Tired!" echoed Arnauld, "when you have all eternity to rest in?" Nor was this energy by any means absorbed by purely theological questions. He was one of the first to adopt the philosophy of Descartes, though with certain orthodox reservations; and between 1683 and 1685 he had a long battle

with Malebranche on the relation of theology to metaphysics. Dn the whole, public opinion leant to Arnauld's side. When Malebranche complained that his adversary had misunderstood him, Boileau silenced him with the question: " My dear sir, whom do you expect to understand you, if M. Arnauld does not?" And popular regard for Arnauld's penetration was much increased by his Art de peiiser, commonly known as the Port-Royal Logic, which has kept its place as an elementary text-book until quite modern times. Lastly a considerable place has quite lately been claimed for Arnauld among the mathematicians of his age; a recent critic even describes him as the Euclid of the 17th century. In general, however, since his death his reputa- tion has been steadily on the wane. Contemporaries admired him chiefly as a master of close and serried reasoning; herein Bossuet, the greatest theologian of the age, was quite at one with d'Aguesseau, the greatest lawyer. But a purely contro- versial writer is seldom attractive to posterity. Anxiety to drive home every possible point, and cut his adversary off from every possible line of retreat, makes him seem intolerably prolix. " In spite of myself," Arnauld once said regretfully, " my books are seldom very short." And even lucidity may prove a snare to those who trust to it alone, and scornfully refuse to appeal to the imagination or the feelings. It is to be feared that, but for his connexion with Pascal, Arnauld's name would be almost forgotten — or, at most, live only in the famous epitaph Boileau consecrated to his memory —

" Au pied de ret autel de structure grossiere Git sans pompe, enferm6 dans une vile biere Le plus savant mortel qui jamais ait ecrit."

Full details as to the lives and writings of the Arnaulds will be found in the various books mentioned at the close of the article on Port Royal. The most interesting account of Angelique will be found in Memoires pour servir a t'histoire de Port-Royal (3 vols., Utrecht : 1 742). Three volumes of her correspondence were also pub- lished at the same time and place. There are excellent modern lives of her in English by Miss Frances Martin {Angelique Arnatdd, 1873) and by A. K. H. (A ngelique of Port Royal, 1905). Antoine Arnauld's complete works — thirty-seven volumes in forty-two parts — were

Published in Paris, 1 775-1781. No modern biography of him exists; ut there is a study of his philosophy in Bouillier, Histoire de la i>hilosopkie cariesienne (Paris, 1868); and his mathematical achieve- ments are discussed by Dr Bopp in the 14th volume of the Abhand- lungen zur Geschichte der mathematischen Wissenschaften (Leipzig, 1902). The memoirs of Arnauld d'Andilly and of his son, the abbe Arnauld, are reprinted both in Petitot's and Poujoulat's collections of memoirs illustrative of the 17th century. (St. C.)

ARNAULT, ANTOINE VINCENT (1 766-1 834), French drama- tist, was born in Paris in January 1766. His first play, Marius a Minturnes (179-1), immediately established his reputation. A year later he followed up his first success with a second republican tragedy, Lucrhce. He left France during the Terror and on his return was arrested by the revolutionary authorities, but was liberated through the intervention of Fabre d'Eglantine and others. He was commissioned by Bonaparte in 1797 with the reorganization of the Ionian Islands, and was nominated to the Institute and made secretary general of the university. He was faithful to his patron through his misfortunes, and after the Hundred Days remained in exile until 1819. In 1829 he was

re-elected to the Academy and became perpetual secretary in 1833. Others of his plays are Blanche et Montcassin, ou les Vinitiens (1798); and Germanicus (1816), the performance of which was the occasion of a disturbance in the parterre which threatened serious political complications. His tragedies are perhaps less known now than his Fables (1813, 1815 and 1826), which are written in very graceful verse. Arnault collaborated in a Vie politique et militaire de Napoleon (1822), and wrote some very interesting Souvenirs d'un. scxagenaire (1833), which contain much out-of-the-way information about the history of the years previous to 1804. Arnault died at Goderville on the 16th of September 1834.

His eldest son, fimilien Lucien (1787-1863), wrote several tragedies, the leading r61es in which were interpreted by Talma.

See Sainte-Beuve, Causeries du lundi, vol. 7. Arnault's CEuvres computes (4 vols.) were published at the Hague and Paris in 1818- 1819, and again (8 vols.) at Paris in 1824.

ARNDT, ERNST MORITZ (1769-1860), German poet and patriot, was born on the 26th of December 1 769 at Schoritz in the island of Riigen, which at that time belonged to Sweden. He was the son of a prosperous farmer, and emancipated serf of the lord of the district, Count Putbus; his fnother came of well-to-do German yeoman stock. In 1787 the family removed into the neighbourhood of Stralsund, where Arridt was enabled to attend the academy. After an interval of private study he went in 1791 to the university of Greifswald as a student of theology and history, and in ; 1793 removed to Jena, where he fell under the influence of Fichte. On the completion of his university course he returned home, was for two years a private tutor in the family of Ludwig Kosegarten (1758-1818), pastor of Wittow and poet, and having qualified for the ministry as a " candidate of theology," assisted in the church services. At the age of twenty- eight he renounced the ministry, and for eighteen months he led a wandering life, visiting Austria, Hungary, Italy, France and Belgium. Returning homewards

up the Rhine, he was moved by the sight of the ruined castles along its banks to intense bitterness against France. The impressions of this journey he later described in Reisendurch einen Theil Teutschlands, Ungarns, Italiensund Frankreichs inden Jahren 1798 und ijgg (1802-1804). In 1800 he settled in Greifswald as privat-docent in history, and the same year published tjber die Freiheit der alien Republiken. In 1 803 appeared Germanien und Europa, "a fragmentary ebullition," as be himself called it, of his views on the French aggression. This was followed by one of the most remarkable of his books, Versuch einer Geschichte der Leibeigensckaft in Pommem und Riigen (Berlin, 1803), a history of serfdom in Pomerania and Riigen, which was so convincing an indictment that King Gustavus Adolphus IV. in 1806 abolished the evil. Arndt had meanwhile risen from privat-docent to extraordinary professor, and in 1806 was appointed to the chair of history at the univer- sity. In this year he published the first part of his Geist der Zeit, in which he flung down the gauntlet to Napoleon and called on his countrymen to rise and shake off the French yoke. So great was the excitement it produced that Arndt was compelled to take refuge in Sweden to escape the vengeance of Napoleon. Settling in Stockholm, he obtained government employment, but devoted himself to the great cause which was nearest his heart, and in pamphlets, poems and songs communicated his enthusiasm to his countrymen. Schill's heroic death at Stralsund impelled him to return to Germany and, under the disguise of " Almann, teacher of languages," he reached Berlin in December 1809. In 1810 he returned to Greifswald, but only for a few months. He again set out on his adventurous travels, lived in close contact with the first men of his time, such as Blucher, Gneisenau and Stein, and in 18,12 was summoned by the last named to St Petersburg to assist in the organization of the final struggle against France. Meanwhile, pamphlet after pamphlet, full of bitter hatred of the French oppressor, came from his pen, and his stirring patriotic songs, such as Was ist das deutsche Vaterland? Der Gott, der Eisen wachsen liess , and Was blasen die Trompeten ? were on all lips. When, after the peace, the university of Bonn was founded in 1818, Arndt was appointed to

the chair of modern history. In this year appeared the fourth part of his Geisl der Zeit, in which he criticized the reactionary policy of the German powers. The boldness of his demands for reform offended the Prussian government, and in the summer of 1 819 he was arrested and his papers confiscated. Although speedily liberated, he was in the following year, at the instance of the Central Commission of Investigation at Mainz, established in accordance with the Carlsbad Decrees, arraigned before a

specially constituted tribunal. Although not found guilty, he was forbidden to exercise the functions of his professorship, but was allowed to retain the stipend. The next twenty years he passed in retirement and literary activity. In 1840 he was reinstated in his professorship, and in 1841 was chosen rector of the university. The revolutionary outbreak of 1848 rekindled in the venerable patriot his old hopes and energies, and he took his seat as one of the deputies to the National Assembly at Frankfort. He formed one of the deputation that offered the imperial crown to Frederick William IV., and indignant at the king's refusal to accept it, he retired with the majority of von Gagern's adherents from public life. He continued to lecture and to write with freshness and vigour, and on his 90th birthday received from all parts of Germany good wishes and tokens of affection. He died at Bonn on the 29th of January i860. Arndt was twice married, first in 1800, his wife dying in the following year; a second time in 1817.

Arndt's untiring labour for his country rightly won for him the title of " the most German of all Germans.' His lyric poems are not, however, all confined to politics. Many among the Gedichte (1803-1818; complete edition, i860) are religious pieces of great beauty. Among his other works are Reise durch Schweden (1797); Nebenstunden, eine Beschreibung und Geschichte der schottldndischen Inseln und der Orkaden (1820); Die Frage iiber die Niederlande (1831); Erinnerungen aus dem dusseren Leben (an autobiography, and the most valuable source of information for Arndt's life, 1840) ; Rhein- und Ahrwanderungen (1846), Wanderungen und Wandlungen mit dem Reichsfreiherrn von Stein (1858), and Pro populo Germanico (1854), which was originally intended to form the fifth part of the Geist der Zeit. Arndt's Werke have been edited by H. Rosch and H. Meisner in 8 vols, (not complete) (1892-1898). Biographies have been written by E. Langenberg (1869) and Wilhelm Baur (5th ed.. 1882); see also H. Meisner and R. Geerds, E. M. Arndt, ein Lebensbild in Briefen (1898), and R. Thiele, E. M. Arndt (1894). There are monuments to his memory at Schoritz, his birthplace, and at Bonn, where he is buried.

ARNDT, JOHANN (1 555-1621), German Lutheran theologian, was born at Ballenstedt, in Anhalt, and studied in several universities. He was at Helmstadt in 1576; at Wittenberg in 1577. At Wittenberg the crypto-Calvinist controversy was then at its height, and he took the side of Melanchthon and the crypto-Calvinists. He continued his studies in Strassburg, under the professor of Hebrew, Johannes Pappus (1540—1610), a zealous Lutheran, the crown of whose life's work was the forcible suppression of Calvinistic preaching and worship in the city, and who had great influence over him. In Basel, again, he studied theology under Simon Sulzer (1508-1585), a broad- minded divine of Lutheran sympathies, whose aim was to reconcile the churches of the Helvetic and Wittenberg confessions. In 1 58 1 he went back to Ballenstedt, but was soon recalled

to active life by his appointment to the pastorate at Badeborn in 1583. After some time his Lutheran tendencies exposed him to the anger of the authorities, who were of the Reformed Church. Consequently, in 1590 he was deposed for refusing to remove the pictures from his church and discontinue the use of exorcism in baptism. He found an asylum in Quedlinburg (1590), and afterwards was transferred to St Martin's church at Brunswick (1599). Arndt's fame rests on his writings. These were mainly of a mystical and devotional kind, and were inspired by St Bernard, J. Tauler and Thomas a. Kempis. His principal work, Wahres Chrislentum (1606- 1609), which has been translated into most European languages, has served as the foundation of many books of devotion, both Roman Catholic and Protestant. Arndt here dwells upon the mystical union between the believer and Christ, and endeavours, by drawing attention to Christ's life in His people, to correct the purely forensic side of the Reformation theology, which paid almost exclusive attention

to Christ's death for His people. Like Luther, Arndt was very fond of the little anonymous book, Deutsche Theologie. He published an edition of it and called attention to its merits in a special preface. After Wahres Chrislentum, his best-known work is Paradiesgdrtlein aller christlichen Tugenden, which was published in 161 2. Both these books have been translated into English; Paradiesgiirtlein with the title the Garden of Paradise. Several of his sermons are published in R. Nesselmann's Buck der Predigten (1858). Arndt has always been held in very high repute by the German Pietists. The founder of Pietism, Philipp Jacob Spener, repeatedly called attention to him and his writings, and even went so far as to compare him with Plato (cf. Karl Scheele, Plato und Johann Arndt, Ein Vortrag, &c,

1857).

A collected edition of his works was published in Leipzig and Gorlitz in 1734. A valuable account of Arndt is to be found in C. Aschmann's Essai sur la vie, &c., de J. Arndt. See further, Herzog-Hauck, Realencyklopddie.

ARNE, THOMAS AUGUSTINE (1710-1778), English musical composer, was born in London on the 12th of March 1710, his father being an upholsterer. Intended for the legal profession, he was educated at Eton, and afterwards apprenticed to an attorney for three years. His natural inclination for music, however, proved irresistible, and his father, finding from his performance at an amateur musical party that he was already a skilful violinist, furnished him with the means of educating himself in his favourite art. On the 7th of March 1733 he produced his first work at Lincoln's Inn Fields theatre, a setting of Addison's Rosamond, the heroine's part being performed by his sister, Susanna Maria, who afterwards became

celebrated as Mrs Cibber. This proving a success was immediately followed by a burletta, entitled The Opera of Operas, based on Fielding's Tragedy of Tragedies. The part of Tom Thumb was played by Arne's young brother, and the opera was produced at the Hay- market theatre. On the 19th of December 1733 Arne produced at the same theatre the masque Dido and Aeneas, a subject of which the musical conception had been immortalized for Englishmen more than half a century earlier by Henry Purcell. Arne's individuality of style first distinctly asserted itself in the music to Dr Dalton's adaptation of Milton's Comus, which was per- formed at Drury Lane in 1738, and speedily established his reputation. In 1740 he wrote the music for Thomson and Mallet's Masque of Alfred, which is noteworthy as containing the most popular of all his airs — " Rule, Britannia!" In 1740 he also wrote his beautiful settings of the songs, " Under the green-wood tree," " Blow, blow, thou winter wind " and " When daisies pied," for a performance of Shakespeare's As You Like It. Four years before this, in 1736, he had married Cecilia, the eldest daughter of Charles Young, organist of All Hallows Barking. She was considered the finest English singer of the day and was frequently engaged by Handel in the performance of his music. In 1742 Arne went with his wife to Dublin, where he remained two years and produced his oratorio Abel, containing the beautiful melody known as the Hymn of Eve, the operas Britannia, Eliza and Comus, and where he also gave a number of successful concerts. On his return to London he was engaged as leader of the band at Drury Lane theatre (1744), and as composer at Vauxhall (1745). In this latter year he composed his successful pastoral dialogue, Colin and Phoebe, and in 1746 the song, " Where the bee sucks. " In 1 7 59 he received the degree of doctor of music from Oxford. In 1760 he transferred his services to' Covent Garden theatre, where on the 28th of November he produced his Thomas and Sally. Here, too, on the 2nd of February 1762 he produced his Artaxerxes, an opera in the Italian style with recitative instead of spoken dialogue, the popularity of which is attested by the fact that it con-tinued to be performed at intervals for upwards of eighty years. The libretto, by Arne himself, was a very poor translation of Metastasio's Artaserse. In 1762 also was produced the ballad- opera Love in a Cottage. His oratorio Judith, of which the first performance was on the 27th of February 1761 at Drury Lane, was revived at the chapel of the Lock hospital, Pimlico, on the

29th of February 1764, in which year was also performed his setting of Metastasio's Olimpiade in the original language at the King's theatre in the Haymarket. At a later performance of Judith at Covent Garden theatre on

the 26th. of February 1773 Arne for the first time introduced female voices into oratorio choruses. In 1769 he wrote the musical parts for Garrick's ode for the Shakespeare jubilee at Stratford-on-Avon, and in 1770 he gave a mutilated version of Purcell's King Arthur. One of his last dramatic works was the music to Mason's Caractacus, published in 1775. Though inferior to Purcell in intensity of feeling, Arne has not been surpassed as a composer of graceful and attractive melody. There is true genius in such airs as "Rule, Britannia!" and " Where the bee sucks," which still retain their original freshness and popularity. As a writer of glees he does not take such high rank, though he deserves notice as the leader in the revival of that peculiarly English form of composition. He was author as well as composer of The Guardian outwitted, The Rose, The Contest of Beauty and Virtue, and Phoebe at Court. Dr Arne died on the 5th of March 1778, and was buried at St Paul's, Covent Garden.

See also the article in Grove's Dictionary (new ed.) ; and two interesting papers in the Musical Times, November and December

1901.

ARNETH, ALFRED, Ritter von (1810-1897), Austrian historian, born at Vienna on the 10th of July 1819, was the son of Joseph Calasanza von Arneth (1 791-1863), a well-known historian and archaeologist, who wrote a history of the Austrian empire (Vienna, 1827) and several works on numismatics. Alfred Arneth studied law, and became an official of the Austrian state archives, of which in 1868 he was appointed keeper. He was a moderate liberal in politics and a supporter of the ideal of German unity. As such he was elected to the Frankfort parliament in 1848. In 1 86 1 he became a member of the Lower Austrian diet and in 1869 was nominated to the Upper House of the Austrian Reichsrath. In 1879 he was appointed president of the Kaiserliche Akademie der Wissenschaften (Academy of Sciences) at Vienna, and in 1S96 succeeded von Sybel as chairman of the historical commission at Munich. He died on the 30th of July 1897.

Arneth was an indefatigable worker, and, as director of the archives, his broad-minded willingness to listen to the advice of experts, as well as his own sound sense, did much to promote the more scientific treatment and use of public records in most of the archives of Europe. His scientific temper and the special facilities which he enjoyed for drawing from original sources give to his numerous historical works a very special value.

Among his publications may be mentioned: Leben des Feld- marschalls Graf en Guido Starhemberg (Vienna, 1863); Prinz Eueen von Savoyen (3 vols., ib. 1864); Gesch. der Maria Theresa (10 vols., ib. 1863-1879); Maria Theresa u. Marie Antoinette, ihr Briefwechsel (ib. 1866); Marie Antoinette,

Joseph II. und Leopold II., ihr Brief- wechsel (1 866) ; Maria Theresa und Joseph II. , ihre Korrespondenz satnt Briefen Josephs an seinen Bruder Leopold (3 vols., 1867) ; Beaumarchais und Sonnenfels (1868); Joseph II. und Katharina von Russland, ihr Briefwechsel (1869); Johann Christian Barthenstein und seine Zeit (1871); Joseph II. und Leopold von Toskana, ihr Briefwechsel (2 vols., 1872); Briefe der Kaiserin Maria Theresa an ihre Kinder und Freunde (4 vols., 1881); Marie Antoinette : Corre- spondance secrete entre Marie-Therese et le cotnte de Mercy- Argenleau (3 vols., Paris, 1875), in collaboration with Auguste Geffroy; Graf Philipp Cobenzl und seine Memoiren (1885); Correspondance secrete du comte de Mercy-Argenleau avec I'empereur Joseph II. et Kaunitz (2 vols., 1889-1891), in collaboration with Jules Flammermont; Anton Ritter von Schmerling. Episoden aus seinem Leben 1835, 1848-1849 (1895); Johann Freiherr von Wessenberg, ein oster- reichischer Staatsmann des 19. Jahrh. (2 vols., 1898). Arneth also published in 1893 two volumes of early reminiscences under the title of Aus meinem Leben.

ARNHEM, or Arnheim, the capital of the province of Gelder- land, Holland, on the right bank of the Rhine (here crossed by a pontoon bridge), and a junction station 35 m. by rail E.S.E. of Utrecht. Pop. (1900) 57,240. It is connected by tramway with Zutphen and Utrecht, and there is a regular service of steamers to Cologne, Amsterdam, Nijmwegen, Tiel, 's Herto- genbosch and Rotterdam. Arnhem is a gay and fashionable town prettily situated at the foot of the Veluwe hills, and enjoys a special reputation for beauty on account of its wooded and

hilly surroundings, which have attracted many wealthy people to its neighbourhood. The Groote Kerk of St Eusebius, built in the third quarter of the 15th century, contains the marble monument to Charles (d. 1538), the last duke of Gelderland of the Egmont dynasty. High up against the wall is an effigy of the same duke in his armour. The fine lofty tower contains a chime of forty-five bells. The Roman Catholic church of St Walburgis is of earlier date, and a new Roman Catholic church dates from 1894. The town hall was built as a palace by Maarten van Rossum, Duke Charles's general, at the end of the 15th century, and was only converted to its present use in 1830. Its grotesque external ornamentation earned for it the name of Duivelshuis, or devil's house. The provincial government house occupies the site of the former palace of the dukes of Gelderland. Other buildings are the court-house, a public library containing many old works, a theatre, a large concert-hall, a museum of antiquities (as well as a separate coDection of Spanish antiquities), a gymnasium, a teachers' and art school, a building (1880) to contain the provincial archives, a hospital (1889) and barracks. On account of its proximity to the fertile Betuwe district and its situation near the confluence of the Rhine and Ysel, the markets and shipping of Arnhem are in a flourishing condition. A wharf for

building and repairing iron steamers was constructed in 1889. The manufactures include woollen and cotton goods, paper, earthenware, soap, carriages, furniture and tobacco, which is cultivated in the neighbourhood. Wool- combing and dyeing are also carried on, and there are oil and timber mills.

The environs of Arnhem are much admired. Following either the Zutphen or the Utrecht road, numerous pleasing views of the Rhine valley present themselves, and country houses and villas appear among the woods on every side. At Bronbeek, a short distance east of the town, is a hospital endowed by King William III. for soldiers of the colonial army. Beyond is the popular summer resort of Velp, with the castle of Biljoen built by Charles, duke of Gelderland, in 1530, and the beautiful park of the ancient castle of Rozendaal in the vicinity. The origin of the castle of Rozendaal is unknown. The first account of it is in connexion with a tournament given there by Reinald I., count of Gelderland, in the beginning of the 14th century, and it ever after remained the favourite residence of the counts and dukes of Gelderland. About the beginning of the 18th century fountains and lanes in the style of those at Versailles were laid out in the park, and soon after the castle itself, of which only the round tower remained (and is still standing), was rebuilt. The park is open to the public, and is famous for the beauty of the beech avenues and fir woods. Beyond this is De Steeg, another popular resort, whence stretches the famous Middachten Allee of beech trees to Dieren. On the Apeldoorn road is Sonsbeek, with a wooded park and small lakes, formerly a private seat and now belonging to the municipality. On the west of Arnhem is another pleasure ground, called the Reeberg, with a casino, and the woods of Heienoord. Close by is the ancient and well-preserved castle of Doornwerth with its own chapel. It was the seat of an independent lordship until 1402, after which time it was held in fief from the dukes of Gelderland. Beyond Doornwerth, at Renkum, is the royal country seat called Oranje- Nassau's Oord, which was bought by the crown in 1881.

History. — Arnhem, called Arnoldi Villa in the middle ages, is, according to some, the Arenacum of the Romans, and is first mentioned in a document in 893. In 1233 Otto II., count of Gelderland, chose this spot as his residence, conferred municipal rights on the town, and fortified it. At a later period it entered the Hanseatic League. In 1473 it was captured by Charles the Bold of Burgundy. In 1505 it received the right of coining from Philip, son of the emperor Maximilian I. In 1514 Charles of Egmont, duke of Gelderland, took it from the Spaniards; but in 1543 it fell to the emperor Charles V., who made it the seat of the council of Gelderland. It joined the union of Utrecht in 1579, and came finally under the effective government of the states-general in 1585, all the later attacks of the Spaniards being repulsed. In 1 586 Sir Philip Sidney died in the town from

the effects of his wound received before Zutphen. The French took the town in 1672, but left it dismantled in 1674. It was refortified by the celebrated Dutch general of engincers,Coehoorn, in the beginning of the 18th century. In 1795 it was again stormed by the French, and in 1813 it was taken from them by the Prussians under Biilow. Gardens and promenades have now taken the place of the old ramparts, the last of which was levelled in 1853.

ARNICA, a genus of plants belonging to the natural order Compositae, and containing 18 species, mostly north-west American. The most important species is Arnica .montana (mountain tobacco), a perennial herb found in upland meadows in northern and central Europe (but not extending to Britain), and on the mountains of western and central Europe. A closely allied species (A.- angustifolia) , with very narrow leaves, is met with in Arctic Asia and America. The heads of flowers are large, 2 to 25 in. across, orange-yellow in colour, and borne on the summit of the stem or branches; the outer ray-flowers are an inch in length. The achenes (fruits) are brown and hairy, and are crowned by a tuft of stiffish hairs (pappus). The root- stock of A. montana is tough, slender, of a dark brown colour and an inch or two in length. It gives off numerous simple roots from its under side, and shows on its upper side the remains of rosettes of leaves. It yields an essential oil in small quantity, and a resinous matter called arnicin, C12H22O2, a yellow crystal- line substance with an acrid taste. The tincture prepared from' it is an old remedy which has a popular reputation in the treat- ment of bruises and sprains. The plant was introduced into English gardens about the middle of the 18th century, but is not often grown; it is a handsome plant for a rockery.

ARNIM, ELISABETH (BETTINA) VON (1785-1859), German authoress, sister of Klemens Brentano, was born at Frankfort- on-Main on the 4th of April 1785. After being educated at a convent school in Fritzlar, sho lived for a while with her grand- mother, the novelist, Sophie Laroche (1731-1807), at Offenbach, and from 1803 to 1806 with her brother-in-law, Friedrich von Savigny, the famous jurist, at Marburg.. In 1807 she made at Weimar the acquaintance of Goethe, for whom she entertained a violent passion, which the poet, although entering into corre- spondence with her, did not requite, but only regarded as a harm- less fancy. Their friendship came to an abrupt end in 181 1, owing to " Bettina's " insolent behaviour to Goethe's wife. In this year she married Ludwig Achim von Arnim (q.v.), by whom she had seven children. After her husband's death in 1831, her passion for Goethe revived, and in 1835 she published her

remarkable book, Goethes Briefwechsel mit einem Kinde, which purported to be a correspondence between herself and the poet. Regarded at first as genuine, it was afterwards for many years looked upon as wholly fictitious, until the publication in 1879 of G. von Loeper's Brief e Goethes an Sophie Laroche una" Bettina Brentano, nebst dichterischen. Beilagen, which proved it to be based on authentic material, though treated with the greatest poetical licence. Equally fantastic is her correspond- ence Die Giinderode (1840), with her unhappy friend, the poet, Karoline von Giinderode (1780-1806), who committed suicide, and that with her brother Klemens Brentano, under the title Klemens Brentanos Friihlingskranz (1844). She also published Dies Buck gehort dem Konig (1843), in which she advocated the emancipation of the Jews, and the abolition of capital punish- ment. Among her other works may be mentioned Ilius Pam- philius und die A mbrosia (1848), also a supposititious correspond- ence. In all her writings she showed real poetical genius, com- bined with evidence of an unbalanced mind and a mannerism which becomes tiresome. She died at Berlin on the 20th of January 1859. Part of a design by her for a colossal statue of Goethe, executed in marble by the sculptor Karl Steinhauser (1813-1878), is in the museum at Weimar.

Her collected works (Sdmtliche Schriften) were published in Berlin in 11 vols., 1853. Goethe's Briefwechsel mit einem Kinde has been edited by H. Grimm (4th ed., Berlin, 1890). See also C. Alberti, B. von Arnim (Leipzig, 1885); Moritz Carriere, Bettina von Arnim (Breslau, 1887), and the literature cited under Ludwig von Arnim.

ARNIM, HARRY KARL KURT EDUARD VON, Count (1824- 1881), German diplomatist, was a member of one of the most numerous and most widely spread families of the Prussian nobility. He was born in Pomerania on the 3rd of October 1824, and brought up by his uncle Heinrich von Arnim, who was Prussian ambassador at Paris and foreign minister from March to June 1848, while Count Arnim-Boytzenburg, whose daughter Harry von Arnim afterwards married, was minister- president. It is noticeable that the uncle was brought before a court of justice and fined for publishing a pamphlet directed against the ministry of Manteuffel. After holding other posts in the diplomatic service Arnim was in 1864 appointed Prussian envoy (and in 1867 envoy of the North German Confederation)at the papal court. In 1 869 he proposed that the governments should appoint representatives to be present at the Vatican council, a suggestion which was rejected by Bismarck, and foretold that the promulgation of papal infallibility would bring serious political difficulties. After the recall of the French troops from Rome he attempted unsuccessfully to mediate between the pope and the Italian government. He was appointed in 187 1 German com- missioner to arrange the final treaty with France, a task which he

carried out with such success that in 1871 he was appointed German envoy at Paris, and in 1872 received his definite appoint- ment as ambassador, a post of the greatest difficulty and responsibility. Differences soon arose between him and Bismarck; he wished to support the monarchical party which was trying to overthrow Thiers, while Bismarck ordered him to stand aloof from all French parties; he did not give that implicit obedience to his instructions which Bismarck required. Bismarck, how- ever, was unable to recall him because of the great influence which he enjoyed at court and the confidence which the emperor placed in him. He was looked upon by the Conservative party, who were trying to overthrow Bismarck, as his successor, and it is said that he was closely connected with the court intrigues against the chancellor. In the beginning of 1874 he was recalled and appointed to the embassy at Constantinople, but this appointment was immediately revoked. A Vienna newspaper published some correspondence on the Vatican council, including confidential despatches of Arnim's, with the object of showing that he had shown greater foresight than Bismarck. It was then found that a considerable number of papers were missing from the Paris embassy, and on the 4th of October Arnim was arrested on the charge of embezzling state papers. This recourse to the criminal law against a man of his rank, who had held one of the most important diplomatic posts, caused great astonish- ment. His defence was that the papers were not official, and he was acquitted on the charge of embezzlement, but convicted of undue delay in restoring official papers and condemned to three months' imprisonment. On appeal the sentence was increased to nine months. Arnim avoided imprisonment by leaving the country, and in 1875 published anonymously at Zurich a pamphlet entitled " Pro nihilo," in which he attempted to show that the attack on him was caused by Bismarck's personal jealousy. For this he was accused of treason, insult to the emperor, and libelling Bismarck, and in his absence condemned – to five years' penal servitude. From his exile in Austria he published two more pamphlets on the ecclesiastical policy of Prussia, " Der Nunzius kommt! " (Vienna, 1878), and "Quid faciamus nos?" (ib. 1879). He made repeated attempts, which were supported by his family, to be allowed to return to Germany in order to take his trial afresh on the charge of treason; his request had just been granted when he died on the 19th of May

1881.

In 1876 Bismarck carried an amendment to the criminal code making it an offence punishable with imprisonment or a fine up to £250 for an official of the foreign office to communicate to others official documents, or for an envoy to act contrary to his instructions. These clauses are commonly spoken of in Germany as the "Arnim paragraphs." (J. W. He.)

ARNIM, LUDWIG ACHIM (JOACHIM) VON (1781-1831), German poet

and novelist, was born at Berlin on the 26th of January 1781. He studied natural science at Halle and

Gottingen, and published one or two essays on scientific subjects; but his bent was from the first towards literature. From the earlier writings of Goethe and Herder he learned to appreciate the beauties of German traditional legends and folk-songs; and, forming a collection of these, published the result (1806- 180S), in collaboration with Klemens Brentano (q.v.) under the title Des Knaben Wunderhorn. From 1810 onward he lived with his wife Bettina, Brentano's sister, alternately at Berlin and on Lis estate at Wiepersdorf, near Dahme in Brandenburg, where he died on the 21st of January 183 1. Arnim was a prolific and versatile writer, gifted with a sense of humour and a refined imagination — qualities shown in the best-known of his works, Des Knaben Wunderhorn, deficient as this is in the philological accuracy and faithfulness to original sources which would now be expected of such a compilation. In general, however, his writings, full as they are of the exaggerated sentiment and affectations of the romantic school, make but little appeal to modern taste. There are possible exceptions, such as the short stories Fiirst Ganzgott und Sanger Halbgott and Der tolle Invalide auf dent Fort Ratonneau and the unfinished romance Die Kronen- wachter (1817), which promised to develop into one of the finest historical romances of the 19th century. Among Arnim's other works may be mentioned Hollins Liebesleben (1802), Der Winter- garten (1809), a collection of tales; Armut, Reichtum Sckuld, und Busse der Crcifin Dolores (r8io), a novel; Halle und Jerusalem (181 1), a dramatic romance; and one or two smaller novels, such as Isabella von Agypten (1812).

Arnim's Samtliclie Werke were edited by his widow and published in Berlin in 18 39-1840; second edition in 22 vols., 1853-1856. Selections have been edited by J. Dohmke (1892); M. Koch, Arnim, Klemens und Bettina Brentano, Gbrres (1893). Des Knaben Wunder- horn has been frequently republished, the best edition being that of A. Birlinger and W. Crecelius (2 vols., 1872-1876). See R. Steig, Achim von Arnim und Klemens Brentano (1894).

ARNIM-BOYTZENBURG, HANS GEORG VON (1581-1641), German general and diplomatist, was born in 158 1 at Boytzen- burg in Brandenburg. From 1613 to 1617 he served in the Swedish army under Gustavus Adolphus, took part in the Russian War, and afterwards fought against the Turks in the service of the king of Poland. In 1626, though a

Protestant, he was induced by Wallenstein to join the new imperial army, in which he quickly rose to the rank of field marshal, and won the esteem of his soldiers as well as that of his commander, whose close friend and faithful ally he became. This attach- ment to Wallenstein, and a spirit of religious toleration, were the leading motives of a strange career of military and political inconstancy. Thus the dismissal of Wallenstein and the perilous condition of German Protestantism after the edict of Restitution combined to induce Arnim to quit the imperial service for that of the elector of Saxony. He had served under Gustavus many years before, and later he had defeated him in the field, when in command of a Polish army; the fortune of war now placed Arnim at the head of the Saxon army which fought by the side of the Swedes at Breitenfeld (1631), and indeed the alliance of these two Protestant powers in the cause of their common religion was largely his work. The reappearances of Wallenstein, how- ever, caused him to hesitate and open negotiations, though he did not attempt to conceal his proceedings from the elector and Gustavus. During the Liitzen campaign, Arnim was operat- ing with success at the head of an allied army in Silesia. In the following year he was under the hard necessity of opposing his old friend in the field, but little was done by either; the complicated political situation which followed the death of Gustavus at Liitzen led him into a renewal of the private nego- tiations of the previous year, though he did nothing actually treasonable in his relations with Wallenstein. In 1634 Wallen- stein was assassinated, and Arnim began at once more active operations. He won an important victory at Liegnitz in May 1634, but from this time he became more and more estranged from the Swedes. The peace of Prague followed, in which Arnim's part, though considerable, was not all-important (163s). Soon after this event he refused an offer of high command in the French army and retired from active life. From 1637 to

1638 he was imprisoned in Stockholm, having been seized at Boytzenburg by the Swedes on suspicion of being concerned in various intrigues. He made his escape ultimately, and returned to Saxony. Arnim died suddenly at Dresden in 1641, whilst engaged in raising an army to free German soil from foreign armies of all kinds. (See Thirty Years' War.)

See K. G. Helbig, " Wallenstein und Arnim " (1850) and " Der Prager Friede,"in Raumer's Historisches Taschenbuch (1858); also E. D. M. Kirchner, Das Schloss Boytzenburg, &c. (i860) and A rchiv fur die sachsische Geschichte, vol. viii. (1870).

ARNO, Arn or Aquila (c. 750-821), bishop and afterwards archbishop of Salzburg, entered the church at an early age, and after passing some time at Freising became abbot of Elnon, or St Amand as it was afterwards called, where he made the acquaintance of Alcuin. In 785 he was made

bishop of Salzburg and in 787 was employed by Tassilo III., duke of the Bavarians, as an envoy to Charlemagne at Rome. He appears to have attracted the notice of the Frankish king, through whose influence in 798 Salzburg was made the seat of an archbishopric; and Arno, as the first holder of this office, became metropolitan of Bavaria and received the pallium from Pope Leo III. The area of his authority was extended to the east by the conquests of Charlemagne over the Avars, and he began to take a prominent part in the government of Bavaria. He acted as one of the missi dominici, and spent some time at the court of Charlemagne, where he was known by the assembled scholars as Aquila, and his name appears as one of the signatories to the emperor's will. He established a library at Salzburg, furthered in other ways the interests of learning, and presided over several synods called to improve the condition of the church in Bavaria. Soon after the death of Charlemagne in 814, Arno appears to have withdrawn from active life, although he retained his archbishopric until his death on the 24th of January 821. Aided by a deacon named Benedict, Arno drew up about 788 a catalogue of lands and proprietary rights belonging to the church in Bavaria, under the title of Indiculus or Congestum Arnonis. An edition of this work, which is of considerable value to historical students, was published at Munich in 1869 with notes by F. Keinz. Many other works were produced under the protection of Arno, among them a Salzburg consuetudinary, an edition of which appears in Quellen und Erorterungen zur bayrischen und deulschen Geschichte, Band vii., edited by L. Rbckinger (Munich, 1856). It has been sug- gested by W. von Giesebrecht that Arno was the author of an early section of Annates Laurissenses majores, which deals with the history of the Frankish kings from 741 to 829, and of which an edition appears in Monumenta Germaniae historica. Scriptores, Band i. pp. 128-131, edited by G. H. Pertz (Hanover, 1826). If this supposition be correct, Arno was the first extant writer to apply the name Deutsch (theodisca) to the German language.

ARNO (anc. Arnus), a river of Italy which rises from the Monte Falterona, about 25 m. E.N.E. of Florence, 4265 ft. above the sea. It first runs S.S.E. through a beautiful valley, the Casentino; near Arezzo it turns W., and at Montevarchi N.N.W.; 16 m. below it forces its way through the limestone rock at Incisa and 10 m. farther on, at Pontassieve, it is joined by the Sieve. Thence it runs westward to Florence and through the gorge of Golfolina onwards to Empoli and Pisa, receiving various tributaries in its course, and falls into the sea 7 J m. west of Pisa, after a total course of 155 m. In prehistoric times the river ran straight on along the valley of the Chiana and joined the Tiber near Orvieto; and there was a great lake, the north end of which was at Incisa and the south at the lake of Chiusi. The distance from Pisa to the mouth in the time of Strabo was only 2§ m. The

Serchio (anc. Auser), which joined the Arno at Pisa in ancient times, now flows into the sea independently. The Arno is navigable for barges as far as Florence; but it is liable to sudden floods, and brings down with it large quantities of earth and stones, so that it requires careful regulation. The most remarkable inundations were those of 1537 and 1740; in the former year the water rose to 8 ft. in the streets of Florence. The valley between Incisa and Arezzo contains accumulations of fossil bones of the deer, elephant, rhinoceros, mastodon, hippopotamus, bear, tiger, &c.

ARNOBIUS (called Afer, and sometimes " the Elder "), early Christian writer, was a teache'r of rhetoric at Sicca Venerea in proconsular Africa during the reign of Diocletian. His conversion to Christianity is said by Jerome to have been occasioned by a dream; and the same writer adds that the bishop to whom Arnobius applied distrusted his professions, and asked some proof of them, and that the treatise Adversus Gentes was com- posed for this purpose. But this story seems rather improbable; for Arnobius speaks contemptuously of dreams, and besides, his work bears no traces of having been written in a short time, or of having been revised by a Christian bishop. From internal evidence (bk. iv. 36) the time of composition may be fixed at about a.d. 303. Nothing further is known of the life of Arnobius. He is said to have been the author of a work on rhetoric, which, however, has not been preserved. His great treatise, in seven books, Adversus Gentes (or Nationes), on account of which he takes rank as a Christian apologist, appears to have been occasioned by a desire to answer the complaint then brought against the Christians, that the prevalent calamities and disasters were due to their impiety and had come upon men since the establishment of their religion. In the first book Arnobius carefully discusses this complaint; he shows that the allegation of greater calam- ities having come upon men since the Christian era is false; and that, even if it were true, it could by no means be attributed to the Christians. He skilfully contends that Christians who worship the self-existent God cannot justly be called less religious than those who worship subordinate deities, and concludes by vindicating the Godhead of Christ. In the second bpok Arnobius digresses into a long discussion on the soul, which he does not think is of divine origin, and which he scarcely believes to be immortal. He even says that a belief in the soul's immor- tality would tend to remove moral restraint, and have a pre- judicial effect on human life. In the concluding chapters he answers the objections drawn from the recent origin of Christi- anity. Books iii., iv. and v. contain a violent attack on the heathen mythology, in which he narrates with powerful sarcasm the scandalous chronicles of the gods, and contrasts with their grossness and

immorality the pure and holy worship of the Christian. These books are valuable as a repertory of mytho- logical stories. Books vi. and vii. ably handle the questions of sacrifices and worship of images. The confusion of the final chapter points to some interruption. The work of Arnobius appears to have been written when he was a recent convert, for he does not possess a very extensive knowledge of Scripture. He knows nothing of the Old Testament, and only the life of Christ in the New, while he does not quote directly from the Gospels. He is also at fault in regard to the Jewish sects. He was much influenced by Lucretius and had read Plato. His statements concerning Greek and Roman mythology are based respectively on the Protrepticus of Clement of Alexandria, and on Antistius Labeo, who belonged to the preceding generation and attempted to restore Neoplatonism. There are some pleasing passages in Arnobius, but on the whole he is a tumid and a tedious author.

Editions. — Migne, Patr. Lai. iv. 349; A. Reifferscheich in the Vienna Corpus Script. Eccles. Lot. (1875).

Translations. — A. H. Bryce and H. Campbell in Ante-Nicene

Literature. — H. C. G. Moule in Diet. Chr. Biog.i.; Herzog- Hauck, Realencyklopadie; and G. Kruger, Early Chr. Lit. p. 304 (where full bibliographies are given).

ARNOBIUS (" the younger "), Christian priest or bishop in Gaul, flourished about 460. He is the author of a mystical and allegorical commentary on the Psalms, first published by Erasmus in 1522, and by him attributed to the elder Arnobius. It has been frequently reprinted, and in the- edition of De la Barre, 1580, is accompanied by some notes on the Gospels by the same author. To him has sometimes been, ascribed the anonymous treatise, Arnobii catholici et Serapionis conflictus de Deo trino et uno . . . de gratiae liberi arbtirii concordia, which was probably written by a follower of Augustine. The opinions of Arnobius, as appears from the commentary, are semi- Pelagian.

ARNOLD, known as "Arnold of Brescia" (d. 1155), om> of the most ardent adversaries of the temporal power of the popes. He belonged to a family of importance, if not noble, and was born probably at Brescia, in Italy, towards the end of the nth century. He distinguished himself in his monastic studies, and went to France about 1115. He studied theology in Paris, but there is no proof that he was a pupil of Abelard. Returning to Italy he became a canon regular. His life was rigidly austere, St Bernard calling him " homo neque manducans neque bibens." He at once directed his efforts against the corruption of the clergy, and especially against the temporal ambitions of the high dignitaries of the church. During the schism

of Anacletus (1131-1137) the town of Brescia was torn by the struggles between the partisans of Pope Innocent II. and the adherents of the anti-pope, and Arnold gave effect to his abhorrence of the political episcopate by inciting the people to rise against their bishop, and, exiled by Innocent II., went to France. St Bernard accused him of sharing the doctrines of Abelard (see Ep. 189, 195), and procured his condemnation by the council of Sens (1140) at the same time as that of the great scholastic. This was perhaps no more than the outcome of the fierce polemical spirit of the abbot of Clairvaux, which led him to include all his adversaries under a single anathema. It seems certain that Arnold professed moral theology in Paris, and several times reprimanded St Bernard, whom he accused of pride and jealousy. St Bernard, as a last resort, begged King Louis VII. to take severe measures against Arnold, who had to leave France and take refuge at Zurich. There he soon became popular, especially with the lay nobility; but, denounced anew by St Bernard to the ecclesiastical authorities, he returned to Italy, and turned his steps towards Rome (1145). It was two years since, in 1143; the Romans had rejected the temporal power of the pope. The urban nobles had set up a republic, which, under forms ostensibly modelled on antiquity (e.g. patriciate, senatus populusque romanus, &c), concealed but clumsily a purely oligarchical government. Pope Eugenius III. and his adherents had been forced after a feeble resistance to resign themselves to exile at Viterbo. Arnold, after returning to Rome, immediately began a campaign of virulent denunciation against the Roman clergy, and, in particular, against the Curia, which he stigmatized as a " house of merchandise and den of thieves." His enemies have attributed to him certain doctrinal heresies, but their accusations do not bear examination. Accord ing to Otto of Freising (Lib. de gestis Friderici, bk. ii. chap, xx.) the whole of his teaching, outside the preaching of penitence, was summed up in these maxims: — " Clerks who have estates, bishops who hold fiefs, monks who possess property, cannot be saved." His eloquence gained him a hearing and a numerous following, including many laymen, but consisting principally of poor ecclesiastics, who formed around him a party character- ized by a rigid morality and not unlike the Lombard Patarenes of the nth century. But his purely political action was very restricted, and not to be compared with that of a Rienzi or a Savonarola. The Roman revolution availed itself of Arnold's popularity, and of his theories, but was carried out without his aid. His name was associated with this political reform solely because his was the only vigorous personality which stood out from the mass of rebels, and because he was the principal victim of the repression that ensued. On the 15th of July 1148 Eugenius III. anathematized Arnold and his adherents; but when, a short time afterwards, the pope, through the support of the king of Naples and the king of France, succeeded in' entering Rome, Arnold remained in the town unmolested, under the protection of the senate. But in

1152 the German king Conrad III., whom the papal party and the Roman republic had in vain begged to intervene, was succeeded by Frederick I. Barbarossa. Frederick, whose authoritative temper was at once offended by the independent tone of the Arnoldist party, con- cluded with the pope a treaty of alliance (October 16, 1152) of such a nature that the Arnoldists were at once put in a minority in the Roman government; and when the second successor of Eugenius III., the energetic and austere Adrian IV. (the

Englishman, Nicholas Breakspear), placed Rome under an inter- dict, the senate, already rudely shaken, submitted, and Arnold was forced to fly into Campania (1155). At the request of the pope he was seized by order of the emperor Frederick, then in Italy, and delivered to the prefect of Rome, by whom he was condemned to death. In June 1155 Arnold was hanged, his body burnt, and the ashes were thrown into the Tiber. His death produced but a feeble sensation in Rome, which was already pacified, and passed almost unnoticed in Italy. The adherents of Arnold do not appear actually to have formed, either before or after his death, a heretical sect. It is probable that his adherents became merged in the communities of the Lombard Waldenses, who shared their ideas on the corruption of the clergy. Legend, poetry, drama and politics have from time to time been much occupied with the personality of Arnold of Brescia, and not seldom have distorted it, through the desire to see in him a hero of Italian independence and a modern democrat. He was before everything an ascetic, who denied to the church the right of holding property, and who occupied himself only as an accessory with the political and social con- sequences of his religious principles.

The bibliography of Arnold of Brescia is very vast and of very unequal value. The following works will be found useful: W. von Giesebrecht, Arnold von Brescia (Munich, 1873); G. Gaggia, Arnaldo da Brescia (Brescia, 1882); and notices by Vacandard in the Revue des questions hisloriques (Paris, 1884), pp. 52-114, by R. Breyer in the Histor. Taschenbuch (Leipzig, 1889), vol. viii. pp. 123-178, and by A. Hausrath in Neue Heidelberg. Jahrb. (1891), Band i. pp. 72-144. (P. A.)

ARNOLD, BENEDICT (1741-1801), American soldier, born in Norwich, Connecticut, on the 14th of January 1741. He was the great-grandson of Benedict Arnold (1615-1678), thrice colonial governor of Rhode Island between 1663 and 1678; and was the fourth in direct descent to bear the name. He received a fair education but was not studious, and his youth was marked by the same waywardness which characterized his whole

career. At fifteen he ran away from home and took part in an expedition against the French, but, restless under restraint, he soon deserted and returned home. In 1762 he settled in New Haven, where he became the proprietor of a drug and book shop; and he subsequently engaged successfully in trade with the West Indies. Immediately after the battle of Lexington Arnold led the local militia company, of which he was captain, and additional volunteers to Cambridge, and on the 29th of April 1775 he proposed to the Massachusetts Committee of Safety an ex- pedition against Crown Point and Ticonderoga. After a delay of four days the offer was accepted, and as a colonel of Massa- chusetts militia he was directed to enlist in the west part of Massachusetts and in the neighbouring colonies the men neces- sary for the undertaking. He was forestalled, however, by Ethan Allen (q.v.), acting on behalf of some members of the Connecticut Assembly. Under him, reluctantly waiving his own claim to command, Arnold served as a volunteer; and soon afterwards, Massachusetts having yielded to Connecticut, and having angered Arnold by sending a committee to make an inquiry into his conduct, he resigned and returned to Cambridge. He was then ordered to co-operate with General Richard Mont- gomery in the invasion of Canada, which he had been one of the first to suggest to the Continental Congress. Starting with 1 1 00 men from Cambridge on the 17th of September 1775, he reached Gardiner, Maine, on the 20th, advanced through the Maine woods, and after suffering terrible privations and hard- ships, his little force, depleted by death and desertion,, reached Quebec on the 13th of November. The garrison had been forewarned, and Arnold was compelled to await the coming of Montgomery from Montreal. The combined attack on the 31st of December 1775 failed; Montgomery was killed, and Arnold was severely wounded. Arnold, who had been commissioned a brigadier-general in January 1776, remained in Canada until the following June, being after April in command at Montreal.

Some time after the retreat from Canada, charges of mis- conduct and dishonesty, growing chiefly out of his seizure from merchants in Montreal of goods for the use of his troops, were

brought against him; these charges were tardily investigated by the Board of War, which in a report made on the 23rd of May 1777, and confirmed by Congress, declared that his " char- acter and conduct " had been " cruelly and groundlessly aspersed." Having constructed a flotilla on Lake Champlain, Arnold engaged a greatly superior British fleet near Valcour Island (October 11, 1776), and after inflicting severe loss on the enemy, made his escape under cover of night. Two days later he was overtaken by the British fleet, which however he, with only one war- vessel, and that crippled, delayed long enough to enable his other vessels to make good their escape, fighting with desperate valour and finally running his own ship

aground and escaping to Crown Point. The engagement of the nth was the first between British and American fleets. Arnold's brilliant exploits had drawn attention to him as one of the most promising of the Continental officers, and had won for him the friendship of Washington. Nevertheless, when in February 1777 Congress created five new major-generals, Arnold, although the ranking brigadier, was passed over, partly at least for sectional reasons— Connecticut had already two major-generals — in favour of his juniors. At this time it was only Washington's urgent persuasion that prevented Arnold from leaving the service. Two months later while he was at New Haven, Governor Tryon's descent on Danbury took place; and Arnold, who took command of the militia after the death of General Wooster, attacked the British with such vigour at Ridgefield (April 27, 1777) that they escaped to their ships with difficulty.

In recognition of this service Arnold was now commissioned major-general (his commission dating from 17 th February) but without his former relative rank. After serving in New Jersey with Washington, he joined General Philip Schuyler in the Northern Department, and in August 1777 proceeded up the Mohawk Valley against Colonel St Leger, and raised the siege of Fort Stanwix (or Schuyler). Subsequently, after Gates had superseded Schuyler (August 19), Arnold commanded the American left wing in the first battle of Saratoga (September 19, 1777). His ill-treatment at the hands of General Gates, whose jealousy had been aroused, led to a quarrel which terminated in Arnold being relieved of command. He remained with the army, however, at the urgent request of his brother officers, and although nominally without command served brilliantly in the second battle of Saratoga (October 7, 1777), during which he was seriously wounded. For his services he was thanked by Congress, and received a new commission giving him at last his proper relative rank.

In June 1778 Washington placed him in command of Phil- adelphia. Here he soon came into conflict with the state authorities, jealous of any outside control. In the social life of Philadelphia, largely dominated by families of Loyalist sym- pathies, Arnold was the most conspicuous figure; he lived extravagantly, entertained lavishly, and in April 1779 took for his second wife, Margaret Shippen (1760-1804), the daughter of Edward Shippen (1720-1806), a moderate Loyalist, who event- ually became reconciled to the new order and was in 1799-1805 chief-justice of the state. Early in February 1779 the executive council of Pennsylvania, presided over by Joseph Reed, one of his most persistent enemies, presented to Congress eight charges of misconduct against Arnold, none of which was of any great importance. Arnold at once demanded an investigation, and in March a committee of Congress made a report exonerating him; but Reed obtained a reconsideration, and in April 1779 Congress, though throwing out four charges, referred the other four to a court-martial. Despite Arnold's

demand for a speedy trial, it was December before the court was convened. It was probably during this period of vexatious delay that Arnold, always sensitive and now incited by a keen sense of injustice, entered into a secret correspondence with Sir Henry Clinton with a view to joining the British service. On the 26th of January 1780 the court, before which Arnold had ably argued his own case, rendered its verdict, practically acquitting him of all intentional wrong, but, apparently in deference to the Penn- sylvania authorities, directing Washington to reprimand him

for two trivial and very venial offences. Arnold, who had confidently expected absolute acquittal, was inflamed with a burning anger that even Washington's kindly reprimand, couched almost in words of praise, could not subdue.

It was now apparently that he first conceived the plan of be- traying some important post to the British. With this in view he sought and obtained from Washington (August 1780) command of West Point, the key to the Hudson River Valley. Arnold's offers now became more explicit, and, in order to perfect the details of the plot, Clinton's adjutant-general, Major John Andre, met him near Stony Point on the night of the 21st of September. On the 23rd, while returning by land, Andre with incriminating papers was captured, and the officer to whom he was entrusted unsuspectingly sent information of his capture to Arnold, who was thus enabled to escape to the British lines. Arnold, commissioned a. brigadier-general in the British army, received £6315 in compensation for his property losses, and was employed in leading an expedition into Virginia which burned Richmond, and in an attack upon New London (q.v) in September 1781. In December 1781 he removed to London and was consulted on American affairs by the king and ministry, but could obtain no further employment in the active service. Disappointed at the failure of his plans and embittered by the neglect and scorn which he met in England, he spent the years 1787-1791 at St John, New Brunswick, once more engaging in the West India trade, but in 1791 he returned to London, and after war had broken out between Great Britain and France, was active in fitting out privateers. Gradually sinking into melancholia, worn down by depression, and suffering from a nervous disease, he died at London on the 14th of June 180 1. ,

Arnold had three sons — Benedict, Richard and Henry — by his first wife, and four sons — Edward Shippen James Robertson, George and William Fitch — by his second wife; five of them, and one grandson, served in the*

British army. Benedict (1768- 1795) was an officer of the artillery and was mortally wounded in the West Indies. Edward Shippen (1 780-1813) became lieutenant of the Sixth Bengal Cavalry and later paymaster at Muttra, India. James Robertson (1 781-1854) entered the corps of Royal Engineers in 1798, served in the Napoleonic wars, in Egypt and in the West Indies, and rose to the rank of lieutenant- general, was an aide-de-camp to William IV., and was created a knight of the Hanoverian Guelphic order and a knight of the Crescent. George (1 787-1828) was a lieutenant-colonel in the Second Bengal Cavalry at the time of his death. William Fitch (1 794-1828) became a captain in the Nineteenth Royal Lancers; his son, William Trail (1826-1855) served in the Crimean War as captain of the Fourth Regiment of Foot and was killed during the siege of Sevastopol.

Bibliography. — Jared Sparks' Life and Treason of. Benedict Arnold (Boston, 1835), in his " Library of American Biography," is biassed and unfair. The best general account is Isaac Newton Arnold's Life of Benedict Arnold (Chicago, 1880), which, while offering no apologies or defence of his treason, lays perhaps too great emphasis on his provocations. Charles Burr Todd's The Real Benedict Arnold (New York, 1903) is a curious attempt to make Arnold's wife wholly responsible for his defection. Frangois de Barb£-Marbois's Complot d' Arnold el de Sir II. Clinton contre les Atats-Unis (Paris, 1816) contains much interesting material, but is inaccurate. Two good accounts of the Canadian Expedition are Justin H. Smith's Arnold's March from Cambridge to Quebec (New York, 1903), which contains a reprint of Arnold's journal of the expedition; and John Codrhan's Arnold's Expedition to Quebec (New York, 1901). Arnold's Letters on the Expedition to Canada were printed in the Maine Historical Society's Collections for 1831 (repr. 1865). See also William Abbatt, The Crisis of the Revolution (New York, 1899); The Northern Invasion of 1780 (Bradford Club Series, No. 6, New York, 1866); " The Treason of Benedict Arnold " (letters of Sir Henry Clinton to Lord George Germaine) in Pennsylvania Magazine of History and Biography, vol. xxii. (Philadelphia, 1898); and Proceedings of a General Court Martial for tlie Trial of Major-General Arnold (Philadelphia, 1780; reprinted with introduction and notes, New York, 1865).

ARNOLD, SIR EDWIN (1832-1904), British poet and jour- nalist, was born on the 10th of June 1832, and was educated at the King's school, Rochester; King's College, London; and University College, Oxford, where in 1852 he gained the Newdi-

gate prize for a poem on Belshazzar's feast. On leaving Oxford he became a schoolmaster, and went to India as principal of the government Sanskrit College at Poona, a post which he held during the mutiny of 1857, when he was able to render services for which he was publicly thanked by Lord

Elphinstone in the Bombay council. Returning to England in 1861 he worked as a journalist on the staff of the Daily Telegraph, a newspaper with which he continued to be associated for more than forty years. It was he who, on behalf of the proprietors of the Daily Telegraph in conjunction with the New York Herald, arranged for the journey of H. M. Stanley to Africa to discover the course of the Congo, and Stanley named after him a mountain to the north-east of Albert Edward Nyanza. Arnold must also be credited with the first idea of a great trunk line traversing the entire African continent, for in 1874 he first employed the phrase " a Cape to Cairo railway " subsequently popularized by Cecil Rhodes. It was, however, as a poet that he was best known to his contemporaries. The Light of Asia appeared in 1879 an d won an immediate success, going through numerous editions both in England and America. It is an Indian epic, dealing with the life and teaching of Buddha, which are expounded with much wealth of local colour and not a little felicity of versification. The poem contains many lines of unquestionable beauty; and its immediate popularity was rather increased than diminished by the twofold criticism to which ft was sub- jected. On the one hand it was held by Oriental scholars to give a false impression of Buddhist doctrine; while, on the other, the suggested analogy between Sakyamuni and Christ offended the taste of some devout Christians. The latter criticism prob- ably suggested to Arnold the idea of attempting a second narra- tive poem of which the central figure should be the founder of Christianity, as the founder of Buddhism had been that of the first. But though The Light of the World (1891), in which this idea took shape, had considerable poetic merit, it lacked the novelty of theme and setting which had given the earlier poem much of its attractiveness; and it failed to repeat the success attained by The Light of Asia. Arnold's other principal volumes of poetry were Indian Song of Songs (1875), Pearls of the Faith (1883), The Song Celestial (1885), With Sadi in the Garden (1888), Potiphar's Wife (1892) and Admma (1893). In his later years Arnold resided for some time in Japan, and his third, wife was a Japanese lady. In Seas and Lands (1891) and Japonica (1892) he gives an interesting study of Japanese life. He received the order of C.S.I, on the occasion of the proclamation of Queen Victoria as empress of India in 1877, and in 1888 was created K.C.I.E. He also possessed decorations conferred by the rulers of Japan, Persia, Turkey and Siam. Sir Edwin Arnold died on the 24th of March 1904.

ARNOLD, GOTTFRIED (1666-1714), German Protestant divine, was born at Annaberg, in Saxony, where his father was a schoolmaster. In 1682 he went to the Gymnasium at Gera, and three years later to the university of Wittenberg. Here he made a special study of theology and history, and afterwards, through the influence of P. J. Spener, " the father of pietism," he became tutor in Quedlinburg. His first work, Die Erste Licbe zuChristo,

*to which in modern times attention was again directed by Leo Tolstoy, appeared in 1696. It went through five editions before 1728, and gained the author much reputation. In the year after its publication he was invited to Giessen as professor of church history. The life and work here, however, proved so distasteful to him that he resigned in 1698, and returned to Quedlinburg. In 1699 he began to publish his largest work, described by Tolstoy (The Kingdom of God is within You, chap, iii.) as" remarkable, although little known," Unparteiische Kirchen- und Ketzerhistorie, in which he has been thought by some to show more impartiality towards heresy than towards the Church (cp. Otto Pfleiderer, Development of Theology, p. 277). His next work, Geheimniss der gottlichen Sophia, published in 1 700, seemed to indicate that he had developed a form of mysti- cism. Soon afterwards, however, his acceptance of a pastorate marked a change, and he produced a number of noteworthy works on practical theology. He was also known as the autho**

ARNOLD, MATTHEW

t>35

of sacred poems. Gottfried Arnold has rightly been classed with the pietistic section of Protestant historians {Bibliotheca Sacra, 1850).

See Calwer-Zeller, Theologisches Handwdrterbuch, and the account of him in Albert Knapp's new edition of Die erste Liebe zu Chrhto

(1845).

ARNOLD, MATTHEW (1822-1888), English poet, literary critic and inspector of schools, was bom at Laleham, near Staines, on the 24th of December 1822. When it is said that he was the son of the famous Dr Arnold of Rugby, and that Win- chester, Rugby and Balliol College, Oxford, contributed their best towards his education, it seems superfluous to add that, in estimating Matthew Arnold and his work, training no less than original endowment has to be considered. A full academic training has its disadvantages as well as its gains. In the in- dividual no less than in the species the history of man's develop- ment is the history of the struggle between the impulse to express original personal force and the impulse to make that force bow to the authority of custom. Where in any individual the first of these impulses is stronger than usual, a complete academic training is a gain; but where the second of these impulses is the dominant one, the effect of the academic habit upon the mind at its most sensitive and most plastic period is apt to be crippling. In regard to Matthew Arnold, it would be a bold critic of his life and his writings who should attempt to say what his work would have been if his training had been different. In his

judgments on Goethe, Wordsworth, Byron, Shelley and Hugo, it may be seen how strong was his impulse to bow to authority. On the other hand, in Arnold's ingenious reasoning away the conception of Providence to "a stream of tendency not ourselves which makes for righteousness," we see how strong was his natural impulse for taking original views. The fact that the very air Arnold breathed during the whole of the impressionable period of his life w r as academic is therefore a very important fact to bear in mind.

In one of his own most charming critical essays he contrasts the poetry of Homer, which consists of " natural thoughts in natural words," with the poetry of Tennyson, which consists of " distilled thoughts in distilled words." " Distilled " is one of the happiest words to be found in poetical criticism, and may be used with equal aptitude in the criticism of life. To most people the waters of life come with all their natural qualities — sweet or bitter— undistilled. Only the ordinary conditions of civilization, common to all, flavoured the waters of life to Shakespeare, to Cervantes, to Burns, to Scott, to Dumas, and those other great creators whose minds were mirrors — broad and clear — for reflecting the rich drama of life around them. To Arnold the waters of life came distilled so carefully that the wonder is that he had any originality left. A member of the upper stratum of that " middle class " which he despised, or pretended to despise — the eldest son of one of the most accomplished as well as one of the most noble-tempered men of his time — Arnold from the moment of his birth drank the finest distilled waters that can be drunk even in these days. Perhaps, on the whole, the surprising thing is how little he suffered thereby. Indeed those who had formed an idea of Arnold's personality from their knowledge of his " culture," and especially those who had been delighted by the fastidious and feminine delicacy of his prose style, used to be quite bewildered when for the first time they met him at a dinner-table or in a friend's smoking-room. His prose was so self-conscious that what people expected to find in the writer was the Arnold as he was conceived by certain " young lions " of journalism whom he satirized — a somewhat over- cultured petit-mailre — almost, indeed, a coxcomb of letters. On the other hand, those who had been captured by his poetry expected to find a man whose sensitive organism responded nervously to every uttered word as an aeolian harp answers to the faintest breeze. What they found was a broad-shouldered, manly — almost burly — Englishman with a fine countenance, bronzed by the open air of England, wrinkled apparently by the sun, wind-worn as an English skipper's, open and frank as a fox-hunting squire's — and yet a countenance whose finely

chiselled features were as high-bred and as commanding as Wellington's or Sir Charles Napier's. The voice they heard was deep-toned, fearless, rich and frank, and yet modulated to express every nuance of thought, every

movement of emotion and humour. In his prose essays the humour he showed was of a somewhat thin-lipped kind; in his more important poems he showed none at all. It was here, in this matter of humour, that Arnold's writings were specially misleading as to the personality of the man. Judged from his poems, it was not with a poet like the writer of " The Northern Farmer," or a poet like the writer of" NedBratts," that any student of poetry would have dreamed of classing him. Such a student would actually have been more likely to class him with two of his contemporaries between whom and himself there were but few points in common, the " humour- less " William Morris- and the " humourless " Rossetti. For, singularly enough, between him and them there was this one point of resemblance: while all three were richly endowed with humour, while all three were the very lights of the sets in which they moved, the moment they took pen in hand to write poetry they became sad. It would almost seem as if, like Rossetti, Arnold actually held that poetry was not the proper medium for humour. No wonder, then, if the absence of humour in his poetry did much to mislead the student of his work as to the real character of the man.

After a year at Winchester, Matthew Arnold entered Rugby school in 1837. He early began to write and print verses. His first publication was a Rugby prize poem, Alaric at Rome, in 1840. This was followed in 1843, after he had gone up to Oxford in 1840 as a scholar of Balliol, by his poem Cromwell, which won the Newdigate prize. In 1844 he graduated with second-iclass honours, and in 1,845 was elected a fellow of Oriel College, where among his colleagues was A. H. Clough, his friendship with whom is commemorated in that exquisite elegy Thyrsis. From 1847 to 1851 he acted as private secretary to Lord Lansdowne; and in the latter year, after acting for a short time as assistant- master at Rugby, he was appointed to an inspectorship of schools, a post which lie retained until two years before his death. He married, in June 1851, the daughter of Mr Justice Wightman. Meanwhile, in 1849, appeared The Strayed Reveller, and other Poems, by A , a volume which gained a considerable esoteric reputation. In 1852 he published another volume under the same initial, Empedocles on Etna, and other. Poems. Empcdocles is as undramatic a poem perhaps as was ever written in dramatic form, but studded with lyrical beauties of a very high order. In 1853 Arnold published a volume of Poems under his own name. This consisted partially of poems selected from the two previous volumes. A second series of poems, which contained, however, only two new ones, was published in 1855. So great was the impression made by these in academic circles, that in 1857 Arnold was elected professor of poetry at Oxford, and he held the chair for ten years. In 1858 he published his classical tragedy, Merope. Nine years afterwards his New Poems (1867) were published. While he held the Oxford professorship he published several series of lectures, which gave him a high place as a

scholar and critic. The essays 1 On Translating Homer: Three Lectures given at Oxford, published in 186 1, supplemented in 1862 by On Translating Homer: Last Wards, a fourth lecture given. ill reply to F. W.. Newman's .ffowmc Translation in Theory and Practice (1861), and On the Study of Celtic Literature, pub- lished in 1867, were full of subtle and brilliant if not of profound criticism. So were the two series of Essays in Criticism, the first of which, consisting of articles reprinted from various reviews, appeared in 1865. The essay on " A Persian Passion Play " was added in the editions of 1875; and a second series, edited by Lord Coleridge, appeared in 1888.

Arnold's poetic activity almost ceased after he left the chair of poetry at Oxford He was several times sent by government to make inquiries into the state of education in France, Germany, Holland and other countries; and his reports, with their thorough-going and searching criticism of continental methods,*

1 These essays were edited.in 1905 with an introduction by W. H. D. Rouse.

as contrasted with English methods, showed how conscientiously he had devoted some of his best energies to the work. His fame as a poet and a literary critic has somewhat overshadowed the fact that he was during thirty-five years of his life — from 1851 to 1886— employed in the Education Department as one of H.M. inspectors of schools, while his literary work was achieved in such intervals of leisure as could be spared from the public service. At the time of his appointment the government, by arrangement with the religious bodies, entrusted the inspection of schools connected with the Church of England to clergymen, and agreed also to send Roman Catholic inspectors to schools managed by members of that communion. Other schools — those of the British and Foreign Society, the Wesleyans, and undenominational schools generally — were inspected by laymen, of whom Arnold was one. There were only three or four of these officers at first, and their districts were necessarily large. It is to the experience gained in intercourse with Nonconformist school managers that we may attribute the curiously intimate knowledge of religious sects which furnished the material for some of his keen though good-humoured sarcasms. The Edu- cation Act of 1870, which simplified the administrative system, abolished denominational inspection, and thus greatly reduced the area assigned to a single inspector. Arnold took charge of the district of Westminster, and remained in that office until his resignation, taking also

an occasional share in the inspection of training colleges for teachers, and in conferences at the central office. His letters, passim, show that some of the routine which devolved upon him was distasteful, and that he was glad to entrust to a skilled assistant much of the duty of individual examination and the making up of schedules and returns. But the influence he exerted on schools, on the department, and on the primary education of the whole country, was indirectly far greater than is generally supposed. His annual reports, of which more than twenty were collected into a volume by his friend and official chief, Sir Francis (afterwards Lord) Sandford, attracted, by reason of their freshness of style and thought, much more of public attention than is usually accorded to blue- book literature; and his high aims, and his sympathetic appreciation of the efforts and difficulties of the teachers, had a remarkable effect in raising the tone of elementary education, and in indicating the way to improvement. In particular, he insisted on the formative elements of school education, on literature and the " humanities," as distinguished from the collection of scraps of information and " useful knowledge "; and he sought to impress all the young teachers with the. necessity of broader mental cultivation than was absolutely required to obtain the government certificate. In his reports also he dwelt often and forcibly on the place which the study of the Bible, not the distinctive formularies of the churches, ought to hold in English schools. He urged that besides the religious and moral purposes of Scriptural teaching, it had a literary value of its own, and was the best instrument in the hands even of the elementary teacher for uplifting the soul and refining and enlarging the thoughts of young children.

On three occasions Arnold was asked to assist the government by making special inquiries into the state of education in foreign countries. These duties were especially welcome to him, serving as they did as a relief from the monotony of school inspection at home, and as opportunities for taking a wider survey of the whole subject of education, and for expressing his views on principles and national aims as well as administrative details. In 1859, as foreign assistant commissioner, he prepared for the duke of Newcastle's commission to inquire into the subject of elementary education a report (printed i860) which was after- wards reprinted (1 861) in a volume entitled The Popular Educa- tion of France, with Notices of that of Holland and Switzerland. In 1865 he was again employed as assistant-commissioner by the Schools Inquiry Commission under Lord Taunton; and his report on this subject, On Secondary Education in Foreign Countries (1866), was subsequently reprinted under the title Schools and Universities on the Continent (1868). Twenty years later he was sent by the Education Department to make special

inquiries on certain specified points, e.g. free education, the status and training of teachers, and compulsory attendance at schools. The result of

this investigation appeared as a parliamentary paper, Special Report on certain points connected with Elementary Education in Germany, Switzerland and France, in 1886. He also contributed the chapter on " Schools " (1837- 1887) to the second volume of Mr Humphry Ward's Reign of Queen Victoria. Part of his official writings may be studied in Reports for Elementary Schools (1852-1882), edited by Sir F. Sandford in 1889.

All these reports form substantial contributions to the history and literature of education in the Victorian age. They have been quoted often, and have exercised marked influence on subse- quent changes and controversies. One great purpose underlies them all. It is to bring home to the English people a conviction that education ought to be a national concern, that it should not be left entirely to local, or private, or irresponsible initiative, that the watchful jealousy so long shown by Liberals, and especially by Nonconformists, in regard to state action was a grave practical mistake, and that in an enlightened democracy, animated by a progressive spirit and noble and generous ideals, it was the part of wisdom to invoke the collective power of the state to give effect to those ideals. To this theme he constantly recurred in his essays, articles and official reports. " Porro unum est necessarium: One thing is needful; organize your secondary education."

In 1883 a pension of £250 was conferred on Arnold in recog- nition of his literary merits. In the same year he went to the United States oh a lecturing tour, and again in 1886, his subjects being " Emerson " and the " Principles and Value of Numbers." The success of these lectures, though they were admirable in matter and form, was marred by the lecturer's lack of experience in delivery. It is sufficient, further, to say that Culture and Anarchy: an Essay in Political and Social Criticism, appeared in 1869; St Paul and Protestantism, with an Introduction on Puritanism and the Church of England (1870); Friendship's Garland: being the Conversations, Letters and Opinions of the late Arminius Baron von Thunder -ten-Tronckh (1871); Literature and Dogma: an Essay towards a Better Apprehension of the ,Bible (1873); God and the Bible: a Review of Objections to Literature and Dogma (1875); Last Essays on Church and Religion (1877); Mixed Essays (1879); Irish Essays and Others (1882); Discourses in America (1885). Such essays as the first of these, embodying as they did Arnold's views of theological and polemical subjects, attracted much attention at the time of their publication, owing to the state of the intellectual atmo- sphere at the moment; but it is doubtful, perhaps, whether they will be greatly considered in the near future. Many severe things have been said, and will be said, concerning the inadequacy of poets like Coleridge and Wordsworth when confronting subjects of a theological or philosophical kind. Wordsworth's High Church Pantheism and Coleridge's dis- quisitions on the

Logos seem farther removed from the specula- tions of to-day than do the dreams of Lucretius. But these two great writers lived before the days of modern science. Arnold, living only a few years later, came at a transition period when the winds of tyrannous knowledge had blown off the protecting roof that had covered the centuries before, but when time and much labour were needed to build another roof of new materials — a period when it was impossible for the poet to enjoy either the quietism of High Church Pantheism in which Wordsworth had basked, or the sheltering protection of German metaphysics under which Coleridge had preached — a period, nevertheless, when the wonderful revelations of science were still too raw, too cold and hard, to satisfy the yearnings of the poetic soul. Objectionable as Arnold's rationalizing criticism was to con- temporary orthodoxy, and questionable as was his equipment in point of theological learning, his spirituality of outlook and ethical purpose were not to be denied. Yet it is not Arnold's views that have become current coin so much as his literary phrases — his craving for " culture " and " sweetness and light," his con- tempt for " the dissidence of Dissent and the Protestantism

of the Protestant religion," his " stream of tendency not our- selves making for righteousness," his classification of " Philistines and barbarians " — and so forth. His death at Liverpool, of heart failure on the 1 5 th of April 1 888, was sudden and quite unexpected.

Arnold was a prominent figure in that great galaxy of Victorian poets who were working simultaneously — Tennyson, Browning, Rossetti, William Morris and Swinburne — poets between whom there was at least this connecting link, that the quest of all of them was the old-fashioned poetical quest of the beautiful. Beauty was their watchword, as it had been the watchword of their immediate predecessors — Wordsworth, Coleridge, Keats, Shelley and Byron. That this group of early 19th-century poets might be divided into two — those whose primary quest was physical beauty, and those whose primary quest was moral beauty — is no doubt true. Still, in so far as beauty was their quest they were all akin. And so with the Victorian group to which Arnold belonged. As to the position which he takes among them opinions must necessarily vary. On the whole, his place in the group will be below all the others. The question as to whether he was primarily a poet or a prosateur has been often asked. If we were to try to answer that question here, we should have to examine his poetry in detail — we should have to inquire whether his primary impulse of expression was to seize upon the innate suggestive power of words, or whether his primary impulse was to rely upon the logical power of the

sentence. In nobility of temper, in clearness of statement, and especially in descriptive power, he is beyond praise. But intellect, judgment, culture and study of great poets may do much towards enabling a prose- writer to write what must needs be called good poetry. What they cannot enable him to do is to produce those magical effects which poets of the rarer kind can achieve by seizing that mysterious, suggestive power of words which is far beyond all mere statement. Notwithstanding the exquisite work that Arnold has left behind him, some critics have come to the con- clusion that his primary impulse in expression was that of the poetically-minded prosateur rather than that of the born poet. And this has been said by some who nevertheless deeply admire poems like " The Scholar Gypsy," "Thyrsis," " The Forsaken Merman, " " Dover Beach," " Heine's Grave," " Rugby Chapel," " The Grande Chartreuse," " Sohrab and Rustum," " The Sick King in Bokhara," " Tristram and Iseult," &c. It would seem that a man may show all the endowments of a poet save one, and that one the most essential — the instinctive mastery over metrical effects.

In all literary expression there are two kinds of emphasis, the emphasis of sound and the emphasis of sense. Indeed the difference between those who have and those who have not the true rhythmic instinct is that, while the former have the innate faculty of making the emphasis of sound and the emphasis of sense meet and strengthen each other, the latter are without that faculty. But so imperfect is the human mind that it can rarely apprehend or grasp simultaneously these two kinds of emphasis. While to the born prosateur the emphasis of sense comes first, and refuses to be more than partially conditioned by the emphasis of sound, to the born poet the emphasis of sound comes first, and sometimes will, even as in the case of Shelley, revolt against the tyranny of the emphasis of sense. Perhaps the very origin of the old quantitative metres was the desire to make these two kinds of emphasis meet in the same syllable. In manipulating their quantitative metrical system the Greeks had facilities for bringing one kind of emphasis into harmony with the other such as are unknown to writers in accentuated metres. This accounts for the measureless superiority of Greek poetry in verbal melody as well as in general harmonic scheme to all the poetry of the modern world. In writers so diverse in many ways as Homer, jEschylus, Sophocles, Pindar, Sappho, the harmony between the emphasis of sound and the emphasis of sense is so complete that each of these kinds of emphasis seems always begetting, yet always born of the other. When in Europe the quantitative measures were superseded by the accentuated measures a reminiscence was naturally and inevitably left behind of the old system; and the result has been, in the English language at

least, that no really great line can be written in which the em- phasis of accent, the emphasis of quantity and the emphasis of sense do not meet on the same syllable. Whenever this junction does not take place the weaker

line, or lines, are always introduced, not for makeshift purposes, but for variety, as in the finest lines of Milton and Wordsworth. Wordsworth no doubt seems to have had a theory that the accent of certain words, such as "without," "within," &c, could be disturbed in an iambic line; but in his best work he does not act upon his theory, and endeavours most successfully to make the emphasis of accent, of quantity and of sense meet. It might not be well for a poem to contain an entire sequence of such perfect lines as

" I thought of Chatterton, the marvellous boy," or

"Thy soul was like a star and dwelt apart,"

for then the metricist's art would declare itself too loudly and weaken the imaginative strength of the picture. But such lines should no doubt form the basis of the poem, and weaker lines — lines in which there is no such combination of the three kinds of emphasis — should be sparingly used, and never used for make- shift purposes. Now, neither by instinct nor by critical study was Arnold ever able to apprehend this law of prosody. If he does write a line of the first order, metrically speaking, he seems to do so by accident. Such weak lines as these are constantly occurring—

" The poet, to whose mighty heart Heaven doth a quicker pulse impart, Subdues that energy to scan Not his own course, but that of man."

Much has been said about what is called the " Greek temper " of Matthew Arnold's muse. A good deal depends upon what it meant by the Hellenic spirit. But if the Greek temper ex- presses itself, as is generally supposed, in the sweet acceptance and melodious utterance of the beauty of the world as it is, accepting that beauty without inquiring as to what it means and as to whither it goes, it is difficult to see where in Arnold's poetry this temper declares itself. Surely it is not in Empedocles on Etna, and surely it is not in Merope. If there is a poem of his in which one would expect to find the joyous acceptance of life apart from questionings about the civilization in which the poet finds himself environed (its hopes,' its fears, its aspirations and its failures) — such questionings, in short, as were for ever Vexing Arnold's soul— it would be in " The Scholar Gypsy," a poem in which the poet tries to throw himself into the mood of a " Romany Rye." The great attraction of the gypsies to Englishmen of a certain temperament is that they alone seem to feel the joyous acceptance of life which is supposed to be specially Greek. Hence it would have been but reasonable to look, if anywhere, for the expression of Arnold's Greek temper in a poem which sets out to describe the feelings of the student who, according to Glanville's story, left Oxford to wander over England with the Romanies. But instead of this we got the old fretting about the unsatisfactoriness of modern

civilization. Glanville's Oxford student, whose story is glanced at now and again in the poem, flits about in the scenery like a cloud- shadow on the grass; but the way in which Arnold contrives to avoid giving us the faintest idea either dramatic or pic- torial of the student about whom he talks so much, and the gypsies with whom the student lived, is one of the most singular feats in poetry. The reflections which come to a young Oxonian lying on the grass and longing to escape life's fitful fever without shuffling off this mortal coil, are, no doubt, beautiful reflections beautifully expressed, but the temper they show is the very opposite of the Greek. To say this is not in the least to disparage Arnold. " A man is more like the age in which he lives," says the Chinese aphorism, " than he is like his own father and mother," and Arnold's polemical writings alone are sufficient to show that the waters of life he drank were from fountains distilled, seven times distilled, at the topmost slope of 19th-century civilization. Mr George Meredith's " Old Chartist" exhibits far more of the temper of acceptance than does any poem by Matthew Arnold.

His most famous critical dictum is that poetry is a " criticism

of life." What he seems to have meant is that poetry is the crowning fruit of a criticism of life; that just as the poet's metrical effects are and must be the result of a thousand semi- conscious generalizations upon the laws of cause and effect in metric art, so the beautiful things he says about life and the beauti- ful pictures he paints of life are the result of his generalizations upon life as he passes through it, and consequently that the value of his poetry consists in the beauty and the truth of his generaliza- tions. But this is saying no more than is said in the line — ■ " Rien n'est beau que le vrai; le vrai seul est aimable " — or in the still more famous lines —

" ' Beauty is truth, truth beauty,' — that is all Ye know on earth, and all ye need to know."

To suppose that Arnold confounded the poet with the writer of pensees would be absurd. Yet having decided that poetry consists of generalizations on human life, in reading poetry he kept on the watch for those generalizations, and at last seemed to think that the less and not the more they are hidden behind the dramatic action, and the more unmistakably they are in- truded as generalizations, the better. For instance, in one of his essays he quotes those lines from the " Chanson de Roland " of Turoldus, where Roland, mortally wounded, lays himself down under a pine-tree with his face turned towards Spain and the enemy, and begins to "call many

things to remembrance; all the lands which his valour conquered, and pleasant France, and the men of his lineage, and Charlemagne, his liege lord, who nourished him ” —

” De plusurs choses a remembrer li prist, De tantes teres cume li bers cunquist, De dulce France, des humes de sun ligu, De Carlemagne sun seignor ki l’nurrit.”

” That,” says Arnold, ” is primitive work v I repeat, with an: undeniable poetic quality of its own. It deserves such praise, and such praise is sufficient for it.” Thenhe contrasts it with a famous passage in Homer— that same passage Which is quoted in the article Poetry, for the very opposite purpose to that of Arnold’s, quoted indeed to show how the epic poet, leaving the dramatic action to act as chorus, weakens the kv6.ni oi the picture — the passage in the Iliad (iii. 243-244) where the poet, after Helen’s pathetic mention of her brother’s comments on the causes of their absence,’ “criticizes life ” and generalizes upon the impotence of human intelligence, the impotence even of human love, to pierce the darkness in which the web of human fate is woven. He appends Dr Hawtrey’s translation:—

“Qs 6lto’ robs d’ ?J5ij Khrixtv vrri£oos ala kv A.(LKehaltiovi aWi,

” We are here,” says Arnold, ” in another world, another order of poetry altogether; here is rightly due such supreme praise as that which M. Vitel gives to the Chanson de Roland. If our words are to have any meaning, if our judgments are to have any solidity, we must not heap that supreme praise upon poetry of an order immeasurably inferior.” He does not see that the two passages cannot properly be compared at all. . In the one case the poet gives us a dramatic picture; in the other; a comment on a dramatic picture.

Perhaps, indeed, the place Arnold held and still holds as a critic is due more to his exquisite felicity in expressing his views than to the penetration of his criticism. Nothing can exceed the easy grace of his prose at the best. It is conversational and yet absolutely exact in the structure of the sentences; and in spite of every vagary, his distinguishing note is urbanity. Keen- edged as his satire could be, his writing for the most part is as urbane as Addison’s own. His influence on contemporary criticism and contemporary ideals was considerable, and gener- ally wholesome. His insistence on the necessity of looking at ” the thing in itself,” and the need for acquainting oneself with ” the best that has been thought and said in the. world,” gave a new stimulus alike to originality and industry in criticism; and in his own selection of subjects — such as Joubert, or the de GuSrins — he opened a new world to a larger class of the better

sort of readers, exercising in this respect an awakening influence in his own time akin to that of Walter Pater a few years after- wards. The comparison with Pater might indeed be pressed further, and yet too far. Both were essentially products of Oxford. But Arnold, whose description of that " home of lost causes, and forsaken beliefs, and unpopular names, and im- possible loyalties," is in itself almost a poem, had a classical austerity in his style that savoured more intimately of Oxford tradition, and an ethical earnestness even in his most flippant moments which kept him notably aloof from the more sensuous school of aesthetics.

The first collected edition of Arnold's poems was published in 1869 in, two volumes, the first consisting of Narrative and Elegiac Poems, and the second of Dramatic and Lyric Poems. Other editions appeared in 1877, 1881; a library edition (3 vols., 1885); a one- volume reprint of the poems printed in the library edition with one or two additions (1890). Publications by Matthew Arnold not mentioned in the foregoing article include : England and the Italian Question (1859), a pamphlet; A French Eton; or, Middle Class Education and the State (1864); Higher Schools and Universities in Germany (1874), a partial reprint from Schools and Universities on the Continent (1868); A Bible Reading for Schools; The Great Prophecy of Israel's Restoration, an arrangement of Isaiah, chs. xl.- lxvi. (1872), republished with additions and varying titles in 1875 and 1883; an edition of the Six Chief Lives from Johnson's Lives of the Poets (1878) ; editions of the Poems of Wordsworth (1879), and the Poetry of Byron (1 881), for the Golden Treasury Series, with prefatory essays reprinted in the second series of Essays in Criticism; an edition of Letters, Speeches and Tracts on Irish Affairs by Edmund Burke (1881); and many contributions to periodical literature. The Letters of Matthew A mold (1 848-1 888) were collected and arranged by George W. E. Russell in 1895, reprinted 1901. Matthew Arnold's Note Bopks, with a Preface by the Hon. Mrs Wodeliouse, appeared in 1902. A complete and uniform edition of The Works of Matthew Arnold (15 vols., 1904-1905) includes the letters as edited by Mr Russell. Vol. iii. contains a complete bibliography of his works, many of the early editions of which are very valuable, by Mr T. B. Smart, who published a separate bibliography in 1892. A valuable note on the rather complicated subject of ArnoldV bibliography is given by Mr H. Buxton Forman in Arnold's Poems, Narrative, Elegiac and Lyric (Temple Classics, 1900).

It was Arnold's expressed desire that his biography should not be written, and before his letters were published they underwent considerable editing at the hands.of his family. There are, however, monographs on Matthew Arnold (1899) in Modern English Writers by Prof. Saintsbury, and by Mr H. VV. Paul (1902), in the English Men of Letters Series. These two works are supplemented by Mr G. W. E. Russell, who, as the editor of Arnold's

letters, is in a 'sense the official biographer, in Matthew Arnold (1904, Literary Lives Series). There are also studies of Arnold in Mr J. M. Robertson's Modern Humanists (1891), and in W. H. Hudson's Studies in Interpre- tation (1896), in Sir J. G. Fitch's Tho-nas and Matthew Arnold (1897), and a review of some of the works above mentioned in the Quarterly for January 1905 by T. H. Warren. (T. W.-D.; J. G. F.)

ARNOLD, SAMUEL (1740-1802), English composer, was born at London on the 10th of August 1740. He received a thorough musical education at the Chapel Royal, and when little more than twenty years of age was appointed composer at Covent Garden theatre. Here, in 1765, he produced his popular opera, The Maid of the Mill, many of the songs in which were selected from the works of Italian composers. In 1776 he transferred his services to the Haymarket theatre. In 1783 he was made composer to George III. Between 1765 and 1802 he wrote as many as forty-three operas, after-pieces and pantomimes, of which the best were The Maid of the Mill, Rosamond, Inkle and Yarico, The Battle of Hexham, The Mountaineers. His oratorios included The Cure of Saul (1767), Abimelech (1768), The Resur- rection (1773), The Prodigal Son (1777) and Elisha (1795). In 1 783 he became organist to the Chapel Royal. In 1 786 he began an edition of Handel's works, which extended to 40 volumes, but was never completed. In 1793 he became organist of West- minster Abbey, where he was buried after his death on the 22nd of October 1802. Arnold is chiefly remembered now for the publication of his Cathedral Music, being a collection in score of the most valuable and useful compositions for that service by the several English masters of the last 200 years (1790).

ARNOLD, THOMAS (1705-1842), English clergyman and headmaster of Rugby school, was born at West Cowes, in the Isle of Wight, on the 13th of June 1795. He was the son of William and Martha Arnold, the former of whom occupied the

situation of collector of customs at Cowes. His father died suddenly of spasm in the heart in 1801, and his early education was confided by his mother to her sister, Miss Delafield. From her tuition he passed to that of Dr Griffiths, at Warminster, in Wiltshire, in 1803; and in 1807 he was removed to Winchester, where he remained until 1811, having entered as a commoner, and afterwards become a scholar of the college. In after life he retained a lively feeling of interest in Winchester school, and remembered with admiration and profit the regulative tact of Dr Goddard. and the preceptorial ability of Dr Gabell, who were successively head-masters

during his stay there.

From Winchester he removed to Oxford in 1811, where he becan.c a scholar at Corpus Christi College; in 1815 he was elected fellow of Oriel College; and there he continued to reside until 1819. This interval was diligently devoted to the pursuit of d. ssice.1 and historical studies, to preparing himself for ordination, and to searching investigations, under the stimulus of continual discussion with a band of talented and congenial associ ;te.s, of the profoundest questions in theology, ecclesiastics 1 polity and social philosophy. The authors he most carefully studied at this period were Thucydides and Aristotle, and for their writings he formed an attachment v. hich remained to the close of his life, and exerted a powerful influence upon his mode of thought and opinions, as well as upon his literary occupations in subsequent years. Herodotus also came in for a considerable share of his regard, but more, apparently, for recreation than for work. Accustomed freely and fearlessly to investigate whatever came before him, and swayed by a scrupulous dread of insincerity, he was doomed to long and anxious hesitation concerning some of the fundamental points of theology before arrivinr; at a firm conviction of the truth of Christianity. Once satisfied, however, his faith remained clear and firm; and thenceforward his life became that of a supremely religious man.

To the name of Christ he was prepared to " surrender his whole soul," and to render before it "obedience, reverence without measure, intense humility, most unreserved adoration " (Scrm ns. vol. iv. p. 210). He did not often talk about religion; he had net much of the accredited phraseology of piety even when he discoursed on spiritual topics; but more than most men he was directed by religious principle and feeling in all his conduct. He left Oxford in 18 19 and settled at Laleham, near Staines, where he took pupils for the university. His spare time was devoted to the prosecution of studies in philology and history, more particularly to the study of Thucydides, and of the new light which had been cast upon Roman history and upon historical method in general by the researches of Niebuhr. He was also occasionally engaged in preaching, and it was whilst here that he published the first volume of his sermons. Shortly after he settled at Laleham, he married Mary, youngest daughter of the Rev. John Penrose, rector of Fledborough, Nottinghamshire. After nine years spent at Laleham he was induced to offer himself as a candid;. te for the vacant' head-mastership of Rugby; and though he entered somewhat late upon the contest, and though none of the electors was personally known to him, he was elected in December 1827. In June 1828 he received priest's orders; in April and November of the same year he took his degrees of B.D. and D.D., and in August entered on his new office.

In one of the testimonials which accompanied his application to the trustees

of Rugby, the writer stated it as his convic~ tion that " if Mr Arnold were elected, he would change the face cf education all through the public schools of England." This somewhat hazardous pledge was nobly redeemed. Under Arnold's superintendence the school became not merely a place where a certain amount of classical or general learning was to be obtained, but a sphere of intellectual, moral and religious discipline, where healthy characters were formed, and men were trained for the duties, and struggles and responsibilities of life. His energies were chiefly devoted to the business of the school; but he found time also for much literary work, as well as for an extensive correspondence. Five volumes of sermons, an edition of Thucydides, with English notes and dissertations, a History of Rome in three vols. £vo, beside numerous articles in reviews,

journals, newspapers and encyclopaedias, are extant to attest the untiring activity of his mind, and his patient diligence during this period. His interest also in public matters vas incessant, especially ecclesiastical questions, and such as bore upon the social welfare and moral improvement of the masses.

In 1841, after fourteen years at Rugby, Dr Arnold was appointed hy Lord Melbourne, then prime minister, to the chair of modern history at Oxford. On the 2nd of December 1841 he delivered his inaugural lecture. Seven other lectures were delivered during the first three weeks of the Lent term of 1842. When the midsummer vacation arrived, he was preparing to set out with his family to Fox How in Westmoreland, where he had purchased some property and built a house^ But he was suddenly attacked by angina pectoris, and died on Sunday, the 12th of June 1842. His remains were interred on the follow- ing Friday in the chancel of Rugby chapel, immediately under the communion table.

The great peculiarity and charm of Dr Arnold's nature seemed to lie in the supremacy of the moral and the spiritual element over his whole being. He was not a notable scholar, and he had not much of what is usually called tact in his dealings either with the juvenile or the adult mind. What gave him his power, and secured for him so deeply the respect and veneration of his pupils and acquaintances, was- the intensely religious:, character of his whole life. He seemed ever, to act from a severe and lofty estimate of duty. To be just, honest and truthful, he ever held to be the first aim of his being.

His Life was written by Dean Stanley (1845).

ARNOTT, NEIL (1788-1874), Scottish physician, was born at Arbroath on the 15th of May 1788. He studied medicine first at Aberdeen, and subsequently in London under Sir Evejard Home (i7s6'-i832), through whom he obtained, while yet in his nineteenth year, the appointment of full

surgeon to an East Indiaman. After making two voyages to China he settled in 181 1 to practise in London, and speedily acquired high reputation in his profession. Within a few years he was made physician to the French and Spanish embassies, and in 1837 he became a physician extraordinary to the queen. From his earliest youth Arnott had ah intense love of natural philosophy, and to this was added an inventiveness which served him in good stead in his profession and yielded the " Arnott water-bed," the " Arnott ventilator," the " Arnott stove," &c. He was the author of several works bearing on physical science or its applications, the most important being his Elements of Physics (1827), which went through six editions in his lifetime. In 1838 he published a treatise on Warming and Ventilating, and, in 1855, one on the Smokeless Fireplace. He was a strong advocate of scientific, as opposed to purely dassical, education; and he manifested his interest in natural philosophy by the gift of £2000 to each of the four universities of Scotland and to the , university of London, to promote its study in the experimental and practical form. He died in London on the and of March 1874.

ARNOULD – PLESSY, JEANNE SYLVANIE (1810-1897), French actress, was born in Metz on the 7th of September 1819, the daughter of a local actor named Plessy. She was a pupil of Samson at the Conservatoire in 1829, and made her debut as Emma at the Comedie Francaise in 1834 in Alexandre Duval's La Fille d'honneur. She had an immense success, and Mile Mars, to whom the public already compared her, took her up. Until 1845 she had prominent parts in all the plays, new and old, at the Theatre Francais, when suddenly at the , height of her success, she left Paris and went to London, marry- ing the dramatic author, J. F. Arnould (d. 1854), a man much older than herself. The Comedie Francaise, after having tried in vain to bring her back, brought a suit against her, and obtained heavy damages, In the meantime Madame Arnould-Plessy accepted an engagement at the French theatre at St Petersburg, where she played for nine years. In 1855 she returned, to Paris and was re-admitted to the Comedie Francaise, as pensionnaire with an engagement for eight years. This second part of her career was even more brilliant than the first. She revived some of her old roles, but began to abandon the jeunes premieres for.

the " lead," in which she had a success unequalled since the retirement of Mile Mars. Her later triumphs were especially associated with new plays by fimile Augier, Le Fils de Giboyer and Maitre Guerin. Her last appearance was in Edouard Gadol's La Grand-maman; she retired in 1876, and died in

1897.

ARNSBERG, a town of Germany, in the Prussian province of Westphalia, romantically situated on an eminence almost surrounded by the river Ruhr, 44 m. S.E. pf Minister and 58 m. E.N.E. of Diisseldorf by rail. Pop. (1900) 8490. It is the seat of the provincial authorities, and has three churches, a court of appeal, a Roman Catholic gymnasium, which was formerly the Benedictine abbey of Weddinghausen, a library, a normal school and a chamber of commerce. Weaving, brewing and distilling are carried on, and there are manufactories of white lead, shot and paper, works for the production of railway plant, and saw-mills. Near the town are the ruins of the castle of the counts of Arnsberg, the last of whom, Gottfried, sold his count- ship, in 1368, to the archbishop of Cologne. The countship was incorporated by the archbishops in their duchy of Westphalia, which in 1802 was assigned to Hesse-Darmstadt and in 181 5 to Prussia. The town, which had received its first charter in 1237 and later joined the Hanseatic League, became the capital of the duchy.

ARNSTADT, a town in the principality of Schwarzburg- Sondershausen, Germany, on the river Gera, 11 m. S. of Erfurt, with which it is connected by rail. Pop. (1900) 14,413. There are five churches, four Protestant and one Catholic. The Evangelical Liebfrauenkirche, a Romanesque building (mainly 12th-century), has two octagonal towers and a 10th-century porch. The palace contains collections of pictures and porcelain, and attached to it is a magnificent tower, all that remains of the castle built in 1560. The town hall dates from 1561. The industries of Amstadt include iron and other metal founding, the manufacture of leather, cloth, tobacco, weighing-machines, paper, playing-cards, chairs, gloves, shoes, iron safes, and beer, and market-gardening and trade in grain and wood are carried on. There are copper-mines in the neighbourhood, as well as tepid saline springs, the waters of which are used for bathing, and are much frequented in summer. Amstadt dates back to the 8th century. It was bought in 1306 by the counts of Schwarzburg, who lived here till 1716.

ARNSWALDE, a town of Germany, in the kingdom of Prussia, in a marshy district between four lakes, 20 m. S.W. of Stargard and on the main line between that place and Posen. Besides the Gothic church there are no noteworthy public buildings. Its industries include iron founding, machinery, and manufactures of cloth, matches and starch. Pop. (1900) 8665.

ARNULF (c. 850-899), Roman emperor, illegitimate son of Carloman, king of Bavaria and Italy, was made margrave of Carinthia about 876, and on his father's death in 880 his dignity and possessions were confirmed by the new king of the east Franks, Louis III. The failure of legitimate male issue

of the later Carolingians gave Arnulf a more important position than otherwise he would have occupied; but he did homage to the emperor Charles the Fat in 882, and spent the next few years in constant warfare with the Slavs and the Northmen. In 887, however, Arnulf identified himself with the disgust felt by the Bavarians and others at the incapacity of Charles the Fat. Gathering a large army, he marched to Tribur; Charles abdicated and the Germans recognized Arnulf as their king, a proceeding which L. von Ranke describes as " the first independent action of the German secular world." Arnulf's real authority did not extend far beyond the confines of Bavaria, and he contented himself with a nominal recognition of his supremacy by the kings who sprang up in various parts of the Empire. Having made peace with the Moravians, he gained a great and splendid victory over the Northmen near Louvain in October 891, and in spite of some opposition succeeded in establishing his illegitimate son, Zwentibold, as king of the district afterwards called Lorraine. Invited by Pope Formosus to deliver him from the power of Guido III., duke of Spoleto, who had been crowned emperor, Arnulf went to Italy in 894, but after storming Bergamo and

receiving the homage of some of the nobles at Pavia, he was compelled by desertions from his army to return. The restoration of peace with the Moravians and the death of Guido prepared the way for a more successful expedition in 895 when Rome was stormed by his troops; and Arnulf was crowned emperor by Formosus in February 896. He then set out to establish his authority in Spoleto, but on the way was seized with paralysis. He returned to Bavaria, where he died on the 8th of December 899, and was buried at Regensburg. He left, by his wife Ota, a son Louis surnamed the Child. Arnulf possessed the qualities of a soldier, and was a loyal supporter of the church.

See " Annates Fuldenses " in the Monumenta Germaniae historica. Scriptores, Band i. (Hanover and Berlin, 1826); E. Dummler, Geschichte des ostfrdnkischen Reichs (Leipzig, 1887-1888) ; M. J. L. de Gagern, Arnulfi imperatoris vita (Bonn, 1837); E. Dummler, De Arnuljo Francorum rege (Berlin, 1852); W. B. Wenck, Die Erhebung Arnulf s und der Zerfall des karolingischen Reiches (Leipzig, 1852) ; O. Dietrich, Beitrdge zur Geschichte Arnolfs von Kdrnthen und Lud- wigs des Kindes (Berlin, 1890); E. Muhlbacher, Die Regesten des Kaiserreichs unte? den Karolingern (Innsbruck, 1881).

AROIDEAE (Arum family) , a large and wide-spread botanical order of Monocotyledons containing about 1000 species in 105 genera. It is generally distributed in temperate and tropical regions, but especially developed in warm countries. The common British representative of the order, Arum maculatum

Arum maculatum, Cuckoo- pint.

1. Leaves and inflorescence. succession (from below) female

2. Underground root-stock. flowers, male flowers, and sterile

3. Lower part of spathe cut open, flowers forming a ring of hairs

4. Spike of fruits. Showing in borne on the spadix. (cuckoo-pint, lords and ladies, or wake robin), gives a meagre idea of its development. The plants are generally herbaceous, often, however, reaching a gigantic size, but are sometimes shrubby, as in Pothos, a genus of shrubby climbing plants, chiefly Malayan. Monstera is a tropical American genus of climbing shrubs, with large often much-perforated leaves; the fruiting spikes of a Mexican species, M . deliciosa, are eaten. The roots of the climbing species are of interest in their adaptation

to the mode of life of the plant. For instance, some species of Philodendron have a growth like that of ivy, with feeding roots penetrating the soil and clasping roots which fix the plant to its support. In other species of the genus the seed germinates on a branch, and the seedling produces clasping roots, and roots which grow downwards hanging like stout cords, and ultimately reaching the ground. The leaves, which show great variety in size and form, are generally broad and net-veined, but in sweet-flag {Acorus Calamus) are long and narrow with parallel veins. In Arum the blade is simple, as also in the so-called arum-lily {Richardia), a South African species common in Britain as a greenhouse plant, and in Caladium, a tropical South American genus, and Alocasia (tropical Asia), species of which are favourite warm-greenhouse plants on account of their variegated leaves. In other genera the leaves are much divided and sometimes very large; those of Dracontium (tropical America) may be 15 ft. high, with a long stem-like stalk and a much-branched spreading blade. The East Indian genus Amor pho phallus has a similar habit. A good series of tropical aroids is to be seen in the aroid house at Kew. The so-called water cabbage (Pistia Stratiotes) is a floating plant widely distributed in the tropics, and consisting of rosettes of broadish leaves several inches across and a tuft of roots hanging in the water.

The small flowers are densely crowded on thick fleshy spikes, which are associated with, and often more or less enveloped by, a large leaf (bract), the so-called spathe, which, as in cuckoo-pint, where it is green in colour, Richardia, where it is white, creamy or yellow, Anthurium, where it is a

brilliant scarlet, is often the most striking feature of the plant. The details of the structure of the flower show a wide variation; the flowers are often extremely simple, sometimes as in Arum, reduced to a single stamen or pistil. The fruit is a berry — the scarlet berries of the cuckoo-pint are familiar objects in the hedges in late summer. The plants generally contain an acrid poisonous juice. The underground stems (rhizomes or tubers) are rich in starch; from that of Arum maculatum Portland arrowroot was formerly extensively prepared by pounding with water and then straining; the starch was deposited from the strained liquid.

The order is represented in Britain by Arum maculatum, a low herbaceous plant common in woods and hedgerows in England, but probably not wild in Scotland. It grows from a whitish root-stock which sends up in the spring a few long-stalked, arrow-shaped leaves of a polished green, often marked with dark blotches. These are followed by the inflorescence, a fleshy spadix bearing in the lower part numerous closely crowded simple uni- sexual flowers and continued above into a purplish or yellowish appendage; the spadix is enveloped by a leafy spathe, con- stricted in the lower part to form a chamber, in which are the flowers. The mouth of this chamber is protected by a ring of hairs pointing downwards, which allow the entrance but prevent the escape of small flies; after fertilization of the pistils the hairs wither. The insects visit the plant in large numbers, attracted by the foetid smell, and act as carriers of the pollen from one spathe to another. As the fruit ripens the spathe withers, and the brilliant red berries are exposed.

The sweet-flag Acorus Calamus (q.v.), which occurs apparently wild in England in ditches, ponds, &c, is supposed to have been introduced.

AROLSEN, a town of Germany, capital of the principality of Waldeck, 25 m. N.W. of Cassel, with which it is connected by rail via Warburg. Pop. 3000. It lies in a pleasant undulating country at an elevation of 900 ft. above the sea. The Evangelical parish church contains some fine statues by Christian Rauch, and the palace (built 17 10-17 20), m addition to a valuable library of 30,000 vols., a collection of coins and pictures, among the latter several by Angel : ca Kauffmann. Arolseri is the birthplace of the sculptor C. Rauch and of the painters Wilhelm and Friedrich Kaulbach.

ARONA, a town of Piedmont, Italy, in the province of Novara, on the W. bank of Lake Maggiore, 3 m. from its S. extremity, 23 m. N. of Novara, and 42 m. N.W. of Milan by rail. Pop. (1001) 4700. It is a railway centre of some importance on the

Simplon line, and is also the southern terminus of the steamers which ply on Lake Maggiore. The church of S. Maria contains a fine altar-piece by

Gaudenzio Ferrari. On a bill to the north of the town stands a colossal bronze statue of S. Carlo Borromeo (born here in 1538), erected in 1697. The pedestal, of red granite, is 42 ft. high, and the statue 70 ft. high; the latter is hollow, and can be ascended from within.

ARPEGGIO (from Ital. arpeggiare, to play upon the harp), in music, the notes of a chord, played in rapid succession as on a harp, and not together.

ARPI (Gr. ‘ Apyoptinra.) , an ancient city of Apulia, 20 m. W. of the sea coast, and 5 m. N. of the modern Foggia. The legend attributes its foundation to Diomedes, and the figure of a horse, which appears on its coins, shows the importance of horse-breeding in early times in the district. Its territory extended to the sea, and Strabo says that from the extent of the city walls one could gather that it had once been one of the greatest cities of Italy. As a protection against the Samnites Arpi became an ally of Rome, and remained faithful until after the battle of Cannae, but Fabius captured it in 213 B.C., and it never recovered its former importance. It lay on a by-road from Luceria to Sipontum. No Roman inscriptions have, indeed, been found here, and remains of antiquity are scanty. Foggia is its medieval representative. (T. As.)

ARPINO (anc. Arpinum), a town of Campania, Italy, in the province of Caserta, 1475 ft. above sea-level; 12 m. by rail N.W. of Roccasecca, a station on the railway from Naples to Rome. Pop. (1901) 10,607. Arpino occupies the lower part of the site of the ancient Volscian town of Arpinum, which was finally taken from the Samnites by the Romans in 305 B.C. It became a civitas sine suffragio, but received full privileges (civitas cum suffragio) in 188 B.C. with Formiae and Fundi; it was governed as a praefectura until the Social War, and then became a municipium. The ancient polygonal walls, which are still finely preserved, are among the best in Italy. They are built of blocks of pudding-stone, originally well jointed, but now much weathered. They stand free in places to a height of n ft., and are about 7 ft. wide at the top. A single line of wall, with medieval round towers at intervals, runs on the north side from the present town to Civitavecchia (2055 ft.), on the site of the ancient citadel. Here is the Porta dell’ Arco, a gate of the old wall, with an aperture 15 ft. high, formed by the gradual inclina- tion of the two sides towards one another. Below Arpino, in the valley of the Liris, between the two arms of its tributary the Fibrenus, and J m. north of Isola del Liri, lies the church of S. Domenico, which marks the site of the villa in which Cicero was born and frequently resided. Near it is an ancient bridge, of a road which crossed the Liris to Cereatae (modern Casamari). The painter Giuseppe Cesari (1 560-1640), more often known as the Cavaliere d’ Arpino, was also born here.

See O. E. Schmidt, Arpinum, eine topographisch-historische Skizze (Meissen, 1900). (T. As.)

ARQUA PETRARCA, a village of Venetia, Italy, in the pro- vince of Padua, 3 m. to the S.W. of Battaglia. Pop. (1901) 1573. It is chiefly famous as the place where Petrarch lived his last few years and died in 1374. His house still exists, and his tomb, a sarcophagus supported by four short columns of red marble, stands in front of the church. Near Arqua., on the banks of the small Lago della Costa, is the site of a prehistoric lake village, excavations in which have produced interesting results.

See A. Moschetti and F. Cordenone in BoUettino del Museo Civico di Padova, iv. (1901), 102 seq.

ARQUEBUS (also called harquebus, hackbut, &c), a firearm of the 1 6th century, the immediate predecessor of the musket. The word itself is certainly to be derived from the German Hakenbiihse (mod. HakenbUchse, cf. Eng. hackbut and hackbush), " hook gun." The " hook " is often supposed to refer to the bent shape of the butt, which differentiated it from the straight-stocked hand gun, but it has also been suggested that the original arquebus had a metal hook near the muzzle, which was used to grip the wall (or other fixed object) so as to steady the aim and take up the force of recoil, that from this

the name Hakenbuhse spread till it became the generic name for small arms, and that the original form of the weapon then took the name of arquebus a croc. The French form arquebuse and Italian arcobugio, archibngio, often and wrongly supposed to indicate the hackbut's affinity with the crossbow (" hollow bow " or " mouthed bow "), are popular corruptions, the Italian being apparently the earlier of the two and supplanting the first and purest French form haquebut. Previous to the French wars in Italy, hand-gun men and even arbalisters seem to have been called arqucbusiers, but in the course of these wars the arquebus or hackbut came into prominence as a distinct type of weapon. The Spanish arquebusiers, who used it with the greatest effect in the Italian wars, notably at Bicocca (1522) and Pavia (1525), are the originators of modern infantry fire action. Filippo Strozzi made many improvements in the arquebus about 1530, and his weapons were effective up to four and five hundred paces. He also standardized the calibres of the arquebuses of

the French army, and from this characteristic feature of the improved weapon arose the English term " caliver." In the latter part of the 16th century (c. 1570) the arquebus began to be displaced by the musket.
.■':■.■;-

ARQUES-LA-BATAILLE, a village of France, in the depart- ment of Seine-Inferieure, 4 m. S.E. of Dieppe by the Western railway. Pop. (1906) 1250. Arques is situated near the con- fluence of the rivers Varenne and Bethune ; the forest of Arques stretches to the north-east. The interest of the place centres in the castle dominating the town, which was built in the nth century by William of Arques; his nephew, William the Con- queror, regarding it as a menace to his own power, besieged and occupied it. After frequently changing hands, it came into the possession of the English, who were expelled in 1449 after an occupation of thirty years. In 1 589 its cannon decided the battle of Arques in favour of Henry IV. Since 1869 the castle has been state property. The first line of fortification was the work of Francis I.; the second line and the donjon date back to the nth century. The church of Arques, a building of the 16th century, preserves a fine stone rood screen, statuary, stained glass and other relics of the Renaissance period.

ARRACK, Rack or Rak, a generic name applied to a variety of spirituous liquors distilled in the Far East. According to some authorities the word is derived from the Arabic arak (perspiration), but according to others (see Morewood's History 0} Inebriating Liquors, 1834, p. 140) it is derived from the areca- nut, a material from which a variety of arrack was long manu- factured, and is of Indian origin. The liquor to which this or a similar name is applied is (or was, since the introduction c f European spirits and methods of manufacture is gradually causing the native spirit industries on the old lines to decay) manufactured in India, Ceylon, Siam, Java, Batavia, China, Corea, &c, and its manufacture still constitutes a considerable industry. The term arrack as designating a distilled liquor does not, however, appear to have been confined to the Far East, as, in Timkowski's Travels, it is stated that a spirit distilled from koumiss (

rule being carried on in so concentrated a liquid that complete fermentation rarely takes place. According to Mann, the total sugar in the liquor ready for fermentation may reach 20 %. The ferment employed (it is so impure that it can scarcely be called yeast) is obtained from a previous fermentation, and, as the latter is never vigorous, it is not surprising that the re- sulting spirit contains, compared with the more scientifically prepared European spirits, a very high proportion of by-products (acid, fusel oil, &c). The injurious nature of these native spirits has long been known and has been frequently set down to the admixture of drugs, such as hemp (ganga), but a recent investiga- tion of this question appears to show

that this is not generally the case. The chemical constitution of these liquors alone affords sufficient proof of their inferior and probably injurious character.

See H. H. Mann, The Analyst (1904).

ARRAH, a town of British India, headquarters of Shahabad district, in the Patna division of Bengal, situated on a navigable canal connecting the river Sone with the Ganges. It is a station on the East Indian railway, 368 m. from Calcutta. In 1901 the population was 40,170. Arrah is famous for an incident in the Mutiny, when a dozen Englishmen, with 50 Sikhs, defended an ordinary house against 2000 Sepoys and a multitude of armed insurgents, perhaps four times that number. A British regiment, despatched to their assistance from Dinapur, was disastrously repulsed; but they were ultimately relieved, after eight days' continuous fighting, by a small force under Major (afterwards Sir Vincent) Eyre.

ARRAIGNMENT (from Lat. ad, to, and rationare, to reason, call to account), a law term, properly denoting the calling of a person to answer in form of law upon an indictment. After a true bill has been found against a prisoner by the grand jury, he is called by name to the bar, the indictment is read over to him, and he is asked whether he be guilty or not of the offence charged. This is the arraignment. Formerly, it was usual to require the prisoner to hold up his hand, in order to identify him the more completely, but this practice is now obsolete, as well as that of asking him how he will be tried. His plea in answer to the charge is then entered, or a plea of not guilty is entered for him if he stands mute of malice and refuses to plead. If a person is mute by the visitation of God (i.e. deaf and dumb), it will be no bar to an arraignment if intelligence can be conveyed to him by signs or symbols. If he pleads guilty, sentence may be passed forthwith; if he pleads not guilty, he is then given in charge to a jury of twelve men to inquire into the truth of the indictment. He may also plead in abatement, or to the jurisdic- tion, or demur on a point of law. Several defendants, except those entitled to the privilege of peerage, charged on the same indictment, are arraigned together.

In Scots law the term for arraignment is calling the diet.

The Clerk of Arraigns is a subordinate officer attached to assize courts and to the Old Bailey. He is appointed by the clerk of assize (see Assize) and acts as his deputy. He assists at the arraignment of prisoners, and puts the formal questions to the jury when delivering their verdict.

ARRAN, EARLS OF. The extinct Scottish title of the earls of Arran (not to be confused with the modern Irish cails of Arran — from the Arran or

Aran Islands, Galway — a title cieated in 1 762) was borne by some famous characters in Scottish history. Except the first earl, Thomas Boyd (see Arran), and James Stewart, all the holders of this title were members of the Hamilton family.

James Hamilton, 1st earl of Arran of the new creation (c. 1475-1529), son of James, 1st Lord Hamilton, and of Mary Stewart, daughter of James II. of Scotland, was born about 1475, and succeeded in 1479 to his father's titles and estates. In 1489 he was made sheriff of Lanark, was appointed a privy councillor to James IV., and in 1503 negotiated in England the marriage between the king and Margaret Tudor. Hamilton excelled in the knightly exercises of the day, and the same year on the nth of August, after distinguishing himself in a famous tournament, he was created earl and iusticiary of Arran. In

1504 as lieutenant-general of the realm he was employed in reducing the Hebrides, and about the same time in an expedition with 10,000 men in aid of John, king of Denmark. In 1507 he was sent ambassador to France, and on his return through Eng- land was seized and imprisoned by Henry VII. After the acces- sion of Henry VIII., Arran, in 1509, signed the treaty of peace between the two countries, and later, when hostilities began, was given command of a great fleet equipped for the aid of France in 15 13. The expedition proved a failure, Arran wasting time by a useless attack on Carrickfergus, lingering for months on the Scottish coast, and returning with a mere remnant of his fleet, the larger ships having probably been purchased by the French government. During his absence the battle of Flodden had been lost, and Arran found his rival Angus, who enjoyed Henry's support, married to the queen dowager and in control of the government. Arran naturally turned to the French party and supported the regency of the duke of Albany. Later, how- ever, becoming impatient of the latter's monopoly of power, he entered into various plots against him, and on Albany's departure in 1 51 7 he was chosen president of the council of regency and provost of Edinburgh. The same year he led an expedition to the border to punish the murderers of the French knight La Bastie. In September, however, after a temporary absence with the young king, the gates of Edinburgh were shut against him by the Douglases, and on the 30th of April 1520 the fierce fight of " Cleanse the Causeway " took place in the streets between the two factions, in which the Hamiltons were worsted. The quarrel, however, between Angus and his wife, the queen-mother, with whom Arran now allied himself, gave the latter another oppor- tunity of regaining power, which he held from 1522, after Albany's

return to France, till 1524, when he was forced to include Angus in the government. In 1526, on the refusal of the latter to give up his control of the king on the expiry of his term of office, Arran took up arms, but retreated before Angus's forces, and having made terms with him, supported him in his close custody of the king, in September defeating the earl of Lennox, who was marching to Edinburgh to liberate James. On the proscription of Angus and the Douglases, Arran joined the king at Stirling. He died in 1529. His eldest son James succeeded him.

James Hamilton, 2nd earl of Arran and duke of Chatel- herault (c. 1515-1575), accompanied James V. in 1536 to France, and on the latter's death in 1542 was, in consequence of his position as next successor to the throne after the infant Mary, proclaimed protector of the realm and heir-presumptive of the crown, in 1543. He was a zealous supporter of the reformation, authorized the translation and reading of the Scriptures in the vulgar tongue, and at first supported the English policy in opposition to Cardinal Beaton, whom he arrested on the 27 th of January 1543, arranging the treaty with England and the marriage of Mary with Prince Edward in July, and being offered by Henry the hand of the princess Elizabeth for his son. But on the 3rd of September he suddenly joined the French party, met Beaton at Stirling, and abjured his religion for Roman Catholi- cism. On the 13th of January 1544, with Angus, Lennox and others, he signed a bond repudiating the English alliance. In 1544 an attempt was made to transfer the regency from him to Mary of Lorraine, but Arran fortified Edinburgh and her forces retired; in March 1545 a truce was arranged by which each had a share in the government. Meanwhile, immediately on the repudiation of the treaty, war had broken out with England, and Arran was unable either to maintain order within the realm or defend it from outside aggression, the Scots being defeated at Pinkie on the 10th of September 1547. He reluctantly agreed in July 1 548 to the marriage of the dauphin with Mary, whom he had designed for his son, to the appeal for French aid, and to the removal of Mary for security to France, and on the 5th of February 1549 was created duke of Chatelherault in Poitou, his eldest son James being henceforth commonly styled earl of Arran. In June 1 548 he had also been made a knight of the order of St Michael in France. On the 12th of April 1554 he abdicated in favour of the queen-mother, whose government he supported

till after the capture of Edinburgh in October 1559 by the lords of the congregation, when he declared himself on their side and took the Covenant. The same month he was one of the council of the Protestant lords, joined them in suspending Mary of Lorraine from the regency, and was made provisionally one of the governors of the kingdom. In order to discredit him with the English government a letter was forged by his enemies, in which Arran declared his allegiance to Francis II., but the plot

was exposed. On the 27 th of February 1560 he agreed to the treaty of Berwick with Elizabeth, which placed Scotland under her pro- tection. The death the same year of Francis II. renewed his hopes of a union between his son and Mary, but disappointment drove him into an attitude of hostility to the court. In 1562 he was accused by his son, probably already insane, of plots against Mary's person, and he was obliged to give up Dumbarton Castle. Lennox claimed precedence over Arran in the succession to the throne, on the plea of the latter's supposed illegitimacy, and his restoration to favour in 1564, together with the project of Mary's marriage with Darnley, still further embittered Arran; he refused to appear at court, was declared a traitor, and fled to England, where on his consent to go into exile for five years he received a pardon from Mary. In 1566 he went to France, where he made vain attempts to regain his confiscated duchy. After the murder of Darnley in 1567 he was nominated by Mary on her abdication one of the regents, and he returned to Scotland in 1569 as a strong supporter of her cause. In March in an assembly of nobles called by Murray, he acknowledged James as king, but on the 5th of April he was arrested for not fulfilling the compact, and continued in confinement till April 1570. After Murray's assassination in January 1570, the regency in July was given to Lennox, and in June 1571 Arran assembled a parliament, when it was declared that Mary's abdication was obtained by fear, and the king's coronation was annulled. On the 28th of August he was declared a traitor and " forfeited," but he continued to support Mary's hopeless cause and to appeal for help to France and Spain, in spite of the pillage of his houses and estates, till February 1573, when he acknowledged James's authority and laid down his arms. He died on the 22nd of January 1575. He was by general consent a weak, fickle man, whose birth alone called him to high office. He married Margaret, daughter of James Douglas, 3rd earl of Morton, and had, besides several daughters, four sons: James, who succeeded him as 3rd earl of Arran, John, 1st marquess of Hamilton, David, and Claud, Lord Paisley, ancestor of the dukes of Abercorn.

James Hamilton, 3rd earl (c. 1537-1609), was styled earl of Arran after the creation of his father as duke of Chatelherault in 1549; the latter title did not descend to him, having been resumed by the French crown. His father's ambition destined him for the hand of Mary queen of Scots, and his union with the princess Elizabeth was proposed by Henry VIII. as the price of his father's adherence to the English interest. He was early involved in the political troubles in which Scotland was then immersed. In 1546 he was seized as a hostage at St Andrews by the murderers of Cardinal Beaton and released in 1547. In 1550 he went to France, was given the command of the Scots guards, and in 1557 distinguished himself in the defence of St Quentin. He became a strong adherent of the reformed doctrine. His arrest

was ordered by Henry II. in 1 559, Mary (probably in conse- quence of his projected union with Elizabeth which would have raised the Hamiltons higher than the Stuarts) declaring her wish that he should be " used as an arrant traitor." He, however, escaped to Geneva and then to England, and had an interview with Elizabeth in August. He returned to Scotland in September, where he supported his father's adherence to the lords of the Congregation against Mary of Lorraine, upheld the alliance with Elizabeth, and became one of the leaders of the Protestant party in the subsequent fighting, in particular organizing, together with Lord James Stuart (afterwards earl of Murray), in 1560, a stubborn resistance to the French at Dysart, and saving Fife. In November 1559 he had declined Bothwell's challenge to single combat. Subsequently he signed the treaty of Berwick, became one of the lords of the Congregation, and was appointed a visitor

for the destruction of the religious houses. The same year proposals w.ere again made for his marriage with Elizabeth, which were rejected by the latter in 1561; and subsequently after the death of Francis II. (in December 1560), he became, with the strong support of the Protestants and Hamiltons, a suitor for Mary, also without success. He was chosen a member of her council on her arrival in Scotland in is6r, but took up a hostile attitude to the court in consequence of the practice of the Roman Catholic religion. He now showed marked signs of insanity, and was confined in Edinburgh Castle, where he re- mained till May 1566. He had then lost the power of speech, and from 1568 he lived in retirement with his mother at Craig- nethan Castle, while his estates were administered by his brother John, afterwards 1st marquess of Hamilton. In 1579, at the time of the fresh prosecution of the Hamiltons, when the helpless Arran was also included in the attainder of his brothers and his titles forfeited, the castle was besieged on the pretence of deliver- ing him from unlawful confinement, and Arran and his mother were brought to Linlithgow, while the charge of his estates was taken over by the government. In 1580 James Stewart (see below) was appointed his guardian, and in 1581 acquired the earldom; but his title and estates were restored after Stewart's disgrace in 1 586, when the forfeiture was repealed. Arran died unmarried in March 1609, the title devolving on his nephew James, 2nd marquess of Hamilton.

James Stewart (d. 1595), the rival earl of Arran above referred to, was the son of Andrew Stewart, 2nd Lord Ochiltree. He served in his youth with the Dutch forces in Holland against the Spanish, and returned to Scotland in 1579. He immediately became a favourite of the young king, and in 1580 was made gentleman of the bedchamber and tutor of his cousin, the 3rd

earl of Arran. The same year he was the principal accuser of the earl of Morton, and in 1581 was rewarded for having accom- plished the latter's destruction by being appointed a member of the privy council, and by the grant the same year, to the prejudice of his ward, of the earldom of Arran and the Hamilton estates, on the pretence that the children of his grandmother's father, the 1st earl of Arran, by his third wife, from whom sprang the succeed- ing earls of Arran, were illegitimate. He claimed the position of second person in the kingdom as nearest to the king by descent. The same year he married Elizabeth, daughter of John Stewart, earl of Atholl, and wife of the earl of March, after both had been compelled to undergo the discipline of the kirk on account of previous illicit intercourse. He became the rival of Lennox for the chief power in the kingdom, but both were deprived of office by the raid of Ruthven on the 22nd of August 1382, and Arran was imprisoned till September under the charge of the earl of Gowrie. In 1583, however, he assembled a force of 12,000 men against the new government; the Protestant lords escaped over the border, and Arran, returning to power, was made governor of Stirling Castle and in 1584 lord chancellor. The same year Gowrie was captured through Arran's treachery and executed after the failure of the plot of the Protestant lords against the latter's government. He now obtained the governorship of Edinburgh Castle and was made provost of the city and lieutenant-general of the king's forces. Arran induced the English government to refrain from aiding the banished lords, and further secured his power by the forfeitures of his opponents. His tyranny and insolence, however, stirred up a multitude of enemies and caused his rapid fall from power. His agent in England, Patrick, Master of Gray, was secretly conspiring against him at Elizabeth's court. On account of the murder of Lord Russell on the border in July 1585, of which he was accused by Elizabeth, he was imprisoned at the castle of St Andrews, and subsequently the banished lords with Elizabeth's support entered Scotland, seized the government and proclaimed Arran a traitor. He fled in November, and from this time his movements are furtive and uncertain. In 1586 he was ordered to leave the country, but it is doubtful whether he ever quitted Scotland. He contrived secretly to maintain friendly communications with James, and in 1592 returned to Edinburgh, and endeavoured unsuccessfully to get reinstated in the court and kirk. Sub-

sequently he is reported as making a voyage to Spain, probably in connexion with James's intrigues with that country. His unscrupulous and adventurous career was finally terminated towards the close of 1595 by his assassination near Symontown in Lanarkshire at the hands of Sir James Douglas (nephew of his victim the earl of Morton), who carried his head in triumph on the point of a spear through the country, while his body was left a prey to the dogs and swine. He had three sons, the eldest of whom

became Lord Ochiltree.

ARRAN, the largest island of the county of Bute, Scotland, at the mouth of the Firth of Clyde. Its greatest length, from the Cock of Arran to Bennan Head, is about 20 m., and the greatest breadth — from Drumadoon Point to King's Cross Point — is n m. Its area is 105,814 acres or 165 sq. m. In 1891 its population was 4824, in 1901, 4819 (or 29 persons to the sq. m.). In 1901 there were 1900 persons who spoke English and Gaelic and nine Gaelic only. There is daily winter communication with Brodick and Lamlash by steamer from Ardrossan, and in summer by many steamers which call not only at these piers, but at Corrie, Whiting Bay and Loch Ranza.

The chief mountains are in the north. The highest is Goatf ell (2866 ft., the name said to be a corruption of the Gaelic Goadh Bhein, " mountain of the winds "). Others are Caistel Abhail (2735 ft., " peaks of the castles "), Beinn Tarsuinn (2706 ft.), Cir Mhor (2618 ft.) and Beinn Nuis (2597 ft.). In the south Tighvein (1497 ft.) and Cnoc Dubh (1385 ft.) are the most important. Owing to the mountainous character of the island, glens are numerous. Glen Rosa and Glen Sannox are remarkable for their wild beauty, and among others are Iorsa, Catacol, Chalmadale, Cloy, Shant, Shurig, Tuie, Clachan, Monamore, Ashdale (with two cascades) and Scorrodale. Excepting Loch Tanna, the inland lakes are small. Loch Ranza, an arm of the sea, is one of the most beautiful in Scotland. The streams, or " waters " as they are called, are nearly all hill burns, affording good fishing.

The oldest rocks, consisting of slate, mica-schists and grits, which have been correlated with the metamorphic series of the eastern Highlands, form an incomplete ring round the granite in the north of the island and occupy the whole of the west coast from Loch Ranza south to Dougrie. On the east side in North Glen Sannox Burn, they are associated with cherts, grits and dark schists with pillowy lavas, tuffs and agglomerates which, on lithological grounds, have been regarded as probably of the same age as the Arenig cherts and volcanic rocks in the south of Scotland. The Lower Old Red Sandstone strata are separated from the foregoing series by a fault and forma curving belt extending from Corloch on the east coast south by Brodick Castle to Dougrie on the west shore. Consisting of red sandstones, mudstones and conglomerates, they are inclined at high angles usually away from the granite massif and the encircling meta- morphic rocks. They are associated with a thin band of lava visible on the west side of the island near Auchencar and traceable inland to Garbh Thorr. The Upper Old Red Sandstone, com- posed of red sandstone and conglomerates, is only sparingly developed. The strata occur on the east shore between the Fallen Rocks and Corrie, and they appear along a narrow strip to the east and

south of the lower division of the system, between Sannox Bay and Dougrie. On the north side of North Glen Sannox they rest unconformably on the Lower Old Red rocks. Contemporaneous lavas, highly decomposed, are intercalated with this division on the north side of North Glen Sannox where the band is highly faulted. The Carboniferous rocks of Arran include representatives of the Calciferous Sandstone, the three subdivisions of the Carboniferous Limestone series, and to a small extent the Coal Measures, and are confined to the north part of the island. They appear on the east coast between the Fallen Rocks and the Cock of Arran, where they form a strip about a quarter of a mile broad, bounded on the west by a fault. Here there is an ascending sequence from the Calciferous Sand- stone, through the Carboniferous Limestone with thin coals formerly worked, to the Coal Measures, the strata being inclined at high angles to the north. On the south side of a well-marked

anticline in the Upper Old Red Sandstone at North Sannox, the Carboniferous strata reappear on the coast with a south dip showing a similar ascending sequence for about half a mile. The lower limestones are well seen at Corrie, but the thin coals are not there represented. From Corrie they can be traced southwards and inland to near the head of Ben Lister Glen. The small development of Upper Carboniferous strata, visible on the shore south of Corrie and in Ben Lister Glen, consists of sandstones, red and mottled clays and purple shales, which yield plant- remains of Upper Carboniferous fades. These may represent partly the Millstone Grit and partly the Coal Measures. Con- temporaneous volcanic rocks, belonging to three stages of the Carboniferous formation, occur in Arran. The lowest group is on the horizon of the Calciferous Sandstone series, being visible at Corrie where it underlies the Corrie limestone, and is traceable southwards beyond Brodick. The second is represented by a thin lava, associated with the Upper Limestone group of the Carboniferous Limestone series, and the highest is found in Ben Lister Glen intercalated with the Upper Carboniferous strata, and may be the equivalent of the volcanic series which, in Ayrshire, occupies the position of the Millstone Grit. The Triassic rocks are arranged in two groups, a lower, composed of conglomerates and sandstones, and an upper one consisting of red and mottled shales and marls with thin sandstones and nodular limestones. In the extreme north at the Cock of Arran, there is a small development of these beds; they also occupy the whole of the east coast south of Corrie, and they spread over the south part of the island south of a line between Brodick Bay and Machrie Bay on the west. At Corrie and the Cock of Arran they rest on Upper Carboniferous strata; in Ben Lister Glen, on the

lower limestone group of the Carboniferous Limestone series; and on the west coast they repose on the Old Red Sandstone. There is, therefore, a clear discordance between the Trias and all older strata in Arran. The former extension of Rhaetic, Liassic and Cretaceous formations in the island is indicated by the presence of fragments of these strata in a large volcanic vent on the plateau, on the south side of the road leading from Brodick to Shiskine. The fossils from the Rhaetic beds belong to the Aricula contorta zone, those from the Lias to the Ammonites angulatus zone, while the blocks of limestone with chert contain Inoceramiis. Cretaceous foraminifera and other organisms. The materials yielding these fossils are embedded in a course volcanic agglomerate which gives rise to crags and is pierced by acid and basic igneous rocks. One of the striking features in the geology of Arran is the remarkable series of intrusive igneous rocks of Tertiary age which occupy nearly one-half of the area and form the wildest and grandest scenery in the island. Of these the most important is the great oval mass of granite in the North, composed of two varieties; one, coarse-grained and older, forms the outside rim, while the fine-grained and newer type occurs in the interior. Another granite area appears on the south side of the road between Brodick and Shiskine, where it is associated with granophyre and quartz-diorite and traverses the volcanic vent of post-Cretaceous or Tertiary age already described. In the south of the island there are sills and dykes of felsite, quartz-porphyry, rhyolite, trachyte and pitchstone. The felsite sheets are well represented in Holy Island. It is worthy of note that the dykes and sheets of felsite are seldom pierced by the basalt dykes and are probably about the most recent of the intrusive rocks. The best example of the basic sills forms the Clauchland Hills and runs out to sea at Clauchland Point. Finally the basic dykes of dolcrite, basalt and augite-andesite are abundant and traverse the various sedimentary formations and the granite.

The chief crops are oats and potatoes. Cattle and sheep are raised in considerable numbers. The game, which is abundant, consisting of blackcock and grouse, is strictly preserved. A few red deer still occur in the wilder hilly district. The fisheries are of some value. Loch Ranza being an important station.

Standing stones, cairns and other memorials of a remote antiquity occur near Tormore, on Machrie Bay, Lamlash, and other places. The Norse raiders found a home in Arran for a long period until the defeat of Haakon V. at Largs (1263) com-

pelled them to retire. The chief name in the island's history is that of Robert Bruce, who found shelter in the King's Caves on the western coast. One was reputed to be his kitchen, another his cellar, a third his stable, while the hill above was styled the King's Hill. From a point still known as

King's Cross he crossed over to Carrick, in answer to the signal which warned him that the moment for the supreme effort for his country was come. In Glen Cloy the ruins of a fort bear the name of Bruce's Castle, in which his men lay concealed, and on the southern arm of Loch Ranza stands a picturesque ruined castle which is said to have been his hunting-seat. Kildonan Castle, near the south-eastern- most point, is a fine ruin of the 14th century, once a royal strong- hold. The island gave the title of earl to Thomas Boyd, who married the elder sister of James III., a step so unpopular with his peers that he had to fly the country, and the title soon after- wards passed to the Hamiltons. Brodick Castle, the ancestral seat of the dukes of Hamilton, is a splendid mansion on the northern shore of Brodick Bay.

Brodick is the chief village in Arran, but most of the dwelling- houses have been built at Invercloy, close to the pier. Three m. south (by road) is Lamlash, on a fine bay so completely sheltered by Holy Island as to form an excellent harbour for ships of all sizes. Four m. to the north lies the village of Corrie which takes its name from a rugged hollow in the hill of Am Binnein (2172 ft.)which overshadows it. Daniel Macmillan (1813-1857), the founder of the publishing firm of Macmillan & Co., was a native of Corrie.

About a mile and a half east of Lamlash village lies Holy Island, which forms a natural breakwater to the bay. It is 1 j m. long, nearly f m. wide, and its finely-marked basaltic cone rises to a height of 1030 ft. The island takes its name from the fact that St Molios, a disciple of St Columba, founded a church near the north-western point. Li the saint's cave on the shore may be seen the rocky shelf on which he made his bed, but his re-mains were interred in the hamlet of Clachan, some 2 m. from Blackwaterfoot. Off the south-eastern coast, f m. from Port Dearg, lies the pear-shaped isle of Pladda, which serves as the telegraph station from which the arrival of vessels in the Clyde is notified to Glasgow and Greenock.

ARRANT (a variant of " errant," from Lat. err are, to wander), a word at first used in its original meaning of wandering, as in " knight-errant," thus an arrant or itinerant preacher, an arrant thief, one outlawed and wandering at large; the meaning easily passed to that of self-declared, notorious, and by the middle of the 1 6th century was confined, as an intensive adjective, to words of opprobrium and abuse, an arrant coward meaning thus a self-declared, downright coward.

ARRAS, a city of northern France, chief town of the department of Pas-de-Calais, 38 m. N.N.E. of Amiens on the Northern railway between that city and Lille. Pop. (1906) 20,738. Arras is situated in a fertile plain on the

right and southern bank of the Scarpe, at its junction with the Crinchon which skirts the town on the south and east. Of the fortifica- tions erected by Vauban in the 17 th century, only a gateway and the partially dismantled citadel, nicknamed la Belle Inutile, are left. The most interesting quarter lies in the east of the town, where the lofty houses which border the spacious squares known as the Grande and the Petite Place are in the Flemish style. They are built with their upper storeys projecting over the foot- way and supported on columns so as to form arcades; beneath these are deep cellars extending under the squares themselves. The celebrated hotel de ville of the 16th century overlooks the Petite Place; its belfry, which contains a fine peal of bells, rises to a height of 240 ft. The decoration is in the richest Gothic style, and is especially admirable in the case Of the windows. Of the numerous ecclesiastical buildings the cathedral, a church of the 18th century possessing some good pictures, is the most important. It occupies the site of the church of the abbey of St Vaast, the buildings of which adjoin it and contain the bishop's palace, the ecclesiastical seminary, a museum of antiquities, paintings and sculptures, and a rich library.

Arras is the seat of a prefect and of a bishop. It has tribunals

of first instance and of commerce, a chamber of commerce, a branch of the Bank of France, a communal college, training colleges, and a school of military engineering. Its industrial establishments include oil-works, dye-works and breweries, and manufactories of hosiery, railings and other iron-work, and of oil-cake. For the tapestry manufacture formerly flourishing at Arras see Tapestry. It has a very important market for cereals and oleaginous grains. The trade of the town is facilitated by the canalization of the Scarpe, the basin of which forms the port.

Before the opening of the Christian era Arras was known as Nemetacum, or Nemetocenna, and was the chief town of the Atrebates, from which the word Arras is derived. Passing under the rule of the Romans, it became a place of some importance, and traces of the Roman occupation have been found. In 407 it was destroyed by the Vandals, and having been partially rebuilt, came into the hands of the Franks. Christianity was introduced by St Vedast (Vaast), who founded a bishopric at Arras about 500. This was soon transferred to Cambrai, but brought back to its original seat about 1 100. As the chief town of the province of Artois, Arras passed to Baldwin I., count of Flanders, in 863, and about 880 was ravaged by the Normans. During this troubled period it retained some vestiges of its former trade,

and the woollen manufacture was established here at an early date. Early in the 12th century a commune was established here, but the earliest known charter only dates from about 1 180; owing to the importance of Arras, this soon became a model for many neighbouring communes. At this time the city appears to have been divided into two parts, one dependent upon the bishop, and the other upon the count. When Philip Augustus, king of France, married Isabella, niece of Philip, count of Flanders, Arras came under the rule of the French king, who confirmed its privileges in 1194. As part of Artois it came in 1237 to Robert, son of Louis VIII., king of France, and in 1384 to Philip the Bold, duke of Burgundy, who promised to respect its privileges. Anxious to recover the city for France, Louis XL placed a garrison therein after the death of Charles the Bold, duke of Burgundy, in 1477. This was driven out by the inhabitants, and Louis then stormed Arras, razed the walls, deported the citizens, whose places were taken by Frenchmen, and changed the name to Franchise. The successor of Louis, Charles VIII., restored the city to its former name and position, and as part of the inheritance of Mary, daughter and heiress of Charles the Bold, it was contended for by the French king, and his rival, the German king, Maximilian I. The peace of Senlis in 1493 gave Arras to Maximilian, and in spite of attacks by the French, it remained. under the rule of the Habsburgs until 1640. Taken in this year by the French, this capture was ratified by the peace of the Pyrenees in 1659, and henceforward it remained part of France. It suffered severely during the French Revolution, especially from Joseph Lebon, who, like the brothers Maximilien and Augustin Robespierre, was a native of the town. Owing to its position and importance, Arras has been the scene of various treaties. In 1414 the peace between the Armagnacs and the Burgundians was made here, and in 1435 a congress met here to make peace between the English and their Bur- gundian allies on the one side, and the French on the other, and after the English representatives had withdrawn, a treaty was signed on the 20th of September between France and Burgundy. In 1482 Louis XL made a treaty here with the estates and towns of Flanders about the inheritance of Mary of Burgundy, wife of the German king Maximilian I.

See E. Lecesne, Histoire d'Arras jusqu'en 1789 (Arras, 1880); Arras sous la Revolution (Arras, 1882-1883).

ARRAY (from the O. Fr. areyer, Med. Lat. arredare, to get ready), an orderly arrangement, particularly the drawing up of an army in position of battle. From the 13th century onwards in England " Commissions of Array " issued from the king for the levy of military forces (see Militia). In English law the term is used for the setting in order, name by name, of the panel of a jury, which may be challenged as a whole, " to the array," or individually, " to the polls."

ARRENOTOKOUS, ARRENOTOKY (from Gr. &ppv, male, and tokos, from tIktuv, to beget), biological terms proposed by Leuckart and Eduard von Siebold to denote those parthenogenetic females which produce male young, while " thelytokous " and " thelytoky " would denote their producing female young.

ARREST (Fr. arrester, arreter, to stop or stay), the restraint of a man's person, for the purpose of compelling him to be obedient to the law. It is defined to be the execution of the command of some court of record or officer of justice.

Arrests in England are either in civil or in criminal cases. I. In Civil Cases. — The arrest must be by virtue of a precept or order out of some court, and must be effected by corporal seizing or touching the defendant's body, or as directed by the writ, capias et attachias, take and catch hold of. And if the defendant make his escape it is a rescous, or rescue, and attach- ment may be had against him, and the bailiff may then justify the breaking open of the house in which he is, to carry him away. Arrests on mesne process (see Process), before judgment obtained, were abolished by the Debtors Act 1869, s. 6; an exception, however, is made in cases in which the plaintiff proves, at any time before final judgment, by evidence on oath to the satisfaction of a judge of one of the superior courts, that he has a good cause of action to the amount of £50, that the defendant is about to quit the country, and that his absence will materially prejudice the plaintiff in prosecuting his action. In such cases an order for arrest may be obtained till security to the amount of the claim be found.

Formerly a judgment creditor might arrest his debtor under a writ of capias ad satisfaciendum, but since 1869 imprisonment for debt has been abolished in England, except in certain cases, and in these the period of detention must not exceed one year.

The following persons are privileged from arrest, viz., 1st, members of the royal family and the ordinary servants of the king or queen regnant, chaplains, lords of the bedchamber, &c. This privilege does not extend to servants of a consort queen or dowager. 2nd, peers of the realm, peeresses by birth, creation or marriage, Scottish and Irish peers and peeresses. 3rd, members of the House of Commons during the session of parliament, and for a convenient time (forty days) before and after it. Members of Convocation appear to have the same privilege. 4th, foreign ambassadors and their "domestics and domestic servants." Temporary privilege from arrest in civil process is enjoyed by barristers travelling on circuit, by parties, witnesses or attorneys connected with a cause, and by clergymen whilst performing divine service.

The arrest of any privileged person is irregular ab initio, and the party may be discharged on motion. The only exception is as to indictable crimes, such as treason, felony and breach of the peace.

There are no longer any places where persons are privileged from arrest, such as the Mint, Savoy, Whitefriars, &c, on the ground of their being ancient palaces.

Except in cases of treason, felony or breach of the peace, an arrest cannot be made on a Sunday, and if made it is void (Sunday Observance Act 1677) ; but it may be made in the night as well as in the day.

II. In Criminal Cases. — All persons whatsoever are, without distinction, equally liable to this arrest, and any man may arrest without warrant or precept, and outer doors may be broken open for that purpose. The arrest may be made, — 1st, by warrant; 2nd, by an officer without warrant; 3rd, by a private person without warrant; or, 4th, by a hue and cry.

1. Warrants are ordinarily granted by justices of the peace on information or complaint in writing and upon oath, and they must be indorsed when it is intended they should be executed in another county by a magistrate of that county (see Indictable Offences Act 1848). A warrant issued by a metropolitan police magistrate can be executed anywhere by a metropolitan police officer. Warrants are also granted in cases of treason or other offence affecting the government by the privy council, or one of the secretaries of state, and also by the chief or other justice of the court of king's bench {bench-warrant) in cases of felony,

misdemeanour or indictment found, or criminal information granted in that court. Every warrant ought to specify the offence charged, the authority under which the arrest is to be made, the person who is to execute it and the person who is to be arrested. A warrant remains in force till executed or discharged by order of a court. An officer may break open doors in order to execute a warrant in cases of treason, felony or indictable offences, provided that, on demand, admittance cannot otherwise be obtained. (See Warrant.)

2. The officers who may arrest without warrant are, — justices of the peace, for felony or breach of the peace committed in their presence; the sheriff and the coroner in their county, for felony; constables, for treason, felony or breach of the peace committed in their view, — and within the metropolitan police district they have even larger powers (Metropolitan

Police Acts 1829-1895).

3. A private person is bound to arrest for a felony committed in his presence, under penalty of fine and imprisonment. By the Prevention of Offences Act 1851, a private person is allowed to arrest any one whom he finds committing an indictable offence by night, and under the Malicious Damage Act 1861, any person committing an offence against that act may be arrested without warrant by the owner of the property damaged, or his servants, or persons authorized by him. So, too, by the Coinage Offences Act 1 86 1. s. 31, any person may arrest any one whom he shall find committing any offence relating to the coin, or other offence against that act.

A person arrested without warrant must not be detained in private custody but must be taken with all convenient speed to a police station or justice and there charged (Summary Jurisdiction Act 1879).

4. The arrest by hue and cry is where officers and private persons are concerned in pursuing felons, or such as have danger- ously wounded others. By the Fugitive Offenders Act 188 1, provision was made for the arrest in the United Kingdom of persons committing treason, and felony in any of the British colonies and vice versa; as to the arrest of fugitives in foreign countries see Extradition.

The remedy for a wrongful arrest is by an action for false imprisonment.

In Scotland the law of arrest in criminal procedure has a general constitutional analogy with that of England, though the practice differs with the varying character of the judicatories. Colloquially the word arrest is used in compulsory procedure for the recovery of debt ; but the technical term applicable in that department is caption, and the law on the subject is generic- ally different from that of England. There never was a practice in Scottish law corresponding with the English arrest in mesne process; but by old custom a warrant for caption could be obtained where a creditor made oath that he had reason to believe his debtor meditated flight from the country, and the writ so issued is called a warrant against a person in meditalione fugae. Imprisonment of old followed on ecclesiastical cursing, and by fiction of law in later times it was not the creditor's remedy, but the punishment of a refractory person denounced rebel for disobedience to the injunctions of the law requiring fulfilment of his obligation. The system was reformed and stripped of its cumbrous fictions by an act of the year 1837. Although the proceedings against the person could only follow on completed process, yet, by a peculiarity of the Scottish law, documents executed with certain formalities, and by special statute bills and promissory notes, can be registered in the records of a court for execution

against the person as if they were judgments of the court.

The general principles as to the law of arrest in most European countries correspond more or less exactly to those prevailing in England.

An arrest of a ship, which is the method of enforcing the admiralty process in rem, founded either on a maritime lien or on a claim against the ship, is dealt with under Admiralty Jurisdiction.

See also article Attachment.

Arrest of Judgment is the assigning just reason why judgment

should not pass, notwithstanding verdict given, either in civil or in criminal cases, and from intrinsic causes arising on the face of the record.

United States. — The law of arrest assimilates to that existing in England. Actual manual touching is not necessary {Pike v. Hanson, 9 N.H. 491; Hill v. Taylor, 50 Mich. 549); words of arrest by the officer, not protested against and no resistance offered, are sufficient {Emery v. Chesley, 18 N.H. 198; Goodell v. Tower, 1904, $8 Am. Rep. 790). Words of arrest, staying over night at prisoner's house, going with him before the magistrate next day constitute arrest {Courtery v. Dozier, 20 Ga. 369). Restraining a person in his own house is arrest.

In civil cases in most of the states arrest for debt is abolished, except in cases of fraud or wilful injury to persons or property by constitutional provision or by statute. One arrested under process of a federal court cannot be arrested under that of a state court for the same cause. There is no provision in the United States constitution as to imprisonment for debt, but congress has enacted (in Rev. Stat., s. 990) that all the provisions of the law of any state applicable to such imprisonment shall apply to the process of federal courts in that state. A woman can be arrested in New York for wilful injury to person, character or property, and in certain other cases (Code, s. 553). The president, federal officials, governors of states, members of con- gress and of state legislatures (during the session), marines, soldiers and sailors on duty, voters while going to and from the polls, judges, court officials (1904, 100 N.W. 591), coroners and jurors while attending upon their public duties, lawyers, parties and witnesses while going to, attending or returning from court, and generally married women without separate property, are exempt from arrest.

In criminal cases a bench-warrant in New York may be served in any county without being backed by a magistrate (Code Crim. Proc, s. 304). In Nebraska one found violating the law may be arrested and detained until a legal warrant can be issued (Crim. Code, s. 283). A bail may lawfully

recapture his principal (1 905) 121 Georgia Rep. 594. Foreign ambassadors and ministers and their servants are exempt from arrest. Exemption from arrest is a privilege, not of the court, as in England, but of the person, and can be waived {Petrie v. Fitzgerald, 1 Daly 401).

ARRESTMENT, in Scots law, the process by which a creditor detains the goods or effects of his debtor in the hands of third parties till the debt due to him shall be paid. It is divided into two kinds: (1) Arrestment in security, used when proceedings are commencing, or in other circumstances where a claim may become, but is not yet, enforceable; and (2) Arrestment in execution, following on the decree of a court, or on a registered document, under a clause or statutory power of registration, according to the custom of Scotland. By the process of arrest- ment the property covered is merely retained in place; to realize it for the satisfaction of the creditor's claim a further proceeding called " furthcoming " is necessary. By old practice, alimentary funds, i.e. those necessary for subsistence, were not liable to arrestment. By the Wages Arrestment Limitation (Scotland) Act 1870, the wages of all labourers, farm-servants, manu- facturers, artificers and work-people are not arrestable except (1) in so far as they exceed 20s. per week; but the expense of the arrestment is not to be charged against the debtor unless the sum recovered exceed the amount of the said expense; or (2) under decrees for alimentary allowances and payments, or for rates and taxes imposed by law.

ARRETIUM (mod. Arezzo), an ancient city of Etruria, in the upper valley of the Arno, situated on the Via Cassia, 50 m. S.E. of Florentia. The site of the original city is not quite certain; some writers place it on the isolated hill called Poggio di S. Cornelio, 25 m. to the S.E., where remains of a fortified enceinte still exist (cf. F. Noack in Romische Miiteilungen, 1897, p. 186); while others maintain, and probably rightly, that it occupied the hill at the summit of the modern town, where the medieval citadel {fortezza) was erected, and which was enclosed by an ancient wall. Numerous Etruscan tombs have been discovered within the lower portion of the area of the modern town, which

appears to correspond in site with the Roman (C.I.L. xi. p. 1082; G. Gamurrini in Notizie degli scan, 1883, 262; 1887, 437). Vitruvius (ii. 8. 9) and Pliny (Nat. Hist. xxxv. 173) speak of the strength of its walls of bricks, but these have naturally disappeared. Many remains of Roman buildings have been discovered within the modern town, and the amphitheatre is still visible in the southern angle. Arretium appears as one

of the cities which aided the Tarquins after their expulsion. It was an opponent of Rome at the end of the 4th and beginning of the 3rd century B.C., but soon sought for help against the attacks of the Gauls, against whom it was almost a frontier fortress. It was an important Roman base during the Hannibalic wars (though at one time it threatened defection — Livy xxvii. 21-24), and in 205 B.C. was able to furnish Scipio with a considerable quantity of arms and provisions (Livy xxviii. 45). In 187 B.C. the high road was extended as far as Bononia. Arretium took the part of Marius against Sulla, and the latter settled some of his veterans there as colonists. Caesar, or Octavian, added others, so that there are three classes, Arretini veteres, Fidentiores, and lulienses. A considerable contingent from Arretium joined Catiline and in 40 B.C. Caesar occupied it. C. Maecenas 1 was perhaps a native of Arretium. Its fertility was famous in ancient times, and still more the red pottery made of. the local clay, with its imitation of chased silver. The reliefs upon it are sometimes of considerable beauty, and large quantities of it, and the sites of several of the kilns, have been discovered in and near Arretium. It was also considerably exported. See Corp. Inscrip. Lai. xi. (Berlin, 1901) p. 1081, and Notizie degli scavi, passim (especially, 1884, 369, for the discovery of a fine group of the moulds from which these vases were made). The museum contains a very fine collection of these and a good collection of medieval majolica. (T. As.)

ARRHENIUS, SVANTE AUGUST (1859-), Swedish physicist and chemist, was born on the 19th of February 1859, at Schloss Wijk, near Upsala. He studied at Upsala from 1876 to 1881 and at Stockholm from 1881 to 1884, then returning to Upsala as privat-docent in physical chemistry. He spent two years from 1886 to 1888 in travelling, and visited Riga Polytechnic and the universities of Wurzburg, Graz, Amsterdam and Leipzig. In 1891 he was appointed lecturer in physics at Stockholm and four years later became full professor. Arrhenius is specially associated with the development of the theory of electrolytic dissociation, and his great paper on the subject, Recherches sur la conductibiliU galvanique des electrolytes — (1) conductibilite galvanique des solutions aqueuses extrimement diluees, (2) thSorie chimique des electrolytes, was presented to the Stockholm Academy of Sciences in 1883. He was subsequently continuously engaged in extending the applications of the doctrine of electrolytic conduction in relation not only to the problems of chemical action but also, on the supposition that in certain conditions the air conducts electrolytically, to the phenomena of atmospheric electricity. In 1900 he published a Larobok i teoretik elektrokemi, which was translated into German and English, and his Lehrbuch der kosmischen Physik appeared in 1903. In 1904 he delivered at the university of California a course of lectures, the object of which was to illustrate the application of the methods of physical chemistry to the study of the theory of toxins and

antitoxins, and which were published in 1907 under the title Immunochemistry. In his Worlds in the Making (1908), an English translation of Das Werden der Welten (1907), he combated the generally accepted doctrine that the universe is tending to what Clausius termed Warmetod through exhaustion of all sources of heat and motion, and suggested that by virtue of a mechanism which maintains its available energy it is self-renovating, energy being " degraded " in bodies which are in the solar state, but " elevated " or raised to a higher level in bodies which are in the nebular state. He further put forward the conception that life is universally diffused, constantly

1 The name Cilnius was apparently never borne by Maecenas himself, though he is so described, e.g. by Tacitus, Ann. vi. 11, cf. Macrob. ii. 4, 12. The Cilnii with whom Maecenas was connected were a noble Etruscan family.

emitted from all habitable worlds in the form of spores which traverse space for years or ages, the majority being ultimately destroyed by the heat of some blazing star, but some few finding a resting-place on bodies which have reached the habitable stage.

ARRIA, in Roman history, the heroic wife of Caecina Paetus. When her husband was implicated in the conspiracy of Scribonianus against the emperor Claudius (a.d. 42), and condemned to death, she resolved not to survive him. She accordingly stabbed herself with a dagger, which she then handed to him with the words, " Paetus, it does not hurt " (Paete, non dolet; see Pliny, Epp. iii. 16; Martial i. 14; Dio Cassius Ix. 16). Her daughter, also called Arria, was the wife of Thrasea Paetus. When he was condemned to death by Nero, she would have imitated her mother's example, but was dis- suaded by her husband, who entreated her to live for the sake of their children. She was sent into banishment (Tacitus, Annals, xvi. 34).

ARRIAN (Flavitjs Arrianus), of Nicomedia in Bithynia, Greek historian and philosopher, was born about a.d. 96. and lived during the reigns of Hadrian, Antoninus Pius and Marcus Aurelius. In recognition of his abilities, he received the citizen- ship of both Athens and Rome. He was greatly esteemed by Hadrian, who appointed him governor, (legatus) of Cappadocia (131-137), in which capacity he distinguished himself in a cam- paign against the Alani. This is the only instance before the 3rd century in which a first-rate Roman military command was given to a Greek. Arrian spent a considerable portion of his time at Athens, where he was archon 147-148. With his retirement or recall from Cappadocia his official career came to an end. In his declining years, he retired to his native place, where he devoted himself to literary work. He died about 180.

His biography, by Dio Cassius, is lost.

When young, Arrian was the pupil and friend of Epictetus, who had probably withdrawn to Nicopolis, when Domitian expelled all philosophers from Rome. He took verbatim notes of his teacher's lectures, which he subsequently published under the title of The Dissertations (Aiarpij3cu), in eight books, of which the first four are extant and constitute the chief authority for Stoic ethics, and The Encheiridion {i.e. Manual) of Epictetus, a handbook of moral philosophy, for many years a favourite instruction book with both Christians and pagans. It was adapted for Christian use by St Nilus of Constantinople (5th century), and Simplicius (about 550) wrote a commentary on it which we still possess.

The most important of Arrian's original works is his Anabasis of Alexander, in seven books, containing the history of Alexander the Great from his. accession to his death. Arrian's chief authorities were, as he tells us, Aristobulus of Cassandreia and Ptolemy, son of Lagus (afterwards king of Egypt), who both accompanied Alexander on his campaigns. In spite of a too indulgent view of his hero's defects, and some over-credulity, Arrian's is the most complete and trustworthy account of Alexander that we possess.

Other extant works of Arrian are: Indica, a description of India in the Ionic dialect, including the voyage of Nearchus, intended as a supplement to the Anabasis; Acies Contra Alanos, a fragment of importance for the knowledge of Roman military affairs; Periplus of the Euxine, an official account written (131) for the emperor Hadrian; Taclica, attributed by some to Aelianus, who wrote in the reign of Trajan; Cynegeticus, a treatise on the chase, supplementing Xenophon's work on the same subject; the Periplus of the Erythraean Sea, attributed to him, is by a later compiler. Amongst his lost works may be mentioned: Td fj.er' 'AXkˆavSpov, a history of the period succeeding Alexander, of which an epitome is preserved in Photius; histories of Bithynia, the Alani and the Parthian wars under Trajan; the lives of Timoleon of Syracuse, Dion of Syracuse and a famous brigand named Timoleon. Arrian's style is simple, lucid and manly; but his language, though pure, presents some peculiarities. He was called " Xenophon the younger " from his imitation of that writer, and he even speaks of himself as Xenophon.

Complete works ed. F. Diibner (1846) ; Anabasis, C. Abicht C 1 with notes, C. VV. Kriiger (1835), C. Sintenis (1867), C. Abicht (1875) ; Scripta Minora, R. Hercher and A. Eberhard (1885); A. J. Roos, i.,

containing the Anabasis (Teubner series, 1907). English trans- lations: Anabasis, Rooke (1812); Anabasis and Indica, E. J. Chinnock (1893); Voyage of Nearchus with the spurious Periplus, W. Vincent (1807), J. \V. M'Crindle (Calcutta, 1879); Periplus of the Euxine, W. Falconer (1805); Cynegeticus [W. Dansey] (1831). See also E. Bolla, Arriano di Nicomedia (1890); E. Schwartz in Pauly-Wissowa's Realencyclopadie der classischen Altertumswissen- schafl (1896) ; H. F. Pelham, " Arrian as Legate of Cappadocia," in English Historical Review, October 1896; article Greece: History, ancient, " Authorities."

ARRIS (Fr. areste, or arete), in architecture, the sharp edge or angle in which two sides or surfaces meet.

ARRONDISSEMENT (from arrondir, to make round), an administrative subdivision of a department in France. Dating nominally from 1800, the arrondissement was really a re-creation of the " district " of 1790. It comprises within itself the canton and the commune. It differs from the department and from the commune in being merely an administrative division and not a complete legal personality with power to acquire and possess. The purposes for which it exists are, again, unlike those of the department and the commune, comparatively limited. It is the electoral district for the chamber of deputies, each arrondissement returning one member; if the population is in excess of 100,000 it is divided into two or more constituencies. It is also a judicial district having a court of first instance. It is under the control of a sub-prefect. There are 362 arrondisse- ments in the 8 7 departments. Each arrondissement has a council, with as many members as there are cantons, whose function is to subdivide among the communes their quota of the direct taxes charged to the arrondissement by the general council of the department. (See France.) Somewhat different from the arrondissements of the department are the arrondissements (20 in number) into which Paris is divided. They bear a certain resemblance to the sub-municipalities created in London by the London Government Act 1899, and each forms a local administra- tive unit (see Paris).

France is also subdivided, for purposes of defence, into five maritime divisions, termed arrondissements. Institutedoriginally under the Consulate, they were suppressed in 1815, but re- established again in 1826. They are under the direction of maritime prefects, who, by a decree of 1875, must be vice-admirals in the navy.

ARROWROOT. A large proportion of the edible starches obtained from the rhizomes or root-stocks of various plants are known in commerce under the name of arrowroot. Properly the name should be restricted to the starch yielded by two or three species of Maranta (nat. ord. Marantaceae) , the chief of which is

Fie. 1. Fig. 2.

Arrowroot Plant {Maranta arundinacea) . — Fig. 1, stem, leaves and flowers; fig. 2, tubers.

M. arundinacea; and when genuine or West Indian arrowroot is spoken of, it is understood that this is the variety meant. Maranta arundinacea is probably a native of Guiana and western Brazil, but it has long been cultivated in the West Indian Islands,

and has now spread to most tropical countries. The plant is a herbaceous perennial with a creeping root-stock which gives off fleshy cylindrical branches or tubers, covered with pale brown or white scales and afterwards ringed with their scars. It is at the period when these tubers are gorged with starch, immediately before the season of rest, that it is ripe for use. In addition to about 25% of starch, the tubers contain a proportion of woody tissue, vegetable albumen and various salts. The arrowroot may be separated on a small scale in the same manner as potato- starch is frequently prepared, that is, by peeling the root and grating it in water, when the starch falls to the bottom. The liquor is then drained off, and the starch purified by repeated washings till it is ready for drying. On a large scale the manu- facture of arrowroot is conducted with specially arranged machinery. The rhizomes when dug up are washed free of earthy impurities and afterwards skinned. Subsequently, according to Pereira's Materia Medica, " the carefully skinned tubers are washed, then ground in a mill, and the pulp washed in tinned-copper cylindrical washing-machines. The fecula (dim. of Lat. faex, dregs, or sediment) is subsequently dried in drying-houses. In order to obtain the fecula free from impurity, pure water must be used, and great care and attention paid in every step of the process. The skinning or peeling of the tubers must be performed with great nicety, as the cuticle contains a resinous matter which imparts colour and a disagreeable flavour to the starch. German-silver palettes are used for

skinning the deposited fecula, and shovels of the same metal for packing the dried fecula. The drying is effected in pans, covered with white gauze to exclude dust and insects."

Arrowroot is distinguished by the granules agglomerating into small balls, by slightly crepitating when rubbed between the fingers, and by yielding with boiling water a fine, transparent, inodorous and pleasant-tasting jelly. In microscopic structure the granules present an ovoid form, marked with concentric lines very similar to potato-starch, but readily distinguished by having a " hilum " marking at the thick extremity of the granule, while in potato-starch the same appearance occurs at the thin end (compare figs. 3 and 4 below). In addition to the West Indian supplies, arrowroot is found in the commerce of Brazil, the East Indies, Australia, Cape Colony and Natal.

The name" arrowroot " is derived from the use by the Mexican Indians of the juice of the fresh root as an application to wounds produced by poisoned arrows. Sir Hans Sloane refers to it in his Catalogue of Jamaica Plants (1696), and it is said to have been introduced into England by William Houston about 1732. It is grown as a stove-plant in botanic gardens. The slender, much – branched stem is 5 or 6 ft. high, and bears numerous leaves with long, narrow sheaths and large spreading ovate blades, and a few short-stalked white flowers.

Tous-les-mois, or Tulema arrowroot, also from the West Indies, is obtained from several species of Canna, a genus allied to Fig. 5. Tous-les- Maranta, and cultivated in mois.

the same manner. The granules of tous-les-mois are readily distinguishable by their very large size (fig. 5). East Indian arrowroot is obtained from the root-stocks of several species of the genus Curcuma (nat. ord. Zingiberaceae), chiefly C. angustifolia, a native of central India. Brazilian arrow- root is the starch of the cassava plant, a species of Manihot (fig. 6) , which when agglutinated on hot plates forms the tapioca of commerce. The cassava is cultivated in the East Indian Archipelago as well as in South America. Tacca, or Otaheite

Fig. 5.

Fig. 6.

Starch Granules magnified. Fig. 3. Potato. Fig. 4. Arrowroot. Fig. 6. Manihot.

arrowroot, is the produce of Tacca pinnatifida, the pia plant of the South Sea Islands. Portland arrowroot was formerly pre- pared on the Isle of Portland from the tubers of the common cuckoo-pint, Arum maculatum. Various other species of arum yield valuable food-starches in hot countries. Under the name of British arrowroot the farina of potatoes is sometimes sold, and the French excel in the preparation of imitations of the more costly starches from this source. The chief use, however, of potato- farina as an edible starch is for adulterating other and more costly preparations. This falsification can readily be detected by microscopic examination, and the accompanying drawings exhibit the appearance under the microscope of the principal starches we have described. Although these starches agree in chemical composition, their value as articles of diet varies considerably, owing to different degrees of digestibility and pleasantness of taste. Arrowroot contains about 82 % of starch, and about 1 % of proteid and mineral matter. Farina, or British arrowroot, at about one-twelfth the price, is just as useful and pleasant a food.

ARROWSMITH, the name of an English family of geographers. The first of them, Aaron Arrowsmith (1750-1823), migrated to London from Winston in Durham when about twenty years of age, and was employed by John Cary, the engraver. In 1 790 he made himself famous by his large chart of the world on Mercator's projection. Four years later he published another large map of the world on the globular projection, with a companion volume of explanation. The maps of North America (1796) and Scotland (1807) are the most celebrated of his many later productions. He left two sons, Aaron and Samuel, the elder of whom was the compiler of the Eton Comparative Atlas, of a Biblical atlas, and of various manuals of geography. They carried on the business in company with John Arrowsmith (1 790-1873), nephew of the elder Aaron. In 1834 John published his London Atlas, the best set of maps then in existence. He followed up the atlas with a long series of elaborate and carefully executed maps, those of Australia, America, Africa and India being especially valuable. In 1863 he received the gold medal of the Royal Geographical Society, of which body he was one of the founders.

ARROYO (O. Sp. arrogio, Lat. arrogium, a rivulet or stream), the channel of a stream cut in loose earth, found often at the head of a gully, where the water flows only at certain seasons of the year.

ARSACES, a Persian name, which occurs on a Persian seal, where it is written in cuneiform characters. The most famous Arsaces was the chief of the Parni, one of the nomadic Scythian or Dahan tribes in the desert east of the Caspian Sea. A later tradition, preserved by Arrian, derives Arsaces I.

and Tiridates from the Achaemenian king Artaxerxes II. , but this has evidently no historical value. Arsaces, seeking refuge before the Bactrian king Diodotes, invaded Parthia, then a province of the Seleucid empire, about 250 B.C. (Strabo xi. p. 515, cf. Arrian p. 1, Miiller, in Photius, Cod. 38, and Syncellus p. 284). After two years (according to Arrian) he was killed, and his brother Tiridates, who succeeded him and maintained himself for a short time in Parthia, during the dissolution of the Seleucid empire by the attacks of Ptolemy III. (247 ff.), was defeated and expelled by Seleucus II. (about 238). But when this king was forced, by the rebellion of his brother, Antiochus Hierax, to return to the west, Tiridates came back and defeated the Macedonians (Strabo xi. pp. 513, 515; Justin xli. 4; Appian, Syr. 65; Isidorus of Charax n). He was the real founder of the Parthian empire, which was of very limited extent until the final decay of the Seleucid empire, occasioned by the Roman intrigues after the death of Antiochus IV.Epiphanes (165 B.C.), enabled Mithradatesl. and his successors to conquer Media and B abylonia. Tiridates adopted the name of his brother Arsaces, and after him all the other Parthian kings (who by the historians are generally called by their proper names) , amounting to the number of about thirty, officially wear only the name Arsaces. With very few exceptions only the name AP2AKH2 (with various epithets) occurs on the coins of the Parthian kings, and the obverse generally shows the seated

figure of the founder of the dynasty, holding in his hand a strung bow. The Arsacidian empire was overthrown in a.d. 226 by Ardashir (Artaxerxes), the founder of the Sassanid empire, whose conquests began about a.d. 212. The name Arsaces of Persia is also borne by some kings of Armenia, who were of Parthian origin. (See Persia and Partfia.) (Ed. M.)

ARS-AN-DER-MOSEL, a town of Germany, in the imperial province Alsace-Lorraine, 5 m. S. of Metz on the railway to Noveant. It has a handsome Roman Catholic church and extensive foundries. In the vicinity are the remains of a Roman aqueduct, which formerly spanned the valley. Pop. 5000.

ARSCHOT, PHILIPPE DE CROY, Duke of (1526-1595), governor-general of Flanders, was born at Valenciennes, and inherited the estates of the ancient and wealthy family of Croy. Becoming a soldier, he was made a knight of the order of the Golden Fleece by Philip II., king of Spain, and was afterwards employed in diplomatic work. He took part in the troubles in the Netherlands, and in 1 563 refused to join William the Silent and others in their efforts to remove Cardinal Granvella from his post. This attitude, together with Arschot's devotion to the Roman Catholic Church, which he expressed by showing his delight at the massacre of St Bartholomew, led Philip of Spain to regard him with still greater favour,

which, however, was with- drawn in consequence of Arschot's ambiguous conduct when welcoming the new governor, Don John of Austria, to the Netherlands in 1576. In spite, however, of his being generally distrusted by the inhabitants of the Netherlands, he was ap- pointed governor of the citadel of Antwerp when the Spanish troops withdrew in 1577. After a period of vacillation he deserted Don John towards the end of that year. Jealous of the prince of Orange, he was then the head of the party which induced the archduke Matthias (afterwards emperor) to under- take the sovereignty of the Netherlands, and soon afterwards was appointed governor of Flanders by the state council. A strong party, including the burghers of Ghent, distrusted the new governor; and Arschot, who was taken prisoner during a riot at Ghent, was only released on promising to resign his office. He then sought to regain the favour of Philip of Spain, and having been pardoned by the king in 1580 again shared in the govern- ment of the Netherlands; but he refused to serve under the count of Fuentes when he became governor-general in 1594, and retired to Venice, where he died on the nth of December 1595. ■ *See J. L. Motley, The Rise of the Dutch Republic.*

ARSENAL, an establishment for the construction, repair, receipt, storage and issue of warlike stores; details as to materiel will be found under Ammunition, Ordnance, &c. The word " arsenal " appears in various forms in Romanic languages (from which it has been adopted into Teutonic), i.e. Italian arzanale, Spanish arsenal, &c; Italian also has arzana and darsena, and Spanish a longer form atarazanal. The word is of Arabic origin, being a corruption of daras-sina'ah, house of trade or manu- facture, dar, house, al, the, and sina'ah, trade, manufacture, sana'a, to make. Such guesses as arx navalis, naval citadel, arx senatus {i.e. of Venice, &c), are now entirely rejected.

A first-class arsenal, which can renew the materiel and equip- ment of a large army, embraces a gun factory, carriage factory, laboratory and small-arms ammunition factory, small-arms factory, harness, saddlery and tent factories, and a powder factory; in addition it must possess great store-houses. In a second-class arsenal the factories would be replaced by workshops. The situation of an arsenal should be governed by strategical considerations. If of the first class, it should be situated at the base of operations and supply, secure from attack, not too near a frontier, and placed so as to draw in readily the resources of the country. The importance of a large arsenal is such that its defences would be on the scale of those of a large fortress. The usual subdivision of branches in a great arsenal is into A, Storekeeping; B, Construction; C, Administration. Under A we should have the following departments and stores: — Departments of issue and receipt, pattern room, armoury department, ordnance or park, harness, saddlery and accoutrements, camp equipment,

tools and instruments,

engineer store, magazines, raw material store, timber yard, breaking-up store, unserviceable store. Under B — Gun factory, carriage factory, laboratory, small-arms factory, harness and tent factory, powder factory, &c. In a second- class arsenal there would be workshops instead of these factories. C — Under the head of administration would be classed the chief director of the arsenal, officials military and civil, non-commissioned officers and military artificers, civilian foremen, workmen and labourers, with the clerks and writers necessary for the office work of the establishments. In the manufacturing branches are required skill, and efficient and economical work, both executive and administrative; in the storekeeping part, good arrangement, great care, thorough knowledge of all warlike stores, both in their active and passive state, and scrupulous exactness in the custody, issue and receipt of stores. For fuller details the reader is referred to papers by Sir E. Collen, R.A., in vol. viii., and Lieut. C. E. Grover, R.E., in vol. vi. Proceedings of R. Artillery Institution. In England the Royal Arsenal, Woolwich, manufactures and stores the requirements of the army and navy (see Woolwich).

ARSENIC (symbol As, atomic weight 75-0), a chemical element, known to the ancients in the form of its sulphides. Aristotle gave them the name aavoapaKT] , and Theophrastus mentions them under the name apcreviKov. The oxide known as white arsenic is mentioned by the Greek alchemist Olympiodorus, who obtained it by roasting arsenic sulphide. These substances were all known to the later alchemists, who used minerals con- taining arsenic in order to give a white colour to copper. Albertus Magnus was the first to state that arsenic contained a metal-like substance, although later writers considered it to be a bastard or semi-metal, and frequently called it arsenicum rex. In 1733 G. Brandt showed that white arsenic was the calx of this element, and after the downfall of the phlogiston theory the views con- cerning the composition of white arsenic were identical with those which are now held, namely that it is an oxide of the element.

Arsenic is found in the uncombined condition in various localities, but more generally in combination with other metals and sulphur, in the form of more or less complex sulphides. Native arsenic is usually found as granular or curvilaminar masses, with a reniform or botryoidal surface. These masses are cf a dull grey colour, owing to surface tarnish; only on fresh fractures is the colour tin-white with metallic lustre. The hard- ness is 3- 5

and the specific gravity 5-63-5-73. Crystals of arsenic belong to the rhombohedral system, and have a perfect cleavage parallel to the basal plane; natural crystals are, however, of rare occurrence, and are usually acicular in habit. Native arsenic occurs usually in metalliferous veins in association with ores of antimony, silver, &c. ; the silver mines of Freiberg in Saxony, St Andreasberg in the Harz, and Chaftarcillo in Chile being well-known localities. Attractive globular aggregates of well-developed radiating crystals have been found at Akatani, a village in the province Echizen, in Japan. »

Arsenic is a constituent of the minerals arsenical iron, arsenical pyrites or mispickel, tin-white cobalt or smaltite, arsenical nickel, realgar, orpiment, pharmacolite and cobalt bloom, whilst it is also met with in small quantities in nearly all specimens of iron pyrites. The ordinary commercial arsenic is either the naturally occurring form, which is, however, more or Jess contaminated with other metals, or is the product obtained by heating arsenical pyrites, out of contact with air, in earthenware retorts which are fitted with a roll of sheet iron at the mouth, and an earthen- ware receiver. By this method of distillation the arsenic sub- limes into the receiver, leaving a residue of iron sulphide in the retort. For further purification, it may be sublimed, after having been previously mixed with a little powdered charcoal, or it may be mixed with a small quantity of iodine and heated. It can also be obtained by the reduction of white arsenic (arsenious oxide) with carbon. An electro-metallurgical process for the extraction of arsenic from its sulphides has also been proposed (German Patent, 67,073). These compounds are brought into solution by means of onlysulphides of the alkali metals and the

resultant liquor run into the cathode compartment of a bath, which is divided by diaphragms into a series of anode and cathode chambers; the anode divisions being closed and gas-tight, and containing carbon or platinum electrodes. The arsenic solution is decomposed at the cathode, and the element precipitated there.

Arsenic possesses a steel-grey colour, and a decided metallic lustre; it crystallizes on sublimation and slow condensation in rhombohedra, isomorphous with those of antimony and tellurium. It is very brittle. Its specific gravity is given variously from 5-395 to 5-959; its specific heat is 0-083, an d its coefficient of linear expansion 0-00000559 (at 40 C). It is volatile at tempera- tures above ioo° C. and rapidly vaporizes at a dull red heat. It liquefies when heated under pressure, and its melting point lies between 446 C. and 45 7 C. The vapour of arsenic is of a golden yellow colour, and has a garlic odour. The vapour density is io-6 (air = i) at 564° C, corresponding to a tetratomic molecule As 4 ; at a white heat the vapour density shows a considerable lowering in value, due to the dissociation of

the complex molecule.

By condensing arsenic vapour in a glass tube, in a current of an indifferent gas, such as hydrogen, amorphous arsenic is obtained, the deposit on the portion of the tube nearest to the source of heat being crystalline, that farther along (at a temperature of about 210 C.) being a black amorphous solid, while still farther along the tube a grey deposit is formed. These two latter forms possess a specific gravity of 4-710 (14 C.) [A. Bettendorff, Annalen, 1867, 144, p. no], and by heating at about 3 58°-36o° C. pass over into the crystalline variety. Arsenic burns on heating in a current of oxygen, with a pale lavender-coloured flame, forming the trioxide. It is easily oxidized by heating with concentrated nitric acid to arsenic acid, and with concentrated sulphuric acid to arsenic trioxide; dilute nitric acid only oxidizes it to arsenious acid. It burns in an atmosphere of chlorine forming the trichloride; it also combines directly with bromine and sulphur on heating, while on fusion with alkalis it forms arsenites.

Arsenic and most of its soluble compounds are very poisonous, and consequently the methods used for the detection of arsenic are very important. For full accounts of methods used in de- tecting minute traces of arsenic in foods, &c, see " Report to Commission to Manchester Brewers' Central Association," the Analyst, 1900, 26, p. 8; " Report of Conjoint Committee of Society of Chemical Industry and Society of Public Analysts," the Analyst, 1902, 27, p. 48; T. E. Thorpe, Journal of the Chemical Society, 1903, 83, p. 774; O. Hehner and others, Journal of Society of Chemical Industry, 1902, 21, p. 94; also Adulteration.

Arsenic and arsenical compounds generally can be detected by (a) Reinsch's test : A piece of clean copper is dipped in a solution of an arsenious compound which has been previously acidified with pure hydrochloric acid. A grey film is produced on the surface of the copper, probably due to the formation of a copper arsenide. The reaction proceeds better on heating the solution. On removing, washing and gently drying the metal and heating it in a glass tube, a white crystalline sublimate is formed on the cool part of the tube; under the same conditions antimony does not produce a crystalline sublimate.

(b) Fleitmann's test and Marsh's test depend on the fact that arsenic and its compounds, when present in a solution in which hydrogen is being generated, are converted into arseniuretted hydrogen, which can be readily detected either by its action on silver nitrate solution or by its decomposition on heating. In Fleitmann's test, the solution containing the arsenious compound is mixed with pure potassium hydroxide solution and a piece of pure zinc or aluminium foil dropped in and the whole then heated. A piece of bibulous paper, moistened with silver nitrate, is held over

the mouth of the tube, and if arsenic be present, a grey or black deposit is seen on the paper, due to the silver nitrate being reduced by the arseniuretted hydrogen. Antimony gives no reaction under these conditions, so that the method can be used to detect arsenic in the presence of antimony, but the test is not so delicate as either Reinsch's or Marsh's method.

In the Marsh test the solution containing the arsenious compounds is mixed with pure hydrochloric acid and placed in an apparatus in which hydrogen is generated from pure zinc and pure sulphuric acid. The arseniuretted hydrogen produced is passed through a tube containing lead acetate paper and soda-lime, and finally through a narrow glass tube, constricted at various points, and heated by a very small flame. As the arseniuretted hydrogen passes over

the heated portion it is decomposed and a black deposit formed. Instead of heating the tube, the gas may be ignited at the mouth of the tube and a cold surface of porcelain or platinum placed in the flame, when a black deposit is formed on the surface. This may be distinguished from the similar antimony deposit by its ready solu- bility in a solution of sodium hypochlorite. A blank experiment should always be carried out in testing for small quantities of arsenic, to ensure that the materials used are quite free from traces of arsenic. It is to be noted that the presence of nitric acid interferes with the Marsh test ; and also that if the arsenic is present as an arsenic compound it must be reduced to the arsenious condition by the action of sulphurous acid. Arsenic compounds can be detected in the dry way by heating in a tube with a mixture of sodium car- bonate and charcoal when a deposit of black amorphous arsenic is produced on the cool part of the tube, or by conversion of the compound into the trioxide and heating with dry sodium acetate when the offensive odour of the extremely poisonous cacodyl oxide is produced. In the wet way, arsenious oxide and arsenites, acidified with hydrochloric acid, give a yellow precipitate of arsenic trisulphide on the addition of sulphuretted hydrogen; this precipitate is soluble in solutions of the alkaline hydroxides, ammonium carbonate and yellow ammonium sulphide. Under like conditions arsenates only give a precipitate on long-continued boiling.

Arsenic is usually estimated either in the form of magnesium pyroarsenate or as arsenic sulphide. 'For the pyroarsenate method it is necessary that the arsenic should be in the arsenic condition, if necessary this can be effected by heating with nitric acid ; the acid solution is then mixed with " magnesia

mixture " and made strongly alkaline by the addition of ammonia. It is then allowed to stand twenty-four hours, filtered, washed with dilute ammonia, dried, ignited to constant weight and weighed, the filter paper being incinerated separately after moistening with nitric acid. From the weight of magnesium pyroarsenate obtained the weight of arsenic can be calculated.

In the sulphide method, the arsenic should be in the arsenious form. Sulphuretted hydrogen is passed through the liquid until it is thoroughly saturated, the excess of sulphuretted hydrogen is expelled from the solution by a brisk stream of carbon dioxide, and the precipitate is filtered on a Gooch crucible and washed with water containing a little sulphuretted hydrogen and dried at 100 ° C. ; it is then well washed with small quantities of pure carbon disulphide to remove any free sulphur, again dried and weighed. Arsenic can also be estimated by volumetric methods; for this purpose it must be in the arsenious condition, and the method of estimation consists in converting it into the arsenic condition by means of a standard solution of iodine, in the presence of a cold saturated solution of sodium bicarbonate.

The atomic weight of arsenic has been determined by many different chemists. J. Berzelius, in 18 18, by heating arsenious oxide with excess of sulphur obtained the value 74-3; J. Pelouze (Comptes renins, 1845, 20, p. 1047) titrated arsenic chloride with silver -solution and obtained 75-0; and F. Kessler (Pogg. Ann. 1861, 113, p. 134) by converting arsenic trisulphide in hydrochloric acid solution into arsenic pentasulphide also obtained 75-0.

Compounds. — Arsenic forms two hydrides: — The dihydride, AS2H2, is a brown velvety powder formed when sodium or potassium arsenide is decomposed by water. It is a somewhat unstable substance, decomposing on being heated, with liberation of hydrogen. Arsenic trihydride (arsine or arseniuretted hydrogen), AsH 3 , is formed by decomposing zinc arsenide with dilute sulphuric acid ; by the action of nascent hydrogen on arsenious compounds, and by the electrolysis of solutions of arsenious and arsenic acids; it is also a product of the action of organic matter on many arsenic compounds. It is a colourless gas of unpleasant smell, excessively poisonous, very slightly soluble in water. It easily burns, forming arsenious oxide if the combustion proceeds in an excess of air, or arsenic if the supply of air is limited ; it is also decomposed into its constituent elements when heated. It liquefies at 40° C. and becomes solid at 118-9° C. (K. Olszewski). Metals such as tin, potassium and sodium, when heated in the gas, form arsenides, with liberation of hydrogen; and solutions of gold and silver salts are reduced by the gas with precipitation of metallic gold and silver. Chlorine, bromine and iodine decompose arsine readily, the action being most violent in the case of chlorine.

Arsenic tribromide, AsBr 3 , is formed by the direct union of arsenic and bromine, and subsequent distillation from the excess of arsenic; it forms colourless deliquescent prisms which melt at 20°-25° C, and boil at 220° C. Water decomposes it, a small quantity of water leading to the formation of the oxybromide, AsOBr, whilst a large excess of water gives arsenious oxide, As 4 06.

Arsenic certainly forms two, or possibly three iodides. The di-iodide, As2l< or Asl2, which is prepared by heating one part of arsenic with two parts of iodine, in a sealed tube to 230 C, forms dark cherry- red prisms, which are easily oxidized, and are readily decomposed by water. The tri-iodide, Ash, prepared by subliming arsenic and iodine together in a retort, by leading arsine into an alcoholic iodine solution, or by boiling powdered arsenic and iodine with water, filtering and evaporating, forms brick-red hexagonal tables, of specific gravity 4-39, soluble in alcohol, ether and benzene, and in a large excess of water; in the presence of a small quantity of water,

it is decomposed with formation of hydriodic acid and an insoluble basic salt of the composition 4AsOF3As 4 06-24H 2 0. It combines with alkaline iodides to form very unstable compounds. The penta- iodide, Asl 5> appears to be formed when a mixture of one part of arsenic and seven parts of iodine is heated to 190 C, but on dis- solving the resulting product in carbon bisulphide and crystallizing from this solvent, only the tri-iodide is obtained.

Arsenic trichloride, AsCl 3 , is prepared by distilling white arsenic with concentrated sulphuric acid and common salt, or by the direct union of arsenic with chlorine, or from the action of phosphorus pentachloride on white arsenic. It is a colourless oily heavy liquid of specific gravity 2-205 (° ° C.), which, when pure and free from chlorine, solidifies at — i8°C, and boilsat I32°C. It is very poisonous and decomposes in moist air with evolution of white fumes. With a little water it forms arsenic oxychloride, AsOCl, and with excess of water it is completely decomposed into hydrochloric acid and white arsenic. It combines directly with ammonia to form a solid com- pound variously givenasAsCl 3 -3NH 3 , or 2 AsCl 3 -7NH 3 ,orAsCl 3 -_4NH 3 .

A rsenic trifluoride, AsF 3 , is prepared by distilling white arsenic with fluorspar and sulphuric acid, or by heating arsenic tribromide with ammonium fluoride; it is a colourless liquid of specific gravity 2-73, boiling at 63 ° C. ; it fumes in air, and in contact with the skin produces painful wounds. It is decomposed by water into arsenious and hydrofluoric acids, and absorbs ammonia forming the compound 2AsF 3 5NH 3 . By the action of gaseous ammonia on arsenious halides at — 30 C. to — 40 ° C,

arsenamide, As(NH2) 3 , is formed. Water de composes it into arsenious oxide and ammonia, and when heated to 6o° it loses ammonia and forms arsenimide, As 2 (NH) 3 (C. Hugot, Compt. rend. 1904, 139, p. 54). For AsF 5 , see Ber., 1906, 39, p. 67.

Two oxides of arsenic are definitely known to exist, namely the trioxide (white arsenic), As 4 6 , and the pentoxide, AS2O5, while the existence of a suboxide, As 2 0(?), has also been mooted. Arsenic trioxide has been known from the earliest times, and was called Hiittenrauch (furnace-smoke) by Basil Valentine. It occurs naturally in the mineral claudetite, and can be artificially prepared by burning arsenic in air or oxygen: It is obtained commercially by roasting arsenical pyrites in either a Brunton's or Oxland's rotatory calciner, the crude product being collected in suitable condensing chambers, and afterwards refined by resublimation, usually in reverberatory furnaces, the foreign matter being deposited in a long flue leading to the condensing chambers. White arsenic exists in two crystalline forms (octahedral and prismatic) and one amorphous form; the octahedral form is produced by the rapid cooling of arsenic vapour, or by cooling a warm saturated solution in water, or by crystallization from hydrochloric acid, and also by the gradual transition of the amorphous variety, this last phenomenon being attended by the evolution of heat. Its specific gravity is 3-7; it is only slightly soluble in cold water, but is more soluble in hot water, the solution reacting faintly acid. The prismatic variety of the oxide can be obtained by crystallization from a saturated boiling solution in potassium hydroxide, or by the crystallization of a solution of silver arsenite in nitric acid. Its specific gravity is 4- 15. In the amorphous condition it can be obtained by condensing the vapour of the oxide at as high a temperature as possible, when a vitreous mass is pro- duced, which melts at 200 C, has a specific gravity of 3-68-3-798, and is more soluble in water than the crystalline variety.

Arsenious oxide is very poisonous. It acts as a reducing agent ; it is not convertible into the pentoxide by the direct action of oxygen ; and its solution is reduced by many metals (e.g. zinc, tin and cadmium) with precipitation of arsenic and formation of arseniuretted hydrogen. The solution of arsenious oxide in water reacts acid towards litmus and contains tribasic arsenious acid, although on evaporation of the solution the trioxide is obtained and not the free acid. The salts of the acid are, however, very stable, and are known as arsenites. Of these salts several series are known, namely the ortho-arsenites,»which are derivatives of the acid H 3 As0 3 , the meta- arsenites, derivatives of HAs0 2 , and the pyro-arsenites, derivatives of H4AS2O5. The arsenites of the alkali metals are soluble in water, those of the other metals are insoluble in water, but are readily soluble in acids. A neutral solution of an arsenite gives a yellow precipitate of silver arsenite, Ag 3 As0 3 , with silver nitrate solution, and a

yellowish-green precipitate (Scheele's green) of cupric hydrogen arsenite, CuHAs0 3 , with copper sulphate solution. By the action of oxidizing agents such as nitric acid, iodine solution, &c, arsenious acid is readily converted into arsenic acid, in the latter case the re- action proceeding according to the equation H 3 As0 3 + l2 + H20 = H 3 As0 4 +2HI. Arsenic pentoxide, As 2 5 , is most easily obtained by oxidation of a solution of arsenious acid with nitric acid ; the solution on concentration deposits the compound 2H 3 As0 4 -H 2 (below 15° C), which on being heated to a dark red heat loses its water of crystallization and leaves a white vitreous mass of the pentoxide. This substance dissolves slowly in water, forming arsenic acid; by heating to redness it decomposes into arsenic and oxygen. It deliquesces in moist air, and is easily reduced to arsenic by heating with carbon.

Arsenic acid, H 3 As0 4 , is prepared as shown above, the compound 2H 3 As0 4 H 2 on being heated to ioo° C. parting with its water of crystallization and leaving a residue of the acid, which crystallizes in needles. On heating to 180° C. it loses water and yields pyro arsenic acid, H4AS2O7, which at 200° C. loses more water and leaves

9 crystalline mass of meta-arsenic acid, HAs03. These latter two acids are only stable in the solid state; they dissolve readily in water with evolution of heat and immediate transformation into the ortho-arsenic acid. The salts of arsenic acid, termed arsenates, are isomorphous with the phosphates, and in general character and reactions resemble the phosphates very closely; thus both series of salts give similar precipitates with "magnesia mixture" and with ammonium molybdate solution, but they can be distinguished by their behaviour with silver nitrate solution, arsenates giving a reddish-brown precipitate, whilstphosphates give a yellow precipitate.

There are three known compounds of arsenic and sulphur, namely, realgar AS2S2, orpiment As 2 S 3 , and arsenic pentasulphide As 2 S_ 5 , Realgar occurs native in orange prisms of specific gravity 3-5; it is prepared artificially by fusing together arsenic and sulphur, but the resulting products vary somewhat in composition; it is readily fusible and sublimes unchanged, and burns on heating in a current of oxygen, forming arsenic trioxide and sulphur dioxide.

Orpiment (auri pigmentum) occurs native in pale yellow rhombic prisms, and can be obtained in the amorphous form by passing a current of

sulphuretted hydrogen gas through a solution of arsenious oxide or an arsenite, previously acidified with dilute hydrochloric acid. It melts_ easily and volatilizes. It burns on heating in air, and is soluble in solutions of alkaline hydroxides and carbonates, forming thioarsenites, As 2 S 3 +4KHO = K 2 HAs0 3 + K 2 HAsS 3 + H 2 0. On acidifying the solution so obtained with hydrochloric acid, the whole of the arsenic is reprecipitated as trisulphide, K 2 HAs0 3 + K 2 HAsS 3 +4HCl=4KCl +3H 2 0+As 2 S 3 . Arsenic pentasulphide, As 2 S 6 , can be prepared by fusing the trisulphide with the requisite amount of sulphur; it is a yellow easily-fusible solid, which in absence of air can be sublimed unchanged ; it is soluble in solutions of the caustic alkalis, forming thioarsenates, which can also be obtained by the action of alkali polysulphides on orpiment. The thioarsenites and thioarsenates of the alkali metals are easily soluble in water, and are readily decomposed by the action of mineral acids. Arsenic compounds containing selenium and sulphur are known, such as arsenic seleno-sulphide, AsSeS^ and arsenic thio-se!enide, AsSSe 2 . Arsenic phosphide, AsP, results when phosphine is passed into arsenic trichloride, being precipitated as a red-brown powder.

Many organic arsenic compounds are known, analogous to those of nitrogen and phosphorus, but apparently the primary and secondary arsines, AsH 2 -CH 3 and AsH(CH 3) 2 , do not exist, although the corresponding chlorine derivatives, AsCl 2 -CH 3 , methyl arsine chloride, and AsCl(CH 3) 2 , dimethyl arsine chloride, are known. The tertiary arsines, such as As(CH 3) 3 , trimethyl arsine, and the quaternary arsonium iodides and hydroxides, (CH 3) 4 AsI and (CH 3) 4 As-OH, tetramethyl arsonium iodide and hydroxide, have been obtained. The arsines and arsine chlorides are liquids of over- powering smell, and in some cases exert an extremely irritating action on the mucous membrane. They do not possess basic properties; the halogen in the chlorine compounds is readily replaced by oxygen, and the oxides produced behave like basic oxides. The chlorides AsCfe-CHs and AsCl(CH 3) 2 as well as As(CH 3) 3 are capable of com- bining with two atoms of chlorine, the arsenic atom apparently changing from the tri- to the penta-valent condition, and the corre- sponding oxygen compounds can also be oxidized to compounds containing one oxygen atom or two hydroxyl groups more, forming acids or oxides. The compounds of the type AsX 5 , e.g. AsCU-CH 8 , AsCl 3 (CH 3) 2 , on heating break down, with separation of methyl chloride and formation of compounds of the type AsX 3 ; the break- ing down taking place more readily the fewer the number of methyl groups in the compound. The dimethyl arsine (or cacodyl) com- pounds have been most studied. On distillation of equal parts of dry potassium acetate and arsenious oxide, a colourless liquid of unbearable smell passes over, which is spontaneously inflammable and excessively poisonous. It is sometimes

called Cadet's fuming liquid, and its composition was determined by R. Bunsen, who gave it the name cacodyl oxide (kiucuSjjs, stinking); its formation may be shown thus :

_ As 4 q 6 +8CH 3 C0 2 K=2[(CH 3) 2 As] 2 0+4K 2 C0 3 +4C0 2 . The liquid is spontaneously inflammable owing to the presence of free cacodyl, Asj(CH]) 4 , which is also obtained by heating the oxide with zinc clippings in an atmosphere of carbon dioxide ; it is a liquid of overpowering odour, and boils at I70°C. Cacodyl oxide boils at 150° C, and on exposure to air takes up oxygen and water and passes over into the crystalline cacodylic acid, thus :

[(CH 3) 2 As] 2 0+H 2 0+0,=2(CH 3) 2 As-0-OH.

Pharmacology. — Of arsenic and its compounds, arsenious acid (dose -jV-tV § r -) and its preparation liquor arsenicalis, Fowler's solution (dose 2-8 1U), are in very common use. The iodide of arsenic (dose glj— £ gr.) is one of the ingredients of Donovan's solution (see Mercury); and iron arsenate (dose T V4 gr. in a piU), a mixture of ferrous and ferric arsenates with some iron oxide, is of great use in certain cases. Sodium arsenate (■ˆs —iV gr.) is somewhat less commonly prescribed, though all the compounds of this metal have great value in experienced hands.

Externally, arsenious acid is a powerful caustic when applied

to raw surfaces, though it has no action on the unbroken skin. Internally, unless the dose be extremely small, all preparations are severe gastro-intestinal irritants. This effect is the same however the drug be administered, as, even after subcutaneous injection, the arsenic is excreted into the stomach after absorp- tion, and thus sets up gastritis in its passage through themucous membrane. In minute doses it is a gastric stimulant, promoting the flow of gastric juice. It is quickly absorbed into the blood, where its presence can be demonstrated especially in the white blood corpuscles. In certain forms of anaemia it increases the number of the red corpuscles and also their haemoglobin content. None of these known effects of arsenic is sufficient to account for the profound change that a course of the drug will often produce in the condition of a patient. It has some power of affecting the general metabolism, but no wholly satisfactory explanation is forthcoming. According to Binz and Schultz its power is due to the fact that it is an oxygen-carrier, arsenious acid withdrawing oxygen from the protoplasm to form arsenic acid, which subse- quently yields up its oxygen again. It is thus vaguely called an alterative, since the patient recovers under its use. It is elimin- ated chiefly by the urine, and to a less extent by the alimentary canal, sweat, saliva, bile, milk, tears, hair, &c, but it is also stored up in the body mainly in the liver and kidneys.

Therapeutics. — Externally arsenious acid has been much used by quack doctors to destroy morbid growths, &c, a paste or solution being applied, strong enough to kill the mass of tissue and make it slough out quickly. But many accidents have resulted from the arsenic being absorbed, and the patient thereby poisoned. Internally it is useful in certain forms of dyspepsia, but as some patients are quite unable to tolerate the drug, it must always be administered in very small doses at first, the quantity being slowly increased as tolerance is shown. Children as a rule bear it better than adults. It should never be given on an empty stomach, but always after a full meal. Certain cases of anaemia which do not yield to iron are often much improved by arsenic, though in other apparently similar ones it appears to be valueless. It is the routine treatment for pernicious anaemia and Hodgkin's disease, though here again the drug may be of no avail. For the neuralgia and anaemia following malaria, for rheumatoid arthritis, for chorea and also asthma and hay fever, it is constantly prescribed with excellent results. Certain skin diseases, as psoriasis, pemphigus and occasionally chronic eczema, are much benefited by its use, though occasionally a too prolonged course will produce the very lesion for which under other circumstances it is a cure. A recent method of using the drug is in the form of sodium cacodylate by subcutaneous injection, and this preparation is said to be free from the cumu- lative effects sometimes arising after the prolonged use of the other forms. Other organic derivatives employed are sodium metharsenite and sodium anilarsenate or atoxyl; hypodermic injections of the latter have been used in the treatment of sleeping sickness. Occasionally, as among the Styrians, indi- viduals acquire the habit of arsenic-eating, which is said to increase their Weight, strength and appetite, and clears their complexion. The probable explanation is that an antitoxin is developed within them.

Toxicology and Forensic Medicine. — The commonest source of arsenical poisoning is the arsenious acid or white arsenic, which in one form is white and opaque, like flour, for which it has been mistaken with fatal results. Also, as it has little taste and no colour it is easily mixed with food for homicidal purposes. When combined with potash or soda it is used to saturate fly- papers, and strong solutions can be obtained by soaking these in water; this fact has also been used with criminal intent. Copper arsenite (or Scheele's green) used to be much employed as a pigment for wall-papers and fabrics, and toxic effects have resulted from their use. Metallic arsenic is probably not poisonous, but as it usually becomes oxidized in the alimentary canal, the usual symptoms of arsenical poisoning follow its use.

In acute poisoning the interval between the reception of the poison and the onset of symptoms ranges from ten minutes, or even less, if a strong solution be taken on an empty stomach, to

twelve or more hours if the drug be taken in solid form and the stomach be full of food. The usual period, however, is from half an hour to an hour. In a typical case a sensation of heat developing into a burning pain is felt in the throat and stomach. This is soon followed by uncontrollable vomiting, and a little later by severe purging, the stools being first of all faecal but later assuming a rice water appearance and often containing blood. The patient suffers from intense thirst, which cannot be relieved, as drinking is immediately followed by rejection of the swallowed fluid. There is profound collapse, the features are sunken, the skin moist and cyanosed. The pulse is feeble and irregular, and respiration is difficult. The pain in the stomach is persistent, and cramps in the calves of the legs add to the torture. Death may be preceded by coma, but consciousness is often maintained to the end. The similarity of the symptoms to those of cholera is very marked, but if the suspicion arises it can soon be cleared up by examining any of the secretions for arsenic. More rarely the poison seems to centre itself on the nerve centres, and gastro-intestinal symptoms may be almost or quite absent. In such cases the acute collapse occurs in company with both superficial and deep anaesthesia of the limbs, and is soon followed by coma terminating in death. In criminal poisoning repeated doses are usually given, so that such cases may not be typical, but will present some of the aspects of acute and some of chronic arsenical poisoning. As regards treatment, the stomach must be washed out with warm water by means of a soft rubber tube, an emetic being also administered. Then, if available, freshly precipitated ferric hydrate must be given, which can be prepared by adding a solution of ammonia to one of iron pef- chloride. The precipitate is strained off, and the patient can swallow it suspended in water. While this is being obtained, magnesia, castor oil or olive oil can be given; or failing all these, copious draughts of water. The collapse must be treated with hot blankets and bottles, and subcutaneous injections of brandy, ether or strychnine. The pain can be lessened by injections of morphia.

Arsenic may be gradually absorbed into the system in very small quantities over a prolonged period, the symptoms of chronic poisoning resulting. The commonest sources used to be wall-papers, fabrics, artificial flowers and toys: also certain trades, as in the manufacture of arsenical sheep-dipping. But at the present time cases arising from these causes occur very rarely. In 1900 an outbreak of " peripheral neuritis " with various skin affections occurred in Lancashire, which was traced to beer made from glucose and invert sugar, in the preparation of which sulphuric acid contaminated with arsenic was said to have been used. But the nature of the disease in this case was decidedly obscure. The symptoms so closely resembled those of

beri-beri that it has also been suggested that the illness was the same, and was caused by the manufacture of the glucose from mouldy rice (see Beri-Beri) , though no proof of this was possible. The earliest symptoms are slight gastric disorders, loss of appetite and general malaise, followed later by colicky pains, irritation of eyelids and skin eruptions. But sooner or later peripheral neuritis develops, usually beginning with sensory disturbances, tingling, numbness, formication and occasionally cutaneous anaesthesia. Later the affected muscles become exquisitely tender, and then atrophy, while the knee-jerk or other reflex is lost. Pigmentation of the skin may occur in the later stages. Recovery is very slow, and in fatal cases death usually results from heart failure.

After acute poisoning, the stomach at a post-mortem presents signs of intense inflammation, parts or the whole of its mucous membrane being of a colour varying from dark red to bright vermilion and often corrugated. Submucous haemorrhages are usually present, but perforation is rare. The rest of the ali- mentary canal exhibits inflammatory changes in a somewhat lesser degree. After chronic poisoning a widely spread fatty degeneration is present. Arsenic is found in almost every part of the body, but is retained in largest amount by the liver, secondly by the kidneys. After death from chronic poisoning it is found present even in the brain and spongy bone. The detection of arsenic in criminal cases is effected either by Reinsch's test or

by Marsh's test, the urine being the secretion analysed when available. But Reinsch's test cannot be used satisfactorily for a quantitative determination, nor can it be used in the presence of chlorates or nitrates. And Marsh's test is very unmanageable with organic liquids on account of the uncontrollable frothing that takes place. But in such cases the organic matter can be first destroyed by one of the various methods, usually the moist method devised by Fresenius being chosen.

ARSENIUS (c. 354-450), an anchorite, said to have been born of a noble Roman family, who achieved a high reputation for his knowledge of Greek and Roman literature. He was appointed by Theodosius the Great, tutor of the young princes Arcadius and Honorius, but at the age of forty he retired to Egypt, where for forty years he lived in monastic seclusion at Scetis in the Thebais, under the spiritual guidance of St John the Dwarf. He is said to have gained the admiration of his fellows by the extreme rigour of his asceticism. The remainder of his life he spent at Canopus, and Troe near Memphis, where he died at the age of ninety-fiye. Of his writings two collections of admonitory maxims are extant: the first, AtSacrKaKia koJ. irapaivtcns, con- taining instructions for monks, is published with a Latin version by Fr. Combefis in Auctarium biblioth. patr. novissim. (Paris, 1672), pp. 301 f.; the second is a collection of forty-four wise sayings put

together by his friends under the title of ‘ Airo

ARSENIUS AUTORIANUS (13th century), patriarch of Con- stantinople, lived about the middle of the 13th century. He received his education in Nicaea at a monastery of which he later became the abbot, though not in orders. Subsequently he gave himself up to a life of solitary asceticism in a Bithynian monastery, and is said, probably wrongly, to have remained some time in a monastery on Mount Athos. From this seclusion he was in a.d. 1255 called by Theodore II. Lascaris to the position of patriarch at Nicaea, and four years later, on that emperor’s death, became joint guardian of his son John. His fellow-guardian Georgios Mouzalon was immediately murdered by Michael Palaeologus, who assumed the position of tutor. Arsenius then took refuge in the monastery of Paschasius, retaining his office of patriarch but refusing to discharge its duties. Nicephorus of Ephesus was appointed in his stead. In 1 261 Michael, having recovered Constantinople, induced Arsenius again to undertake the office of patriarch, but soon incurred his severe censure by ordering the young prince John to be blinded. Arsenius went so far as to excommunicate the emperor, who, having vainly sought for pardon, took refuge in false accusations against Arsenius and caused him to be banished to Proconnesus, where some years afterwards (according to Fabricius in 1264; others say in 1273) he died. Throughout these years he declined to remove the sentence of excommunication which he had passed upon Michael, and after his death, when the new patriarch Josephus gave absolution to the emperor, the quarrel was carried on between the ” Arsenites ” and the ” Josephists.” The ” Arsenian schism” lasted till 1315, when reconciliation was effected by the patriarch Niphon (see Gibbon, Decline and Fall of the Roman Empire, ed. J. B. Bury, 1898, vol. vi. 467 foil.). Arsenius is said to have prepared from the decisions of the councils and the works of the Fathers a summary of divine laws under the title Synopsis Canonum. This was published (Greek original and Latin version) by G. Voel and H. Justel in Biblio- theca Jur. Canon. Vet. (Paris, 166 1), 749 foil. Some hold that the Synopsis was the work of another Arsenius, a monk of Athos (see L. Petit in Vacant’s Diet, theol. cathol. i. col. 1994); the ascription depends on whether the patriarch Arsenius did or did not sojourn at Mount Athos.

See Georgius Pachymeres ii. 15, in. passim, iv. 1-16; Nicephorus Gregoras iii. 1, iv. 1; lor the will of Arsenius see Cotelerius, Monumenta, ii. 168.

ARSES, Persian king, youngest son of Artaxerxes III., was raised to the throne in 338 B.C. by Bagoas (q.v.), who had

murdered his father and all his brothers. But when the young king tried to make himself independentˆ Bagoas killed him too, with all his children, in the third year of his reign (336) (Diod. 17.5; Strabo 15. 736; Trogus, Prol. x., Alexander's despatch to Darius III.; Arrian ii. 14. 5, and the chronographers). In Plutarch, De fort. Alex. ii. 3. 5, he is called Oarses; in Johannes Antioch. p. 38, Arsamos; in the canon of Ptolemy, Aroges (by Elias of Nisibis, Pirilz); in a chronological tablet from Babylon (Brit. Mus. Sp. ii. 71, Zeitschrift fur Assyriologie, viii. 176, x. 64) he is abbreviated into Ar. See Persia: Ancient History. _ (Ed. M.)

ARSINOE, the name of four Egyptian princesses of the Ptolemaic dynasty. The name was introduced into the Ptolemaic dynasty by the mother of Ptolemy I. This Arsinoe' was originally a mistress of Philip II. of Macedon, who presented her to a Macedonian soldier Loqus shortly before Ptolemy was born. It was, therefore, assumed by the Macedonians that the Ptolemaic house was really descended from Philip (see Ptolemies).

1. Daughter of Lysimachus, king of Thrace, first wife of Ptolemy II. Philadelphus (285-247 B.C.). Accused of conspiring against her husband, who perhaps already contemplated marriage with his sister, also named Arsinoe, she was banished to Coptos, in Upper Egypt. Her son Ptolemy was afterwards king under the title of Euergetes. It is supposed by some (e.g. Niebuhr, Kleine Schriften ; cf . Ehrlichs, De Callimachi hymnis) that she is to be identified with the Arsinoe who became wife of Magas, king of Cyrene, and that she married him after her exile to Coptos. But this hypothesis is apparently without foundation. Magas before his death had betrothed his daughter Berenice to the son of his brother Ptolemy II. Philadelphus, but Arsinoe, disliking the projected alliance, induced Demetrius the Fair, son of Demetrius Poliorcetes, to accept the throne of Cyrene as husband of Berenice. She herself, however, fell in love with the young prince, and Berenice in revenge formed a con- spiracy, and, having slain Demetrius, married Ptolemy's son (see Berenice, 3).

2. Daughter of Ptolemy I. Soter and Berenice. Born about 316 B.C., she married Lysimachus, king of Thrace, who made over to her the territories of his divorced wife, Amastris. To secure the succession for her own children she brought about the murder of her stepson Agathocles. Lysandra, the wife of Agathocles, took refuge with Seleucus, king of Syria, who made war upon Lysimachus and defeated him (281). After her husband's death Arsinoe fled to Ephesus and afterwards to Cassandreia in Macedonia. Seleucus, who had seized Lysima- chus's kingdom, was murdered in 281 by Ptolemy Ceraunus (half-brother of Arsinoe), who thus became master of Thrace and Macedonia. To obtain possession of Cassandreia, he offered his

hand in marriage to Arsinoe, and being admitted into the town, killed her two younger sons and banished her to Samo- thrace. Escaping to Egypt, she became the wife of her full brother Ptolemy II., the first instance of the practice (afterwards common) of the Greek kings of Egypt marrying their sisters. She was a woman of a masterful character and won great influence. Her husband, though she bore him no children, was devoted to her and paid her all possible honour after her death in 271. He gave her name to a number of cities, and also to a district (nome) of Egypt. 1 It is related that he ordered the architect Dinochares to build a temple in her honour in Alexandria; in order that her statue, made of iron, might appear to be suspended in the air, the roof was to consist of an arch of loadstones (Pliny, Hist. Nat. xxxiv. 42). Coins were also struck, showing her crowned and veiled on the obverse, with a double cornucopia on the reverse. She was worshipped as a goddess under the title of Gea CkabtK4x>s, and she and her husband as Qtol &5e

See von Prott, Rhein. Mus. liii. (1898), pp. 460 f.

3. Daughter of Ptolemy III. Euergetes, sister and wife of Ptolemy IV. Philopator. She seems to be erroneously called

1 The appendix to pt. ii. of the Tebtunis series of papyri (Grenfell, Hunt and Goodspeed, 1907) contains a lengthy account ol the topo- graphy of the Arsinoite nome.

Eurydice by Justin (xxx. 2), and Cleopatra by Livy (xxvii. 4). Her presence greatly encouraged the troops at the battle of Raphia (217), in which Antiochus the Great was defeated. Her husband put hei to death to please his mistress Agathocleia, a Samian dancer (between 210 and 205). She was worshipped as Geo. 4>lSowo.tu>p; she and her husband as Oeot iXo7raTopes (Polybius v. 83, 84, xv. 25-33).

4. Youngest daughter of Ptolemy XIII. Auletes, and sister of the famous Cleopatra. During the siege of Alexandria by Julius Caesar (48) she was recognized as queen by the inhabitants, her brother, the young Ptolemy, being then held captive by Caesar. Caesar took her with him to Rome as a precaution. After Caesar's triumph she was allowed to return to Alexandria. After the battle of Philippi she was put to death at Miletus (or in the temple of Artemis at Ephesus) by order of Mark Antony, at the request of her sister Cleopatra (Dio Cassius xlii. 39; Caesar, Bell. civ. iii. 112; Appian, Bell. civ. v. 9).

Authorities.— For general authorities see article Ptolemies. The article " Arsinoe " in Pauly-Wissowa's Realencyclopadie contains a full list of those who bore the name, and also of the numerous towns which were called

after the various princesses.

ARSINOITHERIUM (so called from the Egyptian queen Arsinoe), a gigantic horned mammal from the Middle Eocene beds of the Fayum, Egypt, representing a sub-order of Ungulata, called Barypoda. The skull is remarkable for carrying a huge pair of horn-cores above the muzzle, which seem to be the en- larged nasal bones, and a rudimentary pair farther back; the front horn-cores, like the rest of the skull, consist of a mere shell of bone, and were probably clothed in life with horny sheaths. The teeth form a continuous even series, the small canines being crowded between the incisors and premolars; the crowns of the cheek-series are tall (hypsodont), with a distinctive pattern of their own. Although the brain is relatively larger, the bones of the limbs, especially the short, five-toed feet, approximate to those of the Amblypoda and Proboscidea; but in the articula- tion of the astragalus with both the navicular and cuboid Arsinoitherium is nearer the former than the latter group.

It is probable, however, that these resemblances are mainly due to parallelism in development, and are in all three cases adaptations necessary to support the enormous weight of the body. On the other hand, the marked resemblance of the structure of the tarsus is probably indicative of descent from nearly allied condylarthrous ancestors (see Phenacodus). No importance can be attached to the presence of horns as an indication of affinity between Arsinoitherium and the Ambly- poda; and there are important differences in the structure of the skulls of the two, notably in the external auditory meatus, the occiput, the premaxillae, the palatal foramina and the lower jaw.

From the Proboscidea Arsinoitherium differs broadly in skull structure, in the form of the cheek-teeth, and in the persistence of the complete dental series of forty-four without gaps or enlargement of particular teeth. Whether there is any relation- ship with the Hyracoidea cannot be determined until we are acquainted with the forerunners of Arsinoitherium, which is evidently a highly specialized type.

It may be added that as the name Barypoda has been used at an earlier date for another group of animals, the alternative title Embrithopoda has been suggested in case the former should be considered barred.

See C. W. Andrews, Descriptive Catalogue of the Tertiary Vertebrata of the Fayum, British Museum (1906). (R. L.)*

ARSON (from Lat. ardere, to burn), a crime which has been described as the malicious and voluntary burning of the house of another (3 Co. Inst. 66). At common law in England it is an offence of the degree of felony. In

the Roman civil law arson was punishable by death. It appears early in the history of English law, being known in ancient laws by the term of boernet. It is mentioned by Cnut as one of the bootless crimes, and under the Saxon laws was punishable by death. The sentence of death for arson was, says Stephen (Commentaries, iv. 89) , in the reign of Edward I. executed by a kind of lex talionis, for the incendiaries were burnt to death; a punishment which was inflicted also under

the Gothic institutions. Death continued to be the penalty at least down to the reign of King John, according to a reported case (Gloucester Pleas, pi. 216), but in course of time the penalty became that of other common-law felonies, death by the gallows. It is one of the earliest crimes in which the mens rea, or criminal intent, was taken special notice of. Bracton deals at length with the mala conscienlia, which he says is necessary for this crime, and contrasts it with negligentia (f. 146 b), while in many early indictments malice aforethought (malilia praecogitatd) appears. Arson was deprived of " benefit of clergy " under the Tudors, while an act of 8 Henry VI. c. 6 (1429) made the wilful burning of houses, under particular circumstances, high treason, but acts of 1 Ed. VI. c. 12 (1547) and 1 Mary (1553) reduced it to an ordinary felony. The English law concerning arson was con- solidated by 7 & 8 Geo. IV. c. 30, which was repealed and re-enacted by the Malicious Damage Act 1861.

The common-law offence of arson (which has been greatly en- larged by the act of 1861) required some part of the house to be actually burnt; neither a bare intention nor even an actual attempt by putting fire in or towards it will constitute the offence, if no part was actually burnt, but the burning of any part, however trifling, is sufficient, and the offence is complete even if the fire is put out or goes out of itself. The burning must be malicious and wilful, otherwise it is only a trespass. If a man by wilfully setting fire to his own house burn the house of his neighbour also, it will be a felony, even though the primary intention of the party was to burn his own house only. The word house, in the definition of the offence at common law, extends not only to dwelling-houses, " but to all out-houses which are parcel thereof, though not adjoining thereto." Barns with corn and hay in them, though distant from a house, are within the definition.

The different varieties of the offence are specified in the Malicious Damage Act 1861. The following crimes are thereby made felonies: (1) setting fire to any church, chapel, meeting- house or other place of divine worship; (2) setting fire to a dwelling-house, any person being therein; (3) setting fire to

a house, out-house, manufactory, farm-building, &c, with intent to impose and defraud any person; (4) setting fire to buildings appertaining to any railway, port, dock or harbour; or (5) setting fire to any public building. In these cases the act pro- vides that the person convicted shall be liable, at the discretion of the court, to be kept in penal servitude for life, or for any term not less than three years (altered to five years by the Penal Servitude Acts Amendment Act 1864), or to be imprisoned for any time not exceeding two years, with or without hard labour, and, if a male under sixteen years of age, with or without whip- ping. Setting fire to other buildings, and setting fire to goods in buildings under such circumstances that, if the building were thereby set fire to, the offence would amount to felony, are subject to the punishments last enumerated, with this exception that the period of penal servitude is limited to fourteen years. The attempt to set fire to any building, or any matter or thing not enumerated above, is punishable as a felony. Russell says {Crimes, p. 1781) that the term building is no doubt very in- definite, but it was used in 9 & 10 Vict. c. 25, s. 2; and it was thought much better to adopt this term and leave it to be inter- preted as each case might arise, than to attempt to define; as any such attempt would probably have failed in producing any expression more certain than the term " building " itself. In R. v. Manning, 1872 (L.R. 1 C.C.R. 338), it was held that an unfinished house was a building within the meaning of the act. The setting fire to crops of hay, grass, corn, &c, is punishable by penal servitude for any period not exceeding fourteen years, but setting fire to stacks of the same, or any cultivated vegetable produce, or to peat, coals, &c, is regarded as a more serious offence, and the penal servitude may be for life. For the attempt to commit the last two offences penal servitude is limited to seven years. Setting fire to mines of coal, anthracite or other mineral fuel is visited with the full measure of penalty, and in the case of an attempt the penal servitude is limited to fourteen years. By the Dockyards, &c, Protection Act 1772 it is a felony

punishable by death wilfully and maliciously to set fire to any of His Majesty's ships or vessels of war, or any of His Majesty's arsenals, magazines, dockyards, rope-yards, victualling offices or buildings therein, or any timber, material, stores or ammuni- tion of war therein or in any part of His Majesty's dominions. If the person guilty of the offence is a person subject to naval discipline, he is triable by court-martial, and if found guilty, a sentence of capital punishment may be passed. The Malicious Damage Act 1861, s. 43, also includes as a felony the setting fire to any ship or vessel, with intent to prejudice any owner or part owner of the vessel, or of any goods on the same, or any person who has underwritten any policy of insurance on the vessel, or upon any goods on board the same.

In Scotland the offence equivalent to arson in England is known by the

more expressive name of fire-raising. The crime was punishable capitally by old consuetudinary law, but it is now no longer capital, and may be tried in the sheriff court (50 & 51 Vict. c. 35, s. 56). Formerly the public prosecutor had the privilege of declining to demand capital punishment, and he invariably did so. Wilful fire-raising, which is the most heinous form of the crime, requires the raising of fire, without any lawful object, but with the deliberate intention of destroying certain premises or things, whether directly by the application of fire thereto, or indirectly by its application to something contained in or forming part of or communicating with them; also the intention to destroy premises or things of a certain description (much as mentioned above); and such premises or things must be the property of another than the accused. Wicked, culpable and reckless fire-raising differs from wilful fire-raising in that the fire is raised without the deliberate intention of destroying premises or things, but while the accused was engaged in some unlawful act, or while he was in such a state of passion, excitement or recklessness as not to care what results might follow from his acts.

United States. — The same general principles apply to this crime in American law. In some states by statute the intent to injure or defraud must be shown, e.g. when the property is insured. In New York one who wilfully burns property (including a vessel or its cargo) with intent to defraud or prejudice the insurer thereof, though the offence of arson is not committed, is punishable by imprisonment for not more than five years (N.Y. Pen. Code, ss. 575, 578). There must be an intent to destroy the building (ibid. s. 490; California Code, s. 447). An agreement to commit arson is conspiracy (ibid. s. 171). Killing a person in committing the crime of arson is murder in the first degree (ibid. s. 183) ; this is so in California, even where the crime is merely an attempt to commit arson (Cal. Pen. Code, s. 189). Explosion of a house by gunpowder or dynamite is arson (Texas Pen. Code, art. 761), but a charge of arson by " burning " will not be sustained by proof of exploding by dynamite, even though part of the building is burnt by the explosion (Landers v. State [Tex.], 47 S.W. 1008).

Authorities. — W. S. Holdsworth, History of English Law, vol. iii. ; Pollock and Maitland, History of English Law ; Stephen, History of Criminal Law, vol. iii.; Stephen, Commentaries; Russell on Crimes.

ARSONVAL, a village of France in the department of Aube, lies on the right bank of the Aube, about 30 m. east of Troyes. It has a church dating from the 12th century. Pop. 434.

ARSOT, the name of a forest in France, in the immediate neighbourhood of Belfort. It has an area of about 1500 acres, is almost encircled by a small stream, the Eloie, and is about 1400 ft. above the sea. On the east it is

continued by the forest of Denney, which contains the fortress of Roppe, dominating the road from Colmar into France.

ARSUF, a town on the coast of Palestine, 12 m. N.N.E. of Jaffa, famous as the scene of a victory of the crusaders under Richard I. of England over the army of Saladin. After the capture of Acre on the 12th of July 1191, the army of the crusaders, under Richard Cceur-de-Lion and the duke of Burgundy, opened their campaign for the recovery of Jerusalem by marching southward towards Jaffa, from which place it was intended to move direct upon the holy city. The march was

along the sea-shore, and, the forces of Saladin being in the vicinity, the army moved in such a formation as to be able to give battle at any moment. Richand thus moved slowly, but in such compact order as to arouse the admiration even of the enemy. The right column of baggage and supplies, guarded by infantry, was nearest the sea, the various corps of heavy cavalry, one behind the other, formed the central column, and on the exposed left flank was the infantry, well closed up, and " level and firm as a wall," according to the testimony of Saracen authors. The columns were united into a narrow rectangle by the advanced and rear guards. The whole march was a running fight between untiring horse-archers and steady infantry. Only once did the column open out, and the opportunity was swiftly seized by the Saracens, yet so rapid was the rally of the crusaders that little damage was done (August 25). The latter maintained for many days an absolutely passive defence, and could not be tempted to fight; Richard and his knights made occasional charges, but quickly withdrew, and on the 7th of September this irregular skirmishing, in which the crusaders had scarcely suffered at all, culminated in the battle of Arsuf. Saladin had by now decided that the only hope of success lay in compelling the rear of the Christians' column to halt — and thus opening a gap, should the van be still on the move. Richard, on the other hand, had prepared for action by closing up still more, and as the crusaders were now formed a simple left turn brought them into two lines of battle, infantry in first line, cavalry in second line. Near Arsuf the road entered a defile between the sea and a wooded range of hills; and from the latter the whole Moslem army suddenly burst forth. The weight of the attack fell upon the rear of Richard's column, as Saladin desired. The column slowly continued its march, suffering heavily in horses, but otherwise unharmed. The first assault thus made no impression, but a fierce hand-to-hand combat followed, in which the Hospit- allers, who formed the rear of the Christian army, were hard pressed. Their grand master, like many other subordinates

in history, repeatedly begged to be allowed to charge, but Richard, who on this occasion showed the highest gift of generalship, that of feeling the pulse of the fight, waited for the favourable moment. Almost as he gave the signal for the whole line to charge, the sorely pressed Hospitallers rode out upon the enemy on their own initiative. At once the whole of the cavalry followed suit. The head (or right wing) and centre were not closely engaged, and their fleeter opponents had time to ride off, but the rear of the column carried all before it in its impetuous onset, and cut down the Saracens in great numbers. A second charge, followed by a third, dispersed the enemy in all directions. The total loss of the Saracens was more than tenfold that of the Christians, who lost but seven hundred men. The army arrived at Jaffa on the 10th of September. See Oman, Hist, of the Art of War, ii. 303-317.

ARSURE, a village of France in the department of Jura, has some stone quarries and extensive layers of peat in its neighbour- hood. Its church has a choir dating from the nth century. Pop. 370.

ARSURES, a village of France in the department of Jura, situated on a small stream, the Lurine. It is surrounded by vineyards, from which excellent wine is produced. Pop. 233.

ART, a word in its most extended and most popular sense meaning everything which we distinguish from Nature. Art and Nature are the two most comprehensive genera of which the human mind has formed the conception. Under the genus Nature, or the genus Art, we include all the phenomena of the universe. But as our conception of Nature is indeterminate and variable, so in some degree is our conception of Art. Nor does such ambiguity arise only because some modes of thought refer a greater number of the phenomena of the universe to the genus Nature, and others a greater number to the genus Art. It arises also because we do not strictly limit the one genus by the other. The range of the phenomena to which we point, when we say Art, is never very exactly determined by the range of the other phenomena which at the same time we tacitly refer to the order of Nature. Everybody understands the general meaning of a phrase

like Chaucer's " Nature ne Art ne koude him not amende," 01 Pope's " Blest with each grace of nature and of art." In such phrases we intend to designate familiarly as Nature all which exists independently of our study, forethought and exertion — in other words, those phenomena in ourselves or the world which we do not originate but find; and we intend to designate familiarly as Art all which we do not find but originate — or, in other words, the phenomena, which we add by study, forethought and exertion to those existing independently of us. But we do not use these designations

consistently. Sometimes we draw an arbitrary line in the action of individuals and societies, and say, Here Nature ends and Art begins — such a law, such a practice, such an industry even, is natural, and such another is artificial; calling those natural which happen spontaneously and without much reflection, and the others artificial. But this line different observers draw at different places. Sometimes we adopt views which waive the distinction altogether. One such view is that wherein all phenomena are regarded as equally natural, and the idea of Nature is extended so as to include " all the powers existing in either the outer or the inner world, and everything which exists by means of those powers." In this view Art becomes a part of Nature. It is illustrated in the familiar passage of Shakespeare, where Polixenes reminds Perdita that " Nature is made better by no mean,

But nature makes that mean : so, over that art

Which, you say, adds to nature, is an art

That nature makes." . . .

" This is an art

Which does mend nature, change it rather, but

The art itself is nature." A posthumous essay of John Stuart Mill contains a full philo- sophical exposition and defence of this mode of regarding the relations of Nature and Art. Defining Nature as above, and again as a " collective name for all facts, actual and possible," that writer proceeds to say that such a definition

" is evidently inapplicable to some of the modes in which the word is familiarly employed. For example, it entirely conflicts with the common form of speech by which Nature is opposed to Art, and natural to artificial. For in the sense of the word Nature which has thus been defined, and which is the true scientific sense, Art is as much Nature as anything else ; and everything which is artificial is natural — Art has no independent powers of its own: Art is but the employment of the powers of Nature for an end. Phenomena produced by human agency,, no less than those which, as far as we are concerned, are spontaneous, depend on the properties of the elementary forces, or of the elementary substances and their com- pounds. The united powers of the whole human race could not create a new property of matter in general, or of any one of its species. We can only take advantage for our purposes of the properties we find. A ship floats by the same laws of specific gravity and equi- librium as a tree uprooted by the wind and blown into the water. The corn which men raise for food

grows and produces its grain by the same laws of vegetation by which the wild rose and the mountain strawberry bring forth their flowers and fruit. A house stands and holds together by the natural properties, the weight and cohesion of the materials which compose it. A steam engine works by the natural expansive force of steam, exerting a pressure upon one part of a system of arrangements, which pressure, by the mechanical properties of the lever, is transferred from that to another part, where it raises the weight or removes the obstacle brought into con- nexion with it. In these and all other artificial operations the office of man is, as has often been remarked, a very limited one; it consists of moving things into certain places. We move objects, and by doing this, bring some things into contact which were separate, or separate others which were in contact ; and by this simple change of place, natural forces previously dormant are called into action, and produce the desired effect. Even the volition which designs, the intelligence which contrives, and the muscular force which executes these movements, are themselves powers of Nature."

Another mode of thought, in some sort complementary to the last, is based on the analogy which the operations of forces external to a man bear to the operations of man himself. Study, forethought and exertion are assigned to Nature, and her operations are called operations of Art. This view was familiar to ancient systems of philosophy, and especially to that of the Stoics. According to the report of Cicero, Nature as con- ceived by Zeno was a fire, and at the same time a voluntary agent having the power or art of creating things with regularity and design (" naturam esse ignem artificiosum ad gignendum pro- gredientem via"). To this fire not merely creative force and

systematic action were ascribed, but actual personality. Nature was " non artificiosa solum, sed plane artifex." " That which in the works of human art is done by hands, is done with much greater art by Nature, that is, by a fire which exercises an art and is the teacher of other arts." This conception of Nature as an all-generating fire, and at the same time as a personal artist both teaching and including in her own activity all the human arts, on the one hand may be said, with Polixenes and J. S. Mill, to merge Art in Nature; but on the other hand it finds the essence of Nature in the resemblance of her operations to those of Art. " It is the proprium of art," according to the same system, " to create and beget," and the reasoning proceeds —Nature creates and begets, therefore Nature is an artist or Demiurgus. A kindred view is set forth by Sir Thomas Browne in the Religio Medici, when he declares that " all things are artificial; for

Nature is the Art of God."

But these modes of thought, according to which, on the one hand, the processes of Art are included among processes of Nature, or on the other the processes of Nature among the pro- cesses of Art, are exceptional. In ordinary use the two concep- tions, each of them somewhat vague and inexact, are antithetical. Their antithesis was what Dr Johnson had chiefly in his mind when he defined Art as " the power of doing something which is not taught by Nature or by instinct." But this definition is insufficient, because the abstract word Art, whether used of all arts at once or of one at a time, is a name not only for the power of doing something, but for the exercise of the power; and not only for the exercise of the power, but for the rules according to which it is exercised; and not only for the ruies, but for the result. Painting, for instance, is an art, and the word connotes not only the power to paint, but the act of painting; and not only the act, but the laws for performing the act rightly; and not only all these, but the material consequences of the act or the thing painted. So of agriculture, navigation and the rest. Exception might also be taken to Dr Johnson's defini- tion on the ground that it excludes all actions of instinct from the genus Art, whereas usage has in more languages than one given the name of Art to several of those ingenuities in the lower animals which popular theory at the same time declares to be instinctive. Dante, for instance, speaks of boughs shaken by the wind, but not so violently as to make the birds forgo their Art — " Non pero dal lor esser dritto sparte

Tanto, che gl' augelletti per le cime

Lasciasser d' operar ogni lor arte."

And Fontenelle, speaking in the language not of poetry but of science: — ■*" Most animals — as, for instance, bees, spiders and beavers — have a kind of art peculiar to themselves; but each race of animals has no more than one art, and this one has had no first inventor among the race. Man, on the other hand, has an infinity of different arts which were not born with his race, and of which the glory is his own." Dr Johnson might reply that those properties of variety and of originality or in- dividual invention, which Fontenelle himself alleges in the ingenuities of man but not in those of the lower animals, are sufficient to make a generic difference, and to establish the impropriety of calling a honeycomb or a spider's web a work of Art. It is not our purpose to trespass on ground so debateable as that of the nature of consciousness in the lower animals. Enough that when we use the term Art of any action, it is because we are thinking of properties in the action from which we infer, whether justly or not, that the agent voluntarily and designedly puts forth skill for known ends and by regular and uniform methods. If, then, we were called upon to frame a general*

definition of Art, giving the word its widest and most compre- hensive meaning, it would run thus: — Every regulated operation or dexterity by which organized beings pursue ends which they know beforehand, together with the rules and the result of every such operation or dexterity.

Here it will be well to consider very briefly the natural history of the name which has been given to this very comprehensive conception by the principal branches of civilized mankind. Our own word Art the English language has taken, as all the

Romance languages of modern Europe have taken theirs, directly from the Latin. The Latin ars, according to the prevailing opinion of philologists, proceeds from a root AR, of which the primitive signification was to put or fit things together, and which is to be found in a large family of Greek words. The Greek rkx vr l, the name both for arts in the particular and art in the abstract, is by its root related both to tsk-tuv and ren-vov, and thus contains the allied ideas of making and beget- ting. The proprium of art in the logic of the Stoics, " to create and beget," was strictly in accordance with this etymology. The Teutonic Kunst is formed from konnen, and konnen is developed from a primitive Ich kann. In kann philology is inclined to recognize a preterite form of a lost verb, of which we find the traces in Kin-d, a child; and the form Ich kann thus meaning originally " I begot," contains the germ of the two several developments, — konnen, " to be master," " to be able," and kennen, " to know." We thus see that the chief Indo- European languages have with one consent extended a name for the most elementary exercise of a constructive or productive power, till that name has covered the whole range of the skilled and deliberate operations of sentient beings.

In proportion as men left out of sight the idea of creation, of constructing or producing, " artificiosum esse ad gignendum," which is the primitive half of this extended notion, and attended only to the idea of skill, of proceeding by regular and disciplined methods, " progredi via," which is the superadded half, the whole notion Art, and the name for it, might become subject to a process of thought which, if analysed, would be like this: — What is done by regular and disciplined methods is Art; facts are observed and classified, and a systematic view of the order of the universe obtained, by regular and disciplined methods; the observing and classifying of facts, and obtaining a systematic view of the order of the universe, is therefore Art. To a partial extent this did unconsciously take place. Science, of which the essence is only in knowledge and theory, came to be spoken of as Art, of which the essence is all in practice and production. Cicero, notwithstanding his citation of the Stoical dictum that practice and production were of the essence of Art, elsewhere divides Art into two kinds — one by which things are only contemplated in the mind, another by

which something is pro- duced and done. (" Quumque artium aliud eiusmodi sit, ut tantummodo rem cernat; aliud, ut moliatur aliquid et faciat." — Acad. ii. 7.) Of the former kind his instance is geometry; of the latter the art of playing on the lyre. Now geometry, under- standing by geometry an acquisition of the mind, that is, a collected body of observations and deductions concerning the properties of space and magnitude, is a science and not an art; although there is an art of the geometer, which is the skill by which he solves any given problem in his science, and the rules of that skill, and his exertion in putting it forth. And so every science has its instrumental art or practical discipline; and in as far as the word Art is used only of the practical discipline or dexterity of the geometer, the astronomer, the logician, the grammarian, or other person whose business it is to collect and classify facts for contemplation, in so far the usage is just. The same justification may be extended to another usage, whereby in Latin, and some of its derivative languages, the name Art came to be transferred in a concrete sense to the body of rules, the written code or manual, which lays down the discipline and regulates the dexterity; as ars grammatica, ars logica, ars rhetorica and the rest. But when the word is stretched so as to mean the sciences, as theoretical acquisitions of the mind, that meaning is illegitimate. Whether or not Cicero, in the passage above quoted, had in his mind the science of geometry as a collected body of observations and deductions, it is certain that the Ciceronian phrase of the liberal arts, the ingenuous arts, both in Latin and its derivatives or translations in modern speech, has been used currently to denote the sciences themselves, and not merely the disciplines instrumental . to them. The trivium and the quadrivium (grammar, logic and rhetoric — -geometry, astronomy, music and arithmetic) have been habitually called arts, when some of them have been named in that sense in which they mean

not arts but sciences, " only contemplating things in the mind." Hence the nomenclature, history and practical organization, especially in Britain, of one great division of university studies: the division of " arts," with its " faculty," its examinations, and its degrees.

In the German language the words for Art and Science have in general been loosely interchanged. The etymology of the word for Art secured a long continuance for this ambiguity. Kunst was employed indiscriminately in both the senses of the primitive Ich kann, to signify what I know, or Science, and what I can do, or Art. It was not till the end of the 1 7th century that a separate word for Science, the modern Wissenschaft, came

into use. On the other hand, the Greek word rkxvn, with its distinct suggestion of the root signification to make or get, acted probably as a safeguard against this tendency. The distinction between rexvy, Art or practice, and entrriifiri, knowledge or Science, is observed, though not systematically, in Greek philosophy. But for our present purpose, that of making clear the true relation between the one conception and the other, further quotation is rendered superfluous by the discussion the subject has received at the hands of the modern writer already quoted. Between Art, of which we practise the rules, and Science, of which we entertain the doctrines, J. S. Mill establishes the difference in the simplest shape, by pointing out that one grammatical mood is proper for the conclusions of Science, and another for those of Art. Science enunciates her conclusions in the indicative mood, whereas " the imperative is the characteristic of Art, as distinguished from Science." And as Art utters her conclusions in her own form, so she supplies the substance of her own major premise.

" Every art has one first principle, or general major premise, not borrowed from science, that which enunciates the object aimed at, and affirms it to be a desirable object. The builder's art assumes that it is desirable to have buildings; architecture (as one of the fine arts) that it is desirable to have them beautiful and imposing. The hygienic and medical arts assume, the one that the preservation of health, the other that the cure of disease, are fitting and desirable ends. These are not propositions of science. Propositions of science assert a matter of fact — an existence, a co-existence, a succession, or a resemblance. The propositions now spoken of do not assert that anything is, but enjoin or recommend that something should be. They are a class by themselves. A proposition of which the predicate is expressed by the words ought or should be is generically different from one which is expressed by is or will be."

And the logical relation of Art and Science, in other words, the manner of framing the intermediate member between the general major premise of Art and its imperative conclusion, is thus defined: —

" The Art [in any given case] proposes to itself an end to be attained, defines the end, and hands it over to the Science. The Science receives it, considers it as a phenomenon or effect to be studied, and having investigated its causes and conditions, sends it back to Art with a theorem of the causes and combinations by which it could be produced. Art then examines these combinations of circumstances, and according as any of them are or are not in human power, pronounces the end attainable or not. The only one of the premises, therefore, which Art supplies, is the original major premise, which asserts that the attainment of the given end is desirable. Science, then, lends to Art the proposition (obtained by a series of inductions or deductions) that the performance of certain actions will

attain the end. From these premises Art concludes that the performance of these actions is desirable, and finding it also practicable, converts the theorem into a rule or precept. . . . The grounds, then, of every rule of Art are to be found in the theorems of Science. An Art, or a body of Art, consists of the rules, together with as much of the speculative propositions as comprises the justifi- cation of these rules. The complete Art of any matter includes a selection of such a portion from the Science as is necessary to show on what conditions the effects, which the Art aims at producing, depend. And Art in general consists of the truths of Science arranged in the most convenient order for practice, instead of the order which is most convenient for thought. Science groups and arranges its truths so as to enable us to take in at one view as much as possible of the general order of the universe. Art, though it must assume the same general laws, follows them only into such of their detailed consequences as have led to the formation of rules of conduct, and brings together from parts of the field of Science most remote from one another, the truths relating to the production of the different and heterogeneous causes necessary to each effect which the exigencies of practical life require to be produced." — (Mill's Logic, vol. ii. pp.

542-549)-

The whole discussion may be summed up thus. Science consists in knowing, Art consists in doing. What I must do in order to know, is Art subservient to Science : what I must know in order to do, is Science subservient to Art.

Art, then, is defined by two broad distinctions: first, its popular distinction from Nature; and next, its practical and theoretic distinction from Science. Both of these distinctions are observed in the terms of our definition given above. Within the proper limits of this definition, the conception of Art, and the use of the word for it, have undergone sundry variations. These variations correspond to certain vicissitudes or develop- ments in the order of historical facts and in society. The requirements of society, stimulating the ingenuity of its individual members, have led to the invention of arts and groups of arts, constantly progressing, with the progress of civilization, in number, in complexity, and in resource. The religious imagina- tion of early societies, who find themselves in possession of such an art or group of arts, forgets the history of the invention, and assigns it to the inspiration or special grace of some god or hero. So the Greeks assigned the arts of agriculture to Triptolemus, those of spinning and navigation to Athena, and of music to Apollo. At one stage of civilization one art or group of arts is held in higher esteem, another at another. In societies, like most of those of the ancient world, where slaves were employed in domestic service, and upon the handicrafts supplying the immediate utilities of life — food, shelter and clothing-ˆ— these constituted a group of servile arts. The arts of

husbandry or agriculture, on the other hand, have alternately been regarded as servile and as honourable according as their exercise has been in the hands of a subject class, as under feudal institutions, or, as under the Roman republic, of free cultivators. Under feudal institutions, or in a society in a state of permanent war, the allied arts of war and of government have been held the only honourable class. In commercial states, like the republics of Italy, the arts of gain, or of production (other than agricultural) and distribution, have made good their title to equal estimation and greater power beside the art of captains. But among peaceful arts, industries or trades, some have always been held to be of higher and others of lower rank; the higher rank being assigned to those that required larger operations, higher training, or more thoughtful conduct, and yielded ampler returns — the lower rank to those which called for simple manual exercise, especially if such exercise was of a disagreeable or degrading kind. In the cities of Italy, where both commerce and manufactures were for the first time organized on a considerable scale, the name arte, Art, was retained to designate the gilds or corporations by which the several industries were exercised; and, according to the nature of the industry, the art was classed as higher or lower {maggiore and minor e). "i

The arts of which we have hitherto spoken have arisen from positive requirements, and supply what are strictly utilities, in societies; not excluding the art of war, at least so far as concerns one-half of war, the defensive half. But war continued to be an honourable pursuit, because it was a pursuit associated with birth, power and wealth, as well as with the virtue of courage, in cases where it had no longer the plea of utility, but was purely aggressive or predatory; and the arts of the chase have stood in this respect in an analogous position to those of war.

There are other arts which have not had their origin in positive practical needs, but have been practised from the first for pleasure or amusement. The most primitive human beings of whom we have any knowledge, the cave-dwellers of the palaeo- lithic period, had not only the useful art of chipping stones into spear-heads, knife-heads and arrow-heads, and making shafts or handles of these implements out of bone; they had also the ornamental art of scratching upon the bone handle the outlines of the animals they saw — mammoth, rhinoceros or reindeer — or of carving such a handle into a rude resemblance of one of these animals. Here we have a skill exercised, in the first case, for pure fancy or pleasure, and in the second, for adding an element of fancy or pleasure to an element of utility. Here, therefore, is the

germ of all those arts which produce imitations of natural objects for purposes of entertainment or delight, as painting, sculpture, and their subordinates; and of all those which fashion useful objects in one way rather than another because the one way gives pleasure and the other does not, as architecture and the subordi- nate decorative arts of furniture, pottery and the rest. Arts that work in a kindred way with different materials are those of dancing and music. Dancing works with the physical movements of human beings. Music works with sound. Between that imitative and plastic group, and the group of these which only produce motion or sound and pass away, there is the inter- mediate group of eloquence and the drama, which deal with the expression of human feeling in spoken words and acted gestures. There is also the comprehensive art of poetry, which works with the material of written words, and can ideally represent the whole material of human life and experience. Of all these arts the end is not use but pleasure, or pleasure before use, or at least pleasure and use conjointly. In modern language, there has grown up a usage which has put them into a class by themselves under the name of the Fine Arts, as distinguished from the Useful or Mechanical Arts. (See Aesthetics and Fine Arts.) Nay more, to them alone is often appropriated the use of the generic word Art, as if they and they only were the arts Kar't^oxV"- And further yet, custom has reduced the number which the class-word is meant to include. When Art and the works of Art are now currently spoken of in this sense, not even music or poetry is frequently denoted, but only architecture, sculpture and painting by themselves, or with their subordinate and decorative branches. In correspondence with this usage, another usage has removed from the class of arts, and put into a contrasted class cf manufactures, a large number of industries and their products, to which the generic term Art, according to our definition, properly applies. The definition covers the mechanical arts, which can be efficiently exercised by mere trained habit, rote or calculation, just as well as the fine arts, which have to be exercised by a higher order of powers. But the word Art, becoming appropriated to the fine arts, has been treated as if it necessarily carried along with it, and as if works to be called works of art must necessarily possess, the attributes of free individual skill and invention, expressing themselves in ever new combinations of pleasurable contrivance, and seeking perfection not as a means towards some ulterior practical end but as an ideal end in itself. (S. C.)

ARTA (Narda, i.e. h> "ApSa, or Zarla, i.e. eis "Apra), a town of Greece, in the province of Arta, 59 m. N.N.W. of Mesolonghi. Pop. about 7000. It is built on the site of the ancient Ambracia (g.v.), its present designation being derived from a corruption of the name of the river Arachthus (Arta) on which it stands. This enters the Gulf of Arta some distance south of the

town. The river forms the frontier between Greece and Turkey, and is crossed by a picturesque bridge, which is neutral ground. There are a few remains of old cyclopean walls. The town contains also a Byzantine castle, built on the lofty site of the ancient citadel; a palace belonging to the Greek metropolitan; a number of mosques, synagogues and churches, the most remarkable being the church of the Virgin of Consolation, founded in 819. The streets of the town were widened and improved in 1869. Manufacture of woollens, cottons, Russia leather and em- broidery is carried on, and there is trade in cattle, wine, tobacco, hemp, hides and grain. Much of the neighbouring plain is very fertile, and the town is surrounded with gardens and orchards, in which orange, lemon and citron come to great perfection. In 1083 Arta was taken by Bohemund of Tarentum; in 1449 by the Turks; in 1688 by the Venetians. In 1797 it was held by the French, but in the following year, 1798, Ah Pasha of Iannina captured it. During the Greek War of Independence it suffered severely, and was the scene of several conflicts, in which the ultimate success was with the Turks. An insurrec- tion in 1854 was at once repressed. It was ceded to Greece in 1 88 1. In the Greco-Turkish War of 1897 the Greeks gained some temporary successes at Arta during April and May.

ARTA, GULF OF (anc. Sinus Ambracius), an inlet of the Ionian Sea, 25 m. long and 10 broad, most of the northern shores of which belong to Turkey, the southern and eastern to Greece. Its only important affluent, besides the Arta, is the Luro (anc. Charadra), also from the north. The gulf abounds with mullets, soles and eels. Around its shores are numerous ruins of ancient cities: Actium at the entrance, where the famous battle was fought in 31 B.C.; Nicopolis, Argos, Limnaea and Olpae; and several flourishing towns, such as Preveza, Arta (anc. Ambracia), Karavasara or Karbasaras, and Vonitza.

The river Arta (anc. Arachthus or Aratthus, in Livy xxxviii. 3, Aretho) is the chief river of Epirus, and is said to have been navigable in ancient times as far as Ambracia. Below this town it flows through a marshy plain, consisting mainly of its own alluvium; its upper course is through the territory of the Molossians; its total length is about 80 m.

ARTABANUS, the name of a number of Persian princes, soldiers and administrators. The most important are the following : —

1. Brother of Darius I., and, according to Herodotus, the trusted adviser of his nephew Xerxes. Herodotus makes him a principal figure in epic dialogues: he warns Darius not to attack the Scythians (iv. 83; cf. also iv. 143), and predicts to Xerxes his defeat by the Greeks (vii. 10 ff., 46 ff.) ; Xerxes sent him home to govern the empire during the campaign (vii. 52, 53).

2. Vizier of Xerxes (Ctesias, Pers. 20), whom he murdered in 465 B.C. According to Aristotle, Pol. v. 13 n b, he had previ- ously killed Xerxes' son Darius, and was afraid that the father would avenge him; according to Ctesias, Pers. 29, Justin iii. 1, Diod. xi. 69, he killed Xerxes first and then pretended that Darius had murdered him, and instigated his brother Artaxerxes to avenge the parricide. At all events, during the first months of the reign of Artaxerxes I., he was the ruling power in the state (therefore the chronographers wrongly reckon him as king, with a reign of seven months), until Artaxerxes, having learned the truth about the murder of his father and his brother, overwhelmed and killed Artabanus and his sons in open fight.

3. A satrap of Bactria, who revolted against Artaxerxes I., but was defeated in two battles (Ctes. Pers. 31).

The name was borne also by four Parthian kings. The Parthian king Arsaces, who was attacked by Antiochus III., in 209, has been called Artabanus by some modern authors without any reason.

4. Artabanus I., successor of his nephew Phraates II. about 127 B.C., perished in a battle against the Tochari, a Mongolian tribe, which had invaded the east of Iran (Justin xli. 2). He is perhaps identical with the Artabanus mentioned in Trogus, Prol. xlii.

5. Artabanus II. c. a.d. 10-40, son of an Arsacid princess (Tac. Ann. vi. 48), lived in the East among the Dahan nomads. He was raised to the throne by those Parthian grandees who would not acknowledge Vonones I., whom Augustus had sent from Rome (where he lived as hostage) as successor of his father Phraates IV. The war between the two pretenders was long and doubtful; on a coin Vonones mentions a victory over Artabanus. At last Artabanus defeated his rival completely and occupied Ctesiphon; Vonones fled to Armenia, where he was acknowledged as king, under the protection of the Romans. But when Artabanus invaded Armenia, Vonones fled to Syria, and the emperor Tiberius thought it prudent to support him no longer. Germanicus, whom he sent to the East, concluded a treaty with Artabanus, in which he was recognized as king and friend of the Romans. Armenia was given (a.d. 18) to Zeno, the son of the king of Pontus (Tac. Ann. ii. 3 f., 58; Joseph. Ant. 18. 24).

Artabanus II., like all Parthian princes, was much troubled by the opposition of the grandees. He is said to have been very cruel in consequence of his education among the Dahan bar- barians (Tac. Ann. vi. 41). To strengthen his power he killed all the Arsacid princes whom he could reach (Tac. Ann. vi. 31). Rebellions of the subject nations may have occurred also. We learn that he intervened in the Greek city Seleucia in

favour of the oligarchs (Tac. Ann. vi. 48), and that two Jewish brigands

maintained themselves for years in Neerda in the swamps of Babylonia, and were acknowledged as dynasts by Artabanus (Jos. Ant. 18. 9). In a.d. 35 he tried anew to conquer Armenia, and to establish his son Arsaces as king there. A war with Rome seemed inevitable. But that party among the Parthian magnates which was hostile to Artabanus applied to Tiberius for a king of the race of Phraates. Tiberius sent Phraates's grandson, Tiri- dates III., and ordered L. Vitellius (the father of the emperor) to restore the Roman authority in the East. By very dexterous military and diplomatic operations Vitellius succeeded com- pletely. Artabanus was deserted by his followers and fled to the East. Tiridates, who was proclaimed king, could no longer maintain himself, because he appeared to be a vassal of the Romans; Artabanus returned from Hyrcania with a strong army of Scythian (Dahan) auxiliaries, and was again acknow- ledged by the Parthians. Tiridates left Seleucia and fled to Syria. But Artabanus was not strong enough for a war with Rome; he therefore concluded a treaty with Vitellius, in which he gave up all further pretensions (a.d. 37). A short time after- wards Artabanus was deposed again, and a certain Cinnamus was proclaimed king. Artabanus took refuge with his vassal, the king Izates of Adiabene; and Izates by negotiations and the promise of a complete pardon induced the Parthians to restore Artabanus once more to the throne (Jos. Ant. 20. 3). Shortly afterwards Artabanus died, and was succeeded by his son, Vardanes, whose reign was still more turbulent than that of his father.

6. Artabanus III. reigned a short time in a.d. 80 (on a coin of this year he calls himself Arsaces Artabanus) and the following years, and supported a pretender who rose in Asia Minor under the name of Nero (Zonaras xi. 18), but could not maintain himself against Pacorus II.

7. Artabanus IV., the last Parthian king, younger son of Vologaeses IV., who died a.d. 209. He rebelled against his brother Vologaeses V. (Dio Cass. vii. 12), and soon obtained the upper 'hand, although Vologaeses V. maintained himself in a part of Babylonia till about a.d. 222. The emperor Caracalla, wishing to make use of this civil war for a conquest of the East in imitation of his idol, Alexander the Great, attacked the Parthians in 216. He crossed the Tigris, destroyed the towns and spoiled the tombs of Arbela; but when Artabanus advanced at the head of an army, he retired to Carrhae. There he was murdered by Macrinus in April 217. Macrinus was defeated at Nisibis and concluded a peace with Artabanus, in which he gave up all the Roman conquests, restored the booty, and paid a heavy

contribution to the Parthians (Dio Cass, lxxviii. 26 f.) . But at the same time, the Persian dynast Ardashir (q.v.) had already begun his conquests in Persia and Carmania. When Artabanus tried to subdue him his troops were defeated. The war lasted several years; at last Artabanus himself was vanquished and killed (a.d. 226), and the rule of the Arsacids came to an end.

See further Persia : History, § ancient, and works there quoted.

(Ed. M.)

ART AND PART, a term used in Scots law to denote the aiding or abetting in ti/e perpetration of a crime, — -the being an accessory before or at the perpetration of the crime. There is no such offence recognized in Scotland as that of being an accessory after the fact.

ARTAPHERNES, more correctly Artaphrenes, brother of Darius Hystaspis, and satrap of Sardis. It was he who received the embassy from Athens sent probably by Cleisthenes (q.v.) in 507 B.C., and subsequently warned the Athenians to receive back the " tyrant " Hippias. Subsequently he took an important part in suppressing the Ionian revolt (see Ionia, Aristagoras, HiSTiAEirs),and after the war compelled the cities to make agree- ments by which all differences were to be settled by reference. He also measured out their territories in parasangs and assessed their tributes accordingly (Herod, vi. 42). In 492 he was superseded in his satrapy by Mardonius (Herodotus v. 25, 30-32, 35, &c; Diod. Sic. x. 25). His son, of the same name, was appointed (490), together with Datis, to take command of the expedition sent by Darius to punish Athens and Eretria for their share in the

Ionian revolt. After the defeat of Marathon he returned to Asia. In the expedition of Xerxes, ten years later, he was in command of the Lydians and Mysians (Herod, vi. 94, 119; vii. ˆ4, Aesch. Persae, 21).

Aeschylus in his list of Persian kings (Persae, 775 ff.), which is quite unhistorical, mentions two kings with the name Arta- phrenes, who may have been developed out of these two Persian commanders. (Ed. M.)

ARTAXERXES, a name representing Pers. Artakhshatra, " he whose empire is well-fitted " or "perfected", Heb. Artakh- shasta, Bab. Artakshalsu, Susian Irtakshashsha (and variants), Gr. 'Apraˆepˆris, 'Aprofepijjs, and in an inscription of Tralles (Dittenberger, Sylloge, 573) 'Apraˆcrtn/s; Herodotus (vi. 98) gives the translation fikyas apyios, and considers the name as a compound of Xerxes, showing thereby that he knew nothing of the Persian language; the later Persian form is Ardashir, which occurs in

the form Artaxias (Artaxes) as the name of some kings of Armenia. It was borne by three kings of the Achae- menian dynasty of ancient Persia; though, so long as its meaning was understood, it can have been adopted by the kings only after their accession to the throne.

1. Artaxerxes I., surnamed Macrocheir, Longimanus, "Long- hand," because his right hand was longer than his left (Plut. Artax.i.). He was the younger son of Xerxes, and was raised to the throne in 465 by the vizier Artabanus, the murderer of his father. After a few months he became aware of the crimes of the vizier, and slew him and his sons in a hand-to-hand fight in the palace. His reign was, on the whole, peaceful; the empire had reached a period of stagnation. Plutarch (Artax. i.) says that he was famous for his mild and magnanimous character, Nepos (de Reg. i.) that he was exceedingly beautiful and valiant. From the authentic report of his cup-bearer Nehemiah we see that he was a kind, good-natured, but rather weak monarch, and he was undoubtedly much under the baneful influence of his mother Amestris (for whose mischievous character cf. Herod, ix. 109 ff.) and his sister and wife Amytis. The peacefulness of his rule was interrupted by several insurrections. At the very beginning the satrap Artabanus raised a rebellion in Bactria, but was defeated in two battles. More dangerous was the rebellion of Egypt under Inarus (Inaros), which was put down by Megabyzus only after a long struggle against the Egyptians and the Athenians' (460-4 54). Out of it sprang the rebellion of Megabyzus, who was greatly exasperated because, though he had persuaded Inarus to surrender by promising that his life would be spared, Artaxerxes, yielding to the entreaties of his wife Amytis, who wanted to take revenge on Inarus for the death of her brother Achaemenes, the satrap of Egypt, had surrendered him to her for execution.

In spite of his weakness, Artaxerxes I. was not unsuccessful in his polity. In 448 the war with Athens was terminated by the treaty concluded by Callias (but see Callias and Cimon), by which the Athenians left Cyprus and Egypt to the Persians, while Persia gave up nothing of her rights, but promised not to make use of them against the Greek cities on the Asiatic coast, which had gained their liberty (Ed. Meyer, Forschungen zur alt. Gesch. ii. 71 ff.). In the Samian and the Peloponnesian wars, Artaxerxes remained neutral, in spite of the attempts made by both Sparta and Athens to gain his alliance.

During the reign of Artaxerxes I. the Jewish religion was definitely established and sanctioned by law in Jerusalem, on the basis of a firman granted by the king to the Babylonian priest Ezra in his seventh year, 458 B.C., and the appointment of his cup-bearer Nehemiah as governor of Judaea in his twentieth year, 445 B.C. The attempts which have been made to deny the authenticity of those parts of the books of Ezra and Nehemiah

which contain an account of these two men, taken from their own memoirs, or to place them in the reign of Artaxerxes II., are not convincing (cf. Ed. Meyer, Die Entstehung des Judenlums, 1896; see further Jews, §§ 19, 21, 22; Ezra and Nehemiah).

Artaxerxes I. died in December 425, or January 424 (Thuc. iv. 50) . To his reign must belong the famous quadrilingual alabaster vases from Egypt (on which his name is written in Persian,

Susian and Babylonian cuneiform characters and in hiero- glyphics), for Artaxerxes II. and III. did not possess Egypt. A great many tablets, dated from his reign, have been found in Nippur (published by H. von Hilprecht and Clay, The Babylonian Expedition of the University of Pennsylvania, series A, vol. ix.), and a few others at other places in Babylonia. Inscriptions of the king himself are not extant; his grandson mentions his buildings in Susa. For the suggested identification of Artaxerxes I. with the Biblical Ahasuerus, see Ahasuerus.

2. Artaxerxes II., surnamed Mnemon, the eldest son of Darius II., whom he succeeded in the spring of 404. According to Ctesias (Pers. 57; Plut. Artax. i.) he was formerly called Arsaces or Arsikas, whereas Dinon (Plut. Artax. i.) calls him Oarses. This is corroborated by a Babylonian tablet with observations of the moon (Brit. Mus. Sp. ii. 749; Zeitsch. f. Assyriologie, vii. 223), which is dated from the 26th year of " Arshu, who is Artakshatsu," i.e. 379 B.C. (cp. Ed. Meyer, Forschungen zur alien Geschichte, ii. 466 ff .) . When Artaxerxes II. mounted the throne, the power of Athens had been broken by Lysander, and the Greek towns in Asia were again subjects of the Persian empire. But his whole reign is a time of con- tinuous decay; the original force of the Persians had been exhausted in luxury and intrigues, and the king, though personally brave and good-natured, was quite dependent upon his favourites and his harem, and especially upon his mother Parysatis. In the beginning of his reign falls the rebellion of his brother Cyrus, who was secretly favoured by Parysatis and by Sparta. Although Cyrus was defeated at Cunaxa, this rebellion was disastrous inasmuch as it opened to the Greeks the way into the interior of the empire, and demonstrated that no oriental force was able to withstand a band of well-trained Greek soldiers. Sub- sequently Greek mercenaries became indispensable not only to the king but also to the satraps, who thereby gained the means for attempting successful rebellions, into which they were provoked by the weakness of the king, and by the continuous intrigues between the Persian magnates. The reign is, therefore, a

continuous succession of rebellions. Egypt soon revolted anew and could not be subdued again. When in 399 war broke out between Sparta and Persia, the Persian troops in Asia Minor were quite unable to resist the Spartan armies. The active and energetic Persian general Pharnabazus succeeded in creating a fleet by the help of Evagoras, king of Salamis in Cyprus, and the Athenian commander Conon, and destroyed the Spartan fleet at Cnidus (August 394). This victory enabled the Greek allies of Persia (Thebes, Athens, Argos, Corinth) to carry on the Corinthian war against Sparta, and the Spartans had to give up the war in Asia Minor. But it soon became evident that the only gainers by the war were the Athenians, who in 389, under Thrasybulus, tried to found their old empire anew (see Delian League). At the same time Evagoras attempted to conquer the whole of Cyprus, and was soon in open rebellion. The consequence was that, when in 388 the Spartan admiral Antal- cidas (q.v.) came to Susa, the king was induced to conclude a peace with Sparta by which Asia fell to him and European Greece to Sparta. After the peace, Evagoras was attacked. He lost his conquests, but had to be recognized as independent king of Salamis (380 B.C.). Two expeditions against Egypt (383-383 and 374-372) ended in complete failure. At the same period there were continuous rebellions in Asia Minor; Pisidia, Paphlagonia, Bithynia and Lycia, threw off the Persian yoke and Hecatomnus, the satrap of Caria, obtained an almost independent position. Similar wars were going on against the mountain tribes of Armenia and Iran, especially against the Cadusians on the Caspian Sea. In this war Artaxerxes is said to have distinguished himself personally (380 B.C.), but got into such difficulties in the wild country that he was glad when Tiribazus succeeded in concluding a peace with the Cadusian chieftains.

By the peace of Antalcidas the Persian supremacy was pro- claimed over Greece; and in the following wars all parties, Spartans, Athenians, Thebans, Argives continually applied to Persia for a decision in their favour. After the battle of

Leuctra, when the power of Thebes was founded by Epaminondas, Pelopidas went to Susa (367) and restored the old alliance between Persia and Thebes. The Persian supremacy, however, was not based upon the power of the empire, but only on the discord of the Greeks. Shortly after the edict by which the king had proclaimed his alliance with Thebes, and the conditions of the general peace .which he was going to impose upon Greece, his weakness became evident, for since 366 all the satraps of Asia Minor (Datames, Ariobarzanes, Mausolus, Orontes, Artabazus) were in rebellion again, in close alliance with Athens, Sparta and Egypt. The king could do little against them; even Autophradates, satrap of Lydia, who had remained faithful, was forced for some time to unite himself with the rebels. But every one of the allies mistrusted all the others; and the sole

object of every satrap was to improve his condition and his personal power, and to make a favourable peace with the king, for which his neighbours and former allies had to pay the costs. The rebellion was at last put down by a series of treacheries and perfidious negotiations. Some of the rebels retained their provinces; others were punished, as opportunity offered. Mithradates betrayed his own father Ariobarzanes, who was crucified, and murdered Datames, to whom he had introduced himself as a faithful ally. When the long reign of Artaxerxes II. came to its close in the autumn of 359 the authority of the empire had been restored almost everywhere.

Artaxerxes himself had done very little to obtain this result. In fact, in the last years of his reign he had sunk into a perfect dotage. All his time was spent in the pleasures of his harem, the intrigues of which were further complicated by his falling in love with and marrying his own daughter Atossa (according to the Persian religion a marriage between the nearest relations is no incest). At the same time, his sons were quarrelling about the succession; one of them, Ochus, induced the father by a series of intrigues to condemn to death three of his older brothers, who stood in his way. Shortly afterwards, Artaxerxes II. died.

In this reign an important innovation took place in the Persian religion. Berossus (in Clemens Alex. Protrept. i. 5. 65) tells us that the Persians knew of no images of the gods until Artaxerxes II. erected images of Anaitis in Babylon, Susa, Ecbatana, Persepolis, Bactra, Damascus, Sardis. This statement is proved correct by the inscriptions; all the former kings name only Auramazda (Ahuramazda) , but Artaxerxes II. in his build- ing inscriptions from Susa and Ecbatana invokes Ahuramazda, Anahita and Mithra. These two gods belonged to the old popular religion of the Iranians, but had until then been neglected by the true Zoroastrians; now they were introduced into the official worship much in the way in which the cult of the saints came into the Christian religion. About the history of Artaxerxes II. we are comparatively well informed from Greek sources; for the earlier part of his reign from Ctesias and Xenophon (Anabasis), for the later times from Dinon of Ephesus, the historian of the Persians (from whom the account of Justin is derived) , from Ephorus (whose account is quoted by Diodorus) and others. Upon these sources is based the biography of the king by Plutarch.

3. Artaxerxes III. is the title adopted by Ochus, the son of Artaxerxes II., when he succeeded his father in 359- The chronographers generally retain the name Ochus, and in the Babylonian inscriptions he is called ” Umasu, who is called Artakshatsu.” The same form of the name (probably pro- nounced Uvasu) occurs in the Syrian version of the canon of Ptolemy by Elias of Nisibis (Amos).

Artaxerxes III. was a cruel but an energetic ruler. To secure his throne he put to death almost all his relatives, but he sup- pressed the rebellions also. In 356 he ordered all the satraps to dismiss their mercenaries. Most of them obeyed; Artabazus of Phrygia, who tried to resist and was supported by his brothers- in-law, Mentor and Memnon of Rhodes, was defeated and fled to Philip of Macedon. Athens, whose general Chares had supported Artabazus, was by the threatening messages of the king forced to conclude peace, and to acknowledge the independ- ence of its rebellious allies (355 B.C.). Then the king attempted

to subjugate Egypt, but two expeditions were unsuccessful, and, in consequence, Sidon and the other Phoenician towns, and the princes of Cyprus, rebelled against Persia and defeated the Persian generals. After great preparations the king came in person, but again the attack on Egypt was repelled by the Greek generals of Nectanebus (346) . One or two years later Artaxerxes, at the head of a great army, began the siege of Sidon. The Sidonian king Tennes considered resistance hopeless, and betrayed the town to the Persian king, assisted by Mentor, who had been sent with Greek troops from Egypt to defend the town. Artaxerxes repressed the rebellion with great cruelty and destroyed the town. The traitor Tennes was put to death, but Mentor rose high in the favour of the king, and entered into a close alliance with the eunuch Bagoas, the king's favourite and vizier. They succeeded in subjecting the other rebels, and, after a hard fight at Pelusium, and many intrigues, conquered Egypt (343); Nectanebus fled to Ethiopia. Artaxerxes used his victory with great cruelty; he plundered the Egyptian temples and is said to have killed the Apis. After his return to Susa, Bagoas ruled the court and the upper satrapies, while Mentor restored the authority of the empire everywhere in the west. He deposed or killed many Greek dynasts, among them the famous Hermias of Atarneus, the protector of Aristotle, who had friendly relations with Philip (342 B.C.). When Philip attacked Perinthus and Byzantium (340), Artaxerxes sent them support, by which they were enabled to withstand the Macedonians; Philip's antagonists in Greece, Demosthenes and his party, hoped to get subsidies from the king, but were disappointed.

In 338 Artaxerxes III., with his older sons, was killed by Bagoas, who raised his youngest son Arses to the throne. Artaxerxes III. is said never to have entered the country of Persia proper, because, being a great miser, he would not pay the present of a gold piece for every Persian woman, which it was usual to give on such occasions (Plut. Alex. 69). But we have a building inscription from Persepolis, which contains his name and

genealogy, and invocations of Ahuramazda and Mithra.

For the relations of Artaxerxes I. — III. with the Jews see Jews, § § 1 9-2 1 . For bibliographical references see Persia : A ncient History.

The name Artaxerxes was adopted by Bessus when he proclaimed himself king after the assassination of Darius III. It was borne by several dynasts of Persis, when it formed an independent kingdom in the time of the Parthian empire (on their coins they call themselves Artakhshathr; one of them is mentioned by Lucian, Macrobii, 15), and by three kings of the Sassanid dynasty, who are better known under the modern form Ardashir (q.v.). (Ed. M.)

ARTEDI, PETER (1705-1735), Swedish naturalist, was born in the province of Angermania, in Sweden, on the 22nd of February 1705. Intending to become a clergyman, he went, in 1724, to study theology at Upsala, but he turned his attention to medicine and natural history, especially ichthyology, upon the study of which he exercised great influence (see Ichthyology). In 1728 his countryman Linnaeus arrived in Upsala, and a last- ing friendship was formed between the two. In 1732 both left Upsala, Artedi for England, and Linnaeus for Lapland; but before parting they reciprocally bequeathed to each other their manuscripts and books in the event of death. He was accidentally drowned on the 27th of September 1735 at Amsterdam, where he was engaged in cataloguing the collections of Albert Seba, a wealthy Dutchman, who had formed what was perhaps the richest museum of his time. According to agree- ment, his manuscripts came into the hands of Linnaeus, and his Bibliotheca Ichthyologica and Philosophia Ichthyologica, together with a life of the author, were published at Leiden in the year

1738.

ARTEGA, a tribe of African " Arabs," said to be descendants of a sheik of that name who came from Hadramut in pre- Islamic days, settling near Tokar. The name is said to be " patrician," and the Artega may be regarded as the most ancient stock in the Suakin district. They are now an inferior mixed race. They were all followers of the mahdi and khalifa in the Sudan wars (1883-1898).

See A ngIo-EgyptianSudan,edited byCountGleichen(London, 1905) .

ARTEL (Russ. for " gang "), the name for the co-operative associations in Russia. Originally, the artels were true examples

of productive co-operation, bodies of working-men associating together for the purpose of jointly undertaking some piece of work, and dividing the

profits. This original form of artel still survives among the fishermen of Archangel. Artels have come, however, to be little more than trade gilds, with mutual respon- sibility. (For details see Russia.)

ARTEMIDORUS. (1) A geographer " of Ephesus " who flour- ished about 100 B.C. After studying at Alexandria, he travelled extensively and published the results of his investigations in a large work on general geography (Td yecoy paoiiij,eva) in eleven books, much used by Strabo and others. The original work is lost, but we possess many small fragments and larger fragments of an abridgment made by Marcianus of Heracleia (5th century), which contains the periplus of the Euxine and accounts of Bithynia and Paphlagonia. (See Muller, Geographi Graeci Minor es; Bunbury, History of Ancient Geography; Stiehle, " Der Geograph Artemidoros von Ephesos," in Philo- logus, xi., 1856). (2) A soothsayer and interpreter of dreams, who flourished in the 2nd century A.D., during the reigns of Hadrian and the Antonines. He called himself Daldianus from his mother's birthplace, Daldis in Lydia, in order to make its name known to the world. His 'OvupoKpiTina., or interpretation of dreams, was said to have been written by command of Apollo Daldianus, whose initiated votary he was. It is in four books, with an appendix containing a collection of prophetic dreams which had been realized. The first three books, addressed to Cassius Maximus, a Phoenician rhetorician (perhaps identical with Maximus of Tyre) , treat of dreams and divination generally ; the fourth — with a reply to his critics — and the appendix are dedicated to his son, also named Artemidorus and an interpreter of dreams. Artemidorus boasts of the trouble expended on his work; he had read all the authorities on dreams, travelled extensively, and conversed with all who had studied the subject. The work is valuable as affording an insight into ancient super- stitions. According to Suidas, Artemidorus also wrote on augurs and cheiromancy, but all trace of these works is lost. (Editions: Reiff, 1805, Hercher, 1864; translation and notes, Krauss, 1881; English translation by Wood, 1644, and later editions.)

ARTEMIS, one of the principal goddesses in Greek my thology, the counterpart of the Roman Diana. The suggested ety- mologies of the name (see O. Gruppe, Griechische Mythologie, ii.p. 1267, note 2), as in the case of mostof the Olympian deities, are unsatisfactory, and throw no light upon her significance and characteristics. The Homeric and later conception of Artemis, though by no means the original one, may be noticed first. She is the daughter of Zeus and Leto, twin-sister and counterpart of Apollo. She is said to have been born a day before him (on the 6th of the month) and tradition assigns them different birth- places — Delos to Apollo, Ortygia to Artemis. But Ortygia (" home of quails ") applies still to Delos, and may well have been a synonym for that island. In its original sense it does not apply either to the island of Ortygia at Syracuse, or to Ortygia near

Ephesus, which also claimed the honour of having been the birthplace of the goddess. Artemis is the goddess of chastity, an aspect of her character which gradually assumed more and more importance — the protectress of young men and maidens, who defies and contemns the power of Aphrodite. Her resemblance to her brother is shown in many ways. Like him, armed with bow and arrows, she deals death to mortals, sometimes gently and suddenly, especially to women, but also as a punishment for offences against herself or morality. With him she takes part in the combat with Python and with Tityus, in the slaughter of the children of Niobe, while alone she executes vengeance on Orion. Although Apollo has nothing to do with the earlier cult of Artemis, nor Artemis with that of Delphi, their association was a comparatively early one, and probably originated in Delos. Here the connexion of Artemis with the Hyperborean legend (see Apollo) is shown in the names of the maidens (Opis, Hecaerge) who were supposed to have brought offerings from the north to Delos, where they were buried. Both Opis (or Oupis) and Hecaerge are names of Artemis, the latter being the feminine of Hecaergos, an epithet of Apollo. Like her brother, she is not

only a goddess who deals death, but she is also a healing and a purifying divinity, ov\la ("the healer," cf. Apollo Oulios), Xmj, Auaia (" purifier,") and awrupa, " she who saves from all evils" (cf. Apollo d7rorpcnra:os). Her connexion with the prophetic art is doubtful, although mention is made of an Artemis Sibylla. To her association with Apollo are certainly to be referred the names Delphinia and Pythia, and the titles referring to state and family life — irpooTarTjpta, Trarpicoris, j3ouXcaa. It probably accounts for her appearance as a goddess of seafarers, the bestower of fair weather and prosperous voyages. At Phigalia in Arcadia, Eurynome, represented as half woman and half fish, was probably another form of Artemis. To the same association may be traced her slight connexion with music, song and dance.

It is in the Arcadian and Athenian rites and legends, however, which are certainly earlier than Homer, that the original con- ception of the goddess is to be found. These tend to show that Artemis was first and foremost a nature goddess, whose cult shows numerous traces of totemism. As a goddess of fertilizing moisture, lakes, rivers, springs, and marshy lowlands are brought into close connexion with her. Thus she is \t,p.va.ia, bkoiroiva Xip.vqs (" lady of the lake "),iXela(" of marshes "),Torap.la(u of rivers," especially of the Cladaus and Alpheus, whence her name 'A\tia.La). Her influence is very active in promoting the increase of the fruits of the field,

hence she is specially a goddess of agriculture. She drives away the mice (cf. Apollo Smintheus) and slays the Aloidae, the corn spirits; she is the friend of the reapers, and requires her share of the first fruits. Her character as a harvest goddess is clearly shown in the legend of the Calydonian boar, sent by her to ravage the fields out of resentment at not having received a harvest offering from Oeneus (see Meleager). As ext/iuXtos and eiuK Ai/3dwos ("presiding over the mill and the oven ") she extends her protection over the further development of the grain for the use of man.

Artemis was naturally also a goddess of trees and vegetation. Near Orchomenus her wooden image stood in a large cedar-tree — an indication that her worship was originally that of the tree itself (ice5peaTis, " the cedar goddess"); at Caryae there was an image of Artemis KapvarLS (" the nut-tree goddess "). Two curious epithets in this connexion deserve notice: XvyoSicrfxa ("bound with withies "), derived from the legend that the image of Artemis Orthia was found in a thicket of withies, which twined round it and kept it upright (Xfryos is the agnus caslus, and points to Artemis in her relation to women); and cbra/yxopiyij ("the suspended"), probably a reference to the custom of hanging the mask or image of a vegetation-divinity on a tree to obtain fertility (Farnell, Cults of the Greek States, ii. p. 429; cf. the "swing" festival (alwpa) of the Greeks, and the oscilla of the Romans).

The functions of the goddess extended from the vegetable to the animal world, to the inhabitants of the woods and mountains. This is clearly expressed in the cult of Artemis Laphria (possibly connected with Xa

placed amongst the stars as ap/cros (" the bear "). There is ro doubt that Callisto is identical with Artemis; her name is an obvious variation of KaXXtorq, a frequent epithet of the goddess, to whom a temple was erected on the hill where Callisto was supposed to be buried. It is suggested by M. Kraus in Classical Review, February 1908, that Aphaea, the cult-name of Artemis at Aegina, is of Semitic origin and means " beautiful. " Closely connected with this legend is the worship of Artemis Brauronia. The accounts of its institution, which differ in detail, agree that it was intended to appease the wrath of the goddess at the killing of a bear. A number of young girls, between five and ten years of age, wearing a bear-skin (afterwards a saffron-coloured robe) danced a bear-dance, called apKrda, the girls themselves being called apKTOi. In one account, a maiden was ordered to be sacrificed to the bear Artemis, but a certain man who had a goat called it his daughter and offered it up in secret, just as at Munychium a fawn dressed up as a girl was sacrificed to the goddess. In place of the goat or fawn a bear might have been expected, but the choice may have been influenced by the animal totem of the tribe into whose hands the

ritual fell. The whole is a reminiscence of earlier times, when the goddess herself was a bear, to whom human sacrifice was offered. Callisto was origin- ally a bear-goddess worshipped in Arcadia, identified with Artemis, when nothing remained of the original animal-worship but name and ritual. The worship of Callisto being merged in that of the greater divinity, she became the handmaid and companion of Artemis. A stone figure of a bear found on the Acropolis seems to point to the worship of Artemis Brauronia. Her death at the hands of the latter was explained by the wrath of the goddess — in her later aspect as goddess of chastity — at Callisto's amour with Zeus (see A. Lang, Myth, Ritual and Religion, ii.; Farnell, Cults, ii. p. 437). The custom of flogging youths at the altar of Artemis Orthia l at Limnaeum in Laconia, and the legend of Iphigeneia (q.v.), herself another form of Artemis, connected with Artemis Taurica of the TaUric Cher- sonese, are usually supposed to point to early human sacrifice (but see Farnell). Various explanations have been given of the epithet bpBla.: (1) that it refers to the primitive type of the " erect " wooden idol; (2) that it means " she who safely rears children after birth," or "heals the sick " (cf. opdios applied to Asclepius); (3) that it has a phallic significance (Schreiber in Roscher's Lexikon). Scholars differ as to whether Artemis Taurica is identical with Artemis Tauropolos, worshipped chiefly at Samos with a milder ritual, but it is more probable that TavpoiroXos simply means " protectress of bulls."

The protecting influence of Artemis was extended, like that of Apollo, to the highest animal, man. She was especially con- cerned in the bringing up of the young. Boys were brought by their nurses to the temple of Artemis KopvdaXia (= Kovporptupos) and there consecrated to her; at the Apaturia, on the day called Kovpeuns, boys cut off and dedicated their hair to her. Girls as well as boys were under her protection. Her function as a goddess of marriage is less certain, and the cult-titles adduced in support of it are hardly convincing; such are r)ye fibvij, interpreted as " she who leads home the bride," creXacr^opos, " bearer of light," that is, of torches at the marriage procession. On the other hand, her connexion with childbirth is clearly shown: in many places she is even called Eilithyia, who in the earlier poets was regarded as distinct from her. In one version of the story of her birth she is said to have been born a day before Apollo, in order to assist Leto at his birth; women in childbirth invoked her aid, and after delivery offered up their clothes or a lock of hair. As already noticed, in Homer Artemis appears as a goddess of death; closely akin to this is the conception of her as a goddess of war. As such she is vucri

1 The site of the temple of Artemis Orthia was excavated by the British School of Archaeology at Athens (see Annual, 1906). The flogging (foanaoTlyoxjis) is explained by R. C. Bosanquet as a late institution of decadent Sparta, an exaggeration of an old ritual practice of whipping

away boys who tried to steal cheeses from the altar (see The Year's Work in Classical Studies, ed. W. H. D. Rouse,

1907).

ARTEMISIA

665

Ko\tbs "'sword-sheath"); and \apia (see above) may refer to the spoils of war as well as the chase.

The idea of Artemis as a virgin goddess, the " queen and huntress, chaste and fair," which obtained great prominence in early times, and seems inconsistent with her association with childbirth, is generally explained as due to her connexion with Apollo, but it is suggested by Farnell that irapdkvos originally meant " unmarried," and that " "Aprefiis irapdkvos may have been originally the goddess of a people who had not yet the advanced Hellenic institutions of settled marriage . . . and when society developed the later family system the goddess remained celibate, though not opposed to childbirth."

Another view of the original character of Artemis, which has found much support in modern times, is that she was a moon- goddess. But there is no trace of Artemis as such in the epic period, and the Homeric hymn knows nothing of her identifica- tion with Selene. The attribute of the torch will apply equally well to the goddess of the chase, and epithets such as (jxixrcfropos, cre\aa(j>6pos, aidowla, although applicable, are by no means convincing. The idea dates from the 5th century, and was due to her connexion with Hecate and Apollo. When the latter came to be identified by philosophical speculation with the sun- god Helios, it was natural that his sister and counterpart should be identified with the moon-goddess Selene. But she is nowhere recognized in cult as such (see Gruppe, Griechische Mythologie, ii. p. 1297, note 2).

It has been mentioned that Callisto, Iphigeneia, Eilithyia, are only Artemis under different names; to these may be added Adrasteia, Atalanta, Helen, Leto and others (see Wernicke in Pauly-Wissowa's Realencyclopddie) .

Again, various non-Hellenic divinities were identified with Artemis, and their cult gradually amalgamated with hers. The most important of these was Artemis of Ephesus, whose seat was in the marshy valley of the Caystrus. Like the Greek Artemis, she was essentially a nature goddess, the great foster- mother of the vegetable and animal kingdom. A number of officials were engaged in the performance of her temple service. Her eunuch priests, /xeyaffv^oi (a name which points to a Persian origin), were under

the control of a high priest called Essen (according to others, there was a body of priests called Essenes). There were also three classes of priestesses, Mellierae, Hierae, Parierae; there is no evidence that they were called Melissae (" bees "), although the bee is a frequent symbol on the coins of the city. Her chief festival, Ephesia or Artemisia, was held in the spring, at which games and various contests took place after the Greek fashion, although the ritual continued to be of a modified oriental, orgiastic type. This goddess is closely con- nected with the Amazons (?.».), who are said to have built her temple and set up her image in the trunk of a tree. The Greeks of Ephesus identified her with their own Artemis, and claimed that her birthplace Ortygia was near Ephesus, not in Delos. She has much in common with the oriental prototype of Aphro- dite, and the Cappadocian goddess Ma, another form of Cybele. The usual figure of the Ephesian Artemis, which was said in the first instance to have fallen from heaven, is in the form of a female with many breasts, the symbol of productivity or a token of her function as the all-nourishing mother. From the waist to the feet her image resembles a pillar, narrowing downwards and sculptured all round with rows of animals (lions, rams and bulls).

Mention may also be made of the following non-Hellenic representatives of Artemis. Leucophryne (or Leucophrys), whose worship was brought by emigrants from Magnesia in Thessaly to Magnesia on the Maeander, was a nature god- dess, and her representation on coins exactly resembles that of the Ephesian Artemis. Her cult, however, from the little that is known of it appears to have been more Hellenic. There was an altar and temple of Artemis Pergaea at Perga in Pamphylia, where a yearly festival was held in her honour. As in the case of Cybele, mendicant priests were attached to her service. Similar figures were Artemis Cologne, worshipped at Lake Coloe near Sardis; Artemis Cordax, celebrated in wanton dances on Mount Sipylus; the Persian Artemis, identical with Anaitis Bendis,

was a Thracian goddess of war and the chase, whose cult was introduced into Attica in the middle of the 5th century B.C. by Thracian metics. At her festival called Bendidea, held at the Peiraeus, there was a procession of Thracians who were settled in the district, and a torch-race on horseback. (For Britomartis see separate article.)

Among the chief attributes of Artemis are: the hind, specially regarded as her sacred animal; the bear, the boar and the goat; the zebu (Artemis Leucophrys); the lion, one of her oldest animal symbols; bow and arrows, as goddess of the chase and death; a mural crown, as the protectress of cities; the torch, originally an attribute of the goddess of the chase or marriage, but, like the crescent (originally an attribute of the Asiatic nature goddesses), transferred to Artemis, when she came to be regarded as a moon-goddess. The Greek Artemis was usually represented as a huntress

with bow and quiver, or torch in her hand, in face very like Apollo, her drapery flowing to her feet, or, more frequently, girt high for speed. She is accompanied often by a deer or a dog. Perhaps the finest existing statue of her is the Diana of Versailles from Hadrian's Villa (now in the Louvre), in which she wears a short tunic drawn in at the waist and sandals on her feet; her hair is bound up into a knot at the back of her head, with a band over the forehead. With her left hand she holds a stag, while drawing an arrow from the quiver on her shoulder with the right. Another famous statue is one from Gabii, in which she is finishing her toilet and fastening the chlamys over her tunic. In older times her figure is fuller and stronger, and the clothing more complete; certain statues discovered at Delos, imitated from wooden models (£6ara), are supposed to represent Artemis; they are described as stiff and rigid, the limbs as it were glued to the body without life or movement, garments closely fitting, the folds of which fall in symmetrical parallel lines. As a goddess of the moon she wears a long robe, carries a torch, and her head is surmounted by a crescent. On the coins of Arcadia, Aetolia, Crete and Sicily, are to be seen varied and beautiful representations of her head as conceived by the Greek artists in the best times.

Authorities. — Articles in Pauly-Wissowa's Realencyclopddie; Roscher's Lexikon der Mythologie, and Daremberg and Saglio's Dictionnaire des antiquites (s.v. Diana, with well-arranged biblio- graphy) ; L. Preller, Griechische Mythologie (4th ed. by C. Robert) ; L. R. Farnell, The Cults of the Greek States, ii. (1896) ; O. Gruppe, Griechische Mythologie und Religions-Geschichte, ii. (1906) ; A. Claus, De Dianae antiquissima apud Graecos natura (Breslau, 1880). In the article Greek Art, fig. n (a gold ornament from Camirus) represents the Oriental goddess identified by the Greeks with Artemis.

For the Roman goddess identified with Artemis see Diana.

(J- H. F.)

ARTEMISIA, daughter of Lygdamis, was queen of Hali- carnassus and Cos about 480 B.C. Being a dependent of Persia, she took part in person in the expedition of Xerxes against the Greeks, and fitted out five ships, with which she distinguished herself in the sea-fight near Salamis (480). When closely pursued by the Athenians she escaped by the stratagem of attacking one of the Persian vessels, whereupon the Athenians concluded that she was an ally, and gave up the pursuit (Herod, vii. 90, viii. 68). After the battle Xerxes declared that the men had fought like women, and the women like men. By her advice he did not risk another battle, but at once retired from Greece. She is said to have loved a young man named Dardanus, of Abydos, and, enraged at his neglect of her, to have put out his eyes while

he was asleep. The gods, as a punishment for this, ordered her, by an oracle, to take ihe famous but rather mythical lover's leap from the Leucadian promontory (Photius, Cod. 153a).

ARTEMISIA, the sister and wife of Mausolus (or Maussollus), king of Caria, was sole ruler from about 353 to 350 B.C. She has immortalized herself by the honours paid to the memory of her husband. She built for him, in Halicarnassus, a very magnificent tomb, called the Mausoleum, which was one of the seven wonders of the world, and from which the name mausoleum was afterwards given to all tombs remarkable for their grandeur. She appointed panegyrics to be composed in his honour, and offered valuable prizes for the best oratorical and tragic compositions. She also

erected a monument, or trophy, in Rhodes, to commemorate her conquest of that island. When the Rhodians regained their freedom they built round this trophy so as to render it inacces- sible, whence it was known as the Abaton. There are statues of Mausolus and Artemisia in the British Museum.

Vitruvius ii. 8; Diodorus Siculus xvi. 36; Cicero, Tusc. iii. 31; Val. Max. iv. 6.

ARTEMON (fl. c. a.d. 230), a prominent Christian teacher at Rome, who held Adoptianist (see Adoptianism), or humani- tarian views, of the same type as his elder contemporaries the Theodotians, though perhaps asserting more definitely than they the superiority of Christ to the prophets in respect of His super- natural birth and sinlessness. He was excommunicated by Zephyrinus, despite his remarkable claim that all that bishop's predecessors in the see of Rome had held the humanitarian position. (See also Monarchianism.)

ARTENA, a village of Italy, in the province of Rome, situated at the N.N.W. extremity of the Volscian Mountains; it is 36 m. S.E. by rail, and 24 m. direct from Rome. Pop. (1901) 5016. On the mountain above it (2073 ft.) are the fine remains of the fortifications of a city built in a very primitive style, in cyclopean blocks of local limestone; within the walls are traces of build- ings, and a massive terrace which supported some edifice of importance. The name of this city is quite uncertain; Ecetra is a possible suggestion. The modern village, which was called Monte Fortino until 1870, owes its present name to an un- warrantable identification of the site

with the ancient Volscian Artena, destroyed in 404 B.C. Another Artena, which be- longed to the district of Caere, and lay between it and Veii, was destroyed in the period of the kings, and its site is quite unknown.

See T. Ashby and G. J. Pfeiffer in Supplementary Papers of the American School in Rome, i. 87 seq.

ARTERIES (Gr. dpnypta, probably from alpuv, to raise, but popularly connected by the ancients with ai/p, air), in anatomy, the elastic tubes w T hich carry the blood away from the heart to the tissues. As, after death, they are always found empty, the older anatomists believed that they contained air, and to this belief they owe the name, which was originally given to the windpipe (trachea). Two great trunks, the aorta and pulmonary artery, leave the heart and divide again and again until they become minute vessels to which the name of arterioles is given. The larger trunks are fairly constant in position and receive definite names, but as the smaller branches are reached there is an increasing inconstancy in their position, and anato- mists are still undecided as to the normal, i.e most frequent, arrangement of many of the smaller arteries. From a common-sense point of view it is probably of greater importance to realize how variable the distribution of small arteries is than to remember the names of twigs which are of neither surgical nor morphological importance. Arteries adapt themselves more quickly than most other structures to any mechanical obstruction, and many of the differences between the arterial systems of Man and other animals are due to the assumption of the erect position. Many arteries are tortuous, especially when they supply movable parts such as the face or scalp, but when one or two sharp bends are found they are generally due to the artery going out of its way to give off a constant and important branch. Small arteries unite or anastomose with others near them very freely, so that when even a large artery is obliterated a collateral circulation is carried on by the rapid increase in size of the communications between the branches coming off above and below the point of obstruction. Some branches, however, such as those going to the basal ganglia of the brain and to the spleen, are known as "end arteries," and these do not anastomose with their neighbours at all; thus, if one is blocked, arterial blood is cut off from its area of supply. As a rule, there is little arterial anastomosis across the middle line of the body near the surface, though the scalp, lips and thyroid body are exceptions.

The distribution of the pulmonary artery is considered in con- nexion with the anatomy of the lungs (see Respiratory System). That of the aorta will now be briefly described.

The Aorta lies in the cavities of the thorax and abdomen, and

arises from the base of the left ventricle of the heart. It ascends forward, upward, and to the right as far as the level of . .

the second right costal cartilage, then runs backward, and ° ”’

to the left to reach the left side of the body of the 4th thoracic vertebra, and then descends almost vertically. It thus forms the arch of the aorta, which arches over the root of the left lung, and which has attached to its concave surface a fibrous cord, known as the obliterated ductus arteriosus, which connects it with the left branch of the pulmonary artery. The aorta continues its course downward in close relation to the bodies of the thoracic vertebrae, then passes through an opening in the diaphragm (q.v.), enters the abdomen, and descends in front of the bodies of the lumbar vertebrae as low as the 4th, where it usually divides into two terminal branches, the common iliac arteries. Above and behind the angle of bifurca- tion, however, a long slender artery, called the middle sacral, is prolonged downward in front of the sacrum to the end of the coccyx.

It will be convenient to describe the distribution of the arteries under the following headings: — (1) Branches for the head, neck and upper limbs; (2) branches for the viscera of the thorax and abdomen; (3) branches for the walls of the thorax and abdomen; (4) branches for the pelvis and lower limbs.

The branches for the head, neck and upper limbs arise as three large arteries from the transverse part of the aorta; they are named innominate,’ left common carotid and left subclavian. The innominate artery is the largest and passes upward and to the right, to the root of the neck, where it divides into the right common carotid and the right subclavian. The carotid arteries supply the two sides of the head and neck ; the subclavian arteries the two upper extremities.

The common carotid artery runs up the neck by the side of the windpipe, and on a level with the upper border of the _ … thyroid cartilage divides into the internal and external i-arof/rf carotid arteries. system.

The internal carotid artery ascends through the carotid canal in the temporal bone into the cranial cavity. It gives off an ophthalmic branch to the eyeball and other contents of the orbit, and then divides into the anterior and middle cerebral arteries. The middle cerebral artery extends outward into the Sylvian fissure of the brain, and supplies the island of Reil, the orbital part, and the outer face of the frontal lobe, the parietal lobe, and the temporo-sphenoidal lobe; it also gives a choroid branch to the choroid plexus of the velum interpositum. The anterior cerebral artery supplies the inner face of the hemisphere from the anterior end of the

frontal lobe as far back as the internal parieto-occipital fissure. At the base of the brain not only do the two internal carotids anastomose with each other through the anterior communicating artery, which passes between their anterior cerebral branches, but the internal carotid on each side anastomoses with the posterior cerebral branch of the basilar, by a posterior communicating artery. In this manner a vascular circle, the circle of Willis, is formed, which permits of freedom of the arterial circulation by the anastomoses between arteries not only on the same side, but on opposite sides of the mesial plane. The vertebral and internal carotid arteries, which are the arteries of supply for the brain, are distinguished by lying at some depth from the surface in their course to the organ, by having curves or twists in their course, and by the absence ol large collateral branches.

_ The external carotid artery ascends through the upper part of the side of the neck, and behind the lower jaw into the parotid gland, where it divides into the internal maxillary and superficial temporal branches. This artery gives off the following branches : — (a) Superior thyroid to the larynx and thyroid body; (b) Lingual to the tongue and sublingual gland ; (c) Facial to the face, palate, tonsil and sub- maxillary gland ; (d) Occipital to the sterno-mastoid muscle and back of the scalp; (e) Posterior auricular to the back of. the ear and the adjacent part of the scalp; (/) Superficial temporal to the scalp in front of the ear. and by its transverse facial branch to the back part of the face; (g) Internal maxillary, giving muscular branches to the muscles of mastication, meningeal branches to the dura mater, dental branches to the teeth, and other branches to the nose, palate and tympanum; (h) Ascending pharyngeal, which gives branches to the pharynx, palate, tonsils and dura mater.

The subclavian artery is the commencement of the great arterial trunk for the upper limb. It passes across the root of the neck and behind the clavicle, where it enters the armpit, and „ . becomes the axillary artery; by that name it extends .” . as far as the posterior fold of the axilla, where it enters c aV t ˆ” the upper arm, takes the name of brachial, and courses as ˆ s m ‘ far as the bend of the elbow; here it bifurcates into the radial and ulnar arteries. From the subclavian part of the trunk the following branches arise : — (a) Vertebral, which enters the foramen at the root of the transverse process of the 6th cervical vertebra, ascends through the corresponding foramina in the vertebrae above, lies in a groove on the arch of the atlas, and enters the skull through the foramen magnum, where it joins its fellow to form the basilar artery; it gives off muscular branches to the deep muscles of the neck, spinal branches to the spinal cord, meningeal branches to the dura mater, and an inferior cerebellar branch to the under surface of the cere- bellum. The basilar artery, formed by the junction of the two vertebrals, extends from the lower to the upper border of the pons Varolii ;

it gives off transverse branches to the pons, auditory branches

to the internal ear, inferior cerebellar branches to the under surface of the cerebellum, whilst it breaks up into four terminal branches, viz. two superior cerebellar to the upper surface of the cerebellum, and two posterior cerebral which supply the tentorial and mesial aspects of the temporo-sphenoidal lobes, the occipital lobes, and the posterior convolutions of the parietal lobes, (b) Thyroid axis, which immediately divides into the inferior thyroid, the supra-scapular, and the transverse cervical branches; the inferior thyroid supplies the thyroid body, and gives off an ascending cervical branch to the muscles of the neck ; the supra-scapular supplies the muscles on the dorsum scapulae; the transverse cervical supplies the trapezius and the muscles attached to the vertebral border of the scapula, (c) Internal mammary supplies the anterior surface of the walls of the chest and abdomen, and the upper surface of the diaphragm, (d) Superior intercostal supplies the first intercostal space, and by its deep cervical branch the deep muscles of the back of the neck.

The axillary artery supplies thoracic branches to the wall of the chest, the pectoral muscles, and the fat and glands of the axilla; an acromio-thoracic to the parts about the acromion; anterior and posterior circumflex branches to the shoulder joint and deltoid muscle ; a subscapular branch to the muscles of the posterior fold of the axilla.

The brachial artery supplies muscular branches to the muscles of the upper arm; a nutrient branch to the humerus; superior and inferior profunda branches and an anastomotic to the muscles of the upper arm and the region of the elbow joint.

The ulnar artery extends down the ulnar side of the front of the fore-arm to the palm of the hand, where it curves outward toward the thumb, and anastomoses with the superficial volar or other branch of the radial artery to form the superficial palmar arch. In the fore-arm the ulnar gives off the interosseous arteries, which supply the muscles of the fore-arm and give nutrient branches to the bones; two recurrent branches to the region of the elbow; carpal branches to the wrist joint: in the hand it gives a deep branch to the deep muscles of the hand, and from the superficial arch arise digital branches to the sides of the little, ring, and middle fingers, and the ulnar border of the index finger.

The radial artery extends down the radial side of the front of the fore-arm,

turns round the outer side of the wrist to the back of the hand, passes between the 1st and 2nd metacarpal bones to the palm, where it joins the deep branch of the ulnar, and forms the deep palmar arch. In the fore-arm it gives off a recurrent branch to the elbow joint; carpal branches to the wrist joint; and muscular branches, one of which, named superficial volar, supplies the muscle of the thumb and joins the ulnar artery: in the hand it gives off a branch to the thumb, and one to the radial side of the index, interosseous branches to the interosseous muscles, perforating branches to the back of the hand, and recurrent branches to the wrist.

The branches of the aorta which supply the viscera of the thorax are the coronary, the oesophageal, the bronchial and the pericardiac. The coronary arteries, two in number, are the first branches Visceral Q £ t ˆ e aortaj an(j ar ; se opposite the anterior and left branches. p OS f. er j or segments of the semilunar valve, from the wall of the aorta, where it dilates into the sinuses of Valsalva. They supply the tissue of the heart.

The oesophageal, bronchial and pericardiac branches are sufficiently described by their names.

The branches of the aorta which supply the viscera of the abdomen arise either singly or in pairs. The single arteries are the coeliac axis, the superior mesenteric, and the inferior mesenteric, which arise from the front of the aorta ; the pairs are the capsular, the two renal, and the two spermatic or ovarian, which arise from its sides. The single arteries supply viscera which are either completely or almost completely invested by the peritoneum, and the veins corre- sponding to them are the roots of the vena portae. The pairs of arteries supply viscera developed behind the peritoneum, and the veins corresponding to them are rootlets of the inferior vena cava.

The coeliac axis is a thick, short artery, which almost immediately divides into the gastric, hepatic and splenic branches. The gastric gives off oesophageal branches and then runs along the lesser curvature of the stomach. The hepatic artery ends in the substance of the liver; but gives off a cystic branch to the gall bladder, a pyloric branch to the stomach, a gastro-duodenal branch, which divides into a superior pancreatico-duodenal for the pancreas and duodenum, and a right gaslro-epiploic for the stomach and omentum. The splenic artery ends in the substance of the spleen; but gives off pancreatic branches to the pancreas, vasa brevia to the left end of the stomach, and a left gastro-epiploic to the stomach and omentum.

The superior mesenteric artery gives off an inferior pancreatico- duodenal branch to the pancreas and duodenum; about twelve intestinal branches to the small intestines, which form in the sub- stance of the mesentery a series

of arches before they end in the wall of the intestines; an ileocolic branch to the end of the ileum, the caecum, and beginning of the colon; a right colic branch to the ascending colon; and a middle colic branch to the transverse colon.

The inferior mesenteric artery gives off a left colic branch to the descending colon, a sigmoid branch to the iliac and pelvic colon, and ends in the superior haemorrhoidal artery, which supplies the rectum. The arteries which supply the coats of the alimentary tube from the oesophagus to the rectum anastomose freely with

IM,

each other in the wall of the tube, or in its mesenteric attachment, and the anastomoses are usually by the formation of arches or loops between adjacent branches.

The capsular arteries, small in size, run outward from the aorta to end in the supra-renal capsules.

The renal arteries pass one to each kidney, in which they for the most part end, but in the substance of the organ they give off small perforating branches, which pierce the capsule of the kidney, and are distributed in the surrounding fat. Additional renal arteries are fairly common.

The spermatic arteries are two long slender arteries, which descend, one in each spermatic cord, into the scrotum to supply the testicle. The corresponding ovarian arteries in the female do not leave the abdomen.

The branches of the aorta which supply the walls of Parietal the thorax, abdomen and pelvis, are the intercostal, the branches lumbar, the phrenic, and the middle sacral.

The intercostal arteries arise from the back of the thoracic aorta, and are usually nine pairs. They run round the sides of the vertebral bodies as far as the commencement of the inter- costal spaces, where each divides into a dorsal and a proper intercostal branch; the dorsal branch passes to the back of the thorax to supply the deep muscles of the spine ; the proper intercostal branch (AB.) runs outward in the intercostal space to supply its muscles, and the lower pairs of intercostals also give branches to the diaphragm and wall of the ab- domen. Below the last rib a subcostal artery runs.

The lumbar arteries arise from the back of the abdominal aorta, and are usually four pairs. They run round the sides of the lumbar verte- brae, and divide into a dorsal branch which supplies the deep muscles ol the back of

the loins, and an abdominal branch which runs outward to supply the wall of the abdomen. The dis- tribution of the lumbar and inter- costal arteries exhibits a trans- versely segmented arrangement of the vascular system, like the trans- versely segmented arrangement of the bones, muscles and nerves met with in these localities, but more especially in the thoracic region.

The phrenic arteries, two in number, pass to supply the under surface of the diaphragm.

The middle sacral artery, as it runs down the front of the sacrum, gives branches to the back of the pelvic wall.

Injections made by Sir W. Turner have shown that, both in the thoracic and abdominal cavities, slender anastomosing communica- tions exist between the visceral and parietal branches.

The arteries to the pelvis and hind limbs begin at the bifurcation of the aorta into the two common iliacs.

The common iliac artery, after a short course, divides into the internal and external iliac arteries. The internal iliac enters the pelvis and divides into branches for the supply of the pelvic walls and viscera, including the organs of generation, and for the great muscles of the buttock. The external iliac descends system. behind Poupart's ligament into the thigh, where it takes the name of femoral artery. The femoral descends along the front and inner surface of the thigh, gives off a profunda or deep branch, which, by its circumflex and perforating branches, supplies the numerous muscles of the thigh ; most of these extend to the back of the limb to carry blood to the muscles situated there. The femoral artery then runs to the back of the limb in the ham, where it is called popliteal artery. The popliteal divides into two branches, of which one, called anterior tibial, passes between the bones to the front of the leg, and then downward to the upper surface of the foot; the other, posterior tibial, continues down the back of the leg to the sole of the foot, and divides into the internal and external plantar arteries; branches proceed from the external plantar artery to the sides of the toes, and constitute the digital arteries. From the large arterial trunks in the leg many branches proceed, to carry blood to the different structures in the limb.

The wall of an artery consists of several coats (see fig. 2). The outermost is the tunica adventitia, composed of connective tissue; immediately internal to this is the yellow elastic coat; struct — within this again the muscular coat, formed of involuntary . " muscular tissue, the contractile fibre-cells of which are ar t e ries for the most part arranged transversely to the long axis of the artery; in the larger arteries the elastic coat is much thicker than

the muscular, but in the smaller the muscular coat is relatively strong; the vaso-motor nerves terminate in the muscular coat. In the first part of the aorta, pulmonary artery and arteries of the retina there is no muscular coat. Internal to the muscular coat is the elastic fenestrated coat, formed of a smooth elastic membrane

Fig. 1. — Diagram of a pair of intercostal arteries. Ao, The aorta transversely divided, giving off at each side an inter- costal artery. PB, The posterior or dorsal

branch. AB, The anterior or proper intercostal branch. A transverse section through the internal mammary artery.

perforated by small apertures. Most internal of all is a layer of endothelial cells, which form the free surface over which the blood flows. The arteries are not nourished by the blood which flows through them, but by minute vessels, vasa vasorum, distributed in their external, elastic and muscular coats.

Fig. 2. — Diagram of the structure of an artery. A, tunica adven- titia; E, elastic coat; M, muscular coat; F, fenestrated coat; En, endothelium continuous with the endothelial wall of C, the capillaries.

Embryology

The earliest appearance of the blood vessels is dealt with under Vascular System. Here will be briefly described the fate of the main vessel which carries the blood away from the truncus arteriosus of the developing heart (q.v.). This ventral aorta, if traced forward, soon divides into two lateral parts, the explanation being that there were originally two vessels, side by side, which fused to form the

heart, but continued sepa- JH- , .. rate anteriorly. The two

parts run for a little distance toward the head of the embryo, ventral to the alimentary canal, and then turn toward the dorsum, passing one on either side of that tube to form the first aortic arch. Having reached the dor- sum they turn backward toward the tail end and form the dorsal aortae; here, according to A. H. Young (Studies in Ana- tomy, Owens College, 1891 and 1900) they again turn toward the ventral side and become, after a tran- sitional stage, the hypo- gastric, placental, allantoic or umbilical arteries. This authority does not believe middle

R.S.”

3. — Diagram of the Embryonic

A.Ao. D.Ar. In.

Ductus Arteriosus. Innominate Arterv.

Arterial” Arches: I, 2, 3, 4, 5, 6, point that th , e , mid 1 le , ? acral to the six arches. (The black parts are art f r y of . the adult f ˆ obliterated in the adult human subject.) r ? al , continuation of the ,, . ,, ˆ . . ˆ single median dorsal aorta

V.Ao. Ventral Aorta. into which the two parallel

Arch ot Aorta. dorsal vessels just men-

tioned soon coalesce,

d 1 r 1 1 r- v u» a’ 1 :u. 1 .. 1 though until recently it R.I.C.-L.I.C. Right and Left Internal has always been so re .*

™ D Carotid Artenes. ga rded. The anterior loop

D-B- Duct of Botalli. between the ventral and

R.S.-L.S. Right and Left Subclavian dorsal aortae already de ,

r> ,7 r „ n?1 e .?’ j t fi w _ˆ l , scribed as the first aortic R.V.-L.V. Right and Left Vertebral

Arteries. Posterior Auricular Artery. Ophthalmic Artery. Dorsal Aorta. Pulmonary trunk. R.P.A.L.P.A. Right and Left Pul monary Arteries. R.C.C.-L.C.C. Right and Left Common Carotid Arteries.

P.A. Oph. D.Ao P.T.

E.C. External Carotid Artery.

Oc. Occipital Artery.

I.M. Internal Maxillary Artery.

dorsal aorta. Of these arches probably partly represented

the

arch is included in the maxillary or first visceral arch of the soft parts (see

fig. 3, 1). Later, four other well-marked aortic arches grow behind this in the more caudal vis- ceral arches, so that there are altogether five arterial arches on each side of the pharynx, through which the blood can pass from the ventral to the first soon disappears, but adult by the internal

the adult by the maxillary artery, one branch of which, the infraorbital, is enclosed in the upper jaw, while another, the inferior dental, is sur- rounded by the lower jaw. Possibly the ophthalmic artery also belongs to this arch. The second arch also disappears, but the

posterior auricular and occipital arteries probably spring from it, and at an early period it passed through the stapes as the transitory stapedial artery. The third arch forms the beginning of the internal carotid. The fourth arch becomes the arch of the adult aorta, between the origins of the left carotid and left subclavian, on the left side, and the first part of the right subclavian artery on the right. The apparent fifth arch on the left side (fig. 3, 6) remains all through foetal life as the ductus arteriosus, and, as the lungs develop, the pulmonary arteries are derived from it. J. E. V. Boas and W. Zimmermann have shown that this arch is in reality the sixth, and that there is a very transitory true fifth arch in front of it (fig. 3, 5). The part of the ventral aorta from which this last arch rises is a single median vessel due to the same fusion of the two primitive ventral aortae which precedes the formation of the heart, but a spiral septum has appeared in it which divides it in such a way that while the anterior or cephalic arches communicate with the left ven- tricle of the heart, the last one com- municates with the right (see Heart). The fate of the ventral and dorsal longi- tudinal vessels must now be followed. The fused part of the two ventral aortae, just in front of the heart, forms the ascending part of the adult aortic arch, and where this trunk divides between the fifth and fourth arches (strictly speaking, the sixth and fifth), the right one forms the innominate (fig. 3, In.) and the left One a very short part of the transverse arch of the aorta until the fourth arch comes off (see fig. 4) . From this point to the origin of the third arch is common carotid, and after that, to the head, external carotid on each side. The dorsal longitudinal arteries on the head side of the junction with the third arch form the internal carotids. Between the third and fourth arches they are obliterated, while on the caudal side of this, until the point of fusion is reached on the dorsal side of the heart, the left artery forms the upper part of the dorsal aorta while the right entirely disappears. Below this point the _ thoracic and abdominal aortae axe formed — IG- 4 1 ”

by the two primitive dorsal aortae which £iuman

- *J *■ . l * . . .. . hro nr > hoc*

—Diagram of the Aorta and its have fused to form a single median vessel. ˆ a ” c jl es- T’,! S u P er ” As the limbs are developed, vessels bud ficial Temporal Artery. out in them. The subclavian for the arm comes from the fourth aortic arch on each side, while in the leg the main artery is a branch of the caudal arch which is curving ventralward to form the umbilical artery. From the convexity of this arch the internal iliac and sciatic at first carry the blood to the limb, as they do permanently in reptiles, but later the external iliac and femoral become developed, and, as they are on the concave side of the bend of the hip, while the sciatic is on the convex, they have a mechanical advantage and become the permanent main channel.

. F01 further details see O. Hertwig, Handbuch der vergleichenden und experimentellen Entwickelungslehre der Wirbeltiere (Jena, 1905).

Comparative Anatomy

In the Acrania the lancelet (Amphioxus) shows certain arrange- ments of its arteries which are suggestive of the embryonic stages of the higher vertebrates and Man. There is a median ventral aorta below the pharynx, from which branchial arteries run up on each side between the branchial clefts, where the blood is aerated, to join two dorsal aortae which run back side by side until the hind end of the pharynx is reached; here they fuse to form a median vessel from which branches are distributed to the straight intestine. There is no heart, but the ventral aorta is contractile, and the blood is driven forward in it and backward in the dorsal aortae. The branchial arteries are very numerous, and cannot be homologized closely with the five (originally six) pairs of aortic arches in Man.

In the fish the ventral aorta gives rise to five afferent branchial arteries carrying the blood to the gills, though these may not all come off as independent trunks from the aorta. From the gills the afferent branchials carry the blood to the median dorsal aorta. As pectoral and pelvic fins are now developed, subclavian and iliac arteries are found rising from the dorsal aorta, though the aorta itself is continued directly backward as the caudal artery into the tail. In the Dipnoi or mud fish, in which the swim bladder is con- verted into a functional lung, the hindmost afferent branchial artery, corresponding to the fifth (strictly speaking the sixth) aortic arch of the human embryo, gives off on each side a pulmonary artery to that structure.

The arrangement of the branchial aortic arches in the tailed Amphibia (Urodela), and in the tadpole stage of the tailless forms (Anura), makes it probable that the generalized vertebrate has six (if not more) pairs of these instead of the five which are evident in the human embryo. Four pairs of arches are present, the first of which is the carotid and corresponds to the

third of Man; the second is the true aortic arch on each side; the third undergoes

great reduction or disappears when the gills atrophy, and is very transitory in the Mammalia (fig. 3, 5), while the fourth is the one from which the pulmonary artery' is developed when the lungs appear, and corresponds to the nominal fifth, though really the sixth arch, of the higher forms (fig. 3, 6). The dorsal part of this sixth arch remains as a pervious vessel in the Urodela, joining the pulmonary arch to the dorsal aorta. In the central part of the carotid arch the vessel breaks up into a plexus, for a short distance forming the so-called carotid gland, which has an important effect upon the adult circulation of the Amphibia. In the Reptilia the great arteries are arranged on the same plan as in the adult Amphibia, but the carotid arch retains its dorsal communication with the systematic aortic arch on each side, and this communication is known as the duct of Botalli (fig. 3, D.B.). In this class, as in the Amphibia, one great artery, the coeliaco-mesenteric, usually supplies the liver, spleen, stomach and anterior part of the intestines; this is a point of some interest when it is noticed how very close together the coeliac axis and superior mesenteric arteries rise from the abdominal aorta in Man.

In the Birds the right fourth arch alone remains as the aorta, the dorsal part of the left corresponding arch being obliterated. From the arch of the aorta rise two symmetrical innominates, each of which divides later into a carotid and subclavian. The blood path from the aorta to the hind limb in the Amphibia, Reptilia and Aves, is a dorsal one, and passes through the internal iliac and sciatic to the back of the thigh, and so to the popliteal space; the external iliac is, if it is developed at all, only a small branch to the pelvis.

In the Mammalia the fourth left arch becomes the aorta, the corresponding right one being obliterated, but several cases have been recorded in Man in which both arches have persisted, as they do in the reptiles (H. Leboucq, Ann. Sci. Med. Gand, 1894, p. 7). Examples have also been found of a right aortic arch, as in birds, while a very common human abnormality is that in which the dorsal part of the fourth right arch persists, and from it the right subclavian artery arises (see fig. 3).

The commonest arrangement of the great branches of the aortic arch in Mammals is that in which the innominate and left carotid arise by a single short trunk, while the left subclavian comes off later; this is also Man's

commonest abnormality. Sometimes, especially among the Ungulata, all the branches may rise from one common trunk; at other times two innominate arteries may be present ; this is commonest in the Cheiroptera, Insectivora and Cetacea. It is extremely rare to find all four large arteries rising independently from the aorta, though it has been seen in the Koala (F. G. Parsons, " Mammalian Aortic Arch," Journ. of Anal. vol. xxxvi. p. 389). The human arrangement of the common iliacs is not constant among mammals, for in some the external and internal iliacs rise independently from the aorta, and this is probably the more primitive arrangement. The middle sacral artery has already been referred to. A. H. Young and A. Robinson believe, on embryoˆ logical grounds, that this artery in mammals is not homologous with the caudal artery of the fish, and is not the direct continuation of the aorta ; it is an artery which usually gives off two or more collateral branches, and sometimes, as in the Ornithorynchus and some edentates, breaks up into a network of branches which reunite and so form what is known as a rete mirabile. These retia mirabilia are often found in other parts of the mammalian body, though their function is still not satisfactorily explained. The way in which the blood is carried to the foot in the pronograde mammals differs from that of Man; a large branch called the internal saphenous comes off the common femoral in the lower third of the thigh, and this runs down the inner side of the leg to the foot. This arrangement is quite convenient as long as the knee is flexed, but when it comes to be extended, as in the erect posture, the artery is greatly stretched, and it is much easier for the blood to pass to the foot through the anterior and posterior tibials. A vestige of this saphenous artery, however, remains in Man as the anastomotica magna.

The literature of the Comparative Anatomy of the Arteries up to 1902 will be found in R. Wiedersheim's Vergleichende Anatomie der Wirbeltiere (Jena, 1902). The morphology of the Iliac Arteries is described by G. Levi, Archivio Italiano di Anat. ed Embriol., vol. i. (1902). (F. G. P.)

ARTERN, a town of Germany, in Prussian Saxony, on the Unstrut, at the influx of the Helme, at the junction of railways to Erfurt, Naumburg and Sangerhausen, 8 m. S. of the last named. Pop. 5000. It has an Evangelical church, an agricul- tural college and some manufactures of machinery, sugar and boots. Its brine springs, known as early as the 15th century, are still frequented.

ARTESIAN WELLS, the name properly applied to water- springs rising above the surface of the ground by natural hydro- static pressure, on boring a small hole down through a series of strata to a water-carrying bed enclosed between two im- pervious layers ; the name is, however, sometimes loosely applied to any deep well, even when the water is obtained by pumping. In Europe this mode of well-boring was first practised

in the French province of Artois, whence the name of Artesian is derived. At Aire, in that province, there is a well from which the water has continued steadily to flow to a height of 11 feet above the ground for more than a century; and there is, within the old Carthusian convent at Lillers, another which dates from the 1 2th century, and which still flows. But unmistakable traces of much more ancient bored springs appear in Lombardy, in Asia Minor, in Persia, in China, in Egypt, in Algeria, and even in the great desert of Sahara. (See Well.)

ARTEVELDE, JACOB VAN (c. 1290-1345), Flemish statesman, was born at Ghent about 1290. He sprang from one of the wealthy commercial families of this great industrial city, his father's name being probably William van Artevelde. His brother John, a rich cloth merchant, took a leading part in public affairs during the first decades of the 14th century. Jacob, who according to tradition was a brewer by trade, spent three years in amassing quietly a large fortune. He was twice married, the second time to Catherine de Coster, whose family was of considerable influence in Ghent. Not till 1337, when the out- break of hostilities between France and England threatened to injure seriously the industrial welfare of his native town, did Jacob van Artevelde make his first appearance as a political leader. As the Flemish cities depended upon England for the supply of the wool for their staple industry of weaving, he boldly came forward, as a tribune of the people, and at a great meeting at the monastery of Biloke unfolded his scheme of an alliance of the Flemish towns, with those of Brabant, Holland and Hainaut, to maintain an armed neutrality in the dynastic struggle between Edward III. and Philip VI. of France. His efforts were successful. Bruges, Ypres and other towns formed a league with Ghent, in which town Artevelde, with the title of captain- general, henceforth until his death exercised almost dictatorial authority. His first step was to conclude a commercial treaty with England. The efforts of the count of Flanders to overthrow the power of Artevelde by force of arms completely failed, and he was compelled at Bruges to sign a treaty (June 21, 1338) sanctioning the federation of the three towns, Ghent, Bruges and Ypres, henceforth known as the " Three members of Flanders." This was the first of a series of treaties, made during the year 1330-1340, which gradually brought into the federation all the towns and provinces of the Netherlands. The policy of neutrality, however, proved impracticable, and the Flemish towns, under the leadership of Artevelde, openly took the side of the English king, with whom a close alliance was concluded. Artevelde now reached the height of his power, concluding alliances with kings, and publicly associating with them on equal terms. Under his able administration trade flourished, and Ghent rose rapidly in wealth and importance. His well-nigh despotic rule awoke at last among his compatriots jealousy and resentment. The proposal of Artevelde to disown

the sovereignty of Louis, count of Flanders, and to recognize in its place that of Edward, prince of Wales (the Black Prince), gave rise to violent dissatisfaction. A popular insurrection broke out in Ghent, and Artevelde fell into the hands of the crowd and was murdered on the 24th of July 1345.

The great services that he rendered to Ghent and to his country have in later times been recognized. A statue was erected in his native town on the Marche du Vendredi, and was unveiled by Leopold I., king of the Belgians, on the 13th of September 1863.

See J. Hutten, James and Philip van Artevelde (London, 1882); W. J. Ashley, James and Philip van Artevelde (London, 1883); P. Nameche, Les van Artevelde et leur epoque (Louvain, 1887) ; L. Vanderkindere, Le Steele des Arteveldes (Brussels, 1879).

ARTEVELDE, PHILIP VAN (c. 1340-1382), youngest son of the above, and godson of Queen Philippa of England, who held him in her arms at his baptism, lived in retirement until 1381. The Ghenters had in that year risen in revolt against the oppres- sion of the count of Flanders, and Philip, now forty years of age, and without any military or political experience, was offered the supreme command. His name awakened general enthusiasm. At first his efforts were attended by considerable success. He defeated Louis de Male, count of Flanders, before Bruges, entered that city in triumph, and was soon master of all Flanders.

But France took up the cause of the Flemish count, and a splendid French army was led across the frontier by the young king Charles VI. in person. Artevelde advanced to meet the enemy at the head of a burgher army of some 50,000 Flemings. The armies met at Roosebeke near Courtrai, with the result that the Flemings were routed with terrible loss, Philip himself being among the slain. This happened on the 27th of November 1382. The brief but stirring career of this popular leader is admirably treated in Sir Henry Taylor's drama, Philip van Artevelde.

ART GALLERIES. An art gallery (by which, as distinguished from more general Museums of Art, q.v., is here meant one specially for pictures) epitomizes so many phases of human thought and imagination that it connotes much more than a mere collection of paintings. In its technical and aesthetic aspect the gallery shows the treatment of colour, form and composition. In its historical aspect we find the true portraits of great men of the past; we can observe their habits of life, their manners, their dress, the architecture of their times, and the religious worship of the period in which they lived. Regarded collectively, the art of a country epito- mizes the whole development of the people that produced it. Most important of all is the emotional aspect of painting, which must enter less or more into every picture worthy of notice. To take examples from the British National Gallery: pathos in its most intense degree will be found in Francia's " Pieta. "; dignity in . Velasquez' portrait of Admiral Pareja; homeliness in Van Eyck's portrait of Jan Arnolfini and his wife; the interpretation of the varying moods of nature in

According to this theory, though imperfectly realized owing to the paucity of examples, the philosophic influence of art galleries is becoming more widely extended; and in its further develop- ment will be found an ever-growing source of interest, instruction and scholarship to the community. The most suitable method of describing art gallertes is to classify them by their types and contents rather than by the various countries to which they belong. Thus the great representative galleries of the world which possess works of every school are grouped together, followed by state galleries which are not remarkable for more than one school of national art. Municipal galleries are divided into those which have general collections, and those which are notable for special collections. Churches which have good paint- ings, together with those which are now secularized, are treated separately; while the collections in the Vatican and private houses are described together. The remaining galleries, such as the Salon or the Royal Academy, are periodical or commercial

*b**

fr

• • • •

• • • • ■•^•*B*

Fig.

North Vestibule, Early Italian Schools:

I. Tuscan School (15th and 16th cen- turies). II. Sienese School, &c.

III. Tuscan School.

IV. Lombard School.

V. Ferrarese and Bolognese Schools. VI. Umbrian School, &c. VII. Venetian and Brescian Schools.

1. — Plan of the National Gallery, London.

VIII. Paduan and Early Venetian Schools. IX. Later Venetian School. X. Flemish School.

XL Early Dutch and Flemish Schools. XII. Dutch and Flemish Schools.

XIII. Flemish School.

XIV. Spanish School. XV. German Schools.

XVI. French School.

XVII. French School. XVIII. British School. XIX. Old British School. XX. British School. XXI. British School. XXII. Turner Collection. Octagonal Hall: Miscellaneous. East Vestibule: British School. West Vestibule: Italian School.

the work of Turner or Hobbema ; nothing can be more devotional than the canvases of Bellini or his Umbrian contemporaries. So also the ruling sentiments of mankind — mysticism, drama and imagination — are the keynotes of other great conceptions of the artist. All this may be at the command of those who visit the art gallery; but without patience, care and study the higher meaning will be lost to the spectator. The picture which ” tells its own story ” is often the least didactic, for it has no inner or deeper lesson to reveal; it gives no stimulus or training to the eye, quick as that organ may be — segnius irritant animos — to translate sight into thought. In brief, the painter asks that his ffOos may be shared as much as possible by the man who looks at the painting — the art above all others in which it is most needful to share the master’s spirit if his work is to be fully appreciated. So, too, the art gallery, recalling the gentler associations of the past amidst surroundings of harmonious beauty and its attendant sense of comfort, is essentially a place of rest for the mind and eye. In the more famous galleries where the wealth of paintings allows a grouping of pictures according to their respective schools, one may choose the country, the epoch, the style or even the emotion best suited to one’s taste.

in character, and are important in the development of modern art.

The collections most worthy of attention are the state galleries representative of international schools. Among these the British National Gallery holds a high place. The collection ~ te< was founded in 1824 by the acquisition of the Anger- galleries of stein pictures. Its accessions are mainly governed inter- by the parliamentary grant of £5°°° to £10,000 a na "°" a/ year, a sum which has occasionally been enlarged to permit special purchases. Thus, in 1871, the Peel collection of seventy-seven pictures was bought for £75,000, and in 1885 the Ansidei Madonna (Raphael) and Van Dyck's portrait of Charles I. were bought, the one for £70,000 and the other for £17.500. In 1890 the government gave £25,000 to meet a gift of £30,000 made by three gentlemen toacquire three portraits by Moroni, Velazquez and Holbein. The most important private gifts were the Vernon gift in 1847, the Turner bequest in 1856 and the Wynne-Ellis legacy in 1876. Since 1005 the Art Collections Fund, a society of private subscribers, has also been responsible for important additions to the gallery, notably the Venus of Velazquez (1907). The gallery contains very few poor works and all schools are well

represented, with the sole exception of the French school. This, however, can be amply studied at Hertford House (Wallace Collection), which, besides Dutch, Spanish and British pictures of the highest value, contains twenty examples of Greuze, fifteen by Pater, nineteen by Boucher, eleven by Watteau and fifteen by Meissonier. The national gallery of pictures at Berlin (Kaiser Friedrich Museum) , like the British National Gallery, is remark- able for its variety of schools and painters, and for the select type of pictures shown. During the last twenty-five years of the 19th century, the development of this collection was even more strik- ing than that of the English gallery. Italian and Dutch examples are specially numerous, though every school but the British (here

It avoids the undue multiplication of canvases, and the over- crowding so noticeable in many Italian galleries where first-rate pictures hang too high to be examined. Thus the Viennese gallery, besides the intrinsic value of its pictures (Albert Diirer's chief work is there), is admirably adapted for study. The best gallery in Russia (St Petersburg, Hermitage) was made entirely by royal efforts, having been founded by Peter the Great, and much enlarged by the empress Catherine. It contains the collections of Crozat, Briihl and Walpole. There are about 1800 works, the schools of Flanders and Italy being of signal merit; and there are at least thirty-five genuine examples by Rembrandt. The French collection (Louvre Palace, Paris) is one

II.

mm V

Drawings

• s Fig. 2. — Plan of the first and second

as elsewhere) is really well seen. The purchase grant is consider- able, and is well applied. Two other German capitals have collec- tions of international importance — Dresden and Munich. The former is famous for the Sistine Madonna by Raphael, a work of such supreme excellence that there is a tendency to overlook other Italian pictures of celebrity by Titian, Giorgione and Correggio. Munich (Old Pinakothek) has examples of all the best masters, the South German school being particularly noticeable. The arrangement is good, and the methods of exhibition make this one of the most pleasant galleries on the continent. Vienna has the Imperial Gallery, a collection which in point of number cannot be considered large, as there

are not more than 1700 pictures. This, however, is in itself a safeguard, like the wise provision in a statute of 1856 for enabling the English authorities to dispose of pictures " unfit for the collection, or not required."

xliv y \/\ftmV

Studies and

floors of the Imperial Gallery, Vienna.

of the most important of all. In 1880 it was undoubtedly the first gallery in Europe, but its supremacy has since been menaced by other establishments where acquisitions are made more frequently and with greater care, and where the system of classification is such that the value of the pictures is enhanced rather than diminished by their display. In 1900 it was partly rearranged with great effect. The feature of the Louvre is the Salon Carre, a room in which the supposed finest canvases in the collection are kept together, pictures of world-wide fame, repre- senting all schools. It is now generally accepted that this system of selection not only lowers the standard of individual schools elsewhere by withdrawing their best pictures, but does not add to the aesthetic or educational value of the masterpieces them- selves. In Florence the Tribuna room of the Uffizi gallery is a similar case in point. Probably the two most widely known

pictures in the Louvre are Watteau's second " Embarquement pour Cythere," and the " Monna Lisa," a portrait by Leonardo da Vinci, but each school has many unique examples. The original drawings should be noted, being of equal importance to the col- lection preserved at the British Museum. The last collection to be mentioned under this heading is that known as the Royal Galleries in Florence, housed in the Pitti and Uffizi palaces. In some ways this collection does not represent general painting sufficiently to justify its inclusion with the galleries of Berlin, Paris and London. On the other hand, the great number of Italian pictures of vital importance to the history of international art makes this one of the finest existing collections. The two great palaces, dating from the 15th and 16th centuries, are joined together and contain the Medici pictures. They form the largest gallery in the world, and though many of the rooms are small and badly lighted, and although many paintings have suffered from thoughtless restoration, they have a charm and attraction which certainly make them the most popular galleries in Europe. The Pitti has ten Raphaels and excellent examples of Andrea del Sarto, Giorgione and Perugino. The

Uffizi is more representative of non-Italian schools, but is best known for its works by Botticelli, Leonardo da Vinci, Michelangelo and Sodoma, the schools of Tuscany and Umbria forming the bulk of both collections. Admission to the galleries is by payment, and the small income derived from this source is devoted to main- taining and enlarging the collections.

As to the ground plans of the National Gallery, London (fig. 1), and of the Imperial Gallery at Vienna (fig. 2), it will be observed that while the former has the advantage of uniform top-light, the galleries at Vienna possess the most ample facilities for minute classification, small rooms or " cabinets " opening from each large room. Special rooms are also provided for drawings and water-colours, while special ranges of rooms are used by copyists and those responsible for the repair and preservation of the pictures.

Though not so comprehensive as the great collections just described, the state galleries showing national schools of painting state an d little else are of striking interest. In England

*galleries of the National Gallery of British Art (known as the national pate Gallery) contains British pictures. The corre *" °° *' sponding collection of modern French art is at Paris (Luxembourg Palace), Berlin, Rome, Dresden, Vienna and Madrid having analogous galleries. The Victoria and Albert Museum has also numerous British pictures, especially in water-colour, and the National Portrait Gallery, founded in 1856, and since 1896 housed in its permanent home, is instructive in this connexion, though many of its pictures are the work of foreign artists. The national collections at Dublin and Edin- burgh may be mentioned here, though most schools are repre- sented. Brussels and Antwerp are remarkable for fine examples of Flemish art— Matsys, Memlinc and Van Eyck of the primitive schools, Rubens and Van Dyck of the later period. The collec- tions at Amsterdam (Ryks Museum) and the Hague(Mauritshuis) are a revelation to those who have only studied Rembrandt, Franz Hals, Van der Heist, and other Dutch portrait painters outside Holland; and in the former gallery especially, the pictures are arranged in a manner showing them to the best advantage. The Museo del Prado is even more noteworthy, for the fifty examples of Velasquez (outrivalling the Italian pictures, important as they are) make a visit to Madrid imperative to those who wish to realize the achievements of Spanish art. Christiania, Stockholm and Copenhagen have large collections of Scandinavian art, and the cities of Budapest and Basel have galleries of some importance. In Italy the state maintains twelve collections, mainly devoted to pictorial art. Of these the best are situated at Bologna, Lucca, Parma, Venice, Modena, Turin and Milan. In each case the local school of painting is fully represented. In Rome the Corsini and Borghese Galleries, the latter being the most catholic in the city, contain*

superb examples, some of them accepted masterpieces of Italian art; there are also good foreign pictures, but their number is limited. The Accademia at Florence should also be noted as the most

important state gallery of early Italian art. The central Italian Renaissance can be more adequately studied here than in the Pitti. The " Primavera " of Botticelli, and the " Last Judg- ment " by Fra Angelico are perhaps the best-known works. The large statue of David by Michelangelo is also in this gallery, which, on the whole, is one of the most remarkable in Italy. Speaking broadly, these national galleries scattered throughout the country are not well arranged or classified ; and though some are kept in fine old buildings, beautiful in themselves, the lighting is often indifferent, and it is with difficulty that the pictures can be seen. In nearly every case admission fees are charged every day, festivals and Sundays excepted; few pictures are bought, acquisi- tions being chiefly made by removing pictures from churches.

Many towns own collections of well-merited repute. In Italy such galleries are common, and among them may be noted Siena, with Sodoma and his school; Venice with Municipal Tintoretto (Doge's Palace); Genoa, with the great galleries palaces Balbi and Rosso; Vicenza (Montagna and of special school), Ferrara (Dosso and school), Bergamo and Milan (north Italian schools). Other civic collections of Italian art are maintained at Verona, Pisa, Rome, Perugia and Padua. In Holland, Haarlem, Leiden, Rotterdam and the Hague have galleries supplemental to those of the state, and are remarkable in showing the brilliance of artists like Grebber, de Bray and Ravesteyn, who are usually ignored. Birmingham and Man- chester have good examples of modern British art. Moscow (Tretiakoff collection) has modern Russian pictures, and con- temporary German and French work will be found in all the galleries of these two countries included in the municipal group. Collections of French work are found at Amiens, Rouen, Nancy, Tours, Le Mans and Angers, but large as these civic collections are, sometimes containing six and eight hundred canvases, few of their pictures are really good, many being the enormous patriotic canvases marked " Don de l'Etat," which do not confer distinction on the galleries. Cologne has the central collection of the early Rhenish school; Nuremberg is remarkable for early German work (Wohlgemut, &c). Stuttgart, Cassel (Dutch) and Hamburg (with a considerable number of British pictures) are also noteworthy, together with Brunswick, Hanover, Augsburg, Darmstadt and Dusseldorf , where German and Dutch art preponderate. Seville is famous for twenty -five examples of Murillo, and there are old Spanish paintings at Valencia, Cordova and Cadiz.

In Great Britain the best of the municipal galleries of general schools are at Liverpool (early Flemish and British), and at Glasgow (Scottish painters,

Rembrandt, Van der Municipal Goes and Venetian schools). In France there are galleries very large galleries at Tours, Montpellier, Lyons ° f generai (Perugino, Rubens), Dijon and Grenoble (Italian), Valenciennes (Watteau and school), while Rennes, Lille and Marseilles have first-rate collections. Nantes, Orleans, Besancon, Cherbourg and Caen have also many paintings, French for the most part, but with occasional foreign pictures of real importance, presented by the state during the Napoleonic con- quests, and not returned on the declaration of peace as were the works of art amassed in Paris. Some of the American collections have in recent years made a great advance in their acquisition of good pictures. At Boston (Museum of Fine Arts) all schools are represented, so too at the Metropolitan Museum of Art in New York, which is strong in Italian and Dutch works. Modern French and Flemish art is a feature of the Academy at Philadelphia, at the Lenox Library (New York), and at Chicago, where there are good examples of Millet, Con- stable and Rembrandt. The Corcoran bequest at Washington is of minor importance. The best civic collection in Germany of this class is the Stadel Institute at Frankfort (Van Eyck, Christus, early Flemish and Italian).

As the great bulk of religious painting was executed for church decoration, there are still numberless churches which may be considered picture galleries. Thus at Antwerp churches. cathedral the Rubens paintings are remarkable; at Ghent, Van Eyck; at Bruges (hospital of St John), Memlinc;

at Pisa, the Campo Santo (early Tuscan schools); at Sant' Apollinare, Ravenna, primitive Italo-Byzantine mosaics; at Siena, Pinturichio. Examples could be multiplied indefinitely — in Italy alone there are 80,000 churches and chapels, in all of which pictorial art has been employed. In Italy, besides the church " galleries " still used for religious services, there are some which have been secularized and are now used as museums, e.g. Certosa at Pa via, and San Vitale at Ravenna (mosaics); at Florence, the Scalzo (Andrea del Sarto); San Marco (Fra Angelico) ; the Riccardi and Pazzi chapels (Gozzoli and Perugino) ; at Milan, in the Santa Maria delle Grazie, the " Last Supper," by Leonardo, and at Padua, the famous Arena chapel (Giotto).

The Vatican galleries, though best known for their statuary, have fine examples of painting, chiefly of the Italian school; Private the most famous easel picture is Raphael's " Trans- andscmi- figuration," but the Stanze, apartments entirely prl n"ri decorated by painting, are even more famous. In ' England three royal palaces are open to the public — Hampton Court

(Mantegna), Windsor (Van Dyck, Zuccarelli), and Kensington (portraits). At Buckingham Palace the Dutch pictures are admirable, and Queen Victoria lent the cele- brated Raphael cartoons to the Victoria and Albert Museum. Semi-private collections belong to Dulwich College (Velasquez and Watteau), Oxford University (Italian drawings), the Soane Museum (Hogarth and English school), and the Royal Academy (Leonardo). Among private collections the most important are the Harrach, and Prince Liechtenstein (Vienna), J. Pierpont Morgan (including miniatures), Mrs J. Gardner of Boston (Italian), Prince Corsini (Florence). In Great Britain there are immense riches in private houses, though many collections have been dispersed. The most noteworthy (1909) belong to the dukes of Devonshire and Westminster, Lord Ellesmere, Captain Holford (including the masterpiece of Cuyp), Ludwig Mond, Lord Lansdowne, Miss Rothschild. The finest private col- lection is at Panshanger, formerly the seat of Lord Cowper, the gallery of Van Dyck's work being quite the best in the world.

Many galleries are devoted to periodical exhibitions in London ; the Royal Academy is the leading agency of this character, having held exhibitions since 1769. Its loan exhibi- aadcom- ˆ ons 0I Old Masters are most important. Similar merclal. enterprises are the New Gallery, opened in 1888, the Grafton Gallery, and others. There are also old- established societies of etchers, water-colourists, &c. A feature common to these exhibitions is that the public always pays for admission, though they differ from the commercial exhibitions, becoming more common every year, in which the work of a single school or painter is shown for profit. But the annual exhibitions at the Guildhall, under the auspices of the corporation, are free. The great periodical exhibition of French art is known as the Salon, and for some years it has had a rival in the Champ de Mars exhibition. These two societies are now respectively housed in the Grand Palais and Petit Palais, in the Champs Elysees, which were erected in connexion with the Paris Exhibi- tion of 1900, but with the ultimate object of being devoted to the service of the two Salons. Berlin, Rome, Vienna and other Continental towns have regular exhibitions of original work.

The best history of art galleries is found in their official and other catalogues, see article Museums. See also L. Viardot, Les Musees d' Italic, &c._ (3 vols., Paris, 1842, 1843, 1844); Annual Reports, official, of Xational Portrait Gallery, National Galleries of England, Ireland and Scotland; Civil Service Estimates, class iv. official. See also the series edited by Lafenestre and E. Richtenberger : I.e Louvre, La Belgique, Le Hollande, Florence, Belgique; A. La vice. Revue des musees de France, . . . d'Allemagne, . . . d'Angleterre, . . . d'Espagnc, . . . d'ltalie, . . . de Belgique, de Hollande et de Russie (Paris, 1862- 1872); E. Michel, Les Musees d'Allemagne (Paris, .1886) ; Kate Thompson, Public Picture Galleries of Europe (1880); C. L. Eastlake, Notes on Foreign Picture Galleries; Lord

Ronald Gower, Pocket Guide to Art Galleries (public and private) of Belgium and Holland (1875); and many works, albums, and so forth, issued mainly for the sake of the illustrations. (B.)

ARTHRITIS (from Gr. apdpov, a joint), inflammation of the joints, in various forms of what are generally called gout and rheumatism (qq~v.).

ARTHROPODA, a name, denoting the possession by certain animals of jointed limbs, now applied to one of the three sub-phyla into which one of the great phyla (or primary branches) of coelomocoelous animals — the Appendiculata — is divided; the other two being respectively the Chaetopoda and the Rotifeia. The word " Arthropoda " was first used in classification by Siebold and Stannius (Lehrbuch der vergleich. Anatomie, Berlin, 1845) as that of a primary division of animals, the others recognized in that treatise being Protozoa, Zoophyta, Vermes, Mollusca and Vertebrata. The names Condylopoda and Gnatho- poda have been subsequently proposed for the same group. The word refers to the jointing of the chitinized exo-skeleton of the limbs or lateral appendages of the animals included, which are, roughly speaking, the Crustacea, Arachnida, Hexapoda (so-called "true insects"), Centipedes and Millipedes. This primary group was set up to indicate the residuum of Cuvier's Articulata when his class Annelides (the modern Chaetopoda) was removed from that embranchement. At the same time C. T. E. von Siebold and H. Stannius renovated the group Vermes of Linnaeus, and placed in it the Chaetopods and the parasitic worms of Cuvier, besides the Rotifers and Turbellarian worms. 1

The result of the knowledge gained in the last quarter of the 19th century has been to discredit altogether the group Vermes (see Worm), thus set up and so largely accepted by German writers even at the present day. We have, in fact, returned very nearly to Cuvier's conception of a great division or branch, which he called Articulata, including the Arthropoda and the Chaetopoda (Annelides of Lamarck, a name adopted by Cuvier), and differing from it only by the inclusion of the Rotifera. The name Articulata, introduced by Cuvier, has not been retained by subsequent writers. The same, or nearly the same, assemblage of animals has been called Entomozoaria by de Blainville (1822), Arthrozoa by Burmeister (1843), Entomozoa or Annellata by H. Milne-Edwards (1855), and Annulosa by Alexander M'Leay (1819), who was followed by Huxley (1856). The character pointed to by all these terms is that of a ring-like segmentation of the body. This, however, is not the character to which we now ascribe the chief weight as evidence of the genetic affinity and monophyletic (uni-ancestral) origin of the Chaetopods, Rotifers and Arthropods. It is the existence in each ring of the body of a pair of hollow lateral appendages or parapodia, moved by intrinsic muscles and penetrated by blood- spaces,

which is the leading fact indicating the affinities of these great sub-phyla, and uniting them as blood-relations. The

1 Thegroup Arthropoda itself, thusconstituted.wasprecisely identical in its area with the Insecta of Linnaeus, the Entoma of Aristotle. But the word " Insect " had become limited since the days of Linnaeus to the Hexapod Pterygote forms, to the exclusion of his Aptera. Lamarck's penetrating genius is chiefly responsible for the shrinkage of the word Insecta, since it was he who, forty years after Linnaeus's death, set up and named the two great classes Crustacea and Arach- nida (included by Linnaeus under Insecta as the order " Aptera "), assigning to them equal rank with the remaining Insecta of Linnaeus, for which he proposed the very appropriate class-name " Hexapoda." Lamarck, however, appears not to have insisted on this name Hexa- poda, and so the class of Pterygote Hexapods came to retain the group- name Insecta, which is, historically or etymologically, no more appropriate to them than it is to the classes Crustacea and Arachnida. The tendency to retain the original name of an old and comprehensive group for one of the fragments into which such group becomes divided by the advance of knowledge — instead of keeping the name for its logical use as"a comprehensive term, including the new divisions, each duly provided with a new name — is most curiously illustrated in the history of the word physiology. Cicero says, " Physiologia naturae ratio," and such was the meaning of the name Physiologus, given to a cyclopaedia of what was known and imagined about earth, sea, sky, birds, beasts and fishes, which for a thousand years was the authori- tative source of information on these matters, and was translated into every European tongue. With the revival of learning, however, first one and then another special study became recognized — anatomy, botany, zoology, mineralogy, until at last the great comprehensive term physiology was bereft of all its once-included subject-matter, excepting the study of vital processes pursued by the more learned members of the medical profession. Professional tradition and an astute perception on their part of the omniscience suggested by the terms, have left the medical men in English-speaking lands in undisturbed but illogical possession of the words physiology, physic and physician.

parapodia (fig. 8) of the marine branchiate worms are the same things genetically as the " legs " of Crustacea and Insects (figs. 10 and u). Hence the term Appendiculata was introduced by Lankester (preface to the English edition of Gegenbaur's Com- parative Anatomy, 1878) to indicate the group. The relation- ships of the Arthropoda thus stated are shown in

the subjoined table:—

Phylum-

(Sub-phylum 1. Rotifera. -Appendiculata . •] ” 2. Chaetopoda.

(” 3. Arthropoda.

The Rotifera are characterized by the retention of what appears in Molluscs and Chaetopods as an embryonic organ, the velum or ciliated prae-oral girdle, as a locomotor and food- seizing apparatus, and by the reduction of the muscular parapodia to a rudimentary or non-existent condition in all present surviving forms except Pedalion. In many important respects they are degenerate — reduced both in size and elaboration of structure.

The Chaetopoda are characterized by the possession of horny epidermic chaetae embedded in the integument and moved by muscles. Probably the chaetae preceded the development of parapodia, and by their concentration and that of the muscular bundles connected with them at the sides of each segment, led directly to the evolution of the parapodia. The parapodia of Chaetopoda are never coated with dense chitin, and are, therefore, never converted into jaws; the primitive ” head-lobe ” or prostomium persists, and frequently carries eyes and sensory tentacles. Further, in all members of the sub-phylum Chaeto- poda the relative position of the prostomium, mouth and peri- stomium or first ring of the body, retains its primitive character. We do not find in Chaetopoda that parapodia, belonging to primitively post-oral rings or body-segments (called ” somites,” as proposed by H. Milne-Edwards), pass in front of the mouth by adaptational shifting of the oral aperture. (See, however, 8.)

The Arthropoda might be better called the ” Gnathopoda,” since their distinctive character is, that one or more pairs of appendages behind the mouth are densely chitinized and turned (fellow to fellow on opposite sides) towards one another so as to act as jaws. This is facilitated by an important general change in the position of the parapodia; their basal attachments are all more ventral in position than in the Chaetopoda, and tend to approach from the two sides towards the mid-ventral line. Very usually (but not in the Onychophora = Peripatus) all the parapodia are plated with chitin secreted by the epidermis, and divided into a series of joints — giving the ” arthropodous ” or hinged character.

There are other remarkable and distinctive features of structure which hold the Arthropoda together, and render it impossible to conceive of them as having a polyphyletic origin, that is to say, as having originated separately by two or three distinct lines of descent from lower animals; and, on the

contrary, establish the view that they have been developed from a single line of primitive Gnathopods which arose by modification of parapodiate annulate worms not very unlike some of the existing Chaetopods. These additional features are the following — (1) All existing Arthropoda have an ostiate heart and have undergone " phleboedesis," that is to say, the peripheral portions of the blood-vascular system are not fine tubes as they are in the Chaetopoda and as they were in the hypothetical ancestors of Arthropoda, but are swollen so as to obliterate to a large extent the coelom, whilst the separate veins entering the dorsal vessel or heart have coalesced, leaving valvate ostia (see fig. 1) by which the blood passes from a pericardial blood-sinus formed by the fused veins into the dorsal vessel or heart (see Lankester's Zoology, part ii., introductory chapter, 1900). The only exception to this is in the case of minute degenerate forms where the heart has disappeared altogether. The rigidity of the integument caused by the depo- sition of dense chitin upon it is intimately connected with the physiological activity and form of all the internal organs, and is undoubtedly correlated with the total disappearance of the circular muscular layer of the body-wall present in Chaetopods. (2) In all existing Arthropoda the region in front of the mouth is no longer formed by the primitive prostomium or head-lobe, but

one or more segments, originally post-oral, with their appendages have passed in front of the mouth (prosthomeres). At the same time the prostomium and its appendages cease to be recognizable as distinct elements of the head. The brain no longer consists solely of the nerve-ganglion-mass proper to the prostomial lobe, as in Chaetopoda, but is a composite (syncerebrum) produced by the fusion of this and the nerve-ganglion-masses proper to the prosthomeres or segments which pass forwards, whilst their parapodia (= appendages) become converted into eye-stalks, and antennae, or more rarely grasping organs. (3) As in Chaeto- poda, coelomic funnels (coelomoducts) may occur right and left

yˆlKˆ

After Lankester, Q. J . Mic. Sci. vol . xxxiv., 1893.

Fig. i. — Diagram to show the gradual formation of the Arthropod pericardial blood-sinus and " ostiate " heart by the swelling up (phleboedesis) of the veins entering the dorsal vessel or heart of a Chaetopod-like ancestor. The figure on the left represents the con- dition in a Chaetopod , that on the right the condition in an Arthropod, the other two are hypothetical intermediate forms.

as pairs in each ring-like segment or somite of the body, and some of these are in all cases retained as gonoducts and often as renal excretory organs

(green glands, coxal glands of Arachnida, not crural glands, which are epidermal in origin) ; but true nephridia, genetically identical with the nephridia of earthworms, do not occur (on the subject of coelom, coelomoducts and nephridia, see the introductory chapter of part ii. of Lankester's Treatise on Zoology).

Tabular Statement of the Grades, Classes and Sub-classes of the Arthropoda. — It will be convenient now to give in the clearest form a statement of the larger subdivisions of the Arthropoda which it seems necessary to recognize at the present day. The justification of the arrangement adopted will form the substance of the rest of the present article. The orders included in the various classes are not discussed here, but are treated of under the following titles: — Peripatus (Onychophora), Centipede and Millipede (Myriapoda), Hexapoda (Insecta), Arachnida and Crustacea.

Sub-Phylum ARTHROPODA (of the Phylum Appendiculata). Grade A. Hyparthropoda (hypothetical forms connecting ancestors

of Chaetopoda with those of Arthropoda). Grade B. Protarthropoda. Class Onychophora. Ex . — Peripatus. Grade C. Euarthropoda. Class 1. Diplopoda. Ex. — Julus. Class 2. Arachnida.

Grade a. Anomomeristica.

Ex. — Phacops. Grade b. Nomomeristica. (a) Pantopoda.

Ex. — Pycnogonum. (b) Euarachnida.

Ex. — Limulus, Scorpio, Mygale, Acarus. Class 3. Crustacea.

Grade a. Entomostraca.

Ex. — Apus, Branchipus, Cyclops, Balanus. Grade b. Malacostraca.

Ex. — Nebalia, Astacus, Oniscus, Gammarus. Class 4. Chilopoda.

Ex. — Scolopendra. Class 5. Hexapoda (syn. Insecta Pterygota).

Ex. — Locusta, Phryganea, Papilio, Apis, Musca, Cimex, Lucanus, Machilis. Incertae sedis — Tardigrada, Pentastomidae (degenerate forms). The Segmentation of the Body of Arthropoda. — The body of the Arthropoda is more or less clearly divided into a series of rings,

segments, or somites" which can be shown to be repetitions one of another, possessing identical parts and organs which may be larger or smaller, modified in shape or altogether suppressed in one somite as compared with another. A similar constitution of the body is more clearly seen in the Chaetopod worms. In the Vertebrata also a repetition of units of structure (myotomes, vertebrae, &c.) — which is essentially of the same nature as the repetition in Arthropods and Chaetopods, but in many respects subject to peculiar develop- ments — is observed. The name "metamerism " has been given to this structural phenomenon because the " meres," or repeated units, follow one another in line. Each such " mere " is often called a " metamere." A satisfactory consideration of the structure of the Arthropods demands a knowledge of what may be called the laws of metamerism, and reference should be made to the article under that head.

The Theory of the Arthropod Head. — The Arthropod head is a tagma or group of somites which differ in number and in their relative position in regard to the mouth, in different classes. In a simple Chaetopod (fig. 2) the head consists of the first somite only; that somite is perforated by the mouth, and is provided with a prostomium or prae-oral lobe. The prostomium is essentially a part or outgrowth of the first somite, and cannot be regarded as itself a somite. It gives rise to a nerve-ganglion mass, the prostomial ganglion. In the marine Chaetopods (the Polychaeta) (fig. 3), we find the same essential structure, but the prostomium may give rise to two or more tactile tentacles, and to the vesicular eyes. The somites have well-marked parapodia, and the second and

2 Diagram third, as we " as the first, may give rise to

„ˆ „„a „a tentacles which are directed forward, and

thus contribute to form " the head." But

the mouth remains as an inpushing of the

wall of the first somite.

The Arthropoda are all distinguished from

From Goo lrich, Q. J. Micr Set. vol. xi. p. 247.

Fig.

of the head and ad- jacent region of an Oli- gochaet Chaetopod. Pr, The prostomium. m, The mouth.

I,

The nrostomial tne Chaetopoda by the fact that the head ganglion-mass or cons ‘ sts OI one or more somites which lie in archi-cerebrum front of the mouth (now called prosthomeres) , II III coelom of as we ” as °’ one or more somites behind it the first second (opisthomeres). The first of the post oral and third somites, somites invariably has ks parapodia modi fied so as to torm a pair of hemignaths (mandibles). About 1870 the question arose for discussion whether the somites in front of the mouth are to be considered as derived from the prostomium of a Chaetopod-like ancestor. Milne-Edwards and Huxley had satisfied themselves with discussing and establishing, according to the data at their command, the number of somites in the Arthropod head, but had not considered the question of the nature of the prae-oral somites. Lankester (2) was the first to suggest that (as is actually the fact in the Nauplius larva of the Crustacea) the prae-oral somites or prosthomeres and their appendages were ancestrally post-oral, but have become prae-oral ” by adaptational shifting of the oral aperture.” This has proved to be a sound hypothesis and is now accepted as the basis upon which the Arthropod head must be inter- preted (see Korschelt and Heider (3)). Further, the morphologists of the ‘fifties appear, with few exceptions, to have ac- cepted a preliminary scheme with regard to the Arthropod head and Arthropod segmentation generally, which was mis- leading and caused them to adopt forced conclusions and interpretations. It was

p IG i) . Diagram of conceived by Huxley, among others, that

the head and adjacent the same number of cephalic somites region of a Polychaet would be found to be characteristic of all Chaetopod. Letters as the diverse classes of Arthropoda, and that in fig. 1, with the addi- the somites, not only of the head but of tion of’T, prostomial the various regions of the body, could tentacle; Pa, parapo- be closely compared in their numerical dium. (From Goodrich.) sequence in classes so distinct as the Hexapods, Crustaceans and Arachnids. The view which it now appears necessary to take is, on the con- trary, this — viz. that all the Arthropoda are to be traced to a common ancestor resembling a Chaetopod worm, but differing from it in having lost its chaetae and in having a prosthomere in front of the mouth (instead of prostomium only) and a pair of hemignaths (mandibles) on the parapodia of the buccal somite. From this ancestor Arthropods with heads of varying degrees of complexity have been developed characteristic of the different classes, whilst the parapodia and somites of the body have become variously modified and grouped in these different classes. The resemblances which the members of one class often present to the members of another class in regard to the form of the limb-branches (rami) of the parapodia. and the formation of tagmata (regions) are not

Ctnt.

hastily to be ascribed to common inheritance, but we must consider whether they are not due to homoplasy — that is, to the moulding of natural selection acting in the different classes upon fairly similar elements under like exigencies.

The'structure of the head in Arthropods presents three profoundly separated grades of structure dependent upon the number of pros- thomeres which have been assimilated by the prae-oral region. The classes presenting these distinct plans of head-structure cannot be closely associated in any scheme of classification professing to be natural. Peripatus, the type-genus of the class Onychophora, stands at the base of the series with only a single prosthomere (fig. 4). In Peri- patus the prostomium of the Chae- topod-like ancestor is atrophied, but it is possible that two processes on the front of the head (FP) represent in the embryo the dwindled prosto- mial tentacles. The single prostho- mere carries the retractile tentacles as its " parapodia." The second somite is the buccal somite (II, fig. 4) ; its parapodia have horny jaws on their ends, like the claws Fig 4. — Diagram of the head on the following legs (fig. 9), and and adjacent region of Peri- act as hemignaths (mandibles). The patus. Monoprosthomerous.

study of sections of the embryo m, establishes these facts beyond doubt. I, It also shows us that the neuro- meres, no less than the embryonic coelomic cavities, point to the exist- ence of one, and only one, prostho- II, mere in Peripatus, of which the " protocerebrum," P, is the neuro- whilst the deuterocerebrum,

Mouth.

Coelom of the first somite which carries the anten- nae and is in front of the mouth.

Coelom of the second somite which carries the mandibles (hence deu- terognathous).

D, is the neuromere of the second III and IV, Coelom of the third

and fourth somites. Rudimentary frontal pro- cesses perhaps repre- senting the prostomial tentacles of Polychaeta.

or buccal somite. A brief indication of these facts is given by saying FP, that the Onychophora are " deuter- ognathous " — that is to say, that the buccal somite carrying the man- dibular hemignaths is the second of Ant, Antenna or tactile ten- the whole series. tacle.

What has become of the nerve- Md, Mandible, ganglion of the prostomial lobe of Op, Oral- papilla, the Chaetopod in Peripatus is not P, Protocerebrum or fore- clearly ascertained, nor is its fate most cerebral mass be-

indicated by the study of the em- longing to the first

bryonic head of other Arthropods so somite,

far. Probably it is fused with the D, Deuterocerebrum, consist-

ing of ganglion cells be- longing to the second or mandibular somite. (After Goodrich.)

protocerebrum, and may also be concerned in the history of the very peculiar paired eyes of Peripatus, which are like those of Chaetopods in structure — viz. vesicles with an intra- vesicular lens, whereas the eyes of all other Arthropodshaveessentially an- other structure, being ” cups ” of the epidermis, in which a knob-like or rod-like thickening of the cuticle is fitted as refractive medium.

In Diplopoda (Julus, &c.) the results of embryological study point to a composition of the front part of the head exactly similar to that which we find in Onychophora. They are deuterognathous.

The Arachnida present the first stage of progress. Here embryology .

*shows that there are two prostho- head and adjacent region of an meres (fig. 5), and that the gnatho- Arachnid. Diprosthomerous bases of the chelae which act as the ln the adult condition, though first pair of hemignaths are carried embryologically the append- by the third somite. The Arachnida a S es ° f somite II and the are therefore tritognathous. The somite itselt are, as here two prosthomeres are indicated by drawn, not actually in front ol their coelomic cavities in the embryo th e mouth. (I and II, fig. 5), and by two neuro- &, meres, the protocerebrum and the *”” ■. deuterocerebrum. The appendages *J> of the first prosthomere are not*

Fig. 5. — Diagram of the

Lateral eye.

Chelicera.

Mouth.

Protocerebrum.

Deuterocerebrum.

present as tentacles, as in Peripatus ~ >

*and Diplopods, but are possibly l > n nI > IV – *-oelom of the*

represented by the eyes or possibly altogether aborted. The appendages of the second prosthomere are the well-known chelicerae of the Arach- nids, rarely, if ever, antenniform, but modified as clasp-knife fangs in spiders-

first, second, third fourth somites. (Atter Goodrich.)

md

retroverts ” or

The Crustacea (fig. 6) and the Hexapoda (fig. 7) agree in having three somites in front of the mouth, and it is probable, though not ascertained, that the Chilopoda (Scolopendra, &c.) are in the same case. The three prosthomeres or prae-oral somites of Crustacea due to the sinking back of the mouth one somite farther than in Arachnida are not clearly indicated by coelomic cavities in the embryo, but their existence is clearly established by the development and position of the appendages and by the neuromeres.

The eyes in some Crustacea are mounted on articulated stalks, and from the fact that they can after injury be replaced by antenna- like appendages it is inferred that they represent the parapodia of the most anterior prosthomere. The second prosthomere carries the first pair of antennae and the third the second pair of antennae. Sometimes the pair of appendages has not a merely tactile jointed ramus, but is converted into a claw or clasper. Three neuromeres — a proto-, deutero-, and trito-cerebrum — corresponding to those three prosthomeres are sharply marked in the embryo. The fourth somite is that in which the mouth now opens, and which accordingly has its appendages converted into hemignathous mandibles. The Crustacea are tetartognathous.

The history of the development of the head has been carefully worked out in the Hexapod insects. As in Crustacea and Arachnida,

am’

&

ˆ.

re v *

«k

Jl

the two following somites associated with it by the adaptation of their appendages as jaws, and the ankylosis of their terga with that of the prosthomeres. But in higher Crustacea the cephalic ” tagma ” is extended, and more somites are added to the fusion, and their appendages adapted as jaws of a kind.

The Hexapoda are not known to us in their earlier or more primi- tive manifestations; we only know them as possessed of a definite number of somites arranged in definite numbers in three great tagmata. The head shows two jaw-bearing somites besides the mandibular somite (V, VI, in fig. 7) — thus six in all (as in some Crustacea), including prosthomeres, all ankylosed by their terga to form a cephalic shield. There is, however, good embryological evidence in some Hexapods of the existence of a seventh somite, the supra-lingual, occurring between the somite of the mandibles and the somite of the first maxillae (4). This segment is indicated embryologically by its paired coelomic cavities. It is practically an excalated somite, having no existence in the adult. It is probably not a mere coincidence that the Hexapod, with its two rudimentary somites devoid of appendages, is thus found to possess twenty-one somites, including that which carries the anus, and that this is also the number present in the Malacostracous Crustacea.

The Segmental Lateral Appendages or Limbs of Arthropoda. — It has taken some time to obtain any general acceptance of the view that the parapodia of the Chaetopoda and the limbs of Arthropoda are genetically identi-

rtK# *

as, for instance, in the lobster’s claw. Such chelate rami or limb-branchesare independently developed in Crustacea and inArachnida, and are carried by somites of the body which do not correspond in

position in the two groups. The range of modification of which the rami or limb-branches of the limbs of Arthropoda are capable is very large, and in

allied orders or even families or genera we often find what is certainly the palp of the same appendage (as determined by numerical position of the segments) — in one case antenniform, in another chelate, in another pediform, and in another reduced to a mere stump or absent altogether. Very probably the power which the appendage of a given segment has of assuming the perfected form and proportions previously attained by the append- age of another segment must be classed as an instance of " homoeosis," not only where such a change is obviously due to abnormal development or injury, but also where it constitutes a difference permanently established between allied orders or smaller groups, or between the two sexes.

The most extreme disguise as- sumed by the Arthropod parapodium or appendage is that of becoming a mere stalk supporting an eye — a fact which did not obtain general credence until the experiments of Herbst in 1895, who found, on cut- ting off the eye-stalk of Palaemon, that a jointed antenna-like append- age was regenerated in its place. Since the eye-stalks of Podophthal- mate Crustacea represent append- ages, we are forced to the conclusion that the sessile eyes of other Crustacea, and of other Arthropoda generally, indicate the position of appendages which have atrophied. 1 From what has been said, it is apparent that we cannot, in attempt- ing to discover the affinities and divergences of the various forms of Arthropoda, attach a very high phylogenetic value to the coincidence or divergence in form of the ap- pendages belonging to the somites compared with one another. The principal forms assumed by the Arthropod parapodium and its rami may be thus enumerated : —

(1) Axial corm well developed, unsegmented or with two to four

segments ; lateral endites and exites (rami) numerous and of various lengths (certain limbs of lower Crustacea).

(2) Corm, with short unseg- mented rami, forming a flat- tened foliaceous appendage, adap- ted to swim- ming and respira- tion (trunk-limbs of Phyllopods).

(3) Corm alone developed ; with no endites or exites, but pro- vided with ter- minal chitinous claws (ordinary leg of Peripatus), with terminal jaw teeth (jaw of Peripatus), or with blunt extremity (oral papilla of same) (see fig. 9).

1 H. Milne-Edwards, who was followed by Huxley, long ago formu- lated the conclusion that the eye-stalks of Crustacea are modified appendages, basing his argument on a specimen of Palinurus (figured in Bateson's book (1), in which the eye-stalk of one side is replaced by an antenniform palp.

Hofer (6) in 1894 described a similar case in Astacus.

Fig. 9. — Three somite-ap- pendages or parapodia of Peripatus.

A, A walking leg; p 1 to p 4 , the characteristic " pads "; /, the foot; cl 1 , cP, the two claws.

B, An oral papilla, one of the second pair of post-oral appendages.

C, One of the first post-oral pair of appendages or man- dibles; cl 1 , cl', the greatly enlarged claws. (Compare A.)

The appendages are repre- sented with the neural or ventral surface uppermost. Original.

After Lankester, Q.J. Mic. Sci. vol. xxi., 1881.

Fig. 10. — The second thoracic (fifth post-oral) appendage of the left side of Apus cancriformis, placed with its ventral or neural surface upper- most to compare with figs. 8 and 9.

1, 2, The two segments of the axis.

en 1 , The gnathobase.

en- to en e , The five following " endites."

fl, The flabellum or anterior exite.

br, The bract or posterior exite.

(4) Three of the rami of the primitive limb (endites 5 and 6, and exite 1) specially developed as endopodite, exopodite, and epipodite — the first two often as firm and strongly chitinized, segmented, leg-like structures ; the original axis or corm reduced to a basal piece, with or without a distinct gnathobase (endite 1) — typical tri-ramose limb of higher Crustacea.

(5) One ramus (the endopodite) alone developed — the original axis or corm serving as its basal joint with or without gnathobase. This is the usual uni-ramose limb found in the various classes of Arthropoda. It varies as to the presence or absence of the jaw- process and as to the stoutness of the segments of the ramus, theii number (frequently six, plus the basal corm), and the modification of the free end. This may be filiform or brush-like or lamellate when it is an antenna or palp; a simple spike (walking leg of Crustacea, of other aquatic forms, and of Chilopods and Diplopods) ; the, terminal joint flattened (swimming leg of Crustacea and Giganto- straca) ; the terminal joint provided with two or with three recurved claws (walking

leg of many terrestrial forms — e.g. Hexapoda and Arachnida); the penultimate joint with a process equal in length to the last joint, so as to form a nipping organ (chelae of Crustaceans and Arachnids) ; the last joint reflected and movable on the pen- ultimate, as the blade of a clasp-knife on its handle (the retrovert,

After Lankester, Q. J. Mic. Sci. vol. xxi., 1881.

Fig. 11.— The first thoracic (fourth post-oral) appendage of Apus cancriformis (right side). Ax 1 to Ax A , the four segments of

the axis with muscular

bands. En 1 , Gnathobase. En 1 to En h , The elongated jointed

endites (rami). .Ere 6 , The rudimentary sixth en- dite (exopodite of higher

Crustacea). The flabellum which becomes

the epipodite of higher

forms. The bract devoid of muscles

and respiratory in function.

toothed so as to act as a biting jaw in the Hexapod Mantis, the Crustacean Squilla and others) ; with the last joint produced into a needle-like stabbing process in spiders.

(6) Two rami developed (usually, but perhaps not always, the equivalents of the endopodite and exopodite) supported on the somewhat elongated corm (basal segment). This is the typical " bi-ramose limb " often found in Crustacea. The rami may be flattened for swimming, when it is " a bi-ramose swimmeret," or both or only one may be filiform and finely annulate; this is the form often presented by the antennae of Crustacea, and rarely by prae-oral appendages in other Arthropods.

(7) The endopoditic ramus is greatly enlarged and flattened, without or with only one jointing, the corm (basal segment) is evanescent; often the plate-like endopodites of a pair of such appendages unite in the middle line with one another or by the intermediary of a sternal up-growth and form a single broad plate. These are the plate-like swimmerets and opercula of Gigantostraca and Limulus among Arachnids and of Isopod Crustaceans. They may have rudimentary exopodites, and may or may not have branchial filaments or lamellae developed on their posterior faces. The simplest form to which they may be reduced is seen in the genital

operculum of the scorpion.

(8) The gnathobase becomes greatly enlarged and not sepa- rated by a joint from the corm ; it acts as a hemignath or half jaw_ working against its fellow of the opposite side. The endo- podite may be retained as a small segmented palp at the side of the gnathobase or disappear (mandible of Crustacea, Chilopoda and Hexapoda).

_ (9) The corm becomes the seat of a development of a special visual_ organ, the Arthropod eye (as opposed to the Chaetopod eye). Its jointing (segmentation) may be retained, but its rami disappear (Podophthalmous Crustacea). Usually it becomes atrophied, leaving the eye as a sessile organ upon the prae-oral region of the body

(the eye-stalk and sessile lateral eyes of Arthropoda generally, exclusive of Peripatus).

(10) The forms assumed by special modification of the elements of the parapodium in the maxillae, labium, &c, of Hexapods, Chilopods, Diplopods, and of various Crustacea, deserve special enumeration, but cannot be dealt with without ample space and illustration.

It may be pointed out that the most radical difference presented in this list is that between appendages consisting of the corm alone without rami (Onychophora) and those with more or less developed rami (the rest of the Arthropoda). In the latter class we' should distinguish three phases: (a) those with numerous and compara- tively undeveloped rami; (6) those with three, or two highly developed rami, or with only one — the corm being reduced to the dimensions of a mere basal segment ; (c) those reduced to a secondary simplicity (degeneration) by overwhelming development of one segment (e.g. the isolated gnathobase often seen as " mandible " and the genital operculum).

There is no reason to suppose that any of the forms of limb observed in Arthropoda may not have been independently developed in two or more separate diverging lines of descent.

Branchiae. — In connexion with the discussion of the limbs of Arthropods, a few words should be devoted to the gill-processes. It seems probable that there are branchial plumes or filaments in some Arthropoda (some Crustacea) which can be identified with the distinct branchial organs of Chaetopoda, which lie dorsal of the parapodia and are not part of the

parapodium. On the other hand, we cannot refuse to admit that any of the processes of an Arthro- pod parapodium may become modified as branchial organs, and that, as a rule, branchial out-growths are easily developed, de novo, in all the higher groups of animals. Therefore, it seems to be, with our present knowledge, a hopeless task to analyse the branchial organs of Arthropoda and to identify them genetically in groups.

A brief notice must suffice of the structure and history of the Eyes, the Tracheae and the so-called Malpighian tubes of Arthropoda, though special importance attaches to each in regard to the deter- mination of the affinities of the various animals included in this great sub-phylum.

The Eyes. — The Arthropod eye appears to be an organ of special character developed in the common ancestor of the Euarthropoda, and distinct from the Chaetopod eye, which is found only in the Onychophora where the true Arthropod eye is absent. The essential difference between these two kinds of eye appears to be that the Chaetopod eye (in its higher developments) is a vesicle enclosing the lens, whereas the Arthropod eye is a pit or series of pits into which the heavy chitinous cuticle dips and enlarges knobwise as a lens. Two distinct forms of the Arthropod eye are observed — the mono- meniscous (simple) and the polymeniscous (compound). The nerve- end-cells, which lie below the lens, are part of the general epidermis. They show in the monomeniscous eye (see article Arachnida, fig. 26) a tendency to group themselves into " retinulae," consisting of five to twelve cells united by vertical deposits of chitin (rhabdoms). In the case of the polymeniscous eye (fig. 23, article Arachnida) a single retinula or group of nerve-end-cells is grouped beneath each associated lens. A further complication occurs in each of these two classes of eye. The monomeniscous eye is rarely provided with a single layer of cells beneath its lens; when it is so, it is called mono- stichous (simple lateral eye of Scorpion, fig. 22, article Arachnida). More usually, by an infolding of the layer of cells in development, we get three layers under the lens; the front layer is the corneagen layer, and is separated by a membrane from the other two which, more or less, fuse and contain the nerve-end-cells (retinal layer). These eyes are called diplostichous, and occur in Arachnida and Hexapoda (fig. 24, article Arachnida).

On the other hand, the polymeniscous eye undergoes special elaboration on its lines. The retinulae become elongated as deep and very narrow pits (fig. 12 and explanation), and develop addi- tional cells near the moiith of the narrow pit. Those nearest to the lens are the corneagen cells of this more elaborated eye, and those between the original retinula cells and the corneagen cells become firm and transparent. They are the crystalline cells or vitrella (see Watase, 7). Each such complex of cells underlying the lenticle of a compound eye is called an " ommatidium " ; the entire mass of

cells underlying a monomeniscous eye is an " ommataeum." The ommataeum, as already stated, tends to segregate into retinulae which correspond potentially each to an ommatidium of the com- pound eye. The ommatidium is from the first segregate and consists of few cells. The compound eye of the king-crab (Limulus) is the only recognized instance of ommatidia in their simplest state. Each can be readily compared with the single-layered lateral eye of the scorpion. In Crustacea and Hexapoda of all grades we find compound eyes with the more complicated ommatidia described above. We do not find them in any Arachnida.

It is difficult in the absence of more detailed knowledge as to the eyes of Chilopoda and Diplopoda to give full value to these facts in tracing the affinities of the various classes of Arthropods. But they seem to point to a community of origin of Hexapods and Crustacea in regard to the complicated ommatidia of the compound eye, and to a certain isolation of the Arachnida, which are, however, traceable, so far as the eyes are concerned, to a distant common

origin with Crustacea and Hexapoda through the very simple compound eyes (monostichous, polymeniscous) of Limulus.

The Tracheae. — In regard to tracheae the very natural tendency of zoologists has been until lately to consider them as having once developed and once only, and therefore to hold that a group " Tracheata " should be recognized, including all tracheate Arthro- pods. We are driven by the conclusions arrived at as to the deriva- tion of the Arachnida from branchiate ancestors, independently of the other tracheate Arthropods, to formulate the conclusion that tracheae have been independently developed in the Arachnidan class. We are also, by the isolation of Peripatus and the impossi- bility of tracing to it all other tracheate Arthropoda, or of regarding it as a degenerate offset from some one of the tracheate classes, forced to the conclusion that the tracheae of the Onychophora have been independently acquired. Having accepted these two con- clusions, we formulate the generalization that tracheae can be inde- pendently acquired by various branches of Arthropod descent in adaptation to a terrestrial as opposed to an aquatic mode of life. A great point of interest therefore exists in the knowledge of the structure and embryology of tracheae in the different groups. It must be confessed that we have not such full knowledge on this head as could be wished for. Tracheae are essentially tubes like blood- vessels — apparently formed from the same tissue elements as blood- vessels — which contain air in place of blood, and usually communi- cate by definite orifices, the tracheal stigmata, with the atmosphere. They are lined internally by a cuticular deposit of chitin. In Peri-

Fig. 12. — Diagram to show the deri- vation of the unit or " ommatidium " of the compound eye of Crustacea and Hexapoda, C, from a simple mono- meniscous monostichous eye resem- bling the lateral eye of a scorpion, A, or the unit of the compound lateral eye of Limulus (see article Arachnida, figs. 22 and 23). B represents an inter- mediate hypothetical form in which the cells beneath the lens are begin- ning to be superimposed as corneagen, vitrella and retinula, instead of stand- ing side by side in horizontal series. The black represents the cuticular product of the epidermal cells of the ocular area, taking the form either of lens, cl, of crystalline body, cry, or of rhabdom, rhab; hy, hypodermis or epidermal cells; corn 1 , laterally-placed cells in the simpler stage, A, which like the nerve-end cells, vit 1 and ret 1 , are corneagens or lens- producing; corn, specialized corneagen or lens- producing cells; vit 1 , potential vitrella cells with cry 1 , potential crystalline body now indistinguishable from retinula cells and rhabdomeres; vit, vitrella cell with cry, its contained cuticular product, the crystalline cone or body; ret 1 , rhab 1 , retinula cells and rhabdom of scorpion undifferentiated from adjacent cells, vit 1 ; ret, retinula cell ; rhab, rhabdom ; nf, optic nerve-fibres. (Modified from Watase.)

patus and the Diplopods they consist of bunches of fine tubes which do not branch but diverge from one another; the chitinous lining is smooth. In the Hexapods and Chilopods, and the Arachnids (usually), they form tree-like branching structures, and their finest branches are finer than any blood-capillary, actually in some cases penetrating a single cell and supplying it with gaseous oxygen. In these forms the chitinous lining of the tubes is thickened by a close- set spiral ridge similar to the spiral thickening of the cellulose wall of the spiral vessels of plants. It is a noteworthy fact that other tubes in these same terrestrial Arthropoda — namely, the ducts of glands — are similarly strengthened by a chitinous cuticle, and that a spiral or annular thickening of the cuticle is developed in them also. Chitin is not exclusively an ectodermal product, but occurs also in cartilaginous skeletal plates of mesoblastic origin (connective tissue). The immediate cavities or pits into which the tracheal stigmata open appear to be in many cases ectodermic in sinkings, but there seems to be no reason (based on embryological observation) for regarding the tracheae as an ingrowth of the ectoderm. They appear, in fact, to be an air-holding modification of the vasifactive connective tissue.. Tracheae are abundant just in proportion as blood-vessels become suppressed. They are reciprocally exclusive. It seems not improbable that they are two modifications of the same tissue-elements. In Peripatus the stigmatic pits at which the tracheae communicate with the atmosphere are scattered and not definite in their position. In other cases the stigmata are definitely paired and placed in a few segments or in several. It seems that we have to suppose that the vasifactive tissue of Arthropoda can readily take the form of air-holding instead of blood-

holding tubes, and that this somewhat startling change in its character has taken place independently in several instances — viz. in the Onychophora, in more than one group of Arachnida, in Diplopoda, and again in the Hexapoda and Chilopoda.

The Malpighian Tubes. — This name is applied to the numerous fine caecal tubes of noticeable length developed from the proctodaeal

invert of ectodermal origin in Hexapods. These tubes are shown to excrete nitrogenous waste products similar to uric acid. Tubes of renal excretory function in a like position occur in most terrestrial Arthropoda — viz. in Chilopoda, Diplopoda and Arachnida. They are also found in some of the semi-terrestrial and purely aquatic Amphipod Crustaceans. But the conclusion that all such tubes are identical in essential character seems to be without foundation. The Malpighian tubes of Hexapods are outgrowths of the proctodaeum, but those of Scorpion and the Amphipod Crustacea are part of the metenteron or endodermal gut, though originating near its junction with the proctodaeum. Hence the presence or absence of such tubes cannot be used as an argument as to affinity without some discrimination. The Scorpion's so-called Malpighian tubes are not the same organs as those so named in the other Tracheata. Such renal caecal tubes seem to be readily evolved from either metenteron or proctodaeum when the conditions of the out-wash of nitrogenous waste-products are changed by the transference from aquatic to terrestrial life. The absence of such renal caeca in Limulus and their presence in the terrestrial Arachnida is precisely on a parallel with their absence in aquatic Crustacea and their presence in the feebly branchiate Amphipoda.

Group Characters. — We shall now pass the groups of the Arthro- poda in review, attempting to characterize them in such a way as will indicate their probable affinities and genetic history.

Sub-Phylum ARTHROPODA.— The characters of the sub- phylum and those of the associated sub-phyla Chaetopoda and Roti- fera have been given above, as well as the general characters of the phylum Appendiculata which comprises these great sub-phyla.

Grade A. — Hyparthropoda. Hypothetical forms.

Grade B. — Protarthropoda.

(a) The integument is covered by a delicate soft cuticle (not firm or plated)

which allows the body and its appendages great range of extension and contraction.

(6) The paired claws on the ends of the parapodia and the fang- like modifications of these on the first post-oral appendages (man- dibles) are the only hard chitinous portions of the integument.

(c) The head is deuterognathous — that is to say, there is only one prosthomere, and accordingly the first and only pair of hemignaths is developed by adaptation of the appendages of the second somite.

(d) The appendages of the third somite (second post-oral) are clawless oral papillae.

(e) The rest of the somites carry equi-formal simple appendages, consisting of a corm or axis tipped with two chitinous claws and devoid of rami.

(f) The segmentation of the body is anomomeristic, there being no fixed number of somites characterizing all the forms included.

(g) The pair of eyes situated on the prosthomere are not of the Euarthropod type, but resemble those of Chaetopods (hence Nereid- ophthalmous).

(/;) The muscles of the body-wall and gut do not consist of trans- versely-striped muscular fibre, but of the unstriped tissue observed also in Chaetopoda.

(i) A pair of coelomoducts is developed in every somite including the prosthomere, in which alone it atrophies in later development.

(j) The ventral nerve-cords are widely separated — in fact, lateral in position.

(k) There are no masses of nerve-cells forming a ganglion (neuro mere) in each somite. (In this respect the Protarthropoda are at a lower stage than most of the existing Chaetopoda.)

(/) The genital ducts are formed by the enlargement of the coelo- moducts of the penultimate somite.

Class (Unica). — Onychophora.

With the characters of the grade: add the presence within the body of fine unbranched tracheal tubes, devoid of spiral thickening, opening to the exterior by numerous irregularly scattered tracheal pits.

Genera — Eoperipatus, Peripatopsis, Opisthopatus, &c. (See Peri-

PATCS.)

Grade C (of the Arthropoda). — Euarthropoda.

(a) Integument heavily plated with firm chitinous cuticle, allow- ing no expansion and retraction of regions of the body nor change of dimensions, except, in some cases, a dorso-ventral bellows move- ment. The separation of the heavier plates of chitin by grooves of delicate cuticle results in the hinging or jointing of the body and its appendages, and the consequent flexing and extending of the jointed pieces.

(6) Claws and fangs are developed on the branches or rami of the parapodia, not on the end of the axis or corm.

(c) The head is either deuterognathous, tritognathous, or tetartog- nathous.

(d) Rarely only one, and usually at least two, of the somites following the mandibular somite carry appendages modified as jaws (with exceptions of a secondary origin).

(<•) The rest of the somites may all carry appendages, or only a limited number may carry appendages. In all cases the append- ages primarily develop rami or branches which form the limbs, the

primitive axis or corm being reduced and of insignificant size. In the most primitive stock all the post-oral appendages had gnatho- basic outgrowths.

(/) The segmentation of the body is anomomeristic in the more archaic members of each class, nomomeristic in the higher members.

(g) The two eyes of Chaetopod structure have disappeared, and are replaced by the Euarthropod eyes.

(h) The muscles in all parts of the body consist of striped muscular fibre, never of unstriped muscular tissue.

(i) The coelomoducts are suppressed in most somites, and retained only as the single pair of genital ducts (very rarely more numerous) and in some also as the excretory glands (one or two pairs).

(j) The ventral nerve-cords approach one another in the mid- ventral line behind the mouth.

(k) The nerve-cells of the ventral nerve cords are segregated as paired ganglia in each somite, often united by meristic dislocation into composite ganglia.

(/) The genital ducts may be the coelomoducts of the penultimate or antepenultimate or adjacent somite, or of a somite placed near the middle of the series, or of a somite far forward in the series. Class 1 (of the Euarthropoda). — Diplopoda.

The head has but one prosthomere (monoprosthomerous), and is accordingly deuterognathous. This carries short-jointed antennae (in one case bi-ramose) and eyes, the structure and development of which require further elucidation. Only one somite following the first post-oral or mandibula'r segment has its appendages modified as jaws.

The somites of the body, except in Pauropus, either fuse after early development and form double somites with two pairs of appendages (Julus, &c), or present legless and leg-bearing somites alternating.

Somites, anomomeristic, from 12 to 150 in the post-cephalic series.

The genital ducts open in the fourth, or between the fourth and fifth post-oral somite.

Terrestrial forms with small-jointed legs formed by adaptation of a single ramus of the appendage. Tracheae are present.

Note. — The Diplopoda include the Juliformia, the Symphyla (Scolopendrella), and Pauropoda (Pauropus). They were until recently classified with the Chilopoda (Centipedes), with which they have no close affinity, but only a superficial resemblance. (Compare the definition of the class Chilopoda.)

The movement of the legs in Diplopoda is like that of those of Peripatus, of the Phyllopod Crustacea, and of the parapodia of Chaetopoda, symmetrical and identical on the two sides of the body. The legs of Chilopoda move in alternating groups on the two sides of the body. This implies a very much higher develop- ment of nerves and muscles in the latter. (See Millipede.) Class 2 (of the Euarthropoda). — Arachnida.

Head tritognathous and diprosthomerous — that is to say, with two prosthomeres, the first bearing typical eyes, the second a pair of appendages reduced to a single ramus, which is in more primitive forms antenniform, in higher forms chelate or retrovert. The ancestral stock was pantognathobasic — i.e. had a gnathobase or jaw process on every parapodium. As many as six pairs of ap- pendages following the mouth may have an enlarged gnathobase actually functional as a jaw or hemignath, but a ramus is well developed on each of these appendages either as a simple walking leg, a palp or a chela. In the more primitive forms the appendage of every post-oral somite has a gnathobase and two

rami ; in higher specialized forms the gnathobases may be atrophied in every append- age, even in the first post-oral.

The more primitive forms are anomomeristic; the higher forms nomomeristic, showing typically three groups or tagmata of six somites each.

The genital apertures are placed on the first somite of the second tagma or mesosoma. Their position is unknown in the more primi- tive forms. The more primitive forms have branchial respiratory processes developed on a ramus of each of the post-oral appendages. In higher specialized forms these branchial processes become first of all limited to five segments of the mesosoma, then sunk beneath the surface as pulmonary organs, and finally atrophied, their place being taken by a well-developed tracheal system.

A character of great diagnostic value in the more primitive Arachnida is the tendency of the chitinous investment of the tergal surface of the telson to unite during growth with that of the free somites in front of it, so as to form a pygidial shield or posterior carapace, often comprising as many as fifteen somites (Trilobites, Limulus).

A pair of central monomeniscous diplostichous eyes is often present on the head. Lateral eyes also are often present which are monosti- chous withaggregatedlenses(Z,im«/«s)or with isolated lenses(Scorpio), or are diplostichous with simple lens (Pedipalpi, Araneae, &c). Class 3 (of the Euarthropoda). — Crustacea.

Head tetartognathous and triprosthomerous — that is to say, with three prosthomeres; the first bearing typical eyes, the second a pair of antenniform appendages (often bi-ramose), the third a pair of appendages usually antenniform, sometimes claw-like. The ancestral stock was (as in the Arachnida) pantognathobasic, that

is to say, had a gnathobase or jaw-process on the base of every post-oral appendage.

Besides the first post-oral or mandibular pair, at least two succeed- ing pairs of appendages are modified as jaws. These have small and insignificant rami, or none at all, a feature in which the Arach- nida differ from them. The appendages of four or more additional following somites may be turned upwards towards the mouth and assist in the taking of food.

The more primitive forms (Entomostraca) are anomomeristic, presenting great variety as to number of somites, form of appendages, and tagmatic grouping; the higher forms (Malacostraca) are nomo- meristic, showing in front of the telson twenty somites, of which the six hinder carry swimmerets and the five next in front ambulatory limbs. The genital apertures are neither far forward nor far back- ward in the series of somites, e.g. on the fourteenth post-oral in Apus, on the ninth post-oral in female Astacus and in Cyclops.

With rare exceptions, branchial plates are developed either by modification of a ramus of the limbs or as processes on a ramus, or upon the sides of the body. No tracheate Crustacea are known, but some terrestrial Isopoda develop pulmonary in-sinkings of the integument. A characteristic, comparable in value to that presented by the pygidial shield of Arachnida, is the frequent development of a pair of long appendages by the penultimate somite, which with the telson form a trifid, or, when that is small, a bifid termination to the body.

The lateral eyes of Crustacea are polymeniscous, with highly specialized retinulae like those of Hexapoda, and unlike the simpler compound lateral eyes of lower Arachnida. Monomeniscous eyes are rarely present,and when present, single, minute.and central in position.

Note. — The Crustacea exhibit a longer and more complete series of forms than any other class of Arthropoda, and may be regarded as preserving the most completely represented line of descent.

Class 4. — Chilopoda.

Head triprosthomerous l and tetartognathous. The two somites following the mandibular or first post-oral or buccal somite carry appendages modified as maxillae. The fourth post-oral somite has its appendages converted into very large and powerful hemignaths, which are provided with poison-glands. The remaining somites carry single-clawed walking legs, a single pair to each somite. The body is anomomeristic, showing in different genera from 17 (inclusive of the anal and genital) to 175 somites behind that which bears the poison jaws. No tagmata are developed. The genital ducts open on the penultimate somite.

Tracheae are developed which are dendriform and with spiral thickening of their lining. Their trunks open at paired stigmata placed laterally in each somite of the trunk or in alternate somites. Usually the tracheae open by paired stigmata placed upon the sides of a greater or less number of the somites, but never quite regularly on alternating somites. At most they are present on all the pedi- gerous somites excepting the first and the last. In

Scutigera there are seven unpaired dorsal stigmata, each leading into a sac whence a number of air-holding tubes project into the pericardial blood-sinus.

Renal caecal tubes (Malpighian tubes) open into the proctodaeum. (See Centipede.)

Class 5. — Hexapoda.

Head shown by its early development to be triprosthomerous and consequently tetartognathous. The first prosthomere has its appendages represented by the compound eyes and a protocerebrum, the second has the antennae for its appendages and a deutocerebrai neuromere, the third has suffered suppression of its appendages (which corresponded to the second pair of antennae of Crustacea), but has a tritocerebrum and coelomic chamber. The mandibular somite bears a pair of gnathobasic hemignaths without rami or palps, and is followed by two jaw-bearing somites (maxillary and labial). This enumeration would give six somites in all to the head — three prosthomeres and three opisthomeres. Recent investigations (Folsom, 4) show the existence in the embryo of a prae-maxillary or supra-lingual somite which is suppressed during development. This gives seven somites to the Hexapod's head, the tergites of which are fused to form a cephalic carapace or box. The number is signifi- cant, since it agrees with that found in Edriophthalmous Crustacea, and assigns the labium of the Hexapod to the same somite numeri- cally as that which carries the labium-like maxillipedes of those Crustacea.

The somites following the head are strictly nomomeristic and nomotagmic. The first three form the thorax, the appendages of which are the walking legs, tipped with paired claws or ungues (compare the homoplastic claws of Scorpio and Peripatus). Eleven somites follow these, forming the abdominal " tagma," giving thus

1 Embryological evidence of this is still wanting. In the other classes of Arthropoda we have more or less complete embryological evidence on the subject. It appears from observation of the embryo that whilst the first prosthomere of Centipedes has its appendages reduced and represented only by eye-patches (as in Arachnida, Crustacea and Hexapoda), the second has a rudimentary antenna, which disappears, whilst the third carries the permanent antennae, which accordingly correspond to the second antennae of Crustacea, and are absent in Hexapoda.

twenty-one somites in all (as in the higher Crustacea). The somites of the abdomen all may carry rudimentary appendages in the embryo, and some of the hinder somites may retain their appendages in a modified form in

adult life. Terminal telescoping of the ab- dominal somites and excalation may occur in the adult, reducing the obvious abdominal somites to as few as eight. The genital apertures are median and placed far back in the series of somites, viz. the female on the seventh abdominal (seventeenth of the whole series) and the male on the ninth or ante-penultimate abdominal (nineteenth of the whole series). The appendages of the eighth and tenth abdominal somites are modified as gonapophyses. The eleventh abdominal segment is the telson, usually small and soft; it carries the anus.

The Hexapoda are not only all confined to a very definite dis- position of the somites, appendages and apertures, as thus indicated, but in other characters also they present the specialization of a narrowly-limited highly-developed order of such a class as the Crustacea rather than a range from lower more generalized to higher more specialized forms such as that group and also the Arachnida present. It seems to be a legitimate conclusion that the most primitive Hexapoda were provided with wings; and that the term Pterygota might be used as a synonym of Hexapoda. Many Hexa- poda have lost either one pair or both pairs of wings; cases are common of wingless genera allied to ordinary Pterygote genera. Sdme Hexapods which are very primitive in other respects happen to be also Apterous, but this cannot be held to prove that the posses- sion of wings is not a primitive character of Hexapods (compare the case of the Struthious Birds). The wings of Hexapoda are lateral expansions of the terga of the second and third thoracic somites. They appear to be serial equivalents (homogenous meromes) of the tracheal gills, which develop in a like position on the abdominal segments of some aquatic Hexapods.

The Hexapoda are all provided with a highly developed tracheal system, which presents considerable variation in regard to its stigmata or orifices of communication with the exterior. In some a serial arrangement of stigmata comparable to that observed in Chilopoda is found. In other cases (some larvae) stigmata are absent; in other cases again a single stigma is developed, as in the smaller Arachnida and Chilopoda, in the median dorsal line or other unexpected position. When the facile tendency of Arthro- poda to develop tracheal air-tubes is admitted, it becomes probable that the tracheae of Hexapods do not all belong to one original system, but may be accounted for by new developments within the group. Whether the primitive tracheal system of Hexapoda was a closed one or open by serial stigmata in every somite remains at present doubtful, but the intimate relation of the system to the wings and tracheal gills cannot be overlooked.

The lateral eyes of Hexapoda, like those of Crustacea, belong to the most specialized type of " compound eye," found only in these two classes. Simple monomeniscous eyes are also present in many Hexapods.

Renal excretory caeca (Malpighian tubes) are developed from the proctodaeum (not from mesenteron as in scorpion and Amphipoda). Concluding Remarks on the Relationships to one another of the Classes of the Arthropoda. — Our general conclusion from a survey of the Arthropoda amounts to this, that whilst Peripatus, the Diplopoda, and the Arachnida represent terrestrial offshoots from successive lower grades of primitive aquatic Arthropoda which are extinct, the Crustacea alone present a fairly full series of representatives leading upwards from unspecialized forms. The latter were not very far removed from the aquatic ancestors (Trilobites) of the Arachnida, but differed essentially from them by the higher specialization of the head. We can gather no indication of the forefathers of the Hexapoda or of the Chilopoda less specialized than they are, whilst possessing the essential characteristics of these classes. Neither embryology nor palaeontology assists us in this direction. On the other hand, the facts that the Hexapoda and the Chilopoda have triprosthomerous heads, that the Hexapoda have the same total number of somites as the nomomeristic Crustacea, and the same number of opisthomeres in the head as the more terrestrial Crustacea, together with the same adaptation of the form of important appen- dages in corresponding somites, and that the compound eyes of both Crustacea and Hexapoda are extremely specialized and elaborate in structure and identical in that structure, all lead to the suggestion that the Hexapoda, and with them, at no distant point, the Chilo- poda, have branched off from the Crustacean main stem as specialized terrestrial lines of descent. And it seems probable that in the case of the Hexapoda, at any rate, the point of departure was subsequent to the attainment of the nomomeristic character presented by the higher grade of Crustacea. It is on the whole desirable to recognize such affinities in our schemes of classification.

We may tabulate the facts as to head-structure in Chaetopoda and Arthropoda as follows : —

*Grade * (below the Arthropoda). — Agnatha, Aprosthomera.*

Without parapodial jaws; without the addition of originally,

post-oral somites to the prae-oral region, which is a simple prostomial

lobe of the first somite; the first somite is perforated by the mouth

and its parapodia are not modified as jaws.

= Chaetopoda.

ARTHUR

Gradei (of theArthropoda). —Monognatha,Monoprosthomera.

With a single pair of parapodial jaws carried by the somite which is perforated by the mouth; this is not the first somite, but the second. The first somite has become a prosthomere, and carries a pair of extensile antennae.

= Onychophora (Peripatus, &“c). Grade 2 (of theArthropoda). — Dignatha, Monoprosthomera. The third somite as well as the second develops a pair of para- podial jaws; the first somite is a prosthomere carrying jointed antennae.

= Diplopoda.

Grade 3 (of the Arthropoda). — Pantognatha, Diprosthomera.

A gnathobase is developed (in the primitive stock) on every pair of post-oral appendages; two prosthomeres present, the second somite as well as the first having passed in front of the mouth, but only the second has appendages.

= Arachnida.

Grade 4 (of theArthropoda). — Pantognatha, Triprosthomera.

The original stock, like that of the last grade, has a gnathobase on every post-oral appendage, but three prosthomeres are now present, in consequence of the movement of the oral aperture from the third to the fourth somite. The later eyes are polymeniscous, with specialized vitrellae and retinulae of a definite type peculiar to this grade.

= Crustacea, Chilopoda, Hexapoda.

According to older views the increase of the number of somites in front of the mouth would have been regarded as a case of inter- calation by new somite-budding of new prae-oral somites in the series. We are prohibited by a general consideration of metamerism in the Arthropoda from adopting the hypothesis of intercalation of somites. However strange it may seem, we have to suppose that one by one in the course of long historical evolution somites have passed forwards and the mouth has passed backwards. In fact, we have to suppose that the actual somite which in grades 1 and 2 bore the mandibles lost those mandibles, developed their rami as tactile organs, and came to occupy a position in front of the mouth, whilst its previous jaw-bearing function was taken up by the next somite in order,

into which the oral aperture had passed. A similar history must have been slowly brought about when this second mandi- bulate somite in its turn became agnathous and passed in front of the mouth. The mandibular parapodia may be supposed during the successive stages of this history to have had, from the first, well-developed rami (one or two) of a palp-like form, so that the change required when the mouth passed away from them would merely consist in the suppression of the gnathobase. The solid palp- less mandible such as we now see in some Arthropoda is, necessarily, a late specialization. Moreover, it appears probable that the first somite never had its parapodia modified as jaws, but became a prosthomere with tactile appendages before parapodial jaws were developed at all, or rather pari passu with their development on the second somite. It is worth while bearing in mind a second possibility as to the history of the prosthomeres, viz. that the buccal gnathobasic parapodia (the mandibles) were in each of the three grades of prostho- merism only developed after the recession of the mouth and the addition of one, of two, or of three post-oral somites to the prae-oral region had taken place. In fact, we may imagine that the char- acteristic adaptation of one or more pairs of post-oral parapodia to the purposes of the mouth as jaws did not occur until after ancestral forms with one, with two, and with three prosthomeres had come into existence. On the whole the facts seem to be against this supposition, though we need not suppose that the gnathobase was very large or the rami undeveloped in the buccal parapodia which were destined to lose their mandibular features and pass in front of the mouth.

References. — 1. Bateson, Materials for the Study of Variation (Macmillan, 1894), p. 85; 2. Lankester, " Primitive Cell-layers of the Embryo." Annals and Mag. Nat. Hist. (1873), p. 336; 3. Korschelt and Heider, Entwickelungsgeschichte (Jena, 1892), cap. xv. p. 389; 4. Folsom, " Development of the Mouth Parts of Anurida," Bulletin Mus. Comp. Zool. Harvard College, vol. xxxvi. No. 5 (1900), pp. 142- 146; 5. Lankester, " Observations and Reflections on the Append- ages and Nervous System of Apus Cancriformis," Quart. Journ. Micr. Sci. vol. xxi. (1881) ; 6. Hofer, " Ein Krebs mit einer Extremi- st statt eines Stielauges," Verhandl. d. deutschen zool. Gesellsch. (1894) ; 7. Watase, " On the Morphology of the Compound Eyes of Arthropods," Studies from the Biol. Lab. of the Johns Hopkins University, vol. iv. pp. 287-334; 8. Benham describes backward shifting of the oral aperture in certain Chaetopods, Proc. Zoolog. Soc. London (1900), f No. lxiv. p. 976. N. B. — -References to the early literature concerning the group Arthropoda will be found in Carus, Geschichte der Zoologie. The more important literature up to 1892 is given in the admirable treatise on Embryology by Professors Korschelt and Heider. Detailed references will be found under the articles on the separate groups of Arthropoda. (E. R. L.)

ARTHUR (Fr. Artus), the central hero of the cycle of romance known as the Matiere de Bretagne (see Arthurian Legend). Whether there was an historic Arthur has been much debated; undoubtedly for many centuries after the appearance of Geoffrey of Monmouth's Historia Britonwn (circ. 1136), the statements therein recorded of a mighty monarch, who ruled over Britain in the 5th-6th centuries, and carried his conquests far afield, even to the gates of Rome, obtained general, though not universal, credence. Even in the 12th century there were some who detected, and derided, the fictitious character of Geoffrey's " History." As was naturally to be expected, the pendulum swung to the other extreme, and in a more critical age the existence of Arthur was roundly denied. The truth probably lies midway between the two. The words of Wace, the Norman poet who translated the Historia into verse, are here admirably to the point. Speaking of the tales told of Arthur, he says: — " Ne tot mencunge, ne tot veir,

Ne tot fable, ne tot saveir,

Tant ont li conteor conte,

Et li fableor tant fable

Por lor contes embeleter

Que tout ont fait fable sembler." 1

The opinion now generally accepted by scholars is that the evidence of Nennius, whose Historia Britonum preceded that of Geoffrey by some 400 years, is in the main to be relied on. He tells us that Arthur was Dux bellorum, and led the armies of the British kings against the Saxon invaders, whom he defeated in twelve great battles. Tunc Arthur pugnabat cum regibus Britonum, sed ipse dux erat bellorum.

The traditional site of these battles covers a very wide area, and it is supposed that Arthur held a post analogous to that of the general who, under the Roman occupation, was known as Comes Britanniae, and held a roving commission to defend the island wherever attacked, in contradistinction to the Dux Britanniarum, who had charge of the forces in the north, and the Comes Lift oris Saxonici, whose task it was to defend the south-east line. The Welsh texts never call Arthur gwledig (prince), but amheradawr (Latin imperator) or emperor, a title which would be bestowed on the highest official in the island. The truth thus appears to be that, while there was never a King Arthur, there was a noted chieftain and general of that name. If we say that he carried on a successful war against the Saxons, was probably betrayed by his wife and a near kinsman, and fell in battle, we have stated all which can be claimed as an historical

nucleus for his legend. It is now generally admitted that the representation of Arthur as world conqueror, Welt-Kaiser, is due to the influence of the Charlemagne cycle. In the 12 th century the Matiere de France was waning, the Matiere de Bretagne waxing in popularity, and public opinion demanded that the central figure of the younger cycle (for whatever the date of the subject matter, as a literary cycle the Arthurian is the younger) should not be inferior in dignity and importance to that of the earlier. When we add to this the fact that the writers of the 12th century represented the personages and events of the 6th in the garb, and under the conditions, of their own time, we can understand the reason of the manifold difficulties which beset the study of the cycle.

But into the figure of Arthur as we know him, other elements have entered ; he is not merely an historic personality, but at the same time a survival of pre-historic myth, a hero of romance, and a fairy king; and all these threads are woven together in one fascinating but bewildering web. It is only possible here to- summarize the leading features which may be claimed as charac- teristic of each phase.

Mythic. — Certain elements of the story point to Arthur as a culture hero; as such his name has been identified with the Mercurius Artaius of the Gauls. In this role he slays monsters, the boar Twrch Trwyth, the giant of Mont St Michel and the Demon Cat of Losanne (Andre de Coutances tells us that Arthur was really vanquished and carried off by the Cat, but that one durst not tell that tale before Britons!). He never, it should be

1 Nor all a lie, nor all true, nor all fable, nor all known, so much have the story-tellers told, and the fablers fabled, in order to em- bellish their tale9, that they have made all seem fable.

noted, rides on purely chivalric ventures, such as aiding distressed damsels, seeking the Grail, &c. His expeditions are all more or less warlike. The story of his youth belongs, as Alfred Nutt (Folk-lore, vol. iv.) has shown, to the group of tales classified as the Aryan Expulsion and Return formula, found in all Aryan lands. Numerous parallels exist between the Arthurian and early Irish heroic cycles, notably the Fenian or Ossianic. This Fenian cycle is very closely connected with the Tuatha de Danaan, the Celtic deities of vegetation and increase; recent research has shown that two notable features of the Arthurian story, the Round Table and the Grail, can be most reasonably accounted for as survivals of this Nature worship, and were probably parts of the legend from the first.

Romantic. — The character of Arthur as a romantic hero is, in reality, very different from that which, mainly through the popularity of Tennyson's Idylls, English people are wont to suppose. In the earlier poems he is practically a lay figure, his court the point of departure and return for the knights whose adventures are related in detail, but he himself a passive spectator. In the prose romances he is a monarch, the splendour of whose court, whose riches and generosity, are the admiration of all; but morally he is no whit different from the knights who surround him; he takes advantage of his bonnes fortunes as do others. He has two sons, neither of them born in wedlock; one, Modred, is alike his son and his nephew. In certain romances, the Perlesvaus and Diu Crone, he is a veritable roi faineant, over- come by sloth and luxury. Certain traits of his story appear to show the influence of Northern romance. Such is the story of his begetting, where Uther takes upon him the form of Gorlois to deceive Yguerne,even as Siegfried changed shapes with Gunther to the undoing of Briinnhilde. The sword in the perron (stone pillar or block), the withdrawal of which proves his right to the kingdom, is the sword of the Branstock. Morgain carries him off, mortally wounded, to Avalon, even as the Valkyr bears the Northern hero to Valhal. Morgain herself has many traits in common with the Valkyrie; she is one of nine sisters, she can fly through the air as a bird (Swan maiden) ; she possesses a marvel- lous ointment (as does Hilde, the typical Valkyr). The idea of a slumbering hero who shall awake at the hour of his country's greatest need is world-wide, but the most famous instances are Northern, e.g. Olger Danske and Barbarossa, and depend ultimately on an identification with the gods of the Northern Pantheon, notably Thor. W. Larminie cited an instance of a rhyme current in the Orkneys as a charm against nightmare, which confuses Arthur with Siegfried and his winning of the Valkyr.

Fairy. — We find that at Arthur's birth (according to Layamon, who here differs from Wace), three ladies appeared and prophe- sied his future greatness. This incident is also found in the first continuation to the Perceval, where the prediction is due to a lady met with beside a forest spring, clearly here a water fairy. In the late romance of La Bataille de Loquifer Avalon has become a purely fairy kingdom, where Arthur rules in conjunction with Morgain. In Huon de Bordeaux he is Oberon's heir and successor, while in the romance of Brun de la Montague, preserved in a unique MS. of the Bibliotheque Nationale, we have the curious statement that all fairy-haunted places, wherever found, belong to Arthur: —

" Et touz ces lieux faes Sont Artus de Bretagne." This brief summary of the leading features of the Arthurian tradition will indicate with what confused and complex material we are here dealing. (See also Arthurian Legend, Grail, Merlin, Round Table; and Celt: Celtic literature^)

Texts. Historic: — Nennius, Historia Britonum; H. Zimmer, Nennius Vindicatus (Berlin, 1893), an examination into the credi- bility of Nennius; Geoffrey of Monmouth, Historia Britonum (translations of both histories are in Bohn's Library) ; Wace, the Brut (ed. by Leroux de Lincey) ; Layamon (ed. by Sir Fred. Madden).

Romantic: — Merlin — alike in the Ordinary, or Vulgate (ed. Sommer), the Suite or " Huth " Merlin, the 13th century Merlin (ed. by G. Paris and J. Ulrich), and the unpublished and unique version of Bibl. nat. fonds francais, 337 (cf. Freymond's analysis in Zeitschrift fur franz. Sprache, xxii.) — devotes considerable space

to the elaboration of the material supplied by the chronicles, the beginning of Arthur's reign, his marriage and wars with the Saxons. The imitation of the Charlemagne romances is here evident ; the Saxons bear names of Saracen origin, and camels and elephants appear on the scene. The Morte Arthur, or Mart au roi Artus, a metrical romance, of which a unique English version exists in the Thornton collection (ed. for Early English Text Society), gives an expanded account of the passing of Arthur; in the French prose form it is now always found incorporated with the Lancelot, of which it forms the concluding section. The remains of the Welsh tradition are to be found in the Mabinogion (cf. Nutt's edition, where the stories are correctly classified), and in the Triads. Professor Rhys' Studies in the Arthurian Legend are largely based on Welsh material, and may be consulted for details, though the conclusions drawn are not in harmony with recent research. These are the only texts in which Arthur is the central figure; in the great bulk of the romances his is but a subordinate role. (J. L. W.)

ARTHUR I. (1 1 87-1 203) , duke of Brittany, was the posthumous son of Geoffrey, the fourth son of Henry II. of England, and Constance, heiress of Conan IV., duke of Brittany. The Bretons hoped that their young prince would uphold their independence, which was threatened by the English. Henry II. tried to seize Brittany, and in 1187 forced Constance to marry one of his favourites, Randulph de Blundevill, earl of Chester (d. 1232). Henry, however, died soon afterwards (1180). The new king of England, Richard Cceur de Lion, claimed the guardianship of the young Arthur, but in 1100 Richard left for the Crusade. Constance profited by his absence by governing the duchy, and in 1 194 she had Arthur proclaimed duke of Brittany by an assembly of barons and bishops. Richard invaded Brittany in 1 196, but was defeated in 1197 and became reconciled to Con- stance. On his death in 1189, the nobles of Anjou, Maine and Touraine refused to recognize John of England, and did homage to Arthur, who declared himself the vassal of Philip Augustus. In 1202 war was resumed between the king of England and the king of France. The king of France recognized

Arthur's right to Brittany, Anjou, Maine and Poitou. While Philip Augustus was invading Normandy, Arthur tried to seize Poitou. But, surprised at Mirebeau, he fell into the hands of John, who sent him prisoner to Falaise. In the following year he was transferred to Rouen, and disappeared suddenly. It is thought that John killed him with his own hand. After this murder John was condemned by the court of peers of France, and stripped of the fiefs which he possessed in France.

See Ralph of Coggeshall, " Chronicon Anglicanum," in the Monumenta Britanniae historica; Dom Lobineau, Histoire de Bretagne (1702); Dom Morice, Histoire de Bretagne (1742-1756); A. de la Borderie, Histoire de Bretagne, vol. iii. (1899) ; Bemont, " De la condamnation de Jean-sans-Terre par la Cour des Pairs de France," in the Revue historique (1886), vol. xxxii.

ARTHUR III. (1393-1458), earl of Richmond, constable of France, and afterwards duke of Brittany, was the third son of John IV., duke of Brittany, and Joan of Navarre, afterwards the wife of Henry IV. of England. His brother, John V., gave him his earldom of Richmond in England. While still very young, he took part in the civil wars which desolated France during the reign of Charles VI. From 1410 to 1414 he served on the side of the Armagnacs, and afterwards entered the service of Louis the dauphin, whose intimate friend he became. He profited by his position at court to obtain the lieutenancy of the Bastille, the governorship of the duchy of Nemours, and the confiscated territories of Jean Larcheveque, seigneur of Parthenay. His efforts to reduce the latter were, however, interrupted by the necessity of marching against the English. At Agincourt he was wounded and captured, and remained a prisoner in England from 1415 to 1420. Released on parole, he gained the favour of King Henry V. by persuading his brother, the duke of Brittany, to conclude the treaty of Troyes, by which France was handed over to the English king. He was rewarded with the countship of Ivry.

In 1423 Arthur married Margaret of Burgundy, widow of the dauphin Louis, and became thus the brother-in-law of Philip the Good of Burgundy, and of the regent, the duke of Bedford. Offended, however, by Bedford's refusal to give him a high command, he severed his connexion with the English, and in March 1425 accepted the constable's sword from King Charles VII.

He now threw himself with ardour into the French cause, and persuaded his brother, John V. of Brittany, to conclude with Charles VII. the treaty of Saumur (October 7, 1425). But though he saw clearly enough the measures necessary for success, he lacked the means to carry them out. In the field he met with a whole series of reverses; and at court, where his rough and overbearing manners made him disliked, his influence was over-shadowed by that of a series of incompetent favourites. The peace concluded between the duke of Brittany and the English in September 1427 led to his expulsion from the court, where Georges de la Tremoille, whom he himself had recommended to the king, remained supreme for six years, during which Richmond tried in vain to overthrow him. In the meantime, in June 1429, he joined Joan of Arc at Orleans, and fought in several battles under her banner, till the influence of La Tremoille forced his with- drawal from the army. On the 5th of March 1432 Charles VII. concluded with him and with Brittany the treaty of Rennes; but it was not until June of the following year that La Tremoille was overthrown. Arthur now resumed the war against the English, and at the same time took vigorous measures against the plundering bands of soldiers and peasants known as routiers or ecorchenrs. On the 20th of September 143 5, mainly as a result of his diplomacy, was signed the treaty of Arras between Charles VII. and the duke of Burgundy, to which France owed her salvation.

On the 13th of April 1436, Arthur took Paris from the English; but he was ill seconded by the king, and hampered by the necessity for leading frequent expeditions against the ecorcheurs; it was not till May 1444 that the armistice of Tours gave him leisure to carry out the reorganization of the army which he had long projected. He now created the compagnies d'ordonnance, and endeavoured to organize the militia of the francs archers. This reform had its effect in the struggles that followed. In alliance with his nephew, the duke of Brittany, he reconquered, during September and October 1449, nearly all the Cotentin; on the 1 5th of April 1430 he gained over the English the battle of Formigny; and during the year he recovered for France the whole of Normandy, which for the next six or

seven years it was his task to defend from English attacks. On the death of his nephew Peter II., on the 22nd of September 1457, he became duke of Brittany, and though retaining his office of constable of France, he refused, like his predecessors, to do homage to the French king for his duchy. He reigned little more than a year, dying on the 26th of December 1458, and was succeeded by his nephew Francis II., son of his brother Richard, count of Etampes.

Arthur was three times married: (1) to Margaret of Burgundy, duchess of Guienne (d. 1442); (2) to Jeanne d'Albret, daughter of Charles II. of Albret (d. 1444) ; (3) to Catherine of Luxemburg, daughter of Peter of Luxemburg, count of St Pol, who survived him. He left no legitimate children.

Authorities. — The main source for the life of Duke Arthur III. is the chronicle of Guillaume Gruel (c. 1410-1474-1482). Gruel entered the service of the earl of Richmond about 1425, shared in all his campaigns, and lived with him on intimate terms. The chronicle covers the whole period of the duke's life, but the earlier part, up to 1425, is much less full and important than the later, which is based on Gruel's personal knowledge and observation. In spite of a perhaps exaggerated admiration for his hero, Gruel dis- plays in his work so much good faith, insight and originality that he is accepted as a thoroughly trustworthy authority. It was first published at Paris in 1622. Of the numerous later editions, the best is that of Achille le Vavasseur, Chronique d' 'Arthur de Richemont (Paris, 1890). See also E. Cosneau, Le Connetable de Richemont (Paris, 1886); G. du Fresne de Beaucourt, Histoire de Charles VII. (Paris, 1881, seq.).

ARTHUR, CHESTER ALAN (1830- 1886), twenty – first president of the United States, was born in Fairfield, Vermont, on the 5th of October 1830. His father, William Arthur (1796- 1875), when eighteen years of age, emigrated from Co. Antrim, Ireland, and, after teaching in various places in Vermont and Lower Canada, became a Baptist minister. William Arthur had married Malvina Stone, an American girl who lived at the time of the marriage in Canada, and the numerous changes of the family residence afforded a basis for allegations in 1880 that the

son Chester was born not in Vermont, but in Canada, and was therefore, ineligible for the presidency. Chester entered Union College as a sophomore, and graduated with honour in 1848. He then became a schoolmaster, at the same time studying law. In 1853 he entered a law office in New York city, and in the following year was admitted to the bar. His reputation as a lawyer began with his connexion with the famous " Lemmon slave case," in which, as one of the special counsel for the state, he secured a decision from the highest state courts that slaves brought into

New York while in transit between two slave states were ipso facto free. In another noted case, in 1855, he obtained a decision that negroes were entitled to the same accommodations as whites on the street railways of New York city. In politics he was actively associated from the outset with the Republican party. When the Civil War began he held the position of engineer-in-chief on Governor Edwin D. Morgan's staff, and afterwards became successively acting quartermaster-general, inspector-general, and quartermaster-general of the state troops, in which capacities he showed much administrative efficiency. At the close of Governor Morgan's term, on the 31st of December 1862, General Arthur resumed the practice of his profession, remaining active, however, in party politics in New York city. In November 187 1 he was appointed by President U. S. Grant collector of customs for the port of New York. The custom- house had long been conspicuous for the most flagrant abuses of the " spoils system "; and though General Arthur admitted that the evils existed and that they rendered efficient administration impossible, he made no extensive reforms. In 1877 President Rutherford B. Hayes began the reform of the civil service with the New York custom-house. A non-partisan commission, appointed by Secretary John Sherman, recommended sweeping changes. The president demanded the resignation of Arthur and his two principal subordinates, George H. Sharpe, the surveyor, and Alonzo B. Cornell, the naval officer, of the Port. General Arthur refused to resign on the ground that to retire " under fire " would be to acknowledge wrong-doing, and claimed that as the abuses were inherent in a widespread system he should not be made to bear the responsibility alone. His cause was espoused by Senator Roscoe Conkling, for a time successfully; but on the nth of July 1878, during a recess of the Senate, the collector was removed, and in January 1879, after another severe struggle, this action received the approval of the Senate. In 1880 General Arthur was a delegate at large from New York to the Republican national convention. In common with the rest of the "Stalwarts," he worked hard for the nomination of Gen. U. S. Grant for a third term. Upon the triumph of James A. Garfield, the necessity of conciliating the defeated faction led to the hasty acceptance of Arthur for the second place on the ticket. His nomination was coldly received by the public; and when, after his election and accession, he actively engaged on behalf of Conkling in the great conflict with Garfield over the New York patronage, the impression was widespread that he was unworthy of his position. Upon the death of President Garfield, on the 19th of September 1881, Arthur took the oath as his successor. Contrary to the general expectation, his appointments were as a rule unexceptionable, and he earnestly promoted the Pendleton law for the reform of the civil service. His use of the veto in 1882 in the cases of a Chinese Immigration Bill (prohibiting immigration of Chinese for twenty years) and a River and Harbour Bill (appropriating over $18,000,000, to be expended on many

insignificant as well as important streams) confirmed the favourable impression which had been made. The most important events of his administration were the passage of the Tariff Act of 1883 and of the " Edmunds Law " prohibiting polygamy in the territories, and the completion of three great trans-continental railways — the Southern Pacific, the Northern Pacific, and the Atchison, Topeka & Santa Fe. His administration was lacking in political situations of a dramatic character, but on all questions that arose his policy was sane and dignified. In 1884 he allowed his name to be presented for renomination in the Republican convention, but he was easily defeated by the friends of James G. Blaine.

At the expiration of his term he resumed his residence in New York city, where he died on the 18th of November 1886.

For an account of his administration see United States: History.

ARTHURIAN LEGEND. By the "Arthurian legend," or Matiere de Brelagne, we mean the subject-matter of that import- ant body of medieval literature known as the Arthurian cycle (see Arthur). The period covered by the texts in their present form represents, roughly speaking, the century n 50-1 250. The History of Nennius is, of course, considerably earlier, and that of Geoffrey of Monmouth somewhat antedates 11 50 (1136), but with these exceptions the dates above given will be found to cover the composition of all our extant texts.

As to the origin of this Matiere de Bretagne, and the circum- stances under which it became a favourite theme for literary treatment, two diametrically opposite theories are held. One body of scholars, headed by Professor Wendelin Forster of Bonn, while admitting that, so far as any historic basis can be traced, the events recorded must have happened on insular ground, maintain that the knowledge of these events, and their romantic development, are due entirely to the Bretons of the continent. The British who fled before the Teutonic and Scandinavian invasions of the 6th and 8th centuries, had carried with them to Armorica, and fondly cherished, the remembrance of Arthur and his deeds, which in time had become interwoven with traditions of purely Breton origin. On the other side of the Channel, i.e. in Arthur's own land, these memories had died out, or at most survived only as the faint echo of historic tradition. Through the medium of French-speaking Bretons these tales came to the cognizance of Northern French poets, notably Chretien de Troyes, who wove them into romances. According to Professor Forster there were no Arthurian romances previous to Chretien, and equally, of course, no insular romantic tradition. This theory reposes mainly on the supposed absence of pre-Chretien poems, and

on the writings of Professor H. Zimmer, who derives the Arthurian names largely from Breton roots. This represents the prevailing standpoint of German scholars, and may be called the " continental " theory. In opposition to this the school of which the late Gaston Paris was the leading, and most brilliant, representative, maintains that the Arthurian tradition, romantic equally with historic, was preserved in Wales through the medium of the bards, was by them communicated to their Norman conquerors, worked up into poems by the Anglo- Normans, and by them transmitted to the continental poets. This, the " insular " theory, in spite of its inherent probability, has hitherto been at a disadvantage through lack of positive evidence, but in a recently acquired MS. of the British Museum, Add. 36614, we find the first continuator of the Perceval, Wauchier de Denain, quoting as authority for stories of Gawain a certain Bleheris, whom he states to have been " born and bred in Wales." The identity of this Bleheris with the Bledhericus mentioned by Giraldus Cambrensis as Famosus ille tabulator, living at a bygone and unspecified date, and with the Breri quoted by Thomas as authority for the Tristan story, has been fully accepted by leading French scholars. Further, on the evidence of certain MSS. of the Perceval, notably the Paris MS. (Bibl. Nat. 1450), it is clear that Chretien was using, and using freely, the work of a predecessor, large fragments of which have been preserved by the copyists who completed his unfinished work. The evidence of recent discoveries is all in favour of the insular, or French, view.

So far as the character, as distinguished from the provenance, of this subject-matter is concerned, it is largely of folk-lore origin, representing the working over of traditions, in some cases (as e.g. in the account of Arthur's birth and upbringing) common to all the Aryan peoples, in others specifically Celtic. Thus there are a number of parallels between the Arthurian and the Irish heroic cycles, the precise nature of which has yet to be determined. So far as Arthur himself is concerned these parallels are with the Fenian, or Ossianic, cycle, in the case of Gawain with the Ultonian.

In its literary form the cycle falls into three groups: — pseudo- historic: the Histories of Nennius and Geoffrey, the Brut of

Wace and Layamon (see Arthur); poetic: the works of Chretien de Troyes, Thomas, Raoul de Houdenc and others (see Gawain, Perceval, Tristan, and the writers named above); prose: the largest and most important group (see Grail, Lancelot, Merlin, Tristan). Of these three branches the prose romances offer the most insuperable problems; none can be dated with any certainty; all are of enormous length; and all have undergone several redactions. Of not one do we as yet possess a critical and comparative text, and in the absence of such texts the publication of any definite and detailed

theory as to the evolution and relative position of the separate branches of the Arthurian cycle is to be deprecated. The material is so vast in extent, and in so chaotic a condition, that the construction of any such theory is only calculated to invite refutation and discredit.

The best general study of the cycle is to be found in Gaston Paris' s manual La Litterature franQaise au moyen Age (new and revised edition, 1905). See also the introduction to vol. xxx. of Histoire litteraire de la France. For the theories as to origin, see the Intro- ductions to Professor Forster's editions of the poems of Chretien de Troyes, notably that to vol. iv., Der Karrenritter, which is a long and elaborate restating of his position. Also Professor H. Zimmer's articles in Gattingische gelehrte Anzeigen, 12 and 20. For the Insular view, Ferd. Lot's " fitudes sur la provenance du cycle arthurien," Romania, vols, xxiv.-xxviii., are very valuable. For a popular treatment of the subject, cf. Nos. i. and iv. of Popular Studies in Romance and Folk-lore (Nutt). Robert- Huntington Fletcher's "The Arthurian Matter in the Chronicles" (vol. x. of Harvard Studies and Notes in Philology and Literature), is a most useful summary. (J. L. W.)

ARTICHOKE. The common artichoke, Cynara, scolymus, is a plant belonging to the natural order Compositae, having some resemblance to a large thistle. It has long been esteemed as a culinary vegetable ; the parts chiefly employed being the immature receptacle or floret disk, with the lower part of the surrounding leaf -scales, which are known as " artichoke bottoms." In Italy the receptacles, dried, are largely used in soups; those of the cultivated plant as Carciofo domestico, and of the wild variety as Carciofo spinoso.

The Jerusalem artichoke, Helianthus tuberosus, is a distinct plant belonging to the same order, cultivated for its tubers. It closely resembles the sunflower, and its popular name is a corruption of the Italian Girasole Articiocco, the sunflower artichoke. It is a native of Canada and the north-eastern United States, and was cultivated by the aborigines. The tubers are rich in the carbohydrate inulin and in sugar.

The name is derived from the northern Italian articiocco-, or arciciocco, modern carciofo; these words come, through the Spanish, from the Arabic al-kharshiif. False etymology has corrupted the word in many languages: it has been derived in English from " choke," and " heart," or the Latin hortus, a garden; and in French, the form artichaut has been connected with chaud, hot, and chou, a cabbage.

ARTICLE (from Lat. articulus, a joint), a term primarily for that which connects two parts together, and so transferred to the parts thus joined; thus the word is used of the separate clauses or heads in contracts, treaties

or statutes and the like; of a literary composition on some specific subject in a periodical; or of particular commodities, as in " articles of trade and com- merce." It appears also in the phrase " in the article of death " to translate in articulo mortis, at the moment of death. In grammar the term is used of the adjectives which state the ex- tension of a substantive, i.e. the number of individuals to which a name applies; the indefinite article denoting one or any of a particular class, the definite denoting a particular member of a class.

ARTICLES OF ASSOCIATION, in English company law, the regulations for the internal management of a joint stock company registered under the Companies Acts. They are, in fact, the terms of the partnership agreed upon by the shareholders among themselves. They regulate such matters as the transfer and forfeiture of shares, calls upon shares, the appointment and qualification of directors, their powers and proceedings, general meetings of the shareholders, votes, dividends, the keeping and audit of accounts, and other such matters. In regard to these

internal regulations the legislature has left the company free to adopt whatever terms of association it chooses. It has furnished in the schedule to the Companies Act 1862 (Table A), a model or specimen set of regulations, but their adoption, wholly or in part, is optional; only if a company does not register articles of its own these statutory regulations are to apply. When, as is commonly the case, a company decides to have articles of its own framing, such articles must be expressed in separate paragraphs, numbered arithmetically, and signed by the subscribers of the memorandum of association. They must also be printed, stamped like a deed, and attested. When so perfected, they are to be delivered, with the memorandum of association, to the registrar of joint stock companies, who is to retain and register them. The articles of association thereupon become a public document, which any person may inspect on payment of a fee of one shilling. This has important con- sequences, because every person dealing with the company is presumed to be acquainted with its constitution, and to have read its articles. The articles, also, upon registration, bind the company and its members to the same extent as if each member had subscribed his name and affixed his seal to them. (See also Memorandum of Association; Company; Incorporation.)

In the United States, articles of association are any instrument in writing which sets forth the purposes, the terms and conditions upon which a body of persons have united for the prosecu- tion of a joint enterprise. When this

instrument is duly executed and filed, the law gives it the force and effects of a charter of incorporation.

ARTICULATA, a zoological name now obsolete, applied by Cuvier to animals, such as insects and worms, in which the body displays a jointed structure. (See Arthropoda.)

ARTICULATION (from Lat. articulare, to divide into joints), the act of joining together; in anatomy the junction of the bones (see Joints); in botany the point of attachment and separation of the deciduous parts of a plant, such as a leaf. The word is also used for division into distinct parts, as of human speech by words or syllables.

ARTILLERY (the O. Fr. artiller, to equip with engines of war, probably comes from Late Lat. articulwm, dim. of ars, art, cf. " engine " from ingenium, or of artus, joint), a term originally applied to all engines for discharging missiles, and in this sense used in English in the early 17th century. In a more restricted sense, artillery has come to mean all firearms not carried and used by hand, and also the personnel and organization by which the power of such weapons is wielded. It is, however, not usual to class machine guns (q.v.) as artillery. The present article deals with the development and contemporary state of the artillery arm in land warfare, in respect of its organization, personnel and special or " formal " employment. For the materiel — the guns, their carriages and their ammunition — see Ordnance and Ammunition. For ballistics, see that heading, and for the work of artillery in combination with the other arms, see Tactics.

Artillery, as distinct from ordnance, is usually classified in accordance with the functions it has to perform. The simplest division is that into mobile and immobile artillery, the former being concerned with the handling of all weapons so mounted as to be capable of more or less easy movement from place to place, the latter with that of weapons which are installed in fixed positions. Mobile artillery is subdivided, again chiefly in respect of its employment, into horse and field batteries, heavy field or position artillery, field howitzers, mountain artillery and siege trains, adapted to every kind of terrain in which field troops may be employed, and work they may have to do. Immobile artillery is used in fixed positions of all kinds, and above all in permanent fortifications; it cannot, therefore, be classified as above, inasmuch as the raison d'etre, and consequently the arma- ment of one fort or battery may be totally distinct from that of another. " Fortress," " Garrison " and " Foot " artillery are the usual names for this branch. The dividing line, indeed, in the case of the heavier weapons, varies with circumstances; guns of position may remain on their ground while elaborate

fortifications grow up around them, or the deficiencies of a field army in artillery may be made good from the materiel, more frequently still from the personnel, of the fortress artillery. Thus it may happen that mobile artillery becomes immobile and vice versa. But under normal circumstances the principle of classification indicated is maintained in all organized military forces.

Historical Sketch

1. Early Artillery.ˆ Mechanical appliances for throwing pro- jectiles were produced early in the history of organized warfare, and " engines invented by cunning men to shoot arrows and great stones " are mentioned in the Old Testament. These were con- tinually improved, and, under the various names of catapulta, balista, onager, tribuchet, &c, were employed throughout the ancient and medieval periods of warfare. The machines finally produced were very powerful, and, even when a propelling agent so strong as gunpowder was discovered and applied, the super- session of the older weapons was not effected suddenly nor without considerable opposition. The date of the first employ- ment of cannon cannot be established with any certainty, but there is good evidence to show that the Germans used guns at the siege of Cividale in Italy (1331). The terms of a commission given (1414) by Henry V. to his magister operationum, ingeniarum, et gunnarum ac aliarum ordinationum, one Nicholas Merbury, show that the organization of artillery establishments was grafted upon that which was already in existence for the service of the old-fashioned machines. Previously to this it is recorded that of some 340 men forming the ordnance establishment of Edward III. in 1344 only 12 were artillerymen and gunners. Two years later, at Crecy, it is said, the English brought guns into the open field for the first time. At the siege of Harfleur (141 5) the ordnance establishment included 25 " master gunners " and 50 " servitour gunners." The " gunner " appears to have been the captain of the gun, with general charge of the guns and stores, and the special duty of laying and firing the piece in action.

2. The Beginnings of Field Artillery. — It is clear, from such evidence as we possess, that the chief and almost the only use of guns at this time was to batter the walls of fortifications, and it is not until later in the 15th century that their employment in the field became general (see also Cavalry) . The introduction of field artillery may be attributed to John Zizka, and it was in his Hussite wars (1419-1424) that the Wagenburg, a term of more general application, but taken here as denoting a cart or vehicle armed with several small guns, came into prominence. This device allowed a relatively high manoeuvring power to be attained, and it is found occasionally in European wars two centuries later, as for instance at Wimpfen in 1622 and Cropredy Bridge in 1644. In an act of attainder

passed by the Lancastrian party against the Yorkists (1459), it is stated that the latter were " traiterously ranged in bataill . . . their cartes with gonnes set before their batailles " (Rot. Pari. 38 Henry VI., v. 348). In the London fighting of 1460, small guns were used to clear the streets, heavy ordnance to batter the walls of the Tower. The battle of Lose Coat Field (1 469) was decided almost entirely by Edward IV.'s field guns, while at Blackheath (1497) " some cornets of horse, and bandes of foot, and good store of artillery wheeling about " were sent to " put themselves beyond " the rebel camp (Bacon, Henry VII.). The greatest example of artillery work in the 15th century was the siege of Constantinople in 1 4 S3, at which the Turks used a large force of artillery, and in particular some monster pieces, some of which survived to engage a British squadron in 1807, when a stone shot weighing some 700 lb cut the mainmast of Admiral (Sir) J. T. Duckworth's flagship in two, and another killed and wounded sixty men. For siege purposes the new weapon was indeed highly effective, and the castles of rebellious barons were easily knocked to pieces by the prince who owned, or succeeded in borrowing, a few pieces of ordnance (cf. Carlyle, Frederick the Great, book iii. chap. i.). "- >

3. The 16th Century. — In the Italian wars waged by Charles

VIII., Louis XII. and Francis I. of France, artillery played a most conspicuous part, both in siege and field warfare. Indeed, cannon did excellent service in the field before hand firearms attained any considerable importance. At Ravenna (1512) and Marignan (1515) field artillery did great execution, and at the latter battle " the French artillery played a new and distinguished part, not only by protecting the centre of the army from the charges of the Swiss phalanxes, and causing them excessive loss, but also by rapidly taking up such positions from time to time ... as enabled the guns to play upon the flanks of the attacking columns" (Chesney, Observations on Firearms, 1852). In this connexion it must, however, be observed that, when the arquebus and other small arms became really efficient (about 1525), less is heard of this small and handy field artillery, which had hitherto been the only means of breaking up the heavy masses of the hostile pikemen. We have seen that artillery was not ignored in England; but, in view of the splendid and unique efficiency of the archers, there was no great opportunity of developing the new arm. In the time of Henry VIII., the ordnance in use in the field consisted in the main of heavy culverins and other guns of position, and of lighter field pieces, termed sakers, falcons, &c. It is to be noticed that already the lightest pieces had disappeared, the smallest of the above being a 2-pounder. In the earlier

days of field artillery, the artillery train was a miscellaneous congeries of pontoon, supply, baggage and tool wagons, heavy ordnance and light guns in carts. With the development of infantry fire the use of the last- named weapons died out, and it is largely due to this fact that " artillery " came to imply cumbrous and immobile guns of position. Little is, therefore, heard of smart manoeuvring, such as that at Marignan, during the latter part of the 16th century. The guns now usually come into action in advance of the troops, but, from their want of mobility, could neither accompany a farther advance nor protect a retreat, and they were generally captured and recaptured with every changing phase of the fight. Great progress was in the meanwhile made in the adaptation of ordnance to the attack and defence of fortresses and, in particular, vertical fire came into vogue. A great Turkish gun, carrying a 600-lb stone shot, was used in the siege of Constantinople, apparently in this way, since Gibbon records that at the range of a mile the shot buried itself a fathom deep in earth, a fact which implies that a high angle of elevation was given. In the celebrated siege of Malta in 1565 artillery played a conspicuous part.

4. The Thirty Years' War. — Such, in its broadest outlines, is the history of artillery work during the first three centuries of its existence. Whilst the material had undergone a very consider- able improvement, the organization remained almost unchanged, and the tactical employment of guns had become restricted, owing to their slowness and difficulty of movement on the march and immobility in action. In wars of the type of the War of Dutch Independence and the earlier part of the Thirty Years' War, this heavy artillery naturally remained useful enough, and the Wagenburg had given place to the musketry initiated by the Spaniards at Bicocca and Pavia, which since 1525 had steadily improved and developed. It is not, therefore, until the appearance of a captain whose secret of success was vigour and mobility that the first serious attempt was made to produce field artillery in the proper sense of the word, that is, a gun of good power, and at the same time so mounted as to be capable of rapid movement. The " carte with gonnes " had been, as is the modern machine gun, a mechanical concentration of musketry rather than a piece of artillery. Maurice of Nassau, indeed, helped to develop the field gun, and the French had in- vented the limber, but Gustavus Adolphus was the first to give artillery its true position on the battlefield. At the first battle of Breitenfeld (1631) Gustavus had twelve heavy and forty-two light guns engaged, as against Tilly's heavy 24-pounders, which were naturally far too cumbrous for field work. At the Lech (1632) Gustavus seems to have obtained a local superiority over his opponent owing to the handiness of his field artillery even more than by its fire-power. At Lutzen (1632) he had sixty

guns to Wallenstein's twenty-one. His field pieces were not the celebrated "

leather " guns (which were indeed a mere make- shift used in Gustavus' Polish wars) but iron 4-pounders. These were distributed amongst the infantry units, and thus began the system of " battalion guns " which survived in the armies of Europe long after the conditions requiring it had vanished. The object of thus dispersing the guns was doubtless to ensure in the first place more certain co-operation between the two arms, and in the second to exercise a military supervision over the lighter and more useful field pieces which it was as yet impossible to exercise over the personnel of the heavy artillery.

5. Personnel and Classification. — More than 300 years after the first employment of ordnance, the men working the guns and the transport drivers were still civilians. The actual commander of the artillery was indeed, both in Germany and in England, usually a soldier, and Lennart Torstensson, the commander of Gustavus' artillery, became a brilliant and successful general. But the transport and the drivers were still hired, and even the gunners were chiefly concerned for . the safety of their pieces, the latter being often the property, not of the king waging war, but of some " master gunner " whose services he had secured, and the latter's apprentices were usually in entire charge of the material. These civilian " artists," as they were termed, owed no more duty to the prince than any other employes, and even Gustavus, it would appear, made no great improvement in the matter of the reorganization of artillery trains. Soldiers as drivers do not appear until 1 50 years later, and in the meanwhile companies of " firelocks " and " fusiliers " (q.v.) came into existence, as much to prevent the gunners and drivers from running away as to protect them from the enemy. A further cause of difficulties, in England at any rate, was the age of the " gunners." In the reign of Elizabeth, some of the Tower gunners were over ninety years of age. Complaints as to the inefficiency of these men are frequent in the years preceding the English Civil War. Gustavus, however, has the merit of being the first to make the broad classification of artillery, as mobile or non-mobile, which has since been almost universally in force. In his time the 1 2-pounder was the heaviest gun classed as mobile, and the " feildpeece " par excellence was the o-pounder or demi-culverin. After the death of Gustavus at Lutzen (1632), his principles came universally into practice, and amongst them were those of the employment of field artillery.

6. The English Civil War. — Even in the English Civil War (Great Rebellion), in which artillery was hampered by the previous neglect of a century, its field work was not often contemptible, and on occasion the arm did excellent service. But in the cam- paigns of this war, fought out by men whose most ardent desire was to decide the quarrel swiftly, the marching and manoeuvring were unusually rapid. The consequence of this was that the guns were sometimes either late in arriving, as at Edgehill, or absent

altogether, as at Preston. The role of guns was further reduced by the fact that there were few fortresses to be reduced, and country houses, however strong, rarely required to be battered by a siege train. The New Model army usually sent for siege guns only when they were needed for particular service. On such occasions, indeed, the heavy ordnance did its work so quickly and effectually that the assault often took place one or two days after the guns had opened fire. Cromwell in his sieges made great use of shells, 1 2-inch and even larger mortars being employed. The castle of Devizes, which had successfully re- sisted the Parliamentary battering guns, succumbed at once to vertical fire. It does not, however, appear certain that there was any separation of field from siege ordnance, although the Swedish system was followed in almost all military matters.

7. Artillery Progress, 1660-1J40. — Cromwell's practice of relegating heavy guns to the rear, except when a serious siege operation was in view, and in very rapid movements leaving even the field pieces far behind, was followed to some extent in the campaigns of the age of Louis XIV. The number of ammunition wagons, and above all of horses, required for each gun was four or five times as great as that required even for a modern quick- firer. In the days of Turenne heavy guns were much employed.

as the campaigns of the French were directed as a rule to the methodical conquest of territory and fortified towns. Similarly, Marlborough, working amidst the fortresses of the Netherlands in 1706, had over 100 pieces of artillery (of which 60 were mortars) to a force of some 1 1 ,000 men, or about 9 pieces per 1000 men. On the other hand, in his celebrated march to the Danube in 1704, he had but few guns, and the allied armies at Blenheim brought into the field only 1 piece per 1000 men. ,At Oudenarde " from the rapidity of the march . . . the battle was fought with little aid from artillery on either side " (Coxe, Marlborough). There was less need now than ever before for rapid manoeuvres of mobile artillery, since the pike finally disappeared from the scene about 1700, and infantry fire-power had become the decisive factor in battles. In the meantime, artillery was gradu- ally ceasing to be the province of the skilled workman, and assuming its position as an arm of the military service. In the 17th century, when armies were as a rule raised only " for the war." and disbanded at the conclusion of hostilities, there had been no very pressing need for the maintenance in peace of an expensive personnel and material. Gunners therefore remained, as civilians, outside the regular administration of the forces, until the general adoption of the " standing army " principle in the last years of the century (see Army). From this time steps were taken, in all

countries, to organize the artillery as a military force. After various attempts had been made, the " Royal Regiment of Artillery " came into existence in England in 17 16. It is, however, stated that the English artillery did not " begin to assume a military appearance until the Flanders campaigns " of the War of the Austrian Succession. Even in the War of American Independence a dispute arose as to whether a general officer, whose regimental service had been in the Royal Artillery, was entitled to command troops of all arms, and the artillery drivers were not actually soldiers until 1793 at the earliest. French artillery officers received military rank only in 1732.

8. Artillery in the Wars of Frederick the Great. — By the time of Frederick the Great's first wars, artillery had thus been divided into (a) those guns moving with an army in the field, and (b) those which were either wholly stationary or were called upon only when a siege was expected. The personnel was gradu- ally becoming more efficient and more amenable to discipline; the transport arrangements, however, remained in a backward state. Siege and fortress artillery was now organized and employed in accordance with the system of the " formal attack " as finally developed by Vauban. For details of this, as involving the tactical procedure of artillery in the attack and defence of fortresses, the reader is referred to Fortification and Siege- craft. We are concerned here more especially with the progress of field artillery. The part played by this arm began now to vary according to the circumstances of each action, and the " moral " support of guns was calculated as a factor in the dis- positions. In the early Silesian wars, heavy or reserve guns protected the deployment of the army and endeavoured to prepare for the subsequent advance by firing upon the hostile troops; the battalion guns remained close to the infantry, accompanied its movements and assisted in the fire fight. Their support was not without value, and the. heavy guns often pro- voked the enemy into a premature advance, as at Mollwitz. But the infantry or the cavalry forced the decision. It has been mentioned that with the final disappearance of the pike, about 1700, infantry fire-power ruled the battlefield. Throughout the 18th century, it will be found, when the infantry is equal to its work the guns have only a subordinate part in the fighting of pitched battles. At Kunersdorf (1759) the first dashing charge of the Prussian grenadiers captured 72 guns from the Russian army. Later the total of captured ordnance reached 180, yet the Russians, then almost wholly in flight, were not cut to pieces, for only a few light guns of the Prussian army could get to the front; their heavy pieces, though twelve horses were harnessed to each, never came into action. This example will serve to illustrate the difference between the artillery of 1760 and that of fifty years later. According to Tempelhof, who was present, Kunersdorf was the finest opportunity for field artillery that

he had ever seen. Yet the field artillery of the 18th century was, if anything, more powerful than that of Napoleon's time; it was the want of mobility alone which prevented the Prussians from turning to good account an opportunity fully as favourable as that of the German artillery at Sedan. That Frederick made more use of his guns in the later campaigns of the Seven Years' War is accounted for by the fact that his infantry and cavalry were no longer capable of forcing a decision, and also by changes in the general character of the operations. These were fought in and about broken country and entrenched positions, and the mobility of the other arms sank to that of the artillery. Thus power came to the front again, and the heavier weapons regained their former supremacy. In a bataille rangee in the open field the proportion of guns to men had been, in 1741, 2 per 1000. At Leu then (1757) heavy fortress guns were brought to the front for a special purpose. At Kunersdorf the proportion was 4 and 5 per 1000 men, with what degree of effectiveness we have seen. In the later campaigns the Austrian artillery, which was, through- out the Seven Years' War, the best in Europe, placed its numerous and powerful ordnance (an " amphitheatre of 400 guns," as Frederick said) in long lines of field works. The combination of guns and obstacles was almost invariably too formidable to offer the slightest chance of a successful assault. It was at this stage that Frederick, in 1739, introduced horse artillery to keep pace with the movements of cavalry, a proof, if proof were needed, of the inability of the field artillery to manoeuvre. The field howitzer, the weapon par excellence for the attack of field works, has never perhaps been more extensively employed than it was by the Prussians at that time. At Burkersdorf (1762) Frederick placed 45 howitzers in one battery. In those days the mobile artillery was always formed in groups or " batteries " of from 10 to 20 pieces. England too was certainly abreast of other countries in the organization of the field artillery arm. About the middle of the 18th century the guns in use consisted of 24- pounders, 12-pounders, 6-pounders and 3-pounders. The guns were divided into " brigades " of four, five and six guns re- spectively, and began to be separated into "heavy" and "light" brigades. Each field gun was drawn by four horses, the two leaders being ridden by artillerymen, and had 100 rounds of shot and 30 rounds of grape. The British artillery distinguished itself in the latter part of the Seven Years' War. Foreign critics praised its lightness, its elegance and the good quality of its materials. At Marburg (1760) " the English artillery could not have been better served; it followed the enemy with such vivacity, and maintained its fire so well, that it was impossible for the latter to re-form," says Tempelhof, the Prussian artillery officer who records the lost opportunity of Kunersdorf. The merits and the faults of the artillery had been made clear, and nowhere was the lesson taken to heart more than in France, where General Gribeauval, a French officer who had served in the war with the Austrian artillery, initiated reforms which in the end led to the

artillery triumphs of the Napoleonic era. While Frederick had endeavoured to employ, as profitably as possible, the existing heavy equipments, Gribeauval sought improvement in other directions.

9. Gribeauval' s Reforms. — At the commencement of the 1 8th century, French artillery had made but little progress. The carriages and wagons were driven by wagoners on foot, and on the field of battle the guns were dragged about by ropes or remained stationary. Towards the middle of the century some improvements were made. Field guns and carriages were lightened, and the guns separated into "brigades. Siege carriages were introduced. From 1765 onwards, however, Gribeauval strove to build up a complete system both of personnel and materiel, creating a distinct materiel for field, siege, garrison and coast artillery. Alive to the vital importance of mobility for field artillery, he dismissed to other branches all pieces of greater calibre than 12-pounders, and reduced the weight of those retained. His reforms were resisted, and for a time successfully; but in 1776 he became first inspector-general of artillery, and was able to put his ideas into force. The field artillery of the new system included 4-pounder regimental guns,

and for the reserve 8- and 12-pounders, with 6-inch howitzers. For siege and garrison service Gribeauval adopted the 16-pounder and 12-pounder guns, 8-inch howitzer and 10-inch mortar, 12-, 10- and 8-inch mortars being introduced in 1785.

The carriages were constructed on a uniform model and technically improved. The horses were harnessed in pairs, instead of in file as formerly, but the manner in which the teams were driven remained much the same. The prolong (a sort of tow-rope) was introduced, to unite the trail of the gun and the limber in slow retiring movements. Siege carriages differed from those of field artillery only in details. Gribeauval also introduced new carriages for garrison and coast service. The great step made was in a uniform construction being adopted for all materiel, and in making the parts interchangeable so far as possible. In 1765 the personnel of the French artillery was reorganized. The corps or reserve artillery was organized in divisions of eight guns. The battery or division was thus made a unit, with guns, munitions and gunners complete, the horses and drivers being added at a later date. Horse artillery was introduced into the French army in 1701. The last step was made in 1800, when the establishment of a driver corps of soldiers put an end to the old system of horsing by contract.

10. British Artillery, 1JQ3-1815. — Meanwhile the numbers of the English artillery had increased to nearly 4000 men. For some five centuries the word " artillery " in England meant entirely garrison artillery; the field artillery only existed in time of war. When war broke out, a train of artillery was organized, consisting of a certain number of field (or siege) guns, manned by garrison gunners; and when peace was proclaimed the train was disbanded, the materiel being returned into store, and the gunners reverting to some fort or stronghold. In 1793 the British artillery was anything but efficient. Guns were still dispersed among the infantry, mobility had declined again since the Seven Years' War, and the American war had been fought out by the other arms. The drivers were mere carters, on foot with long whips, and the whole field equipment was scarcely able to break from a foot-pace. Prior to the Peninsular War, however, the exertions of an able officer, Major Spearman, had done much to bring about improvement. Horse artillery had been introduced in 1793, and the driver corps established in 1 794. Battalion guns were abolished in 1802, and field " brigades of six guns " were formed, horse artillery batteries being styled " troops." Military drivers were introduced, and the horses teamed in pairs. The drivers were mounted on the near horses, the gunners either rode the off horses or were carried on the limbers and wagons. The equipment was lightened, and a new system of manoeuvres introduced. A troop of horse artillery and a field brigade each had five guns and one howitzer. The " driver corps," raised in 1794, was divided into troops, the addition of one of which to a company of foot artillery converted it into a field brigade. The horse artillery possessed both drivers and horses, and required very limited assistance from the driver corps.

n. French Revolutionary Wars. — During the long wars of the French Revolution and Empire the artillery of the field army by degrees became field artillery as we know it to-day. The develop- ment of musketry in the 16th century had taken the work of preparing an assault out of the hands of the gunners. Per contra, the decadence of infantry fire-power in the latter part of the Seven Years' War had reinstated the artillery arm. A similar decadence of the infantry arm was destined to produce, in 1807, artillery predominance, but this time with an important differ- ence, viz. mobility, and when mobility is thus achieved we have the first modern field artillery. The new tactics of the French in the Revolutionary wars, forced upon them by circumstances, involved an almost complete abandonment of the fire-tactics of Frederick's day, and the need for artillery was, from the first fight at Valmy onwards, so obvious that its moral support was demanded even in the outpost line of the new French armies. St Cyr (Armies of the Rhine, p. 112) quotes a case in which " right in the very farthest outpost line " the original 4-pounder guns were replaced by 8-, 16-, and in the end by 24-pounders. The cardinal principle of massing

batteries was not, indeed, forgotten,

notwithstanding the weakness of raw levies. But though, as we have seen, the materiel had already been greatly improved, and the artillery was less affected by the Revolution than other arms of the service, circumstances were against it, and we rarely find examples of artillery work in the Revolutionary wars which show any great improvement upon older methods. The field guns were however, at last organized in batteries each complete in itself, as mentioned above. The battalion gun disappeared; it was a relic of days in which it was thought advisable, both for other reasons and also because the short range of guns forbade any attempt at concentration of fire from several positions at one target, to have some force of artillery at any point that might be threatened. Though it was officially retained in the regulations of the French army, " officers and men combined to reject it " (Rouquerol, Q. F. Field Artillery, p. 121), and its last appearances, in 1809 and in 181 3, were due merely to an endeavour on the part of Napoleon to give cohesion thereby to the battalions of raw soldiers which then constituted his army. But, with the development of mobility, it was probably found that sufficient guns could be taken to any threatened point, and no one had ever denied the principle of massed batteries, although, in practice, dispersion had been thought to be unavoidable.

12. Napoleon's Artillery Tactics. — During the war the French artillery steadily improved in manoeuvring power. But many years elapsed before perfection was attained. Meanwhile, the infantry, handled without regard to losses in every fight, had in consequence deteriorated. The final production of the field artillery battle, usually dated as from the battle of Friedland (June 14, 1807), therefore saved the situation for the French. Henceforward Napoleon's battles depend for their success on an " artillery preparation," the like of which had never been seen. Napoleon's own maxim illustrates the typical tactics of 1807- 1815. " When once the mUee has begun," he says, "themanwho is clever enough to bring up an unexpected force of artillery, without the enemy knowing it, is sure to carry the day." The guns no longer " prepared " the infantry advance by slowly disintegrating the hostile forces. Still less was it their business merely to cover a deployment. On the contrary, they now went in to the closest ranges and, by actually annihilating a portion of the enemy's line with case-shot fire, " covered " the assault so effectively that columns of cavalry and infantry reached the gap thus created without striking a blow. It is unnecessary to give examples. Every one of Napoleon's later battles illustrates the principle. The most famous case is that of the great battery of 100 guns at Wagram (q.v.) which preceded the final attack of the centre. When Napoleon at Leipzig saw the allied guns forming up in long lines to prepare the assault, he exclaimed, " At last they have learned something."

This " case-shot preparation," of course, involved a high degree of efficiency in manoeuvre, as the guns had to gallop forward far in front of the infantry. The want of this quality had retarded the development of field artillery for 300 years, during which it had only been important relatively to the occasional inferiority of other troops. After Napoleon's time the art of tactics became the art of combining the three arms.

13. Artillery, 18 75- 1865. — Henceforward, therefore, the his- tory of artillery becomes the history of its technical effectiveness, particularly in relation to infantry fire, and of improvements or modifications in the method of putting well-recognized principles into action. Infantry fire, however, being more variable in its effectiveness than that of artillery, the period 1815-1870 saw many changes in the relations of the two arms. In the time of Napoleon, infantry fire never equalled that of the Seven Years' War, and after the period of the great wars the musket was less and less effectively used. Economy was, however, practised to excess in every army of Europe during the period 181 5-1850, and even if there had been great battles at this time, the artillery, which was maintained on a minimum strength of guns, men and horses, would not have repeated the exploits of Senarmont and Drouot in the Napoleonic wars. The principle was well understood, but under such conditions the practice was impossible. It was at this stage that the general

ARTILLERY

Plate I.

Plate II.

ARTILLERY

Photo, GjU & Polden.

BREACH LOADING FIELD BATTERY (15-PR. B.L.).

P)wlo, Galc&Polden.

QUICK-FIRING HORSE ARTILLERY (ROYAL HORSE .ARTILLERY, 13-PR. Q.F.).

Photo, Gale 4- Polden. Photo, Topical Press.

Q.F. FIELD ARTILLERY (18-PE. Q.F., R.F.A.). FRENCH (75-MM. Q.F.) FIELD ARTILLERY MANCEUVRING.

ARTILLERY

introduction of the rifled musket put an end, once for all, to the artillery tactics of the smooth-bore days. Infantry, armed with a far-ranging rifle, as in the American Civil War, kept the guns beyond case-shot range, compelling them to use only round shot or common shell. In that war, therefore, attacking infantry met, on reaching close quarters, not regiments already broken by a feu d'enfer, but the full force of the defenders' artillery and infantry, both arms fresh and unshaken, and the full volume of their case shot and musketry. At Fredericksburg the Federal infantry attacked, unsupported by a single field piece; at Gettysburg the , Federal artillery general Hunt was able to reserve his ammunition to meet Lee's assault, although the infantry of his own side was meanwhile subjected to the fire of 137 Confederate guns. Thus, in both these cases the assault became one of infantry against unshaken infantry and artillery. On many occasions, indeed, the batteries on either side went into close ranges, as the traditions of the old United States army dictated, but their losses were then totally out of proportion to their effectiveness. Indeed, the increased range at which battles were now fought, and the ineffectiveness of the projectiles necessarily used by the artillery at these ranges, so far neutral- ized even rifled guns that artillery generals could speak of " idle cannonades " as the " besetting sin " of some commanders.

14. The Franco-German War, 1870-71. — In the next great war, that of 1866 (Bohemia), guns were present on both sides in great numbers, the average for both sides being three guns per 1000 men. Artillery, however, played but a small part in the Prussian attacks, this being due to the inadequate training then afforded, and also to the mixture of rifled guns and smooth-bores in their armament. In Prussia, however, the exertions of General v. Hindersin, the improvement of the materiel, and above all the better tactical training of the batteries, were rewarded four years later by success on the battlefield almost as decisive as Napoleon's. In 1870 the French artillery was invariably defeated by that of the Germans, who were then free to turn their attention to the hostile infantry. At first, indeed, the German infantry was too impatient to wait until the victorious artillery had prepared the way for them by disintegrating the opposing line of riflemen. Thus the attack of the Prussian Guards at St Privat (August 18, 1870) melted away before the unbroken fire-power of the French, as had that of the Federals at Fredericksburg and that of the Confederates at Gettysburg. But such experiences taught the German infantry commanders the necessity of patience, and at Sedan the French army was enveloped by the fire of nearly 600 guns, which did their work so thoroughly that the Germans annihilated the Imperial army at the cost of only 5 % of casualties.

15. Results of the War. — The tactical lessons of the war, so far as field

artillery is concerned, may be briefly summarized as (a) employment of great masses of guns; (b) forward position of guns in the order of march, in order to bring them into action as quickly as possible; (c) the so-called " artillery duel," in which i.he assailant subdues the enemy's artillery fire; and (d) when this is achieved, and not before, the thorough preparation of all iifantry attacks by artillery bombardment. This theory of iield artillery action has not, even with the almost revolutionary improvements of the present period, entirely lost its value, and it may be studied in detail in the well-known work of von Schell, Taktik der Feldartillerie (1877), later translated into English by Major-General Sir A. E. Turner (Tactics of Field Artillery, 1900). In one important matter, however, the precepts of Schell and his contemporaries no longer hold good. " It is absolutely necessary that the object of the infantry's attack should be cannonaded before it advances. To accomplish this, sufficient time should be given to the artillery, and on no account should the infantry be ordered to advance until the fire of the guns has produced the desired effect." This, the direct outcome of the slaughter at St Privat, represents the best possibilities of breechloading guns with common shell — no more than a slow disintegration of the enemy's power of resistance by a thorough and lengthy " artillery preparation." Against troops sheltered behind works (as in the Russo-Turkish War of 1877-78) the common shell usually failed

to give satisfactory results, if for no other reason, because the " preparation " consumed an inordinate time, and in any case the hostile artillery had first of all to be subdued in the artillery duel.

16. Quick-firing Field Guns. — In 1891, a work by General Wille of the German army (The Field Gun of the Future) and in 1892 another by Colonel Langlois of the French service (Field Artillery with the other Arms) foreshadowed many revolutionary changes in materiel and tactics which have now taken place. The new ideas spread rapidly, and the quick-firing gun came by degrees to be used in every army. The original designs have been greatly improved upon (see Ordnance: Field artillery equipments), but the principles of these designs have not under- gone serious modification. These are, briefly, the mechanical absorption of the recoil, by means of brakes or buffers, and the development of " time shrapnel " as the projectile of field artillery. The absorption of recoil of itself permits of a higher rate of fire, since the gun does not require to be run up and relaid after every shot. Formerly such an advantage was illusory (since aim could not be taken through the thick bank of smoke produced by rapid fire), but the introduction of smokeless powder removed this objection. Artillerists, no longer handi- capped, at once turned their attention to the increase of the rate of fire. At the same time a shield was applied to the gun, for the protection of the detachment. This advantage is solely the result of the non-recoiling carriage. The gunners had formerly to stand clear of the recoiling

gun, and a shield was therefore of but slight value.

*17. Time Shrapnel.— The power of modern artillery owes even more to the improvement of the projectile than to that of the gun (see Ammunition). The French, always in the forefront of artillery progress, were the first nation to realize the new signifi- cance of the time-fuze and the shrapnel shell. These had been in existence for many years; to the British army are due both the invention and the development of the shrapnel, which made its first appearance in European warfare at Vimeira in 1808. But, up to the introduction of rifled pieces, the Napoleonic case-shot attack was universally and justly considered the best method of fighting, and in the transition stage of the materiel many soldiers continued to put faith in the old method, — hence the Prussian artillery in 1866 had many smooth-bore batteries in the field, — and between i860 and 1870 gunners, now convinced of the superiority of the new equipments, undoubtedly sought to turn to account the minute accuracy of the rifled weapons in un-necessarily fine shooting. Thus, in 1870 the French time-fuze was only graduated for two ranges, and the Germans used percussion fuzes only. But this phase has passed, and General Langlois has summarized the tactics of the newest field artillery in one phrase: " It results in transferring to 3000 yds. the point- blank and case-shot fire of the smooth-bore." The meaning of this will be discussed later; here it will be sufficient to say that it is claimed for the modern gun and the modern shell that the Napoleonic method * of annihilating by a rain of bullets has been revived, with the distinction that the shell, and not the gun, fires the bullets close up to the enemy. In the Boer War, Pieter's Hill furnished a notable example of this " covering," as distinct from " preparation," of an assault by artillery fire.*

18. Heavy Field, Siege and Garrison Artillery. — Amongst other results of this war was a recrudescence of the idea of " dispersion." This will be noticed later; the more material result of the Boer War, and of the generally increasing specializa- tion in the various functions of the artillery arm, has been the reintroduction of heavy ordnance into field armies. The field howitzer reappeared some time before the outbreak of that war, and the British howitzers had illustrated their shell-power in the Sudan campaign of 1898. During the latter part of the 19th century, siege and fortress artillery underwent a development hardly less remarkable than that of field artillery in the same time. Rifled guns, " long " and " short " for direct and curved fire, formed the siege artillery of the Germans in 1870-71, and

1 Napoleon's maxim, quoted above, reappears in spirit in the British F. A. Training of 1906 (p. 225).

with the reduction of the old-fashioned fortresses of France began a new era in siegecraft (see Fortification and Siege- craft). At the present time howitzers 1 (B.L. rifled) are the principal siege weapons, while heavy direct-fire guns (see Ordnance passim) still retain a part of the work formerly assigned to the artillery of the attack. For an account of a siege with modern artillery see Macalik and Langer, Kampf um eine Feslung, which describes an imaginary siege of Kbniggratz. On the whole, it may be said that modern artillery has caused a revolution in methods of fortification and siegecraft, which is little less far-reaching than the original change from the trebuchet to the bombard.

Organization

19. Field Artillery Organization. — A battery of field artillery comprises three elements, viz. materiel, — guns, carriages, ammunition and stores; personnel, — officers, non-commissioned officers, gunners, drivers and artificers; and transport, — almost invariably horses, though other animals, and also motor and mechanical transport, are used under special circumstances. As for the materiel, the guns used by field artillery in almost all countries are quick-firers, throwing shells of 13 to 18 pounds; details of these will be found in the article Ordnance. The number of guns in a battery varies in different countries between four and eight; by far the most usual number is six. With the introduction of the quick-firing gun, the tendency towards small batteries (of four guns) has become very pronounced, the ruling motives being (a) better control of fire in action, and (b) more horses available to draw the increased number of ammunition wagons required. " Mixed " batteries of guns and howitzers were formerly employed on occasion, and were supposed to be adapted to every kind of work. However, the difference between the gun and the howitzer was so great that at all times one part of the armament was idle, while the general increase in the artillery arm has permitted batteries and brigades of howitzers to be formed, separately, as required. Machine guns (q.v.) are not treated in Great Britain as being artillery weapons, though abroad they are often organized in batteries. During, and subsequent to the Boer War, heavier machine guns, called pompoms, came into use. The rocket (q.v.), formerly a common weapon of the artillery, is now used, if at all, only for mountain and forest warfare against savages.

20. Ammunition. — The vehicles of a battery include (besides guns and limbers) ammunition wagons, store and provision carts or wagons and forage wagons. On the amount of ammunition that should be carried with a field battery there was formerly a considerable diversity of opinion. The greater the amount a battery carries with it, the more independent it is; on

the other hand, every additional wagon makes the battery more cumbrous and, by lengthening out the column, keeps back the combatant troops marching in rear. But since the introduction of the Q.F. gun it has been universally recognized that the gun must have a very liberal supply of ammunition present with it in action, and the old standard allowance of one wagon per gun has been increased to that of two and even three. Formerly batteries were further hampered by having to carry the reserve of small- arm ammunition for infantry and cavalry. But the greater distances of modern warfare accentuate the difficulties of such a system, and the reserve ammunition for all arms is now carried in special " ammunition columns " (see Ammunition), the personnel and transport of which is furnished by the artillery.

2 1 . Interior Economy. — The organization and interior economy of a battery is much the same in all field artillery. In England the command is held by a major, the second in command is a captain. The battery is divided into three " sections " of two guns each, each under a subaltern officer, who is responsible for everything connected with his section — men, horses, guns, carriages, ammuni- tion and stores. Each section again consists of two sub-sections, each comprising one gun and its wagons, men and horses, and at

1 The old smooth-bore mortar for high-angle fire has of course disappeared, but the name " mortar " is still applied in some countries to short rifled howitzers.

the head of each is the " No. 1″ of the gun detachment — usually a sergeant — who is immediately responsible to the section commander for his sub-section.

The No. 1 rides with the gun, there is also another mounted non-commissioned officer who rides with the first wagon, and the gunners are seated on the gun-carriage, wagon and limbers. The increased number of wagons now accompanying the gun has, however, given more seating accommodation to the detachment, and this distribution has in some cases been altered. The three drivers ride the near horses of their respective pairs, each gun and each wagon being drawn by six horses. On the march, the gun is attached to the limber, a two-wheeled carriage drawn by the gun team; the wagon consists likewise of a " body " and a limber. A battery has also a number of non-combatant carriages, such as forge and baggage wagons. In addition to the gunners and drivers, there are men specially trained in range-taking, signalling, &c, in all batteries.

22. Special Natures of Field Artillery. — Horse Artillery differs from field in that the whole gun detachment is mounted, and the gun and wagon

therefore are freed from the load of men and their equipment. The organization of a battery of horse artillery differs but slightly from that of a field battery; it is somewhat stronger in rank and file, as horse-holders have to be provided for the gunners in action. Horse artillery is often lightened, more- over, by sacrificing power (see Ordnance). The essential feature of Mountain Artillery in general is the carrying of the whole equipment on the backs of mules or other animals. The total weight is usually distributed in four or five mule-loads. For action the loads are lifted off the saddles and " assembled," and the time required to do this is, in well-trained batteries, only one minute. For the technical questions connected with the gun and its carriage, see Ordnance. The weight of a shell in a mountain gun rarely exceeds 12 lb., and is usually less. In most armies the field howitzer has, after an eclipse of many years, reasserted its place. The weapons used are B.L. or Q.F. howitzers on field carriages; the calibre varies from about 4 to 5 in. In Great Britain the field howitzer batteries are organized as, and form part of, the Royal Field Artillery, two batteries of six howitzers each forming a brigade.

23. Heavy Ordnance. — Heavy Field Artillery, officially defined as "all artillery equipped with mobile guns of 4-in. calibre and upwards," is usually composed, in Great Britain, of 5-in. or 4-7-in. Q.F. guns on field carriages. 6-in. Q.F. guns have also been used. A battery (4 guns) is attached to the divisional artillery of each division, a company of the Royal Garrison Artillery furnishing the personnel. The four guns are divided into two sections, each section under an officer and each sub- section under a non-commissioned officer, as in the horse and field batteries. Siege and garrison artillery have not usually the complete and permanent organization that distinguishes field artillery. For siege trains the materiel is usually kept in store, and the personnel and transport are supplied from other sources according to requirement. In garrison artillery, the guns mounted in fortresses and batteries, or stored in arsenals for the purpose, furnish the materiel, and the companies of garrison artillery the personnel. In Great Britain, the Royal Garrison Artillery finds the mountain batteries and the heavy field artillery in addition to its own units. The siege trains are, as has been said, organized ad hoc on each particular occasion (see Fortification and Siegecraft). In Great Britain, the guns and howitzers manned by the R.G.A. would be 6-in. and 8-in. howitzers, 4-7-in. and 6-in. guns, and still heavier howitzers, as well as the field and heavy batteries belonging to the divisions making the siege.

24. Higher Organization of Artillery. — The higher units, in almost every country except Great Britain, are the regiment, and, sometimes, the brigade of two or more regiments. These units are distributed to army corps, divisions and districts, in the same way as units of other arms (see Army). In Great Britain the Royal Regiment of Artillery still comprises the whole

personnel of the arm, being divided into the Royal Horse, Royal Field and Royal Garrison Artillery; to each branch Special

Reserve and Territorial artillery are affiliated. Over and above the military command of these higher units, provision is usually made for technical control of the materiel, and a variety of training and experimental establishments, such as schools of gunnery, are maintained in all countries. The more special unit of organization in mobile artillery is the brigade, formerly called brigade-division (German, Abteilung; French groupe). The brigade is in Great Britain the administrative and tactical unit. Mountain artillery is not organized in brigades in the British empire. The unit consists, in the case of guns, of three batteries (18 guns, heavy artillery 12), in the case of field howitzers of two batteries (12 howitzers), and in the horse artillery of two batteries (12 guns), and is commanded by a lieutenant-colonel. To each brigade is allotted an ammunition column. The necessity for such a grouping of batteries will be apparent if the reader notes that 54 field guns, 12 howitzers and 4 heavy field guns form the artillery of a single British division of about 15,000 combatants.

25. Grouping of the Artillery. — The "corps artillery" (formerly the " reserve artillery ") now consists only of the howitzer and heavy brigades, with a brigade of horse artillery. The latter is held at the disposal of the corps commander for the swift reinforce- ment of a threatened point; the howitzers and the heavy guns have, of course, functions widely different from those of the mass of guns. As the field artillery is required to come into action at the earliest possible moment, it has now been dis- tributed amongst the infantry divisions, and marches almost at the head of the various combatant columns, instead of being relegated perhaps to the tail of the centre column. The redis- tribution of the British army (1907) on a divisional basis is a remarkable example of this; even the special natures of artillery (except horse artillery) are distributed amongst the divisions. In Germany two "regiments" (each of 2 Abteilungen = 6 batteries) form a brigade, under an artillery general in each division who thus disposes of 72 field guns, and the howitzers, with such horse artillery batteries as remain over after the cavalry has been supplied, still form a corps or reserve artillery. In 1903 the French, after long hesitation, assigned the whole of the field artillery to the various divisions, but later (for reasons stated in the article Tactics) arranged to reconstitute the old- fashioned corps artillery in war. (See also Army, § 49).

Tactical Work

26. General Characteristics of Field Artillery Action. — The duty of field artillery in action is to fire with the greatest effect on the target which is for the moment of the greatest tactical importance. This definition of field artillery tactics brings the student at once to questions of combined tactics, for which consult the article Tactics. The purpose of the present article is to indicate the methods employed by the gunners to give effect to their fire at the targets mentioned. For this purpose the artillery has at its disposal two types of projectile, common (or rather, high explosive) shell and shrapnel, and two fuzes, " time " and " percussion " (see Ammunition). The actual process of coming into action may be described in a few words. The gun is, at or near its position in action, " unlimbered " and the gun limber and team sent back under cover. Ammunition for the gun is first taken from the wagon that accompanies it, as it is very desirable to keep the limbers full as long as possible, in case of emergencies such as that of a temporary separation from the wagon. Limber supply is, however, allowed in certain circum- stances. The wagon is now placed as a rule by the side of the gun, an arrangement which immensely simplifies the supply of ammunition, this being done under cover of the armour on the wagon and of the gun-shield and also without fatigue to the men. The older method of placing the wagon at some distance behind the gun is still occasionally used, especially in the case of unshielded equipments. No horses are allowed, in any case, to be actually with the line of guns. According to the British Field Artillery Training of 1906, a battery in action would be thus dis'tributed: first, the " fighting battery " consisting of the six guns, each with its wagon alongside, and the limbers of the

two flank guns; then, under cover in rear, the " first line of wagons " comprising the teams of the fighting battery, the four remaining gurt limbers, and six more wagons. The non-combatant vehicles form the " second line of wagons."

27. Occupation of a Position. — This depends primarily upon considerations of tactics, for the accurate co-operation of the guns is the first essential to success in the general task. In details, however, the choice of position varies to some extent with the nature of the equipment: for instance, an elevated position is better adapted than a low one for high velocity guns firing over the heads of their own infantry, and again, the " spade " with which nearly all equipments are furnished (see Ordnance) should have soil in which it can find a hold. Cover for the gun and its detachment cannot well be obtained from the configuration of the ground, because, if the gun can shoot over the covering mass of earth, the hostile shells can of course do likewise. Sufficient protection is given by the shield, and thus " cover " for field-guns simply means concealment. Cover for the " first line of wagons " is, however, a very serious considera- tion. As to concealment, it is stated that " the broad white flash from a gun firing

smokeless powder is visible " to an enemy " unless the muzzle is at least 10 ft. below the covering crest " (Bethell, Modern Guns and Gunnery, 1907, p. 147). Concealment therefore, means only the skilful use of ground in such a way as to make the enemy's ranging difficult. This frequently involves the use of retired positions, on reverse slopes, in low ground, &c, and in all modern artillery the greatest stress is laid on practice in firing by indirect means. Controversy has, however, arisen as to whether inability to see the foreground is not a drawback so serious that direct fire from a crest position, in spite of its exposure, must be taken as the normal method. The latter is of course immensely facilitated by the introduction of the shield. A great advantage of retired positions is that, provided unity of direction is kept, an overwhelming artillery surprise (see F. A . Training, 1906, p. 225) is carried out more easily than from a visible position. The extent of front of a battery in action is governed by the rule that no two gun detachments should be exposed to being hit by the bullets of one shell, and also by the necessity of having as many guns as possible at work. These two conditions are met by the adoption of a 20-yards interval between the muzzles of the guns. At the present time the gun and its wagon are placed as close together as possible, to obtain the full advantage of the armoured equipment. The shield, behind which the detachments remain at all times covered from rifle (except at very short range) and shrapnel bullets, 1 enables the artillery commander to handle his batteries far more boldly than formerly was the case. General Langlois says " the shield- protected carriage is the corollary to the quick-firing gun." Armour on the wagon, enabling ammunition supply as well as the service of the gun, to be carried on under cover, soon followed the introduction of the shield. The disadvantage of extra weight and consequently increased difficulty of " man-handling " the equipment is held to be of far less importance than the advantages obtained by the use of armour.

28. Laying. — " Elevation " may be defined as the vertical inclination of the gun, " direction " as the horizontal inclination to the right or left, necessary to direct the path of the projectile to the object aimed at. " Laying " the gun, in the case of most modern equipments, is divided, by means of the device called the independent line of sight (see Ordnance), into two processes, performed simultaneously by different men, the adjustment of the sights and that of the gun. The first is the act of finding the " line of sight," or line joining the sights and the point aimed at; for this the equipment has to be " traversed " right or left so as to point in the proper direction, and also adjusted in the vertical plane. The simplest form of laying for direction, or " line," is called the " direct " method. If the point aimed at is the target, and it can be seen by the layer, he has merely to look over the " open " sights. But the point aimed at is rarely the target itself. In war, the target, even if visible, is often indistinct,

1 Though not of course against the direct impact of shrapnel or H.E. shells.

and in this case, as also when the guns are under cover or engaging a target under cover, an " aiming point" or "auxiliary mark," a conspicuous point quite apart and distinct from the target, has to be employed (" indirect " method). In the Russo-Japanese War the sun was sometimes used as an aiming point. When the guns are behind cover and the foreground cannot be seen, an artificial aiming point is often made by placing a line of " aiming posts " in the ground. If an aiming point can be found which is in line with the target, as would be the case when aiming posts are laid out, the laying is simple, but it is as often as not out of the line. Finding the "line " in this case involves the calculation, from a distant observing point, of the angle at which the guns must be laid in order that, when the sights are directed upon the aiming point, the shell will strike the target. It is further necessary to find the " angle of sight " or inclination of the line of sight to the horizontal plane. If aim be taken over the open sights at the target, the line of sight naturally passes through the target, but in any other case it may be above or below it. Then the point where the projectile will meet the line of sight, which should coincide with the target, is beyond it if the line of sight is below or angle of sight is too small, and short of it if the line of sight is too high — that is, range and fuze will be wrong. The process of indirect laying for elevation therefore is, first, the measurement of the angle of sight, and secondly, the setting of the sights to that angle by means of a clinometer; this is called clinometer laying. In all cases the actual elevation of the gun to enable the shell to strike the target is a purely mechanical adjustment, performed independently; the gun is moved relatively to the sights, which have been previously set as described. Frequently the battery commander directs the guns from a point at some distance, communication being maintained by signallers or by field telephone. This is the normal procedure when the guns are firing from cover. Instruments of precision and careful calculations are, of course, required to fight a battery in this manner, many allowances having to be made for the differences in height, distance and angle between the position of the battery commander and that of the guns.

29. Ranging 1 (except on the French system alluded to below) is, first, finding the range (i.e. elevation required), and secondly, correcting the standard length of fuze for that range in accordance with the circumstances of each case. To find the elevation required, it is necessary to observe the bursts of shells " on graze " with reference to the target. The battery commander orders two elevations differing by 300 yds., e.g. " 2500,

2800," and tells off a " ranging section " of two guns. These proceed to fire percus- sion shrapnel at the two different elevations, in order to obtain bursts "over" (+) and "short" (—). When it is certain that this " long bracket " is obtained, the " 100 yds. bracket " is found, the elevations in the given case being, perhaps, 2600 and 2700 yds. " Verifying " rounds are then fired, to make certain of the 100 yds. bracket. The old " short bracket " (50 yds.) is not now required except at standing targets. Circumstances may, of course, shorten the process ; for instance, a hit upon the target itself could be " verified " at once. The determination of the fuze (by time shrapnel) follows. The fuze has a standard length for the ascertained range, but the proper correction of this standard length to suit the atmospheric conditions has to be made. The commander has therefore already given out a series of corrector 2 lengths, his object being to secure bursts both in air 1 Finding the line is also an integral part of ranging. When an aiming point is used, the angle at which the guns must be laid with reference to it is calculated and given out by the battery commander. The modern goniometric sight permits of a wide angle (in England 180 right or left) being given. " Deflection " is a small angular correction applied to individual guns.

■ *The " corrector " is an adjustment on the sights of the gun used to determine the correct fuze. In the British Q.F. equipment, a graduated dial or drum shows the elevation of the gun above the line of sight. The fuze lengths are marked on a movable scale opposite the range graduations to which they apply, and the " cor- rector " moves this fuze scale so as to bring different fuze lengths opposite the range graduation. For example, a certain corrector setting gives 11ˆ on the fuze scale opposite 4000 yds. on the range scale, and if the shells set to 1 1 \ burst too high, a new corrector setting is taken, the fuze length 12 is now opposite to the 4000 range*

and on graze. When he is finally satisfied he opens fire " for effect."

30. An example of the ordinary method of ranging, adapted from Field Artillery Training, 1906, is given below.

Battery commander gives target, &c, and orders: " Right section ranging section; remainder corrector 150 increase 10, 4400-4700," for the long bracket.

No. 1 gun fires, elevation 4400 yds., P.S., round observed- No. 2 ,, ,, ,, 4700 ,, ,, ,, ,, +

B.C. orders " 4500-4600." No. 1 gun fires, elevation 4500 yds., P.S., round observed — No. 2 ,, „ ,, 4600 ,, „ „ .. +»

The 100 yds. bracket appears to be 4500-4600. B.C. orders: " Remainder 4500 time shrapnel," and gives the ranging section 4500-4600 to "verify." Guns 3, 4, 5, 6 set fuzes for 4500 with correctors 150, 160, 170, 180.

No. 1 gun fires, elevation 4500 yds., P.S., round observed — No. 2 ,, ,, ,, 4600 ,, ,, ,, „ +

B.C. orders: " Remainder 4500, one round gun fire, 3 seconds." No. 3 elevation 4500 yds. T. S. corrector 150 air No. 4 ,, ,, ,, ,, ,, 160 air

No. 5 ,, ,, ,, ,, ,, 170 graze

No. 6 ,, „ „ „ „ 180

B.C. selects corrector 160 and goes to " section fire." The battery now begins to fire " for effect."

No. 1 elevation 4500 yds. T.S. corrector 160 air

No. 3 „ „ , „ „

followed by Nos. 5, 2, 4 and 6.

There is another method of ranging, viz. with time shrapnel only. In this the principle is that several shells, fired with the same corrector setting, but at different elevations, will burst in air at different points along one line. Bursts high in the air cannot be judged, and it is therefore necessary to bring down the line of bursts to the target, so that the bursts in air appear directly in front or directly in rear of it. Rounds are therefore fired (in pairs owing to possible imperfections in the fuzes) to ascertain the corrector which gives the best line of observation. This found, the target is bracketed by bursts low in the air observed + and — , as in the ordinary method with percussion shrapnel.

The operations of finding the " line of fire " and the proper elevation may be combined, as the shells in ranging can be made to " bracket " for direction as well as for elevation. The line can be changed towards a new target in any kind of direct and indirect laying, in the latter case by observing the angle made with it by the original line of fire and giving deflection to the guns accordingly. Further, the fire of several dispersed batteries may be concentrated, distributed, or " switched " from one target to another on a wide front, at the will of the commander.

31. Observation of Fire, on the accuracy of which depends the success of ranging, may be done either by the battery com- mander himself or by a special "observing" party. Ineithercase the shooting is carefully observed

throughout, and corrections ordered at any time, whether during the process of ranging or during fire for effect. The difficulties of observation vary considerably with the ground, &c, for instance, the light may be so bad that the target can hardly be seen, or again, if there be a hollow in front of the target, a shell may burst in it so far below that the smoke appears thin, the round being then judged " over " instead of " short." On the other hand, a hollow behind the target may cause a .round to be lost altogether. Ranging with time shrapnel has the merit of avoiding most of these " traps." The " French system of fire discipline," referred to below, has this method as the usual procedure.

32. Fire. — Field Artillery ranges are classed in the British service as: "distant," 6000 to 4500 yds.; "long," 4500 to 3500; "effective," 3500 to 2000: and "decisive," 2000 and

graduation, and this length gives bursts closer up and lower. In the German service a corrector (Aufsatzschieber) alters the real elevation given to the gun, so that while throughout the battery all guns have the same (nominal or ordered) elevation shown on the sights, the real elevations of individual guns vary according to the different corrector settings. Thus bursts at different heights and distances from the target are obtained by shifting the trajectory of the shell. The fuze, being set for the nominal elevation common to all the guns, burns for the same time in each case, and thus the burst will be lower and closer to the target with a less (real) elevation, and higher and farther from it with a greater.

under. The actual methods of fire employed are matters of detail; it will be sufficient to say that " section fire," in which the two guns of a section are fired alternately at a named interval, usually 30 seconds, and " rapid fire," in which two, three or more rounds as ordered are fired by each gun as quickly as possible, are the normal methods. Each battery usually engages a portion of the objective equal in length to its own front, owing to the spread of the cone of shrapnel bullets (see below). The fire is, of course, almost always frontal, though enfilade and oblique fire, when opportunities occur for their employment, are more deadly than ever, because of the depth of the cone. As for the general conduct of an artillery action, accurate fire for effect, at a medium rate, is used in most armies, but in the French and, since 1906, in the British services a new method has arisen, in consequence of the introduction of the modern quick-firer and the perfection of the time shrapnel. The French battery (1900 Q.F. equipment) consists of four guns and twelve wagons. The gun is shielded, as also are

the wagons; the high velocity and flat trajectory give a maximum depth to the cone of shrapnel bullets. In the hope of obtaining a rapid and overwhelming fire, the French artillery ranges only for a long bracket, and once this bracket is found, the ground within its limits is swept from end to end in a burst of rapid fire. This is termed a rafale (squall or gust), and techni- cally signifies " a series of eight rounds per gun, each two rounds being laid with 100 metres more elevation than the last pair, the whole fired off as rapidly as possible." The cone of time shrapnel being assumed as 300 yds. (or metres) , it is clear that four pairs of rounds, bursting, say, at 1000,' 1 100, 1200 and 1300 yds. (adding, for the last, 300 yds. for its forward effect), sweep the whole ground between 1000 and 1600 yds. from the guns. The maximum depth would, of course, be obtained with four eleva- tions differing by the depth of the cone; in such a case the space from 1000 to 2200 yds. would be covered, though much less effectively, since the same number of bullets are distributed over a larger area. On the other hand, the rafale, at a minimum, covers 300 yds., all the guns in this case being laid at the same elevation throughout. Here the maximum number of bullets is obtained for every square yard attacked. Between these extremes, a skilful artillery officer can vary the rafale to the needs of each several case almost indefinitely. " Sweeping " fire is a series of three rounds per gun, one in the original line, one to the right and one to the left of it; this is significantly called " mowing " itir fauchant) . A further refinement in both services is the combined " search and sweep." Forty-eight rounds, constituting in the French army a series of this last kind, can, it is said, be fired in 1 minute and 15 seconds, without setting fuzes beforehand, to cover an area of 600 X 200 metres. The result of such a series, worked out mathematically, is that 19 % of all men and 75 % of all horses, in the area and not under cover, should be hit by separate bullets (Bethell, Modem Guns and Gunnery, 1907). Even allowing a liberal deduction for imperfect distribution of bullets, we may feel certain that nothing but shielded guns could live long in the fire-swept zone. This is, of course, a rate of fire which could not be kept up for any length of time by the same battery. A French battery, firing at the maximum rate, would expend every available round in 13 minutes.

33. Projectiles Employed. — " Time shrapnel," say the German Field Artillery regulations, " is the projectile par excellence . . . against all animate targets which are not under cover." It achieves its purpose, as has been said, by sending a shower of bullets over an area of ground in such quantity that this is swept from end to end. These bullets are propelled, in a cone, forward from the point of burst of the shell, and the effective depth of this cone at medium ranges with a fairly high velocity gun may be taken at 300 yds. Further, the corrector enables the artillery commander to burst his shells at any desired point; for example, a long fuze may be given, to burst

them close up when firing upon a deep target (such as troops in several lines, one behind the other) , and thereby to obtain the maximum searching effect, or to obtain direct hits on shielded guns, while a short corrector, bursting the shell well in front of the enemy, allows the maximum lateral spread of the bullets, and therefore sweeps the greatest front. The

number of bullets in the shell is such that troops in the open under effective shrapnel fire must suffer very heavily, and may be almost annihilated. If the enemy is close behind good cover, the bullets, indeed, pass harmlessly overhead. This, however, leads to a very important fact, viz. that artillery can keep down the fire of hostile infantry, " blind " the enemy, in Langlois' phrase, by pinning it down to cover. Under cover the men are safe, but if they raise their heads to take careful aim, they will almost certainly be hit. Their fire under such conditions is therefore unaimed and wild at the best, and may be wholly ineffective. Common shell and high-explosive shell (see Ammu- nition) belong to another class of projectile. The former is now not often used, but a certain proportion of H.E. shell is carried by the field artillery in many armies (see table in Ordnance: Field Equipments). This has a very violent local effect within a radius of 20 to 25 yds. of the point of burst (see Ammunition, fig. 10). It therefore covers far less ground than shrapnel, and is naturally used either (a) against troops under substantial cover or (b) to wreck cover and buildings. In the former case the shell is supposed to send a rain of splinters vertically downwards. This it will do, provided the fuze is minutely accurate, and a burst is thus obtained exactly over the heads of the enemy, but this is now generally held to be unlikely, and in so far as effect against personnel is concerned the H.E. shell is not thought to be of much value. Indeed, in the British and several other services, no H.E. shells at all are carried by field batteries, reliance being placed upon percussion shrapnel in attacking localities, buildings, &c, and for ranging. Experiments have been made towards pro- ducing a "H.E. shrapnel," which combines the characteristics of both types (see, for a description, Ammunition). For the pro- jectiles used in attacking shielded guns, see section on " field howitzers " below. Case shot is now rarely employed. In the war of 1870-71 Prince Kraft von Hohenlohe-Ingelfingen, who commanded the Prussian Guard artillery, reported the ex- penditure of only one round of case, and even that was merely " broken in transport." The close-quarters projectile of to-day is more usually shrapnel with the fuze set at zero. Langlois, however, calls case shot " the true projectile for critical moments, which nothing can replace."

34. Tactics of Field Artillery. — On the march, the position and movement of the guns are regulated by the necessity of coming quickly into action; the usual place for the arm is at or near the heads of the combatant columns, i.e. as far forward as is consistent with safety. Safety is further provided for by an " escort," or, if such be not detailed, by the nearest infantry or

cavalry. In attack, the role of the field artillery is usually (1) to assist if necessary the advanced guard in the preliminary fighting — for this purpose a battery is usually assigned to that corps of troops, other batteries also being sent up to the front as required, (2) to prepare, and (3) to support or cover the infantry attack. "Preparation " consists chiefly in engaging and subduing the hostile artillery. This is often spoken of as the " artillery duel," and is not a meaningless bombardment, but an essential preliminary to the advance. Massed guns with modern shrapnel would, if allowed to play freely upon the attack, infallibly stop, and probably annihilate, the troops making it. The task of the guns, then, is to destroy the opposing guns and artillerymen, a task which will engage almost all the resources of the assailant's artillery in the struggle for artillery superiority. Shielded guns, enhanced rate of fire, perfection in indirect laying apparatus, and many other factors, have modified the lessons of 1870, and complicated the work of achieving victory in the artillery duel so far that the simple " hard pounding " of former days has given way to a variety of expedients for inflicting the desired loss and damage, as to which opinions differ in and within every army. One point is, however, clear and meets with universal acceptance. " The whole object of the duel is to enable the artillery subsequently to devote all available resources to its principal task, which is the material and moral support of the infantry during each succeeding stage of the fight " (French regulations). One side must be victorious in the end, and when, and not until, the hostile artillery is beaten out of action, the

victor has acquired the power of pressing home the attack. The British regulations (1906), indeed, deal with the steps to be taken when, though the artillery of the attack is beaten, the infantry advance is continued, but only so as to order the guns to " reopen at all costs," in other words, as a forlorn hope. The second part of the preparation, the gradual disintegration of the opposing line of infantry, has practically disappeared from the drill books. The next task of the guns, and that in which modern artillery asserts its power to the utmost, is the support of the infantry attack. The artillery and infantry co-operate, " the former by firing rapidly when they see their own infantry . . . press forward, and the latter by making full use of the periods of intense artillery fire to gain ground " (British F.A. Training, 1906). Thus aided, the infantry closes in to decisive ranges, and as it gains ground to the front, every gun " must be at once turned upon the points selected . . . the most effective support afforded to the attacking infantry by the concentrated fire of guns and field howitzers. The former tie the defenders to their entrench- ments (for retreat is practically impossible over

ground swept by shrapnel bullets), distract their attention and tend to make them keep their heads down, while the shell from the field howitzers searches out the interior of the trenches, the reverse slopes of the position, and checks the movement of reinforcements towards the threatened point." In these words the British Field Artillery drill-book of 1902 summarizes the act of " cover- ing " the infantry advance. Unofficial publications are still more emphatic. The advance of the infantry to decisive range would often be covered by a mass of one hundred or more field guns, firing shrapnel at the rate of ten rounds per gun per minute at the critical moment. Against such a storm of fire the defend- ing infantry, even supposing that its own guns had refitted and were again in action, would be powerless. It is in recognition of the appalling power of field artillery (which has increased in a ratio out of all proportion to the improvements of modern rifles) that the French system has been elaborated to the perfec- tion which it has now attained.

With modern guns and modern tactics artillery almost in- variably fires over the heads of its own infantry. The German regulations indeed say that it should be avoided as far as possible, but, as a matter of fact, if the numerous guns of a modern army (at Koniggratz there were 1550 guns on the field, at Gravelotte 1 252, at Mukden 3000) were to be given a clear front, there would be no room for deploying the infantry. Consequently the French regulations, in which the power of the artillery is given the greatest possible scope, say that " it almost always fires over the heads of its own infantry." With field guns and on level ground it is considered dangerous that infantry in front of the guns should be less than 600 yds. distant — not for fear of the shells striking the infantry, but because the fragments resulting from a " premature " burst are dangerous up to that distance. The question of distance is more important in connexion with the " covering " of the assault. Up to a point, the artillery enables the attacking infantry to advance with a minimum of loss and exhaustion, and thus to close with the enemy at least on equal terms, if not with a serious advantage, for the fire of the guns may shake, perhaps almost destroy the enemy's power of resistance. But when the infantry approaches the enemy the guns can no longer fire upon the latter's front line without risk of injuring their friends. All that they can do, when the opposing infantries can see the whites of each other's eyes, is to lengthen the fuze, raise the trajectory and sweep the ground where the enemy's supports are posted. Under these circumstances it is practically agreed that the risk should be taken without hesitation at so critical a moment as that of a decisive infantry assault which must be pushed home at whatever cost. " It will be better for the infantry to chance a few friendly shells than to be received at short range with a fresh outburst of hostile rifle fire " (Rouquerol, Tactical Employment of Quick-firing Field Artillery). Thus, the distance at which direct support ceases, formerly 600

yds., has been diminished to 100, and even to 50 yds. Howitzers can, of course, maintain their fire almost up to the very last stage, and, in general, high-explosive shell, owing to its

purely local effect, may be employed for some time after it has become unsafe to use shrapnel.

35. Field artillery in defence, which would presumably be inferior to that of the attack, must, of course, act according to circumstances. We are here concerned not with the absolute strength or weakness of the passive defensive, which is a matter of tactics (q.v.), but with the tactical procedure of artillery, which, relatively to other methods, is held to offer the best chance of success, so far as success is attainable. On the defensive in a prepared position, which in European warfare at any rate will be an unusually favourable case for the defender — the guns have two functions, that of engaging and holding the hostile artillery, and that of meeting the infantry assault. The dilemma is this, that on the one hand a position in rear of the line of battle, with modern improvements in communicating and indirect laying apparatus, is well suited for engaging the hostile guns, but not for meeting the assault; and on the other, guns on the for- ward slope of the defender's ridge or hill can fire direct, but are quickly located and overwhelmed, for they can hardly remain silent while their own infantry bears the fire of the assailant's shrapnel. Thus the defender's guns would, as a rule, have to be divided. One portion would seek to fight from rearward concealed positions, and use every device to delay the victory of the enemy's guns and the development of the battle until it is too late in the day for a serious infantry attack. Further, the enemy's mistakes and the " fortune of war " may give oppor- tunities of inflicting severe losses; such opportunities have always occurred and will do so again. In the possible (though very far from probable) case of the defender not merely baffling, but crushing his opponent in the artillery duel, he may, if he so desires, himself assume the role of assailant, and at any rate he places a veto on the enemy's attack.

The portion told off to meet the infantry assault would be entrenched on the forward slope and would take no part in the artillery duel. Very exceptionally, this advanced artillery might fire upon favourable targets, but its paramount duty is to remain intact for the decisive moment. Here again the defender is confronted with grave difficulties. It is true that his advanced batteries may be of the greatest possible assistance at the crisis of the infantry assault, yet even so the covering fire of the hostile guns, as soon as the hostile infantry had found them their target, may be absolutely overwhelming; moreover, once the fight has begun, the guns cannot be withdrawn, nor can their positions easily be modified to meet unexpected developments. The proportion of the whole artillery force which should be

com- mitted to the forward position is disputed. Colonel Bethell (Journal Royal Artillery, vol. xxxiii. p. 67) holds that all the mountain guns, and two-thirds of the field guns, should be in the forward, all the howitzers and heavy guns and one-third of the field guns in the retired position. But in view of the facts that if once the advanced guns are submerged in the tide of the enemy's assault, they will be irrecoverable, and that a modern Q.F. gun, with plenty of ammunition at hand, may use " rapid fire " freely, artillery opinion, as a whole, is in favour of having fewer guns and an abnormal ammunition supply in the forward entrenchments, and the bulk of the artillery (with the ammunition columns at hand) in rear. But the purely passive defensive is usually but a preliminary to an active counter-stroke. This counter-attack would naturally be supported to the utmost by the offensive tactics of the artillery, which might thus at the end of a battle achieve far greater results than it could have done at the begin- ning of the day. In pursuit, it is universally agreed that the action of the artillery may be bold to the verge of rashness. The employment of field artillery in advanced and rear guard actions varies almost indefinitely according to circumstances; with outposts, guns would only be employed exceptionally.

36. Marches. — The importance of having the artillery well up at the front of a marching column is perhaps best expressed in the phrase of Prince Kraft von Hohenlohe-Ingelfingen, " save hours and not minutes." The Germans in 1870 so far acted up to the principle that Prince Hohenlohe, when asked, at the beginning

of the battle of Sedan, for a couple of guns, was able to reply, " You shall have ninety " (see, for details of the march of the Guard artillery, his Letters on Artillery, 6th letter). The German regulations for field service say, very plainly, " the horses have not done their work until they have got the guns into action, even at the cost of utter exhaustion." A notable march was made by the 62nd battery, R.F.A., in the South African War. On the day of the battle of Modder River, the battery marched 32 m. (mostly through deep sand) arriving in time to take part in the action. Such forced marches, if rare, are nowadays expected to be within the power of field artillery to accomplish. Horse artillery is capable of more than this, and as to pace, manoeuvr- ing at the cavalry rate. Heavy guns are the least mobile, and would rarely be able to keep pace with infantry in a forced march. Field artillery walks 4, trots 9, and gallops at the rate of 1 5 m. an hour. A fair marching pace (trot and walk) is 4 m. an hour for field, 5 for horse batteries. A march of 14 m. would, according to the German regulations, be performed by

a field battery in 5 hours,

a horse battery in 4 hours, under favourable circumstances (Bronsart von Schellendorf).

37. Power and Mobility. — It will have been made clear that every gun represents a compromise between these two require- ments, and that each type of artillery has been evolved in accord- ance with the relative requirements of these conditions in respect of the work to be performed. The classification which has been followed in this article represents the practically unanimous decision of every important military state. Still, there has always been controversy between the individual adherents of each side, and the Boer War experiences raised the question as to whether field artillery, as the term is usually understood, should not be abolished, with a view to having only heavy guns and horse artillery with a field army.

38. Concentration and Dispersion. — The use of their artillery made by the Boers in the South African War led to the revival of the idea of " dispersing " guns instead of " concentrating " them. It would be more accurate to say that military thinkers had, after the introduction of the quick-firing gun, challenged every received principle, and amongst others the employment of artillery in masses, which, as a result of the war of 1870, " had become almost an article of faith." The idea was to make use of the increased power of the guns to gain equally great results with the employment of less material than formerly. Thus the dispersion of guns is bound up with the passive defensive. The first editions of the British Field Artillery Training and Combined Training, strongly influenced as they were by South African experience, did not legislate, even in dealing with defence, for " dispersion " in the Boer manner, but only for adaptability (see Field Artillery Training, 1902, p. 15). In the Boer War, whilst the Boers nearly always scattered their guns, almost the only occasion upon which their artillery played a decisive part was at Spion Kop, where its fire was concentrated upon the point of assault. At Pieter's Hill, the fire of seventy guns covered the British infantry assault in the Napoleonic manner. On the whole it may be accepted as a general truth that guns are safe, and may be locally effective, when dispersed, but that they cannot produce decisive effect except when used in masses. It must, however, be clearly understood that a " mass " in this sense means a large number of guns, under one command, and susceptible of being handled as a unit, so far as the direction and effectiveness of their fire is concerned. This being secured, and on that condition only, it does not matter whether the actual gun positions are scattered over a few square miles, or are closed in one long line .and using direct fire — they are still a mass, and capable of acting effectively as such. While there are undoubtedly grave dangers in using the indirect method too freely, technical improvements in laying, telephones, &c, have

had much to do with the possibility, at any rate under favourable circumstances, of a concentration which may be described as one of shells rather than of guns, and the reader is reminded in this connexion that the work formerly done by the gun is now performed by the shell.

39. Horse Artillery is to be regarded as field artillery of great

mobility and manoeuvring power. Its value may be said, in general terms, to lie in augmenting the weak fire-power of the mounted troops, and in facilitating their work as much as possible. Thus, when cavalry meets serious opposition in reconnoitring, the guns may be able to break down the enemy's resistance without calling for assistance from the main body of the cavalry, and, in the action of cavalry versus cavalry, the "paramount duty of the horse artillery is to shatter the enemy's cavalry " {Field Artillery Training, 1906), i.e. to "prepare" the success of the cavalry charge by breaking up as far as possible the enemy's power of meeting it. In the cavalry battle, covering fire is practically impossible, owing both to the short distances separating the combatants and to the rapidity of their movements, but steps are taken " to enable all the guns to bear on the enemy's cavalry at the points of collision." The ideal position for the horse artillery is out to a flank, the cavalry manoeuvring so as to draw the enemy's cavalry under enfilade fire, and at the same time to force them to mask the fire of their own horse artillery. Another and a most important function of the horse batteries is to rein- force, with the greatest possible speed, any point in the general line of battle which is in need of artillery support. For this reason the corps artillery generally includes horse batteries.

40. Field Howitzers are somewhat less mobile than field guns; they have, however, far greater shell power. The special features of the weapon are, of course, the product of the special require- ments which have called it into existence. These are, briefly (a) the necessity of being able to " search " the interior of earthworks, a task which, as has been said, is beyond the power of high-velocity field guns, and (b) demolition work, which is equally beyond the power of even a H.E. shell of field-gun calibre. The first of these conditions implies a steep "angle of descent," which again implies a high angle of elevation. The second requires great shell power but does not call for high velocity. The howitzer, therefore, is a short gun, firing a heavy shell at high angles of elevation. Howitzers almost always are laid by the indirect method of fire from under cover, since it is clear that, with high angles of elevation, the gun may be brought close up to the covering mass, and still fire over it. Ranging must be done very accurately and yet economically, as but few of their heavy shells can be carried in the wagons and limbers, and the shells descending upon an enemy almost vertically lose the long sweeping effect of the field shrapnel which neutralizes minor

errors of ranging. The projectiles employed are high explosive and shrapnel, the latter for use against personnel under cover, the former for demolition of field works, casemates or buildings. It is very generally held that howitzer time shrapnel is the best form of projectile for the attack of shielded guns. Here it may be said that no completely satisfactory method of dealing with these has yet been discovered. The best procedure with field guns is said to be lengthening the fuze to obtain a high percentage of bursts on graze. A shell striking the face of the shield will penetrate it, and should kill some at least of the gun detachment behind. The high-explosive shrapnel alluded to above is designed primarily for the attack of shielded guns.

41. Heavy Field Artillery, alternatively called Artillery of Position, as has been said, includes all guns of 4-in. calibre and upwards, mounted on travelling carriages. In South Africa, where firm soil was usually to be found, 6-in. guns were employed as heavy field guns, but in Europe even the 5-in. (British Service) is liable to sink into the ground. In Great Britain, guns only are used by this branch; abroad, the "heavy artillery of the field army," the "light siege train," &c, as it is variously called, is as a rule composed of howitzers of a heavier calibre than the field howitzer, the 15-cm. (6-in.) howitzer being most commonly met with. This artillery has, however, a different tactical r61e from the heavy field artillery of the British service; and it is always with a view to the attack of permanent or semi- permanent fortifications that the materiel is organized. In Great Britain, heavy batteries armed with the 5-in. gun are considered as " an auxiliary to the horse and field artillery " {Heavy Artillery Training). Ranging is conducted with greater

deliberation than ranging with the lighter guns, though upon the same general lines. Parts of the process may, however, be omitted in certain circumstances. Heavy guns use high-explosive (lyddite) shells and time shrapnel, the former for ranging and for demolishing cover, the latter against personnel. Laying is usually indirect. The tactical principles upon which heavy artillery does its work are based, in the main, on the long range (up to 10,000 yds.) and great shell-power of the guns. This power enables the artillery to reach with effect targets which are beyond the range of lighter ordnance, and it is, therefore, considered possible to disperse the guns in batteries, and even in sections of two guns, along the front of the army, without forfeiting the power of concentrating their fire on any point — a power which otherwise they would not possess owing to their want of mobility. At the same time it is not forbidden to bring them into line with

the rest of the artillery, in order to achieve a decisive result. In the attack, beside the general task of supplementing the effect of other natures of ordnance, heavy artillery may demolish cover, buildings, &c, held by the enemy, and during the infantry assault they may do excellent service in sweeping a great depth of ground, their smaller angle of descent, and the greater remaining velocity and heavier driving charge of their shrapnel, as compared with field guns, enabling them to do this effectively. In the defence, long-range fire has great value, especially in sweeping approaches which the enemy must use. In pursuit, the heavy artillery may be able to shell the main body of the enemy during its retreat, even if it has left a rear- guard. In retreat, the want of mobility of these guns militates against their employment in exposed positions, such as rearguards usually have to take up.

Bibliography. 1 — Amongst general historical works may be mentioned Napoleon III. and Col. Fave, Htudes surle passe et Vavenir de Vartillerie (Paris, 1846-1871); C. von Decker, Geschichte des Geschiitzwesens (Berlin, 1822) ; H. W. L. Hime, Stray Military Papers (London, 1901); Die Beziehung Friedrichs des Grossen zu seiner Artillerie (Berlin, 1865); H. von Muller, Die Entwickelung der Feldartillerie, 1815-1892 (Berlin, 1893-1894); J. Campana, V Artillerie de campagne, 1792-1901 (Paris, 1901); v. Reitzenstein, Das Geschutzwesen, &c. in Hannover und Braunschweig 1365 bis.zur Gegenwart (Leipzig, 1900) ; Kretschmar, Gesch. d. sachsischen Feld- art. 1620-1878 (1879); Schoning, Gesch. des brandenbg.-preuss. Art. (1844-1845); Schneller, Litteratur d. Artillerie (1768); v. Tempelhof, Gesch. d. Artillerie (1797); Duncan, Hist, of the Royal Artillery. jA complete bibliography and criticism of the artillery works of the 14th, 15th and 16th centuries will be found in Max Jahns, Geschichte der Kriegswissenschaften, pp. 221-236,382-424, 621, 658 and 747-752. For the early 17th century, Diego Ufano, Tratado de la Artilleria (1613) is a standard treatise of the time, but the mystery preserved by artillerists in regard to their arm is responsible for an astonishing dearth of artillery literature even in the time of the Thirty Years' War. In 1650 appeared Casimir Simienowicz' Ars magnae artilleriae, an English translation of which was published in London in 1729, and in 1683 Michael Mieth published Artilleriae Recentior Praxis. The first edition of Surirey de S. Remy, Memoires d 'Artillerie, appeared in Paris in 1697. With the reorganization of the arm in the early 18th century came many manuals and other works (see Jahns, op. cit. pp. 1607-1621 and 1692-1698), amongst which may be mentioned the marquis de Quincy s Art de la guerre C1726). From 1740 onwards numerous manuals appeared, mostly official riglements — see French General Staff, L'A rtilleriefrancaise au X VIII' Steele (1908); and the tactical handling of the arm is treated in general works, such as Guibert's, on war. See also de

Morla, Tratado de la Artilleria (1784), translated into German by Hoyer (Lehrbuch der Art.-Wissenschaft,Leipzig, 1821-1826); Du Service de Vartillerie i la guerre (Paris, 1780, German translation, Dresden, 1782, and English, by Capt. Thomson, R.A., London, 1789), Bardet de Villeneuve's Traite de Vartillerie (Hague, 1741), and Hennebert, Gribeau- val, Lieut.-General des armees du Roy (Paris, 1896). Important works of the period 1800-1850 are Scharnhorst, Handbuch der Artillerie (Hanover, 1804-1806, French translation by Fourcy, Traite sur Vartillerie, Pans, 1840-1841); Rouvroy, Vorlesungen uber die Artillerie (Dresden, 1821-1825); Timmerhans, Essai d'un traite d'artillerie (Brussels, 1839-1846); C. v. Decker, Die Artillerie fur alle Waffen (1826); Griffiths, The Artillerist's Manual (Woolwich, 1840); Piobert, Traite d'artillerie (Paris, 1845-1847); Taubert (translated by Maxwell), Use of Field Artillery on Service (London, 1856); Capt. Simmonds, R.A., Application of Artillery in the Field (London, 1819); Gassendi, Aide-memoire a Vusage des officiers d'artillerie (Paris, 1819). See also Girod de l'Ain, Grands artilleurs, Drouot, Senarmont, Tible (Paris, 1894). Among the numerous works

1 Most of the works named deal with technical questions of equip- ment, ammunition, ballistics, &c.

on modern field artillery may be mentioned Prince Hohenlohe- Ingelfingen, Briefe uber Artillerie (Berlin, 1887, 2nd ed., English translation by Col. Walford, Letters on Artillery, Woolwich, 1887); Hoffbauer, Taktik der Feldartillerie, 1866 und 1870-1871 (Berlin, 1876), and Applikatorische Studie uber Verwendung der Artillerie (Berlin, 1884) ; Erb, L' Artillerie dans les batailles de Metz (Paris, 1906); Leurs, L'Art. de campagne prussienne 1864-1870 (Brussels, 1874); v. Schell, Studie uber Taktik der Feldartillerie (quoted abova); Hennebert, Artillerie moderne (Paris, 1889); and for quick-firing artillery, Langlois, Artillerie de campagne en liaison avec les autres armes (Paris, 1892 and 1907) ; Wille, Feldgeschiitz der Zukunft (Berlin, 1891); Waffenlehre (2nd ed., 1901); and Zur Feldgeschiitzfrage (Berlin, 1896); Rohne, Die Taktik der Feld- artillerie (Berlin, 1900), Studie uber d. Schnellfeuergeschiitze in Rohrriicklauflafette (Berlin, 1901), Die franzosische Feldartillerie (Berlin, 1902) ; Eniwicklung des Massengebrauchs der Feldartillerie (Berlin, 1900); and articles in Jahrbucher f. d. Deutsche Armee und Marine (October 1901 and January 1905) ; Hoffbauer, Die Frage des Schnellfeuerfeldgeschutzes (Berlin, 1902), and Verwendung der Feld- haubitzen (Berlin, 1901); Wangemann, Fur die leichte Feldhaubitze (Berlin, 1904); von Reichenau, Studie uber . . . Ausbildung der Feldart. (Berlin, 1896), Einfluss der Schilde auf die Entwicklung des F.A. Materials, and Neue Studien uber die Entwicklung der Feldart. (Berlin, 1902 and 1903); Smekal, Filhrung und Verwendung der Divisions Artillerie (Vienna, 1901); Korzen and Kiihn, Waffen- lehre

(Vienna, 1906) ; G. Rouquerol, Emploi de Vartillerie de campagne & tir rapide (Paris, 1901), and Organisation de Vartillerie de campagne (Paris, 1903) ; Girardon-Lagabbe, Organisation du matSriel de Var- tillerie de campagne (Paris, 1903) ; and in English, Capt. P. de B. Radcliffe's translation of Rouquerol 's work (The Tactical Employ- ment of Quick-firing Field Artillery, London, 1903), and especially Lt.-CoI.H. A. Bethell, Modern Guns and Gunnery (Woolwich, 1907). See also the current drill manuals of the British, French and German artillery. (C. F. A.)

ARTIODACTYLA (from Gr. apnos, even, and So.ktv'Kos, a finger or toe, "even-toed"), the suborder of ungulate mammals in which the central (and in some cases the only) pair of toes in each foot are arranged symmetrically on each side of a vertical line running through the axes of the limbs. As contrasted with the Perissodactyla living, and in a great degree extinct, Artio- dactyla are characterized by the following structural features. The upper premolar and molar teeth are not alike, the former being single and the latter two-lobed; and the last lower molar of both first and second dentition is almost invariably three- lobed. Nasal bones not expanded posteriorly. No alisphenoid canal. Dorsal and lumbar vertebrae together always nineteen, though the former may vary from twelve to fifteen. Femur without third trochanter. Third and fourth digits of both feet almost equally developed, and their terminal phalanges flattened on their inner or contiguous surfaces, so that each is not sym- metrical in itself, but when the two are placed together they form a figure symmetrically disposed to a line drawn between them. Or, in other words, the axis or median line of the whole foot is a line drawn between the third and fourth digits (fig. 1). Lower articular surface of the astragalus divided into two nearly equal facets, one for the navicular and a second for the cuboid bone. The calcaneum with an articular facet for the lower end of the fibula. Stomach almost always more or less complex. Colon convoluted. Caecum small. Placenta diffused or cotyle- donary. Teats either few and inguinal, or numerous and abdominal.

Artiodactyla date from the Eocene period, when they appear to have been less numerous than the Perissodactyla, although at the present day they are immeasurably ahead of that group, and form indeed the dominant ungulates. As regards the gradual specialization and development of the modern types, the follow- ing features are noteworthy.

1. As regards the teeth, we have the passage of a simply tubercular, or bunodont (fiowos, a hillock) type of molar into one in which the four main tubercles, or columns, have assumed a crescentic form, whence this type is termed selenodont (oeh-qvi}, the new moon). Further, there is the modification of the latter from a short-crowned, or brachyodont type, to one in which the columns are tall, constituting the hypsodont, or

hypsiselenodont, type. It is noteworthy, however, that in some instances there appears to have been a retrograde modification from the seleno- dont towards the bunodont type, the hippopotamus being a case in point. Other modifications are the loss of the upper incisors;

the development of the canines into projecting tusks; and the loss of the anterior premolars.

2. As regards the limbs. Reduction of the ulna from a com- plete and distinct bone to a comparatively rudimentary state in which it coalesces more or less firmly with the radius. Reduction of the fibula till nothing but its lower extremity remains. Reduc- tion and final loss of outer pair of digits (second and fifth), with coalescence of the metacarpal and metatarsal bones of the two middle digits to form a cannon-bone. Union of the navicular and cuboid, and sometimes the ectocuneiform bone, of the tarsus.

3. Change of form of the odontoid process of the second or axis vertebrae from a cone to a hollow half-cylinder.

4. Development of horns or antlers on the frontal bones, and gradual complication of form of antlers.

5. By inference only, increasing complication of stomach with ruminating function superadded. Modification of placenta from simple diffused to cotyledonary form.

ABC

Fig. 1. — Bones of Right Fore Feet of existing Artiodactyla.

A, Pig (Sus scrofa). U, Ulna. u, Unciform.

B, Red deer (Cervus elaphus). R, Radius. m, Magnum.

c, Cuneiform. td, Trapezoid.

C, Camel (Camelus bactrianus). I, Lunar.

s. Scaphoid. In the Sheep and the Camel the long compound bone, supporting the two main (or only) toes is the cannon-bone.

The primitive Artiodactyla thus probably had the typical number (44) of incisor, canine and molar teeth, brachyodont molars, conical odontoid process, four distinct toes on each foot, with metacarpal, metatarsal and all the tarsal bones distinct, and no frontal appendages.

As regards classification, the first group is that of the Pecora, or Cotylophora, in which the cheek-teeth are selenodont, but there are no upper incisors or canine-like premolars, while upper canines are generally absent, though some- times largely developed. Inferior incisors, three on each side with an incisiform canine in contact with them. Cheek-teeth consisting of />.§, w.f ,in continuous series. Auditory bulla simple and hollow within. Odontoid process of second vertebra in the form of a crescent, hollow above. Lower extremity of the fibula represented by a distinct malleolar bone articulating with the outer surface of the lower end of the tibia. Third and fourth metacarpals and metatarsals confluent into cannon-bones (fig. 1 B), and the toes enclosed in hoofs. Outer toes small and rudi- mentary, or in some cases entirely suppressed; their metacarpal or metatarsal bones never complete. Navicular and cuboid bones of tarsus united. The skull generally lacks a sagittal crest; and the condyle of the lower jaw is transversely elongated. Horns or antlers usually present, at least in the male sex. Left brachial artery arising from a common innominate trunk,

instead of coming off separately from the aortic arch. Stomach with four complete cavities. Placenta cotyledonous. Teats 2 or 4.

The group at the present day is divided into Giraffidae (giraffe and okapi), Cervidae (deer), Antilocapridae (prongbuck), and Bovidae (oxen, sheep, goats, antelopes, &c). (See Pecora.)

The second group is represented at the present day by the camels (Camelus) of the Old, and the llamas (Lama) of the New World, collectively constituting the family Camelidae. They derive their name of Tylopoda (" boss-footed ") T y"P° da – from the circumstance that the feet form large cushion-like pads, supporting the weight of the body, while the toes have broad nails on their upper surface only, instead of being encased in hoofs. The cheek-teeth are selenodont, and one pair of upper incisors is retained, while some of the anterior premolars assume a canine-like shape, and are separated from the rest of the cheek- series. Auditory bulla filled with honeycombed bony tissue Odontoid process of second vertebra semi-cylindrical; skull with a sagittal crest; and the condyle of the lower jaw rounded. Third and fourth metacarpals and metatarsals (which are alone present) fused into cannon-bones for the greater part of their length, but diverging inferiorly (fig. 1, C) and with their articular surfaces for the toes smooth, instead of ridged $s in the Pecora. Navi- cular and cuboid bones of tarsus distinct. No horns or antlers. Stomach, although complex, differing essentially from that of the Pecora. Placenta diffuse, without cotyledons. Teats few. (See Tylopoda.)

In the same sectional group is included the North American family of

oreodonts (Oreodontldae) , which are much more primi- tive ruminants, "with shorter necks and limbs, the full series of 44 teeth, all in apposition, and the metacarpal and metatarsal bones separate, and the toes generally of more normal type, although sometimes claw-like. (See Oreodon.) The Eocene American genus Homacodon is regarded as representing a third family group, the Homacodontidae (= Pantolestidae), in which the molars were of a bunodont type, and approximate to those of the Condylarthra from which this family appears to have sprung, and to have given origin on the one hand to the Oreodontldae, and on the other to the Camelidae. The family is represented in the Lower, or Wasatch, Eocene by Trigonolestes, in the Middle (Bridger) Eocene by Hcmacodon (Pantolestes), and in the Upper (Uinta) Eocene by Bunomeryx.

The third group is that represented by the chevrotains or mouse-deer, forming the family Tragulidae, with Tragulus in south-eastern Asia and Dorcatherium (or Hyomoschus) j- rajm j] nai in equatorial Africa. The cheek-teeth are selenodont, as in the two preceding groups; there are no upper incisors, but there are long, narrow and pointed upper canines, which attain a large size in the males; the lower canines are incisor-like, as in the Pecora, and there are no caniniform premolars in either jaw. Cheek-teeth in a continuous series consisting of p.%, w.f . Odon- toid process of axis conical. Fibula complete. Four complete toes on each foot. The middle metacarpals and metatarsals generally confluent, the outer ones (second and fifth) slender but complete, i.e. extending from the carpus or tarsus to the digit. Navicular, cuboid and ectocuneiform bones of tarsus united. Auditory bulla of skull filled with cancellar tissue. No frontal appendages. Ruminating, but the stomach with only three distinct compartments, the maniplies or third cavity of the stomach of the Pecora being rudimentary. Placenta diffused. (See Chevrotain.)

In this place must be mentioned the extinct Oligocene Euro- pean group typified by the well-known genus Anoplolherium of the Paris gypsum-quarries, and hence termed Anoplotherina, although the alternative title Dicho- bunoidea has been suggested. It includes the two families Anoplotheriidae and Dichobunidae, of which the first died out with the Oligocene, while the second may have given origin to the Tragulina and perhaps the Pecora. There is the full series of 44 teeth, generally without any gaps, and most of the bones of the skeleton are separate and complete; while, in many instances at any rate, the tail was much longer than in any existing ungulates, and the whole bodily form

Aaopfo" therina.

approximated to that of a carnivore. The upper molars, which may be either selenodont or buno-selenodont, carry five cusps each, instead of the four characteristic of all the preceding groups; and they are all very low-crowned, so as to expose the whole of the valleys between the cusps. In Anoplotherium, some of the species of which were larger than tapirs, there were either two or three toes, the latter number being almost unique among the Artiodactyla. Allied genera are Diplobune and Dacrytherium. The Dichobunidae include the genus Dichobune, of which the species were small animals with buno-selenodont molars. Xiphcdon and Dichodon represent another type with cutting premolars and selenodont molars; while Caenotherium and Plesiomeryx form yet another branch, with resemblances to the ruminants. The most interesting genera are, however, the Upper Oligocene and Lower Miocene Gelocus and Prodremotherium, which have perfectly selenodont teeth, and the third and fourth metacarpal and metatarsal bones respectively fused into an imperfect cannon-bone, with the reduction of the lateral meta- carpals and metatarsals to mere remnants of their upper and lower extremities. While Gelocus exhibits a marked approxima- tion to the Tragulidac, Prodremotherium comes nearer to the

Sulna.

Fig 2. — Restoration of Anoplotherium commune.

Cervidac, of which it not improbably indicates the ancestral type. The Dichobunidae may be regarded as occupying a position analogous to that of the Homacodontidae in the Tylopoda, and like the latter, are probably the direct descendants of Condylarthra. The last section of the Artiodactyla is that of the Suina, represented at the present day by the pigs (Suidae), and the hippopotamuses"(.H'i/>/>0ˆ0to»Mdae), and in past times by the Anthracotheriidae, in which may probably be included the Elotheriidae. In the existing members of the group the cheek-teeth approximate to the bunodont type, although showing signs of being degenerate modifications of the selenodont modification. There is at least one pair of upper incisors, while the full series of 44 teeth may be present. The metacarpals and metatarsals are generally distinct (fig. 1 A), and never fuse into a complete cannon-bone; and the navicular and cuboid bones of the tarsus are separate. The odontoid process of the second vertebra is pig-like : and the tibia and fibula and radius and ulna are severally distinct. The stomach is simple or some- what complex, and the placenta diffused. The Suidae include the Old World pigs {Suinae) and the American peccaries (Dicoty-linae), and are characterized by the snout terminating in a fleshy disk-like expansion, in the midst of which are perforated the nostrils; while the toes

are enclosed in sharp hoofs, of which the lateral ones do not touch the ground. There is a caecum. The Dicotylinae differ from the Suinae in that the upper canines are directed downwards (instead of curving upwards) and have sharp cutting-edges, while the toes are four in front and three behind (instead of four on each foot), and the stomach is complex instead of simple. In the Old World a large number of fossil forms are known, of which the earliest is the Egyptian Eocene Geniohyus. Originally the family was an Old World type, but in the Miocene it gained access into North America, where the earliest form is Bothriolabis, an ancestral peccary showing signs of affinity with the European Miocene genus Palaeochoerus. (See Swine and Peccary.)

The Hippopotamidae are an exclusively Old World group, in which the muzzle is broad and rounded and quite unlike that of the Suidae, while the crowns of the cheek-teeth form a distinctly trefoil pattern, when partially worn, which is only foreshadowed

in those of the latter. The short and broad teeth terminate in four subequal toes, protected by short rounded hoofs, and all reaching the ground. The hinder end of the lower jaw is provided with a deep descending flange. Both incisors and canines are devoid of roots and grow throughout life, the canines, and in the typical species one pair of lower incisors, growing to an immense size. The stomach is complex; but there is no caecum. Although now exclusively African, the family (of which all the representatives may be included in the single genus Hippo- potamus, with several subgeneric groups) is represented in the Pliocene of Europe and the Lower Pliocene of northern India. Its place of origin cannot yet be determined.

The extinct Anthracotheriidae were evidently nearly allied to the Hippopotamidae, of which they are in all probability the ancestral stock. They agree, for instance, with that family in the presence of a descending flange at the hinder end of each side of the lower jaw; but their dentition is of a more generalized type, comprising the full series of 44 teeth, among which the incisors and canines are of normal form, but specially enlarged, and developing roots in the usual manner. The molars are partially selenodont in the typical genus Anthracotherium, with five cusps, or columns, on the crowns of those of the upper jaw, which are nearly square. The genus has a very wide distribution, extending from Europe through Asia to North America, and occurring in strata which are of Oligocene and Miocene age. In Ancodon (Hyopolamus) the cusps on the molars are taller, so that the dentition is more decidedly selenodont; the distribution of this genus includes not only Europe, Asia and North Africa, but also Egypt where it occurs in Upper Eocene beds in company with the European genus Rhagatherium, which is nearer Anthra- cotherium. On the other hand, in Merycopolamus, of the Lower Pliocene of India and Burma, the upper

molars have lost the fifth intermediate cusp of Ancodon; and thus, although highly selenodont, might be easily modified, by a kind of retrograde development, into the trefoil-columned molars of Hippopotamus. In the above genera, so far as is known, the feet were four-toed, although with the lateral digits relatively small; but in Elotherium (or Entelodon), from the Lower Miocene of Europe and the Oligocene of North America, the two lateral digits in each foot had disappeared. This is the more remarkable seeing that Elotherium may be regarded as a kind of bunodont Anthracotherium. It shows the characteristic hippopotamus-flange to the lower jaw, but has also a large descending process from the jugal bone of the zygomatic arch of the skull. Finally, we have in the Pliocene of India the genus Tetraconodon, remarkable for the enormous size attained by the bluntly conical premolars; as the molars are purely bunodont, this genus seems to be a late and specialized survivor of a primitive type. (R. L.)*

ARTISAN, or Artizan, a mechanic; a handicraftsman in distinction to an artist. The English word (from Late Lat. artilianus, instructed in arts) at one time meant " artist," but has been restricted to signify the operative workman only.

*ARTOIS, an ancient province of the north of France, corre- sponding to the present department of Pas de Calais, with the exclusion of the arrondissements of Boulogne and Montreuil, which belonged to Picardy. It is a rich and well-watered country, producing abundance of grain and hops, and yielding excellent pasture for cattle. The capital of the province was Arras, and the other important places were Saint-Omer, Bethune, Aire, Hesdin, Bapaume, Lens, Lillers, Saint-Pol and Saint- Venant. The name Artois (still more corrupted in " Arras ") is derived from the Atrebates, who possessed the district in the time of Caesar. From the 9th to the 12th century Artois belonged to the counts of Flanders. It was bestowed in 11 80 on Philip Augustus of France by Philip of Alsace, as the dowry of his niece Isabella of Hainaut. At her death in 1 190, Baldwin IX., count of Flanders (d. 1206), and then his son-in-law, Ferrand (Ferdinand) of Portugal, count of Flanders, disputed the possession of the country with the king of France, P'errand being in the coalition which was overthrown by Philip Augustus at Bouvines (1214). In 1237 Artois, which was raised to a countship the following year, was conferred as an appanage by Saint Louis on his brothe**

Robert, who died on crusade in 1250. His son, Robert II., took part in the wars in Navarre, Sicily, Guienne and Flanders, and was killed at the battle

of Courtrai in 1302. After his death, his son Philip having predeceased him (1298), Artois was adjudged to his daughter Mahaut, or Matilda, as against her nephew Robert, son of Philip, who attempted to support his claim to the countship by forged titles. Banished from France for this crime (1322), Robert of Artois took refuge in England, where he became earl of Richmond, and incited Edward III. to make war upon Philip of Valois. His descendants, the counts of Eu (q.v.), con- tinued to style themselves counts of Artois. By the marriage of Mahaut (d. 1329) with Otto IV., Artois passed to the house of Burgundy, in whose possession it remained till the marriage of Mary, the daughter of Charles the Bold, to the archduke Maxi- milian brought it to the house of Austria. Louis XL, however, occupied portions of Artois, and the claims of Austria were contested by France until the treaty of Senlis (1493). The emperor Charles V. established the council of Artois, with sovereign authority. At the end of the Thirty Years' War Artois was again conquered by the French, and the conquest was ratified in the treaty of the Pyrenees (1659) by Spain, to whom the province had fallen in 1634. During the war between France and Holland (1672-77) and that of the Spanish Succes- sion, Artois was invaded again, but the treaties of Nijmwegen (1678) and of Utrecht (1713) confirmed the sovereignty of France. The title of count of Artois was borne by Charles X. of France before his accession to the throne. This new creation became extinct on the death of the comte de Chambord in 1883.

ART SALES. The practice of selling objects of art by auction in England dates from the latter part of the 17th century, when in most cases the names of the auctioneers were suppressed. Evelyn (under date June 21, 1693) mentions a "great auction of pictures (Lord Melford's) in the Banquetting House, Whitehall," and the practice is frequently referred to by other contemporary and later writers. Before the introduction of regular auctions the practice was, as in the case of the famous collection formed by Charles I., to price each object and invite purchasers, just as in other departments of commerce. But this was a slow process, especially in the case of pictures, and lacked the incentive of excitement. The first really important art collection to come under the hammer was that of Edward, earl of Oxford, dispersed by Cock, under the Piazza, Covent Garden, on 8th March 1741/2 and the five following days, six more days being required by the coins. Nearly all the leading men of the day, including Horace Walpole, attended or were represented at this sale, and the prices varied from five shillings for an anonymous bishop's '• head " to 165 guineas for Vandyck's group of " Sir Kenelm Digby, lady, and son." The next great dispersal was Dr Richard Mead's extensive collection, of which the pictures, coins and gems, &c, were sold by Langford in February and March 1754, the sale realizing the total, unprecedented up to that time, of £16,069. The thirty-eight days' sale (1786) of the Duchess of Portland's

collection is very noteworthy, from the fact that it included the celebrated Portland vase, now in the British Museum. Many other interesting and important 18th-century sales might be mentioned. High prices did not become general until the Calonne, Trumbull (both 1795) and Bryan (1798) sales. As to the quality of the pictures which had been sold by auction up to the latter part of the 18th century, it may be assumed that this was not high. The importation of pictures and other objects of art had assumed extensive proportions by the end of the 18th century, but the genuine examples of the Old Masters probably fell far short of 1 %. England was felt to be the only safe asylum for valuable articles, but the home which was intended to be temporary often became permanent. Had it not been for the political convulsions on the continent, England, instead of being one of the richest countries in the world in art treasures, would have been one of the poorest. This fortuitous circumstance had, moreover, another effect, in that it greatly raised the critical knowledge of pictures. Genuine works realized high prices, as, for example, at Sir William Hamilton's sale (1801), when Beckford paid 1300 guineas for the little picture of "A Laughing Boy " by

Leonardo da Vinci; and when at the Lafontaine sales (1807 and 181 1) two Rembrandts each realized 5000 guineas, " The Woman taken in Adultery," now in the National Gallery, and " The Master Shipbuilder," now at Buckingham Palace. The Beckford sale of 1823 (41 days, £43,869) was the forerunner of the great art dispersal of the 19th century; Horace Walpole's accumula- tion at Strawberry Hill, 1842 (24 days, £33,45°), and the Stowe collection, 1848 (41 days, £75,562), were also celebrated. They comprised every phase of art work, and in all the quality was of a very high order. They acted as a most healthy stimulus to art collecting, a stimulus which was further nourished by the sales of the superb collection of Ralph Bernal in 1855 (32 days, £62,690), and of the almost equally fine but not so comprehensive collection of Samuel Rogers, 1856 (18 days, £42,367). Three years later came the dispersal of the 1500 pictures which formed Lord Northwick's gallery at Cheltenham (pictures and works of art, 18 days, £94,722).

Towards the latter part of the first half of the 19th century an entirely new race of collectors gradually came into existence; they were for the most part men who had made, or were making, large fortunes in the various industries of the midlands and north of England and other centres. They were untrammelled by " collecting " traditions, and their patronage was almost ex- clusively extended to the artists of the day. The dispersals of these collections began in 1863 with the Bicknell Gallery, and continued at irregular intervals for many years, e.g. Gillott (1872), Mendel (1875), Wynn Ellis and Albert Levy (1876), Albert Grant (1877) and Munro of Novar (1878). These patrons purchased at munificent prices either direct

from the easel or from the exhibitions not only pictures in oils but also water- colour drawings. As a matter of investment their purchases frequently realized far more than the original outlay; sometimes, however, the reverse happened, as, for instance, in the case of Landseer's "Otter Hunt," for which Baron Grant is said to have paid £10,000 and which realized shortly afterwards only 5650 guineas. One of the features of the sales of the 'seventies was the high appreciation of water-colour drawings. At the Gillott sale (1872) 160 examples realized £27,423, Turner's " Bam- borough Castle " fetching 3150 gns. ; at the Quilter sale (1875) David Cox's " Hayfield," for which a dealer paid him 50 gns. in 1850, brought 2810 gns. The following are the most remark- able prices of later years. In 1895 Cox's " Welsh Funeral " (which cost about £20) sold for 2400 gns., and Burne-Jones's " Hesperides " for 2460 gns. In 1908, 13 Turner drawings fetched £12,415 (Acland-Hood sale) and 7 brought £11,077 (Holland sale), the " Heidelberg " reaching 4200 gns. For Fred Walker's " Harbour of Refuge " 2580 gns. were paid (Tatham sale) and 2700 gns. for his " Marlow Ferry " (Holland). The demand for pictures by modern artists, whose works sold at almost fabulous prices in the 'seventies, has somewhat declined; but during all its furore there was still a small band of col- lectors to whom the works of the Old Masters more especially appealed. The dispersal of such collections as the Bredel (1875), Watts Russell (1875), Foster of Clewer Manor (1876), the Hamilton Palace (17 days, £397,562) — the greatest art sale in the annals of Great Britain — Bale (1882), Leigh Court (1884), and Dudley (1892) resulted, as did the sale of many minor collections each season, in many very fine works of the Old Masters finding eager purchasers at high prices. A striking example of the high prices given was the £24,250 realized by the pair of Vandyck portraits of a Genoese senator and his wife in the Peel sale, 1900.

Since the last quarter of the 19th century the chief feature in art sales has been the demand for works, particularly female portraits, by Reynolds, his contemporaries and successors. This may be traced to the South Kensington Exhibitions of 1867 and 1868 and the annual winter exhibitions at Burlington House, which revealed an unsuspected wealth and charm in the works of many English artists who had almost fallen into oblivion. A few of the most remarkable prices for such pictures may be quoted: Reynolds's "Lady Betty Delme " (1894), 11,000 gns.; Romney's "The Ladies Spencer" (1896), 10,500 gns.;

Gainsborough's "Duchess of Devonshire" (1876), 10,100 gns. (for the history of its disappearance see Gainsborough, Thomas), " Maria

Walpole," 12,100 gns. (Duke of Cambridge's sale, 1904) ; Constable's "Stratford Mill" (1895), 8500 gns.; Hoppner's "Lady Waldegrave " (1906), 6000 gns. ; Lawrence's " Childhood's Innocence" (1907), 8000 gns.; Raeburn's "Lady Raeburn " (1905), 8500 gns. Here may also be mentioned the 12,600 gns. paid for Turner's " Mortlake Terrace " in 1908 (Holland sale).

The " appreciation " of the modern continental schools, particularly the French, has been marked since 1880; of high prices paid may be mentioned Corot's " Danse des Amours " (1898), £7200; Rosa Bonheur's " Denizens of the Highlands " (1888), 5550 gns.; Jules Breton's "First Communion," £9100 in New York (1886) ; Meissonier's " Napoleon I. in the Campaign of Paris," i2j in. by 9! in. (1882), 5800 gns., and " The Sign Painter" (1891), 6450 gns. High prices are also fetched by pictures of Daubigny, Fortuny, Gallait, Ger6me, Troyon and Israels. The most marked feature of late has been the demand for the 18th-century painters Watteau, Boucher, Fragonard, Pater and Lancret; thus " La Ronde Champetre " of the last named brought £11,200 at the Say Sale in 1908, and Fragonard's " Le Reveil de Venus " £5520 at the Sedelmeyer sale, 1907.

" Specialism " is the one important development in art col- lecting which has manifested itself since the middle of the 19th century. This accounts for and explains the high average quality of the Wellesley (1866), the Buccleuch (1888) and the Holford (1893) collections of drawings by the Old Masters; for the Sibson Wedgwood (1877), the Due de Forli Dresden (1877), the Shuldham blue and white porcelain (1880), the Benson collection of antique coins (1909), and for the objects of art at the Massey-Mainwaring and Lewis-Hill sales of 1907. Very many other illustrations in nearly every department of art collecting might be quoted — the superb series of Marlborough gems (1875 and 1899) might be included in this category but for the fact that it was formed chiefly in the 18th century. The appreciation — commercially at all events — of mezzotint portraits and of portraits printed in colours, after masters of the early English school, was one of the most remarkable features in art sales during the last years of the 19th century. The shillings of fifty years before were then represented by pounds. The Fraser collection (December 4 to 6, 1900) realized about ten times the original outlay, the mezzotint of the "Sisters Frank land," after Hoppner, by W. Ward, selling for 290 guineas as against 10 guineas paid for it about thirty years previously. The H. A. Blyth sale (March n to 13, 1901, 346 lots, £21,717: 10s.) of mezzotint portraits was even more remarkable, and as a collection it was the choicest sold within recent times, the engravings being mostly in the first state. The record prices were numerous, and, in many cases, far surpassed the prices which Sir Joshua Reynolds received for the original pictures; e.g. the exceptionally fine example of the first state of the " Duchess of Rutland," after Reynolds, by

V. Green, realized 1000 guineas, whereas the artist received only £150 for the painting itself. Even this unprecedented price for a mezzotint portrait was exceeded on the 30th of April 1901, when an example of the first published state of " Mrs Carnac," after Reynolds, by J. R. Smith, sold for 1160 guineas. At the Louis Huth sale (1905) 83 lots brought nearly £10,000, Reynolds's " Lady Bampfylde " by T. Watson, first state before letters, unpublished, fetching 1200 guineas. Such prices as these and many others which might be quoted are exceptional, but they were paid for objects of exceptional rarity or quality.

It is not necessary to pursue the chronicle of recent sales, which have become a feature of every season. It is worth men- tioning, however, that the Holland sale, in June 1908, realized £138,118 (432 lots), a " record " sum for a collection of pictures mainly by modern artists; and that for the Rodolphe Kann collection (Paris) of pictures and objects of art, including 1 1 mag- nificent Rembrandts, Messrs Duveen paid £1,000,000 in 1907. In every direction there has been a tendency to increase prices for really great artistic pieces, even to a sensational extent. The competition has become acute, largely owing to American and

German acquisitiveness. The demand for the finest works of art of all descriptions is much greater than the supply. As an illustration of the magnitude of the art sale business it may be mentioned that the " turnover " of one firm in London alone has occasionally exceeded £1,000,000 annually.

Bibliography. — The chief compilations dealing with art sales in Great Britain are: G. Redford, Art Sales (1888) ; and W. Roberts, Memorials of Christie's (1897); whilst other books containing much important matter are W. Buchanan, Memoirs of Painting; The Year's Art (1880 and each succeeding year); F. S. Robinson, The Connoisseur; and L. Soullie, Les Ventes de tableaux, dessins et objets d'art au XIX' siecle (chiefly French).

ARTS AND CRAFTS, a comprehensive title for the arts of decorative design and handicraft — all those which, in association with the mother-craft of building (or architecture), go to the making of the house beautiful. Accounts of these will be found under separate headings. " Arts and crafts " are also associated with the movement generally understood as the English revival of decorative art, which began about 1875. The title itself only came into general use when the Arts and Crafts Exhibition Society was founded, and held its first exhibition at the New Gallery, London, in the autumn of 1888, since which time arts and crafts exhibitions have been common all over Great Britain. The idea of forming a society for the purpose of showing con- temporary work in design and handicraft really arose out of a movement of revolt or protest against the exclusive view of

art encouraged by the Royal Academy exhibitions, in which oil paintings in gilt frames claimed almost exclusive attention — sculpture, architecture and the arts of decorative design being relegated to quite subordinate positions. In 1886, out of a feeling of discontent among artists as to the inadequacy of the Royal Academy exhibitions, considered as representing the art of Great Britain, a demand arose for a national exhibition to include all the arts of design. One of the points of this demand was for the annual election of the hanging committee by the whole body of artists. After many meetings the group representing the arts and crafts (who belonged to a larger body of artists and craftsmen called the Art-workers' Guild, founded in 1884),[1] perceiving that the painters, especially the leading group of a school not hitherto well represented in the Academy exhibitions, only cherished the hope of forcing certain reforms on the Academy, and were by no means prepared to lose their chances of admission to its privileges, still less to run any risk in the establishment of a really comprehensive national exhibition of art, decided to organize an exhibition themselves in which artists and craftsmen might show their productions, so that contemporary work in decorative art should be displayed to the public on the same footing, and with the same advantages as had hitherto been monopolized by pictorial art. For many years previously there had been great activity in the study and revival in the practice of many of the neglected decorative handicrafts. Amateur societies and classes were in existence, like the Home Arts and Industries Association, which had established village classes in wood-carving, metal work, spinning and weaving, needlework, pottery and basket- work, and the public interest in handicraft was steadily growing. The machine production of an industrial century had laid its iron hands upon, what had formerly been the exclusive province of the handicraftsman, who only lingered on in a few obscure trades and in forgotten corners of England for the most part. The ideal of mechanical perfection dominated British workmen, and the factory system, first by extreme division of labour, and then by the further specialization of the workman under machine production, left no room for individual artistic feeling among craftsmen trained and working under such conditions. The demand of the world-market ruled the character and quality of production, and to the few who would seek some humanity, simplicity of construction or artistic feeling in their domestic decorations and furniture, the only choice was that of the trades- man or salesman, or a plunge into costly and doubtful experiments in original design. From the 'forties onward there had

1 Whose members, comprehending as they do the principal living designers, architects, painters and craftsmen of all kinds, have played no inconsiderable part in the English revival.

been much research and study of medieval art in England; there had been many able designers, architects and antiquaries, such as the Pugins and Henry Shaw (1800-1873) and later William Burges (1827-1881), William Butterfield (i8i4-i9co)and G. E. Street and others. The school of pre-Raphaelite painters, by their careful and thorough methods, and their sympathy with medieval design, were among the first to turn attention to beauty of design, colour and significance in the accessories of daily life, and artists like D. G. Rossetti, Ford Madox Brown, and W. Holman Hunt themselves designed and painted furniture. The most successful and most practical effort indeed towards the revival of sounder ideas of construction and workmanship may be said to have arisen out of the work of this group of artists, and may be traced to the workshop of William Morris and his associates in Queen Square, London. William Morris, whose name covers so large a field of artistic as well as literary and social work, came well equipped to his task of raising the arts of design and handicraft, of changing the taste of his countrymen from the corrupt and vulgar ostentation of the Second Empire, and its cheap imitations, which prevailed in the 'fifties and 'sixties, and of winning them back, for a time at least, to the massive simplicity of plain oak furniture, or the delicate beauty of inlays of choice woods, or the charm of painted work, the richness and frank colour of formal floral and heraldic pattern in silk textiles and wall-hangings and carpets, the gaiety and freshness of printed cotton, or the romantic splendour of arras tapestry. Both William Morris and his artistic comrade and life- long friend, Edward Burne-Jones, were no doubt much influenced at the outset by the imaginative insight, the passionate artistic feeling, and the love of medieval romance and colour of Dante Gabriel Rossetti, who remains so remarkable a figure in the great artistic and poetic revival of the latter half of the 19th century. To William Morris himself, in his artistic career, it was no small advantage to gain the ear of the English public first by his poetry. His verse-craft helped his handicraft, but both lived side by side. The secret of Morris's great influence in the re- vival was no doubt to be attributed to his way of personally mastering the working details and handling of each craft he took up in turn, as well as to his power of inspiring his helpers and followers. He was painter, designer, scribe, illuminator, wood- engraver, dyer, weaver and finally printer and papermaker, and having mastered these crafts he could effectively direct and criticize the work of others. His own work and that of Burne- Jones were well known to the public, and in high favour long before the Arts and Crafts Exhibition Society was formed, and though largely helped and inspired by the work of these two artists, the aims and objects of the society rather represented those of a younger generation, and were in some measure a fresh development both of the social and the artistic ideas which

were represented by Ruskin, Rossetti and Morris, though the society includes men of different schools. Other sources of in- fluence might be named, such as the work of Norman Shaw and Philip W T ebb in architecture and decoration, of Lewis Day in surface pattern, and William de Morgan in pottery. The demand for the acknowledgment of the personality of each responsible craftsman in a co-operative work was new, and it had direct bearing upon the social and economic conditions of artistic pro- duction. The principle, too, of regarding the material, object, method and purpose of a work as essential conditions of its artistic expression, the form and character of which must always be controlled by such conditions, had never before been so emphatically stated, though it practically endorsed the somewhat vague aspirations current for the unity of beauty with utility. Again, a very notable return to extreme simplicity of design in furniture and surface decoration may be remarked ; and a certain reserve in the use of colour and ornament, and a love of abstract forms in decoration generally, which are characteristic of later taste. Not less remarkable has been the new develop- ment in the design and workmanship of jewelry, gold- and silversmiths' work, and enamels, with which the names of Alexander Fisher, Henry Wilson, Nelson Dawson and C. R. Ashbee are associated. Among the arts and crafts of design

which have blossomed into new life in recent years — and there is hardly one which has not been touched by the new spirit — book-binding must be named as having attained a fresh and tasteful development through the work of Mr Cobden-Sanderson and his pupils. The art and craft of the needle also must not be forgotten, and its progress is a good criterion of tasie in design, choice of colour and treatment. The work of Mrs Morris, of Miss Burden (sometime instructress at the Royal School of Art Needlework, which has carried on its work from 1875), of Miss May Morris, of Miss Una Taylor, of Miss Buckle, of Mrs Walter Crane, of Mrs Newbery, besides many other skilled needlewomen, has been frequently exhibited. Good work is often seen in the national competition works of the students of the English art schools, shown at South Kensington in July. The increase of late years in these exhibitions of designs worked out in the actual material for which they were intended is very remarkable, and is an evidence of the spread of the arts and crafts movement (fostered no doubt by the increase of technical schools, especially of the type of the Central School of Arts and Crafts under the Technical Education Board of the London County Council), of which it may be said that if it has not turned all British craftsmen into artists or all British artists into craftsmen, it had done not a little to expand and socialize the idea of art, and (perhaps it is not too much to say) has made the tasteful English house with its furniture and decorations a model for the civilized world. (W. Cr.)

ART SOCIETIES. In banding themselves into societies and associations

artists have always been especially remarkable. The fundamental motive of such leaguing together is apparent, for, by the establishment of societies, it becomes possible for the working members of these to hold exhibitions and thereby to obtain some compensation or reward for their labours. With the growth of artistic practice and public interest, however, art societies have been instituted where this primary object is either absent or is allied to others of more general scope. The further- ance of a cult and the specializing of work have also given rise to many new associations in Great Britain, besides the Royal Academy (see Academy, Royal). At the outset, therefore, it will be well to mention the leading art societies thus described. The (now Royal) Society of Painters in Water Colours, founded in 1804, and the (now Royal) Society of British Artists (1823), are typical of those societies which exist merely for purposes of holding exhibitions and conferring diplomas of membership. The British Institution (for the encouragement of British artists) was started in 1806 on a plan formed by Sir Thomas Bernard; and in the gallery, erected by Alderman Boydell to exhibit the paintings executed for his edition of Shakespeare, were from time to time exhibited pictures by the old masters, deceased British artists and others, till 1867, when the lease of the premises expired. A fund of £16,200, then in the hands of trustees, had accumulated to £24,610 in 1884. The Artists' Society, formed in 1830, has for its object the providing of facilities to enable its members to perfect themselves in their art. To this end there is a good library of works on art, and abundant opportunities are afforded for general study from the life. In the furtherance of a cult the Japan Society, devoted to the encouragement of the study of the arts and industries of Japan, is a typical example; and the Society of Mezzotint Engravers is representative of those bodies formed in the interests of particular groups of workers. One of the remarkable features in the history of art in Great Britain has been the rapid increase of the artistic rank and file. Taking the number of exhibitors at the principal London and provincial exhibitions, it is found that in the period 1 885-1900 the ranks were doubled. At the end of the 1 9th century it was estimated that there were quite 7000 practising artists. Coincident with this astonishing development there has been a corresponding addition of new art societies and the enlargement of older bodies. For instance, the membership of the Royal Society of British Artists advanced in the period mentioned from 80 to 150. Similar extensions can be noted in other societies, or in such a case as that of the Royal Institute of Painters in Water Colours, where the membership is limited to 100,

it is to be noticed that more space is given to the works of outsiders. But the

expansion of older exhibiting societies has not proved sufficient. Portrait painters, pastellists, designers, miniaturists and women artists have felt the necessity of forming separate coteries. Interesting though these movements from within may be, the growth of societies originating in the spirit of altruism associated with such names as Ruskin and Kyrle is equally instructive. Nearly all these are the products of the last quarter of the 19th century, and include the Sunday Society, which in 1896 secured the Sunday opening of the national museums and galleries in the metropolis.

The specializing of study and work has also given rise to much artistic endeavour. For a long time archaeology — British and Egyptian — claimed almost exclusive attention. Latterly the arts of India and Japan have engaged much notice, and societies have been organized to further their study. Finally, bands of workers in particular branches of art have felt the need of clubbing together in order to protect their special interests. A slight suspicion of trade-unionism is attached to some of these; but on the whole the establishment of such bodies as the Society of Illustrators, the Society of Designers, and the Society of Mezzotint Engravers has been with a view to advancing the public knowledge of the merits of these branches of artistic enterprise.

Exhibiting Societies. — (a) Old Established. — These in London are: The Royal Academy, the Royal Water Colour Society, the Royal Institute of Painters in Water Colours, the Society of Oil Painters, and the Royal Society of British Artists. In the provinces, the Birmingham Royal Society of Artists has been in existence since 1825, and has a life academy with professors attached, (b) Modern. — In this category are many which reflect the new spirit which came into artistic life in the last quarter of the 19th century. The New English Art Club, founded in 1885 as a protest against academic art, achieves its purpose by exhibition only. The International Society of Painters and Engravers, again, represents the wider ideas of the 20th century. The Royal Society of Painter-Etchers and Engravers, consisting of fellows and associates, not exceeding 150 in all, conserves the interests of a numerous body of workers, and, in addition to holding exhibitions, confers diplomas (R.E. and A.R.E.) on the exhibitors of meritorious etchings or engravings. The Society of Women Artists (formerly the Society of Lady Artists) is wholly devoted to the display of works by female artists, and in 1891 the Society of Portrait Painters was formed to carry out the object conveyed in its title. Two associations advance the art of the miniature-painter, and the Pastel Society, formed in 1898, holds displays of members' work at the Royal Institute Galleries. In Scotland there is the Royal Scottish Academy. The Royal Scottish Society of Painters in Water Colours (Glasgow) grants the title R.S.W. to its members, and the Society of Scottish Artists (Edinburgh), founded in 1891, has a membership of nearly 500 young artists. Other exhibiting societies

which call for mention are: The Yorkshire Union of Artists (Leeds), which consolidates many local societies; the Nottingham Society of Artists, which also encourages drawing from the living model; and the Liverpool Sketching Club, founded in 1870, which holds an annual exhibition.

Societies of Instruction and Popular Encouragement. — It is under this head that the chief evidence of the modern art revival will be found. First it should be noted that there are very few societies designed for the artistic improvement of artists. The Artists' Society has already been mentioned; and the Art Workers' Guild, which meets at Clifford's Inn Hall, provides meetings, from which the public is excluded, where profitable discussions take place on questions of craft and design. But, as a rule, the art society, of which only artists are mem- bers, is organized for exhibition purposes or for the protection of interests. With regard to those societies of popular and educa- tional intention the old Society of Arts in the Adelphi, founded in 1 7 54, enjoys a good record. Numerous lectures on art subjects have from time to time been given, and in 1887 a scheme was devised by which awards are made to student-workers in design.

The Society for the Encouragement of the Fine Arts (Conduit Street) has also laboured since its foundation in 1858 to increase a technical knowledge, its members holding conversazioni at various picture galleries. The Artists' and Amateurs' Conver- sazione, instituted in 183 1, which used to meet at the Piccadilly Galleries and is now defunct, carried out a similar plan. Two other societies, now obsolete, should be mentioned whose method were directly educational. The Arundel Society, which fo many years promoted the knowledge of art by copying an publishing important works of ancient masters, issued to it members on payment of annual subscriptions, was eventually wound up on the last day of 1897. The Arundel Club, founded in 1904, continues the aim, but with a wider scope, reproducing works of art rendered somewhat inaccessible by being in private collections. The International Chalcographical Society, formed for the study of the early history of engraving, also did useful work. Another association of painters, sculptors, architects and engravers, the Graphic Society, ceased on the 29th of October 1890. This was one of the most interesting of societies, rare works of art being exhibited and discussed at its meetings. A very active educational body, originated in 1888, namely the Royal Drawing Society, has for its definite object the teaching of drawing as a means of education. The methods of instruction are based on the facts that very young children try to draw before they can write, and that they have very keen perception and retentive memory. The society aims, therefore, at using drawing as a means of developing these innate characteristics of the young, and already nearly 300 important schools follow out its system. Lord Leighton, Sir Jojjn Millais, and Sir Edward Burne-Jones took an active part in the society's labours. The Art for

Schools Association, founded in 1883, has also done steady work in endeavouring to provide schools with works of art. These are chiefly reproductions of standard works of art or of historical and natural subjects. The wave of enthusi- asm aroused by Mr Ruskin 's teachings caused Societies of the Rose to be founded in London, Manchester, Sheffield, Birming^- ham, Aberdeen and Glasgow; but some of these eventually ceased active work, to be revived again, however, by the Ruskin Union, formed in the year of the great writer's death (1900). Most of these societies were formed in 1879; but it should not be forgotten that two years earlier the Kyrle Society was started with the object of bringing the refining and cheering influences of natural and artistic beauty to the homes of the people. Under the presidency of Earl Brownlow, the Home Arts and Industries Association continues a work which was started in 1884, and anticipated much of the present system of technical education. Voluntary teachers organize classes for working people, at which a practical knowledge of art handiwork is taught. Training classes for voluntary teachers are held at the studios at the Albert Hall, as well as an annual exhibition. An interesting type of society has been established in Bolton, Lancashire. Under the title of an Arts Guild the members, numbering over 200, devote themselves to the advancement of taste in municipal improvements.

Societies or Special Study, Practice and Protection. — Under this head should be placed those associations which affect a cult, or are composed of particular workers, or which protect public or private interests. Perhaps the chief of the first kind is the Japan Society, which, since its inception in 1892, has been joined by over 1350 members interested in matters relating to Japanese art and industries. The Diirer Society, formed in 1897, has for its main object the reproduction of works by Albrecht Diirer, and his German and Italian contemporaries. The Vasari Society, founded in 1905, works in harmony with the Arundel Club and the Diirer Society, reproducing drawings by the Old Masters. In this category of special study may also be placed the Society for the Encouragement and Preservation of Indian Art, the Egypt Exploration Fund, and the Society for the Promo- tion of Hellenic Studies. Of the societies of special practice it has already been noticed that some are purely exhibiting associa- tions, such as the Portrait Painters, the Pastel Society, and the two miniature bodies. The formation of the Society of Mezzotint

Engravers in 1898 is an example of the leaguing together of particular workers to call attention to their interests. Original and translator

engravers, together with collectors and con- noisseurs, comprise the membership. The decaying art of wood engraving is also fostered by the International Society of Wood Engravers, and the Society of Designers, founded in 1896, safe- guards the interests of professional designers for applied art, without holding exhibitions. Special practice and protection are also considered by the Society of Illustrators, composed of artists who work in black and white for the illustrated press. This society was inaugurated in 1894, and fifteen of the members of the committee must be active workers in illustration. As an instance of the tendency of art workers to combine, the Society of Art Masters is a good illustration. This is an association of teachers of art schools, controlled by the art branch of the Board of Education, and has a membership of over 300. Good work of another kind occupies the National Trust for Places of Historic Interest or Natural Beauty. The council of the Trust includes representatives of such bodies as the National Gallery, the Royal Academy, the Royal Society of Painters in Water Colours, the Society of Antiquaries, the Royal Institute of British Archi- tects, the Universities, Kyrle Society, Society for the Protection of Ancient Buildings and the Selborne Society.

Foreign Art Societies. — The following are brief particulars of the chief art societies elsewhere than in Great Britain: —

Austria. — Vienna, Vereinigung bildender Kunstler Osterreichs (Society of Austrian Painters) and the Wiener Kiinstlergenossenschaft (Association of Viennese Artists).

Belgium. — Brussels, Societe des beaux-arts, the Libre Esthetique, Societe des aquarellistes et pastellistes , Societe royale beige des aquarellistes, and numerous private societies (cercles) in Brussels, Antwerp, Liege, Ghent and other cities.

France. — Paris, the Societe des artistes francais (The Salon), Societe nationale des beaux-arts (The New Salon), Societe des aquarellistes. Exhibiting societies are the Societe des artistes independants , Societe des orientalistes, and Salon des pastellistes.

Germany. — The small local societies are affiliated to one large parent body, the Deutsche Kiinstlergenossenschaft, in Berlin under the presidency of Anton von Werner. The Deutsche Illustratoren- verband watches over the interests of illustrators and designers. In Munich there are two bodies — the Kiinstlergenossenschaft (old society of artists), holding its exhibitions in the Glaspalast, and the Verein bildender Kunstler, the Secessionists.

Italy. — Four exhibiting societies: Rome, Societa in Arte Libertas, Scuola degli Aquarellisti; Milan, Famiglia Artistica, Societa degli Artiste; Florence,

Circolo Artistico; Naples, Instituti di Belli Arti.

Portugal. — Sociedade promotora das Bellas-Artes and Gremio Artistico.

Russia. — There is no exclusively art society of importance, but there is at St Petersburg the Societe litteraire et artistique.

Spain. — Madrid, L' Association des artistes espagnols.

Sweden. — Stockholm, Svenska Konstuareruas Forening.

Switzerland. — Berne, La Societe des peintres et sculpteurs suisses.

United States. — New York, National Academy of Design, American Water Color Society, and National Sculpture Society.

(A. C. R. C.)

ART TEACHING. It is the tendency of all departments of the human mind to outgrow their original limits. Traditions of teaching are long-lived, especially in art, and new ideas only slowly displace the old, so that art teaching as a whole is seldom abreast of the ideas and practice of the more advanced artists. The old academic system adapted to the methods and aims in art in the 18th century, which has been carried on in the principal art schools of Great Britain with but slight changes of method, consisted chiefly of a course of drawing from casts of antique statues in outline, and in light and shade without backgrounds, of anatomical drawings, perspective, and drawing and painting from the living model. Such a training seems to be more or less a response to Lessing's definition of painting as " the imitation of solid bodies upon a plane surface." It seems to have been influenced more by the sculptor's art than any other. Indeed, the academic teaching from the time of the Italian Renaissance was no doubt principally derived from the study of antique sculpture; the proportions of the figure, the style, pose, and sentiment being all taken from Graeco-Roman and Roman sculptures, discovered so abundantly in Italy from the 16th century onwards. As British ideas of art were principally

derived from Italy, British academics endeavoured to follow the methods of teaching in vogue there in later times, and so the art student in Great Britain has had his intention and efforts directed almost exclusively to the representations of the abstract human form in abstract relief. Traditions in art, however, may sometimes prove helpful and beneficial, and preservative of beauty and character, as in the case of certain decorative and constructive arts and handicrafts in common use, such as those of the rural waggon-maker and wheelwright, and horse-harness maker.

Some schools of painting, sculpture and architecture have preserved fine and noble traditions which yet allowed for in- dividuality. Such traditions may be said to have been character- istic of the art of the middle ages. It often happens, too, when many streams of artistic influence meet, there may be a certain domination or ascendancy of the traditions of one art over the others, which is injurious in its effects on those arts and diverts them from their true path. The domination of individualistic painting and sculpture over the arts of design during the last century or two is a case in point.

With the awakening of interest in industrial art — sharply separated by pedantic classification from fine art — which began in England about the middle of the 19th century, schools of design were established which included more varied studies. Even as early as 1836 a government grant was made towards the opening of public galleries and the establishment of a normal school of design with a museum and lectures, and in 1837 the first school of design was opened at Somerset House. In 1840 grants were made to establish schools of the same kind in provincial towns, such as Manchester, Birmingham, Glasgow, Leeds and Paisley. The names of G. Wallis in 1847, and Ambrose Poynter in 1850, are associated with schemes of art instruction adopted in the government art schools, and the year 1851, the year of the Great Exhibition, was also marked by the first public exhibition of students' works, and the first institu- tion of prizes and scholarships. In 1852 " the Department of Practical Art " was constituted, and a museum of objects collected at Marlborough House which afterwards formed the nucleus of the future museum at South Kensington. In 1853 " the Department of Science and Art " was established, and in 1857, under the auspices of Henry Cole, the offices of the depart- ment and the National Art Training School were removed from Marlborough House to South Kensington. Classes for instruction in various crafts had been carried on both at Somerset House and Marlborough House, and the whole object of the government schools of design was to give an artistic training to the designer and craftsman, so that he could carry back to his trade or craft improved taste and skill. The schools, however, became largely filled by students of another type — leisured amateurs who sought to acquire some artistic accomplishment, and even in the case of genuine designers and craftsmen who developed pictorial skill in their studies, the attraction and superior social distinction and possibility of superior commercial value accruing to the career of a painter of easel pictures diverted the schools from their original purpose.

For some time after the removal to South Kensington, during the progress of the new buildings, and under the direction of Godfrey Sykes and F. W. Moody, practical decorative work both in modelling and painting was carried out in the National Art Training School; but on the completion of

these works, the school relapsed into a more or less academic school on the ordinary lines, and was regarded chiefly as a school for the train- ing of art teachers and masters who were required to pass through certain stereotyped courses and execute a certain series of drawings in order to obtain their certificates. Thus model- drawing, freehand outline, plant-drawing in outline, outline from the cast, light and shade from the cast, drawing of the antique figure, still life, anatomical drawings, drawing and painting from the life, ornamental design, historic studies of ornament, perspective and geometry, were all taken up in a cut-and-dried way, as isolated studies, and with a view solely to obtaining the certificate or passing an examination. This theoretic kind of training, though still in force, and though it

enabled the department to turn out certificated teachers for the schools of the country of a certain standard, and to give to students a general theoretic idea of art, has been found wanting, since, in practice, when the student in design leaves his school and desires to take up practical work as a designer or craftsman, he requires special knowledge, and specialized skill in design for his work to be of use; and though he may be able to impart to others what he himself has laboriously acquired, the theoretic and general character of his training proves of little or no use, face to face with the ever shifting and changing demands of the modern manufacturer and the modern market.

A growing conviction of the inadequacy of the schools of the Science and Art Department (now the Board of Education), considered as training grounds for practical designers and craftsmen, led to the establishment of new technical schools in the principal towns of Great Britain. The circumstance of certain large sums, diverted from their original purpose of com- pensation to brewers, being available for educational purposes and at the disposal of the county councils and municipal bodies, provided the means for the building and equipment of these new technical schools, which in many cases are under the same roof as the art school in the provincial towns, and, since the Education Act of 1902, are generally rate-supported. The art schools formerly managed by private committees and supported by private donors, assisted by the government grants, are now, in the principal industrial towns of Great Britain, taken over by the municipality. Birmingham is singularly well organized in this respect, and its art school has long held a leading position. The school is well housed in a new building with class-rooms with every appliance, not only for the drawing, designing and modelling side, but also for the practice of artistic

handicrafts such as metal repousse, enamelling, wood-carving, embroidery, &c. The municipality have also established a jewelry school, so as to associate the practical study of art with local industry. Manchester and other cities are also equipped with well-organized art schools.

The important change involved in the incorporation of the Science and Art Department with the Board of Education also led to a reorganization of the Royal College of Art. A special council of advice on art matters was appointed, consisting of re- presentatives of painting, sculpture, architecture and design, who deal with the Royal College of Art and appoint the professors who control the teaching in the classes for architecture, design and handicraft, decorative painting and sculpture, modelling and carving. The council decide upon the curriculum, and examine and criticize the work of the college from time to time. They also advise the board in regard to the syllabus issued to the art schools of the country, and act as referees in regard to purchases for the museum.*

Of other institutions for the teaching of art, the following may be named: The Royal Drawing Society of Great Britain and Ireland, which was formed principally to promote the teaching of drawing in schools as a means of education. The system therein adopted differs from the ordinary drawing courses, and favours the use of the brush. Brushwork has generally been adopted for elementary work, too, by London County Council teachers, drawing being now a compulsory subject. Remarkable results have been obtained by the Alma Road Council schools in the teaching of boys from eight to twelve by giving them spaces to fill with given forms — leaf shapes — from which patterns are constructed to fill the spaces, brush and water-colour being the means employed. At the Royal Female School of Art in Queen Square, London, classes in drawing and painting from life are held, and decorative design is also studied. There are also the Royal School of Art Needlework and the School of Art Wood- carving, all aided by the London County Council. The City and Guilds of London Institute has two departments for what is termed " applied " art, one at the South London School of Technical Art, and the other at the Art Department in the Technical College, Finsbury. The Slade School of Drawing, Painting and Sculpture, University College, Gower Street, con- fines itself to drawing and painting from the antique and life,

and exercise in pictorial composition. There are also lectures on anatomy and perspective. The Slade professorships at Oxford and Cambridge universities are concerned with the teaching and literature of art, but they do not concern themselves with the practice. There are also, in addition to the schools of art named and those in connexion with the Board of Education and the London County Council in the various districts of London, many and various private clubs and schools, such as the Langham

and " Heatherley's," chiefly concerned in encouraging drawing and painting from the life, and for the study of art from the pictorial point of view, or for the preparation of candidates for the Royal Academy or other schools. The polytechnics and technical insti- tutes also provide instruction in a great variety of artistic crafts.

A general survey, therefore, of the various institutions which are established for the teaching of art in Great Britain gives the impression that the study of art is not neglected, although, perhaps, further inquiry might show that, compared with the great educational establishments, the proportion is not excessive. Now that the Education Act 1902 has given the county councils control of elementary and secondary education and charged them with the task of promoting the co-ordination of all forms of education in consultation with the Board of Education, it is probable that an elementary scholar who shows artistic ability will be enabled to pass on from the elementary classes in one school to the higher art and technical schools, secondary and advanced, without retracing his steps, thus escaping the depres- sion of going over old ground.

The general movement of revival of interest in the arts of decorative design and the allied handicrafts, with the desire to re-establish their influence in art-teaching, has been due to many causes, among which the work of the Arts and Crafts Exhibition Society may count as important. From the leading members of this body the London County Council Technical Educational Board, when it was face to face with the problem of organizing its new schools and its technical classes, sought advice and aid. Success has attended their schools, especially the Central School of Arts and Crafts at Morley Hall, Regent Street. The object of the school is to provide the craftsman in the various branches of decorative design with such means of improving bis taste and skill as the workshop does not afford. It does not concern itself with the amateur or with theoretic drawing. The main difference in principle adopted in this school in the teaching of design is the absence of teaching design apart from handicraft. It is considered that a craftsman thoroughly acquainted with the natural capacities of his material and strictly understanding the conditions of his work, would be able, if he had any feeling or invention, to design appropriately in that material, and no designing can be good apart from a knowledge of the material in which it is intended to be carried out. It should be remembered, too, that graphic skill in representing the appearances of natural objects is one sort of skill, and the execu- tive skill of the craftsman in working out his design, say in wood or metal, is quite another. It follows that the works of drawing or design made by the craftsman would be of quite a different character from a pictorial drawing, and might be quite simple and abstract, while clear and accurate. The training for the pictorial artist and for the craftsman would, therefore, naturally be different.

The character of the art-teaching adopted in any country must of course depend upon the dominant conception of art and its function and purpose. If we regard it as an idle accomplish- ment for the leisured few, its methods will be amateurish and superficial. If we regard art as an important factor in education, as a language of the intelligence, as an indispensable companion to literature, we shall favour systematic study and a training in the power of direct expression by means of line. We shall value the symbolic drawing of early civilizations like the Egyptian, and symbolic art generally, and in the history of decorative art we shall find the true accompaniment and illustration of human history itself. From this point of view we shall value the acquisi- tion of the power of drawing for the purpose of presenting and explaining the facts and forms of nature. Drawing will be the

most direct means at the command of the teacher to explain, to expound, to demonstrate where mere words are not sufficiently definite or explicit. Drawing in this sense is taking a more important place in education, especially in primary education, though there is no need for it to stop there, and one feels it may be destined to take a more important position both as a training for the eye and hand and an aid to the teacher. Then, again, we may regard art more from its social aspect as an essential accompaniment of human life, not only for its illustrative and depicting powers, but also and no less for its pleasure-giving properties, its power of awakening and stimulating the observa- tion and sympathy with the moods of nature, its power of touching the emotions, and above all of appealing to our sense of beauty. We shall regard the study of art from this point of view as the greatest civilizer, the most permeating of social and human forces. Such ideas as these, shared no doubt by all who take pleasure and interest in art, or feel it to be an important element in their lives, are crossed and often obscured by a multitude of mundane considerations, and it is probably out of the struggle for ascendancy between these that our systems of art teaching are evolved. There is the demand of the right to live on the part of the artist and the teacher of art. There is the demand on the part of the manufacturer and salesman for such art as will help him to dispose of his goods. In the present commercial rivalry between nations this latter demand is brought into prominent relief, and art is apt to be made a minister, or perhaps a slave to the market. These are but accidental relation- ships with art. All who care for art value it as a means of expres- sion, and for the pleasure and beauty it infuses into all it touches, or as essential and inseparable from life itself. Seeing then the importance of art from any point of view, individual, social, commercial, intellectual,

emotional, economic, it should be important to us in our systems of art-teaching not to lose sight of the end in arranging the means — not to allow our teaching to be dominated by either dilettantism or commercialism, neither to be feeble for want of technical skill, nor to sacrifice everything to technique. The true object of art-teaching is very much like that of all education — to inform the mind, while you give skill to the hand — not to impose certain rigid rules, or fixed recipes and methods of work, but while giving instruction in definite methods and the use of materials, to allow for the individual development of the student and enable him to acquire the power to express himself through different media without forgetting the grammar and alphabet of design. Practice may vary, but principles remain, and there is a certain logic in art, as well as in reasoning. All art is conditioned in the mode of its expression by its material, and even the most individual kind of art has a convention of its own by the very necessities and means of its existence. Methods of expression, conventions alter as each artist, each age seeks some new interpretation of nature and the imagination — the well-springs of artistic life, and from these reviving streams continually flow new harmonies, new inventions and recombinations, taking form and colour according to the temperaments which give them birth. (W. C r.)

ARTUSI, GIOVANNI MARIA, Italian composer and musical theorist, was born in Bologna, and died on the 18th of August 1613. He was canonico regulare at the church of San Salvatore in his native city. He is chiefly famous in the history of music for his attacks upon Monteverde (q.v.) embodied in his L'Artusi overo d. imp. (1600). For an exhaustive explanation and a tfanslation of excerpts from these the studies of Dr G. Vogel and O. Riemann should be consulted. These will be found in the Vierteljahrsschrift filr Musikwissenschaft, Leipzig, vol. 3, pp. 326, 380 and 426.

ARU ISLANDS (Dutch Aroe), a group in the residency of Amboyna, Dutch East Indies; between 5° 18′ and 7 5′ S., and 134° and 135° E.; the member nearest to the south-west coast of New Guinea lying about 70 m. from it. The larger islands (Wokan, Kobrur, Maikor and Trangan), and certain of the lesser ones, are regarded by the Malays as one land mass which they call tana besar (" great land "). This is justified inasmuch as its parts are only isolated by narrow creeks of curious form,

having the character of rivers. The smaller islands number some eighty; the total land area is 3244 sq. m.; and the population about 22,000. The islands are low, but it is only on the coast that the ground is swampy. The principal formation is coralline limestone; the eastern coast is defended by

coral reefs, and the neighbouring sea (extending as far as New Guinea, and thus demonstrating a physical connexion with that land) is shallow, and abounds in coral in full growth. A large part of the surface is covered with virgin forest, consisting of screw-pines, palm trees, tree ferns, canariums, &c. The fauna is altogether Papuan. The natives are also Papuans, but of mixed blood. They are divided into two confederations, the Uli-luna and the Uli-sawa, which are hostile to each other. The houses are remarkable as being built on piles sunk in the solid rock and having two rooms, the one surrounding the other. The people are in manners complete savages. The natives are governed by rajas (prang kajas), the Dutch government being represented by a posthouder. In the interior is said to exist a tribe — the Korongoeis — with white skins and fair hair, but it has never been seen by travellers. A few villages are nominally Christian, and the Malays have introduced Mabommedanism, but most of the natives have no religion. Dobbo, on a small western island, is the chief place; its resident population is reinforced annually, at the time of the west monsoon, by traders from that quarter, who deal in the tripang, pearl shell, tortoise-shell, and other produce of the islands.

ARUNDEL, EARLDOM OF. This historic dignity, the premier earldom of England, is popularly but erroneously supposed to be annexed to the possession of Arundel Castle. Norman earls were earls of counties, though sometimes styled from their chief residence or from the county town, and Mr J.H.Round has shown that the earldom of " Arundel " was really that of Sussex. Its origin was the grant by Henry I. to his second wife, in dower, of the forfeited " honour " of Arundel, of which the castle was the head, and which comprised a large portion of Sussex. After his death she married William " de Albini " {i.e. d'Aubigny), who from about the year 1141 is variously styled earl of Sussex, of Chichester, or of Arundel, or even Earl William " de Albini." His first known appearance as earl is at Christmas 1141, and it has been ascertained that, after acquiring the castle by marriage, he had not thereby become an earl. Henry II., on his accession, " gave " him the castle and honour of Arundel, in fee, together with " the third penny of the pleas of Sussex, of which he is earl." His male line of heirs became extinct on the death of Hugh " de Albini," earl of Arundel, in 1243, who had four sisters and co-heirs. In the partition of his estates, the castle and honour of Arundel were assigned to his second sister's son, John Fitzalan of a Breton house, from which sprang also the royal house of Stuart. It is proved, however, by record evidence, that neither John nor his son and successor were ever earls; but from about the end of 1 289, when his grandson Richard came of age, he is styled earl of Arundel. Richard's son Edmund was forfeited and beheaded in 1326, and Arundel was out of posses- sion of the family till 1331, when his son was restored, and regained the castle and also the earldom by separate grants. Both were

again lost in 1397 on his son being beheaded and attainted. But the latter's son was restored to both the earldom and the estates by Henry IV. in 1400. He died without issue in

1415-

The castle and estates now passed to the late earl's cousin and heir-male under a family entail, but the representation in blood of the late earl passed to his sisters and co-heirs, of whom the eldest had married Thomas Mowbray, duke of Norfolk. The descent of the earldom remained in doubt, till the heir-male's son and heir successfully claimed it in 1433, in virtue of his tenure of the castle, alleging that it was " a dignity or name united and annexed to the castle and lordship of Arundel for time whereof memory of man was not to the contrary." His claim was opposed on behalf of the Mowbrays, and the allegation on which it was based is discussed and refuted at great length in the Lords' Reports on the Dignity of a Peer (i. 404-429). In the descendants of his brother the earldom remained vested*

till i 580, when the last Fitzalan earl died, leaving as his sole heir his daughter's son Philip Howard, whose father Thomas, duke of Norfolk, had been beheaded and attainted in 1572.

Philip, who was through his father senior representative of the earls of Arundel down to 14 15, and through his mother sole representative of the subsequent earls, was summoned to parlia- ment as earl in January 1581, but was attainted in 1589. His son Thomas was restored to the earldom and certain other honours in 1604, and, in 1627, obtained an act of parliament " concerning the title, name and dignity of Earl of Arundel, and for the annexing of the Castle, Honour, Manor and Lordship of Arundel . . . with the titles and dignities of the Baronies of Fitzalan, Clun and Oswaldestre, and Maltravers, ... to the same title, name and dignity of Earl of Arundel." This act, which was based on the earl's allegation that the title had been " invariably used and enjoyed " by the owners of the castle, " and by reason of the said inheritance and seisin," has been much discussed, especially in the Lords' Reports (i. 430-434). There is no doubt that the earl's object was to entail the earldom and the castle strictly on a certain line of heirs, and this was effected by elaborate remainders (passing over the Howards, earls of Suffolk). It is under this act of parliament that the earldom has been held ever since, and that it passed with the castle in 1777 to the heir-male of the Howards, although the representation in blood then passed to heirs general. Thus the castle and the earldom cannot be

alienated from the line of heirs on whom it is entailed by the act of 1627; while the heirship in blood of the earlier earls (to 1415) is vested in Lords Mowbray and Petre and the Baroness Berkeley, and that of the later earls (to 1777) in Lords Mowbray and Petre.

The precedence of the earldom was challenged in 1446 by Thomas Courtenay, earl of Devon, owing to the question as to its descent spoken of above, but the king in council confirmed to the earl the precedence of his ancestors " by reason of the Castle, Honour and Lordship of Arundel." In the act of 1627 the " places " and " pre-eminences " belonging to the earldom were secured to it. It would appear, however, that the decision of the dispute with the earl of Devon in 1446 restricts that prece- dency to such as the earl's ancestors had enjoyed, if indeed it goes farther than to guarantee his precedence over the earl of Devon. But as there is no other existing earldom older than that of Shrewsbury (1442), the present position of Arundel as the premier earldom is beyond dispute.

See Lords' Reports on the Dignity of a Peer; Dugdale's Baronage; Tierney's History of Arundel; G. E. C[okayne]'s Complete Peerage; Round's Geoffrey de Mandeville; Pike's Constitutional History of the House of Lords. (J. H. R.)

ARUNDEL, EARLS OF. According to Cokayne {Complete Peerage, i. p. 138, note a) there is an old Sussex tradition to the effect that

" Since William rose and Harold fell There have been earls of Arundel." This, he adds, " is the case if for ' of ' we read ' at.' " The questions involved in this distinction are discussed in the pre- ceding article on the earldom of Arundel, now held by the duke of Norfolk. The present article is confined to a biographical sketch of the more conspicuous earls of Arundel, first in the Fitzalan line, and then in the Howard line.

Richard Fitzalan (1267-1302), earl of Arundel, was a son of John, lord of Arundel (1246-12 7 2), and a grandson of another John, lord of Arundel, Clun and Oswaldestre (Oswestry), who took a prominent, if somewhat wavering, part in the troubles during the reign of Henry III., and who died in November 1267. Richard, who was called earl of Arundel about 1289, fought for Edward I. in France and in Scotland, and died on the 9th of March 1302.

He was succeeded by his son, Edmund (1285-1326), who married Alice, sister of John, earl de Warenne. A bitter enemy of Piers Gaveston, Arundel was one of the ordainers appointed in 13 10; he declined to march with - Edward II. to Bannockburn, and after the king's humiliation he was closely associated with Thomas, earl of Lancaster, until about 1321, when he

became connected with the Despensers and sided with the king. He

was faithful to Edward to the last, and was executed at Hereford by the partisans of Queen Isabella on the 17th of November 1326.

His son, Richard (c. 1307-1376), who obtained his father's earldom and lands in 1331, was a soldier of renown and a faithful servant of Edward III. He was present at the battle of Sluys and at the siege of Tournai in 1340; he led one of the divisions of the English army at Crecy and took part in the siege of Calais; and he fought in the naval battle with the Spaniards off Winchelsea in August 1350. Moreover, he was often employed by Edward on diplomatic business. Soon after 1347 Arundel inherited the estates of his uncle John, earl de Warenne, and in 1361 he assumed the title of earl de Warenne or earl of Surrey. He was regent of England in 1355, and died on the 24th of January 1376, leaving three sons, the youngest of whom, Thomas, became archbishop of Canterbury.

Richard's eldest son, Richard, earl of Arundel and Surrey (c. 1346-1397), was a member of the royal council during the minority of Richard II., and about 1381 was made one of the young king's governors. As admiral of the west and south he saw a good deal of service on the sea, but without earning any marked distinction except in 1387 when he gained a victory over the French and their allies off Margate. About 1385 the earl joined the baronial party led by the king's uncle, Thomas of Woodstock, duke of Gloucester, and in 1386 was a member of the commission appointed to regulate the kingdom and the royal household. Then came Richard's rash but futile attempt to arrest Arundel, which was the signal for the outbreak of hostilities. The Gloucester faction quickly gained the upper hand, and the earl was one, and perhaps the most bitter, of the lords appellant. He was again a member of the royal council, and was involved in a quarrel with John of Gaunt, duke of Lancaster, whom he accused in the parliament of 1394. After a personal altercation with the king at Westminster in the same year Arundel underwent a short imprisonment, and in 1397 came the final episode of his life. Suspicious of Richard he refused the royal invitation to a banquet, but his party had broken up, and he was persuaded by his brother, Thomas Arundel, archbishop of Canterbury, to surrender himself and to trust to the king's clemency. At once he was tried, was attainted and sentenced to death, and, bearing himself with great intrepidity, was beheaded on the 21st of September 1397. He was twice married and had three sons and four daughters. The earl founded a hospital at Arundel, and his tomb in the church of the Augustinian Friars, Broad Street, London, was long a place of pilgrimage.

His only surviving son, Thomas (1381-1415), was a ward of John Holand, duke of Exeter, from whose keeping he escaped about 1398 and joined his

uncle, Archbishop Thomas Arundel, at Utrecht, returning to England with Henry of Lancaster, after- wards King Henry IV., in 1399. After Henry's coronation he was restored to his father's titles and estates, and was employed in fighting against various rebels in Wales and in the north of England. Having left the side of his uncle, the archbishop, Arundel joined the party of the Beauforts, and was one of the leaders of the English army which went to France in 141 1; then after a period of retirement he became lord treasurer on the accession of Henry V. From the siege of Harfleur he returned ill to England and died on the 13th of October 1415. His wife was Beatrix (d. 1439), a natural daughter of John I., king of Portugal, but he left no children, and the lordship of Arundel passed to a kinsman, John Fitzalan, Lord Maltravers (1385- 142 1), who was summoned as earl of Arundel in 1416.

John's son, John (1408-1435), did not secure the earldom until 1433, when as the " English Achilles " he had already won great distinction in the French wars. He was created duke of Touraine, and continued to serve Henry VI. in the field until his death at Beauvais from the effects of a wound on the 12th of June 1435. The earl's only son, Humphrey, died in April 1438, when the earldom passed to John's brother, William

(1417-1488).

Henry Fitzalan, 12th earl of Arundel (c. 1517-1580), son of William, nth earl, by Anne, daughter of Henry Percy, 4th earl

of Northumberland, was born about 1517. He entered King Henry's household, attending the latter to Calais in 1532. In 1533 he was summoned to parliament in his father's barony of Maltravers, and in 1540 he was made deputy of Calais, where his vigorous administration was much praised. He returned to England in April 1544 after the death of his father, and was made a knight of the Garter. In July of the same year he commanded with Suffolk the English expedition to France as lord marshal, and besieged and took Boulogne. On his return to England he was made lord chamberlain, an office which he retained after the accession in 1547 of Edward VI., at whose coronation he acted as high constable. He was one of the twelve counsellors nominated in Henry VIII. 's will to assist the executors, but he had little power during the protectorship of Somerset or the ascendancy of Warwick (afterwards dukeof Northumberland), and in 1550 by the latter's device he was accused of embezzle- ment, removed from the council, confined to his house, and fined £'r 2,000 — £8000 of

this sum being afterwards remitted and the charges never being proved. Subsequently he allied himself with Somerset, and was implicated in 1551 in the latter's plot against Northumberland, being imprisoned in the Tower in November. On the 3rd of December 1552, though he had never been brought to trial, he signed a submission and confession before the privy council, and was liberated after having been again heavily fined. As Edward's reign drew to its close, Arundel's support was desired by Northumberland to further his designs on the throne for his family, and he was accordingly reinstated in the council and discharged of his fine. In June 1553 he opposed Edward's " device " for the succession, which passed over his sisters Mary and Elizabeth as illegitimate, and left the crown to the children of the duchess of Suffolk, and alone of the council refused the " engagement " to support it, though he signed the letters patent. On the death of Edward (July 6, 1553) he ostensibly joined in furthering the duke's plans, but secretly took measures to destroy them, and according to some accounts sent a letter to Mary the same evening informing her of Edward's death and advising her to retreat to a place of security. Meanwhile he continued to attend the meetings of the council, signed the letter to Mary declaring her illegitimacy and Lady Jane Grey's right to the throne, accompanied North- umberland to announce to Jane her accession, and urged Northumberland to leave London and place himself at the head of the forces to attack Mary, wishing him God-speed on his departure. In Northumberland's absence, he gained over his fellow-councillors, and having succeeded with them in getting out of the Tower, called an assembly of the corporation and chief men of the city, denounced Northumberland, and had Mary proclaimed queen, subsequently riding off to join her with the Great Seal at Framlingham. On the 20th of July he secured Northumberland at Cambridge, and returned in triumph with Mary to London on the 3rd of August, riding before her with the sword of state. He was now made a privy councillor and lord steward, and was granted several favours and privileges, acting as high constable at the coronation, and obtaining the right to crea te sixty knigh ts. He took a prominent part in various public acts of the reign, was a commissioner to treat for the queen's marriage, presided at the trial of the duke of Suffolk, assisted •in suppressing Wyatt's rebellion in 1554, was despatched on foreign missions, and in September 1555 accompanied Philip to Brussels. The same year he received, together with other persons, a charter under the name of the Merchant Adventurers of England, for the discovery of unknown lands, and was made high steward of Oxford University, being chosen chancellor in 1559, but resigning his office in the same year. In 1557, on the prospect of the war with France, he was appointed lieutenant- general of the forces for the defence of the country, and in 1558 attended the conference at the abbey of Cercamp for the negotia- tion of a peace. He returned to England on the death of Mary in November 1558, and is described to Philip II. at

that time as " going about in high glee, very smart " and with hopes of marrying the queen, but as " flighty " and of " small ability." He was reinstated in all his offices by Elizabeth, served as high

constable at her coronation, and was visited several times by the queen at Nonsuch in Surrey. As a Roman Catholic he violently opposed the arrest of his co-religionists and the war with Scotland, and in 1560 came to blows with Lord Clinton in the queen's presence on a dispute arising on those questions. He incurred the queen's displeasure in 1562 by holding a meeting at his house during her illness to consider the question of the succession and promote the claims of Lady Catherine Grey. In 1564, being suspected of intrigues against the government, he was dismissed from the lord-stewardship and confined to his house, but was restored to favour in December. In March 1 566 he went to Padua, but being summoned back by the queen he returned to London accompanied by a large cavalcade on the 17th of April 1567. Next year he served on the commission of inquiry into the charges against Mary, queen of Scots. Sub- sequently he furthered the marriage of Mary with the duke of Norfolk, his son-in-law, together with the restoration of the Roman Catholic religion and government, and deposition of Elizabeth, in collusion with Spain. He made use of the incident in 1 568, of the seizure of treasure at Southampton intended for Philip, as a means of effecting Cecil's overthrow, and urged upon the Spanish government the stoppage of trade. He is described in 1569 to Philip as having " good intentions," " whilst benefiting himself as he was very needy." In January he alarmed Elizabeth by communicating to her a supposed Spanish project for aiding Mary and replacing her on her throne, and put before the queen in writing his own objections to the adoption of extreme measures against her. In June he received with Norfolk and Lumley 6000 crowns from Philip. In September, on the discovery of Norfolk's plot, he was arrested, but not having committed himself suffi- ciently to -incur the charge of treason in the northern rebellion he escaped punishment, was released in March 1570, and was recalled by Leicester to the council with the aim of embarrassing Cecil. He again renewed his treasonable intrigues, which were at length to some extent exposed by the discovery of the Ridolfi plot in September 1571. He was once more arrested, and not liberated till December 1572 after Norfolk's execution. He died on the 24th of February 1580, and was buried in the chapel at Arundel, where a monument was erected to his memory.

He married (1) Catherine, daughter of Thomas Grey, 2nd marquess of Dorset, by whom he had Henry, who predeceased him, and two daughters, of whom Mary married Thomas Howard, 4th duke of Norfolk; and (2) Mary, daughter of Sir John Arundell and dowager countess of Sussex, by whom he had no children. Arundel was the last earl of his family, the title at his death passing through his daughter Mary to the Howards.

Authorities. — MS. Life by a contemporary in Royal MSS., British Museum, 17 A ix., printed with notes inGent. Mag. (i833)(ii.), pp. 11, 118, 210, 490; M. A. Tierney, Hist, of Arundel, p. 319; Chronicle of Queen Jane (Camden Soc. 1850); Literary Remains of Edward VI. (Roxburghe Club, 1857); J. Nichols, Progresses of Queen Elizabeth (1823), i. 74; Wood, Fasti Oxon. (Bliss), i. 153, 156; Cal. State Papers, Simancas, i. 18, ii. 152, &c, Notes and Queries, 2 Ser. iv. 84, &c.

Philip Howard, 1st earl 1 of Arundel (1557-1595), eldest son of Thomas Howard, 4th duke of Norfolk, executed for high treason in 1572, and of Lady Mary, daughter and heiress of Henry Fitzalan, 12th earl of Arundel, was born on the 28th of June 1557. He was married in 1571 to Anne, daughter and co-heiress of Thomas Dacre, Lord Dacre (1566), and was educated at Cambridge, being accorded the degree of M.A. in 1576. Subsequently Lord Surrey, as he was styled, came to court, partook in its extravagant gaieties and dissipations, and kept his wife in the background; but he nevertheless failed to secure the favour of Elizabeth, who suspected the Howards generally. On the death of his maternal grandfather in February 1580 he became earl of Arundel and retired from the court. In 1582 his wife joined the church of Rome, and was committed to the charge of Sir Thomas Shirley by the queen. He was himself suspected of disloyalty, and was regarded by the discontented Roman Catholics as the centre of the plots against the queen's government, and even as a possible successor. In 1583 he was 1 i.e. in the Howard line.

with some reason suspected of complicity in Throgmorton's plot and prepared to escape to Flanders, but his plans were interrupted by a visit from Elizabeth at his house in London, and by her order subsequently to confine himself there. In September 1584 he became a Roman Catholic, dissembling his conversion and attempting next year once more to escape abroad; but having been brought back he was placed in the Tower on the 25th of April 1585, and charged before the Star Chamber with being a Romanist, with quitting England without leave, sharing in Jesuit plots, and claiming the dukedom of Norfolk. He was sentenced to pay £10,000 and to be imprisoned during the queen's pleasure. In July 1586 his liberty was offered to him if he would carry the sword of state before the queen to church. In 1 588 he was accused of praying, together with other Romanists, for the success of the Spanish Armada. He was tried for high treason on the 14th of April 1589, found guilty and condemned to death; but lingered in confinement under his sentence, which was never executed, till his death on the 19th of October 1595. He was buried in the Tower,

whence his remains were removed in 1624 to Arundel. His career, his later religious constancy and his tragic end have evoked general sympathy, but his conduct gave rise to grave suspicions, and the punishment inflicted upon him was not unwarranted; while the account of the severity of his imprisonment given by his anonymous and contemporary biographer should be compared with his own letters expressing gratitude for favours allowed. 1 There appears no foundation for the belief that he was poisoned, and according to Camden his death was caused by his religious austerities. 2 He was the author of a translation of An Epistle of Jesus Christ to the Faithful Soule by Johann Justus (1595, reprinted 187 1) and of three MS. treatises On the Excellence and Utility.of Virtue. Inscriptions carved by his hand are still to be seen in the Tower. He had two children, Elizabeth, who died young, and Thomas, who (restored in blood) succeeded him as 2nd earl of Arundel, and was created earl of Norfolk in 1644.

Authorities. — Article in the Diet, of Nat. Biography and au- thorities there collected ; the contemporary Lives of Philip Howard, Earl of Arundel and of Anne Dacre his Wife, ed. by the duke of Norfolk (1857); M. Tierney, History of Arundel (1834), p. 357; C. H. Cooper, Athenae Cantabrigenses (1861), with bibliography, ii. 187 and 547; H. Howard, Memoirs of the Howard Family (1824).

Thomas Howard, 2nd earl of Arundel, and earl of Surrey and of Norfolk (c. 1585-1646), son of Philip, 1st earl of Arundel and of Lady Anne Dacre, was born in 1585 or 1586 and educated at Westminster school and at Trinity College, Cambridge. Owing to the attainder of his father he was styled Lord Maltravers, but at the accession of James I. he was restored to his father's earl- doms of Arundel and Surrey, and to the baronies of his grand- father, Thomas, 4th duke of Norfolk. He came to court, travelled subsequently abroad, acquiring a taste for art, and was created K.G. on his return in May 1611. In 1613 he escorted Elizabeth, the electress palatine, to Heidelberg, and again visited Italy. On Christmas day 161 5 Arundel joined the Church of England, and took office, being appointed a privy councillor in 1616. He supported Raleigh's expedition in 161 7, became a member of the New England Plantations Committee in 1620 and planned the colonization of Madagascar. He presided over the House of Lords Committee in April 1621 for investigating the charges against Bacon, whom he defended from degradation from the peerage, and at whose fall he was appointed a commissioner of the great seal. On the 16th of May he was sent to the Tower by the Lords on account of violent and insulting language used by him to Lord Spencer. He incurred Prince Charles's and Buckingham's anger by his opposition to the war with Spain in 1624, and by his share in the duke's impeachment, and on the occasion of his son's marriage to Lady Elizabeth Stewart without the king's approval he was

imprisoned in the Tower by Charles I., shortly after his accession, but was released at the instance of the Lords in June 1626, being again confined to his house till March 1628, when he was once more liberated by the Lords.

J See Cal. of St. Pap. Dom. 1581-15 go, 611 ; and Hist. MSS. Comm. Marq. of Salisbury's MSS. iii. 253, 414.

- *Camden's Elizabeth in Hist, of England (1706), 587.*

In the debates on the Petition of Right, while approving its essential demands, he supported the retention of some discre- tionary power by the king in committing to prison. The same year he was reconciled to the king and again made a privy councillor. On the 29th of August 1621 he had been appointed earl marshal, and in 1623 constable of England, in 1630 reviving the earl marshal's court. In 1625 he was made lord-lieutenant of Sussex and in 1635 of Surrey. He was sent to the Hague in 1632 on a mission of condolence to the queen of Bohemia on her husband's death. In 1634 he was made chief justice in eyre of the forests north of the Trent ; he accompanied Charles the same year to Scotland on the occasion of his coronation, and in 1636 undertook an unsuccessful mission to the emperor to procure the restitution of the Palatinate to the young elector. In 1638 he supported the king's exactions from the vintners, was entrusted with the charge of the Border forts, and, supporting alone amongst the peers the war against the Scots, was made general of the king's forces in the first Bishops' War, though according to Clarendon " he had nothing martial about him but his presence and looks." He was not employed in the second Bishops' War, but in August 1640 was nominated captain-general south of the Trent. In April he was appointed lord steward of the royal household, and in 1641 as lord high steward presided at the trial of Strafford. This closed his public career. He became again estranged from the court, and in 1641 he escorted home Marie de' Medici, remaining abroad, with the exception of a short visit to England in 1642,- for- the rest of his life, and taking up per- manent residence at Padua. He contributed a sum of £34,000 to the king's cause, and suffered severe losses in the war. On the 6 th of June 1644 he was created earl of Norfolk. He died at Padua, when on the point of returning home, on the 14th of September 1646, and was buried at Arundel.

Lord Arundel was a man of high character, an exemplary husband and parent, but reserved and unpopular, and Clarendon ridicules his family pride. His claim to fame rests upon his patronage of arts and learning and his magnificent collections. He employed Hollar, Oughtred, Francis Junius and Inigo Jones; included among his friends Sir Robert Cotton, Spelman, Camden, Selden and John Evelyn, and his portrait was painted by Rubens and Vandyck. He is called the " Father of vertu in England," and was

admired by a contemporary as the person to whom " this angle of the world oweth the first sight of Greek and Roman statues." 3 He was the first to form any considerable collection of art in Great Britain. His acquisitions, obtained while on his travels or through agents, and including inscribed marbles, statues, fragments, pictures, gems, coins, books and manuscripts, were deposited at Arundel House, and suffered considerable damage during the Civil War; and, owing to the carelessness and want of appreciation of his successors, nearly half of the marbles were destroyed. After his death the treasures were dispersed. The marbles and many of the statues were given by his grandson, Henry, 6th duke of Norfolk, to the university of Oxford in 1667, became known as the Arundel (or Oxford) Marbles, and included the famous Parian Chronicle, or Marmor Chronicon, a marble slab on which are recorded in Greek events in Grecian history from 1582 B.C. to 354 B.C., said to have been executed in the island of Paros about 263 B.C. Its narration of events differs in some respects from the most trust- worthy historical accounts, but its genuineness, challenged by some writers, has been strongly supported by Porson and others, and is considered fairly established. Other statues were pre- sented to the university by Henrietta Louisa, countess of Pomfret, in 1755. The cabinets and gems were removed by the wife of Henry, 7th duke of Norfolk, in 1685, and after her death found their way into the Marlborough collection. The pictures and drawings were sold in 1685 and 1691, and Lord Stafford's moiety of the collection in 1720. The coins and medals wen, bought by Heneage Finch, 2nd earl of Winchelsea, and dispersed in 1696; the library, at the instance of John Evelyn, who feared its total loss, was given to the Royal Society, and a part,

3 Peacham in the Compleat Gentleman (1634), p. 107, and Secret Hist, of James I. (1811), i. 199.

consisting of genealogical and heraldic collections, to the College of Heralds, the manuscript portion of the Royal Society's moiety being transferred to the British Museum in 183 1 and forming the present Arundel Collection. The famous bust of Homer reached the British Museum after passing through various hands.

Lord Arundel married in 1606 Lady Alethea, daughter and heir of Gilbert Talbot, 7 th earl of Shrewsbury, by whom, besides three sons who died young and one daughter, he had John, who predeceased him, Henry Frederick, who succeeded him as 3rd earl of Arundel and earl of Surrey and of Norfolk, and William, Viscount Stafford, executed in 1680. In

1849 the Arundel Society for promoting artistic knowledge was founded in his memory. Henry Frederick's grandson Thomas, by the reversal (1660) of the attainder of 1572, succeeded to the dukedom of Norfolk, in which the earldom has since then been merged.

Authorities. — See the article in the Vict, of Nat. Biography, and authorities there collected; D. Lloyd, Memoires (1668), p. 284; Sir E. Walker, Historical Discourses (1705), p. 209 (MS. in Harleian, 6272 f. 152); M. Tierney, History of Arundel (1834), p. 414; Sir Thomas Roe's Negotiations (1740: letters relating to his collections), 334, 444, 495 ; W. Crowne, A True Relation of all the Remarkable Places . . . in the Travels of . . . Thomas, Earl of Arundell: ˆ./'. 1636 (1637); Die englische Mission des Grafen v. Arundel in Numberg (archivalische Zeitschrift: neue Folge, Bd. xi., 1904); H. Howard, Memorials of the Howard Family (1834), p. 31 ; H. K. S. Causton, The Howard Papers (1862) ; Preface to Catalogue of Arundel MSS-, Brit. Museum (1840), &c. For publications relating to the Parian Chronicle see Marmora Arundelliana, publ. J. Selden (1628); Prideaux's Marmora Oxoniensia (1676); Maittaire's variorum edition (1732); Chandler's Marmora Oxoniensia (1763 and 1791), G. Roberts; J. Robertson, The Parian Chronicle (1788) ; J. Hewlett, A Vindication (1789); R. Porson, "The Parian Chronicle," in Tracts, ed. by T. Kidd (1815); Chronicon Parium, ed. by C. F. C. Wagner (1832-1833) ; C. Midler's Fragmenta Historicorum Graecorum (1841), i. 533; F. Jacoby, Das Marmor Parium (1904).

ARUNDEL, THOMAS (1353-1414), archbishop of Canterbury, was the third son of Richard Fitzalan, earl of Arundel and Warenne, by his second wife, Eleanor, daughter of Henry Plantagenet, earl of Lancaster. His family was an old and influential one, and when Thomas entered the church his prefer- ment was rapid. In 1373 he became archdeacon of Taunton, and in April 1374 was consecrated bishop of Ely. During the early years of the reign of King Richard II. he was associated with the party led by Thomas, duke of Gloucester, Henry, earl of Derby, afterwards King Henry IV., and his own brother Richard, earl of Arundel, and in 1386 he was sent with Gloucester to Eltham to persuade Richard to return to parliament. This mission was successful, and Arundel was made lord chancellor in place of Michael de la Pole, duke of Suffolk, and assisted to make peace between the king and the supporters of the commis- sion of regency. In April 1388 he was made archbishop of York, and. when Richard declared himself of age in 1389, he gave up the office of chancellor, to which, however, he returned in 1391. During his second tenure of this office he removed the courts of justice from London to York, but they were soon brought back to the metropolis. In September 1396 he was translated from York to Canterbury, and again resigned the office of chancellor. He began his new rule by a vigorous attempt to assert his rights, warned the citizens of

London not to withhold tithes, and decided appeals from the judgments of his suffragans during a thorough visitation of his province. In November 1396 he had officiated at the marriage of Richard and Isabella, daughter of Charles V-L, king of France, and his fall was the sequel of the king's sudden attack upon the lords appellant in 1397. After the arrest of Gloucester, Warwick and Arundel, the archbishop was impeached by the Commons with the king's consent, although Richard, who had not yet revealed his hostility, held out hopes of safety to him. He was charged with assisting to procure the commission of regency in derogation of the royal authority, and sentence of banishment was passed, forty days being given him during which to leave the realm. Towards the end of 1397 he started for Rome, and Pope Boniface IX., at the urgent request of the king, translated him to the see of St Andrews, a step which the pope afterwards confessed he repented bitterly. This translation virtually deprived Arundel of all authority, as St Andrews did

not acknowledge Boniface. He then became associated with Henry of Lancaster, but did not return to England before 1399, and the account which Froissart gives telling how he was sent by the Londoners to urge Henry to come and assume the crown is thought to refer to his nephew and namesake, Thomas, earl of Arundel. Landing with Henry at Ravenspur, he accompanied him to the west. He took his place at once as archbishop of Canterbury, witnessed the abdication of Richard in the Towel of London, led the new king, Henry IV., to his throne in presence of the peers, and crowned him on the 13th of October 1399.

The main work of his later years was the defence of the church, and the suppression of heresy. To put down the Lollards, he called a meeting of the clergy, pressed on the statute de haeretico comburendo , and passed sentence of degradation upon William Sawtrey. He resisted the attempt of the parliament of 1404 to disendow the church, but failed to induce Henry to pardon Archbishop Scrope in 1405. In 1407 he became chancellor for the fourth time, and in 1408 summoned a council at Oxford, which drew up constitutions against the Lollards. These he published in January 1409, and among them was one forbidding the translation of the Bible into English without the consent of the bishop of the diocese, or of a provincial synod. In 141 1 he went on an embassy abroad, and in 141 2 became chancellor again, his return to power being accompanied by a change in the foreign policy of Henry IV. In 1397 he had sought to vindicate his right of visitation over the university of Oxford, but the dispute remained unsettled until 141 1 when a bull was issued by Pope John XXIII. recalling one issued by Pope Boniface IX., which had exempted the university from the archbishop's authority. In 1413 he took a leading part in the proceedings against Sir John Oldcastle, Lord Cobham, and in the following year he died on the 19th of February, and was buried at Canter- bury. A legend of a

later age tells how, just before his death, he was struck dumb for preventing the preaching of the word of God.

The chief authorities are T. Walsingham, Historia Anglicana, ed. by H. T. Riley (London, 1 863-1 864); Eulogium hisloriarum sive temporis, ed. by F. S. Haydon (London, 1858-1863); the Monk of Evesham, Historia vitae et regni Ricardi II., ed. by T. Hearne (Oxford, 1729) ; W. F. Hook, Lives of the Archbishops of Canterbury, vol. iv. (London, 1 860-1 876).

ARUNDEL, a market town and municipal borough in the Chichester parliamentary division of Sussex, England, 58 m. S.S.W. from London by the London, Brighton & South Coast railway. Pop. (1901) 2739. It is pleasantly situated on the slope of a hill above the river Arun, which is navigable for small vessels to Littlehampton at the mouth, 6 m. south. From the summit of the hill rises Arundel Castle, which guarded the passage along the river through the hills. For its connexion with the title of earl of Arundel see Arundel, Earldom or. A castle existed in the time of King Alfred, and at the time of the Conquest it was rebuilt by Roger de Montgomerie, but it was taken from his son, who rebelled against the reigning monarch, Henry I. In 1397 it was the scene of a conspiracy organized by the earl of Arundel, archbishop of Canterbury and duke of Gloucester, to dethrone Richard II. and murder the lords of his council, a plot which was discovered before it could be carried into execu- tion. During the civil wars of the 17 th century, the stronghold was frequently assaulted by the contending parties, and conse- quently greatly damaged; but it was restored by Charles, nth duke of Norfolk (d. 1815), who made it what it now is, one of the most splendid baronial mansions in England. Extensive reconstruction, in the style of the 13 th century, was undertaken towards the close of the 19th century. The town, according to the whimsical etymology shown on the corporation seal, takes its name from hirondelle (a swallow). The town hall is a castel- lated building, presented to the corporation by the duke of Norfolk. The church of St Nicholas, founded about 1375, is Perpendicular with a low tower rising from the centre. In the north aisle of the chancel there are several ancient monuments of the earls of Arundel. The church is otherwise remarkable for its reredos and iron work. The chancel is the property of the duke of Norfolk and is screened from the rest of the building,

although in 1880 this exercise of right by the owner was made the subject of an action at law and subsequent appeal. The Roman Catholic church of St Philip Neri was built by the duke of Norfolk (1873). Some remains of a

Maison Dieu, or hospital, erected in the time of Richard II., still exist. The borough is under a mayor, 4 aldermen and 1 2 councillors. Area, 2053 acres. The first mention of Arundel (Harundell) comes as early as 877, when it was left by King Alfred in his will to his nephew JEthelm. In the time of Edward the Confessor the town seems to have con- sisted of the mill and a fortification or earthwork which was probably thrown up by Alfred as a defence against the Danes; but it had increased in importance before the Conquest, and appears in Domes- day as a thriving borough and port. It was granted by the Conqueror to Roger de Montgomery, who built the castle on the site of the ancient earthwork. From very early timas markets were held within the borough on Thursday and Saturday, and in 1285 Richard Fitzalan, earl of Arundel, obtained a grant of two annual fairs on the 14th of May and the 17th of December. The borough returned two members to parliament from 1302 to 1832 when the Reform Act reduced the membership to one; in 1868 it was disfranchised altogether. There are no early charters extant, but in 1586 Elizabeth acknowledged the right of the mayor and burgesses to be a body corporate and to hold a court for pleas under forty shillings, two weekly markets and four annual fairs — which rights they claimed to have exercised from time immemorial. James II. confirmed in 1688 a charter given two years before, and incorporated the borough under the title of a mayor, 4 aldermen and 12 burgesses. The town was half destroyed by fire in 1338, but was soon rebuilt. Arundel was formerly a thriving seaport, and in 1813 was connected by canal with London.

See M. A. Tierney, The History and Antiquities of the Castle and Town of Arundel (London, 1834); Victoria County History — Sussex. ARUNDELL OF WARDOUR, THOMAS ARUNDELL, ist Baron (c. 1562-1639), son of Sir Mathew Arundell of Wardour Castle in Wiltshire, a member of the ancient family of Arundells of Lanherne in Cornwall, and of Margaret, daughter of Sir Henry Willoughby, was born about 1562. In 1579 he was personally recommended by Queen Elizabeth to the emperor Rudolph II. He greatly distinguished himself while serving with the imperial troops against the Turks in Hungary, and at the siege of Gran or Esztergom on the 13th of August 159s, he captured the enemy's banner with his own hand. He was created by Rudolph II. a count of the Holy Roman Empire in December 1 595, and returned to England after suffering shipwreck and barely preserving his life in January 1596. His assumption of the foreign title created great jealousy among the English peers, who were wont to give a precedence by courtesy to foreign nobles, and he incurred the resentment of his father, who objected to his superior rank and promptly disinherited him. The queen, moreover, was seriously displeased, declared that " as chaste wives should have no glances but for their own spouses, so should faithful subjects keep their eyes at home and not gaze upon foreign

crowns," and committed him to the Fleet immediately on his arrival, while she addressed a long letter of remonstrance on the subject to the emperor. Arundell remained under arrest till April, when he was liberated after an examination. In April 1597, however, he was again confined, but declared innocent of any charge save that of " practising to contrive the justification of his vain title with Ministers beyond the seas." In December he was liberated and placed under the care of his father, but next year he was again arrested and accused of a conspiracy against the government. His petitions for a licence to undertake an expedition by sea, wherein he declared " his end was honour which some base minds call ambition," were refused, but in 1 599 he was apparently again restored to favour. On the 4th of May 1605 he was created by James I. Baron Arundell of Wardour, but fell again under temporary suspicion at the time of the Gunpowder Plot. [n 1623 he once more got into trouble by championing the cause of the recusants, of whom he was himself one, on the occasion of the visit of the Spanish envoys, and he was committed to custody, and in 1625 all the arms were removed by the government from ' Wardour Castle. After the accession of Charles I. he was pardoned, and attended the sittings of the House of Lords. He was indicted in the king's bench about the year 1627 for not paying some contribution, and in 1632 he was accused of harbouring a priest. In 1637 he was declared exempt from the recusancy laws by the king's order, but in 1639 he again

petitioned for relief. The same year he paid £500 in lieu of attending the king at York. He died on the 7 th of November 1639. Arundell was an earnest Roman Catholic, but the sus- picions of the government as to his loyalty were probably un- founded and stifled a career destined by nature for successful adventure. He married (1) Mary, daughter of Henry Wriothesley, 2nd earl of Southampton, by whom besides other children he had Thomas, who succeeded him as 2nd baron; and (2) Anne, daughter of Miles Philipson, by whom he had several daughters. Henry Arundell, 3rd Baron Arundell of Wardour (c. 1607- 1694), son of Thomas, 2nd baron, and of Blanche, daughter of Edward, earl of Worcester, was born on the 21st of July 1607, and succeeded on his father's death in 1643 to the family title and estates. A strong royalist and Roman Catholic, he supported the king's cause, and distinguished himself in 1644 by the recapture of his castle at Wardour from the parliamentarians, who had taken it in the previous year in spite of his mother's brave defence of the place. In 1648 he was one of the delinquents exempted from pardon in the proposals sent to Charles in the Isle of Wight. His estates had been confiscated, but he was permitted about 1653 to compound for them in the sum of £35,000. In 1652, in consequence of his being second at a duel in which one of the combatants was killed, he was arrested, and tried in 1653; he pleaded his peerage, but the privilege was disallowed as the House of Lords had been

abolished. At the Restoration he regained possession of the family estates, and in 1663 was made master of the horse to Henrietta Maria. He was one of the few admitted to the king's confidence concerning the projects for the restoration of the Roman Catholic religion and the alliance with France. In 1669 he took part in the secret council assembled by Charles II., and in October was sent to France, ostensibly for the funeral of Henrietta Maria, but in reality to negotiate with Louis XIV. the agreement which took shape in 1670 in the treaties of Dover (see Charles II.). In 1676 he was privy to James's negotiations with Rome through Coleman. He was accused in 1678 by Titus Oates of participa- tion in the popish plot, and was one of the five Roman Catholic •peers arrested and imprisoned in the Tower in October, found guilty by the Middlesex grand jury of high treason, and impeached subsequently by the parliament. Lord Stafford was found guilty and executed in December 1680, but after the perpetration of this injustice the proceedings were interrupted, and the three surviving peers were released on bail on the 12 th of February 1684. On the 22nd of May 1685, after James II. 's accession, the charge was annulled, and on the ist of June 1685 they obtained their full liberty. In February 1686, with other Roman Catholics, Arundell urged upon the king the removal of his mistress, Lady Dorchester, on account of her strong Pro- testantism. In spite of his religion he "was made a privy councillor in August 1686, and keeper of the privy seal in 1687, being excused from taking the oaths by the king's dispensation. He presented the thanks of the Roman Catholics to James in June 1687 for the declaration of indulgence. His public career ended with the abdication of the king, and he retired to Breamore, the family residence since the destruction of Wardour Castle. He died on the 28th of December 1694. He was the author of five religious poems said to be composed during his confinement in the Tower in 1679, published the same year and reprinted in A Collection of Eighty-six Loyal Poems in 1685. His piety and benevolence to his unfortunate co-religionists were conspicuous. Evelyn calls him " very good company " and he was a noted sportsman, the Quorn pack being descended from his pack of hounds at Breamore. He married Cecily, daughter of Sir Henry Compton, by whom besides other children he had Thomas, who succeeded him as 4th baron.

The barony is still held in the Arundell family, which has never ceased to be Roman Catholic. The 14th baron (b. 1859) was a direct descendent of the 6th.

ARUSIANUS MESSIUS, or Messus, Latin grammarian, flourished in the 4th century a.d. He was the author of a small extant work Exempla Elocutionum, dedicated to Olybrius an& Probinus, consuls for the year 395. It contains an alphabetical

list, chiefly of verbs admitting more than one construction, with examples from each of the four writers, Virgil, Sallust, Terence and Cicero. Cassiodorus, the only writer who mentions Arusianus, refers to it by the term Quadriga.

See Keil, Grammatici Latini, vii. ; Suringar, Historia Critica Scholiastarum Latinorum (1834-1835); Van der Hoeven, Specimen Literarium (1845).

ARVAL BROTHERS (Fratres Arvales) , in Roman antiquities, a college or priesthood, consisting of twelve members, elected for life from the highest ranks in Rome, and always apparently, during the empire, including the emperor. Their chief duty was to offer annually public sacrifice for the fertility of the fields (Varro, L. L. v. 85). It is generally held that the college was founded by Romulus (see Acca Larentia). This legend probably arose from the connexion of Acca Larentia, as mater Larum, with the Lares who had a part in the religious ceremonies of the Arvales. But apart from this, there is proof of the high antiquity of the college, which was said to have been older than Rome itself, in the verbal forms of the song with which, down to late times, a part of the ceremonies was accompanied, and which is still preserved. It is clear also that, while the members were them- selves always persons of distinction, the duties of their office were held in high respect. And yet it is singular that no mention of them occurs in Cicero or Livy, and that altogether literary allusions to them are very scarce. On the other hand, we possess a long series of the acta or minutes of their proceedings, drawn up by themselves, and inscribed on stone. Excavations, com- menced in the 16th century and continued to the 19th, in the grove of the Dea Dia about 5 m. from Rome, have yielded 96 of these records from a.d. 14 to 241. The brotherhood appears to have languished in obscurity during the republic, and to have been revived by Augustus. In his time the college consisted of a master {magister), a vice-master {promagister), a flamen, and a praetor, with eight ordinary members, attended by various servants, and in particular by four chorus boys, sons of senators, having both parents alive. Each wore a wreath of corn, a white fillet and the praetexta. The election of members was by co-optation on the motion of the president, who, with a flamen, was himself elected for one year. The great annual festival which they had to conduct was held in honour of the anonymous Dea Dia, who was probably identical with Ceres. It occupied three days in May. The ceremony of the first day took place in Rome itself, in the house of the magister or his deputy, or on the Palatine in the temple of the emperors, where at sunrise fruits and incense were offered to the goddess. A sumptuous banquet took place, followed by a distribution of doles and garlands. On the second and principal day of the festival the

ceremonies were conducted in the grove of the Dea Dia. They included a dance in the temple of the goddess, at which the song of the brotherhood was sung, in language so antiquated that it was hardly intelligible (see the text and translation in Mommsen, Hist, of Rome, bk. i. ch. xv.) even to Romans of the time of Augustus, who regarded it as the oldest existing document in their mother-tongue. Especial mention should be made of the ceremony of purifying the grove, which was held to be defiled by the felling of trees, the breaking of a bough or the presence of any iron tools, such as those used by the lapidary who engraved the records of the proceedings on stone. The song and dance were followed by the election of officers for the next year, a banquet and races. On the third day the sacrifice took place in Rome, and was of the same nature as that offered on the first day. The Arvales also offered sacrifice and solemn vows on behalf of the imperial family on the 3rd of January and on other extraordinary occasions. The brotherhood is said to have lasted till the time of Theodosius. The British Museum contains a bust of Marcus Aurelius in the dress of a Frater Arvalis.

Marini, Atti e Monumenti de' Fratri Arvali (1795); Hoffmann, Die A: (185%); Oldenberg, De Sacris Fratrum A. (1875); Bergk, Das Lied dˆr Arvalbruder (1856) ; Breal, " Le Chant des Arvals " in Mem. de la Soc. de Linguistique (1881); Edon, Nouvelle £lude sur le Chant Lemural (1884); Corpus Inscription-urn Latinarum, vi. 2023-2119; Henzen, Acta Fratrum Arvalium (1874).

ARVALS, Arvels or Arthels (0. Norse Arjr, inheritance, and 61, A.S. Ale, a banquet), primarily the funeral dinner, and later, especially in the north of England, a thin, light, sweet cake, spiced with cinnamon and nutmeg, served to the poor at such feasts. The funeral meal was called the Arvel-dinner. The custom seems to have been to hold on such occasions an informal inquest, when the corpse was publicly exposed, to exculpate the heir and those entitled to the property of the dead from all accusations of foul play.

ARVERNI, the name of an ancient Gaulish tribe in the Auvergne, which still bears its name. It resisted Caesar longer than most of Gaul; when once vanquished it adopted Roman civilization readily. Its tribal deity, the god of the mountain, the Puy de Dome, rechristened in Roman phrase Mercurius Dumias, was famous far beyond its territory. Part of his temple has been excavated recently.

ARYAN, a term which has been used in a confusing variety of significations by different philologists. By Max Miiller especially it was employed as a convenient short term for the whole body of languages more commonly known as Indo- European (q.v.) or Indo-Germanic. In the same way Max Miiller used Aryas as a general term for the speakers of such languages, as in his book published in 1888, Biographies of Words and the Home of the Aryas. " Aryas are those who speak Aryan lan- guages, whatever their colour, whatever their blood. In calling them Aryas we predicate nothing of them except that the grammar of their language is Aryan " (p. 245). It is to be observed, therefore, that Max Miiller is careful to avoid any ethnological signification. The Aryas are those who speak Aryan without regard to the question whether Aryan is their hereditary language or not. As he says still more definitely elsewhere in the same work (p. 120), " I have declared again and again that if I say Aryas, I mean neither blood nor bones, nor hair nor skull; I mean simply those who speak an Aryan language. The same applies to Hindus, Greeks, Romans Germans, Celts and Slaves. When I speak of them I commit myself to no anatomical characteristics. The blue-eyed and fair-haired Scandinavians may have been conquerors or con- quered, they may have adopted the language of their darker lords or their subjects, or vice versa. I assert nothing beyond their language when I call them Hindus, Greeks, Romans,

Germans, Celts and Slaves; and in that sense, and in that sense only, do I say that even the blackest Hindus represent an earlier stage of Aryan speech and thought than the fairest Scandinavians ... To me an ethnologist who speaks of Aryan race, Aryan blood, Aryan eyes and hair, is as great a sinner as a linguist who speaks of a dolichocephalic dictionary or a brachycephalic grammar."

From the popularity of Max Miiller's works on comparative philology this is the use of the word which is most familiar to the general public. The arguments in support of this use are set forth by him in the latter part of lecture vi. of the Lectures on the Science of Language (first series) and as an appendix to chap. vii. of the final edition (i. pp. 291 ff.). The Sanskrit usage of the word is fully illustrated by him from the early Sanskrit writings in the article " Aryan " in the ninth edition of this encyclopaedia. From the earliest occurrences of the word it is clear that it was used as a national name not only in India but also in Bactria and Persia (in Sanskrit drya- and arya-, in Zend airy a-, in Old Persian ariya-). That it is in any way connected with a Sanskrit word for earth, ira, as Max Miiller asserts, is far from certain. As Spiegel remarks {Die arische Periode, p. 105), though it is easy enough to connect the word with a root ar-, there are several roots of that form which have different meanings, and there is no certain criterion whereby to decide to which of them it is related. Nor are the other connexions for the word outside this group free from doubt. It is, however, certain that the .connexion with Erin (Ireland), which Pictet in his article " Iren and Arier " (Kuhn and Schleicher's Beitrdge, i. 1858, pp. 81 ff.) sought to establish, is impossible (Whitley Stokes in Max Miiller's Lectures, 1891, i. pp. 299 f.), though the word may have the same origin as the Ario- of names like Ariovistus,

which is found in both Celtic and Germanic words (Uhlenbeck, Kurzgefasstes etymologisches Worterbuch der altindischen Sprache, 6.v.). The name of Armenia (Old Persian Armina-), which has often been connected, is of uncertain origin. Within Sanskrit itself probably two words have to be distinguished: (i) dry a, the origin of Aryan, from which the usual term arya is a deriva- tive; (2) aryd, which frequently appears in the Rig Veda as an epithet of deities. In many passages, however, ary&s may equally well be the genitive of ari, which is explained as " active, devoted, pious." Even in this word probably two originally separate words have to be distinguished, for the further mean- ings which Grassmann in his dictionary to the Rig Veda attaches to it, viz. " greedy " (for treasure and for battle), " godless," " enemy," seem more appropriately to be derived from the same source as the Greek Ipi-s, " strife." The word Arya- is not found as a national name in the Rig Veda, but appears in the Vajasaneyi-sainhita,

where it is explained by Mahldhara as VaiSya-, a cultivator or a man of the third among the original four classes of the population. So in the Atharva Veda (iv. 20. 4; xix. 62. 1) it is contrasted with the Sudra or fourth class (Spiegel, Arische Periode, p. 102). In the Avesta, airya- is found both as adjective and substantive in the sense of Aryan, but no light is thrown upon the history of the word. Darius describes himself in an inscription as of Aryan stock, Ddraya h va K us ariyaHid r a h . In the Avesta the derivative airy ana- is also found in the sense of Aryan. In both India and Persia a word is found (Skt. aryatnan- ; Zend airydman-) which is apparently of the same origin. In both Sanskrit and Zend it means something like " comrade " or " bosom friend," but in Zend is used of the priestly or highest class. In Sanskrit, besides this use in which it is contrasted with the Ddsa or Ddsyu, the enemies, the earlier inhabitants, the word is often used for the bridegroom's spokesman, and in both languages is also employed as the name of a divine being. In the Rig Veda, Aryaman- as a deity is most frequently coupled with Mitra and Varuna (Grassmann, Worterbuch, s.v.); in Zend, according to Bartholomae (Altiranisches Worterbuch, s.v.), from the earliest literature, the Gathas, there is nothing definite to be learnt regarding Airyaman.

Whatever the origin of arya-, however, it is clear that it is a word with dignified associations, by which the peoples belonging to the Eastern section of the Indo-Europeans were proud to call themselves. It is now used uniformly by scholars to indicate the Eastern branch as a whole, a compound, Indo-Aryan, being employed for that part of the Eastern branch which settled in India to distinguish them from the Iranians (Iran is of the same origin), who remained in Bactria and Persia, while Aryo-Indian is sometimes employed to distinguish the Indian people of this stock from the Dravidian and other stocks which also inhabit parts of the Indian peninsula. Of the stages in the occupation of the Iranian table-land by the Aryan people nothing is known, the people themselves having apparently no tradition of a time when they did not hold these territories (Spiegel, Arische Periode, p. 319). Though the Hindus have no tradition of their invasion of India, it is certain that they are not an indigenous people, and, if they are not, it is clear that they could have come in no other direction save from the other side of the Hindu Kusb. At the period of their earliest literature, which may be assigned roughly to about 1000 B.C., they were still settled in the valley of the Indus, and at this time the separation probably had not long taken place, the Eastern portion of the stock having pushed their way along the Kabul valley into the open country of the Indus. According to ProfeS§sffi t E. W. Hopkins {India Old and New, 1 001, p. 31) the Rig FSfowas composed in the district about Umballa. He argues that the people must have been then to the west of the great rivers, otherwise the dawn could not be addressed as one who " in shining light, before the wind

arises, comes gleaming over the waters, making good paths." The vocabulary is still largely the same; whole sentences can be transliterated from one language to the other merely by making regular phonetic changes and without the variation of a single word (for examples see Bartholomae, Handbuch der alliranischen Dialekte, 1883, p. v.; Williams Jackson, Avesta Grammar, 1892,

pp. xxxi. f.; Grundriss der iranischen Philologie, 1895, i. p. 1). It is noteworthy that it is those who remain behind whose language has undergone most change.

By four well-marked characteristics the Aryan group is easily distinguishable from the other Indo-European languages. (1) By the confusion of original e and 0, both long and short, with the original long and short a sound; (2) the short schwa-sound a is represented here, and in this group only, by i (pita, " father," as compared with irarfip, &c.) ; (3) original 5 after i, u and some consonants becomes s; (4) the genitive plural of stems ending in a vowel has a suffix-waw borrowed by analogy from the stems ending in n (Skt. dsvdndm, "of horses"; Zend aspdndm; Old Persian aspdndm). The distinctions between Sanskrit and Iranian are also clear. (1) The Aryan voiced aspirates gh, dh, bh, which survive in Sanskrit, are confused in Iranian with original g, d, b, and further changes take place in the language of the later parts of the Avesta; (2) the Aryan breathed aspirates kh, th, ph, except in combination with certain consonants, become spirants in Iranian; (3) Aryan 5 becomes h initially before vowels in Iranian and also in certain cases medially, Iranian in these respects resembling Greek (cf. Skt. saptd; Zend hapta; Gr. exrd, " seven '); (4) in Zend there are many vowel changes which it does not share with Old Persian. Some of these arise from the umlaut or epenthesis which is so prevalent, and which we have already seen in airya as compared with the Skt. drya. In other respects the languages are remarkably alike, the only striking difference being in the numeral " one " — Skt. eka-; Zend aeva-; Old Persian aiva-, where the Iranian group has the same stem as that seen in the Greek 6t(F)o-s, " alone."*

For the subdivisions of the two groups see the articles on Persia: Language, and Indo-Aryan Languages. Dr Grierson has shown in his monograph on " The Pisaca Languages of North- Western India " (Royal Asiatic Society, 1906) that there is good reason for regarding various dialects of the north-western frontier (Kafiristan, Chitral, Gilgit, Dardistan) as a separate group descended from Aryan but independent of either Sanskrit or Iranian.

The history of the separation of the Aryan from the other Indo-European

languages is not yet clear (see Indo-European Languages). Various attempts have been made, with little success, to identify fragments of unknown languages in cuneiform inscriptions with members of this group. The investigation has entered a new and more favourable stage as the result of the discoveries made by German excavators at Boghaz Keui (said to be identical with Herodotus' Pteria in Cappadocia), where treaties between the king of the Hittites and the king of Mitanni, in the beginning of the 14th century B.C., seem almost certainly to contain the names of the gods Mitra, Varuna and Indra, which belong to the early Aryan mythology (H. Winckler, Mitteilungen der deutschen Orientgesellschaft, No. 35; E. Meyer, Sitzungsberichte der Berliner Akademie, 1908, pp. 14 ff.; Zeitschrift fur vergleichende Sprachforschung, 42, 1908, pp. 24 ff.). Still further light is to be expected when the vast collections of the German expedition to Turfan (Turkestan) have been sifted. Up to 1909 only a preliminary account had been given of Tocharish, a hitherto unknown Indo-European language, which is reported to be in some respects more akin to the Western groups than to Aryan. But further investigation is still required (see E. Sieg and W. Siegling, " Tocharisch, die Sprache der Indoskythen," in Sitzungsberichte der Berl. Akad. (July 1908, pp. 915 ff.). (P. Gi.)

ARYA SAMAJ, a Hindu religious association with reforming tendencies, which was founded by a Guzerati Brahman named Dayanand Saraswati. This man was born of a Saivite family about 1825, but in early manhood grew dissatisfied with idol- worship. He undertook many pilgrimages and studied the Vedic philosophy in the hope of solving the old problem of the Buddha, — how to alleviate human misery and attain final liberation. About 1866, when he had begun to teach and to gather disciples, he first saw the Christian scriptures, which he vehemently assailed, and the Rig Veda, which he correspondingly exalted, though in the conception which he ultimately formed of God the former was much more influential than the latter. Dayanand's

treatment of the Vedas was peculiar, and consisted of reading into them his own beliefs and modern scientific dis- coveries. Thus he explains the Yajna (sacrificial cult) as " the entertainment of the learned in proportion to their worth, the business of manufacture, the experiment and application of chemistry, physics and the arts of peace; the instruction of the people, the purification of the air, the nourishment of vegetables by the employment of the principles of meteorology, called Agni-Notri in Sanskrit." He denied that the Vedas warranted the caste system, but wished to retain the four grades as orders of learning to which admission should be won by

examination.

These views naturally met with scanty acceptance among the Brahmans to whom he introduced them, and Dayanand turned to the masses and established Samajes in various parts of India, the first being at Bombay in 1875. He chose the epithet Arya as being more dignified than the slightly contemptuous term Hindu. After a successful series of tours, during which he debated publicly with orthodox pundits and with Christian missionaries, he died at Ajmere in 1883.

The Arya Samaj is not an eclectic system like the Brahma Samaj, which strives to find the common basis underlying all the great religions, and its narrower scope and corresponding intensity of conviction have won it a greater strength. It seemed to meet the feeling of many educated natives whose faith in current Hinduism was undermined, but who were predisposed against any foreign religious influence. Their patriotic ardour gladly seized on "a view of the original faith of India that seemed to harmonize with all the discoveries of modern science and the ethics of European civilization," and they cheerfully supported their leader's strange polemic with the agnostic and rationalist literature of Europe. By 1890 their numbers had increased to 40,000, by 1900 to over 92,000. Divisions had, however, set in, especially a cleavage into the Ghasi or vegetarian, and the Mansi or flesh-eating sections. To the latter belong those Rajputs who though generally in sympathy with the movement declined to adhere to the tenet of the Samaj which forbade the destruction of animal life and the consumption of animal food. The age of admission to the Samaj is eighteen, and members are expected to contribute to its funds at least 1 % of their income.

The ten articles of their creed may be summarized thus: —

1. The source of all true knowledge is God.

2. God is " all truth, all knowledge, all bliss, boundless, almighty,

just, merciful, unbegotten, without a beginning, incompar- able, the support and Lord of all, all-pervading, omniscient, imperishable, immortal, eternal, holy, and the cause of the universe; worship is due to him alone.

3. The medium of true knowledge is the Vedas.

4. and 5. The truth is to be accepted and to become the guiding

principle.

6. The object of the Samaj is to benefit the world by improving

its physical, social, intellectual and moral conditions.

7. Love and justice are the right guides of conduct.

8. Knowledge must be spread.

9. The good of others must be sought.

10. In general interests members must subordinate themselves to the good of others; in personal interests they should retain independence.

The sixth clause comprehends a wide programme of reform, including abstinence from spirituous liquors and animal food, physical cleanliness and exercise, marriage reform, the promotion of female education, the abolition of caste and of idolatry.

ARYTENOID (or arytaenoid; from Gr. apircuva, a funnel or pitcher), a term, meaning funnel-shaped, applied to cartilages such as those of the larynx.

ARZAMAS, a town of Russia, in the government of, and 76 m. by rail S. of the town of, Nizhniy-Novgorod, on the Tesha river, at its junction with the Arsha. It is an important centre of trade, and has tanneries, oil, flour, tallow, dye, soap and iron works; knitting is an important domestic industry. Sheep- skins and sail-cloth are articles of trade. The town has several churches. Pop. (1897) 10,591.

AS, the Roman unit of weight and measure, divided into 12 unciae (whence both " ounce " and " inch ") ; its fractions being deunx f£, dextans $, dodrans }, bes J, septunx A,

semis , quincunxˆ, triens J, quadrans 5, sextans 5, sescunciaf, uncia tV- As really denoted any integer or whole; whence the English word " ace." The unit or as of weight was the libra (pound: = about nf oz. avoirdupois); of length, pes (foot: = about 1 if in.); of surface, jugerum (= about f acre); of measure, liquid amphora (about sf gal.)., dry tnodius (about 1 peck). In the same way as signified a whole inheritance; whence heres ex asse, the heir to the whole estate, heres ex semisse, heir to half the estate. It was also used in the calculation of rates of interest.

As was also the name of a Roman coin, which was of different weight and value at different periods (see Numismatics, § Roman). The first introduction of coined money is ascribed to Servius Tullius. The old as was composed of the mixed metal aes, an alloy of copper, tin and lead, and was called as libralis, because it nominally weighed 1 lb or 12 ounces (actually 10). Its original shape seems to have been an irregular oblong

bar, which was stamped with the figure of a sheep, ox or sow. This, as well as the word pecunia for money (pecus, cattle), indicates the fact of cattle having been the earliest Italian medium of exchange. The value was indicated by little points or globules, or other marks. After the round shape was introduced, the one side was always inscribed with the figure of a ship's prow, and the other with the double head of Janus. The subdivisions of the as had also the ship's prow on one side, and on the other the head of some deity. The First Punic War having exhausted the treasury, the as was reduced to 2 oz. In the Second Punic War it was again reduced to half this weight, viz. to 1 oz. And lastly, by the Papirian law (89 B.C.) it was further reduced to the diminutive weight of half an ounce. It appears to have been still more reduced under Octavian, Lepidus and Antony, when its value was J of an ounce. Before silver coinage was introduced (269 B.C.) the value of the as was about 6d., in the time of Cicero less than a halfpenny. In the time of the emperor Severus it was again lowered to about -ˆ of an ounce. During the commonwealth and empire aes grave was used to denote the old as in contradistinction to the existing depreciated coin; while aes rude was applied to the original oblong coinage of primitive times.

ASA, in the Bible, son (or, perhaps, rather brother) of Abijah, the son of Rehoboam and king of Judah (1 Kings xv. 9-24). Of his long reign, during which he was a contemporary of Baasha, Zimri and Omri of Israel, little is recorded with the exception of some religious reforms and conflicts with the first-named. Baasha succeeded in fortifying Ramah (er-Rdm), 5 m. north of Jerusalem, and Asa was compelled to use the residue of the temple-funds (cf. 1 Kings xiv. 26) to bribe the king of Damascus to renounce his league with Baasha and attack Israel. Galilee was invaded and Baasha was forced to return; the building material which he had collected at Ramah being used by Asa to fortify Geba, and Mizpah to the immediate north of Jerusalem. The Book of Chronicles relates a story of a sensational defeat of Zerah the " Cushite," and a great religious revival in which Judah and Israel took part (2 Chron. xiv.-xv. 15) (see Chronicles). Asa was succeeded by his son Jehoshaphat.

" Cushite " may designate an Ethiopian or, more probably, an Arabian (Cush, the " father " of the Sabaeans, Gen. x. 7). " If by Zerah the Ethiopian or Sabaean prince be meant, the only real difficulty of the narrative is removed. No king Zerah of Ethiopia is known at this period, nor does there seem to be room for such a person " (W. E. Barnes, Cambridge Bible, Chronicles, p. xxxi.). The identification with Osorkon I. or II. is scarcely tenable considering Asa's weakness; but inroads by desert hordes frequently troubled Judah, and if the tradition be correct in locating the battle at Mareshah it is probable that the invaders were in league with the Philistine towns. Similar situations recur in the reigns of Ahaz and

Jehoram.

See also Wellhausen, Prolegomena, 208; S. A. Cook, Expositor (June 1906), p. 540 sq. (S. A. C.)

ASAFETIDA (asa, Lat. form of Persian aza = mastic, and fetidus, stinking, so called in distinction to asa dulcis, which was a drug highly esteemed among the ancients as laser cyrenaicwm,

and is supposed to have been a gummy exudation from Thapsis garganica), a gum-resin obtained principally from the root of Ferula fetida, and probably also from one or two other closely allied species of umbelliferous plants. It is produced in eastern Persia and Afghanistan, Herat and Kandahar being centres of the trade. Ferula fetida grows to a height of from 5 to 6 ft., and when the plant has attained the age of four years it is ready for yielding asafetida. The stems are cut down close to the root, and the juice flows out, at first of a milky appearance, but quickly setting into a solid resinous mass. Fresh incisions are made as long as the sap continues to flow, a period which varies according to the size and strength of the plant. A freshly-exposed surface of asafetida has a translucent, pearly-white appearance, but it soon darkens in the air, becoming first pink and finally reddish- brown. In taste it is acrid and bitter; but what peculiarly characterizes it is the strong alliaceous odour it emits, from which it has obtained the name asafetida, as well as its German name Teufelsdreck (devil's dung) . Its odour is due to the presence of organic sulphur compounds. Asafetida is found in commerce in " lump " or in " tear," the latter being the purer form. Medicinally, asafetida is given in doses of 5 to 15 grains and acts as a stimulant to the intestinal and respiratory tracts and to the nervous system. An enema containing it is useful in relieving flatus. It is sometimes useful in hysteria, which is essentially a lack of inhibitory power, as its nasty properties induce sufficient inhibitory power to render its readministration superfluous. It may also be used in an effervescing draught in cases of malingering, the drug " repeating " in the mouth and making the malingering not worth while. The gum-resin is relished as a condiment in India and Persia, and is in demand in France for use in cookery. In the regions of its growth the whole plant is used as a fresh vegetable, the inner portion of the full-grown stem being regarded as a luxury.

ASAF-UD-DOWLAH, nawab wazir of Oudh from 1775 to 1797, was the son of Shuja-ud-Dowlah, his mother and grandmother being the begums of

Oudh, whose spoliation formed one of the chief counts in the charges against Warren Hastings. When Shuja-ud-Dowlah died he left two million pounds sterling buried in the vaults of the zenana. The widow and mother of the deceased prince claimed the whole of this treasure under the terms of a will which was never produced. When Warren Hastings pressed the nawab for the payment of debt due to the Company, he obtained from his mother a loan of 26 lakhs of rupees, for which he gave her a jagir of four times the value; he subsequently obtained 30 lakhs more in return for a full acquittal, and the recognition of her jagirs without interference for life by the Company. These jagirs were afterwards con- fiscated on the ground of the begum's complicity in the rising of Chai Singh, which was attested by documentary evidence. The evidence now available seems to show that Warren Hastings did his best throughout to rescue the nawab from his own incapacity, and was inclined to be lenient to the begums.

See The Administration of Warren Hastings, 17 j -2-178 '5, by G. W. Forrest (1892).

ASAPH, the eponym of the Asaphite gild of singers, one of the hereditary choirs that superintended the musical services of the temple at Jerusalem in post-exilic times. The names occur in the titles of certain Psalms, and the writer of the Book of Chronicles makes Asaph a seer (2 Chron. xxix. 30), contemporary with David and Solomon, and chief of the singers of his time.

ASBESTOS, a fibrous mineral from Gr. aafteo-Tos, unquench- able, by transference, incombustible, in allusion to its power of resisting the action of fire. The word was applied by Dioscorides and other Greek authors to quicklime, but Pliny evidently used it in its modern sense. It was occasionally woven by the ancients into handkerchiefs, and, it has been said, into shrouds which were used in cremation to prevent the ashes of the corpse from mingling with the wood-ashes of the pyre.

In different varieties of asbestos the fibres vary greatly in character. When silky and flexible they are sometimes known as mountain flax. The finer kinds are often termed amianthus (j.tf.). When the fibres are naturally interwoven, so as to form

a felted mass, the mineral passes under such trivial names as mountain leather, mountain cork, mountain paper, &c. The asbestos formerly used in the arts was generally a fibrous form of some kind of amphibole, like tremolite, or anthophyllite, though occasionally perhaps a pyroxene. In recent years, however, most of the asbestos in the market is a fibrous variety of serpentine, known mineralogically as chrysotile, and probably some of the ancient asbestos was of this character (see Amian- thus). Both minerals possess similar properties, so far as resistance to heat is

concerned. The amphibole-asbestos, or hornblende-asbestos, is usually white or grey in colour, and may present great length of fibre, some of the Italian asbestos reaching exceptionally a length of 5 or 6 ft., but it is often harsh and brittle. The serpentine-asbestos occurs in narrow veins, yielding fibres of only 2 or 3 in. in length, but of great tensile strength: they are usually of a delicate silky lustre, very flexible and elastic, and of yellowish or greenish colour.

The Canadian asbestos, which of all kinds is at present the most important industrially, occurs in a small belt of serpentine in the province of Quebec, principally near Black Lake and Thetford, where it was first recognized as commercially valuable about 1877. The rock is generally quarried, cobbed by hand, dried if necessary, crushed in rock-breakers, and then passed between rollers; it is reduced to a finer state of division by so-called fiberizers, and graded on a shaking screen, where the loosened fibres are sorted. The process varies in different mills.

In the United States asbestos is worked only to a very limited extent. An amphibole-asbestos is obtained from Sail Mountain, Georgia; and asbestos has also been worked in the serpentine of Vermont. It occurs also in South Carolina, Virginia, Massa- chusetts, Arizona and elsewhere. Dr G. P. Merrill has shown that some asbestos results from a process of shearing in the rocks.

Formerly asbestos was obtained almost exclusively from Italy and Corsica, and a large quantity is still yielded by Italian workings. This is mostly an amphibole. It is in some cases associated with nodules of green garnet known as " seeds " — Semenze dell' amianto. Asbestos is widely distributed, but only in a few localities does it occur in sufficient abundance and purity to be worked commercially; it is found, for example, to a limited extent, at many localities in Tirol,' Hungary and Russia; Queensland, New South^Vales and New Zealand. In the British Isles it is not unknown, being found among the old rocks of North Wales and in parts of Ireland. Byssolite or asbestoid is a blue or green fibrous amphibole from Dauphiny.

The Asbestos Mountains in Griqualand West, Cape Colony, yield a blue fibrous mineral which is worked under the name of Cape asbestos. This is referable to the variety of amphibole called crocidolite (q.v.). It occurs in veins in slaty rocks, associated with jaspers and quartzites rich in magnetite and brown iron-ore. Their geological position is in the Griqua Town series, belonging to what are known in South Africa as the Pre-Cape rocks.

Asbestos was formerly spun and woven into fabrics as a rare curiosity. Charlemagne is said to have possessed a tablecloth of this material, which

when soiled was purified by being thrown into the fire. At a meeting of the Royal Society in 1676 a merchant from China exhibited a handkerchief of " salamander's wool," or linum asbesti. By the Eskimos of Labrador asbestos has been used as a lamp- wick, and it received a similar application in some of the sacred lamps of antiquity. In recent times asbestos has been applied to a great variety of uses in the industrial arts, and its applications are constantly increasing. Its economic value depends not only on its power of withstanding a high temperature, but also on its low thermal conductivity and its partial resistance to the attack of acids: hence it is used for jacketing boilers and steam-pipes, and as a filtering medium for corrosive liquids. It has also come into use as an electric insulator. It is made into yarn, felt, millboard, &c, and is largely employed as packing for joints, glands and stopcocks in machinery. Fire-proof sheathing and felt are used for floor- ing and roofing; fire-proof curtains have been made for the stage, and even clothing for firemen. Asbestos enters into the

composition of fire-proof cements, plasters and paints: it is used for packing safes; and is made into balls with fire-clay for gas- stoves. Various preparations of asbestos with other materials pass in trade under such names as uralite, salamandrite, asbes- tolith. gypsine, &c. "Asbestic " is the name given to a Canadian product formed by crushing the serpentine rock containing thin seams of asbestos, and mixing the result with lime so as to form a plaster.

References. — Fritz Cirkel, Asbestos, its Occurrence, Exploitation and Uses (Ottawa, 1905) ; J. H. Pratt and J. S. Diller in Annual Reports on Mineral Resources, U.S. Geol. Survey; G. P. Merrill, The Non- metallic Minerals (New York, 1904); R. H. Jones, Asbestos and Asbestic (London, 1897).
(F. W. R.)*

ASBJORNSEN, PETER CHRISTEN (1812-1885), and MOE, JORGEN ENGEBRETSEN (1813-1882), collectors of Norwegian folklore, so closely united in their life's work that it is unusual to name them apart. Asbjornsen was born in Christiania on the 15th of January 181 2; he belonged to an ancient family of the Gudbrandsdal, which is believed to have died with him. He became a student at the university in 18,33, t> ut as early as 1832, in his twentieth year, he had begun to collect and write down all the fairy stories and legends which he could meet with. Later he began to wander on foot through the length and breadth of Norway, adding to his stores. Moe, who was born at Mo i Hole parsonage, in Sigdal Ringerike, on the 22nd of April 1813, met Asbjornsen first when he was fourteen years of age. A close friendship began between them, and lasted to the end of

their lives. In 1834 Asbjornsen discovered that Moe had started independently on a search for the relics of national folklore; the friends eagerly compared results, and determined for the future to work in concert. By this time, Asbjornsen had become by pro- fession a zoologist, and with the aid of the university made a series of investigating voyages along the coasts of Norway, particularly in the Hardanger fjord. Moe, meanwhile, having left Christiania University in 1839, had devoted himself to the study of theology, and was making a living as a tutor in Chris- tiania. In his holidays he wandered through the mountains, in the most remote districts, collecting stories. In 1842-1843 appeared the first instalment of the great work of the two friends, under the title of Norwegian Popular Stories (Norske Folkeeventyr) , which was received at once all over Europe as a most valuable contribution to comparative mythology as well as literature. A second volume was published in 1844, and a new collection in 187 1. Many of the Folkeeventyr were translated into English by Sir George Dasent in 1859. In 1845 Asbjornsen pub- lished, without help from Moe, a collection of Norwegian fairy tales (huldreeventyr og folkesagn). In 1856 the attention of Asbjornsen was called to the deforestation of Norway, and he induced the government to take up this important question. He was appointed forest-master, and was sent by Norway to examine in various countries of the north of Europe the methods observed for the preservation of timber. From these duties, in 1876, he withdrew with a pension; he died in Christiania on the 6th of January 1885. From 1841 to 1852 Moe travelled almost every summer through the southern parts of Norway, collecting traditions in the mountains. In 1845 he was appointed professor of theology in the Military School of Norway. He had, however, long intended to take holy orders, and in 1853 he did so, becoming for ten years a resident chaplain in Sigdal, and then (1863) parish priest of Bragernes. He was moved in 1870 to the parish of Vestre Aker, near Chris- tiania, and in 1875 he was appointed bishop of Christiansand. In January 1882 he resigned his diocese on account of failing health, and died on the following 27th of March. Moe has a special claim on critical attention in regard to his lyrical poems, of which a small collection appeared in 1850. He wrote little original verse, but in his slender volume are to be found many pieces of exquisite delicacy and freshness. Moe also published a delightful collection of prose stories for children, In the Well and the Churn (/ Bronde og i Kjarnet), 1851; and A Little Christmas Present (En liden Julegave), i860. Asbjornsen and Moe had the advan- tage of an admirable style in narrative prose. It was usually said that the vigour came from Asbjornsen and the charm from

Moe, but the fact seems to be that from the long habit of writing in unison they had come to adopt almost precisely identical modes of literary

expression. (E. G.)

ASBURY, FRANCIS (1745-1816), American clergyman, was born at Hamstead Bridge in the parish of Handsworth, near Birmingham, in Staffordshire, England, on the 20th of August 1 745. His parents were poor, and after a brief period of study in the village school of Barre, he was apprenticed at the age of fourteen to a maker of " buckle chapes," or tongues. It seems probable that his parents were among the early converts of Wesley; at any rate, Francis became converted to Methodism in his thirteenth year, and at sixteen became a local preacher. He was a simple, fluent speaker, and was so successful that in 1767 he was enrolled, by John Wesley himself, as a regular itinerant minister. In 1771 he volunteered for missionary work in the American colonies. When he landed in Philadelphia in October 1771, the converts to Methodism, which had been intro- duced into the colonies only three years before, numbered scarcely 300. Asbury infused new life into the movement, and within a year the membership of the several congregations was more than doubled. In 1772 he was appointed by Wesley " general assistant " in charge of the work in America, and although superseded by an older preacher, Thomas Rankin (1738-1810), in 1773, he remained practically in control. After the outbreak of the War of Independence, the Methodists, who then numbered several thousands, fell, unjustly, under suspicion of Loyalism, principally because of their refusal to take the pre- scribed oath; and many of their ministers, including Rankin, returned to England. Asbury, however, feeling his sympathies and duties to be with the colonies, remained at his post, and although often threatened, and once arrested, continued his itinerant preaching. The hostility of the Maryland authorities, however, eventually drove him into exile in Delaware, where he remained quietly, but not in idleness, for two years. In 1782 he was reappointed to supervise the affairs of the Methodist congregations in America. In 1784 John Wesley, in disregard of the authority of the Established Church, took the radical step of appointing the Rev. Thomas Coke (1 747-1814) and Francis Asbury superintendents or " bishops " of the church in the United States. Dr Coke was ordained at Bristol, England, in September, and in the following December, in a conference of the churches in America at Baltimore, he ordained and consecrated Asbury, who refused to accept the position until Wesley's choice had been ratified by the conference. From this conference dates the actual beginning of the " Methodist Episcopal Church of the United States of America." To the upbuilding of this church Asbury gave the rest of his life, working .with tireless devotion and wonderful energy. In 1785, at Abingdon, Maryland, he laid the corner-stone of Cokesbury College, the project of Dr Coke and the first Methodist Episcopal college in America; the college building was burned in 1795, and the college was then removed to Baltimore, wherein 1796, after another

fire, it closed, and in 1816 was succeeded by Asbury College, which lived for about fifteen years. Every year Asbury traversed a large area, mostly on horseback. The greatest testimony to the work that earned for him the title of the " Father of American Methodism " was the growth of the denomination from a few scattered bands of about 300 converts and 4 preachers in 1771, to a thoroughly organized church of 214,000 members and more than 2000 ministers at his death, which occurred at Spottsylvania, Virginia, on the 31st of March 1816.

His Journals (3 vols., New York, 1852), apart from their import- ance as a history of his life work, constitute a valuable commentary on the social and industrial history of the United States during the first forty years of their existence. Consult also F. W. Briggs, Bishop Asbury (London, 1874); W. P. Strickland, The Pioneer Bishop; or, The Life and Times of Francis Asbury (NewYork, 1858); J. B. Wakeley, Heroes of Methodism (New York, 1S56): W. C. Larrabee, Asbury and His Co-Laborers (2 vols., Cincinnati, 1853); H. M. Du Bose, Francis Asbury (Nashville, Tenn., 1909); see also under Methodism.

ASBURY PARK, a city of Monmouth county, New Jersey, U.S.A., on the Atlantic Ocean, about 35 m. S. of New York City (50 m. by rail). Pop. (1900) 4148; (1905)4526; (1910)10,150.

It is served by the Central of New Jersey and the Pennsylvania railways, and by electric railway lines connecting it with other New Jersey coast resorts both north and south. Fresh-water lakes, one of which, Deal Lake, extends for some distance into the wooded country, form the northern and southern boundaries. It is one of the most popular seaside resorts on the Atlantic coast, its numerous hotels and cottages accommodating a summer population that approximates 50,°°°, and a large transient population in the autumn and winter months. There is an excellent beach, along which extends a board-walk about 1 m. long; the beach is owned and controlled by the municipality. The municipality owns and operates its water- works, water being obtained from artesian wells. Asbury Park was founded in 1869, was named in honour of the Rev. Francis Asbury, was incorpor- ated as a borough in 1874, and was chartered as a city in 1897. In 1906 territory to the west with a population estimated at 6000 was annexed.

ASCALON, now "Askalan, one of the five chief cities of the Philistines, on the coast of the Mediterranean, 12 m. N. of Gaza. The place is mentioned several times in the Tell el- Amarna correspondence. It revolted from Egypt

on two occasions, but was reconquered, and a sculpture at Thebes depicts the storming of the city. Ascalon was a well-fortified town, and the seat of the worship of the fish-goddess Derketo. Though situated in the nominal territory of the tribe of Judah, it was never for any length of time in the possession of the Israelites. The only incident in its history recorded in the Bible (the spoliation by Samson, Judg. xiv. 19) may possibly have actually occurred at another place of the same name, in the hill country of Judaea. Sennacherib took it in 701 B.C. The conquest of Alexander hellenized its civilization, and after his time it became tributary alternately to Syria and Egypt. Herod the Great was a native of the city, and added greatly to its beauty; but it suffered severely in the later wars of the Romans and Jews. In the 4th century it again rose to importance; and till the 7th century, when it was conquered by the Moslems, it was the seat of a bishopric and a centre of learning. During the first crusade a signal victory was gained by the Christians in the neighbouring plain on the 15th of August 1099; but the city remained in the hands of the caliphs till 1157, when it was taken by Baldwin III., king of Jerusalem, after a siege of five months. By Baldwin IV. it was given to his sister Sibylla, on her marriage with William of Montferrat in 11 78. When Saladin (1187) had almost annihilated the Christian army in the plain of Tiberias, Ascalon offered but a feeble resistance to the victor. At first he repaired and strengthened its fortifications, but afterwards, alarmed at the capture of St Jean d'Acre (Acre) by Richard Cceur de Lion in 1191, he caused it to be dismantled. It was restored in the following year by the English king, but only to be again abandoned. From this time Ascalon lost much of its importance, and at length, in 1270, its fortifications were almost totally destroyed by Sultan Bibars, and its port was filled up with stones. The place is now a desolate heap of ruins, with remains of its walls and fragments of granite pillars. The surrounding country is well watered and very fertile.*

See a paper by Guthe, " Die Ruinen Ascalons," in the Zeitschrift of the Deutsche Palastina-Verein, ii. 164 (translated in Palestine Exploration Fund Quarterly Statement, 1880, p. 182). See also C. R. Conder in the latter journal, 1875, p. 152. (R. A. S. M.)

ASCANIUS, in Roman legend, the son of Aeneas by Creiisa or Lavinia. From Livy it would appear that tradition recognized two sons of Aeneas called by this name, the one the son of his Trojan, the other of 'his Latin wife. According to the usual account, he accompanied his father to Italy on his flight from Troy. On the death of Aeneas, the government of Latium was left in the hands of Lavinia, Ascanius being too young to under- take it. After thirty years he left Lavinium, and founded Alba Longa. Ascanius was also called Ilus and lulus, and the Julian gens claimed to be descended from him. Several more or less contradictory traditions may be found in Dionysius of Halicarnassus, Strabo and other writers.

Virg. Aen. ii. 666; Livy i. 3; see also Klausen. Aeneas und die Penaten (1840).

ASCENSION, an island in the Atlantic Ocean, between 7 53′ and 8° S., and 14 18′ and i4°26′ W., 800 m. N.W. of St Helena, about i\ m. in length and 6 in breadth, with an area of 38 sq. m. and a circumference of about 22 m. The island lies within the immediate influence of the south-east trade- wind. The lee side of the island is subject to the visitation of " rollers," which break on the shore with very great violence. Ascension is a volcanic mass erected on a submarine platform. Numerous cones exist. Green Mountain, the principal elevation, is a huge elliptical crater, rising 2820 ft. above the sea, while the plains or table- lands surrounding it vary in height from 1 200 to 2000 ft. On the north side they sweep gradually down towards the shore, but on the south they terminate in bold and lofty precipices. Steep and rugged ravines intersect the plains, opening into small bays or coves on the shore, fenced with masses of compact and cellular lava; and all over the island are found products of volcanic action. Ascension was originally destitute of vegetation save on the summit of Green Mountain, which owes its verdure to the mists which frequently enshroud it, but the lower hills have been planted with grasses and shrubs. The air is clear and light, and the climate remarkably healthy, notwithstanding the high temperature — the average day temperature on the shore being 85 F., on Green Mountain 75 F. The average rainfall is about 20 in., March and April being the rainy months. Ascension is noted for the number of turtles and turtle eggs found on its shores, the season lasting from December to May or June. The turtles are caught and kept in large ponds. The coasts abound with a variety of fish of excellent quality, of which the most important are the rock-cod, the cavalli, the conger-eel and the " soldier." Numbers of sheep are bred on the island, and there are a few cattle and deer, besides goats and wild cats. Feathered game is abundant. Like St Helena, the island does not possess any indigenous vertebrate land fauna. The "wideawake" birds frequent the island in large numbers, and their eggs are collected and eaten. Beetles and land-shells are well represented . Flies, ants, mosquitoes, scorpions, centipedes and crickets abound. The flora includes purslane, rock roses and several species of ferns and mosses.

The island was discovered by the Portuguese navigator, Joao da Nova, on Ascension Day 1501, and was occasionally visited thereafter by ships. In 1701 William Dampier was wrecked on its coast, and during his detention discovered the only spring of fresh water the island contains. Ascension remained uninhabited till after the arrival of Napoleon at St Helena (1815), when it w&s taken possession of by the British government, who sent a small garrison thither. A settlement, named George Town (locally known as Garrison), was made on the north-west coast, water being

obtained from " Dampier's " springs in the Green Mountain, 6 m. distant. The island is under the rule of the admiralty, and was likened by Darwin to " a huge ship kept in first-rate order." It is governed by a naval captain borne on the books of the flagship of the admiral superintendent at Gibraltar. A depot of stores for the navy is maintained, but the island is used chiefly as a sanatorium. Ascension is connected by cable with Europe and Africa, and is visited once a month by mail steamers from the Cape. Formerly letters were left by passing ships in a crevice in one of the rocks. The population, about 300, consists of seamen, marines, and Krumen from Liberia.

See Africa Pilot, part ii., 5th ed. (London, 1901) ; C. Darwin, Geological Observations on the Volcanic Islands visited during the Voyage of H. M.S." Beagle" (London, 1844); Report of the Scientific Results of the Voyage of the " Challenger," vol. i. part 2 (London, 1885) ; and Six Months in Ascension, by Mrs Gill (London, 1878), an excellent sketch of the island and its inhabitants. It was at Ascen- sion that Mr, afterwards Sir, David Gill determined, in 1877, the solar parallax. >

ASCENSION, FEAST OF THE, one of the oecumenical festivals of the Christian Church, ranking in solemnity with those of Christmas, of Easter and of Pentecost. It is held forty days after Easter, or ten days before Whitsunday, in celebration of Christ's ascension into heaven forty days after the resurrection. It always falls on a Thursday, and the day is known as Ascension ' Day, or Holy Thursday. The festival is of great antiquity; and

though there is no discoverable trace of it before the middle of the 4th century, subsequent references to it assume its long establishment. Thus St Augustine (Ep. 54a.dJa.nuar.) mentions it as having been kept from time immemorial and as probably instituted by the apostles Chrysostom, in his homily on the ascension, mentions a celebration of the festival in the church of Romanesia outside Antioch, and Socrates (Hist, eccles. vii. 26) records that in the year 390 the people of Constantinople " of old custom " (t£ Wovs) celebrated the feast in a suburb of the city. As these two references suggest, the festival was associated with a professional pilgrimage, in commemoration of the passing of Christ and his apostles to the Mount of Olives; such a pro- cession is described by Adamnan, abbot of Iona, as taking place at Jerusalem in the 7th century, when the feast was celebrated in the church on Mount Olivet (de loc. sand. i. 22). The Pere- grinaiio of Etheria (Silvia), which dates from c. a.d. 385, says that the

festival was held in the Church of the Nativity at Bethlehem (Duchesne, Chr. Worship, p. 515)- In the West, however, in the middle ages, the procession with candles and banners outside the church was taken as symbolical of Christ's triumphant entry into heaven.

In the East the festival is known as the ava\ri\f/is, " taking up," or iruruˆoniyri, a term first used in the Cappadocian church, and of which the meaning has been disputed, but which probably signifies the feast " of completed salvation." The word ascensio, adopted in the West, implies the ascension of Christ by his own power, in contradistinction to the assumptio, or taking up into heaven of the Virgin Mary by the power of God.

In the Roman Catholic Church the most characteristic ritual feature of the festival is now the solemn extinction of the paschal candle after the Gospel at high mass. This candle, lighted at every mass for the forty days after Easter, symbolizes the presence of Christ with his disciples, and its extinction his parting from them. The custom dates from 1263, and was formerly confined to the Franciscans; it was prescribed for the universal church by the Congregation of Rites on the 19th of May 1697. Other customs, now obsolete, were formerly associated with the liturgy of this feast; e.g. the blessing of the new beans after the Commemoration of the Dead in the canon of the mass (Duchesne, p. 183). In some churches, during the middle ages, an image of Christ was raised from the altar through a hole in the roof, through which a burning straw figure representing Satan was immediately thrown down.

In the Anglican Church Ascension Day and its octave con- tinue to be observed as a great festival, for which a special preface to the consecration prayer in the communion service is provided, as in the case of Christmas, Easter, Whitsunday, and Trinity Sunday. The celebration of the Feast of the Ascension was also retained in the Lutheran churches as warranted by Holy Scripture.

See Herzog-Hauck, Realencyklopadie (1900), s. "Himmelfahrtsfesf" ; L. Duchesne, Christian Worship (2nd Eng. ed., London, 1904) ; The Catholic Encyclopaedia (London and New York, 1907).

ASCETICISM, the theory and practice of bodily abstinence and self-mortification, generally religious. The word is derived from the Gr. verb honko), " I practise," whence the noun &.

character and discipline of the feelings, which are the essence of any healthy asceticism. Nevertheless these non-moral taboos or restraints may have played a part in building up in us that faculty of preferring the larger good to the impulse of the moment which is the note of real civilization.

Aristotle in his Ethics defines, as the barbarian's ideal of life, " the living as one likes." Yet nothing is less true; for the savage, more than the civilized man, is tied down at every step with superstitious scruples and restrictions barely traceable in higher civilizations except as primitive survivals. It is not that savages are devoid of the ascetic instinct. It is on the contrary over-developed in them, but ill-informed and working in ways unessential or even morally harmful. It is the note of every great religious reformer, Moses, Buddha, Paul, Mani, Mahomet, St Francis, Luther, to enlighten and direct it to higher aims, substituting a true personal holiness for a ritual purity or taboo, which at the best was viewed as a kind of physical condition and contagion, inherent as well in things and animals as in man.

It is useful, therefore, in a summary sketch of asceticism, to begin with the facts as they can be observed among less advanced races, or as mere survivals among people who have reached the level of genuine moral reflection ; and from this basis to proceed to a consideration of self-denial consciously pursued as a-method of ethical perfectton. The latter is as a rule less cruel and rigorous than primitive forms of asceticism. Under this head fall the following: — Fasting, or abstention from certain meats and drinks; denial of sexual instinct; subjection of the body to physical discomforts, such as nakedness, vigils, sleeping on the bare ground, tattooing, deformation of skull, teeth, feet, &c, vows of silence to be observed throughout life or during pilgrim- ages, avoidance of baths, of hair-cutting and of clean raiment, living in a. cave; actual self-infliction of pain, by scourging, branding, cutting with knives, wearing of hair shirts, fire- walking, burial alive, hanging up of oneself by hooks plunged into the skin, suspension of weights by such hooks to the tenderer parts of the body, self-mutilation and numerous other, often ingenious, modes of torture. Such customs repose on various superstitions; for example, the self-mutilation of the Galli or priests of Cybele was probably a magical ceremony intended to fertilize the soil and stimulate the crops. Others of the practices enumerated, probably the greater part of them, spring from demonological beliefs.

Fasting (q.v.) is used in primitive asceticism for a variety of reasons, among which the following deserve notice. Certain animals and vegetables are taboo, i.e. too holy, or — what among Semites and others was the same thing — too defiling and unclean, to be eaten. Thus in Leviticus xi. the Jews are forbidden to eat animals other than cloven-footed ruminants; thus the camel, coney, hare and swine were forbidden; so also any water organisms that had not fins and scales, and a large choice of birds, including swan, pelican, stork, heron and hoopoe. All winged creeping things that have four feet were equally abomin- able. Lastly, the weasel, mouse and most lizards were taboo. All or nearly all of these were at one time totem animals among one or another of the Semitic tribes, and were

not eaten because primitive men will not eat animals between which and themselves and their gods they believe a peculiar tie of kinship to exist. Men do not eat an animal for which they have a reverential dread, or if they eat it at all, it is only in a sacramental feast and in order to absorb into themselves its life and holy properties. Such abstinences as the above, though based on taboo, that is, on a reluctance to eat the totem or sacred animal, are yet ascetic in so far as they involve much self-denial. No flesh is more wholesome or succulent than beef, yet the Egyptians and Phoenicians, says Porphyry (de Abst. ii. n), would rather eat human flesh than that of the cow, and so would two hundred and fifty millions of modern Hindus. The privation involved in abstention from the flesh of the swine, a taboo hardly less wide- spread, is obvious.

Similar prohibitions are common in Africa, where fetish priests are often reduced to a diet of herbs and roots. That such dietary restrictions were merely ceremonial and superstitious, and not

intended to prevent the consumption of meats which would revolt modern tastes, is certain from the fact that the Levitical law freely allowed the eating of locusts, grasshoppers, crickets and cockroaches, while forbidding the consumption of rabbits, hares, storks, swine, &c. The Pythagoreans were forbidden to eat beans.

Another widespread reason for avoiding flesh diet altogether was the fear of absorbing the irrational soul of the animal, which especially resided in the blood. Hence the rule not to eat meats strangled, except in sacramental meals when the god inherent in the animal was partaken of. It is equally a soul or spirit in wine which inspires the intoxicated; the old Egyptian kings avoided wine at table and in libations, because it was the blood of rebels who had fought with the gods, and out of whose rotting bodies grew the vines; to drink the blood was to imbibe the soul of these rebels, and the frenzy of intoxication which followed was held to be possession by their spirits. The medieval Jews also held that there is a cardiac demon in wine which takes possession of drunken men; and the Mahommedan prohibition of wine-drinking is based on a similar superstition. The avoidance of wine, therefore, by Rechabites, Nazirites, Arab dervishes and Pythagoreans, and also of leaven in bread, is parallel to and explicable in the same way as abstention from flesh. Porphyry (de Abst. i. 19) acquaints us with another wide- spread scruple against flesh diet. It was this, that the souls of men transmigrated into animals, so that if you ate these, you might consume your own kind, cannibal-wise. Contemporary meat-eaters set themselves to

combat this prejudice, and argued that it was a pious duty to kill animals and so release the human souls imprisoned. In the same tract Porphyry relates (ii. 48) how wizards acquired the mantic powers of certain birds, such as ravens and hawks, by swallowing their hearts. The soul of the bird, he explains, enters them with its flesh, and endows them with power of divination. The lover of wisdom, who is priest of the universal God, rather than risk the taking into him- self of inferior souls and polluting demons, will abstain from eating animals. Such is Porphyry's argument.

The same fear of imbibing the irrational soul of animals, and thereby reinforcing the lower appetites and instincts of the human being, inspired the vegetarianism of Apollonius of Tyana and of the Jewish Therapeutae, who in their sacred meals were careful to have a table free from blood-containing meats; and the fear of absorbing the animal's psychic qualities equally motived the Jewish and early Christian rule against eating things strangled. It was an early belief, which long survived among the Manichaean sects, that fish, being born in and of the waters, and without any sexual connexion on the part of other fishes are free from the taint which pollutes all animals quae copulatione generantur. Fish, therefore, unlike flesh, could be safely eaten. Here we have the origin of the Catholic rule of fasting, seldom understood by those who observe it. The same scruple against flesh-eating is conveyed in the beautiful confes- sion, in the Cretans of Euripides, of one who had been initiated in the mysteries of Orpheus and became a " Bacchos." The last lines of this, as rendered by Dr Gilbert Murray, are as follows: —

" Robed in pure white, I have borne me clean From man's vile birth and coffined clay, And exiled from my lips alway Touch of all meat where life hath been."

This Orphic fast from meat was only broken by an annual sacramental banquet, originally, perhaps, of human, but later of raw bovine flesh.

The Manichaeans held that in every act of begetting, human or otherwise, a soul is condemned afresh to a cycle of misery by imprisonment in flesh — a thoroughly Indian notion, under the influence of which their perfect or elect ones scrupulously abstained from flesh. The prohibition of taking life, which they took over from the Farther East, in itself entailed fasting from flesh. A fully initiated Manichaean would not even cut his own salad, but employed a catechumen to commit on his behalf this act of murder, for which he subsequently shrived him.

We come to a third widespread reason for fasting, common among savages. Famished persons are liable to morbid excite-

ment, and fall into imaginative ecstasies, in the course of which they see visions and spectres, converse with gods and angels, and are the recipients of supernatural revelations. Accordingly King Saul " ate no bread all the day nor all the night" in which the witch of Endor revealed to him the ghost of Samuel. Weak and famished, he. hardly wanted to eat the fatted calf when the vision was over. Among the North American Indians ecstatic fasting is regularly practised. A faster writes down his visions and revelations for a whole season. They are then examined by the elders of the tribe, and if events have verified them, he is recognized as a supernaturally gifted being, and rewarded with chieftaincy. All over the world fasting is a recognized mode of evoking, consulting and also of overcoming the spirit world. This is why the Zulus and other primitive races distrust a medicine man who is not an ascetic and lean with fasting. In the Semitic East it is an old belief that a successful fast in the wilderness of forty days and nights gives power over the Djinns. The' Indian yogi fasts till he sees face to face all the gods of his Pantheon; the Indian magician fasts twelve days before pro- ducing rain or working any cure. The Bogomils fasted till they saw the Trinity face to face. From the first, fasting was practised in the church for similar reason. In the Shepherd of Hermas a vision of the church rewards frequent fasts and prayer; and it is related in extra-canonical sources that James the Less vowed that he would fast until he too was vouchsafed a vision of the risen Lord. After a long and rigorous fast the Lord appeared to him. Not a few saints were rewarded for their fasting by glimpses of the beatific vision. Dr Tylor writes on this point as follows (Prim. Cult. ii. 415): "Bread and meat would have robbed the ascetic of many an angel's visit: the opening of the refectory door must many a time have closed the gates of heaven to his gaze."

Among the Semites and Tatars worshippers lacerate themselves before the god. So in 1 Kings xviii. 28 the priests of Baal engaged in a rain-making ceremony, gashed themselves with knives and lances till the blood gushed out upon them. The Syriac word ethkashshaph, which means literally to " cut one- self," is, the regular equivalent of to " make supplication." Among Greeks and Arabs, mourners also cut themselves with knives and scratched their faces; the Hebrew law forbade such mourning, and we find the prohibition repeated in many canons of the Eastern churches. At first sight these rites seem intended to call down the pity of heaven on man, but as Robertson Smith points out, their real import was by shedding blood on a holy stone or in a holy place to tie or renew a blood-bond between the God and his faithful ones. We have no clear information about the mind of the Flagellants, who in 1259, and again in 1349, swarmed through the streets of European cities, naked and thrashing themselves, till the blood ran, with leather thongs and iron whips. They were penitents, and no doubt imbued with the ancient belief that without the shedding of blood there is*

no remission of sins.

Asceticism then in its origin was usually not ascetic in a modern sense, that is, not ethical. It was rather of the nature of the savage taboo (q.v.), the outcome of totemistic beliefs or a mode of averting the contaminating presence of djinns and demons. Above all, fasting was a mode of preparing oneself for the sacramental eating of a sacred animal, and as such often assisted by use of purgatives and aperients. It was essential in the old Greek rites of averting the Keres or djinns, the ill regulated ghosts who return to earth and molest the living, to abstain from flesh. The Pythagoreans and Orphic mystae so abstained all their life long, and Porphyry eloquently insists on such a discipline for all who " are not content merely to talk about Reason, but are really intent on casting aside the body and living through Reason with Truth. Naked and without the tunic of the flesh these will enter the arena and strive in the Olympic contest of the soul."

It is time to pass on to Buddhist asceticism, in its essence a more ethical and philosophical product than some of the forms so far considered. The keynote of Buddhist asceticism is deliverance from life and its inevitable suffering. Once >at a

village where he rested the Blessed One (Buddha) addressed his brethren and said: " It is through not understanding and grasping four Noble Truths, O brethren, that we have had to run so long, to wander so long in this weary path of transmigra- tion, both you and I." These noble truths were about sorrow, its cause, its cessation and the path which leads to that cessation. Once they are grasped the craving for existence is rooted out, that which leads to renewed existence is destroyed, and there is no more birth. The Buddha believed he had a way of Truth, which if an elect disciple possessed he might say of himself, " Hell is destroyed for me, and rebirth as an animal, or a ghost, or in any place of woe. I am converted, I am no longer liable to be reborn in a state of suffering, and am assured of final salvation."

Suffering, said the sage in his great sermon at Benares, is inseparable from birth and old age. Sickness is suffering, so is death, so is union with the unloved, and separation from the loved; not to obtain what one desires is suffering; the entire fivefold clinging to the earthly is suffering. Its origin is the thirst for being which leads from birth to birth, together with lust and desire, which find gratification here and there; the thirst for pleasures, for being, for power. This thirst must be extinguished by complete annihilation

of desire, by letting it go, expelling it, separating oneself from it, giving it no room. This extinction is achieved in eight ways, namely rectitude of faith, resolve, speech, action, living, effort, thought, self-con- centration.

In this gospel we must be done with the outer world, partici- pation in which is not the self, yet means for the self birth and death, appetites, longings, emotions, change and suffering, pleasure and pain. He that has put off all lust and desire, all hope and fear, all will to exist as a sinful, because a sentient, being, has won to the heaven of extinction or Nirvana. He may still tread the earth, but he is a saint or Brahman, is in heaven, has quitted the transient and enjoys eternity.

Such was the Buddha's gospel, as his most ancient scriptures enunciate it. Nirvana is constantly defined in them as supreme happiness. It is not even clear how far, if we interpret it strictly, this philosophy leaves any self to be happy. However this be, its practical expression is the life of the monk who has separated himself from the world. Five commandments must be observed by him who would even approach the higher life of saint and ascetic. They are these: to kill no living thing; not to lay hands on another's property; not to touch another's wife; not to speak what is untrue; not to drink intoxicating drinks.

Though couched in the negative, these rules must be inter- preted in the amplest and widest sense by all believers. The Order, however, which the would-be ascetic can enter by regular initiation, when he is twenty years of age, entails a discipline much more severe. He has gone forth from home into homeless- ness, and has not where to lay his head. He must eat only the morsels he gets by begging; must dress in such rags as he can pick up; must sleep under trees. Mendicancy is his recognized way of life. Furthermore, he must abstain all his life from sexual intercourse; he may not take even a blade of grass without permission of the owner; he must not kill even a worm or ant; he must not boast of his perfection. In practice the lives of Buddhist monks are not so squalid as these rules would lead us to suppose. Thanks to the reverent charity of the laymen, they do not live much worse than Benedictine monks; and the prohibition to live in houses does not extend to caves. Everywhere in India and Ceylon they hollowed out cells and churches in the cliffs and rocks, which are the wonder of the European tourist.

But long before the advent of Buddhism, the hermit, or wandering beggar, was a familiar figure in India. No formal initiation was imposed on the would-be ascetic, save (in the case of young men) the duty to live at first in his teacher's house. One who had thus fulfilled the duties of the student order must " go forth remaining chaste," says the Apastamba, ii. 9. 8. He shall then " live without a fire, without a house, without pleasures, without

protection; remaining silent and uttering speech only

on the occasion of the daily recitation of the Veda; begging so much food only in the village as will sustain his life, he shall wander about, neither caring for this world nor for heaven. He shall only wear clothes thrown away by others. Some declare that he shall even go naked. Abandoning truth and falsehood, pleasure and pain, the Vedas, this world and the next, he shall seek the Universal Soul, in knowledge of which standeth eternal salvation."

Such a life was specially recommended for one who has lived the life of a householder, and, having begotten sons according to the sacred law and offered sacrifices, desires in his old age to 1 abandon worldly objects and direct his mind to final liberation. He leaves his wife, if she will not accompany him, and goes forth into the forest, committing her and his house to his sons. He must indeed take with him the sacred fire and implements for domestic sacrifice, but until death overtakes him he must wander silent, alone, possessing no hearth nor dwelling, begging his food in the villages, firm of purpose, with a potsherd for an alms bowl, the roots of trees for a dwelling, and clad in coarse worn-out garments. " Let him not desire to die, let him not desire to live; let him wait for his appointed time, as a servant waits for the payment of his wages. Let him drink water purified by straining with a cloth, let him utter speech purified by truth, let him keep his heart pure. Let him patiently bear hard words, let him not insult anybody, let him not become any one's enemy for the sake of this perishable body. . . . Let him reflect on the transmigrations of men, caused by their sinful deeds, on their falling into hell, and on their torments in tht world of Yama. ... A twice-born man who becomes an ascetic thus shakes off sin here below and reaches the highest Brahman " (Laws of Manu, by G. Biihler, vi. 85).

This old-world wisdom of the Hindus, a thousand years before our era, is worthily to be paralleled from the Manichaeism of about the year 400. Augustine has preserved (contra Faustum, v. 1) the portraiture of a Manichaean elect as drawn by himself: —

" I have given up father and mother, wife, children and all else that the gospel bids us, and do you ask if I accept the gospel ? Are you then still ignorant of what the word gospel means? It is nothing else than the preaching and precept of Christ. I have cast away gold and silver, and have ceased to carry even copper in my belt, being content with my daily bread, nor caring for the morrow, nor anxious how my belly shall be filled or my body clothed ; and do you ask me if I accept the gospel ? You behold in me those beatitudes of Christ which make up the gospel, and you ask me if I accept it. You behold me gentle, a peacemaker, pure of heart, a mourner,

hungering, thirsting, bearing persecutions and hatreds for righteousness' sake, and do you doubt whether I accept the gospel. . . . All that was mine I have given up, father, mother, wife, children, gold, silver, eating, drinking, delights, pleasures. Deem this a sufficient answer to your question and deem yourself on the way to be blessed, if you have not been scandalized in me."

The Greek Cynics (see Cynics) played a great part in the history of Asceticism, and they were so much the precursors of the Christian hermits that descriptions of them in profane literature have been mistaken for pictures of early monasticism. In striving to imitate the rugged strength and independence of their master Socrates, they went to such extremes as rather to caricature him. They affected to live like beggars, bearing staff and wallet, awning nothing, renouncing pleasures, riches, honours. For older thinkers like Plato and Aristotle the perfect life was that of the citizen and householder; but the Cynics were individualists, citizens of the world without loyalty or respect for the ancient city state, the decay of which was coincident with their rise. Their zeal for renunciation often extended not to pleasures, marriage and property alone, but to cleanliness, knowledge and good manners as well, and in this respect also they were the forerunners of later monks.

Philo (20 b.c.-a.d. 40) has left us many pictures of the life which to his mind impersonated the highest wisdom, and they are all inspired by the more respectable sort of cynicism, which had taken deep root among Greek Jews of the day. One such picture merits citation from his tract On Change of Names (vol. i. 583, ed. Mangey): " All this company of the good and wise have of their own free will divested themselves of too copious wealth; nay, have spurned the things dear to the flesh. For of

good habit and lusty are athletes, since they have fortified against the soul the body which should be its servant; but the disciples of wisdom are pale and wasted, and in a manner reduced to skeletons, because they have sacrificed the whole of their bodily strength to the faculties of the soul."

His own favourite ascetics, the Therapeutae, whose chief centre was in Egypt, had renounced property and all its tempta- tions, and fled, irrevocably abandoning brothers, children, wives, parents, throngs of kinsmen, intimacy of friends, the fatherlands where they were born and bred (see Therapeutae). Here we have the ideal of early Christian renunciation at work, but apart from the influence of Jesus. In the pages of

Epictetus the same ideal is constantly held up to us.

In the Christian Church there was from the earliest age a leaning to excessive asceticism, and it needed a severe struggle on the part of Paul, and of the Catholic teachers who followed him, to secure for the baptized the right to be married, to own property, to engage in war and commerce, or to assume public office. One and all of the permanent institutions of society were condemned by the early enthusiasts, especially by those who looked forward to a speedy advent of the millennium, as alien to the kingdom of God and as impediments to the life of grace.

Marriage and property had already been eschewed in the Jewish Essene and Therapeutic sects, and in Christianity the name of Encratite was given to those who repudiated marriage and the use of wine. They did not form a sect, but represented an impulse felt everywhere. In early and popular apocryphal histories the apostles are represented as insisting that their converts should either not contract wedlock or should dissolve the tie if already formed. This is the plot of the Acts of Thecla, a story which probably goes back to the first century. Repudia- tion of the tie by fervent women, betrothed or already wives, occasioned much domestic friction and popular persecution. In the Syriac churches, even as late as the 4th century, the married state seems to have been regarded as incompatible with the perfection of the initiated. Renunciation of the state of wedlock was anyhow imposed on the faithful during the lengthy, often lifelong, terms of penance imposed upon them for sins committed; and later, when monkery took the place, in a church become worldly, partly of the primitive baptism and partly of that rigorous penance which was the rebaptism and medicine of the lapsed, celibacy and virginity were held essential thereto, no less than renunciation of property and money-making.

Together with the rage for virginity went the institution of virgines subintroductae, or of spiritual wives; for it was often assumed that the grace of baptism restored the original purity of life led by Adam and Eve in common before the Fall. Such rigours are encouraged in the Shepherd of Hermas, a book which emanated from Rome and up to the 4th century was read in church. They were common in the African churches, where they led to abuses which taxed the energy even of a Cyprian. They were still rife in Antioch in 260. We detect them in the Celtic church of St Patrick, and, as late as the 7 th century, among the Celtic elders of the north of France. In the Syriac church as late as 340, such relations prevailed between the " Sons and daughters of the Resurrection." It continued among the Albigenses and other dissident sects of the middle ages, among whom it served a double purpose; for their elders were thus not only able to prove their own chastity, but to elude the inquisitors, who were less inclined to suspect a man of the catharism which regarded marriage as the " greater adultery "

{mains adulterium) if they found him cohabiting (in appearance at least) with a woman. There was hardly an early council, great or small, that did not condemn this custom, as well as the other one, still more painful to think of, of self-emasculation. In the Catholic church, however, common sense prevailed, and those who desired to follow the Encratite ideal repaired to the monasteries.

Authorities. — E. B. Tylor, Primitive Culture (London, 1903); Robertson Smith, Religion of the Semites (London, 1901); J. E. Harrison, Prolegomena to the Study of Greek Religion; F. Max Miiller, The Sacred Books of the East; Victor Henry, La Magie dans I'Inde antique; J. G. Frazer, The Golden Bough (London, 1900), and Adonis, Attis, Osiris (London, 1906); Georges Lafay, Culte des

divinitSs d' Alexandria (Paris, 1884); D611inger, Sectengeschichte des Mittelalters (Munich, 1890); Fr. Cumont, Mysteries of Miihra (Chicago, 1903); Zockler, Gesch. der Ascese (1863). See also under Purification. Goldziher, " De l'ascetisme aux premiers temps de l'lslam," in Revue de Vhistoire des religions (1898), p. 314; Muratori, De Synisactis et Agapetis (Pavia, 1709); Jas. Martineau, Types of Ethical Theory (Oxford, 1885); T. H. Green, Prolegomena to Ethics (Oxford, 1883); Franz Cumont, Les Religions orientates dans le paganisme romain (Paris, 1907); Porphyrius, De Absti- nentia; Plutarchus, De Carnium Esu. (F. C. C.)

ASCHAFFENBURG, a town of Germany, in the kingdom of Bavaria, on the right bank of the Main, at its confluence with the Aschaff, near the foot of the Spessart, 26 m. by rail S.E. of Frankfort-on-Main. Pop. (1900) 18,091; (1905) 25,275. Its chief buildings are the Johannisburg, built (1605-1614) by Archbishop Schweikard of Cronberg, which contains a library with a number of incunabula, a collection of engravings and paintings; the Stiftskirche, or cathedral, founded in 980 by Otto of Bavaria, but dating in the main from the early 12th and the 13 th centuries, in which are preserved various monuments by the Vischers, and a sarcophagus,. with the relics of St Margaret (1540); the Capuchin hospital; a theatre, which was formerly the house of the Teutonic order; and several mansions of the German nobility. The town, which has been remarkable for its educational establishments since the 10th century, has a gym- nasium, lyceum, seminarium and other schools. There is an archaeological museum in the old abbey buildings. The graves of Klemens Brentano and his brother Christian (d. 1851) are in the churchyard; and Wilhelm Heinse is buried in the town. Coloured .and white paper, ready-made clothing, cellulose, tobacco, lime and liqueurs are the chief manufactures, while a considerable export trade is done down the Main in wood, cattle and wine.

Aschaffenburg, called in the middle ages Aschafaburg and also Askenburg, was originally a Roman settlement. The 10th and 23rd Roman legions had their station here, and on the ruins of their castrum the Frankish mayors of the palace built a castle. Bonifacius erected a chapel to St Martin, and founded a Bene- dictine monastery. A stone bridge over the Main was built by Archbishop Willigis in 989. Adalbert increased the importance of the town in various ways about 1122. In 1292 a synod was held here, and in 1474 an imperial diet, preliminary to that of Vienna, in which the concordat was decided which has therefore been sometimes called the Aschaffenburg Concordat.

The town suffered greatly during the Thirty Years' War, being held in turn by the various belligerents. In 1842-1849, King Louis built himself to the west of the town a country house, called the Pompeianum, from its being an imitation of the house of Castor and Pollux at Pompeii. In 1866 the Prussians inflicted a severe defeat on the Austrians in the neighbourhood.

The principality of Aschaffenburg, deriving its name from the city, comprehended an area of 654 English sq. m. It formed part of the electorate of Mainz, and in 1803 was made over to the archchancellor, Archbishop Charles of Dalberg. In 1806 it was annexed to the grand-duchy of Frankfort; and in 1814 was transferred to Bavaria, in virtue of a treaty concluded on the 19th of June between that power and Austria. With lower Franconia, it now forms a district of the kingdom of Bavaria.

ASCHAM, ROGER (c. 1515-1568), English scholar and writer, was born at Kirby Wiske, a village in the North Riding of Yorkshire, near Northallerton, about the year 15 15. His name would be more properly spelt Askham, being derived, doubtless, from Askham in the West Riding. He was the third son of John Ascham, steward to Lord Scrope of Bolton. The family name of his mother Margaret is unknown, but she is said to have been well connected. The authority for this statement, as for most others concerning Ascham's early life, is Edward Grant, head- master of Westminster, who collected and edited his letters and delivered a panegyrical oration on his life in 1576.

Ascham was educated not at school, but in the house of Sir Humphry Wingfield, a barrister, and in 1533 speaker of the House of Commons, as Ascham himself tells us, in the Toxophilus, p. 1 20 (not, as by a mistake which originated with Grant and has been repeated ever since, Sir Anthony Wingfield, who was nephew

of the speaker). Sir Humphry " ever loved and used to have many children brought up in his house," where they were under a tutor named R. Bond. Their sport was archery, and Sir Humphry " himself would at term times bring down from London both bows and shafts and go with them himself to the field and see them shoot." Hence Ascham's earliest English work, the Toxophilus, the importance which he attributed to archery in educational establishments, and probably the pro- vision for archery in the statutes of St Albans, Harrow and other Elizabethan schools. From this private tuition Ascham was sent "about 1530," at the age, it is said, of fifteen, to St John's College, Cambridge, then the largest and most learned college in either university. Here he fell under the influence of John Cheke, who was admitted a fellow in Ascham's first year, and Sir Thomas Smith. His guide and friend was Robert Pember, " a man of the greatest learning and with an admirable facility in the Greek tongue." On his advice he practised seriously the precept embodied in the saying, " I know nothing about the subject, I have not even lectured on it," and " to learn Greek more quickly, while still a boy, taught Greek to boys." In Latin he specially studied Cicero and Caesar. He became B.A. on the 18th of February 1534/5. Dr Nicholas Metcalfe was then master of the college, " a papist, indeed, and yet if any young man given to the new learning as they termed it, went beyond his fellows," he " lacked neither open praise, nor private exhibition." He procured Ascham's election to a fellowship, " though being a new bachelor of arts, I chanced among my companions to speak against the Pope . . . after grievous rebuke and some punishment, open warning was given to all the fellows, none to be so hardy, as to give me his voice at that election." The day of election Ascham regarded as his " birthday," and " the whole foundation of the poor learning I have and of all the furtherance that hitherto elsewhere I have obtained." He took his M.A. degree on the 3rd of July 1537. He stayed for some time at Cambridge taking pupils, among whom was William Grindal, who in 1 544 became tutor to Princess Elizabeth. Ascham himself cultivated music, acquired fame for a beautiful handwriting, and lectured on mathematics. Before 1 540, when the Regius professorship of Greek was estab- lished, Ascham " was paid a handsome salary to profess the Greek tongue in public," and held also lectures in St John's College. He obtained from Edward Lee, then archbishop of York, a pension of £2 a year, in return for which Ascham trans- lated Oecumenius' Commentaries on the Pauline Epistles. But the archbishop, scenting heresy in some passage relating to the marriage of the clergy, sent it back to him, with a present indeed, but with something like a reprimand, to which Ascham answered with an assurance that he was " no seeker after novelties," as his lectures showed. He was on safer ground in writing in 1 542- 1543 a book, which he told Sir William Paget in the summer of 1544 was in the press, " on the art of Shooting." This was no doubt suggested partly by the act of parliament 33 Henry VIII. c. o, " an acte for

mayntenaunce of Artyllarie and debar- ringe of unlawful games," requiring every one under sixty, of good health, the clergy, judges, &c, excepted, " to use shooting in the long bow," and fixing the price at which bows were to be sold. Under the title of Toxophilus he presented it to Henry VIII. at Greenwich soon after his triumphant return from the capture of Boulogne, and promptly received a grant of a pension of £10 a year, equal to some £200 a year of our money. A novelty of the book was that the author had " written this Englishe matter in the Englishe tongue for Englishe men," though he thought it necessary to defend himself by the argument that what " the best of the realm think it honest to use" he " ought not to suppose it vile for him to write." It is a Platonic dialogue between Toxo- philus and Philologus, and nowadays its chief interest lies in its incidental remarks. It may probably claim to have been the model for Izaak Walton's Compleat Angler.

From 1 54 1, or earlier, Ascham acted as letter-writer to the university and also to his college. Perhaps the best specimen of his skill was the letter written to the protector Somerset in 1548 on behalf of Sedbergh school, which was attached to St

John's College by the founder, Dr Lupton, in 1525, and the endowment of which had been confiscated under the Chantries Act. In 1 546 Ascham was elected public orator by the university on Sir John Cheke's retirement.

Shortly after the beginning of the reign of Edward VI., Ascham made public profession of Protestant opinions in a disputation on the doctrine of the Mass, begun in his own college and then removed for greater publicity to the public schools of the uni- versity, where it was stopped by the vice-chancellor. Thereon Ascham wrote a letter of complaint to Sir William Cecil. This stood him in good stead. In January 1548, Grindal, the princess Elizabeth's tutor, died. Ascham had already corresponded with the princess, and in one of his letters says that he returns her pen which he has mended. Through Cecil and at the princess's own wish he was selected as her tutor against another candidate pressed by Admiral Seymour and Queen Katherine. Ascham taught Elizabeth — then sixteen years old — for two years, chiefly at Cheshunt. In a letter to Sturm, the Strassburg schoolmaster, he praises her " beauty, stature, wisdom and industry. She talks French and Italian as well as English: she has often talked to me readily and well in Latin and moderately so in Greek. When she writes Greek and Latin nothing is more beautiful than her handwriting … she read with me almost all Cicero and great part of Titus Livius: for she drew all her knowledge of Latin from those two authors. She used to give the morning to the Greek Testament and afterwards read select orations of Isocrates and the tragedies of Sophocles. To these I added St Cyprian and Melanchthon's Commonplaces." In 1550 Ascham quarrelled with

Elizabeth's steward and returned to Cambridge. Cheke then procured him the secretaryship to Sir Richard Morrison (Moryson), appointed ambassador to Charles V. It was on his way to join Morrison that he paid his celebrated morning call on Lady Jane Grey at Bradgate, where he found her reading Plato's Phaedo, while every one else was out hunting.*

The embassy went to Louvain, where he found the university very inferior to Cambridge, then to Innsbruck and Venice. Ascham read Greek with the ambassador four or five days a week. His letters during the embassy, which was recalled on Mary's accession, were published in English in 1553, as a "Report" on Germany. Through Bishop Gardiner he was appointed Latin secretary to Queen Mary with a pension of £20 a year. His Protestantism he must have quietly sunk, though he told Sturm that " some endeavoured to hinder the flow of Gardiner's benevolence on account of his religion." Probably his never having been in orders tended to his safety. On the 1st of June 1554 he married Margaret Howe, whom he described as niece of Sir R. (? J., certainly not, as has been said, Henry) Wallop. By her he had two sons. From his frequent complaints of his poverty then and later, he seems to have lived beyond his income, though, like most courtiers, he obtained divers lucrative leases of ecclesiastical and crown property. In 1555 he resumed his studies with Princess Elizabeth, reading in Greek the orations of Aeschines and Demosthenes' Be Corona. Soon after Elizabeth's accession, on the 5th of October 1559, he was given, though a layman, the canonry and prebend of Wetwang in York minster. In 1563 he began the work which has made him famous, The Scholemaster. The occasion of it was, he tells us (though he is perhaps merely imitating Boccaccio), that during the " great plague " at London in 1563 the court was at Windsor, and there on the 10th of December he was dining with Sir William Cecil, secretary of state, and other ministers. Cecil said he had " strange news; that divers scholars of Eaton be run away from the schole for fear of beating " ; and expressed his wish that " more discretion was used by schoolmasters in correction than commonly is." A debate took place, the party being pretty evenly divided between floggers and anti-floggers, with Ascham as the champion of the latter. Afterwards Sir Richard Sackville, the treasurer, came up to Ascham a/id told him that " a fond schoolmaster " had,- by his brutality, made him hate learning, much to his loss, and as he had now a young son, whom he wished to be learned, he offered, if Ascham would name a tutor, to pay for the education of their respective sons under

Ascham's orders, and invited Ascham to write a treatise on " the right

order of teaching." The Scholemaster was the result. It is not, as might be supposed, a general treatise on educational method, but " a plaine and perfite way of teachyng children to understand, write and speake in Latin tong "; and it was not intended for schools, but " specially prepared for the private brynging up of youth in gentlemen and noblemens houses." The perfect way simply consisted in " the double translation of a model book "; the book recommended by this professional letter-writer being " Sturmius' Select Letters of Cicero." As a method of learning a language by a single pupil, this method might be useful; as a method of education in school nothing more deadening could be conceived. The method itself seems to have been taken from Cicero. Nor was the famous plea for the substitution of gentleness and persuasion for coercion and flogging in schools, which has been one of the main attractions of the book, novel. It was being practised and preached at that very time by Christopher Jonson (c. 1536-1597) at Winchester; it had been enforced at length by Wolsey in his statutes for his Ipswich College in 1528, following Robert Sherborne, bishop of Chichester, in founding Rolleston school; and had been re- peatedly urged by Erasmus and others, to say nothing of William of Wykeham himself in the statutes of Winchester College in 1400. But Ascham's was the first definite demonstration in favour of humanity in the vulgar tongue and in an easy style by a well-known " educationist," though not one who had any actual experience as a schoolmaster. What largely contributed to its fame was its picture of Lady Jane Grey, whose love of learning was due to her finding her tutor a refuge from pinch- ing, ear-boxing and bullying parents; some exceedingly good criticisms of various authors, and a spirited defence of English as a vehicle of thought and literature, of which it was itself an excellent example. The book was not published till after Ascham's death, which took place on the 23rd of December 1568, owing to a chill caught by sitting up all night to finish a New Year's poem to the queen.

His letters were collected and published in 1576, and went through several editions, the latest at Nuremberg in 161 1; they were re- edited by William Elstob in 1703. His English works were edited by James Bennett with a life by Dr Johnson in 1 7 7 1 , reprinted in 8vo in 1815. Dr Giles in 1864-1865 published in 4 vols, select letters with the Toxophilus and Scholemaster and the life by Edward Grant. The Scholemaster was reprinted in 1571 and 1589. It was edited by the Rev. J. Upton in 1711 and in 1743, by Prof. J. E. B. Mayor in 1863, and by Prof. Edward Arber in 1870. The Toxophilus was republished in 1571, 1589 and 1788, and by Prof. Edward Arber in 1868 and 1902. . (A. F. L.)

ASCHERSLEBEN, a town of Germany, in the Prussian province of Saxony, 36 m. by rail N.W. from Halle, and at the junction of lines to Cothen and Nienhagen. Pop. (1900) 27,245; (1905) 27,876. It contains one Roman

Catholic and four Protestant churches, a synagogue, a fine town-hall dating from the 16th century, and several schools. The discovery of coal in the neighbourhood stimulated and altered its industries. In addition to the manufacture of woollen wares, for which it has long been known, there is now extensive production of vinegar, paraffin, potash and especially beetroot-sugar; while the surrounding district, which was formerly devoted in great part to market- gardening, is now turned almost entirely into beetroot fields. There are also iron, zinc and chemical manufactures, and the cultivation of agricultural seeds is carried on. In the neighbour- hood are brine springs and a spa (Wilhelmsbad). Aschersleben was probably founded in the nth century by Count Esico of Ballenstedt, the ancestor of the house of Anhalt, whose grandson, Otto, called himself count of Ascania and Aschersleben, deriving the former part of the title from his castle in the neighbourhood of the town. On the death of Otto III. (13 15) Aschersleben passed into the hands of the bishop of Halberstadt, and at the peace of 1648 was, with the bishopric, united to Brandenburg.

ASCIANO, a town of Tuscany, in the province of Siena, 19 m. S.E. of the town of Siena by rail. Pop. (1901) 7618. It is surrounded by walls built by the Sienese in 13 51, and has some 14th-century churches with paintings of the same period. Six miles to the south is the large Benedictine monastery of Monte

Oliveto Maggiore, founded in 1320, famous for the frescoes by Luca Signorelli (1497-1498) and Antonio Bazzi, called Sodoma (1505), in the cloister, illustrating scenes from the legend of St Benedict; the latter master's work is perhaps nowhere better represented than here. The church contains fine inlaid choir stalls by Fra Giovanni da Verona. The buildings, which are mostly of red brick, are conspicuous against the gray clayey and sandy soil. The monastery is described by Aeneas Sylvius Piccolomini (Pope Pius II.) in his Commentaria. Remains of Roman baths, with a fine mosaic pavement, were found within the town in 1898 (G. Pellegrini in Notizie degli scavi, 1899, 6).

ASCITANS (or Ascitae; from da/cos, the Greek for a wine-skin), a peculiar sect of 2nd-century Christians (Montanists), who introduced the practice of dancing round a wine-skin at their meetings.

ASCITES (Gr. aadrˆ, dropsical, from kancs, bag; sc. vocxos, disease), the term in medicine applied to an effusion of non-inflammatory fluid within the peritoneum. It is not a disease in itself, but is one of the nanifestations of disease elsewhere — usually in the kidneys, heart, or in connexion with the liver (portal obstruction). Portal obstruction is the commonest cause of well-marked ascites. It is produced by (1) diseases within the liver, as cirrhosis (usually alcoholic) and cancer; (2) diseases outside the liver, as

cancer of stomach, duodenum or pancreas, causing pressure on the portal vein, or enlarged glands in the fissure of the liver producing the same effect. Ascites is one of the late symptoms in the disease, and precedes dropsy of the leg, which may come on later, due to pressure on the large veins in the abdominal cavity by the ascitic fluid. In ascites due to heart disease, the dropsy of the feet and legs precedes the ascites, and there will be a history of palpitation, shortness of breath, and perhaps cough. In the ascites of kidney troubles there will be a history of general oedema — puffiness of face and eyes on rising in the morning prob- ably having attracted the attention of the patient or his friends previously. Other less common causes of ascites are chronic peritonitis, either tuberculous in the young, or due to cancer in the aged, and more rarely still pernicious anaemia.

ASCLEPIADES, Greek physician, was born at Prusa in Bithynia in 124 B.C., and flourished at Rome in the end of the 2nd century B.C. He travelled much when young, and seems at first to have settled at Rome as a rhetorician. In that profession he did not succeed, but he acquired great reputation as a physician. He founded his medical practice on a modification of the atomic or corpuscular theory, according to which disease results from an irregular or inharmonious motion of the corpuscles of the body. His remedies were, therefore, directed to the restoration of harmony, and he trusted much to changes of diet, accompanied by friction, bathing and exercise, though he also employed emetics and bleeding. He recommended the use of wine, and in every way strove to render himself as agreeable as possible to his patients. His pupils were very numerous, and the school formed by them was called the Methodical. Asclepiades died at an advanced age.

ASCLEPIADES, of Samos, epigrammatist and lyric poet, friend of Theocritus, .flourished about 270 b.c. He was the earliest and most important of the convivial and erotic epigramma- tists. Only a few of his compositions are actual ” inscrip- tions “; others sing the praises of the poets whom he specially admired, but the majority of them are love-songs. It is doubtful whether he is the author of all the epigrams (some 40 in number) which bear his name in the Greek Anthology. He possibly gave his name to the Asclepiadean metre.

ASCLEPIODOTUS, Greek military writer, flourished in the 1st century B.C. Nothing is known of him except that he was a pupil of Poseidonius the Stoic (d. 51 B.C.). He is the supposed author of a treatise on Graeco-Macedonian tactics (TaKrucd K«dXeua) , which, however, is probably not his own work, but the skeleton outline of the lectures delivered by his master, who is known to have written a work on the subject.

ASCOLI, GRAZIADIO ISAIA (1&20-1907), Italian philologist; of Jewish

family, was born at Gdrz, and at an early age showed a

marked linguistic talent. In 1854 he published his Studii orientali e linguistici, and in i860 was appointed professor of philology at Milan. He made various learned contributions to the study of Indo-European and Semitic languages, and also of the gipsy language, but his special field was the Italian dialects. He founded the Archivio glottologico italiano in 1873, publishing in it his Saggi Ladini, and making it in succeeding years the great organ of original scholarship on this subject. He was universally recognized as the greatest authority on Italian linguistics, and his articie in the Encyclopaedia Britannica (9th ed., revised for this edition) became the classic exposition in English. (See Italy: Language.)

ASCOLI PICENO 1 (anc. A senium), a town and episcopal see of the Marches, Italy, the capital of the province of Ascoli Piceno, 1 7 m. W. of Porto d' Ascoli (a station on the coast railway, 56 m. S.S.E. of Ancona), and 53 m. S. of Ancona direct, situated on the S. bank of the Tronto (anc. Truentus) at its confluence with the Castellano, 500 ft. above sea-level, and surrounded by lofty mountains. Pop. (1901) town, 12,256; commune, 28,608. The Porta Romana is a double-arched Roman gate; adjacent are remains of the massive ancient city walls, in rectangular blocks of stone 2 ft. in height, and remains of still earlier fortifications have been found at this point (F. Barnabei in Notizie degli scavi, 1887, 252). The church of S. Gregorio is built into a Roman tetrastyle Corinthian temple, two columns of which and the cella are still preserved; the site of the Roman theatre can be distinguished; and the church and convent of the Annunziata (with two fine cloisters and a good fresco by Cola d' Amatrice in the refectory) are erected upon large Roman substructures of concrete, which must have supported some considerable building. Higher up is the castle, which now shows no traces of fortifications older than medieval; it commands a fine view of the town and of the mountains which encircle it. The town has many good pre-Renaissance buildings; the picturesque colonnaded market-place contains the fine Gothic church of S. Francesco and the original Palazzo del Comune, now the prefecture (Gothic with Renaissance additions). The cathedral is in origin Romanesque, 2 but has been much altered, and was restored in 1888 by Count Giuseppe Sacconi (1855-1905). The frescoes in the dome, of the same date, are by Cesare Mariani. The cope presented to the cathedral treasury by Pope Nicholas IV. was stolen in 1904, and sold to Mr J. Pierpont Morgan, who generously returned it to the Italian government, and it was then placed for greater safety in the Galleria Corsini at Rome. The baptistery still preserves its

ancient character; and the churches of S. Vittore and SS. Vincenzo ed Anastasio are also good Romanesque buildings. The fortress of the Malatesta, constructed in 1349, has been in the main destroyed; the part of it which remains is now a prison. The present Palazzo Comunale, a Renaissance edifice, contains a fine museum, chiefly remarkable for the contents of prehistoric tombs found in the district (including good bronze fibulae, necklaces, amulets, &c, often decorated with amber), and a large collection of acorn-shaped lead missiles (glandes) used by slingers, belonging to the time of the siege of Asculum during the Social War (89 B.C.). There is also a picture gallery containing works by local masters, Pietro Alamanni, Cola d' Amatrice, Carlo Crivelli, &c. The bridges across the ravines which defend the town are of consider- able importance; the Ponte di Porta Cappucina is a very fine Roman bridge, with a single arch of 71 ft. span. The Ponte di Cecco (so named from Cecco d' Ascoli), with two arches, is also Roman and belongs to the Via Salaria; the Ponte Maggiore and the Ponte Cartaro are, on the other hand, medieval, though the latter perhaps preserves some traces of Roman work. Near Ascoli is Castel Trosino, where an extensive Lombard necropolis of the 7th century was discovered in 1895; the contents of the tombs are now exhibited in the Museo Nazionale delle Terme at Rome (Notizie degli scavi, 1895, 35).

The ancient Asculum was the capital of Picenum, and it

'The epithet distinguishes it from Ascoli Satriano (anc. Ausculum) , which lies 19 m. S. of Foggia by rail.

2 It contains a fine polyptych by Carlo Crivelli (1473).

occupied a strong position in the centre of difficult country. It was taken in 268 B.C. by the Romans, and the Via Salaria was no doubt prolonged thus far at this period; the distance from Rome is 120 m. It took a prominent part in the Social War against Rome, the proconsul Q. Servilius and all the Roman citizens within its walls being massacred by the inhabitants in 90 B.C. It was captured after a long siege by Pompeius Strabo in 89 B.C. The leader, Judacilius, committed suicide, the principal citizens were put to death, and the rest exiled. The Roman general celebrated his triumph on the 25th of December of that year. Caesar occupied it, however, as a strong position after crossing the Rubicon; and it received a Roman colony, p £rhaps under the triumvirs, and became a place of some im- portance. In a.d. 301 it became the capital of Picenum Suburbi- carium. In 545 it was taken by Totila, but is spoken of by Paulus Diaconus as the chief city of Picenum shortly afterwards. From the time of Charlemagne it was under the rule of its bishops, who had the title of prince and the right to coin money, until 1 185, when it became a free republic. It had many struggles with Fermo, and in the 15th century came more directly under the papal

sway.

See N. Persichetti in Romische Mitteilungen (1903), 295 seq.

(T. As.)

ASCONIUS PEDIANUS, QUINTUS (9 b.c.-a.d. 76; or a.d. 3-88), Roman grammarian and historian, was probably a native of Patavium (Padua). In his later years he resided at Rome, where he died, after having been blind for twelve years, at the age of eighty-five. During the reigns of Claudius and Nero he compiled for his sons, from various sources — e.g. the Gazette (Acta Publico,), shorthand reports or " skeletons " (commentarii) of Cicero's unpublished speeches, Tiro's life of Cicero, speeches and letters of Cicero's contemporaries, various historical writers, e.g. Varro, Atticus, Antias, Tuditanus and Fenestella (a contemporary of Livy whom he often criticizes) — historical commentaries on Cicero's speeches, of which only five, viz. in Pisonem, pro Scauro. pro Milone, pro Cornelio and in toga Candida, in a very mutilated condition, are preserved. In a note upon the speech pro Scauro, he speaks of Longus Caecina (d. a.d. 57) as still living, while his words imply that Claudius (d. 54) was not alive. This statement, therefore, must have been written between a.d. 54 and 57. These valuable notes, written in good Latin, relate chiefly to legal, historical and antiquarian matters. A commentary, of inferior Latinity and mainly of a grammatical character, on Cicero's Verrine orations, is universally regarded as spurious. Both works were found by Poggio in a MS. at St Gallen in 1416. This MS. is lost, but three transcripts were made by Poggio, Zomini (Sozomenus) of Pistoia and Bartolommeo da Monte-pulciano. That of Poggio is now at Madrid (Matritensis x. 81), and that of Zomini is in the Forteguerri library at Pistoia (No. 37) . A copy of Bartolommeo's transcript exists in Florence (Laur. liv. 5). The later MSS. are derived from Poggio's copy. Other works attributed to Asconius were: a life of Sallust, a defence of Virgil against his detractors, and a treatise (perhaps a symposium in imitation of Plato) on health and long life.

Editions by Kiessling-Schoil (1875), and A. C. Clark (Oxford, 1906), which contains a previously unpublished collation of Poggio's transcript. See also Madvig, De Asconio Pediano (1828).

ASCOT, a village in the Wokingham parliamentary division of Berkshire, England, famous for its race-meetings. Pop. of parish of Ascot Heath (1901), 1927. The station on the South- western railway, 29 m. W.S.W. of London, is called Ascot and Sunninghill; the second name belonging to an adjacent town- ship with a population (civil parish) of 4719. The race-course is on Ascot Heath, and was laid out by order of Queen Anne in 171 1, and on the nth of August in that year the first meeting was held and

attended by the queen. The course is almost exactly 2 m. in circumference, and the meetings are held in June. The principal race is that for the Ascot Gold Cup, instituted in 1807. The meeting is one of the most fashionable in England, and is commonly attended by members of the royal family. Trie royal procession, for which the meeting is peculiarly famous, was initiated by George IV. in 1820.

See R. Herod, Royal Ascot (London, 1900).

;24

ASCUS— ASHANTI

ASCUS (Gr. &

ASELLI [Asellius, or Asellio], GASPARO (1581-1626), Italian physician, was born at Cremona about 1581, became professor of anatomy and surgery at Pavia, and practised at Milan, where he died in 1626. To him is due the discovery of the lacteal vessels, published in De Lactibus (Milan, 1627).

ASGILL, JOHN (1650-1738), English writer, was born at Hanley Castle, in Worcestershire, in 1659. He was bred to the law, and gained considerable reputation in his profession, in- creased by two pamphlets — the first (1696) advocating the establishment of some currency other than the usual gold and silver, the second (1698) on a registry for titles of lands. In 1699, when a commission was appointed to settle disputed claims in Ireland, he set out for that country, attracted by the hopes of practice. Before leaving London he put in the hands of the printer a tract, entitled An Argument proving that, according to the Covenant of Eternal Life revealed in the Scripture, Man may be- translated from hence into that Eternal Life without passing through Death (1 700) . Coleridge has highly praised the " genuine Saxon English," the " irony " and " humour " of this extra- ordinary pamphlet, which interpreted the relation between God and man by the technical rules of law, and insisted that, Christ having wiped out Adam's sin, the penalty of death must conse- quently be illegal for those who claim exemption. How far it was meant seriously was doubted at the time, and may be doubted now. But its fame preceded the author to Ireland, and was of material service in securing his professional success, so that he amassed money, purchased an estate, and married a daughter of the second Lord Kenmare. He was returned both to the Irish and English parliaments, but was expelled from both on account of his " blasphemous " pamphlet. He was also involved in money difficulties, and litigation about his Irish estate, and these circumstances may have had somethirfg to do with his trouble in parliament. In 1707 he v/as arrested for debt, and the

remainder of his life was spent in the Fleet prison, or within the rules of the king's bench. He died in 1738. Asgill also wrote in 1714-1715 some pamphlets defending the Hanoverian succession against the claims of the Pretender.

ASH 1 (Ger. Esche), a common name (Fr. frene) given to certain trees. The common ash (Fraxinus excelsior) belongs to the natural order Oleaceae, the olive family, an order of trees and shrubs which includes lilac, privet and jasmine. The Hebrew word Oren, translated " ash " in Isaiah xliv. 14, cannot refer to an ash tree, as that is not a native of Palestine, but probably refers to the Aleppo pine (Pinus halepensis). The ash is a native of Great Britain and the greater part of Europe, and also extends to Asia. The tree is distinguished for its height and contour, as well as for its graceful foliage. It attains a height of from 50 to 80 ft., and flowers in March and April, before the leaves are developed. The reddish flowers grow in clusters, but are not showy.. They are naked, that is without sepals or petals, and generally imperfect, wanting either stamens or pistil. The large leaves, which are late in appearing, are pinnately compound, bearing four to seven pairs of gracefully tapering toothed leaflets on a slender stalk. The dry winged fruits, the so-called keys, are a characteristic feature and often remain hanging in bunches long after the leaves have fallen in autumn. The leaves fall early, but the greyish twigs and black buds render the tree conspicuous in winter and especially in early spring.

The ash is in Britain next in value to the oak as a timber-tree. It requires a good deep loam with gravelly subsoil, and a situation naturally sheltered, such as the steep banks of glens, rivers or lakes; in cold and wet clay it does not succeed. As the value of the timber depends chiefly on its toughness and elasticity, it is best grown in masses where the soil is good; the trunk is thus

1 The homonym, ash or (pi.) ashes, the residue (of a body, &c.) after burning, is a common Teutonic word, Ger. Asche, connected with the root found in Lat. ardere, to burn.

drawn up free from large side-branches. The tree is easily propagated from seeds; it throws up strong root shoots. The ash requires much light, but grows rapidly, and its terminal shoots pierce easily through thickets of beech, with which it is often associated. Unmixed ash plantations are seldom satisfac- tory, because the foliage does not sufficiently cover the ground; but when mixed with beech it grows well, and attains great height and girth. Owing to the dense mass of roots which it sends out horizontally a little beneath the surface of the ground, the ash does much harm to vegetation beneath its shade, and is therefore obnoxious as a hedgerow tree. Coppice shoots yield excellent hop-poles, crates, hoops, whip-handles,

&c. The timber is much used for agricultural implements, and by coach-builders and wheelwrights.

A variety of the common species, known as var. heterophylla, has simple leaves. It occurs wild in woods in Europe and England. Another variety of ash (pendula) is met with in which the branches are pendulous and weeping. Sometimes this variety is grafted on the tall stem of the common ash, so as to produce a pleasing effect. It is said that the weeping variety was first observed at Gamlingay, in Cambridgeshire. A variety (crispa) occurs with curled leaves, and another with warty stems and branches, called verrucosa. F. Ornus is the manna ash (see Manna), a handsome tree with greenish -white flowers and native in south Europe. In southern Europe there is a small-leaved ash, called Fraxinus parvifolia. F. floribunda, a large tree with terminal panicles of white flowers, is a native of the Himalayas. In America there are several species — such as Fraxinus americana, the white ash; F. pubescens, the red ash; and F. sambucifolia, the black ash.

The " mountain ash " belongs to a totally different family from the common ash. It is called Pyrus Aucuparia, and belongs to the natural order Rosaceae, and the tribe Pomeae, which includes also apples, pears, &c. Its common name is probably due to its resemblance to the true ash, in its smooth grey bark, graceful ascending branches, and especially the form of the leaf, which is also pinnately compound but smaller than in the true ash. Its common name in Scotland is the rowan tree; it is well known by its clusters of white blossoms and succulent scarlet fruit. The name of poison ash is given to Rhus venenata, the North American poison elder or sumach, belonging to the Anacardiaceae (Cashew family). The bitter ash of the West Indies is Simaruba excelsa, which belongs to the natural order Simarubaceae. The Cape ash is Ekebergia capensis, belonging to the natural order Meliaceae, a large tree, a native of the Cape of Good Hope. The prickly ash, Xanthoxylon Clava-Herculis (nat. ord. Xanthoxyleae), a native of the south-eastern United States, is a small tree, the trunk of which is studded with corky tubercles, while the branches are armed with stout, sharp, brown prickles.

A'SHA [Maimun ibn Qais], Arabian poet, was born before Mahomet, and lived long enough to accept the mission of the prophet. He was born in Manfuha, a village of al-Yemama in the centre of Arabia, and became a wandering singer, passing through all Arabia from Hadramut in the south to al-Hira in the north, and naturally frequenting the annual fair at Okaz (Ukaz). His love poems are devoted to the praise of Huraira, a black female slave. Even before the time of Mahomet he is said to have believed in the resurrection and last judgment, and to have been a monotheist. These beliefs may have been due to his intercourse with the bishop of

Nejran (Najran) and the Tbadites (Christians) of al-Hira. His poems were praised for their descriptions of the wild ass, for the praise of wine, for their skill in praise and satire, and for the varieties of metre employed. His best-known poem is that in praise of Mahomet.

His poems have been collected from various sources in L. Cheikho's Les Poetes arabes Chretiens (Jesuit press, Beirut, 1890), pp. 357-399. His eulogy of Mahomet has been edited by H. Thorbecke, At ASa's Lobgedicht auf Muhammad (Leipzig, 1875). (G. W. T.)

ASHANTI, a British possession in West Africa, bounded W. by the (French) Ivory Coast colony, N. by the British Pro- tectorate known as Northern Territories of the Gold Coast (see

Gold Coast), and E. by the river Volta (which separates it from the German colony of Togoland); the southern frontier is conterminous with the northern frontier of the (British) Gold Coast colony. It forms an irregular oblong, with a triangular projection (the country of the Adansi) southward. It has an area of 23,000 sq. m., and a population estimated (1907) at

500.000.

Physical Features; Flora and Fauna. — A great part of Ashanti is covered with primeval and almost impenetrable forest. 1 Many of the trees, chiefly silk-cotton and hardwood, attain splendid proportions, the bombax reaching a height of over 200 ft., but the monotony is oppressive, and is seldom relieved by the sight of flowers, birds or beasts. Ferns are abundant, and the mimosa rises to heights of from 30 to 60 ft. All over the forest spread lianas, or monkey-ropes, their usual position being that of immense festoons hanging from tree to tree. To these lianas (species of which yield one kind of the rubber of commerce) is due largely the weird aspect of the forest. The country round the towns, however, is cultivated with care, the fields yielding in abundance grain, yams, vegetables and fruits. In the north- eastern districts the primeval forest gives place to park-like country, consisting of plains covered with high coarse grass, and dotted with occasional baobabs, as well as with wild plum, shea-butter, dwarf date, fan palms, and other small trees. Among the wild animals are the elephant (comparatively rare), the leopard, varieties of antelope, many kinds of monkeys and numerous venomous snakes. Crocodiles and two kinds of hippopotami, the ordinary and a pygmy variety, are found in the rivers. Of birds, parrots are the most characteristic. Insect life is abundant.

About 25 m. south-east of Kumasi is Lake Busumchwi, the sacred lake of the Ashanti. It is surrounded by forest-clad hills some 800 ft. high, is nearly circular and has a maximum diameter of 6 m. The Black Volta, and lower down the Volta (q.v.), form the northern frontier, and various tributaries of the Volta, running generally in a northerly direction, traverse the eastern portion of the country. In the central parts are the upper courses of the Ofm and of some tributaries of the Prah. Farther west are the Tano and Bia rivers, which empty their waters into the Assini lagoon. In their course through Ashanti, the rivers, apart from the Volta, are navigable by canoes only. The elevation of the country is generally below 2000 ft., but it rises towards the north.

Climate. — The climate, although unsuited to the prolonged residence of Europeans, is less unhealthy than that of the coast towns of West Africa. The water-supply is good and abundant. The rainy season lasts from the end of May until October; storms are frequent and violent. The mean temperature at Kumasi is 76° F., the mean annual rainfall 40 ins.

Inhabitants. — The most probable tradition represents the Ashanti as deriving their origin from bands of fugitives, who in the 16th or 17th century were driven before the Moslem tribes migrating southward from the countries on the Niger and Senegal. Having obtained possession of a region of impenetrable forest, they defended themselves with a valour which, becoming part of their national character, raised them to the rank of a powerful and conquering nation. They are of the pure negro type, and are supposed to be originally of the same race as the Fanti, nearer the coast, and speak the same language. The separation of Fanti and Ashanti has been ascribed to a famine which drove the former south, and led them to live on fan, or herbs, while the latter subsisted on san, or Indian corn, &c, whence the names Fanti and Santi. The Ashanti are divided into a large number of tribes, of whom a dozen may be dis- tinguished, namely, the Bekwai, Adansi, Juabin, Kokofu, Kumasi, Mampon, Nsuta, Nkwanta, Dadiassi, Daniassi, Ofinsu and Adjisu. Each tribe has its own king, but from the beginning of the 1 8th century the king of Kumasi was recognized as king paramount, and was spoken of as the king of Ashanti. As paramount king he succeeded to the " golden stool," the symbol

1 The exact area of dense forest land is unknown, but is estimated at fully 12,000 sq. m.

of authority among the Ashanti. After the deposition of Prempeh (1896) no king of Kumasi was chosen; Prempeh himself was never " enstooled." The government of Ashanti was formerly a mixture of monarchy and military aristocracy. The confederate tribes were originally organized for purposes of war into six great divisions or clans, this organization developing into

the main social fabric of the state. The chiefs of the clans, with a few sub-chiefs having hereditary rights, formed the King's Council, and the king, unless of exceptionally strong character, often exercised less power than the council of chiefs, each of whom kept his little court, making a profuse display of barbaric pomp. Land is held in common by the tribes, lands unallotted being attached to the office of head chief or king and called "stool lands." Polygamy is practised by all who can afford it. It is stated by the early chroniclers that the king of Ashanti was bound to maintain the " fetish " number of 3333 wives; many of these, however, were employed in menial services. The crown descended to the king's brother, or his sister's son, not to his own offspring. The queen mother exercised considerable authority in the state, but the king's wives had no power. The system of human sacrifices, practised among the Ashanti until the closing years of the 19th century, was founded on a senti- ment of piety towards parents and other connexions — the chiefs believing that the rank of their dead relatives in the future world would be measured by the number of attendants sent after them. There were two periods, called the great Adai and little Adai, at which human victims, chiefly prisoners of war or condemned criminals, were immolated. There is reason to believe that the extent of this practice was not so great as was currently reported.

There are a few Mahommedans in Ashanti, most of them traders from other countries, and the Basel and Wesleyan missionaries have obtained some converts to Christianity; but the great bulk of the people are spirit-worshippers. Unlike many West African races, the Ashanti in general show a repugnance to the doctrines of Islam.

Towns and Trade. — Besides the capital, Kumasi (q.v.), with a population of some 6000, there are few important towns in Ashanti. Obuassi, in the south-west, is the centre of the gold- mining industry. Warn is on the western border, Nkoranza, Atabubu and Kintampo in the north. Kintampo is a town of some size and is about 130 m. north-east of Kumasi. It is the meeting-place of traders from the Niger countries and from the coast. Formerly one of the great slave and ivory marts of West Africa, it is now a centre of the kola-nut commerce and a depot for government stores. The Ashanti are skilful in several species of manufacture, particularly in weaving cotton. Their pottery and works in gold also show considerable skill. A large quantity of silver-plate and goldsmiths' work of great value and considerable artistic elaboration was found in 1874 in the king's palace at Kumasi, not the least remarkable objects being masks of beaten gold. The influence of Moorish art is perceptible.

The vegetable products do not differ greatly from those found on the Gold Coast; the most important commercially is the rubber tree (Funtumia elastica). The nut of the kola tree is in great demand, and since 1905

many cocoa plantations have been established, especially in the eastern districts. Tobacco is cultivated in the northern regions. Gum copal is exported. Part of the trade of Ashanti had been diverted to the French port of Assini in consequence of the wars waged between England and the Ashanti, but on the suppression of the revolt of 1900 measures were taken to improve trade between Kumasi and Cape Coast. Kumasi is the distributing centre for the whole of Ashanti and the hinterland. Gold exists in the western districts of the country, and several companies were formed to work the mines in the period 1895-1901. Most of the gold exported from the Gold Coast in 1902 and following years came from the Obuassi mines. The gold output from Ashanti amounted in 1905 to 68,259 oz., valued at £254,790. The railway to Kumasi from Sekondi, which was completed in 1903, passes through the auriferous region. As far as the trade goes through British

territory southward, the figures are included in those of the Gold Coast; but Ashanti does also a considerable trade with its French and German neighbours, and northwards with the Niger countries. Its revenue and expenditure are included in those of the Gold Coast. Revenue is obtained principally from caravan taxes, liquor licences, rents from government land and con- tributions from the gold-mining companies.

Communications. — The railway to Kumasi, cut through one of the densest forest regions, is described under Gold Coast. The usual means of communication is by tortuous paths through the forest, too narrow to admit any wheeled vehicle. A wide road, 141 m. long, has been cut through the bush from Cape Coast to Kumasi, and from Kumasi ancient caravan routes go to the chief trading centres farther inland. Where rivers and swamps have to be crossed, ferries are maintained. A favourite mode of travelling in the bush is in a palanquin borne on the heads of four carriers. Telegraph lines connect Kumasi with the coast towns and with the towns in the Northern Territories. There is a well-organized postal service.

History. — The Ashanti first came undcrthe notice of Europeans early in the 18th century, through their successful wars with the F H kingdoms bordering the maritime territory. Osai Tutu

relations may be considered as the real founder of the Ashanti with the power. He either built or greatly extended Kumasi; British. ne subdued the neighbouring state of Denkera (17 19) and the Mahommedan countries of Gaman (Jaman) and Banna, and extended the empire by conquests both

on the east and west. At last he was defeated and slain (1731); but his successor, Osai Apoko, made further acquisitions towards the coast. In 1800, Osai Tutu Quamina, an enterprising and ambitious man, who appears early to have formed the desire of opening a communica- tion with white nations, became king. About 1807, two chiefs of the Assin, whom he had defeated in battle, sought refuge among the Fanti, the ruling people on the coast. On the refusal of the Fanti to deliver up the fugitives, Osai Tutu invaded their country, defeated them and drove them towards the sea. The Ashanti reached the coast near Anamabo, where there was then a British fort. The governor exhorted the townsmen to come to terms and offered to mediate; but they resolved to abide the contest. The result was the destruction of the town, and the slaughter of 8000 of the inhabitants. The Ashanti, who lost over 2000 men, failed, however, to storm the English fort, though the garrison was reduced from twenty-four to eight men. A truce was agreed to, and the king refusing to treat except with the governor of Cape Coast, Colonel G. Torrane (governor 180 5-1807) repaired to Anamabo, where he was received with great pomp. Torrane determined to surrender the fugitive Assin chiefs, but one succeeded in escaping; the other, on being given up, was put to death by the Ashanti. Torrane concluded an agreement with the Ashanti, acknowledging their conquest of Fantiland, and delivering up to them half the fugitives in Anamabo fort (most of the remainder were sold by Torrane and the members of his council as slaves). The governor also agreed to pay rent to the Ashanti for Anamabo fort and Cape Coast castle. The character of this man, who died on the coast in 1808, is indicated by Osai Tutu's eulogy of him. " From the hour Governor Torrane delivered up Tchibbu [one of the Assin fugitives] I took the English for my friends," said the king of Ashanti, " because I saw their object was trade only and they did not care for the people. Torrane was a man of sense and he pleased me much." ^

In consequence of repeated invasions of Fantiland by the Ashanti, the British in 181 7 sent Frederick James, commandant of Accra fort, T. E. Bowdich and W. Hutchinson on a mission to Kumasi. After one or two harmonious interviews, the king advanced a claim for the payment of the quit rents for Anamabo fort and Cape Coast castle, rents the major part of which the Fanti had induced the British to pay to them, leaving only a nominal sum for transmission to Kumasi. Mr James, the head of the mission, volunteered no satisfactory explanation, where- upon the king broke into uncontrollable rage, calling the emis- saries cheats and liars. Bowdich and Hutchinson, thinking

that British interests and the safety of the mission were en- dangered, took the negotiation into their own hands. Mr James was recalled, and a treaty was concluded, by which the king's demands were satisfied, and the right of the British to control the natives in the coast towns recognized.

The government at home, though they demurred somewhat to the course that had been pursued, saw the wisdom of cultivat- ing intercourse with this powerful African kingdom. They sent out, therefore, to Kumasi, as consul, Mr Joseph Dupuis, formerly consul at Mogador, who arrived at Cape Coast in January 1819. By that time fresh difficulties had arisen between the coast natives, who were supported by the British, and the Ashanti. Dupuis set out on the 9th of February 1820, and on the 28th arrived at Kumasi. After several meetings with the king, a treaty was drawn up, which acknowledged the sovereignty of Ashanti over the territory of the Fanti, and left the natives of Cape Coast to the mercy of their enemies. Mr J. Hope Smith, the governor of Cape Coast, disowned the treaty, as betraying the interests of the natives under British protection. Mr Hope Smith was supported by the government in London, which in 1821 assumed direct control of the British settlements. s/r Sir Charles M'Carthy, the first governor appointed by Charles the crown, espoused the cause of the Fanti, but was McCarthy's defeated in battle by the Ashanti, the 21st of January fate ' 1824, at a place beyond the Prah called Essamako. The Ashanti had 10,000 men to Sir Charles's 500. Sir Charles and eight other Europeans were killed. The skull of the governor was afterwards used at Kumasi as a royal drinking-cup. It was asserted that Sir Charles lost the battle through his ordnance-keeper bringing up kegs filled with vermicelli instead of ammunition. The fact is that the mistake, if made, only hastened the inevitable cata- strophe. On the very day of this defeat Osai Tutu Quamina died and was succeeded by Osai Okoto. A state of chronic warfare ensued, until the Ashanti sustained a signal defeat at Dodowah on the 7th of August 1826. From this time the power of the Ashanti over the coast tribes waned, and in 183 1 the king was obliged to purchase peace from Mr George Maclean, then administrator of the Gold Coast, at the price of 600 oz. of gold, and to send his son as a hostage to Cape Coast. The payment of ground rent for the forts held by the British had ceased after the battle of Dodowah, and by the treaty concluded by Maclean the river Prah was fixed as the boundary of the Ashanti kingdom, all the tribes south of it being under British protection.

The king (Kwaka Dua I.), who had succeeded Osai Okoto in 1838, was a peace-loving monarch who encouraged trade, but in 1852 the Ashanti tried to reassert authority over the Fanti in the Gold Coast protectorate, and in 1863 a war was caused by the refusal of the king's demand for the surrender by the British of a fugitive chief and a runaway slave-boy. The Ashanti were victorious in two battles and retired unmolested. The governor, Mr Richard Pine, urged the advisability of an advance on Kumasi, but this the British government would not allow. No further fighting followed, but the prestige of the Ashanti greatly increased. " The white men " (said Kwaka Dua) " bring many cannon to the bush, but the

bush is stronger than the cannon. " In April 1867 Kwaka Dua died, and after an interval of civil war was succeeded by Kofi Karikari, who on being enstooled swore, " My business shall be war." Thereafter preparations were made throughout Ashanti to attack the Fanti tribes, and the result was the war of 1873-74.

Two distinct events were the immediate cause of the war. The principal was the transference of Elmina fort from the Dutch to the British, which took place on the 2nd of April 1872. The Elminawere regarded by the Ashanti f 1873. as their subjects, and the king of Ashanti held the 1874. Elmina " custom-note," — that is, he received from the Dutch an annual payment, in its origin a ground rent for the fort, but looked upon by the Dutch as a present for trade purposes. The Ashanti greatly resented the occupation by Britain of what they considered Ashanti territory. Anothei but minor cause of the war was the holding in captivity by the

Ashanti of four Europeans.' An Ashanti force invaded Krepi, a territory beyond the Volta, and in June 1869 captured Mr Fritz A. Ramseyer, his wife and infant son (the child died of privation shortly afterwards), and Mr J. Kiihne, members of the Basel mission. Monsieur M. J. Bonnat, a French trader, was also captured at another place. .The captives were taken to Kumasi. Negotiations for their release were begun, but the Europeans were still prisoners when the sale of Elmina occurred. The Ashanti delayed war until their preparations were complete, whilst the Gold Coast officials appear to have thought the risk of hostilities remote. However, on the 22nd of January 1873 an Ashanti force crossed the Prah and invaded the British pro- tectorate. They defeated the Fanti, stirred up disputes at Elmina, and encamped at Mampon near Cape Coast, to the great alarm of the inhabitants. Measures were taken for the defence of the territory and the punishment of the assailants, which culminated in the despatch of Sir Garnet (afterwards Viscount) Wolseley as British administrator, £800,000 being voted by parliament for the expenses of the expedition. On landing (October 2) at Cape Coast, Wolseley found the Ashanti, who had been decimated by smallpox and fever, preparing to return home. He determined, however, to march to Kumasi, whilst Captain (afterwards Sir) John Glover, R.N., administrator of Lagos, was with a force of native levies to co-operate from the east and take the Ashanti in rear. Meanwhile the enemy broke up camp, and, although harassed by native levies raised by the British, effected an orderly retreat. The Ashanti army re-entered Kumasi on the 22nd of December. Wolseley asked for the help of white troops, and the 2nd battalion Rifle Brigade, the 23rd Fusiliers

and 42nd Highlanders were de- spatched. Seeing the preparations made by his enemy, Kofi Karikari endeavoured to make peace, and in response to General Wolseley's demands the European captives were released (January 1874). Sir Garnet determined that peace must be signed in Kumasi and continued his advance. On the 20th of January the river Prah was crossed by the European troops; on the 24th the Adansi hills were reached; on the 31st there was severe fighting at Amoaful; on the 1st of February Bekwai was captured; and on the evening of the 4th the victorious army was in Kumasi, after seven hours' fighting. The king, who had led his army, fled into the bush when he saw the day was lost. As the 42nd Highlanders pushed forward to Kumasi, the town was found full of Ashanti soldiers, but not a shot was fired at the invaders. Sir Garnet Wolseley sent messengers to the king, but Kofi Karikari refused to surrender. As his force was small, provisions scarce, and the rainy season setting in, and as he was encumbered with many sick and wounded, the British general decided to retire. On the 6th, therefore, the homeward march was commenced, the city being left behind in flames. In the meantime Captain Glover's force had crossed the Prah on the 15 th of January, and the Ashanti opposition weakening after the capture of Kumasi, Glover was able to push forward. On the nth of February, Captain (later General) R. W. Sartorius, who had been sent ahead with twenty Hausa only, found Kumasi still deserted. Captain Sartorius and his twenty men marched 50 m. through the heart of the enemy's country. On the 12th Glover and his force of natives entered the Ashanti capital. The news of Glover's approach induced the king, who feared also the return of the white troops, to sue for peace. On the 9th of February a messenger from Kofi Karikari overtook Sir Garnet, who on the 13 th at Fomana received the Ashanti envoys. A treaty was concluded whereby the king agreed, among other conditions, to pay 50,000 oz. of gold, to renounce all claim to homage from certain neighbouring kings, and all pretensions of supremacy over any part of the former Dutch protectorate, to promote freedom of trade, to keep open a road from Kumasi to the Prah, and to do his best to check the practice of human sacrifice. Besides coloured troops, there were employed in this campaign about 2400 Europeans, who suffered severely from fever and otherwise, though the mortality among the men was slight. Seventy-one per cent of the troops were on the sick list, and more than forty officers died — only six from wounds.

The success of the expedition was facilitated by the exertions of Captain (afterwards General Sir William) Butler and Captain (afterwards General W. L.) Dalrymple, who effected diversions with very inadequate resources.

One result of the war of 1873-74 was that several states dependent on Ashanti declared themselves independent, and sought British protection. This was refused, and the ,4 British inaction of the colonial office

contributed to the protector- reconsolidation of the Ashanti power. 1 Shortly after f. te . e t tal ’” the war the Ashanti deposed Kofi Karikari, and placed on the golden stool — the symbol of sovereignty — his brother Mensa. This monarch broke almost every article of the Fomana treaty, and even the payment of the indemnity was not demanded. (In all, only 4000 oz. of gold, out of the 50,000 stipulated for, were paid.) Mensa’s rule was tyrannous and stained with repeated human sacrifices. In 1883 a revolution displaced that monarch, who was succeeded by Kwaka Dua II. — a young man who died (June 1884) within a few months of his election. In the same month died the ex-king Kofi Karikari, and disruption threatened Ashanti. At length, after a desolating civil war, Prince Prempeh — who took the name of Kwaka Dud III.— was chosen king (March 26, 1888), the colonial government having teen forced to intervene in the dispute owing to the troubles it occasioned in the Gold Coast. The election of Prempeh took place in the presence and with the sanction of an officer of the Gold Coast government. Prempeh defeated his enemies, and for a time peace and prosperity returned to Ashanti. However in 1893 there was fresh trouble between Ashanti and the tribes of the protectorate, and the roads were closed to traders by Prempeh’s orders. The British government was forced to interfere, more especially as the country, by inter- national agreement, had been included in the British sphere of influence. A mission was despatched to Prempeh, calling upon him to fulfil the terms of the 1874 treaty, and further, to accept a British protectorate and receive a resident at Kumasi. The king declined to treat with the governor of the Gold Coast, and despatched informal agents to England, whom the secretary of state refused to receive. To the demands of the British mission relative to the acceptance of a protectorate and other matters, Prempeh made no reply in the three weeks’ grace allowed, which expired on the 31st of October 1895. To enforce the British demands, to put an end to the misgovernment and barbarities carried on at Kumasi, and to establish law, order and security for trade, an expedition was at length decided upon. The force, placed under Colonel Sir Francis Scott, consisted of the 2nd West Yorkshire regiment, a ” special service corps,” made up of detachments from various regiments in the United Kingdom, under specially selected officers, the 2nd West India regiment, and the Gold Coast and Lagos Hausa. The composition of the special service corps was much criticized at the time; but as it was not called upon for fighting purposes, no inferences as to its efficiency are possible. The details of the expedition were care- fully organized. Before the arrival of the staff and contingent from England (December 1895) the native forces were employed in improving the road from Cape Coast to Prahsu (70 m.), and in establishing road stations to serve as standing camps for the troops. About 12,000 carriers were collected, the load allotted to each being 50 lb. In addition, a force of native scouts, which ultimately reached a total of 860 men, was organized

in eighteen companies, and partly armed with Snider rifles, to cover the advance of the main column, which started on the 27th of December, and to improve the road. The king of Bekwai having asked for British protection, a small force was pressed forward and occupied this native town, about 25 m. from Kumasi, on the 4th of January 1896. The advance continued, and at Ordahsu a mission arrived from King Prempeh offering unconditional submission. On the 17 th of January Kumasi was occupied, and Colonel Sir F. Scott received the king. Effective measures

1 An attempt was made late in 1875, by the despatch of Dr V. S. Gouldsbury on a mission to Eastern Akim, Juabin and Kumasi, to repair the effects of the previous inaction of the colonial government, but without success.

were taken to prevent his escape, and on the 20th Prempeh made submission to Mr (afterwards Sir W. E.) Maxwell, the governor of Cape Coast, in native fashion. After this act deposed. °^ P UDUC humiliation, the king and the queen mother with the principal chiefs were arrested and taken as prisoners to Cape Coast, where they were embarked on board H.M.S. " Racoon " for Elmina. The fetish buildings at Bantama were burned, and on the 22nd of January Bokro, a village 5 m. from Kumasi, and Maheer, the king's summer palace, were visited by the native scouts and found deserted. On the same day, leaving the Hausa at Kumasi, the expedition began the return march of 150 m. to Cape Coast. The complete success of the expedition was due to the excellent organization of the supply and transport services, while the promptitude with which the operations were carried out probably accounts in great measure for the absence of resistance. Although no fighting occurred, a heavy strain was thrown upon all ranks, and fever claimed many victims, among whom was Prince Henry of Battenberg, who had volunteered for the post of military secretary to Colonel Sir F. Scott.

After the deportation of Prempeh no successor was appointed to the throne of Ashanti. A British resident, Captain Donald W. Stewart, was installed at Kumasi, and whilst the refle/o/ other states of the confederacy retained their king and Kumasi. tribal system the affairs of the Kumasi were adminis- tered by chiefs under British guidance. Mr and Mrs Ramseyer (two of the missionaries imprisoned by King Kofi Karikari for four and a half years) returned to Kumasi, and other missionaries followed. A fort was built in Kumasi and garrisoned with Gold Coast constabulary. Though outwardly submissive, the Kumasi chiefs were far from reconciled to British

rule, and in 1900 a serious rebellion broke out. The tribes involved were the Kumasi, Adansi and Kokofu; the other tribes of the Ashanti confederation remained loyal. The rebels were, however, able to command a force reported to number 40,000. On the 28th of March, before the rebellion had declared itself, the governor of the Gold Coast, Sir F. Hodgson, in a public palaver at Kumasi, announced that the Ashanti chiefs would have to pay the British government 4000 oz. of gold yearly, and he reproached the chiefs with not having brought to him the golden stool, which the Kumasi had kept hidden since 1896. Three days afterwards the Kumasi warriors attacked a party of Hausa sent with the chief object of discovering the golden stool. (In the previous January a secret attempt to seize the stool had failed.) The Kumasi, who were longing to wipe out the dishonour of having let Prempeh be deported without fighting, next threatened the fort of Kumasi. Mr Ramseyer and the other Basel missionaries, and Sir F. and Lady Hodgson, took refuge in the fort, and reinforcements were urgently asked for. On the 18th of April 100 Gold Coast constabulary arrived. On the 29th the Kumasi attacked in force, but were repulsed. The same day a party of 250 Lagos constabulary reached Kumasi. They had fought their way up, and came in with little ammunition. On the 1 5th of May Major A. Morris arrived from the British territory north of Ashanti, also with 250 men. The garrison now numbered 700. The 29 Europeans in the fort included four women. Outside the fort were gathered 3000 native refugees. Famine and disease soon began to tell their tale. Sir F. Hodgson sent out a message on the 4th of June (it reached the relieving force on the 1 2th of June), saying that they could only hold out to the nth of June. However, it was not till the 23rd of June that the governor and all the Europeans save three, together with 600 Hausa of all ranks, sallied out of the fort. Avoiding the main road, held by the enemy in force, they attacked a weakly held stockade, and succeeded in cutting their way through, with a loss of two British officers mortally wounded, 39 Hausa killed, and double that number wounded or missing. The governor's party reached Cape Coast safely on the 10th of July.

A force of 100 Hausa, with three white men (Captain Bishop, Mr Ralph and Dr Hay), was left behind in Kumasi fort with rations to last three weeks. Meantime a relief expedition had

been organized at Cape Coast by Colonel James Willcocks. This officer reached Cape Coast from Nigeria on the 26th of May. The difficulties before him were appalling. Carriers could scarcely be obtained, there were no local food supplies, the rainy season was at its height, all the roads were deep mire, the bush was almost impenetrable, and the enemy were both brave and cunning, fighting behind concealed stockades. It was not until the 2nd of July that Colonel Willcocks was able to advance to Fumsu. On the next day he heard of the escape of the governor and of the straits of the

garrison left at Kumasi. He determined to relieve the fort in time, and on the 9th of July reached Bekwai, the king of which place had remained loyal. Making his final dispositions, the colonel spread a report that on the 13 th he would attack Kokofu, east of Bekwai, and this drew off several thousands of the enemy from Kumasi. After feinting to attack Kokofu, Colonel Willcocks suddenly marched west. There was smart fighting on the 14th, and at 4.30 p.m. on the 1 5th, after a march since daybreak through roads " in indescribably bad condition," the main rebel stockade was encountered. It was carried at the point of the bayonet by the Yoruba troops, who proved themselves fully equal to the Hausa. "The charge could not have been beaten in 6lan by any soldiers." Kumasi was entered the same evening, a bugler of the war-worn garrison of the fort sounding the " general salute " as the relieving column came in view. Most of the defenders were too weak to stand. Outside the fort nothing was to be seen but burnt-down houses and putrid bodies. The relieving force that marched into Kumasi consisted of 1000 fighting men (all West Africans), with 60 white officers and non-commissioned officers, two 75-millimetre guns, four seven-pounder guns and six Maxims.

Kumasi relieved, there remained the task of crushing the rebellion. Colonel Willcocks's force was increased by Yaos and a few Sikhs from Central Africa to a total of 3368 natives, with 134 British officers and 35 British non-commissioned officers. In addition there were Ashanti levies. On the 30th of September the Kumasi were completely beaten at Obassa. Thereafter many of the rebel chiefs surrendered, and the only two remaining in the field were captured on the 28th of December. Thus 1901 opened with peace restored. The total number of casualties during the campaign (including those who died of disease) was 1007. Nine British officers were killed in action, forty-three were wounded, and six died of disease. The commander, Colonel Willcocks, was promoted and created a K.C.M.G.

By an order in council, dated the 26th of September 1901, Ashanti was formally annexed to the British dominions, and given a separate administration under the control of progress the governor of the Gold Coast. A chief commissioner under represents the governor in his absence, and is assisted British by a staff of four commissioners and four assistant ˆ,™o"' s " commissioners. A battalion of the Gold Coast regiment is stationed in the country with headquarters at Kumasi. The order in council mentioned, which may be described as the first constitution granted Ashanti by its British owners, provides that the governor, in issuing ordinances respecting the adminis- tration of justice, the raising of revenue, or any other matter, shall respect any native laws by which the civil relations of any chiefs, tribes or populations are regulated, " except so far as they may be incompatible with British sovereignty or clearly injurious to the welfare of the natives themselves." After the annexation of the country

in 1901 the relations between the governing power and the governed steadily improved. Mr F. C. Fuller, who succeeded Sir Donald Stewart as chief commissioner early in 1905, was able to report in the following year that among the Ashanti suspicion of the " white man's " ulterior motives was speedily losing ground. The marked preference shown by the natives to resort to the civil and criminal courts established by the British demonstrated their faith in the im- partial treatment awarded therein. Moreover, the maintenance of the tribal system and the support given to the lawful chiefs did much to win the confidence and respect of a people naturally suspicious, and mindful of their exiled king.

Bibliography. — For a general survey of the country, see Travels

in Ashanli and Jaman, by R. A. Freeman (London, 1898) ; Historical Geography of the British Colonies, vol. iii. " West Africa," by C. P. Lucas (Oxford, 1900) ; and the Annual Reports, Ashanti, issued from 1906 onward by the Colonial Office, London. The Tshi-speaking Peoples of the Gold Coast, by Col. A. B. Ellis (London, 1887), deals with ethnology. Of early works on the country the most valuable are A Mission from Cape Coast Castle to Ashantee, by T. E. Bowdich (London, 1819); and Journal of a Residence in Ashantee (London, 1824), by J. Dupuis. For history generally, see A History of the Gold Coast of West Africa, by Col. A. B. Ellis (London, 1893); an d History of the Gold Coast and Asante . . . from about 1500 to i860, by C. C. Reindorf, a native pastor of the Basel mission (Basel, 1895). For the British military campaigns, in addition to the official blue- books, consult: Narrative of the Ashantee War, 2 vols., by (Sir) Henry Brackenbury (London, 1874); The Story of a Soldier's Life by Viscount Wolseley, vol. ii. chs. xliii.-l. (London, 1903) ; Coomassie, by (Sir) H. M. Stanley, being the story of the 1873-74 expedition (new ed., London, 1896) ; Life of Sir John Hawley Glover, by Lady Glover, chs. iii.-x. (London, 1897); The Downfall of Prempeh, by (General) R. S. S. Baden-Powell, an account of the 1895-96 expedi- tion (London, 1896); From Kabul to Kumassi (chs. xv. to end), by Sir James Willcocks, (London, 1904); The Ashanti Campaign of 1900, by Capt. C. H. Armitage and Lieut.-Col. A. F. Montanaro (London, 1901) ; The Relief of Kumasi, by Capt. H. C. J. Biss (London, 1901). The two bocks following are by besieged residents in Kumasi: The Siege of Kumasi, by Lady Hodgson (London, 1901); Dark and Stormy Days at Kumasi, 1900, from the diary of the Rev. Fritz Ramseyer (London, 1901). Many of the works quoted under Gold Coast deal also with Ashanti. (F. R. C.)

ASH'ARl [Abu-1 Hasan 'Ali ibn Isma'Il u]-Ash'arl], (873-935), Arabian theologian, was born of pure Arab stock at Basra, but spent the greater part of his life at Bagdad. Although belonging to an orthodox family, he became a pupil of the great Mu'tazalite teacher al-Jubba'I, and himself remained a Mu'tazalite until his fortieth year. In 912 he returned to the faith of his fathers and became its most distinguished champion, using the philo- sophical methods he had learned in the school of heresy. His theology, which occupied a mediate position between the extreme views on most points, became dominant among the Shafi'ites. He is said to have written over a hundred works, of which only four or five are known to be extant.

See W. Spitta, Zur Geschichte Abu 'l-Hasan al As'ari's (Leipzig, 1876) ; A. F. Mehren, Expose de la reforme de I'Islamisme commencee par Abou 'l-Hasan Alt el-Ash'ari (Leiden, 1878); and D. B. Mac- donald's Muslim Theology (London, 1903), especially the creed of Ash'ari in Appendix iii. (G. W. T.)

ASHBOURNE, a market-town in the western parliamentary division of Derbyshire, England, 13 m. W.N.W. of Derby, on the London & North-Western and the North Staffordshire railways. Pop. of urban district (1901) 4039. It is pleasantly situated on rising ground between two small valleys opening into that of the Dove, and the most beautiful scenery of Dovedale is not far distant. The church of St Oswald is cruciform, Early English and later; a fine building with a central tower and lofty octagonal spire. Its monuments and brasses are of much interest. The town has a large agricultural trade and a manu- facture of corsets. The streams in the neighbourhood are in favour with trout fishermen. Ashbourne Hall, an ancient mansion, has associations with " Prince Charlie," who occupied it both before and after his advance on Derby in 1745. There are also many connexions with Dr Johnson, a frequent visitor here to his friend Dr Taylor, who occupied a house opposite the grammar school.

ASHBURNHAM, JOHN (c. 1603-1671), English Royalist, was the son of Sir John Ashburnham of Ashburnham in Sussex. He early entered the king's service. In 1627 he was sent to Paris by his relative the duke of Buckingham to make overtures for peace, and in 1628 he prepared to join the expedition to Rochelle interrupted by the duke's assassination. The same year he was made groom of the bedchamber and elected member of parliament for Hastings, which borough he also represented in the Long Parliament of 1640. In this capacity he rendered services by reporting proceedings to the king. He made a considerable fortune and recovered the Ashburnham estates alienated by his father. He became one of the king's chief advisers and had his full confidence. He attended Charles at York on the outbreak of the war with Scotland. In the Civil War he was made

treasurer of the royal army, in which capacity |

he aroused Hyde's jealousy and remonstrances by infringing on his province as chancellor of the exchequer. In 1644 he was a commissioner at Uxbridge. He accompanied Charles in his flight from Oxford in April 1646 to the Scots, and subsequently escaped abroad, joining the queen at Paris, residing afterwards at Rouen and being sent to the Hague to obtain aid from the prince of Orange. After the seizure of Charles by the army, Ashburnham joined- him at Hampton Court in 1647, where he had several conferences with Cromwell and other army officers. When Charles escaped from Hampton Court on the 1 1 th of November, he followed Ashburnham's advice in opposition to that of Sir John Berkeley, who urged the king to go abroad, and took refuge in the Isle of Wight, being placed by Ashburnham in the hands of Robert Hammond, the governor. " Oh, Jack," the king exclaimed when he understood the situation, " thou hast undone me! " when Ashburnham, " falling into a great passion of weeping, offered to go and kill Hammond." By this fatal step Ashburnham incurred the unmerited charge of treachery and disloyalty. Clarendon, however, who censures his conduct, absolves him from any crime except that of folly and excessive self-confidence, and he was acquitted both by Charles I. and Charles II. He was separated with Berkeley from Charles on the 1st of January 1648, waited on the mainland in expectation of Charles's escape, and was afterwards taken and imprisoned at Windsor, and exchanged during the second Civil War for Sir W. Masham and other prisoners. He was one of the delinquents specially exempted from pardon in the treaty of Newport. In November he was allowed to compound for his estates, and declared himself willing to take the covenant. After the king's death he remained in England, an object of suspicion to all parties, corresponded with Charles II., and underwent several terms of imprisonment in the Tower and in Guernsey. At the Restoration he was reinstated in his former place of groom of the bedchamber and was compensated for his losses. He represented Sussex in parliament from 1661 till the 22nd of November 1667, when he was expelled the House for taking a bribe of £500 from French merchants for landing their wines. He died on the 15th of June 1671.

He had eight children, the eldest of whom, William, left a son John (1656-1710), who in 1689 was created Baron Ashburn- ham. John's second son, John (1687-1737), who became 3rd Baron Ashburnham on his brother's death in 17 10, was created Viscount St Asaph and earl of Ashburnham in 1730. The 5th earl (b. 1840) was his direct descendant. Bertram (1797-1878), the 4th earl, was the collector of the famous Ashburnham library, which was dispersed in 1883 and 1884.

A Letter from Mr Ashburnham to a Friend, defending John Ash- burnham's

conduct with regard to the king, was published in 1648. His longer Narrative was published in 1830 by George, 3rd earl of Ashburnham (the latter's championship of his ancestor, however, being entirely uncritical and unconvincing) ; A Letter to W. Lenthall (1647) repudiates the charge brought against the king of violating his parole (Thomason Tracts, Brit. Museum, E 418 [4]).

ASHBURTON, ALEXANDER BARING, 1st Baron 1 (1774- 1848), English politician and financier, 2nd son of Sir Francis Baring (the founder of the house of Baring Brothers & Co.) and of Harriet, daughter of William Herring, was born on the 27th of October 1774, and was brought up in his father's business. He was sent by the latter to the United States; married Anne, daughter of William Bingham, of Philadelphia, and formed wide connexions with American houses. In 1810, by his father's death, he became head of the firm. He sat in parliament for Taunton (1806-1826), Callington (1826-1831), Thetford (1831- 1832), North Essex (1832-1835). He regarded politics from the point of view of the business man, opposed the orders in council, and the restrictions on trade with the United States in 181 2, and in 1826 the act for the suppression of small bank-notes. He was a strong antagonist of Reform. He accepted the post of chancellor of the exchequer in the duke of Wellington's projected ministry of 1832; but afterwards, alarmed at the scene in parliament, declared " he would face a thousand devils rather than such a House of Commons," and advised the recall

1 i. e. in the existing line; see below for the earlier creation.

of Lord Grey. In 1834 he was president of the board of trade and master of the mint in Sir Robert Peel's government, and on the latter's retirement was created Baron Ashburton on the 10th of April 1835, taking the title previously held by John Dunning, his aunt's husband. In 1842 he was despatched to America, and the same year concluded the Ashburton or Webster-Ash- burton treaty. A compromise was settled concerning the north-east boundary of Maine, the extradition of certain criminals was arranged, each state agreed to maintain a squadron of at least eighty guns on the coast of Africa for the suppression of the slave trade, and the two governments agreed to unite in an effort to persuade other powers to close all slave markets within their territories. Despite his earlier attitude, Lord Ashburton dis- approved of Peel's free-trade projects, and opposed the Bank Charter Act of 1844. He was a trustee of the British Museum and of the National Gallery, a privy councillor and D.C.L. of Oxford. He

published, besides several speeches, An Enquiry into the Causes and Consequences of the Orders in Council (1808), and The Financial and Commercial Crisis Considered (1847). He died on the 13 th of May 1848, leaving a large family, his eldest son becoming 2nd baron. The 5th baron (b. 1866) suc- ceeded to the title in 1889.

ASHBURTON, JOHN DUNNING, ist Baron 1 (1731-1783), English lawyer, the second son of John Dunning of Ashburton, Devonshire, an attorney, was born at Ashburton on the 18th of October 1731, and was educated at the free grammar school of his native place. At first articled to his father, he was admitted, at the age of nineteen, to the Middle Temple, and called to the bar in 1756, where he came very slowly into practice. He went the western circuit for several years without receiving a single brief. In i762he wasemployed todrawupa defence of the British East India Company against the Dutch East India Company, which had memorialized the crown on certain grievances, and the masterly style which characterized the document procured him at once reputation and emolument. In 1763 he distinguished himself as counsel on the side of Wilkes, whose cause he conducted throughout. His powerful argument against the validity of general warrants in the case of Leach v. Money (June 18, 1763) established his reputation, and his practice from that period gradually increased to such an extent that in 1776 he is said to have been in the receipt of nearly £10,000 per annum. In 1766 he was chosen recorder of Bristol, and in December 1767 he was appointed solicitor-general. The latter appointment he held till May 1770, when he retired with his friend Lord Shelburne. In 1 77 1 he was presented with the freedom of the city of London. From this period he was considered as a regular member of the opposition, and distinguished himself by many able speeches in parliament. He was first chosen member for Calne in 1768, and continued to represent that borough until he was promoted to the peerage. In 1780 he brought forward a motion that the " influence of the crown had increased, was increasing, and ought to be diminished," which he carried by a majority of eighteen. He strongly opposed the system of sinecure officers and pensions; but his probity was not strong enough to prevent his taking advantage of it himself. In 1782, when the marquis of Rocking- ham became prime minister, Dunning was appointed chancellor of the duchy of Lancaster, a rich sinecure; and about the same time he was advanced to the peerage, with the title of Lord Ashburton. Under Lord Shelburne's administration he accepted a pension of £4000 a year. He died at Exmouth on the 18th of August 1783. Though possessed of ah insignificant person, an awkward manner and a provincial accent, Lord Ashburton was one of the most fluent and persuasive orators of his time. He had married Elizabeth Baring, and was succeeded as 2nd baron by his son Richard, at whose death in 1823 the title became extinct, being revived in 1835 by Alexander Baring.

Besides the answer to the Dutch memorial, Lord Ashburton is supposed to have assisted in writing a pamphlet on the law of libel, and to have been the author of A Letter to the Proprietors of East India Stock, on the subject of Lord Clive's Jaghire, occasioned by his Lordship's Letter on that Subject (1764, 8vo). He was at one time suspected of being the author of the Letters of Junius.

1 i.e. of the first creation; for the present title see above.

ASHBURTON, a river of Western Australia, rising in the mountains west of the Great Sandy Desert, and following a course north-westward for 400 m., into Exmouth Gulf. In its upper reaches it flows through a rich gold-bearing district to which it gives name, and nearer its mouth it traverses a vast tract of fine pastoral country. The outlet for both these districts is the port of Onslow, at the mouth of the river, near which there are several pearl -fishing stations. The river is not navigable.

ASHBURTON, a market-town in the Ashburton parliamentary division of Devonshire, England, 24 m. N. W. by W. of Plymouth, on a branch of the Great Western railway. Pop. of urban district (1001) 2628. It lies in a valley surrounded by hills, at a short distance from the river Dart ; the scenery, towards Dartmoor and in the neighbourhood of Buckland and Holne Chase, being unsurpassed in the county. The church of St Andrew is cruciform with a lofty tower. It was built early in the 15 th century, and contains a fine old oak roof over the north aisle, and a tablet in memory of John Dunning, solicitor-general and ist Baron Ashburton (1731-1783). The inscription is by Dr Johnson. Lord Ashburton was educated at the grammar school, which was founded as a chantry in 1314. Serge is manufactured in Ashburton, and there are breweries, paint factories and saw-mills. A large deposit of umber is worked in the neighbourhood. Slate quarries and copper and tin mines were formerly valuable. A neighbouring centre of the serge industry is the urban district of Buckfastleigh (pop. 2520), 3 m. S S.W. Between the two towns is Buckfast Abbey, said to have been," before the Conquest, a Benedictine house, and refounded for Cistercians in 1137. It was restored to use in 1882 by a French Benedictine community, the fine Perpendicular abbot's tower remaining, while other parts have been rebuilt on the original lines.

Ashburton (Essebretona, Asperton, Ashperton) is a borough by prescription and an ancient stannary town. It was governed by a portreeve and bailiff, elected annually at the court leet held by the lord of the manor. According to Domesday, Ashburton was held in chief by Osbern, bishop of Exeter, and rendered geld for six hides. In 1552, as the two manors of Ashburton Borough and Ashburton Foreign, it was sold by the bishop, and subsequently became crown property. Finally, it was acquired in moieties

by the Clinton family, and the present Lord Clinton is joint lord of the manor with Sir Robert Jardine. In 1298 and 1407 Ashburton returned two members, from 1407 until 1640 one member only, and then again two members, until deprived of one by the Reform Act of 1832 and of the other by the Reform Act of 1885. In the reign of Edward II. Bishop Stapledon obtained a Saturday market, and two annual fairs lasting three days at the feasts of St Laurence (August 10) and St Martin in winter (November 11). In 1672 John Ford was granted a Tuesday market for the sale of wool and woollen goods made from English yarn, and in 1705 Andrew Quicke obtained two annual fairs, on the first Thursdays in March and June, for the sale of cattle, corn and merchandise.

ASHBY, TURNER (1824-1862), American cavalry leader in the Confederate army, was born in Fauquier county, Virginia, in 1824. Before the Civil War he was a planter in Markham, Fauquier county, and a local politician. When hostilities began he raised a regiment of cavalry, which he led with con- spicuous success in the Valley campaigns of 1861-62, under Joseph Johnston and Stonewall Jackson. He was promoted a brigadier-general shortly before his death, which took place in a cavalry skirmish at Harrisonburg, Va., on the 6th of June 1862. By his early death the Confederates lost one of the best cavalry officers in their service.

ASHBY-DE-LA-ZOUCH, a market-town in the Bosworth parliamentary division of Leicestershire, England; 118 m. N.W. by N. from London by the Midland railway, on the Leicester-Burton branch. Pop. of urban district (1901) 4726. The church of St Helen is a fine Perpendicular building, restored and enlarged (1880); it contains monuments of the Huntingdon family, and an old finger-pillory for the punishment of mis- behaviour in church. The Ivanhoe baths, erected in 1826, are frequented for their saline waters, which, as containing bromine, are found useful in scrofulous and rheumatic complaints. The springs are at Moira, 3 m. west. There is a Queen Eleanor cross commemorating the countess of Loudoun, by Sir Gilbert Scott. To the south of the town are the extensive remains of Ashby

Castle. There are extensive coal-mines in the neighbouring district, as at Moira, whence the Ashby-de-la-Zouch canal runs south to the Coventry canal.

At the time of the Domesday survey Ashby-de-la-Zouch formed part of the estates of Hugh de Grentmaisnel. Soon after it was held by Robert Beaumeis, from whom it passed by female descent to the family of !a

Zouch, whence it derived the adjunct to its name, having been hitherto known as Ashby or Essebi. The earliest record of a grant of market rights is in 1219, when Roger la Zouch obtained a grant of a weekly market and a two days' fair at the feast of St Helen, in consideration of a fine of one palfrey. In the 15th century the manor was held by James Butler, earl of Ormond, after whose attainder it was granted in 1461 to Lord Hastings, who in 1474 obtained royal licence to em park 3000 acres and to build and fortify a castle. At this castle Mary queen of Scots was detained in 1569 under the custody of the earls of Huntingdon and Shrews- bury. During the Civil War Colonel Henry Hastings fortified and held it for the king, and it was visited by Charles in 1645. In 1648, at the close of the war, it was dismantled by order of parlia- ment. It plays a great part in Sir Walter Scott's Ivanhoe. In the 18th century Ashby was celebrated as one of the best markets for horses in England, and had besides prosperous factories for woollen and cotton stockings and for hats.

See Victoria County History — Leicestershire; History of Ashby- de-la-Zouch (Ashby-de-la-Zouch, 1852).

A-SHE-HO (Manch. Alchuku), a town of Manchuria, China, 125 m. N.E. of Kirin, and 30 m. S. of the Sungari. It is governed by a mandarin of the second class. Pop. about 60,000.

ASHER, a tribe of Israel, called after the son of Jacob and Zilpah, Leah's maid. The name is taken by the narrator of Gen. xxx. 12 seq. (J) to mean happy or propitious, possibly an allusion to the fertility of the tribe's territory (with which cf. Gen. xlix. 20. Deut. xxxiii. 24); on the other hand, like Gad, it may have been originally a divine title. The district held by this tribe bordered upon Naphtali, and lay to the north of Issachar and Zebulun, and to the south of Dan. But the boundaries are not definite and the references to its territory are obscure. Asher is blamed for taking no part in the fight against Sisera (Judg. v. 17), and although it shares with Zebulun and Naphtali in Gideon's defeat of the Midianites (Judg. vi. 35, vii. 23), the narrative in question is not the older of the two accounts of the event, and the incorporation of the name is probably due to a late redactor. Lying as it did in the closest proximity to Phoenicians and Aramaeans, its population must have been exceptionally mixed, and the description of the occupation of Palestine in Judg. i. 31 seq. shows that it contained a strong Canaanite element. In the Blessing of Moses it is bidden to defend itself — evidently against invasion (Deut. xxxiii. 25).

Even in the time of Seti I. and Rameses II. (latter half of 14th cent. B.C.) the district to the west of Galilee appears to have been known to the Egyptians as Aser(u), so that it is possible to infer either (a) that Asher was an Israelite tribe which, if it ever went down into Egypt, separated itself

from its brethren in Egypt, and migrated north, " an example which was probably followed by some of the other tribes as well " (Hommel, Ancient Hebrew Tradition, p. 228); or (b) it was a district which, if never closely bound to Israel, was at least regarded as part of the national kingdom, and treated as Israelite by the genealogical device of making it a " son " of Jacob. It is possible that some of its Israelite population had followed the example of Dan and moved from an earlier home in the south. Two of the clans of Asher, Heber and Malchiel, have been associated with Milk-ili and Habiri, the names of a hostile chief and people in the Amarna Tablets (Jastrow, Journal Bibl. Lit. xi. pp. 118 seq., xii. pp. 61 seq., Hommel), but it is scarcely probable that events of about 1400 B.C. should have survived only in this form. This applies also to the suggestion that the name Asher has been derived from a famous Abd-ashirta of the same period (Barton, ib. xv. p. 174). Some connexion with the goddess Ashir(t)a, however, is not unlikely.

See further H. W. Hogg, Ency. Bibl. col. 327 seq. ; E. Meyer, Israeliten, pp. 540 sqq. (S. A. C.)

'ASHER BEN -YEHIEL (known as Rosh), Jewish rabbi and codilier, was born in the Rhine district c. 1250, and died in Toledo 1327. Endangered by the persecutions inflicted on the German Jews in the 13th century, 'Asher fled to Spain, where

he was made rabbi of Toledo. His enforced exile impoverished him, and from this date begins an important change in the status of medieval rabbis. Before the 14th century, rabbis had obtained a livelihood by the exercise of some secular profession, particularly medicine, and received no salary for performing the rabbinic function. This was now changed. A disciple of Meir of Rothenburg, 'Asher's sole interest was in the Talmud. He was a man of austere piety, profound and narrow. He was a determined opponent of the study of philosophy, and thus was antipathetic to the Spanish spirit. The Jews of Spain continued, nevertheless, devotees of secular sciences as well as of rabbinical lore. 'Asher was the first of the German rabbis to display strong talent for systematization, and his chief work partook of the nature of a compendium of the Talmud. Compiled between 1307 and 1314, 'Asher's Compendium resembled, and to a large extent superseded, the work of 'Al-phasi (

ASHEVILLE, a city and the county-seat of Buncombe county, North Carolina, U.S.A., in the mountainous Blue Ridge region in the west part of the state, about 210 m. W. of Raleigh. Pop. (1890) 10,235; (1900) 14,694, of whom 4724 were negroes; (1910, census) 18,762. Asheville is situated at the junction of three branches of the Southern railway, on a high terrace on the east bank of the French Broad river, at the mouth of the

Swannanoa, about 2300 ft. above the sea. The city is best known as one of the most popular health and pleasure resorts in the south, being a summer resort for southerners and a winter resort for northerners. It has a dry and equable climate and beautiful scenery. Among its social clubs are the Albemarle, the Asheville, the Elks, the Tahkeeostee and the Swannanoa Country clubs. An extensive system of city and suburban parks, connected by a series of beautiful drives, adds to the city's attractiveness. There are great forests in the vicinity. Among the public buildings are the city hall, the court house, the Federal building, the public library and an auditorium. In or near Asheville are a normal and collegiate institute for young women (1892), and, occupying the same campus, a home industrial school (r887) for girls, both under the control of the Woman's Board of Home Missions of the Presbyterian Church; the Asheville farm school for boys, an industrial school for negroes; the Asheville school for boys (5 m. west of Asheville); and the Bingham school (1793), founded at Pittsboro, N.C., by William Bingham (d. 1826), and removed to its present site (3 m. north-west of Asheville) in 1891. About 2 m. south- east of the city is Biltmore, the estate of George W. Vanderbilt, its 125,000 acres constituting what is probably the finest country place in the United States. The central feature of the estate is a chateau (375X150 ft.) of French Renaissance design, after the famous chateau at Blois, France. In the neighbourhood is a model village, with an elementary school, an industrial school for whites, a hospital and a church, maintained by Mr Vanderbilt. Both the chateau and the village were designed by Richard M. Hunt; the landscape gardening was done by Frederick Law Olmsted. A collection of woody plants, one of the largest and finest in the world, and a broad forest and hunting preserve, known as Pisgah Forest (100,000 acres), are also maintained by the owner. Asheville is a market for live-stock, dairy products, lumber and fruits, and has various manufactories (in which a good water-power is utilized), including tanneries, cotton mills, brick and tile factories, and a wood-working and veneer plant. The value of the city's factory products increased from $1,300,698 in 1900 to $1,918,362 in 1905, or 47-5%. The city was named in honour of Samuel Ashe (1725-1813), chief-justice of North Carolina from 1777 to 1796, and John Ashe (1720-1781), a North Carolina soldier who distinguished himself in the War of

Independence, was settled about 1790, and was incorporated in 1835. The city's boundaries were enlarged in 1005.

ASHFORD, a market-town in the Southern or Ashford par- liamentary division of Kent, England, 56 m. S.E. of London by the South-Eastern &

Chatham railway. Pop. of urban district (1901) 12,808. It is pleasantly situated on a gentle eminence near the confluence of the upper branches of the river Stour. It has a fine Perpendicular church dedicated to St Mary, with a lofty, well-proportioned tower and many interesting monuments. The grammar school was founded by Sir Norman Knatchbull in the reign of Charles I. Ashford has agricultural implement works and breweries; and the large locomotive and carriage works of the South-Eastern & Chatham railway are here. At Bethersden, between Ashford and Tenterden, marble quarries were formerly worked extensively, supplying material to the cathedrals of Canterbury and Rochester, and to many local churches. At Charing, north-west of Ashford, the archbishops of Canterbury had a residence from pre-Conquest times, and ruins of a palace, mainly of the Decorated period, remain. On the south-eastern outskirts of Ashford is the populous village of Willesborough (3602).

Ashford (Esselesford, Asshatisforde, Essheford) was held at the time of the Domesday survey by Hugh de Montfort, who came to England with William the Conqueror. A Saturday market and an annual fair were granted to the lord of the manor by Henry III. in 1243. Further annual fairs were granted by Edward III. in 1349 and by Edward IV. in 1466. In 1672 Charles II. granted a market on every second Tuesday, with a court of pie-powder. James I. in 1607, at the petition of the inhabitants of Ashford, gave Sir John Smith, Kt., the right of holding a court of record in the town on every third Tuesday. The fertility of the pasture-land in Romney Marsh to the south and east of Ashford caused the cattle trade to increase in the latter half of the 1 8th century, and led to the establishment of a stock market in 1784. The town has never been incorporated.

See Edward Hasted, History and Survey of Kent (Canterbury, 1778-1799, 2nd ed. 1797-1801); Victoria County History — Kent.

'ASHI (352-427), Jewish 'amora, the first editor of the Talmud, was born at Babylon. He was head of the Sura Academy, and there began the Babylonian Talmud, spending thirty years of his life at it. He left the work incomplete, and it was finished by his disciple Rabina just before the year 500 a.d. (See Talmud.)

ASHINGTON, an urban district in the Wansbeck parliamentary division of Northumberland, England, 4 m. E. of Morpeth, on the Newbiggin branch of the North Eastern railway. Pop. (1901) 13,956. The district, especially along the river Wansbeck, is not without beauty, but there are numerous collieries, from the existence of which springs the modern growth of Ashington. At Bothal on the river (from which parish that of Ashington was formed) is the castle originally belonging to the Bertram family, of which Roger Bertram probably built the gatehouse, the only habitable portion

remaining, in the reign of Edward III. The ruins of the castle are fragmentary, but of considerable extent. The church of St Andrew here has interesting details from Early English to Perpendicular date, and in the neighbouring woods is a ruined chapel of St Mary. The mining centre of Ashington lies 2 m. north-east, on the high ground north of the Wansbeck.

'ASHKENAZI, SEBI (1656-1718), known as Hakham Sebi, for some time rabbi of Amsterdam, was a resolute opponent of the followers of the pseudo-Messiah, Sabbatai Sebi (q.v.). He had a chequered career, owing to his independence of character. He visited many lands, including England, where he wielded much influence. His Responsa are held in high esteem.

ASHLAND, a city of Boyd county, Kentucky, U.S.A., on the Ohio river, about 130 m. E. by N. of Frankfort. Pop. (1890) 4195; (1900) 6800 (489 negroes); (1910) 8688. It is served by the Chesapeake & Ohio (being a terminal of the Lexington and Big Sandy Divisions) and the Norfolk & Western railways, and is connected with Huntington, West Virginia, by an electric line. The city has a fine natural park (Central Park) of about 30 acres; and Clyffeside Park (maintained by a private corporation), of about 75 acres, just east of the city, is a pleasure resort and a meeting-ground (with a casino seating 3000 people) for the Tri-State " Chautauqua " (for certain parts of Kentucky, Ohio and West Virginia). The surrounding country abounds in coal,

iron ore, oil, clay, stone and timber, for which the city is a distributing centre. Ashland has considerable river traffic, and various manufactures, including pig iron, nails, wire rods, steel billets, sheet steel, dressed lumber (especially poplar), furniture, fire brick and leather. Ashland was settled in 1854, and was chartered as a city in 1870.

ASHLAND, a borough of Schuylkill county, Pennsylvania, U.S.A., about 50 m. N.E. of Harrisburg and about 100 m. N.W. of Philadelphia. Pop. (1890) 7346; (1900) 6438 (969 foreign- born); (19 10) 6855. It is served by the Lehigh Valley and the Philadelphia & Reading railways, and by the electric lines of the Schuylkill Railway Company and the Shamokin & Mount Carmel Transit Company. The borough is built on the slope of Locust Mountain, about 885 ft. above sea-level. Its chief industry is the mining of anthracite coal at several collieries in the vicinity; and at Fountain Springs, 1 m. south-east, is a state hospital for injured persons of the Anthracite Coal Region of Pennsylvania, opened in 1883. The municipality owns and operates the waterworks. Ashland was laid out as a town in 1847, and was named in honour of Henry Clay's home at Lexington, Ky. ; in 1857 it was incorporated.

ASHLAND, a village of Hanover county, Virginia, U.S.A., 17 m. N.W. of

Richmond. Pop. (1900) 1147; (1910) 1324. It is served by the Richmond, Fredericksburg & Potomac railway, and is a favourite resort from Richmond. Here is situated the Randolph-Macon College (Methodist Episcopal, South), one of the oldest Methodist Episcopal colleges in the United States. In 1832, two years after receiving its charter, it opened near Boydton, Mecklenburg county, Virginia, and in 1868 was removed to Ashland. The college in 1907-1908 had 150 students and a faculty of 16; it publishes an endowed historical series called The John P. Branch Historical Papers of Randolph-Macon College; and it is a part of the " Randolph- Macon System of Colleges and Academies," which includes, besides, Randolph-Macon Academy (1890) at Bedford City, Virginia, and Randolph-Macon Academy (1892) at Front Royal, Virginia, both for boys; Randolph-Macon Woman's College (1893) at Lynchburg, Virginia, which in 1907-1908 had an enrolment of 390; and Randolph-Macon Institute, for girls, Danville, Virginia, which was admitted into the " System " in 1897. These five institutions are under the control of a single board of trustees; the work of the preparatory schools is thus correlated with that of the colleges. About 7 m. out of Ashland is the birthplace of Henry Clay, and about 15 m. distant is the birthplace of Patrick Henry. Ashland was settled in 1845 and was incorporated in 1856.

ASHLAND, a city and the county-seat of Ashland county, Wisconsin, U.S.A., situated about 315 m. N.W. of Milwaukee, and about 70 m. E. of Superior and Duluth, in the N. part of the state, at the head of Chequamegon Bay, an arm of Lake Superior. Pop. (1890) 9956; (1900) 13,074, of whom 4417 were foreign-born; (1910, census) 11,594. It is served by the Chicago & North- Western, the Northern Pacific, the Chicago, St Paul, Minneapolis & Omaha, and the Wisconsin Central railways, and by several steamboat lines on the Great Lakes. The city is attractively situated, has a dry, healthful climate, and is a summer resort. It has a fine Federal building, one of the best high-school buildings in Wisconsin, the Vaughn public library (1895), a Roman Catholic hospital, and the Rinehart hospital, and is the seat of the Northland College and Academy (Congregational). Ashland has an excellent harbour, has large iron-ore and coal docks, and is the principal port for the shipment of iron ore from the rich Gogebic Range, the annual ore ship- ment approximating 3,500,000 tons, valued at $12,000,000, and it has also an extensive export trade in lumber. Brownstone quarried in the vicinity is also an important export. The lake trade amounts to more than $35,000,000 annually. Ashland has large saw-mills, iron and steel rolling mills, foundries and machine shops, railway repair shops (of the Chicago & North- western railway), knitting works, and manufactories of dynamite, sulphite fibre, charcoal and wood-alcohol. In 1905 its total factory product was valued at $4,210,265. Settled

about 1854, Ashland was incorporated as a village in 1863 and received a city charter in 1887.

ASHLAR, also written Ashler, Ashelere, &c. (probably from Lat. axilla, diminutive of axis, an axle), hewn or squared stone, generally applied to that used for facing walls. In a contract of date 1398 we read — " Murus erit exterius de puro lapide vocato achilar, plane incisso, interius vero de lapide fracto vocato roghwall." " Clene hewen ashler " often occurs in medi- eval documents; this no doubt means tooled or finely worked, in contradistinction to rough-axed faces.

An " ashlar piece " in building is an upright piece of timber framed between the common rafters and the wall plate.

ASHLEY, WILLIAM JAMES (i860-), English economist, was born in London on the 25th of February i860. He was educated at St Olave's grammar school and Balliol College, Oxford, and became a fellow of Lincoln College. In 1888 he was appointed professor of political economy and constitutional history in Toronto University, a post which he resigned in 1802, in order to become professor of economic history at Harvard University. In 1901 he was appointed professor of commerce and finance in Birmingham University and in 1902 dean of the faculty of commerce. Professor Ashley became well known for his work on the early history of English industry, and for his prominence among those English economists who supported Mr Chamberlain's tariff reform movement. His most important works are Early History of the English Woollen Industry (1887); Introduction to English Economic History and Theory (2 parts, 1888-1893); Surveys, Historic and Economic (1900); Adjustment of Wages (1903); the Tariff Problem (2nd ed. 1904); Progress of the German Working Classes (1904).

ASHMOLE. ELIAS (1617-1692), English antiquarian, and founder of the Ashmolean Museum at Oxford, was born at Lichfield on the 23rd of May 1617, the son of a saddler. In 1638 he became a solicitor, and in 1644 was appointed commissioner of excise. At Oxford, whither this brought him when the Royalist Parliament was sitting there, he made friends with Captain (afterwards Sir) George Wharton, through whose influence he obtained the 'king's commission as captain of horse and comptroller of the ordnance. In 1646 he was initiated as a Freemason — the first gentleman, or amateur, to be " accepted." In 1649 he married Lady Mainwaring, some twenty years his senior and a relative of his first wife who had died eight

years before. This marriage placed him in a position of affluence that enabled him to devote his whole time to his favourite studies. His interest in astrology, aroused by Wharton, and by William Lilly, — whom with other astrologers he met in London in 1646, — seems, in the following years, to have subsided in favour of heraldry and antiquarian research. In 1657 his wife petitioned for a separation, but failing to gain her case returned to live with him. Between this crisis in his domestic life and the time of her death in 1668, Ashmole was in high favour at court. He was made successively Windsor herald, commissioner, comptroller and accountant-general of excise, commissioner for Surinam and comptroller of the White Office. He afterwards refused the office of Garter king-at-arms in favour of Sir William Dugdale, whose daughter he had married in 1668. In 1672 he published his Institutions, Laws and Ceremonies of the Order of the Garter, a work which was practically exhaustive, and is an example of his diligence and years of patient antiquarian research. Five years later he presented the Ashmolean Museum, the first public museum of curiosities in the kingdom, the larger part of which he had inherited from a friend, John Tradescant, to the university of Oxford. He made it a condition that a suitable building should be erected for its reception, and the collection was not finally installed until 1683. Subsequently he made the further gift to the university of his library. He died on the 18th of May 1692.

ASHRAF (Shtjrefa, Sherifs), a small scattered tribe of African " Arabs " settled near Tokar, in the valleys of the Gash and Baraka, and in the Amarar country north of Suakin, They call themselves Beni Hashin, and claim descent from Mahomet; hence their name, sherif (plural ashraf) being the title applied to

descendants of the prophet. In the time of the khalifa Abdulla (1885-1898), Ashraf was the name by which the family and adherents of his late master the mahdi were known, the mahdi's family claiming to be Ashraf. The Ashraf of Tokar remained loyal to Egypt during the Sudan troubles.

See Anglo-Egyptian Sudan, edited by Count Gieichen (London, 1905) ; Fire and Sword in the Sudan, by Slatin Pasha (London, 1896) ; for the Ashraf or Sherifs in Arabia, see Arabia : Geography.

ASHREF, a town of Persia in the province of Mazandaran, about 50 m. W. of Astarabad and 5 m. inland from the Caspian Sea, in 36 42′ N. and 53° 32′ E. The population is about 6000, comprising descendants of some Georgians introduced by Shah Abbas I. (1587-1629) and a number of Gudars, a peculiar pariah race, probably of Indian origin. The place was without import- ance until 161 2, when Shah Abbas began building and laying out the palaces and gardens in the neighbourhood now col- lectively

known as Bagh i Shah (the garden of the shah). The palaces, completed in 1627, are now in ruins, but the gardens with their luxuriant vegetation and gigantic cypress and orange trees are well worth a visit. There were originally six separate gardens, all contained within one large wall but separated one from another by high walls. The principal palace was the Chehel Situn (forty pillars), destroyed by the Afghans in 1723, and, although rebuilt by Nadir Shah in 173 1, already in ruins in 1743. About I m. north of the town is the Safi-abad garden, with a palace built by Shah Sari (1629-1642) for his daughter. It is situated on a lovely wooded hill, and was repaired and in part renovated about 1870 by Nasiru'd-Din Shah.

ASHTABULA, a city of Ashtabula county, Ohio, U.S.A., in Ashtabula township, on the Ashtabula river and Lake Erie, and 54 m. N.E. of Cleveland. Pop. (1890) 8338; (1900) 12,949, of whom 3688 were foreign-born; (1910, census) 18,266. There is a large Finnish-born population in the city and in Ash- tabula county, and the Amerikan Sanomat, established here in 1897, is one of the most widely read Finnish weeklies in the country. Ashtabula is served by the Pennsylvania, the Lake Shore & Michigan Southern, and the New York, Chicago & St Louis railways, and by inter-urban electric lines. The city is built on the high bank of the river about 75 ft. above the lake,' and commands good views of diversified scenery. There is a public library. Ashtabula has an excellent harbour, to and from which large quantities of iron ore and coal are shipped. More iron ore is received at this port annually than at any other port in the country, or, probably, in the world; the ore is shipped thence by rail to Pittsburg, Youngstown and other iron manu- facturing centres. In 1907 the port received 7,542,149 gross tons of iron ore, and shipped 2,632,027 net tons of soft coal. Among the city's manufactures are leather, worsted goods, agricultural implements, and foundry and machine shop products; in 1905 the total value of the factory product was $1,895,454, an increase of 114-3 % in five years. There are large green-houses in and near Ashtabula, and quantities of lettuce, cucumbers and tomatoes are raised under glass and shipped to Pittsburg and other large cities. The first settlement here was made about 1801. Ashtabula township was created in 1808, and from it the townships of Kingsville, Plymouth and Sheffield have sub- sequently been formed. The village of Ashtabula was incor- porated in 1831, and received a city charter in 1891. The name Ashtabula is an Indian word first applied to the river and said to mean " fish river."

ASHTON-IN-MAKERFIELD, an urban district in the Newton parliamentary division of Lancashire, England, 4 m. S. of Wigan, on the Great Central railway. Pop. (1901) 18,687. The district is rich in minerals, and has large collieries, and a colliery com- pany's institute; iron goods are manufactured.

ASHTON-UNDER-LYNE, a market-town and municipal and parliamentary borough of Lancashire, England, on the river Tame, a tributary of the Mersey, 185 m. N.W. by N. from London and 65 E. from Manchester. Area, 1346 acres. Pop. (1891) 40,486; (1901) 43,890. It is served by the London & North- western and the Lancashire & Yorkshire railways (Charles- town station), and by the Great Central (Park Parade station).

The church of St Michael is Perpendicular, but almost wholly rebuilt. In the vicinity are barracks. The Old Hall, or manor house of the Asshetons, remains in an altered form, with an ancient prison adjoining, and the name of Gallows Meadow, still preserved, recalls the summary execution of justice by the lords of the manor. In the vicinity of Ashton a few picturesque old houses remain among the numerous modern residences. Stam- ford Park, presented by Lord Stamford, is shared by the towns of Ashton and Stalybridge, which extends across the Tame into Cheshire. A technical school, school of art and free library, and several hospitals are maintained. Chief among industries are cotton-spinning, hat-making and iron-founding and machinery works; and there are large collieries in the neighbourhood. The parliamentary borough, which returns one member, extends into Cheshire. The corporation consists of a mayor, 8 aldermen and 24 councillors.

The derivation from the Saxon cesc (ash) and tun (an enclosed place) accounts for the earliest orthography Estun. The addition subtus lineam is found in ancient deeds and is due to the -position of the place below the line or boundary of Cheshire, which once formed the frontier between the kingdoms of Northumbria and Mercia. The manor was granted to Roger de Poictou by William I., but before the end of his reign came to the Greslets as part of the barony of Manchester. It was held by the Asshetons from 1335 to 1515, when it passed by marriage to the Booths of Dunham Massey, and is now held by the earl of Stamford, the representative of that family. The lord of the manor still holds the ancient court-leet and court-baron half- yearly in May and November, in which cognizance is taken of breaches of agreement among the tenants, especially concerning the repair of roads and cultivation of lands. The place had long enjoyed 4he name of borough, but it was not till 1847 that a charter of incorporation was granted. Under the Reform Act (1832) it returns one member. One of the markets dates back to 1436. The ancient industry was woollen, but soon after the invention of the spinning frame the cotton trade was introduced, and as early as 1769 the weaving of ginghams, nankeens and calicoes was carried on, and the weaving of cotton yarn by machinery soon became the

staple industry. A chapel or church existed here as early as 1 261-1262.

ASH WEDNESDAY, in the Western Church, the first day of Lent (q.v.), so called from the ceremonial.use of ashes, as a symbol of penitence, in the service prescribed for the day. The custom, which is ultimately based on the penance of " sackcloth and ashes " spoken of by the prophets of the Old Testament, has been dropped in those of the reformed Churches which still observe the fast; but it is retained in the Roman Catholic Church, the day being known as dies cinerum (day of ashes) or dies cineris et cilicii (day of ash and sackcloth). The ashes, obtained by burning the palms or their substitutes used in the ceremonial of the previous Palm Sunday, are placed in a vessel on the altar before High Mass. The priest, vested in a violet cope, prays that God may send His angel to hallow the ash, that it become a remedium salubre for all penitents. After another prayer the ashes are thrice sprinkled with holy water and thrice censed. Then the priest invites those present to approach and, dipping his thumb in the ashes, marks them as they kneel with the sign of the cross on the forehead (or in the case of clerics on the place of tonsure), with the words: Memento, homo, quia pulvis es et in puherem reverteris (Remember, man, that thou art dust and unto dust thou shalt return). The celebrant himself either sprinkles the ash on his own head in silence, or receives it from the priest of highest dignity present.

This ceremony is derived from the custom of public penance in the early Church, when the sinner to be reconciled had to appear in the congregation clad in sackcloth and covered with ashes (cf. Tertullian, De Pudicitia, 13). At what date this use was extended to the whole congregation is not known. The phrase dies cinerum appears in the earliest extant copies of the Gregorian Sacramentary, and it is probable that the custom was already established by the 8th century. The Anglo-Saxon homilist ˆElfric, in his Lives of the Saints (996 or 997), refers to

it as in common use; but the earliest evidence of its authori- tative prescription is a decree of the synod of Beneventum in

1091.

Of the reformed Churches the Anglican Church alone marks the day by any special service. This is known as the Commina- tion service, its distinctive element being the solemn reading of

the general sentences of God's cursing against sinners, gathered out of the seven and twentieth chapter of Deuteronomy, and other places of Scripture." The lections for the day are the same as in the Roman Church (Joel ii. 12, &c, and Matt. vi. 16, &c). In the American Prayer Book the

office of Commination is omitted, with the exception of the three concluding prayers, which are derived from the prayers and anthems said or sung during the blessing and distribution of the ashes according to the Sarum Missal. The ceremonial of the ashes was not pro- scribed in England at the Reformation; it was indeed enjoined by a proclamation of Henry VIII. (February 26, 1538) and again in 1550 under Edward VI.; but it had fallen into complete disuse by the beginning of the 17 th century.

See Wetzer and Welte, Kirchenlexikon, and Herzog-Hauck, Realencyklopadie (3rd ed.), s. " Aschermittwoch" ; L. Duchesne, Christian Worship, trans, by M. L. McClure (London, 1904).

ASHWELL, LENA (1872-), English actress, was the daughter of Commander Pocock, R.N. In 1896 she married the actor Arthur Play fair, whom she divorced in 1908; later in the latter year she married Dr Simson. In 1895 she played Elaine in Sir Henry Irving's production of King Arthur at the Lyceum, and again acted with him in 1903 in Dante. She made her first striking success, however, on the London stage in Mrs Dane's Defence with Sir Charles Wyndham in 1900, and a few years later her acting in Leah Kleschna confirmed her position as one of the leading actresses in London. In 1907 she started under her own management at the Kingsway theatre.

ASIA, the name of one of the great continents into which the earth's surface is divided, embracing the north-eastern portion of the great mass of land which constitutes what is generally known as the Old World, of which Europe forms the north- western and Africa the south-western region.

Much doubt attaches to the origin of the name. Some of the earliest Greek geographers divided their known world into two portions only, Europe and Asia, in which last Libya (the Greek name for Africa) was included. Herodotus, who ranks Libya as one of the chief divisions of the world, separating it from Asia, repudiates as fables the ordinary explanations assigned to the names Europe and Asia, but confesses his inability to say whence they came. It would appear probable, however, that the former of these words was derived from an Assyrian or Hebrew root, which signifies the west or setting sun, and the latter from a corresponding root meaning the east or rising sun, and that they were used at one time to imply the west and the east. There is ground also for supposing that they may at first have been used with a specific or restricted local application, a more extended signification having eventually been given to them. After the word Asia had acquired its larger sense, it was still specially used by the Greeks to designate the country around Ephesus. The idea of Asia as originally formed was necessarily indefinite, and long continued to be so; and the area to which the name was finally applied, as geographical knowledge

increased, was to a great extent determined by arbitrary and not very precise conceptions, rather than on the basis of natural relations and differences subsisting between it and the surrounding regions.

Geography

The northern boundary of Asia is formed by the Arctic Ocean; the coast-line falls between 70 and 75° N., and so lies within the Arctic circle, having its extreme northern point in Cape Sivero-Vostochnyi {i.e. north-east) ar ies. ‘ or Chelyuskin, in 78 N. On the south the coast-line is far more irregular, the Arabian Sea, the Bay of Bengal, and the China Sea reaching about to the northern tropic at the mouths of the Indus, of the Ganges and of the Canton river;

while the great peninsulas of Arabia, Hindostan and Cambodia descend to about 10° N., and the Malay peninsula extends within a degree and a half of the equator. On the west the extreme point of Asia is found on the shore of the Mediterranean, at Cape Baba, in 26° E., nor far from the Dardanelles. Thence the boundary passes in the one direction through the Mediter- ranean, and down the Red Sea to the southern point of Arabia, at the strait of Bab-el-Mandeb, in 45 E.; and in the other through the Black Sea, and along the range of Caucasus, following approximately 40 N. to the Caspian, whence it turns to the north on a line not far from the 60th meridian, along the Ural Mountains, and meets the Arctic Ocean nearly opposite the island of Novaya Zemlya. The most easterly point of Asia is East Cape (Vostochnyi, i.e. east, or Dezhnev), in 190 E., at the entrance of Bering Strait. The boundary between this point and the extremity of the Malay Peninsula follows the coast of the Northern Pacific and the China Sea, on a line deeply broken by the projection of the peninsulas of Kamchatka and Korea, and the recession of the Sea of Okhotsk, the Yellow Sea, and the Gulfs of Tongking and Siam.

On the east and south-east of Asia are several important groups of islands, the more southern of which link this continent

to Australia, and to the islands of the Pacific. The Islands. ˆ UT [[C Islands, the Japanese group, Luchu, Formosa and the Philippines, may be regarded as unquestionable outliers of Asia. Between the islands of the Malay archipelago from Sumatra to New Guinea, and the neighbouring Asiatic continent, no definite relations appear ever to have existed, and no

dis tinctly marked boundary for Asia has been established by the old geographers in this quarter. Modern science, however, has indicated a line of physical separation along the channel between Borneo and Celebes, called the Straits of Macassar, which follows approximately 120 E., to the west of which the flora and fauna are essentially Asiatic in their type, while to the south and east the Australian element begins to be distinctly marked, soon to become predominant. To this boundary has been given the name of Wallace's line, after the eminent naturalist, A. R. Wallace, who first indicated its existence.

Owing to the great extent of Asia, it is not easy to obtain a correct conception of the actual form of its outline from ordinary

maps, the distortions which accompany projections of Form of [ar g e spherical areas on a flat surface being necessarily

great and misleading. Turning, therefore, to a globe, Asia, viewed as a whole, will be seen to have the form of a great isosceles spherical triangle, having its north-eastern apex at East Cape (Vostochnyi), in Bering Strait; its two equal sides, in length about a quadrant of the sphere, or 6500 m., extending on the west to the southern point of Arabia, and on the east to the extremity of the Malay peninsula; and the base between these points occupying about 60° of a great circle, or 4500 m., and being deeply indented by the Arabian Sea and the Bay of Bengal on either side of the Indian peninsula. A great circle, drawn through East Cape and the southern point of Arabia, passes nearly along the coast-line of the Arctic Ocean, over the Ural Mountains, through the western part of the Caspian, and nearly along the boundary between Persia and Asiatic Turkey. Asia Minor and the north-western half of Arabia lie outside such a great circle, which otherwise indicates, with fair accuracy, the north-western boundary of Asia. In like manner a great circle drawn through East Cape and the extremity of the Malay peninsula, passes nearly over the coasts of Manchuria, China and Cochin-China, and departs comparatively little from the eastern boundary.

Asia is divided laterally along the parallel of 40° north by a depression which, beginning on the east of the desert of Gobi, extends

westwards through Mongolia to Chinese Turkestan. To General t ˆ e west f Kashgar the central depression is limited by physio- t]j e meridional range of Sarikol and the great elevation graphy. f t ˆ e p am ; ri f which the Sarikol is the eastern face. The level of this depression (once a vast inland sea) between the mountains which enclose the sources of the Hwang-ho and the Sarikol range probably never exceeds 2000 ft. above sea, and modern researches tend to prove that in the central portions of the Gobi

(about Lop Nor) it may be actually below sea-level. A vast pro-

portion of the continent north of this central line is but a few hundred feet in altitude. Shelving gradually upward from the low flats of Siberia the general continental level rises to a great central water- parting, or divide, which stretches from the Black Sea through the Elburz and the Hindu Kush to the Tian-shan mountains in the Pamir region, and hence to Bering Strait on the extreme north-east. This great divide is not always marked by well-defined ranges facing steeply either to the north or south. There are considerable spaces where the strike, or axis, of the main ranges is transverse to the water-parting, which is then represented by intermediate highlands forming lacustrine regions with an indefinite watershed. Only a part of this great continental divide (including such ranges as the Hindu Kush, Tian-shan, Altai or Khangai) rises to any great height, a considerable portion of it being below 5000 ft. in altitude. South of the divide the level at once drops to the central depression of Gobi, which forms a vast interior, almost waterless space, where the local drainage is lost in deserts or swamps. South of this enclosed depression is another great hydrographic barrier which parts it from the low plains of the Amur, of China, Siam and India, bordered by the shallows of the Yellow Sea and the shoals which enclose the islands of Japan and Formosa, all of them once an in- tegral part of the continent. This second barrier is one of the most mighty upheavals in the world, by reason both of its extent and its altitude. Starting from the Amur river and reaching along the eastern margin of the Gobi desert towards the sources of the Hwang- ho, it merges into the Altyn-tagh and the Kuen-lun, forming the northern face of the vast Tibetan highlands which are bounded on the south by the Himalaya. The Pamir highlands between the base of the Tian-shan mountains and the eastern buttresses of the Hindu Kush unite these two great divides, enclosing the Gobi depression on the west ; and they would again be united on the east but for the transverse valley of the Amur, which parts the Khingan mountains from the Yablonoi system to the east of Lake Baikal.

If we consider the whole continent to be divided into three sections, viz. a northern section with an average altitude of less than 5000 ft. above sea, where all the main rivers flow northward to the Mediter- ranean, the Arctic Sea, or the Caspian; a central section of depres- sion, where the drainage is lost in swamps or hamuns, and of which the average level probably does not exceed 2000 ft. above sea; and a southern section divided between highly elevated table-lands from 15,000 to 16,000 ft. in altitude, and lowlands of the Arabian, Indian, Siamese and Chinese peninsulas, with an ocean outlet for its drainage ; we find that there is only one direct connexion between northern and southern sections which involves no mountain passes, and no formidable barrier of altitudes. That one is afforded by the narrow valley of the Hari Rud to the west of Herat. From

the Caspian to Karachi it is possible to pass without encountering any orographic obstacle greater than the divide which separates the valley of the Hari Rud from the Helmund hamun basin, which may be repre- sented by an altitude of about 4000 ft. above sea-level. This fact possesses great significance in connexion with the development of Asiatic railways.

*If we examine the hydrographic basins of the three divisions of Asia thus indicated we find that the northern division, including the drainage falling into the Arctic Sea, the Aralo- Hydro- Caspian depression, or the Mediterranean, embraces an * rap y ‘ area of about 6,394,500 sq. m., as follows: —*

Area of Arctic river basins . ,, Aralo-Caspian basin ,, Mediterranean

Sq. m.

4,367,000

i,759.ooo

268,500

6,394.500

Total The southern division is nearly equal in extent-

Sq. m.

Pacific drainage 3,641,000

Indian Ocean 2,873,000

Total

6,514,000

The interior or inland basins, including the lacustrine regions south of the Arctic watershed, the Gobi depression, Tibetan plateau, the Iranian (or Perso-Afghan) uplands, the Syro-Arabian inland basin, and that of Asia Minor, amount to 3,141,500 sq. m. or about half the extent of the other two.

By far the largest Asiatic river basin is that of the Ob, which exceeds 1,000,000 sq. m. in extent. On the east and south the Amur embraces no less than 776,000 sq. m., the Yang-tsze-kiang including 685,000, the Ganges 409,500, and the Indus 370,000 sq. m. 1

The lakes of Asia are innumerable, and vary in size from an inland sea (such as Lakes Baikal and Balkash) to a highland loch, or the indefinitely extended swamps of Persia. Many of them are at high elevations (Lake Victoria, 13,400 ft., being probably the most ele- vated), and are undoubted vestiges of an ancient period of glaciation. Such lakes, as a rule, show indications of a gradual decrease in size. Others are relics of an earlier geological period, when land areas

1 Authorities differ in their methods and results of computation of these and other similar measurements.

recently upheaved from the sea were spread at low levels with alter- nate inundations of salt and fresh water. Of these LopJNor and the Helmund hamuns are typical. Such lakes (in common with all the plateau hamuns of south-west Baluchistan and Persia) change their form and extent from season to season, and many of them are impregnated with saline deposits from the underlying strata. The kavirs, or salt depressions, of the Persian desert are more frequently widespread deposits of mud and salt than water-covered areas.

Although for the purposes of geographical nomenclature, bound- aries formed by a coast-line — that is, by depressions of the earth's solid crust below the ocean level — are most easily recog- PollUcal n i ze(j am j are f special convenience ; and although such

v s ons. boundaries, from following lines on which the continuity of the land is interrupted, often necessarily indicate important differences in the conditions of adjoining countries, and of their political and physical relations, yet variations of the elevation of the surface above the sea-level frequently produce effects not less marked. The changes of temperature and climate caused by difference of elevation are quite comparable in their magnitude and effect on all organized creatures with those due to differences of latitude ; and the relative position of the high and low lands on the earth's surface, by modify- ing the direction of the winds, the fall of rain, and other atmospheric phenomena, produce effects in no sense less important than those due to the relative distribution of the land and sea. Hence the study of the mountain ranges of a continent is, for a proper apprehension of its physical conditions and characteristics, as essential as the examination of its extent and position in relation to the equator and poles, and the configuration of its coasts.

From such causes the physical conditions of a large part of Asia, and the history of its population, have been very greatly influenced by the occurrence of the mass of mountain above de- y lma ' scribed, which includes the Himalaya and the whole

f ya " d elevated area having true physical connexion with that

oun ary. ran g e| anc j occupies an area about 2000 m. in length and varying from 100 to 500 m. in width, between 65°and ioo°east and between 28 and 35 north. These mountains, which include the highest peaks in the world, rise, along their entire length, far above the line of perpetual snow, and few of the passes across the main ridges are at a less altitude than 15,000 or 16,000 ft. above the sea. Peaks of 20,000 ft. abound along the whole chain, and the points that exceed that elevation are numerous. A mountain range such as this, attaining altitudes at which vegetable life ceases, and the support of animal life is extremely difficult, constitutes an almost impassable barrier against the spread of all forms of living creatures. The mountain mass, moreover, is not less important in causing a com- plete separation between the atmospheric conditions on its opposite flanks, by reason of the extent to which it penetrates that stratum of the atmosphere which is in contact with the earth's surface and is effective in determining climate. The highest summits create serious obstructions to the movements of nearly three-fourths of the mass of the air resting on this part of the earth, and of nearly the whole of the moisture it contains; the average height of the entire chain is such as to make it an almost absolute barrier to one-half of the air and three-fourths of the moisture; while the lower ranges also produce important atmospheric effects, one-fourth of the air and one-half of the watery vapour it carries with it lying below 9000 ft.

This great mass of mountain, constituting as it does a complete natural line of division across a large part of the continent, will form a convenient basis from which to work, in proceeding, as will now be done, to give a general view of the principal countries contained in Asia.

The summit of the great mountain mass is occupied by Tibet, a country known by its inhabitants under the name of Bod or Bodyul. Tib t Tibet is a rugged table-land, narrow as compared with its

e ‘ length, broken up by a succession of mountain ranges,

which follow as a rule the direction of the length of the table-land, and commonly rise into the regions of perpetual snow ; between the flanks of these lie valleys, closely hemmed in, usually narrow, having a very moderate inclination, but at intervals opening out into wide plains, and occupied either by rivers, or frequently by lakes from which there is no outflow and the waters of which are salt.. The eastern termination of Tibet is in the line of snowy mountains which flanks China on the west, between the 27th and 35th parallels of latitude, and about I03°east. On the west the table-land is prolonged beyond the political limits of Tibet, though with much the same physical features, to about 7o”east, beyond which it terminates; and the ranges which are covered with perpetual snow as far west as Samarkand, thence rapidly diminish in height, and terminate in low hills north of Bokhara.

The mean elevation of Tibet may be taken as 15,000 ft. above the sea. The broad mountainous slope by which it is connected with the lower levels of Hindostan contains the ranges known as the Himalaya; the name Kuen-lun is generally applied to the northern slope that descends to the central plains of the Gobi, though these mountains are not locally known under those names, Kuen-lun being apparently a Chinese designation.

The extreme rigour of the climate of Tibet, which combines great cold with great drought, makes the country essentially very poor, and the chief portion of it little better than desert. The vegetation

British India.

is everywhere most scanty, and scarcely anything deserving the name of a tree is to be found unless in the more sheltered spots, and then artificially planted. The population in the lower and warmer valleys live in houses, and follow agriculture ; in the higher regions they are nomadic shepherds, thinly scattered over a large area.

China lies between the eastern flank of the Tibetan plateau and the North Pacific, having its northern and southern limits about on 40 and 20 N.

*respectively. The country, though generally broken up with mountains of moderate elevation, (*hlna. possesses none of very great importance apart from those of its western border. It is well watered, populous, and, as a rule, highly cultivated, fertile, and well wooded; the climate is analogous to that of southern Europe, with hot summers, and winters everywhere cold and in the north decidedly severe.*

*From the eastern extremity of the Tibetan mountains, between the 95th and 100th meridians, high ranges extend from about 35° N. in a southerly direction, which, spreading outwards as they go south, reach the sea at various points in Cochin- ˆL. China, the Malay peninsula, and the east flank of Bengal. &"«•«** Between these ranges, which are probably permanently re g»n. snowy to about 27 N., flow the great rivers of the Indo-Chinese peninsula, the Mekong, the Menam, the Salween, and the Irrawaddy, the valleys of which form the main portions of the states of Cochin- China (including Tongking and Cambodia), of Siam (including Laos) and of Burma. The people of Cochin-China are called Anam ; it is probably from a corruption of their name for the capital of Tong- king, Kechao, that the Portuguese Cochin has been derived. All these countries are well watered, populous and fertile, with a climate very similar to that of eastern Bengal. The geography of the region in which the mountains of Cochin-China and Siam join Tibet is still imperfectly known, but there is no ground left for doubt- ing that the great river of eastern Tibet, the Tsanpo, supplies the main stream of the Brahmaputra. The two great rivers of China, the Hwang-ho and the Yang-tsze-kiang take their rise from the eastern face of Tibet, the former from the north-east angle, the latter from the south-east. The main stream of this last is called Dichu in Tibet, and its chief feeder is the Ya-lung-kiang, which rises not far frpm the Hwang-ho, and is considered the territorial boundary between China and Tibet.*

British India comprises approximately the area between the 95th and 70th meridians, and between the Tibetan table-land and the Indian Ocean. The Indian peninsula from 25 N. south- wards is a table-land, having its greatest elevation on the west, where the highest points rise to over 8000 ft., though the ordinary altitude of the higher hills hardly exceeds 4000 ft. ; the general level of the table-land lies between 3000 ft. as a maximum and 1000 ft.

From the delta of the Ganges and Brahmaputra on the east to that of the Indus on the west, and intervening between the table- land of the peninsula and the foot of the Himalayan slope of the Tibetan plateau, lies the great plain of northern India, which rises at its highest point to about 1000 ft., and includes altogether, with its prolongation up the valley of Assam, an area of about 500,000 sq. m., comprising the richest, the most populous and most civilized districts of India. The great plain extends, with an

almost unbroken surface, from the most western to the most eastern extremity of British India, and is composed of deposits so finely comminuted, that it is no exaggeration to say that it is possible to go from the Bay of Bengal up the Ganges, through the Punjab, and down the Indus again to the sea, over a distance of 2000 m. and more, without finding a pebble, however small.

The great rivers of northern India — the Ganges, the Brahma- putra and the Indus — all derive their waters from the Tibetan mountain mass; and it is a remarkable circumstance that the northern water-parting of India should lie to the north of the Hima- laya in the regions of central Tibet.

The population of India is very large, some of its districts being among the most densely peopled in the world. The country is generally well cleared, and forests are, as a rule, found only along the flanks of the mountains, where the fall of rain is most abundant. The more open parts are highly cultivated, and large cities abound. The climate is generally such as to secure the population the neces- saries of life without severe labour; the extremes of heat and drought are such as to render the land unsuitable for pasture, and the people everywhere subsist by cultivation of the soil or commerce, and live in settled villages or towns.

The island of Ceylon is distinguished from the neighbouring parts of British India by little more than its separate administration and the Buddhistic religion of its population. The highest point in Ceylon rises to about 9000 ft. above the sea, and the mountain slopes are densely covered with forest. The lower levels are in climate and cultivation quite similar to the regions in the same latitude on the Malay peninsula.

Of the islands in the Bay of Bengal the Nicobar and Andaman groups are alone worth notice. They are placed on a line joining the north end of Sumatra and Cape Negrais, the south-western extremity of Burma. They possibly owe their existence to th& volcanic agencies which are known to extend from Sumatra across this part of the Indian Ocean.

The Laccadives and Maldives are groups of small coral islands,

situated along the 73rd meridian, at no great distance from the Indian peninsula, on which they have a political dependency.

The portion of Asia west of British India, excluding Arabia and Syria, forms another extensive plateau covering an area as large The as tnat °ˆ Tibet, though at a much lower altitude. Its

Nearer southern border runs along the Arabian Sea, the Persian gˆ Gulf, the Tigris, and thence westward to the north-east

angle of the Levant; on the north the high land follows nearly 36 N. to the southern shore of the Caspian, and thence to the Black Sea and Sea of Marmora. Afghanistan, Baluchistan, Iran or Persia, Armenia and the provinces of Asia Minor occupy this high region, with which they are nearly conterminous. The eastern flank of this tableland follows a line of hills drawn a short distance from the Indus, between the mouth of that river and the Himalaya, about on the 72nd meridian; these hills do not generally exceed 4000 or 5000 ft. in elevation, but a few of the summits reach 10,000 ft. or more. The southern and south-western face follows the coast closely up the Persian Gulf from the mouth of the Indus, and is formed farther west by the mountain scarp, which, rising in many points to 10,000 ft., flanks the Tigris and the Mesopotamian plains, and extends along Kurdistan and Armenia nearly to the 40th meridian; beyond which it turns along the Taurus range, and the north – eastern angle of the Mediterranean. The north – eastern portion of the Afghan tableland abuts on the Himalaya and Tibet, with which it forms a continuous mass of mountain between the 71st and 72nd meridians, and 34 ° and 36 N. From the point of intersection of the 71st meridian with the 36th parallel of latitude, an unbroken range of mountain stretches on one side towards the north-east, up to the crest of the northern slope of the Tibetan plateau, and on the other nearly due west as far as the Caspian. The north-eastern portion of this range is of great altitude, and separates the headwaters of the Oxus, which run off to the Aral Sea, from those of the Indus and its Kabul tributary, which, uniting below Peshawar, are thence discharged southward into the Arabian Sea. The western part of the range, which received the name of Paropamisus Mons from the ancients, diminishes in height west of the 65th meridian and constitutes the northern face of the Afghan and Persian plateau, rising abruptly from the plains of the Turkoman desert, which lies between the Oxus and the Caspian. These moun- tains at some points attain a height of 10,000 or 12,000 ft. Along the south coast of the Caspian this line of elevation is prolonged as the Elburz range(not to be confused with the Elburz of the Caucasus), and has its culminating point in Demavend, which rises to 19,400 ft. above the sea; thence it extends to the north-west to Ararat, which rises to upwards of 17,000 ft., from the vicinity of which the Euph- rates flows off to the south-west, across the high lands of Armenia. Below the north-east declivity of this range lies Georgia, on the other side of which province rises the Caucasus, the boundary of Asia and Europe between the Caspian and

Black Seas, the highest points of which reach an elevation of nearly 19,000 ft. West of Ararat high hills extend along the Black Sea, between which and the Taurus range lies the plateau of Asia Minor, reaching to the Aegean Sea; the mountains along the Black Sea, on which are the Olympus and Ida of the ancients, rise to 6000 or 7000 ft. ; the Taurus is more lofty, reaching 8000 and 10,000 ft. ; both ranges decline in altitude as they approach the Mediterranean.

This great plateau, extending from the Mediterranean to the Indus, has a length of about 2500 m. from east to west, and a breadth of upwards of 600 m. on the west and nowhere of less than 250 m. It lies generally at altitudes between 2000 ft. and 8000 ft. above the sea-level. Viewed as a whole, the eastern half of this region, comprising Persia, Afghanistan and Baluchistan, is poor and un- productive. The climate is very severe in the winter and extremely hot in summer. The rainfall is very scanty, and running waters \re hardly known, excepting among the mountains which form the •carps of the elevated country. The population is sparse, frequently nomadic and addicted to plunder; progress in the arts and habits of civilization is small. The western part of the area falls within the Turkish empire. Its climate is less hot and arid, its natural productiveness much greater, and its population more settled and on the whole more advanced?

The peninsula of Arabia, with Syria, its continuation to the north- west, has some of the characteristics of the hottest and driest parts Arabia. °^ P ers ‘ a an d Baluchistan. Excepting the northern part of this tract, which is conterminous with the plain of Mesopotamia (which at its highest point reaches an elevation of about 700 ft. above the sea), the country is covered with low mountains, rising to 3000 or 4000 ft. in altitude, having among them narrow valleys in which the vegetation is scanty, with exceptional regions of greater fertility in the neighbourhood of the coasts, where the rainfall is greatest. In northern Syria the mountains of Lebanon rise to about 10,000 ft., and with a more copious water supply the country becomes more productive. The whole tract, excepting south-eastern Arabia, is nominally subject to Turkey, but the people are to no small extent practically independent, living a nomadic, pastoral and freebooting life under petty chiefs, in the more arid districts, but settled in towns in the more fertile tracts, where agricul- ture becomes more profitable and external commerce is established.

The area between the northern border of the Persian high lands and the Caspian and Aral Seas is a nearly desert low-lying plain,

II. 24

extending to the foot of the north – western extremity of the great Tibeto-

Himalayan mountains, and prolonged east- T ward up the valleys of the Oxus (Amu-Darya) and Qasolan Jaxartes (Syr-Darya), and northward across the country re j£ a a „ a of the Kirghiz to the south-western border of Siberia, g^^,/ It includes Bokhara, Khiva and Turkestan proper, in ,t s / a- which the Uzbeg Turks are dominant, and for the most part is inhabited by nomadic tribes, who are marauders, enjoying the reputation of being the worst among a race of professed robbers. The tribes to the north, subject to Russia, are naturally more peace- able, and have been brought into some degree of discipline. In this tract the rainfall is nowhere sufficient for the purposes of agriculture, which is only possible by help of irrigation; and the fixed popula- tion (which contains a non-Turkish element) is comparatively small, and restricted to the towns and the districts near the rivers.

The north-western extremity of the elevated Tibeto-Himalayan mountain plateau is situated about on 73° E. and 39° N. This region is known as Pamir ; it has all the characteristics of the highest regions of Tibet, and so far fitly receives the Russian designation of steppe; but it seems to have no special peculiarities, and the reason of its having been so long regarded as a geographical enigma is not obvious. From it the Oxus, or Amu, flows off to the west, and the Jaxartes, or Syr, to the north, through the Turki state of Khokand, while to the east the waters run down past Kashgar to the central desert of the Gobi, uniting with the streams from the northern slope of the Tibetan plateau that traverse the principalities of Yarkand and Khotan, which are also Turki. Here the Tibetan mountains unite with the line of elevation which stretches across the continent from the Pacific, and which separates Siberia from the region commonly spoken of under the name of central Asia.

A range of mountains, called Stanovoi, rising to heights of 4000 or 5000 ft., follows the southern coast of the eastern extremity of Asia from Kamchatka to the borders of Manchuria, as far Man- as the 135th meridian, in lat. 55 N. Thence the Yablonoi churla. range, continuing in the same direction, divides the waters of the river Lena, which flows through Siberia into the Arctic Sea, from those of the river Amur, which falls into the North Pacific; the basin of this river, with its affluents, constitutes Man- churia. From the north of Manchuria the Khingan range stretches southward to the Chinese frontier near Peking, east of which the drainage falls into the Amur and the Yellow Sea, while to the west is an almost rainless region, the inclination of which is towards the central area of the continent, Mongolia.

From the western end of the Yablonoi range, on the 115th meridian, a mountainous belt extends along a somewhat irregular line to the extremity of Pamir, known under various names Mongolia. in its different parts, and broken up into several branches, enclosing among them many isolated

drainage areas, from which there is no outflow, and within which numerous lakes are formed. The most important of these ranges is the Tian-shan or Celestial Mountains, which form the northern boundary of the Gobi desert; they lie between 40 and 43° N., and between 75 and 95 E., and some of the summits are said to exceed 20,000 ft. in altitude ; along the foot of this range are the principal cultivated districts of central Asia, and here too are situated the few towns which have sprung up in this barren and thinly peopled region. Next may be named the Ala-tau, on the prolongation of the Tian-shan, flanking the Syr on the north, and rising to 14,000 or 15,000 ft. It forms the barrier between the Issyk-kul and Balkash lakes, the elevation of which is about 5000 ft. Last is the Altai, near the 50th parallel, rising to 10,000 or 12,000 ft., which separates the waters of the great rivers of western Siberia from those that collect into the lakes of north- west Mongolia, Dzungaria and Kalka. A line of elevation is con- tinued west of the Altai to the Ural Mountains, not rising to con- siderable altitudes; this divides the drainage of south-west Siberia from the great plains lying north-east of the Aral Sea.

The central area bounded on the north and north-west by the Yablonoi Mountains and their western extension in the Tian-shan, on the south by the northern face of the Tibetan plateau, and on the east by the Khingan range before alluded to, forms the great desert of central Asia, known as the Gobi. Itsjeastern part is nearly con- terminous with south Mongolia, its western forms Chinese or eastern Turkestan. It appears likely that no part of this great central Asiatic desert is less than 2000 ft. above the sea-level. The elevation of the plain about Kashgar and Yarkand is from 4000 to 6000 ft. The more northern parts of Mongolia are between 4000 and 6000 ft., and no portion of the route across the desert between the Chinese frontier and Kiakhta is below 3000 ft. The precise positions of the mountain ridges that traverse this central area are not properly known; their elevation is everywhere considerable, and many points are known to exceed 10,000 or 12,000 ft.*

In Mongolia the population is essentially nomadic, its wealth con- sisting in herds of horned cattle, sheep, horses and camels. The Turki tribes, occupying western Mongolia, are among the least civilized of human beings, and it is chiefly to their extreme barbarity and cruelty that our ignorance of central Asia is due. The climate is very severe, with great extremes of heat and cold. The drought is very great; rain falls rarely and in small quantities. The surface is for the most part a hard stony desert, areas of blown sand occurring ‘ but exceptionally. There are few towns or settled villages, except

along the slopes of the higher mountains, on which the rain falls more abundantly, or the melting snow supplies streams for irrigation. It is only in such situations that cultivated lands are found, and beyond them trees are hardly to be seen.

The portion of Asia which lies between the Arctic Ocean and the mountainous belt bounding Manchuria, Mongolia and Turkestan Siberia on tne nort h ‘ s Siberia. It includes an immense high and broken plateau which spreads from south-west to north-east, losing in width and altitude as it advances north-east. it is fringed on either side by high border ridges, which subside on the north-west into a stretch of high plains, 1500 to 2000 ft. high, finally dropping to lowlands a few hundred feet above sea-level. The extremes of heat and cold are very great. The rainfall, though not heavy, is sufficient to maintain such vegetation as is compatible with the conditions of temperature, and the surface is often swampy or peaty. The mountain-sides are commonly clothed with pine forests, and the plains with grasses or shrubs. The population is very scanty ; the cultivated tracts are comparatively small in extent and restricted to the more settled districts. The towns are entirely Russian. The indigenous races are nomadic Mongols, of a peaceful character, but in a very backward state of civilization. The Ural Mountains do not exceed 2000 or 3000 ft. in average altitude, the highest summits not exceeding 6000 ft., and one of the passes being as low as 1400 ft. In the southern half of the range are the chief mining districts of Russia. The Ob, Yenisei and Lena.which traverse Siberia, are among the largest rivers in the world.

The southern group of the Malay Archipelago, from Sumatra to Java and Timor, extends in the arc of a circle between 95 and Mala I2 ?° ‘ anc ‘ f rom 5° to I0 ° S- The central part of the

Archh g rou P ‘ s a volcanic region, many of the volcanoes being

*oelaeo st ’” act ‘ ve > * ne summits frequently rising to 10,000 ft.*

or more.

Sumatra, the largest of the islands, is but thinly peopled; the greater part of the surface is covered with dense forest, the cultivated area being comparatively small, confined to the low lands, and chiefly in the volcanic region near the centre of the island. Java is the most thickly peopled, best cultivated and most advanced island of the whole Eastern archipelago. It has attained a high degree of wealth and prosperity under the Dutch

government. The people are peace- ful and industrious, and chiefly occupied with agriculture. The highest of the volcanic peaks rises to 12,000 ft. above the sea. The eastern islands of this group are less productive and less advanced.

Borneo, the most western and the largest of the northern group of islands which extends between no° and 150° E., as far as New Guinea or Papua, is but little known. The population is small, rude and uncivilized; and the surface is rough and mountainous and generally covered with forest except near the coast, to the alluvial lands on which settlers have been attracted from various surround- ing countries. The highest mountain rises to nearly 14,000 ft., but the ordinary elevations do not exceed 4000 or 5000 ft.

Of Celebes less is known than of Borneo, which it resembles in condition and natural characteristics. The highest known peaks rise to 8000 ft., some of them being volcanic.

New Guinea extends almost to the same meridian as the eastern coast of Australia, from the north point of which it is separated by PaclH- Torres Straits. Very little is known of the interior. The

Islands. mountains are said to rise to 20,000 ft., having the appear- ance of being permanently covered with snow; the surface seems generally to be clothed with thick wood. The inhabitants are of the Negrito type, with curly or crisp and bushy hair; those of the west coast have come more into communication with the traders of other islands and are fairly civilized. Eastward, many of the tribes are barbarous savages.

The Philippine Islands lie between 5° and 20 N., between Borneo and southern China. The highest land does not rise to a greater height than 10,250 ft.; the climate is well suited for agriculture, and the islands generally are fertile and fairly cultivated, though not coming up to the standard of Java either in wealth or population.

Formosa, which is situated under the northern tropic, near the coast |of China, is traversed by a high range of mountains, reaching nearly 13,000 ft. in elevation. On its western side, which is occupied by an immigrant Chinese population, are open and well-cultivated plains' on the east it is mountainous, and occupied by independent indigenous tribes in a less advanced state.

The islands of Japan, not including Sakhalin, of which half is Japanese, lie between the 30th and 45th parallels. The whole group is traversed by a line of volcanic mountains, some of which are in activity, the highest point being about 13,000 ft. above the sea. The country is generally well

watered, fertile and well cultivated. The Japanese people have added to their ancient civilization and their remarkable artistic faculty, an adaptation of Western methods, and a capacity for progress in war and commerce, which single them out among Eastern races as a great modern world-force.

Exploration The progress of geodetic surveys in Russia had long ago extended across the European half of the great empire, St Petersburg being connected with Tiflis on the southern slopes of the Caucasus by a direct system of triangulation carried out with the highest scientific precision. St Petersburg, again, is connected with Greenwich by

European systems of triangulation ; and the Greenwich meridian is adopted by Russia as the zero for all her longitude values. But beyond the eastern shores of the Caspian no system of direct geodetic measurements by first-class triangulation has been possible, and the surveys of Asiatic Russia are separated from those of Europe by the width of that inland sea. The arid nature of the trans-Caspian deserts has proved an insuperable obstacle to those rigorous methods of geodetic survey which distinguish Russian methods in Europe, so that Russian geography in central Asia is dependent on other means than that of direct measurement for the co-ordinate values in latitude and longitude for any given point. The astronomical observatory at Tashkent is adopted for the initial starting-point of the trans-Caspian triangulation of Russia; the triangulation ranks as second-class only, and now extends to the Pamir frontier beyond Osh. The longitude of the Tashkent observatory has been deter- mined by telegraph differentially with Pulkova as follows: —

H. m. s.

In 1875 via Ekaterinburg and Omsk . 2 35 52-151

,, 1891 „ Saratov ,, Orenburg . 2 35 52-228

» 1895 „ Kiev „ Baku . . 2 35 51-997

With these three independent values, all falling within a range of o s -25,

it is improbable that the mean value has an error as large as o s -io.

Exact surveys in Russia, based upon triangulation, extend as far east as Chinese Turkestan in longitude about 75° E. ˆ x i en t / of Greenwich. In India geodetic triangulation furnishes ex actsur- the basis for exact surveys' as far east as the eastern veys !a boundaries of Burma in longitude about 100° E. Asia.

The close of the 19th century witnessed the forging of the final links in the great geodetic triangulation of India, so far as the peninsula is concerned. Further geodetic connexion with the European systems remains to be accomplished. Since 1890 further and more rigorous application of the telegraphic method of deter- mining longitudes differentially with Greenwich has resulted in a slight correction (amounting to about 2″ of arc) to the previous determination by the same method through Suez. This last deter- mination was effected through four arcs as follows : — I. Greenwich — Potsdam. II. Potsdam — Teheran.

III. Teheran — Bushire.

IV. Bushire — Karachi.

Each arc was measured with every precaution and a multitude of observations. The only element of uncertainty was caused by the retardation of the current, which between Potsdam and Teheran (3000 m.) took o s -20 to travel ; but it is probable that the final value can be accepted as correct to within o s -o5.

The final result of this latest determination is to place the Madras observatory 2′ 27″ to the west of the position adopted for it on the strength of absolute astronomical determinations.

But while we have yet to wait for that expansion of principal trian- gulation which will bring Asia into connexion with Europe by the direct process of earth measurement, a topo-

Connexlon between

*graphical connexion has been effected between Russian n assian and Indian surveys which sufficiently proves that the * d deductive methods employed by both countries for the / no y an determination of the co- ordinate values of fixed points so surveys , far agree that, for all practical purposes of future Asiatic cartography, no difficulty in adjustment between Indian and Russian mapping need be apprehended.*

In connexion with the Indian triangulation minor extensions carried out on systems involving more or less irregularity have been pushed outwards on all sides. They reach through Extension Afghanistan and Baluchistan to the eastern districts of f„ eo . Persia, and along the coast of Makran to that of Arabia, graphical They have long ago included the farther mountain surveys. peaks of Nepal, and they now branch outwards towards western China and into Siam. These far extensions furnish the basis for a vast amount of exploratory survey of a strictly geo- graphical character, and they have contributed largely towards raising the standard of accuracy in

Asiatic geographical surveys to a level which was deemed unattainable fifty years ago. There is yet a vast field open in Asia for this class of surveys. While at the close of the 19th century western Asia (exclusive of Arabia) may be said to have been freed from all geographical perplexity, China, Mongolia and eastern Siberia still include enormous areas of which geographical knowledge is in a primitive stage of nebulous uncertainty.

Of scientific geographical exploration in Asia (beyond the limits of actual surveys) the modern period has been so prolific that it is only possible to refer in barest outline to some of the principal / n(/; an expeditions, most of which have been directed either to eX ptorers. the great elevated tableland of Tibet or to the central depression which exists to the north of it. In southern Tibet the trans-Himalayan explorations of the native surveyors attached to the Indian survey, notably Pundits Nain Singh and Krishna, added largely to our knowledge of the great plateau. Nain Singh explored the sources of the Indus and of the Upper Brahmaputra in the years 1 865-1 867; and in 1 874-1 875 he followed a line from the eastern frontiers of Kashmir to the Tengri Nor lake and thence to Lhasa, in which city he remained for some months. Krishna's remarkable journey in 1 879-1 882 extended from Lhasa northwards through

Tsaidam to Sachu, or Saitu, in Mongolia. He subsequently passed through eastern Tibet to the town of Darchendo, or Tachienlu, on the high road between Lhasa and Peking, and on the borders of China. Failing to reach India through Upper Assam he returned to the neighbourhood of Lhasa, and crossed the Himalayas by a more westerly route. Both these explorers visited Lhasa.

In 1871-1873 the great Russian explorer, Nicolai Prjevalsky, crossed the Gobi desert from the north to Kansu in western China. Russian ˆ e nrst defined the geography of Tsaidam, and mapped explorers. the hydrography of that remarkable region, from which emanate the great rivers of China, Siam and Burma. He penetrated southwards to within a month's march of Lhasa. In 1876 he visited the Lop Nor and discovered the Altyn Tagh range. In 1879 he followed up the Urangi river to the Altai Mountains, and demonstrated to the world the extraordinary physical changes which have passed over the heart of the Asiatic continent since Jenghiz Khan massed his vast armies in those provinces. He crossed, and named, the Dzungarian extension of the Gobi desert, and then traversed the Gobi itself from Hami

to Sachu, which became a point of junction between his journeys and those of Krishna. He visited the sources of the Hwang-ho (Yellow river) and the Salween, and then returned to Russia. His fourth journey in 1883-1885 was to Sining (the great trade centre of the Chinese borderland), and thence through northern Tibet (crossing the Altyn Tagh to Lop Nor), and by the Cherchen-Keriya trade route to Khotan. From Khotan he followed the Tarim to Aksu.

Following Prjevalsky the Russian explorers, Pevtsov and Robor- ovski, in 1889-1890 (and again in 1894), added greatly to our know- ledge of the topography of western Chinese Turkestan and the northern borders of Tibet; all these Russian expeditions being con- ducted on scientific principles and yielding results of the highest value. Among other distinguished Russian explorers in Asia, the names of Lessar, Annentkov (who bridged the Trans-Caspian deserts by a railway), P. K. Kozlov and Potanin are conspicuous during the 19th century.

Although the establishment of a lucrative trade between India and central Asia had been the dream of many successive Indian Other viceroys, and much had been done towards improving

explora- tne a PP roacn es to Simla from the north, very little was tions in really known of the highlands of the Pamirs, or of the central regions of the great central depression, before the mission of Asia. Sir Douglas Forsyth to Yarkand in 1870. Robert Barkley

Shaw and George Hayward were the European pioneers of geography into the central dominion of Kashgar, arriving at Yarkand within a few weeks of each other in 1868. Shaw subse- quently accompanied Forsyth's mission in 1870, when Henry Trotter made the first maps of Chinese Turkestan. The next great accession to our knowledge of central Asiatic geography was gained with the , Russo-Afghan Boundary Commission of 1884-1886, when Afghan Turkestan and the Oxus regions were mapped by Colonel Sir T. H. Holdich, Colonel St George Gore and Sir Adelbert Talbot; and when Ney Elias crossed from China through the Pamirs and Badakshan to the camp of the commission, identifying the great " Dragon Lake," Rangkul, on his way. About the same time a mission, under Captain (afterwards Sir Willaim) Lockhart, crossed the Hindu Kush into Wakhan, and returned to India by the Bashgol valley of Kafiristan. This was Colonel Woodthorpe's opportunity, and he was then enabled to verify the results of W. W. M'Nair's previous explorations, and to determine the conformation of the Hindu Kush. In 1885 Arthur Douglas Carey and Andrew Dalgleish, following more or less the tracks of Prjevalsky, contributed much that was new to the map of Asia ; and in 1886 Captain (afterwards Sir Francis) Younghusband completed a most adventurous journey across the heart of

the continent by crossing the Muztagh, the great mountain barrier between China and Kashmir.

It was in 1886-1887 that Pierre G. Bonvalot, accompanied by Prince Henri d'Orleans, crossed the Tibetan plateau from north Tibetan to south, but failed to enter Lhasa. In 1889-1891 the explora- American traveller, W. W. Rockhill, commenced his tions. Tibetan journeys, and also attempted .to reach Lhasa,

without success. By his writings, as much as by his explorations, Rockhill has made his name great in the annals of Asiatic research. In 1891 Hamilton Bower made his famous journey from Leh to Peking. He, too, failed to penetrate the jealously- guarded portals of Lhasa; but he secured (with the assistance of a native surveyor) a splendid addition to our previous Tibetan mapping. In 1891-1892-1893 the gallant French explorer, Dutreuil de Rhins, was in the field of Tibet, where he finally sacrificed his life to his work; and the same years saw George N. (afterwards Lord) Curzon in the Pamirs, and St George Littledale on his first great Tibetan journey, accompanied by his wife. Littledale's first journey ended at Peking; his second, in 1 894-1895, took him almost within sight of the sacred walls of Lhasa, but he failed to pass inside. Great- est among modern Asiatic explorers (if we except Prjevalsky) is the brave Swede, Professor Sven Hedin, whose travels through the deserts of Takla Makan and Tibet, and whose investigations in the glacial regions of the Sarikol mountains, occupied him from 1894 to 1896. His is a truly monumental record. From 1896 to 1898 we find two British cavalry officers taking the front position in the list of Tibetan travellers — Captain M. S. Wellby of the 18th Hussars and Captain

H. Deasy of the 16th Lancers, each striking out a new line, and rendering most valuable service to geography. The latter continued the Pamir triangulation, which had been carried across the Hindu Kush by Colonels Sir T. H. Holdich and R. A. Wahab during the Pamir Boundary Commission of 1895, into the plains of Kashgar and to the sources of the Zarafshan.

Since the beginning of the century the work of Deasy in western Tibet has been well extended by Dr M. A. Stein and Captain C. G. Rawling, who have increased our knowledge of ancient fields of industry and commerce in Turkestan and Tibet. Ellsworth Huntington threw new light on the Tian-shan plateau and the Alai range by his explorations of 1903; and Sven Hedin, between 1899 and 1902, was collecting material in Turkestan and Tibetan fields, and resumed' his journeys in 1905-1908, the result being to revolu- tionize our knowledge of the region north of the upper Tsanpo (see Tibet). The mission of Sir Francis Younghusband to Lhasa in 1904 resulted

in an extension of the Indian system of triangulation which finally determined the geographical position of that city, and in a most valuable reconnaissance of the valleys of the Upper Brahma- putra and Indus by Captains C. H. D. Ryder and C. G. Rawling.

Meanwhile, in the Farther East so rapid has been the progress of geographical research since the first beginnings of investigation into the route connexion between Burma and China in 1874 Chinese (when the brave Augustus Margary lost his life), that a explora- gradually increasing tide of exploration, setting from tions. east to west and back again, has culminated in a flood of inquiring experts intent on economic and commercial develop- ment in China, essaying to unlock those doors to trade which are hereafter to be propped open for the benefit of humanity. Captain William Gill, of the Indian survey, first made his way across China to eastern Tibet and Burma, and subsequently delighted the world with his story of the River of Golden Sand. Then followed another charming writer, E. C. Baber, who, in 1 877-1 878, unravelled the geographic mysteries of the western provinces of the Celestial empire. Mark Bell crossed the continent in 1887 and illustrated its ancient trade routes, following the steps of Archibald Colquhoun, who wandered from Peking to Talifu in 1881. Meanwhile, the acquisition of Burma and the demarcation of boundaries had opened the way to the extension of geographical surveys in directions hitherto untraversed. Woodthorpe was followed into Burmese fields by many others; and amongst the earliest travellers to those mysterious mountains which hide the sources of the Irrawaddy, the Salween and the Mekong, was Prince Henri d'Orleans Burma was rapidly brought under survey; Siam was already in the map making hands of James M'Carthy, whilst Curzon and Warrington Smyth added much to our knowledge of its picturesque coast districts. No more valuable contribution to the illustration of western Chinese configuration has been given to the public than that of C. C. Manifold who explored and mapped the upper basin of the Yang-tsze river between the years 1900 and 1904, whilst our knowledge of the geography of the Russo-Chinese borderland on the north-east has been largely advanced by the operations attending the Russo-Japanese war which terminated in 1905.

Turning our attention westwards, no advance in the progress of scientific geography is more remarkable than that recorded on the northern and north-western frontiers of India. Here there is little matter of exploration. It has rather been a

Indian frontiers —

*wide extension of scientific geographical mapping. The … Afghan war of 1878-80; the Russo-Afghan Boundary y s f a * n * Commission of 1 884-1*

885; the occupation of Gilgit and B a i u lh m Chitral ; the extension of boundaries east and north of j s t an Afghanistan, and again, between Baluchistan and Persia p ers i' a , — these, added to the opportunities afforded by the systematic survey of Baluchistan which has been steadily progress- ing since 1880 — combined to produce a series of geographical maps which extend from the Oxus to the Indus, and from the Indus to the Euphrates.

In these professional labours the Indian surveyors have been assisted by such scientific geographers as General Sir A. Houtum Schindler, Captain H. B. Vaughan and Major Percy M. Sykes in Persia, and by Sir George Robertson and Cockerill in Kafiristan and the Hindu Kush.

In still more western fields of research much additional light has been thrown since 1875 on the physiography of the great deserts and oases of Arabia. The labours of Charles Doughty and Arabia. Wilfrid S. Blunt in northern Arabia in 1877-1878 were followed by those of G. Schwcinf urth and E. Glaser in the south-west about ten years later. In 1 884-1 885 Colonel S. B. Miles made his adventurous journey through Oman, while Theodore Bent threw searchlights backwards into ancient Semitic history by his investi- gations in the Bahrein Islands in 1888 and in Hadramut in 1894- IS95-

In northern Asia it is impossible to follow in detail the results of the organized Russian surveys. The vast steppes and forest-clad mountain regions of Siberia have assumed a new geo- Northern graphical aspect in the light of these revelations, and Asta already promise a new world of economic resources Siberia to Russian enterprise in the near future. A remarkable ,j c _ expedition by Baron Toll in 1892 through the regions watered by the Lena, resulted in the collection of material which

will greatly help to elucidate some of the problems which beset the geological history of the world, proving inter alia the primeval existence of a boreal zone of the J urassic sea round the North role.

In no other period of the world's history, of equal length of time, has so much. scientific enterprise been directed towards the field of

*Asiatic inquiry. The first great result of recent geogra- Oeneral phical research has been to modify pre-existing ideas of J**" .. " _ the orography*

of the vast central region represented by nves ga- Tj^gj. an(j Mongolia. The great highland plateau which

stretches from the Himalaya northwards to Chinese Turkestan, and from the frontier of Kashmir eastwards to China, has now been defined with comparative geographical exactness. The position of Sachu (or Saitu) in Mongolia may be taken as an obligatory point in modern map construction. The longitude value now adopted is 94 54′ E. of Greenwich, which is the revised value given by Prjevalsky in the map accompanying the account of his fourth exploration into central Asia. Other values are as follows : —

Prjevalsky, by his second and third explorations 94 26′ Krishna ……. 94° 23′

Carey and Dalgleish ….. 94 48′

Littledale ……. 94 49′

Kreitner (with Szecheny's expedition) . . 94° 58′

The longitude of Darchendo, or Tachienlu, on the extreme east, may be accepted as another obligatory point. The adopted value by the Royal Geographical Society is 102 ° 12 ". Krishna gives 102 15", Kreitner 102 5, Baber 102 18".*

South and west the bounding territories are well fixed in geo- graphical position by the Indian survey determinations of the value of Himalayan peaks. On the north the Chinese Turkestan explora- tions are now brought into survey connexion with Kashmir and India.

No longer do we regard the Kuen-lun mountains, which extend from the frontiers of Kashmir, north of Leh, almost due east to the Chinese province of Kansu, as the southern limit of the Gobi or Turkestan depression. This very remarkable longitudinal chain is undoubtedly the northern limit of the Chang Tang, the elevated highland steppes of Tibet; but from it there branches a minor system to the north-east from a point in about 83 ° E. longitude, which culminates in the Altyn Tagh, and extends eastwards in a continuous water-divide to the Nan Shan mountains, north of the Koko Nor basin. Thus between Tibet and the low-lying sands of Gobi we have, thrust in, a system of elevated valleys (Tsaidam), 8000 to 9000 ft. above sea-level, forming an intermediate steppe between the highest regions and the lowest, east of Lop Nor. All this is comparatively new geography, and it goes far to explain why the great trade routes from Peking to the west were pushed so far to the north.

On the western edge of the Kashgar plains, the political boundary between

Russia and China is defined by the meridional range of Russo- Sarikol. This range (known to the ancients as Taurus Chinese anc ‘ m me dieval times as Bolor) like many others of the boundary. most important great natural mountain divisions of the world, consists of two parallel chains, of which the western is the water-divide of the Pamirs, and the eastern (which has been known as the Kashgar or Kandar range) is split at intervals by lateral gorges to allow of the passage of the main drainage from the eastern Pamir slopes.

In western Asia we have learned the exact value of the mountain

barrier which lies between Merv and Herat, and have mapped

, „ its connexion with the Elburz of Persia. We can now

Indian

trontiers-

ls%n”

near Bamian. Every pass of importance is known and recorded; every route of significance has been explored and mapped ; Afghan- istan has assumed a new political entity by the demarcation of a boundary ; the value of Herat and of the Pamirs as bases of aggression has been assessed, and the whole intervening space of mountain and plain thoroughly examined.

Although within the limits of western Asiatic states, still under Asiatic government and beyond the active influence of European _ , interests, the material progress of the Eastern world has

appeared to remain stationary, yet large accessions to geographical knowledge have at least been made, ajnd in some in- stances a deeper knowledge of the surface of the country and modern conditions of life has led to the straightening of many crooked paths in history, and a better appreciation of the slow processes of ad- vancing civilization. The steady advance of scientific inquiry into every corner of Persia, backed by the unceasing efforts of a new school of geographical explorers, has left nothing unexamined that can be subjected to superficial observation. The geographical map of the country is fairly complete, and with it much detailed in- formation is now accessible regarding the coast and harbours of the Persian Gulf, the routes and passes of the interior, and the possi- bilities of commercial development by the construction of trade roads uniting the Caspian, the Karun, the Persian Gulf, and India, via Seistan. Persia has assumed a comprehensible position as a ‘actor in future Eastern politics.

fully appreciate the factor in practical politics which that definite but somewhat irregular mountain system

In Arabia progress has been slower, although the surveys carried out by Colonel Wahab in connexion with the boundary determined in the Aden hinterland added more exact geographical Arabia knowledge within a limited area. Little more is known of the wide spaces of interior desert than has already been given to the world in the works of Sir Richard F. Burton, Wm. Gifford Palgrave and Sir Lewis Pelly amongst Englishmen, and Karsten Niebuhr, John Lewis Burckhardt, Visconte, Joseph Halevy and others, amongst foreign travellers. Charles Doughty and Wilfrid S. Blunt have visited and illustrated the district of Nejd, and de- scribed the waning glories of the Wahabi empire. But extended geographical knowledge does not point to any great practical issue. Commercial relations with Arabia remain much as they were in 1875.

In Asia Minor, Syria and Mesopotamia there is little to record of progress in material development beyond the promises held out by the Euphrates Valley railway concession to a . . German company. The exact information obtained by ˆu nor &c the researches of English surveyors in Palestine and '

beyond Jordan, or by the efforts of explorers in the regions that lie between the Mediterranean and the Caspian, have so far led rather to the elucidation of history than to fresh commercial enterprise or the possible increase of material wealth.

Asiatic Russia, especially eastern Siberia and Mongolia, have been brought within the sphere of Russian exploration, with results so surprising as to form an epoch in the. history of Asia. gasslaln Here there has been a development of the resources ~J . of the Old World which parallels the best records of the New.

The great central depression of the continent which reaches from the foot of the Pamir plateau on the west through theTarim desert to Lop Nor and the Gobi has yielded up many interesting Cnlnese secrets. The remarkable phenomenon of the periodic Turkestan shifting of the Lop Nor system has been revealed by the and Oxos researches of Sven Hedin, and the former existence of 6as ; n- highly civilized centres of Buddhist art and industry in the now sand-strewn wastes of the Turkestan desert has been clearly demonstrated by the same great explorer and by Dr M. A. Stein. The depression westward of the Caspian and Aral basins, and the original connexion of these seas, have also come under the close investigation of Russian scientists, with the result that the theory of an ancient connexion between the Oxus and the Caspian has been displaced by the -more recent hypothesis of an extension of the Caspian Sea eastwards into Trans-

Caspian territory within the post- Pleiocene age. The discovery of shells (now living in the Caspian) at a distance of about 100 m. inland, at an altitude of 140 to 280 ft. above the present level of the Caspian, gives support to this hypo- thesis, which is further advanced by the ascertained nature of the Kara-kum sands, which appear to be a purely marine formation exhibiting no traces of fluviatile deposits which might be considered as delta deposits of the Oxus.

In the discussion of this problem we find the names of Baron A. Kaulbars, Annentkov, P. M. Lessar, and A. M. Konshin prominent. Further matter of interest in connexion with the Oxus basin was elucidated by the researches of L. Griesbach in connexion with the Russo-Afghan Boundary Commission. He reported the gradual formation of an anticlinal or ridge extending longitudinally through the great Balkh plain of Afghan Turkestan, which effectually shuts off the northern affluents of that basin from actual junction with the river. This evidence of a gradual process of upheaval still in action may throw some light on the physical (especially the climatic) changes which must have passed over that part of Asia since Balkh was the " mother of cities," the great trade centre of Asia, and the plains of Balkh were green with cultivation. In the restoration of the out- lines of ancient and medieval geography in Asia Sven Hedin' s dis- coveries of the actual remains of cities which have long been buried under the advancing waves of sand in the Takla Makan desert, cities which flourished in the comparatively recent period of Buddh- ist ascendancy in High Asia, is of the very highest interest, filling up a blank in the identification of sites mentioned by early geo- graphers and illustrating more fully the course of old pilgrim routes.

With the completion of the surveys of Baluchistan and Makran much light has also been thrown on the ancient connexion between east and west; and the final settlement of the southern Baluch- boundaries of Afghanistan has led to the reopening of lstaB anrf one at least of the old trade routes between Seistan Makran. and India.

Farther east no part of Asia has been brought under more care- ful investigation than the hydrography of the strange mountain wilderness that divides Tibet and Burma from China. Burma In this field the researches of travellers already men- ana china. tioned, combined with the more exact reconnaissance of native surveyors and of those exploring parties which have recently been working in the interests of commercial projects, have left little to future inquiry. We know now for certain that the great Tsanpo of Tibet and the Brahmaputra are one and the same river; that north of the point where the great countermarch of that river from east to west is effected are to be found the sources of the Salween, the Mekong, the Yang-tsze-kiang and the Hwang-ho, or Yellow river, in order, from west to east ;

and that south of it, thrust in between the extreme eastern edge of the Brahmaputra basin

and the Salween, rise the dual sources of the Irrawaddy. From the water-divide which separates the most eastern affluent of the Brahmaputra, eastwards to the deep gorges which enclose the most westerly branch of the upper Yang-tsze-kiang (here running from north to south), is a short space of loom.; and within that space two mighty rivers, the Salween and the Mekong, send down their torrents to Burma and Siam. These three rivers flow parallel to each other for some 300 m., deep hidden in narrow and precipitous troughs, amidst some of the grandest scenery of Asia; spreading apart where the Yank-tsze takes its course eastwards, not far north of the parallel of 25°.

The comparatively restricted area which still remains for close investigation includes the most easterly sources of the Brahmaputra, the most northerly sources of the Irrawaddy, and some 300 m. of the course of the upper Salween.

Modern Boundary Demarcation. — The period from about 1880 has been an era of boundary-making in Asia, of defining the politico- geographical limits of empire, and of determining the responsibilities of government. Russia, Persia, Afghanistan, Baluchistan, India and China have all revised their borders, and with the revision the political relations between these countries have acquired a new and more assured basis. See also the articles on the different countries. We are not here concerned with understandings as to "spheres of influence," or with arrangements such as the Anglo-Russian Convention of 1907 concerning Persia.

The advance of Russia to the Turkoman deserts and the Oxus demanded a definite boundary between her trans-Caspian conquests . and the kingdom of Afghanistan. This was determined

Southern Qn the nort h_ west by t ˆ e Russo-Afghan Boundary Com- fBssUi m i 3S i° n °f 1 884-1 886. A boundary was then fixed fa Asia between the Hari Rud (the river of Herat) and the Oxus, which is almost entirely artificial in its construction. Zulfikar, where the boundary leaves the Hari Rud, is about 70 m. south of Sarakhs, and the most southerly point of the boundary (where it crosses the Kushk) is about 60 m. north of Herat. From the junction of the boundary with the Oxus at Khamiab about 150 m.

above the crossing-point of the Russian Trans-Caspian railway at Charjui, the main channel of the Oxus river becomes the northern boundary of Afghanistan, separating that country from Russia, and so continues to its source in Victoria Lake of the Great Pamir. Beyond this point the Anglo-Russian Commission of 1895 demarcated a line to the snowfields and glaciers which overlook the Chinese border. Between the Russian Pamirs and Chinese Turkes- tan the rugged line of the Sarikol range intervenes, the actual dividing line being still indefinite. Beyond Kashgar the southern boundary of Siberia follows an irregular course to the north-east, partly defined by the Tian-shan and Alatau mountains, till it attains a northerly point in about 53° N. lat. marked by the Sayan range to the west of Irkutsk. It then deflects south-east till it touches the Kerulen affluent of the Amur river at a point which is shown in unofficial maps as about 117° 30′ E. long, and 49° 20′ N. lat. From here it follows this affluent to its junction with the Amur river, and the Amur river to its junction with the Usuri. It follows the Usuri to its head (its direction now being a little west of south), and finally strikes the Pacific coast on about 42 ° 30′ N. lat. at the mouth of the Tumen river 100 m. south of the Amur bay, at the head of which lies the Russian port of Vladivostok. At two points the Russian boundary nearly approaches that of provinces which are directly under British suzerainty. Where the Oxus river takes its great bend to the north from Ishkashim, the breadth of the Afghan territory intervening between that river and the main water-divide of the Hindu Kush is not more than 10 or 12 m. ; and east of the Pamir extension of Afghanistan, where the Beyik Pass crosses the Sarikol range and drops into the Taghdumbash Pamir, there is but the narrow width of the Karachukar valley between the Sarikol and the Muztagh. Here, however, the boundary is again undefined. Eastwards of this the great Kashgar depression, which includes the Tarim desert, separates Russia from the vast sterile highlands of Tibet; and a continuous series of desert spaces of low elevation, marking the limits of a primeval inland sea from the Sarikol meridional watershed to the Khingan mountains on the western borders of Manchuria, divide her from the northern pro- vinces of China. From the Khingan ranges to the Pacific, south of the Amur, stretch the rich districts of Manchuria, a province which connects Russia with the Korea by a series of valleys formed by the Sungari and its affluents — a land of hill and plain, forest and swamp, possessing a delightful climate, and vast undeveloped agricultural resources. Throughout this land of promise Russian influence was destroyed by Japan in the war of 1904. The posses- sion of Port Arthur, and direct political control over Korea, place Japan in the dominant position as regards Manchuria.

Coincident with the demarcation of Russian boundaries in Turkes- tan was that of northern Afghanistan. From the Hari Rud on the west to the Sarikol mountains on the east her northern

IH f"l limits were set by the Boundary Commissions of 1884- 60 nd- 1886 and of 1895 respectively. Her southern and eastern

, " boundaries were further defined by a series of minor commissions, working on the basis of the Kabul agreement of 1893, which lasted for nearly four years, terminating with the Mohmand settlement at the close of an expedition in 1897.

The Pamir extension of Afghan territory to the north-east reaches to a point a little short of 75 E., from whence it follows the water- divide to the head of the Taghdumbash Pamir, and is thenceforward defined by the water-parting of the Hindu Kush. It leaves the Hindu Kush near the Dorah Pass at the head of one of the minor Chitral affluents, and passing south-west divides Kafiristan from Chitral and Bajour, separates the sections of the Mohmands who are within the respective spheres of Afghan and British sovereignty, and crosses the Peshawar-Kabul route at Lundi-Khana. It thus places a broad width of independent territory between the bound- aries of British India (which have remained practically, though not absolutely, untouched) and Afghanistan; and this independent belt includes Swat, Bajour and a part of the Mohmand territory north of the Kabul river. The same principle of maintaining an intervening width of neutral territory between the two countries is definitely established throughout the eastern borders of Afghanis- tan, along the full length of which a definite boundary has been demarcated to the point where it touches the northern limits of Baluchistan on the Gomal river. From the Gomal Baluchistan itself becomes an intervening state between British India and Afghanistan, and the dividing line between Baluchistan and Afghanistan is laid down with all the precision employed on the more northerly sections of the demarcation.

Baluchistan can no longer be regarded as a distinct entity amongst Asiatic nations, such as Afghanistan undoubtedly is. Baluchistan independence demands qualification. There is British Baluchi Baluchistan par excellence, and there is the rest of Baluch- istan istan which exists in various degrees of independence, but is everywhere subject to British control. British Baluchistan officially includes the districts of Peshin, Sibi and of Thal-Chotiali. As these districts had originally been Afghan, they were transferred to British authority by the treaty of Gandamak in 1879, although nominally they had been handed over to Kalat forty years previously. Now they form an official province of British Baluchistan within the Baluchistan Agency; and the agency extends from the Gomal to the Arabian Sea and the Persian frontier. Within this agency there are districts as independent as any in Afghanistan, but the political status of the province as a whole is almost precisely that of the native states of the Indian peninsula. The agent to the governor-general of India, with a staff of political assistants, practically exercises supreme control.

The increase of Russian influence on the northern Persian border and its extension southwards towards Seistan led to the appoint- ment of a British consul at Kirman, the dominating mrman. town of southern Khorasan, directly connected with Meshed on the north; and the acquisition of rights of adminis- tration of the Nushki district secured to Great Britain the trade between Seistan and Quetta by the new Helmund desert route.

While British India has so far avoided actual geographical contact with one great European power in Asia on the north and west, she has touched another on the east. The Mekong river which limits British interests in Burma limits also those ?°ˆ n ary of France in Tongking. The eastern boundaries of pˆˆ" Burma are not yet fully demarcated on the Chinese

The following table shows the areas of territories in Asia Area and (continental and insular) dependent on the various extra- political Asiatic powers, and of those which are independent or division. nominally so: —

Territory. Russian British Dutch . French U.S.A. . German Turkish Chinese Japanese Other independent territories

Sq. m.

6,495.970

1,998,220 586,980 247,580

II4.370

193 681,980

4,299,600 161,110

2,232,270

The total area of Asia, continental and insular, is therefore some- what over 16,819,000 sq. m. (but various authorities differ consider- ably in their detailed estimates). The population may be set down roughly as 823,000,000, of which 330,000,000 inhabit Chinese terri- tory, 302,000,000 British, and 25,000,000 Russian. (T. H. H.)*

[GEOLOGY

after rjorˆliau;

Geology

The geology of Asia is so complex and over wide areas so little known that it is difficult to give a connected account of either the structure or the development of the continent, and only the broader features can be dealt with here.

In the south, in Syria, Arabia and the peninsula of India, none but the oldest rocks are folded, and the Upper Palaeozoic, the Meso- zoic and the Tertiary beds lie almost horizontally upon them. It is a region of quiescence or of faulting, but not of folding. North of this lies a broad belt in which the Mesozoic deposits and even the lower divisions of the Tertiary system are thrown into folds which extend in a series of arcs from west to east and now form the principal mountain ranges of central Asia. This belt includes Asia Minor, Persia, Afghanistan, Baluchistan, the Himalayas, the Tian-shan, and, although they are very different in direction, the Burmese ranges. The Kuen-lun, Nan-shan and the mountain ranges of southern China are, perhaps, of earlier date, but nevertheless they lie in the same belt. It is not true that throughout the whole width of this zone the beds are folded. There are considerable tracts which are but little disturbed, but these tracts are enclosed within the arcs formed by the folds, and the zone taken as a whole is dis- tinctly one of crumpling. North of the folded belt, and including

Emery Walker sc

the greater part of Siberia, Mongolia and northern China, lies another area which is, in general, free from any important folding of Mesozoic or Tertiary age. There are, it is true, mountain ranges which are formed of folded beds ; but in many cases the direction of the chajns is different from that of the folds, so that the ranges must owe their elevation to other causes; and the folds, moreover, are of ancient date, for the most part Archaean or Palaeozoic. The configuration of the region is largely due to faulting, trough-like or tray-like depressions being formed, and the intervening strips, which have not been depressed, standing up as mountain ridges. Over a large part of Siberia and in the north of China, even the Cambrian beds still lie as horizontally as they were first laid down. In the extreme north, in the Verkhoyansk range and in the mountains of the Taimyr peninsula, there are indications of another zone of folding of Meso-zoic or later date, but our information concerning these ranges is very scanty. Besides the three chiet regions into which the mainland is thus seen to be divided, attention should be drawn to the festoons of islands 'which border the eastern side of the continent, and which are undoubtedly due to causes similar to those which produced the folds of the folded belt.

Of all the Asiatic ranges the Himalayan is, geologically, the best known; and the evidence which it affords shows clearly that the folds to which it owes its elevation were produced by an overthrust

from the north. It is, indeed, as if the high land of central Asia had been pushed southward against and over the unyielding mass formed by the old rocks of the Indian peninsula, and in the process the edges of the over-riding strata had been crumpled and folded. Overlooking all smaller details, we may consider Asia to consist of a northern mass and a southern mass, too rigid to crumple, but not too strong to fracture, and an intermediate belt of softer rock which was capable of folding. If then by the contraction of the earth's interior the outer crust were forced to accommodate itself to a smaller nucleus, the central softer belt would yield by crumpling; the more rigid masses to the north and south, if they gave way at all, would yield by faulting. It is interesting to observe, as will be shown later, that during the Mesozoic era there was a land-mass in the north of Asia and another in the south, and between them lay the sea in which ordinary marine sediments were deposited. The belt of folding does not precisely coincide with this central sea, but the correspond- ence is fairly close.

The present outline of the eastern coast and the nearly enclosed seas which lie between the islands and the mainland, are attributed by Richthofen chiefly to simple faulting.

Little is known of the early geological history of Asia beyond the fact that a large part of the continent was covered by the sea during the Cambrian and Ordovician periods. But there is positive evidence that much of the north and east of Asia has been land since the Palaeozoic era, and it has been conclusively proved that the peninsula of India has never been beneath the sea since the Carboniferous period at least. Between these ancient land masses lies an area in which marine deposits of Mesozoic age are well developed and which was evidently beneath the sea during the greater part of the Mesozoic era. The northern land-mass has been named Angaraland by E. Suess; the southern, of which the Indian peninsula is but a fragment, is called Gondwanaland by Neumayr, Suess and others; while the intervening sea is the central Mediterranean sea of Neumayr and the Tethys of Suess. The greater part of western Asia, including the basin of the Obi, the drainage area of the Aral Sea, together with Afghanistan,

Baluchistan, Persia and Arabia, was covered by the sea during the later stages of the Cretaceous period; but a considerable part of this region was probably dry land in Jurassic times. •

The northern land-mass begins in the north with the area which lies between the Yenisei and the Lena. Here the folded Archean rocks are overlaid by Cambrian and Ordovician beds, which still lie for the most part flat and undisturbed. Upon these rest patches of freshwater deposits containing numerous remains of plants. They consist chiefly of sandstone and conglomerate, but include workable seams of coal. Some of the deposits appear to be of Permian age, but others are probably Jurassic; and they are all included under the general name of the Angara series. Excepting in the extreme north, where marine Jurassic and Cretaceous fossils have been found, there is no evidence that this part of Siberia has been beneath the sea since the early part of the Palaeozoic era. Besides the plant beds extensive outflows of basic lava rest directly upon the Cambrian and Ordovician strata. The date of these eruptions is still .uncertain, but they probably continued to a very recent period.

South and east of the Palaeozoic plateau is an extensive area consisting chiefly of Archean rocks, and including the greater part of Mongolia north of the Tian-shan. Here again there are no marine beds of Mesozoic of Tertiary age, while plant-bearing deposits belonging to the Angara series are known. Structurally, the folds o! this region are ol ancient date; but the area is crossed by a. series of depressions formed by faults, and the intervening strips, which have not been depressed to the same extent, now stand up as moun- tain ranges. Farther south, in the Chinese provinces of Shansi and Shensi, the geological succession is similar in some respects to that of the Siberian Palaeozoic plateau, but the sequence is more complete. There is again a floor of folded Archean rocks overlaid by nearly horizontal strata of Lower Palaeozoic age; but these are followed by marine beds belonging to the Carboniferous period. From the Upper Carboniferous onward, however, no marine deposits are known; and, as in Siberia, plant-bearing beds are met with. Southern China is very different in structure, consisting largely of folded mountain chains, but the geological succession is very similar, and excepting near the Tibetan and Burmese borders, there are no marine deposits of Mesozoic or Tertiary age.

Thus it appears that from the Arctic Ocean there stretches a broad area as far as the south of China, in which no marine deposits of later date than Carboniferous have yet been found, except in the extreme north. Freshwater and terrestrial deposits of Mesozoic age occur in many places, and the conclusion is irresistible that the greater part of this area has been land since the close of the Palaeo- zoic era. The Triassic deposits of the Verkhoyansk Range show that this land did not extend to the Bering Sea ;

while the marine Mesozoic deposits of Japan on the east, the western Tian-shan on the west and Tibet on the south give us some idea of its limits in other directions.

In the same way the entire absence of any marine fossils in the peninsula of India, excepting near its borders, and the presence of the terrestrial and freshwater deposits of the Gondwana series, representing the whole of the geological scale from the top of the Carboniferous to the top of

has been land since the Carboniferous period. It was a portion of a great land-mass which probably extended across the Indian Ocean and was at one time united with the south of Africa.

But these two land-masses were not connected. Between India and China there is a broad belt in which marine deposits of Mesozoic and Tertiary age are well developed. Marine Tertiary beds occur in Burma; in the Himalayas and in south Tibet there is a nearly complete series of marine deposits from the Carboniferous to the Eocene; in Afghanistan the Mesozoic beds are in part marine and in part fluviatile. The sea in which these strata were deposited seems to have attained its greatest extension in Upper Cretaceous times, when its waters spread over the whole of western Asia and even encroached slightly upon the Indian land. The Eocene sea, however, cannot have been much inferior in extent.

It was after the Eocene period that the main part of the elevation of the Himalayas took place, as is shown by the occurrence of nummulitic limestone at a height of 20,000 ft. The formation of this and of the other great mountain chains of central Asia resulted in the isolation of portions of the former central sea ; and the same forces finally led to the elevation of the whole region and the union of the old continents of Angara and Gondwana. Gondwanaland, however, did not long survive, and the portion which lay between India and South Africa sank beneath the waves in Tertiary times.

Leaving out of consideration all evidence of more ancient volcanic activity, each of the three regions, into which, as we have seen, the continent may be divided, has been, during or since the Cretaceous period, the seat of great volcanic eruptions. 'In the southern region of unfolded beds are found the lavas of the " harras " of Arabia, and in India the extensive flows of the Deccan Trap. In the central folded belt lie the great volcanoes, now mostly extinct, of Asia Minor, Armenia, Persia and Baluchistan. In Burma also there is at least one extinct volcano. In the northern unfolded region great flows of basic lava lie directly upon the Cambrian and Ordovician beds of Siberia, but are certainly in part of Tertiary age. Similar flows on a smaller scale occur in Manchuria, Korea and northern China.

In all these cases, however, the eruptions have now almost ceased ; and the great volcanoes of the present day lie in the islands off the eastern and south-eastern coasts.

References. — E. Suess, Das Antlitz der Erde (see, especially, vol. iii. part i.) ; F. V. Richthofen, " Ueber Gestalt und Gliederung einer Grundlinie in der Morphologic Ost-Asiens," Sitz. k. preuss. Akad. Wiss. (Berlin, 1900), pp. 888-925, and " Geomorphologische Studien aus Ostasien," ibid., 1901, pp. 782-808, 1902, pp. 944-975, 1903, PP- 867-918. (P. La.)

Climate

Among the places on the globe where the temperature falls lowest are some in northern Asia, and among those where it rises highest are some in southern Asia. The mean temperature of Tempera- the north coast of eastern Siberia is but a few degrees ture above the zero of Fahrenheit ; the lowest mean tem- perature anywhere observed is about 4 Fahr., at Melville Island, north of the American continent. The isothermals of mean annual temperature lie over northern Asia on curves tolerably regular in their outline, having their western branches in a somewhat higher latitude than their eastern ; a reduction of I ° of latitude corresponds approximately — and irrespective of modifications due to elevation — to a rise of I ° Fahr., as far say as 30° N., where the mean tempera- ture is about 75° Fahr. Farther south the increase is slower, and the highest mean temperature anywhere attained in southern Asia is not much above 82 ° Fahr.

The variations of temperature are very great in Siberia, amounting near the coast to more than 100 Fahr., between the mean of the hottest and coldest months, and to still more between the extreme temperatures of those months. In southern Asia, and particularly near the sea, the variation between the hottest and coldest monthly means is very much less, and under the equator'it is reduced to about 5°. In Siberia the difference between the means of the hottest and coldest months is hardly anywhere less than 6o° Fahr. On the Sea of Aral it is 80° Fahr. ; and at Astrakhan, on the Caspian, more than 50 . At Tiflis it is 45 . In northern China, at Peking, it is 55 , reduced to 30 at Canton, and to 20 at Manila. In northern India the greatest difference docs not exceed 40 ; and it Jails off to about I5°at Calcutta, and toabout io°or I2°at Bombayand Madras. The temperatures at the head of the Persian Gulf approximate to those of northern India, and those of Aden to Madras. At Singa- pore the range is less than 5 ; and at Batavia in Java, and Galle in Ceylon, it is about the same. The extreme temperatures in Siberia may be considered to lie between 80° and 90 Fahr. for maxima, and between— 40° and — 70° Fahr. for minima. The extreme of heat near the Caspian and Aral Seas rises to nearly ioo° Fahr., while that of cold falls to — 20° Fahr. or lower.

Compared with these figures, we find in southern Asia 110° or 1 12° Fahr. as a maximum hardly ever exceeded. The absolute minimum in northern India, in lat. 30 , hardly goes below 32 ° ; at Calcutta it is about 40°, though the thermometer seldom falls to 50 . At Madras it rarely falls as low as 65 °, or at Bombay below 60°. At Singapore and Batavia the thermometer very rarely falls below 70 , or rises above 90 . At Aden the minimum is a few degrees below 70°, the maximum not much exceeding 90°.

These figures sufficiently indicate the main characteristics of the air temperatures of Asia. Throughout its northern portion the winter is long and of extreme severity ; and even down to the circle of 35 N. lat., the minimum temperature is almost as low as zero of Fahrenheit. The summers are hot, though short in the northern latitudes, the maximum of summer heat being comparatively little less than that observed in the tropical countries farther south. The moderating effect of the proximity of the ocean is felt in an im- portant degree along the southern and eastern parts of Asia, where the land is broken up into islands or peninsulas. The great elevations above the sea-level of the central part of Asia, and of the table-lands of Afghanistan and Persia, tend to exaggerate the winter cold; while the sterility of the surface, due to the small rainfall over the same region, operates powerfully in the opposite direction in increas- ing the summer heat. In the summer a great accumulation of solar heat takes place on the dry surface soil, from which it cannot be released upwards by evaporation, as might be the case were the soil moist or covered with vegetation, nor can it be readily conveyed away downwards as happens on the ocean. In the winter similar consequences ensue, in a negative direction, from the prolonged loss of heat by radiation in the long and clear nights — an effect which is intensified wherever the surface is covered with snow, or the air little charged with vapour. In illustration of the very slow diffusion of heat in the solid crust of the earth, and as affording a further in- dication of the climate of northern Asia, reference may here be made to the frozen soil of Siberia, in the vicinity of Yakutsk. In this region the earth is frozen permanently to a depth of more than 380 ft. at which the temperature is still 5° or 6° Fahr. below the freezing point of water, the summer heat merely thawing the surface to a depth of about 3 ft. At a depth of 50 ft. the temperature is about 15 Fahr. below the freezing point. Under such conditions of the soil, the land, nevertheless, produces crops of wheat and other grain from fifteen to forty fold.

The very high summer temperatures of the area north of the tropic of Cancer are sufficiently accounted for, when compared with those observed south of the tropic, by the increased length of the day in the higher latitude, which more than compensates for the loss of heat due to the smaller mid-day altitude of the sun. The difference between the heating power of the sun's rays at noon on the 2 1st of June, in latitude 20 and in latitude 45 , is only about 2%; while the accumulated heat received during the day, which is lengthened to 1 5 1 hours in the higher latitude, is greater by about 11% than in the lower latitude, where the day consists only of 13ˆ hours.

Although the foregoing account of the temperatures of Asia supplies the main outline of the observed phenomena, a very im- portant modifying cause, of which more will be said hereafter, comes into operation over the whole of the tropical region, namely, the periodical summer rains. These tend very greatly to arrest the increase of the summer heat over the area where they prevail, and otherwise give it altogether peculiar characteristics.

The great summer heat, by expanding the air upwards, disturbs the level of the planes of equal pressure, and causes an outflow _ of the upper strata from the heated area. The winter

. cold produces an effect of just an opposite nature, and

Winds. causes an accumulation of air over the cold area, The diminution of barometric pressure which takes place all over Asia during the summer months, and the increase in the winter, are hence, no doubt, the results of the alternate heating and cooling of the air over the continent.

The necessary and immediate results of such periodical changes of pressure are winds, which, speaking generally, blow from the area of greatest to that of least pressure — subject, however, to certain modifications of direction, arising from the absolute motion of the whole body of the air due to the revolution of the earth on its axis from west to east. The south-westerly winds which prevail north of the equator during the hot half of the year, to which navigators have given the name of the south-west monsoon (the latter word being a corruption of the Indian name for season), arise from the great diminution of atmospheric pressure over Asia, which begins to be strongly marked with the great rise of temperature in April and May, and the simultaneous relatively higher pressure over the equator and the regions south of it. This diminution of pressure, which continues as the heat increases till it reaches its maximum in July soon after the solstice, is followed by the corresponding develop- ment of the south-west monsoon; and as the barometric pressure is gradually restored, and becomes equalized within the tropics soon after the equinox in October, with the

general fall of temperature north of the equator, the south-west winds fall off, and are succeeded by a north-east monsoon, which is developed during the winter months by the relatively greater atmospheric pressure which then occurs over Asia, as compared with the equatorial region.

Although the succession of the periodical winds follows the progress of the seasons as just described, the changes in the wind's direction everywhere take place under the operation of special local influences which often disguise the more general law, and make it difficult to trace. Thus the south-west monsoon begins in the Arabian Sea with west and north-westerly winds, which draw round as the year advances to south-west and fall back again in the autumn by north- west to north. In the Bay of Bengal the strength of the south- west monsoon is rather from the south and south-east, being

succeeded by north-east winds after October, which give place to northerly and north-westerly winds as the year advances. Among the islands of the Malay Archipelago the force of the monsoons is much interrupted, and the position of this region on the equator otherwise modifies the directions of the prevailing winds. The southerly summer winds of the Asiatic seas between the equator and the tropic do not extend to the coasts of Java, and the south- easterly trade winds are there developed in the usual manner. The China Sea is fully exposed to both monsoons, the normal directions of which nearly coincide with the centre of the channel between the continent of Asia and the eastern islands.

The south-west monsoon does not generally extend, in its charactei of a south-west wind, over the land. The current of air flowing in from over the sea is gradually diverted towards the area of least pressure, and at the same time is dissipated and loses much of its original force. The winds which pass northward over India blow a& south-easterly and easterly winds over the north-eastern part of the Gangetic plain, and as south winds up the Indus. They seem almost entirely to have exhausted their northward velocity by the time they have reached the northern extremity of the great Indian plain; they are not felt on the table-lands of Afghanistan, and hardly penetrate into the Indus basin or the ranges of the Himalaya, by which mountains, and those which branch off from them into the Malay peninsula, they are prevented from continuing their progress in the direction originally imparted to them.

Among the more remarkable phenomena of the hotter seas of Asia must be noticed the revolving storms or cyclones, which are ol frequent occurrence in the hot months in the Indian Ocean and China Sea, in which last they are known under the name of typhoon The cyclones of the Bay of Bengal appear to originate over the Andaman and Nicobar islands, and are

commonly propagated in a north-westward direction, striking the east coast of the Indian peninsula at various points, and then often advancing with an easterly tendency over the land, and passing with extreme violence across the delta of the Ganges. They occur in all the hot months, from June to October, and more rarely in November, and appear to be originated by adverse currents from the north meeting those of the south-west monsoon. The cyclones of the China Sea also occur in the hot months of the year, but they advance from north-east to south-west, though occasionally from east to west; they originate near the island of Formosa, and extend to about the 10th degree of N. lat. They are thus developed in nearly the same latitudes and in the same months as those of the Indian Sea, though their progress is in a different direction. In both cases, however, the storms appear to advance towards the area of greatest heat. In these storms the wind invariably circulates from north by west through south to east.

The heated body of air carried from the Indian Ocean over southern Asia by the south-west monsoon comes up highly charged with watery vapour, and hence in a condition to release a large body of water as rain upon the land, whenever it is Rainfall. brought into circumstances which reduce its temperature in a notable degree. Such a reduction of temperature is brought about along the greater part of the coasts of India and of the Burmo- Siamese peninsula by the interruption of the wind, current by continuous ranges of mountains, which force the mass of air to rise over them, whereby the air being rarefied, its specific capacity for heat is increased and its temperature falls, with a corresponding condensation of the vapour originally held in suspension.

This explanation of the principal efficient Cause of the summer rains of south Asia is immediately based on an analysis of the com- plicated phenomena actually observed, and it serves to account for many apparent anomalies. The heaviest falls of rain occur along lines of mountain of some extent directly facing the vapour-bearing winds, as on the Western Ghats of India and the west coast of the Malay peninsula. The same results are found along the mountains at a distance from the sea, the heaviest rainfall known to occur any- where in the world (not less than 600 in. in the year) being recorded on the Khasi range about 100 m. north-east of Calcutta, which presents an abrupt front to the progress of the moist winds flowing up from the Bay of Bengal. The cessation of the rains on the southern border of Baluchistan, west of Karachi, obviously arises from the projection of the south-east coast of Arabia, which limits the breadth of. the south-west monsoon air current and the length of the coast-line directly exposed to it. The very small and irregular rainfall in Sind and along the Indus is to be accounted for by the want of any obstacle in the path of the vapour-bearing winds, which, therefore, carry the uncondensed rain up to the Punjab, where it falls on the outer ranges of the western Himalaya and of

Afghanistan.

The diurnal mountain winds are very strongly marked on the Himalaya, where they probably are the most active agents in deter- mining the precipitation of rain along the chain — the monsoon currents, as before stated, not penetrating among the mountains. The formation of dense banks of cloud in the afternoon, when the up wind is strongest, along the southern face of the snowy ranges of the Himalaya, is a regular daily phenomenon during the hotter months of the year, and .heavy rain, accompanied by electrical discharges, is the frequent result of such condensation.

Too little is known of the greater part of Asia to admit of any more being said with reference to this part of the subject, than to

mention a few facts bearing on the rainfall. In northern Asia there is a generally equal rainfall of 19 to 29 in. between the Volga and the Lena in Manchuria and northern China, rather more considerable increase in Korea, Siam and Japan. At Tiflis the yearly fall is 22 in. ; on the Caspian about 7 or 8 in. ; on the Sea of Aral 5 or 6 in. In south-western Siberia it is 12 or 14 in., diminishing as we proceed eastward to 6 or 7 in. at Barnaul, and to 5 or 6 in. at Urga in northern Mongolia. In eastern Siberia it is about 15 to 20 in. In China we find about 23 in. to be the fall at Peking; while at Canton, which lies nearly on the northern tropic and the region of the south-west monsoon is entered, the quantity is increased to 78 in. At Batavia in Java the fall is about 78 in. ; at Singapore it is nearly 100 in. The quantity increases considerably on that part of the coast of the Malay peninsula which is not sheltered from the south-west by Sumatra. On the Tenasserim and Burmese coast falls of more than 200 in. are registered, and the quantity is here nowhere less than 75 or 80 in., which is about the average of the eastern part of the delta of the Ganges, Calcutta standing at about 64 in. On the hills that flank Bengal on the east the fall is very great. On the Khasi hills, at an elevation of about 4500 ft., the average of ten years is more than 550 in. As much as 150 in. has been measured in one month, and 610 in. in one year. On the west coast of the Indian peninsula the fall at the sea-level varies from about 75 to 100 in., and at certain elevations on the mountains more than 250 in. is commonly registered, with intermediate quantities at inter- vening localities. On the east coast the fall is far less, nowhere rising to 50 in., and towards the southern apex of the peninsula being reduced to 25 or 30 in. Ceylon shows from 60 to 80 in.

As we recede from the coast the fall diminishes, till it is reduced to about 25 or 30 in. at the head of the Gangetic plain. The tract along the Indus to within 60 or 80 m. of the Himalaya is almost rainless, 6 or 8 in. being the fall in the southern portion of the Punjab. On the outer ranges of the Himalaya the yearly fall amounts to about 200 in. on the east in Sikkim, and gradually diminishes on the west, where north of the Punjab it is about 70 or 80 in. In the interior of the chain the rain is far less, and the quantity of precipitation is so small in Tibet that it can be hardly measured. It is to the greatly reduced fall of snow on the northern faces of the highest ranges of the Hima- laya that is to be attributed the higher level of the snow-line, a phenomenon which was long a cause of discussion.

In Afghanistan, Persia, Asia Minor and Syria, winter and spring appear to be the chief seasons of condensation. In other parts of Asia the principal part of the rain falls between May and September, that is, in the hottest half of the year. In the islands under the equator the heaviest fall is between October and February. (R. S.)

Flora and Fauna

The general assemblage of animals and plants found over northern Asia resembles greatly that found in the parts of Europe which are adjacent and have a similar climate. Siberia, north of the 50th parallel, has a climate not much differing from a similarly situated portion of Europe, though the winters are more severe and the summers hotter. The rainfall, though moderate, is still sufficient to maintain the supply of water in the great rivers that traverse the country to the Arctic Sea, and to support an abundant vege- tation. A similar affinity exists between the life of the southern parts of Europe and that in the zone of Asia extending from the Mediterranean across to the Himalaya and northern China. This belt, which embraces Asia Minor, northern Persia, Afghanistan, and the southern slopes of the Himalaya, from its elevation has a tem- perate climate, and throughout it the rainfall is sufficient to main- tain a vigorous vegetation, while the summers, though hot, and the winters, though severe, are not extreme. The plants and animals along it are found to have a marked similarity of character to those of south Europe, with which region the zone is virtually continuous.

The extremely dry and hot tracts which constitute an almost unbroken desert from Arabia, through south Persia and Baluchistan, to Sind, are characterized by considerable uniformity in the types of life, which closely approach to those of the neighbouring hot and dry regions of Africa. The region of the heavy periodical summer rains and high temperature, which comprises India, the Indo- Chinese peninsula, and southern China, as well as the western part of the Malay Archipelago, is also marked by much

similarity in the plants and animals throughout' its extent. The area between the southern border of Siberia and the margin of the temperate alpine zone of the Himalaya and north China, comprising what are commonly called central Asia, Turkestan, Mongolia and western Manchuria, is an almost rainless region, having winters of extreme severity and summers of intense heat. Its animals and plants have a special character suited to the peculiar climatal conditions, more closely allied to those of the adjacent northern Siberian tract than of the other bordering regions. The south-eastern parts of the Malay Archipelago have much in common with the Australian continent, to which they adjoin, though their affinities are chiefly Indian. North China and Japan also have many forms of life in common. Much still remains to be done in the exploration of China and eastern Asia; but it is known that many of the special forms of this region extend to the Himalaya, while others clearly indicate a connexion with North America.

The foregoing brief review of the principal territdrial divisions according to which the forms of life are distributed in Asia, indicates how close is the dependence of this distribution on climatic con- ditions, and this will be made more apparent by a somewhat fuller account of the main features of the flora and fauna.

Flora. — The flora of the whole of northern Asia is in essentials the same as that of northern Europe, the differences being due rather to variations of species than of genera. The absence of Northern the oak and of all heaths east of the Ural may be noticed. Asia. Pines, larch, birch are the principal trees on the moun- tains; willow, alders and poplars on the lower ground. The northern limit of the pine in Siberia is about 70° N.

Along the warm temperate zone, from the Mediterranean to the Himalaya, extends a flora essentially European in character. Many European species reach the central Himalaya, though few are known in its eastern parts. The genera common to the Himalaya and Europe are much more abundant, and extend throughout the chain, and to all elevations. There is also a corresponding diffusion of Japanese and Chinese forms along this zone, these being most numer- ous in the eastern Himalaya, and less frequent in the west.

The truly tropical flora of the hotter and wetter regions of eastern India is continuous with that of the Malayan peninsula and islands, and extends along the lower ranges of the Himalaya, gradually becoming less marked and rising to lower elevations as we go westward, where the rainfall diminishes and the winter cold increases.

The vegetation of the higher and therefore cooler and less rainy ranges of

the Himalaya has greater uniformity of character along the whole chain, and a closer general approach to European forms is maintained; an increased number of species is actually identical, among these being found, at the greatest elevations, many alpine plants believed to be identical with species of the north Arctic regions. On reaching the Tibetan plateau, with the increased dryness the flora assumes many features of the Siberian type. Many true Siberian species are found, and more Siberian genera. Some of the Siberian forms, thus brought into proximity with the Indian flora, extend to the rainy parts of the mountains, and even to the plains of upper India. Assemblages of marine plants form another remark- able feature of Tibet, these being frequently met with growing at elevations of 14,000 to 15,000 ft. above the sea, more especially in the vicinity of the many salt lakes of those regions.

The vegetation of the hot and dry region of the south-west of the continent consists largely of plants which are diffused over Africa, Baluchistan and Sind; many of these extend into the hotter parts of India, and not a few common Egyptian plants are to be met with in the Indian peninsula.

The whole number of species of plants indigenous in the region of south-eastern Asia, which includes India and the Malayan peninsula and islands, from about the 65th to the 105th meridian, Indian was estimated by Sir J. D. Hooker at 12,000 to 15,000. region. The principal orders, arranged according to their numerical importance, are as follows: — Leguminosae.Rubiaceae, Orchidaceae, Compositae, Gramineae, Euphorbiaceae, Acanthaceae, Cyperaceae and Labiatae. But within this region there is a very great variation between the vegetation of the more humid and the more arid regions, while the characteristics of the flora on the higher mountain ranges differ wholly from those of the plains. In short, we have a somewhat heterogeneous assemblage of tropical, temperate and alpine plants, as has been already briefly indicated, of which, however, the tropical are so far dominant as to give their character to the flora viewed as a whole. The Indian flora contains a more general and complete illustration of almost all the chief natural families of all parts of the world than any other country. Compositae are comparatively rare; so also Gramineae and Cyperaceae are in some places deficient, and Labiatae, Leguminosae and ferns in others. Euphorbiaceae and Scrophulariaceae and Orchidaceae are universally present, the last in specially large proportions.

The perennially humid regions of the Malayan peninsula and western portion of the archipelago are everywhere covered with dense forest, rendered difficult to traverse by the thorny cane, a palm of the genus Calamus, which has its greatest development in this part of Asia. The chief trees belong to the orders of Terebinth- aceae, Sapindaceae, Meliaceae, Clusiaceae, Dipterocarpaceae, Tern- stroemiaceae, Leguminosae, laurels,

oaks and figs, with Dilleniaceae, Sapotaceae and nutmegs. Bamboos and palms, with Pandanus and Dracaena, are also abundant. A similar forest flora extends along the mountains of eastern India to the Himalaya, where it ascends to elevations varying from 6000 to 7000 ft. on the east to 3000 or 4000 ft. on the west.

The arboreous forms which least require the humid and equable heat of the more truly tropical and equatorial climates, and are best able to resist the high temperatures and excessive drought of the northern Indian hot months from April to June, are certain Legu- minosae,. Bauhinia, Acacia, Butea and Dalbergia, Bombax, Shorea, Nauclea, Lager stroemia, and Bignonia, a few bamboos and palms, with others which extend far beyond the tropic, and give a tropical aspect to the forest to the extreme northern border of the Indian plain.

Of the herbaceous vegetation of the more rainy regions may be noted the Orchidaceae,;Orontiaceae, Scitamineae, with ferns and other

Cryptogams, besides Gramineae and Cyperaceae. Among these some forms, as among the trees, extend much beyond the tropic and ascend into the temperate zones on the mountains, of which may be mentioned Begonia, Osbeckia, various Cyrtandraceae, Scitamineae, and a few epiphytical orchids.

Of the orders most largely developed, in south India, and more sparingly elsewhere, may be named Aurantiaceae, Dipterocarpaceae, lialsaminaceae, Ebenaceae, Jasmineae, and Cyrtandraceae; but of these few contain as many as ioo peculiar Indian species. Nepenthes may be mentioned as a genus specially developed in the Malayan area, and extending from New Caledonia to Madagascar; it is found as far north as the Khasi hills, and in Ceylon, but does not appear on the Himalaya or in the peninsula of India. The Balsaminaceae may be named as being rare in the eastern region and very abundant in the peninsula. A distinct connexion between the flora of the peninsula and Ceylon and that of eastern tropical Africa is observable not only in the great similarity of many of the more truly tropical forms, and the identity of families and genera found in both regions, but in a more remarkable manner in the likeness of the mountain flora of this part of Africa to that of the peninsula, in which several species occur believed to be identical with Abyssinian forms. This connexion is further established by

the absence from both areas of oaks, conifers and cycads, which, as regards the first two families, is a remarkable feature of the flora of the peninsula and Ceylon, as the mountains rise to elevations in which both of them are abundant to the north and east. With these facts it has to be noticed that many of the principal forms of the eastern flora are absent or comparatively rare in the peninsula and Ceylon.

The general physiognomy of the Indian flora is mainly determined by the conditions of humidity of climate. The impenetrable shady forests of the Malay peninsula and eastern Bengal, of the west coast of the Indian peninsula, and of Ceylon, offer a strong con- trast to the more loosely-timbered districts of the drier regions of central India and the north-western Himalaya. The forest areas of India include the dense vegetation and luxuriant growth of the Tarai jungles at the foot of the eastern Himalaya, and wide stretches of loosely-timbered country which are a prevailing feature in the Central Provinces and parts of Madras. Where the lowlands are highly cultivated they are adorned with planted wood, and where they are cut off from rain they are nearly completely desert.

The higher mountains rise abruptly from the plains; on their slopes, clothed below almost exclusively with the more tropical forms, a vegetation of a warm temperate character, chiefly evergreen, soon begins to prevail, comprising Magnoliaceae, Terns troemiaceae, sub- tropical Rosaceae, rhododendron, oak, Ilex, Symplocos, Lauraceae, Pinus longifolia, with mountain forms of truly tropical orders, palms, Pandanus, Musa, Vitis, Verr.onia, and many others. On the east the vegetation of the Himalaya is most abundant and varied. The forest extends, with great luxuriance, to an elevation of 12,000 ft., above which the sub-alpine region may be said to begin, in which rhododendron scrub often covers the ground up to 13,000 or 14,000 ft. Only one pine is found below 8000 ft., above which several other Coniferae occur. Plantains, tree-ferns, bamboos, several Calami, and other palms, and Pandanus, are abundant at the lower levels. Between 4000 and 8000 ft. epiphytal orchids are very frequent, and reach even to 10,000 ft. Vegetation ascends on the drier and less snowy mountain slopes of Tibet to above 18,000 ft. On the west, with the drier climate, the forest is less luxuriant and dense, and the hill-sides and the valleys better cultivated. The warm mountain slopes are covered with Pinus longifolia, or with oaks and rhododen- dron, and the forest is not commonly dense below 8000 ft., excepting in some of the more secluded valleys at a low elevation. From 8000 to 12,000 ft., a thick forest of deciduous trees is almost universal, above which a sub-alpine region is reached, and vegetation as on the east continues up to 18,000 ft. or more. The more tropical forms of the east, such as the tree-ferns, do not reach west of Nepal. The cedar or deodar is hardly indigenous east of the sources of the Ganges, and at about the same point the forms of the west begin to be more abundant, increasing

in number as we advance towards Afghanistan.

The cultivated plants of the Indian region include wheat, barley, rice and maize; various millets, Sorghum, Penicillaria, Panicum and Eleusine ; many pulses, peas and beans ; mustard and rape ; ginger and turmeric; pepper and capsicum; several Cucurbitaceae; tobacco, Sesamum, poppy, Crotolaria and Cannabis; cotton, indigo and sugar; coffee and tea; oranges, lemons of many sorts; pome- granate, mango, figs, peaches, vines and plantains. The more common palms are Cocos, Phoenix and Borassus, supplying cocoa-nut and toddy. Indian agriculture combines the harvests of the tropical and temperate zones. North of the tropic the winter cold is sufficient to admit of the cultivation of almost all the cereals and vegetables of Europe, wheat being sown in November and reaped early in April. In this same region the summer heat and rain provide a thoroughly tropical climate, in which rice and other tropical cereals are freely raised, being as a rule sown early in July and reaped in September or October. In southern India, and the other parts of Asia and of the islands having a similar climate, the difference of the winter and summer half-years is not sufficient to admit of the proper cultivation of wheat or barley. The other cereals may be seen occasionally,

where artificial irrigation is practised, in all stages of progress at all seasons of the year, though the operations of agriculture are, as a general rule, limited to the rainy months, when alone is the requisite supply of water commonly forthcoming.

The trees of India producing economically useful timber are comparatively few, owing to the want of durability of the wood, in the extremely hot and moist climate. The teak, Tectona grandis, supplies the finest timber. It is found in greatest perfection in the forests of the west coasts of Burma and the Indian peninsula, where the rainfall is heaviest, growing to a height of 100 or 150 ft., mixed with other trees and bamboos. The sai, Shorea robusta, a very durable wood, is most abundant along the skirts of the Himalaya from Assam to the Punjab, and is found in central India, to which the teak also extends. The sal grows to a large size, and is more gregarious than the teak. Of other useful woods found in the plains may be named the babool, Acacia; toon, Cedrela; and sissoo, Dalbergia. The only timber in ordinary use obtained from the Himalaya proper is the deodar, Cedrus deodara. Besides these are the sandalwood, Santalum, of southern India, and many sorts of bamboo found in all parts of the country. The cinchona has recently been introduced with complete success; and the mahogany of America reaches a large size, and gives promise of being grown for use as timber.

The flora of the rainless region of south-western Asia is continuous with the

desert flora of northern and eastern Africa, and extends from the coast of Senegal to the meridian of 75 E., or from western the great African desert to the border of the rainless tract . . along the Indus and the southern parts of the Punjab. It includes the peninsula of Arabia, the shores of the Persian Gulf, south Persia, and Afghanistan and Baluchistan. On the west its limit is in the Cape Verde Islands, and it is partially represented in Abyssinia.

The more common plants in the most characteristic part of this region in southern Arabia are Capparidaceae, Euphorbiaceae, and a few Leguminosae, a Reseda and Dipterygium ; palms, Polygonaceae, ferns, and other cryptogams, are rare. The number of families relative to the area is very small, and the number of genera and species equally restricted, in very many cases a single species being the only representative of an order. The aspect of the vegetation is very peculiar, and is commonly determined by the predominance of some four or five species, the rest being either local or sparingly scattered over the area. The absence of the ordinary bright green colours of vegetation is another peculiarity of this flora, almost all the plants having glaucous or whitened stems. Foliage is reduced to a minimum, the moisture of the plant being stored up in massive or fleshy stems against the long-continued drought. Aridity has favoured the production of spines as a defence from external attack, sharp thorns are frequent, and asperities of various sorts predominate. Many species produce gums and resins, their stems being encrusted with the exudations, and pungency and aromatic odour is an almost universal quality of the plants of desert regions.

The cultivated plants of Arabia are much the same as those of northern India — wheat, barley, and the common Sorghum, with dates and lemons, cotton and indigo. To these must be added coffee, which is restricted to the slopes of the western hills. Among the more mountainous regions of the south-western part of Arabia, known as Arabia Felix, the summits of which rise to 6000 or 7000 ft., the rainfall is sufficient to develop a more luxuriant vegetation, and the valleys have a flora like that of similarly situated parts of southern Persia, and the less elevated parts of Afghanistan and Baluchistan, partaking of the characters of that of the hotter Mediterranean region. In these countries aromatic shrubs are abundant. Trees are rare, and almost restricted to Pistacia, Celtis and Dodonaea, with poplars, and the date palm. Prickly forms of Statice and Astragalus cover the dry hills. In the spring there is an abundant herbaceous vegetation, including many bulbous plants, with genera, if not species, identical with those of the Syrian region, some of which extend to the Himalaya.

The flora of the northern part of Afghanistan approximates to that of the contiguous western Himalaya. Quercus Ilex, the evergreen oak of southern Europe, is found in forests as far east as the Sutlej, accompanied with other

European forms. In the higher parts of Afghanistan and Persia Boraginaceae and thistles abound ; gigantic Umbelliferae, such as Ferula, Galbanum, Dorema, Bubon, Peucedanum, Prangos, and others, alsc characterize the same districts, and some of them extend into Tibet.

The flora of Asia Minor and northern Persia differs but little from that of the southern parts of Europe. The mountains are clothed, where the fall of rain is abundant, with forests of Quercus, Fagus, Ulmus, Acer, Car pinus and Corylus, and various Coniferae. Of these the only genus that is not found on the Himalaya is Fagus. Fruit trees of the plum tribe abound. The cultivated plants are those of southern Europe.

The vegetation of the Malayan Islands is for the most part that of the wetter and hotter region of India; but the greater uniformity of the temperature and humidity leads to the predentin- Eastern ance of certain tropical forms not so conspicuous in India, Asia. while the proximity of the Australian continent has permitted the partial diffusion of Australian types which are not seen in India. The liquidambar and nutmeg may be noticed among

the former; the first is one of the most conspicuous trees in java, on the mountains of the eastern part of which the casuarina, one of the characteristic forms of Australia, is also abundant. Rhodo- dendrons occur in Borneo and Sumatra, descending to the level of the sea. On the mountains of-Java there appears to be no truly alpine flora; Saxifraga is not found. In Borneo some of the tem- perate forms of Australia appear on the higher mountains. On the other islands similar characteristics are to be observed, Australian genera extending to the Philippines, and even to southern China.

The analysis of the Hong Kong flora indicates that about three- fifths of the species are common to the Indian region, and nearly all the remainder are either Chinese or local- forms. The number of species common to southern China, Japan and northern Asia is small. The cultivated plants of China are, with a few exceptions, the same as those of India. South China, therefore, seems, botanic- ally, hardly distinct from the great Indian region, into which many Chinese forms penetrate, as before noticed. The flora of north China, which is akin to that of Japan, shows manifest relation to that of the neighbouring American continent, from which many temperate forms

extend, reaching to the Himalaya, almost as far as Kashmir. Very little is known of the plants of the interior of northern China, but it seems probable that a complete botanical connexion is estab- lished between it and the temperate region of the Himalaya.

The vegetation of the dry region of central Asia is remarkable for the great relative number of Chenopodiaceae, Salicornia and other Central sa ‘ t pl anl – s being common; Polygonaceae also are abun- Asia. dant; leafless forms being of frequent occurrence, which

gives the vegetation a very remarkable aspect. Peculiar forms of Leguminosae also prevail, and these, with many of the other plants of the southern and drier regions of Siberia, or of the colder regions of the desert tracts of Persia and Afghanistan, extend into Tibet, where the extreme drought and the hot (nearly vertical) sun combine to produce a summer climate not greatly differing from that of the plains of central Asia.

Fauna. — The zoological provinces of Asia correspond very closely with the botanical. The northern portion of Asia, as far south as Zoological tne Himalaya, is not zoologically distinct from Europe, regions. an d these two areas, with the strip of Africa north of the Atlas, constitute the Palaearctic region of Dr Sclater, whose zoological primary divisions of the earth have met with the general approval of naturalists. The south-eastern portion of Asia- with the adjacent islands of Sumatra, Java, Borneo and the Philip- pines, form his Indian region. The extreme south-west part of the continent constitutes a separate zoological district, comprising Arabia, Palestine and southern Persia, and reaching, like the hot desert botanical tract, to Baluchistan and Sind; it belongs to what Dr Sclater calls the Ethiopian region, which extends over Africa, south of the Atlas. Celebes, Papua, and the other islands east of Java beyond Wallace’s line, fall within the Australian region.

Nearly all the mammals of Europe also occur in northern Asia, where, however, the Palaearctic fauna is enriched by numerous mammals additional species. The characteristic groups belong and birds. most ly to forms which are restricted to cold and temperate regions. Consequently the Quadrumana, or monkeys, are nearly unrepresented, a single species occurring in Japan, and one or two others in northern China and Tibet. Insectivorous bats are numerous, but the frugivorous division of this order is only repre- sented by a single species in Japan. Carnivora are also numerous, particularly the frequenters of cold climates, such as bears, weasels, wolves and foxes. Of the Insectivora numerous forms of moles, shrews and hedgehogs prevail. The Rodents are also well repre- sented by various squirrels, mice and hares. Characteristic forms of this order in northern Asia are the marmots (Arctomys) and the pikas, or tailless hares

(Lagomys). The great order of Ungulata is represented by various forms of sheep, as many as ten or twelve wild species of Oi'is being met with in the mountain chains of Asia; and more sparingly by several peculiar forms of antelope, such as the saiga {Saiga tatarica), and the Gazella gutturosa, or yellow sheep. Coming to the deer, we also meet with characteristic forms in northern Asia, especially those belonging to the typical genus Cervus. The musk deer (Moschus) is also quite restricted to northern Asia, and is one of its most peculiar types.

The ornithology of northern Asia is even more closely allied to that of Europe than the mammal fauna. Nearly three-fourths of the well-known species of Europe extend through Siberia into the islands of the Japanese empire. Here again we have an absence of all tropical forms, and a great development of groups characteristic of cold and temperate regions. One of the most peculiar of these is the genus Phasianus, of which splendid birds all the species are restricted in their wild state to northern Asia. The still more magnificently clad gold pheasants (Thaumalea) , and the eared pheasants {Crossoptilon), are also confined to certain districts in the mountains of north-eastern Asia. Amongst the Passeres, such forms as the larks, stone-chats, finches, linnets and grosbeaks are well developed, and exhibit many species.

The mammal fauna of the Indian region of Asia is much more highly developed than that of the Palaearctic. The Quadrumana are represented by several peculiar genera, amongst which are Semnopithecus, Hylobates and Simla. Two peculiar forms of the Lemurine group are also met with. Both the insectivorous and

frugivorous divisions of the bats are well represented. Amongst the Insectivora very peculiar forms are found, such as Gymnura and Tupaia. The Carnivora. are likewise numerous ; and this region may be considered as the true home of the tiger, though this animal has wandered far north into the Palaearctic division of Asia. Other characteristic Carnivora are civets, various ichneumons, and the benturong (Arcticlis). Two species of bears are likewise restricted to the Indian region. In the order of Rodents squirrels are very numerous, and porcupines of two genera are met with. The Indian region is the home of the Indian elephant — one of the two sole remain- ing representatives of the order Proboscidea. Of the Ungulates, four species of rhinoceros and one of tapir are met with, besides several peculiar forms of the swine family. The Bovidae, or hollow-horned ruminants, are represented by several genera of antelopes, and by species of true Bos — such as B. sondaicus, B. frontalis and B. bubalus. Deer are likewise numerous, and the peculiar group of chevrotains (Tragulus) is characteristic of the Indian region. Finally, this region affords us representatives of the order Edentata, in the shape of several species of

Manis, or scaly ant-eater.

The assemblage of birds of the Indian region is one of the richest and most varied in the world, being surpassed only by that of tropical America. Nearly every order, except that of the Struthiones or ostriches, is well represented, and there are many peculiar genera not found elsewhere, such as Buceros, Harpactes, Lophophorus, Euplocamus, Pavo and Ceriornis. The Phasianidae (exclusive of true Phasianus) are highly characteristic of this region, as are like- wise certain genera of barbets (Megalaema) , parrots (Palaeornis), and crows (Dendrocitta, Urocissa and Cissa). The family Eurylaemidae is entirely confined to this part of Asia.

The Ethiopian fauna plays but a subordinate part in Asia, intrud- ing only into the south-western corner, and occupying the desert districts of Arabia and Syria, although some of the characteristic species reach still farther into Persia and Sind, and even into western India. The lion and the hunting-leopard, which may be considered as, in this epoch at least, Ethiopian types, extend thus far, besides various species of jerboa and other desert-loving forms.

In the birds, the Ethiopian type is shown by the prevalence of larks and ˆstone-chats, and by the complete absence of the many peculiar genera of the Indian region.

The occurrence of mammals of the Marsupial order in the Molucca Islands and Celebes, while none have been found in the adjacent islands of Java and Borneo, lying on the west of Wallace's line, or in the Indian region, shows that the margin of the Australian region has here been reached. The same conclusion is indicated by the absence from the Moluccas and Celebes of various other Mammals, Quadrumana, Carnivora, Insectivora and Ruminants, which abound in the western part of the Archipelago. Deer do not extend into New Guinea, in which island the genus Sus appears to have its eastern limit. A peculiar form of baboon, Cynopithecus, and the singular ruminant, Anoa, found in Celebes, seem to have no relation to Asiatic animals, and rather to be allied to those in Africa.

The birds of these islands present similar peculiarities. Those of the Indian region abruptly disappear at, and many Australian forms reach but do not pass, the line above spoken of. Species of birds akin to those of Africa also occur in Celebes.

Of the' marine orders of Sirenia and Cetacea the Dugong, Halicore, is exclusively found in the Indian Ocean; and a dolphin, Platanista, peculiar to the Ganges, ascends that river to a great distance from the sea.

Of the sea fishes of Asia, among the Acanthopterygii, or spiny- rayed fishes, the Percidae, or perches, are largely represented ; the genus Serranus, which has only one species in Europe, is Fishes very numerous in Asia, and the forms are very large. Other allied genera are abundant, and extend from the Indian seas to eastern Africa. The Squamipennes, or scaly-finned fishes, are principally found in the seas of southern Asia, and especially near coral reefs. The Mullidae, or red mullets, are largely represented by genera differing from those of Europe. The Polynemidae, which range from the Atlantic through the Indian Ocean to the Pacific, supply animals from which isinglass is prepared; one of them, the mango-fish, esteemed a great delicacy, inhabits the seas from the Bay of Bengal to Siam. The Sciaenidae extend from the Bay of Bengal to China, but are not known to the westward. The Stromateidae, or pomfrets, resemble the dory, a Mediterranean form, and extend to China and the Pacific. The sword fishes, Xiphiidae, the lancet fishes, Acanthuridae, and the scabbard fishes, Trichuridae, are distributed through the seas of south Asia. Mackerels of various genera abound, as well as gobies, blennies and mullets.

Among the Anacanthini, the cod family so well known in Europe shows but one or two species in the seas of south Asia, though the soles and allied fishes are numerous along the coasts. Of the Physos- tomi, the siluroids are abundant in the estuaries and muddy waters; the habits of some of these fishes are remarkable, such as that of the males carrying the ova in their mouths till the young are hatched. The small family of Scopelidae affords the gelatinous Harpodon, or bumalo. The gar-fish and flying-fishes are numerous, extending into the seas of Europe. The Ciupeidae, or herrings, are most abundant; and anchovies, or sardines, are found in shoals, but at irregular and uncertain intervals. The marine eels, Muraenidae, are more numerous towards the Malay Archipelago than in the Indian

seas. Forms of sea-horses {Hippocampus), pipe-fishes (Syngnathus), fife-fishes {Sclerodermus) , and sun-fish, globe-fish, and other allied forms of Gymnodontes, are not uncommon.

Of the cartilaginous fishes, Chondropterygii, the true sharks and hammer-headed sharks, are numerous. The dog-fish also is found, one species extending from the Indian seas to the Cape of Good Hope. The saw-fishes, Pristidae, the electrical rays, Torpedinae, ar d ordinary rays and skates, are also found in considerable numbers.

The fresh waters of southern Asia are deficient in the typical forms of the Acanthopterygii, and are chiefly inhabited by carp, siluroids, simple or spined eels, and the walking and climbing fishes. The Siluridae attain their chief development in tropical regions. Only one Silurus is found in Europe, and the same species extends to southern Asia and Africa. The Salmonidae are entirely absent from the waters of southern Asia, though they exist in the rivers that flow into the Arctic Ocean and the neighbouring parts of the northern Pacific, extending perhaps to Formosa; and trout, though unknown in Indian rivers, are found beyond the watershed of the Indus, in the streams flowing into the Caspian. The Cyprinidae, or carp, are largely represented in southern Asia, and there grow to a size unknown in Europe; a Barbus in the Tigris has been taken of the weight of 300 lb. The chief development of this family, both as to size and number of forms, is in the mountain regions with a temperate climate ; the smaller species are found in the hotter regions and in the low-lying rivers. Of the Clupeidae, or herrings, numerous forms occur in Asiatic waters, ascending the rivers many hundred miles; one of the best-known of Indian fishes, the hilsa, is of this family. The sturgeons, which abound in the Black Sea and Caspian, and ascend the rivers that fall into them, are also found in Asiatic Russia, and an allied form extends to southern China. The walking or climbing fishes, which are peculiar to south-eastern Asia and Africa, are organized so as to be able to breathe when out of the water, and they are thus fitted to exist under conditions which would be fatal to other fishes, being suited to live in the regions of periodical drought and rain in which they are found.

The insects of all southern Asia, including India south of the Himalaya, China, Siam and the Malayan Islands, belong to one Insects. g rou P : n °t only the genera, but even the species are often the same on the opposite sides of the Bay of Bengal. The connexion with Africa is marked by the occurrence of many genera common to Africa and India, and confined to those two regions, and similarities of form are not uncommon there in cases in which the genera are not peculiar. Of Coleopterous insects known to inhabit east Siberia, nearly one-third are found in western Europe. The European forms seem to extend to about 30 N., south of which the Indo-Malayan types are met with, Japan being of the Europeo-Asiatic group. The northern forms extend generally along the south coast of the Mediterranean up to the border of the great desert, and from the Levant to the Caspian.

Of the domesticated animals of Asia may first be mentioned the elephant. It does not breed in captivity, and is not found wild west Domesti- °^ ‘ ne J umna river in northern India. The horse is pro- cated duced, in the highest perfection in Arabia and the hot

animals. an d dry countries of western Asia. Ponies are most esteemed

from the wetter regions of the east, and the hilly tracts. Asses are abundant in most places, and two wild species occur. The horned cattle include the humped oxen and buffaloes of India, and the yak of Tibet. A hybrid between the yak and Indian cattle, called zo, is commonly reared in Tibet and the Himalaya. Sheep abound in the more temperate regions, and goats are univers- ally met with ; both of these animals are used as beasts of burden in the mountains of Tibet. The reindeer of northern Siberia call also for special notice; they are used for the saddle as well as for draught. (R. S.)

Ethnology

Asia, including its outlying islands, has become the dwelling-place of all the great families into which the races of men have been Racial divided. By far the largest area is occupied by the types. Mongolian group. These have yellow-brown skins, black

eyes and hair, flat noses and oblique eyes. They are short in stature, with little hair on the body and face. In general terms they extend, with modifications of character probably due to ad- mixture with other types and to varying conditions of life, over the whole of northern .Asia as far south as the plains bordering the Caspian Sea, including Tibet and China, and also over the Indo- Malayan peninsula and Archipelago, excepting Papua and some of the more eastern islands.

Next in numerical importance to the Mongolians are the races which have been called by Professor Huxley Melanochroic and Xanthochroic. The former includes the dark-haired people of southern Europe, and extends over North Africa, Asia Minor, Syria to south-western Asia, and through Arabia and Persia to India. The latter race includes the fair-haired people of northern Europe, and extends over nearly the same area as the Melanochroi, with which race it is greatly intermixed. The Xanthochroi have fair skins, blue eyes and light hair; and others have dark skins, eyes and hair, and are of a slighter frame. Together they constitute what were once called the Caucasian races. The Melanochroi are not considered by Huxley to be one of the primitive modifications of

mankind, but rather to be the result of the admixture of the Xantho- chroi with the Australoid type, next to be mentioned.

The third group is that of the Australoid type. Their hair is dark, generally soft, never woolly. The eyes and skin are dark, the beard often well developed, the nose broad and flat, the lips coarse, and jaws heavy. This race is believed to form the basis of the people of the Indian peninsula, and of some of the hill tribes of central India, to whom the name Dravidian has

been given, and by its admixture with the Melanochroic group to have given rise to the ordinary population of the Indian provinces. It is also probable that the Australoid family extends into south Arabia and Egypt.

The last group, the Negroid, is represented by the races to which has been given the name of Negrito, from the small size of some of them. They are closely akin to the negroes of South Africa, and possess the characteristic dark skins, woolly but scanty beard and body hair, broad flat noses, and projecting lips of the African ; and are diffused over the Andaman Islands, a part of the Malay peninsula, the Philippines, Papua, and some of the neighbouring islands. The Negritos appear to be derived from a mixture of the true Negro with the Australoid type.

The distribution of the Mongolian group in Asia offers no parti- cular difficulty. There is complete present, and probably previous long-existing, geographical continuity in the area over Mon- which they are found. There is also considerable simi- eolians. larity of climate and other conditions throughout the northern half of Asia which they occupy. The extension of modified forms of the Mongolian type over the whole American continent may be mentioned as a remarkable circumstance connected with this branch of the human race.

The Mongolians of the northern half of Asia are almost entirely nomadic, hunters and shepherds or herdsmen. The least advanced of these, but far the most peaceful, are those that occupy Siberia. Farther south the best-known tribes are the Manchus, the Mongols proper, the Moguls and the Turks, all known under the name of Tatars, and to the ancients as Scythians, occupying from east to west the zone of Asia comprised between the 40th and 50th circles of N. lat. The Turks are Mahommedans; their tribes extend up the Oxus to" the borders of Afghanistan and Persia, and' to the Caspian, and under the name of Kirghiz into Russia, and their language is spoken over a large part of western Asia. Their letters are those of Persia. The Manchus and Mongols are chiefly Buddhist, with letters derived from the ancient Syriac. The Manchus are now said to be gradually falling under the influence of Chinese civilization, and to be losing their old nomadic habits, and even their peculiar language. The predatory habits of the Turkish, Mongolian and Manchu population of northern Asia, and their irruptions into other parts of the continent and into Europe, have produced very remark- able results in the history of the world.

The Chinese branch of the Mongolian family are a thoroughly settled people of agriculturists and traders. They are partially Buddhist, and have a peculiar monosyllabic, uninflected language, with writing consisting of symbols, which represent words, not letters.

The countries lying between India and the Mongolian are occu- pied by populations chiefly of the Mongolian and Chinese type, having languages fundamentally monosyllabic, but using letters derived from India, and adopting their religion, which is almost everywhere Buddhist, from the Indians. Of these^may be named the Tibetans, the Burmese and the Siamese. Cochm-China is more nearly Chinese in all respects. It is known that to the Tibeto- Chinese modifications of the pure Mongolian type all the eastern Burmese tribes — Chins, Kachins, Shans, &c. — belong (as indeed do the Burmese themselves), and that a cognate race occupies the Himalaya to the eastern limits of Kashmir.

Some light has been thrown on the connexion between the Tibetan race and certain tribes of central India, the Bhils and Kols; and it seems more probable that these tribes are the remnants of a Mon- golian race which first displaced a yet earlier Negroid population, and was then itself shouldered out by a Caucasian irruption, than that they entered India by any of the northern passages within historic times. Mongolian settlements have lately been found very much farther extended into the border countries of north-west India than has been hitherto recognized. The Mingals, who, conjointly with the Brahuis, occupy the hills south of Kalat to the limits of the Rajput province of Las Bela, claim Mongolian descent, and traces of a Mongolian colony have been found in Makran.

The Malays, who occupy the peninsula and most of the islands of the Archipelago called after them, are Mongols apparently modified by their very different climate, and by the maritime life Malays forced upon them by the physical conditions of the '

region they inhabit. As they are now known to us, they have under- gone a process of partial civilization, first at the hands of the Brah- minical Indians, from whom they borrowed a religion, and to some extent literature and an alphabet, and subsequently from intercourse with the Arabs, which has led to the adoption of Mahommedanism by most of them.

The name of Aryan has been given to the races speaking languages derived from, or akin to, the ancient form of Sanskrit, who now occupy the temperate zone extending from the Mediterranean, across the highlands of Asia Minor, Persia and Afghanistan, to

India. The races speaking the languages akin to the ancient Assyrian, which

are now mainly represented by Arabic, have been called Semitic, and occupy the countries south-west of Aryans. Persia, including Syria and Arabia, besides extending into North Africa. Though the languages of these races are very different they cannot be regarded as physically distinct, and they are both without doubt branches of the Melanochroi, modified by admixture with the neighbouring races, the Mongols, the Australoids and the Xanthochroi.

The Aryans of India are probably the most settled and civilized of all Asiatic races. This type is found in its purest form in the north and north-west, while the mixed races and the population referred to the Australoid type predominate in the peninsula and southern India. The spoken languages of northern India are very various, differing one from another in the sort of degree that English differs from German, though all are thoroughly Sanskritic in their vocables, but with an absence of Sanskrit grammar that has given rise to considerable discussion. The languages of the south are Dravidian, not Sanskritic. The letters of both classes of languages, which also vary considerably, are all modifications of the ancient Pali, and probably derived from the Dravidians, not from the Aryans. They are written from left to right, exception being made of Urdu or Hindostani, the mixed language of the Mahommedan conquerors of northern India, the character used for writing which is the Persian. From the river Sutlej and the borders of the Sind desert, as far as Burma and to Ceylon, the religion of the great bulk of the people of India is Hindu or Brahminical, though the Mahommedans are often numerous, and in some places even in a majority. West of the Sutlej the population of Asia may be said to be wholly Mahommedan with the exception of certain relatively small areas in Asia Minor and Syria, where Christians predominate. The language of the Punjab does not differ very materially from that of Upper India. West of the Indus the dialects approach more to Persian, which language meets Arabic and Turki west of the Tigris, and along the Turkoman desert and the Caspian. Through the whole of this tract the letters are used which are common to Persian, Arabic and Turkish, written from right to left.

Considerable progress has been made in the classification of the various races which occupy the continent to the west of the great Mongolian region. The ancient Sacae, or Scyths, are Racial recognized in the Aryan population, who may be found dlstri- ; n g rea t numbers and in their purest form in the more

button. inaccessible mountains and glens of the central highlands. These Tajiks (as they are usually called) form the underlying popu- lation of Persia, Baluchistan, Afghanistan and Badakshan, and their language (in the central districts of Asia) is found to contain words of Aryan or Sanskrit

derivation which are not known in Persian. They have been for the most part dispossessed of their country by Turkish immigration and conquests, but they still retain their original intellectual superiority over the Turkish and other mixed tribes by which they are surrounded. Uzbegs and Kirghiz have but small affinity with the Mongol element of Asia. They are the representa- tives of those countless Turkish irruptions which have taken place through all history. Of the two divisions (Kara Kirghiz and Kassak Kirghiz) into which the Kirghiz tribes are divided by Russian authorities, the Kassak Kirghiz is the more closely allied to the Mongol type; the Kara Kirghiz, who are found principally in the valleys of the Tian-shan and Altai mountains, being unmistakably Turkish. The Kipchaks are only a Kirghiz clan. The language of the Kirghiz is Turki and their religion that of Mahomet. As a nomadic people they have great contempt for the Sarts, who repre- sent the town dwellers of the tribe. The Kalmucks are a Buddhist and Mongolian people who originated in a confederacy of tribes dwelling in Dzungaria, migrated to Siberia, and settled on the Lower Volga. From thence they returned late in the 18th century to the reoccupation of their old ground in Kulja under the Chinese. The Turkoman is the purest form of the Turk element, and his lan- guage is the purest form of the Turkish tongue, which is represented at Constantinople by a comparatively mongrel, or mixed, dialect. Ethnographers have traced a connexion between the Turkoman of central Asia and the Teutonic races of Europe, based on a similarity of national customs and immemorial usage. Evidence of an original affinity between Turkoman and Rajput has also been found in the mutual possession by these races of a ruddy skin, so that as ethno- graphical inquiry- advances the Turk appears to recede from his Mongolian affinities and to approach the Caucasian. Turks and Mongols alike were doubtless included under the term Scyth by the ancients, and as Tatars by more modern writers, insomuch that the Turkish dynasty at Delhi, founded by Baber, is usually termed the Mogul dynasty, although there can be no distinction traced between the terms Mogul and Mongol. The general results of recent inquiry into the ethnography of Afghanistan is to support the general correctness of Bellew's theories of the origin of the Afghan races. The claim of the Durani Afghan to be a true Ben-i-Israel is certainly in no way weakened by any recent investigation. The influence of Greek culture in northern India is fully recognized, and the distri- bution of Greek colonies previous to Alexander's time is attested by practical knowledge of the districts they were said to occupy. The habitat of the Nysaeana, and the identity of certain tribes of Kafiristan with the descendants of these pre-Alexandrian colonists

from the west, are also well established. To this day hymns are un-wittingly sung to Bacchus in the dales and glens of Kafiristan. The ethnographical status of the mixed tribes of the mountains that lie between

Chitral and the Peshawar plains has been fairly well fixed by John Biddulph, and much patient inquiry in the vast fields of Baluchistan by Major Mockler, G. P. Tate and others has resulted in quite a new appreciation of the tribal origin of the great con- glomeration of Baluch peoples.

The result of trans-border surveys to the north and west of India has been to establish the important geographical fact that it is by two gateways only, one on the north-west and one on the west of India, that the central Asiatic tides of immigration have flowed into the peninsula. The Kabul valley indicates the north-western entrance, and Makran indicates that on the west. By the Kabul valley route, which includes at its head the group of passes across the Hindu Kush which extend from the Khawak to the Kaoshan, all those central Asian hordes, be they Sacae, Yue-chi, Jats, Goths or Huns, who were driven towards the rich plains of the south, entered the Punjab. Some of them migrated from districts which belong to eastern Asia, but none of them penetrated into India by eastern passes. Such tides as set towards the Himalaya broke against their farther buttresses, leaving an interesting ethnographical flotsam in the northern valleys; but they never overflowed the Himalayan barrier. Later most of the historic invasions of India from central Asia followed the route which leads directly from Kabul to Peshawar and Delhi.

By the western gates of Makran prehistoric irruptions from Mesopotamia broke into the plains of Lower Sind, and either passed on towards the central provinces of India or were absorbed in the highlands south of Kalat. In later centuries the Arabs from the west reached the valley of the Indus by their western route, and there established a dynasty which lasted for 300 years. The identi- fication of existing peoples with the various Scythic, Persian and Arab races who have passed from High Asia into the Indian border- land, has opened up a vast field of ethnographical inquiry which has hardly yet found adequate workers for its investigation. To such fields may be added the yet more complicated problems of those reflex waves which flowed backwards from India into the border highlands. (T. H. H.)*

History

1. The borders assigned to Asia on the west are somewhat arbitrary. The Urals indicate no real division of races, and in both Greek and Turkish times Asia Minor has been connected with the opposite shores of Europe rather than with the lands lying to the east. A juster view of early history is probably obtained by thinking of the countries round the Mediterranean as interacting on one another than by separating Palestine and Asia Minor as Asiatic.

2. The words " Asiatic " and " Oriental " are often used as if they denoted a definite and homogeneous type, but Russians resemble Asiatics in many ways, and Turks, Hindus, Chinese, &c, differ in so many important points that A ? ,atl ° t the common substratum is small. It amounts to this, / s ˆg. that Asiatics stand on a higher level than the natives

of Africa or America, but do not possess the special material civilization of western Europe. As far as any common mental characteristic can be assigned it is also somewhat negative, namely, that Asiatics have not the same sentiment of independ- ence and freedom as Europeans. Individuals are thought of as members of a family, state or religion, rather than as entities with a destiny and rights of their own. This leads to autocracy in politics, fatalism in religion and conservatism in both. Hence, too, Asiatic history has large and simple outlines. Though longer chronologically than the annals of Europe, it is less eventful, less diversified and offers fewer personalities of interest. But the same conditions which render individual eminence difficult procure for it when once attained a more ready recogni- tion, and the conquerors and prophets of Asia have had more power and authority than their parallels in Europe. Jenghiz Khan and Timur covered more ground than Napoleon, and no European has had such an effect on the world as Mahomet.

3. Attention has often been called to the religious character of Asia. Not only the great religions of the world — Buddhism, Christianity, Islam — but those of secondary import- Religion ance, such as Judaism, Parseeism, Taoism, are all and Asiatic. No European race left to itself has developed cMiiza- anything more than an unsystematic paganism. It is

true that Greek philosophy advanced far beyond this stage, but it produced nothing sufficiently popular to be called a religion.

On the other hand Christianity, though Asiatic in its origin and essential ideas, has to a large extent taken its present form on European soil, and some of its most important manifestations — notably the Roman Church — are European reconstructions in which little of the Asiatic element remains. Christianity has made little way farther east then Asia Minor. Modern missions have made no great conquests there, and in earlier times the Nestorians and Jacobites who penetrated to central Asia, China and India, received respectful hearing, but never had anything like the success*

which attended Buddhism and Islam. Yet Buddhism has never made much impression west of India; and Islam is clearly repugnant to Europeans, for even when under Moslem rule (as in Turkey) they refuse to accept it in a far larger proportion than did the Hindus in similar circumstances. Hence there is clearly a deep-seated difference between the religious feelings of the two continents.

Since Asiatic records go back much farther than those of Europe, it is natural that Asia should be thought the birthplace of civilization. But this originality cannot be absolute, for, whatever may have been the relations of Babylonia and the Aryans, the latter brought civilization to India from the west, and it is not always clear whether similarity of government and institutions is the result of borrowing or of parallel development. Both in Europe and in Asia small feudal or aristocratic states tended to consolidate themselves into monarchies, but whereas in Europe from the early days of Rome onwards royalty has often been driven out and replaced temporarily or permanently by popular government, this change seems not to occur in Asia, where revolution means only a change of dynasty. The few cases where the government is not monarchical, as Arabia, seem to represent the persistence of very ancient conditions.

The contemplation of Asia suggests that progress is most rapid when accompanied by the migration of races or the trans- plantation of ideas and institutions. Thus Greece excelled the Eastern countries from whom she may have derived her civiliza- tion, and Buddhism had a far more brilliant career outside India than in it.

4. In many parts of southern Asia are found semi-barbarous races representing the earliest known stratum of population, such as the Yeddahs of Ceylon, and various tribes in China historical an d the Malay Archipelago. Some of them offer outlines. analogies to the Australians. This connexion, if true, must be very ancient, since it apparently goes back to a time when the distribution of land and water was other than at present. In northern Asia are found other aborigines, 'such as the Ainus of Japan and the so-called hyperborean 'races (Chukchis, &c), but no materials are at present forthcoming for their history. There is some record of the migrations of the later races superimposed on these aborigines. The Chinese came from the west, though how far west is unknown: the Hindus and Persians from the north-west: the Burmese and Siamese from the north. We do not know if the Mongols, Turks, &c, had any earlier home than central Asia, but their extensive movements from that region are historical.

The antiquity of Asiatic history is often exaggerated. With the exception of Babylonia and Assyria, we can hardly even conjecture what was the condition of this continent much before 1500 B.C. At that period the

Chinese were advancing along the Hwang-ho, and the Aryans were entering India from the north- west. Both were in conflict with earlier races. The influence of Babylonian civilization was probably widespread. Some connexion between Babylonia and China is generally admitted, and all Indian alphabets seem traceable to a Semitic original borrowed in the course of commerce from the Persian Gulf.

Apart from European conquests, the internal history of Asia in the last 2000 years is the result of the interaction of four main influences: (a) Chinese, (b) Indian, (c) Mahommedan, (d) Central Asian. Of these the first three represent different types of civilization: the fourth has little originality, but has been of great importance in affecting the distribution of races and political power.

(a) China has moulded the civilization of the eastern mainland

and Japan, without much affecting the Malay Archipelago. In the sphere of direct influence fall Korea, Japan and Annam; in the outer sphere are Mongolia, Tibet, Siam, Cambodia and Burma, where Indian and Chinese influence are combined, the Indian being often the stronger. These countries, except Japan, have all been at some time at least nominal tributaries of China. Where Chinese influence had full play it introduced Confucianism , a special style in art and the Chinese system of writing. After the Christian era it was accompanied by Chinese Buddhism. The cumbrous Chinese script maintains itself in the Far East, but has not advanced west of China proper and Annam.

(b) Indian influence may be defined as Buddhism, if it is understood that Buddhism is not at all periods clearly distinguish- able from Hinduism. Its sphere includes Indo-China, much of the Malay Archipelago, Tibet and Mongolia. Moreover, China and Japan themselves may be said to fall within this sphere, in view of the part which Buddhism has played in their develop- ment. The Buddhist influence is not merely religious, for it is always accompanied by Indian art and literature, and often by an Indian alphabet. Much of this art is Greek in origin, being derived from the Perso-Greek states on the north-west frontiers of India. Indian alphabets have spread to Tibet, Cambodia, Java and Korea. The history of Indian civilization in Indo-China and the Archipelago is still obscure, in spite of the existence of gigantic ruins, but it would appear that in some parts at least two periods must be distinguished, first the introduction of Hinduism (or mixed Hinduism and Buddhism), perhaps under Indian princes, and secondly a later and more purely ecclesiastical introduction of Sinhalese Buddhism, with its literature and art.

(c) Mahommedanism or Islam is perhaps the greatest trans- forming force

which the world has seen. It has profoundly affected and to a large extent subjugated all western Asia including India, all eastern and northern Africa as well as Spain, and all eastern Europe. Its open advocacy of force attracts warlike races, and the intensity of its influence is increased by the fusion of secular and religious power, so that the Moslem Church is a Moslem state characterized by slavery, polygamy, and, subject to the autocracy of the ruler, by the theoretical equality of Moslems, who in political status arc superior to non- Moslems. Thus, whenever the population of a Moslem country is of mixed belief, a ruling caste of Moslems is formed, as in Turkey at the present day and India under the Moguls. Islam is paramount in Turkey, Persia, Arabia and Afghanistan. India is the dividing line: Islam is strong in northern and central India, v/ eaker in the south. But only one-fifth of the whole population is Moslem. Beyond India it has spread to Malacca and the Malay Archipelago, where it overwhelmed Hindu civilization, and reached the southern Philippines. But it made no-progress in Indo-China or Japan; and though there is a large Moslem population in China the Chinese influence has been stronger, for alone of all Asiatics the Chinese have succeeded in forcing Islam to accept the ordinary limitations of a religion and to take its place as a creed parallel to Buddhism or any other.

Even more than Buddhism Islam has carried with it a special style of art and civilization. It is usually accompanied by the use of the Arabic alphabet, and in the languages of Moslem nations (notably Turkish, Persian, Hindustani and Malay) a large proportion of the vocabulary is borrowed from Arabic. Hindi and Hindustani, two forms of the same language as spoken by Hindus and Mahommedans respectively, are a curious example of how deeply religion may affect culture.

(d) The great part which central Asian tribes have played in history is obscured by the absence of any common name for them. Linguistically they can be divided into several groups such as Turks, Mongols and Huns, but they were from time to time united into states representing more than one group, and their armies were recruited, like the Janissaries, from all the military races in the neighbourhood. Soon after the Christian era central Asia began to boil over, and at least seven great invasions and more or less complete conquests can be ascribed to these tribes without counting minor movements, (i.) The early invasions of Europe by the Avars, Huns and Bulgarians.

HISTORY]

(ii.) The invasion and temporary subjection of Russia by the Mongols, who penetrated as far west as Silesia, (iii.) The conquests of Timur. (iv.) The conquest of Asia Minor and eastern Europe by the Turks, (v.) The conquest of India by the Moguls, (vi.) The conquest of China by the Mongols under Kublai. (vii.) The later conquest of China by the Manchus. To these may be added numerous lesser invasions of India, China and Persia.

These tribes have a genius for warfare rather than for govern- ment, art or literature, and with few exceptions (e.g. the Moguls in India) have proved poor administrators. Apart from conquest their most important function has been to keep up communica- tions in central Asia, and to transport religions and civilizations from one region to another. Thus they are mainly responsible for the introduction of Islam with its Arabic or Persian civiliza- tion into India and Europe, and in earlier times their movements facilitated the infiltration of Graeco-Bactrian civilization into India, besides maintaining communication between China and the West.

5. Babylonia and Assyria. — The movements mentioned above have been the chief factors of relatively modern Asiatic history, but in early times the centre of activity and culture lay farther west, in Babylonia and Assyria. These ancient states began to decline in the 7th century B.C., and on their ruins rose the Persian empire, which with various political metamorphoses continued to be an important power till the 7th century A.D., after which all western Asia was overwhelmed by the Moslem wave, and old landmarks and kingdoms were obliterated.

The materials for the study of their institutions and population are abundant, but lend themselves to discussion rather than to a summary of admitted facts. In the early history of south- western Asia the Semites form the most important ethnic group, which is primarily linguistic but also shares other remarkable characteristics. Two of the greatest religions of the world, Christianity and Islam, are Semitic in origin, as well as Judaism. In politics these races have been less successful in modern times, but the Semitic states of Babylonia and Assyria were once the principal centres for the development and distribution of civiliza- tion. It is generally agreed that this civilization can be traced back to an earlier race, the Sumero-Akkadians, whose language seems allied to the agglutinative idioms of central Asia. If this ancient civilized race was really allied to the ancestors of the Turks and Huns, it is a remarkable instance of how civilization thrives best by being transplanted at a certain period of growth. Still less is

known of the early non- Aryan races of Asia Minor such as the Hittitcs and Alorodians. One hypothesis supposes that the shores of the Mediterranean were originally inhabited by a homogeneous race neither Aryan nor Semitic.

The earliest Sumerian records seem to be anterior to 4000 B.C. Shortly after that period Babylonia was invaded by Semites, who became the ruling race. The city of Babylon came to the fore as metropolis about 2285 B.C. under Khammurabi. Assyria was an offshoot of Babylonia lying to the north-west, and appar- ently colonized before the second millennium. While using the same language as the Babylonians, the Assyrians had an individuality which showed itself in art and religion. In the oth and 8th centuries B.C. they became the chief power within their sphere and the suzerain of their parent Babylon. But they succumbed before the advance of the Medo-Persian power in 606 B.C., whereas it was not till 555 that Cyrus took Babylon. Assyria, being essentially a military power, disappeared with the destruction of Nineveh, but Babylon continued to exercise an influence on culture and religion for many centuries after the Persian conquest.

6. China. — This is the oldest of existing states, though its authentic history does not go back much beyond 1000 B.C. It is generally admitted that there was some connexion between the ancient civilizations of China and Babylonia, but its precise nature is still uncertain. It is clear, however, that the Chinese came from the west, and entered their present territory along the course of the Hwang-ho at an unknown period, possibly about 3000 B.C. In early historical times China consisted of a shifting

confederacy of feudal states, but about 220 B.C. the state of Tsin or Chin (whence the name China) came into prominence, and succeeded in forming a homogeneous empire, which advanced considerably towards the south. The subsequent history of China is mainly a record of struggles with various tribes, com- monly, but not very correctly, called Tatars. The empire was frequently broken up by successful incursions, or divided between rival dynasties, but at least twice became a great Asiatic power: under the Han dynasty (about 200 b.c.-a.d. 220), and the T'ang (a.d. 618-906). The dominions of the latter extended across central Asia to northern India, but were dis- membered by the attacks of the Kitans, whence the name Cathay. China proper, minus these external provinces, was again united under the Sung dynasty (960-1127), but split into the northern (Tatar) and southern (Chinese) kingdoms. In the 13th century arose the Mongol power, and Kublai Khan conquered China. The Mongol dynasty lasted less than a century, but the Ming, the native Chinese dynasty which succeeded it, reigned for nearly 300 years and despatched expeditions which reached India, Ceylon and East Africa. In 1644 the

Ming succumbed to the attacks of the Manchus, a northern tribe who captured' Peking and founded the present imperial house.

Until the advent of Europeans, the Chinese were always in contact with inferior races. Whether they expanded at the expense of weak aboriginal tribes or were conquered by more robust invaders, Chinese civilization prevailed and assimilated alike the conquered and the conquerors. It is largely to this that we must ascribe the national conservatism and contempt for foreigners. The spirit of the Chinese polity is self-contained, anti-military and anti-sacerdotal. Rank is nominally deter- mined by merit, as tested by competitive examinations. Society is conceived as regulated by mutual obligations, of which the duties of parents and children are the most important. The emperor is head of the state and the high priest, who sacrifices to Heaven on behalf of his people, but he can be deposed, and no divine right is inherent in certain families as in Japan and Turkey. On the contrary there have been 20 dynasties since the Christian era.

The most conspicuous figure in Chinese literature is Confucius (551-475 B.C.). Though he laid no claim to originality and merely sought to collect and systematize the traditions of antiquity, his influence in the Far East has been unbounded, and he must be pronounced one of the most powerful advocates of peace and humanity that have ever existed. Confucianism is an ethical rather than a religious system, and hence was able to co-exist, though not on very friendly terms, with Buddhism, which reached China about the 1st century a.d. and was the chief source of Chinese religious ideas, except the older ancestor worship. But they are not a religious people, and like many Europeans regard the church as a department of the state.

7. Japan appears to have been formerly inhabited by the Ainus, who have traditions of an older but unknown population, but was invaded in prehistoric times by a race akin to the Koreans, which was possibly mingled with Malay elements after occupying the southern part of the islands. Authentic history does not begin till about the 6th century A.D., when Chinese civilization and Buddhism were introduced. The government was originally autocratic, but as early as the 7th century the most characteristic feature of Japanese politics — the power of great families who overshadowed the throne — makes its appearance. We hear first of the Fujiwara family, and then of the rivalry between the houses of Taira and Mina- moto. The latter prevailed, and in 1192 established the dua'i system of government under which the emperor or Mikado ruled only in name, and the real power was in the hands of a hereditary military chief called Shogun. Japan has never been invaded in historical times, but an attempt made by Kublai Khan to conquer it was successfully repulsed. The chief power then passed to the Ashikaga dynasty of Shoguns, who retained it for

about 200 years and were distinguished for their patronage of the arts. The second half of the 16th century was a period of ferment and anarchy, marked by the arrival of the Portuguese

and the rise of some remarkable adventurers, one of whom, Hideyoshi, conquered Korea and apparently meditated the invasion of China. His plans were interrupted by his death, and his successor, Ieyasu, who shaped the social and political life of Japan for nearly 300 years (1603-1868), definitely decided on a policy of seclusion and isolation. All ideas of external conquest were abandoned, Christianity was forbidden, and Japan closed to foreigners, only the Dutch being allowed a strictly limited commerce. In 1854-1859 the Christian powers, beginning with the United States, successfully asserted their right to trade with Japan. The influx of new ideas provoked civil war, in which the already decadent Shogunate was abolished and the authority of the Mikado restored. Recognizing that their only chance of competing with Europeans was to fight them with their own weapons, the Japanese set themselves deliberately to assimilate the material civilization and to some extent the institutions of Europe, such as constitutional government. Their progress and success are without parallel. In 1895 they defeated the Chinese and ten years later the Russians. Their exceptional status among Asiatic nations has been recognized by treaties which, contrary to the general practice in non- Christian countries, place all foreigners in Japan under Japanese law.

This sudden development of the Japanese is perhaps the most important event of the second half of the 19th century, since it marks the rise of an Asiatic power capable of competing with Europe on equal terms. Their history is so different from that of the rest of Asia that it is not surprising if the result is different. The nation hardly came into existence till China and India had passed their prime, and remained secluded and free from the continual struggle against barbarian invaders, which drained the energies of its neighbours. It was left untouched by Mahommedanism, and for an unprecedentedly long period kept Europeans at bay without wasting its strength in hostilities. The military spirit was evolved, not in raids and massacres of the usual Asiatic type which create little but intense racial hatred, but in feuds between families and factions of the same race, which restrained ferocity and tended to create a temper like that of the feudal chivalry of Europe. On the other hand it is noticeable that the Japanese have little which is original in the way of religion, literature or philosophy.

Unlike the Chinese and Indians, they have hitherto not had the smallest influence on the intellectual development of Asia, and though they have in the past sometimes shown themselves intensely nationalist and conservative, they have, compared with India and China, so little which is really their own that their assimila- tion of foreign ideas is explicable.

8. Korea received its civilization and religion from China, but differs in language, and to some extent in customs. An alphabet derived from Indian sources is in use as well as Chinese writing. The country was at most periods independent though nominally tributary to China. In the 16th century the Japanese occupied it for a short period, and in 1894 they went to war with China on account of her claims to suzerainty. In 1895 Korea was declared independent.

9. India. — The population of India comprises at least three strata: firstly, uncivilized aborigines, such as the Kols and Santhals, and secondly, the Dravidians (Tamils, Kanarese, &c), who perhaps represent the earliest northern invaders, and appear to have attained some degree of culture on their own account. The most recent authorities are of opinion that the Kolarians and Dravidians represent a single physical type; but, whatever the historical explanation may be, they certainly have different languages and show different stages of civilization. In pre- historic times they were spread over the whole of India, but were driven to the centre and south of the peninsula by the third stratum of Aryans, and perhaps also by invasions of so-called Mongolian races from the north-west. No historical record has been preserved of these latter, but they appear to have profoundly affected the population of Bengal, which isbelievedto be Mongolo- Dravidian in composition. The Aryans appear to have been settled to the north of the Hindu Kush, and to have migrated

south-eastwards about 1500 B.C. Their original home has been a subject of much discussion, but the view now prevalent is that they arose in southern Russia or Asia Minor, whence a section spread eastwards and divided into two closely related branches — the Hindus and Iranians. There were probably two successive Aryan immigrations, and the tradition of a struggle between them may be preserved in the Mahabharata. The life of the ancient Aryans, as portrayed in their sacred songs, the Rig Veda, was quasi-nomadic and in many ways democratic, but by the 6th century B.C. settled states had been formed in the Ganges valley. They were absolute monarchies, but the power of the king was tempered by the extraordinary influence possessed by the hereditary sacerdotal class or Brahmans. The position of this class, which has remained till the present day, is connected with the institution of caste, a division of the population into groups founded partly on racial distinctions. The peaceful progress of Brahmanism was hindered by the doctrine of the Indian prince Gotama, called the

Buddha, which grew into one of the greatest religions of the world. For many centuries the culture and development of the Hindus depended mainly on the interaction of the old Brahmanical religion and Buddhism. The latter was finally absorbed, and disappeared in India itself, but has spread Indian influence over the whole of eastern Asia, where it still flourishes.

In 326 B.C. Alexander invaded the Punjab. The immediate result was small, but the establishment of Perso-Greek kingdoms in central Asia had a powerful influence on Indian art and culture. It may also have helped to familiarize the Hindu mind with the idea of an empire, which appeared among them later than in other Asiatic countries. The first empire, called Maurya,reached its greatest extent in the time of Asoka (264-227 B.C.), who ruled from Afghanistan to Madras. He was a zealous Buddhist and gave the first example of a missionary religion, for by his exertions the faith was spread over all India and Ceylon. No Hindu empires have lasted long, and the Maurya dominions broke up fifty years after his death.

In the next period (c. 150 b.c-a.d. 300) India was invaded from the north by tribes partly of Parthian and partly of Turki (Yue-chi, &c.) origin. Owing to the absence of dated records, the chronology of these invasions has not yet been set beyond dispute, but the most important was that of the Kushans, whose king Kanishka founded a state which comprised northern India and Kashmir. They were Buddhists, and it is probable that the Mahayana or northern form of Buddhism was due to an amalgamation of Gotama's doctrines with the ideas (largely Greek and Persian) which they brought with them. Much of Sivaism has probably the same origin. Another native empire, known as Gupta, rose on the ruins of the Kushan kingdom, and embraced nearly the whole peninsula, but it broke up in the 5th century, partly owing to the attacks of new northern invaders, the Huns. The Malava dynasty maintained Hindu civilization in the 6th century, and from 606 to 646 Harsha established a brief but brilliant empire in the north with its capital at Kanauj. This epoch is marked by the renaissance of Sanskrit literature and the gradual revival of Hinduism at the expense of Buddhism. But after Harsha Hindu history is lost in a maze of small and transitory states, incapable of resisting the ever advancing Mahommedan peril. As early as 712 the Arabs conquered Sind, and by the end of the nth century the whole of northern India was in Moslem hands. Two periods may be distinguished, namely the Turki (1200-15 26) an d the Mogul empire. The former comprised several dynasties of mixed Turki and Iranian race, but was wanting in coherency. In the neigh- bourhood of the Moslem capitals, Islam spread rapidly, but in such districts as Rajputana and specially Vijayanagar (Mysore) Hindu civilization and religion maintained themselves.

In 1526 the Moguls descended on India from Transoxiana and seized the throne of Delhi. They never subjugated the south, but the empire which they founded in the north was for about two centuries, under such rulers as Akbar and Shah Jehan, one of the most brilliant which Asia has seen. After 1707 it began to decline: the governors became independent: a powerful

Mahratta confederacy arose in central India; Nadir Shah of Persia sacked Delhi ; and Ahmed Shah made repeated invasions. A still more formidable danger, the power of the French and English, continued to increase. Amidst such confusion the authority oi the Mogul empire rapidly disappeared, but it lasted as a name till the Mutiny (1857).

Indian history until Mahommedan times is marked by the unusual prominence of religious ideas, and is a record of in- tellectual development rather than of political events. Whatever national unity the Hindu peoples possessed came from the persistent and penetrating influence of the Brahman caste. Kings held a secondary position, and were generally regarded as adventitious tyrants, rather than as the heads and repre- sentatives of the nation. Even the great dynasties have left few traces, and it is with difficulty that the patient historian disinters the minor kingdoms from obscurity, but Indian religion, literature and art have influenced all Asia from Persia to Japan. 10. Persia. — The Persians, with whom are often coupled the Medes, appear to be pure Aryans in origin, and the earliest form of their language and religion offers remarkable analogies to the Vedas. It is reasonable to suppose that their ancestors and those of the Hindus at one time formed a single tribe somewhere in central Asia. The religion was remodelled by Zoroaster, who seems to be a historical character and to have lived about the 7th century B.C. About the same time they shook off the domination of Assyria. From the 6th century onwards their empire, then known as Median, began to expand at the expense of the surrounding states. They destroyed Nineveh in alliance with the Babylonians, and half a century later Cyrus took Babylon and founded the great dynasty of the Achaemenidae. The substitution of the Persian for the Median power, which took place with the advent of Cyrus, seems to indicate merely the pre-eminence of a particular tribe and not conquest by another race. The power of the Achaemenidae, when at its maximum, extended from the Oxus and Indus in the east to Thrace in the west and Egypt in the south, but fell before Greece, after lasting for rather more than 200 years. Darius and Xerxes were repulsed in their efforts to subjugate the Greek Peninsula, and Alexander the Great conquered their successor Darius III. in 329. But the greater part of the empire continued to exist under new masters, the Seleucids, as a Hellenistic power which was of great importance for the dissemination of Greek culture in the East. Bactria

soon became independent under an Indo- Greek dynasty, and the blending of Greek, Persian, central Asiatic and Hindu influences had an important effect on the art and religion oi India, and through India on all eastern Asia. About the same period (250 b.c.-a.d. 227) the Parthian empire arose under the Arsacids in Khorasan and the adjacent districts. The Parthians appear to have been a Turanian tribe who had adopted many Persian customs. They successfully withstood the Romans, and at one time their power extended from India to Syria. They succumbed to the Persian dynasty of the Sassanids, who ruled successfully for about four centuries, established the Zoroastrian faith as their state religion, and maintained a creditable conflict with the East Roman empire. But in the 7th century they were defeated by Heraclius, and shortly afterwards were annihilated before the first impetus of the Mahommedan conquest, which established Islam in Persia and the neighbouring lands, sweeping away old civilizations and boundaries. During the greater part of the Mahommedan period Persia has been ruled by troubled and short-lived dynasties. It attained a certain dignity and unity under Abbas Shah (1585-1628), but in later times was distracted and disorganized by Afghan invasions. The present dynasty, which is of Turkoman origin, dates from 1789.

The achievements of the Persians in art, literature and religion are by no means contemptible, but somewhat mixed and cosmopolitan. Owing to its position, the Persian state, when it from time to time became a conquering empire, overlapped Asia Minor, Babylon and India, and hence acted as an intermediary for transmitting art and ideas, sending for instance Greek sculpture to India and the cult of Mithra to western Europe. It

is perhaps on account of this intermediate flavour that the literature of Persia — for instance the adaptations of Omar Khayyam — is more appreciated in Europe than that of other Oriental nations. On the other hand, the wars between Persia and Greece were recognized both at the time and afterwards as a struggle between Europe and Asia; the fact that both combatants were Aryans was not felt, and has no importance compared to the difference of continent.

11. Jews. — The Israelites appear to have been originally a nomadic tribe akin to the Arabs, whom they resemble in their want of political instinct and in their extraordinary religious genius. Among many remarkable qualities they have been distinguished from the earliest times by a species of commen- salism, or power of living among other nations without becoming either socially merged or politically distinct. Their traditional history

represents them as migrating to the borders of Egypt and living there for some centuries. After the exodus, which perhaps took place about 1300 B.C., they moved northwards again and founded a state of modest dimensions, which attained a short-lived unity under Solomon, but succumbed to internal dissensions and to the attacks of Assyria and Babylon. Shal- manezer destroyed the northern kingdom or Israel in 720, and following the practice of the times deported the majority of the population, whose traces became lost to history. There is no reason why their descendants should not be found to-day in various' tribes, but the physical type commonly called Jewish is characteristic not so much of Israel as of western Asia generally. In 588 Nebuchadrezzar carried off the Jews in captivity, but after the Persian conquest of Babylonia they were allowed to return to Palestine in 538. Their institutions and ideas were probably considerably modified during this period. Babylon long continued to be a Jewish centre whence the Jews radiated to other countries. The restored state of Jerusalem lived for about six centuries in partial independence under Persian, Egyptian, Syrian and Roman rule, often showing an aggressively heroic attachment to its national customs, which brought it into collision with its suzerains, until the temple was destroyed by Titus in a.d. 70, and the country laid waste in the succeeding years. But long before this period the Jews of the Dispersion had become as important as the inhabitants of Palestine. From choice or compulsion large numbers settled in Egypt in the time of the Ptolemies, and added an appreciable element to Alex- andrine culture, while gradual voluntary emigration established Jewish communities in Syria, Asia Minor, Greece and Italy, who facilitated the first spread of Christianity. In spite of chronic unpopularity and recurring persecutions they have spread over nearly all Europe. At the end of the 15th century they were expelled from Spain and many of the exiles moved eastwards. At present the largest numbers are to be found in the eastern parts of Europe. It is remarkable that though the Jews live in relative peace with Asiatics, the great majority of them prefer Europe as a residence.

12. Arabs. — The Arabs have hardly any history before the rise of Islam, although their name is mentioned by surrounding nations from the 9th century B.C. onwards. They appear to have had few states or kings, but rather tribes and chiefs. Their relationship to the Babylonians and Jews is indicated by linguistic and ethnological data. The language and writing of the Semites who, at an unknown period, settled in what is now Abyssinia, show affinities with those of South Arabia, and these Semites may have been immigrants into Africa from that region. It is plain from early Moslem literature that Persian, Christian and especially Jewish ideas had penetrated into Arabia.

With the rise of Mahommedanism occurred a sudden effer- vescence of the

Arabs, who during some centuries threatened to impose not only their political authority but their civilization and new religion on the whole known world. They successfully invaded India and central Asia in the east, Spain and Morocco in the west. The Caliphate under the Omayyads of Damascus, and then the Abbasids of Bagdad, became the principal power in the nearer East. It had not, however, a sufficiently coherent organization for permanence; parts of it became independent,

others were first protected and then absorbed by the Turks. The Arab rule in Spain, which once threatened to overwhelm Europe and was turned back near Tours by Charles Martel, was distinguished by its tolerance and civilization, and lingered on till the 15th century.

The collapse of the political power of the Arabs was singularly complete. The Caliphate, though Arabian, was always geo- graphically outside Arabia, and on its fall Arabia remained as it was before Islam, isolated and inaccessible. It is still one of the least known parts of the globe, and has hardly any political link with the outside, for the Arabs of northern Africa form separate states. But in spite of this total political collapse, Arabic religion and literature are still one of the greatest forces working in the western half of Asia, in northern Africa and to some extent in eastern Europe.

13. Ceylon, though geographically an annex of India, has not followed its fortunes historically. According to tradition it was invaded by an Aryan-speaking colony from the valley of the Ganges in the 6th century B.C. It received Buddhism from north India in the time of Asoka, and has had considerable importance as a centre of religious culture which has influenced Burma and Siam. Its medieval history consists of struggles between the native sovereigns and Tamil invaders. A powerful native dynasty reigned in the 12th century, but in 1408 the island was attacked by Chinese, and from 1505 onwards it was distracted by the attacks and squabbles of Euˆpeans. It was partially subjugated, first by the Portuguese and then by the Dutch. In 1796 the Dutch were expelled by the English.

14. Indo-China. — This is an appropriate name for Burma, Siam, Cambodia, Annam, &c, for both in position and in civiliza- tion they lie between India and China. Indian influence is predominant as far as Cambodia (though with a Chinese tinge), Indian alphabets being employed

and the Buddhism being of the Sinhalese type, but in Annam and Tongking the Chinese script and many Chinese institutions are in use. The population belongs to various races, and also comprises little-known wild tribes, (i.) Languages of the group known as Mon-Annam are spoken in Annam and in Pegu, an ancient kingdom originally distinct from Burma though now confounded with it. This distribution seems to indicate that they once spread over the whole region, and were divided by the later advance of the Siamese and others. Until Annam was taken by the French, its history consisted of a struggle with the Chinese, who alter- nately asserted and lost their sovereignty. The Annamese are, however, a distinct race. Cochin China was once the seat of a kingdom called Champa, which appears to have had a hinduized Malay civilization and to have been subsequently absorbed by Annam. (ii.) The Burmese are linguistically allied to the Tibetans, and probably entered Burma from the north-west. The early history consists largely of conflicts between the Burmese and Talaings. The kingdom which was annexed by Britain in 1S85 was founded about 1750 by Alompra, who united his countrymen and broke the power of the Talaings. He also invaded Siam. (iii.) The Khmers or Cambodians, whose languages appear to belong to the M5n-Annam group, form a relatively ancient kingdom, much reduced in the last few centuries by the advance of the Siamese and new a French protectorate. Remarkable ruins dating from perhaps a.d. 800 to 1 000 attest the former prevalence of strong Hindu influence. (iv.) The Siamese or Thai, who speak a monosyllabic language of the Chinese type, but written in an Indian alphabet, represent a late invasion from southern China, whence they descended about the 13th century.

15. Malays. — This widely-scattered race has no political union and its distribution is a puzzle for ethnography. At present it occupies the extremity of the Malay Peninsula, Java, Sumatra, Borneo, the Philippines and other islands of the Malay Archipelago as well as Madagascar, while the inhabitants fi most islands in the South Seas, including New Zealand and Hawaii, speak languages which if not Malay have at least under- gone a strong Malay influence. It would seem from this dis- tribution that the Malays are not continental, but a seafaring

race with exceptional powers of dispersal, who have spread over the ocean from some island centre — perhaps Java. The latest theory, however, is that there is a great linguistic group (which may or may not prove to correspond to an ethnic unity) com- prising the Munda, Monkhmer, Malay, Polynesian and Micro- nesian languages, and that the stream of immigration which distributed them started from the extreme west. Three periods can be traced in the history of the Asiatic Malays. In the first (in which such tribes as the Dyaks have remained) they were semi-barbarous. In the second, Hindu civilization reached the Malay Peninsula, Java,

Sumatra and other islands. The presence of Hindu ruins, as well as of numerous Indian words and customs, testifies to the strength of this influence. It was, however, superseded by Islam, which spread to the Malay Archipelago and Peninsula before the 16th century. At the present time the Arabic alphabet is used on the mainland, but Indian alphabets in Java, Sumatra, &c.

16. Tibet. — This remote and mountainous country has a peculiar civilization. It has entirely escaped Islam, and though it is a nominal vassal of China, direct Chinese influence has not been strong. The most striking feature is the religion, a corrupt form of late Indian Buddhism, known as Lamaism, which, largely in consequence of the favour shown by Jenghiz Khan and his successors, has attained temporal power and developed into an ecclesiastical state curiously like the papacy.

17. Mongols. — Such civilization as the Mongols possess is a mixture of Chinese and Indian, the latter derived chiefly through Tibet, but their alphabet is a curious instance of transplantation. It is an adaptation of the Syriac writing introduced by the early Nestorian missionaries.

18. Almost all Asiatic countries have a literature, but it is often not indigenous and consists of foreign works, chiefly religious, read either in translations or the original.

Thus with the exception of a little folklore the literature Lltera- of Indo-China, Tibet, Mongolia, Korea and Manchuria sc i e ‘ ace ‘ is mainly Indian or Chinese. The chief original literatures are Chinese, Sanskrit, Pali, Arabic and Persian. The Japanese have produced few books of importance, and their compositions are chiefly remarkable as being lighter and more secular than is usual in Asia, but the older Chinese works take high rank both for their merits and the effect they have had. The extensive Sanskrit literature, which has reached in transla- tions China, Japan and Java, is chiefly theological and poetical, history being conspicuously absent. India has also a considerable medieval and modern literature in various languages. Pali, though only a form of Hindu literature, has a separate history, for it died in India and was preserved in Ceylon, whence it was imported to Burma and Siam as the language of religion. The Pali versions of Buddha’s discourses are among the most remark- able products of Asia. The literatures of all Moslem peoples are largely inspired by Arabic, which has produced a voluminous collection of works In prose and poetry. Persian, after being itself transformed by Arabic, has in its turn largely influenced all west Asiatic Moslem literature from Hindustani to Turkish.

If one excepts the Old Testament, which is a product of the extreme west of Asia, it is remarkable how small has been the influence of Asiatic literature

on Europe. Though Greek and Slavonic almost ceased to be written languages under Turkish rule, Europeans showed no disposition to replace them by Ottoman or Arabic literature.

Without counting subdivisions, there would seem to be three main schools of art in Asia at present — Chinese, Indian and Moslem. The first contains many original elements. It is feeblest in architecture and strongest in the branches demanding skill and care in a limited compass, such as painting, porcelain and enamel. It is the main inspiration of Japanese art, which, however, shows great originality in its treatment of borrowed themes. Both China and Japan have felt through Buddhism the influence of Indian art, which contains at least two elements — one indigenous and the other Greco-Persian. Unlike Chinese art it has a genius for architecture and sculpture rather than painting. Mahommedan art is also largely architectural and has affected

con' tinents.

nearly all Moslem countries. Except that the use of Arabic inscriptions is one of its principal methods of decoration, it owes little to Arabia and much to Byzantium. The Persian variety of this art is more ornate, and less averse to representations of living beings. Both Moslem and Chinese art are closely connected with calligraphy, but Hindus rarely use writing for ornament.

In both art and literature modern Asia is inferior to the past more conspicuously than Europe.

As for science, astronomy was cultivated by the Babylonians at an early period, and it is probably from them that a knowledge of the heavenly bodies and their movements spread over Asia. Grammar and prosody were studied in India with a marvellous accuracy and minuteness several centuries before Christ. Mathe- matics were cultivated by the Chinese, Indians and Arabs, but nearly all the sciences based on the observation of nature, including medicine, have remained in a very backward condition. Much the same, however, might have been said of Europe until two centuries ago, and the scientific knowledge of the Arabs under the earlier Caliphates was equal or superior to that of any of their contemporaries. Histories and accounts of travels have been composed both in Arabic and Chinese.

iq. It is only natural that Europe should have chiefly felt the influence of western Asia. Though Europeans may be indebted Influence to China for some mechanical inventions, she was of Asia too distant to produce much direct effect, and the on other influence of India has been mainly directed towards the East. The resemblances between primitive Christianity and Buddhism appear to be coincidences, and though both early Greek philosophy and later Alexandrine ideas suggest Indian affinities, there is no clear connexion such as there is between certain aspects of Chinese thought and India.

Any general statement as to the debt owed by early European civilizations to western Asia would at present be premature, for though important discoveries have been made in Crete and Babylonia the best authorities are chary of positive conclusions as to the relations of Cretan civilization to Egypt and Babylonia. Egyptian influence within the Aegean area seems certain, and the theory that Greek writing and systems for reckoning time are Babylonian in origin has not been disproved, though the history of the alphabet is more complex than was supposed.

In historic times Asia has attempted to assert her influence over Europe by a series of invasions, most of which have been repulsed. Such were the Persian wars of Greece, and perhaps one may add Hannibal's invasion of Italy, if the Carthaginians were Phoenicians transplanted to Africa. The Roman empire kept back the Persians and Parthians, but could not prevent a series of incursions by Avars, Huns, Bulgarians, and later by Mongols and Turks. Islam has twice obtained a footing in Europe, under the Arabs in Spain and under the Turks at Constantinople. The earlier Asiatic invasions were conducted by armies operating at a distance from their bases, and had little result, for the soldiery retired after a time (like Alexander from India), or more rarely (e.g. the Bulgarians) settled down without keeping up any connexion with Asia. The Turks, and to some extent the Arabs in Spain, were successful because they first conquered the parts of Asia and Africa adjoining Europe, so that the final invaders were in touch with Asiatic settlements. Though the Turks have profoundly affected the whole of eastern Europe, the result of their conquests has been not so much to plant Asiatic culture in Europe as to arrest development entirely, the countries under their rule remaining in much the same condition as under the moribund Byzantine empire.

In general, Europe has in historic times shown itself decidedly hostile to Asiatic institutions and modes of thought. It is only of recent years that the writings of Schopenhauer and the researches of many distinguished orientalists have awakened some interest in Asiatic philosophy.

The influence of Asia on Africa has been considerable, and until the middle

of the 19th century greater than that of Europe. Some authorities hold that Egyptian civilization came from Babylonia, and that the so-called Hamitic languages are older and less specialized members of the Semitic family. The con-

nexion between Carthage and Phoenicia is more certain, and the ancient Abyssinian kingdom was founded by Semites from south Arabia. The traditions of the Somalis derive them from the same region. The theory that the ruins in Mashonaland were built by immigrants from south Arabia is now discredited, but there was certainly a continuous stream of Arab migration to East Africa which probably began in pre-Moslem times and founded a series of cities on the coast. The whole of the north of Africa from Egypt to Morocco has been mahommedanized, and Mahommedan influence is general and fairly strong from Timbuktu to Lake Chad and Wadai. South of the equator, Arab slave-dealers penetrated from Zanzibar to the great lakes and the Congo during the second and third quarters of the 19th century, but their power, though formidable, has disappeared without leaving any permanent traces.

The relation to Asia of the pre-European civilizations of America is another of those questions which admit of no definite answer at present, though many facts support the theory that the semi-civilized inhabitants of Mexico and Central America crossed from Asia by Bering Straits and descended the west coast. Some authorities hold that Peruvian civilization had no connexion with the north and was an entirely indigenous product, but Kechua is in structure not unlike the agglutinative languages of central and northern Asia.

20. European influence on Asia has been specially strong

at two epochs, firstly after the conquests of Alexander the

Great, and secondly from the 16th century onwards.

Alexander's conquests resulted in the foundation of In "" ence , , ... of Europe

Perso-Greek kingdoms in Asia, which not only hellen- on Asia.

ized their own area but influenced the art and religion of India and to some extent of China. Then follows a long period in which eastern Europe was mainly occupied in combating Asiatic invasions, and had little opportunity of Europeanizing the East. Somewhat later the Crusades kept up communication with the Levant, and established there the power of the Roman Church, somewhat to the detriment of oriental Christianity, but intercourse with farther Asia was limited to the voyages of a few travellers.

Looking at eastern Europe and western Asia only, one must say that Asiatic influences have on the whole prevailed hitherto (though perhaps the tide is turning), for Islam is paramount in this region and European culture at a low ebb. But the case is quite different if one looks at the two continents as a whole, for improvement in means of com- munication has brought about strange vicissitudes, and western Europe has asserted her power in middle and eastern Asia.

In the ifjth century a new era began with the discovery by the Portuguese of the route to India round the Cape, and the naval powers of Europe started one after another on careers of oriental conquest. The movement was maritime and affected the nations in the extreme west of Europe rather than those nearer Asia, who were under the Turkish yoke. Also the parts of Asia affected were chiefly India and the extreme East. The countries west of India, being less exposed to naval invasion, remained comparatively untouched. It will thus be seen that European (excluding Russian) power in Asia is based almost entirely on improved navigation. There was no attempt to overwhelm whole empires by pouring into them masses of troops, but commerce was combined with territorial acquisition, and a continuity of European interest secured by the presence of merchants and settlers. The course of oriental conquest followed the events of European politics, and the possessions of European powers in the East generally changed hands accord-, ing to the fortunes of their masters at home. Portugal was first on the scene, and in the 16th century established a consider- able littoral empire on the coasts of East Africa, India and China, fragments of which still remain, especially Goa, where Portuguese influence on the natives was considerable. Before the century was out the Dutch appeared as the successful rivals of the Portuguese, but the real struggle for supremacy in southern Asia took place between France and England about 1 740-1 783. Both entered India as commercial companies, but the dis- organized condition of the Mogul empire necessitated the use

of military force to protect their interests, and allured them to conquest. The companies gradually undertook the financial control of the districts where they traded and were recognized Dy the natives as political powers. The ultimate victory of England seems due less to any particular aptitude for dealing with oriental problems than to a better command of the seas and to considerations of European politics. At the end of the Napoleonic wars Portugal had Macao and Goa, Holland Java, Sumatra and other islands, France some odds and ends in India, while England emerged with Hong Kong, Singapore, Ceylon and a free hand in India. Guided by such

administrators as Warren Hastings, the East India Company had assumed more and more definitely the functions of government for a great part of India. In 1809 its exclusive trading rights were taken away by Parliament, but its administrative status was thus made clearer, and when after the mutiny of 1857 it was desir- able to define British authority in India there seemed nothing unnatural in declaring it to be a possession of the crown.

Another category of European possessions in Asia comprises those acquired towards the end of the 19th century, such as Indo-China (France), Burma and Wei-Hai-Wei (Britain), and Kiao-Chow (Germany). Whereas the earlier conquests were mostly the results of large half-conscious national movements working out their destinies in the East, these later ones were annexations deliberately planned by European cabinets. It seemed to be assumed that Asia was to be divided among the powers of Europe, and each was anxious to get its share or more.

The advance of Russia in Asia is entirely different from that of the other powers, since it has taken place by land and not by sea. Though the geographical extent of Russian territory and influence is enormous, she has always moved along the line of least resistance. She is a moderately strong empire lying to the north of the great Moslem states, and having for neighbours a series of very weak principalities or semi-civilized tribes. The conquest of Siberia and central Asia presented no real difficulties: Persia and Constantinople were left on one side, and Russia was defeated as soon as she was opposed by a vigorous power in the Far East. As the Russian possessions in Asia are continuous with European Russia, it is only natural that they should have been russified far more thoroughly than the British possessions have been anglicized.

There has been great difference of opinion as to the extent to which Alexander's conquests influenced Asia, and it is equally hard to say what is the effect now being produced by Europe. Clearly such alterations as the construction of railways in nearly all parts of the continent, and the establishment of peace over formerly disturbed areas like India, are of enormous importance, and must change the life of the people. But the mental constitution of Asiatics is less easily modified than their institutions, and even Japan has assimilated European methods rather than European ideas. (C. El.)

Authorities. — The modern bibliography of Asia, including the works of travellers and explorers since 1880, is voluminous. It is impossible to refer to all that has been written in the Survey Reports

•and Gazetteers of the government of India, or in the records of the Royal Asiatic Society, or the Asiatic Society, Bengal ; but amongst the more

important popular works are the following: — Richthofen, " China, Japan, and Korea," vol. iv. Jour. R.G.S., China (Berlin, 1877); Regel, "Upper Oxus," vol. i. Proc. R.G.S., 1879; Dr Bellew, Afghanistan and the Afghans (London, 1879); Nicolas Prjevalski, " Explorations in Asia," see vols. i.,ii.,v., ix. and xi. of the Proc. R.G.S., 1879-1889; W. Blunt, " A Visit to Jebel Shammar,"

•vol ii. Proc. R.G.S., 1880; Captain W Gill, The River of Golden Sand (London, 1880); Sir R. Temple, "Central Plateau of Asia," vol. iv. Proc. R.G.S., 1882; Baker, " A Journey of Exploration in Western Ssu-Chuan," vol. i. Supplementary Papers R.G.S., 1882- 1885; Sir C. Wilson, " Notes on Physical and Historical Geography of Asia Minor," vol. vi. Proc. R.G.S., 1884; General J. T. Walker, " Asiatic Explorers of the Indian Survey," vol. viii. Proc. R.G.S., 1885; Samuel Beal, Buddhist Records of the Western World (Boston, 1885); Charles Doughty, Travels in Northern Arabia (Cambridge, 1886); Travels in Arabia Deserta (Cambridge, 1888); Venukoff, "Explorations," vol. viii. Proc. G.R.S., 1886; Ney Elias, "Explorations in Central Asia," see vols. viii. and ix. Proc. R.G.S., 1886-1887; Arthur Carey, "Explorations in Turkestan," see vol. ix.

Proc. R.G.S., 1887; Henry Lansdell, Through Central Asia (London, 1887); Archibald Colquhoun, Report on Railway Connexion between Burma and China (London, 1887); Major C. Yate, Northern Afghanistan (Edinburgh, 1888); Captain F. Younghusband, The Heart of a Continent (London, 1893) ; A Journey through Manchuria, &c. (Lahore, 1888); also see vol. x. Proc. R.G.S., and vol. v. Jour. R.G.S.; Dutreuil de Rhins, L'Asie Centrale (Paris, 1889); Pierre Bonvalot, Through the Heart of Asia, trans. Pitman (London, 1889); From Paris to Tonkin, trans. Pitman (London, 1891); Roborovski, translation from Russian Invalide, October 1889, vol. xii. Proc. R.G.S.; " Central Asia," vol. viii. Jour. R.G.S., 1896; Colonel Mark Bell, " Trade Routes of Asia," vol. xii. Proc. R.G.S., 1890; W. W. Rockhill, " An American in Tibet," Century Magazine, November 1 890; The Land of the Lamas (London, 1891); Theodore Bent, " Hadramut," vol. iv. Jour. R.G.S., 1894; " Southern Arabia," vol. vi. Jour. R.G.S., 1896; " Bahrein Islands," vol. xii. Proc. R.G.S., 1890; Grombcherski, " Explorations in Kuen Lun," vol. xii. Proc. R.G.S., 1890; Lydekker, " The Geology of the Kashmir Valley and Chamba Territories," vols. xiii. and xiv. Geological Survey of India; Max Muller, The Sacred Books of the East (Oxford, 1890- 1894); Elisee Reclus, The Earth and its Inhabitants (series, 1890); G. W. Leitner, Dardistan; H. F. Blanford, Elementary Geography of India, Burma, and Ceylon (London, 1890); Guide to the Climate and Weather of India (London, 1889); Lord Dunmore, The Pamirs (London, 1892); A. Tissandier, Voyage au tour du monde (Paris, 1892); Lord Curzon, Persia and the Persian Question (London, 1892); Russia and the Anglo-Russian Question (London, 1889); Problems of the Far East

(London, 1894) ; Captain Hamilton Bower, Diary of a Journey across Tibet (Calcutta, 1893); Szechenyi, Die wissenschaftlichen Ergebnisse der Reise des Grafen Bela Szechenyi in Ostasien (Wien, 1893); R. D. Oldham, "Evolution of Indian Geology," vol. iii. Jour. R.G.S., 1894; Baron Toll, " Siberia," vol. iii. Jour. R.G.S., 1894; Delmar Morgan, "The Mountain Systems of Central Asia," Scottish Geological Magazine, No. 10, of 1894; Sir Frederick Goldsmid, " Persian Geography," vol. vi. Jour. R.G.S., 1895; Warrington Smyth, " Siam," vol. vi. Jour. R.G.S., 1895; " Siamese East Coast," vol xi. Jour. 1898; Prince Kropotkin, " Siberian Railway," vol. v. R.G.S. Jour., 1895; W. R. Lawrence, The Vale of Kashmir (Oxford, 1895); Captain Vaughan, " Persia," vol. viii. Jour. R.G.S. , 1896; Prince H. d'Orleans, " Yunan to India;" vol. vii. Jour. R.G.S., 1896; " Tonkin to Talifu," vol. viii. Jour. R.G.S., 1896; Sir T. Holdich, "Ancient and Medieval Makran," vol. vii. Jour. R.G.S., 1896; The Indian Borderland (London, 1901) ; India (Oxford, 1904) ; Colonel Woodthorpe, " Shan States," vol. vii. Jour. R.G.S., 1896; Report of the Pamir Boundary Commission (Calcutta, 1896); St George Littledale, " Journey Across the Pamirs from North to South," vol. iii. Jour. R.G.S., 1894, and vol. vii. Jour. R.G.S., 1896; Sir G. Robertson, The Kafirs of the Hindu Kush (London, 1896); Captain Stiff e, " Persian Gulf Trading Centres," vols, v.iii., ix. and x. Jour. R.G.S., 1897 ; Ney Elias and Ross, A History of the Moghuls of Central Asia, from the Tarskh-i-Rastisdi of Mirza Haidar (London, 1898) ; Grenard, Mission scientifique sur la Haute Asie (Paris, 1898) ; Dr Sven Hedin, Through Asia (London, 1898); Central Asia and Tibet (1903); Geo- graphie des Hochlandes von Pamir (Berlin, 1894); Captain M. Si Wellby, " Through Tibet," R.G.S. Jour., September 1898; Captain P. M. Sykes, " Persian Explorations," vol. x. Jour. R.G.S., 1898; Ten Thousand Miles in Persia (1902) ; Kronshin, " Old Beds of the Oxus," Jour. R.G.S., September 1898; Sir W. Hunter. History of British India, vol. i. (London, 1898); Captain H. Deasy, " Western Tibet," vol. ix. Jour. R.G.S.; In Tibet and Chinese Turkestan (London, 1901); A. Little, The Far East (Oxford, 1905); Captain Rawling, The Great Plateau (London, 1905) ; Journal of the Royal Geogl. Society, vols. xv. to xxv. (1900-1905); Colonel A. Durand, The Making of a Frontier (London, 1899); R. Cobbold, Innermost Asia (London, 1900). (T. H. H.)*

ASIA, in a restricted sense, the name of the first Roman province east of the Aegean, formed (133 B.C.) out of the kingdom left to the Romans by the will of Attalus III. Philometor, king of Pergamum. It included Mysia, Lydia, Caria and Phrygia, and therefore, of course, Aeolis, Ionia and the Troad. In 84 B.C., on the close of the Mithradatic War, Sulla reorganized the province, forming 40 regiones for fiscal purposes, and it was later divided into conventus. From 80 to 50 B.C. the upper Maeander valley and all Phrygia, except the extreme north, were detached and added to Cilicia.

In 27 B.C. Asia was made a senatorial province under a pro-consul. As the wealthiest of Roman provinces it had most to gain by the pax Romano, and therefore welcomed the empire, and established and maintained the most devout cult of Augustus by means of the organization known as the Koinon or Commune, a representative council, meeting in the various metropoleis. In this cult the emperor came to be associated with the common worship of the Ephesian Artemis. By the reorganization of Diocletian, a.d. 297, Asia was broken up into several small provinces, and one of these,

of which the capital was Ephesus, retained the name of the original province (see Asia Minor).

ASIA MINOR, the general geographical name for the peninsula, forming part of the empire of Turkey, on the extreme west of the continent of Asia, bounded on the N. by the Black Sea, on the W. by the Aegean, and on the S. by the Mediterranean, and at its N.W. extremity only parted from Europe by the narrow straits of the Bosporus and Dardanelles. On the east, no natural boundary separates it from the Armenian plateau; but, for descriptive purposes, it will suffice to take a line drawn from the southern extremity of the Giaour Dagh, east of the Gulf of Alexandretta along the crest of that chain, then along that of the eastern Taurus to the Euphrates near Malatia, then up the river, keeping to the western arm till Erzingan is reached, and finally bending north to the Black Sea along the course of the Churuk Su, which flows out west of Batum. This makes the Euphrates the main eastern limit, with radii to the north-east angle of the Levant and the south-east angle of the Black Sea, and roughly agrees with the popular conception of Asia Minor as a geographical region. But it must be remembered that this term was not used by classical geographers (it is first found in Orosius in the 5th century a.d.), and is not in local or official use now. It probably arose in the first instance from a vague popular distinction between the continent itself and the Roman province of " Asia " (q.v.), which at one time included most of the peninsula west of the central salt desert (A xylon) . The name Anatolia, in the form Anadol, is used by natives for the western part of the peninsula (cis Halym) and not as including ancient Cappadocia and Pontus. Before the reconstitution of the pro- vinces as vilayets it was the official title of the principal eyalet of Asia Minor, and was also used more generally to include all the peninsular provinces over which the beylerbey of Anadoli, whose seat was at Kutaiah, had the same paramount military jurisdiction which the beylerbey of " Rumili " enjoyed in the peninsular provinces of Europe. The term " Anatolia " appears first in the work of Constantine Porphyrogenitus (10th

century). The greatest length of Asia Minor, as popularly understood, is along its north edge, 720 m. Along the south itis about 650 m. The greatest breadth is 420 m. from C. Kerembe to C. Anamur; but at the waist of the peninsula, between the head of the Gulf of Alexandretta and the southernmost bight of the Black Sea (at Ordu), it is not quite 300 m. The greater portion of Asia Minor consists of a plateau rising gradually from east to west, 2500 ft. to 4500 ft. ; east of the Kizil Irmak (Halys), the ground rises more sharply to the highlands of Armenia (q.v.). On the south the plateau is buttressed by the Taurus range, which stretches in a broken irregular line from the Aegean to the Persian frontier. On the north the plateau is supported by a range of varying altitude, which follows the southern coast of the Black Sea and has no distinctive name. On the west the edge of the plateau is broken by broad valleys, and the deeply indented coast-line throws out long rocky promontories towards Europe. On the north, excepting the deltas formed by the Kizil and Yeshil Irmaks, there are no considerable coast plains, no good harbours except Sinope and Vona, and no islands. On the west there are narrow coast plains of limited extent, deep gulfs, which offer facilities for trade and commerce, and a fringe of protecting islands. On the south are the isolated plains of Pamphylia and Cilicia, the almost land-locked harbours of Mar- marice, Makri and Kekova, the broad bay of Adalia, the deep-seated gulf of Alexandretta (Iskanderun), and the islands of Rhodes with dependencies, Castelorizo and Cyprus.

Mountains. — The Taurus range, perhaps the most important feature in Asia Minor, runs the whole length of the peninsula or. the south, springing east of Euphrates in the Armeno-Kurdish highlands, and being prolonged into the Aegean Sea by rocky promontories and islands. It attains in Lycia an altitude of 10,500 ft., and in the Bulgar Dagh (Cilicia) of over 10,000 ft. The average elevation is about 7000 ft. East of the Bulgar Dagh the range is pierced by the Sihun and Jihun rivers, and their tributaries, but its continuity is not broken. The principal passes across the range are those over which Roman or Byzantine roads ran: — (1) from Laodicea to Adalia (Attalia), by way of the Khonas pass and the valley of the Istanoz Chai ; (2) from Apamea or from Pisidian Antioch to Adalia, by Isbarta and Sagalassus; (3) from Laranda, by Coropissus and the upper valley of the southern Calycadnus, to Germanicopolis and thence to Anemourium or Kelenderis; (4) from Laranda, by the lower Caly- cadnus, to Claudiopolis and thence to Kelenderis or Seleucia ; (5) from Iconium or Caesarea Mazaca, through the Cilician Gates (Gulek Boghaz, 3300 ft.) to Tarsus ; (6) from Caesarea to the valley of the Sarus and thence to Flaviopolis on the Cilician Plain ; (7) from Caesarea over Anti-Taurus by the Kuru Chai to Cocvsus (Geuksun) and thence to

Germanicia (Marash). Large districts on the southern slopes of the Taurus

chain are covered with forests of oak and fir, and there are numerous yailas or grassy " alps," with abundant water, to which villagers and nomads move with their flocks during the summer months.

Anti-Taurus is a term of rather vague and doubtful application, (a) Some have regarded it as meaning the more or less continuous range which buttresses up the central plateau on the north, parallel to the Taurus, (b) Others take it to mean the line of heights and mountain peaks which separates the waters running to the Black Sea and the Anatolian plateau from those falling to the Persian Gulf and the Mediterranean. This has its origin in the high land, near the source of the Kizil Irmak, and thence runs south-west towards the volcanic district of Mt. Argaeus, which, however, can hardly be regarded as orographically one with it. After a low interval it springs up again at its southern extremity in the lofty sharp-peaked ridge of Ala Dagh (11 ,000 ft.) , and finally joins Taurus, (c) South of Sivas a line of bare hills connects this chain with another range of high forest-clad mountains, which loses itself southwards in the main mass of Taurus, and is held to be the true Anti-Taurus by geographers. It throws off, in the latitude of Kaisarieh, a sub- sidiary range, the Binboa Dagh, which separates the waters of the Sihun from those of the Jihun. The principal passes are those followed by the old roads: — (1) from Sebasteia to Tephrike and the upper valley of the western Euphrates; (2) from Sebasteia to Melitene, by way of the pass of Delikli Tash and the basin of the Tokhma Su ; (3) from Caesarea to Arabissus, by the Kuru Chai and the valley of Cocysus (Geuksun). The range of Amanus (Giaour Dagh) is separ- ated from the mass of Taurus by the deep gorge of the Jihun, whence it runs south – south – west to Ras el – Khanzir, forming the limit between Cilicia and Syria, various parts bearing different names, as Elma Dagh above Alexandretta. It attains its greatest altitude in Kaya Duldul (6500 ft.), which rises abruptly from the bed of the Jihun, and it is crossed by two celebrated passes: — (1) the Amanides Pylae (Baghche Pass), through which ran the road from the Cilician Plain to Apamea-Zeugma, on the Euphrates; (2) the Pylae Syriae or " Syrian Gates " (Beilan Pass), through which passed the great Roman highway from Tarsus to Syria. On the western edge of the plateau several short ranges, running approximately east and west, rise above the general level : — Sultan Dagh (6500 ft.) ; Salbacus- Cadmus (8000 ft.) ; Messogis (3600 ft.) ; Latmus (6000 ft.) ; Tmolus (5000 ft.) ; Dindymus (8200 ft.) ; Ida (5800 ft.) ; and the Mysian Olympus (7600 ft.). The valleys of the Maeander, Hermus and Caicus facilitate communication between the plateau and the Aegean, and the descent to the Sea of Marmora along the valleys of the Tembris and Sangarius presents no difficulties. The northern border range, though not continuous, rises steadily from the west to its 'culmination in the Galatian Olympus (Ilkaz Dagh), south of Kastamuni. East of the Kizil Irmak there is

no single mountain chain, but there are several short ranges with elevations sometimes exceeding 9000 ft. The best routes from the plateau to the Black Sea were followed by the Roman roads from Tavium and Sebasteia to Sinope and Amisus, and those from Sebasteia to Cotyora and Cerasus-Pharnacia, which at first ascend the upper Halys. Several minor ranges rise above the level of the eastern plateau, and in the south groups of volcanic peaks and cones extend for about 150 m. from Kaisarieh (Caesarea) to Karaman. The most important are Mt. Argaeus (Erjish Dagh, 13,100 ft.) above Kaisarieh itself, the highest peak in Asia Minor; Ali Dagh (6200 ft.); Hassan Dagh (8000 ft.); Karaja Dagh; and Kara Dagh (7500 ft.). On the west of the plateau evidences of volcanic activity are to be seen in the district of Kula (Katakekaumene), coated with recent erupted matter, and in the numerous hot springs of the Lycus, Maeander, and other valleys. Earthquakes are frequent all over the peninsula, but especially in the south-east and west, where the Maeander valley and the Gulf of Smyrna are notorious seismic foci. The centre of the plateau is occupied by a vast treeless plain, the Axylon of the Greeks, in which lies a large salt lake, Tuz Geul. The plain is fertile where cultivated, fairly supplied with deep wells, and in many places covered with good pasture. Enclosed between the Taurus and Amanus ranges and the sea are the fertile plains of Cilicia Pedias, consisting in great part of a rich, stoneless loam, out of which rise rocky crags that are crowned with the ruins of Greco-Roman and Armenian strongholds, and of Pamphylia, partly alluvial soil, partly travertine, deposited by the Taurus rivers.

Rivers. — The rivers of Asia Minor are of no great importance. Some do not flow directly to the sea; others find their way to the coast through deep rocky gorges, or are mere torrents; and a few only are navigable for boats for short distances from their mouths. They cut so deep into the limestone formation of the plateau as to over-drain it, and often they disappear into swallow holes (duden) to reappear lower down. The most important rivers which flow to the Black Sea are the following: — the Boas (Churuk Su) which rises near Baiburt, and flows out near Batum; the Iris (Yeshil Irmak), with its tributaries the Lycus (Kelkit Irmak), which rises on the Armenian plateau, the Chekerek Irmak, which has its source near Yuzgat, and the Tersakan Su; the Halys (Kizil Irmak) is the longest river in Asia Minor, with its tributaries, the Deiije Irmak (Cappadox), which flows through the eastern part of Galatia, and the Geuk Irmak, which has its sources in the mountains above Kastamuni. With

the exception of Sivas, no town of importance lies in the valley of the Kizil

Irmak throughout its course of over 600 m. The Sangarius (Sakaria) rises in the Phrygian mountains and, after many changes of direction, falls into the Black Sea, about 80 m. east of the Bosporus. Its tributaries are the Pursak Su (Tembris), which has its source in the Murad Dagh (Dindymus), and, after running north to tski-shehr, flows almost due east to the Sakaria, and the Enguri Su, which joins the Sakaria a little below the junction of the Pursak. To the Black Sea, about 40 m. east of Eregli, also flows the Billaeus (Filiyas Chai). Into the Sea of Marmora run the Rhyndacus(Edrenos Chai) and the Macestus (Susurlu Chai), which unite about 12 m. from the sea. The most celebrated streams of the Troad are the Granicus (Bigha Chai) and the Scamander (Menderes Su), both rising in Mt. Ida (Kaz Dagh). The former flows to the Sea of Mar- mora; the latter to the Dardanelles. The most northerly of the rivers that flow to the Aegean is the Caicus (Bakir Chai), which runs past Soma, and near Pergamum, to the Gulf of Chanderli. The Hermus (Gediz Chai) has its principal sources in the Murad Dagh, and, receiving several streams on its way, runs through the volcanic district of Katakekaumene to the broad fertile valley through which it flows past Manisa to the sea, near Lefke. So recently as about 1880 it discharged into the Gulf of Smyrna, but the shoals formed by its silt-laden waters were so obstructive to navigation that it was turned back into its old bed. Its principal tributaries are — the Phrygius (Kum Chai), which receives the waters of the Lycus (Giirduk Chai), and the Cogamus (Kuzu Chai), which in its upper course is separated from the valley of the Maeander by hills that were crossed by the Roman road from Pergamum to Laodicea. The Caystrus (Kuchuk Menderes) flows through a fertile valley between Mt. Tmoltis and Messogis to the sea near Ephesus, where its silt has filled up the port. The Maeander (Menderes Chai) takes its rise in a celebrated group of springs near Dineir, and after a winding course enters the broad valley, through which it " meanders" to the sea. Its deposits have long since filled up the harbours of Miletus, and converted the islands which protected them into mounds in a swampy plain. Its principal tributaries are the Glaucus, the Senarus (Banaz Chai), and the Hippurius, on the right bank. On the left bank are the Lycus (Churuk Su), which flows westwards by Colossae through a broad open valley that affords the only natural approach to the elevated plateau, the Harpasus (Ak Chai), and the Marsyas (China Chai). The rivers that flow to the Mediterranean, with two excep- tions, rise in Mt. Taurus, and have short courses, but in winter and spring they bring down large bodies of water. In Lycia are the Indus (Gereniz Chai), and the Xanthus (Eshen Chai). The Pamphylian plain is traversed by the Cestrus (Ak Su), the Eurymedon (Keupri Su), and the Melas (Menavgat Chai), which, where it enters the sea, is a broad, deep stream, navigable for about 6 m. The Calycadnus (Geuk Su) has two main branches which join near Mut and flow south-east, and enter the sea, a deep rapid river, about 12 rn. below

Selefke. The Cydnus (Tersous or Tarsus Chai) is formed by the junction of three streams that rise in Mt. Taurus, and one of these flows through the narrow gorge known as the Cilician Gates. After passing Tarsus, the river enters a marsh which occupies the site of the ancient harbour. The Cydnus is liable to floods, and its deposits have covered Roman Tarsus to a depth of 20 ft. The Sarus (Sihun) is formed by the junction of the Karmalas (Zamanti Su), which rises in Uzun Yaila, and the Sarus (Saris), which has its sources in the hills to the south of the same plateau. The first, after entering Mt. Taurus, flows through a deep chasm walled in by lofty precipices, and is joined in the heart of the range by the Saris. Before reaching the Cilician Plain the river receives the waters of the Kerkhun Su, which cuts through the Bulgar Dagh, and opens a way for the roads from the Cilician Gates to Konia and Kaisarieh. After passing Adana, to which point small craft ascend, the Sihun runs south-west to the sea. There are, however, indications that at one period it flowed south-east to join the Pyramus. The Pyramus (Jihun) has its prin- cipal source in a group of large springs near Albistan; but before it enters Mt. Taurus it is joined by the Sogutli Irmak, the Khurman Su and the Geuk Su. The river emerges from Taurus, about 7 m. west of Marash, and here it is joined by the Ak Su, which rises in some small lakes south of Taurus. The Jihun now enters a remarkable defile which separates Taurus from the Giaour Dagh, and reaches the Cilician Plain near Budrun. From this point it flows west, and then south-west past Missis, until it makes a bend to discharge its waters south of Ayas Bay. The river is navigable as far as Missis. The only considerable tributary of the Euphrates which comes within our region is the Tokhma Su, which rises in Uzun Yaila and flows south-east to the main river not far from Malatia. In the central and southern portions of the plateau the streams either flow into salt lakes, where their waters pass off by evaporation, or into freshwater lakes, which have no visible outlets. In the latter cases the waters find their way beneath Taurus in subterranean channels, and reappear as the sources of rivers flowing to the coast. Thus the Ak Geul supplies the Cydnus, and the Beishehr, Egirdir and Kestel lakes feed the rivers of the Pamphylian plain.

Lakes. — The salt lakes are Tuz Geul (anc. Tatta), which lies in the great central plain, and is about 60 m. long and 10 to 30 m. broad in winter, but in the dry season it is hardly more than a saline marsh; Buldur Geul, 2900 ft. above sea-level; and Aji-tuz Geul, 2600 ft. The freshwater lakes are Beishehr Geul (anc. Karalis),

3770 ft., a fine sheet of water 30 m. long, which discharges south-east to the Soghla Geul ; Egirdir Geul (probably anc. Limnae, a name which included the two bays of Hoiran and Egirdir, forming the lake), 2850 ft., which is 30 m. long, but less broad than Beishehr and noted for the abundance and variety of its fish. In the north- west portion of Asia Minor

are Isnik Geul (L. Ascania), Abullionl Geul (L. Apollonia), and Maniyas Geul (L. Miletopolis).

Springs. — Asia Minor is remarkable for the number of its thermal and mineral springs. The most important are: — Yalova, in the Ismid sanjak; Brusa, Chitli, Terje and Eskishehr, in the Brusa vilayet; Tuzla, in the Karasi ; Cheshme, Ilija, Hierapolis (with enormous alum deposits), and Alashehr, in the Aidin; Terzili Hammam and Iskelib in the Angora ; Boli in the Kastamuni; and Khavsa, in the Sivas. Many of these were famous in antiquity and occur in a list given by Strabo. The Maeander valley is especially noted for its hot springs.

Geology. — The central plateau of Asia Minor consists of nearly horizontal strata, while the surrounding mountain chains form a complex system, in which the beds are intensely folded. Around the coast flat-lying deposits of Tertiary age are found, and these often extend high up into the mountain region. The deposits of the central, or Lycaonian, plateau consist of freshwater marls and lime- stones of late Tertiary or Neogene age. Along the south-eastern margin, in front of the Taurus, stands a line of great volcanoes, stretching from Kara-Dagh to Argaeus. They are now extinct, but were probably active till the close of the Tertiary period. On its southern side the plateau is bounded by the high chains of the Taurus and the Anti-Taurus, which form a crescent with its con- vexity facing southwards. Devonian and Carboniferous fossils have been found in several places in the Anti-Taurus. Limestones of Eocene or Cretaceous age form a large part of the Taurus, but the interior zone probably includes rocks of earlier periods. The folding of the Anti-Taurus affects the Eocene but not the Miocene, while in the Taurus the Miocene beds have been elevated, but without much folding, to great heights. North of the Lycaonian plateau lies another zone of folding which may be divided into the East Pontian and West Pontian arcs. In the east a well-defined moun- tain system runs nearly parallel to the Black Sea coast from Batum to Sinope, forming a gentle curve with its convexity facing south- wards. Cretaceous limestones and serpentine take a large part in the formation of these mountains, while even the Oligocene is in- volved in the folds. West of Sinope Cretaceous beds form a long strip parallel to the shore line. Carboniferous rocks occur at Eregli (Heraclea Pontica), where they have been worked for coal. Devon- ian fossils have been found near the Bosporus and Carboniferous fossils at Balia Maden in Mysia. Triassic, Jurassic and Cretaceous beds form a band south of the Sea of Marmora, probably the con- tinuation of the Mesozoic band of the Black Sea coast. Farther south there are zones of serpentine, and of crystalline and schistose rocks, some of which are probably Palaeozoic. The direction of the folds of this region is from west to east, but on the borders of Phrygia and Mysia they meet the north-westerly extension of the Taurus folds and bend around the ancient mass of

Lydia. Marine Eocene beds occur near the Dardanelles, but the Tertiary deposits of this part of Asia Minor are mostly freshwater and belong to the upper part of the system. In western Mysia they are much disturbed, but in eastern Mysia they are nearly horizontal. They are often accompanied by volcanic rocks, which are mainly andesitic, and they commonly lie unconformably upon the older beds. In the western part of Asia Minor there are several areas of ancient rocks about which very little is known. The Taurus folds here meet another system which enters the region from the Aegean Sea.

Climate. — The climate is varied, but systematic observations are wanting. On the plateau the winter is long and cold, and in the northern districts there is much snow. The summer is very hot, but the nights are usually cool. On the north coast the winter is cold, and the winds, sweeping across the Black Sea from the steppes of Russia, are accompanied by torrents of rain and heavy falls of snow. East of Samsun, where the coast is partially protected by the Caucasus, the climate is more moderate. In summer the heat is damp and enervating, and, as Trebizond is approached, the vegetation becomes almost subtropical. On the south coast the winter is mild, with occasional frosts and heavy rain ; the summer heat is very great. On the west coast the climate is moderate, but the influence of the cold north winds is felt as far south as Smyrna, and the winter at that place is colder than in corresponding latitudes in Europe. A great feature of summer is the inbat or north wind, which blows almost daily, often with the force of a gale, off the sea from noon till near sunset.

Products, &c. — The mineral wealth of Asia Minor is very great, but few mines have yet been opened. The minerals known to exist are — -alum, antimony, arsenic, asbestos, boracide, chrome, coal, copper, emery, fuller's earth, gold, iron, kaolin, lead, lignite, magnetic iron, manganese, meerschaum, mercury, nickel, rock-salt, silver, sulphur and zinc. The vegetation varies with the climate, soil anc' elevation. The mountains on the north coast are clothed with dense forests of pine, fir, cedar, oak, beech, &c. On the Taurus range the- forests are smaller, and there is a larger proportion of pine. On the west coast the ilex, plane, oak, valonia oak, and pine predominate. On the plateau willows, poplars and chestnut trees grow near the

streams, but nine-tenths of the country is treeless, except for scrub. On the south and west coasts the fig and olive are largely cultivated. The vine yields rich produce everywhere, except in the higher districts. The apple,

pear, cherry and plum thrive well in the north ; the orange, lemon, citron and sugar-cane in the south; styrax and mastic in the south-west ; and the wheat lands of the Sivas vilayet can hardly be surpassed. The most important vegetable productions are — cereals, cotton, gum tragacanth, liquorice, olive oil, opium, rice, saffron, salep, tobacco and yellow berries. Silk is produced in large quantities in the vicinity of Brusa and Amasia, and mohair from the Angora goat all over the plateau. The wild animals include bear, boar, chamois, fallow red and roe deer, gazelle, hyena, ibex, jackal, leopard, lynx, moufflon, panther, wild sheep and wolf. The native reports of a maneless lion in Lycia (arslan) are probably based on the existence of large panthers. Amongst the domestic animals are the buffalo, the Syrian camel, and a mule camel, bred from a Bactrian sire and Syrian mother. Large numbers of sheep and Angora goats are reared on the plateau, and fair horses are bred on the Uzun Yaila; but no effort is made to improve the quality of the wool and mohair or the breed of horses. Good mules can be obtained in several districts, and small hardy oxen are largely bred for ploughing and transport. The larger birds are the bittern, great and small bustard, eagle, francolin, goose; giant, grey and red- legged partridge, sand grouse, pelican, pheasant, stork and swan. The rivers and lakes are well supplied with fish, and the mountain streams abound with small trout.

The principal manufactures are: — Carpets, rugs, cotton, tobacco, mohair and silk stuffs, soap, wine and leather. The exports are: — Cereals, cotton, cotton seed, dried fruits, drugs, fruit, gall nuts, gum tragacanth, liquorice root, maize, nuts, olive oil, opium, rice, sesame, sponges, storax, timber, tobacco, valonia, walnut wood, wine, yellow berries, carpets, cotton yarn, cocoons, hides, leather, mohair, silk, silk stuffs, rugs, wax, wool, leeches, live stock, minerals, &c. The imports are: — Coffee, cotton cloths, cotton goods, crockery, dry- salteries, fezzes, glass-ware, haberdashery, hardware, henna, iron- ware, jute, linen goods, manufactured goods, matches, petroleum, salt, sugar, woollen goods, yarns, &c.

Communications. — There are few metalled roads, and those that exist are in bad repair, but on the plateau light carts can pass nearly everywhere. The lines of railway now open are: — (i) From Haidar Pasha to Ismid, Eski-shehr and Angora; (2) from Mudania to Brusa;

(3) from Eski-shehr to Afium-Kara-hissar, Koniaand Bulgurli, east of Eregli (the first section of the Bagdad railway). These lines are worked by the German Gesellschaft der anatolischen Eisenbahnen.

(4) From Smyrna to Alanisa, AJa-shehr and Afium Kara-hissar, with , a branch line from Manisa to Soma. This line is worked by a French company. (5) From Smyrna to Aidin and Dineir, with branches to Odemish, Tireh, Sokia, Denizli, Ishekli, Seidi Keui and Bouja, constructed

and worked by an English company. (6) From Mersina to Tarsus and Adana, an English line under a control mainly French. There are two competing routes for the eastern trade — one running inland from Constantinople (Haidar Pasha), the other from Smyrna. The first is connected by ferry with the European railway system ; the second with the great sea routes from Smyrna to Trieste, Mar- seilles and Liverpool. The right to construct all railways in Armenia and north-eastern Asia Minor has been conceded to Russia, and the Germans have a virtual monopoly of the central plateau.

Ethnology. — None of the conquering races that invaded Asia Minor, whether from the east or from the west, wholly expelled or exterminated the race in possession. The vanquished retired to the hills or absorbed the victors. In the course of ages race distinction has been almost obliterated by fusion of blood; by the complete Hellenization of the country, which followed the introduction of Christianity; by the later acceptance of Islam; and by migrations due to the occupation of cultivated lands by the nomads. It will be convenient here to adopt the modern division into Moslems, Christians and Jews: — (a) Moslems. The Turks never established themselves in such numbers as to form the predominant element in the population. Where the land was unsuitable for nomad occupation the agricultural population remained, and it still retains some of its original characteristics. Thus in Cappadocia the facial type of the non- Aryan race is common, and in Galatia there are traces of Gallic blood. The Zeibeks of the west and south-west are apparently representatives of the Carians and Lycians; and the peasants of the Black Sea coast range of the people of Bithynia, Paphla- gonia and Pontus. Wherever the people accepted Islam they called themselves Turks, and a majority of the so-called " Turks " belong by blood to the races that occupied Asia Minor before the Seljuk invasion. Turkish and Zaza-speaking Kurds (see Kurdistan) are found in the Angora and Sivas vilayets. There are many large colonies of Circassians and smaller ones of Noghai (Nogais), Tatars, Georgians, Lazis, Cossacks, Albanians and

Pomaks. East of Boghaz Keui there is a compact population of Kizilbash, who are partly descendants of Shia Turks trans- planted from Persia and partly of the indigenous race. In the Cilician plain there are large settlements of Nosairis who have migrated from the Syrian mountains (see Syria). The nomads and semi-nomads are, for the most part, representatives of the Turks, Mongols and Tatars who poured into the country during the 350 years that followed the defeat of Romanus. Turkomans are found in the Angora and Adana vilayets; Avshars, a tribe of Turkish origin, in the valleys of Anti-Taurus; and Tatars in the Angora and Brusa vilayets; Yuruks are most numerous in the Konia vilayet. They speak Turkish and profess to be Moslems, but have no mosques or imams.

The Turkomans have villages in which they spend the winter, wandering over the great plains of the interior with their flocks and herds during the summer. The Yuruks on the contrary are a truly nomad race. Their tents are made of black goats' hair and their principal covering is a cloak of the same material. They are not limited to the milder districts of the interior, but when the harvest is over, descend into the rich plains and valleys near the coast. The Chepmi and Takhtaji, who live chiefly in the Aidin vilayet, appear to be derived from one of the early races, (b) Christians. The Greeks are in places the descendants of colonists from Greece, many of whom, e.g. in Pamphylia and the Smyrna district, are of very recent importation; but most of them belong by blood to the indigenous races. These people became " Greeks " as being subjects of the Byzantine empire and members of the Eastern Church. On the west coast, in Pontus and to some extent of late in Cappadocia, and in the mining villages, peopled from the Trebizond Greeks, the language is Romaic; on the south coast and in many inland villages (e.g. in Cappadocia) it is either Turkish, which is written in Greek characters, or a Greco-Turkish jargon. In and near Smyrna there are large colonies of Hellenes. Armenians are most numerous in the eastern districts, where they have been settled since the great migration that preceded and followed the Seljuk invasion. There are, however, Armenians in every large town. In central and western Asia Minor they are the descendants of colonists from Persia and Armenia (see Armenia), (c) The Jews live chiefly on the Bosporus; and in Smyrna, Rhodes, Brusa and other western towns. Gypsies — some Moslem, some Christian — are also numerous, especially in the south.

History. — Asia Minor owes the peculiar interest of its history to its geographical position. " Planted like a bridge between Asia and Europe," it has been from the earliest period a battle- ground between the East and the West. The central plateau (2500 to 4500 ft.), with no navigable river and few natural approaches, with its monotonous scenery and severe climate, is a continuation of central Asia. The west coast, with its alterna- tion of sea and promontory, of rugged mountains and fertile valleys, its bright and varied scenery, and its fine climate, is almost a part of Europe. These conditions are unfavourable to permanence, asnd the history of Asia Minor is that of the march of hostile armies, and rise and fall of small states, rather than that of a united state under an independent sovereign. At a very early period Asia Minor appears to have been occupied by non- Aryan tribes or races which differed little from each other in religion, language and social system. During the past generation much light has been thrown upon one of these races — the " Hittites " or " Syro-Cappadocians," who, after their rule had passed away, were known to Herodotus as " White Syrians," and whose de- scendants can still be recognised in the villages of Cappadocia. 1 The centre of their power is supposed to have been Boghaz

Keui (see Pteria), east of the Halys, whence roads radiated to harbours on the Aegean, to Sinope, to northern Syria and to the Cilician plain. Their strange sculptures and inscriptions have been found at Pteria, Euyuk, Fraktin, Kiz Hissar (Tyana), Ivriz, Bulgar, Muden and other places between Smyrna and the

1 The people, Moslem and Christian, are physically one and appear to be closely related to the modern Armenians. This relationship is noticeable in other districts, and the whole original population of Asia Minor has been characterized as Proto-Armenian or Armenoid.

Euphrates (see Hittites). When the great Aryan immigration from Europe commenced is unknown, but it was dying out in the nth and 10th centuries B.C. In Phrygia the Aryans founded a kingdom, of which traces remain in various rock tombs, forts and towns, and in legends preserved by the Greeks. The Phrygian power was broken in the 9th or 8th century B.C. by the Cimmerii, who entered Asia Minor through Armenia; and on its decline rose the kingdom of Lydia, with its centre at Sardis. A second Cimmerian invasion almost destroyed the rising kingdom, but the invaders were expelled at last by Alyattes, 617 B.C. (see Scythia). The last king, Croesus (? 560-546 B.C.) carried the boundaries of Lydia to the Halys, and subdued the Greek colonies on the coast. The date of the foundation of these colonies cannot be fixed; but at an early period they formed a chain of settlements from Trebizond to Rhodes, and by the 8th century B.C. some of them rivalled the splendour of Tyre and Sidon. Too jealous of each other to combine, and too de- moralized by luxury to resist, they fell an easy prey to Lydia; and when the Lydian kingdom ended with the capture of Sardis by Cyrus, 546 B.C. they passed, almost without resistance, to Persia. Under Persian rule Asia Minor was divided into four satrapies, but the Greek cities were governed by Greeks, and several of the tribes in the interior retained their native princes and priest-dynasts. An attempt of the Greeks to regain their freedom was crushed, 500-494 B.C., but later the tide turned and the cities were combined with European Greeks into a league for defence against the Persians. The weakness of Persian rule was disclosed by the expedition of Cyrus and the Ten Thousand Greeks, 402 B.C.; and in the following century Asia Minor was invaded by Alexander the Great (q.v.), 334 B.C. (See Greece; Persia; Ionia.)

The wars which followed the death of Alexander eventually gave Asia Minor to Seleucus, but none of the Seleucid kings was able to establish his rule over the whole peninsula. Rhodes be- came a great maritime republic,

and much of the south and west coast belonged at one time or another to the Ptolemies of Egypt. An independent kingdom was founded at Pergamum, 283 B.C., which lasted until Attalus III., 133 B.c , made the Romans his heirs. Bithynia became an independent monarchy, and Cappadocia and Paphlagonia tributary provinces under native princes. In southern Asia Minor the Seleucids founded Antioch, Apamea, Attalia, the Laodiceas and Seleuceias, and other cities as centres of commerce, some of which afterwards played an import- ant part in the Hellenization (see Hellenism) of the country, and in the spread of Christianity. During the 3rd century, 278-277 B.C., certain Gallic tribes crossed the Bosporus and Hellespont, and established a Celtic power in central Asia Minor. They were" confined by the victories of Attalus I. of Pergamum, c. 232 B.C., to a district on the Sangarius and Halys to which the name Galatia was applied; and after their defeat by Manlius, 189 B.C., they were subjected to the suzer- ainty of Pergamum (see Galatia).

The defeat of A ntiochus the Great at Magnesia, 190 B.C., placed Asia Minor . the mercy of Rome; but it was not until 133 that the first R01 an province, Asia, was formed to include only western Anatolia, without Bithynia. Errors in policy and in government facilitated the rise of Pontus into a formidable power under Mithradates, who was finally driven out of the country by Pompey, and died 63 B.C. Under the settlement of Asia Minor by Pompey, Bithynia-Pontus and Cilicia became provinces, whilst Galatia and Cappadocia were allowed to retain nominal independence for over half a century more under native kings, and Lycia continued an autonomous League. A long period of tranquillity followed, during which the Roman dominion grew, and all Asia Minor was divided into two provinces. The boundaries were often changed; and about a.d. 297, in Diocletian's reorganization of the empire, the power of the great military commands was broken, and the provinces were made smaller and united in groups called dioceses. A great change followed the introduction of Christianity, which spread first along the main roads that ran north and west from the Cilician Gates, and especially along the great trade route to Ephesus. In some

districts it spread rapidly, in others slowly. With its advance the native languages and old religions gradually disappeared, and at last the whole country was thoroughly Hellenized, and the people united by identity of language and religion.

At the close of the 6 th century Asia Minor had become wealthy and prosperous; but centuries of peace and over-centralization had affected the moral of the people and weakened the central government. During the 7 th century the provincial system broke down, and the country was divided into themes or military districts. From 616 to 626 Persian armies swept

unimpeded over the land, and Chosroes (Khosrau) II. pitched his camp on the shore of the Bosporus. The victories of Heraclius forced Chosroes to retire; but the Persians were followed by the Arabs, who, advancing with equal ease, laid siege to Constantinople, a.d. 668. It almost appeared as if Asia Minor would be annexed to the dominion of the Caliph. But the tide of conquest was stemmed by the iconoclast emperors, and the Arab expeditions, excepting those of Harun al-Rashid, 781 and 806, and of el-Motasim, 838, became simply predatory raids. In the 10th century the Arabs were expelled. They never held more than the districts along the main roads, and in the intervals of peace the country rapidly recovered itself. But a more dangerous enemy was soon to appear on the eastern border.

In 1067 the Seljuk Turks ravaged Cappadocia and Cilicia; in 1071 they defeated and captured the emperor Romanus Diogenes, and in 1080 they took Nicaea. One branch of the Seljuks founded the empire of Rum, with its capital first at Nicaea and then at Iconium. The empire, which at one time included nearly the whole of Asia Minor, with portions of Armenia and Syria, passed to the Mongols when they defeated the sultan of Rum in 1243, and the sultans became vassals of the Great Khan. The Seljuk sultans were liberal patrons of art, literature and science, and the remains of their public buildings and tombs are amongst the most beautiful and most interesting in the country. The marches of the Crusaders across Asia Minor left no permanent impression. But the support given by the Latin princes to the Armenians in Cilicia facilitated the growth of the small warlike state of Lesser Armenia, which fell in 1375 with the defeat and capture of Leo VI. by the Mameluke sultan of Egypt. The Mongols were too weak to govern the country they had conquered, and the vassalage of the last sultan of Rum, who died in 1307, was only nominal. On his death the Turkoman governors of his western provinces drove out the Mongols and asserted their independence. A contest for supremacy followed, which event- ually ended in favour of the Osmanli Turks of Brusa. In 1400 Sultan Bayezid I. held all Asia Minor west of the Euphrates; but in 1402 he was defeated and made prisoner by Timur, who swept through the country to the shores of the Aegean. On the death of Timur Osmanli supremacy was re-established after a prolonged straggle, which ended with the annexation by Mahommed II. (1451-1481) of Karamania and Trebizond, and the abandonment of the last of the Italian trading settlements which had studded the coast during the 13th and 14th centuries. The later history of Asia Minor is that of the Turkish empire. The most important event was the advance (1832-1833) of an Egyptian army, under Ibrahim Pasha, through the Cilician Gates to Kohia and Kutaiah.

The defeat of the emperor Romanus (1071) initiated a change in the condition of Asia Minor which was to be complete and lasting. A long

succession of nomad Turkish tribes, pressing forward from central Asia, wandered over the rich country in search of fresh pastures for their flocks and herds. They did not plunder or ill-treat the people, but they cared nothing for town life or for agricultural pursuits, and as they passed onward they left the country bare. Large districts passed out of cultivation and were abandoned to the nomads, who replaced wheeled traffic by the pack horse and the camel. The peasants either became nomads themselves or took refuge in the towns or the mountains. The Mongols, as they advanced, sacked towns and laid waste the agricultural lands. Timur conducted his cam- paigns with a ruthless disregard of life and property. Entire Christian communities were massacred, flourishing towns were

completely destroyed, and all Asia Minor was ravaged. From these disasters the country never recovered, and the last traces of Western civilization disappeared with the enforced use of the Turkish language and the wholesale conversions to Islam under the earliest Osmanli sultans. The recent large increase of the Greek population in the western districts, the construction of railways, and the growing interests of Germany and Russia on the plateau seem, however, to indicate that the tide is again turning in favour of the West.

Bibliography. — 1. General Authorities: — C. Texier, Asie Mineure (1843); P. Tchihatcheff, Asie Mineure (1853-1860); C. Ritter, Erdkunde, vols, xviii. xix. (1858-1859); W. J. Hamilton, Researches in Asia Minor (1843); E. Rectus, Nouv. Geog. Univ. vol. ix. (1884) ; V. Cuinet, La Turquie d'Asie (1890) ; W. M. Ramsay, Hist. Geog. of A. M. (1890) ; Murray's Handbook for A . M. &c, ed. by Sir C. Wilson (1895). For Geology see Tchihatcheff, Asie Mineure, Geologie (Paris, 1867-1869); Schaffer, Cilicia, Peterm. Mitt. Ergan- zungslieft, 141 (1903) ; Philippson, Sitz. k. preuss. Akad. Wiss. (1903), pp. 112-124; English, Quart. Journ. Geol. Soc. (London, 1904), pp. 243- 295; see also Suess, Das Antlitz der Erde, vol. iii. pp. 402-412, and the accompanying references.

2. A. Western Asia Minor. — J. Spon and G. Wheler, Voyage du Levant (1679); P. de Tournefort, Voyage du Levant (1718); F. Beaufort, Ionian Antiquities (181 1); R. Chandler, Travels (1817); W. M. Leake, Journal of a Tour in A. M. (1820) ; F. V. J. Arundell, Visit to the Seven Churches (1828), and Discoveries, &c. (1834); C. Fellows, Excursion in A. M. (1839) ; C. T. Newton, Travels (1867), and Discoveries at Halicarnassus, Sec. (1863); Dilettanti Society, Ionian Antiquities (1769-1840) ; J. R. S. Sterrett, Epigr. Journey and Wolfe Exped. (Papers, Amer. Arch. Inst. ii.

iii.) (1.888); J. H. Skene, Anadol (1853); G. Radet, Lydie (1893); O. Rayet and A. Thomas, Milet et le Golfe Latmique (1872); K. Buresch, Aus Lydien (1898); W. M. Ramsay, Cities and Bishoprics of Phrygia (1895), and Impressions of Turkey (1898).

B. Eastern Asia Minor. — W. F. Ainsworth, Travels in A. M. (1842); G. Perrot and E. Guillaume, Expl. arch, de la Galatie (1862- 1872) ; E. J. Davis, Anatolica (1874) ; H. F. Tozer, Turkish Armenia (1881); H. J. v. Lennep, Travels (1870); D. G. Hogarth, Wandering Scholar (1896); Lord Warkworth, Notes of a Diary, &c. (1898); E. Sarre, Reise (1896); D. G. Hogarth and J. A. R. Munro, Mod. and Anc. Roads (R.G.S. Supp. Papers iii.) (1893); H. C. Barkley, A Ride through A. M. and Armenia (1891); M. Sykes, Dar ul-Islam (1904); E. Chantre, Mission en Cappadocie (1898).

C. Southern Asia Minor. — F. Beaufort, Karamania (1817); C. Fellows, Discoveries in Lycia (1841) ; T. A. B. Spratt and E. Forbes, Travels in Lycia (1847); V. Langlois, Voy. dans la Cilicie (1861); E. J. Davis, Life in Asiatic Turkey (1879); O. Benndorf and E. Niemann, Lykien (1884); C. Lanckoronski, Villes de la Pamphylie et de la Pisidie (1890); F. v. Luschan, Reisen in S.W. Kleinasien 1888); E. Petersen and F. v. Luschan, Lykien (1889); K. Humann and O. Puchstein, Reisen in Kleinasien und Nordsyrien (1890).

D. Northern Asia Minor. — J. M. Kinneir, Journey through A. M. (1818); J. G. C. Anderson and F. Cumont, Studia Pontica (1903); E. Naumann, Vom Goldenen Horn, &c. (1893).

See also G. Perrot and C. Chipiez, Hist, de I'art dans V anliquile, vols. iv. v. (1886-1890); J. Strzygowski, Kleinasien, &c. (1903). Also numerous articles in all leading archaeological periodicals, the Geographical Journal, Deutsche Rundschau, Petermann's Geog. Mitteilungen, &c. &c.

3. Maps. — H. Kiepert, Nouv. carte gen. des prov. asiat. de I'Emp. ottoman (1894), and Spezialkarte v. Westkleinasien (1890); W. von Diest, Karte des Nordwestkleinasien (1901); R. Kiepert, Karle von Kleinasien (1901); E. Friederich, Handels- und Produktenkarte von Kleinasien (1898) ; J. G. C. Anderson, Asia Minor (Murray's Handy Class. Maps) (1903). (C. W. W.; D. G. H.)

ASIENTO, or Assiento (from the verb asentar, to place, or establish), a Spanish word meaning a farm of the taxes, or contract. The farmer or contractor is called an asentista. The word acquired a considerable notoriety in English and American history, on account of the " Asiento Treaty " of 1713. Until 1702 the Spanish government had given the

contract for the supply of negroes to its colonies in America to the Genoese. But after the establishment of the Bourbon dynasty in 1700, a French company was formed which received the exclusive privilege of the Spanish-American slave trade for ten years — from September 1 702 to 1 7 1 2. When the peace of Utrecht was signed the British government insisted that the monopoly should be given to its own subjects. By the terms of the Asiento treaty signed on the 16th of March 1713, it was provided that British subjects should be authorized to introduce 144,000 slaves in the course of thirty years, at the rate of 4800 per annum. The privilege was to expire on the 1st of May 1743. British subjects were also authorized to send one ship of 500 tons per annum, laden with

manufactured goods, to the fairs of Porto Bello and La Vera Cruz. Import duties were to be paid for the slaves and goods. This privilege was conveyed by the British government to the South Sea Company, formed to work it. The privilege, to which an exaggerated value was attached, formed the solid basis of the notorious fit of speculative fever called the South Sea Bubble. Until 1739 the trade in blacks went on without interruption, but amid increasingly angry disputes between the Spanish and the British governments. The right to send a single trading ship to the fairs of Porto Bello or La Vera Cruz was abused. Under pretence of renewing her provisions she was followed by tenders which in fact carried goods. Thus there arose what was in fact a vast contraband trade. The Spanish government established a service of revenue boats {guarda costas) which insisted on searching all English vessels approaching the shores of the Spanish colonies. There can be no doubt that the smugglers were guilty of many piratical excesses, and that the guarda costas often acted with violence on mere suspicion. After many disputes, in which the claims of the British government were metby Spanish counter claims, war ensued in 1739. When peace was made at Aix-la-Chapelle in 1 748 Spain undertook to allow the asiento to be renewed for the four years which were to run when war broke out in 1739. But the renewal for so short a period was not considered advantageous, and by the treaty of El Retiro of 1750, the British government agreed to the recession of the Asiento treaty altogether on the payment by Spain of £100,000. A very convenient account of the Asiento Treaty, and of the trade which arose under it, will be found in Malachy Postlethwayt's Universal Dictionary of Trade and Commerce (London, 1751), s.v.

ASIR, a district in western Arabia, lying between 17 30′ and 21 N., and 40 30′ and 45° E.; bounded N. by Hejaz, E. by Nejd, S. by Yemen and W. by the Red Sea. Like Yemen, it consists of a lowland zone some 20 or 30 m. in width along the coast, and of a mountainous tract, falling steeply on the west and merging into a highland plateau which slopes gradually to the N.E. towards the Nejd steppes. Its length along the coast is about 230 m.,

and its breadth from the coast to El Besha about 180. The lowland, or Tehama, is hot and barren; the principal places in it are Kanfuda, the chief port of the district, Marsa Hali and El Itwad, smaller ports farther south. The mountain- ous tract has probably an average altitude of between 6000 and 7000 ft., with a temperate climate and regular rainfall, and' is fertile and populous. The valleys are well watered and produce excellent crops of cereals and dates. The best-known are the Wadi Taraba and the W. Besha, both running north-east towards the W. Dawasir in Nejd. Taraba, according to John Lewis Burckhardt, is a considerable town, surrounded by palm groves and gardens, and watered by numerous rivulets, and famous for its long resistance to Mehemet Ali's forces in 1815. Five or six days' journey to the south-east is the district of Besha, the most important position between Sana and Taif. Here Mehemet Ali's army, amounting to 12,000 men, found sufficient provisions to supply it during a fortnight's halt. The Wadi Besha is a broad valley abounding with streams containing numerous hamlets scattered over a tract some six or eight hours' journey in length. Its principal affluent, the W. Shahran, rises 120 m. to the south and runs through the fertile district of Khamis Mishet, the highest in Asir. The Zahran district lies four days west of Besha on the crest of the main range: the principal place is Makhwa, a large town and market, from which grain is exported in considerable quantities to Mecca. Farther south is the district of Shamran. Throughout the mountainous country the valleys are well watered and cultivated, with fortified villages perched on the surrounding heights. Juniper forests are said to exist on the higher mountains. Three or four days' journey east and south- east of Besha are the encampments of the Bani Kahtan, one of the most ancient tribes of Arabia; their pastures extend into the adjoining district of Nejd, where they breed camels in large numbers, as well as a few horses.

The inhabitants are a brave and warlike race of mountaineers, and aided by the natural strength of their country they have

hitherto preserved their independence. Since the beginning of the 19th century they have been bigoted Wahhabis, though previously regarded by their neighbours as very lax Mahom- medans; during Mehemet All's occupation of Nejd their constant raids on the Egyptian communications compelled him to send several punitive expeditions into the district, which, however, met with little success. Since the reconquest of Yemen by the Turks, they have made repeated attempts to subjugate Asir, but beyond occupying Kanfuda, and holding one or two isolated points in the interior, of which Ibha and Manadir are the principal, they have effected nothing.

The chief sources of information regarding Asir are the notes madeby J. L. BurckhardtatTaif in i8r4and those of the French officers with the Egyptian expeditions into the country from 1S14 to 1837. No part of Arabia would better repay exploration.

Authorities. — J. L. Burckhardt, Travels in Arabia (London, 1829); F. Mengin, Histoire de I'ltgypte, &c. (Paris, 1823); M. O. Tamisier, Voyage en Arabie (Paris, 1840). (R. A. W.)

ASISIUM (mod. Assist), an ancient town of Umbria, in a lofty situation about 15 m. E.S.E. of Perusia. As an independent community it had already begun to use Latin as well as Umbrian in its inscriptions (for one of these recording the chief magistrates — marones — see C.I.L. xi. 5390). It became a municipium in 90 B.C., but, though numerous inscriptions {C.I.L. xi. 5371- 5606) testify to its importance in the Imperial period, it is hardly mentioned by our classical authorities. Scanty traces of the ancient city walls may be seen; within the town the best-pre- served building is the so-called temple of Minerva, with six Corinthian columns of travertine, now converted into a church, erected by Gaius and Titus Caesius in the Augustan era. It fronted on to the ancient forum, part of the pavement of which, with a base for the equestrian statues of Castor and Pollux (as the inscription upon it records) has been laid bare beneath the present Piazza V'ittorio Emanuele. The remains of the amphi- theatre, in opus reticulaltim, may be seen in the north-east corner of the town; and other ancient buildings have been discovered. Asisium was probably the birthplace of Propertius. (T. As.)

ASKABAD, or Askhabad, a town of Russian central Asia, capital of the Transcaspian province, 345 m. by rail S.E. of Krasnovodsk and 594 from Samarkand, situated in a small oasis at the N. foot of the Kopet-dagh range. It has a public library and a technical railway school; also cotton-cleaning works, tanneries, brick-works, and a mineral-water factory. The trade is valued at £250,000 a year. The population, 2500 in 1881, when the Russians seized it, was 19,428 in 1897, one- third Persians, many of them belonging to the Babi sect.

ASKAULES (Gr. cutkcujAtjs [?] from cktkos, bag, cu>A6s, pipe), probably the Greek word for bag-piper, although there is no documentary authority for its use. Neither it nor acKav\os (which would naturally mean the bag-pipe) has been found in Greek classical authors, though J. J. Reiske — in a note on Dio Chrysostom, Or at. lxxi. ad fin., where an unmistakable descrip- tion of the bag-pipe occurs (" and they say that he is skilled to write, to work as an artist, and to play the pipe with his mouth, on the bag placed under his arm-pits ") — says that affKavXrjs was the Greek word for bag-piper. The only actual corroboration of this is the use

of ascaules for the pure Latin utricularius in Martial x. 3. 8. Dio Chrysostom flourished about a.d. 100; it is therefore only an assumption that the bag-pipe was known to the classical Greeks by the name of aaKav \os. It need not, however, be a matter of surprise that among the highly cultured Greeks such an instrument as the bag-pipe should exist without finding a place in literature. It is significant that it is not mentioned by Pollux {Onomast. iv. 74) and Athenaeus (Deipnos. iv. 76) in their lists of the various kinds of pipes.

See articles Aulos and Bag-pipe; art. "Askaules" in Pauly- Wissowa, Realcncyclopddie.

ASKE, ROBERT (d. 1537), English rebel, was a country gentleman who belonged to an ancient family long settled in Yorkshire, his mother being a daughter of John, Lord Clifford. When in 1536 the insurrection called the " Pilgrimage of Grace " broke out in Yorkshire, Aske was made leader; and marching with the banner of St Cuthbert and with the badge of the " five

wounds," he occupied York on the 16th of October and on the 20th captured Pontefract Castle, with Lord Darcy and the archbishop of York, who took the oath of the rebels. He caused the monks and nuns to be reinstated, and refused to allow the king's herald to read the royal proclamation, announcing his intention of marching to London to declare the grievances of the commons to the sovereign himself, secure the expulsion of counsellors of low birth, and obtain restitution for the church. The whole country was soon in the hands of the rebels, a military organization with posts from Newcastle to Hull was established, and Hull was provided with cannon. Subsequently Aske, followed by 30,000 or 40,000 men, proceeded towards Doncaster, where lay the duke of Norfolk with the royal forces, which, inferior in numbers, would probably have been overwhelmed had not Aske persuaded his followers to accept the king's pardon, and the promise of a parliament at York and to disband. Soon afterwards he received a letter from the king desiring him to come secretly to London to inform him of the causes of the rebellion. Aske went under the guarantee of a safe-conduct and was well received by Henry. He put in writing a full account of the rising and of his own share in it; and, fully persuaded of the king's good intentions, returned home on the 8th of January 1537, bringing with him promises of a visit from the king to Yorkshire, of the holding of a parliament at York, and of free elections. Shortly afterwards he wrote to the king warning him of the still unquiet state not only of the north but of the midlands, and stating his fear that more bloodshed was impending. The same month he received the king's thanks for his action in pacifying Sir Francis Bigod's rising. But his position was now a difficult and a perilous one, and a few weeks later the attitude of the government towards him was suddenly changed. The new rising had

given the court an excuse for breaking off the treaty and sending another army under Norfolk into Yorkshire. Possibly in these fresh circumstances Aske may have given cause for further suspicions of his loyalty, and in his last confession he acknowledged that communications to obtain aid had been opened with the imperial ambassador and were contemplated with Flanders. But it is more probable that the government had from the first treacherously affected to treat him with confidence to secure the secrets of the rebels and to effect his destruction. In March Norfolk congratulated Cromwell on the successful accomplishment of his task, having persuaded Aske to go to London on false assurances of security. He was arrested in April, tried before a commission at West- minster, and sentenced to death for high treason on the 17th of May; and on the 28th of June he was taken back to Yorkshire, being paraded in the towns and country through which he passed. He was hanged at York in July, expressing repentance for breaking the king's laws, but declaring that he had promise of pardon both from Cromwell and from Henry. It is related that his servant, Robert Wall, died of grief at the thought of his master's approaching execution. Aske was a real leader, who gained the affection and confidence of his followers; and his sudden rise to greatness and his choice by the people point to abilities that have not been recorded.

See Henry VIII. and the English Monasteries, by F. A. Gasquet (1906); Letters and Papers of the Reign of Henry VIII., vols. xi. andxii.; English Histor. Review, v. 330, 550 (account of the re- bellion, examination and answers to interrogations) ; Chronicle of Henry VIII., tr. by M. A. S. Hume (1889); Whitaker's Richmond- shire, i. 116 (pedigree of the Askes).

ASKEW, or Ascue, ANNE (iS2i?i5 4 6), English Protestant martyr, born at Stallingborough about 1521, was the second daughter of Sir William Askew (d. 1540) of South Kelsey, Lincoln, by his first wife Elizabeth, daughter of Thomas Wrottesley. Her elder sister, JMartha, was betrothed by her parents to Thomas Kyme, a Lincolnshire justice of the peace, but she died before marriage, and Anne was induced or com pelled to take her place. She is said to have had two children by Kyme, but religious differences and incompatibility of tem- perament soon estranged the couple. Kyme was apparently an unimaginative man of the world, while Anne took to Bible- reading with zeal, became convinced of the falsity of the doctrine

of transubstantiation, and created some stir in Lincoln by her dis- putations. According to Bale and Foxe her husband turned her out of doors, but in the privy council register she is said to have " refused Kyme to

be her husband without any honest allega- tion." She had as good a reason for repudiating her husband as Henry VIII. for repudiating Anne of Cleves. In any case, she came to London and made friends with Joan Bocher, who was already known for heterodoxy, and other Protestants. She was examined for heresy in March 1545 by the lord mayor, and was committed to the Counter prison. Then she was examined by Bonner, the bishop of London, who drew up a form of re- cantation which he entered in his register. This fact led Parsons and other Catholic historians to state that she actually recanted, but she refused to sign Bonner's form without qualification. Two months later, on the 24th of May, the privy council ordered her arrest. On the 13th of June 1545, she was arraigned as a sacramenfarian under the Six Articles at the Guildhall; but no witness appeared against her; she was declared not guilty by the jury and discharged after paying her fees.

The reactionary party, which, owing to the absence of Hertford and Lisle and to the presence of Gardiner, gained the upper hand in the council in the summer of 1546, were not satisfied with this repulse; they probably aimed at the leaders of the reforming party, such as Hertford and possibly Queen Catherine Parr, who were suspected of favouring Anne, and on the 18th of June 1546 Anne was again arraigned before a commission including the lord mayor, the duke of Norfolk, St John, Bonner and Heath. No jury was empanelled and no witnesses were called; she was condemned, simply on her confession, to be burnt. On the same day she was called before the privy council with her husband. Kyme was sent home into Lincolnshire, but Anne was committed to Newgate, " for that she was very obstinate and heady in reasoning of matters of religion." On the following day she was taken to the Tower and racked; according to Anne's own statement, as recorded by Bale, the lord chancellor, Wriothesley, and the solicitor-general, Rich, worked the rack themselves; but she " would not convert for all the pain " (Wriothesley, Chronicle i. 168). Her torture, disputed by Jardine, Lingard and others, is substantiated not only by her own narrative, but by two con- temporary chronicles, and by a contemporary letter {ibid.; Narratives of the Reformation, p. 305; Ellis, Original Letters, 2nd Ser. ii. 177). For four weeks she was left in prison, and at length on the 16th of July, she was burnt at Smith&eld in the presence of the same persecuting dignitaries who had condemned her to death.

Authorities. — Bale's two tracts.printed at Marburg in November 1546 and January 1547, are the basis of Foxe's account. See also Acts of the Privy Council (1542-1547), pp. 424. 462; Wriothesley's Chron. i. 155, 167-169; Narratives of the Reformation, passim; Cough's Index to Parker Soc. Publications; Burnet's Hist, of the Reformation; Dixon's Hist, of the Church of England; Diet. Nat. Biogr. (A. F. P.)

ASMA'I [Abu Sa'Id 'Abd ul -Malik ibn Quraib] (c. 739-831), Arabian scholar, was born of pure Arab stock in Basra and was a pupil there of Abu 'Amr ibn ul-'Ala. He seems to have been a poor man until by the influence of the governor of Basra he was brought to the notice of Harun al-Rashld, who enjoyed his con- versation at court and made him tutor of his son. He became wealthy and acquired property in Basra, where he again settled for a time; but returned later to Bagdad, where he died in 831. Asma'i was one of the greatest scholars of his age. From his youth he stored up in his memory the sacred words of the Koran, the traditions of the Prophet, the verses of the old poets and the stories of the ancient wars of the Arabs. He was also a student of language and a critic. It was as a critic that he was the great rival of Abu 'Ubaida (q.v.). While the latter followed (or led) the Shu'ubite movement and declared for the excellence of all things not Arabian, Asma'i was the pious Moslem and avowed supporter of the superiority of the Arabs over all peoples, and of the free- dom of their language and literature from all foreign influence. Some of his scholars attained high rank as literary men. Of Asma'i's many works mentioned in the catalogue known as the Fihrist, only about half a dozen are extant. Of these the Book of Distinction has been edited by D. H. Miiller (Vienna, 1876);

the Book of the Wild Animals by R. Geyer (Vienna, 1887); the Book of the Horse, by A. Haffner (Vienna, 1895); the Book of the Sheep, by A. Haffner (Vienna, 1896).

For life of Asma'i, see Ibn Khallikan, Biographical Dictionary, translated from the Arabic by McG. de Slane (Paris and London, 1842), vol. ii. pp. 123-127. For his work as a grammarian,. G. Fliigel, Die grammatischen Schulen der Araber (Leipzig, 1862), pp. 72-80. (G. W. T.)

ASMARA, the capital of the Italian colony of Eritrea, N.E. Africa. It is built on the Hamasen plateau, near its eastern edge, at an elevation of 7800 ft., and is some 40 m. W.S.W. in a direct line of the seaport of Massawa. Pop. (1904) about 9000, including the garrison of 300 Italian soldiers, and some 1000 native troops. The European civil population numbers over 500; the rest of the inhabitants are chiefly Abyssinians. There is a small Mahommedan colony. The town is strongly fortified. The European quarter contains several fine public buildings, including the residence of the governor, club house, barracks and hospital. Fort Baldissera is built on a hill to the south-west of the town and is considered impregnable.

Asmara, an Amharic word signifying " good pasture place," is a town of considerable antiquity. It was included in the mari- time province of northern Abyssinia, which was governed by a viceroy who bore the title of

Bahar-nagash (ruler of the sea). By the Abyssinians the Hamasen plateau was known as the plain of the thousand villages. Asmara appears to have been one of the most prosperous of these villages, and to have attained commercial importance through being on the high road from Axum to Massawa. When Werner Munzinger (q.v.) became French consul at Massawa, he entered into a scheme for annexing the Hamasen (of which Asmara was then the capital) to France, but the outbreak of the war with Germany in 1870 brought the project to nought (cf. A. B. Wylde, Modern Abyssinia, 1901). In 1872 Munzinger, now in Egyptian service, annexed Asmara to the khedivial dominions, but in 1884, owing to the rise of the mahdi,Egypt evacuated her Abyssinian provinces and Asmara was chosen by Ras Alula, the representative of the negus Johannes (King John), as his headquarters. Shortly afterwards the Italians occupied Massawa, and in 1889 Asmara (see Abyssinia : History) . In 1900 the seat of government was transferred from Massawa to Asmara, which in its modern form is the creation of the Italians. It is surrounded by rich agricultural lands, cultivated in part by Italian immigrants, and is a busy trading centre. A railway from Massawa to Asmara was completed as far as Ghinda, at the foot of the plateau, in 1904. At Medrizien, 6 m. north of ' Asmara, are gold-mines which have been partially worked.

See G. Dainelli, In Africa. Lettere doll' Eritrea (Bergamo, 1908) ; R. Perini, Di qua dal Mareb (Florence, 1905).

*ASMODEUS, or Ashmedai, an evil demon who appears in later Jewish tradition as "king of demons." He is sometimes identified * with Beelzebub or Apollyon (Rev. ix. n). In the Talmud he plays a great part in the legends concerning Solomon. In the apocryphal book of Tobit (iii. 8)occurs the well-known story of his love for Sara, the beautiful daughter of Raguel, whose seven husbands were slain in succession by him on their respective bridal nights. At last Tobias, by burning the heart and. liver of a fish, drove off the demon, who fled to Egypt. From the part played by Asmodeus in this story, he has been often familiarly called the genius of matrimonial unhappiness or jealousy, and as such may be compared with Lilith. Le Sage makes him the principal character in his novel Le Diable boiteux. Both the word and the conception seem to have been derived originally from the Persian. The name has been taken to mean "covetous." It is in any case no doubt identical with the demon Aeshma of the Zend-Avesta and the Pahlavi texts. But the meaning is not certain. It is generally agreed that the second part of the name Asmodeus is the same as the Zend daewa, dew, " demon." The first part may be equivalent to Aeshma, the impersonation of anger. But W. Baudissin (Herzog-Hauck, Realencyklopddie) prefers to derive it from ish, to drive, set in motion; whence ish-min, driving, impetuous.*

The legend of Asmodeus is given fully in the Jewish Encyclo- paedia,s.y.

See also the articles in the Encyclopaedia Biblica, Hastings' Dictionary of the Bible, and Herzog-Hauck, Realencyklopddie.

ASMONEUS, or Asamonaetjs (so Josephus), great-grandfather of Mattathias, the father of Judas Maccabaeus. Nothing more is known of him, and the name is only given by Josephus (not in 1 Mace. ii. 1). But the dynasty was known to Josephus and the Mishna (once) as " the sons (race) of the Asamonaeans (of A.) "; and the Targum of 1 Sam. ii. 4 has " the house of tte Hash- moneans who were weak, signs were wrought for them and strength." If not the founder, Asmoneus was probably the home of the family (cf. Heshmon, Jos. xv. 27).

See Schurer, Geschichte des jiidischen Volkes, i. 248 N; art. " Maccabees," § 2, in Ency. Biblica. (J. H. A. H.)

ASNIERES, a town of northern France, in the department of Seine, on the left bank of the Seine, about 15 m. N.N.W. of the fortifications of Paris. Pop. (1906) 35,883. The town, which has grown rapidly in recent years, is a favourite boating centre for the Parisians. The industries include boat-building and the manufacture of colours and perfumery.

ASOKA, a famous Buddhist emperor of India who reigned from 264 to 228 or 227 b.c. Thirty-five of his inscriptions on rocks or pillars or in caves still exist (see Inscriptions: Indian), and they are among the most remarkable and interesting of Buddhist monuments (see Buddhism). Asoka was the grandson of Chandragupta, the founder of the Maurya (Peacock) dynasty, who had wrested the Indian provinces of Alexander the Great from the hands of Seleucus, and he was the son of Bindusara, who succeeded his father Chandragupta, by a lady from Champa. The Greeks do not mention him and the Brahmin books ignore him, but the Buddhist chronicles and legends tell us much about him. The inscriptions, which contain altogether about five thousand words, are entirely of religious import, and their references to worldly affairs are incidental. They begin in the thirteenth year of his reign, and tell us that in the ninth year he had invaded Kalinga, and had been so deeply impressed by the horrors involved in warfare that he had then given up the desire for conquest, and devoted himself to conquest by " religion." What the religion was is explained in the edicts. It is purely ethical, independent alike of theology and ritual, and is the code of morals as laid down in the Buddhist sacred books for laymen. He further tells us that in the ninth year of his reign he formally joined the Buddhist community as a layman, in the eleventh year he became a member of the

order, and in the thirteenth he " set out for the Great Wisdom " (the Sambodhi), which is the Buddhist technical term for entering upon the well-known, eight- fold path to Nirvana. One of the edicts is addressed to the order, and urges upon its members and the laity alike the learn- ing and rehearsal of passages from the Buddhist scriptures. Two others are proclamations commemorating visits paid by the king, one to the dome erected over the ashes of Konagamana, the Buddha, another to the birthplace of Gotama, the Buddha (q.v.). Three very short ones are dedications of caves to the use of an order of recluses. The rest either enunciate the religion as explained above, or describe the means adopted by the king for propagating it, or acting in accordance with it. These means are such as the digging of wells, planting medicinal herbs, and trees for shade, sending out of missionaries, appointment of special officers to supervise charities, and so on. The missionaries were sent to Kashmir, to the Himalayas, to the border lands on the Indus, to the coast of Burma, to south India and to Ceylon. And the king claims that missions sent by him to certain Greek kingdoms that he names had resulted in the folk there conform- ing themselves to his religion. The extent of Asoka's dominion included all India from the thirteenth degree of latitude up to the Himalayas, Nepal, Kashmir, the Swat valley, Afghanistan as far as the Hindu Kush, Sind and Baluchistan. It was thus as large as, or perhaps somewhat larger than, British India before the conquest of Burma. He was undoubtedly the most powerful sovereign of his time and the most remarkable and imposing of the native rulers of India. " If a man's fame," says Koppen, " can be measured by the number of hearts who revere his memory, by the number of lips who have mentioned, and still mention him with honour, Asoka is more famous than Char- lemagne or Caesar." At the same time it is probable that,

like Constantine's patronage of Christianity, his patronage of Buddhism, then the most rising and influential faith in India, was not unalloyed with political motives, and it is certain that his vast benefactions to the Buddhist cause were at least one of the causes that led to its decline.

See also Asoka, by Vincent Smith (Oxford, 1901); Inscriptions de Piyadasi, by E. Senart (Paris, 1891); chapters on Asoka in T. W. Rhys Davids's Buddhism(20th ed. .London, 1903), and Buddhist India (London, 1903); V.A.Smith,Edictsof Asoka (1909). (T.W.R.D.)

ASOLO (anc. Acelum), a town of Venetia, Italy, in the province of Treviso, about 19 m. N.W. direct from the town of Treviso, and some 10m. E. of Bassanoby road. Pop. (1901) 5847. It is well situated on a hill, 690 ft. above sea-level. Remains of Roman baths and of a theatre have been discovered in the course of excavation {Notizie degli scavi, 1877, 2 35! 1881, 205; 1882, 289), and the town was probably a municipium. It

became an episcopal see in the 6th century. It was to Asolo that Catherine Cornaro, queen of Cyprus, retired on her abdica- tion. Here she was visited by Pietro Bembo, who conceived here his Dialoghi degli Asolani, and by Andrea Navagero (Naugerius). Paulus Manutius was born here. The village of Maser is 45 m. to the E., and near it is the Villa Giacomelli, erected by Palladio, con- taining frescoes by Paolo Veronese, executedin 1 566-1 568 for Marc- antonio Barbaro of Venice, and ranking among his best works.

ASOR (Hebr. for " ten "), an instrument " of ten strings " mentioned in the Bible, about which authors are not agreed. The word occurs only three times in the Bible, and has not been traced elsewhere. In Psalm xxxiii. 2 the reference is to " kinnor, nebel and asor "; in Psalm xcii. 3, to " nebel and asor "; in Psalm cxliv. to " nebel-asor." In the English version asor is translated " an instrument of ten strings," with a marginal note " omit " applied to " instrument." In the Septuagint, the word being derived from a root signifying " ten," the Greek is h> StKa\op8cp or xpahrripiov denaxopSov, in the Vulgate in deca- chordo psalterio. Each time the word asor is used it follows the word nebel (see Psaltery), and probably merely indicates a variant of the nebel, having ten strings instead of the customary twelve assigned to it by Josephus {Antiquities, vii. 12. 3).

See also Mendel and Reissmann, Musikalisch.es Conversations- Lexikon, vol. i. (Berlin, 1881); Sir John Stainer, The Music of the Bible, pp. 35-37; Forkel, Allgemeine Geschichte der Musik, Bd. i. p. 133 (Leipzig, 1788). (K. S.)

ASP (Vipera aspis), a species of venomous snake, closely allied to the common adder of Great Britain, which it represents throughout the southern parts of Europe, being specially abundant in the region of the Alps. It differs from the adder in having the head entirely covered with scales, shields being absent, and in having the snout somewhat turned up. The term " Asp " (do"7r£s) seems to have been employed by Greek and Roman writers, and by writers generally down to comparatively recent times, to designate more than one species of serpent; thus the asp, by means of which Cleopatra is said to have ended her life, and so avoided the disgrace of entering Rome a captive, is now generally supposed to have been the cerastes, or horned viper {Cerastes cornutus) , of northern Africa and Arabia, a snake about 15 in. long, exceedingly venomous, and provided with curious horn-like protuberances over each eye, which give it a decidedly sinister appearance. The snake, however, to which the word " asp " has been most commonly applied is undoubtedly the haje of Egypt, the spy-slange or spitting snake of the Boers {Naja haje), one of the very poisonous Elarinae, from 3 to 4 ft. long, with the skin of its neck loose, so as to render it dilatable at the will of the animal, as in the cobra of India, a species from which it differs only in the absence of the spectacle-like mark

on the back of the neck. Like the cobra, also, the haje has its fangs extracted by the jugglers of the country, who afterwards train it to perform various tricks. The asp {Pethen, jng) is mentioned in various parts of the Old Testament. This name is twice translated " adder," but as nothing is told of it beyond its poisonous character and the intractability of its disposition, it is impossible accurately to determine the species.

ASPARAGINE, C4H8N2O3, a naturally occurring base, found in plants belonging to the natural orders Leguminosae and

Cruciferae. It occurs in two optically active forms, namely, as laevo-asparagine and dextro-asparagine. Laevo-asparagine was isolated in 1805 by L. N. Vauquelin. A. Piutti (Gazz. chim. ltd., 1887, 17, p. 126; 1888, 18, p. 457) synthesized the asparagines from the monomethyl ester of inactive aspartic acid by heating it with alcoholic ammonia. In this way a mixture of the two asparagines was obtained, which were separated by picking out the hemihedral crystals. HOOC-CH-NH 2 -CH 2 -COOC 2 H 6 +NH 3

= C 2 H 6 OH+HOOC-CH-NH 2 -CH 2 -CONH 2 .

Laevo-asparagine is slightly soluble in cold water and readily soluble in hot water. It crystallizes in prisms, containing one molecule of water of crystallization, the anhydrous form melt- ing at 234-235°C. Nitrous acid converts it into malic acid, HOOC-CHOH-CH 2 -COOH. It is laevo-rotatory in aqueous or in alkaline solution, and dextro-rotatory in acid solution (L. Pasteur, Ann.Chim. Phys., 1851 [2I, 3i,p. 67). Dextro-asparagine was first found in 1886 in the shoots of the vetch (Piutti). It forms rhombic crystals possessing a sweet taste. It is dextro- rotatory in aqueous or alkaline solution, and laevo-rotatory in acid solution.

Hydrolysis by means of acids or alkalis converts the aspara- gines into aspartic acid; whilst on heating with water in a sealed tube they are converted into ammonium aspartate. The con- stitution of the asparagines has been determined by A. Piutti {Gazz. chim. Ital., 1888, 18, p. 457).

ASPARAGUS, a genus of plants (nat. ord. Liliaceae) containing more than 100 species, and widely distributed in the temperate and warmer parts of the Old World; it was introduced from Europe into America with the early settlers. The name is derived from the Greek acnrapayos or aapayos, the origin of which is obscure. Sperage or sparage was the form in use from the 1 6th to 1 8th centuries, cf. the modern Italian spar agio. The vulgar

corruption sparrow-grass or sparagrass was in accepted popular use during the 18th century, " asparagus " being con- sidered pedantic. The plants have a short, creeping, under- ground stem from which spring slender, branched, aerial shoots. The leaves are reduced to minute scales bearing in their axils tufts of green, needle-like branches (the so-called cladodes), which simulate, and perform the functions of, leaves. In one section of the genus, sometimes regarded as a distinct genus Myrsiphyllum, the cladodes are flattened. The plants often climb or scramble, in which they are helped by the develop- ment of the scale-leaves into persistent spines. The flowers are small, whitish and pendulous; the fruit is a berry.

Several of the climbing species are grown in greenhouses for their delicate, often feathery branches, which are also valu- able for cutting; the South African Asparagus plumosus is an especially elegant species. The so-called smilax, much used for decoration, is a species of the Myrsiphyllum section, A. medeo- loides, also known as Myrsiphyllum asparagoides. The young shoots of Asparagus officinalis have fro"m very remote times been in high repute as a culinary vegetable, owing to their delicate flavour and diuretic virtues. The plant, which is a native of the north temperate zone of the Old World, grows wild on the south coast of England; and on the waste steppes of Russia it is so abundant that it is eaten by cattle like grass. In common with the marsh-mallow and some other plants, it contains asparagine or aspartic acidamide. The roots of asparagus were formerly used as an aperient medicine, and the fruits were likewise employed as a diuretic. Under the name of Prussian asparagus, the spikes of an allied plant, Ornithogalum pyrenaicum, are used in some places. The diuretic action is extremely feeble, and neither the plant nor asparagine is now used medicinally.

Asparagus is grown extensively in private gardens as well as for market. The asparagus prefers a loose, light, deep, sandy soil; the depth should be 3 ft., the soil being well trenched, and all surplus water got away. A considerable quantity of well-rotted dung or of recent seaweed should be laid in the bottom of the trench, and another top-dressing of manure should be dug in preparatory to planting or sowing. The beds should be 3 ft. or 5 ft. wide, with intervening alleys of 2 ft., the narrower beds

taking two rows of plants, the wider ones three rows. The beds should run east and west, so that the sun's rays may strike against the side of the bed. In some cases the plants are grown in equidistant rows 3 to 4 ft. apart. Where the beds are made with plants already prepared, either one-year-old or two-year-old plants may be used, for which a trench should be cut sufficient to afford room for spreading out the roots, the crowns being all kept at about 2 in. below the surface. Planting is best done in April, after the plants have started into growth. To prevent injury to the roots, it is,

however, perhaps the better plan to sow the seeds in the beds where the plants are to remain. To experience the finest flavour of asparagus, it should be eaten immediately after having been gathered; if kept longer than one day, or set into water, its finer flavour is altogether lost. If properly treated, asparagus beds will continue to bear well for many years. The asparagus grown at Argenteuil, near Paris, has acquired much notoriety for its large size and excellent quality. The French growers plant in trenches instead of raised beds. The most common method of forcing asparagus is to prepare, early in the year, a moderate hot-bed of stable litter with a bottom heat of 70 , and to cover it with a common frame. After the heat of fermentation has somewhat subsided, the surface of the bed is covered with a layer of light earth or exhausted tan-bark, and in this the roots of strong mature plants are closely placed. The crowns of the roots are then covered with 3 to 6 in. of soil. A common three-light frame may hold 500 or 600 plants, and will afford a supply for several weeks. After planting, linings are applied when necessary to keep up the heat, but care must be taken not to scorch the roots; air must be occasionally admitted. Where there are pits heated by hot water or by the tank system, they may be advantageously applied to this purpose. A succession of crops must be main- tained by annually sowing or planting new beds.

The " asparagus-beetle " is the popular name for two beetles, the " common asparagus beetle " (Crioceris asparagi) and the " twelve-spotted " (C. duodecimpunctata) , which feed on the asparagus plant. C. asparagi has been known in Europe since early times, and was introduced into America about 1856; the rarer C. duodecimpunctata (sometimes called the " fed " to distinguish it from the " blue " species) was detected in America in 1881. For an admirable account of these pests see F. H. Chittenden, Circular 102 of the U. S. Dep. of Agriculture, Bureau of Entomology, May 1908.

The " asparagus-stone " is a form of apatite, simulating aspar- agus in colour.

ASPASIA, an Athenian courtesan of the sth century B.C., was born either at Miletus, or at Megara, and settled in Athens, where her beauty and her accomplishments gained for her a great reputation. Pericles, who had divorced his wife (445), made her his mistress, and, after the death of his two legitimate sons, procured the passing of a law under which his son by her was recognized as legitimate. It was the fashion, especially among the comic poets, to regard her as the adviser of Pericles in all his political actions, and she is even charged with having caused the Samian and Peloponnesian wars (Aristoph. Acharn. 497). Shortly before the latter war, she was accused of impiety, and nothing but the tears and entreaties of Pericles procured her acquittal. On the death of Pericles she is said to have

become the mistress of one Lysicles, whom, though of ignoble birth, she raised to a high position in the state; but, as Lysicles died a year after Pericles (428), the story is unconvincing. She was the chief figure in the dialogue Aspasia by Aeschines the Socratic, in which she was represented as criticizing the manners and training of the women of her time (for an attempted reconstruc- tion of the dialogue see P. Natorp in Philologus, li. p. 489, 1892); in the Menexenus (generally ascribed to Plato) she is a teacher of rhetoric, the instructress of Socrates and Pericles, and a funeral oration in honour of those Athenians who had given their lives for their country (the authorship of which is attributed to Aspasia) is repeated by Socrates; Xenophon (Oecon. Hi. r4) also speaks of her in favourable terms, but she is not mentioned by Thucydides. In opposition to this view, Wilamowitz-MollendorS

(Hermes, xxxv. 1900) regards her simply as a courtesan, whose personality would readily become the subject of rumour, favour- able or unfavourable. There is a bust bearing her name in the Pio Clementino Museum in the Vatican.

See Le Conte de Bievre, Les Deux Aspasies (1736) ; J. B. Capefigue, Aspasie el le sircle de Pericles (1862) ; L. Becq de Fouquieres. Aspasie de Milet (1872); H. Houssaye, Aspasie, Cleopdtre, Theodora (1899); R. Hamerling, Aspasia (a romance; Eng. trans, by M. J. Safford, New York, 1882) ; J. Donaldson, Woman (1907). Also Pericles.

ASPASIUS, a Greek peripatetic philosopher, and a prolific commentator on Aristotle. He flourished probably towards the close of the 1st century a.d., or perhaps during the reign of Antoninus Pius. His commentaries on the Categories, De Inter pretatione, De Sensu, and other works of Aristotle are frequently referred to by later writers, but have not come down to us. Commentaries on Plato, mentioned by Porphyry in his life of Plotinus, have also been lost. Commentaries on books 1-4, 7 (in part), and 8 of the Nicomachean Ethics are preserved; that on book 8 was printed with those of Eustratius and others by Aldus Manutius at Venice in 1536. They were partly (2-4) translated into Latin by Felicianus in 1541, and have frequently been republished, but their authenticity has been disputed. The most recent edition is by G. Heylbut in Commentaria in Aristotelcm Gracca, xix. 1 (Berlin, 1889).

Another Aspasius, in the 3rd century a.d., was a Roman sophist and rhetorician, son or pupil of the rhetorician Demetrianus. He taught rhetoric

in Rome, and filled the chair of rhetoric founded by Vespasian. He was secretary to the emperor Maximin. His orations, which are praised for their style, are lost.

ASPEN, an important section of the poplar genus (Populus) of which the common aspen of Europe, P. tremu/a, may be taken as the type, — a tall fast-growing. tree with rather slender trunk, and grey bark becoming rugged when old. The roundish leaves, toothed on the margin, are slightly downy when young, but after- wards smooth, dark green on the upper and greyish green on the lower surface; the long slender petioles, much flattened towards the outer end, allow of free lateral motion by the lightest breeze, giving the foliage its well-known tremulous character. By their friction on each other the leaves give rise to a rustling sound. It is supposed that the mulberry trees (Becaim) mentioned in 1 Chronicles xiv. 14, 15 were really aspen trees. The flowers, which appear in March and April, are borne on pendulous hairy catkins, 2-3 in. long; male and female catkins are, as in the other species of the genus, on distinct trees.

The aspen is found in moist places, sometimes at a considerable elevation, 1600 ft. or more, in Scotland. It is an abundant tree in the northern parts of Britain, even as far as Sutherland, and is occasionally found in the coppices of the southern counties, but in these latter habitats seldom reaches any large size; through- out northern Europe it abounds in the forests, — in Lapland flourishing even in 70 N. lat., while in Siberia its range extends to the Arctic Circle; in Norway its upper limit is said to coincide with that of the pine; trees exist near the western coast having stems 15 ft. in circumference. The wood of the aspen is very light and soft, though tough; it is employed by coopers, chiefly for pails and herring-casks; it is also made into butchers' trays, pack-saddles, and various articles for which its lightness recom- mends it; sabots are also made of it in France, and in medieval days it, was valued for arrows, especially for those used in target practice; the bark is used for tanning in northern countries; cattle and deer browse greedily on the young shoots and abundant suckers. Aspen wood makes but indifferent fuel, but charcoal prepared from it is light and friable, and has been employed in gunpowder manufacture. The powdered bark is sometimes given to horses as a vermifuge; it possesses likewise tonic and febrifugal properties, containing a considerable amount of salicin. The aspen is readily propagated either by cuttings or suckers, but has been but little planted of late years in Britain. P. trepida, or tremuloides, is closely allied to the European aspen, being chiefly distinguished by its more pointed leaves; it is a native of most parts of Canada and the United States, extending northwards as far as Great Slave Lake. The wood is soft and neither strong nor durable; it burns better in the green state

than that of most trees, and is often used by tbe hunters of the North-West

as fuel; split into thin layers, it was formerly employed in the United States for bonnet and hat making. It is largely manufactured into wood-pulp for paper-making. The bark is of some value as a tonic and febrifuge. P. grandidentata, the large-leaved American aspen, has ovate or roundish leaves deeply and irregularly serrated on the margin. The wood is light, soft and close-grained, but not strong. In northern New England and Canada it is largely manufactured into wood-pulp; it is occasionally used in turnerV and for wooden-ware.

ASPENDUS (mod. Balkis Kale , or, more anciently in the native language, Estvedys (whence the adjective Eslvedijys on coins), an ancient city of Pamphylia, very strongly situated on an isolated hill on the right bank of the Eurymedon at the point where the river issues from the Taurus. The sea is now about 7 m. distant, and the river is navigable only for about 2 m. from the mouth; but in the time of Thucydides ships could anchor off Aspendus. Really of pre-Hellenic date, the place claimed to be an Argive colony. It derived wealth from great salines and from a trade in oil and wool, to which the wide range of its admirable coinage bears witness from the 5th century B.C. onwards. There Alcibiades met the satrap Tissaphernes in 411 B.C., and thence succeeded in getting the Phoenician fleet, intended to co-operate with Sparta, sent back home. The Athenian, Thrasybulus, after obtaining contributions from Aspendus in 389, was murdered by .the inhabitants. The city bought off Alexander in ^^3^ but, not keeping faith, was forcibly occupied by the conqueror. In due course it passed from Pergamene to Roman dominion, and according to Cicero, was plundered of many artistic treasures by Verres. It was ranked by Philos'tratus the third city of Pamphylia, and in Byzantine times seems to have been known as Primopolis, under which name its bishop signed at Ephesus in a.d. 431. In medieval times it was evidently still a strong place, but it has now sunk, in the general decay of Pamphylia, to a wretched hamlet.

The ruins still extant are very remarkable, and, with the noble Roman theatre, the finest in the world, have earned for the place (as is the case with certain other great monuments) a legendary connexion with Solomon's Sheban queen. On the summit of the hillock, surrounded by a wall with three gates, lie the remains of the city. The public buildings round the forum can all be traced, and parts of them are standing to a considerable height. They consist of a fine nympheum on the north with a covered theatre behind it, covered market halls on the west, and a peristyle hall and a basilica on the east. In the plain below are large thermae, and ruins of a splendid aqueduct. But all else seems insignificant beside the huge theatre, half hollowed out of the north-east flank of the hill. This was first published by C. F. M. Texier in 1849, an d has now been completely planned, &c, by Count Lanckoronski's expedition in 1884. It is built of

local conglomerate and is in marvellous preservation. Erected to the honour of the emperors Marcus Aurelius and L. Verus by the architect Zeno, for the heirs of a local Roman citizen (as an inscription repeated over both portals attests), its auditorium has a circuit of 313-17 feet. There are forty tiers of seating, divided by one diazoma, and crowned by an arched gallery of rather later date, repaired in places with brick. This auditorium held 7500 spectators. The seats are not perfect, but so nearly so as to appear practically intact. The wooden stage has, of course, perished, but all its supporting structures are in place, and the great scena wall stands to its full height, and produces a magnificent impression whether from within or from without. Inwardly it was decorated with two orders of columns one above the other, with rich entablatures, much of which survives. In the tympanum is a relief of Bacchus (wrongly supposed to be of a female, and called the Bal-Kis, i.e. " Honey Girl "). The position of the sounding board above the stage is apparent. Under the forepart of the auditorium, built out from the hill, are immense vaults. The whole structure was enclosed within one great wall, pierced with numerous windows. This structure was probably put to some ecclesiastical Byzantine use, as certain mutilated heads of saints appear upon it; and later it became a fortress

and received certain additions. It is now under the care of the local aghd and not allowed to be plundered for building stone.

See C. Lanckoronski, Villes de la Pamphylie et de la Pisidu, i. (1890). (D. G. H.)

ASPER, AEMILIUS, Latin grammarian, possibly lived in the 2nd century a.d. He wrote commentaries on Terence, Sallust and Virgil. Numerous fragments of the last show that as both critic and commentator he possessed good judgment and taste. They are printed in Keil, Probi in Vergilii Bucolica Commentarius (1848); see also Suringar, Hisloria Critica Scholiastarum Lali- norum (1834) ; Grafenhan, Geschichtc der klassischen Philologie im

Alterthum, iv. (1S43-1830). Two short grammatical treatises,

extant under the name of Asper, and of very little value, have nothing to do with the commentator, but belong to a much later date — the time of Priscian (6th century). Both are printed in Keil, Grammatici Latini. See also Schanz, Geschichte der rbmischen Litleratur, § 598.

ASPER, HANS (1499-1571), Swiss painter, was born and died at Zurich.

He wrought in a great variety of styles, but excelled chiefly in flower and fruit pieces, and in portrait-painting. Many of his pictures have perished, but his style may be judged from the illustrations to Gessner's Hisloria Animalium, for which he is said to have furnished the designs, and from portraits of Zwingli and his daughter Regula Gwalter, which are preserved in the public library of Zurich. It has been usual to class Asper among the pupils and imitators of Holbein, but an inspection of his works is sufficient to show that this is a mistake. Though Asper was held in high reputation by his fellow-citizens, who elected him a member of the Great Council, and had a medal struck in his honour, he seems to have died in poverty.

ASPERGES (" thou wilt sprinkle," from the Latin verb asper gcrc), the ceremony of sprinkling the people with holy water before High Mass in the Roman Catholic Church, so called from the first word of the verse (Ps. iv. 0) Asperges me, Domini, hyssopo et mundabor, with which the priest begins the ceremony. The brush used for sprinkling is an aspergill {asper gillum), or aspersoir, and the vessel for this water an aspersorium. The act of sprinkling the water is called aspersion.

ASPERN-ESSLING, Battle of (1809), a battle fought on the 21st and 22 nd of May 1809 between the French and their allies under Napoleon and the Austrians commanded by the arch- duke Charles (see Napoleonic Campaigns). At the time of the battle Napoleon was in possession of Vienna, the bridges over the Danube had been broken, and the archduke's army was on and about the Bisamberg, a mountain near Korneuburg, on the left bank of the river. The first task of the French was the crossing of the Danube. Lobau, one of the numerous islands which divide the river into minor channels, was selected as the point of crossing, careful preparations were made, and on the night of the i9th-2oth of May the French bridged all the channels from the right bank to Lobau and occupied the island. By the evening of the 20th great masses of men had been collected there and the last arm of the Danube, between Lobau and the left bank, bridged. Massena's corps at once crossed to the left bank and dislodged the Austrian outposts. Undeterred by the news of heavy attacks on his rear from Tirol and from Bohemia, Napoleon hurried all available troops to the bridges, and by daybreak on the 21st, 40,000 men were collected on the Marchfeld, the broad open plain of the left bank, which was also to be the scene of the battle of Wagram. The archduke did not resist the passage; it was his intention, as soon as a large enough force had crossed, to attack it before the rest of the French army could come to its assistance. Napoleon had, of course, accepted the risk of such an attack, but he sought at the same time to minimize it by summoning every available battalion to the scene. His forces on the Marchfeld were drawn up in front of the bridges facing north, with their left in the village of Aspern (Gross- Aspern) and their right in Essling (or Esslingen). Both places lay close to the Danube

and could not therefore be turned; Aspern, indeed, is actually on the bank of one of the river channels. But the French had to fill the gap between the villages, and also Xu move forward to give room for the supports to form up.

Whilst they were thus engaged the archduke moved to the attack with his whole army in five columns. Three under Hiller, Bellegarde and Hohenzollern were to converge upon Aspern, the other two, under Rosenberg, to attack Essling. The Austrian cavalry was in the centre, ready to move out against any French cavalry which should attack the heads of the columns. During the 21st the bridges became more and more unsafe, owing to the violence of the current, but the French crossed without intermission all day and during the night. The battle began at Aspern; Hiller carried the village at the first rush, but Massena recaptured it, and held his ground with

the same tenacity as he had shown it Genoa in 1800. The

French infantry, indeed, fought on this day with the old stubborn bravery which it had failed to show in the earlier battles of the year. The three Austrian columns fighting their hardest through the day were unable to capture more than half the village; the rest was still held by Massena when night fell. In the meanwhile nearly all the French infantry posted between the two villages and in front of the bridges had been drawn into the fight on either flank. Napoleon therefore, to create a diversion, sent forward his centre, now consisting only of cavalry, to charge the enemy's artillery, which was deployed in a long line and firing into Aspern. The first charge of the French was repulsed, but the second attempt, made by heavy masses of cuirassiers, was more serious. The French horsemen, gallantly led, drove off the guns, rode round Hohenzollern's infantry squares, and routed the cavalry of Lichtenstein, but they were unable to do more, and in the end they retired to their old position. In the meanwhile Essling had been the scene of fighting almost as desperate as that of Aspern. The French cuirassiers made repeated charges on the flank of Rosenberg's force, and for long delayed the assault, and in the villages Lannes with a single division made a heroic and successful resistance, till night ended the battle. The two armies bivouacked on their ground, and in Aspern the French and Austrians lay within pistol shot of each other. The latter had fought fully as hard as their opponents, and Napoleon realized that they were no longer the professional soldiers of former campaigns. The spirit of the nation was in them and they fought to kill, not for the honour of their arms. The emperor was not discouraged, but on the contrary renewed his efforts to bring up every available man. All through the night more and more French troops were put across.

At the earliest dawn of the 22nd the battle was resumed. Massena swiftly cleared Aspern of the enemy, but at the same time Rosenberg stormed Essling at last. Lannes, however, resisted desperately, and reinforced by St Hilaire's division, drove Rosenberg out. In Aspern Massena had been less for- tunate, the counter-attack of Hiller and Bellegarde being as completely successful as that of Lannes and St Hilaire. Mean- time Napoleon had launched a great attack on the Austrian centre. The whole of the French centre, with Lannes on the right and the cavalry in reserve, moved forward. The Austrian line was broken through, between Rosenberg's right and Hohen- zollern's left, and the French squadrons poured into the gap. Victory was almost won when the archduke brought up his last reserve, himself leading on his soldiers with a colour in his hand. Lannes was checked, and with his repulse the impetus of the attack died out all along the line. Aspern had been lost, and graver news reached Napoleon at the critical moment. The Danube bridges, which had broken down once already, had at last been cut by heavy barges, which had been set adrift down stream for the purpose by the Austrians. Napoleon at once suspended the attack. Essling now fell to another assault of Rosenberg, and though again the French, this time part of the Guard, drove him out, the Austrian general then directed his efforts on the flank of the French centre, slowly retiring on the bridges. The retirement was terribly costly, and but for the steadiness of Lannes the French must have been driven into the Danube, for the archduke's last effort to break down their resistance was made with the utmost fury. Only the complete exhaustion of both sides put an end to the fighting. The French lost 44,000 out of 90,000 successively engaged, and amongst the

killed were Lannes and St Hilaire. The Austrians, 75,000 strong, lost 23,360. Even this, the first great defeat of Napoleon, did not shake his resolution. The beaten forces were at last with- drawn safely into the island. On the night of the 22nd the great bridge was repaired, and the army awaited the arrival of reinforcements, not in Vienna, but in Lobau.

See sketch map in article Wagram.

ASPHALT, or Asphaltum. The solid or semi-solid kinds of bitumen (q.v.) were termed acr^aXros by the Greeks; and by some ancient classical writers the name of pissasphaltum (iriffaa, pitch) was also sometimes employed. The asphalt of the Dead Sea (known as Lacus Asphaltites) received considerable notice from early travellers, and Diodorus the historian states that the inhabitants of the surrounding parts were accustomed to collect it

for use in Egypt for embalming. In common with other forms of bitumen, asphalt is very widely distributed geographically and occurs in greater or less quantity in rocks of all ages. There is some divergence in the views expressed as to the precise manner of its production, but it may certainly be said that the principal asphalt deposits are merely the result of the evaporation and oxidation of liquid petroleum which has escaped from outcropping strata. The celebrated Pitch Lake of Trinidad was long regarded as the largest deposit of asphalt in existence, but it is said to be exceeded in area, if not in depth also, by one in Venezuela. The Trinidad " Lake " has an area of 99-3 acres, and is sufficiently firm in places to support a team of horses. The deposit is worked with picks to a depth of a foot or two, and the excavations soon become filled up by the plastic material flowing in from below and hardening. The depth of the deposit is not accurately known. The surface is not level but is composed of irregularly tumescent masses of various sizes, each said to be subject to independent motion, whereby the interior of each rises and flows centrifugally towards the edges. As the spaces between them are always filled with water, these masses are prevented from coalescing. The softer parts of the lake constantly evolve gas, which is stated to consist largely of carbon dioxide and sulphuretted hydrogen, and the pitch, which is honey-combed with gas-cavities, continues to exhibit this action for some time after its removal from the lake. The working of the deposit is in the hands of the New Trinidad Asphalt Company, who hold the concession up to the year 1930 on payment to the government of a minimum royalty of £10,000 a year. A circular line of tramway, supported on palm-leaves, has been laid on the lake to facilitate the removal 6f the asphalt. Very large quantities are exported for paving and other purposes, the annual shipments amounting to about 130,000 tons from the lake and about 30,000 tons from other properties. The amount of asphalt in the lake has been estimated at 158,400 tons for each foot of depth, and if the average depth be taken at 20 ft. this would give a total of 3,168,000 tons; but in 1908, though 1,885,600 tons had been removed in the previous thirty-five years, there was but little evidence of reduction in the quantity. The Venezuelan deposit already referred to is in the state of Bermudez, and the area of it is reported to be more than 1000 acres. The asphalt of Cuba is a well-known article of commerce, of which 7252 tons was exported to the United States in 1902. The principal deposits are near the harbour of Cardenas (70 ft. thick), in the Pinar del Rio, near Havana (18 ft. thick), at Canas Tomasita ˆ105 ft. thick); and a specially pure variety near Vuelta.

The comparative composition of Trinidad and Cuba asphalt is given in the following table: —

The chemical composition of Trinidad asphalt has been given

C.

H.

N.

0.

s.

80-32

6-30

0-50

1-40

11-48

Refined

Refined

Refined

Trinidad,

Cuba (soft),

Cuba(hard),

Melting

Melting

Melting

point

point

point

185° F.

U5°F.

160 F.

Water

0-17

0-13

O-II

Volatile bitumen .

5i-8i

64-03

8-34

Sulphur ….

IO-OO

a-35

8-92

Ash (earthy matter) .

28-30

19-51

16-60

Fixed carbon .

9-72

7-98

66-03

1

IOO-OO

IOO-OO

IOO-OO

The following is a comparison

of Trinidad

and Venezuela

iermudez) asphalt: —

Refined

Refined

Trinidad.

Bermudez.

Specific gravity at 60° F. .

1-373

1-071

Bitumen soluble in carbon bi-

sulphide ….

61-507%

92-22 %

Mineral matter (ash)

34-51 „

i-5o „

Non-bituminous organic matter .

3-983 „

1-28 „

Portion of total bitumen soluble

in alcohol ….

8-24 „

u-66 ,,

Portion of total bitumen soluble

in ether ….

8o-oi „

81-63 -.

Loss at 212 F. . . .

0-65 „

1-37 „

,, 400° F. in ten hours

7-98 „

17-80 „

Loss at 400° on total bitumen .

12-811,,

18-308 „

Evolution of sulphuretted hydro-

gen at ….

410 F. none at 437° F.

Softening-point

160 F.

„ 113 F.

Flowing-point ….

192° F.

„ I5°° F.

Asphalt in its purest forms is generally black or blackish brown in colour, and is frequently brittle at ordinary tempera- tures. Apart from its principal use in the manufacture of paving materials, it is largely employed in building as a " damp- course " and as a water-excluding coating for concrete floors, as well as in the manufacture, of roofing-felt. It also enters largely into the composition of black varnish. The material chiefly used in the construction of asphalt roadways is an asphaltic or bituminous limestone found in the Val de Travers, canton of Neuchatel; in the neighbourhood of Seyssel, depart- ment of Ain; at Limmer, near the city of Hanover; and else- where. The proportion of bitumen present in asphalt rock usually ranges from 7 to 20 , but it is found that rock containing more than 11 cannot be satisfactorily used for street pave- ments, and it is accordingly customary to mix the richer and poorer varieties in fine powder in such respective quantities that the proportion of bitumen present is from 9 to 10 %. The richer rock is utilized as a source of asphalt " mastic," which is employed for footpaths, floors, roofs, &c. Excellent foundations - for steam-hammers, dynamos and high-speed engines are made of asphaltic concrete. (B. R.)

ASPHODEL (Asphodelus) , a genus of the lily order (Liliaceae), containing seven species in the Mediterranean region. The plants are hardy herbaceous perennials with narrow tufted radical leaves and an elongated stem bearing a handsome spike of white or yellow flowers. Asphodelus albus and A. fistulosus have white flowers and grow from i| to 2 ft. high; A. ramosus is a larger plant, the large white flowers of which have a reddish- brown line in the middle of each segment. Bog-asphodel (Narthecium ossifragum) , a member of the same family, is a small herb common in boggy places in Britain, with rigid narrow radical leaves and a stem bearing a raceme of small golden yellow flowers.

In Greek legend the asphodel is the most famous of the plants connected with the dead and the underworld. Homer describes it as covering the great meadow (

No satisfactory derivation of the word is suggested. The English word " daffodil " is a perversion of " asphodel," formerly written " affodil." The d may come from the French fleur d'qffodille. It is no part of the word philologically.

See Pauly-Wissowa, Realencyclopadie, s.v. ; H. O. Lenz, Botanik der alten Griechen und Romer (1859); J. Murr, Die Pflanzenwelt in der griechischen

Mythologie (1890).

ASPHYXIA (Gr. d- priv., v£t,s, a pulse), a term in medicine, literally signifying loss of pulsation, which is applied to describe the arrestment of the function of respiration from some hindrance to the entrance of air into the lungs. (See Respiratory System : Pathology.)

ASPIC (French, from Lat. aspis), an asp or viper found in Egypt whose bite is supposed to cause a swift and easy death, hence poetically a term for any venomous snake. From associa- tion, perhaps, with the coldness of the aspic (as in the French proverb, froid comme un aspic), the word is used for a savoury jelly containing meat, fish or eggs, &c. It is also the botanical name of the Lavandula spica, or spikenard, from which a white, aromatic and highly inflammable oil is distilled, called huile d' as pic.

ASPIDISTRA, a small genus of the lily order (Liliaceae), native of the Himalayas, China and Japan. Aspidistra lurida is a favourite pot-plant, bearing large green or white-striped leaves on an underground stem, and small dark purplish, cup-shaped flowers close to the ground.

ASPIROTRICHACEAE (O. Butschli), an order of Cilia te Infusoria, characterized by an investment, general or partial, of nearly uniform cilia, without any distinct adoral wreath, and one or two adoral endoral undulating membranes. With the Gymnostomaceae it formed the Holotricha of Stein.

ASPIROZ, MANUEL DE (1836-1905), Mexican statesman and diplomatist, was born at Puebla, and educated at the university of Mexico, where he took his degree in 1855. He took part in the war against the emperor Maximilian, and in 1867, on the establishment of the republic, was appointed assistant secretary of state for foreign affairs. In 1873 he became Mexican consul at San Francisco, where he remained till his election to the Senate in 1875. He was professor of jurisprudence at the college of Puebla from 1883 to 1890, when he was again appointed assistant secretary of foreign affairs. From 1899 till he died in 1905 he was Mexican ambassador to the United States. Among his writings may be mentioned; Codigo de extranjeria de los Estados- Unidos Mexicanos (1876), and La liber dad civil como base del der echo inter nacional privado (1896).

ASPROMONTE, a mountain of Calabria, Italy, rising behind Reggio di Calabria, the west extremity of the Sila range. The highest point is 6420 ft. and the slopes are clad with forest. Here Garibaldi was wounded and taken prisoner by the Italian troops under Pallavicini in 1862.

ASQUITH, HERBERT HENRY (1852-), English states- man, son of Joseph Dixon Asquith, was born at Morley, York- shire, on the 12th of September 1852. He came of a middle-class Yorkshire family of pronounced Liberal and Nonconformist views, and was educated under Dr Edwin Abbott at the City of London school, from which he went as a scholar to Balliol, Oxford; there he had a distinguished career, taking a first-class in classics, winning

the Craven scholarship and being elected a fellow of his college. He was president of the Union, and im- pressed all his contemporaries with his intellectual ability, Dr Jowett himself confidently predicting his signal success in any career he adopted. On leaving Oxford he went to the bar, and as early as 1800 became a K.C. In 1887 he unsuccessfully defended Mr R. B. Cunninghame Graham and Mr John Burns for their share in the riot in Trafalgar Square; and in 1889 he was junior to Sir Charles (afterwards Lord) Russell as counsel for the Irish Nationalists before the Parnell Commission— an association afterwards bitterly commented upon by Mr T. Healy in the House of Commons (March 30, 1908). But though he attained a fair practice at the bar, and was recognized as a lawyer of unusual mental distinction and clarity, his forensic success

11. 25 .y

was not nearly so conspicuous as that of some of his con- temporaries. His ambitions lay rather in the direction of the House of Commons. He had taken a prominent part in politics as a Liberal since his university days, especially in work for the Eighty Club, and in 1886 was elected member of parliament for East Fife, a seat which he retained in subsequent elections. Mr Gladstone was attracted by his vigorous ability as a speaker, and his evidence of sound political judgment; and in August 1892, though comparatively unknown to the general public, he was selected to move the vote of want of confidence which overthrew Lord Salisbury's government, and was made home secretary in the new Liberal ministry. At the Home Office he proved his capacity as an administrator; he was the first to appoint women as factory inspectors, and he was responsible for opening Trafalgar Square to Labour demonstrations; but he firmly refused to sanction the proposed amnesty for the dyna- miters, and he was violently abused by extremists on account of the shooting of two men by the military at the strike riot at Featherstone in August 1893. It was he who coined the phrase (Birmingham, 1894) as to the government's "ploughing the sands " in their endeavour to pass Liberal legislation with a hostile House of Lords. His Employers' Liability Bill 1893 was lost because the government refused to accept the Lords' amendment as to " contracting-out." His suspensory bill, with a view to the disestablishment of the church in Wales, was abortive (1895), but it served to recommend him to the Welsh Nationalists as well as to the disestablish- ment party in England and Scotland. During his three years of office he more than confirmed the high opinion formed of his abilities.

The Liberal defeat in 1895 left him out of office for eleven years. He had married Miss Helen Melland in 1877, and was left with a family when she died in 189 1; in 1894, however, he had married again, his second wife being the accomplished Miss Margaret (" Margot ") Tennant, daughter of

the wealthy iron- master, Sir Charles Tennant, Bart., a lady well known in London society as a member of the coterie known as " Souls," and commonly identified as the original of Mr E. F. Benson's Dodo (1893). On leaving the Home Office in 1895, Mr Asquith decided to return to his work at the bar, a course which excited much comment, since it was unprecedented that a minister who had exercised judicial functions in that capacity should take up again the position of an advocate; but it was obvious that to maintain the tradition was difficult in the case of a man who had no sufficient independent means. During the years of Unionist ascendancy Mr Asquith divided his energies between his legal work and politics; but his adhesion to Lord Rosebery (q.v.) as a Liberal Imperialist at the time of the Boer War, while it strengthened his position in the eyes of the public, put him in some difficulty with his own party, led as it was by Sir Henry Campbell-Bannerman (q.v.), who was identified with the " pro-Boer " policy. He was one of the founders of the Liberal League, and his courageous definiteness of view and intellectual vigour marked him out as Lord Rosebery's chief lieutenant if that statesman should ever return to power. He thus became iden- tified with the Roseberyite attitude towards Irish Home Rule; and, while he continued to uphold the Gladstonian policy in theory, in practice the Irish Nationalists felt, that very little could be expected from his advocacy. In spite of his Imperialist views, however, he did much to smooth over the party difficulties, and when the tariff-reform movement began in 1903, he seized the opportunity for rallying the Liberals to the banner of free- trade and championing the " orthodox " English political economy, on which indeed he had been a lecturer in his younger days. During the critical years of Mr Chamberlain's crusade (1903-1906) he made himself the chief spokesman of the Liberal party, delivering a series of speeches in answer to those of the tariff-reform leader; and his persistent following and answering of Mr Chamberlain had undoubted effect. He also made useful party capital out of the necessity for financial retrenchment, owing to the large increase in public expenditure, maintained by the Unionist government even after the Boer War was over,

and his mastery of statistical detail and argument made his appointment as chancellor of the exchequer part of the natural order of things when in December 1905 Mr Balfour resigned and Sir Henry Campbell-Bannerman (q.v.) became prime minister. .

During Sir Henry Campbell-Bannerman's premiership, Mr Asquith gradually rose in political importance, and in 1907 the prime minister's ill-health resulted in much of the leadership in the Commons devolving on the

chancellor of the exchequer. At first the party as a whole had regarded him somewhat coldly. And his unbending common-sense, and sobriety of criticism in matters which deeply interested the less academic Radicals who were enthusiasts for extreme courses, would have made the parliamentary situation difficult but for the exceptional popu- larity of the prime minister. In the autumn of 1907, however, as the latter's retention of office became more and more improb- able, it became evident that no other possible successor had equal qualifications. The session of 1908 opened with Mr Asquith acting avowedly as the prime minister's deputy, and the course of business was itself of a nature to emphasize his claims. After two rather humdrum budgets he was pledged to inaugurate a system of old-age pensions (forming the chief feature of the budget of 1008, personally introduced by him at the beginning of May), and his speech in April on the Licensing. Bill was a triumph of clear exposition, though later in the year, after passing the Commons, it was thrown out by the Lords. On the 5th of April it was announced that Sir Henry Campbell-Bannerman had re- signed and Mr Asquith been sent for by the king. As the latter was staying at Biarritz, the unprecedented course was followed of Mr Asquith journeying there for the purpose, and on the 8th he resigned the chancellorship of the exchequer and kissed hands as prime minister. The names of the new cabinet were announced on the 13th. The new appointments were: Lord Tweedmouth as lord president of the council (instead of the admiralty) ; Lord Crewe as colonial secretary (instead of lord president of the council) ; Mr D. Lloyd George, chancellor of the exchequer (transferred from the Board of Trade) ; Mr R. McKenna, first lord of the admiralty (instead of minister of education); Mr Winston Churchill, president of the Board of Trade; and Mr Walter Runciman, minister of education. Lord Elgin ceased to be colonial secretary, but Lord Loreburn (lord chancellor), Lord Ripon (lord privy seal), Mr H. Gladstone (Home Office), Sir E. Grey (foreign affairs), Mr Haldane (War Office), Mr Sinclair (secretary for Scotland; created in 1909 Lord Pentland), Mr Burns (Local Government Board), Lord Carrington (Board of Agriculture), Mr Birrell (Irish secretary), Mr S. Buxton (postmaster-general), Mr L. Harcourt (commissioner of works), Mr John Morley (India) and Sir Henry Fowler (duchy of Lan- caster) retained their offices, the two latter being created peers. The Budget (see Lloyd George) was the sole feature of political interest in 1909, and its rejection in December by the Lords led to the general election of January 1910, which left the Liberals and Unionists practically equal, with the Labour and Irish parties dominating the situation (L. 275, U. 273, Lab. 40, 1. 82). Mr Asquith was in a difficult position, but the ministry re- mained in office; and he had developed a concentration of forces with a view to attacking the veto of the House of Lords (see Parliament), when the death of the king in May caused a suspension of hostilities. A conference between the leaders on both sides was arranged, to discViss whether any compromise was

possible, and controversy was postponed to an alftumn session. (H. Ch.)

ASS (O.E. assa; Lat. asinus), a common name (the syno- nym " donkey " is supposed to be derived either by analogy from " monkey," or from the Christian name Duncan; cf. Neddy, Jack, Dicky, &c.) for different varieties of the sub-genus Asinus, belonging to the horse tribe, and especially for the domestic ass; it differs from the horse in its smaller size, long ears, the character of its tail, fur and markings, and its proverbial dulness and obstinacy. The ancient Egyptians symbolized an ignorant person by the head and ears of an ass, and the Romans thought it a bad omen to meet one. In the middle ages the Germans of Westphalia made the ass the symbol of St Thomas,

the incredulous apostle; the boy who was last to enter school on St Thomas' day was called the " Ass Thomas " (Gubernatis's Zoological Mythology, i. 362). The foolishness and obstinacy of the ass has caused the name to be transferred metaphorically to human beings; and the fifth proposition of Book i. of Euclid is known as the Pons Asinorum, bridge of asses.

ASS, FEAST OF THE, formerly a festival in northern France, primarily in commemoration of the biblical flight into Egypt, and usually held on the 14th of January. A girl with a baby at her breast and seated on an ass splendidly caparisoned was led through the town to the church, and there placed at the gospel side of the altar while mass was said. The ceremony degenerated into a burlesque in which the ass of the flight became confused with Balaam's ass. So scandalous became the popular revels associated with it, that the celebration was prohibited by the church in the 15th century. (See Fools, Feast or.)

ASSAB, a bay and port on the African shore of the Red Sea, 60 m. N. of the strait of Bab-el Mandeb. Assab Bay was the first territory acquired by Italy in Africa. Bought from the sultan of Raheita in 1870, it was not occupied until 1880, (See Eritrea, and Italy: History.)

ASSAM, a former province of British India, which was amal- gamated in 1905 with " Eastern Bengal and Assam " {q.v.). Area 56,243 sq. m.; pop. (1901) 6,126,343. The province of Assam lies on the N.E. border of Bengal, on the extreme frontier of the Indian empire, with Bhutan and Tibet beyond it on the N., and Burma and Manipur on the E. It com- prises the valleys of the Brahmaputra and Surma rivers, together with the mountainous watershed which intervenes between them. It is situated between 24° o' and 28° 17′ N. lat., and between 89 46′ and 97° 5′ E. long. It is bounded on the N. by the eastern section of the great Himalayan range, the frontier tribes from west to east being successively Bhutias, Akas, Daphlas, Miris, Abors and Mishmis; on the N.E. by the Mishmi hills, which

sweep round the head of the Brahmaputra valley; on the E. by the unexplored mountains that mark the frontier of Burma, by the hills occupied by the independent Naga tribes and by the state of Manipur; on the S. by the Lushai hills, the state of Hill Tippera, and the Bengal district of Tippera; and on the W. by the Bengal districts of Mymen- singh and Rangpur, the state of Kuch Behar and Jalpaiguri district.

Natural Divisions.— Assam is naturally divided into three distinct tracts, the Brahmaputra valley, the Surma valley and the hill ranges between the two. The Brahmaputra valley is an alluvial plain, about 450″ m. in length, with an average breadth of 50 m., lying almost east and west. To the north is the main chain of the Himalayas, the lower ranges of which rise abruptly from the plain; to the south is the great elevated plateau or succession of plateaus known as the Assam range. The various portions of this range are called by the names of the; tribes who inhabit them — the Garo, the Khasi, the Jaintia, the North Cachar and the Naga hills. The range as a whole is, joined at its eastern extremity by the Patkai to the Himalayan system, and by the mountains of Manipur to the Arakan Yoma. The highest points in the range are Nokrek peak (4600 ft.) in the Garo hills, Shillong] peak (6450 ft.) in the Khasi-Jaintia hills, and Japva peak (nearly 10,000 ft.) in the Naga hills. South of- the range comes the third division of the province, the Surma valley, comprising the two districts of Cachar and Sylhet. The Surma valley is much smaller than the Brahmaputra valley, covering only 7306 against 24,283 sq. m.; its mean elevation is much lower and its rivers are more sluggish.

Physical Aspects. — Assam is a fertile series of valleys, with the great channel of the Brahmaputra (literally, the Son of Brahma) flowing down its middle, and an infinite number of tributaries and watercourses pouring into it from the mountains on either side. The Brahmaputra spreads out in a sheet of water several miles broad during the rainy season, and in its course through Assam forms a number of islands in its bed. Rising in the Tibetan plateau, far to the north of the Himalayas, and skirting round their eastern passes not far from the Yang-tsze-kiang and the great river of Cambodia, it enters Assam by a series of waterfalls and rapids, amid vast boulders and accumulations of rocks. The gorge, situated in Lakhimpur

district, through which the southernmost branch of the Brahma- putra enters, has from time immemorial been held in reverence by the Hindus. It is called the Brahmakunda or Parasiiramkunda ; and although the journey to it is both difficult and dangerous, it is annually visited by thousands of

devotees. After a rapid course westwards down the whole length of the Assam valley, the Brahma- putra turns sharply to the south, spreading itself over the alluvial districts of the Bengal delta, and, after several changes of name, ends its course of 1800 m. in the Bay of Bengal. Its first tributaries in Assam, after crossing the frontier, are the Kundil and the Digaru, flowing from the Mishmi hills on the north, and the Tengapani and Dihing, which take their rise on the Singpho hills to the south-east. Shortly afterwards it receives the Dibang, flowing from the north- east; but its principal confluent is the Dihong, which, deriving its origin, under the name of the Tsangpo, from a spot in the vicinity of the source of the Sutlej, flows in a direction precisely opposite to that river, and traversing the tableland of Tibet, at the back of the great Himalaya range, falls into the Brahmaputra in 27 48′ N. lat., 95 26′ E. long., after a course of nearly 1000 m. Doubts were long entertained whether the Dihong could be justly regarded as the continuation of the Tsangpo, but these were practically set at rest by the voyage of F. J. Needham in 1886. Below the confluence, tne united stream flows in a south-westerly direction, forming the boundary between the districts of Lakhimpur and Darrang, situated on its northern bank, and those of Sibsagar and Nowgong on the south ; and finally bisecting Kamrup, it crosses over the frontier of the province and passes into Bengal. In its course it receives on the left side the Dihing, a river having its rise at the south-eastern angle of the province; and lower down, on the opposite side, it parts with a considerable offset termed the Buri Lohit, which, however, reunites with the Brahmaputra 60 m. below the point of divergence, bearing with it the additional waters of the Subansiri, flowing from Tibet. A second offset, under the name of the Kalang river, rejoins the parent stream a short distance above the town of Gaunati. The remaining rivers are too numerous to be particularized. The streams of the south are not rapid, and have no considerable current until May or June. Among the islands formed by the intersection and confluence of the rivers is Majulij or the Great Island, as it is called by way of pre-eminence. This island extends 55 m. in length by about 10 in breadth, and is formed by the Brahmaputra on the south-east and the Buri Lohit river on the north-west. In the upper part of the valley, towards the gorge where the Brahmaputra enters, the country is varied and picturesque, walled in on the north and east by the Himalayas, and thickly wooded from the base to the snow-line. On either bank of the Brahmaputra a long narrow strip of plain rises almost imperceptibly to the foot of the hills. Gigantic reeds and grasses occupy the low lands near the banks of the great river; expanses of fertile rice-land come next; a little higher up, dotted with villages encircled by groves of bamboos and fruit trees of great size and beauty, the dark forests succeed, covering the interior table-land and mountains. The country in the vicinity of the large rivers is flat, and impenetrable from dense tangled jungle, with the exception of some very low-lying tracts

which are either permanent marshes or are covered with water during the rains. Jungle will not grow on these depressions, and they are covered either with water, reeds, high grasses or rice cultivation. On or near such open spaces are collected all the villages. As the traveller proceeds farther down the valley, the country gradually opens out into wide plains. In the western district of Kamrup the country forms one great expanse, with a few elevated tracts here and there, varying from 200 to 800 ft. in height.

Soils. — The soil is exceedingly rich and well adapted to all kinds of agricultural purposes, and for the most part is composed of a rich black loam reposing on a grey sandy clay, though occasionally it exhibits a light yellow clayey texture. The land may be divided into three great classes. The first division is composed of hills, the largest group within the valley being that of the Mikir Mountains, which stand out upon the plain. Another set of hills project into the valley at Gauhati. But these latter are rather prolongations of spurs from the Khasi chain than isolated groups belonging to the plains. The other hills are all isolated and of small extent. The second division of the lands is the well-raised part of the valley whose level lies above the ordinary inundations of the Brahmaputra. The channels of some of the hill streams, however, are of so little depth that the highest lands in their neighbourhood are liable to sudden floods. On the north bank of the great river, lands of this sort run down the whole length of the valley, except where they are interrupted by the beds of the hill streams. The breadth of these plains is in some places very trifling, whilst in others they comprise a tract of many miles, according to the number and the height of the rocks or hills that protect them from the aberrations of the river. The alluvial deposits of the Brahmaputra and of its tributary streams may be considered as the third general division of lands in Assam. These lands are very extensive, and present every degree of fertility and elevation, from the vast chars of pure sand, subject to annual inun- dations, to the firm islands, so raised by drift-sand and the accumu- lated remains of rank vegetable matter, as no longer to be liable to flood. The rapidity with which wastes, composed entirely of sand newly washed forward by the current during floods, become converted into rich pasture is astonishing. As the freshets begin to lessen and

retire into the deeper channels, the currents form natural embank- ments on their edges, preventing the return of a small portion of water which is thus left stagnant on the sands, and exposed to the action of the sun's rays. It slowly evaporates, leaving a thin crust of animal and vegetable matter. This is soon impregnated with the seeds of the Saccharum spontaneum and other grasses that have been partly brought by the winds and partly deposited by the water. Such places are frequented by numerous flocks of aquatic birds, which resort thither in search of fish and mollusca. As vegetation begins to appear, herds of wild elephants and buffaloes are

attracted by the supply of food and the solitude of the newly-formed land, and in their turn contribute to manure the soil.

Geology. — Geographically the Assam hills lie in the angle between the Himalayas and the Burmese ranges, but geologically they belong to neither. The older rocks are like those of Bengal, and the newer beds show no sign of either the Himalayan or the Burmese folding — on the top of the plateau they are nearly horizontal, but along the southern margin they are bent sharply downwards in a simple monoclinal fold. The greater part of the mass is composed of gneiss and schists. The Sylhet traps near the southern margin are correlated with the Rajmahal traps of Bengal. The older rocks are overlaid unconformably by Cretaceous beds, consisting chiefly of sandstones with seams of coal, the whole series thinning rapidly towards the north and thus indicating the neighbourhood of the old shore-line. The fossils are very similar to those of the South Indian Cretaceous, but very different from those of the corresponding beds in the Nerbudda valley. The overlying Tertiary series includes nummulitic beds and valuable seams of coal.

The border ranges of the east and south of Assam belong to the Burmese system of mountain chains (see Burma), and consist largely of Tertiary beds, including the great coal seams of Upper Assam. The Assam valley is covered by the alluvial deposits of the Brahmaputra.

Of the mineral productions by far the most valuable is coal. Compared with the Gondwana coal of the peninsula of India the Tertiary coal seams of Assam are remarkable for their purity and their extraordinary thickness. The " Thick Seam " of Margherita, in Upper Assam, averages 50 ft., and in some places reaches as much as 80 ft. The average percentage of ash in 27 assays of Assam coal was 3-8 as against 16-3 in 17 assays of Raniganj coal. The coal seams are commonly associated with petroleum springs. Gold is found in the alluvial deposits, but the results of exploration have not been very promising.

Earthquakes. — Assam is liable to earthquakes. There was a severe earthquake in Cachar on the 10th of January 1869, a severe shock in Shillong and Gauhati in September 1875, and one in Silchar in October 1882; but by far the severest shock known is that which occurred on the evening of 12th June 1897. The area of this seismic disturbance extended over north-eastern India, from Manipur to Sikkim; but the focus was in the Khasi and Garo hills. In the station of Shillong every masonry building was levelled to the ground. Throughout the country bridges were shattered, roads were broken up like ploughed fields, and the beds of rivers were dislocated. In the hills there were terrible landslips, which wrecked the little Cherrapunji railway and caused 600 deaths. The total mortality recorded

was 1542, including two Europeans at Shillong. The levels of the country were so affected that the towns of Goalpara and Barpeta became almost uninhabitable during the rains.

Fauna. — The zoology of Assam presents some interesting features. Wild elephants abound and commit many depredations, entering villages in large herds, and consuming everything suitable to their tastes. Many are caught by means of female elephants previously tamed, and trained to decoy males into the snares prepared for subjecting them to captivity. A considerable number are tamed and exported from Assam every year. Many are killed every year in the forests for the sake of the ivory which they furnish. The government keddah establishment from Dacca captures large numbers of elephants in the province, and the right of hunting is also sold by auction to private bidders. The annual catch of. the latter averages about two hundred. The rhinoceros is fourid in the denser parts of the forests and generally in swampy places. This animal is hunted and killed for its skin and its horn. The skin affords the material for the best shields. The horn is sacred in the eyes of the natives. Contrary to the usual belief, it is stated that, if caught young, the rhinoceros is easily tamed and becomes strongly attached to his keeper. Tigers abound, and though many are annually de-stroyed for the sake of the government reward, their numbers seem scarcely, if at all, to diminish. Leopards and bears are numerous; and the sand-badger, the Arctonyx collaris of Cuvier, a small animal somewhat resembling a bear, but haVing the snout, eyes and tail of a hog, is found. Among the most formidable animals known is the wild buffalo or gaur which is of great size, strength and fierceness. The fox and the jackal exist, and the wild hog is very abundant. Goats, deer of various kinds, hares, and two or three species of antelope are found, as are monkeys in great variety. The porcupine, the squirrel, the civet cat, the ichneumon and the otter are common. The birds are too various to admit of enumera- tion. Wild game is plentiful; pheasants, partridges, snipe and water- fowl of many descriptions make the country a tempting field for the sportsman. Vultures and other birds of prey are met with.

Crocodiles (commonly called alligators) swarm in all parts of the Brahmaputra, and are very destructive to the fish, of which hun- dreds of varieties are found, and which supply a valuable article of food. The most destructive of the ferae naturae, as regards human life, are, however, the snakes. Of these, several poisonous species exist, including the cobra and karait {Naja, tripudians and Bun- garus caeruleus). The bite of a fairly-grown , healthy serpent of either of these species is deadly; and it is

ascertained that more deaths occur from snake-bite than from all the other wild. beasts put together. Among the non-poisonous serpents the python ranks first. This is an enormous boa-constrictor of great length and weight, which drops upon his prey from the branch of a tree, or steals upon it in the thick grass. He kills his- victim by rolling himself round the body till he breaks its ribs, or suffocates it by one irre- sistible convolution round its throat. He seldom or never attacks human beings unless in self-defence, and loss of life from this cause is scarcely ever reported.

Agriculture. — The principal and almost the only food – grain of the plains portion of the province is rice. The production of this staple is carried on generally under the same conditions as in Bengal; but the times of sowing and reaping and the names given to the several crops vary much in different parts of the province. In 1901-1902 out of a total cultivated area of 1,736,000 acres, there were 1,194,000 acres under rice, In addition jute is grown to a considerable extent in Goalpara and Sylhet; cotton is grown in large quantities along the slopes of the Assam range. Rubber is grown in government plantations artd is also brought in by the hill tribes; while lac, mustard and potatoes are also produced.

Tea Plantations. — The most important article of commerce pro- duced in Assam is tea. The rice crop covers a very great proportion of the cultivated land, but it is used for local consumption, and the Brahmaputra valley does not produce enough for its own consump- tion, large quantities being imported for the coolies. The tea plantations are the one great source of wealth to the province, and the necessities of tea cultivation are the .chief stimulants ; to the development of Assam. The plant was discovered in 1823 by Mr Robert Bruce, who had proceeded thither on a mercantile exploration. The country, however, then formed part. of. the Burmese dominions. But war with this monarchy shortly after- wards broke out, and a. brother of the first discoverer, happening to be appointed to the command of a division of gunboats employed in some part of the operations, followed up the pursuit of the subject, and obtained several hundred plants and a considerable quantity of seed. Some specimens were ultimately forwarded to the super- intendent of the botanic garden at Calcutta. In. 1832 Captain F. Jenkins was deputed by the governor-general of India, Lord William Bentinck, to report upon the resources of the country, and the tea plant was brought to his especial notice by Mr Bruce; in 1834 a minute was recorded by the governor-general on the subject, .in which it is stated that his attention had been called to it in 1827 before his departure from England. Jn accordance with the views of that minute, a committee was appointed to prosecute inquiries, and to promote the cultivation of the plant. Communications were opened with China with a view to obtain fresh plants and seeds, and, a deputation, composed of gentlemen versed in botanical studies, was despatched to Assam. Some

seeds were obtained from China; but they proved to be of small importance, as it was clearly ascer tained by the members of the Assam deputation that both the black and the green tea plants were indigenous here, and might be multi- plied to any extent ; another result of the Chinese mission, that of procuring persons skilled in the cultivation and manufacture of black tea, was of more material benefit. Subsequently, under Lord Auckland, a further supply of Chinese cultivators and manu- facturers was obtained—men well acquainted with the processes necessary for the production of green tea, as the former set were with those requisite for black. In 1838 the first twejve chests of tea from Assam were received in England, They had been injured in some degree on the passage, but on samples being submitted to brokers, and others of long experience and tried judgment, the reports were highly favourable. It was never, however, fhe in- tention of government to carry on the trade, but to resign it to private adventure as soon as the experimental course could be fairly completed. Mercantile associations for the culture and manufacture of tea in Assam began to be formed as early as 1839; a nd ,in ,1849 the government disposed of their establishment,, and relinquished the manufacture to the ordinary operation of commercial enterprise. In 1851 the crop of the principal company was estimated to produce 280,000 lb. Since then the enterprise has rapidly developed. Tea is now cultivated in all the plains district of the. provinces. When the industry was first established, the land whjqh was supposed to be best for the plant was hill or undulating ground; _but now it has been found in the Surma valley that with good drainage the heaviest crops of tea can be raised from low-lying land, even such as formerly supported rice cultivation. At the close of. the year 1905 there were 942 gardens in all, with 422,335 acres, and employ- ing 464,912 coolies. The majority of gardens are owned by Euro- peans, 405,486 acres belonging to them as against 16,849 to Indians. The total out-turn for the province in igosˆwas 193,556,047 ft). Between 1893 and 1898 there was a great extension of tea cultivation, with the result that the industry began to suffer from the congestion

that follows over-production. Also to meet the requirements of the industry, an enormous number of coolies had to be brought into the province from other parts of India, and in recent years the supply of labour has begun to fall off, causing a rise in the cost of pro- duction. For these reasons there was a crisis in the tea industry of Assam, which was relieved to some extent by the reduction of the English duty on tea in 1906.

Tea-Garden Coolies.— The labour required on the tea gardens is almost entirely imported,; as the natives of the province are too prosperous to do such work.. During the decade 1891-1901, 596,856 coolies were imported, or about a tenth of the total popu- lation of the province. Thq, importation of coolies is controlled by an elaborate system of legislation, which provides

for the regis- tration of. .contracts, the medical inspection of coolies during the journey,' and supervision over rates of pay, &c., on the gardens. The first labour act was passed in 1863, and since then the law on the subject has been changed by successive enactments. The measure now in force is called Act VI. of 1901. Under this act the maximum term of the labour contract is fixed at four years, and a minimum monthly wage is laid down, the payment of which, however, is conT tingent on the completion of a daily task by the labourer. Labourer's under contract deserting; are liable to fine and imprisonment, and, subject to certain restrictions, may be arrested without warrant by, their employers. In addition to the labourers engaged under this act, a large number are employed under contract enforceable by Act XHL of 1859, which provides penalties for breach of the contract, but does not allow of the arrest of deserters without warrant. Neither does this act regulate in any way the terms of the contract, nor contain any special provisions for the protection of the labourer. Many labourers on the conclusion of their first engagement under Act VI. of 1901 enter into renewed contracts under ActXIII. of 1859. In 1905 there were in all 664,296 labourers, and ,24,209 fresh importations, of whom 62 % chose the old act.

Railways. — The Assam-Bengal railway runs from the seaport of Ghittagong to the Surma valley, and thence across the hills to Dibrugarh, at the head of the Brahmaputra valley, with a branch to Gauhati lower down the Brahmaputra. The hill section of this line was found exceedingly difficult of construction, and extensive damage was, done by the earthquake of 1897 ; but it is now complete! This railway is financed by the government, though worked by a company, arid therefore ranks as a state line. At the end of 1904 its open mileage was 576 m. There are several short lines of light railway or tramway in the province. The most important is the Dibru-Sadiya railway, at the head of the Brahmaputra valley, with a .branch to the coal-fields.

Trade. — The external trade of Assam is conducted partly by steamer, partly by native boat, and to a small extent by rail. In the Brahmaputra valley steamers carry as much as 86 % of the exports, and, 94% ■■ of the imports. In the Surma valley native boats, carry about 4.3% of both. In 1904-1905 the total exports were valued at 726 lakhs of rupees. The chief items were tea, rice in. the husk, oil-seeds, tea-seed, timber, coal and jute. The imports were valued at 457 lakhs of rupees. The chief items were cotton piece-goods, rice not in the husk, sugar, grain and pulse,, salt, iron and steel, tobacco, cotton twist and yarn, and brass and copper. No less than two-thirds of the total trade is conducted with Calcutta. The trans-frontier trade is insignificant; and most of it is conducted with the Bengal state of Hill Tippera. The trade through Chi.tta- gong is increasing owing to the opening of the hill-section of the Assam-Bengal railway, which gives

direct communication between the districts of Upper Assam and the port of Chittagong, and the incorporation of that port in the new province of Eastern Bengal and Assam.

Inhabitants.— The total population of Assam, according to the census of 1901, was 6,126,343, of whom 3,429,099 were Hindus, 1,581,317 Mahommedans and 1,068,334 Animists. The number of foreigners in the population due to immigration by the tea-garden coolies was 775,844. But in spite of this immigration the rate of increase in the population was only 5-9 % in the decade, and with the immigrants deducted 1-36%. Amongst nativerborn Assamese during the deca,de there was a serious decrease in Nowgong and some other districts, due to kalaazar and other diseases. The Assamese are an interesting race, of distinct origin from the neighbouring Bengalis. A large proportion of them derive their origin from tribes who came from the Himalayan ranges, from Burma or from the" Chinese frontier. The most important of these are the Ahoms or Ahams, an offshoot of the Shan race of northern Burma. They were the last conquerors of Assam before the Burmese, and they long preserve! their ancient traditions, habits and institutions. Hinduism first made its encroachments among their kings and nobility. Several generations ago they gave up eating beef, and they are now completely Hinduized, except in a few remote recesses of Assam. Hinduism, has also impressed its language*

*upon the province, and the vernacular Assamese possesses a close affinity to Bengali, with the substitution of * for the Bengali ch, of a guttural h for the Bengali h or sh, and a few other dialectic changes. Indeed, so close was the resemblance that for a time Bengali was used as the court and official language of the province under British rule. But with the development of the country the Assamese tongue asserted its claimsto be treated as a distinct vernacular, and a resolution of government (1873) re-established it as the language of official life and public business.*

The Assam peasant, living in a half -populated province, and surrounded by surplus land, is indolent, good-natured and, on the whole, prosperous. He raises sufficient food for his wants with very little labour, and, with the exception of a few religious ceremonies, he has no demand made upon him for money, saving the light rental of his fields. Under the peaceful influences of British rule, he has completely lost his ancient warlike instincts, and forgotten his predatory habits. In complexion he is a shade or two fairer than the Bengali. His person is in general short and robust, but devoid of the grace and flexibility of the Hindu. A flat face, with high

cheek-bones, presents a physiognomy resembling the Chinese, and suggests no idea of beauty. His hair is abundant, black, lank and coarse, but the beard is scanty, and usually plucked out, which gives him an effeminate appear- ance. The women form a striking contrast to the men; there is more of feminine beauty in them than is commonly seen in the women of Bengal, with a form and feature somewhat approach- ing the European. The habits of life of the Assamese peasantry are pre-eminently domestic. Great respect is paid to old age; when parents are no longer capable of labour they are supported by their children, and scarcely any one is allowed to become a burden to the public. They have also in general a very tender regard for their offspring, and are generous and kind to their relations. They are hospitable to people of their own caste, but to no others. The use of opium is very general; – Hill Tribes. — The hill and frontier tribes of Assam include the Nagas, Singphos, Daphlas, Miris, Khamtis, Mishmis, Abors, &c, nearly all of whom, excepting the Nagas, are found near the fron- tiers of Lakhimpur district. The principal of these, in point of numbers, are the Nagas, who inhabit the hills and forests along the eastern and south-eastern frontier of Assam. They reside partly in the British district of the Naga hills and partly in independent territory under the political Control of the deputy- commissioner of the adjoining districts. They cultivate rice, cotton, yams and Indian corn, and prepare salt from the brine springs in their hills. The different tribes of Nagas are inde- pendent of and unconnected with one another, and are often at war with each other. The Singphos are another of the main population of the same race, who occupy in force the hilly country between the Patkai and Chindwin rivers, and are nomin- ally subject to Burma. The Akas, Daphlas, Miris, Abors, Mishmis and Khamtis are described under separate headings. Under regulation V. of 1873, an inner line has been laid down in certain districts, up to which the protection of British authority is guaranteed, and beyond which, except by special permission, it is not lawful for British subjects to go. This inner line has been laid down in Darrang towards the Bhutias, Akas and Daphlas; in Lakhimper towards the Daphlas, Miris, Abors, Mishmis, Khamtis, Singphos and Nagas; and in Sibsagar towards the Nagas. The inner line formerly maintained along the Lushai border has since 1895 been allowed to fall into desuetude, but Lushais visiting Cachar are required to take out passes from the superintendent of the Lushai hills. The line is marked at intervals by frontier posts held by military police and com- manding the roads of access to the tract beyond; and any person from the plains who has received permission to cross the line has to present his pass at these posts.

History. — Assam was the province of Bengal which remained most stubbornly outside the limits of the Mogul empire and of the Mahommedan polity in India. Indeed, although frequently overrun by Mussulman armies and its western districts annexed to the Mahommedan vice-royalty of*

Bengal, the province main- tained an uncertain independence till its invasion by the Burmese

towards the end of the 18th century and its final cession to the British in 1826. – It seems to have been originally included, along with the greater part of north-eastern Bengal, in the old Hindu territory of Kamrup. Its early legends point to great religious revolutions between the rival rites of Krishna and Siva: as a source of dynastic changes. Its roll of kings extends deep into pre-historic times, but the first rajah capable of indentificatidn flourished about the year 76 a.d. Kamrup, the Pragjotishpur of the ancient Hindus, was the capital of a legendary king Narak, whose son Bhagadatta distinguished himself in the great war of the Mahdbharata.*

When Hsiian Tsang visited the country in a.d. 640, a prince named Kumar Bhaskara Barman was on the throne. Thepeople are described as being of small stature with dark yellow com? plexions; they were fierce in appearance, but upright and studious. Hinduism was the state religion, and the number of Buddhists was very small. The soil was deep and fertile, and the towns were surrounded by moats with water brought from rivers or banked-up lakes. Subsequently we read of Pal rulers in Assam. It is supposed that these kings were Buddhist and belbnged to the Pal dynasty of Bengal. Although the whole of Kamrup appears from time to time to have been united into one kingdom under some unusually powerful monarch, it was more often split up into numerous petty states; and for several centuries the Koch, the Ahom and the Chutia powers contested for the Assam valley. In the early part of the 13th. century the Ahoms or Ahams, from northern Burma and the Chinese frontiers, poured into the eastern districts of Assam; founded a kingdomˆ and held it firmly for several centuries. The Ahoms were Shans from the ancient Shan kingdom of Pong. Their manners customs, religion and language were, and for a long time continued to be, different from those of the Hindus; but they found themselves compelled to respect the superior civiliza- tion of; this race, and slowly adopted its customs and language: The conversion of their king Chuchengpha to Hinduism took place in the year a.d. 1655, and all the Ahoms of Assam gradually followed his example. In medieval history, the Assamese were known to the Mussulman population as a warlike, predatory race, who sailed down the Brahmaputra in fleets of innumerable canoes, plundered the rich districts of the delta, and retired in safety to their forests and swamps. As the Mahommedan power consolidated itself in Bengal, repeated ex- peditions were sent out against these river pirates of the north- east. The physical difficulties which an invading force had to contend with in Assam, however, prevented anything like a regular subjugation of the country; and after repeated efforts, the Mussulmans contented themselves with occupying * the western districts at the mouth of the Assam valley. The follow- ing details will suffice for the history of a*

struggle in which no great political object was attained, and which left the Assamese still the same wild and piratical people as when their fleets of canoes first sallied forth against the Bengal delta. In 1638, during the reign of the emperor Shah Jahan, the Assamese descended the Brahmaputra, and pillaged the country round the city of Dacca; they were expelled by the governor of Bengal; who retaliated upon the plunderers by ravaging Assam. During the civil wars between the sons of Shah Jahan, the king of Assam renewed his predatory incursions into Bengal; upon the termina- tion of the contest Aurangzeb determined to avenge these repeated insults, and despatched a considerable force for the regular invasion of the Assamese territory (1660- 166 2). His general, Mir Jumla, defeated the rajah, who fled to the mountains, and most of the chiefs made their submission to the conqueror. But the rains set in with unusual violence, and Mir Jumla 's army was almost annihilated by famine and sickness. Thus terminated the last expedition against Assam by the Mahommedans, whose fortunes in this country were never prosperous. A writer of the Mahommedan faith says: —" Whenever an invading army has entered their territories, the Assamese have sheltered themselves in strong posts, and have distressed the enemy by stratagems, surprises And alarms* and by cutting off their provisions. If these means failed, they have declined a battle in the field, but*

have carried the peasants into the mountains, burned the grain and left the country desert. But when the rainy season has set in upon the advancing enemy, they have watched their oppor- tunity to make excursions and vent their rage; the famished invaders have either become their prisoners or been put to death. In this manner powerful and numerous armies have been sunk in that whirlpool of destruction, and not a soul has escaped." The same writer states that the country was spacious, populous and hard to be penetrated; that it abounded in dangers; that the paths and roads were beset with difficulties; and that the obstacles to conquest were more than could be expressed. The inhabitants, he says, were enterprising, well-armed and always prepared for battle. Moreover, they had lofty forts, numerously garrisoned and plentifully provided with warlike stores; and the approach to them was opposed by thick and dangerous jungles, and broad and boisterous rivers. The difficulties in the way of successful invasion are of course not understated, as it was the object of the writer to exalt the prowess and perseverance of the faithful. He accounts for their temporary success by recording that " the Mussulman hordes experienced the comfort of fighting for their religion, and the blessings of it reverted to the sovereignty of his just and pious majesty." The short-lived triumph of the Mussulmans might, however, have warranted a less ambitious tone. About

the middle of the 17th century the chief became a convert to Hinduism. By what mode the con- version was effected does not clearly appear, but whatever were the means employed, it seems that the decline of the country commenced about the same period. Internal dissensions, in- vasion and disturbances of every kind convulsed the province, and neither prince nor people enjoyed security. Late in the 1 8th century some interference took place on the part of the British government, then conducted by Lord Cornwallis; but the successor of that nobleman, Sir John Shore, adopting the non-intervention policy, withdrew the British force, and aban- doned the country to its fate. Its condition encouraged the Burmese to depose the rajah, and to make Assam a dependency of Ava. The extension of their encroachments on a portion of the territory of the East India Company compelled the British government to take decisive steps for its own protection. Hence arose the series of hostilities with Ava known in Indian history as the first Burmese War, on the termination of which by treaty in February 1826, Assam remained a British possession. In 1832 that portion of the province denominated Upper Assam was formed into an independent native state, and conferred upon Purandhar Singh, the ex-rajah of the country; but the ad- ministration of this chief proved unsatisfactory, and in 1838 his principality was reunited with the British dominions. After a period of successful administration and internal development, under the lieutenant-governor of Bengal, it was erected into a separate chief-comrnissionership in 1874.

In 1886 the eastern Dwars were annexed from Bhutan; and in 1874 the district of Goalpara, the eastern Dwars and the Garo hills were incorporated in Assam. In 1898 the southern Lushai hills were transferred from Bengal to Assam, and the north and south Lushai hills were amalgamated as a district of Assam, and placed under the superintendent of the Lushai hills. Frontier troubles occasionally occur with the Akas, Daphlas, Abors and Mishmis along the northern border, arising out of raids from the independent territory into British districts. In October 1905 the whole province of Assam was incorporated in the new province of Eastern Bengal and Assam.

See E. A. Gait, The History of Assam (1906).

ASSAMESE, the Indo- Aryan language spoken in the Assam valley. In 1901 the number of its speakers was 1,350,846. It is closely related to Bengali and Oriya, forming with them and with Bihari the Eastern Group of the Indo-Aryan vernacu- lars. For further particulars see Bengali.

ASSAROTTI, OTTAVIO GIOVANNI BATTISTA (1753-1829), the founder of schools for the education of deaf-mutes in Italy, was born at Genoa in 1753. After qualifying himself for the church, he entered the society of the

Pietists, " Scuole Pie," who devoted themselves to the training of the young. His

superior learning caused him to be appointed to lecture on theology to the students of the order. In 1801 he heard of the Abb£ Sicard's training of deaf-mutes in Paris, and resolved to try something similar in Italy. He began with one pupil, and had by degrees collected a small number round him, when, in 1805, Napoleon, hearing of his endeavours, ordered a convent to be given him for a school-house, and funds for supporting twelve scholars to be taken from the convent revenues. This order was scarcely attended to till 1811, when it was renewed, and in the following year Assarotti, with a considerable number of pupils, took possession of the new school. Here he continued, with the exception of a short interval in 1814, till his death in 1829. A pension, which had been awarded him by the king of Sardinia, he bequeathed to his scholars.

ASSARY, or Assarion, a Roman copper coin, the " farthing " of Matthew x. 29.

ASSASSIN (properly Hashishin, from Hashish, the opiate made from the juice of hemp leaves), a general term for a secret murderer, originally the name of a branch of the Shiite sect (see Shiites), known as Isma'ilites, founded by Hassan (ibn) Sabbah at the end of the nth century, and from that time active in Syria and Persia until crushed in the 13th century by the Mongols under Hulaku (Hulagu) in Persia, and by the Mameluke Bibars in Syria. The father of Hassan Sabbah, a native of Khorasan, and a Shiite, had been frequently compelled to profess Sunnite orthodoxy, and from prudential motives had sent his son to study under an orthodox doctor at Nishapur. Here Hassan made the acquaintance of Nizam-ul-Mulk, afterwards vizier of the sultan Malik-Shah (see Seljuks). During the reign of Alp-Arslan he remained in obscurity, and then appeared at the court of Malik-Shah, where he was at first kindly received by his old friend the vizier. Hassan, who was a man of great ability, tried to supplant him in the favour of the sultan, but was outwitted and compelled to take his departure from Persia. He went to Egypt (1078-79), and, on account of his high reputation, was received with great honour by the lodge at Cairo. He soon stood so .high in the caliph Mostansir's favour as to excite against him the jealousy of. the chief general, and a cause of open enmity soon arose. The caliph had nominated first one and then another of his sons as his successor, and in consequence a party division took place among the leading men. Hassan, who adopted the cause of Nizar, the eldest son, found his enemies too strong for him, and was forced to leave Egypt. After many adventures he reached Aleppo and Damascus, and after a sojourn there, settled near Kuhistan (Kohistan). He gradually spread his peculiar modification of Isma'llite doctrine, and, having collected a considerable

number of followers, formed them into a secret society. In 1090 he obtained, by stratagem, the strong mountain fortress of Alamut in Persia, and, removing there with his followers, settled as chief of the famous society after- wards called the Assassins.

The speculative principles of this body were identical with those of the Isma'ilites, but their external policy was marked by one peculiar and distinctive feature — the employment of secret " assassination " against all enemies. This practice was introduced by Hassan, and formed the essential characteristic of the sect. In organization they closely resembled the western lodge at Cairo. At the head was the supreme ruler, the Sheik-al-J abal (Jebel), i.e. Chief, or, as it is commonly translated, Old Man of the Mountains. Under him were three Dai-al-Kirbdl, or, as they may be called, grand priors, who ruled the three provinces over which the sheik's power extended. Next came the body of Da is, or priors, who were fully initiated into all the secret doctrines, and were the emissaries of the faith. Fourth were the Refiqs, associates or fellows, who were in process of initiation, and who ultimately advanced to the dignity of dd'is. Fifth came the most distinctive class, the Fedais {i.e. the devoted ones) , who were the guards or assassins proper. These were all young men, and from their ranks were selected the agents for any deed of blood. They were kept uninitiated, and the blindest obedience was exacted from and yielded by them. When the sheik required the services of any of them, the selected fedais*

were intoxicated with the hashish. When in this state they were introduced into the splendid gardens of the sheik, and sur- rounded with every sensual pleasure. Such a foretaste of paradise, only to be granted by their supreme ruler, made them eager to obey his slightest command; their lives they counted as nothing, and would resign them at a word from him. Finally, the sixth and seventh orders were the Lasiqs, or novices, and the common people. Hassan well knew the efficacy of estab- lished law and custom in securing the obedience of a mass of people; accordingly, upon all but the initiated, the observ- ances of Islam were rigidly enforced. As for the initiated, they knew the worthlessness of positive religion and morality; they believed in nothing, and scoffed at the practices of the faithful.

The Assassins soon began to make their power felt. One of their first victims was Hassan's former friend, Nizam-ul-Mulk, whose son also died under the dagger of a secret murderer. The death by poison of the sultan Malik-Shah was likewise ascribed to this dreaded society, and contributed to increase their evil fame. Sultan Sinjar, his successor, made war upon

them, but he was soon glad to come to terms with enemies against whose operations no precaution seemed available. After a long and prosperous rule Hassan died at an advanced age in 1124. He had previously slain both his sons, one on suspicion of having been concerned in the murder of a dd'i at Kuhistan, the other for drinking wine, and he was therefore compelled to name as his successor his chief da'i, Kia-Busurg-Omid.

During the fourteen years' reign of this second leader, the Assassins were frequently unfortunate in the open field, and their castles were taken and plundered; but they acquired a stronghold in Syria, while their numerous murders made them an object of dread to the neighbouring princes, and spread abroad their evil renown. A long series of distinguished men perished under the daggers of the fedais; even the most sacred dignity was not spared. The caliph Mostarshid was assassinated in his tent, and not long after, the caliph Rashid suffered a similar fate Busurg-Omid was succeeded by his son Mahommed I., who, during the long period of twenty-five years, ruthlessly carried out his predecessor's principles. In his time Massiat became the chief seat of the Syrian branch of the society. Mahommed's abilities were not great, and the affections of the people were drawn towards his son Hassan, a youth of great learning, skilled in all the wisdom of the initiated, and popularly believed to be the promised Imam become visible on earth. The old sheik prevented any attempt at insurrection by slaying 250 of Hassan's adherents, and the son was glad to make submission. When, however, he attained the throne, he began to put his views into effect. On the 17th of the month Ramadan, 1164, he assembled the people and disclosed to them the secret doctrines of the initiated; he announced that the doctrines of Islam were now abolished, that the people might give themselves up to feasting and joy. Soon after, he announced that he was the promised Imam, the caliph of God upon earth. To substantiate these claims he gave out that he was not the son of Mahommed, but was descended from Nizar, son of the Egyptian caliph Mostansir, and a lineal descendant of Isma'il. After a short reign of four years Hassan was assassinated by his brother-in-law, and his son Mahommed II. succeeded. One of his first acts was to slay his father's murderer, with all his family and relatives; and his long rule, extending over a period of forty-six years, was marked by many similar deeds of cruelty. He had to contend with many powerful enemies, especially with the great Atabeg sultan Nureddin, and his more celebrated successor, Saladin, who had gained possession of Egypt after the death of the last Fatifnite caliph, and against whom even secret assassination seemed powerless. During his reign, also, the Syrian branch of the society, under their da'i, Sinan, made themselves independent, and remained so ever afterwards. It was with this Syrian branch that the Crusaders made acquaintance; and it appears to have been their emissaries who slew Count Raymund of Tripoli*

and Conrad of Montferrat.

Mahommed II. died from the effects of poison, administered, it is believed, by his son, Jelaleddin Hassan III., who succeeded.

He restored the old form of doctrines—secret principles for the initiated, and Islam for the people — and his general piety and orthodoxy procured for him the name of the new Mussulman. During his reign of twelve years no assassinations occurred, and he obtained a high reputation among the neighbouring princes. Like his father, he was removed by poison, and his son, 'Ala-ed-din Mahommed III., a child of nine years of age, weak in mind and body, was placed on the throne. Under his rule the mild principles of his father were deserted, and a fresh course of assassination entered on. In 1255, after a reign of thirty years, 'Ala-ed-din was slain, with the Connivance of his son, Rukneddln, the last ruler of the Assassins. In the following year Hulaku (Hulagu), brother of the Tatar, Mangu Khan, invaded the hill country of Persia, took Alamut and many other castles, and captured Rukneddln (see Mongols). He treated him kindly, and, at his own request, sent him under escort to Mangu. On the way, Rukneddln treacherously incited the inhabitants of Kirdkuh to resist the Tatars. This breach of good faith was severely punished by the khan, who ordered Rukneddln to be put to death, and sent a messenger to Hulaku (Hulagu) com- manding him to slay all his captives. About 12,000 of the Assassins were massacred, and their power in Persia was com- pletely broken. The Syrian branch flourished for some years longer, till Bibars, the Mameluke sultan of Egypt, ravaged their country and nearly extirpated them. Small bodies of them lingered about the mountains of Syria, and are believed still to exist there. Doctrines somewhat similar to theirs are still to be met with in north Syria.

See J. von Hammer, Geschichte der Assassinen (1818); S. de Sacy, Memoires de I'Institut, iv. (1818), who discusses the etymology fuljy ; Calcutta Review, vols. Iv., lvi. ; A. Jourdain in Michaud's Histoire des Croisades, ii. pp. 465-484, and trans, of the Persian historian Mirkhond in Notices et extraits des manuscrits, xiii. pp. 143 sq. ; cf. R. Dozy, Essai sur Vhistoire de V Islamisme (Leiden and Paris, 1879); ch. ix. (G. W. T.)

ASSAULT (from Lat. ad, to or on, and saltare, to leap), in English law, " an attempt or offer with force or violence to do corporal hurt to another, as by striking at another with a stick or other weapon, or without a weapon, though the party misses his aim." Notwithstanding ancient opinions to the contrary, it is now settled that mere words, be they ever so provoking, will not constitute an assault. Coupled with the attempt or threat to inflict corporal injury, theie must in all cases be the means of carrying the threat into effect. A battery is more than a threat or attempt to injure the person

of another; the injury must have been inflicted, but it makes no difference however small it may be, as the law does not "draw the line between degrees of violence," but " totally prohibits the first and lowest stage of it." Every battery includes an assault. A common assault is a misdemeanour, and is punishable by imprisonment with or without hard labour to the extent of one year, and if it occasions bodily harm, with penal servitude for three years, or imprisonment to the extent of two years, with or without hard labour. There are various different kinds of assaults which are provided against by particular enactments of parliament, such as the Offences against the Person Act 1861, the Prevention of Crimes Act 187 1, &c; and there are also certain aggravated assaults for which the punishment is severer than for common assault, as an assault with intent to murder, with intent to commit a rape, &c. In certain cases an assault and battery is sometimes justifiable, as in the case where a person in authority, as a parent or schoolmaster, inflicts moderate punishment upon a child, or in certain cases of self-defence, or in defence of one's goods and chattels. An assault may be both a tort and a crime, giving a civil action for damages to the person injured, as well as being the subject of a criminal prosecution.

United States. — The general principles applicable throughout the United States are the same as in England. Riding a horse threateningly near a person; or riding a bicycle against another {Mercer v. Corbin, 117 Indiana Rep. 450); waking one from sleep to present a milk bill {Richmond v. Fiske, 160 Mass. 34), are assaults. A minor is liable for damages for an assault {HUdreth v. Hancock, 156 Illinois Rep. 618). In Texas it has

been held that an assault with a knife is not necessarily an aggravated assault (Warren v. State, 3 S.W. 240)) and an axe is not necessarily a " deadly weapon" with which to assault (Gladney v. State, 12 S.W. 868), and the State must prove that it would be likely to produce death or serious bodily injury (Melton v. State, 17 S.W. 257). Neither, a pistol nor brass knuckles are necessarily deadly weapons; the State must show their size or manner of use in making the assault (Ballard v. State, 13 S.W. 674; Miles v. State, 5 S.W. 250). But in 1903 a pistol was held by the Texas Supreme Court to be a deadly weapon if not used simply as a club (Lockland v. State, 73 S.W. 1054), and the same court held in 1904 that a pistol is a deadly weapon (Pace v. State, 79 S.W. 531), and so the assault was an aggravated assault. In North Carolina it has been held that an axe is ex vi termini a " deadly weapon" (State v. Shields, no N.C. 49).

ASSAYE, a village of Hyderabad or the Nizam's Dominions, in southern India, just beyond the Berar frontier. The place is celebrated as the site of a battle fought on the 23rd of September 1803 between the combined Mahratta forces Under Sindhia and the rajah of Berar and the British under Major-General Wellesley, afterwards the duke of Wellington. The Mahratta force con- sisted of 50,000 men, supported by 10b pieces of cannon served by French artillerymen, and entrenched in a strong position. Against this the English had but a force of 4500 men, which, however, after a severe struggle, gained the most complete victory that ever crowned British valour in India.. Of the enemy 12,000 were killed and wounded; and General Wellesley lost 1657 — one-third of his little force — killed and wounded. Assaye is 261 m. north-west of Hyderabad.

ASSAYING. To "assay" (or "essay"; Fr. essayer) is in general to try, or attempt, so to make trial or test. In a restricted sense the term assaying is applied in metallurgy to the deter- mination of the amount of gold or silver in ores or alloys; in this article, however, it will be used in a wider technical signification, and will include a description of the methods for the quantitative determination of those elements in ores which affect their value in metallurgical operations. It would be impossible to give in detail here all the precautions necessary for the successful use of the methods, and the descriptions will therefore be confined to the principles involved and the general manner in which they are applied to secure the desired results.

Gold and Silver. — Ores containing gold or silver are almost invariably assayed in the dry way; that is, by fusion with appropriate fluxes and ultimate separation of the elements in the metallic form. One of the customs which has grown out of our peculiar system of weights is the form of statement of the results of such an assay. Instead of expressing the amounts of gold and silver in percentages of the weight of ore, they are expressed in ounces to the ton, the ounce being the troy ounce and the ton that of 2000 avoirdupois pounds. To simplify calculation and to enable the assayer to use the metric system of weights employed in all chemical calculations, the " assay ton " (" A.T. " = 29-166 grammes) has been devised, which bears the same relation to the ton of 2000 lb avoirdupois that one milligram does to the troy ounce; when one assay ton of ore is used, each milligram of gold or silver found represents one ounce to the ton.

The assay of an ore for gold or silver consists of two operations. In the first the gold or silver is made to combine or alloy with metallic lead, the other constituents of the ore being separated from the lead as slag. In the second, the lead button containing the gold or silver is cupelled and the resulting gold or silver button is weighed. The first is conducted in one of two ways,

known respectively as the crucible method and the scorification method. The crucible method is generally used for ores containing gold in small amounts and for certain classes of silver ores. The amount of ore taken for assay is generally one-half " A.T.," but in very low-grade ores one, two, and sometimes even four " A.T.s " are used. In the scorification method one-tenth of an " A.T." is the amount commonly taken. While in both methods the same result is sought, the means employed are quite different. In the scorification method the ore is mixed in the scorifier (a shallow

dish of burned clay) with from ten to twenty times its weight of granulated metallic lead (test lead) and a little borax glass, and heated in a muffle, the front of which is at first closed. When the lead melts and begins to oxidize, the lead oxide, or so-called litharge, combines with or dissolves the non-metallic and readily oxidizable constituents of the ore, while the gold and silver alloy with the lead. As the slag thus formed flows off to the sides of the scorifier, the assay clears and the melted metallic lead forms an " eye " in the middle. The door of the muffle is then opened and the current of air which is drawn over the scorifier rapidly oxidizes the lead, while the melted litharge gradually closes over the metal. When the " eye " has quite disappeared the door is closed and the temperature raised to make the slag very liquid. The scorifier is taken from the muffle in a pair of tongs and the contents poured into a mould, the lead forming a button in the bottom while the slag floats on top. When 1 cold, the contents of the mould are taken out and the lead button hammered into the form of a cube, the slag, which is glassy and brittle, separating readily from the metal, which is then ready for cupellation. In the crucible method the ore is mixed with from once to twice its Weight of flux, which varies in composition, but of which the following may be taken as a type: —

Sodium bicarbonate . Potassium carbonate. Powdered borax Flour . Litharge . .

8 parts.

3 –

4 „

1 ..

9 ..

The mixture is charged into a round clay crucible from 106 mm, to 125 mm. high, and heated either in a muffle or in a crucible furnace at a gradually increasing heat for forty or fifty minutes. At the expiration of this time, when the charge shouldbe perfectly liquid and in a tranquil state of*

fusion, the crucible is removed from the furnace and the contents are poured into a mould. The resulting lead button hammered into shape and carefully cleansed from slag is ready for the cupel. If the button is too large for cupellation, or if it is hard, it may be scorified either alone or mixed with test lead before cupellation. The character and amount of the flux necessarily depend upon the character of the ore, the object being to concentrate in the lead button all the gold and silver while dissolving and carrying off in the slag the other constituents of the ore. Under the most favourable con- ditions there is a slight loss of gold and silver in the fusion, 1 the scorification and the cupellation, both by absorption in the slag and by actual volatilization and absorption in the cupel. In ores containing.much copper, this metal is largely concentrated in the lead button, making it hard, and necessitating repeated scorifica- tions and, in some cases, a preliminary removal of the copper by solution of the ore in nitric acid. This leaves the gold in the insoluble residue, which is filtered off, and the silver in the solution is thrown down by hydrochloric acid. The resulting precipitate of silver chloride is filtered, and the residue and the precipitate are scorified together. Ores containing much arsenic or sulphur are generally roasted at a low heat and the assay is made on the roasted material.

The process of cupellation is briefly as follows:— The gold alloy is fused with a quantity of lead, and a little silver if silver is already present. The resulting alloy, which is called the lead button, is then submitted to fusion on a very porous support, made of bone-ash, and called a cupel. The fusion being effected in a current of air, the lead oxidizes. The heat is sufficient to keep the resulting lead oxide fused, and the porous cupel has the property of absorbing melted lead oxide without taking up any of the metallic globule, exactly in the same way that blotting- paper will absorb water whilst it will, not touch a globule of mercury. The heat being continued, and the current of air always passing over the surface of the melted lead button, and the lead oxide being sucked up by the cupel as fast as it is formed, the metallic globule rapidly diminishes in size until at last all the lead has been got rid of. Now, if this were the only action, little good would have been gained, for we should simply have put lead into the gold alloy, and then taken it out again;' but another action goes on whilst the lead is oxidizing in the current

of air. Other metals, except the silver and gold, also oxidize, and are carried by the melted litharge into the cupel. If the lead is therefore rightly proportioned to the standard of alloy, the resulting button will consist of

only gold and silver, and these are separated by the operation of parting, which consists in boiling the alloy (after rolling it to a thin plate) in strong nitric acid, which dissolves the silver and leaves the gold as a coherent sponge. To effect this parting properly, the proportion of silver to gold should be as 3 to i. The operation by which the alloy is brought to this standard is termed quartation or inquartation, and consists in fusing the alloy in a cupel with lead and the quantity of fine silver or fine gold necessary to bring it to the desired composition.

Lead. — The " dry " or fire assay for lead is largely used for the valuation of lead ores, although it is being gradually replaced by volumetric methods. One part of the ore is mixed with from three to five parts of a flux of the following composition: —

Potassium carbonate , . . . 40-6 % Sodium bicarbonate . . . . 31-3 ,,

Borax …... 15-6 ,,

Flour 12-5 „

The mixture is charged into a clay crucible and heated for twenty minutes at a good red heat. When the mixture has been in a tranquil state of fusion for a few minutes it is poured into a mould. When cold, the button is hammered, cleaned carefully from slag, and weighed. The proportion is calculated from the amount of ore used, and the result is expressed in parts in a hundred or percentage of the ore. Various impurities, such as copper, antimony and sulphur, go into the lead button, so that the result is generally too high. The most accurate method for the deter- mination of lead in ores is the gravimetric method, in which it is weighed as lead sulphate after the various impurities have been separated. Nearly all lead ores contain more or less sulphur; and as in the process of solution in nitric acid this is oxidized to sulphuric acid which unites with the lead to form the very insoluble lead sulphate, it is simpler to add sulphuric acid to convert all the lead into sulphate and then evaporate until the nitric acid is expelled. The salts of iron, copper, &c, are then dissolved in water and filtered from the insoluble silica, lead sulphate, and calcium sulphate, which are washed with dilute sulphuric acid. The insoluble matter is treated with a hot solu- tion of alkaline ammonium acetate, which dissolves the lead sulphate, the other materials being separated by filtration. The lead sulphate, re-precipitated in the filtrate by an excess of sulphuric acid and alcohol, is then filtered on an asbestos felt in a Gooch crucible, washed with dilute sulphuric acid and alcohol, ignited, and weighed. Lead sulphate contains 68-30 % of metallic lead.

There are several volumetric methods for assaying lead ores, but the best

known is that based on the precipitation of lead by ammonium molybdate in an acetic acid solution. The lead sulphate, obtained as described above and dissolved in ammonium acetate, is acidulated with acetic acid diluted with hot water and heated to boiling-point. A standardized solution of ammonium molybdate is then added from a burette. As long as the solution contains lead, the addition of the molybdate solution causes a precipitation of white lead molybdate. An excess of the precipitant is shown by a drop of the solution imparting a yellow colour to a solution of tannin, prepared by dissolving one part of tannin in 300 of water; drops of this solution are placed on a white porcelain plate, and as the precipitant is added to the lead solution a drop of the latter is removed from time to time on a glass stirring-rod and added to one of the drops on the porcelain plate. The appearance of a yellow colour shows that all the lead has been precipitated and that the solution contains an excess of molybdate. From the reading of the burette the lead is calculated. The molybdate solution should be of such a strength that 1 cc. will precipitate o-oi gramme of lead. It is standardized by dissolving a weighed amount of lead sulphate in ammonium acetate and proceeding as described above.

Zinc. — Chemically the ores of zinc consist of the silicates, carbonates, oxides, and sulDhides of zinc associated with other

metals, some of which complicate the methods of assay. The most modern and the most generally accepted method is volu- metric, and is based on the reaction between zinc chloride and potassium ferrocyanide, by which insoluble zinc ferrocyanide and soluble potassium chloride are formed; the presence of the slightest excess of potassium ferrocyanide is shown by a brownish tint being imparted by the solution to a drop of uranium nitrate. The ore (0-5 gramme) is digested with a mixture of potassium nitrate and nitric acid. A saturated solution of potassium chlorate in strong nitric acid is added, and the mass evaporated to dryness. It is then heated with a mixture of ammonium chloride and ammonia, filtered and washed with a hot dilute solution of the same mixture. The filtrate diluted to 200 cc. is carefully neutralized with hydrochloric acid, and excess of 6 cc. of the strong acid is added, and the solution saturated with hydrogen sulphide, which precipitates the copper and cadmium, metals which would otherwise interfere. Without filtering, the standard solution is added from a burette, and from time to time a drop of the solution is removed on the glass stirring-rod and added to a drop or two of a strong solution of uranium nitrate, previously placed on a white porcelain plate. The appearance of a brown tint in one of these tests shows the end of the reaction. When cadmium is not present the copper may be precipitated by boiling the acidulated ammoniacal solution with test lead and titrating, as before described, without removing the lead and copper from the solution. The ferrocyanide solution is standard- ized by dissolving 1 gramme of pure zinc

in 6 cc. of hydrochloric acid, adding ammonium chloride, and titrating as before. This method is modified in practice by the character of the ores, carbonates and silicates free from sulphides being decomposed by hydrochloric acid, with the addition of a little nitric acid.

Copper. — The fire assay for copper ores was abandoned years ago and the electrolytic method took its place; this in turn is now largely replaced by volumetric methods. In the electrolytic method from 0-5 to 5 grammes of ore are treated in a flask or beaker, with a mixture of 10 cc. of nitric and 10 cc. of sulphuric acid, until thoroughly decomposed. When this liquid is cold it is diluted with cold water, heated until all the soluble salts are dissolved, transferred to a tall, narrow beaker, and diluted to about 1 50 cc. The electrodes are attached to a frame connected with the battery and the beaker is placed on a stool, which can be raised so that the electrodes are immersed in the liquid and reach the bottom of the beaker. The electrodes consist of two cylinders of platinum (placed one inside the other) about 75 mm. high, the smaller of the two 37 mm. and the larger 50 mm. in diameter, both pierced with 10 to 12 holes 5 mm. in diameter, evenly distributed over the surfaces to facilitate diffusion of the liquids. The surfaces of the cylinders are roughened with a sand blast to increase the areas and make the deposited metals adhere more firmly. Each cylinder has a platinum wire fused to the upper circumference to connect with a clamp from which a wire leads to the proper pole of the battery. The smaller cylinder is generally the negative electrode on which the copper is deposited. The framework carrying the clamps is arranged so that a number of determinations may be made at one time, the wires from the clamps running from a rheostat, so arranged that currents of any strength may be Used simultaneously. The cylinder, having been carefully weighed, is placed in position, the beaker con- taining the solution is adjusted, and the current passed until all the copper is precipitated. This generally requires from two to twelve hours. The cylinders are then removed from the solution and washed with distilled water, the one holding the deposited copper being washed with alcohol, dried and weighed; the increase in weight represents the copper contents of the ore. The deposited copper should be firmly adherent and bright rosy red in colour. Silver, arsenic and cadmium, if present, are precipitated with the copper and affect the accuracy of the results; they should be removed by special methods.

Volumetric methods are more expeditious and require less apparatus. The potassium cyanide method is based on the fact that, when potassium cyanide is added to an ammoniacal solution of a salt of copper, the insoluble copper cyanide is

formed, the end of the reaction being indicated by the disappear- ance of the blue colour of the solution. One gramme of the ore is treated in a flask with a mixture of nitric and sulphuric acids and evaporated until all the nitric acid is expelled. After cooling a little, water is added, and then a few grammes of aluminium foil free from copper. On this foil the copper in the solution is all precipitated by electrolytic action in a few minutes, and the aluminium is dissolved by the addition of an excess of sulphuric acid. Water is added, and as soon as the gangue and copper particles have settled the clear solution is decanted, and the residue washed several times in the same way. The copper is then dissolved in 5 cc. of nitric acid; if silver is present a drop or two of hydrochloric acid is added, the solution diluted to about 50 cc, and filtered. To the nitrate (or, if no silver is present, to the diluted nitric acid solution) 10 cc. of ammonia are added, and a standard solution of potassium cyanide is run in from a burette until the blue colour has nearly disappeared. The solution is filtered to get rid of the precipitate, and the titration is finished in the nearly clear filtrate, which should be always about 200 cc. in volume. The titration is complete when the blue colour is so faint that it is almost imperceptible after the flask has been vigorously shaken. T u " potassium cyanide solu- tion is standardized by dissolving 0-5 gramme of pure copper in 5 cc. of nitric acid, diluting, adding 10 cc. of ammonia, and titrating exactly as described above.

When potassium iodide is added to a solution of cupric acetate, the reaction $(Cu(C_2H_3O_2)_2 + 2KI = CuI + 2K(C_2H_3O_2) + I$ *takes place; that is, for each atom of copper one atom of iodine is liberated. If a solution of sodium thiosulphate (hyposulphite) is added to this solution, hydriodic acid, sodium iodide and tetrathionate are formed; and if a little starch solution has been added, the end of the reaction is indicated by the disappearance of the blue colour, due to the iodide of starch. The amount of iodine liberated is therefore a measure of the copper in the solution, and when the sodium thiosulphate has been carefully standardized the method is extremely accurate. The ore is treated as described in the cyanide method until the copper precipitated by the aluminium foil has been washed and dissolved in 5 cc. of nitric acid; then 0-25 gramme of potassium chlorate is added, and the solution boiled nearly dry to oxidize any arsenic present to arsenic acid. The solution is cooled, 50 cc. water added, then 5 cc. ammonia, and the solution is boiled for five minutes. Next 5 cc. of glacial acetic acid are added, the solution cooled, and 5 cc. of a solution of potassium iodide (300 grammes to the litre) and the standard solution of sodium thiosulphate run in from a burette until the brown colour has nearly disappeared. A few drops of starch solution are then added, and when the blue colour has nearly vanished a drop or two of*

methyl orange makes the end reaction very sharp. The thiosulphate solution is standardized by dissolving 0-3 to 0-5 gramme of pure copper in 3 cc. of nitric acid, adding 50 cc. of water ,and 5 cc. of ammonia, and titrating as above after the addition of 5 cc. of glacial acetic acid and 5 cc. of the potassium iodide solution.

Iron. — The methods used in the assay for iron are volumetric, and are all based on the property possessed by certain reagents of oxidizing iron from the ferrous to the ferric state. Two salts are in common use for this purpose, potassium permanganate and potassium bichromate. It is necessary in the first place, after the ore is in solution, to reduce all the iron to the ferrous con- dition; then the carefully standardized solution of the oxidizing reagent is added until all the iron is in the ferric state, the volume of the standard solution used being the measure of the iron contained in the ore. The end of the reaction when potassium permanganate is employed is known by the change in colour of the solution. As the solution of potassium permanganate, which is deep red in colour, is dropped into the colourless iron solution, it is quickly decolorized while the iron solution gradually assumes a yellowish tinge, the first drop of the perman- ganate solution in excess giving it a pink tint. With potassium bichromate solution, which is yellow, the iron solution becomes green from the chromium chloride or sulphate formed, and the

end of the reaction is determined by removing a drop of the solution on the stirring-rod and adding it to a drop of a dilute solution of potassium ferricyanide on a white tile. So long as the solution contains a ferrous salt, the drop on the tile changes to blue; hence the absence of a blue coloration indicates the complete oxidation of all the ferrous salt and the end of the reaction. One gramme of ore is usually taken for assay and treated in a small flask or beaker with 10 cc. of hydrochloric acid. All the iron in the ore generally dissolves upon heating, and a white residue is left. Occasionally this residue contains a small amount of iron in a difficultly soluble form; in that case the solution is slightly diluted with water and filtered into a larger flask. The residue in the filter is ignited and fused with a little sodium carbonate and nitrate, or with sodium peroxide. The product is treated with water, filtered, and the residue dissolved in hydrochloric acid and added to the main solution. This solution, which should not exceed 50 cc. or 75 cc. in volume contains the iron in the ferric state and is ready for reduction.*

In the reduction by metallic zinc, 1 about 3 grammes of granu- lated or foliated zinc are placed in the flask, which is closed with a small funnel; when the iron is reduced, add 10 cc. of sulphuric acid, and as soon as all the zinc is dissolved the solution is ready for titration. In the reduction by stannous chloride the solution of the ore in the flask is heated to boiling,

and a strong solution of stannous chloride is added until the solution is completely decolorized; then 60 cc. of a solution of mercuric chloride (50 grammes to the litre) are run in and the contents of the flask poured into a dish containing 600 cc. of water and 60 cc. of a solu- tion containing 200 grammes of manganous sulphate, 1 litre of phosphoric acid (1-3 sp. gr.), 400 cc. of sulphuric acid, and 1600 cc. of water. The solution is then ready for titration with the standard permanganate solution.

The permanganate or bichromate solution is standardized by dissolving 0-5 of a gramme of pure iron wire in a flask, in hydro- chloric acid, oxidizing it with a little potassium chlorate,' boiling off all traces of chlorine, deoxidizing by one of the methods described above, and titrating with the solution. As the wire always contains impurities, the absolute amount of iron in the wire must be determined and the correction made accordingly. Pure oxalic acid may also be used, which, in the presence of sulphuric acid, is oxidized by the standard solution according to the reaction:—

5(H 2 C 2 4 2H 2 0) +3H 2 S0 4 +2KMnO < = 10CO 2 + 2MnS0 4

+K 2 S04+i8H 2 O

The reaction in case of ferrous sulphate is :—

10FeSO 4 +2KMnO4-|-8H 2 SO,;=5Fe 2 (SO4).3+K 2 SO,

+2MnS04+8H 2 0;

that is, the same amount of potassium permanganate is required to oxidize 5 molecules of oxalic acid that is necessary to oxidize 10 molecules of iron in the form of ferrous sulphate to ferric sulphate, or 63 parts by weight of oxalic acid equal 56 part$ by weight of metallic iron. Ammonium ferrous sulphate may also be used; it contains one-seventh of its weight of iron. , (A. A. B.)

*ASSEGAI, or Assagai (from Berber-Arab as-zahayah, through Portuguese azagaia), *a weapon for throwing or hurling, a light spear or javelin made of wood and pointed with iron, particularly the spear used by the Zulu and other Kaffir tribes of South Africa. In addition to the long-handled assegai there is a shorter weapon for use at close quarters.*

ASSELIJN, HANS (1610-1660), Dutch painter, was born at Diepen, near Amsterdam. He received instruction from Esaias Vandevelde (1587-1630), and distinguished himself particularly in landscape and animal painting, though his historical works and battle pieces are also admired. He travelled much in France and Italy, and modelled his style greatly after Bambpccio (Peter Laer). He was one of the first Dutch painters who introduced a fresh

and clear manner of painting landscapes in the style of Claude Lorraine, and his example was speedily followed by other artists. Asselijn's pictures were in high estimation at Amster- dam, and several of them are in the museums of • that city. Twenty-four, painted in Italy, were engraved. ,, , ,

ASSEMANI the name of a Syrian Maronite family of famous Orientalists.*

1. Joseph Simon, a Maronite of Mount Lebanon, was born in 1687. When very young he was sent to the Maronite college in Rome, and was transferred thence to the Vatican library. In 1717 he was sent to Egypt and Syria to search for valuable MSS., and returned with about 1 50 very choice ones. The success of this expedition induced the pope to send him again to the East in 1735, and he, returned with a still more valuable collection. On his return he was made titular archbishop of Tyre and librarian of the Vatican library. He instantly began to carry into execution most extensive plans for editing and publishing the most valuable MS. treasures of the Vatican. His two great works are the Bibliotheca Orientalis Clementino-V aticana rec. manuscr. codd. Syr., Arab., Pers., Turc, Hebr., Samarit., Armen., Aethiop., Graec, Aegypl., Iber., et.Malab., jussu et munif. Clem. XI. (Rome, 1719-1728), 9 vols, folio, and Ephraemi Syri opera omnia quae extant, Gr., Syr., et Lat., 6 vols, folio (Rome, 1737-1746). Of the Bibliotheca the first three vols, only were completed. The work was to have been in four parts — (1) Syrian and allied MSS., orthodox, Nestorian and Jacobite; (2) Arabian MSS., Christian and Mahommedan; (3) Coptic, Aethiopic, Persian and Turkish MSS.; and (4) Syrian and Arabian MSS. not distinctively theological; only the first part was completed, but extensive preparations were made for the others. There is a German abridgment by A. F. Pfeiffer.

2. Joseph Aloysius, brother of Joseph Simon, and professor of Oriental languages at Rome. Hediedin 1782. Besidesaiding his brother in his literary labours, he published, in 1749-1760, Codex Liturgicus Ecclesiae Universae in xv. libris (this is incom- plete), and Comment, de Catholicis sive Patriarchis Chaldaeorum et Nestorianorum (Rome, 1775).

3. Stephen Evodius, nephew of Joseph Simon and Joseph Aloysius, was the chief assistant of his uncle Joseph Simon in his work in the Vatican library. He was titular archbishop of Apamea in Syria, and held several rich prebends in Italy. His literary labours were very extensive. His two most important works were a description of certain valuable MSS. in his Biblio- thecac Mediceo-Laurentianae et Palatinae codd. manuscr. Orien- talium

Catalogus (Flor. 1742), fol., and his Acta SS. Martyrum Orientalium. He made several translations from the Syrian, and in conjunction with his uncle he began the Bibliothecae Apostol. Vatic, codd. manusc. Catul., in Ires partes distributus. Only three vols, were published, and the fire in the Vatican library in 1768 consumed the manuscript collections which had been prepared for the continuation of the work.

4. Simon, grandnephew of Joseph Simon, was born at Tripoli in 1752, and was professor of Oriental languages in Padua. He died in 1820. He is best known by his masterly detection of the literary imposture of Vella, which claimed to be a history of the Saracens in Syria.

ASSEMBLY, UNLAWFUL, the term used in English law for an assembly of three or more persons with intent to commit a crime by force, or to carry out a common purpose (whether lawful or unlawful), in such a manner or in such circumstances as would in the opinion of firm and rational men endanger the public peace or create fear of immediate danger to the tranquillity of the neighbourhood. In the Year Book of the third year of Henry VII. 's reign assemblies were referred to as not punishable unless in terrorem populi domini regis. It has been suggested (Criminal Code Commission, 1879) that legislation first became necessary at a time when it was usual for those landed proprietors who were on bad terms with one another to go to market at the head of bands of armed retainers (Statute of Northampton, 1328, 2 Edw. III. c. 3). An assembly, otherwise lawful, is not made unlawful if those who take part in it know beforehand that there will probably be organized opposition to it, and that it may cause a breach of the peace (Beatty v. Gillbanks, 1882, 9 Q. B. D. 308). All persons may, and must if called upon to do so, assist in dispersing an unlawful assembly (Redford v. Birley, 1822, 1 St. Tr. n.s.1215; R. v. Pinney, 1831, 3 St. Tr. n.s. n). An assembly which is lawful cannot be rendered unlawful by

proclamation unless the proclamation is one authorized by statute (R. v. Fursey, 1833, 3 St. Tr. n.s. 543, 567; R.v.. O'Connell, 1831, 2 St. Tr. n.s. 629, 656; see also the Prevention of Crimes [Ireland] Act 1887). Meetings for training or drilling, or military movements, are unlawful assemblies unless held under lawful authority from the crown, the lord-lieutenant, or two justices of the peace (Unlawful Drilling Act 1820, s. 11).

An unlawful assembly which has made a motion towards its common purpose is termed a rout, and if the unlawful assembly should proceed to carry out its purpose, e.g. begin to demolish a particular enclosure, it becomes a riot (q.v.). All three offences are misdemeanours in English law, punishable by fine and imprisonment. The common law as to unlawful assembly extends to Ireland, subject to the special legislation referred to under the title Riot. The law of Scotland includes unlawful assembly under

the same head as rioting.

British Dominions Abroad. — The law of the British colonies as a general rule as to unlawful assemblies follows the common law of England. The definitions in the Criminal Codes of Canada (1892, s. 79) and Queensland (1899, s. 61) are substantially the same as the common-law definition above given. Under the Indian Penal Code (s. 141) an assembly of five or more persons is designated an unlawful assembly if the common object of the persons composing that assembly is — (1) to overawe by criminal force, or show of criminal force, the legislative or executive government of India, or the government of any presidency or any lieutenant-governor, or any public servant in the exercise of the lawful power of such public servant; (2) to resist the execution of any law or of any legal process; (3) to commit any mischief or" criminal trespass " or other offence; (4) by means of criminal force or show of criminal force to any person, to take or obtain possession of any property, or to deprive any person of the enjoyment of a right of way, or of the use of water, or other corporeal right of which he is in possession or enjoyment, or to enforce any right or supposed right; or (5) by means of criminal force or show of criminal force, to compel any person to do what he is not legally bound to do, or to omit to do what he is legally entitled to do (see Mayne, Ind. Cr. Law, ed. 1896, p. 480). In South Africa and Mauritius the law on this subject is derived from the Roman Dutch and French law (see Riot.)

United States. — The common-law definition of unlawful assembly is accepted in the United States subject to the special- legislation of the constituent states. The New York Penal Code (s. 451) declares that whenever three or more persons being assembled attempt or threaten any act tending towards a breach of the peace or injury to person or property, or any unlawful act, such assembly is unlawful (see Bishop, Amer. Crim. Law,_ 8th ed., 1892, vol. i. s. 534, vol. ii. s. 1256).

ASSEN, the capital of the province of Drente, Holland, 16 m. by rail S. of Groningen, at the junction of the two canals which run north and south to Groningen and Meppel respectively. Pop. (1900) 11,329. It is partly surrounded by a small forest belonging to the state. Assen possesses schools (a gymnasium and burgher school), a chamber of commerce, a museum of antiquities and a court-house. Peat-cutting forms a considerable industry. Many prehistoric remains found in the neighbourhood are in the museum at Leiden. Until the 19th century Assen was a small place built round the convent in which Otto II. (of Lippe) , bishop of Utrecht, was murdered after being taken prisoner at Koevorden in 1237.

ASSER, or Asserius Menevensis (d. c. 910), English bishop, and author of a life of Alfred the Great, was a native of the western part of Wales, and

was related to Nobis, bishop of St David's. He became a monk at St David's, and having acquired some reputation for learning, he was invited by King Alfred to his court. The king met the monk at Denu (probably East or West Dean, near Seaford in Sussex), but Asser did not at once accept the invitation of Alfred, and returned to Wales to consult his colleagues. He then agreed to spend six months of each year with the king and six months in his own land; but his first stay at the royal court extended to eight months, and it is probable

that the annual visit to Wales was curtailed if not altogether 1 discontinued. It is difficult to fix the date of Asser's arrival in England, but it was probably about 885. He assisted the king in his studies, received from him the monasteries of Congresbury and Banwell, and sometime later " Exeter and its diocese in Saxonland and Cornwall." He became bishop of Sherborne before 900, and his death is recorded in the Anglo-Saxon Chronicle under the date 910, although it is possible that it occurred a year or two earlier. The scanty details of Asser's life are taken from his biography of Alfred, from which it is inferred that he was acquainted with one or two Frankish biographies, and possibly had visited the continent of Europe.

Asser's work, Annates return, gestarum Alfredi magni, was written about 893, and consists of a chronicle of English history from 849 to 887, and an account of Alfred's life, largely drawn from personal knowledge, down to 887. The only manuscript of which there is any record daces from about 1000, and was destroyed by fire in 1731. From this manuscript an edition was printed in 1574 under the direction of Matthew Parker, arch- bishop of Canterbury; but this contained many interpolations and alterations which were copied by subsequent editors. The text has since been the subject of careful study, and the edition edited by W. H. Stevenson (Oxford, 1904) distinguishes between the original work of Asser and the later additions. Some doubt has been cast upon the authenticity of the work, especially by T. Wright in the Biographia Britannica literaria (London, 1842), who ascribes the life to a monk of St Neots; but the latest scholarship regards it as the work of Asser, although all the difficulties which surround the authorship have not been removed. The life was largely used by subsequent chroniclers, among others by Florence of Worcester, Simeon of Durham, Roger of Hoveden, and William of Malmesbury.

See W. H. Stevenson, Introduction to Asser's Life of King Alfred (Oxford, 1904) ; R. Pauli, Introduction to Konig A elf red (Berlin, 1851).

ASSESSMENT, (from Lat. assessare, to sit beside, to judge), a term expressing either an official valuation of income or property for purposes of taxation, or the amount so determined (see Taxation and Valuation). It is also applied to the amount of damages fixed by a jury in a court of law (see Damages).

An assessment committee is a statutory committee appointed under the Union Assessment Acts 1862, 1880, for the purpose of making out the valuation lists upon which the poor-law rate is based.

An assessment policy, in life insurance, is a policy issued at a fixed premium, the excess of which over the portion necessary to meet current claims and expenses goes to form a reserve fund which is devoted to various forms of benefit for the policy- holders. See Insurance and Friendly Societies.

ASSESSOR (Lat. assessare, assidere, to sit by), a Roman term originally applied to a trained lawyer who sat beside a governor of a province or other magistrate, to instruct him in the ad ministration of the laws (see Roll, De assessoribus magistratuum Romanorum, Leipzig, 1872). The system is still exemplified in Scotland, where it is usual in the larger towns for municipal magistrates, in the administration of their civil jurisdiction, to have the aid of professional assessors. In England, by the Judi- cature Act 1873, the court of appeal and the High Court may in any cause or matter call in the aid of assessors. The Patents Act 1907 makes special provision for assessors in patent and trade-mark cases. By the Supreme Court of Judicature Act 1891 the House of Lords may, in appeals in admiralty actions, call in the aid of assessors, while in the admiralty division of the High Court it is usual for the Elder Brethren of Trinity House to assist as nautical assessors. In admiralty cases in the county courts, too, the judge is frequently assisted by assessors of " nautical skill and experience " (County Court Admiralty Jurisdiction Act 1868). In the ecclesiastical courts assessors assist the bishop in proceedings under the Church Discipline Act 1S40, s. 11, while under the Clergy Discipline Act 1892, s. 2, they assist the chancellor in determining questions of fact. By the Appellate Jurisdiction Act 1876, s. 14, the king in council may make rules for the attendance of archbishops and bishops

'as assessors in the hearing of ecclesiastical cases by the judMal committee of the privy council.

The term " assessor "is also very generally applied to persons appointed to ascertain and fix the value of rates, taxes, &c, and in this- sense the word is used in the United States.

In : France and in all European countries where the civil law system prevails, the term assesseur is applied to those assistant judges who, with a president, compose a judicial court.

In Germany an Assessor, or Beisitzer, is -a member of' the legal profession who has passed four years in actual practice and become qualified for the position of a judge.

ASSETS (from the O. Nor. Fr. assets, mod. Fr. assez, " enough"), in English law, strictly the property of a debtor in the hands of his representative sufficient for the satisfaction of his creditors or legatees. Thus the property of a bankrupt is termed his assets and is the fund out of which his liabilities must be paid. All property of the debtor is assets, and it is not necessary that it should have been reduced into possession by him.

The creditors of a debtor are either secured or unsecured. A secured creditor, e.g. a mortgagee, has a prior claim to be paid his debt out of his security. If on realization of the security there is a balance after paying the debt, such balance becomes assets for the unsecured creditors; if there is a deficit, then the creditor becomes ail unsecured creditor for such deficit. The unsecured creditors were formerly divided into creditors by specialty and by simple contract, the first being creditors secured by instrument under seal who ranked in priority to simple contract creditors. But by Hinde Palmer's Act [the Executors Act] 1869 all un- secured creditors rank alike.*

Assets are divisible into legal assets and equitable assets, and the former class is again divisible into assets real and personal. These distinctions, though formerly of great importance, have now lost most of their meaning, btit it is necessary briefly to de- scribe the nature of these divisions and their consequences: The distinction between assets legal and equitable depends entirely upon the remedy open to the creditor to recover his debt and in no way upon the nature of the property from which the debt is sought to be recovered. If the creditor had to sue the executor of a debtor at law to obtain payment out of the property, that property was legal assets; but if the only remedy open to the creditor to get at the property was to bring an action in chancery for the administration of the estate, then the assets were equitable.

Legal assets, as has been said, were divided into real and personal assets. The personal assets were those which devolved virtute officii on the executor or administrator; such assets are since Hihde Palmer's Act available equally for specialty and simple contract creditors. The real assets consisted of those descending to the heir or devised to a devisee, and were at law only liable for specialty debts. However, by the Land Transfer Act

1897 it is provided that the real estate of a deceased shall devolve upon the executor and " shall be administered in the same manner . . . and with the same incidents as if it were personal estate." The distinction, therefore, between assets real and personal has practically ceased to exist, and only continues in regard to such property as is not included in the act, the most important of which is land held in copyhold.

The equitable assets were treated otherwise. In the eyes of equity all unsecured creditors stand upon the same footing; and a creditor suing for administration of the estate sued on behalf of himself and all other creditors of the estate, and the distinction between specialty and simple contract creditors was ignored. Land was not at law liable to satisfy simple con- tract creditors; but if a testator expressly charged it with pay- ment of his debts or devised it to his executors upon trust to pay his debts, equity treated it as equitable- assets and so made it available to satisfy simple contract creditors; and finally by an act of 1833 it was provided that real estate should in all cases be assets to be administered by equity for the benefit of simple contract creditors as well as creditors by specialty. It will be seen therefore that, generally speaking, all creditors have now the same remedies against the executors

either at law or in equity. The only property as to which these distinctions at all survive is that not touched by the Land Transfer Act 1897.

The act of 1833 just mentioned does not, however, deal with legacies, which continue to be payable only out of personalty unless they are expressly charged upon the realty by the testator; it has been contended that the effect of the Land Transfer Act 1897 has been to alter this and make the realty assets for the purpose of paying legacies, but this view is believed to be un- sound.

It is necessary for the representative so to distribute the assets that any fund primarily liable shall bear its proper burden, and that as far as possible all debts and legacies may be paid; this is said to be " marshalling the assets," and a few examples of the principal cases of marshalling will make this clear. If the personalty is exhausted in satisfying the creditors the legatees are left without a fund from which to be paid. But inasmuch as the creditor could have got paid out of the realty, as well as the personalty, it is not fair that the legatee should suffer by the creditor's choice, and he will therefore get payment from the real estate. So again if one legacy is charged upon the real estate and another is not, then if the former be paid

out of the personalty the latter will stand in its place and be paid from the real estate.

Finally it shall be noticed that an insolvent estate may be administered in bankruptcy. In such a case the law of bank- ruptcy regulates the order in which the assets are divided among the creditors (see Bankruptcy), but by the Judicature Act 1875, it is provided that an insolvent estate may be administered in the chancery division, and in such a case " the same rules shall prevail and be observed as to the respective rights of secured and unsecured creditors and as to the debts and liabilities provable and as to the valuation of annuities and future and contingent liabilities respectively as may be in force for the time being under the law of bankruptcy." This clause must be construed strictly, and it is only in the three cases specifically mentioned that the rules of bankruptcy will be imported into the administration of an insolvent estate by the chancery division.

In a less strict sense, the term " assets," or " an asset," is used derivatively as a synonym for any property, or as opposed to " liabilities." Cecil Rhodes once spoke of the British flag as a " great commercial asset " in South Africa, meaning merely that the imperial connexion was a source of strength and credit.

ASSIDEANS (the Anglicized form, derived through the Greek, of the Hebrew ffasidim, " the pious "), the name of a party or sect which stood out against the Hellenization of the Jews in the 2nd century B.C. After the massacre of those who fled from the forces of Antiochus Epiphanes and would not resist on the sabbath, Mattathias (or Judas) decided to set aside the law and was joined by a company of Assideans, brave men of Israel every one, who offered themselves willingly for the law (1 Mace, ii. 42, cf. 2 Mace. viii. 1). On the appointment of Alcimus (162 B.C.), " a descendant of Aaron " as high-priest, " the Assideans were the first who sought peace " (1 Mace. vii. 13 f.); but the treacherous murder of sixty of them (t&. 16) threw them back into the arms of Judas. According to 2 Mace, xiv., Alcimus identified them with the whole party of the rebels, of which they were only one, though the most important, section.

See Schurer, Geschichte des jiidischen Volkes, i. 203 ; art. in Jewish Encyclopaedia, s-v. " fclasidim " (S. M. Dubnow). (J. H. A. H.)

ASSIGNATS (from Lat. assignatus, assigned), a form of paper- money issued in France, from 1789 to 1796. Assigriats were so termed, as representing land assigned to the holders.

The financial strait of the French government in 1789 was extreme. Coin was scarce, loans were not taken up, taxes had ceased to be productive,

and the country was threatened with imminent bankruptcy. In this emergency assignats were issued to provide a substitute for a metallic currency. They were originally of the nature of mortgage bonds on the national lands. These lands consisted of the church property confiscated, on the

motion of Mirabeau, by the Constituent Assembly on the 2nd of November 1789, and the crown lands, which had been taken over by the nation on the 7th of October (see French Revolution).

The assignats were first to be paid to the creditors of the state. With these the creditors could purchase national land, the assignats having, for this purpose, the preference over other forms of money. If the creditor did not care to purchase land, it was supposed that he could obtain the face-value for them from those who desired land. Those assignats which were returned to the state as purchase-money were to be cancelled, and the whole issue, it was argued, would consequently disappear as the national lands were distributed.

A first issue was made of 400,000,000 francs' worth of assignats, each note being of 100 francs' value and bearing interest daily at a rate of 5%. They were to be redeemed by the product of the sales, and from certain other sources, at the rate of 120,000,000 francs in 1791, 100,000,000 francs in 1792, 80,000,000 francs in 1793 and 1794, and the surplus in 1795. The success of the issue was undoubted, and, possibly, if the assignats had been restricted, as Mirabeau at first desired, to the extent of one-half the value of the lands sold, they would not have shared the usual fate of inconvertible paper money. Mirabeau was a strenuous advocate of the assignats. " They represent," he said, "real property, the most secure of all possessions, the soil on which we tread." " There cannot be a greater error than the fear so generally prevalent as to the over- issue of assignats . . . reabsorbed progressively in the purchase of the national domains, this paper-money can never become redundant."

In 1790 the interest was reduced to 3%, and as the treasury had again become exhausted, a further issue was decided upon ; it was also decreed that the assignats were to be accepted as legal tender, all public departments being instructed to receive theni as the equivalent of metallic money. This second issue amounted to 800,000,000 francs and carried no interest. It was solemnly declared in the decree authorizing the issue that the maximum issue was never to exceed twelve hundred millions. This pledge, however, was soon broken, and further issues brought the total up to 3 ,7 50,000,000 francs. The consequence of these further issues was instant depreciation, and the note of 100 francs nominal value sank to less than 20 francs coin. Recourse was then had to protective legislation. The

first step was to decree the penalty of six years' imprisonment against any person who should sell specie for a more considerable quantity of assignats, or who should stipulate a different price for com- modities according as the payment was to be made in specie or in assignats. For the second offence the penalty was to be twenty years' imprisonment (August 1, 1793), for which the death penalty was ultimately substituted (May 10, 1794). This severe provision was, however, repealed after the fall of Robes- pierre. Notwithstanding these precautions, the value of assignats still declined, till the proportion to specie had become that of six' to one. Then came the passing by the Convention on the 3rd of May 1793 of the absurd " maximum." The decree required all farmers and com-dealers to declare the quantity of corn in their possession and to sell it only in recognized markets. No person was to be allowed to lay in more than one month's supply. A maximum price was fixed, above which no one was to buy or sell under severe penalties. These measures were soon stultified by further issues, and by June 1794 the total number of assignats aggregated nearly 8,000,000,000, of which only 2,464,000,000 had returned to the treasury and been destroyed. The extension of the " maximum " to all commodities only increased the confusion. Trade was paralysed and all manufacturing establish- ments were closed down. Attempts by the Convention to increase the value of the assignats were of no avail. Too many causes operated in favour of their depreciation: the enormous issue, the uncertainty as to their value if the Revolution should fail, the relation they bore to both specie and commodities, which retained their value and refused to be exchanged for a money of Constantly diminishing purchasing power. Even

between the assignats themselves there were differences. The royal assignats, which had been issued under Louis XVI., had depreciated less than the republican ones. They were worth from 8 to 15% more, a fact due to the hope that in case of a counter-revolution they would be less likely to be discredited.

The Directory was guilty of even greater abuses in dealing with the assignats. By 1 796 the issues had reached the enormous figure of 45,500,000,000 francs, and even this gigantic total was swollen still more by the numerous counterfeits introduced into France from the neighbouring countries. The assignats had now become totally valueless — the abolition of the " maximum " the previous year (1795) had produced no effect, and, though, by various payments into the treasury, the total number had been reduced to about 24,000,000,000 francs, their face-value was about 30 to 1 of coin. At this value they were converted into 800,000,000 francs of

land-warrants, or mandats territoriaux, which were to constitute a mortgage on all the lands of the republic. These mandats were no more successful than the assignats, and even on the day of their issue were at a discount of 82 %. They had an existence of six months, and were finally received back by the state at about the seventieth part of their face-value in coin.

Authorities. — L. A. Thiers, Histoire de la revolution francaise, gives a full and graphic account of the assignats, the causes of their depreciation, &c. ; J. Gamier, Traite des Finances (1862) ; J. Bresson, Histoire financiere de la France (1829) ; R. Stourm, Les Finances de I'ancien regime et de la revolution (1885); F. A. Walker, Money (1891); Heniy Higgs, in the Cambridge Modern History, vol. viii. (1904). (T. A. I.)

ASSIGNMENT, Assignation, Assignee (from Lat. assignare, to mark out), terms which, as derivatives of the verb " to assign," are of frequent technical use in law. To assign is to make over, and the term is generally used to express a trans- ference by writing, in contradistinction to a transference by actual delivery. In England the usual expression is assignment, in Scotland it is assignation. The person making over is called the assignor or cedent; the recipient, the assign or assignee. An assignee may be such either by deed, as when a lessee assigns his lease to another, or in law, as when property devolves upon an executor. The law as to assignment in connexion with each particular subject, as the assignment of a chose in action, assignment in contract, of dower, of errors, of a lease, &c, will be found under the respective headings. In a colloquial sense, " as- signation " means a secretly contrived meeting between lovers.

ASSINIBOIA, a name formerly applied to two districts of Canada, but not now held by any. (1) A district formed in 1835 by the Hudson's Bay Company, having in it Fort Garry at the junction of the Red and Assiniboine rivers in Rupert's Land, North America. It extended over a circular area, with a radius of 50 m. from Fort Garry. It was governed by a local council nominated by the Hudson's Bay Company. It ceased to exist when Rupert's Land was transferred to Canada in 1870. (2) A district of the North-west Territories, which was given definite existence by an act of the Dominion parliament in 187 5. Assini- boia extended from the western boundary of Manitoba (99 W. in 1875, and 101 25′ W. in 1881) to ni° W., and from 49 N. to 5 2 N. The name was a misnomer, as it barely touched the Assiniboine river. To the north of the district lay the district of Saskatchewan, so that when the two were united by the Dominion act of 1905, they were somewhat changed in boundaries and the name Saskatchewan was given to the new province. The derivation of Assiniboia is from two Ojibway words, assini meaning a stone, and the termination " to cook , by roasting "; from these came a name first applied to a Dakota

or Sioux tribe living on the Upper Red river; afterwards when this tribe separated from the Dakotas, its name was given to the branch of the Red river which the tribe visited, the river being known as the Assiniboine and the tribe as Assiniboin.

ASSINIBOIN (" Stone-Cookers "), a tribe of North American Indians of Siouan stock. Their name (see above) is said to refer to their method of boiling water by dropping red-hot stones into it. Their former range was between the Missouri and the middle Saskatchewan on both sides of the Canadian frontier. In 1904

there were 1234 in the United States, all on reservations in Montana; and in 1902 there were 1371 in Canada.

See Handbook of American Indians, ed. F. W. Hodge (Washington, io°7)-

ASSISE (from the Fr., derived from Lat. assidere, to sit beside) , a geological term for two or more beds of rock united by the occurrence of the same characteristic species or genera.

ASSISI (anc. Asisium), a town and episcopal see of Umbria, Italy, in the province of Perugia, 15 m. E.S.E. by rail from the town of Perugia. Pop. (1901) town, 5338; commune, 17,240. The town occupies a fine position on a mountain (1345 ft. above sea-level) with a view over the valleys of the Tiber and Topino. It is mainly famous in connexion with St Francis, who was born here in 1182, and returned to die in 1226. The Franciscan monastery and the lower and upper church of St Francis were begun immediately after his canonization in 1228, and completed in 1253, being fine specimens of Gothic architecture. The crypt was added in 1818, when the sarcophagus containing his remains was discovered. The lower church contains frescoes by Cimabue, Giotto and others, the most famous of which are those over the high altar by Giotto, illustrating the vows of the Franciscan order; while the upper church has frescoes representing scenes from the life of St Francis (probably by Giotto and his con- temporaries) on the lower portion of the walls of the nave, and scenes from Old and New Testament history by pupils of Cimabue on the upper. The church of Santa Chiara (St Clare), the foundress of the Poor Clares, with its massive lateral buttresses, fine rose-window, and simple Gothic interior, was begun in 1257, four years after her death. It contains the tomb of the saint and 13th-century frescoes and pictures. Santa Maria Maggioce is also a good Gothic church. The cathedral (San Rufmo) has a fine facade with three rose-windows of 1140; the interior was modernized in 1572. The town is dominated by the medieval castle (1655 ft.), built by Cardinal Albornoz (1367) and added to by Popes Pius II. and Paul III. Two miles to the east in a ravine below Monte Subasio is the hermitage delle Carceri (2300 ft.),

partly built, partly cut out of the solid rock, given to St Francis by Benedictine monks as a place of retirement. Below the town to the south-west, close to the station, is the large pilgrimage church of Santa Maria degli Angeli, begun in 1569 by Pope Pius V., with Vignpla as architect; but not completed until 1640. It contains the original oratory of St Francis and the cell in which he died. Adjacent is the garden in which the saint's thornless roses bloom in May. Half a mile outside the town to the south-east is the convent of San Damiano, erected by St Francis, of which St Clare was first abbess. ...

In the early middle ages Assisi was subject to the dukes of Spoleto; but in the nth century it seems to have been inde- pendent. It became involved, however, in the disputes of Guelphs and Ghibellines, and was frequently at war with Perugia. It was sacked by Perugia and the papal troops in 1442, and even after that continued to be the prey of factions. The place is now famous as a resort of pilgrims, and is also important for the history of Italian art. The poet Metastasio was born here in

1698. .. , ■ ■

See L. Duff-Gordon, Assisi (" Mediaeval Towns " series, London, 1900). For ancient history see Asisium. (T. As.)

ASSIUT, or Siut, capital of a province of Upper Egypt of the same name, and the largest and best-built town in the Nile Valley south of Cairo, from which it is distant 248 m. by rail. The population rose from 32,000 in 1882 to 42,000 in 1900. Assiut stands near the west bank of the Nile across which, just below the town, is a barrage, completed in 1902, consisting of an open weir, 2733 ft. long, and over 100 bays or sluices, each 165 ft. wide, which can be opened or closed at will. At the western end of the barrage begins the Ibrahimia canal, the feeder of the Bahr Yusuf, the largest irrigation canal of Egypt. The Ibra- himia canal is skirted by a magnificent embankment planted with shady trees leading from the river to the town. There are several bazaars, baths and handsome mosques, one noted for its lofty minaret, and here the American Presbyterian mission has established a college for both sexes. Assiut is famous for its red and black pottery and for ornamental wood and ivory work,

which find a ready market all over Egypt. It is one of the chief centres of the Copts. Here also is the northern terminus of the caravan route across the desert, which, passing through the Kharga oasis, goes south-west to

Darfur. It is known as the Arbain, or forty days road, from the time occupied on the journey. Assiut (properly Asyut) is the successor of the ancient Lycopolis (Eg. Sioout), capital of the 13 th nome of Upper Egypt. Here were worshipped two canine gods (see Anubis), Ophols (Wepwoi) being the principal god of the city, while Anubis apparently presided over the necropolis. No ruins are visible, the mounds of the old city being for the most part hidden under modern buildings; but the slopes of the limestone hills behind it are pierced with an infinity of rock-cut tombs, some of which were large and decorated with sculptures, paintings and long inscrip- tions. The archaeological commission of the Description de VEgypte visited them in 1799, when the walls of many of the large tombs were still almost intact; in the first half of the 19th cen- tury (and to some extent later) an immense amount of destruction was caused by blasting for stone. Three of the tombs illustrate one of the darkest periods in Egypt's history, when the princes of Siut played a leading part in the struggle between Heracleopolis and Thebes (Dyns. IX.-XL); another, of the Xllth Dynasty, contains a remarkable inscription detailing the contracts made by the nomarch with the priests of the temples of Opho'is and Anubis for perpetual services at his tomb (see Breasted, Ancient Records of Egypt, Historical Documents, vol. i. pp. 179, 258). Remains of the mummies of dogs and similar animals sacred to these deities are scattered among the debris on the hillside in abundance. Lycopolis was the birthplace of Plotinus, the founder of Neo-Platonism (a.d. 205-270). From the 4th century onwards its grottoes were the dwellings of Christian hermits, amongst whom John of Lycopolis was the most celebrated. (F. LI. G.)

ASSIZE, or Assise (Lat. assidere, to sit beside; O. Fr. assire, to sit, assis, seated), a legal term, meaning literally a " session," but in fact, as Littleton has styled it, a nomen aequivocum, mean- ing sometimes a jury, sometimes the sittings of a court, and sometimes the ordinances of a court or assembly.

It originally signified the form of trial by a jury of sixteen persons, which eventually superseded the barbarous judicial combat; this jury was named the grand assize and was sworn to determine the right of seisin of land (see Evidence). The grand assize was abolished in 1833; but the term assize is still applicable to the jury in criminal causes in Scotland.

In the only sense in which the word is not now almost obsolete, assize means the periodical session of the judges of the High Court of Justice, held in the various counties of England, chiefly for the purposes of gaol delivery and trying causes at nisi prius. Previous to Magna Carta (1215) writs of assize had all to be tried at Westminster, or to await trial in the locality in which they had originated at the septennial circuit of the justices in eyre; but, by way of remedy for the great consequent delay and inconvenience, it

was provided by this celebrated act that the assizes of tnort d'ancestor and novel disseisin should be tried annually by the judges in every county. By successive enact- ments, the civil jurisdiction of the justices of assize was extended, and the number of their sittings increased, till at last the necessity of repairing to Westminster for judgment in civil actions was almost obviated to country litigants by an act, passed in the reign of Edward I., which provided that the writ summoning the jury to Westminster should also appoint a time and place for hearing such causes within the county of their origin. The date of the alternative summons to Westminster was always subsequent to the former date, and so timed as to fall in the vacation preceding the Westminster term, and thus " Unless before'' or nisi prius, issues came to be dealt with by the judges of assize before the summons to Westminster could take effect. The nisi prius clause, however, was not then introduced for the first time. It occurs occasionally in writs of the reign of Henry III. The royal commissions to hold the assizes are — (1) general, (2) special. The general commission is issued twice a year to the judges of the High Court of Justice, and two judges are generally sent on each

circuit. It covers commissions — (1) of oyer and terminer, by which they are empowered to deal with treasons, murders, felonies, &c. This is their largest commission ; (2) of nisi prius (q.v.); (3) of gaol delivery, which requires them to try every prisoner in gaol, for whatsoever offence committed; (4) of the peace, by which all justices must be present at their county assizes, or else suffer a fine. Special commissions are granted for inquest in certain causes and crimes. See also the articles Circuit; Jury.

Assizes, in the sense of ordinances or enactments of a court or council of state, as the " assize of bread and ale," the " assize of Clarendon," the " assize of arms," are important in early eco- nomic history. As early as the reign of John the observance of the assisae vetialium was enforced, and for a period of 500 years thereafter it was considered no unimportant part of the duties of the legislature to regulate by fixed prices, for the pro- tection of the lieges, the sale of bread, ale, fuel, &c. (see Adulteration). Sometimes in city charters the right to assize such articles is specially conceded. Regulations of this descrip- tion were beneficial in the repression of fraud and adulteration. Assizes are sometimes used in a wider legislative connexion by early chroniclers and historians — the " assisae of the realme," e.g. occasionally meaning the organic laws of the country. For the " assizes of Jerusalem " see Crusades.

The term assize, Originally applying to an assembly or court, became transferred to actions before the court or the writs by which they were instituted. The following are the more important.

Assize of darrien presentment, or last presentation, was a writ directed to the sheriff to summon an assize or jury to enquire who was the last patron that presented to a church then vacant, of which the plaintiff complained that he was deforced or unlawfully deprived by the defendant. It was abolished in 1833 and the action of quare impedit (q.v.) sub- stituted. But by the Common Law Procedure Act i860, no quare impedit can be brought, so that an action in the king's bench of the High Court was substituted for it.

Assize of mort d'ancestor was a writ which lay where a plaintiff complained of an "abatement" or entry upon his freehold, effected by a stranger on the death of the plaintiff's father, mother, brother, sister, uncle, aunt, &c. It was abolished in 1833.

Assize of novel disseisin was an action to recover lands of which the plaintiff had been " disseised " or dispossessed. It was abolished in 1833. See Pollock and Maitland, Hist. Eng. Law.

Assize, clerk of, an officer "who writes all things judicially done by the justices of assizes in their circuits." He has charge of the commission, and takes recognizances, records, judgments and sentences, grants certificates of conviction, draws up orders, &c. By the Clerks of Assize Act 1869 he must either have been for three years a barrister or solicitor in actual practice, or, have acted for three years in the capacity of subordinate officer of a clerk of assize on circuit.

United States. — There are no assize courts in the United States ; it is not the custom for supreme court judges of the states to go on circuit, but the judges of the United States Supreme Court do sit as members of the United States circuit courts in the several states periodically throughout the year. These courts are not assize courts, but are federal as distinguished from state courts, and have a special and limited jurisdiction. In the several states the highest court is divided into departments, in each of which there are courts presided over by supreme court judges residing in that department, thus avoiding the assize court or circuit- going system.

ASSMANNSHAUSEN, a village of Germany, in the Prussian province of Hesse-Nassau, on the right bank of the Rhine and the railway from Frankfort-on-Main to Niederlahnstein. Pop. 1 100. It has a lithium spring, baths and a Kurhaus, and is famed for its red wine (Assmannshduser), which resembles light Burgundy. From here a railway ascends the Niederwald.

ASSOCIATE (Lat. associatus, from ad, to, and sociare to join). one who is united with another, and so generally a companion, in particular a*

subordinate member of an institution or society,

as an associate of the Royal Academy, or one holding a degree in a learned society lower than that of fellow. In English law the associates are officers of the supreme court, whose duties are to draw up the list of causes, enter verdicts, hand the records to the parties, &c, and generally to conduct the business of trials. By the Judicature (Officers) Act 1879 they were styled masters of the supreme court, but the office is now amalgamated with the crown office department, of which they are clerks.

ASSOCIATION OF IDEAS, or Mental Association, a term used in psychology to express the conditions : under which representations arise in consciousness, and also for a principle put forward by an important historical school of thinkers to account generally for the facts of mental life. Modern physio- logical psychology has so altered the approach to this subject that much of the older discussion has become antiquated, but it may be recapitulated here for historical purposes.

*Earlier Theory. — In the long and erudite Note D**, appended by Sir W. Hamilton to his edition of Reid's Works, many anticipations of modern statements on association are cited from the works of ancient or medieval thinkers; and for Aristotle, in particular the glory is claimed of having at once originated the doctrine and practically brought it to perfection. 1 As translated by Hamilton, but without his interpolations, the classical passage from the De Memoria et Reminiscentia runs as follows :— .,-.■■*

" When, therefore, we accomplish an act of reminiscence, we pass, through a certain series of precursive movements, until we arrive at a movement on which the one we are in quest of is habitually consequent. Hence, too, it is that we hunt through the mental train, excogitating from the present or some other, and from similar or contrary or coadjacent. Through this process reminiscence takes place. For the movements are, in these cases, sometimes at the same time, sometimes parts of the same whole, so that the subsequent movement is already more than half accomplished."

The passage is obscure, but it does at all events indicate the various

§rinciples commonly termed contiguity, similarity and contrast, imilar principles are stated by Zeno the Stoic, by Epicurus (see Diog. Laert. vii. § 52, x. § 32), and by St Augustine {Confessions, x. e. 19). Aristotle's doctrine received a more of less intelligent expansion and illustration from the ancient commentators and the schoolmen, and in the still later period

of transition from. the age of scholasticism to the time of modern philosophy, prolonged in the, works of some writers far into the 17th century, Hamilton adduced not a few philosoohical authorities who gave prominence to the general fact of mental association — the Spaniard Ludovieus Vives (1492-1540) especially being most exhaustive in his account of memory.

In Hobbes's psychology much importance is assigned to what he called, variously, the succession, sequence, series, consequence, coherence, train of imaginations or thoughts in mental discourse. But not before Hume is there express question as to what are the distinct principles of association. John Locke had, meanwhile, introduced the phrase " Association of Ideas " as the title of a supple- mentary chapter incorporated with the fourth edition of his Essay, meaning it, however, only as the name of a principle accounting for the mental peculiarities of individuals, with, little or no suggestion of its general psychological import. Of this last Hump had the strongest impression; he reduced the principles of association to three — Resemblance, Contiguity in time and place, Cause and (or) Effect. Dugald Stewart put forward Resemblance, Contrariety, and Vicinity in time and place, though ha added, as another obvious principle, accidental coincidence in the sounds of words, and further noted three other cases of relation, namely, Cause and Effect, Means and End, Premisses and Conclusion, as holding among the trains of thought under circumstances of special attention. Reid, preceding Stewart, was rather disposed to make light df the subject of.associa- tion, vaguely remarking that.it seems to require no other original quality of mind but the power of habit to explain the spontaneous recurrence of trains of thinking, when become familiar by frequent repetition (Intellectual Powers, p. 387).

Hamilton's own theory of mental reproduction, suggestion or association is a development, greatly modified, of the doctrine ex- pounded in his Lectures on Metaphysics (vol. ii. p. 223, seq.), which reduced the principles of association first to two — Simultaneity and Affinity, arid these further to one supreme principle of Redin- tegration or Totality. In the ultimate schertie he posits no less than four general laws of mental succession concerned in reproduction,:-

(1) Associability or possible co-suggestion (all thoughts of the same mental subject are associable or capable of suggesting each other) ;

(2) Repetition or direct remembrance (thoughts coidentical in

, — . , , , , . — 1 , — , — , , _„.

'There are, however, distinct anticipations of, the theory in" Plato

(Phaedo), as part of the doctrine of dydˆj'ijffis ; :tfyu9 ; we find the idea of Simmias recalled by the picture of Simmias (similarity), and that of a friend by the sight df the lyre on which he played (contiguity). •

modification, but differing in time, tend to suggest each other); (3) Redintegration, direct remembrance or reminiscence (thoughts once Coidentical in time, are, however, different as mental modes, again suggestive of each other , and that in the mutual ordei – which they originally held) ; (4) Preference (thoughts are suggested not merely by force of the general subjective relation subsisting between themselves, they are also suggested in proportion to the relation of interest, from whatever source, in which they stand to the individual mind). Upon these follow, as special laws: — A, Primary — inodes of the laws of Repetition and Redintegration — (1) law of Similars (Analogy, Affinity); (2) law of Contrast; (3) law of Coadjacency (Cause and Effect, &c.) ; B, Secondary — modes of the law of Pre- ference, under the law of Possibility — (1) laws of Immediacy and Homogeneity ; (2) law of Facility.

The Associationist School. — This name is given to the English psychologists who aimed at explaining all mental acquisitions, and the more complex mental processes generally under laws not other than those which have just been set out as determining simple reproduction. Hamilton, though professing to deal with reproduc- tion only, formulates a number of still more general laws of mental succession — rlaw of Succession, law of Variation, law of Dependence, law of Relativity or Integration (involving lawof Conditioned), and, finally, law of Intrinsic or Objective Relativity — as the highest to which human consciousness is subject; but it is in & sense quite different that the ' psychologists of ' the so-called Associationist School intend their appropriation of the principle or principles comrhonly signalized. As far as can be judged from imperfect records, tney were anticipated to some extent by the experientialists of ancient times, both Stoic and Epicurean (cf. Diogenes Laeftius, as above). In the modern period, Hobbes is the first thinker of permanent note to whom this doctrine may be traced. Though, in point of fact, he took anything but an exhaustive view of the phenomena of mental succession, yet, after dealing with trains of imagination, or what' he called mental discourse, he sought in the higher departments of intellect to explain reasoning as a discourse in words, dependent upon an arbitrary system of marks, each associated with, or standing for, a variety of imaginations; and, save for a general assertion that reasoning is a reckonings — otherwise, a compounding and resolving — he had no other account of know ; ledge to: give. The whole emotional side of mind, or, in his language the passions, he, in like manner, resolved into an expectation of consequences based on past experience ; of pleasures and .pains', of sense. Thus, though he made no serious attempt to justify his analysis in detail, he is undoubtedly to be classed with the assofcia-*

tionists of the next century. They, however, were wont to trace ; their psychological theory no further back than to Locke's Essay. Bishop Berkeley was driven to posit expressly a principle of sugges- tion or association in these terms: — " That one idea may suggest' another to the mind, it will suffice that they have been observed to go together; without any demonstration of the necessity of theiT! coexistence, or so much as knowing what it is that makes them so: to, coexist " (New Theory of Vision, § 25); and to, support the, obvious application of the principle . to the case of the sensations of sight and touch before him, he constantly urged that association of sound" and sense of language which the later school has always put in the foreground, whether as illustrating the principle in general or: in explanation of the supreme importance of language for knowledge. It was natural, then, that Hume, coming after Berkeley, and assum- ing Berkeley's results, though he reverted to the larger inquiry of Locke, should be more explicit in his reference to association; but he was original also, when he spoke of it as a " kind'of attraction which in the mental world will be found to have as extraordinary effects as in the natural, arid to show. itself in as many and. asjvarious forms " (Human Nature, i. 1, §'4). Other inquirers about the same' time conceived of association with this breadth of view, and set themselves to track, as psychologists, its effects in; detail.

David Hartley in his Observations on Man, published in 1749) (eleven years after the Human Nature, and one year after the better- known Inquiry, of Hume), Opened the path for all the investigations of like nature that have been so characteristic of English psycho- logy. A physician by profession, he sought to combine with an elaborate theory of mental association a minutely detailed hypo- thesis as to the corresponding action of the nervous system, based upon the suggestion of a vibratory motion within the nerves thrown out by Newton in the last paragraph of the Principia. So far, how- ever, from promoting the acceptance of the psychological theory, this physical hypothesis proved to have rather the opposite effect, and it began to be dropped by Hartley's followers (as F. Priestley, in his abridged edition of the Observations, 1775) before it was seriously impugned from .without. When it is studied in the original, and not taken upon the report of hostile critics, who would not, or could not understand it, no little importance must still be accorded to the first attempt, not seldom a curiously felicitous one, to carry through that parallelism of the physical and psychical, which since then has come to count for more and more in the science of mind. Nor should' it be forgotten that Hartley himself, for all his paternal interest in the doctrine of vibrations, was careful to keep separate from its fortunes the cause of his other doctrine of mental association. Of this the point lay in no mere restatement, with new precision, of a principle of coherence among" ideas,"

but In its being tak°n as a clue by which'

to follow the progressive development of the mind's powers. Hold- ing that mental states could be scientifically understood only as they were analysed, Hartley sought for a principle of synthesis to explain the complexity exhibited not only in trains of representative images, but alike in the most involved combinations of reasonings and (as Berkeley had seen) in the apparently simple phenomena of objective perception, as well as in the varied play of the emotions, or, again, in the manifold conscious adjustments of the motor system. One principle appeared to him sufficient for all, running, as enunciated for the simplest case, thus: " Any sensations A, B, C, &c, by being associated with one another a sufficient number of times, get such a power over the corresponding ideas (called by Hartley also vestiges, types, images) a, ft, c, &c, that any one of the sensations A, when impressed alone, shall be able to excite in the mind b, c, &c, the ideas of the rest." To render the principle applicable in the cases where the associated elements are neither sensations nor simple ideas of sensations, Hartley's first care was to determine the con- ditions under which states other than these simplest ones have their rise in the mind, becoming the matter of ever higher and higher combinations. The principle itself supplied the key to the difficulty, when coupled with the notion, already implied in Berkeley's investi- gations, of a coalescence of simple ideas of sensation into one complex idea, which may cease to bear any obvious relation to its constituents. So far from being content, like Hobbes, to make a rough generaliza- tion to all mind from the phenomena of developed memory, as if these might be straightway assumed, Hartley maae a point of referring them, in a subordinate place of their own, to his universal principle of mental synthesis. He expressly put forward the law of association, endued with such scope, as supplying what was wanting to Locke's doctrine in its more strictly psychological aspect, and thus marks by his work a distinct advance on the line of development of the experiential philosophy.

The new doctrine received warm support from some, as Law and Priestley, who both, like Hume and Hartley himself, took the prin- ciple of association as having the like import for the science of mind that gravitation had acquired for the science of matter. The prin- ciple began also, if not always with direct reference to Hartley, yet, doubtless, owing to his impressive advocacy of it, to be applied systematically in special directions, as by Abraham Tucker (1768) to morals, and by Archibald Alison (1790) to aesthetics. Thomas Brown (d. 1820) subjected anew to discussion the question of theory. Hardly less unjust to Hartley than Reid

or Stewart had been, and forward to proclaim all that was different in his own position, Brown must yet be ranked with the associationists before and after him for the prominence he assigned to the associative principle in sense- perception (what he called external affections of mind), and for his reference of all other mental states (internal affections) to the two generic capacities or susceptibilities of Simple and Relative Sugges- tion. He preferred the word Suggestion to Association, which seemed to him to imply some prior connecting process, whereof there was no evidence in many of the most important cases of suggestion, nor even, strictly speaking, in the case of contiguity in time where the term seemed least inapplicable. According to him, all that could be assumed was a general constitutional tendency of the mind to exist successively in states that have certain relations to each other, of itself only, and without any external cause or any influence previous to that operating at the moment of the suggestion. Brown's chief contribution to the general doctrine of mental association, besides what he did for the theory of perception, was, perhaps, his analysis of voluntary reminiscence and constructive imagination — faculties that appear at first sight to lie altogether beyond the ex- planatory range of the principle. In James Mill's Analysis of the Phenomena of tlie Human Mind (1829), the principle, much as Hartley had conceived it, was carried out, with characteristic consequence, over the psychological field. With a much enlarged and more varied conception of association, Alexander Bain re-executed the general psychological task, while Herbert Spencer revised the doctrine from the new point of view of the evolution- hypothesis. John Stuart Mill made only occasional excursions into the region of psychology proper, but sought, in his System of Logic (1843)ˆ0 determine the conditions of objective truth from the point of view of the associationist theory, and, thus or otherwise being drawn into general philosophical discussion, spread wider than any one before him its repute.

The Associationist School has been composed chiefly of British thinkers, but in France also it has had distinguished representatives. Of these it will suffice to mention Condillac, who professed to explain all knowledge from the single principle of association {liaison) of ideas, operating through a previous association with signs, verbal or other. In Germany, before the time of Kant, mental association svas generally treated in the traditional manner, as by Wolff. Kant's inquiry into the foundations of knowledge, agreeing in its genera) purport with Locke's, however it differed in its critical procedure, brought him face to face with the newer doctrine that had been grafted on Locke's philosophy ; and to account for the fact Of syn- thesis in cognition, in express opposition to associationism, as represented by Hume, was, in truth, his prime object, starting, as he did, from the assumption that there was that in knowledge which no mere association of experiences could explain. To the extent, therefore, that his

influence prevailed, all inquiries made by the

English associationists were discounted in Germany. Notwith- standing, under the very shadow of his authority a corresponding, if not related, movement was initiated by J. F. Herbart. Peculiar, and widely different from anything conceived by the associatipnists, as Herbart's metaphysical opinions were, h'e was at one with them, and at variance with Kant, in assigning fundamental importance to the psychological investigation of the development of consciousness, nor was his conception of the laws determining the interaction and flow of mental presentations and representations, when taken in its bare psychological import, essentially different from theirs. In F. E. Beneke's psychology also, and in more recent inquiries conducted mainly by physiologists, mental association has been understood in its wider scope, as a general principle of explanation.

The associationists differ not a little among themselves in the statement of their principle, or, when they adduce several principles, in their conception of the relative importance of these. Hartley took account only of Contiguity, or the repetition of impressions synchronous or immediately successive; the like is true of James Mill, though, incidentally, he made an express attempt to resolve the received principle of Similarity, and through this the other principle of Contrast, into his fundamental law — law of Frequency, as he sometimes called it, because upon frequency, in conjunction with vividness of impressions, the strength of association, in his view, depended. In a sense of his own, Brown also, while accepting the common Aristotelian enumeration of principles, inclined to the opinion that " all suggestion may be found to depend on prior co- existence, or at least on such proximity as is itself very probably a modification of coexistence," provided account be taken of " the influence of emotions and other feelings that are very different from ideas, as when an analogous object suggests an analogous object by the influence of an emotion which each separately may have produced before, and which is, therefore, common to both. ' To the contrary effect, Spencer maintained that the fundamental law of all mental association is that presentations aggregate or cohere with their like in past experience, and that, besides this law, there is in strictness no other, all further phenomena of association being incidental. Thus in particular, he would have explained association by Contiguity as due to the circumstance of imperfect assimilation of the present to the past in consciousness. A. Bain regarded Contiguity and Similarity logically, as perfectly distinct principles, though in actual psychological occurrence blending intimately with each other, contiguous trains being started by a first (it may be, implicit) representation through Similarity, while the express assimilation of present to "past in consciousness is always, or tends to be, followed by the revival of what was presented in contiguity with that past.

The highest, philosophical interest, as distinguished from that which is more strictly psychological, attaches to the mode of mental association called Inseparable. The coalescence of mental states noted by Hartley, as it had been assumed by Berkeley, was farther formulated by James Mill, in these terms :—

" Some ideas are by frequency and strength of association so closely combined that they cannot be separated ; if one exists, the other exists along with it in spite, of whatever effort we make to disjoin them." — (Analysis of the Human Mind, 2nd ed. vol. i.'p. 93.)

J. S. Mill's statement is more guarded and particular:—

' When two phenomena have been very often experienced in con- junction, and have not, in any single instance, occurred separately either in experience or in thought, there is produced between them what has been called inseparable, or, less correctly, indissoluble, association; by which is not meant that the association must inevitably last to the end of life — • that no subsequent experience or process of thought can possibly avail to dissolve it; but only that as long as no such experience or process of thought has taken place, the association is irresistible; it is impossible for us to think the one thing disjoined from the other. "- — (Examination of Hamilton's Philosophy, 2nd ed. p. 191.)

It is chiefly by J. S. Mill that the philosophical application of the principle has been made. The first and most obvious application is to so-called necessary truths— such, namely, as are not merely analytic judgments but involve a synthesis of distinct notions. Again, the same thinker sought to prove Inseparable Association the ground of belief in an external objective world. The former application, especially, is facilitated, when the experience through which the association is supposed to be constituted is understood as cumulative in the race, and transmissible as original endowment to individuals—endowment that may be expressed either, subjec- tively, as latent intelligence, or, objectively, as fixed nervous connexions. Spencer, as before suggested, is the author of this extended view of mental association.

Modem Criticism. — Of recent years the associationist theory has been subjected to searching criticism, and it has been maintained by many writers that the laws are both unsatisfactorily expressed and insufficient to explain the facts. Among the most vigorous and comprehensive of these investigations is that of F. H. Bradley in his Principles of Logic (1883). Having admitted the psychological fact of mental association, he attacks the theories of Mill and Bam primarily on the ground that they purport to give an account of mental life as a whole, a metaphysical doctrine of

existence. Accord- ing to this doctrine, mental activity is ultimately reducible to-

particular feelings, impressions, ideas, which are disparate and un-connected, until chance Association brings them together. On this assumption the laws of Association naturally emerge in the following form: — (l) The law of Contiguity. — "Actions, sensations and states of feeling, occurring together or in close connexion, tend to grow together, or cohere, in such a way that, when any one of them is afterwards presented to the mind, the others are apt to be brought up in idea " (A. Bain, Senses and Intellect, p. 327). (2) The law of Similarity. — " Present actions, sensation, thoughts or emotions tend to revive their like among previous impressions or states " (A. Bain, ibid. 457. Compare J. S. Mill, Logic, ii. p. 440, 9th ed.). The fundamental objection to (1) is that ideas and impressions once experienced do not recur; they are particular existences, and, as such, do not persevere to recur or be presented. So Mill is wrong in speaking of two impressions being " frequently experienced." Bradley claims thus to reduce the law to " When we have experienced (or even thought of) several pairs of impressions (simultaneous or successive), which pairs are like one another; then whenever an idea occurs which is like all the impressions on one side of these pairs, it tends to excite an idea which is like all the impressions on the other side." This statement is destructive of the title of the law, because it appears that what were contiguous (the impressions) are not associated, and what are associated (the ideas) were not contiguous; in other words, the association is not due to contiguity at all.

Proceeding to the law of Similarity (which in Mill's view is at the back of association by contiguity), and having made a similar criticism of its phrasing, Bradley maintains that it involves an even greater absurdity; if two ideas are to be recognized as similar, they must both be present in the rriind ; if one is to call up the othfcr, one must be absent. To the obvious reply that the similarity is recognized ex post facto, and not while the former idea is being called up, Bradley replies simply that such a view reduces the law to the mere statement of a phenomenon and deprives it of any explanatory value, though he hardly makes it clear in what sense this necessarily invalidates the law from a psychological point of view. He further points out with greater force that in point of fact mere similarity is not the basis of ordinary cases of mental reproduction, inasmuch as in any given instance there is more difference than similarity between the ideas associated.

Bradley himself bases association on identity plus contiguity: — – " Any part of a single state of mind tends, if reproduced, to re-instate the remainder," or " any element tends to reproduce those elements with which it has formed one state of mind." This law he calls by the name " redintegration," understood, of course, in a sense different from that in which Hamilton used it. The radical difference between this law and those of Mill and Bain is that it deals not with particular units of thoughts but with universals or identity between individuals. In any example of such reproduction the universal appears in a particular form which is more or less different from that in which it originally existed.

Psychophysical Researches. — Bradley's discussion deals with the subject purely from the metaphysical side, and the total result practically is that association occurs only between universals. From the point of view of empirical psychologists Bradley's results are open to the charge which he made against those who impugned his view of the law of similarity, namely that they are merely a state- ment — -not in any real sense an explanation. The relation between the mental and the physical phenomena of association has occupied the attention of all the leading psychologists (see Psychology). William James holds that association is of " objects " not of " ideas," is between "things thought of" — so far as the word stands for an effect. " So far as it stands for a cause it is between processes in the brain." Dealing with the law of Contiguity he says that the " most natural way of accounting for it is to conceive it as a result of the laws of habit in the nervous system ; in other words to ascribe it to a physiological cause." Association is.thus due to the fact that when a nerve current has once passed by a given way, it will pass more easily by that way in future; and this fact is a physical fact. He further seeks to maintain the important deduction that the only primary or ultimate law of association is that of neural habit.

The objections to the associationist theory are summed up by Ci. F. Stout {Analytic Psychol., vol. ii. pp. 47 seq.) under three heads. Of these the first is that the theory as stated, e.g. by Bain, lays far (00 much stress on the mere connexion of elements hitherto entirely separate; whereas, in fact, every new mental state or synthesis consists in the development or modification of a pre-existing state or psychic whole. Secondly, it is quite false to regard an association as merely an aggregate of disparate units; in fact, the form of the new idea is quite as important as the elements which it comprises. Thirdly, the phraseology used by the associationists seems to assume that the parts that go to form the whole retain their identity un-impaired; in fact, each part or element is ipso facto modified by the very fact of its entering into such combination.

The experimental methods now in vogue have to a large extent removed the

discussion of the whole subject of association of ideas, depending in the case of the older writers on introspection, into a new sphere. In such a work as E. B. Titchener's Experimental Psychology (1905), association is treated as a branch of the study of mental reactions, of which association reactions are one division.

Bibliography. — See Psychology; and the works of Bradley,

Stout, and James, above quoted, and general works on psychology: articles in Mind (passim); A. Bain, Senses and Intellect (4th ed-, 1894), and in Mind, xii. (1887) pp. 237-249; John Watson, An Outline of Philosophy (1898); H. Hoffding, Hist, of Mod. Philos. (Eng. trans., Lond., 1900), Psychologie in Umrissen auf Grundlage der Erfahrung (2nd ed., Leipzig, 1893); Jas. Sully, The Human Mind (1892), and Outlines of Psych. (Lond., 1892); E. B. Titchener, Outline of Psych. (New York, 1896), and in his trans, of O. Kiilpe's Outlines of Psych. (New York, 1895,); Jas. Ward in Mind, viii. (1883), xii. (1887), new series ii. (1893), iii. (1894); G. T. Ladd, Psychology, Descriptive and Explanatory (Lond., 1894); C. L. C. Morgan, Introd. to Comparative Psych. (Lond., 1894) ; W. Wundt, Princip. of Physiol. Psych. (Eng. trans., 1904), Human and Animal Psych. (Eng. trans., 1894), pp. 282-307; Outlines of Psych. (Eng. trans., 1897); E. Claparede, L' Association des idees (1903). For associationism in Greek philosophy see J. I. Beare, Greek Theories of Elementary Cognition (Oxford, 1906), part iii. §§ 14, 43 seq.

1 ASSONANCE (from Lat. adsonare or assonare, to sound to 01 answer to), a term defined, in its prosodical sense, as " the corresponding or riming of one word with another in the accented vowel and those which follow it, but not in the consonants " (New English Dictionary, Oxford). In other words, assonance is an improper or imperfect form of rhyme, in which the ear is satisfied with the incomplete identity of sound which the vowel gives without the aid of consonants. Much rustic or popular verse in England is satisfied with assonance, as in such cases as " And pray who gave thee that jolly red nose? Cinnamon, Ginger, Nutmeg and Cloves,"

where the agreement between the two o's permits the ear to neglect the discord between 5 and v. But in English these instances are the result of carelessness or blunted ear. It is not so in several literatures, such as in Spanish, where assonance is systematically cultivated as a literary ornament. It is an error to confound alliteration, — which results from the close juxta- position of words beginning with the same sound or letter, — and assonance, which is the repetition of the same vowel-sound in a syllable at points where the ear expects a rhyme. The latter is a more complicated and less primitive employment of artifice than the former, although they have often been used to intensify the effect of each other in a

single couplet. Assonance appears, nevertheless, to have preceded rhyme in several of the European languages, and to have led the way towards it. It is particularly observable in the French poetry which was composed before tlje 1 2th century, and it reached its highest point in the " Chanson de Roland," where the sections are distinguished by the fact that all the lines in a laisse or stanza close with the same vowel-sound. When the ear of the French became more delicate, and pure rhyme was introduced, about the year n 20, assonance almost immediately retired before it and was employed no more, until recent years, when several French poets have re-introduced assonance, in order to widen the scope of their effects of sound. It held its place longer in Provencal and some other Romance literatures, while in Spanish it has retained its absolute authority over rhyme to the present day. It has been observed that in the Romance languages the ear prefers the correspondence of vowels, while in the Teutonic languages the preference is given to consonants. This distinction is felt most strongly in Spanish, where the satisfaction in rimas asonantes is expressed no less in the most elaborate works of the poets and dramatists than in the rough ballads of the people. The nature of the language here permits the full value of the corresponding vowel-sounds to be appreciated, whereas in English — and even in German, where, however, a great deal of assonant poetry exists — the divergence of the consonants easily veils or blunts the similarity of sound. Various German poets of high merit, and in particular Tieck and Heine, have endeavoured to obviate this difficulty, but with- out complete success. Occasionally they endeavour, as English rhymers have done, to mix pure rhyme with assonance, but the result of this in almost all cases is that the assonances, &c, which make a less strenuous appeal to the ear, are drowned and lost in the stress of the pure rhymes. Like alliteration, assonance is a very frequent and very effective ornament of prose style, but such correspondence in vowel-sound is usually accidental and involuntary, an instinctive employment of the skill of the writer. To introduce it with a purpose, as of course must be done in

poetry, has always been held to be a most dangerous, practice in prose. Assonance as a conscious art, in fact, is scarcely recognized as legitimate in English literature. (E. G.)

ASSUAN, or Aswan, a town of Upper Egypt on the east bank of the Nile, facing Elephantine Island below the First Cataract, and 590 m. S. of Cairo by rail. It is the capital of a province of the same name — the southernmost province of Egypt. Popula- tion (1907) 16,128. The principal buildings are along the river front, where a broad embankment has been

built. Popular among Europeans as a winter health resort and tourist centre, Assuan is provided with large modern hotels (one situated on Elephantine Island), and there is an English church. South-east of the railway station are the ruins of a temple built by Ptolemy Euergetes, and still farther south are the famous granite quarries of Syene. On Elephantine Island are an ancient nilometer and other remains, including a granite gateway built under Alexander the Great at the temple of the local ram-headed god Chnubis or Chnumis (Eg. Khnum), perhaps on account of his connexion with Ammon (q.v.) ; two small but very beautiful temples of the XVIII th Dynasty were destroyed there about 1820. In the hill on the opposite side of the river are tombs of the Vlth to Xllth dynasties, opened by Lord Grenfcll in 1 885-1886. The inscrip- tions show that they belonged to frontier-prefects whose ex- peditions into Nubia, &c, are recorded in them. Three and a half miles above the town, at the beginning of the Cataract, the Assuan Dam stretches across the Nile. This great engineering work was finished in December 1902 (see Irrigation: Egypt; and Nile). Above the dam the Nile presents the appearance of a vast lake. Consequent on the rise of the water-level several islands have been wholly and others partly submerged, among the latter Philae (q.v.). On the east bank opposite Philae is the village of Shellal, southern terminus of the Egyptian railway system and the starting point of steamers for the Sudan.

In ancient times the chief city, called Yeb, capital of the frontier nome, the first of the Upper Country, was on the island of Elephantine, guarding the entrance to Egypt. But, owing to the cataract, the main route for traffic with the south was by land along the eastern shore. Here, near the granite quarries — whence was obtained the material for many magnificent monu- ments — there grew up another city, at first dependent on' and afterwards successor to the island town. This city was called Swan, the Mart, whence came the Greek Syene and Arabic Aswan. Syene is twice mentioned (as Seveneh) in the prophecies of Ezekiel, and papyri, discovered on the island, and dated in the reigns of Artaxerxes and Darius II. (464-404 B.C.), reveal the existence of a colony of Jews, with a temple to Yahu (Yahweh, Jehovah), which had been founded at some time before the con- quest of Egypt by Cambyses in 523 b.c. They also mention the great frontier garrison against the Ethiopians, referred to by Herodotus. Syene was one of the bases used by Eratosthenes in his calculations for the measurement of the earth. In Roman times Syene was strongly garrisoned to resist the attacks of the desert tribes. Thither, in virtual banishment, Juvenal was sent as prefect by Domitian. In the early days of Christianity the town became the seat of a bishopric, and numerous ruins of Coptic convents are in the neighbourhood. Syene appears also to have flourished under its first Arab rulers, but in the 12th century was raided and ruined by Bedouin and Nubian tribes. On the conquest of Egypt by the Turks in the 16th century,

Selim I. placed a garrison here, from whom, in part, the present townsmen descend. As the southern frontier town of Egypt proper, Assuan in times of peace was the entrepot of a consider- able trade with the Sudan and Abyssinia, and in 1880 its trade was valued at £2,000,000 annually. During the Mahdia (1884- 1898) Assuan was strongly garrisoned by Egyptian and British troops. Since the defeat of the khalifa at Omdurma?. and the fixing (1899) of the Egyptian frontier farther south, the military value of Assuan has declined.

For the Jewish colony see A. H. Sayce and A. E. Cowley, Aramaic Papyri discovered at Assuan (Oxford, 1906); E. Sachau, Drei Aramdische papyrus- Urkunden cus Elephantine (Berlin, 1907). For the dam see W. Willcocks, The Nile Reservoir Dam at Assuan (London, 1901). (F. Ll. G.)

ASSUMPSIT (" he has undertaken," from Lat. assumere), a word applied to an action for the recovery of damages by reason of the breach or non-performance of a simple contract, either express or implied, and whether made orally or in writing. Assumpsit was the word always used in pleadings by the plaintiff to set forth the defendant's undertaking or promise, hence the name of the action. Claims in actions of assumpsit were ordi- narily divided into (a) common or indebitatus assumpsit, brought usually on an implied promise, and (b) special assumpsit, founded on an express promise. Assumpsit as a form of action became obsolete after the passing of the Judicature Acts 1873 and 1875. (See further Contract; Pleading and Tort.)

ASSUMPTION, FEAST OF. The feast of the " Assumption of the blessed Virgin Mary " (Lat. festum assumptionis, dormitionis, depositionis, pausationis B. V. M. ; Gr. Koifiriais or ava\r)]pis rrjs BeoroKov) is a festival of the Christian Church celebrated on the 15th of August, in commemoration of the miraculous ascent into heaven of the mother of Christ. The belief on which this festival rests has its origin in apocryphal sources, such as the els rijv KoinriaLV tt)s virepayias Beawoivrjs ascribed to the Apostle John, and the de transitu Mariae, assigned to Melito, bishop of Sardis, but actually written about a.d. 400. Pope Gelasius I. (492-496) included them in the list of apocryphal books condemned by the Decretum de libris recipiendis et non recipiendis; but they were accepted as authentic by the pseudo-Dionysius {de nominbus divinis c. 3), whose writings date probably from the 5th century, and by Gregory of Tours (d. 593 or 594). The latter in his De gloria martyrum (i. 4) gives the following account of the miracle: As all the Apostles were watching round the dying Mary, Jesus appeared with His angels and committed the soul of His Mother to the Archangel Michael. Next day, as they were carrying the body to the grave, Christ again appeared and carried it with Him in a cloud to heaven, where it was reunited with the soul. This story is much amplified in the account

given by St John of Damascus in the homilies In dormitionem Mariae, which are still read in the Roman Church as the lesson during the octave of the feast. According to this the patriarchs and Adam and Eve also appear at the death-bed, to praise their daughter, through whom they had been rescued from the curse of God; a Jew who touches the body loses both his hands, which are restored to him by the Apostles; and the body lies three days in the grave without corruption before it is taken up into heaven.

The festival is first mentioned by St Andrew of Crete (c. 650), and, according to the Byzantine historian Nicephorus Callistus (Hist. Eccles. xvii. 28), was first instituted by the Emperor Maurice in a.d. 582. From the East it was borrowed by Rome, where there is evidence of its existence so early as the 7th century. In the Gallican Church it was only adopted at the same time as the Roman liturgy. But though the festival thus became in-corporated in the regular usage of the Western Church, the belief in the resurrection and bodily assumption of the Virgin has never been defined as a dogma and remains a " pious opinion," which the faithful may reject without imperilling their immortal souls, though not apparently — to quote Melchior Cano (De Locis Theolog. xii. 10) — without " insolent temerity," since such rejec- tion would be contrary to the common agreement of the Church. By the reformed Churches, including the Church of England, the festival is not observed, having been rejected at the Reforma tion as being neither primitive nor founded upon any " certain warrant of Holy Scripture."

See Herzog-Hauck, Realencyklopadie (ed. 3), s. " Maria " ; Mgr.L. Duchesne, Christian Worship (Eng. trans., London, 1904); Wetzer and Welte, Kirchenlexikon, s. "Marienfeste " ; The Catholic Encyclo- paedia (London and New York, 1907, &c), s. " Apocrypha," " Assumption."

ASSUR (Auth. Vers. Asshur), a Hebrew name, occurring in many passages of the Old Testament, for the land and dominion of Assyria. 1 The country of Assyria, which in the Assyro-Baby- lonian literature is known as mat Assur (ki), " land of Assur," took its name from the ancient city of Assur, situated at the

1 The name Assur is not connected with the Asshur of I Chron.ii. 24 ; ii. 45. Note that it is customary to spell the god-name Asur and the country-name Assur.

southern extremity of Assyria proper, whose territory, soon after the first

Assyrian settlement, was bounded on the N. by the Zagros mountain range in what is now Kurdistan and on the S. by the lower Zab river. The kingdom of Assyria, which was the outgrowth of the primitive settlement on the site of the city of Assur, was developed by a probably gradual process of coloniza- tion in the rich vales of the middle Tigris region, a district watered by the Tigris itself and also by several tributary streams, the chief of which was the lower Zab. 1

It seems quite evident that the city of Assur was originally founded by Semites from Babylonia at quite an early, but as yet undetermined date. In the prologue to the law-code of the great Babylonian monarch Khammurabi (c. 2250 B.C.), the cities of Nineveh and Assur are both mentioned as coming under that king's beneficent influence. Assur is there called A-usar(ki) , 2 in which combination the ending ki ("land territory") proves that even at that early period there was a province of Assur more extensive than the city proper. It is probable that this non Semitic form A-usar means "well watered region," 3 a most appropriate designation for the river settlements of Assyria. The problem as to the meaning of the name Assur is rendered all the more confusing by the fact that the city and land are also called Assures well as A-usar) ,bothby the Khammurabi records 4 and generally in the later Assyrian literature. Furthermore, the god- and country-name Assur also occurs at a late date in Assyrian literature in the forms An-Sar, A n- sar (ki), which form 6 was presumably read Assur. In the Creation tablet, the heavens personified collectively were indicated by this term An-sar, "host of heaven," in contradistinction to the earth = Ki-sar, " host of earth." In view of this fact, it seems highly probable that the late writing An-sar for Assur was a more or less conscious attempt on the part of the Assyrian scribes to identify the peculiarly Assyrian deity Asur (see Assur, the god, below) with the Creation deity An-sar. On the other hand, there is an epithet A Sir or Ashir ("overseer") applied to several gods and particu- larly to the deity ASur, a fact which introduced a third element of confusion into the discussion of the name Assur. It is probable then that there is a triple popular etymology in the various forms of writing the name AsSur; viz. A-usar, 6 An-Sar and the stem aiaru, all of which is quite in harmony with the methods followed by the ancient Assyro-Babylonian philologists 7

See also A. H. Layard, Discoveries in the Ruins of Nineveh and Babylon (1853); G. Smith, Assyrian Discoveries (1875); R. W. Rogers, History of Babylonia and Assyria, i. 297; ii. 13; ii. 30,76, 102; J. F. M'Curdy, History, Prophecy and the Monuments, §§ 74, 171 f., 247, 258, 283; 57, 59 f. (on the god). (J. D. Pr.)

ASSUR, the primitive capital of Assyria, now represented by the mounds of Kaleh Sherghat (Qal'at Shergat) on the west bank of the Tigris, nearly

midway between the Upper and Lower Zab. It is still doubtful (see discussion on the name in the preceding article) whether the national god of Assyria took his name from that of the city or whether the converse was the case. It is most probable, however, that it was the city which was deified (see Sayce, Religion of Ancient Egypt and Babylonia, 1902, pp. 366, 367). Sir A. H. Layard, through his assistant Hormuzd Rassam, devoted two or three days to excavating on the site, but owing to the want" of pasturage and the fear of Bedouin attacks he left the spot after finding a broken clay cylinder

1 Cf. Rassam, Asshur and the Land of Nimrod, 250-251, and many other works.

2 Robert Harper, Code of Hammurabi, pp. 6-7, lines 55-58.

5 Thus already Delitzsch, Wo lag das Parodies? p. 252. The element a means " water," and in u-sar it is probable that u also means " water," while sir is " park, district." See Prince, Materials for a Sumerian Lexicon, s.v. usar.

1 The name appears as A$-sur(ki) and Ai-iu-ur(ki). See King, Letters and Inscriptions of Hammurabi, iv, p. 23, obv. 27 ; and Nagel, Beitrage zur Assyriologie, iv. p. 404; also Cun. Texts from Bab. Tablets, vi. pi. 19, line 7.

' Meissner-Rost, Bauinschrift Sanheribs, K. 5413a; K. 1306, rev. 16.

- *See on this entire subject, Morris Jastrow, Jr., Journal Amer. Orient. Soc, xxiv. pp. 282-311; also Die Religion Bab. u. Assyr., pp. 207 ff.*

' On the philological methods of the ancient Babylonian priest- hood, see Prince, Materials for a Sumerian Lexicon, Introduction.

containing the annals of Tiglath-Pileser I., and for many years no subsequent efforts were made to explore it. In 1 904, however, a German expedition under Dr W. Andrae began systematic excavations, which have led to important ' results. The city originally grew up round the great temple of the god Assur, the foundation of which was ascribed to the High-priest Uspia. For many centuries Assur and the surrounding district, which came accordingly to be called the land of Assur (Assyria), were governed by high-priests under the suzerainty of Babylonia. With the decay of the Babylonian power the high-priests suc- ceeded in making themselves independent kings, and Assur became the capital of an important kingdom. It was already surrounded by a wall of crude brick, which rested on stone foundations and was strengthened at certain points by courses of burnt brick. A deep moat was dug outside it by Tukulti-In- aristi or Tukulti-Masu

(about 1270 B.C.), and it was further defended on the land side by a salkhu or outwork. In the 1 5th century B.C. it was considerably extended to the south in order to include a " new town " which had grown up there. The wall was pierced by " the gate of Assur," " the gate of the Sun-god," " the gate of the Tigris," &c, and on the river side was a quay of burnt brick and limestone cemented with bitumen. The temples were in the northern part of the city, together with their lofty towers, one of which has been excavated. Besides the temple of Assur there was another great temple dedicated to Anu and Hadad, as well as the smaller sanctuaries of Bel, Ishtar, Merodach and other deities. After the rise of the kingdom, palaces were erected separate from the temples; the sites of those of Hadad-nirari I., Shalmaneser I., and Assur-nazir-pal have been discovered by the German excavators, and about a dozen more are referred to in the inscriptions. Even after the rise of Nineveh as the capital of the kingdom and the seat of the civil power, Assur continued to be the religious centre of the country, where the king was called on to reside when performing his priestly functions. The city survived the fall of Assyria, and extensive buildings as well as tombs of the Parthian age have been found upon the site.

See Mitteilungen der detUschen Orient-Gesellschaft (1904-1906).

(A. H. S.)

ASSUR, Asur, or Ashur, the chief god of Assyria, was origin- ally the patron deity of the city of Assur on the Tigris, the ancient capital of Assyria from which as a centre the authority of the patesis (as the rulers were at first called) spread in various direc- tions. The history of Assyria (q.v.) can now be traced back approximately to 2500 B.C., though it does not rise to political prominence until c. 2000 B.C. The name of the god is identical with that of the city, though an older form A-shir, signifying " leader," suggests that a differentiation between the god and the city was at one time attempted. Though the origin of the form Ashur (or Assur) is not certain, it is probable that the name of the god is older than that of the city (see discussion on the name above) .

The title Ashir was given to various gods in the south, as Marduk and Nebo, and there is every reason to believe that it represents a direct transfer with the intent to emphasize that Assur is the " leader " or head of the pantheon of the north. He is in fact to all intents and purposes of the north. Originally like Marduk a solar deity with the winged disk — the disk always typifying the sun 8 — as his symbol, he becomes as Assyria develops into a military power a god of war, indicated by the attachment of the figure of a man with a bow to the winged disk. While the cult of the other great gods and goddesses of Babylonia was transferred to Assyria, the

worship of Assur so overshadowed that of the rest as to give the impression of a decided tendency towards the absorption of all divine powers by the one god. Indeed, the other gods, Sin, Shamash (Samas), Adad, Ninib and Nergal, and even Ea, take on the warlike traits of Assur in the epithets and descriptions given of them in the annals and votive inscriptions of Assyrian rulers to such an extent as to make them appear like little Assurs by the side of the great one. Marduk alone retains a large measure of his independence as a 8 See Prince, Journ. Bibl. Lit., xxii. 35.

concession on the part of the Assyrians to the traditions of the south, for which they always manifested a profound respect. Even during the period that the Assyrian monarchs exercised complete sway over the south, they rested their claims to the control of Babylonia on the approval of Marduk, and they or their representatives never failed to perform the ceremony of " taking the hand " of Mardtik, which was the formal method of assuming the throne in Babylonia. Apart from this conces- sion, it is Assur who pre-eminently presides over the fortunes of Assyria. 1 In his name, and with his approval as indicated by favourable omens, the Assyrian armies march to battle. His symbol is carried into the thick of the fray, so that the god is actually present to grant assistance in the crisis, and the victory is with becoming humility invariably ascribed by the kings " to the help of Assur." With the fall of Assyria the rule of Assur also comes to an end, whereas it is significant that the cult of the gods of Babylonia — more particularly of Marduk — survives for several centuries the loss of political independence through Cyrus' capture of Babylonia in 539 B.C. The name of Assur's temple at Assur, represented by the mounds of Kaleh Sherghat, was known as E-khar-sag-gal-kur-kurra, i.e. " House of the great mountain of the lands." Its exact site has been determined by excavations conducted at Kaleh Sherghat since 1903 by the German Oriental Society. The name indicates the existence of the same conception regarding sacred edifices in Assyria as in Babylonia, where we find such names as E-Kur (" mountain house ") for the temple of Bel (q.v.) at Nippur, and E-Saggila (" lofty house ") for Marduk's (q.v.) temple at Babylon and that of Ea (q.v.) at Eridu, and in view of the general depend- ence of Assyrian religious beliefs as of Assyrian culture in general, there is little reason to doubt that the name of Assur's temple represents a direct adaptation of such a name as E-Kur, further embellished by epithets intended to emphasize the supreme control of the god to whom the edifice was dedicated. The foundation of the edifice can be traced back to Uspia (Ushpia), c. 2000 B.C., and may turn out to be even older. Besides the chief temple, the capital contained temples and chapels to Anu, Adad, Ishtar, Marduk, Gula, Sin, Shamash, so

that we are to assume the existence of a sacred precinct in Assur precisely as in the religious centres of the south. On the removal of the seat of residence of the Assyrian kings to Calah (c. 1300 B.C.), and then in the 8th century to Nineveh, the centre of the Assur cult was likewise transferred, though the sanctity of the old seat at Assur con- tinued to be recognized. At Nineveh, which remained the capital till the fall of the Assyrian empire in 606 B.C., Assur had as his rival Ishtar, who was the real patron deity of the place, but a reconciliation was brought about by making Ishtar the consort of the chief god. The combination was, however, of an artificial character, and the consciousness that Ishtar was in reality an independent goddess never entirely died out. She too, like Assur, was viewed as a war deity, and to such an extent was this the case that at times it would appear that she, rather than Assur, presided over the fortunes of the Assyrian armies. (M. J a.)

ASSUR-BANI-PAL ("Assur creates a son"), the grand monarque of Assyria, was the prototype of the Greek Sardana- palus, and appears probably in the corrupted form of Asnapper in Ezra iv. 10. He had been publicly nominated king of Assyria (on the 1 2 th of Iyyar) by his father Esar-haddon, some time before the latter's death, Babylonia being assigned to his twin- brother Samas-sum-yukin, in the hope of gratifying the national feeling of the Babylonians. After Esar-haddon's death in 668 B.C. the first task of Assur-bani-pal was to finish the Egyptian campaign. Tirhakah, who had reoccupied Egypt, fled to Ethiopia, and the Assyrian army spent forty days in ascending the Nile from Memphis to Thebes. Shortly afterwards Necho, the satrap of Sais, and two others were detected intriguing with Tirhakah; Necho and one of his companions were sent in chains to Nineveh, but were there pardoned and restored to their

1 As essentially a national god, he is almost identical in character with the early Yahweh of Israel. See Sayce, Hibbert Lectures, Religion of Ancient Babylonia, p. 129.

principalities. Tirhakah died 667 B.C., and his successor Tandaman (Tanuat-Amon) entered Upper Egypt, where a general revolt against Assyria took place, headed by Thebes. Memphis was taken by assault and the Assyrian troops driven out of the country. Tyre seems to have revolted at the same time. Assur- bani-pal, however, lost no time in pouring fresh forces into the revolted province. Once more the Assyrian army made its way up the Nile, Thebes was plundered, and its temples destroyed, two obelisks being carried to Nineveh as trophies (see Nahum iii. 8). Meanwhile the siege of insular Tyre was closely pressed; its water-supply was cut off, and it was compelled to surrender. Assur-bani-pal was now at the height of his power. The land of the Manna. (Minni), south-east of Ararat, had been wasted, its capital captured by the Assyrians, and its king reduced to

vassal- age. A war with Teumman of Elam had resulted in the over- throw of the Elamite army; the head of Teumman was sent to Nineveh, and another king, Umman-igas, appointed by the Assyrians. The kings of Cilicia and the Tabal offered their daughters to the harem of Assur-bani-pal; embassies came from Ararat, and even Gyges of Lydia despatched envoys to " the great king" in the hope of obtaining help against the Cim- merians. Suddenly the mighty empire began to totter. The Lydian king, finding that Nineveh was helpless to assist him, turned instead to Egypt and furnished the mercenaries with whose help Psammetichus drove the Assyrians out of the country and suppressed his brother satraps. Egypt was thus lost to Assyria for ever (660 B.C.). In Babylonia, moreover, discontent was arising, and finally Samas-sum-yukin put himself at the head of the national party and declared war upon his brother. Elamite aid was readily forthcoming, especially when stimulated by bribes, and the Arab tribes joined in the revolt. The resources of the Assyrian empire were strained to their utmost. But thanks in some measure to the intestine troubles in Elam, the Babylonian army and its allies were defeated and driven into Babylon, Sippara, Borsippa and Cutha. One by one the- cities fell, Babylon being finally starved into surrender (648 B.C.) after Samas-sum-yukin had burnt himself in his palace to avoid falling into the conqueror's hands. It was now the turn of the Arabs, some of whom had been in Babylon during the siege, while others had occupied themselves in plundering Edom, Moab and the Hauran. Northern Arabia was traversed by the Assyrian forces, the Nabataeans were almost exterminated, and the desert tribes terrorized into order. Elam was alone left to be dealt with, and the last resources of the empire were therefore expended in preventing it from ever being again a thorn in the Assyrian side.

But the effort had exhausted Assyria. Drained of men and resources it was no longer able to make head against the Cim- merian and Scythian hordes who now poured over western Asia. The Cimmerian Dugdamme (Lygdamis in Strabo i. 3, 16), whom Assur-bani-pal calls " a limb of Satan," after sacking Sardis, had been slain in Cilicia, but other Scythian invaders came to take his place. When Assur-bani-pal died in 626 (?) B.C. his empire was already in decay, and within a few years the end came. He was luxurious and indolent, entrusting the command of his armies to others whose successes he appropriated, cruel and superstitious, but a magnificent patron of art and literature. The great library of Nineveh was to a considerable extent his creation, and scribes were kept constantly employed in it copying the older tablets of Babylonia, though unfortunately their patron's tastes inclined rather to omens and astrology than to subjects of more modern interest. The library was contained in the palace that he built on the northern side of the mound of Kuyunjik and lined with sculptured slabs which display Assyrian art at its best. Whether Kandalanu (Kinela- danos),

who became viceroy of Babylonia after the suppression of the revolt, was Assur-bani-pal under another name, or a different personage, is still doubtful (see Sardanapalus).

Authorities. — George Smith, History of Assurbanipal (1871); S. A. Smith, Die Keilschrifttexte Asurbanipals (1887-1889) ; P. Jensen in E. Schrader's Keilinschriftliche BibUothek, ii. (1889); J. A. Knudtzon, AssyriscKe Gebete an den Sonnengott (1893) ; C. Lehmann, Schamashschumukin (1892). (A. H. S.)

ASS US [mod. Behram], an ancient Greek city of the Troad, on the Adramyttian Gulf. The situation is one of the most magnificent in all the Greek lands. The natural cleavage of the trachyte into joint planes had already scarped out shelves which it was comparatively easy for human labour to shape; and so, high up this cone of trachyte, the Greek town of Assus was built, tier above tier, the summit of the crag being crowned with a Doric temple of Athena. The view from the summit is very beautiful and of great historical interest. In front is Lesbos, one of whose towns, Methymna, is said to have sent forth the founders of Assus, as early, perhaps, as rooo or 900 B.C. The whole south coast-line of the Troad is seen, and in the south-east the ancient territory of Pergamum, from whose masters the possession of Assus passed to Rome by the bequest of Attalus III. (133 B.C.). The great heights of Ida rise in the east. Northward the Tuzla is seen winding through a rich valley. This valley was traversed by the road which St Paul must have followed when he came overland from Alexandria Troas to Assus, leaving his fellow- travellers to proceed by sea. The north-west gateway, to which this road led, is still flanked by two massive towers, of Hellenic work. On the shore below, the ancient mole can still be traced by large blocks under the clear water. Assus affords the only harbour on the 50 m. of coast between Cape Lectum and the east end of the Adramyttian Gulf; hence it must always have been the chief shipping-place for the exports of the southern Troad. The great natural strength of the site protected it against petty assailants; but, like other towns in that region, it has known many masters — Lydians, Persians, the kings of Pergamum, Romans and Ottoman Turks. From the Persian wars to about 350 B.C. Assus enjoyed at least partial independence. It was about 348-345 B.C. that Aristotle spent three years at Assus with Hermeas, an ex-slave who had succeeded his former master Eubulus as despot of Assus and Atarneus. Aristotle has left some verses from an invocation to Arete (Virtue), com- memorating the worth of Hermeas, who had been seized by Persian treachery and put to death.

Under its Turkish name of Behram, Assus is still the com- mercial port of the southern Troad, being the place to which loads of valonia are conveyed by camels from all parts of the country. Explorations were conducted at Assus in 1881-1883 by Mr J. T. Clarke for the Archaeological Institute of America. The main object was to clear the Doric temple of Athena, built about 470 B.C. This temple is remarkable for a sculptured architrave which took the place of the ordinary frieze. The scenes are partly mythological (labours of Heracles), partly purely heraldic. Eighteen panels were transported to the Louvre in 1838; other fragments rewarded the Americans, and a scientific ground-plan was drawn. The well-preserved Hellenistic walls were also studied.

See J. T. Clarke, Assos, 2 vols., 1882 and 1898 (Papers of Arch. Inst, of America, i. ii.) ; and authorities under Troad. (D. G. H.)

ASSYRIA. The two great empires, Assyria and Babylon, which grew up on the banks of the Tigris and Euphrates, can be separated as little historically as geographically. From the beginning their history is closely intertwined; and the power of the one is a measure of the weakness of the other. This inter- dependence of Assyrian and Babylonian history was recognized by ancient writers, and has been confirmed by modern discovery. But whereas Assyria takes the first place in the classical accounts to the exclusion of Babylonia, the decipherment of the inscrip- tions has proved that the converse was really the case, and that, with the exception of some seven or eight centuries, Assyria might be described as a province or dependency of Babylon. Not only was Babylonia the mother country, as the tenth chapter of Genesis explicitly states, but the religion and culture, the literature and the characters in which it was contained, the arts and the sciences of the Assyrians were derived from their southern neighbours. They were similar in race and language. (See Babylonia and Assyria.)

AST, GE0R6 ANTON FRIEDRICH (1778-1841), German philosopher and philologist, was born at Gotha. Educated there and at the university of Jena, he became privat-doccnt at Jena

ii 1802. In 1805 he became professor of classical literature in the university of Landshut, where he remained till 1826, when it was transferred to Munich. There he lived till his death on the 31st of October 1841. In recognition of his work he was made an aulic councillor and a member of the Bavarian Academy of Sciences. He is known principally for his work during the last twenty-five years of his life on the dialogues of Plato. His Platan's Leben und Schriften (1816) was the first of those critical inquiries into the life and works of Plato which originated in the Introductions of Schleiermacher and the historical scepticism of Niebuhr and Wolf. Distrusting tradition, he took a few of the finest dialogues as his

standard, and from internal evidence denounced as spurious not only those which are generally admitted to be so (Epinomis, Minos, Theages, Arastae, Clitophon, Hippmchus, Eryxias, Letters and Definitions), but also the Meno, Euthydemus, Charmides, Lysis, Laches, First and Second Alcibiades, Hippias Major and Minor, Ion, Euthyphro, Apology, Crito, and even (against Aristotle's explicit assertion) The Laws. The genuine dialogues he divides into three series: — (1) the earliest, marked chiefly by the poetical and dramatic element, i.e. Protagoras, Phaedrus, Gorgias, Phaedo; (2) the second, marked by dialectic subtlety, i.e. Theaetelus, Sophist, Statesman, Parmenides, Cratylus; (3) the third group, combining both qualities harmoniously, i.e. the Philebus, Symposium, Republic, Timaeus, Critias. The work was followed by a complete edition of Plato's works (11 vols., 1819-1832) with a Latin translation and commentary. His last work was the Lexicon Platonicum (3 vols., 1834-1839), which is both valuable and comprehensive. In his works on aesthetics he combined the views of Schelling with those of Winckelmann, Lessing, Kant, Herder, Schiller and others. His histories of philosophy are marked more by critical scholarship than by originality of thought, though they are interesting as asserting the now familiar principle that the history of philosophy is not the history of opinions, but of reason as a whole ; he was among the first to attempt to formulate a principle of the development of thought. Beside his works on Plato, he wrote, on aesthetics, System der Kunstlehre (1805) and Grundriss der Aesthetik (1807) ; on the history of philosophy, Grundlinien der Philosophic (1807, republished 1809, but soon forgotten), Grundriss einer Geschichle der Philosophic (1807 and 1825), and Hauptmomenle der Geschichte der Philosophie (1829); in philology, Grundlinien der Philologie (1808), and Grundlinien der Grammatik, Hcrmeneutik und Kritik (1808).

ASTARA, a port of Russian Transcaucasia, government of Baku, on the Caspian, in 38 27′ N. lat. and 48 53′ E. long., on the river of the same name, which forms the frontier between Persia and Russia. Russian merchandize is landed there and forwarded to Azerbaijan and Tabriz via Ardebil.

ASTARABAD, a province of Persia bounded N. by the Caspian Sea and Russian Transcaspian, S. by the Elburz Mountains, W. by Mazandaran, and E. by Khorasan. The country, mountainous in its southern portion, possesses extensive forests, fertile valleys, producing rice, wheat and other grains in abundance, and rich pasturages. The soil, even with little culture, is exceedingly productive, owing to the abundance of water which irrigates and fertilizes it. But while the province in many parts presents a landscape of luxuriant beauty, it is a prey to the ravages of disease, principally malarial fevers due to the extensive swamps formed by waters stagnating in the forests, and to the frequent incursions of the Goklan and Yomut Turkomans, who have their camping-grounds in the northern part of the*

province, and until about 1890 plundered caravans sometimes at the very gates of Astarabad city, and carried people off into slavery and bondage. The province has a popula- tion of about 100,000 and pays a yearly revenue of about £30,000. The inhabitants, notwithstanding the unhealthiness of their climate, are a strong and athletic race, belying their yellow and sickly appearance. The province has the following bulfik (administrative, divisions) : — (1) Astarabad town; (2) Astarabad rustak (villages); (3) Sadan rustak; (4). Anazan; (5) Katul; (6) Findarisk, with Kuhsar and Nodeh; (7) Shahkuh Savar.

Astarabad, the capital of the province, is situated on the Astar, a small tributary of the Kara Su (Black river), which flows into the Caspian Sea 20 m. W. of the city, and about 18 m. S. of the Gurgan river, in 36 51′ N. lat. and 54° 26′ E. long. It is surrounded by a mud wall about 30 ft. in height and about 3 5 m. in circuit, but much of the enclosed space is occupied by gardens, mounds of refuse, and ruins. At one time of greater size, it was reduced by Nadir Shah within its present limits. Astarabad owes its origin to Yazid ibn Mohallab, who occupied the province early in the 8th century for Suleiman, the seventh of the Omayyad caliphs (715-717), and was destroyed by Timur (Tamerlane) in 1384. Jonas Hanway, the philanthropist (d. 1786), visited the place in 1744, and attempted to open a direct trade through it between Europe and central Asia. Owing to the noxious exhalations of the surrounding forests the town is so extremely unhealthy during the hot weather as to have acquired the title of the " Abode of the Plague." It has post and telegraph offices, and a population of about 10,000. Since 1890 the Turkomans who impeded trade by their perpetual raids have been kept more in check, and with the decrease of insecurity the commercial activity of Astarabad has increased considerably.

ASTARTE, a Semitic goddess whose name appears in the Bible as Ashtoreth. 1 She is everywhere the great female principle, answering to the Baal of the Canaanites and Phoenicians 2 and to the Dagon of the Philistines. She had temples at Sidon and at Tyre (whence her worship was transplanted to Carthage), and the Philistines probably venerated her at Ascalon (1 Sam. xxxi. 10). Solomon built a high-place for her at Jerusalem which lasted until the days of King Josiah (1 Kings xi. 5; 2 Kings xxiii. 13), and the extent of her cult among the Israelites is proved as much by the numerous biblical references as by the frequent representations of the deity turned up on Palestinian soil. 3 The Moabites formed a compound deity, Ashtar-Chemosh (see Moab), and the absence of the feminine termination occurs similarly in the Babylonian and Assyrian

prototype Ishtar. The old South Arabian phonetic equivalent 'Athtar is, however, a male deity. Another compound, properly of mixed sex, appears in the Aramaean Atargatis ('At[t]ar-'athe), worn down to Derketo, who is specifically associated with sacred pools and fish (Ascalon, Hierapolis-Mabog). (See Atargatis.)

The derivation of the name Ishtar is uncertain, and the original attributes of the goddess are consequently unknown. She assumes various local forms in the old Semitic world, and this has led to consequent fusion and identification with the deities of other nations. As the great nature-goddess, the attributes of fertility and reproduction are characteristically hers, as also the accompanying immorality which originally, perhaps, was often nothing more than primitive magic. As patroness of the hunt, later identification with Artemis was inevitable. Hence the consequent fusion with Aphrodite, Artemis, Diana, Juno and Venus, and the action and reaction of one upon the other in myth and legend. Her star was the planet Venus, and classical writers give her the epithet Caelestis and Urania. Whether Astarte was also a lunar goddess has been questioned. As the female counterpart of the Phoenician Baal (viewed as a sun-god) , and on the testimony of late writers (Lucian, Herodian) that she was represented with horns, the place-name Ashteroth- Karnaim in Gilead (" Ashteroth of the horns ") has been con- sidered ample proof in favour of the theory. But it is probable that the horns were primarily ram's horns, 4 and that Astarte the moon-goddess is due to the influence of the Egyptian Isis

1 The vocalization suggests the Heb. boshelh, " shame " ; see Baal.

- *Add also the Hittites; for Sutekh, the Egyptian equivalent of the male partner, see W. M. Miiller, Mitt.- d. vordernsial. Gesell. (1902), v. pp. 11, 38. Astarte was introduced also into Egypt and had her temple at Memphis. See also S. A. Cook, Religion of Ancient Palestine, Index, s.v.*

5 Such figurines are in a sense the prototypes of the Venus of Medici. On the influence of her cult upon that of the Virgin Mary, see Rosch, Studien u. Krit. (1888), pp. 265 sqq.

4 A model of an Astarte with ram's horns was unearthed by R. A. S. Macalister at Gezer {Pal. Explor. Fund, Quart. Statement, 1903, p. 227 with figure facing).

and Hathor. Robertson Smith, too, argues that Astarte was originally a sheep-goddess, and points to the interesting use of " Astartes of the flocks " (Deut. vii. 13, see the comm.) to denote the offspring. To nomads, Astarte may well have been a sheep-goddess, but this, if her earliest, was not her

only type, as is clear from the sacred fish of Atargatis, the doves of Ascalon (and of the Phoenician sanctuary of Eryx), and the gazelle or antelope of the goddess of love (associated also with the Arabian Athtar).

The literature is vast; see G. A. Barton, Amer. Journ. of Sent. Lang. vols. ix. x., and his Semitic Origins; Driver, Hastings' Diet. Bible, i. pp. 167-171; Zimmern, Keilinschr. und das alte Test.' pp. 420 sqq.; Lagrange, Etudes d. Relig. Sem. pp. 123-140; and the articles Adonis, Aphrodite, Artemis, Baal.

(S. A. C.)

ASTELL, MARY (1668-1731), English author, was born at Newcastle-upon-Tyne. She was instructed by her uncle, a clergyman, in Latin and French, logic, mathematics and natural philosophy. In her twentieth year she went to London, where she continued her studies. She published, in 1697, a work entitled A Serious Proposal to the Ladies, wherein a Method is offered for the Improvement of their Minds. With the same end in view she elaborated a scheme for a ladies' college, which was favourably entertained by Queen Anne, and would have been carried out had not Bishop Burnet interfered. The most important of her other works was The Christian Religion, as pro- fessed by a Daughter of the Church of England, published in 1705.

ASTER (Gr. aaritp, a star), the name of a genus of plants, given from the fact of the flowers having a radiated or star-like appearance (see below). The Greek word also provides many derivatives: e.g. asterism (Gr. aarepia jxos) , a constellation (q.v.); asteroid (Gr. ctorepo-eiS^s, star-like), an alternative name for planetoids or minor planets (see Planet).

The genus of composite plants named aster (natural order Compositae) is found largely in North America, and scattered sparingly over Asia, Europe and South America. They are usually herbaceous perennials; their flowers arranged in numerous heads (capitula) recall those of the daisy, whence they are popularly known in England as Michaelmas daisies, since many are in bloom about that time. They are valuable plants in a garden, the various species flowering from late summer right on to November or December. The only British species is Aster Tripolium, found abundantly in saline marshes near the sea. One of the species, Aster alpinus, grows at a consider- able height on the mountains of Europe. Some of them, such as Aster spectabilis of North America, are very showy. They are mostly easy to cultivate in ordinary garden soil, and are readily propagated by dividing the roots in early spring. The following are some of the better known forms: — A. alpinus, barely 1 ft. high, and A. Amellus, if ft., with its var. bessarabicus, have broadish blunt leaves and large starry bluish flowers; A.

longifolius var. formosus, 2 ft., bright rosy lilac; A. acris, 2 to 3 ft., with blue flowers in August; A. ericoid.es,' 3 ft., with heath-like leaves and masses of small white flowers; A. puniceus, 4 to 6 ft., blue or rosy lilac; A. turbinellus, 2 to 3 ft., mauve coloured, are showy border plants; and A. Novae- Angliae, 5 to 6 ft., rosy-violet; A. Novi-Belgii, 3 to 6 ft., pale blue; A. laevis, 2 to 6 ft., blue -lilac; and A. grandiflorus, 3 ft., violet, are especially useful from their late-flowering habit.

The China aster (Callistephus chinensis) is also a member of the order Compositae. It is a hardy annual, a native of China, which by cultivation has yielded a great variety of forms. Some of the best for ornamental gardening are the chrysanthemum- flowered, the paeony-flowered, the crown or cockade, the comet, and the globe-quilled. Crown asters have a white centre, and dark crimson or purple circumference, and are very beautiful. The colours range from white and blush through pink and rose to crimson, and from lilac through blue to purple, in various shades. They should be sown early in March in pans, in a gentle heat, the young plants being quickly transferred to a cool pit, and there pricked out in rich soil as soon as large enough, and eventually planted out in the garden in May or June, in soil which has been well worked and copiously manured, where they grow from

8 to 18 in. high, and flower towards the end of summer. They also make handsome pot plants for the conservatory.

ASTERIA, or Star-Stone (from Gr. aarrjp, star), a name applied to such ornamental stones as exhibit when cat en cabochon a luminous star. The typical asteria is the star- sapphire, generally a bluish-grey corundum, milky or opalescent, with a star of six rays. (See Sapphire.) In red corundum the stellate reflexion is less common, and hence the star-ruby occa- sionally found with the star-sapphire in Ceylon is among the most valued of " fancy stones." When the radiation is shown by yellow corundum, the stone is called star-topaz. Cymophane, or chatoyant chrysoberyl, may also be asteriatedi In all these cases the asterism is due to the reflexion of light from twin- lamellae or from fine tubular cavities or thin enclosures definitely arranged in the stone. The astrion of Pliny is believed to have been our moonstone, since it is described as a colourless stone from India having within it the appearance of a star shining with the light of the moon. All star-stones were formerly regarded with much superstition.

ASTERID, a group of starfish. They are the starfish proper, and have the typical genus Asterias (see Starfish).

ASTERISK (from Gr. LartpiaKos, a little star), the sign used in typography. The word is also used in its literal meaning in old writers, and as a description of an ornamental form (star-shaped) in one of the utensils in the Greek Church.*

ASTERIUS, of Cappadocia, sophist and teacher of rhetoric in Galatia, was converted to Christianity about the year '300, and became the disciple of Lucian, the founder of the school of Antioch. During the persecution under Maximian (304) he relapsed into paganism, and thus, though received again into the church by Lucian and supported by the Etisebian party, never attained to ecclesiastical office. He is b6st known as ah able defender of the semi-Arian ' position, and was styled by Athanasius the " advocate " of the Ariaris. His chief work was the Syntagmation, but he wrote many others, including comment- aries on the Gospels, the Psalms, and Romans. He attended many synods, and we last hear of him at the synod of Antioch in 341.

ASTERIUS, bishop of Amasia, in Pontus, c. 400. He was partly contemporary with the emperor Julian (d. 363) and lived to a great age. His fame rests chiefly on his Homilies, which were much esteemed in the Eastern Church. Most of these have been lost, but twenty-one are given in full by Migne (Patrol. Ser. Gr. xl. 164-477), and there are fragments of others in Photius (Cod. 271). Asterius was a man of much culture, and his works are a valuable contribution to our knowledge of the history of preaching.

ASTHMA (Gr. a.

The attacks occur quite suddenly, and in some patients at regular, in others at irregular intervals. They are characterized by extreme difficulty both in inspiration and expiration, but especially in the latter, the chest becoming distended and the diaphragm immobile. In the case of "pure " "idiopathic " or " nervous " asthma, there is no fever or other sign of inflamma- tion. But where the asthma is secondary to disease of some organ of the body, the symptoms will depend largely on that organ and the disease present. Such secondary forms may be bronchitic, cardiac, renal, peptic or thymic.

The mode of onset differs very markedly in different cases. In some the attack begins quite suddenly and without warning, but in others various sensations well known to the patient announce that an attack is imminent. According to the late Dr Hyde Salter the commonest warning is that of an intense desire for sleep, so overpowering that though the patient knows his

only chance of warding off the attack is to keep awake, he is

yet utterly unable to fight against his drowsiness. Among ;other patients, however, a condition of unwonted mental- excitement presages the attack. Again the secondary forms of the disease may be ushered in by flatulence, constipation and loss of appetite, and a symptom which often attends the onset, though it is not strictly premonitory, is a profuse diuresis, the urine being watery and nearly colourkss, as in the' condition of hysterical diuresis. In the majority of instances the attack begins during the night, sometimes abruptly but often by degrees. The patient may or may not be aware that his asthma is threatening. A few hours after midnight he is aroused from sleep by a sense of difficult breathing. In some cases this is. a slowly increasing condition, not becoming acute for some hour or more. But in others the attack is so sudden, so severe, that the patient springs from his bed and makes his way at once to an open window, apparently struggling for breath. Most asthmatics have some favourite attitude which best enables them to use all the auxiliary muscles of respiration in their struggle for breath, and this attitude they immediately assume, and guard fixedly until the attack begins to subside. The picture is characteristic and a very painful one to watch. The face is pale, anxious, und it may be livid. The veins of the forehead stand out, the eyes bulge, and perspiration bedews the face. The head is .fixed in position, and likewise the powerful muscles of the back to aid the attempt at respiration. The breath is whistling and wheezing, and if it becomes necessary for the patient to speak, the words are uttered with great difficulty. If the chest be watched it is seen to be almost motionless, and the respirations may become extraordinarily slowed. Inspiration is difficult as the chest is already over + distended, but expiration is an even far greater struggle. The attack may last any time from an hour to several days; and between the attacks the patient is usually quite at ease. But notwithstanding the intensely distressing character of the attacks, asthma is not one of the diseases that shorten life.

In the child, asthma is usually periodic in its recurrence, but as he ages it tends to become more erratic in both its manifesta- tions and time of appearance. Also, though at first it may be strictly "pure" asthma, later in life it becomes -attended by chronic bronchitis, which in its turn gives rise to emphysema.

As to the underlying cause of the disease, one has only to read the many utterly different theories put forward to account for it, to see how little is really known. But it has now been clearly shown that in the asthmatic state the respiratory centre is in an unstable and excitable condition, and that there is a morbid connexion between this and some part of the nasal apparatus, Dr Alexander Francis has shown, however, that the disease is

not directly due to any mechanical obstruction of the nasal passages, and that the nose comparatively rarely supplies the immediate exciting cause of the asthmatic attack. Paroxysmal sneezing is another form in which asthma may show itself, and, curiously enough, this form occurs more frequently in women, asthma of the more recognized type in men. In infants and young children paroxysmal bronchitis is another form of the same disease. Dr James Goodhart notes the connexion between asthma and certain skin troubles, giving cases of the alternation of asthma and psoriasis, and also of asthma and eczema. The disease occurs in' families with a well-marked neurotic inheritance, and twice as frequently in men as in women. The immediate cause of an attack may be anything or nothing. Dr Hyde Salter notes that 80% of cases in the young date from an attack qf whooping cough, bronchitis or measles.

In the general treatment of asthma there are two methods of dealing with the patient, either that of hardening the individual, widening his range of accommodation, and thus making him less susceptible, or that (5f modifying and adapting the environment to the patient. These two methods correspond to the two methods of drug treatment, tonic or sedative. During the last few years the method of treatment first used by Dr Alexander Francis has come into prominence. His plan is to restore the stability of the respiratory centre, by cauterizing the septal mucous membrane, and combining with this general hygienic measures. In his own words the operation, which is entirely

painless and insignificant, is performed as follows > — "After painting one side of the septum nasi with a few drops of cocaine and resorcin, I draw a line with a galvano-cautery point from a spot opposite the middle turbinated body, forwards and slightly downwards for a distance of rather less than half an inch. In about one week's time I repeat the operation on the other side." In his monograph on the subject, he classifies a large number of cases treated in this manner, most of which resulted in complete relief, some in very great improvement, and a very few in slight or no relief.

ASTI (anc. Hasta), a town and episcopal see of Piedmont, Italy, in the province of Alessandria, situated on the Tanaro; it is 22 m. W. by rail from Alessandria. Pop. (iqoi) town, 19,787; commune, 41,047. Asti has still numerous medieval towers, a fine Gothic cathedral of the 14th century, the remains of a Christian basilica of the 6th century, and the octagonal baptistery of S. Pietro (nth century). It was the birthplace of the poet Vittorio Alfieri. In ancient times it manufactured pottery. It is now famous

for its sparkling wine (Asti spumante), and is a considerable centre of trade.

ASTLEY, JACOB ASTLEY, Baron (1570-1652), royalist commander in the English Civil War, came of a Norfolk family. In 1598 he joined Counts Maurice and Henry of Orange in the Netherlands, where he served with distinction, and afterwards fought under the elector palatine Frederick V. and Gustavus Adolphus in the Thirty Years' War. He was evidently thought highly of by the states-general, for when he was absent, serving under the king of Denmark, his company in the Dutch army ' was kept open for him. Returning to England with a well- deserved reputation, he was in the employment of Charles I. in various military capacities. As " sergeant-major^'or general of the infantry, he went north in 1639 to organize the defence against the expected Scottish invasion. Here his duties were as much diplomatic as military, as the discontent which ended in the Civil War was now coming to a head. In the ill-starred " Bishops' War," Astley did good service tp the cause of the king, and he was involved in the so-called " Army Plot." At the outbreak of the Great Rebellion (1642) he at once joined Charles, and was made major-general of the foot. His character- istic battle-prayer at Edgehill has become famous: < 1 '0 Lord, Thou knowest how busy I must be this day. If I forget Thee, do not forget me. March on, boys!" At Gloucester he com- manded a division, and at the first battle of Newbury he led the infantry of the royal army. With Hopton, in 1644, he served at Arundel and Cheriton. At the second battle of Newbury he made a gallant and memorable defence of Shaw House. He was made a baron by the king, and at Naseby he once more commanded the main body of the foot. He afterwards served in the west, and with 1500 men fought stubbornly but vainly the last battle for the king at Stow-on-the-Wold (March 1646). His remark to his captors has become as famous as his words at Edgehill, " You have now done your work and may go play, unless you will fall out amongst yourselves." His scrupulous honour forbade him to take any part in the Second Civil War, as he had given his parole at Stow-on-the-Wold; but he had to undergo his share of the discomforts that were the lot of the vanquished royalists. He died in February 1651/2. The barony became extinct in 1668.

ASTLEY, SIR JOHN DUGDALE, Bart. (1828-1894), English soldier and sportsman, was a descendant of Lord Astley, and son of the 2nd baronet (cr. 1821). From 1848 to 1859 he was in the army, serving in the Crimean War and retiring as lieutenant- colonel. He married an heiress in 1858, and thenceforth devoted himself to horse-racing, pugilism and sport in general. He succeeded to the baronetcy in 1873, and from 1874 to 1880 was Conservative M.P. for North Lincolnshire. He was a popular figure on the turf, being familiarly known as " the Mate," and won and lost large sums of money. Just before bis death, on the 10th of October 1894, he

published some entertaining reminis^ cences, under the title of Fifty Years of my Life.

ASTON, ANTHONY (fi. 1712-1731), English actor and dramatist, began to be known on the London stage in the early

years of the 18th century. He had tried the law and other professions, which he finally abandoned for the theatre. He had some success as a dramatic author, writing Love in a Hurry, performed in Dublin about 1709, and Pastor a, or the Coy Shepherdess, an opera (171 2). For many years he toured the English provinces with his wife and son, producing pieces which he himself wrote, or medleys from various plays fitted together with songs and dialogues of his own.

ASTON MANOR, a municipal and parliamentary borough of Warwickshire, England, adjoining Birmingham on the north-east. Pop. (1901) 77,326. There are extensive manufactures, including those of motors and cycles with their accessories, also paper- mills, breweries, &c, and the population is largely industrial. Aston Hall, erected by Sir Thomas Holte in 1618-1635, is an admirable architectural example of its period, built of red brick. It stands in a large park, the whole property being acquired by the corporation of Birmingham in 1864, when the mansion became a museum and art gallery. It contains the panelling of a room from the house of Edmund Hector, which formerly stood in Old Square, Birmingham^ where Dr Samuel Johnson was a frequent visitor. Aston Lower Grounds, adjoining the park, contain an assembly hall, and the playing field of the Aston Villa Football Club, where the more important games are witnessed by many thousands of spectators. Aston Manor was incorporated in 1903. The parliamentary borough returns one member. The corporation consists of a mayor, 6 aldermen and 18 councillors Area, 060 acres.

ASTOR, JOHN JACOB (1763-1848), American merchant, was born at the village of Walldorf, near Heidelberg, Germany, on the 17th of July 1763. Until he was sixteen he worked in the shop of his father, a butcher; he then joined an elder brother in London, and there for four years was employed in the piano and flute factory of an uncle, of the firm of Astor & Broadwood. In 1783 he emigrated to America, and settled in New York, whither one of his brothers had previously gone. On the voyage he became acquainted with a fur-trader, by whose advice he devoted himself to the same business, buying furs directly from the Indians, preparing them at first with his own hands for the market, and selling them in London and elsewhere at a great profit. He was also the agent in New York of the firm of Astor & Broadwood. By his energy, industry and sound judgment he gradually enlarged his operations, did business in all the fur markets of the world, and amassed an enormous fortune, — the largest up to that time made by any American. He devoted many years to carrying out a project for organizing the fur trade from the Great Lakes to the Pacific Ocean, and thence by way of the Hawaiian Islands to China and India. In 1811 he founded at the mouth of the Columbia river a settlement named after him Astoria, which was intended to serve as the central depot; but two years later the settlement was seized and occupied by the English. The incidents of this undertaking are the theme of Washington Irving's Astoria. A series of disasters frustrated the gigantic scheme. Astor made vast additions to, his wealth by investments in real estate in New York City, and erected many buildings there, including the hotel known as the Astor House. The last twenty-five years of his life were spent in retirement in New York City, where, he died on the 29th of March 1848, his fortune then being estimated at about $30,600,000. He made various charitable bequests by his will, and among them a gift of $50,000 to found an institution, opened as the " Astor House " in 1854, for the education of poor children and the relief of the aged and the destitute in his native villagein Germany. His chief benefaction, however, was a bequest of $400,000 for the foundation and endowment of a public library in New York City, since known as the Astor library, and since 1895 part of the New York public library.

See Parton'sXtJe of John Jacob Astor (New York, 1865).

His eldest son, William Backhouse Astor (1792-1875), inherited the greater part of his father's fortune, and chiefly by judicious investments in real estate greatly increased it. He was sometimes known as the " Landlord of New York." Under

his direction the building for the Astor library was erected, and to the library he gave about $550,000, including a bequest of $200,000. His son, John Jacob Astor (1822-1890), was also well known as a capitalist and philanthropist, giving liberally to the Astor library.

The son of the last named, William Waldorf Astor (1848-), served in the New York assembly in 1877, and in the state senate in 1880-81. He was United States minister to Italy from 1882 to 1885. He published two romances, Valentine (1885) and Sforza (1889). His wealth, arising from property in New York, where also he built the New Netherland hotel and the Waldorf hotel, was enormous. In 1890 he removed to England, and in 1899 was naturalized. In 1893 he became proprietor of the Pall Mall Gazette, and afterwards started the Pall Mall Magazine.

ASTORGA, EMANUELE D' (1681-1736), Italian musical composer, was born at Naples on the nth of December 1681. No authentic account of Astorga's life can be successfully con- structed from the obscure and confusing evidence that has been until now handed down, although historians have not failed to indulge many pleasant conjectures According to some of these, his father, a baron of Sicily, took an active part in the attempt to throw off the Spanish yoke, but was betrayed by his own soldiers and publicly executed. His wife and son were compelled to be spectators of his fate; and such was the effect upon them that his mother died on the spot, and Emanuele fell into a state of gloomy despondency, which threatened to deprive him of reason. By the kindness of the princess Ursini, the unfortunate young man was placed in a convent at Astorga, in Leon, where he completed a musical education which is said to have been begun in Palermo under Francesco Scarlatti. Here he recovered his health, and his admirable musical talents were cultivated under the best masters. On the details of this account no reliance can safely be placed, nor is there any certainty that in 1703 he entered the service of the duke of Parma. Equally un- trustworthy is the story that the duke, suspecting an attachment between hi? niece Elizabeth Farnese and Astorga, dismissed the musician. The established facts concerning Astorga are indeed few enough. They are: that the opera Dafne was written and conducted by the composer in Barcelona in 1709; that he visited London, where he wrote his Stabat Mater, possibly for the society of " Antient Musick "; that it was performed in Oxford in 17 13; that in 17 12 he was in Vienna, and that he retired at an uncertain date to Bohemia, where he died on the 21st of August 1736, in a castle which had been given to him in the domains of Prince Lobkowitz, in Raudnitz. Astorga deserves remembrance for his dignified and pathetic Stabat Mater, and for his numerous chamber-cantatas for one or two voices. He was probably the last composer to carry on the traditions of this form of chamber-music as perfected by Alessandro Scarlatti.

ASTORGA, a city of N.W. Spain, in the province of Leon; situated near the right bank of the river Tuerto, and at the junction of the Salamanca-Corunna and Leon-Astorga railways. Pop. (1900) 5573. Astorga was the Roman Asturica Augusta, a provincial capital, and the meeting-place of four military roads. Though sacked by the Goths in the 5th century, and later by the Moors, it is still surrounded by massive walls of Roman origin. A ruined castle, near the city, recalls its strategic importance in the 8th century, when Asturias, Galicia and Leon were the headquarters of resistance to the Moors. Astorga has been the see of a bishop since the 3rd century, and was formerly known as the City of Priests, from the number of ecclesiastics resident within its walls. Its Gothic cathedral dates from the 15th century. The city confers the title of marquis on the Osorio family, the ruins of whose palace, sacked in 1810 by the French, are still an object of interest.

For the history, especially the ecclesiastical history, of Astorga, see the anonymous Historia de la ciudad de Astorga (Valladolid, 1840); with Fundacionde la . . . iglesia . . . de Astorga, by P. A. Ezpeleta (Madrid, 1634); and Fundacion, nombre y armas de . . . Astorga, by P. J unco (Pamplona, 1635).

ASTORIA, a city, port of entry, and the county-seat of Clatsop county, Oregon, U.S.A., on the Columbia river, 8 m.

from its mouth. Pop. (1890) 6184; (1900) 8381, of whom 3779 were foreign-born (many being Finns,— a Finnish weekly was established here in 1905), and 601 were Chinese; (1910, C2ftsus) 9599. It is served by the Astoria & Columbia River railroad (Northern Pacific System), and by several coastwise and foreign steamship lines (including that of the Oregon Railway & Naviga- tion Co.). The river here is about 6 m. wide, and the city has a water-front of about 5 m. and a deep, spacious and placid harbour. By dredging and the construction of jetties the Federal government has since 1885 greatly improved the channel at the mouth of the river. The business portion of the city occupies the low ground of the river bottom; the residence portion is on the hillsides overlooking the harbour. Astoria is the port of entry for the Oregon Customs District, Oregon; in 1907 its imports were valued at $21,262, and its exports at $329,103. The city is especially important as a salmon fishing and packing centre (cod, halibut and smaller fish also being abundant) ; it has also an extensive lumber trade, important lumber manufactories, pressed brick and terra-cotta factories, and dairy interests. In 1905 the value of the factory product was $3,092,628 (of which $1,759,871 was the value of preserved and canned fish), being an increase of 41 -8% in five years. Astoria is the oldest American settlement in the Columbia Valley. It was founded in i8u, as a depot for the fur trade, by John Jacob Astor, in whose honour it was named. It was seized by the

British in 1813, but was restored in 1818. In 1-821, while occupied by the North-West Fur Company, it was burned and practically abandoned, only a few settlers remaining. It was chartered as a city in 1876.

See Washington Irving's Astoria; or Anecdotes of an Enterprise beyond the Rocky Mountains (Philadelphia, 1 836).

ASTRAEA, in Greek legend, the "star maiden," daughter of Zeus and Themis, or of Astraeus the Titan and Eos, in which case she is identified with Dike. During the golden age she remained among men distributing blessings, but when the iron (or bronze) age came on, she was forced to withdraw, being the last of the goddesses' to quit the earth. In the heavens she is amongst the signs of the zodiac as the constellation Virgo. She is usually represented with a pair of scales and a crown of stars.

Ov. Met. i. 150; Juv. vi. 19; Aratus, Phaenomena, 96.

ASTRAGAL (from the Gr. dorpa/yaXos, the ankle-joint), an architectural term for a convex moulding. This term is gener- ally applied to small mouldings, " torus " (q.v.) to large ones of the same form. The Lesbian astragal referred to by Vitruvius, bk. iv. ch. vi., was in all probability an astragal carved with a bead and reel enrichment.

ASTRAKHAN, a government of S.E. Russia, on the lower Volga, bounded N. by the governments of Samara and Saratov, W. by Saratov and the government of the Don Cossacks, S. by Stavropol and Terek, and E. by the Caspian Sea and the govern- ment of the Urals. Area, 91,327 sq. m., of which 6730 sq. m. belong to the delta of the Volga and its brackish lagoons, and 62,290 sq. m. are covered by the Kalmuck and Kirghiz Steppes. The surface is a low-lying plain, except that in the west the Ergeni Hills (500-575 ft.) form the water-parting between the Volga basin and that of the Don. The climate is very hot and dry, the average temperature for the year being 50 Fahr., for January 21 , and for July 78 , rainfall 7^3 in., but often there is no rain at all in the summer. Pop. (1897) 1,005,460, of whom I 3 2)383 were urban. The Kalmucks (138,580 in 1897) and Kirghiz (260,000) are semi-nomads. In addition to them the population includes nearly 44,000 Tatars, 4270 Armenians; with Poles and Jews. Fishing off the mouth of the Volga gives occupation to 50,600 persons; the fish, chiefly herrings and sturgeon, together with the caviare prepared from the latter, are sold for the most part at Nizhniy-Novgorod. Over 300,000 tons of salt are extracted annually from the lakes, principally those of Baskunchak and Elton. Cattle-breeding is an important industry. Market-gardening (mustard, water-melons, fruit) is on the increase; but pure agriculture is relatively not much developed. The government is divided into five districts, the chief towns of which are Astrakhan, Enotayevsk (pop.

2810 in 1897), Krasnyi-yar (4680), Chernyi-yar (5140), and Tsarev

Plate.

(8900). The Kalmucks and Kirghiz have their own local administrations, and so have the Astrakhan Cossacks (25,600).

ASTRAKHAN, a town of E. Russia, capital of the government of Astrakhan, on the left bank of the main channel of the Volga, 50 m. from the Caspian Sea, in 46 21′ N. lat. and 48 5′ E. long. Since the growth of the petroleum industry of Baku and the construction of the Transcaspian railway, Astrakhan has become an important commercial centre, exporting fish, caviare, sugar, metals, naphtha, cottons and woollens, and importing grain, cotton, fruit and timber, to the aggregate value of £8,250,000 with foreign countries and of £14,500,000 with the interior of Russia. The town gives its name to the ” fur ” called ” astra- khan,” the skin of the new-born Persian lamb, and so to an imitation in rough woollen cloth. There is some tanning, ship- building and brewing, and making of soap, tar and machinery. Astrakhan is the chief port on the Caspian Sea and the head-quarters of the Russian Caspian fleet. The city consists of (1) the kreml or citadel (1550), crowning a hill, on which stand also the spacious brick cathedral containing the tombs of two Georgian princes, the archbishop’s palace and the monastery of the Trinity; (2) the Byelogorod or White Town, containing the administrative offices and the bazaars; and (3) the suburbs, where most of the population resides. The buildings in the first two quarters are of stone, in the third of wood, irregu- larly arranged along unpaved, dirty streets. The city is the see of a Greek Catholic archbishop and of an Armenian archbishop, and contains a Lamaist monastery, as well as technical schools, an ichthyological museum, the Peter museum, with ethno- graphical, archaeological and natural history collections, a botanical garden, an ecclesiastical seminary, and good squares and public gardens, one of which is adorned with a statue (1884) of Alexander II. Vineyards surround the city. Astrakhan was anciently the capital of a Tatar state, and stood some 7 m. farther north. After this was destroyed by the Mongol prince Timur the Great in 1395, the existing city was built. The Tatars were expelled about 1554 by Ivan IV. of Russia. In 1569 the city was besieged by the Turks, but they were defeated with great slaughter by the Russians. In 1670 it was seized by the rebel Stenka Razin; early in the following century Peter the Great constructed here a shipbuilding yard and

made Astrakhan the base for his hostilities against Persia, and later in the same century Catherine II. accorded the city important industrial privileges. In 1702, 1718 and 1767, it suffered severely from fires; in 17 19 was plundered by the Persians; and in 1830 the cholera swept away a large number of its people. In the middle ages the city was known also as Jitarkhan and Ginterkhan. Pop. (1867) 47,839; (1900) 121,580. Eight miles above Astra- khan, on the right bank of the Volga, are the ruins of two ancient cities superimposed one upon the other. In the upper, which may represent the city of Balanjar (Balansar, Belenjer), have been found gold and silver coins struck by Mongol rulers, as well as ornaments in the same metals. The older and scantier underlying ruins are supposed to be those of the once large and prosperous city of Itil or Atel (Etel, Idl) of the Arab geographers, a residence of the khan of the Khazars, destroyed by the Russians in 969- (P. A. K.)

ASTROLABE (from Gr. acrpov, star, and \a@uv, to take), an instrument used n«t only for stellar, but for solar and lunar altitude-taking. The principle of the astrolabe is explained in fig. 2. There were two kinds, — spherical and planispheric.

Fig. 2. — Principle of the Astrolabe. If a solid circle be fixed in any one position and a tube be pivoted on its centre so as to move; and if the line C D be drawn upon the circle pointing towards any object Q in the heavens which lies in the plane of the circle, by turn- ing the tube A B towards any other object P in the plane of the circle, the angle BOD will be the angle sub- tended by the two objects P and Q at the eye.

The earliest forms were " armillae " and spherical. Gradually, from Eratosthenes to Tycho, Hipparchus playing the most important part among ancient astronomers, the complex astro- labe was evolved, large specimens being among the chief observa-

tory instruments of the 15th, 16th and even 17th centuries; while small ones were in use among travellers and learned men, not only for astronomical, but for astrological and topographical purposes. Nearly every one of the modern instruments used for the observations of physical astronomy is a part of the perfected astrolabe. A collection of circles such as is the armillary sphere, if each circle were fitted with a view-tube, might be considered a complete astrolabe. Tycho's armillae were astrolabes. In fact the modern equatorial, and the altitude and azimuth circle are astrolabes in the strictest and oldest meaning of the term; and Tycho in one of his astrolabes came so near the modern equatorial that it may be taken as the first of the kind.

The two forms of the planispheric astrolabe most widely known and used in

the 15th, 16th and even 17th centuries were: (1) the portable astrolabe shown in fig. 1 (Plate). This originated in the East, and was in early use in India, Persia and Arabia, and was introduced into Europe by the Arabs, who had perfected it — perhaps as early as a.d. 700. It combines the planisphere and armillae of Hipparchus and others, and the theodolite of Theon, and was usually of brass, varying in diameter from a couple of inches to a foot or more. It was used for taking the

altitudes of sun, moon and From Exercises, by T. Blundeville. stars; for calculating latitude; Fig. 3. — Mariner's Astrolabe,

for determining the points of the a.d. 1594. Made of brass, or of

compass, and time; for ascertain- heavv w , ood: . it varied in size

V • i_ -. 1 ^ • o ' rom a few inches to 1 ft. in

ing heights of mountains, &c; di ame ter.

and for construction of horo- scopes. The instrument was a marvel of convenience and ingenuity, and was called " the mathematical jewel." Never- theless it passed out of use, because incapable of any great precision.

(2) The mariner's astrolabe, fig. 3, was adapted from that of astronomers by Martin Behaim, c. 1480. This was the instru- ment used by Columbus. With the tables of the sun's declina- tion then available, he could calculate his latitude by meridian altitudes of the sun taken with his astrolabe. The mariner's astrolabe was superseded by John Hadley's quadrant of 1731.

Authorities. — Chaucer, Treatise on the Astrolabe (Skeat's edition of Chaucer) ; J. J. Stoffler, Elucidatio Fabrice ususgue Astrolabii, &c. ; Thomas Blundeville, His Exercises (1594); F. Ritter, Astrolabium; W. H. Morley, Description of Astrolabe of Shah Husain; M. L. Huggins, " The Astrolabe " (Astrophysical Journal, 1894); Penny Cyclopaedia, article "Astrolabe;" R. Grant, History of Physical Astronomy. (M. L. H.)

ASTROLOGY, the ancient art or science of divining the fate and future of human beings from indications given by the posi- tions of the stars (sun, moon and planets). The belief in a connexion between the heavenly bodies and the life of man has played an important part in human history. For long ages astronomy and astrology (which might be called astromancy, on the same principle as " chiromancy ") were identified; and a distinction is made between " natural astrology," which pre- dicts the motions of the heavenly bodies, eclipses, &c, and " judicial astrology," which studies the influence of the stars on human destiny. Isidore of Seville (d. 636) is one

of the first to distinguish between astronomy and astrology; nor did astronomy begin to rid itself of astrology till the 16th century, when, with the system of Copernicus, the conviction that the earth itself is one of the heavenly bodies was finally established. The study of astromancy and the belief in it, as part of astronomy, is found in a developed form among the ancient Babylonians, and directly or indirectly through the Babylonians spread to other nations. It came to Greece about the middle of the 4th century B.C., and reached Rome before the opening of the Christian era. In India and China astronomy and astrology are largely re- flections of Greek theories and speculations; and similarly with

the introduction of Greek culture into Egypt, both astronomy and astrology were actively cultivated in the region of the Nile during the Hellenistic and Roman periods. Astrology was further developed by the Arabs from the 7th to the 13th century, and in the Europe of the 14th and 15th centuries astrologers were dominating influences at court.

Even up to the present day men of intellectual eminence like Dr Richard Garnett have convinced themselves that astromancy has a foundation of truth, just as there are still believers in chiromancy or other forms of divination. Dr Garnett (" A. G. Trent ") insisted indeed that it was a. mistake to confuse astrology with fortune- telling, and maintained that it was a "physical science just as much as geology," depending like them on ascertained facts, and grossly misrepresented by being connected with magic. Dr Garnett himself looked upon the study of bio- graphy in relation to the casting of horoscopes as an empirical investigation, but it is difficult in practice to keep the distinction clear, to judge by present-day text-books such as those of Dr Wilde (Primer of Astrology, &c). Dr Wilde insists on there being " nothing incongruous with the laws of nature in the theory that the sun, moon and stars influence men's physical bodies and conditions, seeing that man is made up of a physical part of the earth." There is an obvious tendency, however, for astromancy to be employed, like palmistry, as a means of imposing on the ignorant and credulous. How far the more serious claim is likely to be revived in connexion with the renewal of research into the " occult " sciences generally, it is still too early to speculate; and it has to be recognized that such a point of view is opposed to the generally established belief that astrology is either mere superstition or absolute imposture, and that its former vogue was due either to deception or to the tyranny of an unscientific environment. But if the progress of physical science has not prevented the rehabilitation of much of ancient alchemy by the later researches into chemical change, and if

psychology now finds a place for explanations of spiritualism and witchcraft which involve the admission of the empirical facts under a new theory (as in the case of the divining- rod, &c), it is at least conceivable that some new synthesis might once more justify part at all events of ancient and medieval astromancy, to the extent of admitting the empirical facts where provable, and substituting for the supposed influence of the stars as such, some deeper theory which would be consistent with an application to other forms of prophecy, and thus might recon- cile the possibility of dipping into futurity with certain inter- relations of the universe, different indeed from those assumed by astrological theory, but underlying and explaining it. If this is ever accomplished it will need the patient investigation of a number of empirical observations by competent students unbiassed by any parti pris — a difficult set of conditions to obtain; and even then no definite results may be achieved.

*The history of astrology can now be traced back to ancient Babylonia, and indeed to the earliest phases of Babylonian history, i.e. to about 3000 B.C. In Babylonia as well as in Assyria as**a direct offshoot of Babylonian culture (or as we might also term it ’” Euphratean ” culture), astrology takes its place in the official cult as one of the two chief means at the disposal of the priests (who were called bare or ” inspectors “) for ascertaining the will and intention of the gods, the other being through the inspection of the liver of the sacrificial animal (see Omen). Just as this latter method of divination rested on a well-defined theory, to wit, that the liver was the seat of the soul of the animal and that the deity in accepting the sacrifice identified himself with the animal, whose ” soul ” was thus placed in complete accord with that of the god and therefore reflected the mind and will of the god, so astrology is based on a theory of divine government of the world, which in contrast to ” liver ” divination assumes at the start a more scientific or pseudo-scientific aspect. This theory must be taken into consideration as a factor in accounting for the persistent hold which even at the present day astrology still maintains on many minds. Starting with the indisputable fact that man’s life and happiness are largely dependent upon phenomena in the heavens, that the fertility of the soil is de-*

pendent upon the sun shining in the heavens as well as upon the rains that come from heaven, that on the other hand the mischief and damage done by storms and inundations, to both of which the Euphratean Valley was almost regularly subject, were to be traced likewise to the heavens, the conclusion was drawn that all the great gods had their seats in the heavens. In that early age of culture known as the “nomadic” stage, which under normal conditions precedes the ” agricultural ” stage, the moon cult is even more prominent than sun worship, and with the moon and sun cults thus furnished by the ” popular ” faith it was a natural step for the priests, who

correspond to the " scien- tists " of a later day, to perfect a theory of a complete accord between phenomena observed in the heavens and occurrences on earth.

If moon and sun, whose regular movements conveyed to the more intelligent minds the conception of the reign of law and order in the universe as against the more popular notion of chance and caprice, were divine powers, the same held good of the planets, whose movements, though more difficult to follow, yet in the course of time came to be at least partially understood. ; Of the planets five were recognized— Jupiter, Venus, Saturn, Mercury and Mars — to name them in the order in which they appear in the older cuneiform literature; in later texts Mercury and Saturn change places. These five planets were identified with the great gods of the pantheon as follows:— Jupiter with Marduk {q.v.), Venus with the goddess Ishtar (q.v.), Saturn with Ninib (q.v.), Mercury with Nebo (q.v.), and Mars with Nergal (q.v.). The movements of the sun, moon and five planets were regarded as representing the activity of the five gods in question, together with the moon-god Sin (q.v.) and the sun-god Shamash (q.v.), in preparing the occurrences on earth. If, therefore, one could correctly read and interpret the activity of these powers, one knew what the gods were aiming to bring about. The Babylonian priests accordingly applied themselves to the task of perfecting a system of interpretation of the pheno- mena to be observed in the heavens, and it was natural that the system was extended, from the moon, sun and five planets to the more prominent and recognizable fixed stars. That system in- volved not merely the movements of the moon, sun and planets, but. the observation of their relatiye position to one another and to all kinds of peculiarities noted at any point in the course of their movements: in the case of the moon, for instance, the exact appearance of the new crescent, its position in the heavens, the conditions at conjunction and opposition, the appearance of the horns, the halo frequently seen with the new moon, which was compared to a " cap," the ring round the full moon, which was called a "stall " (i.e. " enclosure "), and more of the like. To all these phenomena some significance was attached;, and this significance was naturally intensified in the case of such a striking phenomenon as an eclipse of the moon. Applying the same method of careful observation to the sun and planets, and later to some of the constellations and to many of the fixed stars, it will be apparent that the body of observations noted must have grown in the course of time to large and indeed to enormous proportions, and correspondingly the interpretations assigned to the nearly endless variations in the phenomena thus observed. The interpretations themselves were based (as in the case of divination through the liver) chiefly on two factors:—'- (1) on the recollection or on written records of what in the past had taken place when the phenomenon or phenomena in ques- tion had

been observed, and (2) association of ideas— involving sometimes merely a play upon words — in connexion with the phenomenon or phenomena observed. Thus if on a certain occasion the rise of the hew moon in a cloudy sky was followed by victory over an enemy or by abundant rain, the sign in question was thus proved to be a favourable one and its recur- rence would be regarded as a good omen, though the prognostica- tion would not necessarily be limited to the one or the other of those occurrences, but might be extended to apply to other circumstances. On the other hand, the appearance of the new moon earlier than was expected was regarded as an unfavour- able omen — prognosticating in one case defeat, in another death

among cattle, in a third bad crops— not necessarily because these events actually took place after such a phenomenon, but by an application of the general principle resting upon association of ideas whereby anything premature would suggest an un- favourable occurrence. A thin halo seen above the new moon was pictured as a cap, and the association between this and the symbol of royalty, which was a conical-shaped cap, led to interpreting the phenomenon as an indication that the ruler would have a successful reign. In this way a mass of traditional interpretation of all kinds of observed phenomena was gathered, and once gathered became a guide to the priests for all times.

Astrology in this its earliest stage is, however, marked by two characteristic limitations. In the first place, the movements and position of the heavenly bodies point to such occurrences as are of public import and affect the general welfare. The individual's interests are not in any way involved, and we must descend many centuries and pass beyond the confines of Baby- lonia and Assyria before we reach that phase which in medi- eval and modern astrology is almost exclusively dwelt upon — genethliology or the individual horoscope. In Babylonia and Assyria the cult centred largely and indeed almost exclusively in the public welfare and the person of the king, because upon his well-being and favour with the gods the fortunes of the country were dependent in accordance with the ancient conception of kingship (see J. G. Frazer, The Early History of Kingship). To some extent, the individual came in for his share in the incantations and in the purification ritual through which one might hope to rid oneself of the power of the demons and of other evil spirits, but outside of this the important aim of the priests was to secure for the general benefit the favour of the gods, or, as a means of preparing oneself for what the future had in store, to ascertain in time whether that favour would be granted in any particular

instance or would be continued in the future. Hence in " liver " divination, as in astrology, the in- terpretations of the signs noted all have reference to public affairs and events and not to the individual's needs or desires. In the second place, the astronomical knowledge presupposed and accompanying early Babylonian astrology is essentially of an empirical character. While in a general way the reign of law and order in the movements of the heavenly bodies was recog- nized, and indeed must have exercised an influence at an early period in leading to the rise of a methodical divination that was certainly of a much higher order than the examination of an animal's liver, yet the importance that was laid upon the endless variations in the form of the phenomena and the equally numerous apparent deviations from what were regarded as normal condi- tions, prevented for a long time the rise of any serious study of astronomy beyond what was needed for the purely practical purposes that the priests as " inspectors " of the heavens (as they were also the " inspectors " of the sacrificial livers) had in mind. True, we have, probably as early as the days of Kham- murabi, i.e. c. 2000 B.C., the combinations of prominent groups of stars with outlines of pictures fantastically put together, but there is no evidence that prior to 700 B.C. more than a number of the constellations of our zodiac had become part of the current astronomy. The theory of the ecliptic as representing the course of the sun through the year, divided among twelve constellations with a measurement of 30 to each division, is also of Babylonian origin, as has now been definitely proved; but it does not appear to have been perfected until after the fall of the Babylonian empire in 539 B.C. Similarly, the other accomplishments of Babylonian astronomers, such as their system or rather systems of moon calculations and the drawing up of planetary tablets, belong to this late period, so that the golden age of Babylonian astronomy belongs not to the remote past, as was until recently supposed, but to the Seleucid period, i.e. after the advent of the Greeks in the Euphrates Valley. From certain expressions used in astrological texts that are earlier than the 7th century B.C. it would appear, indeed, that the beginnings at least of the calculation of sun and moon edipses belong to the earlier period, but here, too, the chief work accomplished was after 400 b.c, and the defectiveness of

early Babylonian astronomy may be gathered from the fact that as late as the 6th century B.C. an error of almost an entire month was made by the Babylonian astronomers in the attempt to determine through calculation the beginning of a certain year.

The researches of Bouche-Leclercq, Cumont and Boll have enabled us to fix with a considerable degree of definiteness the middle of the 4th century B.C. as the period when Babylonian astrology began its triumphal march to the west, invading the domain of Greek and Roman culture and destined to exercise a strong hold on all nations and groups — more particularly in

Egypt — that came within the sphere of Greek and Roman influence. It is rather significant that this spread of astrology should have been concomitant with the intellectual impulse that led to the rise of a genuine scientific phase of astronomy in Babylonia itself, which must have weakened to some extent the hold that astrology had on the priests and the people. The advent of the Persians, bringing with them a conception of religion of a far higher order than Babylonian-Assyrian polytheism (see Zoroaster), must also have acted as a disintegrating factor in leading to the decline of the old faith in the Euphrates Valley, and we thus have the interesting though not entirely exceptional phenomenon of a great civilization bequeathing as a legacy to posterity a superstition instead of a real achievement. "Chaldaean wisdom" became among Greeks and Romans the synonym of divination through the planets and stars, and it is not surprising that in the course of time to be known as a " Chaldaean " carried with it frequently the suspicion of char- latanry and of more or less wilful deception. The spread : of astrology beyond Babylonia is thus concomitant with the rise of a truly scientific astronomy in Babylonia itself, which in turn is due to the intellectual impulse afforded by the contact with new forms of culture from both the East and the West.

In the hands of the Greeks and of the later Egyptians both astrology and astronomy were carried far beyond the limits attained by the Babylonians, and it is indeed a matter of surprise to observe the harmonious combination of the two fields-— a harmony that seems to grow more complete with each age, and that is not broken until we reach the threshold of modern science in the 16th century. To the Greek astronomer Hipparchus belongs the credit of the discovery (c. 130 B.C.) of the theory of the precession of the equinoxes, for a knowledge of which among the Babylonians we find no definite proof; but such a : signal advance in pure science did not prevent the Greeks from develop- ing in a most elaborate manner the theory of the influence of the planets upon the fate of the individual. The endeavour to trace the horoscope of the individual from the position of the planet s and stars at the time of birth (or, as was attempted by other astrologers, at the time of conception) represents the most significant contribution of the Greeks to astrology. The system was carried to such a degree of perfection that later ages made but few additions of an essential character to the genethliology or drawing up of the individual horoscope by the Greek astro- logers. The system was taken up almost bodily by the Arab astronomers, it was embodied in the Kabbalistic lore of Jews and Christians, and through these and other channels came to be the substance of the astrology of the middle ages, forming, as aheady pointed out, under the designation of "judicial astrology," a pseudo-science which was placed on a perfect footing of equality with " natural astrology " or the more genuine science of the study of the motions and phenomena of the heavenly bodies.*

Partly in further development of views unfolded in Babylonia, but chiefly under Greek influences, the scope of astrology was enlarged until it was brought into connexion with practically all of the known sciences, botany, chemistry, zoology, mineralogy, anatomy and medicine. Colours, metals, stones, plants, drugs and animal life of all kinds were associated with the planets; and placed under their tutelage. In the system that passes under the, name of Ptolemy, Saturn is associated with grey, Jupiter with white, Mars with red, Venus with yellow, while Mercury, occupy- ing a peculiar place in Greek as it did in Babylonian astrology (where it was at one time designated as the planet par excel' /«nce),'Was supposed to vary its colour according to changing

circumstances. The sun was associated with gold, the moon with silver, Jupiter with electrum, Saturn with lead, Venus with copper, and so on, while the continued influence of astrological motives is to be seen in the association of quicksilver, upon its discovery at a comparatively late period, with Mercury, because of its changeable character as a solid and a liquid. In the same way stones were connected with both the planets and the months; plants, by diverse association of ideas, were connected with the planets, and animals likewise were placed under the guidance and protection of one or other of the heavenly bodies. By this curious process of combination the entire realm of the natural sciences was translated into the language of astrology with the single avowed purpose of seeing in all phenomena signs indicative of what the future had in store. The fate of the individual, as that feature of the future which had a supreme interest, led to the association of the planets with parts of the body. Here, too, we find various systems devised, in part representing the views of different schools, in part reflecting advancing conceptions regarding the functions of the organs in man and animals. In one system the seat of Mercury, representing divine intelligence as the source of all knowledge — a view that reverts to Babylonia where Nebo (corresponding to Mercury) was regarded as the divine power to whom all wisdom is due- — was placed in the liver as the primeval seat of the soul (see Omen), whereas in other systems this distinction was assigned to Jupiter or to Venus. Saturn, taking in Greek astrology the place at the head of the planets which among the Babylonians was accorded to Jupiter- Marduk, was given a place in the brain, which in later times was looked upon as the centre of soul-life; Venus, as the planet of the passion of love, was supposed to reign supreme over the genital organs, the belly and the lower limbs; Mars, as the violent planet, is associated with the bile, as well as with the blood and kidneys. Again, the right ear is associated with Saturn, the left ear with Mars, the

right eye in the case of the male with the sun and the left eye with the moon, while in the case of the female it was just the reverse. From the planets the same association of ideas was applied to the constellations of the zodiac, which in later phases of astrology are placed on a par with the planets themselves, so far as their importance for the individual horoscope is concerned. The fate of the individual in this combination of planets with the zodiac was made dependent not merely upon the planet which happened to be rising at the time of birth or of conception, but also upon its local relationship to a special sign or to certain signs of the zodiac. The zodiac was regarded as the prototype of the human body, the different parts of which all had their corresponding section in the zodiac itself. The head was placed in the first sign of the zodiac — the Ram ; and the feet in the last sign — the Fishes. Between these two extremes the other parts and organs of the body were distributed among the remaining signs of the zodiac, the neck being assigned to the Bull, the shoulders and arms to the Gemini (or twins), the breast to Cancer, the flanks to Leo, the bladder to Virgo, the buttocks to the Balance, the pubis to the Scorpion, the thighs to Sagittarius, the knees to Capricorn, and the limbs to Aquarius. Not content with this, we find the late Egyptian astrologers setting up a correspondence between the thirty-six decani recognized by them and the human body, which is thus divided into thirty-six parts; to each part a god was assigned as a controlling force. With human anatomy thus connected with the planets, with constellations, and with single stars, medicine became an integral part of astrology, or, as we might also put it, astrology became the handmaid of medicine. Diseases and distrubances of the ordinary functions of the organs were attributed to the influence of planets or explained as due to conditions observed in a constellation or in the position of a star; and an interesting survival of this bond between astrology and medicine is to be seen in the. use up to the present time of the sign of Jupiter . QJ., which still heads medicinal prescriptions, while, on the other hand, the influence of planetary lore appears in the assignment of the days of the week to the planets, beginning with Sunday, assigned to the sun, and ending with Saturday, the day of Saturn. Passing on into

still later periods, Saturn's day was associated with the Jewish sabbath, Sunday with the Lord's Day, Tuesday with Tiw, the god of war, corresponding to Mars of the Romans and to the Nergal of the Babylonians. Wednesday was assigned to the planet Mercury, the equivalent of the Germanic god Woden; Thursday to Jupiter, the equivalent of Thor; and Friday to Friga, the goddess of love, who is represented by Venus among the Romans and among the Babylonians by Ishtar. Astrological considerations likewise already regulated in ancient Babylonia the distinction of lucky and unlucky days, which passing down to the Greeks and Romans (dies fasti and nefasti) found a striking expression in

Hesiod's Works and Days. Among the Arabs similar associations of lucky and unlucky days directly connected with the influence of the planets prevailed through all times, Tuesday and Wednesday, for instance, being regarded as the days for blood-letting, because Tuesday was connected with Mars, the lord of war and blood, and Wednesday with Mercury, the planet of humours. Even in modern times travellers relate how, when an auspicious day has been proclaimed by the astro- logers, the streets of Bagdad may be seen running with blood from the barbers' shops.

It is unnecessary here to give a detailed analysis of the methods of judicial astrology as an art, or directions for the casting of a horoscope, or " nativity," i.e. a map of the heavens at the hour of birth, showing, according to the Ephemeris, the position of the heavenly bodies, from which their influence may be deduced. Each of the twelve signs of the zodiac (g.v.) is credited with its own characteristics and influence, and is the controlling sign of its " house of life." The sign exactly rising at the moment of birth is called the ascendant. The benevolent or malignant influence of each planet, together with the sun and moon, is modified by the sign it inhabits at the nativity ; thus Jupiter in one house may indicate riches, fame in another, beauty in another, and Saturn similarly poverty, obscurity or deformity. The calculation is affected by the " aspects," i.e. according as the planets are near or far as regards one another (in conjunction, in semi-sextile, semi-square, sextile, quintile, square, trine, sesqui-quadrate, bi-quintile, opposition or parallel acclination). Disastrous signs predominate over auspicious, and the various effects are combined in a very elaborate and complicated manner.

Judicial astrology, as a form of divination, is a concomitant of natural astrology, in its purer astronomical aspect, but mingled with what is now considered an unscientific and superstitious view of world-forces. In the Janua aurea reserata quatuor linguarum (1643) of J. A. Comenius we find the following definition:—" Astronomus siderum meatus sen motus considerat: Astrologus eorundem efficaciam, influxum, et ejfectum." Kepler was more cautious in his opinion; he spoke of astronomy as the wise mother, and astrology as the foolish daughter, but he added that the existence of the daughter was necessary to the life of the mother. Tycho Brahe and Gassendi both began with astrology, and it was only after pursuing the false science, and finding it wanting, that Gassendi devoted himself to astronomy. In their numerous allusions to the subtle mercury, which the one makes when treating of a means of measuring time by the efflux of the metal, and the other in a treatise on the transit of the planet, we see traces of the school in which they served their first apprenticeship. Huygens, moreover, in his great posthumous work, Cosmotheoros, sen de terris coelestibus, shows himself a more exact observer of astrological symbols than Kircher him- self in his Iter exstaticum. Huygens contends

that between the inhabitants of different planets there need not be any greater difference than exists between men of different types on the earth. " There are on the earth," continues this rational interpreter of the astrologers and chiromancers, " men of cold temperament who would thrive in Saturn, which is the farthest planet from the sun, and there are other spirits warm and ardent enough to live in Venus."

Those were indeed strange times, according to modern ideas, when astrologers were dominant by the terror they inspired, and sometimes by the martydom they endured when their pre- dictions were either too true or too false. Faith, to borrow their

own language, was banished to Virgo, and rarely shed her influence on men. Cardan (1501-1576), for instance, hated Luther, and so changed his birthday in order to give him an unfavourable horoscope. In Cardan's times, as in those of Augustus, it was a common practice for men to conceal the day and hour of their birth, till, like Augustus, they found a com- plaisant astrologer. But, as a general rule, medieval and Renais- sance astrologers did not give themselves the trouble of reading the stars, but contented themselves with telling fortunes by faces. They practised chiromancy (see Palmistry), and relied on afterwards drawing a horoscope to suit. As physiognomists (see Physiognomy) their talent was undoubted, and according to Vanini there was no need to mount to the house-top to cast a nativity. " Yes," he says, " I can read his face; by his hair and his forehead it is easy to guess that the sun at his birth was in the sign of Libra and near Venus. Nay, his complexion shows that Venus touches Libra. By the rules of astrology he could not lie."

A few salient facts may be added concerning the astrologers and their predictions, remarkable either for their fulfilment or for the ruin and confusion they brought upon their authors. We may begin with one taken from Bacon's Essay 0} Prophecies: — " When I was in France, I heard from one Dr Pena, that the queen mother, who was given to curious arts, caused the king her husband's nativitie to be calculated, under a false name; and the astrologer gave a judgment, that he should be killed in a duell; at which the queene laughed, thinking her husband to be above challenges and duels; but he was slaine, upon a course at tilt, the splinters of the staffe of Mongomery going in at his bever." A favourite topic of the astrologers of all countries has been the immediate end of the world. As early as 11 86 the earth had escaped one threatened cataclysm of the astrologers. This did not prevent Stoffler from predicting a universal deluge

for the year 1524 — a year, as it turned out, distinguished for drought. His aspect of the heavens told him that in that year three planets would meet in the aqueous sign of Pisces. The prediction was believed far and wide, and President Aurial, at Toulouse, built himself a Noah's ark — a curious realization, in fact, of Chaucer's merry invention in the Miller's Tale.

Tycho Brahe was from his fifteenth year devoted to astrology, and adjoining his observatory at Uranienburg the astronomer- royal of Denmark had a laboratory built in order to study alchemy, and it was only a few years before his death that he finally abandoned astrology. We may here notice one very remarkable prediction of the master of Kepler. That he had carefully studied the comet of 1577 as an astronomer, we may gather from his adducing the very small parallax of this comet as disproving the assertion ' of the Aristotelians that a solid sphere enveloped the heavens. But besides this, we find him in his character of astrologer drawing a singular prediction from the appearance of this comet. It announced, he tells us, that in the north, in Finland, there should be born a prince who should lay waste Germany and vanish in 1632. Gustavus Adolphus, it is well known, was born in Finland, overran Germany, and died in 1632. The fulfilment of the details of this prophecy suggests that Tycho Brahe had some basis of reason for his prediction. Born in Denmark of a noble Swedish family, a politician, as were all his contemporaries of distinction, Tycho, though no conjuror, could foresee the advent of some great northern hero. Moreover, he was doubtless well acquainted with a very ancient tradition, that heroes generally came from the northern frontiers of their native land, where they are hardened and tempered by the threefold struggle they wage with soil, climate and barbarian neighbours.

Kepler explained the double movement of the earth by the rotation of the sun. At one time the sun presented its friendly side, which attracted one planet, sometimes its adverse side, which repelled it. He also peopled the planets with souls and genii. He was led to his three great laws by musical analogies, just as William Herschel afterwards passed from music to astronomy. Kepler, who in his youth made almanacs, and once prophesied a hard winter, which came to pass, could not help

putting an astrological interpretation on the disappearance of the brilliant star of 1572, which Tycho had observed. Theodore Beza thought that this star, which in December 1573 equalled Jupiter in brilliancy, predicted the second coming of Christ. Astronomers were only then beginning to study variable and periodic stars, and disturbances in that part of the heavens, which had till then, on the authority of Aristotle, been regarded as incorruptible, combined with the troubles of the times, must have given a new stimulus to belief in the signs in heaven. Montaigne (Essais, lib. i. chap, x.) relates a singular episode in the history of astrology. Charles V.

and Francis I., who both bid for the friendship of the infamous Aretino, surnamed the divine, both likewise engaged astrologers to fight their battles. In Italy those who prophesied the ruin of France were sure to be listened to. These prophecies affected the public funds much as telegrams do nowadays. " At Rome," Montaigne tells us, " a large sum of money was lost on the Change by this prognostica- tion of our ruin." The marquis of Saluces, notwithstanding his gratitude to Francis I. for the many favours he had received, including his marquisate, of which the brother was despoiled for his benefit, was led in 1536 to betray his country, being scared by the glorious prophecies of the ultimate success of Charles V. which were then rife. The influence of the Medici made astro- logers popular in France. Richelieu, on whose council was Jacques Gaffarel (1601-1681), the last of the Kabbalists, did not despise astrology as an engine of government. At the birth of Louis XIV. a certain Morin de Villefranche was placed behind a curtain to cast the nativity of the future autocrat. A genera- tion back the astrologer would not have been hidden behind a curtain, but have taken precedence of the doctor. La Bruyere dares not pronounce against such beliefs, " for there are per- plexing facts affirmed by grave men who were eye-witnesses." In England William Lilly and Robert Fludd were both dressed in a little brief authority. The latter gives us elaborate rules for the detection of a thief, and tells us that he has had personal experience of their efficacy. " If the lord of the sixth house is found in the second house, or in company with the lord of the second house, the thief is one of the family. If Mercury is in the sign of the Scorpion he will be bald, &c." Francis Bacon abuses the astrologers of his day no less than the alchemists, but he does so because he has visions of a reformed astrology and a reformed alchemy. Sir Thomas Browne, too, while he denies the capacity of the astrologers of his day, does not venture to dispute the reality of the science. The idea of the souls of men passing at death to the stars, the blessedness of their particular sphere being assigned them according to their deserts (the metempsychosis of J. Reynaud), may be regarded as a survival of religious astrology, which, even as late as Descartes's day, assigned to the angels the task of moving the planets and the stars. Joseph de Maistre believed in comets as messengers of divine justice, and in animated planets, and declared that divination by astrology is not an absolutely chimerical science. Lastly, we may mention a few distinguished men who ran counter to their age in denying stellar influences. Aristarchus of Samos, Martianus Capella (the precursor of Copernicus), Cicero, Favo- rinus, Sextus Empiricus, Juvenal, and in a later age Savonarola and Pico della Mirandola, and La Fontaine, a contemporary of the neutral La Bruyere, were all pronounced opponents of astrology.

In England Swift may fairly claim the credit of having given the death-blow to astrology by his famous squib, entitled Prediction for the Year 1708, by

Isaac Bickerstajf, Esq. He begins, by professing profound belief in the art, and next points out the vagueness and the absurdities of the philomaths. He then, in the happiest vein of parody, proceeds to show them a more excellent way:—" My first prediction is but a trifle, yet 1 mention it to show how ignorant these sottish pretenders to astrology are in their own concerns: it refers to Partridge the almanac-maker. I have consulted the star of his nativity by my own rules, and find he will infallibly die upon the 29th of March next about eleven at night of a raging fever. Therefore I advise him to consider of it and settle his affairs in time."

Then followed a letter to a person of quality giving a full and particular account of the death of Partridge on the very day and nearly at the hour mentioned. In vain the wretched astrologer protested that he was alive, got a literary friend to write a pamphlet to prove it, and published his almanac for 1709. Swift, in his reply, abused him for his want of manners in giving a gentleman the lie, answered his arguments seriatim, and declared that the evidence of the publication of another almanac was wholly irrelevant, " for Gadbury, Poor Robin, Dove and Way do yearly publish their almanacs, though several of them have been dead since before the Revolution." Nevertheless a field is found even to this day for almanacs of a similar type, and for popular belief in them.

To astrological politics we owe the theory of heaven-sent rulers, instruments in the hands of Providence, and saviours of society. Napoleon, as well as Wallenstein, believed in his star. Many passages in the older English poets are unintelligible without some knowledge of astrology. Chaucer wrote a treatise on the astrolabe; Milton constantly refers to planetary influences; in Shakespeare's King Lear, Gloucester and Edmund represent respectively the old and the new faith. We still contemplate and consider; we still speak of men as jovial, saturnine or mercurial; we still talk of the ascendancy of genius, or a disastrous defeat. In French heur, malheur, heureux, malheureux, are all derived from the Latin augurium; the expression ni sous une mauvaise itoile, born under an evil star, corresponds (with the change of Hoile into astre) to the word malotru, in Provencal malastrue; and son itoile pdlit, his star grows pale, belongs to the same class of illusions. The Latin ex augurio appears in the Italian sciagura, sciagurato, softened into sciaura, sciawato, wretchedness, wretched. The influence of a particular planet has also left traces in various languages; but the French and English jovial and the English saturnine correspond rather to the gods

who served as types in chiromancy than to the planets which bear the same names. In the case of the expressions bien or mal luni, well or ill mooned, avoir un quartier de lune dans la tite, to have the quarter of the moon in one's head, the German mond- siichtig and the English moonstruck or lunatic, the fundamental idea lies in the strange opinions formerly held about the moon.

Bibliography.— For the history of astrology with its affinities to astronomy on the one hand, and to other forms of popular belief on the other, the following works out of a large number that might be mentioned are specially recommended: — A. Bouche-Leclercq, L'Astrologie grecque (Paris, 1899), with a full bibliography; Franz Boll, Sphaera (Leipzig, 1903) ; Franz Cumont, Catalogus Codicum Astrologorum Graecorum (Brussels, 1898; 7 parts published up to 1909); Franz Boll, " Die Erforschung der antiken Astrologie " (in Neue Jahrbiicher fiir das klassische Altertum, Band xxi. Heft 2, pp. 103-126) ; Franz Cumont, Les Religions orientates dans le paganisme romain (Paris, 1907) (ch. vii. " L'Astrologie et la magie '); Alfred Maury, La Magie et Vastrologie a I'antiquite et au moyen age (4th ed., Paris, 1877); R. C. Thompson, Reports of the Magicians and As- trologers of Nineveh and Babylon (2 vols., London, 1900) ; F. X. Kugler, Sternkunde und Sterndienst in Babel (Freiburg, 1907;— to be completed in 4 vols.); Ch. Virolleaud, L'Astrologie chaldeenne (Paris, 1905 — to be completed in 8 parts — transliteration and translations of cuneiform texts) ; Jastrow, Religion Babyloniens und Assyriens (Parts 13 and 14); also certain sections in Bouche- Leclercq, Histoire de la divination dans Vantiquili (Paris, 1879), vol. i. pp. 205-257; in Marcellin Berthelot, Les Origines de Valthimie (Paris, 1885), pp. 1-56; Ferd. Hofer, Histoire de I'astronomie (Paris, 1846), pp. 1-90; in Rudolf Wolf, Geschichte der Astronomie (Munich, 1877), ch. i. See also the article by Ernst Riess on Astrology in Pauly-Wissowa, Realencyclopadie der klassischen Altertumswissen- schaft, vol. ii. (Stuttgart, 1896). For modern and practical astro- logy the following works may be found useful in different ways: E. M. Bennett, Astrology (New York, 1894); J. M. Pfaff, Astrologie (Bamberg, 1816); G. Wilde, Chaldaean Astrology up to date (1901); R. Garnett (" A. G. Trent "), " The Soul and the Stars," in the University Magazine, 1880 (reprinted in Dobson and Wilde, Natal Astrology, 1893) < Abel Haatan, Traite d 'astrologie judiciaire (Paris, 1825); Fomalhaut, Manuel d' astrologie spherique el judiciaire (Paris, 1897)- (M. Ja.)

ASTRONOMY (from Gr. h\arpov, a star, and ve/jtuv, to classify or arrange). The subject matter of astronomical science, con- sidered in its widest range, comprehends all the matter of the universe which lies outside the limit of the earth's atmosphere. The seeming anomaly of classifying as a single branch of science

all that we know in a field so wide, while subdividing our know^ ledge of things on our own planet into an indefinite number of separate sciences, finds its explanation in the impossibility of subjecting the matter of the heavens to that experimental scrutiny which yields such rich results when applied to matter which we can handle at will. Astronomy is of necessity a science of observation in the pursuit of which experiment can directly play no part. It is the most ancient of the sciences because, before the era of experiment, it was the branch of knowledge which could be most easily systematized, while the relations of its phenomena to day and night, times and seasons, made some knowledge of the subject a necessity of social life. In recent times it is among the more progressive of the sciences, because the new and improved methods of research now at command have found in its cultivation a field of practically unlimited extent, in which the lines of research may ultimately lead to a comprehension of the universe impossible of attainment before our time.

The field we have defined is divisible into at least two parts, that of Astronomy proper, or " Astrometry," which treats of the motions, mutual relations and dimensions of the heavenly bodies; and that of Astrophysics (q.v.), which treats of their physical constitution. While it is true that the instruments and methods of research in these two branches are quite different in their details, there is so much in common in the fundamental principles which underlie their application, that it is unprofitable to consider them as completely distinct sciences.

Speaking in the most comprehensive way, and making an exception of the ethereal medium (see Aether), which, being capable of experimental study, is not included in the subject of astronomy, we may say that the great masses of matter which make up the universe are of two kinds: — (1) incandescent bodies, made visible to us by their own light; (2) dark bodies, revolving round them or round each other. These dark bodies are known to us in two ways: (a) by becoming visible through reflecting the light from incandescent bodies in their neighbourhood- (b) by their attraction upon such bodies.

The incandescent bodies are of two classes: stars and nebulae. Among the stars our sun is to be included, as it has no properties which distinguish it from the great mass of stars except our proximity to it. The stars are supposed to be generally spherical, like the sun, in form, and to have fairly well-defined boundaries; while the nebulae are generally irregular in outline and have no well-defined limits. It is, however, probable that the one class runs into the other by imperceptible gradations. In the relation of the universe to us there is yet another separation of its bodies into two classes, one comprising the solar system, the other the remainder of the universe. The former consists of the sun and the bodies which move round it.

Considered as a part of the universe, our solar system is insignificant in extent, though, for obvious reasons, great in practical importance to us, and in the facility with which we may gain knowledge relating to it.

Referring to special articles, Solar System, Star, Sun, Moon, &c. for a description of the various parts of the universe, we confine ourselves, at present, to setting forth a few of the most general modern conceptions of the universe. As to extent, it may be said, in a general way, that while no definite limits can be set to the possible extent of the universe, or the distance of its farthest bodies, it seems probable, for reasons which will be given under Star, that the system to which the stars that we see belong, is of finite extent.

As the incandescent bodies of the universe are visible by their own light, the problem of ascertaining their existence and position is mainly one of seeing, and our facilities for attacking it have constantly increased with the improvement of our optical appliances. But such is not the case with the dark bodies. Such a body can be made known to us only when in the neighbourhood of an incandescent body; and even then, unless its mass or its dimensions are considerable, it will evade all the scrutiny of our science. The question of the possible number and magnitude of such bodies is therefore one that does not admit of accurate investigation. We can do no more thari

balance vague estimates of probability. What we do know is that these bodies vary widely in size. Those known to be revolving round certain of the stars are far larger in proportion to their central bodies than our planets are in respect to the sun; for were it otherwise we should never be able to detect their existence. At the other extreme we know that innumerable swarms of minute bodies, probably little more than particles, move round the sun in orbits of every degree of eccentricity, making themselves known to us only in the exceptional cases when they strike the earth's atmosphere. They then appear to us as " shooting stars " (see Meteor).

A general idea of the relation of the solar system to the universe may be gained by reflecting that the average distance between any two neighbouring stars is several thousand times the extent of the solar system. Between the orbit of Neptune and the nearest star known to us is an immense void in which no bodies are yet known to exist, except comets.

But although these sometimes wander to distances considerably beyond the orbit of Neptune, it is probable that the extent of the void which separates our system from the nearest star is hundreds of times the distance of the farthest point to which a comet ever recedes.

We may conclude this brief characterization of astronomy with a statement and classification of the principal lines on which astronomical researches are now pursued. The most comprehensive problem before the investigator is that of the constitution of the universe. It is known that, while infinite diversity is found among the bodies of the universe, there are also common characteristics throughout its whole extent. In a certain sense we may say that the universe now presents itself to the thinking astronomer, not as a heterogeneous collection of bodies, but as a unified whole. The number of stars is so vast that statistical methods can be applied to many of the characters which they exhibit — their spectra, their apparent and absolute luminosity, and their arrangement in space. Thus has arisen in recent times what we may regard as a third branch of astro- nomical science, known as Stellar Statistics. The development of this branch has infused life and interest into what might a few years ago have been regarded as the most lifeless mass of figures possible, expressing merely the positions and motions of innumerˆ able individual stars, as determined by generations of astro- nomical observers. The development of this new branch requires great additions to this mass, the product of perhaps centuries of work on the older lines of the science. To the statistician of the stars, catalogues of spectra, magnitude, position and proper motions are of the same importance that census tables are to the student of humanity. The measurement of the speed with which the individual stars are moving towards or from our system is a work of such magnitude that what has yet been done is scarcely more than a beginning. The discovery by improved optical means, and especially by photography, of new bodies of our system so small that they evaded all scrutiny in former times, is still going on, but does not at present promise any important generalization, unless we regard as such the conclusion that our solar system is a more complex organism than was formerly supposed.

One characteristic of astronomy which tends to make its progress slow and continuous arises out of the general fact that, except in the case of motions to or from us, which can be deter- mined by a single observation with the spectroscope, the motion of a heavenly body can be determined only by comparing its position at two different epochs. The interval required between these two epochs depends upon the speed of the motion. In the case of the greater number of the fixed stars this is so slow that centuries may have to elapse before motion can be deduced. Even in the case of the planets, the variations in the form and position of the orbits are so slow that long periods of observation are required for their correct

determination.

The process of development is also made slow and difficult by the great amount of labour involved in deriving the results of astronomical observations. When an astronomer has made an observation, it still has to be " reduced," and this commonly requires more labour than that involved in making it. But

even this labour may be small compared with that of the theo- retical astronomer, who, in the future, is to use the result as the raw material of his work. The computations required in such work are of extreme complexity, and the labour required is still further increased by the, fact that cases are rather exceptional in which the results reached by one generation will not have to be revised and reconstructed by another; processes which may involve the repetition of the entire work. We may, in fact, regard the fabric of astronomical science as a building in the construction of which no stone can be added without a readjustment of some of the stones on which it has to rest. Thus it comes about that the observer, the computer, and the mathematician have in astro- nomical science a practically Unlimited field for the exercise of their powers.

In treating so comprehensive a subject we may naturally distinguish between what we know of the universe and the methods and processes by which that knowledge is acquired. The former may be termed general, and the latter practical, astronomy. When we descend more minutely into details we find these two branches of the subject to be connected by certain principles, the application of which relates to both subjects. Considering as general or descriptive astronomy a description of the universe as we now understand it, the other branches of the subject generally recognized are as follows: —

Geometrical or Spherical Astronomy, by the principles of which the positions and the motions of the-heaveniy bodies are defined.

Theoretical Astronomy, .which may be considered as an exten- sion of geometrical astronomy and includes the determination of the positions and motions of the heavenly bodies by combining mathematical theory with observation. Modern theoretical astronomy, taken in the most limited sense, is based upon Celestial Mechanics, the science by which, using purely deductive mechanical methods, the laws of motion oi the heavenly bodies are derived by deductive methods from their mutual gravitation towards each other.

Practical Astronomy, which comprises a description of the instruments used in astronomical observation, and of the principles and methods underlying their application.

Spherical ot Geometrical Astronomy.

In astronomy, as in analytical geometry, the position of a point is defined by stating its distance and its direction from a point of reference taken as known. The numerical quantities by which the distance and direction, and therefore the position, are defined, are termed co-ordinates of the point. The latter are measured or defined with regard to a fixed system of lines and planes, which form the basis of the system.

The following are the fundamental concepts of such a system.

(0) An origin or point of reference. The points most generally taken for this purpose in astronomical practice are the following : —

(1) The posrtiori of a point of observation on the earth's surface. We conceive its position to be that occupied by an observer. The position of a heavenly body is then defined by its direction and distance from the supposed observer.

(2) The centre of the earth. This point, though it can never be occupied by an observer, is Used because the positions of the heavenly bodies in relation to it are more readily computed than they can be from a point on the earth's surface.

(3) The centre of the sun.

(4) In addition to these three most usual points, we may, of course, take the centre of a planet or that of a star in order to define the position of bodies in their respective neighbourhoods.

Co-ordinates referred to a point of observation as the origin are termed " apparent," those referred to the centre of the earth are " geocentric," those referred to the centre of the sun, " heliocentric."

(6) The next concept of the system is a fundamental pjane, regarded as fixed, passing through the origin. In connexion with it is an axis perpendicular to it, also passing through the origin. We may consider the axis and the plane as a single concept, the axis determining the plane, Or the plane the axis. The fundamental concepts of this class most in use are : —

(1) When a point on the earth's surface is taken as the origin, the

fundamental axis may be the direction of gravity at that point. This direction defines the vertical line. The fundamental plane which it determines is horizontal arid is termed the plane of the horizon. Such a plane is realized in the surface of a liquid, a basia of quicksilver, for example.

(2) When the centre of the earth is taken as origin, the most natural fundamental axis is that of the earth's rotation. This axis cuts the earth's surface at the North and South Poles. The funda- mental plane perpendicular to it is the plane of the equator. This plane intersects the earth's surface in the terrestrial equator. Co- ordinates referred to this system are termed equatorial. A system of equatorial co-ordinates may also be used when the origin is on the earth's surface. The fundamental axis, instead of being the earth's axis itself, is then a line parallel to it, and the fundamental plane is the plane passing through the point, and parallel to the plane of the equator.

(3) In the system of heliocentric co-ordinates, the plane in which the earth moves round the sun, which is the plane of the ecliptic, is taken as the fundamental one. The axis of the ecliptic is a line perpendicular to this plane.

(c) The third concept necessary to complete the system is a fixed line passing through the origin, and lying in the fundamental plane. This line defines an initial direction from which other directions are counted.

The geometrical concepts just defined are shown in fig. 1. Here O is the origin, whatever point it may be; OZ is the fundamental axis passing through it. In order to represent in the figure the

position of the f u nda, mental plarie, we conceive a circle to be drawn round O, lying in that plane. This circle, projected in perspective as an ellipse, is shown in

;m jt: , — el: X he fi f u «- *?x »*

the fixed initial line by which – - x ," directions are to be

***»...«,_, _—" defined.*

- *Now let P be*

Fig. 1. any point in space,

say the centre of a heavenly body. Conceive a perpendicular PQ to be dropped from this point on the fundamental plane, meeting the latter in the point Q ; PQ will then be parallel to OZ. The co-ordinates of P will then be the following three quantities : —

(1) The length of the line OP, or the distance of the body from the origin, which distance is called the radius vector of the body.

(2) The angle XOQ which the projection of the radius vector upon the fundamental plane makes with the initial line OX. This angle is called the Longitude, Right Ascension or Azimuth of the body, in the various systems of co-ordinates. We may term it in a general way the longitudinal co-ordinate.

(3) The angle QOP, which the radius vector makes with the fundamental plane. This we may call the latitudinal co-ordinate. Instead of it is frequently used the complementary angle ZOP, known as the polar distance of the body. Since ZOQ is a right angle, it follows that the sum of the polar distance and the latitudinal co- ordinates is always 90 . Either may be used for astronomical purposes.

It is readily seen that the position of a heavenly body is completely defined when these co-ordinates are given.

One of the systems of co-ordinates is familiar to every one, and may be used as a general illustration of the method. It is our system of defining the position of a point on the earth's surface by its latitude and longitude. Regarding O (fig. 1) as the centre of the earth, and P as a point on the earth's surface, a city for example, it will be seen that OZ being the earth's axis, the circle MN will be tlie equator. The initial line OX then passes through the foot of the perpendicular dropped from Greenwich upon the plane of the equator, and meets the surface at N. The angle QOP is the latitude of the place and the angle NOQ its longitude. The longitudes and latitudes thus defined are geocentric, and the latitude is slightly different from that in ordinary use for geographic purposes. The difference arises from the oblateness of the earth, and need not be considered here.

The conception of the co-ordinates we have defined is facilitated by

introducing that of the celestial sphere. This conception is embodied in our idea of the vault of heaven, or of the sky. Taking as origin the position of an observer, the direction of a heavenly body is defined by the point in which he sees it in the sky; that is to say, on the celestial sphere. Imagining, as we may well do, that the radius of this sphere is infinite — then every direction, whatever the origin, may be represented by a point on its surface. Take for example the vertical line which is embodied in the direction of the plumb line. This line, extended upwards, meets the celestial sphere in the zenith. The earth's axis, continued indefinitely upwards, meets the sphere in a point called the Celestial Pole. This point in our middle latitudes is between the zenith and the north horizon, near a certain star of the second magnitude familiarly known as the Pole Star. As the earth revolves from west to east the celestial sphere appears to us to revolve in the opposite direction, turning on the line joining the Celestial Poles as on a pivot.

As we conceive of the sky, it does not consist of an entire sphere

but only as a hemisphere bounded by the horizon. But we have no difficulty in extending the conception below the horizon, so that the earth with everything upon it is in the centre of a complete sphere. The two parts of this sphere are the visible hemisphere, which is above the horizon, and the invisible, which is below it. Then the plumb line not only defines the zenith as already shown, but in a downward direction it defines the nadir, which is the point of the sphere directly below our feet. On the side of this sphere opposite to the North Celestial is the South Pole, invisible in the Northern Terrestrial Hemisphere but visible in the Southern one.

The relation of geocentric to apparent co-ordinates depends upon the latitude of the observer. The changes which the aspect of the heaven undergoes, as we travel North and South, are so well known that they need not be described in detail here; but a general state- ment of them will give a luminous idea of the geometrical co-ordinates we have described. Imagine an observer starting from the North Pole to travel towards the equator, carrying his zenith with him. When at the pole his zenith coincides with the celestial pole, and as the earth revolves on its axis, the heavenly bodies perform their apparent diurnal revolutions in horizontal circles round the zenith. As he travels South, his zenith moves along the celestial sphere, and the circles of diurnal rotation become oblique to the horizon. The obliquity continually increases until the observer reaches the equator. His zenith is then in the equator and the celestial poles are in the North and South horizon respectively. The circles in which the heavenly bodies appear to revolve are then vertical. Continuing his journey towards the south, the north celestial pole sinks below the horizon; the south celestial pole rises above it; or to speak more exactly, the zenith of the observer approaches that pole. The circles of diurnal revolution again become oblique. Finally,

at the south pole the circles of diurnal revolution are again apparently horizontal, but are described in a direction apparently (but not really) the reverse of that near the north pole. The reader who will trace out these successive concepts and study the results of his changing positions will readily acquire the notions which it is our subject to define.

We have next to point out the relation of the co-ordinates we have described to the annual motion of the earth around the sun. In consequence of this motion the sun appears to us to describe annually a great circle, called the ecliptic, round the celestial sphere, among the stars, with a nearly uniform motion, of somewhat less than i" in a day. Were the stars visible in the daytime in the immediate neighbourhood of the sun, this motion could be traced from day to day. The ecliptic intersects the celestial equator at two opposite points, the equinoxes, at an angle of 23 27'. The vernal equinox is taken as the initial point on the sphere from which co-ordinates are measured in the equatorial and ecliptic systems. Referring to fig. I , the initial line OX is defined as directed toward the vernal equinox, at which point it intersects the celestial sphere.

The following is an enumeration of the co-ordinates which we have described in the three systems: —

Apparent System.

Latitudinal Co-ordinate; Altitude or Zenith Distance.

Longitudinal ,, Azimuth.

Equatorial System.

Latitudinal Co-ordinate; Declination or Polar Distance. I

Longitudinal ,, Right Ascension.

Ecliptic System.

Latitudinal Co-ordinate; Latitude or Ecliptic Polar Distance.

Longitudinal ,, Longitude.

Relation of the Diurnal Motion to Spherical Co-ordinates. — The vertical line at any place being the fundamental axis of the apparent system of co-ordinates, this system rotates with the earth, and so seems to us as fixed. The other two systems, including the vernal equinox, are fixed on the celestial sphere, and so seem to us to perform a diurnal revolution from east towards west. Regarding the period of the revolution as 24 hours, the

apparent motion goes on at the rate of I5 q per hour. Here we have to make a distinction of fundamental importance between the diurnal motions of the sun and of the stars. Owing to the unceasing apparent motion of the sun toward the east, the interval between two passages of the same star over the meridian is nearly four minutes less than the interval between consecutive passages of the sun. The latter is the measure of the day as used in civil life. In astronomical practice is introduced a day, termed " sidereal," determined, not by the diurnal revolution of the sun, but of the stars. The year, which comprises 365-25 solar days, contains 366-25 sidereal days. The latter are divided into sidereal hours, minutes and seconds as the solar day is. The con- ception of a revolution through 360° in 24 hours is applicable to each case. The sun apparently moves at the rate of 15° in a solar hour; the stars at the rate of 15 in a sidereal hour. The latter motion leads to the use, in astronomical practice, of time instead of angle, as the unit in which the right ascensions are to be expressed. Considering the position of the vernal equinox, and also of a star on the celestial sphere, it will be seen that the interval between the transits of these two points across the meridian may be used to measure the right ascension of a star, since the latter amounts to

15° for every sidereal hour of this interval. For example, if the right ascension of a star is exactly 15 °, it will pass the meridian one sidereal hour after the vernal equinox. For the relations thus arising, and their practical applications, see Time, Measurement of.

Theoretical Astronomy.

Theoretical Astronomy is that branch of the science which, making use of the results of astronomical observations as they are supplied by the practical astronomer, investigates the motions of the heavenly bodies. In its most important features it is an offshoot of celestial mechanics, between which and theoretical astronomy no sharp dividing line can be drawn. While it is true that the one is concerned altogether with general theories, it is also true that these theories require developments and modifica- tions to apply them to the numberless problems of astronomy, which we may place in either class.

Among the problems of theoretical astronomy we may assign the first place to the determination of orbits (q.v.), which is auxiliary to the prediction of

the apparent motions of a planet, satellite or star. The computations involved in the process, while simple in some cases, are extremely complex in others. The orbit of a newly-discovered planet or comet may be computed from three complete observations by well-known methods in a single day. From the resulting elements of the orbit the positions of the body from day to day may be computed and tabulated in an ephemeris for the use of observers. But when definitive results as to the orbits are required, it is necessary to compute the perturbations produced by such of the major planets as have affected the motions of the body. With this complicated process is associated that of combining numerous observations with a view of obtaining the best definitive result. Speaking in a general way, we may say that computations pertaining to the orbital revolutions of double stars, as well as the bodies of our solar system, are to a greater or less extent of the classes we have described. The principal modification is that, up to the present time, stellar astronomy has not advanced so far that a computation of the perturbations in each case of a system of stars is either necessary or possible, except in exceptional cases.

Celestial Mechanics.

Celestial Mechanics is, strictly speaking, that branch of applied mathematics which, by deductive processes, derives the laws of motion of the heavenly bodies from their gravitation towards each other, or from the mutual action of the parts which form them. The science had its origin in the demonstration by Sir Isaac Newton that Kepler's three laws of planetary motion, and the law of gravitation, in the case of two bodies, could be mutually derived from each other. A body can move round the sun in an elliptic orbit having the sun in its focus, and describing equal areas in equal times, only under the influence of a force directed towards the sun, and varying inversely as the square of the distance from it. Conversely, assuming this law of attraction, it can be shown that the planets will move according to Kepler's laws.

Thus celestial mechanics may be said to have begun with Newton's Principia. The development of the science by the successors of Newton, especially Laplace and Lagrange, may be classed among the most striking achievements of the human intellect. The precision with which the path of an eclipse is laid down years in advance cannot but imbue the minds of men with a high sense of the perfection reached by astronomical theories; and the discovery, by purely mathematical processes, of the changes which the orbits and motions of the planets are to undergo through future ages is more impressive the more fully one apprehends the nature of the problem. The purpose of the present article is to convey a general idea of the methods by which the results of celestial mechanics are reached, without entering into those technical details which can be followed only by a

trained mathematician. It must be admitted that any intelligent comprehension of the subject requires at least a grasp of the fundamental conceptions of analytical geometry and the in- finitesimal calculus, such as only one with some training in these subjects can be expected to have. This being assumed, the hope of the writer is that the exposition will afford the student an insight into the theory which may facilitate his orientation, and convey to the general reader with a certain amount of mathe- matical training a clear idea of the methods by which conclusions relating to it are drawn. The non-mathematical reader may

possibly be able to gain some general idea, though vague, of the significance of the subject.

The fundamental hypothesis of the science assumes a system of 6oaYes in motion, of" wni'cfi the sun ancf planets may 6e taften as examples, and of which each separate body is attracted toward all the others according to the law of Newton. The motion of each body is then expressed in the first place by Newton's three laws of motion (see Motion, Laws of, and Mechanics). The first step in the process shows in a striking way the perfection- of the analytic method. The conception of force is, so to speak, elimiitarted from the conditions of the problem, which is reduced to one of pure kinematics. At the outset, the position of each body, considered as a material particle, is defined by reference to a system of co-ordinate axes, and not by any verbal description. Differential equations which express the changes of the co-ordinates are then constructed. The process of discovering the laws of motion of the particle then consists in the integration of these equations. Such equations can be formed for a system of any number of bodies, but the process of integration in a rigorous form is possible only to a limited extent or in special cases. The problems to be treated are of two classes. In one, the bodies are regarded as material particles, no account being taken of their dimensions. The earth, for example, may be regarded as a particle attracted by another more massive particle, the sun. In the other class of problems, the relative motion of the different parts of the separate bodies is considered; for example, the rotation of the earth on its axis, and the consequences of the fact that those parts of a body which are nearer to another body are more strongly attracted by it. Beginning with the first branch of the subject, the fundamental ideas which it is our purpose to convey are em- bodied in the simple case of only two bodies, which we may call the sun and a planet. In this case the two bodies really revolve round their common centre of gravity ; but a very slight modification of the equations of motion reduces them to tne relative motion of the planet round the sun, regarding the moving centre of the latter as the origin of co-ordinates. The motion of this centre, which arises from the attraction of the planet on the sun, ne£d not be considered. In the actual problems of celestial mechanics three co-ordinates necessarily enter, leading

to three differential equations and six equations of solution. But the general principles of the problem are completely exemplified with only two bodies, in which case the motion takes place in a fixed plane. By taking this plane, which is that of the orbit in which the planet performs its revolution, as the plane of xy, we have only two co-ordinates to consider. Let us use the following notation :

x, y, the co-ordinates of the planet relative to. the sun as the origin. M , m, the masses of the attracting bodies, sun and planet, r, the distance apart of the two bodies, or the radius vector of m relative to M. This last quantity is analytically defined by the equation —

r> = x> +y>. I, the time, reckoned from any epoch we choose. The differential equations which completely determine the changes in the co-ordinates x and y, or the motion of m relative to M, are: —

d 2 x _ (M+m)x

dP r s (1)

d 2 y (M--m)y

df ~ r %

These formulae are worthy of special attention. They are the expression in the language of mathematics of Newton's first two laws of motion. Their statement in this language may be regarded as perfect, because it completely and unambiguously expresses the naked phenomena of the motion. The equations do this without expressing any conception, such as that of force, not associated with the actual phenomena. Moreover, as a third advantage, these expressions are entirely free from those difficulties and ambiguities which are met with in every attempt to express the laws of motion in ordinary language. They afford yet another great advantage in that the derivation of the results requires only the analytic operations of the infinitesimal calculus.

The power and spirit of the analytic method will be appreciated by showing how it expresses the relations of motion as they were conceived geometrically by Newton and Kepler. It is quite evident that Kepler's laws do not in themselves enable us to determine the actual motion of the planets. We must have, in addition, in the case of each special planet, certain specific facts, viz. the axes and eccentricity of the ellipse, and the position of the plane in which it lies. Besides these, we must have given the position of the planet in the orbit at some specified moment. Having these data, the position of the planet at any other time may be geometrically constructed by Kepler's laws. The third law enables us to compute the time

taken by the radius vector to sweep over the entire area of the orbit, which is identical with the time of revolution. The problem of constructing successive radii vectores, the angles of which are measured off from the radius vector of the body at the original given position, is then a geometric one, known as Kepler's problem.

In the analytic process these specific data, called elements of the

Fig. 2

orbit, appear as- arbitrary constants, introduced by, the process of integration. In a case like the present one, where there are two differential equations of the second order, there will be four such constants. The result of the integration is that the co-ordinates x and y and their derivatives as to the time, which express the position, direction of motion and speed of the planet at any moment, are found as functions of the four constants and of the time. Putting

- a, b, c, d, for the constants, the general form of the solution will be

x =fi(a,b,c,d,t) ■ . . .

y=f 2 (a,b,c,d,t) (2 >

From these may he derived by differentiation as to t the velocities

*tt *=j'i(a,b,c,d,t)=x'*

%=r{a,b,c4,t)=? ' (3)*

The symbols x' and y' are used for brevity to mean the velocities expressed by the differentia) coefficients. The arbitrary constants, a, b, c and d, are the elements of the orbit, or any quantities from which these elements can be obtained. We note that, in the actual process of integration; no geometric construction need enter.

Let us next consider the problem in another form. Conceive that instead of the orbit of the planet, there is given a position P (fig. 2), through which the planet passed at an assigned moment, with a given velocity, and in a given direction, represented by the arrowhead. Logi- cally these data completely determine the orbit in which the planet shall move, because

there is only one such orbit passing through P, a planet moving in which would have the given speed. It follows that the elements of the orbit admit of determination when the co-ordi- nates of the planet at an assigned moment and their derivatives as to time are given. Analytically the elements are determined from these data by solving the four equations just given, regarding a, b, c and d as unknown quantities, and x, y, x', y' and t as given quantities. The solution of these equations would lead to expressions of the form

a — i(x,y,x',y',l)

b =

&c. &c.

one for each of the elements.

The general equations expressing the motion of a planet considered as a material particle round a centre of attraction lead to theorems the more interesting of which will now be enunciated.

(1) The motion of such a planet may take place not only in an ellipse but in any curve of the second order; an ellipse, hyperbola, or parabola, the latter being the bounding curve between the other two. A body moving fn a parabola or hyperbola would recede indefinitely from its centre of motion and never return to it. The ellipse is therefore the only closed orbit.

(2) The motion takes place in accord with 1 Kepler's laws, enun- ciated elsewhere.

(3) Whewell's theorem: if a point R be taken at a distance from the sun equal to the major axis of the orbit of a planet and, there- fore, at double the mean distance of the planet, the speed of the latter at any point is equal to the speed which a body would acquire by falling from the point R to the actual position of the planet. The speed of the latter may, therefore, be expressed as a function of its radius vector at the moment and of the major axis of its orbit without introducing any other elements into the expression. Another corollary is that in the case of a body moving in a parabolic orbit the velocity at any moment is that which would be acquired by "the body in falling from an infinite distance to the place it occupies at the moment.

(4)., If a number of bodies are projected from any point in space with the same velocity, but in various directions, and subjected only to the attraction of the sun, they will all return to the point of projection at the same moment, although theorbits in which they move may be ever so different. ,

(5) At each distance from the sun there is a certain velocity which a body would, have if it moved in a circular orbit at that distance. If projected with this velocity in any direction the point of projection will be at the end of the minor axis of the orbit, because this is the only point of an ellipse of which the distance from the focus is equal to the semi-major axis of the curve, and therefore the only point at which the distance of the body from the sun is equal to its mean distance.

(6) The relation between the periodic time of a planet and its mean distance, approximately expressed by Kepler's third law, follows very simply from the laws of centrifugal force. It is an ele- mentary principle of mechanics that this force varies directly as the product of the distance of the moving body from the centre of motion into the square of its angular velocity. When bodies revolve at different distances around a centre, their velocities must be such fhat the centrifugal force of each shall be balanced by the attraction of the central mass, and therefore vary inversely as the square of the

distance. If M is the central mass, n the angular velocity, and o the distance, the balance of the two forces is expressed by the equation

a» 2 = Af/o 2 , whence a 3 w 2 = M, a constant.

The periodic time varying inversely as n, this equation expresses Kepler's third law. This reasoning tacitly supposes the orbit to be a circle of radius a, and the mass of the planet to be negligible. The rigorous relation is expressed by a slight modification of the law. Putting M and m for the respective masses of the sun and planet, a for the semi-major axis of the orbit, and n for the mean angular motion in unit of time, the relation then is a s n 2 = M+m.

What is noteworthy in this theorem is that this relation depends only on the sum of the masses. It follows, therefore, that were any portion of the mass of the sun taken from it, and added to the planet, the relation would be unchanged. Kepler's third law therefore expresses the fact that the mass of the sun is the same for all the planets, and deviates from the truth only to the extent that the masses of the latter differ from each other by quantities which are only a small fraction of the mass of the sun.

Problem of Three Bodies. — As soon as the general law of gravitation was fully apprehended, it became evident that, owing to the attrac- tion of each planet upon all the others, the actual motion of the planets must deviate from their motion in an ellipse according to Kepler's laws. In the Principia Newton made several investigations to determine the effects of these actions; but the geometrical method which he employed could lead only to

rude approximations. When the subject was taken up by the continental mathematicians, using the analytical method, the question naturally arose whether the motions of three bodies under their mutual attraction could not be determined with a degree of rigour approximating to that with which Newton had solved the problem of two bodies. Thus arose the cele- brated " problem of three bodies." Investigation soon showed that certain integrals expressing relations between the motions not only of three but of any number of bodies could be found. These were : —

First, the law of the conservation of the centre of gravity. This expresses the general fact that whatever be the number of the bodies which act upon each other, their motions are so related that the centre of gravity of the entire system moves in a straight line with a constant velocity. This is expressed in three equations, one for each of the three rectangular co-ordinates.

Secondly, the law of conservation of areas. This is an extension of Kepler's second law. Taking as the radius vector of each body the line from the body to the common centre of gravity of all, the sum of the produces formed by multiplying each area described, by the mass of the body, remains a constant. In the language of theoretical mechanics, the moment of momentum of the entire system is a constant quantity. This law is also expressed in three equations, one for each of the three planes on which the areas are projected.

Thirdly, the entire vis viva of the system or, as it is -now called^ the energy, which is obtained by multiplying the mass of each body into half the square of its velocity, is equal to the sum of the quotients formed by dividing the product of every pair of the masses, taken two and two, by their distance apart, with the addition of a constant depending on the Original conditions of the system. In the languagfe Of algebra putting tm, m 2 , m s , &c. for the masses of the bodies, ri.2 ri.3 r 2 .s, &c. for their mutual distances apart; v u ,» 2 , i> 8 , &c., for the velocities with which they are moving at any moment; these quantities will continually satisfy the equation

l(mivf+m i vl+ .

, _ mim% , mim.3 . m^m^ . n.a. n.3 n.s

. +a constant.

The theorems of motion just cited are expressed by .seven integrals, or equations expressing a law that certain functions of the variables and of the time remain constant. It is remarkable that although the seven integrals were found almost from the beginning of the investigation, no others have since been added ; and indeed it has recently been shown that no others

exist that can be expressed in an algebraic form. In the case of three bodies these dp not suffice completely to define the motion. In this case, the problem can be attacked only by methods of approximation, devised so as to meet the special conditions of each case. The special conditions which obtain in the solar system are such as to make the necessary ap- proximation theoretically possible however complex the process may be. These conditions are: — (1) The smallness of the masses of the planets in comparison with that of the sun, in consequence of which the orbit of each planet deviates but slightly from an ellipse during any one revolution; (2) the fact that the orbits of the planets are nearly circular, and the planes of their orbits but slightly inclined to each other. The result of these conditions is that all the quantities required admit of development in series proceeding according to the powers of the eccentricities and inclinations of the orbits, and the ratio of the masses of the several planets to the mass of the sun. Perturbations of the Planets. — Kepler's laws. do not completely express the motion of a planet around a central body, except when no force but the mutual attraction of the two bodies comes into play. When one or more other bodies form a part of the system, their action produces deviations from the elliptic motion, which are called perturbations. The problem of determining the perturbations of the

heavenly bodies is perhaps the moat complicated with which the mathematical astronomer has to grapple; and the forms under which it has to be studied are so numerous that they cannot be easily arranged under any one head. But there is one conception of perturbations of such generality and elegance that it forms the common base of all those methods of determining these deviations which have high scientific interest. This conception is embodied in the method of " variation of elements," originally due to J.;Lt Lagrange. The simplest method of presenting it starts with the second view of the elliptic motion already set forth.

We have shown that, when the position of a planet and the direction and speed of its motion at a certain instant are given, the elements of the orbit can be determined. We have supposed this to be done at a certain point P of the orbit, the direction and speed being expressed by the variables x, y, x' and y'. Now, con- sider the values of these same variables expressing the, position of the planet at a second point Q, and the speed with which it passes that point. With this position and speed the elements of the orbit can again be determined. Since the orbit is unchanged so long as no disturbing

force acts, it follows that the elements determined by, means of the two sets of values of the variables are in this case the same. In a word, although the position and speed of the planet and the direction of its motion are constantly changing, the values of the elements determined from these variables remain constant. This fact is fully expressed by the equations (4) where we have constants on one side of the equation equal to functions of the variables on the other. Functions of the variables possessing this property of remaining constant are termed integrals.

Now let the planet be subjected to any force additional to that of the sun's attraction, — say to the attraction of another planet. To fix the ideas let us suppose that the additional attraction

The essential principle of Lagrange's elegant method consists in determining the variations of this osculating ellipse, the co-ordinates and velocities of the planet being ignored in the determination. This may be done because, since the elements and co-ordinates completely determine each other, we may concentrate our attention on either, ignoring the other. The reason for taking the elements as the variables is that they vary very slowly, a property which facilitates their determination, since the variations may be treated as small quantities, of which the squares and products may be neglected in a first solution. In a second solution the squares and products may be taken account of, and so on as far as necessary.

If the problem is viewed from a synthetic point of view, the stages of its solution are as follows. We first conceive of the planets as moving in invariable elliptic orbits, and thus obtain approximate expressions for their positions at any moment. With these expres- sions we express their mutual action, or their pull upon each other at any and every moment. This pull determines the variations of the ideal elements. Knowing these variations it becomes possible to represent by integration the value of the elements as algebraic expressions containing the time, and the elements with which we started. But the variations thus determined will not be rigorously exact, because the pull from which they arise has been determined on the supposition that the planets are moving in unvarying orbits, whereas the actual pull depends on the actual position of the planets. Another approximation is, therefore, to be made, when necessary, by correcting the expression of the pull through taking account of the variations of the elements already determined, which will give a yet nearer approximation to the truth. In theory these successive ap- proximations may be carried as far as we please, but in practice the labour of executing each approximation is so great that we are obliged to stop when the solution is so near the truth that the out- standing error is less than that of the best observations. Even this degree of precision may be impracticable in the more complex cases.

The results which are required to compare with observations are not merely the elements, but the co-ordinates. When the varying elements are known these are computed by the equations (2) because, from the nature of the algebraic relations, the slowly varying elements are continuously determined by the equations (4), which' express the same relations between the elements and the variables as do the equations (2) and (3). This method is, therefore, in form at least, completely rigorous. There are some cases in which it may be applied unchanged. But commonly it proves to be extremely long and

cumbrous, and modifications have to be resorted to. • Of . these modifications the most valuable is one conceived by P, A. Hansen. A certain mean elliptic orbit, as near as possible to the actual varying orbit of the planet, is taken. In this orbit.a certain fictitious planet is supposed to move according to the law of elliptic motion./ Com-: paring the longitudes of the actual and the fictitious_ planet the former will sometimes be ahead of the latter and sometimes behind it. But in every case, if at a certaiii time /, the actual planet has a certain longitude, it is certain that at avery short interval dt before or after /, the fictitious planet will have this same longitude.' What Hansen's method does is to determine a correction dt such that, being applied to the actual time t, the longitude of the fictitious planet computed for the time t--dt, will give- the longitude of the true planet at the time t. By a number of ingenious devices Hansen developed methods by which dt could be determined. The computa- tions are, as a general rule, simpler, and the algebraic expressions less complex, than when the computations of the longitude itself are calculated. Although the longitude of the fictitious planet at the fictitious time is then equal to that of the true planet at the true time, their radii vectores will not be strictly equal. Hansen, therefore, shows how the radius vector is corrected so as to give that of the. true planet.

In all that precedes we have considered only two variables as determining the position of the planet, the latter being supposed to move in a plane. Although this is true when there are any number of bodies moving in the same plane, the fact is that the planets move in slightly different planes. Hence the position of the plane of the orbit of each planet is continually changing in consequence of their mutual; action. The problem of determining the changes is, however, simpler than others in perturbations. The mgthod_ is again that of the variation of elements. The position and velocity being given in all three co-ordinates, a certain osculating plane is determined for each instant in which the planet is moving at that instant. This plane remains invariable so long as no third body acts ;• when it , does ■ act the position of the plane changes very slowly, continually rotating round the radius vector of the planet as an instantaneous axis of rotation. _

Secular and Periodic Variations. — When, following the preceding method, the variations of the elements are expressed in terms of the time, they are found to be of two classes, periodic and secular. The first depend on the mean longitudes of the planets, and always tend back to their original values when the planets return to their original positions in their orbits. The others are, at least through long periods of time, continually progressive.

A luminous idea of the nature of these two classes of variation may be gained by conceiving of the motion of a ship, floatingipn an ocean affected, by a long ground swell. In consequence of the swell, the ship is continually pitching in a somewhat irregular way, the oscillations up and down being sometimes great and sometimes small. An observer on board of her would notice no motion except this. But, suppose the tide to be rising. Then; by continued observation, extended over an hour or more, it will be found that, in the general average, the ship is gradually rising, so that two different kinds of motion are superimposed on each other- . .. The effect. of the rising tide is in the nature of a secular variation, while the pitching is periodic. .„■.■.■■.

But the analogy does not end here. If the progressive rise of the ship be watched for six hours or more, it will be found gradually, to cease and reverse its direction. That is to say, making abstraction of the pitching, the ship is slowly rising and falling in a total period of nearly twelve hours, while superimposed upon this slow motion is a more rapid motion due to the waves. It is thus with the motions of the planets going through their revolutions. Each orbit continu- ally changes its form and position, sometimes in one direction and sometimes in another. But when these changes are averaged through years and centuries it is found that the average orbit has a secular variation which, for a number of centuries, may appear as a very slow progressive change in one direction only. But when this change is more fully investigated} it is found to be really periodic, so, that after thousands, tens of thousands, or hundreds of thousands of years, its direction will be reversed and so on continually,, like the rising and falling tide. The orbits, thus present; themselves to us in the words of a distinguished writer as ‘ Great clocks of eternity which beat ages as ours beat seconds.”

The periodic variations can be represented algebraically as the resultant of a series of harmonic motions in the following way : Let L be an angle which is increasing uniformly with the time, and let n be its rate of increase. We put L for its value at the moment from which the time is reckoned. The general expressipn for the angle will then be

lf — nt. + Lo…..

Such an angle continually goes through the round of 360° in a definite period. For example, if the daily motion is 5°, and we take the day as the unit of time, the round will be completed in 72 days, and the angle will continually go through the value which it had 72 days before. Let us now consider an equation of the form U = asin (nt-f-Li). ■ ,

The value of U will continually oscillate between the extreme values +0 and — a, going through a series of changes in the same

period in which the angle »< +Lo goes through a revolution. In this case the variation will be simply periodic.

The value of any element of the planet's motion will generally be represented by the sum of an infinite series of such periodic quantities, having different periods. For example

U = o sin (nt+Lo)+b sin (mt+Li)+c sin (fe< +L 2) &c. In this case the motion of U, while still periodic, is seemingly irrcjfaˆr, being much like that of a pitching ship, which has no one unvarying period.

In the problems of celestial mechanics the angles within the parentheses are represented by sums or differences of multiples of the mean longitudes of the planets as they move round their orbits. If / be the mean longitude of the planet whose motion we are con- sidering, and /' that of the attracting planet affecting it, the periodic inequalities of the elements as well as of the co-ordinates of the attracted planet, may be represented by an infinite series of terms like the following: —

a sin (/'-/) +6 sin (2l'-l)+c sin (/'-2/)+&c. Here the coefficients of / and /' may separately take all integral values, though as a general rule the coefficients a, b, c, &c. diminish rapidly when these coefficients become large, so that only small values have to be considered.

The most interesting kind of periodic inequalities are those known as " terms of long period." A general idea both of their nature and of their cause will be gained by taking as a special case one celebrated in the history of the subject — the great inequality between Jupiter and Saturn. We begin by showing what the actual fact is in the case

of these two planets. Let fig. 3 represent the two orbits, the sun being at C. _

We know that the period of Jupiter is nearly twelve years, and that of Saturn a little less than thirty years. It will be seen that these numbers are nearly in the ratio of 2 to 5. It follows that the motions of the mean longitudes are nearly in the same proportion re- versed. The annual motion of Jupiter is nearly 30°, that of Saturn a little more than 12°. Let us now consider the effect of this relation upon the configurations and relations of the two planets. Let the line CJ represent the common direction of the two planets from the sun when they are in conjunction, and let us follow the motions until they again come into conjunction. This will occur along a line CRi, making an angle of nearly 240 with CJ. At this point Saturn will have moved 240 and Jupiter an entire revolution +240°, making 6oo°. These two motions, it will be seen, are in the proportion 5 : 2. The next conjunction will take place along CSi, and the third after the initial one will again take place near the original position JQ, Jupiter having made five revolutions and Saturn two.

The result of these repetitions is that, during a number of revolu- tions, the special mutual actions of the two planets at these three points of their orbits repeat themselves, while the actions corres- ponding to the three intermediate arcs are wanting. Thus it happens that if the mutual actions are balanced through a period of a few revolutions only there is a small residuum of forces corresponding to the three regions in question, which repeats itself in the same way, and which, if it continued indefinitely, would entirely change the forms of the two orbits. But the actual mean motions deviate slightly from the ratio 2 :"5, and we have next to show how this deviation results in an ultimate balancing of the forces. The annual mean motions, with the corresponding combinations, are as follows : —

Jupiter:— n = 30°-349043 Saturn: — »' = i2 -221133 2» = 6o -69809 5«' = 6i -10567 5n'-2»= o -40758

If we make a more accurate computation of the conjunctions from these data, we shall find that, in the general mean, the consecutive conjunctions take place when each planet has moved through an entire number of revolutions-)-242-7 9 . It follows that the third conjunction instead of occurring exactly along the line CQi occurs along CQ», making an angle of nearly 8 with CQi. The successive conjunctions following will be along CR 2 , CSj, CQa, &c, the law of progression being obvious.

The balancing of the series of forces will not be complete until the respective triplets of conjunctions have filled up the entire space between them. This will occur when the angle whose annual motion is $n' — 2n has gone through 360 °. From the preceding value of

Fig. 3.

$n' — 2n we see that this will require a little more than 883 years. The result of the continued action of the two planets upon each other is that during half of this period the motion of one planet is constantly retarded and of the other constantly accelerated, while during the other half the effects are reversed. There is thus in the case of each planet an oscillation of the mean longitude which increases it and then diminishes it to its original value at the end of the period of 883 years.

The longitudes, latitudes and radii vectores of a planet, being algebraically expressed as the sum of an infinite periodic series of the kind we have been describing, it follows that the problem of finding their co-ordinates at any moment is solved by computing these expressions. This is facilitated by the construction of tables by means of which the co-ordinates can be computed at any time. Such tables are used in the offices of the national Ephemerides to construct ephemerides of the several planets, showing their exact positions in the sky from day to day.

We pass now to the second branch of celestial mechanics viz. that in which the planets are no longer considered as particles, but as rotating bodies of which the dimensions are to be taken into account. Such a body, in free space, not acted on by any force except the attraction of its several parts, will go on rotating for ever in an invariable direction. But, in consequence of the centrifugal force generated by the rotation, it assumes a spheroidal form, the equatorial regions bulging out. Such a form we all know to be that of the earth and of the planets rotating on their axes. Let us study the effect of this deviation from the spherical form upon the attraction exercised by a distant body.

*We begin with the special case of the earth as acted upon by the sun and moon. Let fig. 4 represent a section of the earth through its axis AB, ECQ being a diameter of the equator. Let the dotted lines show the direction of the distant attracting body. The point E, being more distant than C, will be attracted /^*

with less force, while Q will be attracted / c> with a greater force than will the centre C. Were the force equal on every point . of the earth it would have no influence on its rotation, but would simply draw p IG , 4.

its whole mass toward the attracting

body. It is therefore only the difference of the forces on different parts of the earth that affects the rotation.

Let us, therefore, divide the attracting forces at each point into two parts,

one the average force, whicn we may call F, and which for our purpose may be regarded as equal to the force acting at C ; the others the residual forces which we must superimpose upon the average force F in order that the combination may be equal to the actual force. It is clear that at Q this residual force as represented by the arrow will be in the same direction as the actual force. But at E, since the actual force is less than F, the residual force must tend to diminish F, and must, therefore, act toward the right, as shown by the arrow. These residual forces tend to make the whole earth turn round the centre C in a clockwise direction. If nothing modified this tendency the result would be to bring the points E and Q into the dotted lines of the attraction. In other words the equator would be drawn into coincidence with the ecliptic. Here, however, the same action comes into play, which keeps a rotating top from falling over. (See Gyroscope and Mechanics.) For the same reason as in the case of the gyroscope the actual motion of the earth's axis is at right angles to the line joining the earth and the attracting centre, and without going into the details of the mathematical processes involved, we may say that the ultimate mean effect will be to cause the pole P of the earth to move at right angles to the circle joining it to the pole of the ecliptic. Were the position of the latter invariable, the celestial pole would move round it in a circle. Actually the curve in which it moves is nearly a circle; but the distance varies slightly owing to the minute secular variation in the position of the ecliptic, caused by the action of the planets. This motion of the celestial pole results in a corresponding revolution of the equinox around the celestial sphere. The rate of motion is slightly variable from century to century owing to the secular motion of the plane of the ecliptic. Its period, with the present rate of motion, would be about 26,000 years, but the actual period is slightly indeterminate from the cause just mentioned.

The residual force just described is not limited to the case of an ellipsoidal body. It will be seen that the reasoning applies to the case of any one body or system of bodies, the dimensions of which are not regarded as infinitely small compared with the distance of the attracting body. In all such cases the residual forces virtually tend to draw those portions of the body nearest the attracting centre toward the latter, and those opposite the attracting centre away from it. Thus we have a tide-producing force tending to de-form the body, the action of which is of the same nature as the force producing precession. It is of interest to note that, very approxi- mately, this deforming force varies inversely as the cube of the distance of the attracting body.

The action of the sun upon the satellites of the several planets and the effects of this action are of the same general nature. For the same reason that the residual forces virtually act in opposite directions upon the nearer and more distant portions of a planet

they will virtually act in the case of a satellite. When the latter is between its primary and the sun, the attraction of the latter tends to draw the satellite away from the primary. When the satellite is in the opposite direction from the sun, the same action tends to draw the primary away from the satellite. In both cases, relative to the primary, the action is the same. When the satellite is in quadrature the convergence of the lines of attraction toward the centre of the sun tends to bring the two bodies together. When the orbit of the satellite is inclined to that of the primary planet round the sun, the action brings about a change in the plane of the orbit represented by a rotation round an axis perpendicular to the plane of the orbit of the primary. If we conceive a pole to each of these orbits, determined by the points in which lines perpendicular to their planes intersect the celestial sphere, the pole of the satellite orbit will revolve around the pole of the planetary orbit precisely as the pole of the earth does around the pole of the ecliptic, the inclination of the two orbits remaining unchanged.

If a planet rotates on its axis so rapidly as to have a considerable ellipticity, and if it has satellites revolving very near the plane of the equator, the combined actions of the sun and of the equatorial protuberances may be such that the whole system will rotate almost as if the planes of revolution of the satellites were solidly fixed to the plane of the equator. This is the case with the seven inner satellites of Saturn. The orbits of these bodies have a large inclina- tion, nearly 27 , to the plane of the planet's orbit. The action of the sun alone would completely throw them out of these planes as each satellite orbit would rotate independently; but the effect of the mutual action is to keep all of the planes in close coincidence with the plane of the planet's equator.

Literature. — The modern methods of celestial mechanics may be considered to begin with Joseph Louis Lagrange, whose theory of the variation of elements is developed in his Mecanique analy- tique. The practical methods of computing perturbations of the planets and satellites were first exhaustively developed by Pierre Simon Laplace in his Mecanique celeste. The only attempt since the publication of this great work to develop the various theories involved on a uniform plan and mould them into a consistent whole is that of de Pontecoulant in ThSorie analytique du systeme du monde (1829-46, Paris). An approximation to such an attempt is that of F. F. Tisserand in his Traite de mecanique celeste (4 vols., Paris).

This work contains a clear and excellent resume of the methods which have been devised by the leading investigators from the time of Lagrange until the present, and thus forms the most encyclopaedic treatise to which the student can refer.

Works less comprehensive than this are necessarily confined to the elements of the subject, to the development of fundamental principles and general methods, or to details of special branches. An elementary treatise on the subject is F. R. Moulton's Intro- duction to Celestial Mechanics (London, 1902). Other works with the same general object are H. A. Resal, Mecanique celeste; and O. F. Dziobek, Theorie der Planetenbewegungen. The most com- plete and systematic development of the general principles of the subject, from the point of view of the modern mathematician, is found in J. H. Poincare, Les Methodes nouvelles de la mecanique celeste (3 vols., Paris, 1899, 1892, 1893). Of another work of Poincare, Lecons de mecanique celeste, the first volume appeared in

1905.

Practical Astronomy.

Practical Astronomy, taken in its widest sense, treats of the instruments by which our knowledge of the heavenly bodies is acquired, the principles underlying their use, and the methods by which these principles are practically applied. Our know- ledge of these bodies is of necessity derived through the medium of the light which they emit; and it is the development and applications of the laws of light which have made possible the additions to our stock of such knowledge since the middle of the 19th century.

At the base of every system of astronomical observation is the law that, in the voids of space, a ray of light moves in a right line. The fundamental problem of practical astronomy is that of determining by measurement the co-ordinates of the heavenly bodies as already defined. Of the three co-ordinates,the radius vector does not admit of direct measurement, and must be inferred by a combination of indirect measurements and physical theories. The other two co- ordinates, which define the direction of a body, admit of direct measurement on principles applied in the construction and use of astronomical instruments.

In the first system of co-ordinates already described the funda- mental axis is the vertical line or direction of gravity at the point of observation. This is not the direction of gravity proper, or of the earth's attraction, but the resultant of this attraction combined with the centrifugal force due to the earth's rotation on its axis. The most obvious method of realizing this

direction is by the plumb-line. In our time, however, this appliance is replaced by either of two others, which admit o(much more precise application. These are the basin of mercury and the spirit-level. The surface of a liquid at rest is necessarily perpendicular to the direction of gravity, and

therefore horizontal. Considered as a curved surface, concentric with the earth, a tangent plane to such a surface is the plane of the horizon. The problem of measuring from an axis perpendicular to this plane is solved on the principle that the incident and reflected rays of light make equal angles with the perpendicular to a reflecting

I surface. It follows that if PO (fig. 5) is the direction of a ray, either

from a heavenly body or from a terrestrial point, impinging at O upon the surface of quicksilver, and reflected in the direction OR, the vertical line is the bisector OZ, of the angle POR. If the point P is so adjusted over the quicksilver that the ray is reflected back

ME

]M

Fig. 6.

on its own path, P and R lying on the same line above O, then we know that the line PO is truly vertical. The zenith-distance of an object is the angle which the ray of light from it makes with the vertical direction thus defined.

To show the principle involved in the spirit-level let MN (fig. 6) be the tube of such a level, fixed to an axis OZ on which it may revolve. If this axis is so adjusted that in the course of a revolution around it the bubble of the level undergoes no change of position, we know that the axis is truly vertical. Any slight deviation from verticality is shown by the motion of the bubble during the revolu- tion, which can be measured and allowed for. The level may not be actually attached to an axis, a revolution of 180° being effected round an imaginary vertical axis by turning the level end for end. The motion of the bubble then measures double the inclination of this imaginary axis, or the deviation of a cylinder on which the level may rest from horizontality.

The problem of determining the zenith distance of a celestial object now reduces itself to that of measuring the angle between the direction of the object and the direction of the vertical line realized in one of these ways. This measurement is effected by a combination of two instruments, the

telescope and the graduated circle. Let OF (fig. 7) be a section of the telescope, MN being its

M

..-O

*3**

N

Fig. 7.

object glass. Let the parallel dotted lines represent rays of light emanating from the object to be observed, which, for our purpose, we regard as infinitely distant, a star for example. These rays come to a focus at a point F lying in the focal plane of the telescope. In this plane are a pair of cross threads or spider lines which, as the observer looks into the telescope; are seen as AB and CD (fig. 8). If the telescope is so pointed that the image of the star is seen in coincidence with the cross threads, as represented in fig. 8, then we know that the star is exactly in the line of sight of the telescope, defined as the line joining the centre of the object glass, and the point of inter- section of the cross threads. If the telescope is moved around so that the images of two distant points are successively brought into coincidence with the cross threads, we know that the angle between the directions of these points is equal to that through which the telescope has been turned. This angle is measured by means of a

B

D

Fig. 8.

graduated circle, rigidly attached" to the tube of the telescope in a plane parallel to the line of sight. When the telescope is turned in this plane, the angular motion of the line of sight is equal to that through which the circle has turned.

Stripped of all unnecessary adjuncts, and reduced to a geometric form, the ideal method by which the zenith distance of a heavenly body is determined by the combination which we have described is as follows :— Let OP (fig. 9) be the direction of a celestial body at which a telescope, supplied with a graduating circle, is pointed. Let OZ be an axis, as nearly vertical as it can easily be set, round which

the entire instrument may revolve through 180 . After the image of the body is brought into coincidence with the cross threads, the instrument is turned through i8o c on the axis, which results in the

line of sight of the telescope pointing in a certain direction OQ, determined by the condition QOZ = ZOP. The telescope is then a second time pointed at the object by being moved through the angle QOP. Either of the angles QOZ and ZOP is then one half that through which the telescope has been turned, which may be measured by a graduated circle, and which is the zenith distance of the object measured from the direction of the axis OZ. This axis may not be exactly vertical. Its deviation from the vertical line is determined by the motion of the bubble of a spirit-level rigidly attached either to the axis, or to the telescope. Applying this deviation to the measured arc, the true zenith distance of the body is found. When the basin of quicksilver is used, the telescope, either before or after being directed toward P, is pointed directly downwards, so that the observer mounting above it looks through it into the reflect- ing surface. He then adjusts the instrument so that the cross threads coincide with their images reflected from the surface of the quicksilver. The angular motion of the telescope in passing from this position to that when the celestial object is in the line of sight is the distance (ND) of the body from the nadir. Subtracting go° from (ND) gives the altitude; and subtracting (ND) from 180° gives the zenith distance.

In the measurement of equatorial co-ordinates, the polar distance is determined in an analogous way. We determine the apparent position of an object near the pole on the celestial sphere at any moment, and again at another moment, twelve hours later, when, by the diurnal motion, it has made half a revolution. The angle through the celestial pole, between these two positions, is double the polar distance. The pole is the point midway between them. This being ascertained by one or more stars near it, may be used to determine by direct, measurements the polar distances of other bodies.

The preceding methods apply mainly to.the latitudinal co-ordinate. To measure the difference between the longitudinal co-ordinates of two objects by means of a graduated circle the instruments must turn on an axis parallel to the principal axis of the system of co- ordinates, and the plane of the graduated circle must be at right angles to that axis, and, therefore,

parallel to the principal co-ordinate plane. The telescope, in order that it may be pointed in any direc- tion, must admit of two motions, one round the principal axis, and the other round an axis at right angles to it. By these two motions the instrument may be pointed first at one of the objects and then at the other. The motion of the graduated circle in passing from one pointing to the other is the measure of the difference between the longitudinal co-ordinates of the two objects.

In the equatorial system this co-ordinate (the right ascension) is measured in a different way, by making the rotating earth perform the function of a graduated circle. The unceasing -diurnal motion of the image of any heavenly body relative to the cross threads of a telescope makes a direct accurate measure of any co-ordinate except the declination almost impossible. Before the position of a star can be noted, it has passed away from the cross threads. This trouble- some result is utilized and made a means of measurement. Right ascensions are now determined, not by measuring the angle between one star and another, but, by noting the time between the transits of successive stars over the meridian. The difference between these times, when reduced to an angle, is the difference of the right ascen- sions of the stars. The principle is the same as that by which the distance between two stations may be determined by the time required for a train moving at a uniform known speed to pass from one station to the other. The uniform speed of the diurnal motion is 1 5° per hour. We have already mentioned that in astronomical practice right ascensions are expressed in time, so that no multi- plication by 15 is necessary.

Measures made on the various systems which we have described give the apparent direction of a celestial object as seen by the observer. But this is not the true direction, because the ray of light from the object undergoes refraction in passing through the atmo- sphere. It is therefore necessary to correct the observation for this effect. This is one of the most troublesome problems in astronomy because, owing to fhe ever varying density of the atmosphere, arising from differences of temperature, and owing to the impossi- bility of determining the temperature .with entire precision at any other point than that occupied by the observer, the amount of refraction must always be more or less uncertain. The complexity of the problem will be seen by reflecting that the temperature of the air inside the telescope is not without its effect. This temperature may be and commonly is somewhat different from that of the observ- ing room, which, again, is commonly higher than the temperature of

the air outside. The uncertainty thus arising in the amount of the refraction is least near the zenith, but increases more and more as the horizon is approached.

The result of astronomical observations which is ordinarily wanted is not the direction of an object from the observer, but from the centre of the earth. Thus a reduction for parallax is required. Having effected this reduction, and computed the correction to be applied to the observation in order to eliminate all known errors to which the instrument is liable, the work of the practical astronomer is completed.

The instruments used in astronomical research are described under their several names. The following are those most used in astrometry: —

. The equatorial telescope (q.v.) is an instrument which can be directed to any point in the sky, and which derives its appellation from its being mounted on an axis parallel to that of the earth. By revolving on this axis it follows a star in its diurnal motion, so that the star is kept in the field of view notwithstanding that motion.

Next in extent of use are the transit instrument and the meridian circle, which are commonly united in a single instrument, the transit circle {q.v.), known also as the meridian circle. This instrument moves only in the plane of the meridian on a horizontal east and west axis, and is used to determine the right ascensions and de- clinations of stars. These two instruments or combinations are a necessary part of the outfit of every important observatory. An adjunct of prime importance, which is necessary to their use, is an accurate clock, beating seconds.

Use of Photography. — Before the development of photography, there was no possible way of making observations upon the heavenly bodies except by the eye. Since the middle of the 19th century the system of photographing the heavenly bodies has been introduced, step by step, so that it bids fair to supersede eye observations in many of the determinations of astronomy. (See Photography; Celestial.)

The field of practical astronomy includes an extension which may be regarded as making astronomical science in a certain sense universal. The science is concerned with the heavenly bodies. The earth on which we live is, to all intents and purposes, one of these bodies, and, so far as its relations to the heavens are concerned, must be included in astronomy. The processes of measuring great portions of the earth, and of determining geographical positions, require both astronomical observations proper, and determinations made with instruments similar to those of astronomy. Hence geodesy may be regarded as a branch of practical astronomy. (S. N.)

History of Astronomy.

A practical acquaintance with the elements of astronomy is indispensable

to the conduct of human life. Hence it is most widely diffused among uncivilized peoples, whose existence depends upon immediate and unvarying „ffh° submission to the dictates of external nature. Having science. no clocks, they regard instead the face of the sky; the stars serve them for almanacs; they hunt and fish, they sow and reap in correspondence with the recurrent order of celestial appearances. But these, to the untutored imagination', present a mystical, as well as a mechanical aspect; and barbaric familiarity with the heavens developed at an early age, through the promptings of superstition, into a fixed system of observation. In China, Egypt and Babylonia, strength and continuity were lent to this native tendency by the influence of a centralized authority; considerable proficiency was attained in the arts of observation; and from millennial stores of accumulated data, empirical rules were deduced by which the scope of prediction was widened and its accuracy enhanced. But no genuine science of astronomy was founded until the Greeks sublimed experience into theory.

Already, in the third millennium B.C., equinoxes and solstices were determined in China by means of culminating stars. This is known from the orders promulgated by the emperor Yao about 2300 B.C., as recorded in the Shu Chung, ˆtnO a collection of documents antique in the time of aamy. Confucius (550-478 B.C.). And Yao was merely the renovator of a system long previously established. The Shu Chung further relates the tragic fate of the official astronomers, Hsi and Ho, put to death for neglecting to perform, the rites customary during an eclipse of the sun, identified by Professor S. E. Russell 1 with a partial obscuration visible in northern China 2136 B.C. The date cannot be far wrong, and it is by far the earliest assignable to an event of the kind. There is, however', no certainty that the Chinese were then capable of predicting 1 The Observatory, Nos. 231-234, 1895.*

edipses. They were, on the other hand, probably acquainted, a couple of millenniums before Meton gave it his name, with the nineteen-year cycle, by which solar and lunar years were harmonized; 1 they immemorially made observations in the meridian; regulated time by water-clocks, and used measuring instruments of the nature of armillary spheres and quadrants. In or near noo B.C., Chou Kung, an able mathematician, determined with surprising accuracy the obliquity of the ecliptic; but his attempts to estimate the sun's distance failed hopelessly as being grounded

on belief in the flatness of the earth. From of old, in China, circles were divided into 365I parts, so that the sun described daily one Chinese degree; and the equator began to be employed as a line of reference, concurrently with the ecliptic, probably in the second century B.C. Both circles, too, were marked by star-groups more or less clearly designated and denned. Cometary records of a vague kind go back in China to 2296 B.C.; they are intelligible and trustworthy from 611 B.C. onward. Two instruments constructed at the time of Kublai Khan's accession in 1280 were still extant at Peking in 1881. They were provided with large graduated circles adapted for measurements of declination and right ascension, and prove the Chinese to have anticipated by at least three centuries some of Tycho Brahe's most important inventions. 2 The native astronomy was finally superseded in the 17th century by the scientific teachings of Jesuit missionaries from Europe.

Astrolatry was, in Egypt, the prelude to astronomy. The stars were observed that they might be duly worshipped. The importance of their heliacal risings, or first visible Egyptian appearances at dawn, for the purposes both of practical nomy. life an d of ritual observance, caused them to be systematically noted; the length of the year was accurately fixed in connexion with the annually recurring Nile-flood; while the curiously precise orientation of the Pyramids affords a lasting demonstration of the high degree of technical skill in watching the heavens attained in the third millennium B.C. The con- stellational system in vogue among the Egyptians appears to have been essentially of native origin; but they contributed little or nothing to the genuine progress of astronomy.

With the Babylonians the case was different, although their science lacked the vital principle 'of growth imparted to it by Baby- tne i r successors. From them the Greeks derived their Ionian first notions of astronomy. They copied the Baby- astro- Ionian asterisms, appropriated Babylonian knowledge aomy. | ˆg p} ane t s an d their courses, and learned to predict eclipses by means of the "Saros." This is a cycle of 18 years 11 days, or 223 lunations, discovered at an unknown epoch in Chaldaea, at the end of which the moon very nearly returns to her original position with regard as well to the sun as to her own nodes and perigee. There is no getting back to the beginning of astronomy by the shores of the Euphrates. Records dating from the reign of Sargon of Akkad (3800 B.C.) imply that even then the varying aspects of the sky had been long under expert observation. Thus early, there is reason to suppose, the star- groups with which we are now familiar began to be formed. They took shape most likely, not through one stroke of invention, but incidentally, as legends developed and astrological persua- sions became defined. 3 The zodiacal series in particular seem to have been reformed and reconstructed at wide intervals of time (see Zodiac). Virgo, for example, is referred by P. Jensen, on the ground of its

harvesting associations, to the fourth millennium B.C., while Aries (according to F. K. Ginzel) was interpolated at a comparatively recent time. In the main, however, the constellations transmitted to the West from Babylonia by Aratus and Eudoxus must have been arranged very much in their present order about 2800 B.C. E. W. Maunder's argument to this effect is unanswerable. 4 For the space of the

1 Observations of Comets, translated from the Chinese Annals by' John Williams, F.S.A. (1871).

2 J. L. E. Dreyer, Proc. Roy. Irish Acad. vol. iii. No. 7′ (December

188 1).

3 F. K. Ginzel, " Die astronomischen Kenntnisse der Babylonier," C. F. I.ehmann, Beitruge zur alten Geschichte, Heft i. p. 6 (1001).

1 Knowledge and Scientific News, vol. i. pp. 2, 228.

southern sky left blank of stellar emblazonments was necessarily centred on the pole; and since the pole shifts among the stars through the effects of precession by a known annual amount, the ascertainment of any former place for it virtually fixes the epoch. It may then be taken as certain that the heavens described by Aratus in 270 B.C. represented approximately observations made some 2500 years earlier in or near, north latitude 40 .

In the course of ages,' Babylonian astronomy, purified from the astrological taint, adapted itself to meet the most refined needs of civil life. The decipherment and interpretation by the learned Jesuits, Fathers Epping and Strassmeier, of a number of clay tablets preserved in the British Museum, have" supplied detailed knowledge of the methods practised in Mesopotamia in the 2nd century B.C. 6 They show no trace of Greek influence', and were doubtless the improved outcome of an unbroken tradition. How protracted it had been, can be in a measure estimated from the length of the revolutionary cycles found for the planets. The Babylonian computers were not only aware that Venus returns in almost exactly eight years to a given starting-point in the sky, but they had established similar periodic relations in 46, 59, 79 and 83 years severally for Mercury, Saturn, Mars and Jupiter. They were accordingly able to fix in advance the approximate positions of these objects with reference to ecliptical stars which served as fiducial points for their determination. 'In the Ephemerides published year by year, the times of new moon were given, together with the calculated intervals to the first visibility of the crescent, from which the beginning of each month was reckoned; the dates and circumstances of solar and lunar eclipses were predicted; and due information was supplied

as to the forthcoming heliacal risings and settings, conjunctions and oppositions of the planets; The Babylonians knew of the inequality in the dally motion of the sun, but misplaced by io° the perigee of his orbit. Their sidereal year was 4§ m too long, 6 and they kept the ecliptic stationary among the stars, making no allowance for the shifting of the equinoxes. The striking discovery, on the other hand; has been made by the Rev. F. X. Kugler 7 that the various periods underlying their lunar predictions were identical with those heretofore believed to have been independently arrived at by Hipparchus, who accordingly must be held to have borrowed from Chaldaea the lengths of the synodic, sidereal, anomalistic and draconitic months.

A steady flow of knowledge from East to West began in the 7th century B.C. A Babylonian sage named Berossus founded a school about 640 B.C. in the island of Cos, and perhaps oreek counted Thales of Miletus' (c. 639-548) among his astro- pupils. ' The famous " eclipse of Thales " in 585 bTc. nomjt. has not, it is true, been authenticated by modern , &

research 8 ; yet the story told by Herodotus appears to intimate that a knowledge of the Saros, and of the forecasting facilities connected with it, was possessed by the Ionian sage. Pythagoras of Samos (fl. 540-510 B.C.) learned on his travels in Egypt and the East to identify the morning and .

evening stars, to recognize the obliquity of the ecliptic, goras. and to regard the earth as a sphere freely poised in space. The tenet of its axial movement was held by many of his followers — in an obscure form by Philolaus of Crotona after the middle of the 5th century B.C., and more explicitly by Ecphantus and Hicetas of Syracuse (4th century'B.c), and by Heraclides of Pontus. Heraclides, who became a disciple of '

Plato in 360 B.C., taught in addition that the sun, B4e&. while circulating round the earth, was the centre of revolution to Venus and Mercury. 9 A genuine heliocentric system, developed by Aristarchus of Samos (fl. 280-264 B.C.), was described by Archimedes in his Arenarius, only to be' set aside

8 Astronomisches aus Babylon (Freiburg im Brejsgau, 1889).

8 Ginzel, foe. cit. Heft ii. p. 204.

7 Die babylonische Mondrechnung, p. 50 (1900). a S. Newcomb, Aslr. Nach. No. 3682; P. H. Cowell, Month. Notices Roy. Astr. Soc. lxv. 867.

9 G. V. Schiaparelli, / Precursors del Copernico, pp. 23-28, Pubbl. del R. Osservatorio di Brera, No. iii. (1873).

with disapproval. The long-lived conception of a series of crystal spheres, acting as the vehicles of the heavenly bodies, and attuned to divine harmonies, seems to have originated with Pythagoras himself.

The first mathematical theory of celestial appearances was devised by Eudoxus of Cnidus (408-355 B.C.). 1 The problem he Eudoxus. attempted to solve was so to combine uniform circular

movements as to produce the resultant effects actually observed. The sun and moon and the five planets were, with this end in view, accommodated each with a set of variously revolving spheres, to the total number of 27. The Eudoxian or " homocentric " system, after it had been further elaborated by Callippus and Aristotle, was modified by Apollonius of Perga (fl. 250-220 B.C.) into the hypothesis of deferents and epicycles, which held the field for 1800 years as the characteristic embodi- ment of Greek ideas in astronomy. Eudoxus further wrote two works descriptive of the heavens, the Enoptron and Phaenomena, which, substantially preserved in the Phaenomena of Aratus (fl. 270 B.C.), provided all the leading features of modern stellar nomenclature.

Greek astronomy culminated in the school of Alexandria. It was, soon after its foundation, illustrated by the labours of

Aristyllus and Timocharis (c. 320-260 B.C.), who Alex – ° constructed the first catalogue giving star-positions as madria. measured from a reference-point in the sky. This

fundamental advance rendered inevitable the detection of precessional effects. Aristarchus of Samos observed at Alexandria 280-264 B.C. His treatise on the magnitudes and

distances of the sun and moon, edited by John tarehus. Wallis in 1688, describes a theoretically valid method

for determining the relative distances of the sun and moon by measuring the angle between their centres when half the lunar disk is illuminated; but the time of dichotomy being widely indeterminate, no useful result was thus obtainable. Aristarchus in fact concluded the sun to be not more than twenty times, while it is really four hundred times farther off than our satellite. His general conception of the universe was comprehensive beyond that of any of his predecessors.

Eratosthenes (276-196 B.C.), a native of Cyrene, was summoned from Athens to Alexandria by Ptolemy Euergetes to take charge

of the royal library. He invented, or improved theac. armillary spheres, the chief implements of ancient*

astrometry, determined the obliquity of the ecliptic at 23° 51′ (a value 5′ too great), and introduced an effective mode of arc-measurement. Knowing Alexandria and Syene to be situated 5000 stadia apart on the same meridian, he found the sun to be 7 1 2′ south of the zenith at the northern extremity of this arc when it was vertically overhead at the southern

extremity, and he hence inferred a value of 252,000 stadia for the entire circumference of the globe. This is a very close approximation to the truth, if the length of the unit emDloyed has been correctly assigned. 2

Among the astronomers of antiquity, two great men stand out with unchallenged pre-eminence. Hipparchus and Ptolemy

entertained the same large organic designs; they pJnhus worked on similar methods; and, as the outcome,

their performances fitted so accurately together that between them they re-made celestial science. Hipparchus fixed the chief data of astronomy — the lengths of the tropical and sidereal years, of the various months, and of the synodic periods of the five planets; determined the obliquity of the ecliptic and of the moon's path, the place of the sun's apogee, the eccentricity of his orbit, and the moon's horizontal parallax; all with ap- proximate accuracy. His loans from Chaldaean experts appear, indeed, to have been numerous; but were doubtless independ- ently verified. His supreme merit, however, consisted in the establishment of astronomy on a sound geometrical basis. His acquaintance with trigonometry, a branch of science initiated by

1 G. V. Schiaparelli, / Precursori del Copernico, pp. 23-28, Pubbl. del R. Osservatorio di Brera, No. ix.

- *Marie. Hist, des sciences, t. i. p. 79; P. Tannery, Hist, de Vastro- nomie ancienne, ch. v. p. 115.*

him, together with his invention of the planisphere, enabled him to solve a number of elementary problems; and he was thus led to bestow especial attention upon the position of the equinox, as being the common point of origin for measures both in right ascension and longitude. Its steady retrogression among the stars became manifest to him in 130 B.C., on comparing his own observations with those made by Timocharis a century and a half earlier; and he estimated at not less than 36″ (the true value being 50") the annual amount of "precession."

The choice made by Hipparchus of the geocentric theory of the universe decided the future of Greek astronomy. He further elaborated it by the introduction of " eccentrics," which accounted for the changes in orbital velocity of the sun and moon by a displacement of the earth, to a corresponding extent, from the centre of the circles they were assumed to describe. This gave the elliptic inequality known as the " equation of the centre," and no other was at that time obvious. He attempted no detailed discussion of planetary theory; but his catalogue of 1080 stars, divided into six classes of brightness, or " magni- tudes," is one of the finest monuments

of antique astronomy. It is substantially embodied in Ptolemy's Almagest (see Ptolemy).

An interval of 250 years elapsed before the constructive labours ot Hipparchus obtained completion at Alexandria. His observations were largely, and somewhat arbi- pt i em y. trarily, employed by Ptolemy. Professor Newcomb, who has compiled an instructive table of the equinoxes severally observed by Hipparchus and Ptolemy, with their errors deduced from Leverrier's solar tables, finds palpable evidence that the discrepancies between the two series were artificially reconciled on the basis of a year 6 m too long, adopted by Ptolemy on trust from his predecessor. He nevertheless holds the process to have been one that implied no fraudulent intention.

The Ptolemaic system was, in a geometrical sense, defensible; it harmonized fairly well with appearances, and physical reason- ings had not then been extended to the heavens. To the ignorant it was recommended by its conformity to crude common sense; to the learned, by the wealth of ingenuity expended in bringing it to perfection. The Almagest was the consummation of Greek astronomy. Ptolemy had no successor; he found only commen- tators, among the more noteworthy of whom were Theon of Alexandria (fl. a.d. 400) and his daughter Hypatia (370-415). With the capture of Alexandria by Omar in 641, the last glimmer of its scientific light became extinct, to be rekindled, a century and a half later, on the banks of the Tigris. The first Arabic transla- tion of the Almagest was made by order of Harun al-Rashid about the year 800; others followed, and the Caliph al-Mamun built in 829 a grand observatory at astm- Bagdad. Here Albumazar (805-885) watched the skies nomers. and cast horoscopes; here Tobit ben Korra (836- 901) developed his long unquestioned, yet misleading theory of the "trepidation" of the equinoxes; Abd-ar-rahrnan al-Suf 903-986) revised at first hand the catalogue of Ptolemy; 3 and Abulwefa (939-998), like al-Sufi, a native of Persia, made con- tinuous planetary observations, but did not (as alleged by L. Sedillot) anticipate Tycho Brahe's discovery of the moon's variation. Ibn Junis {c. 950-1008), although the scene of his activity was in Egypt, falls into line with the astronomers of Bagdad. He compiled the Hakimite Tables of the planets, and observed at Cairo, in 977 and 978, two solar eclipses which, as being the first recorded with scientific accuracy, 4 were made available in fixing the amount of lunar acceleration. Nasir ud-din (1201-1274) drew up the Ilkhanic Tables, and determined the constant of precession at 51". He directed an observatory established by Hulagu Khan (d. 1265) at Maraga in Persia, and equipped with a mural quadrant of 1 2 ft. radius, besides altitude and azimuth instruments. Ulugh Beg (1394-1449), a grandson of Tamerlane, was the illustrious personification of Tatar

3 Published by H. C. Schjellerup in a French translation (St Peters- burg, 1874).

4 Newcomb, Researches an the Motion of the Moon, Washington Observations for 1875, Appendix ii. p. 20.

Walther.

astronomy. He founded about 1420 a splendid observatory at Samarkand, in which he re-determined nearly all Ptolemy's stars, while the Tables published by him held the primacy for two centuries. 1

Arab astronomy, transported by the Moors to Spain, flourished temporarily at Cordova and Toledo. From the latter city the

Toletan Tables, drawn up by Arzachel in 1080, took astro- their name; and there also the Alfonsine Tables, nomy, published in 1252, were prepared under the authority

of Alphonso X. of Castile. Their appearance signalized the dawn of European science, and was nearly coincident with that of the Sphaera Mundi, a text-book of spherical astronomy,

written by a Yorkshireman, John Holywood, known astro?" as Sacro Bosco (d. 1256). It had an immense vogue, nomy. perpetuated by the printing-press in fifty-nine*

editions. In Germany, during the 15th century, a brilliant attempt was made to patch up the flaws in Ptolemaic doctrine. George Purbach (1423-1461) introduced into Europe Purbacb tne metrio< i of determining time by altitudes employed

by Ibn Junis. He lectured with applause at Vienna from 1450; was joined there in 1452 by Regiomontanus (q.v.); and was on the point of starting for Rome to inspect a manuscript of the Almagest when he died suddenly at the age of thirty-eight. His teachings bore fruit in the work of Regiomontanus, and of

Bernhard Walther of Nuremberg (1430-1504), who

fitted up an observatory with clocks driven by weights, and developed

many improvements in practical astronomy.

Meantime, a radical reform was being prepared in Italy. Under the searchlights of the new learning, the dictatorship of Ptolemy appeared no more inevitable than that of Aristotle; advanced thinkers like Domenico Maria Novara (1454-1504) pro- mulgated sub rosa what were called Pythagorean opinions; and

they were eagerly and fully appropriated by Nicolaus nfcusT Copernicus during his student-years (1496-1505) at

Bologna and Padua. He laid the groundwork of his heliocentric theory between 1506 and 1512, and brought it to completion in De Revolutionibus Orbium Coelestium (1543). The colossal task of remaking astronomy on an inverted design was, in this treatise, virtually accomplished. Its reasonings were solidly founded on the principle of the relativity of motion. A continuous shifting of the standpoint was in large measure substituted for the displacements of the objects viewed, which thus acquired a regularity and consistency heretofore lacking to them. In the new system, the sphere of the fixed stars no longer revolved diurnally, the earth rotating instead on an axis directed towards the celestial pole. The sun too remained stationary, while the planets, including our own globe, circulated round him. By this means, the planetary " retrogradations " were explained as simple perspective effects due to the combination of the earth's revolutions with those of her sister orbs. The retention, however, by Copernicus of the antique postulate of uniform circular motion impaired the perfection of his plan, since it involved a partial survival of the epicyclical machinery. Nor was it feasible, on this showing, to place the sun at the true centre of any of the planetary orbits; so that his ruling position in the midst of them was illusory. The reformed scheme was then by no means perfect. Its simplicity was only comparative; many out- standing anomalies compromised its harmonious working. Moreover, the absence of sensible parallaxes in the stellar heavens seemed inconsistent with its validity; and a niobile earth outraged deep-rooted prepossessions. Under these dis- advantageous circumstances, it is scarcely surprising that the heliocentric theory, while admired as a daring speculation, won its way slowly to acceptance as a truth.

The Tabulae Prutenicae, calculated on Copernican principles by Erasmus Reinhold (1511-1553), appeared in 1551. Although they represented celestial movements far better than the Alfonsine Tables, large discrepancies were still apparent, and the desirability of testing the novel hypothesis upon which they were based by more refined observations prompted a reform of 1 F. Baily, Memoirs Roy. Astr. Society, vol. xiii. p. 19.

Kepler.

methods, undertaken almost simultaneously by the landgrave William IV. of Hesse-Cassel (1532-1592), and by Tycho Brahe. The landgrave built at Cassel in 1 561 the first observa- tory with a revolving dome, and worked for some years tory ot at a star-catalogue finally left incomplete. Christoph cassel. Rothmann and Joost Burgi (1552-1632) became his assistants in 1577 and 1579 respectively; and through the skill of Burgi, time-determinations were made available for measuring right ascensions. At Cassel, too, the altitude and azimuth instrument is believed to have made its first appearance in Europe. 2

Tycho's labours were both more strenuous and more effective. He perfected the art of pre-telescopic observation. His instru- ments were on a scale and of a type unknown since the days of Nasir ud-din. At Augsburg, in 1569, he Brahe. ordered the construction of a 19-ft. quadrant, and of a celestial globe 5 ft. in diameter; he substituted equatorial for zodiacal armillae, thus definitively establishing the system of measurements in right ascension and declination; and improved the graduation of circular arcs by adopting the method of " transversals." By these means, employed with consummate skill, he attained an unprecedented degree of accuracy, and as an incidental though valuable result, demonstrated the unreality of the supposed trepidation of the equinoxes.

No more congruous arrangement could have been devised than the inheritance by Johann Kepler of the wealth of materials amassed by Tycho Brahe. The younger man's genius supplied what was wanting to his predecessor. Tycho's endowments were of the practical order; yet he had never designed his observations to be an end in themselves. He thought of them as means towards the end of ascertaining the true form of the universe. His range of ideas was, however, restricted; and the attempt embodied in his ground^plan of the solar system to revive the ephemeral theory of Heraclides failed to influence the development of thought. Kepler, on the contrary, was endowed with unlimited powers of speculation, but had no mechanical faculty. He found in Tycho's ample legacy of first-class data precisely what enabled him to try, by the touchstone of fact, the successive hypotheses that he imagined; and his untiring patience in comparing and calcu- lating the observations at his disposal was rewarded by a series of unique discoveries. He long adhered to the tradi- tional belief that all celestial revolutions must be performed equably in circles; but a laborious computation of seven re- corded oppositions of Mars at last persuaded him that the planet travelled in an ellipse, one focus of which was occupied by the sun. Pursuing the inquiry, he found that its velocity was uniform with respect to no single point within the orbit, but that the areas described, in equal times, by a line drawn from the sun to the planet

were strictly equal. These two principles he extended, by direct proof, to the motion of the earth; and, by analogy, to that of the other planets. They were published in 1609 in De Motibus Stellae Martis. The announcement of the third of " Kepler's Laws " was made ten years later, in De Harmonice Mundi. It states that the squares of the periods of circulation round the sun of the several planets are in the same ratio as the cubes of their mean distances. This numerical proportion, as being a necessary consequence of the law of gravitation, must prevail in every system under its sway. It does in fact prevail among the satellite-families of our acquaintance, and presumably in stellar combinations as well. Kepler's ineradicable belief in the existence of some such congrui'ty was derived from the Pythagorean idea of an underlying harmony in nature; but his arduous efforts for its realization took a devious and fantastic course which seemed to give little promise of their surprising ultimate success. The outcome of his discoveries was, not only to perfect the geometrical plan of the solar system, but to enhance very materially the predicting power of astronomy. The Rudolphine Tables (Ulm, 1627), computed by him from elliptic elements, retained authority for a century, and have in principle never been superseded. He was deterred from research into the 2 J. L. E. Dreyer, Life of Tycho Brahe, p. 321.

orbital relations of comets, by his conviction of their perishable nature. He supposed their tails to result from the action of solar rays, which, in traversing their mass, bore off with them some of their subtler particles to form trains directed away from the sun. And through the process of waste thus set on foot; they finally dissolved into the aether, and expired " like spinning insects." (De Cometis; Opera, ed. Frisch, t. vii. p. 110.) This remarkable anticipation of the modern theory of light-pressure was suggested to him by his observations of the great comets of 1618.

The formal astronomy of the ancients left Kepler unsatisfied. He aimed at finding out the cause as well as the mode of the planetary revolutions; and his demonstration that the planes in which they are described all pass through the sun was an important preliminary to a physical explanation of them. But his efforts to supply such an explanation were rendered futile by his imperfect apprehension of what motion is in itself. He had, it is true, a distinct conception of a force analogous to that of gravity, by which cognate bodies tended towards union. Misled, however, into identifying it with magnetism, he imagined circulation in the solar system to be

maintained through the material compulsion of fibrous emanations from the sun, carried round by his axial rotation. Ignorance regarding the inertia of matter drove him to this expedient. The persistence of move- ment seemed to him to imply the persistence of a moving power. He did not recognize that motion and rest are equally natural, in the sense of requiring force for their alteration. Yet his rationale of the tides in De Motibus Stellae is not only memorable as an astonishing forecast of the principle of reciprocal attraction in the proportion of mass, but for its bold extension to the earth of the lunar sphere of influence.

Galileo Galilei, Kepler's most eminent contemporary, took a foremost part in dissipating the obscurity that still hung over the very foundations of mechanical science. He had, indeed, precursors and co-operators. Michel Varo of Geneva wrote correctly in 1584 on the composition of forces; Simon Stevin of B ruges (1548- 1620) independently demonstrated the principle ; and G. B. Benedetti expounded in his Speculationum Liber (Turin, 1385) perfectly clear ideas as to the nature of accelerated motion, some years in advance of Galileo's dramatic experiments at Pisa. Yet they were never assimilated by Kepler; while, on the other hand, the laws of planetary circulation, he had enounced were strangely ignored by Galileo. The two lines of inquiry remained for some time apart. Had they at once been made to coalesce, the true nature of the force controlling celestial movements should have been quickly recognized. As it was, the importance of Kepler's generalizations was not fully appre- ciated until Sir Isaac Newton made them the corner-stone of his new cosmic edifice.

Galileo's contributions to astronomy were of a different quality from Kepler's. They were easily intelligible to the general public; in a sense, they were obvious, since they could be verified by every possessor of one of the Dutch perspective-instruments, just then in course of wide and rapid distribution. And similar results to his were in fact independently obtained in various parts of Europe by Christopher Scheiner at Ingolstadt, by Johann Fabricius at Osteel in Fries- land, and by Thomas Harriot at Syon House, Isleworth. Galileo was nevertheless by far the ablest and most versatile of these early telescopic observers. His gifts of exposition were on a par with his gifts of discernment. What he saw, he rendered con- spicuous to the world. His sagacity was indeed sometimes at fault. He maintained with full conviction to the end of his life a grossly erroneous hypothesis of the; tides, early adopted from Andrea Caesalpino; the " triplicate "■ appearance of Saturn always remained an enigma to him; and in regarding comets as atmospheric emanations he lagged far behind Tycho Brahe; Yet he unquestionably ranks as the true founder of descriptive astronomy; while his splendid presentment of the laws of projectiles in his dialogue of the "New Sciences" (Leiden, 1638) lent potent aid to the solid establishment of celestial mechanics.

Galileo.

The accumulation of facts does not in itself constitute science. Empirical knowledge scarcely deserves the name. Vere scire est per causas scire: Francis Bacon's prescient dream, arariia- however, of a living astronomy by which the physical tioaal laws governing terrestrial relations should be extended astro- to the highest heavens, had long to wait for realization. nomy. Kepler divined its possibility; but his thoughts, derailed (so to speak) by the false analogy of magnetism, brought Bacon. him no farther than to the rough draft of the scheme of vortices expounded in detail by Rene Descartes in his Principia Philosophiae (1644). And this was a Descartes cul-de-sac. The only practicable road struck aside from it. The true foundations of a mechanical theory of the heavens were laid by Kepler's discoveries, and by Galileo's dynamical demonstrations; its construction was facilitated by the development of mathematical methods. The invention of logarithms, the rise of analytical geometry, and the evolution of B. Cavalieri's " indivisibles " into the infinitesimal calculus, all accomplished during the 1 7th century , immeasurably widened the scope of exact astronomy. Gradually, too, the nature of the problem awaiting solution came to be apprehended. Jere- miah Horrocks had some intuition, previously to 1639, that the motion of the moon was controlled by the earth's gravity, and disturbed by the action of the sun. Ismael Bouillaud (1605- 1694) stated in 1645 the fact of planetary circulation under the sway of a sun-force decreasing as the inverse square of the distance; and the inevitableness of this same "duplicate ratio" was separately perceived by Robert Hooke, Edmund Halley and Sir Christopher Wren before Newton's discovery s'ewton. had yet been made public. He was the only man of his generation who both recognized the law, and had power to demonstrate its validity. And, this was only a beginning. His complete achievement had a twofold aspect. It Consisted, first, in the! identification, by strict numerical comparisons, of terrestrial gravity with the mutual attraction of the heavenly bodies; secondly, in the following out of its mechanical con- sequences throughout the solar system. Gravitation was thus shown to be the sole influence governing the movements of planets and satellites; the figure of the rotating earth was successfully explained by . its action on the minuter particles of matter; tides and the precession of the equinpxes proved amenable to reasonings based on the same principle ; and it satisfactorily accounted as well for some of the chief lunar and planetary inequalities. Newton's investigations, however, were very far from being exhaustive. Colossal though his powers were, they had limits; and his work could not but remain un terminated, since it was by its nature interminable. Nor was it possible to provide it with what could . properly be called a sequel. Thp synthetic method employed by him was too unwieldy for common use. Yet no other was jusi then at hand. Mathematical analysis

needed half a century of cultivation, before it was fully available for the arduous tasks reserved for it. They were accordingly taken up anew by a band of continental inquirers, primarily by three men of untiring energy and vivid Euler. genius, Leonhard Euler, Alexis Clairault, and Jean Clairault. le Rond d'Alembert, The first of the outstanding D b '££ m ~ gravitational problems with which they grappled was the unaccountably rapid advance of the lunar perigee. But the apparent anomaly disappeared under Euler's power- ful treatment in 1749, and his result was shortly afterwards still further assured by Clairault. The subject of planetary perturbations was next attacked. Euler devised in 1753 a new method, that of the ' variation of parameters," for their investigation, and applied it to unravel some of the earth's irregularities in a memoir crowned by the French Academy in 1756; while in 1757, Clairault estimated the masses of the moon and Venus by their respective disturbing effects upon terrestrial movements. But the most striking incident in the history of the verification of Newton's law was the return of Halley's comet to perihelion, on the 12th of March 1759, in approximate accordance with Clairault's calculation _o.f the delays due to the action of Jupiter and Saturn. Visual proof

was thus, it might be said, afforded of the harmonious working

of a single principle to the uttermost boundaries of the sun's

dominion.

These successes paved the way for the higher triumphs' of

Joseph Louis Lagrange and of Pierre Simon Laplace. The

subject of the lunar librations was treated by Lagrange

ˆ ran ˆ e – w ; t }j g rea t originality in an essay crowned by the Paris

Academy of Sciences in 1764; and he filled up the lacunae in his theory of them in a memoir communicated to the Berlin Academy in 1780. He again won the prize of the Paris Academy in 1766 with an analytical discussion of the movements of Jupiter's satellites (Miscellanea, Turin Acad. t. iv.) ; and in the same year expanded Euler's adumbrated method of the variation of parameters into a highly effective engine of per- turbational research. It was especially adapted to the tracing out of " secular inequalities," or those

depending upon changes in the orbital elements of the bodies affected by them, and hence progressing indefinitely with time ; and by its means, accordingly, the mechanical stability of the solar system was splendidly demonstrated through the successive efforts of Lagrange and Laplace. The proper share of each in bringing about this memor- able result is not easy to apportion, since they freely imparted and profited by one another's advances and improvements; it need only be said that the fundamental proposition of the invariability of the planetary major axes laid down with restric- tions by Laplace in 1773. was finally established by Lagrange in 1776; while Laplace in 1784 proved the subsistence of such a relation between the eccentricities of the planetary orbits on the one hand, and their inclinations on the other, that an increase of either element could, in any single case, proceed only to a very small extent. The system was thus shown, apart from unknown agencies of subversion, to be constructed for indefinite permanence. The prize of the Berlin Academy was, in 1780, adjudged to Lagrange for a treatise on the perturbations of comets; and he contributed to the Berlin Memoirs, 1781-1784, a set of five elaborate papers, embodying and unifying his perfected methods and their results.

The crowning trophies of gravitational astronomy in the 18th century were Laplace's explanations of the " great inequality " of Jupiter and Saturn in 1784, and of the "secular acceleration " of the moon in 1 787. Both irregularities had been noted, a century earlier, by Edmund HaUey; both had, since that time, vainly exercised the ingenuity of the ablest mathematicians; both now almost simultaneously yielded their secret to the same fortunate inquirer. Johann Heinrich Lambert pointed out in 1773 that the motion of Saturn, from being retarded, had become accelerated. A periodic character was thus indicated for the disturbance; and Laplace assigned its true cause in the near approach to commensurability in the periods of the two planets, the cycle of disturbance completing itself in about 900 (more accurately 9295) years. The lunar acceleration, too, obtains ultimate compensation, though only after a vastly protracted term of years. The discovery, just one hundred years after the publication of Newton's Principia, of its dependence upon the slowly varying eccentricity of the earth's orbit signalized the removal of the last conspicuous obstacle to admitting the unqualified validity of the law of gravitation. Laplace's calculations, it is true, were inexact. An error, corrected by J. C. Adams in 1853, nearly doubled the value of the acceleration deducible from them; and served to conceal a discrepancy with observation which has since given occasion to much profound research (see Moon).

The M&canique celeste, in which Laplace welded into a whole the items of knowledge accumulated by the labours of a century, has been termed the " Almagest of the 18th century " (Fourier). But imposing and complete though the monument appeared, it did not long hold possession of the field.

Further developments ensued. The " method of least squares," by which the most probable result can be educed from a body of observational data, was published by Adrien Marie Legendre in 1806, by Carl Friedrich Gauss in his Theoria Motus (1809), which described also a mode of calculating the orbit of a planet from three complete

Laplace.

observations, afterwards turned to important account for the recapture of Geres, the first discovered asteroid (see Planets, Minor). Researches into rotational movement were facilitated by S. D. Poisson's application to them in 1809 of Lagrange's theory of the variation of constants; Philippe de Pontecoulant successfully used in 1829, for the prediction of the impending return of Halley's comet, a system of " mechanical quadratures " published by Lagrange in the Berlin Memoirs tor 1778; &ni in his Theorie analytique du systeme du monde (1846) he modified and refined general theories of the lunar and planetary revolu- tions. P. A. Hansen in 1829 (A sir. Nach. Nos. 166-168, 179) left the beaten track by choosing time as the sole variable, the orbital elements remaining constant. A. L. Cauchy published in 1842-1845! a method similarly cbnceived, though otherwise developed ; and the scope of analysis in determining the move- ments of the heavenly bodies has since ■ been perseveringly widened by the labours of Urbain J. J. Leverrier, J. C. Adams, S. Newcomb, G. W. Hill, E. W. Brown, H. Gylden, Charles Delaunay, F. Tisserand, H. Poincare and others too numerous to mention. Nor were these abstract investigations unaccompanied by concrete results. Sir George Airy detected in 183 1 an in- equality, periodic in 240 years, between Venus and the earth. Leverrier undertook in 1839, and concluded in 1876, the formid- able task of revising all the planetary theories and constructing from them improved tables. Not less comprehensive has been the work carried out by Professor Newcomb of raising toa higher grade of perfection, and reducing to a uniform standard, all the theories and constants of the solar system. His inquiries afford the assurance of a nearly exact conformity among its members to strict gravitational Jaw, only the moon and Mercury showing some slight, but so far unexplained, anomalies of movement. The discovery of Neptune in 1846 by Adams and Leverrier marked the first solution of the " inverse problem" of perturba- tions. That is to say, ascertained or ascertainable effects were made the starting-point instead of the goal of research.

Observational astronomy, meanwhile, was advancing to some extent independently. The descriptive branch found its principle of development in the growing powers of : the telescope, and had little to do with mathe- ti\ 6 and matical theory; which on the contrary, was closely practical allied, by relations of mutual helpfulness, with practical astrd- astronomy, or "*

astrometry." Meanwhile, the ele- " y ' mentary requirement of making visual acquaintance with the stellar heavens was met, as regards the unknown southern skies, when Johann Bayer published at Nuremberg in 1603 a celestial atlas depicting twelve new constellations' formed from the rude observations of navigators across the line. In the same work, the current mode of star-nomenclature by the letters of the Greek alphabet made its appearance. •_'■" ■ ■ On the 7 th of November r63 1 Pierre Gassendi watched ■

at Paris the passage of Mercury across the sun. This was the first planetary transit observed. The next was that of Venus on the 24th of November (O.S.) 1639, of which Jeremiah Horrocks and William Crabtree were the sole spectators. The improvement of telescopes was prosecuted by Christiaan Huygens from 1655, and promptly led to his discoveries of the sixth Saturnian moon, of the true shape of the Satur- nian appendages, and of the multiple character of the " trapezium " of stars in the Orion nebula. William Gas- coigne's invention Of the filar micrometer and of the adapta- tion of telescopes to graduated instruments remained submerged for a quarteT of a century in consequence of his untimely death at Marston Moor (1644). Thelatter combination had also been ineffectually proposed in 1634 by Jean Baptiste Morin (1 583-1656); and both devices were recontrived at Paris about 1667, the micrometer by Adrien Auzout (d. 1691), telescopic sights (so-called) by Jean Picard (1620-1682), who simultaneously introduced the astronomical use of pendulum- clocks, constructed by Huygens eleven years previously. These improvements were ignored or rejected by Johann Hevelius of Danzig, the author of the last important y 't 3, star-catalogue based solely upon naked-eye determinations.

Bayer.

Huygens.

Oas- coigne.

obaerva toty.

Rooter.

He, nevertheless, used telescopes to good purpose in his studies of lunar

topography, and his designations for the chief mountain- chains and " seas " of the moon have never been superseded. He, moreover, threw out the suggestion (in his Cometographia, 1668) that comets move round the sun in orbits of a parabolic form.

The establishment, in 1671 and 1676 respectively, of the French and English national observatories at once typified and

stimulated progress. The Paris institution, it is true, The Parts i ac ked unity of direction. No authoritative chief was

assigned to it until 1771. G. D. Cassini, his son

and his grandson were only primi inter pares. Claude Perrault's stately edifice was equally accessible to all the more eminent members of the Academy of Sciences; and researches were, more or less independently, carried on there by (among others) Philippedela Hire (i640-i7i8),G.F.Maraldi (1665-1729), and his nephew, J. D. Maraldi, Jean Picard, Huygens, Olaus Romer and Nicolas de Lacaille. Some of the best instruments then extant were mounted at the Paris observatory. G. D.

Cassini brought from Rome a 17-ft. telescope by Cans'iai. ˆ. Campani, with which he discovered in 167 1 Iapetus,

the ninth in distance of Saturn's family of satellites; Rhea was detected in 1672 with a glass by the same maker of 34-ft. focus; the duplicity of the ring showed in 1675; and, in 1684, two additional satellites were disclosed by a Campani telescope of 100 ft. Cassini, moreover, set up an altazimuth in 1678, and employed from about 1682 a " parallactic machine," provided with clockwork to enable it to follow the diurnal motion. Both inventions have been ascribed to Olaus Romer, who used but did not claim them, and must have become familiar with

their principles during the nine years (1672-1681)

spent by him at the Paris observatory. Romer, on the other hand, deserves full credit for originating the transit-circle and the prime vertical instrument; and he earned undying fame by his discovery of the finite velocity of light, made at Paris in 1675 by comparing his observations of the eclipses of Jupiter's satellites at the conjunctions and oppositions of the planet.

The organization of the Greenwich observatory differed widely from that adopted at Paris. There a fundamental scheme

of practical amelioration was initiated by John Fiamsteed. pi ams t e ed,

the first astronomer royal, and has never since been lost sight of. Its purpose is the attainment of so complete a power of prediction that the places of the sun, moon and planets may be assigned without noticeable error for an indefinite future time. Sidereal inquiries, as such, made no part of the original programme in which the stars figured merely as points of reference. But these points are not stationary. They have an apparent precessional movement, the exact amount of which can be arrived at only by prolonged and toilsome enquiries. They have besides " proper motions," detected in 17 18 by E. Halley in a few cases, and since found to prevail universally. Further, James Bradley discovered in 1728 the annual shifting of the stars due to the aberration of light (see Aberration), and in 1748, the complicating effects upon pre- cession of the " nutation " of the earth's axis. Hence, the preparation of a catalogue recording the " mean " positions of a number of stars for a given epoch involves considerable pre-liminary labour; nor do those positions long continue to satisfy observation. They need, after a time, to be corrected, not only systematically for precession, but also empirically for proper motion. Before the stars can safely be employed as route-marks in the sky, their movements must accordingly be tabulated, and research into the method of such movements inevitably follows. We perceive then that the fundamental problems of sidereal science are closely linked up with the elementary and indispens-able procedures of celestial measurement.

The history of the Greenwich observatory is one of strenuous efforts for refinement, stimulated by the growing stringency of theoretical necessities. Improved practice, again, reacted upon theory by bringing to notice residual errors, demanding the correction of formulae, or intimating neglected disturbances. Each increase of mechanical skill claims a corresponding gain in

the subtlety of analysis; and vice versa. And this kind of interaction has gone on ever since Fiamsteed reluctantly furnished the "places of the moon," which enabled Newton to lay the foundations of lunar theory.

Edmund Halley, the second astronomer royal, devoted most of his official attention to the moon. But his plan of attack was not happily chosen; he carried it out with deficient instrumental means; and his administration (1720- ey '

1742) remained comparatively barren. That of his successor, though shorter, was vastly more productive. James Bradley chose the most appropriate tasks, and executed them supremely well, with the indispensable aid of John n ey ' Bird (1709-1776), who constructed for him an 8-ft. quadrant of unsurpassed quality. Bradley's store of observations has accordingly proved invaluable. Those of 3222 stars,

reduced by F. W. Bessel in 1818, and again with masterly insight by Dr A. Auwers in 1882, form the true basis of exact astronomy, and of our knowledge of proper motions. Those relating to the moon and planets, corrected by Sir George Airy, 1 840-1 846, form part of the standard materials for discussing theories of movement in the solar system. The fourth astronomer royal, Nathaniel Bliss, provided in two years a sequel of some value to Bradley's performance. Nevil Mas- kelyne, who succeeded him in 1764, set on foot, in 1767, the publication of the Nautical Almanac,, and about the same time had an achromatic telescope fitted to the Greenwich mural quadrant. The invention, perfected by John t, ae> Dollond in 1757, was long debarred from becoming effective by difficulties in the manufacture of glass, aggravated in England by a heavy excise duty levied t until 1845. More immediately efficacious was the innovation made by John Pond (astronomer royal, 1811-1836) of sub- stituting entire circles for quadrants. He further introduced, in 182 1, the method of duplicate observations by direct vision and by reflection, and by these means obtained results of very high precision. During Sir George Airy's long term of office (1836-1881) exact astronomy and the traditional purposes of the royal observatory were promoted with increased vigour, while the scope of research was at the same time memorably widened. Magnetic, meteorological, and spectroscopic departments were added to the establishment; electricity was employed, through the medium of the chrono- graph, for the registration of transits; and photography was resorted to for the daily automatic record of the sun's condition.

Meanwhile, advances were being made in various parts of the continent of Europe. Peter Wargentin (171 7-1 783), secretary to the Swedish Academy of Sciences, made a special study of the Jovian system. James Bradley had geatia. described to the Royal Society on the 2nd of July 1 7 19 the curious cyclical relations of the three inner satellites; and their period of 437 days was independently discovered by Wargentin, who based upon it in 1 746 a set of tables, superseded only by those of J. B. J. Delambre in 1792. Among the fruits of the strenuous career of Nicolas Louis de Lacaille were tables of the sun, in which terms depending upon planetary perturbations were, for the first time, introduced (1758); an extended acquaintance with the southern heavens; and a determination of the moon's parallax from observations made at opposite extremities of an arc of the meridian 85° in length. Tobias Mayer of Gottingen (1723-1762) originated the mode of adjusting transit-instruments Mayer. still in vogue; drew up a catalogue of nearly a thousand . zodiacal stars (published posthumously in 1775); and deduced the proper motions of eighty stars from a comparison of their places as given by Olaus Romer in 1706 with those obtained by himself in 1756. He executed besides a chart and forty drawings of the moon (published at Gottingen in 1881), and calculated lunar tables from a

skilful development of Euler's theory, for which a reward of £3000 was in 1765 paid to his widow by the British government. They were published by the Board of Longitude, together with his solar tables, in 1770. The material interests of navigation were in these works primarily regarded;

but the imaginative side of knowledge had also potent repre- Lalande. sentatives during the latter half of the 18th century. In France, especially, the versatile activity of J. J. Lalande popularized the acquisitions of astronomy, and enforced its demands ; and he had a German counterpart in J. E. Bode.

Between the time of Aristarchus and the opposition of Mars in 1672, no serious attempt was made to solve the problem of the sun's distance. In that year, however, Jean 'ot'thc' Richer at Cayenne and G. D. Cassini at Paris made tun. combined observations of the planet, which yielded*

a parallax for the sun of 0-5", corresponding to a mean radius for the terrestrial orbit of 87,000,000 m. This result, though widely inaccurate, came much nearer to the truth than any previously obtained ; and it instructively illustrated the feasibility of concerted astronomical operations at distant parts of the earth. The way was thus prepared for availing to the full of the opportunities for a celestial survey offered by the transits of Venus in 1761 and 1769. They had been signalized by E. Halley in 17 16 ; they were later insisted upon by Lalande ; an enthusiasm for co-operation was evoked, and the globe, from Siberia to Otaheite, was studded with observing parties. The outcome, nevertheless, disappointed expectation. The instants of contact between the limbs of the sun and planet defied precise determination. Optical complications fatally impeded sharpness of vision, and the phenomena took place in a debateable border- land of uncertainty. J. F. Encke, it is true, derived from them in 1822-1824 what seemed an authentic parallax of S-S7", implying a distance of 95,370,000 m.; but the confidence it inspired was finally overthrown in 1854 by P. A. Hansen's announcement of its incompatibility with lunar theory. An appeal then lay to the 19th century pair of transits in 1874 and 1882; but no peremptory decision ensued ; observations were marred by the same optical evils as before. Their upshot, however, had lost its essential importance ; for a fresh series of investigations based on a variety of principles had already been started. Leverrier, in 1858, calculated a value of 8-95″ for the solar parallax (equivalent to a distance of 91,000,000 m.) from the "

parallactic inequality ” of the moon ; Professor Newcomb, using other forms of the gravitational method, derived in 1895 a parallax of 8- 76. Again, since the constant of aberration defines the ratio between the velocity of light and the earth’s orbital speed, the span of the terrestrial circuit, in other words, the distance of the sun, is immediately deducible from known values of the first two quantities. The rate of light-transmission was accordingly made the subject of an elaborate set of experi- ments by Professor Newcomb in 1880-1882 ; and the result, taken in connexion with the aberration-constant as determined at Pulkowa, yielded a solar parallax of 8-79”, or a distance (in round numbers) of 93,000,000 m. But the direct or geometrical mode of attack has still the preference over any of the indirect plans. Sir David Gill derived a highly satisfactory value of 8-78′ for the long-sought constant from the opposition of Mars in 1877, and from combined heliometer observations at five observatories in 1888-1889 of the minor planets Iris, Victoria and Sappho, the apparently definitive value of 8 -80″ (equivalent distance, 92,874,000 m.). But an unlooked-for fresh opportunity was afforded by the discovery in 1898 of the singularly circum- stanced minor planet Eros, which occasionally approaches the earth more nearly than any other heavenly body except the moon. The opposition of November 1900, though only moderately favourable, could not be neglected; an international photographic campaign was organized at Paris with the aid of 58 observatories; and the voluminous collected data imply, so far as they have been discussed, a parallax for the sun a little greater than 8-8”. (See also Parallax.)*

The first specimen of a reflecting telescope was constructed by Isaac Newton in 1668. It was of what is still called

aˆ, ” Newtonian ” design, and had a speculum 2 in. in

t /, e . ” x diameter. Through the skill of John Hadley (1682-

ccopes. 1743) and James Short of Edinburgh (17 10-1768)

the instrument unfolded, in the ensuing century, some

of its capabilities, which the labours of William Herschel

enormously enhanced. Between 1 7 74 and 1 789 he built scores of specula of continually augmented size, up to a diameter of 4 ft., the optical excellence of which approved itself HerwahtL by a crowd of discoveries. Uranus (q.v.) was recognized by its disk on the 13th of March 1781 ; two of its satellites, Oberonand Titania, disclosed themselves on the nth of January 1787 ; while with the giant 48-in. mirror, used on the ” front-view ” plan, Mimas and Enceladus, the innermost Saturnian moons, were

brought to view on the 28th of August and the 17th of September 1789. These were incidental trophies; Herschel's main object was the exploration of the sidereal heavens. The task, though novel and formidable, was executed with almost incredible success. Charles Messier (1730-1817) had catalogued in 1781 103 nebulae ; Herschel discovered 2500, laid down the lines of their classification, divined the laws of their distribution, and assigned their place in a scheme of develop- ment. The proof supplied by him in 1802 that coupled stars mutually circulate threw open a boundless field of research ; and he originated experimental inquiries into the construction of the heavens by systematically collecting and sifting stellar statistics. He, moreover, definitively established, in 1783, the fact and general direction of the sun's movement in space, and thus introduced an element of order into the maze of stellar proper motions. Sir John Herschel continued in the northern, and extended to the southern hemisphere, Herschel. his father's work. The third earl of Rosse mounted, at Parsonstown in [1845, a speculum 6 ft. in diameter, which afforded the first indications of the spiral structure shown in recent photographs to be the most prevalent char- acteristic of nebulae. Down to near the close of the jjosm. 19th century, both the use and the improvement of reflectors were left mainly in British hands; but the gift of the " Crossley " instrument in 1895, to the Lick observatory, and its splendid subsequent performances in nebular photography, brought similar tools of research into extensive use among American astronomers ; and they are now, for many of the various purposes of astrophysics, strongly preferred to refractors.

Acquaintance with the asteroidal family began as the '19th century opened. On the 1st of January 1801 Giuseppe Piazzi (1746-1826) discovered Ceres, at Palermo, while engaged in collecting materials for his star-catalogues, pimiit. A prolonged succession of similar events followed. But in the mode of detecting these swarming bodies, a typical change was made on the 22nd of December 1891, Max Wolt when Dr Max Wolf of Heidelberg photographically captured No. 323. Repetitions of the feat are now counted by the score.

Practical astronomy was only secondarily concerned with the addition of Neptune, on the 23rd of September 1846, to the company of known planets ; but William Lassell's Lm e u. discovery of its satellite, on the 10th of October following, was a consequence of the perfect figure and high polish of his 2-ft. speculum. With the same instrument, he further detected, on the 19th of September 1848, Hyperion, the seventh of Saturn's attendants, and, on the 24th of October 1851, Ariel and Umbriel, the interior moons of Uranus. Simultaneously with Lassell, on the opposite shore of the Atlantic, W. C. Bond identified Hyperion ; and he perceived, on the 15th of November 1850, Saturn's dusky ring, independ- ently observed, a fortnight later, by W. R. Dawes, at Watering- bury in Kent.

With the Washington 26-in. refractor, on the nth of August 1877, Professor Asaph Hall descried the moons of Mars, Deimos and Phobos ; and a minute light-speck, noticed by Professor E. E. Barnard in the close neighbourhood of Jupiter on the 9th of September Barnard. 1892, proved representative of a small inner satellite, invisible with less perfect and powerful instruments than the Lick 36-in. achromatic. The Jovian system has been reinforced by three remote and extremely faint members, two ptrrla: photographed by Professor C. D. Perrine with the Crossley reflector in 1904-1905, and the third at Greenwich in

Bond.

Hall.

8i6

ASTRONOMY

[HISTORY

Comets.

Meteors.

*1908; and a pair of Saturnian moons, designated Phoebe and Themis, were tracked out by Professor W. fL Picker- picktrint. ™8 > m x 9 anc * ‘ r 9°5 respectively, amid the thicket of stars imprinted on negatives taken at Arequipa with th? Bruce 24-in. doublet lens. This raises to 26 the number of discovered satellites in the solar system.*

Cometary science has ramified in unexpected ways during the last hundred years. The establishment of a class of ” short- period ” comets by the computations of J. F. Encke in 1819, and of Wilhelm von Biela in”i826, led to the theory of their ” capture ” by the great planets, for which a solid mathematical basis was provided by H. Newton, F. Tisse- rand and O. Callandreau. An argument for the aboriginal connexion of comets with the solar system, founded by R. C. Carrington in i860 upon their participation in its translatory movement, was more fully developed by L. Fabry in 1893; and the close orbital relationships of cometary groups, accentuated by the pursuit of each other along nearly the same track by the comets of 1 843 , 1 880 and 1 88 2 , singularly illustrated the probable vicissitudes of their careers. The most remarkable event, however, in the recent history of cometary astronomy Was its assimilation to that of meteors;whieh took unquestion- able cosmical rank’ as a consequence of the Leonid tempest of November 1833. The affinity of the two classes of objects . became known in 1866′ through G. V. Schiaparelli’s announcement that the orbit of the

bright comet of 1862 agreed strictly with the elliptic ring formed by the circulating Perseid meteors; and three other cases of close coincidence were soort afterwards brought to light. Tebbutt's Comet in 1881 was the first tp be satisfactorily photographed. The study of such objects is now carried on mainly through the agency of the sensitive plate. The photographic registration of meteor-trails, too, has been lately attempted with partial success. The full realization of the method will doubtless provide adequate data for the detailed investigation of meteoric paths.

The progress of science during the 19th century had no more distinctive feature than the rapid growth of sidereal astronomy (see Star). Its scope, wide as the universe, can be astronomy, compassed no otherwise than by statistical means, and the collection of materials for this purpose involves most arduous preliminary labour. The multitudinous enrol- ment, of stars was the first requisite. Only one " catalogue of precision" — Nevil Maskelyne's of 36 fundamental stars- was available in 1800. J. J. Lalande, however, lonns. ' published in 1801, in his Histoire cileste, the approxi- mate places of 47,390 from a reobservation of which the great Paris catalogue (1887-1892) has been compiled. A valuable catalogue of about 7600 stars was issued by Giuseppe Piazzi in 1814; Stephen Groombridge determined 4230 at Blackheath in 1806-1816; while through the joint and successive work of F. W. Bessel and W. A. Argelander, exact acquaintance was made with 90,000, a more general acquaintance with the 324,000 stars recorded in the Bonn Durchmusterung (1859-1862). The southern hemisphere was subsequently reviewed on a similar duplicate plan by E. Schonfeld (1828-1891) at Bonn, by B. A. Gould and J. M. Thome at Cordoba. Moreover, the imposing catalogue set on foot in 1865 at thirteen observatories by the German astronomical society has recently been completed; and adjuncts to it have, from time to time, been provided in the publications of the royal observatories at Greenwich arid the Gape, of Good Hope, and of national, imperial and private establishments in the United States' and on the continent of Europe. But in the execution of these protracted undertakings, the human eye has been, to a large and increasing extent, super- seded by the camera. Photographic star-charting was begun by Sir David Gill in 1885, and the third and concluding volume of the Cape Photographic Durchmusterung appeared in 1900. It gives the co- ordinates of above 450,000 stars, measured by Professor J. C. Kapteyn at Groningen on plates taken by C. Ray Woods at the Cape observatory. And this comprehensive work was merely preparatory to the International Catalogue and Chart, the production of which was initiated by the resolutions

of the Paris Photographic Congress of 1887. Eighteen observa- tories scattered north and south of the equator divided the sky among them; and the outcome of their combined operations aimed at the production of a

catalogue of at least 2,000,000 strictly "determined stars, together with a colossal map in 22,000 sheets, showing stars to the fourteenth magnitude, in numbers difficult ta estimate. (Sea Photography, Celestial.)

The arrangement of the stars in space can be usefully dis- cussed only in connexion with their apparent light-power, or "magnitude." Photometric catalogues, accordingly, photo- form an indispensable part of stellar statistics; and metric their construction has been zealously prosecuted. «■'■ The Harvard Photometry of 4260 lucid stars was ogues.*

issued by Professor E. C. Pickering in 1884, the Uranometria Nova Oxoniensis, giving the relative lustre of 2784 stars, by C. Pritchard in 1885. The instrument used at Harvard was a " meridian photometer," constructed on the principle of polariza- tion; while the " method of extinctions," by means of a wedge of neutral-tinted glass, served for the Oxford determinations. At Potsdam, some 17,000 stars have been measured by C. H. G. M filler and P. F. F. Rempf with a polarizing photometer; but by far the most comprehensive work of the kind is the Harvard Photometric Dwrchmusterung {1 901- 1903), embracing all stars to 7′ 5 magnitude, and extended to the southern pole by measure- ments executed at Arequipa. The embarrassing subject of photo- graphic photometry has also been attacked by ProfessorPickering. The need is urgent of fixing a scale, and defining standards of actinic brightness; but it has not yet been successfully met.

The investigation of double stars was carried on from 1819 to 1850 with singular persistence and ability at Dorpat and Pulkowa by F. G. W. Struve, and by his son and successor, O. W. Struve. The high excellence of the stars. data collected by them was a combined result of their skill, and of the vast improvement in refracting telescopes due to the genius of Joseph Fraunhofer (1787-1826). Among the inheritors of his renown were Alvan Clark arid Alvan G. Clark of Cambridgeport, Massachusetts; and the superb defini- tion of their great achromatics rendered practicable the division of what might have been deemed impossibly close Star-pairs. These facilities were remarkably illustrated by Professor S. ;W. Burnham's record of discovery, which roused fresh enthusiasm for this line of inquiry by compelling recognition of the extra- ordinary profusion throughout the heavens of compound objects. Discoveries with the spectroscope have ratified and extended this conclusion.

Only spurious star-parallaxes had claimed the attention of astronomers until F. W. Bessel announced, in December 1838, the perspective yearly shifting of 61 Cygni in an ellipse with a mean radius of about one-third of a second.

Stellar parallax.

Thomas Henderson (1 798-1844) had indeed measured the larger displacements of a Centauri at the Cape in 183 2-1833, but delayed until 1839 to publish his result; Out of several hundred stars since then examined, seventy or eighty have yielded fairly accurate, though very small parallaxes. But this amount of knowledge, however valuable in itself, is utterly inadequate to the needs of sidereal research; and various attempts have accordingly been made, chiefly by Professors J. C. Kapteyn and Simon Newcomb, to estimate, through the analysis of their proper motions, the "mean parallax " of stars assorted by magnitude. And the data thus arrived at are reassuringly self -consistent. A wide photographic survey, "by which parallaxes might be secured wholesale, has further been recommended "by Kapteyn; but is unlikely to be undertaken in the immediate future.

The exhaustive ascertainment of stellar parallaxes, combined with the visible facts of stellar distribution, would enable us to build a perfect plan of the universe in three dimen- sions. Its perfection would, nevertheless, be under- motion. mined by the mobility of all its constituent parts. Their configuration at a given instant supplies no information as to their configuration hereafter unless the mode and laws of their movements have been determined. Hence, one of the leading*

inducements to the construction of exact and comprehensive catalogues has been to elicit,. by comparisons of those for widely separated epochs, the proper motions of the stars enumerated in them. Little was known on the subject at the beginning of the 19th century. William Herschel founded his determination in 1783 of the sun's route in space upon the movements of thirteen stars; and he took into account those of only six in his second solution of the problem in 1805. But in 1837 Argelander employed 390 proper motions as materials for the treatment of the same subject; and L. Struve had at his disposal, in 1887, no less than 2800. From the re-observation of Lalande's stars, after the lapse of not far from a century, J. Bossert was enabled to deduce 2675 proper motions, published at Paris in four successive memoirs, 18S7-1902; and the sum-total of those ascertained probably now exceeds 6000. Yet this number, although it represents a portentous expenditure of labour, is insignificant compared with the multitude of the stellar throng; nor had any general tendency been discerned to regulate what seemed casual flittings until Professor Kapteyn, in 1904, adverted to the prevalence among all the brighter stars of opposite

stream- flows towards two "vertices" situated in the Milky Way (see Star) . The assured general fact as regards the direction of stellar movements was that they included a common parallactic element due to the sun's translation. And it is by the consideration of this partial accordance in motion that the advance through space of the solar system has been ascertained.

The apex of the sun's way was fixed by Professor Newcomb in 1898 at a point about 4° S. of the brilliant star Vega; but was shifted nearly 7 to the S.W. by J. C. Kapteyn's inquiry in 1 901; so that the range of uncertainty -. as to its position continues unsatisfactorily wide. The speed with which our system progresses is, on the other hand, fairly well known. It cannot differ much from 125 m. a second, the rate assigned to it by Professor W. W. Campbell in 1902. He employed in his discussion the radial velocities of 280 stars, spectroscopically determined; and the upshot signally exemplified the' community of interests between the rising science of astrophysics and the

ancient science of astrometry. Their characteristic physics. purposes are, nevertheless, entirely different. The

positions of the heavenly bodies in space,, arid the changes of those positions with time, constitute the primary subject of investigation by the elder school; while the new

analysis, peculiarities of suns and planets, with their chemistry,

physical habitudes and modes of luminosity. Its distinctive method is spectrum analysis, the invention and development of which in the 19th century have fundamentally altered the purpose and prospects of celestial inquiries.

A beam of sunlight admitted into a darkened room through a narrow aperture, and there dispersed into a vario-tinted band Wollastoa. by the interposition of a prism, is not absolutely

continuous. Dr W. H. Wollaston made the experiment in 1802, and perceived the spaces of colour to be interrupted by seven obscure gaps, which took the shape of lines owing to his use of rectangular slit. He thus caught a preliminary

glimpse of the " Fraunhofer lines," so called because hofer." Joseph Fraunhofer brought them into prominent

notice by the diligence and insight of his labours upon them in 1814-1815. He mapped 324, chose out nine, which he designated by the letters of the

alphabet, to be standards of measurement for the rest, and ascertained the coincidence in position between the double yellow ray derived from the flame of burning sodium and the pair of dark lines named by him " D " in the solar spectrum. There ensued forty-five years of groping for a law which should clear up the enigma of the solar reversals. Partial anticipations abounded. The vital heart of the matter was barely missed by W. A. Miller in 1845, by L. Foucault in 1849, by A. J.Angstrom in 1853, by Balfour Stewart in 1858; while Sir George Stokes held the solution of the problem in the Kircbhoft. hollow of his hand from 1852 onward. But it was the

synthetic genius of Gustav Kirchhoff which first gave unity to the scattered phenomena, and finally reconciled what was

817

elicited in the laboratory with what was observed in the sun. Onithe 15th of December 1859 he communicated to the Berlin Academy of Sciences the principle which bears his name. Its purport is that glowing vapours similarly circumstanced absorb the identical radiations which they emit. That is to say, they stop out just those sections of white light transmitted through them which form their own special luminous badges. Moreover, if the white light come from a source at a higher temperature than theirs, the sections, or lines, absorbed by them show dark against a continuous' background. And this is precisely the case with the sun. ' Kirchhoff's principle, accordingly, not only afforded a simple explanation of the Fraunhofer lines, but availed to found a far-reaching science of celestial chemistry. Thousands of the dark lines in the solar spectrum agree absolutely in wave-length with the bright rays f' 3 ˆ 7 artificially obtained from known substances, and saa . appertaining to them individually. These substances must then exist near the sun. They are in fact suspended in a state of vapour between our eyes and the photosphere, the dazzling prismatic radiance of which they, to a minute extent, intercept, thus writing their signatures on the coloured scroll of dispersed sunshine. By persistent research, powerfully aided by the photographic camera and by the concave gratings invented by H. A. Rowland (1848-1901) in 1882, about forty terrestrial elements have been identified in the sun. Among them, iron, sodium, magnesium, calcium and hydrogen are conspicuous; but it would be rash to assert that any of, the seventy forms of matter provisionally enumerated in text-books are wholly absent from his composition. •.-.■■ >

Solar physics has profited enormously by the abolition, of glare during total eclipses. That of the 8th of July 1842 was the first to be efficiently observed; and the luminous .jˆ ; appendages to the sun disclosed by it were

such as ‘ ec mses, to excite startled attention. Their investigation has since been diligently prosecuted. The corona was, photographed at Konigsberg during the totality of the 28th of July 1851; similar records; of the red prominences, successively obMined by Father Angelo Secchi and Warren de la Rue, as? the shadow track crossed Spain on the i8thof July i860; finally demonstrated their solar status. The Indian eclipse of the 1 8th of August 1868 supplied knowledge of their spectrum, found to 1 include the yellow ray of an exotic gas named by Sir Norman Jjockyer ” helium.” It further suggested, to Lockyer and P.; Jans6en separately^ the spectroscopic method of observing these objects in daylight. Under cover of an eclipse visible in North America on the 7th of August 1869, the bright green line of the corona was discerned; and Professor C. A. Young caught the f flash spectrum” of the reversing layer, at the moment of second contact, at Xerez de la Frontera in Spain, oh the 22nd of December 1870. .This significant but evanescent phenomenon,- ‘which represents the direct emissions of a low-lying solar envelope, was photographed by William Shackleton on the occasipji Itf an eclipse in Novaya Zemlya on the 9th of August 1896; .antjUtt has since been abundantly registered by exposures made during the obscurations of r898 > 1900, 1 901 and 1905.; A singular .and unlooked-for result of eclipse-work has been to include the corona within the scope of solar periodicity; Heinrich Schwabe established, in iSjr, the cyclical variation, in eleven years,! of spot-frequency; terrestrial magnetic disturbances manifestly obeyed the same law; and the peculiar winged aspect of :the corona disclosed by the eclipse of the 29th of July 1878, at an epoch of minimum sun-spots, intimated to A. C. Ranyard’ a theory of coronal types, changing Concurrently with the fluctua- tions of spot-activity. This was amply verified at subsequent eclipses. : .

The photography of prominences was, after some preliminary trials by C. A. Young and others, fully realized in 1891 by Professor George E. Hale at Chicago, and independr : : Promt- eritly by Henri Deslandres at Paris. The pictures were ncno taken, in both cases, with only one quality cf light,! fi boto ‘ the violet ray of calcium, the remaining superfluous &”””?• beams being eliminated by the agency of a double , sift. , The

last-named expedient had been described by Janssen in 1867. Hale devised on the same principle the ” spectre-heliograph,” an instrument by which the sun’s disk can be photographed in calcium-light by imparting a rapid movement to its image relatively to the sensitive plate; and the method has

proved in many ways fruitful.

The likeness of the sun to the stars has been shown by the spectroscope to be profound and inherent. Yet the general agreement of solar and stellar chemistry does not spectra- exclude important diversities of detail. Fraunhofer scopy. was the pioneer in this branch. He observed, in 1823, dark lines in stellar spectra which Kirehhoff's discovery supplied the means of interpreting. The task, attempted by G. B. Donati in i860, was effectively taken in hand, two years later, by Angelo Secchi, William Huggins and Lewis M. Ruther- furd. There ensued a general classification of the stars by Secchi into four leading types, distinguished by diversities of spectral pattern; and the recognition by Huggins of a considerable number of terrestrial elements as present in stellar atmospheres. Nebular chemistry was initiated by the same investigator when, on the 29th of August 1864, he observed the bright-line spectrum of a planetary nebula in Draco. About seventy analogous objects, including that in the Sword of Orion, were found by him to give light of the same quality; and thus after seventy-three years, verification was brought to William Herschel's hypothesis of a "shining fluid" diffused through space, the possible raw material of stars. In 1874, Dr H. C. Vogel published a modifica- tion of Secchi's scheme of stellar diversities, and gave it organic meaning by connecting spectral differences with advance in " age." And in 1895, he set apart, as in the earliest stage of growth, a new class of " helium stars," supposed to develop successively into Sirian, solar, Antarian, or alternatively into carbon stars.

On the 5th of August 1864, G. B. Donati analysed the light of a small comet into three bright bands. Sir William Huggins repeated the experiment on Winnecke's comet in 1868, ^^|° obtained the same bands, and traced them to their origin from glowing carbon-vapour. A photograph of the spectrum of Tebbutt's comet, taken by him on the 24th of June 1 88 1, showed radiations of shorter wave-lengths but identical source, and in addition, a percentage of reflected solar light marked as such by the presence of some well-known Fraunhofer lines. Further experience has generalized these earlier results. The rule that comets yield carbon-spectra has scarcely any exceptions. The usual bands were, however, temporarily effaced in the two brilliant apparitions of 1882 by vivid rays of sodium and iron, emitted during the excitement of perihelion-passage.

The adoption, by Sir William Huggins in 1876, of gelatine or dry plates in celestial photography was a change of decisive _ import. For it made long exposures possible; and

/ospectro- on 'y w ' tn ' on 8 exposures could autographic impres- graphy. sions be secured of such faint objects as nebulae, tele- scopic comets, and the immense majority of stars, or of the dim ranges of stellar and nebular

spectra. The first conspicuous triumph of the new " spectrographic " art thus established was the record by Huggins in 1879 of the dispersed light of several " white" or Sirian stars, in which the chief traits of absorption were the rhythmical series of hydrogen-lines, then memorably discovered. Again by Sir William Huggins, the spectrum of the Orion nebula was photographed on the 7th of March 1882; and the method has gradually become nearly ex- clusive in the study of nebular emanations. The "Draper Catalogue " of 10,351 stellar spectra was published by Professor E. C. Pickering in 1890. The materials for it were rapidly accumulated by the use of an objective prism, that is, of a prism placed in front of, instead of behind the object-lens, by which means the spectra of all the stars in the field, to the number often of many score, imprinted themselves simultaneously on the sensitive plate. The progress of this survey was marked by a number of important discoveries of " new " and variable stars and of spectroscopic binaries, mainly through the acumen of

Mrs Williamina Paten Fleming of Harvard College in scrutinizing the negatives forming the data for the great catalogue.

The principle that the refrangibility of light is altered by end- on motion was enunciated by Christian Doppler of Prague in 1842. The pitch of a steam-whistle quite obviously rises and falls as the engine to which it is attached approaches principle. and recedes from a stationary auditor; and light- pulses are modified like sound-waves by velocity in the line of sight. They are crowded together and therefore rendered shorter and more frequent by the advance of their source, but drawn apart and lengthened by its recession. These effects vary with the rate of motion, which they consequently serve to measure; and they are produced indifferently by movements of the spectator or of the light-source. But Doppler's idea that they might be detected by colour-change was entirely illusory. It would apply only if the spectrum had no infra-red and ultra- violet extensions. These, however, since they share the general lengthening or shortening of wave-length through motion, are thereby shifted, to a certain definite extent, into visibility, and so produce accurate chromatic compensation. Integrated light, accordingly, tells nothing about velocity; but analysed light does, when it includes bright or dark rays the normal positions of which are known. The distinction was pointed out by Hippoly te Fizeau in 1848. By comparison with their analogues in the laboratory it can be determined whether, in which direction, and how much, lines of recognized origin are displaced in the spectra of the heavenly bodies. This subtle mode of research was made available by Sir William Huggins in 1868. He employed it, with an outcome of striking promise, to measure the radial speed of some of the brighter stars. In the following year, Sir Norman Lockyer was enabled to prove, by its means, the extraordinary vehemence of chromospheric disturbances, the bright prominence- rays in his spectroscope

betraying, through their opposite shift- ings, movements and counter-movements up to 120 m. a second; while its validity and refinement were, in 187 1, vouched for by H. C. Vogel's observations on the 9th of June 1871, of differences due to the sun's rotation in the refrangibility of Fraunhofer lines derived respectively from the east and west limbs. Stellar line- of-sight work, however, made no satisfactory progress until, in 1888, Vogel changed the venue from the eye to the camera. A high degree of precision in measurement thus became attainable, and has since been fully attained. Not only the grosser facts concerning radial velocity, but variations in it so small as a mile, or less, per second, have been recorded and interpreted in terms of deep meaning. For the investigation of the general scheme of sidereal structure, the multiplication of results of the kind is indispensable. But as yet, the recessional or approaching move-ments of only a few hundred stars have been registered; and this store of information is scanty indeed compared with the needs of research. How the stars really move in space, and how the sun travels among them, can be ascertained only with the aid of materials collected by the spectrograph, which has now fortu- nately been brought to comply with the arduous conditions of exactitude requisite for collaboration with the transit instrument and its allies, the clock and chronograph. And here, to their great mutual advantage, the old and the new astronomies meet and join forces.

Authorities.— R. Grant, History of Physical Astronomy (1852) ; Sir G. Cornewall Lewis, An Historical Survey of the Astronomy of the Ancients (1862); J. B. J. Delambre, Hist, de I'astr. ancienne; Hist, de I'astr. au moyen age; Hist, de I'astr. mederne; Hist, de I'astr. au XVIII' siecle; J. S. Bailly, Histoire de I'astronomie (5 vols., 1775-1787); J. F. Weidler, Historia Astronomiae (1741); J. H. Madler, Geschichte der Himmelskunde (1873); R. Wolf, Geschichte der Astronomie (1876); Handbuch der Astronomie (1890- 1892); W. Whewell, Hist, of the Inductive Sciences; A. M. Clerke, Htst. of Astronomy during the 19th Century (4th ed., 1903); A. Berry, Hist, of Astronomy (1898) ; J. K. Schaubach, Geschichte der griechischen Astronomie bis auf Eratosthenes (1802); Th. H. Martin, " Memoire sur l'histoire des hypotheses astronomiques," MSmoires de I'Institut, t. xxx. (Paris, 1881); P. Tannery, Recherches sur l'histoire de V astronomie ancienne (1893) ; O. Gruppe, Die kosmischen Systeme der Griechen (1851); G. V. Schiaparelli, I Precursori del Copernico (1873); Le Sfere Omocentriche di Eudosso (1875); P. Jensen, Kosmologie der Babylonier (1890) ; F. X. Kugler, Die

babylonische Mondrechnung (1900) ; J. Epping and J. N. Strass- meier, A stronomisches aus Babylon (1889); F. K. Ginzel, Die astro- nomischen Kenntnisse der Babylonier (1901) ; C. L. Ideler, Historische Untersuchungen iiber die astronomischen Beobachtungen der Alten (1806); Handbuch der math. Chronologie (2 vols., 1825-1826) ; Untersuchungen iiber den Ursprung der Sternnamen (1809) ; G. Costard, History of Astronomy (1767); J. Narrien, An Historical Account of the Origin and Progress of Astronomy (1833); J. L. E. Dreyer, Hist, of the Planetary Systems (1906) ; G. W. Hill, " Progress of Celestial Mechanics," The Observatory, vol. xix.(l896). (A.M.C.)

ASTROPALIA (classical Astypalaea), an island, with good harbours, in the south part of the Aegean, situated in 36-5° N. arid immediately west of 26-5° E. It was colonized by Megara, and its constitution and buildings are known from numerous inscriptions. The Roman emperors recognized it as a free state, and in the middle ages it was called Stampalia, and belonged to the noble Venetian family of Quirini. It was taken by the Turks in the 16th century, and is now noted for its sponges. The customs and dress of the people, who speak a patois of romaic origin, are interesting.

ASTROPHYSICS, the branch of astronomical science which treats of the physical constitution of the heavenly bodies. So long as these bodies could be known to men only as points or disks of light in the sky, no such science was possible. Even later, when the telescope was the only instrument of research, knowledge on this subject was confined to the appearances presented by the planets, supplemented by more or less probable inferences as to the nature of their surfaces. When, in the third quarter of the 19th century, spectrum analysis was applied to the light coming to us from the heavenly bodies, a new era in astronomical science was opened up of such importance that the body of knowledge revealed by this method has sometimes been termed the " new astronomy." The development of the method has been greatly assisted by photography, while the application of photometric measurements has been a powerful auxiliary in the work. It has thus come about that astrophysics owes its recent development, and its recognition as a distinct branch of astronomical science, to the combination of the processes involved in the three arts of spectroscopy, photography and photometry. The most general conclusions reached by this combination may be summed up as follows: —

1. The heavenly bodies are composed of like matter with that which we find to make up our globe. The sun and stars are found to contain the more important elements with which chemistry has made us acquainted. Iron, calcium and hydrogen may be especially mentioned as three familiar chemical elements which enter largely into the constitution of all the matter of the heavens. It would be going too far to say that all the elements known

to us exist in the sun or the stars; nor is the question whether the rarer ones can or cannot be found there of prime importance. The general fact of identity in the main constituents is the one of most fundamental importance. It would be going too far in the other direction to claim that all the elements which compose the heavenly bodies are found on the earth. There are many lines in the spectra of the stars, as well as of the nebulae, which are not certainly identified with those belong- ing to any elements known to our chemistry. The recent dis- coveries growing out of the investigation of newly discovered forms of radiation lead to the conclusion that the question of the forms of matter in the stars has far wider range than the simple question whether any given element is or is not found outside our earth. The question is rather that of the infinity of forms that matter may assume, including that most attenuated form found in the nebulae, which seem to be composed of matter more refined than even the atoms supposed to make up the matter around us.

2. The second conclusion is that, as a general rule, the incandescent heavenly bodies are not masses of solid or liquid matter as formerly assumed, but mainly masses either of gas, or of substances gaseous in their nature, so compressed by the gravitation of their superincumbent parts toward a common centre that their properties combine those of the three forms of matter known to us. We have strong reason to believe that even the sun, though much denser than the general average of

the stars, may possibly be characterized as gaseous rather than solid. Probabilities also seem to favour the view that this may, to a certain extent, be true of the four great planets of our system. The case of bodies like our earth and Mars, which

3. A third characteristic which seems to belong to the great bodies of the universe is the very high temperature of their interior. With a modification to be mentioned presently, we may regard them as intensely hot bodies, probably at a tempera- ture higher than any we can produce by artificial means, of which the superficial portions have cooled off by radiation into space. A modification in this proposition which may hereafter be accepted involves an extension of our ideas of temperature, and leads us to regard the interior heat of the heavenly bodies as due to a form of molecular activity similar to that of which radium affords so remarkable an instance. This modification certainly avoids many difficulties connected with the question of the interior heat of the earth, sun, Jupiter and probably all the larger heavenly bodies.

A limit is placed on our knowledge of astrophysics which, up. to the present time, we have found no means of overstepping. This is imposed upon us by the fact that it is only when mattei is in a gaseous form that the

spectroscope can give us certain knowledge as to its physical condition. So long as bodies are in the solid state the light which they emit, though different in different substances, has no characteristic so precisely marked that detailed conclusions can be drawn as to the nature of the substance emitting it. Even in a liquid form, the spectrum of any kind of matter is less characteristic than that of gas. More- over, a gaseous body of uniform temperature, and so dense as to be non-transparent, does not radiate the characteristic spectrum of the gas of which it is composed. Precise conclusions are possible only when a gaseous body is transparent through and through, so that the gas emits its characteristic rays — of when the rays from an incandescent body of any kind pass through a gaseous envelope at a temperature lower than that of the body itself. In this case the revelations of the spectroscope relate only to the constitution of the gaseous envelepe, and not to the body below the envelope, from which the light emanates. The outcome of this drawback is that our knowledge of the chemical constitution of the stars and planets is still confined to their atmospheres, and that conclusions as to the constitution of the interior masses which form them must be drawn by other methods than the spectroscopic one.

When the spectroscope was first applied in astronomy, it was hoped that the light reflected from living matter might be found to possess some property different from that found in light re- flected from non-living matter, and that we might thus detect the presence of life on the surface of a planet by a study of its spectrum; but no hope of this kind has bo far been realized.

We have, in this brief view of the subject, referred mainly to the results of spectrum analysis. Growing out of, but beyond this method is the beginning of a great branch of research which may ultimately explain many heretofore enigmatical phenomena of nature. The discovery of radio-activity may, by explaining the interior heat of the great bodies of the universe, solve a difficulty which since the middle of the 19th century has been discussed by physicists and geologists — that of reconciling the long duration which geologists claim for the crust of the earth with the period during which physicists have deemed it possible that the sun should have radiated heat. Evidence is also accumulating to show that the sun and stars are radio-active bodies, and that emanations proceeding from the sun, and reaching the earth, have important relations to the phenomena of Terrestrial Magnetism and the Aurora.

The subject of Astrophysics does not admit of so definite a sub- division as that of Astrometry. The conclusions which researches relating to it have so far reached are treated in the articles Star; Sun; Comet; Nebula; Aurora Polaris, &c. (S. N.)

ASTRUC, JEAN (1684-1766), French physician and Biblical critic, was born on the 19th of March 1684 at Sauve, inLanguedoc.

He graduated in medicine at Montpellier in 1703, and in 17 10 he was appointed to the chair of anatomy at Toulouse, which he retained till 1717, when he became professor of medicine at Montpellier. Subsequently he was appointed successively superintendent of the mineral waters of Languedoc (17 21), first physician to the king of Poland (1729), and regius professor of medicine at Paris (1731). He died on the 5th of May 1766 at Paris. Of his numerous works, that on which his fame principally rests is the treatise entitled De Morbis Venereis libri sex, 1736. In addition to other medical works he published anonymously Conjectures sur les mimoires originaux dont il paralt que Moyse s'est servi pour composer le livre de la Genese, (1753), in which he pointed out that two main sources can be traced in the book of Genesis; and two' dissertations on the immateriality and immortality of the soul, 1755.

See Hauck, Realencyk. f. prot. Theol., 1897, vol. ii. pp. 162-170.

ASTURA, formerly an island, now a peninsula, on the coast of Latium, Italy, 7 m. S.E. of Antium, at the S.E. extremity of the Bay of Antium. The name also belongs to the river which flowed into the sea immediately to the S.E., at the mouth of which there was, according to Strabo, an anchorage. The medieval castle of the Frangipani, in which Conradin of Swabia vainly sought refuge after the battle of Tagliaeozza in 1268, is built upon the foundations of a very large villa, of opus re- ticulatum with later additions in brickwork, and with a small harbour attached to it on the south-east. Remains of buildings also exist behind the sand dunes, which possibly mark the line of the channel which separated the island from the mainland, and these may have belonged to the post-station on the Via Severiana. As far as can be seen at present, there are remains of only one villa on the island itself; 1 but along the coast a mile to the north-west a line of villas begins, which continues as far as Antium. To the south-east, on the other hand, remains are almost entirely absent, and this portion of the coast seems to have been as sparsely populated in Roman times as it is now. The island seems to have existed as such in the time of Pope Honorius III. Astura was the site of a favourite villa of Cicero, whither he retired on the death of his daughter Tullia in 45 B.C. It appears to have been unhealthy even in Roman times; accord- ing to Suetonius, both Augustus and Tiberius contracted here the illnesses which proved fatal to them.

See T. Ashby, in MSlanges de V£.cole Francaise de Rome (1905), p. 207. (T. As.)

ASTURIAS, an ancient province and principality of northern Spain, bounded on the N. by the Bay (of Biscay, E. by Old Castile, S. by Leon and W. by Galicia. Pop. (1900) 627,069; area, 4205 sq. m. By the division of Spain' in 1833, the province took the name of Oviedo, though not to the exclusion, in ordinary usage, of the older designation. A full description of its modern condition is therefore given under the heading Oviedo; the present article being confined to an account of its physical features, its history, and the resultant character of its inhabitants. Asturias consists of a portion of the northern slope of the Cantabrian Mountains,and is covered in all directions with offshoots from the main chain, by which it is almost com- pletely shut in on the south. The higher summits, which often reach a height of 7000-8000 ft., are usually covered with snow until July or August, and the whole region is one of the wildest and most picturesque parts of Spain. Until the first railway was opened, in the middle of the 19th century, few of the passes across the mountains were practicable for carriages, and most of them are difficult even for horses. A narrow strip of level moorland, covered with furze and rich in deposits of peat, coal and amber, stretches inland, from the edge of the sheer cliffs which line the coast, to the foot of the mountains. The province is watered by numerous streams and rivers, which have hollowed out deep valleys; but owing to the narrowness of the level tract, their courses are. short, rapid and subject to floods. The most important is the Nalon or Pravia, which receives the waters of the Caudal, the Trubia and the Narcea, and has a course

1 Servius, in speaking of it as oppidum, must be. referring to the post-station.

of 62 m.; after it rank the Navia and the Sella. The estuaries of these rivers are rarely navigable, and along the entire littoral, a distance of 130 m., the only important harbours are at Gij6n and Avil6s.

, A country so rugged, and so isolated by land and sea, naturally served as the last refuge of the older races of Spain when hard pressed by successive invaders. Before the Roman conquest, the Iberian tribe of Astures had been able to maintain itself independent of the Carthaginians, and to extend its territory as far south as the Douro. It was famous for its wealth in horses and gold. About 25 B.C., the Romans subjugated the district south of the Cantabrians, to which they gave the name of Augustana. Their capital was Asturica Augusta, the modern Astorga, in Leon. The Warlike mountaineers of the northern districts, known as Transmon tana, never altogether abandoned their hostility to the Romans, whose rule was ended by the Visigothic conquest, late in the 5th century. In 713, two years after the

defeat and death of Roderick, the last Visigothic king, all Spain, except Galicia and Asturias, fell into the, hands of the Moors. One of the surviving Christian leaders, Pelayo the Goth, took refuge with three hundred followers in the celebrated cave of Covadonga, or Cobadonga, near Cangas de Onis, and from this hiding-place undertook the Christian reconquest of Spain. The Asturians chose him as their king in 718, and although Galicia was lost in 734, the Moors proved unable to penetrate into the remoter fastnesses held by the levies of Pelayo. After his death in 737,the Asturians continued to offer the same heroic resistance, and ultimately enabled the people of Galicia, Leon and Castile to recover their liberty. The title of prince of Asturias, conferred on the heir-apparent to the crown of Spain, dates from 1388, when it was first bestowed on a Castilian prince. The title of count of Covadonga is assumed by the kings of Spain. In modern times Asturias formed a captaincy general, divided into Asturias d'Oviedo, which corresponds with the limits of the ancient prin cipality, and Asturias de Santillana, which now constitutes the western half of Santander.

Owing to their almost entire immunity from any alien domina- tion except that of the Romans and Goths, the Asturians may perhaps be regarded as the purest representatives of the Iberian race; while their dialect (linguaje bable) is sometimes held to be closely akin to the parent speech from which modern Castilian is derived. It is free from Moorish idioms, and, like Galician and Portuguese it often retains the original Latin / which Castilian changes into h. In physique, the Asturians are like the Galicians, a people of hardy mountaineers and fishermen, finely built, but rarely handsome, and with none of the grace of the Castilian or Andalusian. Unlike the Galicians, however, they are remarkable for their keen spirit of independence, which has been fostered by centuries of isolation. Despite the harsh land-laws and grinding taxation which prevent them, with all their industry and thrift, from securing the freehold of the patch of ground cultivated by each peasant family, the Asturians regard them- selves as the aristocracy of Spain. This pride in their land, racfe and history they preserve even when, as often happens, they emigrate to other parts of the country or to South America, and earn their living as servants, water-carriers, or, in the case of the women, as nurses. They make admirable soldiers and sailors, but lack the enterprise and commercial aptitude of the Basques and Catalans; while they are differentiated from the inhabitants of central and southern Spain by their superior industry, and perhaps their lower standard of culture. It is, on the whole, true that by the exclusion of the Moors they lost their opportunity of playing any conspicuous part in the literary and artistic development of Spain. One class of the Asturians deserving special mention is that of the nomad cattle-drovers known as Baqueros or Vaqueros, who tend their herds on the mountains of Leitariegos in summer, and along the coast in winter; forming a separate

caste, with distinctive customs, and rarely or never intermarrying with their neighbours.

For the modern condition of the principality (including climate, fauna and flora), see S. Canals, Asturias: information sobre su presente estado (Madrid, 1900) ; and G, Casal, Memorias de histoxia

natural y medica de Asturias (Oviedo, 1900). For the history and antiquities, there is much that is valuable in Asturias monumental, epigrdfica y diplomatics &;c, by C. M. Vigil (Madrid, 1887) — folio, with maps and illustrations. See also F. de Aramburu y Zuloaga, Monografia de Asturias (Oviedo, 1899).

ASTYAGES, the last king of the Median empire. In the inscriptions of Nabonidus the name is written Ishtuvegu (cylinder from Abu Habba V R 64, col. 1, 32; Annals, published by Pinches, Tr. Soc. Bibl. Arch. vii. col. 2, 2). According to Herodotus, he was the son of Cyaxares and reigned thirty-five years (584-550 B.C.); his wife was Aryenis, the daughter of Alyattes of Lydi'a (Herod, i. 74) . About his reign we know little, as the narrative of Herodotus, which makes Cyrus the grandson of Astyages by his daughter Mandane, is merely a legend; the figure of Harpagus, who as general of the Median army betrays the king to Cyrus, alone seems to contain an historical element, as Harpagus and his family afterwards obtained a high position in the Persian empire. From the inscriptions of Nabonidus we learn that Cyrus, king of Anshan (Susiana), began war against him in 553 B.C.; in 550, when Astyages marched against Cyrus, his troops rebelled, and he was taken prisoner. Then Cyrus occupied and plundered Ecbatana. The captive king was treated fairly by Cyrus (Herod, i. 130), and according to Ctesias (Pers. 5, cf. Justin i. 6) made satrap of Hyrcania, where he was afterwards slain by Oebares against the will of Cyrus, who gave him a splendid funeral. Alexander Polyhistor and Abydenus in their excerpts from Berossus, which Eusebius (Chron. i. pp. 29 and 37) and Syncellus (p. 396) have preserved, give the name Astyages to the Median king who reigned in the time of the fall of Nineveh (606 B.C.), and became father-in-law of Nebuchadrezzar. This is evidently a mistake; the name ought to be Cyaxares (in the fragments of the Jewish history of Alexander Polyhistor, in Euseb. Praep. Ev. ix. 39, the name is converted into Astibaras, who, according to the unhistorical list of Ctesias, was the father of Astyages), and there is no reason to invent an earlier king Astyages I., as some modern authors have done. The Armenian historians render the name Astyages by Ashdahak, i.e. Azhi Dahaka (Zohak), the mythical king of the

Iranian epics, who has nothing whatever to do with the historical king of the Medes. (Ed. M.)

ASTYLAR (from Gr. A-, privative, and orOXos, a column)-, an architectural term given to a class of design in which neither columns nor pilasters are used for decorative purposes; thus the Ricardi and Strozzi palaces in Florence are astylar in their design, in contradistinction to Palladio's palaces at Vicenza, which are columnar.

ASUNC16N (Nuestra Senora de la Asuncion), a city and port of Paraguay, and capital of the republic, on the left bank of the Paraguay river in 25° 16′ 04″ S., 57 42′ 40″ W., and 970 m. above Buenos Aires. Pop. (est. in 1900) 52,000. The port is connected with Buenos Aires and Montevideo by regular lines of river steamers, which are its only means of trade communication with the outer world, and with the inland town of Villa Rica (95 m.) by a railway worked by an English company. The city faces upon a curve in the river bank forming what is called the Bay of Asunci6n, and is built on a low sandy plain, rising to pretty hillsides overlooking the bay and the low, wooded country of the Chaco on the opposite shore. The general elevation is only 253 ft. above sea-level. Asunci6n is laid out on a regular plan, the! credit for which is largely due to Dictator Francia; the principal streets are paved and lighted by gas and electricity; and telephone and street-car services are maintained. The climate is hot but healthful, the mean annual temperature being about, 72 F. The- city is the seat of a bishopric dating from 1547, and con- tains a large number of religious edifices. It has a national college and public library, but no great progress in education has been made. The most prominent edifice in the city is the palace begun by the younger Lopez, which is now occupied by a bank. There are some business edifices and residences of considerable architectural merit, but the greater part are small- and iricon- spicuous, a majority of the residences being thatched, mud- walled cabins. Considerable progress was made during the last two decades of the 19th century, however, notwithstanding misgovernment and the extreme poverty of the people. Asuncion

was founded by Ayolas in 1535, and is the oldest permanent Spanish settlement on the La Plata. It was for a long time the seat of Spanish rule in this region, and later the scene of a bitter struggle between the church authorities and Jesuits. Soon after the declaration of independence in 1 811, the city fell under the despotic rule of Dr Francia, and then under that of the elder and younger Lopez, through which its development was greatly impeded. It was captured and plundered by the Brazilians in 1869, and has been the theatre of several revolutionary outbreaks since then, one of which (1905) resulted in a blockade of several months' duration. (A. J. L.)

ASVINS, in Hindu mythology, twin deities of light. Aftel Indra, Agni and Soma, they are the most prominent divinities in the Rig- Veda, and have more than fifty entire hymns addressed to them. Their exact attributes are obscure. They appear to be the spirits of dawn, the earliest bringers of light in the morning sky; they hasten on in the clouds before Dawn and prepare the way for her. In some hymns they are called sons of the sun; in others, children of the sky; in others, offspring of the ocean. They are youngest of the gods, bright lords of lustre, honey-hued. They are inseparable. The sole purpose of one hymn is to compare them with different twin objects, such as eyes, hands, feet and wings. They have a common wife, Surya. They are physicians, protectors of the weak and old, especially of elderly unmarried women. They are the friends of lovers, and bless marriages and make them fruitful.

See A. A. Macdonell, Vedic Mythology (Strassburg, 1897).

ASYLUM (from Gr. k-, privative, arid aVKtjf right'of seizure), a place of refuge. In ancient Greece, an asylum was an " inviol- able " refuge for persons fleeing from pursuit and in search of protection. In a general sense, all Greek temples' aiid altars were inviolable, that is> it was a religious crime to remove by force any person or thing once under the protection of a deity ˆ But it was only in the case of a small number of temples that this protecting right of a deity was recognized with, common consent. Such were the sanctuaries of Zeus Lycaeus in Arcadia, of Poseidon in the island of Calauria, and of Apollo at Delosˆ they were; however, numerous in Asia Minor. They guaranteed absolute security to the suppliant within their limits. The right of sanctuary, originally possessed by all temples;; appears to have become limited to a few in consequence of abuses of it. Asylums in this sense were peculiar to the Greeks. The asylum of Romulus (Livy i. 8), which was probably the altar of Veiovis, cannot be considered as such. Under Roman dominion, the rights of existing Greek sanctuaries were at first confirmed; but their number was considerably reduced by Tiberius. Under the Empire, the statues of the emperors and the eagles of the legions were made refuges against acts of violence. Generally speaking, the classes of persons who claimed the rights of asylum were slaves who had been maltreated by their masters, soldiers defeated and pursued hy the enemy, and criminals who feared a trial ot who had escaped before sentence was passed. (See treatises De Asylis Graecis, by Forster, 1847; Jaenisch, 1868; Barth, 1888.) ; '

With the establishment of Christianity, the custom of asylum or sanctuary (q.v.) became attached to the church or churchyard. In modern times the word asylum has come to mean an institu-i tion providing shelter dr refuge for any class- of afflicted or destitute persons, such as the blind, deaf and dumb, &e., but more particularly the insane. (See Insanity.)

ASYLUM, RIGHT OF (Fr. droit d'asile; Ger. Asylrecht), in international law, the right which a state possesses^ by .virtue of the principle that every independent state is sole master within its boundaries, of allowing fugitives from another' country to enter or sojourn upon its territory. Extradition (q.v.) treaties are undertakings between states curtailing the exercise of the right of asylum in respect of refugees from justice, but the con- ditions therein laid down invariably show that nations regard the maintenance of this right of asylum' as intimately connected with their right of independent action, however weak as states they -may be, on their own soil. The neutral right to gtant asylum to belligerent forces is now governed by articles 57, / s8

and 59 of the regulations annexed to the Hague Convention of the 29th of July 1899, relating to the Laws and Customs of War on Land. (See War.) (T. Ba.)

ATACAMA, a province of northern Chile, bounded N. and S. respectively by the provinces of Antofagasta and Coquimbo, and extending from the Pacific coast E. to the Argentine boundary line. It has an area of 30,729 sq. m., lying in great part within the Atacama desert region (see below), and a population (1902) of 71,446. The silver and copper mines of the province are numerous, some of them ranking among the most productive known, but the majority are worked with limited capital and on a small scale. The silver ore was first discovered in 1832 by a shepherd at a place which bears his name, Juan Godoi. The nitrate and borax deposits are extensive and productive, and common salt is a natural product of large areas in the elevated desert regions of the Andes. The exports include copper and silver and their ores, nitrate of soda, borax, guano and other minerals in small quantities. The capital, Copiapo (est. pop. 8991 in 1902), is situated on a small river of the same name 37 m. from the coast and 51 m. south-east. by rail from Caldera, the principal port of this great mining district. Before 1842, when guano began to attract notice as an exportable product, Atacama was considered as Bolivian territory, and Coquimbo the extreme northern province of Chile. In that year Chile decided to explore the desert coast, and in 1843 that part of the desert extending north to the 26th parallel was organized into the province of Atacama.

ATACAMA, DESERT OF, an arid, barren and saline region of western South America, covering the greater part of the Chilean provinces of Atacama and Antofagasta, the Argentine territory of Los Andes, and the

south-western corner of the Bolivian department of Potosf. The higher elevations are known as the Puna de Atacama, which is practically a continuation southward of the great puna region of Peru and Bolivia. It is a broken, mountainous region, volcanic in places, saline in others, and ranges from 7000 to 13,500 ft. in general elevation. Its cul- minating ridges are marked by an irregular line of peaks and extinct volcanoes extending north by east from about 28 S. into southern Bolivia. On the eastern side, occasional rainfalls occur and streams from the snow-clads peaks produce some slight displays of fertility, but the general aspect of the plateaus, which are dry and cold in winter and in summer are swept by rain- storms and covered by occasional tufts of coarse grass, is barren and forbidding. They are also broken by great saline lagoons and dry salt basins. This region forms the Argentine territory of Los Andes and is habitable in places. On the western slope the land descends gradually to the Pacific, being broken into great basins, or terraces, by mountainous ridges in its higher elevations, widening out into gently-sloping sandy plains below, famous for their nitrate deposits, and terminating on the coast with sharply-sloping bluffs, having an elevation of 800 to 1500 ft., and looking from the sea like a range of flat-topped hills. This desolate region, which is rainless and absolutely barren, and was considered worthless for three and a half centuries, is now a treasure-house of mineral wealth, abounding in copper, silver, lead, nickel, cobalt, iron, nitrates and borax. It is occupied by many mining settlements, and includes some of the most productive copper and silver mines of the world.

See L. Darapsky, " Zur Geographie der Puna de Atacama," Zeits. Ges. Erdk. zu Berlin, 1899; G. E. Church, "South America: an Outline of its Physical Geography," Geographical Journal, 1901 ; John Ball, Notes of a Naturalist in South America (London, 1887); F. O'Driscoll, " A Journey to the North of the Argentine Republic," Geographical Journal, 1904. (A. J. L.)

. ATACAMITE, a mineral found originally in the desert of Atacama, and named by D. de Gallizen in 1801. It is a cupric oxychloride, having the formula $CuCl_2 .3Cu(OH)_2$, and crystalliz- ing in the orthorhombic system. Its hardness is about 3 and its specific gravity 3-7, while its colour presents various shades of green, usually dark. Atacamite is a comparatively rare mineral, formed in some cases by the action of sea-water on various copper-ores, and occurring also as a volcanic product on Vesuvian lavas. Some of the finest crystals have been yielded by the

copper-mines of South Australia, especially at Wallaroo. It occurs also, with malachite, at Bembe, near Ambriz, in West Africa. From one of its localities in Chile, Los Remolinos, it was termed Remolinite by Brooke and Miller. Atacamite, in a pulverulent state, was formerly used as a pounce

under the name of "Peruvian green sand," and was known in Chile as arsenillo. (F. W. R.)*

ATAHUALLPA (atahu, Lat. virtus, and allpa, sweet), " the last of the Incas " (or Yncas) of Peru, was the son of the ruler Huayna Capac, by Pacha, the daughter of the conquered sove- reign of Quito. His brother Huascar succeeded Huayna Capac in 1527; for, as Atahuallpa was not descended on both sides from the line of Incas, Peruvian law considered him illegitimate. He obtained, however, the kingdom of Quito. A jealous feeling soon sprang up between him and Huascar, who insisted that Quito should be held as a dependent province of his empire. A civil war broke out between the brothers, and, about the time when the Spanish conqueror Pizarro was beginning to move inland from the town of San Miguel, Huascar had been defeated and thrown into prison, and Atahuallpa had become Inca. Pizarro set out in September 1532, and made for Caxamarca, where the Inca was. Messengers passed frequently between them, and the Spaniards on their march were hospitably received by the inhabitants. On the 15th of November, Pizarro entered Caxamarca, and sent his brother and Ferdinando de Soto to request an interview with the Inca. On the evening of the next day, Atahuallpa entered the great square of Caxamarca, accom- panied by some five or six thousand men, who were either un- armed or armed only with short clubs and slings concealed under their dresses. Pizarro's artillery and soldiers were planted in readiness in the streets opening off the square. The interview was carried on by the priest Vicente de Valverde, who addressed the Inca through an interpreter. He stated briefly and dog- matically the principal points of the Christian faith and the Roman Catholic policy, and concluded by calling upon Atahuallpa to become a Christian, obey the commands of the pope, give up the administration of his kingdom, and pay tribute to Charles V., to whom had been granted the conquest of these lands. To this extraordinary harangue, which from its own nature and the faults of the interpreter must have been completely unintelligible, the Inca at first returned a very temperate answer. He pointed out what seemed to him certain difficulties in the Christian religion, and declined to accept as monarch of his dominions this Charles, of whom he knew nothing. He then took a bible from the priest's hands, and, after looking at it, threw it violently from him, and began a more impassioned speech, in which he exposed the designs of the Spaniards, and upbraided them with the cruelties they had perpetrated. The priest retired, and Pizarro at once gave the signal for attack. The Spaniards rushed out suddenly, and the Peruvians, astonished and defenceless, were cut down in hundreds. Pizarro himself seized the Inca, and in endeavouring to preserve him alive, received, accidentally, on his hand the only wound inflicted that day on a Spaniard. Atahuallpa, thus treacherously cap tured, offered an enormous sum of money as a ransom, and fulfilled his*

engagement; but Pizarro still detained him, until the Spaniards should have arrived in sufficient numbers to secure the country. While in captivity, Atahuallpa gave secret orders for the assassination of his brother Huascar, and also endeavoured to raise an army to expel the invaders. His plans were betrayed, and Pizarro at once brought him to trial. He was condemned to death, and, as being an idolater, to death by fire. Atahuallpa, however, professed himself a Christian, received baptism, and his sentence was then altered into death by strangulation (August 29, 1533). His body was afterwards burned, and the ashes conveyed to Quito. (See also Peru: History.)

ATALANTA, in Greek legend, the name of two Greek heroines. (1) The Arcadian Atalanta was the daughter of Iasius or Iasion and Clymene. At her birth, she had been exposed on a hill, her father having expected a son. At first she was suckled by a she-bear, and then saved by huntsmen, among whom she grew

up to be skilled with the bow, swift, and fond of the chase, like the virgin goddess Artemis. At the Calydonian boar-hunt her arrows were the first to hit the monster, for which its head and hide were given her by Meleager. At the funeral games of Pelias, she wrestled with Peleus, and won. For a long time she remained true to Artemis and rejected all suitors, but Meilanion at last gained her love by his persistent devotion. She was the mother of Parthenopaeus, one of the Seven against Thebes (Apollodorus iii. 9 ; Hyginus, Fab. 99). (2) The Boeotian Atalanta was the daughter of Schoeneus. She was famed for her running, and would only consent to marry a suitor who could outstrip her in a race, the consequence of failure being death. Hippomenes, before starting, had obtained from Aphro- dite three golden apples, which he dropped at intervals, and Atalanta, stopping to pick them up, fell behind. Both were happy at the result; but forgetting to thank the goddess for the apples, they were led by her to a religious crime, and were transformed into lions by the goddess Cybele (Ovid, Metam. x. 560; Hyginus, Fab. 185). The characteristics of these two heroines (frequently confounded) point to their being secondary forms of the Arcadian Artemis.

ATARGATIS, a Syrian deity, known to the Greeks by a shortened form of the name, Derketo (Strabo xvi. c. 785; Pliny, Nat. Hist. v. 23. 81), and as Dea Syria, or in one word Deasura (Lucian, de Dea Syria). She is generally described as the " fish-goddess." The name is a compound of two divine names; the first part is a form of the Himyaritic ' Athtar, the equivalent of

the Old Testament Ashtoreth, the Phoenician Astarte (g.v.), with the feminine ending omitted (Assyr. Ishtar); the second is a Palmyrene name 'Athe (i.e. tempus opporlunum) , which occurs as part of many compounds. As a consequence of the first half of the name, Atargatis has frequently, though wrongly, been identified with Astarte. The two deities were, no doubt, of common origin, but their cults are historically distinct. In 2 Mace. xii. 26 we find reference to an Atargateion or Atergateion (temple of Atargatis) at Canlion in Gilead (cf. 1 Mace. v. 43), but the home of the goddess was unquestionably not Palestine, but Syria proper, expecially at Hierapolis (q.v.), where she had a great temple. From Syria her worship extended to Greece, Italy and the furthest west. Lucian and Apuleius give descrip- tions of the beggar-priests who went round the great cities with an image of the goddess on an ass and collected money. The wide extension of the cult is attributable largely to Syrian merchants; thus we find traces of it in the great seaport towns; at Delos especially numerous inscriptions have been found bearing witness to its importance. Again we find the cult in Sicily, introduced, no doubt, by slaves and mercenary troops, who carried it even to the farthest northern limits of the Roman empire. In many cases, however, Atargatis and Astarte are fused to such an extent as to be indistinguishable. This fusion is exemplified by the Camion temple, which is probably identical with the famous temple of Astarte at Ash- taroth-Karnaim.

Atargatis appears generally as. the wife of Hadad (Baal). They are the protecting deities of the community. Atargatis, in the capacity of iroXtoOxos, wears a mural crown, is the ancestor of the royal house, the founder of social and religious life, the goddess of generation and fertility (hence the prevalence of phallic emblems), and the inventor of useful appliances. Not unnaturally she is identified with the Greek Aphrodite. By the conjunction of these many functions, she becomes ultimately a great Nature-Goddess, analogous to Cybele and Rhea (see Cheat Mother of the Gods) ; in one aspect she typifies the function of water in producing life; in another, the universal mother-earth (Macrobius, Saturn, i. 23); in a third (influenced, no doubt, by Chaldaean astrology), the power of destiny. The legends are numerous and of an astrological character, intended to account for the Syrian dove-worship and abstinence from fish (see the story in Athenaeus viii. 37, where Atargatis is derived from orep TanSos," without Gatis," — a queen who is said to have forbidden the eating of fish). Thus Diodorus Siculus, usirig Ctesias, tells how she fell in love with a youth who was

worshipping at the shrine of Aphrodite, and by him became the mother of Semiramis, the Assyrian queen, and how in shame she flung herself into a pool at Ascalon or Hierapolis and was changed into a fish (W. Robertson Smith in Eng. Hist. Rev. ii., 1887). In another story she was hatched from

an egg found by some fish in the Euphrates and by them thrust on the bank where it was hatched by a dove; out of gratitude she persuaded Jupiter to transfer the fish to the Zodiac (cf. Ovid, Fast, ii, 459-474 Metam. V. 331).*

See articles s.v. in Herzog-Hauck, Realencyk. (1897), by W. Bauˆ dissin; afid Pauly-Wissowa, Realencyc; Fr. Baethgen, Beitrdge zur Semit. Religiongesch. (1888); R. Pietschmann, Gesch. der Phonizier

(1889).

ATAULPHUS (the Latinized form of the Gothic Ataulf, " Father-wolf," from attd, father, and vulfs, wolf; mod. Germ. Adolf, Latinized as Adolphus, the form used by Gibbon for the subject of this article), king of the Goths (d. 415). On the death of Alaric (q.v.) his followers acclaimed his brother-in-law Ataul- phus as king. Iii 412 he quitted Italy and led his army across the Alps into Gaul. Here he fought against some of the usurpers who threatened the throne of Honorius; he made some sort of compact with that emperor and, in 414, he married his sister Placidia; who had been since the siege of Rome a captive in the camp of the Goths. The ex-emperor Attalus danced at the marriage festival, which was celebrated with great pomp at Narbonne. In 415 Ataulphus crossed the Pyrenees into Spain and died at Barcelona, being assassinated by a groom. The most important fact in his history is his confession, recorded by Orosius, that he saw the inability of his countrymen to rear a civilized or abiding kingdom, and that consequently his aim should be to build on Roman foundations and blend the two nations into one.

ATAVISM (from Lat. atavus, a great-great-great-grandfather or ancestor), the term given in biology to the reproduction in a living person or animal of the characteristics of an ancestor more remote than its parents (see Heredity). Loosely used, it con- notes a reversion to an earlier type. Individuals reproduce unexpectedly the traits of earlier ancestors, and ethnologists and criminologists frequently explain by " atavism " the occur- rence of degenerate species of man; but the whole subject is complicated by other possible explanations of such phenomena, included in the scientific study of normal " variation."

ATBARA (Bahr-el-Aswad, or Black River), the most northern affluent of the river Nile, N.E. Africa. It rises in Abyssinia to the' N.W. of Lake Tsana, unites its waters with a number of other rivers which also rise in the Abyssinian highlands, and flows north-west 800 m. till its junction at Ed Danier with the Nile (q.v.). The battle of the Atbara, fought near Nakheila, a place on the north bank of the river about 30 m. above Ed Damer r on the 8th of April 1898, between the khalifa's forces under Mahmud and Sir

Herbert (afterwards Lord) Kitchener's Anglo-Egyptian army, resulted in the complete defeat of the Mahdists and the capture of. their leader, and paved the way for the decisive battle of Omdurman on the 2nd of September following (see Egypt: Military Operations}.

ATCHISON, a city and the county-seat of Atchison county, Kansas, U.S.A., on the west bank of the Missouri river, which is navigable at this point but is utilized comparatively little for commerce. Pop. (1890) 13,963; (1900) 15,722, of whom 2508 were of negro descent and 1308 were foreign-born; (1910) 16,429. Atchison is served by the Atchison, Topeka & Santa F6, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, and the Missouri Pacific railways. The city is the seat of Midland College (Lutheran, 1887), St Benedict's College (Roman Catholic, 1858) for boys, Mt. Scholastics Academy (Roman Catholic) for girls, and Western Theological Seminary (Evangelical-Lutheran, 1893); a state soldiers' orphans' home is also located here. Atchison's situation and transportation facilities make it an important supply-centre, its trade in grains and live-stock being particularly large; it has large railway machine shops, and its principal manufactures are flour, furniture, lumber, hardware and drugs. The value of the city's factory

products increased from $2,093,469 in 1900 to $4,052,274 in 1905, or 93-6%. Atchison was founded in 1854 by pro-slavery partisans, and was named in honour of their leader, David Rice Atchison, a United States senator. The city was quickly sur- passed by Leavenworth in commercial importance, and during the Kansas struggle was never of great political importance. Its first city charter was granted in 1858. The Atchison Globe (established 1878) is one of the best-known of western papers.

ATE, in Greek mythology, the personification of criminal folly, the daughter of Zeus and Eris (Strife). She misled even Zeus to take a hasty oath, whereby Heracles became subject to Eurystheus. Zeus thereupon cast her by the hair out of Olympus, , whither she did not return, but remained on earth, working evil and mischief (Iliad, xix. 91). She is followed by the Litae (Prayers), the old and crippled daughters of Zeus, who are able to repair the evil done by her (Iliad, ix. 502). In later times Ate is regarded as the avenger of sin (Sophocles, Antigone,

614, 625).

See J. Girard, Le Sentiment religieux en Grice (1869) ; J. F. Scherer, De

Graecorum Ales Notione atque Indole (1858) ; E. Berch, Bedeutung der Ate bei Aeschylos (1876); C. Lehrs, Populdre Aufsalze aus dent Alterthum (1875) ; L. Schmidt, Die Ethik der alten Griechen (1882).

ATELLA, an ancient Oscan town of Campania, 9 m. N. of Naples and 9 m. S. of Capua, on the road between the two. It was a member of the Campanian confederation, and shared the fortunes of Capua, but remained faithful to Hannibal for a longer time; the great part of the inhabitants, when they could no longer resist the Romans, were transferred by him to Thurii, and the town was reoccupied in 211 by the Romans, who settled the exiled inhabitants of Nuceria there. The fate of Atella at the end of the war, when the latter were able to return to their own city, is unknown. Cicero was in friendly relations with it, and exerted influence that it might retain its property in Gaul, so that it is obvious that it had then recovered municipal rights. The town is mainly famous as the cradle of early Roman comedy, the Fabulae Atellanae (see below). Some remains of the town still exist, including a tower of the city wall in brick.

See J. Beloch, Campanien (2nd ed., Breslau, 1890), p. 379.

ATELLANAE FABULAE (" Atellan fables "), the name of a sort of popular comedy amongst the ancient Romans. The name is derived from Atella, an Oscan town in Campania; for this reason, and from their being also called Osci ludi, it has been supposed that they were of Oscan origin and introduced at Rome after Campania had been deprived of its independence. It seems highly improbable that they were performed in the Oscan language. Mommsen, however, rejects their Oscan origin altogether; he regards them as purely Latin, the scene merely being laid at Atella to avoid causing offence by placing it at Rome or one of the Latin cities. These plays, or rather sketches, contained humorous descriptions of country as contrasted with town life, and found their subjects amongst the lower classes of the people. The subjects alone were decided upon before the performance began; the dialogue was improvised as it proceeded. The Atellanae contained certain stock characters, like the Italian harlequinades: Maccus (the fool), Bucco (fat- chaps), Pappus (daddy), Dossennus (sharper); monsters and bogeys like Manducus, Pytho, Lamia also made their appearance. The performers were the sons of Roman citizens, who did not lose their rights as citizens, and were allowed to serve in the army: professional actors were excluded. The simple prose dialogues were probably varied by songs in the rude Saturnian metre: the language was that of the common people, accom- panied by lively gesticulation and movements. They were characterized by coarseness and obscenity. In the time of Sulla a literary form was given to the Atellanae by Pomponius of Bononia and Novius, who made them regular written comedies. Living persons seem to have been attacked, and even the doings of the gods and

heroes of mythology burlesqued. From this time the Atellanae were used as after-pieces and performed by professional actors. In 46 B.C. they were ousted by the mimes, but regained popularity during the reign of Tiberius (chiefly owing to a certain Mummius), until they were definitely

superseded by and merged in the mimes. They held their ground in the small towns and villages of Italy during the last days of the empire; they probably lingered on into the middle ages, and were the origin of the Italian Commedie dell' arte.

. The scanty fragments of Pomponius and Novius are collected in Ribbeck's Comicorum Romanorum Reliquiae; see also Munk, De Fabulis Atellanis (1840) ; and art. Latin Literature.

ATESTE (mod. Este, q.v.), an ancient town of Venetia, at the southern foot of the Euganean hills, 43 ft. above sea-level; 22m. S.W.of Patavium (Padua). The site was occupied in very early times, as the discoveries since 1882 show. Large cemeteries have been excavated, which show three different periods from the 8th century B.C. down to the Roman domination. In the first period (Italic) cremation burials closely approximating to the Villanova type are found; in the second 1 (Venetian) the tombs are constructed of blocks of stone, and situlae (bronze buckets), sometimes decorated with elaborate designs, are frequently used to contain the cinerary urns; in the third (Gallic), which begins during the 4th century B.C., though cremation continues, the tombs are much poorer, the ossuaries being of badly baked rough clay, and show traces of Gallic influence, and characteristics of the La-Tene civilization. The many important objects found in these excavations are preserved in the local museum. See G. Ghirardini in Notizie degli Scavi; Monumenti dei Lincei, ii. (1893) 161 seq., vii. (1897) 5 seq., x. (1901) 5 seq.; AM del Congresso Intemazionale di Scienze Storiche (Rome, 1904), v. '279 seq. Inscriptions show that the national language asserted its existence even after Ateste came into the hands of the Romans. When this occurred is not known; boundary stones of 135 B.C. exist, which divide the territory of Ateste from that of Patavium and of Vicetia, showing that the former extended from the middle of the Euganean hills to the Atesis (mod. Adige, from which Ateste no doubt took its name, and on which it once stood). After the battle of Actium, Augustus settled veterans from various of his legions in this territory, Ateste being thenceforth spoken of as a colony. It appears to have furnished many recruits, especially for the cohortes urbanae. It appears but little in history, though its importance is vouched for by numerous inscriptions, the majority of which belong to the early Empire. (T. As.)

ATH, or Aath, an ancient town of ; the province of Hainaut, Belgium, situated on the left bank of the Dender. Pop. (1890) 9868; (1904)

11,201. Formerly it was fortified, but after the change in the defensive system of Belgium in 1858 the fortress was dismantled and its ramparts superseded by boulevards. Owing to a fire caused by lightning its fine church of St Julien, dating from the 14th century, which had escaped serious injury during many wars, was destroyed in 1817 (since rebuilt). This left the Tour Burbant as its sole relic of the middle ages. This tower formed part of the donjon of the fortress erected by Baldwin IV., count of Hainaut, about the year 1150. Near Ath is the fine castle of Beloeil, the ancient seat of the princely family of Ligne. Ath is famous for its gild of archersj whose butts are erected on the plain of the Esplanade in the centre of the town. The town militia has the privilege of being armed with bows and crossbows. Ath is also well known in Hainaut for its annual f£te called le jour de ducasse — duedsse being the Walloon word for kermesse (fete) . On this occasion a procession escorting figures of two giants, Goliath, called locally Goyasse, ; and Samson, forms the chief feature of the celebration. The emperor Joseph II. stopped it for its " idolatrous " character, but this act was one of the causes of the Brabant revolution of 1789. The procession, revived in 1790, was again stopped by the French republicans five years later, but was revived under the Empire, and has flourished ever since.

ATHABASCA (Athdpescow) , or Elk, a river and lake Of the province of Alberta, Canada. The river rises in the Rocky Mountains near the Yellowhead Pass in 52 10′ N; and 117 10′ W., and flows north-east as far as Athabasca Landing, and thence north into Lake Athabasca. It is 740 m. long and has a number of important tributaries, including the McLeod, Pembina, Lesser 1 This is by some authorities divided into two.

Slave, which drains the lake :of that name, and Clearwater. Athabasca lake is 195 m. long, west to east, from 20 to 32 m. wide, has an area of 3085 sq. m., and is 690 ft. above the sea. It dis- charges its waters northward by Slave river and the Mackenzie system to the Arctic Ocean. On its north shore the country is high and rocky; on the south, sandy and barren. Shallow- draught steamers navigate the lake and river, and Lesser Slave lake and river, with one interruption — at Grand Rapids near the mouth of the Clearwater river.

ATHALARIC (516-534), king of the Ostrogoths, grandson of Theodoric, became king of the Ostrogoths in Italy on his grand- father's death (526). As he was only ten years old, the regency was assumed by his mother Amalasuntha (q.v.). The murmurs of the Gothic nobles procured for their

young sovereign too early emancipation from the schoolroom. He drank heavily, and indulged in vicious excesses which ruined his constitution. He died on the 2nd of October 534.

ATHALIAH, in the Bible, the daughter of Ahab, and wife of Jehoram, king of Judah. After the death of Ahaziah, her son, she usurped the throne and reigned for six years. She is said to have massacred all the members of the royal house of Judah (2 Kings xi. 1-3), but a similar atrocity is also ascribed to Jehu (2 Kings x. 12-14); with both notices contrast 2 Chron. xxi. 17. The sole survivor Joash was concealed in the temple by his aunt, Jehosheba, wife of the priest Jehoida (2 Chron. xxii. n). These organized a revolution in favour of Joash, and caused Athaliah and her adherents to be put to death (2 Kings xi.; 2 Chron. xxii. 10-12, xxiii., xxiv. 7).

The story of Athaliah forms the subject of one of Racine's best tragedies. It has been musically treated by Handel and Mendelssohn.

ATHAMAS, in Greek mythology, king of the Minyae in Boeotian Orchomenus, son of Aeolus, king of Thessaly, or of Minyas. His first wife was Nephele, the cloud-goddess, by whom he had two children, Phrixus and Helle (see Argonauts). Athamas and his second wife Ino were said to have incurred the wrath of Hera, because Ino had brought up Dionysus, the son of her sister Semele, as a girl, to save his life. Athamas went mad, and slew one of his sons, Learchus; Ino, to escape the pursuit of her frenzied husband, threw herself into the sea with her other son Melicertes. Both were afterwards worshipped as marine divinities, Ino as Leucothea, Melicertes as Palaemon (Odyssey v. 333). Athamas, with the guilt of his son's murder upon him, was obliged to flee from Boeotia. He was ordered by the oracle to settle in a place where he should receive hospitality from wild beasts. This he found at Phthiotis in Thessaly, where he surprised some wolves eating sheep; on his approach they fled, leaving him the bones. Athamas, regarding this as the fulfilment of the oracle, settled there and married a third wife, Themisto. The spot was afterwards called the Athamanian plain (Apollo- dorus i. 9; Hyginus, Fab. 1-5; Ovid, Metam. iv. 416, Fasti, vi. 485; Valerius Flaccus i. 277).

According to a local legend, Athamas was king of Halos in Phthiotis from the first (Schol. on Apoll. Rhorlius ii. 513). After his attempt on the life of Phrixus, which was supposed to have succeeded, the Phthiots were ordered to sacrifice him to Zeus Laphystius, in order to appease the anger of the gods. As he was on the point of being put to death, Cytissorus, a son of Phrixus, suddenly arrived from Aea with the news that Phrixus was still alive. Athamas's life was thus saved, but the wrath of the gods was unappeased, and pursued the family. It was ordained that the el'dest born of the race should not enter the council-chamber; if he did so, he was liable

to be seized and sacrificed if detected (Herodotus vii. 197). The legend of Athamas is probably founded on a very old custom amongst the Minyae—the sacrifice of the first-born of the race of Athamas to Zeus Laphystius. The story formed the subject of lost tragedies by Aeschylus, Sophocles, Euripides and other Greek and Latin dramatists.

ATHANAGILD (d. 547) became king of the Visigoths (in Spain) in 534, having invoked the aid of the emperor Justinian for his revolt against his predecessor Agila. Athanagild, when him- self king, vainly tried to oust his late allies from the footing which

they had gained in Spain, nor were the Greeks finally expelled from Spain till seventy years later. Athanagild himself is chiefly remembered for the tragic fortunes of his daughters Brunechildis and Gavleswintha, who married two Frankish brother kings, Sigebert and Chilperic. Athanagild died ("peacefully," as the annalist remarks) in 547. , .

ATHANARIC (d. 381), a ruler of the Visigoths from about 366 to 380. He bore the title not of king but of judge, a title which may be compared with that of ealdorman among the Anglo- Saxon invaders of Britain. Athanaric waged, from 367 to 369, an unsuccessful war with the emperor Valens, and the peace by which the war was ended was ratified by the Roman and Gothic rulers meeting on a barge in mid-stream of the Danube. Athan- aric was a harsh and obstinate heathen, and his short reign was chiefly famous for his brutal persecution of his Christian fellow- countrymen. In 376 he was utterly defeated by the Huns, who a few years before had burst into Europe. The bulk of the Visigothic people sought refuge within the Empire in the region now known as Bulgaria, but Athanaric seems to have fled into Transylvania. Being attacked there by two Ostrogothic chiefs he also, in 381, sought the protection of the Roman emperor. Theodosius I. received him courteously, and he was profoundly impressed by the glories of Constantinople, but on the fifteenth day after his arrival he died, and was honoured by the emperor with a magnificent funeral.

ATHANASIUS (293-373), bishop of Alexandria and saint, one of the most illustrious defenders of the Christian faith, was born probably at Alexandria. Of his family and of his early education nothing can be said to be known. According to the legend, the boy is said to have once baptized some of his playmates and thereupon to have been taken into his house by Bishop Alexander, who recognized the validity of this proceeding. It is' certain' that Athanasius was young when he took orders, and that he must soon have entered into close relations with his bishop, whom, after the outbreak of the Arian controversy, he accom-r panied as archdeacon to the council of Nicaea. In the sessions and discussions of the council he could take no part;' but in unofficial conferences he took sides vigorously,

according to his own evidence, against the Arians, and was certainly not without influence. He had already, before the opening of the Council, defined his personal attitude towards the dogmatic problem in two essays, Against the Gentiles and On the Incarnation, without, however, any special relation to the Arian controversy..

The essay On the Incarnation is the locus classicus for the presentation of the teaching of the ancient church on the subject of salvation. In this the great idea that God himself had entered into humanity becomes dominant. The doom of death under which mankind had sighed since Adam's fall could only then be averted, when the immortal Word of God (A670S) assumed a mortal body, and, by yielding this to death for the: sake of ally abrogated once for all the law of death, of which the power had been spent on the body of the Lord. Thus was rendered possible the leading back of mankind to God, of which the sure pledge lies in the grace of the resurrection of Christ. Athanasius would hear of no questioning of this religious mystery. In the catch- word Homousios, which had been added to the creed at Nicaea, he too recognized the best formula for the expression of the mystery, although in his own writings he made but sparing use of it. He was in fact less concerned with the formula than with the content. Arians and Semi- Arians seemed to him to be pagans, who worship the creature, instead of the God who created all things, since they teach two gods, one having no beginning, the other having a beginning in Time and therefore of the same nature as the heathen gods, since, like them, he is a, creature. Athanasius has no terms for the definition of the Persons in the one "Divine" (to 1 diiov), which are in their substance one; and yet he is 1 certain that this "Divine" is riot a mere abstraction, but something truly personal: "They are One," so he wrote later in his Discourses against the Arians, " not as though the unity were toin into two parts, which outside the unity would be nothing, 'nor as though the unity bore two names, so that one and the same is at one time Father and then

his own Son, as the heretic Sabellius imagined. But they are two, for the Father is Father, and the Son is notithe same, but, again, the Son is Son, and not the Father himself. But their Nature ((j>vcns) is one, for the Begotten is not dissimilar (avd/wLOs) to the Begetter, but his image, and everything that is the Father's is also the Son's."

Five months after the return from the council of Nicaea Bishop Alexander died; and on the 8th of February 326 Athanasius, at the age of thirty-three, became his successor. The first years of his episcopate were tranquil ; then

the storms in which the remainder of his life was passed began to gather round him. The council had by no means composed the divi- sions in the Church which the Arian controversy had provoked. Arius himself still lived, and his friend Eusebius of Nicomedia rapidly regained influence over the emperor Constantine. The result was a demand made by the emperor that Arius should be readmitted to communion. Athanasius stood firm, but many accusers soon rose up against one who was known to be under the frown of the imperial displeasure. He was charged with cruelty, even with sorcery and murder. It was reported that a bishop of the Meletian party (see Meletius) in the Thebaid, of the name of Arsenius, had been unlawfully put to death by him. He was easily able to clear himself of these charges ; but the hatred of his enemies was not relaxed, and in the summer of 335 he was peremptorily ordered to appear at Tyre, where a council had been summoned to sit in judgment upon his conduct. There appeared plainly a predetermination to condemn him, and he fled from Tyre to Constantinople to appeal to the emperor himself. Refused at first a hearing, his perseverance was at length rewarded by the emperor's assent to his reasonable request that his accusers should be brought face to face with him in the imperial presence. Accordingly the leaders of the council, the most conspicuous of whom were Eusebius of Nicomedia and his namesake of Caesarea, were summoned to Constantinople. Here they did not attempt to repeat their old charges, but found a more effective weapon to their hands in a new charge of a political' kind — that Athanasius had threatened to stop the Alexandrian corn-ships bound for Constantinople. It is very difficult to understand how far there was truth in the persistent accusations made against the prince-bishop of Alexandria. Probably there was in the very greatness of his character and the extent of his popular influence a certain species of dominance which lent a colour of truth to some of the things said against him. On the present occasion his accusers succeeded at once in arousing the imperial jealousy. Without obtaining a hearing, he was banished at the end of 335 to Treves in Gaul. This was the first banishment of Athanasius, which lasted about one year and a half. It was brought to a close by the death of Constantine, and the accession as emperor of the West of Constantine II., who, in June 337, allowed Athanasius to retu-n to Alexandria.

He reached his see on the 23rd of November 337, and, as he himself has told us, " the people ran in crowds to see his face; the churches were full of rejoicing; thanksgivings were every- where offered up ; the ministers and clergy thought the day the happiest in their lives." But this period of happiness was destined to be short-lived. His position as bishop of Alexandria placed him, not under his patron Constantine, but under Con- stantius, another son of the elder Constantine, who had succeeded to the throne of the East. He in his turn fell, as his father had done in later years,

under the influence of Eusebius of Nicomedia, who in the latter half of 339 was transferred to the see of Con- stantinople, the new seat of the imperial court. A second expulsion of Athanasius was accordingly resolved upon. The old accusations against him were revived, and he was further charged with having set at naught the decision of a council. On the 18th of March 339 the exarch of Egypt suddenly confronted Athanasius with an imperial edict, by which he was deposed and a Cappadocian named Gregory was nominated bishop in his place. On the following day, after tumultuous scenes, Athanasius fled, and four days later Gregory was installed by the aid of the soldiery. On the first opportunity, Athanasius went to Rome, to " lay his case before the church." A synod assembled

at Rome in the autumn of 340, and the great council' — probably that which met at Sardica in 342 or 343, where the Orientals refused to meet the representatives of the Western church-^- declared him guiltless. This decision, however, had no immediate effect in favour of Athanasius. Constantius continued for some time implacable, and the bold action of the Western bishops only incited the Arian party in Alexandria to fresh severities. But the death of the intruder Gregory, on the 26th of June 345, opened up a way of reconciliation. Constantius decided to yield to the importunity of his brother Constans, who had succeeded Constantine II. in the West; and the result was the restoration of Athanasius for the second time, on the 21st of October 346. Again he returned to Alexandria amid the enthusiastic demon- strations of the populace, which is described by Gregory of Nazianzus, in his panegyric on Athanasius, as streaming forth like " another Nile " to meet him afar off as he approached the city.

The six years of his residence in the West had given Athanasius the opportunity of displaying a momentous activity. He made long journeys in Italy, in Gaul, and as far as Belgium. Every- where he laboured for the Nicene faith, and the impression made by his personality was so great that to hold fast the orthodox faith and to defend Athanasius were for many people one and the same thing. This was shown when, after the death of the emperor Constans, Constantius became sole ruler of East and West. With the help of counsellors more subtle than discerning, the emperor, with the object of uniting the various parties in the Church at any cost, sought for the most colourless possible formula of belief, which he hoped to persuade all the bishops to accept.. As his efforts remained for years fruitless, he used force. " My will is your guiding-line," he exclaimed in the summer of 355 to the bishops who had assembled at Milan in response to his orders. A series of his most defiant opponents had to go into banishment, Liberius of Rome, Hilarius of Poitiers and Hosius of Corduba, the last-named once the confidant of Constantine and the actual originator of the Homousips, and now nearly a hundred years old. At length came the turn of Athanasius, now almost the sole upholder of the banner of the

Nicene creed in the East. Several attempts to expel him failed owing to the attitude of the populace. On the night of the 8th- 9th of February 356, however, when the bishop was holding the Vigils, soldiers and police broke into the church of Theonas. Athanasius himself has described the scene for us : "I was seated upon my chair, the deacon was about to read the psalm, the people to answer, ' For his mercy endureth for ever.' The solemn act was interrupted; a panic arose." The bishop, who was at first unwilling to save himself, until he knew that his faithful followers were in safety, succeeded in escaping, leaving the town and finding a hiding-place in the country. The solitudes of Upper Egypt, where numerous monasteries and hermitages had been planted, seem at this time to have been his chief shelter. In this case, benefit was repayed by benefit, for Athanasius during his episcopate had been a zealous promoter of asceticism and monachism. With Anthony the hermit and Pachomius the founder of monasteries, he had maintained personal relations, and the former he had commemorated in his Life of Anthony. During his exile his time was occupied in writing on behalf of his cause, and to this period belong some of his most important works, above all the great Orations or Discourses against the Arians, which furnish the best exposition of his theological principles.

During his absence the see of Alexandria was left, without a pastor. It is true that George of Cappadocia had taken his place; but he could only maintain himself for a short while (February 35 7-October 358). The great majority of the popula- tion remained faithful to the exile. At length, in November 361, the way was opened to him for his return to his see by the death of Constantius. Julian, who succeeded to the imperial throne, professed himself indifferent to the contentions of the Church, and gave permission to the bishops exiled in the late reign, to return home. Among others, Athanasius availed himself of this permission, and in February 362 once more seated himself upon

his throne, amid the rejoicings of the people. He had begun his episcopal labours with renewed ardour, and assembled his bishops in Alexandria to decide various important questions, when an imperial mandate again — for the fourth time — drove him from his place of power. The faithful gathered around him weeping. " Be of good heart," he said, " it is but a cloud: it will pass." His forecast proved true; for within a few months Julian had closed his brief career of pagan revival. As early as September 363, Athanasius was able to travel to Jovian, the new emperor, who had sent him a letter praising his Christian fidelity and encouraging him to resume his work. He returned to Alexandria on the 20th of February 364.

With the emperor he continued to maintain friendly relations; but the period of repose was short. In the spring of 365, after the accession of Valens to the throne, troubles again arose. Athanasius was once more compelled to seek safety from his persecutors in concealment (October 365), which lasted, however, only for four months. In February 366 he resumed his episcopal labours, in which he henceforth remained undisturbed. On the 2nd of May 373, having con- secrated one of his presbyters as his successor, he died quietly in his own house.

Athanasius was a man of action, but he also knew how to use his pen for the furtherance of his cause. He left a large number of writings, which cannot of course be compared with those of an Origen, a Basil, or a Gregory of Nyssa. Athanasius was no systematic theologian. All his treatises are occasional pieces, born of controversy and intended for controversial ends. The interest in abstract exposition of clearly formulated theological ideas is everywhere subordinate to the polemical purpose. But all these writings are instinct with a living personal faith, and serve for the defence of the cause; for it was not about words that he was contending. Even those who do not sympathize with the cause which Athanasius steadfastly defended cannot but admire his magnanimous and heroic character. If he was imperious in temper and inflexible in his conception of the Christian faith, he possessed a great heart and a great intellect, inspired with an enthusiastic devotion to Christ. As a theologian, his main distinction was his zealous advocacy of the essential divinity of Christ. Christianity in its Arian conception would have evaporated in a new polytheism. To have set a dam against this process with the whole force of a mighty personality constitutes the importance of Athanasius in the world's history. It is with good reason that the Church honours him as the " Great," and as the "Father of Orthodoxy."

The best edition of the works of Athanasius is the so-called Maurine edition of Bernard de Montfaucon in 3 vols. (Paris, 1698) ; this was enlarged in the 3rd edition by Giustiniani (4 vols., Padua, I777) > and is printed in this form in Migne's Patrologia, vols, xxv.-xxviii. An English translation of selections, with excellent introductions to the several writings, was published by Archibald Robertson in the Library of the Nicene and Post-Nicene Fathers, second series, vol. 4 (Oxford and New York, 1892). There is no biography satisfactory from the modern point of view. Studies preliminary to such a biography began to be published by E. Schwartz in his essays, " Zur Geschichte des Athanasius " (in the Nachrichten der konighchen Gesellschaft der Wissenschaften zu Gottingen, 1904, &c). The life of Athanasius, however, is so completely intertwined with the history of his time that it is permissible to refer, for a knowledge of him, to the general descriptions which will be found at the close of the article Arius, Of the older literature, Tillemont's Memoires pour servir a. Vhistoire

ecclesiastique des six premiers siecles, vols. vi. and viii., are still a mine of material for the historian. Of the newer literature the following deserve to be read: — Johann Adam Mohler, Athanasius der Grosse und die Kirche seiner Zeit, 2 vols. (2nd ed., Mainz, 1844); and Fr. Boehringer, " Arius und Athanasius," Die Kirche Christi und ihre Zeugen, vol. i. part 2 (2nd ed., Stuttgart, 1874). (G. K.)

ATHAPASCAN, a widely distributed linguistic stock of North American Indians, the chief tribes included being the Chippe- wyan, Navajo, Apache, Jicarilla, Lipan, Hupa and Wailaki. The Athapascan family is geographically divided into Northern, Pacific and Southern. The Northern division (Tinneh or D6ne) is about Alaska, and the Yukon and Mackenzie rivers, — the eponymous " Athabasca " tribe living round Lake Athabasca, in the province of Alberta in Canada. The Pacific division covers a strip of territory, some 400 m. in length, from Oregon

southwards into California. The Southern division includes Arizona and New Mexico, parts of Utah, Colorado, Kansas and Texas, and the northern part of Mexico. The typical tribes are those of the Northern division. See Handbook of American Indians (Washington, 1907).

ATHARVA VEDA, the fourth book of the Vedas, the ancient scriptures of the Brahman religion. Like the other Vedas it is divided into Samhita, Brahmanas and Upanishads, representing the spiritual element and its magical and nationalistic develop- ment. The mantras or sayings composing the Samhita of the Atharva Veda differ from those of the other Vedas by being in the form of spells rather than prayers or hymns, and seem to indicate a stage of religion lower than that of the Rig Veda.

ATHEISM (from Gr. d-, privative, and dibs, God), literally a system of belief which denies the existence of God. The term as generally used, however, is highly ambiguous. Its meaning varies (a) according to the various definitions of deity, and especially (6) according as it is (i.) deliberately adopted by a thinker as a description of his own theological standpoint, or (ii.) applied by one set of thinkers to their opponents. As to (a), it is obvious that atheism from the standpoint of the Christian is a very different conception as compared with atheism as understood by a Deist, a Positivist, a follower of Euhemerus or Herbert Spencer, or a Buddhist. But the ambi- guities arising from the points of view described in (b) are much more difficult both intellectually and in their practical social issues. Thus history shows how readily the term has been used in the most haphazard manner to describe even the most trivial divergence of opinion concerning points of dogma. In other words, " atheism " has been used generally by the orthodox adherents of one religion, or even of a single sect, for all beliefs which are different or even differently expressed. It is in fact in these

cases, like " heterodoxy," a term of purely negative significance, and its intellectual value is of the slightest. The distinction between the terms " religion " and " magic " is, in a similar way, often due merely to rivalry between the adherents of two or more mutually exclusive religions brought together in the same community. When the psalmist declares that " the fool hath said in his heart, there is no God," he probably does not refer to theoretical denial, but to a practical disbelief in God's government of human affairs, shown in dis- obedience to moral laws. Socrates was charged with " not believing in the gods the city believes in." The cry of the heathen populace in the Roman empire against the Christians was " Away with the atheists! To the lions with the Christians!" The ground for the charge was probably the lack of idolatry in all Christian worship. Spinoza, for whom God alone existed, was persecuted as an atheist. A common designation of Knox was " the atheist," although it was to him " matter of satisfac- tion that our most holy religion is founded on faith, not on reason."

In its most scientific and serious usage the term is applied to that state of mind which does not find deity (i.e. either one or many gods) in or above the physical universe. Thus it has been applied to certain primitive savages, who have been thought (e.g. by Lord Avebury in his Prehistoric Times) to have no religious belief; it is, however, the better opinion that there are no peoples who are entirely destitute of some rudimentary religious belief. In the second place, and most usually, it is applied to a purely intellectual, metaphysical disbelief in- the existence of any god, or of anything supernatural. In this con- nexion it is usual to distinguish three types of atheism :-ˆthe dogmatic, which denies the existence of God positively; the sceptical, which distrusts the capacity of the human mind to discover the existence of God; and the critical, which doubts the validity of the theistic argument, the proofs for the existence of God. That the first type of atheism exists, in spite of the denials of those who favour the second or the third, may be proved by the utterances of men like Feuerbach, Flourens or Bradlaugh. "There is no God," says Feuerbach, "it is clear as the sun and as evident as the day that there is no God, and still more that there can be none." With greater passion

Flourens declares " Our enemy is God. Hatred of God is the beginning of wisdom. If mankind would make true progress, it must be on the basis of atheism." Bradlaugh maintained against Holyoake that he would fight until men respected the name "atheist." The answer to dogmatic atheism, that it implies infinite knowledge, has been well stated in John Foster's Essays,

and restated by Chalmers in his Natural Theology, and its force is recognized in Holyoake's careful qualification of the sense in which secularism accepts atheism, " always explaining the term atheist to mean ■■' not seeing God ' visually or inferen- tially, never suffering it to be taken for anti-theism, that is, hating God, denying God — as hating implies personal knowledge as the ground of dislike, and denying implies infinite knowledge as the ground of disproof." But dogmatic atheism is rare compared with the sceptical type, which is identical with agnosticism (q.v.) in so far as it denies the capacity of the mind of man to form any conception of God, but is different from it in so far as the agnostic merely holds his judgment in suspense, though, in practice, agnosticism is apt to result in an attitude towards religion which is hardly distinguishable from a passive and unaggressive atheism. The third or critical type may be illustrated by A CandidExaminationvf Theismhy "Physicus" (G.J. Romanes), in which the writer endeavours to estahlish the weakness of the proofs for the existence of God, and to substitute for theism Spencer's physical explanation of the universe, and yet admits how unsatisfying to himself the new position is. " When at times I think, as think at times I must, of the appalling contrast between the hallowed glory of that creed which once was mine, and the lonely mystery of existence as now I find it — at such times I shall ever feel it impossible to avoid the sharpest pang of which my nature is susceptible."

Atheism has to meet the protest of the heart as well as the argument of the mind of mankind. It must be judged not only by theoretical but by practical arguments, in its relations either to the individual or to a society. Voltaire himself, speaking as a practical man rather than as a metaphysician, declared that if there were no God it would be necessary to invent one; and if the analysis is only carried far enough it will be found that those who deny the existence of God (in a conventional sense) are all the time setting up something in the nature of deity by way of an ideal of their own, while fighting over the meaning of a word or its conventional misapplication.

ATHELM (d. 923), English churchman, is said to have been a monk of Glastonbury before his elevation in 909 to the see of Wells, of which he was the first occupant. In 914 he became archbishop of Canterbury.

ATHELNEY, a slight eminence of small extent in the low level tract about the junction of the rivers Tone and Parrett in Somersetshire, England. It was formerly isolated by marshes and accessible only by boat or artificial causeway, and under these conditions it gained its historical fame as the retreat of King Alfred in 878-879 when he was unable to withstand the incursions of the Danes. After regaining his throne he founded a monastery here in gratitude for the retreat afforded him by the island; no traces of it exist above ground, but remains have been excavated. There was also found here, in 1693, the cele- brated Alfred jewel, bearing his name, and

preserved in the Ashmolean Museum.at Oxford. An inscribed pillar commemorat- ing the king was set up in 1801. The name of Athelney signifies the Isle of Princes (A.S, ˆEthelingaea). Athelney is a railway station on a branch of the Great Western line.

ATHENA (the Attic form of the Homeric Athene, also called Athenaia, Pallas Athene, Pallas), one of the most important goddesses in Greek mythology. With Zeus and Apollo, she farms a triad which represents the embodiment of all divine power. No satisfactory derivation of the name Athena has been given 1 ; Pallas, at first an epithet, but after Pindar used

1 O. Gruppe (Grieckiscke Mythologie, ii. p. 1 194) thinks that it probably means " without mother's milk," either in an active or in a passive sense — "' not giving suck," or " unsuckled," in her char- acter as the virgin goddess, or as springing from the head of Zeus. In support of this view he refers to Hesychius (flˆwoc" yiXa) and a passage in Athenagoras (Legalio pro Christianis, 17), where it is

by itself, may possibly be connected with 7raXXttKij (" maiden "). Athena has been variously described as the pure aether, the storm-cloud, the dawn, the twilight; but there is little evidence that she was regarded as representing any of the physical powers of nature, and it is better to endeavour to form an idea of her character and attributes from a consideration of her cult- epithets and ritual. According to the legend, her father Zeus swallowed his wife Metis (" counsel "), when pregnant with Athena, since he had been warned that his children by her might prove stronger than himself and dethrone him. Hephaes- tus (or Prometheus) subsequently split open his head with a hatchet, and Athena sprang forth fully armed, uttering a loud shout of victory (Hesiod, Theogony, 886; Pindar, Olympia, vii. 35). In Crete she was said to have issued from a cloud burst asunder by Zeus. According to Roscher, the manner, of her birth represents the storm-cloud split by lightning; Farnell {Culls of the Greek States, i. p. 285) sees in it an indication that, as the daughter of Metis, Athena was already invested with a mental and moral character, and explains the swallowing of Metis (for which compare the story of Cronus and his children) by the desire to attribute an extraordinary birth to one in whom masculine traitspredominated. Inanotheraccount(as T pirvykvtia.) she is the daughter of the river Triton, to which various localities were assigned, and wherever there was a river (or lake) of that name, the inhabitants claimed that she was born there. It is probable that the name originated in Boeotia (C. O. Muller, Geschichten hellenischer Stamme, i. pp. 351-357; but see Macan on Herodotus, iv. 180), whence it was conveyed by colonists to Cyrene and thence to Libya, where there was a river Triton. Here some local divinity, a daughter of Poseidon, connected with the water and also of a warlike character, was identified by the

colonists with their own Athena. In any case, it is fairly certain that Tritogeneia means "water-born," although an old interpretation derived it from rpirot, a supposed Boeotian word meaning " head," which further points to the name having originated in Boeotia. Roscher suggests that the localization of her birthplace in the extreme west points to the western sea, the home of cloud and storm.

In Homer Athena already appears as the goddess of counsel, of war, of female arts and industries, and the protectress of Greek cities, this last aspect of her character being the most important and pronounced. Hence she is called woXtos, TroXtoOxor, in many Greek states, and is frequently associated with Zeus TroXieiis. The most celebrated festival of the city-goddess was the Panathenaea at Athens and other places. Other titles of kindred meaning are apxriy'trii ("founder") and ravaxats, the protectress of the Achaean league. At Athens she presided over the phratries or clans, and was known as CLTa-rovpla. and (pparpla., and sacrifice was offered to her at the festival Apaturia. The title p-Jiryp, given her by the inhabitants of Elis, whose women, according to the legend, she had blessed with abundance of children, seems at variance with the generally-recognized conception of her as xapflewK ; but p.ijrqp may bear the same meaning as kov por po < £os, the fosterer of the young, in harmony with her aspect as protectress of civic and family life. At Alalcomenae, near the Tritonian lake in Boeotia, she was aXahjcontTrfts ("defender"). Her temple, which was pillaged by Sulla, contained an ivory image, which was said to have fallen from heaven. The inhabitants claimed that the goddess was born there and brought up by a local hero Alal- comeneus. Her images, called Palladia, which guarded the heights (cf. her epithets cbcpio, Kpavaia), represented her with shield uplifted, brandishing her spear to keep off the foe. The cult of Athena Itonia, whose earliest seat appears to have > been amongst the Thessalians, who used her name as a : battle-cry, made its Way to Coronea in Boeotia, where her sanctuary was the seat of the Pamboeotian confederacy., The meaning of Itonia is obscure: DUmmler connects it with irewves, the " willow-beds " on the banks of the river Coralios. (the river

stated that Athena was sometimes called 'AflijXa 6r 'A817X17I For Pallas, he prefers the old etymology from jriXXw (to " shake "), rather in the sense of " earth-shaker " than " lance-brandisher."

of the irlaiden, i.e. Athena); Jebb (on Bacchylides, fr. id. 2) suggests a derivation from Ikvai, the goddess of the "onset." At Thebes she was

worshipped as Athena Onka or Onga, of equally uncertain derivation (possibly from 5yia>s, "a height "). Peculiar to Arcadia is the title Athena Alea, probably = " warder off of evil," although others explain it as=" warmth," and see in it an allusion to her physical nature as one of the powers of light. Farnell {Cults, p. 275) points out that at the same time she is certainly looked upon as in some way connected with the health-divinities, since in her temple she is grouped with Asclepius and Hygieia (see Hygieia).

She already appears as the goddess of counsel (xoXityfoi'Xos) in the Iliad and in Hesiod. The Attic bouleutae took the oath by Athena Boulaia; at Sparta she was ayopaia, presiding over the popular assemblies in the market-place; in Arcadia Mxa-vim, the discoverer of devices. The epithet trpovoia (" forethought ") is due, according to Farnell, to a confusion with irpovaid, referring to a' statue of the goddess standing " before a shrine," and arose later (probably spreading from Delphi), some time after the Persian wars, in which she repelled a Persian attack on the temples " by divine forethought"; another legend attributes the narhe to her skill in assisting Leto at the birth of Apollo and Artemis. With this aspect of her character may be compared the Hesiodic legend, according to which she was the daughter Of Metis. Her connexion with the trial of Orestes, the introduc- tion of a milder form of punishment for justifiable homicide, and the institution of the court t6 hrl IlaXXaSiCj), show the important part played by her in the development of legal ideas. The protectress of cities was naturally also a goddess of war. As such she appears in Homer and Hesiod and in post-Homeric legend as the slayer of the Gorgon and taking part in the battle of the giants. On numerous monuments she is represented as dpeta, " the warlike," viKi7<£6pos, " bringer of victory," holding an image of Nike (q.v.) in her outstretched hand (for other similar epithets see Roscher's Lexikon) . She was also the goddess of the arts of war in general; otoix«»i, she who draws up the ranks for battle, uxrrqpia, she who girds herself for the fray. Martial music (cp. 'Kdrjvr] (r&\iriy£, " trumpet ") and the Pyrrhic dance, in which she herself is said to have taken part to com- memorate the victory over the giants, and the building of war-ships were attributed to her. She instructed certain of her favourites in gymnastics and athletics, as a useful training for war. The epithets i7nria, xa" / ""K) 6ajud

The goddess of war develops into the goddess of peace and the pursuits connected with it. She is prominent as the promoter of agriculture in Attic legend. The Athenian hero Erechtheus (Erich thonius), originally an earth-god, is her foster-son, with whom she was honoured in the Erechtheum on the Acropolis. Her oldest priestesses, the dew-sisters — Aglauros, Herse, Pan- drosos — signify the fertilization of the earth by the dew, and were probably at one time identified with Athena, as surnames of whom both Aglauros and Pandrosos are found. The story of the voluntary sacrifice of the Attic maiden Aglauros on behalf of her country in time of war

(commemorated by the ephebi taking the oath of loyalty to their country in her temple), and of the leap of the three sisters over the Acropolis rock (see Erechtheus), probably points to an old human sacrifice. Athena also gave the Athenians the olive-tree, which was supposed to have sprung from the bare soil of the Acropolis, when smitten by her spear, close to the horse (or spring of water) produced by the trident of Poseidon, to which he appealed in support of his claim to the lordship of Athens. She is also con- nected with Poseidon in the legend of Erechtheus, not as being

in any way akin to the former in nature or character, but as indicating the contest between an oldand a new religion. This god, whose worship was introduced into Athens at a later date by the Ionian immigrants, was identified with Erechtheus- Erichthonius (for whose birth Athena was in a certain sense responsible), and thus was brought into connexion with the goddess, in order to effect a reconciliation of the two cults; Athena was said to have invented the plough, and to have taught men to tame horses and yoke oxen. Various arts were attributed to her — shipbuilding, the goldsmith's craft, fulling, shoemaking and other branches of industry. As early as Homer she takes especial interest in the occupations of women; she makes Hera's robe and her own peplus, and spinning and weaving are often called " the works of Athena." The custom of offering a beautifully woven peplus at the Panathenaic festival is con-' nected with her character as Ergane the goddess of industry. 1 As patroness of the arts, she is associated with Hephaestus (one of her titles is 'H^awrria) and Prometheus, and in Boeotia she was regarded as the -inventress of the flute. According to Pindar, she imitated oh the flute the dismal wail of the two surviving Gorgons after the death of Medusa. The legend that Athena, observing in the water the distortion of her features ; caused by playing that instrument, flung it' away, probably indicates that the Boeotians whom the Athenians regarded with contempt, used the flute in their worship of the Boeotian Athena. The story of the slaying of Medusa by Athena, in which there is no certain evidence that she played a direct part, explained by Roscher as the scattering of the storm-cloud, probably arose from the fact that she is represented as wearing the Gorgon's head as a badge.

As in the case of Aphrodite and Apollo, Roscher in his Lexikon deduces all the characteristics of Athena from a single conception —that of the goddess of the storm or the thunder-cloud (for a discussion of such attempts see Farnell, Cults, i. pp. 3, 263). There seems little reason for regarding her as a nature-'goddess at all, but rather as the presiding divinity of states and cities, of the arts and industries-^-in short, as the goddess of the whole intellectual side of human life.

Except at Athens, little is known of the ceremonies or festivals which attended her worship. There we have the following. (1) The ceremony of

the Three Sacred Ploughs, by which the signal for seed-time was given, apparently dating from a period when agriculture was one of the chief occupations of her worshippers. (2) The Procharisteria at the end of winter, at which thanks were offered for the germination of the seed. (3) The Scirophoria, with a procession from the Acropolis to the village of Skiron, in the height of summer, the priests who were to entreat her to keep off the summer heat walking under the shade of parasols (cr/cipoe) held over them; others, however, connect the name with crxTpos (" gypsum "), perhaps used for smearing the image of the goddess. (4) The Oschophoria, at the vintage season, with races among boys, and a procession, with songs in praise of Dionysus and Ariadne. (5) The Chalkeia (feast of smiths), at which the birth of Erechtheus and the invention of the plough were celebrated. (6) The Plynleria and Callynteria, at which her ancient image and peplus in the Erechtheum and the temple itself were cleaned, with a procession in which bunches of figs (frequently used in lustrations) were carried. (7) The Arrhephoria or Errephoria (perhaps = Ersephoria, "dew-bear- ing "), at which four girls, between seven and eleven years of age, selected from noble families, carried certain unknown sacred objects to and from the temple of Aphrodite " in the gardens " (see J. E. Harrison, Classical Review, April 1889). (8) The Panathenaea, at which the new robes for the image of the goddess were carried through the city, spread like a sail on a mast. The reliefs of the frieze of the cella of the Parthenon enable us to form an idea of the procession. Athletic games, open to all who traced their nationality to Athens, were part of this festival. Mention should also be made of the Argive

'According to J. E. Harrison in Classical Review {June 1894), Athena Ergane is the goddess of the fruits of the field and the pro- creation of children.

ceremony, at which the xoanon (ancient wooden statue) of Athena was washed in the river Inachus, a symbol of her purification after the Gigantomachia.

The usual attributes of Athena were the helmet, the aegis, the round shield with the head of Medusa in the centre, the lance, an olive branch, the owl, the cock and the snake. Of these the aegis, usually explained as a storm-cloud, is probably intended as a battle-charm, like the Gorgon's head on the shield and the faces on the shields of Chinese soldiers; the owl probably represents the form under which she was worshipped in primitive times, and subsequently became her favourite bird (the epithet yXcLVKonris,

meaning "keen-eyed" in Homer, may have originally signified " owl-faced "); the snake, a common companion of the earth deities, probably refers to her connexion with Eijechtheus- Erichthonius.

As to artistic representations of the goddess, we have first the rude figure which seems to be a copy of the Palladium; secondly, the still rude, but otherwise more interesting, figures of her, as e.g. when accompanying heroes, on the early, painted vases; and thirdly, the type of her as produced by Pheidias, from which little variation appears to have been made. Of his numerous statues of her, the three most celebrated were set up on the Acropolis, (i) Athena Parthenos, in the Parthenon. It was, in ivory and gold, and 30 ft. high. She was represented standing, in a long tunic; on her head was a helmet, ornamented with sphinxes and griffins; on her breast was the aegis, fringed with serpents and the Gorgon's head in centre. In her right hand was a Nike or winged victory, while her left held a spear, which rested on a shield on which were represented the battles of the Amazons with the giants. (2) A colossal statue said to have been formed from the spoils taken at Marathon, the so-called Athena Promachos. (3) Athena Lemnia, so called because it had been dedicated by the Athenian cleruchies in Lemnos. In this she was represented without arms, as a brilliant type of virgin beauty. The two last statues were of bronze. From the time of Pheidias calm earnestness, self-conscious might, and clearness of intellect were the main characteristics of the goddess. The eyes, slightly cast down, betoken an attitude of though tfulness; the forehead is clear and open; the mouth indicates firmness and resolution. The whole suggests a masculine rather than a feminine form.

From Greece the worship of Athena extended to Magna Graecia, where a number of temples were erected to her in various places. In Italy proper she was identified with Minerva (q.v.).

See articles in Pauly-Wissowa's Realencyclopddie; W. H. Roscher's Lexikon der Mythologie ; Daremberg and Saglio's Dictionnaire des antiquites (s.v. "Minerva"); L. Preller, Griechische Mythologie; W. H. Roscher, " Die Grundbedeutung der Athene," in Nektar und Ambrosia (.1883); F. A. Voigt, " Beitrage zur Mythologie des Ares und Athena," in Leipziger Studien, iv. (1881); L. R. Farnell, The Cults of the Creek States, i. (1896); J. E. Harrison, Prolegomena to the Study of Greek Religion (1903), for the festivals especially; O. Gruppe, Griechische Mythologie, ii. (1907). In the article Greek Art, fig. 21 represents Athena in the act of striking a prostrate giant ; fig. 38 a statuette of Athena Parthenos, a replica of the work of Pheidias. (J. H. F.)

ATHENAEUM, a name originally applied in ancient Greece ('kBi\vau>v) to buildings dedicated to Athena, and specially used as the designation of a

temple in Athens, where poets and men of learning were accustomed to meet and read their productions. The academy for the promotion of learning which the emperor Hadrian built (about a.d. 135) at Rome, near the Forum, was also called the Athenaeum. Poets and orators still met and discussed there, but regular courses of instruction were given by a staff of professors in rhetoric, jurisprudence, grammar and philosophy. The institution, later called Schola Romana, continued in high repute till the 5 th century. Similar academies were also founded in the provinces and at Constantinople by the emperor Theodosius II. In modern times the name has been applied to various academies, as those of Lyons and Marseilles, and the Dutch high schools; and it has become a very general designation for literary clubs. It is also familiar as the title of several literary periodicals, notably of the London literary weekly founded in 1828.

ATHENAEUS, of Naucratis in Egypt, Greek rhetorician and grammarian, flourished about the end of the 2nd and the beginning

of the 3rd century a.d. Suidas only tells us that he lived " in the times of Marcus "; but the contempt with which he speaks of Commodus (died 192) shows that he survived that emperor. Athenaeus himself states that he was the author of a treatise on the thratta — a kind of fish mentioned by Archippus and other comic poets — and of a history of the Syrian kings, both of which works are lost. We still possess the Deipnosophistae, which may mean dinner- table philosophers or authorities on banquets, in fifteen books. The first two books, and parts of the third, eleventh and fifteenth, are only extant in epitome, but otherwise we seem to possess the work entire. It is an immense store-house of miscellaneous information, chiefly on matters connected with the table, but also containing remarks on music, songs, dances, games, courtesans. It is full of quotations from writers whose works have not come down to us; nearly 800 writers and 2500 separate writings are referred to by Athenaeus; and he boasts of having read 800 plays of the Middle Comedy alone. The plan of the Deipnosophistae is exceedingly cumbrous, and is badly carried out. It professes to be an account given by the author to his friend Timocrates of a banquet held at the house of Laurentius (or Larentius) , a scholar and wealthy patron of art. It is thus a dialogue within a dialogue, after the manner of Plato, but a conversation of sufficient length to occupy several days (though represented as taking place in one) could not be conveyed in a style similar fo the short conversatipns of Socrates. Among the twenty-nine guests are Galen and Ulpian, but they are all probably fictitious personages, and the majority take no part in the conversation. If Ulpian is identical with the famous, jurist, the Deipnosophistae must have been written after his death (228); but the jurist was murdered by the praetorian guards, whereas Ulpian in Athenaeus dies a natural death. The conversation ranges from the dishes before the guests to literary matters of every description, including points of

grammar and criticism; and they are expected to bring with them extracts from the poets, which are read aloud and discussed at table. The whole is but a clumsy apparatus for displaying the varied and extensive reading of the author. As a work of art it can take but a low rank, but as a repertory of fragments and morsels of information it is invaluable.

Editio princeps, Aldine, 1524; Casaubon, 1597-1600; Schweigr hauser, 1801-1807; Dindorf, 1827; Meineke, 1859-1867; Kaibel, 1887-1890; English translation by Yonge in Bohn's Classical Library.

ATHENAGORAS, a Christian apologist of the 2nd century a.d,, was, according to an emendator of the Paris Codex 451 of the nth century, a native of Athens. The only sources of informa- tion regarding him are a short notice by Philip of Side, in Pamphylia (c. a,d. 420), and the inscription on his principal work. Philip — or rather the compiler who made excerpts from him— says that he was at the head of an Alexandrian school (the catechetical), that he lived in the time of Hadrian and Antoninus, to whom he addressed his Apology, and that Clement of Alexandria was his pupil; but these statements are more than doubtful. The inscription on the work describes it as the " Em- bassy of Athenagoras, the Athenian, a philosopher and a Christian concerning the Christians, to the Emperors Marcus Aurelius Antoninus and Lucius Aurelius Commodus, &c." This state- ment has given rise to considerable discussion, but from it and internal evidence the date of the Apology (Upeapda irtpl Xpl- anavvv) may be fixed at about a.d. 177. Athenagoras is also the author of a discourse on the resurrection of the body, which is not authenticated otherwise than by the titles on the various manu- scripts. In the Apology, after contrasting the judicial treatment of Christians with that of other accused persons, he refutes the accusations brought against the Christians of atheism, eating human flesh and licentiousness, and in doing so takes occasion to make a vigorous and skilful attack on pagan polytheism and mythology. The discourse on the resurrection answers objections to the doctrine, and attempts to prove'its truth from considera- tions of God's purpose in the creation of man, His justice and the nature of man himself. Athenagoras is a powerful and clear writer, who strives to comprehend his opponents' views and is

acquainted with the classical writers. He used the Apology of Justin, but hardly the works of Aristides or Tatian. His theology is strongly tinged with Platonism, and this may account for his falling into desuetude. His discussion of the Trinity has some points of speculative interest, but it is not

sufficiently worked out; he regards the Son as the Reason or Wisdom of the Father, and the Spirit as a divine effluence. On some other points, as the nature of matter, the immortality of the soul and the principle of sin, his views are interesting.

Editions. — J. C. Th. Eg. de Otto, Corpus Apol. Christ. Sacc. II. vol. vii. (Jena, 1857) ; E. Schwartz in Texle und Untersuchungen, iv. 2 (Leipzig, 1891).

Translations. — Humphreys (London, 1714) ; B. P. Pratten {Ante-Nic. Fathers, Edinburgh, 1867).

Literature. — A. Harnack, Gesch. der altchr. Litt. pp. 526-558, and similar works by O. Bardenhewer and A. Ehrhard; Herzog-Hauck, Realencyk.; G. Kriiger, Early Chr. Lit. p. 130 (where additional literature is cited). In 1559 and 1612 appeared in French a work on True and Perfect Love, purporting to be a translation from the Greek of Athenagoras ; it is a palpable forgery.

ATHENODORUS, the name of two Stoic philosophers of the 1st century B.C., who have frequently been confounded.

1. Athenodorus Cananites (e. 74 b.c.a.d. 7), so called from his birthplace Canana near Tarsus (not Cana in Cilicia nor Canna in Lycaonia), was the son of one Sandon, whose name indicates Tarsian descent, not Jewish as many have held. He was a personal friend of Strabo, from whom we derive our know ledge of his life. He taught the young Octavian (afterwards Augustus) at Apollonia, and was a pupil of Posidonius at Rhodes. Subsequently he appears to have travelled in the East (Petra and Egypt) and to have made himself famous by lecturing in the great cities of the Mediterranean. Writing in 50 B.C., Cicero speaks of him with the highest respect (cf. Ep. ad. Att., xvi. 11. 4, 14. 4), a fact which enables us to fix the date of his birth as not later than about 74. His influence, over Augustus was strong and lasting. He followed him to Rome in 44, and is said to have criticized him with the utmost candour, bidding him repeat the letters of the alphabet before acting on an angry impulse. In later years he was allowed by Augustus to return to Tarsus in order to remodel the constitution of the city after the degenerate democracy which had misgoverned it under Boethus. He succeeded {c. 15-10 B.C.) in setting up a timocratic oligarchy in the imperial interest (see Tarsus). Sir W. M. Ramsay is inclined to attribute to the influence of Athenodorus the striking resemblances which can be established between Seneca and Paul, the latter of whom must certainly have been acquainted with his teachings. According to Eusebius and Strabo he was a learned scientist for his day, and some attribute to him a history of Tarsus. He helped Cicero in the

composition of the De OJjtciis. His works are not certainly known, and none are extant. (See Sir W. M. Ramsay in the Expositor, September 1906, pp. 268 ff.)

2. Athenodorus Cordylion, also of Tarsus, was keeper of the library at Pergamum, and was an old man in 47 B.C. In his enthusiasm for Stoicism he used to cut out from Stoic writings passages which seemed to him unsatisfactory. He also settled in Rome, where he died in the house of the younger Cato.

Among others of the name may be mentioned (3) Athenodorus of Teos, who played the cithara at the wedding ol Alexander the Great and Statira at Susa (324 B.C.) ; (4) a Greek physician of the 1st century A.D., who wrote on epidemic diseases; and two sculptors, of whom (5) one executed the statues of Apollo and Zeus which the Spartans dedicated at Delphi after Aegospotami ; and (6) the other was a son of Alexander of Rhodes, whom he helped in the Laocoon group.

ATHENRY, a market town of county Galway, Ireland, 14 m. inland (E.) from Galway on the Midland Great Western main line. Pop. (1901) 853. Its name is derived from Ath-na-riogh, the ford of kings; and it grew to importance after the Anglo- Norman invasion as the first town of the Burgs and Ber- minghams. The walls were erected in 121 1 and the castle in 1238, and the remains of both are noteworthy. A Dominican monastery was founded with great magnificence by Myler de Bermingham in 1241, and was repaired by the Board of Works in 1893. Of the Franciscan monastery of 1464 little is left. The town returned two members to the Irish parliament from

the time of Richard II. to the Union; but it never recovered from the wars of the Tudor period, culminating in a successful siege by Red Hugh O'Donnell in 1596.

ATHENS ['Adfjvax, Athenae, modem colloquial Greek 'A&qva], the capital of the kingdom of Greece, situated in 23° 44′ E- and 37 58′ N., towards the southern end of the central and principal plain of Attica. The various theories with regard to the origin of the name are all somewhat unconvincing; it is conceivable that, with the other homonymous Greek towns, such as Athenae Diades in Euboea, 'Adfjvai may be connected etymologically with avdos, a flower (cf . Firenze, Florence) ; the patron goddess, Athena, was probably called after the place of her cult.

I. Topography and Antiquities

The Attic plain, to ireSiov, slopes gently towards the coast of the Saronic

Gulf on the south-west; on the east it is overlooked by Mount Hymettus (3369 ft.) ; on the north-east by Pentelicus or Brilessus (3635 ft.) from which, in ancient and modern times, an immense quantity of the finest marble has been quarried; on the north-west by Parnes (4636 ft.), a continuation of the Boeotian Cithaeron, and on the west by Aegaleus (1532 ft.), which descends abruptly to the bay of Salamis. In the centre of the plain extends from north-east to south-west, a series of low heights, now known as Turcovuni, culminating towards the south in the sharply pointed Lycabettus (1112 ft.), now called Hagios Georgios from the monastery which crowns its summit. Lycabettus, the most prominent feature in the Athenian land- scape, directly overhung the ancient city, but was not included in its walls; its peculiar shape rendered it unsuitable for fortifica- tion. The Turcovuni ridge, probably the ancient Anchesmus, separates the valley of the Cephisus on the north-west from that of its confluent, the Ilissus, which skirted the ancient city on the south-west. The Cephisus, rising in Pentelicus, enters the sea at New Phalerum; in summer it dwindles to an in- significant stream, while the Ilissus, descending from Hymettus, is totally dry, probably owing to the destruction of the ancient forests on both mountains, and the consequent denudation of the soil. Separated from Lycabettus by a depression to the south-west, through which flows a brook, now a covered drain (probably to be identified with the Eridanus), stands the re- markable oblong rocky mass of the Acropolis (512 ft.), rising precipitously on all sides except the western; its summit was partially levelled in prehistoric times, and the flat area was subsequently enlarged by further cutting and by means of re- taining walls. Close to the Acropolis on the west is the lower rocky eminence of the Areopagus, "Apeios irayos (377 ft.), the seat of the famous council; the name (see also Areopagus) has been connected with Ares, whose temple stood on the northern side of the hill, but is more probably derived from the 'Apai or Eumenides, whose sanctuary was formed by a cleft in its north-eastern declivity. Farther west of the Acropolis are three eleva- tions; to the north-west the so-called " Hill of the Nymphs " (341 ft.), on which the modern Observatory stands; to the west the Pnyx, the meeting-place of the Athenian democracy (351 ft.), and to the south-west the loftier Museum Hill (482 ft.), still crowned with the remains of the monument of Philopappus. A cavity, a little to the west of the Observatory Hill, is generally supposed to be the ancient Barathron or place of execution. To the south-east of the Acropolis, beyond the narrow valley of the Ilissus, is the hill Ardettus (436 ft.). The distance from the Acropolis to the nearest point of the sea coast at Phalerum is a little over 3 m.

The natural situation of Athens was such as to favour the growth of a powerful community. For the first requisites of a primitive settlement — food supply and defence — it influence afforded every advantage. The

Attic plain, notwith- cfthegeo- standing the lightness of the soil, furnished an adequate graphical supply of cereals; olive and fig groves and vineyards pos were cultivated from the earliest times in the valley of the Cephisus, and pasturage for sheep and goats was abundant. The surrounding rampart of mountains was broken towards the

north-east by an open tract stretching between. Hymettus and Peatelicus towards Marathon, and was traversed by the passes of Decelea, Phyle and Daphne on the north and north-west, but the distance between these natural passages and the city was sufficient to obviate the danger of surprise by an invading land force. On the other hand Athens, like Corinth, Megara and Argos, was sufficiently far from the sea to enjoy security against the sudden descent of a hostile fleet. At the same time the relative proximity of three natural harbours, Peiraeus, Zea and Munychia, favoured the development of maritime commerce and of the sea power which formed the basis of Athenian hege- mony. The climate is temperate, but liable to sudden changes; the mean temperature is 63°-! F., the maximum (in July) oo°-oi, the minimum (in January) 3i°-55. The summer heat is moder- ated by the sea-breeze or by cool northerly winds from the mountains (especially in July and August). The clear, bracing air, according to ancient writers, fostered the intellectual and aesthetic character of the people and endowed them with mental and physical energy. For the architectural embellishment of the city the finest building material was procurable without difficulty and in abundance; Pentelicus forms a mass of white, transparent, blue-veined marble; another variety, somewhat similar in appearance, but generally of a bluer hue, was obtained from Hymettus. For ordinary purposes grey limestone was furnished by Lycabettus and the adjoining hills; limestone from the promontory of Acte (the co-called " poros " stone), and conglomerate, were also largely employed. For the ceramic art admirable material was at hand in the district north-west of the Acropolis. For sculpture and various architectural purposes white, fine-grained marble was brought from Paros and Naxos. The main drawback to the situation of the city lay in the in- sufficiency of its water-supply, which was supplemented by an aqueduct constructed in the time of the Peisistratids and by later water-courses dating from the Roman period. A great number of wells were also sunk and rain-water was stored in cisterns.

For the purposes of scientific topography observation of the natural features

and outlines is followed by exact investigation of the architectural structures or remnants, a process demanding high technical competence, acute judgment and practical ex- perience, as well as wide and accurate scholarship. The building material and the manner of its employment furnish evidence no less important than the character of the masonry, the design and Sources tne m °des of ornamentation. The testimony, afforded f,- by inscriptions is often of decisive importance, especially

Athenian tnat ° commemorative or votive tablets or of boundary- topo- stones found in situ; the value of this evidence is, on*

tranhy tne ot her hand, sometimes neutralized owing to the former removal of building material already used and its in- corporation in later structures. Thus sepulchral inscriptions have been found on the Acropolis, though no burials took place there in ancient times. In the next place comes the evidence derived from the whole range of ancient literature and specially from de- scriptions of the city or its different localities. The earliest known description of Athens was that of Diodorus, 6 jrepnjYxqs, who lived in the second half of the 4th century B.C. Among his successors were Polemon of Ilium (beginning of 2nd century B.C.),whose great noaiiiKfi x«pt^- yi7«nsgaveaminuteaccountofthevotiveofferingson the Acropolis and the tombs on the Sacred Way; and Heliodorus (second half of the 2nd century) who wrote fifteen volumes on the monuments of Athens. Of these and other works of the earliest topographers only some fragments remain. In the period between a. d. 143 and 159 Pausanias visited Athens at a time when the monuments of the great age were still in their perfection and the principal embellishments of the Roman period had already been completed. The first thirty chapters of his invaluable Description of Greece{irepi.i]- rqrijs 'EXXdSos) are devoted to Athens, its ports and environs. Pausanias makes no claim to exhaustiveness; he selected what was best worth noticing (tA dfujXoTwrara). His account, drawn up from notes taken in the main from personal observation, possesses an especial importance for topographical research, owing to his method of describing each object in the order in which he saw it during the course of his walks. His accuracy, which has been called in question by some scholars, has been remarkably vindicated by recent exca vations at Athens and elsewhere. The list of ancient topographers closes with Pausanias. The literature of succeeding centuries fur- nishes only isolated references; the more important are found ; in the scholia on Aristophanes, the lexicons of Hesychius, Photius and others, and the Etymologicum Magnum. The notices of Athens during the earlier middle ages are scanty in the extreme. In 1395 Niccolo da Mattoni, a pilgrim from the Holy Land, visited Athens

and wrote a description of a portion of the city. Of the work of Cyriac of Ancona, written about 1456, only some fragments remain, which are well

supplemented by the contemporaneous description of the capable observer known as the " Anonymus of Milan." Two treatises in Greek by unknown writers belong to the same period. The Dutchman Joannes Meursius (1,579-1639) wrote three dis- quisitions on Athenian topography. The conquest by Venice in 1687 led to the publication of several works in that city, including the descriptions of De la Rue and Fanelli and the maps of Coronelh and others. The systematic study of Athenian topography was begun in the 17th century, by French residents at Athens, the consuls Giraud and Chataignier and the Capuchin monks. The visit of the French physician Jacques Spon and the Englishman, Sir George Wheler or Wheeler (1650-1723), fortunately took place before the catastrophe of the Parthenon in 1687; Spon's Voyage d'ltalie, de Dalmatie, de Grece et du Levant, which contained the first scientific description of the ruins of Athens, appeared in 1678;, Wheler's Journey into Greece, in 1682. A period of British activity in research followed in the 18th century. The monumental work of James Stuart and Nicholas Revett, who spent three years at Athens (1751- 1754ˆ, marked an epoch in the progress of Athenian topography and is still indispensable to its study, owing to the demolition of ancient buildings which began about the middle of the 1 8th century. To this period also belong the labours of Richard Pococke and Richard Dalton, Richard Chandler, E. D. Clarke and Edward Dodwell. The great work of W. M. Leake {Topography of Athens and the Demi, 2nd ed., 1841) brought the descriptive literature to an end and in- augurated the period of modern scientific research, in which German archaeologists have played a distinguished part.

Recent investigation has thrown a new and unexpected light on the art, the monuments and the topography of the ancient, city. Numerous and costly excavations have been carried out Recent by the Greek government and by native and foreign research. scientific societies, while accidental discoveries have been frequently made during the building of the modern town. The museums, enriched by a constant inflow of works of art and in- scriptions, have been carefully and scientifically arranged, and afford opportunities for systematic study denied to scholars of the past generation. Improved means of communication have enabled many acute observers to apply the test of scrutiny on the spot to theories and conclusions mainly based on literary evidence; five foreign schools of archaeology, directed by eminent scholars, lend valuable aid to students of all nationalities, and lectures are fre- quently delivered in the museums and on the more interesting and important sites. The native archaeologists of the present day hold a recognized position in the scientific world ; the patriotic sentiment of former timeSj which prompted their zeal but occasionally warped their judgment, has been merged in devotion to science for its own sake, and the supervision of excavations, as well as the control of the art-collections, is

now in highly competent hands. Athens has thus become a centre of learning, a meeting-place for scholars and a basis for research in every part of the Greek world. The attention of many students has naturally been concentrated on the ancient city, the birthplace of European art and literature, and a great development of investigation and discussion in the special domain of Athenian archaeology has given birth to a voluminous literature. Many theories hitherto universally accepted have been called in question or proved to be unsound : the views of Leake, for instance, have been challenged on various points, though many of his con- clusions have been justified and confirmed. The supreme importance of a study of Greek antiquities on the spot, long understood by scholars in Europe and in America, has gradually come to be. recog- nized in England, where a close attention to ancient texts, not always adequately supplemented by a course of local study and observation, formerly fostered a peculiarly conservative attitude in regard to the problems of Greek archaeology. Since the foundation of the German Institute in 1874, Athenian topography has to a large extent become a speciality of German scholars, among whom Wilhelm Dorpfeld occupies a pre-eminent position owing to his great architectural attainments and unrivalled local knowledge. Many of his bold and novel theories have provoked strenuous opposition, while others have met with general acceptance, except among scholars of the more conservative type.

Prehistoric Athens. — Numerous traces of the " Mycenaean " epoch have recently been brought to light in Athens and its neighbourhood. Among the monuments of this age discovered in the surrounding districts are the rock-c #fJ!./ hewn tombs of Spata, accidentally revealed by a landslip in 1877, and the domed sepulchre at Menidi, near the ancient Acharnae, excavated by Lolling in 1879. Other " Mycenaean " landmarks have been laid bare at Eleusis; Thoricus, Halae and Aphidna. These structures, however, are of comparatively minor importance in point of dimensions and decoration; they were apparently designed as places of sepulture I for local chieftains, whose domains were afterwards incorporated in the Athenian realm by the o-wooacr/ws (synoecism) attributed

to Theseus. The situation of the Acropolis, dominating the surrounding plain and possessing easy communication with the sea, favoured the formation of a relatively powerful state — inferior, however, to Tiryns and Mycenae; the myths of Cecrops, Erechtheus and Theseus bear witness to the

might of the princes who ruled in the Athenian citadel, and here we may naturally expect to find traces of massive fortifications resembling in some degree those of the great Argolid cities. Such in fact have been brought to light by the modern excavations on the Acropolis (1885-1889). Remains of primitive polygonal walls which un- doubtedly surrounded the entire area have been found at various points a little within the circuit of the existing parapet. The best-preserved portions are at the eastern extremity, at the northern side near the ancient " royal " exit, and at the south- western angle. The course of the walls can be traced with a few interruptions along the southern side. On the northern side are the foundations of a primitive tower and other remains, appar- ently of dwelling-houses, one of which may have been the xv/avos 56/u>5 'Epex^^os mentioned by Homer (Od. vii. 81). Among the foundations were discovered fragments of " Mycenaean " pottery. The various approaches to the citadel on the northern side — the rock-cut flight of steps north-east of the Erechtheum {q.v.), the stairs leading to the well Clepsydra, and the intermediate passage supposed to have furnished access to the Persians — are all to be attributed to the primitive epoch. Two pieces of poly- gonal wall, one beneath the bastion of Nike Apteros, the other in a direct line between the Roman gateway and the door of the Propylaea, are all that remain of the primitive defences of the main entrance.

These early fortifications of the Acropolis, ascribed to the primitive non-hellenic Pelasgi, must be distinguished from _ pi. the Pelasgicum Or Pelargicum, which was in all prob- tfcvm. ability an encircling wall, built round the base of the citadel and furnished with nine gates from which it derived the name of Enneapylon. Such a wall would be required to protect the clusters of dwellings around the Acropolis as well as the springs issuing from the rock, while the gates opening in various directions would give access to the surrounding pastures and gardens. This view, which is that of E. Curtius, alone harmonizes with the statement of Herodotus (vi. 137) that the wall was " around " (7r«p() the Acropolis, and that of Thucy- dides (ii. 17) that it was " beneath " (tixo) the fortress. Thus it would appear that the citadel had an outer and an inner line of defence in prehistoric times. The space enclosed by the outer wall was left unoccupied after the Persian wars in deference to an oracular response apparently dictated by military con- siderations, the maintenance of an open zone being desirable for the defence of the citadel. A portion of the outer wall has been recognized in a piece of primitive masonry discovered near the Odeum of Herodes Atticus; other traces will probably come to light when the northern and eastern slopes of the Acropolis have been completely explored. Leake, whom Frazer follows, assumed the Pelasgicum to be a fortified space at the western end of the Acropolis; this view necessitates the assump- tion that the nine gates were built one within the other, but early

antiquity furnishes no instance of such a construction; Dorpfeld believes it to have extended from the grotto of Pan to the sacred precinct of Asclepius. The well-known passage of Lucian (Piscator, 47) cannot be regarded as decisive for any of the theories advanced, as any portion of the old enceinte dismantled by the Persians may have retained the name in later times. The Pelasgic wall enclosed the spring Clepsydra, beneath the north-western corner of the Acropolis, which furnished a water- supply to the defenders of the fortress. The spring, to which a staircase leads down, was once more included in a bastion during the War of Independence by the Greek chief Odysseus.

To the " Pelasgic " era may perhaps be referred (with Curtius and Milchhofer) the immense double terrace on the north-eastern

The Pnyx. slope of the Pnvx (395 ft – bv 2I2) > tne upper portion

of which is cut out of the rock, while the lower is

enclosed by a semicircular wall of massive masonry; the theory

of these scholars, however, that the whole precinct was a sanctuary

11. 27

of the Pelasgian Zeus cannot be regarded as proved, hof is it easy to abandon the generally received view that this was the scene of the popular assemblies of later times, notwithstanding the apparent unsuitability of the ground and the insufficiency of room for a large multitude. These difficulties are met by the assumption that the semicircular masonry formed the base of a retaining-wall which rose to a considerable height, supporting a theatre-like structure capable of seating many thousand persons. The masonry may be attributed to the 5th century; the chiselling of the immense blocks is not " Cyclopean." Pro- jecting from the upper platform at the centre of the chord of the semicircular area is a cube of rock, n ft. square and 5 ft. high, approached on either side by. a flight of steps leading to the top; this block, which Curtius supposes to have been the primitive altar of Zeus "T\f/i

The Pnyx, the Hill of the Nymphs and the Museum Hill are covered with vestiges of early settlements which extend to a considerable distance towards the south-east in the «_:. direction of Phalerum. They consist of chambers of dwellings various sizes, some of which were evidently human «'"' habitations, together with cisterns, channels, seats, tomla – steps, terraces and quadrangular tombs, all cut in the rock. This neighbourhood was held by Curtius to have been the site of the primeval rock city, upavaa. 7r6Xir (Aristoph. Ach. 75), anterior to the occupation of the Acropolis and afterwards abandoned for the later settlement. It seems inconceivable, however, that any other site should have been preferred by the primitive settlers to the Acropolis, which offered the greatest advantages for defence; the Pnyx, owing to its proximity to the centres of civic life, can never have been deserted, and that portion which lay within the city walls must have been fully occupied when Athens was crowded during the Pelopon- nesian War. Some of the rock chambers originally intended for tombs were afterwards converted, perhaps under pressure of necessity, into habitations, as in the case of the so-called " Prison of Socrates," which consists of three chambers horizon- tally excavated and a small round apartment of the " beehive " type. The remains on the Pnyx and its neighbourhood Cannot all be assigned to one epoch, the prehistoric age. The dwellings do not*

correspond in size or details with the undoubtedly pre- historic abodes on the Acropolis. In view of the ancient law which forbade burial within the city, the tombs within the circuit of the city walls must either be earlier than the time of Themistocles or several centuries later; in the similar rock-tombs on the neighbouring slopes of the Acropolis and Areopagus both Mycenaean and Dipylon pottery have been found. But the numerous vertically excavated tombs out-side the walls are of late date and belong for the most part to the Roman' period.

The Areopagus is now a bare rock possessing few architectural traces. The legend of its occupation by the Amazons (Aeschylus, Eum. 681 seq.) may be taken as indicating its military ■' importance for an attack on the Acropolis; ˆ- e ArSopagu& Persians used it as a point d'appui for their assault. The seat of the old oligarchical council and court for homicide was probably on its eastern height. Here were the altar of Athena Areia and two stones, the \L8os "T/Jpews, on which the accuser, and the \Wos 'AvatSelas, on which the accused, took their stand. Beneath, at the north-eastern corner, is the cleft which formed the sanctuary of the Ze/xvaL, or Erinyes. There is no reason for disturbing the associations connected with this

spot as the scene of St Paul's address to the Athenians (E. Gardner, Anc. Athens, p. 505).

Hellenic Period. — While modern research has added consider- ably to our knowledge of prehistoric Athens, a still greater light has been thrown on the architecture and topography of the city in the earlier historic or " archaic " era, the subsequent age of Athenian greatness, and the period of decadence which set in with the Macedonian conquest; the first extends from the dawn of history to 480-479 B.C., when the city was destroyed by the Persians; the second, or classical, age closes in 322 B.C., when Athens lost its political independence after the Lamian War; the third, or Hellenistic, in 146 B.C., when the state fell under Roman protection. We must here group these important epochs together, as distinguished from the later period of Roman rule, and confine ourselves to a brief notice of their principal monu- ments and a record of the discoveries by which they have been illustrated in recent years.

The earliest settlement on the Acropolis was doubtless soon increased by groups of dwellings at its base, inhabited by the dependents of the princes who ruled in the stronghold. in 'be Y These habitations would naturally in the first instance •'anhak" h e m close proximity to the western approach; after era. the building of the Pelasgicum they seem to have

extended beyond its walls towards the south and south-west — towards the sea and the waters of the Ilissus. The district thus occupied sloped towards the sun and was sheltered by the Acropolis from the prevailing northerly winds. The Thesean synoecism led to the introduction of new cults and the foundation of new shrines partly on the Acropolis, partly in the inhabited district at its base both within and without the wall of the Pelasgiqum. Some of the shrines in this region are mentioned by Thucydides in a passage which is of capital importance for the topography of the city at this period (ii. 15). By degrees the inhabited area began to comprise the open ground to the north-west, the nearer portion of the later Ceramicus, or " potters' field " (afterwards divided by the walls of Themistocles into the Inner and Outer Ceramicus), and eventually extended to the north and east of the citadel, which, by the beginning of the 5th century B.C., had become the centre of a circular or wheel-shaped city, ttoXios rpoxouhkos a/cpo Kapr/va (Oracle apud Herod, vii. 140). To this enlarged city was applied, probably about the second half of the 6th century, the special designation to cuttv, which afterwards distinguished Athens from its port, the Peiraeus; the Acropolis was already 17 iroXts (Thucyd. ii. 15). The city is supposed to have been surrounded by a wall before the time of Solon, the existence of which may be deduced from Thucydides' account of the assassination of Hipparchus (vi. 57), but no certain traces of such a wall have been discovered; the materials may have been removed to build the walls of Themistocles.

The centre of commercial and civic life of the older group of communities, as of the greater city of the classical age, was the Agora or market. Here were the various public < 4_ ra< buildings, which, when the power of the princes on the citadel was transferred to the archons, formed the offices of the administrative magistracy. The site of the primitiv e Agora (dpxaia ayopa) was probably in the hollow between the Acropolis and the Pnyx, which formed a convenient meeting- place 'for the dwellers on the north and south sides of the fortress as well as for its inhabitants. In the time of the Peisistratids the Agora was enlarged so as to extend over the Inner Ceramicus on the north-west, apparently reaching the northern declivities of the Areopagus and the Acropolis on the south. After the Persian Wars the northern portion was used for commercial, the southern for political and ceremonial purposes. In the southern were the Orchestra, where the Dionysiac dances took place, and the famous statues of Harmodius and Aristogeiton by Antenor which were carried away by Xerxes; also the

Metroum, or temple of the Mother of the Gods,the Bouleuterium, or council-chamber of the Five Hundred, the Prytaneum, the hearth of the combined communities, where the guests of the state dined, the temple of the Dioscuri, and the Tholus, or Skias,

a circular stone-domed building in which the Prytaneis were maintained at the public expense; in the northern were the Leocorium, where Hipparchus was slain, the aroa fla

In 1892 Dorpfeld began a series of excavations in the district between the Acropolis and the Pnyx with the object of deter- mining the situation of the buildings described by Pausanias as existing in the neighbourhood of the Ennea- Agora, and more especially the position of the Ennea- crunus. crunus fountain. The Enneacrunus has hitherto been generally identified with the spring Callirrhoe in the bed of the Ilissus, a little to the south-east of the Olympieum; it is apparently, though not explicitly, placed by Thucydides (ii. 15) in proximity to that building, as well as the temple of Dionysus b> Xifivcus and other shrines, the temples of Zeus Olympius and of Ge and the Pythium, which he mentions as situated mainly to the south of the Acropolis. On the other hand, Pausanias (i. 14. 1), who never deviates without reason from the topographical order of his narrative, mentions the Enneacrunus in the midst of his description of certain buildings which were undoubtedly in the region of the Agora, and unless he is guilty of an unaccountable digression the Enneacrunus which he saw must have lain west of the Acropolis. It is now generally agreed that the Agora of classical times covered the low ground between the hill of the " Theseum," the Areopagus and the Pnyx; and Pausanias, in the course of his description, appears to have reached its southern end. The excavations revealed a main road of surprisingly narrow dimensions winding up from the Agora to the Acropolis. A little to the south-west of the point where the road turns towards the Propylaea was found a large rock-cut cistern or reservoir which Dorpfeld identifies with the Enneacrunus. The reservoir is supplied by a conduit of 6th-century tiles connected with an early stone aqueduct, the course of which is traceable beneath the Dionysiac theatre and the royal garden in the direction of the Upper Ilissus. These elaborate waterworks were, according to Dorpfeld, constructed by the Peisistratids in order to increase the supply from the ancient spring Callirrhoe; the fountain was furnished with nine jets and henceforth known as Enneacrunus. This identification has been hotly contested by many scholars, and the question must still be regarded as undecided. An interesting confirmation of Dorpf eld's view is furnished by the map of Guillet and Coronelli, published in 1672, in which the Enneacrunus is depicted as a well with a stream of running water in the neighbourhood of the Pnyx. The fact that spring water is not now found in this locality is by no means fatal to the theory; recent engineering investigations have shown that much of the surface water of the

Attic plain has sunk to a lower level. In front of the reservoir is a small open space towards which several roads converge; close by is a triangular enclosure of polygonal masonry, in which were found various relics relating to the worship of Dionysus, a very ancient wine-press (Xr)v6s) and the remains of a small temple. Built over this early precinct, which Dorpfeld identifies with the Dionysium iv XLuvms, or Lenaeum, is a basilica- shaped building of the Roman period, apparently sacred to Bacchus; in this was found an inscription containing the rules

of the society of the Iobacchi. There is an obvious difficulty in assuming that \ifivai, in the sense of " marshes," existed in this confined area, but stagnant pools may still be seen here in winter. Dorpf eld's identification of the Dionysium, kv \i/xvaLs cannot be regarded as proved; his view that another Pythium and another Olympieum existed in this neighbourhood is still less probable; but the inconclusiveness of these theories does not necessarily invalidate his identification of the Enneacrunus, with regard to the position of which the language of Thucydides is far from clear. Another enclosure, a little to the south, is proved by an inscription to have been a sanctuary of the hitherto unknown hero Amynos, with whose cult those of Asclepius and the hero Dexion were here associated; under the name Dexion, the poet Sophocles is said to have been worshipped after his death. The whole district adjoining the Areopagus was found to have been thickly built over; the small, mean dwelling-houses intersected by narrow, crooked lanes convey a vivid idea of the contrast between the modest private residences and the great public structures of the ancient city.

The age of the Peisistratids (560-511 B.C.) marked an era in the history of Athenian topography. The greatest of their The foundations, the temple of Olympian Zeus, will be

Academy referred to later. Among the monuments of their and rule, in addition to the enlarged Agora and the

Lyceum. j£ nneacrunuS) were the Academy and perhaps the Lyceum. The original name of the Academy may have been Hecademia, from Hecademus, an early proprietor (but see Academy, Greek) . The famous seat of the Platonic philosophy was a gymnasium enlarged as a public park by Cimon; it lay about a mile to the north-west of the Dipylon Gate, with which it was connected by a street bordered with tombs. The Lyceum,

where Aristotle taught, was originally a sanctuary of Apollo Lyceius. Like the Academy, it was an enclosure with a gym- nasium and garden; it lay to the east of the city beyond the Diocharean Gate.

Little was known of the buildings on the Acropolis in the pre-Persian period before the great excavations of 1885-1888, which rank among the most surprising achievements of modern research. The results of these operations, which were conducted by the Archaeological Society under the direction of Kavvadias and Kawerau, must be summarized with the utmost _. brevity. The great deposits of sculpture and pottery

Acropolis now unearthed, representing all that escaped from the before the ravages of the Persians and the burning of the ancient Persian shrines, afford a startling revelation of the development of Greek art in the 7th and 6th centuries. Numbers of statues — among them a series of draped and richly- coloured female figures — masterpieces of painted pottery, only equalled by the Attic vases found in Magna Grecia and Etruria, and numerous bronzes, were among the treasures of art now brought to light. All belong to the " archaic " epoch; only a few remains of the greater age were found, including some frag- ments of sculptures from the Parthenon and Erechtheum. We are principally concerned, however, with the results which add to our knowledge of the topography and architecture of the Acro- polis. The entire area of the summit was now thoroughly ex- plored, the excavations being carried down to the surface of the rock, which on the southern side was found to slope outwards to a depth of about 45 ft. In the lower strata were discovered the remnants of Cyclopean or prehistoric architecture already men- tioned. Of later date, perhaps, are the limestone polygonal retaining walls on the west front, which extended on either side of the early entrance. Of these a portion may probably be attributed to the Peisistratids, in whose time the Acropolis once more became the stronghold of a despotism. Its fortifications, though not increased, were apparently strengthened by the Tyrants. To its embellishment they probably contributed the older ornamental. entrance, facing south-west, the precursor of the greater structure of Mnesicles (see Propylaea) and the colonnade of the " Hecatompedon," or earlier temple of Athena, at this time the only large sacred edifice on the citadel. The aame was subsequently applied to the cella, or eastern chamber,

of the Parthenon, which is exactly 100 ft. long, and also became a popular designation of the temple itself.

The ancient Hecatompedon may in all probability be identified with an early temple, also 100 ft. long, the foundations of which were pointed out in 1885 by DSrpfeld on the ground immediately adjoining the south side of the Erech- temple ot theum. On this spot was apparently the primitive

Athena. sanctuary of Athena, the rich temple (irluv vqos) of Homer (//. ii. 549), in which the cult of the goddess was associated with that of Erechtheus; the Homeric temple is identified by Furtwangler with the " compact house of Erechtheus " (Od. vii. 81), which, he holds, was not a royal palace, but a place of wor- ship, and traces of it may perhaps be recognized in the fragments of prehistoric masonry enclosed by the existing foundations. The foundations seem to belong to the 7th century, except those of the colonnade, which was possibly added by Peisistratus. According to Dorpfeld, this was the " old temple " of Athena Polias, frequently mentioned in literature and inscriptions, in which was housed the most holy image (%6avov) of the goddess which fell from heaven; it was burnt, but not completely destroyed, during the Persian War, and some of its external decorations were afterwards built into the north wall of the Acropolis; it was subsequently restored, he thinks, with or without its colonnade — in the former case a portion of the peristyle must have been removed when the Erechtheum was built so as to make room for the porch of the maidens; the building was set on fire in 406 B.C. (Xen. Hell. i. 6. 1), and the conflagration is identical with that mentioned by Demosthenes (In Timocr. xxiv. 155); its " opisthodomos " served as the Athenian treasury in the 5th and 4th centuries; the temple is the dpX

In 1896 excavations with the object of exploring the whole northern and eastern slopes of the Acropolis were begun by Kavvadias. The pathway between the citadel and The the Areopagus was found to be so narrow that it is grottoes ot certain the Panathenaic procession cannot have taken Paa aad this route to the Acropolis. On the north-west rock p ° "' the caves known as the grottoes of Pan and Apollo were cleared out; these consist of a slight high-arched indentation

Themis- tocles,

immediately to the east of the Clepsydra and a double and somewhat deeper cavern a little farther to the east. In the first mentioned are a number of niches in which irivaices (votive tablets) were placed: some of these, inscribed with dedications to Apollo, have been discovered. The whole locality was the seat of the ancient cult of this deity, afterwards styled " Hypacraeus," with which was associated the legend of Cretisa and the birth of Ion. The worship of Pan was introduced after the Persian wars, in consequence of an apparition seen by Pheidippides, the Athenian

courier, in the mountains of Arcadia. Another cave more to the west was revealed by the demolition of the bastion of Odysseus. To the east a much deeper and hitherto unknown cavern has been revealed, which Kawadias identifies with the grotto of Pan. Close to it are a series of steps hewn in the rock which connect with those discovered in 1886 within the Acropolis wall. Farther east is an underground passage leading eastward to a cave supposed to be the sanctuary of Aglaurus where the ephebi took the oath; with this passage is connected a secret staircase leading up through a cleft in the rock to the precinct of the Errephori on the Acropolis. It is conceivable that the priestesses employed this exit when descending on their mysterious errand.

In the fifty years between the Persian and the Peloponnesian wars architecture and plastic art attained their highest perfection

*in Athens. The almost complete destruction of the classical buildings on the Acropolis and in the lower city, among period: them many temples and shrines which religious senti- '**^" so 'ment might otherwise have preserved, facilitated the*

realization of the magnificent architectural designs

of Themistocles, Cimon and Pericles, while the rapid growth of the Athenian empire provided the state with the necessary means for the execution of these sumptuous projects. Of the great monuments of this epoch few traces remain except on the Acropolis. After the departure of the Persians the first necessity was the reconstruction of the defences of the city and the citadel. The walls of the city, now built under the direction of Themistocles, embraced a larger area than the previous circuit, with which they seem to have coincided at the Dipylon Gate on the north-west where the Sacred Way to Eleusis was joined by the principal carriage route to the Peiraeus and the roads to the Academy and Colonus. The other more important gates were the Peiraic and Melitan on the west; the Itonian on the south leading to Phalerum, the Diomean and Diocharean on the east, and the Acharnian on the north. The wall, which was strengthened with numerous towers, enclosed the quarters of Collytus on the north, Melite on the west, Limnae on the south- west and south, and Diomea on the east. The scanty traces which remain have not been systematically excavated except in the neighbourhood of the Dipylon; the discovery of sepulchral tablets built into the masonry illustrates the statement of Thucydides with regard to the employment of such material in the hasty construction of the walls. The circuit has been practically ascertained in its general lines, though not in details; it is given by Thucydides (ii. 13. 7) as 43 stades (about 5! m.) exclusive of the portion between the points of junc- tion with the long walls extending to the Peiraeus, but the whole circumference

cannot have exceeded 37 stades. Possibly Thucydides, who in the passage referred to is dealing with the question of defence, included a portion of the contiguous long walls in his measurement; this explanation derives probability from his underestimate of the length of the long walls.

The design of connecting Athens with the Peiraeus by long parallel walls is ascribed by Plutarch to Themistocles. The

" Long Walls " (to. /za/cpa rdxt, to.

T "Long ° f W the " N ° rth Wal1 " (ri P°f> aov r6 OC°S)- 0) the

*Walls." "Middle" or " South Wall" (to Slo. ixkaov reixos, Plato, Gorg. 555 e; t6 votlov tux *)', and (3) the "Phaleric Wall " (to Qa'KripiKdv reixos). The north and Phaleric walls were perhaps founded by Cimon, and were completed about 4S7 B.C. in the early administration of Pericles; the middle wall was built about 445 B.C. The lines of the north and middle walls*

have been ascertained from the remnants still existing in the 18th century and the scantier traces now visible. The north wall, leaving the city circuit at a point near the modern Observa- tory, ran from north-east to south-west near the present road to the Peiraeus, until it reached the Peiraeus walls a little to the east of their northernmost bend. The middle wall, beginning south of the Pnyx near the Melitan Gate, gradually approached the northern wall and, following a parallel course at an interval of 550 ft., diverged to the east near the modern New Phalerum and joined the Peiraeus walls on the height of Munychia where they turn inland from the sea. The course of the Phaleric wall has been much disputed. The widely-received view of Curtius that it ran to Cape Kolias (now Old Phalerum) on the east of the Phaleric bay is not accepted by recent topographers. The exigencies of the defensive system planned by Themistocles could only have been satisfied by a juncture of the Phaleric wall with that of the Peiraeus. The existence of any third wall, was denied by Leake, according to whose theory the southern parallel wall would be identical with the Phaleric. The language of Thucy- dides, however, seems decisive with regard to the existence of three walls. The Phaleric wall, branching from the city circuit at some point farther east than the middle or south wall, may have followed the ridge of the Sikelia heights, where some traces of fortifications remain, and then traversed the Phalerum plain till it reached the Peiraeus defences at a point a little to the north-west of their junction with the middle walL The Phaleric wall, proving indefensible, was abandoned towards the close of the Peloponnesian war; with the other two walls it was com- pletely destroyed after the surrender of the city, and was not rebuilt when they were restored by Conon in 393 B.C. The parallel walls fell into

decay, during the Hellenistic period, and according to Strabo (ix. 396) were once more demolished by Sulla.

The great advantages which the Peiraic promontory with its three natural harbours offered for purposes of defence and commerce were first recognized by Themistocles, in whose archonship (493 B.C.) the fortifications of the p e / raeus . Peiraeus were begun. Before his time the Athenians used as a port the roadstead of Phalerum at the north-eastern corner of Phalerum bay partly sheltered by Cape Kolias. As soon as the building of the city walls had been completed, Themistocles resumed the construction of the Peiraeus defences, which protected the larger harbour of Cantharus on the west and the smaller ports of Zea and Munychia (respectively south- west and south-east of the Munychia heights), terminating in moles at their entrances and enclosing the entire promontory on the land and sea sides except a portion of the south-west shore of the peninsula of Acte. The walls, built of finely compacted blocks, were about 10 ft. in thickness and upwards of 60 ft. in height, and were strengthened by towers. The town was laid out at great expense in straight, broad streets, intersecting each other at right angles, by the architect Hippodamus of Miletus in the time of Pericles. In the centre was the Agora of Hippo-damus; on the western margin of the Cantharus harbour extended the emporium, or Digma, the centre of commercial activity, flanked by a series of porticoes; at its northern end, near the entrance to the inner harbour, - was another Agora, on the site of the modern market-place, and near it the fmupa o-roa, the corn depot of the state. This inner and shallower harbour, perhaps the ko>4>6s Xipriv, was afterwards excluded from the town precinct by the walls of Conon, which traversing its opening on an embankment (to 81a n'eaov x&M a) ran round the outer shore of the western promontory of Eetionea, previously enclosed, with some space to the north-west, by the wider circuit of Themistocles. In the harbours of Zea and Munychia traces may be seen of the remarkable series of galley-slips in which the Athenian fleet was built and repaired. The galley-slips around Zea were roofed by a row of gables supported by stone columns, each gable sheltering two triremes. Among the other noteworthy buildings of the Peiraeus were the arsenal (aKevodriKij) of Philo and the temples of Zeus Soter, the patron god of the sailors, of the Cnidian Artemis, built by Cimon, and of Artemis Munychia,

situated near the fort on the Munychia height; traces of a temple of

Asclepius, of two theatres and of a hippodrome remain. The fine marble lion of the classical period which stood at the mouth of the Cantharus harbour gave the Peiraeus its medieval and modern names of Porto Leone and Porto Draco; it was carried away to Venice by Morosini.

In 1870 the Greek Archaeological Society undertook a series of excavations in the Outer Ceramicus, which had already been The partially explored by various scholars. The opera-

Dipyioa tions, which were carried on at intervals till 1890, and Cera- resulted in the discovery of the Dipylon Gate, the micus. principal entrance of ancient Athens. The Dipylon consists of an outer and an inner gate separated by an oblong courtyard and flanked on either side by towers; the gates were themselves double, being each composed of two apertures intended for the incoming and outgoing traffic. An opening in the city wall a little to the south-west, supposed to have been the Sacred Gate (iepa Tri>\r)), was in all probability an outlet for the waters of the Eridanus. This stream, which has hitherto been regarded as the eastern branch of the Ilissus rising at Kaesariane, has been identified by Dorpfeld with a brook descending from the south slope of Lycabettus and conducted in an artificial channel to the north-western end of the city, where it made its exit through the walls, eventually joining the Ilissus. The channel was open in Greek times, but was afterwards covered by Roman arches; it appears to have served as the main drain of the city. Between this outlet and the Dipylon were found a boundary-stone, inscribed opos Kepap.eiKov, which remains in its place, and the foundations of a large rectangular building, possibly the Pompeium, which may have been a robing-room for the processions which passed this way. On either side of the Dipylon the walls of Themistocles, faced on the outside by a later wall, have been traced for a considerable distance. The excavation of the outlying cemetery revealed the unique " Street of the Tombs " and brought to light a great number of sepulchral monuments, many of which remain in situ. Especially note- worthy are the stelae (reliefs) representing scenes of leave-taking, which, though often of simple workmanship, are characterized by a touching dignity and restraint of feeling. In this neighbour- hood were found a great number of tombs containing vases of all periods, which furnish a marvellous record of the development of Attic ceramic art. A considerable portion of the district remains unexplored.

The Acropolis had been dismantled as a fortress after the expulsion of Hippias; its defenders against the Persians found it necessary to erect a wooden barricade at its entrance. jjoHs otthe ˆ ne fortifications were again demolished by the classical Persians, after whose departure the existing north period: its wall was erected in the time of Themistocles; many tortifica commnS) metopes and other fragments from the area. buildings

destroyed by the Persians were built into it,

possibly owing to haste, as in the case of the city walls, but more probably with the design of commemorating the great historic catastrophe, as the wall was visible from the Agora. The fine walls of the south and east sides were built by Cimon after the victory of the Eurymedon, 468 B.C.; they extend considerably beyond the old Pelasgic circuit, the inter- vening space being filled up with earth and the debris of the ruined buildings so as to increase the level space of the summit. On the northern side Cimon completed the wall of Themistocles at both ends and added to its height; the ground behind was levelled up on this side also, the platform of the Acropolis thus receiving its present shape and dimensions. The staircase leading down to the sanctuary of Aglaurus was enclosed in masonry. At the south-western corner, on the right of the approach to the old entrance, a bastion of early masonry was encased in a rectangular projection which formed a base for the temple of Nike. The great engineering works of Cimon provided a suitable area for the magnificent structures of the age of Pericles.

The greater monuments of the classical epoch on the Acropolis are described in separate articles (see Parthenon, Erechtheum,

Propylaea). Next in interest to these noble structures is the beautiful little temple of Athena Nike, wrongly designated Nike Apteros (Wingless Victory), standing on the bastion already mentioned; it was begun after 450 B.C. and was prob-

The reconstruction of the city after its demolition by the Persians was not carried out on the lines of a definite plan like that of the Peiraeus. The houses were hastily repaired, and the

In the

classical

period.

narrow, crooked streets remained; the influence of Themistocles, who aimed at transferring the capital to the Peiraeus, was The city probably directed against any costly scheme of restor- ation, except on the Acropolis.

The period of Cimon's administration, however, especially the interval between his victory on the Eurymedon and his ostracism (468-461 B.C.), was marked by great architectural activity in the lower city as well as on the citadel. To his time may be referred many of the buildings around the Agora (probably rebuilt on the former sites) and elsewhere, and the passage, or Spo/xos, from the Agora to the Dipylon flanked by long porticos. The Theseum or temple of Theseus, which lay to the east of the Agora near the Acropolis, was built by Cimon: here he deposited the bones of the national hero which he brought from Scyros about 470 B.C. The only building in the city which can with certainty be assigned to the administration of Pericles is the Odeum, beneath the southern declivity of the Acropolis, a structure mainly of wood, said to have been built in imitation of the tent of Xerxes: it was used for musical contests and the

though not established, may be regarded as practically certain, notwithstanding the difficulty presented by the subjects of the sculptures, which bear no relation to Hephaestus. The temple is a Doric peripteral hexastyle in antis, with 13 columns at the sides; its length is 104 ft., its breadth 45I ft., its height, to the top of the pediment, 33 ft. The sculptures of the pediments have been completely lost, but their design has been ingeniously reconstructed by Sauer. The frieze of the entablature contains sculptures only in the metopes of the east front and in those of the sides immediately adjoining it; the frontal metopes represent the labours of Heracles, the lateral the exploits of Theseus. As in the Parthenon, there is a sculptured zophoros above the exterior of the cella walls; this, however, extends over the east and west fronts only and the east ends of the sides; the eastern zophoros represents a battle-scene with seated deities on either hand, the western a centauromachia. The temple is entirely of Pentelic marble, except the foundations and lowest step of the stylobate, which are of Peiraic stone, and the zophoros of the cella, which is in Parian marble. The

■^""“jSSii. \

THE ACROPOLIS

Scale of Yards o 10 20 30 40 50 60

-■•■ — *4r~0? > s*

t Plnacotheca ^ S &c'

*%. Roman Cistern &"**t** ^ > %s.-t;'; "*

3. Temple of Nike Apteros ^'(y So-^/siSSsikv

*4. Pandroseum e * – ˆCˆSk ■»”< *..*

5. Erechtheum

Cyfi/opaean

6th. Century B.C. EEi

5th &4th Century B.C. \ WSk

Roman _ £<£j

Afttt J H Mi.M1.luii , by prpiiMloii et tin Hglltnic 8oc ■■■”! P™f E-A CmrJptr

ˆ35

**va£V.*

Asclepieum •ˆˆ■ˆTheatre of Dionysusˆ~ˆˆˆgˆ’ Emeryw-uke

rehearsal of plays. Of the various temples in which statues by Pheidias, Alcamenes and other great sculptors are known to have been placed, no traces have yet been discovered; excavation has not been possible in a large portion of the lower city, which has always been inhabited. The only extant structures of the classical period are the Hephaesteum, the Dionysiac theatre, and the choragic monument of Lysicrates. The remains of a small Ionic temple which were standing by the Ilissus in the time of Stuart have disappeared.

The Hephaesteum, the so-called Theseum, is situated on a slight eminence, probably the Colonus Agoraeus, to the west The of the Agora. The best preserved Greek temple in

Hephae- the world, it possesses no record of its origin; the steam or sty j e f ; ts scu lptures and architecture leads to the Theseum. conclus ; on tnat j t was built about the same time as the Parthenon; it seems to have been finished by 421 B.C. It has been known as the Theseum since the middle ages, apparently because some of its sculptures represent the exploits of Theseus, but the Theseum was an earlier sanctuary on the east of the Agora (see above). The building has been supposed by Curtius, Wachsmuth and others to be the Heracleum in Melite, but its identification with the temple of Hephaestus and Athena seen in this neighbourhood by Pausanias (i. 14. 6),

theatre and As clepieum.*

and the Archaeo-

preservation of the temple is due to its conversion into a church in the middle ages.

The Dionysiac theatre, situated beneath the south side of the Acropolis, was partly hollowed out from its declivity. The representation of plays was perhaps transferred to The this spot from the early Orchestra in the Agora at the Dionysiac beginning of the 5th century B.C.; it afterwards superseded the Pnyx as the meeting-place of the Ecclesia. The site, which had been accurately deter- mined by Leake, was explored by Strack in 1862. researches subsequently undertaken by the Greek logical Society were concluded in 1879. It was not, however, till 1886 that traces of the original circular Greek orchestra were pointed out by Dorpfeld. The arrangements of the stage and orchestra as we now see them belong to Roman times; the cavea or auditorium dates from the administration of the orator Lycurgus (337-323 B.C.), and nothing is left of the theatre in which the plays of Sophocles were acted save a few small remnants of polygonal masonry. These, however, are sufficient to mark out the circuit of the ancient orchestra, on which the subsequently built proscenia encroached. The oldest stage-building was erected in the time of Lycurgus; it consisted of a rectangular hall with square projections (irapacKr]vi,a.) on either side; in

of Lyslcrates.

front of this was built in late Greek or early Roman times a stage with a row of columns which intruded upon the orchestra space; a later and larger stage, dating from the time of Nero, advanced still farther into the orchestra, and this was finally faced (probably in the 3rd century a.d.) by the " bema " of Phaedrus, a platform-wall decorated with earlier reliefs, the slabs of which were cut down to suit their new position. The remains of two temples of Dionysus have been found adjoining the stoa of the theatre, and an altar of the same god adorned with masks and festoons; the smaller and earlier temple probably dates from the 6th century B.C., the larger from the end of the 5 th or the beginning of the 4th century.

Immediately west of the theatre of Dionysus is the sacred precinct of Asclepius, which was excavated by the Archaeological Society in 1876-1878. Here were discovered the foundations of the celebrated

Asclepieum, together with several inscriptions and a great number of votive reliefs offered by grateful invalids and valetudinarians to the god of healing. Many of the reliefs belong to the best period of Greek art. A Doric colonnade with a double row of columns was found to have extended along the base of the Acropolis for a distance of 54 yds.; behind it in a chamber hewn in the rock is the sacred well mentioned by Pausanias. The colonnade was a place of resort for the patients; a large building close beneath the rock was probably the abode of the priests.

The beautiful choragic monument of Lysicrates, dedicated in the archonship of Euaenetus (335-334 B.C.) , is the only survivor The °^ a numDer 0I such structures which stood in the

choragic " Street of the Tripods " to the east of the Dionysiac monument theatre, bearing the tripods given to the successful choragi at the Dionysiac festival. It owes its pre- servation to its former inclusion in a Capuchin convent. The monument consists of a small circular temple of Pentelic marble, 2 if ft. in height and 9 ft. in diameter, with six engaged Corinthian columns and a sculptured frieze, standing on a rect- angular base of Peiraic stone. The delicately carved convex roof, composed of a single block, was surmounted by the tripod. The spirited reliefs of the frieze represent the punishment of the Tyrrhenian pirates by Dionysus and their transforma- tion into dolphins. Another choragic monument was that of Thrasyllus, which faced a cave in the Acropolis rock above the Dionysiac theatre. A portion of another, that of Nicias, was used to make the late Roman gate of the Acropolis. In one of these monuments was the famous Satyr of Praxiteles.

The Cynosarges, from earliest times a sanctuary of Heracles, later a celebrated gymnasium and the school of Antisthenes the Cynic, has hitherto been generally supposed to sarses. have occupied the site of the Monastery of the Asomati on the eastern slope of Lycabettus; its situation, however, has been fixed by Dorpfeld at a point a little to the south of the Olympieum, on the left bank of the Ilissus. Here a series of excavations, carried out by the British School in 1896-1897 under the direction of Cecil Smith, revealed the foundations of an extensive Greek building, the outlines of which correspond with those of a gymnasium; it possessed a large bath or cistern, and was flanked on two sides by water-courses. An Ionic capital found here possibly belonged to the palaestra. The identification, however, cannot be regarded as certain in the absence of inscriptions.

With the loss of political liberty the age of creative genius in Athenian architecture came to a close. The era of decadence, The °^ h°n° rar y statues and fulsome inscriptions, began.

Hellenistic The embellishments which the city received during period: the Hellenistic and Roman periods were no longer the tAttai art; ‘ 3 ti c expression of the religious and political life of a great commonwealth; they were the tribute paid to the intellectual renown of Athens by foreign potentates or dilettanti, who desired to add their names to the list of its illustrious citizens and patrons. Among the first of these benefac- tions was the great gymnasium of Ptolemy, built in the neigh- bourhood of the Agora about 250 b.c. Successive princes of the dynasty of Pergamum interested themselves in the adorn-

ment of the city: Attalus I. set up a number of bronze statues on the Acropolis; Eumenes II. built the long portico west of the Dionysiac theatre, which was excavated and identified in 1877; Attalus II. erected the magnificent Stoa near the Agora, the re- mains of which were completely laid bare in 1898-1902 and have been identified by an inscription. The Stoa consisted of a series of 21 chambers, probably shops, faced by a double colonnade, the outer columns being of the Doric order, the inner unfluted, with lotus-leaf capitals; it possessed an upper storey fronted with Ionic columns.

The greatest monument, however, of the Hellenistic period is the colossal Olympieum or temple of Olympian Zeus, ” unum in terris inchoatum pro magnitudine dei ” (Livy xli. 20), the remains of which stand by the Ilissus p i eum , y to the south-east of the Acropolis. The foundations of a temple were laid on the site — probably that of an ancient sanctuary — by Peisistratus, but the building in its ultimate form was for the greater part constructed under the auspices of Antiochus IV. Epiphanes, king of Syria, by the Roman architect Cossutius in the interval between 174 b.c. and 164 B.C., the date of the death of Antiochus. The work was then suspended and its proposed resumption in the time of Augustus seems not to have been realized; finally, in a. d. 129, the temple was completed and dedicated by Hadrian, who set up a chrys- elephantine statue of Zeus in the cella. The substructure was excavated in 1883 by F. C. Penrose, who proved the correctness of .Dorpfeld’s theory that the building was octostyle; its length was 318 ft., its breadth 132 ft. With the exception of the foundations and two lower steps of the stylobate, it was entirely of Pentelic marble, and possessed 104 Corinthian columns, 56 ft. 7 in. in height, of which 48 stood in triple rows under the pediments and 56 in double rows at the sides; of these, 16 re- mained standing in 1852, when one was blown down by a storm. Fragments of Doric columns and foundations were discovered, probably intended for the temple begun by Peisistratus, the orientation of which differed slightly from that of the later structure. The peribolos, a large artificial platform supported by a retaining wall of squared Peiraic blocks with buttresses, was excavated in 1898 without important results; it is to be hoped that the stability of the columns has not been affected by the

operations.

The Roman Period. — After 146 b.c. Athens and its territory were included in the Roman province of Achaea. Among the earlier buildings of this period is the Horologium The Han- oi Andronicus of Cyrrhus (the " Tower of the Winds"), logium of still standing near the eastern end of the Roman Agora. Androni- The building may belong to the 2nd or 1st century B.C. ; <PUS ' it is mentioned by Varro (De re rust. iii. 5. 17), and therefore cannot be of later date than 35 B.C. It is an octagonal marble structure, 42 ft. in height and 26 ft. in diameter; the eight sides, which face the points of the compass, are furnished with a frieze containing inartistic figures in relief representing the winds; below it, on the sides facing the sun, are the lines of a sun-dial. The building was surmounted by a weathercock in the form of a bronze Triton; it contained a water-clock to record the time when the sun was not shining.

The capture and sack of Athens by Sulla (March 1, 86 B.C.) seems to have involved no great injury to its architectural monuments beyond the burning of the Odeum of Monu Pericles; a portion of the city wall was razed, the ments of groves of the Academy and Lyceum were cut" down, the Roman and the Peiraeus, with its magnificent arsenal and other per ° ' great buildings, burnt to the ground. After this catastrophe the benefactors of Athens were for the most part Romans; the influence of Greek literature and art had begun to affect the conquering race. The New, or Roman, Agora to the north of the Acropolis, perhaps mainly an oil market, was constructed after the year 27 B.C. Its dimensions were practically determined by excavation in 1890-1891. It consisted of a large open rectangular space surrounded by an Ionic colonnade into which opened a number of shops or storehouses. The eastern gate was adorned with four Ionic columns on the outside and two on the inside, the*

western entrance being the well-known Doric portico of Athena Archegetis with an inscription recording its erection from donations of Julius Caesar and Augustus. The whole conclave may be compared with the enclosed bazaars or khans of Oriental cities which are usually locked at night. The Agrippeum, a covered theatre, derived its name from Vipsanius Agrippa, whose statue was set up, about 27 B.C., beneath the north wing of the Acropolis propylaea, on the high rectangular base still remaining. At the eastern end of the Acropolis a little circular temple of white marble with a

peristyle of 9 Ionic columns was dedicated to Rome and Augustus; its foundations were dis- covered during the excavations of 1885-1888. The conspicuous monument which crowns the Museum Hill was erected as the mausoleum of Antiochus Philopappus of Commagene, grandson of Antiochus Epiphanes, in a.d. 114-116. Excavations carried out in 1898-1899 showed that the structure was nearly square; the only portion remaining is the slightly curved front, with three niches between Corinthian pilasters; in the central niche is the. statue of Philopappus.

The emperor Hadrian was the most lavish of all the benefactors of Athens. Besides completing the gigantic Olympieum he Novae enlarged the circuit of the city walls to the east, Athenae: enclosing the area now covered by the royal and the build- public gardens and the Constitution Square. This was «nSw' the City of Hadrian (Hadrianapolis) or New Athens

(Novae Athenae) ; a handsome suburb with numerous villas, baths and gardens; some traces remain of its walls, which, like those of Themistocles, were fortified with rect- angular towers. An ornamental entrance near the Olym- pieum, the existing Arch of Hadrian, marked the boundary between the new and the old cities. The arch is surmounted by a triple attic with Corinthian columns; the frieze above the key- stone bears, on the north-western side, the inscription cu5′ e'icr' 'AOijvai, Ojjcrecos 17 -wplv toXis, and on the south-eastern, oX5′ &a' 'ASpiavov /ecu oi>x' 9t7

The Stadium, in which the Panathenaic Games were held, was first laid out by the orator Lycurgus about 330 B.C. It was

an oblong structure filling a natural depression near stadium tne ˆ e ˆ bank of the Ilissus beneath the eastern de- and clivity of the Ardettus hill, the parallel sides and

Odeum ot semicircular end, or evhbvt), around the arena being Atttcu" partially excavated from the adjoining slopes. The

immense building, however, which was restored in 1896 and the following years, was that constructed in Pentelic marble about a.d. 143 by Tiberius Claudius Herodes Atticus, a wealthy Roman resident, whose benefactions to the city rivalled those of Hadrian. The seats, rising in tiers, as in a theatre, accommodated about 44,000 spectators; the arena was 670 ft. in length and 109 ft. in breadth. The Odeum, built beneath the south-west slope of the Acropolis after a.d. 161 by Herodes

Atticus in memory of his wife Regilla, is comparatively well preserved; it was excavated in 1848 and in 1857-1858. The plan is that of the conventional Roman theatre; the semi- circular auditorium, which seated

some 5000 persons, is, like that of the Dionysiac theatre, partly hollowed from the rock. The orchestra is paved with marble squares. The facade, in Peiraic stone, displays three storeys of arched windows. The whole building was covered with a cedar roof. The Stadium had been already completed and the Odeum had not yet been built when Pausanias visited Athens; these buildings were the last important additions to the architectural monuments of the ancient city. (J. D. B.)

II. The Modern City

At the conclusion of the Greek War of Independence, Athens was little more than a village of the Turkish type, the poorly built houses clustering on the northern and eastern slopes of the Acropolis. The narrow crooked lanes of this quarter still contrast with the straight, regularly laid-out streets of the modern city, which extends to the north-west, north and east of the ancient citadel. The greater commercial advantages offered by Nauplia, Corinth and Patras were outweighed by the historic claims of Athens in the choice of a capital for the newly founded kingdom, and the seat of government was transferred hither from Nauplia in 1833. The new town was, for the most part, laid out by the German architect Schaubert. It contains several squares and boulevards, a large public garden, and many hand- some public and private edifices. A great number of the public institutions owe their origin to the munificence of patriotic Greeks, among whom Andreas Syngros and George Averoff may be especially mentioned. The royal palace, designed by Friedrich von Gartner (1792-1847), is a tasteless structure; attached to it is a beautiful garden laid out by Queen Amalia, which contains a well-preserved mosaic floor of the Roman period. On the south-east is the newly built palace of the crown prince. The Academy, from designs by Theophil Hansen (1813-1891), is con- structed of Pentelic marble in the Ionic style: the colonnades and pediments are richly coloured and gilded, and may perhaps convey some idea of the ancient style of decoration. Close by is the university, with a colonnade adorned with paintings, and the Vallianean library with a handsome Doric portico of Pentelic marble. The observatory, which is connected with the uni- versity, stands on the summit of the Hill of the Nymphs; like the Academy, it was erected at the expense of a wealthy Greek, Baron Sina of Vienna. In the public garden is the Zappeion, a large building with a Corinthian portico, intended for the display of Greek industries; here also is a monument to Byron, erected in 1896. The Boule, or parliament-house, possesses a consider- able library. Other public buildings are the Polytechnic Institute, built by contributions from Greeks of Epirus, the theatre, the Arsakeion (a school for girls), the Varvakeion (a gymnasium), the military school (crxoXi) eve\iri5wv) , and several hospitals and orphanages. The cathedral, a large, modern structure, is devoid of architectural merit, but some of the smaller, ancient, Byzan- tine churches

are singularly interesting and beautiful. Among private residences, the mansion built by Dr Schliemann, the discoverer of Troy, is the most noteworthy; its decorations are in the Pompeian style.

The museums of Athens have steadily grown in importance with the progress of excavation. They are admirably arranged, and the remnants of ancient art which they contain have fortunately escaped injudicious restoration. The National Museum, founded in 1866, is especially rich in archaic sculptures and in sepulchral and votive reliefs. A copy of the Diadumenos of Polyclitus from Delos, and temple sculp- tures from Epidaurus and the Argive Heraeum, are among the more notable of its recent acquisitions. It also possesses the famous collection of prehistoric antiquities found by Schliemann at Tiryns and Mycenae, other " Mycenaean " objects discovered at Nauplia and in Attica, as well as the still earlier remains ex- cavated by Tsountas in the Cyclades and by the British School at Phylakopi in Melos; terra-cottas from Tanagra and Asia

Minor; bronzes from Olympia, Delphi and elsewhere, and numerous painted vases, among them the unequalled white lekythi from Athens and Eretria. The Epigraphical Museum contains an immense number of inscriptions arranged by H. G. Lolling and A. Wilhelm of the Austrian Institute. The Acropolis Museum (opened 1878) possesses a singularly interesting collec- tion of sculptures belonging to the " archaic " period of Greek art, all found on the Acropolis; here, too, are some fragments of the pedimental statues of the Parthenon and several reliefs from its frieze, as well as the slabs from the balustrade of the temple of Nike. The Polytechnic Institute contains a museum of interesting objects connected with modern Greek life and history. In the Academy is a valuable collection of coins superintended by Svoronos. Of the private collections those of Schliemann and Karapanos are the most interesting: the latter contains works of art and other objects from Dodona. There is a small museum of antiquities at the Peiraeus.

Owing to the numbers and activity of its institutions, both native and foreign, for the prosecution of research and the

encouragement of classical studies, Athens has become Scientific once more an international seat of learning. The tions. ' Greek Archaeological Society, founded in 1837,

numbers some distinguished scholars among its members, and displays great activity in the conduct of excava- tions. Important researches at Epidaurus, Eleusis, Mycenae, Amyclae and Rhamnus may be numbered among its principal undertakings, in addition to the complete exploration of the Acropolis and a series of investigations in Athens and Attica. The French Ecole d'Athenes, founded in 1846, is under the scientific direction of the Academie des Inscriptions et Belles- lettres. Among its numerous enterprises have been the extensive and costly excavations at Delos and Delphi, which have yielded such remarkable results. The monuments of the Byzantine epoch have latterly occupied a prominent place in its investiga- tions. The German Archaeological Institute, founded in 1874, has carried out excavations at Thebes, Lesbos, Paros, Athens and elsewhere; it has also been associated in the great researches at Olympia, Pergamum and Troy, and in many other important undertakings. The British School, founded in 1886, has been unable, owing to insufficient endowment, to work on similar lines with the French and German institutions; it has, however, carried out extensive excavations at Megalopolis and in Melos, as well as researches at Abae, in Athens (presumed site of the Cynosarges), in Cyprus, at Naucratis and at Sparta. It has also participated in the exploration of Cnossus and other im- portant sites in Crete. The American School, founded in 1882, is supported by the principal universities of the United States. In addition to researches at Sicyon, Plataea, Eretria and else- where, it has undertaken two works of capital importance — the excavation of the Argive Heraeum and of ancient Corinth. An Austrian Archaeological Institute was founded in 1898.

Notwithstanding certain disadvantages inherent in its situa- tion, the trade and manufactures of Athens have considerably

increased in recent years. Industrial and commercial industry activity is mainly centred at the Peiraeus, where merce. & cloth and cotton mills, 45 cognac distilleries, 14 steam

flour mills, 8 soap manufactories, 13 shipbuilding and engineering works, chair manufactories, dye works, chemical works, tanneries and a dynamite factory have been established. The shipbuilding and engineering trades are active and advan- cing. The export trade is, however, inconsiderable, as the produce of the local industries is mainly absorbed by home consumption. The principal exports are wine, cognac and marble from Pentelicus. As a place of import, the Peiraeus surpasses Patras, Syra and all the other Greek maritime towns, receiving about 53 % of all the merchandise brought into Greece. The principal imports are coal, grain, manufactured articles and articles of luxury. The total value of exports in 1904 was £459,565; of imports, £2,459,278. The number of ships entered and cleared in 1905 was 5020 with a tonnage of 5,796,590 tons, of which 416, with a tonnage

of 609,822 tons, were British.

The Peiraeus, which had never revived since its destruction by the Romans in 86 B.C., was at the beginning of the 19th century a small fishing village known as Porto Leone. When Athens became the capital in 1833 the ancient name of peiraeus. its port was revived, and since that time piers and quays have been constructed, and spacious squares and broad regular streets have been laid out. The town now possesses an exchange, a large theatre, a gymnasium, a naval school, municipal buildings and several hospitals and charitable institutions erected by private munificence. The harbour, in which ships of all nations may be seen, as well as great numbers of the picturesque sailing craft engaged in the coasting trade, is somewhat difficult of access to larger vessels, but has been improved by the con- struction of new breakwaters and dry docks. The port and the capital are now connected by railway with Corinth and the principal towns of the Morea; the line opening up communi- cation with northern Greece and Thessaly, when its proposed connexion with the Continental railway system has been effected, will greatly enhance the importance of the Peiraeus, already one of the most flourishing commercial towns in the Levant.

The population of Athens has rapidly increased. In 1834 it was below 5000; in 1870 it was 44,510; in 1879, 63,374; in 1889, 107,251; in 1896, 111,486. The Peiraeus, which in 1834 possessed only a few hundred inhabitants, tion."' in 1879 possessed 21,618; in 1889, 34,327; in 1896, 43,848. The total population of Athens in 1907 was 167,479 and of Peiraeus 67,982. (J. D. B.)

III. History

1. The Prehistoric Period,. — The history of primitive Athens is involved in the same obscurity which enshrouds the early development of most of the Greek city-states. The Homeric poems scarcely mention Attica, and the legends, though numerous, are rarely of directrhistorical value. In the Minoan epoch Athens is proved by the archaeological remains to have been a petty kingdom scarcely more important than many other Attic com- munities, yet enjoying a more unbroken course of development than the leading states of that period. This accords with the cherished tradition which made the Athenians children of the soil, and free from admixture with conquering tribes. Many legends, however, and the later state organization, point to an immigration of an " Ionian " aristocracy in late Mycenaean days. These Ionian newcomers are almost certainly responsible for the absorption of the numerous independent communities of Attica into a central state of Athens under a powerful monarchy (see Theseus), for the introduction of new cults, and for the division of the people into four tribes whose names — Geleontes, Hopletes, Argadeis and Aegicoreis — recur in

several true Ionian towns. This centralization of power (Synoecism) , to which many Greek peoples never attained, laid the first foundations of Athenian greatness. But in other respects the new constitution tended to arrest development. When the monarchy was supplanted in the usual Greek fashion by a hereditary nobility — a process accom- plished, according to tradition, between about 1000 and 683 B.C. — -all power was appropriated by a privileged class of Eupatridae (q.v .) ; the Geomori and Demiurgi, who formed the bulk of the community, enjoyed no political rights. It was to their control over the machinery of law that the Eupatridae owed their predominance. The aristocratic council of the Areopagus (q.v.) constituted the chief criminal court, and nominated the magistrates, among whom the chief archon (q.v.) passed judgment in family suits, controlled admission to the genos or clan, and consequently the acquisition of the franchise. This system was further supported by religious prescriptions which the nobles retained as a corporate secret. Assisted no doubt by their judicial control, the Eupatridae also tended to become sole owners of the land, reducing the original freeholders or tenants to the position of serfs. During this period Athens seems to have made little use of her militia, commanded by the polemarch, or of her navy, which was raised in special local divisions known as Naucraries (see Naucrary); hence no military esprit de corps could arise to check the Eupatrid

ascendancy. Nor did the commons obtain relief through any commercial or colonial enterprises such as those which alleviated social distress in many other Greek states. The first attack upon the aristocracy proceeded from a young noble named Cylon, who endeavoured to become tyrant about 630 B.C. The people helped to crush this movement; yet discontent must have been rife among them, for in 6?i the Eupatrids commissioned Draco (q.v.), a junior magistrate, to draft and publish a code of criminal law. This was a notable concession, by which the nobles lost that exclusive legal knowledge which had formed one of their main instruments of oppression.

2. The Rise of Athens. — A still greater danger grew out of the widespread financial distress, which was steadily driving many of the agricultural population into slavery and threatened the entire state with ruin. After a protracted war with the neigh- bouring Megarians had accentuated the crisis the Eupatridae gave to one of their number, the celebrated Solon (q.v.), free power to remodel the whole state (594). By his economic legislation Solon placed Athenian agriculture once more upon a sound

footing, and supplemented this source of wealth by encouraging commercial enterprise, thus laying the foundation of his country's material prosperity. His constitutional reforms proved less successful, for, although he put into the hands of the people various safeguards against oppression, he could not ensure their use in practice. After a period of disorder and party-feud among the nobles the new constitution was superseded in fact, if not in form, by the autocratic rule of Peisistratus (q.v.), and his sons Hippias and Hipparchus. The age of despotism, which lasted, with interruptions, from 560 to 510, was a period of great prosperity for Athens. The rulers fostered agriculture, stimulated commerce and industry (notably the famous Attic ceramics), adorned the city with public works and temples, and rendered it a centre of culture. Their vigorous foreign policy first made Athens an Aegean power and secured connexions with numerous mainland powers. Another result of the tyranny was the weakening of the undue influence of the nobles and the creation of a national Athenian spirit in place of the ancient clan-feeling.

The equalization of classes was already far advanced when towards the end of the century a nobleman of the Alcmaeonid family, named Cleisthenes (q.v.), who had taken the chief part in the final expulsion of the tyrants, acquired ascendancy as leader of the commons. The constitution which he promulgated (508/7) gave expression to the change of political feeling by providing a national basis of franchise and providing a new state organization. By making effective the powers of the Ecclesia (Popular Assembly) the Boule (Council) and Heliaea, Cleisthenes became the true founder of Athenian democracy.

This revolution was accompanied by a conflict with Sparta and other powers. But a spirit of harmony 'and energy now breathed within the nation, and in the ensuing wars Athens worsted powerful enemies like Thebes and Chalcis (506). A bolder stroke followed in 500, when a force was sent to support the Ionians in revolt against Persia and took part in the sack of Sardis. After the failure of this expedition the Athenians apparently became absorbed in a prolonged struggle with Aegina (q.v.). In 493 the imminent prospect of a Persian invasion brought into power men like Themistocles and Miltiades (qq.v.), to whose firmness and insight the Athenians largely owed their triumph in the great campaign of 490 against Persia. After a second political reaction, the prospect of a second Persian war, and the naval superiority of Aegina led to the assumption of a bolder policy. In 483 Themistocles overcame the opposition of Aristides (q.v.), and passed his famous measure providing for a large increase of the Athenian fleet. In the great invasion of 480-479 the Athenians displayed an unflinching resolution which could not be shaken even by the evacuation and destruction of their native city. Though the traditional account of this war exaggerates the services of Athens as compared with the other

champions of Greek independence, there can be no doubt that the ultimate victory was chiefly due to the numbers and efficiency of the Athenian fleet, and to the wise policy of her great statesman Themistocles (see Salamis, Plataea).

3. Imperial Athens.— After the Persian retreat and the reoccupation of their city the Athenians continued the war with unabated vigour. Led by Aristides and Cimon they rendered such prominent service as to receive in return the formal leader- ship of the Greek allies and the presidency of the newly formed Delian League (q.v.). The ascendancy acquired in these years eventually raised Athens to the rank of an imperial state. For the moment it tended to impair the good relations which had subsisted between Athens and Sparta since the first days of the Persian peril. But so long as Cimon's influence prevailed the ideal of " peace at home and the complete humiliation of Persia " was steadily unheld. Similarly the internal policy of Athens continued to be shaped by the conservatives. The only notable innovations since the days of Cleisthenes had been the reduction of the archonship to a routine magistracy appointed partly by lot (487), and the rise of the ten elective strategi (generals) as chief executive officers (see Strategus). But the triumph of the navy in 480 and the great expansion of commerce and industry had definitely shifted the political centre of gravity from the yeoman class of moderate democrats to the more radical party usually stigmatized as the " sailor rabble." Though Themistocles soon lost his influence, his party eventually found a new leader in Ephialtes and after the failure of Cimon's foreign policy (see Cimon) triumphed over the conservatives. The year 461 marks the reversal of Athenian policy at home and abroad. By cancelling the political power of the Areopagus and multi- plying the functions- of the popular law-courts, Ephialtes abolished the last checks upon the sovereignty of the commons. His successor, Pericles, who commonly ranked as the " completer of the democracy," merely developed the full democracy so as to secure its effectual as well as its theoretical supremacy. The foreign policy of Athens was now directed towards an almost reckless expansion (see Pericles). The unparalleled success of the Athenian arms at this period extended the bounds of empire to their farthest limits. Besides securing her Aegean possessions and her commerce by the defeat of Corinth and Aegina, her last rivals on sea, Athens acquired an extensive dominion in central Greece and for a time quite overshadowed the Spartan land-power. The rapid loss of the new conquests after 447 proved that Athens lacked a sufficient land-army to defend permanently so extensive a frontier. Under the guidance of Pericles the Athenians renounced the unprofitable rivalry with Sparta and Persia, and devoted themselves to the consolidation and judicious extension of their maritime influence.

The years of the supremacy of Pericles (443-429) are on the whole the

most glorious in Athenian history. In actual extent of territory the empire had receded somewhat, but in point of security and organization it now stood at its height. The Delian confederacy lay completely under Athenian control, and the points of strategic importance were largely held by cleruchies (q.v.; see also Pericles) and garrisons. Out of a citizen body of over 5°;°°° freemen, reinforced by mercenaries and slaves, a superb fleet exceeding 300 sail and an army of 30,000 drilled soldiers could be mustered. The city itself, with its fortifications extending to the port of Peiraeus, was impregnable to a land attack. The commerce of Athens extended from Egypt and Colchis to Etruria and Carthage, and her manufactures, which attracted skilled operatives from many lands, found a ready sale all over the Mediterranean. With tolls, and the tribute of the Delian League, a fund of 9700 talents (£2,300,000) was amassed in the treasury.

Yet the material prosperity of Athens under Pericles was less notable than her brilliant attainments in every field of culture. Her development since the Persian wars had been extremely rapid, but did not reach its climax till the latter part of the century. No city ever adorned herself with such an array of temples, public buildings and works of art as the Athens of Pericles and Pheidias. Her achievements in literature are hardly less great. The Attic drama of the period produced many great masterpieces, and the scientific thought of Europe in the depart- ments of logic, ethics, rhetoric and history mainly owes its origin to a new movement of Greek thought which was largely fostered

by the patronage of Pericles himself. Besides producing numerous men of genius herself Athens attracted all the great intellects of Greece. The brilliant summary of the historian Thucydides in the famous Funeral Speech of Pericles (delivered in 430), in which the social life, the institutions and the culture of his country are set forth as a model, gives a substantially true picture of Athens in its greatest days.

This brilliant epoch, however, was not without its darker side. The payment for public service which Pericles had introduced may have contributed to raise the general level of culture of the citizens, but it created a dangerous precedent and incurred the censure of notable Greek thinkers. Moreover, all this prosperity was obtained at the expense of the confederates, whom Athens exploited in a somewhat selfish and illiberal manner. In fact it was

the cry of "tyrant city" which went furthest to rouse public opinion in Greece against Athens and to bring on the Peloponnesian War (q.v.) which ruined the Athenian empire (431-404). The issue of this conflict was determined less by any intrinsic superiority on the part of her enemies than by the blunders committed by a people unable to carry out a consistent foreign policy on its own initiative, and served since Pericles by none but selfish or short-sighted advisers. It speaks well for the patriotic devotion and discipline of her commons that Athens, weakened by plague and military disasters, should have withstood for so long the blows of her numerous enemies from without, and the damage inflicted by traitors within her walls (see Antiphon, Theramenes).

4. The Fourth Century. — After the complete defeat of Athens by land and sea, it was felt that her former services on behalf of Greece and her high culture should exempt her from total ruin. Though stripped of her empire, Athens obtained very tolerable terms from her enemies. The democratic constitution, which had been supplanted for a while by a government of oligarchs, but was restored in 403 after the latter's misrule had brought about their own downfall (see Critias, Theramenes, Thrasybulus), henceforth stood unchallenged by the Greeks. Indeed the spread of democracy elsewhere increased the prestige of the Athenian administration, which had now reached a high pitch of efficiency. Athenian art and literature in the 4th century declined but slightly from their former standard; philosophy and oratory reached a standard which was never again equalled in antiquity and may still serve as a model. In the wars of the period Athens took a prominent part with a view to upholding the balance of power, joining the Corinthian League in 395, and assisting Thebes against Sparta after 378, Sparta against Thebes after 360. Her generals and admirals, Conon, Iphicrates, Chabrias, Timotheus, distinguished themselves by their military skill, and partially recovered their country's predominance in the Aegean, which found expression in the temporary renewal of the Delian League (q.v.). By the middle of the century Athens was again the leading power in Greece. When Philip of Macedon began to grow formidable she seemed called upon once more to champion the liberties of Greece. This ideal, when put forward by the consummate eloquence of Demosthenes and other orators, created great enthusiasm among the Athenians, who at times displayed all their old vigour in opposing Philip, notably in the decisive campaign of 338. But these outbursts of energy were too spasmodic, and popular opinion repeatedly veered back in favour of the peace-party. With her diminished resources Athens could not indeed hope to cope with the great Macedonian king; however much we may sympathize with the generous ambition of the patriots, we must admit that in the light of hard facts their conduct appears quixotic.

5. The Hellenistic Period. — Philip and Alexander, who sincerely admired Athenian culture and courted a zealous co-operation against Persia, treated the conquered city with marked favour. But the people would not resign themselves to playing a secondary part, and watched for every opportunity to revolt. The outbreak headed by Athens after Alexander's death (323) led to a stubborn conflict with Macedonia. After his victory the regent Antipater punished Athens by the loss of her remaining dependencies, the proscription of her chief patriots,

and the disfranchisement of 12,000 citizens. The Macedonian garrison which was henceforth stationed in Attic territory prevented the city from taking a prominent part in the wars of the Diadochi. Cassander placed Athens under the virtual autocracy of Demetrius of Phalerum (317-307), and after the temporary liberation by Demetrius Poliorcetes (306-300), secured his interests through a dictator named Lachares, who lost the place again to Poliorcetes after a siege (295). After a vain attempt to expel the garrison in 287, the Athenians regained their liberty while Macedonia was thrown into confusion by the Celts, and in 279 rendered good service against the invaders of the latter nation with a fleet off Thermopylae. When Anti- gonus Gonatas threatened to restore Macedonian power in Greece, the Athenians, supported perhaps by the king of Egypt, formed a large defensive coalition; but in the ensuing " Chrem- onidean War " (266-263) a naval defeat off Andros led to their surrender and the imposition of a Macedonian garrison. The latter was finally withdrawn in 229 by the good offices of Aratus (q.v.). At this period Athens was altogether overshadowed in material strength by the great Hellenistic monarchies and even by the new republican leagues of Greece; but she could still on occasion display great energy and patriotism. The prestige of her past history had now perhaps attained its zenith. Her democracy was respected by the Macedonian kings; the rulers of Egypt, Syria, and especially of Pergamum, courted her favour by handsome donations of edifices and works of art, to which the citizens replied by unbecoming flattery, even to the extent of creating new tribes named after their benefactors. If Athens lost her supremacy in the fields of science and scholar- ship to Alexandria, she became more than ever the home of philosophy, while Menander and the other poets of the New Comedy made Athenian life and manners known throughout the civilized world.

6. Relations with the Roman Republic. — In 228 Athens entered into friendly intercourse with Rome, in whose interest she endured the desperate attacks of Philip V. of Macedonia (200-199). In return for help against King Perseus she ac- quired some new possessions, notably the great mart of Delos, which became an Athenian cleruchy (166). By her treacherous attack upon the frontier-town of Oropus (156) Athens indirectly brought about the conflict between Rome and the Achaean League which resulted in

the eventual loss of Greek independence, but remained herself a free town with rights secured by treaty. In spite of the favours displayed by Rome, the more radical section of the people began to chafe at the loss of their international importance. This discontent was skilfully fanned by Mithradates»the Great at the outset of his Roman campaigns. His emissary, the philosopher Aristion, induced the people to declare war against Rome and to place him in chief command. The town with its port stood a long siege against Sulla, but was stormed in 86. The conqueror allowed his soldiers to loot, but inflicted no permanent punishment upon the people. This war left Athens poverty-stricken and stripped of her commerce: her only importance now lay in the philosophical schools, which were frequented by many young Romans of note (Cicero, Atticus, Horace, &c). Greek became fashionable at Rome, and a visit to Athens a sort of pilgrimage for educated Romans (cf. Propertius iv. 21: "Magnum iter ad doctas proficisci cogor Athenas "). In the great civil wars Athens sided with Pompey and held out against Caesar's lieutenants, but received a free pardon " in consideration of her great dead." Similarly the triumvirs after Philippi condoned her enthusiasm for the cause of Brutus. Antony repeatedly made Athens his head- quarters and granted her several new possessions, including Eretria and Aegina — grants which Octavian subsequently revoked.

7. The Roman Empire. — Under the new settlement Athens remained a free and sovereign city — a boon which she repaid by zealous Caesar-worship, for the favours bestowed upon her tended to pauperize her citizens and to foster their besetting sin of calculating flattery. Hadrian displayed his special fondness for the city by raising new buildings and relieving

financial distress. He amended the constitution in some respects, and instituted a new national festival, the Panhellenica. In the period of the Antonines the endowment of professors out of the imperial treasury gave Athens a special status as a university town. Her whole energies seem henceforth devoted to academic pursuits; the military training of her youth was superseded by courses in philosophy and rhetoric; the chief organs of administration, the revived Areopagus and the senior Strategus, became as it were an education office. Save for an incursion by Goths in a.d. 267 and a temporary occupation by Alaric in 395, Athens spent the remaining centuries of the ancient world in quiet prosperity. The rhetorical schools experienced a brilliant revival under Constantine and his successors, when

Athens became the alma mater of many notable men, including Julian, Libanius, Basil and Gregory of Nazianzus, and in her professors owned the last representatives of a humane and moralized paganism. The freedom of teaching was first curtailed by Theodosius I.; the edict of Justinian (529), forbidding the study of philosophy, dealt the death-blow to ancient Athens.

The authorities for the history of ancient Athens will mostly be found under Gref.ce : History, and the various biographies. The following books deal with special periods or subjects only: — (1) Early Athens: W. Warde Fowler, The City-State, ch. vi. (London, 1893). (2) The fifth and fourth centuries: the "Constitution of Athens," ascribed to Xenophon ; W. Oncken, Athen und Hellas (Leipzig, 1865) ; U. v. Wilamowitz-Moellendorff, Aus Kydathen (Berlin, 1880); L. Whibley, Political Parties at Athens (Cambridge, 1889) ; G. Gilbert, Beilrdge zur inneren Geschichte Athens (Leipzig, 1877) ; J. Beloch, Die attische Politik sett PeriM.es (Leipzig, 1884). (3) The Hellenistic and Roman periods: J. P. Mahaffy, Greek Life and Thought, from 323 to 146 (London, 1887), chs. v., vi., xvii. ; A. Holm, Greek History (Eng. trans., London, 1898), iv. chs. vi. and xxiii. ; Wilamowitz- Moellendorff, Antigonos von Karystos (Berlin, 1881), pp. 178-291 ; W. Capes, University Life in Ancient Athens (London, 1877); A. Dumont, Essai sur I'Ephebie attique (Paris, 1875). (4) The Latin rule: G. Finlay, History of Greece (Oxford ed., 1877), vol. iv. ch. vi.

(5) Constitutional History: The Aristotelian " Constitution of Athens"; U. v. Wilamowitz-Moellendorff, Aristoteles und Athen (Berlin and Leipzig, 1893), vol. ii. ; G. Gilbert, Greek Constitutional Antiquities (Eng. trans., London, 1895), pp. 95-453; A. H. J. Greenidge, Handbook of Greek Constitutional History (Oxford, 1896), ch. vi. ; J. W. Headlam, Election by Lot at Athens (Cambridge, 1891).

(6) Finance and statistics: A. Boeckh, The Public Economy of the Athenians (Eng. trans., London, 1828); Ed. Meyer, Forschungen zur alten Geschichte (Halle, 1899), vol. ii. pp. 149-195. (7) Inscrip- tions: Corpus Inscriptionum Atticarum, with supplements (Berlin, 1873-1895). (8) Coins: B. V. Head, Historia Numorum (Oxford, 1887), pp. 309-328. (M. O. B. C.)

8. Byzantine Period. — The city now sank into the position of a provincial Byzantine town. Already it had been robbed of many of its works of art, among them the Athena Promachos and the Parthenos of Pheidias, for the adornment of Constanti- nople, and further spoliation took place when the church of St Sophia was built in a.d. 532. The Parthenon, the Erechtheum, the " Theseum " and other temples were converted into Christian churches and were thus preserved throughout the middle ages. The history of Athens for the next four centuries is almost a blank; the city is rarely mentioned by

the Byzantine chronicles of this period. The emperor Constantine II. spent some months here in a.d. 662-663. In 869 the see of Athens became an arch- bishopric. In 90S Attica was ravaged by the Bulgarians under their tsar Samuel, but Athens escaped; after the defeat of Samuel at Belasitza (1014) the emperor Basil II., who blinded 15,000 Bulgarian prisoners, came to Athens and celebrated his triumph by a thanksgiving service in the Parthenon (1018). From the Runic description on the marble lion of the PeiraeUs it has been inferred that Harold Hardraada and the Norsemen in the service of the Byzantine emperors captured the Peiraeus in 1040, but this conclusion is r.ot accepted by Gregorovius (bk. i. pp. 170-172). Like the rest of Greece, Athens suffered greatly from the rapacity of its Byzantine administrators. The letters of Acominatus, archbishop of Athens, towards the close of the 12th century, bewail the desolate condition of the city in language resembling that of Jeremiah in regard to Jerusalem.

9. Period of Latin Rule: 1204-1458. — After the Latin con- quest of Constantinople in 1 204, Otho de la Roche was granted the lordship of Athens by Boniface of Montferrat, king of Thessa-

lonica, with the title of Megaskyr {fikyas «iiptos = great lord). His nephew and successor, Guy I., obtained the title duke of Athens from Louis IX. of France in 1258. On the death of Guy II., last duke of the house of la Roche, in 1308, the duchy passed to his cousin, Walter of Brienne. He was expelled in 13 n by his Catalonian mercenaries; the mutineers bestowed the duchy " of Athens and Neopatras " on their leader, Roger Deslaur, and, in the following year, on Frederick of Aragon, king of Sicily. The Sicilian kings ruled Athens by viceroys till 1385, when the Florentine Nerio Acciajuoli, lord of Corinth, defeated the Catalonians and seized the city. Nerio, who received the title of duke from the king of Naples, founded a new dynasty. His palace was in the Propylaea; the lofty " Tower of the Franks," which adjoined the south wing of that building, was possibly built in his time. This interesting historical monument was demolished by the Greek authorities in 1874, notwithstanding the protests of Penrose, Freeman and other scholars. The Acciajuoli dynasty lasted till June 1458, when the Acropolis after a stubborn resistance was taken by the Turks under Omar, the general of the sultan Mahommed II., who had occupied the lower city in 1456. The sultan entered Athens in the following month; he was greatly struck by its ancient monuments and treated its inhabitants with comparative leniency.

10. Period of Turkish Rule: 1458-1833. — After the Turkish conquest Athens disappeared from the eyes of Western civiliza- tion. The principal interest of the following centuries lies in the researches of successive travellers, who may be said to have rediscovered the city, and in the fate of its ancient monu- ments, several of which were still in fair preservation at

the beginning of this period. The Parthenon was transformed into a mosque; the existing minaret at its south-western corner was built after 1466. The Propylaea served as the residence of the Turkish commandant and the Erechtheum as his harem. In 1466 the Venetians succeeded in occupying the city, but failed to take the Acropolis. About 1645 a powder magazine in the Propylaea was ignited by lightning and the upper portion of the structure was destroyed. Under Francesco Morosini the Venetians again attacked Athens in September 1687; a shot fired during the bombardment of the Acropolis caused a powder magazine in the Parthenon to explode, and the building was rent asunder. After capturing the Acropolis the Venetians employed material from its ancient edifices in repairing its walls. They withdrew in the following year, when the Turks set fire to the city. The central sculptures of the western pediment of the Parthenon, which Morosini intended to take to Venice, were unskilfully detached by his workmen, and falling to the ground were broken to pieces. Several ancient monuments were sacri- ficed to provide material for a new wall with which the Turks surrounded the city in 1778.

During the 1 8th century many works of art, which still re- mained in situ, fell a prey to foreign collectors. The removal to London in 18 12 of most of the remaining sculptures of the Parthenon by Lord Elgin possibly rescued many of them from injury in the period of warfare which followed. In 18 21 the Greek insurgents surprised the city, and in 1822 captured the Acropolis. Athens again fell into the hands of the Turks in 1826, who bombarded and took the Acropolis in the following year; the Erechtheum suffered greatly, and the monument of Thra- syllus was destroyed. The Turks remained in possession of the Acropolis till 1833, when Athens was chosen as the capital of the newly established kingdom of Greece; since that date the history of the city forms part of that of modern Greece. (See Greece: History, modern.)

General Bibliography. — W. M. Leake, Topography of Athens and the Demi (2nd ed., London, 1841); C. Wachsmuth, Die Stadt Athen im Alterthum (vol. i., Leipzig, 1874; vol. ii. part i., Leipzig, 1890); E. Burnouf, La Ville et I'acropole d'Athenes aux diverses Spoques (Paris, 1877); F. C. Penrose, Principles of Athenian Archi- tecture (London, 1888) ; J. E. Harrison, Mythology and Monuments of Ancient Athens (London, 1890); E. Curtius and A. Milchhofer, Stadtgeschichte von Athen (Berlin, 1891) ; H. Hitzig and H. Bliimner, Pausanias (text and commentary; vol. i., Berlin, 1896); J. G. Frazer, Pausanias (translation and commentary; 6 vols., London, 1898. The commentary on Pausanias' description of Athens,

contained in vol. ii. with supplementary notes in vol. v., is an invalu- able digest of recent researches) ; H. Omont, Athenes au XVII' siecle (Paris, 1898, with plans and views of the town and acropolis and drawings of the sculptures of the Parthenon) ; J. H. Middleton and

E. A. Gardner, Plans and Drawings of Athenian Buildings (London, 1900); E. A. Gardner, Ancient Athens (London, 1902); W. Judeich, Topographic von Athen (Munich, 1905 ; forming vol. iii. part ii. second half, in 3rd edition of I. von Miiller's Handbuch der klass. Altertums- wissenschafl). The history of excavations on the Acropolis is sum- marized in M. L. d'Ooge, Acropolis of Athens (1909); see also A. Botticher, Die Akropolis von Athen (Berlin, 1888); O. Jahn, Pausaniae descriptio arcis Athenarum (Bonn, 1900) ; A. Furtwangler, Masterpieces of Greek Sculpture (appendix; London, 1895); A. Milchhofer, Uber die alten Burgheiligtumer in Athen (Kiel, 1899). For the Parthenon, A. Michaelis, Der Parthenon (texts and plates, Leipzig, 1871); L. Magne, Le Parthenon (Paris, 1895); J. Durm, Der Zustand der antiken athenischen Bauwerken (Berlin, 1895) ;

F. C. Penrose in Journal of Royal Institute of British Architects for 1897; N. M. Balanos in 'Eˆjucpis -rijs KvPepvhatws (Athens, August 25, 1898). For the Dionysiac theatre, A. E. Haigh, The Attic Theatre (Oxford, 1889); W. Dorpfeld and E. Reisch, Das griechische Theater (Athens, 1896) ; Puchstein, Die grierhische Buhne (Berlin, 1901). For the " Theseum," B. Sauer, Das sogenannte Theseion (Leipzig, 1899). For the Peiraeus, E. I. Angelopoulos, Hepl JIctpaLcos /cat ru>v \ip.kvoiv avrov (Athens, 1898). For the Attic Demes, A. Milchhofer, Untersuchungen iiber die Demenordnung des Kleisthenes (in transactions of Berlin Academy, Berlin, 1892); Pauly-Wissowa, Realencyclopadie der class, Altertumswissenschaft (supplement, part i., article "Athenai"; Stuttgart, 1903). For the controversies respecting the Agora, the Enneacrunus and the topography of the town in general, see W. Dorpfeld, passim in Athenische Miltheilungen ; C. Wachsmuth, " Neue Beitrage zur Topographie von Athen," in Abhandlungen der sachsischen Gesell- schaft der Wissenschaflen (Leipzig, 1897). A. Milchhofer, " Zur Topographie von Athen," in Berlin, philol. Wochenschrift (1900), Nos. 9, 11, 12. For the Byzantine and medieval periods, William Miller, Latins in the Levant (London, 1908) ; F. Gregorovius, Geschichte der Stadt Athen im Mittelalter (2 vols., Stuttgart, 1889). Periodical Literature. Miltheilungen des kais. deutsch. arch. Instituts (Athens, from 1876); Bulletin de correspondance hellenique (Athens, from 1877) ; Papers of the American School (New York, 1882-1897) ; Annual of the British School (London, from 1894); Journal of Hellenic Studies (London, from 1880); American Journal of Archae- ology (New York, from 1885); Jahrbuch des kais. deutsch. arch. Instituts

(Berlin, from 1886). The best maps are those in Die Karten von Attika, published with explanatory text by the German Ar- chaeological Institute (Berlin, 1881). See also Baedeker's Greece (London, 1895); Alurray's Greece and the Ionian Islands (London, 1900); Guide Joanne, vol. i. Athlnes et ses environs (Paris, 1896); Meyer's Turkei und Griechenldnder (5th ed., 1901). (J. D. B.)

ATHENS, a city and the county-seat of Clarke county, Georgia, U.S.A., in the N.E. part of the state, about 73 m. E. by N. of Atlanta. Pop. (1890) 8639; (1900) 10,245, ˚f whom 5190 were negroes and only 114 were foreign-born; (1910, census) 14,913. It is served by the Georgia, the Central of Georgia, the Southern, the Seaboard Air Line and the Gainesville Midland railways. Athens is an important educational centre. It was founded in 1801 as the seat of the university of Georgia, which had been chartered in 1785. Franklin College, the academic department of the university, was opened in 180 1, and afterwards the State College of Agriculture and Mechanic Arts (the School of Science, 1872), the State Normal School (co-educational, 1891), the School of Pharmacy (1903), the University Summer School (1903), the School of Forestry (1906), and the Georgia State College of Agriculture (1906), also branches of the university, were established at Athens, and what had been the Lumpkin Law School (incorporated in 1859) became the law department of the university in 1867. Branches of the university not in Athens are: the North Georgia Agricultural College (established in 1871 ; became a part of the university in 1872), at Dahlonega; the medical department, at Augusta (1873; founded as the Georgia Medical College in 1829); the Georgia School of Tech- nology (1885), at Atlanta; the Georgia Normal and Industrial College for Girls (1889), at Milledgeville; and the Georgia Industrial College for Colored Youth (1890), near Savannah. At Athens also are several secondary schools, and the Lucy Cobb Institute (for girls), opened in 1858 and named in honour of a daughterof its founder, Gen. T. R. R. Cobb (1823-1862). The city has various manufactures, the most important being fertilizers, cotton goods, and cotton-seed oil and cake; the value of the total factory product in 1905 was $1,158,205, an increase of 70-9% in 'five years. Athens was chartered as a city in 1872.

ATHENS, a village and the county-seat of Athens county, Ohio, U.S.A., in the township of Athens, on the Hocking river, about 76 m. E.S.E. of Columbus. Pop. (1890) 2620; (1900) 3066; (1910) 5463; of the township (1910) 10,156. It is served by the Baltimore & Ohio Southwestern, the Toledo & Ohio Central (Ohio Central Lines), and the Hocking Valley railways. The village is built on rolling ground rising about 70 ft. above the river (which nearly encircles it), and commands views of some of the most beautiful scenery in the state. There are several ancient mounds in the vicinity. Athens is the seat of Ohio University (co-

educational), a state institution estab- lished in 1804, and having in 1908 a college of liberal arts, a state normal college (1902), a commercial college, a college of music and a state preparatory school. In 1908 the Univer- sity had 53 instructors and 1386 students. South of the village, and occupying a fine situation, is a state hospital for the insane. In the vicinity there are many coal mines, and among the manu- factures are bricks, furniture, veneered doors, and shirts. The municipality operates the water-works. When the Ohio Com- pany, through Manasseh Cutler, obtained from congress their land in what is now Ohio, it was arranged that the income from two townships was to be set aside " for the support of a literary institution." In 1795 the townships (Athens and Alexander.) were located and surveyed, and in 1800 Rufus Putnam and two other commissioners, appointed by the Territorial legislature, laid out a town, which was also called Athens. Settlers slowly came; the town became the county-seat in 1805, was incor- porated as a village in 1811, and was re-incorporated in 1828.

ATHERSTONE, WILLIAM GUYBON (1813-1898), British geologist, one of the pioneers in South African geology, was born in 1813, in the district of Uitenhage, Cape Colony. Having qualified as M.D. he settled in early life as a medical practitioner at Grahamstown, subsequently becoming F.R.C.S. In 1839 his interest was aroused in geology, and from that date he " devoted the leisure of a long and successful medical practice " to the pursuit of geological science. In 1857 he published an account of the rocks and fossils of Uitenhage (the latter described more fully by R. Tate, Quart. Journal Geol. Soc, 1867). He also obtained many fossil reptilia from the Karroo beds, and pre- sented specimens to the British Museum. These were described by Sir Richard Owen. Atherstone's identification in 1867 as a diamond of a crystal found at De Kalk near the junction of the Riet and Vaal rivers, led indirectly to the establishment of the great diamond industry of South Africa. He encouraged the workings at Jagersfontein, and he also called attention to the diamantiferous neck at Kimberley. He was one of the founders of the Geological Society of South Africa at Johannesburg in 1895; and for some years previously he was a member of the Cape parliament. He died at Grahamstown, on the 26th of June 1898.

See the obituary by T. Rupert Jones, Natural Science, vol. xiv. (January 1899).

ATHERSTONE, a market-town in the Nuneaton parliamentary division of Warwickshire, England, 102J m. N.W. from London by the London & North-Western railway. Pop. (1901) 5248. It lies in the upper valley of the Anker, under well-wooded hills to the west, and is on the Roman Watling Street, and the Coventry canal. The once monastic church of St Mary is rebuilt, excepting the central tower and part of the chancel. The chief

industry is hat-making. On the high ground to the west lie ruins of the Cistercian abbey of Merevale, founded in 1149; they include the gatehouse chapel, part of the refectory and other remains exhibiting beautiful details of the 14th century. Coal is worked at Baxterley, 3 m. west of Atherstone.

Atherstone {Aderestone, Edridestone, Edrichestone) , though not mentioned in any pre-Conquest record, is of unquestionably ancient origin. A Saxon barrow was opened near the town in 1824. It is traversed by Watling Street, and portions of the ancient Roman road have been discovered in modern times. Atherstone is men- tioned in Domesday among the possessions of Countess Godiva, the widow of Leofric. In the reign of Henry III. it passed to the monks of Bee in Normandy, who in 1246 obtained the grant of an annual fair at the feast of the Nativity of the Virgin, and the next year of a market every Tuesday. This market became so much frequented

that in 13 19 a toll was levied upon all goods corning into the town, in order to defray the cost of the repair to the roads necessitated by the constant traffic, and in 1332 a similar toll was levied on all goods passing over the bridge called Feldenbrigge near Atherstone. The September fair and Tuesday markets are still continued. In the reign of Edward III. a house of Austin Friars was founded at Atherstone by Ralph Lord Basset of Drayton, which, however, never rose to much importance, and at its dissolution in 1536 was valued at 30 shillings and 3 pence only.

ATHERTON, or Chowbent, an urban district in the Leigh parliamentary division of Lancashire, England, 13 m. W.N.W. of Manchester on the London & North- Western and Lancashire & Yorkshire railways. Pop. (1901) 16,211. The cotton factories are the principal source of industry; there are also ironworks and collieries. The manor was held by the local family of Atherton from John's reign to 1738, when it passed by marriage to Robert Gwillym, who assumed that name. In 1797 his eldest daughter and co-heiress married Thomas Powys, after- wards the second Lord Lilford. Up to 1891 the lord of the manor held a court-leet and court-baron annually in November, but in that year Lord Lilford sold to the local board the market tolls, stallages and pickages, and since this sale the courts have lapsed. The earliest manufactures were iron and cotton. Silk- weaving, formerly an extensive industry, has now almost entirely decayed. The first chapel or church was built in 1645. James Wood, who became Nonconformist minister in the chapel at Atherton in 1691, earned fame and the familiar title of " General " by raising a force from his

congregation, uncouthly armed, to fight against the troops of the Pretender (17 15).

ATHETOSIS (Gr. aderos, " without place "), the medical term applied to certain slow, purposeless, deliberate movements of the hands and feet. The fingers are separately flexed and extended, abducted and adducted in an entirely irregular way. The hands as a whole are also moved, and the arms, toes and feet may be affected. The condition is usually due to some lesion of the brain which has caused hemiplegia, and is especially common in childhood. It is occasionally congenital (so called), and is then due to some injury of the brain during birth. It is more usually associated with hemiplegia, in which condition there is first of all complete voluntary immobility of the parts affected: but later, as there is a return of a certain amount of power over the limbs affected, the slow rhythmic movements of athetosis are first noticed. This never develops, however, where there is no recovery of voluntary power. Its distribution is thus nearly always hemiplegic, and it is often associated with more or less mental impairment. The movements may or may not continue during sleep. They cannot be arrested for more than a moment by will power, and are aggravated by voluntary movements. The prognosis is unsatisfactory, as the condition usually con- tinues unchanged for years, though improvement occasionally occurs in slight cases, or even complete recovery.

ATHIAS, JOSEPH (d. 1700), Jewish rabbi and printer, was born in Spain and settled in Amsterdam. His editions of the Hebrew Bible (1661, 1667) are noted for beauty of execution and the general correctness of the text. He also printed a Judaeo-German edition of the Bible in 1679, a year after the appearance of the edition by Uri Phoebus.

ATHLETE (Gr. adXrjTris; Lat. athleta), in Greek and Roman antiquities, one who contended for a prize (S.6\ov) in the games; now a general term for any one excelling in physical strength. Originally denoting one who took part in musical, equestrian, gymnastic, or any other competitions, the name became re- stricted to the competitors in gymnastic contests, and, later, to the class of professional athletes. Whereas in earlier times competitors, who were often persons of good birth and position, entered the lists for glory, without any idea of material gain, the professional class, which arose as early as the 5 th century B.C., was chiefly recruited from the lower orders, with whom the better classes were unwilling to associate, and took up athletics entirely as a means of livelihood. Ancient philosophers, moralists and physicians were almost unanimous in condemning the pro- fession of athletics as injurious not only to the mind but also to the body. The attack made upon it by Euripides in the fragment

of the Autolycus is well known. The training for the contests was very

rigorous. The matter of diet was of great importance; this was prescribed by the aleiptes, whose duty it also was to anoint the athlete's body. At one time the principal food consisted of fresh cheese, dried figs and wheaten bread. After- wards meat was introduced, generally beef, or pork; but the bread and meat were taken separately, the former at breakfast, the latter at dinner. Except in wine, the quantity was unlimited, and the capacity of some of the heavy-weights must have been, if such stories as those about Milo are true, enormous. In addition to the ordinary gymnastic exercises of the palaestra, the athletes were instructed in carrying heavy loads, lifting weights, bending iron rods, striking at a suspended leather sack filled with sand or flour, taming bulls, &c. Boxers had to practise delving the ground, to strengthen their upper limbs. The com- petitions open to athletes were running, leaping, throwing the discus, wrestling, boxing and the pancratium, or combination of boxing and wrestling. Victory in this last was the highest achievement of an athlete, and was reserved only for men of extraordinary strength. The competitors were naked, having their bodies salved with oil. Boxers wore the caestus, a strap of leather round the wrists and forearms, with a piece of metal in the fist, which was sometimes employed with great barbarity. An athlete could begin his career as a boy in the contests set apart for boys. He could appear again as a youth against his equals, and though always unsuccessful, could go on competing till the age of thirty-five, when he was debarred, it being assumed that after this period of life he could not improve. The most celebrated of the Greek athletes whose names have been handed down are Milo of Crotona, Hipposthenes, Polydamas, Promachus and Glaucus. Cyrene, famous in the time of Pindar for its athletes, appears to have still maintained its reputation to at least the time of Alexander the Great; for in the British Museum are to be seen six prize vases carried off from the games at Athens by natives of that district. These vases, found in the tombs, probably, of the winners, are made of clay, and painted on one side with a representation of the contest in which they were won, and on the other side with a figure of Pallas Athena, with an inscription telling where they were gained, and in some cases adding the name of the eponymous magistrate of Athens, from which the exact year can be determined.

Amongst the Romans athletic contests had no doubt taken place from the earliest times, but according to Livy (xxxix. 22) professional Greek athletes were first introduced at Rome by M. Fulvius Nobilior in 186 B.C. After the institution of the Actian games by Augustus, their popularity increased, until they finally supplanted the gladiators. In the time of the empire, gilds or unions of athletes were formed, each with a temple, treasury and exercise-ground of its own. The profession, although it ranked above that of a gladiator or an actor, was looked upon as derogatory to the dignity of a Roman, and it is a rare thing to find a Roman name amongst the athletes

on in- scriptions. The system was entirely, and the athletes themselves nearly always, Greek. (See also Games, Classical.)

Krause, Gymnastik und Agonistik der Hellenen (1841) ; Friedlander, Sitlengeschichte Roms, ii.; Reisch, in Pauly-Wissowa, Realencyc.

ATHLETIC SPORTS. Various sports were cultivated many hundred years before the Christian era by the Egyptians and several Asiatic races, from whom the early Greeks undoubtedly adopted the elements of their athletic exercises (see Athlete), which reached their highest development in the Olympic games, and other periodical meetings of the kind (see Games, Classical). The original Celtic inhabitants of Great Britain were an athletic race, and the earliest monuments of Teutonic literature abound in records of athletic prowess. After the Norman conquest of England the nobles devoted themselves to the chase and to the joust, while the people had their games of ball, running at the quintain, fencing with club and buckler, wrestling- and other pastimes on green and river. The chroniclers of the succeeding centuries are for the most part silent concerning the sports of the folk, except such as were regarded as a training for war, as archery, while they love to record the prowess of the kings and

their courts. Thus it is told of Henry V. that he " was so swift a runner that he and two of his lords, without bow or other engine, would take a wild buck in a large park." Several romances of the middle ages, quoted by Strutt {Sports and Pastimes of the People of England), chronicle the fact that young men of good family were taught to run, leap, wrestle and joust. In spite of the general silence of the historians concerning the sports of the people, it is evident that they were indulged in very largely, since several English sovereigns found it necessary to curtail, and even prohibit, certain popular pastimes, on the ground that they seduced the people from the practice of archery. Thus Edward III. prohibited weight-putting by statute. Nevertheless a variety of this exercise, "casting of the barre," continued to be a popular pastime, and was afterwards one of the favourite sports of Henry VIII., who attained great proficiency at it. The prowess of the same monarch at throwing the hammer is a matter of history, and his reign seems to have been at a time of general athletic revival. We even find his secretary, Richard Pace, advising the sons of noblemen to practise their sports and " leave study and learning to the children of meaner people," and Sir William Forest, in his Poesye of Princeelye Practice, thus admonishes his high-born readers: —

" In featis of maistries bestowe some diligence. Too ryde, runne, lepe, or caste by violence Stone, barre or plummett, or such other thinge, It not refuseth any prince or kynge."

Mr Montague Shearman, to whose volume on Athletics in the Badminton series the reader is referred, notes that Sir Thomas Elyot, who wrote at about the same period, deprecated too much study and flogging for schoolboys, saying: "A discrete master may with as much or more ease both to himself and his scholler lead him to play at tennis or shoote." Elyot recommends the perusal of Galen's De sanitate tuenda, and suggests as suitable athletic exercises within doors " deambulations, labouryng with poyses made of ledde, lifting and throwing the heavy stone or barre, playing at tennis," and dwells upon " rennyng " as a "good exercise and laudable solace." It is probable that the disciples of the " new learning," who had become prominent in Sir Thomas's time, endeavoured to combat the influence of athletic exercises, their point of view being exemplified by the dictum of Roger Ascham, who, in his Toxophilus, declares that " running, leaping and quoiting be too vile for scholars."

In the 16th century the great football match played annually at Chester was abolished in favour of a series of foot-races, which took place in the presence of the mayor. A list of the common sports of that time is contained in some verses by Randel Holme, a minstrel of the North country, and makes mention of throwing the sledge, jumping, " wrastling," stool-ball (cricket), running, pitching the bar, shooting, playing loggets, " nine holes or ten pins." " football by the shinnes," leap-frog, morris, shove-groat, leaping the bonfire, stow-ball (golf), and many other outdoor and indoor sports, some of them now obsolete. Shakespeare and the other Elizabethan poets abound in allusions to sport, which formed an important feature in school life and at every fair. The Stuart kings were warm encouragers of sport, the Basilikon Boron of James I., written for his son, containing a recom- mendation to the young prince to practise " running, leaping, wrestling, fencing, dancing, and playing at the caitch, or tennise, archerie, palle-malle, and such like other fair and pleasant field games."

An extraordinary variety of sports has been popular in Great Britain with high and low for the past five centuries, no other country comparing with it in this respect. Nor have Ireland and Scotland lagged behind England in athletic prowess. Indeed, so far as history and legend record, Ireland boasts of by far the most ancient organized sports known, the Tailtin Games, or Lugnasad, traditionally established by Lugaid of the Long Arm, one of the gods of Dia and Ana, in honour of his foster-mother Tailti, some three thousand years ago. For many centuries these games, and others like them, were kept up in Ireland, and though the almost constant wars which harried the country finally destroyed their organization, yet the Irish have

always been,

and still are, a very important factor in British athletics, as well as in America and the colonies.

The Scottish people have, like the Irish, ever delighted in feats of strength and skill, especially the Celtic highlanders, the character of whose country and mode of life have, however, prevented organized athletics from attaining the same prominence as in England. Nevertheless, the celebrated Highland games held at Braemar, Bridge of Allan, Luss, Aboyne and other places have served to bring into prominence many athletes of the first class, although the records, on account of the roughness of the grounds, have not generally vied with those made farther south.

The Briton does not lose his love of sport upon leaving his native soil, and the development of athletics in the United States and the British colonies has kept step with that of the mother-land. Upon the continent of Europe sports have occupied a more or less prominent place in the life of the nations, but their development has been but an echo of that in Great Britain. A great advance, however, has been made since the institution of the modern Olympic games.

About the year 1812 the Royal Military College at Sandhurst inaugurated regular athletic sports, but the example was not followed until about 1840, when Rugby, Eton, Harrow, Shrews- bury and the Royal Military Academy at Woolwich came to the front, the " Crick Run " at Rugby having been started in 1837. At the two great English universities there were no organized sports of any kind until 1850, when Exeter College, Oxford, held a meeting; this example has been followed, one after the other, by the other colleges of both institutions. The first contest between Oxford and Cambridge occurred at Oxford in 1864, the programme consisting of eight events, of which four were won by each side. The same year saw the first contest of the Civil Servants, still an annual event.

In 1866 the Amateur Athletic Club was formed in London for " gentlemen amateurs," most of its members being old university men. Its first championship meeting, held in that year, was the beginning of a series afterwards continued to the present day by the Amateur Athletic Association, founded in 1880, which has jurisdiction over British athletic sports. The most important individual English athletic organization is the London Athletic Club, which antedated the Amateur Athletic Club, and whose meetings have always been the most important events except the championships.

In America a revival of interest in athletic sports took place about the year

1870. Ten years later was formed the National Association of Amateur Athletes of America, which, in 1888, became the Amateur Athletic Union. This body controls athletics throughout the United States, and is allied with the Canadian Amateur Athletic Association. It is supreme in matters of amateur status, records and licensing of meetings, and has control over the following branches of sport: basket- ball, billiards, boxing, fencing (in connexion with the Amateur Fencers' League of America), gymnastics, hand-ball (fives), running, jumping, walking, weight-putting (hammer, shot, discus, weights) , hurdle-racing, lacrosse, pole-vaulting, swimming, tugs-of-war and wrestling. The Amateur Athletic Union has eight sectional groups, and is allied with the Intercollegiate Association of Amateur Athletes of America (founded 1876) and the Western Intercollegiate Association. The first American intercollegiate athletic meeting took place at Saratoga in 1873, only three universities competing, though the next year there were eight and in 1875 thirteen. Professional athletes in America are confined almost entirely to base-ball, boxing, bicycling, wrestling and physical training.

The Canadian athletic championships are held independently of the American. Annual championship meetings are also held in South Africa, New Zealand and the different states of Australia. For the Australasian championships New Zealand joins with Australia.

The organization of university sports in America differs from that at Oxford and Cambridge, where there is no official control on the part of the university authorities, and where a man is eligible to represent his college or university while in residence.

In nearly all American universities and colleges athletic and other sports are under the general control of faculty committees, to which the undergraduate athletic committees are subordinate, and which have the power to forbid the participation of any student who has not attained a certain standard of scholarship. For some years prior to 1906 no student of an American university was allowed to represent his university in any sport for longer than four years. Early in that year, however, many of the most important institutions, including Harvard, Yale, Princeton and Pennsylvania, entered upon a new agreement, that only students who have been in residence one year should play in 'varsity teams in any branch of athletics and that no student should play longer than three years. This, together with many other reformatory changes, was directly due to a widespread outcry against the growing roughness of play exhibited in

American football, basket-ball, hockey and other sports, the too evident desire to win at all hazards, the extraordinary luxury of the training equipment, and the enormous gate-receipts of many of the large institutions — the Yale Athletic Association held a surplus of about $100,000 (£20,000) in December 1005, after deducting immense amounts for expenses. The new rule against the participation of freshmen in 'varsity sports was to discourage the practice of offering material advantages of different kinds to promising athletes, generally those at preparatory schools, to induce them to become students at certain universities.

At the present day athletic sports are usually understood to consist of those events recognized in the championship pro- grammes of the different countries. Those in the competitions between Oxford and Cambridge are the 100 yards, 440 yards, 880 yards, i-mile and 3-mile runs; 120 yards hurdle-race; high and long jumps; throwing the hammer; and putting the weight (shot). To the above list the English A. A. A. adds the 4-mile and 10-mile runs; the 2-mile and 7-mile walking races; the 2-mile steeplechase; and the pole-vault. The American intercollegiate programme is identical with that of the Oxford- Cambridge meeting, except that a 2-mile run takes the place of the 3-mile, and the pole-vault is added. The American A.A.U. programme includes the 100 yards, 220 yards, 440 yards, 880 yards, i-mile and 5-mile runs; 120 yards high-hurdle race; 220 yards low-hurdle race; high and broad (long) jumps; throw- ing the hammer; throwing 56-lb weight; putting 16-ib shot; throwing the discus; and pole-vault. Of these the running contests are called " track athletics," and the rest " field " events.

International athletic contests of any importance have, with the exception of the modern Olympic games, invariably taken place between Britons, Americans and Canadians, the conti- nental European countries having as yet produced few track or field athletes of the first class, although the interest in sports in general has greatly increased in Europe during the last ten years. In 1844 George Seward, an American professional runner, visited England and competed with success against the best athletes there; and in 1863 Louis Bennett, called "Deerfoot," a full-blooded Seneca Indian, repeated Seward's triumphs,establish- ing running records up to 12 miles. In 1878 the Canadian, C. C. Mclvor, champion sprinter of America, went to England, but failed to beat his British professional rivals. In 1881 L. E. Myers of New York and E. E. Merrill of Boston competed successfully in England, Myers winning every short-distance championship except the 100-yards, and Merrill all the walking championships save the 7-miles. The same year W. C. Davies of England won the 5-mile championship of America, but, like several other British runners who have had success in America, he competed under the colours of an American club. In 1882 the famous English runner, W. G. George, ran against Myers in America in races of 1 mile, f mile and 5 jnile, winning over the first two distances. In

1884 Myers again went to England and made new British records over 500, 600, 800 and 1000 yards, and world's records over 5 mile and 1200 yards. The next year he won both the British j-mile and j-mile championships. The same year a team of Irish athletes, among them W. J. M. Barry, won several Canadian championships. In 1888 a team of the

Manhattan Athletic Club, New York, competed in England with fair success, and during the same season an Irish team from the Gaelic Athletic Association visited America without much success. In 1890 a team from the Salford Harriers was invited to America by the Manhattan Athletic Club, but the evidently commercial character of the enterprise caused its failure. One of the Harriers, E. W. Parry, won the American steeplechase championship. The next year saw another visit to Europe of the Manhattan athletes, who had fair success in England and won every event at Paris. In 1895 the London Athletic Club team competed in New York against the New York Athletic Club, but lost every one of the eleven events, several new records being established. During the previous summer (1894) occurred the first of the international matches between British and American universities which still retain their place as the most interesting athletic event. In that contest, which took place at Queen's Club, London, Oxford beat Yale by 55 to 3! events. The next summer Cambridge, as the champion English university, visited America and was beaten by Yale (3 to 8). In 1899 both British universities competed at Queen's Club against the com- bined athletes of Harvard and Yale, who were beaten by the odd event. The return match took place between the same uni- versities at New York in the summer of 1901, the Americans winning 6 to 3 events. In 1904 Harvard and Yale beat Oxford and Cambridge at Queen's Club by the same score.

Outside Great Britain and America the most important athletic events are undoubtedly the revived Olympic games. They were instituted by delegates from the different nations who met in Paris on the 16th of June 1894, principally at the instiga- tion of Baron Pierre de Coubertin, the result being the formation of an International Olympic Games Committee with Baron de Coubertin at its head, which resolved that games should be held every fourth year in a different country. The first modern Olympiad took place at Athens, 6th to 12th April 1896, in the ancient stadium, which was rebuilt through the liberality of a Greek merchant and seated about 45 ,000 people. The programme of events included the usual field and track sports, gymnastics, wrestling, pole-climbing, lawn tennis, fencing, rifle and revolver shooting, weight-lifting, swimming, the Marathon race and bicycle racing. Among the contestants were representatives of nearly every European nation, besides Americans and Australians. Great Britain took little direct interest in the occasion and was inadequately represented, but the United States sent five men from Boston and four from Princeton University, who,

though none of them held American championships, succeeded in winning every event for which they were entered. The Marathon race of 42 kilometres (26 miles), commemorative of the famous run of the Greek messenger to Athens with the news of the victory of Marathon, was won by a Greek peasant. The second Olympiad was held in Paris in June 1900. Again Great Britain was poorly represented, but American athletes won eighteen of the twenty-four championship events. The third Olympiad was held at St Louis in the summer of 1904 in connexion with the Louisiana Purchase Exposition, its success being due in great measure to James E. Sullivan, the physical director of the Exposition, and Caspar Whitney, the president of the American Olympic Games Committee. The games were much more numerous than at the previous Olympiads, including sports of all kinds, handicaps, inter-club competitions, and contests for aborigines. In the track and field competitions the American athletes won every championship except weight-throwing (56 lb) and lifting the bar. The sports of the savages, among whom were American Indians, Africans of several tribes, Moros, Patagonians, Syrians, Ainus and Filipinos, were disappointing; their efforts in throwing the javelin, shooting with bow and arrow, weight-lifting, running and jumping, proving to be feeble compared with those of white races. The Americanized Indians made the best showing.

The Greeks, however, were not altogether satisfied with the cosmopolitan character of the revival of these celebrated games of their ancestors, and resolved to give the revival a more definitely Hellenic stamp by intercalating an additional series,

to take place at Athens, in the middle of the quadrennial period. Their action was justified by the success which attended the first of this additional series at Athens in 1906. This success may have been partly due to the personal interest taken in the games by the king and royal family of Greece, and to the presence of King Edward VII., Queen Alexandra, and the prince and princess of Wales; but to whatever cause it should be assigned it was generally acknowledged that neither in France nor in America had the games acquired the same prestige as those held on the classical soil of Greece. In 1906 the governments of Germany, France and the United States made considerable grants of money to defray the expenses of the competitors from those countries. These games aroused much more interest in England than the earlier ones in the series, but though upwards of fifty British competitors took part in the contests, they were by no means representative in all cases of the best British athletics.

The American representatives were slightly less numerous, but they were more successful. It was noteworthy that no British or Americans took part in the rowing races in the Bay of Phalerum, nor in the tennis, football or shooting com- petitions. The Marathon race, by far the most important event in the games, was won in" 1906 by a British athlete, M. D. Sherring, a Canadian by birth. The Americans won a total of 75 p-izes, the British 39, and the Swedes and Greeks each 28.

The games of the 4th Olympiad (1908) were held in London in connexion with the Franco-British Exhibition of that year. An immense sensation was caused by the finish for the Marathon race from Windsor Castle to the stadium in the Exhibition grounds in London. The first competitor to arrive was the Italian, Dorando Pietri, whose condition of physical collapse was such that, appearing to be on the point of death, he had to be assisted over the last few yards of the course. He was there- fore disqualified, and J. Hayes, an American, was adjudged the winner; a special prize was presented to the Italian by Queen Alexandra. In the whole series of contests the United Kingdom made 38 wins, the Americans 22, and the Swedes 7. In the Olympic games proper, British athletes, including two wins by colonials from Canada and Africa, scored 25 successes, and the Americans 18. In the track events 8 wins fell to the British, including two Colonials, and 6 to American athletes; but the latter gained complete supremacy in the field events, of which they won 9, while British competitors secured only two of minor importance.

For records, &c, see the annual Sporting and Athletic Register; for the Olympic games see Theodore Andrea Cook's volume, published in connexion with the Olympiad of 1908.

ATHLONE, a market-town of Co. Westmeath, Ireland, on both banks of the Shannon. Pop. of urban district (1901) 6617. The urban district, under the Local Government (Ireland) Act 1900, is wholly in county Westmeath, but the same area is divided by the Shannon between the parliamentary divisions of South Westmeath and South Roscommon. Athlone is 78 m. W. from Dublin by the Midland Great Western railway, and is also served by a branch from Portarlington of the Great Southern & Western line, providing an alternative and some- what longer route from the capital. The main line of the former company continues W. to Galway, and a branch N.W. serves counties Roscommon and Mayo. The Shannon divides the town into two portions, known as the Leinster side (east), and the Connaught side (west), which are connected by a handsome bridge opened in 1844. There is a swivel railway bridge. The rapids of the Shannon at this point are obviated by means of a lock communication with a basin, which renders the navigation of the river practicable above the town. The steamers of the Shannon Development Company ply on the river, and some trade by water

is carried on with Limerick, and with Dublin by the river and the Grand and Royal canals. Athlone is an important agricultural centre, and there are woollen factories. The salmon fishing both provides sport and is a source of commercial wealth. There are two parish churches, St Mary and St Peter, both erected early in the 19th century, of which the first has near it an isolated church tower of earlier

date. There are three Roman Catholic chapels, a court-house and other public offices. Early remains include portions of the castle, of the town walls (1576), of the abbey of St Peter and of a Franciscan foundation. On several islands of the picturesque Lough Ree, to the north, are ecclesiastical and other remains.

The military importance of Athlone dates from the erection of the castle and of a bridge over the river by John de Grey, bishop of Norwich and justiciar of Ireland, in 12 10. It became the seat of the presidency of Connaught under Elizabeth, and withstood a siege by the insurgents in 164 1. In the war of 1688 the possession of Athlone was considered of the greatest importance, and it consequently sustained two sieges, the first by William III. in person, which failed, and the second by General Godart van Ginkel (q.v.), who, on the 30th of June 1 69 1, in the face of the Irish, forded the river and took possession of the town, with the loss of only fifty men. Ginkel was sub- sequently created earl of Athlone, and his descendants held the title till it became extinct in 1844. In 1797 the town was strongly fortified on the Roscommon side, the works covering 15 acres and containing two magazines, an ordnance store, an armoury with 15,000 stands of arms and barracks for 1500 men. The works are now dismantled. Athlone was incorporated by James I., and returned two members to the Irish parliament, and one member to the imperial parliament till 1885.

ATHOL, a township of Worcester county, northern Massa- chusetts, U.S.A., having an area of 35 sq. m. Pop. (1900) 7061, of whom 986 were foreign-born; (1910 U.S. census) 8536. Its surface is irregular and hilly. The village of Athol is on Miller's river, and is served by the Boston & Albany and the Boston & Maine railways. The streams of the township furnish good water-power, and manufactures of varied character are its leading interests. Athol was first settled in 1735, and was incorporated as a township in 1762. It was named by its largest landowner Col. James Murray, after the ancestral home of the Murrays, dukes of Atholl.

See L. B. Caswell, Athol, Mass., Past and Present (Athol, 1899).

ATHOLL, EARLS AND DUKES OF. The Stewart line of the Scottish earls of Atholl, which ended with the 5th Stewart earl in 1595, the earldom

reverting to the crown, had originated with Sir John Stewart of Balveny (d. 1512), who was created earl of Atholl about 1457 (new charter 1481). The 5th earl's daughter, Dorothea, married William Murray, earl of Tullibardine (cr. 1606), who in 1626 resigned his earldom in favour of Sir Patrick Murray, on condition of the revival of the earldom of Atholl in his wife and her descendants. The earldom thus passed to the Murray line, and John Murray, their only son (d. 1642), was accordingly acknowledged as earl of Atholl (the 1st of the Murrays) in 1629.

John Stewart, 4th earl of Atholl, in the Stewart line (d. 1579), son of John, 3rd earl, and of Grizel, daughter of Sir John Rattray, succeeded his father in 1542. He supported the government of the queen dowager, and in 1560 was one of the three nobles who voted in parliament against the Reformation and the Confession of Faith, and declared their adherence to Roman Catholicism. Subsequently, however, he joined the league against Huntly, whom with Murray and Morton he defeated at Corrichie in October 1562, and he supported the projected marriage of Elizabeth with Arran. On the arrival of Mary from France in 1561 he was appointed one of the twelve privy coun- cillors, and on account of his religion obtained a greater share of the queen's favour than either Murray or Maitland. He was one of the principal supporters of the marriage with Darnley, became the leader of the Roman Catholic nobles, and with Lennox obtained the chief power in the government, successfully protecting Mary and Darnley from Murray's attempts to regain his ascendancy by force of arms. According to Knox he openly attended mass in the queen's chapel, and was especially trusted by Mary in her project of reinstating Roman Catholicism. The fortress of Tantallon was placed in his keeping, and in 1565 he was made lieutenant of the north of Scotland. He is described the same year by the French ambassador as " tres grand catho- lique hardi et vaillant et remuant, comme 1'on diet, mais de nul

jugement et experience." He had no share in the murders of Rizzio or Darnley, and after the latter crime in 1567, he joined the Protestant lords against Mary, appeared as one of the leaders against her at Carberry Hill, and afterwards approved of her im- prisonment at Lochleven Castle. In July he was present at the coronation of James, and was included in the council of regency on Mary's abdication. He, however, was not present at Langside in May 1568, and in July became once more a supporter of Mary, voting for her divorce from Bothwell (1569). In March 1570 he signed with other lords the joint letter to Elizabeth asking for the queen's intercession and supporting Mary's claims, and was present at the

convention held at Linlithgow in April in opposi- tion to the assembly of the king's party at Edinburgh. In 1574 he was proceeded against as a Roman Catholic and threatened with excommunication, subsequently holding a conference with the ministers and being allowed till midsummer to overcome his scruples. He had failed in 1 57 2 to prevent Morton's appoint- ment to the regency, but in 1578 he succeeded with the earl of Argyll in driving him from office. On the 24th of March James took the government into his own hands and dissolved the regency, and Atholl and Argyll, to the exclusion of Morton, were made members of the council, while on the 29th Atholl was appointed lord chancellor. Subsequently, on the 24th of May, Morton succeeded in getting into Stirling Castle and in regaining his guardianship of James. Atholl and Argyll, who were now corresponding with Spain in hopes of assistance from that quarter, then advanced to Stirling with a force of 7000 men, when a compromise was arranged, the three earls being all included in the government. While on his way from a banquet held on the 20th of April 1579 on the occasion of the reconcilia- tion, Atholl was seized with sudden illness, and died on the 25th, not without strong suspicions of poison. He was buried at St Giles's cathedral in Edinburgh. He married (1) Elizabeth, daughter of George Gordon, 4th earl of Huntly, by whom he had two daughters, and (2) Margaret, daughter of Malcolm Fleming, 3rd Lord Fleming, by whom, besides three daughters, he had John, 5th earl of Atholl, at whose death in 1595 the earldom in default of male heirs reverted to the crown.

John Murray, 1st earl of Atholl in the Murray line (see above) , died in 1642. On the outbreak of the civil war he called out the men of Atholl for the king, and was imprisoned by the marquess of Argyll in Stirling Castle in 1640.

John Murray, 2nd earl and 1st marquess of Atholl (1631-1703), son of the 1st earl and of Jean, daughter of Sir Duncan Campbell of Glenorchy, was born on the 2nd of May 1631. In 1650 he joined in the unsuccessful attempt to liberate Charles II. from the Covenanters, and in 1653 was the chief supporter of Glen- cairn's rising, but was obliged to surrender with his two regiments to Monk on the 2nd of September 1654. At the restoration Atholl was made a privy councillor for Scotland and sheriff of Fife, in 1661 lord justice-general of Scotland, in 1667 a commis- sioner for keeping the peace in the western Highlands, in 1670 colonel of the king's horseguards, in 1671 a commissioner of the exchequer, and in 1672 keeper of the privy seal in Scotland and an extraordinary lord of session. In 1670 he became earl of Tullibardine by the death of his cousin James, 4th earl, and on the 7th of February 1676 he was created marquess of Atholl, earl of Tullibardine, viscount of Balquhidder, Lord Murray, Balvenie and Gask. He at first zealously supported Lauderdale's tyrannical policy, but after the raid of 1678, called the " Highland Host," in which

Atholl was one of the chief leaders, he joined in the remonstrance to the king concerning the severities inflicted upon the Covenanters, and was deprived of his office of justice- general and passed over for the chancellorship in 1681. In 1679, however, he was present at the battle of Bothwell Brig; in July 1680 he was made vice-admiral of Scotland, and in 168 1 president of parliament. In 1684 he was appointed lord-lieutenant of Argyll, and invaded the country, capturing the earl of Argyll after his return from abroad in June 1685 at Inchinnan. The excessive severities with which he was charged in this campaign were repudiated with some success by him after the Revolution. 1 1 A. Lang, Hist, of Scotland, iii. 407.

The same year he was reappointed lord privy seal, and in 1687 was made a knight of the Thistle on the revival of the order. At the Revolution he wavered from one side to the other, showing no settled purpose but waiting upon the event, but finally in April 1689 wrote to William to declare his allegiance, and in May took part in the proclamation of William and Mary as king and queen at Edinburgh. But on the occasion of Dundee's insurrection he retired to Bath to drink the waters, while the bulk of his followers joined Dundee and brought about in great measure the defeat of the government troops at Killiecrankie. He was then summoned from Bath to London and imprisoned during August. In 1690 he was implicated in the Montgomery plot and subsequently in further Jacobite intrigues. In June 1691 he received a pardon, and acted later for the government in the pacification of the Highlands. He died on the 6th of May 1703. He married Amelia, daughter of James Stanley, 7th earl of Derby (through whom the later dukes of Atholl acquired the sover- eignty of the Isle of Man), and had, besides one daughter, six sons, of whom John became 2nd marquess and 1st duke of Atholl; Charles was made 1st earl of Dunmore, and William married Margaret, daughter of Sir Robert Nairne, 1st Lord Nairne, becoming in her right 2nd Lord Nairne.

JohnMtjrray, 2nd marquess and 1 st duke of Atholl (1 660-1 724), was born on the 24th of February 1660, and was styled during his father's lifetime Lord Murray, till 1696, when he was created earl of Tullibardine. He was a supporter of William and the Revolution in 1688, taking the oaths in September 1689, but was unable to prevent the majority of his clan, during his father's absence, from joining Dundee under the command of his brother James. In 1693 as one of the commissioners he showed great energy in the examination into the massacre of Glencoe and in bringing the crime home to its authors. In 1694 he obtained a regiment, in 1695 was made sheriff of Perth, in 1696 secretary of state, and from 1696 to 1698 was high commissioner. In the latter year, however, he threw up office and went into opposition. At the accession of Anne he was made a privy councillor, and in 1703 lord privy seal for Scotland. The same year he

succeeded his father as 2nd marquess of Atholl, and on the 30th of June he was created duke of Atholl, marquess of Tullibardine, earl of Strathtay and Strathardle, Viscount Balquhidder, Glenalmond and Glenlyon, and Lord Murray, Balvenie and Gask. In 1704 he was made a knight of the Thistle. In 1 703-1 704 an unsuccess- ful attempt was made by Simon, Lord Lovat, who used the duke of Queensberry as a tool, to implicate him in a Jacobite plot against Queen Anne; but the intrigue was disclosed by Robert Ferguson, and Atholl sent a memorial to the queen on the subject, which resulted in Queensberry's downfall. But he fell nevertheless into suspicion, and was deprived of office in October 1705, subsequently becoming a strong antagonist of the govern- ment, and of the Hanoverian succession. He vehemently opposed the Union during the years 1705-1707, and entered into a project for resisting by force and for holding Stirling Castle with the aid of the Cameronians, but nevertheless did not refuse a compensa- tion of £1000. According to Lockhart, he could raise 6000 of the best men in the kingdom for the Jacobites. On the occasion, however, of the invasion of 1708 he took no part, on the score of illness, and was placed under arrest at Blair Castle. On the downfall of the Whigs and the advent of the Tories to power, Atholl returned to office, was chosen a representative peer in the Lords in 1710 and 1713, in 1712 was an extraordinary lord of session, from 1713 to 1714 was once more keeper of the privy seal, and from 1712 to 17 14 was high commissioner. On the accession of George I. he was again dismissed from office, but at the rebellion of 1715, while three of his sons joined the Jacobites, he remained faithful to the government, whom he assisted in various ways, on the 4th of June 1717 apprehending Robert Macgregor (Rob Roy), who, however, succeeded in escaping. He died on the 14th of November 1724. He married (1) Catherine, daughter of William Douglas, 3rd duke of Hamilton, by whom, besides one daughter, he had six sons, of whom John was killed at Malplaquet in 1709, William was marquess of Tullibardine, and James succeeded his father as 2nd duke on

account of the share taken by his elder brother in the rebellion; and (2) Mary, daughter of William, Lord Ross, by whom he had three sons and several daughters.

The Atholl Chronicles have been privately printed by the 7th duke of Atholl (b. 1840). See also S. Cowan, Three Celtic Earldoms (1909).

ATHOLL, or Athole, a district in the north of Perthshire, Scotland, covering an area of about 450 sq. m. It is bounded on the N. by Badenoch, on the

N.E. by Braemar, on the E. by Forfarshire, on the S. by Breadalbane, on the W. and N.W. by Lochaber. The Highland railway bisects it diagonally from Dunkeld to the borders of Inverness-shire. It is traversed by the Grampian mountains and watered by the Tay, Tummel, Garry, Tilt, Bruar and other streams. Glen Garry and Glen Tilt are the chief glens, and Loch Rannoch and Loch Tummel the principal lakes. The population mainly centres around Dunkeld, Pitlochry and Blair Atholl. The only cultivable soil occurs in the valleys of the large rivers, but the deer-forest and the shootings on moor and mountain are among the most extensive in Scotland. It is said to have been named Athfotla (Atholl) after Fotla, son of the Pictish king Cruithne, and was under the rule of a Celtic mormaer (thane or earl) until the union of the Picts and Scots under Kenneth Macalpine in 843. The duke of Atholl's seats are Blair Castle and Dunkeld House. What is called Atholl brose is a compound, in equal parts, of whisky and honey (or oatmeal), which was first commonly used in the district for hoarseness and sore throat.

ATHOS (Gr. "A710J' "Opos; Turk. Aineros; Ital. Monte Santo), the most eastern of the three peninsular promontories which extend, like the prongs of a trident, southwards from the coast of Macedonia (European Turkey) into the Aegean Sea; Before the 19th century the name Athos was usually confined to the terminal peak of the promontory, which was itself known by its ancient name, Acte. The peak rises like' a pyramid, with a steep summit of white marble, to a height of 6350 ft., and can be seen at sunset from the plain of Troy on the east, and the slopes of Olympus on the west. On the isthmus are distinct traces of the canal cut by Xerxes before his invasion of Greece in 480 B.C. The peninsula is remarkable for the beauty of its scenery, and derives a peculiar interest from its unique group of monastic communities with their medieval customs and institu- tions, their treasures of Byzantine art and rich collections of documents. It is about 40 m. in length, with a breadth varying from 4 to 7 m. ; its whole area belongs to the various monasteries. It was inhabited in the earliest times by a mixed Greek and Thracian population; of its five cities mentioned by Herodotus few traces remain; some inscriptions discovered on the sites were published by W. M. Leake (Travels in N. Greece, 1835, Hi. 140) and Kinch. The legends of the monks attribute the first religious settlements to the age of Constantine (274-337), but the hermitages are first mentioned in historical documents of the gth century. It is conjectured that the mountain was at an earlier period the abode of anchorites, whose numbers were increased by fugitives from the iconoclastic persecutions (726- 842). The " coenobian " rule to which many of the monasteries still adhere was established by St Athanasius, the founder of the great monastery of Laura, in 969. Under a constitution approved by the emperor Constantine Monomachos in 1045, women and female animals were excluded from the holy mountain. In

1060 the community was withdrawn from the authority of the patriarch of Constantinople, and a monastic republic was practically constituted. The taking of Constantinople by the Latins in 1204 brought persecution and pillage on the monks; this reminded them of earlier Saracenic invasions, and led them to appeal for protection to Pope Innocent III., who gave them a favourable reply. Under the Palaeologi (1260-1453) they recovered their prosperity, and were enriched by gifts from various sources. In the 14th century the peninsula became the chosen retreat of several of the emperors, and the monasteries were thrown into commotion by the famous dispute over the mystical Hesychasts.

Owing to the timely submission of the monks to the Turks after the capture of Salonica (1430), their privileges were respected

by successive sultans: a tribute is paid to the Turkish govern- ment, which is represented by a resident kaimakam, and the community is allowed to maintain a small police force. Under the present constitution, which dates from 1783, the general affairs of the commonwealth are entrusted to an assembly (crvva&s) of twenty members, one from each monastery; a committee of four members, chosen in turn, styled epistatae (£jtwt&tXSivTos); Dochiariu (Aox«); and Stavronikitu (tov Sraupow/ctTou, the last built, founded in 1545). The "coenobian "monasteries (koivo- /3ia), each under the rule of an abbot (fiyov/ievos), are subjected to severe discipline; the brethren are clothed alike, take their meals (usually limited to bread and vegetables) in the refectory, and possess no private property. In the " idiorrhythmic " monasteries (ihvbppvB /ia) , which are governed by two or three annually elected wardens (IxiTpajroi), a less stringent rule prevails, and the monks are allowed to supplement the fare of the monastery from their private incomes. Dependent on the several monasteries are twelve sketae (o'Krjrai} or monastic settlements, some of considerable size, in which a still more ascetic mode of life prevails: there are, in addition, several farms (ixeroyia), and many hundred sanctuaries with adjoining habitations (xeXXta) and hermitages (aaicriTripia) . The monas- teries, with the exception of Rossikon (St Panteleimon) and the Serbo-Bulgarian Chiliandari and Zographu, are occupied ex- clusively by Greek monks. The large skete of St Andrew and some others belong to the Russians; there are also Rumanian and Georgian sketae. The great monastery of Rossikon, which is said to number about 3000 inmates, has been under a Russian abbot since 1875; it is regarded as one of the principal centres of the Russian politico-religious propaganda in the Levant. The tasteless style of its modern buildings is out of harmony with the quaint beauty of the other monasteries. Furnished with ample means, the Russian monks neglect no opportunity of adding to their possessions on the holy mountain; their encroach- ments are resisted by the Greek monks, whose wealth, however, was much diminished by the secularization of their

estates in Rumania(i864). The population of the holy mountain numbers from 6000 to 7000; about 3000 are monks (/caXoyepot), the remainder being lay brothers (koct /uko'i.) . The monasteries, which are all fortified, generally consist of large quadrangles enclosing churches; standing amid rich foliage, they present a wonderfully picturesque appearance, especially when viewed from the sea. Their inmates, when not engaged in religious services, occupy themselves with husbandry, fishing and various handicrafts; the standard of intellectual culture is not high. A large academy, founded by the monks of Vatopedi in 1749, for a time attracted students from all parts of the East, but eventually proved a failure, and is now in ruins. The muniment rooms of the monasteries contain a marvellous series of documents, including chrysobulls of various emperors and princes, sigilla of the patriarchs, typica, irades and other documents, the study of which will throw an important light on the political and ecclesiastical history and social life of the

East from the middle of the ioth century. Up to comparatively recent times a priceless collection of classical manuscripts was preserved in the libraries; many of them were destroyed during the War of Greek Independence (1821-1829) by the Turks, who employed the parchments for the manufacture of cartridges; others fell a prey to the neglect or vandalism of the monks, who, it is said, used the material as bait in fishing; others have been sold to visitors, and a considerable number have been removed to Moscow and Paris. The library of Simopetra was destroyed by fire in 1891, and that of St Paul in 1905. There is now little hope of any important discovery of classical manuscripts. The codices remaining in the libraries are for the most part theological and ecclesiastical works. Of the Greek manuscripts, numbering about 11,000, 6618 have been catalogued by Professor Spyridion Lambros of Athens; his work, however, does not include the MSS. in some of the sketae, or those in the libraries of Laura and Vatopedi, of which catalogues (hitherto unpublished) have been prepared by resident monks. The canonic MSS. only of Vatopedi and Laura have been catalogued by Benessevich in the supple- ment to vol. ix. of the Bizantiyskiy Vremennik (St Petersburg, 1904). The Slavonic and Georgian MSS. have not been cata- logued. Apart from the illuminated MSS., the mural paintings, the mosaics, and the goldsmith's work of Mount Athos are of infinite interest to the student of Byzantine art. The frescoes in general date from the 15th or 16th century: some are attri- buted by the monks to Panselinos, " the Raphael of Byzantine painting," who apparently flourished in the time of the Palaeologi. Most of them have been indifferently restored by local artists, who follow mechanically a kind of

hieratic tradition, the principles of which are embodied in a work of iconography by the monk Dionysius, said to have been a pupil of Panselinos. The same spirit of conservatism is manifest in the architecture of the churches, which are all of the medieval Byzantine type. Some of the monasteries were seriously damaged by an earthquake in 1905.

Authorities. — R. N. C. Curzon, Visits to Monasteries in the Levant (London, 1849); J. P. Fallmerayer, Fragmenta aus dem Orient (Stuttgart and Tubingen, 1845); V, Langlois, Le Mont Athos et ses monasteres, with a complete bibliography (Paris, 1867); Duchesne and Bayet, Memoire sur une mission en Macedoine et au Mont Athos (Paris, 1876) ; Texier and Pullan, Byzantine Architecture (London, 1864); H. Brockhaus, Die Kunst in den Athosklbstern (Leipzig, 1891); A. Riley, Athos, or the Mountain of the Monks (London, 1887); S. Lambros, Catalogue of the Greek Manuscripts on Mount Athos (2 vols., Cambridge, 1895 and 1900) ; M. I. Gedeon, o "A0ms (Constantinople, 1885); P. Meyer, " Beitrage zur Kenntniss der neueren Geschichte und des gegenwartigen Zustandes der Athoskloster," in Zeitschrift filr Kirchengeschichte, 1 890 ; Die Hauptur-kundenfilr die Geschichte der Athoskloster (Leipzig, 1894) ; G. Millet, J. Pargoire and L. Petit, Recueil des inscriptions chretiennes de V Athos (Paris, 1904) ; H. Gelzer, Vom Heiligen Berge und aus Makedonien (Leipzig, 1904); K. Vlachu (Blachos), 'H Xtpabv-qaot rov 'Ayiov'Opovs (Athens, 1903); G. Smurnakes, To "Aytop "Opos 'Apxtuo- XoTia opous 'A0u, (Athens, 1904). (J. D. B.)

ATHY (pronounced Athy), a market- town of Co. Kildare, Ireland, in the south parliamentary division, 45 m. S.W. of Dublin on a branch of the Great Southern & Western railway. Pop. of urban district (1901) 3599. It is intersected by the river Barrow, which is here crossed by a bridge of five arches. The crossing of the river here was guarded and disputed from the earliest times, and', the name of the town is derived from a king of Munster killed here in the 2nd century. There are picturesque remains of Woodstock Castle of the 12th or 13th century, and White Castle built in 1506, and rebuilt in 1575 by a member of the family whose name it bears, and still occupied. Both were erected to defend the ford of the Barrow. There are also an old town gate, and an ancient cemetery with slight monastic remains. Previous to the Union Athy returned two members to the Irish parliament. The trade, chiefly in grain, is aided by excellent water communication, by a branch of the Grand Canal to Dublin, and by the river Barrow, navigable from here to Waterford harbour.

ATl'NA, the name of three ancient towns of Italy.

1. A town (mod. Atena) of Lucania, upon the Via Popillia, 7 m. N. of Tegianum, towards which an ancient road leads, in

the valley of the river now known as Diano. Its ancient import- ance is vouched for by its walls of rough cyclopean work, which may have had a total extent of some 2 m. (see G. Patroni in Notizie degli scavi, 1897, 112; 1901, 498). The date of these walls has not as yet been ascertained, recent excavations, which led to the discovery of a few tombs in which the earliest objects showing Greek influence may go back to the 7th century B.C., not having produced any decisive evidence on the point. To the Roman period belong the remains of an amphitheatre and numerous inscriptions.

2. A town (mod. Atina) of the Volsci, 12 m. N. of Casinum, and about 14 m. E. of Arpinum, on a hill 1607 ft. above sea-level. The walls, of carefully worked polygonal blocks of stone, are still preserved in parts, and the modern town does not fill the whole area which they enclose. Cicero speaks of it as a prosperous country town, which had not as yet fallen into the hands of large proprietors; and inscriptions show that under the empire it was still flourishing. One of these last is a boundary stone relating to the assignation of lands in the time of the Gracchi, of which six other examples have been found in Campania and Lucania.

3. A town of the Veneti, mentioned by Pliny, H. N. iii. 131. ATITLAN, or Santiago de Atitlan, a town in the department

of Solola, Guatemala, on the southern shore of Lake Atitlan. Pop. (1905) about 9000, almost all Indians. Cotton-spinning is the chief industry. Lake Atitlan is 24 m. long and 10 m. broad, with 64 m. circumference. It occupies a crater more than 1000 ft. deep and about 4700 ft. above sea-level. The peaks of the- Guatemala Cordillera rise round it, culminating near its southern end in the volcanoes of San Pedro (7000 ft.) and Atitlan (11,719 ft.). Although the lake is fed by many small mountain torrents, it has no visible outlet, but probably communicates by an underground channel with one of the rivers which drain the Cordillera. Mineral springs abound in the neighbourhood. The town of Solola (q.v.) is near the north shore of the lake.

ATKINSON, EDWARD (1827-1905), American economist, was born at Brookline, Massachusetts, on the ioth of February 1827. For many years he was engaged in managing various business enterprises, and became, in 1877, president of the Boston Manufacturers' Mutual Fire Insurance Company, a post which he held till his death. He was a strong controversialist and a prolific writer on such economic subjects as banking, railways, cotton manufacture, the tariff and free trade, and the money question. He was appointed in 1887 a special commissioner to report upon the status of bimetallism in Europe. He also made a special study of mill construction and fire prevention, and invented an improved cooking apparatus, called the " Aladdin oven." He was an active supporter of anti-

imperial- ism. He died at Boston on the nth of December 1905.

His principal works were Right Methods of Preventing Fires in Mills (1881); Distribution of Products (1885); Industrial Progress of the Nation (1889); Taxation and Work (1892); Science, of Nutrition (ioth ed., 1898).

ATKINSON, SIR HARRY ALBERT (1831-1892), British colonial statesman, prime minister and speaker of the legislative council, New Zealand, was born at Chester in 1831, and in 1855 emigrated to Taranaki, New Zealand, where he became a farmer. In i860 the Waitara war broke out, and from its outset Atkinscn, who had been selected as a captain of the New Plymouth Volun- teers, distinguished himself by his contempt for appearances and tradition, and by the practical skill, energy and courage which he showed in leading his Forest Rangers in the tiresome and lingering bush warfare of the next five years. For this work he was made a major of militia, and thanked by the government. Elected to the house of representatives in 1863, he joined Sir Frederick Weld's ministry at the end of November 1864 as minister of defence, and, during eleven months of office, was identified with the well-known " self-reliance " policy, a proposal to dispense with imperial regulars, and meet the Maori with colonials only. Parliament accepted this principle, but turned out the Weld ministry for other reasons. For four years Atkinson was out of parliament; in October 1873 he re-entered it, and a year later became minister of lands under Sir Julius Vogel,

Ten months later he was treasurer, and such was his aptitude for finance that, except during six months in 1876, he thence- forth held that post whenever his party was in power. From October 1874 to January 1891 Atkinson was only out of office for about five years. Three times he was premier, and he was always the most formidable debater and fighter in the ranks of the Conservative opponents of the growing Radical party which Sir George Grey, Sir Robert Stout and John Ballance led in succession. It was he who was mainly responsible for the abolition of the provinces into which the colony was divided from 1853 to 1876. He repealed the Ballance land-tax in 1879, and substituted a property-tax. He greatly reduced the cost of the public service in 1880, and again in 1888. In both these years he raised the customs duties, amongstother taxes, and gave them a quasi-protectionist character. In 1880 he struck 10% off all public salaries and wages; in 1887 he reduced the salary of the governor by one-third, and the pay and number of ministers and members of parliament. By these resolute

steps revenue was increased, expenditure checked, and the colony's finance reinstated. Atkinson was an advocate of compulsory national assurance, and the leasing as opposed to the selling of crown lands. Defeated in the general election of December 1890, he took the appointment of speaker of the legislative council. There, while leaving the council chamber after the sitting of the 28th of June 1892, he was struck down by heart disease and died in a few minutes. Though brusque in manner and never popular, he was esteemed as a vigorous, upright and practical statesman. He was twice married, and had seven children, of whom three sons and a daughter survived him. (W. P. R.)

ATLANTA, the capital and the largest city of Georgia, U.S.A., and the county-seat of Fulton county, situated at an altitude of 1000-1175 ft., in the N.W. part of the state, near the Chatta- hoochee river. Pop. (i860) 9554; (1880) 37,409; (1890) 65,533; (1900) 89,872, of whom 35,727 were negroes and 2531 were foreign-born; (1910) 154,839. It is served by the Southern, the Central of Georgia, the Georgia, the Seaboard Air Line, the Nashville, Chattanooga & St Louis (which enters the city over the Western & Atlantic, one of its leased lines), the Louisville & Nashville, the Atlanta, Birmingham & Atlantic, and the Atlanta & West Point railways. These railway com- munications, and the situation of the city (on the Piedmont Plateau) on the water-parting between the streams flowing into the Atlantic Ocean and those flowing into the Gulf of Mexico, have given Atlanta its popular name, the " Gate City of the South." Atlanta was laid out in the form of a circle, the radius being if m. and the centre the old railway station, the Union Depot (the new station is called the Terminal); large additions have been made beyond this circle, including West End, Inman Park on the east, and North Atlanta. Among the best residence streets are Peachtree and West Peachtree streets to the north, and the older streets to the south of the business centre of the city — Washington Street, Whitehall, Pryor and Capitol Avenues. Among the principal office buildings are the Empire, the Equit- able, the Prudential, the Fourth National, the Austell, the Peters, the Century, the English-American and the Candler buildings; and there are many fine residences, particularly in Peachtree and Washington streets, Inman Park and Ponce de Leon Circle. Among prominent public buildings are the State Capitol (completed 1889), con tainingalaw library of about6s,ooo volumes and a collection of portraits of famous Georgians, the north-west front of the Capitol grounds containing an equestrian statue (unveiled in 1907) of John Brown Gordon (1832-1904), a distinguished Confederate general in the American Civil War and governor of Georgia in 1887-1890; the court house; the Carnegie library, in which the young men's library, organized in 1867, was merged in 1902; the post office building; and the Federal prison (about 4 m. south of the city). The principal parks are: the Piedmont (189 acres), the site of

the Piedmont Exposition of 1887 and of the Cotton States and International Exposition of 1895; the Grant, given to the city by L. P. Grant, an Atlanta railroad builder, in 1882, and subsequently enlarged by the city (in its south-east comer is Fort Walker) ; the Lake-

wood, 6 m. south of the city; and Ponce de Leon Park, owned by an electric railway company and having mineral springs and a fine baseball ground. Four miles south of the centre of Atlanta is Fort McPherson, an important United States military post, occupying a reservation of 40 acres and having barracks for the accommodation of 1000 men. In Oakland Cemetery is a large monument to Confederate soldiers; another monument in Oakland, " To the unknown Confederate Dead," is a reproduction of the Lion of Lucerne; in West View Cemetery (4 m. west of the city) is a memorial erected by the United Confederate Veterans. The city obtains its water-supply from the Chatta- hoochee river (above the mouth of Peachtree Creek), whence the water is pumped by four pumps, which have a daily capacity of 55,000,000 gallons. Atlanta is widely known for its public spirit and enterprise, to which the expositions of 1881, 1887 and 1895 beSr witness. The air is bracing, largely because of the city's altitude/ the mean annual temperature is 6o-8° F. (winter 44-1°, spring 60-5°, summer 77°, autumn 61-5°).

Atlanta is an important educational centre. Its public-school system was organized in 187 1. Here are the Georgia School of Technology, founded in 1885 (opened 1888) as a branch of the university of Georgia; the Atlanta College of Physicians and Surgeons (established in 1898 by the union of the Atlanta Medical College, organized in 1855, and the Southern Medical College, organized in 1878); the Atlanta School of Medicine (1905); the Georgia College of Eclectic Medicine; the Atlanta Theological Seminary (1901, Congregational), the only theo- logical school of the denomination in the South in 1908; the Atlanta Dental College; the Southern College of Pharmacy (1903); Washington Seminary (1877) for girls; and the following institutions for negroes — Atlanta University, founded in 1869, which is one of the best institutions in the country for the higher ■ education of negroes, standing particularly for " culture " education (as opposed to industrial training), which has done particularly good work in the department of sociology, under the direction of Prof. W. E. B. du Bois (b. 1868), one of the most prominent teachers of negro descent in the country, and which had in 1908 339 students; Clark University, founded in 1870 by the Freedman's Aid and Southern Educational Society of the Methodist Episcopal Church; the Atlanta Baptist College, founded in 1867; Morris Brown College (African Methodist Episcopal, founded in 1882, and opened in 1885), which has college preparatory, scientific, academic, normal and mission- ary courses, correspondence courses in English and theology, an industrial department, and departments of law, theology

(Turner Theological Seminary), nurse-training, music and art; the Gammon Theological Seminary (Methodist Episcopal, chartered in 1888), which has its buildings just outside the city limits; and the Spelman Seminary for women and girls (Baptist) opened in 1881 as the Atlanta Baptist Female Seminary — the present name being adopted in 1883 in honour of the parents of Mrs John D. Rockefeller — and incorporated in 1888. At Decatur (pop. 1418 in 1900), a residential suburb, 6 m. east-north- east of Atlanta, is the Agnes Scott College (1890) for white girls; connected with the college is a school of music, art and expres- sion, and an academy.

The city's principal charitable institutions are the Grady Memorial hospital (opened in 1892), supported by the city and named in honour of Henry W. Grady; the Presbyterian hospital; the Baptist Tabernacle Infirmary; the Wesley Memorial hospital; St Joseph's infirmary; the Municipal hospital for contagious diseases; the Florence Crittenden home. Three miles south-east of the city is a (state) soldiers' home, for aged, infirm and disabled Confederate veterans. The Associated Charities of Atlanta was organized in 1905.

The principal newspapers are the Constitution (morning), edited from 1880 until 1889 by Henry W. Grady (1851-1889), 1 one of the most eloquent of Southern orators, who did much to promote the reconciliation of the North and the South after the

1 Grady was succeeded as managing editor by Clark Howell (b. 1863); and Joel Chandler Harris was long a member of the editorial staff.

Civil War, and whose statue stands opposite the post office; the Journal (evening), of which Hoke Smith (b. 1855), a pro- minent political leader, secretary of the interior in President Cleveland's cabinet in 1 893-1896, and later governor of Georgia, was long the proprietor; and the Georgian (evening), founded in 1906 as a Prohibition organ.

As regards commerce and manufactures, Atlanta ranks first among the cities of Georgia. In 1907 its whosesale and retail trade was estimated at $100,000,000. The city is said to receive two-fifths of the total freight delivered in the state of Georgia. From 1895 to 1907 the bank clearings increased from about $65,000,000 to about $260,000,000. In recognition of the city's financial strength, Atlanta has been designated by the secretary of the treasury as one of the cities whose bonds will be accepted as security

for Federal deposits. Atlanta is the Southern head- quarters for a number of fire and life insurance companies, and is the third city of the United States in the amount of insurance business written and reported to resident agents, the annual premium receipts averaging about $10,000,000. It is an import- ant horse and mule market, and handles much tobacco.

The development of manufactures has been especially notable. In 1880 the capital invested in manufacturing industries was approximately $2,468,000; in 1890 it was $9,508,962; in 1900 it had increased to $16,045,156; and in 1905, when only estab- lishments under the " factory system " were counted in the census, to $21,631,162. In 1900 the total product was valued at $16,707,027, and the factory product at $14,418,834; and in 1905 the factory product was valued at $25,745,650, an increase of 786% in five years. Among the products are cotton goods (the product value of which in 1905 was 14% of the total value of the city's manufactures), foundry and machine-shop products, lumber, patent medicines, confectionery, men's clothing, mat- tresses, spring-beds and other furniture. Since 1904 part of the. power utilized for manufacturing has been obtained from the Chattahoochee river, 15 m. from the city. There are many manufactories just outside the city limits.

History. — Atlanta owes its origin to the development of pioneer railroads of Georgia. In 1836 the Western & Atlantic, the first road built into North Georgia, was chartered, and the present site of Atlanta was chosen as its southern terminal, which it reached in 1843, an d which was named " Terminus." The Georgia and the Central of Georgia then projected branches to Terminus in order to connect with the Western & Atlantic, and completed them in 1845 and 1846. The town charter of 1843 changed the name to Marthasville, in honour of the daughter of Governor Wilson Lumpkin; and the city charter of 1847 changed this to Atlanta. The population in 1850 was 2572; in i860, 9554. Manufacturing interests soon became important, and during the Civil War Atlanta was the seat of Confederate military factories and a depot of supplies. In 1864 it was the objective point of the first stage of General William T. Sherman's invasion of Georgia (see American Civil War), which is therefore generally known as the " Atlanta campaign."

After the battles around Marietta (q.v.), and the crossing of the Chattahoochee river on the 8th and 9th of July, Sherman continued his advance against Atlanta. His plan of operations was directed primarily to the seizure of the Decatur railway, by which the Confederate commander, General J. E. Johnston, might receive support from Virginia and the Carolinas. The three Union armies under Sherman's command, outnumbering the Confederates about 3 to 2, began their movement on the 16th of July; the Army of the Cumberland (Gen. G..H. Thomas) on the

right marching from Marietta by the fords of the Upper Chattahoochee on Atlanta, the Army of the Ohio (Gen. J. M. Schofield) in the centre, direct on Decatur, and the Army of the Tennessee (Gen. J. B. McPherson) still farther east towards Stone Mountain. At the moment of marching out to meet the enemy, Johnston was relieved of his command and was replaced by Gen. J. B. Hood (July 17). Hood at once prepared to attack Thomas as soon as that general should have crossed Peachtree Creek (6 m. north of the city) and thus isolated himself from Scho- field and McPherson. Sherman's confidence in Thomas and his

troops was, however, justified. Hood's attack (battle of Peach- tree Creek, July 20) was everywhere repulsed, and Schofield and McPherson closed up at the greatest speed. Hood had to retire to Atlanta, with a loss of more than 4000 men, and the three Union armies gradually converged on the north and east sides of the city. But Hood, who had been put in command as a fighting general, was soon ready to attack afresh. This time he placed Gen. W. J. Hardee's corps, the largest of his army, to the south of Atlanta, facing the left flank of McPherson's army. As Hardee's attack rolled up the Union army from left to right, the remainder of the Confederate army was to issue from the Atlanta fortifications and join in the battle. Hardee opened his attack at noon on the 22nd of July (battle of Atlanta). The troops of the Army of the Tennessee were swiftly driven back, and their commander, McPherson, killed; but presently the Federals re-formed and a severe struggle ensued, in which most of Hood's army joined. The veterans of the Army of the Tennessee, led by Gen. J. A. Logan, offered a stubborn resistance, however, and Schofield's army now intervened. After prolonged attacks lasting to nightfall, Hood had once more to draw off, with about 10,000 men killed and wounded. The Confederates now abandoned all idea of regaining the Decatur line, and based themselves on Jonesboro' and the Macon railway. Sherman quickly realized this, and the Army of the Tennessee, now commanded by Gen. O. O. Howard, was counter-marched from left to right, until it formed up on the right of the Union line about Ezra Church (about 4 m. west of Atlanta). The railway from Chattanooga to Atlanta, destroyed by Johnston as he fell back in May and June, was now repaired and working up to Thomas's camps. Hood had meanwhile extended his entrench- ments southwards to cover the Macon railway, and Howard's movement led to another engagement (battle of Ezra Church, July 28) in which the XV. corps under Logan again bore the brunt of Hood's attack. The Confederates were once more unsuccessful, and the losses were so heavy that the " fighting " policy ordered by the Confederate government was counter- manded. Sherman's cavalry had hitherto failed to do serious damage to the railway, and the Federal general now proceeded to manoeuvre with his main body so as to cut off Hood from his Southern railway lines (August). Covered by Howard at Ezra Church, Schofield led

this advance, but the new Confederate lines baffled him. A bombardment of the Atlanta fortifications was then begun, but it had no material result. Another cavalry raid effected but slight damage to the line, and Sherman now decided to take his whole force to the south side. This appar- ently dangerous movement (August 25) is a remarkable illustra- tion of Sherman's genius for war, and in fact succeeded com- pletely. Only a small force was left to guard the Chattanooga railway, and the Union forces, Howard on the right, Thomas in the centre, and Schofield on the left, reached the railway after some sharp fighting (action of Jonesboro', September 1). The defence of Atlanta was now hopeless; Hood's forces retreated southward the same evening, and on the 2nd of September the Union detachment left behind on the north side entered Atlanta unopposed.

All citizens were now ordered to leave, the place was turned into a military camp, and when Sherman started on his " March to the Sea," on the 15th of November, a large part of the city was burned. Consequently the present city is a product of the post-bellum development of Georgia. The military government of Georgia was established here in 1865. In 1868 Atlanta was made the capital of the state.

In 1881 an International Cotton Exposition was held in Atlanta. This was American, even local, in character; its inception was due to a desire to improve the cultivation and manufacture of cotton; but it brought to the notice of the whole country the industrial transformation wrought in the Southern states during the last quarter of the 19th century. In 1887 the Piedmont Exposition was held in Atlanta. The Cotton States and International Exposition, also held at Atlanta, in 1895, attracted widespread attention, and had exhibits from thirty-seven states and thirteen foreign countries.

ATLANTIC, a city and the county-seat of Cass county, Iowa, U.S.A., on East Nishnabatna river, about 80 m. W. by S. of Des Moines. Pop. (1890) 4351; (1900) S046; (1905, state census) 5180 (625 foreign-born); (1910) 4560. It is served by the Chicago, Rock Island & Pacific railway, and by an inter- urban electric line connecting with Elkhorn and Kimballton, and is the trade centre of a fine agricultural country; among its manufactures are machine-shop products, canned corn, flour, umbrellas, drugs and bricks. The municipality owns the water- works and electric-lighting plant. Atlantic was chartered as a city in 1869.

ATLANTIC CITY, a city of Atlantic county, New Jersey, U.S.A., on the

Atlantic Ocean, 58 m. S.E. of Philadelphia and 137 m. S. by W. of New York. Pop. (1890) 13,055; (1900) 27,838, of whom 6513 were of negro descent and 3189 were foreign-born; (1910 census) 46,150. It is served by the Atlantic City (Philadelphia & Reading) and the West Jersey & Seashore (Pennsylvania system) railways. Atlantic City is the largest and most popular all-the-year-round resort in the United States, and has numerous fine hotels. The city extends for 3 m. along a low sandy island (Absecon Beach), 10 m. long by f m. wide, separated from the mainland by a narrow strip of salt water and 4 or 5 m. of salt marshes, partly covered with water at highest storm tide. There are good bathing, boating, sailing, fishing and wild-fowl shooting. A " Board Walk " stretches along the beach for about 5 m. — the newest part of it is of concrete — and along or near this walk are the largest hotels, and numerous shops, and places of amusement; from the walk into the ocean extend several long piers. Other features of the place are the broad driveway (Atlantic Avenue) and an auto- mobile boulevard. There are several seaside sanitoriums and hospitals, including the Atlantic City hospital, the Mercer Memorial home, and the Children's Seashore home. On the north end of the beach is Absecon Lighthouse, 160 ft. high. The municipality owns the water-works. Oysters are dredged here and are shipped hence in large quantities. There was a settlement of fishermen on the island in the latter part of the 18th century. In 1852 a movement was made to develop it as a seaside resort for Philadelphia, and after the completion of the Camden & Atlantic City railway in 1854 the growth of the place was rapid. A heavy loss occurred by fire on the 3rd of April 1902.

ATLANTIC OCEAN, a belt of water, roughly of an S-shape, between the western coasts of Europe and Africa and the eastern coasts of North and South America. It extends northward to the Arctic Basin and southward to the Great Southern Ocean. For purposes of measurement the polar boundaries are taken to be the Arctic and Antarctic circles, although in discussing the configuration and circulation it is impossible to adhere strictly to these limits. The Atlantic Ocean consists of two characteristic divisions, the geographical equator forming a fairly satisfactory line of division into North and South Atlantic. The North Atlantic, by far the best-known of the main divisions of the hydrosphere, is remarkable for the immense length of its coast-line and for the large number of enclosed seas connected with it, including on the western side the Caribbean Sea and Gulf of Mexico, the Gulf of St Lawrence and Hudson Bay, and on the eastern side the Mediterranean and Black Sea, the North Sea and the Baltic. The North Atlantic is connected with the Arctic Basin by four main channels: (1) Hudson Strait, about 60 m. wide, communicating with the gulfs and straits of the North American Arctic archipelago; (2) Davis Strait, about 200 m. wide, leading to Baffin Bay; (3) Denmark Strait,

between Greenland and Iceland, 130 m. wide; and (4) the " Norwegian Sea," about 400 m. wide, extending from Iceland to the Faeroe Islands, the Shetland Islands and the coast of Norway. The width of the North Atlantic in lat. 6o°, approximately where it breaks up into the branches just named, is nearly 2000 m.; in about lat. 50 N. the coasts of Ireland and Newfoundland approach to 1750 m.; the breadth then increases rapidly to lat. 40 N., and attains its maximum of 4500 m. in lat. 25 N.; farther south the minimum breadth is

Bxteat.

reached between Africa and South America, Cape Palmas being only 1600 m. distant from Cape St Roque. In marked contrast to this, the South Atlantic is distinguished by great simplicity of coast-line; inland seas there are none, and it attains its greatest breadth as it merges with the Southern Ocean; in lat. 35° S. the width is 3700 m.

The total area of the North Atlantic, not counting inland seas connected with it, is, according to G. Karstens, 36,438,000 sq. kilometres, or 10,588,000 sq. m.; including the inland seas the area is 45,641,000 sq. kilometres or 13,262,000 sq. m. The area of the South Atlantic is 43,455,000 sq. kilometres, or 12,627,000 sq. m. Although not the most extensive of the great oceans, the Atlantic has by far the largest drainage area. The " long slopes " of the continents on both sides are directed towards the Atlantic, which accordingly receives the waters of a large proportion of the great rivers of the world, including the St Lawrence, the Mississippi, the Orinoco, the Amazon, the rivers of the La Plata, the Congo, the Niger, the Loire, the Rhine, the Elbe and the great rivers of the Mediterranean and the Baltic. Sir J. Murray estimates the total area of land draining to the Atlantic to be 13,432,000 sq. m., or with the Arctic area nearly 20,000,000 sq. m., nearly four times the area draining to the Pacific Ocean, and almost precisely four times the area draining to the Indian Ocean. Murray's calculations give the amount of precipitation received on this area at 15,800 cub. m. annually, and the river discharge from it at 3900 cub. m.

The dominant feature of the relief of the Atlantic basin is a submarine ridge running from north to south from about lat. 50 N. to lat. 40 S., almost exactly in the central line, and following the S-shape of the coasts. Over SeieA this ridge the average depth is about 1700 fathoms. Towards its northern end the ridge widens and rises to the plateau of the Azores, and in about 50 N. lat. it merges with the " Tele- graph Plateau," which extends across nearly the whole ocean from Ireland to Newfoundland. North of the fiftieth parallel the depths diminish towards the north-east, two long submarine ridges of volcanic origin extend north-eastwards to the south-

west of Iceland and to the Faeroe Islands, and these, with their intervening valleys, end in a transverse ridge connecting Green- land, through Iceland and the Faeroe Islands, with North- western Scotland and the continental mass of Europe. The mean depth over this ridge is about 250 fathoms, and the maxi- mum depth nowhere reaches 500 fathoms. The main basin of the Atlantic is thus cut off from the Arctic basin, with which the area north of the ridge has complete deep-water communication. This intermediate region, which has Atlantic characteristics down to 300 fathoms, and at greater depths belongs more properly to the Arctic Sea, commonly receives the name of Norwegian Sea. On both sides of the central ridge deep troughs extend southwards from the Telegraph plateau to the Southern Ocean, the deep water coming close to the land all the way down on both sides. In these troughs the depth is seldom much less than 3000 fathoms, and this is exceeded in a series of patches to which Murray has given the name of " Deeps." In the eastern trough the Peake Deep lies off the Bay of Biscay in 20 W. long., Monaco Deep and Chun Deep off the north-west of Africa, Moseley Deep off the Cape Verde Islands, Krech Deep off the Liberian coast, and Buchanan Deep off the mouth of the Congo. The western trough extends northwards into Davis Strait, forming a depression in the Telegraph plateau; to the south of Newfoundland and Nova Scotia are Sigsbee Deep, Libbey Deep and Suhm Deep, each of small area; north-east of the Bahamas Nares Deep forms the largest and deepest depression in the Atlantic, in which a sounding of 4561 fathoms was obtained (70 m. north of Porto Rico) by the U.S. ship " Blake " in 1883. Immediately to the south of Nares Deep lies the smaller Makarov Deep; and off the coast of South America are Tizard Deep and Havergal Deep.

Before the Antarctic expeditions of 1903-1904 our knowledge of the form of the sea bottom south of 40 S. lat. was almost wholly derived from the soundings of the expedition of Sir J. C. Ross in the " Erebus " and " Terror " (1839-1843), and the

bathymetrical maps published were largely the result of deduc- tions based on one sounding taken by Ross in 68° 34′ S. lat., 12° 49′ W. long., in which he recorded a depth exceeding 4000 fathoms. The Scottish Antarctic expedition has shown this sounding to be erroneous; the "Scotia" obtained samples of bottom, in almost the same spot, from a depth of 2660 fathoms. Combining the results of recent soundings, Dr W. S. Bruce, the leader of the Scottish expedition, finds that there is a ridge " extending in a curve from

Madagascar to Bouvet Island, and from Bouvet Island to the Sandwich group, whence there is a forked connexion through the South Orkneys to Graham's Land, and through South Georgia to the Falkland Islands and the South American continent." Again, the central ridge of the South Atlantic extends a thousand miles farther south than was supposed, joining the east and west ridge, just described, between the Bouvet Islands and the Sandwich group.

The foundations of our knowledge of the relief of the Atlantic basin may be said to have been laid by the work of H.M.S. " Challenger " (1873-1876), and the German ship " Gazelle " (1874-1876), the French expedition in the " Travailleur " (1880), and the U.S. surveying vessel " Blake " (1877 and later). Large numbers of additional soundings have been made in recent years by cable ships, by the expeditions of H.S.H. the prince of Monaco, the German " Valdivia " expedition under Professor Chun (1898), and the combined Antarctic expeditions (1903-1904).

The Atlantic Ocean contains a relatively small number of islands. The only continental groups, besides some islands in the Mediterranean, are Iceland, the British Isles, Newfoundland, the West Indies, and the Falklands, and the chief oceanic islands are the Azores, Madeira, the Canaries, the Cape Verde Islands, Ascension, St Helena, Tristan da Cunha and Bouvet Island.

The mean depth of the North Atlantic is, according to G.

Mean Karstens, 2047 fathoms. If we include the enclosed

depth, and seas, the North Atlantic has a mean depth of 1800

bottom fathoms. The South Atlantic has a mean depth of deposits. , , ,,

2067 fathoms.

The greater part of the bottom of the Atlantic is covered by a deposit of Globigerina ooze, roughly the area between 1000 and 3000 fathoms, or about 60 % of the whole. At a depth of about 3000 fathoms, i.e. in the " Deeps," the Globigerina ooze gradu- ally gives place to red clay. In the shallower tropical waters, especially on the central ridge, considerable areas are covered by Pteropod ooze, a deposit consisting largely of the shells of pelagic molluscs. Diatom ooze is the characteristic deposit in high southern latitudes. The terrigenous deposits consist of blue muds, red muds (abundant along the coast of Brazil, where the amount of organic matter present is insufficient to reduce the iron in the matter brought down by the great rivers to produce blue muds) , green muds and sands, and volcanic and coral detritus.

The question of the origin of the Atlantic basin, like that of the other great divisions of the hydrosphere, is still unsettled. Most geologists include the Atlantic with the other oceans in the view they adopt as to its age; but E. Suess and M. Neumayr, while they regard the basin of the Pacific as of great antiquity, believe the Atlantic to date only from the Mesozoic age. Neumayr finds evidence of the existence of a continent between Africa and South America, which protruded into the central North Atlantic, in Jurassic times. F. Kossmat has shown that the Atlantic had substantially its present form during the Cretaceous period.

In describing the mean distribution of temperature in the waters of the Atlantic it is necessary to treat the northern and Dlstrlbu- southern divisions separately. The heat equator, or tion of line of maximum mean surface temperature, starts tempera- f rom the African coast in about 5 N. lat., and closely follows that parallel to 40° W. long., where it bends northwards to the Caribbean Sea. North of this line, near which the temperature is a little over 80° F., the gradient trends some- what to the east of north, and the temperature is slightly higher on the western than on the eastern side until, in 45° N. lat., the isothermal of 60° F. runs nearly east and west. Beyond this

Salinity.

parallel the gradient is directed towards the north-west, and temperatures are much higher on the European than on the American side. From the surface to 500 fathoms the general form of the isothermals remains the same, except that instead of an equatorial maximum belt there is a focus of maximum temperature off the eastern coast of the United States. This focus occupies a larger area and becomes of greater relative intensity as the depth increases until, at 500 fathoms, it becomes an elongated belt extending right across the ocean in about 30° N. lat. Below 500 fathoms the western centres of maximum ‘ disappear, and higher temperatures occur in the eastern Atlantic off the Iberian peninsula and north-western Africa down to at least 1000 fathoms; at still greater depths temperature gradually becomes more and more uniform. The communication between the Atlantic and Arctic basins being cut off, as already described, at a depth of about 300 fathoms, the temperatures in the Nor- wegian Sea below that level are essentially Arctic, usually below the freezing-point of fresh water, except where the distribution is modified by the surface circulation. The isothermals of mean surface temperature in the South Atlantic are in the lower latitudes of an c/5-shape, temperatures being higher on the American than on the African side. In latitudes south of 30° S. the curved form tends to disappear, the lines running more and more directly east and west. Below the surface a focus of maxi- mum temperature appears off the coast of South America in about 30° S. lat.,

and of minimum temperature north and north- east of this maximum. This distribution is most marked at about 300 fathoms, and disappears at 500 fathoms, beyond which depth the lines tend to become parallel and to run east and west, the gradient slowly diminishing.

The Atlantic is by far the saltest of the great oceans. Its saltest waters are found at the surface in two belts, one extending east and west in the North Atlantic between 20 and 30° N. lat., and another of almost equal salinity extending eastwards from the coast of South America in io° to 20° S. lat. In the equatorial region between these belts the salinity is markedly less, especially in the eastern part. North of the North Atlantic maximum the waters become steadily fresher as latitude increases until the channels opening into the Arctic basin are reached. In all of these water of relatively high salinity usually appears for a long distance towards the north on the eastern side of the channel, while on the western side the water is Comparatively fresh; but great variations occur at different seasons and in different years. In the higher latitudes of the South Atlantic the salinity diminishes steadily and tends to be uniform from east to west, except near the southern extremity of South America, where the surface waters are very fresh. Our knowledge of the salinity of waters below the surface is as yet very defective, large areas being still unrepresented by a single observation. The chief facts already established are the greater saltness of the North Atlantic compared with the South Atlantic at all depths, and the low salinity at all depths in the eastern equatorial region, off the Gulf of Guinea.

The wind circulation over the Atlantic is of a very definite character. In the South Atlantic the narrow land surfaces of Africa and South America produce comparatively little effect in disturbing the normal planetary circulation. ology. The tropical belt of high atmospheric pressure is very marked in winter; it is weaker during the summer months, and at that season the greater relative fall of pressure over the land cuts it off into an oval-shaped anticyclone, the centre of which rests on the coolest part of the sea surface in that latitude, near the Gulf of Guinea. South of this anticyclone, from about the latitude of the Cape, we find the region where, on account of the uninterrupted sea surface right round the globe, the planetary circulation is developed to the greatest extent known; the pressure gradient is steep, and the region is swept continuously by strong westerly winds — the " roaring forties."

In the North Atlantic the distribution of pressure and resulting wind circulation are very largely modified by the enormous areas of land and frozen sea which surround the ocean on three sides. The tropical belt of high pressure persists all the year

round, but the immense demand for air to supply the ascending currents over the heated land surfaces in summer causes the normal descending movement to be largely reinforced; hence the ” North Altantic anticyclone” is much larger, and its circulation more vigorous, in summer than in winter. Again, during the winter months pressure is relatively high over North America, Western Eurasia and the Arctic regions; hence vast quantities of air are brought down to the surface, and circulation must be kept up by ascending currents over the ocean. The Atlantic anticyclone is, therefore, at its weakest in winter, and on its polar side the polar eddy becomes a trough of low pressure, extending roughly from Labrador to Iceland and Jan Mayen, and traversed by a constant succession of cyclones. The net effect of the surrounding land is, in fact, to reverse the seasonal variations of the planetary circulation, but without destroying its type. In the intermediate belt between the two high-pressure areas the meteorological equator remains permanently north of the geographical equator, moving between it and about n° N. lat. The part of this atmospheric circulation which is steadiest in its action is the trade winds, and this is, therefore, the most effective in producing drift movement of the surface waters. The trade winds give rise, in the region most exposed to their influence, to two westward-moving drifts — the equatorial currents, which are separated in parts of their course by currents moving in the opposite direction along the equatorial belt. These last may be of the nature of ” reaction ” currents; they are collectively known as the equatorial counter-current. On reaching the South American coast, the southern equatorial current splits into two parts at Cape St Roque: one branch, the Brazil current, is deflected southwards and follows the coast as a true stream current at least as far as the river Plate. The second branch proceeds north-westwards towards the West Indies, where it mingles with the waters of the northern equatorial; and the two drifts, blocked by the < -shape of the land, raise the level of the surface in the Gulf of Mexico, the Caribbean Sea, and in the whole area outside the West Indies. This congestion is relieved by what is probably the most rapid and most voluminous stream current in the world, the Gulf Stream, which runs along the coast of North America, separated from it by a narrow strip of cold water, the " cold wall," to a point off the south-east of Newfoundland. At this point the Gulf Stream water mixes with that from the Labrador current (see below), and a drift current eastwards is set up under the influence of the prevailing westerly winds: this is generally called the Gulf Stream drift. When the Gulf Stream drift approaches the eastern side of the Atlantic it

splits into two parts, one going southwards along the north-west coast of Africa, the Canaries current, and another turning northwards and passing to the west of the British Isles. Most of the Canaries current re-enters the northern equatorial, but a certain proportion keeps to the African coast, unites with the equatorial return currents, and penetrates into the Gulf of Guinea. This last feature of the circulation is still somewhat obscure; it is probably to be accounted for by the fact that on this part of the coast the prevailing winds, although to a considerable extent monsoonal, are off-shore winds, blowing the surface-waters out to sea, and the place of the water thus removed is filled up by water derived either from lower levels or from " reaction " currents.

The movements of the northern branch of the. Gulf Stream drift have been the object of more careful and more extended study than all the other currents of the ocean put together, except, perhaps, the Gulf Stream itself. The cruises of the ” Porcupine ” and ” Lightning,” which led directly to the despatch of the ” Challenger ” expedition, were altogether within its ” sphere of influence “; so also was the great Nor- wegian Atlantic expedition. More recently, the area has been further explored by the German expedition in the ss. ” National, ” the Danish ” Ingolf ” expedition, and the minor expeditions of the ” Michael Sars,” ” Jackal,” ” Research,” &c, and since 1902 it has been periodically examined by the International Council for the Study of the Sea. Much has also been done by the discussion of observations made on board vessels belonging

to the mercantile marine of various countries. It may now be taken as generally admitted that the current referred to breaks into three main branches. The first passes northwards, most of it between the Faeroe and Shetland Islands, to the coast of Norway, and so on to the Arctic basin, which, as Nansen has shown, it fills to a great depth. The second, the Irminger stream, passes up the west side of Iceland; and the third goes up the Greenland side of Davis Strait to Baffin Bay. These branches are separated from one another at the surface by currents moving southwards: one passes east of Iceland; the second, the Greenland current, skirts the east coast of Greenland; and the third, the Labrador current already mentioned, follows the western side of Davis Strait.

The development of the equatorial and the Brazil currents in the South Atlantic has already been described. On the polar side of the high-pressure area a west wind drift is under the control of the ” roaring forties,” and on reaching South Africa part of this is deflected and sent northwards along the west coast as the cold Benguella current which rejoins the equatorial. In the central parts of the two high-pressure areas there is practically no surface circulation. In the North Atlantic this region is covered by enormous banks of gulf-weed (Sargassum bucciferum), hence the name

Sargasso Sea. .The Sargasso Sea is bounded, roughly, by the lines of 20°-3S° N. lat. and 4o°-75° W. long.

The sub-surface circulation in the Atlantic may be regarded as consisting of two parts. Where, surface water is banked up against the land, as by the equatorial and Gulf Stream drift currents, it appears to penetrate to Very considerable depths; the escaping stream currents are at first of great vertical thickness and part of the water at their sources has a downward movement. In the case of the Gulf Stream, which is not much impeded by the land, this, descending motion is relatively slight, being perhaps largely due to the greater specific gravity of the water; it ceases to be perceptible beyond about 500 fathoms. On the European-African side the descending movement is more marked, partly because the coast-line is much more irregular and the northward current is deflected against it by the earth's rotation, and partly because of the outflow of salt water from the Mediterranean; here the movement is traceable to at least 1000 fathoms. The northward movement of water across the Norwegian Sea extends down from the surface to the Iceland- Shetland ridge, where it is sharply cut off; the lower levels of the Norwegian Sea are filled with ice-cold Arctic water, close down to the ridge. The south-moving currents originating from melting ice are probably quite shallow. The second part of the circulation in the depth is the slow " creep " of water of very low temperature along the bottom. The North Atlantic being altogether cut off from the Arctic regions, and the vertical circulation being active, this movement is here practically non-existent; but in the South Atlantic, where communication with the Southern Ocean is perfectly open, Antarctic water can be traced to the equator and even beyond.

The tides of the Atlantic Ocean are of great complexity. The tidal wave of the Southern Ocean, which sweeps uninterruptedly round the globe from east to west, generates a secondary wave between Africa and South America, which travels north at a rate dependent only on the depth of the ocean. With this " free " wave is combined a " forced " wave, generated, by the direct action of the sun and moon, within the Atlantic area itself. Nothing is known about the relative importance of these two waves. (H. N. D.)

See also Ocean and Oceanography.

ATLANTIS, Atalantis, or Atlantica, a legendary island in the Atlantic Ocean, first mentioned by Plato in the Timaeus. Plato describes how certain Egyptian priests, in a conversation with Solon, represented the island as a country larger than Asia Minor and Libya united, and situated just beyond the Pillars of Hercules (Straits of Gibraltar). Beyond it lay an archipelago of lesser islands. According to the priests, Atlantis had been a

powerful kingdom nine thousand years before the birth of Solon, and its armies had overrun the lands which

bordered the Mediterranean. Athens alone had withstood them with success. Finally the sea had overwhelmed Atlantis, and had thenceforward become unnavigable owing to the shoals which marked the spot. In the Critias Plato adds a history of the ideal commonwealth of Atlantis. It is impossible to decide how far this legend is due to Plato's invention, and how far it is based on facts of which no record remains. Medieval writers, for whom the tale was preserved by the Arabian geo- graphers, believed it true, and were fortified in their belief by numerous traditions of islands in the western sea, which offered various points of resemblance to Atlantis. Such in particular were the Greek Isles of the Blest, or Fortunate Islands, the Welsh Avalon, the Portuguese Antilia or Isle of Seven Cities, and St Brendan's island, the subject of many sagas in many languages. These, which are described in separate articles, helped to maintain the tradition of an earthly paradise which had become associated with the myth of Atlantis; and all except Avalon were marked in maps of the 14th and 15th centuries, and formed the object of voyages of discovery, in one case (St Brendan's island) until the 18th century. In early legends, of whatever nationality, they are almost invariably described in terms which closely resemble Homer's account of the island of the Phaeacians (Od. viii.) — a fact which may be an indication of their common origin in some folk-tale current among several races. Somewhat similar legends are those of the island of Brazil (q.v.), of Lyonnesse (q.v.), the sunken land off the Cornish coast, of the lost Breton city of Is, and of Mayda or Asmaide — the French Isle Verte and Portuguese Ilha Verde or " Green Island " — which appears in many folk-tales from Gibraltar to the Hebrides, and until 1853 was marked on English charts as a rock in 44° 48′ N. and 26 10′ W. After the Renais- sance, with its renewal of interest in Platonic studies, numerous attempts were made to rationalize the myth of Atlantis. The island was variously identified with America, Scandinavia, the Canaries and even Palestine ; ethnologists saw in its inhabitants the ancestors of the Guanchos, the Basques or the ancient Italians; and even in the 17th and 18th centuries the credibility of the whole legend was seriously debated, and sometimes admitted, even by Montaigne, Buffon and Voltaire.

For the theory that Atlantis is to be identified with Crete in the Minoan period, see " The Lost Continent " in The Times (London) for the 19th of February 1909. See also " Dissertation sur l'Atlan- tide " in T. H. Martin's Htudes sur le Tim.ee (1841).

ATLAS, in Greek mythology, the " endurer," a son of the Titan Iapetus and Clymene (or Asia), brother of Prometheus. Homer, in the Odyssey (i. 52) speaks of him as " one who knows the depths of the whole sea, and keeps the tall pillars which hold heaven and earth asunder." In the first instance he seems to have been a marine creation. The pillars which he supported were thought to rest in the sea, immediately beyond the most western horizon. But as the Greeks' knowledge of the west increased, the name of Atlas was transferred to a hill in the north-west of Africa. Later, he was represented as a king of that district, rich in flocks and herds, and owner of the garden of the Hesperides, who was turned into a rocky mountain when Perseus, to punish him for his inhospitality, showed him the Gorgon's head (Ovid, Metam. iv. 627). Finally, Atlas was explained as the name of a primitive astronomer, who was said to have made the first celestial globe (Diodorus iii. 60). He was the father of the Pleiades and Hyades; according to Homer, of Calypso. In works of art he is represented as carrying the heavens or the terrestrial globe. The Farnese statue of Atlas in the Naples museum is well known.

The plural form Atlantes is the classical term in architecture for the male sculptured figures supporting a superstructure as in the baths at Pompeii, and in the temple at Agrigentum in Sicily. In 18th-century architecture half-figures of men with strong muscular development were used to support balconies <ˆee Caryatides and Telamones).

A figure of Atlas supporting the heavens is often found as a frontispiece in early collections of maps, and is said to have been first thus used by Mercator. The name is hence applied to a

volume of maps (see Map), and similarly to a volume which contains a tabular conspectus of a subject, such as an atlas of ethnographical, subjects or anatomical plates. It is also used of a large size of drawing paper.

The name " atlas," an Arabic word meaning " smooth," applied to a smooth cloth, is sometimes found in English, and is the usual German word, for " satin."

ATLAS MOUNTAINS, the general name for the mountain chains running more or less parallel to the coast of North-west Africa. They extend from Cape Nun on the west to the Gulf of Gabes on the east, a distance of some 1500 m., traversing Morocco, Algeria and Tunisia. To their south lies the Saharan desert. The Atlas consist of many distinct ranges, but they can be roughly divided into two main chains: (1) the Maritime Atlas, i.e. the ranges overlooking the Mediterranean from Ceuta to Cape Bon; (2) the inner and more elevated ranges, which, starting from the Atlantic at Cape Ghir in Sus, run south of the coast ranges and are separated from them by high plateaus. This general disposition is seen most distinctly in eastern Morocco and Algeria. The western inner ranges are the most important of the whole system, and in the present article are described first as the Moroccan Ranges. The maritime Atlas and the inner ranges in Algeria and Tunisia are then treated under the heading Eastern Ranges.

The Moroccan Ranges. — This section of the Atlas, known to the inhabitants of Morocco by its Berber name, Idraren Draren or the " Mountains of Mountains," consists of five distinct ranges, varying in length and height, but disposed more or less parallel to one another in a general direction from south-west to north-east, with a slight curvature towards the Sahara.

1. The main range, that known as the Great Atlas, occupies a central position in the system, and is by far the longest and loftiest chain. It has an average height of over 11,000 ft,, whereas the loftiest peaks in Algeria do not exceed 8000 ft., and the highest in Tunisia are under 6000 ft. Towards the Dahra district at the north-east end the fall is gradual and continuous, but at the opposite extremity facing the Atlantic between Agadir and Mogador it is precipitous. Although only one or two peaks reach the line of perpetual snow, several of the loftiest summits are snowclad during the greater part of the year. The northern sides and tops of the lower heights are often covered with dense forests of oak, cork, pine, cedar and other trees, with walnuts up to the limit of irrigation. Their slopes enclose well-watered valleys of great fertility, in which the Berber tribes cultivate tiny irrigated fields, their houses clinging to the hill-sides. The southern flanks, being exposed to the hot dry winds of the Sahara, are generally destitute of vegetation.

At several points the crest of the range has been deeply eroded by old glaciers and running waters, and thus have been formed a number of devious passes. The central section, culminating in Tizi n 'Tagharat or Tinzar, a peak estimated at 15,000 ft. high, maintains a mean altitude of 11,600 ft., and from this great mass of schists and sandstones a number of secondary ridges radiate in all directions, forming divides between the

rivers Dra'a, Sus, Um-er-Rabia, Sebu, Mulwiya and Ghir, which flow respectively to the south-west, the west, north-west, north, north-east and south-east. All are swift and unnavigable, save perhaps for a few miles from their mouths. With the exception of the Dra'a, the streams rising on the side of the range facing the Sahara do not reach the sea, but form marshes or lagoons at one season, and at another are lost in the dry soil of the desert.

For a distance of 100 m. the central section nowhere presents any passes accessible to caravans, but south-westward two gaps in the range afford communication between the Tansift and Sus basins, those respectively of Gindafi and Bibawan. A few summits in the extreme south-west in the neighbourhood of Cape Ghir still exceed 11,000 ft., and although the steadily rising ground from the coast and the prominence of nearer summits detract from the apparent height, this is on an average greater than that of the European Alps. The most imposing view is to be obtained from the plain of Marrakesh, only some 1000 ft. above sea-level, immediately north of the highest peaks. Besides

huge masses of old schists and sandstones, the range contains extensive limestone, marble, diorite, basalt and porphyry forma- tions, while granite prevails on its southern slopes. The presence of enormous glaciers in the Ice Age is attested by the moraines at the Atlantic end, and by other indications farther east. The best-known passes are: (1) The Bibawan in the upper Wad Sus basin (4150 ft.); (2) the Ginda.fi, giving access from Marrakesh to Tarudant, rugged and difficult, but low; (3) the Tagharat, difficult and little used, leading to the Dra'a valley (11,484 ft.); (4) the Glawi (7600 ft.); (5) Tizi n 'Tilghemt (7250 ft.), leading to Tafilet (Tafila.lt) and the Wad Ghir.

2. The lower portion of the Moroccan Atlas (sometimes called the Middle Atlas) , extending north-east and east from an undefined point to the north of the Great Atlas to near the frontier of Algeria, is crossed by the pass from Fez to Tafilalt. Both slopes are wooded, and its forests are the only parts of Morocco where the Hon still survives. From the north this range, which is only partly explored, presents a somewhat regular series of snowy crests.

3. The Anti-Atlas or Jebel Saghru, also known as the Lesser Atlas, running parallel to and south of the central range, is one of the least elevated chains in the system, having a mean altitude of not more than 5000 ft.,

although some peaks and even passes exceed 6000 ft. At one point it is pierced by a gap scarcely five paces wide with walls of variegated marbles polished by the transport of goods. As to the relation of the Anti-Atlas to the Atlas proper at its western end nothing certain is known.

The two more or less parallel ranges which complete the western system are less important: — (4) the Jebel Bani, south of the Anti-Atlas, a low, narrow rocky ridge with a height of 3000 ft. in its central parts; and (5) the Mountains of Ghaiata, north of the Middle Atlas, not a continuous range, but a series of broken mountain masses from 3000 to 3500 ft. high, to the south of Fez, Taza and Tlemcen.

The Eastern Ranges. — The eastern division of the Atlas, which forms the backbone of Algeria and Tunisia, is adequately known with the exception of the small portion in Morocco forming the province of Er-Rif. The lesser range, nearer the sea, known to the French as the Maritime Atlas, calls for little detailed notice. From Ceuta, above which towers Jebel Miisa — about 2800 ft. — to Melilla, a distance of some 150 m., the Rif Mountains face the Mediterranean, and here, as along the whole coast eastward to Cape Bon, many rugged rocks rise boldly above the general level. In Algeria the Maritime Atlas has five chief ranges, several mountains rising over 5000 ft. The Jurjura range, extending through Kabylia from Algiers to Bougie, contains the peaks of Lalla Kedija (7542 ft.), the culminating point of the maritime chains, and Babor (6447 ft.). (See further Algeria.) The Mejerda range, which extends into Tunisia, has no heights exceeding 3700 ft. It was in these coast mountains of Algeria that the Romans quarried the celebrated Numidian marbles.

The southern or main range of the Eastern division is known by the French as the Saharan Atlas. On its western extremity it is linked by secondary ranges to the mountain system of Morocco. The Saharan Atlas is essentially one chain, though known under different names: Jebel K'sur and Jebel Amur on the west, and Jebel Aures in the east. The central part, the Zab Mountains, is of lower elevation, the Saharan Atlas reaching its culminating point, Jebel Shellia (761 1 ft. above the sea), in the Aures. This range sends a branch northward which joins the Mejerda range of the Maritime Atlas, and another branch runs south by Gafsa to the Gulf of Gabes. Here Mount Sidi AH bu Musin reaches a height of 5700 ft., the highest point in Tunisia. In the 'Saharan Atlas the passes leading to or from the desert are numerous, and in most instances easy. Both in the east (at Batna) and the west (at Ain Sefra) the mountains are traversed by railways, which, starting from Mediterranean seaports, take the traveller into the Sahara.

History and Exploration. — The name Atlas given to these mountains by

Europeans — but never used by the native races — is derived from that of the mythical Greek god represented as carrying the globe on his shoulders, and applied to the high and

distant mountains of the west, where Atlas was supposed to dwell. From time immemorial the Atlas have been the home of Berber races, and those living in the least accessible regions have retained a measure of independence throughout their recorded history. Thus some of the mountain districts of Kabylia had never been visited by Europeans until the French military expedition of 1857. But in general the Maritime range was well known to the Romans. The Jebel Amur was traversed by the column which seized El Aghuat in 1852, and from that time dates the survey of the mountains.

The ancient caravan route from Mauretania to the western Sudan crossed the lower Moroccan Atlas by the pass of Tilghemt and passed through the oasis of Tafilalt, formerly known as Sajilmasa [" Sigilmassa "], on the east side of the Anti-Atlas. The Moroccan system was visited, and in some instances crossed, by various European travellers carried into slavery by the Salli rovers, and was traversed by Ren6 Caill6 in 1828 on his journey home from Timbuktu, but the first detailed exploration was made by Gerhard Rohlfs in 1861-1862. Previous to that almost the only special report was the misleading one of Lieut. Washington, attached to the British embassy of 1837, who from insufficient data estimated the height of Mount Tagharat, to which he gave the indefinite name of Miltsin (i.e. Mul et-Tizin, " Lord of the Peaks "), as 11,400 ft. instead of about 15,000 ft. In 1871 the first scientific expedition, consisting of Dr (after- wards Sir) J. D. Hooker, Mr John Ball and Mr G. Maw, explored the central part of the Great Atlas with the special object of investigating its flora and determining its relation to that of the mountains of Europe. They ascended by the Ait Mizan valley to the Tagharat pass (11,484 ft.), and by the Amsmiz valley to the summit of Jebel Tezah (11,972 ft.). In the Tagharat pass Mr Maw was the only one of the party who reached the water- shed; but from Jebel Tezah a good view was obtained south- ward across the great valley of the Sus to the Anti-Atlas, which appeared to be from 9000 to 10,000 ft. high. Dr Oskar Lenz in 1879-1880 surveyed a part of the Great Atlas north of Taru- dant, determined a pass south of High in the Anti-Atlas, and penetrated thence across the Sahara to Timbuktu. He was followed in 1883-1884 by Vicomte Ch. de Foucauld, whose ex- tensive itineraries include many districts that had never before been visited by any Europeans. Such were parts of the first and middle ranges, crossed once; three routes over the Great Atlas, which was, moreover, followed along both flanks for nearly its whole length; and six journeys across the An ti- Atlas, with a general survey of the foot of this range and several passages over the Jebel Bani. Then came Joseph Thomson, who explored some of the central parts,

and made the highest ascent yet achieved, that of Mount Likimt, 13,150 ft., but broke little new ground, and failed to cross the main range (1888); and Walter B. Harris, who explored some of the southern slopes and crossed the Atlas at two points during his expedition to Tafilalt in 1894. In 1901 and again in 1905 the marquis deSegonzac, a Frenchman, made extensive journeys in the Moroccan ranges. He crossed the Great Atlas in its central section, explored its southern border, and, in part, the Middle and Anti-Atlas ranges, A member of his expeditions, de Flotte Rocquevaire, made a triangulation of part of the western portion of the main Atlas, his labours affording a basis for the co-ordination of the work of previous explorers. (See also Morocco, Algeria, Tunisia and Sahara.)

Authorities. — Vicomte Ch. de Foucauld, Reconnaissance au Maroc 1883-1884 (Paris, 1888, almost the sole authority for the geography of the Atlas; his book gives the result of careful surveys, and is illustrated with a good collection of maps and sketches) ; Hooker, Ball and Maw, Marocco and the Great Atlas (London, 1879, a most valuable contribution, always scientific and trustworthy, especially as to botany and geology); Joseph Thomson, Travels in the Atlas and Southern Morocco (London, 1889, valuable geographical and geological data) ; Louis Gentil, Mission de Segonzac, &c. (Paris, 1906; the author was geologist to the 1905 expedition) ; Gerhard Rohlfs, Adventures in Morocco (London, 1874); Walter B. Harris, Tafilet, a Journey of Exploration in the Atlas Mountains, &c. (London, 1895), full of valuable information; Budgett Meakin, The Land of the Moors (London, 1901), first and last chapters; Dr Oskar Lenz, Timbuktu: Reise durch Marokko, vol. i. (Leipzig, 1884).

ATMOLYSIS (Gr. arjuos, vapour: 'Kiieiv, to loosen), a term invented by Thomas Graham to denote the separation of a mixture of gases by taking advantage of their different rates of diffusion through a porous septum or diaphragm (see Diffusion) .

ATMOSPHERE (Gr. ar/ibs, vapour; alpa, a sphere), the aeriform envelope encircling the earth; also the envelope of a particular gas or gases about any solid or liquid. Meteorological phenomena seated more directly in the atmosphere obtained early recognition; thus Hesiod, in his Works and Days, speculated on the origin of winds, ascribing them to the heating effects of the sun on the air. Ctesibius of Alexandria, Hero and others, founded the science of pneumatics on observations . on the physical properties of air. Anaximenes made air the primordial substance, and it was one of the Aristotelian elements. A direct proof of its material nature

was given by Galileo, who weighed a copper ball containing compressed air.

Before the development of pneumatic chemistry, air was regarded as a distinct chemical unit or element. The study of calcination and combustion during the 17 th and 18th centuries culminated in the discovery that air consists chiefly of a mix- ture of two gases, oxygen and nitiogen. Cavendish, Priestley, Lavoisier and others contributed to this result. Cavendish made many analyses: from more than 500 determinations of air in winter and summer, in wet and clear weather, and in town and country, he discerned the mean composition of the atmo- sphere to be, oxygen 20-833 % anf i nitrogen 79-167 % The same experimenter noticed the presence of an inert gas, in very minute amount ; this gas, afterwards investigated by Rayleigh and Ramsay, is.now named argon {q.v.).

The constancy of composition shown by repeated analyses of atmospheric air led to the view that it was a chemical compound of nitrogen and oxygen; but there was no experimental con- firmation of this idea, and all observations tended to the view that it is simply a mechanical mixture. Thus, the gases are not present in simple multiples of their combining weights; atmo- spheric air results when oxygen and nitrogen are mixed in the prescribed ratio, the mixing being unattended by any manifesta- tion of energy, such as is invariably associated with a chemical action; the gases may be mechanically separated by atmolysis, i.e. by taking advantage of the different rates of diffusion of the two gases; the solubility of air in water corresponds with the " law of partial pressures," each gas being absorbed in amount proportional to its pressure and coefficient of absorption, and oxygen being much more soluble than nitrogen (in the ratio of •041 14 to -02035 a t o°); air expelled from water by boiling is always richer in oxygen.

Various agencies are at work tending to modify the composition of the atmosphere, but these so neutralize each other as to leave it practically unaltered. Minute variations, however, do occur. Bunsen analysed fifteen examples of air collected at the same place at different times, and found the extreme range in the percentage of oxygen to be from 20-97 to 20-84. Regnault, from analyses of the air of Paris, obtained a variation of 20-999 to 20913; country air varied from 20 903 to 21-000; while air taken from over the sea showed an extreme variation of 20-940 to 20-850. Angus Smith determined London air to vary in oxygen content from 20-857 to 20-95, the air in parks and open spaces showing the higher percentage; Glasgow air showed similar results, varying from 20-887 in the streets to 20-929 in open spaces.

In addition to nitrogen and oxygen, there are a number of other gases and

vapours generally present in the atmosphere. Of these, argon and its allies were the last to be definitely isolated. Carbon dioxide is invariably present, as was inferred by Dr David Macbride (1726-1778) of Dublin in 1764, but in a pro- portion which is not absolutely constant; it tends to increase at night, and during dry winds and fogs, and it is greater in towns than in the country and on land than on the sea. Water vapour is always present; the amount is determined by instru- ments termed hygrometers (q.v.). Ozone (q.v.) occurs, in an amount supposed to be associated with the development of atmospheric electricity (lightning, &c); this amount varies

with the seasons, being a maximum in spring, and decreasing through summer and autumn to a minimum in winter. Hydrogen dioxide occurs in a manner closely resembling ozone. Nitric acid and lower nitrogen oxides are present, being formed by electrical discharges, and by the oxidation of atmospheric ammonia by ozone. The amount of nitric acid varies from place to place; rain-water, collected in the country, has been found to contain an average of 0-5 parts in a million, but town rain-water contains more, the greater amounts being present in the more densely populated districts. Ammonia is also present, but in very varying amounts, ranging from 135 to o-i parts (calculated as carbonate) in a million parts of air. Ammonia is carried back to the soil by means of rain, and there plays an important part in providing nitrogenous matter which is after- wards assimilated by vegetable life.

The average volume composition of the gases of the atmosphere may be represented (in parts per 10,000) as follows: —

Oxygen . . .

. 2065-94

Ozone

0-015

Nitrogen

. 7711-60

Aqueous vapour

140-00

Argon (about) .

79-00

Nitric acid .

0-08

Carbon dioxide

3-36

Ammonia

0-005

In addition to these gases, there are always present in the atmosphere many micro-organisms or bacteria (see Bacteri- ology); another invariable constituent is dust (q.v.), which plays an important" part in meteorological phenomena.

Reference should be made to the articles Barometer, Climate and Meteorology for the measurement and variation of the pressure of the atmosphere, and the discussion of other properties.

ATMOSPHERIC ELECTRICITY. 1. It was not until the middle of the 18th century that experiments due to Benjamin Franklin showed that the electric phenomena of the atmosphere are not fundamentally different from those produced in the laboratory. . For the next century the rate of progress was slow, though the ideas of Volta in Italy and the instrumental devices of Sir Francis Ronalds in England merit recognition. The inven- tion of the portable electrometer and the water-dropping electro- graph by Lord Kelvin in the middle of the 19th century, and the greater defmiteness thus introduced into observational results, were notable events. Towards the end of the 19th century came the discovery made by W. Linss (6) 1 and by J. Elster and H. Geitel (7) that even the most perfectly insulated conductors lose their charge, and that this loss depends on atmospheric condi- tions. Hard on this came the recognition of the fact that freely charged positive and negative ions are always present in the atmosphere, and that a radioactive emanation can be collected. Whilst no small amount of observational work has been done in these new branches of atmospheric electricity, the science has still not developed to a considerable extent beyond preliminary stages. Observations have usually been limited to a portion of the year, or to a few hours of the day, whilst the results from different stations differ much in details. It is thus difficult to form a judgment as to what has most claim to acceptance as the general law, and what may be regarded as local or exceptional.

2. Potential Gradient. — In dry weather the electric potential in the atmosphere is normally positive relative to the earth, and increases with the

height. The existence of earth currents (q. v.) shows that the earth, strictly speaking, is not all at one potential, but the natural differences of potential between points on the earth's surface a mile apart are insignificant compared to the normal potential difference between the ea"rth and a point one foot above it. What is aimed at in ordinary observations of atmospheric potential is the measurement of the difference of potential between the earth and a point a given distance above it, or of the difference of potential betweeen two points in the same vertical line a given distance apart. Let a conductor, say a metallic sphere, be supported by a metal rod of negligible electric capacity whose other end is earthed. As the whole conductor must be at zero (i.e. the earth's) potential, there must be an induced charge on the sphere, producing at its centre a potential equal but of opposite sign to what would exist at the same spot in free air. This neglects any charge in the air 1 See Authorities below.

displaced by the sphere, and assumes a statical state of condi- tions and that the conductor itself exerts no disturbing influence. Suppose now that the sphere's earth connexion is broken and that it is carried without loss of charge inside a building at zero potential. If its potential as observed there is -V (volts) , then the potential of the air at the spot occupied by the sphere was + V. This method in one shape or another has been often employed. Suppose next that a fixed insulated conductor is somehow kept at the potential of the air at a given point, then the measurement of its potential is equivalent to a measurement of that of the air. This is the basis of a variety of methods. In the earliest the conductor was represented by long metal wires, supported by silk or other insulating material, and left to pick up the air's potential. The addition of sharp points was a step in advance; but the method hardly became a quantitative one until the sharp points were replaced by a flame (fuse, gas, lamp), or by a liquid jet breaking into drops. The matter leaving the conductor, whether the products of combustion or the drops of a liquid, supplies the means of securing equality of potential between the conductor and the air at the spot where the matter quits electrical connexion with the conductor. Of late years the function of the collector is discharged in some forms of apparatus by a salt of radium. Of flame collectors the two best known are Lord Kelvin's portable electrometer with a fuse, or F. Exner's gold leaf electroscope in conjunction with an oil lamp or gas flame. Of liquid collectors the representative is Lord Kelvin's water-dropping electrograph; while Benndorf's is the form of radium collector that has been most used. It cannot be said that any one form of collector is superior all round. Flame collectors blow out in high winds, whilst water-droppers are apt to get

frozen in winter. At first sight the balance of advantages seems to lie with radium. But while gaseous products and even falling water are capable of modifying electrical conditions in their immediate neighbourhood, the " infection " produced by radium is more insidious, and other drawbacks present them- selves in practice. It requires a radium salt of high radioactivity to be at all comparable in effectiveness with a good water-dropper. Experiment 6y Fl Z/nJte (&/ indicated tAat a water-dropper •

there are external buildings or trees sufficiently near to influence the potential. It is thus futile to compare the absolute voltages met with at two stations, unless allowance can be made for the influence of the environment. With a view to this, it has become increasingly common of late years to publish not the voltages actually observed, but values deduced from them for the potential gradient in the open in volts per metre. Observa- tions are made at a given height over level open ground near the observatory, and a comparison with the simultaneous results from the self-recording electrograph enables the records from the latter to be expressed as potential gradients in the open. In the case, however, of many observatories, especially as regards the older records, no data for reduction exist; further, the reduction to the open is at best only an approximation, the success attend- ing which probably varies considerably at different stations. This is one of the reasons why in the figures for the annual and diurnal variations in Tables I., II. and III., the potential has been expressed as percentages of its mean value for the year or the day. In most cases the environment of a collector is not absolutely invariable. If the shape of the equipotential surfaces near it is influenced by trees, shrubs or grass, their influence will vary throughout the year. In winter the varying depth of snow may exert an appreciable effect. There are sources of uncertainty in the instrument itself. Unless the insulation is perfect, the potential recorded falls short of that at the spot where the radium is placed or the water jet breaks. The action of the collector is opposed by the leakage through imperfect insulation, or natural dissipation, and this may introduce a fictitious element into the apparent annual or diurnal variation. The potentials that have to be dealt with are often hundreds and sometimes thousands of volts, and insulation troubles are more serious than is generally appreciated. When a water jet serves as collector, the pressure under which it issues should be practically constant. If the pressure alters as the water tank empties, a discontinuity occurs in the trace when the tank is refilled, and a fictitious element may be introduced into the diurnal variation. When rain or snow is falling, the potential frequently changes rapidly. These changes are often too rapid to 6e satisfactorily deaft wi'tA 6y an ordinary

m

Table I.-

—Annual Variation Potential Gradient.

Place and Period.

Jan.

Feb.

March.

April.

May.

June.

July.

Aug.

Sept.

Oct.

Nov.

Dec.

Karasjok (10), 1903-1904 .

143

150

137

94

74

65

70

67

67

87

120

126

Sodankyla (31), 1882-1883 . .

94

133

148

155

186

93

53

77

47

72

71

71

Potsdam (9), 1904 ….

167

95

118

88

93

72

73

65

97

IOI

108

123

Kew (12), 1898-1904 . . .

127

141

113

87

77

70

61

72

76

96

126

153

Greenwich (13), 1893-1894, 1896

no

112

127

107

83

71

76

84

83

104

104

139

Florence (14), 1883-1886 . .

132

no

98

84

86

81

77

90

89

99

129

125

Perpignan (IS), 1886-1888 . .

121

112

108

89

9i

92

89

82

74

99

122

121

Lisbon (16), 1884-1886 . . .

104

105

104

92

9i

93

87

92

100

99

“5

117

Tokyo (17), 1897-1898,1900-1901

165

145

117

86

62

58

4i

59

59

97

134

176

Batavia (18)(2 m.), 1887-1890 .

97

115

155

127

129

105

79

62

69

79

90

93

(7-8 m.) 1890-1895 .

100

89

103

120

98

103

85

99

73

IOI

117

112

having a number of fine holes, or having a fine jet under a con- siderable pressure, picks up the potential in about a tenth of the time required by the ordinary radium preparation protected by a glass tube. These fine jet droppers with a mixture of alcohol and water have proved very effective for balloon observations.

3. Before considering observational data, it is expedient to mention various sources of uncertainty. Above the level plain of absolutely smooth surface, devoid of houses or vegetation, the equipotential surfaces under normal conditions would be strictly horizontal, and if we could determine the potential at one metre above the ground we should have a definite measure of the potential gradient at the earth's surface. The presence, how- ever, of apparatus or observers upsets the conditions, while above uneven ground or near a tree or a building the equipotential surfaces cease to be horizontal. In an ordinary climate a building seems to be practically at the earth's potential; near its walls the equipotential surfaces are highly inclined, and near the ridges they may lie very close together. The height of the walls in the various observatories, the height of the collectors, and the distance they project from the wall vary largely, and sometimes

electrometer, and they sometimes leave hardly a trace on the photographic paper. Again rain dripping from exposed parts of the apparatus may materially affect the record. It is thus customary in calculating diurnal inequalities either to take no •account of days on which there is an appreciable rainfall, or else to form separate tables for ” dry ” or ” fine ” days and for ” all ” days. Speaking generally, the exclusion of days of rain and of negative potential comes pretty much to the same thing, and the presence or absence of negative potential is not infrequently the criterion by reference to which days are rejected or are accepted as normal.

4. The potential gradient near the ground varies with the season of the year and the hour of the day, and is largely dependent on the weather conditions. It is thus difficult to form even a rough estimate of the mean value at any place unless hourly readings exist, extend- ing over the whole or the greater part of a year. It is even some- what precipitate to assume that a mean value deduced from a single year is fairly representative of average conditions. At Potsdam, G. Liideling (9) found for the mean value for 1904 in volts per metre 242. At Karasjok in the extreme north of Norway G. C. Simpson (10) in 1903-1904 obtained 139. AtKrewsn} iinster!orl902P. B. Zdlss(U) gives 98. At Kew (12) the mean for individual years from 1898 to

1904 varied from 141 in 1900 to 179 in 1899, the mean from the seven yeais combined being 159. The large difference between the means obtained at Potsdam and Kremsmtinster, as compared to the comparative similarity between the results for Kew and Karasjok, suggests that the mean value of the potential gradient may be much more dependent on local conditions than on difference of latitude.

At any single station potential gradient has a wide range of values. The largest positive and negative values recorded are met with during disturbed weather. During thunderstorms the record from an electrograph shows large sudden excursions, the trace usually going off the sheet with every flash of lightning when the thunder is near. Exactly what the potential changes amount to under such circumstances it is impossible to say; what the trace shows depends largely on the type of electrometer. Large rapid changes are also met with in the absence of thunder during heavy rain or snow fall.

In England the largest values of a sufficiently steady character to be shown correctly by an ordinary electrograph occur during winter fogs. At such

times gradients of +400 or +500 volts per metre are by no means unusual at Kew, and voltages of 700 or 800 are occa- sionally met with.

5. Annual Variation. — Table I. gives the annual variation of the potential gradient at a number of stations arranged according to latitude, the mean value for the whole year being taken in each case as 100. Karasjok as already mentioned is in the extreme north of Norway (69 17′ N.) ; Sodankyla was the Finnish station of the international polar year 1882-1883. At Batavia, which is near the equator (6° 11′ S.) the annual variation seems somewhat irregular. Further, the results obtained with the water-dropper at two heights — viz. 2 and 7-8 metres — differ notably. At all the other stations the difference between summer and winter months is conspicuous. From the European data one would be disposed to conclude that

Table II.

— Diurnal Variation Potential Gradient.

Station.

Karasjok.

Sodankyla.

Kew (19, 12).

Greenwich.

Florence.

Perpignan.

Lisbon.

Tokyo.

Batavia.

Cape Horn(20).

Period.

1903-4.

1882-83.

1862- 1864.

1898- 1904-

1893-96.

1883-85.

1886-88.

1884-86.

1897-98. 1 900-1.

1887- 1890.

1890- 1895-

1882-83.

Days.

All.

All.

Quiet.

All.

All.

Fine.

All.

All.

Dry.

Dry.

Pds.

h

5-5

30

3-5

3-35

3-0

8-4

3-0

i-7

2

7-8

3-5

I

2‘5

1-0

1-3

i-8

1-5

o-5

2-0

2-0

Hour.

1

83

91

87

93

97

92

78

84

IOI

147

125

82

2

73

85

79

88

89

83

72

80

98

141

114

73

3

66

82

74

84

87

77

71

78 ‘

97

135

109

85

4

63

84

72

83

86

75

72

81

99

128

102

81

5

60

89

7i

85

86

74

77

83

121

127

IOI

85

6

68

91

77

93

92

82

92

92

154

137

117

95

7

81

97

92

103

100

100

107

IOI

167

I5«

H7

106

8

87

100

106

112

102

112

114

105

149

104

119

118

9

94

98

107

“5

100

113

in

104

117

b 7

82

119

10

IOI

102

100

112

IOI

107

100

104

87

42

55

123

11

99

98

90

IOI

96

100

96

102

70

35

46

123

Noon.

i°3

102

92

94

97

95

99

108

61

30

43

115

1

106

105

90

89

96

92

99

in

54

30

42

112

2

108

107

91

87

94

90

97

114

49

30

43

94

3

108

108

92

88

95

89

99

109

53

33

46

89

4

109

108

98

93

97

89

105

108

61

4i

53

88

5

no

108

108

99

102

94

“3

108

76

67

73

84

6

119

no

121

108

108

113

126

in

95

91

108

no

7

129

102

134

115

in

121

131

116

107

120

145

107

8

136

in

139

118

“5

129

129

114

114.

137

155

123

9

139

in

138

119

117

132

120

109

119

146

155

112

10

133

104

128

“5

117

127

109

102

120

148

147

99

11

121

108

113

108

in

114

97

92

119

151

143

85

12

102

93

99

99

104

100

86

85

112

147

130

98

Table III-

-Diurna

Variation Potential Gradient.

Station.

Karasjok.

Sodankyla.

Kew.

Greenwich.

Bureau Central (21).

Eiffel Tower(21)

Perpignan (21).

Batavia. (2 m.)

Period.

1903-4.

1882-83.

1

898-1904.

1894 and ‘96.

1894-99.

1896-98.

1885-95-

1887-90.

Winter.

Summer.

Winter.

Summer.

Winter.

Equinox.

Summer.

Winter.

Summer.

Winter.

Summer.

Summer.

Winter.

Summer.

Winter.

Summer.

Hour.

1

76

104

90

99

91

93

96

87

no

79

102

90

72

88

145

I49

2

66

96

79

84

86

88

90

84

IOI

71

92

83

67

83

139

142

3

57

89

78

90

82

85

85

7 6

98

70

88

79

66

81

137

135

4

55

83

74

99

81

84

84

77

96

69

84

76

67

83

131

I27

5

5°

79

74

m

82

87

90

78

94

75

94

78

72

92

I32

123

6

61

83

80

114

86

97

IOI

82

101

83

106

87

84

107

138

136

7

78

89

86

117

95

109

113

94

107

98

118

97

104

114

166

153

8

82

93

95

122

104

118

120

97

in

in

120

103

122

108

118

92

9

90

93

91

109

in

119

119

98

102

113

106

no

126

100

74

64

10

104

93

106

IOI

114

no

no

102

98

in

94

109

114 ‘

93

43

40

11

102

92

98

97

107

95

97

103

86

108

84

107

98

90

35

36

Noon.

119

90

98

100

102

86

87

107

94

106

77

104

99

95

31

3°

1

116

94

116

97

99

81

80

107

85

112

79

107

96

93

29

33

2

118

97

“3

97

97

80

76

109

82

112

81

no

94

90

28

32

3

119

100

121

93

99

82

76

in

78

in

78

107

95

88

24

41

4

U5

99

in

96

103

88

80

116

81

113

80

i°5

102

92

3°

49

5

120

106

105

106

108

96

87

112

93

120

85

106

115

98

60

74

6

131

104

115

92

in

109

98

114

98

124

97

109

128

no

88

94 ‘

7

136

no

118

102

114

120

in

117

99

124

123

113

133

122

119

122

8

134

“3

117

106

112

124

123

113

108

116

134

no

131

127

138

135

9

137

125

115

90

in

123

129

in

118

104

13°

109

124

125

145

147

. 10

125

135

112

90

108

118

125

no

124

97

122

105

in

117

148

148

11

114

126

113

103

103

109

116

102

120

90

115

IOI

96

108

149

152

12

96

in

95

85

96

99

105

93 “6

83

108

94

83

95

148

146

the variation throughout the year diminishes as one approaches the equator. It is decidedly less at Perpignan and Lisbon than at Potsdam, Kew and Greenwich, but nowhere is the seasonal difference more conspicuous than at Tokyo, which is south of Lisbon.

At the temperate stations the maximum occurs near mid- winter; in the Arctic it seems deferred towards spring.

6. Diurnal Variation. — Table II. gives the mean diurnal variation for the whole year at a number of stations arranged in order of latitude, the mean from the 2\ hourly values being taken as 100. The data are some from “all ‘ days, some from ” quiet,” ” fine ” or “dry” days. The height, h, and the distance from the wall, /, where the potential is measured are given in metres when known. In most cases two distinct maxima and minima occur in the 24 hours. The principal maximum is usually found in the evening between 8 and 10 P.M., the principal minimum in the morning from 3 to 5 A.M. At some stations the minimum in the afternoon is in- distinctly shown, but at Tokyo and Batavia it is much more con- spicuous than the morning minimum.

7. In Table III. the diurnal inequality is shown for “winter” and ” summer ” respectively. In all cases the mean value for the

24 hours is taken as 100. By " summer " is meant April to Sep- tember at Sodankyla, Greenwich and Bata- via ; May to August at Kew, Bureau Central (Paris), Eiffel Tower and Perpignan ; and May to July at Karas- jok. " Winter " in- cludes October to March at Sodankyla, Greenwich and Bata- via ; November to February at Kew and Bureau Central;

November to January at Karasjok, and December and Janu- ary at Perpignan. Mean results from March, April, Septem- ber and October at Kew are assigned to " Equinox."

At Batavia the difference between winter and summer is comparatively "small. Elsewhere there is a tendencyforthe double period, usually so pro- minent in summer, to become less pro- nounced in winter, the afternoon minimum tending to disappear. Even in summer the double period is not prominent in the arctic climate of Karasjok or on the top of the Eiffel Tower. The diurnal variation in summer at the latter station is shown graphically in the top curve of fig. I. It presents a remarkable resemblance to the adjacent curve, which gives the diurnal variation at mid-winter at the Bureau Central. The resemblance between these curves is much closer than that between the Bureau Central's own winter and summer curves. All three Paris curves show three peaks, the first and third representing the ordinary forenoon and afternoon maxima. In summer at the Bureau Central the intermediate peak nearly dis- appears in the profound afternoon depression, but it is still recogniz- able. This three-peaked curve is not wholly peculiar to Paris, being seen, for instance, at Lisbon in summer. The December and June

100

Bureau Central Winter

Bureau Central

Summer

100

Kew December 100

Kew Potential 100

Kew Barometric 100 Pressure

curves for Kew are good examples of the ordinary nature of the differ- ence between midwinter and midsummer. The afternoon minimum at Kew gradually deepens as midsummer approaches. Simultaneously the forenoon

maximum occurs earlier and the afternoon maximum later in the day. The two last curves in the diagram contrast the diurnal variation at Kew in potential gradient and in barometric pressure for the year as a whole. The somewhat remarkable resemblance between the diurnal variation for the two elements, first remarked on by J. D. Everett (19), is of interest in connexion with recent theoretical conclusions by J. P. Elster and H. F. K. Geitel and by H. Ebert.

In the potential curves of the diagram the ordinates represent the hourly values expressed — as in Tables II. and III. — as percentages of the mean value for the day. If this be overlooked, a wrong im- pression may be derived as to the absolute amplitudes of the changes. The Kew curves, for instance, might suggest that the range (maximum less minimum hourly value) was larger in June than in December. In reality the December range was 82, the June only 57 volts; but the mean value of the potential was 243 in December as against ill in June. So again, in the case of the Paris curves, the absolute value of the diurnal range in summer was much greater for the Eiffel Tower than for the Bureau Central, but the mean voltage was 2150 at the former station and only 134 at the latter.

8. Fourier Coefficients. — Diurnal inequalities such as those of Tables II. and III. and intended to eliminate irregular changes, but they also to some extent eliminate regular changes if the hours of maxima and minima or the character of the diurnal variation alter throughout the year. The alteration that takes place in the regular diurnal inequality throughout the year is best seen by analysing it into a Fourier series of the type

Cisin (t+ai)+Cisin (2/+a 2)+c 3 sin (st+aˆ+d sin (4/4-04) + . . .

where t denotes time counted from (local) midnight, c\, C2, £3, Ct, . . . are the amplitudes of the component harmonic waves of periods 24, 12, 8 and 6 hours; a l} a?, a 3 , at, are the corresponding phase angles. One hour of time / is counted as 15 , and a delay of one hour in the time of maximum answers to a diminution of 15 in cj, of 30 in 02, and so on. If oi,' say, varies much throughout the year, or if the ratios of Ci, c s , Ct, . . . to Ci, vary much, then a diurnal inequality derived from a whole year, or from a season composed of several months, represents a mean curve arising from the superposition of a number of curves, which differ in shape and in the positions of their maxima and minima. The result, if considered alone, in- evitably leads to an underestimate of the average amplitude of the regular diurnal variation.

It is also desirable to have an idea of the size of the irregular changes which vary from one day to the next. On stormy daysˆ as already mentioned, the irregular changes hardly admit of satis- factory treatment.

Even on the quietest days irregular changes are always numerous and often large.

Table IV. aims at giving a summary of the several phenomena for a single station, Kew, on electrically quiet days. The first line gives the mean value of the potential gradient, the second the mean excess of the largest over the smallest hourly value on individual days. The hourly values are derived from smoothed curves, the object being to get the mean ordinate for a 60-minute period. If the actual crests of the excursions had been measured the figures in the second line would have been even larger. The third line gives the range of the regular diurnal inequality, the next four lines the amplitudes of the first four Fourier waves into which the regular diurnal inequality has been analysed. These mean values, ranges- and amplitudes are all measured in volts per metre (in the open). The last four lines of Table IV. give the phase angles of the first four Fourier waves.

It will be noticed that the difference between the greatest and least hourly values is, in all but three winter months, actually larger than the mean value of the potential gradient for the day; it bears to the range of the regular diurnal inequality a ratio vary- ing from 2-0 in May to 3-6 in November.

At midwinter the 24-hour term is the largest, but near midsummer it is small compared to the 12-hour term. The 24-hour term is very variable both as regards its amplitude and its phase angle (and so

Table IV. — Absolute Potential Data at Kew (12).

Jan.

Feb.

March.

April.

May.

June.

July.

Aug.

Sept.

Oct.

Nov.

Dec.

Mean Potential Gradient Mean of individual daily ranges Range in Diurnal inequality

[Cl jet

Amplitudes of Fourier waves] c 5

ffll

Jo,

Phase angles ‘of Fourier waves | a t

la t

201 203

73 22 21

7

2

224 218

94 22

33 10

3

180

210

83

17

34 5 5

138

164

74

13

31

5

6

123

143

71

18

22

3 4

in

132

57

9

23

1

1

98 117

55 6

24 3 4

114

129

60

6

26

2

3

121

141

54

9

23

3

4

153 196

63 7

30 6 3

200

186

52

14

17

5

2

243 .

213

82

30

21

7

3

206

170

11

235

204 171

9

225

O

123

186

36

307

O

72

193 96

3H

O

86 188 100

3H

79 183 125

277

48 185 124

293

O

142 182 107 313

154

199

16

330

192

266

18

288

e

202

212

38

238

O

208

175

36

249

86 4

its hour of maximum). The 12-hour term is much less variable, especially as regards its phase angle; its amplitude shows distinct maxima near the equinoxes. That the 8-hour and 6-hour waves, though small near midsummer, represent more than mere accidental irregularities, seems a safe inference from the regularity apparent in the annual variation of their phase angles.

9. Table V, gives some data for the 24-hour and 12-hour Fourier coefficients, which will serve to illustrate the diversity between different stations. In this table, unlike Table IV., amplitudes are all expressed as decimals of the mean value of the potential gradient for the corresponding season. " Winter " means generally the four midwinter, and " summer " the four midsummer, months; but at Karasjok three, and at Kremsmiinster six, months are included in each season. The results for the Sonnblick are derived from a comparatively small number of days in August and September. At Potsdam the data represent the arithmetic means derived from the Fourier analysis for the individual months comprising the season. The 1862-1864 data from Kew — due to J. D. Everett (19) — are based on "all" days; the others, except Karas- jok to some extent, represent electrically quiet days. The cause of the large difference between the two sets of data for ft at

Table V. — Fourier Series Amplitudes and Phase Angles.

nearly uniform for heights up to 30 to 40 metres above the ground. At great heights free balloons seem necessary. The balloon carries two collectors a given vertical distance apart. The potential differ- ence between the two is recorded, and the potential gradient is thus found. Some of the earliest balloon observations made the gradient increase with the height, but such a result is now regarded as abnormal. A balloon may leave the earth with a charge, or become charged through discharge of ballast. These possibilities may not have been sufficiently realized at first. Among the most important balloon observations are those by le Cadet (1) F. Linke (28) and H. Gerdien (29). The following are samples from a number of days' results, given in le Cadet's book, h is the height in metres, P the gradient in volts per metre.

Ana o t8oi 5 * 82 4 830 1060 1255 1290 1745 1940 2080 2310 2520
Aug. 9, I893 i p _, 7 43 4S 4I 42 34 25 21 18 16

Place

Period.

Winter.

Summer.

ft.

c 2 .

. ■ al –

a 2 .

ft.

c 2 .

01.

a 2 .

Kew .

Bureau Central Eiffel Tower Sonnblick (22) Karasjok . Kremsmiinster (23) Potsdam

1862-64

1 898- 1 904

1894-98

1896-98

1902-3

1903-4

1902

1904

0-283

•102 •220

•356 ■280 •269

0-160

•103 •104

•144 •117

•IOI

184 206

223

189 224

194

193

I80

206

155 194

185

0-127

•079 •130

•133 •208

•165 •166 •096

0-229

•213 •200 •085 •120 •093 ■153 •152

III

87 95 216 178 141 241 343

179 186 197 171

H5

144 209

185

Kew is uncertain. The potential gradient is in all cases lower in summer than winter, and thus the reduction in ft in summer would appear even larger than in Table V. if the results were expressed in absolute measure. At Karasjok and Kremsmiinster the seasonal variation in ai seems comparatively small, but at Potsdam and the Bureau Central it is as large as at Kew. Also, whilst the winter values of a t are fairly similar at the several stations the summer values are widely different. Except at Karasjok, where the diurnal changes seem somewhat irregular, the relative amplitude of the 12-hour term is considerably greater in summer than in winter. The values of a 2 at the various stations differ comparatively little, and show but little seasonal change. Thus the 12-hour term has a much greater uniformity than the 24-hour term. This possesses signifi- cance in connexion with the view, supported by A. B. Chauveau (21), F. Exner (24) and others, that the 12-hour term is largely if not entirely a local phenomenon, due to the action of the lower atmo- spheric strata, and tending to disappear even in summer at high altitudes. Exner attributes the double daily maximum, which is largely a consequence of the 12-hour wave, to a thin layer near the ground, which in the early afternoon absorbs the solar radiation of shortest wave length. This layer he believes specially characteristic of arid dusty regions, while comparatively non-existent in moist climates or where foliage is luxuriant. In support of his theory Exner states that he has found but little trace of the double maximum and minimum in Ceylon and elsewhere. C. Nordmann (25) describes some similar results which he obtained in Algeria during August and September 1905. His station, Philippeville, is close to the shores of the Mediterranean, and sea breezes persisted during the day. The diurnal variation showed only a single maximum and minimum, between 5 and 6 p. M. and 4 and 5 A. M. respectively. So again, a few days' observations on the top of Mont Blanc (4810 metres) by le Cadet (26) in August and September 1902, showed only a single period, with maximum between 3 and 4 P. M., and minimum about 3 a.m. Chauveau points to the reduction in the 12-hour term as compared to the 24-hour term on the Eiffel Tower, and infers the practical disappearance of the former at no great height. The close approach in the values for ft in Table V. from the Bureau Central and the Eiffel Tower, and the reduction of c 2 at the latter station, are unquestionably significant facts; but the summer value for c 2 at Karasjok — a low level station — is nearly as small as that at the Eiffel Tower, and notably smaller than that at the Sonnblick (3100 metres). Again, Kew is surrounded by a large park, not devoid of trees, and hardly the place where Exner's theory would suggest a large value for c 2 , and yet the summer value of c 2 at Kew is the largest in Table V.

1 o. Observations on mountain tops generally show high potentials near the ground. This only means that the equipotential surfaces are crowded

together, just as they are near the ridge of a house. To ascertain how the increase in the voltage varies as the height in the free atmosphere increases, it is necessary to employ kites or' balloons. At small heights Exner (27) has employed captive balloons, provided with a burning fuse, and carrying a wire con- nected with an electroscope on the ground. He found the gradient

*Sen 11 1807 – * IX 4° J 378 1630 1914 2370 2786 3136 3364 3912 4085 aep.ii, i»97} p 43 3 g 33 25 22 2I lg lg I4 I3*

The ground value on the last occasion was 150. From observations during twelve balloon ascents, Linke concludes that below the 1500-metre level there are numerous sources of disturbance, the gradient at any given height varying much from day to day and hour to hour ; but at greater heights there is much more uni- formity. At heights from 1500 to 6000 metres his observations agreed well with the formula

dV/dh = 34.—o-oo6h, V denoting the potential, h the height in metres. The formula makes the gradient diminish from 25 volts per metre at 1500 metres height to 10 volts per metre at 4000 metres. Linke's mean value for dVjdh at the ground was 125. Accepting Linke's formula, the potential at 4000 metres is 43,750 volts higher than at 1500 metres. If the mean of the gradients observed at the ground and at 1500 metres be taken as an approxi- mation to the mean value of the gradient throughout the lowest 1500 metres of the atmosphere, we find for the potential at 1500 metres level 112,500 volts. Thus at 4000 metres the potential seems of the order of 150,000 volts. Bearing this in mind, one can readily imagine how close together the equipotential surfaces must lie near the summit of a high sharp mountain peak.

11. At most stations a negative potential gradient is exceptional, unless during rain or thunder. During rain the potential is usually but not always negative, and frequent alternations of sign are not uncommon. In some localities, however, negative potential gradient is by no means uncommon, at least at some seasons, in the absence of rain. At Madras, Michie Smith (30) often observed negative potential during bright August and September days. The pheno- menon was quite common between 9-30 a.m. and noon during westerly winds, which at Madras are usually very dry and dusty. At Sodankyla, in 1882-1883, K. S. Lemstrom and F. C. Biese (31) found that out of 255 observed occurrences of negative potential, 106 took place in the absence of rain or snow. The proportion of occurrences of negative potential under a clear sky was much above its average in autumn. At Sodankyla rain or snowfall was often unaccompanied by change of sign in the potential. At the polar station Godthaab (32) in 1882-1883, negative potential seemed some- times associated with aurora (see Aurora Polaris).

Lenard, Elster and Geitel, and others have found the potential gradient negative near waterfalls, the influence sometimes extending to a considerable distance. Lenard (33) found that when pure water falls upon water the neighbouring air takes a, negative charge. Kelvin, Maclean and Gait (34) found the effect greatest in the air near the level of impact. A sensible effect remained, however, after the influence of splashing was eliminated. Kelvin, Maclean and Gait regard this property of falling water as an objection to the use of a water-dropper indoors, though not of practical importance when it is used out of doors.

12. Elster and Geitel (35) have measured the charge carried by raindrops falling into an insulated vessel. Owing to observational difficulties, the exact measure of success attained is a little difficult to gauge, but it seems fairly certain that raindrops usually carry a. charge. Elster and Geitel found the sign of the charge often fluctuate repeatedly during a single rain storm, but it seemed more often than not opposite to that of the simultaneous potential gradient. Gerdien' has more recently repeated the experiments, employing an apparatus devised by him for the purpose. It has been found by C. T. R. Wilson (36) that a vessel in which freshly fallen rain or snow has been evaporated to dryness shows radioactive properties lasting for a few hours. The results obtained from equal weights of rain and snow seem of the same order.

13. W. Linss (6) found that an insulated conductor charged either positively or negatively lost its charge in the free atmosphere ; the potential V after time / being connected with its initial value Vo by a formula of the type V = V e — al where a is constant. This was, confirmed by Elster and Geitel (7), whose form of dissipation appa- ratus has been employed in most recent work. The percentage of the

charge which is dissipated per minute is usually denoted by a + or o_ according to its sign. The mean of a + and c_ is usually de- noted by a+ or simply by a, while q is employed for the ratio a_/c + . Some observers when giving mean values take 2(a_/a+) as the mean value of q, while others take 2(a_)/2(a +). The Elster and Geitel apparatus is furnished with' a cover, serving to protect the dissipator from the direct action of rain, wind or sunlight. It is usual to observe with this cover on, but some observers, e.g. A. Gockel, have made long series of observations without it. The loss of charge is due to more than one cause, and it is difficult to attribute an absolutely definite meaning even to results obtained with the cover on. Gockel (37) says that the results he obtained without the cover

when divided by 3 are fairly comparable with those obtained under the usual conditions; but the appropriate divisor must vary to some extent with the climatic conditions. Thus results obtained for a + or a_ with- out the cover are of doubtful value for purposes of comparison with those found elsewhere with it on. In the case of q the uncertainty is much less.

Table VI. gives the mean values of a± and q found at various places. The observations were usually confined to a few hours of the day, very commonly between 11 a.m. and 1 p.m., and in absence of in- formation as to the diurnal variation it is impossible to say how much this influences the results. The first eight stations lie inland; that at Seewalchen (38) was, however, adjacent to a large lake. The next five stations are on the coast or on islands. The final four are at high levels. In the cases where the observations were con- fined to a few months the representative nature of the results is more doubtful.

On mountain summits q tends to be large, i.e. a negative charge is lost much faster than a positive charge. Apparently q has also a tendency to be large near the sea, but this phenomenon is not seen at Trieste. An exactly opposite phenomenon, it may be remarked, is seen near waterfalls, q becoming very small. Only Innsbruck and Mattsee give a mean value of q less than unity. Also, as later observations at Innsbruck give more normal values for g, some doubt

Table VI. — Dissipation. Mean Values.

Table VII. gives comparative results for winter (October to March) and summer at a few stations, the value for the season being the arithmetic mean from the individual months composing it. At Karasjok (10), Simpson observed thrice a day; the summer value there is nearly double the winter both for a + and a_. The Krems- munster (42) figures show a smaller but still distinct excess in the summer values. At Trieste (47), Mazelle's data from all days of the year show no decided seasonal change in a+ or a_ ; but when days on which the wind was high are excluded the summer value is decidedly the higher. At Freiburg (43), q seems decidedly larger in

Table VII. — Dissipation.

Place.

Winter.

Summer.

a+

o_{-}

$a \pm$

2

$a +$

o_{-}

$^{\circ} \pm$

S

Karasjok 1903-1904 Kremsmunster 1903 . Freiburg

Trieste 1902-1903 ,, calm days

2-28

1-14 0-56

2-69 1-30

o-59

2-49

1-22

o : 58 o-35

i-i8

1-14

i-57

1-07

4-38

i-38

o-55

4-94 1-56

o-6i

4-65

1-47

o : 58

0-48

I-I3

I-I2

1-26

I-I3

Place.

Period.

Season.

Observer or Authority.

a+

2

Karasjok . . . .

1903-4

Year

Simpson (10)

3-57

i-i5

Wolfenbuttel

Year

Elster and Geitel(39)

i-33

1-05

Potsdam . . . .

1904

Year

Ludeling (40)

1 -1.3

1-33 ,

Kremsmunster

1902

Year

Zeiss (41)

1-32

1-18

,, ...

1903

Year

Zolss (42)

1-35

i-i+

Freiburg ....

Year

Gockel (43)

1-41

Innsbruck ....

1902

Czermak (44)

i-95

0-94

,, ...

1905

Jan. to June

Defant (45)

1-47

1-17

Mattsee (Salzburg)

1905

July to Sept.

von Schweidler (46)

0-99

Seewalchen ….

1904

July to Sept.

von Schweidler (38)

1-18

Trieste

1902-3

Year

Mazelle (47)

0-58

1-09

Misdroy

1902

Ludeling (40)

1-09

1-58

Swinemiinde

1904

Aug. and Sept.

Ludeling (40)

1-23

i-37

Heligoland (sands)

1903

Summer

Elster and Geitel (40)

1-14

1-71

,, plateau

It

>t

„ (40)

3-o7

1-50

Juist (Island)

»»

„ (48)

1-56

1-56

Atlantic and German Ocean

1904

August

Boltzmann (49)

I-8 3

2-69

Arosa (1800 m.) .

1903

Feb. to April

Saake (SO)

179

1-22

Rothhorn (2300 m.) .

1903

September

Gockel (43)

5‘3i

Sonnblick (3100 m.) .

1903

September

Conrad (22)

1-75

Mont Blanc (4810 m.)

1902

may be felt as to the earlier observations there. The result for Mattsee seems less open to doubt, for the observer, von Schweidler, had obtained a normal value for q during the previous year at Seewalchen. Whilst the average q in at least the great majority of stations exceeds unity, individual observations making q less than unity are not rare. Thus in 1902 (51) the percentage of cases in which q fell short of I was 30 at Trieste, 33 at Vienna, and 35 at Krems- munster; at Innsbruck q was less than 1 on 58 days out of 98.

In a long series of observations, individual values of q show usually a wide range. Thus during observations extending over more than a year, q varied from 0'i8 to 8-25 at Kremsmunster and from o-n to 3-00 at Trieste. The values of a + , a_ and a+ also show large variations. Thus at Trieste a+ varied from 0-12 to 4-07, and a_ from o-n to 3-87; at Vienna a + varied from 0-32 to 7-10, and a_ from 0-78 to 5-42; at Kremsmunster a+ varied from 0-14 to 5-83-

14. Annual Variation. — When observations are made at irregular hours, or at only one or two fixed hours, it is doubtful how repre- sentative they are. Results obtained at noon, for example, probably differ more from the mean value for the 24 hours at one season than at another. Most dissipation results are exposed to considerable uncertainty on these grounds. Also it requires a long series of years to give thoroughly representative results for any element, and few stations possess more than a year or two's dissipation data.

11. 28

winter than in summer; at Karasjok and Trieste the seasonal effect in q seems small and uncertain.

15. Diurnal Variation. — P. B. Zolss (41, 42) has published dirunal variation data for Kremsmunster for more than one year, and independently for midsummer (May to August) and midwinter (December to February). His figures show a double daily period in both a + and a_, the principal maximum occurring about I or 2 P.M. The two minima occur, the one from 5 to 7 A.M., the other from 7 to 8 P.M. ; they are nearly equal. Taking the figures answer- ing to the whole year, May 1903 to 1904, a + varied throughout the day from 0-82 to 1-35, and a_ from 0-85 to 1-47. At midsummer the extreme hourly values were 0-91 and 1-45 for

a + , 0-94 arid I 60 for o_. The corresponding figures at midwinter were 0-65 and 1-19 for a + , o-6i and 1-43 for

variation is somewhat irregular. At Karas- jok, Simpson found a + and

Summer observations on mountains have shown diurnal variations very large and fairly regular, but widely different from those observed at lower levels. On the Rothhorn, Gockel (43) found a + particu- larly variable, the mean 7 A.M. value being 4§ times that at 1 P.M. g (taken as 2(a_/a +) varied from 2-25 at 5 A.M. and 2-52 at 9 p.m. to 7-82 at 3 p.m. and 8-35 at 7 p.m. On the Sonnblick, in early Septem- ber, V. Conrad (22) found somewhat similar results for q, the principal maximum occur- ring at 1 P.M., with minima at 9 p.m. and 6 a.m. ; the largest hourly value was, however, scarcely double the least. Conrad found a_ largest at 4 a.m. and least at 6 p.m., the largest value being double the least ; a + was largest at 5 a.m. and least at 2 p.m., the largest value being fully 2\ times the least. On Mont Blanc, le Cadet (43) found q largest from I to 3 P.M., the value at either of these hours being more than double that at 1 1 a.m. On the Patscherkofel, H. .von Ficker and A. Defant (52), observing in December, found q largest from I to 2 P.M. and least between 11 A.M. and noon, but the largest value was only I J times the least. On mountains much seems to depend on whether there are rising or falling air currents, and results from a single season may not be fairly representative.

16. Dissipation seems largely dependent on meteorological con- ditions, but the phenomena at different stations vary so much as to suggest that the connexion is largely indirect. At most stations a + and a_ both increase markedly as wind velocity rises. From the observations at Trieste in 1902-1903 E. Mazelle (47) deduced an increase of about 3% in a + for a rise of 1 km. per hour in wind velocity. The following are some of his figures, the velocity v being in kilometres per hour : —

V

to 4.

20 to 24

40 to 49.

60 to 69.

a

1

o-33 I-I3

0-64 1-19

1-03

I-OO

1-38

0-96

For velocities from o to 24 km. per hour q exceeded unity in 74 cases out of 100; but for velocities over 50 km. per hour g exceeded unity

in only 40 cases out of loo. Simpson got similar results at Karasjok ; the rise in a + and a_ with increased wind velocity seemed, however, larger in winter than in summer. Simpson observed a fall in q for wind velocities exceeding 2 on Beaufort's scale. On the top of the Sonnblick, Conrad observed a slight increase of a± as the wind velocity increased up to 20 km. per hour, but for greater velocities up to 80 km. per hour no further decided rise was observed.

At Karasjok, treating summer and winter independently, Simpson (10) found a + and a_ both increase in a nearly linear relation with temperature, from below 20° to + 15° C. For ex ample, when the temperature was below -20° mean values were 0-76 for a + and 091 for a_; for temperatures between -10° and -5° the corresponding means were 2-45 and 2-82; while for temperatures between +10° and +15 they were 4-68 and 5-23. Simpson found no certain temperature effect on the value of q. At Trieste, from 470 days when the wind velocity did not exceed 20 km. per hour, Mazelle (47) found somewhat analogous results for temperatures from 0° to 30° C. ;

Observations on the Sonnblick agree with those at low-level stations in showing a diminution of dissipation with increase of relative humidity. The decrease is most marked as saturation approaches. At Trieste, for example, for relative humidities be- tween 90 and 100 the mean a± was less than half that for relative humidities under 40. With certain dry winds, notably Fohn winds in Austria and Switzerland, dissipation becomes very high.

Thus at Innsbruck Defant (45) found the mean dissipation on days of Fohn fully thrice that on days without Fohn. The increase was largest for

The results obtained as to the relation between dissipation and barometric pressure are conflicting. At Kremsmiinster, Zolss (42) found dissipation vary with the absolute height of the barometer, a± having a mean value of 1-36 when pressure was below the normal, as against 1-20 on days when pressure was above the normal. He also found 0+ on the average about 10% larger when pressure was falling than when it was rising. On the Sonnblick, Conrad (22) found dissipation increase decidedly as the absolute barometric pressure was larger, and he found no difference between days of rising and falling barometer. At Trieste, Mazelle (47) found no certain connexion with absolute barometric pressure. Dissipation was .above the average when cyclonic conditions prevailed, but this seemed simply a consequence of the increased wind velocity. At Mattsee, E. R. von Schweidler (46) found no connexion between absolute barometric pressure and dissipation, also days of rising and falling pressure gave the same mean. At Kiel, K. Kaehler (53) found o + and a_ both greater with rising than with falling barometer.

V. Conrad and M. Topolansky (54) have found a marked connexion at Vienna between dissipation and ozone. Regular observations were made of both elements. Days were grouped according to the intensity of colouring of ozone papers, o representing no visible effect, and 14 the darkest colour reached. The mean values of a + and a_ answering to 12 and 13 on the ozone scale were both about double the corresponding values answering to o and I on that scale.

17. A charged body in air loses its charge in more than one way. The air, as is now known, has always present in it ions, some carrying a positive and others a negative charge, and those having the opposite sign to the charged body are attracted and tend to dis- charge it. The rate of loss of charge is thus largely dependent on the extent to which ions are present in the surrounding air. It depends, however, in addition on the natural mobility of the ions, and also on the opportunities for convection. Of late years many observations have been made of the ionic charges in air. The best-known appa- ratus for the purpose is that devised by Ebert. A cylinder condenser has its inner surface insulated and charged to a high positive or negative potential. Air is drawn by an aspirator between the sur- faces, and the ions having the opposite sign to the inner cylinder are deposited on it. The charge given up to the inner cylinder is known from its loss of potential. The volume of air from which the ions have been extracted being known, a measure is obtained of the total charge on the ions, whether positive or negative. The con- ditions must, of course, be such as to secure that no ions shall escape, otherwise there is an underestimate. I + is used

to denote the charge on positive ions, I_ that on negative ions. The unit to which they are ordinarily referred is I electrostatic unit of electricity per cubic metre of air. For the ratio of the mean value of I + to the mean value of I_, the letter Q is employed by Gockel (55), who has made an unusually complete study of ionic charges at Freiburg. Numerous observations were also made by Simpson (10) — thrice a day — at

Karasjok, and von Schweidler has made a good many observations about 3 P.M. at Mattsee (46) in 1905, and Seewalchen (38) in 1904. These will suffice to give a general idea of the mean values met with.

Station.

Authority.

1 +

*I_*

Q

Freiburg …. Karasjok …. Mattsee …. Seewalchen

Gockel

Simpson

von Schweidler

o-34

0-38

o-35 o-45

0-24

o-33

0-29 0-38

1-41

1-17 119 1-17

Gockel's mean values of I + and Q would be reduced to 0-31 and 1-38 respectively if his values for July — which appear abnormal — were

omitted. I + and I_ both show a considerable range of values, even at the same place during the same season of the year. Thus at Seewalchen in the course of a month's observations at 3 P.M., I + varied from 0-31 to 067, and I_ from 0-17 to 0-67.

There seems a fairly well marked annual variation in ionic contents, as the following figures will show. Summer and winter represent each six months and the results are arithmetic means of the monthly values.

Freiburg.

Karasjok.

1 +

*I_*

Q

I +

*I_*

Q

Winter Summer .

0-29 0-39

0-21 0-28

1-49 1-34

o-33

0-44

0-27

o-39

1-22

I-I3

If the exceptional July values at Freiburg were omitted, the summer values of 1 + and Q would become 0-33 and I -25 respectively.

18. Diurnal Variation. — At Karasjok Simpson found the mean values of I + and I_ throughout the whole year much the same between noon and 1 P.M. as between 8 and 9 A.M. Observations between 6 and 7 p.m. gave means slightly lower than those from the earlier hours, but the difference was only about 5 % in 1+ and 10 % in I_. The evening values of Q were on the whole the largest. At Freiburg, Gockel found I + and I_ decidedly larger in the early afternoon than in either the morning or the late evening hours. His greatest and least mean hourly values and the hours of their occurrence are as follows : —

Winter.

Summer.

I +

I

1+

I

-

Max. o-333

2 P.M.

Min.

0-193

7 P.M.

Max.

0-242

2 P.M.

Min.

0-130

8 P.M.

Max. o-430

4 P.M.

Min.

0-244

9 to

IO P.M.

Max.

0-333

4 P.M.

Min.

0-192

9 to

IO P.M.

Gockel did not observe between 10 p.m. and 7 A.M.

19. Ionization seems to increase notably as temperature rises. Thus at Karasjok Simpson found for mean values : —

Temp, less than -20° -10° to -5° . io° to 15

I + =o-l8, I_ = o-i6 I + = o-36, I_ = o-30 I + = o-45, I_ = o-43

Simpson found no clear influence of temperature on Q. Gockel; observed similar effects at Freiburg — though he seems doubtful whether the relationship is direct — but the influence of temperature on 1+ seemed reduced when the ground was covered with snow. Gockel found a diminution of ionization with rise of relative humidity. Thus for relative humidities between 40 and 50 mean values were 0-306 for I + and 0-219 f° r I-; whilst for relative humidities between 90 and 100 the corresponding means were re- spectively 0-222 and 0-134. At Karasjok, Simpson found a slight decrease in I_ as relative humidity increased, but no certain change in I+. Specially large values of I + and I_ have been observed at high levels in balloon ascents. Thus on the 1st of July 1901, at a height of 2400 metres, H. Gerdien (29) obtained o-86 for I + and 1-09 for I_.

20. In 1901 Elster and Geitel found that a radioactive emanation is present

*in the atmosphere. Their method of measuring the radio- activity is as follows (48) : A wire not exceeding I mm. in diameter, charged to a negative potential of at least 2000 volts, is supported between insulators in the open, usually at a height of about 2 metres. After two hours' exposure, it is wrapped round a frame supported in a given position relative to Elster and Geitel's dissipation appa- ratus, and the loss of charge is noted. This loss is proportional to the length of the wire. The radioactivity is denoted by A, and A = *l signifies that the potential of the dissipation apparatus fell I volt in an hour per metre of wire introduced. The loss of the dissipation body due to the natural ionization of the air is first allowed for. Suppose, for instance, that in the absence of the wire the potential falls from 264 to 255 volts in 15 minutes, whilst when the wire (10 metres long) is introduced it falls from 264 to 201 volts in 10 minutes, then*

10A = (264 — 201) x6 — (264— 255) X4 = 342 ; or A =34-2.

The values obtained for A seem largely dependent on the station.

At Wolfenbiittel, a year's observations by Elster and Geitel (56) made A vary from 4 to 64, the mean being 20. In the island of Juist, off the Friesland coast, from three weeks' observations they obtained only 5-2 as the mean. On the other hand, at Altjoch, an Alpine station, from nine days' observations in July 1903 they obtained a mean of 137, the maximum being 224, and the minimum 92. At Freiburg, from 150 days' observations near noon in 1903-1904, Gockel (57) obtained a mean of 84, his extreme values being 10 and 420. At Karasjok, observing several times throughout the day for a good many months, Simpson (10) obtained a mean of gˆ and a maximum of 432. The same observer from four weeks' observations at Hammerfest got the considerably lower mean value 58, with a maximum of 252. At this station much lower values were found for A with sea breezes than with land breezes. Observing on the pier at Swinemtinde in August and September 1904, Liideling (40) obtained a mean value of 34.

Elster and Geitel (58), having found air drawn from the soil highly radioactive, regard ground air as the source of the emanation in the atmosphere, and in this way account for the low values they obtained for A when observing on or near the sea. At Freiburg in winter Gockel (55) found A notably reduced when snow was on the ground, 1+ being also reduced. When the ground was covered by snow the mean value of A was only 42, as compared with 81 when there was no snow.

J. C. McLennan (59) observing near the foot of Niagara found A only about one-sixth as large as at Toronto. Similarly at Altjoch, Elster and Geitel (56) found A at the foot of a waterfall only about one-third of its normal value at a distance from the fall.

21. Annual and Diurnal Variations. — At Wolfenbiittel, Elster and Geitel found A vary but little with the season. At Karasjok, on the contrary, Simpson found A much larger at midwinter — notwithstanding the presence of snow — than at midsummer. His mean value for November and December was 129, while his mean for May and June was only 47 He also found a marked diurnal variation, A being considerably greater between 3 and 5 a.m. or 8-30 to 10-30 p.m. than between 10 A.M. and noon, or between 3 and 5 P.M.*

At all seasons of the year Simpson found A rise notably with increase of relative humidity. Also, whilst the mere absolute height of the barometer seemed of little, if any, importance, he obtained larger values of A with a falling than with a rising barometer. This last result of course is favourable to Elster and Geitel's views as to the source of the emanation. .

22. For a wire exposed under the conditions observed by Elster and Geite\ the emanation seems to be almost entirely derived from radium. Some part, however, seems to be derived from thorium, and H. A. Bumstead (60) finds that with longer exposure of the wire the relative importance of the thorium emanation increases. With three hours' exposure he found the thorium emanation only from 3 to 5% of the whole, but with 12 hours' exposure the percentage of thorium emanation rose to about 15. These figures refer to the state of the wire immediately after the exposure ; the rate of decay is much more rapid for the radium than for the thorium emanation.

23. The different elements — potential gradient, dissipation, ionization and radioactivity — ■ are clearly not independent of one another. The loss of a charge is naturally largely dependent on the richness of the surrounding air in ions. This is clearly shown by the following results obtained by Simpson (10) at Karasjok for the mean values of 0+ corresponding to certain groups of values of I ± . To eliminate the disturbing influence of wind, different wind strengths are treated separately.

Table VIII. — Mean Values of a ± .

Wind Strength.

ItO to o-i.

O-I tO 0-2.

0-2 to 0-3

0-3 to 0-4.

0-4 to 0-5.

to 1

1 „ 2

1 2 „ 3

o-45

0-65

o-6o

1-08

1-26

1-85 2-70

2-04 2-92

3-88

3-°3

3-83 5-33

Simspon concluded that for a given wind velocity dissipation is practically a linear function of ionization.

24. Table IX. will give a general idea of the relations of potential gradient to dissipation and ionization.

Table IX. — Potential, Dissipation, Ionization,

Potential

gradients.

volts per

metre.

2

Karasjok (Simpson (10)).

Kremsmunster(41).

Freiburg (43).

Rothhorn (43).

0+

*o_*

I +

*I_*

Q

to 50

I-I2

50 „ 100

1-14

I-3I

4-29

4-67

0-43

o-39

i-n

100 ,, 150

1-24

1 69

3-38

3-93

o-37

0-32

i-i5

150 „ 200

1-48

1-84

i-«5

2-58

0-36

0-28

1-28

200 ,, 300

3-21

1-37

1-58

0-26

0-19

1-42

300 „ 400

4-33

060

0-85

400 „ 500

500 „ 700

8-75

If we regard the potential gradient near the ground as represent- ing a negative charge on the earth, then if the source of supply of that charge is unaffected the gradient will rise and become high when the operations by which discharge is promoted slacken their activity. A diminution in the number of positive ions would thus naturally be accompanied by a rise in potential gradient. Table IX. associates with rise in potential gradient a reduced number of both positive and negative ions and a diminished rate of dissipation whether of a negative or a positive charge. The rise in q and Q indicates that the diminished rate of dissipation is most marked for positive charges, and that negative ions are even more reduced then positive.

At KremsmiinsterZolss (41) finds a considerable similarity between the diurnal variations in q and in the potential gradient, the hours of the forenoon and afternoon maxima being nearly the same in the two cases.

No distinct relationship has yet been established between potential gradient and radioactivity. At Karasjok Simpson (10) found fairly similar mean values of A for two groups of observations, one confined to cases when the potential gradient exceeded +400 volts, the other confined to cases of negative gradient.

At Freiburg Gockel (55, 57) found that when observations were grouped according to the value of A there appeared a distinct rise in both a_ and I + with increasing A. For instance, when A lay between 100 and 150 the mean value of a_ was 1-27 times greater than when A lay between o and 50 ; while when A lay between 120 and 150 the mean value of I + was 1-53 times larger than when A lay between o and 30. These apparent relationships refer to mean values. In individual cases widely different values of a_ or I + are associated with the same value of A.

25. If V be the potential, p the density of free electricity at a point in the atmosphere, at a distance r from the earth's centre, then assuming statical conditions and neglecting variation ol V in horizon- tal directions, we have

r^{dldr) (r*dV/dr) +4xp = o.

For practical purposes we may treat r 2 as constant, and replace d/dr by d/dh, where h is height in centimetres above the ground.

We thus find p = – (i/^dW/dh*.

If we take a tube of force 1 sq. cm. in section, and suppose it cut by equipotential surfaces at heights hi and h 2 above the ground, we have for the total charge M included in the specified portion of the tube

4irM = (dV!dh)h-(dVjdh)ih.

Taking Linke's (28) figures as given in § 10, and supposing h\=o, A2 = i5Xio 4 , we find for the charge in the unit tube between the ground and 1500 metres level, remembering that the centimetre is now the unit of length, M = (1/471-) (i25-2s)/ioo. Taking 1 volt equal 1/300 of an electrostatic unit, we find M =0-000265. Between 1 500 and 4000 metres the charge inside the unit tube is much less, only 0-000040. The charge on the earth itself has its surface density given by

There is a difficulty in reconciling observed values of the ionization with the results obtained from balloon ascents as to the variation of the potential with altitude. According to H. Gerdien (61), near the ground a mean value for d?V/dh? is — (1/10) volt/ (metre) 2 . From this we deduce for the charge p per cubic centimetre (i/4?r) X io -6 (volt/cm 2), or2-7Xio- 9 electrostatic units. But taking, for example, Simpson's mean values at Karasjok, we have observed p= = I+- Ii = 0-05 X (cm./metre) 3 = 5 X I0"«, and thus (calculated p)/(observed p) =0-05 approximately. Gerdien himself makes I+ — I- considerably larger than Simpson, and con- cludes that the observed value of p is from 30 to 50 times that cal- culated. The presumption is either that d'v/dh 2 near the ground is much larger numerically than Gerdien supposes, or else that the ordinary instruments for measuring ionization fail to catch some species of ion whose charge is preponderatingly negative.

26. Gerdien (61) has made some calculations as to the probable

average value of the vertical elec- tric current in the atmosphere in fine weather. This will be com- posed of a conduction and a con- vection current, the latter due to rising or falling air currents carry- ing ions. He supposes the field near the earth to be 100 volts per metre, or 1/300 electrostatic units. For simplicity, he assumes I + and I_ each equal 0-25 Xio- 6 electro- static units. The specific velocities of the ions — i.e. the velocities in unit field — he takes to be 1-3X300 for the positive, and 1-6X300 for the negative. The positive and

negative ions travel in opposite directions, so the total current is (1/300X0-25 Xio -6) (1-3X300 + 1 -6X300), or 73 Xio~ in*

electrostatic measure, otherwise 2-4XIO 16 amperes per sq. cm. As to the con vection current, Gerdien supposes — as in § 25 — p = 2-7Xlo 9 electro static units, and on fine days puts the average velocity of rising air currents at 10 cm. per second. This gives a convection current of 2-7 Xio -8 electrostatic units, or about 1/27 of the conduction current. For the total current we have approximately 2-5 X io 16 amperes per sq. cm. This is insignificant compared to the size of the currents which several authorities have calculated from con siderations as to terrestrial magnetism (q.v.). Gerdien's estimate of the convection current is for fine weather conditions. During rainfall, or near clouds or dust layers, the magnitude of this current might well be enormously increased ; its direction would naturally vary with climatic conditions.

27. H. Mache (62) thinks that the ionization observed in the atmo- sphere may be wholly accounted for by the radioactive emanation. If this is true we should have g = a» 2 , where q is the number of ions of one sign made in I cc. of air per second by the emanation, a the constant of recombination, and n the number of ions found simul- taneously by, say, Ebert's apparatus. Mache and R. Holfmann, from observations on the amplitude of saturation currents, deduce 9 = 4 as a mean value. Taking for o Townsend's value i-2 + lo -6 , Mache finds n = 1800. The charge on an ion being 3-4 Xio -10 Mache deduces for the ionic charge, I + or I_, per cubic metre 1800X3-4 Xio -10 Xio 6 , or o-6. This is at least of the order observed, which is all that can be expected from a calculation which assumes I + and 1_ equal. If, however, Mache's views were correct, we should expect a much closer connexion between I and A than has actually been observed.

28. C. T. R. Wilson (63) seems disposed to regard the action of rainfall as the most probable source of the negative charge on the earth's surface. That great separation of positive and negative electricity sometimes takes place during rainfall is undoubted, and the charge brought to the ground seems preponderatingly negative. The difficulty is in accounting for the continuance in extensive fine weather districts of large positive charges in the atmosphere in face of the processes of recombination always in progress. Wilson considers that convection currents in the upper atmosphere would be quite inadequate, but conduction may, he thinks, be sufficient alone. At barometric pressures such as exist between 18 and 36 kilometres above the ground the mobility of the ions varies in- versely as the pressure, whilst the coefficient of recombination o varies approximately as the pressure. If the atmosphere at different heights is exposed to ionizing radiation of uniform intensity the rate of production of ions per cc, g, will vary as the pressure. In the steady state the number, n, of "ons of either sign per cc. is given by n = yjqja, and so is independent of the pressure or the height. The conductivity, which varies as the product of n into the

mobility, will thus vary inversely as the pressure, and so at 36 kilometres will be one hundred times as large as close to the ground. Dust particles interfere with conduction near the ground, so the relative conduc- tivity in the upper layers may be much greater than that calculated. Wilson supposes that by the fall to the ground of a preponderance of negatively charged rain the air above the shower has a higher positive potential than elsewhere at the same level, thus leading to large conduction currents laterally in the highly conducting upper layers.

29. Thunder. — Trustworthy frequency statistics for an individual station are obtainable only from a long series of observations, while if means are taken from a large area places may be included which differ largely amongst themselves. There is the further complication that in some countries thunder seems to be on the increase. In temperate latitudes, speaking generally, the higher the latitude the fewer the thunderstorms. For instance, for Edinburgh (64) (1771 to 1900) and London (65) (1763 to 1896) R. C. Mossman found the

appears fairly uniform, we may take Hungary (67). According to the statistics for 1903, based on several hundred stations, the average number of days of thunder throughout six subdivisions of the country, some wholly plain, others mainly mountainous, varied only from 2I-I to 26-5, the mean for the whole of Hungary being 23-5. The antithesis of this exists in the United States of America. According to A, J. Henry (68) there are three regions of maximum frequency: one in the south-east, with its centre in Florida, has an average of 45 days of thunder in the year; a second including the middle Mississippi valley has an average of 35 days; and a third in the middle Missouri valley has 30. With the exception of a narrow strip along the Canadian frontier, thunderstorm frequency is fairly high over the whole of the United States to the east of the 100th meridian. But to the west of this, except in the Rocky Mountain region where storms are numerous, the frequency steadily diminishes, and along the Pacific coast there are large areas where thunder occurs only once or twice a year.

30. The number of thunderstorm days is probably a less exact measure of the relative intensity of thunderstorms than statistics as to the number of persons killed annually by lightning per million of the population. Table X. gives a number of statistics of this kind. The letter M stands for " Midland."

Table X. — Deaths by Lightning, per annum, per million Inhabitants.
Hungary 7-7

2-8

i-8

1-3

Netherlands

England, N.M. . . .

E. . . . . „ S.M

York and W.M.

N

Wales 0-9

England, S.E. .... o-8 „ N.W. . . . 07

S.W. .... o-6 London o-i

1-2

i-i

i-o

15

10

8

7 7

‘ 7 6

■’■’ ‘ 5

20

b

Upper Missouri and Plains .

Rocky Mountains and Plateau

South Atlantic ....

Central Mississippi

Upper ,, ...

Ohio Valley

Middle Atlantic . . . .

Gulf States

New England …

Pacific Coast .

North and South Dakota

California .

The figure for Hungary is based on the seven years 1897-1903; that for the Netherlands, from data by A. J. Monne (69) on the nine years 1882-1890. The English data, due to R. Lawson (70), arefrom twenty-four years, 1857-1880; those for the United States, due to Henry (68), are for five years, 1896-1900. In comparing these data allowance must be made for the fact that danger from lightning is much greater out of doors than in. Thus in Hungary, in 1902 and 1903, out of 229 persons killed, at least 171 were killed out of doors. Of the 229 only 67 were women, the only assignable explanation being their rarer employment in the fields. Thus, ceteris paribus, deaths from lightning are much more numerous in a country than in an industrial population. This is well brought out by the low figure for London. It is also shown conspicuously in figures given by Henry. In New York State, where the population is largely industrial, the annual deaths per million are only three, but of the agricultural population eleven. In states such as Wyoming and the Dakotas the population is largely rural, and the deaths by light- ning rise in consequence. The frequency and intensity of thunder- storms are unquestionably greater in the Rocky Mountain than in the New England states, but the difference is not so great as the statistics at first sight suggest.

3 1 . Even at the same place thunderstorms vary greatly in intensity and duration. Also the times of beginning and ending are difficult to define exactly, so that several elements of uncertainty exist in data as to the seasonal or diurnal variation. The monthly data in Table XL are percentages of the total for the year. In most cases the figures are based on the number of days of thunder at a particular station, or at the average station of a country; but the second set

Table XI. — Annual Variation of Thunderstorms.

Jan.

Feb. March. April. May. June

July. Aug. Sept. Oct.

Nov.

Dec.

Edinburgh London Paris

Netherlands France Switzerland Hungary (a) (b) United States Hong-Kong Trevandrum Batavia

1-8

o-6

0-2 2-2 2-2 0-2 0-0 00

O-I O-O

3-2

IO-4

1-4

o-5

0-4

i-8

2-8

o-3 o-i

0-0

O-I

2-1

3-8 9-2

1-4

i-6

2-3 3-7 4-1

o-5

1-6

i-o

1-2

4-3

I3-I ii-i

3-8 6-6

7-5 6-5 8-4 4.9

57 3‘2 4-0

8-5 20-9 10-5

12-3 12-7

14-9

14-0 13-8

n-9

20-9

n-8 H-3

12-8

18-6 7-9

20-8 18-3

21-6

14-7 18-7 22-9 25-0

20-6

25-0

23-4 5-5

28-2 25-5

22-0

15-6 14-6 29-9 23-2 30-7 27-2 14-9

1-2

4-3

19 19

17 14 13 18

15 25 20 21 3 3

7-0

9-3 9.9

10-3

io-o

9-8 5-7 6-9 5-8 106 2-5 5-4

2-3

3-1

3-5

io- 1

6-3

i-i

1-3

o-5

1-4

2-1

12-9

I-I

i-7

0-4

3-8 3-1

o-3

0-4

0-0

o-3

0-0 12-0 12-2

0-8

0-9 0-4

2-5 2-4

0-2 0-2

O-O O-I O-O

33 10-9

storm days to be respectively 893) E. Renou (66) found 27-3

average annual number of'thundei

6-4 and 10-7; while at Paris (1873-]

such days. In some tropical stations, at certain seasons of the year,

thunder is almost a daily occurrence. At Batavia (18) during the

epoch 1867-1895, there were on the average 120 days of thunder in

the year.

As an example of a large area throughout which thunder frequency

for Hungary relates to the number of lightning strokes causing fire,; and the figures for the United States relate to deaths by lightning. Thedata for Edinburgh, due to R. C. Mossman (64), refer to 130 years, 1771 to 1900. The data for London (1763-1896) are also due to

1 Note in case of Pacific Coast, Table X., than 1."

1 less

Mossman (65) ; for Paris (1 873-1 893) to Renou (66) ; for the Netherlands (1882-1900) to A. J. Monne (69) ; for France(71) (1886-1899) to Frou and Hann ; for Switzerland to K. Hess (72) ; for Hungary (67) (1896-1903) to L. von Szalay and others; for the United States (1890-1900) to A. J. Henry (68); for Hong-Kong (73H1894-1903) to VV. Doberck. The Trevandrum (74) data (1 853-1 864) were due originally to A. Broun; the Batavia data (1867-1895) are from the Batavia Observations, vol. xviii.

Most stations in the northern hemisphere have a conspicuous maximum at midsummer with little thunder in winter. Trevan- drum (8° 31′ N.) and Batavia (6° 11′ S.), especially the former, show a double maximum and minimum.

32. Daily Variation. — The figures in Table XII. are again per-

for Germany, due to O. Steffens (80), represent the average number of houses struck by lightning in a year per million houses; in the first decade only seven years (1854-1860) are really included. Mossman thinks that the apparent increase at Edinburgh and London in the later decades is to some extent at least real. The two sets of figures show some corroborative features, notably the low frequency from i860 to 1870. The figures for Germany — repre- senting four out of six divisions of that country — are remarkable. In Germany as a whole, out of a million houses themumber struck per annum was three and a half times as great in the decade 1890 to 1900 as between 1854 and i860. Von Bezold (81) in an earlier memoir presented data analogous to Steffens', seemingly accepting them as representing a true increase in thunderstorm destructiveness.

Table XII. — Diurnal Variation of Thunderstorms.

Hour.

0-2.

2-4.

4-6.

6-8.

-10. 10-12. 0-2′ 2-4’. 4’-6’. 6’-8’. 8’-io’. 10-12′

Finland (76)

Edinburgh (64) .

Belgium (77) .

Brocken (78) .

Switzerland (72)

Italy (77) . .

Hungary (i.) (67) (ii.) (67) (iii.) (75) (iv.) (75)

Trevandrum (74)

Agustia (74)

2-3

i-7

3-0 1-6

3-i

.1-3 21 6-9 “2-3

2-6

5-6 2-9

2-0 2-0

2-9 2-5

2-3

16 19

4-2

1-9

2-2

4-9 2-9

2-2 1-4

1-7

i-3

2-1

1-4 19 2-3

2-0

19

4-3

o-3

3-o

1-7 1-8

1-3 1-6 2-0

2-1 2-0

2-4 1-9 1-3

0-0

4-6

47

2-0

4-2

2-0

3-o

2-9

2-0

i-7

3-6 1-4

1-7

I2-I

14-2 6-4 3-1 7-3 8-5

n-5 5-o

7-9

13-3

2-0

2-9

18-9 22-4 12-9

I2-I

13-8 19-5 18-1 9.9 16-1 199 13-3

I5-I

19-2 237

21-6

28-6 20-9 26-5

22-0

l6-9

22-1

20-7 24-5 36-1

I6-I n-9

19-4

22-4 20-8

16-6 17-9 18-2 19- 1 15-2 15-9

22-2

10-1 9-2

15-8

10- 1

146

9-8

10-7

10-7

12-7

9-2

13-3

9-3

61 51

8-4 7-2

8-o

8-3 6-2

n-7

7-6 62 7-6 4-6

3-4

2-0

4-1 5-6 3-5 1-5

2-8

IO-O

3-2 3-3 5-9

2-0

centages. They are mostly based on data as to the hour of com- mencement of thunderstorms. Data as to the hour when storms are most severe would throw the maximum later in the day. This is illustrated by the first two sets of figures for Hungary (67). The first set relate as usual to the hour of commencement, the second to the hours of occurrence of lightning causing fires. Of the two other sets of figures for Hungary (75;, (iii.) relates to the central plain, (iv.) to the mountainous regions to north and south of this. The hour of maximum is earlier for the mountains, thunder being more frequent there than in the plains between 8 a.m. and 4 p.m., but less frequent between 2 and 10 p.m. Trevandrum (8° 31′ N., 76 59′ E., 195 ft.

Table XIII.

Year.

Nether- lands.

France.

Hungary.

U.S.A.

Year.

Nether- lands.

France.

Hungary.

U.S.A.

1882

98

141

1893

102

288

233

209

1883

117

195

1894

III

300

333

336

1884

95

229

1895

119

309

280

426

1885

93

192

1896

109

266

299

34i

1886

102

251

*3*9*

1897

119

297

350

362

1887

78

292

236

1898

95

299

386

367

1888

94

286

232

1899

112

299

368

563

1889

126

294 •

258

1900

108

401

713

1890

93

299

265

1901

502

1891

98

317

302

204

1902

322

1892

86

324

350

251

1903

256

above sea-level) and Agustia (8° 37′ N., 77 20′ E., 6200 ft. above sea-level) afford a contrast between low ground and high ground in India. In this instance there seems little difference in the hour of maximum, the distinguishing feature being the great concentration of thunderstorm occurrence at Agustia between noon and 6 p.m.

33. Table XIII. gives some data as to the variability of thunder from year to year. The figures for the Netherlands (69) and France (71) are the number of days when thunder occurred somewhere in the country. Its larger area and more varied climate give a much larger number of days of thunder to France. Notwith- standing the proximity of the two countries, there is not much parallelism between the data. The figures

for Hungary (67) give the number of light- ning strokes causing fire; those for the United States (68) give the number of per- sons killed by lightning. The conspicuous maximum in 1901 and great drop in 1902 in Hungary are also shown by the statistics as to the number of days of thunder. This number at the average station of the country fell from 38-4 in 1901 to 23-1 in 1902. On the whole, however, the number of destructive lightning strokes and of days of thunder do not show a close parallelism.

34. Table XIV. deals with the variation of thunder over longer periods. The data for Edinburgh (64) and London (65) due to Mossman, and those for Tilsit, due to C. Kassner (79), represent the average number of days of thunder per annum. The data

Doubts have, however, been expressed by others — e.g. A. Gockel, Das Gewitter, p. 106 — as to the real significance of the figures. Changes in the height or construction of buildings, and a greater readiness to make claims on insurance offices, may be contributory causes.

35. The fact that a considerable number of people sheltering under trees are killed by lightning is generally accepted as a con- vincing proof of the unwisdom of the proceeding. When there is an option between a tree and an adjacent house, the latter is doubt- less the safer choice. But when the option is between sheltering under a tree and remaining in the open it is not so clear. In

Hungary (67), during the three years 1901 to 1903, 15% of the total deaths by light- ning occurred under trees, as against 57 % wholly in the open. In the United States (68) in 1900, only 10 % of the deaths where the precise conditions were ascertained occurred under trees, as against 52 % in the open. If then the risk under trees exceeds that in the open in Hungary and the United States, at least five or six times as many people must remain in the open as seek shelter under trees. An isolated tree occupying an exposed position is, it should be remembered, much more likely to be struck than the average tree in the midst of a wood. A good deal also depends on the species of tree. A good many years' data for Lippe (82) in Ger- many make the liability to lightning stroke as follows — the number of each species being supposed the same: — Oak 57, Fir 39, Pine 5, Beech I. In Styria, according to K. Prohaska (83), the species most liable to be struck are oaks, poplars and pear trees; beech trees again are exceptionally safe. It should, however, be borne in mind that the apparent differences between different species may be partly

Table XIV.

Decade ending

1810.

1820.

1830.

184O.

I85O.

i860.

1870.

1880.

1890.

1900.

Edinburgh

4.9

57

7-7

67

5-7

6-5

5-4

jo-6

9-4

9-2

London

9-5

8-3

“•5

n-8

10-5

n-9

9-6

15-7

13-0

Tilsit ….

I2-I

I2-I

i6-i

15-3

n-9

17-6

21-8

Germany, South .

49

66

91

143

175

,, West .

92

106

187

244

331

North

124

135

245

288

352

,, East .

102

143

186

210

273

Whole

90

116

189

254

318

a question of height, exposure or proximity to water. A good deal may also depend on the soil. According to Hellmann, as quoted by Henry (82), the liability to lightning stroke in Germany may be put at chalk 1, clay 7, sand 9, loam 22.

36. Numerous attempts have been made to find periodic varia- tions in thunderstorm frequency. Among the periods suggested are the I i-year sunspot period, or half this (cf. v. Szalay (67)). Ekholm and Arrhenius (84) claim to have established the existence of a tropical lunar period, and a 25929-day period; while P. Polis (85) considers a synodic lunar period probable. A. B. MacDowall (86) and others have advanced evidence in favour of the view that thunderstorms are most frequent near new moon and fewest near full moon. Much more evidence would be required to produce a general acceptance of any of the above periods.

37. St Elmo's Fire. — Luminous discharges from masts, lightning conductors, and other pointed objects are not very infrequent, especially during thunderstorms. On the Sonnblick, where the phenomenon is common, Elster and Geitel (87) have found St Elmo's fire to answer to a discharge sometimes of positive sometimes of negative electricity. The colour and appearance differ in the two cases, red predominating in a positive, blue in a. negative discharge. The differences characteristic of the two forms of discharge are de- scribed and illustrated in Gockel's Das Gewitter. Gockel states {I.e. p. 74) that during snowfall the sign is positive or negative accord- ing as the flakes are large or an small and powdery. The discharge is not infrequently accompanied by a sizzling sound.

38. Of late years many experiments have been made on the influence of electric fields or currents on plant growth. S. Lem- strom (88), who was a pioneer in this department, found an electric field highly beneficial in some but not in all cases. Attempts have been made to apply electricity to agriculture on a commercial scale, but the exact measure of success attained remains somewhat doubt- ful. Lemstrom believed atmospheric electricity, to play an im- portant part in the natural growth of vegetation, and he assigned a special role to the needles of fir and pine trees.

Bibliography. — The following abbreviations are here used: — • M.Z., Meteorologische Zeitschrift ; P.Z., Physikalische Zeitschrift ; S., Sitzungsberichte k. Akad. Wiss. Wien, Math. Naturw. Klasse, Theil ii. 2; P.T., "Philosophical Transactions Royal Society of London"; T.M., Terrestrial Magnetism, edited by Dr L. A. Bauer.

Text-books: — (1) G. le Cadet, Etude du champ electrique del' atmosphere (Paris, 1898); (2) Svante A. Arrhenius, Lehrbuch der kosmischen Physik (Leipzig, 1903) ; (3) A. Gockel, Das Gewitter (Cologne, 1905).

Lists of original authorities: — (4) F. Exner, M.Z., vol. 17, 1900, p. 529 (especially pp. 542-3); (5) G. C. Simpson, Q.J.R. Met. Soc, vol.31, 1905, p. 295 (especially pp. 305-6). References in the text : — (6) M.Z., vol. 4, 1887, p. 352; (7) T.M., vol. 4, 1899, p. 213; (8) P.Z., vol. 4, p. 661 ; (9) M.Z., vol. 23, 1906, p. 114; (10) P.T., vol. 205 A, 1906, p. 61 ; (11) P.Z., vol. 5, p. 260; (12) C. Chree, P.T., vol. 206 A, p. 299; (13) Annual volumes, Greenwich Magnetical and Meteoro- logical Observations; (14) M.Z., vol. 8, 1891, p. 357; (15) M.Z., vol. 7, 1890, p. 319 and vol. 8, 1891, p. 113; (16) Annual volumes, Annaes do Obs. do Infante D. Luiz; (17) Annual Reports, Central Meteorological Observatory of Japan; (18) Observations made at the Mag. and Met. Obs. at Batavia, vol. 18, 1895; (19) J. D. Everett, P.T., vol. 158, 1868, p. 347; (20) M.Z., vol. 6, 1889, p. 95; (21) A. B. Chauveau, Ann. bureau central meteorologique, Paris, annee 1900, " Memoires," p. Ci; (22) V. Conrad, S., 113, p. 1143; (23) P. B. Zolss, P.Z., vol. 5, p. 260; (24) T.M., vol. 7, 1902, p. 89; (25) Revue generate des sciences, 1906, p. 442 ; (26) T.M., vol. 8, 1903, p. 86, and vol. 9, 1904, p. 147 ; (27) S., 93, p. 222 ; (28) M.Z., vol. 22, 1905, p. 237; (29) P.Z., vol. 4, p. 632; (30) Phil. Mag., vol. 20, 1885, p. 456; (31) Expedition polaire finlandaise, vol. 3 (Helsingfors, 1898); (32) A. Paulsen, Bull, de I' Acad. . . . de Danemarke, 1894, p. 148; (33) Wied. Ann., vol. 46, 1892, p. 584; (34) P.T., vol. 191 A, p. 187; (35) M.Z., vol. 5, 1888, p. 95; S., 99, p. 421; T.M., vol. 4, 1899, p. 15; (36) Camb. Phil. Soc. Proc, vol. II, p. 428, and vol. 12, pp. 17 and 85; (37) P.Z., vol. 4, pp. 267 and 873; (38) E. R. v. Schweidler, 5., 113, p. 1433; (39) S., ill, July 1902; (40) Verbffentl. des Kg. Preuss. Met. Inst., 1904; (41) P.Z., vol. 5,

p. 106; (42) 5., 114, p. 198; (43) P.Z., vol. 4, p. 871 ; (44) P.Z., vol. 4, p. 93; (45) M.Z., vol. 23, 1906, p. 229; (46) S., 114, p. 1705; (47) S., 114, p. 399; (48) P.Z., vol. 4, p. 522; (49) S., 113, p. 1455; (50) P.Z., vol. 4, p. 627; (51) P.Z., vol. 4, p. 90; (52) S., 114, p. 151 ; (53) M.Z., vol. 23, 1906, p. 253; (54) P.Z., vol. 5, p. 749; (55) M.Z., vol. 23, 1906, pp. 53 and 339; (56) P.Z., vol. 5, p. 11; (57) P.Z., vol. 5, p. 591; (58) T.M., vol. 9, 1904, p. 49; (59) P.Z., vol. 4, p. 295; (60) P.Z., vol. 5, p. 504; (61) T.M., vol. 10, 1905, p. 65; (62) S., 114, p. 1377; (63) Camb. Phil. Soc. Proc, vol. 13, p. 363; (64) Trans. R.S. Edin., vol. 39, p. 63, and vol. 40, p. 484; (65) Q.J.R. Met. Soc, vol. 24, 1898, p. 31 ; (66) M.Z., vol. 11, 1894, P- 2 77; (67) Jahrbucher der Konigl. Ung. Reichsanstalt fur Met. und Erdmag., vol. 33, 1903, III. Theil with appendix by L. von Szalay; (68) U.S. Dept. of Agriculture, Weather Bureau Bulletin, No. 30, 1901; (69) M.Z., vol. 19, 1902, p. 297; (70) Q.J.R. Met. Soc, vol. 15, 1889, p. 140; (71) M.Z., vol. 20, 1903, p. 227; (72) M.Z., vol. 20, 1903, p. 522; (73) M.Z., vol. 23, 1906, p. 367; (74) M.Z., vol. 22, 1905, p. 175; (75) J. Hegyfoky, M.Z., vol. 20, 1903, p. 218; (76) M.Z., vol. 22, 1905, p. 575; (77) S. Arrhenius, M.Z., vol. 5, 1888, p. 348; (78) G, Hellmann, M.Z., vol. 22, 1905, p. 223; (79) M.Z., vol. 11, 1894, p. 239; (80) M.Z., vol. 23, 1906, p. 468; (81) Berlin Sitz., 1889, No. 16; (82) A. J. Henry, U.S. Dept. of Agriculture Bull., No. 26, 1899; (83) M.Z.,

vol. 16, 1899, p. 128; (84) K. Sven. Vet. Akad. Hand., Bd. 19, No. 8, Bd. 20, No. 6, Bd. 31, Nos. 2 and 3; (85) M.Z., vol. 1.1/1894, P- 2 3°; (86) Nature, vol. 65, 1902, p. 367; (87) M.Z., vol. 8, 1891, p. 321; (88) Brit. Assoc. Report for 1898, p. 808, also Electricity in Agri- culture and Horticulture (London, 1904). (C. Ch.)

ATMOSPHERIC RAILWAY. About 1840-1845 great interest was excited by a method of propelling railway trains through the agency of atmospheric pressure. Various inventors worked at the realization of this idea. On the system worked out in England by Jacob Samuda and S. Clegg, a continuous pipe or main was laid between the rails, and in it a partial vacuum was maintained by means of air pumps. A piston fitting closely in it was connected to the leading vehicle of the train by an iron plate which passed through a longitudinal groove or aperture running the whole length of the pipe. This aperture was covered by a valve consisting of a continuous strip of leather, strengthened on each side with iron plates; one edge was fastened, while the other was free to rise, and was closed against a composition of beeswax and tallow placed in the groove, the surface of which was slightly melted by a heater, carried on each train, in order to secure an air-tight joint. Connected behind the piston was a frame carrying four wheels which lifted and sustained the continuous valve for a distance of about 15 ft. Thus the piston having atmospheric pressure on one side of it and a vacuum equal to 15 or 16 in. of mercury on the other, was forced

along the tube, taking the train with it. Various advantages were claimed by the advocates of the system, including cheapness of operation as compared with steam locomotives, and safety from collision, because the main was divided into sections by separating valves and only one train could be in each section at a given time. It was installed on about 2 m. of line between Kingstown and Dalkey (Ireland) in 1843 and worked till 1855; it was also tried on the London and Croydon and on the South Devon lines, but was soon abandoned. The same principle is applied in the system of pneumatic despatch (q.v.) to the transmission of small parcels in connexion with postal and telegraph work.

For further particulars see three papers by J. Samuda, P. W. Barlow and G. Berkeley, with reports of the discussions upon them, in Proc. Inst. C.E., 1844 and 1845.

ATOLL (native name atollon in the Maldive Islands) ; a horse- shoe or ring shaped coral reef enclosing a lagoon. The usual shape is that of a partly submerged dish with a broken edge, forming the ring of islands, standing upon a conical pedestal. The dish is formed of coral rock and the shells of various reef- dwelling mollusca, covered, especially at the seaward edges, with a film of living coral polyps that continually extend the fringe, and enlarge the diameter of the atoll. The lagoon tends to deepen when the land is stationary by the death of the coral animals in the still water, and the patchy disintegration of the " hard " coral, while waves and storms tear off blocks of rock and pile them up at the margin, increasing the height of the islands, which become covered by vegetation. The lagoon entrance in the open part of the horse-shoe is always to leeward of prevailing winds, since the coral growth is there slower than where the waves constantly renew the polyps' food supply. The conical pedestal rising from the depths is frequently a submarine volcanic cone or island, though any submerged peak may be crowned by an atoll. For the theory of atoll formation see Coral-reees,

ATOM (Gr. aro/xos, indivisible, from d- privative, and Tifivtw, to cut) , the term given in physical science to the ultimate indivisible particle of matter, and so by analogy to something minutely small in size. If we examine such a substance as sugar we find that it can be broken up into fine grains, and these again into finer, the finest particles still appearing to be of the same nature as sugar. The same is true in the case of a liquid such as water; it can be divided into drops and these again into smaller drops, or into the finest spray the particles of which are too small to be detected by our unaided vision. In fact, so far as the direct evidence of our senses tells us, matter appears to be indefinitely divisible. Moreover, small particles do not seem to exist in the water until it is broken up; so far as we can see, the material of the water is continuous not granular. This

conception of matter, as infinitely divisible and continuous, Was taught by

Anaxagoras more than four centuries before the Christian era, and in the philosophy of Aristotle the same ideas are found. But some phenomena are difficult to reconcile with of matter ^^ v ‘ ew > f° r example, a cubic foot of air can be com- pressed into less than one five-hundredth of a cubic foot, or, if allowed to expand, the air originally occupying the cubic foot can be made to fill, apparently uniformly, a space of a million cubic feet or more. This enormous capacity for expansion and contraction is astonishing if we believe matter to be continuous, but if we imagine air to be made up of little particles separated by relatively large empty spaces the changes in volume are more easily conceivable. Moreover, if we attribute such a structure to gases, we are led to attribute it to liquids and to solids also, since gases can be liquefied without any abrupt change, and many substances usually solid can be converted into gases by heating them. This conception of the grained structure of matter is very ancient; traces of it are to be found in Indian philosophy, perhaps twelve centuries before the Christian era, and the Greek philosophers Democritus and Epicurus, in the 3rd and 4th centuries B.C., taught it very definitely. Their view was that ” matter is not indefinitely divisible, but that all substances are formed of indivisible particles or atoms which are eternal and unchangeable, that the atoms are separated from one another by void, and that these atoms, by their combinations, form the matter we are conscious of.” The Roman poet Lucretius (De Rerum Natura) was an eloquent exponent of this theory, but throughout the middle ages, indeed until the 17th century, it was eclipsed by the prestige of Aristotle. In the time, however, of Boyle ‘ and Newton, we again find an atomic theory of matter; Newton 2 regarded a gas as consisting of small separate particles which repelled one another, the tendency of a gas to expand being attributed to the supposed repulsion between the particles.

Let us consider some common phenomena in the light of these rival theories as to the nature of matter. When a few lumps of sugar are added to a glass of water and stirred, the sugar soon disappears and we are left with a uniform liquid resembling water, except that it is sweet. What has become of the sugar? Does it still exist ? The atomist would say, ” Yes, it is broken up into its atoms, and these are distributed throughout the spaces between the particles of water.” The rival philosopher, who believes water to be continuous and without spaces between its particles, has a greater difficulty in accounting for the dis- appearance of the sugar; he would probably say that the sugar, and the water also, had ceased to exist, and that a new con-

tinuous substance had been formed from them, but he could offer no picture of how this change had taken place. Or consider a well-marked case of what we are in the habit of calling chemical combination. If 127 parts of iodine, which is an almost black solid, and 100 parts of mercury, which is a white liquid metal, be intimately mixed by rubbing them together in a mortar, the two substances wholly disappear, and we obtain instead a brilliant red powder quite unlike the iodine or the mercury; almost the only property that is unchanged is the weight. The question again arises, what has become of the original sub- stances? The atomist has an easy answer; he says that the new body is made up by the juxtaposition of the atoms of iodine and mercury, which still exist in the red powder. His opponent would be disposed to say that the iodine and the mercury ceased to exist when the red powder was formed, that they were components but not constituents of it. The fact that the two components can be recovered from the compound by destroying it does not decide the question. It is remarkable that pure chemistry, even to-day, has no very conclusive arguments for the settlement of this controversy; but the sister science of physics is steadily accumulating evidence in favour of the atomic conception.

Until the time of John Dalton, the atomic conception remained purely qualitative, and until then it does not appear to have

*•Robert Boyle, The Sceptical Chymist (1661); The Usefulness of Natural Philosophy (1663). * Sir Isaac Newton. Principia, bk. ii. prop. 23.*

advanced chemistry or to have found further confirmation in the facts of chemistry. Dalton (1803) gave the atomic theory a quantitative form, and showed that, by means of it, DaUon a vast number of the facts of chemistry could be predicted or explained. In fact, he did so much to make the atomic theory of matter probable that he is popularly regarded as its originator. Dalton lived in a period marked by great ad- vances in experimental chemistry. Rather before the commence- ment of the 10th century the work of Lavoisier had rendered it very probable that chemical changes are not accompanied by any change in weight, and this principle of the conservation of matter was becoming universally accepted; chemists were also acquiring considerable skill in chemical analysis, that is, in the determination of the nature and relative amounts of the elements contained in compounds. But Sir H. E. Roscoe and A. Harden, New View of the Atomic Theory (1896), have shown, from a study of Dalton's manuscript notes, that we do not owe his atomic theory to such experiments. If their view is correct, the theory appears to be a remarkable example of deductive reasoning. Dalton, who was a mathematical physicist even more than a chemist, had given much thought to the study of gases. Follow- ing Newton, he believed a gas to be made up of particles or atoms,

From Dalton's New System o] Chemical Philosophy . Hydrogen Gas. Nitrous Gas.

Carbonic Acid Gas.

separated from one another by considerable spaces. Certain difficulties that he met with in his speculations led him to the conclusion that the particles of any one kind of gas, though all of them alike, must differ from those of another gas both in size and weight. He thus arrived at the conception oi a definite atomic weight peculiar to the particles of each gas, and he thought that he could determine these atomic weights, in terms of one of them, by means of the quantitative analysis of com- pounds. The conclusion that each element had a definite atomic weight, peculiar to it, was the new idea that made his specula- tions fruitful, because it allowed of quantitative deduction and verification. He drew simple diagrams, three of which, taken from Dalton's New System of Chemical Philosophy, part ii. (1810), are reproduced here, in which gases are represented as composed of atoms. Knowing that the gas which he called " nitrous gas " was composed of oxygen and nitrogen, and believ- ing it to be the simplest compound of these two elements, he naturally represented its atom as formed of an atom of oxygen and an atom of nitrogen in juxtaposition. When two elements form more than one compound, as is the case with oxygen and carbon, he assigned to the compound which he thought the more complex an atom made up of two atoms of the one element and one atom of the other; the diagram , ,

for carbonic acid illustrates this, and X oxygen? 11 ' an extension of the same plan enabled nitrogen, him to represent any compound, how- • carbon,

ever complex its structure. The table ©$ water. _ . • , • c t\ 1. > ©CD ammonia,

here given contains some of Dalton s q, ethvlene*

*diagrams of atoms. They are not all #0 carbon monoxide, considered to be correct at the present 0*0 carbon dioxide, time; for example, we now think that ®Q nitric oxide the ultimate particle of water is made qqcd nitrousoxfde up of two atoms of hydrogen and one CKDO nitrogen peroxide, of oxygen, and that that of ammonia*

contains three atoms of hydrogen to one of nitrogen. But these differences between Dalton's views and our present ones do not impair the accuracy of the arguments which follow.

The diagrams show that Dal ton formed a very definite conception of the nature of chemical combination; it was the union of a small number of atoms of one kind with a small number of another kind to form a compound atom, or as we now say a " molecule," this identical process being repeated millions of times to form a perceptible amount of a compound. The con- ceptions of " element," " compound " and " mixture " became more precise than they had been hitherto; in an element all the atoms are alike, in a compound all the molecules are alike, in a mixture there are different kinds of molecules. If we accept the hypothesis that each kind of atom has a specific and invariable weight, we can, with the aid of the above theery, make most important inferences concerning the proportions by weight in which substances combine to form compounds. These inferences are often summarized as the laws of constant, multiple and Xeciprocal proportions.

The law of constant proportions asserts that when two elements unite to form a compound the weights that combine are in an Law of invariable ratio, a ratio that is characteristic of that constant compound. Thus if Dalton's diagram for the molecule, propor- or compound atom, of water be correct, it follows that in all samples of water the total number of the hydrogen atoms is equal to that of the oxygen atoms; consequently, the ratio of the weight of oxygen to that of hydrogen in water is the same as the ratio of the weights of an oxygen and a hydrogen atom, and this is invariable. Different samples of water cannot therefore differ ever so little in percentage composition, and the same must be true for every compound as distinguished from a mixture. Apart from the atomic theory there is no obvious reason why this should be so. We give the name bread to a substance containing variable proportions of flour and water. Similarly the substance we call wine is undeniably variable in composition. Why should not the substance we call water also vary more or less? The Aristotelian would find no difficulty in such a variability; it is only the disciple of Dalton to whom it seems impossible. It is evident that we have in this law a definite prediction that can be tested by experiment.

The law of multiple proportions asserts that if two elements form more than one compound, then the weights of the one element Lav of which are found combined with unit weight of the other multiple in the different compounds, must be in the ratio of two propor- or more w hole numbers. If we compare Dalton's diagrams of the two oxides of carbon or of the three oxides of nitrogen that are given in the preceding table, we at once see the necessity of this law; for the more complex molecule has to be formed from the simpler one by the addition of one or more whole atoms. In the oxides of carbon the same weight of carbon must be combined with weights of

oxygen that are as i : 2, and in the oxides of nitrogen a fixed weight of nitrogen must be in union with weights of oxygen that are as i : 2 : \, which are the same ratios as 2 : 4 : 1. This law has been abun- dantly verified by experiment; for example, five oxides of nitrogen are known, and independent analyses show that, if we consider the same weight of nitrogen in every case, the weights of oxygen combined with it are to one another asi :2 : 3 : 4 : 5. The discovery of this law is due to Dalton; it is a direct deduction from his atomic theory. Here again, apart from this theory, there is no obvious reason why the composition of different substances should be related in so simple a way. As Dalton said, " The doctrine of definite proportions appears mysterious unless we adopt the atomic hypothesis." " It appears like the mystical ratios of Kepler which Newton so happily elucidated." The chemists of Dalton's time were not unanimous in accepting these laws; indeed C. L. Berthollet (Essai de statique chimique, 1803) expressly controverted them. He maintained that, under varying conditions, two substances could combine in an indefinitely large number of different ratios, that there could in fact be a continuous variation in the combining ratio. This view is clearly inconsistent with the atomic theory, which requires that when the combining ratio of two substances changes it should do so, per saltum, to quite another value.

The law of reciprocal proportions, or, as it might well be named,

the law of equivalence, cannot be adequately enunciated in a few words. The following gives a partial statement of it. Law of If we know the weights a and b of two elements that are reciprocal found in union with unit weight of a third element, then P r °P» r ' we can predict the composition of the compounds which the first two elements can form with each other; either the weights a and b will combine exactly, or if not, these weights must be multi- plied by integers to obtain the composition of a compound. To see how this law follows from Dalton's theory let us consider his diagrams for the molecules of water, ethylene and the oxides of carbon. In water and in ethylene experiment shows that 8 parts by weight of oxygen and 6 parts of carbon, respectively, are in union with one part of hydrogen; also, if the diagrams are correct, these numbers must be in the ratio of the atomic weights of oxygen and carbon. We can therefore predict that all oxides of carbon will have compositions represented by the ratio of 8m parts of oxygen to 6« parts of carbon, where m and n are whole numbers. This prediction is verified by the result of analysis. Similarly, if we know by experiment the composition of water and of ammonia, we can predict the probable composi- tion of the oxides of nitrogen. Experiment shows that, in water and ammonia, we have, respectively, 8 parts of oxygen and 4-67 parts of nitrogen in union with one part of hydrogen; we can therefore infer that the oxides of nitrogen will all have the composition of &m parts of oxygen to 4-6yn parts of nitrogen. Experiment alone can tell us the values

of m and n; all that the theory tells us is that they are whole numbers. In this particular case, n turns out to be 3, and m has in succession the values 1, 2, 3, 4, 5.

It is evident that these laws all follow from the idea that a compound molecule can only alter through the a'ddition or subtraction of one or more complete atoms, together with the idea that all the molecules in a pure substance are alike. For- tunately, the compounds at first examined by the chemists engaged in verifying these laws were comparatively simple, so that the whole numbers referred to above were small. The astonishing variety of ratios in which carbon and hydrogen combine was not at first realized. Otherwise Berthollet's position would have been a much stronger one, and the atomic theory might have had to wait a long while for acceptance. Even at the present time, it would be too much to say that all the complex organic substances have been proved by analysis to obey these laws; all we can assert is that their composition and properties can be satisfactorily explained on the assumption that they do so.

The above statement does not by any means exhaust the possible predictions that can be made from the atomic theory, but it shows how to test the theory. If chemical compounds can be proved by experiment to obey these laws, then the atomic theory acquires a high degree of probability; if they are contradicted by experiment then the atomic theory must be abandoned, or very much modified. Dalton himself made many analyses with the purpose of establishing his views, but his skill as an analyst was not very great. It is in the work of the great Swedish chemist J. J. Berzelius, and somewhat later, in the experiments of the Belgian chemist J. S. Stas, that we find the most brilliant and vigorous verification of these laws, and therefore of the atomic theory.

We shall now give an outline of the experimental evidence for the truth of these laws.

The law of the conservation of matter, ah important element in the atomic theory, has been roughly verified by innumerable analyses, in which, a given weight of a substance having been taken, each ingredient in it is isolated Experi- and its weight separately determined; the total weight evidence. of the ingredients is always found to be very nearly equal to the weight of the original substance. But on account of experimental errors in weighing and measuring, and through loss of material in the transfer of substances from one vessel to another, such analyses are rarely trustworthy to more than one part in about 500; so that small changes in weight consequent on the chemical change could not with certainty be proved or

disproved. A few experimenters have carried the verification much further. Stas, in his syntheses of silver iodide, weighed the silver and the iodine separately, and after converting them into the compound he weighed this also. In each of a number of experiments he found that the weight of the silver iodide did not differ by one twenty-thousandth of the whole from the sum of the weights of the silver and the iodine used. His analyses of another compound, silver iodate, confirm the law to one part in 78,000. In E. W. Morley's experiments on the synthesis of water the hydrogen, the oxygen and the water that had been formed were separately determined; taking the mean of his results, the sum of the weights of the ingredients is not found to differ from the weight of the product by one part in 10,000. It is evident that if our experiments are solely directed to the verification of this law, they should, if possible, be carried out in a hermetically closed vessel, the vessel and its contents being weighed before and after the chemical change. The extremely careful experiments of this kind, by H. Landolt and others, made it at first appear that the change in weight, if there is any, consequent on a chemical change can rarely exceed one-millionth of the weight of the reacting substances, and that it must often be much less. The small discrepancies found are so easily accounted for by attributing them to experimental errors that, until recently, every chemist would have regarded the law as sufficiently verified. Landolt's subsequent experiments showed, what was already noticed in the earlier ones, that these minute changes in weight are nearly always losses, the products weigh less than the components, while if they had been purely experimental errors, due to weighing, they might have been ex- pected to be as frequently gains as losses. Landolt was dis- posed to attribute these losses in weight to the containing vessel, which was of glass or quartz, not being absolutely im-pervious, but in 1908 he showed that, by making allowance for the moisture adsorbed on the vessel, the errors were both positive and negative, and were less than one in ten million. He concluded that no change of weight can be detected. Modern researches (see Radioactivity) on the complex nature of the atom have a little shaken the belief in the absolute permanence of matter. But it seems pretty clear that if there is any change in weight consequent on chemical change, it is too minute to be of im-portance to the chemist, though the methods of modern physics may settle the question. (See Element.)

The law of constant proportions is easily verified to a moderate degree of accuracy by such experiments as the following. We can prepare, in the laboratory, a white powder that proves to be calcium carbonate, that is, it appears to be wholly composed of carbon dioxide and lime. We find in nature two other unlike substances, marble and Iceland spar, each of which is wholly composed of carbon dioxide and lime. Thus these three sub-

stances, unlike in appearance and origin, are composed of the same ingredients: if small variations in the combining ratio of the components were possible, we might expect to find them in such a case as this. But analysis has failed to find such differences; the ratio of the weights of lime and carbon dioxide is found to be the same in all three substances. Such analyses, which do not always admit of great accuracy, have been confirmed by a few carefully planned experi- ments in which two components were brought together under very varied conditions, and the resulting compound analysed. Stas carried out such experiments on the composition of silver chloride and of ammonium chloride, but he never found a variation of one part in 10,000 in the composition of the substances.

The two laws discussed above were more or less accepted before the promulgation of the atomic theory, but the law of multiple proportions is the legitimate offspring of this theory. Berzelius saw at once that it afforded an admirable test for the correctness of Dalton's views, and he made numerous experiments expressly designed to test the law. One of these experiments may be described. Two chlorides of copper are known, one a highly coloured substance, the other quite white. Berzelius took 8 grams of copper, converted it into the coloured chloride, and

sealed up the whole of this in solution, together with a weighed strip of copper. After some time the colour entirely dis- appeared; the strip of copper was then taken out and reweighed, and it was found to have lost 8-03 grams. Thus the chlorine, which in the coloured compound was in union with 8 grams of copper, appears, in the colourless chloride, to be combined with 16-03 grams, or almost exactly double the amount. It is easy to verify this result. In a series of repetitions of the experiment, by different observers, the following numbers were obtained for the ratio of the copper in the two chlorides: 1-98, 1-97, 2-03, 2-003, the mean value being 1-996. It will be noticed that the ratio found is sometimes above and sometimes below the number 2, which is required by the atomic theory, and therefore the deviations may not unreasonably be attributed to experimental errors. Such experiments — and numerous ones of about this degree of accuracy have been made on a variety of substances 1 — ■ give a high degree of probability to the law, but leave it an open question whether it has the exactitude of the law of the conserva- tion of matter, or whether it is only approximately true. The question is, however, vital to the atomic theory. It is, therefore, worth while to quote a verification of great exactitude from the work of Stas and J. B. A. Dumas 1 on the composition of the two oxides of carbon. From their work it follows that the ratio of the weights of oxygen combined with unit weight of carbon in the two oxides is 1-99995, or with somewhat different data,

1-9996.

The law of reciprocal proportion, of which some examples have been already given, is part of a larger law of equivalence that underlies most of our chemical methods and calculations. One section of the law expresses the fact that the weights of two substances, not necessarily elements, that are equivalent in one reaction, are often found to be equivalent in a number of other reactions. The neutralization of acids by bases affords many illustrations, known even before the atomic theory, of the truth of the statement. It is universally found that the weights of two bases which neutralize the same weight of one acid are equivalent in their power of neutralizing other acids. Thus 5 parts by weight of soda, 7 of potash and 3-5 of quicklime will each neutralize 4-56 parts of hydrochloric acid or 7-875 of nitric or 6-125 parts of sulphuric acid; these weights, in fact, are mutually equivalent to one another. The Daltonian would say that each of these weights represents a certain group of atoms, and that these groups can replace, or combine with, each other, to form new molecules. The change from a binary compound, that is, one containing two elements, to a ternary compound in which these two elements are associated with a third, sometimes affords a very good test for the theory. The atomic theory car picture the change from the binary to the ternary compound si aply as the addition of one or more atoms of the third elemen . to the previously existing molecule; in such a case the combining ratio of the first two elements should be absolutely the same in both compounds. Berzelius tested this prediction. He showed that lead sulphide, a black substance containing only lead and sulphur, could be converted by oxidation into lead sulphate, a white compound containing oxygen as well as lead and sulphur. The whole of the lead and sulphur of the sulphide was found to be present in the sulphate; in other words, the combining ratio of the lead and sulphur was not altered by the addition of the oxygen. This is found to be a general rule. It was verified very exactly by Stas's experiments, in which he removed the oxygen from the ternary compound silver iodate and found that the whole of the silver and the iodine remained in combination with each other as silver iodide; his results prove, to one part in ten millions, that the combining ratio of the silver and the iodine is unaltered by the removal of the oxygen.

The above gives some idea of the evidence that has been accumulated in favour of the laws of chemical combination, laws which can be deduced from the atomic theory. Whenever any of these laws, or indeed any prediction from the theory, can be tested it has so far proved to be in harmony with experiment. The existence of the periodic law (see Element), and the 1 Freund, The Study of Chemical Composition.

Formulae.

researches of physicists on the constitution of matter (q.v.), also furnish very strong support to the theory.

Dalton was of the opinion that it was possible to determine the weights of the elementary atoms in terms of any one by the analysis of compounds. It is evident that this is weight practicable if the number and kind of atoms contained in the molecule of a compound can be determined. To take the simplest possible case, if Dalton had been correct in assuming that the molecule of water was made up of one atom of oxygen and one of hydrogen, then the experimental fact that water contains eight parts by weight of oxygen to one part of hydrogen, would at once show that the atom of oxygen is eight times as heavy as the atom of hydrogen, or that, taking the atomic weight of hydrogen as the unit, the atomic weight of oxygen is 8. Similarly, Dalton's diagram for ammonia, together with the fact that ammonia contains 4-67 parts of nitrogen to one of hydrogen, at once leads to the conclusion that the atomic weight of nitrogen is 4-67. But, unfortunately, the assumption as to the number of atoms in the molecules of these two com- pounds was an arbitrary one, based on no valid evidence. It is now agreed that the molecule of water contains two atoms of hydrogen and one of oxygen, so that the atomic weight of oxygen becomes 16, and similarly that the molecule of ammonia contains three atoms of hydrogen and one of nitrogen, and that conse- quently the atomic weight of nitrogen is 14. On account of this difficulty, the atomic weights published by Dalton, and the more accurate ones of Berzelius, were not always identical with the values now accepted, but were often simple multiples or submultiples of these.

The " symbols " for the elements used by Dalton, apparently suggested by those of the alchemistsˆhave been rejected in favour of those which were introduced by Berzelius. The latter employed the first letter, or the first two letters, of the name of an element as its symbol. The symbol, like that of Dalton, always stands for the atomic weight of the element, that is, while H stands for one part by weight of hydrogen, O stands for 16 parts of oxygen, and so on. The symbols of compounds become very concise, as the number of atoms of one kind in a molecule can be expressed by a sub-index. Thus the symbol or formula H 2 for water expresses the view that the molecule of water consists of one 'atom of oxygen and two of hydrogen; and if we know the atomic weights of oxygen and hydrogen, it also tells us the composition of water by weight. Similarly, the modern formula for ammonia is NH 3 .

The .superiority of this notation over that of Dalton is not so obviov when we consider such simple cases as the above, but cherni s are now acquainted with very complex molecules contai ing numerous atoms; cane sugar, for example, has the formula CuHmOh. It would be a serious business to draw a Daltonian diagram for such a molecule.

Dalton believed that the molecules of the elementary gases consisted each of one atom; his diagram for hydrogen gas makes the point clear. We now believe that the molecule of an element is frequently made up of two or more atoms; thus the formulae for the gases hydrogen, oxygen and nitrogen are H 2 , 2 , N 2 , while gaseous phosphorus and sulphur are probably P4 and S 6 , and gaseous mercury is Hgi, — that is, the molecule of this element is monatomic. This view, as to the frequently complex nature of the elementary molecule, is logically and historically connected with the striking hypothesis of Amadeo Avogadro and A. M. Ampere. These natural philosophers suggested that equal volumes of all gaseous substances must contain, at the same temperature and pressure, the same number of molecules. Their hypothesis explains so many facts that it is now considered to be as well established as the parts of the theory due to Dalton. 1 This principle at once enables the weights of molecules to be compared even when their composition is unknown; it is only

1 It will be seen that in the three gas diagrams of Dalton that are reproduced above, equal numbers of molecules are contained in equal volumes, but if Dalton held this view at one time he certainly afterwards abandoned it.

necessary to determine the specific gravities of the various gases referred to some one of them, say hydrogen; the numbers so obtained giving the weights of the molecules referred to that of the hydrogen molecule.

*The atomic theory has been of priceless value to chemists, but it has more than once happened in the history of science that a hypothesis, after having been useful in the discovery p*e„ a t and the co-ordination of knowledge, has been aban- position doned and replaced by one more in harmony with later of the discoveries. Some distinguished chemists have thought **<""*' that this fate may be awaiting the atomic theory, and that in future chemists may be able to obtain all the guidance they need from the science of the transformations of energy. But modern discoveries in radioactivity 2 are in favour of the existence of the atom, although they lead to the belief that the atom is not so eternal and unchangeable a thing as Dalton and his predecessors imagined, and in fact, that the atom itself may be subject to that eternal law of growth and decay of which Lucretius speaks. (F. H. Ne.)*

*ATONEMENT and DAY OF ATONEMENT. "Atone" (originally — see below — " at one ") and " atonement " are terms ordinarily used as practically synonymous with satisfaction, reparation, compensation, with a view r *® to reconciliation. As the English technical terms ˆJˆne. representing a theological doctrine which plays an important part not only in Christianity but in most religions, the underlying ideas require more detailed analysis. A doctrine of atonement makes the following presuppositions, (a) There is a natural relation between God and man in which God looks favourably upon man. (b) This relation has been disturbed so that God regards man's character and conduct with disapproval, and inflicts suffering upon him by way of punishment. In the higher religions the disturbance is due, as just implied, to unsatisfactory conduct on man's part, i.e. sin. (c) The normal relation may be restored, i.e. sin may be forgiven; and this restoration is the atonement.*

The problem of the atonement is the means or condition of the restoration of man to God's favour; this has been variously found (a) in the endurance of punishment; (6) in the payment of compensation for the wrong done, the compensation consist- ing of sacrifices and other offerings; (c) in the performance of magical or other ritual, the efficacy of the ritual consisting in its being pleasing to or appointed by God, or even in its having a coercive power over the deity; (d) in repentance and amendment of life. .Most theories of atonement would combine two or more of these, and would include repentance and amendment. Some or all of the conditions of atonement may be fulfilled, according to various views, either by the sinner or vicariously on his behalf by some kinsman; or by his family, clan or nation; or by some one else.

In the Old Testament, " atonement," " make an atonement " represent the Hebrew kippur and its derivatives. It is doubtful whether this root meant originally to " cover " or " wipe out "; but probably it is used as a technical °' rf _ term without any consciousness of its etymology. meat. The Old Testament presents very varied teaching on this subject without attempting to co-ordinate its doctrines in a harmonious system. In some cases there is no suggestion of any forgiveness; sinners are " cut off " from the chosen people; individuals and nations perish in their iniquity. 3 Some passages refer exclusively to the endurance of punishment as a condition of pardon; 4 others to the penitence and amendment of the sinner. 5 In Ezekiel xxxvi. 25-31, repentance is called forth by the divine forgiveness.

Sacrifice and other rites are also spoken of as conditions of the restoration of man to happy relations with God. The Priestly Code (Leviticus and allied passages) seems to confine the efficacy

2 Rutherford, Radioactivity.

3 Cf. Exodus xii. 15, &c. ; Josh. vii. 24 (Achan) ; Jer. li. 62 (Babylon).

4 2 Sam. xii. 13, 14 (David) ; Isaiah xl. 2 (Jerusalem) : in such cases, however, the context implies repentance.

6 Ezek. xviii., Micah vi.

of sacrifice to ritual, venial and involuntary sins, 1 and requires that the sacrifices should be offered at Jerusalem by the Aaronic priests; but these limitations did not belong to the older religion; and even in later times popular faith ascribed a larger efficacy to sacrifice. On the other hand, other passages protest against the ascription of great importance to sacrifice; or regard the rite as a consequence rather than a cause of forgiveness. 2 The Old Testament has no theory of sacrifice; in connexion with sin the sacrifice was popularly .regarded as payment of penalty or com- pensation. Lev. xvii. 1 1 suggests a mystic or symbolic explana- tion by its statement " the life of the flesh is in the blood; and I have given it to you upon the altar to make atonement for your lives: 3 for it is the blood that maketh atonement by reason of the life." The Old Testament nowhere explains why this importance is attached to the blood, but the passage is often held to mean that the life of the victim represented the forfeited life of the offerer.

The atoning ritual reached its climax on the Day of Atpne- ment n-:9?n ti\ 17/xepa e£iXcwjuoD, in the Mishna simply " the Jewish Day " Yomd), observed annually on the 10th day of day of the 7 th month (Tisri), in the autumn, about October, shortly before the Feast of Tabernacles or vintage festival. At one time the year began in Tisri. The laws of the Day of Atonement belong to the Priestly Code. 4 There is no trace of this function before the exile; the earliest reference to any such special time of atonement being the proposal of Ezek. xlv. 18-20 to establish two days of atonement, in the first and seventh months. 5 No doubt, however, both the principles and ritual are partly derived from earlier times. The object of the observances was to cleanse the sanctuary, the priesthood and the people from all their sins, and to renew and maintain favourable relations between Yahweh and Israel. The ritual includes features found on other holy days, sacrifices, abstinence from work, &c. ; and also certain unique acts. The Day of Atonement is the only fast provided in the Law; it is only on this occasion that (a) the Jews are required to " afflict their souls," (b) the

High Priest enters the Holy of Holies, (c) the High Priest offers incense before the mercy seat and sprinkles it with blood, and (d) the scapegoat or Azazel is sent away into the wilderness, bearing upon him all the iniquities of the people. In later Judaism, especially from about 100 B.C., great stress was laid on the Day of Atonement, and it is now the most important religious function of the Jews. On that day many attend the synagogues who are seldom or never seen in them at other times.

The idea of vicarious atonement appears in the Old Testament in different forms. The nation suffers for the sin of the indivi- dual; 8 and the individual for the sin of his kinsfolk 7 or of the nation. 8 Above all the Servant of Yahweh 9 appears as atoning for sinners by his sufferings and death. Again, the Old Testament speaks of the restoration of heathen nations, and of the salvation of the heathen; 10 but does not formulate any theory of atonement in this connexion. The Old Testament, however, only prepares the way for the Christian doctrine of the atonement; this is clear, inasmuch as its teaching is largely concerned with the nation, and hardly touches on the future life. Moreover, it could not define the relation of Christ to the atonement. Later Judaism emphasized the idea of vicarious atonement for Israel through the sufferings of the righteous, especially the martyrs; but it is very doubtful whether the idea of the atonement through the death of the Messiah is a pre-Christian Jewish doctrine. 11

In the New Testament, the English version uses ” atonement ”

*1 Lev. iv. 2, ” sin unwittingly ” bishegagd, c. 450 B.C., &c. * Psalm 1. 10, li. 16-19; Isaiah i. 11; Micah vi. 6-8.*

3 Heb. nephesh, also translated ” soul.”

4 Lev. xvi., xxiii. 27-32; Numb. xxix. 7-1 1.

5 So Davidson, &c. with LXX. The A.V. with Hebrew text has ” seventh day of the month.”

■ *‘ e.g. Achan, Josh. vii. 10-15.*

7 2 Sam. xxi. 1-9; Deut. v. 9, 10.

8 Ezek. xxi. 3, 4. 9 Isaiah liii. u Koberle, Siinde und Gnade, pp. 592 ff.

Isaiah xix. 25 xlix. 6.

once, Rom. v. 11, for KaraWaylj (R.V. here and elsewhere ” reconciliation “). This Greek word corresponds to the idea suggested by the etymology of at-one-ment, rtsta- the re-uniting in amity of those at variance, a sense

meat which the word had in the 17th century but has since lost. But the idea which is now usually expressed by " atone- ment " is rather represented in the New Testament by iXacr/ios and its cognates, e.g. 1 John ii. 2 R.V., " He (Jesus) is the propitiation (tXacr/uos) for our sins." But these words are rare, and we read more often of " salvation " (cruTiipLa) and " being save,d," which includes or involves that restoration to divine favour which is called atonement. The leading varieties of teaching, the Sayings of Jesus, Paul, the Johannine writings, the Epistle to the Hebrews, connect the atonement with Christ especially with His death, and associate it with faith in Him and with repentance and amendment of life. 12

These ideas are also common to Christian teaching generally. The New Testament, however, does not indicate that its writers were agreed as to any formal dogma of the atonement, as regards the relation of the death of Christ to the sinner's restoration to God's favour; but various suggestions are made as to the solution of the problem. St Paul's teaching connects with the Jewish doctrine of vicarious suffering, represented in the Old Testament by Is. liii., and probably, though not expressly, with the ritual sacrifices. Christ suffering on behalf of sinners satisfies the divine righteousness, which was outraged by their sin. 13 His work is an expression of God's love to man; 14 the redeeming power of Christ's death is also explained by his solidarity with humanity as the second Adam, 15 — the redeemed sinner has " died with Christ. " 16 Some atoning virtue seems also attributed to the Resurrection; 17 Christ's sayings connect admission to the kingdom of God with susceptibility to the influence of His personality, faith in Himself and His mission, and the loyalty that springs from faith. 18 In John, Christ is a " propitiation " (iXatryuos) provided by the love of God that man may be cleansed from sin; He is also their advocate (IIa.pa.KXijTOs) with God that they may be forgiven, for His name's sake. 19 Hebrews speaks of Christ as transcending the rites and officials of the law; He accomplishes the realities which they could only foreshadow; in relation to the perfect, heavenly sacrifice which atones for sin, He is both priest and victim. 20

The subsequent development of the Christian doctrine has chiefly shaped itself according to the Pauline formula of vicarious atonement; the sufferings of Christ were accepted as a substitute for the punishment which men deserved, /JJ e ˆC and so the divine righteousness was satisfied — a pretation. formula, however, which left much room for contro- versy. The creeds and confessions are usually vague. Thus the Apostles' Creed, " I believe in the forgiveness of sins "; the Nicene Creed, " I believe in one Lord Jesus Christ . . . who for us men and for our salvation came down from Leaven … I acknowledge one baptism for the remission of sins"; the Athanasian Creed, " Who (Christ) suffered for our salvation." In the Thirty-nine Articles of the Church of England we have (ii.) " Christ

suffered … to reconcile his Father to us, and to be a sacrifice, not only for original guilt, but also for all actual sins of men " ; and (xxxi.) " The offering of Christ once made is that perfect redemption, propitiation, and satisfaction, for all the sins of the whole world." The council of Trent declared that " Christus . . . nobis sua sanctissima passione Ugno cruets justificationem meruit et pre nobis deo patri satisfecit," " Christ earned our justification by His most holy passion and satisfied God the Father for us." The Confession of Augsburg uses words equivalent to the Articles quoted above which were based upon it. The Westminster Confession declares: "The. Lord Jesus Christ, by His perfect obedience and sacrifice of Himself, which He through the Eternal Spirit once offered up to God, hath

12 Mark x. 45 ; Matt. xxvi. 28 ; 1 Cor. xv. 3 ; John xi. 48-52 ; Heb. ii. 9.

13 Rom. iii. 25. u Rom. v. 8. ls Rom. v. 15-19. 16 Rom. vi. 8. « Rom. iv. 25.

18 Matt. xxv. 34 f. ; Mark viii. 34 ff., ix. 36 f., x. 21.

19 1 John ii. 1, 2, 12, iii. 5, 8, iv. 10. M Heb. ii. 17. ix.14.

fully satisfied the justice of His Father, and purchased not only reconciliation, but an everlasting inheritance in the kingdom of heaven, for all those whom the Father hath given unto Him."

Individual theologians have sought to define more exactly the points on which the standards are vague. For instance, how was, justice satisfied by Christ? The early Fathers, from Irenaeus (d. c. 200) to Anselm (d. noo), 1 held, inter alia, that Christ paid a ransom to Satan to induce him to release men from his power. Anselm and the scholastics regarded the atonement as an offering to God of such infinite value as to outweigh men's sins, a view sometimes styled the " Commerical Theory." 2 The leading reformers emphasized the idea that Christ bore the punish- ment of sin, sufferings equivalent to the punishments deserved by men, a view maintained later on by Jonathan Edwards junior. But the intellectual activity of the Reformation also developed other views; the Socinians, with their humanitarian theory of the Person of Christ, taught that He died only to assure men of God's forgiving love and to afford them an example of obedience — " Forgiveness is granted upon the ground of repentance and obedience." 3 Grotius put forward what has been called the Governmental Theory, viz. that the atonement took place not to satisfy the wrath of God, but in the practical interests of the divine government of the world, " The

sufferings and death of the Son of God are an exemplary exhibition of God's hatred of moral evil, in connexion with which it is safe and prudent to remit that penalty, which so far as God and the divine attributes are concerned, might have been remitted without it." 4

The formal legal view continued to be widely held, though it was modified in many ways by various theologians. For instance, it has been held that Christ atoned for man- views" kind not by enduring the penalty of sin, but by identify- ing Himself with the sinner in perfect sympathy, and feeling for him an " equivalent repentance " for his sin. Thus McLeod Campbell (q.v.) held that Christ atoned by offering up to God a perfect confession of the sins of mankind and an adequate repentance for them, with which divine justice is satisfied, and a full expiation is made for human guilt. A similar view was held by F. D. Maurice. 6 Others hold that the effect of the atoning death of Christ is not to propitiate God, but to reconcile man to God; it manifests righteousness, and thus reveals the heinousness of sin; it also reveals the love of God, and conveys the assurance of His willingness to forgive or receive the sinner; thus it moves men to repentance and faith, and effects their salvation; so substantially Ritschl. 6 In England much influence has been exerted by Dr R. W. Dale's Atonement (1875), the special point of which is that the death of Christ is not required by the personal demand of God to be propitiated, but by the necessity of honouring an ideal law of righteousness; thus, " the death of Christ is the objective ground on which the sins of men are remitted, because it was an act of submission to the righteous authority of the law by which the human race was condemned . . . and because in consequence of the relation between Him and us — His life being our own — His submission is the expression of ours, and carries ours with it . . . (and) because in His submission to the awful penalty of sin . . . there was a revelation of the righteousness of God, which must other- wise have been revealed in the infliction of the penalties of sin on the human race." 7 This view, however, leads to a dilemma; if the law of righteousness is simply an expression of the divine will, satisfaction to law is equivalent to propitiation offered to God; if the law has an independent position, the view is incon- sistent with pure monotheism.

The present position may be illustrated from a work repre- senting the more liberal Anglican theology. Bishop Lyttelton in Lux Mundi stated that the death of Christ is propitiatory*

1 Stevens, Christian Doctrine of Salvation, p. 138.

2 Ibid. p. 151.

3 Shedd, Hist, of Christ. Doctr. ii. 385 ff. ; cf. van Oosterzee, Christ.

*Dogmatics, 611. * Shedd ii. 358 f.*

‘ Crawford, Scripture Doctrine of the Atonement, pp. 327 ff.

8 Orr, Ritschlian Theology, pp. 149 ff.

7 Dale, Atonement, pp. 430 ff.

‘ Pp. 209, 212, 214, 216, 219, 221, 225.

towards God because it expressed His perfect obedience, it manifested God’s righteous wrath against sin, and in virtue of Christ’s human nature involved man’s recognition of the righteousness of God’s condemnation of sin; also because in some mysterious way death has a propitiatory value; and finally because Christ is the representative of the human race. Towards man, the death of Christ has atoning efficacy because it delivers from sin, bestows the divine gift of life and conveys the assurance of pardon. The benefits of the atonement are appropriated by ” the acceptance of God’s forgiveness in Christ, our self-identification with Christ’s atoning attitude, and then working out, by the power of the life bestowed upon us, all the (moral and spiritual) consequence of forgiveness.”

At present the belief in an objective atonement is still widely held; whether in the form of penal theories — the old forensic view that the death of Christ atones by paying the penalty of man’s sin — or in the form of governmental theories; that the Passion fulfilled a necessity of divine government by expressing and vindicating God’s righteousness. But there is also a wide- spread inclination to minimize, ignore or deny the objective aspect of the atonement, the effect of the death of Christ on God’s attitude towards men; and to follow the moral theories in emphasizing the subjective aspect of the atonement, the ‘ influence of the Passion on man. There is a tendency to eclectic views embracing the more attractive features of the various theories; and attempts are made to adapt, interpret and qualify the imagery and language of older formulae, in order so to speak, to issue them afresh in new editions, compatible with modern natural science, psychology and historical criticism. Such attempts are necessary in a time of transition, but they involve a measure of obscurity and ambiguity.

Bibliography. — Atonement: H. Bushnell, Vicarious Sacrifice (1871); J. McLeod Campbell, Nature of the Atonement (1869); T. J. Crawford, Doctrine of the Holy Spirit respecting the Atonement (1871); R. W. Dale, Atonement (1875); J. Denney, Death of Christ, Atonement and the Modern Mind (1903) ; A. Lyttelton, Lux Mundi, pp. 201 ff. (Atonement), (1889); R. Moberly, Atonement and Per- sonality; A. Ritschl, Die christliche Lehre von der Rechtfertigung und Versohnung (1870-1874); G. B. Stevens,

Christian Doctrine of Salvation (1905).

Day of Atonement: articles in Hastings' Bible Dictionary, and in the Encyclopaedia Biblica. ' (W. H. Be.)

ATRATO, a river of western Colombia, South America, rising on the slopes of the Western Cordilleras, in 5° 36′ N. lat., and flowing almost due north to the Gulf of Uraba, or Darien, where it forms a large delta. Its length is about 400 m., but owing to the heavy rainfall of this region it discharges no less than 175,000 cub. ft. of water per second, together with a very large quantity of sediment, which is rapidly filling the gulf. The river is navi- gable to Quibdo (250 m.), and for the greater part of its course for large vessels, but the bars at its mouth prevent the entrance of sea-going steamers. Flowing through the narrow valley between the Cordillera and coast range, it has only short tribu- taries, the principal ones being the Truando, Sucio and Murri. The gold and platinum mines of Choco were on some of its affluents, and the river sands are auriferous. The Atrato at one time attracted considerable attention as a feasible route for a trans-isthmian canal, which, it was estimated, could be excavated at a cost of £11,000,000.

ATREK, a river which rises in 37° 10′ N. lat. and 59° E., in the mountains of the north-east of the Persian province of Khorasan, and flows west along the borders of Persia and the Russian Transcaspian province, till it falls, after a course of 350 m., into the south-eastern corner of the Caspian, a short distance north-north-west of Astarabad.

ATREUS, in Greek legend, son of Pelops and Hippodameia, and elder brother of Thyestes. Having murdered his step- brother Chrysippus, Atreus fled with Thyestes to Mycenae, where he succeeded Eurystheus in the sovereignty. His wife Aerope was seduced by Thyestes, who was driven from Mycenae. To avenge himself, Thyestes sent Pleisthenes (Atreus' son whom Thyestes had brought up as his own) to kill Atreus, but Plei- sthenes was himself slain by his own father. After this Atreus, apparently reconciled to his brother, recalled him to Mycenae

and invited him to a banquet to eat of his son, whom Atreus had slain. Thyestes fled in horror. Subsequently Atreus married the daughter of Thyestes, Pelopia, who had by her own father a son, Aegisthus, who was adopted by Atreus. Thyestes was found by Agamemnon and Menelaus, the sons of Atreus, and imprisoned at Mycenae. Aegisthus being sent to murder

Thyestes, mutual recognition took place, and Atreus was slain by the father and son, who seized the throne, and drove Aga- memnon and Menelaus out of the country (Thucydides i. 9; Hyginus, Fabulae; Apollodorus). Homer does not speak of the horrors of the story, which are first found in the tragedians; he merely states (Iliad, ii. 105) that Atreus at his death left the kingdom to Thyestes.

See T. Voigt in Dissert, philol. Halenses. vi. (1886).

ATRI, a town of the Abruzzi, Italy, in the province of Teramo, 6 m. W. of the station of that name on the railway from Ancona to Foggia, and 18 m. due E.S.E. of Teramo, on the site of the ancient Hadria (q.v.). Pop. (1901) 13,448. Its Gothic cathedral (1 285-1305) is remarkably fine; and the interior, though spoilt by restoration in 1657, contains some important frescoes of the end of the 1 5th century by Andrea di Lecce and his pupils. The crypt was originally a cistern of the Roman period. The palace of the Acquaviva family, who were dukes of Atri from 1398 to 1775, is a massive building situated in the principal square.

ATRIUM (either from ater, black, referring to the blackening of the walls from the smoke of the hearth, or from the Greek dfflpwv, open to the sky, or from an Etruscan town, Atria, where the style of building is supposed to have originated), the principal entrance hall or court of a Roman dwelling, giving access and light to the rooms round it. The centre of the roof over the atrium was open to the sky and called the compluvium; the rain-water from the roof collected in the gutters was dis- charged into a marble tank underneath, which was known as the impluvium. In the early periods of Roman civilization the atrium was the common public apartment, and was used for the reception of visitors and clients, and for ordinary domestic purposes, as cooking and dining. In it were placed the ancestral pictures, the marriage-couch, the hearth and generally a small altar. At a somewhat later period, and among the wealthy, separate apartments were built for kitchens and dining-rooms, and the atrium was kept as a general reception-room for clients and visitors. There were many varieties of the atrium, depending on the way in which the roof was carried. These are described by Vitruvius under the title of canaedium.

Other buildings, both consecrated and unconsecrated, were called by the term (corresponding to the English " hall "), such as the Atrium Vestae, where the vestal virgins lived, and the Atrium Libertatis, the residence of the censor, where Asinius Pollio established the first public library at Rome.

The word atrium in Rome had a second signification, being given to an open court with porticos round, sometimes placed in front of a temple. A similar arrangement was adopted by the early Christians with relation to

the Basilica, in front of which there was an open court surrounded by colonnades or arcades. The church of San Clemente at Rome, that of Sant' Ambrogio at Milan and the cathedral of Parenzo in Istria still retain their atria.

ATROPHY (Gr. &.- priv., Tpcxfyfi, nourishment), a term in medicine used to describe a state of wasting due to some inter- ference with the function of healthy nutrition (see Pathology). In the living organism there are always at work changes involving the waste of its component tissues, which render necessary, in order to maintain and preserve life, the supply and proper assimi- lation of nutritive material. It is also essential for the mainten- ance of health that a due relation exist between these processes of waste and repair, so that the one may not be in excess of the other. When the appropriation of nutriment exceeds the waste, hypertrophy (q.v.) or increase in bulk of the tissues takes place. When, on the other hand, the supply of nutritive matter is suspended or diminished, or when the power of assimilation is impaired, atrophy or wasting is the result. Thus the whole body becomes atrophied in many diseases; and in old age every

part of the frame, with the single exception of the heart, under- goes atrophic change. Atrophy may, however, affect single organs or parts of the body, irrespective of the general state of nutrition, and this may be brought about in a variety of ways. One of the most frequently observed of such instances is atrophy from disuse, or cessation of function. Thus, when a limb is deprived of the natural power of motion, either by paralysis or by painful joint disease, the condition of exercise essential to its nutrition being no longer fulfilled, atrophy of all its textures sooner or later takes place. The brain in imbeciles is frequently observed to be shrivelled, and in many cases of blindness there is atrophy of the optic nerve and optic tract. This form of atrophy is likewise well exemplified in the case of those organs and structures of the body which subserve important ends during foetal life, but which, ceasing to be necessary after birth, undergo a sort of natural atrophy, such as the thymus gland, and certain vessels specially concerned in the foetal circulation. The uterus after parturition undergoes a certain amount of atrophy, and the ovaries, after the child-bearing period, become shrunken. Atrophy of a part may also be caused by interrup- tion to its normal blood-supply, as in the case of the ligature or obstruction of an artery. Again, long-standing disease, by affecting the nutrition of an organ and by inducing the deposit of morbid products, may result in atrophy, as frequently happens in affections of the liver and kidneys. Parts that are subjected to continuous pressure are liable to become atrophied, as is sometimes seen in internal organs which have been pressed upon by tumours or other morbid growths, and is well illustrated in the Chinese practice of foot-binding. Atrophy may manifest itself simply by loss of substance; but, on the other hand, it is often found to co-exist with

degenerative changes in the textures affected and the formation of adventitious growth, so that the part may not be reduced in bulk although atrophied as regards its proper structure. Thus, in the case of the heart, when affected with fatty degeneration, there is atrophy of the proper muscular texture, but as this is largely replaced by fatty matter, the organ may undergo no diminution in volume, but may, on the contrary, be increased in size. Atrophy is usually a gradual and slow process, but sometimes it proceeds rapidly. In the disease known by the name of acute yellow atrophy of the liver, that organ undergoes such rapidly destructive change as results in its shrinking to half, or one-third, of its normal size in the course of a few days. The term progressive muscular atrophy (synonyms, wasting or creeping palsy) is applied to an affection of the muscular system, which is characterized by the atrophy and subsequent paralysis of certain muscles, or groups of muscles, and is associated with morbid changes in the anterior roots of the nerves of the spinal cord. This disease begins insidiously, and is often first observed to affect the muscles of one hand, generally the right. The attention of the sufferer is first attracted by the power of the hand becoming weakened, and then there is found to be a wasting of certain of its muscles, particularly those of the ball of the thumb. Gradually other muscles in the arms and legs become affected in a similar manner, their atrophy being attended with a corresponding diminution in power. Although sometimes arrested, this disease tends to progress, until in course of time the greater part of the muscular system is implicated and a fatal result ensues.

ATROPOS, in Greek mythology, the eldest of the three Fates (see Fate). Her name, the " Unalterable " (a- privative, and rpexeic, to turn), indicates her function, that of rendering the decisions of her sisters irreversible or immutable. Atropos is most frequently represented with scales, a sun-dial or a cutting instrument, the " abhorred shears," with which she slits the thin-spun thread of life that has been placed on the spindle by Clotho and drawn off by Lachesis.

ATTA, TITUS QUINCTIUS, or Quintictus (d. 77 B.C.), Roman comedy writer, was, like Titinius and Afranius, distinguished as a writer of fabulae togatae, national comedies. He had the reputation of being a vivid delineator of character, especially female. He also seems to have published a collection of epigrams. The scanty fragments contain many archaisms, but are lively in

style. According to Horace (Epistles, ii 1. 79) the plays of Atta were still

put on the stage in his time.

Aulus Gellius vii. 9; fragments in Neukirch, De fabula togaia Romanorum (1833) ; Ribbeck, Comicorum Latinorum reliquiae (1855).

ATTACAPA (Choctaw for " cannibal "), a tribe of North- American Indians, whose home was in south-west Louisiana; they are now practically extinct.

ATTACHMENT, 1 in law, a process from a court of record, awarded by the justices at their discretion, on a bare suggestion, or on their own knowledge, and properly grantable in cases of contempt. It differs from arrest {q.v.), in that he who arrests a man carries him to a person of higher power to be forthwith disposed of; but he that attaches keeps the party attached, and presents him in court at the day assigned, as appears by the words of the writ. Another difference is, that arrest is only upon the body of a man, whereas an attachment is often upon his goods. It is distinguished from distress in not extending to lands, as the latter does; nor does a distress touch the body, as an attachment does. Every court of record has power to fine and imprison for contempt of its authority. Attachment being merely a process to bring the defendant before the court, is not necessary in cases of contempt in the presence of the court itself. Attachment will be granted in England against peers and members of parliament only for such gross contempts as rescues, disobedience to the sovereign's writs and the like. Attachment will not he against a corporation. The county courts in this respect are regulated by acts of 1846 and 1849. They can only punish for contempts committed in presence of the court (see Contempt of Court). Attachments are granted on a rule in the first instance to show cause, which must be personally served before it can be made absolute, except for non-payment of costs on a master's allocatur, and against a sheriff for not obeying a rule to return a writ or to bring in the body. The offender is then arrested, and when committed will be compelled to answer interrogatories, exhibited against him by the party at whose instance the proceedings have been had; and the examination when taken is referred to the master, who reports thereon, and on the contempt being reported, the court gives judgment accord- ing to its discretion, in the same manner as upon a conviction for a misdemeanour at common law. Sir W. Blackstone observes that " this method of making the defendant answer upon oath to a criminal charge is not agreeable to the genius of the common law in any other instance "; and the elasticity of the legal definitions of contempt of court, especially with respect to comments on judicial proceedings, is the subject of much complaint.

Attachment of Debts. — It was suggested by the common law commissioners in 1853 that a remedy analogous to that of Foreign

Attachment (see below) might be made available to creditors, after judgment, against debts due to their debtors. Accordingly, the Common Law Procedure Act 1854 enacted that any creditor, having obtained judgment in the superior courts, should have an order that the judgment debtor might be examined as to any debts due and owing to him before a master of the court. The rules and regulations under the Judicature Act 1873 retained the process for attachment of debts as estab- lished by the Procedure Act of 1854. On affidavit that the judg- ment was still unsatisfied, and that any other person within the jurisdiction was indebted to the judgment debtor, the judge was empowered to attach all debts due from such third person (called the garnishee) to the judgment debtor, to answer the judgment debt. This order binds the debts in the hands of the garnishee, and if he does not dispute his liability execution issues against him at once. If he disputes his liability the ques- tion must be tried. Payment by the garnishee or execution

1 " To attach " is first used in English in the legal sense of arrest or seizure, and the sense of " fasten to " is comparatively late. The Old French atachier, modern attacker, from which the English " attach " is derived, is from a word for a peg or nail, in English " tack," which is found in many forms in Scandinavian and Celtic languages, and is ultimately connected with the root seen in Latin tangere, to touch. The Italian attacare, especially in the phrase attacare battaelia, to join battle, gave the French attaquer, whence the English attack," which is therefore by origin a doublet of " attach."

against him is a complete discharge as against the judgment debtor. These provisions were, by an order in council of the 18th of November 1867, extended to the county courts. By the Wages Attachment Abolition Act 1870 it is enacted that no order for the attachment of the wages of any servant, labourer or workman shall be made by the judge of any court of record or inferior court, and by the Merchant Shipping Act 1894 it is enacted that the wages of a seaman or apprentice are not subject to attachment.

In the United States attachment of debts is a statutory remedy accorded in most of the states in certain circumstances for the security of creditors, by the seizure by the sheriff of the debtor's goods or the imposition of a lien upon his land, before judgment, and sometimes at the very commencement of the action. In some states it is only allowed in special cases, as when the debtor has absconded, or is a non-resident or guilty of fraud; in a few it may be had, as of right, at the commencement of ordinary actions. The common-law courts of the United States (by act of Congress) follow the practice in this regard of the state in which they sit. Such attachments (on mesne process) can generally be dissolved by the substitution of a bond

with surety. The body can also be attached in most states on civil actions of tort (for a wrongful or negligent act to the damage of another), but not in actions on contract.

Foreign Attachment is an important custom prevailing in the city of London, whereby a creditor may attach money owing to his debtor, or property belonging to him in the possession of third parties. The person holding the property or owing the money must be within the city at the time of being served with the process, but all persons are entitled to the benefit of the custom. The plaintiff having commenced his action, and made a satis- factory affidavit of his debt, is entitled to issue attachment, which thereupon affects all the money or property of the de- fendant in the hands of the third party, the garnishee. The garnishee, of course, has as against the attachment all the defences which would be available to him against the defendant, his alleged creditor. The garnishee may plead payment under the attachment, if there has been no fraud or collusion, in bar to an action by the defendant for his debt or property. The court to which this process belongs is the mayor's court of London, the procedure in which is regulated by the Mayor's Court of London Procedure Act 1857. This custom, and all proceedings relating thereto, are expressly exempted from the operation of the Debtor's Act 1869. Similar customs exist in Bristol and a few other towns in England and also in Scotland.

A Writ of Attachment enforces answers and obedience to decrees and orders of the High Court of Justice, and is made out without order upon an affidavit of the due service of the process, &c, with whose requirements compliance is sought. A corporation, however, is proceeded against by distringas and not by attach- ment. It was formerly competent to the plaintiff to compel the appearance of a defendant in chancery by attachment, but the usual course was to enter appearance for him in case of default. It is one of the modes of execution allowed for the recovery of property other than land or money.

Attachment of the Forest was the proceeding in the courts of attachments, Woodmote, or Forty Days' courts. These courts have fallen into desuetude. They were held before the verderers of the royal forests in different parts of the kingdom once in every forty days, for the purpose of inquiring into all offences against " vert (greensward) and venison." The attachment was by the bodies of the offenders, if taken in the very act of killing venison, or stealing wood, or preparing so to do, or by fresh and immediate pursuit after the act was done; else they must be attached by their goods. These attachments were received by the verderers and enrolled, and certified under their seals to the Swainmote, or Court of Justice-seat, which was the superior of the forest courts.

ATTAINDER (from the 0. Fr. ataindre, ateindre, to attain, i.e. to strike, accuse, condemn; Lat. attingere, tangere, to touch; the meaning has been greatly affected by the confusion with Fr. taindre, teindre, to taint, stain, Lat. tingere, to dye), in English

law, was the immediate and inseparable consequence from the common law upon the sentence of death. When it was clear beyond all dispute that the criminal was no longer fit to live he was called attaint, and could not, before the Evidence Act 1843, be a witness in any court. This attainder took place after judgment of death, or upon such circumstances as were equivalent to judgment of death, such as judgment of outlawry on a capital crime, pronounced for absconding from justice. Conviction without judgment was not followed by attainder. The con- sequences of attainder were (1) forfeiture, (2) corruption of blood. On attainder for treason, the criminal forfeited to the crown his lands, rights of entry on lands, and any interest he might have in lands for his own life or a term of years. For murder, the offender forfeited to the crown the profit of his freeholds during life, and in the case of lands held in fee-simple, the lands themselves for a year and a day; subject to this, the lands escheated to the lord of the fee. These forfeitures related back to the time of the offence committed. Forfeitures of goods and chattels ensued not only on attainder, but on conviction for a felony of any kind, or on flight from justice, and had no relation backwards to the time of the offence committed. By corruption of blood, " both upwards and downwards," the attainted person could neither inherit nor transmit lands. The lands escheated to the lord of the fee, subject to the crown's right of forfeiture. The doctrine of attainder has, however, ceased to be of much importance. The Forfeiture Act 1870 enacted that henceforth no confession, verdict, inquest, con- viction or judgment of or for any treason or felony, or felo de se, should cause any attainder or corruption of blood, or any forfeiture or escheat. Sentence of death, penal servitude or imprisonment with hard labour for more than twelve months, after conviction for treason or felony, disqualifies from holding or retaining a seat in parliament, public offices under the crown or otherwise, right to vote at elections, &c, and such disability is to remain until the punishment has been suffered or a pardon obtained. Provision was made for the due administration of convicts' estates, in the interests of themselves and their families. Forfeiture consequent on outlawry was exempted from the pro- visions of the act. The United States constitution (Art. III. s. 3) says: " The Congress shall have power to declare the punishment of treason, but no attainder of treason shall work corruption of blood, or forfeiture except during the life of the person attainted."

Bills of Attainder, in English legal procedure, were formerly a parliamentary method of exercising judicial authority. They were ordinarily initiated in the House of Lords and the pro- ceedings were the same as on other bills, but the parties against whom they were brought might appear by counsel and produce witnesses in both Houses. In the case of an impeachment (q.v.), the House of Commons was prosecutor and the House of Lords judge; but such bills being legislative in form, the consent of crown, lords and commons was necessary to pass them. Bishops, who do not exercise but who claim the right to vote in cases of impeachmentˆ.ˆ.), have a right to vote upon bills of attainder, but their vote is not conclusive in passing judgment upon the accused. First passed in 1459, such bills were employed, more particularly during the reigns of the Tudor kings, as a species of extrajudicial procedure, for the direct punishment of political offences. Dispensing with the ordinary judicial forms and precedents, they took away from the accused whatever advantages he might have gained in the courts of law; such evidence only was admitted as might be necessary to secure conviction; indeed, in many cases bills of attainder were passed without any evidence being produced at all. In the reign of Henry VIII. they were much used, through a subservient parliament, to punish those who had incurred the king's dis- pleasure; many distinguished victims who could not have been charged with any offence under the existing laws being by this means disposed of. In the 17th century, during the disputes with Charles I., the Long Parliament made effective use of the same procedure, forcing the sovereign to give his consent. After the Restoration it became less frequent, though the Jacobite

movement in Scotland produced several instances of attainder, without, however, the infliction of the extreme penalty of death. The last bill of attainder passed in England was in the case of Lord Edward Fitzgerald, one of the Irish rebel leaders of 1798.

A bill for reversing attainder took a form contrary to the usual rule. It was first signed by the sovereign and presented by a peer to the House of Lords by command of the crown, then passed through the ordinary stages and on to the commons, to whom the sovereign's assent was communicated before the first reading was taken, otherwise the whole proceedings were null and void.

A Bill of Pains and Penalties resembles a bill of attainder in object and procedure, but imposes a lesser punishment than death. The most notable instances of the passing of a bill of pains and penalties are those of Bishop Atterbury in 1722, and of Queen Caroline, wife of George IV., in 1820.

The constitution of the United States declares that " no bill of attainder or ex post facto law shall be passed."

ATTAINT, WRIT OF, an obsolete method of procedure in English law, for inquiring by a jury of twenty-four whether a false verdict had been given in a trial before an ordinary jury of twelve. If it were found that an erroneous judgment had been given, the wrong was redressed and the original jury incurred infamy, with imprisonment and forfeiture of their goods, which punishments were, however, commuted later for a pecuniary penalty. In criminal cases a writ of attaint was issued at suit of the king, and in civil cases at the suit of either party. In criminal cases it appears to have become obsolete by the end of the 15th century. Procedure by attaint in civil cases had also been gradually giving place to the practice of granting new trials, and after the decision in Bushell's case in 1670 (see Jury) it became obsolete, and was finally abolished by the Juries Act 1825, except as regards jurors guilty of embracery (q.v.).

ATTALIA, an ancient city of Pamphylia, which derived its name from Attalus II., king of Pergamum; the modern Adalia (q.v.). It was important as the nearest seaport to the rich districts of south-west Phrygia. A much-frequented " half- sea " route led through it to the Lycus and Maeander valleys, and so to Ephesus and Smyrna. This was the natural way from any part of central Asia Minor to Syria and Egypt, and accordingly we hear of Paul and Barnabas taking ship at Attalia for Antioch. Originally the port of Perga, Attalia eclipsed the old Pamphylian capital in early Christian times and became the metropolis. There are extensive remains of the ancient walls, including some portions which go back to the foundation of the Pergamenian city. The most conspicuous monument is the triple Gate of Hadrian, flanked by a tower built by the empress Julia. This lies about half-way round the enceinte and formerly admitted the road from Perga.

ATTAR [or Otto] OF ROSES (Pers. 'afar, essence), a perfume consisting of essential oil of roses, prepared by distilling, or, in some districts, by macerating the flowers. The manufacture is chiefly carried out in India, Persia and the Balkans; the last named supplying the bulk of the European demand. It is used by perfumery manufacturers as an ingredient. The genuine attar of roses is costly and it is frequently adulterated.

ATTEMPT (Lat. adtemptare, attentare, to try), in law, an act done with intent to commit a crime, and forming one of a series of acts which would constitute its actual commission if it were not interrupted. An attempt must proceed beyond mere pre- paration, but at the same time it must fall short of the ultimate purpose in any part of it. The actual point, however, at which an act ceases to be an attempt, and becomes criminal, depends upon the circumstances of each particular case. A person may be guilty of an attempt to commit a crime, even if its commis- sion in the manner proposed was impossible. Every attempt to commit a treason, felony or indictable misdemeanour is in itself an indictable misdemeanour, punishable by fine

or imprisonment, unless the attempt to commit is specifically punishable by statute as a felony, or in a defined manner as a misdemeanour; and a person who has been indicted for a, felony or misdemeanour may,

if the evidence so warrants, be found guilty only of the attempt, provided that it too is a misdemeanour.

ATTENTION (from Lat. ad-tendo, await, expect; the condi- tion of being " stretched " or " tense "), in psychology, the con- centration of consciousness upon a definite object or objects. The result is brought about, not by effecting any change in the perceptions themselves, but simply by isolating them from other objects. Since all consciousness involves this isolation, attention may be denned generally as the necessary condition of conscious- ness. Such a definition, however, throws no light upon the nature of the psychological process, which is partly explained by the general law that the greater the number of objects on which attention is concentrated the less will each receive (" pluribus intentus, minor est ad singula sensus "), and conversely. There are also special circumstances which determine the amount of attention, e.g. influences not subject to the will, such as the vividness of the impression (e.g. in the case of a shock), strong change in pleasurable or painful sensations. Secondly, an exer- cise of volition is employed in fixing the mind upon a definite object. This is a purely voluntary act, which can be strengthened by habit and is variable in different individuals; to it the name "attention" is sometimes restricted. The distinction is ex- pressed by the words " reflex " or " passive," and " volitional " or " active." It is important to notice that in every case of attention to an object, there must be in consciousness an implicit apprehension of surrounding objects from which the particular object is isolated. These objects are known as the " psychic fringe," and are essential to the systematic unity of the attention- process. Attempts have been made to examine the attention- process from the physiological standpoint by investigating the muscular and neural changes which accompany it, and even to assign to it a specific local centre. It has, for example, been remarked that uniformity of environment, resulting in practi- cally automatic activity, produces mental equilibrium and the comparative disappearance of attention-processes; whereas the necessity of adapting activity to abnormal conditions produces a comparatively high degree of attention. In other words, attention is absent where there is uniformity of activity in accordance with uniform, or uniformly changing, environment. In spite of the progress made in this branch of study, it has to be remembered that all psycho-physical experiments are to some extent

vitiated by the fact that the phenomena can scarcely remain normal under inspection.

See G. F. Stout, Analytic Psychology (London, 1896), especially part ii. chap. 2 ; also Psychology, Brain, &c.

ATTERBOM, PER DANIEL AMADEUS (1790-1855), Swedish poet, son of a country parson, was born in the province of Ostergotland on the 19th of January 1790. He studied in the university of Upsala from 1805 to 1815, and became professor of philosophy there in 1828. He was the first great poet of the romantic movement which, inaugurated by the critical work of Lorenzo Hammerskold, was to revolutionize Swedish literature. In 1807, when in his seventeenth year, he founded at Upsala an artistic society, called the Aurora League, the members of which included V. F. Palmblad, A. A. Grafstrom (d. 1870), Samuel Hedborn (d. 1849), and other youths whose names were destined to take a foremost rank in the literature of their generation. Their first newspaper, Poly/em, was a crude effort, soon aban- doned, but in 1810 there began to appear a journal, Fosforos, edited by Atterbom, which lasted for three years and finds a place in classic Swedish literature. It consisted entirely of poetry and aesthetico-polemical essays; it introduced the study of the newly arisen Romantic school of Germany, and formed a vehicle for the early works, not of Atterbom only, but of Hammerskold, Dahlgren, Palmblad and others. Later, the members of the Aurora League established the Poetisk Kalender (1812-1822), in which their poems appeared, and a new critical organ, Svensk Litter alurtidning (1813-1824). Among Atterbom's independent works the most celebrated is Lycksalighetens O {The Fortunate Island), a romantic drama of extraordinary beauty, published in 1823. Before this he had published a cycle of lyrics, Blommorna {The Flowers), of a mystical character,

somewhat in the manner of Novalis. Of a dramatized fairy tale, Fagel bid (The Blue Bird), only a fragment, which is among the most exquisite of his writings, is preserved. As a purely lyrical poet he has not been excelled in Sweden, but his more ambitious works are injured by his weakness for allegory and symbolism, and his consistent adoption of the mannerisms of Tieck and Novalis. In his later years he became less violent in literary controversy. He became in 1835 professor of aesthetics and literature at Upsala, and four years later he was admitted to the Swedish Academy. He died on the 21st of July 1855. His Svenska Siare och Skalder (6 vols., 1841-1855) supplement, 1864) consists of a series of biographies of Swedish poets and men of letters, which forms a valuable history of Swedish letters down to the end of the " classical " period. Atterbom's works were collected (13 vols., Orebro) in 1854-1870.

ATTERBURY, FRANCIS (1662-1732), English man of letters, politician

and bishop, was born in the year 1662, at Milton or Middleton Keynes in Buckinghamshire, a parish of which his father was rector. He was educated at Westminster school and at Christ Church, Oxford, where he became a tutor. In 1682 he published a translation of Absalom and Ahithophel into Latin verse; but neither the style nor the versification was that of the Augustan age. In English composition he succeeded much' better. In 1687 he published An Answer to some Considerations,, on the Spirit of Martin Luther and the Original of the Reformation, a reply to Obadiah Walker, who, elected master of University College in 1676, had printed in a press set up by him there an attack on the Reformation, written by Abraham Woodhead. Atterbury's treatise, though highly praised by Bishop Burnet, is perhaps more distinguished for the vigour of his rhetoric than for the soundness of his arguments, and the Papists were so much galled by his sarcasms and invectives that they accused him of treason, and of having, by implication, called King James a Judas.

After the Revolution, Atterbury, though bred in the doctrines of non-resistance and passive obedience, readily swore fealty to the new government. He had taken holy orders in 1687, preached occasionally in London with an eloquence which raised his reputation, and was soon appointed one of the royal chaplains. But he ordinarily resided at Oxford, where he was the chief adviser and assistant of Dean Aldrich, under whom Christ Church was a stronghold of Toryism. Thus he became the inspirer of his pupil, Charles Boyle, in the attack (1698) on the Whig scholar, Richard Bentley (q.v.), arising out of Bentley's impugnment of the genuineness of the Epistles of Phalaris. He was figured by Swift in the Battle of the Books as the Apollo who directed the fight, and was, no doubt, largely the author of Boyle's essay. Bentley spent two years in preparing his famous reply, which proved not only that the letters ascribed to Phalaris were spurious, but that all Atterbury's wit, eloquence and skill in controversial fence was only a cloak for an audacious pretence of scholarship.

Atterbury was soon occupied, however, in a dispute about matters still more important and exciting. The rage of religious factions was extreme. High Church and Low Church divided the nation. The great majority of the clergy were on the High Church side; the majority of King William's bishops were inclined to latitudinarianism. In 1700 Convocation, of which the lower house was overwhelmingly Tory, had not been suffered to meet for ten years. This produced a lively controversy, into which Atterbury threw himself with characteristic energy, publishing a series of treatises written with much wit, audacity and acrimony. By the mass of the clergy he was regarded as the most intrepid champion that had ever defended their rights against the oligarchy of Erastian prelates. In 1701 he was rewarded with the archdeaconry of Totnes and a prebend in Exeter cathedral. The lower house of Convocation voted him thanks for his

services; the university of Oxford created him a, doctor of divinity; and in 1704, soon after the accession of Anne,, while the Tories still had the chief weight in the government,, he was promoted to the deanery of Carlisle.

Soon after he had obtained this preferment the Wtug party

came into power. From that party he could expect no favour. Six years elapsed before a change of fortune took place. At length, in the year 1710, the prosecution of Sacheverell produced a formidable explosion of High Church fanaticism. At such a moment Atterbury could not fail to be conspicuous. His in- ordinate zeal for the body to which he belonged, his turbulent and aspiring temper, his rare talents for agitation and for controversy, were again signally displayed. He bore a chief part in framing that artful and eloquent speech which the accused divine pronounced at the bar of the Lords, and which presents a singular contrast to the absurd and scurrilous sermon which had very unwisely been honoured with impeachment. During the troubled and anxious months which followed the trial, Atterbury was among the most active of those pamphleteers who inflamed the nation against the Whig ministry and the Whig parliament. When the ministry had been changed and the parliament dissolved, rewards were showered upon him. The lower house of Convocation elected him prolocutor, in which capacity he drew up, in 1711, the often-cited Representation of the Slate of Religion; and, in August 1711, the queen, who had selected him as her chief adviser in ecclesiastical matters, appointed him dean of Christ Church on the death of his old friend and patron Aldrich.

At Oxfcrd he was as conspicuous a failure as he had been at Carlisle, and it was said by his enemies that he was made a bishop because he was so bad a dean. Under his administration Christ Church was in confusion, scandalous altercations took place, and there was reason tc fear that the great Tory college would be ruined by the tyranny of the great Tory doctor. In 1713 he was removed to the bishopric of Rochester, which was then always united with the deanery of Westminster. Still higher dignities seemed to be before him. For, though there were many able men on the episcopal bench, there was none who equalled or approached him in parliamentary talents. Had his party continued in power it is not improbable that he would have been raised to the archbishopric of Canterbury. The more splendid his prospects the more reason he had to dread the accession of a family which was well known to be partial to the Whigs, and there is every reason to believe that he was one of those

politicians who hoped that they might be able, during the life of Anne, to prepare matters in such a way that at her decease there might be little difficulty in setting aside the Act of Settle- ment and placing the Pretender on the throne. Her sudden death confounded the projects of these conspirators, and, what- ever Atterbury's previous views may have been, he acquiesced in what he could not prevent, took the oaths to the house of Hanover, and did his best to ingratiate himself with the royal family. But his servility was requited with cold contempt; and he became the most factious and pertinacious of all the opponents of the government. In the House of Lords his oratory, lucid, pointed, lively and set off with every grace of pronunciation and of gesture, extorted the attention and admiration even of a hostile majority. Some of the most remarkable protests which appear in the journals of the peers were drawn up by him; and, in some of the bitterest of those pamphlets which called on the English to stand up for their country against the aliens who had come from beyond the seas to oppress and plunder her, critics easily detected his style. When the rebellion of 1715 broke out, he refused to sign the paper in which the bishops of the province of Canterbury declared their attachment to the Protestant succession, and in 1717, after having been long in indirect communication with the exiled family, he began to correspond directly with the Pretender.

In 1721, on the discovery of the plot for the capture of the royal family and the proclamation of King James, Atterbury was arrested with the other chief malcontents, and in 1722 committed to the Tower, where he remained in close confinement during some months. He had carried on his correspondence with the exiled family so cautiously that the circumstantial proofs of his guilt, though sufficient to produce entire moral conviction, were not sufficient to justify legal conviction. He could be reached only by a bill of pains and penalties. Such a bill

the Whig party, then decidedly predominant in both Houses, was quite prepared to support, and in due course a bill passed the Commons depriving him of his spiritual dignities, banishing him for life, and forbidding any British subject to hold inter- course with him except by the royal permission. In the Lords the contest was sharp, but the bill finally passed by eighty-three votes to forty-three.

Atterbury took leave of those whom he loved with a dignity and tenderness worthy of a better man, to the last protesting his innocence with a singular disingenuousness. After a short stay at Brussels he went to Paris, and became the leading man among the Jacobite refugees there. He was invited to Rome by the Pretender, but Atterbury felt that a bishop of the Church of England would be out of place at the Vatican, and declined the invitation. During some months, however, he seemed to stand high in the good graces

of James. The correspondence between the master and the servant was constant. Atterbury's merits were warmly acknowledged, his advice was respectfully received, and he was, as Bolingbroke had been before him, the prime minister of a king without a kingdom. He soon, however, perceived that his counsels were disregarded, if not distrusted. His proud spirit was deeply wounded. In 1728 he quitted Paris, fixed his residence at Montpelier, gave up politics, and devoted himself entirely to letters. In the sixth year of his exile he had so severe an illness that his daughter, Mrs Morice, herself very ill, determined to run all risks that she might see him once more. She met him at Toulouse, received the communion from his hand, and died that night.

Atterbury survived the severe shock of his daughter's death two years. He even returned to Paris and to the service of the Pretender, who had found out that he had not acted wisely in parting with one who, though a heretic, was the most able man of the Jacobite party. In the ninth year of his banishment he published a luminous, temperate and dignified vindication of himself against John Oldmixon, who had accused him of having, in concert with other Christ Church men, garbled the new edition of Clarendon's History of the Rebellion. The charge, as respected Atterbury, had not the slightest foundation; for he was not one of the editors of the History, and never saw it till it was printed. A copy of this little work he sent to the Pretender, with a letter singularly eloquent and graceful. It was impossible, the old man said, that he should write anything on such a subject without being reminded of the resemblance between his own fate and that of Clarendon. They were the only two English subjects who had ever been banished from their country and debarred from all communication with their friends by act of parliament. But here the resemblance ended. One of the exiles had been so happy as to bear a chief part in the restoration of the royal house. All that the other could now do was to die asserting the rights of that house to the last. A few weeks after this letter was written Atterbury died, on the 2 2nd of February 1732. His body was brought to England, and laid, with great privacy, under the nave of Westminster Abbey. No inscription marks his grave.

It is agreeable to turn from Atterbury's public to his private life. His turbulent spirit, wearied with faction and treason, now and then required repose, and found it in domestic endearments, and in the society of the most illustrious literary men of his time. Of his wife, Katherine Osborn, whom he married while at Oxford, little is known; but between him and his daughter there was an affection singularly close and tender. The gentleness of his manners when he was in the company of a few friends was such as seemed hardly credible to those who knew him only by his writings and speeches. Though Atterbury's classical attainments were not great, his taste in English literature was excellent; and his admiration of genius was so strong that it overpowered even his political and religious antipathies. His fondness for Milton, the mortal enemy of the Stuarts and of the Church, was such as to many Tories seemed a crime; and he was the close friend of Addison. His favourite companions, however, were, as might have been expected, men whose politics had at least a tinge of Toryism. He lived on friendly terms with Swift, Arbuthnot and Gay. With Prior he had a close intimacy,

which some misunderstanding about public affairs at last dis- solved. Pope found in Atterbury not only a warm admirer, but a most faithful, fearless and judicious adviser.

See F. Williams, Memoirs and Correspondence of Atterbury with Notes, &c. (1869); Stuart Papers, vol. i. : Letters of Atterbury to the Chevalier St George, &c. (1847); J. Nichols, Epistolary Correspond- ence, &c. (1783-1796) ;and H. C. Beeching, Francis Atterbury, (1909).

ATTESTATION (Lat. adtestare, attestare, to bear witness, testis, a witness), the verification of a deed, will or other instrument by the signature to it of a witness or witnesses, who endorse or subscribe their names under a memorandum, to the effect that it was signed or executed in their presence. The essence of attestation is to show that at the execution of the document there was present some disinterested person capable of giving evidence as to what took place. The clause at the end of the instrument, immediately preceding the signatures of the wit- nesses to the execution, and stating that they have witnessed it, is known as the attestation clause. In Scots law, the corre- sponding clause is called the testing-clause (see Deed; Will or Testament; Witness).

ATTHIS (an adjective meaning " Attic "), the name given to a monograph or special treatise on the religious and political history, antiquities and topography of Attica and Athens. During the 4th and 3rd centuries B.C., a class of writers arose, who, making these subjects their particular study, were called atthidographi, or compilers of atthides. The first of these was Clidemus or Clitodemus (about 378 B.C.); the last, Ister of Cyrene (died 212 B.C.); the most important was Philochorus (first half of the 3rd century B.C.), of whose work considerable fragments have been preserved. The names of the other atthido- graphi known to us are Phanodemus, Demon, Androtion, Andron, Melanthius. They laid no claim to literary skill; their style was monotonous and soon became wearisome. They were in fact chroniclers or annalists — not historians. Their only object was to set down, in plain and simple language, all that seemed worthy of note in reference to the legends, history, constitution, religion and civilization of Attica. They followed the order of the olympiads and archons, and their work was supported by the authority of original documents, monuments and in- scriptions. Their writings were much used by historians, as well as by the scholiasts and grammarians.

Fragments in Miiller, Fragmenta Historicorum Graecorum, i.

ATTIC {i.e. "in the Attic style"), an architectural term given to the masonry rising above the main cornice of a building, the earliest example known being that of the monument of Thra- syllus at Athens. It was largely

employed by the Romans, who in their arches of triumph utilized it for inscriptions or for bas- relief sculpture. It was used also to increase the height of enclosure walls such as those of the Forum of Nerva. By the Italian revivalists it was utilized as a complete storey, pierced with windows, as found in PaUadio's work at Vicenza and in Greenwich hospital. The largest attic in existence is that which surmounts the entablature of St Peter's at Rome, which measures 39 ft. in height. The term is also employed in modern terminology to designate an upper storey in a roof, and the feature is sometimes introduced to hide a roof behind.

ATTICA, a district of ancient Greece, triangular in shape, projecting in a south-easterly direction into the Aegean Sea, the base line being formed by the continuous chain of Mounts Cithaeron and Parnes, the apex by the promontory of Sunium. It was washed on two sides by the sea, and the coast is broken up into numerous small bays and harbours, which, however, are with few exceptions exposed to the south wind. The surface of Attica, as of the rest of Greece, is very mountainous, and between the mountain chains lie several plains of no great size, open on one side to the sea. On the west its natural boundary is the Corinthian Gulf, so that it would include Megaris; indeed, before the Dorian invasion, which resulted in the foundation of Megara, the whole country was politically one, in the hands of the Ionian race. This is proved by the column which, as we learn from Strabo, once stood on the Isthmus of Corinth, bearing

on one side in Greek the inscription, "This land is Peloponnesus, not Ionia," and on the other, "This land is not Peloponnesus, but Ionia."

The position of Attica was one main cause of its historical importance. Hence in part arose the maritime character of its inhabitants; and when they had once taken to the sea, the string of neighbouring islands, Ceos, Cythnos and others, some of which lay within sight of their coasts, and from one to another of which it was possible to sail without losing sight of land, served to tempt them on to further enterprises. Similarly on land, the post it occupied between northern Greece and the Peloponnese materially influenced its relation to other states, both in respect of its alliances, such as that with Thessaly, towards which it was drawn by mutual hostility to Boeotia, which lay between them; and also in respect of offensive combinations of other powers, as that between Thebes and Sparta, which throughout an important part of Greek history were closely associated in their politics, through mutual dread of their powerful neighbour.

The mountains of Attica, which form its most characteristic , feature, are a continuation of that chain which, starting from Tymphrestus at the southern extremity of Pindus, passes through Phocis and Boeotia under the names. tains. of Parnassus and Helicon; from this proceeds the range

which, as Cithaeron in its western and Parnes in its eastern portion, separates Attica from Boeotia, throwing off spurs southward towards the Saronic Gulf in Aegaleos and Hymettus, which bound the plain of Athens. Again, the eastern extremity of Parnes is joined by another line of hills, which, separating from Mount Oeta, skirts the Euboic Gulf, and, after entering Attica, throws up the lofty pyramid of Pentelicus, overlooking the plain of Marathon, and then sinks towards the sea at Sunium to rise once more in the outlying islands. Finally, at the ex 7 treme west of the whole district, Cithaeron is bent round at right angles in the direction of 'the isthmus, at the northern approach to which it abuts against the mighty mass of Mount Geraneia, which is interposed between the Corinthian and the Saronic Gulf. Both Cithaeron and Parnes are about 4600 ft. high, Pentelicus 3635, and Hymettus 3370, while Aegaleos does not rise higher than 1534 ft. At the present day they are extremely bare, and in this respect almost repellent; but the lack of colour is compensated by the delicacy of the outlines, the minute articulation of the minor ridges and valleys, and the symmetrical grouping of the several mountains.

The soil is light and thin, and requires very careful agricul- ture not only on the rocky mountain sides but to some extent also in the maritime plains. This fact had consider- able influence on the inhabitants, both by enforcing industrious habits and by leading them at an early period to take, to the sea. Still, the level ground was sufficiently fertile to form a marked contrast to the rest of the district. . Thucydides attributes to the nature of the scil (i. 2 to \eirT6yt(i>v) , which presented no attraction to invaders, the permanence of the same inhabitants in the country, whence arose the claim to indigenous- ness on which the Athenians so greatly prided themselves; while at the same time the richer ground fostered that fondness for country life, which is proved by the enthusiastic terms in which it is always spoken of by Aristophanes. That we are not justified in judging of the ancient condition of the soil by, the aridity which prevails at the present day, is shown by the fact that out of the 182 demes (see Cleisthenes) into which Attica was divided, one- tenth were named from trees' or plants.

The climate of Attica has always been celebrated. In ap- proaching Attica from Boeotia a change of temperature is felt as soon as a person descends from Cithaeron or Parnes, cumaie. and the sea breeze, which in modern times is called 6 'eˆhrrjs, or that which sets towards shore, moderates the heat in summer. The Attic comedians and Plato speak with enthusiasm of their native climate, and the fineness of the Athenian intellect was attributed to the clearness of the Attic atmosphere. It was in the neighbourhood of Athens itself that

Soil.

Vegeta- tion.

the air was thought to be purest. So Euripides describes the inhabitants as " ever walking gracefully through the most luminous ether " {Med. 829); and Milton —

',' Where, on the Aegean shore, a city stands,

Built nobly, pure the air, and light the soil —

Athens, the eye of Greece."

Or again Xenophon says " one would not err in thinking that this city is placed near the centre of Greece — nay, of the civilized world — because, the farther removed persons are from it, the severer is the cold or heat they meet with" (Vectigol. 1. 6). The air is so clear that one can see from the Acropolis the lines of white marble that streak the sides of Pentelicus. The brilliant colouring which is so conspicuous in an Athenian sunset is due to the same cause. The epithet " violet-crowned," used of Athens by Pindar, is due. either to the blue haze on the surrounding hills, or to the use of violets (or irises) for festal wreaths. This otherwise perfect climate is slightly marred by the prevalence of the north wind. This is expressed on the Horologium of Andronicus Cyrrhestes, called the Temple or Tower of the Winds, at Athens, where Boreas is represented as a bearded man of stern aspect, thickly clad, and wearing strong buskins; he blows into a conch shell, which he holds in his hand as a sign of his tempestuous character.

Of the flora of Attica, the olive is the most important. This tree, we learn from Herodotus (v. 82), was thought at one time to have been found in that country only; and the enthusiastic praises of Sophocles (Oed. Col. 700) teach us that it was the land in which it flourished best. So great was the esteem in which it was held, that in the early legend of the struggle between the gods of sea and land, Poseidon and Athena, for the patronage of the country, the sea-god is represented as having to retire vanquished before the giver of the olive; and at a later period the evidences of this contention were found in an ancient olive tree in the Acropolis, together with three holes in the rock, said to have been made by the trident of Poseidon, and to be connected with a salt well hard by. The fig also found its favourite home in this country, for Demeter was said to have bestowed it as a gift on the Eleu- sinian Phytalus, i.e. " the gardener." Both Cithaeron and Parnes must have been wooded in former times; for on the former are laid the picturesque silvan scenes in the Bacchae of Euripides, and it was

from the latter that the wood came which caused the neighbouring deme of Acharnae to be famous for its charcoal — the avOpanes Ilapjˆcrwi of the Aeharnians of Aristophanes (348). From the thymy slopes of Hymettus came the famous Hymettian honey. Among the other products we must notice the marble — both that of Pentelicus, which afforded a material of unrivalled purity and whiteness for building the Athenian temples, and the blue marble of Hymettus — the trabes Hymettiae of Horace — which used to be transported to Rome for the construction of palaces. But the richest of all the sources of wealth in Attica was the silver mines of Laurium, the yield of which was so considerable as to render silver the principal medium of exchange in Greece, so that " a silver piece " (apyvpiov) was the Greek equivalent term for money. Hence Aeschylus speaks of the Athenians as possessing a " fountain of silver " (Pers. 235), and Aristophanes makes his chorus of birds promise the audience that, if they show him favour, owls from Laurium (i.e. silver pieces with the emblem of Athens) shall never fail them (Birds, 1106). The reputation of these coins for purity of metal and accuracy of weight was so great that they had a very wide circulation, and in. consequence it was thought undesirable to make any alteration in the types lest their genuineness should be doubted. This accounts for the somewhat inartistic character which the Athenian coins maintained to the last (see further Numismatics : Greek, § Athens). In Strabo's time, though the mines had almost ceased to yield, silver was obtained in considerable quantities from the scoriae; and at the present day a large amount of lead is got in the same way, the work being chiefly carried on by two companies, one of which is French and the ether Greek. In the ancient workings, many of which are in the

same condition as they were left 1800 years ago, there are in all 2000 shafts and galleries.

It has been already mentioned that the base line of Attica is formed by the chain of Cithaeron and Parnes, running from west to east; and that from this transverse chains run southward, dividing Attica into a succession of plains. Megara. The westernmost of these, which is separated from the innermost bay of the Corinthian Gulf, called the Mare Alcyonium, by an offshoot of Cithaeron, and is bounded on the east by a ridge which ends towards the Saronic Gulf in a striking two- horned peak called Kerata, is the plain of Megara. It is only for geographical purposes that we include this district under Attica, for both the Dorian race of the inhabitants, and its dangerous proximity to Athens, caused it to be at perpetual feud with that city; but its position as an outpost for the Peloponnesians, together with the fact of its having once been Ionian soil, suffi- ciently explains the bitter hostility of the Athenians towards the Megarians. The great

importance of Megara arose from its commanding all the passes into the Peloponnese. These were three in number: one along the shores of the Corinthian Gulf, which, owing to the nature of the ground, makes a long detour; the other two starting from Megara, and passing, the one by a lofty though gradual route over the ridge of Geraneia, the other along the Saronic Gulf, under the dangerous precipices of the Scironian rocks.

To the east of the plain of Megara lies that of Eleusis, bounded on the one side by the chain of Kerata, and on the other by that of Aegaleos, through a depression in which was the line of the sacred way, where the torchlight processions Eleusis. from Athens used to descend to the coast, the " brightly gleaming shores " (Xa/rn-

" A king sate on the rocky brow Which looks o'er sea-born Salamis."

The eastern portion of the plain of Eleusis was called the Thriasian plain, and the city itself was situated in the recesses of the bay just mentioned.

Next in order to the plain of Eleusis came that of Athens, which is the most extensive of all, reaching from the foot of Parnes to the sea, and bounded on the west by Aegaleos, and on the east by Hymettus. Its most Atheas. conspicuous feature is the broad line of dark green along its western side, formed by the olive-groves of Colonus and the gardens of the Academy, which owe their fertility to the waters of the Cephisus. This river is fed by copious sources on the side of Mt. Parnes, and thus, unlike the other rivers of Attica, has a constant supply of water, which was diverted in classical times, as it still is, into the neighbouring plantations (cf. Sophocles, Oed. Col. 685). The position of Colonus itself is marked by two bare knolls of light- coloured earth, which caused the poet in the same chorus tc apply the epithet " white " (apyfJTa) to that place. On the opposite side of the plain runs the other river, the Ilissus, which rises from two sources on the side of Mt. Hymettus, and skirts the eastern extremity of the city of Athens; but this, notwith- standing its celebrity, is a mere brook, which stands in pools a great part of the year, and in summer is completely dry. The situation of Athens relatively to the surrounding objects is singularly harmonious; for, while it forms a central point, so as to be the eye of the plain, and while the altar-rock of the Acropolis and the hills by which it is surrounded are conspicuous from every point of view, there is no such exactness in its position as to give formality, since it is nearer to the sea than to Parnes, and nearer to Hymettus than to Aegaleos, The most striking summit in the neighbourhood of the city is that of Lycabettus,

on the north-eastern side; and the variety is still further in- creased by the continuation of the ridge which it forms for some distance northwards through the plain. Three roads lead to Athens from the Boeotian frontier over the intervening mountain barrier — the easternmost over Parnes, from Delium and Oropus by Decelea, which was the usual route of the invading Lacedae- monians during the Peloponnesian War; the westernmost over Cithaeron, by the pass of Dryoscephalae, or the " Oakheads," leading from Thebes by Plataeajto Eleusis, and so to Athens, which we hear of in connexion with the battle of Plataea, and with the escape of the Plataeans at the time of the siege of that city in the Peloponnesian War; the third, midway between the two, by the pass of Phyle, near the summit of which, on a rugged height overlooking the Athenian plain, is the fort occupied by Thrasybulus in the days of the Thirty Tyrants. On the sea- coast to the south-west of Athens rises the hill of Munychia, a mass of rocky ground, forming the acropolis of the town of Peiraeus. It was probably at one time an island; this was Strabo's opinion, and at the present day the ground which joins it to the mainland is low and swampy, and seems to have been formed by alluvial soil brought down by the Cephisus. On one side of this, towards Hymettus, lay the open roadstead of Phalerum, on the other the harbour of Peiraeus, a completely land-locked inlet, safe, deep and spacious, the approach to which was still further narrowed by moles. The eastern side of the hill was further indented by two small but commodious havens, which were respectively called Zea and Munychia.

The north-eastern boundary of the plain of Athens is formed by the graceful pyramid of Pentelicus, which received its name from the deme of Pentele at its foot, but was far more Attica." commonly known as Brilessus in ancient times. This mountain did not form a continous chain with Hy- mettus, for between them intervenes a level space of ground 2 m. in width, which formed the entrance to the Mesogaea, an elevated undulating plain in the midst of the mountains, reaching nearly to Sunium. At the extremity of Hymettus, where it projects into the Saronic Gulf, was the promontory of Zoster (" the Girdle "), which was so called because it girdles and protects the neighbouring harbour; but in consequence of the name, a legend was attached to it, to the effect that Latona had loosed her girdle there. From this promontory to Sunium there runs a lower line of mountains, and between these and the sea a fertile strip of land intervenes, which was called the Paralia. Beyond Sunium, on the eastern coast, were two safe ports, that of Thoricus, which is defended by the island of Helene, forming a natural breakwater in front of it, and that of Prasiae, now called Porto Raphti (" the Tailor "), from a statue at the entrance to which the natives have given that name. In the north-east corner is the little plain of Marathon (q.v.), the scene of the battle against the Persians (490 B.C.). It lies between Parnes, Pentelicus and the sea. The bay in front is sheltered by

Euboea, and on the north by a projecting tongue of land, called Cynosura. The mountains in the neighbourhood were the home of the Diacrii or Hyperacrii, who, being poor mountaineers, and having nothing to lose, were the principal advocates of political reform; while, on the other hand, the Pedieis, or in- habitants of the plains, being wealthy landholders, formed the strong conservative element, and the Parali, or occupants of the sea-coast, representing the mercantile interest, held an inter- mediate position between the two (see Cleisthenes). Finally, there was one district of Attica, the territory of Oropus, which properly belonged to Boeotia, as it was situated to the north of Parnes; but on this the Athenians always endeavoured to retain a firm hold, because it facilitated their communications with Euboea. The command of that island was of the utmost im- portance to them; for, if Aegina could rightly be called " the eyesore of the Peiraeus," Euboea was quite as truly a thorn in the side of Attica; for we learn from Demosthenes (De Cor. p. 307) that at one period the pirates that made it their headquarters so infested the neighbouring sea as to prevent all navigation.

The place in Attica which has been the chief scene of excava-

tions (independently of Athens and its vicinty) is Eleusis (q.v.), where the remains of the sanctuary of Demeter, the

EXCttV& m

home of the Eleusinian Mysteries, together with other tions. buildings in its neighbourhood, were cleared by the Greek Archaeological Society in 1882-1887 and 1895-1896. Of the other classical ruins in Attica the best-known is the temple of Athena at Sunium, which forms a conspicuous object on the headland, to which it gave the name of Cape Colonnae, still used by the peasants. It is in the Doric style, of white marble, and eleven columns of the peristyle and one of the pronaos are now standing. At Thoricus there is a theatre, which was cleared of earth by the archaeologists of the American School in 1886. In the neighbourhood of Rhamnus are the remains of two temples that stood side by side, the larger of which was dedicated to Nemesis, the smaller probably to Themis, of which goddess a fine statue was discovered in its ruins in the course of the excavations of the Greek Archaeological Society in 1890. The same Society, in 1884, 1886 and 1887, excavated the sanctuary of Amphiaraus, 4 m. from Oropus; in ancient times this was the resort of numerous invalids, who came thither to consult the healing divinity. Within it were found a temple of Amphiaraus, a large altar, and a long colonnade, which may have been the dormitory where the patients slept in hope of obtaining counsel in dreams. There Were also baths and a small theatre, and numerous in- scriptions relating to the arrangement and observances Of the

sanctuary and oracle. The walls and towers also of the city of Eleutherae and the fortress of Phyle are fine specimens of Hellenic fortifications.

Of the condition of Attica in medieval and modern times little need be said, for it has followed for the most part the fortunes of Athens. The population, however, has undergone a great change, independently of the large admixture of Slavonic blood that has affected the Greeks of the mainland generally, by the immigration of Albanian colonists, who now occupy a great part of the country. The district formed part of the nome (administrative division) of Boeotia and Attica until 1899, when it became a separate nome.

Bibliography.— J. G. Frazer, Pausanias's Description of Greece, vols. ii. and v. (London, 1898); W. M. Leake, The Demi of Attica (2nd ed., London, 1841); Chr. Wordsworth, Athens and Attica (4th ed., London, 1869); C. Bursian, Geographie von Griechenldnd, vol. i. (Leipzig, 1862) ; Baedeker's Greece (4th Eng. ed., Leipzig, 1908); Karten von Attica, published by the German Archaeological Institute of Athens, with explanatory text, chiefly by Professor Milchhofer (1875-1903); see also Athens, Eleusis and Greece: Topography. (H. F. T.)

ATTIC BASE, the term given in architecture to the base of the Roman Ionic order, consisting of an upper and lower torus, separated by a scotia (q.v.) and fillets. It was the favourite base of the Romans, and was employed by them for columns of the Corinthian and Composite orders, and in Byzantine and Romanesque work would seem to have been generally adopted as a model.

ATTICUS, TITUS POMPONIUS (109-32 B.C.), Roman patron of letters, was born at Rome three years before Cicero, with whom he and the younger Marius were educated. His name was Titus Pomponius, that of Atticus, by which he is known, being given him afterwards from his long residence in Athens (86-65) and his intimate acquaintance with the Greek literature and language. His family is said to have been of noble and ancient descent; his father belonged to the equestrian order, and was very wealthy. When Pomponius was still a young man his father died, and he at once took the prudent resolution of transferring himself and his fortune to Athens, in order to escape the dangers of the civil war, in which he might have been involved through his connexion with the murdered tribune, Sulpicius Rufus. Here he lived in retirement, devoting himself entirely to study. On his return to Rome, he took possession of an inheritance left him by his uncle and assumed the name of Quintus Caecilius Pomponianus. From this time he kept aloof from political strife, attaching himself to no particular party, and continuing on intimate terms with men so opposed as Caesar I and Pompey, Antony and Octavian. His most intimate friend,

however, was Cicero, whose correspondence with him extended over many years, and who seems to have found his prudent counsel and sympathy a remedy for all his many troubles. His private life was tranquil and happy. He did not marry till he was fifty-three years of age, and his only child became the wife of Marcus Vipsanius Agrippa, the distinguished minister of Augustus. In 32, being seized with an illness believed to be incurable, he starved himself to death. Of his writings none is extant, but mention is made of two: a Greek history of Cicero's consulship, and some annals, in Latin, an epitome of the events of Roman history down to the year 54. His most important work was his edition of the letters addressed to him by Cicero. He also formed a large library at Athens, and engaged a staff of slaves to make copies of valuable works.

See Life by Cornelius Nepos ; Berwick, Lives of Messalla Corvinus and T.P.A. (1813); Fialon, Thesis in T.P.A. (1861); Boissier, Ciceron et ses amis (1888: Eng. trans. A. D. Jones, 1897); Peter, Historicorum Romanorum Fragmenta.

ATTICUS HERODES, TIBERIUS CLAUDIUS (c. a.d. 101-177), Greek rhetorician, was born at Marathon in Attica. He belonged to a wealthy and distinguished family, and received a careful education under the most distinguished masters of the time, especially in rhetoric and philosophy. His talents gained him the favourable notice of Hadrian, who appointed him praefect of the free towns in the province of Asia (125). On his return to Athens, he attained great celebrity as an orator and teacher of rhetoric, and was elected to the office of archon. In 140 he was summoned by Antoninus Pius to undertake the education of Marcus Aurelius and Lucius Verus, and received many marks of favour, amongst them the consulship (143). He is principally celebrated, however, for the vast sums he expended on public purposes. He built at Athens a great race-course of Pentelic marble, and a splendid musical theatre, called the Odeum in memory of his wife Regilla, which still exists. At Corinth he built a theatre, at Delphi a stadium, at Thermopylae hot baths, at Canusium in Italy an aqueduct. He even contemplated cutting a canal through the Isthmus of Corinth, but was afraid to carry out his plan because the same thing had been unsuccessfully attempted before by the emperor Nero. Many of the partially ruined cities oi Greece were restored by Atticus, and numerous inscriptions testify their gratitude to their benefactor. His latter years were embittered by family misfortune, and having incurred the enmity of the Athenians, he withdrew from Athens to his villa near Marathon, where he died. He enjoyed a very high reputation amongst his contemporaries, and wrote

numerous works, of which the only one to come down to us is a rhetorical exercise On the Constitution (ed. Hass, 1880), advo- cating an alliance of the Thebans and Peloponnesians against Archelaus, king of Macedonia. The genuineness of this speech, which is of little merit, has been disputed.

Philostratus, Vit. Soph. ii. I ; Fiorillo, Herodis Attici quae super- sunt (1801) ; A Biographical Notice of A.H. (London, 1832), privately printed; Fuelles, De Herodis Attici Vita (1864); Vidal-Lablache, Herode Atticus (1871).

ATTILA (d. 453), king of the Huns, became king in 433, along with his brother Bleda, on the death of his uncle Roua. We hear but little as to Bleda, who died about 445, possibly slain by his brother's orders. In the first eight years of his reign Attila was chiefly occupied in the wars with other barbarian tribes, by which he made himself virtually supreme in central Europe. His own special kingdom comprised the countries which are now called Hungary and Transylvania, his capital being possibly not far from the modern city of Buda-Pest; but having made the Ostro- goths, the Gepidae and many other Teutonic tribes his subject- allies, and having also sent his invading armies into Media, he seems for nearly twenty years to have ruled practically without a rival from the Caspian to the Rhine. Very early in his reign, Honoria, grand-daughter of the emperor Theodosius II., being subjected to severe restraint on account of an amorous intrigue with one of the chamberlains of the palace, sent her ring to the king of the Huns and called on him to be her husband and her deliverer. Nothing came of the proposed engagement, but the wrongs of Honoria, his affianced wife, served as a convenient

pretext for some of the constantly recurring embassies with which Attila, fond of trampling on the fallen majesty of Rome, worried and bullied the two courts of Constantinople and Ravenna. Another frequent subject of complaint was found in certain sacred . vessels which the bishop of Sirmium had sent as a bribe to the secretary of Attila, and which had been by him, fraudu- lently, as his master contended, pawned to a silversmith at Rome. There were also frequent and imperious demands for the surrender of fugitives who had sought shelter from the wrath of Attila within the limits of the empire. One of the return embassies from Constantinople, that sent in 448, had the great advantage of being accompanied by a rhetorician named Priscus, whose minute journalistic account of the negotiations, including as it does a vivid picture of the great Hun in his banquet-hall, is by far the most valuable source of information as to the court and camp of Attila. What lends additional interest to the story, is the fact that in the ambassador's suite there was an interpreter named Vigilas, who for fifty pounds of gold had promised to assassinate Attila. This base design was discovered by the Hunnish king, but had never been revealed to

the head of the embassy or to his secretary. The situations created by this strange combination of honest diplomacy and secret villainy are described by Priscus with real dramatic power.

In 450 Theodosius II., the incapable emperor of the East, died, and his throne was occupied by a veteran soldier named Marcian, who answered the insulting message of Attila in a manlier tone than his predecessor. Accordingly the Hun, who had something of the bully in his nature, now turned upon Valentinian III., the trembling emperor of the West, and demanded redress for the wrongs of Honoria, and one-half of Valentinian's dominions as her dowry. Allying himself with the Franks and Vandals, he led his vast many-nationed army to the Rhine in the spring of 451, crossed that river, and sacked, apparently, most of the cities in Belgic Gaul. Most fortunately for Europe, the Teutonic races already settled in Gaul rallied to the defence of the empire against invaders infinitely more barbarous than themselves. Prominent in this new coalition was Theodoric, king of the Visigoths, whose capital city was Toulouse. His firm fighting alliance with the. Roman general Aetius, with whom he had had many a conflict in previous years, was one of the best auguries for the new Europe that was to arise out of the ruins of the Roman empire. Meanwhile Attila had reached the Loire and was besieging the strong city of Orleans. The citizens, under the leadership of their bishop Anianus, made a heroic defence, but the place was on the point of being taken when, on the 24th of June, the allied Romano- Gothic army was seen on the horizon. Attila, who knew the difficulty that he should have in feeding his immense army if his march was further delayed, turned again to the north-east, was persuaded by the venerable bishop Lupus to spare the city of Troyes, but halted near that place in the Catalaunian plains and offered battle to his pursuers Aetius and Theodoric. The battle which followed — certainly one of the decisive battles of the world — has been well described by the Gothic historian Jordanes as " ruthless, manifold, immense, obstinate." It lasted for the whole day, and the number of the slain is variously stated at 175,000 and 300,000. All such estimates are, of course, untrustworthy, but there is no doubt that the carnage was terrible. The Visigothic king was slain, but the victory, though hardly earned, remained with his people and his allies. Attila did not venture to renew the engagement on the morrow, but retreated, apparently in good order, on the Rhine, recrossed that river and returned to his Pannonian home. From thence in the spring of 452 he again set forth to ravage or to conquer. Italy. Her great champion Aetius showed less energy in her cause than he had shown in his defence of Gaul. After a stubborn contest, Attila took and utterly destroyed Aquileia, the chief city bf Venetia, and then proceeded on his destructive course, capturing and burning the cities at the head of the Adriatic, Concordia, Altinum and Patavium (Padua). The fugitives from these cities, but especially from the

last, seeking shelter in the lagoons of the Adriatic, laid the foundations of

that which was one day to become the glorious city of Venice. Upon Milan and the cities of western Lombardy the hand of Attila seems to have weighed more lightly, plundering rather than utterly destroying; and at last when Pope Leo I., at the head of a deputation of Roman senators, appeared in his camp on the banks of the Mincio, entreating him not to pursue his Victorious career to the gates of Rome, he yielded to their entreaties and consented to cross the Alps, with a menace, however, of future return, should the wrongs of Honoria remain unredressed. As he himself jokingly said: he knew how to conquer men, but the Lion and the Wolf (Leo and Lupus) were too strong for him. No further expeditions to Italy were undertaken by Attila, who died suddenly in 453, in the night following a great banquet which celebrated his marriage with a damsel named Ildico. Notwithstanding some rumours of violence it is probable that his death was natural and due to his own intemperate habits.

Under his name of Etzel, Attila plays a great part in Teu- tonic legend (see Nibelungenlied) and under that of Atli in Scandinavian Saga, but his historic lineaments are greatly obscured in both. He was short of stature, swarthy and broad- chested, with a large head which early turned grey, snub nose and deep-set eyes. He walked with proud step, darting a haughty glance this way and that as if he felt himself lord of all.

The chief authorities for the life of Attila are Priscus, Jor- danes, the Historia Miscella, Apollonius Sidonius and Gregory of Tours. (T. H.)

ATTIS, or Atys, a deity worshipped in Phrygia, and later throughout the Roman empire, in conjunction with the Great Mother of the Gods. Like Aphrodite and Adonis in Syria, Baal and Astarte at Sidon, and Isis and Osiris in Egypt, the Great Mother and Attis formed a duality which symbolized the relations between Mother Earth and her fruitage. Their worship included the celebration of mysteries annually on the return of the spring season. Attis was also known as Papas, and the Bithynians and Phrygians, according to evidence of the time of the late Empire, called him Zeus. He was never worshipped independently, however, though the worship of the Great Mother was not always accompanied by his. He was confused with Pan, Sabazios, Men and Adonis, and there were resem- blances between the orgiastic features of his worship and that of Dionysus. His resemblance to Adonis has led to the theory that the names of the two are identical, and that Attis is only the Semitic companion of Syrian

Aphrodite grafted on to the Phrygian Great Mother worship (Haakh, Stuttgarter-Philolog.- Vers., 1857, 176 ff.). It is likely, however, that Attis, like the Great Mother, was indigenous to Asia Minor, adopted by the invading Phrygians, and blended by them with a deity of their own.

Legends. — According to Pausanias (vii. 17), Attis was a beautiful youth born of the daughter of the river Sangarius, who was descended from the hermaphroditic Agdistis, a monster sprung from the earth by the seed of Zeus. Having become enamoured of Attis, Agdistis struck him with frenzy as he was about to wed the king's daughter, with the result that he deprived himself of manhood and died. Agdistis in repentance prevailed upon Zeus to grant that the body of the youth should never decay or waste. In Arnobius (v. 5-8) Attis emasculates himself under a pine tree, which the Great Mother bears into her cave as she and Agdistis together wildly lament the death of the youth. Zeus grants the petition as in the version of Pausanias, but permits the hair of Attis to grow, and his little finger to move. The little finger, digitus, Sd/cruXos, is interpreted as the phallus by Georg Kaibel (Gottinger Nachrichten, iqoi, p. 513). In Diodorus (iii. 58, 50) the Mother is the carnal lover of Attis, and, when her father the king discovers her fault and kills her lover, roams the earth in wild grief. In Ovicf {Fasti, iv. 223 ff.) she is inspired with chaste love for him, which he pledges himself to reciprocate. On his proving unfaithful, the Great Mother slays the nymph with whom he has sinned, whereupon in madness he mutilates himself as a penalty. Another form of the legend

(Paus. vii. 17), showing the influence of the Aphrodite-Adonis myth, relates that Attis, the impotent son of the Phrygian Calaus, went into Lydia to institute the- worship of the Great Mother, and was there slain by a boar sent by Zeus.

See Great Mother of the Gods; J. G. Frazer, Adonis, Attis, Osiris (1906). (G. Sn.)

ATTLEBOROUGH, a township of Bristol county, in south-east Massachusetts, U.S.A. Pop. (1800) 7577; (1900) 11,335, of whom 3237 were foreign-born; (1910 census) 16,215 It is traversed by the New York, New Haven & Hartford railway, and by inter-urban electric lines. It has an area of 28 sq. m. The population is largely concentrated in and about the village which bears the name of the township. In Attleborough are the Attleborough Home Sanitarium, and a public library (1885). The principal manufactures of the township are jewelry, silver- ware, cotton goods, cotton machinery, coffin trimmings, and leather. In 1005 the total value of the township's factory products was $10,050,384, of which $5,544,285 was the value of jewelry, Attleborough ranking fourth among the cities of the country in this industry, and producing 10-4% of the total jewelry

product of the United States. Attleborough was in- corporated in 1694, though settled soon after 1661 (records since 1672) as part of Rehoboth. In 1887 the township was divided in population, wealth and area by the creation of the township of North Attleborough — pop. (1890) 6727; (1900) 7253, of whom 1786 were foreign-born; (1905, state census) 7878. This township produced manufactured goods in 1900 to the value of $3,990,731, jewelry valued at $2,785,567; it maintains the Richards memorial library.

See J. Daggett, A Sketch of the History of Attleborough to 1887 (Boston, 1894).

ATTOCK, a town and fort of British India, in the Rawalpindi district of the Punjab, 47 m. by rail from Peshawar, and situated on the eastern bank of the Indus. Pop. (1901) 2822. The place is of both political and commercial importance, as the Indus is here crossed by the military and trade route through the Khyber Pass into Afghanistan. Alexander the Great, Tamerlane and Nadir Shah are believed to have successively crossed the Indus at or about this spot in their respective invasions of India. The river runs past Attock in a deep rapid channel about 200. yds. broad, but is easily crossed in boats or on inflated skins of oxen. The rocky gorges through which it flows, with a distant view of the Hindu Kush, form some of the finest scenery in the world. In 1883 an iron girder bridge of five spans was opened, which carries the North-Western railway to Peshawar, and has also a subway for wheeled traffic and foot passengers. The fort of Attock was built by the emperor Akbar in 1581, on a low hillock beside the river. The walls are of polished stone, and the whole structure is handsome; but from a military point of view it is of little importance, being commanded by a hill, from which it is divided only by a ravine. On the opposite side of the river is the village of Khairabad, with a fort, also erected by Akbar according to some, or by Nadir Shah according to others. The military importance of Attock has diminished, but it still has a small detachment of British troops.

ATTORNEY (from O. Fr. atorne, a person appointed to act for another, from atourner, legal Lat. attornare, attorn, literally to turn over to another or commit business to another), in English law, in its widest sense, any substitute or agent appointed to act in " the turn, stead or place of another." Attorneys are of two kinds, attorneys-in-fact and attorneys-at-law. An attorney- in-fact is simply an agent, the extent of whose capacity to act is bounded only by the powers embodied in his authority, his power of attorney. An attorney-at-law was a public officer, conducting legal proceedings on behalf of others, known as his clients, and attached to the supreme courts of common law at Westminster. Attorneys-at-law corresponded to . the Solicitors of the courts of chancery and the proctors

of the admiralty, ecclesiastical, probate and divorce courts. Since the passing of the Judicature Act of 1873, however, the designation " attorney" has become obsolete in England, all persons admitted as solicitors,

attorneys or proctors of an English court being henceforth called " solicitors of the supreme court " (see Solicitor).

In the United States an attorney-at-law exercises all the functions distributed in England between barristers, attorneys and solicitors, and his full title is " attorney and counsellor-at- law." When acting in a court of admiralty he is styled "proctor" or "advocate." Formerly, in some states, there existed a grade among lawyers of attorneys-at-law, which was inferior to that of counsellors-at-law, and in colonial times New Jersey established a higher rank still — that of serjeant-at-law. Now the term attorney-at-law is precisely equivalent to that of lawyer. Attorneys are admitted by some court to which the legislature confides the power, and on examination prescribed by the court, or by a board of state examiners, as the case may be. The term of study required is generally two or three years, but in some states less. In one no examination is required. College graduates are often admitted to examination after a shorter term of study than that required from those not so educated. In the courts of the United States, admission is regulated by rules of court and based upon a previous admission to the state bar. In almost all states aliens are not admitted as attorneys, and in many states women are ineligible, but during recent years several states have passed statutes permitting them to practise. Since 1879 women have been eligible to practise before the U. S. Supreme Court, if already admitted to practise in some state court, under the same conditions as men. A state attorney or district attorney is the local public prosecutor. He is either elected by popular vote at the state elections for the district in which he resides and goes out of office with the political party for which he was elected, or he is appointed by the governor of the state for that district and for the same term. He represents the state in criminal prosecutions and also in civil actions within his district. There is a United States district attorney in each federal district, similarly representing the federal government before the courts.

An attorney is an officer of the court which admits him to practise, and he is subject to its discipline. He is liable tc his client in damages for failure to exercise ordinary care and skill, and he can bring action for the value of his services. He has a lien on his client's papers, and usually on any judgment in favour of his client to secure the payment of his fees. (See also

under Bar, The.)

ATTORNEY-GENERAL, in England, the chief law officer appointed to manage all the legal affairs and suits in which the crown is interested. He is appointed by letters-patent authoriz- ing him to hold office during the sovereign's pleasure. He is ex officio the leader of the bar, and only counsel of the highest eminence are appointed to the office. The origin of the office is uncertain, but as far back as 1277 we find an attornatus regis appointed to look after the interests of the crown, in proceedings affecting rt before the courts. He has precedence in all the courts, and in the House of Lords he has precedence of the lord advocate, even in Scottish appeals, but unlike the lord advocate and the Irish attorney-general he is not necessarily made a privy councillor. He is a necessary party to all proceedings affecting the crown, and has extensive powers of control in matters relating to charities, lunatics' estates, criminal prosecutions, &c. The attorney-general and the solicitor-general are always members of the House of Commons (except for temporary difficulties in obtaining a seat) and of the ministry, being selected from the party in power, and their advice is at the disposal of the govern- ment and of each department of the government, while in the House of Commons they defend the legality of ministerial action if called in question. Previously to 1895 there was no restric- tion placed on the law officers as to their acceptance of private practice, but since that date this privilege has been withdrawn, and the salary of the attorney-general is fixed at £7000 a year and in addition such fees according to the ordinary professional scales as he may receive for any litigious business he may conduct on behalf of the crown. The crown has also as a legal adviser an attorney-general in Ireland. In Scotland he is called lord advocate (q.v.). There is also an attorney-general in almost all

the British colonies, and his duties are very similar to those of the same officer in England. In the self-governing colonies he is appointed by the administration of the colony, and in the crown colonies by royal warrant under the signet and sign- manual. There is an attorney-general for the duchy of Cornwall and also one for the duchy of Lancaster, each of whom sues in matters relating to that duchy.

The United States has an officer of this name, who has a seat in the cabinet. His duties are in general to represent the federal government before the United States Supreme Court, to advise the president on questions of law, and to advise similarly the heads of the state departments with reference to matters affecting their department. His opinions are published by the government periodically for the use of its officials and they are frequently cited by the courts. Every state but one or two has a similar officer. He represents the state in important legal matters, and is often required to assist the local prosecutor in trials for capital offences. He

appears for the public interest in suits affecting public charities. He is generally elected by the people for the same term as the governor and on the same ticket.

ATTORNMENT (from Fr. tourner, to turn), in English real property law, the acknowledgment of a new lord by the tenant on the alienation of land. Under the feudal system, the relations of landlord and tenant were to a certain extent reciprocal. So it was' considered unreasonable to the tenant to subject him to a new lord without his own approval, and it thus came about that alienation could not take place without the consent of the tenant. Attornment was also extended to all cases of lessees for life or for years. The necessity for attornment was abolished by an act of 1705. The term is now used to indicate an ac- knowledgment of the existence of the relationship of landlord and tenant. An attornment-clause, in mortgages, is a clause whereby the mortgagor attorns tenant to the mortgagee, thus giving the mortgagee the right to distrain, as an additional security.

ATTRITION (Lat. attritio, formed from atlerere, to rub away), a rubbing away; a term used in pathology and geology. Theo- logians have also distinguished " attrition " from " contrition " in the matter of sin, as an imperfect stage in the process of re- pentance; attrition being due to servile fear of the consequences of sin, contrition to filial fear of God and hatred of sin for His sake. It has been held among the Roman Catholics that in the sacrament of penance attrition becomes contrition.

ATTWOOD, THOMAS (1765-1838), English composer, the son of a coal merchant who had musical tastes, was born in London on the 23rd of November 1765. At the age of nine he became a chorister in the Chapel Royal, where he remained for five years. In 1783 he was sent to study abroad at the expense of the prince of Wales (afterwards George IV.), who had been favourably impressed by his skill at the harpsichord. After spending two years at Naples, Attwood proceeded to Vienna, where he became a favourite pupil of Mozart. On his return to London in 1787 he held for a short time an appointment as one of the chamber musicians to the prince of Wales. In 1796 he was chosen organist of St Paul's, and in the same year he Was made composer to the Chapel Royal. His court connexion was further confirmed by his appointment as musical instructor to the duchess of York, and afterwards to the princess of Wales. For the coronation of George IV. he composed the anthem, " The King shall rejoice," a work of high merit. The king, who had neglected him for some years on account of his con- nexion with the princess of Wales, now restored him to favour, and in 182 1 appointed him organist to his private chapel at Brighton. Soon after the institution of the Royal Academy of Music in 1823, Attwood was chosen one of the professors. He was also one of the original members of the Philharmonic Society, founded in 1813. He

wrote the anthem, " O Lord, grant the King a Long Life," which was performed at the corona- tion of William IV., and he was composing a similar work for the coronation of Queen Victoria when he died at his house in Cheyne Walk, Chelsea, on the 24th of March 1838. He was buried under the organ in St Paul's cathedral. His services and anthems

were published in a collected form after his death by his pupil Walmisley. Of his secular compositions several songs and glees are well known and popular. The numerous operas which he composed in early life- are now practically forgotten. Of his songs the most popular was " The Soldier's Dream," and the best of his glees were " In peace Love tunes the shepherd's reed," and " To all that breathe the air of Heaven." Attwood was a friend of Mendelssohn, for whom he professed an admiration at a time when the young German's talent was little appreciated by the majority of English musicians.

ATTWOOD, THOMAS (1783-1856), English political re- former, was born at Halesowen, Worcestershire, on the 6th of October 1783. In 1800 he entered his father's banking business in Birmingham, where he was elected high bailiff in 181 1. He took a leading part in the public life of the city, and became very popular with the artisan class. He is now remembered for his share in the movement which led to the carrying of the Reform Act of 1832. He was one of the founders, in January 1830, of the Political Union, branches of which were soon formed through- out England. Under his leadership vast crowds of working- men met periodically in the neighbourhood of Birmingham to demonstrate in favour of reform of the franchise, and Attwood used his power over the multitude to repress any action on their part which might savour of illegality. His successful exertions in favour of reform made him a popular hero all over the country, and he was presented with the freedom of the city of London. After the passing of the Reform Act in 1832 he was elected one of the members for the new borough of Birmingham, for which he sat till 1839. He failed in the House of Commons to maintain the reputation which he had made outside it, for in addition to an eager partisanship in favour of every ultra-democratic movement, he was wearisomely persistent in advocating his peculiar monetary theory. This theory, which became with him a monomania, was that the existing currency should be rectified in favour of state-regulated and inconvertible paper- money, and the adoption of a system for altering the standard of value as prices fluctuated. His waning influence with his constituents led him to retire from parliament in 1837, and, though invited to re-enter political life in 1843, he had by that

time become a thoroughly spent force. He died at Great Malvern on the 6th of March 1856.

His grandson, C. M. Wakefield, wrote his life " for private cir- culation " (there is a copy in the British Museum), and his economic theories are set forth in a little book, Gemini, by T. B. Wright and J. Harlow, published in 1844.

ATWOOD, GEORGE (1746-1807), English mathematician, was born in the early part of the year 1746. He entered West- minster school, and in 1759 was elected to a scholarship at Trinity College, Cambridge. He graduated in 1769, with the rank of third wrangler and first Smith's prizeman. Subsequently he became a fellow and a tutor of the college, and in 1776 was elected a fellow of the Royal Society of London. In the year 1784 he left Cambridge, and soon afterwards received from William Pitt the office of a patent searcher of the customs, which required but little attendance, and enabled him to de- vote, a considerable portion of his time to his special studies. He died in July 1807. Atwood's published works, exclusive of papers contributed to the Philosophical Transactions, for one of which he obtained the Copley medal, are as follows: — Analysis of a Course of Lectures on the Principles of Natural Philosophy (Cambridge, 1784); Treatise on the Rectilinear Motion and Rotation of Bodies (Cambridge, 1784), which gives some interest- ing experiments, by means of which mechanical truths can be ocularly exhibited and demonstrated, and describes the machine, since called by Atwood's name, for verifying experimentally the laws of simple acceleration of motion; Review of the Statutes and Ordinances of Assize which have been established in England from the 4th year of King John, 1202, to the 37th of his present Majesty (London, 1801), a work of some historical research; Dissertation on the Construction and Properties of Arches (London, 1801), ■with supplement, pt. i., 1801, pt. ii., 1804, an elaborate work, npw completely superseded.

AUBADE (a French word from aube, the dawn), the dawn-song of the troubadours of Provence, developed by the Minnesingers (q.v.) of Germany into the Tagelied, the song of the parting at dawn of lovers at the warning of the watchman. In France in modern times the term is applied to the performance of a military band in the early morning in honour of some distinguished person.

AUBAGNE, a town of south-eastern France, in the department of Bouches-du-Rhone on the Huveaune, n m. E. of Marseilles by rail. Pop. (1906) 6039. The town carries on the manufacture of earthenware and pottery, leather, &c. and the cultivation of fruit and wine. There is a fountain to the memory of the statesman, F. Barthelemy (d. 1830), born at Aubagne.

AUBE, a department of north-eastern France, bounded N. by the department of Marne, N.W. by Seine-et-Marne, W. by Yonne, S. by Yonne and Cote-d'Or, and E. by Haute-Marne; it was formed in 1790 from Basse-Champagne, and a small portion of Burgundy. Area, 2326 sq. m. Pop. (1906) 243,670. The department belongs to the Seine basin, and is watered chiefly by the Seine and the Aube. These rivers follow the general slope of the department, which is from south-east, where the Bois du Mont (1200 ft.), the highest point, is situated, to north-west. The southern and eastern districts are fertile and well wooded. The remainder of the department, with the exception of a more broken and picturesque district in the extreme north-west, forms part of the sterile and monotonous plain known as Champagne Pouilleuse. The climate is mild but damp. The annual rainfall over the greater part varies from 24 to 28 in.; but in the extreme south-east it at times reaches a height of 36 in. Aube is an agricultural department; more than one- third of its surface consists of arable land of which the chief products are wheat and oats, and next to them rye, barley and potatoes; vegetables are extensively cultivated in the valleys of the Seine and the Aube. The vine flourishes chiefly on the hills of the south-east; the wines of Les Riceys, Bar-sur-Aube, Bouilly and Laines-aux-Bois are most esteemed. The river valleys abound in natural pasture, and sainfoin, lucerne and other forage crops are largely grown; cattle-raising is an important source of wealth, and the cheeses of Troyes are well known. There are excellent nurseries and orchards in the neighbourhood of Troyes, Bar-sur-Seine, Mery-sur-Seine arid Brienne. Chalk, from which blanc de Troyes is manufactured, and clay are abundant; and there are peat workings and quarries of building-stone and limestone. The spinning and weaving of cotton and the manufacture of hosiery, of both of which Troyes is the centre, are the main industries of the depart- ment; there are also a large number of distilleries, tanneries, oil works, tile and brick works, flour-mills, saw-mills and dye- works. The Eastern railway has works at Romilly, and there are iron works at Clairvaux and wire-drawing works at Plaines; but owing to the absence of coal and iron mines, metal working is of small importance. The exports of Aube consist of timber, cereals, agricultural products, hosiery, wine, dressed pork, &c; its imports include wool and raw cotton, coal and machinery, especially looms. The department is served by the Eastern railway, of which the main line to Belfort crosses it. The river Aube is navigable for 28 m. (from Arcis-sur-Aube to its confluence with the Seine) ; the Canal de la Haute-Seine extends beside the Seine from Bar-sur-Seine to Marcilly (just outside the depart- ment) a distance of 46 m. ; below Marcilly the Seine is canalized. Aube is divided into 5 arrondissements with 26 cantons and 446 communes. It falls within the educational circumscription (acadimie) of Dijon and the military circumscription of the XX. army corps; its court of appeal is in Paris. It constitutes the diocese of Troyes and part of the

archiepiscopal province of Sens. The capital of the department is Troyes; of the arrondissements the capitals are Troyes, Bar-sur-Aube, Arcis-sur-Aube, Bar-sur- Seine and Nogent-sur-Seine. The architecture of the department is chiefly displayed in its churches, many of which possess stained glass of the 16th century. Besides the cathedral and other churches of Troyes, those of Mussy-sur-Seine (13th century), Chaource (16th century) and Nogent-sur-Seine (15th and 16th

centuries), are of note. The/ abbey buildings of Clairvaux are the type of the Cistercian abbey.

AUBENAS, a town of south-eastern France, in the department of Ardeche, 19 m. S.W. of Privas by road. Pop. (1906) 3976 (town) , 7064 (commune) . Aubenas is beautifully situated on the slope of a hill, on the right bank of the Ardeche, but its streets generally are crooked and narrow. It has a castle of the 13th and 1 6th centuries, now occupied by several of the public institu- tions of the town. These include a tribunal and chamber of commerce, and a conditioning-house for silk. Iron and coal mines are worked in the vicinity. As the centre of the silk trade of southern France Aubenas is a place of considerable traffic. It has also a large silk spinning and weaving industry, and carries on tanning and various minor industries together with trade in silk. The district is rich in plantations of mulberries and olives.

AUBER, DANIEL FRANCOIS ESPRIT (1782-1871), French musical composer, the son of a Paris printseller, was born at Caen in Normandy on the 29th of January 1782. Destined by his father to the pursuits of trade, he was allowed, nevertheless, to indulge his fondness for music, and learnt to play at an early age on several instruments, his first teacher being the Tirolean composer, I. A. Ladurner. Sent at the age of twenty to London to complete his business training, he was obliged to leave England in consequence of the breach of the treaty of Amiens (1804). He had already attempted musical composition, and at this period produced several concertos pour basse, in the manner of the violoncellist, Lamarre, in whose name they were published. The praise given to his concerto for the violin, which was played at the Conservatoire by Mazas, encouraged him to undertake the resetting of the old comic opera, Julie (18 n). Conscious by this time of the need of regular study of his chosen art, he placed himself under the severe training of Cherubini, by which the special qualities of the young composer were admirably developed. In 1813 he made his debut in an opera in one act, the Sejour militaire, the unfavourable reception of

which put an end for some years to his attempts as composer. But the failure in business and death of his father, in 1819, compelled him once more to turn to music, and to make that which had been his pastime the serious employment of his life. He produced another opera, the Testament et les billets-doux (1819), which was no better received than the former. But he persevered, and the next year was rewarded by the complete success of his Bergere chdlelaine, an opera in three acts. This was the first in a long series of brilliant successes: In 1822 began his long association with A. E. Scribe, who shared with him, as librettist, the success and growing popularity of his compositions. The opera of Leicester, in which they first worked together (1823), is remark- able also as showing evidences of the influence of Rossini. But his own style was an individual one, marked by lightness and facility, sparkling vivacity, grace and elegance, clear and piquant melody — characteristically French. In La Muette de Portici, familiarly known as Masaniello, Auber achieved his greatest musical triumph. Produced at Paris in 1828, it rapidly became a European favourite, and its overture, songs and choruses were everywhere heard. The duet, " Amour sacre de la patrie," was welcomed like a new Marseillaise; sung by Nourrit at Brussels in 1830, it became the signal for the revolution which broke out there. Of Auber's remaining operas (about 50 in all) the more important are: Le Macon (1825), La Fiancee (1829), Fra Diavolo (1830), Lestocq (1834), Le Cheval de bronze (1835), L'Ambassadrice (1836), Le Domino noir (1837), Le Lac des fees (1839), Les Diamants de la couronne (1841), Haydte (1847), Marco Spada (1853), Manon Lescaut (1856), and La Fiancee du roi des Garbes (1864). Official and other dignities testified the public appreciation of Auber's works. In 1829 he was elected member of the Institute, in 1830 he was named director of the court concerts, and in 1842, at the wish of Louis Philippe, he succeeded Cherubini as director of the Conservatoire. He was also a member of the Legion of Honour from 1825, and attained the rank of commander in 1847. Napoleon III', made Auber his Imperial Maitre de Chapelle in 1857.

One of Auber's latest compositions was a march, written for the opening of the International Exhibition in London in 1862. His fascinating manners, his witty sayings, and his ever-ready kindness and beneficence won for him a secure place in the respect and love of his fellow-citizens. He remained in his old home during the German siege of Paris, 1870-71, but the miseries of the Communist war which followed sickened his heart, and he died in Paris on the 13th of May 1871.

See Adolph Kohut, " Auber," vol. xvii. of Musiker Biographien (Leipzig, 1895).

AUBERGINE (diminutive of Fr. auberge, a variant of alberge, a kind of peach), or Egg Plant (Solatium melongena, var. ovigerum) , a tender

annual widely cultivated in the warmer parts of the earth, and in France and Italy, for the sake of its fruits, which are eaten as a vegetable. The seed should be sown early in February in a warm pit, where the plants are grown till shifted into 8-in. or 10-in. pots, in well-manured soil. Liquid manure should be given occasionally while the fruit is swelling; about four fruits are sufficient for one plant. The French growers sow them in a brisk heat in December, or early in January, and in March plant them out four or eight in a hot-bed with a bottom heat of from 60° to 68°, the sashes being gradually more widely opened as the season advances, until at about the end of May they may be taken off. The two main branches which are allowed are pinched to induce laterals, but when the fruits are set all young shoots are taken off in order to increase their size. The best variety is the large purple, which produces oblong fruit, sometimes reaching 6 or 7 in. in length and 10 or 12 in. in circumference. The fruit of the ordinary form almost exactly resembles the egg of the domestic fowl. It is also grown as an ornamental plant, for covering walls or trellises; especially the black-fruited kind.

AUBERVILLIERS, or Aubervilliers-les-Vertus, a town of northern France, in the department of Seine, on the canal St Denis, 2 m. from the right bank of the Seine and 1 m. N. of the fortifications of Paris. Pop. (1906) 33,358. Its manufac- tures include cardboard, glue, oils, colours, fertilizers, chemical products, perfumery, &c. During the middle ages and till modern times Aubervilliers was the resort of numerous pilgrims, who came to pay honour to Notre Dame des Vertus. In 1814 the locality was the scene of a stubborn combat between the French and the Allies.

AUBIGNAC, FRANCOIS HEDELIN, Abbe d' (1604-1676), French author, was born at Paris on the 4th of August 1604. His father practised at the Paris bar, and his mother was a daughter of the great surgeon Ambroise Pare. Francois Hedelin was educated for his father's profession, but, after practising for some time at Nemours he abandoned law, took holy orders, and was appointed tutor to one of Richelieu's nephews, the due de Fronsac. This patronage secured for him the abbey of Aubignac and of Mainac. The death of the due de Fonsac in 1646 put an end to hopes of further preferment, and the Abb6 d' Aubignac retired to Nemours, occupying himself with literature till his death on the 25th of July 1676. He took an energetic share in the literary controversies of his time. Against Gilles Menage he wrote a Terence juslifie (1656); he laid claim to having originated the idea of the " Carte de tendre " of Mile de Scudery's Clelie; and after being a professed admirer of Corneille he turned against him because he had neglected to mention the abbe in his Discours sur le poeme dramalique. He was the author of four tragedies: La Cyminde (1642), La Pucelle d'Orleans (1642), ZSnobie (1647) and Le Martyrede Sainte Catherine (1650). Zenobie was written with the intention of affording a

model in which the strict rules of the drama, as understood by the theorists, were observed. In the choice of subjects for his plays, he seems to have been guided by a desire to illustrate the various kinds of tragedy — patriotic, antique and religious. The dramatic authors whom he was in the habit of criticizing were not slow to take advantage of the opportunity for retaliation offered by the production of these mediocre plays. It is as a theorist that D'Aubignac still arrests attention. It has been proved that to Jean Chapelain belongs the credit of having been the first to

establish as a practical law the convention of the unities that plays so large a part in the history of the French stage; but the laws of dramatic method and construction generally were codified by d'Aubignac in his Pratique du thedtre. The book was only published in 1657, but had been begun at the desire of Richelieu as early as 1640. His Conjectures academiques sur I'lliade d'Homere, which was not published until nearly forty years after his death, threw doubts on the existence of Homer, and anticipated in some sense the conclusions of Friedrich August Wolf in his Prolegomena ad Homerum (1795).

The contents of the Pratique du theatre are summarized by F. Brunetiere in his notice of Aubignac in the Grande Encyclopedic. See also G. Saintsbury, Hist, of Criticism, bk. v., and H. Rigault, Hist, de la querelle des anciens et modernes. (1859).

AUBIGNfi, CONSTANT D' [Baron de Surineau] (c. 1584- 1647), French adventurer, was the son of Theodore Agrippa d'Aubigne, and the father of Madame de Maintenon. Born a Protestant, he became by turns Catholic or Protestant as it suited his interests. He betrayed the Protestants in 1626, revealing to the court, after a voyage to England, the projects of the English upon La Rochelle. He was renounced by his father; then imprisoned by Richelieu's orders at Niort, where he was detained ten years. After having tried his fortunes in the Antilles, he died in Provence, leaving in destitution his wife, Jeanne de Cardillac, whom he had married in 1627. He had two children, Charles, father of the duchess of Noailles, and Francoise, known in history as Madame de Maintenon.

See T. Lavallee, LaFamille d'Aubigne et I'enfance de Madame de Maintenon (Paris, 1863).

AUBIGN& JEAN HENRI MERLE D' (1794-1872), Swiss Protestant divine and historian, was born on the 16th of August 1794, at Eaux Vives, near

Geneva. The ancestors of his father, Aime Robert Merle d'Aubigne (1755—1799), were French Pro- testant refugees. Jean Henri was destined by his parents to a commercial life; but at college he decided to be ordained. He was profoundly influenced by Robert Haldane, the Scottish missionary and preacher who visited Geneva. When in 181 7 he went abroad to further his education, Germany was about to celebrate the tercentenary of the Reformation; and thus early he conceived the ambition to write the history of that great epoch. At Berlin he received stimulus from teachers so unlike as J. A. W. Neander and W. M. L. de Wette. After presiding for five years over the French Protestant church at Hamburg, he was, in 1823, called to become pastor of a congregation in Brussels and preacher to the court. He became also president of the consistory of the French and German Protestant churches. At the Belgian revolution of 1830 he thought it advisable to undertake pastoral work at home rather than to accept an educational post in the family of the Dutch king. The Evan- gelical Society had been founded with the idea of promoting evangelical Christianity in Geneva and elsewhere, but it was found that there was also needed a theological school for the training of pastors. On his return to Switzerland, d'Aubigne was invited to become professor of church history in an institution of the kind, and continued to labour in the cause of evangelical Pro- testantism. In him the Evangelical Alliance found a hearty promoter. He frequently visited England, was made a D.C.L. by Oxford University, and received civic honours from the city of Edinburgh. He died suddenly in 1872.

His principal works are — Discours sur I'elude de I'histoire de Chrislianisme (Geneva, 1832); Le Luther anisme et la Riforme (Paris, 1844); Germany, England and Scotland, or Recollections of a Swiss Pastor (London, 1848); Trois siecles de lutte en Ecosse, ou deux rois et deux royaumes; Le Protecteur ou la ripublique d'Angleterre aux jours de Cromwell (Paris, 1848); Le Concile et V inf dillibilite (1870) ; Histoire de la Reformation au XV I iinu siecle (Paris, 1835-1853; new ed:, 1 861-1862, in 5 vols.); and Histoire de la Reformation en Europe au temps de Calvin (8 vols., 1862-1877).

The first portion of his Histoire de la Reformation, which was devoted to the earlier period of the movement in Germany, gave him at once a foremost place amongst modern French ecclesi- astical historians, and was translated into most European tongues. The second portion, dealing with reform in the time

of Calvin, was not less thorough, and had a subject hitherto less exhaustively treated, but it did not meet with the same success. This part of the subject, with which he was most competent to deal, was all but completed at the time of his death. Among his minor treatises, the most

important are the vindication of the character and aims of Oliver Cromwell, and the sketch of the contendings of the Church of Scotland.

Indefatigable in sifting original documents, Aubigne had amassed a wealth of authentic information; but his desire to give in all cases a full and graphic picture, assisted by a vivid imagination, betrayed him into excess of detail concerning minor events, and in a few cases into filling up a narrative by inference from later conditions. Moreover, in his profound sympathy . with the Reformers, he too frequently becomes their apologist. But his work is a monument of painstaking sincerity, and brings us into direct contact with the spirit of the period.

AUBIGNfi, THEODORE AGRIPPA D' (1552-1630), French poet and historian, was born at St Maury, near Pons, in Saintonge, on the 8th of February 1552. His name Agrippa (aegre partus) was given him through his mother dying in childbirth. In his childhood he showed a great aptitude for languages; according to his own account he knew Latin, Greek and Hebrew at six years of age; and he had translated the Crito of Plato before he was eleven. His father, a Huguenot who had been one of the con- spirators of Amboise, strengthened his Protestant sympathies by showing him, while they were passing through that town on their way to Paris, the heads of the conspirators exposed upon the scaffold, and adjuring him not to spare his own head in order to avenge their death. After a brief residence he was obliged to flee from Paris to avoid persecution, but was captured and threatened with death. Escaping through the intervention of a friend, he went to Montargis. In his fourteenth year he was present at the siege of Orleans, at whicn his father was killed. His guardian sent him to Geneva, where he studied for a con- siderable time under the direction of Beza. In 1567 he made his escape from tutelage, and attached himself to the Huguenot army under the prince of Conde. Subsequently he joined Henry of Navarre, whom he succeeded in withdrawing from the corrupt- ing influence of the house of Valois (1576), and to whom he rendered valuable service, both as a soldier and as a counsellor, in the wars that issued in his elevation to the throne as Henry IV. After a furious battle at Casteljaloux, and suffering from fever from his wounds, he wrote his Tragiques (1571). He was in the battle of Coutras (1587), and at the siege of Paris (1590). His career at camp and court, however, was a somewhat chequered one, owing to the roughness of his manner and the keenness of his criticisms, which made him many enemies and severely tried the king's patience. In his tragedie-ballet Circe (1576) he did not hesitate to indulge in the most outspoken sarcasm against the king and other members of the royal family. Though he more than once found it expedient to retire into private life he never entirely lost the favour of Henry, who made him governor of Maillezais. After the conversion of the king to Roman Catho- licism, d'Aubigne remained true to the Huguenot cause, and a fearless advocate of

the Huguenot interests. The first two volumes of the work by which he is best known, his Histoire universelle depuis 1550 jusqu'a Van 1601, appeared in 1616 and 1618 respectively. The third volume was published in 1619, but, being still more free and personal in its satire than those which had preceded it, it was immediately ordered to be burned by the common hangman. The work is a lively chronicle of the incidents of camp and court life, and forms a very valuable source for the history of France during the period it embraces. In September 1620 its author was compelled to take refuge in Geneva, where he found a secure retreat for the last ten years of his life, though the hatred of the French court showed itself in procuring a sentence of death to be recorded against him more than once. He devoted the period of his exile to study, and the superintend- ence of works for the fortifications of Bern and Basel which were designed as a material defence of the cause of Protestantism. He died at Geneva on the 29th of April 1630.

A complete edition of his works according to the original MSS.

was begun by E. Reaume and F. de Caussade (1879). It contains all the literary works, the Avenlures du baron de Faeneste (1617), and the Memoires (6 vols., 1873-1892). The best edition of the Histoire universelle is by A. de Ruble. The Memoires were edited by L. Lalanne (1854).

AUBIN, a town of southern France, in the department of Aveyron on the Enne, 30 m. N.W. of Rodez. In 1906 the urban population was 2229, the communal population 9986. Aubin is the centre of important coal-mines worked in the middle ages, and also has iron-mines, the product of which supplies iron works close to the town. Sheep-breeding is important in the vicinity. The church dates from the 12th century.

AUBREY, JOHN (1626-1697), English antiquary, was born at Easton Pierse or Percy, near Malmesbury, Wiltshire, on the 12th of March 1626, his father being a country gentleman of consider- able fortune. He was educated at the Malmesbury grammar school under Robert Latimer, who had numbered Thomas Hobbes among his earlier pupils, and at his schoolmaster's house Aubrey first met the philosopher about whom he was to leave so many curious and interesting details. He entered Trinity College, Oxford, in 1642, but his studies were interrupted by the Civil War. In 1646 he became a student of the Middle Temple, but was never called to the bar. He spent much of his time in the country, and in 1649 he brought into notice the megalithic remains at Avebury. His father died in 1652, leaving

to Aubrey large estates, and with them, unfortunately, complicated law-suits. Aubrey, however, lived gaily, and used his means to gratify his passion for the company of celebrities and for every sort of knowledge to be gleaned about them. Anthony a Wood prophesied that he would one day break his neck while running downstairs after a retreating guest, in the hope of extracting a story from him. He took no active share in the political troubles of the time, but from his description of a meeting of the Rota Club, founded by James Harrington, the author of Oceana, he appears to have been a theorizing republican. His reminiscences on this subject date from the Restoration, and are probably softened by considerations of expediency. In 1663 he became a member of the Royal Society, and in the next year he met Joan Somner, " in an ill hour," he tells us. This connexion did not end in marriage, and a lawsuit with the lady complicated his already embarrassed affairs. He lost estate after estate, until in 1670 he parted with his last piece of property, Easton Pierse. From this time he was dependent on the hospitality of his numerous friends. In 1667 he had made the acquaintance of Anthony a Wood at Oxford, and when Wood began to gather materials for his invaluable Athenae Oxonienses, Aubrey offered to collect information for him. From time to time he forwarded memoranda to him, and in 1680 he began to promise the " Minutes for Lives," which Wood was to use at his discretion. He left the task of verification largely to Wood. As a hanger-on in great houses he had little time for systematic work, and he wrote the " Lives " in the early morning while his hosts were sleeping off the effects of the dissipation of the night before. He constantly leaves blanks for dates and facts, and many queries. He made no attempt at a fair copy, and, when fresh in- formation occurred to him, inserted it at random. He made some distinction between hearsay and authentic information, but had no pretence to accuracy, his retentive memory being the chief authority. The principal charm of his " Minutes " lies in the amusing details he has to recount about his personages, and in the plainness and truthfulness that he permits himself in face of established reputations. In 1592 he complained bitterly that Wood had destroyed forty pages of his MS., probably because of the dangerous freedom of Aubrey's pen. Wood Was prosecuted eventually for insinuations against the judicial integrity of the earl of Clarendon. One of the two statements called in question was certainly founded on information provided by Aubrey. This perhaps explains the estrangement between the two anti- quaries and the ungrateful account that Wood gives of the elder man's character. " He was a shiftless person, roving and magotie-headed, and sometimes little better than erased. And being exceedingly credulous, would stuff his many letters sent to A. W. with follies and misinformations, which sometimes

would guide him into the paths of errour." 1 In 1673 Aubrey began his "

Perambulation " or " Survey " of the county of Surrey, which was the result of many years' labour in collecting inscriptions and traditions in the country. He began a " History of his Native District of Northern Wiltshire," but, feeling that he was too old to finish it as he would wish, he made over his material, about 1695, to Thomas Tanner, afterwards bishop of St Asaph. In the next year he published his only completed, though certainly not his most valuable work, the Miscellanies, a collection of stories on ghosts and dreams. He died at Oxford in June 1697, and was buried in the church of St Mary Magdalene.

Beside the works already mentioned, his papers included: " Architectonica Sacra," notes on ecclesiastical antiquities; and " Life of Thomas Hobbes of Malmesbury," which served as the basis of Dr Blackburn's Latin life, and also of Wood's account. His survey of Surrey was incorporated in R. Rawlinson's Natural History and Antiquities of Surrey (1719); his antiquarian notes on Wiltshire were printed in Wiltshire; the Topographical Collections of John Aubrey, corrected and enlarged by J. E. Jackson (Devizes, 1862) ; part of another MS. on " The Natural History of Wiltshire " was printed by John Britton in 1847 for the Wiltshire Topographical Society; the Miscellanies were edited in 1890 for the Library of Old Authors; the " Minutes for Lives " were partially edited in 1813. A complete transcript, Brief Lives chiefly of Contemporaries set down by John Aubrey between the Years 1669 and 1696, was edited for the Clarendon Press in 1898 by the Rev. Andrew Clark from the MSS. in the Bodleian, Oxford.

See also John Britton, Memoir of John Aubrey (1845); David Masson, in the British Quarterly Review, July 1856; Emile Montegut, Heures de lecture d'un critique (1891); and a catalogue of Aubrey's collections in The Life and Times of Anthony Wood . . ., by Andrew Clark (Oxford, 1891-1900, vol. iv. pp. 191-193), which contains many other references to Aubrey.

AUBURN, a city and the county-seat of Androscoggin county, Maine, U.S.A., on the Androscoggin river, opposite Lewiston (with which it practically forms an industrial unit), in the S.W. part of the state. Pop. (1890) 11,250; (1900) 12,951, of whom 2076 were foreign-born; (1910, census) 15,064. It is served by the Grand Trunk and the Maine Central railways. The river furnishes abundant water-power, and the city ranked fourth in the state as a manufacturing centre in 1905. Boots and shoes are the principal products; in 1905 seven-tenths of the city's wage-earners were engaged in their manufacture, and Auburn's output ($4,263,162 = 66-5% of the total factory product of the city) was one-third of that of the whole state. Other manu- factures are butter, bread and other bakery products, cotton goods, furniture and leather. The municipality owns and operates its waterworks. Auburn was first settled in 1786, and was incorporated in

1842, but the present charter dates only from 1869.

AUBURN, a city and the county-seat of Cayuga county, New York, U.S.A., 25 m. S.W. of Syracuse, on an outlet of Owasco Lake. Pop. (1890) 25,858; (1900) 30,345, of whom 5436 were foreign-born, 2084 being from Ireland and 1023 from England; (1910) 34,668. It is served by the Lehigh Valley and the New York Central & Hudson River railways, and by inter-urban electric lines. The city is attractively situated amidst a group of low hills in the heart of the lake country of western New York; the streets are wide, with a profusion of shade trees. Auburn has a city hall, the large Burtis Audi- torium, the Auburn hospital, two orphan asylums, and the Seymour library in the Case Memorial building. There is a fine bronze statue of William H. Seward, who made his home here after 1823, and was buried in Fort Hill Cemetery. In Auburn are the Auburn (State) prison (1816), in connexion with which there is a women's prison; the Auburn Theological Seminary (Presbyterian), founded in 1819, chartered in 1820, and opened for students in 1821; the Robinson school for girls; and the Women's Educational and Industrial Union, for the education of working girls, with a building erected in 1907. The city owns its water-supply system, the water being pumped from Owasco Lake, about 2 -J m. S.S.E. of the city. There is a good water-power, and the city has important manufacturing

1 "Life of Anthony a Wood written by Himself" (Athen. Oxon., ed. Bliss).

interests. The principal manufactures are cordage and twine, agricultural implements, engines, pianos, boots and shoes, cotton and woollen goods, carpets and rugs, rubber goods, flour and machinery. The total factory product in 1905 was valued at $13,420,863; of this $2,890,301 was the value of agricultural implements, in the manufacture of which Auburn ranked fifth among the cities of the United States. There are a number of grey and blue limestone quarries, one of which is owned and operated by the municipality.

Settled soon after the close of the War of Independence, Auburn was laid out in 1793 by Captain John L. Hardenburgh, a veteran of the war, and for some years was known as Harden- burgh's Corners. In 1805, when it was made, the county-seat, it was renamed Auburn. It was incorporated in 1814, and was chartered as a city in 1848.

See C. Hawley, Early Chapters of Cayuga History (Auburn, 1879).

AUBURN (from the Low Lat. alburnus, whitish, light-coloured) , ruddy-brown; the meaning has changed from the original one of brownish-white or light yellow (cilrinus, in Promptorium Parvulorum) , probably through the intensification of the idea of brown caused by the early spelling " abron " or " abrown."

AUBUSSON, PIERRE D' (1423-1503), grand-master of the order of St John of Jerusalem, and a zealous opponent of the Turks, was born in 1423. He belonged to a noble French family, and early devoted himself to the career of a soldier in the service of the emperor Sigismund. Under the archduke Albert of Austria he took part in a campaign against the Turks, and on his return to France sided with the Armagnacs against the Swiss, greatly distinguishing himself at the battle of St Jacob in 1444. He then joined the order of the knights of Rhodes, and success- fully conducted an expedition against the pirates of the Levant and an embassy to Charles VII. He soon rose to the most important offices in the order, and in 1476 was elected grand- master. It was the period of the conquests of Mahommed II., who, supreme in the East, now began to threaten Europe. In December 1479 a large Turkish fleet appeared in sight of Rhodes; a landing was effected, and a vigorous attack made upon the city. But in July of the next year, being reinforced from Spain, the knights forced the Mussulmans to retire, leaving behind them 9000 dead. The siege, in which d'Aubusson was seriously wounded, enhanced his renown throughout Europe. Mahommed was furious, and would have attacked the island again but for his death in 148 1. His succession was disputed between his sons Bayezid and Jem. The latter, after his defeat by Bayezid, sought refuge at Rhodes under a safe-conduct from the grand- master and the council of the knights. What followed remains a stain on dAubusson's memory. Rhodes not being considered secure, Jem with his own consent was sent to France. Mean-while, in spite of the safe-conduct, d'Aubusson accepted an annuity of 45,000 ducats from the sultan; in return for which he undertook to guard Jem in such a way as to prevent his design of appealing to the Christian powers to aid him against his brother. For six years Jem, in spite of frequent efforts to escape, was kept a close prisoner in various castles of the Rhodian order in France, until in 1489 he was handed over to Pope Innocent VIII. , who had been vying with the kings of Hungary and Naples for the possession of so valuable a political weapon. D'Aubusson's reward was a cardinal's hat (1489), and the power to confer all benefices connected with the order without the sanction of the papacy; the order of St John received the wealth of the suppressed orders of the Holy Sepulchre and St Lazarus. The remaining years of his life d'Aubusson spent in the attempt to restore discipline and zeal in his order, and to organize a grand international crusade against the Turks. The age of the Renaissance, with Alexander Borgia on the throne of St Peter, was, however, not favourable

to such an enterprise; the death of Jem in 1495 had removed the most formidable weapon available against the sultan; and when in 1501 d'Aubus- son led an expedition against Mytilene, dissensions among his motley host rendered it wholly abortive. The old man's last years were embittered by chagrin at his failure, which was hardly compensated by his success in extirpating Judaism in

Rhodes, by expelling all adult Jews and forcibly baptizing their children. In the summer of 1503 he died.

See P. Bouhours, Hist, de Pierre d'Aubusson (Paris, 1676; Hague, 1793; abridged ed. Bruges, 1887); G. E. Streck, Pierre d'Aubusson, Grossmeister, &c. (Chemnitz, 1873); J. B. Bury in Cambridge Mod. Hist. vol. i. p. 85, &c. (for relations with Jem).

AUBUSSON, a town of France, capital of an arrondissement in the department of Creuse, picturesquely situated on the river Creuse 24 m. S.E. of Gueret by rail. Pop. (1906) 6475. It has celebrated manufactories of carpets, &c, employing about 2000 workmen, the artistic standard of which is maintained by a national school of decorative arts, founded in 1869. Nothing certain is known as to the foundation of this industry, but it was in full activity at least as far back as 1531. From the 10th to the 13th century Aubusson was the centre of a viscounty, and the viscountess Marguerite, wife of Rainaud VI., was sung by many a troubadour. After the death of the viscount Guy II. (a little later than 1262) Aubusson was incorporated in the countship of La Marche by Hugh XII. of Lusignan, and shared in its fortunes. Louis XIV. revived the title of viscount of Aubusson in favour of Franfois, first marshall de la Feuillade (1686). From the family of the old viscounts was descended Pierre d'Aubusson (q.v.). Admiral Sallandrouze de Lamornaix (1840-1902) belonged to a family of tapestry manufacturers established at Aubusson since the beginning of the 19th century. Aubusson was also the native place of the novelists Leonard Sylvain, Julien Sandeau and Alfred Assollant (1827-1886).

See Le Pere Anselme, Hist, genealogique de la maison de France, vol. v. pp. 318 et seq.; P. Mignaton, Hist, de la maison d' Aubusson (Paris, 1886); Cyprien Perathon, Hist. d'Aubusson (Limoges, 1886). (A. T.)

AUCH, a city of south-western France, capital of the depart- ment of Gers, 55 m. W. of Toulouse on the Southern railway. Pop. (1906) 9294. Auch is built on the summit and sides of a hill at the foot of which flow the yellow waters of the Gers. It consists of a lower and upper quarter united in several places by flights of steps. The streets are in general steep and narrow, but there is a handsome promenade in the upper town, laid out in the 18th century by the intendant Antoine Megret d'Etigny. Three bridges

lead from the left to the right bank of the Gers, on which the suburb of Patte d'Oie is situated. The most in- teresting part of the town lies in the old quarter around the Place Salinis, a spacious terrace which commands an extensive view over the surrounding country. On its eastern side it communicates with the left bank of the river by a handsome series of steps; on its north side rises the cathedral of Sainte- Marie. This church, built from 1489 to 1662, belongs chiefly to the Gothic style, of which it is one of the finest examples in southern France. The facade, however, with its two square and somewhat heavy flanking towers dates from the 17th century, and is Greco-Roman in architecture. Sainte-Marie contains many artistic treasures, the chief of which are the magnificent stained-glass windows of the Renaissance which b'ght the apsidal chapels, and the 113 choir-stalls of carved oak, also of Renaissance workmanship. The archbishop's palace adjoins the cathedral; it is a building of the 18th century with a Romanesque hall and a tower of the 14th century. Opposite the south side of the cathedral stands the lycee on the site of a former Jesuit college. Only scanty remains are left of the once celebrated abbey of St Orens. The ecclesiastical seminary contains an important library with a collection of manuscripts, and there is a public library in the Carmelite chapel, a building of the 17 th century. The former palace of the intendants of Gascony is now used as the prefecture. Auch is the seat of an archbishopric, a prefect and a court of assizes, and has tribunals of first instance and of commerce, a chamber of commerce, a lycee, training-colleges, a school of design, a branch of the Bank of France and an im- portant lunatic asylum. The manufactures include agricultural implements, leather, vinegar and plaited sandals, and there is a trade in brandy, wine, cattle, poultry and wool; there are quarries of building-stone in the neighbourhood.

Auch (Elimberris) was the capital of a Celtiberian tribe, the Ausci, and under the Roman domination was one of the most

important cities in Gaul. In the 4th century this importance was increased by the foundation of its bishopric, and after the destruction of Eauze in the 9th century it became the metropolis of Novempopulana. Till 73 2, Auch stood on the right bank of the Gers, but in that year the ravages of the Saracens drove the inhabitants to take refuge on the left bank of the river, where a new city was formed. In the 10th century Count Bernard of Armagnac founded the Benedictine abbey of St Orens, the monks of which, till 1308, shared the jurisdiction over Auch with the archbishops — an arrangement which gave rise to constant strife. The counts of Armagnac

possessed a castle in the city, which was the capital of Armagnac in the middle ages. During the Religious Wars of the 16th century Auch remained Catholic, except for a short occupation in 1569 by the Huguenots under Gabriel, count of Montgomery. In the 18th century it was capital of Gascony, and seat of a generality. Antoine Megret d'Etigny, intendant from 1751 to 1767, did much to improve the city and its commerce.

AUCHMUTY, SIR SAMUEL (1756-1822), British general, was born at New York in 1756, and served as a loyalist in the American War of Independence, being given an ensigncy in the royal army in 1777, and in 1778 a lieutenancy in the 45th Foot, without purchase. When his regiment returned to England after the war, having neither private means nor influence, he exchanged into the 5 2n d, in order to proceed to India. He took part in the last war against Hyder Ali ; he was given a staff appointment by Lord Cornwallis in 1790, served in the operations against Tippoo Sahib,and continued in various staff appointments up to 1797, when he returned to England a brevet lieut- coloncl. In- 1800 he was made lieut. -colonel and brevet colonel; and in the following year, as adjutant-general to Sir David Baird in Egypt, took a distinguished share in the march across the desert and the capture of Alexandria. On his return to England in 1803 he was knighted, and three years later he went out to the River Plate as a brigadier-general. Auchmuty was one of the few officers who came out of the disastrous Buenos Aires expedition of 1806-7 with enhanced reputation. While General Whitelocke, the commander, was cashiered, Auchmuty was at once re-employed and promoted major-general, and was sent out in 1810 to command at Madras. In the following year he commanded the expedition organized for the conquest of Java, which the governor-general, Lord Minto, himself accom- panied. The storming of the strongly fortified position of Meester Cornells (28th August 1811), stubbornly defended by the Dutch garrison under General Janssens, practically achieved the conquest of the island, and after the action of Samarang (September 8th) Janssens surrendered. Auchmuty received the thanks of parliament and the order of K.C.B. (G.C.B. in 1815), and in 1813, on his return home, was promoted to the rank of lieut. -general. In 1821 he became commander-in-chief in Ireland , and a member of the Irish privy council. He died suddenly on the nth of August 1822.

AUCHTERARDER (Gaelic, " upper high land "), a police burgh of Perthshire, Scotland, 13! m. S.W. of Perth by the Caledonian railway. Pop. (1901) 2276. It is situated on Ruthven Water, a right-hand tributary of the Earn. The chief manufactures are those of tartans and other woollens, and of agricultural implements. At the beginning of the 13th century it obtained a charter from the earl of Strathearn, afterwards became a royal burgh for a period, and was represented in the Scottish parliament. Its castle, now ruinous, was built as a hunting-lodge for Malcolm Canmore, but of the

abbey which it possessed as early as the reign of Alexander II. (1198-1249) no remains exist. The ancient church of St Mungo, now in ruins, was a building in the Norman or Early Pointed style. The town was almost entirely burned down by the earl of Mar in 17 16 during the abortive Jacobite rising. It was in connexion with this parish that the ecclesiastical dispute arose which led to the disruption in the Church of Scotland in 1843. The estate of Kincardine, 1 m. south, gives the title of earl of Kincardine to the duke of Montrose. The old castle, now in ruins, was dismantled in 1645 by the marquis of Argyll in retaliation for the destruction

of Castle Campbell in Dollar Glen on the south side of the Ochils. The old ruined castle of Tullibardine, 2 m. west of the burgh, once belonged to the Murrays of Tullibardine, ancestors of the duke of Atholl, who derives the title of marquis of Tullibardine from the estate. The ancient chapel adjoining, also ruinous, was a burial-place of the Murrays.

AUCHTERMUCHTY (Gaelic, " the high ground of the wild sow"), a royal and police burgh of Fifeshire, Scotland, built on an elevation about 9 m. W. by S. of Cupar, with a station on a branch of the North British railway from Ladybank to Mawcarse Junction. Pop. 1387. The rapid Loverspool Burn divides the town. The principal industries include the weaving of linen and damasks, bleaching, distilling and malting. John Glas, founder of the sect known as Glassites or Sandemanians, was a native of the town. A mile and a half to the south-west is the village of Strathmiglo (pop. 966), on the river Eden, with a linen factory and bleaching works.

AUCKLAND, GEORGE EDEN, Earl of (1784-1849), English statesman, was the second son of the 1st Baron Auckland. He completed his education at Oxford, and was admitted to the bar in 1809. His elder brother was drowned in the Thames in the following year ; and in 1814, on the death of his father, he took his seat in the House of Lords as Baron Auckland. He supported the Reform party steadily by his vote, and in 1830 was made president of the Board of Trade and master of the Mint. In 1834 he held office for a few months as first lord of the admiralty, and in 1835 he was appointed governor-general of India. He proved himself to be a painstaking and laborious legislator, and devoted himself specially to the improvement of native schools, and the expansion of the commercial industry of the nation committed to his care. These useful labours were interrupted in 1838 by complications in Afghanistan, which excited the fears not only of the Anglo-Indian government but of the home authorities. Lord Auckland resolved to enter upon a war, and on the 1st of October 1838 published at Simla his famous manifesto dethroning Dost Mahommed. The early operations were crowned with success, and the governor-general received the title of earl of Auckland. But reverses followed quickly, and in the

ensuing campaigns the British troops suffered the most severe disasters. Lord Auckland had the double mortifica- tion of seeing his policy a complete failure and of being super- seded before his errors could be rectified. In the autumn of 1 84 1 he was succeeded in office by Lord Ellenborough, and returned to England in the following year. In 1846 he was made first lord of the admiralty, which office he held until his death, on the 1st of January 1849. He died unmarried, and the earldom became extinct, the barony (see below) passing to his brother Robert.

See S. J. Trotter, The Earl of Auckland (" Rulers of India " series),

1893.

AUCKLAND, WILLIAM EDEN, ist Baron (1745-1814), English statesman, son of Sir Robert Eden, 3rd Bart., of Windle- stone Hall, Durham, and of Mary, daughter of William Davison, was born in 1 745, educated at Eton and Christ Church, Oxford, and called to the bar at the Middle Temple in 1768. In 1771 he published Principles of Penal Law, and was early recognized as an authority on commercial and economic questions, and ' in 1772 he was appointed an under secretary of state. He repre- sented New Woodstock in the parliaments of 1774 and 1780, and Heytesbury in those of 1784 and 1790. In 1776 he was appointed a commissioner on the board of trade and plantations. In 1778 he carried an act for the improvement of the treatment of prisoners, and accompanied the earl of Carlisle as a com- missioner to North America on an unsuccessful mission to settle the disputes with the colonists. On his return in 1779 he published his widely read Four Letters to the Earl of Carlisle, and in 1780 became chief secretary for Ireland. He was elected to the Irish House of Commons as member for Dungannon in 1781 and sworn of the Irish privy council, and while in Ireland established the National Bank. He advised the increase of the secret service fund, and was reputed, according to Lord Charle- mont (a political opponent), as especially skilful in the arts of

corruption and in overcoming political prejudices. He resigned in 1782, but in the following year he took office again as vice- treasurer of Ireland under the coalition ministry, which he had been instrumental in arranging, and was included in the privy council, resigning with the government in December. He opposed strongly Pitt's propositions for free trade between Eng- land and Ireland in 1785, but took office with Pitt as a member of the committee on trade and plantations, and negotiated in 1786 and 1787 Pitt's important commercial treaty with France, and agreements concerning

the East India Companies and Holland. In 1787 he published his History of New Holland. Next year he was sent as ambassador to Spain, and after his return was created (September 1789) Baron Auckland in the Irish peerage. The same year he was sent on a mission to Holland, and represented English interests there with great zeal and prudence during the critical years of 1790 to 1793, obtaining the assistance of the Dutch fleet in 1790 on the menace of a war with Spain, signing the convention relating to the Netherlands the same year, and in 1793 attending the congress at Antwerp. He retired from the public service in the latter year, received a pension of £2300, and was created Baron Auck- land of West Auckland, Durham, in the English peerage. During his retirement in the country at Beckenham, he continued his intimacy with Pitt, his nearest neighbour at Holwood, who at one time had thoughts of marrying his daughter; and with Pitt's sanction he published his Remarks on the Apparent Cicumstances of the War in 1 795, to prepare public opinion for a peace. In 1 798 he was included in Pitt's government as joint postmaster-general, and supported strongly the income tax and the Irish Union, assisting in drawing up the act embodying the latter. In 1 799 he brought in a bill to check adultery by preventing the marriage of the guilty parties, and the same year took a mischievous part in the cabal against Sir Ralph Abercromby. He severely criticized Pitt's resignation in 1801, from which he had en- deavoured to dissuade him, and retained office under Addington. This terminated his friendship with Pitt, who excluded him from his administration in 1804 though he increased his pension. Auckland was included in Granville's ministry of " All the Talents " as president of the board of trade in 1806. He held the appointments of auditor and director of Greenwich hospital, recorder of Grantham, and chancellor of the Marischal College in Aberdeen. He died on the 28th of May 18 14.

He had married in 1776 Eleanor, sister of the first Lord Minto, and had a large family. Emily Eden (1797-1869), the novelist, was one of his daughters. On the death of his son George, 2nd baron and earl of Auckland (q.v.), the barony passed to the 1st baron's younger son Robert John (1790-1870), bishop of Bath and Wells, from whom the later barons were descended, and who was also the father of Sir Ashley Eden (1831-1887), lieutenant-governor of Bengal. The 1st baron had two dis- tinguished brothers — Morton Eden (1752-1830), a diplomatist, who married Lady Elizabeth Henley, and in 1799 was created 1st Baron Henley (his family, from 1831, taking the name of Henley instead of Eden); and Sir Robert Eden, governor of Maryland, whose son, Sir Frederic Morton Eden (1766-1809), was a well-known economist.

Lord Auckland's Journal and Correspondence, published in 1861- 1862, throws much light on the political history of the time.

AUCKLAND, a city and seaport on the east coast of North Island, New Zealand, in Eden county; capital of the province of its name, and the seat of a bishop. Pop. (1906) 37,736; including suburbs, 82,101. It is situated at the mouth of an arm of Hauraki Gulf, and is only 6 m. distant from the head of Manukau harbour on the western coast. The situation is extremely beautiful. The Hauraki Gulf, a great square inlet opening northward, is studded with islands of considerable elevation; Rangitoto, which protects the harbour, is a volcanic cone reaching nearly 1000 ft. The isthmus on which the town stands (which position has caused it to be likened to Corinth) can be crossed without surmounting any great elevation, and offers a feasible canal route. A number of small extinct volcanoes, however, appear in all directions. To the west the Titirangi hills

exceed 1400 ft. Some of the volcanic soil is barren, but much of the district is clothed in luxuriant vegetation.

Auckland harbour, one of the best in New Zealand, is approach- able by the largest vessels at the lowest tide. There are two graving docks. Queen Street, the principal thoroughfare, leads inland from the main dock, and contains the majority of the public buildings. There is a small government house, standing in beautiful grounds, adjoining Albert Park, with plantations of oaks and pines. The government offices, art gallery and exchange, with St Mary's cathedral (Anglican), a building in a combination of native timbers, St Paul's and St Patrick's cathedral (Roman Catholic), are noteworthy buildings. The art gallery and free library contain excellent pictures, and valuable books and MSS. presented by Sir G. Grey. The museum contains one of the best existing collections of Maori art. There are an opera-house and an academy of music. The Auckland University College and the grammar school are the principal educational establishments. The parks are the Domain, with a botanical garden, the Albert Park near the harbour, with a bronze statue of Queen Victoria, the extensive grounds at One Tree Hill on the outskirts, and Victoria Park on Freeman's Bay. The principal thoroughfares are served by electric tramway. Of the suburbs, Newton, Parnell and Newmarket are in reality outlying parts of the town itself. Devonport, Birkenhead and Northcote are beautifully situated on the north shore of the inlet, and are served by steam-ferries. Several other residential suburbs lie among the hills on the mainland, such as Mount Albert, Mount Eden and Epsom. Onehunga is a small port on Manukau harbour, served by rail. In Parnell is the former residence of Bishop Selwyn, who, arriving in the colony in 1842, assisted to draw up the constitution of the Anglican church. There are many associations with his name in the neighbour- hood. The prospect over the town and its environs from Mount Eden is justly famous. The hill is terraced with former native fortifications.

Auckland has industries of sugar-refining, ship-building and paper-, rope- and brick-making, and timber is worked. The town was founded as capital of the colony in 1840 by Governor Hobson. There is communication both south and north by rail, and regular steamers serve the ports of the colony, the principal Pacific Islands, Australia, &c. From 1853 to 1876 Auckland was the seat of the provincial government, and until 1865 that of the central government, which was then transferred to Wellington. The first session of the general assembly took place here in 1854. Auckland is under municipal government.

AUCKLAND ISLANDS, a group in the Pacific Ocean, dis- covered in 1806 by Captain Briscoe, of the English whaler " Ocean," in 50° 24′ S., 166 7′ E. The islands, of volcanic origin, are very fertile, and are covered with forest. They were granted to the Messrs Enderby by the British government as a whaling station, but the establishment was abandoned in 1852. The islands belong politically to New Zealand.

AUCTION PITCH, a card game which is a popular variation of All Fours (q.v.). The name is derived from the rule that the first card played, or pitched, is the trump suit, and that the eldest hand has the privilege of pitching it or of selling out to the highest bidder. A full pack is used, and the cards rank as in All Fours, namely from ace down to 2, ace being highest in cutting also. From four to seven may play, each player being provided with seven white counters, and also with red counters in case stakes are played for. Each player receives six cards in every deal, three at a time, no trump being turned. The object is to get rid of the white counters, one of which may be put into the pool either (1) for holding the highest trump played; (2) for having the lowest trump dealt to one; (3) for taking the Jack (knave) of trumps; or (4) for winning the game, namely the greatest number of pips that count. In case of a tie of pips no game is scored. If the eldest hand decides to pitch and not to sell out, he may do so, but is obliged to make four points or be set back that number. If he decides to sell, he says " I pass," and the player at his left bids for the privilege of pitching the trump or passes, &c. When a bid has been made the rest must

pass or bid higher, and the eldest hand must either accept a bid or undertake to make as many points as the bidder. If no bid is made he pitches the trump himself, without the obligation of making anything. The first card played is the trump suit, the winner of the trick leading again. In trumps a player must follow suit if he can, and the same rule applies in plain suits, excepting that a trump may be played at any time (" follow suit

or trump "). In play the highest card wins the trick unless trumped. When the hand is played out each player puts a white counter into the pool for every point won, and the first player to get rid of all his seven white counters wins the pool and takes from it all the red counters, which represent cash. This ends the game. In case two players count out during the same deal, the bidder has the first right to the pool, the rule being " bidder counts out first." If the two players who count out are neither of them bidder, then they go out in regular order, i.e. high first, then low, Jack and game. If a bidder fails to make his points he is set back that number. A revoke is punished by the offender being set back the number of points bid and forfeiting a red counter to the pool.

AUCTIONS and AUCTIONEERS. An auction (Lat. audio, increase) is a proceeding at which people are invited to compete for the purchase of property by successive offers of advancing sums. The advantages of conducting a sale in this way are ob- vious, and we naturally find that auctions are of great antiquity. Herodotus describes a custom which prevailed in Babylonian villages of disposing of the maidens in marriage by delivering them to the highest bidders in an assembly annually held for the purpose (Book i. 196). So also among the Romans the quaestor sold military booty and captives in war by auction — • sub hasta — the spear being the symbol of quiritarian ownership. The familiarity of such proceedings is forcibly suggested by the conduct of the Praetorian Guard when Sulpicianus was treating for the imperial dignity after the murder of Pertinax. Appre- hending that they would not obtain a sufficient price by private contract, the Praetorians proclaimed from their ramparts that the Roman world was to be disposed of by public auction to the best bidder. Thereupon Julian proceeded to the foot of the ramparts and outbid his competitor (Gibbon, vol. i. ch. v.). Though, however, auctions were undoubtedly common among the Romans both in public and private transactions, the rules whereby they were governed are by no means clearly enunciated in the Corpus Juris Civilis.

In England the method of conducting auctions has varied. In some places it has been usual to set up an inch of lighted candle, the person making the last bid before the fall of the wick becoming the purchaser. By an act of William III. (1698), this method of sale was prescribed for goods and merchandise imported from the East Indies. Lord Eldon speaks of " candle-stick biddings," where the several bidders did not know what the others had offered. A " dumb bidding " was the name given to a proceeding at which a price was put by the owner under a candlestick with a stipulation that no bidding should avail if not equal to it. In a " Dutch auction " property is offered at a certain price and then successively at lower prices until one is accepted.

According to the practice now usual in England, a proposed auction is duly advertised, and a printed catalogue in the case of chattels, or particulars of sale in the case of land, together with conditions of sale, are circulated. Sometimes, in sales of goods, the conditions are merely suspended in the auction room. At the appointed time and place, the auctioneer, standing in a desk or rostrum, " puts up " the several lots in turn by inviting biddings from the company present. He announces the accept- ance of the last bid by a tap with his hammer and so "knocks down " the lot to the person who has made it. Sometimes property is offered on lease to the highest bidder. " Roup " is the Scottish term for an auction. A bid in itself is only an offer, and may accordingly be retracted at any time before its acceptance by the fall of the hammer or otherwise. Puffing is unlawful. Unless a right to bid is expressly reserved on behalf of the vendor, he must neither bid himself nor employ any one i

else to bid. When a right to bid has been expressly reserved, the seller or any one person (but no more) on his behalf may bid at the auction. If it is simply announced that the sale is to be subject to a reserved or upset price, no bidding by or on behalf of the seller is permissible: it is only lawful to declare by some appropriate terms that the property is withdrawn. Where a sale is expressed to be without reserve, or where an upset price has been reached, the auctioneer must, after the lapse of a reasonable interval, accept the bid of the highest bona fide bidder. By not doing so he would render the vendor liable in damages. The auctioneer must not make a pretence of receiving bids which are not in fact made, as it would be fraudulent to run up the price by such an artifice. A " knock-out " is a combination of persons to prevent competition between them- selves at an auction by an arrangement that only one of their number shall bid, and that anything obtained by him shall be afterwards disposed of privately among themselves. Such a combination is not illegal. A " mock auction " is a proceeding at which persons conspire by artifice to make it appear, contrary to the fact, that a bona fide sale is being conducted, and so

attempt to induce the public to purchase articles at prices far above their value. Those who invite the public to enter the room where the supposed auction is proceeding, or otherwise endeavour to attract bidders, are called " barkers." A conspiracy to defraud in this way is an indictable offence.

American law is in general the same as the English law with regard to auctions. As to bidding by the vendor, however, it is less stringent. For, though puffing or by-bidding, as it is often called, will, under both systems alike, render an auction sale voidable at the option of a purchaser when it amounts to fraud, the weight of authority in the United States is in favour of the view that an owner may, without notice, employ a person to bid for him, if he does so with no other purpose than to prevent a sacrifice of the property under a given price.

By a charter of Henry VII., confirmed by Charles I., the business of selling by auction was confined to an officer called an outroper, and all other persons were prohibited from selling goods or merchandise by public claim or outcry (see Henry Blackstone's Reports, vol. ii. p. 557). The only qualification now required by an auctioneer is a licence on which a duty of £10 has to be paid, and which must be renewed before the 5th of July in each year. A liability to a penalty of £100 is incurred by acting as an auctioneer without being duly licensed. The duty formerly imposed upon the purchase-money payable by virtue of a sale at auction was abolished by an act of 1845. An auctioneer is bound under a penalty of £20 to see that his full name and address are displayed before the commencement of an auction and during its continuance in the place where he conducts it. He is the agent of the vendor only, except in so far that, after he has knocked down a lot to the highest bidder, he has authority to affix the name of the latter to a memorandum of the transaction, so as to render the contract of sale enforceable where written evidence is necessary. An auctioneer does not, by merely announcing that a sale of certain articles will take place, render himself liable to those who, in consequence, attend at the time and place advertised, if the sale is not in fact pro- ceeded with, provided he acts in good faith. One of the chief risks run by an auctioneer is that of being held liable for the conversion of goods which he has sold upon the instructions of a person whom he believed to be the owner, but who in fact had no right to dispose of them.

The number of auctioneers' licences issued during the year ended the 31st of March 1908 was in England 6639, in Scotland 760, and in Ireland 839. A central organization having its headquarters in London, the Auctioneers' Institute of the United Kingdom, was founded in 1886, in order to elevate the status and further the interests of auctioneers, estate agents and valuers. It has nearly 2000 members. (H. Ha.)

AUCUBA, the Japanese name for a small genus of the Dogwood order (Cornaceae). The familiar Japanese laurel of gardens and shrubberies is Aucuba japonica. It bears male and female flowers on distinct plants; the red berries often last till the

next season's flowers appear. There are numerous varieties in cultivation , differing in the variegation of their leaves.

AUDAEUS, or Audius, a church reformer of the 4th century, by birth a Mesopotamian. He suffered much persecution from the Syrian clergy for his fearless censure of their irregular lives, and was expelled from the church, thereupon establishing an episcopal monastic community. He was afterwards banished into Scythia, where he worked successfully among the Goths, not living to see the destruction of his labours by Athanaric. The Audaeans celebrated the feast of Easter on the same day as the Jewish Passover, and they were also charged with attributing to the Deity a human shape, an opinion which they appear to have founded on Genesis i. 26. Theodoret groundlessly accuses them of Manichean tendencies.

The main source of information is Epiphanius {Haer. 70) .

AUDE, a river of south-western France, rising in the eastern Pyrenees and flowing into the Golfe du Lion. Rising in a small lake a short distance east of the Puy de Carlitte, it soon takes a northerly direction and flows for many miles through deep gorges of great beauty as far as the plain of Axat. Beyond Axat its course again lies through defiles which become less profound as the river nears Carcassonne. Below that town it receives the waters of the Fresquel and turns abruptly east. From this point to its junction with the Cesse its course is parallel with that of the Canal du Midi. The river skirts the northern spurs of the Corbieres, some distance below which it is joined by the Orbieu and the Cesse. It then divides into two branches, the northernmost of which, the Aude proper, runs east and empties into the Mediterranean some 12 m. east-north-east of Narbonne, while the other branch, the Canal de la Robine, turning south, traverses that town, below which its course to the sea lies between two extensive lagoons, the Etang de Bages et de Sigean and the Etang de Gruissan. The Aude has a length of 140 m. and a basin 2061 sq. m. in extent. There is practically no traffic upon it.

AUDE, a maritime department of southern France, formed in 1790 from part of the old province of Languedoc. Area, 2448 sq. m. Pop. (1906)

308,327. It is bounded E. by the Mediterranean, N. by the departments of Herault and Tarn, N.W. by Haute-Garonne, W. by Ariege, and S. by Pyrenees- Orientales. The department is traversed on its western boundary from S. to N. by a mountain range of medium height, which unites the Pyrenees with the southern Cevennes; and its northern frontier is occupied by the Montagne Noire, the most westerly portion of the Cevennes. The Corbieres, a branch of the Pyrenees, run in a south-west and north-east direction along the southern district. The Aude (q.v.), its principal river, has almost its entire length in the department, and its lower course, together with its tributary the Fresquel, forms the dividing line between the Montagne Noire and the Pyrenean system.

The lowness of the coast causes a, series of large lagoons, the chief of which are those of Bages et Sigean, Gruissan, Lapalme and Leucate. The climate is warm and dry, but often sudden in its alterations. The wind from the north-west, known as the cers, blows with great violence, and the sea-breeze is often laden with pestilential effluvia from the lagoons. The agriculture of the department is in a flourishing condition. The meadows are extensive and well watered, and are pastured by numerous flocks and herds. The grain produce, consisting mainly of wheat, oats, rye and Indian corn, exceeds the consumption, and the vineyards yield an abundant supply of both white and red wines, those of Limoux and the Narbonnais being most highly esteemed. Truffles are abundant. The olive and chestnut are the chief fruits. Mines of iron, manganese, and especially of mispickel, are worked, and there are stone-quarries and productive salt- marshes. Brewing, distilling, cooperage, iron-founding, hat- making and machine construction are carried on, and there are flour-mills, brick-works, saw-mills, sulphur refineries and leather and paper works. The formerly flourishing textile industries are now of small importance. The department imports coal, lime, stone, salt, raw sulphur, skins and timber

and exports agricultural and mineral products, bricks and tiles, and other manufactured goods. It is served by the Southern railway. The Canal du Midi, following the courses of the Fresquel and the Aude, traverses it for 76 m.; and a branch, the Canal de la Robine, which passes through Narbonne to the sea, has a length of 24 m. The capital is Carcassonne, and the department is divided into the four arrondissements of Carcas- sonne, Limoux, Narbonne and Castelnaudary, with 31 cantons and 439 communes. It belongs to the 16th military region, and to the academie (educational division) of Montpellier, where also is its court of appeal. It forms the diocese of Carcas- sonne, and part of the province of the archbishop of Toulouse. Carcassonne, Narbonne and Castelnaudary are the principal towns. At Alet, which has hot springs of some note, there are ruins of a fine Romanesque cathedral destroyed in the religious wars of the 16th century. The extensive buildings of the Cistercian abbey of Fontfroide,

near Bizanet, include a Romanesque church, a cloister, dormitories and a refectory of the 12th century. A curious polygonal church of the nth century at Rieux-Minervois, the abbey-church at St Papoul, with its graceful cloister' of the 14th century, and the remains of the important abbey of St Hilaire, founded in the 6th century and rebuilt from the 12th to the 15th century, are also of antiquarian interest. Rennes-les-Bains has mineral springs of repute.

AUDEBERT, JEAN BAPTISTE (1759-1800), French artist and naturalist, was born at Rochefort in 1759. He studied painting and drawing at Paris, and gained considerable reputa- tion as a miniature-painter. Employed in preparing plates for the Histoire des coleopteres of G. A. Olivier (1756-1814), he acquired a taste for natural history. In 1800 appeared his first original work,!,' 'Histoire naturelle des singes, des makis et des gaUopitheques, illustrated by sixty-two folio plates, drawn and engraved by himself. The colouring in these plates was unusually beautiful, and was applied by a method devised by himself. Audebert died in Paris in 1800, leaving complete materials for another great work, Histoire des colibris, des oiseaux-mouches , desjacamars etdes promirops, which was published in 1802. Two hundred copies were printed in folio, one hundred in large quarto, and fifteen were printed with the whole text in letters of gold. Another work, left unfinished, was also published after the author's death, L'Histoire des grimpereaux et des oiseaux de paradis. The last two works also appeared together in two volumes, Oiseaux doris ou a reflets metalliques (1802).

AUDEFROI LE BATARD, French Irouvere, flourished at the end of the 1 2 th century and was born at Arras. Of his life nothing is known. The seigneur de Nesles, to whom some of his songs are addressed, is probably the chatelain of Bruges who joined the crusade of 1200. Audefroi was the author of at least five lyric romances: Argentine, Belle Idoine, Belle Isabeau, Belle Emmelos and Beatrix. These romances follow older chansons in subject, but the smoothness of the verse and beauty of detail hardly compensate for the spontaneity of the shorter form.

See A. Jeanroy, Les Origines de la poesie lyrique en France ail moyen Age (Paris, 1889).

AUDIENCE (from Lat. audire, to hear), the act or state of hearing, the term being therefore transferred to those who hear or listen, as in a theatre, at a concert or meeting. In a more technical sense, the term is applied to the right of access to the sovereign enjoyed by the peers of the realm individually and by the House of Commons collectively. More particularly it means the ceremony of the admission of ambassadors, envoys or others to an interview with a sovereign or an important official for the purpose of

presenting their credentials. In France, audience is the term applied to the sitting of a law court for hearing actions. In Spain, audiencia is the name given to certain tribunals which try appeals from minor courts. The Spanish judges were originally known as oidores, hearers, from the Spanish oir, to hear; but they are now called ministros, or magis- trados togados, robed judges, as the gown of the Spanish judge is called a toga. The audiencia pretorial, i. e. of the praetor, was a court in Spanish America from which there was no appeal

to the viceroy, but only to the council of the Indies in Spain. It is not the custom in Spain to speak of audiencias reales, royal courts, but of the audiencias del Reino, courts of the kingdom.

In England the Audience-court was an ecclesiastical court, held by the archbishops of Canterbury and York, in which they once exercised a considerable part of their jurisdiction, dealing with such matters as they thought fit to reserve for their own hearing. It has been long disused and is now merged in the court of arches.

AUDIFFRET-PASQUIER, EDME ARMAND GASTON, Due d' (1823-1905), French statesman, was the grand-nephew and adopted son of Baron Etienne Denis Pasquier. He was created duke in 1844, and became auditor at the council of state in 1846. After the revolution of 1848 he retired to private life. Under the empire he was twice an unsuccessful candidate for the legislature, but was elected in February 187 1 to the National Assembly, and became president of the right centre in 1873. After the fall of Thiers, he directed the negotiations between the different royalist parties to establish a king in France, but as he refused to give up the tricolour for the flag of the old rSgime, the project failed. Yet he retained the confidence of the chamber, and was its president in 1875 when the constitutional laws were being drawn up. Nominated senator under the new constitution, he likewise was president of the senate from March 1876 to 1879 when his party lost the majority. Henceforth he was less prominent in politics. He was distinguished by his moderation and uprightness; and he did his best to dissuade MacMahon from taking violent advisers. In 1878 he was elected to the French Academy, but never published anything.

AUDIT and AUDITOR. An audit is the examination of the accounts kept by the financial officers of a state, public corpora- tions and bodies, or private persons, and the certifying of their accuracy. In the United Kingdom

the public accounts were audited from very early times, though, until the reign of Queen Elizabeth, in no very systematic way. Prior to 1559 this duty was carried out, sometimes by auditors specially appointed, at other times by the auditors of the land revenue, or by the auditor of the exchequer, an office established as early as 13 14. But in 15 59 an endeavour was made to systematize the auditing of the public accounts, by the appointment of two auditors of the imprests. These officers were paid by fee and did their work by deputy, but as the results were thoroughly unsatisfactory the offices were abolished in 1785. An audit board, consisting of five commissioners, was appointed in their place, but in order to concentrate under one authority the auditing of the accounts of the various departments, some of which had been audited separately, as the naval accounts, the Exchequer and Audit Act of 1866 was passed. This statute, which sets forth at length the duties of the audit office, empowered the sovereign to appoint a "comptroller and auditor-general," with the requisite staff to examine and verify the accounts prepared by the different departments of the public service. In examining accounts of the appropriation of the several supply grants, the comptroller and auditor-general " ascertains first whether the payments which the account department has charged to the grant are supported by vouchers or proofs of payments; and second, whether the money expended has been applied to the purpose or purposes for which such grant was intended to provide." The treasury may also submit certain other accounts to the audit of the comptroller-general. All public moneys payable to the exchequer (q.v.) are paid to the "account of His Majesty's exchequer " at the Bank of England, and daily returns of such payments are forwarded to the comptroller. Quarterly accounts of the income and charge of the consolidated fund are prepared and transmitted to him, and in case of any deficiency in the consolidated fund, he may certify to the bank to make advances.

In the United States the auditing of the Federal accounts is in the charge of the treasury department, under the supervision of the comptroller of the treasury, under whom are six auditors, (1) for the treasury department, (2) for the war, (3) for the interior, (4) for the navy, (5) for the state, &c, (6) for the post office, as well as a register and assistant register, who keep all

general receipt and expenditure ledgers; there are official auditors in most of the states and in many cities. In practically all European countries there is a department of the administration, charged with the auditing of the public accounts, as the cour des comptes in France, the Rechnungshof des deutschen Reiches in Germany, &c. All local boards, large cities, corporations, and other bodies have official auditors for the purpose of

examin- ing and checking their accounts and looking after their expenditure. So far as regards the work which auditors discharge in connexion with the accounts of joint-stock companies, building societies, friendly societies, industrial and provident societies, savings banks, &c, the word auditor is now almost synonymous with " skilled accountant," and his duties are discussed in the article Accountants.

In Scotland there is an " auditor " who is an official of the court of session, appointed to tax costs in litigation, and who corresponds to the English taxing-master. In France there are legal officers, called auditors, attached to the Conseil d'Etat, whose duties consist in drawing up briefs and preparing docu- ments. On the continent of Europe, lawyers skilled in military law are called " auditors " (see Military Law).

Auditor is also the designation of certain officials of the Roman curia. The auditores Rotae are the judges of the court of the Rota (so called, according to Hinschius, probably from the form of the panelling in the room where they originally met) . These were originally ecclesiastics appointed to hear particular questions in dispute and report to the pope, who retained the decision in his own hands. In the Speculum juris of Durandus (published in 1272 and re-edited in 1287 and 1291) the auditores palatii domini papae are cited as permanent officials appointed to instruct the pope on questions as they arose. The court of the Rota appears for the first time under this name in. the bull Romani Pontificis of Martin V. in 1422, and the auditores by this time had developed into a permanent 'tribunal to which the definitive decision of certain disputes, hitherto relegated to a commission of cardinals or to the pope himself, was assigned. From this time the powers of the auditores increased until the reform of the curia by Sixtus V., when the creation of the congregations of cardinals for specific purposes tended gradually to withdraw from the Rota its most important functions. It still, however, ranks as the supreme court of justice in the papal curia, and, as members of it, the auditores enjoy special privileges. They are prelates, and, besides the rights enjoyed by these, have others conceded by successive popes, e.g. that of holding benefices in plurality, of non-residence, &c. When the pope says mass pontifically the subdeacon is always an auditor. The auditores must be in priest's or deacon's orders, and have always been selected — nominally at least — after severe tests as to their moral and intellectual qualifications. They are twelve in number, and, by the constitution of Pius IV., four of them were to be foreigners; one French, one Spanish, one German and one Venetian; while the nomination of others was the privilege of certain, cities. No bishop, unless in partibus (see Bishop), may be an auditor-. On the other hand, from the auditores, as the intellectual elite of the curia, the episcopate, the nunciature and the cardinalate are largely recruited. The auditor camerae (uditore Sfffiftt}// umd ffflei'enda camera apostolica) is

an official formerly charged with important executive functions. In 1485, by a bull of Innocent VIII., he was given extensive jurisdiction over all civil and criminal causes arising in the curia, or appealed to it from the papal territories. In addition he received the function of watching over the execution of all sentences passed by the curia. This was extended later, by Pius IV., to a similar execu- tive function in respect of all papal bulls and briefs, wherever no special executor was named This right was confirmed by Gregory XVI. in 1834, and the auditor may still in principle issue letters monitory. In practice, however, this function was at all times but rarely exercised, and, since 1847, has fallen to a prelate locum tenens, who also took over the auditor's jurisdiction in the papal states (Hinschius, Kathol. Kirchenrecht,. 409, &c).

Auditores (listeners), in the early Church, was another name . for catechumens (q.v.).

AUDLEY, or Audeley, SIR JAMES (c. 1316-1386), one of the original knights, or founders, of the order of the Garter, was the eldest son of Sir James Audley of Stratton Audley in Oxford- shire. When the order of the Garter was founded, he was instituted as one of the first founders, and his stall in St George's chapel, Windsor, was the eleventh on the side of Edward, the Black Prince. He appears to have served in France in 1346, and in August 1350 took part in the naval fight off Sluys. When hostilities were renewed between England and France in 1354 Sir James was in constant attendance upon the Black Prince, and earned a great reputation for valour. At the battle of Poitiers on the 19th of September 1356 he took his stand in front of the English army, and after fighting for a long time was severely wounded and carried from the fight. After the victory, the prince inquired for Sir James, who was brought to the royal tent, where Edward told him he had been the bravest knight on his side, and granted him an annuity of five hundred marks. Sir James made over this gift to the four esquires who had attended him during the battle, and received from the prince a further pension of six hundred marks. In 1359 he was one of the leaders of an expedition into France, in 1360 he took the fortress of Chaven in Brittany, and was present at Calais when peace was made between England and France in October 1360. He was afterwards governor of Aquitaine and great seneschal of Poitou, and took part in the capture of the town of La Roche- sur-Yon by Edmund, earl of Cambridge. He died in 1386 at Fontenay-le-Comte, where he had gone to reside, and was buried

at Poitiers.

See Jean Froissart, Chroniques, translated by T. Johnes (Hafod, 1810) ; G. F. Beltz, Memorials of the Most Noble Order of the Garter (London, 1841).

AUDLEY, THOMAS AUDLEY, Baron (c. 1488-1544), lord chancellor of England, whose parentage is unknown, is believed to have studied at Buckingham College, Cambridge. He was educated for the law, entered the Middle Temple (becoming autumn reader in 1526), was town clerk of Colchester, and was on the commission of the peace for Essex in 152 1. In 1523 he was returned to parliament for Essex, and represented this constituency in subsequent parliaments. In 1527 he was groom of the chamber, and became a member of Wolsey's household. On the fall of the latter in 1529, he was made chancellor of the duchy of Lancaster, and the same year speaker of the House of Commons, presiding over the famous assembly styled the Black or Long Parliament of the Reformation, which abolished the papal jurisdiction. The same year he headed a deputation of the Commons to the king to complain of Bishop Fisher's speech against their proceedings. He interpreted the king's " moral " scruples to parliament concerning his marriage with Catherine,

f and made himself the instrument of the king in the attack upon the clergy and the preparation of the act of supremacy. In 1 53 1 he had been made a serjeant-at-law and king's Serjeant; and on the 20th of May 1532 he was knighted, and succeeded Sir Thomas More as lord keeper of the great seal, being appointed lord chancellor on the 26th of January 1533. He supported the king's divorce from Catherine and the marriage with Anne Boleyn; and presided at the trial of Fisher and More in 1535, at which his conduct and evident intention to secure a conviction has been generally censured. Next year he tried Anne Boleyn and her lovers, was present on the scaffold at the unfortunate queen's execution, and recommended to parliament the new act of succession. In 1537 he condemned to death as traitors the Lincolnshire and the Yorkshire rebels. On the 29th of November 1538 he was created Baron Audley of Walden; and soon after- wards presided as lord steward at the trials of Henry Pole, Lord Montacute, and of the unfortunate marquess of Exeter. In 1539, though inclining himself to the Reformation, he made himself the king's instrument in enforcing religious conformity, and in the passing of the Six Articles Act. On the 24th of April 1 540 he was made a knight of the Garter, and subsequently managed the attainder of Thomas Cromwell, earl of Essex, and

• the dissolution of Henry's marriage with Anne of Cleves. In 1542 he warmly supported the privileges of the Commons in the

case of George Ferrers, member for Plymouth, arrested and imprisoned in London, but his conduct was inspired as usual by subservience to the court, which desired to secure a subsidy, and his opinion that the arrest was a flagrant contempt has been questioned by good authority. He resigned the great seal on the 21st of April 1544, and died on the 30th, being buried at Saffron Walden, where he had prepared for himself a splendid tomb. He received several grants of monastic estates, including the priory of Christ Church in London and the abbey of Walden in Essex, where his grandson, Thomas Howard, earl of Suffolk, built Audley End, doubtless named after him. In 1542 he re-endowed and re-established Buckingham College, Cambridge, under the new name of St Mary Magdalene, and ordained in the statutes that his heirs, " the possessors of the late monastery of Walden," should be visitors of the college in perpetuum. A Book of Orders for the Warre both by Sea and Land (Harleian MS. 297, f. 144) is attributed to his authorship. He married (1) Christina, daughter of Sir Thomas Barnardiston, and (2) Elizabeth, daughter of Thomas Grey, marquess of Dorset, by whom he had two daughters. His barony became extinct at his death.

AUDOUIN, JEAN VICTOR (1797-1841), French naturalist, was born at Paris on the 27th of April 1797. He began the study of law, but was diverted from it by his strong predilection for natural history, and entered the medical profession. In 1824 he was appointed assistant to P. A. Latreille (1762-1833) in the entomological chair at the Paris museum of natural history, and succeeded him in 1833. In 1838 he became a member of the Academy of Sciences. He died in Paris on the 9th of November 1 84 1. His principal work, Histoire des insectes nuisibles & la ■eigne (1842), was completed after his death by Henry Milne- Edwards and Emile Blanchard. His papers mostly appeared in the Annates des sciences naturelles, which, with A. T. Brongniart and J. B. A. Dumas, he founded in 1824, and in the proceedings of the Societe Entomologique de France, of which he was one of the founders in 1832.

AUDRAN, the name of a family of French artists and en- gravers. The first who devoted himself to the art of engraving was Claude Audran, born 1597, and the last was Benoit, Claude's great-grandson, who died in 1772. The two most distinguished members of the family are Gerard and Jean.

Gerard, or Girard, Audran, the most celebrated French engraver, was the third son of Claude Audran, and was born at Lyons in 1640. He was taught the first principles of design and engraving by his father; and, following the example of his brother, went to Paris to perfect himself in his art. He there, in 1666, engraved for Le Brun " Constantine's Battle with Maxentius," his " Triumph," and the " Stoning of Stephen," which gave great satisfaction to the painter, and placed Audran in the very first rank

of engravers at Paris. Next year he set out for Rome, where he resided three years, and engraved several fine plates. That great patron of the arts, J. B. Colbert, was so struck with the beauty of Audran's works, that he persuaded Louis XIV. to recall him to Paris. On his return he applied himself assiduously to engraving, and was appointed engraver to the king, from whom he received great encourage- ment. In the year 1681 he was admitted to the council of this Royal Academy. He died at Paris in 1703. His engravings of Le Brun's " Battles of Alexander " are regarded as the best of his numerous works. " He was," says the Abbe Fontenay, " the most celebrated engraver that ever existed in the historical line. We have several subjects, which he engraved from his own designs, that manifested as much taste as character and facility. But in the ' Battles of Alexander ' he surpassed even the expectations of Le Brun himself." Gerard published in 1683 a work entitled Les Proportions du corps humain mesuries sur les plus belles figures de I'antiquite.

Jean Audran, nephew of Gerard, was born at Lyons in 1667. After having received instructions from his father, he went to Paris to perfect himself in the art of engraving under his uncle, next to whom he was the most distinguished member of his family. At the age of twenty his genius began to display itself in a surprising manner; and his subsequent success was such, that

in 1707 he obtained the title of engraver to the king, Louis XIV., who allowed him a pension, with apartments in the Gobelins; and the following year he was made a member of the Royal Academy. He was eighty years of age before he quitted the graver, and nearly ninety when he died. The best prints of this artist are those which appear not so pleasing to the eye at first sight. In these the etching constitutes a great part; and he has finished them in a bold, rough style. The " Rape of the Sabines," after Poussin, is considered his masterpiece.

AUDRAN, EDMOND (1842-1901), French musical composer, was born at Lyons on the 1 ith of April 1842. He studied music at the Ecole Niedermeyer, where he won the prize for composition in 1859. Two years later he accepted the post of organist of the church of St Joseph at Marseilles. He made his first appear- ance as a dramatic composer at Marseilles with L'Ours et le Pacha (1862), a musical version of one of Scribe's vaudevilles. This was followed by La Chercheuse d'Esprit (1864), a comic opera, also produced at Marseilles. Audran wrote a funeral march on the death of Meyerbeer, which was performed with some success, and

made various attempts to win fame as a writer of sacred music. He produced a mass (Marseilles, 1873), an oratorio, La Sulamite (Marseilles, 1876), and numerous minor works, but he is known almost entirely as a composer of the lighter forms of opera. His first Parisian success was made with Les Noces d'Olivette (1879), a work which speedily found its way to London and (as Olivette) ran for more than a year at the Strand theatre (1880-1881). Audran's music has, in fact, met with as much favour in England as in France, and all save a few of his works have been given in a more or less adapted form in London theatres. Besides those already mentioned, the following have been the most undeniably successful of Audran's many comic operas: Le Grand Mogol (Marseilles, 1876; Paris, 1884; London, as The Grand Mogul, 1884), La Mascotte (Paris, 1880; London, as The Mascotte, 1881), Gillette de Narbonne (Paris, 1882; London, as Gillette, 1883), La Cigale et la Fourmi (Paris, 1886; London, as La Cigale, 1890), Miss Hilyett (Paris, 1890; London, as Miss Decima i89i),La Poupte (Paris, 1896; London, 1897). Audran was one of the best of the successors of Offenbach. He had little of Offenbach's humour, but his music is distinguished by an elegance and a refinement of manner which lift it above the level of opera bouffe to the confines of genuine op6ra comique. He was a fertile if not a very original melodist, and his orchestration is full of variety, without being obtrusive or vulgar. Many of his operas, La Mascotte in particular, reveal a degree of musicianship which is rarely associated with the ephemeral productions of the lighter stage. He died in Paris on the 16th of August 1901.

AUDREHEM, ARNOUL D (c. 1305-1370), French soldier, was born at Audrehem, in the present department of Pas de Calais, near St Omer. Nothing is known of his career before 1332, when he is heard of at the court of the king of France. Between 1335 and 1342 he went three times to Scotland to aid King David Bruce in his wars. In 1342 he became captain for the king of France in Brittany; then he seems to have served in the household of the duke of Normandy, and in 1346, as one of the main defenders of Calais, was taken as a prisoner to England by Edward III. From 1349 he holds an important place in the military history of France, first as captain in Angouleme, and from June 1351, in succession to the lord of Beaujeu, as marshal of France. In March 1352 he was appointed lieutenant for the king in the territory between the Loire and the Dordogne, in June 1353 in Normandy, and in 1355 in Artois, Picardy and the Boulonnais. It was Audrehem who arrested Charles the Bad, king of Navarre, and his partisans, at the banquet given by the dauphin at Rouen in 1356. At Poitiers he was one of those who advised King John to attack the English, and, charging in the front line of the French army, was slightly wounded and taken prisoner. From England he was several times given safe-conducts to France, and he took an active part in the negotiations for*

the treaty of Bretigny, recovering his liberty the same time as King John. In 1361, as the king's lieutenant in Languedoc, he prevented the free companies from seizing the castles, and

negotiated the treaty with their chiefs under which they followed Henry, count of Trastamara (later Henry II. of Castile), into Spain. In 1365 he himself joined du Guesclin in the expedition to Spain, was taken prisoner with him by the Black Prince at the battle of Najera (1367), and was unable to pay his ransom until 1369. In 1368, on account of his age, he was relieved of the office of marshal, being appointed bearer of the oriflamme, with a pension of 2000 livres. He was sent to Spain in 1370 by Charles V., to urge his friend du Guesclin to return to France, and in spite of his age he took part in the battle of Pontvallain (December 1370), but fell ill and died, probably at Saumur, in the latter part of December 1370.

See £mile Molinier, " Etude sur la vie d'Arnoul d'Audrehem, marechal de France," in Menioires presentes par divers savants d, Vacademie des inscriptions et belles-lettres, 2 serie, iv. (1883).

AUDUBON, JOHN JAMES (1780-1851), American naturalist, is said to have been born on the 5th of May 1780 in Louisiana, his father being a French naval officer and his mother a Spanish Creole. He was educated in Paris, where he had lessons from the painter, J. L. David. Returning to America in 1798 he settled on a farm near Philadelphia, and gave himself up to the, study of natural history, and especially to drawing birds. In 1826 he went to England in the hope of getting his drawings published, and by the following year he had obtained sufficient subscribers to enable him to begin the publication of his Birds of America, which on its completion in 1838 consisted of 435 coloured plates, containing 1055 figures of birds the size of life. Cuvier called it " le plus magnifique monument que l'art ait encore elev6 a. la nature." The descriptive matter to accompany the plates appeared at Edinburgh in 5 vols, from 1831 to 1839 under the title of American Ornithological Biography. During the publication of these works Audubon divided his time between Great Britain and America, devoting his leisure to expeditions to various parts of the United States and Canada for the purpose of collecting new material. In 1842 he bought an estate on the Hudson, now Audubon Park in New York City. In 1844 he pub- lished in America a popular octavo edition of his Birds of A merica. He also took up the preparation of a new work, The Quadrupeds of America, with the collaboration of John Bachman, the publica- tion of which was begun in New York in 1846 and finished in 1853-1854. He died at New York on the 27th of January 1851.

See Ornithology; also Audubon and his Journals (1897), by his grand-daughter Maria R. Audubon, with notes by Elliot Coues.

AUE, a town of Germany, in the kingdom of Saxony, at the confluence of the Mulde and Schwarzwasser, 21 m. S.W. from Chemnitz on the railway to Adorf. It has a school of lace- making, foundries, and manufactures of machinery, tin-plate and cotton goods. Pop. (1905) 17,102.

AUERBACH, BERTHOLD (181 2-1882), German novelist, was born on the 28th of February 1812 at Nordstetten in the Wiirttemberg Black Forest. His parents were Jews, and he was intended for the ministry; but after studying philosophy at Tubingen, Munich and Heidelberg, and becoming estranged from Jewish orthodoxy by the study of Spinoza, he devoted himself to literature. He made a fortunate beginning in a romance on the life of Spinoza (1837), so interesting in itself, and so close in its adherence to fact, that it may be read with equal advantage as a novel or as a biography. Dichter und Kaufmann followed in 1839, and a translation of Spinoza's works in 1841, when Auerbach turned to the class of fiction which has made him famous, the Schwarzwalder Dorfgeschichten (1843), stories of peasant life in the Black Forest. In these, as well as in Barfilssele (1856), Edelweiss (1861), and other novels of greater compass, he depicts the life of the south German peasant as " Jeremias Gotthelf " (Albrecht Bitzius) had painted the peasantry of Switzerland, but in a less realistic spirit. When this vein was exhausted Auerbach returned to his first phase as a philosophical novelist, producing Auf der Hohe (1865), Das Landhaus am Rhein (1869), and other romances of profound speculative tendencies, turning on plots invented by himself. With the exception of Auf der Hohe, these works did not enjoy much popularity, and suffer from lack of form and concentration.

Auerbach's fame continues to rest upon his Dorfgeschichten, although the celebrity of even these has been impaired by the growing demand for a more uncompromising realism. Auerbach died at Cannes on the 8th of February 1882.

The first collected edition of Auerbach's Schriften appeared in 22 vols, in 1863-1864; the best edition is in 18 vols. (1892-1895). Auerbach's Briefe an seinen Freund J. Auerbach (with a preface by F. Spielhagen) were published in 2 vols. (1884). See E. Zabel, B. Auerbach (1882); and E. Lasker, B. Auerbach, ein Gedenkblatt

(1882).

AUERSPERG, ANTON ALEXANDER, Graf von (1806-1876), Austrian

poet, who wrote under the pseudonym of Anastasitjs Grun, was born on the 1 ith of April 1806, at Laibach, the capital of the Austrian duchy of Carniola, and was head of the Thurn-am- Hart branch of the Carniolan cadet line of the house of Auersperg. He received his university education first at Graz and then at Vienna, where he studied jurisprudence. In 1830 he succeeded to his ancestral property, and in 1832 appeared as a member of the estates of Carniola on the Herrenbank of the diet at Laibach. Here he distinguished himself by his outspoken criticism of the Austrian government, leading the opposition of the duchy to the exactions of the central power. In 1832 the title of " imperial chamberlain " was conferred upon him s and in 1839 he married Maria, daughter of Count Attems. After the revolution of 1848 at Vienna he represented the district of Laibach at the German national assembly at Frankfort-on-the- Main, to which he tried in vain to persuade his Slovene com- patriots to send representatives. After a few months, however, disgusted with the violent development of the revolution, he resigned his seat, and again retired into private life. In i860 he was summoned to the remodelled Reichsrat by the emperor, who next year nominated him a life member of the Austrian upper house (Herrenhaus), where, while remaining a keen up- holder of the German centralized empire, as against the federalism of Slavs and Magyars, he greatly distinguished himself as one of the most intrepid and influential supporters of the cause of liberalism, in both political and religious matters, until his death at Graz on the 12th of September 1876.

Count Auersperg's first publication, a collection of lyrics, Blatter der Liebe (1830), showed little originality; but his second production, Der letzte Ritter (1830), brought his genius to light. It celebrates the deeds and adventures of the emperor Maxi- milian I. (1493-1519) in a cycle of poems written in the strophic form of the Nibelungenlied. But Auersperg's fame rests almost exclusively on his political poetry; two collections entitled Spaziergdnge eines Wiener Poeten (1831) and' Schutt (1835) created a sensation in Germany by their originality and bold liberalism. These two books, which are remarkable not merely for their outspoken opinions, but also for their easy versification and powerful imagery, were the forerunners of the German political poetry of 1840-1848. His Gedichte (1837), if anything, increased his reputation; his epics, Die Nibelungen im Frack (1843) and Der Pfaff vom Kohlenberg (1850), are characterized by a fine ironic humour. He also produced masterly translations of the popular Slovenic songs current in Carniola (Volkslieder aus Krain, 1850), and of the English poems relating to " Robin Hood " (1864).

Anastasius Griin's Gesammelte Werke were published by L. A. Frankl in 5 vols. (Berlin, 1877); his Briefwechsel mit L. A. Frankl (Berlin, 1897). A selection of his Politische Reden und Schriften has been published by S. Hock (Vienna, 1906). See P. von Radics, Anastasius Griin (2nd ed.,

Leipzig, 1879).

AUFIDENA, an ancient city of the Samnites Caraceni, the site of which is just north of the modern Alfedena, 1 Italy, a station on the railway between Sulmona and Isernia, 37 m. from the latter. Its remains are fully and accurately described by L. Mariani in Monumenti dei Lincei (1901), 225 seq. : cf. Notizie degli scam, 1901, 442 seq.; 1902, 516 seq. The ancient city occupied two hills, both over 3800 ft. above sea-level (in the valley between were found the supposed remains of the later forum), and the walls, of rough Cyclopean work, were over a mile in

1 Two churches here contain paintings of interest in the history of Abruzzese art, and one of them, the Madonna del Campo, contained fragments of a temple of considerable size.

length. A fortified outpost lay on a still higher hill to the north. Not very much is as yet known of the city itself (though one public building of the 5th century B.C. was excavated in: 1901, and a small sanctuary in 1902), attention having been chiefly devoted to the necropolis which lay below it; 1400 tombs had already been examined in 1908, though this number is con- jectured to be only a sixteenth of the whole. They are all inhumation burials, of the advanced iron age, and date from the 7th to the 4th century B.C., falling into three classes — those without coffin, those with a coffin formed of stone slabs, and those with a coffin formed of tiles. The objects discovered are preserved in a museum on the spot. In the Roman period we find Aufidena figuring as a post station on the road between Sulmo and Aesernia, which, however, runs past Castel di Sangro, crossing the river by an ancient bridge some 5 m. to the north- east. Castel di Sangro has remains of ancient walls, but these are attributed to a road by Mariani, and in any case the fortified area there was quite small, only one-sixteenth the size of Aufidena. The attempted identification of Castel di Sangro with Aufidena must therefore be 'rejected, though we must allow that it was probably the Roman post station; the ancient city, since its capture by the Romans in the 3rd century B.C., having lost something of its importance. (T. As.)

AUGEAS, or Augeias, in Greek legend, a son of Helios, the sun-god, and king of the Epeians in Elis. He possessed an im- mense wealth of herds, including twelve bulls sacred to Helios, and white as swans. Eurystheus imposed upon Heracles the task of clearing out all his stalls unaided in one day. This he did by turning the rivers Alpheus and Peneus through them. Augeas had promised him a tenth of the herd, but refused this, alleging that Heracles had acted only in the service of Eurys- theus. Heracles thereupon sent an army against him, and, though at first defeated, finally slew Augeas and his sons.

Apollodorus ii. 5, 7; Pindar, Olympia, xi, 24; Diodorus iv. 13; Theocritus, Idyll 25.

AUGER (from the O. Eng. nafu-gdr, nave-borer; the original initial n having been lost, as in " adder," through a confusion in the case of a preceding indefinite article), a tool for boring (q.v.) or drilling.

AUGEREAU, PIERRE FRANCOIS CHARLES, duke of Castiglione (1757-1816), marshal of France, was born in Paris in a humble station of life. At the age of seventeen he enlisted in the carabineers and thereafter came into note as a duellist. Having drawn his sword upon an officer who insulted him, he fled from France and roamed about in the Levant. He served in the Russian army against the Turks; but afterwards escaped into Prussia and enlisted in the guards. Tiring of this, he deserted with several others and reached the Saxon frontier. Service in the Neapolitan army and a sojourn in Portugal filled up the years 1788-1791; but the events of the French Revolution brought him back to his native land. He served with credit against the .Vendeans and then joined the troops opposing the Spaniards in the south. There he rose rapidly, becoming general of division on the 23rd of December 1793. His division distinguished itself even more when transferred to the army of Italy; and under Bonaparte he was largely instrumental in gaining the battle of Millesimo and in taking the castle of Cosseria and the camp of Ceva. At the battle of Lodi (May 10, 1796), the turning move- ment of Augereau and his division helped to decide the day. But it was at Castiglione that he rendered the most signal services. Marbot describes him as encouraging even Bonaparte himself in the confused situation that prevailed before that battle, and, though this is exaggerated, there is no doubt that Augereau largely decided the fortunes of those critical days. Bonaparte thus summed up his military qualities: " Has plenty of char- acter, courage, firmness, activity; is inured to war; is well liked hy the soldiery; is fortunate in his operations." In 1797 Bona- parte sent him to Paris to encourage the Jacobinical Directors, and it was Augereau and the troops led by him that coerced the " moderates " in the councils and carried through the coup d'etat of 18 Fructidor (4th of September) 1797. He was then sent to lead the united French forces in Germany; but peace

speedily ensued; and he bore a grudge against the Directors and Bonaparte for their treatment of him at that time. He took no part in the coup d'etat of Brumaire 1799, and did not dis- tinguish himself in the Rhenish campaign which ensued. Never- theless, owing to his final adhesion to

Bonaparte's fortunes, he received a marshal's baton at the beginning of the Empire (May 19, 1804). In the campaign of 1805 he did good service around Constance and Bregenz, and at Jena (October 14, 1806) his corps distinguished itself. Early in 1807 he fell ill of a fever, and at the battle of Eylau he had to be supported on his horse, but directed the movements of his corps with his wonted bravery. His corps was almost annihilated and the marshal himself received a wound from which he never quite recovered. When transferred to Catalonia, he gained some successes but tarnished his name by cruelty. In the campaign of 181 2 in Russia and in the Saxon campaign of 1813 his conduct was little more than mediocre. Before the battle of Leipzig (October 16, 18, 19, 1813), Napoleon reproached him with not being the Augereau of Castiglione; to which he replied, " Give me back the old soldiers of Italy, and I will show you that I am." In 1814 he had com- mand of the army of Lyons, and his slackness exposed him to the charge of having come to an understanding with the Austrian invaders. Thereafter he served Louis XVIII. , but, after reviling Napoleon, went over to him during the Hundred Days. The emperor repulsed him and charged him with being a traitor to France in 1814. Louis XVIII. , when restored to the throne, deprived him of his military title and pension. He died at his estate of La Houssaye on the 12th of June 1816. In person he was tall and commanding, but his loud and vulgar behaviour frequently betrayed the soldier of fortune.

As authorities consult: Kock's Memoires de Massena; Bouvier, Bonaparte en Italie; Count A. F. Andreossi, La Campagne sur le Mein, 1800-1801 ; Baron A. Ducasse, Precis de la campagne de Varmee de Lyon en 1814; and the Memoirs of Marbot. (J. Hl. R.)

AUGHRIM, or Aghrim, a small village in Co. Galway, Ireland, 4 m. W. by S. of Ballinasloe. It is rendered memorable by the decisive victory gained here on the 12th of July 1691 by the forces of William III. under General Ginkel, over those of James II. under the French general St Ruth, who fell in the fight. The Irish numbering 25,000, and strongly posted behind marshy ground, at first maintained a vigorous resistance; but Ginkel having penetrated their line of defence, and their general being struck down by a cannon ball at this critical moment, they were at length overcome and routed with terrible slaughter. The loss of the English did not exceed 700 killed and 1000 wounded; while the Irish, in their disastrous flight, lost about 7000 men, besides the whole material of the army. This defeat rendered the ad- herents of James in Ireland incapable of further efforts, and was speedily followed by the complete submission of the country.

AUGIER, GUILLAUME VICTOR EMILE (1820-1889), French dramatist, was born at Valence, Dr6me, on the 17th of September 1820. He was the grandson of Pigault Lebrun, and belonged to the well-to-do bourgeoisie in

principles and in thought as well as by actual birth. He received a good education and studied for the bar. In 1844 he wrote a play in two acts and in verse, La Cigue, refused at the Theatre Francais, but produced with considerable success at the Odeon. This settled his career. Thenceforward, at fairly regular intervals, either alone or in collaboration with other writers — Jules Sandeau, Eugene- Marie Labiche, fid. Foussier — he produced plays which were in their way eventful. Le Fils de Giboyer (1862) — which was regarded as an attack on the clerical party in France, and was only brought out by the direct intervention of the emperor — caused some political excitement. His last comedy, Les Four- chambault, belongs to the year 1879. After that date he wrote no more, restrained by an honourable fear of producing inferior work. The Academy had long before, on the 31st of March 1857, elected him to be one of its members. He died in his house at Croissy on the 25th of October 1889. Such, in briefest outline, is the story of a life which Augier himself describes as " without incident " — a life in all senses honourable. Augier, with Dumas fils and Sardou, may be said to have held the

French stage during the Second Empire. The man respected himself and his art, and his art on its ethical side — for he did not disdain to be a teacher — has high qualities of rectitude and self- restraint. Uprightness of mind and of heart, generous honesty, as Jules Lemaitre well said, constituted the very soul of all his dramatic work. L' Aventuriere (1848), the first of Augier's important works, already shows a deviation from romantic models; and in the Mariage d'Olympe (1855) the courtesan is shown as she is, not glorified as in Dumas's Dame aux Camillas. In Gabrielle (1849) the husband, not the lover, is the sympathetic, poetic character. In the Lionnes pauvres (1858) the wife who sells her favours comes under the lash. Greed of gold, social demoralization, ultramontanism, lust of power, these are satirized in Les Ejjrontes (1861), Le Fils de Giboyer (1862), Contagion, first announced under the title of Le Baron d'Estrigaud (1866), Lions et renards (1869) — which, with Le Gendre de M. Poirier (1854), written in collaboration with Jules Sandeau, reach the high-water mark of Augier's art; in Philiberte (1853) he pro- duced a graceful and delicate drawing-room comedy; and in Jean de Thommeray, acted in 1873 after the great reverses of 1870, the regenerating note of patriotism rings high and clear. His last two dramas, Madame Caverlet (1876) and Les Fourcham- bault (1879), are problem plays. But it would be unfair to suggest that Emile Augier was a preacher only. He was a moralist in the great sense, the sense in which the term can be applied to Moliere and the great dramatists — a moralist because of his large and sane outlook on life. Nor does the interest of his dramas depend on elaborate plot. It springs from character and its evolution. His men and women move as personality, that mysterious factor, dictates. They are real, several of them typical.

Augier's first drama, La Cigue, belongs to a time (1844) when the romantic drama was on the wane; and his almost exclusively domestic range of subject scarcely lends itself to lyric outbursts of pure poetry. But his verse, if not that of a great poet, has excellent dramatic qualities, while the prose of his prose dramas is admirable for directness, alertness, sinew and a large and effective wit. Perhaps it wanted these qualities to enlist laughter on his side in such a war as he waged against false passion and false sentiment. (F. T. M.)

AUGITE, an important member of the pyroxene (q.v.) group of rock-forming minerals. The name (from avyfj, lustre) has at various times been used in different senses; it is now applied to aluminous pyroxenes of the monoclinic series which are dark- greenish, brownish or black in colour. Like the other pyroxenes it is characterized crystallographically by its distinct cleavages parallel to the prism-faces (M), the angle between which is 87 . A typical crystal is represented in fig. 1, whilst fig. 2 shows a crystal twinned on the orthopinacoid (/). Such crystals, of short prismatic habit and black in colour, are common as pheno- crysts in many basalts, and are hence known as " basaltic augite ": when the containing rock weathers to a clayey material the augite is left as black isolated crystals, and such specimens, usually from Bohemia, are represented in all mineral collections. Though typical of basaltic rocks, augite is also an important constituent of many other kinds of igneous rocks, and a rock composed almost wholly of augite is known as augitite. It also occurs in metamorphic rocks; for example, in the crystalline limestones of the Fassathal in Tirol, where the variety known as fassaite is found as pistachio-green crystals resembling epidote in appearance.

Chemically, augite resembles diopside in consisting mainly of CaMgSi 2 6 , but it contains in addition alumina and ferric iron as (Mg, Fe") (Al, Fe"")s Si0 6 ; the acmite (NaFe"'Si 8 0«)

Fig. 1.

Fig. 2.

go2

and jadeite (NaAlSi 2 0e) molecules are also sometimes present. Variations in the amount of iron in mixtures of these isomorphous molecules are accompanied by variations in the optical characters of the augite. (L. J. S.)

AUGMENT (Lat. augere, to increase), in Sanskrit and Greek grammar the vowel prefixed to indicate the past tenses of a verb ; in Greek grammar it is

called syllabic, when only the e is pre- fixed; temporal, when it causes an initial vowel in the verb to become a diphthong or long vowel.

AUGMENTATION, or enlargement, a term in heraldry for an addition to a coat of arms; in music, for the imitation in longer notes of an original theme; in biology, an addition to the normal number of parts; in Scots law, an increase of a minister's stipend by an action called " Process of Augmentation." The " Court of Augmentation " in Henry VIII. 's time was established to try cases affecting the suppression of monasteries, and was dissolved in Mary's reign.

AUGSBURG, a city and episcopal see of Germany, in the kingdom of Bavaria, chief town of the district of Swabia. Pop. (1885) 65,905; (1000) 89,109; (1905) 93,882. It lies on a high plateau, 1500 ft. above the sea, between the rivers Wertach and Lech, which unite below the city, 39 m. W.N.W. from Munich, with which, as with Regensburg, Ingolstadt and Ulm, it is connected by main lines of railway. It consists of an upper and a lower town, the old Jakob suburb and various modern suburbs. Its fortifications were dismantled in 1703 and have since been converted into public promenades. Maximilian Street is re- markable for its breadth and architectural beauty. One of its most interesting edifices is the Fugger Haus, of which the entire front is painted in fresco. Among the public buildings of Augs- burg most worthy of notice is the town-hall in Renaissance style, one of the finest in Germany, built by Elias Holl in 1616-1620. One of its rooms, called the " Golden Hall," from the profusion of its gilding, is 113 ft. long, 59 broad and 53 high. The palace of the bishops, where the memorable Confession of Faith was presented to Charles V., is now used for government offices. Among the seventeen Reman Catholic churches and chapels, the cathedra], a basilica with two Romanesque towers, dates in its oldest portions from the 10th century. The church of St Ulrich and St Afra, built 1474-1500, is a Late Gothic edifice, with a nave of magnificent proportions and a tower 300 ft. high. The church stands on the spot where the first Christians of the district suffered martyrdom, and where a chapel was erected in the 6th century over the grave of St Afra. There are also a Protestant church, St Anne's, a school of arts, a polytechnic institution, a picture gallery in the former monastery of St Catherine, a museum, observatory, botanical gardens, an exchange, gymnasium, deaf- mute institution, orphan asylum, several remarkable fountains dating from the 16th century, &c. Augsburg is particularly well provided with special and technical schools. The newer buildings, all in the modern west quarter of the city, include law courts, a theatre, and a municipal library with .200,000 volumes. The " Fuggerei," built in 1519 by the brothers Fugger, is a miniature town, with six streets or alleys, three gates and a, church, and consists of a hundred and six small houses let to indigent Roman Catholic citizens at a nominal rent. The manufactures of Augs- burg are of great

importance. It is the chief seat of the textile industry in south Germany, and its cloth, cotton goods and linen manufactories employ about 10,000 hands. It is also noted for its bleach and dye works, its engine works, foundries, paper factories, and production of silk goods, watches, jewelry, mathe- matical instruments, leather, chemicals, &c. Augsburg is also the centre of the acetylene gas industry of Germany. Copper- engraving, for which it was formerly noted, is no longer carried on; but printing, lithography and publishing have acquired a considerable development, one of the best-known Continental newspapers being the Allgemeine Zeitung or Augsburg Gazette. On the opposite side of the river, which is here crossed by a bridge, lies the township of Lechhausen.

Augsburg (the Augusta Vindelicorum of the Romans) derives its name from the Roman emperor Augustus, who, on the conquest of Rhaetia by Drusus, established here a Roman colony

about 14 B.C. In the 5th century it was sacked by the Huns, and afterwards came under the power of the Frankish kings. It was almost entirely destroyed in the war of Charlemagne against Tassilo III., duke of Bavaria; and after the dissolution and division of that empire, it fell into the hands of the dukes of Swabia. After this it rose rapidly into importance as a manu- facturing and commercial town, becoming, after Nuremberg, the centre of the trade between Italy and the north of Europe; its merchant princes, the Fuggers and Welsers, rivalled the Medici of Florence; but the alterations produced in the currents of trade by the discoveries of the 15th and 16th centuries occa- sioned a great decline. In 1 276 it was raised to the rank of a free imperial city, which it retained, with many changes in its internal constitution, till 1806, when it was annexed to the kingdom of Bavaria. Meanwhile, it was the scene of numerous events of historical importance. It was besieged and taken by Gustavus Adolphus in 1632, and in 1635 it surrendered to the imperial forces; in 1703 it was bombarded by the electoral prince of Bavaria, and forced to pay a contribution of 400,000 dollars; and in the war of 1803 it suffered severely. Of its conventions the most memorable are those which gave birth to the Augsburg confession (1530) and to the Augsburg alliance (1686).

See Wagenseil, Geschichte der Stadt Augsburg (Augs., 1820-1822); Werner, Geschichte der Stadt Augsburg (1899); Roth, Augsburg'i Reformationsgeschichte (1902).

AUGSBURG, CONFESSION OF, the most important Protestant statement of belief drawn up at the Reformation. In summoning a diet for April 1530, Charles V. offered a fair hearing to all religious parties in the Empire. Luther, Justus Jonas, Melanch- thon and Johann Bugenhagen were appointed to draw up a statement of the Saxon position. These " Torgau

Articles " (March 1530) tell merely why Saxony had abolished certain ecclesiastical abuses. Melanchthon, however, soon found. that, owing to attacks by Johann Eck of Ingolstadt (" 404 Articles "), Saxony must state its position in doctrinal matters as well. Taking the Articles of Marburg (see Marburg, Colloquy o?) and of Schwabach as the point of departure, he repudiated all connexion with heretics condemned by the ancient church. On the nth of May he sent the draft to Luther, who approved it, adding that he himself " could not tread so softly and gently." On the 23rd of June the Confession, originally intended as the statement of Electoral Saxony alone, was discussed and signed by a number of other Protestant princes and cities, and read before the diet on the 25th of June. Articles 1-21 attempt to show that the Evangelicals had deviated from current doctrine only in order to restore the pure and original teaching of the church. In spite of significant omissions (the sole authority of scripture; rejection of transubstantiation), the Confession contains nothing contradictory to Luther's position, and in its emphasis on justification by faith alone enunciates a cardinal concept of the Evangelical churches. Articles 22-28 describe and defend the reformation of various " abuses." On the 3rd of August, shorn of much of its original bitterness, the so-called Confutatio pontificia was read; it well expresses the views approved in substance by the emperor and all the Catholic party. In answer, Melanchthon was ordered to prepare an Apology of the Confession, which the emperor refused to receive; so Melanchthon enlarged it and published the editio princeps of both Confession and Apology in 153 1.

As he felt free to make slight changes, the first edition does not represent the exact text of 1530; the edition of 1533 was further improved, while that of 1540, rearranged and in part rewritten, is known as the Variata. Dogmatic changes in this seem to have drawn forth no protest from Luther or Brenz, so Melanchthon made fresh alterations in 1542. Later, the Variata of 1540 became the creed of the Melanchthonians and even of the Crypto-calvimsts ; so the framers of the Formula of Concord, promulgated in 1580, returned to the text handed in at the Diet. By mistake they printed from a poor copy and not from the original, from which their German text varies at over 450 places. Their Latin text, that of Melanchthon s editio princeps, is more nearly accurate. The textus receptus is that of the Formula of Concord, the divergent Latin and German forms being equally binding.

Acceptance of the Confession and Apology was made a condition of membership in the Schmalkalden League. The

Wittenberg Concord (1536) and the Articles of Schmalkalden (1537) reaffirmed them. The Confession was the ultimate source of much of the Thirty-nine Articles. The Religious Peace of Augsburg (1555) recognized no Protestants save ad- herents of the Confession; this was modified in 1648. To-day the Invariata is of symbolical authority among Lutherans generally, while the Variata is accepted by the Reformed churches of certain parts of Germany (see Lober, pp. 79-83.)

Editions of the received text: J. T. Muller, Die symbolischen Bucher der evangelisch-lutherischen Kirche (10th ed., Gütersloh, 1907), with a valuable historical introduction by Th. Kolde; Theodor Kolde, Die Augsburgische Konfession (Gotha, 1896), (con- tains also the Marburg, Schwabach and Torgau Articles, the Confu- tatio and the Variata of 1540). For translations of these, as well as of Zwingli's Reckoning of his Faith, and of the Tetrapolitan Confession, see H. E. Jacobs, The Book of Concord (Philadelphia, 1882-83). The texts submitted to the emperor, lost before 1570, are reconstructed and compared with the textus receptus by P. Tschackert, Die unveranderte Augsburgische Konfession (Leipzig, 1901). For the genesis of the Confession, see Th. Kolde, Die alteste Redaktion der Augsburger Konfession (Gütersloh, 1906), also Kolde's article, " Augsburger Bekenntnis," in Herzog-Hauck, Realencyklo- pddie (3rd ed., vol. ii., Leipzig, 1897). The standard commentary is still G. L. Plitt, Einleitung in die Augustana (Erlangen, 1867 ff.) ; compare also J. Ficker, Die Konfuiation des Augsburgischen Bekennt- nisses in ihrer ersten Gestalt (Leipzig, 1891); also A. Petzold, Die Konfuiation des Vierstddtebekenntnisses (Leipzig, 1900). On its present use see G. Leber, Die im evangelischen Deutschland geltenden Ordinationsverpflichtungen geschichtlich geordnet (Leipzig, 1905), 79 ff. (W. W. R.)*

AUGSBURG, WAR OF THE LEAGUE OF, the name applied to the European war of 1688-1697. The league of Augsburg was concluded on the 9th of July 1686 by the emperor, the elector of Brandenburg and other princes, against the French. Spain, Sweden, England and other non-German states joined the league, and formed the Grand Alliance by the treaty of Vienna (July 12, 1689). (See Grand Alliance, War of the.)

AUGURS, in ancient Rome, members of a religious college whose duty it was to observe and interpret the signs (auspices) of approval or disapproval sent by the gods in reference to any proposed undertaking. The augures were originally called auspices, but, while auspex l fell into disuse and was replaced by augur, auspicium was retained as the scientific term for the observation of signs.

The early history of the college is obscure. Its institution has been attributed to Romulus or Numa. It probably consisted originally of three members, of

whom the king himself was one. This number was doubled by Tarquinius Priscus, but in 300 B.C. it was only four, two places, according to Livy (x. 6), being vacant. The Ogulnian law in the same year increased the number to nine, five plebeian being added to the four patrician members. In the time of Sulla the number was fifteen, which was increased to sixteen by Julius Caesar. This number con- tinued in imperial times; the college itself was certainly in existence as late as the 4th century. The office of augur, which was bestowed only upon persons of distinguished merit and was much sought after by reason of its political importance, was held for life. Vacancies were originally filled by co-optation, but by the Domitian law (104) the selection was made, by seventeen out of the thirty-five tribes chosen by lot, from candidates previously nominated by the college. The insignia of office were the lituus, a staff free from knots and bent at the top, and the trabea, a kind of toga with bright scarlet stripes and a purple border. The science of augury was contained in various written works, which were consulted as occasion arose: such were the libri augurum, a manual of augural ritual, and the commentarii augurum, a collection of decrees or answers given by the college to the senate in certain definite cases.

1 There is no doubt that auspex = avi-spex (" observer of birds "), but the derivation of augur is still unsettled. The following have been suggested: (1) augur (or augus) is a substantive originally meaning " increase " (related to augustus as robur to robustus), then transferred to the priest as the giver of increase or blessing; (2) = avi-gur, the second part of the word pointing to (a) garrire, " chatter," or (b) gerere, the augur being conceived as " carrying " or guiding the flight of the birds; (3) from a lost verb augo — ' tell," " declare." It is now generally agreed that the science of augury is of Italian, not Etruscan, origin.

The natural region to look to for signs of the will of Jupiter was the sky, where lightning and the flight of birds seemed directed by him as counsel to men. The latter, however, was the more difficult of interpretation, and upon it, therefore, mainly hinged the system of divination with which the augurs were occupied. It was the duty of the augur, before the auspices properly so called (those from the sky and from birds) were taken, to mark out with his staff the templum or consecrated space within which his observations were intended to be made. The method of procedure was as follows. At midnight, when the sky was clear and there was an absence of wind, the augur, in the presence of a magistrate, took up his position on a hill which afforded a wide view. After prayer and sacrifice, he marked out the templum both in the sky and on the ground and dedicated it. Within its limits he then pitched a tent, in which he sat down with covered head, asked the gods for a sign, and waited for an answer. As the augur looked south he had the east, the lucky quarter, on his left, and therefore signs on

the left side were considered favourable, those on the right unfavourable. The practice was the reverse in Greece ; the observers of signs looked towards the north, so that signs on the right were regarded as the favourable ones, and this is frequently adopted in the Roman poets. The augur afterwards announced the result of his observa- tions in a set form of words, by which the magistrate was bound. Signs of the will of the gods were of two kinds, either in answer to a request (auspicia impetrativa) , or incidental (auspicia oblativa). Of such signs there were five classes: (1) Signs in the sky (caelestia auspicia), consisting chiefly of thunder and lightning, but not excluding falling stars and other phenomena. Lightning from left to right was favourable, from right to left unfavourable; but on its mere appearance, in either direction, all business in the public assemblies was suspended for the day. Since the person charged to take the auspices for a certain day was constitutionally subject to no other authority who could test the truth or false- hood of his statement that he had observed lightning, this became a favourite device for putting off meetings of the public assembly. Restrictions were, however, imposed in later republican times. When a new consul, praetor or quaestor entered on his first day of office and prayed the gods for good omens, it was a matter of custom to report to him that lightning from the left had been seen. (2) Signs from birds (signa ex avibus), with reference to the direction of their flight, and also to their singing, or uttering other sounds. To the first class, called alites, belonged the eagle and the vulture; to the second, called oscines, the owl, the crow and the raven. The mere appearance of certain birds indicated good or ill luck, while others had a reference only to definite persons or events. In matters of ordinary life on which divine counsel was prayed for, it was usual to have recourse to this form of divination. For public affairs it was, by the time of Cicero, superseded by the fictitious observation of lightning. (3) Feeding of birds {aus- picia ex tripudiis) , which consisted in observing whether a bird— usually a fowl — on grain being thrown before it, let fall a particle from its mouth (tripudium sollistimum) . If it did so, the will of the gods was in favour of the enterprise in question. The simplicity of this ceremony recommended k for very general use, particularly in the army when on service. The fowls were kept in cages by a servant, styled pullarius. In imperial times decuriales pullarii are mentioned. (4) Signs from animals (pedestria auspicia, or ex quadrupedibus) , i.e. observation of the course of, or sounds uttered by, quadrupeds and reptiles within a fixed space, corresponding to the observations of the flight of birds, but much less frequently employed. It had gone out of use by the time of Cicero. (5) Warnings (signa ex diris), consisting of all unusual phenomena, but chiefly such as boded ill. Being accidental in their occurrence, they belonged to the auguria oblativa, and their interpretation was not a matter for the augurs, unless occurring in the course of some public transaction, in which case they formed a divine veto

against it. Otherwise, reference was made for an interpretation to the pontifices in olden times,af terwards frequently to the Sibylline books,or the Etruscan haruspices, when the incident was not already provided for by a rule, as, for example, that it was unlucky for a person leaving his

house to meet a raven, that the sudden death of a person from epilepsy at a public meeting was a sign to break up the assembly.

Among the other means of discovering the will of the gods were the casting of lots, oracles of Apollo (in the hands of the college sacris faciundis), but chiefly the examination of the entrails of animals slain for sacrifice (see Omen). Anything abnormal found there was brought under the notice of the augurs, but usually the Etruscan haruspices were employed for this. The persons entitled to ask for an expression of the divine will on a public affair were the magistrates. To the highest offices, including all persons of consular and praetorian rank, belonged the right of taking auspicia maxima; to the inferior offices of aedile and quaestor, the auspicia minora; the differences between these, however, must have been small. The subjects for which auspicia publica were always taken were the election of magistrates, their entering on office, the holding of a public assembly to pass decrees, the setting out of an army for war. They could only be taken in Rome itself; and in case of a commander having to renew his auspicia, he must either return to Rome or select a spot in the foreign country to represent the hearth of that city. The time for observing auspices was, as a rule, between midnight and dawn of the day fixed for any proposed undertaking. In military affairs this course was not always possible, as in the case of taking auspices before crossing a river. The founding of colonies, the beginning of a battle, the calling together an army, the sittings of the senate, decisions of peace or war, were occasions, not always but frequently, for taking auspices. The place where the ceremony was performed was not fixed, but selected with a view to the matter in hand. A spot being selected, the official charged to make the observation pitched his tent there some days before. A matter postponed through adverse signs from the gods could on the following or some future day be again brought forward for the auspices. If an error (vitium) occurred in the auspices, the augurs could, of their own accord or at the request of the senate, inform themselves of the circumstances, and decree upon it. A consul could refuse to accept their decree while he remained in office, but on retiring he could be prosecuted. Auspicia oblaliva referred mostly to the comitia. A magistrate was not bound to take notice of signs reported merely by a private person, but he could not overlook such a report from a brother

magistrate. For example, if a quaestor on his entry to office observed lightning and announced it to the consul, the latter must delay the public assembly for the day.

On the subject generally, see A. Bouche-Leclercq, Histoire de la divination dans Vantiquite (1879), and his articles, with bibliography, in Daremberg and Saglio's Dictionnaire des antiquites; also articles " Augures," "Auspicium," by Wissowa in Pauly's Realencyclopadie (II. pt. ii., 1896), and by L. C. Purser (and others) in Smith's Diction- ary of Greek and Roman Antiquities (3rd ed., 1890). (See also Divination, Omen, Astrology, &c.)

AUGUST (originally Sextilis), the sixth month in the pre- Julian Roman year, which received its present name from the emperor Augustus. The preceding month, Quintilis, had been called " July " after Julius Caesar, and the emperor chose August to be rechristened in his own honour because his greatest good fortune had then happened. In that month he had been admitted to the consulate, had thrice celebrated a triumph, had received the allegiance of the soldiers stationed on the Janiculum, had con- cluded the civil wars, and had subdued Egypt. As July contained thirty-one days, and August only thirty , it was thought necessary to add another day to the latter month, in order that the month of Augustus might not be in any respect inferior to that of Julius.

AUGUSTA, a city and the county-seat of Richmond county, Georgia, U.S.A., at the head of steamboat navigation on the Savannah river, 132 m. N.W. of Savannah by rail and 240 m. by river course. Pop. (1890) 33,300; (1900) 39,441, of whom 18,487 were negroes and only 995 were foreign-born; (1910 census) 41,040. Augusta is served by the Southern, the Augusta Southern (controlled by the Southern), the Atlantic Coast Line, the Charleston & Western Carolina (controlled by the Atlantic Coast Line), the Georgia and the Central of Georgia railways, by an electric line to Aiken, South Carolina, and by a line of steamers to Savannah. The city extends along the river

bank for a distance of more than 3 m., and is connected by a bridge with Hamburg, and with North Augusta, South Carolina, two residential suburbs. Augusta is well known as a winter resort (mean winter temperature, 47 F.), and there are many fine winter homes here of wealthy Northerners. There are good roads, stretching from Augusta for miles in almost every direction. In North Augusta there is a large hotel, and there is another in Summerville (pop. in 1910, 4361), 2\ m. N.W., an attractive residential suburb and winter resort, in which there are a country club and a large United States arsenal, established in 1831. Broad Street is the principal thoroughfare of Augusta, and Greene Street, with a park in the

centre and flanking rows of oaks and elms, is the finest residential street. Of historical interest is St Paul's church (Protestant Episcopal); the present building was erected in 18 19 and is the third St Paul's church on the same site. The first church was " built by the gentlemen of Augusta " in 1750. In the crypt of the church General Leonidas Polk is buried; and in the churchyard are the graves of George Step toe Washington, a nephew of George Washington, and of William Longstreet, the inventor. Among the city's principal buildings are the Federal building, the Richmond county court house, the Augusta orphan asylum, the city hospital, the Lamar hospital for negroes, and the buildings of Richmond Academy (incorporated in 1783), of the Academy of the Sacred Heart (for girls), of Paine's Institute (for negroes), of Houghton Institute, endowed in 1852 to be " free to all the children of Augusta," and of the medical school of the university of Georgia, founded in 1829, and a part of the university since 1873. A granite obelisk 50 ft. high was erected in 1861 as a memorial to the signers for Georgia of the Declaration of Independence; beneath it are buried Lyman Hall (1 726-1 790) and George Walton (1 740-1 804) . There are two Italian marble monuments in honour of Confederate soldiers, and monuments to the Southern poets, Paul Hamilton Hayne and Richard Henry Wilde (1789-1847).

In commerce and manufacturing, Augusta ranks second among the cities of Georgia. As a centre of trade for the " Cotton Belt," it has a large wholesale and retail business; and it is an important cotton market. The principal manufacture is cotton goods; among the other products are lumber, flour, cotton waste, cotton-seed oil and cake, ice, silk, boilers and engines, and general merchandise staples. Water-power for factories is secured by a system of " water-power canals " from a large dam across the Savannah, built in 1847 and enlarged in 1871; the principal canal, owned by the city, is so valuable as nearly to pay the interest on the municipal debt. In 1905 the value of the city's total factory product was $8,829,305, of which $3,832,009, or 43-4 %, was the value of the cotton goods. The principal newspaper is the Augusta Chronicle, founded in 1785.

Augusta was established in 1735-1736 by James Edward Oglethorpe, the founder of Georgia, and was named in honour of the princess of Wales. The Carolina colonists had a trading post in its vicinity before the settlement by Oglethorpe. The fort, built in 1736, was first named Fort Augusta, and in 1780, at the time of the British occupation, was enlarged and renamed Fort Cornwallis; its site is now marked by a Memorial Cross, erected by the Colonial Dames of Georgia in the churchyard of St Paul's. Tobacco was the principal agricultural product during the 18th century, and for its culture negro slaves were introduced from Carolina, before the restrictions of the Georgia Trustees on slavery were removed. During the colonial period several treaties with Indians were made at Augusta; by the

most important, that of 1763, the Choctaws, Creeks, Chickasaws, Cherokees and Catawbas agreed (in a meeting with the governors of North and South Carolina, Virginia and Georgia) to the terms of the treaty of Paris. At the opening of the American War of. Independence, the majority of the people of Augusta were Loyalists. The town was taken by the British under Lieut.-Col. Archibald Campbell (1 739-1 791) in January 1779, but was evacu- ated a month later; it was the seat of government of Georgia for almost the entire period from the capture of Savannah in December 1778 until May 1780, and was then abandoned by the Patriots and was occupied chiefly by Loyalists under Lieut.-Col.

Thomas Brown. In September 1780 a force of less than 500 patriots under Col. Elijah Clarke marched against the town in three divisions, and while one division, attacking a neigh- bouring Indian camp, drew off most of the garrison, the other two divisions entered the town; but British reinforcements arrived before Brown could be dislodged from a building in which he had taken refuge, and Clarke was forced to withdraw. A stronger American force, under Lieut. Col. Henry Lee, renewed the siege in May 1781 and gained possession on the 5th of June. From 1783 until 1795 Augusta was again the seat of the state govern ment. It was the meeting-place of the Land Court which con- fiscated the property of the Loyalists of Georgia, and of the convention which ratified for Georgia the Constitution of the United States. In 1798 it was incorporated as a town, and in 181 7 it was chartered as a city. Augusta was the home of the inventor, William Longstreet (1759-1814), who as early as 1788 received a patent from the state of Georgia for a steamboat, but met with no practical success until 1808; as early as 1801 he had made experiments in the application of steam to cotton gins and saw-mills at Augusta. Near Augusta, on the site now occupied by the Eli Whitney Country Club, Eli Whitney is said to have first set up and operated bis cotton gin; he is com- memorated by a mural tablet in the court house. The establish- ment of a steamboat line to Savannah in 181 7 aided Augusta's rapid commercial development. There was a disastrous fire in 1829, an epidemic of yellow fever in 1839, and a flood in 1840, but the growth of the city was not seriously checked ; the cotton receipts of 1846 were 212,019 bales, and in 1847 a cotton factory was built. During the Civil War Augusta was the seat of extensive military factories, the tall chimney of the Confederate powder mills still standing as a memorial. The economic develop- ment has, since the Civil War, been steady and continuous. An exposition was held in Augusta in 1888, and another in 1893.

AUGUSTA, the capital of Maine, U.S.A., and the county-seat of Kennebec county, on the Kennebec river ‘ (at the head of navi- gation), 44 m. from its mouth, 62 m. by rail N.E. of Portland, and 74 m. S.W. of Bangor. Pop. (1890) 10,527; (1900) 11,683, of whom 2131 were foreign-born; (1910, census) 13,211. It is served by the Maine Central railway, by several electric lines, and by steamboat lines to Portland, Boston and several other ports. It is built on a series of terraces, mostly on the west bank of the river, which is spanned here by a bridge 1 100 ft. long. The state house, built of granite quarried in the vicinity, occupies a commanding site along the south border of the city, and in it is the state library. The Lithgow library is a city public library. Near the state house is the former residence of James G. Blaine. On the other side of the river, nearly opposite, is the Maine insane hospital. Among other prominent buildings are the court house, the post office and the city hall. In one of the parks is a soldiers’ and sailors’ monument. By means of a dam across the river, 17 ft. high and nearly 600 ft. long, good water-power is provided, and the city manufactures cotton goods, boots and shoes, paper, pulp and lumber. A leading industry is the printing and publishing of newspapers and periodicals, several of the periodicals published here having an enormous circulation. The total value of the factory products in 1905 was $3,886,833. Augusta occupies the site of the Indian village, Koussinoc, at which the Plymouth Colony established a trading post about 1628. In 1661 Plymouth sold its interests, and soon afterward the four purchasers aban- doned the post. In 1754, however, their heirs brought about the erection here of Fort Western, the main building of which is still standing at the east end of the bridge, opposite the city hall. Augusta was originally a part of the township of Hallowell (incorporated in 1771); in 1797 the north part of Hallowell was incorporated as a separate town and named Harrington ; and later in the same year the name was changed to Augusta. It became the county-seat in 1799 ; was chosen by the Maine legislature as the capital of the state in 1827, but was not occupied as such until the completion of the state house in 1831 ; and was chartered as a city in 1849.

1 The Kennebec was first explored to this point in 1607.

AUGUSTA, a seaport of the province of Syracuse, Sicily, 19 m. N. of it by rail. Pop. (1901) 16,402. It occupies a part of the former peninsula of Xiphonia, now a small island, connected with the mainland by a bridge. It was founded by the emperor Frederick II. in 1232, and almost entirely destroyed by an earthquake in 1693, after which it was rebuilt. The castle is now a large prison. The fortified port, though unfrequented except as a naval harbour of refuge, is a very fine one. There are considerable saltworks at Augusta. To the south, on the left bank of the Molinello. i|m. from its mouth, Sicel tombs and Christian catacombs, and farther up the river a cave village of the early middle ages, have been explored {Notizie

degli Scavi, 1902, 411, 631 ; Romische Quartalschrift, 1902, 205). Whether there was ever a town bearing the name Xiphonia is doubted by E. A. Freeman {Hist, of Sic. i. 583); cf., however, E. Pais, Atakta (Pisa, 1891), 55, who attributes its foundation, under the name of Tauromenion (which it soon lost), to the Zancleans of Hybla (afterwards Megara Hyblaea). (T. As.)

AUGUSTA BAGIENNORUM, the chief town of the Ligurian tribe of the Bagienni, probably identical with the modern Bene Vagienna, on the upper course of the Tanaro, about 35 m. due south of Turin. The town retained its position as a tribal centre in the reorganization of Augustus, whose name it bears, and was erected on a systematic plan. Considerable remains of public buildings, constructed in concrete faced with small stones with bands of brick at intervals, an amphitheatre with a major axis of 390 ft. and a minor axis of 305 ft., a theatre with a stage 1 3 3 ft. in length, and near it the foundations of what was probably a basilica, an open space (no doubt the forum), an aqueduct, baths, &c, have been discovered by recent excavations, and also one of the city gates, flanked by two towers 22 ft. sq.

See G. Assandria and G. Vacchetta in Notizie degli Scavi (1 894) , 155; (1896), 215 ; (1897), 441 ; (1898), 299 ; (1900), 389 ; (1901), 413. (T. As.)

AUGUSTAN HISTORY, the name given to a collection of the biographies of the Roman emperors from Hadrian to Carinus (a.d. 117-284). The work professes to have been written during the reigns of Diocletian and Constantine, and is to be regarded as the composition of six authors, — Aelius Spartianus, Julius Capitolinus, Aelius Lampridius, Vulcacius Gallicanus, Trebellius Pollio and Flavius Vopiscus — known as Scriptores Historiae Augustae, writers of Augustan history. It is generally agreed, however, that there is a large number of interpolations in the work, which are referred to the reign of Theodosius ; and that the documents inserted in the lives are almost all forgeries. The more advanced school of critics holds that the names of the supposed authors are purely fictitious, as those of some of the authorities which they profess to quote certainly are. The lives, which (with few exceptions) are arranged in chronological order, are distributed as follows : — To Spartianus : the biographies of Hadrian, Aelius Verus, Didius Julianus, Septimius Severus, Pescennius Niger, Caracallus, Geta (?) ; to Vulcacius Gallicanus : Avidius Cassius ; to Capitolinus : Antoninus Pius, Marcus Aurelius Antoninus, Verus, Pertinax, Clodius Albinus, the two Maximins, the three Gordians, Maximus and Balbinus, Opilius Macrinus (?) ; to Lampridius : Commodus, Diadumenus, Elaga- balus, Alexander Severus; to Pollio: the two Valerians, the Gallieni, the so-called Thirty Tyrants or Usurpers, Claudius (his lives of Philip, Decius, and Gallus being lost); to Vopiscus: Aurelian, Tacitus, Florian,

Probus, the four tyrants (Firmus, Saturninus, Proculus, Bonosus), Carus, Numerian, Carinus.

The importance of the Augustan history as a repertory of information is very considerable, but its literary pretensions are of the humblest order. The writers' standard was con- fessedly low. " My purpose," says Vopiscus, " has been to provide materials for persons more eloquent than I." Copsider- ing the perverted taste of the age, it is perhaps fortunate that the task fell into the hands of no showy declaimer who measured his success by his skill in making surface do duty for substance, but of homely, matter-of-fact scribes, whose sole concern was to record what they knew. Their narrative is unmethodical and inartificial ; their style is tame and plebeian ; their conception of biography is that of a collection of anecdotes ; they have

no notion of arrangement, no measure of proportion, and no criterion of discrimination between the important and the trivial; they are equally destitute of critical and of historical insight, unable to sift the authorities on which they rely, and unsuspicious of the stupendous social revolution comprised within the period which they undertake to describe. Their value, consequently, depends very much on that of the sources to which they happen to have recourse for any given period of history, and on the fidelity of their adherence to these when valuable. Marius Maximus and Aelius Junius Cordus, to whose qualifications they themselves bear no favourable testimony, were their chief authorities for the earlier lives of the series. Marius Maximus, who lived about 165-230, wrote biographies of the emperors, in continuation of those of Suetonius, from Nerva to Elagabalus; Junius Cordus dealt with the less-known emperors, perhaps down to Maximus and Balbinus. The earlier lives, however, contain a substratum of authentic historical fact, which recent critics have supposed to be derived from a lost work by a contemporary writer, described by one of these scholars as " the last great Roman historian." For the later lives the Scriptores were obliged to resort more largely to public records, and thus preserved matter of the highest importance, rescuing from oblivion many imperial rescripts and senatorial decrees, reports of official proceedings and speeches on public occasions, and a number of interesting and character- istic letters from various emperors. Their incidental allusions sometimes cast vivid though undesigned light on the circum- stances of the age, and they have made large contributions to our knowledge of imperial jurisprudence in particular. Even their trivialities have their use; their endless anecdotes respecting the personal habits of the subjects of their

biographies, if valueless to the historian, are most acceptable to the archaeologist, and not unimportant to the economist and moralist. Their errors and deficiencies may in part be ascribed to the contemporary neglect of history as a branch of instruction. Education was in the hands of rhetoricians and grammarians; historians were read for their style, not for their matter, and since the days of Tacitus, none had arisen worth a schoolmaster's notice. We thus find Vopiscus acknowledging that when he began to write the life of Aurelian, he was entirely misinformed respecting the latter's competitor Firmus, and implying that he would not have ventured on Aurelian himself if he had not had access to the MS. of the emperor's own diary in the Ulpian library. The writers' historical estimates are superficial and conventional, but report the verdict of public opinion with substantial accuracy. The only imputation on the integrity of any of them lies against Trebellius Pollio, who, addressing his work to a descendant of Claudius, the successor and probably the assassin of Gallienus, has dwelt upon the latter versatile sovereign's carelessness and extravagance without ac- knowledgment of the elastic though fitful energy he so frequently displayed in defence of the empire. The caution of Vopiscus's references to Diocletian cannot be made a reproach to him.

No biographical particulars are recorded respecting any of these writers. From their acquaintance with Latin and Greek literature they must have been men of letters by profession, and very probably secretaries or librarians to persons of distinction. There seems no reason to accept Gibbon's contemptuous estimate of their social position. They appear particularly versed in law. Spartianus's reference to himself as " Diocletian's own " seems to indicate that he was a domestic in the imperial household. They address their patrons with deference, acknowledging their own deficiencies, and seem painfully conscious of the profession of literature having fallen upon evil days.

Editio princeps (Milan, 1475) ; Casaubon (1603) showed great critical ability in his notes, but for want of a good MS. left the restora- tion of the text to Salmasius (1620), whose notes are a most remark- able monument of erudition, combined with acuteness in verbal criticism and general vigour of intellect. Of recent years considerable attention has been devoted by German scholars to the History, especially by Peter, whose edition of the text in the Teubner series (2nd ed., 1884) contains (praef. xxxv.-xxxvii.) a bibliography of works on the subject preceding the publication of his own special treatise. The edition by Jordan-F.yssenhardt (1863) should also be mentioned. Amongst the most recent treatises on the subject are: A. Gemoll, Die Scriptores Historiae Augustae (1886); H. Peter, Die

Scriptores Historiae Augustae (1892); G. Tropea, Sludi sugli Scrip- tores Historiae Augustae (1 899-1 903) ; J. M. Heer, Der historische Wert der

Vita Commodi in der Sammlung der Scriptores Historiae Augustae (1901); C. Lecrivain, &udes sur I'histoire Auguste (1904); E. Kornemann, Kaiser Hadrian und der letzte grosse Historiker von Rom (1905), according to whom " the last great historian of Rome " is Lollius tJrbicus; O. Schulz, Das Kaiserhaus der Antonine und der letzte Historiker Roms (1907). On their style, see C. Paucker, De Latinitate Scriptorum Historiae Augustae (1870) ; special lexicon by C. Lessing (1901-1906). An English translation is included in The Lives of the Roman Emperors, by John Bernard (1698). See further Rome: History (anc. ad fin.), section " Authorities "; M. Schanz, Geschichte der romischen Litteratur, iii. p. 69 (for Marius Maximus and Junius Cordus), iv. p. 47; Teuffel-Schwabe, Hist, of Roman Literature (Eng. tr.), § 392; H. Peter, bibliography from 1893 to 1905 in Bursian's Jahresbericht, cxxix. (1907).

AUGUSTA PRAETORIA SALASSORUM (mod. Aosta, q.v.), an ancient town of Italy in the district of the Salassi, founded by Augustus about 24 B.C. on the site of the camp of Varro Murena, who subdued this tribe in 25 B.C., and settled with 3000 praetorians. Pliny calls it the last town of Italy on the north-west, and its position at the confluence of two rivers, at the end of the Great and Little St Bernard, gave it considerable military importance, which is vouched for by considerable remains of Roman buildings. The ancient town walls, enclosing a rectangle 793 by 624 yds., are still preserved almost in their entire extent. The walls are 21 ft. high. They are built of concrete faced with small blocks of stone, and at the bottom are nearly 9 ft. thick, and at the top 6 ft. There are towers at the angles of the enceinte, and others at intervals, and two at each of the four gates, making a total of twenty towers altogether. They are roughly 32 ft. square, and project 14 ft. from the wall. The Torre del Pailleron on the south and the Torre del Leproso in the west are especially well preserved. The east and south gates exist (the latter, a double gate with three arches flanked by two towers, is the Porta Praetoria, and is especially fine), while the rectangular arrangement of the streets perpetuates the Roman plan, dividing the town into 16 blocks (insulae). The main road, 32 ft. wide, divides the city into two equal halves, running from east to west, an arrangement which makes it clear that the guarding of the road was the main raison d'Ure of the city. Some arcades of the amphitheatre (the diameters of which are 282 ft. and 239 ft.), and the south wall of the theatre are also preserved, the latter to a height of over 70 ft., and a market-place some 300 ft. square, surrounded by store- houses on three sides with a temple in the centre, and two on the open (south) side, and the thermae, have been discovered. Outside the town is a handsome triumphal arch in honour of Augustus. About 5 m. to the west is a single-arched Roman bridge, the Pondel, which has a closed passage lighted by windows for foot passengers in winter, and above it an open footpath, both being

about 35 ft. in width. There are considerable remains of the ancient road from Eporedia (mod. Ivrea) to Augusta Praetoria, up the Valle d' Aosta, which the modern railway follows, notably the Pont St Martin, with a single arch with a span of 116 ft. and a roadway 15 ft. wide, the cutting of Donnaz, and the Roman bridges of Chatillon (Pont St Vincent) and Aosta (Pont de Pierre), &c.

See C. Promis, Le antichila di Aosta (Turin, 1862); E. Berard in Atti delta Societa di Archeologia di Torino, iii. 119 seq. ; Notizie degli Scavi, passim ; A. d'Andrade, Relazione dell' Ufficio Regionale per la conservazione dei Monumenti del Piemonte e delta Liguria (Turin, 1899), 46 seq. (T. As.)

AUGUSTI, JOHANN CHRISTIAN WILHELM (1772-1841), German theologian, born at Eschenberga, near Gotha, was of Jewish descent, his grandfather having been a converted rabbi. He was educated at the gymnasium at Gotha and the university of Jena. At Jena he studied oriental languages, of which he became professor there in 1803. Subsequently he became ordinary professor of theology (1812), and for a time rector, at Breslau. In 1819 he was transferred to the university of Bonn, where he was made professor primarius. In 1828 he was ap- pointed chief member of the consistorial council at Coblenz. Here he was afterwards made director of the consistory. He died at Coblenz in 1841. Augusti had little sympathy with the modern philosophical interpretations of dogma, and although

he took up a position of free criticism with regard to the Biblical narratives, he held fast to the traditional faith. His works on theology (Dogmengeschichte, 1805; 4th ed., 1835) are simple statements of fact; they do not attempt a speculative treatment of their subjects. In 1809 he published in conjunction with W. M. L. de Wette a new translation of the Old Testament. Mention should also be made of his Grundriss einer historisch- krilischen Einleitung ins Alte Testament (1806), his Exegetisches Handbuch des Alten Testaments (1797-1800), and his edition of Die Apokryphen des A. T. (1804). In addition to these, his most important writings are the Denkwiirdigkeiten aus der Christlichcn Archaologie, 12 vols. (181 7-183 1), a partially digested mass of materials, and the Handbuch der Christ. Archaologie, 3 vols. (1836-1837), which gives the substance of the larger work in a more compact and systematic form.

AUGUSTINE, SAINT (354-430), one of the four great fathers of the Latin Church. Augustinus — the praenomen Aurelius is used indeed by his

disciples Orosius and Prosper, and is found in the oldest Augustine MSS., but is not used by himself, nor in the letters addressed to him — was born at Tagaste, a town of Numidia, now Suk Ahras in Constantine, on the 13th of November 354. His father, Patricius, was a burgess of Tagaste and still a pagan at the time of his son's birth. His mother, Monica, was not only a Christian, but a woman of the most tender and devoted piety, whose beautiful faith and enthusiasm and patient prayer for both her husband and son (at length crowned with success in both cases) have made her a type of womanly saintliness for all ages. She early instructed her son in the faith and love of Jesus Christ, and for a time he seems to have been impressed by her teaching. Falling ill, he wished to be baptized; but when the danger was past, the rite was deferred and, in spite of his mother's admonitions and prayers, Augustine grew up without any profession of Christian piety or any devotion to Christian principles.

Inheriting from his father a passionate nature, he formed while still a mere youth an irregular union with a girl, by whom he became the father of a son, whom in a fit of pious emotion he named Adeodatus (" by God given "), and to whom he was passionately attached. In his Confessions he afterwards de- scribed this period of his life in the blackest colours; for in the light of his conversion he saw behind him only shadows. Yet, whatever his youthful aberrations, Augustine was from the first an earnest student. His father, noticing his early promise, destined him for the brilliant and lucrative career of a rhetorician, for which he spared no expense in training him. Augustine studied at his native town and afterwards at Madaura and Carthage, especially devoting himself to the works of the Latin poets, many traces of his love for which are to be found in his writings. His acquaintance with Greek literature was much more limited, and, indeed, it has been doubted, though without sufficient reason, whether he could use the Greek scriptures in the original. Cicero's Hortensius, which he read in his nineteenth year, first awakened in his mind the spirit of speculation and the impulse towards the knowledge of the truth. But he passed from one phase of thought to another, unable to find satisfaction in any. Manichaeism, that mixed product of Zoroastrian and Christian-gnostic elements, first, enthralled him. He became a fervent member of the sect, and was admitted into the class of auditors or " hearers." Manichaeism seemed to him to solve the mysteries of the world, and of his own experiences by which he was perplexed. His insatiable imagination drew congenial food from the fanciful religious world of the Manichaeans, decked out as this was with the luxuriant wealth of Oriental myth. His strongly developed sense of a need of salvation sought satisfaction in the contest of the two principles of Good and Evil, and found peace, at least for the moment, in the conviction that the portions of light present in him would be freed from the darkness in which they were immersed. The ideal

of chastity and self-restraint, which promised a foretaste of union with God, amazed him, bound as he was in the fetters of sensuality and for ever shaking at these fetters. But while his moral force was not sufficient for the attainment of this ideal, gradually everything else which Manichaeism seemed to

offer him dissolved before his criticism. Increasingly occupied with the exact sciences, he learnt the incompatibility of the Manichaean astrology with the facts. More and more absorbed in the problems of psychology, he realized the insufficiency of dualism, which did not solve the ultimate questions but merely set them back. The Manichaean propaganda seemed to him invertebrate and lacking in force, and a discussion which he had with Faustus, a distinguished Manichaean bishop and contro- versialist, left him greatly disappointed.

Meanwhile nine years had passed. Augustine, after finishing his studies, had returned to Tagaste, where he became a teacher of grammar. He must have been an excellent master, who knew how to influence the whole personality of his pupils. It was then that Alypius, who in the later stages of Augustine's life proved a true friend and companion, attached himself to him. He remained in his native town little more than a year, during which time he lived with his mother, who was comforted by the bishop for the estrangement of her son from the Catholic faith ("a son of so many tears cannot be lost": Confess. III. xii.§ 21), comforted also, and above all, by the famous vision, which Augustine thus describes: " She saw herself standing on a certain wooden rule, and a shining youth coming towards her, cheerful and smiling upon her the while she grieved, and was consumed with grief: and when he had inquired of her the causes of her grief and daily tears (for the sake, as is their wont, of teaching, not of learning) and she had made answer that she was bewailing my perdition, he bade her be at ease, and advised her to look and observe, ' That where she was, there was I also.' And when she looked there, she saw me standing by her on the same rule " (Confess. III. xi.). Augustine now returned for a second time to Carthage, where he devoted himself zealously to work. Thence, probably in the spring of 383, he migrated to Rome. His Manichaean friends urged him to take this step, which was rendered easier by the licentious lives of the students at Carthage. His stay at Rome may have lasted about a year, no agreeable time for Augustine, since his patrons and friends belonged to just those Manichaean circles with which he had in the meantime entirely lost all intellectual touch. He, therefore, accepted an invitation from Milan, where the people were in search of a teacher of rhetoric.

At Milan the conflict within his mind in search of truth still continued. It was now that he separated himself openly from the Manichaean sect. As a

thinker he came entirely under the influence of the New Academy; he professed the Sceptic philo- sophy, without being able to find in it the final conclusion of wisdom. He was, however, not far from the decision. Two things determined his further development. He became ac- quainted with the Neo-Platonic philosophy; its monism replaced the dualism, its intellectualized world of ideas the materialism of Manichaeism. Here he found the admonition to seek for truth outside the material world, and from created things he learnt to recognize the invisible God; he attained the certainty that this God is, and is eternal, always the same, subject to change neither in his parts nor in his motions. And while thus Augustine's metaphysical convictions were being slowly re- modelled, he met, in Ambrose, bishop of Milan, a man in whom complete worldly culture and the nobility of a ripe Christian personality were wonderfully united. He heard him preach; but at first it was the orator and not the contents of the sermons that enchained him. He sought an opportunity of conversation with him, but this was not easily found. Ambrose had no leisure for philosophic discussion. He was accessible to all who sought him, but never for a moment free from study or the cares of duty. Augustine, as he himself tells us, used to enter without being announced, as all persons might; but after staying for a while, afraid of interrupting him, he would depart again. He continued, however, to hear Ambrose preach, and gradually the gospel of divine truth and grace was received into his heart. He was busy with his friend Alypius in studying the Pauline epistles; certain words were driven home with irresistible force to his conscience. His struggle of mind became more and more intolerable, the thought of divine purity fighting in his heart

with the love of the world and the flesh. That sensuality was his worst enemy he had long known. The mother of his child had accompanied him to Milan. When he became betrothed he dismissed her; but neither the pain of this parting nor consideration for his not yet marriageable bride prevented him from forming a fresh connexion of the same kind. Meanwhile, the determination to renounce the old life with its pleasures of sense, was ever being forced upon him with more and more distinctness. He then received a visit from a Christian com- patriot named Pontitian, who told him about St Anthony and the monachism in Egypt, and also of a monastery near Milan. He was shaken to the depths when he learnt from Pontitian that two young officials, like himself betrothed, had suddenly formed a determination to turn their backs upon the life of the world. He could no longer bear to be inside the house; in terrible excitement he rushed into the garden; and now followed that scene which he himself in the Confessions has described to us with such graphic realism. He flung himself

under a fig tree, burst into a passion of weeping, and poured out his heart to God. Suddenly he seemed to hear a voice bidding him consult the divine oracle: " Take up and read, take up and read." He left off weeping, rose up, sought the volume where Alypius was sitting, and opening it read in silence the following passage from the Epistle to the Romans (xiii. 13, 14): " Not in rioting and drunkenness, not in chambering and wantonness, not in strife and envying. But put ye on the Lord Jesus Christ, and make not provision for the flesh to fulfil the lusts thereof." He adds: " I had neither desire nor need to read further. As I finished the sentence, as though the light of peace had been poured into the heart, all the shadows of doubt dispersed. Thus hast Thou con- verted me to Thee, so as no longer to seek either for wife or other hope of the world, standing fast in that rule of faith in which Thou so many years before hadst revealed me to my mother " (in qua me ante lot annos ei revelaveras: Confess. VIII. xii. § 30). 1

The conversion of Augustine, as we have been accustomed to call this event, took place in the late summer of 386, a few weeks before the beginning of the vacation. The determination to give up his post was rendered easier by a chest-trouble which was not without danger, and which for months made him in- capable of work. He withdrew with several companions to the country estate of Cassisiacum near Milan, which had been lent him by a friend, and announced himself to the bishop as a candidate for baptism. His religious opinions were still to some extent unformed, and even his habits by no means altogether such as his great change demanded. He mentions, for example, that during this time he broke himself of a habit of profane swearing, and in other ways sought to discipline his character and conduct for the reception of the sacred rite. He received baptism the Easter following, in his thirty-third year, and along with him his son Adeodatus and his friend Alypius were admitted to the Church. Monica, his mother, had rejoined him, and at length rejoiced in the fulfilment of her prayers. She died at Ostia, just as they were about to embark for Africa, her last hours being gladdened by his Christian sympathy. In the account of the con- versation which he had with his mother before her end, in the narrative of her death and burial (Confess. IX. x.-xi., §§ 23-28), Augustine's literary power is displayed at its highest.

The plan of returning home, remained for the present un- accomplished. Augustine stayed for a year in Rome, occupied in literary work, particularly in controversy with Manichaeism. It was not until the autumn of 388 that he returned to Tagaste, probably still accompanied by his son, who, however, must have died shortly afterwards. With some friends, who joined him in devotion, he formed a small religious community, which looked to him as its head. Their mode of life was not formally monastic according to any special rule, but the experience of this time of seclusion was, no doubt, the basis of that monastic system which Augustine

afterwards sketched and which derived its name from him (see Augustinians). As may be imagined, the fame of such a convert in such a position soon spread, and invitations to a more active ecclesiastical life came to him from many quarters. He 1 The reference is to the vision described above.

shrank from the responsibility, but his destiny was not to be avoided. After two and a half years spent in retirement he went to Hippo, to see a Christian friend, who desired to converse with him as to his design of quitting the world and devoting himself to a religious life. The Christian community there being in want of a presbyter and Augustine being present at the meeting, the people unanimously chose him and he was ordained to the presbyterate. A few years afterwards, 395 or 396, he was made coadjutor to the bishop, and finally became bishop of the see.

Henceforth Augustine's life is filled up with his ecclesiastical labours, and is more marked by the series of his numerous writings and the great controversies in which they engaged him than by anything else. His life was spent in a perpetual strife. During the first half this had been against himself; but even when others stepped into his place, it always seems as though a part of Augustine himself were incarnate in them. Augustine had early distinguished himself as an author. He had written several philosophical treatises, and, as teacher of rhetoric at Carthage, he had composed a work De pulchro et apto, which is no longer extant. Whenat Cassisiacum he had combated the scepticism of the New Academy (Contra Academicos) , had treated of the " blessed life " (De Vita beata), of the significance of evil in the order of the world (Deordine), of the means for the elucidation of spiritual truths (Soliloquia) . Shortly before the time of his baptism, he was occu- pied with the question of the immortality of the soul (De immor- talitate animae) , and in Rome and at Tagaste he was still engaged with philosophical problems, as is evidenced by the writings De quantitate animae and De magistro. In all these treatises is apparent the influence of the Neo-Platonic method of thought, which for him, as for so many others, had become the bridge to the Christian. While still in Rome, he began to come to a reckoning with the Manichaeans, and wrote two books on the morals of the Catholic Church and of the Manichaeans (De moribus ecclesiae Catholicae et de moribus Manichaeorum libri duo) . For many years he pursued this controversy in a long series of writings, of which the most conspicuous is the elaborate reply to his old associate and disputant, Faustus of Mileve (Contra Faustum Manichaeum, a.d. 400). It was natural that the Manichaean heresy, which had so long enslaved his own mind, should have first exercised Augustine's great powers as a theological thinker and contro- versialist. He was able from his own experience to give force to his arguments for the unity of creation and of the spiritual life, and to strengthen the mind of the Christian Church in its

last struggle with that dualistic spirit which had animated and moulded in succession so many formsof thought at variance with Christianity.

But the time was one of almost universal ecclesiastical and intellectual excitement; and so powerful a mental activity as his was naturally drawn forth in all directions. Following his writings against the Manichaeans came those against the Dona- tists. The controversy was one which strongly interested him, involving as it did the whole question of the constitution of the Church and the idea of catholic order, to which the circumstances of the age gave special prominence. The Donatist controversy sprang out of the Diocletian persecution in the beginning of the century. A party in the Church of Carthage, fired with fanatic zeal on behalf of those who had courted martyrdom by resistance to the imperial mandates, resented deeply the appointment of a bishop of moderate opinions, whose consecration had been performed, they alleged, by a traditor, viz. a bishop who had " delivered " the holy scriptures to the magistrates. They set up, in consequence, a bishop of their own, of the name of Majorinus, succeeded in 3 1 5 by Donatus. The party made great pretensions to purity of discipline, and rapidly rose in popular favour, not- withstanding a decision given against them both by the bishop of Rome and by the emperor Cons tan tine. Augustine was strongly moved by the lawlessness of the party and launched forth a series of writings against them, the most important of which survive. Amongst these are " Seven Books on Baptism " (De baptismo contra Donatistas, c. a.d. 400) and a lengthy answer, in three books, to Petilian, bishop of Cirta, who was the most eminent theologian amongst the Donatist divines. At a later period, about 417, Augustine wrote a treatise concerning

the correction of the • Donatists (De correctione Donatistarum) " for the sake of those," he says in his Retractations," who were not willing that the Donatists should be subjected to the correction of the imperial laws." In these writings, while vigorously maintaining the validity of the Church as it then stood in the Roman world, and the necessity for moderation in the exercise of church discipline, Augustine yet gave currency, in his zeal against the Donatists, to certain maxims as to the duty of the civil power to control schism, which were of evil omen, and have been productive of much disaster in the history of Christianity.

The third controversy in which Augustine engaged was the most important, and the most intimately associated with his distinctive greatness as a theologian. As may be supposed, owing to the conflicts through which he

had passed, the bishop of Hippo was intensely interested in what may be called the anthropological aspect of the great Christian idea of redemption. He had himself been brought out of darkness into " marvellous light," only by entering into the depths of his own soul, and finding, after many struggles, that there was no power but divine grace, as revealed in the life and death of the Son of God, which could bring rest to human weariness, or pardon and peace for human guilt. He had found human nature in his own case too weak and sinful to find any good for itself. In God alone he had found good. • This deep sense of human sinfulness coloured all his theology, and gave to it at once its depth — its profound and sympathetic adaptation to all who feel the reality of sin — and that tinge of darkness and exaggeration which has as surely repelled others. When the expression " Augustinism " is used, it points especially to those opinions of the great teacher which were evoked in the Pelagian controversy, to which he devoted the most mature and powerful period of his life. His opponents in this controversy were Pelagius, from whom it derives its name, and CoeJestius and JuJianus, pupils of the former. Nothing is certainly known as to the home of Pelagius. Augustine calls him Brito, and so do Marius Mercator and Orosius. Jerome points to his Scottish descent, in such terms, however, as to leave it uncertain whether he was a native of Scotland or of Ireland. He was a man of blameless character, devoted to the reformation of society, full of that confidence in the natural impulses of humanity which often accompanies philanthropic enthusiasm. About the year 400 he came, no longer a young man, to Rome, where he lived for more than a decade, and soon made himself conspicuous by his activity and by his opinions. His pupil Coeiestius, a lawyer of unknown origin, developed the views of his master with a more outspoken logic, and, while travelling with Pelagius in Africa, in the year 411, was at length arraigned before the bishop of Carthage for the following, amongst other heretical opinions:— (1) that Adam's sin was- purely personal, and affected none but himself; (2) that each man, consequently, is born with powers as incorrupt as those of Adam, and only falls into sin under the force of temptation and evil example; (3) that children who die in infancy, being untainted by sin, are saved without baptism. Views such as these were obviously in conflict with the whole course of Augustine's experience, as well as with his interpretation of the catholic doctrine of the Church. And when his attention was drawn to them by the trial and excommunication of Coeiestius, he undertook their refutation, first of all in three books on the punishment and forgiveness of sins and the baptism of infants (De peccatorum meritis et remissione et de baptismo parmlorum) , addressed to his friend Marcellinus, in which he vindicated the necessity of baptism of infants because of original sin and the grace of God by which we are justified {Retract, ii. 23). This was in 412. In the same year he addressed a further treatise to the same Marcellinus on The Spirit and the Letter (De

spiritu et litter a). Three years later he composed the treatises on Nature and Grace (De natura et gratia) and the relation of the human to the divine righteousness (De perfectione iuslitiae hominis). The controversy was continued during many years in no fewer than fifteen treatises. Upon no subject did Augustine bestow more of his intellectual strength, and in relation to no other have

his views so deeply and permanently affected the course of Christian thought. Even those who most usually agree with his theological standpoint will hardly deny that, while he did much in these writings to vindicate divine truth and to expound the true relations of the divine and human, he also, here as else- where, was hurried into extreme expressions as to the absolute- ness of divine grace and the extent of human corruption. Like his great disciple in a later age — Luther — Augustine was prone to emphasize the side of truth which he had most realized in his own experience, and, in contradistinction to the Pelagian exaltation of human nature, to depreciate its capabilities beyond measure.

In addition to these controversial writings, which mark the great epochs of Augustine's life and ecclesiastical activity after his settlement as a bishop at Hippo, he was the author of other works, some of them better known and even more important. His great work, the most elaborate, and in some respects the most significant, that came from his pen, is The City of God (De civitate Dei). It is designed as a great apologetic treatise in vindication of Christianity and the Christian Church, — the latter conceived as rising in the form of a new civic order on the crumbling ruins of the Roman empire, — but it is also, perhaps, the earliest contribution to the philosophy of history, as it is a repertory throughout of his cherished theological opinions. This work and his Confessions are, probably, those by which he is best known, the one as the highest expression of his thought, and the other as the best monument of his living piety and Christian experience. The City of God was begun in 413, and continued to be issued in its several portions for a period of thirteen years, or till 426. The Confessions were written shortly after he became a bishop, about 397, and give a vivid sketch of his early career. To the devout utterances and aspirations of a great soul they add the charm of personal disclosure, and have never ceased to excite admiration in all spirits of kindred piety. Something of this charm also belongs to the Retractations, that remarkable work in which Augustine, in 427, towards the end of his life, held as it were a review of his literary activity, in order to improve what was erroneous and to make clear what was doubtful in it. His systematic treatise on The Trinity (De Trinitate) which extends to fifteen books and occupied him for nearly thirty years, must not be passed over. This important work, unlike most of his dogmatic writings, was not provoked by any special controversial emergency, but grew up silently during this long period in the author's mind. This has given

it something more of completeness and organic arrangement than is usual with Augustine, if it has also led him into the prolonged discussion of various analogies, more curious than apt in their bearing on the doctrine which he expounds. Brief and concise is the presentation of the Catholic doctrine in the compendium, which, about 421, he wrote at the request of a Roman layman named Laurentius (Encheiridion, sive defide spe et caritate). In spite of its title, the compendious work on Christian doctrine (De doctrina Christiana), begun as early as 393, but only finished in 426, does not belong t6 the dogmatic writings. It is a sort of Biblical hermeneutic, in which homiletic questions are also dealt with. His catechetical principles Augus- tine developed in the charming writing De catechizandis rudibus (c 400). A large number of tractates are devoted to moral and theological problems (Contra mendaciunt, c 420; De bono conjugali, 401, &c). A widespread influence was exercised by the treatise De opere monachorum (c.400), in which, on the ground of Holy Scripture, manual work was demanded of monks. Of less importance than the remaining works are the numerous exegetical writings, among which the commentary on the Gospel of St John deserves a special mention. These have a value owing to Augustine's appreciation of the deeper spiritual mean- ing of scripture, but hardly for their exegetical qualities. His Letters are full of interest owing to the light they throw on many questions in the ecclesiastical history of the time, and owing to his relations with such contemporary theologians as Jerome. They have, however, neither the liveliness Hor the varied interest of the letters of Jerome himself. As a preacher Augustine was

of great importance. We still possess almost four hundred sermons which may be ascribed to him with certainty. Many others only pass under his celebrated name.

The closing years of the great bishop were full of sorrow. The Vandals, who had been gradually enclosing the Roman empire, appeared before the gates of Hippo, and laid siege to it. Augus- tine was ill with his last illness, and could only pray for his fellow-citizens. He passed away during the siege, on the 28th of August 430, at the age of seventy-five, and thus was spared the indignity of seeing the city in the hands of the enemy.

The character of Augustine, both as a man and as a theologian, has been briefly indicated in the course of our sketch. None can deny the greatness of Augustine's soul — his enthusiasm, his unceasing search after truth, his affectionate disposition, his ardour, his self-devotion. And even those who

may doubt the soundness of his dogmatic conclusions, cannot but acknowledge the depth of his spiritual convictions, and the logical force and penetration with which he handled the most difficult questions, thus weaving all the elements of his experience and of his profound scriptural knowledge into a great system of Christian thought. Of the four great Fathers of the Church he was admittedly the greatest — more profound than Ambrose, his spiritual father, more original and systematic than Jerome, his correspondent, and intellectually far more distinguished than Gregory the Great, his pupil on the papal throne. The theological position and influence of Augustine may be said to be unrivalled. No single name has ever exercised such power over the Christian Church, and no one mind ever made so deep an impression upon Christian thought. In him scholastics and mystics, popes and the opponents of the papal supremacy, have seen their champion. He was the fulcrum on which Luther rested the thoughts by which he sought to lift the past of the Church out of the rut; yet the judgment of Catholics still proclaims the ideas of Augustine as the only sound basis of philosophy.

The best complete edition of Augustine's works is that of the Maurines, in II vols. fol. published at Paris, 1679-1700, and re- printed in Migne's Patrologie (Paris, 1841-1842). Of the new critical edition in the Corpus Scriptorum Ecclesiasticorum Latinorum, issued by the Vienna Academy, thirteen volumes had been published in 1908, including the Confessions, the Retractations, De civitate Dei, and a number of exegetical and of dogmatic polemical works, together with a portion of the Letters. An English translation of nearly the whole of Augustine's writings will be found in the Select Library of the Nicene and post-Nicene Fathers of the Christian Church (series I, Buffalo, 1886, &c). Tillemont, in his Memoires pour servir d I'histoire ecclesiastique des VI premiers siecles, has devoted a quarto volume (vol. xiii.) to Augustine's life and writings. The most complete monographs are those on the Catholic side by Kloth (Aix-la- Chapelle, 1839-1840, 3 vols.) and J. J. F. Poujoulat (7th ed., Paris, 1886, 2 vols.), and on the Protestant side by Bindemann (Berlin, Leipzig, Greifswald, 1844-1869, 3 vols,). There are interesting sketches, from quite different points of view, by von Hertling, Augustinus (2nded., Mainz, 1904), and Joseph McCabe, St Augustine and His Age (London, 1902). See also Nourrisson, La Philosophic de St Augustin (2nd ed., Paris, 1866, 2 vols.); H. A. Naville, St Augustin, etude sur la developpement de sa pensee jusqu'a Vepoque de son ordination (Geneva, 1872) ; Dorner, Augustinus (Berlin, 1873) ; Reuter, Augustinisclie Studien (Gotha, 1886); F. Scheel, Die Anschauung Augustins iiber Christi Person und Werk (Tubingen, 1901); A. Hatzfeld, Saint Augustin (6th ed., Paris, 1902); G. von Hertling, Augustin (Mainz, 1902); A. Egger, Der heilige Augustinus (Kempten, 1904) ; J. N. Espenberger, Die Elemente der Erbsunde nach Augustin und der Fruhscholastik (Mainz, 1905); S. Angus, The Sources of the First Ten Books of Augustine's De Civitate Dei (Princeton, 1906) ; and the more modern text-books of the history of dogma, especially Harnack. (G. K.)

AUGUSTINE, SAINT (d. c.613), first archbishop of Canterbury, occupied a position of authority in the monastery of St Andrew at Rome, when Gregory I. summoned him to lead a mission to England in a.d. 596. The apprehensions of Augustine's followers caused him to return to Rome, but the pope furnished him with letters of commendation and encouraged him to proceed. He landed in Thanet in a.d. 597, and was favourably received by ˆEthelberht, king of Kent, who granted a dwelling-place for the monks in Canterbury, and allowed them liberty to preach. Augustine first made use of the ancient church of St Martin at Canterbury, which before his arrival had been the oratory of the Queen Berhta and her confessor Liudhard. ˆEthelberht upon

his conversion employed all his influence in support of the mission. In 601 Augustine received the pallium from Gregory and was given authority over

the Celtic churches in Britain, as well as all future bishops consecrated in English territory, including York. Authority over the see of York was not, however, to descend to Augustine's successors. In 603 he consecrated Christ Church, Canterbury, and built the monastery of SS. Peter and Paul, afterwards known as St Augustine's. At the conference of Augustine's Oak he endeavoured in vain to bring over the Celtic church to the observance of the Roman Easter. He afterwards consecrated Mellitus and Justus to the sees of London and Rochester respectively. The date of his death is not recorded by Bede, but MS. F of the Saxon Chronicle puts it in 614, and the Annales Monaslerienses in 612.

See Bede, Eccl. Hist. (ed. by Plummer), i. 23-ii. 3.

AUGUSTINIAN CANONS, a religious order in the Roman Catholic Church, called also Austin Canons, Canons Regular, and in England Black Canons, because their cassock and mantle were black, though they wore a white surplice : elsewhere the colour of the habit varied considerably.

The canons regular (see Canon) grew out of the earlier institute of canonical life, in consequence of the urgent exhortations of the Lateran Synod of 1059. The clergy of some cathedrals (in England, Carlisle), and of a great number of collegiate churches all over western Europe, responded to the appeal ; and the need of a rule of life suited to the new regime produced, towards the endx>f the nth century, the so-called Rule of St Augustine (see Axtgtjstinians). This Rule was widely adopted by the canons regular, who also began to bind themselves by the vows of poverty, obedience and chastity. In the 12 th century this discipline became universal among them; and so arose the order of Augustinian canons as a religious, order in the strict sense of the word. They resembled the monks in so far as they lived in community and took religious vows; but their state of life remained essentially clerical, and as clerics their duty was to undertake the pastoral care and serve the parish churches in their patronage. They were bound to the choral celebration of the divine office, and in its general tenor their manner of life differed little from that of monks.

Their houses, at first without bonds between them, soon tended to draw together and coalesce into congregations with cor- porate organization and codes of constitutions supplementary to the Rule. The popes encouraged these centralizing tendencies; and in 1339 Benedict XII. organized the Augustinian canons on the same general lines as those laid down for the Benedictines, by a system of provincial chapters and visitations.

Some thirty congregations of canons regular of St Augustine are numbered. The most important were: (1) the Lateran canons, formed soon after the synod of 1059, by the clergy of the Lateran Basilica; (2) Congregation of

St Victor in Paris, c. 1 1 00, remarkable for the theological and mystical school Of Hugh, Richard and Adam of St Victor; (3) Gilbertines (see Gilbert of Sempringham, St) ; (4) Windesheim Congregation, c. 1400, in the Netherlands and over north and central Germany (see Groot, Gerhard), to which belonged Thomas a. Kempis; (5) Congregation of Ste Genevieve in Paris, a reform c. 1630. During the later middle ages the houses of these various conˆ gregations of canons regular spread all over Europe and became extraordinarily numerous. They underwent the natural and inevitable vicissitudes of all orders, having their periods of depression and degeneracy, and again of revival and reform. The book of Johann Busch, himself a canon of Windesheim, De Reformatione monasteriorum, shows that in the 15 th century grave relaxation had crept into many monasteries of Augustinian canons in north Germany, and the efforts at reform were only partialiy successful. The Reformation, the religious wars and the Revolution have swept away nearly all the canons regular, but some of their houses in Austria still exist in their medieval splendour. In England there were as many as 200 houses of Augustinian canons, and 60 of them were among the " greater monasteries" suppressed in 1538-1540 (for list see Tables in

F. A. Gasquet's English Monastic Life). The first foundation was Holy Trinity, Aldgate, by Queen Maud, in 1108; Carlisle was an English cathedral of Augustinian canons. In Ireland the order was even more numerous, Christ Church, Dublin, being one of their houses. Three houses of the Lateran canons were established in England towards the close of the 19th century. Most of the congregations of Augustinian canons had convents of nuns, called canonesses; many such exist to this day. See the works of Amort and Du Molinet, mentioned under Canon. Vol. ii. of Helyot's Hist, des ordres religieux (1792) is devoted to canons regular of all kinds. The information is epitomized by Max Heimbucher, Orden und Kongregationen, i. (1896), §§ 54-60, where copious references to the literature of the subject are sup- plied. See also Otto Zockler, A skese und Monchtum, ii. (1897), p. 422 ; and Wetzer und Welte, Kirchenlexicon (2nd ed.), art. " Canonici Regulares " and " Canonissae." For England see J. W. Clark, Observances in use at the Augustinian Priory at Barnwell (1897); and an article in Journal of Theological Studies (v.) by Scott Holmes. (E. C. B.)

AUGUSTINIAN HERMITS, or Friars, a religious order in the Roman Catholic Church, sometimes called (but improperly) Black Friars (see Friars). In the first half of the 13th century there were in central Italy

various small congregations of hermits living according to different rules. The need of co-ordinating and organizing these hermits induced the popes towards 1250 to unite into one body a number of these congregations, so as to form a single religious order, living according to the Rule of St Augustine, and called the Order of Augustinian Hermits, or simply the Augustinian Order. Special constitutions were drawn up for its government, on the same lines as the Dominicans and other mendicants — a general elected by chapter, provincials to rule in the different countries, with assistants, definitors and visitors. For this reason, and because almost from the beginning the term " hermits " Became a misnomer (for they abandoned the deserts and lived conventually in towns), they ranked among the friars, and became the fourth of the mendicant orders. The observance and manner of life was, relatively to those times, mild, meat being allowed four days in the week. The habit is black. The institute spread rapidly all over western Europe, so that it eventually came to have forty provinces and 2000 friaries with some 30,000 members. In England there were not more than about 30 houses (see Tables in F. A. Gasquet's English Monastic Life). The reaction against the inevitable tendencies towards mitigation and relaxation led to a number of reforms that produced upwards of twenty different congrega- tions within the order, each governed by a vicarˆgeneral, who was subject to the general of the order. Some of these congregations went in the matter of austerity beyond the original idea of the institute; and so in the 16th century there arose in Spain, Italy and France, Discalced or Barefooted Hermits of St Augus- tine, who provided in each province one house wherein a strictly eremitical life might be led by such as desired it.

About 1500 a great attempt at a reform of this kind was set on foot among the Augustinian Hermits of northern Germany, and they were formed into a separate congregation independent of the general. It was from this congregation that Luther went forth, and great numbers of the German Augustinian Hermits, among them Wenceslaus Link the provincial, followed him and embraced the Reformation, so that the congregation was dissolved in 1526.

The Reformation and later revolutions have destroyed most of the houses of Augustinian Hermits, so that now only about a hundred exist in various parts of Europe and America; in Ireland they are relatively numerous, having survived the penal times. The Augustinian school of theology (Noris, Berti) was formed among the Hermits. There have been many convents of Augus- tinian Hermitesses, chiefly in the Barefooted congregations; such convents exist still in Europe and North America, devoted to education and hospital work. There have also been nurnerous congregations of Augustinian Tertiaries, both men and women, connected with the order and engaged on charitable works of every kind (see Tertiaries).

See Helyot, Hist, des ordres religieux (1792), iii. ; Max Heimbucher, Orden und Kongregationen, i. (1896), § 61-65; Wetzer und Welte,

Kirchenlexicon (2nd ed.), art " Augustiner " ; Herzog, Realency- klopddie (3rd ed.), art. " Augustiner." The chief book on the subject is Th. Kolde, Die deutschen Augustiner – Kongregationen (1879). (E. C. B.)

AUGUSTINIANS, in the Roman Catholic Church, a generic name for religious orders that follow the so-called " Rule of St Augustine." The chief of these orders are: — Augustinian Canons (q.v.), Augustinian Hermits (q.v.) or Friars, Premon- stratensians (q.v.), Trinitarians (q.v.), Gilbertines (see Gilbert of Sempringham, St) . The following orders, though not called Augustinians, also have St Augustine's Rule as the basis of their life : Dominicans, Servites, Our Lady of Ransom, Hieronymites, Assumptionists and many others; also orders of women: Brigittines, Ursulines, Visitation nuns and a vast number of congregations of women, spread over the Old and New Worlds, devoted to education and charitable works of all kinds.

See Helyot, Ordres religieux (1792), vols, ii., iii., iv. ; Max Heim- bucher, Orden und Kongregationen, i. (1896), § 66-85; Wetzer und Welte, Kirchenlexicon, i., 1665-1667.

St Augustine never wrote a Rule, properly so called; but Ep. 211 (al. 109) is a long letter of practical advice to a com- munity of nuns, on their daily life; and Sertn. 355, 356 describe the common life he led along with his clerics in Hippo. When in the second half of the nth century the clergy of a great number of collegiate churches were undertaking to live a substantially monastic form of life (see Canon), it was natural that they should look back to this classical model for clerics living in community. And so attention was directed to St Augustine's writings on community life; and out of them, and spurious writings attributed to him, were compiled towards the close of the nth century three Rules, the "First" and "Second" being mere fragments, but the " Third " a substantive rule of life in 45 sections, often grouped in twelve chapters. This Third Rule is the one known as " the Rule of St Augustine." Being confined to fundamental principles without entering into details, it has proved itself admirably suited to form the foundation of the religious life of the most varied orders and congregations, and since the 12 th century it has proved more prolific than the Benedictine Rule. In an uncritical age it was attributed to St Augustine himself, and Augustinians, especially the canons, put forward fantastic claims to antiquity, asserting unbroken con- tinuity, not merely from St Augustine, but from Christ and the Apostles.

The three Rules are printed in Dugdale, Monasticon (ed. 1846), vi. 42; and in Holsten-Brockie, Codex Regularum, ii. 121. For the literature see

Otto Zockler, Askese und Monchtum (1897), pp. 347, 354- (E. C. B.)

AUGUSTOWO, a city of Russian Poland, in the government of Suwalki, 20 m. S. of the town of that name, on a canal (65 m.) connecting the Vistula with the Niemen. It was founded in 1557 by Sigismund II. (Augustus), and is laid out in a very regular manner, with a spacious market-place. It carries on a large trade in cattle and horses, and manufactures linen and huckaback. Pop. (1897) 12,746.

AUGUSTUS (a name 1 derived from Lat. augeo, increase, i.e. venerable, majestic, Gr. 2e/3aoT6s), the title given by the Roman senate, on the 17th of January 27 B.C., to Gaius Julius Caesar Octavianus (63 b.C.-a.d. 14), or as he was originally designated, Gaius Octavius, in recognition of his eminent services to the state (Mon. Anc. 34), and borne by him as the first of the Roman emperors. The title was adopted by all the succeeding Caesars or emperors of Rome long after they had ceased to be connected by blood with the first Augustus.

Gaius Octavius was born in Rome on the 23rd of September 63 B.C., the year of Cicero's consulship and of Catiline's conspiracy. He came of a family of good standing, long settled at Velitrae (Velletri\ but his father was the first of the family to obtain a curule magistracy at Rome and senatorial dignity. His mother, however, was Ati? : daughter of Julia, the wife of M. Atius Balbus, and sister of J ulius Ca esar, and it was this connexion with the great dictator which determined his career. In his fifth year (58 B.C.) his father died; about a year later his mother

1 On the name see Neumann, in Pauly-Wissowa's Reaiencyao- pddie f. cl. alterth., s.v.. 2374.

remarried, and the young Octavius passed under her care to that of his stepfather, L. Marcius Philippus. At the age of twelve (51 B.C.) he delivered the customary funeral panegyric on his grand- mother Julia, his first public appearance. On the 1 8th of October 48 (or ? 47) B.c he assumed the " toga virilis " and was elected into the pontifical college, an exceptional honour which he no doubt owed to his great-uncle, now dictator and master of Rome. In 46 B.C. he shared in the glory of Caesar's African triumph, and in 45 he was made a patrician by the senate, and designated as one of Caesar's " masters of the horse " for the next year. In the autumn of 45, Caesar, who was planning his Parthian campaign, sent his nephew to study quietly at the Greek colony of Apollonia, in Illyria.

Here the news of Caesar's murder reached him and he crossed to Italy. On landing he learnt that Caesar had made him his heir and adopted him into the Julian gens, whereby he acquired the designation of Gaius Julius Caesar Octavianus. The inheritance was a perilous one; his mother and others would have dissuaded him from accepting it, but he, confident in his abilities, declared at once that he would under- take its obligations, and discharge the sums bequeathed by the dictator to the Roman people. Mark Antony had possessed himself of Caesar's papers and effects, and made light of his young nephew's pretensions. Brutus and Cassius paid him little regard, and dispersed to their respective provinces. Cicero, much charmed at the attitude of Antonius, hoped to make use of him, and flattered him to the utmost, with the expectation, however, of getting rid of him as soon as he had served his purpose. Octavianus conducted himself with consummate adroitness, making use of all competitors for power, but assisting none. Considerable forces attached themselves to him. The senate, when it armed the consuls against Antonius, called upon him for assistance ; and he took part in the campaign in which Antonius was defeated at Mutina (43 B.C.). The soldiers of Octavianus demanded the consulship for him, and the senate, though now much alarmed, could not prevent his election. He now effected a coalition with Antonius and Lepidus, and on the 27th of November 43 B.C. the three were formally appointed a triumvirate for the reconstitution of the commonwealth for five years. They divided the western provinces among them, the east being held for the republic by Brutus and Cassius. They drew up a list of proscribed citizens, and caused the assassination of three hundred senators and two thousand knights. They further confiscated the territories of many cities throughout Italy, and divided them among their soldiers. Cicero was murdered at the demand of Antonius. The remnant of the republican party took refuge either with Brutus and Cassius in the East, or with Sextus Pompeius, who had made himself master of the seas.

Octavianus and Antonius crossed the Adriatic in 42 B.C. to reduce the last defenders of the republic. Brutus and Cassius were defeated, and fell at the battle of Philippi. War soon broke out between the victors, the chief incident of which was the siege and capture by famine of Perusia, and the alleged sacrifice of three hundred of- its defenders by the young Caesar at the altar of his uncle. But peace was again made between them (40 B.C.). Antonius married Octavia, his rival's sister, and took for himself the eastern half of the empire, leaving the west to Caesar. Lepidus was reduced to the single province of Africa. Meanwhile Sextus Pompeius made himself formidable by cutting off the supplies of grain from Rome. The triumvirs were obliged to concede to him the islands in the western Mediterranean. But Octavianus could not allow the capital to be kept in alarm for its daily sustenance. He picked a quarrel with Sextus, and when his colleagues

failed to support him, undertook to attack him alone. Antonius, indeed, came at last to his aid, in return for military assistance in the campaign he meditated in the East. But Octavianus was well served by the commander of his fleet, M. Vipsanius Agrippa. Sextus was completely routed, and driven into Asia, where he perished soon afterwards (36 B.C.). Lepidus was an object of contempt to all parties, and Octavianus and Antonius remained to fight for supreme power.

The five years (36-31 B.C.) which preceded the decisive en- counter between the two rivals were wasted by Antony in fruitless

campaigns, and in a dalliance with Cleopatra which shocked Roman sentiment. By Octavian they were employed in strength- ening his hold on the West, and his claim to be regarded as the one possible saviour of Rome and Roman civilization. His marriage with Livia (38 B.C.) placed by his side a sagacious counsellor and a loyal ally, whose services were probably as great as even those of his trusted friend Marcus Agrippa. With their help he set himself to win the confidence of a public still inclined to distrust the author of the proscriptions of 43 b.c. Brigandage was suppressed in Italy, and the safety of the Italian frontiers secured against the raids of Alpine tribes on the north- west and of Illyrians on the east, while Rome was purified and beautified, largely with the help of Agrippa (aedile in 33 B.C.). Meanwhile, indignation at Antony's un-Roman excesses, and alarm at Cleopatra's rumoured schemes of founding a Greco- Oriental empire, were rapidly increasing. In 32 B.C. Antony's repudiation of his wife Octavia, sister of Octavian, and the dis- covery of his will, with its clear proofs of Cleopatra's dangerous ascendancy, brought matters to a climax, and war was declared, not indeed against Antony, but against Cleopatra.

The decisive battle was fought on the 2nd of September 31 B.C. at Actium on the Epirot coast, and resulted in the almost total, destruction of Antony's fleet and the surrender of his land forces. Not quite a year later (Aug/ 1, 30 B.C.) followed the capture of Alexandria and the deaths by their own hands of Antony and Cleopatra. On the nth of January 29 B.C. the restoration of peace was marked by the closing of the temple of Janus for the first time for 200 years. In the summer Octavian returned to Italy, and in August celebrated a three days' triumph. He was welcomed, not as a successful combatant in a civil war, but as the man who had vindicated the sovereignty of Rome against its assailants, as the saviour of the republic and of his fellow-citizens, above all as the restorer of peace.

He was now, to quote his own words, " master of all things," and the Roman world looked to him for some permanent settle- ment of the distracted empire. His first task was the re-establish- ment of a regular and constitutional government, such as had not existed since Julius Caesar

crossed the Rubicon twenty years before. To this task he devoted the next eighteen months (Aug. 20-Jan. 27 B.C.). In the article on Rome : History (q.v.), his achievements are described in detail, and only a brief summary need be given here. The " principate," to give the new form of government its most appropriate name, was a compromise thoroughly characteristic of the combination of tenacity of purpose with cautious respect for forms and conven- tions which distinguished its author. The republic was restored; senate, magistrates and assembly resumed their ancient func- tions; and the public life of Rome began to run once more in the familiar grooves. The triumvirate with its irregularities and excesses was at an end. The controlling authority, which Octavian himself wielded, could not indeed be safely dispensed with. But henceforward he was to exercise it under constitu- tional forms and limitations, and with the express sanction of the senate and people. Octavian was legally invested for a period of ten years with the government of the important frontier provinces, with the sole command of the military and naval forces of the state, and the exclusive control of its foreign relations. At home it was understood that he would year by year be elected consul, and enjoy the powers and pre-eminence attached to the chief magistracy of the Roman state. Thus the republic was restored under the presidency and patronage of its " first citizen " (princeps civitatis).

In acknowledgment of this happy settlement and of his other services further honours were conferred upon Octavian. On the 13th of January 27 B.C., the birthday of the restored republic, he was awarded the civic crown to be placed over the door of his house, in token that he had saved his fellow-citizens and restored the Republic. Four days later (Jan. 17) the senate conferred upon him the cognomen of Augustus.

But it was not only the machinery of government in Rome that needed repair. Twenty years of civil war and confusion had disorganized the empire, and the strong hand of Augustus,

as he must now be called, could alone restore confidence and order. Towards the end of 27 B.C. he left Rome for Gaul, and from that date until October 19 B.C. he was mainly occupied with the reorganization of the provinces and of the provincial administration, first of all in the West and then in the East. It was during his stay in Asia (20 B.C.) that the Parthian king Phraates voluntarily restored the Roman prisoners and standards taken at Carrhae (53 B.C.), a welcome tribute to the respect inspired by Augustus, and a happy augury for the future. In October 19 B.C. he

returned to Rome, and the senate ordered that the day of his return (Oct. 12) should thenceforward be observed as a public holiday. The period of ten years for which his imperium had been granted him was nearly ended, and though much remained to be done, very much had been accomplished. The pacification of northern Spain by the subjugation of the Astures and Cantabri, the settlement of the wide territories added to the empire by Julius Caesar in Gaul — the " New Gaul," or the " long-haired Gaul " (Gallia Comata) as it was called by way of distinction from the old province of Gallia Narbonensis (see Gaul) — and the re-establishment of Roman authority over the kings and princes of the Near East, were achievements 'which fully justified the acclamations of senate and people.

In 18 B.C. Augustus's imperium was renewed for five years, and his tried friend Marcus Agrippa, now his son-in-law, was associated with him as a colleague. From October of 19 B.C. till the middle of 16 B.C. Augustus's main attention was given to Rome and to domestic reform, and to this period belong such measures as the Julian law " as to the marriage of. the orders." In June of 17 B.C. the opening of the new and better age, which he had worked to bring about, was marked by the celebration in Rome of the Secular games. The chief actors in the ceremony were Augustus himself and his colleague Agrippa, — while, as the extant record tells us, the processional hymn, chanted by youths and maidens first before the new temple of Apollo on the Palatine and then before the temple of Jupiter on the Capitol, was composed by Horace. The hymn, the well-known Carmen Saeculare, gives fervent expression to the prevalent emotions of joy and gratitude.

In the next year (16 B.C.), however, Augustus was suddenly called away from Rome to deal with a problem which engrossed much of his attention for the next twenty-five years. The defeat of Marcus Lollius, the legate commanding on the Rhine, by a horde of German invaders, seems to have determined Augustus to take in hand the whole question of the frontiers of the empire towards the north, and the effective protection of Gaul and Italy. The work was entrusted to Augustus's step-sons Tiberius and Drusus. The first step was the annexation of Noricum and Raetia (16-15 B.C.), which brought under Roman control the mountainous district through which the direct routes lay from North Italy to the upper waters of the Rhine and the Danube. East of Noricum Tiberius reduced to order for the time the restless tribes of Pannonia, and probably established a military post at Carnuntum on the Danube. To Drusus fell the more ambitious task of advancing the Roman frontier line from the Rhine to the Elbe, a work which occupied him until his death in Germany in 9 B.C. In 13 B.C. Augustus had returned to Rome; his return, and the conclusion of his second period of rule, were commemorated by the erection of one of the most beautiful monuments of the Augustan age, the Ara Pacis Augustae

(see Roman Art, PI. II, III). His, imperium was renewed, again for five years, and in 12 B.C., on the death of his former fellow-triumvir Lepidus, he was elected Pontifex Maximus. But this third period of his imperium brought with it losses which Augustus must have keenly felt. Only a few months after his reappointment as Augustus's colleague, Marcus Agrippa, his trusted friend since boyhood, died. As was fully his due, his funeral oration was pronounced by Augustus, and he was buried in the mausoleum near the Tiber built by Augustus for himself and his family. Three years later his brilliant step-son Drusus died on his way back from a campaign in Germany, in which he had reached the Elbe. Finally in 8 B.C. he lost the comrade who next to Agrippa had been the most intimate

friend and counsellor of his early manhood, Gaius Cilnius Mae- cenas, the patron of Virgil and Horace.

For the moment Augustus turned, almost of necessity, to his surviving step-son. Tiberius was associated with him as Agrippa had been in the tribunician power, was married against his will to Julia, and sent to complete his brother Drusus's work in Germany (7-6 B.C.). But Tiberius was only his step-son, and, with all his great qualities, was never a very lovable man. On the other hand, the two sons of Agrippa and Julia, Gaius and Lucius, were of his own blood and evidently dear to him. Both had been adopted by Augustus (17B.C.). In 6 B.C. Tiberius, who had just received the tribunician power, was transferred from Germany to the East, where the situation in Armenia demanded attention. His sudden withdrawal to Rhodes has been variously explained, but, in part at least, it was probably due to the plain indications which Augustus now gave of his wish that the young Caesars should be regarded as his heirs. The elder, Gaius, now fifteen years old (5 B.C.), was formally introduced to the people as consul-designate by Augustus himself, who for this purpose resumed the consulship (12th) which he had dropped since 23 B.C., and was authorized to take part in the deliberations of the senate. Three years later (2 B.C.) Augustus, now consul for the 13th and last time, paid a similar compliment to the younger brother Lucius. In 1 B.C. Gaius was given proconsular imperium, and sent to re-establish order in Armenia, and a few years afterwards (a.d. 2) Lucius was sent to Spain, apparently to take command of the legions there. But the fates were unkind; Lucius fell sick and died at Marseilles on his way out, and in the next year (a.d. 3) Gaius, wounded by an obscure hand in Armenia, started reluctantly for home, only to die in Lycia. Tiberius alone was left, and Augustus, at once accepting facts, formally and finally declared him to be his colleague and destined successor (a.d. 4) and adopted him as his son.

The interest of the last ten years of Augustus's life centres in the events occurring on the northern frontier. The difficult task of bringing the

German tribes between the Rhine and the Elbe under Roman rule, commenced by Drusus in 13 B.C., had on his death been continued by Tiberius (9-6 B.C.). During Tiberius's retirement in Rhodes no decisive progress was made, but in a.d. 4 operations on a large scale were resumed. From Velleius Paterculus, who himself served in the war, we learn that in the first campaign Roman authority was restored over the tribes between the Rhine and the Weser, and that the Roman forces, instead of returning as usual to their headquarters on the Rhine, went into winter-quarters near the source of the Lippe. In the next year (a.d. 5) the Elbe was reached by the troops, while the fleet, after a hazardous voyage, arrived at the mouth of the same river and sailed some way up it. Both feats are deservedly commemorated by Augustus himself in the Ancyran monument. To complete the conquest of Germany and to connect the frontier with the line of the Danube, it seemed that only one thing remained to be done, to break the power of the Marcomanni and their king Maroboduus. In the spring of a.d. 6 preparations were made for this final achieve- ment; the territory of the Marcomanni (now Bohemia) was to be invaded simultaneously by two columns. One, starting apparently from the headquarters of the army of Upper Germany at Mainz, was to advance by way of the Black Forest and attack Maroboduus on the west; the other, led by Tiberius himself, was to start from the new military base at Carnuntum on the Danube and operate from the south-east.

But the attack was never delivered, for at this moment, in the rear of Tiberius, the whole of Pannonia and Dalmatia burst into a blaze of insurrection. The crisis is pronounced by Suetonius to have been more serious than any which had confronted Rome since the Hannibalic war, for it was not merely the loss of a province but the invasion of Italy that was threatened, and Augustus openly declared in the senate that the insurgents might be before Rome in ten days. He himself moved to Ariminum to be nearer the seat of war, recruiting was vigorously carried on in Rome and Italy, and legions were summoned from

Moesia and even from Asia. In the end, and not including the Thracian cavalry of King Rhoemetalces, a force of 15 legions with an equal number of auxiliaries was employed. Even so the task of putting down the insurrection was difficult enough, and it was not until late in the summer of a.d. 9, after three years of fighting, that Germanicus, who had been sent to assist Tiberius, ended the war by the capture of Andetrium in Dalmatia.

Five days later the news reached Rome of the disaster to Varus and his

legions, in the heart of what was to have been the new province of Germany beyond the Rhine. The disaster was avowedly due entirely to Varus's incapacity and vanity, and might no doubt have been repaired by leaders of the calibre of Tiberius and Germanicus. Augustus, however, was now seventy- two, the Dalmatian outbreak had severely tried his nerve, and now for the second time in three years the fates seemed to pro- nounce clearly against a further prosecution of his long-cherished scheme of a Roman Germany reaching to the Elbe.

All that was immediately necessary was done. Recruiting was pressed forward in Rome, and first Tiberius and then Germanicus were despatched to the Rhine. But the German leaders were too prudent to risk defeat, and the Roman generals devoted their attention mainly to strengthening the line of the Rhine.

The defeat of Varus, and the tacit abandonment of the plans of expansion begun twenty-five years before, are almost the last events of importance in the long principate of Augustus. The last five years of his life (a.d. 10-14) were untroubled by war or disaster. Augustus was ageing fast, and was more and more disinclined to appear personally in the senate or in public. Yet in a.d. 13 he consented, reluctantly we are told, to yet one more renewal of his imperium for ten years, stipulating, however, that his step-son Tiberius, himself now over fifty, should be associated with himself on equal terms in the administration of the empire. Early in the same year (January 16, a.d. 13) the last triumph of his principate was celebrated. Tiberius was now in Rome, the command on the Rhine having been given to Germanicus, who went out to it immediately after his consulship (a.d. 12), and the time had come to celebrate the Dalmatian and Pannonian triumph, which the defeat of Varus had postponed. Augustus witnessed the triumphal procession, and Tiberius, as it turned from the Forum to ascend the Capitol, halted, descended from his triumphal car, and did reverence to his adopted father.

One last public appearance Augustus made in Rome. During a.d. 13 he and Tiberius conducted a census of Roman citizens, the third taken by his orders; the first having been in 28 B.C. at the very outset of his rule. The business of the census lasted over into the next year, but on the nth of May, a.d. 14, before a great crowd in the Campus Martius, Augustus took part in the solemn concluding ceremony of burying away out of sight .the old age and inaugurating the new. The ceremony had been full of significance in 28 B.C., and now more than forty years later it was given a pathetic interest by Augustus himself. When the tablets containing the vows to be offered for the welfare of the state during the next lustrum were handed to him, he left the duty of reciting them to Tiberius, saying that he would not take vows which he was never destined to perform.

It was apparently at the end of June or early in July that Augustus left Rome on his last journey. Travelling by road to Astura (Torre Astura) at the southern point of the little bay of Antium, he sailed thence to Capri and to Naples. On his way at Puteoli, the passengers and crew of a ship just come from Alexandria cheered the old man by their spontaneous homage, declaring, as they poured libations, that to him they owed life, safe passage on the seas, freedom and fortune.

At Naples, in spite of increasing disease, he bravely sat out a gymnastic contest held in his honour, and then accompanied Tiberius as far as Beneventum on his way to Brundusium and Illy ri cum. On his return he was forced by illness to stop at Nola, his father's old home. Tiberius was hastily recalled and had a last confidential talk on affairs of state. Thenceforward, says Suetonius, he gave no more thought to such great affairs. He bade farewell to bis friends, inquired after the health of

Drusus's daughter who was ill, and then quietly expired in the arms of the wife who for more than fifty years had been his most intimate and trusted guide and counsellor, and to whom his last words were an exhortation to " live mindful of our wedded life." He died on the 19th of August, a.d. 14, in the same room in which his father had died before him, and on the anniversary of his entrance upon his first consulship fifty-seven years before (43 B.C.). The corpse was carried to Rome in slow procession along the Appian Way. On the day of the funeral it was borne to the Campus Martius on the shoulders of senators and there burnt. The ashes were reverently collected by Livia, and placed in the mausoleum by the Tiber which her husband had built for himself and his family. The last act was the formal decree of the senate by which Augustus, like his father Julius before him, was added to the number of the gods recognized by the Roman state.

If we except writers like Voltaire who could see in Augustus only the man who had destroyed the old republic and extin- guished political liberty, the verdict of posterity on Augustus has varied just in proportion as his critics have fixed their attention, mainly, on the means by which he rose to power, or the use which he made of the power when acquired. The" lines of argument followed respectively by friendly and hostile contemporaries immediately after his death (Tac. Ann. i. 9, 10) have been followed by later writers with little change. But of late years, our increasing mistrust of the current gossip about him, and our increased knowledge of the magnitude of what he actually accomplished, have conspicuously influenced the judgments passed upon him. We allow the faults and crimes of his early manhood, his cruelties and deceptions, his readiness to sacrifice everything that came between him and the end he had in view. On the other hand, a careful study of what he achieved between the years 38 B.C.,

when he married Livia, and his death in a.d. 14, is now held to give him a claim to rank, not merely as an astute and successful intriguer, or an accom- plished political actor, but as one of the world's great men, a statesman who conceived and carried through a scheme of political reconstruction which kept the empire together, secured peace and tranquillity, and preserved civilization for more than two centuries.

Bibliography. — The most comprehensive work on Augustus and his age is that of V. Gardthausen, Augustus und seine Zeit (2 vols., Leipzig, 1891-1904), which deals with all aspects of Augustus's life, vol. ii. consisting of elaborate critical and bibliographical notes. See also histories of Rome generally, and among special works: — E. S. Shuckburgh, Augustus (London, 1903; reviewed by F. T. Richards in Class. Rev. vol. xviii.), containing the text of the Monu- mentum Ancyranum (see also Gardthausen, book xiii.) ; J. B. Firth, Augustus Caesar (London, 1903), in " Heroes of the Nations " .series; O. Seeck, " Kaiser Augustus " (Monographien zur Welt- geschichte, xvii., 1902), nine essays on special problems, e.g. the campaigns of Mutina, Perusia and against Sextus Pompeius, "das Augustische Zeitalter"; A. Dumeril, " Auguste et la fondation de l'empire romain," in the Annates de la Fac. des lett. de Bordeaux (1890); a suggestive monograph on the reforms of Augustus in relation to the decrease of population is Jules Ferlet's L' Abaissement de la natalite & Rome (Paris, 1902). (H. F. P.)

AUGUSTUS I. (1526-1586), elector of Saxony, was the younger son of Henry, duke of Saxony, and consequently belonged to the Albertine branch of the Wettin family. Born at Freiberg on the 31st of July 1526, and brought up as a Lutheran, he received a good education and studied at the university of Leipzig. When Duke Henry died in 1541 he decreed that his lands should be divided equally between his two sons, but as his bequest was contrary to law, it was not carried out, and the dukedom passed almost intact to his elder son, Maurice. Augustus, however, remained on friendly terms with his brother, and to further his policy spent some time at the court of the German king, Ferdinand I., in Vienna. In 1544 Maurice secured the appointment of his brother as administrator of the bishopric of Merseburg; but Augustus was very extravagant and was soon compelled to return to the Saxon court at Dresden. Augustus supported his brother during the war of the league of Schmalkalden, and in the policy which culminated in the transfer of the Saxon electorate from John Frederick I., the head of the Ernestine branch of the Wettin

]•

AtfGtfiSTUS' II.

family, to Maurice. On the 7 th of October 1548 Augustus was married at Torgau to Anna, daughter of Christian III., king of Denmark, and took up his residence at Weissenfels. But he soon desired a more imposing establishment. The result was that Maurice made more generous provision for his brother, who acted as regent of Saxony in 1552 during the absence of the elector. Augustus was on a visit to Denmark when by Maurice's death in July 1553 he became elector of Saxony.

The first care of the new elector was to come to terms with John Frederick, and to strengthen his own hold upon the electoral position. This object was secured by a treaty made at Naum- burg in February 1 554, when, in return for the grant of Altenburg and other lands, John Frederick recognized Augustus as elector of Saxony. The elector, however, was continually haunted by the fear that the Ernestines would attempt to deprive him of the coveted dignity, and his policy both in Saxony and in Ger- many was coloured by this fear. In imperial politics Augustus acted upon two main principles: to cultivate the friendship of the Habsburgs, and to maintain peace between the contending religious parties. To this policy may be traced his share in bringing about the religious peace of Augsburg in 1555, his tortuous conduct at the diet of Augsburg eleven years later, and his reluctance to break entirely with the Calvinists. On one occasion only did he waver in his allegiance to the Habsburgs. In 1568 a marriage was arranged between John Casimir, son of the elector palatine, Frederick III., and Elizabeth, a daughter of Augustus, and for a time it seemed possible that the Saxon elector would support his son-in-law in his attempts to aid the revolting inhabitants of the Netherlands. Augustus also entered into communication with the Huguenots; but his aversion to foreign complications prevailed, and the incipient friendship with the elector palatine soon gave way to serious dislike. Although a sturdy Lutheran the elector hoped at one time to unite the Protestants, on whom he continually urged the necessity of giving no cause of offence to their opponents, and he favoured the movement to get rid of the clause in the peace of Augsburg concerning ecclesiastical reservation, which was offensive to many Protestants. His moderation, however, prevented him from joining those who were prepared to take strong measures to attain this end, and he refused to jeopardize the concessions already won.

The hostility between the Albertines and the Ernestines gave serious trouble to Augustus. A preacher named Matthias Flacius held an influential position in ducal Saxony, and taught a form of Lutheranism different from that taught in electoral Saxony. This breach was widened when Flacius began to make personal attacks on Augustus, to prophesy his speedy downfall, and to incite Duke John Frederick to make an effort to recover

his rightful position. Associated with Flacius was a knight, William of Grumbach, who, not satisfied with words only, made inroads into electoral Saxony and sought the aid of foreign powers in his plan to depose Augustus. After some delay Grumbach and his protector, John Frederick, were placed under the imperial ban, and Augustus was entrusted with its execution. His campaign in 1 567 was short and successful. John Frederick surrendered, and passed his time in prison until his death in 1595; Grumbach was taken and executed; and the position of the elector was made quite secure.

The form of Lutheranism taught in electoral Saxony was that of Melanchthon, and many of its teachers and adherents, who were afterwards called Crypto-Calvinists, were favoured by the elector. When Augustus, freed from the fear of an attack by the Ernestines, became gradually estranged from the elector palatine and the Calvinists, he seemed to have looked with suspicion upon the Crypto-Calvinists, who did not preach the pure doctrines of Luther. Spurred on by his wife the matter reached a climax in 1574, when letters were discovered, which, while revealing a hope to bring over Augustus to Calvinism, cast some aspersions upon the elector and his wife. Augustus ordered the leaders of the Crypto-Calvinists to be seized, and they were tortured and imprisoned. A strict form of Lutheranism was declared binding upon all the inhabitants of Saxony, and

many persons were banished from the country. In 1576 he made a serious but unsuccessful attempt to unite the Protestants upon the basis of some articles drawn up at Torgau, which in. culcated a strict form of Lutheranism. The change in Saxony, however, made no difference to the attitude of Augustus on imperial questions. In 1576 he opposed the proposal of the Protestant princes to- make a grant for the Turkish War con- ditional upon the abolition of the clause concerning ecclesiastical reservation, and he continued to support the Habsburgs.*

Much of the elector's time was devoted to extending his territories. In 1573 he became guardian to the two sons of John William, duke of Saxe-Weimar, and in this capacity was able to add part of the county of Henneberg to electoral Saxony. His command of money enabled him to take advantage of the poverty of his neighbours, and in this way he secured Vogtland and the county of Mansfeld. In 1555 he had appointed one of his nominees to the bishopric of Meissen, in 1561 he had secured the election of his son Alexander as bishop of Merseburg, and three years later as bishop of Naumburg; and when this prince died in 1565 these bishoprics came under the direct rule of Augustus.

As a ruler of Saxony Augustus was economical and enlightened. He

favoured trade by encouraging Flemish emigrants to settle in the country, by improving the roads, regulating the coinage and establishing the first posts. He was specially interested in benefiting agriculture, and added several fine buildings to the city of Dresden. His laws were numerous and comprehensive. The constitution of 1572 was his work, and by these laws the church, the universities and the police were regulated, the administration of justice was improved, and the raising of taxes placed upon a better footing (see Saxony) .

In October 1585 the electress Anna died, and a few weeks later Augustus married Agnes Hedwig, a daughter of Joachim Ernest, prince of Anhalt. His own death took place at Dresden on the 21st of January 1586, and he was buried at Freiberg. By his first wife he had fifteen children, but only four of these survived him, among whom was his successor, the elector Christian I. (1 560-1 591). Augustus was a covetous, cruel and superstitious man, but these qualities were redeemed by his political caution and his wise methods of government. He wrote a small work on agriculture entitled Kunsllich Obst- und Gartenbiichlein.

See C. W. Bottiger and T. Flathe, Geschichte Sachsens, Band ii. (Gotha, 1870) ; M. Ritter, Deutsche Geschichte im Zeitalter der Gegen-reformation, Band i. (Stuttgart, 1890) ; R. Calinich, Kampf und Untergang des Melanchthonismus in Kursachsen (Leipzig, 1866); J. Falke, Geschichte des Kurfursten August in volkswirtschaftlicher Beziehung (Leipzig, 1868); J. Janssen, Geschichte des Deutschen Volks seit dem Ausgang des Mittelalters (Freiburg, 1885-1894); W. Wenck, Kurfiirst Moritz und Herzog August (Leipzig, 1874).

AUGUSTUS II., king of Poland, and, as Frederick Augustus I., elector of Saxony (1670-1733), second son of John George III., elector of Saxony, was born at Dresden on the 12th of May 1670. He was well educated, spent some years in travel and in fighting against France, and on account of his immense strength was known as " the Strong." On the death of his brother, John George IV., in 1694, he became elector of Saxony, and in 1695 and 1696 led the imperial troops against the Turks, but without very much success. When John Sobieski died in 1696, Augustus was a candidate for the Polish throne, and in order to further his chances became a Roman Catholic, a step which was strongly resented in Saxony. By a lavish expenditure of money, and by his promptness in entering the country, he secured his election and coronation in September 1697, and his principal rival F. L. de Bourbon, prince of Conti, abandoned the contest and returned to France. Augustus continued the war against the Turks for a time, and being anxious to extend his influence and to find a pretext for retaining the Saxon troops in Poland, made an alliance in 1699 with Russia and Denmark against Charles XII. of Sweden. The Poles would not

assist, and at the head of the Saxons Augustus invaded Livonia, but for various causes the campaign was not a success, and in July 1702 he was defeated by Charles at Klissow. Augustus was then deposed in Poland,

and after holding Warsaw for a short time he fled to Saxony. The alliance with Russia was renewed and in reply Charles invaded Saxony in 1706, and compelled the elector to sign the treaty of Altranstadt in September of that year, to recognize Stanislaus Leszczynski as his successor in Poland, and to abandon the Russian alliance. During the War of the Spanish Succession, Augustus fought with the imperialists in the Netherlands, but after the defeat of Charles XII. at Poltawa in July 1709, he turned his attention to the recovery of Poland. Declaring the treaty of Altranstadt void and renewing his alliance with Russia and Denmark, he quickly recovered the Polish crown. He then attacked Swedish Pomerania. He was handicapped by the mutual jealousy of the Saxons and the Poles, and a struggle broke out in Poland which was only ended when the king promised to limit the number of his army in that country to 18,000 men. Peace was made with Sweden in December 17 19 at Stockholm after the death of Charles XII., and Augustus was recognized as king of Poland. His remaining years were spent in futile plans to make Poland a hereditary monarchy, to weaken the power of the Saxon nobles, and to gain territory for his sons in various parts of Europe. He was a man of ex- travagant and luxurious tastes, and, although he greatly improved the city of Dresden, he cannot be called a good ruler. He sought to govern Saxony in an absolute fashion, and, in spite of his declaration that his conversion to Roman Catholicism was personal only, assisted the spread of the teachings of Rome. His wife was Christine Eberhardine, a member of the Hohen- zollern family, who left him when he became a Roman Catholic, and died in 1727. Augustus died at Warsaw on the 1st of February 1733, leaving a son Frederick Augustus, who succeeded him in Poland and Saxony, and many illegitimate children, among whom was the famous general, Maurice of Saxony, known as Marshal Saxe (g.v.).

See Otwikowski, History of Poland under Augustus II. (Cracow, 1849) ; F. Forster, Die Hofe und Kabinette Europas im achtzehnten Jahrhundert (Potsdam, 1839) ; Jarochowski, History of Augustus II. (Posen, 1856-1874); C. W. Bcittiger and T. Flathe, Geschichte des Kurstaates und Konigreichs Sachsen (Gotha, 1867-1873).

AUGUSTUS III., king of Poland, and, as Frederick Augustus II., elector of Saxony (1696-1763), the only legitimate son of Augustus II. (" the Strong

"), was born at Dresden on the 17th of October 1696. Educated as a Protestant, he followed his father's example by joining the Roman Catholic Church in 1712, although his conversion was not made public until 17 17. In August 1 7 19 he married Maria Josepha, daughter of the emperor Joseph I., and seems to have taken very little part in public affairs until he became elector of Saxony on his father's death in February 1733. He was then a candidate for the Polish crown; and having purchased the support of the emperor Charles VI. by assenting to the Pragmatic Sanction, and that of the czarina Anne by recognizing the claim of Russia to Cour- land, he was elected king of Poland in October 1733. Aided by the Russians, his troops drove Stanislaus Leszczynski from Poland; Augustus was crowned at Cracow in January 1734, and was generally recognized as king at Warsaw in June 1736. On the death of Charles VI. in October 1740, Augustus was among the enemies of his daughter Maria Theresa, and, as a son-in-law of the emperor Joseph I., claimed a portion of the Habsburg territories. In 1742, however, he was induced to transfer his support to Maria Theresa, and his troops took part in the struggle against Frederick the Great during the Silesian wars, and again when the Seven Years' War began in 1756. Saxony was in that year attacked by the Prussians, and with so much success that not only was the Saxon army forced to capitulate at Pima in October, but the elector, who fled to Warsaw, made no attempt to recover Saxony, which remained under the dominion of Frederick. When the treaty of Huberts- burg was concluded in February 1763, he returned to Saxony, where he died on the 5th of October 1763. He left five sons, the eldest of whom was his successor in Saxony, Frederick Christian; and five daughters, one of whom was the wife of Louis, the dauphin of France, and mother of Louis XVI. Another

daughter was the wife of Charles III., king of Spain, but she predeceased her father. Augustus, who showed neither talent nor inclination for government, was content to leave Poland under the influence of Russia, and Saxony to the rule of his ministers. He took great interest in music and painting, and added to the collection of art treasures at Dresden.

See C. W. Bottiger and T. Flathe, Geschichte des Kurstaates und Konigreichs Sachsen (Gotha, 1867-1873); R. Ropell, Polen um die Mitte des 18. Jahrhunderts (Gotha, 1876).

AUGUSTUSBAD, a watering-place of Germany, in the king- dom of Saxony, 10 m. E. from Dresden, close to Radeberg, in a pleasant valley. Pop. 900. It has five saline chalybeate springs, used both for drinking and bathing, and specific in feminine disorders, rheumatism, paralysis and neuralgia. The spa is largely frequented in summer and has agreeable public rooms and gardens.

AUK, a name commonly given to several species of sea-fowl. A special interest attaches to the great auk {Alca impennis), owing to its recent extinction and the value of its eggs to collectors. (See Garefowl; also Guillemot, Puffin, Razor- bill.)

AULARD, FRANCOIS VICTOR ALPHONSE (1849-), French historian, was born at Montbron in Charente in 1849. Having obtained the degree of doctor of letters in 1877 with a Latin thesis upon C. Asinius Pollion and a French one upon Giacomo Leopardi (whose works he subsequently translated into French), he made a study of parliamentary oratory during the French Revolution, and published two volumes upon Les Orateurs de la constituante (1882) and upon Les Orateurs de la legislative et de la convention (1885). With these works, which were reprinted in 1905, he entered a fresh field, where he soon became an acknowledged master. Applying to the study of the French Revolution the rules of historical criticism which had produced such rich results in the study of ancient and medieval history, he devoted himself to profound research in the archives, and to the publication of numerous most important contribu- tions to the political, administrative and moral history of that marvellous period. Appointed professor of the history of the French Revolution at the Sorbonne, he formed the minds of students who in their turn have done valuable work. To him we owe the Recueil des actes du comite de salut public , (vol. i., 1889; vol. xvi., 1904); La SociiU des Jacobins; recueil de documents pour Vhistoire du club des Jacobins de Paris (6 vols., 1889-1897); and Paris pendant la reaction thermidorienne et sous le directoire, recueil de documents pour Vhistoire de I'esprit public d Paris (5 vols., 1898-1902), which was followed by an analogous collec- tion for Paris sous le consulat (2 vols., 1903-1904). For the Societe de 1'Histoire de la Revolution Francaise, which brought out under his supervision an important periodical publication called La Revolution francaise, he produced the Registre des deliberations du consulat provisoire (1894), and L'Etat de la France en Van VIII et en Van IX, with the reports of the prefects (1897), besides editing various works or memoirs written by men of the Revolution, such as J. C. Bailleul, Chaumette, Fournier (called the American), Herault de Sechelles, and Louvet de Couvrai. But these large collections of documents are not his entire output. Besides a little pamphlet upon Danton, he has written a Histoire politique de la Revolution francaise (1901), and a number of articles which have been collected in volumes under the title Eludes et lemons sur la Revolu- tion francaise (5 vols., 1893-1908). In a volume entitled Taine, historien de la Revolution franc aise (1 908), Aulardhas submitted the method of the eminent philosopher to a criticism, severe, perhaps even unjust, but certainly well-informed. This is, as it were, the " manifesto " of the new school of criticism applied to the political and social history of the Revolution (see Les Annates

Re.volutionnaires, June 1908).

See A. Mathiez, " M. Aulard, historien et professeur," in the Revue de la Revolution francaise (July 1908). (C. B.)*

AULIC COUNCIL (Reichshofrat) , an organ of the Holy Roman Empire, originally intended for executive work, but acting chiefly as a judicature, which worked from 1497 to 1806. In the

early middle ages the emperor had already his consiliarii ; but his council was a fluctuating body of personal advisers. In the 14th century there first arose an official council, with permanent and paid members, many of whom were legists. Its business was largely executive, and it formed something of a ministry; but it had also to deal with petitions addressed to the king, and accordingly it acted as a supreme court of judicature. It was thus parallel to the king's council, or concilium continuum, of medieval England; while by its side, during the 15th century, stood the Kammergericht, composed of the legal members of the council, in much the same way as the Star Chamber stood beside the English council. But the real history of the Aulic Council, as that term was understood in the later days of the Empire, begins with Maximilian I. in 1497-1498. In these years Maximilian created three organs (apparently following the precedent set by his Burgundian ancestors in the Netherlands) — a Hofrat, a H of hammer for finance, and a Hofkanzlei. Primarily intended for the hereditary dominions of Maximilian, these bodies were also intended for the whole Empire ; and the Hofrat was to deal with " all and every business which may flow in from the Empire, Christendom at large, or the king's hereditary principalities." It was thus to be the supreme executive and judicial organ, discharging all business except that of finance and the drafting of documents; and it was intended to serve Maximilian as a point d'appui for the monarchy against the system of oligarchical committees, instituted by Berthold, archbishop of Mainz. But it was difficult to work such a body both for the Empire and for the hereditary principalities; and under Ferdinand I. it became an organ for the Empire alone (circ. 1558), the hereditary principalities being removed from its cognizance. As such an imperial organ, its composition and powers were fixed by the treaty of Westphalia of 1648. (1) It consisted of about 20 members — a president, a vice-president, the vice-chancellor of the Empire, and some 18 other members. These came partly from the Empire at large, partly (and in greater numbers) from the hereditary lands of the emperor. There were two benches, one of the nobles, one of doctors of civil law; six of the members

must be Protestants. The council followed the person of the emperor, and was therefore stationed at Vienna; it was paid by the emperor, and he nominated its members, whose office terminated with his life — an arrangement which made the council more dependent than it should have been on the emperor's will. (2) Its powers were nominally both executive and judicial, (a) Its executive powers were small: it gradually lost everything except the formal business of in- vestiture with imperial fiefs and the confirmation of charters, its other powers being taken over by the Geheimrdte. These Geheimrdte, a narrow body of secret counsellors, had already become a determinate concilium by 1527; and though at first only concerned with foreign affairs, they acquired, from the middle of the 16th century onwards, the power of dealing with imperial affairs in lieu of the Aulic Council. (6) In its judicial aspect, the Aulic Council, exercising the emperor's judicial powers on his behalf, and thus succeeding, as it were, to the old Kammergericht, had exclusive cognizance of matters relating to imperial fiefs, criminal charges against immediate vassals of the Empire, imperial charters, Italian affairs, and cases " reserved " for the emperor. In all other matters, the Aulic Council was a competitor for judicial work with the Imperial Chamber 1 (Reichskammergerichl, a tribunal dating from the great diet of Worms of 1495: see under Imperial Chamber). It was determined in 1648 that the one of these two judicial authorities which first dealt with a case should alone have com- petence to pursue it. An appeal lay from the decision of the council to the emperor, and judgment on appeal was given by those members of the council who had not joined in the original decision, though in important cases they might be afforced by members of the diet. Neither the council nor the chamber could

1 The Aulic Council is the private court of the emperor, with its members nominated by him; the Imperial Chamber is the public court of the Empire, with its members nominated by the estates of the Empire.

deal with cases of outlawry, except to prepare such cases for the decision of the diet. To-day the archives of the Aulic Council are in Vienna, though parts of its records have been given to the German states which they concern.

Authorities. — R. Schroder, Lehrbuch der deutschen Rechts- geschichte (Leipzig, 1904), gives the main facts; S. Adler, Die Organisation dcr Centralverwaltung unter Maximilian I. (Leipzig, 1886), deals with Maximilian's reorganization of the Council; and J. St. Putter, Historiscke Enhvickelung der heutigen Staatsverfassung des Teutschen Reichs (Gottingen, 1 798-1 799), may be consulted for its development and later form. (E.Br.)

AULIE-ATA, a town and fort of Russian Turkestan, province of Syr-darya,

152 m. N.E. of Tashkent, on the Talas river, at the western end of the Alexander range, its altitude being 5700 ft. The inhabitants are mostly Sarts and Tajiks, trading in cattle, horses and hides. Pop. (1897) 12,006.

AULIS, an ancient Boeotian town on the Euripus, situated on a rocky peninsula between two bays, near the modern village of Vathy, about 3 m. S. of Chalcis. Its fame was due to the tradition that it was the starting-place of the Greek fleet before the Trojan War, the scene of the sacrifice of Iphigenia. The temple of Artemis was still to be seen in the time of Pausanias.

AULNOY (or Aunoy), MARIE CATHERINE LE JUMEL DE BARNEVILLE DE LA MOTTE, Baronne d' (c. 1650-1705), French author, was born about 1650 at Barneville near Bourg-Achard (Eure). She was the niece of Marie Bruneau des Loges, the friend of Malherbe and of J. G. de Balzac, who was called the " tenth Muse." She married on the 8th of March 1666 Francois de la Motte, a gentleman in the service of Cesar, due de Vendome, who became Baron d'Aulnoy in 1654. With her mother, who by a second marriage had become marquise de Gudaigne, she instigated a prosecution for high treason against her husband. The conspiracy was exposed, and the two women saved themselves by a hasty flight to England. Thence they went (February 1679) to Spain, but were eventually allowed to return to France in reward for secret services rendered to the government. Mme. d'Aulnoy died in Paris on the 14th of January 1705. She wrote f&iry tales, Contes nouvelles ou les Fees d la mode (3 vols., 1698), in the manner of Charles Perrault. This collection (24 tales) included L'Oiseau bleu, Finette Cendron, La Chatte blanche and others. The originals of most of her

admirable tales are to be found in the Pentamerone (1637) of Giovanni Battista Basile. Other works are : L'Histoired'Hippolyte, comte de Duglas (1690), a romance in the style of Madame de la Fayette, though much inferior to its model; Mimoires de la cour d'Espagne (1679-1681); and a Relation du voyage d'Espagne (i690or 1691) in the form of letters, edited in 1874-1876 as La Cour et la ville de Madrid by Mme. B. Carey; Histoire de Jean de Bourbon (1692); Memoires sur la cour de France (1692); MSmoires de la cour d' Angleterre (1695). Her historical writings are partly borrowed from existing records, to which she adds much that must be regarded as fiction, and some vivid descriptions of contemporary manners.

The Diverting Works of the Countess d'Anois, including some extremely untrustworthy " Memoirs of her own life," were printed in London in 1707. The Fairy Tales of Madame d'Aulnoy, with an introduction by Lady Thackeray Ritchie, appeared in 1892. For biographical particulars see M. de Lescure's introduction to the Conies des Fees (1881).

AULOS (Gr. av\6s; Lat. tibia; Egyptian hieroglyphic, Ma-it ; medieval equivalents, shalm, chalumeau, schalmei, hautbois), in Greek antiquities, a class of wood- wind instruments with single or with double reed mouthpiece and either cylindrical or conical bore, thus corresponding to both oboe and clarinet. In its widest acceptation the aulas was a generic term for instruments consisting of a tube in which the air column was set in vibration either directly by the lips of the performer, or through the medium of a mouthpiece containing a single or a double reed. Even the pipes of the pan-pipes {syrinx polycalamus, 1 o-vpiyl- woXvuaXa/jos) were sometimes called auloi (av\oi). The aulos is also the earliest prototype of the organ, which, by gradual assimilation of the principles of syrinx and bag-pipe, reached 1 See Pollux, Onom. iv. 69.

the stage at which it became known as the Tyrrhenian aulos (Pollux iv. 70) or the hydraulos, according to the method of compressing the wind supply (see Organ: Early History ; and Syrinx). The aulos in its earliest form, the reed pipe, during the best classical period had a cylindrical bore (xoiXia) like that of the modern clarinet, and therefore had the acoustic properties of the stopped pipe, whether the air column was set in vibration by means of a single or of a double reed, for the mouth- piece does not affect the harmonic series. 1 To the acoustic properties of open or stopped pipes are due those essential differences which underlie the classification of modern wind instruments. A stopped pipe produces its fundamental tone one octave lower than the tone of an open pipe of corresponding length, and overblows the harmonics of the twelfth, and of the third above the second octave of the fundamental tone, i.e. the odd numbers of the series; whereas the open pipe gives the whole series of harmonics, the octave, the twelfth, the double octave, and the third above it, &c.

To produce the diatonic scale throughout the octaves of its compass, the stopped pipe requires eleven lateral holes in the side of the pipe, at appropriate distances from each other, and from the end of the pipe, whereas the open pipe requires but six. The acoustic properties of the open pipe can only be secured in combination with a reed mouthpiece by making the bore conical. The late Romans (and therefore we may perhaps assume the Greeks also, since the Romans acknowledge their indebtedness to the Greeks in matters relating to musical in- struments, and more especially to the cithara and aulos) under- stood the acoustic principle utilized to-day in making wind instruments, that a hole of small diameter nearer the mouthpiece may be substituted for one of greater diameter in the theoretically correct position. This is demonstrated by the 4th- century grammarian Macrobius, who says (Comm. in Somn. Scip. ii. 4, 5) : " Nee secus probamus in tibiis, de quarum foraminibus vicinis inflantis ori sonus acutus emittitur, de longinquis autem et termino proximis gravior; item acutior per patentiora foramina, gravior per angusta " (see Bassoon). Aristotle gives directions for boring holes in the aulos, which would apply only to a pipe of cylindrical bore (Probl. xix. 23). At first the aulos had but three or four holes; to Diodorus of Thebes is due the credit of having increased this number (Pollux iv. 80). Pronomus, the musician, and teacher of Alcibiades (5th century B.C.), further improved the aulos by making it possible to play on one pair of instruments the three musical scales in use at his time, the Dorian, the Phrygian, and the Lydian, whereas previously a separate pair of pipes had been used for each scale (Pausanias ix. 12. 5; Athenaeus xiv. 31). These three modes would require a compass of a tenth in order to produce the fundamental octave in each.

There are two ways in which this increased compass might have been obtained: (1) by increasing the number of holes and covering up those not

required, (2) by means of contrivances for lowering the pitch of individual notes as required. We have evidence that both means were known to the Greeks and Romans. The simplest device for closing holes not in use was a band of metal left free to slide round the pipe, and having a hole bored through it corresponding in diameter with the hole in the pipe. Each hole was provided with a band, which was in some cases prevented from slipping down the pipe by narrow fixed rings of metal. The line on fig. 1 between r and s is thought to have been one of these rings.

Some pipes had two holes pierced through the bands and the bone, in such a manner that only one could be exposed at a time. This is clearly shown in the diagram (fig. 1) of fragments of an aulos from the museum at Candia, for which the writer is greatly indebted to Professor John L. Myres, by whom measured drawings were made from the instrument in 1893. These highly interesting remains, judging from the closed end (5), seem to belong to a side-blown reed-pipe similar to the Maenad pipes in the Castellani collection at the British Museum, illus-

1 See Friedrich Zamminer, Die Musik und die musikalischen Instrumente in ihrer Beziehung zu den Gesetzen der Akustik (Giessen, 1855). P- 3°5

trated below; they are constructed like modern flutes, but played by means of a reed inserted into the lateral embouchure.

In the Candia pipe, it seems likely that Nos. 1 and 2 represented the bell end, slightly expanded, No. 3 joining the broken end of No. 2 at /; there being a possible fit at the other end at 5 with a in No. 4 (the drawings must in this case be imagined as reversed for parts 3 and 4), and No. 5 joining on to No. 4 at k.

According to Professor Myres there are fragments of a pair of pipes in the Cyprus Museum of precisely the same construction as the one in Candia. In the drawing, the shape and relative position of the holes on the circumference is approximate only, but their position lengthways is measured.

Bands of silver were found on the ivory pipes from Pompeii 2 (fig. 2), as well as on two pipes belonging to the Castellani collection (fig. 4) and on one from Halicarnassus, in the British Museum. In order to enable the performer to use these bands

/

wm

a

.r\ -rˆ

n

8ont..thvt fironzt ”

Scale of Inches

ˆ

(From a drawing by Prof. John L. Myres.)

Fig. 1. — Diagram of the Fragments of an Aulos (Candia Mus.).

a, Triple wrapping of bronze as well as slide. Slide with hole.

b

c, Slides with two holes not un-

covered together.

d, Slides with two holes not un-

covered together, one hole at back.

e, Slide.

/, Slide missing. [holes.

g, Slide missing, scars of slide h, Slide. i and j, Slide. k, Socket.

/, Male half of joint. m, n 0, Slides, the top hole being in the slide only.

p and q, Slides, with two holes ; the small hole shown is in the pipe, there being a corre- sponding hole in the slide at the back.

r, Bronze covering (and slide?).

s, Male joint.

/, The wavy line shows the extreme length of fragment.

u, 13 mm. inside diameter, 14 mm. outside diameter.

w, Engraved lines and conical form of bronze covering. Wavy line shows extreme

length of fragment. Stopped end of pipe with engraved lines.

x,

The line between r and s is either a turned ring or part of bronze cover. The double lines to the right of / are engraved lines.

conveniently, a contrivance such as a little ring, a horn or a hook termed keras (/cepas) was attached to the band. 8

Thirteen of the bands on the Pompeian pipes still have sockets which probably originally contained kerata. Pollux (iv. 80) mentions that Diodorus of Thebes, in order to increase the range of the aulos, made lateral channels for the air (TKayiai 68oi). These consisted of tubes inserted into the holes in the bands for the purpose of lengthening the column of air, and lowering individual notes at will, the sound being then produced at the extremity of the tube, instead of at the surface of the pipe. It is possible that some of the double holes in the slides of the Candia pipe were intended for the reception of these tubes. These lateral tubes form the archetype of the modern crook or piston. 4 The mouthpiece of the aulos was called zeugos

2 These pipes were discovered during the excavations in 1867, and are now in the museum at Naples. Excellent reproductions and descriptions of them are given in " The Aulos or Tibia," by Albert A. Howard, Harvard Studies, vol. iv. (Boston, 1893), pi. ii. and PP- 48-55-

3 For illustrations of auloi provided with these contrivances, see illustration (fig. 2) of an aulos from Pompeii; a relief in Vatican, No. 535 ;_ Helbig's Wandgemalde, Nos. 56, 69, 730, 765, &c.

4 For illustrations of 6Soi showing the holes at the ends of the tubes, see Description des marbres antiques du Musee Campana, by H. d'Escamps, pi. 25 ; Wilhelm Froehner's Catalogue of the Louvre,

(feO-yos), 1 the reed tongue glossa or glotta (yKSkrcra or yKuTTa), and the socket into which the reed was fixed glottis 3 (yKonris). The double reed was probably used at first, being the simplest form of mouthpiece; the word zeugos, moreover, signifies a pair of like things. There is, however, no difficulty in accepting the probability that a single beating reed or clarinet mouthpiece was used by the Greeks, since the ancient Egyptians used it with the as-it or arghoul (q.v.).*

The beak-shaped mouthpiece of a pipe found at Pompeii (fig. 3) has all the appearance of the beak of the clarinet, having, on the side not shown, the lay on which to fix a single or beating reed. 4 It may, how- ever, have been the cap of a covered reed, or even a whistle mouthpiece in which the lip does not show in the photograph. It is difficult to form a conclusion without seeing the real instrument. On a mosaic of Monnus in Treves 5 is represented an aulos which also appears to have a beak-shaped mouthpiece. The upper part of the aulos, as in the Pompeian pipes, frequently had the form of a flaring cup supported on a pear-shaped bulb, respectively identified as the holmos (oX/ws) and the hypholmion (v6\niov), the support of the holmos. An explanation of the original nature and construction of the bulb and flaring cup, so familiar in the various representations of the aulos, and in the real instruments found in Pompeii, is provided by an ancient Egyptian flute belonging to the collection of G. Maspero, illustrated and described by Victor Loret. 6 Loret calls the double bulb the beak mouth- piece of the instrument, and describes its construction; it consists of a piece of reed of larger diameter than that of the flute, and eight centimetres long; this reed has been forcibly compressed a little more than half way down by means of a ligature of twine, thus reducing the diameter from 6 mm. to 4 mm. The end of the pipe, covered by rows of waxed thread, fits into the end of the smaller bulb, to which it was also bound by waxed thread exactly as in the Elgin pipe at the British Museum, described below. There is no indication of the manner in which the pipe was sounded, and Loret assumes that there was once a whistle or flageolet mouthpiece. To the present writer, however, it seems probable that the constricted diameter between the two bulbs formed a socket into which the double reed or straw was inserted, and that, in this case at least, the reed was not taken into the mouth, but vibrated in the upper bulb or air-chamber. This simple contrivance was probably also employed in the earliest Greek pipes, and was later copied and elaborated in wood, bone or metal, the upper bulb being made shorter and developing into the flaring cup, in order that the reeds might be taken directly into the mouth. During the best period of Greek music the reeds were taken directly into the mouth 7 and not enclosed in an air-chamber.

No. 378; Glyptothek Museum at Munich, No. 188; Albert A. Howard, " The Aulos or Tibia," Harvard Studies, iv. (Boston, 1893), pi. 1, No. 1.

1 For a description of the reed calamus from which pipe and mouthpiece were made see Theophrastus, Hist. Plant, iv. 11.

2 Aeschines 86. 29; Aristotle, H.A. 6, io, 9, &c.

3 Lucian, Harm. 1.

4 Cf. article Mouthpiece.

5 See Antike Denkmdler, Deutsches archaol. Inst., Berlin, 1891, vol. i. pi. 49.

6 See " Les Flutes egyptiennes antiques," Journal asiatique, 8th ser. vol. xiv. (Paris, 1889), pp. 212-215.

'See Aristotle, De Audib. p. 802 b, 18, and p. 804 a; Festus, ed. Mueller, p. 116.

V

(Drawn from a photo by Brogi.l

Fig. 2. — Roman Ivory Aulos found at Pompeii (Naples Mus.),showingslides and rings.

(From a photo by Brogi.)

Fig. 3. — Beak mouthpiece. Found at Pompeii (Naples Mus.).

The two pipes were kept in position while the fingers stopped the holes and turned the bands by means of the (fropfida (Lat. capistrum) , a bandage encircling mouth and cheeks, and having holes through which the reed-mouthpiece passed into the mouth of the performer ; the phorbeia also relieved the pressure of the breath on the cheeks and lips, 8 which is felt more especially by performers on oboe and bassoon at the present day.

In the pair of wooden pipes belonging to the Elgin collection at the British Museum, one of the bulbs, partly broken, but pre- served in the same case as the' pipes, was fastened to the pipes by means of waxed thread, the indented lines being still visible on the rim of the bulb. The aulos was kept in a case called sybene 9 (o-vfirjvrj) or aulotheke 10 (avKodrjicri) , and the little bag or case in which the delicate reeds were carried was known by the name of glottokomeion 10 (yKoTTOKOfielov) . u Two Egyptian flute cases are extant, one in the Louvre, 12 and the other in the museum at Leiden. The latter case is of sycamore wood, cylindrical in shaDe, with a stopper of the same wood ; there is no legend or design upon it. The case contained seven pipes, five pieces of reed without bore or holes, and three pieces of straw suitable for making double-reed mouthpieces. 13

Aristoxenus gives the full compass of a single pipe or pair of pipes as over three octaves:—" For doubtless we should find an interval greater than the above mentioned three octaves between the highest note of the soprano clarinet (aulos) and the lowest note of the bass-clarinet (aulos); and again

between the highest note of a clarinet phyer performing with the speaker open, and the lowest note of a clarinet player performing with the speaker closed." 14 ;

This, according to the tables of Alypius, would correspond to the full range of the Greek scales, a little over three octaves

from

Greeks obtained this full compass on the aulos by means of the harmonics. Proclus (Comm. in Alcibiad. chap. 68) states that from each hole of the pipe at least three tones could be produced. Moreover, classic writers maintain that if the per- former press the zeugos or the glottai of the pipes, a sharper tone is produced. 15 This is exactly how a performer on a modern clarinet or oboe produces the higher harmonics of the instrument. 16 The small bore of the aulos in comparison to its length facilitated the production of the harmonics (cf . Zamminer p. 218), as does also the use of a small hole near the mouthpiece, called in Greek syrinx (avpi.y£) and in the modern clarinet the " speaker," which when open enables the performer to over- blow with ease the first harmonic of the lowest fundamental

8 See Albert A. Howard, op. cit. p. 29, and Dr Hugo Riemann, Gesch. d. Musik, Bd. i. T. I, p. m (Leipzig, 1904).

9 Pollux, Onomasticon, vii. 153.

10 Hesychius.

11 Pollux ii. 108, vii. 153, x. 153-154; A. A. Howard, op. cit. pp. 26-27. An illustration of the little bag is given in Denkmaler des klassischen Altertums, by August Baumeister, vol. i. p. 554, fig. 591.

12 Two Egyptian pipes now in the Louvre were found in a case ornamented with a painting of a female musician playing a double pipe. See E. de Rouge, Notice sommaire des monuments egyptiens exposes dans les galeries du Louvre, p. 87.

13 See Victor Loret, " Les Flutes egyptiennes antiques," in Journal asiatique, vol. xiv. (Paris, 1889), pp. 199, 200 and 201 (note), pp. 207, 211 and 217, and Conrad Leemans, Description raisonnee des monu- ments egyptiens du Musee d'Antiquites de Leyde, p. 132, No. 489; contents of case Nos. 474-488.

14 Aristoxenus, Harm. bk. i. 20 and. 21, H. S. Macran's edition with translation (Oxford, 1902), p. 179.

15 Aristotle, De audib. p. 804. a-. Porphyry, ed. Wallis, p. 249; ibid. p. 252.

16 Zamminer, op. cit. p. 301.

tones. To Mr Albert A. Howard of Harvard University is due the credit of having identified the syrinx of the aulos with the speaker of the clarinet. 1 This assumption is. doubtless correct, and is supported by classical grammarians, 2 who state that the syrinx was one of the holes of the aulos. It renders quite clear certain passages in Aristoxenus, Aristotle and Plutarch, and a scholion to Pindar's 12th Pythian, which before were difficult to understand (see Syrinx).

The aulos or tibia existed in a great number of varieties enumerated by Pollux (Onomasl. iv. 74 et seq.) and Athenaeus

Fig. 4. — The Plagiaulos. Castellani Collection (Maenad Pipes), British Museum.

(iv. 76 et seq.). They fall into two distinct classes, the single and the double pipes. There were three principal single pipes, the monaulos, the plagiaulos and the syrinx monocalamos. The double pipes were used by the great musicians of ancient Greece, and notably at the musical contests at Delphi, and what has been said above concerning the construction of the aulos refers mainly to the double pipes. The monaulos, a single pipe of Egyptian origin, which, by inference, we assume to have been played from the end by means of a reed, (\ may have been the archetype of the oboe or clarinet. The plagiaulos photinx or tibia obliqua, invented by the Libyans (Pollux iv. 74) , or, according to Pliny (vii. 204) , by Midas of Phrygia, was held like the modern flute, but was played by means of a mouthpiece containing a reed. Three of the existing pipes at the British Museum (the two in the Castellani collection, and the pipe from Halicarnassus) belong to this type. The mouthpiece projects from the side of the pipe and communicates with the main bore by means of a slanting passage; the end nearest the mouthpiece is stopped as in the modern flute; in the latter, however, the embouchure is not closed by the lips when playing, and therefore the flute has the acoustic properties of the open pipe, whereas

the plagiaulos ^^ing a reed mouthpiece gave

Fig. 5. — Ancient Greek Double Pipes. Elgin Collection, British Museum.

I, I \ 1 the harmonics Wa closed pipe. The double

III \ 1 pipes existed in five sizes according to pitch,

in the days of Aristoxenus, who, in a treatise

on the construction of the auloi (Hepl avh&v

Tpr/creojs) , unfortunately not extant, 3 divides

them thus: —

(1) Parthenioi auloi {■Ka.p6kvioia.vKoi), the maiden's auloi, corresponding to the soprano compass.

(2) Paidikoi auloi (ttcuSikoi av\oi), the boy's pipes or alto auloi, used to accompany boys' songs and also in double pairs at feasts.

(3) Kitharisterioi auloi (Ki0apioTi?pioi avKol), used to accom- pany the cithara.

(4) Teleioi auloi, the perfect aulos, or tenor's pipes; also known as the pythic auloi (tv6lkoI avKoi); used for the paeans and for solos at the Pythean games (without chorus) . It was the pythic auloi and the kitharisterioi auloi more especially which were provided with the speaker (syrinx) in order to improve the harmonic notes (see Syrinx).

1 Op. cit. p. 32-35.

2 See Etymologicum magnum (Augsburg, 1848), s.v. " Syrinx."

3 See Athenaeus xiv. 634, who quotes from Didymus.

(5) Hyperteleioi auloi (vrepTtheioi avKoi) or andreioi auloi (avSpeloL avkoi) (see Athenaeus iv. 79), the bass-auloi.

The Phrygian pipes or auloi Elymoi 4 were made of box- wood and were tipped with horn; they were double pipes, but differed from all others in that the two pipes were unequal in length and in the diameter of their bores 5 ; sometimes one of the pipes was curved upwards and terminated in a horn bell 6 ; they seem to have had a conical bore, if representations on monuments are to be trusted. We may conclude that the "archetype of the oboe with conical bore was not unknown to the Greeks; it was frequently used by the Etruscans and Romans, and appears on many bas-reliefs, mural paintings and other monuments. For illustrations see Wilhelm Froehner, Les M usees de France, pi. iii., " Marsyas playing the double pipes." There the bore is decidedly conical in the ratio of at least 1 : 4

between the mouthpiece and the end of the instrument; the vase is Roman, from the south of France. See also Bulletino della Commissione Archeologica Comunale di Roma, Rome, 1879, vol. vii., 2nd series, pi. vii. and p. 1 19 et seq., " Le Nozze di Elena e Paride," from a bas-relief in the monastery of S.Antonio on the Esquiline; Wilhelm Zahn, Die schonsten Ornamente und die merkwurdigsten Gemdlde aus Pompeji, Herkulaneum und Stabiae (German and French), vol. iii., pi. 43 and 51 (Berlin, 1828-1859).

For further information on the aulos, consult Albert A. Howard, "The Aulos or Tibia," Harvard Studies, iv., 1893; Frangois A. Gevaert, Histoire de la musique dans Vantiquite, vol. ii. p. 273 et seq. ; Carl von Jan's article " Flote " in August Baumeister's Denkmaler des klassiscken Altertums (Munich, 1884-1888), vol. i. ; Dr Hugo Riemann, Handbuch der Musikgeschichte, Bd. I. T. 1, pp. 93-112 (Leipzig, 1904) ; Caspar Bartholinus, De Tibiis Veterum (Amster- dam, 1779). (K. S.)

AUMALE, HENRI EUGENE PHILIPPE LOUIS D'ORLEANS, Due d' (1822-1897), French prince and statesman, fifth son of Louis Philippe, duke of Orleans, afterwards king of the French, and of Marie Amelie, princess of the Two Sicilies, was born at Paris on the 16th of January 1822. While still young he in- herited a large fortune from the prince de Conde. Brought up by his parents with great simplicity, he was educated at the college of Henri IV., on leaving which at the age of seventeen he entered the army with the rank of a captain of infantry. He distinguished himself during the conquest of Algeria, and was appointed governor of that colony, in which capacity he received the submission of the amir Abd-el-Kader. After the revolution of 1848 he retired to England and busied himself with historical and military studies, replying in 1861 by a Letter upon the History of France to Prince Napoleon's violent attacks upon the house of Orleans. On the outbreak of the Franco-Prussian War he volunteered for service in the French army, but his offer was declined. Elected deputy for the Oise department, he returned to France, and succeeded to the fauteuil of the comte de Montalembert in the French Academy. In March 1872 he resumed his place in the army as general of division; and in 1873 he presided over the court-martial which condemned Marshal Bazaine to death. About this period, being appointed com- mandant of the VII. army corps at Besancon, he retired from political life, and in 1879 became inspector-general of the army. By the act of exception passed in 1883 all members of families that had reigned in France serving in the army were deprived of their military positions; consequently the due d'Aumale was placed on the unemployed supernumerary list. Subse- quently, in 1886, another law was promulgated which expelled from French territory the heads of former reigning families, and provided that henceforward all members of those families should be disqualified for any public position or

function, and for election to any public body. The due d'Aumale protested energetically, and was himself expelled. By his will of the 3rd of June 1884, however, he had bequeathed to the Institute of France his Chantilly estate, with all the art-collection he had gathered there. This generosity led the government to withdraw the decree of exile, and the duke returned to France in 1889.

4 Pollux iv. 74.

5 Servius ad Aen. ix. 615.

6 Tibullus ii. 85; Virg. Aen. xi. 735; Ovid, Met. iii. 533, Ex Ponto i. I. 39.

He died at Zucco in Sicily on the 7th of May 1897. Of his marriage, contracted in 1844 with his first cousin, Caroline de Bourbon, daughter of the prince of Salerno, were born two sons: the prince de Conde (d. 1866), and the due de Guise (d. 1872). The due d'Aumale's principal literary work was an Histoire des princes de Conde, which he left unfinished.

See Georges Picot, M. le due d'Aumale (Paris, 1898); Ernest Daudet, Le due d'Aumale (Paris, 1898). (M. P.)*

AUMALE, a town of northern France, in the department of Seine - Inferieure, on the left bank of the Bresle, 47 m. N.E. of Rouen on the Northern railway. Pop. (1906) 1999. The church is an interesting building of the 16th and 17th centuries, and has a portal attributed to Jean Goujon. The town has glass and steel works.

The territory of Aumale (Albemarle, Aubemale, Aumerle; Lat. Alba Maria) in Normandy, a dependency of the archbishopric of Rouen, was granted to Odo of Champagne, brother-in-law of William the Conqueror, who founded the first line of counts of Aumale. Hawise (Hadwide, Havoise or Avoie), countess of Aumale, after the death of her first husband William de Mande- ville, earl of Essex (d. 11 89), married William des Forts (de Fors, or de Fortz; Lat. de Fortibus), a military adventurer who had been one of the commanders of the fleet under Richard I. during his first crusade. He died in 1195, and his widow married Baldwin de Betun, who became count of Aumale in her right. He died in 1213, and in 1214 William de Fortibus, son of Hawise by her second husband, was confirmed by King John in all his mother's laryis. Meanwhile, however, the territory of Aumale shared the fate of the rest of Normandy, and was annexed to the French crown by King Philip Augustus; but the title of earl of Albe- marle, derived from it,

continued to be borne in England by William de Fortibus, and was passed on to his heirs (see Albe- marle). Aumale itself was conferred by Philip Augustus as an appanage on his son Philip. It was subsequently granted by Louis VIII. to Simon, count of Dammartin, whose daughter, Jeanne, countess of Dammartin, transferred it, together with the countship of Ponthieu, to the house of Castile, by her marriage with Ferdinand III., king of Castile, called the Saint (1238). It then remained in the possession of a branch of her descendants bearing the name of Ponthieu, until it passed to the house of Harcourt on the marriage of Blanche of Ponthieu with John, count of Harcourt (1340). Marie d'Harcourt (d. 1476), heiress of Aumale, married Anthony of Lorraine, count of Vaudemont, and Aumale was created a duchy in the peerage of France for Claude and Francis of Lorraine in 1547. By the marriage of Anne of Lorraine with the duke of Nemours in 161 8 the duchy of Aumale passed to the house of Savoy-Nemours. In 1686 Marie Jeanne Baptiste, duchess of Nemours and of Aumale, and wife of Charles Emmanuel II., duke of Savoy, sold Aumale to Louis XIV., who gave it to his natural son, the duke of Maine. After the death of that prince, the dukedom devolved upon his brother, the count of Toulouse, subsequently passing to the latter's son, the duke of Penthievre, whose daughter married the duke of Orleans. Since the reign of Louis Philippe, king of the French, the title of duke of Aumale has been borne by a son of the duke of Orleans.

AUMONT, the name of a family which played an important part in French history. The origin of the name is uncertain, but it has usually been derived from Aumont, now a small commune in the department of the Somme. The family was of great antiquity, a Jean, sire d'Aumont, having accompanied Louis IX. on crusade. It was already powerful in the 14th century, and during the English wars of that period its members fought in the armies of the kings of France. Towards the end of the century, the family took the part of the dukes of Burgundy, but returned to the side of France on the death of Charles the Bold. Jean d'Aumont, lieutenant-general to the king of France in the government of Burgundy, rendered important services to Louis XII. and Francis I. Another Jean d'Aumont (d. 159s), a marshal of France and knight of the order of the Holy Ghost since its institution in 1578, fought against the Huguenots under the last of the Valois kings; but he was among the first to

recognize Henry IV., and was appointed governor of Champagne and of Brittany, where he had to fight against the League. His grandson Antoine (1601-1669) was also a marshal of France (1651), governor of Paris (1662), duke and peer (1665). Louis Marie Augustin, due d'Aumont (1 709-1 782), was a celebrated collector of works of art. Louis Marie Celeste d'Aumont, due de Piennes, afterwards due d'Aumont (1762-1831), emigrated during the Revolution and served in the army of the royalists, as

also in the Swedish army. During the Hundred Days he effected a descent upon Normandy in the Bourbon interest, and succeeded in capturing Bayeux and Caen.

AUNCEL (from the Anglo-Fr. auncelle, a confused derivation from l' auncelle, Ital. lancella, a little balance), a balance formerly used in England; now, in dialectical use, a term for the weighing of meat by hand instead of by scales.

AUNDH, a native state of India, in the Deccan division of Bombay, ranking as one of the Satara Jagirs. Its area is 447 sq. m.; its population was 63,921 in 1901, showing a decrease of 2% in the decade. Estimated revenue £9422. The chief, whose title is Pant Pratinidhi, is a Brahman by caste. The state has suffered severely from plague. The town of Aundh is situated 26 m. S.E. of Satara. Pop. about 3500.

AUNGERVYLE, RICHARD (1287-1345), commonly known as Richard de Bury, English bibliophile, writer and bishop, was born near Bury St Edmunds, Suffolk, on the 24th of January 1287. He was the son of Sir Richard Aungervyle, who was descended from one of William the Conqueror's soldiers, settled in Leicestershire, where the family came into possession of the manor of Willoughby. His education was undertaken by his uncle, John de Willoughby, and after leaving the grammar school of his native place he was sent to Oxford, where he is said to have distinguished himself in philosophy and theology. John Pits 1 says, but apparently without authority, that he became a Benedictine monk. He was made tutor to Prince Edward of Windsor (afterwards Edward III.), and, according to Dibdin, inspired him with some of his own love of books. He was mixed up with the sordid intrigues which preceded the deposition of Edward II., and supplied Queen Isabella and Mortimer in Paris with money in 1325 from the revenues of Guienne, of which province he was treasurer. For some time he had to hide in Paris from the officers sent by Edward II. to apprehend him. On the accession of Edward III. his services were rewarded by rapid promotion. He was cofferer to the king, treasurer of the wardrobe and afterwards clerk of the privy seal. The king, moreover, repeatedly recommended him to the pope, and twice sent him, in 1330 and 1333, as ambassador to the papal court, then in exile at Avignon. On the first of these visits he made the acquaintance of a fellow bibliophile in Petrarch, who records his impression (Epist. Famil. lib. iii. Ep. 1) of the Englishman as "not ignorant of literature and . . . from his youth up curious beyond belief of hidden things." He asked him for information about Thule, but Aungervyle, who promised information when he should once more be at home among his books, never sent any answer, in spite of repeated enquiries. The pope, John XXII.,- made him his principal chaplain, and presented him with a rochet in earnest of the first vacant bishopric in

England.

During his absence from England he was made (1333) dean of Wells. In September of the same year the see of Durham fell vacant, and the king overruled the choice of the monks, who had elected and actually installed their sub-prior, Robert de Gray- stanes, in favour of Aungervyle. In February 1334 he was made lord treasurer, an appointment he exchanged later in the year for that of lord chancellor. This charge he resigned in the next year, and, after making arrangements for the protec- tion of his northern diocese from an expected inroad of the Scots, he proceeded in July 1336 to France to attempt a settle- ment of the claims in dispute between Edward and Philip. In the next year he served on three commissions for the defence of the northern counties. In June 1338 he was once more sent abroad to secure peace, but within a month of his appointment 1 De III. Angl. Script. (1619, p. 467).

Edward himself landed in Flanders to procure allies for his ap- proaching campaign. Aungervyle accompanied him to Coblenz to his meeting with the emperor Louis IV., and in the next year was sent to England to raise money. This seems to have been his last visit to the continent. In 1340 and 1342 he was again engaged in trying to negotiate peace with the Scots, but from this time his life appears to have passed quietly in the care of his diocese and in the accumulation of a library.

He sent far and wide in search of manuscripts, rescuing many treasures from the charge of ignorant and neglectful monks. " No dearness of price," he says, " ought to hinder a man from the buying of books, if he has the money demanded for them, unless it be to withstand the malice of the seller or to await a more favourable opportunity of buying." It is to be supposed that Richard de Bury sometimes brought undue pressure to bear on the owners, for it is recorded that an abbot of St Albans bribed him to secure his influence for the house by four valuable books, and that de Bury, who procured certain coveted privileges for the monastery, bought from him thirty-two other books, for fifty pieces of silver, far less than their normal price. The record of his passion for books, his Philobiblon, was completed on his fifty-eighth birthday, the 24th of January 1345, and he died on the 14th of April (May, according to Adam Murimuth) of that year. He gives an account (chapter viii.) of the unwearied efforts made by himself and his agents to collect books. In the eighteenth chapter he records his intention of founding a hall at Oxford, and in connexion with it a library of which his books were to form the nucleus. He even details the rules to be observed for

the lending and care of the books, and he had already taken the preliminary steps for the foundation. The bishop died, however, in great poverty, and it seems likely that his collection was dispersed immediately after his death. But the traditional account is that the books were sent to the Durham Benedictines at Oxford, and that on the dissolution of the foundation by Henry VIII. they were divided between Duke Humphrey of Gloucester's library, Balliol College and Dr George Owen. Only two of the volumes are known to be in existence; one is a copy of John of Salisbury's works in the British Museum, and the other some theological treatises by Anselm and others in the Bodleian.

The chief authority for the bishop's life is William de Chambre (printed in Wharton's Anglia Sacra, 1691, and in Historiae Dunelmensis scriptores tres, Surtees Soc. 1839), who describes him as an amiable and excellent man, charitable in his diocese, and the liberal patron of many learned men, among these being Thomas Bradwardine, afterwards archbishop of Canterbury, Richard Fitzralph, afterwards archbishop of Armagh, the enemy of the mendicant orders, Walter Burley, who translated Aristotle, John Mauduit the astronomer, Robert Holkot and Richard de Kilvington. John Bale 1 and Pits 2 mention other works of his, Epistolae Familiar es and Oraliones ad Principes. The opening words of the Philobiblon and the Epistolae as given by Bale represent those of the Philobiblon and its prologue, so that he apparently made two books out of one treatise. It is possible that the Orationes may represent a letter book of Richard de Bury's, entitled Liber Epistolaris quondam domini Ricardi de Bury, Episcopi Dunelmensis, now in the possession of Lord Harlech. This MS., the contents of which are fully catalogued in the Fourth Report (1874) of the Historical MSS. Commission (Appendix, pp. 379-397), contains numerous letters from various popes, from the king, a correspondence dealing with the affairs of the university of Oxford, another with the province of Gascony, beside some harangues and letters evidently kept as models to be used on various occasions.

It has often been asserted that the Philobiblon itself was not written by Richard de Bury at all, but by Robert Holkot. This assertion is supported by the fact that in seven of the extant MSS. of Philobiblon it is ascribed to Holkot'in an introductory note, in these or slightly varying terms: Incipit prologus in philobiblon ricardi dunelmensis episcopi que libru composuit

1 Script. III. Maj. Brit. cent. v. No. 69.

2 De III. Angl. Script. (1619, p. 468).

Robertus holcote de ordine predicatorum sub nomine dicti episcopi. The Paris MS. has simply Philobiblon olchoti anglici, and does not contain the

usual concluding note of the date when the book was completed by Richard. As a great part of the charm of the book lies in the unconscious record of the collector's own character, the establishment of Holkot's authorship would materially alter its value. A notice of Richard de Bury by his contemporary Adam Murimuth {Conlinuatio Chronicarum, Rolls Series, 1889, p. 171) gives a less favourable account of him than does William de Chambre, asserting that he was only moder- ately learned, but desired to be regarded as a great scholar.

The original Latin text was printed at Cologne (1473), Spires (1483), Paris (1500), Oxford (1598 and 1599), &c. It was first trans- lated into English by J. B. Inglis in 1832, and into French by Hippo- lyte Cocheris in 1856. The best translation is that by Mr E. C. Thomas, accompanying the Latin text, with full biographical and bibliographical introductions (1888). Other editions are in the King's Classics (1902) and for the Grolier Club (New York, 1889, ed. A. W. West).

AUNT SALLY, the English name for a game popular at fairs, race-courses and summer resorts. It consists in throwing hard balls, of wood or leather-covered yarn, at puppets dressed to represent different characters, originally a grotesque female figure called " Aunt Sally," with the object of smashing a clay pipe which is inserted either in the mouth or forehead of the puppet. In France the game is popular under the name jeu de massacre. In a variation of the pastime the mark consists of a living person's head thrust through a hole in a sheet of canvas. In case of a hit a second shy is allowed, or a small prize is given.

AURA (from the Gr. for " breath " or " breeze "), a term used in old days to denote a supposed ethereal emanation from a volatile substance; applied later to the " electrical aura," or air-current caused by electrical discharge; in epilepsy (q.v.) to one of its premonitory symptoms; and in spiritualism to a mysterious light associated with the presence of spirit-forms. See also Aureola.

AURANGABAD, or Aurungabad, a city of India, in the dominions of the nizam of Hyderabad, north-west division, situated 138 m. from Poona, 207 from Bombay via Poona, and 270 from Hyderabad on the river Kaum. It gives its name to a district. It was founded in 1610, under the name of Fatch- nagar, by Malik Ambar, an Abyssinian, who had risen from the condition of a slave to great influence. Subsequently it became the capital of the Mogul conquests in the south of India. Aurang- zeb, who erected here a mausoleum to his wife which has been compared to the Taj at Agra, made the city the seat of his government during his viceroyalty of the Deccan, and gave it the name of Aurangabad. It thus grew into the principal city of an extensive province of the same name, stretching

westward to the sea, and comprehending nearly the whole of the territory now comprised within the northern division of the presidency of Bombay. Aurangabad long continued to be the capital of the succession of potentates bearing the modern title of nizam, after those chiefs became independent of Delhi. They abandoned it subsequently, and transferred their capital to Hyderabad, when the town at once began to decline. Aurangabad is a railway station on the Hyderabad-Godavari line, 435 m. from Bombay. In 1901 the population, with military cantonments, was 36,837, showing an increase of 8 % in the decade. It has a cotton mill.

The district of Aurangabad has an area of 6172 sq. m. The population in 1901 was 721,407. It contains the famous caves of Ajanta, and also the battlefield of Assaye.

AURANGZEB (1618-1707), one of the greatest of the Mogul emperors of Hindustan, was the third son of Shah Jahan, and was born in November 1618. His original name, Mahommed, was changed by his father, with whom he was a favourite, into Aurangzeb, meaning ornament of the throne, and at a later time he assumed the additional titles of Mohi-eddin, reviver of religion, and Alam-gir, conqueror of the world. At a very early age, and throughout his whole life, he manifested profound religious feeling perhaps instilled into him in the course of his education uniff some of the strictest Mahommedan doctors.

He was employed, while very young, in some of his father's expeditions into the country beyond the Indus, gave promise of considerable military talents, and was appointed to the command of an army directed against the Uzbegs. In this campaign he was not completely successful, and soon after was transferred to the army engaged in the Deccan. Here he gained several victories, and in conjunction with the famous general, Mir Jumla, who had deserted from the king of Golconda, he seized and plundered the town of Hyderabad, which belonged to that monarch. His father's express orders prevented Aurangzeb from following up this success, and, not long after, the sudden and alarming illness of Shah Jahan turned his thoughts in another direction. Of Shah Jahan's four sons, the eldest, Dara, a brave and honourable prince, but disliked by the Mussulmans on account of his liberality of thought, had a natural right to the throne. Accordingly, on the illness of his father, he at once seized the reins of government and established himself at Delhi. The second son, Shuja, governor of Bengal, a dissolute and sensual prince, was dissatisfied, and raised an army to dispute the throne with Dara. The keen eye of Aurangzeb saw in this

conjuncture of events a favourable opportunity for realising his own ambitious schemes. His religious exercises and temperate habits gave him, in popular estimation, a great superiority over his brothers, but he was too politic to put forward his claims openly. He made overtures to his younger brother Murad, governor of Gujarat, representing that neither of their elder brothers was worthy of the kingdom, that he himself had no temporal ambition, and desired only to place a fit monarch on the throne, and then to devote himself to religious exercises and make the pilgrimage to Mecca. He therefore proposed to unite his forces to those of Murad, who would thus have no difficulty in making himself master of the empire while the two elder brothers were divided by their own strife. Murad was completely deceived by these crafty representations, and at once accepted the offer. Their united armies then moved northward. Meanwhile Shah Jahan had recovered, and though Dara resigned the crown he had seized, the other brothers professed not to believe in their father's recovery, and still pressed on. Shuja was defeated by Dara's son, but the imperial forces under Jaswant Singh were completely routed by the united armies of Aurangzeb and Murad. Dara in person took the field against his brothers, but was defeated and compelled to fly. Aurangzeb then, by a clever stroke of policy, seized the person of his father, and threw him into confinement, in which he was kept for the remaining eight years of his life. Murad was soon removed by assassination, and the way being thus cleared, Aurangzeb, with affected reluct- ance, ascended the throne in August 1658. He quickly freed himself from all other competitors for the imperial power. Dara, who again invaded Gujarat, was defeated and closely pursued, and was given up by the native chief with whom he had taken, refuge. He was brought up to Delhi, exhibited to the people, and assassinated. Shuja, who had been a second time defeated near Allahabad, was attacked by the imperial forces under Mir Jumla and Mahommed, Aurangzeb's eldest son, who, however, deserted and joined his uncle. Shuja was defeated and fled to Arakan, where he perished; Mahommed was captured, thrown into the fortress of Gwalior, and died after seven years' con- finement. No similar contest disturbed Aurangzeb's long reign of forty-six years, which has been celebrated, though with doubtful justice, as the most brilliant period of the history of Hindustan. The empire certainly was wealthy and of enormous extent, for there were successively added to it the rich kingdoms of Bijapur and Golconda, but it was internally decaying ahd ready to crumble away before the first vigorous assault. Two causes principally had tended to weaken the Mogul power. The one was the intense bigotry and intolerant policy of Aurang- zeb, which had alienated the Hindus and roused the fierce ani- mosity of the haughty Rajputs. The other was the rise and rapid growth of the Mahratta power. Under their able leader, Sivaji, these daring freebooters plundered in every direction, nor could all Aurangzeb's efforts avail to subdue them. For the last twenty-six years of bJs life Aurangzeb

was engaged in wars

in the Deccan, and never set foot in his own capital. At the close of the long contest the Mogul power was weaker, the Mahratta stronger than at first. Still the personal ability and influence of the emperor were sufficient to keep his realms intact during his own life. His last years were embittered by remorse, by gloomy forebodings, and by constant suspicion, for he had always been in the habit of employing a system of espionage, and only then experienced its evil effects. He died on the 3rd of March 1707 at Ahmadnagar, while engaged on an extensive but unfortunate expedition against the Mahrattas.

See Lane-Poole, Aurangzib, " Rulers of India " series (1893).

AURAY, a town of France near the mouth of the Auray river, in the department of Morbihan, 12 m. W. of Vannes on the railway between that town and Lorient. Pop. (1906) 5241. Its port, which is formed by the channel of the river and divides the town into two parts, is frequented by coasting and fishing vessels. The principal buildings are the church of St Esprit (13th century) now secularized; the Renaissance church of St Gildas; the town-hall (18th century) ; and, at a short distance from the town, the Carthusian monastery, now a deaf and dumb institute, on the site of the battle of 1364, at which Charles of Blois was defeated by John of Montfort (see Bkittany: History). Adjoining the Chartreuse is a small chapel in which are preserved the bones of the Royalists captured by the Republicans in a battle fought near the spot in 1 795. In the neighbourhood is the church of Sainte Anne d'Auray, one of the principal places of pilgrimage in Brittany. Auray is one of the chief centres in France for oyster-breeding, and carries on boat-building and sardine-fishing.

AURELIA, VIA, an ancient highroad of Italy, the date of the construction of which is unknown. It ran from Rome to Alsium, where it reached the sea, and thence along the south-west coast of Italy, perhaps originally only as far as Cosa, and was later extended to Vada Volaterrana, and in 109 B.C. to Genua and Dertona by means of the Via Aemilia, though a coast road as far as Genua at least must have existed long before. The name is applied in the Antonine Itinerary to these extensions, and even to the prolongation to Aries. Its line is in the main closely followed by the modern coast highroad; cf., however, for the section between Cosa and Populonia, O. Cuntz in Jahreshefte des Osterr. arch. Instituts, vii. (1904), 54.- (T. As.)

AURELIAN [Lucius Domitius AuRELiANUs],one of the greatest of the Roman soldier emperors, was born at Sirmium in Pannonia between A.d. 212-214. He was of humble origin, but nothing definite is known of his

family. He had always shown great enthusiasm for a military career, and so distinguished himself in the campaigns in which he took part that on one occasion he received a public vote of thanks. At the same time he was proclaimed consul elect, and adopted by Ulpius Crinitus, military governor of Illyria and Thrace. On the death of the emperor Claudius II. Gothicus (2 70) , Aurelian was proclaimed his successor with the universal approval of the soldiers. His first task was to continue the war which had been begun by Claudius against the Goths. He drove them out of Moesia across the Danube, where he left them in possession of Dacia, which he did not think himself able to retain; the name was transferred to Moesia, which was then called Dacia Aureliani. The chronology, how- ever, of Aurelian's reign is very confused, and the abandonment of Dacia is placed by some authorities towards its close. He next entered upon campaigns against the Juthungi, Alamanni, and other Germanic tribes, over whom, after a severe defeat which was said to have imperilled the very existence of the empire, he at length obtained a complete victory. Having thus secured the Rhine and Danube frontiers, he turned his energies towards the east, and in 271 set out on his expedition against Zenobia, queen of Palmyra (q.v.). At the same time he crushed two pretenders to the throne — Firmus and Tetricus. Firmus, a wealthy merchant of Seleucia, had proclaimed himself emperor of Egypt. Aurelian, who was at the time in Mesopotamia, hastened thither, and ordered him to be seized and put to death. Tetricus, who had been proclaimed emperor in the west after the death of Gallienus, and left undisturbed by Claudius II., still ruled over Gaul, Spain and Britain. A decisive battle was fought

near the modern Chalons, in which Tetricus was defeated. The restoration of the unity of the empire was thus complete. In 274 a brilliant triumph, adorned by the persons of Zenobia and Tetricus, was celebrated at Rome.

Aurelian now turned his attention to the internal affairs of the empire. He introduced sumptuary laws; relieved the poor by distributions of bread and meat, proceeded with great severity against informers and embezzlers; began the construction of various public works and buildings; and proclaimed a general amnesty for political crimes. The restoration and enlargement of the walls of Rome, commenced by him, was not completed till the reign of Probus. An attempt to restore the standard of the coinage is said to have caused a revolt of the workmen and officials connected with the mint, which was only put down with the loss of 7000 soldiers. It has been suggested that this was really an attempt at revolution incited by the senate and praetorian guards, the opportunity being found in disturbances

resulting from opposition to the attempted reform, which by themselves could hardly have assumed such serious proportions. Aurelian's restless spirit was not long able to endure a life of inaction in the city. Towards the end of 274, he started on an expedition against the Persians, halting in Thrace by the way. While on the march between Heracleia and Byzantium, at the beginning of the following year, he was assassinated through the treachery of his secretary Eros, who, in order to escape the discovery of his own irregularities, incited certain officers against the emperor by showing them a forged list, on which their names appeared as marked out for death.

Aurelian well deserved the title of restorer of the empire, and it must be remembered that he lived in an age when severity was absolutely necessary. He was a great soldier and a rigid but just disciplinarian. In more favourable circumstances he would have been a great administrator. He displayed a fondness for pomp and show on public occasions; he was the first Roman emperor to wear the diadem, and assumed the title of Lord and God on medals.

The chief authority for the events of Aurelian's reign is his life by Vopiscus, one of the writers of the " Augustan History "; it is founded on Greek memoirs and certain journals deposited in the Ulpian library at Rome. See L. Homo, Le Regne de Vempereur Aurelien (1904), and Groag's art. in Pauly-Wissowa, Realencyclo- padie, v. 1347 foil.

AURELIANUS, CAELIUS, a physician of Sicca in Numidia, who probably flourished in the 5th century a.d., although some place him two or even three centuries earlier. In favour of the later date is the nature of his Latin, which shows a strong tendency to the Romance, and the similarity of his language to that of Cassius Felix, also an African medical writer, who about 450 wrote a short treatise, chiefly based on Galen. We possess a translation by Aurelianus of two works of Soranus of Ephesus (2nd century), the chief of the " methodist " school of medicine, on chronic and acute maladies— Tardae or Chronicae Passiones, in five, and Celeres or Acutae Passiones in three books. The translation, which is especially valuable since the original has been lost, shows that Soranus possessed considerable practical skill in the diagnosis of ordinary and even of exceptional diseases. It is also important as containing numerous references to the methods of earlier medical authorities. We also possess considerable fragments of his Medicinales Responsiones, also adapted from Soranus, a general treatise on medicine in the form of question and answer; it deals with rules of health (salutaria praecepta) and the pathology of internal diseases (ed. Rose, Anecdota Graeca et Latina, ii., 1870). Where it is possible to compare Aurelianus's translation with the original — as in a fragment of his Gynaecia with Soranus's Hepl yvvcuntiuiv Ilafla.'i' — it is found that it is literal, but abridged. There is

apparently no MS. of the treatises in existence. (Editions: Amman, 1709; Haller, 1774.)

AURELLE DE PALADINES, LOUIS JEAN BAPTISTE D' (1804-1877), French general, was born at Malzieu, Lozere, on the 9th of January 1804. He was educated at St Cyr, and entered the army as sub-lieutenant of foot in 1824. He served with distinction in Algeria between 1841 and 1848, becoming

lieut.-colonel and an officer of the Legion of Honour; took part ~ in the Roman campaigns of 1848 and 1849, and was made colonel. He served as general of brigade throughout the Crimean War of 1854-56, being promoted general of division and commander of the Legion of Honour. During the campaign in Lombardy in 1 859he commanded at Marseilles, and superintended the despatch of men and stores to the seat of war, and for his services he was made a grand officer of the Legion of Honour. Placed on the reserve list in 1869, he was recalled to the Marseilles command on the outbreak of the Franco-German War of 1870-71. After the first capture of Orleans by the Germans, he was appointed by the Government of National Defence, in November 1870, to the command of the Army of the Loire. He was at first very successful against von der Tann-Rathsamhausen, winning the battle of Coulmiers and compelling the Germans to evacuate Orleans, but the capitulation of Metz had set free additional German troops to oppose him, and, after his defeat at Beaune la Rolande and subsequent unsuccessful fighting near Orleans, resulting in its recapture by the Germans in December, Aurelle retreated into the Sologne and was superseded. After the armis- tice he was elected to the National Assembly by the departments both of Allier and Gironde. He sat for Allier and was one of the fifteen officers chosen to assist in the peace negotiations. He was decorated with the grand cross of the Legion of Honour, and was given the command at Bordeaux, but retired in 1872. Elected a life senator in 1875, he supported the monarchical majority of 1876. He died at Versailles on the 17th of December 1877. He was the author of La Premiere Armee de la Loire, published in 1872.

AUREOLA, Aureole (diminutive of Lat. aura, air) , the radiance of luminous cloud which, in paintings of sacred personages, is represented as surrounding the whole figure. In the earliest periods of Christian art this splendour was confined to the figures of the persons of the Godhead, but it was afterwards extended to the Virgin Mary and to several of the saints. The aureola, when enveloping the whole body, is generally oval or elliptical in form, but is occasionally circular or quatrefoil. When it is merely a luminous disk round the head, it is called specifically a nimbus, while the combination of nimbus and aureole is called a glory. The strict distinction between nimbus and aureole is not commonly maintained, and the latter

term is most frequently used to denote the radiance round the heads of saints, angels or persons of the Godhead. The nimbus in Christian art appeared first in the 5th century, but practically the same device was known still earlier, though its history is obscure, in non-Christian art. Thus (though earlier Indian and Bactrian coins do not show it) it is found with the gods on some of the coins of the Indian kings Kanishka, Huvishka and Vasudeva, 58 B.C. to a.d. 41 (Gardner's Cat. of Coins of Greek and Scythic Kings of Bactria and India, Brit. Mus. 1886, plates 26-29). And its use has been traced through the Egyptians to the Greeks and Romans, representations of Trajan (arch of Constantine) and Antoninus Pius (reverse of a medal) being found with it. In the circular form it constitutes a natural and even primitive use of the idea of a crown, modified by an equally simple idea of the emanation of light from the head of a superior being, or by the meteorological phenomenon of a halo. The probability is that all later associations with the symbol refer back to an early astrological origin (cf. Mithras), the person so glorified being identified with the sun and represented in the sun's image; so the aureole is the Hvareno of Mazdaism. From this early astrological use the form of " glory " or " nimbus " has been adapted or inherited under new beliefs.

AURICH, a town of Germany, in the Prussian province of Hanover, chief town of the district of East Friesland, on the Ems- Jade canal, 18 m. N.W. from Emden by rail. Pop. (1900) 6013. It is built in the Dutch style, and lies in a sandy but fertile plain, surrounded by pleasant promenades which have taken the place of the old fortifications. It has a palace, formerly the residence of the counts of East Friesland and now used as government offices, a Roman Catholic and two Protestant churches, a gymnasium, and four libraries. There are breweries

and small manufactories of paper and tobacco. Close by is the Upstallsboom, the hill of oath and liberty, where every year at Whitsuntide representatives of the seven Frisian coast lands assembled to deliberate.

See W'iarda, Bruchstiicke zur Geschichte der Stadt Aurich (Emden,

1835)-

AURICLE (from Lat. diminutive of auris, ear) , the external ear in animals, or an analogous part in plants, &c, From a supposed resemblance to the ear of a dog, the term was applied to the upper cavities of the heart. The adjective " auricular " is more specially used in the phrase " auricular

confession ” (see Confession), i.e. private.

AURICULA {Primula auricula), an Alpine plant, which has been an inmate of British gardens for about three hundred years, and is still prized by florists as a favourite spring flower. It loves a cool soil and shady situation. The florists’ varieties are grown in rich composts, for the preparation of which number- less receipts have been given; but many of the old nostrums are now exploded, and a more rational treatment has taken their place. Thus Mr Douglas writes {Hardy Florists’ Flowers) : — ■

” There is no mystery, as some suppose, about the potting, any more than there is about the potting material. The compost should consist of turfy loam four parts, leaf-mould one part, sharp river or silver sand one part, and a few bits of broken charcoal mixed with it. The pots to be used should be from 3 to 4J in. in diameter, inside measure; about I in. of potsherds should be placed in the bottom of each pot, and over this some fibrous turf, from which the fine particles of earth have been removed. The old soil should be shaken from the roots of the plants to be potted; and before potting cut off, if necessary, a portion of the main root. In potting press the soil rather firmly around the roots.”

Auriculas are best grown in a cold frame mounted on legs about 2 ft. from the ground, and provided with hinged sashes. A graduated stage formed of wood battens 6 in. broad, with a rise of 2 in., should be fixed so as to take each one row of pots, with the plants standing at about 15 in. from the glass; the spaces between the shelves should be closed, while the top board of the back and the front should be hinged so as to be let down when desired for ventilation, the sashes, too, being movable for the same purpose, and also to afford facilities for examining and attending to the plants. This frame should face the north from May to October, and south in winter. No protection will be needed except in very severe frosts, when two or three thicknesses of garden mats may be thrown over the glass, and allowed to remain on until the soil is thawed, should it become frozen.

Auriculas may be propagated from seed, which is to be sown as soon as ripe, in July or August, in boxes, kept under cover, and exposed only to the rays of the morning sun. When seed has been saved from the finer sorts, the operation is one of consider- able nicety, as it not unfrequently happens that the best seedlings are at first exceedingly weak. They generally flower in the second or third year, a few good sorts being all that can be expected from a large sowing. The established varieties are increased by taking off the offshoots, an operation performed at the time of potting in July or the beginning of August. But some varieties are very shy in producing offsets.

The original of the auricula is a hardy perennial herb, of dwarf habit,

bearing dull yellowish blossoms. This and the commoner forms raised from seed, as well as one or two double forms, are interesting hardy border flowers. The choice florists' varieties are divided into five classes: — the green-edged, with the margins of the flowers green; the grey-edged, with the green margins powdered with meal so as to appear to be coloured grey; the white-edged, with the mealy powder so dense as to cover the green; the selfs, which have none of the green variegation of margin seen in the foregoing, but are of some distinct colour, as purple, maroon, &c, but have, like the preceding, a white paste surrounding the eye ; and the alpines, which resemble the selfs in not having any green marginal variegation, but differ in having a yellow centre more or less dense. The individual flowers of the first three groups of florists' auriculas show four distinct circles: — first the eye or tube, which should have the

stamens lying in it, but sometimes has the pin-headed stigma instead, which is a defect; second, the paste or circle of pure white surrounding the eye; third, the body colour, a circle of some dark tint, as maroon or violet, which feathers out more or less towards the edge, but is the more perfect the less it is so feathered, and is quite faulty if it breaks through to the outer circle; fourth, the margin, which is green or grey or white. These circles should be about equal in width and clearly defined, and the nearer they are to this standard the more perfect is the flower. In the group of selfs the conditions are the same, except that there is no margin, and consequently the body colour, which should be uniform in tone, extends to the edge. In the alpines there should be no paste or white surrounding the eye, but this space should be either golden-yellow or creamy-yellow, which makes two subdivisions in this group; and the body colour is more or less distinctly shaded, the edges being of a paler hue. There is besides a group of laced alpines, in which a distinct and regular border of colour surrounds each of the marginal lobes.

The following is a selection of the best varieties cultivated in 1909: —

Green-edged. — Abbe Liszt, Abraham Barker, Shirley Hibberd, Prince Charming, Mrs Henwood.

Grey-edged. — Amy Robsart, George Lightbody, Marmion, Olym- pus, George Rudd, Richard Headly.

White-edged.-^ Acme, Conservative, Heather Bell, Mrs Dodson, Rachel, Smiling Beauty.

Selfs. — Andrew Miller, Gerald, Mikado, Mrs Phillips, Mrs Potts, Harrison Weir.

Alpines. — Argus, Dean Hole, Duke of York, Firefly, Flora Mclvor, Mrs Douglas, Mrs Markham, Perfection, Phyllis, Rosy Morn, The Bride, Teviotdale.

AURIFABER (the latinized form of Goldschmidt), a surname borne by three prominent men of the Reformation period in Germany.

i. Andreas (1514-1559) was a physician of some repute, but through his influence with Albert of Brandenburg, last grand- master of the Teutonic order, and first Protestant duke of Prussia, became an outstanding figure in the controversy associated with Andreas Osiander (q.v.) whose daughter he had married.

2. Joannes (Vratislaviensis ; 1517-1568), the younger brother of Andreas, was born at Breslau on the 30th of January 1 51 7, and educated at Wittenberg, where he formed a close and lasting friendship with Melanchthon. After graduating in 1538 he spent twelve years as docent at the university, and having then received his doctorate of divinity, was appointed professor of divinity and pastor of the church of St Nicholas at Rostock. He distinguished himself by his conciliatory disposition, earned the special confidence of Duke John Albert of Mecklenburg, and took a leading part in 1552 in drawing up the constitution of the Mecklenburg church. He also settled some religious disputes in the town of Liibeck. In 1553 Duke Albert of Prussia, anxious to heal the differences in the Prussian church caused by the discussion of Osiander's doctrines, invited him to Konigsberg, and in the following year appointed him professor of divinity and president of the Samland diocese. Joannes, however, found it impossible to conciliate all parties, and in 1565 returned to Breslau, where, in 1567, he became pastor in the church of St Elizabeth and inspector of the Lutheran churches and schools. He died on the 19th of October 1568.

3. Joannes (Vinariensis; 1 519-1575), was born in the county of Mansfeldt in 1 519. He studied at Wittenberg where he heard the lectures of Luther, and afterwards became tutor to Count Mansfeldt. In the war of 1 544-45 he accompanied the army as field-preacher, and then lived with Luther as his .famulus or private secretary, being present at his death in 1546. In the following year he spent six months in prison with John Frederick, elector of Saxony, who had been captured by the emperor, Charles V. He held for some years the office of court -preacher at Weimar, but owing to theological disputes was compelled to resign this office in 1561. In 1566 he was appointed to the Lutheran church at Erfurt, and there remained till his death

in November 1575. Besides taking a share in the first collected or Jena edition of Luther's works (1556), Aurifaber sought out and published at Eisleben in 1564-1565 several writings not included in that edition. He also published Luther's Letters (1556, 1565), and Table Talk (1566). This popular work, which has given him most of his fame, is unfortunately but a second or third hand compilation.

See G. Kawerau's art. in Herzog-Hauck's Realencyk, fur prot. Theologie, and the literature there cited.

AURIGA (the " charioteer " or " waggoner "), in astronomy, a constellation of the northern hemisphere, found in the catalogues of Eudoxus (4th century B.C.) and Aratus (3rd century B.C.). It was symbolized by the Greeks as an old man in a more or less sitting posture, with a goat and her kids in his left hand, and a bridle in his right. The ancient Greeks associated this con- stellation with many myths. Some assume it to be Erichthonius, son of Athena and Hephaestus, who was translated to the skies by Zeus on account of his invention of chariots or coaches. Others assume it to be Myrtilus, a son of Hermes and Clytie, and charioteer to Oenomaus, who was placed in the heavens by Hermes. Another myth has it to be Olenus, a son of Hephaestus, and father of Aega and Helice, two nymphs who nursed Zeus. Ptolemy catalogued fourteen stars, Tycho Brahe twenty-seven, and Hevelius forty in this constellation. Interesting stars are: a Aurigae or Capella (the goat), one of the brightest stars in the heavens, determined by Newall and Campbell to be a spectroscopic binary; /3 Aurigae, a star of the second magnitude also a spectroscopic binary; e Aurigae, an irregularly variable star; and Nova Aurigae, a " new " star discovered by Anderson in 1892, and afterwards found on a photographic plate exposed at Harvard in December 1891. Several fine star clusters also appear in this constellation.

AURILLAC, a town of central France, capital of the depart- ment of Cantal, 140 m. N.N.E. of Toulouse, on the Orleans rail- way between Figeac and Murat. Pop. (1906) 14,097. Aurillac stands on the right bank of the Jordanne, and is dominated from the north-west by the Roc Castanet, crowned by the castle of St Etienne, the keep of which dates from the nth century. Its streets are narrow and uninteresting, with the exception of one which contains, among other old houses, that known as the Maison des Consuls, a Gothic building of the 16th century, decorated with sculptured stone-work. Aurillac owes its origin to an abbey founded in the 9th century by St Geraud, and the abbey-church, rebuilt in the 17th century in the Gothic style, is the chief building in the town. The former college, which dates from the 17 th century, is now occupied by a museum

and a library. There is a statue of Pope Silvester II., born near Aurillac in 930 and educated in the abbey, which soon afterwards became one of the most famous schools of France. Aurillac is the seat of a prefect, and its public institutions include tribunals of first instance and of commerce, a chamber of commerce, a lycee, training-colleges and a branch of the Bank of France. The chief manufactures are wooden shoes and umbrellas, and there is trade in cheese and in the cattle and horses reared in the neighbourhood.

AURISPA,. GIOVANNI (c. 1370-1459), one of the learned Italians of the 15th century, who did so much to promote the revival of the study of Greek in Italy, was born at Noto in Sicily. In 1418 he visited Constantinople, where he remained for some years, perfecting his knowledge of Greek and searching for ancient MSS. His efforts were rewarded by the acquisition of some 250 MSS., with which he returned to Venice. Here he is said to have been obliged to pawn his treasures for 50 gold florins to provide for his immediate wants. Cosimo de' Medici, hearing of his embarrassment, redeemed the MSS. and summoned the owner to Florence. In 1438, at the council of Basel, Aurispa attracted the attention of Pope Eugenius IV., who made him his secretary; he held a similar position under Nicholas V., who presented him to two lucrative abbacies. He died at Ferrara. Considering his long life and reputation Aurispa produced little: Latin translations of the commentary of Hierocles on the golden verses of Pythagoras (1474) and of Philisci Consolaturia ad

Ciceronem from Dio Cassius (not published till 1510); and, according to Gesner, a translation of the works of Archimedes. Aurispa's reputation rests upon the extensive collection of MSS. copied and distributed by him, and his persistent efforts to revive and promote the study of ancient literature.

AUROCHS (from Lat. urus, the wild ox, and " ox ") or Ueus, the name of the extinct wild ox of Europe (Bos taurus primi- genius), which after the disappearance of that animal became transferred to the bison. According to the German Freiherr von Herberstein (1486-1566), in his Moscovia, of which an Italian translation was published ±X Venice in 1550, the aurochs survived in Poland (and probably also in Hungary) during the latter middle ages. In this work appear woodcuts — rude but char- acteristic and unmistakable — of two distinct types of European wild cattle; one the aurochs, or ur, and the other the bison. As Herberstein had travelled in Poland, it is probable that he had seen both species alive, and the drawings were most likely executed under his own direction. It has indeed been suggested that the figure of the aurochs was taken from a domesticated ox, but this is a mistaken idea. Not the least important feature of the work of Herberstein is the application of the name aurochs to

the wild ox, as distinct from the bison. The locality where aurochs survived in Herberstein's time was the forest of Jakto- zowka, situated about 55 kilometres west-south-west of Warsaw, in the provinces of Bolemow and Sochaczew. From other evidence it appears that the last aurochs was killed in this forest in the year 1627. Herberstein describes the colour of the aurochs as black, and this is confirmed by another old picture of the animal. Gesner's figure of the aurochs, or as he calls it " thur," given in the Icones to his History of Animals, was probably adapted from Herberstein's. It may be added that an ancient gold goblet depicts the hunting and taming of the wild aurochs.

As a wild animal, then, the aurochs appears to have ceased to exist in the early part of the 17th century; but as a species it survives, for the majority of the domesticated breeds of European cattle are its descendants, all diminished in point of size, and some departing more widely from the original type than others. Aurochs' calves were in all probability captured by the early inhabitants of Britain and the continent and tamed; and from these, with perhaps an occasional blending of wild blood, are descended most European breeds of cattle.

Much misconception, however, has prevailed as to which breeds are the nearest to the ancestral wild stock. At one time this position was supposed to be occupied by the white half -wild cattle of Chillingham and other British parks. These white breeds are, however, partial albinos; and such semi-albinos are always the result of domestication and could not have arisen in the wild state. Moreover, park-cattle display evidence of their descent from dark-coloured breeds by the retention of red or black ears and brown or black muzzles. In the Chillingham cattle the ears are generally red, although sometimes black, and the muzzle is brown; while in the breed at Cadzow Chase Lanarkshire, both ears and muzzle are black, and there are usually flecks of black on the head and forequarters. It is further significant that, in the Chillingham herd, dark-coloured calves, which are weeded out, make their appearance from time to time.

A very ancient British breed is the black Pembroke; and when this breed tends to albinism, the ears and muzzle, and more rarely the fetlocks, remain completely black, or very dark grey, although the colour elsewhere is whitish, more or less flecked and blotched with pale grey. In the shape and curvature of the horns, which at first incline outwards and forwards, and then bend somewhat upwards and inwards, this breed of cattle resembles the aurochs and the (by comparison) dwarfed park-breeds. Moreover, in both the Pembroke and the park-breeds the horns are light-coloured with black tips.

Evidence as to the affinity between these breeds is afforded by the fact that

a breed of cattle very similar to that at Chillingham was found in Wales in the 10th century; these cattle being white with red ears. Individuals of this race survived till at least 1850 in Pembroke, where they weie at one time kept

perfectly pure as a part of the regular farm-stock. Until a period comparatively recent, they were relatively numerous, and were driven in droves to the pasturages of the Severn and the neighbouring markets. Their whole essential characters are the same as those of the cattle at Chillingham. Their horns are white, tipped with black, and extended and turned upwards in the manner distinctive of the park-breed. The inside of the ears and the muzzle are black, and the feet are black to the fetlock joint. The skin is unctuous and of a deep-toned yellow colour. Individuals of the race were sometimes born entirely black, and then were not to be distinguished from the common Pembroke cattle of the mountains.

It is thus evident that park-cattle are an albino offshoot from the ancient Pembroke black breed, which, from their soft and well-oiled skins, are evidently natives of a humid climate, such as that of the forests in which dwelt the wild aurochs. This disposes of a theory that they are descendants of a white sacrificial breed introduced into Britain by the ancient Romans.

The Pembroke and park-cattle are, however, by no means the sole descendants of the aurochs, the black Spanish fighting-bulls claiming a similar descent. This breed shows a light-coloured line along the spine, which was characteristic of the aurochs. It has also been suggested that the Swiss Siemental cattle are nearly related to the aurochs. The latter was a gigantic animal, especially during the Pleistocene period; the skulls and limb- bones discovered in the brick-earths and gravels of the Thames valley and many other parts of England having belonged to animals that probably stood six feet at the shoulder. (R.L.)*

AURORA (perhaps through a form ausosa from Sansk. ush, to burn ; the common idea of ” brightness ” suggests a connexion with aurum, gold), the Roman goddess of the dawn, correspond- ing to the Greek goddess Eos. According to Hesiod (Theog. 271) she was the daughter of the Titan Hyperion and Thea (or Eury- phassa), and sister of Helios and Selene. By the Titan Astraeus, she was the mother of the winds Zephyrus, Notus and Boreas, of Hesperus and the stars. Homer represents her as rising every morning from the couch of Tithonus (by whom she was the mother of Emathion and Memnon), and drawn out of the east in a chariot by the

horses Lampus and Phaethon to carry light to gods and men (Odyssey, xxiii. 253); in Homer, she aban- dons her course when the sun is fully risen (or at the latest at mid-day, Iliad, ix. 66), but in later literature she accompanies the sun all day and thus becomes the goddess of the daylight. From the roseate shafts of light which herald the dawn, she bears in Homer the epithet " rosy-fingered." The conception of a dawn-goddess is common in primitive religions, especially in • the Vedic mythology, where the deity Usas is closely parallel to the Greco-Roman; see Paul Regnaud, Le Rig-Veda in Annales du musee Guimet, vol. i. c. 6 (Paris, 1892). She is also represented as the lover of the hunter Orion (Odyssey, v. 121), the representa- tive of the constellation that disappears at the flush of dawn, and the youthful hunter Cephalus, by whom she was the mother of Phaethon (Apollodorus iii. 14. 3). In works of art, Eos is represented as a young woman, fully clothed, walking fast with a youth in her arms; or rising from the sea in a chariot drawn by winged horses; sometimes, as the goddess who dis- penses the dews of the morning, she has a pitcher in each hand. In the fresco-painting by Guido Reni in the Rospigliosi palace at Rome, Aurora is represented strewing flowers before the chariot of the sun. Metaphorically the word Aurora was used (e.g. Virg. Aen. viii. 686, vii. 606) for the East generally.

AURORA, a city of Kane county, Illinois, U.S.A., in the N.E. part of the state, on the Fox river, about 37 m. W. of Chicago. Pop. (1890) 19,688; (1900) 24,147, of whom 5075 were foreign-born; (1910) 29,807. Aurora is served by the Chicago, Burlington & Quincy, the Chicago & North-Western, the Elgin, Joliet & Eastern, and the Illinois, Iowa and Minnesota rail- ways, and is connected with Chicago by an electric line. The city has a soldiers' memorial hall, erected by popular sub- scription, and a Carnegie library. Aurora is an important manu- facturing centre; among its manufactures are railway cars — the shops of the Chicago, Burlington & Quincy railway being

here — flour and cotton, carriages, hardware specialties, corsets, suspenders, stoves and silver-plate. In 1905 the city's factory products were valued at $7,329,028, an increase of 30 % in 5 years. The municipality owns and operates the water-works and electric- lighting plants. The first settlement in the vicinity of Aurora was made in 1834. In 1845 the village of East Aurora was incorporated, and West Aurora was incorporated nine years later. In 1853 the two villages were united under a city charter, which was superseded by a revised charter in 1887.

AURORA, a city of Lawrence county, Missouri, U.S.A., 275 m. S.W. of St Louis, on the St Louis & San Francisco, and the St Louis, Iron Mountain & Southern railways. Pop.(i89o) 3482; (1900) 6191; (1910) 4148. It is situated near a lead and zinc mining region, where surface lead was

discovered in 1873 and systematic mining began in 1887; among the cities of the state it is second to Joplin in mineral importance, and has large ironworks and flour-mills; mining machinery also is manu- factured. Farming and fruit-growing are carried on in the surrounding country, and Aurora is the place from which the products are shipped. Aurora was platted in 1870 and was chartered as a city in 1886.

AURORA, a village of Cayuga county, New York, U.S.A., on Cayuga Lake, 16 m. S.W. of Auburn. Pop. (1905) 623; (1910) 493 • It is served by the Lehigh Valley railway. Aurora is a beau- tiful place and a popular summer resort, but it is best known as the seat of Wells College, a non-sectarian college for women, founded in 1868 by Henry Wells (1805-1878), of the Wells Fargo Express Company, and liberally endowed by Edwin B. Morgan (1806-1881), also connected with the same company, and by others. At Aurora are also the Somes school (a prepara- tory school for boys), founded in 1798 and until 1904 known as the Cayuga Lake Academy, and the Wells school (a preparatory school for girls). The village has a public library. Aurora was settled in 1789 chiefly by residents of New England, and was incorporated in 1905.

AURORA POLARIS (Aurora Borealis and Australis, Polar Light, Northern Lights), a natural phenomenon which occurs in many forms, some of great beauty.

1. Forms. — Various schemes of classification have been proposed, but none has met with universal acceptance; the following are at least the principal types. (1) Arcs. These most commonly resemble segments of circles, but are not in- frequently elliptical or irregular in outline. The ends of arcs frequently extend to the horizon, but often one or both ends stop short of this. Several arcs may be visible at the same time. Usually the under or concave edge of the arc is the more clearly defined, and adjacent to it the sky often seems darker than elsewhere. It is rather a disputed point whether this dark segment — through which starlight has been seen to pass — • represents a real atmospheric condition or is merely a contrast effect. (2) Bands. These may be nearly straight and regular in outline, as if broken portions of arcs; frequently they are ribbon-like serpentine forms showing numerous sinuosities. (3) Rays. Frequently an arc or band is visibly composed of innumerable short rays separated by distinctly less luminous intervals. These rays are more or less perpendicular to the arc or band; sometimes they are very approximately parallel to one another, on other occasions they converge towards a point. Longer rays often show an independent existence. Not in- frequently rays extend from the upper edge of an arc towards the zenith. Combinations of rays sometimes resemble a luminous fan, or a series of fans, or part of a hollow luminous cylinder. Rays often alter suddenly in length, seeming to stretch down towards the

horizon or mount towards the zenith. This accounts for the description of aurora as " Merry Dancers." (4) Curtains or Draperies. This form is rare except in Arctic regions, where it is sometimes fairly frequent. It is one of the most imposing forms. As a rule the higher portion is visibly made up of rays, the light tending to become more continuous towards the lower edge; the combination suggests a connected whole, like a curtain whose alternate portions are in light and shade. The curtain often shows several conspicuous folds, and the lower

edge often resembles frilled drapery. At several stations in Greenland auroral curtains have been observed when passing right overhead to narrow to a thin luminous streak, exactly as a vertical sheet of light would seem to do to one passing under- neath it. (5) Corona. A fully developed corona is perhaps the finest form of aurora. As the name implies, there is a sort of crown of light surrounding a comparatively or wholly dark centre. Farther from the centre the ray structure is usually prominent. The rays may he very close together, or may be widely separated from one another. (6) Patches. During some displays, auroral light appears in irregular areas or patches, which sometimes bear a very close resemblance to illuminated detached clouds. (7) Diffused Aurora. Sometimes a large part of the sky shows a diffuse illumination, which, though brighter in some parts than others, possesses no definite outlines. How far the different forms indicate real difference in the nature of the phenomenon, and how far they are determined by the position of the observer, it is difficult to say. Not infrequently several different forms are visible at the same time.

2. Isochasms. — Aurora is seldom observed in low latitudes. In the southern hemisphere there is comparatively little in- habited land in high latitudes and observational data are few; thus little is known as to how the frequency varies with latitude and longitude. Even in the northern hemisphere there are large areas in the Arctic about which little is known. H. Fritz (2) has, however, drawn a series of curves which are believed to give a good general idea of the relative frequency of aurora throughout

the northern hemisphere. Fritz' curves, shown in the illustration, are termed isochasms, from the Greek word employed by Aris- totle to denote aurora. Points on the same curve are supposed to have the same average number of auroras in the year, and this average number is shown adjacent to the curve. Starting from the equator and travelling northwards we find in the extreme south of Spain an average of only one aurora in ten years. In the north of France the average rises to five a year; in the north of Ireland to

thirty a year; a little to the north of the Shetlands to one hundred a year. Between the Shetlands

and Iceland we cross the curve of maximum frequency, and farther north the frequency diminishes. The curve of maximum frequency forms a slightly irregular oval, whose centre, the auroral pole, is according to Fritz at about 8i° N. lat., 70 W. long. Isochasms reach a good deal farther south in America than in Europe. In other words, auroras are much more numerous in the southern parts of Canada and in the United States than in the same latitudes of Europe.

3. Annual Variation.— Table I. shows the annual variation observed in the frequency of aurora. It has been compiled from several authorities, especially Joseph Lovering (4) and Sophus Tromholt (5) . The monthly figures denote the percentages of the total number seen in the year. The stations are arranged in order of latitude. Individual places are first considered, then a few large areas.

The Godthaab data in Table I. are essentially those given by Prof. A. Paulsen (6) as observed by Kleinschmidt in the winters of 1865 to 1882, supplemented by Lovering's data for summer. Starting at the extreme north, we have a simple period with a well-marked maximum at midwinter, and no auroras during several months at midsummer. This applies to Hammerfest, Jakobshavn, Godthaab and the most northern division of Scandinavia. The next division of Scandinavia shows a transi- tion stage. To the south of this in Europe the single maximum at mid-winter is replaced by two maxima, somewhere about the equinoxes.

4. In considering what is the real significance of the great differ- ence apparent in Table I. between higher and middle latitudes, a primary consideration is that aurora is seldom seen until the sun is some degrees below the horizon. There is no reason to suppose that the physical causes whose effects we see as aurora are in existence only when aurora is visible. Until means are devised for detecting aurora during bright sunshine, our knowledge as to the hour at which these causes are most frequently or most powerfully in opera- tion must remain incomplete. But it can hardly be doubted that the differences apparent in Table I. are largely due to the influence of sunlight. In high latitudes for several months in summer it is never dark, and consequently a total absence of visible aurora is practically inevitable. Some idea of this influence can be derived from figures obtained by the Swedish International Expedition of 1882-1883 at Cape Thorsden, Spitsbergen, lat. 78 28′ N. (7). The original gives the relative frequency of aurora for each degree of depression of the sun below the horizon, assuming the effect of twi- light to be nil {i.e. the relative frequency to be 100) when the de- pression is 18-5° or more. The following are a selection

of the figures: — ■

Angle of depression . . 4-5° 7-5° 10-5° 12-5° 15-5°.

Relative frequency . . 0-3 9-3 44-9 74-5 95-9.

These figures are not wholly free from uncertainties, arising from

true diurnal and annual variations in the frequency, but they give

a good general idea of the influence of twilight.

If sunlight and twilight were the sole cause of the apparent annual variation, the frequency would have a simple period, with a maxi- mum at midwinter and a minimum at midsummer. This is what is actually shown by the most northern stations and districts in Table I. When we come, however, below 65 lat. in Europe the frequency near the equinoxes rises above that at midwinter, and we have a distinct double period, with a principal minimum at mid- summer and a secondary minimum at midwinter. In southern Europe— where, however, auroras are too few to give smooth results in a limited number of years— in southern Canada, and in the United States, the difference between the winter and summer months is much reduced. Whether there is any real difference between high and mean latitudes in the annual frequency of the causes rendered visible by aurora, it is difficult to say. The Scan- dinavian data, from the wealth of observations, are probably the most representative, and even in the most northern district of Scandinavia the smallness of the excess of the frequencies in Decem- ber and January over those in March and October suggests that some influence tending to create maxima at the equinoxes has largely counterbalanced the influence of sunlight and twilight in reducing the frequency at these seasons.

5. Fourier Analysis. — With a view to more minute examination, the annual frequency can be expressed in Fourier series, whose terms represent waves, whose periods are 12, 6, 4, 3, &c. months. This has been done by Lovering (4) for thirty-five stations. The nature of the results will best be explained by reference to the formula given by Lovering as a mean from all the stations considered, viz. : —

8-33 + 3-03 sin (30i + ioo°52') + 2-53 sin (6oi + 309°5') + o-i6 sm

(90« + 2i3°3i') + 0-56 sin (i20i + i62°45')-|-o-27 sin (i5o/ + 32°38').

The total number of auroras in the year is taken as 100, and t denote!

the time, in months, that has elapsed since the middle of January.

AURORA

Fig. i.— TWO TYPES OF AURORAL ARCS.

Fig. 2.— TWO TYPES OF AURORAL RAYS.

(From the Internationale Pohrforschung, 1882-1883, by permission of the Kaiserlichen Akademie der Wissenschaflen, Vienna.)

Plate II.

AURORA

Fig. 3— AURORAL BANDS.

Fig. 5.— AURORAL CORONA.

AURORA POLARIS

Table I. — Annual Frequency (Relative).

929

Place.

Latitude.

Jan.

Feb.

March.

April.

May.

June.

July.

Aug.

Sept.

Oct.

Nov.

Dec.

Hammerfest

7°i

20-9

17-6

8-8

4-4

9-9

17-6

20-9

Jakobshavn

69

14-6

13-0

9-2

o-5

.

9

2

15

1

18-4

20-0

Godthaab ….

64

15-5

12-4

97

4-9

1-2

8

7

13

3

17-0

17-4

St Petersburg .

60

6-5

91

16-8

13-8

3-5

1-2

1-4

5-9

13

8

13

1

7-6

7-3

Christiania

60

8-6

u-4

14-0

1 1 -2

o-6

0-2

6-5

14

6

12

2

10-3

10-3

Upsala

60

8-4

12-9

14-9

7-4

0-7

0-2

0-4

7”i

12

4

14

3

10-7

10-7

Stockholm

59

7-9

IO-O

H-7

16-4

3‘8

O-O

o-o

5-6

12

9

11

4

10-0

7-3

Edinburgh ….

56

9-5

12-6

140

9-5

3-4

0-0

i-7

6-o

12

13

5

n-8

5-2

Berlin

52 1

7-0

io-8

16-4

15-5

n-4

o-6

2-9

2-9

6

5

13

2

8-5

4-1

London ….

*51**

8-6

10-5

IO-2

10-7

4-0

I-I

1-9

5-6

14

5

16

9

9-6

6-4

Quebec

47,

3-6

14-8

8-3

14-2

4-1

5-9

77

5-9

II

2

12

4

7-7

4-1

Toronto ….

43?

5-4

9-5

87

n-8

9-0

6-2

8-0

6-4

8

5

11

1

8-7

6-7

Cambridge, Mass.

42 i

5-i

8-2

n-8

10-2

6-4

5-1

10-3

8-5

13

3

9

2

6-8

5-1

New Haven, Conn.

4ii

7-7

7-3

8-9

8-2

7-6

57

8-9

8-1

II

9

7

6

io-6

7-5

Scandinavia

N. of 68i°

16-4

13-8

14-8

1-6

o-o

o-o

o-o

0-4

7

8

15

1

14-4

15-7

,,

68i° to 65

15-3

14-6

13-7

2-9

o-o

o-o

o-o

i-i

9

7

14

b

14-0

14-1

65°to6iJ°

13-2

12-3

14-5

5-4

0-2

o-o

0-0

2-8

13

1

14

2

12-8

“•5

6ii° to 58

9-5

II-2

13-5

109

1-3

0-1

0-4

5-7

13

6

13

8

10-4

9-6

,,

S. of 58

8-2

n-9

12-6

13-3

i-5

0-1

o-6

4-9

14

9

13

5

10-3

8-2

New York State . .

45° to 4 oi°

6-3

7-4

9-1

II-O

7-4

6-6

8-8

10-4

n-7

9-7

6-2

5-4

Putting t = o, 1, &c, in succession, we get the percentages of the total number of auroras which occur in January, February, and so on. The first periodic term has a period of twelve, the second of six months, and similarly for the others. The first periodic term is largest when ;X30° + ioo ° 52′ = 450°. This makes / = n-6 months after the middle of January, otherwise the 3rd of January, approxi- mately. The 6-month term has the earliest of its two equal maxima about the 26th of March. These two are much the most important of the periodic terms. The angles ioo°52',309°5', &c.,are known as the phase angles of the respective periodic terms, while 3-03, 2-53, &c, are the corresponding amplitudes. Table II. gives a selection of Lovering's results. The stations are arranged according to latitude.

Table II.

Station.

Jakobshavn . Godthaab St Petersburg . Christiania . Upsala …. Stockholm . Makerstown (Scotland) Great Britain Toronto …. Cambridge, Mass. .

New Haven, Conn. New York State.

Annual Term.

6-Month Term.

4-Month Term.

Amp.

Phase.

Amp.

Phase.

Amp.

Phase.

10-40

123

I-I3

206

1-41

333

8-21

in

1-54

316

0-64

335

2-81

96

5-99

309

o-57

208

4-83

116

4.99

317

0-76

189

5-41

119

4-57

322

o-86

296

3-68

91

5-80

303

i-3i

180

5-79

102

4-47

310

2-00

342

3-87

126

4-24

287

0-40

73

0-18

12

2-13

260

0-52

305

1-02

262

2-84

339

1-28

253

0-99

183

1 02

313

o-57

197

1-34

264

2-29

325

o-54

157

Speaking generally, the annual term diminishes in importance as we travel south. North of 55° in Europe its phase angle seems fairly constant, not differing very much from the value no" in Lovering's general formula. The 6-month term is small, in the two most northern stations, but south of 60° N. lat. it is on the whole the most important term. Excluding Jakobshavn, the phase angles in the 6-month term vary wonderfully little, and approach the value 309° in Lovering's general formula. North of lat. 50 the 4-month term is, as a rule, comparatively unimportant, but in the American stations its relative importance is increased. The phase angle, however, varies so much as to suggest that the term mainly repre- sents local causes or observational uncertainties. Lovering's general formula suggests that the 4-month term is really less important than the 3-month term, but he gives no data for the latter at individual stations.

6. Sunlight is not the only disturbing cause in estimates of auroral frequency. An idea of the disturbing influence of cloud may be derived from some interesting results from the Cape Thorsden (7) observations. These show how the frequency of visible auroras diminished as cloud increased from o (sky quite clear) to 10 (sky wholly overcast).

Grouping the results, we have:

Amount of cloud . .0 1 to 3 4 to 6 7 to 9 10

Relative frequency . . 100 82 57 46 8

Out of a total of 1714 hours during which the sky was wholly overcast the

Swedish expedition saw auroras on 17, occurring on 14 separate days, whereas 226 hours of aurora would have occurred out of an equal number of hours with the sky quite clear. The figures being

based on only one season's observations are somewhat irregular. Smoothing them, Carlheim-Gyllenskold gives / = 100′ — 7-36 as the most probable linear relation between c, the amount of cloud, and /, the frequency, assuming the latter to be 100 when there is no cloud.

7. Diurnal Variation. — The apparent daily period at most stations is largely determined by the influence of daylight on the visibility. It is only during winter and in high latitudes that we can hope to ascertain anything directly as to the real diurnal variation of the causes whose influence is visible at night as aurora. Table III. gives particulars of the number of occasions when aurora was seen at each hour of the twenty-four during three expeditions in high latitudes when a special outlook was kept.

The data under A refer to Cape Thorsden (78 28′ N. lat., 15° 42′ E. . long.), those under B to Jan Mayen (8) (71° o' N. lat., 8° 28′ W. long.), both for the winter of 1882-1883. The data under C are given by H. Arctowski (9) for the "Belgica" Expedition in 1898. They may be regarded as applying approximately to the mean position of the " Belgica," or7o|° S.lat., 86i° W. long. The method of counting frequencies was fairly alike, at least in the case of A and B, but in comparing the different stations the data should be regarded as relative rather than absolute. The Jan Mayen data refer really to Gottingen mean time, but this was only twenty-three minutes late on local time. In calculating the percentages of forenoon and afternoon occur- rences half the entries under noon and midnight were assigned to each half of the day. Even at Cape Thorsden, the sun at mid-winter is only 11° below the horizon at noon, and its effect on the visibility is thus not wholly negligible. The influence of daylight is presumably the principal cause of the difference between the phenomena during November, December and January at Cape Thorsden and Jan Mayen, for in the equinoctial months the results from these two stations are closely similar. Whilst day- light is the principal cause of the diurnal inequality, it is not the only cause, otherwise there would be as many auroras in the morning (forenoon) as in the evening (afternoon). The number seen in the evening is, however, according to Table III., consider- ■ ably in excess at all seasons. Taking the whole winter, the percentage seen in the evening was the same for the " Belgica " as for Jan Mayen, i.e. for practically the same latitudes South and North. At Cape Thorsden from. November to January there seems a distinct double period, with minima near noon and midnight. The other months at Cape Thorsden show a single maximum and

minimum, the former before midnight.

11

93°

AURORA POLARIS

The same phenomenon appears at Jan Mayen especially in November, December and January, and it is the normal state of matters in temperate latitudes, where the frequency is usually greatest between 8 and 10 p.m. An excess of evening over morning occurrences is also the rule, and it is not infrequently more pronounced than in Table III. Thus at Tasiusak (65 37′ N. lat, 37 33′ W. long.) the Danish Arctic Expedition (10) of 1904 found seventy-five out of every hundred occurrences to take place before midnight.

Table III. — Diurnal Variation.

Feb., March,

Sept. to March (N. Lat.).

Hour.

Dec.

Nov. and Jan.

Sept. and Oct.

March to Sept. (S. Lat.).

A

B

A

B

A

B

A

B

C

1

14

7

14

8

27

23

55

38

24

2

10

6

15

6

20

25

45

37

23

3

9

4

15

5

15

21

39

30

10

4

10

5

21

7

14

18

45

30

4

5

13

5

20

3

10

10

43

18

2

6

11

3

15

4

2

3

28

10

1

7

9

2

13

3

1

2

23

7

8

5

1

6

1

11

2

9

7

2

9

16

2

10

10

5

15

11

9

6

15

Noon

10

4

14

1

10

6

16

2

14

IO

24

3

18

1

20

3

38

4

4

16

7

19

7

1

1

36

15

5

12

11

22

10

5

2

39

23

3

6

14

10

21

16

8

5

43

3i

3

7

16

13

23

16

20

9

59

38

14

8

15

12

22

18

24

24

61

54

25

9

14

15

18

17

27

28

59

60

3i

10

12

15

19

15

31

25

62

55

29

11

10

12

18

17

33

26

61

55

26

Midnight

9

9

13

11

28

22

50

42

26

Totals

277

140

354

167

266

244

897

551

221

Percentages —

Forenoon

42

28

42

25

39

46

41

35

35

Afternoon

58

72

58

75

61

54

59

65

65

8. The preceding remarks relate to auroras as a whole; the different forms differ considerably in their diurnal variation. Arcs, bands and, generally speaking, the more regular and persistent forms, show their greatest frequencies earlier in the night than rays or patches. Table IV. shows the percentages of e. (evening) and m. (morning) occurrences of the principal forms as recorded by the Arctic observers at Cape Thorsden, Jan Mayen and Tasiusak.

Table IV.

Arcs.

Bands.

Rays.

Patches.

Cape Thorsden . Jan Mayen . Tasiusak

e.

m.

e.

m.

e.

m.

e.

m.

76

78 85

24 22

15

66

68 85

34 32 15

52 60

65

48 40 35

51 60 62

49 40

38

At Cape Thorsden diffused auroral light had percentages e. 65, m – 35, practically identical with those for bands. At Tasiusak, 8 p.m. was the hour of most frequent occurrence for arcs and bands, whereas patches had their maximum frequency at 11 p.m. and rays at midnifiht.

9. Lunar and other Periods. — The action of moonlight neces- sarily gives

rise to a true lunar period in the visibility of aurora. The extent to which it renders aurora invisible depends, however, so much on the natural brightness of the aurora — which depends on the time and the place- — and on the sharpness of the outlook kept, that it is difficult to gauge it. Ekholm and Arrhenius(11) claim to have established the existence of a true tropical lunar period of 27-32 days, and also of a 26-day period, or, as they make it, a 25-929-day period. A 26-day period has also been derived by J. Liznar (12), after an elaborate allowance for the disturbing effects of moonlight from the observations in 1882-1883 at

Bossekop, Fort Rae and Jan Mayen. Neither of these periods is universally conceded. The connexion between aurora and earth magnetic disturbances renders it practically certain that if a 26-day or similar period exists in the one phenomenon it exists also in the other, and of the two terrestrial magnetism (q.v.) is probably the element least affected by external complications, such as the action of moonlight.

10. Sun-spot Connexion. — The frequency of auroral displays is much greater in some years than others. At most places the

variation in the frequency has shown a general similarity to that of sun-spots. Table V. gives contemporaneous data for the frequency of sun-spots and of auroras seen in Scandinavia. The sun-spot data prior to 1902 are from A. Wolfer's table in the Met. Zeitschrift for 1902, p. 195; the more recent data are from his quarterly lists. All are observed frequencies, derived after Wolf's method; maxima and minima are in heavy type. The auroral data are from Table E of Tromholt's cata- logue (5), with certain modifica- tions. In Tromholt's yearly data the year commences with July. This being inconvenient for com- parison with sun-spots, use was made of his monthly values to obtain corresponding data for years commencing with January. The Tromholt-Schroeter data for Scandinavia as a whole com- menced with 1 761; the figures for earlier years were obtained by multiplying the data for Sweden by 1-356, the factor being derived by comparing the figures for Sweden alone and for the whole of Scandinavia from July 1761 to June 1783.

In a general way Table V. warrants the conclusion that years of many sun-spots are years of many auroras, and years of few sun-spots years of few auroras; but it does not disclose any very definite relationship between the two frequencies. The maxima and minima in the two phenomena in a good many cases are not found in the same years. On the other hand, there is absolute coincidence in a number of cases, some of them very striking, as for instance the remarkably low minima of 18 10 and

1823.

11. During the period 1764 to 1872 there have been ten years of maximum, and ten of minimum, in sun-spot frequency. Taking; the three years of greatest frequency at each maximum, and the three years of least frequency at each minimum, we get thirty years of many and thirty of few sun-spots. Also we can split the period into an earlier half, 1764 to 1817, and a later half, 1818 to 1872, containing respectively the earlier five and the later five of the above groups of sun-spot maximum and minimum years. The annual means derived from the whole group, and the two sub-groups, of years of many and few sun-spots are as follows : —

Years of

1764-1872.

1764-1817.

1818-1872.

Spots.

Auroras.

Spots.

Auroras.

Spots.

Auroras.

Many sun-spots. Few „

93-4 13-4

99.9

6i-5

86-7 13-6

70-7 51-6

IOO-I

i3-i

129-1 71-3

In each case the excess of auroras in the group of years of many sun-spots is decided, but the results from the two sub-periods do not harmonize closely. The mean sun-spot frequency for the group of years of few sun-spots is almost exactly the same for the two sub- periods, but the auroral frequency for the later group is nearly 40 % in excess of that for the earlier, and even exceeds the auroral

frequency in the years of many sun-spots in the earlier sub-period. This inconsistency, though startling at first sight, is probably more apparent than real. It is almost certainly due in large measure to a progressive change in one or both of the units of frequency. In the case of sun-spots, A. Schuster (13) has compared J. R. Wolf and A. Wolfer's frequencies with data obtained by other observers for areas of sun-spots, and his figures show unquestionably that the unit in one or other set of data must have varied appreciably from time to time. Wolf and VVolfer have, however, aimed persistently at securing a definite standard, and there are several reasons for believing that the change of unit has been in the auroral rather than the sun-spot frequency. R. Rubenson (14), from whom Tromholt derives his data for Sweden, seems to accept this view, assigning the apparent increase in auroral frequency since i860 to the institution by the state of meteorological stations in 1859, and to the increased interest taken in the subject since 1865 by the university of Upsala. The figures themselves in Table V. certainly point to this conclusion, unless we are prepared to believe that auroras have increased enor- mously in number. If, for instance, we compare the first and the last three 11 -year cycles for which Table V. gives complete data, we obtain as yearly means : —

1 749-1 781 1 844-1 876

Sun-spots 56-4

55-8

Auroras 77-5

,, II2-2

The mean sun-spot frequencies in the two periods differ by only I %, but the auroral frequency in the later period is 45 % in excess of that in the earlier.

The above figures would be almost conclusive if it were not for the

conspicuous differences that exist between the mean sun-spot frequencies for different 11-year periods. Schuster, who has con- sidered the matter very fully, has found evidence of the existence of other periods — notably 8-4 and 4-8 years — in addition to the recog- nized period of 11-125 years, and he regards the difference between the maxima in successive 11-year periods as due at least partly to an overlapping of maxima from the several periodic terms. This cannot, however, account for all the fluctuations observed in sun-spot frequencies, unless other considerably longer periods exist. There has been at least one 33-year period during which the mean value of sun-spot frequency has been exceptionally low, and, as we shall see, there was a corresponding remarkable scarcity of auroras. The period in question may be regarded as extending from 1794 to 1826 inclusive. Comparing it with the two adjacent periods of thirty-three years, we obtain the following for the mean annual frequencies: —

33-Year Period.

Sun-spots.

Auroras.

1761-1793 1 794- 1 826 1827-1859

65-6 20-3 56-1

76-1

39-5

84-4

12. The association of high auroral and sun-spot frequencies shown in Table V. is not peculiar to Scandinavia. It is shown, for instance, in Loomis's auroral data, which are based on observation. at a variety of European and American stations (Ency. Brit. 9th ed. art. Meteorology, Table XXVIII.). It does not seem, however, to apply universally. Thus at Godthaab we have, according to Adam Paulsen (IS), comparing 3-year periods of few and many sun-spots : —

3- Year Period.

Total Sun-spot Frequency.

Total Nights of Aurora.

1 865-1 868 1869-1872 1876-1879

48

339

23

274 138

273

The years start in the autumn, and 1 865-1 868 includes the three winters of 1865 to '66, '66 to '67, and '67 to '68. Paulsen also gives data from two other stations in Greenland, viz. Ivigtut (1869 to 1879) and Jakobshavn (1873 to 1879), which show the same pheno- menon as at Godthaab in a prominent fashion. Greenland lies to the north of Fritz's curve of maximum auroral frequency, and the suggestion has been made that the zone of maximum frequency expands to the south as sun-spots increase, and contracts again as they diminish, the number of auroras at a given station increasing or diminishing as the zone of maximum frequency approaches to or recedes from it. This theory, however, does not seem to fit all the facts and stands in want of confirmation.

13. Auroral Meridian. — It is a common belief that the summit of an auroral arc is to be looked for in the observer's magnetic meridian. On any theory it would be rather extraordinary if this were invariably true. In temperate latitudes auroral arcs are seldom near the zenith, and there is reason to believe them at very great heights. In high latitudes the average height is probably less, but the direction in which the magnetic needle

Table V.

Year.

Frequency.

Year.

Frequency.

Yesr.

Frequency.

Year.

Frequ

ency.

Sun-spot.

Auroral.

Sun-spot.

Auroral.

Sun-spot.

Auroral.

Sun-spot.

Auroral.

1749

80-9

103

1789

1181

89

1829

67-0

93

1869

73-9

160

1750

83

4

134

1790

89-9

90

1830

71

132

1870

1391

\H

1751

47

7

53

1791

66-6

54

1831

47-8

89

1871

III-2

1752

47

8

in

1792

6o-o

64

1832

27-5

54

1872

IOI-7

200

1753

30

7

96

1793

46-9

29

1833

8-5

79

1873

66-3

189

1754

12

2

65

1794

41-0

37

1834

13-2

81

1874

44-7

158

1755

9

6

34

1795

21-3

34

1835

56-9

58

1875

17-1

133

1756

10

2

60

1796

16-0

37

1836

I2I-5

98

1876

n-3

137

1757

32

4

83

1797

6-4

61

1837

138-3

137

1877

12-3

126

1758

47

6

80

1798

41

35

1838

103-2

159

1878

3-4

1759

54

“3

1799

6-8

28

1839

85-8

165

1879

6-0

1760

62

9

86

1800

H-5

30

1840

63-2

82

1880

32-3

1761

85

9

124

1 801

34-0

34

1841

36-8

75

1881

54-3

1762

61

2

114

1802

45-°

65

1842

24-2

91

1882

59-7

1763

45

1

89

1803

43-i

73

1843

10-7

66

1883

63-7

1764

36

4

107

1804

47-5

101

1844

15-0

81

1884

63-5

1765

20

9

76

1805

42-2

85

1845

40-1

26

1885

52-2

1766

11

4

51

1806

28-1

62

1846

6i-5

50

1886

25-4

1767

37

8

68

1807

IO-I

42

1847

98-5

63

1887

n-i

1768

69

8

80

1808

8-i

20

1848

124-3

107

1888

6-8

1769

106

1

89

1809

2-5

20

1849

95-9

131

1889

6-3

1770

100

8

83

1810

00

4

1850

66-5

95

1890

7-i

i77i

81

6

62’

i8n

1-4

13

1851

64-5

60

1891

35-6

1772

66

5

38

1812

5-0

11

1852

54-2

92

1892

73-0

1773

34

8

58

1813

12-2

18

1853

39-o

65

1893

84-9

1774

3°

6

98

1814

13-9

17

1854

20-6

64

1894

78-0

1775

7

33

1815

35-4

10

1855

6-7

49

1895

64-0

1776

19

8

17

1816

45-8

33

1856

4-3

46

1896

41-8

1777

92

5

64

1817

41-1

60

1857

22-8

38

1897

26-2

1778

154

4

59

1818

3°-4

74

1858

54-8

88

1898

26-7

1779

125

9

60

1819

23-9

43

1859

93-8

131

1899

12-1

1780

84

8

67

1820

15-7

62

i860

95-7

119

1900

9-5

1781

68

1

103

1821

6-6

37

1861

77-2

127

1901

2-7

1782

38

5

67

1822

4-0

33

1862

59-i

135

1902

50

1783

22

8

70

1823

1-8

13

1863

44-0

135

1903

24-4

1784

10

2

78

1824

8-5

14

1864

47-0

124

1904

42-0

1785

24

1

83

1825

16-6

40

1865

3°-5

119

1905

62-8

1786

82

9

136

1826

36-3

58

1866

16-3

130

1906

53-8

1787

132

115

1827

497

79

1867

7-3

127

1907

62-0

1788

130-9

97

1828

62-5

60

1868

37-3

144

1908

48-5

*93 **

points changes rapidly with change of latitude and longitude, and has a large diurnal variation. Thus there must in general be a difference between the observer's magnetic meridian — answering to the mean position of the magnetic needle at his station — and the direction the needle would have at a given hour, if undisturbed by the aurora, at any spot where the phenomena which the observer sees as aurora exist.

Very elaborate observations have been made during several Arctic expeditions of the azimuths of the summits of auroral arcs. At Cape Thorsden (7) in 1882-18S3 the mean azimuth derived from 371 arcs was 24 12′ W.,or 11 "27′ to theW. of the magnetic meridian. As to the azimuths in individual cases, 130 differed from the mean by less than io°, 118 by from 10° to 20°, 82 by from 20° to 30 , 21 by from 30 to 40 , 14 by from 40 to 50°; in six cases the departure exceeded 50 , and in one case it exceeded 70°. Also, whilst the mean azimuths deduced from the observations between 6 a.m. and noon, between noon and 6 p.m., and between 6 p.m. and midnight, were closely alike, their united mean being 22-4° W. of N. (or E.of S.), the mean derived from the 113 arcs observed between midnight and 6 a.m. was 47-8° W. At Jan Mayen (8) in 1882-1883 the mean azimuth of the summit of the arcs was 28-8° W. of N., thus approach- ing much more closely to the magnetic meridian 29-9° W. As to individual azimuths, 113 lay within io° of the mean, 37 differed by from io° to 20°, 18 by from 20° to 30 , 6 by from 30° to 40 , whilst 6 differed by over 40°. Azimuths were also measured at Jan Mayen for 338 auroral bands, the mean being 22-0° W., or 7-9° to the east of the magnetic meridian. Combining the results from arcs and bands, Carlheim-

Gyllenskold gives the " anomaly " of the auroral meridian at Jan Mayen as 5-7° E. At the British Polar station of 1882, Fort Rae (62 23′ N. lat., 115° 44′ W. long.), he makes it 15-7° W. At Godthaab in 1 882-1 883 the auroral anomaly was, according to Paulsen, 15-5° E., the magnetic meridian lying 57-6° W. of the astronomical.*

14. Auroral Zenith. — Another auroral direction having appar- ently a close relation to terrestrial magnetism is the imaginary line drawn to the eye of an observer from the centre of the corona — i.e. the point to which the auroral rays converge. This seems ingeneral to be nearly coincident with the direction of the dipping needle.

Thus at Cape Thorsden (7) in 1 882-1 883 the mean of a considerable number of observations made the angle between the two directions only 1° 7', the magnetic inclination being 80° 35', whilst the coronal centre had an altitude of 79° 55′ and lay somewhat to the west of the magnetic meridian. Even smaller mean values have been found for the angle between the auroral and magnetic " zeniths " — as the two directions have been called — e.g. 0° 50′ at Bossekop (16) in 1838-1839, and o° 7′ at Treurenberg (17) (79 55′ N. lat., 16° 51′ E. long.) in 1899-1900.

15. Relations to Magnetic Storms. — That there is an intimate connexion between aurora when visible in temperate latitudes and terrestrial magnetism is hardly open to doubt. A bright aurora visible over a large part of Europe seems always accom- panied by a magnetic storm and earth currents, and the largest magnetic storms and the most conspicuous auroral displays have occurred simultaneously. Noteworthy examples are afforded by the auroras and magnetic storms of August 28-29 an d Sep- tember 1-2, 1859; February 4, 1872; February 13-14 and August 12, 1892; September 9, 1898; and October 31, 1903. On some of these occasions aurora was brilliant in both the northern and southern hemispheres, whilst magnetic disturbances were experienced the whole world over. In high latitudes, however, where both auroras and magnetic storms are most numerous, the connexion between them is much less uniform. Arctic observers, both Danish and British, have repeatedly reported displays of aurora unaccompanied by any special magnetic disturbance. This has been more especially the case when the auroral light has been of a diffused character, showing only minor variability. When there has been much apparent movement, and brilliant changes of colour in the aurora, magnetic disturbance has nearly always accompanied it. In the Arctic, auroral displays seem sometimes to be very local, and this may be the explanation. On the other hand, Arctic observers have reported an apparent connexion of a particularly defi- nite character. According to Paulsen (18), during the Ryder expedition in 1891-1892, the following phenomenon was seen at least twenty times by Lieut. Vedel at Scoresby Sound (70 27′ N. lat., 26

10′ W. long.). An auroral curtain travelling with considerable velocity would approach from the south, pass right overhead and retire to the north. As the curtain approached, the compass needle always deviated to the west, oscillated as

the curtain passed the zenith, and then deviated to the east. The behaviour of the needle, as Paulsen points out, is exactly what it should be if the space occupied by the auroral curtain were traversed by electric currents directed upwards from the ground. The Danish observers at Tasiusak (10) in 1898-1899 observed this phenomenon occasionally in a slightly altered form. At Tasiusak the auroral curtain after reaching the zenith usually retired in the direction from which it had come. The direction in which the compass needle deviated was west or east, according as the curtain approached from the south or the north; as the curtain retired the deviation eventually diminished.

Kr. Birkeland (19), who has made a special study of magnetic disturbances in the Arctic, proceeding on the hypothesis that they arise from electric currents in the atmosphere, and who has thence at- tempted to deduce the position and intensity of these currents, asserts that whilst in the case of many storms the data were in- sufficient, when it was possible to fix the position of the mean line of flow of the hypothetical current relatively to an auroral arc, he invariably found the directions coincident or nearly so.

16. In the northern hemisphere to the south of the zone of greatest frequency, the part of the sky in which aurora most generally appears is the magnetic north. In higher latitudes auroras are most often seen in the south. The relative frequency in the two positions seems to vary with the hour, the type of aurora, probably with the season of the year, and possibly with the position of the year in the sun-spot cycle.

At Jan Mayen (8) in 1882-1883, out of 177 arcs whose position was accurately determined, 44 were seen in the north, their summits averaging 38-5° above the northern horizon; 88 were seen in the south, their average altitude above the southern horizon being 33-5°; while 45 were in the zenith. At Tasiusak (10) in 1898-1899 the magnetic directions of the principal types were noted separately. The results are given in Table VI.

Table VI.

Direc- tion.

Absolute Number for each Type.

Percentage from all Types.

Arcs.

Bands.

Curtains.

Rays.

Patches.

N.

9

16

5

15

4

10

N.E.

9

13

2

20

4

9

E.

3

11

2

26

3

9

S.E.

5

6

1

10

7

6

S.

45

43

1

16

15

24

s.w.

9

9

2

12

13

9

w.

3

11

2

22

6

9

N.W.

2

8

2

8

5

5

Table VI. accounts for only 81 % of the total displays; of the remainder 15% appeared in the zenith, while 4 % covered the whole sky. Auroral displays generally cover a considerable area, and are constantly changing, so the figures are necessarily somewhat rough. But clearly, whilst the arcs and bands, and to a lesser extent the patches, showed a marked preference for the magnetic meridian, the rays showed no such preference.

At Cape Thorsden (7) in 1 882-1 883 auroras as a whole were divided into those seen in the north and those seen in the south. The variation throughout the twenty-four hours in the percentage seen in the south was as follows : —

Hour.

0-3 •

3-6.

6-9.

9-12.

A.M.

P.M.

69

55

55 70

44 65

35 65

The mean from the whole twenty-four hours is sixty-three. Between 3 A.M. and 3 p.m. the percentage of auroras seen in the south thus appears decidedly below the mean.

17. The following data for the apparent angular width of arcs were obtained at Cape Thorsden, the arcs being grouped accord- ing to the height of the lower edge above the horizon. Group I. contained thirty arcs whose altitudes did not exceed n° 45'; Group II. thirty arcs whose altitudes lay between 12 and 35°; and Group III, thirty arcs whose altitudes lay between 36° and 80 .

Group.

Greatest width Least , , Mean

I.

II- 5c i-o°

3-45°

II.

12-0″

o-75° 4-6°

III.

21-0

2-0°

6-9°

There is here a distinct tendency for the width to increase With the altitude. At the same time, arcs near the horizon often appeared wider than others near the zenith. Furthermore, GyHenskold says that when arcs mounted, as they not infrequently did, from the horizon, their apparent width might go on increasing right up to the

zenith, or it might increase until an altitude of about 45° was reached and then diminish, appearing much reduced when the zenith was reached. Of course the phenomenon might be due to actual change in the arc, but it is at least consistent with the view that arcs are of two kinds, one form constituting a layer of no great vertical depth but considerable real horizontal width, the other form having little horizontal width but considerable vertical depth, and resembling to some extent an auroral curtain.

18. According to numerous observations made at Cape Thors- den, the apparent angular velocity of arcs increases on the average with their altitude. Dividing the whole number of arcs, 156, whose angular velocities were measured into three numerically equal groups, according to their altitude, the following were the results in minutes of arc per second of time (or degrees per minute of time) : —

Group.

I.

II.

III.

All.

Mean altitude . Greatest velocity . Mean velocity .

10-5°

4-81

, 0-48

34-6°

15-12 2-42

72-3°

109-09

8-67

3-86

Each group contained auroras which appeared stationary. The intervals to which the velocities referred were usually from five to ten minutes, but varied widely. The velocity 10909 was much the largest observed, the next being 52-38; both were from observations lasting under half a minute.

19. In 1 882-1 883 the direction of motion of arcs was from north to south in 62% of the cases at Jan Mayen, and in 58% of the cases at Cape Thorsden. This seems the more common direction in the northern hemisphere, at least for stations to the south of the zone of maximum frequency, but a considerable preponderance of movements towards the north was observed in Franz Joseph Land by the Austrian Expedition of 1872-1874. The apparent motion of arcs is sometimes of a complicated character. One end only, for example, may appear to move, as if rotating round the other; or the two ends may move in opposite directions, as if the arc were rotating about a vertical axis through its summit.

20. Height. — If an auroral arc represented a definite self- luminous portion of space of small transverse dimensions at a uniform height above the ground, its height could be accurately determined by observations made with theodolites at the two ends of a measured base, provided the base were not too short compared to the height. If a very long base is taken, it becomes increasingly open to doubt whether the portions of space emitting auroral light to the observers at the two ends are the same. There is also difficulty in ensuring that the observations shall be simultaneous, an important matter especially when the apparent velocity is considerable. If the base is short, definite resul ts can hardly be hoped for unless the height is very moderate. Amongst the best-known theodolite determinations of height are those made at Bossekop in Norway by the French Expedition of 1838-1839 (16) and the Norwegian Expedition of 188 2-1883, an d those made in the latter year by the Swedes at Cape Thorsden and the Danes at Godthaab. At Bossekop and Cape Thorsden there were a considerable proportion of negative or impossible parallaxes. Much the most consistent results were those obtained at Godthaab by Paulsen (15). The base was 5-8 km. (about 3§ miles) long, the ends being in the same magnetic meridian, on opposite sides of a fiord, and observations were confined to this meridian, strict simultaneity being secured by signals. Heights were calculated only when the observed parallax exceeded 1°, but this happened

in three-fourths of the cases. The calculated heights — all referring to the lowest border of the aurora — varied from o-6 to 67-8 km. (about 0-4 to 42 m.), the average being about 20 km. (12m.). Regular arcs were selected in most cases, but the lowest height obtained was for a collection of rays forming a curtain which was actually situated between the two stations.

In 1885 Messrs Garde and Eherlin made similar observations at Nanortalik near Cape Farewell in Greenland, but using a base of only 1250 metres (about | m.). Their results were very similar to Paul- sen's. On one occasion twelve observations, extending over half an hour, were made on a single arc, the Calculated heights varying in a fairly regular fashion from 1-6 to 12-9 km. (about I to 8 m.). The calculated horizontal distances of this arc varied between 5 and 24 km. (about 3 and 15 m.), the motion being sometimes towards, sometimes away from the observers, but not apparently exceeding 3 km. (nearly 2 m.) per minute. Heights of arcs have often been calculated from the apparent altitudes at stations widely apart in Europe or America. The heights calculated in this way for the under

surface of the arc, have usually exceeded 100 m. ; some have been much in excess of this figure. None of the results so obtained can be accepted without reserve, but there are several reasons for believ- ing that the average height in Greenland is much below that in lower latitudes. Heights have been calculated in various less direct ways, by observing for instance the angular altitude of the summit of an arc and the angular interval between its extremities, and then making some assumption such as that the portion visible to an observer may be treated as a circle whose centre lies over the so-called auroral pole. The mean height calculated at Arctic stations, where careful observations have been made, in this or analogous ways, has varied from 58 km. (about 36 m.) at Cape Thorsden (Gyllenskold) to 227 km. (about 141 m.) at Bossekop (Bravais). The height has also been calculated on the hypothesis that auroral light has its source where the atmospheric pressure is similar to that at which most brilliancy is observed when electric discharges pass in vacuum tubes. Estimates on this basis have suggested heights of the order of 50 km. (about 31 m.). There are, of course, many uncertainties, as the con- ditions of discharge in the free atmosphere may differ widely from those in glass vessels. If the Godthaab observations can be trusted, auroral discharges must often occur within a few miles of the earth's surface in Arctic regions. In confirmation of this view reference may be made to a number of instances where observers — e.g. General Sabine, Sir John Franklin, Prof. Selim Lemstrom, Dr David Walker (at Fort Kennedy in 1858-1859), Captain Parry (Fort Bowen, 1825) and others — have seen aurora below the clouds or between themselves and mountains. One or two instances of this kind have even been described in Scotland. Prof. Cleveland Abbe (20) has given a full historical account of the subject to which reference may be

made for further details.

21. Brightness. — In auroral displays the brightness often varies greatly over the illuminated area and changes rapidly. Estimates of the intensity of the light have been based on various arbitrary scales, such for instance as the size of type which the observer can read at a given distance. The estimate depends in the case of reading type on the general illumination. In other cases scales have been employed which make the result mainly depend on the brightest part of the display. At Jan Mayen (8) in 1882-1883 a scale was employed running from 1, taken as corresponding to the brightness of the milky way, to 4, corresponding to full moonlight. The following is an analysis of the results obtained, showing the number of times the different grades were reached : —

Scale of Intensity.

1.

2.

3-

4-

Mean Intensity.

Arcs . . . Bands . . Rays . . . Corona . .

27 46

3°

3

53

83

116

14

13

49

138

12

1

22 28 12

l-8 7

2-24

2-21 2-81

On one or two occasions at Jan Mayen auroral light is described as making the full moon look like an ordinary gas jet in presence of electric light, whilst rays could be seen crossing and brighter than the moon's disk. Such extremely bright auroras seem very rare, however, even in the Arctic. There is a general tendency for both bands and rays to appear brightest at their lowest parts; arcs seldom appear as bright at their summits as nearer the horizon. It is not unusual for arcs and bands to look as if pulses or waves of light were travelling along them; also the direction in which these pulses travel does not seem to be wholly arbitrary. Movements to the east were twice as numerous at Jan Mayen and thrice as numerous at Traurenberg as movements to the west. In some cases changes of intensity take place round the auroral zenith, simulating the effect that would be produced by a cyclonic rotation of luminous matter. In the case of isolated patches the intensity often waxes and wanes as if a search-light were being thrown on and turned off.

22. Colour. — The ordinary colour of aurora is white, usually with a distinct yellow tint in the brighter forms, but silvery white when the light is faint. When the light is intense and changing rapidly, red is not infrequently present, especiaDy towards the lower edge. Under these circumstances, green is also sometimes visible, especially towards the zenith. Thus a bright auroral ray may seem red towards the foot and green at its summit, with yellow intervening. In some cases the green may be only a contrast effect. Other colours, e.g. violet, have occasionally been noticed but are unusual.

23 . Spectrum. — The spectrum of aurora consists of a number of lines. Numerous measurements have been made of the wave- lengths of the brightest. One line, in the yellow green, is so dominant optically as often to be described as the auroral line. Its wave-length is probably very near 5571 tenth-metres, and it is very close to, if not absolutely coincident with, a prominent line in the spectrum of krypton. This line is so characteristic that its presence or absence is the usual criterion for deciding

whether an atmospheric light is aurora. The Swedish Expedi- tion (17) of 1 899-1 902, engaged in measuring an arc of the meridian in Spitsbergen, were unusually well provided spectro- graphically, and succeeded in taking photographs of aurora in conjunction with artificial lines — chiefly of hydrogen — which led to results claiming exceptional accuracy. In the spectrograms three auroral rays — including the principal one mentioned above — were pre-eminent. For the two shorter wave-lengths, for whose measurement he claims the highest precision, the observer, J. Westman, gives the values 4276-4 and 3913-5. In addition, he assigns wave-lengths for 156 other auroral lines between wave-lengths 5205 and 3513. The following table gives the wave-lengths of the photographically 'brightest of these, retaining four significant figures in place of Westman's five.

Table VII.

4830

4489

4329

3997

3861

4709

4420

4242

3986

3804

4699

4371

4230

3947

3793

4661

4356

4225

3937

3704

4560

4344

4078

3880

3607

4550

4337

4067

3876

3589

There are a number of optically bright lines of longer wave- length. For the principal of these Angot (1) gives the following wave-lengths (unit 1 nn or iXio -9 metre): — 630, 578, 566,

535, 523, 5°°-

Out of a total of 146 auroral lines, with wave-lengths longer than 3684 tenth-metres, Westman identifies 82 with oxygen or nitrogen lines at the negative pole in vacuum discharges. Amongst the lines thus identified are the two principal auroral lines having wave-lengths 4276-4 and 3913-5. The interval considered by Westman contains at least 300 oxygen and nitrogen lines, so that approximate coincidence with a number of auroral lines was almost inevitable, and an appreciable number of the coincidences may be accidental. E. C. C Baly (21), making use of the observations of the Russian expedition in Spitsbergen in 1899, accepts as

the wave-lengths of the three principal auroral lines 5570, 4276 and 3912; and he identifies all three and ten other auroral lines ranging between 5570 and 3707 with krypton lines measured by himself. In addition to these, he mentions other auroral lines as very probably krypton lines, but in their case the wave-lengths which he quotes from Paulsen (22) are given to only three significant figures, so that the identification is more uncertain. The majority of the krypton lines which Baly identi- fies with auroral lines require for their production a Leyden jar and spark gap.

If, as is now generally believed, aurora represents some form of electrical discharge, it is only reasonable to suppose that the auroral lines arise from atmospheric gases. The conditions, however, as regards pressure and temperature under which the hypothetical discharges take place must vary greatly in different auroras, or even sometimes in different parts of the same aurora. Further, auroras are often possessed of rapid motion, so that conceivably spectral lines may receive small displacements in accordance with Doppler's principle. Thus the differences in the wave-lengths of presumably the same lines as measured by different Arctic observers may be only partly due to unfavourable observational conditions. Many of the auroral lines seen in any single aurora are exceedingly faint, so that even their relative positions are difficult to settle with high precision.

24. Whether or not auroral displays are ever accompanied by a characteristic sound is a disputed question. If sound waves originate at the seat of auroral displays they seem hardly likely to be audible on the earth, unless the aurora comes very low and great stillness prevails. It is thus to the Arctic one looks for evidence. According to Captain H. P. Dawson (26), in charge of the British Polar Station at Fort Rae in 1882-1883, " The Indians and voyageurs of the Hudson Bay Company, who often pass their nights in the open, say that it [sound] is not uncommon . . . there can be no doubt that distinct sound does occasionally accompany certain displays of aurora." On the one occasion when Captain Dawson says he heard it himself, " the sound was like the swishing of a whip or the noise produced by a sharp squall of wind in the upper rigging of a ship, and as the aurora brightened and faded so did the sound which accompanied it." If under these conditions the sound was really due to the aurora, the latter, as Captain Dawson himself remarks, must have been pretty close.

25. Usually the electric potential near the ground is positive

compared to the earth and increases with the height (see Atmo- spheric Electricity). Several Arctic observers,however,especially Paulsen (18) have observed a diminution of positive potential, or even a change to negative, for which they could suggest no explana- tion except the presence of a bright aurora. Other Arctic observers have failed to find any trace of this

phenomenon. If it exists, it is presumably confined to cases when the auroral discharge comes unusually low.

26. Artificial Phenomena resembling Aurora. — At Sodankyla, the station occupied by the Finnish Arctic Expedition of 1882-1883, Selim Lemstrom and Biese (23) described and gave drawings of optical phenomena which they believed to be artificially produced aurora. A number of metallic points, supported on insulators, were connected by wires enclosing several hundred square metres on the top of a hill. Sometimes a Holtz machine was employed, but even without it illumination resembling aurora was seen on several occasions, extending apparently to a considerable height. In the laboratory, Kr. Birkeland (19) has produced phenomena bearing a striking resemblance to several forms of aurora. His apparatus consists of a vacuum vessel containing a magnetic sphere — intended to represent the earth — and the phenomena are produced by sending electric discharges through the vessel.

27. Theories. — A great variety of theories have been advanced to account for aurora. All or nearly all the most recent regard it as some form of electrical discharge. Birkeland (l9) supposes the ultimate cause to be cathode rays emanating from the sun ; C. Nord- mann (24) replaces the cathode rays by Hertzian waves; while Svante Arrhenius (25) believes that negatively charged particles are driven through the sun's atmosphere by the Maxwell-Bartoli re- pulsion of light and reach the earth's atmosphere. For the size and density of particles which he considers most likely, Arrhenius cal- culates the time required to travel from the sun as forty-six hours. By modifying the hypothesis as to the size and density, times appreciably longer or shorter than the above would be obtained. Cathode rays usually have a velocity about a tenth that of light, but in exceptional cases it may approach a third of that of light. Hertzian waves have the velocity of light itself. On either Birke- land's or Nordmann's theory, the electric impulse from the sun acts indirectly by creating secondary cathode rays in the earth's atmo- sphere, or ionizing it so that discharges due to natural differences of potential are immensely facilitated. The ionized condition must be supposed to last to a greater or less extent for a good many hours to account for aurora being seen throughout the whole night. The fact that at most places the morning shows a marked decay of auroral frequency and intensity as compared to the evening, the maximum preceding midnight by several hours, is certainly favour- able to theories which postulate ionization of the atmosphere by some cause or other emanating from the sun.

Authorities. — The following works are numbered according to the references in the text: — (1) A. Angot, Les Aurores polaires (Paris, 1895) ; (2) H. Fritz, Das Polarlicht (Leipzig, 1881) ; (3) Svante August Arrhenius,

Lehrbuch der kosmischen Physik; (4) Joseph Lovering, " On the Periodicity of the Aurora Borealis," Mem. American Acad. vol. x. (1868); (5) Sophus Tromholt, Catalog der in Norwegen bis Juni 1878 beobachteten Nordlichter; (6) Observations Internationales polaires (1 882-1 883), Expedition Danoise, tome i. " Aurores boreales "; (7) Carlheim-Gyllenskold, " Aurores boreales" in Observations faites au Cap Thorsden Spitzberg par I 'expedition suedoise, tome ii. 1; (8) " Die Osterreichische Polar Station Jan Mayen " in Die Internationale Polarforschung, 1882-1883, Bd. ii. Abth. I ; (9) Henryk Arctowski, " Aurores australes " in Expedition antarctique beige . . . Voyage du S. Y. "Belgica" ; (10) G. C.Amdrup, Observations . . . faites par V expedition danoise; H. Ravn, Obser- vations de I'aurore boreale de Tasiusak; (11) K. Sven. Vet.-Akad. Hand. Bd. 31 , Nos. 2, 3, &c. ; (12) Sitz. d. k. Akad. d. Wiss. (Vienna), Math. Naturw. Classe, Bd. xcvii. Abth. iia, 1888; (13) Proc. Roy. Soc, 1906, lxxvii. A, 141 ; (14) Kongl. Sven. Vet.-Akad. Hand. Bd. 15, No. 5, Bd. 18, No. 1; (15) Bull. Acad. Roy. Danoise, 1889, p. 67; (16) Voyages . . . pendant les annees 1838, 183$ et 1840 sur . . . la Recherche, "Aurores boreales," by MM.Lottin, Bravais, &c. ; (17) Missions scientifiques . . . au Spitzberg . . . en 1899-1902, Mission suedoise, tome ii. VIII Section, C. "Aurores boreales"; (18) Bull. Acad. R. des Sciences de Danemark, 1894, p. 148; (19) Kr. Birkeland, Expedition norvegienne 1899-1900 pour V etude des aurores boreales (Christiania, 1901) ; (20) Terrestrial Magnetism, vol. iii. (1898), PP- 5< 53, 149; (2l) Astrophysical Journal, 1904, xix. p. 187; (22) Rapports presenthau Conrges International de Physique reuni h. Paris, 1900, iii. 438; (23) Expedition polaire finiandaise (1882-1884), tome iii.; (24) Charles Nordmann, Theses presentees d, la Faculte des Sciences de Paris (1903); (25) Terrestrial Magnetism, vol. 10, 1905, p. I ; (26) Observations of the International Polar Expeditions 1882-1883 Fort Rae . . . by Capt.-H. P. Dawson, R.A. (C. Ch.)

AURUNCI, the name given by the Romans to a tribe which in historical times occupied only a strip of coast on either side of the Mons Massicus between the Volturnus and the Liris, although it must at an earlier period have extended over a considerably wider area. Their own name for themselves in

the 4th century B.C. was Ausones, and in Greek writers we find the name Ausbnia applied to Latium and Campania (see Strabo v. p. 247; Aristotle, Pol. iv. (vii.) 10; Dion. Hal. i. 72), while in the Augustan poets (e.g. Virgil, Aen. vii. 705) it is used as one of many synonyms for Italy. In history the tribe appears only for a brief space, from 340 to 295 B.C. (Mommsen,

C.I.L. x. pp. 451, 463, 465), and their struggle with the Romans ended in complete extermination; their territory was parcelled out between the Latin colonies of Cales (Livy viii. 16) and Suessa Aurunca (id. ix. 28) which took the place of an older town called Ausona (id. ix. 25; viii. 15), and the maritime colonies Sinuessa (the older Vescia) and Minturnae (both in 295 B.C., Livy x. 21). The coin formerly attributed to Suessa Aurunca on the strength of its supposed legend Aurunkud has now been certainly referred to Naples (see R. S. Conway, Italic Dialects, 145, and Verner's law in Italy, p. 78, where the change of j to r is explained as probably due to the Latin conquest). Seeing that the tribe was blotted out at the beginning of the 3rd century B.C., we can scarcely wonder that no record of its speech survives; but its geographical situation and the frequency of the co-suffix in that strip of coast (besides Aurunci itself we have the names Vescia, Mons Massicus, Marica, Clanica and Caedicii; see Italic Dialects, pp. 283 f.) rank them beyond doubt with their neighbours the Volsci (q.v.). (R. S. C.)

AUSCULTATION (from Lat. auscultate, to listen), a term in medicine, applied to the method employed by physicians for determining, by the sense of hearing, the condition of certain internal organs. The ancient physicians appear to have practised a kind of auscultation, by which they were able to detect the presence of air or fluids in the cavities of the chest and abdomen. Still no general application of this method of investigation was resorted to, or was indeed possible, till the advance of the study of anatomy led to correct ideas regarding the locality, structure and uses of the various organs of the body, and the alterations produced in them by disease. In 1761 Leopold Auenbrugger (1 722-1809), a Viennese physician, published his Inventum Novum, describing the art of percussion in reference more especially to diseases of the chest. This consisted in tapping with the fingers the surface of the body, so as to elicit sounds by which the comparative resonance of the subjacent parts or organs might be estimated. Auenbrugger's method attracted but little attention till the French physician J. N. Corvisart (1755-1828) in 1808 demonstrated its great practical importance, and then its employment in the diagnosis of affections of the chest soon became general. Percussion was originally practised in the manner above mentioned (immediate percussion), but subsequently the method of mediate percussion was introduced by P. A. Piorry (1 794-1879). It is accomplished by placing upon the spot to be examined some solid substance, upon which the percussion strokes are made with the fingers. For this purpose a thin oval piece of ivory (called a pleximeter, or stroke- measurer) may be used, with a small hammer; but one or more fingers of the left hand applied flat upon the part answer equally well, and this is the method which most physicians adopt. Percussion must be regarded as a necessary part of auscultation, particularly in relation to the examination of the chest; for the physician who has made himself

acquainted with the normal condition of that part of the body in reference to percussion is thus able to recognize by the ear alterations of resonance pro- duced by disease. But percussion alone, however important in diagnosis, could manifestly convey only limited and imperfect information, for it could never indicate the nature or extent of functional disturbance.

In 1819 the distinguished French physician R. T. H. Laennec (.1 781-1826) published his Traits de V auscultation mediate, embodying the present methods of auscultatory examination, and venturing definite conclusions based on years of his own study. He also invented the stethoscope (crriQos, the breast, and oTcoxeiv, to examine) . Since then many men have widened the scope of auscultation, notably Skoda, Wintrich, A. Geigel, Th. Weber and Gerhardt. According to Laennec the essential of a good stethoscope was its capability of intensifying the tone

vibrations. But since his time the opinion of experts on thia matter has somewhat changed, and there are now two definite schools. The first and older condemns the resonating stethoscope, maintaining that the tones are bound to be altered; the second and younger school warmly advocates its use. In America, more than elsewhere, there is a type of phonendoscope much used by the younger men, which has the advantage that it can be used when the older type of instrument fails, viz. when the patient is recumbent and too ill to be moved. By slipping it beneath the patient's back a fairly accurate idea of the breathing over the bases of the lungs behind can often be obtained.

Stethoscopes have been made of many forms and materials. They usually consist of a hollow stem of wood, hard rubber or metal, with an enlarged tip slightly funnel-shaped at one end, and an ear-plate with a hole in the middle, fastened perpendicu- larly to the other end. To enable the instrument to be more conveniently carried, the ear-plate can be unscrewed from the tube. The length of the stem of the instrument is of minor importance, but its bore should be as nearly as possible that of the entrance of the external ear. A flexible stethoscope in general use both in England and America transmits the sound from a funnel 'through tubes to the ears of the observer. This is the common form of a binaural resonating stethoscope. It is convenient and gives a loud tone, but is condemned by the older school, who say that the resonance is confusing, and that the slightest movement in handling gives rise to perplexing murmurs. Nevertheless, it is this form of instrument which has by far the greatest vogue. It is probable, however, that the most skilled physicians of all find a special use in each form, the monaural non-resonating type being more sensitive to high-pitched sounds, and of greater assistance in differentiating the sounds and murmurs of the heart, the ordinary binaural form being more useful in examining the lungs and other organs. In using the stethoscope, it must be

applied very carefully, so that the edge of the funnel makes an air-tight connexion with the skin, and in the monaural form the ear must be but lightly applied to the ear-plate, not pressing heavily on the patient.

The numerous diseases affecting the lungs can now be recog- nized and discriminated from each other with a precision which, but for auscultation and the stethoscope, would have been altogether unattainable. The same holds good in the case of the heart, whose varied and often complex forms of disease can, by auscultation, be identified with striking accuracy. But in addition to these its main uses, auscultation is found to render great assistance in the investigation of many obscure internal affections, such as aneurysms and certain diseases of the oesoph- agus and stomach. To – the accoucheur the stethoscope yields valuable aid in the detection of some forms of uterine tumours, and especially in the diagnosis of pregnancy — the only evidence now accepted as absolutely diagnostic of that condition being the hearing of the foetal heart sounds.

AUSONIUS, DECIMUS MAGNUS (c. 310-395), Roman poet and rhetorician, was born at Burdigala [Bordeaux], He received an excellent education, especially in grammar and rhetoric, but confesses that his progress in Greek was unsatisfactory. Having completed his studies, he practised for some time as an advocate, but his inclination lay in the direction of teaching. He set up (in 334) a school of rhetoric in his native place, which was largely attended, his most famous pupil being Paulinus,afterwards bishop of Nola. After thirty years of this work, he was summoned by Valentinian to the imperial court, to undertake the education of Gratian, the heir-apparent. The prince always entertained the greatest regard for his tutor, and after his accession bestowed upon him the highest titles and honours, culminating in the consul- ship (379). After the murder of Gratian (383), Ausonius retired to his estates near Burdigala. He appears to have been a (not very enthusiastic) convert to Christianity. He died about 395.

His most important extant works are: in prose, Gratiamm Actio, an address of thanks to Gratian for his elevation to the consulship; Periochae, summaries of the books of the Iliad and Odyssey; and one or two epistolae; in verse, Epigrammata, including several free translations from the Greek Anthology;

Ephemeris, the occupations of a day ; Parentalia and Commemo- ratio Professorum Burdigalensium, on deceased relatives and literary friends ;

Epitaphia, chiefly on the Trojan heroes ; Caesares, memorial verses on the Roman emperors from Julius Caesar to Elagabalus ; Ordo Nobilium Urbium, short poems on famous cities ; Ludus Seplem Sapienlum, speeches delivered by the Seven Sages of Greece ; Idyllia, of which the best-known are the Mosella, a descriptive poem on the Moselle, and the in- famous Cento Nuptialis. We may also mention Cupido Cruciatus, Cupid on the cross ; Technopaegion, a literary trifle consisting of a collection of verses ending in monosyllables ; Eclogarum Liber, on astronomical and astrological subjects ; Epistolae, including letters to Paulinus and Symmachus ; lastly, Prae- fatiunculae, three poetical epistles, one to the emperor Theo- dosius. Ausonius was rather a man of letters than a poet; his wide reading supplied him with material for a great variety of subjects, but his works exhibit no traces of a true poetic spirit ; even his versification, though ingenious, is frequently defective. There are no MSS. containing the whole of Ausonius's works. Editio princeps, 1472; editions by Scaliger 1575, Souchay 1730, Schenkl 1883, Peiper 1886; cf. Mosella, Booking 1845, de la Ville de Mirmont (critical edition with translation) 1889, and De Ausonii Mosella, 1892, Hosius 1894. See Deydou, Un Poite bordelais (1868) ; Everat, De Ausonii Operibus (1885); Jullian, Ausone et Bordeaux (1893); C. Verrier and R. de Gourmont, Les Epigrammes d' Ausone ˆtranslation with bibliography, 1905); R. Pichon, Les Derniers Ecrivains profanes (1907).

AUSSIG (Czech Ousti nod Labem), a town of Bohemia, Austria, 68 m. N. of Prague by rail. Pop. (1900) 37,255, mostly German. It is situated in a mountainous district, at the confluence of the Biela and the Elbe, and, besides being an active river port, is an important junction of the northern Bohemian railways. Aussig has important industries in chemicals, textiles, glass and boat- building, and carries on an active trade in coal from the neigh- bouring mines, stone and stoneware, corn, fruit and wood. It was the birthplace of the painter, Raphael Mengs (1728-1779). Aussig is mentioned as a trading centre as early as 993. It was made a city by Ottokar II. in the latter part of the 13th century. In 1423 it was pledged by King Sigismund to the elector Frederick of Meissen, who occupied it with a Saxon garrison. In 1426 it was besieged by the Hussites, who on the 16th of June, though only 25,000 strong, defeated a German army of 70,000, which had been sent to its relief, with great slaughter. The town was stormed and sacked next day. After lying waste for three years, it was rebuilt in 1429. It suffered much during the Thirty Years' and Seven Years' Wars, and in 1830 it had only 1400 inhabitants. Not far from Aussig is the village of Kulm, where, on the 29th and 30th of August 1813, a battle took place between the French under Vandamme and an allied army of Austrians, Prussians and Russians. The French were defeated, and Vandamme surrendered with his army of 10,000 men.

AUSTEN, JANE (1775-1817), English novelist, was born on the 16th of December 1775 at the parsonage of Steventon, in Hampshire, a village of which her father, the Rev. George Austen, was rector. She was the youngest of seven children. Her mother was Cassandra Leigh, niece of Theophilus Leigh, a dry humorist, and for fifty years master of Balliol, Oxford. The life of no woman of genius could have been more uneventful than Miss Austen's. She did not marry, and she never left home except on short visits, chiefly to Bath. Her first sixteen years were spent in the rectory at Steventon, where she began early to trifle with her pen, always jestingly, for family entertainment. In 1 80 1 the Austens moved to Bath, where Mr Austen died in '805, leaving only Mrs Austen, Jane and her sister Cassandra, to whom she was always deeply attached, to keep up the home ; his sons were out in the world, the two in the navy, Francis William and Charles, subsequently rising to admiral's rank. In 1805 the Austen ladies moved to Southampton, and in 1809 to Chawton, near Alton, in Hampshire, and there Jane Austen remained till 1817, the year of her death, which occurred at Winchester, on July 18th, as a memorial window in the cathedral testifies.

During her placid life Miss Austen never allowed her literary

work to interfere with her domestic duties : sewing much aiid admirably, keeping house, writing many letters and reading aloud. Though, however, her days were quiet and her area circumscribed, she saw enough of middle-class provincial society to find a basis on which her dramatic and humorous faculties might build, and such was her power of searching observation and her sympathetic imagination that there are not in English fiction more faithful representations of the life she knew than we possess in her novels. She had no predecessors in this genre. Miss Austen's " little bit (two inches wide) of ivory " on which she worked " with so fine a brush " — her own phrases — was her own invention.

Her best-known, if not her best work, Pride and Prejudice, was also her first. It was written between October 1796 and August 1797, although, such was the blindness of publishers, not issued until 181 3, two years after Sense and Sensibility, which was written, on an old scenario called " Eleanor and Marianne," in 1797 and 1798. Miss Austen's inability to find a publisher for these stories, and for Northanger Abbey, written in 1798 (although it is true that she sold that MS. in 1803 for £10 to a Bath bookseller, only, however, to see it locked away in a safe for some years, to be gladly resold to her later), seems to have damped her ardour ; for there is no evidence that between 1798 and 1809 she wrote anything but the fragment called " The Watsons," after which year she began to revise her early work for the press. Her other three books belong to a later date — Mansfield Park, Emma and Persuasion being written between 1811 and

1816. The years of publication were Sense and Sensibility, 181 1 ; Pride and Prejudice, 1813 ; Mans- field Park, 1814 ; and Emma, 1816 — all in their author's lifetime. Persuasion and Northanger Abbey were published posthumously in 1818. All were anonymous, agreeably to their author's retiring disposition.

Although Pride and Prejudice is the novel which in the mind of the public is most intimately associated with Miss Austen's name, both Mansfield Park and Emma are finer achievements — at cnce riper and richer and more elaborate. But the fact that Pride and Prejudice is more single-minded, that the love story, of Elizabeth Bennet and D'Arcy is not only of the book but is the book (whereas the love story of Emma and Mr Knightley and Fanny Price and Edmund Bertram have parallel streams), has given Pride and Prejudice its popularity above the others among readers who are more interested by the course of romance than by the exposition of character. Entirely satisfactory as is Pride and Prejudice so far as it goes, it is, however, thin beside the niceness of analysis of motives in Emma and the wonderful management of two housefuls of young lovers that is exhibited in Mansfield Park.

It has been generally agreed by the best critics that Miss Austen has never been approached in her own domain. No one indeed has attempted any close rivalry. No other novelist has so concerned herself or himself with the trivial daily comedy of small provincial family life, disdaining equally the assistance offered by passion, crime and religion. Whatever Miss Austen may have thought privately of these favourite ingredients of fiction, she disregarded all alike when she took her pen in hand. Her interest was in life's little perplexities of emotion and con- duct; her gaze was steadily ironical. The most untoward event in any of her books is Louisa's fall from the Cobb at Lyme Regis, in Persuasion ; the most abandoned, Maria's elopement with Crawford, in Mansfield Park. In pure ironical humour Miss Austen's only peer among novelists is George Meredith, and indeed Emma may be said to be her Egoist, or the Egoist his Emma. But irony and fidelity to the fact alone would not have carried her down the ages. To these gifts she allied a perfect sense of dramatic progression and an admirably lucid and flowing prose style which makes her stories the easiest reading.

Recognition came to Miss Austen slowly. It was not until quite recent times that to read her became a necessity of culture. But she is now firmly established as an English classic, standing far above Miss Burney (Madame d'Arblay) and Miss Edgeworth, who in her day were the popular women novelists of real life,

AUSTERLITZ

while Mrs Radclifie and " Monk" Lewis, whose supernatural fancies' Northanger Abbey was written in part to ridicule, are no longer anything but names. Although, however, she has become only lately a household word, Miss Austen had always her pane- gyrists among the best intellects — such as Coleridge, Tennyson, Macaulay, Scott, Sydney Smith, Disraeli and Archbishop Whately, the last of whom may be said to have been her dis- coverer. Macaulay, whose adoration of Miss Austen's genius was almost idolatrous, considered Mansfield, Park her greatest feat; but many critics give the palm to Emma. Disraeli read Pride and Prejudice seventeen times. Scott's testimony is often quoted: " That young lady had a talent for describing the involvements, feelings and characters of ordinary life which is to me the most wonderful I have ever met with. The big bow-wow I can do myself like any one going; but the exquisite touch which renders commonplace things and characters inter- esting from the truth of the description and the sentiment is denied to me."

Many monographs on Miss Austen have been written, in addition to the authorized Life by her nephew J. E. Austen Leigh in 1870, and the collection of her Letters edited by Lord Brabourne in 1884. The chief books on her and around her are Jane Austen, by S. F. Maiden (1889); Jane Austen, by Goldwin Smith (1890); Jane Austen: Her Contemporaries and Herself, by W. H. Pollock; Jane Austen: Her Homes and Her Friends, by Constance Hill (1902); Jane Austen and Her Times, by G. E. Mitton (1905); Jane Austens Sailor Brothers, by J. H. and E. C. Hubback (1906); and the essay on her in Lady Richmond (Thackeray) Ritchie's Book of Sibyls (1883). (E. V. L.)

AUSTERLITZ (Czech Slavkov), a town of Austria, in Moravia, 15 m. E.S.E. of Briinn by rail. Pop. (1900) 3145, mostly Czech. It contains a magnificent palace belonging to the prince of Kaunitz-Rietberg, and a beautiful church.

The great battle in which the French under Napoleon I. defeated the Austrians and Russians on the 2nd of December 1805, was fought in the country to the west of Austerlitz, the position of Napoleon's left wing being almost equi-distant from Brunn and from Austerlitz. The wooded hills to the northward throw out to the south and south-west long spurs, between which are the low valleys of several rivers and brooks. The

Emeiy Walker. jc

scene of the most important fighting was the Pratzen plateau. The famous " lakes " in the southern part of the field were artificial ponds, which have

long since been drained. On the west or Briinn side of the Goldbach is another and lower ridge, which formed in the battle the first position of the French right and centre. On the other wing is the mass of hills from which

the spurs and streams descend: here the Olmutz-Brunn road passes. The road from Briinn to Vienna, Napoleon's presumed line of retreat, runs in a southerly direction, and near the village of Raigern (3 m. west of Monitz) is very close to the extreme right of the French position, a fact which had a great influence on the course of the battle. (The course of events which led to the action is described under Napoleonic Campaigns.) Napoleon, falling back before the advance of the allied Austrians and Russians from Olmiitz, bivouacked west of the Goldbach, whilst the allies, holding, near Austerlitz, the junction of the roads from Olmiitz and from Hungary, formed up in the valleys east of the Pratzen heights. The cavalry of both sides remained inactive, Napoleon's by express order, the enemy's seemingly from mere negligence, since they had 177 squadrons at their disposal. Napoleon, having determined to fight, as usual called up every available battalion; the splendid III. corps of Davout only arrived upon the field after a heavy march, late on the night of December 1st. The plan of the allies was to attack Napoleon's right, and to cut him off from Vienna, and their advanced guard began, before dark on the 1st of December, to skirmish towards Telnitz. At that moment Napoleon was in the midst of his troops, thousands of whom had made their bivouac-straw into torches in his honour. The glare of these seemed to the allies to betoken the familiar device of lighting fires previous to a retreat, and thus confirmed them in the impression which Napoleon's calculated timidity had given. Thus encouraged, those who desired an immediate battle soon gained the upper hand in the councils of the tsar and the emperor Francis. The attack orders for the 2nd of December (drawn up by the Austrian general Weyrother, and explained by him to a council of superior officers, of whom some were hostile, the greater part indifferent, and the chief Russian member, General Kutusov, asleep) gave the five columns and the reserve, into which the Austro-Russian army was organized, the following tasks: the first and second (Russians) to move south-westward behind the Pratzen ridge towards Telnitz and Sokolnitz; the third (Russian) to cross the southern end of the plateau, and come into line on the right of the first two; the fourth (Austrians and Russians under Kolo- wrat) on the right of the third to advance towards Kobelnitz. An Austrian advanced guard preceded the 1st and 2nd columns. Farther still on the right the 5 th column (cavalry under Prince John of Liechtenstein) was to hold the northern part of the plateau, south of the Briinn-Olmutz road; across the road itself was the corps of Prince Bagration, and in rear of Liechtenstein's corps was the reserve (Russians under the grand-duke Constan- tine). Thus, the farther the four main columns penetrated into the French right wing, the wider

would the gap 'become between Bagration and Kolowrat, and Liechtenstein's squadrons could not form a serious obstacle to a heavy attack of Napoleon's centre. The whole plan was based upon defective information and preconceived ideas; it has gone down to history as a classical example of bad generalship, and its author Weyrother, who was perhaps nothing worse than a pedant, as a charlatan.

Napoleon, on the other hand, with the exact knowledge of the powers of his men, which was the secret of his generalship, entrusted nearly half of his line of battle to a division (Legrand's) of Soult's corps, which was to be supported by Davout, some of whose brigades had marched, from Vienna, 90 m. in forty-eight hours. But the ground which this thin line was to hold against three columns of the enemy was marshy and densely intersected by obstacles, and the III. corps was the best in the Grande Armie, while its leader was perhaps the ablest of all Napoleon's marshals. The rest of the army formed in the centre and left. " Whilst they march to turn my right," said Napoleon in the inspiriting proclamation which he issued on the eve of the battle, " they present me their flank," and the great counterstroke was to be delivered against the Pratzen heights by the French centre. This was composed of Soult's corps, with Bernadotte's in second line. On the left, around the hill called by the French the Santon (which was fortified) was Lannes' corps, supported by the cavalry reserve under Murat. The general reserve consisted of the Guard and Oudinot's grenadiers.

938

AUSTIN

The attack of the allies was begun by the first three columns, which moved down from their bivouacs behind the Pratzen plateau before dawn on the 2nd, towards Telnitz and Sokolnitz. The Austrian advanced guard engaged at daybreak, and the French in Telnitz made a vigorous defence; both parties were reinforced, and Legrand drew upon himself, in fulfilling his mission, the whole weight of the allied attack. The contest was long and doubtful, but the Russians gradually drove back Legrand and a part of Davout's corps; numerous attacks both of infantry and cavalry were made, and by the successive arrival of reinforce- ments each side in turn received fresh impetus. Finally, at about 10 a.m., the allies were in possession of the villages on the Goldbach from Sokolnitz southwards, and Davout's line of battle had reformed more than a mile to rearward, still, however, maintaining touch with the French centre on the Goldbach at Kobelnitz. Between the two lines the fighting continued almost to the close of the battle. With 12,500 men of all arms the Marshal held in front of him over 40,000 of the enemy.

In the centre, the defective arrangements of the allied staff had delayed the 4th column (Kolowrat), the line of march of which was crossed by Liechtenstein's cavalry moving in the opposite direction. The objective of this column was Kobelnitz, and the two emperors and Kutusov accompanied it. The delay had, how- ever, opened a gap between Kolowrat and the 3rd column on his left; and towards this gap, and the denuded Pratzen plateau, Napoleon sent forward St Hilaire's division of Soult's corps for the decisive attack. Kutusov was pursuing this march to the south-west when he was surprised by the swift advance of Soult's men on the plateau itself. Napoleon had here double the force of the allies; Kutusov, however, displayed great energy, changed front to his right and called up his reserves. The French did not win the plateau without a severe struggle. St Hilaire's (the right centre) division was fiercely engaged by Kolowrat's column, General Miloradovich opposed the left centre attack under Vandamme, but the French leaders were two of the best fighting generals in their army. The rearmost troops of the Russian 2nd column, not yet committed to the fight on the Goldbach, made a bold counter stroke against St Hilaire's right flank, but were repulsed, and Soult now turned to relieve the pressure on DavOut by attacking Sokolnitz. The Russians in Sokolnitz surrendered, an opportune cavalry charge further discomfited the allied left, and the Pratzen plateau was now in full possession of the French. Even the Russian Guard failed to shake Vandamme's hold. In the meanwhile Lannes and Murat had been engaged in the defence of the Santon. Here the allied leaders displayed the greatest vigour, but they were unable to drive back the French. The cavalry charges in this quarter are celebrated in the history of the mounted arm; and Kellermann, the hero of Marengo, won fresh laurels against the cavalry of Liechtenstein's command. The French not only held their ground, but steadily advanced and eventually forced back the allies on Austerlitz, thereby barring their retreat on Olmutz. The last serious attempt of the allies in the centre led to some of the hardest fighting of the day; the Russian Imperial Guard under the grand-duke Constantine pressed closely upon St Hilaire and Vandamme on the plateau, and only gave way when the French Guard and the Grenadiers came into action. After the " Chevalier Guards " had been routed by Marshal Bessieres and the Guard cavalry, the allies had no more hope of victory; orders had already been sent to Buxhowden, who commanded the three columns engaged against Davout, to retreat on Austerlitz. No further attempt was made on the plateau, which was held by the French from Pratzen to the Olmutz road. The allied army was cut in two, and the last confused struggle of the three Russian columns on the Goldbach was one for liberty only. The fighting in Telnitz was perhaps the hardest of the whole battle, but the inevitable retreat, every part of which was now under the fire of the French on the plateau, was terribly costly. Soult now barred the way to Austerlitz, and the allies turned southward towards Satschan.

As they retreated, the ice of the Satschan pond was broken up by the French artillery, and many of the fugitives were drowned. In the twelve hours from 7 a.m. to nightfall, the 65,000 French

troops had lost 6800 men, or about 10%; the allies (82,500 engaged) had 12,200 killed and wounded, and left in the enemy's hands 15,000 prisoners (many wounded) and 133 guns.

AUSTIN, ALFRED (1835-), English poet-laureate, was born at Headingley, near Leeds, on the 30th of May 1835. His father, Joseph Austin, was a merchant of the city of Leeds; his mother, a sister of Joseph Locke, M.P. for Honiton. Mr Austin was educated at Stonyhurst, Oscott, and London Univer- sity, where he graduated in 1853. He was called to the bar four years later, and practised as a barrister for a short time; but in 1 86 1, after two comparatively false starts in poetry and fiction, he made his first noteworthy appearance as a writer with a satire called The Season, which contained incisive lines, and was marked by some promise both in wit and observation. In 1870 he published a volume of criticism, The Poetry of the Period, which was again conceived in a spirit of satirical invec- tive, and attacked Tennyson, Browning, Matthew Arnold and Swinburne in no half-hearted fashion. The book aroused some discussion at the time, but its judgments were extremely un- critical. In 1881 Mr Austin returned to verse with a tragedy, Savonarola, to which he added Soliloquies in 1882, Prince Lucifer in 1887, England's Darling in 1896, The Conversion of Winckeltnann in 1897, &c. A keen Conservative in politics, for several years he edited The National Review, and wrote leading articles for The Standard. On Tennyson's death in 1892 it was felt that none of the then living poets, except Swinburne or William Morris, who were outside consideration on other grounds, was of sufficient distinction to succeed to the laurel crown, and for several years no new poet-laureate was nominated. In the interval the claims of one writer and another were much canvassed, but eventually, in 1896, Mr Austin was appointed. As poet-laureate, his occasional verses did not escape adverse criticism; his hasty poem in praise of the .Jameson Raid in 1896 being a notable instance. The most effective characteristic of Mr Austin's poetry, as of the best of his prose, is a genuine and intimate love of nature. His prose idylls, The Garden that I love and In Veronica's Garden, are full of a pleasant, open-air flavour, which is also the outstanding feature of his English Lyrics. His lyrical poems are wanting in spontaneity and individuality, but many of them possess a simple, orderly charm, as of an English country lane. He has, indeed, a true love of England, sometimes not without a suspicion of insularity, but always fresh and ingenuous. A drama by him, Flodden Field, was acted at His Majesty's theatre in 1903.

AUSTIN, JOHN (1790-1859), English jurist, was born on the 3rd of

March 1790. His father was the owner of flour mills at Ipswich and in the neighbourhood, and was in good circumstances. John was the eldest of five brothers. One of his brothers, Charles (1 799-1874), obtained great distinction at the bar. John Austin entered the army at a very early age; he is said to have been only sixteen. He served with his regiment under Lord William Bentinck in Malta and Sicily. He seems to have liked his profession, and to have joined in the amusements and even in the follies of his brother officers. Yet it appears from a journal kept by him at the time that he occupied himself with studies of a far more serious kind than is common amongst young officers in the army. He notes having read in the course of one year Dugald Stewart's Philosophical Essays, Drummond's Academical Questions, Enfield's History of Philosophy, and Mitford's History of Greece, and upon all of these he makes observations which disclose much thought and a capacity for criticism which must have come from extensive reading else- where. The prevailing note of this journal is one of bitter self-depreciation. He says in it that the retrospect of the past year (1811) "has hardly given rise to one single feeling of satisfaction," and farther on he says that " indolence, always the prominent vice of my character," has " assumed over me an empire I almost despair of shaking off." It is difficult to believe that a man only just of age, whose serious reading consisted of such books, and who (as appears from the same journal) was in the habit of turning to the classics as an alter- native, could have deserved the reproach of indolence.

In 1812, he resigned his commission in the army, and returned home. He then began to read law in the chambers of a barrister. He was called to the bar in the year 1818, and joined the Norfolk circuit, but he never obtained any large practice, and he finally retired from the bar in 1825. In 18 19 he married Sarah Taylor (see Austin, Sarah).

Although Austin had failed to attain success at the bar it was not long before he had an opportunity of exercising his abilities and in a manner peculiarly suited to his particular turn of mind. In 1826 a number of eminent men were engaged in the foundation of University College, and it was determined to establish in it a chair of jurisprudence. This chair was offered to Austin and he agreed to accept it. As he was not called upon to begin his lectures immediately, he resolved to proceed to Germany in order to prepare himself for his duties by studying the method of legal teaching pursued at German universities. He resided first at Heidelberg, and afterwards at Bonn, where he lived on terms of intimacy with such distinguished lawyers as Savigny and K. J. A. Mittermaier, and such

eminent men q£ letters as

Niebuhr, Brandis, Schlegel and A. W. Heffter. He began lecturing in 1828, and at first was not without encouragement. His class was a peculiarly brilliant one. It included a number of men who afterwards became eminent in law, politics and philosophy — Sir George Cornewall Lewis, Charles Buller, Charles Villiers, Sir Samuel Romilly and his brother Lord Romilly, Edward Strutt afterwards Lord Belper, Sir William Erie and John Stuart Mill were all members of his class. All of these have left on record expressions of the profound admiration which the lectures excited in the minds of those who heard them. But the members of his class, though exceptional in quality, were few in number, and as there was no fixed salary attached to the professorship, Austin could not afford to remain in London, and in 1832 he resigned. , In that year he published his Province of Jurisprudence determined, being the first ten of his delivered lectures compressed into six.

There is ample testimony that Austin's lectures were very highly appreciated by those who heard them. Their one fault was that they were over-elaborated. In his desire to avoid ambiguity, he repeats his explanations and qualifications to an extent which must have tired his hearers. Nevertheless the lectures excited an admiration which almost amounted to enthusiasm. Nor was Austin's influence confined to his lectures. Sir William Erie says in a letter written to him in 1844, " The interchange of mind with you in the days of Lincoln's Inn I regard as a deeply important event in my life, and I ever remember your friendship with thankfulness and affection." John Stuart Mill, whose views on political subjects were entirely opposed to those of Austin, spoke of him after his death as the man " to whom he (Mill) had been intellectually and morally most indebted," and he expressed the opinion " that few men had contributed more by their individual influence, and their conversation, to the formation and growth of the most active minds of the generation."

In 1833 a royal commission was issued to draw up a digest of criminal law and procedure. Of this commission Austin was a member. The first report was signed by all the commissioners, and was presented in June 1834. Nevertheless it appears from some notes made at the time that Austin, though he thought it his duty to sign the report, strongly objected to some passages which it contained. It is pretty obvious from the nature of these objections that nothing would have satisfied him short of a complete recasting of the criminal law, whereas what the commissioners were ordered to produce was not a code but a digest. Probably Austin felt, as Mr Justice Wills felt some years later, that the anomalies which a code would remove would " choke a digest."

In 1834 the benchers of the Inner Temple appointed Austin to give lectures on the " General Principles of Jurisprudence and International Law." He delivered a few lectures in the spring of that year, but in June the course was by order of the benchers suspended on account of the smallness of the attend- ance, and it was never resumed. He then went to live with his

wife and only child Lucie (afterwards Lady Duff-Gordon) at Boulogne. Here he remained for about a year and a half. He then accepted an appointment offered him by Sir James Stephen to go as royal commissioner to Malta in conjunction with Mr (afterward Sir Gedrge) Cornewall Lewis, to inquire into the nature and extent of the grievances of which the natives of that island complained.

The Austins remained in Malta until July 1838. After their return they lived a good deal abroad, and in 1844 they settled in Paris, where they remained until driven out of France by the revolution of 1848. They then took a house at Weybridge, and there Austin remained until his death in December 1859. He was urged by his friends to publish a second edition of the Province of Jurisprudence, which was then out of print, and he went so far as to allow a prospectus to be issued by Mr Murray of an extended work on " The Principles and Relations of Jurisprudence and Ethics." But nothing came of it.

In 1842 Austin published in the Edinburgh Review an attack upon Friedrich List's system of trade protection (Das nationale

System der politischen Okonomie). Ana m 1859 ne pubnsnea a pamphlet entitled " A Plea for the Constitution." This was occasioned by the publication of Lord Grey's essay on" Parlia- mentary Government." Its main object was to show that the consequences to be anticipated from Parliamentary Reform were all of them either impossible of realization or mischievous. He thought any attempt on the part of the poorer classes to improve their position was barred by the inexorable laws of political economy ; and that if they obtained power they would only use it to plunder the rich; whilst, on the other hand, he seems not to have had any suspicion that the " proprietary class " were likely to disregard the interests of the poor. He thinks that political power is safest in the hands of those possessed of hereditary or acquired property; and that without property even intelligence and knowledge afford no presumption of political capacity. Undoubtedly Austin was a utilitarian in the Benthamite sense, and remained so to the end of his life. It must be remembered that Bentham's sole and immutable test of human action was the greatest happiness of the greatest number. This is a principle which an aristocrat may adopt if he chooses, no less than a democrat; an individualist no less than a socialist; and there is nothing in the " Plea for the Constitution "

which contravenes this. But Austin thought, and in this no doubt he differed from Bentham, that the mass of the people did not know their own interests so well as " an aristocracy of independent gentlemen " who might be trusted to provide for the wants of all classes alike.

Austin's position as a jurist is much more difficult to estimate. Twice his influence appeared likely to produce some impression upon English law, but upon both occasions it lasted only a short time, and never extended very far. The men whom he influenced were very eminent, but in numbers they were few. As a rule, students for the bar never at any time paid any attention to his teaching. The first published lectures were almost forgotten when Mr (afterwards Sir Henry) Maine was appointed to lecture on jurisprudence at the Inner Temple. Both in his private and public lectures Maine constantly urged upon his hearers the importance of Austin's analytical inquiries into the meaning of legal terms. He used to say that it was Austin's inquiries which had made a philosophy of law possible. Undoubtedly Maine's influence revived for a short time the interest in Austin's teaching. Maine was lecturing about the time of Austin's death, and in 1861 Mrs Austin published a second edition of the Province of Jurisprudence, and this was followed soon after by two volumes which contained in addition in a fragmentary form the remaining lectures delivered at University College and other notes {Lectures on Jurisprudence; or The Philosophy of Positive Law).

It cannot be said that Austin's views of jurisprudence have had, as yet, any visible influence whatever on the study of English law. But if we consider what it was that Austin en- deavoured to teach, it can hardly be said that the subject is one which a lawyer can with impunity neglect. He proposes to

distinguish law from morals; to explain the notions which have been entertained of duty, right, liberty, injury, punish- ment and redress; and their connexion with, and relations to, sovereignty; to examine the distinction between rights in rem and rights in personam, and between rights ex contractu and rights ex delicto ; and further to determine the meaning of such terms as right, obligation, injury, sanction, person, thing, act and forbearance. These are some of the terms, notions and distinctions which Austin endeavoured to explain. They are daily in the mouth of every practising lawyer. The only portion of Austin's work which has attracted much attention of recent years is his conception of sovereignty, and his dictum that all laws properly so called must be considered as sanctioned expressly or tacitly by the sovereign. This has been indignantly denied. It

has been considered enough to justify this denial to point out that there are in existence states where the seat of sovereignty, and the ultimate source of law, cannot be accur- ately indicated. But this criticism is entirely misplaced; for as pointed out by Maine (Early History of Institutions, Lecture xii.), in an elaborate discussion of Austin's views, which in the main he accepts, what Austin was engaged upon was not an inquiry into the nature of sovereignty as it is found to exist, but an inquiry into what was the connexion between the various forms of political superiority. And this inquiry was undertaken in order to enable him to distinguish the province of jurisprudence properly so called from the province of morality; an inquiry which was hopeless unless the connexion just stated was clearly conceived. Austin's views of sovereignty, therefore, was an abstraction, useless it is true for some purposes, but by no means useless for others. "There is," as Maine says, "not the smallest necessity for accepting all the conclusions of these great writers (i.e. Bentham and Austin) with implicit deference, but there is the strongest necessity for knowing what these con- clusions are. They are indispensable, if for no other object, for the purpose of clearing the head." These last words exactly express the work which Austin set himself to do. It was to clear his own head, and the heads of his hearers, that he laboured so hard. As Austin once said of himself, his special vocation was that of untying intellectual knots. The disentangling of classifica- tions and distinctions, the separation of real from accidental distinctions, the analysis of ideas confusedly appxehended, these (as has been truly said) were the characteristics of Austin's work which specially distinguished him. Austin thought that this somewhat irksome task was a necessary preliminary both to the study of law as a science, and to the production of a code. It is a curious reflection that whilst the lectures in which these inquiries were begun (though not completed) excited the ad- miration of his contemporaries, hardly any one now thinks such inquiries worth pursuing.

The Lectures on Jurisprudence were reviewed by J. S. Mill in the Edinburgh Review of October 1863, a nd this review is republished in Mill's Dissertations and Discussions, vol. 3, p. 206. Professor Jethro Brown has published (1906) an edition of Austin's earlier lectures, in which they are stated in an abbreviated form. There is a sketch of his life by his widow in the preface to the Lectures on Jurisprudence, which she published after his death. (W. Ma.)

AUSTIN, SARAH (1793-1867), English author, was born in 1793, the daughter of John Taylor (d. 1826), a wool-stapler and a member of the well-known Taylor family of Norwich. Her great grandfather, Dr John Taylor (1694-1761), had been pastor of the Presbyterian church there, and wrote a once famous polemical work on The Scripture Doctrine of Original Sin (1738), which called forth celebrated treatises by Jonathan

Edwards on Original Sin. Her mother, Susannah Cook, was an exceedingly clever woman who transmitted both her beauty and her talent to her daughter. Their friends included Dr Alderson and his daughter Mrs Opie, Henry Crabbe Robinson, the Gurneys and Sir James Mackintosh. Sarah Taylor married in 1820 John Austin (q.v.). They lived in Queen Square, Westminster, where Mrs. Austin, whose tastes, unlike her husband's, were extremely sociable, gathered round her a large circle, Jeremy Bentham, James Mill and the Grotes being especially intimate. She received many Italian exiles, who found a real friend in her. In 1821 was born

her only child, Lucie, afterwards Lady Duff-Gordon. Mrs. Austin never attempted any considerable original wort , con- tenting herself chiefly with translations, of which the most important are the History of the Reformation in Germany and the History of the Popes (1840), from the German of Leopold von Ranke, Report on the State of Public Instruction in Prussia (1834) from the French of V. Cousin, and F. W. Carove's The Story without an End (1864). After her husband's death in 1859 she edited his Lectures on Jurisprudence. She also edited the Memoirs of Sydney Smith (1855) an d Lady Duff-Gordon's Letters from Egypt (1865). She died at Weybridge on the 8th of August 1867.

See Three Generations of Englishwomen (18S8), by her grand- daughter, Mrs Janet Ross.

AUSTIN, STEPHEN FULLER (1 793-1836), American pioneer, was born in Austinville, Wythe county, Virginia, on the 3rd of November 1793. He was the son of Moses Austin (1767-1821), a native of Durham, Connecticut, who in 1820 obtained from Mexico a grant of land for an American colony in Texas, but died before he could carry out his project. The son was educated in New London, Connecticut, and at Transylvania University, Lexington, Kentucky, and settled in Missouri, where he was a member of the territorial legislature from 1813 to 1819. In 1819 he removed to Arkansas Territory, where he was appointed a circuit judge. After his father's death he obtained a con- firmation of the Texas grants from the newly established Mexican government, and in 1821-1823 he established a colony of several hundred American families on the Brazos river, the principal town being named, in his honour, San Felipe de Austin. He was a firm defender of the rights of the Americans in Texas, and in 1833 he was sent to the city of Mexico to present a petition from a convention in Texas praying for the erection of a separate state government. While there, despairing of success for his petition, he wrote home recommending the organization of a state without waiting for the consent of the Mexican congress. This letter falling into the hands of the Mexican government, Austin, while returning home, was arrested at Saltillo, carried as a prisoner back to Mexico, and imprisoned for a year

without trial. Returning to Texas in 1835, he found the Texans in armed revolt against Mexican rule, and was chosen commander-in-chief of the revolutionary forces, but after failing to take San Antonio he resigned the command, for which he had never considered himself fitted, and in November 1835 went to the United States as a commissioner to secure loans and supplies, and to learn the position the United States authorities would be likely to take in the event of a declaration of Texan independence. He suc- ceeded in raising large sums, and received assurances that satisfied him that Americans would look with great favour on an inde- pendent Texas. Returning to Texas in the summer of 1836, he became a candidate, rather reluctantly, for the presidency of the newly established republic of Texas, but was defeated by Samuel Houston, under whom he was secretary of state until his sudden death on the 7th of December 1836.

See A Comprehensive History of Texas, edited by D. G. Wooten (2 vols., Dallas, 1898).

AUSTIN, a city and the county-seat of Mower county, Minnesota, U.S.A., on the Red Cedar river and Turtle creek, (by rail) 105 m. S. of Minneapolis and 100 m. from St Paul. Pop. (1900) 5474; (1905, state census) 6489 (913 foreign-born); (1910, U.S. census) 6960. It is served by the Chicago Great Western and the Chicago, Milwaukee & St Paul railways. Austin is the seat of the Southern Minnesota Normal College and Austin School of Commerce (1896), and has a Carnegie library, court house and city hall. It is a market for live-stock, and for dairy and farm products, and has slaughtering and packing establishments, flour mills, creameries and cheese factories, canning and preserving factories, carriage works, ‘ a flax fibre mill and grain elevators. Brick, tile, sewer-pipe, and hydraulic cement are manufactured, and there are railway repair shops. A valuable water-power is utilized for manu- facturing purposes. Fresh-water pearls of considerable value

and beauty are found in the Red Cedar river. The city owns and operates its own water-supply system and electric-lighting plant. Austin was settled in 1855, was incorporated as a village in 1868, and was chartered as a city in 1873.

AUSTIN, the capital of Texas, U.S.A., and the county-seat of Travis county, on the N. bank of the Colorado river, near the centre of the state and about 145 m. W.N.W. of Houston. Pop. (1800) 14,575; (I 9°o) 22

> 2 58, of whom 5822 were negroes; (1910 census) 29,860. Austin is served by the Houston & Texas Central, the International & Great Northern, and the Missouri, Kansas & Texas railways. The city is built on high bluffs 40-1 20 ft. above the river, which is spanned here by a bridge, built in 1874. The Texas State Capitol, a handsome building of red Texas granite, with a dome 318 ft. high, cost more than $3,500,000, and stands in a square in the centre of the city. It was built (1881-1888) by Chicago capitalists in exchange for a land grant of 3,000,000 acres. It is in the form of a Greek cross, with an extreme length of 556-5 ft. and an extreme width of 288-8 ft. Next to the National Capitol at Washington, it is the largest capitol building in the United States, and it is said to be one of the ten largest buildings in the world. Austin is the seat of the University of Texas (opened in 1883; co- educational) ; the medical department of the state university is at Galveston, and the departments in Austin are the college of arts, department of education, department of engineering, department of law, school of pharmacy, and school of nursing. The government of the university is vested in a board of eight regents nominated by the governor and appointed with the advice and consent of the state senate. At Austin are also state institutions and asylums for the insane, the blind, the coloured deaf and blind; the state school for the deaf and dumb; the state Confederate home; the Confederate woman's home (1907 ; for wives and widows of Confederate soldiers and sailors), maintained by the Daughters of the Confederacy; St Mary's Academy (Roman Catholic, under the supervision of the Sisters of the Holy Cross, founded 1875, chartered 1886); St Edward's College (Roman Catholic, chartered 1885); the Austin Presbyterian Theological Seminary (Presbyterian Church, South), opened in 1902 by the Synod of Texas, and after 1905 partly controlled by the Synod of Arkansas; Tillotson College (a negro school under Congregational control, founded by the American Missionary Association, chartered in 1877, and opened in 1881); and Samuel Huston College (for negroes; Methodist Episcopal; opened in 1900 and named in honour of an Iowan benefactor). The principal newspapers of Austin are the Statesman (Democratic, established in 1871), a morning paper, and the Tribune (Democratic, established in 1891), an evening paper. The Quarterly of the Texas State Historical Society is published here. Austin is the principal trade and jobbing centre for central and western Texas, is an important market for live- stock, cotton, grain and wool, and has extensive manufactories of flour, cotton-seed oil, leather goods, lumber and wooden ware; the value of the factory product in 1905 was $1,569,353, being 105-2 % more than in 1900. The city owns and operates its water-supply system. In 1890-1893 one of the largest dams in the world, an immense structure of granite masonry, 1200 ft. long. 60-70 ft. high, and 18 to 66 ft. thick, was constructed across the Colorado river 2 m. above the city for the pur- pose of supplying water and power, creating a reservoir (ZaJte

M'Donald) about 30 m. long. Freshets in the spring of 1900, however, undermined the wall, and on the 7 th of April the dam broke with a resulting loss of several lives and about $1,000,000 worth of property. The rebuilding of the dam was projected in 1 907 . Austin was first settled in 1 838 and was named Waterloo, but in 1839, when it was chosen as the site of the capital of the Republic of Texas, it was renamed in honour of Stephen F. Austin, one of its founders. Under the influence of General Sam Houston the capital was for a time in 1842-1845 removed from Austin to Houston, but in 1845 an ordinance was passed making Austin the capital, and it remained the state capital after Texas entered the Union, although Huntsville and Tehuacana Springs

to be chosen in its place. The first Anglo-American settlement in Texas, established on the Brazos river in 1823 by members of the Austin colony, was San Felipe de Austin now San Felipe. In 1909 Austin adopted a commission form of government.

AUSTRALASIA, a term used by English geographers in a sense nearly synonymous with the Oceania of continental writers. It thus comprises all the insular groups which extend almost con- tinuously from the south-eastern extremity of Asia to more than half-way across the Pacific. Its chief divisions are Malaysia with the Philippines; Australia with Tasmania and New Zealand; Melanesia, that is, New Guinea, New Britain, New Ireland, Admiralty, the Solomons, New Hebrides, Santa Cruz, Fiji, Loyalties and New Caledonia; Micronesia, that is, the Ladrones, Pelew and Carolines, with the Marshall and Gilbert groups; lastly, Polynesia, that is, Samoa, Tonga, Cook, Tahiti, the Marquesas, Ellice, Hawaii and all intervening clusters. The term is so far justified in that it harmonizes better than Oceania did with the names of the other continents, and also embodies the two essential facts that it is a south-eastern extension of Asia, and that its central and most important division is the great island-continent of Australia. In a more restricted sense the term Australasia corresponds to the large division including Australia, Tasmania and New Zealand.

See Australasia, 2 vols. Stanford Compendium Series, new issue (London, 1907-1908).

AUSTRALIA, the only continent entirely in the southern hemisphere. It lies between 10° 39′ and 39° 1 1|' S., and between 113 5′ and 153 16′ E. Its greatest length is 2400 m. from east to west, and the greatest breadth 197 1 m. from north to south. The area is, approximately, 2,946,691 sq. m., with a coast line measuring about 8850 m. This is equal to 1 m. to each 333 sq. m. of land, the smallest proportion of coast shown by any of the continents.

Physical' Geography Physiography. — The salient features of the Australian continent are its compact outline, the absence of navigable rivers communicating with the interior, the absence of active volcanoes or snow-capped mountains, its character. isolation from other lands, and its antiquity. Some of the most profound changes that have taken place on this globe occurred in Mesozoic times, and a great portion of Australia was already dry land when vast tracts of Europe and Asia were submerged; in this sense, therefore, Australia has been rightly referred to as one of the oldest existing land surfaces. It has been described as at once the largest island and the smallest continent on the globe. The general contours exemplify the law of geographers in regard to continents, viz. as to their having a high border around a depressed interior, and the highest mountains on the side of the greatest ocean. On the N. Australia is bounded by the Timor Sea, the Arafura Sea and Torres Strait; on the E. by the Pacific Ocean; on the S. by Bass Strait and the Southern Ocean; and on the W. by the Indian Ocean. It stands up from the ocean depths in three fairly well-marked terraces. The basal plain of these terraces is the bed of the ocean, which on the Pacific side has an average depth of 15,000 ft. From this profound foundation rise Australia, New Guinea and Melanesia, in varying slopes. The first ledge rising from the ocean floor has a depth averaging 8000 ft. below sea-level. The outer edge of this ledge is roughly parallel to the coast of Western Australia, and more than 150 m. from the land. Round the Australian Bight it continues parallel to the coast, until south of Spencer Gulf (the basal ledge still averaging 8000 ft. in depth) it sweeps southwards to lat. 55°, and forms a submarine promontory 1000 m. long. The edge 0/ the abysmal area comes close to the eastern coasts of. Tasmania and New South Wales, approaching to within 60 m. of Cape Howe. The terrace closest to the land, known as the continental shelf, has an average depth of 600 ft., and connects Australia, New Guinea, and Tasmania in one unbroken sweep. Compared with other continents, the Australian continental shelf is ex.-

in 1S50 and Houston fn 1S72 attempted in popular elections I tremely narrow, and there are points on the eastern coast where

the land plunges down to oceanic depths with an abruptness rarely paralleled. Off the Queensland coast the shelf broadens, its outer edge being lined by the seaward face of the Great Barrier Reef. From Torres Strait to Dampier Land the shelf spreads out, and connects Australia with

New Guinea and the Malay Archipelago. An elongation of the shelf to the south joins Tasmania with the mainland. The vertical relief of the land above the ocean is a very important factor in determining the climate as well as the distribution of the fauna and flora of a continent.

The land mass of Australia rises to a mean height much less than that of any other continent; and the chief mountain systems are parallel to, and not far from, the coast-line. Thus, taking the con- tinent as a whole, it may be described as a plateau, fringed by a low- lying well-watered coast, with a depressed, and for the most part arid, interior. A great plain, covering quite 500,000 sq. m., occupies a position a little to the east of a meridional line bisecting the con- tinent, and south of the 22nd degree, but portions of it stretch upwards to the low-lying country south of the Gulf of Carpentaria. The contour of the continent in latitude 30 ° 5′ is as follows: — a short strip of coastal plain ; then a sharp incline rising to a mountain range 4000 ft. above sea-level, at a distance of 40 m. from the coast. From this a gently-sloping plateau extends to almost due north of Spencer Gulf, at which point its height has fallen almost to sea- level. Then there is a gentle rise to the low steppes, 500 to 1000 ft. above sea-level. A further gentle rise in the high steppes leads to the mountains of the West Australian coast, and another strip of low-lying coastal land to the sea.

With a circumference of 8000 m. Australia presents a contour wonderfully devoid of inlets from the sea except on its northern shores, where the coast-line is largely indented. The Gulf of Car- pentaria, situated in the north, is enclosed on the east by the pro- jection of Cape York, and on the west by Arnheim Land, and forms the principal bay on the whole coast, measuring about 6° of long, by 6° of lat. Farther to the west, Van Diemen's Gulf, though much smaller, forms a better-protected bay, having Melville Island between it and the ocean ; while beyond this, Queen's Channel and Cambridge Gulf form inlets about 14 50′ S. On the north-west of the continent the coast-line is much broken, the chief indentations being Admiralty Gulf, Collier Bay and King Sound, on the shores of Tasman Land. Western Australia, again, is not favoured with many inlets, Exmouth Gulf and Shark's Bay being the only bays of any size. The same remark may be made of the rest of the sea-board ; for, with the exception of Spencer Gulf, the Gulf of St Vincent and Port Phillip on the south, and Moreton Bay, Hervey Bay and Broad Sound on the east, the coast-line is singularly uniform. There are, however, numerous spacious harbours, especially on the eastern coast, which are referred to in the detailed articles dealing with the different states. The Great Barrier Reef forms the prominent feature off the north-east coast of Australia ; its extent from north to south is 1200 m., and it is therefore the greatest of all coral reefs. The channel between the reef and the coast is in places 70 m. wide and 400 ft. deep. There are a few clear openings in the outer rampart which the

reef presents to the ocean. These are opposite to the large estuaries of the Queensland rivers, and might be thought to have been caused by fresh water from the land. The breaks are, however, some 30 to 90 m. away from land and more probably were caused by subsidence; the old river-channels known to exist below sea-level, as well as the former land connexion with New Guinea, seem to point to the conditions assumed in Darwin's well-known subsidence theory, and any facts that appear to be inconsistent with the theory of a steady and prolonged subsidence are explainable by the assump- tion of a slight upheaval.

With the exception of Tasmania there are no important islands belonging geographically to Australia, for New Guinea, Timor and other islands of the East Indian archipelago, though not removed any great distance from the continent, do not belong to its system. On the east coast there are a few small and unimportant islands. In Bass Strait are Flinders Island, about 800 sq. m. in area, Clarke Island, and a few other small islands. Kangaroo Island, at the entrance of St Vincent Gulf, is one of the largest islands on the Australian coast, measuring 80 m. from east to west with an average width of 20 m. Numerous small islands lie off the western coast, but none has any commercial importance. On the north coast are Melville and Bathurst Islands; the former, which is 75 m. long and 38 m. broad, is fertile and well watered. These islands are opposite Port Darwin, and to the westward of the large inlet known as Van Diemen's Gulf. In the Gulf of Carpentaria are numerous islands, the largest bearing the Dutch name of Groote Eylandt.

Along the full length of the eastern coast extends a succession of mountain chains. The vast Cordillera of the Great Dividing Kloun- Range originates in the south-eastern corner of the con-

lalas. tinent, and runs parallel with and close to the eastern

shore, through the states of Victoria and New South Wales, right up to the far-distant York Peninsula in Queensland. In Victoria the greatest elevation is reached in the peaks of Mount Bogong (6508 ft.) and Mount Feathertop (6303 ft.), both of which

lie north of the Dividing Range; in the main range Mount Hotham (6100 ft.) and Mount Cobberas (6025 ft.) are the highest summits. In New South Wales, but close to the Victorian border, are found the loftiest peaks of Australia, Mount Kosciusco and Mount Townsend, rising to heights of 7328 and 7260 ft. respectively. The range is here called the Muniong, but farther north it receives the name of Monaro Range; the latter has a much reduced altitude, its average being only about 2000 ft. As the tableland runs northward it decreases both in height and width, until it narrows to a

few miles only, with an elevation of scarcely 1500 ft. ; under the name of the Blue Mountains the plateau widens again and increases in altitude, the chief peaks being Mount Clarence(4000 ft.), Mount Victoria (3525 ft.), and Mount Hay (3270 ft.). The Dividing Range decreases north of the Blue Mountains, until as a mere ridge it divides the waters of the coastal rivers from those flowing to the Darling. The mass widens out once more in the Liverpool Range, where the highest peak, Mount Oxley, reaches 4500 ft., and farther north, in the New England Range, Ben Lomond reaches an elevation of 5000 ft. Near the Queensland border, Mount Lindsay, in the Macpherson Range, rises to a height of 5500 ft. In the latitude of Brisbane the chain swerves inland; no other peak north of this reaches higher than Mount Bartle Frere in the Bellenden Ker Range (5438 ft.). The Southern Ocean system of the Victorian Dividing Range hardly attains to the dignity of high mountains. An eastern system in South Australia touches at a few points a height of 3000 ft. ; and the Stirling Range, belonging to the south-western system of South Australia, reaches to 2340 ft. There are no mountains behind the Great Australian Bight. On the west the Darling Range faces the Indian Ocean, and extends from Point D'Entrecasteaux to the Murchison river. North of the Murchison, Mount Augustus and Mount Bruce, with their connecting highlands, cut off the coastal drainage from the interior; but no point on the north-west coast reaches a greater altitude than 4000 ft. Several minor ranges, the topography of which is little known, extend from Cambridge Gulf, behind a very much broken coast-line, to Limmen Bight on the Gulf of Carpentaria. Nothing is more remarkable than the contrast between the aspect of the coastal ranges on the north-east and on the south-east of the continent. The higher Australian peaks in the south-east look just what they are, the worn and denuded stumps of mountains, standing for untold ages above the sea. Their shoulders are lifted high above the tree-line. Their summits stand out gaunt and lonely in an unbroken solitude. Having left the tree-line far behind him, nothing is visible to the traveller for miles around but barren peaks and torn crags in in- describable confusion. A verdure of herbage clothes the valleys that have been scooped from the summits downwards. But there are no perpetual snow-fields, no glaciers creep down these valleys, and no alpine hamlets ever appear to break the monotony. The moun- tains of the north-east, on the contrary, are clothed to their summits with a rich and varied flora. Naked crags, when they do appear, lift themselves from a sea of green, and a tropical vegetation, quite Malaysian in character, covers everything.

The absence of active volcanoes in Australia is a state of things, in a geological sense, quite new to the continent. Some of the volcanoes of the western districts of Victoria have been in eruption probably subseauent to the advent of the black-fellow. In some instances the cones are quite intact,

and the beds of ash and scoriae are as yet almost unaffected by denuding agencies. Late in the Tertiary period vast sheets of lava poured from many points of the Great Dividing Range of eastern Australia. But it is notable that all recent volcanic action was confined to a wide belt parallel to the coast. No evidences of recent lava flows can be found in the interior over the great alluvial plain, the Lower, or the Higher Steppes. Nor has the continent, as a whole, in recent times been subjected to any violent earth tremors; though in 1873, to the north of Lake Amadeus, in central Australia, Ernest Giles records the occurrence of earthquake shocks violent enough to dislodge con- siderable rock masses.

Australia possesses one mountain which, though not a volcano, is a " burning mountain." This is Mount Wingen, situated in a spur of the Liverpool Range and close to the town of Scone. Its fires are not volcanic, but result from the combustion of coal some distance underground, giving off much smoke and steam; geologists estimate that the burning has been going on for at least 800 years.

The coastal belt of Australia is everywhere well watered, with the exception of the country around the Great Australian Bight and Spencer Gulf. Flowing into the Pacific Ocean on the Rivers. east coast there are some fine rivers, but the majority have short and rapid courses. In Queensland a succession of rivers falls into the Pacific from Cape York to the southern boundary of the state. The Burdekin is the finest of these, draining an area of 53,500 sq. m., and emptying into Upstart Bay; it receives numerous tributaries in its course, and carries a large body of fresh water even in the driest seasons. The Fitzroy river is the second in point of size; it drains an area of 55,600 sq. m., and receives several tributary streams during its course to Keppel Bay. The Brisbane river, falling into Moreton Bay, is important chiefly from the fact that the city of Brisbane is situated on its banks. In New South Wales there are several important rivers, the largest of which is the Hunter, draining 1 1,000 sq. m., and having a course of 200 m. Taking them from north to south, the principal rivers are the Richmond, Clarence,

Macleay, Hastings, Manning, Hunter, Hawkesbury and Shoalhaven. The Snowy river has the greater part of its course in New South Wales, but its mouth and the last 120 m. are in Victoria. The other rivers worth mentioning are the Yarra, entering the sea at Port Phillip, Hopkins and

Glenelg. The Murray (q.v.), the greatest river of Australia, debouches into Lake Alexandrina, and thence into the sea at Encounter Bay in South Australia. There are no other rivers of importance in South Australia, but the Torrens and the Gawler may be mentioned. Westward of South Australia, on the shores of the Australian Bight, there is a stretch of country 300 m. in length unpierced by any streams, large or small, but west of the bight, towards Cape Leeuwin, some small rivers enter the sea. The south- west coast is watered by a few streams, but none of any size; amongst these is the Swan, upon which Perth, the capital of Western Australia, is built. Between the Swan and North-West Cape the principal rivers are the Greenough, Murchison and Gascoyne; on the north-west coast, the Ashburton, Fortescue and De Grey ; and in the Kimberley district, the Fitzroy, Panton, Prince Regent and the Ord. In the Northern Territory are several fine rivers. TheVictoria river is navigable for large vessels for a distance of about 43 m. from the sea, and small vessels may ascend for another 80 m. The Fitz- maurice, discharging into the estuary of the Victoria, is also a large stream. The Daly, which in its upper course is called the Katherine, is navigable for a considerable distance, and small vessels are able to ascend over 100 m. The Adelaide, discharging into Adam Bay, has been navigated by large vessels for about 38 m., and small vessels ascend still farther. The South Alligator river, flowing into Van Diemen's Gulf, is also a fine stream, navigable for over 30 m. by large vessels ; the East Alligator river, falling into the same gulf, has been navigated for 40 m. Besides those mentioned, there are a number of smaller rivers discharging on the north coast, and on the west shore of the Gulf of Carpentaria the Roper river discharges itself into Limmen Bight. The Roper is a magnificent stream, navigable for about 75 or 80 m. by vessels of the largest tonnage, and light draught vessels can ascend 20 m. farther. Along the portion of the south shore of the Gulf of Carpentaria which belongs to Queensland and the east coast, many large rivers discharge their waters, amongst them the Norman, Flinders, Leichhardt, Albert and Gregory on the southern shore, and the Batavia, Archer, Coleman, Mitchell, Staaten and Gilbert on the eastern shore. The rivers flowing into the Gulf of Carpentaria, as well as those in the Northern Territory, drain country which is subject to regular monsoonal rains, and have the general characteristics of sub-tropical rivers.

The network of streams forming the tributaries of the Darling and Murray system give an idea of a well-watered country. The so-ca//ed rivers have a strong flow on/y after heavy rams, and some of them do not ever reach the main drainage fine. Flood waters disappear often within a distance of a few miles, being absorbed by porous soil, stretches of sand, and sometimes by the underlying bed-rocks. In many cases the rivers as they approach the main stream break up into numerous branches, or spread their waters over

vast flats. This is especially the case with the tributaries of the Darling on its left bank, where in seasons of great rains these rivers overspread their banks and flood the flat country for miles around and thus reach the main stream. Lieutenant John Oxley went down the Lachlan (1817) during one of these periods of flood, and the great plains appeared to him to be the fringe of a vast inland sea. As a matter of fact, they are an alluvial deposit spread out by the same flood waters. The great rivers of Australia, draining inland, carve out valleys, dissolve limestone, and spread out their deposit over the plains when the waters become too sluggish to bear their burden farther. From a geological standpoint, the Great Australian Plain and the fertile valley of the Nile have had a similar origin. Taking the Lachlan as one type of Australian river, we find it takes its rise amongst the precipitous and almost unexplored valleys of the Great Dividing Range. With the help of its tributaries it acts as a denud- ing agent for 14,000 sq. m. of country, and carries its burden of sediment westwards. A point is reached about 200 m. from the Dividing Range, where the river ceases to act as a denuding agent, and the area of deposition begins, at a level of 250 ft. above the sea, but before the waters can reach the ocean they have still to travel about 1000 m.

The Darling is reckoned amongst the longest rivers in the world, for it is navigable, part of the year, from Walgett to its confluence with the Murray, 1758 m., and then to the sea, a further distance of 587 m. — making in all 2345 m. of navigable water. But this gives no correct idea of the true character of the Darling, for it can hardly be said to drain its own watershed. From the sources of its various tributaries to the town of Bourke, the river may be described as draining a watershed. But from Bourke to the sea, 550 m. in a direct line, the river gives rather than receives water from the country it flows through.

The annual rainfall and the area of the catchment afford no measure whatever as to the size of a river- in the interior of Australia. The discharge of the Darling river at Bourke does not amount to more than 10 % of the rainfall over the country which it drains. It was this remarkable fact which first led to the idea that, as the rainfall could not be accounted for either by evaporation or by the river discharge, much of the 90 % unaccounted for must sink into the ground, and in part be absorbed by some underlying bed-rock.

All Australian rivers, except the Murray and the Murrumbidgee, depend entirely and directly on the rainfall. They are flooded after rain, and in seasons of drought many of them, especially the tribu- taries of the Darling, become chains of ponds. Springs which would equalize the discharge of rivers by continuing to pour water into their beds after the rainy season has passed seem entirely absent in the interior. Nor are there any snowfields to

feed rivers, as in the other continents. More remarkable still, over large tracts of country the water seems disposed to flow away from, rather than to, the river-beds. As the low-lying plains are altogether an alluvial deposit, the coarser sediments accumulate in the regions where the river first overflows its banks to spread out over the plains. The country nearest the river receiving the heaviest deposit becomes in this way the highest ground, and so continues until a " break-away " occurs, when a new river-bed is formed, and the same process of deposition and accumulation is repeated. As the general level of the country is raised by successive alluvial deposits, the more ancient river-beds become buried, but being still connected with the newer rivers at some point or other, they continue to absorb water. This under- ground network of old river-beds underlying the great alluvial plains must be filled to repletion before flood waters will flow over the surface. It is not surprising, therefore, that comparatively little of the rainfall over the vast extent of the great central plain ever reaches the sea by way of the river systems; indeed these systems as usually shown on the maps leave a false impression as to the actual condition of things.

The great alluvial plain is one of Australia's most notable inland features; its extent is upwards of 500,000 sq. m., lying east of I 35° W. and extending right across the continent from steppes. the Gulf of Carpentaria to the M urray river. The interior of the continent west of 135 and north of the Musgrave ranges is usually termed by geographers the Australian Steppes. It is entirely different in all essential features from the great alluvial plains. Its prevailing aspect is characterized by flat and terraced hills, capped by desert sandstone, with stone-covered flats stretching over long distances. The country round Lake Eyre, where some of the land is actually below sea-level, comes under this heading. The higher steppes, as far as they are known, consist of Ordovician and Cambrian rocks, with an average elevation of 1500 to 3000 ft. above sea-level. Over this country water-courses are shown on maps. These run in wet seasons, but in every instance for a short distance only, and sooner or later they are lost in sand-hills, where their waters disappear and a line of stunted gum-trees (Eucalyptus roslrata) is all that is present to indicate that there may be even a soakage to mark the abandoned course. The steppes cover a surface of 400,000 sq. m., and from this vast expanse not a drop of the scanty rai'nfa// reaches the sea; there is no leading drainage system and there are no rivers. Another notable feature of the interior is the so-called lake area, a district stretching to the north of Spencer Gulf. These lakes are expanses of brackish waters that spread or Lakes. contract as the season is one of drought or rain. In seasons of drought they are hardly more than swamps and mud flats, which for a time may become a grassy plain, or desolate coast en- crusted with salt. The country around is the dreariest imaginable, the surface is a dead level, there is no heavy timber and practically no*

settlement. Lake Torrens, the largest of these depressions, some- times forms a sheet of water 100 m. in length. To the north again stretches Lake Eyre, and to the west Lake Gairdner. Some of these lake-beds are at or slightly below sea-level, so that a very slight depression of the land to the south of them would connect much of the interior with the Southern Ocean. (T. A. C.)

Geology. — The states of Australia are divided by natural bound- aries, which separate geographical areas having different characters, owing, mainly, to their different geological structures. Hence the general stratigraphical geology can be most conveniently summarized for each state separately, dealing here with the geological history of Australia as a whole. Australia is essentially the fragment of a great plateau land of Archean rocks. It consists in the main of an Archean block or " coign, "which still occupies nearly the whole of the western half of the continent, outcrops in north-eastern Queensland, forms the foundation of southern New South Wales and eastern Victoria, and is exposed in western Victoria, ; n Tasmania, and in the western flank of the Southern Alps of New Zealand. These areas of Archean rocks were doubtless once continuous. But they have been separated by the foundering of the Coral Sea and the Tasman Sea, which divided the continent of Australia from the islands of the Australasian festoon; and the foundering of the band across Australia, from the Gulf of Carpentaria, through western Queensland and western New South Wales, to the lower basin of the Murray, has separated the Archean areas of eastern and western Australia. The breaking up of the old Archean foundation block began in Cambrian and Ordo- vician times. A narrow Cambrian sea must have extended across central Australia from the Kimberley Goldfield in the riorth-west, through Tempe Downs and the Macdonnell chain in central Australia , to the South Australian highlands, central Victoria at Mansfield, and northern Tasmania. Cambrian rocks occur in each of these districts, and they are best developed in the South Australian high- lands, where they include a long belt of contemporary glacial de- posits. Marine Ordovician rocks were deposited along the same general course. They are best developed in the Macdonnell chain in

central Australia and in Victoria, where the fullest sequence is known ; while they also extended north-eastward from Victoria into New South Wales, where, as yet, no Cambrian rocks have been found. The Silurian system was marked by the retreat of the sea from central Australia; but the

sea still covered a band across Victoria, from the coast to the Murray basin, passing to the east of Melbourne. This Silurian sea was less extensive than the Ordovician in Victoria ; but it appears to have been wider in New South Wales and in Queensland. The best Silurian sequence is in New South Wales. Silurian rocks are well developed in western Tasmania, and the Silurian sea must have washed the south-western corner of the continent, if the rocks of the Stirling Range be rightly identified as of this age.

The Devonian system includes a complex series of deposits, which are of most interest in eastern Australia. This period was marked by intense earth movements, which affected the whole of the east Australian highlands. The Lower Devonian beds are in the main terrestrial, or coarse littoral deposits, and volcanic rocks. The Middle Devonian was marked by the same great transgression as in Europe and America; it produced inland seas, extending into Victoria, New South Wales and Queensland, in which were deposited limestones with a rich coral fauna. The Upper Devonian was a period of marine retreat; the crustal disturbances of the Lower Devonian were renewed and great quartz-pebble beaches were formed on the rising shore lines, producing the West Coast Range conglomerates of Tasmania, and the similar rocks to the south-east of Mansfield in Victoria. Intrusions of granitic massifs in the Devonian period formed the primitive mountain axis of Victoria, which extends east and west across the state and forms the nucleus of the Victorian highlands. Similar granitic intrusions occurred in New South Wales and Queensland, and built up a mountain chain,

Gmˆ yVfeUccra

which ran north and south across the continent; its worn-down stumps now form the east Australian highlands.

The Carboniferous period began with a marine transgression, enabling limestones to form in Tasmania and New South Wales; and at the same time the sea first got in along the western edge of the western plateau, depositing the Carboniferous rocks of the Gascoyne basin and the coastal plain of north-western Australia. The Upper Carboniferous period was in the main terrestrial, and during it were laid down the coal-seams of New South Wales; they are best developed in the basin of the Hunter river, and they extend southward, covered by Mesozoic deposits, beyond Sydney. The Coal Measures become narrower in the south, until, owing to the eastward projection of the highlands, the Lower Palaeozoic rocks reach the coast, The coal-seams must have been formed in well- watered, lowland forests, at the foot of a high mountain range, built up by the Devonian earth movements. The mountains both in Victoria and New South Wales were snow-capped, and glaciers flowed down their flanks and laid down

Carboniferous glacial deposits, which are still preserved in basins that flank the mountain ranges, such as the famous conglomerates of Bacchus Marsh, Heathcote and the Loddon valley in Victoria, and cf Branxton and other localities in New South Wales. The age of the glacial deposits is later than the Glossopteris flora and occurs early in the time of the Gangamopteris flora. Kitson's work in Tasmania shows that there also the glacial beds may be correlated with the lower or Greta Coal Measures of New South Wales.

The Permian deposits are best developed in New South Wales and Tasmania, where their characters show the continuation of the Carboniferous conditions. The Mesozoic begins with a Triassic lai.d period in the mainland of Australia; while the islands of the Aus- tralasian festoon contain the Triassic marine limestones, which fringe

the whole of the Pacific. The Triassic beds are best known in New South Wales, where round Sydney they include a series of sandstones and shales. They also occur in northern Tasmania.

The Jurassic system is represented by two types. In Victoria, Tasmania, northern New South Wales and Queensland, there are Jurassic terrestrial deposits, containing the coal seams of Victoria, of the Clarence basin of north-eastern New South Wales, and of the Ipswich series in Queensland; the same beds range far inland on the western slopes of the east Australian highlands in New South Wales and Queensland and they occur, with coal-seams, at Leigh's Creek, at the northern foot of the South Australian highlands. They are also preserved in basins on the western plateau, as - shown by brown coal deposits passed through in the Lake Phillipson bore. The second and marine type of the Jurassics occurs in Western Australia, on the coastal, plain skirting the western foot of the western plateau.

The Cretaceous period was initiated by the subsidence of a large area to the south of the Gulf of Carpentaria, whereby a Lower Cretaceous sea spread southward, across western Queensland, western New South Wales and the north-eastern districts of South Australia. In this sea were laid down the shales of the Rolling Downs formation. The sea does not appear to have extended com- pletely across Australia, breaking it into halves, for a projection from the Archean plateau of Western Australia extended as far east as the South Australian highlands, and thence probably continued eastward, till it joined the Victorian highlands. The Cretaceous sea

gradually receded and the plains of the Rolling Downs formation formed on its floor were covered by the sub-aerial and lacustrine deposits of the Desert Sandstone.

The Kainozoic period opened with fresh earth movements, the most striking evidence of which are the volcanic outbreaks all round the Australian coasts. These movements in the south-east formed the Great Valley of Victoria, which traverses nearly the whole of the state between the Victorian highlands to the north, and the Jurassic sandstones of the Otway Ranges and the hills of south Gippsland. In this valley were laid down, either in Eocene or Oli- gocene times, a great series of lake beds and thick accumulations of brown coal. Similar deposits, of approximately the same age, occur in Tasmania and New Zealand ; and at about the same time there began the Kainozoic volcanic period of Australasia. The first eruptions piled up huge domes of lavas rich in soda, including the geburite-dacites and solvsbergites of Mount Macedon in Victoria, and the kenyte and tephrite domes of Dunedin, in New Zealand. These rocks were followed by the outpouring of the extensive older basalts in the Great Valley of Victoria and on the highlands of eastern Victoria, and also in New South Wales and Queensland. Then followed a marine transgression along most of the southern coast of Australia. The sea encroached far on the land from the Great Australian Bight and there formed the limestones of the Nullarbor Plains. The sea extended up the Murray basin into the western plains of New South Wales. Farther east the sea was interrupted by the still existing land-connexion between Tasmania and Victoria; but beyond it, the marine deposits are found again, fringing the coasts of eastern Gippsland and Croajingolong. These marine deposits are not found anywhere along the eastern coast of Australia; but they occur, and reach about the same height above sea-level, in New Guinea, and are widely developed in New Zealand. No doubt eastern Australia then extended far out into the Tasman Sea. The great monoclinal fold which formed the eastern face of the east Australian highlands, west of Sydney, is of later age. After this marine period was brought to a close the sea retreated. Tas- mania and Victoria were separated by the foundering of Bass Strait, and at the same time the formation of the rift valley of Spencer Gulf, and Lake Torrens, isolated the South Australian highlands from the Eyre Peninsula and the Westralian plateau. Earth movements are still taking place both along Bass Strait and the Great Valley of South Australia, and apparently along the whole length of the southern coast of Australia.

The Flowing Wells of Central Australia. — The clays of the Rolling Downs formation overlie a series of sands and drifts, saturated with water under high pressure, which discharges at the surface as a flowing well, when a borehole pierces the impermeable cover. The first of these wells was opened at Kallara in the west of New South Wales in 1880. In 1882, Dr W. L.

Jack concluded that western Queensland might be a deep artesian basin. The Blackball bore, put down at his advice from 1885 to 1888, reached a water-bearing layer at the depth of 1645 ft. and discharged 291 ,000 gallons a day. It was the first of the deep artesian wells of the continent. As the plains on the Rolling Downs formation are mostly waterless, the discovery of this deep reservoir of water has been of great aid in the develop- ment of central Australia. In Queensland to the 30th of June 1904, 973 wells had been sunk, of which 596 were flowing wells, and the total flow was 62,635,722 cub. ft. a day. The deepest well is that at Whitewood, 5046 ft. deep. In New South Wales by the 30th of June 1903, the government had put down 101 bores producing 66 flowing wells and 22 sub-artesian wells, with a total discharge of 54,000,000 gallons a day; and there were also 144 successful private wells. In South Australia there are 38 deep bores, from 20 of which there is a flow of 6,250,000 gallons a day.

The wells were first called artesian in the belief that the ascent of

the water in them was due to the hydrostatic pressure of water at a higher level in the Queensland hills. The well-water was supposed to have percolated underground, through the Blythesdale Braystone, which outcrops in patches on the eastern edge of the Rolling Downs formation. But the Blythesdale Braystone is a small local formation, unable to supply all the wells that have been sunk; and many of the wells derive their water from the Jurassic shales and mudstones. The difference in level between the outcrop of the assumed eastern intake and of the wells is often so small, in comparison with their distance apart, that the friction would completely sop up the whole of the available hydrostatic head. Many of the well-waters contain gases; thus the town of Roma is lighted by natural gas which escapes from its well. The chemical characters of the well-waters, the irregular distribution of the water-pressure, the distribution of the underground thermal gradients, and the occurrence in some of the wells of a tidal rise and fall of a varying period, are facts which are not explained on the simple hydrostatic theory. J. W. Gregory has maintained {Dead Heart of Australia, 1906, pp. 273-341) that the ascent of water in these wells is due to the tension of the included gases and the pressure of overlying sheets of rocks, and that some of the water is of plutonic origin. 1 (J. W. G.)

Climate. — The Australian continent, extending over 28 of latitude, might be expected to show a considerable diversity of climate. In reality, however, it experiences fewer climatic variations than the other great continents, owing to its distance (28°) from the Antarctic circle and (11°) from the equator. There is, besides, a powerful determining cause in the uniform character and undivided extent of its dry interior. The plains and steppes

already described lie either within or close to the tropics. They present to the fierce play of the sun almost a level surface, so that during the day that surface becomes intensely heated and at night gives off its heat by radiation. Ordinarily the alternate expansion and contraction of the atmosphere which takes place under such circumstances would draw in a supply of moisture from the ocean, but the heated interior, covering some 900,000 sq. m., is so immense, that the moist air from the ocean does not come in sufficient supply, nor are there mountain chains to intercept the clouds which from time to time are formed; so that two-fifths of Australia, com- prising a region stretching from the Australian Bight to 20 S. and from 117 to 142 E., receives less than an average of 10 in. of rain throughout the year, and a considerable portion of this region has less than 5 in. No part of Victoria and very little of Queensland and New South Wales lie within this area. The rest of the continent may be considered as well watered. The north-west coast, particularly the portions north of Cambridge Gulf and the shores of the Gulf of Carpentaria, are favoured with an annual visitation of the monsoon from December to March, penetrating as far as 500 m. into the continent, and sweeping sometimes across western and southern Queensland to the northern interior of -New South Wales. It is this tropical downpour that fills and floods the rivers flowing into Lake Eyre and those falling into the Darling on its right bank. The whole of the east coast of the continent is well watered. From Cape York almost to the tropic of Capricorn the rainfall exceeds 50 in. and ranges to over 70 in. At -Brisbane the fall is 50 in., and portions of the New South Wales coast receive a like quantity, but speaking generally the fall is from 30 in. to 40 in. The southern shores of the continent receive much less rain. From Cape Howe to Melbourne the fall may be taken at from 30 in. to 40 in., Melbourne itself having an average of 25-6 in. West of Port Phillip the fall is less, averaging 20 in. to 30 in., diminish- ing greatly away from the coast. Along the shores of Encounter Bay and St Vincent and Spencer Gulfs, the precipitation ranges from 10 to 20 in., the yearly rainfall at Adelaide is a little less than 21 in., while the head of Spencer Gulf is within the 5 to 10 in. district. The rest of the southern coast west as far as 124° E., with the exception of the southern projection of Eyre Peninsula, which receives from 10 to 20 in., belongs to the

1 The literature of the geology of Australia is enumerated, to 1884, in the bibliography by Etheridge and Jack. A general sum- mary of the stratigraphical geology was given by R. Tate, Rep. Austral. Assoc. Adv. Sci. vol. v. (1893), pp. 1-69. References to the chief sources of information regarding the states is given under each of them. A geological map of the whole continent, on the scale of 50 m. to the inch, was compiled by A. Everett, and issued in 1887 in six sheets, by the Geological Survey of Victoria.

district with from 5 to 10 in. annual rainfall. The south-western angle of the continent, bounded by a line drawn diagonally from Jurien river to Cape Riche, has an average of from 30 to 40 in. annual rainfall, diminishing to about 20 to 30 in. in the country along the diagonal line. The remainder of the south and west coast from 124° E. to York Sound in the Kimberley district for a distance of some 150 m. inland has a fall ranging from 10 to 20 in. The 10 to 20 in. rainfall band circles across the continent through the middle of the Northern Territory, embraces the entire centre and south-west of Queensland, with the exception of the extreme south-western angle of the state, and includes the whole of the interior of New South Wales to a line about 200 m. from the coast, as well as the western and northern portions of Victoria and South Australia south of the Murray.

The area of Australia subject to a rainfall of from 10 to 20 in. is 843,000 sq. m. On the seaward side of this area in the north and east is the 20 to 30 in. annual rainfall area, and still nearer the sea are the exceptionally well-watered districts. The following table shows the area of the rainfall zones in square miles : —

Rainfall. Under 10 inches 10 to 20 ,, 20 to 30 ,, 30 to 40 40 to 50 ,, 50 to 60 ,, 60 to 70 „ Over 70

Total

Rainfall Areas

in sq. m.

1,219,600

843,100

399,900

225,700

140,300

47,900

56,100

14,100

2,946,700

The tropic of Capricorn divides Australia into two parts. Of these the northern or intertropical portion contains 1,145,000 sq. m., com- prising half of Queensland, the Northern Territory, and the north- western divisions of Western Australia. The whole of New South Wales. Victoria and South Australia proper, half of Queensland, and more than half of Western Australia, comprising 1,801,700 sq. m., are without the tropics. In a region so extensive very great varieties of climate are naturally to be expected, but it may be stated as a general law that the climate of Australia is milder than that of corresponding lands in the northern hemisphere. During July, which is the coldest month in southern latitudes, one-half of Australia has a mean temperature ranging from 45 to 61°, and the other half from 62 ° to 8o D . The following are the areas subject to the various average temperatures during the month referred to: —

Temperature Area

Fahr. in sq. m.

45°-50° 18,800

50°-55° 506,300

55°-6o° 681,800

6o°-65° 834,400

65°—o° 515.000

70°-75° 275,900

75°-8o° 24,500

The temperature in December ranges from 6o° to above 95 Fahr., half of Australia having a mean temperature below 84 . Dividing the land into zones of average summer temperature, the following are the areas which would fall to each : —

Area in sq. m.

67,800

63,700

352,300

439.200

733.6oo

85 “90 57°.6oo

90°-95° 584.100

95 and over 135,400

Judging from the figures just given, it must be conceded that a considerable area of the continent is not adapted for colonization by European races. The region with a mean summer temperature in excess of 95° Fahr. is the interior of the Northern Territory north of the 20th parallel; and the whole of the country, excepting the seaboard, lying between the meridians of 120 and 140°, and north of the 25th parallel, has a mean temperature in excess of 90° Fahr.

The area of Australia is so large that the characteristics of its climate will not be understood without reference to the individual „ states. About one-half of the colony of Queensland lies

laad ‘ m ‘he tropics, the remaining area lying between the tropic and 29 S. The temperature, however, has a daily range less than that of other countries under the same isothermal lines. This circumstance is due to the sea-breezes, which blow with

Temperature

Fa

hr.

60 °

-6,S°

65°

-70°

70 u

-75°

-80°

80 °

-«5″

great regularity, and temper what would otherwise be an excessive heat. The hot winds which prevail during the summer in some of the other colonies are unknown in Queensland. Of course, in a territory of such large extent there are many varieties of climate, and the heat is greater along the coast than on the elevated lands of the interior. In the northern parts of the colony the high tem- perature is very trying to persons of European descent. The mean temperature at Brisbane, during December, January and February, is about 76°, while during the months of June, July and August it averages about 60°. Brisbane, however, is situated near the extreme southern end of the colony, and its average temperature is con- siderably less than that of many of the towns farther north. Thus the winter in Rockhampton averages nearly 65°, while the summer heat rises almost to 85°; and at Townsville and Norman ton the average temperature is still higher. The average rainfall along the coast is high, especially in the north, where it ranges from 60 to 70 in. per annum, and along a strip of country south from Cape Melville to Rockingham Bay the average rainfall exceeds 70 in. At Brisbane the rainfall is about 50 in., taking an average of forty years. A large area of the interior is watered to the extent of 20 to 30 in. per annum, but in the west and south, more remote than from 250 to 300 m., there is a rainfall of less than 20 in.

Climatically, New South Wales is divided into three marked divisions. The coastal region has an average summer temperature ranging from 78 ° in the north to 67 ° in the south, with New a winter temperature of from 59 to 52 . Taking the South district generally, the difference between the mean Wales. summer and mean winter temperatures may be set down as averaging not more than 20 °, a range smaller than is found in most other parts of the world. Sydney, situated in latitude 33°5i'S., has a mean temperature of 62-9° Fahr., which corresponds with that of Barcelona in Spain and of Toulon in France, the former of these being in latitude 41° 22′ N. and the latter in 43 °j' N. At Sydney the mean summer temperature is 70-8° Fahr., and that of winter 53-9°. The range is thus 16-9° Fahr. At Naples, where the mean temperature for the year is about the same as at Sydney, the summer temperature reaches a mean of 74-4°, and the mean of winter is 47-6°, with a range 26-8°. The mean temperature of Sydney for a long series of years was spring 62 °, summer 71°, autumn 64 , winter 54 .

Passing from the coast to the tableland, a distinct climatic region is entered. Cooma, with a mean summer temperature of 65-4°, and a mean winter temperature of 41-4°, may be taken as illustrative of the climate of the southern tableland, and Armidale of the northern. The yearly average temperature of the latter is scarcely 65‘5°, while the summer only reaches 67-7°, and the winter falls

t0 44-4°-

The climatic conditions of the western districts of the state are entirely different from those of the other two regions. The summer is hot, but on the whole the climate is very healthy. The town of Bourke, lying on the upper Darling, may be taken as an example of many of the interior districts, and illustrates peculiarly well the defects as well as the excellencies of the climate of the whole region. Bourke has exactly the same latitude as Cairo, yet its mean summer temperature is 1-3° less, and its mean annual temperature 4 less than that of the Egyptian city. New Orleans, also on the same parallel is, 4 hotter in summer. As regards winter temperature Bourke leaves little to be desired. The mean winter reading of the thermometer is 54-7, and accompanied as this is by clear skies and an absence of snow, the season is both pleasant and in- vigorating. The rainfall of New South Wales ranges from an annual average of 64 in. at various points on the northern coast, and at Kiandra in the Monaro district, to 9 in. at Milparinka in the trans- Darling district. The coastal districts average about 42 in. per annum, the tablelands 32 in., and the western interior has an average as low as 20 in. At Sydney, the average rainfall, since observations were commenced, has been 50 in.

The climate of Victoria does not differ greatly from that of New South Wales. The heat, however, is generally less intense in summer, and the cold greater in winter. Melbourne, which stands victoria. in latitude 37° 50′ S., has a mean temperature of 57-3°, and therefore corresponds with Washington in the United States, Madrid, Lisbon and Messina. The difference between summer and winter is, however, less at Melbourne than at any of the places men- tioned, the result of a long series of observations being spring 57 , summer 65-3°, autumn 58-7°, and winter 49-2°. The highest recorded temperature in the shade at Melbourne is 110-7°, and the lowest 27°, but it is rare for the summer heat to exceed 85°, or for the winter temperature in the daytime to fall below 40°. Bailarat, the second city of Victoria, lies above 100 m. west from Melbourne at a height of 1400 ft. above sea-level. It has a minimum temperature of 29°, and a maximum of 104-5°, the average yearly mean being 54-1°. The rainfall of Melbourne averages 25-58 in., the mean number of rainy days being 131.

South Australia proper extends over 26 degrees of latitude, and naturally

presents considerable variations of climate. The coldest months are June, July and August, during which the south temperature is very agreeable, averaging 53-6°, 51-7°, Australia. and 54° in those months respectively. On the plains slight frosts occur occasionally, and ice is sometimes seen on the

highlands. In summer the sun has great power, and the temperature reaches ioo° in the shade, with hot winds blowing from the interior. The weather on the whole is remarkably dry. At Adelaide there are on an average 120 rainy days per annum, with a mean rainfall of 20-88 in. The country is naturally very healthful, as evidence of which may be mentioned that no great epidemic has ever visited the state.

*Western Australia has practically only two seasons, the winter or wet season, which commences in April and ends in October, and Western *-ˆ e summer or dry season, which comprises the remainder Australia. °ˆ tne Y ear – During the wet season frequent and heavy rains fall, and thunderstorms, with sharp showers, occur in the summer, especially on the north-west coast, which is some- times visited by hurricanes of great violence. In the southern and early-settled parts of the state the mean temperature is about 64°, but in the more northern portions the heat is excessive, though the dryness of the atmosphere makes it preferable to moist tropical climates. The average rainfall at Perth is 33 in. per annum.*

The climate of the Northern Territory is extremely hot, except on the elevated tablelands ; altogether, the temperature of this part of the continent is very similar to that of northern Queensland, and the climate is not favourable to Europeans. The rainfall in the extreme north, especially in January and February, is very heavy, and the annual average along the coast is about 63 in. The whole of the peninsula north of 15° S. has a rainfall considerably exceeding 40 in. This region is backed by a belt of about 100 m. wide, in which the rainfall is from 30 to 40 in., from which inwards the rainfall gradually declines until between Central Mount Stuart and Macdonnell ranges it falls to between 5 and 10 in.

Fauna and Flora. — The origin of the fauna and flora of Australia has attracted considerable attention. Much accumu- lated evidence, biological and geological, has pointed to a southern extension of India, an eastern extension of South Africa, and a western extension of Australia into the Indian Ocean. The comparative richness of proteaceous plants in Western

Australia and South Africa first suggested a common source for these primitive types. Dr H. O. Forbes drew attention to a certain community amongst birds and other vertebrates, invertebrates, and amongst plants, on all the lands stretching towards the south pole. A theory was therefore propounded that these known types were all derived from a continent which has been named Antarctica. The supposed continent extended across the south pole, practically joining Australia and South America. Just as we have evidence of a former mild climate in the arctic regions, so a similar mild climate has been postulated for Antarctica. Modern naturalists consider that many of the problems of Australia's remarkable fauna and flora can be best explained by the following hypothesis: — The region now covered by the antarctic ice-cap was in early Tertiary times favoured by a mild climate ; here lay an antarctic continent or archipelago. From an area corresponding to what is now South America there entered a fauna and flora, which, after undergoing modifica- tion, passed by way of Tasmania to Australia. These immigrants then developed, with some exceptions, into the present Australian flora and fauna. This theory has advanced from the position of a disparaged heresy to acceptance by leading thinkers. The discovery as fossil, in South America, of primitive or ancestral forms of marsupials has given it much support. One of these, Prothylacinus, is regarded as the forerunner of the marsupial wolf of Tasmania. An interesting link between divergent marsupial families, still living in Ecuador, the Coenolestes, is another discovery of recent years. On the Australian side the fact that Tasmania is richest in marsupial types indicates the gate by which they entered. It is not to be supposed that this antarctic element, to which Professor Tate has applied the name Euronolian, entered a desert barren of all life. Previous to its arrival Australia doubtless possessed considerable vegetation and a scanty fauna, chiefly invertebrate. At a comparatively recent date Australia received its third and newest constituent. The islands of Torres Strait have been shown to be the denuded remnant of a former extension of Cape York peninsula in North Queensland. Previous to the existence of the strait, and across its site, there poured into Australia a wealth of Papuan forms. Along the Pacific slope of the Queensland Cordillera these found in soil and climate a congenial home. Among the plants the wild banana, pepper, orange and mangosteen, rhododendron, epiphytic orchids and the palm; among mammals the bats and

rats; among birds the cassowary and rifle birds; and among reptiles the crocodile and tree snakes, characterize this element. The numerous facts, geological, geographical and biological, which when linked together lend great support to this theory, have been well worked out in Australia by Mr Charles Hedley of the Australian Museum, Sydney.

The zoology of Australia and Tasmania presents a very con- spicuous point

of difference from that of other regions of the globe, in the prevalence of non-placental mammalia. The vast Fauna majority of the mammalia are provided with an organ in the uterus, by which, before the birth of their young, a vascular connexion is maintained between the embryo and the parent animal. There are two orders, the Marsupialia and the Monotremata, which do not possess this organ; both these are found in Australia, to which region indeed they are not absolutely confined.

The geographical limits of the marsupials are very interesting. The opossums of America are marsupials, though not showing anomalies as great as kangaroos and bandicoots (in their feet) , and Myrmecobius (in the number of teeth). Except the opossums, no single living marsupial is known outside the Australian zoological region. The forms of life characteristic of India and the Malay peninsula come down to the island of Bali. Bali is separated from Lombok by a strait not more than 15 m. wide. Yet this narrow belt of water is the boundary line between the Australasian and the Indian regions. The zoological boundary passing through the Bali Strait is called " Wallace's line," after the eminent naturalist who was its discoverer. He showed that not only as regards beasts, but also as regards birds, these regions are thus sharply limited. Aus- tralia, he pointed out, has no woodpeckers and no pheasants, which are widely-spread Indian birds. Instead of these it has mound- making turkeys, honey-suckers, cockatoos and brush-tongued lories, all of which are found nowhere else in the world.

The marsupials constitute two-thirds of all the Australian species of mammals. It is the well-known peculiarity of this order that the female has a pouch or fold of skin upon her abdomen, in which she can place the young for suckling within reach of her teats. The opossum of America is the only species out of Australasia which is thus provided. Australia is inhabited by at least no different species of marsupials, which is about two-thirds of the known species ; these have been arranged in five tribes, according to the food they eat, viz., the grass-eaters (kangaroos), the root-eaters (wombats), the insect-eaters (bandicoots), the flesh-eaters (native cats and rats), and the fruit-eaters (phalangers).

The kangaroo (Macropus) lives in droves in the open grassy plains. Several smaller forms of the same general appearance are known as wallabies, and are common everywhere. The kangaroo and most of its congeners show an extraordinary disproportion of the hind limbs to the fore part of the body. The rock wallabies again have short tarsi of the hind legs, with a long pliable tail for climbing, like that of the tree kangaroo of New Guinea, or that of the jerboa. Of the larger kangaroos, which attain a weight of 200 lb and more, eight species are named, only one of which is found in Western Australia. Fossil bones of extinct kangaroo species are met with; these

kangaroos must have been of enormous size, twice or thrice that of any species now living.

There are some twenty smaller species in Australia and Tasmania, besides the rock wallabies and the hare kangaroos; these last are wonderfully swift, making clear jumps 8 or 10 ft. high. Other terrestrial marsupials are the wombat (Phascolomys) , a large, clumsy, burrowing animal, not unlike a pig, which attains a weight of from 60 to 100 lb; the bandicoot (Perameles) , a rat-like creature whose depredations annoy the agriculturist; the native cat (Dasyurus), noted robber of the poultry yard; the Tasmanian wolf (Thylacinus) , which preys on large game; and the recently discovered Notoryctes, a small animal which burrows like a mole in the desert of the interior. Arboreal species include the well-known opossums {Phalanger) ; the extraordinary tree- kangaroo of the Queensland tropics; the flying squirrel, which expands a membrane between the legs and arms, and by its aid makes long sailing jumps from tree to tree; and the native bear (Phascolarctos), an animal with no affinities to the bear, and having a long soft fur and no tail.

The Myrmecobius of Western Australia is a bushy-tailed ant-eater about the size of a squirrel, and from its lineage and structure of more than passing interest. It is, Mivart remarks, a survival of a very ancient state of things. It had ancestors in a flourishing con- dition during the Secondary epoch. Its congeners even then lived in England, as is proved by the fact that their relics have been found in the Stonesfield oolitic rocks, the deposition of which is separated from that which gave rise to the Paris Tertiary strata by an abyss of past time which we cannot venture to express even in thousands of years. . .

We pass on to the other curious order of non-placental mammals, that of the Monotremata, so called from the structure of their organs of evacuation with a single orifice, as in birds. Their abdominal bones are like those of the marsupials ; and they are furnished with pouches for their young, but have no teats, the milk being distilled into their pouches from the mammary glands. Australia and Tasmania possess two animals of this order — the echidna, or spiny

ant-eater (hairy in Tasmania), and the Platypus anatinus, the duck- billed water mole, otherwise named the Ornithorhynchus paradoxus. This odd

animal is provided with a bill or beak, which is not, like that of a bird, affixed to the skeleton, but is merely attached to the skin and muscles.

Australia has no apes, monkeys or baboons, and no ruminant beasts. The comparatively few indigenous placental mammals, besides the dingo or wild dog — which, however, may have come from the islands north of this continent — are of the bat tribe and of the rodent or rat tribe. There are four species of large fruit-eating bats, called flying foxes, twenty of insect-eating bats, above twenty of land-rats, and five of water-rats. The sea produces three different seals, which often ascend rivers from the coast, and can live in lagoons of fresh water; many cetaceans, besides the " right whale " and sperm whale; and the dugong, found on the northern shores, which yields a valuable medicinal oil.

The birds of Australia in their number and variety of species may be deemed some compensation for its poverty of mammals; yet it will not stand comparison in this respect with regions of Africa and South America in the same latitudes. The black swan was thought remarkable when discovered, as belying an old Latin proverb. There is also a white eagle. The vulture is wanting. Sixty species of parrots, some of them very handsome, are found in Aus- tralia The emu corresponds with the African and Arabian ostrich, the rhea of South America, and the cassowary of the Moluccas and New Guinea. In New Zealand this group is represented by the apteryx, as it formerly was by the gigantic moa, the remains of which have been found likewise in Queensland. The graceful Menura superba, or lyre-bird, with its tail feathers spread in the shape of a lyre, is a very characteristic form. The mound-raising megapodes, the bower-building satin-birds, and several others, display peculiar habits. The honey-eaters present a great diversity of plumage. There are also many kinds of game birds, pigeons, ducks, geese, plovers and quails. The ornithology of New South Wales and Queensland is more varied and interesting than that of the other provinces.

As for reptiles, Australia has a few tortoises, all of one family, and not of great size. The " leathery turtle," which is herbivorous, and yields abundance of oil, has been caught at sea off the Illawarra coast so large as 9 ft. in length. The saurians or lizards are numerous, chiefly on dry sandy or rocky ground in the tropical region. The great crocodile of Queensland has been known to attain a length of 30 ft. ; there is a smaller one about 6 ft. in length to be met with in the shallow lagoons of the interior of the Northern Territory. Lizards occur in great profusion and variety. The monitor, or fork- tongued lizard, which burrows in the earth, climbs and swims, is said to grow to a length of 8 to 9 ft. This species and many others do not extend to Tasmania. The monitor is popularly known as the goanna, a name derived from the iguana, an entirely different animal. There are

about twenty kinds of night-lizards, and many which hibernate. One species can utter a cry when pained or alarmed, and the tall-standing frilled lizard can lift its forelegs, and squat or hop like a kangaroo. There is also the Moloch horridus of South and Western Australia, covered with tubercles bearing large spines, which give it a very strange aspect. This and some other lizards have power to change their colour, not only from light to dark, but over some portions of their bodies, from yellow to grey or red. Frogs of many kinds are plentiful, the brilliant green frogs being especially conspicuous and noisy. Australia is rich in snakes, and has more than a hundred different kinds. Most of these are venomous, but all are not equally dreaded. Five rather common species are certainly deadly — the death adder, the brown, the black, the superb and the tiger snakes. During the colder months these reptiles remain in a torpid state. No certain cure has been or is likely to be dis- covered for their poison, but in less serious cases strychnine has been used with advantage. In tropical waters a sea snake is found, which, though' very poisonous, rarely bites. Among the inoffensive species are counted the graceful green " tree snake," which pursues frogs, birds and lizards to the topmost branches of the forest ; also several species of pythons, the commonest of which is known as the carpet snake. These great reptiles may attain a length of 10 ft. ; they feed on small animals which they crush to death in their folds.

The Australian seas are inhabited by many fishes of the same genera as exist in the southern parts of Asia and Africa. Of those peculiar to Australian waters may be mentioned the arripis, represented by what is called among the colonists a salmon trout. A very fine fresh- water fish is the Murray cod, which sometimes weighs 100 lb; and the golden perch, found in the same river, has rare beauty of colour. Among the sea fish, the schnapper is of great value as an article of food, and its weight comes up to 50 lb. This is the Pagrus unicolor, of the family of Sparidae, which includes also the bream. Its colours are beautiful, pink and red with a silvery gloss; but the male as it grows old takes on a singular deformity of the head, with a swelling in the shape of a monstrous human-like nose. These fish frequent rocky shoals off the eastern coast and are caught in numbers outside Port Jackson for the Sydney market. Two species of mackerel, differing some-what from the European species, are also caught on the coasts. The so-called red garnet, a pretty fish, with hues of carmine and blue stripes on its head, is much esteemed for the table. The Trigla

polyommata, or flying garnet, is a greater beauty, with its body of crimson and silver, and its large pectoral fins, spread like wings, of a rich green, bordered with purple, and relieved by a black and white spot. Whiting, mullet, gar-fish, rock cod and many others known by local names, are in the lists of edible fishes belonging to New South Wales and Victoria. Oysters abound on the eastern coast, and on the shelving banks of a vast

extent of the northern coast the pearl oyster is the source of a considerable industry.

Two existing fishes may be mentioned as ranking in interest with the Myrmecobius (ant-eater) in the eyes of the naturalist. These are the Ceratodus Forsteri and the Port Jackson shark. The " mud- fish " of Queensland {Ceratodus Forsteri) belongs to an ancient order of fishes — the Dipnoi, only a few species of which have survived from past geological periods. The Dipnoi show a distinct transition between fishes and amphibia. So far the mud-fish has been found only in the Mary and the Burnett rivers. Hardly of less scien- tific interest is the Port Jackson shark (Heterodontus) . It is a harmless helmeted ground-shark, living on molluscs, and almost the sole survivor of a genus abundant in the Secondary rocks of Europe.

The eastern parts of Australia are very much richer both in their botany and in their zoology than any of the other parts. This is due in part to the different physical conditions there prevail- Flora.

ing and in part to the invasion of the north-eastern portion of the continent by a number of plants characteristically Melanesian. This element was introduced via Torres Strait, and spread down the Queensland coast to portions of the New South Wales littoral, and also round the Gulf of Carpentaria, but has never been able to obtain a hold in the more arid interior. It has so completely obliterated the original flora, that a Queensland coast jungle is almost an exact replication of what may be seen on the opposite shores of the straits, in New Guinea. This wealth of plant life is confined to the littoral and the coastal valleys, but the central valleys and the plateaux have, if not a varied flora, a considerable wealth of timber trees in every way superior to the flora inland in the same latitudes. In the interior there is little change in the general aspect of the vegetation, from the Australian Bight to the region of Carpentaria, where the exotic element begins. Behind the luxuriant jungles of the sub-tropical coast, once over the main range, we find the purely Australian flora with its apparent sameness and sombre dulness. Physical surroundings rather than latitude deter- mine the character of the flora. The contour lines showing the heights above sea-level are the directions along which species spread to form zones. Putting aside the exotic vegetation of the north and east coast-line, the Australian bush gains its peculiar character from the prevalence of the so-called gum-trees (Eucalyptus) and the acacias, of which last there are 300 species, but the eucalypts above all are everywhere. Dwarfed eucalypts fringe the tree-limit on Mount Kosciusco, and the soakages in the parched interior are in- dicated by a line of the same trees, stunted and straggling. Over the vast continent from Wilson's Promontory to Cape York, north, south, east and west — where anything can grow — there will

be found a gum-tree. The eucalypts are remarkable for the oil secreted in their leaves, and the large quantity of astringent resin #f their bark. This resinous exudation (Kino) somewhat resembles gum, hence the name " gum " tree. It will not dissolve in water as gums do, but it is soluble in alcohol, as resin usually is. Many of the gum- trees throw off their bark, so that it hangs in long dry strips from the trunk and branches, a feature familiar in " bush " pictures. The bark, resin and " oils " of the eucalyptus are well known as commercial products. As early as 1866, tannic acid, gallic acid, wood spirit, acetic acid, essential oil and eucalyptol were produced from various species of eucalyptus, and researches made by Aus- tralian chemists, notably by Messrs. Baker and Smith of the Sydney Technical College, have brought to light many other valuable pro- ducts likely to prove of commercial value. The genus Eucalyptus numbers more than 150 species, and provides some of the most durable timbers known. The iron-bark of the eastern coast uplands is well known (Eucalyptus sideroxylon) , and is so called from the hardness of the wood, the bark not being remarkable except for its rugged and blackened aspect. Samples of this timber have been studied after forty-three years' immersion in sea-water. Portions most liable to destruction, those parts between the tide marks, were found perfectly sound, and showed no signs of the ravages of marine organisms. Other valuable timber trees of the eastern portion of the continent are the blackbutt, tallow-wood, spotted gum, red gum, mahogany, and blue gum, eucalyptus; and the turpentine (Syncarpialaurifolia), which has proved to be more resistant to the attacks of teredo than any other timber and is largely used in wharf construction in infested waters. There are also several extremely valuable soft timbers, the principal being red cedar (Cedrela Toona), silky oak (Grevillea robusta), beech and a variety of teak, with several important species of pine. The red gum forests of the Murray valley and the pine forests bordering the Great Plains are important and valuable. In Western Australia there are extensive forests of hardwood, principally jarrah (Eucalyptus marginata), a very durable timber; 14,000 sq. m. of country are covered with this species. Jarrah timber is nearly impervious to the attacks of the teredo, and there is good evidence to show that, exposed to wear and weather, or placed under the soil, or used as submarine piles, the wood remained

intact after nearly fifty years' trial. The following figures show the high density of Australian timber: —

Australian Specific

timber. gravity.

Jarrah I-I2

Grey iron-bark l-l8

Red iron-bark 1-22

Forest oak I-2I

Tallow wood 1-23

Mahogany I -20

Grey gum -917

Red gum -995

European Specific

timber. gravity.

Ash -753

Beech -690

Chestnut -535

British oak -99

The resistance to breaking or rupture of Australian timber is very high; grey iron-bark with a specific gravity of I- 18 has a modulus of rupture of 17,900 lb per sq. in. compared with 11,800 lb for British oak with a specific gravity of -69 to -99. No Australian timber in the foregoing list has a less modulus than 13,100 lb per sq. in.

Various " scrubs " characterize the interior, differing very widely from the coastal scrubs. " Mallee " scrub occupies large tracts of South Australia and Victoria, covering probably an extent of 16,000 sq. m. The mallee is a species of eucalyptus growing 12 to 14 ft. high. The tree breaks into thin stems close to the ground, and these branch again and again, the leaves being developed umbrella- fashion on the outer branches. The mallee scrub appears like a forest of dried osier, growing so close that it is not always easy to ride through it. Hardly a leaf is visible to the height of one's head ; but above, a crown of thick leather-like leaves shuts out the sunlight. The

ground below is perfectly bare, and there is no water. Nothing could add to the sterility and the monotony of these mallee scrubs. " Mulga " scrub is a somewhat similar thicket, covering large areas. The tree in this instance is one of the acacias, a genus distributed through all parts of the continent. Some species have rather elegant blossoms, known to the settlers as " wattle." They serve admirably to break the sombre and monotonous aspect of the Australian vege- tation. Two species of acacia are remarkable for the delicate and violet-like perfume of their wood — myall and yarran. The majority of the species of Acacia are edible and serve as reserve fodder for sheep and cattle. In the alluvial portions of the interior salsolaceous plants — saltbush, bluebush, cottonbush — are invaluable to the pastoralist, and to their presence the pre-eminence of Australia as a wool-producing country is largely due.

Grasses and herbage in great variety constitute the most valuable element of Australian flora from the commercial point of view. The herbage for the most part grows with marvellous rapidity after a spring or autumn shower and forms a natural shelter for the more stable growth of nutritious grasses.

Under the system of grazing practised throughout Australia it is customary to allow sheep, cattle and horses to run at large all the year round within enormous enclosures and to depend entirely upon the natural growth of grass for their subsistence. Proteaceous plants, although not exclusively Australian, are exceedingly characteristic of Australian scenery, and are counted amongst the oldest flowering plants of the world. The order is easily distinguished by the hard, dry, woody texture of the leaves and the dehiscent fruits. They are found in New Zealand and also in New Caledonia, their greatest developments being on the south-west of the Australian continent. Proteaceae are found also in Tierra del Fuego and Chile. They are also abundant in South Africa, where the order forms the most conspicuous feature of vegetation. The range in species is very limited, no one being common to eastern and western Australia. The chief genera are banksia (honeysuckle), and hakea (needle bush).

The Moreton Bay pine (Araucaria Cunninghamii) is reckoned amongst the giants of the forest. The genus is associated with one long extinct in Europe. Moreton Bay pine is chiefly known by the utility of its wood. Another species, A. Bidwillii, or the bunya- bunya, afforded food in its nut-like seeds to the aborigines. A most remarkable form of vegetation in the north-west is the gouty-stemmed tree (Adansonia Gregorii), one of the Malvaceae. It is related closely to the famous baobab of tropical Africa. The " grass-tree " (Xan- Ihorrhoea), of the uplands and coast regions, is peculiarly Australian in its aspect. It is seen as a clump of wire-like leaves, a few feet in diameter, surrounding a stem, hardly thicker than a walking-stick, rising to a height of 10 or 12 ft. This terminates in a long spike

thickly studded with white blossoms. The grass-tree gives as distinct a character to an Australian picture as the agave and cactus do to the Mexican landscape. With these might be associated the gigantic lily of Queensland (Nymphaea giganlea), the leaves of which float on water, and are quite 18 in. across. There is also a gigantic lily (Doryanthes excelsa) which grows to a height of 15 feet. The " flame tree is a most conspicuous feature of an Illawarra landscape, the largest racemes of crimson red suggesting the name. The

waratah or native tulip, the magnificent flowering head of which, with the kangaroo, is symbolic of the country, is one of the Pro- teaceae. The natives were accustomed to suck its tubular flowers for the honey they contained. The " nardoo " seed, on which the aborigines sometimes contrived to exist, is a creeping plant, growing plentifully in swamps and shallow pools, and belongs to the natural order of Marsileaceae. The spore-cases remain after the plant is dried up and withered. These are collected by the natives, and are known over most of the continent as nardoo.

No speculation of hypothesis has been propounded to account satisfactorily for the origin of the Australian flora. As a step towards such hypothesis it has been noted that the Antarctic, the South African, and the Australian floras have many types in common. There is also to a limited extent a European element present. One thing is certain, that there is in Australia a flora that is a remnant of a vegetation once widely distributed. Heer has described such Australian genera as Banksia, Eucalyptus, Grevillea and Hakea from the Miocene of Switzerland. Another point agreed upon is that the Australian flora is one of vast antiquity. There are genera so far removed from every living genus that many connecting links must have become extinct. The region extending round the south-western extremity of the continent has a peculiarly characteristic assemblage of typical Australian forms, notably a great abundance of the Proteaceae. This flora, isolated by arid country from the rest of the continent, has evidently derived its plant life from an outside source, probably from lands no longer existing.

Political and Economic Conditions

Population. 1 — The Australian people are mainly of British origin, only 3 J % of the population of European descent being of non-British race. It is certain that the aborigines (see the section on Aborigines below) are very much less numerous than when the country was first colonized, but their present numbers can be given for only a few of the states. At the census of 1901, 48,248 aborigines were enumerated, of whom 7434 were in New South Wales, 652 in Victoria, 27,123 in South Australia, and 6212 in Western Australia. The assertion by the Queensland authorities that there

are 50,000 aborigines in that state is a crude estimate, and may be far wide of the truth. In South Australia and the Northern Territory a large number are outside the bounds of settlement, and it is probable that they are as numerous there as in Queensland. The census of Western Australia included only those aborigines in the employment of the colonists; and as a large part of this, the greatest of the Australian states, is as yet unexplored, it may be presumed that the aborigines enumerated were very far short of the whole number of persons of that race in the state. Taking all things into consideration, the aboriginal population of the continent may be set down at something like 1 80,000. Chinese, numbering about 30,000, are chiefly found in New South Wales, Queensland, Victoria, and the Northern Territory. Of Japanese there were 3500, of Hindu and Sinhalese 4600, according to recent com- putation, but the policy of the Commonwealth is adverse to further immigration of other than whites. South Sea Islanders and other coloured races, numbering probably about 15,000, were in 1906 to be found principally in Queensland, but further immigration of Pacific Islanders to Australia is now restricted, and the majority of those in the country in 1906 were deported by the middle of 1907.

At the close of 1906 the population of Australia was approxi- mately 4,120,000, exclusive of aborigines. The increase of population since 1871 was as follows: 1871,- 1,668,377; 1881, 2,252,617; 1891, 3,183,237; 1901, 3,773,248. The expansion has been due mainly to the natural increase; that is, by reason of excess of births over deaths. Immigration to Australia has been very slight since 1891, owing originally to the stoppage of progress consequent on the bank crisis of 1893, and, subse- quently, to the disinclination of several of the state governments towards immigration and their failure to provide for the welfare of immigrants on their arrival. During 1906 a more rational view of the value of immigration was adopted by the various state governments and by the federal government, and immigra- tion to Australia is now systematically encouraged. Australia's gain of population by immigration, — i.e. the excess of the

1 The statistical portion of this article includes Tasmania, which is a member of the Australian Commonwealth.

inward over the outward movement of a population — since the discovery of gold in 1851, arranged in ten years periods, was

1852-1861 520,713

1862-1871 188,158

1872-1881 223,326

1882-1891 374,097

1892-1901 2,377

During the five years following the last year of the foregoing table, there was practically no increase in population by immigration.

The birth rate averages 26-28 per thousand of the population and the death rate 12-28, showing a net increase of 14 per thousand by reason of the excess of births over deaths. The marriage rate varies as in other countries from year to year according to the degree of prosperity prevailing. In the five years 1 881- 1888 the rate was 8- 08 marriages (16-1 persons) per thousand of the population, declining to 6-51 in 1891-1895; in recent years there has been a considerable improvement, and the Australian marriage rate may be quoted as ranging between 6-75 and 7-25. The death rate of Australia is much below that of European countries and is steadily declining. During the twenty years preceding the census of 1901 there was a fall in the death rate of 3-4 per thousand, of which, however, 1 per thousand is attributable to the decline in the birth rate, the balance being attributable to improved sanitary conditions.

Territorial Divisions. — Australia is politically divided into five states, which with the island of Tasmania form the Common- wealth of Australia. The area of the various states is as follows:

Sq. m.

New South Wales 310,700

Victoria •. . 87,884

Queensland 668,497

South Australia 903,690

Western Australia 975,920

Tasmania

2,946,691 26,215

Commonwealth 2,972,906

To the area of the Commonwealth shown in the table might be added that of New Guinea, 90,000 sq. m.; this would bring the area of the territory controlled by the Commonwealth to 3,062,906 sq. m. The distribution of population at the close of 1906 (4,118,000) was New South Wales 1,530,000, Victoria 1,223,000, Queensland 534,000, South Australia 381,000, Western Australia 270,000, Tasmania 180,000. The rate of increase since the previous census was 1-5 % per annum, varying from 0-31 in Victoria to 2-06 in New South Wales and6-9in Western Australia.

Australia contains four cities whose population exceeds 100,000, and fifteen with over 10,000. The principal cities and towns are Sydney (pop. 530,000), Newcastle, Broken Hill, Parramatta, Goulburn, Maitland, Bathurst, Orange, Lithgow, Tamworth, Grafton, Wagga and Albury, in New South Wales; Melbourne (pop. 511,900), Ballarat, Bendigo, Geelong, Eagle- hawk, Warrnambool, Castlemaine, and Stawell in Victoria; Brisbane (pop. 128,000), Rockhampton, Maryborough, Towns- ville, Gympie, Ipswich, and Toowoomba in Queensland; Adelaide (pop. about 175,000), Port Adelaide and Port Pirie in South Australia; Perth (pop. 56,000), Fremantle, and Kal- goorlie in Western Australia; and Hobart (pop. 35,500) and Launceston in Tasmania.

Defence. — Up to the end of the 19th century, little was thought of any locally-raised or locally-provided defensive forces, the mother-country being relied upon. But the Transvaal War of 1899-1902, to which Australia sent 63 10 volunteers (principally mounted rifles), and the gradual increase of military sentiment, brought the question more to the front, and more and more attention was given to making Australian defence a matter of local concern. Naval defence in any case remained primarily a question for the Imperial navy, and by agreement (1903, for ten years) between the British government and the governments of the Commonwealth (contributing an annual subsidy of £200,000) and of New Zealand (£40,000), an efficient fleet patrolled the Australasian waters, Sydney, its headquarters, being ranked as a first-class naval station. Under the agreement

a royal naval reserve was maintained, three of the Imperial vessels provided being utilized as drill ships for crews recruited from the Australian states. At the end of 1908 the strength of the naval forces under the Commonwealth defence department was: permanent, 217, naval militia, 1016; the estimated expenditure for 1908-1909 being £63,531. In 1908-1909 a movement began for the establishment by Australia of a local flotilla of torpedo-boat destroyers, to be controlled by the Commonwealth in peace time, but subject to the orders of the British admiralty in war time,

though not to be removed from the Australian coast without the sanction of the Commonwealth; and by 1909 three such vessels had been ordered in England preparatory to building others in Australia. The military establishment at the beginning of 1909 was represented by a small permanent force of about 1400, a militia strength of about 17,000, and some 6000 volunteers, besides 50,000 members of rifle clubs and 30,000 cadets; the expenditure being (estim&te, 1908-1909) £623,946. But a reorganization of the military forces, on the basis of obligatory national training, was already contemplated, though the first Bill introduced for this purpose by Mr Deakin's government (Sept. 1908) was dropped, and in 1909 the subject was still under discussion.

Religion. — There is no state church in Australia, nor is the teaching of religion in any way subsidized by the state. The Church of England claims as adherents 39 % of the population, and the Roman Catholic Church 22%; next in numerical strength are the Wesleyans and other Methodists, numbering . 12%, the various branches of the Presbyterians 11%, Congregationalists 2 %, and Baptists 2 %. These proportions varied very little between 1881 and 1906, and may be taken as accurately representing the present strength of the various Christian denominations. Churches of all denominations are liberally supported throughout the states, and the residents of every settlement, however small, have their places of worship erected and maintained by their own contributions.

Instruction. — Education is very widely distributed, and in every state it is compulsory for children of school ages to attend school. The statutory ages differ in the various states; in New South Wales and Western Australia it is from 6 to 13 years inclusive, in Victoria 6 to 12 years, in Queensland 6 to n years, and in South Australia 7 to 12 years inclusive. Religious instruction is not imparted by the state-paid teachers in any state, though in certain states persons duly authorized by the religious organizations are allowed to give religious instruction to children of their own denomination where the parents' consent has been obtained. According to the returns for 1905 there were 7292 state schools, with 15,628 teachers and 648,927 pupils, and the average attendance of scholars was 446,000. Besides state schools there were 2145 private schools, with 7825 teachers and 137,000 scholars, the average number of scholars in attendance being 120,000. The census of 1901 showed that about 83% of the whole population and more than 91 % of the population over five years of age could read and write. There was, therefore, a residue of 9 % of illiterates, most of whom were not born in Australia. The marriage registers furnish another test of education. In 1905 only ten persons in every thousand married were unable to sign their names, thus proving that the number of illiterate adults of Australian birth is very small.

Instruction at state schools is either free or at merely nominal cost, and high schools, technical colleges and agricultural colleges are maintained by appropriations from the general revenues of the states. There are also numerous grammar schools and other private schools. Universities have been established at Sydney, Melbourne, Adelaide and Hobart, and are well equipped and numerously attended; they are in part supported by grants from the public funds and in part by private endowments and the fees paid by students. The number of students attend- ing lectures is about 2500 and the annual income a little over £100,000. The cost of public instruction in Australia averages about us. 4d. per inhabitant, and the cost per scholar in average attendance at state schools is £4:13: 9.

Pastoral and Agricultural Industries, — The continent is

essentially a pastoral one, and the products of the flocks and herds constitute the chief element in the wealth of Australia. Practically the whole of the territory between the 145 meridian and the Great Dividing Range, as well as extensive tracts in the south and west, are a natural sheep pasture with climatic conditions and indigenous vegetation pre-eminently adapted for the growth of wool of the highest quality. Numerically the flocks of Australia represent one-sixth of the world's sheep, and in just over half a century (1851-1905) the exports of Australian wool alone reached the value of £650,000,000. During the same period, owing to the efforts of pastoralists to improve their flocks, there was a gradual increase in the weight of wool produced per sheep from 3jlb to an average of over 7ft. The cattle and horse-breeding industries are of minor importance as compared with wool-growing, but nevertheless represent a great source of wealth, with vast possibilities of expansion in the over-sea trade. The perfection of refrigeration in over-sea carriage, which has done so much to extend the markets for Australian beef and mutton, has also furthered the expansion of dairying, there being an annual output of over 160 million lb of butter, valued at £6,000,000; of this about 64 million lb, valued at £2,500,000, is exported annually to British markets.

Next 'to the pastoral industry, agriculture is the principal source of Australian wealth. At the close of 1905 the area devoted to tillage was 9,365,000 acres, the area utilized for the production of breadstuffs being 6,270,000 acres or over two-thirds of the whole extent of cultivation. At first wheat was cultivated solely in the coastal country, but experience has

shown that the staple cereal can be most successfully grown over almost any portion of the arable lands within the 20 to 40 in. rainfall areas. The value of Australian wheat and flour exported in 1905 was £5,500,000.

Other important crops grown are — maize, 324,060 acres; oats, 493,000 acres; other grains, 160,000 acres; hay, 1,367,000 acres; potatoes, 119,000 acres; sugar-cane, 141,000 acres; vines, 65,000 acres; and other crops, 422,000 acres. The chief wheat lands are in Victoria, South Australia and New South Wales; the yield averages about 9 bushels to the acre; this low average is due to the endeavour of settlers on new lands to cultivate larger areas than their resources can effectively deal with; the introduction of scientific farming should almost double the yield. Maize and sugar-cane are grown in New South Wales and Queensland. The vine is cultivated in all the states, but chiefly in South Australia, Victoria and New South Wales. Australia produces abundant quantities and nearly all varieties of fruits; but the kinds exported are chiefly oranges, pine- apples, bananas and apples. Tobacco thrives well in New South ' Wales and Victoria, but kinds suitable for exportation are not largely grown. Compared with the principal countries of the world, Australia does not take a high position in regard to the gross value of the produce of its tillage, the standard of cultivation being for the most part low and without regard to maximum re- turns, but in value per inhabitant it compares fairly well; indeed, some of the states show averages which surpass those of many of the leading agricultural countries. For 1905 the total value of agricultural produce estimated at the place of production was £18,750,000 sterling, or about £4: 13 : 4 per inhabitant.

Timber Industry. — Although the timbers of commercial value are confined practically to the eastern and a portion of the western coastal belt and a few inland tracts of Australia, they constitute an important national asset. The early settlement of heavily timbered country was characterized by wanton destruction of vast quantities of magnificent timber; but this waste is a thing of the past, and under the pressure of a demand for sound timber both for local use and for exportation, the various governments are doing much to conserve the state forests. In Western Australia, New South Wales, Tasmania and Queens- land there are many hundreds of well-equipped saw-mills affording employment to about 5000 men. The export of timber is in ordinary years valued at a million sterling and the total pro- duction at £2,250,000.

Fisheries. — Excellent fish of many varieties abound in the

Australian seas and in many of the rivers. In several of the states, fish have been introduced successfully from other countries. Trout may now be taken in many of the mountain streams. At one time whaling was an important

industry on the coasts of New South Wales and Tasmania, and afterwards on the Western Australian coasts. The industry gravitated to New Zealand, and finally died out, chiefly through the wasteful practice of killing the calves to secure the capture of the mothers. Of late years whaling has again attracted attention, and a small number of vessels prosecute the industry during the season. The only source of maritime wealth that is now being sufficiently exploited to be regarded as an industry is the gathering of pearl-oysters from the beds off the northern and north-western coasts of the continent. In Queensland waters there are about 300 vessels, and on the Western Australian coast about 450 licensed craft engaged in the industry, the annual value of pearl-shell and pearls raised being nearly half a million sterling. Owing to the depletion of some of the more accessible banks, and to difficulties in connexion with the employment of coloured crews, many of the vessels have now gone farther afield. As the pearl-oyster is remarkably prolific, it is considered by experts that within a few years of their abandonment by fishing fleets the denuded banks will become as abundantly stocked as ever.

Mineral Production. — Australia is one of the great gold producers of the world, and its yield in 1905 was about £16,000,000 sterling, or one-fourth of the gold output of the world; Qola

and the total value of its mineral production was approximately £25,000,000. Gold is found throughout Australia, and the present prosperity of the states is largely due to the discoveries of this metal, the development of other industries being, in a country of varied resources, a natural sequence to the acquisition of mineral treasure. From the date of its first discovery, up to the close of 1905, gold to the value of £460,000,000 sterling has been obtained in Australia. Victoria, in a period of fifty-four years, contributed about £273,000,000 to this total, and is still a large producer, its annual yield being about 800,000 oz., 20,000 men being engaged in the search for the precious metal. Queensland's annual output is between 750,000 and 800,000 oz.; the number of men engaged in gold-mining is 10,000. In New South Wales the greatest production was in 1852, soon after the first discovery of the precious metal, when the output was valued at £2,660,946; the production in 1905 was about 270,000 oz., valued at £1,150,000. For many years Western Australia was considered to be destitute of mineral deposits of any value, but it is now known that a rich belt of mineral country extends from north to south. The first im- portant discovery was made in 1882, when gold was found in the Kimberley district; but it was not until a few years later that this rich and extensive area was developed. In 1887 gold was found in Yilgarn, about 200 m. east of Perth. This was the first of the many rich discoveries in the same district which have made Western Australia the chief gold-producer of the Australian group. In 1907 there were eighteen goldfields in the state,

and it was estimated that over 30,000 miners were actively engaged in the search for gold. In 1905 the production amounted to 1,983,000 oz., valued at £8,360,000. Tasmania is a gold producer to the extent of about 70,000 or 80,000 oz. a year, valued at £300,000 ; South Australia produces about 30,000 oz.

Gold is obtained chiefly from quartz reefs, but there are still some important alluvial deposits being worked. The greatest development of quartz reefing is found in Victoria, some of the mines being of great depth. There are eight mines in the Bendigo district over 3000 ft. deep, and fourteen over 2500 ft. deep. In the Victoria mine a depth of 3750 ft. has been reached, and in Lazarus mine 3424 ft. In the Ballarat district a depth of 2520 ft. has been reached in the South Star mine. In Queensland there is one mine 3156 ft. deep, and several others exceed 2000 ft. in depth. A considerable number of men are engaged in the various states on alluvial fields, in hydraulic sluicing, and dredging is now adopted for the winning of gold in river deposits. So far this form of winning is chiefly carried on in New South Wales, where there are about fifty gold-dredging plants in

successful operation. Over 70,000 men are employed in the gold-mining industry, more than two-thirds of them being engaged in quartz mining.

Silver has been discovered in all the states, either alone or in the form of sulphides, antimonial and arsenical ores, chloride, bromide, _,. iodide and chloro-bromide of silver, and argentiferous

ye ‘ lead ores, the largest deposits of the metal being found

in the last-mentioned form. The leading silver mines are in New South Wales, the returns from the other states being compara- tively insignificant. The fields of New South Wales have proved to be of immense value, the yield of silver and lead during 1905 being £2,500,000, and the total output to the end of the year named over £40,000,000. The Broken Hill field, which was discovered in 1883, extends over 2500 sq. m. of country, and has developed into one of the principal mining centres of the world. It is situated beyond the river Darling, and close to the boundary between New South Wales and South Australia. The lodes occur in Silurian metamorphic micaceous schists, intruded by granite, porphyry and diorite, and traversed by numerous quartz reefs, some of which are gold-bearing. The Broken Hill lode is the largest yet discovered. It varies in width from

10 ft. to 200 ft., and may be traced for several miles. Although indications of silver abound in all the other states, no fields of great importance have yet been discovered. Up to the end of 1904 Australia had produced silver to the value of £45,000,000. At Broken Hill mines about 11,000 miners are employed.

Copper is known to exist in all the states, and has been mined extensively in South Australia, New South Wales, Queensland and Conner Tasmania. The low quotations which ruled for a number

pp ' of years had a depressing effect upon the industry, and many mines once profitably worked were temporarily closed, but in 1906 there was a general revival. The discovery of copper had a marked effect on the fortunes of South Australia at a time when the young colony was surrounded by difficulties. The first important mine, the Kapunda, was opened up in 1842. It is estimated that at one time 2000 tons were produced annually, but the mine was closed in 1879. In 1845 the celebrated Burra Burra mine was discovered. This mine proved to be very rich, and paid £800,000 in dividends to the original owners. For a number of years, however, the mine has been suffered to remain untouched, as the deposits originally worked were found to be depleted. For many years the average output was from 10,000 to 13,000 tons of ore, yielding from 22 to 23% of copper. For the period of thirty years during which the mine was worked the production of ore amounted to 234,648 tons, equal to 51,622 tons of copper, valued at £4,749,924. The Wallaroo and Moonta mines, discovered in i860 and 1861, proved to be even more valuable than the Burra Burra, the Moonta mines employing at one time upwards of 1600 hands. The dividends paid by these mines amounted to about £1,750,000 sterling. The satisfactory price obtained during recent years has enabled renewed attention to be paid to copper mining in South Australia, and the production of the metal in 1905 was valued at £470,324. The principal deposits of copper in New South Wales are found in the central part of the state between the Macquarie, Darling and Bogan rivers. Deposits have also been found in the New England and southern districts, as well as at Broken Hill, showing that the mineral is widely distributed throughout the state. The more important mines are those of Cobar, where the Great Cobar mine produces annually nearly 4000 tons of refined copper. In northern Queensland copper is found throughout the Cloncurry district, in the upper basin of the Star river, and the Herberton district. The returns from the copper fields in the state are at present a little over half a million sterling per annum, and would be still greater if it were not for the lack of suitable fuel for smelting purposes, which renders the economical treatment of the ore difficult ; the development of the mines is also retarded by the want of easy and cheaper communication with the coast. In Western Australia copper deposits have been worked for some years. Very rich lodes of the

metal have been found in the Northampton, Murchison and Champion Bay districts, and also in the country to the south of these districts on the Irwin river. Tasmania is now the largest copper-producing state of the Commonwealth; in 1905 the output was over £672,010 and in earlier years even larger. The chief mines belong to the Mount Lyell Mining & Railway Co., and are situated on the west side of the island with an outlet by rail to Strahan on the west coast. The total value of copper produced in Australia up to the end of 1905 was £42,500,000 sterling, £24,500,000 having been obtained in South Australia, £7,500,000 in New South Wales, £6,400,000 in Tasmania and over £3,500,000 in Queensland.

Tin was known to exist in Australia from the first years of colon- ization. The wealth of Queensland and the Northern Territory y in in this mineral, according to the reports of Dr Jack, late

Government geologist of the former state, and the late Rev. J. E. Tenison-Woods, appears to be very great. The most important tin-mines in Queensland are in the Herberton district, south-west of Cairns; at Cooktown, oh the Annan and Bloomfield rivers; and at Stanthorpe, on the border of New South Wales. Herberton and Stanthorpe have produced more than three-fourths of the total production of the state. Towards the close of the 19th century the production greatly decreased in consequence of the low price of the metal, but in 1899 a stimulus was given to the industry,

and since then the production has increased very considerably, the output for 1905 being valued at £989,627. In New South Wales lode tin occurs principally in the granite and stream tin under the basaltic country in the extreme north of the state, at Tenterfield, Emmaville, Tingha, and in other districts of New England. The metal has also been discovered in the Barrier ranges, and many other places. The value of the output in 1905 was £226,110. The yield of tin in Victoria is very small, and until lately no fields of import- ance have been discovered; but towards the latter end of 1899 extensive deposits were reported to exist in the Gippsland district — at Omeo and Tarwin. In South Australia tin-mining is unim- portant. In Western Australia the production from the tin-fields at Greenbushes and elsewhere was valued at £87,000. Tasmania during the last few years has attained the foremost position in the production of tin, the annual output now being about £363,000. The total value of tin produced in Australia is nearly a million sterling per annum, and the total production to the end of 1905 was £22,500,000, of which Tasmania produced about 40%, New South Wales one-third, Queensland a little more than a fourth.

Iron is distributed throughout Australia, but for want of capital for developing the fields this industry has not progressed. In New South Wales

there are, together with coal and limestone ,

in unlimited supply, important deposits of rich iron ores roa '

suitable for smelting purposes; and for the manufacture of steel of certain descriptions abundance of manganese, chrome and tungsten ores are available. The most extensive fields are in the Mittagong, Wallerawang and Rylstone districts, which are roughly estimated to contain in the aggregate 12,944,000 tons of ore, containing 5,853,000 tons of metallic iron. Extensive deposits, which are being developed successfully, occur in Tasmania, it being estimated that there are, within easy shipping facilities, 17,000,000 tons of ore. Magnetite, or magnetic iron, the richest of all iron ores, is found in abundance near Wallerawang in New South Wales. The proximity of coal-beds now being worked should accelerate the development of the iron deposits, which, on an average, contain 41% of metal. Magnetite occurs in great abundance in Western Australia, together with haematite, which would be of enormous value if cheap labour were available. Goethite, limonite and haematite are found in New South Wales, at the junction of the Hawkesbury sandstone formation and the Wianamatta shale, near Nattai, and are enhanced in their value by their proximity to coal-beds. Near Lithgow extensive deposits of limonite, or clay-band ore, are interbedded with coal. Some samples of ore, coal and limestone, obtained in the Mittagong district, with pig-iron and castings manufactured therefrom, were exhibited at the Mining Exhibition in London and obtained a first award.

Antimony is widely diffused throughout Australia, and is some- times found associated with gold. In New South Wales the principal centre of this industry is Hillgrove, near Armidale, where the Eleanora Mine, one of the richest in the state, is . er . situated. The ore is also worked for gold. In Victoria the m er s ' production of antimony gave employment in 1890 to 238 miners, but owing to the low price of the metal, production has almost ceased. In Queensland the fields were all showing development in 1 89 1, when the output exhibited a very large increase compared with that of former years; but, as in the case of Victoria, the production of the metal seems to have ceased. Good lodes of stibnite (sulphide of antimony) have been found near Roebourne in Western Australia, but no attempt has yet been made to work them.

Bismuth is known to exist in all the Australian states, but up to the present time it has been mined for only in three states, viz. New South Wales, Queensland, South Australia and Tasmania. It is usually found in association with tin and other minerals. The principal mine in New South Wales is situated at Kingsgate, in the New England district, where the mineral is generally associated with molybdenum and gold.

Manganese probably exists in all the states, deposits having been found in New South Wales, Victoria, Queensland and Western Australia, the richest specimens being found in New South Wales. Little, however, has been done to utilize the deposits, the demands of the colonial markets being extremely limited. The ore generally occurs in the form of oxides, manganite and pyrolusite, and contains a high percentage of sesquioxide of manganese.

Platinum and the allied compound metal iridosmine have been found in New South Wales, but so far in inconsiderable quantities. Iridosmine occurs commonly with gold or tin in alluvial drifts.

The rare element tellurium has been discovered in New South Wales at Bingara and other parts of the northern districts, as well as at Tarana, on the western line, though at present in such minute quantities as would not repay the cost of working. At many of the mines at Kalgoorlie, Western Australia, large quantities of ores of telluride of gold have been found in the lode formations.

Lead is found in all the Australian states, but is worked only when associated with silver. In Western Australia the lead occurs in the form of sulphides and carbonates of great richness, but the quantity of silver mixed with it is very small. The lodes are most frequently of great size, containing huge masses of galena, and so little gangue that the ore can very easily be dressed to 83 or 84%. The association of this metal with silver in the Broken Hill mines of New South Wales adds very greatly to the value of the product.

Mercury is found in New South Wales and Queensland. In New

South Wales, in the form of cinnabar, it has been discovered on the Cudgegong river, near Rylstone, and it also occurs at Bingara, Solferino, Yulgilbar and Cooma. In the last-named place the assays of ore yielded 22 % of mercury.

Titanium, in the minerals known as octahedrite and brookite, is found in alluvial deposits in New South Wales, in conjunction with diamonds.

Wolfram (tungstate of iron and manganese) occurs in some of the states, notably in New South Wales, Victoria, Tasmania and Queens- land. Scheelite, another mineral of tungsten, is also found in Queens- land.

Molybdenum, in the form of molybdenite (sulphide of molyb- denum), is found in Queensland, New South Wales and Victoria, associated in the parent state with tin and bismuth in quartz reefs.

Zinc ores, in the several varieties of carbonates, silicates, oxide, sulphide and sulphate of zinc, have been found in several of the Australian states, but have attracted little attention except in New South Wales, where special efforts are being made successfully to produce a high-grade zinc concentrate from the sulphide ores. Several companies are devoting all their energies to zinc extraction, and the output is now equal to about 5% of the world's production.

Nickel, so abundant in the island of New Caledonia, has up to the present been found in none of the Australian states except Queens- land and Tasmania. Few attempts, however, have been made to prospect systematically for this valuable mineral.

Cobalt occurs in New South Wales, Victoria and South Australia, and efforts have been made in the former state to treat the ore, the metal having a high commercial value ; but the market is small, and no attempt has been made up to 1907 to produce it on any large scale. The manganese ores of the Bathurst district of New South Wales often contain a small percentage of cobalt — sufficient, indeed, to warrant further attempts to work them. In New South Wales chromium is found in the northern portion of the state, in the Clarence and Tamworth districts and also near Gundagai. It is usually associated with serpentine. In the Gundagai district the industry was rapidly becoming a valuable one, but the low price of chrome has greatly restricted the output. Chromium has been discovered in Tasmania also.

Arsenic, in its well-known and beautiful forms, orpiment and realgar, is found in New South Wales and Victoria. It usually occurs in association with other minerals in veins.

The Australian states have been bountifully supplied with mineral fuel. Five distinct varieties of black coal, of well-characterized Fuel. types. ma Y be distinguished, and these, with the two

extremes of brown coal or lignite and anthracite, form a perfectly continuous series. Brown coal, or lignite, occurs princi- pally in Victoria. Attempts have frequently been made to use the mineral for ordinary fuel purposes, but its inferior quality has prevented its general use. Black coal forms one of the principal resources of New South Wales ; and in the other states the deposits of this valuable mineral are being rapidly developed. Coal of a very fair description was discovered in the basin of the Irwin

river, in Western Australia, as far back as the year 1846. It has been ascertained from recent explorations that the area of carboniferous formation in that state extends from the Irwin northwards to the Gascoyne river, about 300 m., and probably all the way to the Kimberley district. The most important discovery of coal in the state, so far, is that made in the bed of the Collie river, near Bunbury, to the south of Perth. The coal has been treated and found to be of good quality, and there are grounds for supposing that there are 250,000,000 tons in the field. Dr Jack, late government geologist of Queensland, considers the extent of the coal-fields of that state to be practically unlimited, and is of opinion that the carboniferous formations extend to a considerable distance under the Great Western Plains. It is roughly estimated that the Coal Measures at present practically explored extend over an area of about 24,000 sq. m. Coal-mining is an established industry in Queensland, and is progressing satisfactorily. The mines, however, are situated too far from the coast to permit of serious competition with Newcastle in an export trade, and the output is practically restricted to supply- ing local requirements. The coal-fields of New South Wales are situated in three distinct regions — the northern, southern and western districts. The first of these comprises chiefly the mines of the Hunter river districts; the second includes the Illawarra district, and, generally, the coastal regions to the south of Sydney, together with Berrima, on the tableland; and the third consists of the mountainous regions on the Great Western railway and extends as far as Dubbo. The total area of the Carboniferous strata of New South Wales is estimated at 2,3,950 sq. m. The seams vary in thick- ness. One of the richest has been found at Greta in the Hunter river district; it contains an average thickness of 41 ft. of clean coal, and the quantity underlying each acre of ground has been computed to be 63,700 tons. The coal mines of New South Wales give employ- ment to 14,000 persons, and the annual production is over 6,600,000 tons. Black coal has been discovered in Victoria, and about 250,000 tons are now being raised. The principal collieries in the state are the Outtrim Howitt, the Coal Creek Proprietary and the Jumbunna. In South Australia, at Leigh's Creek, north of Port Augusta, coal- beds have been discovered. The quantity of coal extracted annually in Australia had in 1906 reached 7,497,000 tons.

Kerosene shale (torbanite) is found in several parts of New South

Wales. It is a species of cannel coal, somewhat similar to the Bog- head mineral of Scotland, but yielding a much larger percentage of volatile hydro-carbon than the Scottish mineral. The richest quality yields about 100 to 130 gallons of crude oil per ton, or 17,000 to 18,000 cub. ft. of gas, with an illuminating power of 35 to 40 sperm candles, when gas only is extracted from the shale.

Large deposits of alum occur close to the village of Bulladelah, 30 m. from Port Stephens, New South Wales. It is said to yield well, and a quantity of the manufactured alum is sent to Sydney for local consumption. Marble is found in many parts of New South Wales and South Australia. Kaolin, fire-clays and brick-clays are common to all the states. Except in the vicinity of cities and town- ships, however, little use has been made of the abundant deposits of clay. Kaolin, or porcelain clay, although capable of application to commercial purposes, has not as yet been utilized to any extent, although found in several places in New South Wales and in Western Australia.

Asbestos has been found in New South Wales in the Gundagai Bathurst and Broken Hill districts — in the last-mentioned district in considerable quantities. Several specimens of very fair quality have also been met with in Western Australia.

Many descriptions of gems and gem stones have been discovered in various parts of the Australian states, but systematic search has been made principally for the diamond and the noble opal. _

Diamonds are found in all the states; but only in New South Wales have any attempts been made to work the diamond drifts. The best of the New South Wales diamonds are harder and much whiter than the South African diamonds, and are classified as on a par with the best Brazilian gems, but no large specimens have yet been found. The finest opal known is obtained in the Upper Cretaceous formation at White Cliffs, near Wilcannia, New South Wales, and at these mines about 700 men find constant employment. Other precious stones, including the sapphire, emerald, oriental emerald, ruby, opal, amethyst, garnet, chrysolite, topaz, cairngorm, onyx, zircon, &c, have been found in the gold and tin bearing drifts and river gravels in numerous localities throughout the states. The sapphire is found in all the states, principally in the neighbourhood of Beechworth, Victoria. The oriental topaz has been found in New South Wales. Oriental amethysts also have been found in that state, and the ruby has been found in Queensland, as well as in New South Wales. Turquoises have been found near Wangaratta, in Victoria, and mining operations are being carried on in that state. Chrysoberyls have been found in New South Wales; spinel rubies in New South Wales and Victoria ; and white topaz in all the states. Chalcedony, carnelian, onyx and cat's eyes are found in New South Wales;' and it is probable that they are also to be met with in the other states, particularly in Queensland. Zircon, tourmaline, garnet and other precious stones of little commercial value are found throughout Australia.

Commerce. — The number of vessels engaged in the over-sea trade of Australia in 1905 was 211 2, viz. 1050 steamers, with a tonnage of

2,629,000, and 1062 sailers, tonnage 1,090,000; the total of both classes was 3,719,000 tons. The nationality of the tonnage was, British 2,771,000, including Australian 288,000, and foreign 948,000. The destination of the shipping was, to British ports 2,360,000 tons, and to foreign ports 1,350,000 tons. The value of the external trade was £95,188,000, viz. £38,347,000 imports, and £56,841,000 exports. The imports represent £9:11:6 per inhabitant and the exports £14:4:2, with a total trade of £23:15:8. The import trade is divided between the United Kingdom and possessions and foreign countries as follows: — United Kingdom £23,074,000, British possessions £5,384,000, and foreign states £9,889,000, while the destination of the exports is, United Kingdom £26,703,000, British possessions £12,519,000, and' foreign countries £17,619,000. The United Kingdom in 1905 sent 60 % of the imports taken by Australia, compared with 26 % from foreign countries, and 14 % from British possessions; of Australian imports the United Kingdom takes 47 %, foreign countries 31 % and British possessions 22 %. In normal years (that is to say, when there is no large movement of capital) the exports of Australia exceed the imports by some £15,300,000. This sum represents the interest payable on government loans placed outside Australia, mainly in England, and the income from British and other capital invested in the country; the former may be estimated at £7,300,000 and the latter £8,000,000 per annum. The principal items of export are wool, skins, tallow, frozen mutton, chilled beef, preserved meats, butter and other articles of pastoral produce, timber, wheat, flour and fruits, gold, silver, lead, copper, tin and other metals. In 1905 the value of the wool export regained the £20,000,000 level, and with the rapid recovery of the numerical

strength of the flocks, great improvements in the quality and weight of fleeces, this item is likely to show permanent ad- vancement. The exports of breadstuffs — chiefly to the United Kingdom — exceed six millions per annum, butter two and a half millions, and minerals of all kinds, except gold, six millions. Gold is exported in large quantities from Australia. The total gold production of the country is from £14,500,000 to £16,000,000, and as not more than three-quarters of a million are required to strengthen existing local stocks, the balance is usually available for export, and the average export of the precious metal during the ten years, 1896-1905, was £12,500,000 per annum. The chief articles of import are apparel and textiles, machinery and hardware, stimulants, narcotics, explosives, bags

and sacks, books and paper, oils and tea.

Lines of steamers connect Australia with London and other British ports, with Germany, Belgium, France, Italy, Japan, China, India, San Francisco, Vancouver, New York and Monte- video, several important lines being subsidized by the countries to which they belong, notably Germany, France and Japan.

Railways. — Almost the whole of the railway lines in Australia are the property of the state governments, and have been constructed and equipped wholly by borrowed capital. There were on the 30th of June 1905, 15,000 m. open for traffic, upon which nearly £135,000,000 had been expended.

The railways are of different gauges, the standard narrow gauge of 4 ft. 8 j in. prevailing only in New South Wales; in Victoria the gauge is 5 ft. 3 in., in South Australia 5 ft. 3 in. and 3 ft. 6 in., and in the other states 3 ft. 6 in. Taking the year 1905, the gross earnings amounted to £11,892,262 ; the working expenses, exclusive of interest, £7.443.546; and the net earnings £4,448,716; the latter figure re- presents 3‘3i% upon the capital expended upon construction and equipment ; in the subsequent year still better results were obtained. In several of the states, New South Wales and South Australia proper, the railways yield more than the interest paid by the govern- ment on the money borrowed for their construction. The earnings per train-mile vary greatly; but for all the lines the average is 7s. id., and the working expenses about 4s. 5d., making the net earnings 2s. 8d. per train-mile. The ratio of receipts from coaching traffic to total receipts is about 41%, which is somewhat less than in the United Kingdom; but the proportion varies greatly amongst the states themselves, the more densely populated states approach- ing most nearly to the British standard. The tonnage of goods carried amounts to about 16,000,000 tons, or 4 tons per inhabitant, which must be considered fairly large, especially as no great pro- portion of the tonnage consists of minerals on which there is usually a low freightage. Excluding coal lines and other lines not open to general traffic, the length of railways in private hands is only 382 m. or about 2 \ % of the total mileage open. Of this length, 277 m. are in Western Australia. The divergence of policy of that state from that pursued by the other states was caused by the inability of the government to construct lines, when the extension of the railway system was urgently needed in the interests of settlement. Private enterprise was, therefore, encouraged by liberal grants of land to undertake the work of construction; but the changed conditions of the state have now altered the state policy, and the government have already acquired one of the two trunk lines constructed by private enterprise, and it is not likely that any further concessions in regard to railway construction will be granted to private persons.

Posts and Telegraphs. — The postal and telegraphic facilities offered by the various states are very considerable. There are some 6686 post-offices throughout the Commonwealth, or about one office to every 600 persons. The letters carried amount to about 80 per head, the newspapers to 32 per head and the packets to 15 per head. The length of telegraph lines in use is 46,300 m., and the length of wire nearly three times that distance. In 1905 there were about 11,000,000 telegraphic messages sent, which gives an average of 2-7 messages per inhabitant. The postal services and the telegraphs are administered by the federal government.

Banking. — Depositors in savings banks represent about twenty- nine in every hundred persons, and in 1906 the sum deposited amounted to £37,205,000 in the names of 1,152,000 persons. In ordinary banks the deposits amounted to £106,625,000, so that the total deposits stood at £143,830,000, equivalent to the very large sum of £34, 1 8s. per inhabitant. The coin and bullion held by the banks varies between 20 and 24 millions sterling and the note circu- lation is almost stationary at about 3J millions.

Public Finance. — Australian public finance requires to be treated under the separate headings of Commonwealth and states finance. Under the Constitution Act the Commonwealth is given the control of the postal and telegraph departments, public defence and several other services, as well as the power of levying customs and excise duties; its powers of taxation are unrestricted, but so far no taxes have been imposed other than those just mentioned. The Common-

wealth is empowered to retain one-fourth of the net revenue from customs and excise, the balance must be handed back to the states. This arrangement was to last until 1910. Including the total receipts derived from the customs, the Commonwealth revenue, during the year 1906, was made up as follows: —

Customs and excise £8,999,485

Posts, telegraphs, &c 2,824,182

Other revenue 55.676

£11,879,343

The return made to the states was £7,385,731, so that the actual revenue disposed of by the Commonwealth was less by that amount, or £4,493,612. The expenditure was distributed as follows: —

Customs collection

Posts, telegraphs, &c.

Defence

Other expenditure

Total .

£261,864

• 2,774,804

949,286 508,887

• £4.494.841

The states have the same powers of taxation as the Commonwealth except in regard to customs and excise, over which the Common- wealth has exclusive power, but the states are the owners of the crown lands, and the revenues derived from this source form an im- portant part of their income. The states have a total revenue, from sources apart from the Commonwealth, of £23,820,439, and if to this be added the return of customs duties made by the federal government, the total revenue is £31,206,170. Although the financial operations of the Commonwealth and the states are quite distinct, a statement of the total revenue of the Australian Commonwealth and states is not without interest as showing the weight of taxation and the different sources from which revenue is obtained. For 1906 the respective revenues were : — •

Commonwealth £11.879,343

States 23,820,439

£35.699,782

Direct taxation £3,200,000

Indirect taxation ; customs and excise . 8,999,485

Land revenue 3,500,000

Post-office and telegraphs …. 2,824,182

Railways, &c 13,650,000

Other service 3,526,115

The revenue from direct taxation is equal to 15s. iod. per inhabitant, from indirect taxation £2: 4: 6, and the total revenue from all sources £35,699,782, equal to £8 : 16 : 2 per inhabitant. The federal government has no public debt, but each of the six states has con- tracted debts which aggregate £237,000,000, equal to about £58, 8s. per inhabitant. The bulk of this indebtedness has been contracted for the purpose of constructing railways, tramways, water-supplies, and other revenue-producing works and services, and it is estimated that only 8% of the total indebtedness can be set down for unpro- ductive services.

Information regarding Australian state finance will be found under the heading of each state. (T. A. C.)

Aborigines

The origin of the natives of Australia presents a difficult problem. The chief difficulty in deciding their ethnical relations is their remarkable physical difference from the neighbouring peoples. And if one turns from physical criteria to their manners and customs it is only to find fresh evidence of their isolation. While their neighbours, the Malays, Papuans and Polynesians, all cultivate the soil, and build substantial huts and houses, the Australian natives do neither. Pottery, common to Malays and Papuans, the bows and arrows of the latter, and the elaborate canoes of all three races, are unknown to the Australians. They then must be considered as representing an extremely primitive type of mankind, and it is necessary to look far afield for their prehistoric home.

Wherever they came from, there is abundant evidence that their first occupation of the Australian continent must have been at a time so remote as to permit of no traditions. No record, no folk tales, as in the case of the Maoris of New Zealand, of their migration, are preserved by the Australians. True, there are legends and tales of tribal migra- tions and early tribal history, but nothing, as A. W. Howitt points out, which can be twisted into referring even indirectly to their first arrival. It is almost incredible there should be none, if the date of their arrival is to be reckoned as only dating

back some centuries. Again, while they differ physically from neighbouring races, while there is practically nothing in common between them and the Malays, the Polynesians, or the Papuan Melanesians, they agree in type so

closely among themselves that they must be regarded as forming one race. Yet it is note- worthy that the languages of their several tribes are different. The occurrence of a large number of common roots proves them to be derived from one source, but the great variety of dialects — sometimes unintelligible between tribes separated by only a few miles — cannot be explained except by supposing a vast period to have elapsed since their first settlement. There is evidence in the languages, too, which supports the physical separation from their New Zealand neighbours and, therefore, from the Polynesian family of races. The numerals in use were limited. In some tribes there were only three in use, in most four. For the number " five " a word meaning " many " was employed. This linguistic poverty proves that the Australian tongue has no affinity to the Polynesian group of languages, where denary enumeration prevails: the nearest Polynesians, the Maoris, counting in thousands. Further evidence of the antiquity of Australian man is to be found in the strict observance of tribal boundaries, which would seem to show that the tribes must have been settled a long time in one place.

A further difficulty is created by a consideration of the Tas- manian people, extinct since 1876. For the Tasmanians in many ways closely approximated to the Papuan type. They had coarse, short, woolly hair and Papuan features. They clearly had no racial affinities with the Australians. They did not possess the boomerang or woomerah, and they had no boats. When they were discovered, a mere raft of reeds in which they could scarcely venture a mile from shore was their only means of navigation. Yet while the Tasmanians are so distinctly separated in physique and customs from the Australians, the fauna and flora of Tasmania and Australia prove that at one time the two formed one continent, and it would take an enormous time for the formation of Bass Strait. How did the Tasmanians with their Papuan affinities get so far south on a continent inhabited by a race so differing from Papuans ? Did they get to Tasmania before or after its separation from the main continent? If before, why were they only found in the south ? It would have been reasonable to expect to find them sporadically all over Australia. If after, how did they get there at all? For it is impossible to accept the theory of one writer that they sailed or rowed round the continent — a journey requiring enormous maritime skill, which, according to the theory, they must have promptly lost.

Four points are clear: (1) the Australians represent a distinct race; (2) they have no kinsfolk among the neighbouring races;

(3) they have occupied the continent for a very long period;

(4) it would seem that the Tasmanians must represent a still earlier occupation of Australia, perhaps before the Bass Strait existed.

Several theories have been propounded by ethnologists. An attempt has been made to show that the Australians have close affinities with the African negro peoples, and certain resem- blances in language and in customs have been relied on. Sorcery, the scars raised on the body, the knocking out of teeth, circum- cision and rules as to marriage have been quoted; but many such customs are found among savage peoples far distant from each other and entirely unrelated. The alleged language similarities have broken down on close examination. A. R. Wallace is of the opinion that the Australians " are really of Caucasian type and are more nearly allied to ourselves than to the civilized Japanese or the brave and intelligent Zulus." He finds near kinsmen for them in the Ainus of Japan, the Khmers and Chams of Cambodia and among some of the Micro- nesian islanders who, in spite of much crossing, still exhibit marked Caucasic types. He regards the Australians as repre- senting the lowest and most primitive examples of this primitive Caucasic type, and he urges that they must have arrived in Australia at a time when their ancestors had no pottery, knew no agriculture, domesticated no animals, had no houses and

used no bows and arrows. This theory has been supported by the investigations of Dr Klaatsch, of the university of Heidelberg, who would, however, date Australian ancestry still farther back, for his studies on the spot have convinced him that the Australians are " a generalized, not a specialized, type of humanity — that is to say, they are a very primitive people, with more of the common undeveloped characteristics of man, and less of the qualities of the specialized races of civilization." Dr Klaatsch's view is that they are survivals of a primitive race which inhabited a vast Antarctic continent of which South America, South Africa and Australia once formed a part, as evidenced by the identity of many species of birds and fish. He urges that the similarities of some of the primitive races of India and Africa to the aborigines of Australia are indications that they were peopled from one common stock. This theory, plausible and attractive as it is, and fitting in, as it does, with the acknowledged primitive character of the Australian blackfellow, overlooks, nevertheless, the Tasmanian difficulty. Why should a Papuan type be found in what was certainly once a portion of the Australian continent? The theory which meets this difficulty is that which has in its favour the greatest weight of evidence, viz. that the continent was first inhabited by a Papuan type of man who made his way thither from Flores and Timor, New Guinea and the Coral Sea. That in days so remote as to be un- dateable, a Dravidian people driven from their primitive home in the hills of the Indian Deccan made their way south via Ceylon (where they may to-day be regarded as represented by the Veddahs) and eventually sailed and drifted in their bark boats to the western and north-western shores of Australia. It is difficult to believe that they at first arrived in such numbers as at once to overwhelm the Papuan

population. There were probably several migrations. What seems certain, if this theory is adopted, is that they did at last accumulate to an extent which permitted of their mastering the former occupiers of the soil, who were probably in very scattered and defenceless communities.

In the slow process of time they drove them into the most southerly corner of Australia, just as the Saxons drove the Celts into Cornwall and the Welsh hills. Even if this Dravidian invasion is put subsequent to the Bass Strait forming, even if one allows the probability of much crossing between the two races at first, in time the hostilities would be renewed. With their earliest settlements on the north-north-west coasts, the Dravidians would probably tend to spread out north, north-east and east, and a southerly line of retreat: would be the most natural one for the Papuans. 1 When at last they were driven to the Strait they would drift over on rafts or in clumsy shallops; being thereafter left in peace to concentrate their race, then possibly only in an approximately pure state, in the island to which the Dravidians would not take the trouble to follow them, and where they would have centuries in which once more to fix their racial type and emphasize over again those differences, perhaps temporarily marred by crossing, which were found to exist on the arrival of the Whites.

This Indo – Aryan origin for the Australian blackf ellows is borne out by their physique. In spite of their savagery they are admitted by those who have studied them to be far removed from the low or Simian type of man. Dr Charles Pickering (1805-1878), who studied the Australians on the spot, writes:

1 In his Discoveries in Central Australia, E. T. Eyre has ingeniously attempted to reconstruct the routes taken by the Australians in their advance across the continent. He has relied, however, in his efforts to link the tribes together, too much on the prevalence or absence of such customs as circumcision — always very treacherous evidences — to allow of his hypothetical distribution being regarded very seriously. The migrations must have always been dependent upon physical difficulties, such as waterless tracts or mountain barriers. They were probably not definite massed movements, such as would permit of the survival of distinctive lines of custom between tribe and tribe; but rather spasmodic movements, sometimes of tribes or of groups, sometimes only of families or even couples, the first caused by tribal wars, the second to escape punishment for some offence against tribal law, such as the defiance of the rules as to clan-marriages.

" Strange as it may appear, I would refer to an Australian as the finest model of the human proportions I have ever met; in muscular development combining perfect symmetry, activity and strength, while his head might have compared with the antique bust of a philosopher." Huxley concluded, from descriptions, that " the Deccan tribes are indistinguishable from the Australian races." Sir W. W. Hunter states that the Dravidian tribes were driven southwards in Hindustan, and that the grammatical relations of their dialects are " expressed by suffixes," which is true as to the Australian languages. He states that Bishop Caldwell, 1 whom he calls " the great missionary scholar of the Dravidian tongue," showed that the south and western Australian tribes use almost the same words for " I, thou, he, we, you, as the Dravidian fishermen on the Madras coast." When in addition to all this it is found that physically the Dravidians resemble the Australians; that the boomerang is known among the wild tribes of the Deccan alone (with the doubtful exception of ancient Egypt) of all parts of the world except Australia, and that the Australian canoes are like those of the Dravidian coast tribes, it seems reasonable enough to assume that the Australian natives are. Dravidians, exiled in remote times from Hindustan, though when their migration took place and how they traversed the Indian Ocean must remain questions to which, by their very nature, there can be no satisfactory answer.

The low stage of culture of the Australians when they reached their new home is thus accounted for, but their stagnation is remarkable, because they must have been frequently in contact with more civilized peoples. In the north of Australia there are traces of Malay and Papuan blood. That a far more advanced race had at one time a settlement on the north-west coast is indicated by the cave-paintings and sculptures discovered by Sir George Grey. In caves of the valley of the Glenelg river, north-west Australia, about 60 m. inland and 20 m. south of Prince Regent's river, are representations of human heads and bodies, apparently of females clothed to the armpits, but all the faces are without any indication of mouths. The heads are surrounded with a kind of head-dress or halo and one wears a necklace. They are drawn in red, blue and yellow. The figures are almost life-size. Rough sculptures, too, were found, and two' large square mounds formed of loose stones, and yet perfect parallelograms in outline, placed due east and west. In the same district Sir George Grey noticed among the blackfellows people he describes as " almost white." On the Gascoyne river, too, were seen natives of an olive colour, quite good-looking; and in the neighbourhood of Sydney rock-carvings have been also found. All this points to a temporary occupation by a race at a far higher stage of culture than any known Australians, who were certainly never capable of executing even the crude works of art described.

Physically the typical Australian is the equal of the average European in height, but is inferior in muscular development, Physique. tne ˆ e S s an d arms being of a leanness which is often emphasized by an abnormal corpulence. The bones are delicately formed, and there is the lack of calf usual in black races. The skull is abnormally thick and the cerebral capacity small. The head is long and somewhat narrow, the forehead broad and receding, with overhanging brows, the eyes sunken, large and black, the nose thick and very broad at the nostrils. The mouth is large and the lips thick but not protuberant. The teeth are large, white and strong. In old age they appear much ground down; particularly is this the case with women, who chew the different kinds of fibres, of which they make nets and bags. The lower jaw is heavy; the cheekbones somewhat high, and the chin small and receding. The neck is thicker and shorter than that of most Europeans. The colour of the skin is a deep copper or chocolate, never sooty black. When born, the Australian baby is of a much lighter colour than its parents and remains so for about a week. The hair is long, black or very dark auburn, wavy and sometimes curly, but never woolly, and the men have luxuriant beards and whiskers, often of an auburn tint, while the whole body inclines to hairiness. On 1 The Languages of India (1875).

the Balonne river, Queensland, Baron Mikluho Maclay found a group of hairless natives. The head hair is usually matted with grease and dirt, but when clean is fine and glossy. The skin gives out an objectionable odour, owing to the habit of anointing the body with fish-oils, but the true fetor of the negro is lacking in the Australian. The voices of the blackfellows are musical. Their mental faculties, though inferior to those of the Polynesian race, are not contemptible. They have much aciite- ness of perception for the relations of individual objects, but little power of generalization. No word exists in their language for such general terms as tree, bird or fish; yet they have invented a name for every species of vegetable and animal they know. The grammatical structure of some north Australian languages has a considerable degree of refinement. The verb presents a variety of conjugations, expressing nearly all the moods and tenses of the Greek. There is a dual, as well as a plural form in the declension of verbs, nouns, pronouns and adjectives. The distinction of genders is not marked, except in proper names of men and women. All parts of speech, except adverbs, are declined by terminational inflections. There are words for the elementary numbers, one, two, three; but " four " is usually expressed by " two-two." They have no idea of decimals. The number and diversity of separate languages is bewildering.

In disposition the Australians are a bright, laughter-loving folk, but they are treacherous, untruthful and hold human life cheaply. They have no great physical courage. They character are mentally in the condition of children. None of them has an idea of what the West calls morality, except the

simple one of right or wrong arising out of property. A wife will be beaten without mercy for unfaithfulness to her husband, but the same wife will have had to submit to the first-night promiscuity, a widespread revel which Roth shows is a regular custom in north-west-central Queensland. A husband claims his wife as his absolute property, but he has no scruple in handing her over for a time to another man. There is, however, no proof that anything like community of women or unlimited promiscuity exists anywhere. It would be wrong, however, to conclude that moral considerations have led up to this state of things. Of sexual morality, in the everyday sense of the word, there is none. In his treatment of women the aboriginal may be ranked lower than even the Fuegians. Yet the Australian is capable of strong affections, and the blind (of whom there have always been a great number) are cared for, and are often the best fed in a tribe.

The Australians when first discovered were found to be living in almost a prehistoric simplicity. Their food was the meat they killed in the chase, or seeds and roots, Manners. grubs or reptiles. They never, in any situation, cultivated the soil for any kind of food-crop. They never reared any kind of cattle, or kept any domesticated animal except the dog, which probably came over with them in their canoes. They nowhere built permanent dwellings, but contented themselves with mere hovels for temporary shelter. They neither manufactured nor possessed any chattels beyond such articles of clothing, weapons, ornaments and utensils as they might carry on their persons, or in the family store-bag for daily use. In most districts both sexes are entirely nude. Sometimes in the south during the cold season they wear a cloak of skin or matting, fastened with a skewer, but open on the right-hand side.

When going through the bush they sometimes wear an apron of skins, for protection merely. No headgear is worn, except sometimes a net to confine the hair, a bunch of feathers, or the tails of small animals. The breast or back, of both sexes, is usually tattooed, or rather, scored with rows of hideous raised scars, produced by deep gashes made at puberty. Their dwellings for the most part are either bowers, formed of the branches of trees, or hovels of piled logs, loosely covered with grass or bark, which they can erect in an hour, wherever they encamp. But some huts of a more substantial form were seen by Captain Matthew Flinders on the south-east coast in 1799, and by Captain King and Sir T. Mitchell on the north-east, where they

no longer appear. The ingenuity of the race is mostly exhibited in the manufacture of their weapons of warfare and the chase. While the use of the bow and arrow does not seem to have occurred to them, the spear and axe are in general use, commonly made of hard-wood; the hatchets of stone, and the javelins pointed with stone or bone. The characteristic weapon of the Australian is the boomerang (q.v.). Their nets, made by women, either of the tendons of animals or the fibres of plants, will catch and hold the kangaroo or the emu, or the very large fish of Australian rivers. Canoes of bent bark, for the inland waters, are hastily prepared at need; but the inlets and straits of the north-eastern sea-coast are navigated by larger canoes and rafts of a better construction. As to food, they are omnivorous. In central Queensland and elsewhere, snakes, both venomous and harmless, are eaten, the head being first carefully smashed to pulp with a stone.

The tribal organization of the Australians was based on that of the family. There were no hereditary or formally elected chiefs, nor was there any vestige of monarchy. The / .. affairs of a tribe were ruled by a council of men past tioa. middle age. Each tribe occupied a recognized territory,

averaging perhaps a dozen square miles, and used a common dialect. This district was subdivided between the chief heads of families. Each family, or family group, had a dual organization which has been termed (i) the Social, (2) the Local. The first was matriarchal, inheritance being reckoned through the mother. No territorial association was needed. All belonged to the same totem or totemic class, and might be scattered throughout the tribe, though subject to the same marriage laws. The second was patriarchal and of a strictly territorial nature. A family or group of families had the same hunting-ground, which was seldom changed, and descended through the males. Thus, the sons inherited their fathers' hunting-ground, but bore their mothers' name and therewith the right to certain women for wives. The Social or matriarchal took precedence of the Local or patriarchal organization. In many cases it arranged the assemblies and ceremonial of the tribe; it regulated marriage, descent and relationship; it ordered blood feuds, it prescribed the rites of hospitality and so on. Nevertheless the Local side of tribal life in time tended to overwhelm the Social and to organize the tribe irrespective of matriarchy, and inclined towards hereditary chieftainship.

The most intricate and stringent rules existed as to marriage within and without the totemic inter-marrying classes. There is said to be but one exception to the rule that marriage must be contracted outside the totem name. This exception wa,s discovered by Messrs Spencer and Gillen among the Arunta of central Australia, some allied septs, and their nearest neighbours to the north, the Kaitish. This tribe may legally marry within

the totem, but always avoids such unions. Even in casual amours these class laws were invariably observed, and the young man or woman who defied them was punished, he with death, she with spearing or beating. At the death of a man, his widows passed to his brother of the same totem class. Such a system gave to the elder men of a tribe a predominant position, and generally respect was shown to the aged. Laws and penalties in protection of property were enforced by the tribe. Thus, among some tribes of Western Australia the penalty for abducting another's wife was to stand with leg extended while each male of the tribe stuck his spear into it. Laws, however, did not protect the women, who were the mere chattels of their lords. Stringent rules, too, governed the food of women and the youth of both sexes, and it was only after initiation that boys were allowed to eat of all the game the forest provided. In every case of death from disease or unknown causes sorcery was suspected and an inquest held, at which the corpse was asked by each relative in succession the name of the murderer. This formality having been gone through, the flight of the first bird which passed over the body was watched, the direction being regarded as that in which the sorcerer must be sought. Some- times the nearest relative sleeps with his head on the corpse, in the belief that he will dream of the murderer. The most

/

sacred duty an Australian had to perform was the avenging of the death of a kinsman, and he was the object of constant taunts and insults till he had done so. Cannibalism was almost universal, either in the case of enemies killed in battle or when animal food was scarce. In the Luritcha tribe it was customary when a child was in weak health to kill a younger and healthy one and feed the weakling on its flesh. Cannibalism seems also to have sometimes been in the nature of a funeral observance, in honour of the deceased, of whom the relatives reverently ate portions.

They had no special forms of religious worship, and no idols. The evidence on the question of whether they believed in a Supreme Being is very contradictory. Messrs Spencer R e iM oa and Gillen appear to think that such rudimentary idea of an All-Father as has, it is thought, been detected among the blackfellows is an exotic growth fostered by contact with mis- sionaries. A. W. Howitt and Dr Roth appear to have satisfied themselves of a belief, common to most tribes, in a mythic being (he has different names in different tribes) having some of the attributes of a Supreme Deity. But Mr Howitt finds in this being " no trace of a divine nature, though under favourable conditions the beliefs might have developed into an actual religion." Other authorities suggest that it is going much too far to deny the existence of religion altogether, and instance as proof of the divinity of the supra-normal anthropomorphic beings of the Baiame class, the fact that the

Yuin and cognate tribes dance around the image of Daramulun (their equivalent of Baiame) and the medicine men " invocate his name." A good deal perhaps depends on each observer's view of what religion really is. The Australians believed in spirits, generally of an evil nature, and had vague notions of an after-life. The only idea of a god known to be entertained by them seems to be that of the Euahlayi and Kamilaori tribe, Baiame, a gigantic old man lying asleep for ages, with his head resting on his arm, which is deep in the sand. He is expected one day to awake and eat up the world. Researches go to show that Baiame has his counter- part in other tribes, the myth varying greatly in detail, But the Australians are distinguished by possessing elaborate initiatory ceremonies. Circumcision of one or two kinds was usual in the north and south, but not in Western Australia or on the Murray river. In South Australia boys had to undergo three stages of initiation in a place which women were forbidden to approach. At about ten they were covered with blood from head to foot, several elder men bleeding themselves for the purpose. At about twelve or fourteen circumcision took place and (or sometimes as an alternative on the east coast) a front tooth was knocked out, to the accompaniment of the booming of the bullroarer (q.v.). At the age of puberty the lad was tattooed or scarred with gashes cut in back, shoulders, arms and chest, and the septum of the nose was pierced. The gashes varied in patterns for the different tribes. Girls, too, were scarred at puberty and had teeth knocked out, &c. The ceremonies — known to the Whites under the native generic term for initiatory rites, Bora — were much the same throughout Australia. Polygamy was rare, due possibly to the scarcity of women. 1 Infanticide was universally recognized. The mode of disposing of the dead varied. Among some tribes a circular grave was dug and the body placed in it with its face towards the east, and a. high mound covered with bark or thatch raised over it. In New South Wales the body is often burned and the ashes buried. On the Lower Murray the body is placed on a platform of sticks and left to decay. Young children are often not buried for months, but are carried about by their mothers. At the funeral of men there is much mourning, the female relatives cutting or tearing their hair off and plastering their faces with clay, but for women no public ceremonies took place.

The numbers of the native Australians are steadily diminishing. It was estimated that when first visited by Europeans the native

1 The existence of "Group Marriage "is a much-controverted point. This custom, which has been denned as the invasion of actual marriage by allotting permanent paramours, is confined to a special set of tribes.

population did not much exceed 200,000. A remnant of the race exists in each of the provinces, while a few tribes still wander over the interior.

Authorities. — Dr A. W. Howitt, The Native Tribes of South-east Australia (1904) and On the Organization of Australian Tribes (1889) ; G. T. Bettany, The Red, Brown and Black Men of Australia (1890); B. Spencer and F. J. Gillen, Native Tribes of Central Australia (1899) ; The Northern Tribes of Central Australia (London, 1904) ; E. M. Curr, The Australian Race (3 vols.,1886-1887); G. W. Rusden, History of Australia (1897); Australasia, British Empire. Series (Kegan Paul & Co., 1900); A. R. Wallace, Australasia (1880, new ed,, 2 vols., 1893-1895); Rev. Lorimer Fison and Dr A. W. Howitt, Kamilaroi arid Kurnai, Group Marriage and Relationship (Melbourne, 1880); H. Ling Roth, Queensland Aborigines (Brisbane, 1897) ‘< Carl Lum- holtz, Among Cannibals (1889); Walter E. Roth, Ethnological Studies among the North-west-central Queensland A borigines (London, 1897) ; Mrs K. Langloh Parker, Euahlayi Tribes (1905) ; F. J. Gillen, Notes on Manners and Customs of the Aborigines of the Macdonnell Ranges belonging to the Arunta Tribe; J. E. Frazer, " The Beginnings of Religion and Totemism among the Australian Aborigines," Fortnightly Review, July 1905; N. W. Thomas, Native Tribes of Australia (1907). (C. Ar.)

History 1. The Discovery of Australia.

It is impossible to say who were the first discoverers of Australia, although there is evidence that the Chinese had some knowledge of the continent so far back as the 13th century. The Malays, also, would seem to have been acquainted with the northern coast; while Marco Polo, who visited the East at the close of the 13th century, makes reference to the reputed existence of a great southern continent. There is in existence a map, dedicated to Henry VIII. of England, on which a large southern land is shown, and the tradition of a Terra Australis appears to have been current for a long period before it enters into authentic history.

In 1503 a French navigator named Binot Paulmyer, sieur de Gonneville, was blown out of his course, and landed on a large island, which was claimed to be the great southern land of tradi- tion, although Flinders and other authorities are inclined to think that it must have been Madagascar. Some French authorities confidently put forward a claim that Guillaume le Testu, of Provence, sighted the continent in 1531- The Portu- guese also advance claims to be the first discoverers of Australia, but so far the

evidence cannot be said to establish their preten- sions. As early as 1597 the Dutch historian, Wytfliet, describes the Australis Terra as the most southern of all lands, and proceeds to give some circumstantial particulars respecting its geographical relation to New Guinea, venturing the opinion that, were it thoroughly explored, it would be regarded as a fifth part of the world.

Early in the 17th century Philip III. of Spain sent out an expedition from Callao, in Peru, for the purpose of searching for a southern continent. The little fleet comprised three vessels, with the Portuguese pilot, De Quiros, as navigator, and De Torres as admiral or military commander. They left Callao on the 21st of December 1605, and in the following year discovered the island now known as Espiritu Santo, one of the New Hebrides group, which De Quiros, under the impression that it was indeed the land of which he was in search, named La Austrialia del Espiritu Santo. Sickness and discontent led to a mutiny on De Quiros' vessel, and the crew, overpowering their officers during the night, forced the captain to navigate his ship to Mexico. Thus, abandoned by his consort, De Torres, compelled to bear up for the Philippines to refit, discovered and sailed through the strait that bears his name, and may even have caught a glimpse of the northern coast of the Australian continent. His discovery was not, however, made known until 1792, when Dalrymple rescued his name from oblivion, bestowing it upon the passage which separates New Guinea from Australia. De Quiros returned to Spain to re-engage in the work of petitioning the king to despatch an expedition for the purpose of prosecuting the discovery of the Terra Australis. He was finally successful in his petitions, but died before accomplishing his work, and was buried in an unknown

De Toms.

grave in Panama, never being privileged to set his foot upon the continent the discovery of which was the inspiration of his Mfe.

During the same year in which De Torres sailed through the strait destined to make him famous, a little Dutch vessel called the " Duyfken," or " Dove," set sail from Bantam, in Java, on a voyage of discovery. This ship entered coverers " the Gulf of Carpentaria, and sailed south as far as Cape Keerweer, or Turn-again. Here some of the crew landed, but, being attacked by natives, made no attempt to explore the country. In 1616 Dirk Hartog discovered the island bearing his name. In 1622 the " Leeuwin," or " Lioness," made some discoveries on the south-west coast; and during the following year the yachts " Pera " and " Arnheim " explored the shores of the Gulf of Carpentaria. Arnheim Land, a portion of the Northern Territory, still appears on many maps as a memento of this voyage. Among other early Dutch discoverers were Edel; Pool, in 1629, in the Gulf of

Carpentaria; Nuyts, in the " Guide Zeepaard," along the southern coast, which he called, after himself, Nuyts Land; De Witt; and Pelsaert, in the " Batavia." Pelsaert was wrecked on Houtman's Abrolhos; his crew mutinied, and he and his party suffered greatly from want of water. The record of his voyage is interest- ing from the fact that he was the first to carry back to Europe an authentic account of the western coast of Australia, which he described in any but favourable terms. It is to Dutch navigators in the early portion of the 17 th century that we owe the first really authentic accounts of the western coast and adjacent islands, and in many instances the names given by these mariners to prominent physical features are still retained. By 1665 the Dutch possessed rough charts of almost the whole of the western littoral, while to the mainland itself they had given the name of New Holland. Of the Dutch discoverers, Pelsaert was the only one who made any detailed observations of the character of the country inland, and it may here be re- marked that his journal contains the first notice and description of the kangaroo that has come down to us.

In 1642 Abel Janszoon Tasman sailed on a voyage of discovery from Batavia, the headquarters of the governor and council of the Dutch East Indies, under whose auspices the expedition was undertaken. He was furnished with a yacht, the " Heems- kirk," and a fly-boat, the " Zeehaen " (or " Sea Hen "), under the command of Captain Jerrit Jansen. He left Batavia on what has been designated by Dutch historians the " Happy Voyage," on the 14th of August 1642. After a visit to the Mauritius, then a Dutch possession, Tasman bore away to the south-east, and on the 24th of November sighted the western coast of the land which he named Van Diemen's Land, in honour of the governor under whose directions he was acting. The honour was later transferred to the discoverer himself, and the island is now known as Tasmania. Tasman doubled the southern extremity of Van Diemen's Land and explored the east coast for some distance. The ceremony of hoisting a flag and taking possession of the country in the name of- the government of the Netherlands was actually performed, but the description of the wildness of the country, and of the fabulous giants by which Tasman's sailors believed it to be inhabited, deterred the Dutch from occupying the island, and by the international principle of " non-user " it passed from their hands. Resuming his voyage in an easterly direction, Tasman sighted the west coast of the South Island of New Zealand on the 13th of December of the same year, and describes the coast-line as consisting of " high mountainous country."

The first English navigator to sight the Australian continent was William Dampier, who made a visit to these shores in 1688, as supercargo of the " Cygnet," a trader whose crew had turned buccaneers. On his return to England he published an account of his voyage, which resulted in his being sent out in the " Roebuck " in 1699 to prosecute his discoveries further. To

him we owe the exploration of the coast for about 900 m. — from Shark's Bay to Dampier's Archipelago, and thence to Roebuck Bay. He appears to have landed in several places in search of water. His account of the country was

Dampier.

DISCOVERY]

AUSTRALIA

959

Cook.

quite as unfavourable as Pelsaert's. He described it as barren and sterile, and almost devoid of animals, the only one of any importance somewhat resembling a raccoon — a strange creature, which advanced by great bounds or leaps instead of walking, using only its hind legs, and covering 1 2 or 1 5 f t. at a time. The reference is, of course, to the kangaroo, which Pelsaert had also remarked and quaintly described some sixty years previously.

During the interval elapsing between Dampier's two voyages, an accident led to the closer examination of the coasts of Western Australia by the Dutch. In 1684 a vessel had sailed from Holland for the Dutch possessions in the East Indies, and after rounding the Cape of Good Hope, she was never again heard of. Some twelve years afterwards the East India Company fitted out an expedition under the leadership of Commander William de Vlamingh, with the object of searching for any traces of the lost vessel on the western shores of New Holland. Towards the close of the year 1696 this expedition reached the island of Rottnest, which was thoroughly explored, and early the following year a landing party discovered and named the Swan river. The vessels then proceeded northward without finding any traces of the object of their search, but, at the same time, making fairly accurate charts of the coast-line.

The great voyage of Captain James Cook, in 1760-1770, was primarily undertaken for the purposes of observing the transit of Venus, but he was also expressly commissioned to ascertain " whether the unexplored part of the southern hemisphere be only an immense mass of water, or contain another continent." H.M.S. " Endeavour," the vessel fitted out for the voyage, was a small craft of 370 tons, carrying twenty-two guns, and built originally for a collier, with a view rather to strength than to speed. Chosen by Cook himself, she was renamed the " Endeavour," in allusion to the great work which her commander was setting out to achieve. Mr Charles

Green was commissioned to conduct the astronomical observa- tions, and Sir Joseph Banks and Dr Solander were appointed botanists to the expedition. After successfully observing the transit from the island of Tahiti, or Otaheite, as Cook wrote it, the " Endeavour's " head was turned south, and then north-west, beating about the Pacific in search of the eastern coast of the great continent whose western shores had been so long known to the Dutch. On the 6th of October 1769 the coast of New Zealand was sighted, and two days later Cook cast anchor in Poverty Bay, so named from the inhospitality and hostility of the natives.

After voyaging westward for nearly three weeks, Cook, on the 19th of April 1770, sighted the eastern coast of Australia at a point which he named after his lieutenant, who discovered it, Point Hicks, and which modern geographers identify with Cape Everard.

The " Endeavour " then coasted northward, and after passing and naming Mount Dromedary, the Pigeon House, Point Up- right, Cape St George and Red Point, Botany Bay was discovered on the 28th of April 1770, and as it appeared to offer a suitable anchorage, the " Endeavour " entered the bay and dropped anchor. The ship brought-to opposite a group of natives, who were cooking over a fire. The great navigator and his crew, unacquainted with the character of the Australian aborigines, were not a little astonished that these natives took no notice of them or their proceedings. Even the splash of the anchor in the water, and the noise of the cable running out through the hawse-hole, in no way disturbed them at their occupation, or caused them to evince the slightest curiosity. But as the captain of the " Endeavour " ordered out the pinnace and prepared to land, the natives threw off their nonchalance; for on the boat approaching the shore, two men, each armed with a bundle of spears, presented themselves on a projecting rock and made threatening signs to the strangers. It is interesting to note that the ingenious wommera, or throw-stick, which is peculiar to Australia, was first observed on this occasion. As the men were evidently determined to oppose any attempt at landing, a musket was discharged between them, in the hope that they would be frightened by the noise, but it produced no effect

beyond causing one of them to drop his bundle of spears, of which, however, he immediately repossessed himself, and with his comrade resumed the same menacing attitude. At last one cast a stone towards the boat, which earned him a charge of small shot in the leg. Nothing daunted, the two ran back into the bush, and presently returned furnished with shields made of bark, with which to protect themselves from the firearms of the crew. Such intrepidity is certainly worthy of passing notice. Unlike the American Indians, who supposed Columbus and his crew to be supernatural beings, and their ships in some way endowed with life, and

were thrown into convulsions of terror by the first discharge of firearms which they witnessed, these Australians were neither excited to wonder by the ship nor overawed by the superior number and unknown weapons of the strangers. Cook examined the bay in the pinnace, and landed several times; but by no endeavour could he induce the natives to hold any friendly communication with him. The well-known circumstance of the great variety of new plants here obtained, from which Botany Bay derives its name, should not be passed over. Before quitting the bay the ceremony was performed of hoisting the Union Jack, first on the south shore, and then near the north head, formal possession of the territory being thus taken for the British crown. During the sojourn in Botany Bay the crew had to perform the painful duty of burying a comrade — a seaman named Forby Sutherland, who was in all probability the first British subject whose body was committed to Australian soil.

After leaving Botany Bay, Cook sailed northward. He saw and named Port Jackson, but forbore to enter the finest natural harbour in Australia. Broken Bay and other inlets, and several headlands, were also seen and named, but the vessel did not come to an anchor till Moreton Bay was reached, although the wind. prevented Cook from entering this harbour. Still sailing northward, taking notes as he proceeded for a rough chart of the coast, and landing at Bustard and Keppel Bays and the Bay of Inlets, Cook passed over 1300 m. without the occurrence of any event worthy of being chronicled, till suddenly one night at ten o'clock the water was found to shoal, without any sign of breakers or land. While Cook was speculating on the cause of this phenomenon, and was in the act of ordering out the boats to take soundings, the " Endeavour " struck heavily, and fell over so much that the guns, spare cables, and other heavy gear had at once to be thrown overboard to lighten the ship. As day broke, attempts were made to float the vessel off with the morning tide; but these were unsuccessful. The water was rising so rapidly in the hold that with four pumps constantly going the crew could hardly keep it in check. At length one of the midshipmen suggested the device of " fothering," which he had seen practised in the West Indies. This consists of passing a sail, attached to cords, and charged with oakum, wool, and other materials, under the vessel's keel, in such a manner that the suction of the leak may draw the canvas into the aperture, and thus partially stop the vent. This was performed with great success, and the vessel was floated off with the evening tide. The land was soon after made near the mouth of a small stream, which Cook called, after the ship, the Endeavour river. A headland close by he named Cape Tribulation. The ship was steered into the river, and there careened and thoroughly repaired. Cook having completed the survey of the east coast, to which he gave the name of New South Wales, sighted and named Cape York, the northernmost point of Australia, and

took final possession of his discoveries northward from 38 S. to io| c S., on a spot which he named Possession Island, thence returning to England by way of Torres Straits and the Indian Ocean.

The great navigator's second voyage, undertaken in 1772, with the "Resolution" and the "Adventure," is of less im- portance. The vessels became separated, and both at different times visited New Zealand. Captain Tobias Furneaux, in the " Adventure," also found his way to Storm Bay in Tasmania. In 1777, while on his way to search for a north-east passage between the Atlantic and Pacific oceans, Cook again touched at the coast of Tasmania and New Zealand.

On his first voyage, in 1770, Cook had some grounds for the belief that Van Diemen's Land, as Tasmania was then called, was a separate island. The observations of Captain Furneaux, however, did not strengthen this belief, and when making his final voyage, the great navigator appears to have definitely concluded that it was part of the mainland of Australia. This continued to be the opinion of geographers until 1798, when Bass discovered the strait which bears his name. The next recorded expedition is a memorable one in the annals of Australian history — the despatch of a British colony to the shores of Botany Bay. The fleet sailed in May 1787, and arrived off the Australian coast early in the following January.

2. Inland Exploration.

For a period of twenty-five years after the first establishment of a British settlement in Australia, the colonists were only acquainted with the country along the coast extending north- wards about 70 m. from Sydney and about a like distance to the south and shut in to the west by the Blue Mountain range, forming a narrow strip not more than 50 m. wide at its broadest part.

The Blue Mountains attain a height of between 3000 and 4000 ft. only, but they are intersected with precipitous ravines 1500 ft. deep, which baffled every effort to reach the interior until in 1813, when a summer of severe drought had made it of vital importance to find new pastures, three of the colonists, Messrs Blaxland, Lawson and Wentworth, more fortunate than their predecessors in exploration, after crossing the Nepean river at Emu Plains and ascending the Dividing Range, were able to reach a position enabling them to obtain a view of the grassy valley of the Fish

river, which lies on the farther side of the Dividing Range. The western descent of the mountains appeared to the explorers comparatively easy, and they returned to report their discovery. A line of road was constructed across the mountains as far as the Macquarie river by the surveyor, Mr Evans, and the town of Bathurst laid out. This marks the beginning of the occupation of the interior of the continent. Some small expeditions were made from Bathurst, resulting in the discovery of the Lachlan, and in 1816 the first of the great exploration expeditions of Australia was fitted out under Lieutenant Oxley, R.N. Oxley was accompanied y ‘ by Mr Evans and Mr Allan Cunningham the botanist, and the object of his expedition was to trace the course of the Lachlan in a westerly direction. Oxley traced the river until it lost itself in the swamps east of 147 E., then crossing the river he traversed the country between the Lachlan and Murrum- bidgee as far as 34 S. and 144 30′ E. On his return journey Oxley again crossed the Lachlan about 160 m., measured along the river, below the point where he left it on his journey south. Continuing in a north-easterly direction Oxley struck the Macquarie river at a place he called Wellington, and from this place in the following year he organized a second expedition in hopes of discovering an inland sea. He was, however, dis- appointed in this, as after descending the course of the Macquarie below Mount Harris, he found that the river ended in an immense swamp overgrown with reeds. Oxley now turned aside — led by Mr Evans’s report of the country eastward — crossed the Arbuth- not range, and traversing the Liverpool Plains, and ascending the Peel and Cockburn rivers to the Blue Mountains, gained sight of the open sea, which he reached at Port Macquarie. A valuable extension of geographical knowledge had been gained by this circuitous journey of more than 800 m. Yet its result was a disappointment to those who had looked for means of inland navigation by the Macquarie river, and by its supposed issue in a mediterranean sea.

During the next two or three years public attention was occupied with Captain King’s maritime explorations of the north-west coast in three successive voyages, and by explorations of Western Australia in 182 1. These steps were followed by the foundation of a settlement on Melville Island, in the extreme north, which, however, was soon abandoned. In 1823 Lieutenant Oxley proceeded to Moreton Bay and Port Curtis, the first place

Darling.

500 m., the other 690 m. north of Sydney, to choose the site of a new penal establishment. From a shipwrecked English sailor he met with, who had lived with the savages, he heard of the river Brisbane. About the same time, in the opposite direction, south-west of Sydney, a large extent of the interior was revealed. Messrs Hamilton Hume and Hovell set out from Lake

George, crossed the Murrumbidgee, and, after following the river for a short distance, struck south, skirting the foothills of what are now known as the Australian Alps until they reached a fine river, which was called the Hume after the leader's father. Crossing the Murray at Albury, the explorers, bearing to the south-west, skirted the western shore of Port Philip and reached the sea-coast near where the town of Geelong now stands. In 1827 and the two following years, Cunningham prosecuted instructive explorations on both sides of the Liverpool range, between the upper waters of the Hunter and those of the Peel and other tributaries of the Brisbane north of New South Wales. Some of his discoveries, including those of Pandora's Pass and the Darling Downs, were of great practical utility.

By this time much had thus been done to obtain an acquaint- ance with the eastern parts of the Australian continent, although the problem of what could become of the large rivers flowing north-west and south-west into the interior was still unsolved. With a view to determine this question, Governor Sir Ralph Darling, in the year 1828, sent out the ex- pedition under Captain Charles Sturt, who, proceeding first to the marshes at the end of the Macquarie river, found his progress checked by the dense mass of reeds in that quarter. He therefore turned westward, and struck a large river, with many affluents, to which he gave the name of the Darling. This river, flowing from north-east to south-west, drains the marshes in which the Macquarie and other streams from the south appeared to be lost. The course of the Murrumbidgee, a deep and rapid river, was followed by the same eminent explorer in his second expedition in 1 83 1 with a more satisfactory result. He travelled on this occasion nearly 2000 m., and discovered that both the Murrum- bidgee, carrying with it the waters of the Lachlan morass, and likewise the Darling, from a more northerly region, finally joined another and larger river. This stream, the Murray, in the upper part of its course runs in a north-westerly direction, but after- wards turning southwards, almost at a right angle, expands into Lake Alexandrina on the south coast, about 60 m. south-east of the town of Adelaide, and finally enters the sea at Encounter Bay in E. long. 139°.

After gaining a practical solution of the problem of the destina- tion of the westward-flowing rivers, Sir Thomas Mitchell, in 1833, led an expedition northward to the upper branches of the Darling; the party met with a sad disaster in the death of Richard Cunningham, brother of the eminent botanist, who was murdered by the blacks near the Bogan river. The expedition reached the Darling on the 25th of May 1833, and after establishing a depot at Fort Bourke, Mitchell traced the Darling southwards for 300 m. until he was certain the river was identical with that reported by Sturt as joining the Murray about 142 E.

Meantime, from the new colony of Adelaide, South Australia, on the shores

of Gulf St Vincent, a series of adventurous journeys to the north and to the west was begun by Mr Eyre, who explored a country very difficult of access. In 1840 he performed a feat of extraordinary personal daring, travelling all the way along the barren sea-coast of the Great Australian Bight, from Spencer Gulf to King George Sound. Eyre also explored the interior north of the head of Spencer Gulf, where he was misled, however, by appearances to form an erroneous theory about the water-surfaces named Lake Torrens. It was left to the veteran explorer, Sturt, to achieve the arduous enterprise of penetrating from the Darling northward to the very centre of the continent. This was in 1845, the route lying for the most part over a stony desert, where the heat (reaching 13 1° Fahr.), with scorching winds, caused much suffering to the party. The most northerly point reached by Sturt on this occasion was about S. lat. 24 25'.

Mitchell.

Byre.

EXPLORATION]

AUSTRALIA

9ˆ

A military station having been fixed by the British govern- ment at Port Victoria, on the coast of Arnheim Land, for the

protection of shipwrecked mariners on the north coast, bantt '• was thought desirable to find an overland route*

between this settlement and Moreton Bay, in what then was the northern portion of New South Wales, now called Queensland. This was the object of Dr Leichhardt's expedition in 1844, which proceeded first along the banks of the Dawson and the Mackenzie, tributaries of the Fitzroy river, in Queensland. It thence passed farther north to the Burdekin, ascending to the source of that river, and turned westward across a table-land, from which there was an easy descent to the Gulf of Carpentaria. Skirting the low shores of this gulf, all the way round its upper half to the Roper, Leichhardt crossed Arnheim Land to the Alligator river, which he descended to the western shore of the peninsula, and arrived at Port Victoria, otherwise Port Essington, after a journey of 3000 m., performed within a year and three months. In 1847 Leichhardt undertook a much more formidable task, that of crossing the entire continent from east to west. His starting-point was on the Fitzroy Downs, north of the river Condamine, in Queensland, between the 26th and 27th degrees of S. latitude. But this eminent explorer had not proceeded far into the interior before he met his death, his last despatch dating from the Cogoon, 3rd of April 1848. In the same region, from 1845 to 1847, Sir Thomas Mitchell and Mr E. B. Kennedy explored the northern tributaries of the Darling, and a river in S. lat. 24°, named the Barcoo or Victoria, which flows to the south-west. This river was more thoroughly examined by Mr A. C. Gregory in 1858. Mr Kennedy lost his life in 1848, being killed by the natives while attempting to explore the peninsula of Cape York, from Rockingham Bay to Weymouth Bay.

Among the performances of less renown, but of much practical utility in surveying and opening new paths through the country, we may mention that of Captain Banister, showing the way across the southern part of Western Australia, from Swan river to King George Sound, and that of Messrs Robinson and G. H. Haydon in 1844, making good the route from Port Phillip to Gipps' Land with loaded drays, through a dense tangled scrub, which had been described by Strzelecki as his worst obstacle. Again, in Western Australia there were the explorations of the Arrowsmith, the Murchison, the Gascoyne, and the Ashburton rivers, by Captain Grey, Mr Roe, Governor Fitzgerald, Mr R. Austin, and the brothers Gregory, whose discoveries have great importance from a geographical point of view.

These local researches, and the more comprehensive attempts of Leichhardt

and Mitchell to solve the chief problems of

Australian geography, must yield in importance to the

grand achievement of Mr Stuart in 1862. The first of his tours independently performed, in 1858 and 1859, were around the South Australian lakes, namely, Lake Torrens, Lake Eyre and Lake Gairdner. These waters had been erroneously taken for parts of one vast horseshoe or sickle shaped lake, only some 20 m. broad, believed to encircle a large portion of the inland country, with drainage at one end by a marsh into Spencer Gulf. The mistake, shown in all the old maps of Australia, had originated in a curious optical illusion. When Mr Eyre viewed the country from Mount Deception in 1840, looking between Lake Torrens and the lake which now bears his own name, the refraction of light from the glittering crust of salt that covers a large space of stony or sandy ground produced an appearance of water. The error was discovered, after eighteen years, by the explorations of Mr Babbage and Major Warburton in 1858, while Mr Stuart, about the same time, gained a more complete knowledge of the same district.

A reward of £10,000 having been offered by the legislature of South Australia to the first man who should traverse the whole continent from south to north, starting from the city of Adelaide, Mr Stuart resolved to make the attempt. He started in March i860, passing Lake Torrens and Lake Eyre, beyond which he found a pleasant, fertile country till he crossed the Macdonnell range of mountains, just under the line of the tropic

n.31

Stuart.

of Capricorn. On the 23rd of April he reached a mountain in S. lat. nearly 22°, and E. long, nearly 134°, which is the most central marked point of the Australian continent, and has been named Central Mount Stuart. Mr Stuart did not finish his task on this occasion, on account of indisposition and other causes. But the 18th degree of latitude had been reached, where the watershed divided the rivers of the Gulf of Carpentaria from the Victoria river, flowing towards the north-west coast. He had also proved that the interior of Australia was not a stony desert, like the region visited by Sturt in 1845. On the first day of the next year, 1861, Mr Stuart again started for a second attempt to cross the continent, which occupied him eight months. He failed, however, to advance farther than one geographical degree north of the point reached in i860, his progress being arrested by dense scrubs and the want of water.

Meanwhile, in the province of Victoria, by means of a fund subscribed among the colonists and a grant by the legislature, the ill-fated expedition of Messrs Burke and Wills was started. It made for the Barcoo (Cooper's Creek) , wins with a view to reach the Gulf of Carpentaria by a northerly cour? e midway between Sturt's track to the west and Leichhardt's to the east. The leading men of the party were Mr Robert O'Hara Burke, an officer of police, and Mr William John Wills, of the Melbourne observatory. Leaving the main body of his party at Menindie on the Darling under a man named Wright, Burke, with seven men, five horses and sixteen camels, pushed on for Cooper's Creek, the understanding being that Wright should follow him in easy stages to the depot proposed to be there established. Wright frittered away his time in the district beyond the Darling and did not attempt to follow the party to Cooper's Creek, and Burke, tired of waiting, determined to push on. Accordingly, dividing his party, leaving at the depot four men and taking with him Wills and two men, King and Gray, with a horse and six camels, he left Cooper's Creek on the 16th of December and crossed the desert traversed by Sturt fifteen years before. They got on in spite of great diffi- culties., past the McKinlay range of mountains, S. lat. 21° and 22 , and then reached the Flinders river, which flows into the bead of the Gulf of Carpentaria. Here, without actually standing on the sea-beach of the northern shore, they met the tidal waters of the sea. On the 23rd of February 1861 they commenced the return journey, having in effect accomplished the feat of crossing the Australian continent. Gray, who had fallen ill, died on the 1 6th of April. Five days later, Burke, Wills and King had repassed the desert to the place on Cooper's Creek (the Barcoo, S. lat. 27 40', E. long. 140° 30'), where they had left the depot, with the rest of the expedition. Here they experienced a cruel disappointment. The depot was abandoned; the men in charge had quitted the place the same day, believing that Burke and those with him were lost. The men who had thus abandoned the depot rejoined the main body of the expedition under Wright, who at length moved to Cooper's Creek, and, incredible to relate, neglected to search for the missing explorers. Burke, Wills and King, when they found themselves so fearfully left alone and unprovided in the wilderness, wandered about in that district till near the end of June. They subsisted miserably on the bounty of some natives, and partly by feeding on the seeds of a plant called nardoo. At last both Wills and Burke died of starvation. King, the sole survivor, was saved by meeting the friendly blacks, and was found alive in September by Mr A. W. Howitt's party, sent on purpose to find and relieve that of Burke.

Four other parties, besides Howitt's, were sent out that year from different Australian provinces. Three of them, respectively commanded by Mr Walker, Mr Landsborough, and Mr Norman, sailed to the north, where the

latter two landed on the shores of the Gulf of Carpentaria, while Mr Walker marched inland from Rockhampton. The fourth party, under Mr J. McKinlay, from Adelaide, made for the Barcoo by way of Lake Torrens. By these means, the unknown region of Mid Australia wa? simultaneously entered from the north, south, east and west, and important additions were made to geographical knowledge. Landsborough crossed the entire continent from north to south.

between February and June 1862; and McKinlay, from south to north, before the end of August in that year. The interior of New South Wales and Queensland, all that lies east of the 140th degree of longitude, was examined. The Barcoo or Cooper's Creek and its tributary streams were traced from the Queensland mountains, holding a south-westerly course to Lake Eyre in South Australia; the Flinders, the Gilbert, the Gregory, and other northern rivers watering the country towards the Gulf of Carpentaria were also explored. These valuable additions to Australian geography were gained through humane efforts to relieve the lost explorers. The bodies of Burke and Wills were recovered and brought to Melbourne for a solemn public funeral, and a noble monument has been erected to their honour.

Mr Stuart, in 1862, made his third and final attempt to traverse the continent from Adelaide along a central line, which, inclining a little westward, reaches the north coast of Arnheim Land, opposite Melville Island. He started in January, and on the 7th of April reached the farthest northern point, near S. lat. 1 7°, where he had turned back in May of the preceding year. He then pushed on, through a very thick forest, with scarcely any water, till he came to the streams which supply the Roper, a river flowing into the western part of the Gulf of Carpentaria. Having crossed a table-land of sandstone which divides these streams from those running to the western shores of Arnheim Land, Mr Stuart, in the month of July, passed down what is called the Adelaide river of north Australia. Thus he came at length to stand on the verge of the Indian Ocean; " gazing upon it," a writer has said, " with as much delight as Balboa, when he crossed the Isthmus of Darien from the Atlantic to the Pacific." The line crossing Australia which was thus explored has since been occupied by the electric telegraph connecting Adelaide, Melbourne, Sydney, and other Australian cities with London.

A third part, at least, of the interior of the whole continent, between the

central line of Stuart and the known parts of Oosse Western Australia, from about 120 to 134 E. long.,

an extent of half a million square miles, still remained a blank in the map. But the two expeditions of 1873, conducted by William Christie Gosse (1842-1881) , afterwards deputy surveyor- general for South Australia, and Colonel (then Major) Egerton Warburton, made a beginning in the exploration of this terra incognita west of the central telegraph route. That line of more than 1800 m., having its southern extremity at the head of Spencer Gulf, its northern at Port Darwin, in Arnheim Land, passes Central Mount Stuart, in the middle of the continent, S. lat. 22°, E. long. 134°. Mr Gosse, with men and horses pro- vided by the South Australian government, started on the 21st of April from the telegraph station 50 m. south of Central Mount Stuart, to strike into Western Australia. He passed the Reynolds range and Lake Amadeus in that direction, but was compelled to turn south, where he found a tract of well- watered grassy land. A singular rock of conglomerate, 2 m. long, 1 m. wide, and 1 100 ft. high, with a spring of water in its centre, struck his attention. The country was mostly poor and barren, sandy hillocks, with scanty growth of spinifex. Mr Gosse, having travelled above 600 m., and getting to 26 32′ S. and 127 E., two degrees within the Western Australian boundary, was forced to return. Meantime a more successful attempt to reach the

western coast from the centre of Australia was made by bartoa. Major Warburton, with thirty camels, provided by Mr

(afterwards Sir) T. Elder, of South Australia. Leaving the telegraph line at Alice Springs (23° 40′ S., 133° 14′ E.), 1120 m. north of Adelaide city, Warburton succeeded in making his way to the De Grey river, Western Australia. Overland routes had now been found possible, though scarcely convenient for traffic, between all the widely separated Australian provinces. In northern Queensland, also, there were several explorations about this period, with results of some interest. That performed by Mr W. Hann, with Messrs Warner, Tate and Taylor, in 1873, related to the country north of the Kirchner range, watered by the Lynd, the Mitchell, the Walsh and the Palmer rivers, on the east side of the Gulf of Carpentaria. The coasting expedition

Giles.

of Mr G. Elphinstone Dalrymple, with Messrs Hill and Johnstone, finishing in December 1873, effected a valuable survey of the inlets and navigable rivers in the Cape York Peninsula.

Of the several attempts to cross Western Australia, even Major

Warburton's expedition, the most successful, had failed in the important particular of determining the nature of the country through which it passed. Major Warburton had virtually raced across from the Macdonnell range in South Australia to the headwaters of the Oakover river on the north- west coast, without allowing himself sufficient time to note the characteristics of the country. The next important expedition was differently conducted. John (afterwards Sir John) p ofr est. Forrest was despatched by the Perth government with general instructions to obtain information regarding the immense tract of country out of which flow the rivers falling into the sea on the northern and western shores of Western Australia. Leaving Yewin, a small settlement about lat. 28 S., long. 116 E., Forrest travelled north-east to the Murchison river, and followed the course of that river to the Robinson ranges; thence his course lay generally eastward along the 26th parallel. Forrest and his party safely crossed the entire extent of Western Australia, and entering South Australia struck the overland telegraph line at Peake station, and, after resting, journeyed south to Adelaide. Forrest traversed seventeen degrees of desert in five months, a very wonderful achievement, more especially as he was able to give a full report of the country through which he passed. His report destroyed all hope that pastoral settlement would extend to the spinifex region; and the main object of subsequent explorers was to determine the extent of the desert in the direction of north and south. Ernest Giles made several attempts to cross the Central Australian Desert, but it was not until his third attempt that he was successful. His journey ranks almost with Forrest's in the importance of its results and the success with which the appalling difficulties of the journey were overcome. Through the generosity of Sir Thomas Elder, of Adelaide, Giles's expedition was equipped with camels. It started on the 23rd of May 1875 from Port Augusta. Working westerly along the line of the 30th parallel, Giles reached Perth in about five months. After resting in Perth for a short time, he commenced the return journey, which was made for the most part between the 24th and 25th parallels, and again successfully traversed the desert, reaching the overland telegraph line in about seven months. Giles's journeys added greatly to our knowledge of the character- istics of Western and South Australia, and he was able to bear out the common opinion that the interior of Australia west of 132° E. long, is a sandy and waterless waste, entirely unfit for settlement.

The list of explorers since 1875 is a long one; but after Forrest's and Giles's expeditions the main object ceased to be the discovery of pastoral country: a new zest had been added to the cause of exploration, and most of exp i rers. the smaller expeditions concerned themselves with the search for gold. Amongst the more important explorations may be ranked those of Tietkins in 1889, of Lindsay in 1891, of Wells in 1896, of Hiibbe in 1896, and of

the Hon. David Carnegie in 1896-97. Lindsay's expedition, which was fitted out by Sir Thomas Elder, the generous patron of Australian exploration, entered Western Australia about the. 26th parallel south lat., on the line of route taken by Forrest in 1874. From this point the explorer worked in a south-westerly direction to Queen Victoria Springs, where he struck the track of Giles's expedition of 1875. From the Springs the expedition went north-west and made a useful examination of the country lying between 119 and 115 meridians and between 26° and 28 S. lat. Wells's expedition started from a base about 122° 20′ E. and 25° 54′ S., and worked northward to the Joanna Springs, situated on the tropic of Capricorn and near the 124th meridian. From the springs the journey was continued along the same meridian to the Fitzroy river. The country passed through was mostly of a forbidding character, except where the Kimberley district was entered, and the expedition suffered even more than the

usual hardships. The establishment of the gold-fields, with their large population, caused great interest to be taken in the discovery of practicable stock routes, especially from South Australia in the east, and from Kimberley district in the north. Alive to the importance of the trade, the South Australian government despatched Hubbe from Oodnadatta to Coolgardie. He successfully accomplished his journey, but had to report that there was no practicable route for cattle between the two districts.

One of the most successful expeditions which traversed Western Australia was that led and equipped by the Hon. David Carnegie, which started in July 1896, and travelled north-easterly until it reached Alexander Spring; then turning northward, it traversed the country between Wells's track of 1896 and the South Australian border. The expedition en- countered very many hardships, but successfully reached Hall Creek in the Kimberley district. After a few months' rest it started on the return journey, following Sturt Creek until its termination in Gregory's Salt Sea, and then keeping parallel with the South Australian border as far as Lake Macdonald. Rounding that lake the expedition moved south-west and reached the settled districts in August 1897. The distance travelled was 5000 m., and the actual time employed was eight months. This expedition put an end to the hope, so long entertained, that it was possible to obtain a direct and practicable route for stock between Kimberley and Coolgardie gold-fields ; and it also proved that, with the possible exception of small isolated patches, the desert traversed contained no auriferous country.

It may be said that exploration on a large scale is now at an end; there remain only the spaces, nowhere very extensive, between the tracks of the old explorers yet to be examined, and these are chiefly in the Northern Territory and in Western Australia north of the tropic of Capricorn. The search for gold and the quest for unoccupied pasturage daily diminish the extent of these areas.

3. Political History.

Of the six Australian states, New South Wales is the oldest. It was in 1788, eighteen years after Captain Cook explored

the east coast, that Port Jackson was founded as forty a penal station for criminals from England; and

Oon"'"' tne settlement retained that character, more or less,*

during the subsequent fifty years, transportation being virtually suspended in 1839. The colony, however, from 1821 had made a fair start in free industrial progress. By this time, too, several of the other provinces had come into existence. Van Diemen's Land, now called Tasmania, had been occupied as early as 1803. It was an auxiliary penal station under New South Wales till in 1825 it became a separate government. From this island, ten years later, parties crossed Bass Strait to Port Phillip, where a new settlement was shortly established, forming till 1851 a part of New South Wales, but now the state of Victoria. In 1827 and 1829, an English company endeavoured to plant a settlement at the Swan river, and this, added to a small military station established in 1825 at King George Sound, constituted Western Australia. On the shores of the Gulf St Vincent, again, from 1835 to 1837, South Australia was created by another joint-stock company, as an experiment in the Wake- field scheme of colonization. Such were the political component parts of British Australia up to 1839. The early history, there- fore, of New South Wales is peculiar to itself. Unlike the other mainland provinces, it was at first held and used chiefly for the reception of British convicts. When that system was abolished, the social conditions of New South Wales, Victoria, and South Australia became more equal. Previous to the gold discoveries of 1851 they may be included, from 1839, in a general summary view.

The first British governors at Sydney, from 1788, ruled with despotic power. They were naval or military officers in command of the garrison, the convicts and the few free settlers. The duty was performed by such men as Captain Arthur Phillip, Captain Hunter, and others. In the twelve years' rule of General

Macquarie, closing with 1821, the colony made a substantial advance. By means of bond labour roads and bridges were con- structed, and a route opened into the interior beyond jj fae of the Blue Mountains. A population of 30,000, three- New fourths of them convicts, formed the infant common- South wealth, whose attention was soon directed to the profit- Wales. able trade of rearing fine wool sheep, first commenced by Captain John McArthur in 1803. During the next ten years, 1821-1831, Sir Thomas Brisbane and Sir Ralph Darling, two generals of the army, being successively governors, the colony increased, and eventually succeeded in obtaining the advantages of a repre- sentative institution, by means of a legislative council. Then came General Sir Richard Bourke, whose wise and liberal administration proved most beneficial. New South Wales became prosperous and attractive to emigrants with capital. Its enterprising ambition was encouraged by taking fresh country north and south. In the latter direction, explored by Mitchell in 1834 and 1836, lay Australia Felix, now Victoria, including the well-watered, thickly-wooded country of Gipps' Land.

This district, then called Port Phillip, in the time of Governor Sir George Gipps, 1838-1846, was growing fast into a position claiming independence. Melbourne, which began with a few huts on the banks of the Yarra-Yarra in 1835, vMorta" was in 1840 a busy town of 6000 inhabitants, the population of the whole district, with the towns of Geelong and Portland, reaching 12,850; while its import trade amounted to £204,000, and its exports to £138,000. Such was the growth of infant Victoria in five years; that of Adelaide or South Australia, in the same period, was nearly equal to it. At Mel- bourne there was a deputy governor, Mr Latrobe, under Sir George-Gipps at Sydney. Adelaide had its own governors, first Captain Hindmarsh, next Colonel Gawler, and then Captain George Grey. Western Australia progressed but slowly, with less than 4000 inhabitants altogether, under Governors Stirling and Hutt.

The general advancement of Australia, to the era of the gold- mining, had been satisfactory, in spite of a severe commercial crisis, from 1841 to 1843, caused by extravagant land speculations and inflated prices. Victoria produced of^u! 7 already more wool than New South Wales,the aggregate produce of Australia in 1852 being 45,000,000 lb; and South Australia, between 1842 and this date, had opened most valuable mines of copper. The population of New South Wales in 185 1 was 190,000; that of Victoria, 77,000; and that of South Australia about the same. At Summerhill Creek, 20 m. north of Bathurst, in the Macquarie plains, gold was discovered, in February 185 1, by Mr E. Hargraves, a gold-miner from California. The intelligence was made known in April or May; and then began a rush of thousands, — men leaving their former employ- ments in the bush or in the towns to search for the ore so greatly coveted in all ages.

In August it was found at Anderson's Creek, near Melbourne; a few weeks later the great Ballarat gold-field, 80 m. west of that city, was opened; and after that, Bendigo to the north. Not only in these lucky provinces, New South Wales and Victoria, where the auriferous deposits were revealed, but in every British colony of Australasia, all ordinary industry was left for the one exciting pursuit. The copper mines of South Australia were for the time deserted, while Tasmania and New Zealand lost many inhabitants, who emigrated to the more promising country. The disturbance of social, industrial and commercial affairs, during the first two or three years of the gold era, was very great. Immigrants from Europe, and to some extent from North America and China, poured into Mel- bourne, where the arrivals in 1852 averaged 2000 persons in a week. The population of Victoria was doubled in the first twelve- month of the gold fever, and the value of imports and exports was multiplied tenfold between 1851 and 1853. The colony of Victoria was constituted a separate province in July 1851, Mr Latrobe being appointed governor, followed by Sir Charles Hotham and Sir Henry Barkly in succession.

The separation of the northern part of eastern Australia,

under the name of Queensland, from the original province of New South Wales, took place in 1859. At that time the district contained about 25,000 inhabitants; and in the first six years Respon- its population was quadrupled and its trade trebled. sibie At the beginning of i860, when the excitement of the

govern- gold discoveries was wearing off, five of the states

had received from the home government the boon of responsible government, and were in a position to work out the problem of their position without external interference; it was not, however, until 1890 that Western Australia was placed in a similar position. After the establishment of responsible government the main questions at issue were the secular as opposed to the religious system of public instruction, protection as opposed to a revenue tariff, vote by ballot, adult suffrage, abolition of transportation and assignment of convicts, and free selection of lands before survey; these, and indeed all the great questions upon which the country was divided, were settled within twenty years of the granting of self-government. 1 With the disposal of these important problems, politics

in Australia became a struggle for office between men whose political principles were very much alike, and the tenure of power enjoyed by the various governments did not depend upon the principles of administration so much as upon the personal fitness of the head of the ministry, and the acceptability of his ministry to the members of the more popular branch of the legislature.

The two most striking political events in the modern history of Australia, as a whole, apart from the readiness it has shown

to remain a part of the British empire (q.v.), and to a "straiten develop along Imperial lines, are the advent of the problems. Labour party and the establishment of federation.

As regards the last mentioned it may be said that it was accomplished from within, there being no real external necessity for the union of the states. Leading politicians have in all the states felt the cramping effects of mere domestic legislation, albeit on the proper direction of such legislation depends the well- being of the people; and to this sense of the limitations of local politics was due, as much as to anything else, the movement towards federation.

Before coming, however, to the history of federation, and the evolution of the Labour party, we must refer briefly to some

*other questions which have been of general interest y*Ss/a? D in Australia. Taking the states as a whole, agrarian Hon. legislation has been the most important subject that*

has engrossed the attention of their parliaments, and every state has been more or less engaged in tinkering with its land laws. The main object of all such legislation is to secure the residence of the owners on the land. The object of settlers, however, in a great many, perhaps in the majority of instances, is to dispose of their holdings as soon as possible after the require- ments of the law have been complied with, and to avoid per- manent settlement. This has greatly facilitated the formation of large estates devoted chiefly to grazing purposes, contrary to the policy of the legislature, which has everywhere sought to en- courage tillage, or tillage joined to stock-rearing, and to discourage large holdings. The importance of the land question is so great that it is hardly an exaggeration to say that it is usual for every parliament of Australia to have before it a proposal to alter or amend its land laws. Since 1870 there have been five radical changes made in New South Wales. In Victoria the law has been altered five times, and in Queensland and South Australia seven times.

The prevention or regulation of the immigration of coloured races has also claimed a great share of parliamentary attention.

The agitation against the influx of Chinese commenced 'tion ' very s00n a ˆ ter t ' le £°ld discoveries, the European question, miners objecting strongly to the presence of these

aliens upon the diggings. The allegations made con- cerning the Chinese really amounted to a charge of undue

1 Australia, it may be noted, has woman's suffrage in all the states (Victoria, the last, adopting it in November 1908), and for the federal assembly.

industry. The Chinese were hard-working and had the usual fortune attending those who work hard. They spent little on drink or with the storekeepers, and were, therefore, by no means popular. As early as i860 there had been disturbances of a serious character, and the Chinese were chased off the goldfields of New South Wales, serious riots occurring at Lambing Flat, on the Burrangong goldfield. The Chinese difficulty, so far as the mining population was concerned, was solved by the exhaus- tion of the extensive alluvial deposits; the miners' prejudice against the race, however, still exists, though they are no longer serious competitors, and the laws of some of the states forbid any Chinese to engage in mining without the express authority in writing of the minister of mines. The nearness of China to Australia has always appeared to the Australian democracy as a menace to the integrity of the white settlements; and at the many conferences of representatives from the various states, called to discuss matters of general concern, the Chinese question has always held a prominent place, but the absence of any federal authority had made common action difficult. In 1888 the last important conference on the Chinese question was held in Sydney and attended by delegates from all the states. Previ- ously to the meeting of the conference there had been a great deal of discussion in regard to the influx of Chinese, and such influx was on all sides agreed to be a growing danger. The conference, therefore, merely expressed the public sentiment when it resolved that, although it was not advisable to prohibit altogether this class of immigration, it was necessary in the public interests that the number of Chinese privileged to land should be so limited as to prevent the people of that race from ever becoming an important element in the community. In conformity with this determination the various state legislatures enacted new laws or amended the existing laws to cope with the difficulty; these remained until they were in effect superseded by Common- wealth legislation. The objection to admitting immigrants was not only to the Chinese, but extended to all Asiatics; but as a large proportion of the persons whose entrance into the colonies it was desired to

stop were British subjects, and the Imperial government refused to sanction any measure directly prohibiting in plain terms the movement of British subjects from one part of the empire to another, resort was made to indirect legislation; this was the more advisable, as the rise of the Japanese power in the East and the alliance of that country with Great Britain rendered it necessary to pay attention to the susceptibilities of a powerful nation whose subjects might be affected by restrictive laws. Eventually the difficulty was overcome by the device of an educational test based on the provisions of an act in operation in Natal. It was provided that a person was to be prohibited from landing in Australia who failed to write in any prescribed language fifty words dictated to him by the commonwealth officer supervising immigration. The efficacy of this legislation is in its administration, the language in which coloured aliens are usually tested being European. The agitation against the Chinese covered a space of over fifty years, a long period in the history of a young country, and was promoted and kept alive almost entirely by the trades unions, and the restriction acts were the first legislative triumph of the Labour party, albeit that party was not at the time directly represented in parliament.

One of the most notable events in the modern history of Australia occurred shortly after the great strike of 1890. This was what is ordinarily termed the bank crisis of 1893. Although this crisis followed on the great strike, the crisis ot two things had no real connexion, the crisis being the is93. natural result of events long anterior to 1890. The effects of the crisis were mainly felt in the three eastern states, Queensland, New South Wales and Victoria, Tasmania and South Australia being affected chiefly by reason of the fact of their intimate financial connexion with the eastern states. The approach of the crisis was heralded by many signs. Deposits were shifted from bank to bank, there were small runs on several of the savings banks guaranteed by the government, mortgagees required additional security from their debtors, bankruptcies

became frequent, and some of the banks began to accumulate gold against the evil day. The building societies and financial institutions in receipt of deposits, or so many of them as were on an unsound footing, failed at an early period of the depression, so also did the weaker banks. There was distrust in the minds of the depositors, especially those whose holdings were small, and most of the banks were, at a very early period, subjected to the strain of repaying a large proportion of their deposits as they fell due. For a

time the money so withdrawn was hoarded, but after a while it found its way back again into the banks. The crisis was by no means a sudden crash, and even when the failures began to take place they were spread over a period of sixteen weeks.

The first noticeable effect of the crisis was a great scarcity of employment. Much capital was locked up in the failed banks, and was therefore not available for distribution amongst wage- earners. Wages fell precipitately, as also did rents. There was an almost entire cessation of building, and a large number of houses in the chief cities remained untenanted, the occupants moving to lodgings and more than one family living in a single house. Credit became greatly restricted, and all descriptions of speculative enterprise came to an end. The consuming power of the population was greatly diminished, and in the year following the crisis the imports into Australia from abroad diminished by four and three-quarter millions. In fact, every- where the demand for goods, especially of those for domestic consumption, fell away; and there was a reduction in the average number of persons employed in the manufacturing industries to the extent of more than 20 %. The lack of employment in factories naturally affected the coal mining industry, and indeed every industry in the states, except those connected with the export trade, was severely affected. During the crisis banks having a paid-up capital and reserves of £5,000,000 and deposits of £53,000,000 closed their doors. Most of these, however, reopened for business before many weeks. The crisis was felt in the large cities more keenly than in the country districts, and in Melbourne more severely than in any other capital. The change of fortune proved disastrous to many families, previously to all appearances in opulent circum- stances, but by all classes alike their reverses were borne with the greatest bravery. In its ultimate effects the crisis was by no means evil. Its true meaning was not lost upon a business community that had had twenty years of almost unchecked prosperity. It required the chastening of adversity to teach it a salutary lesson, and a few years after, when the first effects of the crisis had passed away, business was on a much sounder footing than had been the case for very many years. One of the first results was to put trade on a sound basis and to abolish most of the abuses of the credit system, but the most striking effect of the crisis was the attention which was almost immedi- ately directed to productive pursuits. Agriculture everywhere expanded, the mining industry revived, and, if it had not been for the low prices of staple products, the visible effects of the crisis would have passed away within a very few years.

Another matter which deserves attention was the great drought which culminated in the year 1902. For some years previously the pastoral industry had been declining of˚iM2. an(l l ˆ e num ber of sheep and cattle in Australia had greatly diminished, but the year 1902 was one of veritable

drought. The failure of the crops was almost universal and large numbers of sheep and cattle perished for want of food. The truth is, pastoralists for the most part carried on their industry trusting very greatly to luck, not making any special provisions against the vicissitudes of the seasons. Enormous quantities of natural hay were allowed every year to rot or be destroyed by bush fires, and the bountiful provision made by nature to carry them over the seasons of dry weather absolutely neglected; so that when the destructive season of 1902 fell upon them, over a large area of territory there was no food for the stock. The year 1903 proved most bountiful, and in a few years all trace of the disastrous drought of 1902 passed away. But

beyond this the pastoralist learnt most effectually the lesson that, in a country like Australia, provision must be made for the occasional season when the rainfall is entirely inadequate to the wants of the farmer and the pastoralist.

The question of federation was not lost sight of by the framers of the original constitution which was bestowed upon New South Wales. In the report of the committee of the legislative council appointed in 1852 to prepare a constitution tiom for that colony, the following passage occurs: — " One of the most prominent legislative measures required by the colony, and the colonies of the Australian group generally, is the establishment at once of a general assembly, to make laws in relation to those intercolonial questions that have arisen or may hereafter arise among them. The questions which would claim the exercise of such a jurisdiction appear to be (1) inter- colonial tariffs and the coasting trade; (2) railways, roads, canals, and other such works running through any two of the colonies; (3) beacons and lighthouses on the coast; (4) inter- colonial gold regulations; (5) postage between the said colonies;

(6) a general court of appeal from the courts of sucn colonies;

(7) a power to legislate on all other subjects which may be submitted to them by addresses from the legislative councils and assemblies of the colonies, and to appropriate to any of the above-mentioned objects the necessary sums of money, to be raised by a percentage on the revenues of all the colonies interested." This wise recommendation received very scant attention, and it was not until the necessities of the colonies forced them to it that an attempt was made to do what the framers of the original constitution suggested. Federation at no time actually dropped out of sight, but it was not until thirty- five years later that any practical steps were taken towards its accomplishment. Meanwhile a sort of makeshift was devised, and the Imperial parliament passed a measure permitting the formation of a federal council, to which any colony that felt inclined to

join could send delegates. Of the seven colonies New South Wales and New Zealand stood aloof from the council, and from the beginning it was therefore shorn of a large share of the prestige that would have attached to a body speaking and acting on behalf of a united Australia. The council had also a fatal defect in its constitution. It was merely a deliberative body, having no executive functions and possessing no control of funds or other means to put its legislation in force. Its existence was well-nigh forgotten by the people of Australia until the occurrence of its biennial meetings, and even then but slight interest was taken in its proceedings. The council held eight meetings, at which many matters of intercolonial interest were discussed. The last occasion of its being called together was in 1899, when the council met in Melbourne. In 1889 an important step towards federation was taken by Sir Henry Parkes. The occasion was the report of Major-General Edwards on the defences of Australia, and Sir Henry addressed the other premiers on the desirability of a federal union for purposes of defence. The immediate result was a conference at Parliament House, Melbourne, of representatives from each of the seven colonies. This conference adopted an address to the queen expressing its loyalty and attachment, and submitting certain resolutions which affirmed the desirability of an early union, under the crown, of the Australasian colonies, on principles just to all, and provided that the remoter Australasian colonies should be entitled to admission upon terms to be afterwards agreed upon, and that steps should be taken for the appointment of delegates to a national Australasian convention, to consider and report upon an adequate scheme for a federal convention. In accordance with the understanding arrived at, the various Australasian parliaments appointed delegates to attend a national convention to be held in Sydney, and on the 2nd March 1891 the convention held its first meeting. Sir Henry Parkes was elected president, and he moved a series of resolutions embodying the principles necessary to establish, on an enduring foundation, the structure of a federal government. These resolutions were slightly altered by the conference, and were adopted in the following form: —

1. The powers and rights of existing colonies to remain intact, except as regards such powers as it may be necessary to hand over to the Federal government.

2. No alteration to be made in states without the consent of the legislatures

of such states, as well as of the federal parliament.

3. Trade between the federated colonies to be absolutely free.

4. Power to impose customs and excise duties to be in the Federal government and parliament.

5. Military and naval defence forces to be under one command.

6. The federal constitution to make provision to enable each state to make amendments in the constitution if necessary for the purposes of federation.

Other formal resolutions were also agreed to, and on the 31st of March Sir Samuel Griffith, as chairman of the committee on constitutional machinery, brought up a draft Constitution Bill, which was carefully considered by the convention in committee of the whole and adopted on the 9th of April, when the conven- tion was formally dissolved. The bill, however, fell absolutely dead, not because it was not a good bill, but because the movement out of which it arose had not popular initiative, and therefore failed to reach the popular imagination.

Although the bill drawn up by the convention of 1891 was not received by the people with any show of interest, the federation movement did not die out; on the contrary, it had many en- thusiastic advocates, especially in the colony of Victoria. In 1894 an unofficial convention was held at Corowa, at which the cause of federation was strenuously advocated, but it was not until 1895 that the movement obtained new life, by reason of the proposals adopted at a meeting of premiers convened by Mr G. H. Reid of New South Wales. At this meeting all the colonies except New Zealand were represented, and it was agreed that the parliament of each colony should be asked to pass a bill enabling the people to choose ten persons to represent the colony on a federal convention; the work of such convention being the framing of a federal constitution to be submitted to the people for approval by means of the referendum. During the year 1896 Enabling Acts were passed by New South Wales, Victoria, Tasmania, South Australia and Western Australia, and delegates were elected by popular vote in all the colonies named except Western Australia, where the delegates were chosen by parlia- ment. The convention met in Adelaide on the 22nd of March 1897, and, after drafting a bill for the consideration of the various parliaments, adjourned until the 2nd of September. On that date the delegates reassembled in Sydney, and debated the bill in the light of the suggestions made by the legislatures of the federating colonies. In the course of the proceedings it was announced that Queensland desired to come within the proposed union; and in view of this development, and in order to give further opportunity for the consideration of the bill, the convention

again adjourned. The third and final session was opened in Melbourne on the 20th of January 1898, but Queensland was still unrepresented; and, after further con- sideration, the draft bill was finally adopted on the 16th of March and remitted to the various colonies for submission to the people.

The constitution was accepted by Victoria, South Australia and Tasmania by popular acclamation, but in New South Wales very great opposition was shown, the main points of objection being the financial provisions, equal representation in the Senate, and the difficulty in the way of the larger states securing an amendment of the constitution in the event of a conflict with the smaller states. As far as the other colonies were concerned, it was evident that the bill was safe, and public attention throughout Australia was fixed on New South Wales, where a fierce political contest was raging, which it was recognized would decide the fate of the measure for the time being. The fear was as to whether the statutory number of 80,000 votes necessary for the acceptance of the bill would be reached. This fear proved to be well founded, for the result of the referendum in New South Wales showed 71,595 votes in favour of the bill and 66,228 against it, and it was accordingly lost. In Victoria, Tasmania and South Australia, on the other hand, the bill was accepted by triumphant majorities. Western Australia did not put it to the vote, as the Enabling Act of that colony only provided for joining a federation of which New South Wales should form a part. The existence

of such a strong opposition to the bill in the mother colony convinced even its most zealous advocates that some changes would have to be made in the constitution before it could be accepted by the people; consequently, although the general election in New South Wales, held six or seven weeks later, was fought on the federal issue, yet the opposing parties seemed to occupy somewhat the same ground, and the question narrowed itself down to one as to which party should be entrusted with the negotiations to be conducted on behalf of the colony, with a view to securing a modification of the objectionable features of the bill. The new parliament decided to adopt the procedure of again sending the premier, Mr Reid, into conference, armed with a series of resolutions affirming its desire to bring about the completion of federal union, but asking the other colonies to agree to the reconsideration of the provisions which were most generally objected to in New South Wales. The other colonies interested were anxious to bring the matter to a speedy termina- tion, and readily agreed to this course of procedure. Accord- ingly a premiers' conference was held in Melbourne at the end of January 1899, at which Queensland was for the first time represented. At this conference a compromise was effected, something was conceded to the claims of New South Wales, but the main principles of the bill remained intact. The bill as amended was submitted to the electors of each colony and again triumphantly carried in Victoria,

South Australia arid Tasmania. In New South Wales and Queensland there were still a large number of persons opposed to the measure, which was nevertheless carried in both colonies. New South Wales having decided in favour of federation, the way was clear for a decision on the part of Western Australia. The Enabling Bill passed the various stages in the parliament of that colony, and the question was then adopted by referendum.

In accordance with this general verdict of all the states, the colonial draft bill was submitted to the imperial government for legislation as an imperial act; and six delegates were sent to England to explain the measure and to pilot it through the cabinet and parliament. A bill was presented to the British parliament which embodied and established, with such variations as had been accepted on behalf of Australia by the delegates, the constitution agreed to at the premiers' conference of 1899 and speedily became law. Under this act, which was dated the 9th of July 1900, a proclamation was issued on the 17th of September of the same year, declaring that, on and after the 1st of January 1901, the people of New South Wales, Victoria, South Australia, Queensland, Tasmania and Western Australia should be united in a federal commonwealth under the name of the Commonwealth of Australia.

*The six colonies entering the Commonwealth were denominated original states, and new states might be admitted, or might be formed by separation from or union of two or more states _ˆ or parts of states; and territories (as distinguished from /ˆy ?**L** states) might be taken over and governed under the legis- Jfˆg- lative power of the Commonwealth. The legislative otI90e – power is vested in a federal parliament, consisting of the sovereign, a senate, and a house of representatives, the sovereign being represented by a governor-general. The Senate was to consist of the same number of members (not less than six) for each state, the term of service being six years, but subject to an arrangement that half the number would retire every three years. The House of Representatives was to consist of members chosen in the different states in numbers proportioned to their population, but never fewer than five. The first House of Representatives was to contain seventy-five members. For elections to the Senate the governors of states, and for general elections of the House of Representatives the governor-general, would cause writs to be issued. The Senate would choose its own president, and the House of Representatives its speaker; each house would make its own rules of procedure; in each, one-third of the number of members would form a quorum; the members of each must take oath, or make affirmation of allegi- ance ; and all alike would receive an allowance of £400 a year. The legislative powers of the parliament have a wide range, many matters being transferred to it from the colonial parliaments. The more important subjects with which it deals are trade, shipping and*

railways; taxation, bounties, the borrowing of money on the credit of the Commonwealth; the postal and telegraphic services; defence, census and statistics; currency, coinage, banking, bank- ruptcy ; weights and measures ; copyright, patents and trade

marks; marriage and divorce; immigration and emigration; con- ciliation and arbitration in industrial disputes. Bills imposing taxation or appropriating revenue must not originate in the Senate, and neither taxation bills nor bills appropriating revenue for the annual service of the government may be amended in the Senate, but the Senate may return such bills to the House of Representatives with a request for their amendment. Appropriation laws must not deal with other matters. Taxation laws must deal with only one subject of taxation ; but customs and excise duties may, respectively, be dealt with together. Votes for the appropriation of the revenue shall not pass unless recommended by the governor-general. The constitution provides means for the settlement of disputes between the houses, and requires the assent of the sovereign to all laws. The executive power is vested in the governor-general, assisted by an executive council appointed by himself. He has command of the army and navy, and appoints federal ministers and judges. The ministers are members of the executive council, and must be, or within three months of their appointment must become, members of the parliament. The judicial powers are vested in a high court and other federal courts, and the federal judges hold office for life or during good behaviour. The High Court has appellate jurisdiction in cases from other federal courts and from the supreme courts of the states, and it has original jurisdiction in matters arising under laws made by the federal parliament, in disputes between states, or residents in different states, and in matters affecting the representa- tives of foreign powers. Special provisions were made respecting appeals from the High Court to the sovereign in council. The con- stitution set forth elaborate arrangements for the administration of finance and trade during the transition period following the trans- ference of departments to the Commonwealth. Within two years uniform customs duties were to be imposed; thereafter the parlia- ment of the Commonwealth had exclusive power to impose customs and excise duties, or to grant bounties; and trade within the Commonwealth was to be absolutely free. Exceptions were made permitting the states to grant bounties on mining and (with the consent of the parliament) on exports of produce or manufactures — Western Australia being for a time partially exempted from the prohibition to

impose import duties.

The constitution, parliament and laws of each state, subject to the federal constitution, retained their authority; state rights were carefully safeguarded, and an inter-state commission was given powers of adjudication and of administration of the laws relating to trade, transport and other matters. Provision was made for necessary alteration of the constitution of the Commonwealth, but so that no alteration could be effected unless the question had been directly submitted to, and the change accepted by the electorate in the states. The seat of government was to be within New South Wales, not less than ioo m. distant from Sydney, and of an area not less than ioo sq. m. Until other provision was made, the governor-general was to have a salary of £10,000, paid by the Commonwealth. Respecting the salaries of the governors of states, the constitution made no provision.

The choice of governor-general of the new Commonwealth fell upon Lord Hopetoun (afterwards Lord Linlithgow) ,. who had won golden opinions as governor of Victoria a few years before; Mr (afterwards Sir Edmund) Barton, who had taken the lead among the Australian delegates, became first prime minister; and the Commonwealth was inaugurated at the opening of 1901. The first parliament under the constitution was elected on the 29th and 30th of March 1901, and was opened by the prince of Wales on the 9th of May following. In October 1908 the Yass-Canberra district, near the town of Yass, N.S.W., was at length selected by both federal houses to contain the future federal capital.

The Labour movement in Australia may be traced back to the early days when transportation was in vogue, and the free immigrant and the time-expired convict objected movement. t0 ˆ e competition of the bond labourer. The great object of these early struggles being attained, Labour directed its attention mainly to securing shorter hours. It was aided very materially by the dearth of workers consequent on the gold discoveries, when every man could command his own price. When the excitement consequent on the gold finds had subsided, there was a considerable reaction against the claims of Labour, and this was greatly helped by the congested state of the labour market; but the principle of an eight-hours day made progress, and was conceded in several trades. In the early years of the 'seventies the colonies entered upon an era of well- being, and for about twelve years every man, willing to work and capable of exerting himself, readily found employment. The Labour unions were able to secure in these years many concessions both as to hours and wages. In 1873 there was an

important rise in wages, in the following year there was a further advance,

and another in 1876: but in 1877 wages fell back a. little, though not below the rate of 1874. In 1882 there was a very important advance in wages; carpenters received us. a day, bricklayers 12s. 6d., stone-masons 11 s. 6d., plasterers 12s., painters 1 is., blacksmiths 10s., and navvies and general labourers 8s., and work was very plentiful. For five years these high wages ruled; but in 1886 there was a sharp fall, -though wages still remained very good. In 1888 there was an advance, and again in 1889. In 1890 matters were on the eve of a great change and wages fell, in most cases to a point 20 % below the rates of 1885. During the whole period from 1873 onwards, prices, other than of labour, were steadily tending downwards, so that the cost of living in 1890 was much below that of 1873. Taking everything into consideration the reduction was, perhaps, not less than 20 %, so that, though the nominal or money wages in 1873 and 1890 were the same, the actual wages were much higher in the latter year. Much of the improvement in the lot of the wage-earners has been due to the Labour organizations, yet so late as 1881 these organizations were of so little account, politically, that when the law relating to trades unions was passed in New South Wales, the English law was followed, and it was simply enacted that the purposes of any trades union shall not be deemed unlawful (so as to render a member liable to criminal prosecution for conspiracy or otherwise) merely by reason that they are in restraint of trade. After the year 1884 Labour troubles became very frequent, the New South Wales coal miners in particular being at war with the colliery owners during the greater part of the six years intervening between then and what is called the Great Strike. The strong downward tendency of prices made a reduction of wages im- perative; but the labouring classes failed to recognize any such necessity, and strongly resented any reductions proposed by employers. It was hard indeed for a carter drawing coal to a gasworks to recognize the necessity which compelled a reduction in his wages because wool had fallen 20 %. Nor were other labourers, more nearly connected with the producing interests, satisfied with a reduction of wages because produce had fallen in price all round. Up to 1889 wages held their ground, although work had become more difficult to obtain, and some industries were being carried on without any profit. It was Tbeareai at such an inopportune time that the most extensive strike combination of Labour yet brought into action against of 1890. capital formulated its demands. It is possible that the London dockers' strike was not without its influence on the minds of the Australian Labour leaders. That strike had been liberally helped by the Australian unions, and it was confidently predicted that, as the Australian workers were more effectively organized than the English unions, a corresponding success would result from their course of action. A strike of the Newcastle miners, after lasting twenty-nine weeks, came to an end in January 1890, and throughout the rest of the year there was great unrest in Labour circles. On the 6th of September the

silver mines closed down, and a week later a conference of employers issued a, manifesto which was met next day by a counter-manifesto of the Intercolonial Labour Conference, and almost immediately afterwards by the calling out of 40,000 men. The time chosen for the strike was the height of the wool season, when a cessation of work would be attended with the maximum of inconvenience. Sydney was the centre of the disturbance, and the city was in a state of industrial siege, feeling running to dangerous extremes. Riotous scenes occurred both in Sydney and on the coal-fields, and a large number of special constables were sworn in by the government. Towards the end of October 20,000 shearers were called out, and many other trades, principally concerned with the handling or shipping of wool, joined the ranks of the strikers, with the result that the maritime and pastoral industries through- out the whole of Australia were most injuriously disturbed. The Great Strike terminated early in November 1890, the employers gaining a decisive victory. The colonies were, how- ever, to have other and bitter experiences of strikes before Labour recognized that of all means for settling industrial

conse- quences.

disputes strikes are, on the whole, the most disastrous that it can adopt. The strikes of the years 1890 and 1892 are just as important on account of their political consequences as from the direct gains or losses involved.

As one result of the strike of 1890 a movement was set afoot by a number of enthusiasts, more visionary than practical, that has resulted in a measure of more or less disaster. Political This was thg planting of a colony of communistic Australians in South America. After much negotiation the leader, Mr William Lane, a Brisbane journalist, decided on Paraguay, and he tramped across the continent, preaching a new crusade, and gathering in funds and recruits in his progress. On the 16th of July 1893 the first little army of " New Australians " left Sydney in the " Royal Tar," which arrived at Montevideo on the 31st of August. Other consign- ments of intending settlers in " New Australia " followed; but though the settlement is still in existence it has completely failed to realize the impracticable ideals of its original members. The Queensland government assisted some of the disillusioned to escape from the paradise which proved a prison ; some managed to get away on their own account; and those that have remained have split into as many settlements almost as there are settlers. Another

effect of the Great Strike was in a more practical direc- tion. New South Wales was the first country which endeavoured to settle its labour grievances through the ballot-box and to send a great party to parliament as the direct representation of Labour, pledged to obtain through legislation what it was unable to obtain by strikes and physical force. The principle of one-man one-vote had been persistently advocated without arousing any special parliamentary or public enthusiasm until the meeting of the Federal Convention in 189 1. The convention was attended by Sir George Grey, who was publicly welcomed to the colony by New Zealanders resident in Sydney, and by other admirers, and his reception was an absolute ovation. He eloquently and persistently advocated the principle of one- man one-vote as the bed-rock of all democratic reform. This subsequently formed the first plank of the Labour platform. Several attempts had been made by individuals belonging to the Labour party to enter the New South Wales parliament, but it was not until 1891 that the occurrence of a general election gave the party the looked-for opportunity for concerted action. The results of the election came as a complete surprise to the majority of the community. The Labour party captured 35 seats out of a House of 125 members; and as the old parties almost equally divided the remaining seats, and a fusion was impossible, the Labour representatives dominated the situation. It was not long, however, before the party itself became divided on the fiscal question ; and a Protectionist government coming into power, about half the Labour members gave it consistent support and enabled it to maintain office for about three years, the party as a political unit being thus destroyed. The events of these three years taught the Labour leaders that a parliamentary party was of little practical influence unless it was able to cast on all important occasions a solid vote, and to meet the case a new method was devised. The party therefore determined that they would refuse to support any person standing in the Labour interests who refused to pledge himself to vote on all occasions in such way as the majority of the party might decide to be expedient. This was called the " solidarity pledge," and, united under its sanction, what was left of the Labour party contested the general election of 1894. The result was a defeat, their numbers being reduced from 35 to 19; but a signal triumph was won for solidarity. Very few of the members who refused to take the pledge were returned and the adherents of the united party were able to accomplish more with their reduced number than under the old conditions.

The two features of the Labour party in New South Wales are its detachment from other parties and the control of the caucus. The caucus, which is the natural corollary of the detachment, determines by majority the vote of the whole of the members of the party, independence of action being allowed on minor questions only. So far the party has refrained from formal alliance with the other great parties of the state. It supports the

government as the power

alone capable of promoting legislation, but its support is given only so long as the measures of the government are consistent with the Labour policy. This position the Labour party has been able to maintain with great success, owing to the circumstance that the other parties have been almost equally balanced.

The movement towards forming a parliamentary Labour party was not confined to New South Wales; on the contrary, it was common to all the states, having its origin in p ar n a . the failure of the Great Strike of 1890. The experience mentary of the party was also much the same as in New South Labour Wales, but its greatest triumphs were achieved in pa y ‘ South Australia. The Labour party has been in power in Queensland, Western Australia and South Australia, and has, on many occasions, decided the fate of the government on a critical division in all the states except Tasmania and Victoria”. Different ideals dominate the party in the different states. The one ideal which has just been described represents the Labour party from the New South Wales standpoint. The only qualification worth mentioning is the signing of the pledge of solidarity. The other ideal, typified by the South Australian party, differs from this in one important respect. To the Labour party in that state are admitted only persons who have worked for their living at manual labour, and this qualification of being an actual worker is one that was strongly insisted upon at the formation of the party and strictly adhered to, although the temptation to break away from it and accept as candidates persons of superior education and position has been very great. On the formation of the Commonwealth a Labour party was established in the federal houses. It comprises one-third of the representation in the House of Representatives, and perhaps a still larger propor- tion in the Senate. The party is, however, formed on a broader basis than the state parties, the solidarity pledge extends only to votes upon which the fate of a government depends. Naturally, however, as the ideals of the members of the party are the same, the members of the Labour party will be generally found voting together on all important divisions, the chief exception being with regard to free trade or protection. The Labour party held power in the Commonwealth for a short period, and has had the balance of power in its hands ever since the formation of the Commonwealth. (T. A. C.)

Australian legislation in the closing years of the 19th century and the first decade of the 20th bore the most evident traces of the Labour party’s influence. In all the colonies a complete departure from principles laid down by the f^f leading political economists of the 19th century was lation. made when acts were passed subjecting every branch of domestic industry to the control of specially constituted tribunals, which were*

empowered among other important functions to fix the minimum rate of wages to be paid to all grades of work- men. (See also the articles Arbitration and Conciliation; Trade Unions; Labour Legislation.)

Victoria was the pioneer in factory legislation, the first Victorian act of that character dating from 1873. In 1884 a royal commission, appointed two years earlier to inquire into the conditions victoria. of employment in the colony and certain allegations of "sweating" that had then recently been made, reported that: — " The most effective mode of bringing about industrial co-operation and mutual sympathy between employers and employed, and thus obviating labour conflicts in the future, is by the establishment of courts of conciliation in Victoria, whose procedure and awards shall have the sanction and authority of law." This report led to the passing of a number of acts which, proving ineffectual, were followed by the Factories and Shops Act of 1896, passed by the ministry of Mr (afterwards Sir Alexander) Peacock. This measure, together with several subsequent amending acts, of which the most important became law in 1903, 1905 and 1907, forms a complete industrial code in which the principle of state regulation of wages is recognized and established. Its central enactment was to bring into existence (1) " Special Boards," consisting of an equal number of representa- tives of employers and workmen respectively in any trade, under the presidency of an independent chairman, and (2) a Court of Industrial Appeals. A special board may be formed at the request of any union of employers or of workmen, or on the initiative of the Labour department. After hearing evidence, which may be given on oath, the special board issues a " determination," fixing the minimum rate of wages to be paid to various classes of workers of both sexes and different ages in the trade covered by the deter- mination, including apprentices ; and specifying the number of hours

per week for which such wages are payable, with the rates for over- time when those hours are exceeded. The determination is then gazetted, and it becomes operative over a specified area, which varies in different cases, on a date fixed by the board. Either party, or the minister for Labour, may refer a determination to the court of industrial appeals, and the court, in the event of a special board failing to make a determination, may itself be called upon to frame one. The general administration of the Factories and Shops Acts, to which the special boards owe their being, is vested in a chief inspector of factories, subject to the control of the minister of Labour in

matters of policy. Before the end of 1906 fifty-two separate trades in Victoria had obtained special boards, by whose determina- tions their operations were controlled.

South -ˆ similar system was introduced into South Australia

Australia, by an act passed in 1900 amending the Factory Act of 1894, which was the first legislation of the sort passed in that state.

In Queensland, where the earliest factory legislation dates from

Queens- l 9 > keen parliamentary conflict raged round the pro-

land. posal in 1907 to introduce the special boards system for

fixing wages. More than one change of government

occurred before the bill became law in April 1908.

In New South Wales, whose example was followed by Western Australia, the machinery adopted for fixing the statutory rate of New South wa S es was °f a somewhat different type. The model Wales. followed in these two states was not Victoria but New Zealand, where an Industrial Conciliation and Arbitration Act was passed in 1894. A similar measure, under the guidance of the attorney-general, the Hon. B. R. Wise, was carried after much opposition in New South Wales in 1901, to remain in force till the 30th of June 1908. By it an arbitration court was instituted, con- sisting of a president and assessors representing the employers' unions and the workers' unions respectively; in any trade in which a dispute occurs, any union of workmen or employers registered under the act was given the right to bring the matter before- the arbitration court, and if the court makes an award, an application may be made to it to make the award a " common rule," which there- upon becomes binding over the trade affected, wherever the act applies. The award of the court is thus the equivalent of the deter- mination of a special board in Victoria, and deals with the same questions, the most important of which are the minimum rates of wages and the number of working hours per week. The act contained stringent provisions forbidding strikes; but in this respect it failed to effect its purpose, several strikes occurring in the years following its enactment, in which there were direct refusals to obey awards.

In the years 1900 and 1902 acts were passed in Western Australia still more closely modelled on the New Zealand act than was the Western above-mentioned statute in New South Wales. Unlike Australia. tne l at ter, they reproduced the institution of district conciliation boards in addition to the arbitration court ; but these boards were a failure here as they were in

New Zealand, and after 1903 they fell into disuse. In Western Australia, too, the act failed to prevent strikes taking place. In 1907 a serious strike occurred in the timber trade, attended by all the usual accompani- ments, except actual disorder, of an industrial conflict.

In all this legislation one of the most hotly contested points was whether the arbitration court should be given power to lay it down Federal t ˆ at wor ‘ c ers who were members of a trade union should Arbitra- ˆ e em Pl°y e d in preference to non-unionists. This power tloa Act vvas gi ven to the tribunal in New South Wales, but was 1904. withheld in Western Australia. It was the same question

that formed the chief subject of debate over the Federal Conciliation and Arbitration Act, which, after causing the defeat of more than one ministry, passed through the Commonwealth parlia- ment in 1904. It was eventually compromised by giving the power, but only with safeguarding conditions, to the Federal arbitration court. This tribunal differs from similar courts in the states inasmuch as it consists of a single member, called the ” president,” an officer appointed by the governor-general from among the justices of the High Court of Australia. The president has the power to appoint assessors to advise him on technical points ; and considerable powers of devolution of authority for the purpose of inquiry and report are conferred upon the court, the main object of which is to secure settlement by conciliatory methods. The distinctive object of the Federal Act, as defined in the measure itself, is to provide machinery for dealing with industrial disputes extending beyond any one state, examples of which were furnished by the first two important cases submitted to the court — the one concerning the merchant marine of Australia, and the other the sheep shearers, both of which were heard in 1907. An additional duty was thrown on the Federal arbitration court by the Customs and Excise Tariff Acts of 1906, in which were embodied the principles known as the ” New Pro- tection.” By the Customs Act the duty was raised on imported agricultural implements, while as a safeguard to the consumer the maximum prices for the retail of the goods were fixed. In order to provide a similar protection for the artisans employed in the protected industries, an excise duty was imposed on the home-produced articles, which was to be remitted in favour of manufacturers who could show that they paid “fair and reasonable ” wages, and complied with certain other conditions for the benefit of their workmen. The ‘

chief authority for determining whether these conditions are satisfied or not is the Federal arbitration court.

The same period that saw this legislation adopted was also marked by the establishment of old age pensions in the three eastern states, and also in the

Commonwealth. By the Federal Act, oidage passed in the session of 1908, a pension of ten shillings pen sions. a week was granted to persons of either sex over sixty-five years of age, or to persons over sixty who are incapacitated from earning a living. The Commonwealth legislation thus made pro- vision for the aged poor in the three states which up to 1908 had not accepted the principle of old age pensions, and also for those who, owing to their having resided in more than one state, were debarred from receiving pension in any.

An important work of the Commonwealth parliament was the passing of a uniform tariff to supersede the six separate tariffs in force at the establishment of the Commonwealth, Tariff but many other important measures were considered and some passed into law. During the first six years of federation there were five ministries; the tenure of office under the three- yearly system was naturally uncertain, and this uncertainty was reflected in the proposals of whatever ministry was in office. The great task of adjusting the financial business of the Common- wealth on a permanent basis was one of very great difficulty, as the apparent interests of the states and of the Commonwealth were opposed. Up till 1908 it had been generally assumed that the constitution required the treasurer of the Commonwealth to hand over to the states month by month whatever surplus funds remained in his hands. But in July 1908 a Surplus Revenue Act was passed which was based on a different inter- pretation of the constitution. Under this act the appropriation of these surplus funds to certain trust purposes in the Federal treasury is held to be equivalent to payment to the states. The money thus obtained was appropriated in part to naval defence and harbours, and in part to the provision of old age pensions under the Federal Old Age Pension Act of 1908. The act was strongly opposed by the government of Queensland, and the question was raised as to whether it was based on a true inter- pretation of the constitution. The chief external interest, how- ever, of the new financial policy of the Commonwealth lay in its relation towards the empire as a whole. At the Imperial Conference in London in 1907 Mr Deakin, the Commonwealth premier, was the leadingadvocateof colonial preference witha view to imperial commercial union; and though no reciprocal arrange- ment was favoured by the Liberal cabinet, who temporarily . spoke for the United Kingdom, the colonial representatives were all agreed in urging such a policy, and found the Opposition (the Unionist party) in England prepared to adopt it as part of Mr Chamberlain's tariff reform movement. In spite of the official rebuff received from the mother-country, the Australian ministry, in drawing up the new Federal tariff, gave a substantial preference to British imports, and thus showed their willingness to go farther. (Sep the article British Empire.) (R. J.M.)

General Bibliography. — For Physical Geography: Barton, Australian

Physiography ■(Brisbane, 1895) ; Wall, Physical Geography of Australia (Melbourne, 1883) ; Taylor, Geography of New South Wales (Sydney, 1898) ; Saville Kent, The Great Barrier Reef of Australia (London, 1893) ; A. Agassiz, Visit to the Barrier Reef (Cam- bridge, Mass., 1899) ; J. P. Thomson, The Physical Geography of Australia (Smithsonian Report, Washington, 1898); J. W. Gregory, The Dead Heart of Australia. For Flora: Maiden, Useful. Native Plants of Australia (Sydney, 1889) ; Bentham and Mueller, Flora Australiensis (London, 1863-1878); Fitzgerald, Australian Orchids (Sydney, 1870-1890); Mueller, Census of Australian Plants (Mel- bourne, 1889). For Fauna: Forbes, " The Chatham Islands; their Relation to a former Southern Continent," Geographical Journal, vol. ii. (1893); Hedley, " Surviving Refugees in Austral Lands of Ancient Antarctic Life," Royal Society N. S. Wales, 1895; " The Relation of the Fauna and Flora of Australia to those of New Zealand," Nat. Science (1893); Tenison- Woods, The Fish and Fisheries of New South Wales (Sydney, 1883); Ogilvy, Catalogue of Australian Mammals (Sydney, 1892); Aflalo, Natural History of Australia (London, 1896); Flower and Lydekker, Mammals, Living and Extinct (London, 1891); J. Douglas Ogilby, Catalogue of the Fishes of New South Wales, 4to (Sydney, 1886). For Statistics and Miscellanea: T. A. Coghlan, A Statistical Account of the Seven Colonies of Australasia, 8vo (Sydney, 1904); G. Collingridge, The Discovery of Australia (Sydney, 1895); W. Epps, The Land Systems of Australia, 8vo (London, 1894); Ernest Favenc, The History of Australasian Exploration, royal Svo (Sydney, 188$); R. R. Garran,

The Coming Commonwealth: a Handbook of Federal Government (Sydney, 1897); George William Rusden, History of Australia, 3 vols. 8vo (London, 1883) ; K. Schmeisser, The Goldfields of Austral- asia, 2 vols. (London, 1899) ; G. F. Scott, The Romance of Australian Exploring (London, 1899) ; H. de R. Walker, Australasian Democracy (London, 1897); William Westgarth, Half a Century of Australian Progress (London, 1899); T. A. Coghlan and T. T. Ewing, Progress of Australia in the ioth Century; G. P. Tregarthen, Commonwealth of Australia; Ida Lee, Early Days of Australia; W. P. Reeves, State Experiments in Australia and New Zealand; A. Metin, La Socialisme sans doctrine.

AUSTRASIA. The word Austria signifies the realm of the east (Ger. Ost Reich). In Gregory of Tours this word is still used vaguely, but the sense of it is gradually defined, and finally the name of Austria or Austrasia was given to the eastern- most part of the Frankish kingdom. It usually had Metz for its capital, and the inhabitants of the kingdom were known as the

Austrasii. Retrospectively, later historians have given this name to the kingdom of Theuderich I. (511-534), of his son Theudebert (534-548), and of his grandson Theudebald (548- 555); then, after the death of Clotaire I., to the kingdom of Sigebert (561-575), and of his son Childebert (575-597). They have even tried to interpret the long struggle between Fredegond and Brunhilda as a rivalry between the two kings of Neustria and Austrasia. When these two words are at last found in the texts in their precise signification, Austrasia is applied to that part of the Frankish kingdom which Clotaire II. entrusted to his son Dagobert, subject to the guardianship of Pippin and Arnulf (623-629), and which Dagobert in his turn handed on to his son Sigebert (634-639), under the guardianship of Cunibert, bishop of Cologne, and Ansegisel, mayor of the palace. After the death of Dagobert, Austrasia and Neustria almost always had separate kings, with their own mayors of the palace, and then there arose a real rivalry between these two provinces, which ended in the triumph of Austrasia. The Austrasian mayors of the palace succeeded in enforcing their authority in the western as well as in the eastern part, and in re-establishing to their own ad- vantage the unity of the Frankish kingdom. The mayor Pippin the Short was even powerful enough to take the title of king over the whole.

At the time of Charlemagne, the word Austrasia underwent a change of meaning and became synonymous with Francia orientalis, and was applied to the Frankish dominions beyond the Rhine (Franconia). This Franconia was in 843 included in the kingdom of Louis the German, and was then increased by the addition of the territories of Mainz, Spires and Worms, on the right bank of the river.

See A. Huguenin, Histoire du royaume merovingien d'Austrasie (Paris, 1857); Aug. Digot, Histoire du royaume d'Austrasie, 4 vols. (Nancy, 1863); L. Drapeyron, Essai sur I'origine, le developpement et les resultats de la lutte entre la Neustrie et I'Austrasie (Paris, 1867); Auguste Longnon, Atlas historique, 1st and 2nd parts. (C. Pf.)

AUSTRIA. (Ger. Osterreich), a country of central Europe, bounded E. by Russia and Rumania, S. by Hungary, the Adriatic Sea and Italy, W. by Switzerland, Liechtenstein and the German empire (Bavaria), and N. by the German empire (Saxony and Prussia) and Russia. It has an area of 115,533 sq. m., or about twice the size of England and Wales together. Austria is one of the states which constitute the Austro-Hungarian (Habsburg) monarchy (see Austria-Hungary: History), and is also called Cisleithania, from the fact that it contains the portion of that monarchy which lies to the west of the river Leitha. Austria does not form a geographical unity, and the constituent parts of this empire belong to different geographical regions. Thus, Tirol, Styria and Carinthia belong,

like Switzerland, to the system of the Alps, but these provinces together with' those lying in the basin of the Danube form, nevertheless, a compact stretch of country. On the other hand Galicia, extending on the eastern side of the Carpathians, belongs to the great plain of Russia; Bohemia stretches far into the body of Germany; while Dalmatia, which is quite separated from the other provinces, belongs to the Balkan Peninsula.

Coasts. — Austria has amongst all the great European countries the most continental character, in so far as its frontiers are mostly

land-frontiers, only about one-tenth of them being coast-land. The Adriatic coast, which stretches for a distance of about 1000 m., is greatly indented. The Gulf of Trieste on the west, and the, Gulf of Fiume or Quarnero on the east, include between them the pen- insula of Istria, which has many sheltered bays. In the Gulf of Quarnero are the Quarnero islands, of which the most important are Cherso, Veglia and Lussin. The coast west of the mouth of the Isonzo is fringed by lagoons, and has the same character as the Venetian coast, while the Gulf of Trieste and the Istrian peninsula have a steep coast with many bays and safe harbours. The principal ports are Trieste, Capodistria, Pirano, Parenzo, Rovigno and Pola, the great naval harbour and arsenal of Austria. The coast of Dal- matia also possesses many safe bays, the principal being those of Zara, Cattaro and Ragusa, but in some places it is very steep and inaccessible. On the other hand a string of islands extends along this coast, which offer many safe and easily accessible places of anchorage to ships during the fierce winter gales which rage in the Adriatic. The principal are Pago, Pasman, Isola Lunga and Isola Incoronata, Brazza, Lesina, Curzoia and Meleda.

The political divisions of Austria correspond, for the most part, so closely to natural physical divisions that the detailed account of the physical features, natural resources and the movement of the population has been given under those separate headings. In this general article the geography of Austria — physical, economical and political — has been treated in its broad aspects, and those points insisted upon which give an adequate idea of the country as a whole.

Mountains. — Austria is the most mountainous country of Europe after Switzerland, and about four-fifths of its entire area is more than 600 ft. above the level of the sea. The mountains of Austria belong to three different mountain systems, namely, the Alps (q.v.), the Carpathians (q.v.), and the Bohemian-Moravian Mountains. The Danube, which is the principal river of Austria, divides the Alpine region, which occupies the whole country lying at its south, from the Bohemian-Moravian Mountains and their offshoots lying at its north ; while the valleys of the March and the Oder separate the last-named mountains from the Carpathians. Of the

three principal divisions of the Alps — the western, the central and the eastern Alps — Austria is traversed by several groups of the central Alps, while the eastern Alps lie entirely within its territory. The eastern Alps are continued by the Karst mountains, which in their turn are continued by the Dinaric Alps, which stretch through Croatia and Dalmatia. The second great mountain-system of Austria, the Carpathians, occupy its eastern and north-eastern portions, and stretch in the form of an arch through Moravia, Silesia, Galicia and Bukovina, forming the frontier towards Hungary, within which territory they principally extend. Finally, the Bohemian-Moravian Mountains, which enclose Bohemia and Moravia, and form the so-called quadrilateral of Bohemia, constitute the link of the Austrian mountain-system with the hilly region (the Mittelgebirge) of central Europe. Only a little over 25 % of the area of Austria is occupied by plains. The largest is the plain of Galicia, which is part of the extensive Sarmatic plain; while in the south, along the Isonzo, Austria comprises a small part of the Lombardo- Venetian plain. Several smaller plains are found along the Danube, as the Tulner Becken in Lower Austria, and the Wiener Becken, the plain on which the capital is situated; to the north of the Danube this plain is called the Marchfeld, and is continued under the name of the Marchebene into Moravia as far north as Olmiitz. Along the other principal rivers there are also plains of more or less magnitude, some of them possessing tracts of very fertile soil.

Rivers. — Austria possesses a fairly great number of rivers, pretty equally distributed amongst its crown lands, with the exception of Istria and the Karst region, where there is a great scarcity of even the smallest rivers. The principal rivers are: the Danube, the Dniester, the Vistula, the Oder, the Elbe, the Rhine and the Adige or Etsch. As the highlands of Austria form part of the great watershed of Europe, which divides the waters flowing northward into the North Sea or the Baltic from those flowing southward or eastward into the Mediterranean or the Black Sea, its rivers flow in three different directions — northward, southward and eastward. With the exception of the small streams belonging to it which fall into the Adriatic, all its rivers have their mouths in other countries', and its principal river, the Danube, has also its source in another country. When it enters Austria at the gorge of Passau, where it receives the Inn, a river which has as large a body of water as itself, the Danube is already navigable. Till it leaves the country at Hainburg, just before Pressburg, its banks are pretty closely hemmed by the Alps, and the river passes through a succession of narrow defiles. But the finest part of its whole course, as regards the picturesqueness of the scenery on its banks, is between Linz and Vienna. Where it enters Austria the Danube is 898 ft. above the level of the sea, and where it leaves it is only 400 ft. ; it has thus a fall within the country of 498 ft., and is at first a very rapid stream, becoming latterly much slower. The

Danube has in Austria a course of 234 m., and it drains an area of 50,377 sq.m. Its principal affluents in Austria, besides the Inn, are the Traun, the Enns and the March. The Dniester, which, like the Danube, flows into the Black Sea, has its source in the Carpathians in Eastern Galicia, and pursues a very winding course towards the south-east, passing into Russia. It has in Austria a course of 370 m. of which 300 are navigable, and drains

an area of 12,000 sq. m. The Vistula and the Oder both fall into the Baltic. The former rises in Moravia, flows first north through Austrian Silesia, then takes an easterly direction along the borders of Prussian Silesia, and afterwards a north-easterly, separating Galicia from Russian Poland, and leaving Austria not far from Sandomir. Its course in Austria is 240 m., draining an area of 15,500 sq. m. It is navigable for nearly 200 m., and its principal affluents are the Dunajec, the San and the Bug. The Oder has also its source in Moravia, flows first east and then north-east through Austrian Silesia into Prussia. Its length within the Austrian territory is only about 55 m., no part of which is navigable. The only river of this country which flows into the North Sea is the Elbe. It has its source in the Riesengebirge, not far from the Schneekoppe, flows first south, then west, and afterwards north-west through Bohemia, and then enters Saxony. Its principal affluents are the Adler, Iser and Eger, and, most important of all, the Moldau. The Elbe has a course within the Austrian dominions of 185 m., for about 65 of which it is navigable. It drains an area of upwards of 2 1 ,000 sq. m. The Rhine, though scarcely to be reckoned a river of the country, flows for about 25 m. of its course between it and Switzerland. The principal river of Austria which falls into the Adriatic is the Adige or Etsch. It rises in the mountains of Tirol, flows south, then east, and afterwards south, into the plains of Lombardy. It has in Austria a course of 138 m., and drains an area of 4266 sq. m. Its principal affluent is the Eisak. Of the streams which have their course entirely within the country, and fall into the Adriatic, the principal is the Isonzo, 75 m. in length, but navigable only for a short distance from its mouth.

Lakes. — Austria does not possess any great lakes ; but has numer- ous small mountain lakes situated in the Alpine region, the most renowned for the beauty of their situation being found in Salzburg, Salzkammergut, Tirol and Carinthia. There should also be men- tioned the periodical lakes situated in the Karst region, the largest of them being the Lake of Zirknitz. The numerous and large marshes, found now mostly in Galicia and Dalmatia, have been greatly reduced in the other provinces through the

canalization of the rivers, and other works of sanitation.

Mineral Springs. — No other European country equals Austria in the number and value of its mineral springs. They are mostly to be found in Bohemia, and are amongst the most frequented watering-places in the world. The most important are, the alkaline springs of Carlsbad, Marienbad, Franzensbad and Bilin; the alkaline acidulated waters of Giesshiibel, largely used as table waters; the iron springs of Marienbad, Franzensbad and of Pyrawarth in Lower Austria; the bitter waters of Piillna, Saidschitz and Sedlitz; the saline waters of Ischl and of Aussee in Styria; the iodine waters of Hall in Upper Austria; the different waters of Gastein; and lastly the thermal waters of Teplitz-Schonau, Johannisbad, and of Romerbad in Styria. Altogether there are reckoned to exist over 1500 mineral springs, of which many are not used. (O. Br.)

Geology. — The Austro-Hungarian Monarchy is traversed by the great belt of folded beds which constitutes the Alps and the Car- pathians; a secondary branch proceeding from the main belt runs along the Adriatic coast and forms the Julian and Dinaric Alps. In the space which is thus enclosed, lies the Tertiary basin of the Hun- garian plain ; and outside the belt, on the northern side, is a region which, geologically, is composite, but has uniformly resisted the Carpathian folding. In the neighbourhood of Vienna a gap in the folded belt — the gap between the Alps and the Carpathians — has formed a connexion between these two regions since the early part of the Miocene period. On its outer or convex side the folded belt is clearly defined by a depression which is generally filled by modern deposits. Beyond this, in Russia and Galicia, lies an extensive plateau, much of which is covered by flat-lying Miocene and Pliocene beds; but in the deep valleys of the Dniester and its tributaries the ancient rocks which form the foundation of the plateau are laid bare. Archaean granite is thus exposed at Yampol and other places in Russia, and this is followed towards the west by Silurian and Devonian beds in regular succession — the Devonian being of the Old Red Sandstone type characteristic of the British Isles and of Northern Russia. Throughout, the dip is very low and the beds are unaffected by the Carpathian folds, the strike being nearly from north to south. After Devonian times the region seems to have been dry land until the commencement of the Upper Cretaceous period, when it was overspread by the Cenomanian sea, and the deposits of that sea lie flat upon the older sediments.

Some 25 or 30 m. of undulating country separate the Dniester from the margin of the Carpathian chain, and in this space the Palaeozoic floor sinks far beneath the surface, so that not even the deep-cut valley of the Pruth exposes any beds of older date than Miocene. Towards the north-west, also, the Palaeozoic foundation falls beneath an increasing thickness

of Cretaceous beds and lies buried far below the surface. At Lemberg a boring 1650 ft. in depth did not reach the base of the Senonian. West of Cracow the Cretace- ous beds are underlaid by Jurassic and Triassic deposits, the general dip being eastward. It is not till Silesia that the Palaeozoic for- mations again rise to the surface. Here is the margin, often concealed by very modern deposits, of the great mass of Archaean and Palaeo- zoic rocks which forms nearly the whole of Bohemia and Moravia. The Palaeozoic beds no longer lie flat and undisturbed, as in the

Polish plain. They are faulted and folded. But the folds are alto- gether independent of those of the Carpathians; they are of much earlier date, and are commonly different in direction. The principal folding took place towards the close of the Carboniferous period, and the massif is a fragment of an ancient mountain chain, the Variscische Gebirge of E. Suess, which in Permian and Triassic times stretched across the European area from west to east.

In Bohemia and Moravia the whole of the beds from the Cambrian to the Lower Carboniferous are of marine origin; but after the Carboniferous period the area appears to have been dry land until the beginning of the Upper Cretaceous period, when the sea again spread over it. The deposits of this sea are now visible in the large basin of Upper Cretaceous beds which stretches from Dresden south- eastward through Bohemia. Since the close of the Cretaceous period the Bohemian massif has remained above the sea ; but the depression which lies immediately outside the Carpathian chain has at times been covered by an arm of the sea and at other times has been occupied by a chain of salt lakes, to which the salt deposits of Wieliczka and numerous brine springs owe their origin.

The large area which is enclosed within the curve of the Car- pathians is for the most part covered by loess, alluvium and other modern deposits, but Miocene and Pliocene beds appear around its borders. In the hilly region of western Transylvania a large mass of

1 Triassic

1 Permian

] Carboniferous

M01M Devonian

Archaean A Meiamorphlo Plutonic Rocks Volcanic Rocks

Geological Map of Austria-Hungary.

more ancient rocks is exposed ; the Carboniferous system and all the Mesozoic systems have been recognized here, and granite and volcanic rocks occur. In the middle of Hungary a line of hills rises above the plain, striking from the Platten See towards the north- east, where it merges into the inner girdle of the Carpathian chain. These hills are largely formed of volcanic rocks of late Tertiary age ; but near the Platten See Triassic beds of Alpine type are well de- veloped. The Tertiary eruptions were not confined to this line of hills. They were most extensive along the inner border of the Carpathians, and they occurred also in the north of Bohemia. Most of the erup- tions took place during the Miocene and Pliocene periods.

The mineral wealth of Austria is very great. The older rocks are in many places peculiarly rich in metalliferous ores of all kinds. Amongst them may be mentioned the silver-bearing lead ores of Erzgebirge and of Pribram in Bohemia; the iron ores of Styria and Bukovina; and the iron, copper, cobalt and nickel of the dis- tricts of Zips and Gomor. The famous cinnabar and mercury mines of Idria in Carniola are in Triassic beds; and the gold and silver of northern Hungary and of Transylvania are associated with the Tertiary volcanic rocks. The Carboniferous coal-fields of Silesia and Bohemia are of the greatest importance; while Jurassic coal is worked at Steyerdorf and Funfkirchen in Hungary, and lignite at many places in the Tertiary beds. The great salt mines of Galicia are in Miocene deposits; but salt is also worked largely in the Trias of the Alps. (See also Alps; Carpathians; Hungary and Tirol.) _ (P. La.)

Climate. — The climate of Austria, in consequence of its great extent, and the great differences in the elevation of its surface, is very various. It is usual to divide it into three distinct zones. The most southern extends to 46° N. lat., and includes Dalmatia and the country along the coast, together with the southern portions of Tirol and Carinthia. Here the seasons are mild and equable, the winters are short (snow seldom falling), and the summers last for five months. The vine and maize are everywhere cultivated, as well as olives and other southern products. In the south of Dalmatia tropical plants flourish in the open air. The central zone lies between 46 s and 49 N. lat., and includes Lower and Upper Austria, Salzburg, Styria, Carinthia, Carniola, Central and Northern Tirol, Southern Moravia

and a part of Bohemia. The seasons are more marked here than in the preceding. The winters are longer and more severe, and the summers are hotter. The vine and maize are cultivated in favourable situations, and

wheat and other kinds of grain are gener- ally grown. The northern zone embraces the territory lying north of 49 N. lat., comprising Bohemia, Northern Moravia, Silesia and Galicia. The winters are here long and cold ; the vine and maize are no longer cultivated.the principal crops being wheat, barley, oats, rye, hemp and flax. The mean annual temperature ranges from about 59 in the south to 48 in the north. In some parts of the country, however, it is as low as 46 40′ and even 36 . In Vienna the average annual temperature is 50 , the highest temperature being 94 , the lowest 2° Fahr. In general the eastern part of the country receives less rain than the western. In the south the rains prevail chiefly in spring and autumn, and in the north and central parts during summer. Storms are frequent in the region of the south Alps and along the coast. In some parts in the vicinity of the Alps the rainfall is excessive, sometimes exceeding 60 in. It is less among the Carpathians, where it usually varies from 30 to 40 in. In other parts the rainfall usually averages from 20 to 24 in.

Flora. — From the varied character of its climate and soil the vegetable productions of Austria are very diverse. It has floras of the plains, the hills and the mountains; an alpine flora, and an arctic flora ; a flora of marshes, and a flora of steppes ; floras peculiar to the clay, the chalk, the sandstone and the slate formations. The number of different species is estimated at 12,000, of which one-third are phanerogamous.or flowering plants, and two-thirds cryptogamous, or flowerless. The crown land of Lower Austria far surpasses in this respect the other divisions of the country, having about four-ninths of the whole, and not less than 1 700 species of flowering plants. As stated above, Austria is a very mountainous country and the moun- tains are frequently covered with vegetation to a great elevation. At the base are found vines and maize ; on the lower slopes are green pastures, or wheat, barley and other kinds of corn; above are often forests of oak, ash, elm, &c. ; and still higher the yew and the fir may be seen braving the climatic conditions. Corn grows to between 3400 and 4500 ft. above the level of the sea, the forests extend to 5600 or 6400 ft., and the line of perpetual snow is from 7800 to 8200 ft.

Fauna.— -The animal kingdom embraces, besides the usual domestic animals (as horses, cattle, sheep, swine, goats, asses, &c), wild boars, deer, wild goats, hares, &c. ; also bears, wolves, lynxes, foxes, wild cats, jackals, otters, beavers, polecats, martens, weasels and the like. Eagles and hawks are common, and many kinds of singing birds. The rivers and lakes abound in different kinds of fish, which are also plentiful on the sea-coast. Among the insects the bee and the silkworm are the most useful. The leech forms an article of trade. In all there are 90 different species of mammals, 248 species of birds, 377 of fishes and more than 13,000 of insects.

Divisions. — Austria is composed of seventeen ” lands,” called also ”

crown lands." Of these, three — namely, Bohemia, Galicia and Lodomeria, and Dalmatia — are kingdoms; two — Lower and Upper Austria — archduchies; six — Salzburg, Styria, Carinthia, Carniola, Silesia and Bukovina — duchies ; two — Gorz-Gradisca and Tirol — countships of princely rank (gefilrstete Graf schaf ten); two — Moravia andlstria — margraviates (march counties). Vorarlberg bears the title simply of " land." Trieste, with its district, is a town treated as a special crown land. For administrative purposes Trieste, with Gorz-Gradisca and Istria, constituting the Kiistenland (the Coast land) and Tirol and Vorarlberg, are each comprehended as one administrative territory. The remaining lands constitute each an administrative territory by itself.

Population. — Austria had in 1900 a population of 26,107,304 inhabitants, 1 which is equivalent to 226 inhabitants per sq. m. As seen from the above table the density of the population is unequal in the various crown lands. The most thickly populated province is Lower Austria; the Alpine provinces are sparsely populated, while Salzburg is the most thinly populated crown land of Austria. As regards sex, for every 1000 men there were 1035 women, the female element being the most numerous in every crown land,except the Kiistenland,Bukovina and Dalmatia. Compared with the census returns of 1890, the population shows an increase of 2,211,891, or 9-3% of the total population. The increase between the preceding census returns of 1880 and 1890

J The census returns of 1857, and of 1869, which were the first systematic censuses taken, gave the population of Austria as 18,224,500 and 20,394,980 respectively. It must be noticed that between these two dates Austria lost its Lombardo- Venetian terri- tories, with a population of about 5,000,000 inhabitants.

was of 1,750,093 inhabitants, or 7-9% of the total population. A very important factor in the movement of the population is the large over-sea emigration, mostly to the United States of America, which has grown very much during the last quarter

Administrative Territories.

Areas in Square Miles.

Population.

Density of

Population

per sq. m.

in 1900.

1890.

1900.

Austria —

Lower Austria …. Upper Austria …. Salzburg

Carinthia …..

Carniola

Kiistpnland

Tirol and Vorarlberg . Bohemia

Galicia

Total . . .

.ˆ—

7,654 4,617

2,757 8,642

3,992

3-844

3,074

11,287

19,997 8,555 1,981

30,212 4,022 4,923

2,661,799 785,831

l73,5io

1,282,708 361,008 498,958 695,384 928,769

5,843,094

2,276,870 605,649

6,607,816 646,591 527,426

3,100,493 809,918

193,247 1,356,058

367,344

508,348

755,183

979,878

6,318,280

2,435,o8i

680,529

7,295,538

729,921

591,597

405 175

69 156

91 132

245 86

315

284

342 241 181 120

H5,533

23,895,413

26,107,304

of the 19th century, and which shows a tendency to become still larger. Between 1891 and 1900 the number of over-sea emigrants was 387,770 persons. The movement of the population shown in the other vital statistics — births, marriages, deaths — are mostly satisfactory, and show a steady and normal progress. The annual rate per thousand of population in 1900 was: births, 37-0; still-births, i-i; deaths, 25-2; marriages, 8-2. The only unsatisfactory points are the great number of illegitimate births, and the high infant mortality. Of the total population of Austria 14,009,233 were scattered in 26,321 rural communities with less than 2000 inhabitants; while the remainder was distributed in 1742 communities with a population of 2000-5000; in 260 communities with a population of 5000-10,000; in 96 towns with a population of 10,000-20,000; in 41 towns with a population of 20,000-50,000; in 6 towns with a popula- tion of 50,000-100,000; and in 6 towns with a population of over 100,000 inhabitants. The principal towns of Austria are Vienna (1,662,269), Prague (460,849), Trieste (132,879), Lemberg (159,618), Graz (138,370), Briinn (108,944), Cracow (91,310), Czernowitz (67,622), Pilsen (68,292) and Linz (58,778).

I Czechs ^^ Slovaks.- t^/t ft,f/jenians….^3 Poles.

Slovenes H”»l Serto Croais..bjL!sb Maguars\^_i „ (Italians ana ;M Ladlns

5 I Rumanians. „

*•*S*JS”SR?E.;W.rt-Ji’;;,*

«vi«r4^“K:

AUSTRIA-HUNGARY Distribution of Races.

English MiWs o 50 100 .ISO 200

Btncry Walker K.

Races. — From an ethnographical point of view Austria contains a diversity of races; in fact no other European state contains within its borders so many nationalities as the Austrian empire. The three principal races of Europe — the Latin, the Teutonic and the Slavonic— are all represented in Austria. The Slavonic race, numbering 15,690,000, is numerically the principal race in Austria, but as it is divided into a number of peoples, differing from one another in language, religion,

culture, customs and historical traditions, it does not possess a national unity. Besides, these various nationalities are geographically separated from one another by other races, and are divided into two groups. The northern group includes the Czechs, the Moravians, the Slovaks, the Ruthenians and the Poles; while the southern group contains the Slovenes, the Servians and the Croats. Just as their historical traditions are different, so are also the aspirations of these various peoples of the Slavonic race different, and the rivalries between them, as for instance between the Poles and the Ruthenians, have prevented them from enjoying the full political advantage due to their number. The Germans, numbering 9,171,614, constitute the most numerous nationality in Austria, and have played and still play the principal role in the political life of the country. The Germans are in a relative majority over the other peoples in the empire, their language is the vehicle of communication between all the other peoples both in official life and in the press; they are in a relatively more advanced state of culture, and they are spread over every part of the empire. Historically they have contributed most to the foundation and to the development of the Austrian monarchy, and think that for all the above- mentioned reasons they are entitled to the principal position amongst the various nationalities of Austria. The Latin race is represented by the Italians, Ladini and Rumanians.

The following table gives the numbers of different nationalities, as determined by the languages spoken by them in 1900: —

Germans 9,171,614

Czechs and Slovaks 5,955,397

Poles 4,252483

Ruthenians 3,381,570

Slovenes ‘ i,‘l92,‘78o

Italians and Ladini 727,102

Servians and Croats 711,380

Rumanians 230,963

Magyars 9I516

The Germans occupy exclusively Upper Austria, Salzburg, Vorarlberg, and,

to a large extent, Lower Austria; then the north and central part of Styria, the north and western part of Carinthia, and the north and central part of Tirol. In Bohemia they are concentrated round the borders, in the vicinity of the mountains, and they form nearly half the population of Silesia; besides they are found in every part of the monarchy. The Czechs occupy the central and eastern parts of Bohemia, the greatest part of Moravia and a part of Silesia. The Poles are concentrated in western Galicia, and in a part of Silesia; the Ruthenians in eastern Galicia and a part of Bukovina; the Slovenes in Carniola, Gorz and Gradisca, Istria, the south of Styria, and the Trieste territory. The Servians and Croats are found in Istria and Dalmatia ; the Italians and Ladini in southern Tirol, Gorz and Gradisca, Trieste, the coast of Istria, and in the towns of Dalmatia; while the Rumanians live mostly in Bukovina.

Agriculture. — Notwithstanding the great industrial progress made by Austria during the last quarter of the 19th century, agriculture still forms the most important source of revenue of its inhabitants. In 1900 over 50 % of the total population of Austria derived their income from agricultural pursuits. The soil is generally fertile, although there is a great difference in the productivity of the various crown-lands owing to their geographical situation. The productive land of Austria covers 69,519,953 acres, or 93-8 % of the total area, which is 74,102,001 acres ; to this must be added 0-4 of lakes and fish- ponds, making a total of 94-2 % of productive area. The remainder is unproductive, or used for other, not agricultural purposes. The area of the productive land has been steadily increasing — it was estimated to cover about 89 % in 1875, — and great improvements in the agricultural methods have also been introduced. Of the whole productive area of Austria, 37-6 % is laid out in arable land ; 34-6 % in woods; 25-2 % in pastures and meadows; 1-3 % in gardens, 0-9 % in vineyards; and 0-4 % in lakes, marshes and ponds. The provinces having the largest proportion of arable land are Bohemia, Galicia, Moravia and Lower Austria. The principal products are wheat, rye, barley, oats, maize, potatoes, sugar beet, and cattle turn'P- The produce of the ploughed land does not, on the whole, suffice for the home requirements. Large quantities in particular of wheat and maize are imported from Hungary for home consumption. Only barley and oats are usually reaped in quantity for export. The provinces which have the lowest proportion of arable land are Tirol and Salzburg. Besides these principal crops, other crops of considerable magnitude are : buckwheat in Styria, Galicia, Carniola and Carinthia ; rape and rape-seed in Bohemia and Galicia, poppy in Moravia and Silesia ; flax in Bohemia, Moravia, Styria and Galicia ; hemp in Galicia, chicory in Bohemia; tobacco, which is a state monopoly, in Galicia, Bukovina, Dalmatia and Tirol; fuller's thistle in Upper Austria and Styria; hops in Bohemia, including

the celebrated hops round Saaz, in Galicia and Moravia ; rice in the Kiistenland ; and cabbage in Bohemia, Galicia, Lower Austria and Styria. The principal garden products are kitchen vegetables and fruit, of which large quantities are exported. The best fruit dis- tricts are in Bohemia, Moravia, Upper Austria and Styria. Certain districts are distinguished for particular kinds of fruit, as Tirol for apples, Bohemia for plums, Dalmatia for figs, pomegranates and olives. The chestnut, olive and mulberry trees are common in the south — chiefly in Dalmatia, the Kiistenland and Tirol ; while in the south of Dalmatia the palm grows in the open air, but bears no fruit.

The vineyards of Austria covered in 1901 an area of 626,044 acres, the provinces with the largest proportion of vineyards being Dal- matia, the Kiistenland, Lower Austria, Styria and Moravia. The wines of Dalmatia are mostly sweet wines, and not suitable to bf kept for long periods, while those of the other provinces are not so sweet, but improve with age.

Forests. — The forests occupy just a little over one-third of the whole productive area of Austria, and cover 24,157,709 acres. In the forests tall timber predominates to the extent of 85 %, and consists of conifers much more than of green or leaved trees, in the proportion of seventy against fifteen out of the 85 % of the total forests laid out in tall timber. Exceptions are the forest lands oi the Karst region, where medium-sized trees and underwood occupy 80 %, and of Dalmatia, where underwood occupies 92-6 % of the whole forest land. The Alpine region is well wooded, and amongst the other provinces Bukovina is the most densely wooded, having 43 -2 % of its area under forests, while Galicia with 25-9 % is the most thinly-wooded crown-land of Austria. The forests are chiefly composed of oak, pine, beech, ash, elm, and the like, and constitute one of the great sources of wealth of the country. Forestry is carried on in a thoroughly scientific manner. Large works of afforestation have been undertaken in Carinthia, Carniola and Tirol with a view of checking the periodical inundations, while similar works have been successfully carried out in the Karst region.

Landed Property. — Of the whole territory of the state, 74,102,001 acres, about 29 %, is appropriated to large landed estates; 71 % is disposed of in medium and smaller properties. Large landed property is most strongly represented in Bukovina, where it absorbs 46 % of the whole territory, and in Salzburg, Galicia, Silesia and Bohemia. ‘ To the state belongs 4! % of the total territory. The Church, the communities, and the corporations are also in possession of large areas of land ; 4 % (speaking roundly) of the territory of Austria is held on the tenure of fidei-commissum. Of the entire property in large landed estates, 59 % is laid out in woods ; of the property in fidei-commissum, 66 % is woodland ; of the entire forest land, about 10

% is the property of the state; 14-5 % is communal property; and 3-8 % is the property of the Church. The whole of the territory in large landed estates includes 52 %'of,the entire forest land. The forest land held under fidei-commissum amounts to over 9 % of the entire forest land.

Live Stock. — Although richly endowed by nature, Austria cannot be said to be remarkable as a cattle-rearing country. Indeed, except in certain districts of the Alpine region, where this branch of human activity is carried on under excellent conditions, there is much room for improvement. The amount of live stock is registered every ten years along with the census of the population.

Horses

Mules and asses

Cattle

Goats

Sheep

Pigs . . . .

Beehives .

1,463,282 49,618

8,584,077 1,006,675 3,841,340

2,721,541 926,312

1890.

1,548,197 57,952 8,643,936 1,035,832 3,186,787 3,549,700 920,640

1900.

1,711,077 66,638 9,506,626 1,015,682 2,621,026 4,682,734

996,i39

Austria is distinguished for the number and superiority of its horses, for the improvements of which numerous studs exist all over the country. All kinds of horses are represented from the heaviest to the lightest, from the largest to the smallest. The most beautiful horses are found in Bukovina, the largest and strongest in Salzburg; those of Styria, Carinthia, Northern Tirol

and Upper Austria are also famous. In Dalmatia, the Kiistenland and Southern Tirol, horses are less numerous, and mules and asses in a great measure take their place. The finest cattle are to be found in the Alpine region; of the Austrian provinces, Salzburg and Upper Austria contain the largest proportion of cattle. The number of sheep has greatly diminished, but much has been done in the way of improving the breeds, more particularly in Bohemia, Moravia, Silesia and Upper and Lower Austria. The main object has been the improve- ment of the wool, and with this object the merino and other fine- woolled_ breeds have been introduced. Goats abound mostly in Dalmatia, Bohemia and Tirol. The rearing of pigs is carried on most largely in Styria, Bohemia, Galicia and Upper and Lower Austria. Bees are extensively kept in Carinthia, Carniola, Lower Austria and Galicia. The silk-worm is reared more particularly in Southern Tirol and in the Kiistenland, and the average annual yielcf is 5,000,000 lb of cocoons. In the Alpine region dairy-farming has attained a great degree of development, and large quantities of

butter and cheese are annually produced. Altogether, the rearing of cattle, with all its actual shortcomings, constitutes a great source of revenue, and yields a certain amount for export.

Fisheries. — The fisheries of Austria are very extensive, and are divided into river, lake and sea fisheries. The numerous rivers of Austria swarm with a great variety of fishes. The lake fisheries are mostly pursued in Bohemia, where pisciculture is an art of old stand- ing, and largely developed. The sea fisheries on the coast of Dal- matia and of the Kustenland constitute an important source of wealth to the inhabitants of these provinces. About 4000 vessels, with a number of over 16,000 fishermen are employed, and the average annual catch realizes £240,000.

In the mountainous regions of Austria game is plentiful, and constitutes a large source of income.

Minerals. — In the extent and variety of its mineral resources Austria ranks among the first countries of Europe. With the ex- ception of platinum, it possesses every useful metal; thus, besides the noble metals, gold and silver, it abounds in ores of more or less richness in iron, copper, lead and tin. Rich deposits of coal, both pit coal and brown coal are to be found, as well as extensive basins of petroleum, and large deposits of salt. In smaller quantities are found zinc, antimony, arsenic, cobalt, nickel, manganese, bismuth, chromium, uranium, tellurium, sulphur, graphite and

asphalt. There are also marble, roofing-slate, gypsum, porcelain-earth, potter's clay, and precious stones. It is therefore natural that mining operations should have been carried out in Austria from the earliest times, as, for instance, the salt mines of Hallstatt in Upper Austria, which had already been worked during the Celtic and Romanic period. Famous through the middle ages were also the works, especially for the extraction of gold and silver, carried out in Bohemia and Moravia, whose early mining regulations, for instance those of Iglau, were adopted in other countries. But the great industrial development of the 19th century, with its growing necessity for fuel, has brought about the exploitation of the rich coal-fields of the country, and to-day the coal mines yield the heaviest output of any mineral products. To instance' the rapid growth in the extraction of coal, it is worth mentioning that in 1825 its output was about 150,000 tons; in 1875, or only after half a century, the output has become 100 times greater, namely, over 15,000,000 tons; while in 1900 it was 32,500,000 tons. Coal is found in nearly every province of Austria, with the exception of Salzburg and Bukovina, but the richest coal-fields are in Bohemia, Silesia, Styria, Moravia and Carniola in the order named. Iron ores are found more or less in all the crown-lands except Upper Austria, the Kustenland and Dalmatia, but it is most plentiful in Styria, Carinthia, Bohemia and Moravia. Gold and silver ores are found in Bohemia, Salzburg and Tirol. Quicksilver is found at Idria in Carniola, which after Almaden in Spain is the richest mine in Europe. Lead is extracted in Carinthia and Bohemia, while the only mines for tin in the whole of Austria are in Bohemia. Zinc is mostly found in Galicia, Tirol and Bohemia, and copper is extracted in Tirol, Moravia and Salzburg. Petroleum is found in Galicia, where ozocerite is also raised. Rock- salt is extracted in Galicia, while brine-salt is produced in Salzburg, Salzkammergut and Tirol. Graphite is extracted in Bohemia, Moravia, Styria and Lower Austria. Uranium, bismuth and anti- mony are dug out in Bohemia, while procelain earth is found in Bohemia and Moravia. White, red, black and variously-coloured marbles exist in the Alps, particularly in Tirol and Salzburg ; quartz, felspar, heavy spar, rock-crystal, and asbestos are found in various parts; and among precious stones may be specially mentioned the Bohemian garnets. The total value of the mines and foundry products throughout Austria in 1875 was £5,000,000. The number of persons employed in the mines and in the smelting and casting works in the same year was 94,019. The total value of the mining products throughout Austria in 1902 was £10,500,000, and the value of the product of the foundries was £3,795,000. Of this amount £3,150,000 represents the value of the iron: raw steel and pig iron. The increase in the value of the mining products during the period 1892-1902 was 40 %; and the increase in the product of the furnaces in the same period was 35 %. The number of persons employed in 1902 in mining was 140,890; in smelting works

7148; and in the extraction of salt, 7963. The value of the chief mining products of Austria in 1903 was: Brown coal (21,808,583 tons), £4,182,516; coal (12,145,000 tons), £4,059,807; iron ores (1,688,960 tons), £615,273; lead ores, £135,965; silver ores, £119,637; quicksilver ores, £92,049; graphite, £78,437; tin ores, £78,275; copper ores, £22,119; manganese ores, £5368; gold ores, £4407; asphalt, £2250; alum and vitriol slate, £992. The production of petroleum was 660,000 tons, and of salt 340,000 tons. The value of the principal products of the smelting furnaces in 1903 was: Iron (955,543 tons), £2,970,866; coke, £862,137; zinc (metallic), £174,344; silver, £141,594; copper, £57,542; sulphuric acid, £8488; copper vitriol, £5710; mineral colours, £5565; lead, £5067; tin, £4566; gold, £878; iron vitriol, £603; litharge, £384; quicksilver, £218; coal briquettes, £92,000.

Industry. — The manufactures of Austria were much developed (Juring the last quarter of the 19th century, although Austria as a whole cannot be said to be an industrial country. Austria possesses many favourable conditions for a great industrial activity. It possesses an abundance of raw materials, of fuel — both mineral and

wood, — of metals and minerals, in fact all the necessaries for a great and flourishing industry; and the rivers can easily be utilized as producers of motive power. It is besides densely populated, and has an adequate supply of cheap labour, while the undeveloped industries of the Balkan states also offer a ready market for its pro- ducts. The glass manufacture in Bohemia is very old, and has kept up its leading position in the markets of the world up to the present day. Industrial activity is greatly developed in Bohemia, Lower Austria, Silesia, Moravia and Vorarlberg, while in Dalmatia and Bukovina it is almost non-existent. The principal branches of manufactures are, the textile industry, the metallurgic industries; brewing and distilling; leather, paper and sugar; glass, porcelain and earthenware; chemicals; and scientific and musical instruments. The textile industry in all its branches — cotton, woollen, linen, silk, flax and hemp — is mostly concentrated in Bohemia, Moravia, Silesia and Lower Austria. It is an old industry, and one which has made great progress since 1875. Thus the number of mechanical looms increased more than threefold during this period, and numbered in 1902 about 120,000. In the same year the number of spindles at work was about 3,100,000. Austria had in 1902, 21,837 textile factories with 337,514 workmen. The principal seat of the manu- facture of cotton goods is in northern Bohemia, from the Eger to Reichenberg, which can be considered as the Lancashire of Austria, Lower Austria between the Wiener Wald and the Leitha, and in Vorarlberg. Woollen goods are manufactured in the above places, and besides in Moravia, at Briinn and at Iglau ; in Silesia ; and at Biala in Galicia. Vienna is also distinguished for its manufacture of shawls. The coarser kind of woollen

goods are manufactured all over the country, principally in the people's houses as a home industry. The most important places for the linen industry are in Bohemia at Trautenau ; in Moravia and Silesia, while the commoner kinds of linen are mostly produced as a home industry by the peasants in the above-mentioned crown-lands. The manufacture of ribbons, embroidery and lace, the two latter being carried on princi-

Cally as a house industry in Vorarlberg and in the Bohemian Erzge- irge, also thrives. The industry in stitched stuffs is especially developed in northern Bohemia. Ready-made men's clothes and oriental caps (fezes) are produced on a large scale in Bohemia and Moravia. The manufacture of silk goods is mainly carried on in Vienna, while the spinning of silk has its principal seat in southern Tirol, and to a smaller extent in the Kustenland.

The metallurgic industry forms one of the most important branches of industry, because'iron ore of excellent quality is extracted annually in great quantities. The principal seats of the iron and steel manu- factures are in Bohemia, Moravia, Silesia, Upper and Lower Austria, Styria and Carinthia, which contain extensive iron-works. The most important manufactured products are cutlery, firearms, files, wire, nails, tin-plates, scythes, sickles, steel pens, needles, rails, iron furniture, drains, and kitchen utensils. A famous place for its iron manufacture is Steyr in Upper Austria. The manufacture of machinery, for industrial and agricultural purposes, and of railway engines is mainly concentrated in Vienna, Wiener-Neustadt, Prague, Briinn and Trieste ; while the production of rolling stock for railways is carried on in Vienna, Prague and Graz. Ship-building yards for sea-vessels are at Trieste and Pola; while for river-vessels the largest yards are at Linz. Among other metal manufactures, the principal are copper works at Brixlegg and other places in Tirol, and in Galicia, tin and lead in Bohemia, and metallic alloys, especially Packfong or German silver, an alloy of nickel and copper, at Berndorf in Lower Austria. The precious metals, gold and silver, are princi- pally worked in the larger towns, particularly at Vienna and Prague. Vienna is also the principal seat for scientific and surgical instruments. In the manufacture of musical instruments Austria takes a leading part amongst European states, the principal places of production being Vienna, Prague, Koniggratz, Graslitz and Schonbach.

The glass manufacture is one of the oldest industries in Austria, and is mainly concentrated in Bohemia. Its products are of the best quality, and rule the markets of the world. In the manufacture of earthenwares Austria plays also a leading part, and the porcelain industry round Carlsbad and in the Eger district in Bohemia has a world-wide reputation. The leather industry is widely extended, and is principally carried on in Lower Austria, Bohemia and Moravia. Vienna and Prague are great centres for the boot

and shoe trade, and the gloves manufactured in these towns enjoy a great reputation. The manufacture of wooden articles is widespread over the country, and is very varied. In Vienna and other large towns the production of ornamental furniture has attained a great development. The industry in paper has also assumed great proportions, its principal seats being in Bohemia, Moravia, Upper and Lower Austria. Of food-stuffs, besides milling, and other flour products, the principal industry is the manufacture of sugar from beet-root. The sugar in- dustry is almost exclusively carried on in Bohemia, Moravia, Silesia and Galicia. It has attained such large proportions that large districts in those provinces have been ˆconverted from wheat-growing districts into fields for the cultivation of beet-root. Brewing is ex- tensively carried on, and the beer produced is of a good quality. The largest brewing establishment is at Schwechat near Vienna, and large breweries are also found at Pilsen and Budweissin Bohemia, whose products enjoy a great reputation abroad. There were in Austria 1341 breweries, which produced 422,993,120 gallons of beer.

in 1902-1903. Distilling is carried on on a large scale in Galicia, Bukovina, Bohemia, Moravia and Lower Austria; the number of distilleries being 1257, which produced 30,435,812 gallons of spirit. Rosoglio, maraschino, and other liqueurs are made in Dalmatia and Moravia. The manufacture as well as the growth of tobacco is a government monopoly, which has 30 tobacco factories with over 40,000 work-people, the largest establishment being at Hainburg in Lower Austria. Other important branches of industry are the manufacture of chemicals, in Vienna and in Bohemia; petroleum refineries in Galicia, and the extraction of various petroleum products ; the manufacture of buttons; printing, lithographing, engraving, and map-making, especially in Vienna, &c.

In 1900 the various manufacturing industries employed in Austria 3,138,800 persons, of whom 2,264,871 were workmen and 103,854 were labourers. Including families and domestic servants, a little over 7,000,000 were dependent on industry for their livelihood.

Commerce. — Austria forms together with Hungary one customs and commercial territory, and the statistics for the foreign trade are given under Austria-Hungary. Owing to its situation, the bulk of the Austrian trade is carried on the railways and on the inland navigable rivers. Only a small portion is sea-borne trade, while the commercial interchange between the provinces lying on the Adriatic coast is very small.

Commercial Navy. — The commercial sea navy of Austria, excluding small coasting vessels and fishing-boats, consisted in 1900 of 154 vessels, with a tonnage of 198,322 tons, of which 123 vessels with a tonnage of 183,949 were steamers. The greatest navigation company is the Austrian Lloyd in Trieste, which in 1900 employed 70 steamers of 165,430 tons. During 1900 the total tonnage of vessels engaged in the foreign trade, which entered all the Austrian ports, was 1,448,764 tons under the Austro-Hungarian flag, and 888,707 under foreign flags; the total tonnage of vessels cleared during the same period was 1,503,532 tons under the Austro-Hungarian flag, and 866,591 under foreign flags.

Government. — Austria is a parliamentary or constitutional (limited) monarchy, its monarch bearing the title of emperor. The succession to the throne is hereditary, in the order of primo- geniture, in the male line of the house of Habsburg-Lothringen; and failing this, in the female line. The monarch must be a member of the Roman Catholic Church. The emperor of Austria is also king of Hungary, but except for having the same monarch and a few common affairs (see Austria-Hungary), the two states are quite independent of one another. The emperor has the supreme command over the armed forces of the country, has the right to confer degrees of nobility, and has the pre- rogatives of pardon for criminals. He is the head of the executive power, and shares the legislative power with the Reichsrat; and justice is administered in his name. The constitution of Austria is based upon the following statutes: — (1) the Pragmatic Sanction of the emperor Charles VI., first promulgated on the 19th of April 1 713, which regulated the succession to the thrcne; (2) the Pragmatic Patent of the emperor Francis II. of the 1st of August 1804, by which he took the title of Emperor of Austria; (3) the Diploma of the emperor Francis Joseph I. of the 20th of October i860, by which the constitutional form of government was introduced; (4) the Diploma of the emperor Francis Joseph I. of the 26th of February 1861, by which the provincial diets were created ; (5) the six fundamental laws of the 21st of December 1867, which contain the exposition and guarantee of the civil and political rights of the citizen, the organization of justice, the organization and method of election for the Reichsrat, &c.

The executive power is vested in the council of ministers, at whose head is the minister-president. There are eight ministries, namely, the ministry of the interior, of national defence, of worship and instruction, of finance, of commerce, of agriculture, of justice, and of railways. There are, further, two ministries, wi thout portfolio , for Galicia and Bohemia. The civil administra- tion in the different provinces is carried out by governors or stadtholders {Statlhalter) , to whom are subordinate the heads of the 347 districts in which Austria was divided in 1900, and of the ˆ3 towns with special statute, i.e. of the towns which have also the management of the

civil administration. Local self- government of the provinces, districts and communities is also granted, and is exercised by various elective bodies. Thus, the autonomous provincial administration is discharged by the provincial committees elected by the local diets; and the affairs of the communities are discharged by an elected communal council.

The legislative power for all the kingdoms and lands which constitute Austria is vested in the Reichsrat. It consists of two Houses; an Upper House (the Herrenkaus), and a Lower House (the Abgeordnetenhaus) . The Upper House is composed of (1) princes of the imperial house, who are of age (14 in 1907); (2) of the members of the large landed nobility, to which the emperor had conferred this right, and which is hereditary in their family (78 in 1907); (3) of 9 archbishops and 8 prince- bishops; and (4) of life members nominated by the emperor for distinguished services (170 in 1907). The Lower House has undergone considerable changes since its creation in 1861, by the various modifications of the electoral laws passed in 1867, 1873, 1892, 1896 and 1907. The general spirit of those modifica tions was to broaden the electoral basis, and to extend the franchise to a larger number of citizens. The law of the 26th of January 1907 granted universal franchise to Austrian male citizens over twenty-four years of age, who have resided for a year in the place of election. The Lower House consists of 516 members, elected for a period of six years. The members receive payment for their services, as well as an indemnity for travelling expenses. A bill to become law must pass through both Houses, and must receive the sanction of the emperor. The emperor is bound to summon the Reichsrat annually.

According to the imperial Diploma of the 26th February 1 86 1, local diets have been created for the legislation of matters of local interest. These provincial parliaments are 1 7 in number, and their membership varies from 22 members, which compose the diet of Gorz and Gradisca.to the 242 members which constitute that of Bohemia. They assemble annually and are composed of members elected for a period of six years, and of members ex-officio, namely, the archbishops and bishops of the respective provinces, and the rector of the local university.

ion. — Religious toleration was secured throughout the Habsburg dominions by the patent of the 13th of October 1781, but Protestants were not given full civil rights until the issue of the Protestanlenpatent of the 8th of April 1861, after the promulgation of the imperial constitution of the 26th of February. The principle underlying this and all subsequent acts is the guarantee to all religious bodies recognized by law of freedom of worship, the manage- ment of their own affairs, and the undisturbed possession and disposal of their property. Though all the churches are, in a sense, " estab- lished," the Roman Catholic Church, to which the sovereign

must belong, is the state religion. The reigning house, however, though strongly attached to the Roman faith, has always resisted the extreme claims of the papacy, an attitude which in Joseph II.'s time resulted, under the influence of Febronianism (q.v.), in what was practically a national schism. Thus the emperor retains the right to tax church property, to nominate bishops, and to prohibit the circulation of papal bulls without his permission. By the concordat of August 18, 1855, this traditional attitude was to some extent reversed; but this agreement soon became a dead letter and was formally denounced by the Austrian government after the promulga- tion of the dogma of papal infallibility.

Of the population of Austria in 1900, 23,796,814 (91%) were Roman Catholics, including 3,134,439 uniate Greeks and 2096 uniate Armenians. There were 12,937 Old Catholics, in scattered com- munities, 606,764 members of the Eastern Orthodox Church, mainly in Bukovina and Dalmatia, and 698 Armenians, also mainly in Bukovina. The Protestants, who in the 16th century comprised 90 % of the population, are now only 1 -9 %. In 1900, 365,505 of them were returned as belonging to the Augsburg Confession (Lutheran), 12 8,557 to the Helvetic (Reformed). Other Christian Confessions in Austria are Herrnhuters (Moravian Brethren) in Bohemia, Mennonites in Galicia, Lippovanians (akin to the Russian Skoptsi) in Bukovina, and Anglicans. The Jews compose 4-7 % of the population, and are strongest in Galicia, Lower Austria, Bohemia, Moravia and Bukovina. The Roman Catholic Church is divided into eight 'provinces, seven of the Latin rite — Vienna, Prague, Lemberg, Salzburg, Olmiitz, Gorz and Zara — with 23 bishoprics, and one of the Greek rite (Lemberg) , with two bishoprics. The Armenian bishopric of Lemberg and the Austrian part of the archdiocese of Breslau are under the immediate jurisdiction of the Holy See. The Greek Orthodox Church has one archbishopric (at Czernowitz) and two bishoprics. There are 559 communities of the Jewish religion (253 in Galicia, and 255 in Bohemia). In 1900 there were, belonging to the Roman Catholic Church, 541 monasteries with 7775 monks, and 877 convents with 19,194 nuns; while the Greek Orthodox Church had 14 monasteries with 85 members. The Evangelical Church, according to the constitution granted by imperial decree on the 9th of April 1861 (modified by those of January 6, 1866 and December 9, 1891) is organized on a territorial basis, being

administered by 10 superintendents, who are, in their turn, subject to the Supreme Church Council (K.K. Oberkirchenrat) at Vienna, the emperor as sovereign being technically head of the Church. The small Anglican

community at Trieste is under the jurisdiction of the Evangelical superintendent of Vienna.

Education. — The system of elementary schools dates from the time of Maria Theresa; the present organization was introduced by the education law of May 14, 1869 (amended in 1883). By this law the control of the schools, hitherto in the hands of the Church, was assumed by the state, every local community being bound to erect and maintain public elementary schools. These are divided into Volksschulen (national or primary schools) and Biirgerschulen (higher elementary schools). Attendance is obligatory on all from the age of six to fourteen (in some provinces six to twelve). Religious instruc- tion is given by the parish priest, but in large schools a special grant is made or a teacher ad hoc appointed in the higher classes (law of June 17, 1888). Private schools are also allowed which, if fulfilling the legal requirements, may be accorded the validity of public primary schools. The language of instruction is that of the nation- ality prevalent in the district. In about 40% of the schools the instruction is given in German ; in 26 % in Czech ; in 28 % in other Slavonic languages, and in the remainder in Italian, Rumanian or Magyar. In 1903 there were in Austria 20,268 elementary schools with 78,025 teachers, frequented by 3,618,837 pupils, which compares favourably with the figures of the year 1875, when there were 14,257 elementary schools with 27,677 teachers, frequented by 2,050,808 pupils. About 88 % of the children who are of school age actually attend school, but in some provinces like Upper Austria and Salzburg nearly the full 100 attend, while in the eastern parts of the monarchy the percentage is much lower. In 1900 62 % of the total population of Austria could read and write, and 2-9% could only read. In the number of illiterates are included children under seven years of age. For the training of teachers of elementary schools there were in 1900 54 institutions for masters and 38 for mistresses. In these training colleges., as also in the secondary or " middle " schools (Mittelschulen), religious instruction is also in the hands of the Roman Catholic Church; but, by the law of June 20, 1870, the state must provide for such teaching in the event of the Protestant pupils numbering 20 or upwards (the school authorities usually refuse to take more than 19 Protestants in consequence).

Besides the elementary schools three other groups of educational establishments exist in Austria: " middle " schools (Mittelschulen) ; " high " schools (Hochschulen) ; professional and technical schools (Fachlehranstalten and Gewerbeschulen). The " middle " schools include the classical schools (Gymnasien) , " modern "schools with some Latin teaching (Realgymnasien) , and modern schools simply (Realschulen). In 1903 there were 202 Gymnasien, 19 Realgymnasien and 117-Realschulen, with 7121 teachers and 111,012 scholars. The " high "

schools include the universities and the technical high schools (Technische Hochschulen). Of state universities there are eight: — Vienna, Gratz, Innsbruck, Prague (German), and Czernowitz, in which German is the language of instruction ; Prague (Bohemian) with Czech; and Cracow and Lemberg with Polish as the language of instruction. Each university has four faculties — theology, law and political science, medicine, and philosophy. In Czernowitz, however, the faculty of medicine is wanting. Since 1905 an Italian faculty of law has been added to the university of Innsbruck. The theological faculties are all Rdman Catholic, except Czernowitz, where the theological faculty is Orthodox Eastern. All the universities are maintained by the state. The number of professors and lecturers was about 1596 in 1903; while the number of students was 17,498.

Justice.— The judicial authorities in Austria are: — (1) the county courts, 963 in number; (2) the provincial • and district courts, 74 in number, to which are attached the jury courts, — both these courts are courts of first instance; (3) the higher provincial courts, 9 in number, namely, at Vienna, Graz, Trieste, Innsbruck, Zara, Prague, Brilnn, Cracow and Lemberg; these are courts of appeal from the lower courts, and have the supervision of the criminal courts in their jurisdiction; (4) the supreme court of justice and court of cassation in Vienna. The judicial organization is independent of the executive power. There are also special courts for commercial, industrial, shipping, military and other matters. There is also the court of the Empire at Vienna, which has the power to decide in case of conflict between different authorities.

Finance. — The growth of the Austrian budget, is shown by the following figures: —

1885

1895

1900

1905

Expenditure Revenue . .

£44,121,600 £43,714,666

£55,396,916 £57,446,091

£66,003,494 £66,020,475

£74,oi3,ooo £74,079,000

The chief sources of revenue are direct taxes, indirect taxes, customs duties, post and telegraph and post-office savings banks receipts, railway receipts, and profits or royalties on forests, domains and mining. The direct taxes are divided into two groups, real and personal ; the former include the land tax and house-rent tax, and the latter the personal income tax, tax on salaries, tax on commercial and industrial establishments, tax on all business with properly audited accounts (like the limited liability companies), and tax on investments. The principal indirect taxes are the tobacco monopoly, stamps and fees, excise duties on sugar, alcohol and beer, the salt monopoly, excise duty on mineral oil, and excise duty on meat and cattle for slaughtering.

The national debt of Austria is divided into two groups, a general national debt, incurred jointly by the two halves of the Austro- Hungarian monarchy for common affairs, and is therefore jointly borne by both parts, and a separate debt owed only by Austria alone. The following table shows the growth of the Austrian debt in millions sterling :—

1885

1890

1895

1900

1905

45″

88-23

119-60

140-68

167-91

At the close of 1903 the debt of Austria was £156,724,000, an increase since 1900 of £16,044,000. This large increase is due to the great expenditure on public works, as railways, navigable canals, harbour works, &c, started by the Austrian government since 1900.

Railways. — As regards internal communications, Austria is provided with an extensive network of railways, the industrial provinces being specially

favoured. This has been accomplished in spite of the engineering difficulties owing to the mountainous nature of the country and of the great financial expenses resulting there- from. The construction of the Semmering railway, opened in 1854, for instance, was the first mountain railway built in the European continent, and marked an epoch in railway engineering. The first railway laid down in Austria was in 1824 between Budweis and Kerschbaum, over a distance of 40 m., and was at first used for horse tramway. The first steam railway was opened in 1837 overadistance of about 10 m. between Floridsdorf (near Vienna) and Wagram. From the first, the policy of the Austrian government was to con- struct and to work the railways itself ; and in granting concessions to private companies it stipulated among its conditions the rever- sionary right of the state, whereby the line becomes the property of the state without compensation after the lapse of the period of concession. With various modifications, according to its financial means, it vigorously pursued its policy, by both building railways itself, and encouraging private companies to build. In 1905 the total length of railways in Austria was 13,590 m., of which 5017 m. belonged to and were worked by the state, and 3359 m. belonged to private companies, but were worked by the state.

Bibliography. — F. Umlauft, Die Lander Osterreich-Ungarns in Wort und Bild (15 vols., Vienna, 1881-1889), Die bsterreichisch- ungarische Monarchic (3rd ed., Vienna, 1896), Die osterreichische Monarchic in Wort und Bild (24 vols., Vienna, 1888-1902), and Die Vblker Osterreich-Ungarns (12 vols., Teschen, 1881-1885) ; A. Supan, " Osterreich-Ungarn " (Vienna, 1889, in Kirchhoff's Landerkunde von Europa, vol. ii.) ; Auerbach, Les Races et les nationality en Autriche-Hongrie (Paris, 1897); Mayerhofer, Osterreich-ungarisches Ortslexikon (Vienna, 1896). For geology see C. Diener, &c, Bau und Bild Osterreichs (Vienna and Leipzig, 1903) ; F. von Hauer, Die Geologie (Vienna). The official statistical publications o f the central statistical department, of the ministry of agriculture, ana of the ministry of commerce, appearing annually. (O. Br.)

PRINTED IN U.S.A.

VOL03_AUSTRIA-_LOWER-BISECTRIX

Britannica

THE

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

FIRST edit

ion, published in three volumes, 1768 — 1771.

SECOND ,

, ,, ten ,

, 1777— 1784.

THIRD ,

, „ eighteen ,

, 1788— 1797.

FOURTH ,

, ,, twenty ,

, 1801 — 1810.

FIFTH ,

, „ twenty ,

, 1815—1817.

SIXTH ,

, „ twenty ,

, 1823 — 1824.

SEVENTH . ,

, „ twenty-one ,

, 1830 — 1842.

EIGHTH ,

, „ twenty-two ,

, 1853—1860

NINTH ,

, „ twenty-five ,

, 1875— 1889.

TENTH ,

, ninth edition and eleven

supplementary volumes,

1902 — 1903.

ELEVENTH ,

, published in twentynine volume

s, 1910 — 1911.

COPYRIGHT

in all countries subscribing tq the ..■'.. Bern Q&nventKm ‘ • ‘ by

THE CHANCELLOR, MASTERS AND SCHOLARS

of tie UNIVERSITY OF CAMBRIDGE

AH ‘ rights reserved

THE

ENCYCLOPAEDIA BRITANNICA

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME II!

AUSTRIA LOWER to BISECTRIX

New York

Encyclopaedia Britannica, Inc. 342 Madison Avenue

Copyright, In tlie'Uhrted'Slates of America, 1910,

by

The Encyclopaedia Britannica Company.

INITIALS USED IN VOLUME III. TO IDENTIFY INDIVIDUAL

CONTRIBUTORS, 1 WITH THE HEADINGS OF THE

ARTICLES IN THIS VOLUME SO SIGNED.

A. c. p.

A. C. S. A. P. P.

A. Go.* A. G. G.

A. HI.

A. H. N.

A. H.-S. A. H. S. A. J. L.

A. L. A.N. A. P. H.

A. Sp.

A. St H. G.

A. W.* A. W. H.*

Anna C. Paues, Ph.D. J

Lecturer in Germanic Philology at Newnbam College, Cambridge. Formerlyˆ Bible, English. Fellow of Newnham College. Author of A Fourteenth Century Biblical Version ; &c. I

-j Beaumont and VaUJLu,

Algernon Charles Swinburne.

See biographical article: Swinburne, Algernon C.

Albert Frederick Pollard, M.A., F.R.Hist.Soc. Tt>i .

Professor of English History in the University of London. Fellow of All Souls' j Balnaves; College, Oxford. Assistant Editor of the Dictionary of National Biography, 1893-ˆ Barnes, Ruber C, iqoi. Lothian prizeman (Oxford), 1892; Arnold prizeman, 1898. Author of Bilnev. England under the Protector Somerset; Henry VIII.; Life of Thomas Cranmer; &c. "-

r

Rev. Alexander Gordon,. M. A.

Lecturer on Church History in the University of Manchester.

Sir Alfred George Greenhill, M.A., F.R.S.

Formerly Professor of Mathematics in the Ordnance College, Woolwich. Author, of Differential and Integral Calculus with Applications; Hydrostatics; Notes on Dynamics; &c.

Beza.

Ballistics.

Oxford. Author of A Handbook of European J Austria-Hungary: History {in Editor of the 3rd edition of T. H. Dyer's 1 part).

Arthur Hassall, M. A.

Student and Tutor of Christ Church,

History; The Balance of Power; &c. History of Modern Europe.

Albert Henry Newman, LL.D., D.D. f

Professor of Church History, Baylor University, Texas. Professor at McMaster J T>onti«ta- Aˆerim*. University, Toronto, 1881-1901. Author of The Baptist Churches in the United 1 Ba P us,s – American. States; Manual of Church History; A Century of Baptist Achievement. I

A. Houtum-Schindler, CLE. f Azerbaijan; Bakhtiari;

General in the Persian Army. Author of Eastern Persian Irak. \ Bander Abbasi; Barfurush

Rev. Archibald Henry Sayce, D.Litt., LL.D. J Babylon; Babylonia arid

See the biographical article: Sayce, A. H. 1 Assyria; Belshazzar;

L Berossus.

Editor of the Rio News) Bahia: State; [Bahia: City.

Andrew Lang.

See the biographical article: Lang, Andrew.

Alfred Newton, F.R.S.

See the biographical article: Newton, Alfred,

Alfred Peter Hillier, M.D., M.P.

President, South African Medical Congress, 1893. Author of South African Studies; &c. Served in Kaffir War, 1878-1879. Partner with Dr L. S. Jameson in medical practice in South Africa till 1896. Member of Re'form Committee, Johannesburg, and Political Prisoner at Pretoria, 1895-1896. M.P. for Hitchin division of Herts, 1910,

Archibald Sharp.

Consulting Engineer and Chartered Patent Agent.

Alfred St Hill Gibbons.

Major, East Yorkshire Regiment. Explorer in South Central Africa. Author of -j Barotse, Barotseland. Africa from South to North through Marotseland.

Sir

Andrew Jackson Lamoureux.

Librarian, College of Agriculture, Cornell University. (Rio de Janeiro), 1879-1901.

j Ballads.

\ Birds of Paradise.

Basutoland: History {in par$ \ Bechuanaland {in part).

\ Bicycle.

Arthur Willey, F.R.S., D.Sc

Director of Colombo Museum, Ceylon.

Arthur William Holland.

Formerly Scholar of St John's College, Oxford.

■\ Balanoglossus.

("Austria-Hungary: History (in

\ part); ■■> ;- 5

Bacon Scholar of Gray's Inn, 1900. L Bavaria: History {in pari).

1 A complete list, showing all individual contributors, appears in the final volume.

v

rles Francis Bastable, M.A., LL.D. r

Regius Professor of Laws and Professor of Political Economy in the University of J „• * ir

Dublin. Author of Public Finance; Commerce of Nations; Theory of International 1 "HBCtailism.

Bible : New Testament Chronology.

vi INITIALS AND HEADINGS OF ARTICLES

A. W. Po. Alfred William Pollard, M.A. r

Assistant Keeper of Printed Books, British Museum. Fellow of King's College,

London. Hon. Secretary Bibliographical Society. Editor of Books about Books; \ Bibliography and Bibliology.

and Bibliographica. Joint-editor of the Library. Chief Editor of the " Globe " Chaucer. ..,.-. I

B. K. Prince Bojidar Karageorgevitch (d. 1908). r

Artist, art critic, designer and goldsmith. Contributor to the Paris Figaro, the J _ … . „ Magazine of Art, &c. Author of Enchanted India. Translator of the works of Tolstoi 1 Bashkirtsen. and Jokai, &c. [_

C. The Earl of Crewe, K.G., F.S.A. J

See the biographical article: Crewe, ist Earl of. j Banville.

C. A. C. Charles Arthur Conant. r

Member of Commission on International Exchange of U.S., 1903. Treasurer, J Banks and Banking :

Morton Trust Co., New York, 1902-1906. Author of History of Modern Banks] American

of Issue; The Principles of Money and Banking; &c. [_ . ‘ .

C. B.* Charles Bemont, D. es L., Litt.D. (Oxon.). f „ .

See the biographical article: Bemont, C. -jˆBalUze ; Beam.

C. F. A. Charles Francis Atkinson. r &„~t rian «„„„«.,•.. «,.,.

Formerly Scholar of Queen’s College, Oxford. Captain, ist City of London (Royal A !l , succession War. Fusiliers). Author of The Wilderness and Cold Harbour. [Military.

C. F. B. Charles Francis Bastable, M.A., LL.D

Regius Pre ” Dublin. P Trade; &c.

C. H. T. Ctjthbert Hamilton Turner, M.A.

Fellow of Magdalen College, Oxford; Fellow of the British Academy. Speaker’s Lecturer in Biblical Studies in the University of Oxford, 1906-1909. First Editor of the Journal of Theological Studies, 1899-1902. Author of ” Chronology of the New Testament,” and ” Greek Patristic Commentaries on the Pauline Epistles ” in Hastings’ Dictionary of the Bible, &c.

C. H. W. J. Rev. Claude Hermann Walter Johns, M.A., Litt.D. r

Master of St Catharine’s College, Cambridge. Lecturer in Assyriology, Queens’ College, Cambridge, and King’s College, London. Author of

Assyrian Deeds and \ Babyloniaˆ Law. Documents of the 7th Century B.C. ; The Oldest Code of Laws ; Babylonian and Assyrian Laws ; Contracts and Letters ; &c. |_

C. J. L. Sir Charles James Lyall, K.C.S.I., CLE., LL.D. (Edin.).

Secretary, Judicial and Public Department, India Office. Fellow of King's f College, London. Secretary to Government of India in Home Department, 1889- \ Bihar! Lai. 1894. Chief Commissioner, Central Provinces, India, 1895-1898. Author of Translations of Ancient Arabic Poetry; &c. L

C. Mi. Chedomille Mijatovich. r

Senator of the Kingdom of Servia. Envoy Extraordinary and Minister Pleni- •„ , . potentiary of the King of Servia to the Court of St James's, 1 895-1900, and 1902-] Be 'Srade. I903- [

C. PI. Rev. Charles Plummer, M.A. r

Fellow and Chaplain of Corpus Christi College, Oxford. Ford's Lecturer, 1901. -J Bede. Author of Life and Times of Alfred the Great; &c. I

C. R, B. Charles Raymond Beazley, M.A., D.Litt., F.R.G.S., F.R.Hist.S. r

Professor of Modern History in the University of Birmingham. Formerly Fellow Dpofuc. of Merton College, Oxford, and University Lecturer in the History of Geography. \ Beal;us » Lothian prizeman (Oxford), 1889. Lowell Lecturer, Boston, 1908. Author of] Behaim. Henry the Navigator ; The Dawn of Modern Geography ; &c. I

C. W. W. Sir Charles William Wilson, K.C.B., K.C.M.G., F.R.S. (1836-1907).

Major-General, Royal Engineers. Secretary to the North American Boundary Commission, 1858-1862. British Commissioner on the Servian Boundary Com- mission. Director-General of the Ordnance Survey, 1886-1894. Director-General of Military Education, 1895-1898. Author of From Korti to Khartoum; Life of Lord Clive; &c.

D. B. Ma. Duncan Black Macdonald, D.D. r

Professor of Semitic Languages, Hartford Theological Seminary, U.S.A. \ Bafram.

D. C. B. Demetrius Charles Boulger. r u 1 • r

Author of England and Russia in Central Asia] History of China; Life of Gordon;} Be ‘ glum: . ˆograpky and India in the 19th Century ; History of Belgium ; Belgian Life in Town and Country ; &c. \ Matishcs.

J). F. T. Donald Francis Tovey. ..

Balliol College, Oxford. Author of Essays in Musical Analysis — comprising The Bach, J. S.; Classical Concerto, The Goldberg Variations, and analyses of many other classical | Beethoven. works. I

Beirut {in pari).

D. G. H. David George Hogarth, M.A. Baalbek-

Keeper of the Ashmolean Museum, Oxford. Fellow of Magdalen College, Oxford R arra . ‘ FellowjDf the British Academy. Excavated at Paphos, 1888; Naukratis, 1899 and J J,*.?//

1903; Ephesus, 1904-1905; Assiut, 1906-1907. Director, British School at Ather.o, Belrul W» part); 1897-1900; Director, Cretan Exploration Fund, 1899. [Bengazi.

D. H. David Hannay. f Austrian Succession W«:

Formerly British Vice-Consul at Barcelona. Author of Short History of Royal Navy \ Naval; 1 217-1688; Life of Emilio Castelar; &c. ‘1 Aviles; Bainbridge, Williaw

LBarbary Pirates.

INITIALS AND HEADINGS OF ARTICLES

yn

D.Mn.

D. S. M.*

ft. Sj-S.

E.B.

G.Br.

E. CI.

E. C. B.

£• F. S«

E. G. E. G. B.

E. H. M.

Ed. M. E. Ma. E. M. T.

E. N. S. E. Pr.

E. Tn. E.V. F C. B.

F. C. C.

Director of the London i Berry, Charles Albert.

Rev. Dugald Mactadyen, M.A.

Minister of South Grove Congregational Church, Highgate. Missionary Society.

David Samuel Margoliouth, M.A., D.Litt. r

Laudian Professor of Arabic, Oxford; Fellow of New College. Author of Arabic J • Papyri of the Bodleian Library; Mohammed and the Rise of Islam; Cairo, Jerusalem'] " xunl ' and Damascus. [

David Seth-Smith, F.Z.S. f

Curator of Birds to the Zoological Society of London. Formerly President of the . Avicultural Society. Author of Parrakeels; a Practical Handbook to those Species kept in Captivity.

Edward Breck, Ph.D.

Formerly Foreign Correspondent of the New York Herald and the New York Times. • Author of Wilderness Pets.

Aviary.

Base-Ball.

Formerly Fellow and Tutor"

Ernest Barker, M.A.

Fellow and Lecturer of St John's College, Oxford, of Merton College. Craven Scholar (Oxford), 1895.

Edward Clodd. f

Vice-President of the Folk- Lore Society. Author of Story of Primitive Man ; i Baer. Primer of Evolution; Tom Tit Tot; Animism; Pioneers of Evolution [

Baldwin I. to IV. Jerusalem.

0!

Right Rev. Edward Cuthbert Butler, O.S.B., D.Litt. (Dubl.). Abbot of Downside Abbey, Bath.

Edward Fairbrother Strange.

Assistant-Keeper, Victoria and Albert Museum, South Kensington. Council, Japan Society. Author of numerous works on art subjects; of Bell's " Cathedral " Series.

Edmund Gosse, LL.D.

See the biographical article : Gosse, Edmund.

Member of Joint-editor "

Basilian Monks;

Benedict of Nursia;

Benedictines;

St Bernardin of Siena.

Beardsley, Aubrey Vincent.

Baggesen; Ballade; Barnfleld;

Beaumont, Sir John; Belgium: Literature; Biography.

Bankruptcy: Comparative Law.

Autographs.

Edward Granville Browne, M.A., M.R.C.S., M.R.A.S.

Sir Thomas Adams's Professor of Arabic and Fellow of Pembroke College, Cam- bridge. Fellow of the British Academy. Author of A Traveller's Narrative, -j Babiism. written to Illustrate the Episode of the Bab ; The New History of Mirzd AH Muhammed the Bab ; Literary History of Persia ; &c.

Ellis Hˆvell Minns, M.A. C

Lecturer and Assistant Librarian, and formerly Fellow of Pembroke College, -< Bastarnae. Cambridge. University Lecturer in Palaeography. [

Eduard Meyer, D.Litt. (Oxon.), LL.D., Ph.D. f Bactria; Bagoas;

Professor of Ancient History in the University of Berlin. Author of Geschichte des -\ Bahram; Balash; Alterthums; Geschichte des alien Agyptens;Die Israeliten und ihre Nachbarstamme; &c. I Behistun.

Edward Manson.

Barrister-at-Law. Joint-editor of Journal of Comparative Legislation, Author of Short View of the Law of Bankruptcy; &c. ˆ

Sir Edward Maunde Thompson, G.C.B., D.C.L., LL.D., Litt.D.

Director and Principal Librarian, British Museum, 1888-1909. Fellow of the British Academy. Corresponding Member of the Institute of France and of the Royal Prussian Academy of Sciences. Author of Handbook of Greek and Latin Palaeo- graphy. Editor of the Chronicon Angliae, &c. Joint-editor of Publications of the Palaeographical Society.

E. N. Stockley. C

Captain, Royal Engineers. Instructor in Construction at the School of Military J R arrac lr g Engineering, Chatham. For some time in charge of the Barracks Design Branch of 1 ,>a^^ac, ' 5 • the War Office. I

Edgar Prestage. f

Special Lecturer in Portuguese Literature in the University of Manchester. Com- J Azurara; mendador, Portuguese Order of S. Thiago. Corresponding Member of Lisbon Royal 1 BaiTOS. Academy of Sciences and Lisbon Geographical Society.

Rev. Ethelred Leonard Taunton (d 1907).

Author of The English Black Monks of St Benedict; History of the Jesuits in England,

Rev. Edmund Venables, M.A., D.D. (1819-1895).

Canon and Precentor of Lincoln. Author of Episcopal Palaces of England.

Francis Crawford Burkitt, M.A., D.D.

Norrisian Professor of Divinity, Cambridge. Fellow of the British Academy. Part-editor of The Four Gospels in Syriac transcribed from the Sinailic – Palimpsest. Author of The Gospel History and its Transmission; Early Eastern Christianity; &c.

Frederick Cornwallis Conybeare, M.A., D.Th. (Giessen).

Fellow of the British Academy. Formerly Fellow of University College, Oxford. Author of The Ancient Armenian Texts of Aristotle; Myth, Magic and Morals; &c.

.{ {

Baronius.

Basilica (in pari).

Bible: New Testament, Higher Criticism.

Baptism.

viii

f.

6.

F.

G.

M. B

LI.

G ;

L.

L.

P.

R.

C.

F.

R.

H.

F.

W.

R.*

6.

A.

«♦

G.A.Gr.

INITIALS AND HEADINGS OF ARTICLES

G. B. B. G. B. G.*

G. E.

G. F. Z. G. G. S.

G. H. C.

G. Sa. G. W. T.

H.Br.

H. Ch.

H. C. R* H.Fr. H. F. G.

HBeaeohsfield, Earl of. -{ Bernicia.

Bes.

Frederick. Greenwood.

See the biographical article : Greenwood, Frederick.

Frederick George Meeson Beck, M.A.

Fellow and Lecturer of Clare College, Cambridge.

Francis Llewelyn Griffith, M.A., Ph.D., F.S.A.

Reader in Egyptology, Oxford. Editor of the Archaeological Survey and Archaeo- _ logical Reports of the Egypt Exploration Fund. Fellow of the Imperial German Archaeological Institute.

Lady Lugard. ■ .

See the biographical article : Lugard, Sir F. J. D.

FrAjNk Podmore, M.A. (d. 1910). f

Pembroke College, Oxford. Author of Studies in Psychical Research; Modern “j Automatic Writing,

Spiritualism; &c.

Frank R. Cana.

Author of South Africa from the Great Trek to the Union.

Bauchl.

rBasutoland (in part) ; J Bahr-el-Ghazal (in part) iBechuanaland (in pari).

J Baiburt; 1 Bashkala.

Francis Richard Maunsell, C.M.G.

Lieut.-Col., Royal Artillery. Military Vice-Consul, Sivas, Trebizond, Van (Kurd- istan), 1897-1898. Military Attache, British Embassy, Constantinople, 1901-1905. Author of Central Kurdistan ; &c.

Frederick William Rudler, I.S.O., F.G.S.

,: Curator and Librarian of the Museum of Practical Geology, London, 1879-1902.- President of the Geologists' Association, 1887-1889.

George A. Boulenger, F.R.S., D.Sc, Ph.D.

In charge of the Collections of Reptiles and Fishes, Department of Zoology, British" Museum. Vice-President of the Zoological Society of London.

George 'Abraham Grierson, C.I.E., Ph.D. D.Litt. (Dublin).

Member of the Indian Civil Service, 1873-1903. In charge of Linguistic Survey of India, 1898-1902. Gold Medallist, Asiatic Society, 1909. Vice-President of the – Royal Asiatic Society. Formerly Fellow of Calcutta University. Author of The Languages of India ; &c.

Gerard Baldwin Brown, M.A. f

Professor of Fine Arts, University of Edinburgh. Formerly Fellow of Brasenose ~\ Basilica (in part). College, Oxford. Author of From Schola to Cathedral; The Fine Arts; &c. I

I Aventurine; [Beryl.

1 Axolotl; I Batrachia.

Bengali; Bihari.

Bible: Old Testament) Textual Criticism, and Higher Criticism.

Belgium: History.

George Buchanan Gray, M.A., D.D., D.Litt. (Oxon.) " " '■

Professor of Hebrew and Old Testament Exegesis, Mansfield College, Oxford. . Examiner in Hebrew, University of Wales. Author of The Divine Discipline of Israel; &c.

Rev. George Edmundson, M.A., F.R.Hist.S.

Formerly Fellow and Tutor of Brasenose College, Oxford. Ford's Lecturer, 1909. < Hoh. Member Dutch Historical Society, and Foreign Member, Netherlands Associa- tion of Literature.

. G. F. Zimmer, A.M.Inst.C.E.

Author of Mechanical Handling of Material.

Geokge Gregory Smith, M.A. f

Professor of English Literature, Queen's University, Belfast. Author of The Days "{ Barbour, John. of James IV.; The Transition Period; Specimens of Middle Scots; &c. I

George Herbert Carpenter, B.Sc. ["

Professor of Zoology in the Royal College of Science, Dublin. President of the J Bee Association of Economic Biologists. Member of the Royal Irish Academy. Author | of Insects: their Structure and Life ; &c. ' I

Biseuit.

George Edward Bateman Satntsbury, LL.D., D.Litt. See the biographical article: Saintsbury, G. E. B.

Rev. Griffithes Wheeler Thatcher, M.A., B.D.

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and Old Testament History at Mansfield College, Oxford.

Henry Bradley, M.A., Ph.D.

Joint-editor of the New English Dictionary (Oxford). Fellow of the British Academy. Author of The Story of the Goths; The Making of English; &c.

Hugh Chisholm, M.A.

Formerly Scholar of Corpus Christi College, Oxford. Editor of the nth edition of -j Balfour, A. J. the Encyclopaedia Britannica. Co-editor of the 10th edition.

Balzac, H. de,

Avempace; Averroes; Avieenna; BaidawT; Baladhuri; BehS ud-DIn Beha ud-DIn Zuhair; Blrunl.

-{ Beowulf.

Sir Henry Creswicke Rawlinson, Bart., K.C.B. See the biographical article: Rawlinson, Sir H. C.

Henri Frantz.

Art Critic, Gazette des Beaux Arts (Paris).

Hans Friedrich Gadow, F.R.S., Ph.D.

Strickland Curator and Lecturer on Zoology in the University of Cambridge Author of ” Amphibia and Reptiles ” in the Cam bridge Natural History.

Bagdad: City.

Barye; Bastien-Lepage; Baudry, P. J. A.

Bird.

INITIALS AND HEADINGS OF ARTICLES

IX

ri. H. H.*

H.H. J. H. HL, R.

H. M. W.

H. N. D. H. W. C. D.

H. W. S. LA.

J. An.

J. A. H.

J. B. B. J. D. B. J. F.-K.

J. F. St.

J. H. R. J. HI. R.

J. M. M.

J. P.-B. J. G. Sc.

J. P. E.

Herbert Hensley Henson, M.A., D.D.

Canon of Westminster Abbey and Rector of St Margaret’s, Westminster. Proctor in Convocation since 1902. Formerly Fellow of

All Souls' College, Oxford. Select Preacher (Oxford), 1895-1896; (Cambridge), 190 1. Author of Apostolic Christianity; Moral Discipline in the Christian Church; The National Church; Christ and the Nation; &c.

Sir Harry Hamilton Johnston, D.Sc., G.C.M.G., K.C.B. See the biographical article: Johnston, Sir H. H.

Bible, English: Revised Ver-

sion.

-I Banˆu Languages.

Editor of The Times Engineering \ Bell: House Bell.

Hugh Munro Ross.

Formerly Exhibitioner of Lincoln College, Oxford. Supplement. Author of British Railways.

H. Marshall Ward, M.A., F.R.S., D.Sc. (d. 1905).

Formerly Professor of Botany, Cambridge. President of the British Mycological . Society. Author of Timber and some of its Diseases; The Oak; Sack's Lectures on the Physiology of Plants ; Grasses ; Disease in Plants ; &c.

Henry Newton Dickson, M.A., D.Sc, F.R.G.S.

Professor of Geography, University College, Reading. Author of Elementary Meteorology; Papers on Oceanography; &c.

Henry William Carless Davis, M.A.

Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls', Oxford, 1895— 1902. Author of Charlemagne ; England under the Normans and Angevins, 1066-1272.

H. Wickham Steed,

Correspondent of The Times at Rome (1897-1902) and Vienna.

Israel Abrahams, M.A.

Reader in Talmudic and Rabbinic Literature, University of Cambridge. President, „ Jewish Historical Society of England. Author of A Short

History of Jewish Litera- ture; Jewish Life in the Middle Ages; &c.

Joseph Anderson, LL.D.

Keeper of the National Museum of Antiquities, Edinburgh, and Assistant Secretary of the Society of Antiquaries of Scotland. Honorary Professor of Antiquities to – the Royal Scottish Academy. Author of Scotland in Early Christian and Pagan Times.

John Allen Howe, B.Sc.

Curator and Librarian at the Museum of Practical Geology, London.

Bacteriology (in part); Berkeley, Miles Joseph.

Baltic Sea.

Becket; ‘

Bene&ietus Abbas.

Austria-Hungary: History (in

part) ; Bertani.

John Bagnell Bury, LL.D., Litt.D.

See the biographical article: Bury, J. B.

Bahya

Barrow.

Avonian; Bajoeian; Barton Bedsj -‘ s ‘

Bathonian Series; I Bed: Geology.

‘ Baldwin I. and II.: ‘ ■”* of Romania; Basil I. and II.: EmperSsy 1 I Belisarius.

James David Bourchier, M.AˆF.R.G.S. – King’s College, Cambridge. Correspondent of The Times in South-Eastern Europe. . Commander of the Orders of Prince Danilo of Montenegro and of the Saviour of Greece, and Officer of the Order of St Alexander of Bulgaria.

James Fitzmaurice-Kelly, Litt.D., F.R.Hist.S.

” Gilmour Professor of Spanish Language and Literature, Liverpool

University.

‘ Norman McColl Lecturer, Cambridge University. Fallow of the British Academy.

Member of the Council of the Hispanic Society of America. Knight Commander of

the Order of Alphonso XII. Author of A History of Spanish Literature.

Balkan Peninsula.

Ayala y Herrera; Bello.

Bible: Old Testament: Texts and Versions.

John Frederick Stenning, M.A.

Dean and Fellow of Wadham College, Oxford. University Lecturer in Aramaic. Lecturer in Divinity and Hebrew at Wadham College. v. . .

r Baron; Baronet; John Horace Round, M.A., LL.D. (Edin.). J Battle Abbey Roll;

Author of Feudal England; Studies in Peerage and Family History; Peerage and”) Bayeux Tapestry; ”

Pedigree; &c. [Beauchamp.

John Holland Rose, M.A., Litt.D. r

Christ’s College, Cambridge. Lecturer on Modern History to the Cambridge J Barras;

University Local Lectures Syndicate. Author of Life of Napoleon I.; Napoleonic’) Beauharnais, Eugene de.< ■

Studies; The Development of the European Nations; The Life of Pitt; &c. [_

John Malcolm Mitchell. f Bacon Francis (in Part)-

Sometime Scholar of Queen’s College, Oxford. Lecturer in Classics, East London-^ „ , .’ _ , ■

College (University of London). Joint editor of Grote’s History of Greece. { Berkeley, George (in part).

James George Joseph Penderel-Brodhurst. Editor of the Guardian (London).

Sir James George Scott, K.C.I.E.

Superintendent and Political Officer, Southern Shan States. Handbook; The Upper Burma Gazetteer, &c.

Jean Paul Hippolyte Emmanuel Adhemak Esmein. r

Professor of Law in the University of Paris. Officer of the Legion of Honour. J Bailiff: Bailli; Member of the Institute of France. Author of Cours elimintaire d'histoire du droit") Basoche. f'anqais; &c. [

J Bed: Furniture; \Berain.

Author of Burma, a J Bhamo

X

J. P. Pe.

J. B. P.

J. Sm.* J. S. F.

J. T. Be. J.Vn. J. V. B. J. W. He.

K.L.

K.S.

L.A. L.D.* L. J. S.

L.V.* L. W. K.

M. A. C.

M. Br. M. D. Ch.

H. 6. H. H. Ci

INITIALS AND HEADINGS OF ARTICLES

Rev. John Punnett Peters, Ph.D., D.D. ,

Canon Residentiary, Cathedral of New York. Formerly Professor of Hebrew, Bagdad: Vilayet; University of Pennsylvania. In charge of

Expedition of University of Pennsylvania J Bagdad: City • conducting excavations at Nippur, 1888-1895. Author of Scriptures, Hebrew and Basra ‘ ‘

Christian; Nippur, or Explorations and Adventures on the Euphrates; &c I

Sir John Rahere Paget, Bart., K.C.

Bencher of the Inner Temple. Formerly Gilbart Lecturer on Banking. Author of The Law of Banking; &c.

John Smith, C.B.

Formerly. Inspector-General in Companies’ Liquidation, General in Bankruptcy.

Banks and Banking:

English Law.

1890-1904, and Inspector- -j Bankruptcy,

Author of The Apostolic ‘

John Smith Flett, D.Sc, F.G.S.

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in Edin- burgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby Medallist of the Geological Society of London. I

John T. Bealby. [

Joint author of Stanford’s Europe. Formerly Editor of the Scottish Geographical “1 Magazine. Translator of Sven Hedin’s Through Asia, Central Asia and Tibet, &c. I

Julien Vinson. , f

Formerly Professor of Hindustani and Tamil at the Ecole des Langues Orientales, \ Basques {in part). Paris. Author of Le Basque et les langues mexicaines; &c. I

James Vernon Bartlet, M.A., D.D. (St Andrews).

Professor of Church History, Mansfield College, Oxford. Age; &c.

James Wycliffe Headlam, M.A.

Staff Inspector of Secondary Schools under the Board of Education. Formerly Fellow of King's College, Cambridge. Professor of Greek and Ancient History at " Queen's College, London. Author of Bismarck and the Foundation of the German Empire; &c.

Rev. Kirsopp Lake, M.A.

Lincoln College, Oxford. Professor of Early Christian Literature and New Testa- . ment Exegesis in the University of Leiden. Author of The Text oftlie New Testament; The Historical Evidence for the Resurrection of Jesus Christ ; &c.

Kathleen Schlesinger.

Author of The Instruments of the Orchestra.

Lyman Abbott, D.D.

See the biographical article: Abbott, L.

Louis Marie Olivier Duchesne.

See the biographical article: Duchesne, L. M. O.

Leonard James Spencer, M.A., F.G.S. f Autunite; Axinite;

Assistant, Department of Mineralogy, Natural History Museum, South Kensington. I Azurite; Barytes; Formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar, "j Barvtocalcite* Bauxite

Basalt; Batholite.

Baikal;

Bessarabia (in part).

Barnabas.

Austria-Hungary: History ; Bamberger; Bebel; Benedetti; Beust.

Bible: New Testament: Texts and Versions and Textual Criticism.

Bagpipe; Banjo; Barbiton; Barrel-organ; Bass Clarinet; Basset Horn; Bassoon; Batyphone.

Beecher, Henry Ward.

Benedict (I.-X.)

Editor of the Mineralogical Magazine. Luigi Villari.

ItaHan Foreign Office (Emigration Dept.). Formerly Newspaper Correspondent J gassi Ueo*

I Biotite.

Azeglio; Bandiera, A. and E.;

in East of Europe. Author of Italian Life in Town and Country; &c.

I Bentivoglio, Giovanni.

Leonard William King, M.A., F.S.A.

Assistant to the Keeper of Egyptian and Assyrian Antiquities, British Museum. Lecturer in Assyrian at King's College, London. Conducted Excavations at Kuyunjik (Nineveh) for British Museum. Author of Assyrian Chrestomathy; ' Annals of the Kings of Assyria; Studies in Eastern History; Babylonian Magic and Sorcery; &c.

Maurice A. Canney, M.A. r

Assistant Lecturer in Semitic Languages in the University of Manchester. Formerly J Exhibitioner of St John's College, Oxford. Pusey and Ellerton Hebrew Scholar] Baur. (Oxford), 1892; Kennicott Hebrew Scholar, 1895; Houghton Syriac Prize, 1896. [

Babylonia and Assyria:

Chronology.

Marg*aret Bryant.

Beaumont and Fletcher:

Appendix.

Sir Mackenzie Dalzell Chalmers, K.C.B., C.S.I. , M.A.

Trinity College, Oxford. Barrister-at-Law. Formerly Permanent Under-Secretary J BJU of Exchangee of State for Home Department. Author of Digest of the Law of Bills of Exchange ; &c. \

Moses G aster, Ph.D. (Leipzig).

Chief Rabbi of the Sephardic Communities of England. Vice-President, Zionist Congress, 1898, 1899, 1900. Ilchester Lecturer at Oxford on Slavonic and By- *j Bassarab. zantine Literature, 1886 and 1891. Author of A New Hebrew Fragment of Ben- Sira; The Hebrew Version of the Secretum Secretorum of Aristotle.

Montague Hughes Crackanthorpe, K.C, D.C.L. f

Honorary Fellow, St John's College, Oxford. Bencher of Lincoln's Inn. President J tj q1 ,.-_ 5.. a „!,.•*„„«„„ of the Eugenics Education Society. Formerly Member of the General Council 1 Berm S »ea Aroiirauon. of the Bar and of the Council of Legal Education, and Standing Counsel to the I University of Oxford.

INITIALS AND HEADINGS OF ARTICLES xi

M. Ja. Morris Jastrow, Ph.D. . <■ D ,• ■

Professor of Semitic Languages, University of Pennsylvania. Author ot Religion of the Babylonians and Assyrians; &c.

M. P.* Leon Jacques Maxime Prinet.

Auxiliary of the Institute of France (Academy of Moral and Political Sciences). Author of L' Industrie du set en Franche-Comte.

O.Br.

R.

A.*

R.

Ad.

R.

A. S.

M

R.

C.J.

R.

Gn.

R.

H. Co

Babylonia and Assyria: Proper Names;

Babylonian and Assyrian Religion; Bel; Belit.

Avaray; Bar-le-Due;

Batarnay; Bauffremont;

Beauharnais; Beaujeu; . Beauvillier;

Bellegarde: Family.

N. B. W. N. B. Wagle. . „ , ‘ f

Formerly Lecturer on Sanskrit at the Robert Money Institution, Bombay. Vice- J President of the London Indian Society. Author of Industrial Development of j Bnau ua]l. India; &c. *-

N. H. M. Rev. Newton Herbert Marshall., M.A., Ph.D. (Halle). J

Minister of Heath Street Baptist Church, Hampstead, London. Author of Gegen- 1 Baptists. wartige Richlungen der Religionsphilosophie in England; Theology and Truth. I

N. M. Norman McLean, M.A. f Bardaisan;

Fellow, Lecturer and Librarian of Christ’s College, Cambridge. University Lecturer J Bar-Hebraeus; in Aramaic. Examiner for the Oriental Languages Tripos and the Theological Bar-SallbT. Tripos at Cambridge. *-

N. V. Joseph Marie Noel Valois. f

Member of the Academie des Inscriptions et Belles-Lettres. Honorary Archivist at J Basel, council oi;

the Archives Nationales.. Formerly President of the Societe de l’Histoire de France Benedict XIII. {anti-pope).

and of the Societe de l'Ecole de Chartes. >-

N. W. T. Northcote Whitbridge Thomas, M.A.

Government Anthropologist to Southern Nigeria. Corresponding Member of the < Automatism.

Societe d' Anthropologic de Paris. Author of Thought Transference; Kinship and I

Marriage in Australia; &c. O.Ba. Oswald Barron, F.S.A. S Beard; Berkeley {Family);

Editor of The Ancestor, 1902-1905. L Bill {Weapon).

Oscar Briliant. { Austria-Hungary: Statistics.

0. Hr. Otto Henker, Ph.D. f Bln _, i n <;triimpnt

On the Staff of the Carl Zeiss Factory, Jena, Germany. \ Binocular instrument.

P. A. Paul Daniel Alphandery. f

Professor of the History of Dogma, Ecole Pratique des Hautes Etudes, Sorbonne, Paris, -s AutO-da-Fe. Author of Les Idees morales chez les heterodoxes lalines au debut du XIII s siecle. I

P. A. A. Philip A. Ashworth, M.A., Doc. Juris. f Bavaria: Statistics;

New College, Oxford. Barrister-at-Law. Translator of H. R. von Gneist s History i Berlin. of the English Constitution. I

P. A. K. Prince Peter Alexeivitch Kropotkin. J* Baikal; Baku;

See the biographical article: Kropotkin, P. A.]. Bessarabia {in part).

P. C. M. Peter Chalmers Mitchell, M.A., F.R.S., F.Z.S., D.Sc, LL.D. f

Secretary to the Zoological Society of London. University Demonstrator in Com- Biogenesis; parative Anatomy and Assistant to Linacre Professor at Oxford, 1888-1891. -j Bloloev Examiner in Zoology to the University of London, 1903. Author of Outlines of I 5 '*

Biology; &c. ' ^

P.C.Y. Philip Chesney Yorke M.A. { Balfour, Sir James.

Magdalen College, Oxford. I ‘

P. Gi. Peter Giles, M.A., Litt.D., LL.D. f

Fellow and Classical Lecturer of Emmanuel College, Cambridge. University J B. Reader in Comparative Philology. Formerly Secretary of the Cambridge Philological | Society. Author of Manual of Comparative Philology; &c. I

P. S. Philip Schidrowitz, Ph.D., F.C.S. [

Member of Council, Institute of Brewing; Member of Committee of Society of J Beer. Chemical Industry. Author of numerous articles on the Chemistry and Technology] of Brewing, Distilling, &c. <-

Robert Anchel. J Billaud-Varenne.

Archivist of the Departement de l’Eure. t

Robert Adamson, M.A., LL.D. J Bacon, Francis;

See the biographical article: Adamson, Robert. 1 Bacon, KOger, Benese,

I Berkeley, Bishop.

Robert Alexander Stewart Macalister, M.A., F.S.A. f” Bashan –

St John’s College, Cambridge. Director of Excavations for the Palestine Explora- < _ .!. .' tion Fund. Joint author of Excavations in Palestine, 1898-1900. • [Betnienem.

Sir Richard Claverhouse Jebb, LL.D., D.C.L., Litt.D. J Bacchvlides

See the biographical article : Jebb, Sir Richard C. \ y

Sir Robert Giffen, F.R.S. fBagehot;

See the biographical article: Giffen, Sir R. \ Balance of Trade.

Rev. Robert Henry Charles, M.A., D.D., Litt.D. (Oxon.). r

Grinfield Lecturer and Lecturer in Biblical Studies, Oxford. Fellow of the British _ .

Academy. Formerly Senior Moderator of Trinity College, Dublin. Author and -j Barucn.

Editor of Book of Enoch; Book of Jubilees; Apocalypse of Baruch; Assumption of I

Moses ; A scension of Isaiah ; Testaments of XII. Patriarchs ; &c.

Xll

R.

H.I.

P

R.

J. M.

R.

L*

R.

L. S.

R.

M.*

R. N. B.

S. A. C.

S.C. S. R. D. T. A. J.

T. As.

T. A. I. T. Ba.

T. E. H.

T. G. C.

T.

H.

D.

T.

H.

H.

T.

H.

H.*

T.L.P.

T.O.

INITIALS AND HEADINGS OF ARTICLES

Sir Robert Harry Inglis Palgrave, F.R.S. f

Director of Barclay & Co., Ltd., Bankers. Editor of the Economist, 1871-1883. J Banks and Banking: Author of Notes on Banking in Great Britain and Ireland, Sweden, Denmark and 1 General. Hamburg; &c. Editor of Dictionary of Political Economy. I

Ronald John McNeill, M.A. f

Christ Church, Oxford. Barrister-at-Law. Formerly Editor of the St James's \ Beresford, John. Gazette (London). L

Richard Lydekker/F.R.S., F.G.S., F.Z.S. f Avahi; Aye-Aye;

Trinity College, Cambridge. Member of the Staff of the Geological Survey of India, J Babirusa* 1874-1882. Author of Catalogues of Fossil Mammals, Reptiles and Birds in British 1 j» a ij nnn . 'opjivpr Museum ; The Deer of all Lands ; &c. I aa,oaoa > weaver.

Robert Louis Stevenson. See the. biographical article:

Stevenson, R. L. B.

Robert Muir, M.A., M.D., F.R.C.P. (Edin.).

Professor of Pathology, University of Glasgow. Andrews, 1898-1899. Author of Manual of Bacteriology; &c.

Beranger.

Professor of Pathology at St { B * J*^ /b > *

Robert Nisbet Bain (d. 1000).

Assistant Librarian, British Museum, 1 883-1909. Author of Scandinavia: the Political History of Denmark, Norway and Sweden, is 13-1900 ; The First Romanovs, 1613-1725; Slavonic Europe: the Political History of Poland and Russia from 1460 to 1706; Charles XII. and the Collapse of the Swedish Empire; Gustavus III. and his Contemporaries ; The Pupils of Peter the Great ; &c.

Stanley Arthur Cook, M.A. . r

Editor for Palestine Exploration Fund. Lecturer and formerly Fellow, Gonville J and Caius College. Author of Glossary of Aramaic Inscriptions; The Laws of Moses 1 and Code of Hammurabi; Critical Notes on Old Testament History; &c. I

Sidney Colvin, M.A., Litt.D. j'

**See the biographical article: Colvin, Sidney. **

Bakdcz; Balassa; Banffy; Bar, Confederation of; Baross; Basil; Batnory; Batthyany; Bela III. and IV.; Bern; Bed thy; Bernstorff; Bestuzhev-Ryumin; Bethlen; Bezborodko; Biren,

Baal; Benjamin.

Samuel Rolles Driver, D.D., Litt.D.

See the biographical article : Driver, S. R.

Thomas Athol Joyce, M.A.

Assistant in Department of Ethnography, Anthropological Institute.

Baldovinetti; Bellini.

Bible: Old Testament: and Chronology.

Canon

British Museum. Hon.

Sec, Royall Beehuana.

Thomas Ashby, M.A., D.Litt. (Oxon.), F.S.A.

Director of British School of Archaeology at Rome. Formerly Scholar of Christ Church, Oxford. Craven Fellow (Oxford). Corresponding Member of the Imperial German Archaeological Institute. Author of the Classical Topography of the Roman Campagna; &c.

Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.

Sir Thomas Barclay, M.P.

‘ Member of the Institute of International Law. Member of the Supreme Council of ., the Congo Free State. Officer of the Legion of Honour. Author of Problems of International Practice and Diplomacy; &c. M.P. for Blackburn, 1910.

Thomas Erskine Holland, K.C., D.C.L., LL.D.

Fellow of the British Academy. Fellow of All Souls’ College, Oxford. Formerly Professor of International Law in the University of Oxford. Bencher of Lincoln’s . Inn. Author of Studies in International Law; The Elements of Jurisprudence; Alberici Gentilis de jure belli; The Laws of War on Land; Neutral Duties in a Mari- time War; &c.

Thomas G. Carver, M.A., K.C. (d. 1906).

Formerly Scholar of St John’s College, Cambridge. 8th Wrangler, 1871. Author of – Ore the Law Relating to the Carriage of Goods by Sea.

Rev. Thomas Herbert Darlow, M.A.

Literary Superintendent of the British and Foreign Bible Society. Sometime Scholar of Clare College, Cambridge. Author of Historical Catalogue of Printed • Editions of Holy Scriptures (vol. i. with H. G. Moule) ; &c.

Thomas Henry Huxley, F.R.S.

See the biographical article: Huxley, Thomas H.

Sia Thomas Hungerford Holdich, K.C.M.G., K.C.I.E., D.Sc, F.R.G.S.

Colonel in the Royal Engineers. Superintendent, Frontier Surveys, India, 1892- 1898. Gold Medallist, R.G.S. (London), 1887. H. M. Commissioner for the Persa- Beluch Boundary, 1896. Author of The Indian Borderland; The Gates of India; &c.

Rev. Thomas Leslie Papillon, M.A.

Hon. Canon of St Albans. Formerly Fellow, Dean and Tutor of New College, Oxford. Fellow of Merton College. Author of Manual of Comparative Philology ; &c.

Thomas Okey.

Examiner in Basket Work for the City of London Guilds and Institute.

Auximum; Avella;

Avellino; Avernus; Baiae;

Bari; Barletta; Bassano;

Belluno; Benevento;

Bergamo; Bertinoro. ("Bailiff; Bffl(tow); I Bill of Sale.

Belligerency.

Bentham, Jeremy.

Average.

Bible Societies.

-J Biology (in part).

' Badakshan; Bahrein Islands; Bajour; Balkh; Baluchistan; Bamian; Bela; Bhutan.

Bell.

Basket.

INITIALS AND HEADINGS TO ARTICLES

-T1H

ir. w. R. d.

V. H. B. W. A. B. C

W. A. G.

W.A*P.

W. Bo,

W. B. Ca. W. C. P.

W. E. D.

w.

E.

G.

w.

H.

Be.

w.

H

Ha.

w.

J.

H.*

w.

L.

D.

w.

M

S.

w.

P.

C.

w.

P.J.

W. P. R.

W. R. L

W.Sa.

T. W. Rhys Davids, M.A., LL.D., Ph.D.

Professor of Comparative Religion in the University of Manchester. Formerly Professor of Pali and Buddhist Literature, University College, London. Fellow of j Bharahat. the British Academy. Secretary and Librarian of the Royal Asiatic Society, 1885 1902. Author of Early Buddhism; Buddhist India; &c.

Vernon Herbert Blackman, M.A., D.Sc. .

Professor of Botany in the University of Leeds. Formerly Fellow of St John's -j Bacteriology: Botany. College, Cambridge.

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D.

Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880-1881. Author of Guide to Switzerland; The Alps in Nature and in History; &c. Editor of the Alpine Journal, 1880-1889.

Walter Armstrong Graham.

His Siamese Majesty's Resident Commissioner for the Siamese Malay State of Kelantan. Commander, Order of the White Elephant. Member of the Burma – Civil Service, 1889-1903. Author of The French Roman Catholic Mission in Siam; Kelantan, a Handbook ; &c.

Baden: Switzerland; Barcelonnette; Basel; Basses-AIpes; Beaulieu; Bellinzona; Bern; BiennS,

Bangkok.

Walter Alison Phillips, M.A.

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, Oxford. Author of Modern Europe; The War of Greek Independence; &c.

Austria-Hungary: History

(in part) ; Babeuf ; Balance of Pdwer; Baron; Bates;

Bavaria: History; Beguines; Berlin: Congress and Treaty of; Bernard, St; Biretta.

Author of i Basilides.

Bee: Bee-keeping.

Wilhelm Bousset, D.Th.

Professor of New Testament Exegesis in the University of Gottingen. Das Wesen der Religion; The Antichrist Legend; &c.

W. Broughton Cars.

Formerly Editor of the British Bee Journal and the Bee-Keepers' Record.

William Charles Porˆ LEWELL, M.Sc, A.M. I.C.E. ("

Lecturer in Engineering in Manchester School of Technology (University of Man- s Bellows and Blowing Machines*.

Chester). Author of Compressed Air; Heat Engines; &c. [_

William Ernest Dalby, M.A., M.Inst.CE., M.I.M.E. r '

Professor of Civil and Mechanical Engineering at the City and Guilds of London ■•>.

Institute Central Technical College, South Kensington. Associate Member of the -j Bearings. ;»

Institute of Naval Architects. Author of The Balancing of Engines; Valves and . '

Valve Gear Mechanisms ; &c. I

Sir William Edmund Garstin, G.C.M.G. f

Governing Director, Suez Canal Co. Formerly Inspector-General of Irrigation,-! Bahr-el-Ghazal (in part). Egypt. Adviser tc the Ministry of Public Works in Egypt, 1904-1908. (_

William Henry Bennett, M.A., D.D., D.Litt. (Cantab.). r

Professor of Old Testament Exegesis in New and Hackney Colleges, London. J Balaam; Formerly Fellow of St John's College, Cambridge. Lecturer in Hebrew at Firth | Rnefrehiil

College, Sheffield. Author of Religion of the Post-Exilic Prophets; &c.

William Henry Hadow, M.A., Mus.Doc.

Principal, Armstrong College, Newcastle-on-Tyne. Formerly Fellow and Tutor of . Worcester College, Oxford. Member of Council, Royal College of Music. Editor Oxford History of Music. Author of Studies in Modern Music ; &c.

William James Hughan.

Past Senior Grand Deacon of Freemasons of England, 1874. of Grand Lodges of Egypt, Quebec and Iona, &c.

Beelzebub.

Bach, K. P. E.

Hon. Senior Warden 4 Banker-Marks.

William Leslie Davidson, LL.D.

Professor of Logic and Metaphysics, Aberdeen University. Author of The Logic of – Definition; Christian Ethics; &c. Editor of Alexander Bain's Autobiography.

William Milligan Sloane, Ph.D., LL.D.

Bain, Alexander.

Professor of History, Columbia University, New York. Secretary to George) n ,, „

Bancroft while American Ambassador in Berlin, 1872-1875. Author of Life of] Bancr0It > beorge

f Bath, Williarfl PuMeney, I Marquess of. ‘

High Bailiff of County Courts, -l Barrie, J. M,

Napoleon Bonaparte.

William Prideaux Courtney.

See the article: Courtney, L. H., Baron.

William Price James.

University College, Oxford. Barrister-at-Law. Cardiff. Author of Romantic Professions ; &c.

Hon. William Pember Reeves. ‘ r

Director of London School of Economics. Agent-General and High Commissioner J u-na-.. i„v,» for New Zealand, 1896-1909. Minister of Education, Labour and Justice, New 1 Ballanee » JOnnj Zealand, 1891-1896. Author of The Long White Cloud, a History of New Zealand ; &c. I

W. R. Lethaby, F.S.A.

Principal of the Central School of Arts and Crafts under the London County Council. Author of Architecture, Mysticism and Myth; &c.

William Sanday, D.D., LL.D., Litt.D.

Baptistery.

Lady Margaret Professor of Divinity, and Canon of Christ Church, Oxford. Chap- lain in Ordinary to His Majesty the King. Hon. Fellow of Exeter College, Oxford. \ Bible: New Testament: Canon tellow ot the British Academy. Author of Inspiration (Bampton Lecture, 1893); Commentary on the Epistle to the Romans; &c. I.

XIV

INITIALS AND HEADINGS TO ARTICLES

W.T.Ca, W.T.T.-

W.W.

W.We.

W.Wr.

W.R.S. W.W.R.

William Thomas Calman, D.Sc, F.Z.S.

Assistant in charge of Crustacea, Natural History Museum, South Kensington. Author of ” Crustacea ” in Lankester’s Treatise on Zoology.

D. Sir William Turner Thiselton-Dyer, F.R.S., K.C.M.G., C.I.E., D.Sc. LL.D., Ph.D., F.L.S. Hon. Student of Christ Church, Oxford. Director, Royal Botanic Gardens, Kew, . 1885-1905. Botanical Adviser to Secretary of State for Colonies, 1902-1906. Joint-author of Flora of Middlesex. Editor of Flora Capenses and Flora of Tropical Africa.

William Wallace, M.A.

See the biographical article: Wallace, William (1844-1897).

Rev. Wentworth Webster (d. 1906). Author of Basque Legends; &c.

Barnacle.

Bentham, George.

J” Averroes; 1 Avicenna.

f Basque Provinces; \ Basques.

Bacon, Leonard.

Williston Walker, Ph.D., D.D.

Professor of Church History, Yale University. Author of History of the Congre- gational Churches in the United States ; The Reformation ; John Calvin ; &c.

W. Robertson Smith, LL.D.

See the biographical article: Smith, William Robertson.

William Walker Rockwell, Lic.Theol. f vrt VTIT vt ..

Assistant Professor of Church History, Union Theological Seminary, New York, -j Benedict Al., All., Xlll., Al V Author of Die Doppelehe des Landgrafen Philipp von Hessen. L

{

Baal.

PRINCIPAL UNSIGNED ARTICLES

Azo Compounds.

Azoimide.

Azores.

Baader, F. X.

Baber.

Baby-Farming.

Bachelor.

Backgammon.

Baden: Grand Duchy.

Badger.

Badminton.

Bagatelle.

Bahamas.

Balaklava.

Bale, John.

Baliol.

Ballet.

Ballot.

Balneotherapeutics.

Bamboo.

Ban.

Banana.

Bank-notes.

Barbados.

Barbarossa.

Barbed Wire.

Barcelona.

Barclay, Alexander.

Barere de Vieuzac.

Barium.

Barlaam and Josaphat.

Barley.

Barnes, William. Barometer. Barrister. Barrow, Isaac. Bastiat, F. Bastille. Baths. Battery. Baudelaire. Bautzen. Baxter, Richard. Bayard, P. T. Bazaine. Bean. Bear.

Bear – Baiting and Bull- Baiting. Beaton.

Beaufort: Family. Beaufort, Henry. Beaumarchais. Beaumont: Family. Becher.

Beddoes, Thomas Loveil. Bedford, Earls and Dukes of. Bedfordshire. Bedouins. Beecher, Lyman. Behar. Beheading. Bejart. Belfast: Ireland.

Belfort: Town. Bell, Sir Charles. Belladonna. Bellarmine. Bellary.

Belle-Isle, C. L. A. F., Due de. Benares. Benedek. Benediction. Benefice. Benevolence. Bengal. Bengel. Benin.

Benjamin (Judah Philip). Benson (Archbishop of Canter- bury). Bentley, Richard. Benton. Benzaldehyde. Benzene. Benzoic Acid.

Berar. Berbers. Berengarius. Beresford, Lord Charles. Beresford, Viscount. Bergen. Beri-Beri. Berkshire. Berlioz. Bermondsey.

Bermudas.

Bernhardt, Sarah.

Bernoulli.

Berthelot.

Berwick (Duke of).

Berwickshire.

Berwick-upon-Tweed.

Beryllium.

Besancon.

Bessemer, Sir Henry.

Bet and Betting.

Betrothal.

Beyle.

Bezique.

Bhagalpur.

Bible Christians.

Bichromates and Chromates.

Bidder.

Bigamy.

Bijapur.

Bikanir.

Bilaspur.

Bilbao.

Billiards.

Binomial.

Birch.

Birkenhead.

Birmingham.

Birney, James G.

Biron, Armand de Gontaut.

Birth.

Biscay (Vizcaya).

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

VOLUME III

AUSTRIA, LOWER (Ger. Niederosterreich or Osterreich unter der Enns, " Austria below the river Enns "), an archduchy and crownland of Austria, bounded E. by Hungary, N. by Bohemia and Moravia, W. by Bohemia and Upper Austria, and S. by Styria. It has an area of 7654 sq. m. and is divided into two parts by the Danube, which enters at its most westerly point, and leaves it at its eastern extremity, near Pressburg. North of this line is the low hilly country, known as the Waldviertel, which lies at the foot and forms the continuation of the Bohemian and Moravian plateau. Towards the W. it attains in the Weins- berger Wald, of which the highest point is the Peilstein, an altitude of 3478 ft., and descends towards the valley of the Danube through the Gfohler Wald (2368 ft.) and the Manhartsgebirge (1758 ft.). Its most south-easterly offshoots are formed by the Bisamberg (1180 ft.), near Vienna, just opposite the Kahlenberg. The southern division of the province is, in the main, mountainous and hilly, and is occupied by the Lower Austrian Alps and their offshoots. The principal groups are: the Voralpe (5802 ft.), the Durrenstein (6156 ft.), the Otscher (6205 ft.), the Raxalpe (6589 ft:) and the Schneeberg (6806 ft.), which is the highest summit in the whole province. To the E. of the famous ridge of Semmering are the groups of the Wechsel (5700 ft.) and the Leithagebirge (1674 ft.).

The offshoots of the Alpine group are formed by the Wiener Wald, which attains an altitude of 2929 ft. in the Schopfl and ends N.W. of Vienna in the Kahlen- berg (1404 ft.) and Leopoldsberg (1380 ft.).

Lower Austria belongs to the watershed of the Danube, which with the exception of the Lainsitz, which is a tributary of the Moldau, receives all the other rivers of the province. Its principal affluents on the right are: the Enns, Ybbs, Erlauf, Pielach, Traisen, Wien, Schwechat, Fischa and Leitha; on the left the Isper, Krems, Kamp, Gollersau and the March. Besides the in. 1

Danube, only the Enns and the March are navigable rivers. Amongst the small Alpine lakes, the Erlaufsee and the Lunzer See are worth mentioning. Of its mineral springs, the best known are the sulphur springs of Baden, the iodine springs of Deutsch-Altenburg, the iron springs of Pyrawarth, and the thermal springs of Voslau.. In general the climate, which varies with the configuration of the surface, is moderate and healthy, although subject to rapid changes of temperature. Although 43 ‘4 % of the total area is arable land, the soil is only of moderate fertility and does not satisfy the wants of this thickly-populated province. Woods occupy 34-2%, gardens and meadows 13-1% and pastures 3-2%. Vineyards occupy 2% of the total area and produce a good wine, specially those on the sunny slopes of the Wiener Wald. Cattle-rearing is not well developed, but game and fish are plentiful. Mining is only of slight importance, small quantities of coal and iron-ore being extracted in the Alpine foothill region; graphite is found near Miihldorf. From an industrial point of view, Lower Austria stands, together with Bohemia and Moravia, in the front rank amongst the Austrian provinces. The centre of its great industrial activity is the capital, Vienna (q.v.) ; but in the region of the Wiener Wald up to the Semmering, owing to its many waters, which can be transformed into motive power, many factories are spread. The principal industries are, the metallurgic and textile industries in all their branches, milling, brewing and chemicals; paper, leather and silk; cloth, objets de luxe and millinery; physical and musical instruments; sugar, tobacco factories and food- stuffs. The very extensive commerce of the province has also its centre in Vienna. The population of Lower Austrio in 1900 was 3,100,493, which corresponds to 405 inhabitants per sq. m. It is, therefore, the most densely populated province of Austria. According to the language in common use, 95% of the population

was German, 4-66 % was Czech, and the remainder was composed of Poles,ˆ>lovaks, Ruthenians, Croatians and Italians. According to religion 92-47 % of the inhabitants were Roman Catholics; S”°7% were Jews; 2-11% were Protestants and the remainder belonged to the Greek church. In the matter of education, Lower Austria is one of the most advanced provinces of Austria, and 99-8% of the children of school-going age attended school regularly in 1900. The local diet is composed of 78 members, of which the archbishop of Vienna, the bishop of St Polten and the rector of the Vienna University are members ex officio. Lower Austria sends 64 member., to the Imperial Reichsrat at Vienna. For administrative purposes, the province is divided into 22 districts and three towns with autonomous munici- palities: Vienna (1,662,269), the capital (since 1905 including Floridsdorf, 36,599), Wiener-Neustadt (28,438) and Waidhofen on the Ybbs (4447). Other principal towns are: Baden(i2,447), Bruck on the Leitha (5134), Schwechat (8241), Korneuburg (8298), Stokerau (10,213), Krems (12,657), Modling (15,304), Reichenau (7457), Neunkirchen (10,831), St Polten (14,510) and Klosterneuburg (11,595),

The original archduchy, which included Upper Austria, is the nucleus of the Austrian empire, and the oldest possession of the house of Habsburg in its present dominions.

See F. Umlauft, Das Erzherzogtum Osterreich unter der Enns, vol. i. of the collection Die Lander Osterreich- Ungarns in Wort und Bild (Vienna, 1 881-1889, 15 vols.); Die osterreichisch-ungarische Monarchie in Wert und Bild, vol. 4, (Vienna, 1886-1902, 24 vols.);. M. Vansca, Cesch. Nieder- u. g/ber-Qsterreibhs (in Beeren’s Staaten- gesch., Gotha, 1965);

AUSTRIA, UPPER (Ger. Ober osterreich or Osterreich ob der Enns, ” Austria above the river Enns “), an archduchy and crown-land of Austria, bounded N. by Bohemia, W. by Bavaria, S. by Salzburg and Styria, and E. by Lower Austria. It has an area of 4631 sq. m. Upper Austria is divided by the Danube into two unequal parts. Its smaller northern part is a prolonga- tion of the southern angle of the Bohemian forest and contains as culminating points the Plbcklstein (4510 ft.) and the Sternstein (3690 ft.). The southern part belongs to the region of the Eastern Alps, containing the Salzkammergut and Upper Austrian Alps, which are found principally in the district of Salzkammergut (q.v.). To the north

of these mountains, stretching towards the Danube, is the Alpine foothill region, composed partly of terraces and partly of swelling undulations, of which the most important is the Hausruckwald. This is a wooded chain of mountains, with many branches, rich in brown coal and culminating in the Goblberg (2950 ft.). Upper Austria belongs to the watershed of the Danube, which flows through it from west to east, and receives here on the right the Inn with the Salzach, the Traun, the Enns with the Steyr and on its left the Great and Little Mtihl rivers. The Schwarzenberg canal between the Great Muhl and the Moldau establishes a direct navigable route between the Danube and the Elbe. The climate of Upper Austria, which varies according to the altitude, is on the whole moderate; it is somewhat severe in the north, but is mild in Salzkammergut. The population of the duchy in 1900 was 809,918, which is equivalent to 174-8 inhabitants per sq. m. It has the greatest density of population of any of the Alpine provinces. The inhabitants are almost exclusively of German stock and Roman Catholics. For administrative purposes, Upper Austria is divided into two autonomous municipalities, Linz (58,778) the capital, and Steyr (17,592) and 12 districts. Other principal towns areWels (12,187), Ischl (9646) and Gmunden (7126). The local diet, of which the bishop of Linz is a member ex officio, is composed of 50 members and the duchy sends 22 members to the Reichsrat at Vienna. The soil in the valleys and on the lowe* slopes of the hills is fertile, indeed 35-08% of the whole area is arable. Agriculture is well developed and relatively large quantities of the principal cereals are produced. Upper Austria has the largest proportion of meadows in all Austria, 1 8”S4%, while 2-49% is lowland and Alpine pasturage. Of the remainder, woods occupy 34-02 %, gardens 1 -99 % and 4-93 % is unproductive. Cattle-breeding is also in a very advanced stage and together with the timber-trade forms a considerable resource

of the province. The principal mineral wealth of Upper Austria is salt, of which it extracts nearly 50 % of the total Austrian production. Other important products are lignite, gypsum and a variety of valuable stones and clays. There are about thirty mineral springs, the best known being the salt baths of Ischl and the iodine waters at Hall. The principal industries are the iron and metal manufactures, chiefly centred at Steyr. Next in importance are the machine, linen, cotton and paper manufactures, the milling, brewing and distilling industries and shipbuilding. The principal articles of export are salt, stone,

timber, live-stock, woollen and iron wares and paper.

See Edlbacher, Landeskunde von Ober osterreich (Linz, 2nd ed., 1883) ; Vansca, op. cit. in the preceding article.

AUSTRIA-HUNGARY, or the Austro-Hungarian Monarchy (Ger. Osterreichisch-ungarische Monarchie or Osterreichisck-ungarisches Reich), the official name of a country situated in central Europe, bounded E. by Russia and Rumania, S. by Rumania, Servia, Turkey and Montenegro, W. by the Adriatic Sea, Italy, Switzerland, Liechtenstein, and the German Empire, and N. by the German Empire and Russia. It occupies about the sixteenth part of the total area of Europe, with an area (1905) of 239,977 sq. m. The monarchy consists of two independent states: the kingdoms and lands represented in the council of the empire {Reichsrat), unofficially called Austria (q.v.) or Cisleithania; and the " lands of St Stephen's Crown," un- officially called Hungary (q.v.) or Transleithania. It received its actual name by the diploma of the emperor Francis Joseph I. of the 14th of November 1868, replacing the name of the Austrian Empire under which the dominions under his sceptre were formerly known. The Austro-Hungarian monarchy is very often called unofficially the Dual Monarchy. It had in 1901 a population of 45,405,267 inhabitants, comprising therefore within its borders, about one-eighth of the total population of Europe. By the Berlin Treaty of 1878 the principalities of Bosnia and Herzegovina with an area of 19,702 sq. m., and a population (1895) of 1,591,036 inhabitants, owning Turkey as suzerain, were placed under the administration of Austria- Hungary, and their annexation in 1908 was recognized by the Powers in 1909, so that they became part of the dominions of the monarchy.

Government.— Thepresent constitution of the Austro-Hungarian monarchy (see Austria) is based on the Pragmatic Sanction of the emperor Charles VI., first promulgated on the 19th of April 1 7 13, whereby the succession to the throne is settled in the dynasty of Habsburg-Lorraine, descending by right of primo- geniture and lineal succession to male heirs, and, in case of their extinction, to the female line, and whereby the indissolubility and indivisibility of the monarchy are determined; is based) further, on the diploma of the emperor Francis Joseph L of the 20th of October i860, whereby the constitutional form of government is introduced; and, lastly, on the so-called Ausgleich or "Compromise," concluded on the 8th of February 1867, whereby the relations between Austria and Hungary were regulated.

The two separate states — Austria and Hungary — are completely independent of each other, and each has its own parliament and its own government. The unity of the monarchy is expressed in the common head of the state, who bears the title Emperor of Austria and Apostolic King of Hungary,, and. in the common administration of a series of affairs, which affect both halves of the Dual Monarchy. These are: (1) foreign affairs, including diplomatic and consular representation abroad; (2) the army, including the navy, but excluding the annual voting of recruits, and the special army of each state; (3) finance in so far as it concerns joint expenditure.

For the administration of these common affairs there are three joint ministries: the ministry of foreign affairs and of the imperial and royal house, the ministry of war, and the ministry of finance. It must be noted that the authority of the joint ministers is restricted to common affairs, and that they are not allowed to direct or exercise any influence on affairs of govern- ment affecting separately one of the halves of the monarchyi

The minister of foreign affairs conducts the international relations of the Dual Monarchy, and can conclude international treaties. But commercial treaties, and such state treaties as impose burdens on the state, or parts of the state, or involve a change of territory, require the parliamentary assent of both states. The minister of war is the head for the administration of all military affairs, except those of the Austrian Landwehr and of the Hungarian Honveds, which are committed to the ministries for national defence of the two respective states. But the supreme command of the army is vested in the monarch, who has the power to take all measures regarding the whole army. It follows, therefore, that the total armed power of the Dual Monarchy forms a whole under the supreme command of the sovereign. The minister of finance has charge of the finances of common affairs, prepares the joint budget, and administers the joint state debt. (Till 1900 the provinces of Bosnia and Herze- govina were also administered by the joint minister of finance, excepting matters exclusively dependent on the minister of war.) For the control of the common finances, there is appointed a joint supreme court of accounts, which audits the accounts of the joint ministries.

Budget. — Side by side with the budget of each state of the Dual Monarchy, there is a common budget, which comprises the expendi- ture necessary for the common affairs, namely for the conduct of foreign affairs, for the army, and for the ministry of finance. The revenues Of the joint budget consist of the revenues of the joint ministries, the net proceeds of the customs, and the qUota, or the proportional contributions of the two states. This quota is fixed for a period of years, and generally coincides with the duration of the customs and commercial treaty. Until 1897 Austria contri- buted 70 %, and Hungary 30 % of the joint expenditure, remaining after -deduction of the common revenue. It was then decided that from 1897 to July 1907 the quota should be 66J| for Austria, and 33A for Hungary. In 1907 Hungary's contribution was raised to 36-4 %. Of the total charges 2 % is first of all debited to Hungary on account of the incorporation with this state of the former military frontier.

The Budget estimates for the common administration were as follows in 1905:—

Revenue — Ministry of Foreign Affairs Ministry of War Ministry of Finance Board of Control The Customs

£21,167

305,907

4,870

18

4,780,000

Proportional contributions 15,650,448

Total . . £20,762,410 Expenditure — •

Ministry of Foreign Affairs .... £485,480 Ministry of War : —

Army 12,679,160

Navy 2,306,100

Ministry of Finance 177,000

Board of Control 13,250

Extraordinary Military Expenditure 4,785,500

Extraordinary Military Expenditure in Bosnia 315,920

Total

• £20,762,410

The following table gives in thousands sterling the joint budget for the years 1875-1905: —

Expenditure.

DeR— Besides the debts of each state of the Dual Monarchy, there is a general debt, which is borne jointly by Austria and Hun- gary. The following table gives in millions sterling the amount of the general debt for the years 1875ˆ,1905:—

1875-

1885.

1895.

1900.

1905-

232-41

231-02

229-67

226-81

224-31

1875-

1885.

1895-

1900.

1905.

Ministry of Foreign Affairs Ministry of War (Army and

Navy)

Ministry of Finance Supreme Court of Accounts .

Total

396

9005-4

154-2 10-5

3-68-7

10,085 •

167-2

io-6

333

12,539 170-4 10-7

433-4

13,887-5 175 12-5

493-8

18,087-7

177-1

13-3

9566-1

10,631-5

13,053-1

14-508-4

20,430-3

Revenue.

For the above Departments

Customs

Proportional Contributions

Total

432 997-4 8136-7

258-2

402-2

9971-1

260-7 4476 83164

260-3 5202-3 9045-8

331-9

4799-7

15,650-4

9566-1

10,631-5

13,053-1

14,508-4

20,430-3

Delegations.— The constitutional right of voting money applicable to the common affairs and of its political control is exercised by the Delegations, which consist each of sixty members, chosen for one year, one-third of them by the Austrian Herrenhaus (Upper House) and the Hungarian Table of Magnates (Upper House), and two- thirds of them by the Austrian and the Hungarian Houses of Representatives. The delegations are annually summoned by the monarch alternately to Vienna and to Budapest. Each delegation has its separate sittings, both alike

public. Their decisions are reciprocally communicated in writing, and, in case of non-agreement, their deliberations are renewed. Should three such interchanges be made without agreement, a common plenary sitting is held of an equal number of both delegations; and these collectively, without discussion, decide the question by common vote. The common decisions of both houses require for their validity the sanction of the monarch. Each delegation has the right to formulate resolutions independently, and to call to account and arraign the common ministers. In the exercise of their office the members of both delegations are irresponsible, enjoying constitutional immunity.

Army. — The military system of the Austro-Hungarian monarchy is similar in both states, and rests since 1868 upon the principle of the universal and personal obligation of the citizen to bear arms. Its military force is composed of the common army (K. und K.); the special armies, namely the Austrian (K.K.) Landwehr, and the Hungarian Honveds, which are separate national institutions, and the Landsturm or levy-in- mass. As stated above, the common army stands under the administration of the joint minister of war, while the special armies are under the administration of the respective ministries of national defence. The yearly contingent of recruits for the army is fixed by the military bills voted by the Austrian and Hungarian parliaments, and is generally determined on the basis of the population, according to the last census returns. It amounted in 1905 to 103,100 men, of which Austria furnished 59,211 men, and Hungary 43,889. Besides 10,000 men are annually allotted to the Austrian Landwehr, and 12,500 to the Hungarian Honveds. The term of service is 2 years (3 -years in the cavalry) with the colours, 7 or 8 in the reserve and 2 in the Landwehr; in the case of men not drafted to the active army the same total period of service is spent in various special reserves.

For the military and administrative service of the army the Dual Monarchy is divided into 16 military territorial districts (15 of which correspond to the 15 army corps) and 108 supplementary districts (105 for the army, and 3 for the navy). In 1902, since which year no material change was made in the formal organization of the army, there were 5 cavalry divisions and 31 in- fantry divisions, formed in 15 army corps, which are located as follows: — I. Cracow, II. Vienna, III. Graz, IV. Budapest, V. Press- burg, VI. Kaschau, VII. Temesvar, VIII. Prague, IX. Josefstadt, X. Przemysl, XI. Lemberg, XII. Herrmannstadt, XIII. Agram, XIV. Innsbruck, XV. Serajewo. In addition there is the

military district of Zara. The usual strength of the corps is, 2 infantry divi- sions (4 brigades, 8 or 9 regiments, 32 or 36 battalions), 1 cavalry brigade (18 squadrons), and 1 artillery brigade (16- 18 batteries or 128-144 field-guns), besides technical and departmental units and in some cases fortress artillery regiments. The infantry is organized into line regiments, Jager and Tirolese regi- ments, the cavalry into dragoons, lancers, Uhlans and hussars, the artillery into regi- ments. The Austrian Landwehr (which re- tains the old designation K.K,., formerly

applied to the Austrian regular army) is organized in 8 divisions of varying strength, the " Royal Hungarian " Landwehr or Honveds in 7 divisions, both Austrian and Hungarian Landwehr having in addition cavalry (Uhlans and hussars) and artillery. It is probable that a Landwehr or Honveds division will, in war, form part of each army corps except in the case of the Vienna corps, which has 3 divisions in peace. The remaining men of military age (up to 42) as usual form the Landsturm. It is to be noted that this Land- sturm comprises many men who would elsewhere be classed as Landwehr.

The strength of the Austro-Hunganan army on a peace tooting was as follows in 1905: —

Infantry —

Common Army .

Austrian Landwehr .

Hungarian Honveds Cavalry —

Common Army .

Austrian Landwehr .

Hungarian Honveds Field Artillery . . . Fortress Artillery . Technical troops (Pioneers, and Railway and Telegraph Regiment)

Transport Service

Sanitary Service .

Total . . .

Belonging to the Common Army . Austrian Landwehr . Hungarian Honveds

Officers.

10,801 1,883 2,258

1,890 170

390

1,630

408

588

461

85

20,564

15,863 2,053 2,648

Men. Horses.

187,604

23.905 21,149

45,486 1,861 4,170

27,612 7,722 9.935

4.312 3,062

336,818

285,733 25,766

25.319

1,152 174 262

40,740 1,282

3.5io

14.520

131

19

3.097

64,887

59.659

i,456

3,772

Guns.

1048

1048

1048

The troops stationed in Bosnia and Herzegovina in 1905 (376 officers and 6372 men) are included in the total for the common

The peace strength of the active army in combatants is thus about 550 000 officers and men, inclusive of the two Landwehrs and of the Austrian " K.K." guards, the Hungarian crown guards, the gen darmerie, &c. The numbers of the Landsturm and the war strength of the whole armed forces are not published. It is estimated that the first line army in war would consist of 460,000 infantry, 49,000 cavalry 78,000 artillery, 21,000 engineers, &c, beside train and non- combatant soldiers. The Landwehr and Honved would yield 2 1 9.000 infantry and 18,000 cavalry, and other reserves 223,000 men. These figures give an approximate total strength of 1,147,000, not inclusive

of Landsturm. .,„.,.■. . , , . u

Fortifications. — The principal fortifications in Austria-Hungary are- Cracow and Przemysl in Galicia; Komarom, the centre of the inland fortifications, Petervarad, O-Arad and Temesvar in Hungary ; Seraiewo, Mostar and Bilek in Bosnia-Herzegovina.

The Alpine frontiers, especially those in Tirol, have numerous fortifications, whose centre is formed by Trent and Franzensfeste ; while all the military roads leading into Carinthia have been provided with strong defensive works, as at Malborgeth, Predil Pass, &c. The two capitals, Vienna and Budapest, are not fortified. On the Adriatic coast, the naval harbour of Pola is strongly fortified with sea and land defences ; then come Trieste, and several places in Dalmatia, notably Zara and Cattaro. . . . . ˆ , .

Navy.— The Austro-Hunganan navy is mainly a coast defence force and includes also a flotilla of monitors for the Danube. It is administered by the naval department of the ministry of war. It consisted in 1905 of 9 modern battleships, 3 armoured cruisers, 5 cruisers, 4 torpedo gunboats, 20 destroyers and 26 torpedo boats. There was in hand at the same time a naval programme to build 12 armourclads, 5 second-class cruisers, 6 third-class cruisers, and a number of torpedo boats. The headquarters of the fleet are at Pola, which is the principal naval arsenal and harbour of Austria ; while another great naval station is Trieste.

Trade. — On the basis of the customs and commercial agreement between Austria and Hungary, concluded in 1867 and renewable every ten years, the following affairs, in addition to the common affairs of the monarchy, are in both states treated according to the same principles :— Commercial affairs, including customs legislation ; legislation on the duties closely connected with industrial production — on beer, brandy, sugar and mineral oils; determination of legal tender and coinage, as also of the principles regulating the Austro- Hungarian Bank; ordinances in respect of such railways as affect the interests of both states. In conformity with the customs and commercial compact between the two states, renewed in 1899, the monarchy constitutes one identical customs and commercial territory, inclusive of Bosnia and Herzegovina and the principality of Liechtenstein. ‘ , .

The foreign trade of the Austro-Hunganan monarchy is shown in the following table : —

Year.

Imports.

Exports.

1900

£70,666,000

£80,916,000

1901

68,833,000

78,541,000

1902

71,666,000

79,708,000

1903

78,200,000

88,600,000

1904

85,200,000

86,200,000

1905

89,430,000

93,500,000

The following tables give the foreign trade of the Austro-Hungarion monarchy as regards raw material and manufactured goods : —

Imports.

Articles.

Value in Millions Sterling.

1900.

1901.

1902.

1903.

1904.

Raw material (including “1

articles of food; raw

material for agriculture >•

41-5

40-5

41-8

45-9

51-9

and industry ; and mining

and smelting products) J

Semi-manufactured goods .

9-6

9-b

10-3

io-6

io-8

Manufactured goods.

19-5

18-7

19-5

21-6

22-5

Exports.

Articles.

Value in Millions Sterling.

1900..

1901.

1902.

1903.

1904.

Raw material (as above) Semi-manufactured goods . Manufactured goods.

34-1

12-6

34-2

34-i n-i

33-3

35-8

ii'i

32-8

39 12-4

37-2

35-3

12-6

38-3

The most important place of derivation and of destination for the Austro-Hungarian trade is the German empire with about 40 % of the imports, and about 60 % of the exports. Next in importance comes Great Britain, afterwards India, Italy, the United States of America, Russia, France, Switzerland, Rumania, the Balkan states and South America in about the order named. The principal articles of import are cotton and cotton goods, wool and woollen goods, silk and silk goods, coffee, tobacco and metals. The principal articles of export are wood, sugar, cattle, glass and glassware, iron and iron- ware, eggs, cereals, millinery, fancy goods, earthenware and pottery, and leather goods.

The Austro-Himiarian Bank. — Common to the two states of the monarchy is the " Austro-Hungarian Bank," which possesses a legal exclusive right to the issue of bank-notes. It was founded in 1816, and had the title of the Austrian National Bank until 1878, when it received its actual name. In virtue of the new bank statute of the year 1899 the bank is a joint-stock company, with, a stock of £8,780,000. The bank's notes of issue must be covered to the extent of two-fifths by legal specie (gold and current silver) in reserve; the rest of the paper circulation, according to bank usage. The state, under certain conditions, takes a portion of the clear profits of the bank. The management of the bank and the supervision exercised over it by the state are established on a footing of equality, both states having each the same influence. The accounts of the bank at the end of 1900 were as follows: capital, £8,750,000; reserve fund, £428,250; note circulation, £62,251,000; cash, £50,754,000. In 1907 the reserve fund was £548,041; note circulation, £84,501,000; cash, 1ˆ60,036,625. The charter of the bank, which expired in 1897, was renewed until the end of 1910. In the Hungarian ministerial crisis of 1909 the question of the renewal of the charter played a conspicuous part, the more extreme members of the Independence party demanding the establishment of separate banks for Austria and Hungary with, at most, common superintendence (see History, below). (O- BR.)

History

I. The 'Whole Monarchy. The empire of Austria, as the official designation of the territories ruled by the Habsburg monarchy, dates back only to 1804, when Francis II., the last of the Holy Roman ThetltIe emperors, proclaimed himself emperor of Austria as "Emperor Francis I. His motive in doing so was to guard °^ astrlg „ against the great house of Habsburg being relegated to a

position inferior to the parvenus Bonapartes, in the event of the final collapse of the Holy Roman Empire, or of the possible election of Napoleon as his own successor on the throne of Charlemagne. The title emperor of Austria, then, replaced that of ” Imperator Romanorum semper Augustus ” when the Holy Empire came to an end in 1806. From the first, however, it was no more than a title, which represented but ill the actual relation of the Habsburg sovereigns to their several states.

king of Bohemia. The interests of the Austrian margraves and dukes were riot confined to the acquisition of wealth either in land or chattels. Vienna became a centre of culture and learning, and many religious houses were founded and endowed. The

acme of the early prosperity of Austria was reached Leopold II. un de r Duke Leopold II., surnamed the Glorious, who

reigned from 1 194 to 1230, He gave a code of municipal law to Vienna, and rights to other towns, welcomed the Minne- singers to his brilliant court, and left to his subjects an enduring memory of valour and wisdom. Leopold and his predecessors were enabled, owing to the special position of Austria, to act practically as independent rulers. Cherishing the privilege of 1156, they made treaties with foreign kings, and arranged marriages with the great families of Europe. With full 1 control of jurisdiction and of commerce, no great bishopric nor imperial city impeded the course of their authority, and the emperor interfered only to settle boundary disputes.

The main lines of Austrian policy undA the Babenbergs were warfare with the Hungarians and other eastern neighbours, and a general attitude of loyalty towards the emperors. The story of the Hungarian wars is a monotonous record of forays, of assistance given at times to the Babenbergs by the forces of the Empire, and ending in the gradual eastward advance of Austria. The traditional loyalty to the emperors, which was cemented by several marriages between the imperial house and the Babenbergs, was, however, departed from by the margrave Leopold II., and by Duke Frederick II. During the investiture

struggle Leopold deserted the emperor Henry IV., who deprived him of Austria and conferred it upon Vratislav II., duke of the Bohemians. Unable to maintain his position, Vratislav was soon driven out, and in 1083 Leopold again obtained possession of the mark, and was soon reconciled with Henry. Very similar _ . was the result of the conflict between the emperor

Frederick Frederick II. and Duke Frederick II. Ignoring the a., the privilege of 1156, the emperor claimed certain rights Qimml' j n Austria, and summoned the duke to his Italian diets.

Frederick, who was called the Quarrelsome, had irri- tated both his neighbours and his subjects, and complaints of his exactions and confiscations reached the ears of the emperor. After the duke had three times refused to appear before the princes, Frederick placed him under the ban, declared the duchies of Austria and Styria to be vacant, and, aided by the king of Bohemia, the duke of Bavaria and other princes, invaded the country in 1236. He met with very slight opposition, declared the duchies to be immediately dependent upon the Empire, made Vienna an imperial city, and imposed other changes upon

e s~t4$— the constitution of Austria. After his departure, End of toe . r

house of however, the duke returned, and m 1239 was in Baben- possession of his former power, while the changes made ber *' by the emperor were ignored. Continuing his career of

violence and oppression, Duke Frederick was killed in battle by the Hungarians in June 1246, when the family of Babenberg became extinct.

The duchies of Austria and Styria were now claimed by the emperor Frederick II. as vacant fiefs of the Empire, and their

government was entrusted to Otto II., duke of Bavaria. to the Frederick, however, who was in Italy, harassed and

Austrian afflicted, could do little to assert the imperial authority, succes- an(j n } s enemy, Pope Innocent IV., bestowed the two

duchies upon Hermann VI., margrave of Baden, whose wife, Gertrude, was a niece of the last of the Babenbergs. Hermann was invested by the German king, William, count of Holland, but he was unable to establish his position, and law and order were

quickly disappearing from the duchies. The deaths of Hermann and of the emperor in 1250, however, paved the way for a settlement. Weary of struggle and disorder, and despairing of any help from the central authority, the estates of Austria met at TrUbensee in 1251, and chose Ottakar, son of Wenceslaus I., king of Bohemia, as their duke. This step was favoured by the pope, and Ottakar, eagerly accepting the offer, strengthened his position by marrying Margaret, a sister of Duke Frederick II., and in return for his investiture promised

his assistance to William of Holland. Styria appears at this time to have shared the fortunes of Austria, but it was claimed by Bela IV., king of Hungary, who conquered the land, and made a treaty with Ottakar in 1254 which Ottakar of confirmed him in its possession. The Hungarian duk& ‘ rule was soon resented by the Styrians, and Ottakar, who had become king of Bohemia in 1253, took advantage of this resentment, and interfered in the affairs of the duchy. A war with Hungary was the result, but on this occasion victory rested with Ottakar, and by a treaty made with Bela, in March 1 261, he was recognized as duke of Styria. In 1269 Ottakar inherited the duchy of Carinthia on the death of Duke Ulrich III., and, his power having now become very great, he began to aspire to the German throne. He did something to improve the condition of the duchies by restoring order, introducing German colonists into the eastern districts, and seeking to benefit the inhabitants of the towns.

In 1273 Rudolph, count of Habsburg, became German king, and his attention soon turned to Ottakar, whose power menaced the occupant of the German throne. Finding some support in Austria, Rudolph questioned the title of ˆfj?‘? the Bohemian king to the three duchies, and sought iu „ to recover the imperial lands which had been in the possession of the emperor Frederick II. Ottakar was summoned twice before the diet, the imperial court declared against him, and in July 1275 he was placed under the ban. War was the result, and in November 1276 Ottakar submitted to Rudolph, and renounced the duchies of Austria, Styria and Carinthia. For some time the three duchies were administered by Rudolph in his capacity as head of the Empire, of which they formed part. Not content with this tie, however, which was personal to himself alone, the king planned to make them hereditary posses- sions of his family, and to transfer the headquarters of the Habsburgs from the Rhine to the Danube. Some opposition Was offered to this scheme; but the perseverance of the king overcame all difficulties, and one of the

most important events in European history took place on the 27th of December ˆ

1282, when Rudolph invested his sons, Rudolph and buegs Albert, with the duchies of Austria and Styria. He estab- retained Carinthia in his own hands until 1286, when, Ushedin in return for valuable services, he bestowed it upon jˆf 2 ˆ a ‘ Meinhard IV., count of Tirol. The younger Rudolph took no part in the government of Austria and Styria, which was undertaken by Albert, until his election as German king in 1 298. Albert appears to have been rather an arbitrary ruler. In 1288 he suppressed a rising of the people of Vienna, and he made the fullest use of the ducal power in asserting his real or supposed rights. At this time the principle of primogeniture was unknown in the house of Habsburg, and for many years the duchies were ruled in common by two, or even three, members of the family. After Albert became German king, his two elder sons, Rudolph and Frederick, were successively associated with him in the government, and after his death in 1308, his four younger sons shared at one time or another in the administration of Austria and Styria. In 13 14 Albert’s son, Frederick, was chosen German king in opposition to Louis IV., duke of Upper Bavaria, after- wards the emperor Louis IV., and Austria was weakened by the efforts of the Habsburgs to sustain Frederick in his contest with Louis, and also by the struggle carried on between another brother, Leopold, and the Swiss. ‘ A series of deaths among the Habsburgs during the first half of the 14th century left Duke Albert II. and his four sons as the only representatives of the family. Albert ruled the duchies alone from 1344 to 1356, and after this date his sons began to take part in the government. The most noteworthy of these was Duke Rudolph IV., a son-in-law of the emperor Charles IV., who showed S”ˆ h his interest in learning by founding the university of lV- Vienna in 1365. Rudolph’s chief aim was to make Austria into an independent state, and he forged a series of privileges the purport of which was to free the duchy from all its duties towards the Empire. A sharp contest with the emperor followed this proceeding, and the Austrian duke, annoyed that

Magyars and Slavs never willingly recognized a style which ignored their national rights and implied the superiority of the German elements of the monarchy; to the Germans it was a poor

substitute for a title which had represented the political unity of the German race under the Holy Empire. For long after the Vienna Congress of 1814-1815 the " Kaiser " as such exercised a powerful influence over the imaginations of the German people outside the Habsburg dominions; but this was because the title was still surrounded with its ancient halo and the essential change was not at once recognized. The outcome of the long struggle with Prussia, which in 1866 finally broke the spell, and the proclamation of the German empire in 1871 left the title of emperor of Austria stripped of everything but a purely territorial significance. It had, moreover, by the compact with Hungary of 1867, ceased even fully to represent the relation of the emperor to all his dominions; and the title which had been devised to cover the whole of the Habsburg monarchy sank into the official style of the sovereign of but a half; while even within the Austrian empire proper it is resented by those peoples which, like the Bohemians, wish to obtain the same recognition of their national independence as was conceded to Hungary. In placing the account of the origin and development of the Habsburg monarchy under this heading, it is merely for the sake of convenience.

The first nucleus round which the present dominions of the house of Austria gradually accumulated was the mark which lay

along the south bank of the Danube, east of the river Origin of E nnSj founded about a.d. 800 as a defence for the Austria. Frankish kingdom against the Slavs. Although its

total length from east to west was only about 60 m., it was associated in the popular mind with a large and almost unbroken tract of land in the east of Europe. This fact, together with the position of the mark with regard to Germany in general and to Bavaria in particular, accounts for the name Osterreich (Austria), i.e. east empire or realm, a word first used in a charter of 996, where the phrase in regione vulgari nomine Ostarrichi occurs. The development of this small mark into the Austro- Hungarian* monarchy was a slow and gradual process, and falls into two main divisions, which almost coincide with the periods during which the dynasties of Babenberg and Habsburg have respectively ruled the land. The energies of the house of Babenberg were chiefly spent in enlarging the area and strengthening the position of the mark itself, and when this was done the house of Habsburg set itself with remarkable perseverance and marvellous success to extend its rule over neighbouring territories.

The many vicissitudes which have attended this development have not, however, altered the European position of Austria, which has remained the same for over a thousand years. Standing sentinel over the valley of the middle Danube, and barring the advance of the Slavs on Germany, Austria, whether mark, duchy or empire, has always been the meeting-place of the Teuton and the Slav. It is this fact which gives it a unique interest and importance in the history of Europe, and which unites the ideas of the Germans to-day with those of Charlemagne and Otto the Great.

The southern part of the country now called Austria was inhabited before the opening of the Christian era by the Taurisci,

a Celtic tribe, who were subsequently called the Norici, habitants. an< ˆ wn0 were conquered by the Romans about 14 B.C.

Their land was afterwards included in the provinces of Pannonia and Noricum, and under Roman rule, Vindobona, the modern Vienna, became a place of some importance. The part of the country north of the Danube was peopled by the Marcomanni and the Quadi, and both of these tribes were fre- quently at war with the Romans, especially during the reign of the emperor Marcus Aurelius, who died at Vindobona in a.d. 180 when campaigning against them. Christianity and civilization obtained entrance into the land, but the increasing weakness of the Roman empire opened the country to the inroads of the barbarians, and during the period of the great migrations it was ravaged in quick succession by a number of these tribes, prominent among whom were the Huns. The lands on both banks of the

river shared the same fate, due probably to the fact to which Gibbon has drawn attention, that at this period the Danube was frequently frozen over. About 590 the district was settled by the Slovenes, or Conitanes, a Slavonic people, who formed part of the kingdom of Samo, and were afterwards included in the extensive kingdom of the Avars. The Franks claimed some authority over this people, and probably some of the princes of the Slovenes had recognized this claim, but it could not be regarded as serious while the Avars were in possession of the land. In 791 Charlemagne, after he had established his authority over the Bajuvarii or Bavarians, crossed the river Enns, and moved against the Avars. This attack was followed by campaigns on the part of his lieutenants, and in 805 the Avars were finally subdued, and

their land incorporated with the Frankish empire. This step brought the later Austria definitely under the rule of the Franks, and during the struggle c s < a ft/; s ft. Charlemagne erected a mark, called the East Mark, meat of to defend the eastern berder of his empire. A series of the East margraves ruled this small district from 799 to 907, Mark – but as the Frankish empire grew weaker, the mark suffered more and more from the ravages of its eastern neighbours. During the 9th century the Frankish supremacy vanished, and the mark was overrun by the Moravians, and then by the Magyars, or Hungarians, who destroyed the few remaining traces of Frankish influence.

A new era dawned after Otto the Great was elected German king in 936, and it is Otto rather than Charlemagne who must be regarded as the real founder of Austria. In August 955 he gained a great victory over the Magyars on the T f%”^ s ˆ Lechfeld, freed Bavaria from their presence, and re- berg. founded the East Mark for the defence of his kingdom. In 976 his son, the emperor Otto II., entrusted the government of this mark, soon to be known as Austria, to Leopold, a member of the family of Babenberg (q.v.), and its administration was conducted with vigour and success. Leopold and his descendants ruled Austria until the extinction of the family in 1246, and by their skill and foresight raised the mark to an important place among the German states. Their first care was to push its eastern frontier down the Danube valley, by colonizing the lands on either side of the river, and the success of this work may be seen in the removal of their capital from Pochlarn to Melk, then to Tulln, and finally about 1 140 to Vienna. The country as far as the Leitha was subsequently incorporated with Austria, and in the other direction the district between the Enns and the Inn was added, to the mark in 1156, an important date in Duchvof Austrian history. Anxious to restore peace to Germany Austria in this year, the new king, Frederick I., raised Austria created, to the rank of a duchy, and conferred upon it ex- nS6 ‘ ceptional privileges. The investiture was bestowed not only upon Duke Henry but upon his second wife, Theodora; in case of a failure of male heirs the duchy was to descend to females; and if the duke had no children he could nominate his successor. Controlling all the jurisdiction of the land, the duke’s only duties towards the Empire were to appear at any diet held in Bavaria, and to send a contingent to the imperial army for any campaigns in the countries bordering upon Austria. In 1186 Duke Leopold I. made a treaty with Ottakar IV., duke of Styria, an arrangement which brought Styria and upper

Austria to the Babenbergs in 1192, and in 1229 Duke Leopold II. purchased some lands from the bishop of Freising, and took the title of lord of Carniola. When the house of Babenberg became extinct in 1246, Austria, stretching from Passau almost to Pressburg, had the frontiers which it retains to-day, and this increase of territory had been accompanied by a corresponding increase in wealth and general prosperity. The chief reason for this pros- perity was the growth of trade along the Danube, which stimu- lated the foundation, or the growth, of towns, and brought considerable riches to the ruler. Under the later Babenbergs Vienna was regarded as one of the most important of German cities, and it was computed that the duke was as rich as the archbishop of Cologne, or the margrave of Brandenburg, and was surpassed in this respect by only one German prince, the

ofLadls laiis.

Austria was not raised to the dignity of an electorate by the Golden Bull of 1356, did not shrink from a contest with Charles. In 1361, however, he abandoned his pretensions, but claimed the title of archduke (q.v.) and in 1364 declared that the posses- sions of the Habsburgs were indivisible. Meanwhile the acquisi- tion of neighbouring territories had been steadily pressed on. In 1335 the duchy of Carinthia, and a part of Carniola, were inherited by Dukes Albert II. and Otto, and in 1363 Rudolph IV. obtained the county of Tirol. In 1364 Carniola was made into an hereditary duchy; in 1374 part of Istria came under the rule of the Habsburgs; in 1382 Trieste submitted voluntarily to Austria, and at various times during the century, other smaller districts were added to the lands of the Habsburgs.

Rudolph IV. died childless in 1365, and in 1379 his two remaining brothers, Leopold III. and Albert III., made a division of their lands, by which Albert retained Austria proper and Carniola, and Leopold got Styria, Carinthia and Tirol. Leopold was killed in 1386 at the battle of Sempach, and Albert became guardian for his four nephews, who subsequently ruled their lands in common. The senior line which ruled in Austria was represented after the death of Duke Albert III. in 1395 by his son, Duke Albert IV., and then by his grandson, Duke Albert V., who became German king as Albert II. in 1438. Albert married

Elizabeth, daughter of Sigismund, king of Hungary and Bohemia, and on the death of his father-in-law assumed these two crowns. He died in 1439, and just after his

death a son was born to him, who was called Ladislaus Minority Posthumus, and succeeded to the duchy of Austria and

to the kingdoms of Hungary and Bohemia. William

and Leopold, the two eldest sons of Duke Leopold III., and, with their younger brothers Ernest and Frederick, the joint rulers of Styria, Carinthia and Tirol, died early in the 15th century, and in 1406 Ernest and Frederick made a division of their lands. Ernest became duke of Styria and Carinthia, and Frederick, count of Tirol. Ernest was succeeded in 1424 by his sons, Frederick and Albert, and Frederick in 1439 by his son, Sigismund, and these three princes were reigning when King Albert II. died in 1439. Frederick, who succeeded Albert as German king, and was soon crowned emperor as Frederick III., acted as guardian for Sigismund of Tirol, who was a minor, and „ also became regent of Austria in consequence of the

of the infancy of Ladislaus. His rule was a period of struggle

emperor and disorder, owing partly, to the feebleness of his own Frederick cnarac t e r, partly to the wish of his brother, Albert, to

share his dignities. The Tirolese soon grew weary of his government, and, in 1446, Sigismund was declared of age. The estates of Austria were equally discontented and headed an open revolt, the object of which was to remove Ladislaus from Frederick's charge and deprive the latter of the regency. The Popular leading spirit in this movement was Ulrich Eiczing revolt (Eitzing or von Eiczinger, d. before 1463), a low-born

under adventurer, ennobled by Albert II., in whose service iˆf 1 he had accumulated vast wealth and power. In 1451

and Count he organized an armed league, and in December, with Ulrich of the aid of the populace, made himself master of Vienna, Cim. whither he had summoned the estates. In March 1452

he was joined by Count Ulrich of Cilli, while the Hungarians and the powerful party of the great house of Rosenberg in Bohemia attached themselves to the league. Frederick, who had hurried back from Italy, was besieged in August in the Vienna Neustadt,

and was forced to deliver Ladislaus to Count Ulrich, whose influence had meanwhile eclipsed that of Eiczing. Ladislaus now ruled nominally himself, under the tutelage of Count Ulrich. The country was, however, distracted by quarrels between the party of the high aristocracy, which recognized the count of Cilli as its chief, and that of the lesser nobles, citizens and populace, who followed Eiczing. In September 1453 the latter, by a successful imeute, succeeded in ousting Count Ulrich, and remained in power till February 1455, when the count once more entered Vienna in triumph. Ulrich of Cilli was killed before Belgrade in November 1456; a year later Ladislaus himself died (November 1457). Meanwhile Styria and Carinthia

were equally unfortunate under the rule of Frederick and Albert; and the death of Ladislaus led to still further complica- tions. Austria, which had been solemnly created an Austria archduchy by the emperor Frederick in 1453, was created claimed by the three remaining Habsburg princes, and an arch- lower Austria was secured by Frederick, while Albert duc ˚y- , obtained upper Austria; Both princes were unpopular, and in 1462 Frederick was attacked by the inhabitants of Vienna; and- was forced to surrender lower Austria to Albert, whose spendt thrift habits soon made his rule disliked. A further struggle between the brothers was prevented by Albert's death in 1463, when the estates did homage to Frederick. The emperor was soon again at issue with the Austrian nobles, and was attacked by Matthias Corvinus, king of Hungary, fungariaa who drove him from Vienna in 1485. Although ham- „˚ Austria. pered by the inroads of the Turks, Matthias pressed on, and by 1487 was firmly in possession of Austria, Styria and Carinthia, which seemed quite lost to the Habsburgs.

The decline in the fortunes of the family, however, was to be arrested by Frederick's son, Maximilian, afterwards the emperor Maximilian I., who was the second founder Tne of the greatness of the house of Habsburg. Like his emperor ancestor, Rudolph, he had to conquer the lands over Maxi- ., which his descendants were destined to rule, and by "＞Uia"I. arranging a treaty of succession to the kingdoms of Hungary and Bohemia, he pointed the way to power and empire in eastern Europe. Soon after his election as king of the Romans in i486, Maximilian attacked the Hungarians, and in 1490 he had driven them from Austria, and recovered his hereditary lands. In the same year he made an arrangement with his kinsman; Sigismund of Tirol, by which he brought this county under his rule, and when the emperor

Frederick died in 1493, Maximilian united the whole of the Austrian lands under his sway. Continu- ing his acquisitions of territory, he inherited the possessions of the counts of Gorz in 1500, added some districts to Tirol by intervening in a succession war in Bavaria, and acquired Gradisca in 1 51 2 as the result of a struggle with Venice. He did much for the better government of the Austrian duchies. Bodies were established for executive, financial and judicial purposes, the Austrian lands constituted one of the imperial circles which were established in 1512, and in 15 18 representatives of the various diets (Landtage) met at Innsbruck, a proceeding which marks the beginning of an organic unity in the Austrian lands. In these ways Maximilian proved himself a capable and energetic ruler, although his plans for making Austria into a kingdom, or an electorate, were abortive.

At the close of the middle ages the area of Austria had in- creased to nearly 50,000 sq. m., but its internal condition does not appear to have improved in proportion to this . . . increase in size. The rulers of Austria lacked the the close prestige which attached to the electoral office, and, of the although five of them had held the position of German mldd,e king, the four who preceded Maximilian had added little or nothing to the power and dignity of this position. The ecclesiastical organization of Austria was imperfect, so long as there was no archbishopric within its borders, and its clergy owed allegiance to foreign prelates. The work of unification which was so successfully accomplished by Maximilian was aided by two events, the progress of the Turks in south-eastern Europe, and the loss of most of the Habsburg possessions on the Rhine. The first tended to draw the separate states together for purposes of defence, and the second turned the attention of the Habsburgs to the possibilities of expansion in eastern Europe. (A. W. H.*)

At the time of the. death of the emperor Maximilian in 1519 the Habsburg dominions in eastern Germany included the duchies of Upper and Lower Austria, Styria, Carinthia, . Carniola and the county of Tirol. Maximilian was under succeeded as archduke of Austria as well as emperor by Charles V. his grandson Charles of Spain, known in history as the ™> d F erdim emperor Charles V. To his brother Ferdinand Charles resigned all his Austrian lands, including his claims on Bohemia

and Hungary. Austria and Spain were thus divided, and, in spite of the efforts of the archduke Charles in the Spanish Succession War, were never again united, for at the battle of

Mohacs, on the 28th of August 1526, Suleiman the and Us Magnificent defeated and killed Louis, king of Bohemia results. and of Hungary, whose sister Anne had married

Ferdinand. By this victory the Turks conquered and retained, till the peace of Karlowitz in 1609, the greater part of Hungary. During most of his life Ferdinand was engaged in combating the Turks and in attempting to secure Hungary. In John Zapolya, who was supported by Suleiman, Ferdinand found an active rival. The Turks besieged Vienna in 1 530 and made several invasions of Hungary and Austria. At length Ferdinand agreed to pay Suleiman an annual tribute for the small portion — about 12,228 sq. m. — of Hungary which he held. During Charles V.'s struggles with the German Protestants, Ferdinand preserved a neutral attitude, which contributed to gain Germany a short period of internal peace. Though Ferdi nand himself did not take a leading part in German religious or foreign politics, the period was one of intense interest to Austria. Throughout the years from 1519 to 1648 there are, said Stubbs, two distinct ideas in progress which " may be regarded as giving a unity to the whole period. . . . The Reformation is one, the claims of the House of Austria is the other." Austria did not benefit from the reign of Charles V. The emperor was too much

absorbed in the affairs of the rest of his vast dominions, and ' nota bly those of the Empire, rent in two by religious Austria. differences and the secular ambitions for which those

were the excuse, to give any effective attention to its needs. The peace of Augsburg, 1555, which recognized a dualism within the Empire in religion as in politics, marked the failure of his plan of union (see Charles V.; Germany; Maurice of Saxony) ; and meanwhile he had been able to accomplish nothing to rescue Hungary from the Turkish yoke. It was left for his brother Ferdinand, a ruler of consummate wisdom (1 556-1 564) "to establish the modern Habsburg-Austrian empire with its exclusive territorial interests, its administrative experiments, its

intricacies of religion and of race."

Before his death Ferdinand divided the inheritance of the German Habsburgs between his three sons. Austria proper was The policy ˆt to ms e West son Maximilian, Tirol to the archduke ofFerdi- Ferdinand; and Styria with Carinthia and Carniola aand and to the archduke Charles. Under the emperor Maxi- mWanll. mman H- ˆ l Sˆ -1 57ˆ) > who was also king of Bohemia

and Hungary, a liberal policy preserved peace, but he was unable to free his government from its humiliating position of a tributary to the Turk, and he could do nothing to found religious liberty within his dominions on a permanent basis. The whole of Austria and nearly the whole of Styria were mainly Lutheran; in Bohemia, Silesia and Moravia, various forms of Christian belief struggled for mastery; and Catholicism was almost confined to the mountains of Tirol. The The accession of Rudolph II. 1 (1576-1612)ˆ fanatical

reign of Spanish Catholic, changed the situation entirely. Rudolph Under him the Jesuits were encouraged to press on ,L the counter-Reformation. In the early part of his

reign there was hardly any government at all. In Bohemia a state of semi-independence existed, while Hungary preferred the Turk to the emperor. In both kingdoms Rudolph had failed to assert his sovereign power except in fitful attempts to extirpate heresy. With anarchy prevalent within the Austrian dominions some action became necessary. Accordingly in 1606 The the archdukes made a compact agreeing to acknowledge

family the archduke Matthias as head of the family. This compact, arrangement proved far from successful. Matthias,

who was emperor from 1612 to 161 9, proved unable to restore order, and when he died Bohemia was practically independent. His successor Ferdinand II. (1619-1637) was strong of will; and resolved to win back Germany to the Catholic faith. As archduke of Styria he had crushed out Protestantism in that duchy, and having been elected king of Bohemia in 161 8 1 Rudolph V. as archduke of Austria, II. as emperor.

was resolved to establish there the rule of the Jesuits. His

attempt to do so led to the outbreak of the Thirty Years' War

(see Bohemia; Thirty Years' War). Till 1630 the

fortunes of Austria brightened under the active rule years'

of Ferdinand, who was assisted by Maximilian of War.

Bavaria and the Catholic League, and by Wallenstein.

The Palatinate was conquered, the Danish king was overthrown,

and it seemed that Austria would establish its predominance

over the whole of Germany, and that the Baltic would become

an Austrian lake. The f ortun es of Austria never seemed brighter

than in 1628 when Wallenstein began the siege of Stralsund.

His failure, followed by the arrival of Gustavus Adolphus in

Germany in 1630, proved the death blow of Austrian hopes.

In 1632 Gustavus Adolphus was killed, in 1634 Wallenstein was

assassinated, and in 1635 France entered into the war. The

Thirty Years' War now ceased to be a religious struggle The

between Catholicism and Protestantism; it resolved Swedish

itself into a return to the old political strife between and French

France and the Habsburgs. Till 1648 the Bourbon >ater '

1 TT 1 1 . 1 , 1 , vention.

and Habsburg powers continued the war, and at the

peace of Westphalia Austria suffered severe losses. Ferdinand III. (1637-1657) was forced to yield Alsace to France, to grant territorial supremacy, including the right of making The peace alliances, to the states of the Empire, and to acknow- of West- ledge the concurrent jurisdiction of the imperial ??£?* chamber and the Aulic council. The disintegration of the Holy Roman Empire was now practically accomplished, and though the possession of the imperial dignity continued to give the rulers of Austria prestige, the Habsburgs henceforward devoted

themselves to their Austrian interests rather than to those of the Empire.

In 1657 Leopold I., who had already ruled the Austrian dominions for two years, succeeded his father Ferdinand and was crowned emperor in the following year. His long Leopold 1. reign of 48 years was of great importance for Austria, as determining both the internal character and the external policy of the monarchy. The long struggle with France to which the ambitions of Louis XIV. gave rise, and which culminated in the War of Spanish Succession, belongs less to the history of Austria proper than to that of Germany and of Europe. Of more importance to Austria itself was the war with Sweden (1657-60) which resulted in the peace of Oliva, by which the independence of Poland was secured and the frontier of Hungary safeguarded, and the campaigns against the Turks (1662-64 and 1683-99), by which the Ottoman power was driven from Hungary, and the Austrian attitude towards Turkey and the Slav peoples of the Balkans determined for a century to come. The first war, due to Ottoman aggression in Transylvania, ended with Montecuculi's victory over the grand vizier at Turkey. St Gothard on the Raab on the 1st of August 1664. The general political situation prevented Leopold from taking full advantage of this, and the peace of Vasvar (August 10) left the Turks in jpossession of Nagyvarad (Grosswardein) and the fortress of Ersekujvar (Neuhausel), Transylvania being recognized as an independent principality. The next Turkish war was the direct outcome of Leopold's policy in Hungary, where the persecution of the Protestants and the suppression of the constitution in 1658, led to a widespread conspiracy. This was mercilessly suppressed; and though after a period of arbitrary government (1672-1679), the palatinate and the constitution, with certain concessions to the Protestants, were restored, the discontent continued. In 1683, invited by Hungarian malcontents and spurred on by Louis XIV., the Turks burst into Hungary, overran the country and appeared before the walls of Vienna. The victory of the 12 th of September, gained over the Turks by John Sobieski (see John III. Sobieski, King of Poland) not only saved the Austrian capital, but was the first of a series of successes which drove the Turks perman- ently beyond the Danube, and established the power of Austria in the East. The victories of Charles of Lorraine at Parkany (1683) and Esztergom (Gran) (1685) were followed by the capture of Budapest (1686) and the defeat of the Ottomans at

Moha.cs (1688). In 1688 the elector took Belgrade; in 1691 Louis William I. of Baden. won the battle of Slankamen, and on the 1 ith of September 1697 Prince Eugene gained the crowning victory of Zenta. This was followed, on the 26th of January 1699, by the peace of Karlowitz, by which Slavonia, Transylvania and all Hungary, except the banat of Temesvar, were ceded to the Austrian crown. Leopold had wisely decided to initiate a conciliatory policy in Hungary. At the diet of Pressburg (1687-1688) the Hungarian crown had been made hereditary in the house of Habsburg, and the crown prince Joseph had been crowned hereditary king of Hungary (q.v.). In 1697 Transylvania was united to the Hungarian monarchy. A further fact of great prospective importance was the im- migration, after an abortive rising against the Turks, of some 30,000 Slav and Albanian families into Slavonia and southern Hungary, where they were granted by the emperor Leopold a certain autonomy and the recognition of the Orthodox religion.

By the conquest of Hungary and Transylvania Leopold completed the edifice of the Austrian monarchy, of which the foundations had been laid by Ferdinand I. in 1526. He had also done much for its internal consolidation. By the death of the archduke Sigismund in 1665 he not only gained Tirol, but a considerable sum of money, which he used to buy back the Silesian principalities of Oppeln and Ratibor, pledged by Ferdinand III. to the Poles. In the administration of his dominions, too, Leopold succeeded in strengthening the authority of the central government. The old estates, indeed, survived; but the emperor kept the effective power in his own hands, and to his reign are traceable the first beginnings of that system of centralized bureaucracy which was established under Maria Theresa and survived, for better or for worse, till the revolution of 1848. It was under Leopold, also, that the Austrian standing army was established in spite of much opposition; the regiments raised in 1672 were never disbanded. For the intellectual life of the country Leopold did much. In spite of his intolerant attitude towards religious dissent, he proved himself an en- lightened patron of learning. He helped in the establishment of the universities of Innsbruck and Olmutz; and under his auspices, after the defeat of the Turks in 1683, Vienna began to develop from a mere frontier fortress into one of the most brilliant capitals of Europe. (See. Leopold I.)

Leopold died in 1705 during the war of Spanish Succession (1702-13), which he left as an evil inheritance to his sons Joseph I. Warof (d- 1711) and Charles VI. The result of the war was Spanish a further aggrandizement of the house of Austria; but not to the extent that had been hoped. Apart from the fact that British and Austrian troops had been unable to deprive Philip V. of his throne, it was from the point of view of Europe at large by no means desirable that Charles VI. should succeed in reviving the empire of .Charles V. By the treaty of Utrecht, accordingly, Spain was left to the House of Bourbon, while that of Austria received the Spanish Netherlands, Sardinia and Naples.

The treaty of Karlowitz, and the settlement of 1713-1714, marked a new starting-point in the history of Austria. The efforts of Turkey to regain her ascendancy in eastern from 1715 Europe at the expense of the Habsburgs had ended to 1740. in failure, and henceforward Turkish efforts were confined to resisting the steady development of Austria in the direction of Constantinople. The treaties of Utrecht, Rastadt and Baden had also re-established and strengthened the position of the Austrian monarchy in western Europe. The days of French invasions of Germany had for the time ceased, and revenge for the attacks made by Louis XIV. was found in the establishment of Austrian supremacy in Italy and in the substitution of Austrian for Spanish domination in the Nether- lands.

The situation, though apparently favourable, was full of difficulty, and only a statesman of uncommon dexterity could have guided Austria with success through the ensuing years. Composed of a congeries of nationalities which included Czechs,

Succes slon.

Magyars, Ruthenes, Rumanians, Germans, Italians, Flemings and other races, and with territories separated by many miles, the Habsburg dominions required from their ruler patience, tolerance, administrative skill and a full knowledge of the currents of European diplomacy. Charles VI. possessed none of these qualities; and when he died in 1740, the weakness of the scattered Habsburg empire rendered it an object of the cupidity of the continental powers. Yet, though the War of Spanish Succession had proved a heavy drain on the resources of the hereditary dominions of the Austrian crown, Charles VI. had done much to compensate for this by the successes of his arms in eastern Europe. In 1716, in alliance with Venice, he declared war

on the Turks; Eugene's victory at Peterwardein involved the conquest of the banat of Temesvar, and was followed in 1 71 7 by the capture of Belgrade. By the treaty signed at Passarowitz on the 21st of July 1718, the banat, which rounded off Hungary and Belgrade, with the northern districts of Servia, were annexed to the Habsburg monarchy.

Important as these gains were, the treaty none the less once more illustrated the perpetual sacrifice of the true interests of the hereditary dominions of the house of Habsburg to its European entanglements. Had the war continued, Austria would undoubtedly have extended her conquests down the Danube. But Charles was anxious about Italy, then in danger from Spain, which under Alberoni's guidance had occupied Sardinia and Sicily. On the 2nd of August 1718, accordingly, Charles joined the Triple Alliance, henceforth the Quadruple Alliance. The coercion of Spain resulted in a peace by which Charles obtained Sicily in exchange for Sardinia. The shifting of the balance of power that followed belongs to the history of Europe (q.v.) ; for Austria the only important outcome was that in 1 73 1 Charles found himself isolated. Being without a son, he was now anxious to secure the throne for his daughter Maria Theresa, in accordance with the Pragmatic haematic Sanction of the 19th of April 17 13, in which he had Sanction. pronounced the indivisibility of the monarchy, and had settled the succession on his daughter, in default of a male heir. It now became his object to secure the adhesion of the powers to this instrument. In 1731 Great Britain and Holland agreed to respect it, in return for the cession of Parma, Piacenza and Guastalla to Don Carlos; but the hostility of the Bourbon powers continued, resulting in 1733 in the War of Polish Succes- sion, the outcome of which was the acquisition of Lorraine by France, and of Naples, Sicily and the Tuscan ports by Don Carlos, while the power of the Habsburg monarchy in northern Italy was strengthened by the acquisition of Parma, Piacenza and Guastalla. At the same time Spain and Sardinia adhered to the Pragmatic Sanction. Francis, the dispossessed duke of Lorraine, was to be compensated with Tuscany. On the 12th of February 1736 he was married to the archduchess Maria Theresa, and on the nth of May following he signed the formal act ceding Lorraine to France.

The last years of Charles VI. were embittered by the disastrous outcome of the war with Turkey (1738-1739), on which he had felt compelled to embark in accordance with the terms of a treaty of alliance with Russia signed in 1726. ˆu,raie, After a campaign

of varying fortunes the Turks beat 1739. the imperial troops at Krotzka on the 23rd of July 1739 and laid siege to Belgrade, where on the 1st of September a treaty was signed, which, with the exception of the banat, surrendered everything that Austria had gained by the treaty of Passarowitz. On the 20th of October 1740, Charles died, leaving his dominions in no condition to resist the attacks of the powers, which, in spite of having adhered to the Pragmatic Sanction, now sought to profit from their weakness. Yet for their internal development Charles had done much. His religious attitude was moderate and tolerant, and he did his best to pro- mote the enlightenment of his subjects. He was zealous, too, for the promotion of trade and industry, and, besides the East India Company which he established at Ostend, he encouraged the development of Trieste and Fiume as sea-ports and centres of trade with the Levant.

IO

AUSTRIA-HUNGARY

[HISTORY

The accession of Maria Theresa to the throne of the Habsburgs marks an important epoch in the history of Austria. For a while, indeed, it seemed that the monarchy was on Theresa. tne P°int of dissolution. To the diplomacy of the 1 8th century the breach of a solemn compact was but lightly regarded; and Charles VI. had neglected the advice of Prince Eugene to leave an effective army of 200,000 men as a more solid guarantee of the Pragmatic Sanction than the signa- tures of the powers. As it was, the Austrian forces, disorganized in the long confusion of the Turkish wars, were in no condition to withstand Frederick the Great, when in 1740, at the head of the splendid army bequeathed to him by his father, he invaded Silesia (see Austrian Succession, War or). The Prussian victory at Mollwitz (April 10, 1741) brought into the field against Austria all the powers which were ambitious of expansion at her expense: France, Bavaria, Spain, Saxony and Sardinia. Nor was the peril wholly external. Apart from the perennial discontents of Magyars and Slavs, the confusion and corruption of the administration, and the misery caused by the ruin of the finances, had made the Habsburg dynasty unpopular even in its German states, and in Vienna itself a large section of public opinion was loudly in favour of the claims of Charles of Bavarian Yet the war, if it revealed the weakness of the Austrian monarchy, revealed also' unexpected

sources of strength. Not the least of these was the character of Maria Theresa herself, who to the fascination of a young and beautiful woman added a very masculine resolution and judgment. In response to her personal appeal, and also to her wise and timely concessions, the Hun- garians had rallied to her support, and for the first time in history awoke not only to a feeling of enthusiastic loyalty to a Habsburg monarch, but also to the realization that their true interests were bound up with those of Austria (see Hungary: History). Although, then, as the result of the war, Silesia was by the treaty of Dresden transferred from Austria to Prussia, while in Italy by the treaty of Aix-la-Chapelle in 1748 cessions were made at the expense of the house of Habsburg to the Spanish Don Philip and to Sardinia, the Austrian monarchy as a whole had displayed a vitality that had astonished the world, and was in some respects stronger than at the beginning of the struggle, notably in the great improvement in the army and in the posses- sion of generals schooled by the experience of active service.

The period from 1747 to 1756, the year of the outbreak of the Seven Years' War, was occupied in preparations for carrying into effect the determination of Maria Theresa to recover the lost provinces. To give any chance of success, it was recognized that a twofold change of system was necessary: in internal and in external affairs. To strengthen the state internally a complete revolution of its administration was begun under the auspices of Count F. W. Haugwitz (1700-1765); the motley system which had survived from the middle ages was gradually replaced by an administrative machinery uniformly organized and central- ized; and the army especially, hitherto patched together from the quotas raised and maintained by the various diets and provincial estates, was withdrawn from their interference. These reforms were practically confined to the central provinces of the, monarchy; for in Hungary, as well as in the outlying territories of Lombardy and the Netherlands, it was recognized that the conservative temper of the peoples made any revolu- tionary change in the traditional system inadvisable.

Meanwhile, in foreign affairs, it had become clear that for Austria the enemy to be dreaded was no longer France, but Prussia, and Kaunitz prepared the way for a diplomatic Avn6A°" revolution, which took effect when, on the 1st of May affiance, 1756, Austria and France concluded the first treaty and Seven of Versailles. The long rivalry between Bourbons and JJ}"™' Habsburgs was thus ended, and France and Austria remained in alliance or at peace

until the outbreak of the French Revolution. So far as Austria was concerned, the Seven Years' War (q.v.) in which France and Austria were ranged against Prussia and Great Britain, was an attempt on the part of Maria Theresa to recover Silesia. It failed; and the peace of Hubertsburg, signed on the 15th of February 1763, left Germany

divided between Austria and Prussia, whose rivalry for the hegemony was to last until the victory of Koniggratz (1866) deˆ finitely decided the issue in favour of the Hohenzollern monarchy. The loss of Silesia led Austria to look for " compensation " elsewhere. The most obvious direction in which this could be sought was in Bavaria, ruled by the decadent house of Wittelsbach, the secular rival of the house of Austria Habsburg in southern Germany. The question of the Bavaria. annexation of Bavaria by conquest or exchange had occupied the niinds of Austrian statesmen throughout the century: it would not only have removed a perpetual menace to the peace of Austria, but would have given to the Habsburg monarchy an overwhelming strength in South Germany. The matter came to an issue in 1777, on the death of the elector Maximilian III. The heir was the elector palatine Charles Theodore, but Joseph II., who had been elected emperor in 1765, in succession to his father, and appointed co-regent with his mother — claimed the inheritance, and prepared to assert his claims by force. The result was the so-called War of Bavarian Succession. As a matter of fact, however, though the armies under Frederick and Joseph were face to face in the field, the affair was settled without actual fighting; Maria Theresa, fearing the chances of another struggle with Prussia, overruled her son at the last moment, and by the treaty of Teschen agreed to be content with the cession of the Quarter of the Inn (Innviertel) and some other districts.

Meanwhile the ambition of Catherine of Russia, and the war with Turkey by which the empire of the tsars was advanced to the Black Sea and threatened to establish itself south „ of the Danube, were productive of consequences of Austria enormous importance to Austria in the East. Russian and the control of the Danube was a far more serious menace ottoman to Austria than the neighbourhood of the decadent m P re – Ottoman power; and for a while the policy of Austria towards the Porte underwent a change that foreshadowed her attitude towards the Eastern Question in the 19th century. In spite of the reluctance of Maria Theresa, Kaunitz, in July 1 7 7 1 , concluded a defensive alliance with the Porte. He would have exchanged this for an active co-

operation with Turkey, could Frederick the Great have been persuaded to promise at least neutrality in the event of a Russo-Austrian War. But Frederick was un- willing to break with Russia, with whom he was negotiating the partition of Poland; Austria in these circumstances dared not take the offensive; and Maria Theresa was compelled to pur- chase the modification of the extreme claims of Russia in Turkey by agreeing to, and sharing in, the spoliation of Poland. Her own share of the spoils was the acquisition, by the first treaty of partition (August 5, 1772), of Galicia P tfpˆ" d and Lodomeria. Turkey was left in the lurch; and Austrian troops even occupied portions of Moldavia, in order to secure the communication between the new Polish provinces and Transylvania. At Constantinople, too, Austria once more supported Russian policy, and was rewarded, in 1777, by the acquisition of Bukovina from Turkey. In Italy the influence of the House of Austria had been strengthened by the marriage of the archduke Ferdinand with the heiress of the d'Estes of Modena, and the establishment of the archduke Leopold in the grand-duchy of Tuscany.

In internal affairs Maria Theresa may be regarded as the practical founder of the unified Austrian state. The new system of centralization has already been referred to. It only . t . remains to add that, in carrying out this system, Maria reforms Theresa was too wise to fall into the errors afterwards under made by her son and successor. She was no doctrin- ˆ r,a aire, and consistently acted on the principle once laid down by Machiavelli, that while changing the substance, the prince should be careful to preserve the form of old institutions. Alongside the new bureaucracy, the old estates survived in somnolent inactivity, and even in Hungary, though the ancient constitution was left untouched, the diet was only summoned four times during the reign, and reforms were carried out, without protest, by royal ordinance. It was under Maria Theresa, too,

that the attempt was first made to make German the official language of the whole monarchy; an attempt which was partly successful even in Hungary, especially so far as the army was concerned, though Latin remained the official tongue of the diet,

the county-assemblies and the courts.

The social, religious and educational reforms of Maria Theresa also mark her reign as the true epoch of transition from medieval to modern conditions in Austria. In religious matters the empress, though a devout Catholic and herself devoted to the Holy See, was carried away by the prevailing reaction, in which her ministers shared, against the pretensions of the papacy. The anti-papal tendency, known as Febronianism (q.v.) , had made immense headway, not only among the laity but among the clergy in the Austrian dominions. By a new law, papal bulls could not be published without the consent of the crown, and the direct intercourse of the bishops with Rome was forbidden; the privileges of the religious orders were curtailed; and the education of the clergy was brought under state control. It was, however, only with reluctance that Maria Theresa agreed to carry out the papal bull suppressing the Society of Jesus; and, while declaring herself against persecution, she could never be persuaded to accept the views of Kaunitz and Joseph in favour of toleration. Parallel with the assertion of the rights of the state as against the church, was the revolution effected in the educational system of the monarchy. This, too, was taken from the control of the church; the universities were remodelled and modernized by the introduction of new faculties, the study of ecclesiastical law being transferred from that of theology to that of jurisprudence, and the elaborate system of elementary and secondary education was established, which survived with slight modification till 1869.

The death of Maria Theresa in 1780 left Joseph II. free to attempt the drastic revolution from above, which had been Joseph ll. restrained by the wise statesmanship of his mother. and He was himself a strange incarnation at once of

” Joseph- doctrinaire liberalism and the old Habsburg autocracy.

sm ‘ Of the essential conditions of his empire he was constitutionally unable to form a conception. He was a disciple, not of Machiavelli, but of Rousseau; and his scattered dominions, divided by innumerable divergences of racial and class prejudice, and encumbered with traditional institutions to which the people clung with passionate conservatism, he regarded as so much vacant territory on which to build up his ideal state. He was, in fact, a Revolutionist who happened also to be an emperor. ” Reason ” and ” enlightenment ” were his watchwords; opposition

to his wise measures he regarded as obscurantist and unreasonable, and unreason, if it proved stubborn, as a vice to be corrected with whips. In this spirit he at once set to work to reconstruct the state, on lines that strangely anticipated the principles of the Constituent Assembly of 1789. He refused to be crowned or to take the oath of the local constitutions, and divided the whole 'monarchy into thirteen departments, to be governed under a uniform system. In ecclesiastical matters his policy was also that of " reform from above," the complete subordination of the clergy to the state, and the severance of all effective ties with Rome. This treatment of the " Fakirs and Ulemas " (as he called them in his letters) , who formed the most powerful element in the monarchy, would alone have ensured the failure of his plans, but failure was made certain by the introduction of the conscription, which turned even the peasants, whom he had done much to emancipate, against him. The threatened revolt of Hungary, and the actual revolt of Tirol and of the Netherlands (see Belgium: History) together with the disasters of the war with Turkey, forced him, before he died, to the formal reversal of the whole policy of reform.

In his foreign policy Joseph II. had been scarcely less unhappy. In 1784 he had resumed his plan of acquiring Bavaria for Austria by negotiating with the elector Charles Theodore its exchange for the Netherlands, which were to be erected for his benefit into a " Kingdom of Burgundy." The elector was not unwilling, but the scheme was wrecked by the opposition of the heir to

the Bavarian throne, the duke of Zweibrucken, in response to whose appeal Frederick the Great formed, on the 23rd of July 1785, a confederation of German princes (Fiirstenbund) for the purpose of opposing the threatened preponderance of Austria. Prussia was thus for the first time formally recognized as the protector of the German states against Austrian ambition, and had at the same time become the centre of an anti-Austrian alliance, which embraced Sweden, Poland and the maritime powers. In these circumstances the war with Turkey, on which Joseph embarked, in alliance with Russia, in 1788, would hardly have been justified by the most brilliant success. The first campaign, however, which he conducted in person was a dismal failure; the Turks followed the Austrian army, disorganized by disease, across the Danube, and though the transference of the command to the veteran marshal Loudon somewhat retrieved the initial disasters, his successes were more than counterbalanced by the alliance, concluded on the 31st of January 1790, between

Prussia and Turkey. Three weeks later, on the 20th of February 1790, Joseph died broken-hearted.

The situation needed all the statesmanship of the new ruler, Leopold II. This was less obvious in his domestic than in his foreign policy, though perhaps equally present. As grand-duke of Tuscany Leopold had won the reputation n,° P ° of an enlightened and liberal ruler; but meanwhile ” Josephinism ” had not been justified by its results, and the progress of the Revolution in France was beginning to scare even enlightened princes into reaction. Leopold, then, reverted to the traditional Habsburg methods; the old supremacy of the Church, regarded as the one effective bond of empire, was restored; and the Einheitsstaal was once more resolved into its elements, with the old machinery of diets and estates, and the old abuses. It was the beginning of that policy of ” stability ” associated later with Metternich, which was to last till the cataclysm of 1848. For the time, the policy was justified by its results. The spirit of revolutionary France had not yet touched the heart of the Habsburg empire, and national rivalries were expressed, not so much in expansive ambitions, as in a somnolent clinging to traditional privileges. Leopold, therefore, who made his d6but on the European stage as the executor of the ban of the Empire against the insurgent Liegeois, was free to pose as the champion of order against the Revolution, without needing to fear the resentment of his subjects. He played this role with consummate skill in the negotiations that led up to the treaty of Reichenbach (August 15, 1790), which ended the quarrel with Prussia and paved the way to the armistice of Giurgevo with Turkey (September 10). Leopold was now free to deal with the Low Countries, which were reduced to order before the end of the year. On the 4th of August 1791, was signed at Sistova the definitive peace with Turkey, which practically established the status quo.

On the 6th of October 1700, Leopold had been crowned Roman emperor at Frankfort, and it was as emperor, not as Habsburg, that he first found himself in direct antagonism to the . , rf France of the Revolution. The fact that Leopold’s and the sister, Marie Antoinette, was the wife of Louis XVI. preach had done little to cement the Franco-Austrian alliance, Revolu- which since 1763 had been practically non-existent; nor was it now the mainspring of his attitude towards revolu- tionary France. But by the decree of the 4th of August, which in the general abolition of feudal rights involved the possessions of many German princes enclaves- in Alsace and Lorraine, the Constituent Assembly had

made the first move in the war against the established European system. Leopold protested as sovereign of Germany; and the protest was soon enlarged into one made in the name of Europe. The circular letter of Count Kaunitz, dated the 6th of July 1791, calling on the sovereigns to unite against the Revolution, was at once the beginning of the Concert of Europe, and in a sense the last manifesto of the Holy Roman Empire as " the centre of political unity." But the common policy proclaimed in the famous declaration of Pillnitz (August 27), was soon wrecked upon the particular interests of the powers. Both Austria and Prussia

were much occupied with the Polish question, and to have plunged into a crusade against France would have been to have left Poland, where the new constitution had been proclaimed on the 3rd of May, to the mercy of Russia. Towards the further development of events in France, therefore, Leopold assumed at first a studiously moderate attitude; but his refusal to respond to the demand of the French government for the dis- persal of the corps of emigres assembled under the protection of the German princes on the frontier of France, and the insistence on the rights of princes dispossessed in Alsace and Lorraine, precipitated the crisis. On the 25th of January 1792 the French Assembly adopted the decree declaring that, in the event of no satisfactory reply having been received from the emperor by the 1st of March, war should be declared. On the 7th of February Austria and Prussia signed at Berlin an offensive and defensive treaty of alliance. Thus was ushered in the series of stupendous events which were to change the face of Europe and profoundly to affect the destinies of Austria. Leopold himself did not live to see the beginning of the struggle; he died on the 1st of March 1792, the day fixed by the Legislative Assembly as that on which the question of peace or war was to be decided.

The events of the period that followed, in which Austria necessarily played a conspicuous part, are dealt with elsewhere Effects of (see Europe, French Revolutionary Wars,

theRevol- NAPOLEON, NAPOLEONIC CAMPAIGNS). Here it will

utlonary only be necessary to mention those which form per-
Wars. manent landmarks in the progressive conformation of the Austrian monarchy. Such was the second partition of Poland (January 23, 1793), which eliminated the ” buffer state ” on which Austrian statesmanship had hitherto laid such importance, and brought the Austrian and Russian frontiers into contact. Such, too, was the treaty of Campo Formio (October 1 7 , 1797) which ended the first revolutionary war. By this treaty the loss of the Belgian provinces was confirmed, and though Austria gained Venice, the establishment of French preponder- ance in the rest of Italy made a breach in the tradition of Habs- burg supremacy in the peninsula, which was to have its full effect only in the struggles of the next century. The rise of Napoleon, and his masterful interference in Germany, produced a complete and permanent revolution in the relations of Austria to the German states. The campaigns which issued in the treaty of LuneVille (February 9, 1801) practically sealed the fate of the old Empire. Even were the venerable name to survive, it was felt that it would pass, by the election of the princes now tributary to France, from the house of Habsburg to that of Bonaparte. Francis II. determined to forestall the possible indignity of the The subordination of his family to an upstart dynasty.

“Empire On the 14th of May 1804, Napoleon was proclaimed “t ff emperor of the French; on the nth of August End of the F ranc is H. assumed the style of Francis I., hereditary Holy emperor of Austria. Two years later, when the defeat

Roman f Austerlitz had led to the treaty of Pressburg Empire. (j anuar y Xj xg 6), by which Austria lost Venice and Tirol, and Napoleon’s Confederation of the Rhine had broken the unity of Germany, Francis formally abdicated the title and functions of Holy Roman emperor (August 6, 1806).

Austria had to undergo further losses and humiliations, notably by the treaty of Vienna (1809), before the outcome of Napoleon’s Russian campaign in 181 2 gave her the opportunity for recuperation and revenge. The skilful diplomacy of Metter- nich, who was now at the head of the Austrian government, enabled Austria to take full advantage of the situation created by the disaster to Napoleon’s arms. His object was to recover Austria’s lost possessions and if possible to add to them, a policy which did not necessarily involve the complete overthrow of the French emperor. Austria, therefore, refused to join the alliance between Russia and Prussia signed on the 17th of March 1813, but pressed

on her armaments so as to be ready in any event. Her opportunity came after the defeats of the Allies at Liitzen and Bautzen and the conclusion of an armistice at Pleswitz. Between 200,000 and 300,000 Austrian troops were massed in Bohemia; and Austria took up the r61e of mediator, prepared

to throw the weight of her support into the scale of whichever side should prove most amenable to her claims. The news of the battle of Vittoria, following on the reluctance of Napoleon to listen to demands involving the overthrow of the whole of his political system in Central Europe, decided Austria in favour of the Allies. By this fateful decision Napoleon's fall was assured. By the treaty of Trachenberg (July 12, 1813) the Grand Alliance was completed; on the 16th, 17th and 18th of October the battle of Leipzig was fought; and the victorious advance into France was begun, which issued, on the nth of April 1814, in Napoleon's abdication. (See Napoleon, Napoleonic Campaigns, Europe,)

It was a recognition of the decisive part played by Austria in these great events that Vienna was chosen as the scene of the great international congress summoned (September 1 8 14) for the purpose of re-establishing the balance „° vyˆa of power in Europe, which Napoleon's conquests had upset. An account of the congress is given elsewhere (see Vienna, Congress of). The result for Austria was a triumphant vindication of Metternich's diplomacy. He had, it is true, been unable to prevent the retention of the grand-duchy of Warsaw by Alexander of Russia; but with the aid of Great Britain and France (secret treaty of January 3, 1815) he had frustrated the efforts of Prussia to absorb the whole of Saxony, Bavaria was forced to disgorge the territories gained for her by Napoleon at Austria's expense, Illyria and Dalmatia were regained, and Lombardy was added to Venetia to constitute a kingdom under the Habsburg crown; while in the whole Italian peninsula French was replaced by Austrian influence. In Germany the settlement was even more fateful for Austria's future. The Holy Empire, in spite of the protests of the Holy See, was not restored, Austria preferring the loose confederation of sovereign states (Staotenbund) actually constituted under her presidency. Such a body, Metternich held, " powerful for defence, powerless for offence," would form a guarantee of the peace of central Europe — and of the preponderance of Austria; and in its councils Austrian diplomacy, backed by the weight of the Habsburg power beyond the borders of Germany, would exercise a greater influence than any possible prestige derived from a venerable title that had become a by-

word for the union of unlimited pretensions with practical impotence. Moreover, to the refusal to revive the Empire — which shattered so many patriotic hopes in Germany — Austria added another decision yet more fateful. By relinquishing her claim to the Belgian provinces and other outlying territories in western Germany, and by acquiescing in the establishment of Prussia in the Rhine provinces, she abdicated to Prussia her position as the bulwark of Germany against France, and hastened the process of her own gravitation towards the Slavonic East to which the final impetus was given in 1866.

In order to understand the foreign policy of Austria, insepar- ably associated with the name of Metternich, during the period from the close of the congress of Vienna to the out- internal break of the revolutions of 1848, it is necessary to know affairs of something of the internal conditions of the monarchy Austria before and during this time. In 1792 Leopold II. had p ranC j s //. been succeeded by his son Francis II. His popular and designation of ” our good Kaiser Franz ” this monarch Metier- owed to a certain simplicity of address and bonhomie aich ‘ which pleased the Viennese, certainly not to his serious qualities as a ruler. He shared to the full the autocratic temper of the Habsburgs, their narrow-mindedness and their religious and intellectual obscurantism; and the qualities which would have made him a kindly, if somewhat tyrannical, father of a family, and an excellent head clerk, were hardly those required by the conditions of the Austrian monarchy during a singularly critical period of its history.

, The personal character of the emperor, moreover, gained a special importance owing to the modifications that were made in the administrative system of the empire. This had been origin- ally organized in a series of departments: Aulic chanceries for Austria, for Hungary and Transylvania, a general Aulic chamber for finance, domains, mines, trade, post, &c, an Aulic council

of war, a general directory of accounts, and a chancery of the household, court and state. The heads of all these departments had the rank of secretaries of state and met in council under the

royal presidency. In course of time, however, this body became too unwieldy for an effective cabinet, and Maria Theresa established the council of state. During the early years of the reign of Francis, the emperor kept himself in touch with the various departments by means of a cabinet minister; but he had a passion for detail, and after 1805 he himself undertook the function of keeping the administration together. At the same time he had no personal contact with ministers, who might communicate with him only in writing, and for months together never met for the discussion of business. The council of state was, moreover, itself soon enlarged and subdivided; and in course of time the emperor alone represented any synthesis of the various departments of the administration. The jurisdiction of the heads of departments, moreover, was strictly defined, and all that lay outside this was reserved for the imperial decision. Whatever was covered by established precedent could be settled by the department at once; but matters falling outside such precedent, however insignificant, had to be referred to the throne. 1 A system so inelastic, and so deadening to all initiative, could have but one result. Gradually the officials, high and low, subjected to an elaborate system of checks, refused to take any responsibility whatever; and the minutest administrative questions were handed up, through all the stages of the bureaucratic hierarchy, to be shelved and forgotten in the imperial cabinet. For Francis could not possibly himself deal with all the questions of detail arising in his vast empire, even had he desired to do so. In fact, his attitude towards all troublesome problems was summed up in his favourite phrase, ” Let us sleep upon it “: questions unanswered would answer themselves.

The result was the gradual atrophy of the whole administrative machine. The Austrian government was not consciously tyrannical, even in Italy; and Francis himself, though determined to be absolute, intended also to be paternal. Nor would the cruelties inflicted on the bolder spirits who dared to preach reform, which made the Austrian government a by- word among the nations, alone have excited the passionate spirit of revolt which carried all before it in 1848. The cause of this is to be sought rather in the daily friction of a system which had ceased to be efficient and only succeeded in irritating the public opinion it was powerless to curb.

Metternich himself was fully conscious of the evil. He recognized that the fault of the government lay in the fact that it did not govern, and he deplored that his own function, in a decadent

age, was but ” to prop up mouldering institutions.” He was not constitutionally averse from change; and he was too clear-sighted not to see that, sooner or later, change was inevitable. But his interest was in the fascinating game of diplo- macy; he was ambitious of playing the leading part on the great stage of international politics; and he was too consummate a courtier to risk the loss of the imperial favour by any insistence on unpalatable reforms, which, after all, would ■ perhaps only reveal the necessity for the complete revolution which he feared.

The alternative was to use the whole force of the government to keep things as they were. The disintegrating force of the ever-simmering racial rivalries could be kept in check by the army ; Hungarian regiments garrisoned Italy, Italian regiments guarded Galicia, Poles occupied Austria, and Austrians Hungary. The peril from the infiltration of ” revolutionary ” ideas from without was met by the erection round the Austrian dominions of a Chinese wall of tariffs and censors, which had, however, no more success than is usual with such expedients. 2 The peril from the independent growth of Liberalism within was guarded against by a rigid supervision of the press and the re-establish- ment of clerical control over education. Music alone flourished,

1 Thus, while the number of recruits, though varying from year to year, could be settled by the war department, the question of the claim of a single conscript for exemption, on grounds not recog- nized by precedent, could only be settled by imperial decree.

1 Forbidden books were the only ones read, and forbidden news-papers the only ones believed.

free from government interference; but, curiously enough, the movements, in Bohemia, Croatia and elsewhere, for the revival of the national literatures and languages — which were to issue in the most difficult problem facing the Austrian govern- ment at the opening of the 20th century — were encouraged in exalted circles, as tending to divert attention from political to purely scientific interests. Meanwhile the old system of provincial diets and estates was continued or revived (in 1816 in Tirol and Vorarlberg, 181 7 in Galicia, 1818 in Carniola, 1828 in the circle of Salzburg), but they were in no sense representative, clergy and nobles alone being eligible, with a few delegates from the towns, and they had practically no functions beyond register- ing the imperial decrees, relative to recruiting or taxation, and dealing

with matters of local police. 3 Even the ancient right of petition was seldom exercised, and then only to meet with the imperial disfavour. And this stagnation of the administration was accompanied, as might have been expected, by economic stagnation. Agriculture languished, hampered, as in France before the Revolution, by the feudal privileges of a noble caste which no longer gave any equivalent service to the state; trade was strangled by the system of high tariffs at the frontier and internal octrois; and finally public credit was shaken to its foundations by lavish issues of paper money and the neglect to publish the budget.

The maintenance within the empire of a system so artificial and so unsound, involved in foreign affairs the policy of pre- venting the success of any movements by which it Metier- might be threatened. The triumph of Liberal principles nich's or of national aspirations in Germany, or elsewhere policy ot in Europe, might easily, as the events of 1848 proved, sa ' y ' shatter the whole rotten structure of the Habsburg monarchy, which survived only owing to the apathy of the popula- tions it oppressed. This, then, is the explanation of the system of " stability " which Metternich succeeded in imposing for thirty years upon Europe, If he persuaded Frederick William III. that the grant of a popular constitution would be fatal to the Prussian monarchy, this was through no love of Prussia; the Carlsbad Decrees and the Vienna Final Act were designed to keep Germany quiet, lest the sleep of Austria should be disturbed; the lofty claims of the Troppau Protocol were but to cover an Austrian aggression directed to purely Austrian ends: and in the Eastern Question, the moral support given to the " legitimate " authority of the sultan over the " rebel " Greeks was dictated solely by the interest of Austria in maintaining the integrity of Turkey. (See Europe: History; Germany: History; Alexander I. of Russia; Metternich, &c.)

Judged by the standard of its own aims Metternich's diplomacy was, on the whole, completely successful. For fifteen years after the congress of Vienna, in spite of frequent alarms, the peace of Europe was not seriously disturbed; and even in 1830, the revolution at Paris found no echo in the great body of the Austrian dominions. The isolated revolts in Italy were easily suppressed; and the insurrection of Poland, though it provoked the lively sympathy of the Magyars and Czechs, led to no actual movement in the Habsburg states. For a moment, indeed, Metternich had meditated taking advantage of the popular

feeling to throw the weight of Austria into the scale in favour of the Poles, and thus, by re-establishing a Polish kingdom under Austrian influence, to restore the barrier between the two empires which the partition of Poland had destroyed. But cautious counsels prevailed, and by the victory of the Russian arms the status quo was restored (see Poland) .

The years that followed were not wanting in signs of the coming storm. On the 2nd of March 1835 Francis I. died, and was succeeded by his son Ferdinand I. The new emperor Fenti- was personally amiable, but so enfeebled by epilepsy nandi. as to be incapable of ruling; a veiled regency had to ,83S ‘ be constituted to carry on the government, and the 1S48 ‘ vices of the administration were further accentuated by weakness and divided counsels at the centre. Under these circumstances

8 In Hungary the diet was not summoned at all between 181 1 and 1825, nor in Transylvania between 181 1 and 1834.

popular discontent made rapid headway. The earliest symptoms of political agitation were in Hungary, where the diet began to show signs of vigorous life, and the growing Slav separatist movements, especially in the south of the kingdom, were rousing the old spirit of Magyar ascendancy (see Hungary: History). For everywhere the Slav populations were growing restive under the German-Magyar domination. In Bohemia the Czech literary movement had developed into an organized resistance to the established order, which was attacked under the disguise of a criticism of the English administration in Ireland. ” Repeal ” became the watchword of Bohemian, as of Irish, nationalists (see Bohemia). Among the southern Slays the “Illyrian” movement, voiced from 1836 onward in the Illyrian National Gazette of Ljudevit Gaj, was directed in the first instance to a somewhat shadowy Pan-Slav union, which, on the interference of the Austrian government in 1844, was exchanged for the more definite object of a revival of ” the Triune Kingdom ” (Croatia, Slavonia,’ Dalmatia) independent of the Hungarian crown (see Croatia, &c). In the German provinces also, in spite of Metternich’s censors and police; the national movements in

Germany had gained an entrance, and, as the revolution of 1848 in Vienna was to show, the most advanced revolutionary views were making headway.

The most important of all the symptoms of the approaching cataclysm was, however, the growing unrest among the peasants. As had been proved in France in 1789, and was again ˆsiar" t0 k e s h° wn i n R uss i a m i9°6, the success of any 1846. ‘ political revolution depended ultimately upon the attitude of the peasant class. In this lies the main significance of the rising in Galicia in 1 846. This was in its origin a Polish nationalist movement, hatched in the little independent republic of Cracow. As such it had little importance; though, owing to the incompetence of the Austrian commander, the Poles gained some initial successes. More fateful was the attitude of the Orthodox Ruthenian peasantry, who were divided from their Catholic Polish over-lords by centuries of religious and feudal oppression. The Poles had sought, by lavish promises, to draw them into their ranks ; their reply was to rise in support of the Austrian government. In the fight at Gdow (February 26th) , where Benedek laid the foundations of the military reputation that Was to end so tragically at Kbniggratz, flail and scythe wrought more havoc in the rebel ranks than the Austrian mus- ketry. Since, in spite of this object-lesson, the Polish nobles still continued their offers, the peasants consulted the local Austrian authorities as to what course they should take; and the local authorities, unaccustomed to arriving at any decision without consulting Vienna, practically gave them carte blanche to do as they liked. A hideous jacquerie followed for three or four days; during which cartloads of dead were carried into Tarnow, where the peasants received a reward for every " rebel " brought in.

This affair was not only a scandal for which the Austrian government, through its agents, was responsible; but it placed the authorities at Vienna in a serious dilemma. For the Ruthenians, elated by their victory, refused to return to work, and demanded the abolition of all feudal obligations as the reward of their loyalty. To refuse this claim would have meant the indefinite prolongation of the crisis; to concede it would have been to invite the peasantry of the whole empire to put forth similar demands on pain of a general rising. On the 13 th of April 1846 an imperial decree abolished some of the more burdensome feudal obligations; but this concession was greeted with so fierce an outcry, as an authoritative endorsement of the atrocities, that it was again revoked, and Count Franz von Stadion was sent to

restore order in Galicia. The result was, that the peasants saw that though their wrongs were admitted, their sole hope of redress lay in a change of government, and added the dead weight of their resentment to the forces making for revolt tion. It was the union of the agrarian with the nationalist movements that made the downfall of the Austrian system inevitable.

The material for the conflagration in Austria was thus all

prepared when in February 1848 the fall of Louis Philippe fanned into a blaze the smouldering fires of revolution throughout Europe. On the 3rd of March, Kossuth, in the diet at Pressburg, delivered the famous speech which was tkms “of the declaration of war of Hungarian Liberalism against is48, the Austrian system. ” From the charnel-house of the Vienna cabinet,” he exclaimed, ” a pestilential air breathes on us, which dulls our nerves and paralyses the flight of our spirit.” Hungary liberated was to become the centre of freedom for all the races under the Austrian crown, and the outcome was to be a new ” fraternization of the Austrian peoples.” In the enthusiasm of the moment the crucial question of the position to be occupied by the conflicting nationalities in this” fraternal union ” was overlooked. Germanism had so far served as the basis of the Austrian system, not as a national ideal, but because ” it formed a sort of unnational mediating, and common element among the contradictory and clamorous racial tendencies.” But with the growth of the idea of German unity, Germanism had established a new ideal, of which the centre lay beyond the boundaries of the Austrian monarchy, and which was bound to be antagonistic to the aspirations of other races. The new doctrine of the fraternization of the Austrian races would inevitably soon come into conflict with the traditional German ascendancy strengthened by the new sentiment of a united Germany. It was on this rock that, both in Austria and in Germany, the revolution suffered shipwreck.

Meanwhile events progressed rapidly. On the nth of March a meeting of ” young Czechs ” at Prague drew up a petition embodying nationalist and liberal demands; and on the same day the diet of Lower Austria petitioned the crown to summon a meeting of the delegates of the diets to set the Austrian finances in order. To this last proposal the government, next day, gave its consent. But in the actual temper of the Viennese the slightest concession was dangerous. The hall of the diet was invaded by a mob of students and workmen, Kossuth’s speech was read and its

proposals adopted as the popular programme, and the members of the diet were forced to lead a tumultuous procession to the Hofburg, to force the assent of the government to a petition based on the catch- words of the Revolution. The authorities, taken by surprise, were forced to temporize and agreed to lay the petition before the emperor. Meanwhile Fallot round the hall of the diet a riot had broken out; the Metter- soldiers intervened and blood was shed. The middle ??*'. ., classes now joined the rebels ; and the riots had become 1S48i ' a revolution. Threatened by the violence of the mob, Metternich, on the evening of the 13th of March, escaped from the Hofburg and passed into exile in England.

The fall of Metternich was the signal for the outburst of the storm, not in Austria only, but throughout central Europe. In Hungary, on the 31st of March, the government was forced to consent to a new constitution which virtually erected Hungary into an independent state. On the 8th of April a separate constitution was promised to Bohemia; and if the petition of the Croats for a similar concession was rejected, this was due to the armed mob of Vienna, which was in close alliance with Kossuth and the Magyars. The impotence of the Austrian government in this crisis was due to the necessity of keeping the bulk of the Austrian forces in Italy, where the news of Metternich's fall had also led to a concerted rising against the Habsburg rule (see Italy). Upon the fortunes of war in the peninsula depended the ultimate issue of the revolutions so far as Austria was concerned.

The army and the prestige of the imperial tradition were, in fact, the two sheet-anchors that enabled the Habsburg monarchy to weather the storm. For the time the latter was the only one available; but it proved invaluable, especially in Germany, in preventing any settlement, until Radetzky's victory of Novara had set free the army, and thus once more enabled Austria to back her policy by force. The Austrian government, in no position to refuse, had consented to send delegates from its German provinces to the parliament of united Germany, which met at Frankfort on the 18th of May 1848. The question at

once arose of the place of the Austrian monarchy in united Germany. Were only its German provinces to be included ? Or was it to be incorporated whole ? As to the first, the Austrian government would not listen to the suggestion of a settlement which would have split the monarchy in half and subjected it to a double allegiance. As to the second, German patriots could not stomach the inclusion in Germany of a vast non-German population. The dilemma was from the first so obvious that the parliament would bave done well to have recognized at once that the only possible solution was that arrived at, after the withdrawal of the Austrian delegates, by the exclusion of Austria altogether and the offer of the crown of Germany to Frederick William of Prussia. But the shadow of the Holy Empire, immemorially associated with the house of Habsburg, still darkened the counsels of German statesmen. The Austrian archduke John had been appointed regent, pending the election of an emperor; and the political leaders could neither break loose from the tradition of Austrian hegemony, nor reconcile themselves with the idea of a mutilated Germany, till it was too late, and Austria was once more in a position to re-establish the system devised by her diplomacy at the congress of Vienna. (See Germany: History.)

This fatal procrastination was perhaps not without excuse, in view of the critical situation of the Austrian monarchy during 1848. For months after the fall of Metternich Austria was practically without a central government. Vienna itself, where on the 14th of March the establishment of a National Guard was authorized by the emperor, was ruled by a committee of students and citizens, who arrogated to themselves a voice in imperial affairs, and imposed their will on the distracted ministry. On the 15th of March the government proposed to summon a central committee of local diets; but this was far from satisfying public opinion, and on the 25th of April a constitution was proclaimed, including the whole monarchy with the exception of Hungary and Lombardo-Venetia. This was, however, met by vigorous protests from Czechs and Poles, while its provisions for a partly nominated senate, and the indirect election of deputies, excited the wrath of radical Vienna. Committees of students and national guards were formed; on the 13th of May a Central Committee was established; and on the 15th a fresh insurrection broke out, as a result of which the government once more yielded, recognizing the Central Committee, admitting the right of the National Guard to take an active part in politics, and promising the convocation

of a National Convention on the basis of a single chamber elected by universal suffrage. On the 17th the emperor left Vienna for Innsbruck " for the benefit of his health," and thence, on the 20th, issued a proclamation in which he cast himself on the loyalty of his faithful provinces, and, while confirming the concessions of March, ignored those of the 15 th of May. The flight of the emperor had led to a revulsion of feeling in Vienna ; but the issue of the proclamation and the attempt of the government to disperse the students by closing the university, led to a fresh outbreak on the 26th. Once more the ministry conceded all the demands of the insurgents, and even went so far as to hand over the public treasury and the responsibility of keeping order to a newly constituted Committee of Public Safety.

The tide was now, however, on the turn. The Jacobinism of the Vienna democracy was not really representative of any widespread opinion even in the German parts of move- Austria, while its loud-voiced Germanism excited meats. the lively opposition of the other races. Each of these had taken advantage of the March troubles to press its claims, and everywhere the government had shown the same yielding spirit. In Bohemia, where the attempt to hold elections for the Frankfort parliament had broken down on the opposition of the Czechs and the conservative German aristocracy, a separate constitution had been proclaimed on the 8th of April; on March the 23rd the election by the diet of Agram of Baron Joseph Jellachich as ban of Croatia was confirmed, as a concession to the agitation among the southern Slavs; on the 1 8th of March Count Stadion had proclaimed a new con-

stitution for Galicia. Even where, as in the case of the Serbs and Rumans, the government had given no formal sanction to the national claims, the emperor was regarded as the ultimate guarantee of their success; and deputations from the various provinces poured into Innsbruck protesting their loyalty.

To say that the government deliberately adopted the Machia-vellian policy of mastering the revolution by setting race against race would be to pay too high a compliment to its capacity* The policy was forced upon it; and was only pursued consciously when it became obvious. Count Stadion began it in Galicia, where, before bombarding insurgent Cracow into submission (April 26), he had won over the Ruthenian peasants by the abolition of feudal dues and by forwarding a petition to the emperor for the official recognition of their language alongside

Polish. But the great object lesson was furnished by the events in Prague, where the quarrel between Czechs and Germans; radicals and conservatives, issued on the 12 th of June in a rising of the Czech students and populace. The suppression of this rising, and with it of the revolution in Bohemia, on the 16th of June, by Prince Windischgratz, was not only the first victory of the army, but was the signal for the outbreak of a universal race war, in which the idea of constitutional liberty was sacrificed to the bitter spirit of national rivalry. The parliament at Frankfort hailed Windischgratz as a national hero, and offered to send troops to his aid; the German revolutionists in Vienna welcomed every success of Radetzky's arms in Italy as a victory for Germanism. The natural result was to drive the Slav nationalities to the side of the imperial government, since, whether at Vienna or at Budapest, the radicals were their worst enemies.

The 1 6th of June had been fatal to the idea of an independent Bohemia, fatal also to Pan-Slav dreams. To the Czechs the most immediate peril now seemed that from the German parliament, and in the interests of their nationality they were willing to join the Austrian government in the struggle against German liberalism. The Bohemian diet, summoned for the 19th, never met. Writs were issued in Bohemia for the election to the Austrian Reichsrath; and when, on the 10th of July, this assembled, the Slav deputies were found to be in a majority. This factj which was to lead to violent trouble later, was at first subordinate to other issues, of which the most important was the question of the emancipation of the peasants. After long debates the law abolishing feudal services — the sole permanent outcome of the revolution — was carried on the 31st of August, and on the 7th of September received the imperial consent. The peasants thus received all that they desired, and their vast weight was henceforth thrown into the scale of the government against the revolution.

Meanwhile the alliance between the Slav nationalities and the conservative elements within the empire had found a powerful representative in Jellachich, the ban of Croatia. At jettuchlch first, indeed, his activity had been looked at askance and at Innsbruck, as but another force making for dis- ". 1Uy , r ~ integration. He had apparently identified himself sm ' with the " Illyrian " party, had broken off all communications with the Hungarian government, and, in spite of an imperial edict issued in response to the urgency of Batthyani, had summoned a diet to Agram, which on the 9th of June decreed the separation of the

“Triune Kingdom” from Hungary. :?Fhe imperial government, which still hoped for Magyar aid against the Viennese revolutionists, repudiated the action of the ban, accused him of disobedience and treason, and deprived him of his military rank. But his true motives were soon apparent; his object was to play off the nationalism of the ” Illyrians ” against the radicalism of Magyars and Germans, and thus to preserve his province for the monarchy; and the Hungarian radicals played into his hands. The fate of the Habsburg empire depended upon the issue of the campaign in Italy, which would have been lost by the withdrawal of the Magyar and Croatian regiments; and the Hungarian government chose this critical moment to tamper with the relations of the army to the monarchy. In May a National Guard had been established;

and -the soldiers of the line were invited to join this, with the promise of higher pay; on the ist of June the garrison of Pest took the oath to the Constitution. On the ioth Jellachich issued a proclamation to the Croatian regiments in Italy, bidding them remain and fight for the emperor and the common Fatherland. His loyalty to the tradition of the imperial army was thus announced, and the alliance was cemented between the army and the southern Slavs.

Jellachich, who had gone to Innsbruck to lay the Slav view before the emperor, was allowed to return to Agram, though not as yet formally reinstated. Here the diet passed a resolution denouncing the dual system and demanding the restoration of the union of the empire. Thus was proclaimed the identity of the Slav and the conservative points of view; the radical “Illyrian ” assembly had done its work, and on the 9th of July Jellachich, while declaring it ” permanent,” prorogued it indefinitely “with a paternal greeting,” on the ground that the safety of the Fatherland depended now ” more upon physical than upon moral force.” The diet thus prorogued never met again. Absolute master of the forces of the banat, Jellachich now waited until the intractable politicians of Pest should give him the occasion and

the excuse for setting the imperial army in motion against them.

The occasion was not to be long postponed. Every day the rift between the dominant radical element in the Hungarian parliament and imperial court was widened. Kossuth and his followers were evidently aiming at the complete separation of Hungary from Austria; they were in sympathy, if not in alliance, with the German radicals in Vienna and Frankfort; they were less than half-hearted in their support of the imperial arms in Italy. The imperial government, pressed by the Magyar nationalists to renounce Jellachich and all his works, equivocated and procrastinated, while within its councils the idea of a centralized state, to replace the loose federalism of the old empire, slowly took shape under the pressure- of the military party. It was encouraged by the news from Italy, where, on the 25th of July, Radetzky had won the battle of Custozza, and on the 6th of August the Austrian standard once more floated over the towers of Milan. At Custozza Magyar hussars, Croats from the Military Frontier, and Tirolese sharp- shooters had fought side by side. The possibility was obvious of combating the radical and nationalist revolution by means of the army, with its spirit of comradeship in arms and its imperialist tradition.

So early as the beginning of July, Austrian officers, with the permission of the minister of war, had joined the Serb insurgents who, under Stratemirovic, were defying the Magyar power in the banat. By the end of August the breach between the Austrian and Hungarian governments was open and complete; on the 4th of September Jellachich was reinstated in all his honours, and on the nth he crossed the Drave to the invasion of Hungary. The die was thus cast; and, though efforts continued to be made to arrange matters, the time for moderate counsels was passed. The conservative leaders of the Hungarian nationalists, Eotvos and Deak, retired from public life; and, though Batthyani consented to remain in office, the slender hope that this gave of peace was ruined by the flight of the palatine (September 24) and the murder of Count Lamberg, the newly appointed com- missioner and commander-in-chief in Hungary, by the mob at Pest (September 27). The appeal was now to arms; and the fortunes of the Habsburg monarchy were bound up with the fate of the war in Hungary (see Hungary: History).

Meanwhile, renewed trouble had broken out in Vienna, where the radical populace was in conflict alike with the government and with the Slav majority of the Reichsrath. The German

democrats appealed for aid to the Hungarian government; but the Magyar passion for constitutional legality led to delay, and before the Hungarian advance could be made effective, it was too late. On the 7 th of October the emperor Ferdinand had fled from Schonbrunn to Olmiitz, a Slav district, whence he issued a proclamation inviting whoever loved "Austria and freedom" to rally round the throne. On the 1 1 th Windischgratz proclaimed

his intention of marching against rebellious Vienna, and on the 1 6th an imperial rescript appointed him a field-marshal and commander-in-chief of all the Austrian armies except that of Italy. Meanwhile, of the Reichsrath, the members of the Right and the Slav majority had left Vienna and announced a meeting of the diet at Briinn for the 20th of October; all that remained in the capital was a rump of German radicals, impotent in the hands of the proletariat and the students. The defence of the city was hastily organized under Bern, an ex-officer of Napoleon; but in the absence of help from Hungary it was futile. On the 28th of October Windischgratz began his attack; on the ist of November he was master of the city.

The fall of revolutionary Vienna practically involved that of the revolution in Frankfort and in Pest. From Italy the congratulations of Radetzky's victorious army came to Windischgratz, from Russia the even more significant commendations of the emperor Nicholas. The moral of the victory was painted for all the world by the military execution of Robert Blum, whose person, as a deputy of the German parliament, should have been sacrosanct. The time had, indeed, not yet come to attempt any conspicuous breach with the constitutional principle; but the new ministry was such as the imperial sentiment would approve, inimical to the German ideals of Frankfort, devoted to the traditions of the Habsburg monarchy. At its head was Prince Felix Schwarzenberg (q.v.), the " army-diplomat," a statesman at once strong and unscrupulous. On the 27th of November a proclamation announced that the continuation of Austria as a united state was necessary both for Germany and for Europe. On the 2nd of December the emperor Ferdinand, bound by too many personal obligations to the revolutionary parties to serve as a useful instrument for the new Accession policy, abdicated, and his nephew Francis Joseph ofFrancis ascended the throne. The proclamation of the new J .°Jf˜ h ' emperor was a gage of defiance thrown down to Magyars and German unionists alike: " Firmly determined to preserve undimmed the lustre of our crown," it ran, " but prepared to share our rights with the

representatives of our peoples, we trust that with God's aid and in common with our peoples we shall succeed in uniting all the countries and races of the monarchy in one great body politic."

While the Reichsrath, transferred to Kremsier, was discussing " fundamental rights " and the difficult question of how to reconcile the theoretical unity with the actual dualism of the empire, the knot was being cut by the sword on the plains of Hungary. The Hungarian retreat after the bloody battle of Kapolna (February 26-27, 1849) was followed by the dissolution of the Kremsier assembly, and a proclamation in which the emperor announced his intention of granting & constitution to the whole monarchy " one and indivisible." On the 4th of March the constitution was published; but it proved all but as distasteful to Czechs and Croats as to the Magyars, and the speedy successes of the Hungarian arms made it, for the while, a dead letter. It needed the intervention of the emperor Nicholas, in the loftiest spirit of the Holy Alliance, before even an experimental unity of the Habsburg dominions could be established (see Hungary: History).

The capitulation of Vilagos, which ended the Hungarian insurrection, gave Schwarzenberg a free hand for completing the work of restoring the status quo ante and the influence of Austria in Germany. The account of the process by which this was accomplished belongs to the history of Germany {q.v.). Here it will suffice to say that the terms of the Convention of Olmiitz (November 29, 1850) seemed at the time a complete triumph for Austria over Prussia. As a matter of fact, however, the convention was, in the words of Count Beust, " not a Prussian humiliation, but an Austrian weakness." It was in the power of Austria to crush Prussia and to put an end to the dual influence in the Confederation which experience had proved to be unwork- able; she preferred to re-establish a discredited system, and to leave to Prussia time and opportunity to gather strength for the inevitable conflict.

In 185 1 Austria had apparently triumphed over all its

difficulties. The revolutionary movements had been sup- pressed, the attempt of Prussia to assume the leadership in Germany defeated, the old Federal Diet of 1815 o/AusMa. na d been restored. Vienna again became the centre of a despotic government the objects of which were to Germanize the Magyars and Slavs, to check all agitation for a constitution, and to suppress all attempts to secure a free press. For some ten years the Austrian dominion groaned under one of the worst possible forms of autocratic government. The failure of the Habsburg emperor to perpetuate this despotic rdgime was due (1) to the Crimean War, (2) to the establishment of Italian unity, and (3) to the successful assertion by Prussia of its claim to the leadership in Germany. The disputes which resulted in the Crimean War revealed the fact that ” gratitude ” plays but a small part in international affairs. In the minds of Austrian statesmen the question of the free navigation of the Danube, which would have been imperilled by a Russian occupation of the Principalities, outweighed their sense of obligation to Russia, on which the emperor Nicholas had rashly relied. That Austria at first took no active part in the war was due, not to any senti- mental weakness, but to the refusal of Prussia to go along with her and to the fear of a Sardinian attack on her Italian provinces. But, on the withdrawal of the Russian forces from the Princi- palities, these were occupied by Austrian troops, and on the 2nd of December 1854, a treaty of alliance was signed at Vienna, between Great Britain, Austria and France, by which Austria undertook to occupy Moldavia and Walachia during the con- tinuance of the war and ” to defend the frontier of the said principalities against any return of the Russian forces.” By Article III., in the event of war between R.ussia and Austria the alliance both offensive and defensive was to be made effective (Hertslet, No. 252). With the progressive disasters of the Russian arms, however, Austria grew bolder, and it was the ultimatum delivered by her to the emperor Alexander II. in December 1855, that forced Russia to come to terms (Treaty of Paris, March 30, 1856).

Though, however, Austria by her diplomatic attitude had secured, without striking a blow, the settlement in her sense of the Eastern Question, she emerged from the contest without allies and without friends. The ” Holy Alliance ” of the three autocratic northern powers, recemented at Mtinchengratz in r833, which had gained for Austria the decisive intervention of the tsar in 1849, had been hopelessly shattered by her attitude

during the Crimean War. Russia, justly offended, drew closer her ties with Prussia, where Bismarck was already hatching the plans which were to mature in 1866; and, if the attitude of Napoleon in the Polish question prevented any revival of the alliance of Tilsit, the goodwill of Russia was assured for France in the coming struggle with Austria in Italy. Already the isolation of Austria had been conspicuous in the congress of Paris, where Cavour, the Sardinian plenipotentiary, laid bare before assembled Europe the scandal of her rule in Italy. It was emphasized during the campaign of 1859, when Sardinia, in alliance with France, laid the foundations of united Italy. The threat of Prussian intervention, which determined the pro- visions of the armistice of Villafranca, was due, not to love of Austria, but to fear of the undue aggrandizement of France. The campaign of 1859, and the diplomatic events that led up to it, are dealt with elsewhere (see Italy, Italian Wars, Napoleon III., Cavour). The results to Austria were two-fold. Externally, she lost all her Italian possessions except Venice; internally, her failure led to the necessity of conciliating public opinion by constitutional concessions.

The proclamation on the 26th of February 1861 of the new constitution for the whole monarchy, elaborated by Anton von Schmerling, though far from satisfying the national aspirations of the races within the empire, at least gave Austria a temporary popularity in Germany; the liberalism of the Habsburg monarchy was favourably contrasted with the ” reactionary ” policy of Prussia, where Bismarck was defying the majority of the diet in his determination to build up the military power of Prussia. The meeting of the princes summoned to Frankfort by the

emperor Francis Joseph, in 1863, revealed the ascendancy of Austria among the smaller states of the Confederation; but it revealed also the impossibility of any consolidation of the Confederation without the co-operation of Prussia, which stood outside. Bismarck had long since decided that the matter could only be settled by the exclusion of Austria altogether, and that the means to this end were not discussion, but ” Blood and Iron.” The issue was forced by the developments of the tangled Schleswig-Holstein Question ($.».), which led to the definitive breach between the two great German powers, to the campaign of 1866, and the collapse of Austria on the field of Koniggratz (July 3. See Seven Weeks’ War). (W. A. P.; A. Hl.)

The war of 1866 began a new era in the history of the Austrian empire. By the treaty of Prague (August 23, 1866) the emperor

surrendered the position in Germany which his ancestors had held for so many centuries; Austria and Tirol, Bohemia and Salzburg, ceased to be German, and eight million Germans were cut off from all political union with their fellow-countrymen. At the same time the surrender of Venetia completed the work of 1859, and the last remnant of the old-established Habsburg domination in Italy ceased. The war was immediately followed by a re- organization of the government. The Magyar nation, Establish- as well as the Czechs, had refused to recognize the otentof validity of the constitution of 1861 which had estab- -foe dual lished a common parliament for the whole empire; monarcby – they demanded that the independence of the kingdom of Hungary should be restored. Even before the war the necessity of coming to terms with the Hungarians had been recognized. In June 1865 the emperor Francis Joseph visited Pest and replaced the chancellors of Transylvania and Hungary, Counts Francis Zichy and Nadasdy, supporters of the February con- stitution, by Count Majlath, a leader of the old conservative magnates. This was at once followed by the resignation of Schmerling, who was succeeded by Count Richard Belcredi. On the 20th of September the Reichsrath was prorogued, which was equivalent to the suspension of the constitution; and in December the emperor opened the Hungarian diet in person, with a speech from the throne that recognized the validity of the laws of 1848. Before any definite arrangement as to their re-introduction could be made, however, the war broke out; and after the defeats on the field of battle the Hungarian diet was able to make its own terms. They recognized no union between their country and the other parts of the monarchy except that which was based on the Pragmatic Sanction. 1 All recent innovations, all attempts made during the last hundred years to absorb Hungary in a greater Austria, were revoked. An agreement was made by which the emperor was to be crowned at Pest and take the ancient oath to the Golden Bull ; Hungary (including Transylvania and Croatia) was to have its own parliament and its own ministry; Magyar was to be the official language; the emperor was to rule as king; there was to be com-plete separation of the finances; not even a common nationality was recognized between the Hungarians and the other subjects of the emperor; a Hungarian was to be a foreigner in Vienna, an Austrian a foreigner in Budapest. A large party wished indeed that nothing should be left but a purely personal union similar to that between England and Hanover. Deak and the majority agreed, however, that there should be certain institu- tions

common to Hungary and the rest of the monarchy; these were— (1) foreign affairs, including the diplomatic and consular service; (2) the army and navy; (3) the control of the expenses required for these branches of the public service.

Recognizing in a declaratory act the legal existence of these common institutions, they also determined the method by which they should be administered. In doing so they carried out with great exactitude the principle of dualism, establishing in form a complete parity between Hungary on one side and the other territories of the king on the other. They made it a condition

1 For the separate political histories of Austria and Hungary see the section on II. Austria Proper, below, and Hungary; the present section deals with the history of the whole monarchy as such.

that there should be constitutional government in the rest of the monarchy as well as in Hungary, and a parliament in which all the other territories should be represented. From both the Hungarian and the Austrian parliament there was to be elected a Delegation, consisting of sixty members; to these Defcya-Delegations the common ministers were to be re- sponsible, and to them the estimates for the joint services were to be submitted. The annual meetings were to be held alternately in Vienna and in Best. They were very care- ful that these Delegations should not overshadow the parliaments by which they were appointed. The Delegations were not to sit together; each was to meet separately; they were to com- municate by writing, every document being accompanied by a translation in Magyar or German, as the case might be; only if after three times exchanging notes they failed to agree was there to be a common session; in that case there would be no discussion, and they were to vote in silence; a simple majority was sufficient. There were to be three ministers for common purposes— (i) for foreign affairs; (2) for war; (3) for finance; these ministers were responsible to the Delegations, but the Delegations were really given no legislative power. The minister of war controlled the common army, but even the laws determin- ing the method by which the army was to be recruited

had to be voted separately in each of the parliaments. The minister of finance had to lay before them the common budget, but they could not raise money or vote taxes; after they had passed the budget the money required had to be provided by the separate parliaments. Even the determination of the proportion which each half of the monarchy was to contribute was not left to the Delegations. It was to be fixed once every ten years by separate committees chosen for that purpose from the Austrian Reichsrath and the Hungarian parliament, the so-called Quota-Deputations. In addition to these ” common affairs “the Hungarians, indeed, recognized that there were certain other matters which it was desirable should be managed on identical principles in the two halves of the monarchy — namely, customs and excise currency; the army and common railways. For these, however, no common institutions were created; they must be arranged by agreement; the ministers must confer and then introduce identical acts in the Hungarian and the Austrian parliaments.

The main principles of this agreement were decided during the spring of 1867; but during this period the Austrians were not really consulted at all. The negotiations on behalf f”. < = ta ' of the court of Vienna were entrusted to Beust, whom the emperor appointed chancellor of the empire and also minister-president of Austria. He had no previous experience of Austrian affairs, and was only anxious at once to bring about a settlement which would enable the empire to take a strong position in international politics. In the summer of 1867, however (the Austrian Reichsrath having met), the two parliaments each elected a deputation of fifteen members to arrange the financial settlement. The first matter was the debt, amounting to over 3000 million gulden, in addition to the floating debt, which had been contracted during recent years. The Hungarians laid down the principle that they were in no way responsible for debts contracted during a time when they had been deprived of their constitutional liberties; they consented, however, to pay each year 29ˆ million gulden towards the interest The whole responsibility for the payment of the remainder of the interest, amounting annually to over a hundred million gulden, and the management of the debt, was left to the Austrians. The Hungarians wished that a considerable part of it should be repudiated. It was then agreed that the two states should form a Customs Union for the next ten years; the customs were to be paid to the common exchequer; all sums required in addition to

this to meet the expenses were to be provided as to 30% by Hungary and as to 70 % by Austria. After the financial question had been thus settled, the whole of these arrangements were then, on the 21st and the 24th of December 1867, enacted by the two parliaments, and the system of dualism was estab- lished.

The acts were accepted in Austria out of necessity; but no

settle' meat.

parties were really satisfied. The Germans, who accepted the principle of dualism, were indignant at the financial arrange- ments; for Hungary, while gaining more than an equal share of power, paid less than one-third of the common expenses. On the other hand, according to British ideas of taxable capacity, Hungary paid, and still pays, more than her share. The Ger^ mans, however, could at least hope that in the future the financial arrangements might be revised; the complaints of the Slav races were political, and within the constitution there was no means of remedy, for, while the settlement gave to the Hungarians all that they demanded, it deprived the Bohemians or Galicians of any hope that they would be able to obtain similar independ- ence. Politically, the principle underlying the agreement was that the empire should be divided into two portions; in one of these the Magyars were to rule, in the other the Germans; in either section the Slav races — the Serbs and Croatians, the Czechs, Poles and Slovenes — were to be placed in a position of political inferiority. 1

The logical consistency with which the principle of Dualism was carried out is shown in a change of title. By a letter to Beust of the 14th of November 1868 the emperor ordered that he should henceforward be styled, not as before " Emperor of Austria, King of Hungary, King of Bohemia, &c," but " Emperor of Austria, King of Bohemia, &c, and Apostolic King of Hungary," thereby signify- ing the separation of the two districts over which he rules. His shorter style is " His Majesty the Emperor and King," and " His Imperial and Apostolic Royal Majesty " ; the lands over which he rules are called " The Austrian-Hungarian Monarchy " or " The Austrian-Hungarian Realm." The new terminology, " Imperial and Royal " (Kaiserlich und Koniglich), has since then been applied to all those branches of the public service which belong to the common ministries; this was first the case with the diplomatic service; not till 1889 was it applied to the army, which for some time kept up the old style of Kaiserlich-Koniglich;

in 1895 it was applied to the ministry of the imperial house, an office always held by the minister for foreign affairs. The minister for foreign affairs was at first called the Reichskanzler ; but in 1 871,, when Andrassy succeeded Beust, this was given up in deference to Hungarian feeling, for it might be taken to imply that there was a single state of which he was minister. The old style Kaiserlich-Koniglich, the " K.K." which has become so familiar through long use, is still retained in the Austrian half of the monarchy. There are, therefore, e.g., three ministries of finance: the Kaiserlich und Koniglich lor joint affairs; the Kaiserlich-Koniglich for Austrian affairs ; the Kirdlye for Hungary.

The settlement with Hungary consisted then of three parts: — (1) the political settlement, which was to be permanent an& has since remained part of the fundamental constitu- tion of the monarchy; (2) the periodical financial affairs. settlement, determining the partition of the common expenses as arranged by the Quota-Deputations and ratified by the parliaments; (3) the Customs Union and the agreement as to currency — a voluntary and terminable arrangement made between the two governments and parliaments. The history of the common affairs which fall under the management of the common ministries is, then, the history of the foreign policy of the empire and of the army. It is with this and this alone that the Delegations are occupied, and it is to this that we must now turn. The annual meetings call for little notice; they have generally been the occasion on which the foreign minister has explained and justified his policy; according to the English custom, red books, sometimes containing important despatches, have been laid before them; but the debates have caused less embarrassment to the government than is generally the case in parliamentary assemblies, and the army budget has generally been passed with few and unimportant alterations.

For the first four years, while Beust was chancellor, the foreign policy was still influenced by the feelings left by the war of 1866. We do not know how far there was a real intention to revenge Koniggratz and recover the policy. position lost in Germany. This would be at least a possible policy, and one to which Beust by his previous history would be inclined. There were sharp passages of arms with the

1 Baron H. de Worms, The Austro-Hungarian Empire (London, 1876), and Beust's Memoirs.

Prussian government regarding the position of the South German states; a close friendship was maintained with France; there were meetings of the emperor and of Napoleon at Salzburg in 1 868, and the next year at Paris; the death of Maximilian in Mexico cast a shadow over the friendship, but did not destroy it. The opposition of the Hungarians and financial difficulties probably prevented a warlike policy. In 1870 there were dis- cussions preparatory to a formal alliance with France against the North German Confederation, but nothing was signed. 1 The war of 1870 put an end to all ideas of this kind; the German successes were so rapid that Austria was not exposed to the temptation of intervening, a temptation that could hardly have b£en resisted had the result been doubtful or the struggle pro-, longed. The absorption of South Germany in the German empire took away the chief cause for friction; and from that time warm friendship, based on the maintenance of the estab- lished order, has existed between the two empires. Austria, gave up all hope of regaining her position in Germany; Germany disclaimed all intention of acquiring the German provinces of Austria. Beust's retirement in 1871 put the finishing touch on the new relations. His successor, Count Andr&ssy, a Hungarian, established a good understanding with Bismarck; and in 1872 the visit of the emperor Francis Joseph, accompanied by his minister, to Berlin, was the final sign of the reconciliation with his uncle. The tsar was also present on that occasion, and for the next six years the close friendship between the three empires removed all danger of war. Three years later the full reconcilia- tion with Italy followed, when Francis Joseph consented to visit Victor Emmanuel in Venice.

The outbreak of disturbance in the Balkans ended this period of calm. The insurrection in Bosnia and Herzegovina immedi- ately affected Austria; refugees in large numbers Eastern crossed the frontier and had to be maintained by question, the government. The political problem presented was a very difficult one. The sympathy of the Slav inhabitants of the empire made it impossible for the government of Vienna to regard with indifference the sufferings of Christians in Turkey. Active support was impossible, because the Hun- garians, among whom the events of 1848 had obliterated the remembrance of the earlier

days of Turkish conquest, were full of sympathy for the Turks. It was a cardinal principle of Austrian policy that she could not allow the erection of new Slav states on her southern frontier. Moreover, the disturbances were fomented by Russian agents, and any increase of Russian influence (for which the Pan-Slav party was working) was full of danger to Austria. For a time the mediation of Germany preserved the good understanding between the two eastern empires. In 1875 Andrassy drafted a note, which was accepted by the powers, requiring Turkey to institute the reforms necessary for the good government of the provinces. Turkey agreed to do this, but the insurgents required a guarantee from the Powers that Turkey would keep her engagements. This could not be given, and the rebellion continued and spread to Bulgaria. The lead then passed to Russia, and Austria, even after the outbreak of war, did not oppose Russian measures. At the beginning of 1877 a secret understanding had been made between the two powers, by which Russia undertook not to annex any territory, and in other ways not to take steps which would be injurious to Austria. The advance of the Russian army on Constantinople, however, was a serious menace to Austrian influence; Andrassy therefore demanded that the terms of peace should be submitted to a European conference, which he suggested should meet at Vienna. The peace of San Stefano violated the engagements made by Russia, and Andr&ssy was therefore compelled to ask for a credit of 60 million gulden and to mobilize a small portion of the army; the money was granted unanimously in the Hungarian Delegation, though the Magyars disliked a policy the object of which appeared to be not the defence of Turkey against Russia, but an agreement with Russia which would give Austria compensation at the expense of Turkey; in

1 See General Le Brun, Souvenirs militaires (1866-1870, Paris, 1895) ; also, Baron de Worms, op. cit., and the article on Beust.

the Austrian Deputation it was voted only by a majority of 39 to 20, for the Germans were alarmed at the report that it would be used for an occupation of part of the Turkish territory.

The active share taken by Great Britain, however, relieved Austria from the necessity of having recourse to further measures. By an arrangement made beforehand, Austria was Bosnia requested at the congress of Berlin to undertake the and occupation and administration of Bosnia and Herze- Herze-govina — an honourable but arduous task. The gor “” provinces

could not be left to the Turks; Austria could not allow them to fall under Russian influence. The occupation was immediately begun, and 60,000 Austrian troops, under the command of General Philippovich, 2 crossed the frontier on the 29th of July. The work was, however, more difficult than had been anticipated; the Mahommedans offered a strenuous resistance; military operations were attended with great difficulty in the mountainous country; 200,000 men were required, and they did not succeed in crushing the resistance till after some months of obstinate fighting. The losses on either side were very heavy; even after the capture of Serajevo in August, the resistance was continued; and besides those who fell in battle, a considerable number of the insurgents were put to death under military law. The opposition in the Delegations, which met at the end of the year, was so strong that the government had to be content with a credit to cover the expenses for 1879 of less than half what they had originally asked, and the supplementary estimate of 40,000,000 gulden for 1878 was not voted till the next year. In 1879 the Porte, after long delay, recognized the occupation on the distinct understanding that the sovereignty of the sultan was acknowledged. A civil administration was then established, the provinces not being attached to either half of the empire, but placed under the control of the joint minister of finance. The government during the first two years was not very successful; the Christian population were dis- appointed at finding that they still had, as in the old days, to pay rent to the Mahommedan begs. There were difficulties also between the Roman Catholics and the members of the Greek Church. In 188 1 disturbances in Dalmatia spread over the frontier into Herzegovina, and another expedition had to be sent to restore order. When this was done Benjamin de Kallay was appointed minister, and under his judicious govern- ment order and prosperity were established in the provinces. In accordance with another clause of the treaty of Berlin, Austria was permitted to place troops in the sanjak of Novi-Bazar, a district of great strategic importance, which separated Servia and Montenegro, and through which the communication between Bosnia and Salonica passed. This was done in September 1879 an agreement with Turkey having specified the numbers and position of the garrison. Another slight alteration of the frontier was made in the same year, when, during the delimitation of the new frontier of Montenegro, the district of Spizza ■ was incorporated in the kingdom of Dalmatia.

The congress of Berlin indirectly caused some difficulties with

Italy. In that country was a large party which, under the name of the " Irredentists," demanded that those Italian-speaking districts, South Tirol, Istria and th/im- Trieste, which were under Austrian rule, should be dentists. joined to Italy; there were public meetings and riots in Italy; the Austrian flag was torn down from the consulate in Venice and the embassy at Rome insulted. The excitement spread across the frontier; there were riots in Trieste, and in Tirol it was necessary to make some slight movement of troops as a sign* that the Austrian government was determined not to surrender any territory. For a short time there was appre- hension that the Italian government might not be strong enough to resist the movement, and might even attempt to realize these wishes by means of an alliance with Russia; but the danger quickly passed away.

In the year 1879 the European position of the monarchy was

2 Josef, Freiherr Philippovlc von Philippsberg (1818-1S belonged to an old Christian noble family of Bosnia.

placed on a more secure footing by the conclusion of a formal alliance with Germany. In the autumn of that year Bismarck

visited Vienna and arranged with Andrassy a treaty A 'ith" Ce ky which Germany bound herself to support Austria Germany, against an attack from Russia, Austria-Hungary

pledging herself to help Germany against a combined attack of France and Russia; the result of this treaty, of which the tsar was informed, was to remove, at least for the time, the danger of war between Austria-Hungary and Russia. It was the last achievement of Andrassy, who had already resigned, but it was maintained by his successor, Baron Haymerle, and after his death in 1881 by Count Kalnoky. It was strengthened in 1882 by the adhesion of Italy, for after 1881 the Italians re- quired support, owing to the French occupation of Tunis, and after five years it was renewed. Since that time it has been the foundation on which the policy of Austria-Hungary has depended , and it has survived all dangers arising either from commercial differences (as between 1880 and 1890) or national discord. The alliance was naturally very

popular among the German Austrians; some of them went so far as to attempt to use it to influence internal policy, and suggested that fidelity to this alliance required that there should be a ministry at Vienna which supported the Germans in their internal struggle with the Slavs; they represented it as a national alliance of the Teutonic races, and there were some Germans in the empire who supported them in this view. The governments on both sides could of course give no countenance to this theory; Bismarck especially was very careful never to let it be supposed that he desired to exercise influence over the internal affairs of his ally. Had he done so, the strong anti-German passions of the Czechs and Poles, always inclined to an alliance with France, would have been aroused, and no government could have maintained the alliance. After 1880, the exertions of Count Kaln6ky again established a fairly good understanding with Russia, as was shown by the meetings of Francis Joseph with the tsar in 1884 and 1885, but the outbreak of the Bulgarian question in 1885 again brought into prominence the opposed interests of Russia and Austria-Hungary. In the December of this year Austria- Hungary indeed decisively interfered in the war between Bulgaria and Servia, for at this time Austrian influence predominated in Servia, and after the battle of Slivnitza the Austro-Hungarian minister warned Prince Alexander of Bulgaria that if he advanced farther he would be met by Austro-Hungarian as well as Servian troops. But after the abdication of Alexander, Count Kalnoky stated in the Delegations that Austria-Hungary would not permit Russia to interfere with the independence of Bulgaria. This decided step was required by Hungarian feeling, but it was a policy in which Austria-Hungary could not depend on the support of Germany, for — as Bismarck stated — Bulgaria was not worth the bones of a single Pomeranian grenadier. Austria-Hungary also differed from Russia as to the position of Prince Ferdinand of Bulgaria, and during 1886-1887 much alarm was caused by the massing cf Russian troops on the Galician frontier. Councils of war were summoned to consider how this exposed and distant province was to be defended, and for some months war was considered inevitable; but the danger was averted by the re- newal of the Triple Alliance and the other decisive steps taken at this time by the German government (see Germany). 1

Since this time the foreign policy of Austria-Hungary has been peaceful and unambitious; the close connexion with Germany has so far been maintained, though during the last few years it

has been increasingly difficult to prevent the violent passions engendered by national enmity at home from reacting on the foreign policy of the monarchy; it would scarcely be possible to do so, were it not that discussions on foreign policy take place not in the parliaments but in the Delegations where the numbers are fewer and the passions cooler. In May 1895 Count Kalnoky had to retire, owing to a difference with Banffy, the Hungarian premier, arising out of the struggle with Rome. He was succeeded by Count Goluchowski, the son of a well-

1 Sir Charles Dilke, The Present Position of European Politics (London, 1887).

known Polish statesman. In 1898 the expulsion of Austrian subjects from Prussia, in connexion with the Anti-Polish policy of the Prussian government, caused a passing irritation, to which Count Thun, the Austrian premier, gave expression. The chief objects of the government in recent years have been to maintain Austro-Hungarian trade and influence in the Balkan states by the buildingof railways, by the opening of the Danube for navigation, and by commercial treaties with Rumania, Servia and Bulgaria; since the abdication of King Milan especially, the affairs of Servia and the growth of Russian influence in that country have caused serious anxiety.

The disturbed state of European politics and the great increase in the military establishments of other countries made it desirable for Austria also to strengthen her military resources. The ar The bad condition of the finances rendered it, however, impossible to carry out any very great measures. In 1868 there had been introduced compulsory military service in both Austria and Hungary; the total of the army available in war had been fixed at 800,000 men. Besides this joint army placed under the joint ministry of war, there was in each part of the monarchy a separate militia and a separate minister for national defence. In Hungary this national force or honvid was kept quite distinct from the ordinary army; in Austria, however (except in Dalmatia and Tirol, where there was a separate local militia) , the Landwehr,- as it was called, was practically organized as part of the standing army. At the renewal of the periodical financial and economic settlement (Ausgleich) in 1877 no important change was made, but in 1882 the system of compulsory service was extended to Bosnia and Herzegovina, and a reorganization was carried out, including the introduction of army corps and local organization on the Prussian plan. This was useful for the

purposes of speedy mobilization, though there was some danger that the local and national spirit might penetrate into the army. In 1886 a law was carried in either parliament creating a Landsturm, and providing for the arming and organization of the whole male population up to the age of forty-two in case of emergency, and in 1889 a small increase was made in the annual number of recruits. A further increase was made in 189 2- 1893. In contrast, however, with the military history of other continental powers, that of Austria-Hungary shows a small increase in the army establishment. Of recent years there have been signs of an attempt to tamper with the use of German as the common language for the whole army. This, which is now the principal remnant of the old ascendancy of German, and the one point of unity for the whole monarchy, is a matter on which the govern- ment and the monarch allow no concession, but in the Hungarian parliament protests against it have been raised, and in 1899 and 1900 it was necessary to punish recruits from Bohemia, who answered the roll call in the Czechish zde instead of the German hier.

In those matters which belong to the periodical and terminable agreement, the most important is the Customs Union, which was established in 1867, and it is convenient to treat separately the commercial policy of the dual state. 2 V”*.

sZ r . ,1 .«■•»■ -r-r Customs

At first the customs tariff in Austria-Hungary, as in union. most other countries, was based on a number of commercial treaties with Germany, France, Italy, Great Britain, &c, each of which specified the maximum duties that could be levied on certain articles, and all of which contained a ” most favoured nation ” clause. The practical result was a system very nearly approaching to the absence of any customs duties, and for the period for which these treaties lasted a revision of the tariff could not be carried out by means of legislation. After the year 1873, a strong movement in favour of protective duties made itself felt among the Austrian manufacturers who were affected by the competition of German, English and Belgian goods, and Austria was influenced by the general movement in economic thought which about this time caused the reaction

2 Matlekovits, Die Zollpolitik der osterreichish-ungarischen Monarchie (Leipzig, 1891),.. gives the Hungarian point of view; Bazant, Die Handelspolitik Osterreich-Ungarns (1875-1892,

against the doctrines of free trade. Hungary, on the other hand, was still in favour of free trade, for there were no important manufacturing industries in that country, and it required a secure market for agricultural produce. After 1875 the commercial treaties expired; Hungary thereupon also gave notice to terminate the commercial union with Austria, and negotiations began as to the principle on which it was to be renewed. This was done during the year 1877, and in the new treaty, while raw material was still imported free of duty, a low duty was placed on textile goods as well as on corn, and the excise on sugar and brandy was raised. All duties, moreover, were to be paid in gold — this at once involving a considerable increase. The tariff treaties with Great Britain and France were not renewed, and all attempts to come to some agreement with Germany broke down, owing to the change of policy which Bismarck was adopting at this period. The result was that the system of commercial treaties ceased, and Austria-Hungary was free to introduce a fresh tariff depending simply on legislation, an " autonomous tariff " as it is called. With Great Britain, France and Germany, there was now only a " most favoured nation " agreement; fresh commercial treaties were made with Italy (1879), Switzerland and Servia (1881). During 1881-1882 Hungary, desiring means of retaliation against the duties on corn and the impediments to the importation of cattle recently introduced into Germany, withdrew her opposition to protective duties; the tariff was completely revised, protective duties were introduced on all articles of home production, and high finance duties on other articles such as coffee and petroleum. At the same time special privileges were granted to articles imported by sea, so as to foster the trade of Trieste and Fiume; as in Germany a subvention was granted to the great shipping companies, the Austrian Lloyd and Adria; the area of the Customs Union was enlarged so as to include Trieste, Istria and Dalmatia, as well as Bosnia and Herzegovina. In 1887 a further increase of duties was laid on corn (this was at the desire of Hungary as against Rumania, for a

vigorous customs war was being carried on at this time) and on woollen and textile goods. Austria, therefore, during these years completely gave up the principle of free trade, and adopted a nationalist policy similar to that which prevailed in Germany. A peculiar feature of these treaties was that the government was empowered to impose an additional duty (Retorsionszoll) on goods imported from countries in which Austria-Hungary received unfavourable treatment. In 1881 this was fixed at 10 % (5 % for some articles), but in 1887 it was raised to 30 and 15 % respectively. In 1892 Austria-Hungary joined with Germany, Italy, Belgium, and Switzerland in commercial treaties to last for twelve years, the object being to secure to the states of central Europe a stable and extended market; for the introduction of high tariffs in Russia and America had crippled industry. Two years later Austria-Hungary also arranged with Russia a treaty similar to that already made between Russia and Germany; the reductions in the tariff secured in these treaties were applicable also to Great Britain, with which there still was a most favoured nation treaty. The system thus introduced gave commercial security till the year 1903.

The result of these and other laws was an improvement in financial conditions, which enabled the government at last to take in hand „ , the long-delayed task of reforming the currency. Hitherto

a/the” t * le currenc y had been partly in silver (gulden), the currency “Austrian currency ” which had been introduced in 1857, partly in paper money, which took the form of notes issued by the Austro-Hungarian Bank. This institution had, in 1867, belonged entirely to Austria; it had branches in Hungary, and its notes were current throughout the monarchy, but the direction was entirely Austrian. The Hungarians had not sufficient credit to establish a national bank of their own, and at the settlement of 1877 they procured, as a concession to themselves, that it should be con- verted into an Austro-Hungarian bank, with a head office at Pest as well as at Vienna, and with the management divided between the twocountries. This arrangement was renewed in 1887. Ini848the government had been obliged to authorize the bank to suspend cash payments, and the wars of 1859 and 1866 had rendered abortive all attempts to renew them. The notes, therefore, formed an incon- vertible paper currency. The bank by its charter had the sole right of issuing notes, but during the war of 1866 the government, in order

to raise money, had “itself issued notes (Staatsnoten) to the value of 312 million gulden, thereby violating the charter of the bank. The operation begun in 1892 was therefore threefold : (1) the substitution of a gold for a silver standard ; (2) the redemption of the Staatsnoten ; (3) the resumption of cash payments by the bank.

In 1867 Austria-Hungary had taken part in the monetary conference which led to the formation of the Latin Union ; it was intended to join the Union, but this was not done. A first step, however, had been taken in this direction by the issue of gold coins of the value of eight and four gulden. No attempt was made, however, to regulate the relations of these coins to the ” Austrian ” silver coinage; the two issues were not brought into connexion, and every payment was made in silver, unless it was definitely agreed that it should be paid in gold. In 1879, owing to the continued depreciation of silver, the free coinage of silver was suspended. In 1892 laws introducing a completely new coinage were carried in both parliaments, in accord- ance with agreements made by the ministers. The unit in the new issue was to be the krone, divided into 100 heller; the krone being almost of the same value (24-251)1) as the franc. (The twenty-krone piece in gold weighs 6-775 gr., the twenty-franc piece 6-453.) The gold krone was equal to -42 of the gold gulden, and it was declared equal to -5 of the silver gulden, so much allowance being made for the depreciation of silver. The first step towards putting this act into practice was the issue of one-krone pieces (silver), which circulated as half gulden, and of nickel coins; all the copper coins and other silver coins were recalled, the silver gulden alone being left in cir- culation. The coinage of the gold four- and eight-gulden wan suspended. Nothing more could be done till the supply of gold had been increased. The bank was required to buy gold (during 1892 it bought over forty M. gulden), and was obliged to coin into twenty- or ten-krone pieces all gold brought to it for that purpose. Then a loan of 150 M. gulden at 4% was made, and from the gold (chiefly bar gold and sovereigns) which Rothschild, who undertook the loan, paid in, coins of the new issue were struck to the value of over 34 million kronen. This was, however, not put into circulation; it was used first for paying off the Staatsnoten. By 1894 the state was able to redeem them to the amount of 200 million gulden, including all those for one gulden. It paid them, however, not in gold, but in silver (one-krone pieces and gulden) and in bank notes, the coins and notes being provided by the bank, and in exchange the

newly-coined gold was paid to the bank to be kept as a reserve to cover the issue of notes. At the same time arrangements were made between Austria and Hungary to pay off about 80 million of exchequer bills which had been issued on the security of the government salt-works, and were therefore called ” salinenscheine.” In 1899 the remainder of the Staatsnoten (112 million gulden) were redeemed in a similar manner. The bank had in this way acquired a large reserve of gold, and in the new charter which was (after long delay) passed in 1899, a clause was introduced requiring the resumption of cash payments,’ though this was not to come into operation immediately. Then from 1st January 1900 the old reckoning by gulden was superseded, that by krone being introduced in all government accounts, the new silver being made a legal tender only for a limited amount. For the time until the 1st of July 1908, however, the old gulden were left in cir- culation, payments made in them, at the rate of two kronen to one gulden, being legal up to any amount.

This important reform has thereby been brought to a satisfactory conclusion, and at a time when the political difficulties had reached a most acute stage. It is indeed remarkable that notwithstanding the complicated machinery of the dual monarchy, and the numerous obstacles which have to be overcome before a reform affecting both countries can be carried out, the financial, the commercial,, and the foreign policy- has been conducted since 1870 with success. The credit of the state has risen, the chronic deficit has disappeared, the currency has been put on a sound basis, and part of the unfunded debt has been paid off. Universal military service has been intro- duced, and all this has been done in the presence of difficulties greater than existed in any other civilized country.

Each of the financial and economic reforms described above was, of course, the subject of a separate law, but, so far as they are determined at the general settlement which takes y Ae place between Austria and Hungary every ten years, Ausgieich they are comprised under the expression ” Ausgieich ” wltl > (compact or compromise), which includes especially “““Z&ry- the determination of the Quota, and to this extent they are all dealt with together as part of a general settlement and bargain. In this settlement a concession on commercial policy would be set off against a gain on the financial agreement; e.g. in 1877 Austria gave Hungary a share in the management of the bank, while the arrangement for paying the bonus on exported sugar was favourable to Austria; on the other hand, since the increased

duty on coffee and petroleum would fall more heavily on Austria, the Austrians wished to persuade the Hungarians to pay a larger quota of the common expenses, and there was also a dispute whether Hungary was partly responsible for a debt of 80 M.

gulden to the bank. Each measure had, therefore, to be considered not only on its own merits, but in relation to the general balance of advantage, and an amendment in one might bring about the rejection of all. The whole series of acts had to be carried in two parliaments, each open to the influence of national jealousy and race hatred in its most extreme form, so that the negotiations have been conducted under serious difficulties, and the periodical settlement has always been a time of great anxiety. The first settlement occupied two full years, from 1876, when the negotiations began, to June 1878, when at last all the bills were carried successfully through the two parliaments; and it was necessary to prolong the previous arrangements (which expired at the end of 1877) till the middle of 1878. First the two ministries had to agree on the drafts of all the bills; then the bills had to be laid before the two parliaments. Each parliament elected a committee to consider them, and the two committees carried on long negotiations by notes supplemented by verbal discussions. Then followed the debates in the two parliaments; there was a ministerial crisis in Austria, because the House refused to accept the tax on coffee and petroleum which was recommended by the ministers; and finally a great Council of all the ministers, with the emperor presiding, deter- mined the compromise that was at last accepted. In 1887 things went better; there was some difficulty about the tariff, especially about the tax on petroleum, but Count Taaffe had a stronger position than the Austrian ministers of 1877. Ten years later, on the third renewal, the difficulties were still greater. They sprang from a double cause. First the Austrians were determined to get a more favourable division of the common expenses; that of 1867 still continued, although Hungary had grown relatively in wealth. 1 Moreover, a proposed alteration in the taxes on sugar would be of considerable advantage to Hungary; the Austrians, therefore, demanded that henceforth the proportion should be not 68-6:31-4 but 58:42. On this there was a

deadlock; all through 1897 and 1898 the Quota- Deputations failed to come to an agreement. This, however, was not the worst. Parliamentary government in Austria had broken down; the opposition had recourse to obstruction, and no business could be done. Their object was to drive out the Badeni government, and for that reason the obstruction was chiefly directed against the renewal of the Ausgleich; for, as this was the first necessity of state, no government could remain in office which failed to carry it through. The extreme parties of the Germans and the anti-Semites were also, for racial reasons, opposed to the whole system. When, therefore, the government at the end of 1897 introduced the necessary measures for prolonging the existing arrangements provisionally till the differences with Hungary had been settled, scenes of great disorder ensued, and at the end of the yeaT the financial arrangements had not been prolonged, and neither the bank charter nor the Customs Union had been renewed. The government, therefore (Badeni having resigned), had to proclaim the necessary measures by imperial warrant. Next year it was even Worse; for there was obstruction in Hungary as well as in Austria; the Quota-Deputations again came to no agreement, and the proposals for the renewal of the Bank charter, the reform of the currency, the renewal of the Customs Union, and the new taxes on beer and brandy, which were laid before parliament both at Vienna and Pest, were not carried in either country; this time, therefore, the existing arrangements had to be prolonged provisionally by imperial and royal warrant both in Austria and Hungary. During 1899 parliamentary peace was restored in Hungary by the resignation of Banffy; in Austria, however, though there was again a change of ministry the only result was that the Czechs imitated the example of the Germans and resorted to obstruction so that still no business could be done. The Austrian ministry, therefore, came to an agreement with the Hungarians that the terms of the new Ausgleich should be

‘ The only change was that as the military frontier had been given over to Hungary, Hungary in consequence of this addition of terri- tory had to pay 2%, the remaining 98% being divided as before, so that the real proportion was 31-4 and 68-6.

finally proclaimed in Austria by imperial warrant; the Hungarians only giving their assent to this in return for considerable financial concessions. ; The main points of the agreement were: (1) the Bank charter was to- be renewed till. 1910, the Hungarians receiving a larger share in the . direction

than, they had hitherto enjoyed; (2) the Customs Union so far as it was based on a reciprocal and binding treaty lapsed, both sides, however, continuing it in practice, and promising to do so until the 31st of December 1907: Not later than 1901 negotiations were to be begun for a renewal of the alliance, and if possible it was to be renewed. from the year 1903, in which year the commercial treaties would expire. If this were done, then the tariff would be revised before any fresh commercial treaties were made. If it were not done, then no fresh treaties would be made extending beyond the year 1907, so that if the Commercial Union of Austria and Hungary w.ere not renewed before 1907, each party would be able to determine its own policy unshackled by any previous treaties. These arrangements in Hungary received the sanction of the parliament ; but this could not be procured in Austria, and they were, therefore, proclaimed by imperial warrant; first of all, on 20th July,: the new duties on beer, brandy and sugar; then on 23rd September the Bank charter, &c. In November the Quota- Deputations at last agreed that Hungary should" henceforward pay 33ˆ1 a very small increase, and this was also in Austria proclaimed in the same way. The result was that a working agreement was made, by which the Union was preserved. (J. W. He.)

Since the years 1866-1871 no period of Austro-Hungarian development has been so important as the years 1903-1907. The defeat of the old Austria by Prussia at Sadowa in 1866, the establishment of the Dual Monarchy Hungarian in 1867 and the foundation of the new German empire crisis, in 1 87 1 , formed. the starting-pcint of Austro-Hungarian ,903 ' history properly so called; but the Austro-Hungarian ' ' crisis of 1 903-1 906— a crisis temporarily settled but not defini- tively solved, — and the introduction of universal suffrage in Austria, discredited the original interpretation of the dual system and raised the question whether it represented the permanent form of the Austro-Hungarian polity.

At the close of the 19th century both states of the Dual Monarchy were visited by political crises of some severity. Parliamentary life in Austria was paralysed by the feud between Germans and Czechs that ' resulted directly from the Badeni language ordinances of 1897 and indirectly from the development of Slav influence, particularly that of Czechs and Poles during the Taaffe era (1 879-1 893). Government in Austria was carried on by cabinets of officials with the help of the emergency clause (paragraph 14) of the constitution. Ministers, nominally

responsible to parliament, were in practice responsible only to the emperor. Thus during the closing years of last and the opening years of the present century, political life in Austria was at a low ebb and the constitution was observed in the letter rather than in spirit.

Hungary was apparently better situated. Despite the campaign of obstruction that overthrew the Banffy and led to the formation of the Szell cabinet in 1899, the hegemony of the Liberal party which, under various names, had been the mainstay of dualism since 1867, appeared to be unshaken. But clear signs of the decay of the dualist and of the growth of an extreme nationalist Magyar spirit were already visible. The Army bills of 1889, which involved an increase of the peace footing of the joint AUstro-Hungarian army, had been carried with difficulty, despite the efforts of Koloman Tisza and of Count' Julius Andrassy the Elder. Demands tending towards the Magyarization of the joint army had been advanced and had found such an echo in Magyar public opinion that Count Andrassy was obliged solemnly to warn the country of the dangers of nationalist Chauvinism and to remind it of its obligations under the Compact of 1867. The struggle over the civil marriage and divorce laws that filled the greater part of the nineties served and was perhaps intended by the Liberal leaders to serve as a diversion in favour of the Liberal-dualist standpoint; nevertheless, Nationalist feeling found strong expression during the negotiations of Banffy and Sz6U with various Austrian premiers for the renewal of the economic Ausgleich, or " Customs and Trade Alliance." At the end of 1902 the Hungarian premier, Szell, concluded with the Austrian premier, Kerber, a. new customs and trade alliance

comprising a joint Austro-Hungarian tariff as a basis for the negotiation of new commercial treaties with Germany, Italy and other states. This arrangement, which for the sake of brevity will henceforth beref erred to as the Szell-Korber Compact, was destined to play an important part in the history of the next few years, though it was never fully ratified by either parliament and was ultimately discarded. Its conclusion was prematurely greeted as the end of a period of economic strife between the two halves

of the monarchy and as a pledge of a decade of peaceful development. Events were soon to demon- strate the baselessness of these hopes.

In the autumn of 1902 the Austrian and the Hungarian governments, at the instance of the crown and in agreement

with the joint minister for war and the Austrian and question? Hungarian ministers for national defence, laid before

their respective parliaments bills providing for an increase of 21,000 men in the annual contingents of recruits. 16,700 men were needed for the joint army, and the remainder for the Austrian and Hungarian national defence troops (Land- wehr and honved). The total contribution of Hungary would have been some 6500 and of Austria some 14,500 men. The military authorities made, however, the mistake of detaining in barracks several thousand supernumerary recruits (i.e. recruits liable to military service but in excess of the annual 103,000 enrollable by law) pending the adoption of the Army bills by the two parliaments. The object of this apparently high-handed step was to avoid the expense and delay of summon- ing the supernumeraries again to the colours when the bills should have received parliamentary sanction; but it was not unnaturally resented by the Hungarian Chamber, which has ever possessed a lively sense of its prerogatives. The Opposition, consisting chiefly of the independence party led by Francis Kossuth (eldest son of Louis Kossuth), made capital out of the grievance and decided to obstruct ministerial measures until the supernumeraries should be discharged. The estimates could not be sanctioned, and though Kossuth granted the Szell cabinet a vote on account for the first four months of 1903, the Government found itself at the mercy of the Opposition. At the end of 1902 the supernumeraries were discharged — too late to calm the ardour of the Opposition, which proceeded to demand that the Army bills should be entirely withdrawn or that, if adopted, they should be counterbalanced by concessions to Magyar nationalist feeling calculated to promote the use of the Magyar language in the Hungarian part of the army and to render the Hungarian regiments, few of which are purely Magyar, more and more Magyar in character. Szell, who vainly advised the crown and the military authorities to make timely conces- sions, was obliged to reject these demands which enjoyed the secret support of Count Albert Apponyi, the Liberal president of the Chamber and of his adherents. The obstruction of the estimates continued. On the 1st

of May the Szell cabinet found itself without supply and governed for a time ” ex-lex “; Szell, who had lost the confidence of the crown, resigned and was succeeded (June 26) by Count Khuen-Hedervary, previously ban, or governor, of Croatia. Before taking office Khuen- Hedervary negotiated with Kossuth and other Opposition leaders, who undertook that obstruction should cease if the Army bills were withdrawn. Despite the fact that the Austrian Army bill had been voted by the Reichsrath (February 19), the crown consented to withdraw the bills and thus compelled the Austrian parliament to repeal, at the dictation of the Hun- garian obstructionists, what it regarded as a patriotic measure. Austrian feeling became embittered towards Hungary and the action of the crown was openly criticized.

Meanwhile the Hungarian Opposition broke its engagement. Obstruction was continued by a section of the independence The party; and Kossuth, seeing his authority ignored,

Magyar resigned the leadership. The obstructionists now words of raised the cry that the German words of command comman . . q ˆ j om (- arm y must be replaced by Magyar words in the regiments recruited from Hungary— a demand which, apart from its disintegrating influence on the army, the crown

considered to be an encroachment upon the royal military prerogatives as defined by the Hungarian Fundamental Law XII. of 1867. Clause n of the law runs: — ” In pursuance of the constitutional military prerogatives of His Majesty, every- thing relating to the unitary direction, leadership and inner organization of the whole army, and thus also of the Hungarian army as a complementary part of the whole army, is recognized as subject to His Majesty’s disposal.” The cry for the Magyar words of command on which the subsequent constitutional crisis turned, was tantamount to a demand that the monarch should differentiate the Hungarian from the Austrian part of the joint army, and should render it impossible for any but Magyar officers to command Hungarian regiments, less than half of which have a majority of Magyar recruits. The partisans of the Magyar words of command based their claim upon clause 12 of the Fundamental Law XII. of 1867 — which runs:— ” Nevertheless the country reserves its right periodically to complete the Hungarian army and the right of granting recruits, the fixing of the conditions on which the recruits are granted, the fixing of the term of service and all the dispositions concerning the stationing and the supplies of the troops according to existing

law both as regards legislation and administration." Since Hungary reserved her right to fix the conditions on which recruits should be granted, the partisans of the Magyar words of command argued that the abolition of the German words of command in the Hungarian regiments might be made such a condition, despite the enumeration in the preceding clause n, of everything appertaining to the unitary leadership and inner organization of the joint Austro-Hungarian army as belong- ing to the constitutional military prerogatives of the crown. Practically, the dispute was a trial of strength between Magyar nationalist feeling and the crown. Austrian feeling strongly supported the monarch in his determination to defend the unity of the army, and the conflict gradually acquired an intensity that appeared to threaten the very existence of the dual system.

When Count Khuen-HederVary took office and Kossuth, relinquished the leadership of the independence party, the extension of the crisis could not be foreseen. A few extreme nationalists continued to obstruct the estimates, and it appeared as though their energy would soon flag. An attempt to quicken this process by bribery provoked, however, an outburst of feeling against Khuen-Hedervary who, though personally innocent, found his position shaken. Shortly afterwards Magyar resentment of an army order issued from the cavalry manoeuvres at Chlopy in Galicia — in which the monarch declared that he would " hold fast to the existing and well-tried organization of the army'* and would never "relinquish the rights and privileges guaranteed to its highest war-lord"; and of a provocative utterance of the Austrian premier Korber in the Reichsrath led to the overthrow of the Khuen-Hedervary cabinet (September 30) by an immense majority. The cabinet fell on a motion of censure brought forward by Kossuth, who had profited by the bribery incident to resume the leadership of his party.

An interval of negotiation between the crown and many leading Magyar Liberals followed, until at the end of October 1903 Count Stephen Tisza, son of Koloman Tisza, accepted a mission to form a cabinet after all others had declined. risza\ As programme Tisza brought with him a number of concessions from the crown to Magyar nationalist feeling in regard to military matters, particularly in regard to military badges, penal procedure, the transfer of officers of Hungarian origin from Austrian to Hungarian regiments, the establishment of military scholarships for Magyar youths and the introduction of the two years' service system. In regard to the military language, the Tisza programme

— which, having been drafted by a committee of nine members, is known as the ” programme of the nine “—declared that the responsibility of the cabinet extends to the military prerogatives of the crown, and that ” the legal influence of parliament exists in this respect as in respect of every constitutional right.” The programme, however, expressly excluded for ” weighty political reasons affecting great interests of the nation ” the question of the military

language; and on Tisza’s motion the Liberal party adopted an addendum, sanctioned by the crown: ” the party maintains the standpoint that the king has a right to fix the language of service and command in the Hungarian army on the basis of his constitutional prerogatives as recognized in clause 1 1 of law XII. of 1867.”

Notwithstanding the concessions, obstruction was continued by the Clericals and the extreme Independents, partly in the hope of compelling the crown to grant the Magyar words of command and partly out of antipathy towards the person of the young calvinist premier. In March 1004, Tisza, therefore, introduced a drastic ” guillotine ” motion to amend the standing orders of the House, but withdrew it in return for an undertaking from the Opposition that obstruction would cease. This time the Opposition kept its word. The Recruits bill and the estimates were adopted, the Delegations were enabled to meet at Budapest — where they voted £22,000,000 as extraordinary estimates for the army and navy and especially for the renewal of the field artillery — and the negotiations for new commercial treaties with Germany and Italy were sanctioned, although parliament had never been able to ratify the Szell-Korber compact with the tariff on the basis of which the negotiations would have to be conducted. But, as the autumn session approached, Tisza foresaw a new campaign of obstruction, and resolved to revert to his drastic reform of the standing orders. The announcement of his determination caused the Opposition to rally against him, and when on the 18th of November the Liberal party adopted a ” guillotine ” motion by a show of hands in defiance of orthodox procedure, a section of the party seceded. On the 13th of

December the Opposition, infuriated by the formation of a special corps of parliamentary constables, invaded and wrecked the Chamber. Tisza appealed to the country and suffered, on the 26th of January 1905, an overwhelming defeat at the hands of a coalition composed of dissentient Liberals, Clericals, Independents and a few Banffyites. The Coalition gained an absolute majority and the Independence party became the strongest political group. Nevertheless the various adherents of the dual system retained an actual majority in the Chamber and prevented the Independence party from attempting to realize its programme of reducing the ties between Hungary and Austria to the person of the joint ruler. On the 25th of January, the day before his defeat, Count Tisza had signed on behalf of Hungary the new commercial treaties concluded by the Austro-Hungarian foreign office with Germany and Italy on the basis of the Szell-Korber tariff. He acted ultra vires, but by his act saved Hungary from a severe economic crisis and retained for her the right to benefit by economic partnership with Austria until the expiry of the new treaties in 1017.

A deadlock, lasting from January 1905 until April 1906, ensued between the crown and Hungary and, to a great extent, between Hungary and Austria. The Coalition, though o//90j' possessing the majority in the Chamber, resolved not to take office unless the crown should grant its demands, including the Magyar words of command and customs separation from Austria. The crown declined to concede these points, either of which would have wrecked the dual system as interpreted since 1867. The Tisza cabinet could not be relieved of its functions till June 1905, when it was succeeded by a non- parliamentary administration under the premiership of General Baron Fejervary, formerly minister for national defence. Seeing that the Coalition would not take office on acceptable terms, Fejervary obtained the consent of the crown to a scheme, drafted by Kristoffy, minister of the interior, that the dispute between the crown and the Coalition should be subjected to the test of universal suffrage and that to this end the franchise in Hungary be radically reformed. The scheme alarmed the Coalition, which saw that universal suffrage might destroy not only the hegemony of the Magyar nobility and gentry in whose hands political power was concentrated, but might, by admitting the non-Magyars to political equality with the Magyars, under- mine the supremacy of the Magyar race itself. Yet the Coalition did not yield at once. Not until the Chamber had been dissolved

by military force (February 10, rgo6) and an open breach of the constitution seemed within sight did they fome to terms with the crown and form an administration. The miserable state of public finances and the depression of trade doubtless helped to induce them to perform a duty which they ought to have performed from the first; but their chief motive was the desire to escape the menace of universal suffrage or, at least, to make sure that it would be introduced in such a form as to safeguard Magyar supremacy over the other Hungarian races.

The pact concluded (April 8, 1906) between the Coalition and the crown is known to have contained the following conditions: — All military questions to be suspended until after the introduction of universal suffrage; the estimates 1906? and the normal contingent of recruits to be voted for 1 905 and 1906; the extraordinary military credits, sanctioned by the delegations in 1904, to be voted by the Hungarian Chamber; ratification of the commercial treaties concluded by Tisza; election of the Hungarian Delegation and of the Quota-Deputation; introduction of a suffrage reform at least as far reaching as the Kristoffy scheme. These ” capitulations ” obliged the Coalition government to carry on a dualist policy, although the majority of its adherents became, by the general election of May 1906, members of the Kossuth or Independence party, and, as such, pledged to the economic and political separation of Hungary from Austria save as regards the person of the ruler. Attempts were, however, made to emphasize the independence of Hungary. During the deadlock (June 2, 1905) Kossuth had obtained the adoption of a motion to authorize the compilation of an autonomous Hungarian tariff, and on the 28th of May 1906, the Coalition cabinet was authorized by the crown to present the Szell-Korber tariff to the Chamber in the form of a Hungarian autonomous tariff distinct from but identical with the Austrian tariff. This concession of form having been made to the Magyars without the knowledge of the Austrian government, Prince Konrad Hohenlohe, the Austrian premier, resigned office; and his successor, Baron Beck, eventually (July 6) withdrew from the table of the Reichsrath the whole Szell-Korber compact, declaring that the only remaining economic ties between the two countries were freedom of trade, the commercial treaties with foreign countries, the joint state bank and the management of excise. If the Hungarian govern- ment wished to regulate its relationship to Austria in a more definite form, added the Austrian premier, it must conclude a new agreement before the end of the year 1907,

when the recipro- city arrangement of 1899 would lapse. The Hungarian govern- ment replied that any new arrangement with Austria must be concluded in the form of a commercial treaty as between two foreign states and not in the form of a ” customs and trade alliance.”

Austria ultimately consented to negotiate on this basis. In October 1907 an agreement was attained, thanks chiefly to the sobering of Hungarian opinion by a severe economic crisis, which brought out with unusual clearness the meatoi fact that separation from Austria would involve a 1907. period of distress if not of commercial ruin for Hungary. Austria also came to see that separation from Hungary would seriously enhance the cost of living in Cisleithania and would deprive Austrian manufacturers of their best market. The main features of the new ” customs and commercial treaty ” were: (1) Each state to possess a separate but identical customs tariff. (2) Hungary to facilitate the establishment of direct railway communication between Vienna and Dalmatia, the communication to be established by the end of 191 1, each state building the sections of line that passed through its own territory. (3) Austria to facilitate railway communication between Hungary and Prussia. (4) Hungary to reform her produce and Stock Exchange laws so as to prevent speculation in agrarian produce. (5) A court of arbitration to be established for the settlement of differences between the two states, Hungary selecting four Austrian and Austria four Hungarian judges, the presidency of the court being decided by lot, and each government being repre- sented before the court by its own delegates. (6) Impediments

to free trade in sugar to be practically abolished. (7) Hungary to be entitled to redeem her share of the old Austrian debt (originally bearing interest at 5 and now at 4-2%) at the rate of 4-325% within the next ten years; if not redeemed within ten years the rate of capitalization to decrease annually by tSr % unt ˆ ˆ reaches 4-2 . This arrangement represents a potential economy of some £2,000,000 capital for Hungary as compared with the original Austrian demand that the Hungarian contribution to the service of the old Austrian debt be capitalized at 4-2. (8) The

securities of the two governments to rank as investments for savings banks, insurance companies and similar institutions in both countries, but not as trust fund investments. (9) Commercial treaties with foreign countries to be negotiated, not, as hitherto, by the joint minister for foreign affairs alone, but also by a nominee of each government. (10) The quota of Austrian and Hungarian contribution to joint expenditure to be 63-6 and 36-4 respectively — an increase of 2 % in the Hungarian quota, equal to some £200,000 a year.

The economic dispute between Hungary and Austria was thus settled for ten years after negotiations lasting more than twelve years. One important question, however, that of the future of the joint State Bank, was left over for subsequent decision. During the negotiations for the customs and commercial treaty, the Austrian government attempted to conclude for a longer period than ten years, but was unable to overcome Hungarian resistance. Therefore, at the end of 1917, the commercial treaties with Germany, Italy and other countries, and the Austro-Hungarian customs and commercial treaty, would all lapse. Ten years of economic unity remained during which the Dual Monarchy might grow together or grow asunder, increasing accordingly in strength or in weakness. (H. W. S.)

During this period of internal crisis the international position of the Dual Monarchy was threatened by two external dangers. The unrest in Macedonia threatened to reopen the Eastern Question in an acute form; with Italy the irredentist attitude of the Zanardelli cabinet led in 1902-1903 to such strained relations that war seemed imminent. The southern Tirol, the chief passes into Italy, strategic points on the Istrian and Dalmatian coasts, were strongly fortified, while in the interior the Tauern, Karawanken and Wochein railways were constructed, partly in order to facilitate the movement of troops towards the Italian border. The tension was relaxed with the fall of the Zanardelli government, and comparatively cordial relations were gradually re-established. *.-;■ •

In the affairs of the Balkan Peninsula a temporary agreement with Russia was reached in 1903 by the so-called ” February Programme,” supplemented in the following October crisis.” by the “Miirzsteg Programme” (see Macedonia; Turkey ; Europe : History) . The terms of the Miirzsteg programme were observed by Count Goluchowski, in spite of the ruin of Russian prestige in the war with Japan, so long as he remained in office. In October

1906, however, he retired, and it was soon clear that his successor, Baron von Aerenthal, 1 was determined to take advantage of the changed European situation to take up once more the traditional policy of the Habsburg monarchy in the Balkan Peninsula. He gradually departed from the Miirzsteg basis, and in January 1908 deliberately undermined the Austro-Russian agreement by obtaining from the sultan a concession for a railway from the Bosnian frontier through the sanjak of Novibazar to the Turkish terminus at Mitrovitza. This was done in the teeth of the expressed wish of Russia; it roused the helpless resentment of Servia, whose economic dependence upon the Dual Monarchy was emphasized by the outcome of the war of tariffs into which she had plunged in 1906, and who saw in this scheme another link in the chain forged for her by the Habsburg empire; it

1 Alois, Count Lexa von Aerenthal, was born on the 27th of September 1854 at Gross-Skal in Bohemia, studied at Bonn and Prague, was attache at Paris (1877) and afterwards at St Petersburg, envoy extraordinary at Bucharest (1895) and ambassador at St Petersburg (1896). He was created a count on the emperor's 79th birthday in 1909.

offended several of the great powers, who seemed to see in this railway concession the price of the abandonment by Austria-Hungary of her interest in Macedonian reforms. That Baron von Aerenthal was able to pursue a policy apparently so rash, was due to the fact that he could reckon on the support of Germany. The intimate relations between the two powers had been revealed during the dispute between France and Germany about Morocco; in the critical division of the 3rd of March 1906 at the Algeciras Conference Austria-Hungary, alone of all the powers, had sided with Germany, and it was a proposal of the Austro-Hungarian plenipotentiary that formed the basis of the ultimate settlement between Germany and France (see Morocco: History). The cordial relations thus emphasized encouraged Baron Aerenthal, in the autumn of

1908, to pursue a still bolder policy. The revolution in Turkey had entirely changed the face of the Eastern Question; the problem of Macedonian reform was swallowed up in that of the reform of the Ottoman empire generally, there was even a danger that a rejuvenated Turkey might in time lay claim to the provinces occupied by Austria-Hungary under the treaty of Berlin; in any case, the position of these provinces, governed

autocratically from Vienna, between a constitutional Turkey and a constitutional Austria-Hungary, would have been highly anomalous. In the circumstances Baron Aerenthal determined on a bold policy. Without consulting the co-signatory powers of the treaty of Berlin, and in deliberate violation of its provisions, the king-emperor issued, on the 13 th of October, a decree annexing Bosnia and Herzegovina to the Habsburg Monarchy, and at the same time announcing the withdrawal of the Austro- Hungarian troops from the sanjak of Novibazar. (See Europe: History.)

Meanwhile the relations between the two halves of the Dual Monarchy had again become critical. The agreement of 1907 had been but a truce in the battle between two irreconcilable principles : between Magyar nationalism, ˆ«.™ a ‘ determined to maintain its ascendancy in an inde- cuUies. pendent Hungary, and Habsburg imperialism, equally determined to preserve the economic and military unity of the Dual Monarchy. In this conflict the tactical advantage lay with the monarchy; for the Magyars were in a minority in Hungary, their ascendancy was based on a narrow and artificial franchise, and it was open to the king-emperor to hold in terrorem over them an appeal to the disfranchised majority. It was the introduction of a Universal Suffrage Bill by Mr Joseph Krist6ffy, minister of the interior in the ” unconstitutional ” cabinet of Baron Fejervary, which brought the Opposition leaders in the Hungarian parliament to terms and made possible the agreement of 1907. But the Wekerle ministry which succeeded that of Fejervary on the 9th of April 1906 contained elements which made any lasting compromise impossible. The burning question of the ” Magyar word of command ” remained unsettled, save in so far as the fixed determination of the king-emperor had settled it; the equally important question of the renewal of the charter of the Austro-Hungarian State Bank had also formed no part of the agreement of 1907. On the other hand, the Wekerle ministry was pledged to a measure of franchise reform, a pledge which they showed no eagerness to redeem, though the granting of universal suffrage in the Austrian half of the Monarchy had made such a change inevitable. In March 1908 Mr Hallo laid before the Hungarian parliament a formal proposal that the charter of the Austro-Hungarian Bank, which was to expire at the end of 1910, should not be renewed; and that, in the event of failure to negotiate a convention between the banks of Austria and Hungary, a separate Hungarian Bank should be established. This question, obscured during the winter by the Balkan crisis, once more

became acute in the spring of

1909. In the Coalition cabinet itself opinion was sharply divided, but in the end the views of the Independence party prevailed, and Dr Wekerle laid the proposal for a separate Hungarian Bank before the king-emperor and the Austrian government. Its reception was significant. The emperor Francis Joseph pointed out that the question of a separate Bank for Hungary

did not figure in the act of 1867, and could not be introduced into it, especially since the capital article of the ministerial programme, i.e. electoral reform, was not realized, nor near being realised. This was tantamount to an appeal from the Magyar populus to the Hungarian plebs, the disfranchised non-Magyar majority; an appeal all the more significant from the fact that it ignored the suffrage bill brought in on behalf of the Hungarian government by Count Julius Andrassy in November 1008, a bill which, under the guise of granting the principle of universal suffrage, was ingeniously framed so as to safeguard and even to extend Magyar ascendancy (see Hungary: History). In consequence of this rebuff Dr Wekerle tendered his resignation on the 27th of April. Months passed without it being possible to form a new cabinet, and a fresh period of crisis and agitation was begun. (W. A. P.)

II. Austria Proper since 1867.

As already explained, the name Austria is used for convenience to designate those portions of the possessions of the house of Habsburg, which were not included by the settlement of 1867 among the lands of the Hungarian crown. The separation of Hungary made it necessary to determine the method by which these territories 1 were henceforth to be governed. It was the misfortune of the country that there was no clear legal basis on which new institutions could be erected. Each of the terri- tories was a separate political unit with a separate history, and some of them had a historic claim to a large amount of self- government; in many the old feudal estates had survived till 1848, Since that year the empire had been the subject of numerous experiments in

government; by the last, which began in i860, Landtage or diets have been instituted in each of the territories on a nearly uniform system and with nearly identical powers, and by the constitution published in February 1861 (the February Constitution, as it is called), which is still Tlle the ultimate basis for the government, there was

February instituted a Reichsrath or parliament for the whole Constitu- empire; it consisted of a House of Lords (Herren- tlon ‘ haus) , in which sat the archbishops and ; prince bishops,

members of the imperial family, and other members appointed for life, besides some hereditary members, and a Chamber of Deputies. The members of the latter for each territory were not chosen by direct election, but by the diets. The diets themselves were elected for six years; they were chosen generally (there were slight local differences) in the following way : (a) a certain number of bishops and rectors of universities sat in virtue of their office; (b) the rest of the members were chosen by four electoral bodies or curiae, — (1) the owners of estates which before 1848 had enjoyed certain feudal privileges, the so-called great proprietors; (2) the chambers of commerce; (3) the towns; (4) the rural districts. In the two, latter classes all had the suffrage who paid at least ten gulden in direct taxes. The districts were so arranged as to give the towns a very large representation in proportion to their populations. In Bohemia, e.g., the diet consisted of 241 members: of these five were ex officio members; the feudal proprietors had seventy; the towns and chambers of commerce together had eighty-seven; the rural districts seventy-nine. The electors in the rural districts were 236,000, in the towns 93,000. This arrangement seems to have been deliberately made by Schmerling, so as to

1 It is impossible to avoid using the word ” Austria ” to designate these territories, though it is probably incorrect. Officially the word “Austria” is not found, and though the sovereign is emperor of Austria, an Austrian empire appears not to exist ; the territories are spoken of in official documents as .” the kingdoms and lands repre- sented in the Reichsrath.” The Hungarians and the German party in Austria have expressed their desire that the word Austria should be used, but it has not been gratified. On the other hand, expressions such as ” Austrian citizens,” ” Austrian law ” are found. The reason of this peculiar use is probably twofold. On the one hand, a reluctance to confess that Hungary is no longer in any sense a part of Austria ; on the other hand, the

refusal of the Czechs to recognize that their country is part of Austria. Sometimes the word Erblander, which properly is applied only to the older ancestral dominions of the house of Habsburg, is used for want of a better word.

give greater power to the German inhabitants of the towns; the votes of the proprietors would, moreover, nearly always give the final decision to the court and the government, for the influence exercised by the government over the nobility would generally be strong enough to secure a majority in favour of the government policy. ‘ :

This, constitution had failed; territories so different in size, history and circumstances were not contented with similar institutions, and a form of self-government which satisfied Lower Austria and Salzburg did not satisfy Galicia and Bohemia. The Czechs of Bohemia, like the Magyars, had refused to recog- nize the common parliament on the ground that it violated the historic rights’ of the Bohemian as of the Hungarian crown, and in 1865 the constitution of 1861 had been superseded, while the territorial diets remained. In 1867 it was necessary once more to summon, in some form or another, a common parliament for the whole of Austria, by which the settlement with Hungary could be ratified. ,

This necessity brought to a decisive issue the struggle between the parties of the Centralists and Federalists. The latter claimed that the new constitution must be made by ceatraU agreement with the territories; the former maintained ists ans that the constitution of 1861 was still valid, and Federal- demanded that in accordance with it the Reichsrath ,sts ‘ should be summoned and a “constitutional” government restored. The difference between the two parties was to a great extent,, though not entirely, one’ of race. The kernel of the empire was the purely German district, including Upper and Lower Austria, Salzburg, Tirol (except the south) and Vorarlberg, all Styria except the southern districts, and a large part of Carinthia. There was strong local feeling, especially in Tirol, but it -was local feeling similar to that which formerly existed in the provinces of France; among all classes and parties there was great. loyalty both to the ruling house and to the idea of the Austrian state; hut while the Liberal party, which was dominant in Lower Austria and Styria, desired to develop the central institutions, there was a strong Conservative and Clerical party which supported local institutions as a protection against the Liberal influence of a

centralized parliament and bureaucracy, and the bishops and clergy were willing to gain support in the struggle by alliance with the Federalists.

Very different was it in the other territories where the majority of the population was not German — and where there was a lively recollection of the time when they were not Austrian. With Palacky, they said," We existed j [* e before Austria ; we shall continue to exist after it ? an

there was a large Polish element which did not support the Czechs, the diet refused to recognize the claims of the Bohemians.

The Poles of Galicia stood apart from the other Slav races. The German-speaking population was very small, consisting chiefly of government officials, railway servants and Jews; but there was a large minority (some 43%) of Ruthenes. The Poles wished to gain as much autonomy as they could for their own province, but they had no interest in opposing the central- ization of other parts; they were satisfied if Austria 1 would surrender the Ruthenes to them. They were little influenced by the pan-Slav agitation; it was desirable for them that Austria, which gave them freedom and power, should continue strong and united. Their real interests were outside the monarchy, and they did not cease to look forward to a restoration of the Polish kingdom. The great danger was that they might entangle Austria in a war with Russia.

The southern Slavs had neither the unity, nor the organization, nor the historical traditions of the Czechs and Poles; but the Slovenes, who formed a large majority of the population in Carniola, and a considerable minority in the adjoining territory of Carinthia and the south of Styria, demanded that their language should be used for purposes of government and education. Their political ideal Was an " Illyrian "kingdom, including Croatia and all the southern Slavs in the coast district, and a not very successful movement had been started to establish a so-called Illyrian language, which should be accepted by both

Croats and Slovenes. There was, however, another element in the southern districts, viz. the Serbs, who, though of the same race and language as the Croats, were separated from them by religion. Belonging to the Orthodox Church they were attracted by Russia. They were in constant communication with Servia and Montenegro; and their ultimate hope, the creation of a great Servian kingdom, was less easy to reconcile with loyalty to Austria. Of late years attempts have been made to turn the Slovenian national movement into this direction, and to attract the Slovenes also towards the Orthodox non- Austrian Slavs.

In the extreme south of Dalmatia is a small district which had not formed part of the older duchy of Dalmatia, and had not been South joined to the Austrian empire till 1814; in former years Dalmatia. P 31 "* °? '*- formed the republic- of Ragusa, and the rest belonged to Albania. The inhabitants of this part, who chiefly belonged to the Greek Church, still kept up a close connexion with Albania and with Montenegro, and Austrian authority was maintained with difficulty. Disturbances had already broken put once before; and in 1869 another outbreak took place. This district had hitherto been exempted from military service; by the law of 1869, which introduced universal military service, those who had hitherto been exempted were required to serve, not in the regular army but in the militia. The inhabitants of the district round the Bocche di Cattaro (the Bocchesi, as they are commonly called) refused to obey this order, and when a military force was sent it failed to overcome their resistance; and by an agreement made at Knezlac in December 1869, Rodics, who had taken command, granted the insurgents all they asked and a complete amnesty. After the conquest of Bosnia another attempt was made to enforce military service; once more a rebellion broke out, and spread to the contiguous districts of Herzegovina. This time, however, the govern- ment, whose position in the Balkans had been much strengthened by the occupation of the new provinces, did not fear to act with decision. A considerable force was sent under General Baron Stephan von Jovanovich (1828-1885); they were supported from sea by the navy, and eventually the rebellion was crushed. An amnesty was proclaimed, but the greater number of the insurgents sought refuge in Montenegro rather than submit to military' service.

The Italians of Trieste and Istria were the only people of the empire who really desired separation from Austria; annexation to Italy was the aim of the Italianissimi, as they were' called. The

feeling was less strong in Tirol, where, except in the city of Trent, they seem chiefly to have wished for separate local institutions, so that they should no longer be governed from Innsbruck. The Italian-speaking population on the coast of Dalmatia only asked that the government should uphold them against the pressure of the Slav races in the interior, and for this reason were ready to support the German constitutionalists.

The party of centralization was then the Liberal German

party, supported by a few Italians and the Ruthenes, and ae years went by it was to become the National German party. They hoped by a common parliament to create the aerman feeling of a common Austrian nationality, by German Const/to- schools to spread the use of the German language. m "?* Every grant of self-government to the territories party ' must diminish the influence of the Germans, and bring about a restriction in the use of the German language; moreover, in countries such as Bohemia, full self-government would almost certainly mean that the Germans would become the subject race; This was a result which they could not accept. It was intolerable to them that just at the time when the national power of the non- Austrian Germans was so greatly increased, and the Germans were becoming the first race in Europe, they themselves should resign the position as rulers which they had won during the last three hundred years. They maintained, moreover, that the ascendancy of the Germans was the only means of preserving the unity of the monarchy; German was the only language in which the different races could communicate with one another; it must be the language of the army, the civil service and the parliament. They laid much stress on the historic task of Austria in bringing German culture to the half-civilized races of the east. They demanded, therefore, that all higher schools and universities should remain German; and that so far as possible the elementary schools should be Germanized. They looked on the German schoolmaster as the apostle of German culture, and they looked forward to the time when the feeling of a common Austrian nationality should obscure the national feeling of the Slavs, and the Slavonic idioms should survive merely as the local dialects of the peasantry, the territories becoming merely the provinces of a united and centralized state. The total German population was not quite a third of the whole. The maintenance of their rule was, therefore, only possible by the exercise of great political ability, the more so, since, as we have seen, they were not united among themselves, the clergy and Feudal party being opposed to the

Liberals. Their watchword was the constitution of 1861, which had been drawn up by their leaders; they demanded that it should be restored, and with it parliamentary government. They called themselves, therefore, the Constitutional party. But the introduction of parliamentary government really added greatly to the difficulty of the task before them. In the old days German ascendancy had been secured by the common army, the civil service and the court. As soon, however, as power was transferred to a parliament, the Germans must inevitably be in a minority, unless the method of election was deliberately arranged so as to give them a majority. Parliamentary discus sion, moreover, was sure to bring out those racial differences which it was desirable should be forgotten, and the elections carried into every part of the empire a political agitation which was very harmful when each party represented a different race.

The very first events showed one of those extraordinary changes of policy so characteristic of modern Austrian history. Th« decision of the government on the constitutional question was really determined by immediate practical necessity. The Hungarians required that the settlement should be ratified by a parliament, therefore^ parliament must be procured which would do this. It must be a parliament in which the Germans had a majority, for the system of dualism was directly opposed to the ambitions of the Slavs and the Federalists. Belcredi, who had come into power in 1865 as a Federalist, and had suspended the constitution of 1861 on the 2nd of January 1867, ordered new elections for the diets, which were then to elect deputies to an extraordinary Reichsrath which should consider the Ausgleich, or compact with Hungary. The wording of the decree implied that the February constitution did not exist as of law; the Germans and Liberals, strenuously objecting to a ” feudal- federal ” constitution which would give the Slavs a preponder- ance in the empire, maintained that the February consti- tution was still in force, and that changes could only be introducedbya regular Reichsrath summoned in accord- ance wi-th it, protested against the decree, and, in some cases, threatened not to take part in the elections. As the Federalists

Crista of

1867.

were all opposed to the Ausgleich, it was clear that a Reichsrath chosen in these circumstances would refuse to ratify it, and this was probably Belcredi's intention. As the existence of the empire would thereby be endangered, Beust interfered; Belcredi was dismissed, Beust himself became minister-president on the 7th of February 1867, and a new edict was issued from Vienna ordering the diets to elect a Reichsrath, according to the con- stitution, which was now said to be completely valid. Of course, however, those diets in which there was a Federalist majority, viz. those of Bohemia, Moravia, Carinthia and Tirol, which were already pledged to support the January policy of the government, did not acquiesce in the February policy; and they refused to elect except on terms which the government could not accept. The first three were immediately dissolved. In the elections which followed in Bohemia the influence of the government was sufficient to secure a German majority among the landed pro- prietors; the Czechs, who were therefore in a minority, declared the elections invalid, refused to take any part in electing deputies for the Reichsrath, and seceded altogether from the diet. The result was that Bohemia now sent a large German majority to Vienna, and the few Czechs who were chosen refused to take their seat in the parliament. Had the example of the Czechs been followed by the other Slav races it would still have been difficult _ , to get together a Reichsrath to pass the Ausgleich. compact It wa s, however, easier to deal with the Poles of Galicia, with the for they had no historical rights to defend ; and by Poles – sending delegates to Vienna they would not sacrifice any principle or prejudice any legal claim; they had only to consider how they could make the best bargain. Their position was a strong one; their votes were essential to the government, and the government could be useful to them; it could give them the complete control over the Ruthenes. A compact then was easily arranged.

Beust promised them that there should be a special minister for Galicia, a separate board for Galician education, that Polish should be the language of instruction in all secondary schools, that Polish instead of German should be the official language in the law courts and public offices, Ruthenian being only used in the elementary schools under strict limitations. On these terms the Polish deputies, led by Ziemialkowski, agreed to go to Vienna

and vote for the Ausgleich.

When the Reichsrath met, the government had a large majority ; and in the House, in which all the races except the Czechs were represented, the Ausgleich was ratified ˆift?"' almost unanimously. This having been done, it was of 1867. possible to proceed to special legislation for the territories, which were henceforward officially known as " the kingdoms and lands represented in the Reichsrath." A series of fundamental laws were carried, which formally established parliamentary government, with responsibility of ministers, and complete control over the budget, and there were included a number of clauses guaranteeing personal rights and liberties in the way common to all modern constitutions. The influence of the Poles was still sufficient to secure considerable concessions to the wishes of the Federalists, since if they did not get what they wished they would leave the House, and the Slovenes, Dalmatians and Tirolese would certainly follow them. Hence the German Liberals were prevented from introducing direct elections to the Reichsrath, and the functions of the Reichsrath were slightly less extensive than they had hitherto been. Moreover, the Delegation was to be chosen not by the House as a whole, but by the representatives of the separate territories. This is one reason for the comparative weakness of Austria as compared with Hungary, where the Delegation is elected by each House as a whole; the Bohemian representatives, e.g., meet and choose 10 delegates, the Galicians 7, those from Trieste 1 ; the Delegation, is, therefore, not representative of the majority of the chamber of deputies, but includes representa- tives of all the groups which may be opposing the government there, and they can carry on their opposition even in the Delega- tion. So it came about in 1869, that on the first occasion when there was a joint sitting of the Delegations to settle a point in the

budget, which Hungary had accepted and Austria rejected, the Poles and Tirolese voted in favour of the Hungarian proposal.

As soon as these laws had been carried (December 1867), Beust retired from the post of minister-president ; and in accordance with constitutional practice a parliament- Tb ary ministry was appointed entirely from the ranks BUrger of the Liberal majority; a ministry generally known Minis- as the " Burger Ministerium " in which Giskra and tertum. Herbst — the leaders of the German party in Moravia and Bohemia — were the most important members. Austria now began its new life as a modern

constitutional state. From this time the maintenance of the revised constitution of 1867 has been the watchword of what is called the Constitutional party. The first use which the new government made of their power was to settle the finances, and in this their best work was done. Among them were nearly all the representatives of trade and industry, of commercial enterprise and financial speculation; they were the men who hoped to make Austria a great industrial state, and at this time they were much occupied with railway enterprise. Convinced free-traders, they hoped by private energy to build up the fortunes of the country, parliamentary government — which meant for them the rule of the educated and well-to-do middle class — being one of the means to this end. They accepted the great burden of debt which the action of Hungary imposed upon the country, and rejected the proposals for repudiation, but notwithstanding the protest of foreign bondholders they imposed a tax of 16 % on all interest on the debt. They carried out an extension of the commercial treaty with Great Britain by which a further advance was made in the direction of free trade.

Of equal importance was their work in freeing Austria from the control of the Church, which checked the intellectual life of the people. The concordat of 1855 had given the The Church complete freedom in the management of all Liberals ecclesiastical affairs; there was full liberty of inter- and the course with Rome, the state gave up all control over «° acordat the appointment of the clergy, and in matters of church discipline the civil courts had no voice — the clergy being absolutely subject to the power of the bishops, who could impose temporal as well as spiritual penalties. The state had even resigned to the Church all authority over some departments of civil life, and restored the authority of the canon law. This was the case as regards marriage; all disputes were to be tried before ecclesiastical courts, and the marriage registers were kept by the priests. All the schools were under the control of the Church; the bishops could forbid the use of books prejudicial to religion; in ele- mentary schools all teachers were subject to the inspection of the Church, and in higher schools only Roman Catholics could be appointed. It had been agreed that the whole education of the Roman Catholic youth, in all schools, private as well as public, should be in accordance with the teaching of the Roman Catholic Church. The authority of the Church extended even to the universities. Some change in this system was essential; the Liberal party demanded that the government should simply state

that the concordat had ceased to exist. To this, however, the emperor would not assent, and there was a difficulty in overthrowing an act which took the form of a treaty. The government wished to come to some agreement by friendly discussion with Rome, but Pius IX. was not willing to abate anything of his full claims. The ministry, therefore, proceeded by internal legislation, and in 1868 introduced three laws : (1) a marriage law transferred the decisions on all questions of marriage from the ecclesiastical to the civil courts, abolished the authority of the canon law, and introduced civil marriage in those cases where the clergy refused to perform the ceremony; (2) the control of secular education was taken from the Church, and the manage- ment of schools transferred to local authorities which were to be created by the diets; (3) complete civil equality between Catholics and non-Catholics was established. These laws were carried through both Houses in May amid almost unparalleled excitement, and at once received the imperial sanction, notwith- standing the protest of all the bishops, led by Joseph Othmar

von Rauscher (1797-1875), cardinal archbishop of Vienna, who had earned his red hat by the share he had taken in arranging the concordat of 1855, and now attempted to use his great personal influence with the emperor (his former pupil) to defeat the bill.

The ministry had the enthusiastic support of the German population in the towns. They were also supported by the teaching profession, which desired emancipation from ecclesiastical control, and hoped that German schools and German railways were to complete the work which Joseph II. had begun. But the hostility of the Church was dangerous. The pope, in an allocution of 22nd June 1868, declared that these ” damnable and abominable laws ” which were ” contrary to the concordat, to the laws of the Church and to the principles of Christianity,” were ” absolutely and for ever null and void.” The natural result was that when they were carried into effect the bishops in many cases refused to obey. They claimed that the laws were inconsistent with the concordat, that the concordat still was in force, and that the laws were consequently invalid. The

argument was forcible, but the courts decided against them. Rudigier, bishop of Linz, was summoned to a criminal court for disturbing the public peace; he refused to appear, for by the concordat bishops were not subject to temporal jurisdiction; and when he was condemned to imprisonment the emperor at once telegraphed his full pardon. In the rural districts the clergy had much influence; they were supported by the peasants, and the diets of Tirol and Vorarlberg, where there was a clerical majority, refused to carry out the school law.

On the proclamation of papal infallibility in 1870, the government took the opportunity of declaring that the concordat had lapsed, on the ground that there was a fundamental change in the character of the papacy. Nearly all the Austrian prelates had been opposed to the new doctrine; many of them remained to the end of the council and voted against it, and they only declared their submission with great reluctance. The Old Catholic movement, however, never made much progress in Austria. Laws regulating the position of the Church were carried in 1874. (For the concordat see Laveleye, La Prusse et VAutriche, Paris, 1870.)

During 1868 the constitution then was open to attack on two sides, for the nationalist movement was gaining ground in National- Bohemia and Galicia. In Galicia the extreme party, ism in Qa- headed by Smolka, had always desired to imitate the ihia and Czechs and not attend at Vienna; they were outvoted, o em a. ˆ u) _ ˆ p ar ti e s agreed on a declaration in which the final demands of the Poles were drawn up; 1 they asked that the powers of the Galician diet should be much increased, and that the members from Galicia should cease to attend the Reichsrath on the discussion of those matters with which the Galician diet should be qualified to deal. If these demands were not granted they would leave the Reichsrath. In Bohemia the Czechs were very active; while the Poles were parading their hostility to Russia in such a manner as to cause the emperor to avoid visiting Galicia, some of the Czech leaders attended a Slav demonstration at Moscow, and in 1868 they drew up and presented to the diet at Prague a ” declaration ” which has since been regarded as the official statement of their claims. They asked for the full restoration of the Bohemian kingdom; they contended that no foreign assembly was qualified to impose taxes in Bohemia; that the diet was not qualified to elect representatives to go to Vienna, and that a separate settlement must be made with Bohemia similar to that with Hungary. This declaration was signed by eighty-one members, including many of the feudal

nobles and bishops. 2 The German majority declared that they had forfeited their seats, and ordered new elections. The agitation spread over the country, serious riots took place, and with a view to keeping order the government decreed exceptional laws. Similar events happened in Moravia, and in Dalmatia the revolt broke out among the Bocchesi.

Before the combination of Clericals and Federalists the ministry broke down; they were divided among themselves; Counts Taaffe and Alfred Potocki, the minister of agriculture, wished to conciliate the Slav races — a policy recommended

1 The documents are printed in Baron de Worms, op. cit. 1 It is printed in the Europdischer Geschichtskalender (1868).

by Beust, probably with the sympathy of the emperor; the others determined to cripple the opposition by taking away the elections for the Reichsrath from the diets. p ar // a . Taaffe and his friends resigned in January 1870, but mentary the majority did not long survive. In March, after breakdown long delay, the new Galician demands were definitely ° rejected; the whole of, the Polish club, followed by the Tirolese and Slovenes, left the House, which consequently consisted of no members — the Germans and German representatives from Bohemia and Moravia. It was clearly impossible to govern with such a parliament. Not four years had gone by, and the new constitution seemed to have failed like the old one. The only thing to do was to attempt a reconciliation with the Slavs. The ministry resigned, and Potocki and Taaffe formed a government with this object. Potocki, now minister-president, then entered on negotiations, hoping to persuade the Czechs to accept the constitution. Rieger and Thun were summoned to Vienna; he himself went to Prague, but after two days he had to give up the attempt in despair. Feudals and Czechs all supported the declaration of 1868, and would accept no compromise, and he returned to Vienna after what was the greatest disappoint- ment of his life. Government, however, had to be carried on; the war between Germany and France broke out in July, and Austria might be drawn into it; the emperor could not at such a crisis alienate either the Germans or the Slavs. The Reichsrath and all the diets were dissolved. This time in Bohemia the Czechs, supported by the Feudals' and the Clericals, gained a large majority; they took their seats in the diet only to declare that they did not regard it as the legal representative of the Bohemian kingdom, but merely an informal assembly, and refused to elect delegates for the Reichsrath. The

Germans in their turn now left the diet, and the Czechs voted an address to the crown, drawn up by Count Thun, demanding the restora- tion of the Bohemian kingdom. When the Reichsrath met there were present only 130 out of 203 members, for the whole Bohemian contingent was absent; the government then, under a law of 1868, ordered that as the Bohemian diet had sent no delegates, they were to be chosen directly from the people. Twenty-four Constitutionalists and thirty Declaranten were chosen; the latter, of course, did not go to Vienna, but the additional twenty-four made a working majority by which the government was carried on for the rest of the year.

But Potocki's influence was gone, and as soon as the European crisis was over, in February 1871, the emperor appointed a ministry chosen not from the Liberals but from the fhe Federalists and Clericals, led by Count Hohenwart ministry and A. E.F. Schaffle, a professor at the university of otHohen- Vienna, chiefly known for his writings on political waH ' economy. They attempted to solve the problem by granting to the Federalists all their demands. So long as parliament was sitting they were kept in check; as soon as it had voted supplies and the Delegations had separated, they ordered new elections in all those diets where there was a Liberal majority. By the help of the Clericals they won enough seats to put the Liberals in a minority in the Reichsrath, and it would be possible to revise the constitution if the Czechs consented to come. They would only attend, however, on their own terms, which were a com- plete recognition by the government of the claims made in the Declaration. This was agreed to; and on the 12th of September at the opening of the diet, the governor read a royal message recognizing the separate existence of the Bohemian kingdom, and promising that the emperor should be crowned as king at Prague. It was received with delight throughout Bohemia, and the Czechs drew a draft constitution of fundamental rights. On this the Germans, now that they were in a minority, left the diet, and began preparations for resistance. In Upper Austria, Moravia and Carinthia, where they were outvoted by the Clericals, they seceded, and the whole work of 1867 was on the point of being overthrown. Were the movement not stopped the constitution would be superseded, and the union with Hungary endangered. Beust and Andrassy warned the emperor of the danger, and the crown prince of Saxony was summoned

by Beust to remonstrate with him. A great council was called at Vienna (October 20), at which the emperor gave his decision that the Bohemian demands could not be accepted. The Czechs must come to Vienna, and consider a revision of the constitution in a constitutional manner. Hohenwart resigned, but at the same time BeUst was dismissed, and a new cabinet was chosen once more from among the German Liberals, under the leadership of Prince Adolf Auersperg, whose brother Carlos had been one of the chief members in the Burger Ministerium. For the second time in four years the policy of the government had completely changed within a few months. On 12 th September the decree had been published accepting the Bohemian claims; before the end of the year copies of it were seized by the police, and men were thrown into prison for circulating it.

Auersperg's ministry held office for eight years. They began as had the Burger Ministerium, with a vigorous Liberal central-Auers- izing policy. In Bohemia they succeeded at first in Peng's almost crushing the opposition. In 1872 the diet was ministry, dissolved; and the whole influence of the government 'f/ 7 ' g ia was used to procure a German majority. Koller, the

governor, acted with great vigour. Opposition news-, papers were suppressed; cases in which Czech journalists were concerned were transferred to the German districts, so that they were tried by a hostile German jury. Czech manifestoes were confiscated, and meetings stopped at the slightest appearance of disorder; and the riots were punished by quartering soldiers upon the inhabitants. The 1 decision between the two races turned on the vote of the feudal proprietors, and in order to win this a society was formed among the German capitalists of Vienna (to which the name of Chabms .was popularly given) to acquire by real or fictitious purchase portions of those estates to which a vote was attached. These measures were successful ; a large German majority was secured; Jews from Vienna sat in the place of the Thuns and the Schwarzenbergs; and as for many years the Czechs refused to sit in the diet, the government could be carried on without difficulty. A still greater blow to the Federalists was the passing of a new electoral law in 1873. The measure transferred the right of electing members of the Reichsrath from the diets to the direct vote of the people, the result being to deprive the

Federalists of their chief weapon; it was no longer possible to take a formal vote of the legal repre- sentatives in any territory refusing to appoint deputies, and if a Czech or Slovene member did not take his seat the only result was that a single constituency was unrepresented, and the opposition weakened. The measure was strongly opposed. A petition with 250,000 names was presented from Bohemia; and the Poles withdrew from the Reichsrath when the law was introduced. But enough members remained to give the legal quorum, and it was carried by 1 20 to 2 votes. At the same time the number of members was increased to 353, but the proportion of representatives from the different territories was maintained and the system of election was not altered. The proportion of members assigned to the towns was increased, the special representatives of the chambers of commerce and of the landed proprietors were retained, and the suffrage was not extended.' The artificial system which gave to the Germans a parliamentary majority continued.

At this time the Czechs were much weakened by quarrels among themselves. A new party had arisen, calling themselves

Radicals, but generally known as the Young Czechs. mnUoas' They disliked the alliance with the aristocracy and the

clergy; they wished for universal suffrage, and recalled the Hussite traditions. They desired to take their seats in the diet, and to join with the Germans: in political reform. They violently attacked Rieger, the leader of the Old Czechs., who maintained the alliance with the Feudalists and the policy of passive opposition. Twenty-seven members of the diet led by Gregr and Stadkowsky, being outvoted in the Czech Club,- resigned their seats. They were completely defeated in the elections which followed, but for the next four years the two parties among the Czechs were as much occupied in opposing one another as in opposing the Germans. These events might have

•secured the predominance of the Liberals for many years. The election after the reform bill gave them an increased majority in the Reichsrath. Forty-two Czechs who had won seats did not attend; forty-three Poles stood aloof from all party com- bination, giving their votes on each occasion as the interest of their country seemed to require; the real opposition was limited to forty Clericals and representatives of the other Slav races, who were collected on the Right under the leadership of Hohenwart. Against them were 227 Constitutionalists, and it seemed to

matter little that they were divided into three groups; there were 105 in the Liberal Club under the leadership of Herbst, 57 Constitutionalists, elected by the landed proprietors, and a third %ody of Radicals, some of< whom were more democratic than the old Constitutional party, while others laid more stress on nationality. They used their majority to carry a number of important laws regarding ecclesiastical affairs. Yet within four years the government was obliged to turn for support to the Federalists and Clericals, and the rule of the German Liberals was overthrown. Their influence was in- ■

directly affected by the great commercial crisis of 1873 . cHsls c ot For some years there had been active speculations on 1873. the Stock Exchange; a great number of companies, chiefly banks and building societies, had been founded on a very insecure basis. The inevitable crisis began in 1872; it was postponed for a short time, and there was some hope that the Exhibition, fixed for 1873, would bring fresh prosperity; the hope was not, however, fulfilled, and the final crash, which occurred in May, brought with it the collapse of hundreds of Undertakings. The loss fell almost entirely on those who had attempted to increase their wealth by speculative investment. Sound industrial concerns were little touched by it, but specula- tion had become so general that every class of society was affected, and in the investigation which followed it became apparent that some of the most distinguished members of the governing Liberal party, including at least two members of the government, were among those who had profited by the unsound finance. It appeared also that many of the leading newspapers of Vienna, by which the Liberal party was supported, had received money from financiers. For the next two years political interest was transferred from parliament to the law courts, in which financial scandals were exposed, and the reputations of some of the leading politicians were destroyed. 1

This was to bring about a reaction against the economic doctrines which had held the field for nearly twenty years; but the 1 full effect of the change was not seen for some –

tithe. What ruined the government was the want of ubera i unity in the party, and their neglect to support a ministry. ministry which had been taken from their own ranks. In a country like Austria, in which a mistaken foreign policy or a serious quarrel with Hungary might bring about' the disruption of the monarchy, parliamentary government was impossible unless the party

which the government helped in internal matters were prepared to support it in foreign affairs and in the commercial policy bound up with the settlement with Hungary. This the constitutional parties did not do. During discussions on the economic arrangement with Hungary in 1877 a large number voted against the duties on coffee and petroleum, which were an essential part of the agreement; they demanded, moreover, that the treaty of Berlin should be laid before the House, and 112 members, led by Herbst, gave a vote hostile to some of its provisions, and in the^ Delegation refused the supplies necessary for the occupation of Bosnia. They doubtless were acting in accordance with their principles, but- the situation was such that it would have been impossible to carry out their wishes; the only result was that the Austrian ministers and Andrassy had to turn for help to the Poles, who began to acquire the position of a government party, which they have kept since then. At the beginning of 1870 Auersperg's resignation, which had long been offered, was accepted. The constitutionalists remained

1 See Wirth, Geschkhte der Handelskrisen (Frankfort, 1885); and an interesting article by Schaffle in the Zeitschrift f. Staatswissenschaft (Stuttgart, 1874).

in power; but in the reconstructed cabinet, though Stremayr was president, Count Taaffe, as minister of the interior, was the most important member.

Parliament was dissolved in the summer, and Taaffe, by private negotiations, first of all persuaded the Bohemian feudal proprietors to give the Feudalists, who had long been excluded, a -certain number of seats; secondly, he succeeded where Potocki had failed, and. came to an : agreement with the Czechs; they had already, in 1878, taken their seats in the diet at Prague, and now gave up the policy of " passive resistance," and consented to take their seats also in the parliament at Vienna.

On entering the House they took the oath without reservation, but in the speech from the throne the emperor himself stated that they had entered without prejudice to their Taaffe. convictions,

and on the first day of the session Rieger read a formal reservation of right. The Liberals had also lost many seats, so that the House now had a completely different aspect; the constitutionalists were reduced to 91 Liberals and 54 Radicals; but the Right, under Hoheriwart, had increased to 57, and there were 57 Poles and: 54 Czechs. A combination of these three parties might govern against the constitutionalists. Taaffe, who now became first minister, tried first of all to govern by the help of the moderates of all parties, and he included representatives of nearly every party in his cabinet. But the Liberals again voted against the government on an important military bill, an offence almost as unpardonable in Austria as in Germany, and a great meeting of the party decided that they would not support the government. Taaffe, therefore, was obliged to turn for support to the Right. The German members of the government resigned, their place was taken by Clericals, Poles and Czechs, Smolka was elected president of the Lower House of the Reichsrath, and the German Liberals found themselves in a minority opposed by the "iron ring " of these three parties, and helpless in the parliament of their own creation. For fourteen years Taaffe succeeded in maintaining the position he had thus secured. He was not himself a party man; he had sat in a Liberal. government; he had never assented to the principles of the Federalists, nor was he an adherent of the Clerical party. He continued to rule according to the constitution; his watchword was " unpolitical politics," and he brought in Little contentious legislation. The great source of his strength was that he stood between the Right and a Liberal government. There was a large minority of constitutionalists; they might easily become a majority, and the Right were therefore obliged to support Taaffe in order to avert this. They continued to support him, even if they did not get from him all that they could have wished, and the Czechs acquiesced in a foreign policy with which they had little sympathy. Something, however, had to be done for them, and from time to time concessions had to be made to the Clericals and the Federalists.

The real desire of the Clericals was an alteration of the school law, by which the control of the schools should be restored to the Church and the period of compulsory education reduced. In this, however, the government did not meet them, and in 1882 the Clericals, under Prince Alfred v. Liechtenstein, separated from Hohenwart's party and founded their own club, so that they could act more freely. Both the new Clerical Club and the remainder of the Conservatives were much affected by the

reaction against the doctrines of economic Liberalism. They began to adopt the principles of Christian Socialism expounded by Rudolf Mayer and Baron von Vogelfang, and the economic revolt against the influence of capital was with them joined to a half religious attack upon the Jews. They represented that Austria was being governed by a close ring of political financiers, many of whom were Jews or in the pay of the Jews, who used the forms of the constitution, under which there was no representation of the working classes, to exploit the labour of the poor at the same time that they ruined the people by alienating them from Christianity in " god less schools." It was during these years that the foundation for tb,e democratic clericalism of the future was laid. The chief

The Clericals.

political leader in this new tendency was Prince Aloys v. Liechten- stein, who complained of the political influence exercised by the chambers of commerce, and demanded the organization cf working men in gilds. It was by their influence that a law was introduced limiting the rate of interest, and they co-operated with the government in legislation for improving the material condition of the people, which had been neglected during the period of Liberal government, and which was partly similar to the laws introduced at the same time in Germany.

, There seems no doubt that the condition of the workmen in the factories of Moravia and the oil-mines of Galicia was peculiarly unfortunate; the hours of work were very long, the conditions were very injurious to health, and there / e *fe/ a . were no precautions against accidents. The report of tloa. a parliamentary inquiry, called for by the Christian Socialists, showed the necessity for interference. In 1883 a law was carried, introducing factory inspection, extending to mines and all industrial undertakings. The measure seems to have been successful, and there is a general agreement that the inspectors have done their work with skill and courage. In 1884 and 1885 important laws were passed regulating the work in mines and factories, and introducing a maximum working day of eleven hours in factories, and ten hours in mines. Sunday labour was forbidden, and the hours during which women and children could be employed were limited. Great power was given to the administrative authorities to relax the application of these laws in special cases and special trades. This power was at first freely used, but it was Closely restricted by a further law of 1893. In 1887-1888 laws,

modelled on the new German laws, introduced compulsory insurance against accidents and sickness. , These measures, 1 ˆ though severely criticized by the Opposition, were introduced to remedy obvious, and in some cases terrible social evils. Other laws to restore gilds among working men had a more direct political object. Another form of state socialism was the acquisition of railways by the state. Originally railways had been built by private enterprise, sup- ported in some cases by a state guarantee; a law of 1877 per- mitted the acquisition of private lines; when Taaffe retired the state possessed nearly 5000 m. of railway, not including those which belonged to Austria and Hungary conjointly. In 1809 a minister of railways was appointed., In this policy military considerations as well as economic were of influence. In every department we find the same reaction against the doctrines of laissez-faire. In 1889 for the first time the Austrian budget showed a surplus, partly the result of the new impoit duties, partly due to a reform of taxation.

For a fuller description of these social reforms, see the Jahrbuch fur Gesetzgebung (Leipzig, 188.6, 1888 and 1894) ; also the annual summary of new laws in the Z'eitschrift fiir Staatswissenschaft (Stutt- gart). For the Christian Socialists, see Nitti,. Catholic Socialism (London, 1895).

Meanwhile it was necessary for the government to do some- thing for the Czechs and the other Slavs, on whose support they depended for their majority. The influence of the government became more favourable to them in language the matter of language, and this caused the struggle question. of nationalities to assume the first place in Austrian public life — a place which it has ever since maintained. The question of language becomes a political one, so far as it concerns the use of different languages in the public offices and law courts, and in the schools. There never was any general law laying down clear and universal rules, but since the time of Joseph II. German had been the ordinary language of the government. All laws were published in German; German was the sole language used in the central public offices in Vienna, and the language of the court and of the army; moreover, in almost every part of the monarchy it had become the language of what is called the internal service in the public offices and law courts; all books and correspondence were kept in German, not only in the German districts, but also in countries such as Bohemia and Galicia. The bureaucracy and the law courts had therefore be- come a network of German-speaking officialism

extending over the whole country; no one had any share in the government

32

AUSTRIA-HUNGARY

unless he could speak and write German. The only excep- tion was in the Italian districts; not only in Italy itself (in Lombardy, and afterwards in Venetia), but in South Tirol, Trieste, Istria and Dalmatia, Italian has always been used, even for the internal service Of the government offices, and though the actual words of command are now given in German and the officers are obliged to know Serbo-Croatian it remains to this day the language of the Austrian navy. Any interference with the use of German would be a serious blow to the cause of those who hoped to Germanize the whole empire. Since 1867 the old rules have been maintained absolutely as regards the army, and German has also, as required by the military authorities, become the language of the railway administration. It remains the language of the central offices in Vienna, and is the usual, though not the only, language used in the Reichsrath. In 1869 a great innovation was made, when Polish was introduced throughout the whole of Galicia as the normal language of government; and since that time the use of German has almost entirely disappeared in that territory. Similar innovations have also begun, as we shall see, in other parts.

Different from this is what is called the external service. Even in the old days it* was customary to use the language of the district in communication between the government offices and private individuals, and evidence could be given in the law courts in the language generally spoken. This was not the result of any law, but depended on administrative regulations of the government service; it was practically necessary in remote districts, such as Galicia and Bukovina, where few of the popu- lation understood German. In some places a Slav-speaking individual would himself have to provide the interpreter, and approach the government in German. Local authorities, e.g. town councils and the diets, were free to use what language they wished, and in this matter the Austrian government has shown great liberality. The constitution of 1867 laid down a principle of much importance, by which previous custom became established as a right. Article 19 runs: “All races of the empire have equal rights, and every race has an inviolable right to the preservation and use of its own nationality and language. The equality of all customary (landesilblick) languages in school, office and public life, is recognized by the state. In those territories in which several races dwell, the public and educational institutions are to be so arranged that, without

applying com- pulsion to learn a second Landessprache, each of the races re- ceives the necessary means of education in its own language." The application of this law gives great power to the government, for everything depends on what is meant by landesiiblich, and it rests with them to determine when a language is customary. The Germans demand the recognition of German as a customary language in every, part of the empire, so that a German may claim to have his business attended to in his own language, even in Dalmatia and Galicia. In Bohemia the Czechs claim that their language shall be recognized as customary, even in those districts such as Reichenberg, which are almost completely German; the Germans, on the other hand, claim that the Czech language shall only be recognized in those towns and districts where there is a considerable Czech population. What Taaffe's Administration did was to interpret this law in a sense more favourable to the Slavs than had hitherto been the case.

Peculiar importance is attached to the question of education. The law of 1867 required that the education in the elementary schools in the Slav districts should be given in Czech or Slovenian, as the case might be. The Slavs, however, required that, even when a small minority of Slav race settled in any town, they should not be compelled to go to the German schools, but should have their own school provided for them; and this demand was granted by Prazak, minister of education under Count Taaffe. The Germans had always hoped that the people as they became educated would cease to use their own particular language. Owing to economic causes the Slavs, who increase more rapidly than the Germans, tend to move westwards, and large numbers settle in the towns and manufacturing districts. It might have been expected that they would then cease to use

their own language and become Germanized; but, on the con- trary, the movement of population is spreading their language and they claim that special schools should be provided for them, and that men of their own nationality should be appointed to government offices to deal with their business. This has hap- pened not only in many places in Bohemia, but in Styria, and even in Vienna, where there has been a great increase in the Czech population and a Czech school has been founded. The introduction of Slavonic into the middle and higher schools has affected the Germans in their most sensitive point. They have always insisted that German is the Kultur-sprache. On one occasion Count A. Auersperg (Anastasius Griin) entered the diet

of Carniola carrying the whole of the Slovenian literature under his arm, as evidence that the Slovenian language could not well be substituted for German as a medium of higher education.

The first important regulations which were issued under the law of 1867 applied to Dalmatia, and for that country between 1872 and 1876 a series of laws and edicts were issued determining to what extent the Slavonic idioms were to be recognized. Hitherto all business had been done in Italian, the language of a small minority living in the seaport towns. The effect of these laws has been to raise Croatian to equality with Italian. It has been introduced in all schools, so that nearly all educa- tion is given in Croatian, even though a knowledge of Italian is quite essential for the maritime population; and it is only in one or two towns, such as Zara, the ancient capital of the country, that Italian is able to maintain itself. Since 1882 there has been a Slav majority in the diet, and Italian has been disused in the proceedings of that body. In this case the con- cessions to the Servo-Croatians had been made by the Liberal ministry; they required the parliamentary support of the Dalmatian representatives, who were more numerous than the Italian, and it was also necessary to cultivate the loyalty of the Slav races in this part so as to gain a support for Austria against the Russian party, which was very active in the Balkan Peninsula. It was better to sacrifice the Italians of Dalmatia than the Germans of Carinthia. 1

It was not till 1879 tnat the Slovenes received the support of the government. In Carniola they succeeded, in 1882, in winning a majority in the diet, and from this time, while the diet of Styria is the centre of the German, that of Carniola is the chief support of the Slovene agitation. In the same year they won the majority in the town council of Laibach, which had hitherto been German. They were able, therefore, to introduce Illyrian as the official language, and cause the names of the streets to be written up in Illyrian. This question of street names is, as it were, a sign of victory. Serious riots broke out in some of the towns of Istria when, for the first time, Illyrian was used for this purpose as well as Italian. In Prague the victory of the Czechs has been marked by the removal of all German street names, and the Czech town council even passed a by-law forbidding private individuals to have tablets put up with the name of the street in German. In consequence of a motion by the Slovene members of the Reichsrath and a resolution of the diet of Carniola, the government also declared Slovenian to be a recognized language for the whole of Carniola, for the district of Cilli in Styria, and for

the Slovene and mixed districts in the south of Carinthia, and determined that in Laibach a Slovene gymnasium should be maintained as well as the German one.

The Germans complain that in many cases the government acted very unfairly to them. They constantly refer to the case of Klagen- furt. This town in Carinthia had a population of 16,401 German- speaking Austrians; the Slovenian-speaking population numbered 568, of whom 180 were inhabitants of the gaol or the hospital. The government, however, in 1880 declared Slovenian a customary language, so that provision had to be made in public offices and law courts for dealing with business" in Slovenian. It must be remem- bered, however, that even though the town was German, the rural population of the surrounding villages was chiefly Slovene.

It was in Bohemia and Moravia that the contest was fought out with the greatest vehemence. The two races were nearly equal, and the victory of Czech would mean that nearly two

1 For Dalmatia, see T. G. Jackson, Dalmatia, &c. (Oxford, 1889).

million Germans would be placed in a position of subordination; but for the last twenty years there had been a constant encroach- ment by Czech on German. This was partly due to the direct action of the government. An ordinance of 1880 determined that henceforward all business which had been brought before any government office or law court should be dealt with, within the office, in the language in which it was introduced; this applied to the whole of Bohemia and Moravia, and meant that Czech would henceforward have a position within the government service. It was another step in the same direction when, in 1886, it was ordered that " to avoid frequent translations " business introduced in Czech should be dealt with in the same language in the high courts of Prague and Briinn. Then not only were a large number of Czech elementary schools founded, but also many middle schools were given to the Czechs, and Czech classes introduced in German schools ; and, what affected the Germans most, in 1882 classes in Czech were started in the university of

Prague — a desecration, as it seemed, of the oldest German university.

The growth of the Slav races was, however, not merely the result of government assistance ; it had begun long before Taaffe assumed office ; it was to be seen in the census returns and in the results of elections. Prague was no longer the German city it had been fifty years before ; the census of 1880 showed 36,000 Germans to 120,000 Czechs. It was the same in Pilsen. In 1861 the Germans had a majority in this town; in 1880 they were not a quarter of the population. This same phenomenon, which occurs elsewhere, cannot be attributed to any laxity of the Germans. The generation which was so vigorously demanding national rights had themselves all been brought up under the old system in German schools, but this had not implanted in them a desire to become German. It was partly due to economic causes — the greater increase among the Czechs, and the greater migration from the country to the towns ; partly the result of the romantic and nationalist movement which had arisen about 1830, and partly the result of establishing popular educa- tion and parliamentary government at the same time. As soon as these races which had so long been ruled by the Germans received political liberty and the means of education, they naturally used both toreassert their national individuality.

It may be suggested that the resistance to the German language is to some extent a result of the increased national feeling among the Germans themselves. They have made it a matter of principle. In the old days it was common for the children of German parents in Bohemia to learn Czech; since 1867 this has ceased to be the case. It may almost be said that they make it a point of honour not to do so. A result of this is that, as educated Czechs are gener- ally bilingual, it is easier for them to obtain appointments in districts where a knowledge of Czech is required, and the Germans, therefore, regard every order requiring the use of Czech as an order which excludes Germans from a certain number of posts. This attitude of hostility and contempt is strongest among the educated middle class; it is not shown to the same extent by the clergy and the nobles.

The influence of the Church is also favourable to the Slav races, not so much from principle as owing to the fact that they supply more candidates for ordination than the Germans. There is no doubt, however, that the tendency among Germans has been to exalt the principle of nationality above religion, and to give it an

absolute authority in which the Roman Catholic Church cannot acquiesce. In this, as in other ways, the Germans in Austria have been much influenced by the course of events in the German empire. This hostility of the Church to the German nationalist movement led in 1898 to an agitation against the Roman Catholic Church, and among the Germans of Styria and other territories large numbers left the Church, going over either to Protestantism or to Old Catholicism. This " Los von Rom " movement, which was caused by the con- tinued alliance of the Clerical party with the Slav parties, is more of the nature of a political demonstration than of a religious move- ment.

The Germans, so long accustomed to rule, now saw their old ascendancy threatened, and they defended it with an energy

that increased with each defeat. In 1880 they founded a hostility g re at society, the Deutscher Schulverein, to establish and

assist German schools. It spread over the whole of the empire; in a few years it numbered 100,000 members, and had an income of nearly 300,000 gulden ; no private society in Austria

had ever attained so great a success. In the Reichsrath a motion was introduced, supported by all the German Liberal parties, demanding that German should be declared the language of state and regulating the conditions under which the other idioms could be recognized ; it was referred to a committee from which it never emerged, and a bill to the same effect, introduced in 1886, met a similar fate. In Bohemia they demanded, as a means of protecting themselves against the effect of the language ordinances, that the country should be divided into two parts; in one German was to be the sole language, in the other Czech was to be recognized. A proposal to this effect was introduced by them in the diet at the end of 1886, but since 1882 the Germans had been in a minority. The Czechs, of course, refused even to consider it; it would have cut away the ground on which their whole policy was built up, namely, the indissoluble unity of the Bohemian kingdom, in which German and Czech should through- out be recognized as equal and parallel languages. It was rejected on a motion of Prince Karl Schwarzenberg without discussion, and on this all the Germans rose and left the diet, thereby imitating the action of the Czechs in old days when they had the majority.

These events produced a great change on the character of the

German opposition. It became more and more avowedly racial; the defence of German nationality was put in the front of their programme. The growing national aerman animosity added bitterness to political life, and de- parties. stroyed the possibility of a strong homogeneous party on which a government might depend. The beginning of this movement can be traced back to the year 1870. About that time a party of young Germans had arisen who professed to care little for constitutionalism and other ” legal mummies,” but made the preservation and extension of their own nationality their sole object. As is so often the case in Austria, the movement began in the university of Vienna, where a Leseverein (reading club) of German students was formed as a point of cohesion for Germans, which had eventually to be suppressed. The first representative of the movement in parliament was Herr von Schonerer, wjio did not scruple to declare that the Germans looked forward to union with the German empire. They were strongly influenced by men outside Austria. Bismarck was their national hero, the anniversary of Sedan their political festival, and approximation to Germany was dearer to them than the maintenance of Austria. After 1878 a heightening of racial feeling began among the Radicals, and in 1881 all the German parties in opposition joined together in a club called the United Left, and in their programme put in a prominent place the defence of the position of the Germans as the condition for the existence of the state, and demanded that German should be expressly recognized as the official language. The younger and more ardent spirits, however, found it difficult to work in harmony with the older constitutional leaders. They complained that the party leaders were not sufficiently decisive in the measures for self-defence. In 1885 great festivities in honour of Bismarck’s eightieth birthday, which had been arranged* in Graz, were forbidden by the government, and the Germans of Styria were very indignant that the party did not take up the matter with sufficient energy. After the elections of 1885 the Left, therefore, broke up again into two clubs, the ” German Austrian,” which included the more moderate, and the ” German,” which wished to use sharper language. The German Club, e.g., congratulated Bismarck on his measures against the Poles; the German Austrians refused to take cognizance of events outside Austria with which they had nothing to do. Even the German Club was not sufficiently decided for Herr von Schonerer and his friends, who broke off from it and founded a ” National German Union.” They spoke much of Germanentum and Unverjalsehtes Deutsch- tum, and they advocated a political

union with the German empire, and were strongly anti-Hungarian and wished to resign all control over Galicia, if by a closer union with Germany they could secure German supremacy in Bohemia and the south Slav countries. They play the same part in Austria as does the " Dan-Germanic Union " in Germany. When in 1888 the

two clubs, the German Austrians and the Germans, joined once more under the name of the " United German Left " into a new club' with eighty-seven members, so as the better to guard against the common danger and to defeat the educational demands of the Clericals, the National Germans remained apart with seventeen members. They were also infected by the growing spirit of anti-Semitism. The German parties had originally been the party of the capitalists, and comprised a large number of Jews; this new German party committed itself to violent attacks upon the Jews, and for this reason alone any real harmony between the different branches would have been impossible.

Notwithstanding the concessions about language the Czechs had, however, made no advance towards their real object — the recognition of the Bohemian kingdom. Perhaps the leaders of the party, who were now growing old, would have been content with the influence they had already attained, but they were hard pressed at home by the Young Czechs, who were more impatient. When Count Thun was appointed governor of Bohemia their hopes ran high, for he was supposed to favour the coronation of the emperor at Prague. In 1890, however, instead of proceeding to the coronation as was expected, Taaffe The agree attempted to bring about a reconciliation between meat the opposing parties. The influence by which his

»■"* policy was directed is not quite clear, but the Czechs

Bohemia, j^d j)een Q j recen (. y ears l ess eaS y to deal with, and

Taaffe had never really shown any wish to alter the constitution; his policy always was to destroy the influence of parliament by playing off one party against the other, and so to win a clear field for the government. During the month of January con- ferences

were held at Vienna, with Taaffe in the chair, to which were invited representatives of the three groups into which the Bohemian representatives were divided, the German party, the Czechs, and the Feudal party. After a fortnight's discussion an agreement was made on the basis of a separation between the German and the Czech districts, and a revision of the electoral law. A protocol enumerating the points agreed on was signed by all who had taken part in the conference, and, in May bills were laid before the diet incorporating the chief points in the agreement. But they were not carried; the chief reason being that the Young Czechs had not been asked to take part in the conference, and did not consider themselves bound by its decisions; they opposed the measures and had recourse to obstruction, and a certain number of the Old Czechs gradually came over to them. Their chief ground of criticizing the proposed measures was that they would threaten the unity of the Bohemian country. 1 At the elections in 189 1 a great struggle took place between the Old and the Young Czechs. The latter were completely victorious; Rieger, who had led the party for thirty years, disappeared from the Reichsrath. The first result was that the proposed agreement with Bohemia came to an end. But the disappearance of the Old Czechs made the parliamentary situation very insecure. The Young Czechs could not take their place: their Radical and anti-clerical tendencies alarmed the Feudalists and Clericalists who formed so large a part of the Right; they attacked the alliance with Germany; they made public demonstration of their French sympathies; they entered into communication with other Slav races, especially the Serbs of Hungary and Bosnia; they demanded universal suffrage, and occasionally supported the German Radicals in their opposition to the Clerical parties, especially in educational matters; under their influence disorder increased in Bohemia, a secret society called the Umladina (an imitation of the Servian society of that name) was discovered, and stringent measures had to be taken to preserve order. The government therefore veered round towards the German Liberals; some of the ministers most obnoxious to the Germans resigned, and their places were taken by Germans. For two years the government seemed to waver, looking now to the Left, now to Hohenwart and his friends; for a time Taaffe really had the support of all parties except the Young Czechs.

1 On this see Menger, Der Ausgleich mit Bohmen (Vienna, 1891), where the documents are printed.

After two years he gave up his cautious policy and took a bold

move. In October 1 893 he introduced a reform bill. Univer- sal suffrage had long been demanded by the working men and the Socialists; the Young Czechs also had reform. put it on their programme, and many of the Christian Socialists and anti-Semites desired an alteration of the franchise. Taaffe's bill, while keeping the curiae of the feudal proprietors and the chambers of commerce as they were, and making no change in the number of members, proposed to give the franchise in both towns and rural districts to every one who could read and write, and had resided six months in one place. This was opposed by the Liberals, for with the growth of socialism and anti-Semitism, they knew that the extension of the franchise would destroy their influence. On this Taaffe had probably calculated, but he had omitted to inquire what the other parties would do. He had not even consulted Hohenwart, to whose assistance he owed his long tenure of power. Not even the pleasure of ruining the Liberals was sufficient to persuade the Conservatives to vote for a measure which would transfer the power from the well-to-do to the indigent, and Hohenwart justly complained that they ought to have been secure against surprises of this kind. The Poles also were against a measure which would give more influence to the Ruthenes. The position of the government was hopeless, and without waiting for a division Taaffe resigned.

The event to which for fourteen years the Left had looked forward had now happened. Once more they could have a share in the government, which they always believed rae belonged to them by nature. Taught by experience coalition and adversity, they did not scruple to enter into an mlaistry, alliance with their old enemies, and a coalition ministry '

was formed from the Left, the Clericals and the Poles. The president was Prince Alfred Windisch-Gratz, grandson of the celebrated general, one of Hohen wart's ablest lieutenants; Hohenwart himself did not take office. Of course an administra- tion of this kind could not take a definite line on any controversial question, but during 1894 they carried through the commercial treaty with Russia and the laws for the continuance of the currency reform. The differences of the clubs appeared, how- ever, in the discussions on franchise reform; the government, not strong enough to have a policy of its own, had referred the matter to a committee; for the question having once been raised, it was impossible not to go on with it. This would probably have been fatal to the coalition, but the final blow was given by a matter of very small importance arising from the

disputes on nationality. The Slovenes had asked that in the gymnasium at CilU classes in which instruction was given in Slovenian should be formed parallel to the German classes. This request caused great excitement in Styria and the neigh- bouring districts; the Styrian diet (from which the Slovene minority had seceded) protested. The Slovenes were, however, members of the Hohenwart Club, so Hohenwart and his followers supported the request, which was adopted by the ministry. The German Left opposed it; they were compelled to do so by the popular indignation in the German districts; and when the vote was carried against them (12th June 1895) they made it a question of confidence, and formally withdrew their support from the government, which therefore at once resigned.

After a short interval the emperor appointed as minister-president Count Badeni, who had earned a great reputation as governer of Galicia. He formed an administration the merit of which, as of so many others, was that it was m ; /l ; s < 0 ,. to belong to no party and to have no programme. He hoped to be able to work in harmony with the moderate elements of the Left; his mission was to carry through the composition (Ausgleich) with Hungary; to this everything else must be sub- ordinated. During 1896 he succeeded in carrying a franchise reform bill, which satisfied nearly all parties. All the old categories of members were maintained, but a fifth curia was added, in which almost any one might vote who had resided six months in one place and was not in domestic service; in this way seventy-two would be added to the existing members. This matter having been

settled, parliament was dissolved. The result of the elections of 1897 was the return of a House so constituted as to make any strong government impossible. On both sides the anti-Semitic parties representing the extreme demagogic elements were present in considerable numbers. The United German Left had almost disappeared; it was represented only by a few members chosen by the great proprietors; in its place there were the three parties — the German Popular party, the German Nationalists, and the German Radicals — who all put questions of nationality

first and had deserted the old standpoint of the constitution. Then there were the fourteen Social Democrats who had won their seats under the new franchise. The old party of the Right was, however, also broken up; side by side with forty-one Clericals there were twenty-eight Christian Socialists led by Dr Lueger, a man of great oratorical power, who had won a predominant influence in Vienna, so long the centre of Liberalism, and had quite eclipsed the more modest efforts of Prince Liechtenstein. As among the German National party, there were strong nationalist ele- ments in his programme, but they were chiefly directed against Jews and Hungarians; Lueger had already distinguished himself by his violent attacks on Hungary, which had caused some embarrassment to the government at a time when the negotiations for the Ausgleich were in progress. Like anti-Semites elsewhere, the Christian Socialists were reckless and irresponsible, appealing directly to the passions and prejudices of the most ignorant. There were altogether 200 German members of the Reichsrath, but they were divided into eight parties, and nowhere did there seem to be the elements on which a government could be built up.

The parliamentary situation is best explained by the following table showing the parties : — German Liberals —

Constitutional Landed Proprietors German Radicals

German Popular Party Schoenerer Group Kronawetter Democrat.

Social Democrats

German Conservatives — German Clericals Catholic Popular Party Christian Socialists

Federalist Great Proprietors Czechs —

Young Czechs

Radical Young Czechs

Clerical Czechs .

Agrarian Czechs .

Poles- Polish Club . Stoyalovski Group Popular Polish Party

Slovenes —

Clerical Slovenes Radical „

Italians — Liberal Italians Clerical ,,

Croatians . Serbs Ruthenes —

Ruthenes

Young Ruthenes

Rumanians — Rumanians . Young Rumanians

1897. 28

49 42

5

1 1

1901.

28

41

51

21

126

14

141 10

**3° (15 **

28

60 1 1 1

73 16

37 23

53 4

2 6

60 16

- 63 – 65

59 6

3

— 68

60

11

5

14 5

16

J9

11

2

71

16

19 9

2

Total

425

425

The most remarkable result of the elections was the disappearance of the Liberals in Vienna. In 1879, out of 37 members returned in Lower Austria, 33 were Liberals, but now they were

replaced to a large extent by the Socialists. It was impossible to maintain a strong party of moderate constitutionalists, on whom

the government could depend, unless there was a large nucleus from Lower Austria. The influence of Lueger was very embarrassing; he had now a majority of two- thirds in the town council, and had been elected burgomaster. The emperor had refused to confirm the election; he had been re-elected, and then the emperor, in a personal interview, appealed to him' to withdraw. He consented to do so; but, after the election of 1897 had given him so many followers in the Reichsrath, Badeni advised that his election as burgomaster should be confirmed. There was violent antipathy between the Christian Socialists and the German Nationalists, and the transference of their quarrels from the Viennese Council Chamber to the Reichstath was very detrimental to the orderly conduct of debate.

The limited suffrage had hitherto prevented socialism from becoming a political force in Austria as it had in Germany, and the national divisions have always impeded the socialism creation of a centralized socialist party. The first object of the working classes necessarily was the attainment of political power; in 1867 there had been mass demonstrations and petitions to the government for universal suffrage. During the next years there was the beginning of a real socialist move- ment in Vienna and in Styria, where there is a considerable industrial population; after 1879, however, the growth of the party was interrupted by the introduction of anarchical doctrines. Most's paper, the Freiheit, was introduced through Switzerland, and had a large circulation. The anarchists, under the leadership of Peukert, seem to have attained considerable numbers. In 1883-1884 there were a number of serious strikes, collisions between the police and the workmen, followed by assassinations ; it was a peculiarity of Austrian anarchists that in some cases they united robbery to murder. The government, which was seriously alarmed, introduced severe repressive measures; the leading anarchists were expelled or fled the country. In 1887, under the leadership of Dr Adler, the socialist party began to revive (the party of violence having died away) , and since then it has steadily gained in numbers; in the forefront of the political programme is put the demand for universal suffrage. In no country is the 1st of May, as the festival of Labour, celebrated so generally.

Badeni after the election sent in his resignation, but the emperor refused to accept it, and he had, therefore, to do the best he could arid turn for support to the other nationalities. The strongest of them were the fifty-nine Poles and sixty Young

Czechs; he therefore attempted, as Taaffe had done, to come to some agreement with thern. The Poles were always ready to support the government ; among the Young Czechs the more moderate had already attempted to restrain the wilder spirits of the party, and they were quite prepared to enter into negotiations. They did not wish to lose the opportunity which now was open to them of winning influence over the administration. What they required was further concession as to the language in Bohemia. In May 1897 Badeni, therefore, published his celebrated ordinances. They determined (1) that all correspondence and documents regarding every matter jˆ e brought before the government officials should be language conducted in the language in which it was first intro- °“W”aaces duced. This applied to the whole of Bohemia, and meant the introduction of Czech into the government offices throughout the whole of the kingdom; (2) after 1903 no one was to be appointed to a post under the government in Bohemia until he had passed an examination in Czech. These ordinances fulfilled the worst fears of the Germans. The German Nationalists and Radicals declared that no business should be done till they were repealed and Badeni dismissed. They resorted to obstruction. They brought in repeated motions to impeach the ministers, and parliament had to be prorogued in June, although no business of any kind had been transacted. Badeni had not anticipated the effect his ordinances would have; as a Pole he had little experience in the western part of the empire. During the recess he tried to open negotiations, but

the Germans refused even to enter into a discussion until the ordinances had been withdrawn. The agitation spread throughout the country; great meetings were held at Eger and Aussig, which were attended by Germans from across the frontier, and led to serious disturbances; the cornflower, which had become the symbol of German nationality and union with Germany, was freely worn, and the language used was in many cases treasonable. The emperor insisted that the Reichsrath should again be summoned to pass the necessary measures for the agreement with Hungary; scenes then took place which have no parallel in parliamentary history. To meet the obstruction it was

determined to sit at night, but this was unsuccessful. On one occasion Dr Lecher, one of the representatives of Moravia, spoke for twelve hours, from 9 p.m. till g a.m., against the Ausgleich. The opposition was not always limited to feats of endurance of this kind. On the 3rd of November there was a free fight in the House; it arose from a quarrel between Dr Lueger and the Christian Socialists on the one side (for the Christian Socialists had supported the government since the confirmation of Lueger as burgomaster) and the German Nationalists under Herr Wolf, a German from Bohemia, the violence of whose language had already caused Badeni to challenge him to a duel. The Nationalists refused to allow Lueger to speak, clapping their desks, hissing and making other noises, till at last the Young Czechs attempted to prevent the disorder by violence. On the 24th of November the scenes of disturbance were renewed. The president, Herr v. Abrahamovitch, an Armenian from Galicia, refused to call on Schonerer to speak. The Nationalists therefore stormed the platform, and the president and ministers had to fly into their private rooms to escape personal violence, until the Czechs came to their rescue, and by superiority in numbers and physical strength severely punished Herr Wolf and his friends. The rules of the House giving the president no authority for maintaining order, he determined, with the assent of the ministers, to propose alterations in procedure The next day, when the sitting began, one of the ministers, Count Falkenhayn, a Clerical who was very unpopular, moved " That any member who continued to disturb a sitting after being twice called to order could be suspended — for three days by the president, and for thirty days by the House." The din and uproar was such that not a word could be heard, but at a pre-arranged signal from the president all the Right rose, and he then declared that the new order had been carried, although the procedure of the House required that it should be submitted to a committee. The next day, at the beginning of the sitting, the Socialists rushed on the platform, tore up and destroyed all the papers lying there, seized the president, and held him against the wall. After he had escaped, eighty police were introduced into the House and carried out the fourteen Socialists. The next day Herr Wolf was treated in the same manner. The excitement spread to the street. Serious disorders took place in Vienna and in Graz; the German opposition had the support of the people, and Lueger warned the ministers that as burgomaster he would be unable to maintain order in Vienna; even the Clerical Germans showed signs of deserting the government. The emperor, hastily summoned to

Vienna, accepted Badeni's resignation, the Germans having thus by obstruction attained part of their wishes. The new minister, Gautsch, a man popular with all parties, held office for three months; he proclaimed the budget and the Ausgleich, and in February replaced the language ordinances by others, under which Bohemia was to be divided into three districts — one Czech, one German and one mixed. The Germans, however, were not satisfied with this; they demanded absolute repeal. The Czechs also were offended; they arranged riots at Prague; the professors in the university refused to lecture unless the German students were defended from violence; Gautsch resigned, and Thun, who had been governor of Bohemia, was appointed minister. Martial law was proclaimed in Bohemia, and strictly enforced. Thun then arranged with the Hungarian ministers a compromise about the Ausgleich. The Reichsrath was again summoned, and the meetings were

Badeni resigns.

less disturbed than in the former year, but the Germans still prevented any business from being done. The Germans now had a new cause of complaint. Paragraph 14 of the Constitutional law of 1867 provided that, in cases of conflict pressing necessity, orders for which the assent of the between Reichsrath was required might, if the Reichsrath were Germans not in session, be proclaimed by the emperor; they had ˆechs. to be signed by the whole ministry, and if they were not laid before the Reichsrath within four months of its meeting, or if they did not receive the approval of both Houses, they ceased to be valid. The Germans contended that the application of this clause to the Ausgleich was invalid, and demanded that it should be repealed. Thun had in consequence to retire, in September 1899. His successor, Count Clary, began by with- drawing the ordinances which had been the cause of so much trouble, but it was now too late to restore peace. The Germans were not sufficiently strong and united to keep in power a minister who had brought them the relief for which they had been clamouring for two years. The Czechs, of course, went into opposition, and used obstruction. The extreme German party, however, took the occasion to demand that paragraph 14 should be repealed. Clary explained that this was impossible, but he gave a formal pledge that he would not use it. The Czechs, however, prevented him passing a law on excise which was a necessary part of the agreements with Hungary; it was, therefore, impossible for him to carry on the government without breaking his word; there was nothing left for him to do

but to resign, after holding office for less than three months. The emperor then appointed a ministry of officials, who were not bound by his pledge, and used paragraph 14 for the necessary purposes of state. They then made way for a ministry under Herr v. Korber. During the early months of 1900 matters were more peaceful, and Korber hoped to be able to arrange a com- promise; but the Czechs now demanded the restoration of their language in the internal service of Bohemia, and on 8th June, by noise and disturbance, obliged the president to suspend the sitting. The Reichsrath was immediately dissolved, the emperor having determined to make a final attempt to get together a parliament with which it would be possible to govern. The new elections on which so much was to depend did not take place till January 1901. They resulted in a great increase of the extreme German Nationalist parties. Schonerer and the German Radicals — the fanatical German party who in their new programme advocated union of German Austria with the German empire — now numbered twenty-one, who chiefly came from Bohemia. They were able for the first time to procure the election of one of their party in the Austrian Delegation, and threatened to introduce into the Assembly scenes of disorder similar to those which they had made common in the Reichsrath. All those parties which did not primarily appeal to national feeling suffered loss; especially was this the case with the two sections of the Clericals, the Christian Socialists and the Ultra- montanes; and the increasing enmity between the German Nationalists (who refused even the name German to a Roman Catholic) and the Church became one of the most conspicuous features in the political situation. The loss of seats by the Socialists showed that even among the working men the national agitation was gaining ground; the diminished influence of the anti-Semites was the most encouraging sign.

Notwithstanding the result of the elections, the first months of the new parliament passed in comparative peace. There was a truce between the nationalities. The Germans were more occupied with their opposition to the Clericals than with their feud with the Slavs. The Czechs refrained from obstruction, for they did not wish to forfeit the alliance with the Poles and Conservatives, on which their parliamentary strength depended, and the Germans used the opportunity to pass measures for promoting the material prosperity of the country, especially for an important system of canals which would bring additional prosperity to the coal-fields and manufactures of Bohemia. (J. W.

He.).

. The history of Austria since the general election of 1901 is the

history of ‘franchise reform as a crowning attempt to restore parliament to normal working conditions. The premier, Dr von Korber, who had undertaken to overcome obstruc- works ti° n anc ˆ wno hoped to effect a compromise between policy. Germans and Czechs, induced the Chamber to sanction the estimates, the contingent of recruits and other ” necessities of state ” for iooi and 1902, by promising to under- take large public works in which Czechs and Germans were alike interested. These public works were chiefly a canal from the Danube to the Oder; a ship canal from the Danube to the Moldau near Budweis, and the canalization of the Moldau from Budweis to Prague; a ship canal running from the projected Danube-Oder canal near Prerau to the Elbe near Pardubitz, and the canalization of the Elbe from Pardubitz to Melnik; a navigable connexion between the Danube-Oder Canal and the Vistula and the Dniester. It was estimated that the construction of these four canals would require twenty years, the funds being furnished by a 4% loan amortizable in ninety years. In addition to the canals, the cabinet proposed and the Chamber sanctioned the construction of a ” second railway route to Trieste ” de- signed to shorten the distance between South Germany, Salzburg and the Adriatic, by means of a line passing under the Alpine ranges of central and southern Austria. The principal sections of this line were named after the ranges they pierced, the chief tunnels being bored through the Tauern, Karawanken and Wochein hills. Sections were to be thrown open to traffic as soon as completed and the whole work to be ended during 1909. The line forms one of the most interesting railway routes in Europe. The cost, however, greatly exceeded the estimate sanctioned by parliament; and the contention that the parlia- mentary adoption of the Budget in 1901-1902 cost the state £100,000,000 for public works, is not entirely unfounded. True, these works were in most cases desirable and in some cases necessary, but they were hastily promised and often hastily begun under pressure of political expediency. The Korber administration was for this reason subsequently exposed to

severe censure.

Despite these public works Dr von K6rber found himself unable to induce parliament to vote the Budgets for 1903, KSrber's I0O 4 or IQ0 5> anc ˆ was obliged to revert to the expedient pariia- employed by his predecessors of sanctioning the esti- mentary mates by imperial ordinance under paragraph 14 of aif f' the constitution. His attempts in December 1902

and January 1903 to promote a compromise between Czechs and Germans proved equally futile. Korber proposed that Bohemia be divided into 10 districts, of which 5 would be Czech, 3 German and 2 mixed. Of the 234 district tribunals, 133 were to be Czech, 94 German and 7 mixed. The Czechs demanded on the contrary that both their language and German should be placed on an equal footing throughout Bohemia, and be used for all official purposes in the same way. As this demand involved the recognition of Czech as a language of internal service in Bohemia it was refused by the Germans. Thence- forward, until his fall on the 31st of December 1904, Korber governed practically without parliament. The Chamber was summoned at intervals rather as a pretext for the subsequent employment of paragraph 14 than in the hope of securing its assent to legislative measures. The Czechs blocked business by a pile of " urgency motions " and occasionally indulged in noisy obstruction. On one occasion a sitting lasted 57 hours without interruption. In consequence of Czech aggressiveness, the German parties (the German Progressists, the German Populists, the ConstitutionalLandedProprietors and the Christian Socialists) created a joint executive committee and a supreme committee of four members to watch over German racial interests.

By the end of 1904 "it had become clear that the system of government by paragraph 14, which Dr von Korber had perfected was not effective in the long run. Loans were needed a "tech f° r military and other purposes, and paragraph 14 premier. itself declares that it cannot be employed for the contraction of any lasting burden upon the exchequer, nor for any sale of state patrimony. As the person of the premier

had become so obnoxious to the Czechs that his removal would be regarded by them as a concession, his resignation was suddenly accepted by the emperor, and, on the 1st of January 1905, a former premier, Baron von Gautsch, was appointed in his stead. Parliamentary activity was at once resumed; the Austro-

Hungarian tariff contained in the Szell-Korber compact was adopted, the estimates were discussed and the commercial treaty with Germany ratified. In the early autumn, however, a radical change came over the spirit of Austrian politics. For nearly three years Austria had been watching with bitterness and depression the course of the crisis in Hungary. Parliament had repeatedly expressed its disapproval of the Magyar demands upon the crown, but had succeeded only in demonstrating its own impotence. The feeling that Austria could be compelled by imperial ordinance under paragraph 14 to acquiesce in whatever concessions the crown might make to Hungary galled Austrian public opinion and prepared it for coming changes. In August 1905 the crown took into consideration and in September sanctioned the proposal that universal suffrage be introduced into the official programme of the Fejervary cabinet then engaged in combating the Coalition in Hungary. It is not to be supposed that the king of Hungary assented to this programme without reflecting that what he sought to further in Hungary, it would be impossible for him, as emperor of Austria, to oppose in Cisleithania. His subsequent action justifies, indeed, the belief that, when sanctioning the Fejervary programme, the monarch had already decided that universal suffrage should be introduced in Austria; but even he can scarcely have been prepared for the rapidity with which the movement in Austria gained ground and accomplished its object.

On the 15th of September 1905 a huge socialist and working-class demonstration in favour of universal suffrage took place before the parliament at Budapest. The Austrian Socialist party, encouraged by this manifestation and r^fa-m!** influenced by the revolutionary movement in Russia, resolved to press for franchise reform in Austria also. An initial demonstration, resulting in some bloodshed, was organized in Vienna at the beginning of November. At Prague, Graz and other towns, demonstrations and collisions with the police were frequent. The premier, Baron Gautsch, who had previously discountenanced universal suffrage while admitting the desira- bility of a restricted reform, then changed attitude and per- mitted an enormous Socialist demonstration, in support of universal suffrage, to take place (November 28) in the Vienna Ringstrasse. Traffic was suspended for five hours while an orderly procession of workmen, ten abreast, marched silently along the Ringstrasse past the houses of parliament. The demonstration made a deep impression upon public opinion. On the same day the premier

promised to introduce by February a large measure of franchise reform so framed as to protect racial minorities from being overwhelmed at the polls by majorities of other races. On the 23rd of February 1906 he indeed brought in a series of franchise reform measures. Their main principles were the abolition of the curia or. electoral class system and the establish- ment of the franchise on the basis of universal suffrage; and the division of Austria electorally into racial compartments within which each race would be assured against molestation from other races. The Gautsch redistribution bill proposed to increase the number of constituencies from 425 to 455, to allot a fixed number of constituencies to each province and, within each province, to each race according to its numbers and tax-paying capacity. The reform bill proper proposed to enfranchise every male citizen above 24 years of age with one year's residential qualification.

At first the chances of the adoption of such a measure seemed small. It was warmly supported from outside by the Social Democrats, who held only n seats in the House; inside, the Christian Socialists or Lueger party were favourable on the whole as they hoped to gain seats at the expense of the German Progressives and German Populists and to extend their own organization throughout the empire. The Young Czechs, too, were favourable, while the Poles reserved their attitude. Hostile

in principle and by instinct, they waited to ascertain the mind of the emperor, before actively opposing the reform. " With the exception of the German Populists who felt that a German " Liberal " party could not well oppose an extension of popular rights, all the German Liberals were antagonistic, some bitterly, to the measure. The Constitutional Landed Proprietors who had played so large a part in Austrian politics since the 'sixties, and had for a generation held the leadership of the German element in parliament and in the country, saw themselves doomed and the leadership of the Germans given to the Christian Socialists. None of the representatives of the curia system fought so tenaciously for their privileges as did the German nominees of the curia of large landed proprietors. Their opposition proved unavailing. The emperor frowned repeatedly upon their efforts.

Baron Gautsch fell in April over a difference with the Poles, and his successor, Prince Konrad zu Hohenlohe-Schillingsfiirst,

who had taken over the reform bills, resigned also, f -1 ?" six weeks later, as a protest against the action of the premier. crown in consenting to the enactment of a customs

tariff in Hungary distinct from, though identical with, the joint Austro-Hungarian tariff comprised in the SzelkRorber compact and enacted as a joint tariff by the Reichsrath. A new cabinet was formed (June 2) by Baron von Beck, permanent under secretary of state in the ministry for agriculture, an official of considerable ability who had first acquired prominence' as an instructor of the heir apparent, Archduke Francis Ferdinand, in constitutional and administrative law. By dint of skilful negotiation with the various parties and races, and steadily supported by the emperor who, on one occasion, summoned the recalcitrant party leaders to the Hofburg ad audiendum verbum and told them the reform " must be accomplished," Baron Beck succeeded, in October 1906, in attaining a final agreement, and on the 1st of December in securing the adoption of the reform. During the negotiations the number of con- stituencies was raised to 516, divided, according to provinces, as follows:—

Bohemia 130 previously no

Galicia 106

Lower Austria ....

Moravia

Styria 30

Tirol

Upper Austria ....

Austrian Silesia ....

Bukovina

Carniola

Dalmatia

Carinthia

Salzburg

Istria

Gorz and Gradisca Trieste and territory . Vorarlberg

In the allotment of the constituencies to the various races their tax-paying capacity was taken into consideration. In mixed districts separate constituencies and registers were established for the electors of each race, who could only vote on their own register for a candidate of their own race. Thus Germans were obliged to vote for Germans and Czechs for Czechs; and, though there might be victories of Clerical over Liberal Germans or of Czech Radicals over Young Czechs, there could be no victories of Czechs over Germans, Poles over Ruthenes, or Slovenes over Italians. The constituencies were divided according to race as follows : —

Germans of all parties

Czechs of all parties ....

Poles

Southern Slavs (Slovenes, Croats,

Serbs) 37 27

Ruthenes 34 » n

Italians 19 „ 18

Rumanians ..... 5 ,, 5

These allotments were slightly modified at the polls by the victory of some Social Democratic candidates not susceptible of strict racial classification. The chief feature of the allotment was, however, the formal overthrow of the fictio’n that Austria

49

43

30

27

25

21

22 „

20

15

12

14

11

12 „

11

11 „

n

10 „

10

7

7

6

5

6

5

5

5

4

4

233 previously 205

108 „ 81

80 „ 71

is preponderatingly a German country and not a country pre-ponderatingly Slav with a German dynasty and a German facade. The German constituencies, though allotted in a proportion unduly favourable, left the Germans, with 233 seats, in a permanent minority as compared with the 259 Slav seats. Even with the addition of the ” Latin ” (Rumanian and Italian) seats the ” German-Latin block ” amounted only to 257. This ” block ” no longer exists in practice, as the Italians now tend to co-operate rather with the Slavs than with the Germans. The greatest gainers by the redistribution were the Ruthenes, whose representation was trebled, though it is still far from being proportioned to their numbers. This and other anomalies will doubtless be corrected in future revisions of the allotment, although the. German parties, foreseeing that any revision must work out to their disadvantage, stipulated that a two-thirds majority should be necessary for any alteration of the lav/.

After unsuccessful attempts by the Upper House to introduce plural voting, the bill became law in January 1907, the peers insisting only upon the establishment of a fixed maximum number or Humerus clausus, of non-heredi- *feˆ tary peers, so as to prevent the resistance of the Upper 190T. Chamber from being overwhelmed at any critical moment by an influx of crown nominees appointed ad hoc. The general election which took place amid considerable enthusiasm on the 14th of May resulted in a sweeping victory for the Social Democrats whose number rose from n to 87; in a less complete triumph for the Christian Socialists who increased from 27 to 67; and in the success of the extremer over the conservative elements in all races. A classification of the groups in the new Chamber presents many difficulties, but the following statement is approxi- mately accurate. It must be premised that, in order to render the

Christian Socialist or Lueger party the strongest group in parliament, an amalgamation was effected between them and the conservative Catholic party: — •

German Conservatives — Total.

Christian Socialists 96

German Agrarians 19

German Liberals —

Progressives 15

Populists 29

Pan-German radicals (Wolf group) . . 13

Unattached Pan-Germans 3

,, Progressives 2

Czechs — – • — 177

Czech Agrarians 28

Young Czechs 18

Czech Clericals 17

Old Czechs . 7

Czech National Socialists 9

Realists . 2

Unattached Czech 1

Social Democrats — — 82

Of all races 87 87

Poles- Democrats 26

Conservatives 15

Populists 18

Centre 12

Independent Socialist 1

Ruthenes— — 72 National Democrats 25

Old or Russophil Ruthenes . . . 5

Slovenes — . — 30

Clericals . . 17

Southern Slav Club — Croats . ~)

Serbs . > 20 37

Slovene Liberals)

Italians —

Clerical Populists 11

Liberals . . 4

— IS

Rumanians—

Rumanian Club 5 5

Jews~-

Zionists 4

Democrats 1 5

Unclassified, vacancies, &c 6 6

510

AUSTRIAN SUCCESSION

39

The legislature elected by universal suffrage worked fairly smoothly during the first year of its existence. The estimates were voted with regularity, racial animosity was somewhat less prominent, and some large issues were debated. The desire not to

disturb the emperor's Diamond Jubilee year by untoward scenes doubtless contributed to calm political passion, and it was celebrated in 1908 with complete success. But it was no sooner over than the crisis over the annexation of Bosnia and Herzegovina, which is dealt with above, eclipsed all purely domestic affairs in the larger European question. (H. W. S.)

Bibliography. — 1. Sources. A collection of early authorities on Austrian history was published in 3 vols, folio by Hieronymus Pez (Leipzig, 1 721-1725) under the title Scriptores rerum, Austria- carum veteres et genuini, of which a new edition was printed at Regensburg in 1 745, and again, under the title of Rerum A ustriacarum scriptores, by A. Rauch at Vienna in I793~I794- It was not, how- ever, till the latter half of the 19th century that the vast store of public and private archives began to be systematically exploited. Apart from the material published in the Monumenta Germ. Hist. of Pertz and his collaborators, there are several collections devoted specially to the sources of Austrian history. Of these the most notable is the Fontes rerum Austriacarum, published under the auspices of the Historical Commission of the Imperial Academy of Sciences at Vienna; the series, of which the first volume was published in 1855, is divided into two parts : (i.) Scriptores, of which the 9th vol. appeared in 1904; (ii.) Diplomataria et Acta, of which the 58th vol. appeared in 1906. It covers the whole range of Austrian history, medieval and modern. Another collection is the Quellen und Forschungen zur Geschichte, Literatur und Sprache Osterreichs Und seiner Kronlander, edited by J. Hirn and J. E. Wackernagel (Graz, 1895, &c), of which vol. x. appeared in 1906. ; Besides these there are numerous accounts and inventories of public and private archives, for which see Dahlmann-Waitz, Quellenkunde '(ed. 1906), pp. 14-15, 43, and suppl. vol. (1907), PP- 4-5- Of collections of treaties the most notable is that of L. Neumann, Recueil des traites conclus par VAutriche avec les puissances etrangeres depuis 1763 (6 vols., Leipzig, 1855: c), continued by A. de Plason (18 vols., Vienna, 1877-1905). In 1907, however, the Imperial Commission for the Modern History of Austria issued the first volume of a new series, Osterreichische Staatsvertrdge, which promises to be of the utmost value. Like the Recueil des traites conclus par la Russie of T. T. de Martens, it is compiled on the principle of devoting separate volumes to the treaties entered into with the several states; this is obviously convenient as enabling the student to obtain a clear review of the relations of Austria to any particular state throughout the whole

period covered. For treaties see also J. Freiherr von Vasque von Piittlingen, tjbersicht der osterreichischen Staatsvertrdge seit Maria Theresa bis auf die neueste Zeit (Vienna, 1868) ; and L. Bittner, Chronologisches Verzeichnis der osterreichischen Staats-vertrdge (Band G, 1526-1723, Vienna, I9°3)- ,. „ , ■„.,

2. Works. — (a) General. Archdeacon William Coxes History of the House of Austria, 1218-1792 (3 vols., London, 1817), with its continuation by W. Kelly (London, 1853; new edition, 1873), remains the only general history of Austria in the English language. It has, of course, long been superseded as a result of the research indicated above. The amount of work that has been devoted to this subject since Coxe's time will be seen from the following list of books, which are given in the chronological order of their publication:— T Mailath, Geschichte des osterreichischen Kaiserstaates (5 vols., Hamburg, 1 834-1 850); Count F. von Hartig, Genesis def Revolution in Qslerreich im Jahre 1848 (Leipzig, 1851; 3rd edition, enlarged, 16., 1851; translated as appendix to Coxe's House of Austria, ed. 1853), a work which created a great sensation at the time and remains of much value; W. H. Stiles, Austria in 1848-1840(2 vols., New York, 1852), by an eye-witness of events; M. Budmger, Osterreichische Gesch. bis zum Ausgange des dreizehnten Jahrhunderts, vol. i. to a.d. 1055 (Leipzig, 185*); A. Springer, Geschichte Oster- reichs seit dem Wiener Frieden, 1809 (2 vols, to 1849; Leipzig, 1863-1865); A. von Arneth, Geschichte Maria Theresias (10 vols., Vienna, 1 863-1 879); the series Osterreichische Gesch. fur das Volk, 17 vols., by various authors (Vienna, 1864, &c), for which see Dahlmann- Waitz, p. 86; H. Bidermann, Gesch. der osterreichischen Gesamt- staalsidee, 1526-1804, parts I and 2 to 1740 (Innsbruck, 1867, 1887); J A. Freiherr von Helfert, Gesch. Osterreichs vom Ausgange des Oktoberaufslandes, 1848, vols. i. T iv. (Leipzig and Prague, 1869- 1889)- W. Rogge, Osterreich von Vildgos bis zur Gegenwart (3 vols., Leipzig and Vienna, 1872, 1873), and Osterreich seit der Katastrophe Hohenwart-Beust (Leipzig, 1879), written from a somewhat violent German standpoint; Franz X. Krones (Ritter von Marchland), Handbuch der Gesch. Osterreichs (5 vols., Berlin, 1876-1879), with copious references, Gesch. der Neuzeit Osterreichs vom 18 ten Jahr-hundert bis auf die Gegenwart (Berlin, 1879), from the German-liberal point of view, and Grundriss der osterreichischen Gesch. (Vienna, 1882); Baron Henry de Worms, The Austro-Hunganan Empire (London 2nd ed., 1876); Louis Asseline, Histoire de VAutriche depuis la mart de Marie Therise (Paris, 1877), sides

with the Slavs against Germans and Magyars; Louis Leger, Hist, de I Autriche-

Hongrie (Paris, 1879), also strongly Slavophil ; A. Wolf, Geschicht- liche Bilder aus Osterreich (2 vols., Vienna, 1878-1880), and Oster- reich unter Maria Theresia, Joseph II. und Leopold I. (Berlin, 1882); E. : Wertheimer, Gesch. Osterreichs und Ungarns im ersten Jahrzehnt des ioten Jahrhunderts (2 vols., Leipzig, 1884-1890); A. Huber, Gesch. Osterreichs, vols. i. to v. up to 1648 (in Heeren's Gesch. der europ. Staaten, Gotha, 1885-1895) ; J. Emmer, Kaiser Franz Joseph I., funfzig Jahre bsterreichischer Gesch. (2 vols., Vienna, 1808); F. M. Mayer, Gesch. Osterreichs mit besonderer Riicksicht auf das Kulturleben (2 vols. 2nd ed., Vienna, 1900-1901) ; A. Dopsch, Forschungen zur inneren Gesch. Osterreichs, vol. i. I (Innsbruck,l903) ; Louis Eisenmann, Le Compromis austro-hongrois de 1867 (Paris, 1904); H. Friedjung, Osterreich von 1848 bis i860 (Stuttgart, 1908 seq:); Geoffrey Drage, Austria-Hungary (London, 1909):

(b) Constitutional: — E. Werunsky, Osterreichische Reichs- und Rechtsgeschichte {Vienna, 1894, &c); A. Bechmann, Lehrbuch der osterreichischen Reichsgesch. (Prague, 1895-1896); A. Huber, Osterreichische Reichsgesch. (Leipzig and Vienna, 1895ˆ 2nd ed. by A. Dopsch, ib., 1901); A. Luschin von Ebengreuth, Osterreichische Reichsgesch. (2 vols., Bamberg, 1895, 1896), a work of first-class importance; and Grundriss der osterreichischen Reichsgesch. (Bam- berg, 1899) ; G. Kolmer, Parlament und Verfassung in Osterreich, vols. i. to iii. from 1848 to 1885 (Vienna, 1902-1905). For relations with Hungary see J. Andr4ssy, 'Ungarns Ausgleich mit Osterreich, 1867 (Leipzig, 1897) ; L. Eisenmann, Le Compromis austro-hongrois de 1867 (Paris, 1904).

(c) Diplomatic. — A Beer, Zehn Jahre bsterreichischer Politik, 1801- 1810 (Leipzig, 1877), and Die orientalische Politik Osterreichs seit 1774 (Prague and Leipzig, 1883); A. Fournier, Gentz und Cobenzl: Gesch. der ost. Politik in den jahren 1801-1805 (Vienna, 1880); F. von Demelitsch, Metternich und seine auswartige Politik, vol. i. (1809-1812, Stuttgart, 1898); H. Ubersberger, Osterreich und Russland seit dem Ende des i

1907).

(d) Racial Question. — There is a very extensive literature on the question of languages and race in Austria. The best statement of

the legal questions involved is in Josef Ulbrith and Ernst Mischler's Osterr. Staatsworterbuch (3. vols., Vienna, 1894-1897; 2nd ed. 1904, &c). See also Dummreicher, Sudostdeutsche Betrachtungen(Leipzig, 1893); Hainisch, Die Zukunft der Deutsch-Osterreicher (Vienna, 1892); Herkner, Die Zukunft der Deutsch-Osterreicher (ib. 1893); L. Leger, La Save, le Danube et le Balkan (Paris, 1884); Bressnitz von Sydacoff, Die panslavistische Agitation (Berlin, 1899); Bertrand Auerbach, Les Races et les nationalites en Autriche-Hongrie (Paris,

1898).

(e) Biographical. — C. von Wurzbach, Biographisches Lexikon des Kaisertums Osterreich (60 vols., Vienna, 1856-1891); also the All-gemeine deutsche Biographic

Many further authorities, whether works, memoirs or collections of documents, are referred to in the lists appended to the articles in this book on the various Austrian sovereigns and statesmen. For full bibliography see Dahlmann-Waitz, Quellenkunde (ed. 1906, and subsequent supplements) ; many works, covering particular periods, are also enumerated in the bibliographies in the several volumes of the Cambridge Modern History. (W. A. P.)

AUSTRIAN SUCCESSION, WAR OF THE (1740-1-748). This war began with the invasion of Silesia by Frederick II. of Prussia in 1740, and was ended by the peace of Aix-la-Chapelle (Aachen) in 1748. After 1741 nearly all the powers of Europe were involved in the struggle, but the most enduring interest of the war lies in the struggle of Prussia and Austria for Silesia. South- West Germany, the Low Countries and Italy were, as usual, the battle-grounds of France and Austria. The constant allies of France and Prussia were Spain and Bavaria; various other powers at intervals joined them. The cause of Austria was supported almost as a matter of course by England and Holland, the traditional enemies of France. Of Austria's allies from time to time Sardinia and Saxony were the most important.

1. Frederick's Invasion of Silesia, i?4°- — Prussia in 1740 was a small, compact and thoroughly organized power, with an army 100,000 strong. The only recent war service of this army had been in the desultory Rhine campaign of 1733-35- It was therefore regarded as one of the minor armies of Europe, and few thought that it could rival the forces of Austria and France. But it was drilled to a perfection not hitherto attained, and the I

Prussian infantry soldier was so well trained and equipped that

he could fire five shots to the Austrian's three, though the cavalry and artillery were less efficient. But the initial advantage of Frederick's army was that it had, undisturbed by wars, developed the standing army theory to full effect. While the Austrians had to wait for drafts to complete the field forces, Prussian regiments could take the field at once, and thus Frederick was able to overrun Silesia almost unopposed. His army was concentrated quietly upon the Oder, and without declaration of war, on the 16th of December 1740, it crossed the frontier into Silesia. The Austrian generals could do no more than garrison a few fortresses, and with the small remnant of their available forces fell back to the mountain frontier of Bohemia and Moravia. The Prussian army was soon able to go into winter quarters, holding all Silesia and investing the strong places of Glogau, Brieg and Neisse.

2. Silcsian Campaign of 1741. — In February 1741, the Austrians collected a field army under Count Neipperg (1684- 1774) and made preparations to reconquer Silesia. The Austrians in Neisse and Brieg still held out. Glogau, however, was stormed on the night of the 9th of March, the Prussians, under Prince Leopold (the younger) of Anhalt-Dessau, executing their task in one hour with a mathematical precision which excited universal admiration. But the Austrian army in Moravia was now in the field, and Frederick's cantonments were dispersed over all Upper Silesia. It was a work of the greatest difficulty to collect the army, for the ground was deep in snow, and before it was completed Neisse was relieved and the Prussians cut off from their own country by the march of Neipperg from Neisse on Brieg; a few days of slow manoeuvring between these places ended in the battle of Mollwitz (10th April 1 741), the first pitched battle fought by Frederick and his army. The Prussian right wing of cavalry was speedily routed, but the day was retrieved by the magnificent discipline and tenacity of the infantry. The Austrian cavalry was shattered in repeated attempts to ride them down, and before the Prussian volleys the Austrian infantry, in spite of all that Neipperg and his officers could do, gradually melted away. After a stubborn contest the Prussians remained masters of the field. Frederick himself was far away. He

had fought in the cavalry melee, but after this, when the battle seemed lost, he had been persuaded by Field Marshal Schwerin to ride away. – Schwerin thus, like Marshal Saxe at Fontenoy, remained behind to win the victory, and the king narrowly escaped being captured by wandering Austrian hussars. The immediate result of the battle was that the king secured Brieg, and Neipperg fell back to Neisse, where he maintained himself and engaged in a war of manoeuvre during the summer. But Europe realized suddenly that a new military power had arisen, and France sent Marshal Belleisle to Frederick's camp to negotiate an alliance. Thenceforward the " Silesian adventure " became the War of the Austrian Succession. The elector of Bavaria's candidature for the imperial dignity was to be supported by a French "auxiliary" army, and other French forces were sent to observe Hanover. Saxony was already watched by a Prussian army under Prince Leopold of Anhalt- Dessau, the "old Dessauer," who had trained the Prussian army to its present perfection. The task of Sweden was to prevent Russia from attacking Prussia, but her troops were defeated, on the 3rd of September 1741, at Wilmanstrand by a greatly superior Russian army, and in 1742 another great reverse was sustained in the capitulation of Helsingfors. In central Italy an army of Neapolitans and Spaniards was collected for the conquest of the Milanese.

3. The Allies in Bohemia. — The French duly joined the elector's forces on the Danube and advanced on Vienna; but the objective was suddenly changed, and after many counter- marches the allies advanced, in three widely-separated corps, on Prague. A French corps moved via Amberg and Pilsen. The elector marched on Budweis, and the Saxons (who had now joined the allies) invaded Bohemia by the Elbe valley. The Austrians could at first offer little resistance, but before long a considerable force intervened at Tabor between the Danube and the allies, and Neipperg was now on the march from Neisse to

join in the campaign. He had made with Frederick the curious agreement of Klein Schnellendorf (9th October 1741), by which Neisse was surrendered after a mock siege, and the Austrians undertook to leave Frederick unmolested in return for his releasing Neipperg's army for service elsewhere. At the same time the Hungarians, moved to enthusiasm by the personal appeal of Maria Theresa, had put into the field a levee en masse, or " insurrection," which furnished the regular army with an invaluable force of light troops. A fresh army was collected under

Field Marshal Khevenhuller at Vienna, and the Austrians planned an offensive winter campaign against the Franco- Bavarian forces in Bohemia and the small Bavarian army that remained on the Danube to defend the electorate. The French in the meantime had stormed Prague on the 26th of November, the grand-duke Francis, consort of Maria Theresa, who com- manded the Austrians in Bohemia, moving too slowly to save the fortress. The elector of Bavaria, who now styled himself arch- duke of Austria, was crowned king of Bohemia (19th December 1 741) and elected to the imperial throne as Charles VII. (24th January 1742), but no active measures were undertaken. In Bohemia the month of December was occupied in mere skirmishes. On the Danube, Khevenhuller, the best general in the Austrian service, advanced on the 27th of December, swiftly drove back the allies, shut them up in Linz, and pressed on into Bavaria. Munich itself surrendered to the Austrians on the coronation day of Charles VII. At the close of this first act of the campaign the French, under the old Marshal de Broglie, maintained a precarious foothold in central Bohemia, menaced by the main army of the Austrians, and Khevenhuller was ranging unopposed in Bavaria, while Frederick, in pursuance of his secret obligations, lay inactive in Silesia. In Italy the allied Neapolitans and Spaniards had advanced towards Modena, the duke of which state had allied himself with them, but the vigilant Austrian commander Count Traun had outmarched them, captured Modena, and forced the duke to make a separate peace.

4. Campaign of 1742. — Frederick had hoped by the truce to secure Silesia, for which alone he was fighting. But with the successes of Khevenhuller and the enthusiastic ” insurrection ” of Hungary, Maria Theresa’s opposition became firmer, and she divulged the provisions of the truce, in order to compromise Frederick with his allies. The war recommenced. Frederick had not rested on his laurels; in the uneventful summer cam- paign of 1 741 he had found time to begin that reorganization of his cavalry which was before long to make it even more efficient than his infantry. Charles VII., whose territories were overrun by the Austrians, asked him to create a diversion by invading Moravia. In December 1741, therefore, Schwerin had crossed the border and captured Olmiitz. Glatz also was invested, and the Prussian army was concentrated about Olmiitz in January 1742. A combined plan of operations was made by the French, Saxons and Prussians for the rescue of Linz. But Linz soon fell; Broglie on the Moldau, weakened by the departure of the Bavarians to

oppose Khevenhuller, and of the Saxons to join forces with Frederick, was in no condition to take the offensive, and large forces under Prince Charles of Lorraine lay in his front from Budweis to Iglau. Frederick's march was made towards Iglau in the first place. Brttnn was invested about the same time (February), but the direction of the march was changed, and instead of moving against Prince Charles, Frederick pushed on southwards by Znaim and Nikolsburg. The extreme outposts of the Prussians appeared before Vienna. But Frederick's advance was a mere foray, and Prince Charles, leaving a screen of troops in front of Broglie, marched to cut off the Prussians from Silesia, while the Hungarian levies poured into Upper Silesia by the Jablunka Pass. The Saxons, discontented and demoralized, soon marched off to their own country, and Frederick with his Prussians fell back by Zwittau and Leuto- mischl to Kuttenberg in Bohemia, where he was in touch with Broglie on the one hand and (Glatz having now surrendered) with Silesia on the other. No defence of Olmiitz was attempted, and the small Prussian corps remaining in Moravia fell back towards Upper Silesia. Prince Charles, in pursuit of the king

marched by Iglau and Teutsch (Deutsch) Brod on Kuttenberg, and on the 17th of May was fought the battle of Chotusitz or Czaslau, in which after a severe struggle the king was victorious. His cavalry on this occasion retrieved its previous failure, and its conduct gave an earnest of its future glory not only by its charges on the battlefield, but its vigorous pursuit of the defeated Austrians. Almost at the same time Broglie fell upon a part of the Austrians left on the Moldau and won a small, but morally and politically important, success in the action of Sahay, near Budweis (May 24, 1742). Frederick did not propose another combined movement. His victory and that of Broglie dis- posed Maria Theresa to cede Silesia in order to make good her position elsewhere, and the separate peace between Prussia and Austria, signed at Breslau on the nth of June, closed the First Silesian War. The War of the Austrian Succession continued.

5. The French at Prague. — The return of Prince Charles, released by the peace of Breslau, put an end to Broglie's offensive. The prince pushed back the French posts everywhere, and his army converged upon Prague, where, towards the end of June 1742,

the French were to all intents and purposes surrounded. Broglie had made the best resistance possible with his inferior forces, and still displayed great activity, but his position was one of great peril. The French government realized at last that it had given its general inadequate forces. The French army on the lower Rhine, hitherto in observation of Hanover and other possibly hostile states, was hurried into Franconia. Prince Charles at once raised the siege of Prague (September 14), called up Khevenhiiller with the greater part of the Austrian army on the Danube, and marched towards Amberg to meet the new opponent. Marshal Maillebois (1682-1762), its commander, then manoeuvred from Amberg towards the Eger valley, to gain touch with Broglie. Marshal Belleisle, the political head of French affairs in Germany and a very capable general, had accompanied Broglie throughout, and it seems that Belleisle and Broglie believed that Maillebois' mission was to regain a permanent foothold for the army in Bohemia; Maillebois, on the contrary, conceived that his work was simply to disengage the army of Broglie from its dangerous position, and to cover its retreat. His operations were no more than a demonstration, and had so little effect that Broglie was sent for in haste to take over the command from him, Belleisle at the same time taking over charge of the army at Prague. Broglie's command was now on the Danube, east of Regensburg, and the imperial (chiefly Bavarian) army of Charles VII. under Seckendorf aided him to clear-Bavaria of the Austrians. This was effected with ease, for Khevenhiiller and most of his troops had gone to Bohemia. Prince Charles and Khevenhiiller now took post between Linz and Passau, leaving a strong force to deal with Belleisle in Prague. This, under Prince Lobkowitz, was little superior in numbers or quality to the troops under Belleisle, under whom served Saxe and the best of the younger French generals, but its light cavalry swept the country clear of pro- visions. The French were quickly on the verge of starvation, winter had come, and the marshal resolved to retreat. On the night of the 16th of December 1742, the army left Prague to be defended by a small garrison under Chevert, and took the route of Eger. The retreat (December 16-26) was accounted a triumph of generalship, but the weather made it painful and costly. The brave Chevert displayed such confidence that the Austrians were glad to allow him freedom to join the main army. The cause of the new emperor was now sustained only in the valley of the Danube, where Broglie and Seckendorf opposed Prince Charles and Khevenhiiller, who were soon joined by the force lately opposing Belleisle.

In Italy, Traun held his own with ease against the Spaniards and Neapolitans. Naples was forced by a British squadron to withdraw her troops for home defence, and Spain, now too weak to advance in the Po valley, sent a second army to Italy via France. Sardinia had allied herself with Austria, and at the same time neither state was at war with France, and this led to curious complications, combats being fought in the Isere valley between

the troops of Sardinia and of Spain, in which the French took no part.

6. The Campaign of 1743 opened disastrously for the emperor. The French and Bavarian armies were not working well together, and Broglie and Seckendorf had actually quarrelled. No connected resistance was offered to the converging march of Prince Charles's army along the Danube, Khevenhiiller from Salzburg towards southern Bavaria, and Prince Lobkowitz (1685-1755) from Bohemia towards the Naab. The Bavarians suffered a severe reverse near Braunau (May 9, 1743), and now an Anglo-allied army commanded by King George II., which had been formed on the lower Rhine on the withdrawal of Maillebois, was advancing southward to the Main and Neckar country. A French army, under Marshal Noailles, was being collected on the middle' Rhine to deal with this new force. But Broglie was now in full retreat, and the strong places of Bavaria surrendered one after the other to Prince Charles. The French and Bavarians had been driven almost to the Rhine when Noailles and the king came to battle. George, completely outmanoeuvred by his veteran antagonist, was in a position of the greatest danger between Aschaffenburg and Hanau in the defile formed by the Spessart Hills and the river Main. Noailles blocked the outlet and had posts all around, but the allied troops forced their way through and inflicted heavy losses on the French, and the battle of Dettingen is justly reckoned as a notable victory of the British arms (June 27). Both Broglie, who, worn out by age and exertions, was soon replaced by Marshal Coigny (1670-1759), and Noailles were now on the strict defensive behind the Rhine. Not a single French soldier re- mained in Germany, and Prince Charles prepared to force the passage of the great river in the Breisgau while the king of England moved forward via Mainz to co-operate by drawing upon himself the attention of both the French marshals. The Anglo-allied army took Worms, but after several unsuccessful attempts to cross, Prince Charles went into winter quarteis. The king followed his example, drawing in his troops to the north- ward, to deal, if necessary, with the army which the

French were collecting on the frontier of Flanders. Austria, England, Holland and Sardinia were now allied. Saxony changed sides, and Sweden and Russia neutralized each other (peace of Abo, August 1743). Frederick was still quiescent; France, Spain and Bavaria alone continued actively the struggle against Maria Theresa.

In Italy, the Spaniards on the Panaro had achieved a Pyrrhic victory over Traun at Campo Santo (February 8, 1743), but the next six months were wasted in inaction, and Lobkowitz, joining Traun with reinforcements from Germany, drove back the enemy to Rimini. The Spanish-Piedmontese war in the Alps continued without much result, the only incident of note being a combat at Casteldelfino won by the king of Sardinia in person.

7. Campaign of 1744. — With 1744 began the Second Silesian War. Frederick, disquieted by the universal success of the Austrian cause, secretly concluded a fresh alliance with Louis XV. France had posed hitherto as an auxiliary, her officers in Germany had worn the Bavarian cockade, and only with England was she officially at war. She now declared war direct upon Austria and Sardinia (April 1744). A corps was assembled at Dunkirk to support the cause of the Pretender in Great Britain, and Louis in person, with 90,000 men, prepared to invade the Austrian Netherlands, and took Menin and Ypres. His presumed opponent was the allied army previously under King George and now composed of English, Dutch, Germans and Austrians. On the Rhine, Coigny was to make head against Prince Charles, and a fresh army under the prince de Conti was to assist the Spaniards in Piedmont and Lombardy. This plan was, however, at once dislocated by the advance of Charles, who, assisted by the veteran Traun, skilfully manoeuvred his army over the Rhine near Philipsburg (July 1), captured the lines of Weissenburg, and cut off the French marshal from Alsace. Coigny, however, cut his way through the enemy at Weissenburg and posted him- self near Strassburg. Louis XV. now abandoned the invasion of Flanders, and his army moved down to take a decisive part

in the war in Alsace and Lorraine. At the same time Frederick crossed the Austrian frontier (August).

The attention and resources of Austria were fully occupied, and the Prussians were almost unopposed. One column passed through Saxony, another through Lusatia, while a third advanced from Silesia. Prague, the objective, was reached on the 2nd of September. Six days later the Austrian garrison was compelled to surrender, and the Prussians advanced to Budweis. Maria Theresa once again rose to the emergency, a new "insurrection" took the field in Hungary, and a corps of regulars was assembled to cover Vienna, while the diplomatists won over Saxony to the Austrian side. Prince Charles withdrew from Alsace, unmolested by the French, who had been thrown intb confusion by the sudden and dangerous illness of Louis XV. at Metz, Only Seckendorf with the Bavarians pursued him. No move Was made by the French, and Frederick thus found himself after all isolated and exposed to the combined attack of the Austrians and Saxons. Marshal Traun, summoned from the Rhine, held the king in check in Bohemia, the Hungarian irregulars inflicted numerous minor reverses on the Prussians, and finally Prince Charles arrived with the main army. The campaign resembled that of 1742; the Prussian retreat was closely watched, .and the rearguard pressed hard. Prague fell, and Frederick, com- pletely outmanoeuvred by the united forces of Prince Charles and Traun, regained Silesia with heavy losses. At the same time, the Austrians gained no foothold in Silesia itself. On the Rhine, Louis, now recovered, had besieged and taken Freiburg, after which the forces left in the north were reinforced and besieged the strong places of Flanders. There was also a slight war of manoeuvre on the middle Rhine.

In 1744 the Italian war became for the first time serious. A grandiose plan of campaign was formed, and as usual the French and Spanish generals at the front were hampered by the orders of their respective governments. The object was to unite the army in Dauphine with that on the lower Po. The adhesion of Genoa was secured, and a road thereby obtained into central Italy. But Lobkowitz had already taken the offensive and driven back the Spanish army of Count de Gages towards the Neapolitan frontier. The king of Naples at this juncture was compelled to assist the Spaniards at all hazards. A combined army was formed at Velletri, and defeated Lobkowitz there on the nth of August. The crisis past, Lobkowitz then went to Piedmont to assist the king against Conti, the king of Naples returned home, and de Gages followed the Austrians with a weak force. The war in the Alps and the Apennines was keenly contested. Villefranche and

Montalban were stormed by Conti on the 20th of April, a desperate fight took place at Peyre-Longue on the 1 8th of July, and the king of Sardinia was defeated in a great battle at Madonna del Olmo (September 30) near Coni (Cuneo) . Conti did not, however, succeed in taking this fortress, and had to retire into Dauphine for his winter quarters. The two armies had, therefore, failed in their attempt to combine, and the Austro-Sardinians still lay between them.

8. Campaign of 1745. — The interest of the next campaign centres in the three greatest battles of the war — Hohenfriedberg, Kesselsdorf and Fontenoy. The first event of the year was the Quadruple Alliance of .England, Austria, Holland and Saxony, concluded at Warsaw on the 8th of January. Twelve days previously, the death of Charles VII. submitted the imperial title to a new election, and his successor in Bavaria was not a candidate. The Bavarian army was again unfortunate; caught in its scattered winter quarters (action of Amberg, January 7), it was driven from point to point, and the young elector had to abandon Munich once more. The peace of Fussen followed on the 22nd of April, by which he secured his hereditary states on condition of supporting the candidature of the grand-duke Francis, consort of Maria Theresa. The '■' imperial " army ceased ipso foclo to exist, and Frederick was again isolated. No help was to be expected from France, whose efforts this year were centred on the Flanders campaign. In effect, on the 10th of May, before Frederick took the field, Louis XV. and Saxe had besieged Tournay, and inflicted upon the relieving army of

the duke of Cumberland the great defeat of Fontenoy (

o. Operations in Italy, 1745-1747. — The campaign in Italy this year was also no mere war of posts. In March 1745 a secret treaty allied the Genoese republic with France, Spain and Naples. A change in the command of the Austrians favoured the first move of the allies, De Gages moved from Modena towards Lucca, the French and Spaniards in the Alps under Marshal Maillebois advanced through the Riviera to the Tanaro, and in the middle of July the two armies were at last concentrated between the Scrivia and the Tanaro, to the unusally large number of 80,000. A swift march on Piacenza drew the Austrian commander thither, and in his absence the allies fell upon and completely defeated the Sardinians at Bassignano (September 27), a victory which was quickly followed by the capture of Alessandria, Valenza and Casale. Jomini calls the concentration of forces which effected

the victory " le plus remarquable de toute la guerre." But the complicated politics of Italy brought it about that Maillebois was ultimately unable to turn his victory to account. Indeed, early in 1 746, Austrian troops, freed by the peace with Frederick, passed through Tirol into Italy; the Franco-Spanish winter quarters were "brusquely attacked, and a French garrison of 6000 men at Asti was forced to capitulate. At the same time Count Browne with an Austrian corps struck at the allies on the lower Pp, and cut off their communication with the main body

in Piedmont. A series of minor actions thus completely destroyed the great concentration. The allies separated, Maillebois covering Liguria, the Spaniards marching against Browne. The latter was promptly and heavily reinforced, and all that the Spaniards could do was to entrench themselves at Piacenza; the Spanish Infant as supreme commander calling up Maillebois to his aid. The French, skilfully conducted and marching rapidly, joined forces once more, but their situation was critical, for only two marches behind them the army of the king of Sardinia was in pursuit, and before them lay the principal army of the Austrians. The pitched battle of Piacenza (June 16) was hard fought, and Maillebois had nearly achieved a victory when orders from the Infant compelled him to retire. That the army escaped at all was in the highest degree creditable to Maillebois and to his son and chief of staff, under whose leadership it eluded both the Austrians and the Sardinians, defeated an Austrian corps in the battle of Rottofreddo (August 12), and made good its retreat on Genoa. It was, however, a mere remnant of the allied army which returned, and the Austrians were soon masters of north Italy, including Genoa (September). But they met with no success in their forays towards the Alps. Soon Genoa revolted from the oppressive rule of the victors, rose and drove out the Austrians (December 5-1 1), and the French, now commanded by Belleisle, took the offensive (1747). Genoa held out against a second Austrian siege, and after the plan of campaign had as usual been referred to Paris and Madrid, it was relieved, though a picked corps of the French army under the chevalier de Belleisle, brother of the marshal, was defeated in the almost impossible attempt (July 19) to storm the en- trenched pass of Exiles (Col di Assietta), the chevalier, and with him the elite of the French nobility, being killed at the barricades. Before the steady advance

of Marshal Belleisle the Austrians retired into Lombardy, and a desultory campaign was waged up to the conclusion of peace.

In North America the most remarkable incident of what has been called " King George's War " was the capture of the French Canadian fortress of Louisburg by a British expedition (April 20-June 16, 1745), of which the military portion was furnished by the colonial militia under Colonel (afterwards Lieutenant-General Sir William) Pepperell (1696-1759) of Maine. Louisburg was then regarded merely as a nest of priva- teers, and at the peace it was given up, but in the: Seven Years' War it came within the domain of grand strategy, and its second capture was the preliminary step to the British conquest of Canada. For the war in India, see India: History.

10. Later Campaigns. — The last three campaigns of the war in the Netherlands were illustrated by the now fully developed genius of Marshal Saxe. After Fontenoy the French carried all before them. The withdrawal of most of the English to aid in suppressing the 'Forty-Five rebellion at home left their allies in a helpless position. In 1746 the Dutch and the Austrians were driven back towards the line of the Meuse, and most of the important fortresses were taken by the French. The battle of Roucoux (or Raucourt) near Li6ge, fought on the 1 ith of October between the allies under Prince Charles of Lorraine and the French under Saxe, resulted in a victory for the latter. Holland itself was now in danger, and when in April 1747 Saxe's army, which had now conquered the Austrian Netherlands up to the Meuse, turned its attention to the United Provinces, the old fortresses on the frontier offered but slight resistance. The prince of Orange and the duke of Cumberland underwent a severe defeat at Lauffeld (Lawfeld, &c, also called Val) on the 2nd of July 1747, and Saxe, after his victory, promptly and secretly despatched a corps under (Marshal) Lowendahl to besiege Bergen – op-Zoom. On the 18th of September Bergen-op-Zoom was stormed by the French, and in the last year of the war Maestricht, attacked by the entire forces of Saxe and La wendahl, surrendered on the 7 th of May 1748. A large Russian army arrived on the Meuse to join the allies, but too late to be of use. The quarrel of Russia and Sweden had been settled by the peace of Abo in 1 743, and in 1 746 Russia had allied herself with Austria. Eventu- ally a large army marched from Moscow to the Rhine, an event

which was not without military significance, and in a manner

preluded the great invasions of 1813-1814 and 1815. The general peace of Aix-la-Chapelle (Aachen) was signed on the 18th of October 1 748.

11. General Character of the War. — Little need be said of the military features of the war. The intervention of Prussia as a military power was indeed a striking phenomenon, but her triumph was in a great measure due to her fuller application of principles of tactics and discipline universally recognized though less universally enforced. The other powers reorganized their forces after the war, not so much on the Prussian model as on the basis of a stricter application of known general principles. Prussia, moreover, was far ahead of all the other continental powers in administration, and over Austria, in particular, her advantage in this matter was almost decisive of the struggle. Added to this was the personal ascendancy of Frederick, not yet a great general, but energetic and resolute, and, further, opposed to generals who were responsible for their men to their individual sovereigns. These advantages have been decisive in many wars, almost in all. The special feature of the war of 1740 to 1748, and of other wars of the time, is the extraordinary disparity between the end and the means. The political schemes to be executed by the French and other armies were as grandiose as any of modern times; their execution, under the then conditions of time and space, invariably fell short of expectation, and the history of the war proves, as that of the Seven Years' War was to prove, that the small standing army of the 18th century could conquer by degrees, but could not deliver a decisive blow. Frederick alone, with a definite end and proportionate means wherewith to achieve it, succeeded completely. The French, in spite of their later victories, obtained so little of what they fought for that Parisians could say to each other, when they met in the streets, " You are as stupid as the Peace." And if, when fighting for their own hand, the governments of Europe could so fail of their purpose, even less was to be expected when the armies were composed of allied contingents, sent to the war each for a different object. The allied national armies of 18 13 co-operated loyally, for they had much at stake and worked for a common object; those of 1741 represented the divergent private interests of the several dynasties, and achieved nothing.

Bibliography. — Besides general works on Frederick's life arid reign, of which Carlyle, Preuss and v. Taysen are of particular importance, and Frederick's own works, see the Prussian official Die I. und II, schlesischen Kriege (Berlin, 1890-1895): Austrian

official Kriege der Kaiserin Maria Theresia; Gesch. des Osterr. Erbfolge- krie'ges (Vienna, from I895); Jomini, Traiti des grandes operations militaires, introduction to vol. i. (Paris, 4th edition, 1851); C. von B.-K., Geist und Stoff im Kriege (Vienna, 1895); v. Arneth, Maria Teresiqs ersten Regierungsjahre (1863) ; v.Schoning, Die J ersle Jahre der Regierung Friedrichs des Grossen; Bernhardt, Friedrich der Grosse als Feldherr (Berlin, 1881); v. Canitz, Nachrichten, &fc., fiber die Taten und Schicksale der Reiterei, &c. (Berlin, 1861) ; Griinhagen, Gesch. des I. schlesischen Krieges (Gotha, 1881-1882); Orlich, Gesch- der schlesischen. Kriege; Deroy, Beitrage zur Gesch. des osterr. Erbfolgekrieges (Munich, 1883); Crousse, La Guerre de la succession dans les provinces belgiques (Paris, 1885) ; Duncker, Militarische, &c, Aktenstiicke zur Gesch. des I. schles. Krieges; Militar-Wochenblatt supplements 1875, 1877, 1878, 1883, 1891, 1901, &c. (Berlin); Mit- teilungen des k.k. Kriegsarchivs, from 1887 (Vienna) ; Baumgart, Die Litteratur, &c, fiber Friedrich d. Gr. (Berlin, 1886); Fortescue, History of the British Army, vol. ii. ; F. H. Skrine, Fontenoy and the War of the Austrian Succession (London, 1906); Francis Parkman, A Half-Century of Conflict (1892). (C. F. A.)

Nflval Operations.

The naval operations of this war were languid and confused. They are complicated by the fact that they were entangled with the Spanish war, which broke out in 1739 in consequence of the long disputes between England and Spain over their conflicting claims in America. Until the closing years they were conducted with small intelligence or spirit. The Spanish government was nerveless, and sacrificed its true interest to the family ambition of the king Philip V., who wished to establish his younger sons as ruling princes in Italy. French administration was corrupt, and the government was chiefly concerned in its political interests in Germany. The British navy was at its lowest point of energy

and efficiency after the long administration of Sir Robert Walpole. Therefore, although the war contained passages of vigour, it was neither interesting nor decisive on the sea.

War on Spain was declared by Great Britain on the 23rd of

October 1739. It was universally believed that the Spanish colonies would fall at once before attack. A plan was laid for combined operations against them from east and west. One force, military and naval, was to assault them from the West Indies under Admiral Edward Vernon. Another, to be commanded by Commodore George Anson, afterwards Lord Anson, was to round Cape Horn and to fall upon the Pacific coast. Delays, bad preparations, dockyard corruption, and the unpatriotic squabbles of the naval and military officers concerned caused the failure of a hopeful scheme. On the 21st of November 1739 Admiral Vernon did indeed succeed in capturing the ill-defended Spanish harbour of Porto Bello (in the present republic of Panama) — a trifling success to boast of. But he did nothing to prevent the Spanish convoys from reaching Europe. The Spanish privateers cruised with destructive effect against British trade, both in the West Indies and in European waters. When Vernon had been joined by Sir Chaloner Ogle with naval reinforcements and a strong body of troops, an attack was made on Cartagena in what is now Colombia (March o-April 24, 1741). The delay had given the Spanish admiral, Don Bias de Leso, time to prepare, and the siege failed with a dreadful loss of life to the assailants. Want of success was largely due to the incompetence of the military officers and the brutal insolence of the admiral. The war in the West Indies, after two other unsuccessful attacks had been made on Spanish territory, died down and did not revive till 1748. The expedition under Anson sailed late, was very ill provided, and less strong than had been intended. It consisted of six ships and left England on the 18th of September 1740. Anson returned alone with his flagship the ” Centurion ” on the 15th of June 1744. The other vessels had either failed to round the Horn or had been lost. But Anson had harried the coast of Chile and Peru and had captured a Spanish galleon of immense value near the Philippines. His cruise was a great feat of resolution and endurance.

While Anson was pursuing his voyage round the world, Spain was mainly intent on the Italian policy of the king. A squadron was fitted out at Cadiz to convey troops to Italy. It was watched by the British admiral Nicholas Haddock. When the blockading squadron was forced off by want of provisions, the Spanish admiral Don Jose Navarro put to sea. He was followed, but when the British force Came in sight of him Navarro had been joined by a French squadron under M. de Court (December 1 741). The French admiral announced that he would support the Spaniards

if they were attacked and Haddock retired. France and Great Britain were not yet openly at war, but both were engaged in the struggle in Germany — Great Britain as the ally of the queen of Hungary, Maria Theresa; France as the supporter of the Bavarian claimant of the empire. Navarro and M. de Court went on to Toulon, where they remained till February 1744. A British fleet watched them, under the command of admiral Richard Lestock, till Sir Thomas Mathews was sent out as commander-in-chief, and as minister to the court of Turin. Partial manifestations of hostility between the French and British took place in different seas, but avowed war did not begin till the French government issued its declaration of the 30th of March, to which Great Britain replied on the 31st. This formality had been preceded by French preparations for the invasion of England, and by a collision between the allies and Mathews in the Mediterranean (see Toulon, Battle of). On the 1 ith of February a most confused battle was fought, in which the van and centre of the British fleet was engaged with the rear and centre of the allies. Lestock, who was on the worst possible terms with his superior, took no part in the action. He en- deavoured to excuse himself by alleging that the orders of Mathews were contradictory. Mathews, a puzzle-headed and hot-tempered man, fought with spirit but in a disorderly way, breaking the formation of his fleet, and showing no power of direction. The mismanagement of the British fleet in the battle,

by arousing deep anger among the people, led to a drastic reform of the British navy which bore its first fruits before the war ended.

The French invasion scheme was arranged in combination with the Jacobite leaders, and soldiers were to be transported from Dunkirk. But though the British government showed itself wholly wanting in foresight, the plan broke down. In February 1744, a French fleet of twenty sail of the line entered the Channel under Jacques Aymar, comte de Roquefeuil, before the British force under admiral John Norris was ready to oppose him. But the French force was ill equipped, the admiral was nervous, his mind dwelt on all the misfortunes which might possibly happen, and the weather was bad. M. de Roquefeuil came up almost as far as the Downs, where he learnt that Sir John Norris was at hand with twenty-five sail of the line, and thereupon precipitately retreated. The military expedition prepared at Dunkirk to cross under cover of Roquefeuil's fleet naturally did not start. The utter weakness of the French at sea, due to long neglect of the fleet

and the bankrupt state of the treasury, was shown during the Jacobite rising of 1745, when France made no attempt to profit by the distress of the British government. The Dutch having by this time joined Great Britain, made a serious addition to the naval power opposed to France, though Holland was compelled by the necessity for maintaining an army in Flanders to play a very subordinate part at sea. Not being stimulated by formidable attack, and having immediate interests both at home and in Germany, the British government was slow to make use of its latest naval strength. Spain, which could do nothing of an offensive character, was almost neglected. During 1745 the New England expedition which took Louisburg (April 30-June 16) was covered by a British naval force, but the opera- tions were in a general way sporadic, subordinated to the supply of convoy, or to unimportant particular ends. In the East Indies, Mahe de la Bourdonnais made a vigorous use of a small squadron to which no effectual resistance was offered by the British naval forces. He captured Madras (July 24-September 9, 1746), a set-off for Louisburg, for which it was exchanged at the close of the war. In the same year a British combined naval and military expedition to the coast of France — the first of a long series of similar ventures which in the end were derided as " breaking windows with guineas " — was carried out during August and October. The aim was the capture of the French East India company's dockyard at L'Orient, but it was not attained.

From 1747 till the close of the war in October 1748 the naval policy of the British government, without reaching a high level, was yet more energetic and coherent. A closer watch was kept on the French coast, and effectual means were taken to intercept communication between France and her American possessions. In the spring information was obtained that an important convoy for the East and West Indies was to sail from L'Orient. In the previous year the British government had allowed a French expedition under M. d'Anville to fail mainly by its own weakness. In 1747 a more creditable line was taken. An overwhelming force was employed under the command of Anson to intercept the convoy in the Channel. It was met, crushed and captured, or driven back, on the 3rd of May. On the 14th of October another French convoy, protected by a strong squadron, was intercepted by a well-appointed and well-directed squadron of superior numbers — the squadrons were respectively eight French and fourteen British — in the Bay of Biscay. The French admiral Desherbiers de l'Etenduere made a very gallant, resist- ance, and

the fine quality of his ships enabled him to counteract to some extent the superior numbers of Sir Edward Hawke, the British admiral. While the war-ships were engaged, the merchant vessels, with the small protection which Desherbiers could spare them, continued on their way to the West Indies. Most of them were, however, intercepted and captured in those waters. This disaster convinced the French government of its helplessness at sea, and it made no further effort.

The last naval operations took place in the West Indies, where the Spaniards, who had for a time been treated as a negli- gible quantity, were attacked on the coast of Cuba by a British

squadron under Sir Charles Knowles. They had a naval force under Admiral Regio at Havana. Each side was at once anxious to cover its own trade, and to intercept that of the other. Capture was rendered particularly desirable to the British by the fact that the Spanish homeward-bound convoy would be laden with the bullion sent from the American mines. In the course of the movement of each to protect its trade, the two squadrons met on the ist of October 1 748 in the Bahama Channel. The action was indecisive when compared with the successes of British fleets in later ‘days, but the advantage lay with Sir Charles Knowles. He was prevented from following it up by the speedy receipt of the news that peace had been made in Europe by the powers, who were all in various degrees exhausted. That it was arranged on the terms of a mutual restoration of conquests shows that none of the combatants could claim to have estab- lished a final superiority. The conquests of the French in the Bay of Bengal, and their military successes in Flanders, enabled them to treat on equal terms, and nothing had been taken from Spain.

The war was remarkable for the prominence of privateering on both sides. It was carried on by the Spaniards in the West Indies with great success, and actively at home. The French were no less active in all seas. Mahe de la Bourdonnais’s attack on Madras partook largely of the nature of a privateering venture. The British retaliated with vigour. The total number of captures by French and Spanish corsairs was in all probability larger than the list of British — partly for the reason given by Voltaire, namely, that more British merchants were taken because there were many

more British merchant ships to take, but partly also because the British government had not yet begun to enforce the use of convoy so strictly as it did in later times.

See Beatson's Naval and Military Memoirs (London, 1804) ; La Marine militaire de la France sous le regne de Louis XV, by G. Lacour-Gayet (Paris, 1902); The Royal Navy, by Sir W. L. Clowes and others (London, 1891, &c). (D. H.)

AUTHENTIC (from Gr. avdtvrns, one who does a thing himself), genuine, as opposed to counterfeit, true or original. In music it is one of the terms used for the ecclesiastical modes. The title of A uthentics was also used for Justinian's Novells.

AUTOCEPHALOUS (from Gr. afrros, self, and Kt4>a\i), head), of independent headship, a term used of certain ecclesiastical functionaries and organizations.

AUTOCHTHONES (Gr. abrbs, and xˆwi», earth, i.e. people sprung from earth itself; Lat. terrigenae; see also under Aborigines), the original inhabitants of a country as opposed to settlers, and those of their descendants who kept themselves free from an admixture of foreign peoples. The practice in ancient Greece of describing legendary heroes and men of ancient lineage as " earthborn " greatly strengthened the doctrine of autochthony; for instance, the Athenians wore golden grasshoppers in their hair in token that they were born from the soil and had always lived in Attica (Thucydides i. 6; Plato, Menexenus, 245). In Thebes, the race of Sparti were believed to have sprung from a field sown with dragons' teeth. The Phrygian Corybantes had been forced out of the hill-side like trees by Rhea, the great mother, and hence were called 8evdpo4>veis. It is clear from Aeschylus (Prometheus, 447) that primitive men were supposed to have at first lived like animals in caves and woods, till by the help of the gods and heroes they were raised to a stage of civilization.

AUTOCLAVE, a strong closed vessel of metal in which liquids can be heated above their boiling points under pressure. Etymologically the word indicates a self-closing vessel (avrbs, self, and clavis, key, or clavus, nail), in which the tightness of the joints is maintained by the internal pressure, but this characteristic is frequently wanting in the actual apparatus to which the name is applied. The prototype of the autoclave was the digester of Denis Papin, invented in 1681, which is still used in cooking, but the appliance finds a much wider range of employment in chemical industry, where it is utilized in various forms in the manufacture of candles, coal-tar colours, &c. Frequently an agitator, passing through a stuffing-box, is fitted so

that the

contents may be stirred, and renewable linings are provided in cases where the substances under treatment exert a corrosive action on metal.

AUTOCRACY (Gr. avroKparua, absolute power), a term applied to that form of government which is absolute or irre- sponsible, and vested in one single person. It is a type of government usually found amongst eastern peoples; amongst more civilized nations the only example is that of Russia, where the sovereign assumes as a title " the autocrat of all the Russias."

AUTO-DA-FE\ more correctly Atjto-de-fe (act of faith), the name of the ceremony during the course of which the sentences of the Spanish inquisition were read and executed. The auto- da-fe was almost identical with the sermo generalis of the medieval inquisition. It never took place on a feast day of the church, but on some famous anniversary: the accession of a Spanish monarch, his marriage, the birth of an infant, &c. It was public : the king, the royal family, the grand councils of the kingdom, the court and the people being present. The ceremony comprised a procession in which the members of the Holy Office, with its familiars and agents, the condemned persons and the penitents took part; a solemn mass; an oath of obedience to the inquisi- tion, taken by the king and all the lay functionaries; a sermon by the Grand Inquisitor; and the reading of the sentences, either of condemnation or acquittal, delivered by the Holy Office. The handing over of impenitent persons, and those who had relapsed, to the secular power, and their punishment, did not usually take place on the occasion of an auto-da-fe, properly so called. Sometimes those who were condemned to the flames were burned on the night following the ceremony. The first great auto- da-fes were celebrated when Thomas de Torquemada, was at the head of the Spanish inquisition (Seville 1482, Toledo 1486, &c). The last, subsequent to the time of Charles III., we* held in secret; moreover, they dealt with only a very small number of sentences, of which hardly any were capital. The isolated cases of the torturing of a revolutionary priest in Mexico in 1816, and of a relapsed Jew and of a Quaker in Spain during 1826, cannot really be considered as auto-da-fes. (P. A.)

AUTOGAMY (from Gr. avros, self, and ya/iia, marriage), a botanical term for self-fertilization. (See Angiosferms.)

AUTOGENY, AUTOGENOUS (Gr. avroyevris), spontaneous generation, self-produced. Haeckel distinguished autogeny and plasmogeny, applying the former term when the formative fluid in which the first living matter was supposed to arise was in-organic and the latter when it was organic, i.e. contained the requisite fundamental substances dissolved in the form of complicated and fluid combinations of carbon. In ” autogenous soldering ” two pieces of metal are united by the melting of the opposing surfaces, without the use of a separate fusible alloy or solder as a cementing material.

AUTOGRAPHS. Autograph (Gr. avros, self, yphfaiv, to write) is a term applied by common usage either to a document signed by the person from whom it emanates, or to one written entirely by the hand of such person (which, however, is also more technically described as holograph, from oXos, entire, ypaeiv, to write), or simply to an independent signature.

The existence of autographs must necessarily have been coeval with the invention of letters. Documents in the hand- writing of their composers may possibly exist among the early papyri of Egypt and the clay tablets of Babylonia and Assyria, and among the early examples of writing in the East. But the oriental practice of employing professional ‘ scribes in writing the body of documents and of using seals for the purpose of ” signing ” (the ” signum ” originally meaning the impression of the seal) almost precludes the idea. When we are told (1 Kings xxi. 8) that Jezebel wrote letters in Ahab’s name and sealed them with his seal, we are, of course, .to understand that the letters were written by the professional scribes and that the impression of the king’s seal was the authentication, equivalent to the signature of western nations; and again, when King Darius ” signed ” the writing and the decree (Dan. vi. 9), he did so with his seal. To find documents which we can

recognize with certainty to be autographs, we must descend to the Ptolemaic and Roman periods of Egyptian history, which are represented by an abundance of papyrus documents of all kinds, chiefly in Greek. Among them are not a few original letters and personal documents, in which we may see the hand- writing of many lettered and unlettered individuals who lived during the

3rd century B.C. and in succeeding times, and which prove how very widespread was the practice of writing in those days. We owe it to the dry and even atmosphere of Egypt that these written documents have been preserved in such numbers. On the other hand, in Italy and Greece ancient writings have perished, save the few charred papyrus rolls and waxen tablets which have been recovered from the ruins of Herculaneum and Pompeii. These tablets, however, have a special value, for many of them contain autograph signatures of principals and witnesses to legal deeds to which they were attached, together with im- pressions of seals, in compliance with the Roman law which required the actual subscriptions, or attested marks, of the persons concerned.

But, when we now speak of autographs and autograph collec- tions, we use such terms in a restricted sense and imply documents or signatures written by persons of some degree of eminence or notoriety in the various ranks and professions of life; and naturally the only early autographs in this sense which could be expected to survive are the subscriptions and signatures of royal personages and great officials attached to important public deeds, which from their nature have been more jealously cared for than mere private documents.

Following the Roman practice, subscriptions and signatures were required in legal documents in the early centuries of our era. Hence we find them in the few Latin deeds on papyrus which have come to light in Egypt; we find them on the well- known Dacian waxen tablets of the 2nd century; and weˆ£nd them in the series of papyrus deeds from Ravenna and dther places in Italy between the 5th and 10th centuries. The same practice obtained in the Frankish empire. The Merovingian kings, or at least those of them who knew how to write, sub- scribed their diplomas and great charters with their own hands; and their great officers of state, chancellors and others, counter- signed in autograph. The unlettered Merovingian kings made use of monograms composed of the letters of their names; and, curiously, the illiterate monogram was destined to supersede the literate subscriptions. For the monogram was adopted by Charlemagne and his successors as a recognized symbol of their subscription. It was their signum manuale, their sign manual. In courtly imitation of the royal practice, monograms and other marks were adopted by official personages, even though they could write. The notarial marks of modern times are a survival of the practice. By the illiterate other signs, besides the mono- gram, came to be employed, such as the cross, &c, as signs manual. The monogram

was used by French monarchs from the reign of Charlemagne to that of Philip the Fair, who died in 1314. It is very doubtful, however, whether in any instance this sign manual was actually traced by the monarch's own hand. At the most, the earlier sovereigns appear to have drawn one or two strokes in their monograms, which, so far, may be called their autographs. But in the later period not even this was done; the monogram was entirely the work of the scribe. (See Diplomatic.)

The employment of marks or signs manual went out of general use after the 12 th century, in the course of which the affixing or appending of seals became the common method of executing deeds. But, as education became more general and the practice of writing more widely diffused, the usage grew up in the course of the 14th century of signing the name-signature as well as of affixing the seal; and by the 15th century it had become established, and it remains to the present time. Thus the signum manuale had disappeared, except among notaries; but the term survived, and by a natural process it was transferred to the signature. In the present day it is used to designate the " sign manual " or autograph signature of the sovereign. The Anglo-Saxon kings of England did not sign their charters,

their names being invariably written by the official scribes. After the Norman conquest, the sign manual, usually a cross, which sometimes accompanied the name of the sovereign, may in some instances be autograph; but no royal signature is to be found earlier than the reign of Richard II. Of the signatures of this king there are two examples, of the years 1386 and 1389, in the Public Record Office; and there is one, of 1397, in the British Museum. Of his father, the Black Prince, there is in the Record Office a motto-signature, De par Homont (high courage), Ich dene, subscribed to a writ of privy seal of 1370. The kings of the Lancastrian line were apparently ready writers. Of the handwriting of both Henry IV. and Henry V. there are specimens both in the Record Office and in the British Museum. But by their time writing had become an ordinary accomplishment.

Apart from the autographs of sovereigns, those of famous men of the early middle ages can hardly be said to exist, or, if they do exist, they are difficult to identify. For example, there is a charter at Canterbury bearing the statement that it was written by Dunstan; but, as there is a duplicate in the British Museum with the same statement, it is probable that both the one and the other are copies. The autograph MSS. of the chronicles of

Ordericus Vitalis, of Robert de Monte, and of Sigebert of Gembloux are in existence; and among the Cottonian MSS. there are undoubtedly autograph writings of Matthew of Paris, the English chronicler of Henry III.'s reign. There are certain documents in the British Museum in the hand of William of Wykeham; and among French archives there are autograph writings of the historian Joinville. These are a few instances: When we come to such a collection as the famous Paston Letters, the correspondence of the Norfolk family of Paston of the 15th century, we find therein numerous autographs of historical personages of the time.

From the 16th century onward, we enter the period of modern history, and autograph documents of all kinds become plentiful. And yet in the midst of this plenty, by a perverse fate, there is in certain instances a remarkable dearth. The instance of Shakespeare is the most famous. But for three signatures to the three sheets of his will, and two signatures to the conveyances of property in Blackfriars, we should be without a vestige of his handwriting. For certain other signatures, professing to be his, inscribed in books, may be dismissed as imitations,. Such forgeries come up from time to time, as might be expected, and are placed upon the market. The Shakespearean forgeries, however, of W. H. Ireland were perpetrated rather with a literary intent than as an autographic venture.

Had autograph collecting been the fashion in Shakespeare's days, we should not have had to deplore the loss of his and of other great writers' autographs. But the taste had not then come into vogue, at least not in England. The series of auto- graph documents which were gathered in such a library as that of Sir Robert Cotton, now in the British Museum, found their way thither on account of their literary or historic interest, and not merely as specimens of the handwriting of distinguished men. Such a series also as that formed by Philippe de Bethune, Comte de Selles et Charost, and his son, in the reign of Louis XIV., consisting for the most part of original letters and papers, now in the Bibliotheque Nationale, might have been regarded as the result of autograph collecting did we not know that it was brought together for historical purposes. It was in Germany and the Low Countries that the practice appears to have origi- nated, chiefly among students and other members of the universities, of collecting autograph inscriptions and signatures of one's friends in albums, alba amicorum, little oblong pocket volumes of which a considerable number have survived, a very fair collection being

in the British Museum. The earliest album in the latter series is the Egerton MS. n 78, beginning with an entry of the year 1554- Once the taste was established, the collecting of autographs of living persons was naturally extended to those of former times; and many collections, famous in their day, have been formed, but in most instances only to be dispersed again as the owners tired of their fancy or as their heirs failed to inherit their tastes along with their

possessions. The most celebrated collection formed in England in recent years is that of the late Mr Alfred Morrison, which still remains intact, and which is well known by means of the sumptuous catalogue, with its many facsimiles, compiled by the owner.

The rivalry of collectors and the high prices which rare or favourite autographs realize have naturally given encouragement to the forger. False letters of popular heroes and of popular authors, of Nelson, of Burns, of Thackeray, and of others, appear from time to time in the market: in some instances clever imitations, but more generally too palpably spurious to deceive any one with experience. Like the Shakespearean forgeries of Ireland, referred to above, the forgeries of Chatterton were literary inventions; and both were poor performances. One of the cleverest frauds of this nature in modern times was the fabrication, in the middle of the 19th century, of a series of letters of Byron and Shelley, with postmarks and seals complete, which were even published as bona fide documents (Brit. Mus., Add. MS. 19,377).

There are many published collections of facsimiles of autographs of different nations. Among those published in England the follow- ing may be named: — British Autography, by J. Thane (1788-1793, with supplement by Daniell, 1854) ; Autographs of Royal, Noble, Learned and Remarkable Personages in English History, by J. G. Nichols (1829) ; Facsimiles of Original Documents of Eminent Literary Characters, by C. J. Smith (1852) ; Autographs of the Kings and Queens and Eminent Men of Great Britain, by J. Netherclift (I835); One Hundred Characteristic Autograph Letters, by J. Nether- clift and Son (1849) ; The Autograph Miscellany, by F. Netherclift (1855); The Autograph

Souvenir, by F. G. Netherclift and R. Sims (1865); The Autographic Mirror (1864-1866); The Handbook of Autographs, by F. G. Netherclift (1862) ; The Autograph Album, by L. B. Phillips (1866); Facsimiles of Autographs (British Museum publication), five series (1896-1900). Facsimiles of autographs also appear in the official publications, Facsimiles of National MSS., from William the Conqueror to Queen Anne (Master of the Rolls), 1865-1868; Facsimiles of National MSS. of Scotland (Lord Clerk Register), 1867-1871; and Facsimiles of National MSS. of Ireland (Public Record Office, Ireland), 1874-1884. (E. M. T.)

AUTOLYCUS, in Greek mythology, the son of Hermes and father of Anticleia, mother of Odysseus. He lived at the foot of Mount Parnassus, and was famous as a thief and swindler. On one occasion he met his match. Sisyphus, who had lost some cattle, suspected Autolycus of being the thief, but was unable to bring it home to him, since he possessed the power of changing everything that was touched by his hands. Sisyphus accordingly burnt his name into the hoofs of his cattle, and, during a visit to Autolycus, recognized his property. It is said that on this occasion Sisyphus seduced Autolycus's daughter Anticleia, and that Odysseus was really the son of Sisyphus, not of Laertes, whom Anticleia afterwards married. The object of the story is to establish the close connexion between Hermes, the god of theft and cunning, and the three persons — Sisyphus, Odysseus, Autolycus — who are the incarnate representations of these practices. Autolycus is also said to have instructed Heracles in the art of wrestling, and to have taken part in the Argonautic expedition.

Iliad, x. 267; Odyssey, xix. 395; Ovid, Metam. xi. 313; Apollodorus i. 9; Hyginus, Fab. 201.

AUTOLYCUS OF PITANE, Greek mathematician and astro- nomer, probably flourished in the second half of the 4th century B.C., since he is said to have instructed Arcesilaus. His extant works consist of two treatises; the one, Uepl Kivovfihrjs acfraipas, contains some simple propositions on the motion of the sphere, the other, Ilepi tmroXSiv ko.1 Sbaeoiv, in two books, discusses the rising and setting of the fixed stars. The former treatise is historically interesting for the light it throws on the development which the geometry of the sphere had already reached even before Autolycus and Euclid (see Theodositis or Tripolis).

There are several Latin versions of Autolycus, a French

translation by Forcadel (1572), and an admirable edition of the Greek text with Latin translation by F. Hultsch (Leipzig, 1885).

AUTOMATIC WRITING, the name given by students of psychical-research to writing performed without the volition of the agent. The writing may also take place without any consciousness of the words written ; but some automatists are

aware of the word which they are actually writing, and perhaps of two or three words on either side, though there is rarely any clear perception of the meaning of the whole. Automatic writing may take place when the agent is in a state of trance, spontaneous or induced, in hystero-epilepsy or other morbid states; or in a condition not distinguishable from normal wakefulness. Auto- matic writing has played an important part in the history of modern spiritualism. The phenomenon first appeared on a large scale in the early days (c. 1850-1860) of the movement in America. Numerous writings are reported at that period, many of con- siderable length, which purported for the most part to have been produced under spirit guidance. Some of these were written in ” unknown tongues.” Of those which were published the most notable are Andrew J. Davis’s Great Harmania, Charles Linton’s The Healing of the Nations, and J. Murray Spear’s Messages from the Spirit Life.

In England also the early spiritualist newspapers were filled with ” inspirational ” writing, — Pages of the Paraclete, &c. The most notable series of English automatic writings are the Spirit Teachings of the Rev. W. Stainton Moses. The phenomenon, of course, lends itself to deception, but there seems no reason to doubt that in the great majority of the cases recorded the writing was in reality produced without deliberate volition. In the earlier years of the spiritualist movement, a ” planchette,” a little heart-shaped board running on wheels, was employed to facilitate the process of writing.

Of late years, whilst the theory of external inspiration as the cause of the phenomenon has been generally discredited, auto-matic writing has been largely employed as a method of experi-mentallyˆinvestiga ting subconscious mental processes. Knowledge which had lapsed from the primary consciousness is frequently revealed by this means; e.g. forgotten fragments of poetry or foreign languages are occasionally given. An experimental parallel to this reproduction of forgotten knowledge was devised by Edmund Gurney. ‘.He showed that

information communicated to a subject in the hypnotic trance could be subsequently reproduced through the handwriting, whilst the attention of the subject was fully employed in conversing or reading aloud; or an arithmetical problem which had been set during the trance could be worked out under similar conditions without the apparent consciousness of the subject.

Automatic writing for the most part, no doubt, brings to the surface only the debris of lapsed memories and half-formed impressions which have never reached the focus of consciousness — the stuff that dreams are made of. But there are indications in some cases of something more than this. In some spontaneous instances the writing produces anagrams, puns, nonsense verses and occasional blasphemies or obscenities; and otherwise exhibits characteristics markedly divergent from those of the normal consciousness. In the well-known case recorded by Th. Flournoy {Des Indes & la planete Mars) the automatist produced writing in an unknown character, which purported to be the Martian language. The writing generally resembles the ordinary handwriting of the agent, but there are sometimes marked differences, and the same automatist may employ two or three distinct handwritings. Occasionally imitations are produced of the handwriting of other persons, living or dead. Not infrequently the writing is reversed, so that it can be read only in a looking- glass (Spiegelschrift) ; the ability to produce such writing is often associated with the liability to spontaneous somnambulism. The hand and arm are often insensible in the act of writing. There are some cases on record in which the automatist has seemed to guide his hand not by sight, but by some special extension of the muscular sense (Carpenter, Mental Physiology, § 128; W. James, Proceedings American S.P.R. p. 554).

Automatic writing frequently exhibits indications of telepathy. The most remarkable series of automatic writings recorded in this connexion are those executed by the American medium, Mrs Piper, in a state of trance (Proceedings S. P. R.). These writings appear to exhibit remarkable telepathic powers, and are thought by some to indicate communication with the spirits of the dead.

.8

AUTOMATISM— AUTONOMY

The opportunities afforded by automatic writing for communi-

cating with subconscious strata of the personality have been made use of by Pierre Janet and others in cases of hystero-epilepsy, and other forms of dissociation of consciousness. A patient in an attack of hysterical convulsions, to whom oral appeals are made in vain, can sometimes be induced to answer in writing questions addressed to the hand, and thus to reveal the secret of the malady or to accept therapeutic suggestions.

See Edmonds and Dexter, Spiritualism (New York, 1853); Epes Sargent, Planchette, th-e Despair of Science (Boston, U.S.A., 1869) ; Mrs de Morgan, From Matter to Spirit (London, 1863) ; W. Stainton Moses, Spirit Teachings (London, 1883) ; Proceedings S.P R. passim; Th. Flournoy, Des Ind.es & la planete Mars (Geneva, 1900) ; F. Pod- more, Modern Spiritualism (London, 1902) ; F. W. H. Myers, Human Personality (London, 1903) ; Pierre Janet, L'Automalisme psychologique (2nd ed., Paris, 1894) ; Morton Prince, The Dissocia- tion of a Personality (London, 1906). (F. P.)

AUTOMATISM. In philosophical terminology this word is used in two main senses: (1) in ethics, for the view that man is not responsible for his actions, which have, therefore, no moral value; (2) in psychology, for all actions which are not the result of conation or conscious endeavour. Certain actions being admittedly automatic, Descartes maintained that, in regard of the lower animals, all action is purely mechanical. The same theory has since been applied to man, with this difference that, accompanying the mechanical phenomena of- action, and entirely disconnected with it, are the phenomena of consciousness. Thus certain physical changes in the brain result in a given action; the concomitant mental desire or volition is in no sense causally connected with, or prior to, the physical change. This theory, which has been maintained by T. Huxley (Science and Culture) and Shadworth Hodgson (Metaphysic of Experience and Theory of Practice) , must be distinguished from that of the psychophysical parallelism, or the " double aspect theory " according to which both the mental state and the physical phenomena result from a so-called " mind stuff," or single substance, the material or cause of both.

Automatic acts are of two main kinds. Where the action goes on while the attention is focused on entirely different subjects (e.g. in cycling), it is purely automatic. On the other hand, if the attention is fixed on the end or on any particular part of a given action, and the other component parts of the action are

performed unconsciously, the automatism may be called relative.

See G. F. Stout, Anal. Psych, i. 258 foil.; Wm. James, Princ. of Psych, i. chap. 5; also the articles Psychology, Suggestion, &c.

Sensory Automatism is the term given by students of psychical research to a centrally initiated hallucination. Such hallucinations are commonly provoked by crystal-gazing (q.v.), but auditory hallucinations may be caused by the use of a shell (shell-hearing), and the other senses are occasionally affected.

Motor Automatism, on the other hand, is a non-reflex movement of a voluntary muscle, executed in the waking state but not controlled by the ordinary waking consciousness. Phenomena of this kind play a large part in primitive ceremonies of divina- tion (q.v.) and in our own day furnish muck of the material of Psychical Research. At the lowest level we have vague movements of large groups of muscles, as in " bier-divination," where the murderer or his residence is inferred from the actions of the bearers; of a similar character but combined with more specialized action are many kinds of witch seeking. These more specialized actions are most typically seen in the Divining Rod (q.v.; see also T able-Turning), which indicates the presence of water and is used among the uncivilized to trace criminals. At a higher stage still we have the delicate movements necessary for Automatic Writing (q.v.) or Drawing. A parallel case to Automatic Writing is the action of the speech centres, resulting in the production of all kinds of utterances from trance speeches in the ordinary language of the speaker to mere unintelligible babblings. An interesting form of speech automatism is known as Glossolalia; in the typical case of Helene Smith, Th. Flournoy has shown that these utterances may reach a higher plane and

form a real language, which is, however, based on one already known to the speaker.

See Man (1904), No. 68; Folklore, xiii. 134; Myers in Proc. S.P.R. ix. 26, xii. 277, xv. 403 ; Flournoy, Des Indes a la planete Mars and in Arch, de Psychologie; Myers, Human Personality.

(N. W. T.)

AUTOMATON (from avTos, self, and fiaw, to seize), a self-moving machine, or one in which the principle of motion is contained within the mechanism itself. According to this description,

clocks, watches and all machines of a similar kind, are automata, but the word is generally applied to contrivances which simulate for a time the motions of animal life. If the human figure and actions be represented, the automaton has sometimes been called specially an androides. We have very early notices of the construction of automata, e.g. the tripods of Vulcan, and the moving figures of Daedalus. In 400 B.C., Archytas of Tarentum is said to have made a wooden pigeon that could fly, and during the middle ages numerous instances of the construction of automata are recorded. Regiomontanus is said to have made of iron a fly, which would flutter round the room and return to his hand, and also an eagle, which flew before the emperor Maximilian when he was entering Nuremberg. Roger Bacon is said to have forged a brazen head which spoke, and Albertus Magnus to have had an androides, which acted as doorkeeper, and was broken to pieces by Aquinas. Of these, as of some later instances, e.g. the figure constructed by Descartes and the automata exhibited by Dr Camus, not much is accurately known. But in the 18th century, Jacques de Vaucanson, the celebrated mechanician, exhibited three admirable figures, — the flute-player, the tam- bourine-player, and the duck, which was capable of eating, drinking, and imitating exactly the natural voice of that fowl. The means by which these results had been produced were clearly seen, and a great impulse was given to the construction of similar figures. Knauss exhibited at Vienna an automaton which wrote; a father and son named Droz constructed several ingenious mechanical figures which wrote and played music; Frederick Kaufmann and Leonard Maelzel made automatic trumpeters who could play several marches. The Swiss have always been celebrated for their mechanical ingenuity, and they construct most of the curious toys, such as flying and singing birds, which are frequently met with in industrial exhibitions. The greatest difficulty has generally been experienced in devising any mechanism which shall successfully simulate the human voice (not to be compared with the gramophone, which repro- duces mechanically a real voice). No attempt has been thoroughly successful, though many have been made. A figure exhibited by Fabermann of Vienna remains the best. Kempelen's famous chess-player for many years astonished and puzzled Europe. This figure, however, was no true automaton, although the mechanical contrivances for concealing the real performer and giving effect to his desired movements were exceedingly ingenious. J. N. Maskelyne, in more recent times (1875-1880), has been prominent in exhibiting his automata, Psycho (who played cards) and Zoe (who drew

pictures), at the Egyptian Hall, London, but the secret of these contrivances was well kept. (See Conjuring.)

AUTOMORPHISM (from Gr. avros, self, and juop<ˆ, form), the conception and interpretation of other people's habits and ideas on the analogy of one's own.

AUTONOMY (Gr. airos, self, and vo/mk, law), in general, freedom from external restraint, self-government. The term is usually coupled with a qualifying adjective. Thus, political autonomy is self-government in its widest sense, independence of all control from without. Local autonomy is a freedom of self-government within a sphere marked out by some superior authority; e.g. municipal corporations in England have their administrative powers marked out for them by acts of parliament, and in so far as they govern themselves within these limits exercise local autonomy. Administrative or constitutional autonomy, such as exists in the British colonies, implies an extent of self-government which falls short only of complete independence. The term is used loosely even in the case of e.g. religious bodies, individual churches and other communities

which ; enjoy a measure of self-government in certain specified respects.

In philosophy, the term (with its antithesis ” heteronomy “) was applied by Kant to that aspect of the rational will in which, qua rational, it is a law to itself, independently alike of any external authority, of the results of experience and of the im- pulses of pleasure and pain. In the sphere of morals, the ultimate and only authority which the mind can recognize is the law which emerges from the pure moral consciousness. This is the only sense in which moral freedom can be understood. (See Ethics; Kant.) Though the term “autonomy” in its fullest sense implies entire freedom from causal necessity, it can also be used even in determinist theories for relative independence Of particular conditions, theological or conventional.

AUTOPSY (Gr. avros, self, and

‘ AUTRAN, JOSEPH (1813-1877), French po«t, was born at Marseilles on the 20th of June 1813. In 1832 he addressed an ode

to Lamartine, who was then at Marseilles on his way to the East. The elder poet persuaded the young man's father to allow him to follow his poetic bent, and Autran remained from that time a faithful disciple of Lamartine. His best known work is La Mer (1835), remodelled in 1852 as Les Poemes de la mer. Ludibria ventis (1838) followed, and the success of these two volumes gained for Autran the librarianship of his native town. His other most important work is his Vie rurale (1856), a series of pictures of peasant life. The Algerian campaigns inspired him with verses in honour of the common soldier. Milianah (1842) describes the heroic defence of that town, and in the same vein is his Laboureurs et soldats (1854). Among his other works are the Paroles de Salomon (1868), Epitres rustiques (1861), Sonnets capricieux, and a tragedy played with great success at the Odeon in 1848, La Fille d'Eschyle. A definitive edition of his works was brought out between 1875 and 1881. He became a member of the French Academy in 1868, and died at Marseilles on the 6th of March 1877.

• AUTUN, a town of east-central France, capital of an arrondissement in the department of Saone-et-Loire, 62 m. S.W. of Dijon on the Paris-Lyon railway to Nevers. Pop. (1906) 11,927. Autun is pleasantly situated on the slope of a hill at the foot of which runs the Arroux. Its former greatness is attested by many Roman remains, the chief of which are two well-preserved stone gateways, the Porte d' Arroux and the Porte St Andr6, both pierced with four archways and surmounted by arcades. There are also remains of the old ramparts and aqueducts, of a square tower called the Temple of Janus, of a theatre and of an amphitheatre. A pyramid in the neighbouring village of Couhard was probably a sepulchral monument. The chapel of St Nicolas (12th century) contains many of the remains discovered at Autun. The cathedral of St Lazare, once the chapel attached to the residence of the dukes of Burgundy, is in the highest part of the town. It belongs mainly to the 12th century, but the Gothic central tower and the chapels were added in the 15 th century by Nicolas Rolin, chancellor of Burgundy, born at Autun. The chief artistic features of the church are the group of the Last Judgment sculptured on the tympanum above the west door, and the painting by Ingres representing the martyrdom of St Symphorien, which took place at Autun in 179. In the cathedral square stands the fountain of St Lazare, a work of the Renaissance. The hotel Rolin, a house of the 15th century, contains the collections of the " Aeduan literary and scientific society." The hotel de ville,

containing a museum of paintings; the law-court and the theatre are modern buildings. Autun is the seat of a bishopric, of tribunals of first instance and of commerce, and has an ecclesiastical seminary, a communal college and a cavalry school. Among the industries of the town are the extraction of oil from the bituminous schist obtained in the neighbourhood, leather

manufacture, metal-founding, marble-working, and the manufacture of machinery and furniture. Autun is the commercial centre for a large part of the Morvan, and has considerable trade in timber and cattle.

Autun (Augustodunum) succeeded Bibracte as capital of the Aedui when Gaul was reorganized by Augustus. Under the Romans, it was a flourishing town, covering double its present extent and renowned for its schools of rhetoric. In the succeeding centuries its prosperity drew upon it the attacks of the barbarians, the Saracens and the Normans. The counts of Autun in 880 became dukes of Burgundy, and the town was the residence of the latter till 1276. It was ravaged by the English in 1379, and, in 1591, owing to its support of the League, had to sustain a siege conducted by Marshal Jean d'Aumont, general of Henry IV.

See H. de Fontenay, Autun et ses monuments (Autun, 1889).

AUTUNITE, or Calco-uranite, a mineral which is one of the " uranium micas," differing from the more commonly occurring torbernite (q.v.) or cupro-uranite in containing calcium in place of copper. It is a hydrous uranium and calcium phosphate, Ca (U0 2) 2 (P0 4)2+8(or 12)H 2 0. Though closely resembling the tetragonal torbernite in form, it crystallizes in the orthorhombic system and is optically biaxial. The crystals have the shape of thin plates with very nearly square outline (89 17′ instead of 90). An important character is the perfect micaceous cleavage parallel to the basal plane, on which plane the lustre is pearly. The colour is sulphur-yellow, and this enables the mineral to be distinguished at a glance from the emerald-green torbernite. Hardness 2-25; specific gravity 3 -05-3 -19. Autunite is usually found with pitchblende and other uranium minerals, or with ores of silver, tin and iron; it sometimes coats joint-planes in gneiss and pegmatite. Falkenstein in Saxony, St Symphorien near Autun (hence the name of the species), and St Day in Cornwall are well-known localities for this mineral. (L. J. S.)

AUVERGNE, formerly a province of France, corresponding to the departments of Cantal and Puy-de-D6me, with the arrondissement of Brioude in Haute-Loire. It contains many mountains volcanic in origin (Plomb du Cantal, Puy de Dome, Mont Dore), fertile valleys such as that of Limagne, vast pasture-lands, and numerous medicinal springs. Up to the present day the population retains strongly-marked Celtic characteristics. In the time of Caesar the Arverni were a powerful confederation, the Arvernian Vercingetorix being the most famous of the Gallic chieftains who fought against the Romans. Under the empire Arvernia formed part of Prima Aquitania, and the district shared in the fortunes of Aquitaine during the Merovingian and Carolingian periods. Auvergne was the seat of a separate countship before the end of the 8th century; the first hereditary count was William the Pious (886). By the marriage of Eleanor of Aquitaine with Henry Plantagenet, the countship passed under the suzerainty of the kings of England, but at the same time it was divided, William VII., called the Young (1145-1168), having been despoiled of a portion of his domain by his uncle William VIII., called the Old, who was supported by Henry II. of England, so that he only retained the region bounded by the Allier and the Coux. It is this district that from the end of the 13 th century was called the Dauphine d' Auvergne. This family quarrel occasioned the intervention of Philip Augustus, king of France, who succeeded in possessing himself of a large part of the country, which was annexed to the royal domains under the name of Terre d' Auvergne. As the price of his concurrence with the king in this matter, the bishop of Clermont, Robert I. (1195-1227), was granted the lordship of the town of Clermont, which subsequently became a countship. Such was the origin of the four great historic lordships of Auvergne. The Terre d' Auvergne was first an appanage of Count Alphonse of Poitiers (1241-1271), and in 1360 was erected into a duchy in the peerage of France (duche-pairie) by King John II. in favour of his son John, through whose daughter the new title passed in 1416 to the house of Bourbon. The last duke, the celebrated constable Charles of Bourbon, united the domains of the Dauphine to those of the

duchy, but all were confiscated by the crown in consequence of the sentence which punished the constable's treason in 1527. The countship, however, had passed in 1422 to the house of La Tour,

and was not annexed to the domain until 1615. The administration of the royal province of Auvergne was organized under Louis XIV. At the time of the revolution it formed what was called a “government,” with two divisions: Upper Auvergne (Aurillac), and Lower Auvergne (Clermont).

Bibliography. — Baluze, Histoire genealogique de la maison d’ ‘Auvergne (1708); Andre Imberdis, Histoire generate de V Auvergne (1,867); J- B. M. Bielawski, Histoire de la comte d’ “Auvergne ‘et de sa capitate Vic-le-Comte (1868); B. Gonot, Catalogue des ouvrages imprimes et manuscrits concernant I ‘Auvergne (1849). See further Chevalier, Repertoire des sources hist., Topobibliographie, s.v.

AUXANOMETER (Gr. avˆaveLV, to increase, yJtrpov, measure), an apparatus for measuring increase or rate of growth in plants.

AUXENTIUS (fl. c. 370), of Cappadocia, an Arian theologian of some eminence (see Arius). When Constantine deposed the orthodox bishops who resisted, Auxentius was installed into the seat of Dionysius, bishop of Milan, and came to be regarded as the great opponent of the Nicene doctrine in the West. So prominent did he become, that he was specially mentioned by name in the condemnatory decree of the synod which Damasus, bishop of Rome, urged by Athanasius, convened in defence of the Nicene doctrine (a.d. 369). When the orthodox emperor Valentinian ascended the throne, Auxentius was left undisturbed in his diocese, but his theological doctrines were publicly attacked by Hilary of Poitiers.

The chief source of information about him is the Liber contra Auxentium in the Benedictine edition of the works of Hilary.

AUXERRE, a town of central France, capital of the department of Yonne, 38 m. S.S.E. of Sens on the Paris-Lyon railway, between Laroche and Nevers. Pop. (1906) 16,971. Itissituated on the slopes and the summit of an eminence on the left bank of the Yonne, which is crossed by two bridges leading to suburbs on the right bank. The town is irregularly built and its streets are steep and narrow, but it is surrounded by wide tree-lined boulevards, which have replaced the ancient fortifications, and has some fine churches. That of St fitienne, formerly the cathedral, is a majestic Gothic building of the 13th to the 16th centuries. It is entered by three richly sculptured portals, over the middle and largest of which is a rose window; over the north portal rises a massive

tower, but that which should sur- mount the south portal is unfinished. The lateral entrances are sheltered by tympana and arches profusely decorated with statuettes. The plan consists of a nave, with aisles and lateral chapels, transept and choir, with a deambulatory at a slightly lower level. Beneath the choir, which is a fine example of early Gothic architecture, extends a crypt of the nth century with mural paintings of the 12th century. The church has some fine stained glass and many pictures and other works of art. The ancient episcopal palace, now used as prefecture, stands behind the cathedral; it preserves a Romanesque gallery of the 12th cen fury.- The church of St Eusebe belongs to the 1 2th, 13th and 1 6th centuries- O 1 the abbey church of St Germain, built in the 13th and 141J 1 centuries, most of the nave has disappeared, so that its imposing Romanesque tower stands apart from it; crypts of the 9th centm* v contain the tombs of bishops of Auxerre. The abbey was once fortified an d a high wall and cylindrical tower remain. The buil; din g s (l8th century) are partly occupied by a hospital and a trai; nin g- colle S e – The church of St Pierre, in the Renaissance style .§ f the l6tn and *7 th centuries, is con- spicuous for the elaborate" "ornamentation of its west facade. The old law-court contains ; the museum, with a collection of antiquities and paintings, a nd a library. I n the middle of the town is a gateway surmount r ed ˆ a be l frv > dating from the 15 th century. Auxerre has statue s of Marshal Davout, J. B . J. Fourier and Paul Bert, the two latt c er nat ives 0I the town. The town is the seat of a court of assiz t es > and has tribunals of first instance and of commerce, and a bra, nch of the Bank of France. A lycee for girls, a communal collef.° e and training colleges are among its educational establishment' s – Manufactures of ochre, of which there are quarries in the vicinit v > ar,d of iron goods are carried on. The

canal of Nivernais reaches as far as Auxerre, which has a busy port and carries on boat-building. Trade is principally in the choice wine of the surrounding vineyards, and in timber and coal.

Auxerre (Autessiodurum) became the seat of a bishop and a civitas in the 3rd century. Under the Merovingian kings the abbey of St Germain, named after the 6th bishop, was founded, and in the 9th century its schools had made the town a seat of learning. The bishopric was suppressed in 1790.

The countship of Auxerre was granted by King Robert I. to his

son-in-law Renaud, count of Nevers. It remained in the house of Nevers until 1 184, when it passed by marriage to that of Courtenay. Other alliances transferred it successively to the families of Donzy, Chatillon, Bourbon and Burgundy. Alice of Burgundy, countess of Auxerre, married John of Chalons (d. 1309), and several counts of Auxerre belonging to the house of Chalons distinguished themselves in the wars against the English during the 14th century. John II., count of Auxerre, was killed at the battle of Crecy (1346), and his grandson, John IV., sold his countship to King Charles V. in 1370.

AUXILIARY (from Lat. auxilium, help), that which gives aid or support; the term is used in grammar of a verb which completes the tense, mood or voice of another verb; in engineer- ing, e.g. of the low steam power used to supplement the sail- power in sailing ships, still occasionally used in yachts, sealers or whalers; and in military use, of foreign or allied troops, more properly of any troops not permanently maintained under arms. In the British army the term " Auxiliary Forces " was employed formerly to include the Militia, the Imperial Yeomanry and the Volunteers.

AUXIMUM (mod. Osimo) , an ancient town in Picenum, situated on an isolated hill 8 m. from the Adriatic, on the road from Ancona to Nuceria. It was selected by the Romans as a fortress to protect their settlements in northern Picenum, and strongly fortified in 174 B.C. The walls erected at that period, of large rectangular blocks of stone, still exist in great part. Auximum became a colony at latest in 157 B.C. It often appears in the history of the civil wars, owing to its strong position. Pompey was its patron, and intended that Caesar should find resistance here in 49 B.C. It appears to have been a place of some im- portance in imperial times', as inscriptions and the monuments of its forum (the present piazza) show. In the 6th century it is called by Procopius the chief town of Picenum, Ancona being spoken of as its harbour. (T. As.)

AUXONNE, a town of eastern France, in the department of Cote d'Or, 19 m. E.S.E. of Dijon on the Paris-Lyon rail- way to Belfort. Pop. (1906) 2766 (town); 6307 (commune). Auxonne is a quiet town situated in a wide plain on the left bank of the Saone. It preserves remains of ramparts, a stronghold of the 16th century flanked by cylindrical towers, and a sculptured gateway of the 15th century. Vauban restored these works in the latter half of the 17th century, and built the arsenal now used as a market. The church of Notre-Dame dates from the 14th century. Of the

two towers surmounting its triple porch only that to the south is finished. A lofty spire rises above a third tower over the crossing. The hotel de ville (15 th century) and some houses of the Renaissance period are also of architectural interest. A statue of Napoleon I. as a sub-lieutenant com- memorates his sojourns in the town from 1788 to 1791. Auxonne has a tribunal of commerce and a communal college. Its industries are unimportant, but it has a large trade in the vege- tables produced by the numerous market gardens in the vicinity.

Auxonne, the name of which is derived from its position on the Sa6ne (ad Sonam), was in the middle ages chief place of a countship, which in the first half of the 13th century passed to the dukes of Burgundy. The town received a charter in 1229 and derived some importance from the mint which the dukes of Burgundy founded in it. It was invested by the allies in 1814, and surrendered to an Austrian force in the following year.

AVA, the ancient capital of the Burman empire, now a subdivision of the Sagaing district in the Sagaing division of Upper Burma. It is situated on the Irrawaddy on the opposite

bank to Sagaing, with which it was amalgamated in 1889. Amarapura, another ancient capital, lies 5 m. to the north-east of Ava, and Mandalay, the present capital, 6 m. to the north. The classical name of Ava is Yadanapura, ” the city of precious gems.” It was founded by Thadomin Paya in a.d. 1364 as successor to Pagan, and the religious buildings of Pagan were to a certain extent reproduced here, although on nothing like the same scale as regards either size or splendour. It remained the seat of government for about four centuries with a succession of thirty kings. In 1782 a new capital, Amarapura, was founded by Bodaw Paya, but was deserted again in favour of Ava by King Baggidaw in 1823. On his deposition by King Tharawaddi in 1837, the capital reverted to Amarapura; but finally in i860 the last capital of Mandalay was occupied by King Mindon. For picturesque beauty Ava is unequalled in Burma, but it is now more like a park than the site of an old capital. Traces of the great council chamber and various portions of the royal palace are still visible, but otherwise the secular buildings are completely destroyed; and most of the religious edifices are also

dilapidated.

AVADANA, the name given to a type of Buddhist romance literature represented by a large number of Sanskrit (Nepalese) collections, of which the chief are the Avadanasataka (Century of Legends), and the Divyavadana (The Heavenly Legend). Though of later date than most of the canonical Buddhist books, they are held in veneration by the orthodox, and occupy much the same position with regard to Buddhism that the Puranas do towards Brahminism.

AVAHI, the native name of a Malagasy lemur (Avakis laniger) nearly allied to the indri (q.v.), and the smallest representative of the subfamily Indrisinae, characterized by its woolly coat, and measuring about 28 in. in length, of which rather more than half is accounted for by the tail. Unlike the other members of the group, the avahi is nocturnal, and does not associate in small troops, but is met with either alone or in pairs. Very slow in its movements, it rarely descends to the ground, but, when it does, walks upright like the other members of the group. It is found throughout the forests which clothe the mountains on the east coast of Madagascar, and also in a limited district on the north-west coast, the specimens from the latter locality being of smaller size and rather different in colour. The eastern phase is generally rusty red above, with the inner sides of the limbs white; while the predominant hue in the western form is usually yellowish brown. (See Primates.) (R. L.*)

AVALANCHE (adopted from a French dialectic form, avalance, descent), a mass of snow and ice mingled with earth and stones, which rushes down a mountain side, carrying everything before it, and producing a strong wind which uproots trees on each side of its course. Where the supply of snow exceeds the loss by evaporation the surplus descends the mountain sides, slowly in the form of glaciers, or suddenly in ice-falls or in avalanches. A mass of snow may accumulate upon a steep slope and become compacted into ice by pressure, or remain loosely aggregated. When the foundation gives way, owing to the loosening effect of spring rains or from any other cause, the whole mass slides downward. A very small cause will sometimes set a mass of overloaded snow in motion. Thunder or even a loud shout is said to produce this effect when the mass is just poised, and Swiss guides often enjoin absolute silence when crossing dangerous spots.

AVALLON, a town of central France, capital of an arrondissement in the department of Yonne, 34 m. S.S.E. of Auxerre on a branch of the Paris-Lyon railway. Pop. (1906) 5197. The town, with wide streets and picturesque promenades, is finely situated on a promontory, the base of which is washed on the south by the Cousin, on the east and west by small streams. Its chief building, the church of St Lazare, dates from the 12th century. The two western portals are adorned with sculpture in the ornate Romanesque style; the tower on the left of the facade was rebuilt in the 17th century. The Tour de L'Horloge, pierced by a gateway through which passes the Grande Rue, is a 15th century structure containing a museum on its second floor. Remains of the ancient fortifications, including seven of

the flanking towers, are still to be seen. Avallon has a statue of Vauban, the military engineer. The public institutions include the subprefecture, a tribunal of first instance, and a communal college. The manufacture of biscuits and gingerbread, and of leather and farm implements is carried on, and there is considerable traffic in wood, wine, and the live-stock and agricultural produce of the surrounding country.

Avallon (Aballo) was in the middle ages the seat of a viscounty dependent on the duchy of Burgundy, and on the death of Charles the Bold passed under the royal authority.

AVALON (also written Avallon, Avollon, Avilion and Avelion), in Welsh mythology the kingdom of the dead, after- wards an earthly paradise in the western seas, and finally, in the Arthurian romances, the abode of heroes to which King Arthur was conveyed after his last battle. In Welsh the name is Ynys yr Afallon, usually interpreted " Isle of Apples," but possibly connected with the Celtic tradition of a king over the dead named Avalloc (in Welsh Afallach). If the traditional derivation is correct, the name is derived from the Welsh afal, an apple, and, as no other large fruit was well known to the races of northern Europe, is probably intended to symbolize the feasting and enjoyments of elysium. Other forms of the name are Ynysvitrin and Ynysgutrin, " Isle of Glass " — which appear to be identical with Glasberg, the Teutonic kingdom of the dead. Perhaps owing to a confusion between Glasberg or Ynysvitrin and the Anglo-Saxon Glaestinga-burh, Glastonbury, the name " Isle of Avalon " was given to the low ridge in central Somersetshire which culminates in Glastonbury Tor, while Glastonbury itself came to be called Avalon. Attempts have also been made to identify

Avalon with other places in England and Wales.

See Studies in the Arthurian Legend, by J. Rhys (Oxford, 1891) ; also Arthur (King) ; Atlantis.

AVARAY, a French territorial title belonging to a family some of whose members have been conspicuous in history. The Bearnaise family named Besiade moved into the province of Orleanais in the 17 th century, and there acquired the estate of Avaray. In 1667 Theophile de Besiade, marquis d'Avaray, obtained the office of grand bailiff of Orleans, which was held by several of his descendants after him. Claude Antoine de Besiade, marquis d'Avaray, was deputy for the bailliage of Orleans in the states-general of 1789, and proposed a Declaration of the Duties of Man as a pendant to the Declaration of the Rights of Man; he subsequently became a lieutenant-general in 1814, a peer of France in 1815, and due d'Avaray in 1818. Antoine Louis Frangois, comte d'Avaray, son of the above, distinguished himself during the Revolution by his devotion to the comte de Provence, afterwards Louis XVIII. , whose emigration he assisted. Having nominally become king in 1799, that prince ' created the estate of Ile-Jourdain a duchy, under the title of Avaray, in favour of the comte d'Avaray, whom he termed his "liberator." ' (M. P.*)

AVARS, or Avari, an East Caucasian people, the most renowned of the Lesghian tribes, inhabiting central Daghestan (see Lesghians). They are the only Lesghian tribe who possess a written language, for which they make use of the Arabic characters. They are often confused with the Avars whose empire on the Danube was broken by Charlemagne; but Komarov asserts that they are of more recent origin as a tribe, their name being Lowland Turki for " vagrant " or " refugee."

AVATAR, a Sanskrit word meaning " descent," specially used in Hindu mythology (and so in English) to express the incarnation of a deity visiting the earth for any purpose. The ten Avatars of Vishnu are the most famous. The Hindus believe he has appeared (1) as a fish, (2) as a tortoise, (3) as a hog, (4) as a monster, half man half lion, to destroy the giant Iranian, (5) as a dwarf, (6) as Rama, (7) again as Rama for the purpose of killing the thousand-armed giant Cartasuciriargunan, (8) as Krishna, (9) as Buddha. They allege that the tenth Avatar has yet to occur and will be in the form of a white- winged horse (Kalki) who will destroy the earth.

AVEBURY, JOHN LUBBOCK, ist Baron (1834-), English banker, politician and naturalist, was born in London

on the 30th of April 1834, the son of Sir John William Lubbock, 3rd baronet, himself a highly distinguished man of science. John Lubbock was sent to Eton in 1845; but three years later was taken into his father's bank, and became a partner at twenty-two. In 1865 he succeeded to the baronetcy. His love of science kept pace with his increasing participation in public affairs. He served on commissions upon coinage and other financial questions; and at the same time acted as president of the Entomological Society and of the Anthropological Institute. Early in his career several banking reforms of great importance were due to his initiative, while such works as Prehistoric Times (1865) and The Origin of Civilization (1870) were proceeding from his pen. In 1870, and again in 1874, he was elected a member of parliament for Maidstone. He lost the seat at the election of 1880; but was at once elected member for London University, of which he had been vice-chancellor since 1872. He carried numerous enactments in parliament, including the Bank Holidays Act 1871, and bills dealing with absconding debtors, shop hours regulations, public libraries, open spaces, and the preservation of ancient monuments, and he proved himself an indefatigable and influential member of the Unionist party. A prominent supporter of the Statistical Society, he took an active part in criticizing the encroachment of municipal trading and the increase of the municipal debt. He was elected the first president of the Institute of Bankers in 1879; in 1881 he was president of the British Association, and from 1881 to 1886 president of the Linnaean Society. He received honorary degrees from the universities of Oxford, Cambridge (where he was Rede lecturer in 1886), Edinburgh, Dublin and Wiirzburg; and in 1878 was appointed a trustee of the British Museum. From 1888 to 1892 he was president of the London Chamber of Commerce; from 1889 to 1890 vice- chairman and from 1890 to 1892 chairman of the London County Council. During the same period he served on royal commissions on education and on gold and silver. In 1890 he was appointed a privy councillor; and was chairman of the committee of design on the new coinage in 1891. In 1900 he was raised to the peerage, under the title of Baron Avebury, and he continued to play a leading part in public life, not only by the

weight of his authority on many subjects, but by the readiness with which he lent his support to movements for the public benefit. Among other matters he was a prominent advocate of proportional representation. As an original author and a thoughtful popularizer of natural history and philosophy he had few rivals in his day, as is evidenced by the number of editions issued of many of his writings, among which the most widely-read have been: The Origin and Metamorphoses of Insects (1873), British Wild Flowers (1875), Ants, Bees and Wasps (1882), Flowers, Fruit and Leaves (1886), The Pleasures of Life (1887), The Senses, Instincts and Intelligence of Animals (1888), The Beauties of Nature (1892), The Use of Life (1894).

AVEBURY, a village in the Devizes parliamentary division of Wiltshire, England, on the river Kennet, 8 m. by road from Marlborough. The fine church of St James contains an early font with Norman carving, a rich Norman doorway, a painted reredos, and a beautiful old roodstone in good preservation. Avebury House is Elizabethan, with a curious stone dovecot. The village has encroached upon the remains of a huge stone circle (not quite circular), surrounded by a ditch and rampart of earth, and once approached by two avenues of monoliths. Within the larger circle were two smaller ones, placed not in the axis of the great one but on its north-eastern side, each of which consisted of a double concentric ring of stones; the centre being in one case a menhir or pillar, in the other a dolmen or tablestone resting on two uprights. Few traces remain, as the monoliths have been largely broken up for building purposes. The circle is the largest specimen of primitive stone monuments in Britain, measuring on the average 1 200 ft. in diameter. The stones are all the native Sarsens which occur everywhere in the district, and show no evidence of having been hewn. Those still re- maining vary in size from 5 to 20 ft. in height above ground, and from 3 to 12 ft. in breadth. As in the case of Stonehenge,

the purpose for which the Avebury monument was erected has been the source of much difference of opinion among anti-quaries, Dr Stukely (Stonehenge a Temple restored to the British Druids, 1740) regarding it as a Druidical temple, while Fergusson (Rude Stone Monuments, 1872) believed that it, as well as Silbury Hill, marks the site of the graves of those who fell in the last Arthurian battle at Badon Hill (a.d. 520). The majority of anti- quaries, however, see no reason for dissociating its chronological horizon from that of the numerous other analogous monuments found in Great Britain, many of which have been

shown to be burial places of the Bronze Age. Excavations were carried out here in 1908, but without throwing any important new light on the monument.

There are many barrows on the neighbouring downs, besides traces of a double oval of monoliths on Hackpen hill, and the huge mound of Silbury Hill. Waden Hill, to the south, has been, like Badbury, identified with Badon Hill, which was the traditional scene of the twelfth and last great battle of King Arthur in 520. The Roman road from Winchester to Bath skirts the south side of Silbury Hill.

At the time of the Domesday Survey, the church of Avebury (Avreberie, Abury), with two hides attached, was held in chief by Rainbold, a priest, and was bestowed by Henry III. on the abbot and monks of Cirencester, who continued to hold it until the reign of Henry VIII. The manor of Avebury was granted in the reign of Henry I. to the Benedictine monks of St George of Boucherville in Normandy, and a cell from that abbey was subsequently established here. In consequence of the war with France in the reign of Edward III., this manor was annexed by the crown, and was conferred on the newly founded college of New College, Oxford, together with all the possessions, spiritual and temporal, of the priory.

AVEIA, an ancient town of the Vestini, on the Via Claudia Nova, 6 m. S.E. of Aquila, N.E. of the modern village of Fossa. Some remains of ancient buildings still exist, and the name Aveia still clings to the place. The identification was first made by V. M. Giovenazzi, Delia Citta di Aveia ne' Vestini (Rome, 1773). Paintings in the church of S. Maria ad Cryptas, of the 12th to 15th centuries, are important in the history of art. An inscription of a stationarius of the 3rd century, sent here on special duty (no doubt for the suppression of brigandage) , was found here in 1902 (A. von Domaszewski, Rom. Mitt., 1902, 330).

AVEIRO, a seaport, episcopal see, and the capital of an administrative district, formerly included in the province of Beira, Portugal; on the river Vouga, and the Lisbon-Oporto railway. Pop. (1900) 9979. Aveiro is built on the southern shore of a marshy lagoon, containing many small islands, and measuring about 15 m. from north to south, with an average breadth of about 1 m. The Barra Nova, an artificial canal about 33 ft. deep, was constructed between 1801 and 1808, and gives access to the Atlantic ocean. The local industries include the

preparation of sea-salt, the catching and curing of fish, especially sardines and oysters, and the gathering of aquatic plants (moliqo) . There is also a brisk trade in wine, oil and fruit; while the Aveiro district contains copper and lead mines, besides much good pasture-land.

Aveiro is probably the Roman Talabriga. In the 1 6th century it was the birthplace of Joao Affonso, one of the first navigators to visit the fishing-grounds of Newfoundland; and it soon became famous for its fleet of more than sixty vessels, which sailed yearly to that country, and returned laden with dried codfish. During the same century the cathedral was built, and the city was made a duchy. The title " duke of Aveiro " became extinct when its last holder, Dom Jose Mascarenhas e Lancaster, was burned alive for high treason, in 1759. The administrative district of Aveiro coincides with the north-western part of the province of Beira; pop. (1900)303,169; area, 1065 sq. m. ":'■-

AVELLA (anc. Abella), a city of Campania, Italy, in the province of Avellino, 23 m. N.E. of Naples by rail. Pop. (i9or) 4107. It is finely situated in fertile territory and its nuts (nuces A bellanae) and fruit were renowned in Roman days. About 2 m. to the north-east lies Avella Vecchia, the ancient Abella, regarded

by the ancients as a Chalcidian colony. An important Oscan inscription relates to a treaty with Nola, regarding a joint temple of Hercules, attributable to the 2nd century B.C. Under the early empire it had already become a colony and had perhaps been one since the time of Sulla. It has remains of the walls of the citadel and of an amphitheatre, and lay on the road from Nola to Abellinum, which was here perhaps joined by a branch from Suessula. See J. Beloch, Campanien (2nd ed., Breslau, 1890), 411 seq.

(T.As.)

AVELLINO, a city and episcopal see of Campania, Italy, the capital of the province of Avellino,n5o ft. above sea-level, 28 m. direct and 59 m. by rail E.N.E. of Naples, at the foot of Monte Vergine. Pop. (1901) 23,760. There are ruins of the castle constructed in the 9th or 10th century, in which the antipope

Anacletus II. crowned Count Roger II. king of Sicily and Apulia. Avellino is the junction of lines to Benevento and Rocchetta S. Antonio. The name is derived from the ancient Abellinum, the ruins of which lie 2§ m. north-east, close to the village of Atripalda, and consist of remains of city walls and an amphitheatre in opus reticulatum, i.e. of the early imperial period, when Abellinum appears to have been the chief place of a tribe, to which belonged also the independent communities of the A bellinates cognomine Protropi among the Hirpini, and the Abellinates cognominati Marsi among the Apulians (Nissen, Italische Landeskunde, ii.822). It lay on the boundary of Campania and the territory of the Hirpini, at the junction of the roads from Nola (and perhaps also from Suessula) and Salernum to Beneventum.

The Monte Vergine (4165 ft.) lies 4 m. to the N.W. of Avellino; upon the summit is a sanctuary of the Virgin, founded in 11 19, which contains a miraculous picture attributed to S. Luke (the greatest festival is on the 8th of September). The present church is baroque in style, but contains some works of art of earlier periods. The important archives have been transported to Naples. (T. As.)

AVEMPACE [Abu Bakr Muhammad ibn Yahya, known as Ibn Bajja or Ibn Sa'igh, i.e. son of the goldsmith, the name being corrupted by the Latins into Avempace, Avenpace or Aben Pace] , the earliest and one of the most distinguished of the Arab philosophers of Spain. Little is known of the details of his life. He was born probably at Saragossa towards the close of the nth century. According to Ibn Khaqan, a contemporary writer, he became a student of the exact sciences and was also a musician and a poet. But he was a philosopher as well, and apparently a sceptic. He is said to have rejected the Koran, to have denied the return to God, and to have regarded death as the end of existence. But even in that orthodox age he became vizier to the amir of Murcia. Afterwards he went to Valencia, then to Saragossa. After the fall of Saragossa (1 1 19) he went to Seville, then to Xativa, where he is said to have returned to Islam to save his life. Finally he retired to the Almoravid court at Fez, where he was poisoned in 1138. Ibn 'Usaibi ' a gives a list of twenty-five of his works, but few of these remain. He had a distinct influence upon Averroes (see Arabian Philosophy). ■ For his life see M'G. de Slane's trans, of Ibn Khallikan's Bio- graphical Dictionary (Paris and London, 1842), vol. iii. pp. 130 ff., and Ibn 'Usaibi'a's biography translated in P. de Gayangos' edition of the History of

the Mohammedan Dynasties in Spain, by al-Maqqari (London, 1840), vol. ii., appendix, p. xii. List of extant works in C. Brockelmann's Geschichte der arabischen Litteratur, vol. i. p. 460. For his philosophy cf. T. J. de Boer's The History of Philosophy in Islam (London, 1903), ch. vi. (G. W. T.)

AVENARIUS, RICHARD HEINRICH LUDWIG (1843-1896), German philosopher, was born in Paris on the 19th of November 1843. His education, begun in Zurich and Berlin, was completed at the university of Leipzig, where he -graduated in 1876. In 1877 he became professor of philosophy in Zurich, where he died on the 18th of August 1896. At Leipzig he was one of the founders of the Akademisch-philosophische Verein, and was the first editor of the Vierteljahrsschrift fur wissenschajtliche Philo- sophie. In 1868 he published an essay on the Pantheism of Spinoza. His chief works are Philosophie als Denken der Welt gemass dent Princip des Heinsten Kraftmasses (1876) and the

Kritik der reinen Erfahrung (1888-1890). In these works he made an attempt to co-ordinate thought and action. Like Mach, he started from the principle of economy of thinking, and in the Kritik endeavoured to explain pure experience in relation to knowledge and environment. He discovers that statements dependent upon environment constitute pure experience. This philosophy, called Empirio-criticism, is not, however, a realistic but an idealistic dualism, nor can it be called materialism. ˆ

See Wundt, Philos. Stud. xiii. (1897) ; Carstanjen and Willy in Zeitsch. f. wiss. Philos. xx. (1896), 361I ff. ; xx. 57 ff. ; xxh. 53 ff.; J- Petzoldt's Einfiihrung in d. Philos, d. reinen Erfahrung (1900). jMJdlˆ

AVENGER OF BLOOD, the person, usually the nearest kinsman of the murdered man, whose duty it was to avenge his death by killing the murderer. In primitive societies, before the evolution of settled government, or the uprise of a systematized criminal law, crimes of violence were regarded as injuries of a personal character to be punished by the sufferer or his kinsfolk. This right of vengeance was common to most countries, and in many was the subject of strict regulations and limitations. It was prevented from running into excesses by the law of sanctuary (q.v.) and in many lands the institution of blood-money, and the wergild offered the wrong-doer a mode of escaping from his enemies' revenge. The Mosaic law recognized the right of vengeance, but not the money-compensation. The Koran, on the

contrary, while sanctioning the vengeance, also permits pecuniary commutation for murder.

AVENGERS, or Vendicatori, a secret society formed about 1 186 in Sicily to avenge popular wrongs. The society was finally suppressed by King William II., the Norman, who hanged the grand master and branded the members with hot irons.

AVENTAIL, or Avantaille (O. Fr. esventail, presumably from a Latin word exventaculum, air-hole), the mouthpiece of an old-fashioned helmet, movable to admit the air.

AVENTINUS (1477-1534), the name taken by Johann Ttjr- mair, author of the Annales Boiorum, or Annals of Bavaria, from Aventinum, the Latin name of the town of Abensberg, where he was born on the 4th of July 1477. Having studied at Ingolstadt, Vienna, Cracow and Paris, he returned to Ingolstadt in 1507, and in 1509 was appointed tutor to Louis and Ernest, the two younger sons of Albert the Wise, the late duke of B avaria- Munich. He retained this position until 15 17, wrote a Latin grammar, and other manuals for the use of his pupils, and in 1515 travelled in Italy with Ernest. Encouraged by William IV. , duke of Bavaria, he began to write the Annales Boiorum, about 1517, and finishing this book in 1521, undertook a German version of it, entitled Bayersche Chronih, which he completed some years later. He assisted to found the Sodalitas litteraria Angilostadensis, under the auspices of which several old manu-scripts were brought to light. Although Aventinus did not definitely adopt the reformed faith, he sympathized with the reformers and their teaching, and showed a strong dislike for the monks. On this account he.was imprisoned in 1528, but his friends soon effected his release. The remainder of his life was somewhat unsettled, and he died at Regensburg on the 9th of January 1534. The Annales, which are in seven books, deal with the history of Bavaria in conjunction with general history from the earliest times to 1460, and the author shows a strong sympathy for the Empire in its struggle with the Papacy. He took immense pains with his work, and to some degree anticipated the modern scientific method of writing history. The Annales were first published in 1554, but many important passages were omitted in this edition, as they reflected on the Roman Catholics. A more complete edition was published at Basel in 1580 by Nicholas Cisner. Aventinus, who has been called the ” Bavarian Herodotus,” wrote other books of minor importance, and a complete edition of his works was published at Munich (1881-

1886). More recently a new edition (six vols.) has appeared.

See T. Wiedemann, Johann Turmair gen. Aventinus (Freising, 1858) ; W. Dittmar, Aventin (Nordlingen, 1862) ; J. von D611inger, Aventin und seine Zeit (Munich, 1877) ; S. Riezler, Zum Schutze der neuesten Edition von Aventins Annalen ±(Mumch, 1886); F. X. von Wegele, Aventin (Bamberg, 1890).

AVENTURINE, or Avanturine, a variety of quartz containing spangles of mica or scales of iron-oxide, which confer brilliancy on the stone. It is found chiefly in the Ural Mountains, and is cut for ornamental purposes at Ekaterinburg. Some of the Siberian aventurine, like that of the vase given by Nicholas I. to Sir R. Murchison, in 1843, is a micaceous iron-stained quartz, of but little beauty. Most aventurine is of reddish brown or yellow colour, but a green variety, containing scales of fuchsite or chrome-mica, is also known. This green aventurine, highly valued by the Chinese, is said to occur in the Bellary district in India.

Aventurine felspar, known also as Sun-stone (q.v.) is found principally at Tvedestrand in south Norway, and is a variety of oligoclase enclosing micaceous scales of haematite. Other kinds of felspar, even orthoclase, may however also show the aventurine appearance. Both plagioclastic and orthoclastic aventurine occur at several localities in the United States.

The mineral aventurine takes its name from the well-known aventurine-glass of Venice. This is a reddish brown glass with gold-like spangles, more brilliant than most of the natural stone. The story runs that this kind of glass was originally made accidentally at Murano by a workman, who let some copper filings fall into the molten ” metal,” whence the product was called avventurino. From the Murano glass the name passed to the mineral, which displayed a rather similar appearance. (F. W. R.*)

AVENUE (the past participle feminine of Fr. avenir, to come to), a way of approach; more particularly, the chief entrance- road to a country house, with rows of trees on each side; the trees themselves are said to form the avenue. In modern times the

word has been much used as a name for streets in towns, whether with or without trees, such as Fifth Avenue in New York, or Shaftesbury Avenue in London.

AVENZOAR, or Abumeron [Abu Merwan 'Abdal-Malik ibn Zuhr] , Arabian physician, who flourished at the beginning of the 12 th century, was born at Seville, where he exercised his pro- fession with great reputation. His ancestors had been celebrated as physicians for several generations, and his son was afterwards held by the Arabians to be even more eminent in his profession than Avenzoar himself. He was a contemporary of Averroes, who, according to Leo Africanus, heard his lectures, and learned physic of him. He belonged, in many respects, to the Dog- matists or Rational School, rather than to the Empirics. He was a great admirer of Galen; and in his writings he protests emphatically against quackery and the superstitious remedies of the astrologers. He shows no inconsiderable knowledge of anatomy in his remarkable description of inflammation and abscess of the mediastinum in his own person, and its diagnosis from common pleuritis as well as from abscess and dropsy of the pericardium. In cases of obstruction or of palsy of the gullet, his three modes of treatment are ingenious. He proposes to support the strength by placing the patient in a tepid bath of nutritious liquids, that might enter by cutaneous imbibition, but does not recommend this. He speaks more favourably of the introduction of food into the stomach by a silver tube; and he strongly recommends the use of nutritive enemata. From his writings it would appear that the offices of physician, surgeon and apothecary were already considered as distinct professions. He wrote a book entitled The Method of Preparing Medicines : and Diet, which was translated into Hebrew in the year 1280, ; and thence into Latin by Paravicius, whose version, first printed at Venice, 1490, has passed through several editions.

AVERAGE, a term found in two main senses. (1) The first, which occurs in old law, is from a Law-Latin averagium, and is connected with the Domesday Book avera, the " day's work which the king's tenants gave to the sheriff"; it is supposed to be a form of the O. Fr. ovre (ceuvre), work, affected by aver, the O. Eng. word for cattle or property, but the etymology is uncertain. As meaning some form of feudal service rendered by tenants to their superiors, it survived for a long time in the Scottish phrase " arria,ge and carriage," this form of the word being due to a contraction into " arage." (2) The second word, which represents the modern usages, is also uncertain in its

derivation, but corresponded with the Fr. avarie, and was early spelt ” averays,” recurring also as ” avaria,” ” averia,” and meaning a certain tax on goods, and then more precisely in maritime law any charge additional to ” freight ” (see Affreightment), payable by the owner of goods sent by ship. Hence the modern employment of the term for particular and general average (see below) in marine insurance. The essential of equitable distribution, involved in this sense, was transferred to give the word ” average ” its more colloquial meaning of an equalization of amount, or medium among various quantities, or nearest common rate or figure. (For a discussion of the etymology, see the New English Dictionary, especially the concluding note with reference to authorities.)

In Shipping. — Average, in modern law, is the term used in maritime commerce to signify damages or expenses resulting from the accidents of navigation. Average is either general or particular. General average arises when sacrifices have been made, or expenditures incurred, for the preservation of the ship, cargo and freight, from some peril of the sea or from its effects. It implies a subsequent contribution, from all the parties concerned, rateably to the values of their respective interests, to make good the loss thus occasioned. Particular average signifies the damage or partial loss happening to the ship, goods, or freight by some fortuitous or unavoidable accident. It is borne by the parties to whose property the misfortune happens or by their insurers. The term average originally meant what is now distinguished as general average; and the expression ” particular average,” although not strictly accurate, came to be afterwards used for the convenience of distinguishing those damages or partial losses for which no general contribution could be claimed.

Although nothing can be more simple than the fundamental principle of general average, that a loss incurred for the advantage of all the coadventurers should be made good by them all in equitable proportion to their stakes in the adventure, the applica- tion of this principle to the varied and complicated cases which occur in the course of maritime commerce has given rise to many diversities of usage at different periods and in different countries. It is soon discovered that the principle cannot be applied in any settled or consistent manner unless by the aid of rules of a technical and sometimes of a seemingly arbitrary character. The difficulty, which at one time seemed nearly insuperable, of bringing together the rules in force in the several

maritime countries, has been to a large extent overcome — not by legislation but by framing a set of rules covering the principal points of difference in such a manner as to satisfy, on the whole, those who are practically concerned, and to lead them to adopt these rules in their contracts of affreightment and contracts of insur- ance (see Insurance: Marine). The honour of the achievement belongs to a small number of men who recognized the History of need of uniformity. The work began in May i860 at the York- a congress held at Glasgow, under the presidency of An ˆ wer P Lord Brougham, assisted by Lord Neaves. Further congresses were held in London (1862), and at York (1864), when a body of rules known as the ” York Rules ” was agreed to. There the matter stood, until it was taken up by the ” Association for the Reform and Codification of the Law of Nations ” at conferences held at the Hague (1875), Bremen (1876) and Antwerp (1877). Some changes were made in the “York Rules”; and so altered, the body of rules was adopted at the last-named conference, and was styled the ” York and Antwerp (or York- An twerp) Rules.” The value of these rules was quickly perceived, and practical use of them followed. But they proved to be insufficient, or unsatisfactory, on some points; and again, in the autumn of 1890, a conference on the subject was held, this time at Liverpool, by the same Association, under the able presidency of Dr F. Sieveking, president of the Hanseatic High Court of Appeal at Hamburg. Important changes were then made, carrying further certain departures from English law, already apparent in the earlier rules, in favour of views prevailing upon the continent of Europe and in the United States. The newjules were styled the York-

Antwerp Rules 1890. In practice they quickly displaced those oi 1877; and in 1892, at a conference of the same Association held at Genoa, it was formally declared that the only international rules of general average having the sanction and authority of the association were the York- An twerp Rules as revised in 1890, and that the original rules were rescinded. It is this later body of rules which is now known as the York-Antwerp Rules. Reference is now to be found in most English contracts of carriage and contracts of insurance, to these rules, as intended to govern the adjustment of G.A. between the parties; with the result that (so far as the rules cover the ground) adjustments do not depend

upon the law of the place of destination, and so do not vary according to the destination, or the place at which the voyage may happen to be broken up, as used formerly to be the case. The rules are as follows : —

Rule I. — Jettison of Deck Cargo No jettison of deck cargo shall be made good as G.A. Every structure not built in with the frame of the vessel shall be considered to be a part of the deck of the vessel.

Rule II. — Damage by Jettison and Sacrifice for the Common Safety

Damage done to a ship and cargo, or either of them, by or in consequence of a sacrifice made for the common safety, and by water which goes down a ship's hatches opened, or other ppening made for the purpose of making a jettison for the common safety, shall be made good as G.A.

Rule III. — Extinguishing Fire on Shipboard

Damage done to a ship and cargo, or either of them, by water or otherwise, including damage by beaching or scuttling a burning ship, in extinguishing a fire on board the ship, shall be made good as G.A. ; except that no compensation shall be made for damage to such portions of the ship and bulk cargo, or to such separate packages of cargo, as have been on fire.

Rule IV. — Cutting away Wreck

Loss or damage caused by cutting away the wreck or remains of spars, or of other things which have previously been carried away by sea-peril, shall not be made good as G.A.

Rule V. — Voluntary Stranding

When a ship is intentionally run on shore, and the circumstances are such that if that course were not adopted she would inevitably sink, or drive on shore or on rocks, no loss or damage caused to the ship, cargo and freight, or any of them, by such intentional running on snore, shall be made good as G.A. But in all other cases where a ship is intentionally run on shore for the common safety, the consequent loss or damage shall be allowed as G.A.

Rule VI. — Carrying Press of Sail — Damage to or Loss of Sails

Damage to or loss of sails and spars, or either of them, caused by forcing a ship off the ground or by driving her higher up the ground, for the common safety, shall be made good as G.A. ; but where a ship is afloat, no loss or damage caused to the ship, cargo and freight, or any of them, by carrying a press of sail, shall be made good as G.A.

Rule VII. — Damage to Engines in Refloating a Ship

Damage caused to machinery and boilers of a ship which is ashore and in a position of peril, in endeavouring to refloat, shall be allowed in G.A., when shown to have arisen from an actual intention to float the ship for the common safety at the risk of such damage.

Rule VIII. — Expenses of Lightening a Ship when Ashore, and Consequent Damage

When a ship is ashore, and, in order to float her, cargo, bunker coals and ship's stores, or any of them, are discharged, the extra cost of lightening, lighter hire, and reshipping (if incurred), and the loss or damage sustained thereby, shall be admitted as G.A.

Rule IX. — Cargo, Ship's Materials, and Stores Burnt for Fuel

Cargo, ship's materials and stores, or any of them, necessarily burnt for fuel for the common safety at a time of peril, shall be admitted as G.A., when and only when an ample supply of fuel had been provided ; but the estimated quantity of coals that would have been consumed, calculated at the price current at the ship's last port of departure at the date of her leaving, shall be charged to the shipowner and credited to the G.A.

Rule X. — Expenses at Port of Refuge, &c. (a) When a ship shall have entered a port or place of refuge, or shall have returned to her port or place of loading, in consequence of accident, sacrifice, or other extraordinary circumstances, which render that necessary for the common safety, the expenses of entering such port or place shall be admitted as G.A. ; and when

she shall have sailed thence with her original cargo, or a part of it, the corresponding expenses of leaving such port or place, consequent upon such entry or return, shall likewise be admitted as G.A.

(b) The cost of discharging cargo from a ship, whether at a port

or place of loading, call or refuge, shall be admitted as G.A., when the discharge was necessary for the common safety or to enable damage to the ship, caused by sacrifice or accident during the voyage, to be repaired, if the repairs were necessary for the safe prosecution of the voyage.

(c) Whenever the cost of discharging cargo from a ship is admissible as G.A., the cost of reloading and storing such cargo on board the said ship, together with all storage charges on such cargo, shall likewise be so admitted. But when the ship is condemned or does not proceed on her original voyage, no storage expenses incurred after the date of the ship's condemnation or of the abandon- ment of the voyage shall be admitted as G.A.

(

Rule XI. — Wages and Maintenance of Crew in Port of Refuge, &c.

When a ship shall have entered or shall have been detained in any port or place under the circumstances, or for the purposes of the repairs, mentioned in Rule X., the wages payable to the master, officers and crew, together with the cost of maintenance of the same, during the extra period of detention in such port or place until the ship shall or should have been made ready to proceed upon her voyage, shall be admitted as G.A. But when this ship is condemned or does not proceed on her original voyage, the wages and mainten- ance of the master, officers and crew, incurred after the date of the ship's condemnation or of the abandonment of the voyage, shall not be admitted as G.A.

Rule XII. — Damage to Cargo in Discharging, &c. Damage done to or loss of cargo necessarily caused in the act of discharging, storing, reloading and stowing shall be made good as G.A. when and only when the cost of those measures respectively is admitted as G.A.

Rule XIII. — Deductions from Cost of Repairs In adjusting claims for G.A., repairs to be allowed in G.A. shall be subject tothe following deductions in respect of " new for old," viz. : — ■

In the case of iron or steel ships, from date of original register to the date of accident : —

Up to year old (A.)

Between

1 and 3 years

(B.)

Between

3 and 6 years

(C.)

All repairs to be allowed in full, except painting or coating of bottom, from which one-third is to be deducted.

One-third to be deducted off repairs to and re- newal of woodwork of hull, masts and spars, furni- ture, upholstery, crockery, metal and glassware, also sails, rigging,_ ropes, sheets and hawsers (other than wire and chain), awnings, covers and painting.

One-sixth to be deducted off wire rigging, wire ropes and wire hawsers, chain cables and chains, donkey engines, steam _ winches and connexions, steam cranes and connexions ; other repairs in full.

Deductions as above under clause B, except that one-sixth be deducted off ironwork of masts and spars, and machinery (inclusive of boilers and their mountings) .

(Deductions as above under clause C, except that one-third be deducted off ironwork of masts and spars, repairs to and renewal of all machinery (in- clusive of boilers and their mountings), and all hawsers, ropes, sheets and rigging. Between f One-third to be deducted off all repairs and re- 10 Sf 15 years} newals, except ironwork of hull and cementing and chain cables, from which one-sixth to be deducted. Anchors to be allowed in full.

One-third to be deducted off all repairs and re- newals. Anchors to be allowed in full. One-sixth to be deducted off chain cables.

CE-)

Over 15 years

Generally (G.)

The deductions (except as to provisions and stores, machinery and boilers) to be regulated by the age of the ship, and not the age of the particular part of her to which they apply. No painting bottom to be allowed if the bottom has not been painted within six months previous to the date of accident. No deduc- tion to be made in respect of old material which is repaired without being replaced by new, and pro- visions and stores which have not been in use.

5&

AVERAGE

lit the case of wooden or composite ships: —

When a ship is under one year old from date of original register, at the time of accident, no deduction ” new for old ” shall be made. After that period a deduction of one-third shall be made, with the following exceptions : —

Anchors shall be allowed in full. Chain cables shall be subject to a deduction of one-sixth only.

No deduction shall be made in respect of provisions and stores which had not been in use.

Metal sheathing shall be dealt with, by allowing in full the cost of a weight equal to the gross weight of metal sheath- ing stripped off, minus the proceeds of the old metal. Nails, felt and labour metalling are subject to a deduction of one- third. In the case of ships generally: —

In. the case of all ships, the expense of straightening bent iron-work, including labour of taking out and replacing it, shall be allowed in full.

Graving dock dues, including expenses of removals, cart- ages, use Of shears, stages and graving dock materials, shall be allowed in full.

Rule XIV. — Temporary Repairs No deductions “new for old” shall be made from the cost of temporary repairs of damage allowable as G.A.

Rule XV. — Loss of Freight Loss of freight arising from damage to or loss of cargo shall be made good as G.A., either when caused

by a G.A. act or when the damage to or loss of cargo is so made good.

Rule XVI. — Amount to be made good for Cargo Lost or

Damaged by Sacrifice The amount to be made good as G.A. for damage or loss of goods sacrificed shall be the loss which the owner of the goods has sustained thereby, based on the market values at the date of the arrival of the vessel or at the termination of the adventure.

Rule XVII. — Contributory Values The contribution to a G.A. shall be made upon the actual values of the property at the termination of the adventure, to which shall be added the amount made good as G.A. for property sacrificed; deduction being made from the shipowner's freight and passage- money at risk, of such port charges and crew's wages as would not have been incurred had the ship and cargo been totally lost at the date of the G.A. act or sacrifice, and have not been allowed as G.A. ; deduction being also made from the value of the property of all charges incurred in respect thereof subsequently to the G.A. act, except such charges as are allowed in G.A.

Passengers' luggage and personal effects, not shipped under bill of lading, shall not contribute to G.A.

Rule XVIII. — Adjustment Except as provided in the foregoing rules, the adjustment shall be drawn up in accordance with the law and practice that would have governed the adjustment had the contract of affreightment not contained a clause to pay G.A. according to these rules.

The above rules differ in some important respects from English common law, and from former English practice. They follow ideas upon the subject of G.A. which have prevailed in practice in foreign countries (though often in apparent opposition to the language of the codes), in preference to the more strict principle of the common law applied by English courts. That principle requires that, in order to have the character of G.A. a sacrifice or expenditure must be made for the common safety of the several interests in the adventure and under the pressure of a common risk. It is not enough that the sacrifice or expendi- ture is prudent, or even necessary to enable the common adven- ture to be completed. G.A., on the English view, only arises where the safety of the several interests is at stake. " The idea of a common

commercial adventure, as distinguished from the common safety from the sea," is not recognized. It is not sufficient " that an expenditure should have been made to benefit both cargo owner and shipowner." 1

Thus expenses incurred after ship and cargo are in safety, say at a port of refuge, are not generally, by English law, to be treated Port of as G.A. ; although the putting into port may have refuge ex- ˆ een ˆ or sa f et y> an d therefore a G.A. act. If the put- peases. tm S mto P ort nas Deen necessitated by a G.A. sacrifice, as by cutting away the ship's masts, the case is different ; the port expenses, the expenses of repairing the G.A. damage, and the incidental expenses of unloading, storing and reloading the cargo are, in such a case, treated as consequences of the original sacrifice, and therefore subjects for contribution. But where the reason for putting in is to avoid some danger, such as a storm or

1 Per Bowen, L.J., in Svensden v. Wallace, 1883, 13 Q.B.D. at p. 84.

hostile cruiser, or to effect repairs necessitated by some accidental damage to the ship, the G.A. sacrifice is considered to be at an end when the port has been reached, if the ship and cargo are then in physical safety. The subsequent expenditure in the port is said not tb flow from that sacrifice, but from the necessity of completing the voyage, and is incurred in performance of the shipowner's obligation under his contract. The practice of English average adjusters has indeed modified this strict view by treating the expense of unloading as G.A. ; but it may well be doubted whether that practice can be legally supported. Moreover, expenditure in the port which is in- curred in protecting the cargo as in warehousing it, is by English practice treated as a charge to be borne by the cargo for whose benefit it was incurred.

If we turn now to York-Antwerp Rule X., it will be seen that a much broader view is adopted. Whatever the reason for putting into the port of refuge, provided it was necessary for the common safety, the expenses of going in, and the consequent expenses of getting out (if she sails again with all or part of her original cargo), are allowed as G.A., Rule X. (a). Further, the cost of discharging the cargo to enable damage to the ship to be repaired, whether caused by sacrifice or by accident during the voyage, is to be allowed as G.A., " if the repairs were necessary for the safe prosecution of the voyage," Rule X. (6); And that is to

be so even where such re- pairs are done at a port of call, as well as where done at a port of refuge. ,Again, when the cost of discharging is treated as G.A-‘, so also are to be the expenses of storing the cargo on shore, and of re- loading and stowing it on board, after the repairs have been done (Rule X. (c)), together with any damage or loss incidental to those operations (Rule XII.).

Further, by Rule XI. the wages of the master, officers and crew, and the cost of their maintenance, during the detention of a ship under the circumstances, or for the purpose of the repairs’mentioned in Rule X., are to be allowed in G.A. It is questionable whether English law allows the wages and maintenance of the crew at a port of refuge in any case. Where the detention is to repair accidental damage it seems clear that they are not allowed* And in practice under common law, the allowance is never made; so that Rule XL is an important concession to the shipowner. Like the changes introduced by Rule X., it is a change towards the practice in foreign countries.

It may be noted that the rules do not afford equal protection to a shipper in the comparatively infrequent case of his being put to expense by the delay at a port of refuge. Thus a shipper of cattle is not entitled to have the extra wages and provisions of his cattle- men on board, nor the extra fodder consumed by the cattle during the stay at a repairing port, made as good as G.A. under Rules XI. and X. {Anglo-Argentine &c. Agency v. Temperley Shipping Co., 1899, 2 Q.B. 403). ‘,..’...

As to the acts which amount to G.A. sacrifices, as distinguisned from expenditures, the York-Antwerp Rules do not much alter English common law. They do, however, make definite General provisions upon some points on which authority was ave rage scanty or doubtful. (See Rules I. -IX.) And in Rule I., sacrifices. as to jettison of deck cargo, a change is made from the common law rule, for the jettison is not allowed as G.A. even though the cargo be carried on deck in accordance with an established custom of the particular trade. ‘

Rule III. deals with damage done in extinguishing fire on board a ship. Modern decisions have cleared away the old doubts whether such damage to ship or cargo should, at law, be allowed in G.A. But recent cases in the United States have raised the question whether the allowance should be made where the fire occurs in port, and is extinguished, not by the master, but by a

public authority acting in the interests of the public. Tie Supreme Court of the United States decided against the allowance in 1894 in a case of Ralli v. Troup (157 U.S. 386). The ship had there been scuttled to put out a fire on board, by the port authority, acting upon their own judgment, but with the assent of the master. It was held that the damage suffered by ship and cargo ought not to be made good by G.A. contributions; for the sacrifice had not been made "by some one specially charged with the control and safety of that ad- venture," but was the compulsory act of a public authority. On the other hand, in the English case of Papayanni v. Grampian S.S. Co. (i. Com. Ca. 448), Mathew, J., held that the scuttling of a ship at a port of refuge in Algeria, by orders of the captain of the port, was a G.A. act. It had been done in the interest of ship and cargo, and there was no evidence of any other motive.

Rule V. deals with the question whether, and under what con- ditions, a voluntary stranding of the ship is a G.A. act, in a manner which will probably be held to express the law in England when the matter comes up for decision.

Rules VI. and VII. deal with the damage sustained by the. ship, or her appliances, in efforts to force her off the ground when she has stranded. Such efforts involve an abnormal use which is likely to cause damage to sails and spars, or to engines and boilersj and they are treated as acts of sacrifice. The case of " The Bona," 1895 (P. 125) shows that the rules are in accord with English law upon the point. The court of appeal held that both the damage sustained by the engines while worked to get the ship off, and the coal and stores consumed, were subjects for G.A. contribution at common law.

Rule VIII. allows as G.A. any damage sustained by cargo when discharged and, say, lightered for the purpose of getting the ship off a strand. And the corresponding damage in the case of cargo dis- charged at a port of refuge to enable repairs to be done to the ship is allowed by Rule XII. But in the latter case the allowance does not expressly, extend to damage sustained while stored on land. Whether the law would require contribution to a loss of goods, say, by thieves or by fire, while landed for repairs, is not clear. Where the landing has been necessitated by a G.A. act, as

cutting away masts, it would seem that the loss ought to be made good, as being a result of the special risks to which those goods have thereby been exposed. The risks which they would have run if they had remained on board throughout are taken into account, as will presently appear, in estimating how much of the damage is to be made good.

Where cattle were taken into a port of refuge in Brazil, owing to accidental damage to the ship, with the result that they could not legally be landed at their destination (Deptford), and had to be taken to another port (Antwerp), at which they were of much less value, this loss of value was allowed in G.A. (Anglo-Argentine &c. Agency, v. Temperley Shipping Co., 1899, 2 Q.B. 403).

The case of a stranded ship and cargo often gives rise to difficulty as to whether the cost of operations to lighten the ship, and after-Wards to get her floated, should be treated as G.A. expenditure, or as expenses separately incurred in saving the separate interests. The true conclusion seems to be that either the whole operation should be treated as one for the common safety, and the whole expense be contributed to by all the interests saved, or else the several parts of the operation should be kept distinct, debiting the cost of each to the interests thereby saved. Which of these two views should be adopted in any case seems to depend upon the motives with which the earlier operations (usually the discharge of the cargo) were presumably undertaken. It may, however, happen that this test cannot be applied once for all. Take the case of a stranded ship carrying a bulky cargo of hemp and grain, but carrying also some bullion. Suppose this last to be rescued and taken to a place of safety at small expense in comparison with its value. It may well be that that operation must be regarded as done in the interest simply of the bullion itself, but that the subsequent opera- tions of lightening the ship and floating her can only be properly regarded as undertaken in the common interest of ship, hemp, grain and freight. In such a case there will be a G.A. contribution towards those later operations by those interests. But the bullion will not con- tribute; it will merely bear the expense of its own rescue [Royal Mail S. P. Co. v. English Bank of Rio de Janeiro, 1887, 19 Q.B.D. 362).

The York-Antwerp Rules have not only had the valuable result of introducing uniformity where there had been great variety, and corresponding certainty as to the principles which will be acted Upon in adjusting any G.A. loss, but also they have introduced

greater clearness and definiteness on points where there had been a want of definition. Thus Rule XIII. has laid down a careful and definite scale to regulate the deductions from the cost of repairs, in respect of " new for old," in place of the former somewhat uncertain customary rules which varied according to the place of adjustment; while at the same time the opportunity has been taken of adapting the, scale of deductions to modern conditions of shipbuilding. And Rule XVII. lays down a rule as to contributory values in place of the widely varying rulesof different countries as to the amounts upon which ship and freight shall contribute (cf. Gow, Marine Insurance, 305).

It may be of interest to refer briefly to one or two main principles which govern the adjustment (q.v.) of general average, i.e. the calculation of thefamounts to be made good and paid by the several interests, which is a complicated matter. The fundamental idea is that the several interests at risk shall contribute in proportion to the benefits they have severally received by the completion of the adventure. Contributions are not made in proportion to the amounts at stake when the sacrifice was made, but in proportion to the results when the adventure has come to an end. An interest which has become lost after the sacrifice, during the subsequent course of the voyage, will pay nothing; an interest which has become de- preciated will pay in proportion to the diminished value. The liability to contribute is inchoate only when the sacrifice has been made. It becomes complete when the adventure has come to an end, either by arrival at the destination, or by having been broken up at some intermediate point, while the interest in question still survives. To this there is one exception, in the case of G.A. expenditure. Where such expenditure has been incurred by the owner of one interest, generally by the ship- owner, the repayment to him by the other interests ought not to be wholly dependent upon the subsequent safety of those interests at the ultimate destination. If those other interests or some of them arrive, or are realized, as by being landed at an intermediate port, the rule (as in the case of G.A. sacrifices)

is that the contributions are to be in proportion to the arrived or realized values. But if all are lost the burden of the expendi- ture ought not to remain upon the interest which at first bore it; and the proper rule seems to be that contributions must be made by all the interests which were at stake when it was made, in proportion to their then values.

Again, the object of the law of G.A. is to put one whose property is sacrificed upon an equal footing with the rest, not upon a better footing. Thus, if goods to the value of £100 have been thrown overboard for the general safety, the owner of those goods must not receive the full £100 in contribution. He himself must bear a part of it, for those goods formed part of the adventure for whose safety the jettison was made; and it is owing to the partial safety of the adventure that any contribution at all is received by him. He, therefore, is made to contribute with the other saved interests towards his own loss, in respect of the amount ” made good ” to him for that. The full £100 is treated as the amount to be made good, but the owner of the goods is made to contribute towards that upon the sum of £100 thus saved to him.

The same principle has a further consequence. The amount to be made good will not necessarily be the value of the goods or other property in their condition at the time they were sacrificed; so to calculate it would in effect be to withdraw those goods from the subsequent risks of the voyage, and thus to put them in a better position than those which were not sacrificed. Hence, in estimating the amount to be made good, the value of the goods or property sacrificed must be estimated as on arrival, with reference to the condition in which they would probably have arrived had they remained on board throughout the voyage.

The liability to pay G.A. contributions falls primarily upon the owner of the contributing interest, ship, goods or freight. But in practice the contributions are paid by the insurers of the several interests. Merchants seldom have to concern themselves with the subject. And yet in an ordinary policy of insurance there is no express provision requiring the underwriter to in- demnify the assured against this liability. The policy commonly contains clauses which recognize such an obligation, e.g. a warranty against average ” unless general,” or an agreement that G.A. shall be payable ” as per foreign statement,” or ” according to York-Antwerp Rules “; but it does not directly state the obligation. It assumes that. The explanation seems to be that the practice of the underwriter to pay the contribution has been so uniform, and his liability has been so fully recognized, that express provisions were needless. But one result has been that very differing views of the ground of the obligation have been held. One view has been that it is covered by the sue and labour clause of an ordinary policy, by which the insurer agrees to bear his proportion of expenses voluntarily incurred ” in and about the

defence, safeguard and recovery " of the insured subject. But that has been held to be mistaken by the House of Lords {Atichisonv. Lohre, 1879,4 A. C. 755). Another view is that the underwriter impliedly undertakes to repay sums which the law may require the assured to pay towards averting losses which would, by the contract, fall upon the underwriter. Expenses voluntarily incurred by the assured with that object are expressly made repayable by the sue and labour clause of the policy. It might well be implied that payments compulsorily required from the assured by law for contributions to G.A., or as salvage for services by salvors, will be undertaken or repaid by the underwriter, the service being for his benefit." But the decision in Aitchison v. Lohre negatives this ground also. The claim was against underwriters on a ship which had been so damaged that the cost of repairs had exceeded her insured value. A claim for the ship's contribution to certain salvage and G.A. expenses which had been incurred, over and above the cost of repairs, was disallowed. The view seems to have been that the insurer is liable for salvage and G.A. payments as losses of the subject insured, and therefore included in the sum insured, not as collateral payments made on his behalf. This bases the claim against the insurer upon a fiction, for there has been no loss of

the subject insured; in fact, the payment has been for averting such a loss. And it suggests that the insurer is not liable for salvage where the policy is free of particular average, which does not accord with practice.

An important question as to an insurer's liability for G.A. arose in the case of the Brigella (1893, P. 189), where a shipowner had incurred expenses which would have been the subject of G.A. contributions, but that he alone was interested in the voyage. There were no contributories. He claimed from the insurers of the ship what would have been the ship's G.A. contribution had there been other persons to contribute in respect of freight or cargo. The claim was disallowed on the ground that there could be no G.A. in such circumstances, and therefore no basis for a claim against the insurer. The liability of the insurer was thus made to depend, not upon the character of the loss, but upon the fact or possibility of contribution. But this was not followed in Montgomery v. Indemnity Mutual M. I. Co. (1901, 1 K.B. 147).

There ship, freight and cargo all belonged to the same person. He had insured the cargo but not the ship. The cargo underwriters were held liable to pay a contribution to damage done to the ship by cutting away masts for the general safety. The loss was in theory spread over all the interests at risk, and they had undertaken to bear the cargo's share of such losses. Their liability did not depend jtpon the accident of whether the interests all belonged to one person or not. This agrees with the view taken in the United States.

As to Particular Average, see under Insurance: Marine.

Authorities.— Lowndes on General Average (4th ed., London,); Abbott's Merchant Ships and Seamen (14th ed., London

1901); Arnould's Marine Insurance (7th ed., London, 1901); Carver's Carriage by Sea (4th ed., London, 1905). (T. G. C.)

AVERNUS, a lake of Campania, Italy, about if m. N. of Baiae. It is an old volcanic crater, nearly 2 m. in circumference, now, as in Roman times, filled with water. Its depth is 213 ft., and its height above sea-level 3 J ft.; it has no natural outlet. In ancient times it was surrounded by dense forests, and was the centre of many legends. It was represented as the entrance by which both Odysseus and Aeneas descended to the infernal regions, and as the abode of the Cimmerii. Its Greek name, "Aopvos, was explained to mean that no bird could fly across it. Hannibal made a pilgrimage to it in 214 B.C. Agrippa in 37 B.C. converted it into a naval harbour, the Portus lulius; joining it to the Lacus Lucrinus by a canal, and connecting the latter with the sea, he reduced the distance to Cumae by boring a tunnel over 5 m. in length, now called Grotta della Pace, through the hill on the north-west side of Lake Avernus. After Sextus Pompeius had been subdued, the chief naval harbour was transferred to Misenum. Nero's works for his proposed canal from Baiae to the Tiber (a.d. 64) seem to have begun near. Lake Avernus; indeed, according to one theory, the Grotta della Pace would be a portion of this canal. On the east side of the lake are remains of baths, including a great octagonal hall known as the Temple of Apollo, built of brickwork, and belonging to the 1st century. The so-called Grotto of the Cumaean Sibyl, on the south side, is a rock-cut passage, ventilated by vertical apertures, possibly a part of the works connected with the naval harbour. To the south-east of the lake is the Monte Nuovo, a volcanic hill upheaved in 1538, with a deep extinct crater in the centre. To the south is the Lacus Lucrinus.

See J. Beloch, Campanien (2nd ed., Breslau, 1890), pp. 168 seq. (T. As.)

AVERROES [Abul-Walid Muhammad ibn- Ahmad Ibn-Muhammad ibn-Rushd] (1126-1198), Arabian philosopher, was born at Cordova. His early life was occupied in mastering the curriculum of theology, jurisprudence, mathematics, medicine and philosophy, under the approved teachers of the time. The years of his prime fell during the last period of Mahommedan rule in Spain under the Almohades (q.v.). It was Ibn-Tufail (Abubacer), the philosophic vizier of Yusef, who introduced Averroes to that prince, and Avenzoar (Ibn-Zuhr), the greatest of Moslem physicians, was his friend. Averroes, who was versed in the Malekite system of law, was made cadi of Seville (1169), and in similar appointments the next twenty-five years

of his life were passed. We find him at different periods in Seville, Cordova and Morocco, probably as physician to Yusef al-Mansur, who took pleasure in engaging him in discussions on the theories of philosophy and their bearings on the faith of Islam. But science and free thought then, as now, in Islam, depended almost solely on the tastes of the wealthy and the favour of the monarch. The ignorant fanaticism of the multitude viewed speculative studies with deep dislike and distrust, and deemed any one a Zendik (infidel) who did not rest content with the natural science of the Koran. These smouldering hatreds burst into open flame about the year 1195. Averroes was accused of heretical opinions and pursuits, stripped of his honours, and banished to a place near Cordova, where his actions were closely watched. At the same time efforts were made to stamp out all liberal culture in Andalusia, so far as it went beyond the little medicine, arithmetic and astionomy required for practical life. But the storm soon passed. Averroes was recalled to Morocco when the transient passion of the people had been satisfied, and for a brief period survived his restoration to honour. He died in the year before his patron, al-Mansur, with whom (in 1199) the political power of the Moslems came to an end, as did the culture of liberal science with Averroes. The philosopher left several sons, some of whom became jurists like his own grandfather. One of them has left an essay, expounding his father's theory of the intellect. The personal character of Averroes is known to us only in a general way, and as we can gather it from his writings. His clear, exhaustive and dignified style of treatment evidences the rectitude and nobility of the man. In the histories of his own nation he has little place; the renown which spread in his

lifetime to the East ceased with his death, and he left no school. Yet, from a note in a manuscript, we know that he had intelligent readers in Spain more than a century afterwards. His historic fame came from the Christian Schoolmen, whom he almost initiated into the system of Aristotle, and who, but vaguely discerning the expositors who preceded, admired in his commentaries the accumulated results of two centuries of labours.

The literary works of Averroes include treatises on jurisprudence, grammar, astronomy, medicine and philosophy. In 1859 a work of Averroes was for the first time published in Arabic by the Bavarian Academy, and a German translation appeared in 187s by the editor, J. Miiller. It is a treatise en- titled Philosophy and Theology, and, with the exception of a German version of the essay on the conjunction of the intellect with man, is the first translation which enables the non-Semitic scholar to form any adequate idea of Averroes. The Latin translations of most of his works are barbarous and obscure. A great part of his writings, particularly on jurisprudence and astronomy, as well as essays on special logical subjects, prolego- mena to philosophy, criticisms on Avicenna and Alfarabius (FarabI) ,remain in manuscript in the Escorial and other libraries. The Latin editions of his medical works include the Colliget {i.e. Kulliyyat, or summary), a resumS of medical science, and a commentary on Avicenna's poem on medicine; but Averroes, in medical renown, always stood far below Avicenna. The Latin editions of his philosophical works comprise the Commen- taries on Aristotle, the Deslructio Destructionis (against Ghazali), the De Substantia Orbis and a double treatise De Animae Beati- tudine. The Commentaries of Averroes fall under three heads : — the larger commentaries, in which a paragraph is quoted at large, and its clauses expounded one by one; the medium commentaries, which cite only the first words of a section; and the paraphrases or analyses, treatises on the subjects of the Aristotelian books. The larger commentary was an innovation of Averroes; for Avicenna, copied by Albertus Magnus, gave under the rubrics furnished by Aristotle works in which, though the materials were borrowed, the grouping was his own. The great com- mentaries exist only for the Posterior Analytics, Physics, De Caelo, De Anima and Metaphysics. On the History of Animals no commentary at all exists, and Plato's Republic is substituted for the then inaccessible Politics. The Latin editions of these works between 1480 and 1580 number about 100. The first

appeared at Padua (1472) ; about fifty were published at Venice, the best-known being that by the Juntas (1552-1553) in ten volumes folio.

See E. Renan, Averroes et I'Averroisme (2nd ed., Paris, 1861); S. Munk, Melanges, 418-458; G. Stockl, Phil. d. Mittelalters, ii. 67-124; Averroes (Vater und Sohn), Drei Abhandl. iiber d. Conjunction d. separaten Intellects mit d. Menschen, trans, into German from the Arabic version of Sam. Ben-Tibbon, by Dr J. Hercz (Berlin, 1869); T. J. de Boer, History of Philosophy in Islam (London, 1903), ch. vi. ; A. F. M. Mehren in Museon, vii. 613-627; viii. 1-20; Carl Brockel- mann, Geschichte der arabischen Litteratur (Weimar, 1898), vol. i. pp. 461 f. See also Arabian Philosophy. (W. W. ; G. W. T.)

AVERRUNCATOR, a form of long shears used in arboriculture for " averruncating " or pruning off the higher branches of trees, &c. The word " averruncate " (from Lat. averruncare, to ward off, remove mischief) glided into meaning to " weed the ground," " prune vines," &c, by a supposed derivation from the Lat. ab, off, and eruncare, to weed out, and it was spelt " aberuncate " to suit this ; but the New English Dictionary regards such a derivation as impossible.

A VERSA, a town and episcopal see of Campania, Italy, in the province of Caserta, 155 m. S.S.W. by rail from Caserta, and 125 m. N. by rail from Naples, from which there is also an electric tramway. Pop. (1901) 23,477. Aversa was the first place in which the Normans settled, it being granted to themiin 1027 for the help which they had given to Duke Sergius of Naples against Pandulf IV. of Capua. The Benedictine abbey of S. Lorenzo preserves a portal of the nth century. There is also a large lunatic asylum, founded by Joachim Murat in 1813.

AVESNES, a town of northern France, capital of an arrondissement in the department of Nord, on the Helpe, 28 m. S.E. of Valenciennes by rail. Pop. (1906) 5076. The town is the seat of a sub-prefect, and has a tribunal of first instance, a chamber of commerce and a communal college. Its church of St Nicholas (16th century) has a tower 200 ft. high, with a fine chime of bells. The chief industry of the town is wool-spinning, and there is trade in wood. Avesnes was founded in the nth century, and formed a countship which in the 15th century passed to the

house of Burgundy and afterwards to that of Habsburg. In 1477 it was destroyed by Louis XI. By the treaty of the Pyrenees (1659) it came into the possession of the French, and was fortified by Vauban. It was captured by the Prussians in 181 5.

AVEYRON, a department of southern France, bounded N. by Cantal, E. by Lozere and Gard, S.W. by Tarn and W. by Tarn-et-Garonne and Lot. Area, 3386 sq. m. Pop. (1006) 377,299. It corresponds nearly to the old district of Rouergue, which gave its name to a countship established early in the 9th century, and united with that of Toulouse towards the end of the 1 1 th century. The earliest known natives of this region were the Celtic Rutheni, to whom the numerous megalithic monuments found in the department are attributed. Aveyron lies on the southern border of the central plateau of France. Its chief rivers are the Lot in the north, the Aveyron in the centre and the Tarn in the south, all tributaries of the Garonne. They flow from east to west, following the general slope of the department, and divide it into four zenes. In the north-east, between the Lot and its tributary the Truyere, lies the lonely pastoral plateau of the Viadene, dominated by the volcanic mountains of Aubrac, which form the north-eastern limit of the department and include its highest summit (4760 ft.). Entraygues, at the confluence of the Lot and the Truyere, is one of the many picturesque towns of the department. Between the Lot and the Aveyron is a belt of causses or monotonous limestone table-lands, broken here and there by profound and beautiful gorges — a type of scenery characteristic of Aveyron. This zone is also watered by the Dourdou du Nord, a tributary of the Lot. The salient feature of the region between the Tarn and the Aveyron is the plateau of the Segala, bordered on the east by the heights of Levezou and Palanges and traversed from east to west by the deep valley of the Viaur, a tributary of the Aveyron. The country south of the Tarn is occupied in great part by the huge plateau of Larzac, which lies between the Causse Noir and the Causse St Affrique, the three forming the south-western termination of the

Cevennes, On the Causse Noir is found the fantastic chaos of rocks and precipices known as Montpellier-le-Vieux, resembling the ruins of a huge city. The climate of Aveyron varies from extreme rigour in the mountains to mildness in the sheltered valleys ; the south wind is sometimes of great violence. Wheat, rye and oats are the chief cereals cultivated, the soil of Aveyron being naturally poor. Other crops are potatoes, colza, hemp and flax. The mainstay of the agriculture of the department is the

raising of live-stock, especially of cattle of the Aubrac breed, for which Laguiole is an important market. The wines of Entraygues, St Georges, Bouillac and Najac have some reputation; in the Segala chestnuts form an important element in the food of the peasants, and the walnut, cider-apple, mulberry (for the silk-worm industry), and plum are among the fruit trees grown. The production of Roquefort cheeses is prominent among the agricultural industries. They are made from the milk of the large flocks of the plateau of Larzac, and the choicest are ripened in the even temperature of the caves in the cliff which overhangs Roquefort. The minerals found in the depart- ment include the coal of the basins of Aubin and Rodez as well as iron, zinc and lead. Quarries of various kinds of stone are also worked. The chief industrial centres are Decazeville, which has metallurgical works, and Millau, where leather-dressing and the manufacture of gloves have attained considerable importance. Wool-weaving and the manufacture of woollen goods, machinery, chemicals and bricks are among the other industries.

There are five arrondissements, of which the chief towns are Rodez, capital of the department, Espalion, Millau, St Affrique and Villefranche, with 43 cantons and 304 communes. Rodez is the seat of a bishopric, the diocese of which comprises the de-partment. Aveyron belongs to the 16th military region, and to the academic or educational circumscription of Toulouse. Its court of appeal is at Montpellier. The department is traversed by the lines both of the Orleans and Southern railways. The more important towns are Rodez, Millau, St Affrique, Ville- franche-de-Rouergue and Decazeville. The following are also of interest : — Sauveterre, founded in 1281, a striking example of the bastide (q.v.) of that period; Conques, which has a remark- able abbey-church of the nth century like St Sernin of Toulouse in plan and possessing a rich treasury of reliquaries, &c. ; Espalion, where amongst other old buildings there are the remains of a feudal stronghold and a church of the Romanesque period ; Najac, which has the ruins of a magnificent chateau of the 13th century; and Syl vanes, with a church of the 12 th century, once attached to a Cistercian abbey.

AVEZZANO, a town of the Abruzzi, Italy, in the province of Aquila, 67 m. E. of Rome by rail and 38 m. S. of Aquila by road. Pop. (1901) 9442. It has a fine and well-preserved castle, built in 1490 by Gentile Virginio Orsini; it is square, with round towers at the angles. Avezzano is on the main line from Rome to Castellammare Adriatico; a branch railway diverges to Rocca-

secca, on the line from Naples to Rome. The Lago Fucino lies i|m. to the east.

AVIANUS, a Latin writer of fables, placed by some critics in the age of the Antonines, by others as late as the 6th century a.d. He appears to have lived at Rome and to have been a heathen. The 42 fables which bear his name are dedicated to a certain Theodosius, whose learning is spoken of in most flattering terms. He may possibly be Macrobius Theodosius, the author of the Saturnalia ; some think he may be the emperor of that name. Nearly all the fables are to be found in Babrius, who was probably Avianus's source of inspiration, but as Babrius wrote in Greek, and Avianus speaks of having made an elegiac version from a rough Latin copy, probably a prose paraphrase, he was not indebted to the original. The language and metre are on the whole correct, in spite of deviations from classical usage, chiefly in the management of the pentameter. The fables soon became popular as a school-book. Promythia and epimythia (introductions and morals) and paraphrases, and imitations were frequent, such as the Novus Avianus of Alexander Neckam (12th century).

Editions. — Cannegieter (1731), Lachmann (1 845) , Frohner (1 862) ,

Bahrens in Poetae Laiini Minores, Ellis (1887). See Mviller, De Phaedri et Aviani Fabulis (1875) ; Unrein, De Aviani Aetate (1885) ; Hervieux, Les Fabulistes latins (1894) ; The Fables of Avian trans- lated into Englyshe . . . by William Caxton at Westmynslre (1483).

AVIARY (from Lat. avis, a bird), called by older writers " volary," a structure in which birds are kept in a state of captivity. While the habit of keeping birds in cages dates from a very remote period, it is probable that structures worthy of being termed aviaries were first used by the ancient Romans, chiefly for the process of fattening birds for the table. In Varro's time, 116-127 B.C., aviaries or " ornithones " (from Gr. tpvvs oppidas, bird) were common. These consisted of two kinds, those constructed for pleasure, in which were kept nightin- gales and other song-birds, and those used entirely for keeping and fattening birds for

market or for the tables of their owners. Varro himself had an aviary for song-birds exclusively, while Lucullus combined the two classes, keeping birds both for pleasure and as delicacies for his table. The keeping of birds for pleasure, however, was very rarely indulged in, while it was a common practice with poulterers and others to have large ornithones either in the city or at Sabinum for the fattening of thrushes and other birds for food.

Ornithones consisted merely of four high walls and a roof, and were lighted with a few very small windows, as thejfeirds were considered to pine less if they could not see their free companions outside. Water was introduced by means of pipes, and conducted in narrow channels, and the birds were fed chiefly upon dried figs, carefully peeled, and chewed into a pulp by persons hired to perform this operation.

Turtle-doves were fattened in large numbers for the market on wheat and millet, the latter being moistened with sweet wine; but thrushes were chiefly in request, and Varro mentions one ornithon from which no less than five thousand of these birds were sold for the table in one season.

The habit of keeping birds in aviaries, as we understand the term, for the sake of the pleasure they afford their owners and for studying their habits is, however, of comparatively recent date. The beginning of geographical research in the 15th century brought with it the desire to keep and study at home some of the beautiful forms of bird-life which the explorers came across, and hence it became the custom to erect aviaries for the reception of these creatures. In the 16th century, in the early part of which the canary-bird was introduced into Europe, aviaries were not uncommon features of the gardens of the wealthy, and Bacon refers to them in his essay on gardening (1597). Elizabeth of Bohemia, the daughter of James I. of England, when a child, had an outdoor aviary at Coombe Abbey near Coventry, the back and roof of which were formed of natural rock, in which were kept birds of many species from many countries.

Within recent years the method of keeping birds in large aviaries has received considerable attention, and it is fully recognized that by so doing, not only do we derive great pleasure, but our knowledge of avian habits and mode of living can thereby be very considerably increased.

An aviary may be of almost any size, from the large cage known, on account of its shape, as the ” Crystal Palace aviary,” to a structure as large as a church; and the term is sometimes applied to the room of a house with the windows covered with wire-netting; but as a rule it is used for outdoor structures, composed principally of wire-netting supported on a framework of either iron or woodwork. For quite hardy birds little more than this is necessary, providing that protection is given in the form of growing trees and shrubs, rock-work or rough wooden shelters. For many of the delicate species, however, which hail from tropical countries, warmth must be provided during the inclement months of the year, and thus a part at least of an aviary designed for these birds must be in the form of a wooden or brick house which can be shut up in cold weather and artificially warmed.

The ideal aviary, probably, is that which is constructed in two parts, viz. a well-built house for the winter, opening out

into a large wire enclosure for use in the summer months. The doors between the two portions may be of wood or glazed. The part intended as the winter home of the birds is best built in’ brick or stone, as these materials are practically vermin-proof and the temperature in such a building is less variable than that in a thin wooden structure. The floor should be of concrete or brick, and the house should be fitted with an efficient heating apparatus from which the heat is distributed by means of hot-water pipes. Any arrangement which would permit the escape into the aviary of smoke or noxious fumes is to be strongly condemned. Such a house must be well lighted, preferably by means of skylights; but it is a mistake to have the whole roof glazed, at least half of it should be of wood, covered with slates or tiles. Perches consisting of branches of trees with the bark adhering should be fixed up, and, if small birds are to be kept, bundles of bushy twigs should be securely fixed up in corners under the roofs.

The outer part, which will principally be used during the summer, though it will do most birds good to be let out for a few hours on mild winter days also, should be as large as possible, and constructed entirely of wire-netting stretched on a framer work of wood or iron. If the latter material is selected, stout gas-piping is both stronger and more easily fitted together than solid iron rods.

If the framework be of wood, this should be creosoted, preferably – under pressure, or painted with three coats of good lead paint, the latter preservative also being used if iron is the material selected.

The wire-netting used may be of almost any sized mesh, according to the sized birds to be kept, but as a general rule the smallest mesh, such as half or five-eighths of an inch, should be used, as it is practically vermin-proof, and allows of birds of any size being kept. Wire-netting for aviaries should be of the best quality, and well galvanized. The new interlinked type is less durable than the old mesh type, though perhaps it looks somewhat neater when fixed.

Provision must be made for the entire exclusion of such vermin as rats, stoats and weasels, which, if they were to gain access, would commit great havoc amongst the birds. The simplest and most effectual method of doing this is by sinking the wire-netting some 2 ft. into the ground all round the aviary, and then turning it outwards for a distance of another foot as shown in the annexed cut (fig. 1).

The outer part of the aviary should be turfed and planted with evergreen and deciduous shrubs, and be provided with some means of supplying an abun- dance of pure water for the birds to drink and bathe in; a gravel path should not be forgotten.

Perhaps the most useful type of aviary is that built as above described, but with several compartments, and a passage at the back by which any compartment may be visited without the necessity of passing through and disturbing the birds in other compartments. Fig. 2 represents a ground plan of an aviary of this type divided into four compartments, each with an inner house 10 ft. square, and an outer flight of double that area'. The outer flights are intended to be turfed, and planted with shrubs, and the gravel path has a glazed roof above it by which it is kept dry in wet weather. Shallow water-basins are shown, which should be supplied by means of an underground pipe and a cock which can be turned on from outside the aviary; and they must be connected with a properly laid drain by means of a waste plug and an overflow pipe.

An aviary should always be built with a southern or south-eastern aspect, and, where possible, should be sheltered from the north, north-east and north-west by a belt of fir-trees, high wall

or bank, to protect the birds from the biting winds from these quarters.

When parrots of any kind are to be kept it is useless to trj

Fig.. 1.

and

to grow any kind of vegetation except grass, and even this will be demolished unless the aviary is of considerable size. The larger parrots will, in fact, bite to pieces not only living trees but also the woodwork of their abode, and the only really suitable materials for the construction of an aviary for these birds are brick or stone and iron; and the wire-netting used must be of the stoutest gauge or it will be torn to pieces by their strong bills.

The feeding of birds in aviaries is, obviously, a matter of the utmost importance, and, in order that they may have what is most suitable, the aviculturist should find out as much as possible of the wild life of the species he wishes to keep, or if little or nothing is known about their mode of living, as is often the case with rare forms, of nearly related species whose habits and food are probably much the same, and he should endeavour to provide food as nearly as possible resembling that which would be ob- tained by the birds when wild. It is often, however, impossible to supply precisely the same food as would be obtained by the birds had they their liberty, but a substitute which suits them well can

Fig. 2. — Plan of 4-compartment Aviary for Foreign Birds,

generally be obtained. The majority of the parrot tribe subsist principally upon various nuts, seed and fruit, while some of the smaller parrakeets or paroquets appear to feed almost exclusively upon the seeds of various grasses. Almost all of these are com- paratively easy to treat in captivity, the larger ones being fed on maize, sunflower-seed, hemp, dari, oats, canary-seed, nuts and various ripe fruits, while the grass-parrakeets thrive re- markably well on little besides canary-seed and green food, the most suitable of which is grass in flower, chickweed, groundsel and various seed-bearing weeds. But there is another large group of parrots, the Loriidae or brush-tongued parrots, some of the most

interesting and brightly coloured of the tribe, which, when wild, subsist principally upon the pollen and nectar of flowers, notably the various species of Eucalyptus, the filamented tongues of these parrots being peculiarly adapted for obtaining this. In captivity these birds have been found to live well upon sweetened milk-sop, which is made by pouring boiling milk upon crumbled bread or biscuit. They frequently learn to eat seed like other parrots, but, if fed exclusively upon this, are apt, especially if deprived of abundance of exercise, to suffer from fits which are usually fatal. Fruit is also readily eaten by the lories and lorikeets, and should always be supplied.

The foreign doves and pigeons form a numerous and beautiful group which are mostly hardy and easily kept and bred in captivity. They are for the most part grain-feeders and require only small corn and seeds, though a certain group, known as the fruit-pigeons, are fed in captivity upon soft fruits, berries, boiled potato and soaked grain.

The various finches and finch-like birds form an exceedingly large group and comprise perhaps the most popular of foreign

aviary birds. The weaver-birds of Africa are mostly quite hardy and very easily kept, their food consisting, for the most part, of canary-seed. The males of these birds are, as a rule, gorgeously attired in brilliant colours, some having long flowing tail-feathers during the nuptial season, while in the winter their showy dress is replaced by one of sparrow-like sombreness. The grass-finches of Australasia contain some of the most brilliantly coloured birds, the beautiful grass-finch {Poephila mirabilis) being resplendent in crimson, green, mauve, blue and yellow. Most of these birds build their nests, and many rear their young, successfully in outdoor aviaries, their food consisting of canary and millet seeds, while flowering grasses provide them with an endless source of pleasure and wholesome food. The same treatment suits the African waxbills, many of which are extremely beautiful, the crimson-eared waxbill or ” cordon- bleu ” being one of the most lovely and frequently imported. These little birds are somewhat delicate, especially when first imported, and during the winter months require artificial warmth.

There is a very large group of insectivorous and fruit-eating birds very suitable for aviculture, but their mode of living necessarily involves considerable care on the part of the avicul- turist in the

preparation of their food. Many birds are partially insectivorous, feeding upon insects when these are plentiful, and upon various seeds at other times. Numbers of species again which, when adult, feed almost entirely upon grain, feed their young, especially during the early stages of their existence, upon insects; while others are exclusively insect-eaters at all times of their lives. All of these points must be considered by those who would succeed in keeping and breeding birds in aviaries.

It would be almost an impossibility to keep the purely insectivorous species, were it not for the fact that they can be gradually accustomed to feed on what is known as " insectivorous " or " insectile " food, a composition of which the principal ingredients generally consist of dried ants' cocoons, dried flies, dried powdered meat, preserved yolk of egg, 1 and crumb of bread or biscuit. This is moistened with water or mixed with mashed boiled potato, and forms a diet upon which most of the insectivorous birds thrive. The various ingredients, or the food ready made, can be obtained at almost any bird-fancier's shop. Although it is a good staple diet for these birds, the addition of mealworms, caterpillars, grubs, spiders and so forth is often a necessity, especially for purely insectivorous species.

The fruit-eating species, such as the tanagers and sugar-birds of the New World, require ripe fruit in abundance in addition to a staple diet such as that above described, while for such birds as feed largely upon earth-worms, shredded raw meat is added with advantage.

Many of the waders make very interesting aviary birds, and require a diet similar to that above recommended, with the addition of chopped raw meat, mealworms and any insects that can be obtained.

Birds of prey naturally require a meat diet, which is best given in the form of small, freshly killed mammals and birds, the fur or feathers of which should not be removed, as they aid digestion.

The majority of wild birds, from whatever part of the world they may come, will breed successfully in suitable aviaries providing proper nesting sites are available. Large bundles of brushwood, fixed up in sheltered spots, will afford accom- modation for many kinds of birds, while some will readily build in evergreen shrubs if these are grown in their enclosure. Small boxes and baskets, securely fastened to the wall or roof of the

1 It has recently been stated by certain medical men that egg-food in any form is an undesirable diet for birds, owing to its being peculiarly adapted to the multiplication of the bacillus of septic- aemia, a. disease which is responsible for the death of many newly imported birds. It is a significant fact, however, that insectivorous species, which are those principally fed upon this substance, are not nearly so susceptible to this disease as seed-eating birds which rarely taste egg; and in spite of what has been written concerning its harmfulness the large majority of aviculturists use it, in both the fresh and the preserved state, with no apparent ill effects, but rather the reverse.

sheltered part of an aviary, will be appropriated by such species as naturally build in holes and crevices. Parrots, when wild, lay their eggs in hollow trees, and occasionally in holes in rocks, making no nest, 1 but merely scraping out a slight hollow in which to deposit the eggs. For these birds hollow logs, with small entrance holes near the top, or boxes, varying in size according to the size of the parrots which they are intended for, should be supplied. In providing nesting accommodation for his birds the aviculturist must endeavour to imitate their natural surroundings and supply sites as nearly as possible similar to those which the birds, to whatever order they may belong, would naturally select.

Aviculture is a delightful pastime, but it is also far more than this; it is of considerable scientific importance, for it admits of the living birds being studied in a way that would be quite impossible otherwise. There are hundreds of species of birds, from all parts of the world, the habits of which are almost un-known, but which may be kept without difficulty in suitable aviaries. Many of these birds cannot be studied satisfactorily in a wild state by reason of their shy nature and retiring habits, not to mention their rarity and the impossibility, so far as most people are concerned, of visiting their native haunts. In suitable large aviaries, however, their nesting habits, courtship, display, incubation, moult and so forth can be accurately observed and recorded. The keeping of birds in aviaries is therefore a practice worthy of every encouragement, so long as the aviaries are of sufficient size and suitable design to allow of the birds exhibiting their natural habits; for in a large aviary they will reveal the secrets of their nature as they never would do in a cage or small

aviary. (D. S. -S.)

AVICENNA [Abu ‘AH al-Husain ibn ‘Abdallah ibn Sina] (080-1037), Arabian philosopher, was born at Afshena in the district of Bokhara. His mother was a native of the place; his father, a Persian from Balkh, filled the post of tax-collector in the neighbouring town of Harmaitin, under Nuh II. ibn Mansur, the Samanid amir of Bokhara. On the birth of Avicenna’s younger brother the family migrated to Bokhara, then one of the chief cities of the Moslem world, and famous for a culture which was older than its conquest by the Saracens. Avicenna was put in charge of a tutor, and his precocity soon made him the marvel of his neighbours, — as a boy of ten who knew by rote the Koran and much Arabic poetry besides. From a green- grocer he learnt arithmetic; and higher branches were begun under one of those wandering scholars who gained a livelihood by cures for the sick and lessons for the young. Under him Avicenna read the Isagoge of Porphyry and the first propositions of Euclid. But the pupil soon found his teacher to be but a charlatan, and betook himself, aided by commentaries, to master logic, geometry and the Almagest. Before he was sixteen he not merely knew medical theory, but by gratuitous attendance on the sick had, according to his own account, discovered new methods of treatment. For the next year and a half he worked at the higher philosophy, in which he encountered greater obstacles. In such moments of baffled inquiry he would leave his books, perform the requisite ablutions, then hie to the mosque, and continue in prayer till light broke on his difficulties. Deep into the night he would continue his studies, stimulating his senses by occasional cups of wine, and even in his dreams problems would pursue him and work out their solution. Forty times, it is said, he read through the Metaphysics of Aristotle, till the words were imprinted on his memory; but their meaning was hopelessly obscure, until one day they found illumination from the little commentary by Farabi (q.v.), which he bought at a bookstall for the small sum of three dirhems. So great was his joy at the discovery, thus made by help of a work from which he had expected only mystery, that he hastened to return thanks to God, and bestowed an alms upon the poor. Thus, by the end of his seventeenth year his apprenticeship of study was 1 There is, however, one true nest-building parrot, the grey- breasted parrakeet (Myopsittacus monachus), which constructs a huge nest of twigs. The true love-birds (Agapornis) may also be said to build nests, for they line their nest-hole with strips of pliant bark.

concluded, and he went forth to find a market for his accomplishments.

His first appointment was that of physician to the amir, who owed him his recovery from a dangerous illness (997). Avicenna's chief reward for this service was access to the royal library of the Samanids (q.v.), well-known patrons of scholarship and scholars. When the library was destroyed by fire not long after, the enemies of Avicenna accused him of burning it, in order for ever to conceal the sources of his knowledge. Mean- while, he assisted his father in his financial labours, but still found time to write some of his earliest works.

At the age of twenty-two Avicenna lost his father. The Samanid dynasty came to its end in December 1004. Avicenna seems to have declined the offers of Mahmud the Ghaznevid, and proceeded westwards to Urjensh in the modern Khiva, where the vizier, regarded as a friend of scholars, gave him a small monthly stipend. But the pay was small, and Avicenna wandered from place to place through the districts of Nishapur and Merv to the borders of Khorasan, seeking an opening for his talents. Shams al-Ma'ali Qabus, the generous ruler of Dailam, himself a poet and a scholar, with whom he had expected to find an asylum, was about that date (1012) starved to death by his own revolted soldiery. Avicenna himself was at this season stricken down by a severe illness. Finally, at Jorjan, near the Caspian, he met with a friend, who bought near his own house a dwelling in which Avicenna lectured on logic and astronomy. For this patron several of his treatises were written; and the commencement of his Canon of Medicine also dates from his stay in Hyrcania.

He subsequently settled at Rai, in the vicinity of the modern Teheran, where a son of the last amir, Majd Addaula, was nominal ruler, under the regency of his mother. At Rai about thirty of his shorter works are said to have been composed. But the constant feuds which raged between the regent and her second son, Shams Addaula, compelled the scholar to quit the place, and after a brief sojourn at Kazwln, he passed southwards to Hamadan, where that prince had established himself. At first he entered into the service of a high-born lady; but ere long the amir, hearing of his arrival, called him in as medical attendant, and sent him back with presents to his dwelling. Avicenna was even raised to the office of vizier; but the turbulent soldiery, composed of Kurds and Turks, mutinied against their nominal sovereign, and demanded that the new vizier should be put to

death. Shams Addaula consented that he should be banished from the country. Avicenna, however, remained hidden for forty days in a sheik's house, till a fresh attack of illness induced the amir to restore him to his post. Even during this perturbed time he prosecuted his studies and teaching. Every evening extracts from his great works, the Canon and the Sanatio, were dictated and explained to his pupils; among whom, when the lesson was over, he spent the rest of the night in festive enjoyment with a band of singers and players. On the death of the amir Avicenna ceased to be vizier, and hid himself in the house of an apothecary, where, with intense assiduity, he continued the composition of his works. Meanwhile, he had written to Abu Ya'far, the prefect of Isfahan, offering his services; but the new amir of Hamadan getting to hear of this correspondence, and discovering the place of Avicenna's con- cealment, incarcerated him in a fortress. War meanwhile con- tinued between the rulers of Isfahan and Hamadan; in 1024 the former captured Hamadan and its towns, and expelled the Turkish mercenaries. When the storm had passed Avicenna returned with the amir to Hamadan, and carried on his literary labours; but at length, accompanied by his brother, a favourite pupil, and two slaves, made his escape out of the city in the dress of a Sufite ascetic. After a perilous journey they reached Isfahan, and received an honourable welcome from the prince. The remaining ten or twelve years of Avicenna's life were spent in the service of Abu Ya'far 'Ala Addaula, whom he accompanied as physician and general literary and scientific adviser, even in his numerous campaigns. During these years he began to study literary matters and philology, instigated, it is asserted, by

criticisms on his style. But amid his restless study Avicenna never forgot his love of enjoyment. Unusual bodily vigour enabled him to combine severe devotion to work with facile indulgence in sensual pleasures. His passion for wine and women was almost as well known as his learning. Versatile, light- hearted, boastful and pleasure-loving, he contrasts with the nobler and more intellectual character of Averroes. His bouts of pleasure gradually weakened his constitution; a severe colic, which seized him on the march of the army against Hamadan, was checked by remedies so violent that Avicenna could scarcely stand. On a similar occasion the disease returned; with difficulty he reached

Hamadan, where, finding the disease gaining ground, he refused to keep up the regimen imposed, and resigned himself to his fate. On his deathbed remorse seized him; he bestowed his goods on the poor, restored unjust gains, freed his slaves, and every third day till his death listened to the reading of the Koran. He died in June 1037, in his fifty- eighth year, and was buried in Hamadan.

It was mainly accident which determined that from the 12th to the 17th century Avicenna should be the guide of medical study in European universities, and eclipse the names of Rhazes, Ali ibn al-Abbas and Avenzoar. His work is not essentially different from that of his predecessors Rhazes and Ali; all present the doctrine of Galen, and through Galen the doctrine of Hippocrates, modified by the system of Aristotle. Slit the Canon of Avicenna is distinguished from the Al-Hawi (Continens) or Summary of Rhazes by its greater method, due perhaps to the logical studies of the former, and entitling him to his surname of Prince of the Physicians. The work has been variously appreciated in subsequent ages, some regarding it as a treasury of wisdom, and others, like Avenzoar, holding it useful only as waste paper. In modern times it has been more criticized than read. The vice of the book is excessive classification of bodily faculties, and over-subtlety in the discrimination of diseases. It includes five books; of which the first and second treat of physiology, pathology and hygiene, the third and fourth deal with the methods of treating disease, and the fifth describes the composition and preparation of remedies. This last part contains some contingent of personal observation. He is, like all his countrymen, ample in the enumeration of symptoms, and is said to be inferior to Ali in practical medicine and surgery. He introduced into medical theory the four causes of the Peri- patetic system. Of natural history and botany he pretends to no special knowledge. Up to the year 1650, or thereabouts, the Canon was still used as a text-book in the universities of Louvain and Montpellier.

About 100 treatises are ascribed to Avicenna. Some of them are tracts of a few pages, others are works extending through several volumes. The best-known amongst them, and that to which Avicenna owed his European reputation, is the Canon of Medicine; an Arabic edition of it appeared at Rome in 1593, and a Hebrew version at Naples in 1491. Of the Latin version there were about thirty editions, founded on the original trans- lation by Gerard of Cremona. The 15th century has the honour of composing the great commentary on the text of the Canon, grouping around it all that theory had imagined, and all that practice had observed. Other medical works translated into Latin are the Medicamenta Cordialia, Canticum de Medicina, Tractatus de Syrupo Acetoso. Scarcely any member of the Arabian circle of the sciences, including theology, philology, mathematics, astronomy, physics and music, was left un- touched by the

treatises of Avicenna, many of which probably varied little, except in being commissioned by a different patron and having a different form or extent. He wrote at least one treatise on alchemy, but several others have been falsely attri- buted to him. His book on animals was translated by Michael Scot. His Logic, Metaphysics, Physics, De Caelo, are treatises giving a synoptic view of Aristotelian doctrine. The Logic and Metaphysics have been printed more than once, the latter, e.g., at Venice in 1493, 1495 and 1546. Some of his shorter essays on medicine, logic, &c, take a poetical form (the poem on logic was published by Schmoelders in 1836). Two encyclopaedic

treatises, dealing with philosophy, are often mentioned. The larger, Al-ShijbV (Sanatio), exists nearly complete in manuscript in the Bodleian library and elsewhere; part of it on the De Anima appeared at Pavia (1490) as the Liber Sextus Naturalium, and the long account of Avicenna's philosophy given by Shah- rastani seems to be mainly an analysis, and in many places a reproduction, of the Al-Shifa'. A shorter form of the work is known as the An-najdt (Liberatio). The Latin editions of part of these works have been modified by the corrections which the monkish editors confess that they applied. There is also a Philosophia Orientalis, mentioned by Roger Bacon, and now lost, which according to Averroes was pantheistic in tone.

For Avicenna's life, see Ibn Khallikan's Biographical Dictionary, translated by McG. de Slane (1842) ; F. Wiistenfeld's Geschickte der arabischen Aerzte und Naturforscker (Gottingen, 1840). For bis medicine, see Sprengel, Histoire de la MMecine; and for his philo- sophy, see Shahrastani, German trans, vol. ii. 213-332; K. Prantl, Geschickte der Logik, ii. 318-361; A. Stockl, Phil. d. Mittelalters, ii. 2 3-58; S. Munk, Melanges, 352-366; B. Haneberg in the Abhand- lungen der pkilos.-philolog. Class, der bayerischen Academie (1867); and Carra de Vaux, Avicenne (Paris, 1900). For list of extant works see C. Brockelmaim's Geschickte der arabischen Litteratur (Weimar, 1898), vol. i. pp. 452-458. (W. W.; G. W. T.)

AVIENUS, RUFIUS FESTUS, a Roman aristocrat and poet, of Vulsinii in Etruria, who flourished during the second half of the 4th century a.d. He was probably proconsul of Africa (366) and of Achaia (372). Avienus was a pagan and a staunch supporter of the old religion. He translated the ˆaivofxeua. of AratUs and paraphrased the Hepiriyiiai.s of Dionysius under the title of Descriptio Orbis Terrarum, both in hexameters. He also compiled

a description, in iambic trimeters, of the coasts of the Mediterranean, Caspian and Black Seas in several books, of which only a fragment of the first is extant. He also epitomized Livy and Virgil's Aeneid in the same metre, but these works are lost. Some minor poems are found under his name in anthologies, e.g. a humorous request to one Favianus for some pomegranates for medicinal purposes.

AVIGLIANA, a town of Piedmont, Italy, in the province of Turin, 14 m. W. by rail from the town of Turin. Pop. (1901) 4629. It has medieval buildings of some interest, but is mainly remarkable for its large dynamite factory, employing over 500 workman.

AVIGNON, a city of south-eastern France, capital of the department of Vaucluse, 143 m. S. of Lyons on the railway between that city and Marseilles. Pop. (1906) 35,356. Avignon, which lies on the left bank of the Rhone, a few miles above its confluence with the Durance, occupies a large oval-shaped area not fully populated, and covered in great part by parks and gardens. A suspension bridge leads over the river to Villeneuve-les- Avignon (q.v.), and a little higher up, a picturesque ruined bridge of the 12th century, the Pont Saint-Benezet, projects into the stream. Only four of the eighteen piles are left; on one of them stands the chapel of Saint-Benezet, a small Romanesque building. Avignon is still encircled by the ramparts built by the popes in the 14th century, which offer one of the finest examples of medieval fortification in existence. The walls, which are of great strength, are surmounted by machicolated battlements, flanked at intervals by thirty-nine massive towers and pierced by several gateways, three of which date from the 14th century. The whole is surrounded by a line of pleasant boulevards. The life of the town is almost confined to the Place de l'Hotel de Ville and the Cours de la Republique, which leads out of it and extends to the ramparts. Elsewhere the streets are narrow, quiet, and, for the most part, badly paved. At the northern extremity of the town a precipitous rock, the Rocher des Doms, rises from the river's edge and forms a plateau stretch- ing southwards nearly to the Place de l'Hotel .de Ville. Its summit is occupied by a public garden and, to the south of this, by the cathedral of Notre-Dame des Doms and the Palace of the Popes. The cathedral is a Romanesque building, mainly of the 12th century, the most prominent feature of which is the gilded statue of the Virgin which surmounts the western tower. Among the many works of art in the interior, the most beautiful is the mausoleum of Pope John XXII., a masterpiece of Gothic

carving of the 14th century. The cathedral is almost dwarfed by the Palace of the Popes, a sombre assemblage of buildings, which rises at its side and cavers a space of more than ij acres. Begun in 1316 by John XXII., it was continued by succeeding popes until 1370, and is in the Gothic style; in its construction everything has been sacrificed to strength, and though the effect is imposing, the place has the aspect rather of a fortress than of a palace. It was for long used as a barracks and prison, to the exigencies of which the fine apartments were ruthlessly adapted, but it is now municipal property. Among the minor churches of the town are St Pierre, which has a graceful facade and richly carved doors, St Didier and St Agricol, all three of Gothic architecture. The most notable of the civil buildings are the hotel de ville, a modern building with a belfry of the 14th century, and the old Hotel des Monnaies, the papal mint which was built in 1610 and is now used as a music-school. The Calvet Museum, so named after F. Calvet, physician, who in 1810 left his collections to the town, is rich in inscriptions, bronzes, glass and other antiquities, and in sculptures and paintings. Tlie library has over 140,000 volumes. The town has a statue of a Persian, Jean Althen, who in 1765 introduced the culture of the madder plant, which long formed the staple and is still an important branch of local trade. In 1873 John Stuart Mill died at Avignon, and is buried in the cemetery. For the connexion of Petrarch with the town see Petrarch. ~^

Avignon is subject to violent winds, of which the most disastrous is the mistral. The popular proverb is, however, somewhat exaggerated, Avenio ventosa, sine vento venenosa, cum vento fastidiosa (windy Avignon, pest-ridden when there is no wind, wind-pestered when there is) .

Avignon is the seat of an archbishop and has tribunals of first instance and of commerce, a council of trade-arbitrators, a lycee, and training college, a chamber of commerce and a branch of the Bank of France. It is in the midst of a fertile district, in the products of which it has a large trade, and has flour-mills, distilleries, oil-works and leather-works, manufactures soap, chemicals and liquorice, and is well known for its sarsanet and other fabrics.

Avignon (Avenio) was an important town of the Gallic tribe of the Cavares, and under the Romans one of the leading cities of Gallia Narbonensis. Severely harassed during the barbarian invasions and by the Saracens, it was, in later times, attached successively to the kingdoms of Burgundy and of Aries and to the domains of the counts of Provence and of Toulouse and of Forcalquier. At the end of the 1 2 th century it became a republic, but in 1226 was taken and dismantled by Louis VIII. as punishment for its support of the Albigenses, and in 1251 was forced to submit to the counts of Toulouse and Provence. In 1309 the city was chosen by Clement V. as his residence, and from that time till 1377 was the papal seat. In 1348 the city was sold by Joanna, countess of Provence, to Clement VI. After Gregory XI. had migrated to Rome, two antipopes, Clement VII. and Benedict XIII., resided at Avignon, from which the latter was expelled in 1408. The town remained in the possession of the popes, who governed it by means of legates, till its annexation by the National Assembly in 1791, though during this interval several kings of France made efforts to unite it with their dominions. In 1791 conflicts between the adherents of the Papacy and the Republicans led to much bloodshed. In 1815 Marshal Brune was assassinated in the town by the adherents of the royalist party. The bishopric, founded in the 3rd century, became an archbishopric in 1475.

See Fantoni Castrucci, Istoria detta citta d" Avignone e del Contado Venesino (Venice, 1678); J. B. Joudou, Histoire des souverains pontifes qui out siege a Avignon (Avignon, 1855); A. Canron, Guide de V Stranger dans la ville a" Avignon et ses environs (Avignon, 1858) ; J. F. Andre, Histoire de la Papaute d Avignon (Avignon, 1887).

AVILA, GIL GONZALEZ DE (c. iS77-i6s8)_, Spanish bio- grapher and antiquary, was born and died at Avila. He was made historiographer of Castile in 161 2, and of the Indies in 1 64 1. Of his numerous works, the most valuable are his Teatro de las Grandezas des Madrid (Madrid, 1623, sqq.), and his Teatro Eclesiastico. descriptive of the metropolitan churches and

cathedrals of Castile, with lives of the prelates (Madrid, 1645-1653, 4 vols. 4to).

AVILA, a province of central Spain, one of the modern divisions of the kingdom of Old Castile; bounded on the N. by Valladolid, E. by Segovia and Madrid, S. by Toledo and Caceres, and W. by

Salamanca. Pop. (1900) 200,457; area, 2570 sq. m. Avila is naturally divided into two sections, differing completely in soil, climate, productions and social economy. The northern portion is generally level; the soil is of indifferent quality, strong and marly in a few places, but rocky in all the valleys of the Sierra de Avila; and the climate alternates from severe cold in winter to extreme heat in summer. The population of this part is mainly agricultural. The southern division is one mass of rugged granitic sierras, interspersed, however, with sheltered and well-watered valleys, abounding with rich vegeta- tion. The winter here, especially in the elevated region of the Paramera and the waste lands of Avila, is long and severe, but the climate is not unhealthy. In this region stock-breeding is an important industry. The principal mountain chains are the Guadarrama, separating this province from Madrid; the Paramera and Sierra de Avila, west of the Guadarrama; and the vast wall of the Sierra de Gredos along the southern frontier, where its outstanding peaks rise to 6000 or even 8000 ft. The ridges which ramify from the Paramera are covered with valuable forests of beeches, oaks and firs, presenting a striking contrast to the bare peaks of the Sierra de Gredos. The principal rivers are the Alberche and Tietar, belonging to the basin of the Tagus, and the Tormes, Trabancos and Adaja, belonging to that of the Douro. The mountains contain silver, copper, iron, lead and coal, but their mineral wealth has been exaggerated, and at the beginning of the 20th century mining had practically been abandoned. Quarries of fine marble and jasper exist in the district of Arenas. The province declined in wealth and popula- tion during the 1 8th and 19th centuries, a result due less to the want of activity on the part of the inhabitants than to the oppressive manorial and feudal rights and the strict laws of entail and mortmain, which acted as barriers to progress.

Towards the close of this period many improvements were introduced, although the want of irrigation is still keenly felt Wide tracts of waste land were planted with pinewoods by the ducal house of Medina Sidonia. The main roads are fairly good; and Avila, the capital, is connected by rail with Salamanca. Valladolid and Madrid; but in many parts of the province the means of communication are defective. Except Avila there are no important towns. The principal production is the wool of the merino sheep, which at one time yielded an’ immense revenue. Game is plentiful, and the rivers abound in fish, specially trout. Olives, chestnuts and grapes are grown, and silk-worms are kept.

There is little trade, and the manufactures are few, consisting chiefly of copper utensils, lime, soap, cloth, paper and combs. The state of elementary education is com- paratively good, rather more than two-thirds of the population being able to read and write, and the ratio of crime is proportion- ately low.

AVILA (anc. Abula or Avela), the capital of the province described above; on the right bank of the river Adaja, 54 m. W. by N. of Madrid, by the Madrid-Valladolid railway. Pop. (1900) 11,885. The city is built on -the flat summit of a rocky hill, which rises abruptly in the midst of a veritable wilderness; a brown, arid, treeless table-land, strewn with immense grey boulders, and shut in by lofty mountains. The ancient walls of Avila, constructed of brown granite, and surmounted by a breastwork, with eighty-six towers and nine gateways, are still in excellent repair; but a large part of the city lies beyond their circuit. Avila is the seat of a bishop, and contains several ecclesiastical buildings of high interest. The Gothic cathedral, said by tradition to date from 1167, but probably of 13th or 14th century workmanship, has the appearance of a fortress, with embattled walls and two solid towers. It contains many interesting sculptures and paintings, besides one especially fine silver pyx, the work of Juan de Arphe, dating from 1571. The churches of San Vicente, San Pedro, Santo Tomas and San

Segundo are, in their main features, Romanesque of the 15th century, although parts of the beautiful San Vicente, and of San Pedro, may be as old as the 12 th century. Especially noteworthy is the marble monument in Santo Tomas, carved by the 15th-century Florentine sculptor Domenico Fancelli, over the tomb of Prince John (d. 1497), the only son of Ferdinand and Isabella. The convent and church of Santa Teresa mark the supposed birthplace of the saint whose name they bear (c. 1515-1582). Avila also possesses an old Moorish castle (alcdzar) used as barracks, a foundling hospital, infirmary, military academy, and training schools for teachers of both sexes. From 1482 to 1807 it was also the seat of a university. It has a considerable trade in agricultural products, leather, pottery, hats, linen and cotton goods.

For the local history see V. Picatoste, Traiiciones de Ayila

(Madrid, 1888) ; and L. Ariz, Historic, de las grandezas de . . . Avila (Alcala de Henares, 1607).

AVILA Y ZDNIGA, LUIS DE (C.1400-C 1560), Spanish historian, was born at Placentia. He was probably of low origin, but married a wealthy heiress of the family of Zuniga, whose name he added to his own. He rose rapidly in the favour of the emperor Charles V., served as ambassador to Rome, and was made grand commander of the order of the Knights of Alcantara. He accompanied the emperor to Africa in 1541, and having served during the war of the league of Schmaikalden, wrote a history of this war entitled Commentaries de la guerra de Alemana, hecha de Carlos V enelano de 1546 y 154J. This was first printed in 1548, and becoming very popular was translated into French, Dutch, German, Italian and Latin. As may be expected from the author's intimacy with Charles, the book is very partial to the emperor, and its misrepresentations have been severely criticized.

AVILES, PEDRO MENENDEZ DE (1519-1574), Spanish seaman, founder of St Augustine, Florida, was born at Aviles in Asturias on the 15th of February 1519. His family were gentry, and he was one of nineteen brothers and sisters. At the age of fourteen he ran away to sea, and was engaged till he was thirty in a life of adventure as a corsair. In 1549 during peace between France and Spain he was commissioned by the emperor Charles V. to clear the north coast of Spain and the Canaries of French pirates. In 1554 he was appointed captain- general of the " flota " or convoy which carried the trade between Spain and America. The appointment was made by the emperor over the head and against the will of the Casa de Contratacion, or governing board of the American trade. In this year, and before he sailed to America, Aviles accompanied the prince of Spain, afterwards Philip II., to England, where he had gone to marry Queen Mary. As commander of the flota he displayed a diligence, and achieved a degree of success in bringing back treasure, which earned him the hearty approval of the emperor. But his devotion to the imperial service, and bis steady refusal to receive bribes as the reward for permitting breaches of the regulations, made him unpopular with the merchants, while his high-handed ways offended the Casa de Contratacion. Re- appointed commander in 1557; and knowing the hostility of the Casa, he applied for service elsewhere. The war with France in which Spain and England were allies was then in progress, and until the close of 1559 ample occupation was found for Avilfis in bringing money

and recruits from Spain to Flanders. When peace was restored he commanded the fleet which brought Philip II. back from the Low Countries to Spain. In 1560 he was again appointed to command the flota, and he made a most successful voyage to America and back, in that and the following year. His relations with the Casa de Contratacion were, however, as strained as ever. On his return from another voyage in 1563 he was arrested by order of the Casa, and was detained in prison for twenty months. What the charges brought against him were is not known. Aviles in a letter to the king avows his innocence, and he was finally discharged by the judges, but not until they had received two peremptory orders from the king to come to a decision.

On his release he prepared to sail to the Bermudas to seek for

his son Juan, who had beert shipwrecked in the previous year. At that time the French Huguenots were engaged in endeavour- ing to plant a colony in Florida. As the country had been explored by the Spaniards they claimed it as theirs, and its position-on the track of the home-coming trade of Mexico rendered its possession by any other power highly dangerous. Philip II. endeavoured to avert the peril by making an ” asiento” or contract with Aviles, by which he advanced 15,000 ducats to the seaman, and constituted him proprietor of any colony which he could establish in Florida, on condition that the money was repaid. The contract was signed on the 20th of March 1565. Aviles sailed on the 28th of July of the 1 same year with one vessel of 600 tons, ten sloops and 1 500 men. On the 28th of August he entered and named the Bay of St Augustine, and began a fort there. He took the French post of Fort Caroline on the 20th of September 1565, and in October exterminated a body of French- men who, under the Huguenot Jean Ribault, had arrived on the coast of Florida to relieve their colony. The Spanish commander, after slaying nearly all his prisoners, hung their bodies on trees, with the inscription, ” Not as Frenchmen but as Lutherans.” A French sea-captain named Dominique de Gourgues revenged the massacre by capturing in 1568 Fort San Mateo (as the Spanish had renamed Fort Caroline), and hanging the garrison, with the inscription, ” Not as Spaniards but as murderers.” Till 1567 Aviles remained in Florida, busy with his colony. In that year he returned to Spain. He made one more voyage to Florida, and died on the i7thof September 1574. Aviles married Maria de Solis, when very young, and left three daughters. His letters prove him to have

been a pious and high-minded officer, who never imagined that he could be supposed by any honest man to have gone too far in massacring the Frenchmen, whom he regarded as pirates and heretics.

See The Spanish Settlements within the Present Limits of the United States, filQlida, 1562-1574, by Woodbury Lowery (New York, 1905). * (D. H.)

AVIL&S, or S/.ˆ Nicolas de' Aviles (the Roman Flavionavia) , a seaport of northern Spain, in the province of Oviedo; on the Bay of Avil6s, a winding inlet of the Bay of Biscay, 24 m. by rail W. of Gijon. Pop. (1900) 12,763. Avil6s is a picturesque and old-fashioned town, containing several ancient palaces and Gothic churches. The bay, which is crossed by a fine bridge at its narrow landward extremity, is the headquarters of a fishing fleet, and a port of call for many coasting vessels. Coal from the Oviedo mines is exported coastwise, and in 1904 the shipments from Aviles for the first time exceeded those from Gijon, reaching a total of more than 290,000 tons. Glass and coarse linen and woollen stuffs are manufactured; and there are valuable stone quarries in the neighbourhood.

AVIZANDUM (from Late Lat. avizare, to consider), a Scots law term; the judge " makes avizandum with a cause," i.e. takes time to consider his judgment.

AVLONA (anc. Aulon; Ital. Valona; Alb. Vliona), a town and seaport of Albania, Turkey, in the vilayet of Iannina. Pop. (1900) about 6000. Avlona occupies an eminence near the Gulf of Avlona, an inlet of the Adriatic, almost surrounded by mountains. The port is the best on the Albanian coast, and the nearest to Italy. It is protected by the island of Saseno, the ancient Saso, and by Cape Glossa, the northernmost headland of the Acroceraunian mountains. It is regularly visited by steamers from Trieste, Fiume, Brindisi, and other Austro-Hungarian and Italian ports, as well as by many small Greek and Turkish coasters. The cable and telegraph line from Otranto, in Italy, to Constantinople, has an important station here. The town is about if m. from the sea, and has rather a pleasant appearance with its minarets and its palace, surrounded with gardens and olive-groves. Valonia, a material largely used by tanners, is the pericarp of an acorn obtained in the neighbouring oak- woods, and derives its name from Valona. The surrounding district is mainly agricultural and pastoral, producing oats, maize, cotton,

olive oil, cattle, sheep, skins, hides and butter. All these commodities are exported in considerable quantities, besides bitumen, which is obtained from a mine worked by a French

company. The imports are woollen and cotton piece-goods, metals and petroleum.

Avlona played an important part in the wars between the Normans and the Byzantines, during the nth and 12th centuries. In 1464 it was taken by the Ottomans; and after being in Venetian possession in 1690, was restored to them in 169 1. In 1851 it suffered severely from an earthquake.

AVOCA, or Ovoca, VALE OF, a mountain glen of county Wicklow, Ireland, in the south-eastern part of the county, formed by the junction of the small rivers Avonmore and Avon- beg, which, rising in the central highlands of the county, form with their united waters the Ovoca river, flowing south and south-east to the Irish Sea at Arklow. The vale would doubtless rank only as one among the many beautiful glens of the district, but that it has obtained a lasting celebrity through one of the Irish Melodies of the poet Thomas Moore, in which its praises are sung. It is through this song that the form ” Avoca ” is most familiar, although the name is locally spelt ” Ovoca.” The glen is narrow and densely wooded. Its beauty is somewhat marred by the presence of lead and copper mines, and by the main line of the Dublin & South Eastern railway, on which Ovoca station, midway in the vale, is 42! m. south of Dublin. Of the two ” meetings of the waters ” (the upper, of the Avon- more and Avonbeg, and the lower, of the Aughrim with the Ovoca) the upper, near the fine seat of Castle Howard, is that which inspired the poet. At Avondale, above the upper ” meeting,” by the Avonmore, Charles Stewart Parnell was born.

AVOCADO PEAR, the fruit of the tree Persea gratissima, which grows in the West Indies and elsewhere; the flesh is of a soft and buttery consistency and highly esteemed. The name avocado, the Spanish for ” advocate,” is a sound-substitute for the Aztec ahuacatl; it is also corrupted into ” alliga tor-pear.” Avocato, avigato, abbogada are variants.

AVOGADRO, AMEDEO, Conte Di QuaejˆGNA (1776-1856), Italian physicist, was born at Turin on the 9th of June 1776, and died there on the 9th of July 1856. He was for many years professor of higher physics in Turin University. He published many physical memoirs on electricity, the dilatation of liquids by heat, specific heats, capillary attraction, atomic volumes &c. as well as a treatise in 4 volumes on Fisica di corpi ponderabili (1837-1841). But he is chiefly remembered for his " Essai d'une maniere de determiner les masses relatives des molecules elemen- taires des corps, et les proportions selon lesquelles elles entrent dans les combinaisons " (Journ. de Phys., 1811), in which he enunciated the hypothesis known by his name (Avogadro's rule) that under the same conditions of temperature and pressure equal volumes of all gases contain the same number of smallest particles or molecules, whether those particles consist of single atoms or are composed of two or more atoms of the same or different kinds.

fhi AVOIDANCE (from " avoid," properly to make empty or void, in current usage, to keep away from, to shun; the word " avoid " is adapted from the O. Fr. esvuidier or evider, to empty out, voide, modern vide, empty, connected with Lat. vacuus), the action of making empty, void or null, hence, in law, invalidation, annulment (see Confession and Avoidance) ; also the becoming void or vacant, hence in ecclesiastical law a term signifying the vacancy of a benefice — that it is void of an incumbent. In general use, the word means the action of keeping away from anything, shunning or avoiding.

AVOIRDUPOIS, or Averdupois (from the French avoir de pois, goods of weight), the name of a system of weights used in Great Britain and America for all commodities except the precious metals, gems and medicines. The foundation of the system is the grain. A cubic inch of water weighs 252-458 grains. Of this grain 7000 now (see Weights and Measures) make a pound avoirdupois. This pound is divided into 16 oz., and these ounces into 16 drachms.

Avoirdupois Weight.

Drachm, i6 = ounce_ i6 = pound, i4 = stone t 2 = quarter, 4 = hundred, 2o; = ton. 27*3 grains 437*5 7000 98,000 196,000 grs, 112 B > 2240 5b.

AVON, the name of several rivers in England and elsewhere. The word is Celtic, appearing in Welsh (very frequently) as afon, in

Manx as aon, and in Gaelic as abhuinn (pronounced avain), and is radically identical with the Sanskrit ap, water, and the Lat. aqua and amnis. The root appears more or less disguised in a vast number of river names all over the Celtic area in Europe. Thus, besides such forms as Evan, Aune, Anne,Ive, Auney, Inney, &c, in the British Islands, Aff, Aven, Avon, Aune appear in Brittany and elsewhere in France, Avenza and Avens in Italy, Avia in Portugal, and Avono in Spain; while the terminal syllable of a large proportion of the Latinized names of French rivers, such as the Sequana > the Matrona and the Garumna, seems originally to have been the same word. The names Punjofe, Doafe, &c, show the root in a clearer shape.

In England the following are the principal rivers of this name.

1. The East or Hampshire Avon rises in Wiltshire south of Marlborough, and watering the Vale of Pewsey collects feeders from the high downs between Marlborough and Devizes. Breaching the high ground of Salisbury Plain, it passes Amesbury, and following a very sinuous course reaches Salisbury. Here it receives on the east bank the waters of the Bourne, and on the west those of the Wylye. With a more direct course, and in a widening, fertile valley it continues past Downton, Fordingbridge and Ringwood, skirting the New Forest on the west, to Christchurch, where it receives the Stour from the west, and 25 m, lower enters the English Channel through the broad but narrow- mouthed Christchurch harbour. The length, excluding lesser sinuosities, is about 60 m., Salisbury being 35 m. above the mouth. The total fall is rather over 500 ft., and that from Salisbury about 140 ft. The river is of no commercial value for navigation. It abounds in loach, and there are valuable salmon fisheries. The drainage area is 1132 sq. m.

2. The Lower or Bristol Avon rises on the eastern slope of the Cotteswold Hills in Gloucestershire, collecting the waters of several streams south of Tetbury and east of Malmesbury. It flows east and south in a wide curve, through a broad upper valley past Chippenham and Melksham, after which it turns abruptly west to Bradford-on-Avon, receives the waters of the Frome from the south, and enters the beautiful narrow valley in which lie Bath and Bristol. Below Bristol the valley becomes the Clifton Gorge, famous for its wooded cliffs and for the Clifton (q.v.) suspension bridge which bestrides it. The cliffs and woods have been so far disfigured by quarries that public feeling was aroused, and in 1904 an " Avon Gorge Committee " was appointed to report to

the corporation of Bristol on the possibility of preserving the beauties of the locality. The Avon finally enters the estuary of the Severn at Avonmouth, though it can hardly be reckoned as a tributary of that river. From Bristol downward the river is one of the most important commercial waterways in England, as giving access to that great port. The Kennet and Avon Canal, between Reading and the Avon, follows the river closely from Bradford down to Bath, where it enters it by a descent of seven locks. The length of the river, excluding minor sinuosities, is about 75 m., the distance from Bradford to Bath being 10 m., thence to Bristol 12m., and thence to the mouth 8 m. The total fall is between 500 and 600 ft., but it is only 235 ft. from Malmesbury. The drainage area is 891 sq. miles.

3. The Upper Avon, also called the Warwickshire, and sometimes the " Shakespeare " Avon from its associations with the poet's town of Stratford on its banks, is an eastern tributary of the Severn. It rises near Naseby in Northamptonshire, and, with a course of about 100 m. joins the Severn immediately below Tewkesbury in Gloucestershire. Its early course is south- westerly to Rugby, thereafter it runs west and south-west to Warwick, receiving the Learn on the east. Its general direction thereafter remains south-westerly, and it flows past Stratford- on-Avon, receives the Stour on the south and the Arrow on the north and thence past Evesham and Pershore to Tewkesbury. The valley is always broad, and especially from Warwick down- ward, through the Vale of Evesham, the scenery is very beautiful, the rich valley being flanked by the bold Cotteswold Hills on

the south and by the wooded slopes of the Arden district of Warwickshire on the north. The view of Warwick Castle, rising from the wooded banks of the river, is unsurpassed, and the positions of Stratford and Evesham are admirable. The river is locked, and carries a small trade up to Evesham, 28 m. from Tewkesbury; the locks frohi Evesham upward to Stratford (17 m.) are decayed, but the weirs, and mill-dams still higher, afford many navigable reaches to pleasure boats. The total fall of the river is about 500 ft.; from Rugby about 230 ft., and from Warwick 120 ft. The river abounds in coarse fish.

Among other occurrences of the name of Avon in Great Britain

there may be noted — in England, a stream flowing south-east from Dartmoor in Devonshire to the English Channel; in South Wales, the stream which has its mouth at Aberavon in Glamorganshire; in Scotland, tributaries of the Clyde, the Spey and the Forth.

AVONIAN, in geology, the name proposed by Dr A. Vaughan in 1905 (Q.J.G.S. vol. lxi. p. 264) for the rocks of Lower Carboniferous age in the Avon gorge at Bristol. The Avonian stage appears to embrace precisely the same rocks and fossil-zones as the earlier designation ” Dinantien ” (see Carboniferous System) ; but its substages, being founded upon different local conditions and a different interpretation of the zonal fossils, do not correspond exactly with those of the French and Belgian geologists.

Substages. Zones. Substages.

Kidwellian { Dibunophyllum \ Seminula

Avonian

rTournaisien

Dinantien

{VViseen Syringothyris J Zaphrentis Cleistopora j

The upper Avonian (Kidwellian) is well developed about Kidwelly in Carmarthenshire. The lower substage (Clevedonian) is well displayed near Clevedon in Somerset.

See A. Vaughan, ” The Carboniferous Limestone Series (Avonian) of the Avon Gorge,” Proc. Bristol Naturalists’ Soc, 4th series, vol. i. pt. 2, 1906, pp. 74-168 (many plates) ; and T. F. Sibley, ” On the Carboniferous Limestone (Avonian) of the Mendip area (Somer- set),” Q.J.G.S. vol. lxii., 1906, pp. 324-380 (plates). (J. A. H.)

AVONMORE, BARRY YELVERTON, ist Viscount (1736- 1805), Irish judge, was born in 1736. He was the eldest son of Frank Yelverton of Blackwater, Co. Cork. Educated at Trinity College, Dublin, he was for some years an assistant master under Andrew Buck in the Hibernian Academy. In 1761 he married Miss Mary Nugent, a lady of some fortune, and was then enabled to read for the bar. He was called in 1 764, his success was rapid, and he

took silk eight years afterwards. He sat in the Irish parliament as member successively for the boroughs of Donegal and Carrickfergus, becoming attorney-general in 1782, but was elevated to the bench as chief baron of the exchequer in 1783. He was created (Irish) Baron Avonmore in 1795, and in 1800 (Irish) viscount. Among his colleagues at the Irish bar Yelver- ton was a popular and charming companion. Of insignificant appearance, he owed his early successes to his remarkable eloquence, which made a great impression on his contemporaries ; as a judge, he was inclined to take the view of the advocate rather than that of the impartial lawyer. He gave his support to Grattan and the Whigs during the greater part of his parlia- mentary career, but in his latter days became identified with the court party and voted for the union, for which his viscounty was a reward. He had three sons and one daughter, and the title has descended in the family.

AVRANCHES, a town of north-western France, capital of an arrondissement in the department of Manche, 87 m. S. of Cher- bourg on the Western railway. Pop. (1906) 7186. It stands on a wooded hill, its botanical gardens commanding a fine view westward of the bay and rock of St Michel. At the foot of the hill flows the river See, which at high tide is navigable from the sea. The town is surrounded by avenues, which occupy the site of the ancient ramparts, remains of which are to be seen on the north side. Avranches was from 511 to 1790 a bishop's see, held at the end of the 17th century by the scholar Daniel Huet; and its

cathedral, destroyed as insecure in the time of the first French Revolution, was the finest in Normandy. Its site is now occupied by an open square, one stone remaining to mark the spot where Henry II. of England received absolution for the murder of Thomas Becket. The churches of Notre-Dame des Champs and St Saturnin are modern buildings in the Gothic style. The ancient episcopal palace is now used as a court of justice; a public library is kept in the h6tel de ville. In the public gardens there is a statue of General Jean Marie Valhubert, killed at Austerlitz. Avranches is seat of a sub-prefect and has a tribunal of first instance and a communal college. Leather-dressing is the chief industry; steam-sawing, brewing and dyeing are also carried on, and horticulture flourishes in the environs. Trade is in cider, cattle, butter, flowers and fruit, and there are salmon and other fisheries.

Avranches, an important military station of the Romans, was in the middle ages chief place of a county of the duchy of

Normandy. It sustained several sieges, the most noteworthy of which, in 1591, was the result of its opposition to Henry IV. In 1639 Avranches was the focus of the peasant revolt against the salt-tax, known as the revolt of the Nu-pieds.

AWADIA and FADNIA, two small nomad tribes of pure Arab blood living in the Bayuda desert, Anglo-Egyptian Sudan, between the wells of Jakdul and Metemma. They are often incorrectly classed as Ja'alin. They own numbers of horses and cattle, the former of the black Dongola breed. At the battle of Abu Klea (17th of January 1885) they were conspicuous for their courage in riding against the British square.

See Anglo-Egyptian Sudan, edited by Count Gleichen (London, I905)-

AWAJI, an island belonging to Japan, situated at the eastern entrance of the Inland Sea, having a length of 32 m., an extreme breadth of 16 m., and an area of 218 sq. m., with a population of about 190,000. It is separated on the south from the island of Shikoku by the Naruto channel, through which, in certain conditions of the tide, a remarkable torrential current is set up. The island is celebrated for its exquisite scenery, and also for the fact that it is traditionally reputed to have been the first of the Japanese islands created by the deities Izanagi and Izanami. The loftiest peak is Yuruuba-yama (1998 ft.) , the most picturesque Sen-zan (1519 ft.). Awaji is noted for a peculiar manufacture of pottery.

AWARD (from O. Fr. ewarl, or esguart, cf. "reward"), the decision of an arbitrator. (See Arbitration.)

AWE, LOCH, the longest freshwater lake in Scotland, situated in mid-Argyllshire, 116 ft. above the sea, with an area of nearly 16 sq. m. It has a N.E. to S.W. direction and is fully 23 m. long from Kilchurn Castle to Ford, its breadth varying from -J of a mile to 3 m. at its upper end, where it takes the shape of a crescent, one arm of which runs towards Glen Orchy, the other to the point where' the river Awe leaves the lake. The two ends of the loch are wholly dissimilar in character, the scenery of the upper extremity being majestic, while that of the lower half is pastoral and tame. Of its numerous islands the best-known is Inishail, containing ruins of a church and convent, which was suppressed at the Reformation. At the extreme north-eastern end of the lake, on an islet which, when the water is low, becomes part of the

mainland, stand the imposing ruins of Kil- churn Castle. Its romantic surroundings have made this castle a favourite subject of the landscape painter. Dalmally, about 2 m. from the loch, is one of the pleasantest villages in the High- lands and has a great yogue in midsummer. The river Awe, issuing from the north-western horn of the loch, affords excellent trout and salmon fishing.

AWL (O. Eng. ael; at one time spelt nawl by a confusion with the indefinite article before it) , a small hand-tool for piercing holes.

AXE (O. Eng. aex; a word common, in different forms, in the Teutonic languages, and akin to the Greek dijiyrj; the New English Dictionary prefers the spelling ” ax “), a tool or weapon, taking various shapes, but, when not compounded with some distinguishing word (e.g. in ” pick-axe “), generally formed

by an edged head fixed upon a handle for striking. A ” hatchet ” is a small sort of axe.

AXHOLME, an island in the north-west part of Lincolnshire, England, lying between the rivers Trent, Idle and Don, and isolated by drainage channels connected with these rivers. It consists mainly of a plateau of slight elevation, rarely ex- ceeding ioo ft., and comprises the parishes of Althorpe, Belton, Epworth, Haxey, Luddington, Owston and Crowle; the total area being about 47,900 acres. At a very early period it would appear to have been covered with forest; but this having been in great measure destroyed, it became in -great part a swamp. In 1627 King Charles I., who was lord of the island, entered into a contract with Cornelius Vermuyden, a Dutchman, for reclaiming the meres and marshes, and rendering them fit for tillage. This undertaking led to the introduction of a large number of Flemish workmen, who settled in the district, and, in spite of the violent measures adopted by the English peasantry to expel them, retained their ground in sufficient numbers to affect the physical appearance and the accent of the inhabitants to -this day. The principal towns in the isle are Crowle (pop. 2769) and Epworth. The Axholme joint light railway runs north and south through the isle, connecting Goole with Haxey junction; and the Great Northern, Great Eastern and Great Central lines also afford

communications. The land is extremely fertile. The name, properly Axeyholm (.cf. Haxey), js' hybrid, Ax being the Celtic uisg, water; ey the Anglo-Saxon for island; and holm the Norse word with the same signification.

AXILE, or Axial, a term (= related to the axis) used technic- ally in science; in botany an embryo is called axile when it has the same direction as the axis of the seed.

AXINITE, a mineral consisting of a complex aluminium and calcium boro-silicate with a small amount of basic hydrogen; the calcium is partly replaced in varying amounts by ferrous iron and manganese, and the aluminium by ferric iron: the formula is HCa 3 BAl 2 (Si04)4- The mineral was named (from aˆivri, an axe) by R. J. Haiiy in 1799, on account of the char- acteristic thin wedge-like form of its anorthic crystals. The colour is usually , clove-brown, but rarely it has a violet tinge (on this account the mineral was named yanolite, meaning violet stone, by J. C. Delametherie in 1792). The best specimens are afforded by the beautifully developed transparent glassy crystals, found with albite, prehnite and quartz, in a zone of amphibolite and chlorite-schists at Le Bourg d'Oisans in Dauphine. It is found in the greenstone and horn- blende-schists of Batallack Head near St Just in Cornwall, and in diabase in the Harz; and small ones in Maine and in North- ampton county, Pennsylvania, U.S.A. Large crystals have also been found in Japan. In its occurrence in basic rather than in acid eruptive rocks, axinite differs from the boro-silicate tourmaline, which is usually found in granite. The specific gravity is 3-28. The hardness of 65-7, combined with the colour and transparency, renders axinite applicable for use as a gem- stone, the Dauphine crystals being occasionally cut for this purpose. (L. J. S.)

AXIOM (Gr. a&wixa), a general proposition or principle accepted as self-evident, either absolutely or within a particular sphere of thought. Each special science has its own axioms (cf. the Aristotelian dpxai, "first principles "), which, however, are sometimes susceptible of proof in another wider science. The Greek word was probably confined by Plato to mathematical axioms, but Aristotle (Anal. Post. i. 2) gave it also the wider significance of the ultimate principles of thought which are behind all special sciences (e.g. the principle of contradiction). These are apprehended solely by the mind, which may, however, be led to them by an inductive process. After Aristotle, the term was used by the Stoics and the school of Ramus for a proposition

simply, and Bacon (Nov. Organ, i. 7) used it of any general proposition. The word was reintroduced in modern philosophy probably by Rene Descartes (or by his followers)

who, in the search for a definite self-evident principle as the basis of a new philosophy, naturally turned to the familiar science of mathematics. The axiom of Cartesianism is, therefore, the Cogito ergo sum. Kant still further narrowed the meaning to include only self-evident (intuitive) synthetic propositions, i.e. of space and time. The nature of axiomatic certainty is part of the fundamental problem of logic and metaphysics. Those who deny the possibility of all non-empirical knowledge naturally hold that every axiom is ultimately based on observa- tion. For the Euclidian axioms see Geometry.

AXIS (Lat. for ” axle “), a word having the same meaning as axle, and also used with many extensions of this primary meaning. It denotes the imaginary line about which a body or system of bodies rotates, or a line about which a body or action: is symmetrically disposed. In geometry, and in geo- metrical crystallography, the term denotes a line which serves to aid the orientation of a .figure. In anatomy, it is, among other uses, applied to the second cervical vertebra, and in botany it means the stem.

AXLE (in Mid. Eng. axel-tre, from O. Norweg. oxull-tre, cognate with the O. Eng. mxe or eaxe, and connected with Sansk. dksha, Gr. aˆow, and Lat. axis), the pin or spindle on which a wheel turns. In carriages the axle-tree is the bar on which the wheels are mounted, the axles being strictly its thinner rounded prolongations on which they actually turn. The pins which pass through the ends of the axles and keep the wheels from slipping off are known as axle-pins or ” linch-pins,” ” linch ” being a corruption, due to confusion with ” link,” of the Old English word for ” axle,” lynis, cf. Ger. Liinse.

AX – LES – THERMES, a watering place of south-western France, in the department of Ariege, at the confluence of the Ariege with three tributaries, 26 m. S.S.E. of Foix by rail. Pop. (1906) 1 1 79. Ax (Aquae), situated at a height of 2300 ft., is well known for its warm sulphur springs (77°-i72° F.), of which there are about sixty. The waters, which were used by the Romans, are efficacious in the treatment of rheumatism, skin diseases and other maladies.

AXMINSTER, a market-town in the Honiton parliamentary division of Devonshire, England, on the river Axe, 27 m. E. by N. of Exeter by the London & South-Western railway. Pop. (1901) 2906. The minster, dedicated to St Mary the Virgin, illustrates every style of architecture from Norman to Perpen- dicular. There are in the chancel two freestone effigies, perhaps of the 14th century, besides three sedilia, and a piscina under arches. Axminster was long celebrated for the admirable quality of its carpets, which were woven by hand, like tapestry. Their manufacture was established in 1 755. Their name is preserved, but since the seat of this industry was removed to Wilton near Salisbury, the inhabitants of Axminster have found employment in brush factories, corn mills, timber yards and an iron foundry. Cloth, drugget, cotton, leather, gloves and tapes are also made. Coaxdon House, the birthplace in 1602 of Sir Symonds d'Ewes, the Puritan historian, is about 2 m. distant, and was formerly known as St Calyst.

Axminster (Axemystre) derives its name from the river Axe and from the old abbey church or minster said to have been built by King iEthelstan. The situation of Axminster at the intersection of the two great ancient roads, Iknield Street and the Fosse Way, and also the numerous earthworks and hill-fortresses in the neighbour- hood indicate a very early settlement. There is a tradition that the battle of Brunanburh was fought in the valley of the Axe, and that the bodies of the Danish princes who perished in action were buried in Axminster church. According to Domesday, Axminster was held by the king. In 1246 Reginald de Mohun, then lord of the manor, founded a Cistercian abbey at Newenham within the parish of Axminster, granting it a Saturday market and a fair on Mid- summer day, and the next year made over to the monks from Beaulieu the manor and hundred of Axminster. The abbey was dissolved in 1539. The midsummer fair established by Reginald de Mohun is still held.

See Victoria County History — Devon; James Davidson, British and Roman Remains in the Vicinity of Axminster (London, 1833).

AXOLOTL, the Mexican name given to larvae salamanders of the genus Amblystoma. It required the extraordinary acumen of the great Cuvier at once to recognize, when the first specimens

of the Gyrinus edulis or Axolett of Mexico were brought to him by Humboldt in the beginning of the 19th century, that these Batrachians were not really related to the Perennibranchiates, such as Siren and Proteus, with which he was well acquainted, but represented the larval form of some air-breathing salamander. Little heed was paid to his opinion by most systematists, and when, more than half a century later, the axolotl was found to breed in its branchiferous condition, the question seemed to be settled once for all against him, and the genus Siredon, as it was called by J. Wagler, was unanimously maintained and placed among the permanent gill-breathers.

It seemed impossible to admit that an animal which lives for years without losing its gills, and is able to propagate in that state, could be anything but a perfect form. And yet subsequent discoveries, which followed in rapid succession, have established that Siredon is but the larval form of the salamander A mbly-Stoma, a genus long known from various parts of North America; and Cuvier's conclusions now read much better than they did half a century after they were published. Before reviewing the history of these discoveries, it is desirable to say a few words of the characters of the axolotl (larval form) and of the Amblystoma (perfect or imago form).

The axolotl has been known to the Mexicans from the remotest times, as an article of food regularly brought from neighbouring lakes to the Mexico market, its flesh being agreeable and whole-some. Francisco Hernandez (151 4- 157 8) has alludedˆfo it as Gyrinus edulis or atolocatl, and as lusus aquarum, piscis ludicrus, or axolotl, which latter name has remained in use, in Mexico and elsewhere, to the present day. But for its large size — it grows to a length of eleven inches — it is a nearly exact image of the British newt larvae. It has the same moderately long, plump body, with a low dorsal crest, the continuation of the membrane bordering the strongly compressed tail; a large thick head with small eyes without lids and with a large pendent upper lip; two pairs of well-developed limbs, with free digits; and above all, as the most characteristic feature, three large appendages on each side of the back of the head, fringed with filaments which, in their fullest development, remind one of black ostrich feathers. These are the external gills, through which the animal breathes the oxygen dissolved in the water. The jaws are provided with small teeth in several rows, and there is an elongate patch of further teeth on each side of the front of the palate (inserted on the vomerine and palatine bones) . The colour

is blackish, or of a dark olive-grey or brownish grey with round black spots or dots.

The genus Amblystoma was established by J. J. Tschudi in 1838 for various salamanders from North America, which had previously been described as Lacerta or Salamandra, and which, so far as general appearance is concerned, differ little from the European salamanders. The body is smooth and shiny, with vertical grooves on the sides, the tail is but feebly compressed, the eye is moderately large and provided with movable lids, and the upper lip is nearly straight. But the dentition of the palate is very different; the small teeth, which are in a single row, as in the jaws, form a long transverse, continuous or interrupted series behind the inner nares or choanae. The animal leaves the water after completing its metamorphosis, the last stage of which is marked by the loss of the gills. One of the largest and most widely distributed species of this genus, which includes about twenty, is the Amblystoma tigrinum, an inhabitant of both the east and west of the United States and of a considerable part of the cooler parts of Mexico. It varies much in colour, but it may be described as usually brown or blackish, with more or less numerous yellow spots, sometimes arranged in transverse bands. It rarely exceeds a length of nine inches. This is the Amblystoma into which the axolotl has been ascertained to transform. It is generally admitted that the axolotls which were kept alive in Europe and were particularly abundant between 1870 and 1880 are all the descendants of a stock bred in Paris and distributed chiefly by dealers, originally, we believe, by the late P. Carbonnier. Close in-breeding without the infusion of Hew blood is probably the cause of the decrease in their numbers at the present day, specimens being more difficult to procure and

fetching much higher prices than they did formerly, at least in England and in France.

The original axolotls, from the vicinity of Mexico City, it is believed, arrived at the Jardin d'Acclimatation, Paris, late in

1863. They were thirty-four in number, among which was an albino, and had been sent to that institution, together with a few other animals, by order of Marshal Forey, who was appointed commander-in-chief of the French expeditionary force to Mexico after the defeat of General Lorencez at Puebla (May 5th, 1862), and returned to France at the end of 1863, after having handed over the command to Marshal (then General) Bazaine. Six

specimens (five males and one female) were given by the Society d'Acclimatation to Professor A. Dumeril, the administrator of the reptile collection of the Jardin des Plantes, the living specimens of which were at that time housed in a very miserable structure, situated at a short distance from the comparatively sumptuous building which was erected some years later and opened to the public in 1874. Soon after their arrival at the Jardin d'Acclimatation, some of the axolotls spawned, but the eggs, not having been removed from the aquarium, were devoured by its occupants. At the same time, in the Jardin des Plantes, the single female axolotl also spawned, twice in succession, and a large number of young were successfully reared. This, it then seemed, solved the often-discussed question of the perennibranchiate nature of these Batrachians. But a year later, the second generation having reached sexual maturity, new broods were produced, and out of these some individuals lost their gills and dorsal crest, developed movable eyelids, changed their dentition, and assumed yellow spots,— in fact, took on all the characters of A mbly stoma tigrinum. However, these transformed salamanders, of which twenty-nine were obtained from 1865 to 1870, did not breed, although their branchiate brethren continued to do so very freely. It was not until 1876 that the axolotl in its Ambly- stoma state, offspring of several generations of perennibran- chiates, was first observed to spawn, and this again took place in the reptile house of the Jardin des Plantes, as reported by Professor E. Blanchard.

The original six specimens received in 1864 at the Jardin des Plantes, which had been carefully kept apart from their progeny, remained in the branchiate condition, and bred eleven times from 1865 to 1868, and, after a period of two years' rest, again in 1870. According to the report of Aug. Dumeril, they and their offspring gave birth to 9000 or 10,000 larvae during that period. So numerous, were the axolotls that the Paris Museum was able to distribute to other institutions, as well as to dealers and private individuals, over a thousand examples, which found their way to all parts of Europe, and numberless specimens have been kept in England from 1866 to the present day. The first specimens exhibited in the London Zoological Gardens, in August

1864, were probably part of the original stock received from Mexico by the Societe d'Acclimatation, but do not appear to have bred.

" White " axolotls, albinos of a pale flesh colour, with beautiful

red gills, have also been kept in great numbers in England and on the continent. They are said to be all descendants of one albino male specimen received in the Paris Museum menagerie in 1866, which, paired with normal specimens in 1867 and 1&68, produced numerous white offspring, which by selection have been fixed as a permanent race, without, according to L. Vaillant, showing any tendency to reversion. We are not aware of any but two of these albinos having ever turned into the perfect Amblystoma form, as happened in Paris in 1870, the albinism being retained.

Thus we see that in our aquariums most of the axolotls remain in the branchiate condition, transformed individuals being on the whole very exceptional. Now it has been stated that in the lakes near Mexico City, where it was first discovered, the axolotl never transforms into an Amblystoma. This the present writer is inclined to doubt, considering that he has received examples of the normal Amblystoma tigrinum from various parts of Mexico, and that Alfred Duges has described an Amblystoma from mountains near Mexico City; at the same time he feels very

suspicious of the various statements to that effect which have appeared in so many works, and rather disposed to make light of the ingenious theories launched by biological speculators who have never set foot in Mexico, especially Weismann's picture of the dismal condition of the salt-incrusted surroundings which were supposed to have hemmed in the axolotl — the brackish Lago de Texcoco, the largest o"f the lakes near Mexico, being evidently in the philosopher's mind.

Thanks to the enthusiasm of H. Gadow during his visit to Mexico in the summer of 1902, we are now better informed on the conditions under which the axolotl lives near Mexico City. First, he ascertained that there are no axolotls at all in the Lago de Texcoco, thus disposing at once of the Weismannian explanation; secondly, he confirmed A. Duges's statement that there is a second species of Ambly stoma, which is normal in its metamorphosis, near Mexico but at a higher altitude, which may explain Velasco's observation that regularly transforming Amblystomas occur near that city; and thirdly, he made a careful examination of the two lakes, Chalco and Xochimilco, where

the axolotls occur in abundance and are procured for the market. The following is an abstract of Gadow's very interesting account. " Lakes Chalco and Xochimilco are a paradise, situated about 10 ft. higher than the Texcoco Lake and separated from it by several hills. High mountains slope down to the southern shores, with a belt of fertile pastures, with shrubs and trees and little streams, here and there with rocks and ravines. In fact, there are thousands of inviting opportunities for newts to leave the. lake if they wanted to do so. Lake Xochimilco contains powerful springs, but away from them the water appears dark and muddy, full of suspended fresh and decomposing vegetable matter, teeming with fish, larvae of insects, Daphniae, worms and axolotl. These breed in the beginning of February. The native fishermen know all about them; how the eggs are fastened to the water plants, how soon after the little larvae swarm about in thousands, how fast they grow, until by the month of June they are all grown into big, fat creatures ready for the market; later in the summer the axolotls are said to take to the rushes, in the autumn they become scarce, but none have ever been known to leave the water or to metamorphose, nor are any perfect Amblystomas found in the vicinity of the two lakes."

In Gadow's opinion, the reason why there are only perenni-branchiate axolotls in these lakes is obvious. The constant abundance of food, stable amount of water, innumerable hiding-places in the mud, under the banks, amongst the reeds and roots of the floating islands which are scattered all over them, — all these points are inducements or attractions so great that the creatures remain in their paradise and consequently retain all those larval features which are not directly connected with sexual maturity. There is nothing whatever to prevent them from leaving these lakes, but there is also nothing to induce them to do so. The same applies occasionally to European larvae, as in the case observed in the Italian Alps by F. de Filippi. Nevertheless, in the axolotl the latent tendency can still be revived, as we have seen above and as is proved by the experiments of Marie von Chauvin. When once sexually ripe the axolotl are apparently incapable of changing, but their ancestral course of evolution is still latent in them, and will, if favoured by circumstances, reappear in following generations.

Bibliography. — G. Cuvier, Mem. Instil. Nation. (1807), p. 149, and in A. Humboldt and A. Bompland, Observ. zool. i. (181 1), p. 93; L. Calori, Mem. Ace. Bologna, iii. (1851), p. 269 ; A. Dumeril, Comptes rendus, lx. (1865), p. 765, and N. Arch. Mus. ii. (1866),

p. 265; E. Blanchard, Comptes rendus, lxxxii. (1876), p. 716; A. Weismann, Z. wiss. Zool. xxv. (Suppl. 1875), p. 297; M. von Chauvin, Z. wiss. Zool. xxvii. (1876), p. 522; F. de Filippi, Arch. p. la zool. i. (1862), p. ,206; G. Hahn, Rev. Quest. Sci. Brussels (2), i. (1892), p. 178; H. Gadow, Nature, lxvii. (1903), p. 330. (G..A. B.)

AXUM, or Aksum, an ancient city in the province of Tigre, Abyssinia (14 7′ 52″ N., 38 31′ 10″ E.; altitude, 7226 ft), 12 m. W. by S. of Adowa. Many European travellers have given descriptions of its monuments, though none of them has stayed there more than a few days. The name, written Aksm and Aksum in the Sabaean and Ethiopic inscriptions in the place,

is found in classical and early Christian writers in the forms of Auxome, Axumis, Axume, &c, the first mention being in the Periplus Maris Erylhraei (c. a.d. 67), where it is said to be the seat of a kingdom, and the emporium for the ivory brought from the west. For the history of this kingdom see Ethiopia. J. T. Bent conjectured that the seat of government was transferred to Axum from Jeha, which he identified with the ancient Ava; and according to a document quoted by Achille Raff ray the third Christian monarch transferred it from Axum to Lalibela. This second transference probably took place very much later; in spite of it, the custom of crowning Abyssinian kings at Axum continued, and King John was crowned there as late as 187 1 or 1872. A. B. Wylde conjectures that it had become unsuitable for a royal seat by having acquired the status of a sacred city, and thus affording sanctuary to criminals and political offenders within the chief church and a considerable area round it, where there are various houses in which such persons can be lodged and entertained. This same sanctity makes it serve as a depository for goods of all sorts in times of danger, the chief church forming a sort of bank. The present town, containing less than a thousand houses, is supposed to occupy only a small portion of the area covered by the ancient city; it lies in a kloof or valley, but the old town must have been built on the western ridge rather than in the valley, as the traces of well-dressed stones are more numerous there than elsewhere.

Most of the antiquities of Axum still await excavation; those that have been described consist mainly of obelisks, of which about fifty are still standing, while many more are fallen. They form a consecutive series from rude Unhewn stones to highly finished obelisks, of which the tallest still erect is 60 ft. in height, with 8

ft. 7 in. extreme front width; others that are fallen may have been taller. The highly finished monoliths are all representations of a many-storeyed castle, with an altar at the base of each. They appear to be connected with Semitic sun-worship, and are assigned by Bent to the same period as the temple at Baalbek, though some antiquarians would place them much earlier; the representation of a castle in a single stone seems to bear some relation to the idea worked out in the monolith churches of Lalibela described by Raffray. The fall of many of the monuments, according to 3-ent, was caused by the washing away of the foundations by the stream called Mai Shum, and indeed the native tradition states that ” Gudert, queen of the Amhara,” when she visited Axum, destroyed the chief obelisk in this way by digging a trench from the river to its foundation. Others attribute it to religious fanaticism, or to the result of some barbaric invasion, such as Axum may have repeatedly endured before it was sacked by Mahommed Gran, sultan of Harrar, about 1535.

Literature. — Classical references to Axum are collected by Pietschmann in Pauly’s Realencyclopadie (2nd ed.) ; for the history as derived from the inscriptions see D. H. Miiller, Appendix to J. T. Bent’s Sacred City of the Ethiopians (London, 1893), and E. Glaser, Die Abessinier in Arabien (Munich, 1895). For the antiquities, Bruce’s Travels (1790); Salt, in the Travels of Viscount Valentia (Lpndon, 1809), iii. 87-97 and 178-200; J. T. Bent, I.e. ; and A. B. Wylde, Modem Abyssinia (London, 1901). For geology, Schimper, in the Zeitschrift der Gesellschaft fur Erdkunde (Berlin, 1869). (D. S. M.*)

AY, AYE. The word” aye,” meaning always (and pronounced as in‘“day”; connected with Gr. ael, always, and Lat. aevum, an age), is often spelt ” ay,” and the New English Dictionary prefers this. ” Aye,” meaning Yes (and pronounced almost like the word ” eye “), though sometimes identified with ” yea,” is probably the same word etymologically, though differentiated by usage; the form ” ay ” for this is also common, but incon- venient; at one time it was spelt simply / (e.g. in Michael Drayton’s Idea, 57; published in 1593).

AYACUCHO, a city and department of central Peru, formerly known as Guamanga or Huamanga, renamed from the small plain of Ayacucho (Quichua, ” corner of death “). This lies near the village of Quinua, in an elevated valley 11,600 ft. above sea-level, where a decisive battle was fought between General Sucre

and the Spanish viceroy La Serna in 1824, which resulted in the defeat of the latter and the independence of Peru. The city of Ayacucho, capital of the department of that name

and of the province of Guamanga, is situated on an elevated plateau, 891 1 ft. above sea-level, between the western and central Cordilleras, and on the main road between Lima and Cuzco, 394 m. from the former by way of Jauja. Pop. (1896) 20,000. It has an agreeable, temperate climate, is regularly built, and has considerable commercial importance. 1 1 is the seat of a bishopric and of a superior court of justice. It is distinguished for the number of its churches and conventual establishments, although the latter have been closed. The city was founded by Pizarro in 1530 and was known as Guamanga down to 1825. It has been the scene of many notable events in the history of Peru.

The department of Ayacucho extends across the great plateau of central Peru, between the departments of Huancavelica and Apurimac, with Cuzco on the E. and lea on the W. Area, 18,185 sq. m.; pop. (1896) 302,469. It is divided into six provinces, and covers a broken, mountainous region, partially barren in its higher elevations but traversed by deep, warm, fertile valleys. It formed a part of the original home of the Incas and once sustained a large population. It produces Indian corn and other cereals and potatoes in the colder regions, and tropical fruits, sweet potatoes and mandioca (Jalropha manihot, L.) in the low tropical valleys. It is also an important mining region, having a large number of silver mines in operation. Its name was changed from Guamanga to Ayacucho by a decree of 1825.

AYAH, a Spanish word (aya) for children's nurse or maid, introduced by the Portuguese into India and adopted by the English to denote their native nurses.

AYALA, DON PEDRO LOPEZ DE (1332-1407), Spanish states- man, historian and poet, was born at Vittoria in 1332. He first came into prominence at the court of Peter the Cruel, whose cause he finally deserted; he greatly distinguished himself in subsequent campaigns, during which he was twice made prisoner, by the Black Prince at Najera (1367) and by the Portuguese at Aljubarrota (1385). A favourite of Henry II. and John I. of Castile,

he was made grand chancellor of the realm by Henry III. in 1398. A brave officer arid an able diplomat, Ayala was one of the most cultivated Spaniards of his time, at once historian, translator and poet. Of his many works the most important are his chronicles of the four kings of Castile during whose reigns he lived; they give a generally accurate account of scenes and events, most of which he had witnessed; he also wrote a long satirical and didactic poem, interesting as a picture of his personal experiences and of contemporary morality. The first part of his chronicle, covering only the reign of Peter the Cruel, was printed at Seville in 1495; the first complete edition was printed in 17 79-1 780 in the collection of Cronicas Espanolas, under the auspices of the Spanish Royal Academy of History. Ayala died atCalahorra in 1407.

See Rafael Floranes, ” Vida literaria de Pedro Lopez de Ayala,” in the Documenlos ineditos para la historia de Espana, vols. xix. and xx.; F. W. Schirrmacher, ” tJber die Glaubwiirdigkeit der Chronik Ayalas,” in Geschichle von Spanien (Berlin, 1902), vol. v. pp. 510-

532-

AYALA Y HERRERA, ADELARDO LOPEZ DE (1828-1879), Spanish writer and politician, was born at Guadalcanal on the 1st of May 1828, and at a very early age began writing for the theatre of his native town. The titles of these juvenile per- formances, which were played by amateurs, were Saiga por donde saliere, Me voy d Sevilla and La Corona y el Punal. As travelling companies never visited Guadalcanal, and as ladies took no part in the representations, these three plays were written for men only. Ayala persuaded his sister to appear as the heroine of his comedy, La primera Dama, and the innovation, if it scandalized some of his townsmen, permitted him to develop his talent more freely. In his twentieth year he matriculated at the university of Seville, but his career as a student was undistinguished. In Seville he made acquaintance with Garcia Gutierrez, who is reported to have encouraged his dramatic ambitions and to have given him the benefit of his own experience as a playwright. Early in 1850 Ayala removed his name from the university books, and settled in Madrid with the purpose of becoming a professional dramatist. Though he had no friends and no influence, he speedily found an opening. A four-

act play in verse, Un Hombre de Estado, was accepted by the

managers of the Teatro Espanol, was given on the 25th of January 1851, and proved a remarkable success. Henceforward Ayala's position and popularity were secure. Within a twelve-month he became more widely known by his Castigo y Perdon, and by a more humorous effort, Los dos Guzmanes; and shortly afterwards he was appointed by the Moderado govern- ment to a post in the home office, which he lost in 1854 on the accession to power of the Liberal party. In 1854 he produced Rioja, perhaps the most admired and the most admirable of all his works, and from 1854 to 1856 he took an active part in the political campaign carried on in the journal El Padre Cobos. A zarzuela, entitled Guerta a muerte, for which Emilio Arrieta composed the music, belongs to 1855, and to the same collabora- tion is due El Agente de Matrimonios. At about this date Ayala passed over from the Moderates to the Progressives, and this political manoeuvre had its effect upon the fate of his plays. The performances of Los Comuneros were attended by members of the different parties; the utterances of the different characters were taken to represent the author's personal opinions, and every speech which could be brought into connexion with current politics was applauded by one half of the house and derided by the other half. A zarzuela, named El Conde de Castralla, was given amid much uproar on the 20th of February 1856, and, as the piece seemed likely to cause serious disorder in the theatre, it was suppressed by the government after the third performance. Ayala's rupture with the Moderates was now complete, and in 1857, through the interest of O'Donnell, he was elected as Liberal deputy for Badajoz. His political changes are difficult to follow, or to explain, and they have been unsparingly censured. So far as can be judged, Ayala had no strong political views, and drifted with the current of the moment. He took part in the revolution of 1868, wrote the " Manifesto of Cadiz," took office as colonial minister, favoured the candida- ture of the due de Montpensier, resigned in 1871, returned to his early Conservative principles, and was a member of Alfonso XII. 's first cabinet. Meanwhile, however divided in opinion as to his political conduct, his countrymen were practically unani- mous in admiring his dramatic work; and his reputation, if it gained little by El Nuevo Don Juan, was greatly increased by El Tanto por Ciento and El Tejado de Vidrio. His last play, Consuelo, was given on the 30th of March 1878. Ayala was nominated to the post of president of congress shortly before his death, which occurred unexpectedly on the 30th of January 1879. The best of his lyrical work, excellent for finish and intense sincerity, is his

Epistola to Emilio Arrieta, and had he chosen to dedicate himself to lyric poetry, he might possibly have ranked with the best of Spain's modern singers; as it is, he is a very considerable poet who affects the dramatic form. In his later writings he deals with modern society, its vices, ideals and perils; yet in many essentials he is a manifest disciple of Calderon. He has the familiar Calderonian limitations; the substitution of types for characters, of eloquence for vital dialogue. Nor can he equal the sublime lyrism of his model; but he is little inferior in poetic conception, in dignified idealiza- tion, and in picturesque imagery. And it may be fairly claimed for him that in El Tejado de Vidrio and El Tanto por Ciento he displays a very exceptional combination of satiric intention with romantic inspiration. By these plays and by Rioja and Consuelo he is entitled to be judged. They will at least ensure for him an honourable place in the history of the modern Spanish theatre. A complete edition of his dramatic works, edited by his friend and rival Tamayo y Baus, has been published in seven volumes (Madrid, 1881-1885). (J. F.-K.)

AYE-AYE, a word of uncertain signification (perhaps only an exclamation), but universally accepted as the designation of the most remarkable and aberrant of all the Malagasy lemurs (see Primates). The aye-aye, Chiromys (or Daubentonia) madagas- cariensis, is an animal with a superficial resemblance to a long- haired and dusky-coloured cat with unusually large eyes. It has a broad rounded head, short face, large naked eyes, large hands, and long thin fingers with pointed claws, of which the

third is remarkable for its extreme 1 slenderness; The foot resembles that of the other lemurs in its large opposable great toe with a flat nail; but all the other toes have pointed com- pressed claws. Tail long and bushy. General colour dark brown, the outer fur being long and rather loose, with a woolly under-coat. Teats two, * inguinal in position. The aye-aye was discovered by Pierre Sonnerat in 1780, the specimen brought to Paris by that traveller being the only one known until i860. Since then many others have been obtained, and one lived for several years in the ga- rdens of the Zoological Society of London. Like so many lemurs, it is completely nocturnal in its habits, living either alone or in pairs, chiefly in the bamboo forests. Observations upon captive specimens have led to the conclusion that it feeds principally on

juices, especially of the sugar-cane, which it obtains by tearing open the hard woody circumference of the stalk with its strong incisor teeth; but it is said also to devour certain species of wood-boring caterpillars, which it obtains by first cutting down with its teeth upon their burrows, and then- picking them out of their retreat with the claw of its attenuated middle finger. – It constructs large ball-like nests of dried leaves, lodged in a fork of the branches of a large tree, and with the opening on one side.

Till recently the aye-aye was regarded as representing a family by itself — the Chiromyidae; but the discovery, that it resembles the other lemurs of Madagascar in the structure of the inner ear, and thus differs from all other members o£ the group, has led to the conclusion that it is best classed as a subfamily (Ghiromyinae) of the Lemuridae* (R. L.*)

AYLESBURY, a market-town in the Aylesbury parlia- mentary division of Buckinghamshire, England, 38 m. N. W. by W. of London; served by the Great Central, Metropolitan and Great Western railways (which use a common station) and by a branch of the London & North- Western railway. Pop. of urban district (1001) 9243. It has connexion by a branch with the Grand Junction canal. It lies on a slight eminence in a fertile tract called the Vale of Aylesbury, which extends north- ward from the foot of the Chiltern Hills. Its streets are mostly narrow and irregular, but picturesque. The church of St Mary, a large cruciform building, is primarily Early English, but has numerous additions of later dates. The font is transitional Norman, a good example; and a small pre-Norman crypt remains beneath part of the church. There are some Decorated canopied tombs, and the chancel stalls are of the 15th century. The central tower is surmounted by an ornate clock-turret dating from the second half of the 17th century. The countyrhall and town-hall, overlooking a broad market-place, are the principal public buildings. The grammar school was founded in 1611. Aylesbury is the assize town for the county, though Buckingham is the county town. There is a large agricultural trade, the locality being especially noted for the rearing of ducks; straw- plaiting and the manufacture of condensed milk are carried on, and there are printing works. The Jacobean mansion of Hart- well in the neighbourhood of Aylesbury was the residence of the French king Louis XVIII. during his exile (1810-1814).

Aylesbury OEylesburge, Eilesberia, Aillesbir) was famous in Saxon times as the supposed burial-place of St Osith. In A,D. 571

it was one of the towns captured by Cuthwulf, brother of Ceawhn, king of the Saxons. At the time of the Domesday survey the king owned the manor. In 1554, by a charter from Queen Mary, bestowed as a reward for fidelity during the rebellion of the duke of Northumber- land, Aylesbury was constituted a free borough corporate, with a common council consisting of a bailiff, 10 aldermen and 12 chief burgesses. The borough returned two members to parliament from this date until the Redistribution Act of 1885, but the other privileges appear to have lapsed in the reign of Elizabeth. Ayles- bury evidently had a considerable market from very early times, the tolls being assessed at the time of Edward the Confessor at £25 and at the time of the Domesday survey at £tq. Tn 1239 Henry III. made a grant to John, son of Geoffrey FitzPeter of an annual fair at the feast of St Osith (June 3rd), which was confirmed by Henry VI. in 1440. Queen Mary's charter instituted a Wednesday market and fairs at the feasts of the Annunciation and the Invention of the Holy Cross. In 1579 John Pakington obtained a grant of two annual fairs to be held on the day before Palm Sunday and on the feast of the Tnvention of the Holy Cross, and a Monday market for the sale of horses and other animals, grain and merchandise.

; AYLESFORD, HENEAGE FINCH, 1st Earl as (c. 1640-1719), 2nd son of Heneage Finch, 1st earl of Nottingham, was educated at Westminster school and at Christ Church, Oxford, where he rriatriculated on the 18th of November 1664. In 1673 he became a barrister of the Inner Temple; king's counsel and bencher in 1677; and in 1679, during the chancellorship of his father, was appointed solicitor-general, being returned to parliament for Oxford University, and in 1685 for Guildford. In 1682 he represented the crown in the attack upon the corporation of London, and next year in the prosecution of Lord Russell, when, according to Burnet, " and in several other trials afterwards, he showed more of a vicious eloquence in turning matters with some subtlety against the prisoners than of strict or sincere reasoning." l He does not, however, appear to have exceeded the duties of prosecutor for the crown as they were then under- stood. In 1684, in the trial of Algernon Sidney, he argued that the unpublished treatise of the accused was an overt act, and supported the opinion of Jeffreys that scribere est agere. 2 The same year he was counsel for James in his successful action against Titus Oates for libel, and in 1685 prosecuted Oates for the crown for perjury. Finch, however, though a Tory and a crown lawyer, was a staunch churchman, and on his refusal in 1686 to

defend the royal dispensing power he was summarily dismissed by James. He was the leading counsel in June 1688 for the seven bishops, when he " strangely exposed and very boldly ran down " 3 the dispensing power, but his mistaken tactics were nearly the cause of his clients losing their case. 4 He sat again for Oxford University in the convention parliament, which constituency he represented in all the following assemblies except that of 1698, till his eleva- tion to the peerage. He was, however, no supporter of the House of Orange, advocated a regency in James's name, and was one of the few who in the House of Commons opposed the famous vote that James had broken the contract between king and people and left the throne vacant. He held no office during William's reign, and is described by Macky as " always a great opposer " of the administration. In 1689 he joined in voting for the reversal of Lord Russell's attainder, and endeavoured to defend his conduct in the trial, but was refused a hearing by the House. He opposed the Triennial Bill of 1692, but in 1696 spoke against the bill of association and test, which was voted for the king's protection, on the ground that though William was to be obeyed as sovereign he could not be acknowledged " rightful and lawful king." In 1694 he argued against the crown in the bankers' case. In 1703 he was created baron of Guernsey and a privy councillor, and after the accession of George I. on the 19th of October 17 14, earl of Aylesford, being reappointed a privy coun- cillor and made chancellor of the duchy of Lancaster, which office he retained till February 1716. He died on the 22nd of July 17 19. According to John Macky (Memoirs, p. 71; published by Roxburghe Club, 1895) he was accounted " one of the greatest orators in England and a good common lawyer; a firm asserter of the prerogative of the crown and jurisdiction of the church; a tall, thin, black man, splenatick." He married Elizabeth, daughter and co-heiress of Sir John Banks of Aylesford, by whom, besides six daughters, he had three sons, of whom the eldest, Heneage, succeeded him as 2nd earl of Aylesford. The 2nd earl died in 1757, and since this date the earldom has been held by his direct descendants, six of whom in succession have borne the Christian name of Heneage.

Many of his legal arguments are printed in State Trials (see esp. viii. 694, 1087, ix. 625, 880, 996, x. 126, 319, 405, 1199, xii. 183, 353, 365). Wood attributes to him on the faith of common rumour the authorship of An Antidote against Poison . . .Remarks upon a Paper printed .by Lady (Rachel) Russel (1683), ascribed in State Trials (ix. 710) to Sir Bartholomew Shower; but see the

latter's allusion to it on p. 753-

1 Hist, of His Own Times, i. 556. Swift has appended a note, " an arrant rascal," but Finch's great offence with the dean was probably his advancement by George I. rather than his conduct of state trials as here described.

2 Ibid. 572, and Speaker Onslow's note.

3 N- Luttrell's Relation, i. 447.

4 State Trials, xii. 353.

AYIBSFORD, a town in the Medway parliamentary division of Kent, England, 35 m. N.W. of Maidstone on the South- Eastern & Chatham railway. Pop. (1901) 2678. It stands at the base of a hill on the right bank of the Medway. The ancient church of St Peter (restored in 1878) is principally Perpendicular, but contains some Norman and Decorated portions. It has interesting brasses of the 15th and ,16th cen- turies and an early embattled tower. At a short distance west, a residence occupying part of the site, are remains of a Carmelite friary, founded here in 1240. It is claimed for this foundation (but not with certainty) that it was the first house of Carmelites established in England, and the first general chapter of the order was held here in 1245. Several remains of antiquity exist in the neighbourhood, among them a cromlech called Kit's Coty House, about a mile north-east from the village. (See Stone Monuments, Plate, fig. 2.) In accordance with tradition this has been thought to mark the burial-place of Catigern, who was slain here in a battle between the Britons and Saxons in a.d. 455; the name has also been derived from Celtic Ked-coit, that is, the tomb in the wood. The name of the larger group of monuments close by, called the Countless Stones, is due to the popular belief, which occurs elsewhere, that they are not to be counted. Large numbers of British coins have been found in the neighbourhood. The supposed tomb of. Horsa, who fell in the same battle, is situated at Horsted, about 2 m-. to the north.

AYLLON, LUCAS VASQUEZ DE (c. 14/5-1526), Spanish adventurer and colonizer in America, was born probably in Toledo, Spain, about 1475. He accompanied Nicolas Ovando to Hispaniola (Santo Domingo) in 1502, and there became a magistrate of La

Concepcion and other towns, and a member of the superior court of Hispaniola. He engaged with great profit in various commercial enterprises, became interested in a plan for the extension of the Spanish settlements to the North American mainland, and in 1521 sent Francisco Gordillo on an exploring expedition which touched on the coast of the Florida peninsula and coasted for some distance northward. Gordillo's report of the region was so favourable that Ayllon in 1523 obtained from Charles V. a rather indefinite charter giving him the right to plant colonies. He sent another reconnoitring expedition in 1525, and early in 1526 he himself set out with 500 colonists and about 100 African slaves. He touched at several places along the coast, at one time stopping long enough to replace a wrecked ship with a new one, this being considered the first instance of shipbuilding on the North American con- tinent. Sailing northward to about latitude 33 40', he began the construction of a town which he called San Miguel. The exact location of this town is in dispute, some writers holding that it was on the exact spot upon which Jamestown, Va., was later built; more probably, however, as Lowery contends, it was near the mouth of the Pedee river. The employment of negro slaves here was undoubtedly the first instance of the sort in what later became the United States. The spot was unhealthy and fever carried off many of the colonists, including Ayllon himself, who died on the 18th of October 1526. After the death of their leader dissensions broke out among the colonists, some of the slaves rebelled and escaped into the forest, and in December the town was abandoned and the remnant of the colonists embarked for Hispaniola, less than 150 arriving in safety.

See Woodbury Lowery, Spanish Settlements within the Present Limits of the United States (2 vols., New York, 1903-1905).

AYLMER, JOHN (1521-1594), English divine, was born in the year 1521 at Aylmer Hall, Tivetshall St Mary, Norfolk. While still a boy, his precocity was noticed by Henry Grey, marquis of Dorset, afterwards duke of Suffolk, who sent him to Cambridge, where he seems to have become a fellow of Queens' College. About 1541 he was made chaplain to the duke, and tutor to his daughter, Lady Jane Grey. His first preferment was to the archdeaconry of Stow, in the diocese of Lincoln, but his opposition in convocation to the doctrine of transubstantia- tion led to his deprivation and to his flight into Switzerland. While there he wrote a reply to John Knox's famous Blast

agaiHst the Monstrous Regiment of Women, under the title of An Harborowe for Faithfull and Trewe Subjects, &c, and assisted ■ John Foxe in translating the: Acts of the Martyrs into Latin. On the accession of Elizabeth he returned to England. In 1559 he resumed the : Stow archdeaconry, and in 1562 he obtained that of Lincoln. He was a member of the famous convocation of 1562, which reformed and settled the doctrine and discipline of the Church of England. In 1576 he was consecrated bishop of London, and while in that position made himself notorious by hia harsh treatment of all who differed from him on ecclesi- astical questions, whether Puritan or Papist. Various efforts were made to remove him to another see. He is frequently assailed in the famous Marprelate Tracts, and is characterized as “.Morrell,” the bad shepherd, in Spenser’s Shepheard’s Calendar (July). His reputation as a scholar hardly balances his inade- quacy as a bishop in the transition time in which he lived. He died in June 1594- His Life was written by John Strype (i7˚i)-

AYMARA (anc. Colla), a tribe of South American Indians, formerly inhabiting the country around Lake Titicaca and the neighbouring valleys of the Andes. They form now the chief ethnical element in Bolivia, but are of very mixed blood. In early days the home of the Aymaras by Lake Titicaca was a ” holy land ” for the Incas themselves, whose national legends attributed the: origin of all Quichua (Inca) civilization to that region. The Aymaras, indeed, seem to have possessed a very Considerable culture before their conquest by the Incas in the r 3th and 14th centuries, evidence of which remains in the megalithic ruins of Tiahuanaco. When the Spaniards arrived the Aymaras had been long under the Inca domination, and were in a decadent state. They, however, retained certain privileges, such as the use of their own language; and their treatment by their conquerors generally suggested that the latter believed themselves of Aymara blood. Physically, the pure Aymara is short and thick-set, with a great chest development, and with the same reddish complexion, broad face, black eyes and rounded forehead which distinguish the Quichuas. Like the latter, too, the Aymaras are sullen and apathetic in disposi- tion. They number now, including half-breeds, about half a million in Bolivia. Some few are also found in southern Peru.

See_ Journal Ethnol. Society (1870), “The Aymara Indians of Bolivia and Peru.”

AYMER, or ˆEthelmar, OF VALENCE (d. 1260), bishop of

Winchester, was a half-brother of Henry III. His mother was Isabelle of Angouleme, the second wife of King John, his father was Hugo of Lusignan, the count of La Marche, whom Isabelle married in 1220. The children of this marriage came to England in 1247 in the hope of obtaining court preferment. In 1250 the king, by putting strong pressure upon the electors, succeeded in obtaining the see pf Winchester for Aymer. The appointment was in every way unsuitable. Aymer was illiterate, ignorant of the English language, and wholly secular in his mode of life. Upon his head was concentrated the whole of the popular indignation against the foreign favourites; and he seems to have deserved this unenviable distinction. At the parliament of Oxford (1258) he and his brothers repudiated the new constitu- tion prepared by the barons. He was pursued to Winchester, besieged in Wolvesey castle, and finally compelled to surrender and leave the kingdom. He had never been consecrated; accordingly in 1259 the chapter of Winchester proceeded to a new election. Aymer, however, gained the support of the pope; he was on his way back to England when he was over- taken by a fatal illness at Paris.

See W. Stubbs' Constitutional History, vol. ii. (1896); G. W. Prothero's Simon de Montfort (1877); W. H. Blaauw's Barons' War

(1871).

AYMESTRY LIMESTONE, an inconstant limestone which occurs locally in the Ludlow series of Silurian rocks, between the Upper and Lower Ludlow shales. It derives its name from Aymestry in Herefordshire, where it may be seen on both sides of the river Lugg. It is well developed in the neighbourhood of Ludlow (it is sometimes called the Ludlow limestone) and occupies a * similar position in the Ludlow shales at Woolhope,

the Abberley Hills, May Hill and the Malvern Hills. In litho- ' logical character it varies greatly; in one place it is a dark grey, somewhat crystalline limestone, elsewhere it passes into a flaggy, earthy or shaly condition, or even into a mere layer of nodules. When well developed it may reach 50 ft. in thickness in beds of from 1 to 5 ft.; in this, condition it naturally forms a con- spicuous feature in the landscape because it stands out by its

superior hardness from the soft shales above and below.

The most common fossil is Pentamerus Knighlii, which is extremely abundant in places. Other brachiopods, corals and trilobites are present, and are similar to those found in the Wenlock limestone. (See Silurian.)

AYR, a royal, municipal and police burgh and seaport, and county town of Ayrshire, Scotland, at the mouth of the river Ayr, 4i£m. S.S.W. of Glarˆow by the Glasgow & South- western railway. Pop. (1891) 24,944; (1901) 29,101. It is situated on a fine bay and its beautiful sands attract thousands of summer visitors. Ayr proper lies on the south bank of the river, which is crossed by three bridges, besides the railway viaduct — the Victoria Bridge (erected in 1898) and the famous ” Twa Brigs ” of Burns. The Auld Brig is said to date from the reign of Alexander III. (d. 1286). The New Brig was built in 1788, mainly owing to the efforts of Provost Ballantyne. The prophecy which Burns put into the mouth of the venerable structure came true in 1877, when the newer bridge yielded to floods and had to be rebuilt (1879); and the older structure itself was closed for public safety in 1 904. The town has extended greatly on the southern side of the stream, where, in the direction of the racecourse, there are now numerous fine villas. The county buildings, designed after the temple of Isis in Rome, accommodate the circuit and provincial courts and various local authorities. The handsome town buildings, surmounted by a fine spire 226 ft. high, contain assembly and reading rooms. Of the schools the most notable is the Academy (rebuilt in 1880), which in 1764 superseded the grammar school of the burgh, which existed in the 13th century. The Gothic Wallace Tower in High Street stands on the site of an old building of the same name taken down in 1835, from which were transferred the clock and bells of the Dungeon steeple. A niche in front is filled by a statue of the Scottish hero by James Thorn (1802- 1850), a self-taught sculptor. There are statues of Burns, the 13th earl of Eglinton, General Smith Neill and Sir William Wallace. The Carnegie free library was established in 1893. The charitable institutions include the county hospital, district asylum, a deaf and dumb home, the Kyle combination poor- house, St John’s refuge and industrial schools for boys and girls. The Ayr Advertiser first appeared on 5th of August 1803, and was the earliest newspaper published in Ayrshire. In the suburbs is a racecourse where the Western Meeting is held in September of every year. The principal manufactures include leather, carpets, woollen goods, flannels, blankets, lace, boots

and shoes; and fisheries and shipbuilding are also carried on. There are several foundries, engineering establishments and saw mills. Large quantities of timber are imported from Canada and Norway; coal, iron, manufactured goods and agricultural produce are the chief exports. The harbour, with wet and slip dock, occupies both sides of the river from the New Bridge to the sea, and is protected on the south by a pier projecting some distance into the sea, and on the north by a breakwater with a commodious dry dock. There are esplanades to the south and north of the harbour. The town is governed by a provost and council, and unites with Irvine, Inveraray, Campbeltown and Oban in returning one member to parliament.

In 1873 the municipal boundary was extended northwards beyond the river so as to include Newton-upon-Ayr and Wallace Town, formerly separate. Newton is a burgh or barony of very ancient creation, the charter of which is traditionally said to have been granted by Robert Bruce in favour of forty-eight of the inhabitants who had distinguished themselves at Bannock- burn. The suburb is now almost wholly occupied with manu- factures, the chief of which are chemicals, boots and shoes, carpets and lace. It is on the Glasgow & South-Western

railway, and has a harbour and dock from which coal and goods are the main exports. About 3 m. north of Ayr is Prestwick, a popular watering-place and the headquarters of one of the most flourishing golf clubs in Scotland. The outstanding attraction of Ayr, however, is the pleasant suburb of Alloway, 2| m r . to the south,' with which there is frequent communication by electric cars. The '* auld clay biggin " in which Robert Burns was born on the 25th of January 1759, has been com- pletely repaired and is now the property of the Ayr Burns's Monument trustees. In the kitchen is the box bed in which the poet was born, and many of the articles of furniture belonged to his family. Adjoining the cottage is a museum of Burnsiana. The " auld haunted kirk," though roofless, is otherwise in a fair state of preservation, despite relic-hunters who have removed all the woodwork. In the churchyard is the grave of William Burness, the poet's father. Not far distant, on a conspicuous position close by the banks of the Doon, stands the Grecian monument to Burns, in the grounds of which is the grotto con- taining Thorn's figures of Tam o' Shanter and Souter Johnnie.

Nothing is known of the history of Ayr till the close of the 1 2 th century, when it was made a royal residence, and soon

afterwards a royal burgh, by William the Lion. During the wars of Scottish independence the possession of Ayr and its castle was an object of importance to both the contending parties, and the town was the scene of many of Wallace's exploits. In 1315 the Scottish parliament met in the church of St John to confirm the succession of Edward Bruce to the throne. Early in the 16th century it was a place of considerable influence and trade. The liberality of William the Lion had bestowed upon the corporation an extensive grant of lands; while in addition to the well-endowed church of St John, it had two monasteries, each possessed of a fair revenue. When Scotland was overrun by Cromwell, Ayr was selected as the site of one of the forts which he built to command the country. This fortification, termed the citadel, enclosed an area of ten or twelve acres, and included within its limits the church of St John, which was converted into a storehouse, the Protector partly indemnifying the inhabitants by contributing £150 towards the erection of a new place of worship, now known as the Old Church. A portion of the tower of St John's church remains, but has been completely modernized. The site of the fort is now nearly covered with houses, the barracks being in Fort Green.

AYRER, JAKOB (?-i6os), German dramatist, of whose life little is known. He seems to have come to Nuremberg as a boy and worked his way up to the position of imperial notary. He died at Nuremberg on the 26th of March 1605. Besides a rhymed Chronik der Stadl Bamberg (edited by J. Heller, Bamberg, 1838), and an unpublished translation of the Psalms, Ayrer has left a large number of dramas which were printed at Nuremberg under the title Opus Thealricum in 1618. This collection contains thirty tragedies and comedies and thirty-six Fastnachtsspiele (Shrovetide plays) and Singspiele. As a dramatist, Ayrer is virtually the successor of Hans Sachs (q.v.), but he came under the influence of the so-called Engliscke Kombdianten, that is, troupes of English actors, who, at the close of the 16th century and during the 17th, repeatedly visited the continent, bringing with them the repertory of the Elizabethan theatre. From those actors Ayrer learned how to enliven his dramas with sensational incidents and spectacular effects, and from them he borrowed the character of the clown. His plays, however, are in spite of his foreign models, hardly more dramatic, in the true sense of the word, than those of Hans Sachs, and they are inferior to the latter in poetic qualities. The plots of two of his comedies, Von der schonen Phoenicia and Von der schonen Sidea, were evidently

drawn from the same sources as those of Shakespeare's Much Ado about Nothing and Tempest.

Ayrers Dramen, edited by A. von Keller, have been published by the Stuttgart Lit. Verein (1864-1865). See also L. Tieck, Deutsche! Theater (1817); A. Cohn, Shakespeare in Germany (1885), which contains a translation of the two plays mentioned above; J. Tittmann, Schauspiele des sechzehnlen Jahrhunderts (1888).

AYRSHIRE, a south-western county of Scotland, bounded N. by Renfrewshire, E. by Lanarkshire and Dumfriesshire, S.E. by

Kirkcudbrightshire, S. by Wigtownshire and W. by the Firth of Clyde. It includes off its coast the conspicuous rock of Ailsa Craig, 10 m. W. of Girvan, Lady Island, 3 m. S.W.. of Troon, and Horse Island, off Ardrossan. Its area is 724,523 acres or 1 142 sq. m., its coast-line being 70 m. long. In former times the shire was divided into the districts of Cunninghame (N. of the Irvine), Kyle (between the Irvine and the Doon), and Carrick (S. of the Doon), and these terms are still occasionally used. Kyle was further divide>l by the Ayr into King's Kyle on the north and Kyle Stewart. Robert Bruce was earl of Carrick, a title now borne by the prince of Wales. The county is politic- ally divided into North and South Ayrshire, the former compris- ing Cunninghame and the latter Kyle and Carrick. The surface is generally undulating with a small mountainous tract in the north and a larger one in the south and south-east. The principal hills are Black Craig (2298 ft.), 5 m. south-east of New Cumnock; Enoch (1865 ft.), s m. east of Dalmellington; Polmaddie (1750 ft.) 2 m. south-east of Biirr; Stake on the confines of Ayrshire and Renfrewshire, and Corsancone (1547 ft.), 3 m. north-east of New Cumnock. None of the rivers is navigable, but their varied and tranquil beauty has made them better known than many more important streams. The six most noted are the Stinchar (c soft), Girvan, Doon, Ayr, Irvine and Garnock. Of these the Ayr is the longest. It rises at Glenbuck, on the border of Lanarkshire, and after a course of some 38 m. falls into the Firth of Clyde at the county town which, wfth the county, is named from it. The scenery along its banks from Sorn down- wards — passing Catrine, Ballochmyle, Barskimming, Sundrum, Auchencruive and Craigie — is remarkably picturesque. The lesser streams are numerous, but

Burns's verse has given pre- eminence to the Afton, the Cessnock and the Lugar. There are many lochs, the largest of which is Loch Doon, 55 m. long, the source of the river of the same name. From Loch Finlas, about 20 m. south-east of Ayr, the town derives its water-supply. The Nith rises in Ayrshire and a few miles of its early course belong to the county.

Geology. — The greater portion of the hilly region in the south of the county forms part of the Silurian tableland of the south of Scotland. Along its north margin there is a belt of elevated ground consisting mainly of Old Red Sandstone strata, while the tract of fertile low ground is chiefly occupied by younger Palaeozoic rocks. The Silurian belt stretching eastwards from the mouth of Loch Ryan ' to the Merrick range is composed of grits, greywackes and shales with thin leaves of black shales, containing graptolites of Upper Llandeilo age which are repeated by folding and cover a broad area. Near their northern limit Radiolarian cherts, mudstones and lavas of Arenig age rise from underneath the former along anticlines striking north-east and south-west. In the Ballantrae region there is a remarkable development of volcanic rocks — lavas, tuffs and agglo- merates — of Arenig age,' their horizon being defined by graptolites occurring in cherty mudstones and black shales interleaved in lavas and agglomerates. These volcanic materials are pierced by ser- pentine, gabbro and granite. The serpentine forms two belts running inland from near Bennane Head and from Burnfoot, being typically developed on Balhamie Hill near Colmonell. Gabbro appears on the shore north of Lendalfoot, while on the Byne and Grey Hills south of Girvan there are patches of granite and quartz-diorite which seem to pass into more basic varieties. These volcanic and plutonic rocks and Radiolarian cherts are covered unconformably by con- glomerates (Bennan Hill near Straiton and Kennedy's Pass) which are associated with limestones of Upper Llandeilo age that have been wrought in the Stinchar valley and at Craighead. South of the river Girvan there is a sequence from Llandeilo — Caradod to Llan- dovery — Tarannon strata, excellent sections of which are seen on the shore north of Kennedy's Pass and in Penwhapple Glen near Girvan. Llandovery strata again appear north of the Girvan at Daifly, where they form an inher surrounded by the Old Red Sand- stone and Carboniferous formations. Representatives of Wenlock rocks form a narrow belt near the village of Straiton. Some of the Silurian sediments of the Girvan province are highly fossiliferous, but the order of succession is determined by the

graptolites. Near Muir- kirk and in the Douglas Water there are inliers of Wenlock, Ludlow and Downtonian rocks, coming to the surface along anticlines trun- cated by faults and surrounded by Old Red Sandstone and Carboni- ferous strata. In the south-east of the county there is a part of the large granite mass that stretches from Loch Doon south to Loch Dee, giving rise to wild scenery and bounded by the high ground near the head of the Girvan Water, boulders of which have been dis- tributed over a wide area during the glacial period. Along the northern margin of the uplands the Lower Old Red Sandstone is

usually faulted against the Silurian strata, but on Hadyard Hill south of the Girvan valley they rest on the folded and denuded members of the latter system. The three divisions of this formation are well represented. The lower group of conglomerates and sand- stones are well displayed on Hadyard Hill and on the tract near May- bole; the middle volcanic series on the shore south of the Heads of Ayr and from the Stinchar valley along the Old Red belt towards Dalmellington and New Cumnock; while the upper group, com- prising conglomerates and sandstones, form a well-marked syn- clinal ford at Corsancone north-east of New Cumnock. The Upper Old Red Sandstone appears as a fringe round the south-west margin of the Carboniferous rocks of the county, and it rises from beneath them on the shore of the Firth of Clyde south of Wemyss Bay. The Carboniferous strata of the central low ground form a great basin traversed by faults, all the subdivisions of the system being represented save the Millstone Grit. Round the north and north-east margin there is a great development of volcanic rocks — lavas, tuffs and agglomerates — belonging to the Calciferous Sandstone series, and passing upwards into the Carboniferous Limestone. The lower limestones of the latter division are typically represented near Dairy and Beith, where in one instance they reach a thickness of over 100 ft. They are followed by the coal-bearing group (Edge coals of Midlothian) which have been wrought in the Dairy, and Patna districts and at Dailly. The position of the Millstone Grit is occupied by lavas and tuffs, extending almost continually as a narrow fringe round the northern margin of the Coal Measures from Saltcoats by Kilmaurs to the Crawfordland Water. The workable coals of the true Coal Measures have a wide distribution from Kilwinning by Kilmarnock to Galston and again in the districts of Coylton, Dal- mellington, Lugar and Cumnock. These members are overlaid by a set of upper barren red sandstones, probably the equivalents of

the red beds of Uddingston, Dalkeith and Wemyss in Fife, visible in the ravines of Lugar near Ochiltree and of Ayr at Catrine. In various parts of the Ayrshire coalfield the coal-seams are rendered useless by intrusive sheets of dolerite as near Kilmarnock and Dalmellington. In the central part of the field there is an oval-shaped area of red sandstones now grouped with the Trias, extending from near Tar- bolton to Mauchhne, where they are largely worked for building stone. They are underlaid by a volcanic series which forms a continuous belt between the underlying red sandstones of the Coal Measures and the overlying Trias. I n the north part of the county, as near Wemyss Bay, the strata are traversed by dykes of dolerite and basalt trending in a north-west direction and probably of Tertiary age.

Agriculture. — There has been no lack of agricultural enterprise. With a moist climate, and, generally, a rather heavy soil, drainage was necessary for the successful growth of green crops. Up to about 1840, a green crop in the rotation was seldom seen, except on porous river-side land, or on the lighter farms of the lower districts. In the early part of the 19th century lime was a powerful auxiliary in the inland districts, but with repeated applications it gradually became of little avail. Thorough draining gave the next great impetus. Enough had been done to test its efficacy before the announcement of Sir Robert Peel's drainage loan, after which it was rapidly extended throughout the county. Green-crop husbandry, and the liberal use of guano and other manures, made a wonderful change in the county, and immensely increased the amount of produce. Potatoes are now extensively grown, the coast-lands supplying the markets of Scotland and the north of England. Of roots, turnips, carrots and mangolds are widely cultivated, heavy crops being obtained by early sowing and rich manuring. Oats form the bulk of the cereal crop, but wheat and barley are also grown. High farming has developed the land enormously. Dairying has received particular attention. Dunlop cheese was once a well-known product. Part of it was very good; but it was unequal in its general character, and unsaleable in English markets. Dissatisfied with the inferior commercial value of their cheese in comparison with some English varieties, the Ayrshire Agricultural Association brought a Somer- set farmer and his wife in 1855 to teach the Cheddar method, and their effort was most successful. Cheddar cheese of first-rate quality is now made in Ayrshire, and the annual cheese show at Kilmarnock is the most important in Scotland. The Ayrshire breed of cows are famous for the quantity and

excellence of their milk. Great numbers of cattle, sheep and pigs are raised for the market, and the Ayrshire horse is in high repute.

Other Industries. — Ayrshire is the principal mining county in Scotland and has the second largest coalfield. There is a heavy annual output also of iron ore, pig iron and fire-clay. The chief coal districts are Ayr, Dalmellington, Patna, Maybole, Drongan, Irvine, Coylton, Stevenston, Beith, Kilwinning,

Dairy, Kilbirnie, Dreghorn, Kilmarnock, Galstony Hurlford, Muirkirk, Cumnock and New Cumnock. Ironstone' occurs chiefly at Patna, Coylton, Dairy, Kilbirnie, Dreghorn , and Cumnock, and there are blast furnaces at most of i these towns. A valuable whetstone is quarried at Bridge of Stair on the Ayr — the Water.-of-Ayr stone. The leading manufactures fire im- portant. At Catrine are cotton factories and bleachfields, and at Ayr and Kilmarnock extensive engineering works, and carpet, blanket and woollens, boot and shoe factories. Cotton, woollens, and other fabrics and hosiery are also manufactured at Dairy, Kilbirnie, Kilmaurs, Beith and Stewarton. An extensive trade in chemicals is carried on at Irvine. Near Stevenston works have been erected in the sandhills' for the making of dynamite and other explosives. There aire large lace curtain factories at Galston, Newmilns and Darvel, and at Beith cabinet-making is a considerable industry. Shipbuilding is conduct|d at Troon, Ayr, Irvine and Fairlie, which is famous for its yaolts. The leading ports are Ardrossan, Ayr, Girvan, Irvine and Troon. Fishing is carried on in the harbours and creeks, which are divided between the fishery districts of Greenock and Ballantrae. '

Communications. — The Glasgow & South- Western railway owns most of the lines within the shire, its system serving all the industrial towns, ports and seaside resorts. Its tnmk line via Girvan to Stranraer commands the shortest sea passage to Belfast and the north of Ireland, and its main line via Kilmarnock communicates with Dumfries and Carlisle and so with England, The Lanarkshire & Ayrshire branch of the Caledonian railway company also serves aj part of the county. For passenger steamer traffic Ardross|n is the principal port, there being services to Arran and Belfast and, during the season, to Douglas in the

Istei > f Man. Millport, on Great Cumbrae, is reached by steamerlrlm Fairlie.

Population and Administration- The population of Ayrshire in 1891 was 226,386, and in 1901, 254,468, or 223 to the sq. m. In 1901 the number of persons speaking Gaelic only was 17. The chief towns, with populations in 1901 are: Ardrossan (6077), Auchinleck (2168), Ayr (29,101), Beith (4963), Cumnock (3o88),»Dalry (5316), Darvel (3070), Galston (4876), Girvan (4024),JHurlford (4601), Irvine (9618), Kilbirnie (457), Kilmarnock (35,091), Kilwinning (4440)* Largs (3246), Maybole (5892), Muirkirk (3892), Newmilns (4467), Saltcoats (8120), Stevenston (6554), Stewarton (2858), Troon (4764). The county returns two members to parliament, who represent North and South Ayrshire respectively. Ayr (the county town) and Irvine are royal burghs and belong to the Ayr group of parliamentary burghs, and Kilmarnock is a parliamentary burgh of the Kilmarnock group. Under the county council special water districts, drainage districts, and lighting and scavenging districts have been formed. The county forms a sheriffdom, and there are resident sheriffs-substitute at Ayr and Kilmarnock, who sit also at Irvine, Beith, Cumnock and Girvan. The shire is under school-board jurisdiction, but there are a considerable number of voluntary schools, besides secondary schools at Ayr, Irvine, Kilmarnock and Beith, while Kilmarnock Dairy School is a part of the West of Scotland Agricultural College established in 1899. In addition to grants earned by the schools, the county and borough councils expend a good deal of money upon secondary and technical education, towards which contributions are also made by the Glasgow and West of Scotland Technical College and the Kilmarnock Dairy School. The technical classes, subsidized at various local centres, em- brace instruction in agriculture, mining, engineering, plumbing, gardening, and various science and art subjects.

History. — Traces of Roman occupation are found in Ayrshire. At the time of Agricola's campaigns the country was held by the Damnonii, and their town of Vandogara has been identified with a site at Loudoun Hill near Darvel,where a serious encounter with the Scots took place. On the withdrawal of the Romans, Ayrshire formed part of the kingdom of Strathclyde and ultimately passed under the sway of the Northumbrian kings. Save for occasional intertribal troubles, as that in which the

Scottish king Alphv was slain at Dalmellington in the 9th

century, the annals are silent until the battle of Largs in 1263, when the pretensions of Haakon of Norway to the sovereignty of the Isles were crushed by the Scots under Alexander HI. A generation later William Wallace conducted a vigorous campaign in the shire. He surprised the English garrison at Ardrossan,. and burned the barns of Ayr in which the forces of Edward I. were lodged. Robert Bruce is alleged to have been born at Turnberry Castle, some 12 m. S.W. of Ayr. In 1307 he defeated the English at Loudoun Hill. Cromwell paid the county a hurried visit, during which he demolished the castle of Ardrossan and is said to have utilized the stones in rearing a fort at Ayr. Between 1660 and 1688 the sympathies of the county were almost wholly with the Covenanters, who suffered one of their heaviest reverses at Airds Moss — a morass between the Ayr and Lugar, — their leader, Richard Cameron, being killed (20th of July 1680). The county was dragooned and the Highland host ravaged wherever it went. The Hanoverian succession excited no active hostility if it evoked no enthusiasm. Antiquarian remains include cairns in Galston, Sorn and other localities; a road supposed to be a work of the Romans, which extended from Ayr, through Dalrymple and Dalmellington, towards the Solway; camps attributed to the Norwegians or Danes on the hills of Knockgeorgan and Dundonald; and the castles of Loch Doon, Turnberry, Dundonald, Portencross, Ardrossan and Dunure. There are ruins of celebrated abbeys at Kilwinning and Crossraguel, and of Alloway's haunted church, famous from their associations.

See James Paterson, " History of the County of Ayr." Transactions of Ayrshire and Galloway Archaeological Associations, Edinburgh, 1879-1900; John Smith, Prehistoric Man in Ayrshire (London, 1895) ; William Robertson, History of Ayrshire (Edinburgh, 1894); Archibald Sturrock, "On the Agriculture of Ayrshire," Transactions of Highland and Agricultural Society; D. Lands- borough, Contributions to Local History (Kilmarnock, 1878).

AYRTON, WILLIAM EDWARD (1847-1908), English physi- cist, was born in London on the 14th of September 1847. He was educated at University College, London, and in 1868 went out to Bengal in the service of the Indian Government Telegraph department. In 1873 he was appointed professor of physics and telegraphy at the Imperial College of Engineering, Tokio. On his return to London six years later he became professor of applied physics at the Finsbury College of the City and Guilds • of London Technical Institute, and in 1884 he was chosen professor of

electrical engineering at the Central Technical College, South Kensington. He published, both alone and jointly with others, a large number of papers on physical, and in particular electrical, subjects, and his name was especially associated, together with that of Professdr John Perry, with the invention of a long series of electrical measuring instruments. He died in London on the 8th of November 1908. His wife, Mrs Hertha Ayrton, whom he married in 1885, assisted him in his researches, and became known for her scientific work on the electric arc and other subjects. The Royal Society awarded her one of its Royal medals in 1906.

AVSCOUGH, SAMUEL (1745-1804), English librarian and index-maker, was born at Nottingham in 1745. His father, a printer and stationer, having ruined himself by speculation, Samuel Ayscough left Nottingham for London, where he obtained an engagement in the cataloguing department of the British Museum. In 1782 he published a two-volume catalogue of the 1 then undescribed manuscripts in the museum. About 1785 he was appointed assistant librarian at the museum, and soon afterwards took holy orders. In 1786 he published an index to the first seventy volumes of the Monthly .Review, and in 1796 indexed the remaining volumes. Both this index and his catalogue of the undescribed manuscripts in the museum were private ventures. His first official work was a third share in the British Museum catalogue of 1787, and he subsequently catalogued the ancient rolls and charters, 16,000 in all. In 1789 he produced the first two volumes of the index to the Gentleman's Magazine,a.nd in 1790 the first index-concordance to Shakespeare. He was a Fellow of the Society of Antiquaries, and has been called

" The Prince of Indexers." He died at the British Museum on the 30th of October 1804.

AYSCUE (erroneously Askew or Ayscough), SIR GEORGE (d. 1671), British admiral, came of an old Lincolnshire family. Beyond the fact that he was knighted by Charles I., nothing is known of his career until in 1646 he received a naval command. Through the latter years of the first civil war, Ayscue seems to have acted as one of the senior officers of the fleet. In 1648,

when Sir William Batten went over to Holland with a portion of his squadron, Ayscue's influence kept a large part of the fleet loyal to the Parliament, and in reward for this service he was appointed the following year admiral of the Irish Seas. For his conduct at the relief of Dublin he received the thanks of Parlia ment, and in 1651 he was employed under Blake in the operations for the reduction of Stilly. He was next sent to the West Indies in charge of a squadron destined for the Conquest of Barbadoes and the other islands still under royalist control. This task successfully accomplished, he returned to take part in the first Dutch War. In this he played a prominent part, but the in-decisive battle off Plymouth (August 16th, 1652) cost him his command, though an annuity was assigned him. For some years Sir George Ayscue lived in retirement, but the later years of the Commonwealth he spent in Sweden, Cromwell having despatched him thither as naval adviser. At the Restoration he returned, and became one of the commissioners of the navy, but on the outbreak of the second Dutch War in 1664 he once more hoisted his flag as rear-admiral of the Blue, and took part in the battle of Lowestoft (June 3rd, 1665). In the great Four Days' Battle (June nth-i4th, 1666) he served with Monck as admiral of the White. His flagship, the " Prince Royal," was taken on the third day, and he himself remained a prisoner in Holland till the peace. It seems doubtful whether he ever again flew his flag at sea, and the date of his death is supposed to be 167 1. Lely's portrait of Sir George Ayscue is in the Painted Hall at Greenwich.

AYTOUN, or Ayton, SIR ROBERT (1570-1638), Scottish poet, son of Andrew Aytoun of Kinaldie, Fifeshire, was born in 1570. He was educated at the university of St Andrews, where he was incorporated as a student of St Leonard's College in 1584 and graduated M.A. in 1588. He lived for some years in France, and on the accession of James VI. to the English throne he wrote in Paris a Latin panegyric, which brought him into immediate favour at court. He was knighted in 161 2. He held various lucrative offices, and was private secretary to the queens of James I. and Charles I. He died in London and was buried in Westminster Abbey on the 28th of February 1638. His reputation with his contemporaries was high, both personally and as a writer, though he had no ambition to be known as the latter.

Aytoun's remains are in Latin and English. In respect of the latter he is one of the earliest Scots to use the southern standard as a literary medium. The Latin poems include the panegyric already referred to, an Epicedium in obitum Thorna Rhodi; Basia, sive

Strena ad Jacobum Hayum; Lessus in funere Raphaelis Thorei; Carina Caro; and minor pieces, occasional and epitaphic. His first English poem was Diophantus and Charidora (to which he refers in his Latin panegyric to James). He has left a number of pieces on amatory subjects, including songs and sonnets.

Aytoun's Latin poems are printed in DelUiae Poetarum Scotorum (Amsterdam, 1637), i. pp. 40-75. His English poems are preserved in a MS. in the" British Museum {Aid. MSS. 10,308), which was pre- pared by his nephew, Sir John Aytoun. Both were collected by Charles Rogers in The Poems of Sir Robert Aytoun (London, privately printed, 1871). This edition is unsatisfactory, though it is better than the first issue by the same editor in 1844. Additional poems are included which cannot be ascribed to Aytoun, and which in some cases have been identified as the work of others. The poem " I do confess thou'rt smooth and fair " may be suspected, and the old version of " Auld Lang Syne " and " Sweet Empress " are cer- tainly not Aytoun's. Some of the English poems are printed in Watson's Collection (1706-1711) and in the Bannatyne Miscellany, i. p. 299 (1827). There is a memoir of Aytoun in Rogers's edition, and another by Grosart in the Diet, of Nat. Biog. Particulars of his public career will be found in the printed Calendars of State Papers and Register of the Privy Council of the period.

AYTOUN, WILLIAM EDMONSTOUNE (1813-1865), Scottish poet, humorist and miscellaneous writer, was born at Edinburgh on the 21st of June 1813. He was the only son of Roger Aytoun, a writer to the signet, and the family was of the same stock as Sir Robert Aytoun noticed above. From his mother, a woman of marked originality of character and considerable culture, he derived his distinctive qualities, his early tastes in literature, and his political sympathies, his love for ballad poetry, and his admiration for the Stuarts. At the age of eleven he was sent to the Edinburgh Academy, passing in due time to the university. In 1833 he spent a few months in London for the purpose of studying law; but in September of that year he went to study German at Aschaffenburg, where he remained till April 1834. He then resumed his legal, pursuits in his father's chambers, was admitted a writer to the signet in 1835, and five years later was called to the Scottish bar. But, by his own confession, though he " followed the law, he never could overtake it." His first publication — a volume entitled Poland, Homer, and other Poems, in which he gave expression to his eager interest in the state of Poland— bad appeared in 1832ˆ While in Germany he

made a translation in blank verse of the first part of Faust; but, forestalled by other translations, it was never published. In 1836 he made his earliest contributions to Blackwood's Magazine, in translations from Uhland; and from 1839 till his death he remained on the staff of Blackwood. About 1841 he became acquainted with Mr (afterwards Sir) Theodore Martin, and in association with him wrote a series of light humorous papers on the tastes and follies of the day, in which were inter- spersed the verses which afterwards became popular as the Bon Gaultier Ballads (1855). The work on which his reputation as a poet chiefly rests is the Lays of the Scottish Cavaliers (1848; 29th ed. 1883). In 1845 he was appointed professor of rhetoric and belles lettres at Edinburgh University. His lectures were very attractive, and the number of students increased correspond- ingly. His services in support of the Tory party, especially during the Anti-Corn-Law struggle, received official recognition in his appointment (1852) as sheriff of Orkney and Zetland. In 1854 appeared Firmilian, a Spasmodic Tragedy, in which he attacked and parodied the writings of Philip James Bailey, Sydney Dobell and Alexander Smith; and two years later he published his Bothwell, a Poem. Among his other literary works are a Collection of the Ballads of Scotland (1858), a translation of the Poems and Ballads of Goethe, executed in co-operation with his friend Theodore Martin (1858), a small volume on the Life and Times of Richard I. (1840), written for the Family Library, and a novel entitled Norman Sinclair (1861), many of the details in which are taken from incidents in his own experience. In i860 Aytoun was elected honorary president of the Associated Societies of Edinburgh University. In 1859 he lost his first wife, a daughter of John Wilson (Christopher North), to whom he was married in 1849, and this was a great blow to him. His mother died in November 1861, and his own health began to fail. In December 1863 he married Miss Kinnear. He died at Black- hills, near Elgin, on the 4th of August 1865.

See Memoir of W. E. Aytoun (1867), by Sir Theodore Martin, with an appendix containing some of his prose essays.

AYUB KHAN (1855-), Afghan prince, son of Shere Ali (formerly amir of Afghanistan), and cousin of the amir Abdur Rahman, was born about 1855. During his father's reign little is recorded of him, but after Shere Ali's expulsion from Kabul by the English, and his death in January 1879, Ayub took possession of Herat, and maintained himself there until June 188 1, when he invaded Afghanistan with the view of asserting his claims to the

sovereignty, and in particular of gaining possession of Kandahar, still in the occupation of the British. He encountered the British force commanded by General Burrows at Maiwand on the 27th of July, and was able to gain one of the very few pitched battles that have been won by Asiatic leaders over an army under European direction. His triumph, however, was short- lived; while he hesitated to assault Kandahar he was attacked by Sir Frederick (afterwards Lprd) Roberts, at the close of the latter's memorable march from Kabul, and utterly discomfited,

•20th. of September 1880. He made his way back to Herat, where he remained for some time unmolested. In the summer of 188 1 he again invaded Afghanistan, and on the anniversary of the battle of Maiwand obtained a signal victory over Abdur Rahman's lieutenants, mainly through the defection of a Durani regiment. Kandahar fell into his hands, but Abdur Rahman now took the field in person, totally defeated Ayub, and expelled him from Herat. He took refuge in Persia, and for some time lived quietly in receipt of an allowance from the Persian govern- ment. In 1887 internal troubles in Afghanistan tempted him to make another endeavour to seize the throne. Defeated and driven into exile, he wandered for some time about Persia, and in November gave himself up to the British agent at Meshed. He was sent to India to live as a state prisoner.

AYUNTAMIENTO, the Spanish name for the district over which a town council has administrative authority; it is used also for a town council, and for the town hall. The word is de rived from the Latin adjungere, and originally meant " meeting." In some parts of Spain and in Spanish America the town council was called the cabildo or chapter, from the Latin capitulum. The ayuntamiento consisted of the official members, and of regidores or regulators, who were chosen in varying proportions from the " hidalgos " or nobles (hijos de algo, sons of somebody) and the " pecheros," or commoners, who paid the pecho, or personal tax; pecho (Lat. pectus) is in Spanish the breast, and then by extension the person. The regidores of the ayunta- mientos, or lay cabildos, were checked by the royal judge or corregidor, who was in fact the permanent chairman or president. The distinction between hidalgo and pechero has been abolished in modern Spain, but the powers and the constitution of ayun- tamientos

have been subject to many modifications.

AYUTHIA, a city of Siam, now known to the Siamese as Krung Kao or " the Old Capital," situated in ioo° 32′ E., 14° 21′ N. Pop. about 10,000. The river Me Nam, broken up into a network of creeks, here surrounds a large island upon which stand the ruins of the famous city which was for more than four centuries the capital of Siam. The bulk of the inhabitants live in the floating houses characteristic Of lower Siam, using as thorough- fares the creeks to the edges of which the houses are moored. The ruins of the old city are of great archaeological interest, as are the relics, of which a large collection is housed in the local museum. Outside the town is an ancient masonry enclosure for the capture of elephants, which is still periodically used. Ayuthia is on the northern main line of the state railways, 42 m. from Bangkok. Great quantities of paddi are annually sent by river and rail to Bangkok, in return for which cloth and other goods are imported to supply the wants of the agriculturist peasantry. There is no other trade. Ayuthia is the chief town of one of the richest agricultural provincial divisions of Siam and is the headquarters of a high commissioner. The government offices occupy spacious buildings, once a royal summer retreat; the government is that of an ordinary provincial division (Monlon) .

Historically Ayuthia is the most interesting spot in Siam. Among the innumerable ruins may be seen those of palaces, pagodas, churches and fortifications, the departed glories of which are recorded in the writings of the early European travellers who first brought Siam within the knowledge of the West, and laid the foundations of the present foreign intercourse and trade. The town was twice destroyed by the Burmese, once in 1555 and again in 1767, and from the date of the second destruction it ceased to be the capital of the country.

AZAIS, PIERRE HYACINTHE (1766-1845), French philo- sopher, was born at Soreze and died at Paris. He spent his early years as a teacher and a village organist. At the outbreak of the Revolution he viewed it with favour, but was soon disgusted at the violence of its methods. A critical pamphlet drew upon him the hatred of the revolutionists, and it was not until 1806 that he was able to settle in Paris. In 1809 he published his great work, Des Compensations dans les destinies humaines (5th ed. 1846), which pleased Napoleon so much that he made its author professor at St Cyr. In 181 1 he became

inspector of the public library at Avignon, and from 1812- to 18 15 he held the same position at Nancy. The Restoration government at* first suspected him as a Bonapartist, but at length granted him a pension. From that time he occupied himself in lecturing and the publication of philosophical works. In the Compensations he sought to prove that, on the whole, happiness and misery are equally balanced, and therefore that men should accept the government which is given them rather than risk the horrors of revolution. " Le principedel'inegalite naturelle et essentielle dans les destinees humaines conduit inevitablement au fanatisme revolutionnaire ou au fanatisme religieux." The principles of compensation and equilibrium are found also in the physical universe, the product of matter and force, whose cause is God. Force, naturally expansive and operating on the homogeneous atoms which constitute elemental matter, is subject to the law of equilibrium, or equivalence of action and reaction. The development of phenomena under this law may be divided into three stages — the physical, the physiological, the intellectual and moral. The immaterial in man is the expansive force inherent in him. Moral and political phenomena are the result of the opposing forces of progress and preservation, and their perfection lies in the fulfilment of the law of equilibrium or universal harmony. This may be achieved in seven thousand years, when man will vanish from the world. In an additional five thousand, a similar equilibrium will obtain in the physical sphere, which will then itself pass away. In addition to his philosophical work, Azais studied music under his father, Pierre Hyacinthe Azai's (1 743-1 796), professor of music at Soreze and Toulouse, and composer of sacred music in the style of Gossec. He wrote for the Revue musicale a series of articles entitled Acoustique jondameniale (1831), containing an ingenious, but now exploded, theory of the vibration of the air. His other works are: Systeme universel (8 vols., 1812); Du Sort de I'homme (3 vols., 1820); Cours de philosophie (8 vols., 1824), reproduced as Explication universelle (3 vols., 1826-1828); Jeunesse, maturity, religion, philosophie (1837); De la phrSnologie, du magnitisme, et de la folie (1843).

AZALEA, a genus of popular hardy or greenhouse plants, belonging to the heath order (Ericaceae), and scarcely separable botanically from Rhododendron. The beautiful varieties now in cultivation have been bred from a few originals, natives of the hilly regions of China and Japan, Asia Minor, and the United States. They are perhaps unequalled as indoor decorative plants.

They are usually increased by grafting the half-ripened shoots on the stronger-growing kinds, the shoots of the stock and the grafts being in a similarly half-ripened condition, and the plants being placed in a moist heat of 65°. Large plants of inferior kinds, if healthy, may be grafted all over with the choicer sorts, so as to obtain a large specimen in a short time. They require a rich and fibrous peat soil, with a mixture of sand to prevent its getting water-logged. The best time to pot azaleas is three or four weeks after the blooming is over. The soil should be made quite solid to prevent its retaining too much water. To produce handsome plants, they must while young be stopped as required. Specimens that have got leggy may be cut back just before growth commences. The lowest temperature for them during the winter is about 35°, and during their season of growth from 55° to 65° at night, and 75° by day, the atmo- sphere being at the same time well charged with moisture. They are liable to the attacks of thrips and red spider, which do great mischief if not promptly destroyed. i»

The following are some well-known species: — A. arborescens (Pennsylvania) , a deciduous shrub 10-20 ft. high; A. calendulacea (Carolina to Pennsylvania), a beautiful deciduous shrub 2-6 ft. high, with yellow, red, orange and copper-coloured flowers; A. hispida, a North American shrub, 10-15 ft. high, flowers white edged with red; A. indica (China), the so-called Indian azalea, a shrub 3-6 ft. or more high, the original of numerous single and double varieties, many of the more vigorous of which are hardy in southern England and Ireland; A. nudifiora, a North American shrub, 3-4 ft. high, which hybridizes freely with A. calendulacea, A. pontica and others, to produce single and

double forms of a great variety of shades; A. pontica (Levant, Caucasus, &c), 4-6 ft. high, with numerous varieties differing in the colour of the flowers and the tint of the leaves; A. sinensis (China and Japan), a beautiful shrub, 3-4 ft. high, with orange-red or yellow bell-shaped flowers, hardy in the southern half of England, large numbers of varieties being in cultivation under the name of Japanese azaleas.

AZAMGARH, or Azimgarh, a city and district of British India, in

the Gorakhpur division of the United Provinces. The town is situated on the river Tons, and has a railway station. It is said to have been founded about 1665 by a powerful landholder named Azim Khan, who owned large estates in this part of the country. Pop. (1901) 18,835.

The area of the district is 2207 sq. m. It is bounded on the N. by the river Gogra, separating it from Gorakhpur district; on the E. by Ghazipur district and the river Ganges; on the S. by the districts of Jaunpur and Ghazipur; and on the W. by Jaunpur and Fyzabad. The portion of the district lying along the banks of the Gogra is a low-lying tract, varying considerably in width; south of this, however, the ground takes a slight rise. The slope of the land is from north-west to south-east, but the general drainage is very inadequate. Roughly speaking, the district consists of a series of parallel ridges, whose summits are depressed into beds or hollows, along which the rivers flow; while between the ridges are low-lying rice lands, interspersed with numerous natural reservoirs. The soil is fertile, and very highly cultivated, bearing magnificent crops of rice, sugar-cane and indigo. There are several indigo factories. A branch of the Bengal & North-Western railway to Azamgarh town was opened in 1898. In 1901 the population was 1,529,785, showing a decrease of 1 1 % in the decade. The district was ceded to the Company in 1801 by the wazirs of Lucknow. In 1857 it became a centre of mutiny. On the 3rd of June 1857 the 17th Regiment of Native Infantry mutinied at Azamgarh, murdered some of their officers, and carried off the government treasure to Fyzabad. The district became a centre of the fighting between the Gurkhas and the rebels, and was not finally cleared until October 1858 by Colonel Kelly.

AZAN (Arabic for ” announcement “), the call or summons to public prayers proclaimed by the Muezzin (crier) from the mosque twice daily in all Mahommedan countries. In small mosques the Muezzin at Azan stands at the door or at the side of the building; in large ones he takes up his position in the minaret. The call translated runs: “God is most great!” (four times), “I testify there is no God but God!” (twice), ” I testify that Mahomet is the apostle of God!” (twice), ” Come to prayer!” (twice), “Come to salvation!” (twice), “God is most great!” (twice), “There is no God but God!” To the morning Azan are added the words, ” Prayer is better than sleep! ” (twice). The devout Moslem has to make a set response to each phrase of the Muezzin. At first these are mere repetitions of Azan, but to the cry “Come to prayer!” the listener must answer, ” I have no

power nor strength but from God the most High and Great." To that of " Come to salvation! " the formal response is, " What God willeth will be: what He willeth not will not be." The recital of the Azan must be listened to with the utmost reverence. The passers in the streets must stand still, all those at work must cease from their labours, and those in bed must sit up.

The Muezzin, who is a paid servant of the mosque, must stand with his face towards Mecca and with the points of his forefingers in his ears while reciting Azan. He is specially chosen for good character, and Azan must not be recited by any one unclean, by a drunkard, by the insane, or by a woman. The summons to prayers was at first simply " Come to prayer!" Mahomet, anxious to invest the call with the dignity of a ceremony, took counsel of his followers. Some suggested the Jewish trumpet, others the Christian bell, but according to legend the matter was finally settled by a dream: — " While the matter was under discussion, Abdallah, a Khazrajite, dreamed that he met a man clad in green raiment, carrying a bell. Abdallah sought to buy it, saying that it would do well for bringing together the assembly

of the faithful. ' I will show thee a better way,' replied the stranger; ' let a crier cry aloud " God is most great, &c." ' On awaking, Abdallah went to Mahomet and told him his dream," and Azan was thereupon instituted.

AZARA, DON JOSE NICHOLAS DE (1731-1804), Spanish diplomatist, was born in 1731 at Barbunales, Aragon, and was appointed in 1765 Spanish agent and procurator-general, and in 1785 ambassador at Rome. During his long residence there he distinguished himself as a collector of Italian antiquities and as a patron of art. He was also an able and active diplomatist, took a leading share in the difficult and hazardous task of the expulsion of the Jesuits from Spain, and was instrumental in securing the election of Pius VI. He withdrew to Florence when the French took possession of Rome in 1798, but acted on behalf of the pope during his exile and after his death at Valence in 1799. He was afterwards Spanish ambassador in Paris. In that post it was his misfortune to be forced by his government to conduct the negotiations which led to the treaty of San Ilde- fonso, by which Spain was wholly subjected to Napoleon. Azara was friendly to a French alliance, but his experience showed him that his country was being sacrificed to Napoleon. The First Consul liked him personally, and found him easy to influence. Azara died, worn

out, in Paris in 1804. His end was undoubtedly embittered by his discovery of the ills which the French alliance must produce for Spain.

Several sympathetic notices of Azara will be found in Thiers, Consulat et Empire. See also Reinado de Carlos IV, by Gen. J. Gomez de Arteche, in the Historia General de Espana, published by the R. Acad, de la Historia, Madrid, 1892, &c. There is a Notice historique sur le Chevalier a" Azara by Bourgoing (1804).

His younger brother, Don Felix de Azara (1746-1811), spent twenty years in South America as a commissioner for delimiting the boundary between the Spanish and Portuguese territories. He made many observations on the natural history of the country, which, together with an account of the discovery and history of Paraguay and Rio de la Plata, were incorporated in his principal work, Voyage dans I'Amerique miridionale depuis ij&i jusqu'en 1801, published at Paris in 1809 in French from his MS. by C. A. Walckenaer.

AZARIAH, the name of several persons mentioned in the Old Testament. (1) One of Solomon's " princes," son of Zadok the priest (1 Kings iv. 2), was one of several Azariahs among the descendants of Levi (1 Chron. vi. 9, 10, 13, 36; 2 Chron. xxvi. 17). (2) The son of Nathan, a high official under King Solomon (1 Kings iv. 5). (3) King of Judah, son of Amaziah by his wife Jecholiah (2 Kings xv. 1, 2), also called Uzziah (2 Chron. xxvi. 1).

(4) Son of Ethan and great-grandson of Judah (1 Chron. ii. 8).

(5) Son of Jehu, of the posterity of Judah (1 Chron. ii. 38). (6) A prophet in the reign of Asa, king of Judah (2 Chron. xv. 1).

(7) Two sons of Jehoshaphat, king of Judah (2 Chron. xxi. 2).

(8) King of Judah, also called Ahaziah and Jehoahaz, son of Jehoram (2 Chron. xxi. 17; xxii. 1, 6). (9) The son of Jeroham, and (10) the son of Obed, were made " captains of hundreds " by Jehoiada the priest (2 Chron. xxiii. 1). (n) Son of Hilkiah and grandfather of Ezra the Scribe (Ezra vii. 1; Neh. vii. 7, viii. 7, x. 2). (12) Son of Maaseiah, one of those who under the commission of Artaxerxes restored the wall of Jerusalem (Neh. iii. 2 3)- (J 3) Son of Hoshaiah, an opponent of the prophet Jeremiah (Jer. xliii. 2). (14) One of the companions in captivity of the prophet Daniel, called Abednego by Nebuchadrezzar, by whom with two

companions he was cast into a ” burning fiery furnace ” for refusing to worship the golden image set up by that monarch (Dan. i. 6, iii. 8-30).

AZAY-LE-RIDEAU, a town of western France, in the depart- ment of Indre-et-Loire, on the Indre, 16 m. S.W. of Tours by rail. Pop. (1906) 1453. The town has a fine Renaissance chateau, well restored in modern times, with good collections of furniture and pictures.

AZEGLIO, MASSIMO TAPARELLI, Marquis d’ (1798-1866), Italian statesman and author, was born at Turin in October 1 798, descended from an ancient and noble Piedmontese family. His father, Cesare d’Azeglio, was an officer in the Piedmontese army and held a high position at court; on the return of Pope

Pius VII. to Rome after the fall of Napoleon, Cesare d’Azeglio was sent as special envoy to the Vatican, and he took his son, then sixteen years of age, with him as an extra attache. Young Massimo was given a commission in a cavalry regiment, which he soon relinquished on account of his health. During his residence in Rome he had acquired a love for art and music, and he now determined to become a painter, to the horror of his family, who belonged to the stiff and narrow Piedmontese aristocracy. ‘ His father reluctantly consented, and Massimo settled in Rome, devoting himself to art. He led an abstemious life, maintaining himself by his painting for several years. But he was constantly meditating on the political state of Italy. In 1830 he returned to Turin, and after his father’s death in 1831 removed to Milan. There he remained for twelve years, moving in the literary and artistic circles of the city. He became the intimate of Alessandro Manzoni the novelist, whose daughter he married; thenceforth literature became his chief occupation instead of art, and he produced two historical novels, Niccold dei Lapi and Ettore Fieramosca, in imitation of Manzoni, and with pronounced political tendencies, his object being to point out the evils of foreign domination in Italy and to reawaken national feeling. In 1845 he visited Romagna as an unauthorized political envoy, to report on its conditions and the troubles which he foresaw would break out on the death of Pope Gregory XVI. The following year he published his famous pamphlet Degli ultimi

cast di Romagna at Florence, in consequence of which he was expelled from Tuscany. He spent the next few months in Rome, sharing the general enthusiasm over the supposed liberalism of the new pope, Pius IX. ; like V. Gioberti and Balbo he believed in an Italian confederation under papal auspices, and was opposed to the Radical wing of the Liberal party. His political activity increased, and he wrote various other pamphlets, among which was I lulti di Lombardia (1848).

On the outbreak of the first war of independence, d'Azeglio donned the papal uniform and took part under General Durando in the defence of Vicenza, where he was severely wounded. He retired to Florence to recover, but as he opposed the democrats who ruled in Tuscany, he was expelled from that country for the second time. He was now a famous man, and early in 1849 Charles Albert, king of Sardinia, invited him to form a cabinet. But realizing how impossible it was to renew the campaign, and " not having the heart to sign, in such wretched internal and external conditions, a treaty of peace with Austria " (Correspondance politique, by E. Rendu), he refused. After the defeat of Novara(23rd of March 1849), Charles Albert abdicated and was succeeded by Victor Emmanuel II. D'Azeglio was again called on to form a cabinet, and this time, although the situation was even more difficult, he accepted, concluded a treaty of peace, dissolved the Chamber, and summoned a new one to ratify it. The treaty was accepted, and d'Azeglio continued in office for the next three years. While all the rest of Italy was a prey to despotism, in Piedmont the king maintained the constitution intact in the face of the general wave of reaction. D'Azeglio conducted the affairs of the country with tact and ability, improving its diplomatic relations, and opposing the claims of the Roman Curia. He invited Count Cavour, then a rising young politician, to enter the ministry in 1850. Cavour and Farini, also a member of the cabinet, made certain declarations in the Chamber (May 1852) which led the ministry in the direction of an alliance with Rattazzi and the Left. Of this d'Azeglio disapproved, and therefore resigned office, but on the king's request he formed a new ministry, excluding both Cavour and Farini. In October, however, owing to ill-health and dissatisfaction with some of his colleagues, as well as for other reasons not quite clear, he resigned once more and retired into private life, suggesting Cavour to the king as his successor.

For the next four years he lived modestly at Turin, devoting himself once more to art, although he also continued to take an

active interest in politics, Cavour always consulting him on matters of moment. In 1855 ne was appointed director of the Turin art gallery. In 1859 he was given various political missions, including one to Paris and London to prepare the basis for a

general congress of the powers on the Italian question. When war between Piedmont and Austria appeared inevitable he re- turned to Italy, and was sent as royal commissioner by Cavour to Romagna, whence the papal troops had been expelled. After the peace of Villafranca, d'Azeglio was recalled with orders to withdraw the Piedmontese garrisons; but he saw the danger of allowing the papal troops to reoccupy the province, and after a severe inner struggle left Bologna without the troops, and interviewed the king. The latter approved of his action, and said that his orders had not been accurately expressed; thus Romagna was saved. That same year he published a pamphlet in French entitled De la Politique et du droit chrilien au point de vue de la question italienne, with the object of inducing Napoleon III. to continue his pro-Italian policy. Early in i860 Cavour appointed him governor of Milan, evacuated by the Austrians after the battle of Magenta, a position which he held with great ability. But, disapproving of the government's policy with regard to Garibaldi's Sicilian expedition and the occupation by Piedmont of the kingdom of Naples as inoppor- tune, he resigned office.

The death of his two brothers in 1862 arid of Cavour in 1861 caused Massimo great grief, and he subsequently led a com- paratively retired life. But he took part in politics, both as a deputy and a writer, his two chief subjects of interest being the Roman question and the relations of Piedmont (now the kingdom of Italy) with Mazzini and the other revolutionists. In his opinion Italy must be unified by means of the Franco- Piedmohtese army alone, all connexion with the conspirators being eschewed, while the pope should enjoy nominal sovereignty over Rome, with full spiritual independence, the capital of Italy being established elsewhere, but the Romans being Italian citizens (see his letters to E. Rendu and his pamphlet Le questioni urgenti). He strongly disapproved of the convention of 1864 between the Italian government and the pope. The last few years of d' Azeglio's life were spent chiefly at his villa of Cannero, where he set to work to write his own memoirs. He died of fever on the 15th of January 1866.

Massimo d'Azeglio was a very attractive personality, as well as an absolutely honest patriot, and a characteristic example of the

best type of Piedmontese aristocrat. He was cautious and conservative; in his general ideas on the liberation of Italy he was wrong, and to some extent he was an amateur in politics, but of his sincerity there is no doubt. As an author his political writings are trenchant and clear, but his novels are somewhat heavy and old-fashioned, and are interesting only if one reads the political allusions between the lines.

Besides a variety of newspaper articles and pamphlets, d'Azeglio's chief works are the two novels Ettore Fieramosca(i8ˆ)a.nd Niccold dei £0ˆ1(1841), and a volume of autobiographical memoirs entitled I Miei Ricordi, a most charming work published after his death, in 1866, but unfortunately incomplete. See in addition to the Ricordi, L. Carpi's II Risorgimento Italiano,vo. i. pp. 288 sq . and the Souvenirs historiques of Constance d'Azeglio, Massimo's niece (Turin, 1884). (L. V.*)

AZERBAIJAN (also spelt Adeebijan; the Azerbadegan of medieval writers, the A thropatakan and A tropatene of the ancients) , the north-western and most important province of Persia. lit is separated from Russian territory on the N. by the river Aras (Araxes), while it has the Caspian Sea, Gilan and Khamseh (Zenjan) on the E., Kurdistan on the S., and Asiatic Turkey on the W. Its area is estimated at 32,000 sq. m.; its population at 1 § to 2 millions, comprising various races, as Persians proper, Turks, Kurds, Syrians, Armenians, &c. The country is superior in fertility to most provinces of Persia, and consists of a regular succession of undulating eminences, partially cultivated and opening into extensive plains. Near the centre of the province the mountains of Sahand rise in an accumulated mass to the height cf 1 2 ,000 ft. above the sea. The highest mountain of the province is in its eastern part, Mount Savelan, with an elevation of 15,792 ft., and the Talish Mountains, which run from north to south, parallel to and at no great distance from the Caspian, have an altitude of 9000 ft. The principal rivers are the Aras and Kizil Uzain, both receiving numerous tributaries and flowing into the Caspian, and the Jaghatu, Tatava, Murdi, Aji and others, which

drain into the Urmia lake. The country to the west of the lake, with the districts of Selmas and Urmia, is the most prosperous

part of Azerbaijan, yet even here the intelligent traveller laments the want of enterprise among the inhabitants. Azerbaijan is one of the most productive provinces of Persia. The orchards and gardens in which many villages are embosomed yield delicious fruits of almost every description, and great quantities, dried, are exported, principally to Russia. Provisions are cheap and abundant, but there is a lack of forests and timber trees. Lead, copper, sulphur, orpiment, also lignite, have been found within the confines of the province; also a kind of beautiful, variegated, translucent marble, which takes a high polish, is used in the construction of .palatial buildings, tanks, baths, &c, and is known as Maragha, or'Tabriz marble. The climate is healthy, not hot in summer, and cold in winter. The cold sometimes is severely felt by the poor classes owing to want of proper fuel, for which a great part of the population has no substitute except dried cow- dung. Snow lies oh the mountains for about eight months in the year, and water is everywhere abundant. The best soils when abundantly irrigated yield from 50- to 60-fold, and the water for this purpose is supplied by the innumerable streams which intersect the province. The natives of Azerbaijan make excellent soldiers, and about a third of the Persian army is composed of them. The province is divided into a number of administra- tive sub-provinces or districts, each with a hakim, governor or sub-governor, under the governor-general, who under the Kajar dynasty has always been the heir-apparent to the throne of Persia, assisted by a responsible minister appointed by the shah. The administrative divisions are as follows: — Tabriz and environs; Uskuh; Deh-Kharegan; Maragha; Miandoab; Satijbulagh; Sulduz; Urmia; Selmas; Khoi; Maku; Gerger; Merend; Karadagh; Arvanek; Talish; Ardebil; Mishkin; Khalkhal; Hashtrud; Garmrud; Afshar; Sain Kaleh; Ujan; Sarab. The revenue amounts to about £200,000 per annum in cash and kind, and nearly all of it is expended in the province for the maintenance of the court of the heir-apparent, the salaries and pay to government officials, troops, pensions, &c. (A.H.-S.)

AZIMUTH (from the Arabic), in astronomy, the angular distance from the north or south point of the horizon to the foot of the vertical circle through a heavenly body. In the case of a horizontal line the azimuth is its deviation from the north or south direction.

AZO (c. 1150-1230), Italian jurist. This Azo, whose name is sometimes written Azzo and Azzolenus, and who is occasionally described as Azo Soldanus, from the surname of his father, is to

be distinguished from two other famous Italians of the same name, viz. Azo Lambertaccius, a canonist of the 13th century, professor of canon law at the university of Bologna, author of Quesliones in jus canonicum, and Azo de Ramenghis, a canonist of the 14th century, also a professor of canon law at Bologna, and author of Repetitiones super libro Decretorum. Few particulars are known as to the life of Azo, further than that he was born at Bologna about the middle of the 12th century, and was a pupil of Joannes Bassianus, and afterwards became professor of civil law in the university of his native town. He also took an active part in municipal life, Bologna, with the other Lombard republics, having gained its municipal independence. Azo occupied a very important position amongst the glossators, and his Readings on the Code, which were collected by his pupil, Alessandro de Santo Aegidio, and completed by the additions of Hugolinus and Odofredus, form a methodical exposition of Roman law, and were of such weight before the tribunals that it used to be said, ” Chi non ha Azzo, non vada a palazzo.” Azo gained a great reputation as a professor, and numbered amongst his pupils Accursius and Jacobus Balduinus. He died about 1 230.

AZO COMPOUNDS, organic substances of the type RN:NR’ (where R = an aryl radical and R’ = a substituted alkyl, or aryl radical). They may be prepared by the reduction of nitro compounds in alkaline solution (using zinc dust and alkali, or a solution of an alkaline stannite as a reducing agent) ; by oxida- tion of hydrazo compounds; or by the coupling of a diazotized amine and any compound of a phenolic or aminic type, provided

that there is a free para position in the amine or phenol. They may also be obtained by the molecular rearrangement of the diazoamines, when these are warmed with the parent base and its hydrochloride. This latter method of formation has been studied by H. Goldschmidt and R. U. Reinders (Ber., 1896, 29, p. 1369), who found that the reaction is monomolecular, and that the velocity constant of the reaction is proportional to the amount of the hydrochloride of the base present and also to the temperature, but is independent of the concentration of the diazoamine. The azo compounds are intensely coloured, but are not capable of being used as dyestuffs unless they contain salt-forming, acid or basic groups (see Dyeing). By oxidizing agents they are converted into azoxy compounds, and by reducing agents into hydrazo compounds or amines.

Azo-benzene, CeHjNiNQHs, discovered by E. Mitscherlich in

1834, may be prepared by reducing nitrobenzene in alcoholic solution with zinc dust and caustic soda; by the condensation of nitrosobenzene with aniline in hot glacial acetic acid solution; or by the oxidation of aniline with sodium hypobromite. It crystallizes from alcohol in orange red plates which melt at 68° C. and boil at 293 C. It does not react with acids or alkalis, but on reduction with zinc dust in acetic acid solution yields aniline.

Amino-azo Compounds may be prepared as shown above. They are usually yellowish brown or red in colour, the presence of more amino groups leading to browner shades, whilst the introduction of alkylated amino groups gives redder shades. They usually crystallize well and are readily reduced. When heated with aniline and aniline hydrochloride they yield indu- lines (p. 670) that the velocity of formation of the amino-azo compound depends only on the nature of the reagents and not on the concentration, and that in coupling the hydrochloride of a tertiary amine with diazobenzene sulphonic acid the reaction takes place between the acid and the base set free by the hydrolytic dissociation of its salt, for the formation of the amino-azo compound, when carried out in the presence of different acids, takes place most rapidly with the weakest acid (H. Goldschmidt and F. Buss, Ber., 1897, 30, p. 2075).

Methyl orange (helianthin, gold orange, Mandarin orange), (CH3)2N-C6H4-N2-C 6 H4S03Na, is the sodium salt of para-dimethylaminobenzene-azo-benzene sulphonic acid. It is an orange crystalline powder which is soluble in water, forming a yellow solution. The free acid is intensely red in colour. Methyl orange is used largely as an indicator. The constitution of methyl orange follows from the fact that on reduction by stannous chloride in hydrochloric acid solution it yields sulphanilic acid and para-aminodimethyl aniline.

Oxyazo Compounds. — The oxyazo compounds are prepared by adding a solution of a diazonium salt to a cold slightly alkaline solution of a phenol. The diazo group takes up the para position

with regard to the hydroxyl group, and if this be prevented it then goes into the ortho position. It never goes directly into the meta position.

The constitution of the oxyazo compounds has attracted much attention, some chemists holding that they are true azbphenols of the type R-N 2 -RrOH, while others look upon them as having a quinonoid structure, i.e. as being quinone hydrazones, type R-NH-N:Ri:0. The first to attack the purely chemical side were Th. Zincke (Ber., 1883,16, p. 2929; 1884, 17, p. 3026; 1887,

20, p. 3171) and R. Meldola (Jour. Ckem. Sac, 1889. 55, pp. 114, 603). Th. Zincke found that the products obtained by coupling a diazonium salt with a-naphthol, and by condensing phenyl-hydrazine with G-naphthoquinone, were identical; whilst Meldola acetylated the azophenols, and split the acetyl pro- ducts by reduction in acid solution, but obtained no satisfactory results. K. Auwers (Zeit. f. phys. Chem., 1896, 21, p. 355; Ber., 1900, 33, p. i302)examined the questionfromthe physico-chemical standpoint by ‘ determining the freezing-point depressions, the result being that the para-oxyazo compounds give abnormal depressions and the ortho-oxyazo compounds give normal depressions; Auwers then concluded that the para compounds are phenolic and the ortho compounds are quinone hydrazones or act as such. A. Hantzsch (Ber., 1899, 32, pp. 590, 3089) con- siders that the oxyazo compounds are to be classed as pseudo- acids, possessing in the free condition the configuration of quinone hydrazones, their salts, however, being of the normal phenolic type. J. T. Hewitt (Jour. Chem. Soc., 1900, 77, pp. 99 et seq.) nitrated para-oxyazobenzene with dilute nitric acid and found that it gave a benzene-azo-ortho-nitrophenol, whereas quinones are not attacked by dilute nitric acid. Hewitt has also attacked the problem by brominating the oxyazobenzenes, and has shown that when the hydrobromic acid produced in the reaction is allowed to remain in the system, a brombenzene-azo-phenol is formed, whilst if it be removed (by the addition of sodium acetate) bromination takes place in the phenolic nucleus; con- sequently the presence of the mineral acid gives the azo compound a pseudo-quinonoid character, which it does not possess if the mineral fecid be removed from the sphere of the reaction.

Para-oxyazobenzene (benzene-azo-phenol), C6H5N: N®-C6H4-OH(4), is prepared by coupling diazotized aniline with phenol in alkaline solution. It is an orange-red crystalline compound whichmeltsat 154° C. Ortho-oxyazobenzene, C6H f ,N:N(i)CoHs’ OH(2), was obtained in small quantity by E. Bamberger (Ber., 1900, t,, p. 3189) simultaneously with the para com- pound, from which it may be separated by distillation in a current of steam, the ortho compound passing over with

the steam. It crystallizes in orange-red needles which melt at 82-5-83° C. On reduction with zinc dust in dilute sal- ammoniac solution, it yields ortho-aminophenol and aniline. Meta-oxyazobenzene, C 6 H 5 N: N(i)C 6 H 4 -OH(3), was obtained in 1*903 by P. Jacobson (Ber., 1903, 36, p 4093) by condensing ortho-anisidine with diazo benzene, the resulting compound being then diazotized and reduced by alcohol to benzene-azo- meta-anisole, from which meta-oxyazobenzene was obtained by hydrolysis with aluminium chloride. It melts at n 2-1 14° C. and is easily reduced to the corresponding hydrazo compound.

Diazo- Amines. — The diazo-amines, R-N : N-NHRi, are ob- tained by the action of primary amines on diazonium salts; by the action of nitrous acid on a free primary amine, an iso- diazohydroxide being formed as an intermediate product which then condenses with the amine; and by the action of nitros- amines on primary amines. They are crystalline solids, usually of a yellow colour, which do not unite with acids; they are readily converted into amino-azo compounds (see above) and are decomposed by the concentrated halogen acids, yielding haloid benzenes, nitrogen and an amine. Acid anhydrides replace the imino-hydrogen atom by acidyl radicals, and boiling with water converts them into phenols. They combine with phenyl iso- cyanate to form urea derivatives (H. Goldschmidt, Ber., 1888,

21, p. 2578), and on reduction with zinc dust (preferably in alco- holic acetic acid solution) they yield usually a hydrazine and an amine. Diazoamino benzene, C 6 H 5 N : N-NHC 6 H 5 , was first

obtained by P. Griess (Ann., 1862, 121, p. 258). It crystallizes in yellow laminae,which melt at 96° C. and explode at slightly higher temperatures. It is readily soluble in alcohol,, ether and benzene. Diazoimino benzene, QH5N3, is also known. It may be pre- pared by the action of ammonia on diazobenzene perbromide; by the action of hydroxylamine on a diazonium sulphate (K. Heumann and L. Oeconomides, Ber., 1887, 20, p. 372); and by the action of phenylhydrazine on a diazonium sulphate. It is a yellow oil which boils at 59° C. (12 mm.), and possesses a stupefying odour. ■• It explodes when heated. Hydrochloric acid converts it into chloraniline, nitrogen being eliminated; whilst boiling sulphuric acid converts it into aminophenol.

Azoxy Compounds, R-NO-N-R'-, are usually yellow or red crystalline solids which result from the reduction of nitro or nitroso compounds by heating them with alcoholic potash (preferably using methyl alcohol). They may also be obtained by

the oxidation of azo compounds. When reduced (in acid solution) they yield amines; distillation with reduced iron gives azo compounds, and warming with ammonium sulphide gives hydrazo compounds. Concentrated sulphuric acid converts azoxybenzene into oxyazobenzene (O. Wallach, Ber., 1880, 13, p. 525). Azoxybenzene, (C 6 H 6 N) 2 0, crystallizes from alcohol in yellow needles, which melt at 36° C. On distillation, it yields aniline and azobenzene. Azoxybenzene is also found among the electro-reduction products of nitrobenzene, when the reduc- tion is carried out in alcoholic-alkaline solution.

The mixed azo compounds are those in which the azo group •N: N- is united with an aromatic radical on the one hand, and with a radical of the aliphatic series on the other. The most easily obtained mixed azo compounds are those formed by the union of a diazonium salt with the potassium or sodium salt of a nitroparaffin (V. Meyer, Ber., 1876, 9, p. 384):

C 6 H 6 N 2 -N0 3 + CHrCH(NC 2)K = KN0 3 -|-C6H5N2-CH(N0 2)CH 3 .

Benzene-azo-nitro-ethane. Those not containing a nitro group may be prepared by the oxidation of the corresponding mixed hydrazo compounds with mercuric oxide. E. Bamberger (Ber., 1898, 31, p. 455) has shown that the nitro-alkyl derivatives behave as though they possess the constitution of hydrazones, for on. heating with dilute alkalies they split more or less readily into an alkaline nitrite and an acid hydrazide : C 6 H 5 NH-N : C(N0 2)CH 3 +NaOH=NaN0 2 +C 6 H 6 NH-NH-CO-CH s .

Benzene-azo-methane, C 6 H 5 -N 2 -CH3, is a yellow oil which boils at 1 50° C. and is readily volatile in steam. Benzene-azo-ethane, C 6 H5'N 2 -C 2 H 6 , is a yellow oil which boils at about 180° C. with more or less decomposition. On standing with 60 % sulphuric acid for some time, it is converted into the isomeric acetaldehyde-phenylhydrazone,C 6 H 5 NH-N: CH-CH 3 (Ber., 1896,

29, P- 794)-

The diazo cyanides, C 6 H 6 N 2 -CN, and carboxytic acids, C 6 H 5 – N 2 -COOH, may also be considered as mixed azo derivatives. Diazobenzenecyanide, QH 5 N 2 -CN, is an unstable oil, formed when potassium cyanide is added to a solution of a diazonium salt. Phenyl-azo-carboxylic acid, C 6 H 5 -N 2 COOH, is obtained

in the form of its potassium salt when phenylsemicarbazide is oxidized with potassium permanganate in alkaline solution (J. Thiele, Ber., 1895, 28, p. 2600). It crystallizes in orange-red needles and is decomposed by water. The corresponding amide, phenyl-azo-carbonamide, C H 5 N 2 -CONH 2 , also results from the oxidation of phenylsemicarbazide (Thiele, loc. eit.), and forms reddish-yellow needles which melt at 114° C. When heated with benzaldehyde to 120° C. it yields diphenyloxytriazole, (C 6 H 5) 2 CN 3 C(QH).

AZOIMIDE, or Hydrazoic Acid, N 3 H, a compound of nitrogen and hydrogen, first isolated in 1890 by Th. Curtius (Berichte, 1890, 23, p. 3023). It is the hydrogen compound corresponding to P. Greiss' diazoimino benzene, C6H5N3, which is prepared by the addition of ammonia to diazobenzene perbromide.

Curtius found that benzoyl glycollic acid gavebenzoyl hydrazine with hydrazine hydrate: C 6 H c OCO-CH 2 COOH + 2N 2 H4-H 2 = H 2 0 + C 6 H s CONH-NH 2 f

NHrNHCHrCOOH.

(Ethyl benzoate may be employed instead of benzoyl glycollic acid for this reaction.) This compound gave a nitroso compound with nitrous acid, which changed spontaneously into benzoyl-azoimide by loss of water:

CHsCO NH NH 2 + HONO = H 2 0 + C £ H 6 CO N(NO)NH 2 . GHsCO-NCNO-NH^^O + CeHsCONs. The resulting benzoylazoimide is easily hydrolysed by boiling with alcoholic solutions of caustic alkalis, a benzoate of the alkali metal and an alkali salt of the new acid being obtained; the latter is precipitated in crystalline condition on standing.

An improved method of preparation was found in the use of hippuric acid, which reacts with hydrazine hydrate to form hippuryl hydrazine, C 6 H 6 CONH-CH 2 CONH-MH 2 , and thissub- stance is converted by nitrous acid into diazo-hippuramide, C 6 H 6 CONH-CH 2 -CONH-N 2 OH, which is hydrolysed by the action of caustic alkalis with the production of salts of hydrazoic acid. To obtain the free acid it is best to dissolve the diazo hippuramide in dilute soda, warm the solution

to ensure the formation of the sodium salt, and distil the resulting liquid with dilute sulphuric acid. The pure acid may be obtained by fractional distillation as a colourless liquid of very unpleasant smell, boiling at 30° C, and extremely explosive. It is soluble in water, and the solution dissolves many metals (zinc, iron, &c.) with liberation of hydrogen and formation of salts (azoimides, azides or hydrazoates). All the salts are explosive and readily interact with the alkyl iodides. In its properties it shows some analogy to the halogen acids, since it forms difficultly soluble lead, silver and mercurous salts. The metallic salts all crystallize in the anhydrous condition and decompose on heating, leaving a residue of the pure metal. The acid is a " weak " acid, being ionized only to a very slight extent in dilute aqueous solution.

E. Noelting and E. Grandmougin (Berichte, 1891, 24, p. 2546) obtained azoimide from dinitraniline, C 6 H 3 (N0 2) 2 -NH 2 , by diazotization and conversion of the diazo compound into the perbromide, (N0 2) 2 C6H3-N 2 Br 3 . This compound is then decom posed by ammonia, dinitrophenylhydrazoate being formed, which on hydrolysis with alcoholic potash gives potassium hydrazoate (azide) and dinitrophenol. The solution is then acidified and distilled, when azoimide passes over. Somewhat later, they found that it could be prepared from diazobenzene imide, provided a nitro group were present in the ortho or para position to the diazo group. The para-nitro compound is dropped slowly into a cold solution of one part of caustic potash in ten parts of absolute alcohol; the solution becomes dark red in colour and is then warmed for two days on the water bath. After the greater portion of the alcohol has distilled off, the solution is acidified with sulphuric acid and the azoimide distilled over. The yield obtained is only about 40% of that required by theory, on account of secondary reactions taking place. Qrtho- nitro-diazobenzene imide only yields 30%.

W. Wislicenus (Berichte, 1892, 25, p. 2084) has prepared the sodium salt by passing nitrous oxide over sodamide at high temperatures. The acid can also be obtained by the action of nitrous acid on hydrazine sulphate; by the oxidation of hydrazine by hydrogen peroxide and sulphuric acid (A. W. Browne, /. Amer. Chem. Soc, 1905, 25, p. 251), or by ammonium metavanadate (A. W. Browne and F. F. Shetterly, Abst. J.C.S., 1907, ii. p. 863).

Ammonium azoimide, N 3 -NH 4 , may be prepared by boiling diazohippuramide with alcoholic ammonia, until no more

ammonia escapes, the following reaction taking place: C 6 H 5 CO-NHCH 2 CONH-N 2 -OH + 2NH 3 = N 3 -NH4 + H 2 +

C 6 H 6 CONH-CH 2 CONH 2 . The liquid is then allowed to stand for twelve hours, and the clear alcoholic solution is decanted from the precipitated hip puramide. To the alcoholic solution, four times its volume of ether is added, when the ammonium salt is precipitated. It is then filtered, washed with ether, and air-dried. The salt is readily soluble in water, and is only feebly alkaline. It is ex- tremely explosive. Hydrazine azoimide, N5H5, is also known.

Chloroazoimide, Cl-N 3 , the chloride corresponding to azoimide,

was obtained by F. Raschig (Ber., 1908, 41, p. 4194) as a highly explosive colourless gas on acidifying a mixture of sodium azide and hypochlorite with acetic or boric acid.

AZORES (Azores), or Western Islands, an archipelago in the Atlantic Ocean,: belonging to the kingdom of Portugal. Pop. (1900) 2s6,29i.;,area, 922 sq. m. The Azores extend in an oblique line from N.W. to S.E., between 36 55′ and 39 55′ N., and between 25° and 31° 16′ W. They are divided into three widely, severed groups, rising from a depth of more than 25 m. The south-eastern, group consists of St Michael's (Sao. Miguel) and St Mary (Santa Maria), with Formigas; the central, of

20° Loug.W.of ˆ"Greenwich 2 >°

Fayal (Faial), Pico, St George (Sao Jorge) , Terceira and Graciosa; the north-western, of Flores and Corvo.

The nearest continental land is Cape da Roca on the Portuguese coast, which lies 830 m. E. of St Michael's; while Cape Cantin, the nearest point on the African mainland, is more than 900 m. distant, and Cape Race in Newfoundland, the nearest American headland, is more than 1000 m. Thus the Azores are the farthest from any continent of all the island groups in the Atlantic; but they are usually regarded as belonging to Europe,: as their climate and flora are European in character. ;

Physical Description.-ˆ-The aspect of all the islands is very similar in general characteristics, presenting an elevated and

undulating outline, with little or no tableland, and rising into peaks, of which the lowest, that of Corvo, is 350 ft., and the highest that of Pico, 7612 ft. above sea-level. The lines of sea-coast are, with few exceptions, high and precipitous, with bases of accumulated masses of fallen rock, in which open bays, or scarcely more enclosed inlets, form the harbours of the trading towns. The volcanic character of the whole archipelago is obvious, and has been abundantly confirmed by the numerous earthquakes and eruptions which have taken place since its discovery. Basalt and scoria are the chief erupted materials. Hitherto Flores, Corvo and Graciosa have been quite exempt, and Fayal has only suffered from one eruption (1672). The centre of activity has for the most part been St Michael's, while the neighbouring island of St Mary has altogether escaped. In 1444-1445 there was a great eruption at St Michael's, of which, however, the accounts that have been preserved exaggerate the importance. In 1522 the town of Villa Franca, at that time the capital of the island, was buried, with all its 6000 inhabitants, during a violent convulsion. In 1572 an eruption took place in Pico; in 1580 St George was the scene of numerous outbursts; and in 1614 a little town in Terceira was destroyed. In 1630, 1652, 1656, 1755, 1852, &c, St Michael's was visited with successive eruptions and earthquakes, several of them of great violence. On various occasions, as in 1638, 1720, 1811 and 1867, subterranean eruptions have taken place, which have sometimes been accompanied by the appearance of temporary islands. Of these the most remarkable was thrown up in June 181 1, about half a league from the western extremity of St Michael's. It was called Sabrina by the commander of the British man-of-war of that name, who witnessed the phenomenon.

Climate. — The climate is particularly temperate, but the extremes of sensible heat and cold are increased by the humidity. The range of the thermometer is from 45 Fahr., the lowest known extreme, or 48 , the ordinary lowest extreme of January, to 82 , the ordinary, or 86°, the highest known extreme of July, near the level of the sea. Between these two points (both taken in the shade) there is from month to month a pretty regular grada- tion of increase or decrease, amounting to somewhat less than four degrees. In winter the prevailing winds are from the north- west, west and south; in summer the most frequent are the north, north-east and east. The weather is often extremely stormy, and the winds from the west and south-west render the navigation of

the coasts very dangerous.

Fauna. — The mammalia of the Azores are limited to the rabbit, weasel, ferret, rat (brown and black), mouse and bat, in addition to domestic animals. The game includes the woodcock, red partridge (introduced in the 16th century), quail and snipe. Owing to the damage inflicted on the crops by the multitude of blackbirds, bullfinches, chaffinches and green canaries, a reward was formerly paid for the destruction of birds in St Michael's, and it is said that over 400,000 were destroyed in several succes- sive years between 1875 and 1885. There are valuable fisheries of tunny, mullet and bonito. The porpoise, dolphin and whale are also common. Whale-fishing is a profitable industry, with its headquarters at Fayal, whence the sperm-oil is exported. Eels are found in the rivers. The only indigenous reptile is the lizard. Fresh-water molluscs are unknown, and near the coast the marine fauna is not rich; but terrestrial molluscs abound, several species being peculiar to the Azores.

Flora. — The general character of the flora is decidedly European, no fewer than 400 out of the 478 species generally considered as indigenous belonging likewise to that continent, while only four are found in America, and forty are peculiar to the archipelago. Vegetation in most of the islands is remarkably rich, especially in grasses, mosses, and ferns, heath, juniper, and a variety of shrubs. Of tall-growing trees there was, till the 19th century, an almost total lack; but the Bordeaux pine, European poplar, African palm-tree, Australian eucalyptus, chestnut, tulip-tree, elm, oak, and many others, were then successfully introduced. The orange, apricot, banana, lemon, citron, Japanese medlar, and pomegranate are the common fruits, and various other varieties are more or less cultivated. |

At one time much attention was given to the growing of sugar-cane, but it has now for the most part been abandoned. The culture of indigo, introduced in the 16th century, also belongs to the past. A kind of fern (Dicksonia culcita) , called by the natives cabellinho, furnishes a silky material for the stuffing of mat-tresses and is exported to Brazil and Portugal.

Population.- — The inhabitants of the islands are mostly of Portuguese origin, with a well-marked strain of Moorish and Flemish blood. There is a high birth-rate and a low average of infant mortality. A large proportion of the poorer classes, especially among the older men and women, are totally illiterate,

but education tends to spread more rapidly than in Portugal itself, owing to the custom of sending children to the United States, where they are taught in the state schools. Negroes, mulattoes, English, Scottish and Irish immigrants are present in considerable numbers, especially in Fayal and St Michael's. The total number of resident foreigners in 1900 was 1490.

Government. — The Azores are subdivided into three administrative districts named after their chief towns, i.e. Ponta Delgada, the capital of St Michael's; Angra, or Angra do Heroismo, the capital of Terceira; and Horta, the capital of Fayal. St Michael's and St Mary are included in the district of Ponta Delgada; Terceira, St George and Graciosa, in that of Angra; Pico, Fayal, Flores and Corvo, in that of Horta. Four members are returned by Ponta Delgada to the parliament in Lisbon, while each of the other districts returns two members. Roman Catholicism is the creed of the majority, and Angra is an episcopal see. For purposes of military administration the islands form two commands, with their respective headquarters at Angra and Ponta Delgada. Besides the frequent and regular services of mails which connect the Azores with Portugal and other countries, there is a cable from Lisbon to Villa Franca do Campo, in St Michael's, and thence to Pico, Fayal, St George and Graciosa. Fayal is connected with Waterville, in Ireland, by a cable laid in 1901. At Angra and Ponta Delgada there are meteorological stations. The principal seaports are Angra (pop. 1900, 10,788), Ponta Delgada (17,620), and Horta (6574). Trade. — The trade of the Azores, long a Portuguese monopoly, is now to a great extent shared by the United Kingdom and Germany, and is chiefly carried in British vessels. Textiles are imported from Portugal; coal from Great Britain; sugar from Germany, Madeira and the United States; stationery, hardware, chemicals, paints, oils, &c, from the United Kingdom and Germany. The exports consist chiefly of fruit, wine, natural mineral waters and provisions. The trade in pineapples is especially important. No fewer than 940,000 pineapples were exported in 1902 and 1903, going in almost equal quantities to London and Hamburg. The fruit is raised under glass. Pottery, cotton fabrics, spirits, straw hats and tea are produced in the district of Ponta Delgada; linen and woollen goods, cheese, butter, soap, bricks and tiles, in that of Angra; baskets, mats, and various ornamental articles made from straw, osier, and the pith of dried fig-wood, in that of Horta.

The largest and most populous of the Azores is St Michael's, which has an area of 297 sq. m., and in 1900 had 12 1,340

inhabit- ants. Graciosa (pop. 8385; area, 17 sq. m.) and St George (16,177; 40 sq. m.) form part of the central group. Graciosa is noteworthy for the beauty of its scenery. Its chief towns are Santa Cruz de Graciosa (2185) and Guadalupe (2717). The chief towns of St George are Ribeira Seca (2817) and Velas (2009).

History.— It does not appear that the ancient Greeks and Romans had any knowledge of the Azores, but from the number of Carthaginian coins discovered in Corvo it has been supposed that the islands must have been visited by that adventurous people. The Arabian geographers, Edrisi in the 12th century, and Ibn-al-Wardi in the 14th, describe, after the Canaries, nine other islands in the Western Ocean, which are in all probability the Azores. This identification is supported by various con- siderations. The number of islands is the same ; the climate under which they are placed by the Arabians makes them north of the Canaries; and special mention is made of the hawks or buzzards, which were sufficiently numerous at a later period to

give rise to the present name (Port. A f or, a hawk) . The Arabian writers represent them as having been populous, and as having contained cities of some magnitude; but they state that the inhabitants had been greatly reduced by intestine warfare. The Azores are first found distinctly marked in a map of 1351, the southern group being named the Goat Islands (Cabreras); the middle group, the Wind or Dove Islands (De Ventura sive de Columbis); and the western, the Brazil Island (De Brail)— the word Brazil at that time being employed for any red dye-stuff. In a Catalan map of the year 1375 Corvo is found as Corvi Marini, and Flores as Li Conigi; while St George is already designated San Zorze. It has been conjectured that the discoverers were Genoese, but of this there is not sufficient evidence. It is plain; however, that the so-called Flemish discovery by van der Berg is only worthy of the name in a very secondary sense. According to the usual account,

For a general account of the islands, see The Azores, by W. F. Walker (London, 1886), and Madeira and the Canary Islands, with the Azores, -by A. S. Brown (London, 1901). On the fauna and flora of the islands, the following books by H. Drouet are useful: — Elements de la faune acoreenne (Paris, 1861);

Mollusques marins des ties Azores (1858), Letlres acoreennes (1862), and Catalogue de la flore des ties Acores, prScede de Vitineraire d'une voyage dans cet archipel (1866). The progress of Azorian commerce is best shown in the British and American consular reports. For history, see La Conquista de las Azores en 1583, by C. Fernandez Duro (Madrid, 1886), and Histoire de la decouverte des ties Azores et de Vorigine de lew dSnomination d'iles flamandes, by J. Mees (Ghent, 1901).

AZOTH, the name given by the alchemists to mercury, and by Paracelsus to his universal remedy.

AZOTUS, the name given by Greek and Roman writers to Ashdod, an ancient city of Palestine, now represented by a few remains in the little village of % Esdud, in the governmental district of Acre. It was situated about 3 m. inland from the Mediterranean, on the famous military route between Syria and Egypt, about equidistant (18 m.) from Joppa and Gaza. As one of the five chief cities of the Philistines and the seat of the worship of Dagon (1 Sam. v.; cf. 1 Mace. x. 83), it maintained, down even to the days of the Maccabees, a vigorous though

somewhat intermittent independence against the power of the Israelites, by whom it was nominally assigned to the territory of Judah. In 711 B.C. it was captured by the Assyrians (Is. xx. 1), but soon regained its power, and was strong enough in the next century to resist the assaults of Psammetichus, king of Egypt, for twenty-nine years (Herod, ii. 157). Restored by the Roman Gabinius from the ruins to which it had been reduced by the Jewish wars (1 Mace. v. 68, x. 77, xvi. 10), it was presented" by Augustus to Salome, the sister of Herod. The only New Testament reference is in Acts viii. 40. Ashdod became the seat of a bishop early in the Christian era, but seems never to have attained any importance as a town. The Mount Azotus of 1 Mace. ix. 15, where Judas Maccabeus fell, is possibly the rising ground on which the village stands. A fine Saracenic khan is the principal relic of antiquity at 'Esdud.

AZOV, or Asov (in Turkish, Asak), a town of Russia, in the government of the Don Cossacks, on the left bank of the southern arm of the Don, about 20 m. from its mouth. The ancient Tanais lay some 10 m. to the north. In the 13th century the Genoese had a factory here which they called Tana. Azov was long a place of great military and commercial importance. Peter the Great obtained possession of it after a protracted siege in 1696, but in

1711 restored it to the Turks; in 1739 it was finally united to the Russian empire. Since then it has greatly declined, owing to the silting up of its harbour and the competition of Taganrog. Its population, principally engaged in the fisheries, numbered 25,124 in 1900.

AZOV, SEA OF, an inland sea of southern Europe, communicating with the Black Sea by the Strait of Yenikale, or Kerch, the ancient Bosporus Cimmerius. To the Romans it was known as the Palus Maeotis, from the name of the neighbouring people, who called it in their native language Temarenda, or Mother of Waters. It was long supposed to possess direct communication with the Northern Ocean. In prehistoric times a connexion with the Caspian Sea existed; but since the earliest historical times no great change has taken place in regard to the character or relations of the Sea of Azov. It lies between 45° 20′ and 47 18′ N. lat:, and between 35° and 39 E. long., its length from south- west to north-east being 230 m., and its greatest breadth no. The area runs to 14,515 sq. m. It generally freezes from November to the middle of April. The Don is its largest and, indeed, its only very important affluent. Near the mouth of that river the depth Of the sea varies from 3 to 10 ft., and the greatest depth does not exceed 45 ft. Of recent years, too, the level has been constantly dropping, for the surface lies 4! ft. higher than the surface of the Black Sea. Fierce and continuous winds from the east prevail during July and August, and in the latter part of the year those from the north-east and south-east are not unusual; a great variety of currents is thus produced. The water is for the most part comparatively fresh, but differs considerably in this respect according to locality and current. Fish are so abundant that the Turks describe it as Baluk-deniz, or Fish Sea. To the west, separated from the main basin by the long narrow sand-spit of Arabat, lie the remarkable lagoons and marshes known as the Sivash, or Putrid Sea; here the water is intensely salt. The Sea of Azov is of great importance to Russian commerce; along its shores st-and the cities of Taganrog, Berdyansk, Mariupol and Yenikale.

AZOXIMES (furo [a.b.] diazoles), a class of organic compounds

which contain the ring system n CH – They may be prepared by converting nitriles into amidoximes by the action of hydroxylamine, the amidoximes so formed being then acylated by acid chlorides or anhydrides. From these acyl derivatives the elements of water are removed, either by simple heating or by boiling their aqueous solution; this elimination is accom- panied by the formation of the azoxime ring. Thus

NH2OH ,„ ˆ u boil with

C 6 H 6 CN- »C 6 H 5 -C

\ y*tiz propionic anhydride [c 6 H 6 CC6H6 . G /N.Ox c . C2H6 _

Azoximes can also be produced from a-benzil dioxime by the ” Beckmann ” change. Most of the azoximes are very volatile’ substances, sublime readily, and are easily soluble in water, alcohol and benzene.

For detailed descriptions, see F. Tieraann (Ber., 1885, 18, p. 1059), O. Schulz {Ber., 1885, 18, pp. 1084, 2459), and G. Miiller {Ber., 1886, 19, p. 1492) ; also Annual Reports of the Chemical Society).

AZTECS (from the Nahuatl word azilan, ” place of the Heron/’ or ” Heron ” people), the native name of one of the tribes that occupied the tableland of Mexico on the arrival of the Spaniards in America. It has been very frequently employed as equivalent to the collective national title of Nahuatlecas or Mexicans. The Aztecs came, according to native tradition, from a country to which they gave the name of Aztlan, usually supposed to lie towards the north-west, but the satisfactory localization of it is one of the greatest difficulties in Mexican history. The date of the exodus from Aztlan is equally un- determined, being fixed by various authorities in the nth and by others in the 12 th century. One Mexican manuscript gives a date equivalent to a.d. 1164. They gradually increased their influence among other tribes, until, by union with the Toltecs, who occupied the tableland before them, they extended their empire to an area of from

18,000 to 20,00c square leagues. The researches of Humboldt gave the first clear insight into the early periods of their history. See Mexico; Nahuatlan Stock.

AZUAGA, a town of western Spain, in the province of Badajoz, on the Belmez-Fuente del Arco railway. Pop. (1900) 14,192. Azuaga is the central market for the live-stock of the broad up- land pastures watered by the Matachel, a left-hand tributary of the Guadiana, and by the Bembezar, a right-hand tributary of the Guadalquivir. Coarse woollen goods and pottery are manufactured in the town.

AZUAY (sometimes written Assuay), a province of Ecuador, bounded N. by the province of Cafiar, E. by Oriente, S. by Loja, and W. by El Oro. It was formerly called Cuenca, and formed part of the department of Azuay, which also included the province of Loja. Azuay is an elevated mountainous district with a great variety of climates and products; among the latter are silver, quicksilver, wheat, Indian corn, barley, cattle, wool, cinchona and straw hats. The capital is Cuenca.

AZUNI, DOMENICO ALBERTO (1749-1827), Italian jurist, was born at Sassar, in Sardinia, in 1749. He studied law at Sassari and Turin, and in 1782 was made judge of the consulate at Nice. In 1 786-1 788 he published his Dizionario Universale Ragionato delta Giurisprudenza Mercantile. In 1795 appeared his systematic work on the maritime law of Europe, Sistema Universale del Principii del Diritto Maritimo dell' Europa, which he afterwards recast and translated into French. In 1806 he was appointed one of the French commission engaged in. drawing up a general code of commercial law, and in the following year he proceeded to Genoa as president of the court of appeal. After the fall of Napoleon in 1814, Azuni lived for a time in retirement at Genoa, till he was invited to Sardinia by Victor Emmanuel I., and appointed judge of the consulate at Cagliari, and director of the university library. He died at Cagliari in 1827. Azuni also wrote numerous pamphlets and minor works, chiefly on maritime law, an important treatise on the origin and progress of maritime law (Paris, 1810), and an historical, geographical and political account of Sardinia (1799, enlarged 1802).

AZURARA, GOMES EANNES DE (?-i474>, the second notable Portuguese chronicler in order of date. He adopted the career of letters in middle life. He probably entered the royal library as assistant to Fernao Lopes (q.v.) during the reign of King Duarte

(1433-1438), and he had sole charge of it in 1452. His Chronicle of the Siege and Capture of Ceuta, a supplement to the Chronicle of King John I., by Lopes, dates from 1450, and three years later he completed the first draft of the Chronicle of the Discovery and Conquest of Guinea, our authority for the early Portuguese voyages of discovery down the African coast and in the ocean, more especially for those undertaken under the auspices of Prince Henry the Navigator. It contains some account of the life work of that prince, and has a biographical as well as a geographical interest. On the 6th of June 1454 Azurara

became chief keeper of the archives and royal chronicler in succession to Fernao Lopes. In 1456 King Alphonso V. commissioned him to write the history of Ceuta, " the land-gate of the East," under the governorship of D. Pedro de Menezes, from its capture in 1415 until 1437, and he had it ready in 1463. A year afterwards the king charged him with a history of the deeds of D. Duarte de Menezes, captain of Alcacer, and, proceeding to Africa, he spent a twelvemonth in the town collecting materials and studying the scenes of the events he was to describe, and in 1468 he completed the chronicle. Alphonso corresponded with Azurara on terms of affectionate intimacy, and no less than three commendas of the order of Christ rewarded his literary services. He has little of the picturesque ingenuousness of Lopes, and loved to display his erudition by quotations and philosophical reflections, showing that he wrote under the influence of the first Renaissance. Nearly all the leading classical, early Christian and medieval writers figure in his pages, and he was acquainted with the notable chronicles and romances of Europe and had studied the best Italian and Spanish authors. In addition, he had mastered the geographical system of the ancients and their astrology. As an historian he is laborious, accurate and conscientious, though his position did not allow him to tell the whole truth about his hero, Prince Henry.

His works include: (1) Chronica del Rei D. Joam I. Terceira parte em que se content a tomada de Ceuta (Lisbon, 1644) ; (2) Chronica do Descobrimento e Conquista de Guine (Paris, 1841; Eng. version in 2 vols, issued by the Hakluyt Society, London, 1896-1899); (3) Chronica do Conde D. Pedro {de Menezes), printed in the Ineditos de Historia Portugueza, vol. ii. (Lisbon, 1792) ; (4) Chronica do Conde D. Duarte de Menezes, printed in the Ineditos, vol. iii. (Lisbon, 1793). The preface to the English version of the Chronicle of Guinea contains a full account of the life and writings of Azurara and cites all the authorities. (E. Pr.)

AZURE (derived, through the Romance languages, from the Arabic al-lazward, for the precious stone lapis lazuli, the initial / having dropped), the lapis lazuli; and so its colour, blue.

AZURITE, or Chessylite, a mineral which is a basic copper carbonate, 2CuC0 3 – Cu(OH) 2 . In its vivid blue colour it contrasts strikingly with the emerald-green malachite, also a basic copper carbonate, but containing rather more water and less carbon dioxide. It was known to Pliny under the name caeruleum, and the modern name azurite (given by F. S. Beudant in 1824) also has reference to the azure-blue colour; the name chessylite, also in common use, is of later date (1852), and is from the locality, Chessy near Lyons, which has supplied the best crystallized specimens of the mineral. Crystals of azurite belong to the monoclinic system; they have a vitreous lustre and are trans- lucent. The streak is blue, but lighter than the colour of the mineral in mass. Hardness 35-4; sp. gr. 3-8.

Azurite occurs with malachite in the upper portions of deposits of copper ore, and owes its origin to the alteration of the sulphide or of native copper by water containing carbon dioxide and oxygen. It is thus a common mineral in all copper mines, and sometimes occurs in large masses, as in Arizona and in South Australia, where it has been worked as an ore of copper, of which element it contains 55%. Being less hydrated than malachite it is itself liable to alteration into this mineral, and pseudomorphs of malachite after azurite are not uncommon. Occasionally the massive material is cut and polished for decora- tive purposes, though the application in this direction is far less extensive than that of malachite. (L. J. S.)

AZYMITES (Gr. &-, without; fujuˆ, leaven), a name given by the Orthodox Eastern to the Western or Latin Church, because of the latter's use of unleavened bread in the Eucharist, a practice which arose in the 9th century and is also observed by Armenians and Maronites following the Jewish passover custom. The Orthodox, Church strenuously maintains its point, arguing that the very name bread, the holiness of the mystery, and the example of Jesus and the early church alike, testify against the use of unleavened bread in this connexion.

B— BAADER

BThis letter corresponds to the second symbol in the Phoenician alphabet, and appears in the same position in all the European alphabets, except those derived, like the Russian, from medieval Greek, in which the pronun- ciation of this symbol had changed from b to v. A new form had therefore to be invented for the genuine b in Slavonic, to which there was, at the period when the alphabet was adopted, no cor- responding sound in Greek. The new symbol, which occupies the second position, was made by removing the upper loop of B, thus producing a symbol somewhat resembling an ordinary lower- case b. The old B retained the numerical value of the Greek as 2, and no numerical value was given to the new symbol. In the Phoenician alphabet the earliest forms are ˆ ˆ or more rounded 9′ The rounded form appears also in the earliest Aramaic (see Alphabet). Like some other alphabetic symbols it was not borrowed by Greek in its original form. In the very early rock inscriptions of Thera (700-600 B.C.), written from right to left; it appears in a form resembling the ordinary Greek X; this form apparently arose from writing the Semitic symbol upside down. Its form in inscriptions of Melos, Selinus, Syracuse and elsewhere in the 6th and 5th centuries suggests the influence of Aramaic forms in which the head of the letter is opened, */. The Corinthian J”IJj U1 and Z, (also at Corcyra) and the P J~ of Byzantine coins are other adaptations of the same symbol. The form C which it takes in the alphabets of Naxos, Delos and other Ionic islands at the same period is difficult to explain. Otherwise its only variation is between pointed and rounded loops (U and B). The sound which the symbol represents is the voiced stop made by closing the lips and vibrating the vocal chords (see Phonetics). It differs from p by the presence of vibration of the vocal chords and from m because the nasal passage as well as the lips is closed. When an audible emission of breath attends its production the aspirate bh is formed. This sound was frequent in the pro-ethnic period of the Indo-European languages and survived into the Indo- Aryan languages. Accord- ing to the system of phonetic changes generally known as ” Grimm’s law,” an original b appears in English as p, an original bh as b. An original medial p preceding the chief accent of the word also appears as 6 in English and the other members of the same group. It is not certain that any English word is descended from an original word beginning with b, though it has been suggested that peg is of the same origin as the Latin baculum and the Greek @aKTpov. When the lips are not tightly closed the sound produced is not a stop, but a spirant like the English 111. In Late Latin there was a tendency to this spirant

pro- nunciation which appears as early as the beginning of the 2nd century A.D.; by the 3rd century b and consonantal u are in- extricably confused. When this consonantal u (English w as seen in words borrowed very early from Latin like wall and wine) passed into the sound of English v (labio-dental) is not certain, but Germanic words borrowed into Latin in the 5th century a.d. have in their Latin representation gu- for Germanic w-, guisa- corresponding to English wise and reborrowed indirectly as guise. The earliest form of the name of the symbol which we can reach is the Hebrew beth, to which the Phoenician must have been closely akin, as is shown by the Greek fiijra, which is borrowed from it with a vowel affixed. (P. Gi.)

BAADER, FRANZ XAVER VON (1765-1841), German philosopher and theologian, born on the 27th of March 1765 at Munich, was the third son of F. P. Baader, court physician to the elector of Bavaria. His brothers were both distinguished — the elder, Clemens, as an author; the second, Joseph (1763-1835), as an engineer. Franz studied medicine at Ingolstadt and Vienna, and for a short time assisted his father in his practice. This life he soon found uncongenial, and decided on becoming a mining engineer. He studied under Abraham Gottlob Werner at Freiberg, travelled through several of the mining districts in north Germany, and for four years, 1 792-1 796, resided in

England. There he became acquainted with the works of Jakob Boehme, and with the ideas of Hume, Hartley and Godwin, which were extremely distasteful to him. The mystical specula- tions of Meister Eckhart, Saint Martin, and above all those of Boehme, were more in harmony with his mode of thought. In 1796 he returned from England, and in Hamburg became acquainted with F. H. Jacobi, with whom he was for years on terms of friendship. He new learned something of Schelling, and the works he published during this period were manifestly influenced by that philosopher. Yet Baader is no disciple of Schelling, and probably gave out more than he received. Their friendship continued till about the year 1822, when Baader's denunciation of modern philosophy in his letter to the emperor Alexander I. of Russia entirely alienated Schelling.

All this time Baader continued to apply himself to his pro- fession of engineer. He gained a prize of 12,000 gulden (about £1000) for his new method of employing Glauber's salts instead of potash in the making of glass. From 1817 to 1820 he held the post of superintendent of mines, and was raised to the rank of nobility

for his services. He retired in 1820, and soon after published one of the best of his works, Fermenla Cognilionis, 6 parts, 1822-1825, in which he combats modern philosophy and recommends the study of Boehme. In 1826, when the new university was opened at Munich, he was appointed professor of philosophy and speculative theology. Some of the lectures delivered there he published under the title, Speculative Dogmatik, 4 parts, 1827-1836. In 1838 he opposed the interference in civil matters of the Roman Catholic Church, to which he belonged, and in consequence was, during the last three years of his life, interdicted from lecturing on the philosophy of religion. He died on the 23rd of May 1841.

It is difficult to summarize Baader's philosophy, for he himselt generally gave expression to his deepest thoughts in obscure aphorisms, or mystical symbols and analogies (see Ed. Zeller's Ges. d. deut. Phil. 732, 736). Further, he has no systematic works; his doctrines exist for the most part in short detached essays, in comments on the writings of Boehme and Saint Martin, or in his extensive correspondence and journals. At the same time there are salient points which mark the outline of his thought. Baader starts from the position that human reason by itself can never reach the end it aims at, and maintains that we cannot throw aside the presuppositions of faith, church and tradition. His point of view may be described as Scholasticism; for, like the scholastic doctors, he believes that theology and philosophy are not opposed sciences, but that reason has to make clear the truths given by authority and revelation. But in his attempt to draw still closer the realms of faith and knowledge he approaches more nearly to the mysticism of Eckhart, Paracelsus and Boehme. Our existence depends on the fact that we are cognized by God {cogitor ergo cogito et sum). All self-consciousness is at the same time God-consciousness ; our know* ledge is never mere scientia, it is invariably con-scientia — a knowing with, consciousness of, or participation in God. Baader's philosophy is thus essentially a theosophy. God is not to be conceived as mere abstract Being (substantia), but as everlasting process, activity (actus). Of this process, this self-generation of God, we may dis- tinguish two aspects — the immanent or esoteric, and the emanent or exoteric. God has reality only in so far as He is absolute spirit, and only in so far as the primitive will is conscious of itself can it become spirit at all. But in this very cognition of self is involved the distinction of knower and known, from which proceeds the power to become spirit. This

immanent process of self-consciousness, wherein indeed a trinity of persons is not given but only rendered possible, is mirrored in, and takes place through, the eternal and impersonal idea or wisdom of God, which exists beside, though not distinct from, the primitive will. Concrete reality or personality is given to this divine Ternar, as Baader calls it, through nature, the principle of self-hood, of individual being, which is eternally and necessarily produced by God. Only in nature is the trinity of persons attained. These processes, it must be noticed, are not to be conceived as successive, or as taking place in time; they are to be looked at sub specie aeternitatis, as the necessary elements or moments in the self-evolution of the divine Being. Nor is nature to be confounded with created substance, or with matter as it exists in space and time ; it is pure non-being, the mere otherness (alter itas) of God — his shadow, desire, want, or desiderium sui, as it is called by mystical writers. Creation, itself a free and non-temporal act of God's love and will, cannot be speculatively deduced, but must be accepted as an historic

fact. Created beings were originally of three orders — the intelligent or angels; the non-intelligent natural existences; and man, who mediated between these two orders. Intelligent beings are endowed with freedom; it is possible, but not necessary, that they should fall. Hence the fact of the fall is not a speculative but an historic truth. The angels fell through pride — through desire to raise them- selves to equality with God; man fell by lowering himself to the level of nature. Only after the fall of man begins the creation of space, time and matter, or of the world as we now know it ; and the motive of this creation was the desire to afford man an opportunity for taking advantage of the scheme of redemption, for bringing forth in purity the image of God according to which he has been fashioned. The physical philosophy and anthropology which Baader, in con- nexion with this, unfolds in various works, is but little instructive, and coincides in the main with the utterances of Boehme. In nature and in man he finds traces of the dire effects of sin, which has corrupted both and has destroyed their natural harmony. As regards ethics, Baader rejects the Kantian or any autonomic system of morals. Not obedience to a moral law, but realization in ourselves of the divine life is the true ethical end. But man has lost the power to effect this by himself; he has alienated himself

from God, and therefore no ethical theory which neglects the facts of sin and re- demption is satisfactory or even possible. The history of man and of humanity is the history of the redeeming love of God. The means whereby we put ourselves so in relation with Christ as to receive from Him his healing virtue are chiefly prayer and the sacraments of the church; mere works are never sufficient. Man in his social relations is under two great institutions. One is temporal, natural and limited — the state; the other is eternal, cosmopolitan and universal — the church. In the state two things are requisite : first, common submission to the ruler, which can be secured or given only when the state is Christian, for God alone is the true ruler of men; and, secondly, inequality of rank, without which there can be no organization. A despotism of mere power and liberalism, which naturally produces socialism, are equally objectionable. The ideal state is a civil community ruled by a universal or Catholic church, the principles of which are equally distinct from mere passive pietism, or faith which will know nothing, and from the Protestant doctrine, which is the very radicalism of reason.

Baader is, without doubt, among the greatest speculative theo- logians of modern Catholicism, and his influence has extended itself even beyond the precincts of his own church. Among those whom he influenced were R. Rothe, Julius Muller and Hans L. Markensen.

His works were collected and published by a number of his adherents — F. Hoffman, J. Hamberger, E. v. Schaden, Lutterbeck, von Osten-Sacken and Schliiter — Baader' s sammtliche Werke (16 vols., 1851-1860). Valuable introductions by the editors are pre- fixed to the several volumes. Vol. xv. contains a full biography; vol. xvi. an index, and an able sketch of the whole system by Lutterbeck. See F. Hoffmann, Vorhalle zur spekulativen Lehre Baader's (1836) ; Grundziige der Societdts-Philosophie Franz Baader "s (1837) ; Philosophische Schriften (3 vols., 1868-1872) ; Die Weltalter (1868); Biographie und Briefwechsel (Leipzig, 1887); J. Hamberger, Cardinalpunkte der Baaderschen Philosophic (1855) ; Fundamental- begriffe von F. B.'s Ethik, Politik, u. Religions-Philosophic (1858); J. A. B. Lutterbeck, Philosophische Standpunkte Baaders (1854); Baader s Lehre vom Weltgebdude (1866). The most satisfactory surveys are those given by Erdmann, Versuch einer Gesch. d. neuern Phil. iii. 2, pp. 583-636; J. Claassen, Franz von Baaders Leben und theosophische Werke (Stuttgart, 1886-1887), and Franz von Baaders Gedanken iiber Stoat und Gesellschaft (Gtitersloh, 1890)

; Otto Pfleiderer, Philosophy of Religion (vol. ii., Eng. trans. 1887) ; R. Falckenberg, History of Philosophy, pp. 472-475 (trans. A. C. Arm- strong, New York, 1893) ; Reichel, Die Sozietdtsphilosophie Franz v. Baaders (Tubingen, 1901); Kuno Fischer, Zur hundertjdhrigen Geburtstagfeier Baaders (Erlangen, 1865).

BAAL, a Semitic word, which primarily signifies lord, owner or inhabitant, 1 and then, in accordance with the Semitic way of looking at family and religious relations, is specially appropriated to express the relation of a husband to his wife and of the deity to his worshipper. In the latter usage it indicated not that the god was the lord of the worshipper, but rather the possessor of, or ruler in, some place or district. In the Old Testament it is regularly written with the article, i.e. " the Baal "; and the baals of different tribes or sanctuaries were not necessarily conceived as identical, so that we find frequent mention of Baalim, or rather " the Baalim " in the plural. That the Israelites even applied the title of Baal to Yahweh himself is proved by the occurrence of such names as Jerubbaal (Gideon), Eshbaal (one of Saul's sons) and Beeliada (a son of David, 1 Chron. xiv. 7). The last name appears in 2 Sam. v. 16 as Eliada, showing that El

1 Cf. its use as a noun of relation, e.g. a ba'al of hair, " a hairy man " (2 Kings i. 8), b. of wings, " a winged creature," and in the plural, b. of arrows, " archers " (Gen. xlix. 23), b. of oath, " conspirators " (Neh. vi. 18).

(God) was regarded as equivalent to Baal; cf. also the name Be'aliah, " Yahweh is baal or lord," which survives in 1 Chron. xii. 5. However, when the name Baal was exclusively appropriated to idolatrous worship (cf. Hos. ii. 16 seq.), abhorrence for the unholy word was marked by writing bdsheth (shameful thing) for baal in compound proper names, and thus we get the usual forms Ishbosheth, Mephibosheth.

The great difficulty which has been felt by investigators in determining the character and attributes of the god Baal mainly arises from the original appellative sense of the word, and many obscure points become clear if we remember that when a title becomes a proper name it may be appropriated by different peoples to quite distinct deities. Baal being originally a title, and not a proper name, the innumerable baals could be distinguished by the addition of the name of a place or of some special

attribute. 2 Accordingly, the baals are not to be regarded necessarily as local variations of one and the same god, like the many Virgins or Madonnas of Catholic lands, but as distinct numina. Each community could speak of its own baal, although a collection of allied communities might share the same cult, and naturally, since the attributes ascribed to the individual baals were very similar, subsequent syncretism was facilitated.

The Baal, as the head of each worshipping group, is the source of all the gifts of nature (cf. Hos. ii. 8 seq., Ezek. xvi. 19); as the god of fertility all the produce of the soil is his, and his adherents bring to him their tribute of first-fruits. He is the patron of all growth and fertility, and, by the " uncontrolled use of analogy characteristic of early thought," the Baal is the god of the productive element in its widest sense. Originating probably, in the observation of the fertilizing effect of rains and streams upon the receptive and reproductive soil, baalism becomes identical with the grossest nature-worship. Joined with the baals there are naturally found corresponding female figures known as Ashtaroth, embodiments of Ashtoreth (see Astarte; Ishtar). In accordance with primitive notions of analogy, 3 which assume that it is possible to control or aid the powers of nature by the practice of " sympathetic magic " (see Magic), the cult of the baals and Ashtaroth was characterized by gross sensuality and licentiousness. The fragmentary allusions to the cult of Baal Peor (Num. xxv., Hos. ix. 10, Ps. cvi. 28 seq.) exemplify the typical species of Dionysiac orgies that prevailed. 4 On the summits of hills and mountains flourished the cult of the givers of increase, and "under every green tree" was practised the licentiousness which in primitive thought was held to secure abundance of crops (see Frazer, Golden Bough, 2nd ed. vol. ii. pp. 204 sqq.). Human sacrifice (Jer. xix. 5), the burning of incense (Jer. vii. 9), violent and ecstatic exercises, ceremonial acts of bowing and kissing, the preparing of sacred mystic cakes, appear among the offences denounced by the Israelite prophets, and show that the cult of Baal (and Astarte) included the character- istic features of heathen worship which recur in various parts of the Semitic world, although attached to other names. 6

By an easy transition the local gods of the streams and springs which fertilized the increase of the fields became identified with

2 Compounds with geographical terms (towns, mountains), e.g. Baal of Tyre, of Lebanon, &c, are frequent; see G. B. Gray, Heb. Proper Names, pp. 124-126. Baal-berith or El-berith of Shechem

(Judg. ix. 4, 46) is usually interpreted to be the Baal or God of the covenant, but whether of covenants in general or of a particular covenant concluded at Shechem is disputed. The BaX/ tapicws (near Beirut) apparently presided over dancing; another compound (in Cyprus) seems to represent a Baal of healing. On the ” Baal of flies ” see Beelzebub.

3 The general analogy shows itself further in the idea of the deity as the husband (ba’al) of his worshippers or of the land in which they dwell. The Astarte of Gabal (Byblus) was regularly known as the ba’alath (fern, of baal), her real name not being pronounced (perhaps out of reverence).

4 See further Clermont-Ganneau, Pal. Explor. Fund Quart. Stat., 1901, pp. 239, 369 sqq.’; Biichler, Rev. d’ etudes juives, 1901, pp. 125 seq.

6 The extent to which elements of heathen cult entered into purer types of religion is illustrated in the worship of Yahweh. The sacred cakes of Astarte and old holy wells associated with hei cult were later even transferred to the worship of the Virgin (Ency. Bib. col. 3993; Rouvier, in Bull. ArchSol., 1900, p. 170).

the common source of all streams, and proceeding along this line it was possible for the numerous baals to be regarded eventually as mere forms of one absolute deity. Consequently, the Baal could be identified with some supreme power of nature, e.g. the heavens, the sun, the weather or some planet. The particular line of development would vary in different places, but the change from an association of the Baal with earthly objects to heavenly is characteristic of a higher type of belief and appears to be relatively later. The idea which has long prevailed that Baal was properly a sky-god affords no explanation of the local character of the many baals; on the other hand, on the theory of a higher development where the gods become heavenly or astral beings, the fact that ruder conceptions of nature were still retained (often in the unofficial but more popular forms of cult) is more intelligible.

A specific Baal of the heavens appears to have been known among the Hittites in the time of Rameses II., and considerably

later, at the beginning of the 7th century, it was the title of one of the gods of Phoenicia. In Babylonia, from a very early period, Baal became a definite individual deity, and was identified with the planet Jupiter. This development is a mark of superior culture and may have been spread through Babylonian influence. Both Baal and Astarte were venerated in Egypt at Thebes and Memphis in the XlXth Dynasty, and the former, through the influence of the Aramaeans who borrowed the Babylonian spelling Bel, ultimately became known as the Greek Belos who was identified with Zeus.

Of the worship of the Tyrian Baal, who is also called Melkart (king of the city), and is often identified with the Greek Heracles, but sometimes with the Olympian Zeus, we have many accounts in ancient writers, from Herodotus downwards. He had a magnificent temple in insular Tyre, founded by Hiram, to which gifts streamed from all countries, especially at the great feasts. The solar character of this deity appears especially in the annual feast of his awakening shortly after the winter solstice (Joseph. C. Apion. i. 18). At Tyre, as among the Hebrews, Baal had his symbolical pillars, one of gold and one of smaragdus, which, transported by phantasy to the farthest west, ate still familiar to us as the Pillars of Hercules. The worship of the Tyrian Baal was carried to all the Phoenician colonies. 1 His name occurs as an element in Cartha- ginian proper names (Hannibal, Hasdrubal, &c,), and a tablet found at Marseilles still survives to inform us of the charges made by the priests of the temple of Baal for qffering sacrifices.

The history of Baalism among the Hebrews is obscured by the difficulty of determining whether the false worship which the prophets stigmatize is the heathen worship of Yahweh under a conception, and often with rites, which treated him as a local nature god; or whether Baalism was consciously recognized to be distinct from Yahwism from the first. Later religious practice was undoubtedly opposed to that of earlier times, and attempts were made to correct narratives containing views which had come to be regarded as contrary to the true worship of Yahweh. The Old Testament depicts the history of the people a? a series of acts of apostasy alternating with subsequent penitence and return to Yahweh, and the question whether this gives effect to actual conditions depends upon the precise character of the elements of Yahweh worship brought by the Israelites into Palestine. This is still under dispute. There is strong evidence at all events that many of the conceptions are contrary to historical fact, and the

points of similarity between native Canaanite cult and Israelite worship are so striking that only the persistent traditions of Israel's origin and of the work of Moses compel the conclusion that the germs of specific Yahweh worship existed from his day. The earliest certain reaction against Baalism is ascribed to the reign of Ahab, whose marriage with Jezebel gave the impulse to the introduction of a particular form of the cult. In honour of his wife's god, the king, following the example of Solomon, erected a temple to the Tyrian Baal (seeabove). This, however, did not prevent him from remaining & follower of Yahweh, whose prophets he still consulted, and

1 The sanctuary of Heracles at Daphne near Antioch was properly that of the Semitic Baal, and at Amathus Jupiter Hospes takes the place of Heracles or Malika, in which the Tyrian Melkart is to be recognized (W. R. Smith, Rel. Sent. 2nd ed. pp. 178, 376). See further Phoenicia.

whose protection he still cherished when he named his sons Ahaziah and Jehoram (" Yah [weh] holds," " Y. is high "). The antagonism of Elijah was not against Baalism in general; but against the introduction of a rival deity. But by the time of Hosea (ii. 16 seq.) a further advance was marked, and the use of the term " Baal " was felt to be dangerous to true religion. Thus there gradually grew up a tendency to avoid the term, and in accordance with the idea of Ex. xxiii. 13, it was replaced by the contemptuous bosheth, " shame " (see above). However, the books of Deuteronomy and Jeremiah (cf. also Zeph. i. 4) afford complete testimony for the prevalence of Baalism as late as the exile, but prove that the clearest distinction was then drawn between the pure worship of Yahweh the god of Israel and the inveterate and debased cults of the gods of the land. (See further Hebrew Religion; Prophet.) '•■ Bibliography. — W. Robertson Smith, Relig. Semites, 2nd ed. pp. 93-1 13 (against his theory of the introduction of Baal among the Arabs see M. J. Lagrange, Etudes d. relig. sem. pp. 83-98). For the reading "Baal " in the Amarna tablets (Palestine, about 1400 B.C.) see Knudtzon, Beitr. 2. Assyriol. (1901), pp. 320 seq., 415; other cunei- form evidence in E. Schrader's Keilinsch. u. Alte Test. 3rd ed. p. 357 (by H. Zimmern; see also his Index, sub voce). On Baal-Shamem (B. of the heavens) M. Lidzbarski's monograph (Ephemeris, i. 243- 260, ii. 120) is invaluable, and this work, with his Handbuck d. nord-semit. Epigraphik, contains full account of the epigraphical material. See Baethgen, Beitr. 2. semit. Religionsgesch. pp. 17-32; also the articles on Baal by E. Meyer in Roscher's Lexikon, and G.

F. Moore in Ency. Bib. (On Beltane fires and other apparent points of con- nexion with Baal it may suffice to refer to Aug. Fick, Vergleich. Wbtterbuch, who derives the element bel from an old Celtic root meaning shining, &c.) (W. R. S. ; S. A. C.)

BAALBEK (anc. Heliopolis) , a town of the Buka'a (Coelesyria) , altitude 3850 ft., situated E. of the Litani and near the parting between its waters and those of the Asi. Pop. about 5000, including 2000 Metawali and 1000 Christians (Maronite and Orthodox). Since 1902 Baalbek has been connected by railway with Rayak (Rejak) on the Beirut-Damascus line, and since 1907 with Aleppo. It is" famous for its temple ruins of the Roman period, before which we have no record of it, certain though it be that Heliopolis is a translation of an earlier native name, in which Baal was an element. It has been suggested, but without good reason, that this name was the Baalgad of Josh. xi. 17.

Heliopolis was made a colonia probably by Octavian (coins of 1st century A.D.), and there must have been a Baal temple there in which Trajan consulted the oracle. The foundation of the present buildings, however, dates from Antoninus Pius, and their dedication from Septimius Severus, whose coins first show the two temples. The great courts of approach were not finished before the reigns of Caracalla and Philip. In commemoration, no doubt, of the dedication of the new sanctuaries, Severus conferred the jus Italicum on the city. The greater of the two temples was sacred to Jupiter (Baal), identified with the Sun, with whom were associated Venus and Mercury as ovfiPwuoi. 0eot. The lesser temple was built in honour of Bacchus (not the Sun, as formerly believed). Jupiter-Baal was represented locally as a beardless god in long scaly drapery, holding a whip in his right hand and lightning and ears of corn in his left. Two bulls supported him. In this guise he passed into European worship in the 3rd and 4th centuries a.d. The extreme licence of the Heliopolitan worship is often animadverted upon by early Christian writers, and Constantine, making an effort to curb the Venus cult, built a basilica. Theodosius erected another, with western apse, in the main court of the Jupiter temple.

When Abu Ubaida (or Obaida) attacked the place .after the Moslem capture of Damascus (a.d. 635), it was still an opulent city and yielded a rich booty. It became a bone of contention between the various Syrian dynasties and the caliphs first of Damascus, then of Egypt, and in 748 was sacked with great slaughter. In 1090 it passed to the Seljuks, and in 1134 to Jenghiz

Khan; but after 1145 it remained attached to Damascus and was captured by Saladin in 1175. The Crusaders raided its valley more than once, but never took the city. Three times shaken by earthquake in the 12th century, it was dismanded by Hulagu in 1260. But it revived, and most of its fine Moslem mosque and fortress architecture, still extant, belongs to the

reign of Sultan Kalaun (1282) and the succeeding century, during which Abulfeda describes it as a very strong place. In 1400 Timur pillaged it, and in 1517 it passed, with the rest of Syria, to the Ottoman dominion. But Ottoman jurisdiction was merely nominal in the Lebanon district, and Baalbek was really in the hands of the Metawali (see Lebanon), who retained it against other Lebanon tribes, until ” Jezzar ” Pasha, the rebel governor of the Acre province, broke their power in the last half of the 1 8th century. The anarchy which succeeded his death in 1804 was only ended by the Egyptian occupation (1832). With the treaty of London (1840) Baalbek became really Ottoman, and since the settlement of the Lebanon (1864) has attracted great numbers of tourists.

BAALBEK \

Scale of Yards %

d 10 20 30 40 50 60 70 80 \

Roman Work. \

•

» Byzantine or Early Christian Work \

tatsu Work

~-SITe i OF«STEˆ>S”’

Af Ler Puchstein, with permission of Georg Reimer

Emery Walker sc.

The ruins were brought to European notice by Pierre Belon in I555j though previously visited, in 1507, by Martin von Baumgarten. Much damaged by the earthquake of 1 7 59, they remained a wilderness of fallen blocks till 1901, when their clearance was undertaken by the German Archaeological Institute and entrusted to the direction of Prof. O. Puchstein. They lie mainly on the ancient Acropolis, which has been shored up with huge walls to form a terrace raised on vaults and measuring about 1100 ft. from E. to W. The Propylaea lie at the E. end, and were approached by a flight of steps now quarried away. These propylaea formed a covered hall, or vestibule, about 35 ft. deep, flanked with towers richly decorated within and without (much damaged by Arab reconstruction). Columns stood in front, whose bases still exist and bear the names of Antoninus Pius and Julia Domna. Hence, through a triple gateway in a richly ornamented screen, access is gained to the first or Hexagonal Court, which measures about 250 ft. from angle to angle. It is now razed almost to foundation level; but it can be seen that it was flanked with halls each having four columns in front. A

portal on the W., 50 ft. wide, flanked by lesser ones 10 ft. wide (that on the N. is alone preserved), admitted to the Main Court, in whose centre was the High Altar of Burnt Sacrifice. This altar and a great tank on the N. were covered by the foundations of Theodosius' basilica and not seen till the recent German clearance. The Main Court measures about 440 ft. from E. to W. and 370 ft. from N. to S., thus covering about 3! acres. It had a continuous fringe of covered halls of various dimensions and shapes, once richly adorned with statues and columnar screens. Some of these halls are in fair preservation. Stairs on the W. led up to the temple of Jupiter-Baal, now much ruined, having only 6 of the 54 columns of its peristyle erect. Three fell in the earthquake of 1 7 59 . Those still standing are Nos. 1 r to 1 6 in the southern rank. Their bases and shafts are not finished, though the capitals and rich entablature seem completely worked. They have a height of 60 ft. and diameter of 75 ft., and are mostly formed of three blocks. The architrave is threefold and bears a frieze with lion-heads, on which rest a moulding and cornice.

The temple of Bacchus stood on a platform of its own formed by a southern projection of the Acropolis. It was much smaller than the Jupiter temple, but is better preserved. The steps of the E. approach were intact up to 1688. The temple was peripteral with

46 columns in its peristyle. These were over 52 ft. in height and of the Corinthian order, and supported an entablature 7 ft. high with double frieze, connected with the cella walls by a coffered ceiling, which contained slabs with heads of gods and emperors. Richard Burton, when consul-general at Damascus in 1870, cleared an Arab screen out of the vestibule, and in consequence the exquisite doorway leading into the cella can now be well seen. On either side of it staircases constructed within columns lead to the roof. The cracked door-lintel, which shows an eagle on the soffit, was propped up first by Burton, and lately, more securely, by the Germans. The cella, now ruinous, had inner wall-reliefs and engaged columns, which supported rich entablatures.

The vaults below the Great Court of the Jupiter Temple, together with the supporting walls of the terrace, are noticeable. In the W. wall of the latter occur the three famous megaliths, which gave the name Trilithon to the Jupiter temple in Byzantine times. These measure from 63 to 64 ft. in length and 13 ft. in height and breadth, and have been raised 20 ft. above the ground. They are the largest blocks known to have been used in actual construction, but are excelled by another block still attached to its bed in the quarries half a mile S.W. This is 68 ft. long by 14 ft. high and weighs about 1500 tons. For long these blocks were supposed, even by European visitors, to be relics of a primeval race of giant builders.

In the town, below the Acropolis, on the S.E. is a small temple of the late imperial age, consisting of a semicircular cella with a peristyle of eight Corinthian columns, supporting a projecting entablature. The cella is decorated without with a frieze, and within with pillars and arcading. This temple owes its preservation to its use as a church of St Barbara, a local martyr, also claimed by the Egyptian Heliopolis. Hence the building is known as Barbarat al-atika. Considerable remains of the N. gate of the city have also been exposed.

Bibliography. — These vast ruins, more imposing from their immensity than pleasing in detail, have been described by scores of travellers and tourists; but it will be sufficient here to refer to the following works: — (First, discoverers) M. von Baumgarten, Pere- grinaiio in . . . Syridm (1594); P. Belon, De admirabili operum antiquorum praestantia (1553); and Observations, &c. (1555). (Before earthquake of 1759) R. Wood, Ruins of Baalbec (1757). (Before excavation) H. Frauberger, Die Akropolis von

Baalbek (1892). (After excavation) O. Puchstein, Ftihrer durch die Ruinen v. Baalbek (1905), (with Th. v. Liipke) Ansichten, &c. (1905). See also R. Phene Spiers, Quart. Stat. Pal. Exp. Fund, 1904, pp. 58-64, and the Builder, 11 Feb. 1905. (D. G. H.)

BAARN, a small town in the province of Utrecht, Holland, 5 m. by rail E. of Hilversum, at the junction of a branch line to Utrecht. Like Hilversum it is situated in the midst of pictur- esque and wooded surroundings, and is a favourite summer re- sort of people from Amsterdam. The Baarnsche Bosch, or wood, stretches southward to Soestdyk, where there is a royal country-

seat, originally acquired by the state in 1795. Louis Bonaparte, king of Holland, who was very fond of the spot, formed a zoo- logical collection here which was removed to Amsterdam in 180a. In 18 1 6 the estate was presented by the nation to the prince of Orange (afterwards King William II.) in recognition of his services at the battle of Quatre Bras. Since then the palace and grounds have been considerably enlarged and beautified. Close to Baarn in the south-west were formerly situated the ancient castles of Drakenburg and Drakenstein, and at Vuursche there is a remarkable dolmen.

BABADA6, or Babatag, a town in the department of Tulcea, Rumania; situated on a small lake formed by the river Taitza among the densely wooded highlands of the northern Dobrudja. Pop. (1900) about 3500. The Taitza lake is divided only by a strip of marshland from Lake Razim, a broad landlocked sheet of water which opens on the Black Sea. Babadag is a market for the wool and mutton of the Dobrudja. It was founded by Bayezid I., sultan of the Turks from 1389 to 1403. It occasion- ally served as the winter headquarters of the Turks in their wars with Russia, and was bombarded by the Russians in 1854.

BABBA6E, CHARLES (1792-1871), English mathematician and mechanician, was born on the 26th of December 1792 at Teignmouth in Devonshire. He was educated at a private school, and afterwards entered St Peter's College, Cambridge, where he graduated in 1814. Though he did not compete in the mathe- matical tripos, he acquired a great reputation at the university. In the years 1815-1817 he contributed three papers on the "

Calculus of Functions ” to the Philosophical Transactions, and in 1816 was made a fellow of the Royal Society. Along with Sir John Herschel and George Peacock he laboured to raise the standard of mathematical instruction in England, and especially endeavoured to supersede the Newtonian by the Leibnitzian notation in the infinitesimal calculus. Babbage’s attention seems to have been very early drawn to the number and im- portance of the errors introduced into astronomical and other calculations through inaccuracies in the computation of tables. He contributed to the Royal Society some notices on the relation between notation and mechanism; and in 1822, in a letter to Sir H. Davy on the application of machinery to the calculation and printing of mathematical tables, he discussed the principles of a calculating engine, to the construction of which he devoted many years of his life. Government was induced to grant its aid, and the inventor himself spent a portion of his private fortune in the prosecution of his undertaking. He travelled through several of the countries of Europe, examining different systems of machinery; and some of the results of his investigations were published in the admirable little work, Economy of Machines and Manufactures (1834). The great calculating engine was never completed; the constructor apparently desired to adopt a new principle when the first specimen was nearly complete, to make it not a difference but an analytical engine, and the government declined to accept the further risk (see Calculating Machines) . From 1828 to 1839 Babbage was Lucasian professor of mathematics at Cambridge. He contributed largely to several scientific periodicals, and was instrumental in founding the Astronomical (1820) and Statistical (1834) Societies. He only once endeavoured to enter public life, when, in 1832, he stood unsuccessfully for the borough of Finsbury. During the later years of his life he resided in London, devoting himself to the construction of machines capable of performing arithmetical and even algebraical calculations. He died at London on the 18th of October 1871. He gives a few biographical details in his Passages from the Life of a Philosopher (1864), a work which throws considerable light upon his somewhat peculiar character. His works, pamphlets and papers were very numerous; in the Passages he enumerates eighty separate writings. Of these the most important, besides the few already mentioned, are Tables of Logarithms (1826); Comparative View of the Various Institutions for the Assurance of Lives (1826); Decline of Science in England (1830); Ninth Bridge-water Treatise (1837); The Exposition of

1851 (1851).

See Monthly Notices, Royal Astronomical Society, vol. 32.

BABEL, the native name of the city called Babylon (q.v.) by the Greeks, the modern Hillah. It means “gate of the god,” not”gate of the gods,” corresponding to the Assyrian Bab-ili. According to Gen. xL 1-9 (J), mankind, after the deluge, travelled from the mountain of the East, where the ark had rested, and settled in Shinar. Here they attempted to build a city and a tower whose top might reach unto heaven, but were miraculously prevented by their language being confounded. In this way the diversity of human speech and the dispersion of mankind were accounted for; and in Gen. xi. 9 (J) an etymology was found for the name of Babylon in the Hebrew verb bdlal, ” toconfuse or confound,” Babel being regarded as a contraction of Balbel. In Gen. x. 10 it is said to have formed part of the kingdom of Nimrod.

The origin of the story has not been found in Babylonia. The tower was no doubt suggested by one of the temple towers of Babylon. W. A. Bennet (Genesis, p. 169; cf. Hommel in Hastings’ Dictionary of the Bible) suggests E-Saggila, the great temple of Merodach (Marduk). The variety of languages and the dispersion of mankind were regarded as a curse, and it is probable that, as Prof. Cheyne (Encyclopaedia Biblica, col. 411) says, there was an ancient North Semitic myth to explain it. The event was afterwards localized in Babylon. The myth, as it appears in Genesis, is quite polytheistic and anthropomorphic. According to Cornelius Alexander (frag. 10) and Abydenus (frags. 5 and 6) the tower was overthrown by the winds; according to Yaqut (i, 448 f.) and the Lisan el-‘ Arab (xiii. 72) mankind were swept together by winds into the plain afterwards called ” Babil,” and were scattered again in the same way (see further D. B. Macdonald in the Jewish Encyclopaedia) . A tradition similar to that of the tower of Babel is found in Central America. Xelhua, one of the seven giants rescued from the deluge, built the great pyramid of Cholula in order to storm heaven. The gods, how- ever, destroyed it with fire and confounded the language of the builders. Traces of a somewhat similar story have also been met with among the Mongolian Tharus in northern India (Report of the Census of Bengal, 1872, p. 160), and, according to Dr Livingstone, among the Africans of Lake Ngami. The Esthonian myth of ” the Cooking of Languages ” (Kohl, Reisen in die Ostseeprovinzen, ii. 251-255) may also be compared, as well as the Australian legend of the origin of the diversity of speech (Gerstacker, Reisen, vol. iv. pp.

381 seq.).

BAB-EL-MANDEB (Arab, for ” The Gate of Tears “), the strait between Arabia and Africa which connects the Red Sea (q.v.) with the Indian Ocean. It derives its name from the dangers attending its navigation, or, according to an Arabic legend, from the numbers who were drowned by the earthquake which separated Asia and Africa. The distance across is about 20 m. from Ras Menheli on the Arabian coast to Ras Siyan on the African. The island of Perim (q.v.), a British possession, divides the strait into two channels, of which the eastern, known as the Bab Iskender (Alexander’s Strait), is 2 m. wide and 16 fathoms deep, while the western, or Dact-el-Mayun, has a width of about 16 m. and a depth of 170 fathoms. Near the African coast lies a group of smaller islands known as the ” Seven Brothers.” There is a surface current inwards in the eastern channel, but a strong under-current outwards in the western channel.

BABENBERG, the name of a Franconian family which held the duchy of Austria before the rise of the house of Habsburg. Its earliest known ancestor was one Poppo, who early in the 9th century was count in Grapfeld. One of his sons, Henry, called margrave and duke in Franconia, fell fighting against the Normans in 886; another, Poppo, was margrave in Thuringia from 880 to 892, when he was deposed by the German king Arnulf . The family had been favoured by the emperor Charles the Fat, but Arnulf reversed this policy in favour of the rival family of the Conradines. The leaders of the Babenbergs were the three sons of Duke Henry, who called themselves after their castle of Babenberg on the upper Main, round which their possessions centred. The rivalry between the two families was intensified by their efforts to extend their authority in the region of the middle Main, and this quarrel, known as the ” Babenberg feud,” came to a head at the beginning of the 10th century during the

troubled reign of the German king, Louis the Child. Two of the Babenberg brothers were killed, and the survivor Adalbert was summoned before the imperial court by the regent Hatto I., archbishop of Mainz, a partisan of the Conradines. He refused to appear, held his own for a time in his castle at Theres against the

king's forces, but surrendered in 906, and in spite of a promise of safe-conduct was beheaded. From this time the Babenbergs lost their influence in Franconia; but in 976 Leopold, a member of the family who was a count in the Donnegau, is described as margrave of the East Mark, a district not more than 60 m. in breadth on the eastern frontier of Bavaria which grew into the duchy of Austria. Leopold, who probably received the mark as a reward for his fidelity to the emperor Otto II. during the Bavarian rising in 976, extended its area at the expense of the Hungarians, and was succeeded in 994 by his son Henry I. Henry, who continued his father's policy, was followed in 1018 by his brother Adalbert and in 1055 by his nephew Ernest, whose marked loyalty to the emperors Henry III. and Henry IV. was rewarded by many tokens of favour. The succeeding margrave, Leopold II., quarrelled with Henry IV., who was unable to oust him from the mark or to prevent the succession of his son Leopold III. in 1096. Leopold supported Henry, son of Henry IV., in his rising against his father, but was soon drawn over to the emperor's side, and in 1106 married his daughter Agnes, widow of Frederick I., duke of Swabia. He declined the imperial crown in 1125. His zeal in founding monasteries earned for him his surname " the Pious," and canonization by Pope Innocent VIII. in 1485. He is regarded as the patron saint of Austria. One of Leopold's sons was Otto, bishop of Freising (g.v.). His eldest son, Leopold IV., became margrave in 1136, and in 1139 received from the German king Conrad III. the duchy of Bavaria, which had been forfeited by Duke Henry the Proud. Leopold's brother Henry (surnamed Jasomirgott from his favourite oath, " So help me God!") was made count palatine of the Rhine in 1140, and became margrave of Austria on Leopold's death in 1 141. Having married Gertrude, the widow of Henry the Proud, he was invested in 1143 with the duchy of Bavaria, and resigned his office as count palatine. In 1 147 he went on crusade, and after his return renounced Bavaria at the instance of the new king Frederick I. As compensation for this, Austria, the capital of which had been transferred to Vienna in 1 146, was erected into a duchy. The second duke was Henry's son Leopold I., who succeeded him in 1177 and took part in the crusades of 1 1 8 2 and 1 1 90. In Palestine he quarrelled with Richard I., king of England, captured him on his home- ward journey and handed him over to the emperor Henry VI. Leopold increased the territories of the Babenbergs by acquiring Styria in H92 1 under the will of his kinsman Duke Ottakar IV. He died in 1194, and Austria fell to one son, Frederick, and Styria to another, Leopold; but on Frederick's death in 1198 they were

again united by Duke Leopold II., surnamed ” the Glorious.” The new duke fought against the infidel in Spain, Egypt and Palestine, but is more celebrated as a lawgiver, a patron of letters and a founder of towns. Under him Vienna became the centre of culture in Germany and the great school of Minnesingers (q.v.). His later years were spent in strife with his son Frederick, and he died in 1230 at San Germano, whither he had gone to arrange the peace between the emperor Frederick II. and Pope Gregory IX. His son Frederick II. followed as duke, and earned the name of ” Quarrelsome ” by constant struggles with the kings of Hungary and Bohemia and with the emperor. He deprived his mother and sisters of their possessions, was hated by his subjects on account of his oppressions, and in 1236 was placed under the imperial ban and driven from Austria. Restored when the emperor was excom- municated, he treated in vain with Frederick for the erection of Austria into a kingdom. He was killed in battle in 1246, when the male line of the Babenbergs became extinct. The city of Bamberg grew up around the ancestral castle of the family.

See G. Juritsch, Geschichte der Babenberger und ihrer Lander (Innsbruck, 1894); M. Schmitz, Oesterreichs Scheyern-Wittelsbacher oder die Dynaslie der Babenberger (Munich, 1880).

BABER, or Babas (1483-1530), a famous conqueror of India and founder of the so-called Mogul dynasty. His name was Zahir ud-din- Mahomet, and he was given the surname of Baber, meaning the tiger. Born on the 14th of February 1483, he was a descendant of Timur, and his father, Omar Sheik, was king of Ferghana, a district of what is now Russian Turkestan. Omar died in 1495, and Baber, though only twelve years *of age, succeeded to the throne. An attempt made by his uncles to dislodge him proved unsuccessful, and no sooner was the young sovereign firmly settled than he began to meditate an extension of his own dominions. In 1497 he attacked and gained possession of Samarkand, to which he always seems to have thought he had a natural and hereditary right. A rebellion among his nobles robbed him of his native kingdom, and while marching to recover it his troops deserted him, and he lost Samarkand also. After some reverses he regained both these places, but in 1501 his most formidable enemy, Shaibani (Sheibani) Khan, ruler of the Uzbegs, defeated him in a great engagement and drove him from Samarkand. For three years he wandered about trying in vain to recover his lost possessions; at last, in 1504, he gathered some troops, and crossing the snowy Hindu Kush besieged and

captured the strong city of Kabul. By this dexterous stroke he gained a new and wealthy kingdom, and completely re-established his fortunes. In the following year he united with Hussain Mirza of Herat against Shaibani. The death of Hussain put a stop to this expedition, but Baber spent a year at Herat, enjoying the pleasures of that capital. He returned to Kabul in time to quell a formidable rebellion, but two years later a revolt among some of the leading Moguls drove him from his city. He was compelled to take to flight with very few companions, but his great personal courage and daring struck the army of his opponents with such dismay that they again returned to their allegiance and Baber regained his kingdom. Once again, in 1510, after the death of Shaibani, he endeavoured to obtain possession of his native country. He received considerable aid from Shah Ismael of Persia, and in 1511 made a triumphal entry into Samarkand. But in 1514 he was utterly defeated by the Uzbegs and with difficulty reached Kabul. He seems now to have resigned all hopes of recovering Ferghana, and as he at the same time dreaded an invasion of the Uzbegs from the west, his attention was more and more drawn towards India. Several preliminary incursions had been already made, when in 1521 an opportunity presented itself for a more extended expedition. Ibrahim, emperor of Delhi, had made himself detested, even by his Afghan nobles, several of whom called upon Baber for assistance. He at once assembled his forces, 12,000 strong, with some pieces of artillery and marched into India. Ibrahim, with 100,000 soldiers and numer- ous elephants, advanced against him. The great battle was fought at Panipat on the 21st of April 1526, when Ibrahim was slain and his army routed. Baber at once took possession of Agra. A still more formidable enemy awaited him; the Rana Sanga of Mewar collected the enormous force of 210,000 men, with which he moved against the invaders. On all sides there was danger and revolt, even Baber's own soldiers, worn out with the heat of this new climate, longed for Kabul. By vigorous measures and inspiriting speeches he restored their courage, though his own heart was nearly failing him, and in his distress he abjured the use of wine, to which he had been addicted. At Kanwaha, on the 10th of March 1527, he won a great victory and made himself absolute master of northern India. The remaining years of his life he spent in arranging the affairs and revenues of his new empire and in improving his capital, Agra. He died on the 26th of December 1530 in his forty-eighth year. Baber was above the middle height, of great strength and an ad- mirable archer and swordsman. His mind was as well

cultivated as his bodily powers; he wrote well, and his observations are generally acute and accurate; he was brave, kindly and generous.

Full materials for his life are found in his Memoirs, written by himself (translated into English by Leyden and Erskine (London, 1826); abridged in Caldecott, Life of Baber (London, 1844). See also Lane-Poole, Baber (Rulers of India Series), 1899.

BABEUF, FRANCOIS NOEL (1760-1797), known as Gracchus Babeuf, French political agitator and journalist, was born at Saint Quentin on the 23rd of November 1 760. His father, Claude Babeuf, had deserted the French army in 1738 and taken service under Maria Theresa, rising, it is said, to the rank of major. Amnestied in 1755 he returned to France, but soon sank into dire poverty, being forced to earn a pittance for his wife and family as a day labourer. The hardships endured by Babeuf during early years do much to explain his later opinions. He had received from his father the smatterings of a liberal education, but until the outbreak of the Revolution he was a domestic servant, and from 1785 occupied the invidious office of com- missaire d terrier, his function being to assist the nobles and priests in the assertion of their feudal rights as against the unfortunate peasants. On the eve of the Revolution Babeuf was in the employ of a land surveyor at Roye. His father had died in 1780, and he was now the sole support, not only of his wife and two children, but of his mother, brothers and sisters. In the circumstances it is not surprising that he was the life and soul of the malcontents of the place. He was an indefatigable writer, and the first germ of his future socialism is contained in a letter of the 21st of March 1787, one of a series — mainly on literature — addressed to the secretary of the Academy of Arras. In 1789 he drew up the first article of the cahier of the electors of the bailliage of Roye, demanding the abolition of feudal rights. Then, from July to October, he was in Paris super- intending the publication of his first work: Cadastre perpeluel, didii a Vassemblee nationale, Van 1289 et le premier de la liberti franqaise, which was written in 1787 and issued in 1790. The same year he published a pamphlet against feudal aids and the gabelle, for which he was denounced and arrested, but provision- ally released. In October, on his return to Roye, he founded the Correspondant picard, the violent

character of which cost him another arrest. In November he was elected a member of the municipality of Roye, but was expelled. In March 1791 he was appointed commissioner to report on the national property (Mens nationaux) in the town, and in September 1792 was elected a member of the council-general of the department of the Somme. Here, as everywhere, the violence of his attitude made his position intolerable to himself and others, and he was soon transferred to the post of administrator of the district of Montdidier. Here he was accused of fraud for having sub- stituted one name for another in a deed of transfer of national lands. It is probable that his fault was one of negligence only; but, distrusting the impartiality of the judges of the Somme, he fled to Paris, and on the 23rd of August 1793 was condemned in contumaciam to twenty years' imprisonment. Meanwhile he had been appointed secretary to the relief committee (comiti des subsistances) of the commune of Paris. The judges of Amiens, however, pursued him with a warrant for his arrest, which took place in Brumaire of the year II. (1794). The court of cassation quashed the sentence, through defect cf form, but sent Babeuf for a new trial before the Aisne tribunal, by which he was acquitted on the 18th of July.

Babeuf now returned to Paris, and on the 3rd of September 1 794 published the first number of his Journal de la liberie de la presse, the title of which was altered on the 5 th of October to Le Tribun du peuple. The execution of Robespierre on the 28th of July had ended the Terror, and Babeuf — now self-styled "■ Gracchus " Babeuf — defended the men of Thermidor and attacked the fallen terrorists with his usual violence. But he also attacked, from the point of view of his own socialistic theories, the economic outcome of the Revolution. This was an attitude which had few supporters, even in the Jacobin club, and in October Babeuf was arrested and sent to prison at Arras. Here he came under the influence of certain terrorist prisoners, notably of Lebois, editor of the Journal de I'Sgalite, afterwards of the Ami du peuple, papers which carried on the traditions of Marat. He emerged from prison a confirmed terrorist and con- vinced that his Utopia, fully proclaimed to the world in No. 33 of his Tribun, could only be realized through the restoration of the constitution of 1793. He was now in open conflict with the

whole trend of public opinion. In February 1795 he was again arrested, and the Tribun du peuple was solemnly burnt in the Theatre des Bergeres by the jeunesse dorSe, the young men whose mission it was to bludgeon Jacobinism out of the streets

and cafes. But for the appalling economic conditions produced by the fall in the value of assignats, Babeuf might have shared the fate of other agitators who were whipped into obscurity.

It was the attempts of the Directory to deal with this economic crisis that gave Babeuf his real historic importance. The new government was pledged to abolish the vicious system by which Paris was fed at the expense of all France, and the cessation of the distribution of bread and meat at nominal prices was fixed for the 20th of February 1796. The announcement caused the most wide-spread consternation. Not only the workmen and the large class of idlers attracted to Paris by the system, but rentiers and government officials, whose incomes were paid in assignats on a scale arbitrarily fixed by the government, saw themselves threatened with actual starvation. The government yielded to the outcry that arose; but the expedients by which it sought to mitigate the evil, notably the division of those ‘ entitled to relief into classes, only increased the alarm and the discontent. The universal misery gave point to the virulent attacks of Babeuf on the existing order, and at last gained him a hearing. He gathered round him a small circle of his im- mediate followers known as the Sociiti des Ugaux, soon merged with the rump of the Jacobins, who met at the Pantheon; and in November 1795 he was reported by the police to be openly preaching ” insurrection, revolt and the constitution

of I793-” ‘

For a time the government, while keeping itself informed of his activities, left him alone; for it suited the Directory to let the socialist agitation continue, in order to frighten the people from joining in any royalist movement for the overthrow cf the existing regime. Moreover the mass of the ouvriers, even of extreme views, were repelled by Babeuf ‘s blood thirstiness; and the police agents reported that his agitation was making many converts — for the government. The Jacobin club of the Faubourg Saint-Antoine refused to admit Babeuf and Lebois, on the ground that they were ” Sgorgeurs.” With the development of the economic crisis, however, Babeuf’s influence increased. After the club of the Pantheon was closed by Bonaparte, on the 27th of February 1796, his aggressive activity redoubled. In Ventose and Germinal he published, under the nom de plume of ” Lalande, soldat de la patrie,” a new paper, the Eclaireur du peuple, ou le dtjenseur de vingl-cinq millions d’opprimis, which was hawked clandestinely from group to group in the streets of Paris. At the

same time No. 40 of the Tribun excited an immense sensation. In this he praised the authors of the September massacres as ” deserving well of their country,” and declared that a more complete ” September 2nd ” was needed to annihilate the actual government, which consisted of ” starvers, blood- suckers, tyrants, hangmen, rogues and mountebanks.” The distress among all classes continued to be appalling; and in March the attempt of the Directory to replace the assignats (q.v.) by a new issue of mandats created fresh dissatisfaction after the breakdown of the hopes first raised. A cry went up that national bankruptcy had been declared, and thousands of the lower class of ouvrier began to rally to Babeuf’s flag. On the 4th of April it was reported to the government that 500,000 people in Paris were in need of relief. From the nth Paris was pla- carded with posters headed Analyse de la doctrine de Babceuf (sic), tribun du peuple, of which the opening sentence ran: ” Nature has given to every man the right to the enjoyment of an equal share in all property,” and which ended with a call to restore the constitution of 1 793. Babeuf’s song Mourant defaim, mouranl de froid (Dying of hunger, dying of cold), set to a popular air, began to be sung in the caf6s, with immense applause; and reports were current that the disaffected troops in the camp of Grenelle were ready to join an emeule against the government. The Directory thought it time to act; the bureau central had accumulated through its agents, notably the ex-captain Georges

Grisel, who had been initiated into Babeuf’s society, complete evidence of a conspiracy for an armed rising fixed for Floreal 22, year IV. (nth of May 1796), in which Jacobins and socialists were combined. On the 10th of May Babeuf was arrested with many of his associates, among whom were A. Darthe and P. M. Buonarroti, the ex-members of the Convention, Robert Lindet, J. A. B. Amar, M. G. A. Vadier and Jean Baptiste Drouet, famous as the postmaster of Saint-Menehould who had arrested Louis XVI., and now a member of the Council of Five Hundred.

The coup was perfectly successful. The last number of the Tribun appeared on the 24th of April, but Lebois in the Ami du peuple tried to incite the soldiers to revolt, and for a while there were rumours of a military rising. The trial of Babeuf and his accomplices was fixed to take place before the newly constituted

high court of justice at Vendome. On Fructidor 10 and n (27th and 28th of August), when the prisoners were removed from Paris, there were tentative efforts at a riot with a view to rescue, but these were easily suppressed. The attempt of five or six hundred Jacobins (7th of September) to rouse the soldiers at Grenelle met with no better success. The trial of Babeuf and the others, begun at Vendome on the 20th of February 1797, lasted two months. The government for reasons of their own made the socialist Babeuf the leader of the conspiracy, though more important people than he were implicated; and his own vanity played admirably into their hands. On Prairial 7 (26th of April 1797) Babeuf and Darthe were condemned to death; some of the prisoners, including Buonarroti, were exiled; the rest, including Vadier and his fellow-conventionals, were acquitted. Drouet had succeeded in making his escape, according to Barras, with the connivance of the Directory. Babeuf and Darthe were executed at Vendome on Prairial 8 (1797).

Babeuf's character has perhaps been sufficiently indicated above. He was a type of the French revolutionists, excitable, warm-hearted, half-educated, who lost their mental and moral balance in the chaos of the revolutionary period. Historically, his importance lies in the fact that he was the first to propound socialism as a practical policy, and the father of the movements which played so conspicuous a part in the revolutions of 1848 and 1871.

See V. Advielle, Hist, de Gracchus Babeuf et de Babouvisme (2 vols., Paris, 1884); P. M. Buonarroti, Conspiration, pour I'egalite, dite de Babeuf (2 vols., Brussels, 1828; later editions, 1850 and 1869), English translation by Bronterre O'Brien (London, 1836); Cam- bridge Modern History, vol. viii.; Adolf Schmidt, Pariser Zustdnde wahrend der Revolutionszeit von ifSg-1800 (Jena., 1874). French trans, by P. Viollet, Paris pendant la Revolution d'apres les rapports de la police .secrete, 1789-1800 (4 vols., 1880-1894); A. Schmidt, Tableaux de la Revolution francaise, &c. (Leipzig, 1 867-1 870), a collection of reports of the secret police on which the above work is based. A full report of the trial at Venddme was published in four volumes at Paris in 1797, Debats du proces, &c. (W. A. P.)

BABllSM, the religion founded in Persia in a.d. 1844-1845 by Mirza 'Ali Muhammad of Shiraz, a young Sayyid who was at that time not twenty-five years of age. Before his "manifesta- tion " {zuhur), of which he gives in the Persian Bay&n a date

corresponding to 23rd May 1844, he was a disciple of Sayyid Kazim of Rasht, the leader of the Shaykhis, a sect of extreme Shi'ites characterized by the doctrine (called by them Rukn-i-rdbi', " the fourth support ") that at all times there must exist an intermediary between the twelfth Imam and his faithful followers. This intermediary they called " the perfect Shi'ite," and his prototype is to be found in the four successive Bdbs or " gates " through whom alone the twelfth Imam, during the period of his " minor occultation " (Ghaybat-i-sughrd, a.d. 874- 940), held communication with his partisans. It was in this sense, and not, as has been often asserted, in the sense of " Gate of God " or " Gate of Religion," that the title Bdb was understood and assumed by Mirza' Ali Muhammad; but, though still generally thus styled by non-Babis, he soon assumed the higher title of Nuqla (" Point "), and the title Bdb, thus left vacant, was conferred on his ardent disciple, Mulla Husayn of Bushrawayh.

The history of the Babis, though covering a comparatively short period, is 'so full of incident and the particulars now available

are so numerous, that the following account purports to be 9nly the briefest sketch. The Bab himself was in captivity first at Shiraz, then at Maku, and lastly at Chihrfq, during the greater part of the six years (May 1844 until July 1850) of his brief career, but an active propaganda was carried on by his disciples, which resulted in several serious revolts against the government, especially after the death of Muhammad Shah in September 1848. Of these risings the first (December 1848-July 1849) took place in Mazandaran, at the ruined shrine of Shaykh Tabarsi, near Barfurush, where the Babis, led by Mulla. Muhammad 'Ali of Barfurush and Mulla Husayn of Bushrawayh (" the first who believed"), defied the shah's troops for seven months before they were finally subdued and put to death. The revolt at Zanjan in the north-west of Persia, headed by Mulla, Muhammad 'Ali Zanjani, also lasted seven or eight months (May-December 1850), while a serious but less protracted struggle was waged against the government at Niriz in Fars by Aga, Sayyid Yahya of Niriz. Both revolts were in progress when the Bab, with one of his devoted disciples, was brought from his prison at Chihrfq to Tabriz and publicly shot in front of the arg or citadel. The body, after being exposed for some days, was recovered by the Babis and conveyed to a shrine near Tehran, whence it was ultimately removed to Acre in Syria, where it is now buried. For the next two years comparatively little was heard of the Babis, but on the 15th of August 1852 three of them, acting on their own initiative,

attempted to assassinate Nasiru'd-Din Shah as he was returning from the chase to his palace at Niyavaran. The attempt failed, but was the cause of a fresh persecution, and on the 31st of August 1852 some thirty Babis, including the beautiful and talented poetess Qurratu'l-'Ayn, were put to death in Tehran with atrocious cruelty. Another of the victims of that day was Hajji Mirza Jani of Kashan, the author of the oldest history of the movement from the Babi point of view. Only one complete MS. of his invaluable work (obtained by Count Gobineau in Persia) exists in any public library, the Bibliotheque Nationale at Paris. The so-called " New History " (of which an English translation was published at Cambridge in 1893 by E. G, Browne) is based on Mirza Janf's work, but many important passages which did not accord with later Babi doctrine or policy have been suppressed or modified, while some additions have been made. The Bab was succeeded on his death by Mirza. Yahya. of Nur (at that time only about twenty years of age), who escaped to Bagdad, and, under the title of Subh-i-Ezcl (" the Morning of Eternity "), became the pontiff of the sect. He lived, however, in great seclusion, leaving the direc- tion of affairs almost entirely in the hands of his elder half- brother (born 12th November 1817), Mirza Husayn 'Ali, entitled Bahd' ulldh (" the Splendour of God "), who thus gradually became the most conspicuous and most influential member of the sect, though in the Iqdn, one of the most important polemical works of the Babis, composed in 1858-1859, he still implicitly recognized the supremacy of Subh-i-Ezel. In 1863, however, Baha declared himself to be " He whom God shall manifest " (Man Yuz-hiruhu'lldh, with prophecies of whose advent the works of the Bab are filled), and called on all the Babis to recog- nize his claim. The majority responded, but Subh-i-Ezel and some of his faithful adherents refused. After that date the Babis divided into two sects, Ezelis and Baha'is, of which the former steadily lost and the latter gained ground, so that in 1908 there were probably from half a million to a million of the latter, and at most only a hundred or two of the former. In 1863 the Babis were, at the instance of • the Persian government, removed from Bagdad to Constantinople, whence they were shortly afterwards transferred to Adrianople. In 1868 Baha and his followers were exiled to Acre in Syria, and Subh-i-Ezel with his few adherents to Famagusta in Cyprus, where he was still living in 1908. Baha'u'llah died at Acre on the 16th of May 1892. His son 'Abbas Efendi (also called 'Abdu'1-Baha, " the servant of Baha "') was generally recognized as his successor, but another of his four sons, Muhammad 'Ali, put forward a rival claim. This

caused a fresh and bitter schism, but ‘Abbas Efendi steadily gained ground, and there could be little doubt as to his eventual

triumph. The controversial literature connected with this latest schism is abundant, not only in Persian* but in English, for since 1900 many Americans have adopted the religion of Baha. The original apostle of America was Ibrahim George Khayru’llah, who began his propaganda at the Chicago Exhibition and later supported the claims of Muhammad “All. Several Persian missionaries, including the aged and learned Mirza Abu‘1-Fazl of Gulpayagan, were thereupon despatched to America by ‘Abbas Efendi, who was generally accepted by the American Baha’is as ” the Master.” The American press contained many notices of the propaganda and its success. An interesting article on the subject, by Stoyan Krstoff Vatralsky of Boston, Mass., entitled ” Mohammedan Gnosticism in America,” appeared in the American Journal of Theology for January 1902, pp. 57-58.

A correct understanding of the doctrines of the early Babis (now represented by the Ezelfs) is hardly possible save to one who is conversant with the theology of Islam and its developments, and especially the tenets of the Shi’a. The Babis are Muham- madans only in the sense that the Muhammadans are Christians or the Christians Jews; that is to say, they recognize Muhammad (Mahomet) as a true prophet and the Qur’an (Koran) as a re- velation, but deny their finality. Revelation, according to their view, is progressive, and no revelation is final, for, as the human race progresses, a fuller measure of truth, and ordinances more suitable to the age, are vouchsafed. The Divine Unity is incom- prehensible, and can be known only through its Manifestations; to- recognize the Manifestation of the cycle in. which he lives is the supreme duty of man. Owing to the enormous volume and unsystematic character of the Babi scriptures, and the absence of anything resembling church councils, the doctrine on many important points (such, as the future life) is undetermined and vague. The resurrection of the body is denied, but some form of personal immortality is generally, though not universally, accepted. Great importance was attached to the mystical values of letters and numbers, especially the numbers 18 and 19 (” the number of the unity”) and 19 2 = 361 (“the number. of all things “) . In general, the Bab’s doctrines most closely resembled those

of the Isma'flis and Hurufis. In the hands of Baha, the aims of the sect became much more practical and ethical, and the wilder pantheistic tendencies and metaphysical hair-splittings of the early Babis almost disappeared. The intelligence, integrity and morality of the Babis are high, but their efforts to improve the social position of woman have been much exaggerated. They were in no way concerned (as was at the time falsely alleged) in the assassination of Nasiru'd-Din Shah in May 1896. Of recent persecutions of the sect the two most notable took place at Yazd, one in May 1891, and another of greater ferocity in June 1903. Some account of the latter is given by Napier Malcolm in his book Five Years in a Persian Town (London,i905), pp. 87-89 and 186. In the constitutional movement in Persia (1907) the Babis, though their sympathies are undoubtedly with the reformers, wisely refrained from outwardly identifying themselves with that party, to whom their open support, by alienating the orthodox mujtahids and mullds, would have proved fatal. Here, as in all their actions, they clearly obeyed orders issued from headquarters.

Literature. — The literature of the sect is very voluminous, but mostly in manuscript. The most valuable public collections in Europe are at St Petersburg, London (British Museum) and Paris (Bibliotheque Nationale), where two or three very rare MSS. collected by Gobineau, including the precious history of the Bab's contemporary, Hajji Mirza Jani of Kashan, are preserved. For the bibliography up to 1889, see vol. ii. pp. 173-21 1 pf the Traveller's Narrative, written to illustrate the Episode of the Bab, a Persian work composed by Baha's son, 'Abbas. Efendi, edited, translated and annotated by E. G. Browne (Cambridge, 1891). More recent works are: — Browne, The New History of the Bab (Cambridge, 1893).; and " Catalogue and Description of the 27 Babi Manuscripts," Journal of R. Asiat. Soc. (July and October 1892); Andreas, Die Bdbi's in Persian (1896); Baron Victor Rosen, Collections scien- tifiques de I'Institut des Langues orientales, vol. i. (1877), pp. 179-212 ; vol. iii. (1886), pp. 1-51; vol. vi. (1891), pp. 141-255; ' Manuscrits Babys"; and other important articles in Russian by the same scholar; and by Captain A. G. Toumansky in the Zapiski vostochnava otdyeleniya Imperatorskava Russkava Archeologicheskava Obshchestva

(vols. iv;-xii., St Petersburg, 1890-1900) ; also, an excellent edition by Toumansky, with Russian translation, notes and introduction, of the Kitdb-i-Aqdas (the most important of Baha's works), &c. (St Petersburg, 1899). Mention should also be made

of an Arabic history of the Babis (unsympathetic but well-informed) written by a Persian, Mirza Muhammad Mahdi Khan, Za'imu'd-Duwla, printed in Cairo in a. it. 1321 (= A.D. 1903-1904). Of the works composed in English for the American converts the most important are:ˆ Bahd'u'lldh (The Glory of God), by Ibrahim Khayru'llah, assisted by Howard MacNutt (Chicago, 1900) ; The Three Questions (n.d.) and Facts for Bahdists (1901), by the same; Life and Teachings of 'Abbas Efendi, by Myron H. Phelps, with preface by E. G. Browne (New York, 1903); Isabella Brittingham, The Revelations of Bahd?u'lldh, in a Sequence of Four Lessons (1902); Laura Clifford Burney, Some Answered. Questions Collected [in Acre, 1904-1906] and Translated from the Persian of "Abdu'l-Balui [i.e. 'Abbas Efendi] (London, 1908). _ In French, A. L. M. Nicolas (first dragoman at the French legation at Tehran) has published several important translations, viz. Le Livre des sept preuves de la mission du Bab (Paris, 1902); Le Livre de la certitude (1904); and Le Beydn arabe (1905); and there are other notable works by H. Dreyfus, an adherent of the Babi faith. Lastly, mention should be made of a remarkable but scarce little tract by Gabriel Sacy, printed at Cairo in June 1902, artd entitled Du regne de Dieu et de V A gneau, connu sous le nam de Babysme. (E. G. B.)

BABINGTON, ANTHONY (1561-1586), English conspirator, son of Henry Babington of Dethick in Derbyshire, and of Mary, daughter of George, Lord Darcy, was born in October 1561, and was brought up secretly a Roman Catholic. As a youth he served at Sheffield as page to Mary queen of Scots, for whom he early felt an ardent devotion. In 1580 he came to London, attended the court of Elizabeth, and joined the secret society formed that year supporting the Jesuit missionaries. In 1582 after the execution of Father Campion he withdrew to Dethick, and attaining his majority occupied himself for a short time with the management of his estates. Later he went abroad and became associated at Paris with Mary's supporters who were planning her release with the help of Spain, and on his return he was entrusted with letters for her. In April 1586 he became, with the priest John Ballard, leader of a plot to murder Elizabeth and her ministers, and organize a general Roman Catholic rising in England and liberate M'ary. The conspiracy was regarded by Mendoza, the Spanish ambassador, one of its chief instigators, and also by Walsingham, as the most dangerous of recent years; it included, in its general purpose of destroying the government, a large number of Roman Catholics, and had ramifications all over the country. Philip II. of

Spain, who ardently desired the success of an enterprise " so Christian, just and advantageous to the holy Catholic faith," 1 promised to assist with an expedition directly the assassination of the queen was effected. Babington's conduct was marked by open folly and vanity. Desirous of some token of appreciation from Mary for his services, he entered into a long correspondence with her, which was intercepted by the spies of Walsingham. On the 4th of August Ballard was seized and betrayed his comrades, probably under torture. Babington then applied for a passport abroad, for the ostensible purpose of spying upon the refugees, but in reality to organize the foreign expedition and secure his own safety. The passport being delayed, he offered to reveal to Walsingham a dangerous con- spiracy, but the latter sent no reply, and meanwhile the ports were closed and none allowed to leave the kingdom for some days. He was still allowed his liberty, but one night while supping with Walsingham's servant he observed a memorandum of the minister's concerning himself, fled to St John's Wood, where he was joined by some of his companions, and after disguising himself succeeded in reaching Harrow, where he was sheltered by a recent convert to Romanism. Towards the end of August he was discovered and imprisoned in the Tower. On the 13th and 14th of September he was tried with Ballard and five others by a special commission; when he confessed his guilt, but strove to place all the blame upon Ballard. All were condemned to death for high treason. On the 19th he wrote to Elizabeth praying for mercy, and the same day offered £1000 for procuring his pardon; and on the 20th, having disclosed the cipher used in the correspondence between himself and Mary, he was execute'd

1 Cata., of Slate Papers Simancas, iii. 606, Mendoza to Philip.

with the usual barbarities in Lincoln's Inn Fields. The detection of the plot led to Mary's own destruction. There is no positive documentary proof in Mary's own hand that she had knowledge of the intended assassination of Elizabeth, but her circumstances, together with the tenour of her correspondence with Babington, place her complicity beyond all reasonable doubt.

BABINGTON, CHURCHILL (1821-1889), English classical scholar and archaeologist, was born at Roecliffe, in Leicestershire, on the

1 1 th of March 1 8 2 1 . He was educated by his father till he was seventeen, when he was placed under the tuition of Charles Wycliffe Goodwin, the orientalist and archaeologist. He entered St John's College, Cambridge, in 1839, and graduated B.A. in 1843, being seventh in the first class of the classical tripos and a senior optime. In 1845 he obtained the Hulsean Prize for his essay The Influence of Christianity in promoting the Abolition of Slavery in Europe. In 1846 he was elected to a fellowship and took orders. He proceeded to the degree of M.A. in 1846 and D.D. in 1879. From 1848 to 1861 he was vicar of Horningsea, near Cambridge, and from 1866 to his death on the 12th of January 1889, vicar of Cockfield in Suffolk. From 1865 to 1880 he held the Disney professorship of archaeology at Cambridge. In his lectures, illustrated from his own collections of coins and vases, he dealt chiefly with Greek and Roman pottery and numismatics. Dr Babington was a many-sided man and wrote on a variety of subjects. His early familiarity with country life gave him a taste for natural history, especially botany and ornithology. He was also an authority on conchology. He was the author of the appendices on botany (in part) and ornithology in Potter's History and Antiquities of Chamwood Forest (1842); Mr Macaiday's Character of the Clergy . . . considered (1849), a defence of the clergy of the 17 th century, which received the approval of Mr Gladstone, against the strictures of Macaulay. He also brought out the editio princeps of the speeches of Hypereides Against Demosthenes (1850), On Behalf of Lycophron and Euxenippus.(i&53), and his Funeral Oration (1858). It was by his edition of these speeches from the papyri discovered at Thebes (Egypt) in 1847 and 1856 that Babington's fame as a Greek scholar was made. In 1855 he published an edition of Bencfizio della Morte di Cristo, a remarkable book of the Reformation period, attributed to Paleario, of which nearly all the copies had been destroyed by the Inquisition. Babington's edition was a facsimile of the editio princeps published at Venice in 1543, with Introduction and French and English versions. He also edited the first two volumes of Higden's Polychronicon (1858) and Bishop Pecock's Repressor of Overmuch Blaming of the Clergy (i860), undertaken at the request of the Master of the Rolls; Introductory Lecture on Archaeology (1865); Roman Antiquities found at Rougham [1872]; Catalogue of Birds of Suffolk (1884-1886); Flora of Suffolk (with W. M. Hind, 1889), and (1855, 1865) some inscriptions found in Crete by T. A. B. Spratt, the explorer of the island. In addition to contributing to various classical and scientific journals, he catalogued the

classical MSS. in the University Library and the Greek and English coins in the Fitzwilliam museum.

BABIRUSA (" pig-deer "), the Malay name of the wild swine of Celebes and Buru, which has been adopted in zoology as the scientific designation of this remarkable animal (the only representative of its genus), in the form of Babirusa alfurus. The skin is nearly naked, and very rough and rugged. The total number of teeth is 34, with the formula i.f . c.. p.. m.. The molars, and more especially the last, are smaller and simpler than in the pigs of the genus Sus, but the peculiarity of this genus is the extraordinary development of the canines, or tusks, of the male. These teeth are ever-growing, long, slender and curved, and without enamel. Those of the upper jaw are directed upwards from their bases, so that they never enter the mouth, but pierce the skin of the face, thus resembling horns rather than teeth; they curve backwards, downwards, and finally often forwards again, almost or quite touching the forehead. Dr A. R. Wallace remarks that " it is difficult to understand what can be the use of these horn-like teeth. Some of the old writers supposed that they served as hooks by which the creature could rest its

head on a branch. But the way in which they usually diverge just over and in front of the eye has suggested the more probable idea, that they serve to guard these organs from thorns and spines while hunting for fallen fruits among the tangled thickets of rattans and other spiny plants. Even this, however, is not satisfactory, for the female, who must seek her food in the same way, does not possess them. I should be inclined to believe rather that these tusks were once useful, and were then worn

Old Male Babirusa (Babirusa alfurus).

down as fast as they grew, but that changed conditions of life have rendered them unnecessary, and they now develop into a monstrous form, just as the incisors of the beaver and rabbit will go on growing if the opposite teeth do not wear them away. In old animals they reach an enormous size, and are generally broken off as if by fighting." On this latter view we may regard the tusks of the male babirusa as examples of redundant development, analogous to that of the single pair of lower teeth in some of the beaked whales. Unlike ordinary wild pigs, the babirusa produces uniformly coloured young. (See Swine.) (R. L.*)

BABOON (from the Fr. babuin, which is itself derived from

Babon, the Egyptian deity to whom it was sacred) , properly the designation of the long-muzzled, medium-tailed Egyptian monkey, scientifically known as Papio anubis; in a wider sense applied to all the members of the genus Papio (formerly known as Cynocephalus) now confined to Africa and Arabia, although in past times extending into India. Baboons are for the most part large terrestrial monkeys with short or medium-sized tails, and long naked dog-like muzzles, in the truncated extremity of which are pierced the nostrils. As a rule, they frequent barren rocky districts in large droves, and are exceedingly fierce and dangerous to approach. They have large cheek-pouches, large naked callosities, often brightly coloured, on the buttocks, and short thick limbs, adapted rather to walking than to climbing. Their diet includes practically everything eatable they can capture or kill. The typical representative of the genus is the yellow baboon (P. cynocephalus, or babuin), distinguished by its small size and grooved muzzle, and ranging from Abyssinia to the Zambezi. The above-mentioned anubis baboon, P. anubis (with the subspecies neumanni, pruinosus, heuglini and doguera), ranging from Egypt all through tropical Africa, together with P. sphinx, P. olivaceus, the Abyssinian P. lydekkeri, and the chacma, P. porcarius of the Cape, represent the subgenus Choeropithecus. The named Arabian baboon, P. hamadryas of North Africa and Arabia, dedicated by the ancient Egyptians to the god Thoth, and the South Arabian P. arabicus, typify Hamadryas; while the drill and mandrill of the west coast, P. leucophaeus and P. maimon, constitute the subgenus Maimon. The anubis baboons, as shown by the frescoes, were tamed by the ancient Egyptians and trained to pluck sycamore-figs from the trees. (See Primates; Chacma; Drill; Gelada and Mandrill). (R. L.*)

BABRIUS, author of a collection of fables written in Greek. Practically nothing is known of him. He is supposed to have been a Roman, whose gentile name was possibly Valerius, living in the East, probably in Syria, where the fables seem first

to have gained popularity. The address to “a son of King Alexander ” has caused much speculation, with the result that dates varying between the 3rd century B.C. and the 3rd century a.d. have been assigned to Babrius. The Alexander referred to may have been Alexander Severus (a.d. 222-235), who was fond

of having literary men of all kinds about his court. " The son of Alexander " has further been identified with a certain Branchus mentioned in the fables, and it is suggested that Babrius may have been his tutor; probably, however, Branchus is a purely fictitious name. There is no mention of Babrius in ancient writers before the beginning of the 3rd century A.D., and his language and style seem to show that he belonged to that period. The first critic who made Babrius more than a mere name was Richard Bentley, in his Dissertation on the Fables of Aesop. In a careful examination of these prose Aesopian fables, which had been handed down in various collections from the time of Maximus Planudes, Bentley discovered traces of versification, and was able to extract a number of verses which he assigned to Babrius. Tyrwhitt {Be Babrio, 1776) followed up the researches of Bentley, and for some time the efforts of scholars were directed towards reconstructing the metrical original of the prose fables. In 1842 M. Minas, a Greek, the discoverer of the Philosophoumena of Hippolytus, came upon a MS. of Babrius in the convent of St Laura on Mount Athos, now in the British Museum. This MS. contained 123 fables out of the supposed original number, 160. They are arranged alphabetically, but break off at the letter O. The fables are written in choliambic, i.e. limping or imperfect iambic verse, having a spondee as the last foot, a metre originally appropriated to satire. The style is extremely good, the expression being terse and pointed, the versification correct and elegant, and the construction of the stories is fully equal to that in the prose versions. The genuineness of this collection of the fables was generally admitted by scholars. In 1857 Minas professed to have discovered at Mount Athos another MS. containing 94 fables and a preface. As the monks refused to sell this MS., he made a copy of it, which was sold to the British Museum, and was published in 1859 by SirG. Cornewall Lewis. This, however, was soon proved to be a forgery. Six more fables were brought to light by P. Knoll from a Vatican MS. (edited by A. Eberhard, Analecta Babriana, 1879).

Editions. — Boissonade (1844) ; Lachmann (1845) ; Schneider (1853); Eberhard (1876); Gitlbauer (1882); Rutherford (1883); Knoll, Fabularum Babrianarum Paraphrasis Bodleiana (1877) ; Feuillet (1890); Desrousseaux (1890); Passerat (1892); Croiset (1892); Crusius (1897). See also Mantels, t)ber die Fabeln des B. (1840); Crusius, De Babrii Aetate (1879); Ficus, De Babrii Vita (1889); j. Weiner, Quaestiones Babrianae (1891); Conington, Miscellaneous Writings, ii. 460-491 ; Marchiano, Babrio (1899) ;

Fusci, Babrio (1901) ; Christoffersson, Studia de Fabulis Babrianis (1901). There are translations in English by Davies (i860) and in French by Leveque (1890), and in many other languages.

BABU, a native Indian clerk. The word is really a term of respect attached to a proper name, like ” master ” or ” Mr,” and Babu-ji is still used in many parts of India, meaning ” sir “; but without the suffix the word itself is now generally used contemptuously as signifying a semi-literate native, with a mere veneer of modern education.

BABY-FARMING, 1 a term meaning generally the taking in of infants to nurse for payment, but usually with an implication of improper treatment. Previous to the year 1871 the abuse of the practice of baby-farming in England had grown to an alarming extent, while the trials of Margaret Waters and Mary Hall called attention to the infamous relations between the lying-in houses and the baby-farming houses of London. The evil was, no doubt, largely connected with the question of illegitimacy, for there was a wide-spread existence of baby- farms where children were received without question on payment of a lump sum. Such children were nearly all illegitimate, and in these cases it was to the pecuniary advantage of the baby- farmer to hasten the death of the child. It had become also the practice for factory operatives and mill-hands to place out

1 Baby is a diminutive or pet form of ” babe,” now chiefly used in poetry or scriptural language. ” Babe ” is probably a form of the earlier baban, a reduplicated form of the infant sound ba.

their children by the day, and since in many cases the children were looked upon as a burden and a drain on their parents’ resources, too particular inquiry was not always made as to the mode in which the children were cared for. The form was gone through too of paying a ridiculously insufficient sum for the maintenance of the child. In 187 1 the House of Commons found it necessary to appoint a select committee ” to inquire a.s to the best means of preventing the destruction of the lives of infants put out to nurse for hire by their parents.” ” Improper and insufficient food,” said the committee, ” opiates, drugs, crowded rooms, bad air, want of cleanliness, and wilful neglect are sure to be followed in a few months by diarrhoea, convulsions and wasting away.” These unfortunate children were nearly all

illegitimate, and the mere fact of their being hand-nursed, and not breast-nursed, goes some way (according to the experir ence of the Foundling hospital and the Magdalene home) to, explain the great mortality among them. Such children, when nursed by their mothers in the workhouse, generally live. The practical result of the committee of 1871 was the act of 1872, which provided for the compulsory registration of all houses in which more than one child under the age of one year were received for a longer period than twenty-four hours. Nq licence was granted by the justices of the peace, unless the house was suitable for the purpose, and its owner a person of good character and able to maintain the children. Offences against the act, including wilful neglect of the children even in a suitable house, were punishable by a fine of £5 or six months' imprison- ment with or without hard labour. In 1896 a select committee of the House of Lords sat and reported on the working of this act. In consequence of this report the act of 1872 was repealed and superseded by the Infant Life Protection Act 1897, which did away with the system of registration and substituted for it one of notice to a supervening authority. By the act all persons, retaining or receiving for hire more than one infant under the age of five had to give written notice of the fact to the local authority. The local authorities were empowered to appoint inspectors, and required to arrange for the periodical inspection of infants so taken in, while they could also fix the number of infants which might be retained. By a special clause any person, receiving an infant under the age of two years for a sum of money not exceeding twenty pounds had to give notice of the fact to the local authority. If any infants were improperly kept, the inspector might obtain an order for their removal to a work- houseorplace of safety until restored to their parents orguardians, or otherwise legally disposed of. The act of 1897 was repealed and amended by the Children Act 1908, which codified the law relating to children, and added many new provisions. This act is dealt with in the article Children, Law relating to.

In the United States the law is noticeably strict in most states. In Massachusetts, a law of 1891 directs that "every person who receives for board, or for the purpose of procuring adoption, an infant under the age of three years shall use diligence to ascertain whether or not such infant is illegitimate, and if he knows or has reason to believe it to be illegitimate shall forthwith notify the State Board of Charity of the fact of such reception; and said board and its officers or agents may enter and

inspect any building where they may have reason to believe that any such illegitimate infant is boarded, and remove such infaat when, in *heir judgment, such removal is necessary by reason of neglect, abuse or other causes, in order to preserve the infant's life, and such infant so removed shall be in the custody cf said Board of Charity, \>hich shall make provision therefor according to law." The penal code of the state of New York requires a licence for baby-farming to be issued by the board of health of the city or town where such children are boarded or kept, and " every person so licensed must keep a register wherein he shall enter the names and ages of all such children, and of all children born on such premises, and the names and residences of their parents, as far as known, the time of reception and the discharge of such children, and the reasons therefor, and also a correct register of every child under five years of age who is given out, adopted, taken away, or indentured from such place

to or by any one, together with the name and residence of the person so adopting " (Pen. Code, § 288, subsec. 4).

Persons neglecting children may be prosecuted under § 289 of the N.Y. penal code, which provides that any person who " wilfully causes or permits the life or limb of any child, actually or apparently under the age of sixteen years, to be endangered, or its health to be injured, or its morals to become depraved ... is guilty oi a misdemeanour."

In Australia particular care has been taken by most of the states to prevent the evils of baby-farming. In South Australia there is a State Children's Council, which, under the State Children Act of 1895, has large powers with respect to the oversight of infants under two years boarded out by their mother. " Foster-mothers," as the women who take in infants as boarders are called, must be licensed, while the number of children authorized to be kept by the foster-mother is fixed by licence; every licensed foster-mother must keep a register containing the name, age and place of birth of every child received by her, the names, addresses and description of the parents, or of any person other than the parents from or to whom the child was received or delivered over, the date of receipt or delivery over, particulars of any accident to or illness of the child, and the name of the medical

practitioner (if any) by whom attended. In New South Wales the Children's Protec- tion Act of 1892, with the amendments of 1902, requires the same state supervision over the homes in which children are boarded out, with licensing of foster-mothers. In Victoria an act was passed in 1890 for " making better provision for the protection of infant life." In New Zealand, there is legislation to the same effect by the " Adoption of Children Act 1895 " and the "Infant Life Protection Act 1896."

BABYLON (mod. Hillak), an ancient city on the left bank of the Euphrates, about 70 m. S. of Bagdad. " Babylon " is the Greek form of Babel or Bab-ili, " the gate of the god " (some- times incorrectly written "of the gods"), which again is the Semitic translation of the original Sumerian name Ka-dimirra. The god was probably Merodach or Marduk (q.v.), the divine patron of the city. In an inscription of the Kassite conqueror Gaddas the name appears as Ba-ba-lam, as if from the Assyrian babalu, " to bring "; another foreign Volksetymologie is found in Genesis xi. 9, from balbal, " to confound." A second name of the city, which perhaps originally denoted a separate village or quarter, was Su-ahna, and in later inscriptions it is often repre- sented ideographically by E-ki, the pronunciation and meaning of which are uncertain. One of its oldest names, however, was Din-tir, of which the poets were especially fond; Din-tir signifies in Sumerian " the life of the forest," though a native lexicon translates it " seat of life." Uru-azagga, " the holy city," was also a title sometimes applied to Babylon as to other cities in Babylonia. Ka-dimirra, the Semitic Bab-ili, probably denoted at first E-Saggila, " the house of the lofty head," the temple dedicated to Bel-Merodach, along with its immediate surround- ings. Like the other great sanctuaries of Babylonia the temple had been founded in pre-Semitic times, and the future Babylon grew up around it. Since Merodach was the son of Ea, the culture god of Eridu near Ur on the Persian Gulf, it is possible that Babylon was a colony of Eridu. Adjoining Babylon was a town called Borsippa (q.v.).

The earliest mention of Babylon is in a dated tablet of the reign of Sargon of Akkad (3800 B.C.), who is stated to have built sanctuaries there to Anunit and Ae (or Ea), and H. Winckler may be right in restoring a mutilated passage in the annals of this king so as to make it mean that Babylon owed its name to Sargon, who made it the capital of his empire. If so, it fell back afterwards into the position of a mere provincial town and re- mained so for centuries, until it became the capital of " the first

dynasty of Babylon " and then of Khammurabi's empire (2250 B.C.). From this time onward it continued to be the capital of Babylonia and the holy city of western Asia. The claim to supremacy in Asia, however real in fact, was not admitted de jure until the claimant had " taken the hands " of Bel- Merodach at Babylon, and thereby been accepted as his adopted

son and the inheritor of the old Babylonian empire. It was this which made Tiglath-pileser III. and other Assyrian kings so anxious to possess themselves of Babylon and so to legitimize their power. Sennacherib alone seems to have failed in securing the support of the Babylonian priesthood; at all events he never underwent the ceremony, and Babylonia throughout his reign was in a constant state of revolt which was finally suppressed only by the complete destruction of the capital. In 689 b.c. its walls, temples and palaces were razed to the ground and the rubbish thrown into the Arakhtu, the canal wHich bordered the earlier Babylon on the south. The act shocked the religious conscience of western Asia; the subsequent murder of Sennacherib was held to be an expiation of it, and his successor Esarhaddon hastened to rebuild the old city, to receive there his crown, and make it his residence during part of the year. On his death Babylonia was left to his elder son Samas-sum-yukin, who eventually headed a revolt against his brother Assur-bani-pal of Assyria. Once more Babylon was besieged by the Assyrians and starved into surrender. Assur-bani-pal purified the city and celebrated a " service of reconciliation," but did not venture to " take the hands " of Bel. In the subsequent overthrow of the Assyrian empire the Babylonians saw another example of divine vengeance.

With the recovery of Babylonian independence under Nabopolassar a new era of architectural activity set in, and his son Nebuchadrezzar made Babylon one of the wonders of the ancient world. It surrendered without a struggle to Cyrus, but two sieges in the reign of Darius Hystaspis, and one in the reign of Xerxes, brought about the destruction of the defences, while the monotheistic rule of Persia allowed the temples to fall into decay. Indeed part of the temple of E-Saggila, which like other ancient temples served as a fortress, was intentionally pulled down by Xerxes after his capture of the city. Alexander was murdered in the palace of Nebuchadrezzar, which must therefore have been still standing, and cuneiform texts show that, even under the Seleucids, E-Saggila was not wholly a ruin. The foundation of Seleucia in its neighbourhood, however, drew away the popula-

tion of the old city and hastened its material decay. A tablet dated 275 b.c. states that on the 12th of Nisan the inhabitants of Babylon were transported to the new town, where a palace was built as well as a temple to which the ancient name of E-Saggila was given. With this event the history of Babylon comes practically to an end, though more than a century later we find sacrifices being still performed in its old sanctuary.

Our knowledge of its topography is derived from the classical writers, the inscriptions of Nebuchadrezzar, and the excavations of the Deutsche Orientgesellschaft, which were begun in 1899. The topography is necessarily that of the Babylon of Nebuchadrezzar; the older Babylon which was destroyed by Sennacherib having left few, if any, traces behind. Most of the existing remains lie on the E. bank of the Euphrates, the principal being three vast mounds, the Babil to the north, the Qasr or " Palace " (also known as the Mujelliba) in the centre, and the Ishan 'Amran ibn 'Ali, with the outlying spur of the Jumjuma, to the south. Eastward of these come the Ishan el-Aswad or " Black Mound " and three lines of rampart, one of which en- > closes the Babil mound on the N. and E. sides, while a third forms a triangle with the S.E. angle of the other two. W. of the Euphrates are other ramparts and the remains of the ancient Borsippa.

We learn from Herodotus and Ctesias that the city was built on both sides of the river in the form of a square, and enclosed within a double row of lofty walls to which Ctesias adds a third. Ctesias makes the outermost wall 360 stades (42 m.) in circumference, while according to Herodotus it measured 480 stades (56 m.), which would include an area of about 200 sq. m. The estimate of Ctesias is essentially the same as that of Q. Curtius (v. 1. 26), 368 stades, and Clitarchus (ap. Diod. Sic. ii. 7), 365 stades; Strabo (xvi. 1. 5) makes it 385 stades. But even the estimate of Ctesias, assuming the stade to be its usual length, would imply an area of about 100 sq. m. According to Herodotus the height of the walls was about 335 ft. and their width 85 ft,;

according to Ctesias the height was about 300 ft. The measurements seem exaggerated, but we must remember that even in Xenophon's time (Anab. iii. 4. 10) the ruined wall of Nineveh was still 150 ft high, and that the spaces between the 250 towers of

the wall of Babylon (Ctes. 417, ap. Diod. ii. 7) were broad enough to let a four-horse chariot turn (Herod, i. 179). The clay dug from the moat served to make the bricks of the wall, which had 100 gates, all of bronze, with bronze lintels and posts. The two inner enclosures were faced with enamelled tiles and repre- sented hunting-scenes. Two other walls ran along the banks of the Euphrates and the quays with which it was lined, each containing 25 gates which answered to the number of streets they led into. Ferry-boats plied between the landing- places of the gates, and a movable drawbridge (30 ft. broad), supported on stone piers, joined the two parts of the city together.

The account thus given of the walls must be grossly exaggerated and cannot have been that of an eye-witness. Moreover, the two-walls — Imgur-Bel, the inner wall, and Nimitti-Bel, the outer — which enclosed the city proper on the site of the older Babylon have been confused with the outer ramparts (enclosing the whole of Nebuchadrezzar's city), the remains of which can still be traced to the east. According to Nebuchadrezzar, Imgur-Bel was built in the form of a square, each side of which measured "30 aslu by the great cubit"; this would be equivalent, if Professor F. Hommel is right, to 2400 metres. Four thousand cubits to the east the great rampart was built " mountain high," which surrounded both the old and the new town; it was pro- vided with a moat, and a reservoir was excavated in the triangle on the inner side of its south-east corner, the western wall of which is still visible. The Imgur-Bel of Sargon's time has been discovered by the German excavators running south of the Qasr from the Euphrates to the Gate of Ishtar.

The German excavations have shown that the Qasr mound represents both the old palace of Nabopolassar, and the new palace adjoining it built by Nebuchadrezzar, the wall of which he boasts of having completed in 1 5 days. They have also laid bare the site of the " Gate of Ishtar " on the east side of the mound and the little temple of Nin-Makh (Beltis) beyond it, as well as the raised road for solemn processions (A-ibur-sabu) which led from the Gate of Ishtar to E-Saggila and skirted the east side of the palace. The road was paved with stone and its walls on either side lined with enamelled tiles, on which a procession of lions is represented. North of the mound was a canal, which seems to have been the Libilkhegal of the inscriptions, while on the south side was the Arakhtu, " the river of Babylon," the brick quays of which were built by Nabopolassar.

The site of E-Saggila is still uncertain. The German ex- cavators assign it to the ‘Amran mound, its tower having stood in a depression immediately to the north of this, and so place it south of the Qasr; but E. Lindl and F. Hommel have put forward strong reasons for considering it to have been north of the latter, on a part of the site which has not yet been explored. A tablet copied by George Smith gives us interesting details as to the plan and dimensions of this famous temple of Bel; a plan based on these will be found in HommePs Grundriss der Geographic und Geschichte des alien Orients, p. 321. There were three courts, the outer or great court, the middle court of Ishtar and Zamama, and the inner court on the east side of which was the tower of seven stages (known as the House of the Foundation of Heaven and Earth), 90 metres high according to Hommel’s calculation of the measurements in the tablet; while on the west side was the temple proper of Merodach and his wife Sarpanit or Zarpanit, as well as chapels of Anu, Ea and Bel on either side of it. A winding ascent led to the summit of the tower, where there was a chapel, containing, according to Herodotus, a couch and golden table (for the showbread),but no image. The golden image of Merodach 40 ft. high, stood in the temple below, in the sanctuary called E-Kua or ” House of the Oracle,” together with a table, a mercy-seat and an altar — all of gold. The deities whose chapels were erected within the precincts of the temple enclosure were re-garded as forming his court. Fifty-five of these chapels existed

altogether in Babylon, but some of them stood independently in other parts of the city.

There are numerous gates in the walls both of E-Saggila and of the city, the names of many of which are now known. Nebuchadrezzar says that he covered the walls of some of them with blue enamelled tiles ” on which bulls and dragons were pourtrayed,” and that he set up large bulls and serpents of bronze on their thresholds.

The Babil mound probably represents the site of a palace built by Nebuchadrezzar at the northern extremity of the city walls and attached to a defensive outwork 60 cubits in length. Since H. Rassam found remains of irrigation works here it might well be the site of the Hanging Gardens. These consisted, we are told, of a garden of trees and flowers, built on the topmost of a series of arches some 75 ft. high, and in the form of a square, each side of which measured 400 Greek ft. Water was raised from the Euphrates by means of a screw (Strabo xvi. 1. 5; Diod. ii. 10. 6).

In the Jumjuma mound at the southern ex- tremity of the old city the contract and other business tablets of the Egibi firm were found.

See C. J. Rich, Memoir on the Ruins of Babylon (1816), and Collected Memoirs (1839); A. H. Layard, Nineveh and Babylon (1853); C. P. Tiele, De Hoofdtempel van Babel (1886); A. H. Sayce, Religion of the Ancient Babylonians, App. ii. (1887); C. J. Ball in Records of the Past (new ser. iii. 1890); Mittheilungen der deutschen Orientgesellschaft (1899ˆ1906) ; F. Delitzsch, Im Lande des einstigen Paradieses (1903) ; F. H. Weissbach, Das Stadtbild von Babylon (1904); F. Hommel, Grundriss der Geographie und Geschichte des alien Orients (1904). (A. H. S.)

BABYLONIA AND ASSYRIA. I. Geography— Geographic- ally as well as ethnologically and historically, the whole district enclosed between the two great rivers of western Asia, the Tigris and Euphrates, forms but one country. The writers of antiquity clearly recognized this fact, speaking of the whole under the general name of Assyria, though Babylonia, as will be seen, would have been a more accurate designation. It naturally falls into two divisions, the northern being more or less mountainous, while the southern is flat and marshy; the near approach of the two rivers to one another, at a spot where the undulating plateau of the north sinks suddenly into the Babylonian alluvium, tends to separate them still more completely. In the earliest times of which we have any record, the northern portion was included in Mesopotamia; it was definitely marked off as Assyria only after the rise of the Assyrian monarchy. With the exception of Assur, the original capital, the chief cities of the country, Nineveh, Calah and Arbela, were all on the left bank of the Tigris. The reason of this preference for the eastern bank of the Tigris was due to its abundant supply of water, whereas the great Meso- potamian plain on the western side had to depend upon the streams which flowed into the Euphrates. This vast flat, the modern El-Jezireh, is about 250 miles in length, interrupted only by a single limestone range, rising abruptly out of the plain, and branching off from the Zagros mountains under the names of Sarazur, Hamrin and Sinjar. The numerous remains of old habitations show how thickly this level tract must once have been peopled, though now for the most part a wilderness. North of the plateau rises a well-watered and undulating belt of country, into which run low ranges of limestone hills, sometimes arid, sometimes covered with dwarf-oak, and often shutting in, between their northern and north-eastern flank and the main

mountain'-line from which they detach themselves, rich plains and fertile valleys. Behind them tower the massive ridges of the Niphates and Zagros ranges, where the Tigris and Euphrates take their rise, and which cut off Assyria from Armenia and Kurdistan.

The name Assyria itself was derived from that of the city of Assur (q.v.) or Asur, now Qal'at Sherqat (Kaleh Shergat), which stood on the right bank of the Tigris, midway between the Greater and the Lesser Zab. It remained the capital long after the Assyrians had become the dominant power in western Asia, but was finally supplanted by Calah (Nimrud), Nineveh (Nebi Yunus and Kuyunjik) , and Dur-Sargina (Khorsabad) , some 60 m. farther north (see Nineveh).

In contrast with the arid plateau of Mesopotamia, stretched the

rich alluvial plain of Chaldaea, formed by the deposits of the two great rivers by which it was enclosed. The soil was extremely fertile, and teemed with an industrious population. Eastward rose the mountains of Elam, southward were the sea-marshes and the Kalda or Chaldaeans and other Aramaic tribes, while on the west the civilization of Babylonia encroached beyond the banks of the Euphrates, upon the territory of the Semitic nomads (or Suti). Here stood Ur (Mugheir, more correctly Muqayyar) the earliest capital of the country; and Babylon, with its suburb, Borsippa (Birs Nimrud), as well as the two Sipparas (the Sepharvaim of Scripture, now Abu Habba), occupied both the Arabian and Chaldaean sides of the river (see Babylon). The Arakhtu, or " river of Babylon," flowed past the southern side of the city, and to the south-west of it on the Arabian bank lay the great inland freshwater sea of Nejef, surrounded by red sandstone cliffs of considerable height, 40 m. in length and 35 in breadth in the widest part. Above and below this sea, from Borsippa to Kufa, extend the famous Chaldaean marshes, where Alexander was nearly lost (Arrian, Exp. Al. vii. 22; Strab. xvi. 1, § 12); but these depend upon the state of the Hindiya canal, disappearing altogether when it is closed.

Eastward of the Euphrates and southward of Sippara, Kutha and Babylon were Kis (Ukaimir, 9 m. E. of Hillah), Nippur (Nijfer) — where stood the great sanctuary of El-lil, the older Bel — Uruk or

Erech (Warka) and Larsa (Senkera) with its temple of the sun-god, While eastward of the Shatt el-Hai, probably the ancient channel of the Tigris, was Lagash (Tello), which played an important part in early Babylonian history. The primitive seaport of the country, Eridu, the seat of the worship of Ea the culture-god, was a little south of Ur (at Abu Shahrain or Nowawis on the west side of the Euphrates). It is now about 130 m. distant from the sea; as about 46 in. of land have been formed by the silting up of the shore since the foundation of Spasinus Charax (Muhamrah) in the time of Alexander the Great, or some 115 ft. a year, the city would have been in existence at least 6000 years ago. The marshes in the south like the adjoining desert were frequented by Aramaic tribes; of these the most famous were the Kalda or Chaldaeans who under Merodach-baladan made themselves masters of Babylon and gave their name in later days to the whole population of the country. The combined stream of the Euphrates and Tigris as it flowed through the marshes was known to the Babylonians as the nar marrali, ” the salt river” (cp. Jer. 1. 21), a name originally applied to the Persian Gulf.

The alluvial plain of Babylonia was called Edin, the Eden of Gen. ii., though the name was properly restricted to ” the plain ” on the western bank of the river where the Bedouins pastured the flocks of their Babylonian masters. This ” bank ” or kisad, together with the corresponding western bank of the Tigris (according to Hommel the modern Shatt el-Hai), gave its name to the land of Chesed, whence the Kasdim of the Old Testament. In the early inscriptions of Lagash the whole district is known as Gu-Edinna, the Sumerian equivalent of the Semitic Kisad Edini. The coast-land was similarly known as Gu-abba (Semitic Kisad tamtim) , the ” bank of the sea.” A more comprehensive name of southern Babylonia was Kengi, “the land,” or Kengi Sumer, ” the land of Sumer,” for which Sumer alone came afterwards to be used. Sumer has been supposed to be the original of the Biblical Shinar; but Shinar represented northern rather than southern Babylonia, and was probably the Sankhar of the Tell el-Amarna tablets (but see Sumer). Opposed to Kengi and Sumer were Urra (Uri) and Akkad or northern Babylonia. The original meaning of Urra was perhaps ” clayey soil,” but it came to signify ” the upper country ” or ” highlands,” kengi being ” the lowlands.” In Semitic times Urra was pronounced Uri and confounded with uru, “city”; as a geographical term, however, it was replaced by Akkadu (Akkad), the Semitic form of AgadS— written Akkattim in the Elamite inscriptions — the name of the elder Sargon’s capital,

which must have stood close to Sippara, if indeed it was not a quarter of Sippara itself. The rise of Sargon's empire was doubtless the cause of this extension of the name of Akkad; from henceforward, in the imperial title,

" Sumer and Akkad " denoted the whole of Babylonia. After the Kassite conquest of the country, northern Babylonia came to be known as Kar-Duniyas, " the wall of the god Duniyas," from a line of fortification similar to that built by Nebuchadrezzar between Sippara and Opis, so as to defend his kingdom from attacks from the north. As this last was " the Wall of Semiramis " mentioned by Strabo (xi. 14. 8), Kar-Duniyas may have represented the Median Wall of Xenophon (Anab. ii. 4. 12), traces of which were found by F. R. Chesney extending from Faluja to Jibbar.

The country was thickly studded with towns, the sites of which are still represented by mounds, though the identification of most of them is still doubtful. The latest to be identified are Bismya, between Nippur and Erech, which recent American excavations have proved to be the site of Udab (also called Adab and Usab) and the neighbouring Fara, the site of the ancient Kisurra. The dense population was due to the elaborate irrigation of the Babylonian plain which had originally reclaimed it from a pestiferous and uninhabitable swamp and had made it the most fertile country in the world. The science of irrigation and engineering seems to have been first created in Babylonia, which was covered by a network of canals, all skilfully planned and regulated. The three chief of them carried off the waters of the Euphrates to the Tigris above Babylon, — the Zabzallat canal (or Nakr Sarsar) running from Faluja to Ctesiphon, the Kutha canal from Sippara to Madain, passing Tell Ibrahim or Kutha on the way, and the King's canal or Ar-Malcha between the other two. This last, which perhaps owed its name to Khammurabi, was conducted from the Euphrates towards Upi or Opis, which has been shown by H. Winckler {Altorientalische Forschungen, ii. pp. 509 seq.) to have been close to Seleucia on the western side of the Tigris. The Pallacopas, called Pallukkatu in the Neo-Babylonian texts, started from Pallukkatu or Faluja, and running parallel to the western bank of the Euphrates as far as Iddaratu or Teredon (?) watered an immense tract of land and supplied a large lake near Borsippa. B . Meissner may be right in identifying it with " the Canal of the Sun-god " of the early texts. Thanks to this system of irrigation the cultivation of the soil was highly advanced in Babylonia. According to Herodotus (i. 193) wheat

commonly returned two hundred-fold to the sower, and occasionally three hundred-fold. Pliny (H. N. xviii. 17) states that it was cut twice, and afterwards was good keep for sheep, and Berossus remarked that wheat, sesame, barley, ochrys, palms, apples and many kinds of shelled fruit grew wild, as wheat still does in the neighbourhood of Anah. A Persian poem celebrated the 360 uses of the palm (Strabo xvi. 1. 14), and Ammianus Marcellinus (xxiv. 3) says that from the point reached by Julian's army to the shores of the Persian Gulf was one continuous forest of verdure.

II. Classical Authorities. — Such a country was naturally fitted to be a pioneer of civilization. Before the decipherment of the cuneiform texts our knowledge of its history, however, was scanty and questionable. Had the native history of Berossus survived, this would not have been the case; all that is known of the Chaldaean historian's work, however, is derived from quotations in Josephus, Ptolemy, Eusebius and the Syncellus. The authenticity of his list of 10 antediluvian kings who reigned for 120 sari or 432,000 years, has been partially confirmed by the inscriptions; but his 8 postdiluvian dynasties are difficult to reconcile with the monuments, and the numbers attached to them are probably corrupt. It is different with the 7th and 8th dynasties as given by Ptolemy in the Almagest, which prove to have been faithfully recorded: —

1. Nabonassar (747 B.C.) 14 years

2. Nadios 2 „

3. Khinziros and Poros (Pul) 5 „

4. Ilulaeos 5 i> •

5. Mardokempados (Merodach-Baladan) . 12 „

6. Arkeanos (Satgon) 5 „

7. Interregnum 2 ,,

8. Hagisa 1 month

9. Belibos (702 B.C.) 3 years

10. Assaranadios (Assur-nadin-sum) . . . 6 „

, II. RegebeloS- . • . > ■ • • • . •'• • iyear 12. Mesesimordakos . . . . 4 years

" 13. Interregnum . 8 „

14. Asaridinos (Esar-haddon) . . . . . 13 ,,

: 15. Saosdukhinos (Savul-sum-yukin) . . . . 20 „ i6. Sineladanos (Assur-bani-pal) . . . . r .22 ■„ .

The account of Babylon given by Herodotus is not that of an eye-witness, and his historical notices are meagre and untrust-worthy. He was controverted by Ctesias, who, however, has mistaken mythology for history, and Greek romance owed to him its Ninus and Semiramis, its Ninyas and Sardanapalus. The only ancient) authority of value on Babylonian and Assyrian history is the' Old Testament.

III. Modern Discovery. .* The excavations of iP: E. Botta and A. H. Layard at Nineveh opened up a new world, coinciding as they did with the successful decipherment of the cuneiform system of writing. Layard's discovery of the library of Assur- bani-pal put the materials for reconstructing the ancient life and history of Assyria and Babylonia into the hands of scholars. He also was the first to excavate in Babylonia, where C. J. Rich had already done useful topographical work. Layard's excava- tions in this latter; country were continued by W. K. Lof tus, who also opened trenches at Susa, as well as by J. Oppert on behalf of the trench government. 1 But it was only in the last quarter of the 19th century that anything like systematic exploration was attempted. After the death of George Smith at Aleppo in 1876, an expedition was sent by the British Museum (1877- 1879), under the conduct of Hormuzd Rassam, to continue his work at Nineveh and its neighbourhood. Excavations in the mounds of Balawat, called Imgur-Bel by the Assyrians, 15 m. east of Mosul, resulted in the discovery of a small temple dedi-> cated to the god of dreams by Assur-nazir-pal III. (883 B.C.), containing a stone coffer or ark in which were two inscribed tables of alabaster of rectangular shape, as well as of a palace which had been destroyed by the Babylonians but restored by Shal- maneser II: (858 B.C.). From the latter came the bronze gates with hammered reliefs, which are now in the British Museum. The remains of a palace of Assur-nazir-pal III. at Nimrud (Calah) were also excavated, and

hundreds of enamelled tiles were disinterred. Two years later (1880-1881) Rassam was sent to Babylonia, where he discovered the site of the temple of the sun-god of Sippara at Abu-Habba, and so fixed the position of the two Sipparas or Sepharvaim. Abu-Habba lies south-west of Bagdad, midway between the Euphrates and Tigris, on the south side of a canal, which may once have represented the main stream of the Euphrates, Sippara of ! the goddess Anunit, now Dir, being on its opposite bank.

Meanwhile (1877-1881) the French consul, de Sarzec, had been excavating at Tello, the ancient Lagash, and bringing to light monuments of the pre-Semitic age, which included the diorite statues of Gudea now in the Louvre, the stone of which, accord- ing to the inscriptions upon them, had been brought from Magan, the Sinaitic peninsula. The subsequent excavations of de Sarzec in Tello and its neighbourhood carried the history of the city back to at least 4000 B.C., and a collection of more than 30,000 tablets has been found, which were arranged on shelves in the time of Gudea (c.2700 B.C.). In 1886-1887 a German expedi- tion under Dr Koldewey explored the cemetery of El Hibba (immediately to the south of Tello), and for the first time made Us acquainted with the burial customs of ancient Babylonia. Another German expedition, on a large scale, was despatched by the Or.ientgesellschaft in 1899 with the object of exploring the ruins of Babylon; the palace of Nebuchadrezzar and the great processional road were laid bare, and Dr W. Andrae subsequently conducted excavations at Qal'at Sherqat, the site of Assur. Even the Turkish government has not held aloof from the work of exploration, and the Museum at Constantinople is filled with the tablets discovered by Dr V. Scheil in 1897 on the site of Sippara. J. de Morgan's exceptionally important work at Susa lies outside the limits of Babylonia; not so, however, the American excavations (1903-1904) under E. J. Banks at Bismya (Udab),, and those of the university of Pennsylvania at Niffer (see Nippur) first begun in 1889, where Mr J.H. Haynes

has systematically and patiently uncovered the remains of the great temple of El-lil, removing layer after layer of debris and cutting sections in the ruins down to the virgin soil. Midway in the mound is a platform of large bricks stamped with the names of Sargon of Akkad and his son Naram-Sin (3800 B.C.); a& th£ debris above them is 34 ft. thick, the topmost stratum being not later than the Parthian era (H. V. Hilprecht, The Babylonian Expedition, i. 2, p. 23), it is calculated that the debris underneath the pavement, 30 ft. thick, must represent a period of about 3000

years, more especially as older constructions had to be levelled before the pavement was laid. In the deepest part of the excavations, however, inscribed clay tablets and fragments of stone vases are still found, though the cuneiform characters upon them are of a very archaic type, and sometimes even retain their primitive pictorial forms.

IV. Chronology? — -The later chronology of Assyria has long been fixed, thanks to the lists of limmi, or archons, who gave their names in succession to their years of office. Several copies of these lists from the library of Nineveh are in existence, the earliest of which goes back to 911 B.C., while the latest comes down to the middle of the reign of Assur-bani-pal.' The beginning of a king's reign is noted in the lists, and in some, of them the chief events of the year are added to the name of its ar.cjh.on, Assyrian chronology is, therefore, certain from 911 B.C. to 666,,. and an eclipse of the sun which is stated to have been visible in the month Sivan, 763 B.C., is one that has been calculated to have taken place on the 15th of June of that year. The system of reckoning time by Ummi was of Assyrian origin, and recent discoveries have made it clear that it went back to the first days of the monarchy. Even in the distant colony at Kara Euyuk near Kaisariyeh (Caesarea) in Cappadocia cuneiform tablets show that the Assyrian settlers used it in the 15th century B.C. In Babylonia a different system was adopted. Here the years were dated by the chief events that distinguished them, as was also the case in Egypt in the epoch of the Old Empire. What the event should be was determined by the government and notified to all its officials; one of these notices, sent to the Babylonian officials in Canaan in the reign of Samsu- iluna, the son of Khammurabi, has been found in the Lebanon: A careful register of the dates was kept, divided into reigns, from which dynastic lists were afterwards compiled, giving the duration of each king's reign as well as that of the several dynasties. Two of these dynastic compilations have been discovered, unfortunately in an imperfect state. 2 In addition to the chronological tables, works of a more ambitious and literary character were also attempted of the nature of chronicles. One of these is the so-called" Synchronous History of Assyria and Babylonia/' consisting of brief notices, written by an Assyrian, of the occasions on which the kings of the two countries had entered into relation, hostile or otherwise, with one another; a second is the Babylonian Chronicle- discovered by Dr Th. G. Pinches, which gave a synopsis of Babylonian history from a Babylonian point of view,

and was compiled in the reign of Darius. It is interesting to note that its author says of the battle of Khalule, which we know from the Assyrian inscriptions to have taken place in 691 or 690 B.C., that he does ” not know the year ” when it was fought: the records of Assyria had been already lost, even in Babylonia. The early existence of an’ accurate system of dating is not surprising; it was necessitated by the fact that Babylonia was a great trading community, in which it was not only needful that commercial and legal docu- ments should be dated, but also that it should be possible to refer easily to the dates of former business transactions. The Baby- lonian and Assyrian kings had consequently no difficulty in

1 For a survey of the chronological systems adopted by different modern scholars, see below, section viii. ” Chronological Systems.”

2 The compiler of the more complete one seems to have allowed himself liberties. At all events he gives 30 years of reign to Sin-muballidh instead of the 20 assigned to him in a list of dates drawn up at the time of Ammi-zadok’s accession, 55 years to Khammurabi instead of 43, and 35 years to Sarnsu-‘iluna instead of 38, while he omits altogether the seven years’ reign of the Assyrian king Tukulti- In-aristi at Babylon: ‘

determining the age of their predecessors or of past events. Nabonidus (Nabunaid) , who was more of an antiquarian than a politician, and spent his time in excavating the older temples of his country and ascertaining the names of their builders, tells us that Naram-Sin, the son of Sargon of Akkad, lived 3200 years before himself (i.e. 3750 B.C.), and Sagarakti-suryas 800 years; and we learn from Sennacherib that Shalmaneser I. reigned 600 years earlier, and that Tiglath-pileser I. fought with Merodach-nadin-akhi (Marduk-nadin-akhe) of Babylon 418 years before the campaign of 689 B.C.; while, according to Tiglath-pileser I., the high-priest Samas-Hadad, son of Isme- Dagon, built the temple of Anu and Hadad at Assur 701 years before his own time. Shalmaneser I. in his turn states that the high-priest Samas-Hadad, the son of Bel-kabi, governed Assur 580 years previously, and that 159 years before this the high- priest Erisum was reigning there. The raid of the Elamite king Kutur-Nakhkhunte is

placed by Assur-bani-pal 1635 years before his own conquest of Susa, and Khammurabi is said by Nabonidus to have preceded Burna-buryas by 700 years.

V. History. — In the earliest period of which we have any knowledge Babylonia was divided into several independent

states, the limits of which were denned by canals and Sumerian boundary stones. Its culture may be traced back to period. two main centres, Eridu in the . south and Nippur

in the north. But the streams of civilization which flowed from them were in strong contrast. El-lil, around whose sanctuary Nippur had grown up, was lord of the ghost-land, and his gifts to mankind were the spells and incantations which the spirits of good or evil were compelled to obey. The world which he governed was a mountain; the creatures whom he had made lived underground. Eridu, on the other hand, was the home of the culture-god Ea, the god of light and beneficence, who employed his divine wisdom in healing the sick and restoring the dead to life. Rising each morning from his palace in the deep, he had given man the arts and sciences, the industries and manners of civilization. To him was due the invention of writing, and the first law-book was his creation. Eridu had once been a seaport, and it was doubtless its foreign trade and intercourse with other lands which influenced the development of its culture. Its cosmology was the result of its geographical position: the earth, it was believed, had grown out of the waters of the deep, like the ever-widening coast at the mouth of the Euphrates. Long before history begins, however, the cultures of Eridu and Nippur had coalesced. While Babylon seems to have been a colony of Eridu, Ur, the immediate neigh- bour of Eridu, must have been colonized from Nippur, since its moon-god was the son of El-lil of Nippur. But in the admixture of the two cultures the influence of Eridu was predominant.

We may call the early civilization of Babylonia Sumerian. The race who first developed it spoke an agglutinative language, and to them was due the invention of the pictorial hieroglyphs which became the running-hand or cuneiform characters of later days, as well as the foundation of the chief cities of the country and the elements of its civilization. The great engineering works by means of which the marshes were drained and the overflow of the rivers regulated by canals went back to Sumerian times, like a considerable part of later Babylonian religion and the

beginnings of Babylonian law. Indeed Sumerian continued to be the language of religion and law long after the Semites had become the ruling race.

Arrival of the Semites. — When the Semites first entered the Edin or plain of Babylonia is uncertain, but it must have been

at a remote period. The cuneiform system of writing influence. was stu ˆ m process of growth when it was borrowed

and adapted by the new comers, and the Semitic Babylonian language was profoundly influenced by the older language of the country, borrowing its words and even its grammatical usages. Sumerian in its turn borrowed from Semitic Babylonian, and traces of Semitic influence in some of the earliest Sumerian texts indicate that the Semite was already on the Babylonian border. His native home was probably Arabia; hence Eridu (" the good city ") and Ur (" the city ")

would have been built in Semitic territory, and their population may have included Semitic elements from the first. It was in the north, however, that the Semites first appear on the monuments. Here in Akkad the first Semitic empire was founded, Semitic conquerors or settlers spread from Sippara to Susa, Khana to the east of the Tigris was occupied by " West Semitic " tribes, and " out of " Babylonia " went forth the Assyrian." As in Assyria, so too in the states of Babylonia the patesi or high-priest of the god preceded the king. The state had grown up around a sanctuary, the god of which was nominally its ruler, the human patesi being his viceregent. In course of time many of the high-priests assumed the functions and title of king; while retaining their priestly office they claimed at the same time to be supreme in the state in all secular concerns. The god remained nominally at its head; but even this position was lost to him when Babylonia was unified under Semitic princes, and the earthly king became an incarnate god. A recollection of his former power survived, however, at Babylon, where Bel-Merodach adopted the king before his right to rule was allowed.

Early Princes. — The earliest monuments that can be approximately dated come from Lagash (Tello). Here we hear of a " king of Kengi," as well as of a certain Me-silim, king .

of Kis, who had dealings with Lugal-suggur, high- dynasty. priest of Lagash, and the high-priest of a neighbouring town, the name

of which is provisionally transcribed Gis-ukh (formerly written Gis-ban and confounded with the name of Opis). According to Scheil, Gis-ukh is represented by Jokha, south of Fara and west of the Shatt el-Hai, and since two of its rulers are called kings of Te on a seal-cylinder, this may have been the pronunciation of the name. 1 At a later date the high-priests of Lagash made themselves kings, and a dynasty was founded there by Ur-Nina. In the ruins of a building, attached by him to the temple of Nina, terra-cotta bas-reliefs of the king and his sons have been found, as well as the heads of lions in onyx, which remind us of Egyptian work and onyx plates. These were "booty" dedicated to the goddess Bau. E-anna-du, the grandson of Ur-Nina, made himself master of the whole of southern Babylonia, including " the district of Sumer " together with the cities of Erech, Ur and Larsa (?). He also annexed the kingdom of Kis, which, however, recovered its independence after his death. Gis-ukh was made tributary, a certain amount of grain being levied upon each person in it, which had to be paid into the treasury of the goddess Nina and the god Ingurisa. The so-called " Stele of the Vultures," now in the Louvre, was erected as a monument of the victory. On this various incidents in the war are represented. In one scene the king stands in his chariot with a curved weapon in his right hand formed of three bars of metal bound together by rings (similar, as M. L. Heuzey has pointed out, to one carried by the chief of an Asiatic tribe in a tomb of the 12th dynasty at Beni-Hasan in Egypt), while his kilted followers with helmets on their heads and lances in their hands march behind him. In Another a flock of vultures is feeding on the bodies of the fallen enemy; in a third a tumulus is being heaped up over those who had been slain on the side of Lagash. Elsewhere we see the victorious prince beating down a vanquished enemy, and superintending the execution of other prisoners who are being sacrificed to the gods, while in one curious scene he is striking with his mace a sort of wicker-work cage filled with naked men. In his hand he holds the crest of Lagash and its god — a lion-headed eagle with outstretched wings, sup- ported by two lions which are set heraldically back to back. The sculptures belong to a primitive period of art.

E-anna-du's campaigns extended beyond the confines of Babylonia. He overran a part of Elam and took the city of Az on the Persian Gulf. Temples and palaces were repaired or erected at Lagash and elsewhere, the town of Nina — which probably gave

1 They are also called high-priests of Gunammide and a contract-

tablet speaks of ” Te in Babylon,” but this was probably not the Te of the seal. It must be remembered that the reading of most of the early Sumerian proper names is merely provisional, as we do not know how the ideographs of which they are composed were pro- nounced in either Sumerian or Assyrian.

its name to the later Nina or Nineveh — was rebuilt, and canals and reservoirs were excavated. He was succeeded by his brother En-anna-tum I., under whom Gis-ukh once more became the dominant power. As En-anna-tum has the title only of high-priest, it is probable that he acknowledged Ur-lumma of Gis-ukh as his suzerain. His son and successor Entemena restored the prestige of Lagash. Gis-ukh was subdued and a priest named Illi was made its governor. A tripod of silver dedicated by Entemena to his god is now in the Louvre. A frieze of lions devouring ibexes and deer, and incised with great artistic skill, runs round the neck, while the eagle crest of Lagash adorns the globular part. The vase is a proof of the high degree of excellence to which the goldsmith’s art had already attained. A vase of calcite, also dedicated by Entemena, has been found at Nippur.

The eighth successor of Ur-Nina was Uru-duggina, who was overthrown and his city captured by Lugal-zaggisi, the high-priest of Gis-ukh. Lugal-zaggisi was the founder of the first empire in Asia of which we know. He made Erech his capital and calls himself king of Kengi. In a long inscription which he caused to be engraved on hundreds of stone vases dedicated to El-lil of Nippur, he declares that his kingdom extended ” from the Lower Sea of the Tigris and Euphrates,” or Persian Gulf, to ” the Upper Sea ” or Mediterranean. It was at this time that Erech received the name of ” the City,” which it continued to bear when written ideographically.

Semitic Empire of S argon of Akkad.— The next empire founded in western Asia was Semitic. Semitic princes had already _^ f established themselves at Kis, and a long inscription has been discovered at Susa by J. de Morgan, belonging to one of them, Manistusu, who like Lugal-zaggisi was a con- temporary of Uru-duggina. Another Semitic ruler of Kis of the same period was Alusarsid (or Urumus) who ” subdued Elam and BarahsS.” But the fame of these early establishers of Semitic supremacy was far

eclipsed by that of Sargon of Akkad and his son, Naram-Sin. The date of Sargon is placed by Nabonidus at 3800 B.C. He was the son of Itti-Bel, and a legend related how he had been born in concealment and sent adrift in an ark of bulrushes on the waters of the Euphrates. Here he had been rescued and brought up by " Akki the husbandman " ; but the day arrived at length when his true origin became known, the crown of Babylonia was set upon his head and he entered upon a career of foreign conquest. Four times he invaded Syria and Palestine, and spent three years in thoroughly subduing the countries of " the west," and in uniting them with Babylonia " into a single empire." Images of himself were erected on the shores of the Mediterranean in token of his victories, and cities and palaces were built at home out of the spoils of the conquered lands. Elam and the northern part of Mesopotamia were also subjugated, and rebellions were put down both in Kazalla and in Babylonia itself. Contract tablets have been found dated in the years of the campaigns against Palestine and Sarlak, king of Gutium or Kurdistan, and copper is mentioned as being brought from Magan or the Sinaitic peninsula.

Sargon's son and successor, Naram-Sin, followed up the successes of his father by marching into Magan, whose king he took captive. He assumed the imperial title of " king &™ m ' of the four zones," and, like his father, was addressed as a god. He is even called " the god of Agade " (Akkad), reminding us of the divine honours claimed by the Pharaohs of Egypt, whose territory now adjoined that of Baby- lonia. A finely executed bas-relief, representing Naram-Sin, and bearing a striking resemblance to early Egyptian art in many of its features, has been found at Diarbekr. Babylonian art, however, had already attained a high degree of excellence; two seal cylinders of the time of Sargon are among the most beautiful specimens of the gem-cutter's art ever discovered. The empire was bound together by roads, along which there was a regular postal service; and clay seals, which took the place of stamps, are now in the Louvre bearing the names of Sargon and his son. A cadastral survey seems also to have been instituted, and one of the documents relating to it states that a certain Uru-Malik, whose name appears to indicate his Canaanitish origin, was

Ur dynasty.

governor of the land of the Amorites, as Syria and Palestine were called by the Babylonians. It is probable that the first collection

of astronomical observations and terrestrial omens was made for a library established by Sargon.

Bingani-sar-ali was the son of Naram-Sin, but we do not yet know whether he followed his father on the throne. Another son was high-priest of the city of Tutu, and in the name of his daughter, Lipus-Eaum, a priestess of Sin, some scholars have seen that of the Hebrew deity Yahweh. The Babylonian god Ea, however, is more likely to be meant. The fall of Sargon's empire seems to have been as sudden as its rise. The seat of supreme power in Babylonia was shifted southwards to Isin and Ur. It is generally assumed that two dynasties reigned at Ur and claimed suzerainty over the other Babylonian states, though there is as yet no clear proof that there was more than one. It was probably Gungunu who succeeded in transferring the capital of Babylonia from Isin to Ur, but his place in the dynasty (or dynasties) is still uncertain. One of his successors was Ur-Gur, a great builder, who built or restored the temples of the Moon-god at Ur, of the Sun-god at Larsa, of Ishtar at Erech and of Bel at Nippur. His son and successor was Dungi, whose reign lasted more than 51 years, and among whose vassals was Gudea, the patesi or high-priest of Lagash. Gudea was also a great builder, and the materials for his buildings and statues were brought from all parts of western Asia, cedar wood from the Amanus mountains, quarried stones from Lebanon, copper from northern Arabia, gold and precious stones from the desert between Palestine and Egypt, dolerite from Magan (the Sinaitic peninsula) and timber from Dilmun in the Persian Gulf. Some of his statues, now in the Louvre, are carved out of Sinaitic dolerite, and on the lap of one of them (statue E) is the plan of his palace, with the scale of measurement attached. Six of the statues bore special names, and offerings were made to them as to the statues of the gods. Gudea claims to have con- quered Anshan in Elam, and was succeeded byhis sonUr-Ningirsu. His date may be provisionally fixed at 2700 B.C.

This dynasty of Ur was Semitic, not Sumerian, notwithstanding the name of Dungi. Dungi was followed by Bur-Sin, Gimil-Sin, and Ibi-Sin. Their power extended to the Mediterranean, and we possess a large number of contemporaneous monuments in the shape of contracts and similar business documents, as well as chronological tables, which belong to their reigns.

After the fall of the dynasty, Babylonia passed under foreign influence. Sumuabi (" Shem is my father"), from southern Arabia (or perhaps Canaan), made himself master of northern Babylonia,

while Elamite invaders occupied the south. After a reign of 14 years Sumuabi was succeeded by his son Sumu-la-ilu, in the fifth year of whose reign the fortress of Babylon was built, and the city became for the first time a capital. Rival kings, Pungun-ilaandlmmerum,are mentioned in the contract tablets as reigning at the same time as Sumu-la-ilu (or Samu-la-ilu) ; and under Sin-muballidh, the great-grandson of Sumu-la-ilu, the Elamites laid the whole of the country under tribute, and made Eri-Aku or Arioch, called Rim-Sin by his Semitic subjects, king of Larsa. Eri-Aku was the son of Kudur-Mabug, who was prince of Yamutbal, on the eastern border of Babylonia, and also " governor of Syria." The Elamite supremacy was at last shaken off by the son and successor of Sin-muballidh, Khammurabi, whose name is also written Ammurapi and Kham- m urab\ muram, and who was the Amraphel of Gen. xiv. 1. The Elamites, under their king Kudur-Lagamar or Chedor- laomer, seem to have taken Babylon and destroyed the temple of Bel-Merodach; but Khammurabi retrieved his fortunes, and in the thirtieth year of his reign (in 2340 B.C.) he overthrew the Elamite forces in a decisive battle and drove them out of Baby- lonia. The next two years were occupied in adding Larsa and Yamutbal to his dominion, and in forming Babylonia into a single monarchy, the head of which was Babylon. A great literary revival followed the recovery of Babylonian independ- ence, and the rule of Babylon was obeyed as far as the shores of the Mediterranean. Vast numbers of contract tablets, dated in the reigns of Khammurabi and other kings of the dynasty, have

been discovered, as well as autograph letters of the kings them-selves, more especially of Khammurabi. Among the latter is one ordering the despatch of 240 soldiers from Assyria and Situllum, a proof that Assyria was at the time a Babylonian dependency. Constant intercourse was kept up between Babylonia and the west, Babylonian officials and troops passing to Syria and Canaan, while " Amorite " colonists were established in Baby-lonia for the purposes of trade. One of these Amorites, Abi-ramu or Abram by name, is the father of a witness to a deed dated in the reign of Khammurabi's grandfather. Ammj -ditana, the great-grandson of Khammurabi, still entitles himself " king of the land of the Amorites," and both his father and son bear the Canaanitish (and south Arabian) names jof Abesukh or Abishua

and Ammi-zadok.

One of the most important' works of this " First Dynasty of Babylon," as it was called by the native historians, was the compilation' of a code of laws (see Babylonian Law). This was made by order of Khammurabi after the expulsion of the Elamites and the settlement of his kingdom. A copy of the Code has been found at Susa by J. de Morgan and is how in the Louvre, The last king of the dynasty was Samsu-ditana the son of Ammi- zadok. He was followed by a dynasty of n Sumerian kings, who are said to have reigned for 368 years, a number which must be much exaggerated. As yet the name of only one of them has been found in a contemporaneous document. They were over- thrown and Babylonia was conquered by Kassites or Kossaeans from the mountains of Elam, with whom Samsu-iluna had already come into conflict in his 9th year. The Kassite dynasty was founded by Kandis/ Gandis or Gaddas (about 1780 B.C.), and lasted for 576! years. Under this foreign dominion, which offers a striking analogy to the contemporary rule of the Hyksos in Egypt, Babylonia lost its empire over western Asia, Syria and Palestine became independent, and the high priests of Assur made themselves kings of Assyria. The divine attributes with which the Semitic kings of Babylonia had been invested dis appeared at the same time; the title of " god " is never given to a Kassite sovereign. Babylon, however, remained the capital of the kingdom and the holy city of western Asia, where the priests were all-powerful, and the right to the inheritance of the old Babylonian empire could alone be conferred.

Rise of Assyria. — Under Khammurabi a Samsi-Hadad (or Samsi-Raman) seems to have been vassal-prince at Assiir, and the names of several of the high-priests of Assur who succeeded him have been made known to us by the recent German excava- tions. The foundation of the monarchy was ascribed to Zulilu, who is described as'living after Bel-kapkapi or Belkabi (1900 B.C.), the ancestor of Shalmaneser I. Assyria grew in power at the expense of Babylonia, and a time came when the Kassite king of Babylonia was glad to marry the daughter of Assur-yuballidh of Assyria, whose letters to Amenophis (Amon-hotep) IV. of Egypt have been found at Tell el-Amarna. The marriage, however, led to disastrous results, as the Kassite faction at court murdered the king and placed a pretender on the throne. Assur-yuballidh promptly marched into Babylonia and avenged his son-in-law, making Burna-buryas of the royal line king in his stead. Burna-buryas, who reigned 22 years, carried on a correspondence with

Amenophis IV. of Egypt. After his death, the Assyrians, who were still nominally the vassals of Babylonia, threw off neseri.” a ˆ disguise, and Shalmaneser I. (1300 B.C.), the great- great-grandson of Assur-yuballidh, openly claimed the supremacy in western Asia. Shalmaneser was the founder of Calah, and his annals, which have recently been discovered at Assur, show how widely extended the Assyrian empire already was. Campaign after campaign was carried on against the Hittites and the Wild tribes of the north-west, and Assyrian colonists were settled in Cappadocia. His son Tukulti-In-aristi conquered Babylon, putting its king Bitilyasu to death, and thereby made Assyria the mistress of the oriental world. Assyria had taken the place of Babylonia.

For 7 years Tukulti-In-aristi ruled at Babylon with the old imperial title of ” king of Sumer and Akkad.” Then the Babylonians revolted. The Assyrian king was murdered by his

son, Assur-nazir-pal L, and Uadad-nadih-akhi made king of Babylonia.- But it was not until several years later, in “the reign of the Assyrian,: king Tukulti-Assur, that’a reconciliation was effected between the two rival kingdoms. The next Assyrian monarch, Bel-kudur-uzUr, was the last of the old, royal line. He: seems to have been slain fighting against the Babylonians, who were still under the rule of Hadad-nadin-akhi, and a hew dynasty was established at Assur by In-aristiˆpileser, who claimed to be a descendant of the ancient prince Erba-Raman. His ■ ■ . : fourth successor wasTiglath-pileser I., one of the great p if e tet’i. conquerors of Assyria, who carried his arms towards Armenia on the north and Cappadocia on the west; he hunted wild bulls in the Lebanon and’ was presented with a crocodile by the Egyptian king. In 1107 B.C., however, he sustained a, temporary defeat at the hands of Merodach-nadin-akbi (Marduk- nadin-akhg) of Babylonia, where the Kassite dynasty had finally succumbed to Elamite attacks and a new line of kings. was on the throne.

Of the immediate successors of Tiglath-pileser I. we know, little, and it is with Assur-nazir-pal III. (883-858 B.C.) that our knowledge of Assyrian history begins once more to be fairly full. The empire of Assyria was ■ again ex- #«/£” tended in all directions, and the palacesˆ temples and pal ill. other buildings raised by him bear witness to a con- siderable development of wealth and art. Calah became the favourite residence of a monarch who was distinguished even among Assyrian conquerors for his revolting cruelties. His son Shalmaneser II. had a long reign of 3ˆ years, during which the Assyrian capital

was converted into' Beser //, a sort of armed camp. Each year the Assyrian armies marched out of it to plunder and destroy. Babylon was occupied and the country reduced to vassalage. In the west the con federacy of Syrian princes headed by Benhadad of Damascus and including Ahab of Israel (see Jews, § io)was shattered in 853 B.C., and twelve years later the forces of Hazael were annihilated and the ambassadors of Jehu of Samaria brought, tribute to " the great king." The last few years of his life, however, were dis

With Nabu-nazir, the Nabonassar of classical writers, the so-called Canon of Ptolemy begins. When he ascended the throrie' of Babylon in 747 b.c. Assyria was in the throes of a revolution. Civil war and pestilence were devastat- nazlr. ing the country, and its northern provinces had been wrested from it by Ararat. In 746 B.C. Calah joined the rebels, and on the 13th of Iyyar in the following year, Pulu or Puly who took the name of Tiglath-pileser III., seized the crown and inaugurated a new and vigorous policy.

Second Assyrian Empire. — Under Tiglath-pileser III. arose the second Assyrian empire, which differed from the first in its greater, consolidation. For the first time in history the idea of centralization was introduced into politics; the p n e ser'iii. conquered provinces were organized under an elaborate bureaucracy at the head of which: was the king, each district paying a fixed tribute and providing a military contingent. The Assyrian forces became a standing army, which, by successive improvements and careful discipline, was moulded into an irresistible fighting machine, and Assyrian policy was directed towards the definite object of reducing the whole civilized world into a single empire and thereby throwing its trade and wealth into Assyrian handsi With this object, after terrorizing Armenia and the Medes and breaking the power of the Hittites, Tiglath-pileser HI. secured the high-roads of commerce to the Mediterranean together with the Phoenician seaports and then made himself master of Babylonia. In 729 B.C. the summit of his ambition was attained, and he was invested With the sovereignty of Asia in the holy city of Babylon. Two years later, in Tebet

Photos, Mansell &• Co.

BABYLONIA AND ASSYRIA

Plate I.

STELE OF VICTORY OF NARAM-SIN, KING OF AGADE. Louvre.

COPPER VOTIVE FIGURE OF ARAD- SIN, KING OF LARSA.

FIGURE OF GUDEA, PATESI OF LAGASH. Louvre.

BOUNDARY-STONE SCULPTURED WITH EMBLEMS OF THE GODS; REIGN OF NEBUCHADREZZAR I.

RELIEF REPRESENTING ASSUR- BANI-PAL SPEARING A LION.

COLOSSAL WINGED AND HUMAN- HEADED LION FROM THE PALACE OF ASSUR-NAZIR-PAL

STATUE OF ASSUR-NAZIR-PAL, KING OF ASSYRIA.

FIGURE OF A DYING LION, FROM THE LION-HUNT RELIEFS OF ASSUR-BANI-PAL.

STATUE OF THE GOD NEBO- REIGN OF ADAD-NIRARI III.

Plate II.

BABYLONIA AND ASSYRIA

STAMPˆˆK-INSCRXP. LETTER ˆ FRON ˆJUˆATTA KING PRISM OF SˆNACHERIB. TABLET FROM A|SUR ; ™UR° F ‘ SPECIMENS OF KS f AND ASSYRIAN WRITING. ***«.»**»*.

BABYLONIA AND ASSYRIA

■105

Sean* cherlb.

727 B.C.; he died, but his successor Ulula, who took the name of Shalmaneser IW, continued the policy he had begun. Shalmaneser died suddenly in Tebet 722 B.C., while pressing the siege of Samaria, and the seizure of the throne by another general, Sargon, on the 12th of the month, gave the Babylonians an opportunity to > revolt. In Nisan the Kalda prince, bafodan. h ‘ Merodach (Marduk)-baladan, entered Babylon and was there Crowned.legitimate king. For twelve years he successfully resisted the Assyrians; but the failure of his allies in the west to act in concert with him, and the overthrow of the Elamites, eventually compelled him to fly to his ancestral domains in the marshes of southern Babylonia. Sargon, who meanwhile had

crushed the confederacy of the northern nations, had taken (717 B.C.) the Hittite stronghold of Carchemish and had annexed the future kingdom of Ecbatana, was now accepted as king by the Babylonian priests and his claim to be the suc- cessor of Sargon of Akkad acknowledged up to the time of his murder in 705 b.c His son Sennacherib, who succeeded him on the 12th of Ab, did not possess the military or administrative 1 abili ties of his father, and the success of his reign was not commensurate with the vanity of the ruler. He was never crowned at Babylon, which was in a perpetual state of revolt until, in 691 b.c, he shocked the religious and political conscience of Asia by razing the holy city of Babylon to the ground. His campaign against Hezekiah of Judah was as much a failure as his policy in Babylonia, ; and in his murder by his sons on the 20th of Tebet 681 B.C. both Babylonians and Jews saw the judgment of heaven. '

Esar-haddon, who succeeded him, was of different calibre from his father. He was commanding the army in a campaign against Ararat at the time of the murder; forty- two days TaJdon later the murderers fled from Nineveh and took refuge at the court of Ararat. But the Armenian army was utterly defeated near Malatia on the 12th of lyyar, and at the end of the day Esar-haddon was saluted by his soldiers as king. He thereupon returned to Nineveh and on the 8th of Sivan formally ascended the throne.

One, of his first acts was to restore Babylon, to send back the image of Bel-Merodach (Bel-Marduk) to its old home, and to re-people the city with such of the priests and the former popula- tion as had survived massacre. Then he was solemnly declared king in the temple of Bel-Merodach, which had again risen from its ruins, and Babylon became the second capital of the empire. Esar-haddon's policy was successful and Babylonia remained contentedly quiet throughout his reign. In February (674 B.C.) the Assyrians entered upon their invasion of Egypt (see also Egypt: History), and in Nisan (or March) 670 B.C. an expedition on an unusually large scale set out from Nineveh. The Egyptian frontier was crossed on the 3rd of Tammuz (June), and Tirhaka, at the head of the Egyptian forces, was driven to Memphis after fifteen days of continuous fighting, during which the Egyptians were thrice defeated with heavy loss and Tirhaka himself was wounded. On the 22nd of the month Memphis was entered by the victorious army and Tirhaka fled to the south. A stele, commemorating the victory and represepting Tirhaka with the features of a negro, was set up at Sinjirli (north of the Gulf of Antioch) and is now in the Berlin Museum. Two years later (668

b.c.) Egypt revolted, and while on the march to reduce it, Esar-haddon fell ill and died (on the 10th of Marchesvan or October). Assur-bani-pal succeeded him as king of Assyria and its empire, while his brother, Samas-sum- yukin, was made viceroy of Babylonia. The arrange- ment was evidently intended to flatter the Babylonians by giving them once more the semblance of independence. But it failed to work. Samas-sum-yukin became more Babylonian than his subjects; the viceroy claimed to be the successor of the monarchs Whose empire had once stretched to the Mediterranean; even the Sumerian language was revived as the official tongue, and a revolt broke out which shook the Assyrian empire to its founda- tions. After .several years of struggle, during which Egypt re- covered its independence, Babylon was starved into surrender, and the rebel viceroy and his supporters were put to death.

Assur- banl-pal.

Egypt had already recovered its independence (660 B.C.) with the help of mercenaries sent by Gyges of Lydia, who had vainly solicited aid from Assyria against his Cimmerian enemies. Next followed the contest with Elam, in spite of the efforts of Assur-bani-pal to ward it off. Assyria, however, was aided by civil war in Elam itself; the country was wasted with fire and sword, and its capital Susa or Shushan levelled with the ground, But the long struggle left Assyria maimed and exhausted. It had been drained of both wealth and fighting population; the devastated provinces of Elam and Babylonia could yield nothing with which to supply the needs of the imperial exchequer, and it was difficult to find sufficient troops even to garrison the conquered populations. Assyria, therefore, was ill prepared to face the hordes of Scythians— or Manda, as they were called'by the Babylonians — who now began to harass the frontiers. A Scythian power had grown up in the old kingdom of Ellip, tfc the east of Assyria, where Ecbatana was built by a "• Manda Vi prince; Asia Minor was infested by the Scythian tribe of Cim- merians, and the death of the Scythian leader DugdammS (tne Lygdamis of Strabo i. 3. 16) was regarded by Assur-bani-pSl as a special mark of divine favour. : ; i

When Assur-bani-pal died, his empire was fast breaking up. Under his successor, Assur-etil-ilani, the Scythians penetrated into Assyria and made their way as far as the borders of Egypt. Calah was burned, though the strong walls "iˆiaence. of Nineveh protected the relics of the Assyrian army which had taken refuge

behind them; and when the raiders had passed on to other fields of booty, a new palace was erected among the ruins of the neighbouring city. But Its architectural poverty and small size show that the resources of ‘Assyria were at a low ebb. A contract has been found at Sippara, dated in the fourth year of Assur-etil-ilani, though it is possible that his rule in Babylonia was disputed by his Ra/D-shakeh (vizier)-, Assur-sum-lisir, whose accession year as king of Assyria occurs on a contract from Nippur (Niffer). The last king of Assyria was probably the brother of Assur-etil-ilani, Sin-sar-iskun (Sin-sarra-uzur), who seems to have been the Sarakos (Saracus) of Berossus. He was still reigning in Babylonia in his seventh year, as a contract dated in that year has been discovered at Erech, and an inscription of his, in Which he speaks of restor- ing the ruined temples and their priests, couples Merodach of Babylon with Assur of Nineveh. Babylonia, however, was again restless. After the over throw of Samas-sum-yukin, Kandalanu, the Chineladanos of Ptolemy’s canon, had N h been appointed viceroy. His successor was Nabopo- iˆ S ar!” lassar, between whom and the last king of Assyria war broke out. The Scythian king of Ecbatana, the Cyaxares of the Greeks, came to the help of the Babylonians. Nineveh was captured and destroyed by the Scythian army, along with thOˆe cities of northern Babylonia which had sided with Babylonia, and the Assyrian empire was at an end.

The seat of empire was now transferred to Babylonia. Nabopo-lassar was followed by his son Nebuchadrezzar II., whose reign of 43 years made Babylon once more the mistress of the civilized world. Only a small fragment of his oUus. annals has been discovered relating to his invasion of Egypt in 567 B.C., and referring to ” Phut of the Ionians.” Of the reign of the last Babylonian king, Nabonidus, however, and the conquest of Babylonia by Cyrus, we now have a fair amount of information. 1 This is chiefly derived from a chronological tablet containing the annals of Nabonidus, which is supplemented by an inscription of Nabonidus, in which he recounts his restora- tion of the temple of the Moon-god at Harran, as well as by a proclamation of Cyrus issued shortly after his formal recognition as king of Babylonia. It was in the sixth year of Naboijidus (549 B.C.) — or perhaps in 553— that Cyrus, “king of AnshanY in Elam, revolted against his suzerain Astyages, king of ” the Manda” or Scythians, at Ecbatana. The army of AstyageS betrayed him to his enemy, and Cyrus (q.v.) established himself at Ecbatana, thus putting an end to the empire of the Scythians,

1 For the events leading up to the conquests of Cyrus, see Persia: Ancient History, § v. The" chronology is not absolutely certain.

which the Greek writers called that of the Medes, through a confusion of Mada or "Medes " with Manda. Three years later we find that Cyrus has become king of Persia and is engaged in a campaign in the north of Mesopotamia. Meanwhile Nabonidus has established a camp at Sippara, near the northern frontier

of his kingdom, his son — probably the Belshazzar of by Cyrus, other inscriptions — being in command of the army.

In 538 B.C. Cyrus invaded Babylonia. A battle was fought at Opis in the month of June, in which the Babylonians were defeated, and immediately afterwards Sippara surrendered to the invader. Nabonidus fled to Babylon, whither he was pursued by Gobryas, the governor of Kurdistan, and on the 16th of Tammuz, two days after the capture of Sippara, " the soldiers of Cyrus entered Babylon without fighting. " Nabonidus was dragged out of his fuding-place, and Kurdish guards were placed at the gates of the great temple of Bel, where the services continued without intermission. Cyrus did not arrive till the 3rd of Marchesvan (October), Gobryas having acted for him in his absence. Gobryas was now made governor of the province of Babylon, and a few days afterwards the son of Nabonidus, according to the most probable reading, died. A public mourning followed, which lasted six days, and Cambyses accompanied the corpse to the tomb. Cyrus now claimed to be the legitimate successor of the ancient Babylonian kings and the avenger of Bel-Merodach, who was wrathful at the impiety of Nabonidus in removing the images of the local gods from their ancestral shrines to his capital Babylon. Nabonidus, in fact, had excited a strong feeling against himself by attempting to centralize the religion of Babylonia in the temple of Merodach (Marduk) at Babylon, and while he had thus alienated the local priesthoods the military party despised him on account of his antiquarian tastes. He seems to have left the defence of his kingdom to others, occupying himself with the more congenial work of excavating the founda- tion records of the temples and determining the dates of their builders. The invasion of Babylonia by Cyrus was doubtless facilitated by the existence of a disaffected party in the state, as well as by the

presence of foreign exiles like the Jews, who had

1 The following is a list of the later dynasties and kings of Babylonia and Assyria so far as they are known at present. For the views of other writers on the chronology, see § viii., Chronological Systems.

The Babylonian Dynasties from dr. 2500 b.c

Dynasty of Ur.

Gungunu, cir. 2500 B.C.

Ur-Gur.

Dungi, more than 51 years.

Bur-Sin, more than 12 years.

Gimil-Sin, more than 9 years.

Ibi-Sin.

Idin-Dagan.

Sumu-ilu.

First Dynasty of Babylon. 2350 B.C. Sumu-abi, 14 years. Sumu-la-ilu, 36 years. Zabium, 14 years. Abil-Sin, 18 years. Sin-muballidh, 20 years. Khammurabi, 43 years. Samsu-iluna, 38 years. Abesukh, 25 years. Ammi-ditana, 25 years. Ammi-zadoq, 21 years. Samsu-ditana, 31 years.

Dynasty of Sisku (?)/or 368 years. 2160 B.C.

Anman, 60 years. Ki-Nigas, 56 years. Damki-ilisu, 26 years. Iskipal, 15 years. Sussi, 27 years. Gul-ki [sar] , 55 years. Kirgal-daramas, 50 years. A-dara-kalama, 28 years. Akur-duana, 26 years. Melamma-kurkura, 8 years. Ea-ga(mil), 9 years.

Kassite Dynasty of 36 kings for

576 years 9 months. 1780 B.C. Gandis, 16 years. Agum-sipak, 22 years. Bitilyasu I., 22 years. Ussi (?), 9 years. Adu-metas. Tazzi-gurumas. Agum-kakrime.

Kara-indas.

Kadasman-Bel, his son, corre- sponded with Amon-hotep (Amenophis) III. of Egypt, 1400 B.C.

Kuri-galzu II.

Burna-buryas, his son, 22 years.

Kuri-galzu III., his son, 26 years.

Nazi-Maruttas, his son, 17 years.

Kadasman-Turgu, his son, 13 years.

Kudur-bel, 6 years.

Sagarakti-suryas, his son, 13 years.

Bitilyasu II., 8 years.

Tukulti-In-aristi of Assyria (1272 B.C.) for 7 years, native vassal kings being —

Bel-sum-iddin, ij years.

Kadasman-Bel II., l\ years.

Hadad-sum-iddin, 6 years.

Hadad-sum-uzur, 30 years.

Meli-sipak, 15 years.

Merodach-baladan I., his sort, 13 years.

Zamama-sum-iddin, I year.

Bel-sum-iddin, 3 years.

been planted in the midst of the country. One of the first acts of Cyrus accordingly was to allow these exiles to return to their own homes, carrying with them the images of their gods and their sacred vessels. The permission to do so was embodied in a proclamation, in which the conqueror endeavoured to justify his claim to the Babylonian throne. The feeling was still strong that none had a right to rule over western Asia until he had been consecrated to the office by Bel and his priests; and from henceforth, accordingly, Cyrus assumed the imperial title of " king of Babylon." A year before his death, in 529 B.C., he associated his son Cambyses (q.v.) in the government, making him king of Babylon, while he reserved for himself the fuller title of " king of the (other) provinces " of the empire. It was only when Darius Hystaspis, the representative of the Aryan race and the Zoroastrian religion, had re-conquered the empire of Cyrus, that the old tradition was broken and the claim of Babylon to confer legitimacy on the rulers of western Asia ceased to be acknowledged (see Darius). Darius, in fact, entered Babylon as a conqueror; after the murder of the Magian it had recovered its independence under Nidinta-Bel, who took the name of Nebuchadrezzar III., and reigned from October 521 B.C. to August 520 B.C., when the Persians took it by storm. A few years later, probably 514 B.C., Babylon again revolted under the Armenian Arakha; on this occasion, after its capture by the Persians, the walls were partly destroyed. E-Saggila, the great temple of Bel, however, still continued to be kept in repair and to be a centre of Babylonian patriotism, until at last the foundation of Seleucia diverted the population to the new capital of Babylonia and the ruins of the old city became a quarry for the builders of the new seat of government. 1 VI. Assyria and Babylonia contrasted. — The sister-states of Babylonia and Assyria differed essentially in character. Babylonia was a land, of merchants and agriculturists; Assyria was ah organized camp. The Assyrian dynasties were founded

Dynasty of I sin of 11 kings for 1325 years. 1203 B.C. Merodach-.... 18 years.

Nebuchadrezzar I. Bel-nadin-pal. Merodach-nadin-akhi, 22 years.

Merodach- I J years.

Hadad-baladan, an usurper. Merodach -sapik-zer-mati, 12

years. Nabu-nadin, 8 years.

Dynasty of the Sea-coast. 1070 B.C. Simbar-sipak, 18 years. Ea-mukin-zeri, 5 months. Kassu-nadin-akhi, 3 years.

Dynasty of Bit-Bazi. 1050 B.C. E-Ulmas-sakin-sumi, 17 years. Ninip-kudur-uzur I., 3 years. Silanim-Suqamuna, 3 months.

Dynasty of Elam. 1030 B.C. An Elamite, 6 years.

Second Dynasty of Babylon.

1025 B.C.

Nebo-kin-abli, 36 years. Ninip-kudur-uzur II. (?) 8

months 12 days. Probably 5 names missing. B.C. Samas-mudammiq . cir. 920 Nebo-sum-iskun . cir. 900 Nebo-baladan . . cir. 880 Merodach-nadin-sumi cir. 860 Merodach-baladhsu-iqbi cir. 830 Bau-akhi-iddin . . cir. 810 Probably two names missing. Nebo-sum-iskun, son of

Dakuri . . . cir. Nabonassar, 14 years Nebo-nadin-suma, his son,

2 years Nebo-sum-yukin, his son,

I month 12 days .

End of ” the 22 nd dynasty.

760 747

733

731

Dynasty of Sape. Yukin-zera or Chinziros, 3 B.C.

years 730

Pulu (Pul or Poros), called

Tiglath-pileser III. in

Assyria, 2 years . . 727

Ulula, called Shalmaneser

IV. in Assyria . . 725

Merodach-baladan II. the

Chaldaean . . .721

Sargon of Assyria . . 709

Sennacherib, his son . 705

Merodach-zakir-sumi, I

month . . . 702

Merodach-baladan III., 6

months ... 702

Bel-ebus of Babylon . 702

Assur-nadin-sumi, son of

Sennacherib . . 700

Nergal-yusezib . . 694

Musezib-Merodach . . 693

Sennacherib destroys

Babylon . . . 689

Esar-haddon, his son . 681

Samas-sum-yukin, his son 668 Kandalanu (Kineladanos) . 648 Nabopolassar . . . 626

Nabu-kudur-uzur (Nebu- chadrezzar II.) . 605 Amil-Marduk (Evil-Mero-

dach), his son . . 562

Nergal – sarra – uzur (Ner-

gal-sharezer) . . 560

Labasi-Marduk, his son, 3

months . . 556

Nabu-nahid (Nabonidus) . 556 Cyrus conquers Babylon . 538
Cambyses, his son . . 529

Gomates, the Magian, 7

months . . ., 521

Nebuchadrezzar III., na- tive king . . -521 Darius, son of
Hystaspes . 520 Nebuchadrezzar IV., rebel

king . . .5H

Darius restored . .513

by successful generals; in Babylonia it was the priests whom a revolution raised to the throne. The Babylonian king remained a priest to the last, under the control of a powerful hierarchy; the Assyrian king was the autocratic general of an army, at whose side stood in early days a feudal nobility, and from the reign of Tiglath-pileser III. onwards an elaborate bureaucracy. His palace was more sumptuous than the temples of the gods, from which it was quite separate. The people were soldiers and little else; even the sailor belonged to Babylonia. Hence the sudden collapse of Assyria when drained of its fighting population in the age of Assur-bani-pal.

VII. Assyro- Babylonian Culture. — Assyrian culture came from Babylonia, but even here there was a difference between the two countries. There was little in Assyrian literature that was .Original, and education, which was general in Babylonia, was in the northern kingdom confined for the most part to a single class. In Babylonia it was of very old standing. There were libraries in most of the towns and temples; an old Sumerian proverb averred that ” he who would excel in the school of the scribes must rise

with the dawn." Women as well as men learned to read and write, and in Semitic times this involved a knowledge of the extinct Sumerian as well as of a most complicated and extensive syllabary. A considerable amount of Semitic Baby- lonian literature was translated from Sumerian originals, and the language of religion and law long continued to be the old agglutinative language of Chaldaea. Vocabularies, grammars and interlinear translations were compiled for the use of students as well as commentaries on the older texts and explanations of obscure words and phrases. The characters of the syllabary were all arranged and named, and elaborate lists of them were drawn up. The literature was for the most part inscribed with a metal stylus on tablets of clay, called laterculae coctiles by Pliny; the papyrus which seems to have been also employed has perished. Under the second Assyrian empire, when Nineveh had become a great centre of trade, Aramaic — the language of commerce and diplomacy — was added to the number of subjects which the educated class was required to learn. Under the Seleucids Greek was introduced into Babylon, and fragments of tablets have been found with Sumerian and Assyrian (i.e. Semitic Babylonian) words transcribed in Greek letters.

Babylonian Literature and Science. — There were many literary works the titles of which have come down to us. One of the

Zulilu " founder archy."

Kings of Assyria. of the mon-

Assur-rabi. Assur-nirari, his son. Assur-rim-nisesu, his son.

Erba-Hadad,

Assur-nadin-akhi I., his son. Assur-yuballidh I., his son.

B.C.

Assur-bil-nisi-su . cir. 1450

Buzur-Assur . . . 1440

Assur-nadin-akhi II. . 1410

Assur-yuballidh, his son . 1390

Bel-nirari, his son . . 1370

Arik-den-ilu, his son . 1350

Hadad-nirari I., his son . 1330 Shalmaneser I., his son

(built Calah) . . 1 3 10

Tiglath-In-aristi I., his son, 1280

conquers Babylon cir. 1270

Assur-nazir-pal I., his son 1260

Assur-narara and his son

Nebo-dan . . .1250 Assur-sum-Iisir . . 1235 In-aristi-tukulti-Assur . 1225 Bel-kudur-uzur 12 15 In-aristi-pileser, descend- ant of Erba-Hadad . 1200 Assur-dan I., his son . 1185 Mutaggil-Nebo, his son . 1160 Assur-ris-isi, his son . 1 140 Tiglath-pileser I., his son. 1120 Assur-bil-kala, his son . 1090

Samsi-Hadad I., his

brother Assur-nazir-pal II., his son Assur-irbi

Hadad-nirari II. . cir. Tiglath-pileser II., his son Assur-dan II., his son Hadad-nirari III., his son Tukulti-In-aristi, his son Assur-nazir-pal III., his

son .... Shalmaneser II., his son . Assur-danin-pal (Sardana-

pallos), rebel king Samsi-Hadad II., his

brother Hadad-nirari IV., his son . Shalmaneser III. Assur-dan III. Assur-nirari . Pnlu, usurper, takes the

name of Tiglath-pileser

III. . Ulula, usurper, takes the

name of Shalmaneser IV. Sargon, usurper Sennacherib, his son Esar-haddon, his son Assur-bani-pal, his son . Assur-etil-ilani-yukin, his

son .... Assur-sum-lisir Sin-sarra-uzur (Sarakos) . Destruction of Nineveh .

B.C.

1070 1060

960

95°

930 911

883 858

825

823 810 781 771 753

745

727 722

705 68 1 668

? ?

?

606

most famous of these was the Epic of Gilgamesh, in twelve books, composed by a certain Sin-liqi-unninni, and arranged upon an astronomical principle. Each division contains the story of a single adventure in the career of Gilgamesh. The whole story is a composite product, and it is possible that some of the stories are artificially attached to the central figure. (See Gilgamesh, Epic of.)

Another epic was that of the Creation, the object of which was to glorify Bel-Merodach by describing his contest with Tiamst, the dragon of chaos. In the first book an account is given of the creation of the world out of the primeval deep and the birth of the gods of light. Then comes the story of the struggle between the gods of light and the powers of darkness, and the final victory of Merodach, who clove Tiamat asunder, forming the heaven out of one half of her body and the earth out of the other. Merodach next arranged the stars in order, along with the sun and moon, and gave them laws which they were never to transgress. After this the plants and animals were created, and finally man. Merodach here takes the place of Ea, who appears as the creator in the older legends, and is said to have fashioned man

out of the clay.

The legend of Adapa, the first man, a portion of which was found in the record-office of the Egyptian king Amenophis IV. (Akhenaton) at Tell-el-Amarna, explains the origin of death. Adapa while fishing had broken the wings of the south wind, and was accordingly summoned before the tribunal of Anu in heaven. Ea counselled him not to eat or drink there. He followed the advice, and thus refused the food which would have made him and his descendants immortal.

Among the other legends of Babylonia may be mentioned those of Namtar, the plague-demon, of Urra, the pestilence, of Etanna and of Zu. Hades, the abode of Nin-erisgal or Allat, had been entered by Nergal, who, angered by a message sent to her by the gods of the upper world, ordered Namtar to strike off her head. She, however, declared that she would submit to any conditions imposed on her and would give Nergal the sovereignty of the earth. Nergal accordingly relented, and Allatu became the queen of the infernal world. Etanna conspired with the eagle to fly to the highest heaven. The first gate, that of Anu, was successfully reached; but in ascending still farther to the gate of Ishtar the strength of the eagle gave way, and Etanna was dashed to the ground. As for the storm-god Zu, we are told that he stole the tablets of destiny, and therewith the prerogatives of Bel. God after god was ordered to pursue him and recover them, but it would seem that it was only by a stratagem that they were finally regained.

Besides the purely literary works there were others of the most varied nature, including collections of letters, partly official, partly private. Among them the most interesting are the letters of Khammurabi, which have been edited by L. W. King. Astronomy and astrology, moreover, occupy a conspicuous place. Astronomy was of old standing in Babylonia, and the standard work on the subject, written from an astrological point of view, which was translated into Greek by Berossus, was believed to go back to the age of Sargon of Akkad. The zodiac was a Babylonian invention of great antiquity; and eclipses of the sun as well as of the moon could be foretold. Observatories were attached to the temples, and reports were regularly sent by the astronomers to the king. The stars had been numbered and named at an early date, and we possess tables of lunar longitudes and observations of the phases of Venus. In Seleucid and Parthian times the astronomical reports were of a thoroughly scientific character; how far the

advanced knowledge and method they display may reach back we do not yet know. Great atten- tion was naturally paid to the calendar, and we find a week of seven and another of five days in use. The development of astronomy implies considerable progress in mathematics; it is not surprising, therefore, that the Babylonians should have invented an extremely simple method of ciphering or have discovered the convenience of the duodecimal system. The ner of 600 and the sar of 3600 were formed from the soss or unit of 60, which corresponded with a degree of the equator. Tablets

of squares and: cubes, calculated from i to 60, have been found at Senkera, and a people who were acquainted with the sun-dial, the clepsydra, the lever and the pulley, must have had no mean knowledge of mechanics. A crystal lens, turned on the lathe, was discovered by Layard at Nimrud along with glass vases bearing the name of Sargon; this will explain the excessive minuteness of some of the writing on the Assyrian tablets, and a lens may also have been used in the observation of the heavens.

Art and Architecture— -The culture of Assyria, and still more of Babylonia, was essentially literary; we miss in it the artistic spirit of Egypt or Greece. In Babylonia the abundance of clay and want of stone led to the employment of brick; the Babylonian temples are massive but shapeless structures of crude brick, supported by buttresses, the rain being carried off by drains, one of which at Ur was of lead. The use of brick led to the early development of the pilaster and column, as well as of frescoes and enamelled tiles. The walls were brilliantly coloured, and sometimes plated with bronze or gold as well as with tiles. Painted terra-cotta cones were also embedded in the plaster. Assyria in this, as in other matters, the servile pupil of Babylonia, built its palaces and temples of brick, though stone “was the natural building material of the country, even preserving the brick platform, so necessary in the marshy soil of Babylonia, but little needed in the north. As time went on, however, the later Assyrian architect began to shake himself free: from Babylonian influences and to employ stone as well as brick. The walls of the Assyrian palaces were lined with sculptured and coloured slabs of stone, instead of being painted as in Chaldaea. We can trace three periods in the art of these bas-reliefs; it is vigorous but simple under Assur-

nazir-pal III., careful and realistic under Sargon, refined but wanting in bold- ness under Assurˆbani-pal. In Babylonia, in place of the bas- relief we have the figure in the round, the earliest examples being the statues from Tello which are realistic but somewhat clumsy. The want of stone in Babylonia made every pebble precious and led to a high perfection in the art of gem-cutting. Nothing can be better than two seal-cylinders that have come down to us from the age of Sargon of Akkad. No remarkable specimens of the metallurgic art of an early period have been found, apart perhaps from the silver vase of Entemena, but at a later epoch great excellence was attained in the manufacture of such jewellery as ear-rings and bracelets of gold. Copper, too, was worked with skill; indeed, it is possible that Babylonia was the original home of copper-working, which spread westward with the civilization to which it belonged. At any rate the people were famous from an early date for their embroideries and rugs. The ceramic history of Babylonia and Assyria has unfortunately not yet been traced; at Susa alone has the care demanded by the modern methods of archaeology been as yet expended on examining and separating the pottery found in the excavations,; and, Susa is not Babylonia. We do not even know the date of 'the spirited terra-cotta reliefs discovered by Loftus and Rawlinson. The forms of Assyrian pottery, however, are graceful; the porcelain, like the glass discovered in the palaces of Nineveh, was derived from Egyptian originals. Transparent glass seems to have been first introduced in the reign of Sargon. Stone as well as clay and glass were employed in the manufacture of vases, and vases of hard stone have been disinterred at Tello similar to. those of the early dynastic period of Egypt.

Social Life. — Castes were unknown in both Babylonia and Assyria, but the priesthood of Babylonia found its counterpart in the military aristocracy of Assyria. The priesthood was divided into a great number of classes, among which that of the doctors may be reckoned. The army was raised, at all events in part, by conscription; a standing army seems to have been first organized in Assyria. Successive improvements were introduced into it by the kings of the second Assyrian empire; chariots were superseded by cavalry; Tiglath-pileser III. gave the riders saddles and high boots, and Sennacherib created a corps of slingers. Tents, baggage-carts and battering-rams were carried on the march, and the tartan or commander-in-chief ranked next to the king. In both countries there was a large

body of slaves; above them came the agriculturists and commercial classes, who were, however, comparatively little numerous in Assyria. The scribes, on the other hand, formed a more important class in Assyria than in Babylonia. Both countries had their artisans, money-lenders, poets and musicians. –

The houses of the people contained but little furniture; chairsˆ tables and couches, however, were used, and Assur-bani-pal is represented as reclining on his couch at a meal while his wife sits on a. chair beside him. After death the body was usually partially cremated along with the objects that had been buried with it. The cemetery adjoined the city of the living and wag laid out in streets through which ran rivulets of "pure" water. Many of the tombs, which were built of crude brick, were pro- vided with gardens, and there were shelves or altars on which were placed the, offerings to the dead. As the older tombs decayed a fresh city of tombs arose on their ruins. It is remarkable that thus far no cemetery older than the Seleucid or Parthian period has been found in Assyria.

Authorities. — See A. H. Layard, Nineveh and Babylon (1853); E. de Sarzec and L. Heuzey, Decouvertes en Chaldee (1884 foil.); H. V. Hilprecht, The' Babylonian Expedition of the University of Pennsylvania (1893 foil.) ; J. P, Peters, Nippur (1897) ; E. Schrader, Keilinschriftliche Bibliothek (1889-1900); Records of the Past (new series, 1888-1892); Th. G. Pinches, " The Babylonian Chronicle," in Journ. R. A. S. (1887) ; H. Winckler, Altorientaliscjie Forschungen (1893 foil.), and The Tell-el-Antarm Letters (1896); G. Maspero, Dawn of Civilization (1896), Struggle of the Nations (1897), and Passing of the Entpires (1900); L. W. King, Letters of Khammurabi (1898-1900); H. Radau, Early Babylonian History (1900); R. W. Rogers, History of Babylonia and Assyria (1900) ; P. Hommel, Grundriss der Geographie und Geschichte des alten Orients (1904); Mitteilungen der deutschen Orientgesellschaft (1899). (A. H. S.)

VIII. Chronological Systems:— The extreme divergence in the chronological schemes employed by different writers on the history of Babylonia and Assyria has frequently caused no small perplexity to readers who have no special knowledge of the subject. In this section an attempt is made to indicate briefly the causes which have led to so great a diversity of opinion, and to describe in outline the principles underlying the chief schemes of chronology that have been suggested; a short account will then

be given of the latest discoveries in this branch of research, and of the manner in which they affect the problems at issue. It will be convenient to begin with the later historical periods, and then to push our inquiry 1 back into the earlier periods of Babylonian and Sumerian history. •

Up to certain points no difference of opinion exists upon the dates to be assigned to the later kings wno ruled in Babylon apd in Assyria. The Ptolemaic Canon (see sect. II.) gives a list of the Babylonian, Assyrian and Persian kings who ruled, in Babylon, together with the number of years each of them reigned, from the accession of Nabonassar in 747 B.C. : to the conquest of Babylon by Alexander the Great in 331 B.C. The accuracy of this list is confirmed by the larger List of Kings and by the principal Babylonian Chronicle; the latter, like the Canon, begins with the reign of Nabonassar, who, it has been suggested, may have revised the calendar and have inaugurated a new epoch for the later chronology. The Ptolemaic Canon is further controlled and its accuracy confirmed by the Assyrian Eponym Lists, or lists of limmi (see sect. II.), "by means of which Assyrian chronology, is fixed from 911 B.C. to 666 B.C., the solar eclipse of June 15th, 763 B.C., which is recorded inthe eponymy of Pur-Sagale, placing the dead reckoning for these later periods upon an absolutely certain basis.

Thus all historians are agreed with regard to the Babylonian chronology back to. the year 747 B.C., and with regard to that of Assyria back to the year 911 B.C. It is in respect of the periods anterior to these two dates that different writers have propounded differing systems of chronology, and, as might be imagined, the earlier the period we examine the greater becomes the discrepancy between the systems proposed. This variety of opinion is due to the fact that the data available for settling the chronology often conflict with one another, or are capable of more than one interpretation.

Since its publication in 1884 the Babylonian List, of Kings has furnished the framework for every chronological system that has

been proposed. In its original form this document gave a list, arranged in dynasties, of the Babylonian kings, from the First

Dynasty of Babylon down to the Neo-Babylonian period. If the text were complete we should probably be in possession of the system of Babylonian chronology current in the Neo- Babylonian period from which our principal classical authorities (see sect. II.) derived their information. The principal points of uncertainty, due to gaps in the text, concern the length of Dynasties IV. and VIII.; for the reading of the figure giving the length of the former is disputed, and the summary at the close of the latter omits to state its length. This omission is much to be regretted, since Nabonassar was the last king but two of this dynasty, and, had we known its duration, we could have combined the information on the earlier periods furnished by the Kings' List with the evidence of the Ptolemaic Canon. In addition to the Kings' List, other important chronological data consist of references in the classical authorities to the chronological system of Berossus (q.v.); chronological references to earlier kings occurring in the later native inscriptions, such as Nabonidus's estimate of the period of Khammurabi (or Ham- muribi); synchronisms, also furnished by the inscriptions, between kings of Babylon and of Assyria; and the early Babylonian date-lists.

Dyn. I.

Dyn. II.

Dyn. III.

B.C.

B.C.

B.C.

Oppert (1888) ....

2506-2202

2202-1834

I834-I257

Sayce (1899) ■

2478-(2i74)

2i74-(i8o6)

i8o6-(i229)

„ (1902) . . . .

246o-(2i74)

2i74-(i8o6)

i8o6-(i229)

Rogers (1900)

2454-2 15 1

2150-1783

1782-1207

Winckler (1894) . . .

(2425-2120)

2120-1752

1752-1177

„ (1892) . . .

2403-2098

2098-1730

1729-1150

(1905) • • •

c. 2400-2100

c. 2100-1700

c. 1700-1150

Delitzsch (1907) .

c. 2420-2120

C. 2I20-(I752)

(1752-1176)

„ (1891) • • •

2399-2094

2O94-I726

1726-1150

Maspero (1897)

2416-2082

2082-I 7 14

I7i4-(ii37)

Lehmann-Haupt (1898) .

2360-2057

2056-1689

1688-1113

„ (1903) •

2296-2009/8

2OO8/7-I69I

1690-1115

Marquart (1899) .

2335-2051

2O5I/O-I694/3

1 693/2-1 1 1 8/7

Peiser (1891) ....

2251-1947

1947-1579

1579-1180

Rost (1897) ....

2232-1928

I928-I560

1560-1224

„ (1900) ....

2231-1941

I94O-I573

1572-1179

Hommel (1901)

5 2223-1923

(or 2050-1752

(1923-1752) I

I752-II75

„ (1895) ■ • •

2058-1754

I753-II78

(1886) . . .

2035-1 73 1

2403-2035

1731-1154

(1898) . . .

1884-1580

1580-1180

Niebuhr (1896) . . .

2193-1889

2 1 I4-I746

1746-1169

In view of the uncertainty regarding the length of Dynasties IV. and VIII. of the Kings' List, attempts have been made to ascertain the dates of the earlier dynasties by independent means. The majority of writers, after fixing the date at which Dynasty III. closed by means of the synchronisms and certain of the later chronological references, have accepted the figures of the Kings' List for the earlier dynasties, ignoring their apparent inconsistencies with the system of Berossus and with the chronology of Nabonidus. Others have attempted to reconcile the conflicting data by emendations of the figures and other ingenious devices. This will explain the fact that while the difference between the earliest and latest dates suggested for the close of Dynasty III. is only 144 years, the difference between the earliest and latest dates suggested for the beginning of Dynasty I. is no less than 622 years. A comparison of the principal schemes of chronology that have been propounded may be made by means of the preceding table. The first column gives the names of the writers and the dates at which their schemes were published, while the remaining columns give the dates they have suggested for Dynasties I., II. and III of the Kings' List. 1 The systems with the highest dates are placed first in the list; where a writer has produced more than one system, these are grouped together, the highest dates proposed by him deter- mining his place in the series.

1 These three dynasties are usually known as the First Dynasty of Babylon, the Dynasty of Sisku or Uruku, and the Kassite Dynasty ; see sect. v.

Omitting that of Oppert, which to some extent stands in a category by itself, the systems fall into three groups. The first group, comprising the second to the sixth names, obtains its results by selecting the data on which it relies and Ignoring others. The second group, comprising the next four names, attempts to reconcile the conflicting data by emending the figures. The third group, consisting of the last two names, is differentiated by its proposals with regard to Dynasty II. It will

be noted that the first group has obtained higher dates. than the second, and the second group higher dates on the whole than the third.

Oppert's system 2 represents the earliest dates that have been suggested. He accepted the figures of the Kings' List and claimed that he reconciled them with the figures of Berossus) though he ignored the later chronological notices. But there is no evidence for his "cyclic date" of 2517 B.C., on which his system depended, and there is little doubt that the beginning of the historical period of Berossus is to be set, not in 2506 B.C., but in 2232 B.C. The two systems of Sayce, 3 that of Rogers, * the three systems of Winckler, 6 both those of Delitzsch, 6 and that of Maspero, 7 may be grouped together, for they are based on the same principle. Having first fixed the date of the close of Dynasty III., they employed the figures of the Kings' List unemended for defining the earlier periods, and did not attempt to reconcile their results with other conflicting data. The difference of eighteen years in Sayce's two dates for the rise of Dynasty I. was due to his employing in 1902 the figures assigned to the first seven kings of the dynasty upon the larger of the two contemporary date-lists, which had meanwhile been published, in place of those given by the List of Kings. It should be noted that Winckler (1905) and Delitzsch (1907) gives the dates only in round numbers.

A second group of systems may be said to con- sist of those proposed by Lehmann-Haupt, Marquart, Peiser, and Rost, for these writers attempted to get over the discrepancies in the data by emending some of the figures furnished by the inscriptions. In 1891, with the object of getting the total duration of the dynasties to agree with the chronological system of Berossus and with the statement of Nabonidus concerning Kham- murabi's date, Peiser proposed to emend the figure given by the Kings' List for the length of Dynasty III. The reading of " 9 soss and 36 years," which gives the total 576 years, he suggested was a scribal error for " 6 soss and 39 years "; he thus reduced the length of Dynasty III. by 177 years and effected a corresponding reduction in the dates assigned to Dynasties I. and II. 8 In 1897 Rost followed up Peiser's suggestion by reducing the figure still further, but he counteracted to some extent the effects of this additional reduction by emending Sennacherib's date for Marduk- nadin-akhe's defeat of Tiglath-pileser I. as engraved on the rock at Bavian, holding that the figure " 418," as engraved upon the rock, was a mistake for " 478." 9 Lehmann-Haupt's first system (1898) resembled those of Oppert, Sayce, Rogers,

Winckler, Delitzsch and Maspero in that he accepted the figures of the Kings' List, and did not attempt to emend them. But he obtained his low date for the close of Dynasty III. by emending

2 See Oppert, Comptes rendus de V Acad, des Inscr. et Belles-Lettres (1888), xvi. pp. 218 ff., and'Bofe. and Or. Rec. ii. pp. 107 ff.

s See Sayce, Early Israel, pp. 281 ff., and Encyc. Brit., 10th ed., vol. xxvi. p. 45 (also his account above). ■ I

4 See Rogers, History of Babylonia and Assyria (1900).'

6 See Winckler, Geschichte Babyloniens und Assyriens (1892), Altorientalische Forschungen, i. Hft. 2 (1894), and Auszug aus der Vorderasiatischen Geschichte (1905).

6 See Delitzsch and Miirdter, Geschichte Babyloniens und Assyriens (1891), and Delitzsch, Mehr Licht (1907).

7 See Maspero, Histoire ancienne des peuples de I'Orient classique, tome ii.

8 See Peiser, Zeits. fur Assyr. vi. pp. 264 ff.

9 See Rost, Mitteil. der vorderas. Gesellschaft (1897), ii.

Sennacherib's figure in the Bavian inscription; this he reduced by a hundred years, 1 instead of increasing it by sixty as Rost had suggested. Lehmann-Haupt's influence is visible in Marquart's system "published in the following year; 2 it may be noted that his slightly reduced figure for the beginning of Dynasty I. was arrived at by incorporating the new information supplied by the first date-list to be published. When revising his scheme of chronology in 1900, Rost abandoned his suggested emenda- tion of Sennacherib's figure, but by decreasing his reduction of the length of Dynasty III., he only altered his date for the be- ginning of Dynasty I. by one year. 3 In his revised scheme of chronology, published in 1903, i Lehmann-Haupt retained his emendation of Sennacherib's figure, and was in his turn influenced by Marquart's method of reconciling the dynasties of Berossus with the Kings' List. He continued to accept the figure of the Kings'

List for Dynasty III., but he reduced the length of Dynasty II. by fifty years, arguing that the figures assigned to some of the reigns were improbably high. His slight reduction in the length of Dynasty I. was obtained from the recently published date-lists, though his proposed reduction of Ammi- zaduga's reign to ten years has since been disproved.

A third group of systems comprises those proposed by Hommel and Niebuhr, for their reductions in the date assigned to Dynasty I. were effected chiefly by their treatment of Dynasty II. In his first system, published in 1886, 6 Hommel, mainly with the object of reducing Khammurabi's date, reversed the order of the first two dynasties of the Kings' List, placing Dynasty II. before Dynasty I. In his second and third systems (1895 and 1898), 6 and in his second alternative scheme of 1901 (see below), he abandoned this proposal and adopted a suggestion of Halevy that Dynasty III. followed immediately after Dynasty I.; Dynasty II., he suggested, had either synchronized with Dynasty I., or was mainly apocryphal (eine spdtere Geschichtskonstruction) . Niebuhr's system was a modification of Hommel's second theory, for, instead of entirely ignoring Dynasty II., he reduced its independent existence to 143 years, making it overlap Dynasty I. by 225 years. 7 The extremely low dates proposed by Hommel in 1898 were due to his adoption of Peiser's emendation for the length of Dynasty III., in addition to his own elimination of Dynasty II. In 1901 Hommel abandoned Peiser's emendation and suggested two alternative schemes. 8 According to one of these he attempted to reconcile Berossus with the Kings' List by assigning to Dynasty II. an independent existence of some 171 years, while as a possible alternative he put forward what was practically his theory of 1895.

Such are the principles underlying the various chronological schemes which had, until recently, been propounded. The balance of opinion was in favour of those of the first group of writers, who avoided emendations of the figures and were content to follow the Kings' List and to ignore its apparent discrepancies with other chronological data; but it is now admitted that the general principle underlying the third group of theories was actually nearer the truth. The publication of fresh chronological material in 1906 and 1907 placed a new complexion on the prob- lems at issue, and enabled us to correct several preconceptions, and to reconcile or explain the apparently conflicting data.

From a Babylonian chronicle in the British Museum 9 we now know that Dynasty II. of the Kings' List never occupied the throne of Babylon, but ruled only in the extreme south of

1 See Lehmann-Haupt, Zwei Hauplprobleme (1898).

2 See Marquart, Philologus, Supplbd. vii. (1899), pp. 637 ff. » See Rost, Orient. Lit.-Zeit., iii. (1900), No. 6.

4 See Lehmann-Haupt, Beitrdge zur alien Geschichte (Klio), Bd. iii. Heft 1 (1903).

6 See Hommel, Geschichte Babyloniens und Assyriens.

'See Ancient Hebrew Tradition, p. 125, and Hastings' Dictionary of the Bible, i. pp. 226 f.

7 See Niebuhr, Chronologie (1896).

8 See Hommel, " Sitzungsberichte der konigl. bohmischen Gesell-schaft der Wissenschaften," Phil.-hist. Classe (1901), v.

' Published and discussed by L. W. King, " Chronicles concerning early Babylonian Kings " (Studies in Eastern History, vols. ii. and iii., 1907), and History of Egypt, vol. xiii. (published by the Grolier Society, New York, in the spring of 1906), pp. 244 ff.

Babylonia on the shores of the Persian Gulf; that its kings were contemporaneous with the later kings of Dynasty I. and with the earlier kings of Dynasty III. of the Kings' List; that in the reign of Samsu-ditana, the last king of Dynasty I., Hittites from Cappadocia raided and captured Babylon, which in her weakened state soon fell a prey to the Kassites (Dynasty III.) ; and that later on southern Babylonia, till then held by Dynasty II. of the Kings' List, was in its turn captured by the Kassites, who from that time onward occupied the whole of the Babylonian plain. The same chronicle informs us that Ilu-shuma, an early Assyrian patesi, was the contemporary of Su-abu, the founder of Dynasty I. of the Kings' List, thus enabling us to trace the history of Assyria back beyond the rise of Babylon.

Without going into details, the more important results of this new information may be summarized: the elimination of Dynasty II. from the throne of Babylon points to a date not much earlier than 2000 or 2050 B.C. for the rise of Dynasty I., a date which harmonizes with the chronological notices of Shalmaneser I.;

Nabonidus's estimate of the period of Kham- murabi, so far from being centuries too low, is now seen to have been exaggerated, as the context of the passage in his inscription suggests; and finally the beginning of the historical period of Berossus is not to be synchronized with Dynasty I. of the Kings' List, but, assuming that his figures had an historical basis and that they have come down to us in their original form, with some earlier dynasty which may possibly have had its capital in one of the other great cities of Babylonia (such as the Dynasty of Isin).

New data have also been discovered bearing upon the period before the rise of Babylon. A fragment of an early dynastic chronicle from Nippur 10 gives a list of the kings of the dynasties of Ur and Isin. From this text we learn that the Dynasty of Ur consisted of five kings and lasted for 117 years, and was succeeded by the Dynasty of Isin, which consisted of sixteen kings and lasted for 2255 years. Now the capture of the city of Isin by Rim-Sin, which took place in the seventeenth year of Sin-muballit, the father of Khammurabi, formed an epoch for dating tablets in certain parts of Babylonia, 11 and it is probable that we may identify the fall of the Dynasty of Isin with this capture of the city. In that case the later rulers of the Dynasty of Isin would have been contemporaneous with the earlier rulers of Dynasty I. of the Kings' List, and we obtain for the rise of the Dynasty of Ur a date not much earlier than 2300 B.C.

These considerable reductions in the dates of the earlier dynasties of Babylonia necessarily react upon our estimate of the age of Babylonian civilization. The very high dates of 5000 or 6000 B.C., formerly assigned by many writers to the earliest remains of the Sumerians and the Babylonian Semites, 12 depended to a great extent on the statement of Nabouidus that 3200 years separated his own age from that of Naram-Sin, the son of Sargon of Agade; for to Sargon, on this statement alone, a date of 3800 B.C. has usually been assigned. But even by postulating the highest possible dates for the Dynasties of Babylon and Ur, enormous gaps occurred in the scheme of chronology, which were unrepresented by any royal name or record. In his valiant attempt to fill these gaps Radau was obliged to invent kings and even dynasties, 13 the existenceof which is now definitely disproved. The statement of Nabonidus has not, however, been universally accepted. Lehmann-Haupt suggested an emendation of the text, reducing the number by a thousand years; 14 while Winckler has regarded the statement of Nabonidus as an uncritical exaggeration. 16 Obviously the

scribes of Nabonidus were not anxious to diminish the antiquity of the foundation-inscription of Naram-Sin, which their royal master had unearthed;

10 Published and discussed by Hilprecht, " Mathematical, Metrological and Chronological Texts " (Bab. Exped., Ser. A, xx. I, dated 1906, published 1907), pp. 46 ff.

11 See L. W. King, Letters and Inscriptions of Khammurabi, vol. iii. pp. 228 ff.

12 Cf., e.g., Hilprecht, Old Babylonian Inscriptions, pt. ii. p. 24.

13 See Radau, Early Babylonian History (1900).

14 See Lehmann-Haupt, Zwei Hauplprobleme, pp. 172 ff.

15 See Winckler in Schrader's Keilinschriften und das Alte-Testament (3rd ed.), i. pp. 17 f., and cf. Mitteil. der vorderas. Gesellschafl (1906), i. p. 12, n.l.

in

and another reason for their calculations resulting in so high a figure is suggested by the recent discoveries: they may in all good faith have reckoned as consecutive a number of early dynasties which were as a matter of fact contemporaneous. But, though we may refuse to accept the accuracy of this figure of Nabonidus, it is not possible at present to fix a definite date for the early kings of Agade. All that can be said is that both archaeological and epigraphic evidence indicates that no very long interval separated the empire of the Semitic kings of Agade from that of the kings of Sumer and Akkad, whose rule was inaugurated by the founding of the Dynasty of Ur. 1

To use caution in accepting the chronological notices of the later kings is very far removed from suggesting emendations of their figures. The emenders postulate mechanical errors in the writing of the figures, but, equally with those who accept them, regard the calculations of the native scribes as above reproach. But that scribes could make mistakes in their reckoning is definitely proved by the discovery at Shergat of two totally conflicting accounts of the age and history of the great temple of Assur. 2 This discovery in itself suggests that all chronological data are

not to be treated as of equal value and arranged mechanically like the pieces of a Chinese puzzle; and further, that no more than a provisional acceptance should be accorded any statement of the later native chronologists, until confirmed by contemporary records. On the other hand, the death-blow has been given to the principle of emendation of the figures, which for so long has found favour among a considerable body of German writers. (L. W. K.)

IX. Proper Names. — In the early days of the decipherment of the cuneiform inscriptions, the reading of the proper names borne by Babylonians and Assyrians occasioned great difficulties; and though most of these difficulties have been overcome and there is general agreement among scholars as to the principles underlying both the formation and the pronunciation of the thousands of names that we encounter in historical records, business documents, votive inscriptions and literary productions, differences, though mostly of a minor character, still remain. Some time must elapse before absolute uniformity in the transliteration of these proper names is to be expected; and since different scholars still adopt varying spellings of Babylonian and Assyrian proper names, it has been considered undesirable in this work to ignore the fact in individual articles contributed by them. The better course seems to be to explain here the nature of these variations.

The main difficulty in the reading of Babylonian and Assyrian proper names arises from the preference given to the " ideographic " method of writing them. According to the developed cuneiform system of writing, words may be written by means of a sign (or combination of signs) expressive of the entire word, or they may be spelled out phonetically in syllables. So, for example, the word for " name " may be written by a sign MU, or it may be written cut by two signs shu-mu, the one sign MU representing the " Sumerian " word for " name," which, however, in the case of a Babylonian or Assyrian text must be read as shumu — the Semitic equivalent of the Sumerian MU. Similarly the word for " clothing " may be written SIG-BA, which represents again the " Sumerian " word, whereas, the Babylonian-Assyrian equivalent being lubushtu it is so to be read in Semitic texts, and may therefore be also phonetically written lu-bu-ush-tu. This double method of writing words arises from the circumstance that the cuneiform syllabary is of non-Semitic origin, the system being derived from the non-Semitic settlers of the Euphrates valley, commonly termed Sumerians (or Sumero-

Akkadians), to whom, as the earlier settlers, the origin of the cuneiform script is due. This script, together with the general Sumerian culture, was taken over by the Babylonians upon their settlement in the Euphrates valley and adapted to their language, which belonged to the Semitic group. In this transfer the Sumerian words — largely monosyllabic — were reproduced, but read as Semitic, and

1 Cf . L. W. King, Chronicles, i. pp. 15 ff., 61 f.

2 See Mitteilungen der deutschen Orientgesellschaft, Nos. 21 and 22, and cf. L. \V. King, Chronicles, i. pp. 114 ff.

at the same time the advance step was taken of utilizing the Sumerian words as means of writing the Babylonian words phonetically. In this case the signs representing Sumerian words were treated merely as syllables, and, without reference to their meaning, utilized for spelling Babylonian words. The Babylonian syllabary which thus arose, and which, as the culture passed on to the north — known as Assyria — became the Babylonian Assyrian syllabary, 3 was enlarged and modified in the course of time, the Semitic equivalents for many of the signs being distorted or abbreviated to form the basis of new "phonetic" values that were thus of " Semitic " origin; but, on the whole, the " non-Semitic " character of the signs used as syllables in the phonetic method of writing Semitic words was preserved; and, furthermore, down to the latest days of the Babylonian and Assyrian empires the mixed method of writing continued, though there were periods when " purism " was the fashion, and there was a more marked tendency to spell out the words laboriously in preference to using signs with a phonetic complement as an aid in suggesting the reading desired in any given instance. Yet, even in those days, the Babylonian syllabary continued to be a mixture of ideographic and phonetic writing. Besides the conventional use of certain signs as the indications of names of gods, countries, cities, vessels, birds, trees, &c, which, known as " determinants," are the Sumerian signs of the terms in question and were added as a guide for the reader, proper names more particularly continued to be written to a large extent in purely " ideographic " fashion. The conservatism which is a feature of proper names everywhere, in consequence of which the archaic traits of a language are frequently preserved in them, just as they are preserved in terms used in the ritual and in poetic diction, is sufficient to account for the interesting fact that the Semitic settlers of the Euphrates valley in handing down their names

from one generation to another retained the custom of writing them in " Sumerian " fashion, or, as we might also put it, in "ideographic" form. Thus the name of the deity, which enters as an element in a large proportion of the proper names, 4 was almost invariably written with the sign or signs representing this deity, and it is only exceptionally that the name is spelled phonetically. Thus the name of the chief god of the Babylonian pantheon, Marduk, is written by two signs to be pronounced AMAR-UD, which describe the god as the " young bullock of the day " — an allusion to the solar character of the god in question. The moon-god Sin is written by a sign which has the force of " thirty," and is a distinct reference to the monthly course of the planet; or the name is written by two signs to be pronounced EN-ZU, which describe the god as the " lord of wisdom." The god Nebo appears as PA — the sign of the stylus, which is associated with this deity as the originator and patron of writing and of knowledge in general, — or it is written with a sign AK, which describes the god as a " creator."

Until, therefore, through parallel passages or through explanatory lists prepared by the Babylonian and Assyrian scribes in large numbers as an aid for the study of the language, 5 the exact phonetic reading of these divine names was determined, scholars remained in doubt or had recourse to conjectural or provisional readings. Even at the present time there are many names of deities, as, e.g. Ninib, the phonetic reading of which is still unknown or uncertain. In most cases, however, these belong to the category of minor deities or represent old local gods assimilated to some more powerful god, who absorbed, as it were, the attributes and prerogatives of these minor ones. In many cases they will probably turn out to be descriptive epithets of gods

3 The Assyrian language is practically identical with the Babylonian, just as the Assyrians are the same people as the Babylonians with some foreign admixtures.

4 In many names the divine element is lopped off, but was originally present.

6 Aramaic endorsements on business documents repeating in Aramaic transliteration the names of parties mentioned in the texts have also been of service in fixing the phonetic readings of names. See e.g. Clay's valuable article, " Aramaic Endorsements on the Documents of Murashu Sons " (Persian period) in Old Testament and Semitic Studies in Memory of William Rainey

Harper (Chicago, 1908, vol. i.), pp. 285-322.

already known rather than genuine proper names. A peculiar difficulty arises in the case of the god of storms, who, written IM, was generally known in Babylonia as Ramman, ” the thunderer,” whereas in Assyria he also had the designation Adad. In many cases, therefore, we may be in doubt how the sign IM is to be read, more particularly since this same god appears to have had other designations besides Ramman and Adad.

Besides the divine element, proper names as a rule in the Babylonian-Assyrian periods had a verbal form attached and a third element representing an object. Even when the sign indicative of the verb is clearly recognised there still remains to be determined the form of the verb intended. Thus in the case of the sign KUR, which is the equivalent of nasaru, ” protect,” there is the possibility of reading it as the active participle nasir, or as an imperative ussur , or even the third person perfect issur. Similarly in the case of the sign MU, which, besides signifying V name ” as above pointed out, is also the Sumerian word for “give,” and therefore may be read iddin, “he gave,” from nadtinu, or may be read nadin, ” giver “; and when, as actually happens, a name occurs in which the first element is the name of a deity followed by MU-MU, a new element of doubt is introduced through the uncertainty whether the first MU is to be taken as a form of the verb nadanu and the second as the noun shumu, “name,” or vice versa.

Fortunately, in the case of a large number of names occurring 6n business documents as the interested parties or as scribes or as witnesses— and it is through these documents that we obtain the majority of the Babylonian-Assyrian proper names — we have variant readings, the same name being written phonetically itt whole or part in one instance and ideographically in another. Certain classes of names being explained in this way, legitimate and fairly reliable conclusions can be drawn for many others belonging to the same class or group. The proper names of the numerous business documents of the Khammurabi period, when phonetic writing was the fashion, have been of special value in resolving doubts as to the correct reading of names written ideographically. Thus names like Sin-na-di-in-shuˆmi and Bel~na-

di-in-shu-mi, i.e. “Sin is, the giver of a name” (i.e. offspring), and ” Bel is the giver of a name,” form the model for names with deities as the first element followed by MU-MU, even though the model may not be consistently followed in all cases. In historical texts also variant readings occur in consider- able number. Thus, to take a classic example, the name of the famous king Nebuchadrezzar occurs written in the following different manners: — (a) Na-bi-um-ku-du-ur-ri-u-su-ur, (6)AK-DU u-su-ur, (c) AK-ku-dur-ri-SHES, and (d) PA-GAR-DU-SHES, from which we are permitted to conclude that PA or AK (with the determinative for deity AN) = Na-bi-um or Nebo, that GAR-DU or DU alone = kudurri, and that SHES —ussur. The second element signifies ” boundary ” or ” territory “; the third element is the imperative of nasaru, “protect”; so that the whole name signifies, ” O, Nebo! protect my boundary ” (or “my territory “).

■ It is not the purpose of this note to set forth the principles underlying the formation of proper names among the Babylonians and Assyrians, but it may not be out of place to indicate that by the side of such full names, containing three elements (or even more), we have already at an early period the reduction of these elements to two through the combination of the name of a deity with a verbal form merely, or through the omission of the name of the deity. From such names it is only a step to names of one element, a characteristic feature of which is the frequent addition of an ending -turn (feminine), an, a, um, atum, atija, sha, &c, most of these being ” hypocoristic affixes,” corresponding in a measure to modern pet-names.

Lastly, a word about genuine or pseudo-Sumerian names. In the case of texts from the oldest historical periods we encounter hundreds of names that are genuinely Sumerian, and here in view of the multiplicity of the phonetic values attaching to the signs used it is frequently difficult definitely to determine the reading of the names. Our knowledge of the ancient Sumerian language

is still quite imperfect, despite the considerable progress made, more particularly during recent years. It is therefore not sur- prising that scholars should differ considerably in the reading of Sumerian names, where we have not helps at our command as for Babylonian and Assyrian names. Changes in the manner of reading the Sumerian names are frequent. Thus the name of a king of Ur, generally read Ur-Bau until quite recently, is now read Ur-Engur; for Lugal-zaggisi, a king of Erech, some scholars

still prefer to read Ungal-zaggisi; the name of a famous political and religious centre generally read Shir-pur-la is more probably to be read Shir-gul-Ja; and so forth. There is reason, however, to believe that the uncertainty in regard to many of these names will eventually be resolved into reasonable certainty. A doubt also still exists in regard to a number of names of the older period because of the uncertainty whether their bearers were Sumerians or Semites. If the former, then their names are surely to be read as Sumerian, while, if they were Semites, the signs with which the names are written are probably to be read according to their Semitic equivalents, though we may also expect to encounter Semites bearing genuine Sumerian names. At times too a doubt may exist in regard to a name whose bearer was a Semite, whether the signs composing his name represent a phonetic reading or an ideographic compound. Thus, e.g. when inscriptions of a Semitic ruler of Kish, whose name was written Uru-mu-ush, were first deciphered, there was a disposition to regard this as an ideographic form and to read phonetically Alu-usharshid (" he founded a city," with the omission of the name of the deity), but scholarly opinion finally accepted Uru- mu-ush (Urumush) as the correct designation.

For further details regarding the formation of Sumerian and Babylonian-Assyrian proper names, as well as for an indication of the problems involved and the difficulties still existing, especially in the case of Sumerian names, 1 see the three excellent works now at our disposal for the Sumerian, the old Babylonian, and the neo- Babylonian period respectively, by Huber, Die Personennamen in den Keilschrifturkunden aus der Zeit der Konige von Ur und Nisin (Leipzig, 1907) ; Ranke, Early Babylonian Proper Names (Phil- adelphia, 1905) ; and Tallqvist, Neu-Babylonisches Namenbuch (Helsingfors, 1905). (M. Ja.)

BABYLONIAN AND ASSYRIAN RELIGION. The develop- ment of the religion of Babylonia, so far as it can be traced with the material at hand, follows closely along the lines of the periods to be distinguished in the history of the Euphrates valley. Leaving aside the primitive phases of the religion as lying beyond the ken of historical investigation, we may note the sharp dis- tinction to be made between the pre-Khammurabic age and the post-Khammurabic age. While the political movement repre- sented by Khammurabi may have been proceeding for some time prior to the appearance of the great conqueror, the period of c. 2230 B.C., when the union of the Euphratean states was effected by Khammurabi, marks the beginning of a new epoch in the religion

as well as in the political history of the Euphrates valley. Corresponding to the states into which we find the country divided before 2250 B.C., we have a various number of religious centres such as Nippur, Erech, Kutha (Cuthah), Ur, Sippara (Sippar), Shirgulla (Lagash), Eridu and Agade, in each of which some god was looked upon as the chief deity around whom there were gathered a number of minor deities and with whom there was invariably associated a female consort. The jurisdiction of this chief god was, however, limited to the political extent or control of the district in which the main seat of the cult of the deity in question lay. Mild attempts, to be sure, to group the chief deities associated with the most important religious and political centres into a regular pantheon were made — notably in Nippur and later in Ur — but such attempts lacked the enduring quality which attaches to Khammurabi's avowed policy to raise Marduk — the patron deity of the future capital, Babylon — to the head of the entire Babylonian pantheon, as

1 Even in the case of the " Semitic " name of the famous Sargon I. (?.».), whose full name is generally read Sharru-kenu-sha-ah, and interpreted as " the legitimate king of the city," the question has recently been raised whether we ought not to read " Sharru-kenu- shar-ri " and interpret as " the legitimate king rules " — an illus- tration of the vacillation still prevailing in this difficult domain of research. •

Babylon itself came to he recognized as the real centre of the entire Euphrates valley.

Associated with Marduk was his consort Sarpanit, and grouped around the pair as princes around a throne were the chief deities of the older centres, like Ea and Damkina of Eridu, Nebo and Tashmit of Borsippa, Nergal and Allatu of Kutha, Shamash and A of Sippar, Sin and Ningal of Ur, as well as pairs like Ramman (or Adad) and Shala whose central seat is unknown to us. In this process of accommodating ancient prerogatives to new conditions, it was inevitable that attributes belonging specifically to the one or the other of these gods should have been transferred to Marduk, who thus from being, originally, a solar deity becomes an eclectic power, taking on the traits of Bel, Ea, Shamash, Nergal, Adad and even Sin (the moon-god) — a kind of

composite residuum of .all the chief gods.

In the religious literature this process can be traced with perfect definiteness. The older incantations, associated with Ea, were re-edited so as to give to Marduk the supreme power over demons, witches and sorcerers; the hymns and lamenta- tions composed for the cult of Bel, Shamash and of Adad were transformed into paeans and appeals to Marduk, while the ancient myths arising in the various religious and political centres underwent a similar process of adaptation to changed conditions, and as a consequence their original meaning was obscured by the endeavour to assign all mighty deeds and acts, originally symbolical of the change of seasons or of occurrences in nature, to the patron deity of Babylon — the supreme head of the entire Babylonian pantheon. Besides the chief deities and their consorts, various minor ones, representing likewise patron gods of less important localities and in most cases of a solar character were added at one time or the other to the court' of Marduk, though there is also to be noted a tendency on the part of the chief solar deity, Shamash of Sippara, and for the chief moon-god to absorb the solar and lunar deities of less important sites, leading in the case of the solar gods to the differentiation of the functions of Shamash during the various seasons of the year and the various times of the day among these minor deities. In this way Ninib, whose chief seat appears to have been at Shirgulla (Lagash), became the sun-god of the springtime and of the morning, bringing joy and new life to the earth, while Nergal of Kutha was regarded as the sun of the summer solstice and of the noonday heat — the harbinger of suffering and death.

There were, however, two deities who appear to have retained an independent existence — Anu (q.v.) , the god of heaven, and Ishtar (q.v.), the great mother-goddess, who symbolized fertility and vitality in general. There are some reasons for believing that the oldest seat, and possibly the original seat, of the Anu cult was in Erech, as it is there where the Ishtar cult that subse- quently spread throughout Babylonia and Assyria took its rise. While Anu, with whom there was associated as a pale reflection a consort Antum, assigned to him under the influence of the widely prevalent view among the early Semites which conceived of gods always in pairs, remained more or less of an abstraction during the various periods of the Babylonian-Assyrian religion and taking little part in the active cult of the temples, his unique position as the chief god of the highest heavens was always recognized in the theological system developed by the priests,

which found an expression in making him the first figure of a triad, consisting of Anu, Bel and Ea, among whom the priests divided the three divisions of the universe, the heavens, the earth with the atmosphere above it, and the watery expanse respectively.

Postponing the discussion of this triad, it is to be noted thai the systematization of the pantheon after the days of Kham- murabi did not seriously interfere with the independence of the goddess Ishtar. While frequently associated with Marduk, and still more closely with the chief god of Assyria, the god Assur (who occupies in the north the position accorded to Marduk in the south), so much so as to be sometimes spoken of as Assur's consort— the lady or Belit par excellence — the belief that as the source of all life she stands apart never lost its hold upon the

people and found an expression also in the system devised by the priests. By the side of the first triad, consisting of Anu, Bel and Ea — disconnected in this form entirely from all local associations — we encounter a second triad composed of Shamash, Sin and Ishtar. As the first triad symbolized the three divisions of the universe — the heavens, earth and the watery element — so the second represented the three great forces of nature— the sun, the moon and the life-giving power. According as the one or the other aspect of such a power is brought into the foreground, Ishtar becomes the mother of mankind, the fertile earth, the goddess of sexual love, and the creative force among animals, while at times she appears in hymns and myths as the general personification of nature.

We thus find in the post-Khammurabic period the pantheon assuming distinct shapes. The strong tendency towards con- centrating in one deity — Marduk — the attributes of all others was offset by the natural desire to make the position of Marduk accord with the rank acquired by the secular rulers. As these emphasized their supremacy by grouping around them a court of loyal attendants dependent in rank and ready to do their master's bidding, so the gods of the chief centres and those of the minor local cults formed a group around Marduk; and the larger the group the greater was the reflected glory of the chief figure. Hence throughout the subsequent periods of Babylonian history, and despite a decided progress towards a monotheistic conception' of divine government of the universe, the recognition of a large number of gods and their consorts by the side of Marduk remained a' firmly embedded doctrine in the Babylonian

religion as it did in the Assyrian religion, with the important variation, however, of transferring the role of the head of the pantheon from Marduk to Assur. Originally the patron god of the city of Assur (q.v.), when this city became the centre of a growing and independent district, Assur was naturally advanced to the same position in the north that Marduk occupied in the south. The religious predominance of the city of Babylon served to maintain for Marduk recognition even on the part of the Assyrian rulers, who, on the political side likewise, conceded to Babylonia the form at least of an independent district even when, as kings of Assyria, they exercised absolute control over it. They appointed their sons or brothers governors of Babylonia, and in the long array of titles that the kings gave themselves, a special phrase was always set aside to indicate their mastery over Babylonia. " To take the hand of Bel-Marduk "was the ceremony of installation which Assyrian rulers recognized equally with Babylonians as an essential preliminary to exercising authority in the Euphrates valley. Marduk and Assur became rivals only when Babylonia gave the Assyrians trouble; and when in 689 B.C. Sennacherib, whose patience had been exhausted by the difficulties en- countered in maintaining peace in the south, actually besieged and destroyed the city of Babylon, he removed the statue of Marduk to Nineveh as a symbol that the god's rule had come to an end. His grandson Assur-bani-pal, with a' view of re- establishing amicable relations, restored the statue to the temple E-Saggila,in Babylon and performed the time-honoured ceremony of " taking the hand of Bel " as a symbol of his homage to the ancient head of the Babylonian pantheon.

But for the substitution of Assur for Marduk, the Assyrian pantheon was the same as that set up in the south, though some of the gods were endowed with attributes which differ slightly from those which mark the same gods in the south. The warlike nature of the Assyrians was reflected in their conceptions of the gods, who thus became little Assurs by the side of the great protector of arms, the big Assur. The cult and ritual in the north likewise followed the models set up in the south. The hymns composed for the temples of Babylonia were transferred to Assur, Calah, Harran, Arbela and Nineveh in the north; and the myths and legends also wandered to Assyria, where, to be sure, they underwent certain modifications. To all practical purposes, however, the religion of Assyria was identical with that practised in the south.

We thus obtain four periods in the development of the

Babylonian- Assyrian religidn: (1) the oldest period from

ii4

BABYLONIAN AND ASSYRIAN RELIGION

c. 3500 B.e. to the time of Khammurabi (c. 2250 B.C.); (2) the post-Khammurabic period in Babylonia; (3) the Assyrian period (c. 2000 B.C.) to the destruction of Nineveh in 606 B.C.; (4) the neo-Babylonian period beginning with Nabopolassar (625-604 B.C.), the first independent ruler under whom Babylonia inaugurates a new though short-lived era of power and prosperity, which ends with Cyrus's conquest of Babylon and Babylonia in 539 B.C., though since the religion proceeds on- its undisturbed course for several centuries after the end of the political inde- pendence, we might legitimately carry this period to the Greek conquest of the Euphrates valley (331 B.C.), when new influences began to make themselves felt which gradually led to the extinction of the old cults.

In this long period of c. 3500 to c. 300 B.C., the changes introduced after the adjustment to the new conditions produced by Khammurabi's union of the Euphratean states are of a minor character. As already indicated, the local cults in the im- portant centres of the south and north maintained themselves despite the tendency towards centralization, and while the cults themselves varied according to the character of the gods worshipped in each centre, the general principles were the same and the rites differed in minor details rather than in essential variations. An important factor which thus served to maintain the rites in a more or less stable condition was the predominance of what may be called the astral theology as the theoretical substratum of the Babylonian religion, and which is equally pronounced in the religious system of Assyria. The essential feature of this astral theology is the assumption of a close link between the movements going on in the heavens and occurrences on earth, which led to identifying the gods and goddesses with heavenly bodies — planets and stars, besides sun and moon — and to assigning the seats of all the deities in the heavens. The personification of the two great luminaries — the sun and the moon — was the first step in the unfolding of this system, and this was followed by placing the other deities where Shamash and Sin had their seats. This process, which reached its culmination in the post-Khammurabic period, led to identifying the planet Jupiter with Marduk, Venus with Ishtar, Mars with Nergal, Mercury with Nebo, and Saturn with Ninib. The system repre- sents a harmonious combination of two factors, one of popular origin, the other the outcome of speculation in the schools attached to the temples of Babylonia. The popular factor is the belief in the influence exerted by the movements of the

heavenly bodies on occurrences on earth — a belief naturally suggested by the dependence of life, vegetation and guidance upon the two great luminaries. Starting with this belief the priests built up the theory of the close correspondence between occurrences on earth and phenomena in the heavens. The heavens presenting a constant change even to the superficial observer, the conclusion was drawn of a connexion between the changes and the ever- changing movement in the fate of individuals and of nature as well as in the appearance of nature.

To read the signs of the heavens was therefore to understand the meaning of occurrences on earth, and with this accomplished it was also possible to foretell what events were portended by the position and relationship to one another of sun, moon, planets and certain stars. Myths that symbolized changes in season or occurrences in nature were projected on the heavens, which were mapped out to correspond to the divisions of the earth. All the gods, great and small, had their places assigned to them in the heavens, and facts, including such as fell within the domain of political history, were interpreted in terms of astral theology. So completely did this system in the course of time sway men's minds that the cult, from being an expression of animistic beliefs, took on the colour derived from the "astral" interpretation of occurrences and doctrines. It left its trace in incantations, omens and hymns, and it gave birth to astronomy, which was assiduously cultivated because a knowledge of the heavens was the very foundation of the system of belief unfolded by the priests of Babylonia and Assyria. " Chaldaean wisdom " became in the classical world the synonym of this science, which in its character was so essentially religious. The persistent

prominence which astrology (q.v.) continued to enjoy down to the border-line of the scientific movement of our own days, and which is directly traceable to the divination methods per- fected in the Euphrates valley, is a tribute to the scope and influence attained by the astral theology of the Babylonian and Assyrian priests.

As an illustration of the manner in which the doctrines of the religion were made to conform to the all-pervading astral theory, it will be sufficient to refer to the modification undergone in this process of the view developed in a very early period which appor- tioned the control of the universe among the three gods Ami, Bel and Ea. Disassociating these gods from all local connexions, Anu became the power presiding over the heavens,

to Bel was assigned the earth and the atmosphere immediately above it, while Ea ruled over the deep. With the transfer of all the gods to the heavens, and under the influence of the doctrine of the correspondence between the heavens and the earth, Anu, Bel and Ea became the three ” ways ” (as they are called) on the heavens. The ” ways ” appear in this instance to have been the designation of the ecliptic circle, which was divided into three sections or zones — a northern, a middle and a southern zone, Anu being assigned to the first, Bel to the second, and Ea to the third zone, The astral theology of the Babylonian-Assyrian religion, while thus bearing the ear-marks of a system devised by the priests, succeeded in assimilating the beliefs which represented the earlier attempts to systematize the more popular aspects of the religion, and in this way a unification of diverse elements was secured that led to interpreting the contents and the form of the religion in terms of the astral- theological system.

The most noteworthy outcome of this system in the realm of religious practice was, as already intimated, the growth of an elaborate and complicated method of divining the future by the observation of the phenomena in the heavens. It is significant that in the royal collection of cuneiform literature made by King Assur-bani-pal of Assyria (668-626 B.C.) and deposited in his palace at Nineveh, the omen collections connected with the astral theology of Babylonia and Assyria form the largest class. There are also indications that the extensive texts dealing with divination through the liver of sacrificial animals, which represents a more popular origin than divination through the observations of the heavens, based as it is on the primitive view which regarded the liver as the seat of life and of the soul, were brought into connexion with astral divination. Less influenced by the astral-theological system are the old incantation texts which were gathered together into series. In these series we can trace the attempt to gather the incantation formulae and prayers produced in different centres, and to make them con- form to the tendency to centralize the cult in the worship of Marduk and his consort in the south, and of Assur and Ishtar in the north. Incantations originally addressed to Ea of Eridu, as the god of the watery element, and to Nusku, as the god of fire, were transferred to Marduk. This was done by making Ea confer on Marduk as his son the powers of the father, and by making Nusku a messenger between Ea and Marduk. At the same time, since the invoking of the divine powers was the essential element in the incantations, in order to make the magic formulae as effective as

possible, a large number of the old local deities are introduced to add their power to the chief ones; and it is here that the astral system comes into play through the introduction of names of stars, as well as through assigning attri- butes to the gods which clearly reflect the conception that they have their seats in the heavens. The incantations pass over naturally into hymns and prayers. The connexion between the fwo is illustrated by the application of the term shiptu, " in- cantation," to the direct appeals to the gods, as well as by the introduction, on the one hand, of genuine prayers into the incantations and by the addition, on the other hand, of incanta- tions to prayers and hymns, pure and simple. In another division of the religious literature of Babylonia which is largely represented in Assur-bani-pal's collection — the myths and legends — tales which originally symbolized the change of seasons, or in which historical occurrences are overcast with more or less copious

admixture of legend and myth, were transferred to the heavens, and so it happens that creation myths, and the accounts of wanderings and adventures of heroes of the past, are referred to movements among the planets and stars as well as to occur- rences or supposed occurrences on earth.

The ritual alone which accompanied divination practices and incantation formulae and was a chief factor in the celebration of festival days and of days set aside for one reason or the other to the worship of some god or goddess or group of deities, is free from traces of the astral theology. The more or less elaborate ceremonies prescribed for the occasions when the gods were approached are directly connected with the popular elements of the religion. Animal sacrifice, libations, ritualistic purifica- tion, sprinkling of water, and symbolical rites of all kinds accompanied by short prayers, represent a religious practice which in the Babylonian-Assyrian religion, as in all religions, is older than any theology and survives the changes which the theoretical substratum of the religion undergoes.

On the ethical side, the religion of Babylonia more particularly, and to a less extent that of Assyria, advances to noticeable con- ceptions of the qualities associated with the gods and goddesses and of the duties imposed on man. Shamash the sun-god was

invested with justice as his chief trait, Marduk is portrayed as full of mercy and kindness, Ea is the protector of mankind who is grieved when, through a deception practised upon Adapa* humanity is deprived of immortality. The gods, to be sure, are easily aroused to anger, and in some of them the dire aspects predominated, but the view becomes more and more pronounced that there is some cause always for the divine wrath. Though, in accounting for the anger of the gods, no sharp distinction is made between moral offences and a ritualistic oversight or neglect, yet the stress laid in the hymns and prayers, as well as in the elaborate atonement ritual prescribed in order to appease the anger of the gods, on the need of being clean and pure in the sight of the higher powers, the inculcation of a proper aspect of humility, and above all the need of confessing one's guilt and sins without any reserve— all this bears testimony to the strength which the ethical factor acquired in the domain of the religion.

This factor appears to less advantage in the unfolding of the views concerning life after death; Throughout all periods of Babylonian-Assyrian history, the conception prevailed of a large dark cavern below the earth, not far from the Apsu — the ocean encircling and flowing underneath the earth— in which all the dead were gathered and where they led a miserable exist- ence of inactivity amid gloom and dust. Occasionally a favoured individual was permitted to escape from this general fate and placed in a pleasant island. It would appear also that the rulers were always singled out for divine grace, and in the earlier periods of the history, owing to the prevailing view that the rulers stood nearer to the gods than other mortals, the kings were deified after death, and in some instances divine honours were paid to them even during their lifetime.

The influence exerted by the Babylonian-Assyrian religion was particularly profound on the Semites, while the astral theology affected the ancient world in general, including the Greeks and Romans. The impetus to the purification of the old Semite religion to which the Hebrews for a long time clung in common with their fellows — the various branches of nomadic Arabs— was largely furnished by the remarkable civilization unfolded in the Euphrates valley and in many of the traditions, myths and legends embodied in the Old Testament; traces of direct borrow- ing from Babylonia may,be discerned, while the indirect influences in the domain of the prophetical books, as also in the Psalms and in the so-called " Wisdom Literature," are even more

note- worthy. Even when we reach the New Testament period, we have not passed entirely beyond the sphere of Babylonian-Assyrian influences. In such a movement as early Christian gnosticism, Babylonian elements — modified, to be sure, and transformed — are largely present, while the growth of an apocalyptic literature is ascribed with apparent justice by many scholars to the recrudescence of views the ultimate source of

which is to be found in the astral-theology of the Babylonian and Assyrian priests.

Bibliography. — Morris Jastrow, jun., Religion Babyloniens und Assyrians (Giessen, 1904), enlarged and re-written form of the author's smaller Religion of Babylonia and Assyria (Boston, 1898); A. H. Sayce, The Religion of the Ancient Babylonians (Hibbert Lectures, London, 1887), now superseded by the same author's Religions of Ancient Egypt and Babylonia (Gifford Lectures. Edin- burgh, 1902) ; Friedrich Jeremias, Die Babylonier und Assyrer, in de la Saussaye's Lehrbuch der Religions geschichte (3rd ed., Tubingen, I9 5)i v °l- i-; L. W. King, Babylonian Religion and Mythology (London, 1899); T. G. Pinches, Religion of Babylonia and Assyria (London, 1906). Of special texts and monographs bearing on the religion may be mentioned various volumes in the new series of cuneiform texts from Babylonian tablets, &c, in the British Museum (London, 1901-), especially parts v., xii., xv., xvii., xviii., xx. and xxi. and vol. iv. of the earlier series, of Selections from the Miscellaneous Inscriptions of Western Asia, ed. by H. C. Rawlinson (2nd ed.", London, 1891); H. Zimmern, Beitrage zur Kenntniss der babylon- ischen Religion (Leipzig, 1901); J. A. Craig,. Assyrian and Baby- Ionian Religious Texts (Leipzig, 1895-1897) ; L. W. King, The Seven Tablets of Creation (London, 1902); R. C. Thompson, The Reports of the Magicians and Astrologers of Nineveh and Babylon (London, 1900) ; A. Boissier, Documents assyriens relatifs aux presages (Paris, 1894-1897); and his Choix de textes relatifs A la divination assyro- babylonienne (Geneva, 1905-1906) ; Ch. Fossey, La Magie assyrienne (Paris, 1902) ; G. A. Reisner, Sumerisch-babylonische Hymrien (Berlin, 1896) ; L. W. King, Babylonian Magic and Sorcery (London, 1896); R. C. Thompson, Devils and Evil Spirits of Babylonia (London, 1903-1904) ; K. L. Tallqvist, Die assyrische Beschworungs- serie Maqlu (Leipzig, 1895); J. A. Knudtzon, Assyrische Gebete an den Sonnengott (Leipzig, 1893) ; Virolleaud, V Astrologie chaldienne (Paris, 1906-); Craig, Astrological-Astronomical Texts (Leipzig, 1892) ; Martin, Textes religieux assyriens el babyloniens (Paris,

1900 and 1903) ; Paul Haupt, Das babylonische Nimrodepos (Leipzig, 1891); Friedrich Delitzsch, Das babylonische Weltschopfungsepos (Leipzig, 1896) ; P. Jensen, ” Assyrisch-babylomsche Mythen und Epen,” in Schrader’s Keilinschriftliche Bibliothek, vol. vi. part I (Berlin, 1900) ; also his Das Nationalepos der Babylonier, &c. (Strassburg, 1906) ; H. Zimmern in vol. ii. of 3rd ed. of Schrader’s Keilinschnften und das Alte Testament (Berlin, 1903) ; Alfred Jeremias, Die babylonisch-assyrischen Vorstellungen von Leben nach dem Tode (Leipzig, 1887) ; and his Das Alte Testament im Lichte des Alten Orients (2nd ed., Leipzig, 1906-1907) ; and Babylonisches im Neuen Testament (Leipzig, 1905). On the religious litera- ture of Babylonia and Assyria, see also chapters xv. to xxiv. in Jastrow’s work (German and English edition), Carl Bezold’s Ninive and Babylon (Bielefeld, 1905), chapters vi. to xii., and the same author’s monumental catalogue of the cuneiform tablets in the Kuyunjik collection of the British Museum (5 vols., London, 1889-1899). (M. Ja.)

BABYLONIAN CAPTIVITY, the name generally given to the deportation of the Jews to Babylon by Nebuchadrezzar. . Three separate occasions are mentioned (Jer. Hi. 28-30). The first was in the time of Jehoiachin in 597 B.C., when the temple of Jerusalem was partially despoiled and a number of the leading citizens removed. After eleven years (in the reign of Zedekiah) a fresh rising of the Judaeans occurred; the city was razed to the ground, and a further deportation ensued. Finally, five years later, Jeremiah (loc. cit.) records a third captivity. After the overthrow of Babylonia by the Persians, Cyrus gave the Jews permission to return to their native land (537 B.C.), and more then forty thousand are said to have availed themselves of the privilege. (See Jehoiakim; Jehoiachin; Zedekjah; Ezra- Nehemiah and Jews: History.)

BABYLONIAN LAW. The material for the study of. Baby- lonian law is singularly extensive without being exhaustive. The so-called ” contracts,” including a great variety of deeds, conveyances, bonds, receipts, accounts and, most important of all, the actual legal decisions given by the judges in the law courts, exist in thousands. Historical inscriptions, royal charters and rescripts, despatches, private letters and the general literature afford welcome supplementary information. Even grammatical and lexicographical works, intended solely to facilitate the study of ancient literature, contain many extracts or short sentences bearing on law and custom. The so-called ”

Sumerian Family Laws ” are thus preserved. The discovery of the now celebrated Code of Khammurabi (Hammurabi) 1 (hereinafter simply termed

1 For the transliteration of Babylonian and Assyrian names generally, see Babylonia and Assyria, section ix., Proper Names.

” the Code “) has, however, made a more systematic study possible than could have resulted from the classification and interpretation of the other material. Some fragments of a later code exist and have been published; but there still remain many points upon which we have no evidence.

This material dates from the earliest times down to the commencement 01 our era. lne evidence upon a particular point may be very full at one period and almost entirely lacking at another. The Code forms the backbone of the skeleton sketch which is here reconstructed. The fragments of it which have been recovered from Assur-bani-pal’s library at Nineveh and later Babylonian copies show that it was studied, divided into chapters entitled Ninu ilu sirum from its opening words, and recopied for fifteen hundred years or more. The greater part of it remained in force, even through the Persian, Greek and Parthian conquests, which affected private life in Babylonia very little, and it survived to influence Syro-Roman and later Mahommedan law in Meso- potamia. The law and custom which preceded the Code we shall call ” early,” that of the New Babylonian empire (as well as the Persian, Greek, &c.) ” late. ” The law in Assyria was derived from Babylonia but conserved early features long after they had disappeared elsewhere.

When the Semitic tribes settled in the cities of Babylonia, their tribal custom passed over into city law. The early history of the country is the story of a struggle for supremacy between the cities. A metropolis demanded tribute and military support from its subject cities but left their local cults and customs unaffected. The city rights and usages were respected by kings and conquerors alike.

As late as the accession of Assur-bani-pal and Samas-sum-yukiri we find the Babylonians appealing to their city laws that groups

of aliens to the number of twenty at a time were free to enter the city, that foreign women once married to Babylonian husbands could not be enslaved and that not even a dog that entered the city could be put to death untried.

The population of Babylonia was of many races from early times and intercommunication between the cities was incessant. Every city had a large number of resident aliens. This freedom of intercourse must have tended to assimilate custom. It was, however, reserved for the genius of Khammurabi to make Babylon his metropolis and weld together his vast empire by a uniform system of law.

Almost all trace of tribal custom has already disappeared from the law of the Code. It is state-law ; alike self-help, blood-feud, marriage by capture, are absent ; though Code of family solidarity, district responsibility, ordeal, the lex murabi. talionis, are primitive features that remain. The king is a benevolent autocrat, easily accessible to all his subjects, both able and willing to protect the weak against the highest-placed oppressor. The royal power, however, can only pardon when private resentment is appeased. The judges are strictly supervised and appeal is allowed. The whole land is covered with feudal holdings, masters of the levy, police, &c. There is a regular postal system. The pax Babylonica is so assured that private individuals do not hesitate to ride in their carriage from Babylon to the coast of the Mediterranean. The position of women is free and dignified.

The Code did not merely embody contemporary custom or conserve ancient law. It is true that centuries of law-abiding and litigious habitude had accumulated in the temple archives of each city vast stores of precedent in ancient deeds and the records of judicial decisions, and that intercourse had assimilated city custom. The universal habit of writing and perpetual recourse to written contract even more modified primitive custom and ancient precedent. Provided the parties could agree, the Code left them free to contract as a rule. Their deed of agreement was drawn up in the temple by a notary public, and confirmed by an oath " by god and the king." It was publicly sealed and witnessed by professional witnesses, as well as by collaterally interested parties. The manner in which it was thus executed may have been sufficient security that its stipulations were not impious or illegal. Custom or public opinion doubtless secured

that' the parties would not agree to wrong. In case of dispute the judges dealt first with the contract. They might not sustain it, but if the parties did not dispute it, they were free to observe it. The judges' decision might, however, be appealed against. Many contracts contain the proviso that in case of future dispute the parties would abide by " the decision of the king." The Code made known, in a vast number of cases, what that decision would be, and many cases of appeal to the king were sent back to the judges with orders to decide in accordance with it. The Code itself was carefully and logically arranged and the order of its sections was conditioned by their subject-matter. Neverthe- less the order is not that of modern scientific treatises, and a somewhat different order from both is most convenient for our purpose.

The Code contemplates the whole population as falling into three classes, the amelu, the muskinu and the ardu. The amelu was a patrician, the man of family, whose birth, marriage and death were registered, of ancestral estates and full civil rights. He had aristocratic privileges and responsibilities, the right to exact retaliation for corporal injuries, and liability to heavier punishment for crimes and misdemeanours, higher fees and fines to pay. To this class belonged the king and court, the higher officials, the professions and craftsmen. The term became in time a mere courtesy title but originally carried with it stand- ing. Already in the Code, when status is not concerned, it is used to denote " any one." There was no property qualification nor does the term appear to be racial. It is most difficult to char&cterize the muskinu exactly. The term came in time to mean " a beggar " and with that meaning has passed through Aramaic and Hebrew into many modern languages ; but though the Code does not regard him as necessarily poor, he may have been landless. He was free, but had to accept monetary com- pensation for corporal injuries, paid smaller fees and fines, even paid less offerings to the gods. He inhabited a separate quarter of the city. There is no reason to regard him as specially con- nected with the court, as a royal pensioner, nor as forming the bulk of the population. The rarity of any reference to him in contemporary documents makes further specification conjectural. The ardu was a slave, his master's chattel, and formed a very numerous class. He could acquire property and even hold other slaves. His master clothed and fed him, paid his doctor's fees, but took all compensation paid for injury done to him. His master usually found him a slave-girl as wife (the children were then born slaves), often set

him up in a house (with farm or business) and simply took an annual rent of him. Otherwise he might marry a freewoma.n (the children were then free), who might bring him a dower which his master could not touch, and at his death one-half of his property passed to his master as his heir: He could acquire his freedom by purchase from his master, or might be freed and dedicated to a temple, or even adopted, when he became an ; amelu and not a muskinu. Slaves were recruited by purchase abroad, from captives taken in war and by freemen degraded for debt or crime. A slave often ran away ; if caught, the captor was bound to restore him to his master, and the Code fixes a reward of two shekels which the owner must pay the captor. It was about one-tenth of the average value. To detain, harbour, &c, a slave was punished by death. So was an attempt to get him to leave the city. A slave bore an identification mark, which could only be removed by a surgical operation and which later consisted of his owner's name tattoed or branded on the arm. On the great estates in Assyria and its subject provinces were many serfs, mostly of subject race, settled captives, cr quondam slaves, tied to the soil they cultivated and sold with the estate but capable of possessing land and property of their own. There is little trace of serfs in Babylonia, unless the muskinu be really a serf.

The god of a city was originally owner of its land, which encircled it with an inner ring of irrigable arable land and an outer fringe of pasture, and the citizens were his tenants. The god and his viceregent, the king, had long ceased to disturb tenancy, and were content, with fixed dues in naturalia, stock,

money or service. One of the earliest monuments records the purchase by a king of a large estate for his son, paying a fair market price and adding a handsome honorarium to the many owners in costly garments, plate, and precious articles of rurniture. The Code recognizes complete private ownership in land, but apparently extends the right to hold land to votaries, merchants (and resident aliens ?). But all land was sold subject to its fixed charges. The king, however, could free land from these charges by charter, which was a frequent way of rewarding those who deserved well of the state. It is from these charters that we learn nearly all we know of the obligations that lay upon land. The state demanded men for the army and the corvee as

well as dues in kind. A definite area was bound to find a bowman together with his linked pikeman (who bore the shield for both) and to furnish them with supplies for the cam- paign. This area was termed ” a bow ” as early as the 8th century B.C., but the usage was much earlier. Later, a horseman was due from certain areas. A man was only bound to serve so many (six ?) times, but the land had to find a man annually. The service was usually discharged by slaves and serfs, but the amelu (and perhaps the muskinu) went to war. The ” bows ” were grouped in tens and hundreds. The corvee was less regular. The letters of Khammurabi often deal with claims to exemption. Religious officials and shepherds in charge of flocks were exempt. Special liabilities lay upon riparian owners to repair canals, bridges, quays, &c. The state claimed certain proportions of all crops, stock, &c. The king’s messengers could commandeer any subject’s property, giving a receipt. Further, every city had its own octroi duties, customs, ferry dues, highway and water rates. The king had long ceased to be, if he ever was, owner of the land. He had his own royal estates, his private property and dues from all his subjects. The higher officials had endowments and official residences. The Code regulates the feudal position of certain classes. They held an estate from the king consisting of house, garden, field, stock and a salary, on condition of personal service on the king’s errand. They could not delegate the service on pain of death. When ordered abroad they could nominate a son, if capable, to hold the benefice and carry on the duty. If there was no son capable, the state put in a locum tenens, but granted one-third to the wife to main- tain herself and children. The benefice was inalienable, could not be sold, pledged, exchanged, sublet, devised or diminished. Other land was held of the state for rent. Ancestral estate was strictly tied to the ‘family. If a holder would sell, the family had the right of redemption and there seems to have been no time-limit to its exercise.

The temple occupied a most important position. It received Irom its estates, from tithes and other fixed dues, as well as from the sacrifices (a customary share) and other offerings of the faithful, vast amounts of all sorts of naturalia; besides money and permanent gifts. The larger temples had many officials and servants. Originally, perhaps, each town clustered round one temple, and each head of a family had a right to minister there and share its receipts. As the city grew, the right to so many days a year at one or other shrine (or its ” gate “) descended in certain families and became a species of property which could be

pledged, rented or shared within the family, but not alienated. In spite of all these demands, however, the temples became great granaries and store-houses; as they also were the city archives. The temple had its responsibilities. If a citizen was captured by the enemy and could not ransom himself the temple of his city must do so. To the temple came the poor farmer to borrow seed corn or supplies for harvesters, &c. — advances which he repaid without interest. The king's power over the temple was not proprietary but administrative. He might borrow from it but. repaid like other borrowers. The tithe seems to have beer the composition for the rent due to the god for his land. It fi not clear that all lands paid tithe, perhaps only such as once had a special connexion with the temple.

The Code deals with a class of persons devoted to the service of a god, as vestals or hierodules. The vestals were vowed to chastity, lived together in a great nunnery, were forbidden to

open or enter a tavern, and together with other votaries had many privileges.

The Code recognizes many ways of disposing of property — sale, lease, barter, gift, dedication, deposit, loan, pledge, all of which were matters of contract. Sale was the delivery of the purchase (in the case of real estate symbolized by a staff, a key, or deed of conveyance) in return for the purchase money, receipts being given for both. Credit, if given, was treated as a debt, and secured as a loan by the seller to be repaid by the buyer, for which he gave a bond. The Code admits no claim unsubstantiated by documents or the oath of witnesses. A buyer had to convince himself of the seller's title. If he bought (or received on deposit) from a minor or a slave without power of attorney, he would be executed as a thief. If the goods were stolen and the rightful owner reclaimed them, he had to prove his purchase by producing the seller and the deed of sale or witnesses to it. Otherwise he would be adjudged a thief and die. If he proved his purchase, he had to give up the property but had his remedy against the seller or, if he had died, could reclaim five-fold from his estate. A man who bought a slave abroad, might find that he had been stolen or captured from Babylonia, and he had to restore him to his former owner without profit. If he bought property belonging to a feudal holding, or to a ward in chancery, he had to return it and forfeit what he gave for it as well. He could repudiate the purchase of a slave attacked by the bennu sickness within the month (later, a hundred days) , and had a

female slave three days on approval. A defect of title or undisclosed liability would invalidate the sale at'any time.

Landowners frequently cultivated their land themselves but might employ a husbandman or let it. The husbandman was bound to carry out the proper cultivation, raise an average crop and leave the field in good tilth. In case the crop failed the Code fixed a statutory return. Land might be let at a fixed rent when the Code enacted that accidental loss fell on the tenant. If let on share-profit, the landlord and tenant shared the loss proportionately to their stipulated share of profit. If the tenant paid his rent and left the land in good tilth, the landlord could not interfere nor forbid subletting. Waste land was let to reclaim, the tenant being rent-free for three years and paying a stipulated rent in the fourth year. If the tenant neglected to reclaim the land the Code enacted that he must hand it over in good tilth and fixed a statutory rent. Gardens or plantations were let in the same ways and under the same conditions; but for date- groves four years' free tenure was allowed. The metayer system was in vogue, especially on temple lands. The landlord found land, labour, oxen for ploughing and working the watering- machines, carting, threshing or other implements, seed corn, rations for the workmen and fodder for the cattle. The tenant, or steward, usually had other land of his own. If he stole the seed, rations or fodder, the Code enacted that his fingers should be cut off. If he appropriated or sold the implements, im- poverished or sublet the cattle, he was heavily fined and in default of payment might be condemned to be torn to pieces by the cattle on the field. Rent was as contracted.

Irrigation was indispensable. If the irrigator neglected to repair his dyke, or left his runnel open and caused a flood, he had to make good the damage done to his neighbours' crops, or be sold with his family to pay the cost. The theft of a watering- machine, water-bucket or other agricultural implement was heavily fined.

Houses were let usually for the year, but also for longer terms, rent being paid in advance, half-yearly. The contract generally specified that the house was in good repair, and the tenant was bound to keep it so. The woodwork, including doors and door frames, was removable, and the tenant might bring and take away his own. The Code enacted that if the landlord would re-enter before the term was up, he must remit a fair proportion of the rent. Land was leased for houses or other buildings to be built upon it, the tenant being rent-free for eight or ten years;

after which the building came into the landlord's possession.

Despite the multitude of slaves, hired labour was often needed, especially at harvest. This was ma tier of contract, and the hirer,

who usually paid in advance, might demand a guarantee to fulfil the engagement. Cattle were hired for ploughing, working the watering-machines, carting, threshing, etc. The Code fixed a statutory wage for sowers, ox-drivers, field-labourers, and hire for oxen, asses, &c.

There were many herds and flocks. The flocks were com- mitted to a shepherd who gave receipt for them and took them out to pasture. The Code fixed him a wage. He was responsible for all care, must restore ox for ox, sheep for sheep, must breed them satisfactorily. Any dishonest use of the flock had to be re- paid ten-fold, but loss by disease or wild beasts fell on the owner. The shepherd made good all loss due to his neglect. If he let the flock feed on a field of corn he had to pay damages four-fold ; if he turned them into standing corn when they ought to have been folded he paid twelve-fold.

In commercial matters, payment in kind was still common, though the contracts usually stipulate for cash, naming the standard expected, that of Babylon, Larsa, Assyria, Carchemish, &c. The Code enacted, however, that a debtor must be allowed to pay in produce according to statutory scale. If a debtor had neither money nor crop, the creditor must not refuse goods.

Debt was secured on the person of the debtor. Distraint on a debtor's corn was forbidden by the Code; not only must the creditor give it back, but his illegal action forfeited his claim altogether. An unwarranted seizure for debt was fined, as was the distraint of a working ox. The debtor being seized for debt could nominate as mancipium or hostage to work off the debt, his wife, a child, or slave. The creditor could only hold a wife or child three years as mancipium. If the mancipium died a natural death while in the creditor's possession no claim could lie against the latter; but if he was the cause of death by cruelty, he had to give son for son, or pay for a slave. He could sell a slave-hostage, unless she were a slave-girl who had borne her master children.

She had to be redeemed by her owner.

The debtor could also pledge his property, and in contracts often pledged a field, house or crop. The Code enacted, however, that the debtor should always take the crop himself and pay the creditor from it. If the crop failed, payment was deferred and no interest could be charged for that year. If the debtor did not cultivate the field himself he had to pay for the cultivation, but if the cultivation was already finished he must harvest it himself and pay his debt from the crop. If the cultivator did not get a crop this would not cancel his contract. Pledges were often made where the intrinsic value of the article was equivalent to the amount of the debt; but antichretic pledge was more common, where the profit of the pledge was a set-off against the interest of the debt. The whole property of the debtor might be pledged as security for the payment of the debt, without any of it coming into the enjoyment of the creditor. Personal guarantees were often given that the debtor would repay or the guarantor become liable himself.

Trade was very extensive. A common way of doing business was for a merchant to entrust goods or money to a travelling agent, who sought a market for his goods. The caravans travelled far beyond the limits of the empire. The Code insisted that the agent should inventory and give a receipt for all that he received. No claim could be made for anything not so entered. Even if the agent made no profit he was bound to return double what he had received, if he made poor profit he had to make up the deficiency; but he was not responsible for loss by robbery or extortion on his travels. On his return, the principal must give a receipt for what was handed over to him. Any false entry or claim on the agent's part was penalised three-fold, on the principal's part six-fold. In normal cases profits were divided according to contract, usually equally.

A considerable amount of forwarding was done by the caravans. The carrier gave a receipt for the consignment, took all responsibility and exacted a receipt on delivery. If he defaulted he paid five-fold. He was usually paid in advance. Deposit, especially warehousing of grain, was charged for at one-sixtieth. The warehouseman took all risks, paid double for all shortage, but no

claim could be made unless he had given a properly witnessed receipt. Water traffic on the Euphrates and canals was early very considerable. Ships, whose tonnage was estimated at the amount

of grain they could carry, were continually hired for the transport of all kinds of goods. The Code fixes the price for building and insists on the builder's giving a year's guarantee of seaworthiness. It fixes the hire of ship and of crew. The captain was responsible for the freight and the ship; he had to replace all loss. Even if he refloated the ship he had to pay a fine of half its value for sinking it. In the case of collision the boat under way was responsible for damages to the boat at anchor. The Code also regulated the liquor traffic, fixing a fair price for beer and forbidding the connivance of the tavern-keeper (a female!) at disorderly conduct or treasonable assembly, under pain of death. She was to hale the offenders to the palace, which implied an efficient and accessible police system.

Payment through a banker or by written draft against deposit was frequent. Bonds to pay were treated as negotiable. Interest was rarely charged on advances by the temple or wealthy land-owners for pressing needs, but this may have been part of the metayer system. The borrowers may have been tenants. Interest was charged at very high rates for overdue loans of this kind. Merchants (and even temples in some cases) made ordinary business loans, charging from 20 to 30 %.

Marriage retained the form of purchase, but was essentially a contract to be man and wife together. The marriage of young people was usually arranged between the relatives, the bride-groom's father providing the bride-price, which with other presents the suitor ceremonially presented to the bride's father. This bride-price was usually handed over by her father to the bride on her marriage, and so came back into the bridegroom's possession, along with her dowry, which was her portion as a daughter. The bride-price varied much, according to the position of the parties, but was in excess of that paid for a slave. The Code enacted that it the father does not, after accepting a man's presents, give him his daughter, he must return the presents doubled. Even if his decision was brought about by libel on the part of the suitor's friend this was done, and the Code enacted that the faithless friend should not marry the girl. If a suitor changed his mind, he forfeited the presents. The dowry might include real estate, but generally consisted of personal effects and household furniture. It remained the wife's for life, descending to her children, if any; otherwise returning to her family, when the husband could deduct the bride-price if it had not been given to her, or return it, if it had. The marriage ceremony included joining of hands and the utterance of some formula of

acceptance on the part of the bridegroom, as " I am the son of nobles, silver and gold shall fill thy lap, thou shalt be my wife, I will be thy husband. Like the fruit of a garden I will give thee offspring." It must be performed by a freeman.

The marriage contract, without which the Code ruled that the woman was no wife, usually stated the consequences to which each party was liable for repudiating the other. These by no means necessarily agree with the Code. Many conditions might be inserted: as that the wife should act as maidservant to her mother-in-law, or to a first wife. The married couple formed a unit as to external responsibility, especially for debt. The man was responsible for debts contracted by his wife, even before her marriage, as well as for his own; but he could use her as a mancipium. Hence the Code allowed a proviso to be inserted in the marriage contract, that the wife should not be seized for her husband's pre-nuptial debts; but enacted that then he was not responsible for her pre-nuptial debts, and, in any case, that both together were responsible for all debts contracted after marriage. A man might make his wife a settlement by deed of gift, which gave her a life interest in part of his property, and he might reserve to her the right to bequeath it to a favourite child, but she could in no case leave it to her family. Although married she always remained a member of her father's house — she is rarely named wife of A, usually daughter of B, or mother of C.

Divorce was optional with the man, but he had to restore the dowry and, if the wife had borne him children, she had the

custody of them. He had then to assign her the income of field, or garden, as well as goods, to maintain herself and children until they grew up. She then shared equally with them in the allowance (and apparently in his estate at his death) and was free to marry again. If she had no children, he returned her the dowry and paid her a sum equivalent to the bride-price, or a mina of silver, if there had been none. The latter is the forfeit usually named in the contract for his repudiation of her.

If she had been a bad wife, the Code allowed him to send her away, while he kept the children and her dowry; or he could degrade her to the position of a slave in his own house, where

she would have food and clothing. She might bring an action against him for cruelty and neglect and, if she proved her case, obtain a judicial separation, taking with her her dowry. No other punishment fell on the man. If she did not prove her case, but was proved to be a bad wife, she was drowned. If she were left without maintenance during her husband's involuntary absence, she could cohabit with another man, but must return to her husband if he came back, the children of the second union remaining with their own father. If she had maintenance, a breach of the marriage tie was adultery. Wilful desertion by, or exile of, the husband dissolved the marriage, and if he came back he had no claim on her property; possibly not on his own.

As a widow, the wife took her husband's place in the family, living on in his house and bringing up the children. She could only remarry with judicial consent, when the judge was bound to inventory the deceased's estate and hand it over to her and her new husband in trust for the children. They could not alienate a single utensil. If she did not remarry, she lived on in her husband's house and took a child's share on the division of his estate, when the children had grown up. She still retained her dowry and any settlement deeded to her by her husband. This property came to her children. If she had remarried, all her children shared equally in her dowry, but the first husband's gift fell to his children or to her selection among them, if so empowered.

Monogamy was the rule, and a childless wife might give her husband a maid (who was no wife) to bear him children, who were reckoned hers. She remained mistress of her maid and might degrade her to slavery again for insolence, but could not sell her if she had borne her husband children. If the wife did this, the Code did not allow the husband to take a concubine. If she would not, he could do so. The concubine was a wife, though not of the same rank; the first wife had no power over her. A concubine was a free woman, was often dowered for marriage and her children were legitimate. She could only be divorced on the same conditions as a wife. If a wife became a chronic invalid, the husband was bound to maintain her in the home they had made together, unless she preferred to take her dowry and go back to her father's house; but he was free to remarry. In all these cases the children were legitimate and legal heirs.

There was, of course, no hindrance to a man having children by a slave girl. These children were free, in any case, and their mother

could not be sold, though she might be pledged, and she was free on her master's death. These children could be legiti- mized by their father's acknowledgment before witnesses, and were often adopted. They then ranked equally in sharing their father's estate, but if not adopted, the wife's children divided and took first choice.

Vestal virgins were not supposed to have children, yet they could and often did marry. The Code contemplated that such a wife would give a husband a maid as above. Free women might marry slaves and be dowered for the marriage. The children were free, and at the slave's death the wife took her dowry and half what she and her husband had acquired in wedlock for self and children; the master taking the other half as his slave's heir.

A father had control over his children till their marriage. He had a right to their labour in return for their keep. He might hire them out and receive their wages, pledge them for debt, even sell them outright. Mothers had the same rights in the absence of the father; even elder brothers when both parents were dead.

A father had no claim on his married children for support, but they retained a right to inherit on his death.

The daughter was not only in her father's power to be given in marriage, but he might dedicate her to the service of some god as a vestal or a hierodule ; or give her as a concubine. She had no choice in these matters, which were often decided in her childhood. A grown-up daughter might wish to become a votary, perhaps in preference to an uncongenial marriage, and it seems that her father could not refuse her wish. In all these cases the father might dower her. If he did not, on his death the brothers were bound to do so, giving her a full child's share if a wife, a con- cubine or a vestal, but one-third of a child's share if she were a hierodule or a Marduk priestess. The latter had the privilege of exemption from state dues and absolute disposal of her property. All other daughters had only a life interest in their dowry, which reverted to their family, if childless, or went to their children if they had any. A father might, however, execute a deed granting a daughter power to leave her property to a favourite brother or sister. A daughter's estate was usually managed for her by her brothers, but if they did not satisfy her, she could appoint a steward. If she married, her husband managed it,

The son also appears to have received his share on marriage, but did not always then leave his father's house; he might bring his wife there. This was usual in child marriages.

Adoption was very common, especially where the father (or mother) was childless or had seen all his children grow up and' marry away. The child was then adopted to care for the parents' old age. This was done by contract, which usually specified what the parent had to leave and what maintenance was expected. The real children, if any, were usually consenting parties to an arrangement which cut off their expectations. They even, in some cases, found the estate for the adopted child who was to relieve them of a care. If the adopted child failed to carry out the filial duty the contract was annulled in the law courts. Slaves were often adopted and if they proved unfilial were reduced to slavery again.

A craftsman often adopted a son to learn the craft. He profited by the son's labour. If he failed to teach his son the craft, that son could prosecute him and get the contract annulled. This was a form of apprenticeship, and it is not clear that the apprentice had any filial relation.

A man who adopted a son, and afterwards married and had a family of his own, could dissolve the contract but must give the adopted child one-third of a child's share in goods, but no real estate. That could only descend in the family to which he had ceased to belong. Vestals frequently adopted daughters, usually other vestals, to care for their old age.

Adoption had to be with consent of the real parents, who usually executed a deed making over the child, who thus ceased to have any claim upon them. But vestals, hierodules, certain palace officials and slaves had no rights over their children and could raise no obstacle. Foundlings and illegitimate children had no parents to object. If the adopted child discovered his true parents and wanted to return to them, his eye or tongue was torn out. An adopted child was a full heir, the contract might even assign him the position of eldest son. Usually he was residuary legatee.

All legitimate children shared equally in the father's estate at his death, reservation being made of a bride-price for an un- married son, dower for a daughter or property deeded to favourite children by the father. There was no birthright attaching to the position of eldest son, but he usually acted as executor and after

considering what each had already received equalized the shares. He even made grants in excess to the others from his own share. When there were two mothers, the two families shared equally in the father's estate until later times when the first family took two- thirds. Daughters, in the absence of sons, had sons' rights. Children also shared their own mother's property, but had no share in that of a stepmother.

A father could disinherit a son in early times without restriction, but the Code insisted upon judicial consent and that only for repeated unfilial conduct. In early times the son who denied his father had his front hair shorn, a slave-mark put on him, and

could be sold as a slave; while if he denied his mother he had his front hair shorn, was driven round the city as an example and expelled his home, but not degraded to slavery.

Adultery was punished with the death of both parties by drowning, but if the husband was willing to pardon his wife, the king might intervene to pardon the paramour. For incest with his own mother, both were burned to death; with a stepmother, the man was disinherited; with a daughter, the man was exiled; with a daughter-in-law, he was drowned; with a son's betrothed, he was fined. A wife who for her lover's sake procured her husband's death was gibbeted. A betrothed girl, seduced by her prospective father-in-law, took her dowry and returned to her family, and was free to marry as she chose.

In the criminal law the ruling principle was the lex talionis. Eye for eye, tooth for tooth, limb for limb was the penalty for assault upon an amelu. A sort of symbolic retaliation was the punishment of the offending member, seen in the cutting off the hand that struck a father or stole a trust; in cutting off the breast of a wet-nurse who substituted a changeling for the child entrusted to her; in the loss of the tongue that denied father or mother (in the Elamite contracts the same penalty was inflicted for perjury) ; in the loss of the eye that pried into forbidden secrets. The loss of the surgeon's hand that caused loss of life or limb; or the brander's hand that obliterated a slave's identification mark, are very similar. The slave, who struck a freeman or denied his master, lost an ear, the organ of hearing

and symbol of obedience. To bring another into danger of death by false accusation was punished by death. To cause loss of liberty or property by false witness was punished by the penalty the perjurer sought to bring upon another.

The death penalty was freely awarded for theft and other crimes regarded as coming under that head; for theft involving entrance of palace or temple treasury, for illegal purchase from minor or slave, for selling stolen goods or receiving the same, for common theft in the open (in default of multiple restoration) or receiving the same, for false claim to goods, for kidnapping, for assisting or harbouring fugitive slaves, for detaining or appropriating same, for brigandage, for fraudulent sale of drink, for disorderly conduct of tavern, for delegation of personal service, for misappropriating the levy, for oppression of feudal holders, for causing death of a house- holder by bad building. The manner of death is not specified in these cases. This death penalty was also fixed for such conduct as placed another in danger of death. A specified form of death penalty occurs in the following cases: — gibbeting (on the spot where crime was committed) for burglary, later also for encroach- ing on the king's highway, for getting a slave-brand obliterated, for procuring husband's death; burning for incest with own mother, for vestal entering or opening tavern, for theft at fire (on the spot); drowning for adultery, rape of betrothed maiden, bigamy, bad conduct as wife, seduction of daughter -in-law.

A curious extension of the talio is the death of creditor's son for his father's having caused the death of debtor's son as mancipium; of builder's son for his father's causing the death of house-owner's son by building the house badly; the death of a man's daughter because her father caused the death of another man's daughter.

The contracts naturally do not concern such criminal cases as the above, as a rule, but marriage contracts do specify death by strangling, drowning, precipitation from a tower or pinnacle of the temple or by the iron sword for a wife's repudiation of her husband. We are quite without evidence as to the executive in all these cases.

Exile was inflicted for incest with a daughter; disinheritance for incest with a stepmother or for repeated unfilial conduct. Sixty strokes of an ox-hide scourge were awarded for a brutal assault on a superior, both being amelu. Branding (perhaps the

equivalent of degradation to slavery) was the penalty for slander of a married woman or vestal. Deprivation of office in perpetuity fell upon the corrupt judge. Enslavement befell the extravagant wife and unfilial children. Imprisonment was common, but is not recognized by the Code.

The commonest of all penalties was a fine. This is awarded by the Code for corporal injuries to a muskinu or slave (paid to his master) ; for damages done to property, for breach of contract. The restoration Of goods appropriated, illegally bought, or damaged by neglect, was usually accompanied by a fine, giving it the form of multiple restoration. This might be double, treble, fourfold, fivefold, sixfold, ‘ tenfold, twelvefold, even thirtyfold, according to the enormity of the offence.

The Code recognized the importance of intention. A man who killed another in a quarrel must swear he did not do so intentionally, and was then only fined according to the rank of the deceased. The Code does not say what would be the penalty of murder, but death is so often awarded where death is caused that we can hardly doubt that the murderer was put to death. If the assault only led to injury and was unintentional, the assailant in a quarrel had to pay the doctor’s fees. A brander, induced to remove a slave’s identification mark, could swear to his ignorance and was free. The owner of an ox which gored a man on the street was only responsible for damages if the ox was known by him to be vicious, even if it caused death. If the mancipium died a natural death under the creditor’s hand, the creditor was scot free. In ordinary cases responsibility was not demanded for accident or for more than proper care. Poverty excused bigamy on the part of a deserted wife.

On the other hand carelessness and neglect were severely punished, as in the case of the unskilful physician, if it led to loss of life or limb his hands were cut off, a slave had to be re- placed, the loss of his eye paid for to half his value; a veterinary surgeon who caused the death of an ox or ass paid quarter value; a builder, whose careless workmanship caused death, lost his life or paid for it by the death of his child, replaced slave or goods, and in any case had to rebuild the house or make good any damages due to defective building and repair the defect as well. The boat-builder had to make good any defect of construction or damage due to it for a year’s warranty.

Throughout the Code respect is paid to status.

Suspicion was not enough. The criminal must be taken in the act, e.g. the adulterer, ravisher, &c. A man could not be convicted of theft unless the goods were found in his possession.

In the case of a lawsuit the plaintiff preferred his own plea. There is no trace of professional advocates, but the plea had to be in writing and the notary doubtless assisted in the drafting of it. The judge saw the plea, called the other parties before him and sent for the witnesses. If these were not at hand he might adjourn the case for their production, specifying a time up to six months. Guarantees might be entered into to produce the witnesses on a fixed day. The more important cases, es- pecially those involving life and death, were tried by a bench of judges. With the judges were associated a body of elders, who shared in the decision, but whose exact function is not yet clear. Agreements, declarations and non-contentious cases are usually witnessed by one judge and twelve elders.

Parties and witnesses were put on oath. The penalty for false witness was usually that which would have been awarded the convicted criminal. In matters beyond the knowledge of men, as the guilt or innocence of an alleged wizard or a suspected wife, the ordeal by water was used. The accused jumped into the sacred river, and the innocent swam while the guilty drowned. The accused could clear himself by oath where his own know- ledge was alone available. The plaintiff could swear to his loss by brigands, as to goods claimed, the price paid for a slave purchased abroad or the sum due to him. But great stress was laid on the production of written evidence. It was a serious thing to lose a document. The judges might be satisfied of its existence and terms by the evidence of the witnesses to it, and then issue an order that whenever found it should be given up. Contracts annulled were ordered to be broken. The court might go a journey to view the property and even take with them the saCred symbols on which oath was made.

The decision given was embodied in writing, sealed and witnessed by the judges, the elders, witnesses and a scribe. Women might act in all these capacities. The parties swore an

oath, embodied in the document, to observe its stipulations. Each

took a copy and one was held by the scribe to be stored in the archives.

Appeal to the king was allowed and is well attested. The judges at Babylon seem to have formed a superior court to those of provincial towns, but a defendant might elect to answer the charge before the local court and refuse to plead at Babylon.

Finally, it may be noted that many immoral acts, such as the use of false weights, lying, &c, which could not be brought into court, are severely denounced in the Omen Tablets as likely to bring the offender into ” the hand of God ” as opposed to ” the hand of the king.”

Bibliography. — Contracts in general: Oppert and Meiiant, Documents juridiques de I’Assyrie el de la Chaldee (Paris, 1877); J. Kohler and F. E. Peiser, Aus dem babylonischen Rechtsleben (Leipzig, 1890 ff.) ; F. E. Peiser, Babylonische Vertrdge (Berlin, 1890), Keilinschriftliche Actenstilcke (Berlin, 1889); Br. Meissner, Beitrdge zur altbabylonischen Privatrecht (Leipzig, 1893) ; F. E. Peiser, ” Tex.te juristischen und geschaftlichen Inhalts,” vol. iv. of Schrader’s Keilinschriftliche Bibliothek (Berlin, 1896) ; C. H. W. Johns, Assyrian Deeds and Documents relating to the Transfer of Property (3 vols., Cam- bridge, 1898) ; H. Radau, Early Babylonian History (New York, 1900); C. H. W. Johns, Babylonian and Assyrian Laws, Contracts and Letters (Edinburgh, 1904). For editions of texts and the in- numerable articles in scientific journals see the bibliographies and references in the above works. ” The Code of Hammurabi,” Editio princeps, by V. Scheil in tome iv. of the Textes Elamites-Semitiques of the Memoires de la delegation en Perse (Paris, 1902) ; H. Winckler, ” Die Gesetze Hammurabis Konigs von Babylon um 2250 v. Chr.” Der alte Orient, iv. Jahrgang, Heft 4; D. H. Miiller, Die Gesetze Hammurabis (Vienna, 1903) ; J. Kohler and F. E. Peiser, Hammurabis Gesetz (Leipzig, 1904); R. F. Harper, The Code of Hammurabi, King of Babylon about 2250 B.C. (Chicago, 1904) ; S. A. Cook, The Laws of Moses and the Code of Hammurabi (London, 1903). (C. H. W. J.)

BACAU, the capital of the department of Bacau, Rumania; situated among the foothills of the Carpathian Mountains, and on the river Bistritza, which enters the river Sereth 5 m. S. Pop. (1900) 16,187, including 7850 Jews. Although of modern growth, Bacau is one of the chief commercial centres in Moldavia, possessing many large timber yards. It is on the main railway

from Czernovitz, in Bukovina, to Galatz; and on two branch lines, one of which enters Transylvania through the Ghimesh Pass, while both give access to the salt mines, petroleum wells and forests of the Carpathians.

BACCARAT, a gambling card-game (origin of name unknown), supposed to have been introduced into France from Italy during the reign of Charles VIII. There are two accepted varieties of the game — baccarat chemin de fer (railway) and baccarat banque (or a deux tableaux). In baccarat chemin de fer six full packs of cards are used. These are shuffled by a croupier and then by any of the players who wish to do so. From three to eleven persons may play. Counters are generally used and are sold by the banker who afterwards redeems them. The croupier takes a number of cards from the top of the pack and passes them to the player on his right (sometimes left) who becomes banker, a position which he holds until he loses, when the deal passes to the player next in order. The other players are called punters. The banker places before him the sum he wishes to stake and the punters do likewise, unless a punter desires to go bank, signifying his intention by saying, Banco! In this case he plays against the entire stake of the banker. After the stakes have been made the dealer deals a card to his right for the punters, then one to himself, then a third to his left for the punters and, finally, another to himself, all face downwards. Court cards and tens count nothing; all others the number of their pips. Each punter looks at his cards, and any one having 8 or 9 turns his card up and announces it, the hand then being at an end. The player having the highest stake plays for both punters, and if the card turned is better than that of the banker, the latter pays each punter the amount of his stake. If not, the banker wins all stakes and the game proceeds as before. If no announcement is made, meaning that neither player holds 8 or 9, the banker deals another card to the player on his right, who, if his first card is 6 or 7, will refuse it, fearing to overrun. The second card is turned face upwards on the table. If his card is 5 he may, or may not, accept the

second card, according to his judgment. In case of his refusal the card is offered to the second punter. If the first card is baccarat {i.e. amounts to o) or 1, 2, 3 or 4, a punter always accepts the second card. The banker then decides whether he will draw another card himself or expose his original ones, and when he has made his play pays or receives according as he wins or loses. Ties neither win nor lose but go over to the next deal. A player

who has lost on going bank may go bank again, but no player may go bank more than twice in succession. In the variation baccarat banque (or a deux tableaux), three packs of cards are used and the banker is permanent; the player who offers to risk the largest amount occupying the position. A line is drawn across the table and any one wishing to do so may place his stake a cheval, i.e. on the line. Stakes so placed neither win nor lose if one side wins and the other loses, but win if both sides win and are lost if both sides lose. The laws of baccarat are com- plicated and no one code is accepted as authoritative, the different clubs making their own rules.

See Badoureau, Etude mathematique sur le feu de baccarat (Paris, 1881); L. Billard, Breviaire du baccara experimental (Paris, 1883).

BACCHANALIA, the Lat. name for the wild and mystic festivals of Bacchus (Dionysus). They were introduced into Rome from lower Italy by way of Etruria, and held in secret, attended by women only, on three days in the yea* in the grove of Simila (Stimula, Semele; Ovid, Fasti, vi. 50s), near the Aventine hill. Subsequently, admission to the rites were extended to men and celebrations took place five times a month. The evil reputation of these festivals, at which the grossest de- baucheries took place, and all kinds of crimes and political conspiracies were supposed to be planned, led in 186 B.C. to a decree of the senate — the so-called Senatus consultum de Bacchanalibus, inscribed on a bronze tablet discovered in Calabria (1640), now at Vienna — by which the Bacchanalia were prohibited throughout the whole of Italy, except in certain special cases, in which the senate reserved the right of allowing them, subject to certain restrictions. But, in spite of the severe punishment inflicted upon those who were found to be implicated in the criminal practices disclosed by state investigation, the Bacchanalia were not stamped out, at any rate in the south of Italy, for a very long time (Livy xxxix. 8-iq, 41; xl. 19).

BACCHYLIDES, Greek lyric poet, was born at Iulis, in the island of Ceos. His father's name was probably Meidon; his mother was a sister of Simonides, himself a native of Iulis. Eusebius says that Bacchylides " flourished " (jiKixaˆtv) in 01. 78. 2 (467 B.C.). As the term ˆK/xaˆtv refers to the physical prime, and was commonly placed at about the fortieth year, we may suppose that Bacchylides was born circa 507 B.C. Among his Odes the earliest that can be approximately dated is xii., 1 which may belong to

481 or 479 B.C.; the latest is vi., of which the date is fixed by the recently found fragment of the Olympic register to 01. 82. 1 (452 B.C.). He would thus have been some forty-nine years younger than his uncle Simonides, and some fifteen years younger than Pindar. Elsewhere Eusebius states that Bacchylides " was of repute " (eyecopifero) in 01. 87. 2 (431 B.C.); and Georgius Syncellus, using the same word, gives 01. 88 (428-425 B.C.). The phrase would mean that he was then in the fulness of years and of fame. There is nothing improbable in the supposition that he survived the beginning of the Pelopon- nesian war.

Bacchylides, like Simonides and Pindar, visited the court of Hiero I. of Syracuse (478-467). In his fifth Ode (476 B.C.), the word %kvos (v. 1 1) has been taken to mean that he had already been the guest of the prince; and, as Simonides went to Sicily in or about 477 B.C., that is not unlikely. Ode iii. (468 B.C.) was possibly written at Syracuse, as verses 15 and 16 suggest. He there pays a high compliment to Hiero's taste in poetry (ver. 3 ff.). A scholium on Pytk. ii. 90 (166) avers that Hiero preferred the Odes of Bacchylides to those of Pindar. The Alexandrian scholars interpreted a number of passages in Pindar as hostile allusions to Bacchylides or Simonides. If the scholiasts

1 The references are given according to the numbering in Jebb's edition.

are right, it would appear that Pindar regarded the younger of the two Cean poets as a jealous rival, who disparaged him to their common patron (schol. Pyth. ii. 52 f.), and as one whose poetical skill was due to study rather than to genius (01. ii. 91-110). In Olymp. ii. 96 the dual yapverov, if it does not refer to the uncle and nephew, remains mysterious; nor does it admit of probable emendation. 1 One would gladly reject this tradition, to which the scholia so frequently refer; yet it would be rash to assume that it rested merely on surmise. The Alexandrians may have possessed evidence on the subject which is now lost. It is tolerably certain that the three poets were visitors at Hiero's court at about the same time: Pindar and Bacchylides wrote odes of the same kind in his honour; and there was a tradition that he preferred the younger poet. There is thus no intrinsic improbability in the hypothesis that Pindar's haughty spirit had

suffered, or imagined, some mortification. It is noteworthy that, whereas in 476 and 470 both he and Bacchylides celebrated Hiero's victories, in 468 (the most important occasion of all) Bacchylides alone was commissioned to do so; although in that year Pindar composed an ode (Olymp. vi.) for another Syracusan victor at the same festival. Nor is it difficult to conceive that a despot such as Hiero, whose constitutional position was ill-defined, and who was perhaps all the more exigent of deference on that account, may have found the genial Ionian a more agreeable courtier than Pindar, an aristocrat of the Boeoto-Aeolic type, not unmindful of " his fathers the Aegidae," and rather prone to link the praises of his patron with a lofty intimation of his own claims (see, e.g., Olymp. i. ad fin.). But, whatever may have been the true bearing of Pindar's occasional innuendoes, it is at any rate pleasant to find that in the extant work of Bacchylides there is not the faintest semblance of hostile allusion to any rival. Nay, one might almost imagine a compliment to Pindar, when, in mentioning Hesiod, he calls him Boicoris avjjp.

Plutarch (de Exilio, p. 605 c) names Bacchylides in a list of writers, who after they had been banished from their native cities, were active and successful in literature. It was Peloponnesus that afforded a new home to the exiled poet. The passage gives no clue to date or circumstance; but it implies that Peloponnesus was the region where the poet's genius ripened and where he did the work which established his fame. This points to a residence of considerable length; and it may be noted that some of the poems illustrate their author's intimate know- ledge of Peloponnesus. Thus in Ode viii., for Automedes of Phlius, he draws on the legends connected with the Phliasian river Asopus. In Ode x., starting from the Argive legend of Proetus and Acrisius, he tells how the Arcadian cult of Artemis 'Hpepa was founded. In one of his dithyrambs (xix.) he treated the legend of Idas (a Messenian hero) and Marpessa in the form of a hymenaeus sung by maidens of Sparta.

The Alexandrian scholars, who drew up select lists of the best writers in each kind, included Bacchylides in their " canon " of the nine lyric poets, along with Alcman, Sappho, Alcaeus, Stesichorus, Ibycus, Anacreon, Simonides and Pindar. The Alexandrian grammarian Didymus (circ. 30 B.C.) wrote a commentary on the epinikian odes of Bacchylides. Horace, a poet in some respects of kindred genius, was a student of his works, and imitated him (according to Porphyrion) in Odes, i. 15, where

Nereus predicts the destruction of Troy. Quotations from Bacchylides, or references to him, occur in Dionysius of Halicarnassus, Strabo, Plutarch, Stobaeus, Athenaeus, Aulus Gellius, Zenobius, Hephaestion, Clement of Alexandria, and various grammarians or scholiasts. Ammianus Marcellinus (xxv. 4) says that the emperor Julian enjoyed reading Bacchylides. It is clear, theti, that this poet continued to be popular during at least the first four centuries of our era. No inference adverse to his repute can fairly be drawn from the fact that no mention of him occurs in the extant work of any Attic writer. The only definite estimate of him by an ancient critic occurs in the treatise II epl"T\// ovs commonly translated " On the Sublime," but meaning rather,

1 For other explanations suggested, see Jebb's edition, Ihtrod. p. 18.

" On the Sources of Elevation in Style "; a work ambiguously ascribed to Cassius Longinus (circ. a.d. 260), but more probably due to some writer of the first century of our era. In chapter xxxiii. of that treatise, the author asks whether we ought to prefer " greatness " in literature, with some attendant faults, to flawless merit on a lower level, and of course replies in the affirmative. In tragedy, he asks, who would be Ion of Chios rather than Sophocles; or in lyric poetry, Bacchylides rather than Pindar? Yet Bacchylides and Ion are "faultless, with a style of perfect elegance and finish." In short, the essayist regards Bacchylides as a thoroughly finished poet of the second class, who never commits glaring faults, but never reaches the loftier heights.

The first and most general quality of style in Bacchylides is his perfect simplicity and clearness. Where the text is not corrupt, there are few sentences which are not lucid in meaning and simple in structure. This lucidity is partly due, no doubt, to the fact that he seldom attempts imagery of the bolder kind, and never has thoughts of a subtle or complex order. Yet it would be very unjust to regard such clearness as merely a com- pensatory merit of lyric mediocrity, or to ignore its intimate connexion with the man's native grace of mind, with the artist's feeling for expression, with the poet's delicate skill. How many readers, who could enjoy and appreciate Pindar if he were less difficult, are stopped on the threshold by the aspect of his style, and are fain to save their self-esteem by concluding that he is at once turgid and shallow! A pellucid style must always have been a source of wide, though modest, popularity for Bacchylides. If it be true

that Hiero preferred him to Pindar, and that he was a favourite with Julian, those instances suggest the charm which he must always have had for cultivated readers to whom affairs did not leave much leisure for study, and who rejoiced in a poet with whom they could live on such easy terms.

Another prominent trait in the style of Bacchylides is his love of picturesque detail. This characteristic marks the fragment by which, before the discovery of the 1896 MS., he was best known — a passage, from one of his paeans, on the blessings of peace (fr. 13, Bergk, 3, Jebb); and it frequently appears in the Odes, especially in the mythical narratives. Greater poets can make an image flash upon the mind, as- Pindar sometimes does, by a magic phrase, or by throwing one or two salient points into strong relief. The method of Bacchylides is usually quieter; he paints cabinet pictures. Observation and elegance do more for him than grasp or piercing insight; but his work is often of very high excellence in its own kind. His treatment of simile is only a special phase of this general tendency. It is exemplified by the touches with which he elaborates the simile of the eagle in Ode v., and that of the storm-tossed mariners in Ode xii. This full development of simile is Homeric in manner, but not Homeric in motive: Homer's aim is vividness; Bacchylides is rather intent on the decorative value of the details themselves. There are occasional flashes of brilliancy in his imagery, when it is lit up by his keen sense of beauty or splendour in external nature. A radiance, " as of fire," streams from the forms of the Nereids (xvi. 103 ff.). An athlete shines out among his fellows like " the bright moon of the mid-month night " among the stars (viii. 27 ff.). The sudden gleam of hope which comes to the Trojans by the withdrawal of Achilles is like a ray of sunshine " from beneath the edge of a storm-cloud " (xii. 105 ff.). The shades of the departed, as seen by Heracles on the banks of the Cocytus, are compared to the countless leaves fluttering in the wind on " the gleaming headlands of Ida " (v. 65 ff.) — an image not unworthy of Dante or of Milton.

Among the minor features of this poet's style the most remarkable is his use of epithets. A god or goddess nearly always receives seme ornamental epithet; sometimes, indeed, two or even three (e.g. Ka\vKooTeavov cepvas ... 'ApreplSos \evKcc \hov, v. 98 f.). Such a trait is in unison with the epic manner, the straightforward narrative, which we find in some of the larger poems (as in v., x., and xvi.). On the other hand, the copious use of such ornament has the disadvantage that it sometimes gives a

tinge of conventionality to his work. This impression is somewhat strengthened by the fact that many

of the epithets are long compound words, not found elsewhere and (in some cases at least) probably invented by the poet; words which suggest a deliberate effort to vary the stock , repertory.

The poems contained in the MS. of Bacchylides found (see below) in 1896 are of two classes: I. Odes of Victory; II. Dithyrambs. The Ode of Victory, imv'uaov (/leXos) or kirivucos (vfivos), is a form derived from the vˆvos, which was properly a song in praise of a deity. Stesichorus (c. 610 B.C.) seems to have been the first who composed hymns in honour, not of gods, but of heroes; the next step was to write hymns in celebration of victories by living men. This custom arose in the second half of the 6th century B.C., the age in which the games at the four great Greek festivals reached the fulness of their popularity. Simonides (b. c. 556 B.C.) was the earliest recorded writer of epinikia. His odes of this class are now repre- sented only by a few very small fragments, some twenty lines in all. Two of these fragments, belonging to the description of a chariot-race, warrant the belief that Simonides, in his epinikia, differed from Pindar in dwelling more on the incidents ot the particular victory. The same characteristic is found in the epinikia of Bacchylides. His fifth ode, and Pindar's first Olympian, alike celebrate the victory of the horse Pherenicus; but, while Pindar's reference to the race itself is slight and general (w. 20-22), Bacchylides describes the running of the winner much more vividly and fully (vv. 37-49).

The MS. contains fourteen epinikia, or thirteen if Blass be right in supposing that Odes vi. and vii., as numbered by Kenyon in the editio princeps, are parts of a single ode (for Lachon of Ceos). Four (or on the view just stated, three) of the odes relate to the Olympian festival; two to the Pythian; three to the Isthmian; three to the Nemean ; and one to a Thessalian festival called the nerptua. This comes last. The order in which the MS. arranges the other epinikia seems to be casual; at least it does not follow (1) the alpha betical sequence of the victors' names, or of the names of their cities; nor (2) chronological sequence; nor (3) classification by contests; nor (4) classification by festivals — except that the four great festivals precede the Petraea. The first

ode, celebrating a victory of the Cean Argeios at the Isthmus, may possibly have been placed there for a biographical reason, viz., because the poet treated in it the early legends of his native island.

A mythical narrative, connected in some way with the victor or his city, usually occupies the central part of the Pindaric ode. It serves to lift the poem into an ideal region, and to invest it with more than a local or temporary significance. The method of Bacchylides in this department of the epinikion is best illustrated by the myth of Croesus in Ode iii., that of Heracles and Meleager in Ode v., and that of the Proetides in Ode x. Pindar's habit is to select certain moments or scenes of a legend, which he depicts with great force and vividness. Bacchylides, on the other hand, has a gentle flow of simple epic narrative; he relies on the interest of the story as a whole, rather than on his power of presenting situations. Another element, always present in the longer odes of victory, is that which may be called the " gnomic." Here, again, there is a contrast between the two poets. Pindar packs his yv&fiai, his maxims or moral senti- ments, into terse and sometimes obscure epigrams; he utters them in a didactic tone, as of one who can speak with the com- manding voice of Delphic wisdom. The moralizing of Bacchylides is rather an utterance of quiet meditation, sometimes recalling the strain of Ionian gnomic elegy.

The epinikia of Bacchylides are followed in the MS. by six compositions which the Alexandrians classed under the general name of Sidvpafijioi, and which we, too, must be content to describe collectively as Dithyrambs. The derivation of {k-dvpan(los is uncertain: Si may be the root seen in 5cos (cp. StmJXia), and dbpapfios another form of dpiap.f$as, a word by which Cratinus (c. 448 B.C.) denotes some kind of hymn to the wine-god. The " dithyramb," first mentioned by Archi- lochus (c. 670 B.C.), received a finished and choral form from Arion of Lesbos (c. 600 B.C.). His dithyrambs, produced at Corinth, belonged to the cult of Dionysus, and the members of his chorus (rpayucds xopˆs) personated satyrs. Originally concerned with the birth of the god, the dithyramb came to deal

with all his fortunes: then its scope became still larger; it might celebrate, not Dionysus alone, but any god or hero. This last development had taken place before the close of the 6 th century B.C. Simonides wrote a dithyramb on Memnon and Tithonus; Pindar, on Orion and on Heracles. Hence the Alexandrian

scholars used Stdvpanfios in a wide sense, as denoting simply a lyric poem occupied with a mythical narrative. Thus Ode xvii. of Bacchylides (relating the voyage of Theseus to Crete), though it was clearly a ircuav for the Delian Apollo, was classed by the Alexandrians among his ” dithyrambs ” — as appears not only from its place in our MS., but also from the allusion of Servius (on Aen. vi. 21). The six dithyrambs of Bacchylides are arranged in (approximately) alphabetical order: ‘AvrrivoplSai, ‘HpaxXijs, ‘WiOtoi fj Gr/o-efa, Qrjaevs, ‘Ico, T5as. The principal feature, best exemplified by the first and third, is necessarily epic narrative, — often adorned with touches of picturesque detail, and animated by short speeches in the epic manner.

Several other classes of composition are represented by those fragments of Bacchylides, preserved in ancient literature, which were known before the discovery of the new MS. (1) 6/xvoi. Among these we hear of the aTOTrenTTtxoi, hymns of pious fare-well, speeding some god on his way at the season when he passed from one haunt to another. (2) iraiaves, represented by the well-known fragment on the blessings of peace. (3) wpocodta, choral odes sung during processions to temples. (4) VKOpxtlitara., lively dance-songs for religious festivals. (5) epwuih, represented by five fragments of a class akin to 0×6X10., drinking-songs. Under this head come some lively and humorous verses on the power of wine, imitated by Horace {Odes, iii. 21. 13-20). It may be conjectured that the facile grace and bright fancy of Bacchy- lides were seen to especial advantage in light compositions of this kind. (6) The elegiacs of Bacchylides are represented by two kirtypap-fiaTa avaOrmariKa, each of four lines, in the Palatine Anthology. The first (Anth. vi. 313) is an inscription for an offering commemorative of a victory gained by a chorus with a poem written by Bacchylides. The second (Anth. vi. 53) is an inscription for a shrine dedicated to Zephyrus. Its authenticity has been questioned, but not disproved.

The papyrus containing the odes of Bacchylides was found in Egypt by natives, and reached the British Museum in the autumn of 1896. It was then in about 200 pieces. By the skill and industry of Mr F. G. Kenyon, the editor of the editio princeps (1897), the MS. was reconstructed from these lacerated members. As now arranged, the MS. consists of three sections. (1) The first section contains 22 columns of writing. It breaks off after the 8 opening verses of Ode xii. (2) The second section contains columns 23-29. Of these, column 23 is represented only by the last letters of two words. This section comprises what remains of Odes xiii. and xiv.

It breaks off before the end of xiv., which is the last of the epinikia. (3) The third section comprises columns 30-39. It begins with the mutilated opening verses of Ode xv. (‘AvrrivopiSai., the first of the dithyrambs), and breaks off after verse 1 1 of the last dithyramb,“ISas. The number of lines in a column varies from 32 to 36, the usual number being 35, or (though less often) 34.

It is impossible to say how much has been lost between the end of column 29 and the beginning of column 30. Probably, however, Ode xiv., if not the last, was nearly the last of the epinikia. It concerns a festival of a merely local character, the Thessalian HeTpaia, and was therefore placed after the thirteen other epinikia, which are connected with the four great festivals. The same lacuna leaves it doubtful whether any collective title was prefixed to the SSvpanpoi. After the last column (39) of the MS., a good deal has probably been lost. Bacchylides seems to have written at least three other poems of this class (on Cassandra, Laocoon and Philoc- tetes) ; and these would have come, in alphabetical order, after the last of the extant six (Idas).

The writing of the MS. is a fine uncial. It presents some traits of a distinctly Ptolemaic type, though it lacks some features found in the earlier Ptolemaic MSS. (those of the 3rd or 2nd century B.C.). Among the characteristic forms of letters is the “|”> with a shallow curve on the top of the upright ; a form found in MSS. ascribed to the 1st century B.C., and different from the more fully formed upsilon of the Roman period. Another very significant letter is the H, written as *j*, a form which begins to go out after c. 50 B.C., giving place to one in which the middle stroke is connected with the other two. From these and other indications it is probable that the MS. is not later than the middle of the 1st century B.C.

The scribe, though he sometimes corrected his own mistakes, was, on the whole, careless of the sense, as of the metre; he seems to have been a mechanical copyist, excellent in penmanship, but

intent only on the letters. The MS. has received corrections or small supplements from at least two different persons. One of them (Kenyon’s A 2) was contemporary, or nearly so, with the scribe. The other (A 3) was considerably later; he wrote a Roman cursive which might belong to the end of the 1st century A.D., or

to the early part of the 2nd. The correctors seem to be generally trustworthy; though, like the scribe, they were inattentive to metre, passing over many metrical faults which could easily have been removed. They appear to have compared their MS. with another, or others; but they sometimes made a bad use of such aid, intruding a false reading where their text had the true one.

Breathings are generally added, especially rough breathings; the form is usually square, but sometimes partially rounded. Accents are added, not to all words, but only, as a rule, to those which might cause doubt or difficulty to the reader. This was the Alexandrian practice, accents being regarded as aids to correct reading, and more liberally used when the dialect was not Attic. In accord- ance with the older system, the accent is not written on the last syllable of a word; when the accent falls there, a grave accent is written on the preceding syllable, or on two such syllables (e.g. /3XijxP«, 7r

As Kenyon observes, no MS. of equal antiquity is so well supplied with accents. The MS. which comes nearest to it in this respect is the Alcman fragment in the Louvre, which is of similar or slightly higher age, belonging perhaps to the early part of the 1st century a.d. ; and in that MS. the comparatively frequent accents were doubtless designed to aid readers unfamiliar with Alcman's Laconian Doric. With regard to other grammatical or metrical signs (irpoaqSlcu) used in the Bacchylides MS., there is not much that calls for special remark. The punctuation, whether by the scribe or by correctors, is. very sparse, and certainly cannot always be regarded as authori- tative. The signs denoting the end of a strophe or antistrophe (pamgmphus) , of an epode (coronis), or of an ode [asterisk), are often omitted by the scribe, and, when employed, are sometimes placed incorrectly, or employed in an irregular manner.

Editions. — F. G. Kenyon, Ed. princeps (1897); F. Blass, 3rd ed. (1904); H. Jurenka (1898); N. Festa, text, translation and notes (1898). [The latest edition is by Sir Richard Jebb (1905), with introduction, notes, translation, and bibliography; text only (1906). See also T. Zanghieri, Studi su Bacchilide, Bibliografia Bacchilidea, 1897-1905 (1905)] . (R- C. J.)

BACCIO D'AGNOLO (c. 1460-1543), Florentine wood-carver, sculptor and architect, had the family name of Baglioni, but was always known by the abbreviation of Bartolommeo into Baccio and the use of d'Agnolo as meaning the son of Angelo, his

father's name. He started as a wood-carver, and between 1491 and 1502 did much of the decorative carving in the church of Santa Maria Novella and the Palazzo Vecchio in Florence. Having made his reputation as a sculptor he appears to have turned his attention to architecture, and to have studied at Rome, though at what precise date is uncertain; but quite at the beginning of the 16th century he was engaged with Simon Pollajuolo in restoring the Palazzo Vecchio, and in 1506 he was commissioned to complete the drum of the cupola of the metropolitan church of Santa Maria del Fiore. The latter work, however, was interrupted on account of adverse criticisms from Michelangelo, and it remained unexecuted. Baccio d' Agnolo also planned the Villa Borghese and the Bartolini palace, with other fine palaces and villas. The Bartolini palace was the first house to be given frontispieces of columns to the door and windows, previously confined to churches; and he was ridiculed by the Florentines for his innovation. Another much-admired work by him was the campanile of the church of Santo Spirito. His studio was the resort of the most celebrated artists of the day, Michelangelo, Sansovino, the brothers Sangallo and the young Raphael. He died in 1543, leaving three sons, all architects, the best-known being Giuliano.

BACH, JOHANN SEBASTIAN (1685-1750), German musical composer. The Bach family was of importance in the history of music for nearly two hundred years. Four branches of it were known at the beginning of the 16th century, and in 1561 we hear of Hans Bach of Wechmar who is believed to be the father of Veit Bach (born about 1555). The family genealogy, drawn up by J. Sebastian Bach himself and completed by his son Philipp Emanuel, describes Veit Bach as the founder of the family, a baker and a miller, " whose zither must have sounded very pretty among the clattering of the mill-wheels." His son, Hans Bach, " der Spielmann," is the first professional musician of the family. Of Hans's large family the second son, Christoph, was the grandfather of Sebastian Bach. Another son,

Family.

Heinrich, of Arnstadt, had two sons, Johann Michael and Johann Christoph, who are among the greatest of J. S. Bach's fore-runners, Johann Christoph being now supposed (although this is still disputed) to be the author of the splendid motet, Ich lasse .

dick nicht (" I wrestle and pray "), formerly ascribed to Sebastian Bach. Another descendant of Veit Bach, Johann Ludwig, was admired more than any other ancestor by Sebastian, who copied twelve of his church cantatas and sometimes added work of his own to them.

The Bach family never left Thuringia until the sons of Sebastian went into a more modern world. Through all the misery of the peasantry at the period of the Thirty Years' War this clan maintained its position and produced musicians who, however local their fame, were among the greatest in Europe. So numerous and so eminent were they that in Erfurt musicians were known as " Bachs," even when there were no longer any members of the family in the town. Sebastian Bach thus inherited the artistic tradition of a united family whose circum- stances had deprived them of the distractions of the century of musical fermentation which in the rest of Europe had destroyed polyphonic music.

Johann Sebastian Bach was baptized at Eisenach on the 23rd of March 1685. His parents died in his tenth year, and his elder brother, Johann Christoph, organist at Ohrdruf, took charge of him and taught him music. The elder brother g'raphy. is said to have been jealous of Sebastian's talent, and to have forbidden him access to a manuscript volume of works by Froberger, Buxtehude and other great organists. Every night for six months Sebastian got up, put his hand through the lattice of the bookcase, and copied the volume out by moonlight, to the permanent ruin of his eyesight (as is shown by all the extant portraits of him at a later age and by the blindness of his last years). When he had finished, his brother discovered the copy and took it away from him. In 1700 Sebastian, now fifteen and thrown on his own resources by the death of his brother, went to Lilneburg, where his beautiful soprano voice obtained him an appointment at the school of St Michael as chorister. He seems, however, to have worked more at instrumental than at vocal music. Apart from the choristers' routine, his position provided only for his general education, and we know little about his definite musical instructors. In any case he owed his musical development mainly to his own incessant study of classical and contemporary composers, such as Frescobaldi (c. 1587), Caspar Kerl (1628-1693), Buxtehude, Froberger, Muffat the elder, Pachelbel and probably Johann Joseph Fux (1660-1741), the author of the Grains ad Parnassum on which all later classical composers were trained. A prettier and no less authentic story

than that of his brother's forbidden organ-volume tells how, on his return from one of the many holiday expeditions which Bach made to Hamburg on foot to hear the great Dutch organist Reinken, he sat outside an inn longing for the dinner he could not afford, when two herring-heads were flung out of the window, and he found in each of them a ducat with which he promptly paid his way, not home, but back to Hamburg. At Hamburg, also, Keiser was laying the foundations of German opera on a splendid scale which must have fired Bach's imagination though it never directly influenced his style. On the other hand Keiser's church music was of immense importance in his development. In Celle the famous Hofkapelle brought the influence of French music to bear upon Bach's art, an influence which inspired nearly allhis works in suite-form and to which his many autograph copies of Couperin's music bear testimony. Indeed, there is no branch of music, from Palestrina onwards, conceivably accessible in Bach's time, of which we do not find specimens carefully copied in his own handwriting. On the other hand, when Bach, at the age of nineteen, became organist at Arnstadt, he found Liibeck within easy distance, and there, in October 1705, he went to hear Buxtehude, whose organ works show so close an affinity to Bach's style that only their lack of coherence as wholes reveals to the attentive listener that with all their nobility they are not by Bach himself. Bach's enthusiasm for Buxtehude caused him to outstay his leave by three months, and this, together with his

habit of astonishing the congregation by the way he harmonized the chorales got him into trouble. But he was already too great an ornament to be lightly dismissed; and though his answers to the complaints of the authorities (every word of which makes amusing reading in the archives of the church) were spirited rather than satisfactory, and the consistorium had to add to their complaints the grave scandal of his allowing a " strange maiden " to sing in the church, 1 Bach was able to maintain his position at Arnstadt until he obtained the organistship of St Blasius in Muhlhausen in 1 707. Here he married his cousin, easily identified with the " strange maiden " of Arnstadt; and here he wrote his first great church cantatas, Aus der Tiefe, Gott ist mein Konig and Goties Zeii.

Bach's mastery of the keyboard attracted universal attention, and prevented his ever being unemployed. In 1 708 he went to Weimar where his successes were crowned by his appointment, in 1714, at the age of twenty-nine, as Hofkonzerlmeister to the duke of Weimar. Here the composition of sacred music was one of his most congenial duties, and the great cantata, Ich hatte viel Bekiimmerniss, was probably the first work of his new office. In 1 717 Bach visited Dresden in the course of a concert tour, and was induced to challenge the arrogant French organist, J. Louis Marchand, who was making himself thoroughly disliked by the German musicians who could not deny his powers. Bach was first given an opportunity of listening secretly to Marchand's playing, then a competition on the organ was proposed, and a day was fixed for the tournament at which all the court and all the musical celebrities' of the town were to be present, to see nothing less than the issue between French and German music. Marchand took up the challenge contemptuously;* but it would appear that he also was allowed to listen secretly to Bach's playing, for on the day of the tournament the only news of him was that he had left Dresden by the earliest coach.

This triumph was followed by Bach's appointment as Kapell-meister to the duke of Cothen, a post which he held from 1717 to 1723. The Cothen period is that of Bach's central instrumental works, such as the first book of the W ohltemperirtes Klavier, the solo violin and violoncello sonatas, the Brandenburg con- certos, and the French and English suites.

In 1723, finding his position at Cothen uninspiring for choral music, he removed to Leipzig, where he became cantor of the Thomasschule, being still able to retain his post as visiting Kapell- meister at Cothen, besides a similar position at Weissenfels. His wife had died in 1720, leaving seven children, of whom Frieder- mann and Philipp Emanuel had a great future before them. (For his sons see Bach, K. P. E., below.) In December 1721 Bach married again, and for the beautiful soprano voice of his second wife he wrote many of his most inspired arias. She was a great help to him with all his work, and her musical handwriting soon became so like his own that her copies are difficult to distinguish from his autographs. In 1729 Bach heard that Handel was for a second time visiting Halle on his way back to London from Italy. A former attempt of Baeh's to meet Handel had failed, and now he was too ill to travel, so he sent his son to Halle to invite Handel to Leipzig; but the errand was not successful, and much to Bach's disappointment he never met his

only comˆ peer. Bach so admired Handel that he made a manuscript copy of his Passion nach Brockes. This work, though almost unknown in England then as now, was, next to the oratorios of Keiser, in- comparably the finest Passion then accessible, as Graun's beauti- ful masterpiece, Der Tod Jesu, was not composed until four years after Bach's death. The disgusting poem of Brockes (which was set by every German composer of the time) was transformed by Bach with real literary skill as the groundwork of the non- scriptural numbers in his Passion according to St John.

All Bach's most colossal achievements, such as the Passion according to St Matthew and the B Minor Mass (for discussion of which see Oratorio and Mass), date from his cantorship at Leipzig. But, important and congenial as was his position there, and smooth as the course of his hie seems to have been until

- Spitta points out that this cannot mean singing in the choir at a service, but making music in church privately. '

his death in 1750, he must have had quite as much experience as can have been good for him. He was often ruffled by the town councillors of Leipzig, who (like his earlier employers at Arnstadt) were shocked by the " unecclesiastical style " of his composi- tions and by his independent bearing. But he had more serious troubles. Of his seven children by his first wife only three survived him. By his second wife he had thirteen children, of whom he lost four of the six sons. For the head of so large a family his post was dignified rather than lucrative, and few documents tell a prouder tale of uncomplaining thrift than the inventory of his possessions made after his death. One can only be thankful that he did not live to see anything but the wonder- ful promise of his son Friedermann, who, in the words of the brilliantly successful K. Philipp Emanuel Bach, was more nearly capable of replacing his father than all the rest of the family together. The prospect of complete loss of the tradition of his own polyphonic art he faced with equanimity, saying of the new style, which in the hands of his own son, Philipp Emanuel, was soon to eclipse it for the next hundred years, " The art has advanced to great heights : the old style of music no longer pleases our modern ears." But it would have broken his heart if he had forseen that Friedermann Bach was to attain a dis- reputable old age after a dissolute and unproductive life.

The brilliant successes of Philipp Emanuel led to his appoint-

ment as court-composer to the king of Prussia and hence, in 1747, to Sebastian's being summoned to visit Frederick the Great at Potsdam, an incident which Bach always regarded as the culmination of his career, much as Dr Johnson regarded his interview with George III. Bach had to play on the numerous newly invented pianofortes of Silbermann which the king had bought, and also to try the organs of the churches of Potsdam. Frederick, whose musical reputation rested on a genuine if narrow basis, gave him a splendid theme on which to extemporize; and on that theme Bach afterwards wrote Das musikalische Opfer. Two years after this event his sight began to fail, and before long he shared the fate of Handel in becoming perfectly blind. 2

Bach died of apoplexy on the 28th of July 1750. His loss was deplored as that of one of the greatest organists and clavier players of his time. Of his compositions comparatively little was known. At his death his MS. works were divided amongst his sojs, and many of them have been lost; only a small fraction of his greater works was recovered when, after the lapse of nearly a century, the verdict of his neglectful posterity was reversed by the modern upholders of polyphonic art. Even now some important works are still apparently irrecoverable.

The rediscovery of Bach is closely connected with the name of Mendelssohn, who was amongst the first to proclaim by word and deed the powers of a genius too gigantic to be grasped by three generations. By the enthusiastic ; a ˆ el ˆ. endeavours of Mendelssohn, Schumann and others, and in England still earlier by the performances and publica- tions of Wesley and Crotch, the circle of Bach's worshippers rapidly increased. In 1850, a century after his death, a society was started for the correct publication of all Bach's remaining works. Robert Franz, the great song-writer, did good service in arranging some of Bach's finest works for modern performance, until the experience of a purer scholarship could prove not only the possibility but the incomparably greater beauty of a strict adherence to Bach's own scoring. The Porson of Bach-scholarship, however, is Wilhelm Rust (grandson of the interesting composer of that name who wrote polyphonic suites and fantasias early in the 19th century). During the fourteen years of his editorship of the Bach-Gesellschaft he displayed a steadily increasing insight into Bach's style which has never since been rivalled. In more than one case he has restored harmonies of priceless value from incomplete texts, by means of research and reasoning which he sums up in a modest footnote that reads as something self-evident. His

prefaces to the Bach-Gesellschaft volumes are perhaps the most valuable contributions to the criticism of 18th-century music ever written, Spitta's great biography not excepted.

2 The same surgeon operated unsuccessfully on both composers..

Bach's Importance in the history of music cannot be exaggerated. His art, neglected as old-fashioned and crabbed by his younger contemporaries, survived only in certain limited aspects as the subject of a desultory and unintelligent academic study, until its re-discovery by Mendelssohn. And yet, whatever disguise may have been foisted on it by corrupt traditions and ignorance of its idioms, whenever any fragment of it gained the inner ear of a true composer the effect on the history of music was immediate and profound. Indeed his influence is by no means chiefly manifested in the time when his work became known in its larger aspects, though the Bach-revival is very obviously connected with certain tendencies in the " Romantic " movement in music. But, however clear we may consider Bach's claim to the title of " the first of Romanticists," the full influence of his whole work has hardly yet begun to show itself. Schumann died before even such enthusiasts as the editors of the Bach-Gesell- schaft began to find more beauty than extravagance in Bach's ordinary musical language (see, for example, Hauptmann's letters passim, The Letters of a Leipzig Cantor, trans, by A. D. Coleridge, London, Novello, Ewer, 1892), or, indeed, to grasp the main features of his designs. 1 The labours of the Bach- Gesellschaft have occupied more than fifty years, during which about four-fifths of Bach's choral works have been published for the first time; and it would be surprising if another fifty years sufficed to make these adequately known to the world at large. It is difficult to make an anthology of such bulky works as church- cantatas, nor does an anthology meet the purpose where the whole work so constantly attains that excellence for which the anthologist seeks. Except for practical difficulties (as when Bach writes for obsolete instruments) the only reason why some cantatas are better known than others is that a beginning must be made somewhere. Indeed, a cantata was recently selected, on the ground of its popularity, for a choral competition in a small English country town the year before it was performed as a novelty in Berlin !

It is clear, then, that the influence of Bach's art as an understood whole is still undeveloped. In the past history of music his part was hardly suspected except by the great composers themselves; and, to any one contemplating the art of the generation after him, it might have seemed that both he and Handel had worked in vain. Yet his was the most subtle and universal force in the development of music, even when his musical language seemed hopelessly forgotten. Mozart, when rapidly advancing to the height of his mastery, had but to read the Baron von Swieten's manuscript copies of the motets and of the Wohltemperirtes Klavier, and his style, quite apart from his immediate essays in the old art-forms, and apart also from the influence of his study of Handel, developed a new polyphonic richness and depth of harmony which steadily increased until his untimely death. Beethoven studied all the accessible works of Bach profoundly, and frequently quoted them in his sketch-books, often with a direct bearing on his own works. His rendering of the Wohltemperirtes Klavier is said to be recorded in the marks of expression and tempo given in Czerny's edition; and if that record is true, Beethoven must have been completely in the dark as to Bach's meaning in many important respects; but art is full of such illustrations of the way in which great minds influence each other in spite of every barrier which diversity of language and time can set. Beethoven's great Thirty-three Variations on a Waltz by Diabelli were actually described in the publisher's puff as worthy of their kinship with the " Goldberg Variations " of Bach; and that kinship is revealed in its truest light by a comparison between Beethoven's 31st variation and Bach's 25th; for here, just where the resemblance is most obvious, each composer utters his most intimate expression of feeling.

In the same way, Chopin is nowhere more characteristic than where he shows his love of the Wohltemperirtes Klavier in his Etudes and Preludes; and so subtle is the influence of poly-

1 See the wild conjectures of the editor of the Four Short Masses as to the " displacing " of structure in the kyrie of the G minor Mass (B.-G., Jahr. viii. preface, with Rust's answer in the preface to Jahr. ttiii.).

phonic style even over a writer so little apt to make direct use of it as Chopin, that one of Schumann's few plagiarisms occurs in his use of a phrase from Chopin's F minor Etude (written for the Mithode des mithodes) as the subject of a fugue (Op. 72, No. 3). And, apart from fugues, which Schumann cultivated assiduously

at a late stage in his career, the influence of Bach pervades the texture and rhythm of his work in more ways than can easily be followed.

In a more external, but not less significant way, the Passion according to St Matthew made its mark on Mendelssohn from the time when he discovered it at the age of twelve, and suggested to him many features in the general design of oratorios, by means of which he rescued that branch of art from the operatic influences that ruined Beethoven's Mount of Olives. Without the example of Bach, Wagner's schemes of Leitmotif would never in his lifetime have become woven into that close polyphonic texture which secures for his music a flow as continuous as that of drama itself: — and intimately connected with this is the whole subject of Wagner's harmonization, which in many of its boldest characteristics was foreshadowed by Bach. A close study of the texture of Brahms's work shows that he develops Bach's and Beethoven's artistic devices pari passu, and that the result is a complete unification of that opposition between polyphony and form which in the infancy of the sonata (as in every transitional stage in musical history) threatened to wreck the art as a false antithesis wrecks a philosophy. Perhaps the only great composers who escaped the direct influence of Bach are Gluck and Berlioz. Even Gluck reproduced in every detail of harmony arid figure the first twelve bars of the Gigue of Bach's B flat Clavier-Partita in the aria " Je t'implore et je tremble " in Iphiginie en Tauride. But plagiarism, however unconscious, is a very different thing from that profound indebtedness which makes a great man attain his truest originality; and Gluck's training practically deprived him of Bach's direct influence, useful as that would have been to the attainment of his aims in harmonic and choral expression. The indirect influence no one could escape, for whatever in modern music is not traceable to Sebastian Bach is traceable to his sons, who were encouraged by their father in the cultivation of those infant art-forms which were so soon to dazzle the world into the belief that his own work was obsolete.

Bach's place in music is thus far higher than that of a reformer, or even of an inventor of new forms. He is a spectator of all musical time and existence, to whom it is not of the smallest importance whether a thing be new or old, so long as it is true. It is doubtful whether even the forms most peculiar to him (such as the arpeggio-prelude) are of his invention. Yet he left no form as he found it, — not even that most conventional of all, the Da Capo Aria, which he did not outwardly alter in the least. On the

other hand, with every form he touched he said the last word. All the material that could be assimilated into a mature art he vitalized in his own way, and he had no imitators. The language of music changed at his death, and his influence became all-pervading just because he was not the prophet of the new art, but an unbiassed seeker of truth. Whether so great a man becomes ” progressive ” or ” reactionary ” depends on the artistic resources of his time. He will always work at the kind of art that is most complete and consistent in all its aspects. The same spirit of truthfulness that makes Sebastian Bach hold himself aloof from the progressive art which he encourages in his sons, drives Beethoven to invent new forms and new means of expression with every work he writes. Gluck abolished the Da Capo Aria, because it was unfit for dramatic music. Bach did not abolish it, because he did not intend to write dramatic music in the strict sense of the term. Mature musical art in Bach’s time could not be dramatic, except in the loose sense in which the term may be applied to an epic poem. Dramatic expression, properly so called, can only be attained in music by the full development of resources that do not blend with those of Bach’s art at all. Meanwhile there are many things unsuitable for the stage which are nevertheless valuable on “purely musical grounds; and the Da Capo Aria was one. Bach

Bach’s method.

developed it in a great variety of ways, while retaining even the minor details of what in other hands had long before become its conventional form; but the one thing he did not do was to abuse it according to time-honoured custom as the staple form for opera. For that he had too much dramatic insight. His treat- ment of other important art-forms is illustrated in the articles on Contrapuntal Forms; Concerto and Instrumentation. Here we may attempt to illustrate his methods by such forms and characteristics as cannot be classified under those headings.

i . The toccatas of Buxtehude and his predecessors show how an effective musical scheme may be suggested by running over nostra- the keyboard of an organ as if to try (teccare) the tioasof touch, then bursting out into sustained and full harmony, and at last settling down to a fugue. But before Bach no one seemed able to keep the fugue in motion long enough to make a convincing climax. Very soon it collapsed and the process of quasi-

extemporization began again, to culminate in a new fugue which often gave the whole work a happy but deceptive suggestion of organic unity by being founded on an ingenious variation of the subject of the first fugue. But in Bach's hands the toccata becomes one of the noblest and most plastic of forms. The introductory runs may be disjointed and exaggerated to grotesqueness, until the gaps between them gradually fill out, and they build themselves up into grand piles of musical architecture, as in the organ toccata in C; or they may be worked out on an enormous scale in long and smooth canonic passages with a definite theme, as in the greatest of all toccatas, that in F for organ, which is most artistically followed by a fugue unusually quiet for its size. In one instance, the toccata at the beginning of the E minor clavier- partita, the introductory runs, though retaining much of the extempore character from which the form derives its name, take shape in a highly organized and rounded-off group of contrasted themes. The fugue follows without change of time, and is developed in so leisurely a manner that it is fully as long as a normal fugue on a large scale by the time it reaches what sounds like its central episode. At this point some of the introductory matter quietly enters, and leads to a recapitulation of the whole introduction in the key now reached. The obvious sequel would be a counter-development of the fugue, at least as long as what has gone before, as in the clavier-toccata in C minor; but Bach does not choose to weary the hearer and weaken the impression of breadth he has already made here. Instead, he expands this restatement of the introduction, and makes its harmonies deliberately return to the fundamental key, and thus in an astonishingly short time the toccata is brought to a close with the utmost effect of climax and finality. The same grasp of all the possible meanings of an artistic device shows itself in his treatment of the other features of toccata form. With his variety of proportion and flow he has no need to break off the fugue like earlier composers: but all the old devices by which the division into sections was managed are turned to account by him, and almost every toccata has its own scheme of contrasted movements, always based on the old natural idea of the growth of an organized music from a chaos Of extemporization.

If this is Bach's treatment of a comparatively small and specialized art-form, it is obviously impossible to reduce the scantiest account of the rest of his work into practical limits here, nor is there as yet a sufficient body of accepted criticism of Bach

for such an account to carry further conviction than an expression of individual opinion. Fortunately, however, Bach was constantly re-arranging his own compositions; indeed he evidently regards adaptability to fresh environment as the test of his finest work: and we cannot do better than review the evidence thus given to us, — evidence which only Beethoven's sketch-books surpass in significance.

i. The successful transplanting of a work of art to a fresh environment is obviously fe. convincing test of our definitions of the art-forms concerned, if only we take care to distinguish between the alterations produced by the change of environment

and those that imply the composer's dissatisfaction with the original version. In Bach's case this seldom causes much difficulty; his methods of adaptation are so logical and so varied as to form a scheme of musical morphology with all the interest and none of the imperfections of the geological record; and the few cases in which a work owes its changes to the need for improvement as well as adaptation cause no confusion, but rather form a link between the pure adaptations and the numerous revisions of his favourite works without change of medium. There is, for example, no difficulty in separating the element of corrective criticism from that of the impulse to give an already successful composition a larger or more permanent form, in such cases as the transformations undergone by the movements of the birthday cantata, Was mir behagt ist nur die munlre Jagd, during their distribution among the church cantatas, Also- hat Gott die Welt geliebt and Man singet mil Freuden vom Sieg. The fine bass aria, " Ein Fiirst ist seines Landes Pan," was obviously ill-proportioned, with its breakneck return to the tonic and its perfunctory close; and Bach's chief concern in adapting it for its place as the aria, " Du bist geboren mir zu Gute," in Also hat Gott, was to remedy this defect. On the other hand, the use of the delightful ritornello for violoncello from the little aria, " Weil die wollenreichen Heerden," in the birthday cantata, and the restoration of the rejected long instrumental fugato that was to follow, were obviously brought about by the concep- tion of the entirely new material for the voice in the famous aria, " Mein glaubiges Herze." And when the last chorus of Was mir behagt became the first chorus of Man singet mil Freuden, it was expanded to the proportions necessary for a triumphant opening (as distinguished from a cheerful

finale) by the adroit insertion of new material between every joint in the design. This material, being new, could not produce the effect of diffuse- ness that would result from the expansion of the old material already complete in its simplest form, and thus this instance does not imply criticism.

A highly interesting example of pure self-criticism is the Passion according toStJohn,whichw&stwice revised, and each timereduced to a smaller scale by the omission of some of its finest numbers. The final result was a work of perfect proportions, and of the rejected numbers one (a magnificent aria with chorale) remained unused, two were replaced by finer substitutes, others took shape as one of the most complete and remarkable of the church cantatas, Du wahrer Gott, while the greatest of the figured chorales was transferred to the Passion according to St Matthew, of which it now crowns the first part.

3. Such instances of self-criticism might be paralleled in the works of other composers; but there is no parallel in music to Bach's power of reproducing already perfect works in different media. Here Bach reveals to us identities in difference which we should otherwise never have suspected. Of course it is possible to arrange works in different ways without illustrating any profound identities at all. Handel, for instance, collected several of his favourite choruses in an enormous instrumental concerto (see vol. 46 of the Ha'ndel-Gesellschaft), and the result in the case of a chorus like " Lift up your Heads " was ridiculous. Bach, however, does not arrange old work merely to please a court where it was already admired. He never leaves it in a state of mere make-shift, though he cannot always attain his evident aim of a new originality. His methods of orchestration and the profoundly significant identity of certain forms of chorus with certain concerto forms may better be described under their proper headings (see articles Instrumentation and Concerto). Here we will attempt first to show, by illustrations of Bach's power of adding parts to already complete harmonic and con- trapuntal schemes, what was his conception of the nature of an art-form, and secondly, by means of a short analysis of cases in which he adapts the same music to different words, to define his range of expression.

Bach arranged all his violin concertos for clavier, including two that are lost in the original version. Here his power of providing new and apparently necessary material for the left hand of the cembalist (or, in the double concertos, two hit

hands) without disturbing the already complete score, is astonish- ing; and it fails only in the slow movements, which he prefers to leave obviously in the condition of an arrangement rather than to spoil their broad cantabile style by a too polyphonic bass.

But these cases are insignificant compared with such trans- formations as that of the prelude of the E major partita for unaccompanied violin into the sinfonia for organ obligato accompanied by full orchestra (including three trumpets and a pair of drums) at the beginning of the church cantata, Wir danken dir, Gott. The original version is perhaps the most complete and natural of the violin solos, for its arpeggios produce full harmony without recourse to that constant attempt to play on all four strings at once, which makes the performance of the polyphonic movements a tour de force in which steady rhythm is nearly impossible. Yet in the sinfonia its proportions seem to reveal themselves for the first time. Not a bar is displaced and not a note of the newaccompaniment is unnecessary. The whole is almost entirely without themes; for even this, the largest of all arpeggio-preludes, consists essentially of the gradual un- folding of a scheme of harmony in which rhythmic and melodic organization is reduced to a minimum. Only in the first line does the incisive initial figure persist a little longer in the new accompaniment than in the original solo, but on the last page it reappears and pervades the whole orchestra, even the drums thundering out its rhythm at the climax where the holding-notes of the trumpet span the torrent of harmony like a rainbow.

Deeper still is the thought that underlies the transformation of two movements of the great violin-concerto in D minor (unfortunately lost except in its splendid arrangement for clavier) into parts of the church cantata, Wir miissen durch viel Trubsal in das Reich Gottes eingehen. In both movements the violin is replaced by the organ an octave lower, the orchestral accom- paniment remaining where it was. This treatment, with the addition of new and plaintive parts for wind instruments, turns the already very long and sombre first movement into an im- pressive idealization of the ” much tribulation ” that lies between us and the kingdom of heaven. The slow movement is

still more solemn, and is arranged in the same way as regards the instruments ; but from the first note to the last a four-part chorus sings, to the words of the title, a mass of quite new material (except for the bass and for numerous imitations of the solo-part), treated with every variety of vocal colouring and a grandeur of conception which is not dwarfed even by the Passion according to St Matthew.

4. The four short masses, the Christmas oratorio and the B minor mass, contain every variety of adaptation from earlier work. The four short masses are indeed obviously compiled for use in a church where the orchestra was small. Only four movements in the whole collection are not traceable to other extant works; all the rest comes from church cantatas. The adaptations are not always significant; no attempt, for example, is made in the G minor mass to conceal how unfit for a Kyrie eleison is the tremendous denunciatory chorus, Herr, deine Augen sehen nach dem Glauben. But the F major and G major masses are very instructive; and the A major mass, except for the damage done to the instrumentation, is a work that no one would conceive to be not original. The -Kyrie is one of Bach's most individual utterances and could surely never have fitted any other text, but we should say the same of the Gloria if we did not possess the church cantata, Halt im Gedachtniss. The Gloria begins with a triumphant polyphonic chorus accompanied by a spirited symphony for strings. At the words " et in terra pax " the time changes, and two flutes softly accompany a single solemn melody in the altos. At the " laudamus te " the material of the beginning returns, and is interrupted again by the calm slow movement, this time in another key and for another voice, at the words " adoramus te." Twice the " laudamus " and " adoramus " alternate in a finely proportioned design; at last the words " gratias agimus tibi propter magnam gloriam tuam " are set for the full chorus to the music of the slow movement, the strings join with the flutes, and this most appropriate setting of those words is finished. And yet it is quite impossible to

regard this as superseding the last chorus of Halt im Gedachtniss. Not one bar or harmony of the framework differs; yet the two versions are two independent works of art. In the cantata the beginning is for instruments only; when the slow movement (here adequately scored for a flute and two oboe d' amore) begins, the basses, permanently separated from the rest of the chorus, sing " Peace be unto you." The other voices then sing the triumph of the faithful helped by the Saviour in their battle

against the world. The slow movement is, of course, set for bass alone throughout, and at the last recurrence of the allegro the bass continues to sing " Friede sei miteuch" through the rest of the chorus, as if leading the chorus of humanity through strife to the kingdom of heaven, and then the single voice of peace remains to the end. Hardly a bar of the chorus-material is on the same themes in the two versions.

The study of the sources of the Christmas oratorio will complete the evidence on which we support our estimate of Bach's methods and range of expression. It is certain that the occasional cantatas, from which all except the chorale-tune numbers and those set to words from the Bible were taken, date from shortly before the oratorio; and that Bach, being incapable of putting inferior work even into birthday odes, rescued it from oblivion by having the verses for the oratorio numbers built on the same rhythms as those of the odes in order that he might use those occasional works as a sketch (see B.-G., Jahr. xxxiv. preface). Be this as it may, the alterations are confined to details even where an aria is transposed a fourth or fifth; but the effect of them is startling. Pleasure (Wollust) sings a lovely soprano aria to allure Hercules from the paths of Virtue, to which Hercules replies indignantly with an aria in a spirited staccato style. It is no doubt a shock to our feelings to find that Wollust's aria became the Virgin's cradle-song, while Hercules's reply became the alto aria in which Zion is bidden to "prepare for the Bride- groom." But it does not warrant the inference that Bach's music lacks definite characterization : on the contrary, these two arias are the best demonstration of his profound insight into the possibilities of musical expression within his range. It is no part of his conception of art that Wollust should be represented by a Wagnerian Venusberg-music ; the obvious way to represent Pleasure was by writing pleasant music, and with Bach's ideas of pleasance the step from this to the solemn beauty of the sacred cradle-song was a mere matter of change of colour and tempo. The key is lowered from B flat to G, the strings are veiled with the tender reed tone of a group of oboe d' amore, the soprano becomes an alto whose notes are, as it were, sur- rounded with a nimbus by being doubled in the upper octave by a flute; and the aria becomes worthy of its new purpose, not by losing a grossness which it never possessed, but by gaining the richness which distinguishes the perfect work from the boldly executed draft.

As to the aria of Hercules the change is in manner, while the

character, in the human sense of the term, is quite rightly the same. Both Hercules and the faithful Christian of the oratorio are renouncing pomps and vanities for the claims of a higher life; in the one case indignantly, in the other case inspired ” mit zart-lichem Triebe.” A change to a,. legato style, the substitution of a single oboe d’ amove for tutti violins, the addition of delicate ornaments indicative of a slower pace, and the noble stream of melody preserve its identity while changing its aspect. Bach’s larger designs react on their changing contents as a cathedral reacts on the impressiveness of the rites performed within it, or as nature reacts on a poet’s thoughts; and in the same way Bach’s melody is greater than any possible mood of the moment, not because of that vague and negative pseudo-classical quality misnamed ” reserve,” but because of its vital individuality. In their proper directions its changes are limitless; elsewhere change in inconceivable. No amount of ” Umarbeitung ” could, for instance, turn the aria of Hercules into the Virgin’s cradle-song, or Wollust’s aria into the exhortation of Zion to prepare for the Bridegroom. In short, Bach’s meloHies are characteristic, not like a mask with a set expression, but like a living face that is the more individual for the mobility of its features.

Within these limits, ttiiiT i», Z\ˆict of dramatic expression in just so far as ” the end of drama is not character but action,” there is nothing good that Bach’s art does not express. He has plenty of humour, if the term may be applied to art which is, so to speak, always literal, — art in which a jest is a jest and serious things are treated with familiar directness, and all, whether in jest or earnest, is primarily beautiful. In Der Streit zwischen Phoebus und Pan Bach answers the critics who censured him for his pedantry and provincial ignorance of the grand Italian operatic style, by making effective use of that style in Pan’s prize-aria (” Zum Tanze, zum Sprunge, so wack-ack-ack-ackelt das Herz “), nobly representing his own style in Phoebus’s aria, and promptly caricaturing it in the second part of Pan’s (” Wenn der Ton zu miihsam klingt “). Midas votes for Pan — ” denn nach meinen beiden Ohren singt er unvergleichlich schon.” At the word ” Ohren ” the violins give a pianissimo ” hee-haw ” which is fully as witty in its musical aptness as Mendelssohn’s clown-theme in the Overture to the Midsummer Night’s Dream; and in the ensuing dialogue their prophecy is verified. As with many other

great artists, Bach's playfulness occasionally showed itself inconveniently where little things shock little minds. The hilarious aria, " Ermuntre dich," in the church cantata, Schmucke dich, liebe Seele, is one instance, and the quaint representation of the words " dimisit inanes" in the Magnificat is another. This great work, one of the most terse and profound things Bach ever wrote, contains, among many other subtle inspirations, one conception with which we may fitly end our survey, for it strongly suggests Bach himself and the destiny of all that work which he finished so lovingly, with no prospect of its becoming more than a family heirloom and a salutary tradition in his Leipzig choir- school. In the Magnificat he sets the words " quia respexit humilitatem ancillae suae " to a touchingly appropriate soprano solo accompanied by his favourite oboe d'amore. With the next sentence " ecce enim beatam me dicent " the tone brightens to a quiet joy, but Bach takes advantage of the syntax of the Latin in a way that defies translation, and the sentence is finished by the chorus. " Omnes generationes " seem indeed to pass before us in the crowded fugue which rises in perpetual stretto, the incessant entries of its subject now mounting the whole scale, each part a step higher than the last, and now collecting in unison with a climax of closeness and volume overwhelming in its impression of time and multitude.

SUMMARY OF BACH'S WORKS

No attempt is here made at chronological sequence. The changes in Bach's style, though clear and important, are almost impossible to describe in untechnical language; nor are they of such general interest as to make it worth while to expand this summary by an attempt to apportion its contents among the Arnstadt-Miihlhausen period, the Weimar period, the Cothen period (chiefly remarkable for instrumental music and comparatively uninteresting in its easy-going choral music), and the last period (1733-1750) in which, while the choral works became at once more numerous and more terse (e.g. Jesu, der du meine Seele) the instrumental music, though never diffuse, shows an increasing preference for designs on a large scale. (Compare, for example, the second book of theWohlte?nperirtes Klavier, 1744, with the first, 1722.)

I. — Church Music

A. With Orchestra

I90 church cantatas: besides several which are only known from fragmentary sets of parts. Of the 190, 40 are for solo voices, about 60 (including some solo cantatas) are more or less founded on chorales, and the rest, though almost invariably containing a chorale (for congregational singing), are practically short oratorios and frequently so entitled by Bach himself.

3 wedding cantatas: the Easter oratorio (exactly like the above-mentioned oratorio-cantatas; and the Christmas oratorio (six similar cantatas forming a connected design for performance on six separate days).

The Passions according to St Matthew and St John. Funeral ode for the Duchess Eberhardine (now known to be arranged from portions of the lost Passion according to St Mark).

4 short masses (i.e. Kyrie and Gloria only) mainly compiled from church cantatas.

Mass in B minor. Magnificat in D. A few other ecclesiastical Latin choruses.

m.

B. Without Orchestra

5 motets a capella (but there is reason to believe that these, except Komm Jesu komm, were intended to be partly supported by the organ). A sixth motet has an obligato figured-bass accompaniment.

A few early choruses, mostly turned to account in later works.

A large collection of plain chorales, including 1 several original melodies.

II. — Secular Vocal Music

Der Streit zwischen Phoebus und Pan and Der zufrieden gestellte Aeolus; both entitled Dramma per Musica, but showing no more essential connexion with the stage than Handel's Acts and Galatea.

7 solo and 7 choral cantatas, of which latter three were almost entirely absorbed into the Christmas oratorio and the B minor mass. Of the solo cantatas two are Italian (one of these being

Bach's only developed work for voice and clavier) and two are burlesque.

Several tunes with clavier bass, almost foreshadowing the modern song.

III. — Instrumental Music A. Orchestral

7 clavier concertos arranged from violin concertos and other sources.

3 concertos for two claviers (two being arranged from concertos for two violins).

2 concertos for three claviers.

The 6 Brandenburg concertos, for various combinations.

2 violin concertos, and a colossal torso of a concerted violin-movernent forming the prelude to a lost church cantata.

1 concerto for two violins.

4 orchestral suites. (The symphony in F in the same volume of the B. G. is only an earlier version of the first Brandenburg concerto.)

B. Chamber Music

3 sonatas for clavier and flute; a suite and 6 sonatas for clavier and violin, 3 for clavier and viola da gamba ; 2 trios with figured bass; 2 flute-sonatas and a violin suite with figured bass; 6 sonatas (i.e. 3 sonatas and 3 partitas) for violin alone; 6 suites for violoncello alone.

C. Clavier and Organ Music Bach's own collections are : —

1. Das wohltemperirte Klavier for clavichord : two books each containing 24 preludes and fugues, one in each major and minor key; with the object of stimulating tuning by " equal temperament "instead of sacrificing the euphony of remoter keys to that of the more usual ones.

2. Klavier-Ubung (chiefly for harpsichord) in four books comprising: (i) 15 two-part inventions and 15 three-part symphonies, (ii.) 6 partitas, (iii.) The " Goldberg " variations. 4 duets, and an important collection of organ choral-preludes, with the " St Anne

” prelude and fugue in E flat, (iv.) The Italian concerto and French overture.

3. The 6 ” French ” and 6 ” English ” suites.

The other clavier works fill two Jahrgange of the B.-G.

Bach’s collections of organ music are (besides that included in the third part of the Klavier- tlbung) : — (l) 6 sonatas. (2) 4 groups cf 6 organ preludes and fugues. (3) Das Orgelbiichlein, a coltection of short choral-preludes carefully planned — all the blank pages of the autograph being headed with the titles of the chorales intended for them — but not half executed. (The projected whole would have been a larger volume than the Wohltemperirtes Klavier). (4) 18 larger chorale-preludes, including Bach’s last composition. (5) The 6 ‘ Schiibler ” chorales, all arranged from movements of cantatas.

Besides these there are the three great independent toccatas and the Passacaglia. The remaining choral-preludes fill one Jahrgang, and the other organ works two more.

D. Unclassified Two important instrumental works cannot be classified, viz. Das musikalische Opfer, the volume of compositions (two great fugues, various puzzle-canons, and a splendid trio for flute, violin and figured bass) on the theme given to Bach by Frederick the Great ; and Die Kunst der Fuge, a progressive series of fugues on one and the same subject, written in open score as if entirely abstract studies, but all (except the extreme contrapuntal tours de force) in admirable clavier style and of great musical value.

IV. — Lost Works A. Choral

J. N. Forkel’s statement that Bach wrote 5 Jahrgange of church cantatas (i.e. enough to provide one for each Sunday and holy day for five years) would indicate that some 80 are lost, but there is reason to believe that this is a great exaggeration. Not more than six or seven cantatas are known to be lost, by the evidence of fragments, text-books, &c.

Forkel also says that Bach wrote five Passions. Besides the great Matthew and John Passions there is in an indisputable Bach autograph one according to St Luke ; but it is so worthless that the best plea for its authenticity offered by responsible crilics is that only a personal interest could have induced Bach to make a copy

of it.

The lost Passion according to St Mark must, judging by the movements preserved in the Trauer-Ode, have been larger than that according to St John.

Was there a genuine Lucas-Passion ? If so, Forkel's report of five Passions would be explained. Several lost secular works are partly preserved in those portions of the Christmas oratorio of which the sources are not definitely knov,n, but which, like the other duplicated numbers, are fair copies in the autograph.

B. Instrumental

Three violin concertos and one for two violins; known only from the wonderful clavier versions.

Most of the first movement of the A major sonata for clavier and flute which was written in the spare staves at the bottom of a larger score. Some of these have been cut off.

V. — Arrangements of Works by other Composers

Arrangements for harpsichord alone of 1 6 concertos, generally described as by Vivaldi, but including several by other composers.

4 Vivaldi concertos arranged for organ.

Many of these arrangements contain much original matter, such as entirely new slow movements, large cadenzas, &c.

Concerto in A minor for 4 claviers and orchestra, from Vivaldi's B minor concerto for 4 violins. This, though the most faithful to its original, is the richest and most Bach-like of all these arrangements, and is well worth performing in public.

2 sonatas from the Hortus Musicus of Reinken, arranged for clavier. (The ends of the slow movements are Bach.)

Finishing touches to cantatas by his uncle Johann Ludwig Bach. Also a very characteristic complete " Christe eleison " inserted in Kyrie of Johann Ludwig's.

VI. — Doubtful and Spurious Works Bach's autographs give the name of the composer on the outside sheet only. He was constantly making copies of all that interested him; and where the outside sheet is lost, only the music itself can tell us whether it is his or not. The above-mentioned Passion according to St Luke is the chief case in point. The little music-books he and his second wife wrote for their children are full of pieces in the most various styles- and the editors of the Bach-Gesellschaft have not completely identified them, even Couperin's well-known " Les Bergeries " escaping their scrutiny. A sonata for two claviers by Bach's eldest son, Wilhelm Friedermann, was detected by the editors after its inclusion in Jahrgang xliv. The second of the 3 sonatas for clavier and flute is extremely suggestive of Bach's sons, but Philipp Emanuel ascribes it to his father. However, he might easily have docketed it wrongly while arranging copies of his father's works. It has a twin brother (B.-G. ix. Anhang ii.) for which he has not vouched.

Four absurd church cantatas are printed for conscience' sake in Jahrgang xliii. More important than these, because by no means too obviously ridiculous to deceive a careless listener, is the well-known 8-part motet, Lob, Ehr' und Weisheit (blessing and glory and wisdom). A closer acquaintance shows that it is really very poor stuff; and it was finally crowned with absurdity by the discovery that its composer was a contemporary of Bach, — and that his name was Wagner.

The beautiful motet, Ich lasse dich nicht, has long been known to be by one of Bach's uncles (Johann Christoph).

Editions

Almost the only works of Bach published during his lifetime were the instrumental collections, most of which he engraved himself. Of the church cantatas only one, Gott ist mein Kbnig (written when he was nineteen, but a very great work), was published in his lifetime.

Of modern editions that of the Bach-Gesellschaft is, of course, the only complete one. It is, inevitably, of very unequal merit. Its first editors could not realize their own ignorance of Bach's language; their immediate admiration of his larger choruses seemed to them proof of their competence to retain or dismiss details of ornamentation, figured bass, variants between score and parts, &c, without always stopping to see what light these

might shed on questions of tempo and style — especially in the arias and recitatives, which they regarded as archaic almost in direct proportion to the depth of thought really displayed in them. In the 9th Jahrgang Wilhelm Rust introduced scholarly methods, with the happiest results. The Wohltemperirtes Klavier {Jahrgang xiv.) was edited by Kroll, who also made his text accessible in the Edition Peters (which till then had only Czerny's — an amazing result of corrupt tradition, still widely accepted). Kroll's and Rust's volumes are far the best in the B. G. On Rust's death the standard deteriorated ; his immediate successor seems more interested in reprinting in full an early version of a work of which Rust had given only the variants, than in digesting his own materials (Jahrgang xxix.) ; and in his next volume (Jahrgang xxx. p. 109) the bass and violin are a bar apart for a whole line. The last ten volumes, however, are again satisfactory, and in Jahrgang xliv. the French and English suites are re-edited. Part of the B minor mass was also worked over again; and Kroll's text of the Wohltemperirtes Klavier was supple- mented by the evidence of the British Museum autograph. The

Steingraber edition of the clavier works, edited by Dr Hans Bischoff, is incomparably the best, giving all the variants in footnotes and clearly distinguishing the extremely intelligent nuances and phrasing signs of the editor from the rare but significant indications of Bach himself. Nor does this wealth of scholarship interfere with the pre- sentation of a straightforward, single text ; though in addition there is every necessary explanation of the ornaments and kindred matters.

We have seen no other editions that distinguish Bach's text from the editor's taste— the disappointing publications of the Neue Bachgesellschaft 1 by no means excepted. We may remark that the older vocal scores of cantatas in the Edition Peters are, though unfortunately but a selection, far better than the complete series issued by Breitkopf and Hartel in conformity with the Bach Gesell- schaft, and therefore accepted as authoritative (see Instrumenta- tion). The English vocal scores published by Novello are gener- ally very good though covering but small ground. The Novello score of the Christmas oratorio contains a fine analytic preface by Sir George Macfarr^n.

Bibliography. — J. N. Forkel, Uber Bach's Leben, Kunst und Kunstwerke, translated (London, 1820); C. H. Bitter, John Sebastian Bach (Berlin, 1865); Ernest David, La Vie et les ozuvres de Bach (Paris, 1882); P. Spitta, Johann Sebastian Bach (Leipzig,

1873 and 1880); E. Heinrich, Sebastian Bach's Leben (Berlin, 1885); A. Pirro, L' Esthetique de Jean Sebastian Bach (Paris, 1907) ; and L' Orgue de Jean Sebastian Bach (Paris, 1907) ; A. Schweitzer, /. S. Bach: Le Musicien poete. Spitta's biography superseded everything written before it and has not since been approached. With corrections in the light of Rust's B. G. prefaces it contains everything worth knowing about Bach, except the music itself. (D. F. T.)

BACH, KARL PHILIPP EMANUEL (1714-1788), German musician and composer, the third son of Johann Sebastian Bach, was born at Weimar on the 14th of March 17 14. When he was ten years old he entered the Thomasschule at Leipzig, of which in 1723 his father had become cantor, and continued his education as a student of jurisprudence at the universities of Leipzig (1731) and of Frankfort on the Oder (1735). In 1 738 he took his degree, but at once abandoned all prospects of a legal career and determined to devote himself to music. A few months later he obtained an appointment in the service of the crown prince of Prussia, on whose accession in 1740 he became a member of the royal household. He was by this time one of the first clavier-players in Europe, and his compositions, which date from 1731, included about thirty sonatas and concerted pieces for his favourite instrument. His reputation was established by the two sets of sonatas which he dedicated respectively to Frederick the Great (1742) and to the grand duke of Wiirttemberg (1744); in 1746 he was promoted to the post of Kammermusikus, and for twenty-two years shared with Karl Heinrich, Graun, Johann Joachim, Quantz and Johann Gottlieb Naumann the continued favour of the king. During his residence at Berlin he wrote a fine setting of the Magnificat (1749), in which he shows more traces than usual of his father's influence, an Easter cantata (1756), several symphonies and concerted works, at least three volumes of songs, — Geistliche Oden und Lieder, to words by Gellert (1758), Oden mit Melodien (1762) and Sing-Oden (1766)— and a few secular cantatas and other pieces d' occasion. But his main work was concentrated on the clavier, for which he composed, at this time, nearly two hundred sonatas and other solos, including the set mit verdnderten Reprisen (1760-1768) and a few of those fitr Kenner und Liebhaber. Meanwhile he placed himself in the fore- front of European critics by his Versuck ilber die wahre Art das Clavier zu spielen (first part 1753, second, with the first reprinted, 1762), a systematic and masterly treatise which by 1780 had reached its third edition, and which laid the foundation

for the methods of Clementi and Cramer. In 1768 Bach succeeded Georg Philipp Telemann as Kapellmeister at Hamburg, and in consequence of his new office began to turn his attention more towards church music. Next year he produced his oratorio Die Israeltien in der Wiisle, a composition remarkable not only for its great beauty but for the resemblance of its plan to that of Mendelssohn's Elijah, and between 1769 and 1788 added over twenty settings of the Passion, a second oratorio Der Auferstehung

1 The object of the Neue Bachgesellschaft is to render the completed results of the first Bachgesellschaft generally accessible by holding frequent Bach festivals and issuing cheap and practical editions. The activities of this society, together with the new movement to restore Bach's vocal music to its place in the Lutheran Church, cannot fail to haye a salutary effect on the future of music.

und Himmelfahrt Jesu (1777), and some seventy cantatas, litanies, motets and other liturgical pieces. At the same time his genius for instrumental composition was further stimulated by the career of Haydn, to whom he sent a letter of high appreciation, and the climax of his art was reached in the six volumes of sonatas fiir Kenner und Liebkaber, to which he devoted the best work of his last ten years. He died at Hamburg on the 14th of December 1788.

Through the latter half of the 18th century the reputation of K. P. E. Bach stood very high. Mozart said of him, " He is the father, we are the children " ; the best part of Haydn's training was derived from a study of his work; Beethoven expressed for his genius the most cordial admiratj»n and regard. This position he owes mainly to his clavier sonatas, which mark an important epoch in the history of musical form. Lucid in style, delicate and tender in expression, they are even more notable for the freedom and variety of their structural design ; they break away altogether from the exact formal antithesis which, with the composers of the Italian school, had hardened into a convention, and substitute the wider and more flexible outline which the great Viennese masters showed to be capable of almost infinite development. The content of his work, though full of invention,

lies within a somewhat narrow emotional range, but it is not less sincere in thought than polished and felicitous in phrase. Again he was probably the first composer of eminence who made free use of harmonic colour for its own sake, apart from the movement of contrapuntal parts, and in this way also he takes rank among the most important pioneers of the school of Vienna. His name has now fallen into undue neglect, but no student of music can afford to disregard his Sonaten fiir Kenner und Liebkaber, his oratorio Die Israeliten in der Wuste, and the two concertos (in G major and D major) which have been republished by Dr Hugo Riemann.

A list of his voluminous compositions may be found in Eitner's Quellen Lexikon, and a critical account of them is given in Bitter's C. P. E. und W. F. Bach und deren Bruder (2 vols., Berlin, 1868), a mine of valuable though ill-arranged information.

Four more of Johann Sebastian Bach's sons grew to manhood and became musicians. The eldest of them, Wilhelm Frieder- mann Bach (1710-1784) was by common repute the most gifted; a famous organist, a famous improvisor and a complete master of counterpoint. But, unlike the rest of the family, he was a man of idle and dissolute habits, whose career was little more than a series of wasted opportunities. Educated at Leipzig, he was appointed in 1733 organist of the Sophienkirche at Dresden, and in 1747 became musical director of the Liebfrauenkirche at Halle. The latter office he was compelled to resign in 1764, and thence-forward he led a wandering life until, on the 1st of July 1784, he died in great poverty at Berlin. His compositions, very few of which were printed, include many church cantatas and instrumental works, of which the most notable are the fugues, polonaises and fantasias for clavier, and an interesting sestet for strings, clarinet and horns. Several of his manuscripts are preserved in the Royal library at Berlin; and a complete list of his works, so far as they are known, may be found in Eitner's Quellen Lexikon.

The fourth son, Johann Gottfried Bernhard Bach (17 15- 1739) was > like his elder brothers, born at Weimar and educated at Leipzig. From 1735 to 1738 he held successively the organist-ships at Muhlhausen and Sangerhausen; in 1738 he threw up his appointment and went to study law at Jena; in 1739 he died, aged 24.

Johann Christoph Friedrich Bach (1732-1795), the ninth son, was

born at Leipzig, studied at the Thomasschule and the university, and in 1750 was appointed Kapellmeister at Biickeburg. He was an industrious composer, especially of church-music and opera, whose work reflects no discredit on the family name.

Johann Christian Bach (1735-1782), the eleventh son, was born at Leipzig, and on the death of his father in 1750 became the pupil of his brother Emanuel at Berlin. In 1754 he went to Italy where he studied under Padre Martini, and from 1760 to 1762 held the post of organist at Milan cathedral, for which he

wrote two Masses, a Requiem, a Te Deum and other works. Having also gained some reputation as a composer of opera, he was in 1762 invited to London and there spent the rest of his life. For twenty years he was the most popular musician in England, his dramatic works, produced at the King's theatre, were received with great cordiality, he was appointed music- master to the queen, and his concerts, given in partnership with Abel at the Hanover Square rooms, soon became the most fashionable of public entertainments. He is of some historical interest as the first composer who preferred the pianoforte to the older keyed-instruments; but his works, though elegant and pleasing, were ephemeral in character and have been deservedly forgotten.

A full account of J. C. Bach's career is given in the fourth volume of Burney's History of Music, and a catalogue of his compositions in an article by Max Schwarz, published in the Sammelbande of the Internationale Musik-Gesellschaft, Jhrg. ii. p. 401. (W. H. Ha.)

BACHARACH, YAIR (1639-1702), German rabbi, was the author of Hawwoth Yair (a collection of Response) and other works. Bacharach was a man of wide culture, and holds an honourable place among the pioneers of the Jewish Re- naissance which was inaugurated towards the end of the 18th century.

BACHARACH, a town of Germany, in the Prussian Rhine Province, romantically situated on the left bank of the Rhine, 30 m. above Coblenz on the railway to Mainz. Pop. 2000. There is an interesting church, a basilica, dating from the beginning of the 13th century. There are also ruins of a Gothic church of the 13th and 15th centuries. The ruined castle of Stahleck, crowning the heights above the town, is celebrated in history as the scene of the marriage between Henry, eldest son of Henry the Lion (shortly before the latter's death in 1195) and Agnes of

Hohenstaufen, which effected a temporary reconciliation between the houses of Welf and Hohen- staufen. Other ruined castles are those of Fiirstenberg and Stahlberg. All three belonged to the counts palatine. The wines of Bacharach were once held in the greatest esteem, and it is still one of the chief markets of the Rhenish wine trade.

BACHAUMONT, LOUIS PETIT DE (1690-1771), French litterateur, was of noble family and was brought up at the court of Versailles. He passed his whole life in Paris as the centre of the salon of Madame Doublet de Persan (1677-1771), where criticism of art and literature took the form of malicious gossip. A sort of register of news was kept in a journal of the salon, which dealt largely in scandals and contained accounts of books suppressed by the censor. Bachaumont's name is commonly connected with the first volumes of this register, which was published anonymously under the title Mlmoires secrets pour servir & Vhistoire de la Ripublique des Lettres, but his exact share in the authorship is a matter of controversy. It was continued by Pidansat de Mairobert (1 707-1 779) and others, until it reached 36 volumes (1774-1779). It is of some value as a historical source, especially for prohibited literature. Extracts were published by P. Lacroix in one volume, 1859. An incomplete edition (4 vols.) was undertaken in 183c by Ra venal.

See, in addition to the memoirs of the time, especially the Correspondance litteraire of Grimm, Diderot, d'Alembert and others (new ed., Paris, 1878, 17 vols.); Ch. Aubertin, L' Esprit public au XVIII' siecle (Paris, 1872).

BACHE, ALEXANDER DALLAS (1806-1867), American physicist, great-grandson of Benjamin Franklin, was born at Philadelphia on the 19th of July 1806. After graduating at the United States Military Academy at West Point in 1825, he acted as assistant professor there for some time, and as a lieutenant in the corps of engineers he was engaged for a year or two in the erection of coast fortifications. He occupied the post of professor t>f natural philosophy and chemistry in the University of Penn- sylvania in 1828-1841 and in 1842-1843. For the trustees of what in 1848 was to become Girard College, but had not yet been opened, he spent the years 1836-1838 in Europe, examining European systems of education, and on his return published a very valuable report. In 1843, on the death of Professor F. R. Hassler (1770-1843), he was appointed

superintendent of the United States coast survey. He succeeded in impressing Congress with a sense of the great value of this work, and by means of the liberal aid it granted, he carried out a singularly comprehensive plan with great ability and mcst satisfactory results. By a skilful division of labour, and by the erection of numerous observing stations, the mapping out of the whole coast proceeded simultaneously under the eye of the general director, and in addition a vast mass of magnetic and meteorological observations was collected. He died at Newport, Rhode Island, on the 17th of February 1867.

BACHE, FRANCIS EDWARD (1833-1888), English musical composer, was born in Birmingham on the 14th of September 1833. The pupil of Alfred Mellon for violin and Sterndale Bennett for composition, he afterwards went to Leipzig in 1853 and studied with Hauptmann and Plaidy. Considering the early age at which he died, his compositions are fairly numerous, and the best, a trio for piano and strings, is still held in high esteem. Two operettas, a piano concerto and a number of published pianoforte pieces and songs do little more than show how great was his promise. He died at Birmingham of con- sumption on the 24th of August 1858. His younger brother, Walter Bache (1842-1888), was born in Birmingham on the 19th of June 1842, and followed him to theLeipzigConservatorium, where he became an excellent pianist. From 1862 to 1865 he studied with Liszt in Rome, and for many years devoted himself to the task of winning popularity for his master'sworks in England. At his annual concerts in London nearly all Liszt's larger works were heard for the first time in England, and on the occasion of Liszt's last visit to England in 1886, he was entertained by Bache at a memorable reception at the Grosvenor Gallery. Walter Bache was professor of the pianoforte at the Royal Academy of Music for some years before his death, and the foundation of the Liszt scholarship at that institution was mainly due to his efforts. He died in London on the 26th of March 1888.

An interesting memoir of the two brothers, by Miss Constance Bache, appeared in 190 1 under the title Brother Musicians.

BACHELOR (from Med. Lat. baccalarius, with its late and rare variant baccalaris — cf. Ital. baccalare — through 0. Fr.

bacheler), in the most general sense of the word, a young man. The word, however, as it possesses several widely distinct applica- tions, has passed through many meanings, and its ultimate origin is still involved in a certain amount of obscurity. The derivation from Welsh bach, little, is mentioned as ” possible ” by Skeat (Etymological Dictionary) , but is “definitely discarded” by the New English Dictionary, and that given here is suggested as probable. The word baccalarius was applied to the tenant of a baccalaria (from baccalia, a herd of cows, bacca being a Low Latin variant of vacca), which was presumably at first a grazing farm and was practically the same as a vaselleria, i.e. the fief of a sub-vassal. Just, however, as the character and the size of the baccalaria varied in different ages, so the word baccalarius changed its significance; thus in the 8th century it was applied to the rustici, whether men or women (baccalariae) , who worked for the tenant of a mansus. Throughout all its meanings the word has retained the idea of subordination suggested in this origin. Thus it came to be applied to various categories of persons as follows. — (1) Ecclesiastics of an inferior grade, e.g. young monks or even recently appointed canons (Severtius, de episcopis Lugdunen- sibus, p. 377, in du Cange). (2) Those belonging to the lowest stage of knighthood. Knights bachelors were either poor vassals who could not afford to take the field under their own banner, or knights too young to support the responsibility and dignity of knights bannerets (see Knighthood and Chivalry). (3) Those holding the preliminary degree of a university, enabling them to proceed to that of master (magister) which alone entitled them to teach. In this sense the word baccalarius or baccalaureu? first appears at the university of Paris in the 13th century, in the system. of degrees established under the auspices of Pope Gregory IX., as applied to scholars still in statu pupillari. Thus there were two classes of baccalarii: the baccalarii cursores,i.e. theological candidates passed for admission to the divinity course, and the baccalarii dispositi, who, having completed this

course, were entitled to proceed to the higher degrees. In modern universities the significance of the degree of bachelor, in relation to the others, varies; e.g. at Oxford and Cambridge the bachelor can proceed to his mastership by simply retaining his name on the books and paying certain fees-; at other universities a further examination is still necessary. But in no case is the bachelor a full member of the university. The degree of bachelor (of arts, &c.) is borne by women also. (4) The younger or inferior members of a trade gild or city company, otherwise known as ”

yeomen ” (now obsolete). (5) Unmarried men, since these presumably have their fortunes yet to make and are not full citizens. The word bachelor, now confined to men in this connotation, was formerly sometimes used of women also.

Bachelors, in the sense of unmarried men, have in many countries been subjected to penal laws. At Sparta, citizens who remained unmarried after a certain age suffered various penalties. They were not allowed to witness the gymnastic exercises of the maidens; and during winter they were compelled to march naked round the market-place, singing a song composed against them- selves and expressing the justice of their punishment. The usual respect of the young to the old was not paid to bachelors (Plut. Lye. 15). At Athens there was no definite legislation on this matter; but certain minor laws are evidently dictated by a spirit akin to the Spartan doctrine (see Schomann, Gr. Alterth. i. 548). At Rome, though there appear traces of some earlier legislation in the matter, the first clearly known law is that called the Lex Julia, passed about 18 B.C. It does not appear to have ever come into full operation; and in a.d. 9 it was incorporated with the Lex Papia et Poppaea, the two laws being frequently cited as one, Lex Julia et Papia Poppaea. This law, while re- stricting marriages between the several classes of the people, laid heavy penalties on unmarried persons, gave certain privileges to those citizens who had several children, and finally imposed lighter penalties on married persons who were childless. Isolated instances of such penalties occur during the middle ages, e.g. by a charter of liberties granted by Matilda I., countess of Nevers, to Auxerre in 1223, an annual tax of five solidi is imposed on any man qui non habet uxorem et est bache- larius. In Britain there has been no direct legislation bearing on bachelors; but, occasionally, taxes have been made to bear more heavily on them than on others. Instances of this are the act (6 and 7 Will. III.) passed in 1695; the tax on servants, 1785; and the income tax, 1798.

BACHIAN (Dutch Batjan), one of the Molucca Islands, in the residency of Ternate, Dutch East Indies, in the Molucca Sea, in o °i3’-o°55′ S. and i27°22’i28°E. With its subordinate islands, Mandioli, Tawali and others, it lies west of the southern penin sula of the island of Halmahera or Jilolo, and has an area of 914 sq. m. It is of irregular form, consisting of two distinct moun- tainous parts, united by a low isthmus, which a slight subsidence would submerge. The island is in part of volcanic formation, and the existence of hot springs points to volcanic activity. There are,

however, especially in the southern portion, ancient and non-volcanic rocks. The highest elevation occurs at the south of the island, the mountain of Labua reaching 6950 ft. Coal and other minerals have been discovered. A large portion of the island is richly wooded, and sago, cocoa-nuts and cloves (which are indigenous) are abundantly produced. Bachian is remarkable as the most eastern point on the globe inhabited by any of the Quadrumana, a black ape occurring here as in Celebes. The island is very rich in birds and insects. The interior of the island is uninhabited and none of the dwellers on the coast are indigenous. They consist of the Sirani or Christian descendants of the Portuguese, of Malays, with a Papuan element, Galela men from the north of Halmahera, immigrants from Celebes, with some Chinese and Arabs. The total number of inhabitants is about 13,000. The chief village, called Amasing by the in-habitants, but also called Bachian, is situated on the west side of the isthmus. Bachian is the most important island of a group formerly governed by a sultan, but since 1889 by a committee of chiefs under the control of a Dutch controleur. From 1882 onwards a Batjan company attempted to exploit the island, but

unsuccessfully, owing to a deficient knowledge of the soil and its capabilities and a lack of labourers.

BACK-BOND, or Back-Letter, in Scots law, a deed qualify- ing the terms of another deed, or declaratory of the purposes for which another deed has been granted. Thus an ex facie absolute disposition, qualified by a back-bond expressing the limited nature of the right actually held by the person to whom the disposition is made, would constitute what in England is termed a deed of trust.

BACK-CHOIR, Retro-Choir, a space behind the high altar in the choir of a church, in which there is, or was, a small altar standing back to back with the other.

BACKERGUNJE, or Bakargant, a district of British India in the Dacca division of Eastern Bengal and Assam. It forms part of the joint delta of the Ganges and the Brahmaputra, and its area is 4542 sq. m. The general aspect of the district is that of a flat even country, dotted with clusters of bamboos and betel- nut trees,

and intersected by a perfect network of dark-coloured and sluggish streams. There is not a hill or hillock in the whole district, but it derives a certain picturesque beauty from its wide expanses of cultivation, and the greenness and freshness of the vegetation. This is especially conspicuous in the rains, but at no time of the year does the district present a dried or burnt-up appearance. The villages, which are always walled round by groves of bamboos and betel-nut palms, have often a very striking appearance; and Backergunje has many beauties of detail which strike a traveller in passing through the country. The level of the country is low, forming as it does a part of the great Gangetic delta; and the rivers, streams and water-courses are so numerous that it is very difficult to travel except by boat at any season of the year. Every natural hollow is full of water, around the margin of which long grasses, reeds and other aquatic plants grow in the greatest profusion, often making it difficult to say where the land ends and the water begins. Towards the north-west the country is very marshy and nothing is to be seen for miles but tracts of unreclaimed swamps and rice lands, with a few huts scattered here and there and raised on mounds of earth. In the south of the district, along the coast of the Bay of Bengal, lie the forest tracts of the Sundarbans, the habitation of tigers, leopards and other wild beasts.

The principal rivers of the district are the Meghna, the Arial Khan and the Haringhata or Baleswar, with their numerous off- shoots. The Meghna represents the accumulated waters of the Brahmaputra and Ganges. It flows along the eastern boundary of the district in a southerly direction for about 100 m. till it debouches into the Bay of Bengal. During the latter part of its course this noble river expands into a large estuary containing many islands, the principal of which is that of Dakshin Shahbaz-pur. The islands on the sea-front are exposed to devastation by cyclonic storm-waves. The Arial Khan, a branch of the Ganges, enters the district from the north, and flows generally in a south-easterly direction till it falls into the estuary of the Meghna. The main channel of the Arial Khan is about 1700 yds. in width in the dry season, and from 2000 to 3000 yds. in the rains. It receives a number' of tributaries, sends off several offshoots, and is navigable throughout the year by native cargo boats of the largest size. The Haringhata, Baleswar, Madhumati and Garai are various local names for the same river in different parts of its course and represent another great offshoot of the Ganges. It enters Backergunje near the north-west corner of the district,

whence it forms its western boundary, and runs south, but with great windings in its upper reaches, till it crosses the Sundarbans, and finally falls into the Bay of Bengal by a large and deep estuary, capable of receiving ships of considerable burden. In the whole of its course through the district the river is navigable by native boats of large tonnage, and by large sea-going ships as high up as Morrellganq, in the neighbouring district of Jessore. Among its many tributaries in Backergunje the most important is the Kacha, itself a considerable stream and navigable by large boats all the year round, which flows in a southerly direction for 20 m., when it falls into the Baleswar. Other rivers of minor importance are the Barisal, Bishkhali, Nihalganj, Khairabad,

Ghagar, Kumar, &c. All the rivers in the district are subject to tidal action from the Meghna on the north, and from the Bay of Bengal on the south, and nearly all of them are navigable at high tide by country boats of all sizes. The rise of the tide is very considerable in the estuary of the Meghna, and many of the creeks and water-courses in the island of Dakshin Shahbazpur, which are almost dry at ebb tide, contain 18 or 19 ft. of water at the flood. A very strong ” bore ” or tidal wave runs up the estuary of the Meghna at spring tides, and a singular sound like thunder, known as the ” Barisal guns,” is often heard far out at sea about the time it is coming in. There are numerous marshes in the district, of great size and depth, and abounding in fish.

The Mussulmans of Backergunje are among the worst of their creed, steeped in ignorance and prejudice, easily excited to violence and murder, very litigious and grossly immoral. On account of an epidemic of murders disarmament had to be enforced in the district. The Faraizis or Puritan sect of Mahommedans are exceedingly numerous in the district. The Buddhist popula- tion consists of Maghs or the people of Arakan, who first settled in Backergunje about 1800, and have made themselves very useful in the clearing of the Sundarbans. A gipsy-like tribe called the Bebajias are rather numerous in this district. They live principally in boats, travelling from place to place, profess Mahommedanism, and gain their subsistence by wood-cutting in the Sundarbans, fishing, fortune -telling and trading in trinkets. In 1 90 1 the population was 2,291,752, showing an increase of 6 % in the decade.

A number of small trading villages exist throughout the district, and each locality has its periodical fairs for purposes of traffic.

The material condition of the people is good. Every inhabitant is a small landholder and cultivates sufficient rice and other necessaries for the support of his family. Owing to this reason, hired labour is very scarce. Rice is the great crop of the district, and three harvests are obtained annually — the aman, or winter rice; aus, or autumn crop; and boro, or spring rice. The climate of Backergunje is one of the healthiest in Eastern Bengal, owing to the strong south-west monsoon, which comes up directly from the Bay of Bengal, and keeps the atmosphere cool; but the heavy rainfall and consequent humidity of the atmosphere, combined with the use of bad water, are fruitful sources of disease. The average annual temperature varies from 78 to 85 F. The thermometer ranges from 62 to 98°.

Barisal, the headquarters station, situated on the west bank of the Barisal river, had a population in 1901 of 18,978. The next largest town is Pirojpur (14,119).

BACKGAMMON, a game played with draughtsmen and a special board, depending on the throw of dice. It is said to have been invented about the 10th century (Strutt) . A similar game {Ludus duodecim scriptorum, the ” twelve-line game “) was known to the Romans, and Plato {Republic, bk. x.) alludes to a game in which dice were thrown and men were placed after due consideration. The etymology of the word ” backgammon ” is disputed; it is probably Saxon — bate, back, gamen, game; i.e. a game in which • the players are liable to be sent back. Other derivations are, Dan. bakke, tray, gammen, game (Wedgwood) ; and Welsh bach, little, cammaun, battle (Henry). Chaucer alludes to a game of ” tables,” played with three dice, in which ” men ” were moved from the opponent’s ” tables,” the game {ludus Anglicorum) being described in the Harleian MSS. (1527). The French name for backgammon is trictrac, imitative of the rattle of the dice.

Backgammon is played by two persons. The ” board ” (see diagram) is divided into four ” tables,” each table being marked with six ” points ” coloured differently. The inner and outer tables are separated from each other by a projecting bar. The board (in the ordinary form of the game) is furnished with fifteen white and fifteen black men, ” set ” or arranged as in the diagram. It is usual to make the inner table the one nearest to the light. Two dice-boxes are required, one for each player, and a pair of dice, which are used by both players. The dice are marked with numbers on their six sides, from one to six, number one

being called, ” ace “; two, ” deuce “; three, ” trey.” Formerly the

Black

Black’s Home or Inner Table.

Black’s Outer Tabic.

four was called ” quatre ” (pronounced “cater”); the five, ” cinque ” .{pronounced either ” sank ” or ” sink “); and the six, ” six ” (size).

For the right to start each player throws one or two dice; the one who throws the higher number has the right of playing first,; and he may either adopt the numbers thrown or he may throw again, using both dice.

The men are moved on from point to point, according to the throws of the dice made by the players alternately. White moves from black’s inner table to black’s outer, and from this to white’s outer table, and so on to white’s inner table; and all black’s moves must be in the contrary direction. A player may move any of his men a number of points corresponding to the numbers thrown by him, provided the point to which the move

would bring him is not blocked by two or more of his adversary’s men being on it. The whole throw may be taken with one man, or two men maybe moved, one the exact number of points on one die, the other the number on the other die. If doub- lets are thrown (e.g. two sixes) , four moves of that number (e.g. four movesofsixpoints) may be made,

White’s Home or Inner Table. White’s Outer Table. either all by One

White man or separately

Backgammon Board. by more. Thus,

1. Black’s ace-point. 3. Black’s bar-point, suppose white

2. White’s ace-point. 4. White’s bar-point, throws five six he may move one of his men from the left-hand corner of the black’s inner table to the left-hand corner of black’s outer table for six; he may, again, move the same man five points farther on, when his move is completed; or he may move any other man five points. But white cannot move a man for five from the black’s ace-point, because the six-point in that table is blocked. Any part of the throw which cannot be moved is of no effect, but it is compulsory for a player to move the whole throw unless blocked. Thus if the men were differently placed, and white could move a six, and having done so could not move a five, his move is com- pleted. If, however, by moving the five first, he can afterwards

move a six, he must make the move in that manner.

When a player so moves as to place two men on the same point, he is said to ” make a point.”

When there is only a single man on a point, it is called a ” blot.” When a blot is left, the man there may be taken up (technically the blot may be ” hit “) by the adversary if he throws a number which will enable him to place a man on that point. The man hit is placed on the bar, and has to begin again by entering the adversary’s home table again at the next throw should it result in a number that corresponds to an unblocked point. The points in the home tables count for this purpose as 1, 2, 3, 4, 5, 6, beginning from the ace-point. A player is not allowed to move any other man while he has one to enter. It is, therefore, an advantage to have made all the points in your own board, so that your adversary, if you take a man up, cannot enter; and you can then continue throwing until a point is opened.

The game proceeds until one of the players gets all his men into his inner table or home. Then he begins to take his men off the board, or to bear them, i.e. to remove a man from any point that corresponds in number with his throw. If such a point is un-occupied, a move must be made, if there is room for it, and a move may be taken, instead of bearing a man, at any time; but

when six is empty, if six is thrown a man may be borne from five and so on. If, after a player has commenced throwing off his men , he should be hit on a blot, he must enter on his adversary’s inner table and must bring the man taken up into his own inner table before he can bear further.

Whoever first takes off all his men wins the game :■ — a single game (a ” hit “) if his adversary has begun bearing; a double game (a ” gammon “) if the adversary has not borne a man; and a triple game (a ” backgammon “) if, at the time the winner bears his last man, his adversary, not having borne a man, has one in the winner’s inner table, or has a man up. When a series of games is played, the winner of a hit has the first throw in the succeeding game; but if a gammon is won, the players each throw a single die to determine the first move of the next game.

In order to play backgammon well, it is necessary to know all the chances on two dice and to apply them in various ways. The number of different throws that can be made is thirty-six. By

taking all the combinations of these throws which include given numbers, it is easily discovered where blots may be left with the least probability of being hit. For example, to find the chance of being hit where a blot can only be taken up by an ace, the adversary may throw two aces, or ace in combination with any other number up to six, and he may throw each of these in two different ways, so that there are in all eleven ways in which an ace may be thrown. This, deducted from thirty-six (the total number of throws), leaves twenty-five; so that it is 25 to 11 against being hit on an ace. It is very important to bear in mind the chance of being hit on any number. The following table gives the odds against being hit on any number within the reach of one or two dice: —

It is 25 to 11, or about 9 to 4, against being hit on 1 „ 24 ,, 12, or 2 ,, 1, „ 2

3 4 5 6

7 8

9

10

» 11

,. 12

The table shows that if a blot must be left within the reach of one die, the nearer it is left to the adversary's man the less probability there is of its being hit. Also, that it is long odds against being hit on a blot which is only to be reached with double dice, and that, in that case (on any number from 7 to 11), the farther off the blot is, the less chance there is of its being hit.

The table assumes that the beard is open for every possible throw. If part of the throw is blocked by an intervening point being held by adverse men, the chance of being hit is less.

Two principles, then, have to be considered in moving the men: — (1) To make points where there is the best chance of obstructing the opponent. (2) When obliged to leave blots, to choose the posi- tion in which they are least likely to be hit.

The best points to secure. are the five-point in your own inner

table and the five-point in your adversary's inner table. The next best is your own bar-point ; and the next best the four in your own inner table.

The best move for some throws at the commencement of a game is as follows: — Aces (the best of all throws), move two on your bar- point and two on your five-point. This throw is often given to inferior players by way of odds.

Ace, trey: make the five-point in your inner table.

Ace, six: make your bar-point.

Deuces : move two on the four-point in your inner table, and two on the trey-point in your opponent's inner table.

Deuce, four: make the four-point in your own table.

Threes: play two on the five-point in your inner table, and two on the four-point of your adversary's inner table, or make your bar-point.

Trey, five : make the trey-point in your own table.

Trey, six : bring a man from your adversary's ace-point as far as he will go.

Fours: move on two on the five-point in your adversary's inner table, and two from the five in his outer table.

Four, five and four, six: carry a man from your adversary's ace-point as far as he will go.

Fives: move two men from the five in your adversary's outer table to the trey-point in your inner table.

Five, six: move a man from your adversary's ace-point as far as he will go.

Sixes (the second-best throw): move two on your adversary's bar-point and two on your own bar-point.

In carrying the men home carry the most distant man to your adversary's bar-point, to the six-point in your outer table, and then to the six-point in your inner table. By following this rule as nearly

22 ,

14.

or

a bo

ut 3

.1 2,

21 ,

15.

or

7

-. 5,

21 ,

IS.

,,

7

.. 5,

19 ,

17.

n

9i

.. 8j,

30 ,

6,

,,

S

„ 1,

30 .

, 6,

j»

5

,, 1,

31 –

S,

or

about 6

„ 1-

33 .

. 3.

or

11

» i»

34 .

■ 2,

„

17

,, 1.

33 .

, 3,

as the throws admit, you will carry the men to your inner table in the fewest number of throws.

Avoid carrying many men upon the trey or deuce-point in your own tables, as these men are out of play.

Whenever you have taken up two 6f your adversary's men, and two or. more points made in your inner table, spread your other men in the hope of making another point in your tables, and of hitting the man your adversary enters.

Always take up a man if the blot you leave in making the move can only be hit with double dice, but if you already have two of your opponent's men in your tables it is unwise to take up a third.

In entering a man which it is to your adversary's advantage to hit, leave the blot upon the lowest point you can, e.g. ace-point in preference to deuce-point.

When your adversary is bearing his men, and you have two men in his table, say, on his ace-point, and several men in the outer table, it is to your advantage to leave one man on the ace-point, because it prevents his bearing his men to the greatest advantage, and gives you the chance of his leaving a blot. But if you find that you can probably save the gammon by bringing both your men out of his table, do not wait for a blot. Eight points is the average throw.

The laws of backgammon (as given by Hoyle) are as follows : —
■

1. When a man is touched by the caster it must be played if possible; if impossible no penalty. 2. A man is not played till it is placed upon a point and quitted. 3. If a player omits a man from the board there is no penalty. 4. If he bears any number of men

before he has entered a man taken up, men so borne must be entered again. 5. If he has mistaken his throw and played it, and his adversary has thrown, it is not in the choice of either of the

C layers to alter it, unless they both agree to do so. 6. If one or oth dice are " cocked," i.e. do not lie fairly and squarely on the table, a fresh throw is imperative.

Russian Backgammon varies from the above game in that the men, instead of being set as in the diagram, are entered in the same table by throws of the dice, and both players move in the same direction round to the opposite table. There are various rules for this game. By some a player is not obliged to enter all his men before he moves any; he can take up blots at any time on entering, but while he has a man up, he must enter it before entering any more or moving any of those already entered. If he cannot enter the man that is up, he loses the benefit of the throw.

A player who throws doublets must play or enter not only the number thrown, but also doublets of the number corresponding to the opposite side of the dice; thus, if he throws sixes, he must first enter or move the sixes, as the case may be, and then aces, and he also has another throw. Some rules allow him to play either doublets first, but he must always complete one set before playing the other. If a player cannot play the whole of his throw, his adversary is sometimes allowed to play the unplayed portion, in which cases the caster is sometimes allowed to come in and complete his moves, if he can, and in the event of his having thrown deuce-ace or doublets to throw again. If he throws doublets a second time, he moves and throws again, and so on. The privilege is sometimes restricted by not allowing this advantage to the first doublets thrown by each player. It is sometimes extended by allowing the thrower of the deuce-ace to choose any doublets he likes on the opposite side of the dice, and to throw again. The restriction with regard to the first doublets thrown does not apply to deuce-ace, nor does throwing it remove the restriction with regard to first doublets. A player must first be able to complete the doublets thrown. If the player cannot move the whole throw he cannot take the corre- sponding doublets, and he is not allowed another throw if he cannot move all the points to which he is entitled.

BACKHUYSEN, or Bakhuisen, LUDOLF (1631-1708), Dutch painter, was born at Emden, in Hanover. He was brought up as a merchant at Amsterdam, but early discovered so strong a genius

for painting that he relinquished business and devoted himself to art. He studied first under Allart van Everdingen and then under Hendrik Dubbels, two eminent masters of the time, and soon became celebrated for his sea-pieces. He was an ardent student of nature, and frequently exposed himself on the sea in an open boat in order to study the effects of tempests. His compositions, which are very numerous, are nearly all variations of one subject, and in a style peculiarly his own, marked by intense realism or faithful imitation of nature. In his later years Backhuysen employed his time in etching and calligraphy. He died in Amsterdam on the 17 th of November 1708.

BACKNANG, a town of Germany, in the kingdom of Wflrttem-berg, 19 m. by rail N.E. from Stuttgart. Pop. (1900) 7650. It has an interesting church, dating from the 12th century, and notable tanneries and leather factories, woollen and cloth mills. In 1325 Backnang was ceded to Wurttemberg by Baden. In the vicinity is the Wilhelmsheim sanatorium for consumptives.

BACKSCRATCHER, a long slender rod of wood, whalebone, tortoiseshell, horn or cane, with a carved human hand, usually of ivory, mounted at the extremity. Its name suggests the primary use of the implement, but little is known of its history, and it was unquestionably also employed as a kind of rake to keep in order the huge ” heads ” of powdered hair worn by ladies during a considerable portion of the 18th and the early part of the 19th centuries. The backscratcher varies in length from 1 2 to 20 in., and the more elaborate examples,which were occasionally hung from the waist, are silver-mounted, and in rare instances the ivory fingers bear carved rings. The hand is sometimes outstretched, and sometimes the fingers are flexed; the modelling is frequently good, the fingers delicately formed and the nails well defined. As a rule the rod is finished off with a knob. The hand was now and again replaced by a rake or a bird’s claw. The hand was indifferently dexter or sinister, but the Chinese variety usually bears a right hand. Like most of the obsolete appliances of daily life, the backscratcher, or scratch-back, as it is sometimes called, has become scarce, and it is one of the innumerable objects which attract the attention of the modern collector.

BACK’S RIVER {Thlewechodyeth, or “Great Fish”), a river in Mackenzie and Keewatin districts, Canada, rising in Sussex lake, a small body of water in 108° 20′ W. and 64° 25′ N., and flowing with a very tortuous course N.E. to an inlet of the Arctic Ocean,

passing through several large lake-expansions- — Pelly, Garry, MacDougall and Franklin. Like the Coppermine, the only other large river of this part of Canada, it is rendered unnavigable by a succession of rapids and rocks. It was discovered and explored by Sir George Back in 1834. Its total length is 560 m.

BACKWARDATION, or, as it is more often called for brevity, Back, a technical term employed on the London Stock Exchange to express the amount charged for the loan of stock from one account to the other, and paid to the purchaser by the seller on a bear account (see Account) in order to allow the seller to defer the delivery of the stock. The seller, having sold for delivery on a certain date, stocks or shares which probably he does not possess, in the hope that he may be able, before the day fixed for delivery, to buy them at a cheaper price and so earn a profit, finds on settling-day that the prices have not gone down accord- ing to his expectation, and therefore pays the purchaser an agreed amount of interest {backwardation) for the privilege of deferring the delivery, either in order to procure the stock, or else in the hope that there will be a shrinkage in the price which will enable him to gain a profit. (See also Stock Exchange).

BACON, FRANCIS (Baron Verulam, Viscount St Albans) (1561-1626), English philosopher, statesman and essayist, was born at York House in the Strand, London, on the 2 2nd of January 1560/1. He was the youngest son of Sir Nicholas Bacon (q.v.). His mother, the second wife of Sir Nicholas, was a daughter of Sir Anthony Cooke, formerly tutor to Edward VI. She was a woman of considerable culture, well skilled in the classical studies of the period, and a warm adherent of the Reformed or Puritan Church. Very little is known of Bacon's early life and education. His health being then, as always, extremely delicate, he probably received much of his instruction at home. In April 1573 he was entered at Trinity College, Cambridge, where for three years he resided with his brother Anthony. At Cam- bridge he applied himself diligently to the several sciences as then taught, and came to the conclusion that the methods em- ployed and the results attained were alike erroneous. Although he preserved a reverence for Aristotle (of whom, however, he seems to have known but little), he learned to despise the current Aristotelian philosophy. It yielded no fruit, was serviceable only for disputation, and the end it proposed to itself was a mistaken one. Philosophy must be taught its true purpose, and for this purpose a new method must be devised. With the

first germs of this great conception in his mind, Bacon left the university.

On the 27th of June 1576 he and his brother Anthony were entered de societate magistrorum at Gray's Inn, and a few months later he was sent abroad with Sir Amyas Paulet, the English ambassador at Paris. The disturbed state of government and society in France at that time afforded him valuable political instruction. It was formerly supposed that certain Notes on the State of Christendom, usually printed in his works, contain the results of his observations, but Spedding has shown that there is no reason for ascribing these Notes to him, and that they may be attributed with more probability to one of his brother Anthony's correspondents.

The sudden death of his father in February 1378/9 necessitated Bacon's return to England, and exercised a very serious influence on his fortunes. A considerable sum of money had been laid up by Sir Nicholas for the purchase of an estate for his youngest son, the only one otherwise . unprovided for. Owing to his sudden death, this intention was not carried out, and a fifth only of the money descended to Francis. This was one of the gravest misfortunes of his life; he started with insufficient means, acquired a habit of borrowing and was never afterwards out of debt. As it had become necessary that he should adopt some profession, he selected that of law, and took up his residence at Gray's Inn in

IS7Q.

In the fragment De Interpretations Naturae Prooemium (written probably about 1603) Bacon analyses his own mental character and lays before us the objects he had in view when he entered on public life. If his opening sentence, " Ego cum me ad utilitates humanas natum existimarem "(" since I thought my- self born to be of advantage to mankind "), seems at first sight a little arrogant, it must be remembered that it is the arrogance of Aristotle's neya'Koˆvxos, 1 who thinks himself worthy of great things, and is worthy. The ideal of production of good to the human race through the discovery of truth, was combined in him with the practical desire to be of service to his country. He purposed, therefore, to obtain, if possible, some honourable post

in the state which would give him the means of realizing these projects, and would enable him to do somewhat for the church, the third of the objects whose good he had at heart. The constant striving after these three ends is the key to Bacon's life. His qualifications for accomplishing the task were not small. His intellect was far-seeing and acute, quick and yet cautious, meditative, methodical and free from prejudice. If we add to this account that he seems to have been of an unusually amiable disposition we have a fairly complete picture of his mental character at this critical period of his life.

In 1 580 he appears to have taken the first step in his career by applying, through his uncle, Burghley, the lord treasurer, for some post at court. His suit, though well received by the queen, was unsuccessful; the particulars are totally unknown. For two years after this disappointment he worked quietly at Gray's Inn, and in 1582 was admitted an outer barrister. In 1584 he took his seat in parliament for Melcombe in Dorsetshire, but the notes for the session do not disclose what reputation he gained. About the. same time he made another application to Burghley, apparently with a view to expediting his progress at the bar. His uncle, who appears to have " taken his zeal for ambition," wrote him a severe letter, taking him to task for arrogance and pride, qualities which Bacon vehemently disclaimed. As his advancement at the bar was unusually rapid, his uncle's influence may have been exerted in his behalf. In 1589 he received the first substantial piece of patronage from his powerful kinsman, the reversion of the clerkship of the Star Chamber. The office was worth about £1600 a year; but it did not become vacant for nearly twenty years. A considerable period of his life thus slipped away, and his affairs had not prospered. He had written on the condition of parties in the church; he had set down his thoughts on philosophical reform in the lost tract, Temporis Partus Maximus; but he had failed in obtaining the position which he looked upon as an indispensable condition 1 See Nic. Eth. iv. 3. 3. 1123b.

of success. A long and eloquent letter to Burghley 2 throws additional light upon his character, and gives a hint as to the cause of his uncle's slackness in promoting him.

Some time before this, perhaps as early as 1588, Bacon appears to have become acquainted with the earl of Essex, Elizabeth's favourite. At the close of 1591 he was acting as the earl's confidential adviser, and exerted himself, together with his

brother Anthony, diligently in the earl's service. In February 1593 parliament was called, and Bacon took his seat for Middlesex. The special occasion for which the House had been summoned was the discovery of one of the numerous popish plots that distracted Elizabeth's reign.

As Bacon's conduct in this emergency seriously affected his fortunes and has been much misunderstood, it is necessary to state, as briefly as possible, the whole facts of the case. The House having been duly informed of the state necessities, assented to a double subsidy and appointed a committee to draw up the requisite articles. Before this was completed, a message arrived from the House of Lords requesting a conference, which was granted. The committee of the Commons were then informed that the crisis demanded a triple subsidy to be collected in a shorter time than usual, that the Lords could not assent to less than this, and that they desired to confer on the matter. This proposal of the Lords to discuss supply infringed upon the privileges of the Commons; accordingly, when the report of committee was read to the Lower House, Bacon spoke against the proposed conference, pointing out at the same time that a communication from the Lords might be received, but that the actual deliberation on it must be taken by themselves alone. His motion, after some delay, was carried and the conference was rejected. The Lords upon this lowered their demands, and desired merely to make a communication, which, being legitimate, was at once assented to. The House had then before them the proposal for a triple subsidy, to be collected in three, or, as the motion ultimately was shaped, in four years, instead of in 'six, as the ordinary custom would have been. Bacon, who approved of the increased subsidy, was opposed to the short period in which it was proposed to raise it. He suggested that it would be difficult or impossible for the people to meet such heavy demands, that discontent and trouble would arise, and that the better method of procedure was to raise money by levy or imposition. His motion appears to have received no support, and the four years' subsidy was passed unanimously. Bacon, as it turned out, had been mistaken in thinking that the country would be unable to meet the increased taxation, and his conduct, though prompted by a pure desire to be of service to the queen, gave deep and well-nigh ineradicable offence. He was accused

2 " I wax now somewhat ancient; one-and-thirty years is a great deal of sand in the hour-glass. ... I ever bare a mind (in some middle place that I could discharge) to serve her majesty; not as

a man born- under Sol, that loveth honour; nor under Jupiter, that loveth business (for the contemplative planet carrieth me away wholly) ; but as a man born under an excellent sovereign, that de- serveth the dedication of all men's abilities. . . .Again, the meanness of my estate doth somewhat move me ; for though I cannot accuse myself that I am either prodigal or slothful, yet my health is not to spend, nor my course to get. Lastly, I confess that I have as vast contemplative ends as I have moderate civil ends; for I have taken all knowledge to be my province ; and if I could purge it of two sorts of rovers, whereof the one with frivolous disputations, confutations and verbosities, the other with blind experiments and auricular traditions and impostures, hath committed so many spoils, I hope I should bring in industrious observations, grounded conclusions and profitable inventions and discoveries — the best state of that province. This, whether it be curiosity, or vain-glory, or nature, or (if one take it favourably) philanthropia, is so fixed in my mind as it cannot be removed. And I do easily see, that place of any reasonable command- ment doth bring commandment of more wits than of a man's own. . . .And if your lordship shall find now, or at any time, that I do seek or affect any place whereunto any that is nearer to your lord- ship shall be convenient, say then that I am a most dishonest man. And if your lordship will not carry me on,. . .this I will do, I will sell the inheritance that I have, and purchase some lease of quick revenue, or some office of gain that shall be executed by deputy, and so give over all care of service, and become some sorry bookmaker, or a true pioneer in that mine of truth." — Spedding, Letters and Life, i. 108-109.

of seeldng popularity, and was for a time excluded from the court. His letter to Burghley, 1 who had told him of the queen's displeasure with his speech, offers no apology for what he had said, but expresses regret that his motives should have been misunderstood. He soon felt that the queen's anger was not to be appeased by such a justification. The attorney-generalship had fallen vacant and Bacon became a candidate for the office, his most formidable rival being his life-long antagonist, Edward Coke, who was then solicitor. Essex warmly espoused Bacon's cause and earnestly pressed his claims upon the queen; but his impetuous, pettish pleading tended to retard the cause. Burghley, on the other hand, in no way promoted his nephew's interest; he

would recommend him for the solicitorship, but not for the attorney-generalship; and it is not improbable that Sir Robert Cecil secretly used his influence against his cousin. The queen delayed the appointment, and Bacon's fortunes, as they then stood, could ill brook delay. He was harassed with debt and at times so disheartened that he contemplated retire- ment from public life. In March 1 594 it was at last understood that Coke was to be attorney-general. Essex, though bitterly mortified, at once threw all his energies into the endeavour to procure for Bacon the solicitorship; but in this case also, his method of dealing, which was wholly opposed to Bacon's advice, 2 seemed to irritate the queen. The old offence was not yet for-' given, and after a tedious delay, the office was given, in October 1595, to Serjeant Thomas Fleming. Burghley and Sir John Puckering seem to have assisted Bacon honestly, if not over- warmly, in this second application; but the conduct of Cecil had roused suspicions which were not perhaps without foundation. Essex, to compensate in some degree for Bacon's disappointment, insisted on presenting him with a piece of land, worth about £1800, and situated probably near Twickenham Park. Nor did his kindness cease there; before sailing on the expedition to Cadiz, in the beginning of 1596, he addressed letters to Buck- hurst, Fortescue and Egerton, earnestly requesting them to use their influence towards procuring for Bacon the vacant office of master of the rolls. Before anything came of this application, the Cadiz expedition had resulted in a brilliant success, and Essex became the idol of the army and the people. Bacon saw clearly that such a reputation would assuredly alienate the affections of the queen, who loved not to have a subject too powerful or too popular. He therefore addressed an eloquent and imploring letter to the earl, pointing out the dangers of his position and urging upon him what he judged to be the only safe course of action, to seek and secure the favour of the queen alone; above all things dissuading him from the appearance of military popularity. His advice, however, was unpalatable and proved ineffectual. The earl still continued his usual course of dealing with the queen, depending solely upon her supposed affection for him, and insanely jealous of any other whom she might seem to favour. His unskilful and unlucky management of the sea expedition to Ferrol and the Azores in no way lowered his popularity with the people, but undoubtedly weakened his influence with the queen.

Bacon's affairs in the meantime had not been prospering. He had increased his reputation by the publication in 1597 of his Essays,

along with which were the Colours of Good and Evil and the Meditationes Sacrae; but his private fortunes were in a bad condition. No public office apparently could be found for him; a scheme for retrieving his position by a marriage with the wealthy widow, Lady Elizabeth Hatton, failed, and in 1598 he was arrested for debt. He seems, however, to have been growing in favour with the queen. Some years previously (perhaps about 1594), he had begun to be employed by her in crown affairs, and he gradually acquired the standing of one of the learned counsel, though he had no commission or warrant, and received no salary. At the same time he was no longer on the former friendly terms with Essex, a certain estrangement

1 Spedding, Lettersand Life, i. 234-235, cf. i. 362. This letter, with those to Puckering or Essex and the queen.i. 2ˆ0-241, should be com- pared with what is said of them by Macaulay in his Essay on Bacon, and by Campbell, Lives, ii. 287.

2 See Letters and Life, i. 289, ii. 34.

having sprung up between them, caused no doubt by the earl's dislike of his friend's advice. The earl's affairs were then at a somewhat critical stage, and as our judgment upon a most important episode in Bacon's life depends upon our knowledge of the events of the ensuing year, it will be requisite to enter somewhat minutely into proceedings with which Bacon himself had nothing to do.

Ireland was then in a rebellious and discontented condition, and it was difficult for the English government to decide either on a definite course of policy with regard to it, or on a leader by whom that policy might be carried out. A violent quarrel took place between the queen and Essex, who for some months retired from court and refused to be reconciled. At last he came forth from his seclusion, and it was soon understood that he was in person to undertake the subjugation of the rebels in Ireland, with a larger force than had ever before been sent into that country. Into the obscure details of this unhappy campaign it is unnecessary to enter; one fact stands out clearly, that Essex endeavoured to carry out a treasonable design. His jealousy and ill-temper had been so roused that the only course open to him seemed to be the obtaining a powerful military force, the possession of which would compel the queen to reinstate him in her favour. Whether or not this plan was in contemplation before he undertook the Irish expedition is not evident, though even

outsiders at that time entertained some suspicions, but there can be no doubt of the treasonable character of the negotiations carried on in Ireland. His plans, probably not very definite, were disturbed by an imperative message from the queen, ordering him not to return to England without her permission. He at once set off, and, trusting apparently to her affection for him, presented himself suddenly before her. He was, for the moment, received kindly, but was soon afterwards ordered to keep his chamber, and was then given into the custody of the lord keeper at York House, where he remained till March 1600. His great popularity, and the general ignorance of the reasons for his imprisonment, stirred up a strong feeling against the queen, who was reported to be influenced by Bacon, and such indignation was raised against the latter that his friends feared his life would be in danger. It was at last felt necessary that the queen should in some way vindicate her proceedings, and this she at first did, contrary to Bacon's advice, by a declaration from the Star Chamber. This, however, gave little or no satisfaction, and it was found expedient to do what Bacon had always recommended, to have a fair trial, yet not one in which the sentence must needs be damaging to the earl. The trial accordingly took place before a body of her majesty's councillors, and Bacon had a subordinate and unimportant part in the accusation. Essex does not seem to have been at all hurt by his action in this matter, and shortly after his release they were again on friendly terms, Bacon drawing up letters as if to or from the earl with the design of having them brought before the queen. But Bacon did not know the true character of the transactions in which Essex had been engaged. The latter had been released from all custody in August, but in the meantime he had been busily engaged in treasonable correspondence with James of Scotland, and was counting on the Irish army under his ally, Charles Blount, Baron Mountjoy (afterwards earl of Devonshire), the new deputy. But Mountjoy had apparently come to see how useless the attempt would be to force upon the queen a settlement of the succession and declined to go farther in the matter. Essex was thus thrown upon his own resources, and his anger against the queen being roused afresh by the refusal to renew his monopoly of sweet wines, he formed the desperate project of seizing her person and compelling her to dismiss from her council his enemies Raleigh, Cobham, and Cecil. As some pretext, he intended to affirm that his life was in danger from these men, who were in league with the Spaniards. The plot was forced on prematurely by the suspicions excited at court, and the rash attempt to rouse the city of London (8th of February

1601), proved a complete fiasco. The leaders were arrested that night and thrown into prison. Although the actual rising might have appeared a mere outburst ot frantic passion, the private examinations of the most prominent

conspirators disclosed to the government a plot so widely spread, and involving so many of the highest in the land, that it would have been perilous to have pressed home accusations against all who might be implicated. Essex was tried along with the young earl of Southampton, and Bacon, as one of her majesty's counsel, was present on the occasion. Coke, who was principal spokesman, managed the case with great want of skill, incessantly allowing the thread of the evidence to escape, and giving the prisoners opportunity to indulge in irrelevant justifications and protesta- tions which were not ineffectual in distracting attention from the real question at issue. On the first opportunity Bacon rose and briefly pointed out that the earl's plea of having done nothing save what was absolutely necessary to defend his life from the machinations of his enemies was weak and worthless, inasmuch as these enemies were purely imaginary ; and he compared his case to that of Peisistratus, who had made use of a somewhat similar stratagem to cloak his real designs upon the city of Athens. He was thereupon interrupted by the earl, who proceeded to defend himself, by declaring that in one of the letters drawn up by Bacon, and purporting to be from the earl to Anthony Bacon, the existence of these rumours, and the dangers to be appre- hended from them, had been admitted ; and he continued, " If these reasons were then just and true, not counterfeit, how can it be that now my pretences are false and injurious?" To this Bacon replied, that " the letters, if they were there, would not blush to be seen for anything contained in them, and that he had spent more time in vain in studying how to make the earl a good servant to the queen than he had done in anything' else." It seems to be forgotten in the general accounts of this matter, not only that Bacon's letters bear out what he said, but that the earl's excuses were false. A second time Bacon was compelled to interfere in the course of the trial, and to recall to the minds of those present the real question at issue. He animadverted strongly upon the puerile nature of the defence, and in answer to a remark by Essex, that if he had wished to stir up a rebellion he would have had a larger company with him,

pointed out that his dependence was upon the people of London, and compared his attempt to that of the duke of Guise at Paris. Tq this the earl made little or no reply. Bacon's use of this illustration and of the former one of Peisistratus, has been much commented on, and in general it seems to have been thought that had it not been for his speeches Essex might have escaped, or, at all events, have been afterwards pardoned. But this view of the matter depends on the supposition that Essex was guilty only of a rash outbreak. 1 That this was not the case was well known to the queen and her council. Unfortunately, prudential motives hindered the publication of the whole evidence; the people, consequently, were still ignorant of the magnitude of the crime, and, till recently, biographers of Bacon have been iii a like ignorance. 2 The earl himself, before execution, confessed his guilt and the thorough justice of his sentence, while, with singular lack of magnanimity, he incriminated several against whom accusations had not been brought, among others his sister Lady Rich. After his execution it was thought necessary that some account of the facts should be drawn up and circulated, in order to remove the prejudice against the queen's action in the matter. This was entrusted to Bacon, who drew up a Declaration of the Practices and Treasons attempted and committed by Robert, late Earl of Essex, his first draft being extensively altered and corrected by the queen and council. Nothing is known with certainty of the reception given to this official explanation, but the ill-feeling against Bacon was not wholly removed, and some years later, in 1604, he published, in the form of a letter to Mountjoy, an Apology for his action in the case. This Apology gives a most fair and temperate history of the relations between Bacon and Essex, shows how the prudent counsel of the one had been rejected by the other, and brings out very clearly what we conceive to be the true explanation of the matter. Everything

1 See Macaulay's Essay on Bacon.

' The whole story of Essex is given in Spedding's Letters and Life. It is vigorously told by J. Bruce in the introduction to his Correspondence of James VI. with Sir Robert Cecil (Camden Society, 1861).

that Bacon could do was done by him, until the real nature of Essex's design was made apparent, and then, as he had repeatedly told the earl, his devotion and respect were for the queen and state, not for any subject; friendship could never take rank above loyalty. Those who blame Bacon must acquit Essex of

all wrong-doing.

Bacon's private fortunes, during the period after the death of Essex, were not in a flourishing condition. He had obtained a grant of £1200 from the fines imposed on Catesby, one of the conspirators, but his debts were sufficient to swallow up this and much more. And, though he was trusted by Elizabeth, and on good terms with her, he seems to have seen that he had no chance of advancement. But her death in 1603, followed by the un- disputed succession of James, gave him new hopes. He used every means in his power to bring himself under James's notice, writing to all his friends at the Scottish court and to the king himself. He managed to obtain a personal interview with the king, but does not seem to have been much satisfied with it. In fact, while the king confirmed in their situations those who had held crown offices under Elizabeth, Bacon, not holding his post by warrant, was practically omitted. He was, however, continued, by special order of the king, as learned counsel extraordinary, but little or no law business appears to have been entrusted to him. He procured, through his cousin Cecil, the dignity of knighthood, which, contrary to his inclination, he received along with about 300 others, on the 23rd of July 1603. Between this time and the opening of James's first parliament he was engaged in literary work, and sent to the king two pamphlets — one on the Union, the other on measures for the pacification of the church. Shortly after he published his Apology. In March 1604 parliament met, and during their short session Bacon's hands seem to have been full of work. It was a busy and stirring time, and events occurred during it which carried within them the seeds of much future dissension. Prerogative and privilege came more than once into collision, the abuses of purveyance and wardship were made matters of conference, though the thorough discussion of them was deferred to a suc- ceeding session ; while James's temper was irritated by the objections brought against his favourite scheme of the Union, and by the attitude taken up by the House with regard to religious affairs. The records are barely full enough to enable us to judge of the share taken by Bacon in these discussions; his name generally appears as the reporter of the committees on special subjects. We can occasionally, however, discern traces of his tact and remarkable prudence; and, on the whole, his attitude, particularly with regard to the Union question, recom- mended him to James. He was shortly afterwards formally installed as learned counsel, receiving the salary of £40, and at the same time

a pension of £60 yearly. He was also appointed one of the commission to treat of the conditions necessary for the Union; and the admirable manner in which the duties of that body were discharged must be attributed mainly to his influence and his complete mastery of the subject. During the recess he published his Advancement of Learning, dedicated to the king.

He was now brought into relations with James, and his prospects began to improve. It is important for us to know what were his ideas upon government, upon parliaments, pre- rogative, and so forth, since a knowledge of this will clear up much that would seem inexplicable in his life. It seems quite evident 3 that Bacon, from position, early training and, one might almost think, natural inclination, held as his ideal of government the Elizabethan system. The king was the supreme power, the centre of law and justice, and his prerogative must not be infringed. Parliament was merely a body called to consult with the king on emergencies {circa ardua regni) and to grant supplies. King and parliament together make up the state, but the former is first in nature and importance. The duty of a statesman was, therefore, to carry out the royal will in as prudent a manner as possible ; he was the servant of the king, and stood or fell according to his pleasure. He was not singular in his opinions and he was undoubtedly sincere; and it is only » See Letters and Life, iv. 177, vi. 38, vii. n6, 117.

by keeping them constantly in mind that we can understand his after relations with the king.

In the second parliament there was not so much scope for the exercise of his powers. The Gunpowder Plot had aroused in the Commons warmer feelings towards the king; they passed severe laws against recusants, and granted a triple subsidy. At the same time they continued the collection of the grievances concerning which they were to move. In the course of this session Bacon married Alice Barnham ” the alderman’s daughter, an handsome maiden, to my liking,” of whom he had written some years before to his cousin Cecil. Li ttle or nothing is known of their married life.

The third parliament was chiefly occupied with the commercial

and legal questions rising out of the proposed Union, in particular, with the dispute as to the naturalization of the Post Nati. Bacon argued ably in favour of this measure, but the general feeling was against it. The House would only pass a bill abolishing hostile laws between the kingdoms; but the case of the Post Nati, being brought before the law courts, was settled as the king wished. > Bacon's services were rewarded in June 1607 by the office of solicitor. 1 Several years passed before he gained another step. Meantime, though circumstances had thrown him too much into active life, he had not forgotten his cherished project of reorganizing natural science. A survey of the ground had been made in the Advancement, and some short pieces not published at the time were probably written in the subsequent two or three years. Towards the close of 1607 he sent to his friends a small tract, entitled Cogitata et Visa, probably the first draft of what we have under that title. In 1609 he wrote the noble panegyric, In felicem memoriam Elizabethae, and the curiously learned and ingenious work, De Sapientia Veterum; and completed what seems to have been the Redargutio Philosophi- arum, or treatise on the " idols of the theatre."

In 1610 the famous fourth parliament of James met. Prerogative, despite Bacon's advice and efforts, clashed more than once with liberty; Salisbury's bold schemes for relieving the embarrassment caused by the reckless extravagance of the king proved abortive, and the House was dissolved :n February 1611. Bacon took a considerable share in the debates, consistently upheld the prerogative, and seemed yet to possess the confidence of the Commons. The death of Salisbury, occurring soon, after, opened a position in which Bacon thought his great political skill and sagacity might be made more immediately available for the king's service. How far he directly offered himself for the post of secretary is uncertain, but we know that his hopes were disappointed, the king himself undertaking the duties of the office. About the same time he made two ineffectual applications for the mastership of the wards; the first, on Salisbury's death, when it was given to Sir George Carey; the second, on the death of Carey. It is somewhat hard to understand why so little favour was shown by the king to one who had proved himself able and willing to do good service, and who, in spite of his disappointments, still continued zealausly to offer advice and assistance. At last in 161 3, a fair opportunity for promotion occurred. The death of Sir Thomas Fleming made a vacancy in the chief justiceship of the king's bench, and Bacon, after some

deliberation, proposed to the king that Coke should be removed from his place in the court of common pleas and transferred to the king's bench. He gives several reasons for this in his letter to the king, but in all probability his chief motive was that pointed out by Spedding, that in the court of king's bench there would be less danger of Coke coming into collision with the king on questions of prerogative, in handling which Bacon was always very circumspect and tender. The vacancy caused by Coke's promotion was then filled up by Hobart, and Bacon, finally, stepped into the place of attorney-general. The fact of this advice being offered and followed in all essentials, illustrates very clearly the close relations between the king and Bacon, who had become a confidential adviser on most occasions of difficulty. That his adherence to the royal party was already noticed and commented on appears from the significant remark

1 Jn October 1608 he became treasurer of Gray's Inn. The ter-centenary was celebrated in 1908. :

of Chamberlain, who, after mentioning the recent changes among the law officials, says, " There is a strong apprehension that ... Bacon may prove a dangerous instrument."

Further light is thrown upon Bacon's relations with James, and upon his political sympathies, by the letter to the king advocating the calling of a parliament, 2 and by the two papers of notes on which his letter was founded. 3 These documents, even after due weight is given to all considerations urged in their favour, 4 seem to confirm the view already taken of Bacon's theory of government, and at the same time show that his sympathies with the royal party tended to blind him to the true character of certain courses of action, which can only be justified by a straining of political ethics. The advice he offered, in all sin-cerity, was most prudent and sagacious, and might have been successfully carried out by a man of Bacon's tact and skill; but it was intensely one-sided, and exhibited a curious want of appreciation of what was even then beginning to be looked on as the true relation of king, parliament and people. Unfortu- nately for James, he could neither adopt nor carry out Bacon's policy. The parliament which met in April 1614, in which Bacon sat for Cambridge University, and was dissolved in June, after a stormy session, was by no means in a frame of mind suitable for the king's purposes. The House was enraged at the supposed project (then much misunderstood) of the " Undertakers "; objection was taken to Bacon being elected or serving as a member while

holding office as attorney-general; and, though an excep- tion was made in his favour, it was resolved that no attorney- general should in future be eligible for a seat in parliament. No supply was granted, and the king's necessities were increased instead of diminished. The emergency suggested to some of the bishops the idea of a voluntary contribution, which was eagerly taken up by the noblemen and crown officials. The scheme was afterwards extended so as to take in the whole kingdom, but lost something of its voluntary character, and the means taken to raise the money, which were not what Bacon would have recom- mended, 6 were calculated to stir up discontent. The general dissatisfaction received a somewhat unguarded and intemperate expression in a letter sent to the justices of Marlborough by a gentleman of the neighbourhood, named Oliver St John, 6 in which he denounced the attempt to raise funds in this way as contrary to law, reason and religion, as constituting in the king personally an act of perjury, involving in the same crime those who contributed, and thereby subjecting all parties to the curses levelled by the church at such offences. St John was summoned before the Star Chamber for slander and treasonable language; and Bacon, ex officio, acted as public prosecutor. The sentence pronounced (a fine of £5000 and imprisonment for life) was severe, but it was not actually inflicted, and probably was not intended to be carried out, the success of the prosecution being all that was desired. St John remained a short time in prison, and Was then released, after making a full apology and submission. The fine was remitted. It seems incredible that Bacon's conduct on this occasion should have been censured by his biographers. The offence was clear; the law was undoubted; no particular sympathy was excited for the culprit; the sentence was not carried out; and Bacon did only what any one in his place would naturally and necessarily have done. The nature of his office involved him in several trials for treason occurring about the same time, and one of these is of interest sufficient to require a somewhat longer examination. Edmund Peacham 7 had been

2 Letters and Life, iv. 380.

3 Ibid, iv. 365-373. 5 Ibid. v. 81-83.

- Ibid. iv. 375-378.

6 Not to be confounded with any of those of the same name who held the title of Baron St John of Bletsho (see Diet, of Nat. Biog. vol. 1. p. 150 ad fin.).

7 Circa 1554-1616; educated at Cambridge; ordained priest 1581; vicar of Ridge, Herts, 1581 ; rector of Hinton St George, Somerset, 1587; eventually condemned to death at the Taunton Assizes (7th August 1615). The sentence was not carried out, and Peacham is said to have died in gaol (March 1616). See Gardiner's Hist, of England, ii. 272-283; State Trials, ii. 869; Calendar of State Papers (1603-1606); Hallam's Constitutional Hist. i. 343; T. P. Taswetl- Langmead, English Constitutional History (5th ed., 1896), p. 425. Nearly all works on constitutional law and history discuss the case.

committed to custody for a libel on his superior, James Montagu (i568?i6i8), bishop of Bath and Wells. In searching his house for certain papers, the officers came upon some loose sheets stitched together in the form of a sermon, the contents of which were of such a nature that it was judged right to lay them before the council. As it was at first suspected that the writing of this book had been prompted by some disaffected persons, Peacham was interrogated, and after he had declined to give any information, was subjected to torture. Bacon, as one of the learned counsel, was ordeied by the council to take part in this examination, which was undoubtedly warranted by precedent, whatever may now be thought of it. Nothing, however, was extracted from Peacham in this way, and it was resolved to proceed against him for treason. Now, in the excited state of popular feeling at that period, the failure of government to substantiate an accusation of treason would have been a serious matter. The king, with whom the council agreed, seems there fore to have thought it desirable to obtain beforehand the opinions of the four chief judges as to whether the alleged offence amounted to treason. In this there was nothing unusual or illegal, and no objection would at that time have been made to it, but James introduced a certain innovation; he proposed that the opinions of the four judges should be given separately and in private. It may be reasonably inferred that his motive for this was the suspicion, or it may be the knowledge, that Coke did not consider the matter treasonable. At all events when Coke, who as a councillor already knew the facts of the case, was consulted regarding the new proposal of the king, he at once objected to it, saying that " this particular and auricular taking of opinions " was " new and dangerous," and " not according to the custom of the realm." He

at last reluctantly assented, and proposed that Bacon should consult with him, while the other law officers addressed themselves to the three puisne judges. By Bacon's directions the proposal to the three judges to give their opinions separately was made suddenly and confidently, and any scruples they might have felt were easily overcome. The first step was thus gained, and it was hoped that if " infusion " could be avoided, if the papers bearing on the case were presented to the judges quickly, and before their minds could be swayed by extraneous influence, their decision on the case would be the same as that of the king. It is clear that the extraneous influence to be feared was Coke, who, on being addressed by Bacon, again objected to giving his opinion separately, and even seemed to hope that his brother judges after they had seen the papers would withdraw their assent to giving their decisions privately. Even after the discussion of the case with Bacon, he would not give his opinion until the others had handed in theirs. What the other judges thought is not definitely known, but Bacon appears to have been unable to put in operation the plan he had devised for swaying Coke's judgment, 1 or if he did attempt it, he was unsuccessful, for Coke finally gave an opinion consistent with what he seems to have held at first, that the book was not treasonable, as it did not disable the king's title. Although the opinions of the judges were not made public, yet as we learn, not only from Bacon, but from a sentence in one of Carleton's letters, 2 a rumour had got about that there was doubt as to the book being treasonable. Under these circumstances, Bacon, who feared that such a report might incite other people to attempt a similar offence, proposed to the king that a second rumour should be circulated in order to destroy the impression caused by the first. " I do think it necessary," he says, " that because we live in an age in which no counsel is kept, and that it is true there is some bruit abroad that the judges of the king's bench do doubt of the case that it should not be treason, that it be given out constantly, and yet as it were in secret, and so a fame to slide, that the doubt was only upon the publication, in that it was never published. For that (if your majesty marketh it) taketh away or at least qualifieth the danger of the example ; for that will be no man's case." 3 Bacon's conduct in this matter has been curiously misrepresented. He has been accused of 1 Letters and Life, v. ioi«, * ! Ibid. v. 121, n.

5 Ibid. v. 124.

torturing the prisoner, and of tampering with the judges 4 by consulting them before the trial; nay, he is even represented as

selecting this poor clergyman to serve for an example to terrify the disaffected, as breaking into his study and finding there a sermon never intended to be preached, which merely encouraged the people to resist tyranny. 6 All this lavish condemnation rests on a complete misconception of the case. If any blame attaches to him, it must arise either from his endeavour to force Coke to a favourable decision, in which he was in all probability prompted by a feeling, not uncommon with him, that a matter of state policy was in danger of being sacrificed to some senseless legal quibble or precedent, or from his advice to the king that a rumour should be set afloat which was not strictly true.

Bacon's share in another great trial which came on shortly afterwards, the Overbury and Somerset case, is not of such a nature as to render it necessary to enter upon it in detail. 6 It may be noted, however, that his letters about this time show that he had become acquainted with the king's new favourite, the brilliant Sir George Villiers, and that he stood high in the king's good graces. In the early part of 1616, when Thomas Egerton, Baron Ellesmere (c. 1540-16 17), the lord chancellor, was dangerously ill, Bacon wrote a long and careful letter to the king, proposing himself for the office, should it fall vacant, and stating as frankly as possible of what value he considered his services would be. In answer, he appears to have received a distinct promise of the reversion of the office; but, as Ellesmere recovered, the matter stood over for a time. He proposed, however, that he should be made a privy councillor, in order to give him more weight in his almost recognized position of adviser to the king, and on the 9th of June 1616 he took the oaths and his seat at the council board.

Meanwhile, his great rival Coke, whose constant tendency to limit the prerogative by law and precedent had made him an object of particular dislike to James, had on two points come into open collision with the king's rights. The first case was an action of praemunire against the court of chancery, evidently instigated by him, but brought at the instance of certain parties whose adversaries had obtained redress in the chancellor's court after the cause had been tried in the court of king's bench. With all his learning and ingenuity Coke failed in inducing or even forcing the jury to bring in a bill against the court of chancery, and it seems fairly certain that on the technical point of law involved he was wrong. Although his motive was, in great measure, a feeling of personal dislike towards Ellesmere, yet it is not

improbable that he was influenced by the desire to restrict in every possible way the jurisdiction of a court which was the direct exponent of the king's wishes. The other case, that of the commendams, was more important in itself and in the circumstances connected with it. The general question involved in a special instance was whether or not the king's prerogative included the right of granting at pleasure livings in commendam, i.e. to be enjoyed by one who was not the incumbent. Bacon, as attorney-general, delivered a speech, which has not been reported; but the king was informed that the arguments on the other side had not been limited to the special case, but had directly impugned the x general prerogative right of granting livings. It was necessary for James, as a party interested, at once to take measures to see that the decision of the judges should not be given on the general question without due con- sultation. He accordingly wrote to Bacon, directing him to intimate to the judges his pleasure that they should delay judgment until after discussion of the matter with himself. Bacon communicated first with Coke, who in reply desired that similar notice should be given to the other judges. This was done by Bacon, though he seems to hint that in so doing he was

4 Macaulay's Essay. 6 Campbell, Lives, ii. 344.

6 The mysterious crimes supposed to be concealed under the obscure details of this case have cast a shadow of vague suspicion on all who were concerned in it. The minute examination of the facts by Spedding {Letters and Life, v. 208-347) seems to show that these secret crimes exist nowhere but in the heated imaginations of romantic biographers and historians.

going a little beyond his instructions. The judges took no notice of the intimation, proceeded at once to give judgment, and sent a letter in their united names to the king announcing what they had done, and declaring that it was contrary to law and to their oath for them to pay any attention to a request that their decision should be delayed. The king was indignant at this encroach- ment, and acting partly on the advice of Bacon, held a council on the 6th of June 1616, at which the judges attended. James then entered at great length into the case, censuring the judges for the offensive form of their letter, and for not having

delayed judgment upon his demand, which had been made solely because he was himself a party concerned. The judges, at the conclusion of his speech, fell on their knees, and implored pardon for the manner of their letter; but Coke attempted to justify the matter contained in it, saying that the delay required by his majesty was contrary to law. The point of law was argued by Bacon, and decided by the chancellor in favour of the king, who put the question to the judges individually, " Whether, if at any time, in a case depending before the judges, which his majesty con- ceived to concern him either in power or profit, and thereupon required to consult with them, and that they should stay pro- ceedings in the meantime, they ought not to stay accordingly?" To this all gave assent except Coke, who said that " when the case should be, he would do that should be fit for a judge to do." No notice was taken by the king of this famous, though somewhat evasive, reply, But the judges were again asked what course they would take in the special case now before them. They all declared that they would not decide the matter upon general grounds affecting the prerogative, but upon special circumstances incident to the case; and with this answer they were dismissed. Bacon's conduct throughout the affair has been blamed, but apparently on wrong grounds. As attorney he was merely fulfilling his duty in obeying the command of the king; and in laying down the law on the disputed point, he was, we may be sure, speaking his own convictions. Censure might more reasonably be bestowed on him because he deliberately advised a course of action than which nothing can be conceived better calculated to strengthen the hands of an absolute monarch. 1 This appeared to Bacon justifiable and right, because the prerogative would be defended and preserved intact. Coke certainly stands out in a better light, not so much for his answer, which was rather indefinite, and the force of which is much weakened by his assent to the second question of the king, but for the general spirit of resistance to encroachment exhibited by him. He was undeniably trouble- some to the king, and it is no matter for wonder that James resolved to remove him from a position where he could do so much harm. On the 26th June he was called before the council to answer certain charges, one of which was his conduct in the praemunire question. He acknowledged his error on that head, and made little defence. On the 30th he was suspended from council and bench, and ordered to employ his leisure in revising certain obnoxious opinions in his reports. He did not perform the task to the king's satisfaction, and a few months later he was dismissed from office.

Bacon's services to the king's cause had been most important; and as he had, at the same time, acquired great favour with Villiers, his prospects looked brighter than before. According to his custom, he strove earnestly to guide by his advice the conduct of the young favourite. His letters, in which he analyses the various relations in which such a man must stand, and prescribes the course of action suitable for each, are valuable and deserving of attention. 2 Very striking, in view of future events, are the words 3 in which he gives him counsel as to his dealing with judges: " By no means be you persuaded to interpose yourself by word or letter in any cause depending, or like to be depending, in any court of justice, nor suffer any man to do it where you can hinder it; and by all means dissuade the king himself from it, upon the importunity of any, either for their friends or themselves. If it should prevail, it perverts justice;

1 A somewhat similar case is that of the writ De Rege inconsulto brought forward by Bacon. See Letters and Life, v. 233-236. 1 Ibid, vi. 6, 7, 13-26, 27-56. 3 Ibid. vi. 33.

but if the judge be so just, and of so undaunted a courage (as ht ought to be) as not to be inclined thereby, yet it alwaysleavesataint of suspicions and prejudice behind it." It is probable that Villiers at this time had really a sense of the duties attaching to his position' and was willing to be guided by a man of approved wisdom. It was not long before an opportunity occurred for showing his gratitude and favour. Ellesmere resigned the chancellorship on the 5th of March 1616/7, and on the 7th the great seal was bestowed upon Bacon, with the title of lord keeper. Two months later he took his seat with great pomp in the chancery court, and delivered a weighty and impressive opening discourse. He entered with great vigour on his new labours, and in less than a month he was able to report to Buckingham that he had cleared off all outstanding chancery cases. He seemed now to have reached the height of his ambition; he was the first law officer in the kingdom, the accredited minister of his sovereign, and on the best terms with the king and his favourite. His course seemed perfectly prosperous and secure, when a slight storm arising opened his eyes to the frailty of the tenure by which he held his position.

Coke was in disgrace but not in despair; there seemed to be a way whereby he could reconcile himself to Buckingham, through the marriage of his daughter, who had an ample fortune, to Sir John Villiers, brother of the marquess, who was penniless or

nearly so. The match was distasteful to Lady Hattcn and to her daughter; a violent quarrel was the consequence, and Bacon, who thought the proposed marriage most unsuitable, took Lady Hatton's part. His reasons for disapproval he explained to the king and Buckingham, but found to his surprise that their indignation was strongly roused against him. He received from both bitter letters of reproof; it was rumoured that he would be disgraced, and Buckingham was said to have compared his present conduct to his previous unfaithfulness to Essex. Bacon, who seems to have acted from a simple desire to do the best for Buckingham's own interests , at once changed his course, advanced the match by every means in his power, and by a humble apology appeased the indignation that had been excited against him. It had been a sharp lesson, but things seemed to go on smoothly after it, and Bacon's affairs prospered.

On the 4th of January 1 61 7/8 he received the higher title of lord chancellor; in July of the same year he was made Baron Verulam and in January 1620/1 he was created Viscount St Albans. His fame, too, had been increased by the publication in 1620 of his most celebrated work, the Novum Organnm. He seemed at length to have made satisfactory progress towards the realization of his cherished aims; the method essential for his Instauration was partially completed; and he had attained as high a rank in the state as he had ever contemplated. But his actions in that position were not calculated to promote the good of his country.

Connected with the years during which he held office is one of the weightiest charges against his character. Buckingham, notwithstanding the advice he had received from Bacon himself, was in the habit of addressing letters to him recommending the causes of suitors. In many cases these seem nothing more than letters of courtesy, and, from the general tone, it might fairly be concluded that there was no intention to sway the opinion of the judge illegally, and that Bacon did not understand the letters in that sense. This view is supported by consideration of the few answers to them which are extant. 5 One outstanding case, however, that of Dr Steward, 6 casts some suspicion on all the others. The terms of Buckingham's note 7 concerning it might easily have aroused doubts; and we find that the further course of the action was to all appearances exactly accommodated to Dr Steward, who

4 A position which Bacon in some respects approved. See Essays,

” Of Ambition.” ” It is counted by some a weakness in princes to have favourites; but it is of all others the best remedy against ambitious great ones ; for when the way of pleasuring and displeasur- ing lieth by the favourite, it is impossible any other should be over great.”

5 Letters and Life, vi. 278, 294-296, 313.

6 Ibid. vii. 579-588, analysis of the case by D. D. Heath, who expresses a strong opinion against Bacon’s action in the matter.

7 Ibid. vi. 444.

had been so strongly recommended. It is, of course, dangerous to form an extreme judgment on an isolated and partially understood case, of which also we have no explanation from Bacon himself, but if the interpretation advanced by Heath be the true one, Bacon certainly suffered his first, and, so far as we can see, just judgment on the case to be set aside, and the whole matter to be reopened in obedience to a request from Buckingham.

It is somewhat hard to understand Bacon’s position with regard to the king during these years. He was the first officer of the crown, the most able man in the kingdom, prudent, sagacious and devoted to the royal party. Yet his advice was followed only when it chimed in with James’s own will; his influence was of a merely secondary kind; and his great practical skill was employed simply in carrying out the measures of the king in the best mode possible. We know indeed that he sympathized cordially with the home policy of the government; he had no objection to such monopolies or patents as seemed advantageous to the country, and for this he is certainly not to be blamed. 1 The opinion was common at the time, and the error was merely ignorance of the true principles of political economy. But we know also that the patents were so numerous as to be oppressive, and we can scarcely avoid inferring that Bacon more readily saw the advantages to the government than the disadvantages to the people. In November 1620, when a new parliament was summoned to meet on January following, he earnestly pressed that the most obnoxious patents, those of alehouses and inns, and the

monopoly of gold and silver thread, should be given up, and wrote to Buckingham, whose brothers were interested, advising him to withdraw them from the impending storm. This prudent advice was unfortunately rejected. But while he went cordially with the king in domestic affairs, he was not quite in harmony with him on questions of foreign policy. Not only was he personally in favour of a war with Spain for the recovery of the Palatinate, but he foresaw in such a course of action the means of drawing together more closely the king and his parliament. He believed that the royal difficulties would be removed if a policy were adopted with which the people could heartily sympathize, and if the king placed himself at the head of his parliament and led them on. But his advice was neglected by the vacillating and peace-loving monarch, his proffered pro- clamation was put aside, and a weak, featureless production substituted in its place. Nevertheless the new parliament seemed at first more responsive than might have been looked for. A double subsidy was granted, which was expressly stated to be " not on any consideration or condition for or concerning the Palatinate." The session, however, was not far advanced when the question of patents was brought up; a determined attack was made upon the very ones of which Bacon had been in dread, and it was even proposed to proceed against the referees (Bacon and Montagu) who had certified that there was no objection to them in point of law. This proposal, though pressed by Coke, was allowed to drop; while the king and Buckingham, acting under the advice of Williams, afterwards lord keeper, agreed to give up the monopolies. It was evident, however, that a determined attack was about to be made upon Bacon, and that the proceeding against the referees was really directed against him. It is probable that this charge was dropped because a more powerful weapon had in the meantime been placed in his enemies' hands. This was the accusation of bribery and corrupt dealings in chancery suits, an accusation apparently wholly unexpected by Bacon, and the possibility of which he seems never to have contemplated until it was actually brought against him. At the beginning of the session a committee had been appointed for inquiring into abuses in the courts of justice. Some illegal practices of certain chancery officials had been detected and punished by the court itself, and generally there was a disposi- tion to overhaul its affairs, while Coke and Lionel Cranfield, earl of Middlesex (1575-1645) directly attacked some parts of the chancellor's administration. But on the 14th of March one

. ‘ For a full discussion of Bacon’s connexion with the monopolies, see Gardiner, Prince Charles, &c. ii. 355-373. For his opinion of monopolies in general, see Letters and Life, vi. 49.

Christopher Aubrey appeared at the bar of the House, and charged Bacon with having received from him a sum of money while his suit was going on, and with having afterwards decided against him. Bacon’s letter 2 on this occasion is worthy of serious attention; he evidently thought the charge was but part of the deliberate scheme to ruin him which had already been in progress. A second accusation (Edward Egerton’s case) followed immediately after, and was investigated by the House, who, satisfied that they had just matter for reprehension, appointed the 19th for a conference with the Lords. On that day Bacon, as he had feared, was too ill to attend. He wrote 3 to the Lords excusing his absence, requesting them to appoint a convenient time for his defence and cross-examination of witnesses, and imploring them not to allow their minds to be prejudiced against him, at the same time declaring that he would not ” trick up an innocency with cavillations, but plainly and ingenuously declare what he knew or remembered.” The charges rapidly accumulated, but Bacon still looked upon them as party moves, and was in hopes of defending himself. 4 Nor did he seem to have lost his courage, if we are to believe the common reports of the day, 6 though certainly they- do not appear worthy of very much credit.

The notes 6 bearing upon the interview which he obtained with the king show that he had begun to see more clearly the nature and extent of the offences with which he was charged, that he now felt it impossible altogether to exculpate himself, and that his hopes were directed towards obtaining some mitigation of his sentence. The long roll of charges made upon the 19th of April finally decided him; he gave up all idea of defence, and wrote to the king begging him to show him favour in this emergency. 7 The next day he sent in a general confession to the Lords, 8 trusting that this would be considered satisfactory. The Lords, however, decided that it was not sufficient as a ground for their censure, and demanded a detailed and particular confession. A list of twenty-eight charges was then sent him, to which an answer by letter was required. On the 30th of April his ” confession and humble submission ”’ 9 was handed in. In it, after going over the several instances, he says, ” I do again confess, that on the points charged upon me, although they should be taken as myself have declared them, there is a great deal of

corruption and neglect; for which I am heartily and penitently sorry, and submit myself to the judgment, grace, and mercy of the court." 10 On the 3rd of May, after considerable discussion, the Lords decided upon the sentence, which was, 11 That he should undergo fine and ransom of £40,000; that he should be imprisoned in the Tower during the king's pleasure; that he should be for ever incapable of any office, place or employment in the state or commonwealth; that he should never sit in parliament, or come within the verge of the court. This heavy sentence was

i Letters and Life, vii. 213: " I know I have clean hands and a clean heart, and I hope a clean house for friends or servants. But Job himself, or whosoever was the justest judge, by such hunting for matters against him as hath been used against mc, may for a time seem foul, specially in a time when greatness is the mark and accusa- tion is the game." 3 Ibid. vii. 215-216.

4 Ibid. vii. 225-226. From the letter to the king (March 25, 1621) — " When I enter into myself, I find not the materials of such a tem- pest as is comen upon me. I have been (as your majesty knoweth best) never author of any immoderate counsel, but always desired to have things carried suavibus modis. I have been no avaricious op- pressor of the people. I have been no haughty or intolerable or hateful man in my conversation or carriage. I have inherited no hatred from my father, but am a good patriot born. Whence should this be? For these are the things that use to raise dislikes abroad. . . . And for the briberies and gifts wherewith I am charged, when the book of hearts shall be opened, I hope I shall not be found to have the troubled fountain of a corrupt heart in a depraved habit of taking rewards to pervert justice, howsoever I may be frail, and partake of the abuse of the times."

6 Ibid. vii. 227, and Gardiner, Prince Charles, &c. i. 450.

6 Letters and Life, vii. 236, 238. 7 Ibid. vii. 241.

8 Ibid. vii. 242-244; " It resteth therefore that, without fig-leaves, I do ingenuously confess and acknowledge, that having understood the particulars of the charge, not formally from the House but enough to inform my conscience and memory, I find matter sufficient and full, both to move me to desert the defence, and to move your lordships to condemn and censure me."

9 Ibid. vii. 252-262. w Ibid. vii. 261, u Ibid. vii. 270.

only partially executed. The fine was in effect remitted by the king; imprisonment in the Tower lasted for about four days; a general pardon (not of course covering the parliamentary censure) was made out, and though delayed at the seal for a time by Lord Keeper Williams, was passed probably in November 1621. The cause of the delay seems to have lain with Buckingham, whose friendship had cooled, and who had taken" offence at the fallen chancellor's unwillingness to part with York House. This differ- ence was finally smoothed over, and it was probably through his in- fluence that Bacon received the much-desired permission to come within the verge of the court. He never again sat in parliament.

So ends this painful episode, which has given rise to the most severe condemnation of Bacon, and which still presents great and perhaps insuperable difficulties. On the whole, the tendency of the most recent and thorough researches has been towards the opinion that Bacon's own account of the matter (from which, indeed, our knowledge of it is chiefly drawn) is substantially correct. He distinguishes three ways in which bribes may be given, 1 and ingenuously confesses that his own acts amounted to corruption and were worthy of condemnation. Now, corrup- tion strictly interpreted would imply the deliberate sale of justice, and this Bacon explicitly denies, affirming that he never " had bribe or reward in his eye or thought when he pronounced any sentence or order." When we analyse the specific charges against him, with his answers to them, we find many that are really of little weight. The twenty-eighth and last, that of negligence in looking after his servants, though it did him much harm, may fairly be said to imply no moral blame. The majority of the others are instances of gratuities given after the decision, and it is to be regretted that the judgment of the peers gives us no means of determining how such gifts were looked upon, whether or not the acceptance of them was regarded as a " corrupt " practice. In four cases specifically, and in some others by implication, Bacon confesses that he had received bribes from suitors pendente lite. Yet he affirms, as we said before, that his intention was never swayed by a bribe; and so far as any of these cases can be traced, his decisions, often given in conjunction

with some other official, a re to all appearance thoroughly just. In several cases his judgment appears to have been given against the party bestowing the bribe, and in at least one instance, that of Lady Wharton, it seems impossible to doubt that he must have known when accepting the present that his opinion would be adverse to her cause. Although, then, he felt that these practices were really corrupt, and even rejoiced that his own fall would tend to purify the courts from them, 2 he did not feel that he was guilty of perverting justice for the sake of reward. How far, then, is such defence or explanation admissible and satisfactory? It is clear that two things are to be considered: the one the guilt of taking bribes or presents on any consideration, the other the moral guilt depending upon the wilful perversion of justice. The attempt has sometimes been made to defend the whole of Bacon's conduct on the ground that he did nothing that was not done by many of his contemporaries. Bacon himself disclaims a defence of this nature, and we really have no direct evidence which shows to what extent the offering and receiving of such bribes then prevailed. That the practice was common is indeed implied by the terms in which Bacon speaks of it, and it is not improbable that the fact of these gifts being taken by officials was a thing fairly well known, although all were aware of their illegal character, and it was plain that any public exposure of such dealings would be fatal to the individual against whom the charge was made out. 3 Bacon knew all this;

1 Letters and Life, vii. 235-236: "The first, of bargain and contract for reward to pervert justice, pendente lite. The second, where the judge conceives the cause to be at an end, by the information of the party or otherwise, and useth not such diligence as he ought to inquire of it. And the third, where the cause is really ended, and it is sine fraude without relation to any precedent promise. . . . For the first of them I take myself to be as innocent as any born upon St Innocent's Day, in my heart. For the second, I doubt on some particulars I may be faulty. And for the last, I conceived it to be no fault, but therein I desire to be better informed, that I may be twice penitent, once for the fact and again for the error." 2 Ibid. vii. 242.

'Ibid. vii. 244: " Neither will your lordships forget that there

he was well aware that the practice was in itself indefensible, 4 and that his conduct was therefore corrupt and deserving of censure. So far, then, as the mere taking of bribes is concerned, he would permit no defence, and his own confession and

judgment on his action contain as severe a condemnation as has ever been passed upon him. Yet in the face of this he does not hesitate to call himself " the justest chancellor that hath been in the five changes since Sir Nicholas Bacon's time"; 5 and this on the plea that his intentions had always been pure, and had never been affected by the p.resents he received. His justification has been set aside by modern critics, not on the ground that the evidence demonstrates its falsity, 6 but because it is inconceivable or unnatural that any man should receive a present from another, and not suffer his judgment to be swayed thereby. It need hardly be said that such an a priori conviction is not a sufficient basis on which to found a sweeping condemnation of Bacon's integrity as an administrator of justice. On the other hand, even if it be admitted to be possible and conceivable that a present should be given by a suitor simply as seeking favourable consideration of his cause, and not as desirous of obtaining an unjust decree, and should be accepted by the judge on the same understanding, this would not entitle one absolutely to accept Bacon's state- ment. Further evidence is necessary in order to give foundation to a definite judgment either way; and it is extremely improbˆ able, nay, almost impossible, that such can ever be produced. In these circumstances, due weight should be given to Bacon's own assertions of his perfect innocence and purity of intention; they ought not to be put out of court unless found in actual contradiction to the facts, and the reverse of this is the case, so far as has yet appeared. 7

The remaining five years of his life, though he was still harassed by want of means, for James was not liberal, were spent in work far more valuable to the world than anything he had accbmplished in his high office. In March 1622 he presented to Prince Charles his History of Henry VII. ; and immediately, with unwearied industry, set to work to complete some portions of his great work; In November 1622 appeared the HistoriaVentorum; in January 1622/3, the Historia Vitae et Mortis; and in October of the same year, the De Augmentis Scienliarum, a Latin trans- lation, with many additions, of the Advancement. Finally, in December 1624, he published his Apophthegms, and Translations of some of the Psalms, dedicated to George Herbert; and, in 1625, a third and enlarged edition of the Essays.

Busily occupied with these labours, his life now drew rapidly to a close. In March 1626 he came to London, and when driving one day near Highgate, was taken with a desire to discover whether

snow would act as an antiseptic. He stopped his carriage, got out at a cottage, purchased a fowl, and with his own hands assisted to stuff it with snow. He was seized with a sudden chill, and became so seriously unwell that he had to be conveyed to Lord Arundel's house, which was near at hand. Here his illness increased, the cold and chill brought on bronchitis and he died, after a few days' suffering, on the 9th of April 1626.

are vitia temporis as well as vitia hominis, and that the beginning of reformations hath the contrary power to the pool of Bethesda, for that had strength to cure only him that was first cast in, and this hath commonly strength to hurt him only that is first cast in."

4 See, among many other passages, Essays, "Of Great Place": "For corruptions do not only bind thine own hands or thy servant's hands from taking, but bind the hands of suitors also from offering; for integrity used doth the one; but integrity professed, and with a manifest detestation of bribery, doth the other; and avoid not only the fault but the suspicion."

6 Cf. Letters and Life, vii. 560: " I was the justest judge that was in England these fifty years; but it was the justest censure in Parliament that was these two hundred years."

6 Or on the ground that there was a distinct rule forbidding chancellors and the like officials to take presents. This does not seem to have been the case, if we may judge from what Bacon says Letters and Life, vii. 233.

7 Not only do the cases, so far as they are known, support Bacon's plea of innocence, but it is remarkable that no attempt at a reversal of any of his numerous decrees appears to have been successful. Had his decrees been wilful perversions of justice, it is scarcely conceivable that some of them should not have been overturned. See Letters and Life, vii. 555-562.

Bacon's Works and Philosophy.

A complete survey of Bacon's works and an estimate of his place in literature and philosophy are matters for a volume. It is here proposed merely to classify the works, to indicate their general

character and to enter somewhat more in detail upon what he himself regarded as his great achievement, — the re-organization of the sciences and the exposition of a new method by which the human mind might proceed with security and certainty towards the true end of all human thought and action.

Putting aside the letters and occasional writings, we may conveniently distribute the other works into three classes, Professional, Literary, Philosophical. The Professional works include the Reading on the Statute of Uses, the Maxims of Law and the treatise (possibly spurious) on the Use of the Law. " I am in good hope," said Bacon himself, "that when Sir Edward Coke's reports and my rules and decisions shall come to posterity, there will be (whatsoever is now thought) question who was the greater lawyer." If Coke's reports show completer mastery of technical details, greater knowledge of precedent, and more of the dogged grasp of the letter than do Bacon's legal writings, there can be no dispute that the latter exhibit an infinitely more comprehensive intelligence of the abstract principles of jurisprudence, with a richness and ethical fulness that more than compensate for their lack of dry legal detail. Bacon seems indeed to have been a lawyer of the first order, with a keen scientific insight into the bearings of isolated facts and a power of generalization which admirably fitted him for the self-imposed task, unfortunately never completed, of digesting or codifying the chaotic mass of the English law.

Among the literary works are included all that he himself designated moral and historical pieces, and to these may be added some theological and minor writings, such as the Apophthegms. Of the moral works the most valuable are the Essays, which have been so widely read and universally admired. The matter is of the familiar, practical kind, that " comes home to men's bosoms." The thoughts are weighty, and even when not original have acquired a peculiar and unique tone or cast by passing through the crucible of Bacon's mind. A sentence from the Essays can rarely be mistaken for the production of any other writer. The short, pithy sayings have become popular mottoes and household words. The style is quaint, original, abounding in allusions and witticisms, and rich, even to gorgeousness, with piled-up analogies and metaphors. 1 The first edition contained only ten essays, but the number was increased in 1612 to thirty-eight, and in 1625 to fifty-eight. The short tract, Colours of Good and Evil, which 1 with the Meditationes Sacrae originally accompanied the Essays, was afterwards incorporated with the

De Augmentis. Along with these works may be classed the curiously learned piece, De Sapientia Veterum, in which he works out a favourite idea, that the mythological fables of the Greeks were allegorical and concealed the deepest truths of their philo- sophy. As a scientific explanation of the myths the theory is of no value, but it affords fine scope for the exercise of Bacon's unrivalled power of detecting analogies in things apparently most dissimilar. The Apophthegms, though hardly deserving Mac- aulay's praise of being the best collection of jests in the world, contain a number of those significant anecdotes which Bacon used with such effect in his other writings. Of the historical works, besides a few fragments of the projected history of Britain there remains the History of Henry VII., a valuable work, giving a clear and animated narrative of the reign, and characterizing Henry with great skill. The style is in harmony with the matter, vigorous and flowing, but naturally with less of the quaintness and richness suitable to more thoughtful and original writings.

1 The peculiarities of Bacon's style were noticed very early by his contemporaries. (See Letters and Life, i. 268.) Raleigh and Jonson have both recorded their opinions of it, but no one has characterized it more happily than his friend, Sir Tobie Matthews, " A man so rare in knowledge, of so many several kinds, endued with the facility and felicity of expressing it all in so elegant, significant, so abundant, and yet' so choice and ravishing a way of words, of metaphors, of allusions, as perhaps the world hath not seen since it was a world." — "Address to the Reader" prefixed to Collection 0} English Letters (1660) .

The series of the literary works is completed by the minor treatises on theological or ecclesiastical questions. Some of the latter, included among the occasional works, are sagacious and prudent and deserve careful study. Of the former, the principal specimens are the Meditationes Sacrae and the Confession of Faith. The Paradoxes (Characters of a believing Christian in paradoxes, and seeming contradictions), which was often and justly sus- pected, has been conclusively proved by Grosart to be the work of another author.

Philosophical Works. — The great mass of Bacon's writings consists of treatises or fragments, which either formed integral parts of his grand comprehensive scheme, or were closely con- nected with it. More exactly they may be classified under three heads: (A) Writings originally intended to form parts of the Instauratio, but which were afterwards superseded or thrown

aside; (B) Works connected with the Instauratio, but not directly included in its plan; (C) Writings which actually formed part of the Instauratio Magna.

(A) This class contains some important tracts, which certainly contain little, if anything, that is not afterwards taken up and expanded in the more elaborate works, but are not undeserving of attention, from the difference in the point of view and method of treatment. The most valuable of them are: (1) The Advancement of Learning, of which no detailed account need be given, as it is completely worked up into the De Augmentis, and takes its place as the first part of the Instauratio. (2) Valerius Terminus, a very remarkable piece, composed probably about 1603, though perhaps retouched at a later period. It contains a brief and somewhat obscure outline of the first two parts in the Instauratio, and is of importance as affording us some insight into the gradual development of the system in Bacon's own mind. (3) Temporis Partus Masculus, another curious fragment, remarkable not only from its contents, but from its style, which is arrogant and offen- sive, in this respect unlike any other writing of Bacon's. The adjective masculus points to the power of bringing forth fruit possessed by the new philosophy, and perhaps indicates that all previous births of time were to be looked upon as feminine or imperfect; it is used in a somewhat similar sense in Letters and Life, vi. 183, " In verbis masculis, no flourishing or painted words, but such words as are fit to go before deeds." (4) Redargutio Philosophiarum, a highly finished piece in the form of an oration, composed probably about 1608 or i6og, and containing in pretty full detail much of what afterwards appears in connexion with the Idola Theatri in book i. of the Novum Organum. (5) Cogilata et Visa, perhaps the most important of the minor philosophical writings, dating from 1607 (though possibly the tract in its present form may have been to some extent altered), and containing in weighty and sonorous Latin the substance of the first book of the Organum. (6) The Descriptio Gobi Intellectual-is, which is to- some extent intermediate between the Advancement and the De Augmentis, goes over in detail the general classification of the sciences, and enters particularly on some points of minor interest. (7) The brief tract De Inter pretatione Naturae Sententiae Duodecim- os evidently a first sketch of part of the Novum Organum, and in phraseology is almost idenlical with it. (8) A few smaller pieces, such as the Inquisitio de Motu, the Color et Frigus, the Hisloria Soni et Auditus and the Phaenomena Universi, are early

specimens of his Natural History, and exhibit the first tentative applications of the new method.

(B) The second group consists of treatises on subjects connected with the Instauratio, but not forming part of it. The most interesting, and in many respects the most remarkable, is the philosophic romance, the New Atlantis, a description of an ideal state in which the principles of the new philosophy are carried out by polftical machinery and under state guidance, and where many of the results contemplated by Bacon are in imagination attained. The work was to have been completed by the addition of a second part, treating of the laws of a model commonwealth, which was never written. Another important tract is the De Principiis atque Originibus secundum Fabulas Cupidinis et Caeli, where, under the disguise of two old mythological stories, he (in the manner of the Sapientia Veterum) finds the deepest truths

concealed. The tract is unusually interesting, for in it he discusses at some length the limits of science, the origin of things and the nature of primitive matter, giving at the same time full notices of Democritus among the ancient philosophers and of Telesio among the modern. Deserving of attention are also the Cogitationes de Natura Rerum, probably written early, perhaps in 1605, and the treatise on the theory of the tides, De Fluxu et Refluxu Maris, written probably about 1616.

(C) The philosophical works which form part of the Insiauratio must of course be classed according to the positions which they respectively hold in that scheme of the sciences.

The great work, the reorganization of the sciences, and the restoration of man to that command over nature which he had lost by the fall, consisted in its final form of six divisions.

I. Partitiones Scientiarum, a survey of the sciences, either such as then existed or such as required to be constructed afresh — in fact, an inventory of all the possessions of the human mind. The famous classification 1 on which this survey proceeds is based upon an analysis of the faculties and objects of human knowledge. This division is represented by the De Augmentis Scientiarum.

II. Interpretatio Naturae. — After the survey of all that has yet been done in the way of discovery or invention, comes the new method, by which the mind of man is to be trained and directed in its progress towards the renovation of science. This division is represented, though only imperfectly, by the Novum Organum, particularly book ii.

III. Historia Naturalis et Experimentalis. — The new method is valueless, because inapplicable, unless it be supplied with materials duly collected and presented — in fact, unless there be formed a competent natural history of the Phaenomena Universi. A short introductory sketch of the requisites of such a natural history, which, according to Bacon, is essential, necessary, the basis totius negotii, is given in the tract Parasceve, appended to the Novum Organum. The principal works intended to form portions of the history, and either published by himself or left in manuscript, are Historia Ventorum, Historia Vitae et Mortis, Historia Densi et Pari, and the extensive collection of facts and observations entitled Sylva Sylvarum.

IV. Scala Intellectus. — It might have been supposed that the new philosophy could now be inaugurated. Materials had been supplied, along with a new method by which they were to be treated, and naturally the next step would be the finished result. But for practical purposes Bacon interposed two divisions between the preliminaries and the philosophy itself. The first was intended to consist of types or examples of investigations conducted by the new method, serviceable for keeping the whole process vividly before the mind, or, as the title indicates, such that the mind could run rapidly up and down the several steps or grades in the process. Of this division there seems to be only one small fragment, the Filum Labyrinthi, consisting of but two or three pages.

V. Prodromi, forerunners of the new philosophy. This part, strictly speaking, is quite extraneous to the general design. According to the Distributio ‘peris, 2 it was to contain certain speculations of Bacon’s own, not formed by the new method, but by the unassisted use of his understanding. These, therefore, form temporary cr uncertain anticipations of the new philosophy. There is extant a short preface to this division of the work, and according toSpedding.some of the miscellaneous treatises, such as De Principiis, De Fluxu et Refluxu, Cogitationes de Natura Rerum, may probably have been intended to be included under this head. This supposition receives some support from the

manner in which the fifth part is spoken of in the Novum Organum, i. 116.

VI. The new philosophy, which is the work of future ages, and the result of the new method.

Bacon's grand motive in his attempt to found the sciences anew was the intense conviction that the knowledge man

1 The division of the sciences adopted in the great French Encyclo- pedic was founded upon this classification of Bacon's. See Diderot's Prospectus (CEuvres, iii.) and d'Alembert's Discours (CEuvres,i.) The scheme should be compared with later attempts of the same nature by Ampere, Cournov, Comte and Herbert Spencer.

2 See also " Letter to Fulgentio," Letters and Life, vii. 533.

possessed was of little service to him. " The knowledge whereof the world is now possessed, especially that of nature, extendeth not to magnitude and certainty of works." 3 Man's sovereignty over nature, which is founded on knowledge alone, had been lost, and instead of the free relation between things and the human mind, there was nothing but vain notions and blind experiments. To restore the original commerce between man and nature, and to recover the imperium hominis, is the grand object of all science. The want of success which had hitherto attended efforts in the same direction had been due to many causes, but chiefly to the want of appreciation of the nature of philosophy and its real aim. Philosophy is not the science of things divine and human; it is not the search after truth. " I find that even those that have sought knowledge for itself, and not for benefit or ostentation, or any practical enablement in the course of their life, have nevertheless propounded to themselves a "wrong mark, namely, satisfaction (which men call Truth) and not operation." 4 " Is there any such happiness as for a man's mind to be raised above the confusion of things, where he may have the prospect of the order of nature and error of man ? But is this a view of delight only and not of discovery ? of content- ment and not of benefit ? Shall he not as well discern the riches of nature's warehouse as the beauty of her shop ? Is truth ever barren ? Shall he not be able thereby to produce worthy effects, and to endow the life of man with infinite commodities ? " 6 Philosophy is altogether practical; it is of little matter to the fortunes of humanity what abstract notions one may entertain concerning

the nature and the principles of things. 6 This truth, however, has never yet been recognized ; 7 it has not yet been seen that the true aim of all science is ” to endow the condition and life of man with new powers or works,” 8 or ” to extend more widely the limits of the power and greatness of man.” 9 Nevertheless, it is not to be imagined that by this being proposed as the great object of search there is thereby excluded all that has hitherto been looked upon as the higher aims of human life, such as the contemplation of truth. Not so, but by following the new aim we shall also arrive at a true knowledge of the universe in which we are, for without knowledge there is no power; truth and utility are in ultimate aspect the same; ” works themselves are of greater value as pledges of truth than as contributing to the comforts of life.” *!> Such was the concep- tion of philosophy with which Bacon started, and in which he felt himself to be thoroughly original. As his object was new and hitherto unproposed, so the method he intended to employ was different from all modes of investigation hitherto attempted. ” It would be,” as he says, ” an unsound fancy and self-con- tradictory, to expect that things which have never yet been done can be done except by means which have never yet been tried.” u There were many obstacles in his way, and he seems always to have felt that the first part of the new scheme must be a pars destruens, a destructive criticism of all other methods. Opposi- tion was to be expected, not only from previous philosophies, but especially from the human mind itself. In the first place, natural antagonism might be looked for from the two opposed sects, the one of whom, in despair of knowledge, maintained that all science was impossible; while the other, resting on authority and on the learning that had been handed down from the Greeks, declared that science was already completely known, and consequently devoted their energies to methodizing and elaborating it. ‘Secondly, within the domain of science itself, properly so called, there were two ” kind of rovers ” who must be dismissed. The first were the speculative or logical philo- sophers, who construe the universe ex analogia hominis, and not ex analogia mundi, who fashion nature according to preconceived ideas, and who employ in their investigations syllogism and abstract reasoning. The second class, who were equally offensive, consisted of those who practised blind experience, which is mere

3 Fit. Lab. ; Cog. et Visa, i. ; cf. Pref. to Ins. Mag.

1 Val. Ter. 232; cf. N. 0. i. 124. ‘“Letters, i. 123. 6 N. 0. i. 116.

7 Fit. Lab. 5; cf. N. 0. i. 81; Val. Ter. (Works, iii. 235); Advancement, bk. i. (Works, iii. 294).

8 Fit. Lab. 5; cf. N. O. i. 81; Val. Ter. (Works, iii. 222 233); New Atlantis (Works, iii. 156). *N. 0- i. 1 16. 10 Ibid. i. 124. ” Ibid.i. 6.

groping in the dark (vaga experientia mera palpatio est), who occasionally hit upon good works or inventions, which, like Atalanta’s apples, distracted them from further steady and gradual progress towards universal truth. In place of these straggling efforts of the unassisted human mind, a graduated system of helps was to be supplied, by the use of which the mind, when placed on the right road, would proceed with unerring and mechanical certainty to the invention of new arts and sciences.

Such were to be the peculiar functions of the new method, though it has not definitely appeared what that method was, or to what objects it could be applied. But, before proceeding to unfold his method, Bacon found it necessary to enter in considerable detail upon the general subject of the obstacles to progress, and devoted nearly the whole of the first book of the Organum to the examination of them. This discussion, though strictly speaking extraneous to the scheme, has always been looked upon as a most important part of his philosophy, and his name is perhaps as much associated with the doctrine of Idols (Idola) as with the theory of induction or the classification of the sciences.

The doctrine of the kinds of fallacies or general classes of errors into which the human mind is prone to fall, appears in many of the works written before the Novum Organum, and the treatment of them varies in some respects. The classification in the Organum, however, not only has the author’s sanction, but has received the stamp of historical acceptation; and com- parison of the earlier notices, though a point of literary interest, has no important philosophic bearing. The Idola (Nov. Org. i. 39) 1 false notions of things,or erroneouswaysof lookingat nature, areof four kinds: the first two innate, pertaining to the very nature of the mind and not to be eradicated; the third creeping insensibly into men’s minds, and hence in a sense innate and inseparable; the fourth imposed from without. The first kind are the Idola Tribus,

idols of the tribe, fallacies incident to humanity or the race in general. Of these, the most prominent are — the prone- ness to suppose in nature greater order and regularity than there actually is; the tendency to support a preconceived opinion by affirmative instances, neglecting all negative or opposed cases; and the tendency to generalize from few observations, or to give reality to mere abstractions, figments of the mind. Manifold errors also result from the weakness of the senses, which affords scope for mere conjecture; from the influence exercised over the understanding by the will and passions; from the restless desire of the mind to penetrate to the ultimate principles of things; and from the belief that " man is the measure of the universe," whereas, in truth, the world is received by us in a distorted and erroneous manner. The second kind are the Idola Specus, idols of the cave, or errors incident to the peculiar mental or bodily constitution of each individual, for according to the state of the individual's mind is his view of things. Errors of this class are innumerable, because there are numberless varieties of dis- position; but some very prominent specimens can be indicated. Such are the tendency to make all things subservient to, or take the colour of some favourite subject, the extreme fondness and reverence either for what is ancient or for what is modern, and excess in noting either differences or resemblances amongst things. A practical rule for avoiding these is also given: " In general let every student of nature take this as a rule, that what- ever his mind seizes and dwells upon with particular satisfaction is to be held in suspicion." 5 The third class are the Idola Fori, idols of the market-place, errors arising from the influence exercised over the mind by mere words. This, according to

'The word Idola is manifestly borrowed from Plato. It is used twice in connexion with the Platonic Ideas (N. O. i. 23, 124) and is contrasted with them as the false appearance. The el8w\oi> with Plato is the fleeting, transient image of the real thing, and the passage evidently referred to by Bacon is that in the Rep. vii. 516 A, koI wpayTov fikv ras aKtas av fi^ara Kadoptptj, nal fiera tovto kv rois voaat ra rt tQv AvdpdjTrojy teal ra ru>v aWuv eldojKa, txrrepoy Si aina. It IS explained well in the Advancement, bk. i. (Works, in. 287). (For valuable notes on the Idola, see T. Fowler's Nov. Org. i. 38 notes; especially for a comparison of the Idola with Roger Bacon's Offen- dicula.) 2 N. O. i. 58-

Bacon, is the most troublesome kind of error, and has been especially fatal in philosophy. For words introduce a fallacious

mode of looking at things in two ways: first, there are some words that are really merely names for non-existent things, which are yet supposed to exist simply because they have received a name; secondly, there are names hastily and unskilfully abstracted from a few objects and applied recklessly to all that has the faintest analogy with these objects, thus causing the grossest confusion. The fourth and last class are the Idola Theatri, idols of the theatre, i.e. fallacious modes of thinking resulting from received systems of philosophy and from erroneous methods of demonstration. The criticism of the demonstrations is introduced later in close connexion with Bacon's new method; they are the rival modes of procedure, to which his own is definitely opposed. The philosophies which are " redargued " are divided into three classes, the sophistical, of which the best example is Aristotle, who, according to Bacon, forces nature into his abstract schemata and thinks to explain by definitions; the empirical, which from few and limited experiments leaps at once to general conclusions; and the superstitious, which corrupts philosophy by the introduction of poetical and theological notions.

Such are the general causes of the errors that infest the human mind; by their exposure the way is cleared for the introduction of the new method. The nature of this method cannot be understood until it is exactly seen to what it is to be applied. What idea had Bacon of science, and how is his method connected with it? Now, the science 3 which was specially and invariably contemplated by him was natural philosophy, the great mother of all the sciences; it was to him the type of scientific knowledge, and its method was the method of all true science. To discover exactly the characteristics and the object of natural philosophy it is necessary to examine the place it holds in the general scheme furnished in the Advancement or De Augmentis. All human knowledge, it is there laid down, may be referred to man's memory or imagination or reason. In the first, the bare facts presented to sense are collected and stored up; the exposition of them is history, which is either natural or civil. In the second, the materials of sense are separated or divided in ways not corresponding to nature but after the mind's own pleasure, and the result is poesy or feigned history. In the third, the materials are worked up after the model or pattern of nature, though we are prone to err in the progress from sense to reason; the result is philosophy, which is concerned either with God, with nature or with man, the second being the most important. Natural

philosophy is again divided into speculative or theoretical and operative or practical, according as the end is contemplation or works. Speculative or theoretical natural philosophy has to deal with natural substances and qualities and is subdivided into physics and metaphysics. Physics inquires into the efficient and material causes of things; metaphysics, into the formal and final causes. The principal objects of physics are concrete substances, or abstract though physical qualities. The research into abstract qualities, the fundamental problem of physics, comes near to the metaphysical study of forms, which indeed differs from the first only in being more general, and in having as its results a form strictly so called, i.e. a nature or quality which is a limitation or specific manifestation of some higher and better-known genus. 4 Natural philosophy is, therefore, in ultimate resort the study of forms, and, consequently, the fundamental problem of philosophy in general is the discovery of these forms.

" On a given body to generate or superinduce a new nature or natures, is the work and aim of human power. ... Of a given nature to discover the form or true specific difference, or nature-engendering nature (natura naturans) or source of emanation (for these are the terms which are nearest to a description cf the thing), is the work and aim of human knowledge." 6

The questions, then, whose answers give the key to the who'e Baconian philosophy, may be put briefly thus — What are

3 N. 0. i. 79, 80, 98, 108.

4 On the meaning of the word form in Bacon's theory see also Fowler's N. O. introd. § 8. 6 N. O. ii. I.

forms? and how is it that knowledge of them solves both the theoretical and the practical problem of science? Bacon himself, as may be seen from the passage quoted above, finds great difficulty in giving an adequate and exact definition of what he means by a form. As a general description, the following passage from the Novum Organum, ii. 4, may be cited: —

" The form of a nature is such that given the form the nature infallibly follows. . . . Again, the form is such that if it be taken away the nature infallibly vanishes. . . . Lastly, the true form is

such that it deduces the given nature from some source of being which is inherent in more natures, and which is better known in the natural order of things than the form itself." 1

From this it would appear that, since by a nature is meant some sensible quality, superinduced upon, or possessed by, a body, so by a form we are to understand the cause of that nature, which cause is itself a determinate case or manifestation of some general or abstract quality inherent in a greater number of objects. But all these are mostly marks by which a form may be recognized, and do not explain what the form really is. A further definition is accordingly attempted in Aph. 13: —

" The form of a thing is the very thing itself, and the thing differs from the form no otherwise than as the apparent differs from the real, or the external from the internal, or the thing in reference to the man from the thing in reference to the universe."

This throws a new light on the question, and from it the inference at once follows, that the forms are the permanent causes or substances underlying all visible phenomena, which are merely manifestations of their activity. Are the forms, then, forces ? At times it seems as if Bacon had approximated to this view of the nature of things, for in several passages he identifies forms with laws of activity. Thus, he says —

"When I speak of forms I mean nothing more than those laws and determinations of absolute actuality which govern and constitute any simple nature, as heat, light, weight, in every kind of matter and subject that is susceptible of them. Thus the form of heat or the form of light is the same thing as the law of heat or the law of light." 2 "Matter rather than forms should be the object of our attention, its configurations and changes of configuration, and simple action, and law of action or motion; for forms are fig- ments of the human mind, unless you will call those laws of action forms." ' " Forms or true differences of things, which are in fact laws of pure act." 4 " For though in nature nothing really exists besides individual bodies,' performing pure individual acts accord- ing to a fixed law, yet in philosophy this very law, and the investi- gation, discovery and explanation of it, is the foundation as well of knowledge as of operation. And it is this law, with its clauses, that I mean when I speak of forms." 6

Several important conclusions may be drawn from these

passages. In the first place, it is evident that Bacon, like the Atomical school, of whom he highly approved, had a clear perception and a firm grasp of the physical character of natural principles; his forms are no ideas or abstractions, but highly general physical properties. Further, it is hinted that these general qualities may be looked upon as the modes of action of simple bodies. This fruitful conception, however, Bacon does not work out; and though he uses the word cause, and identifies form with formal cause, yet it is perfectly apparent that the modern notions of cause as dynamical, and of nature as in a process of flow or development, are foreign to him, and that in his view of the ultimate problem of science, cause meant causa immanens, or underlying substance, effects were not consequents but manifestations, and nature was regarded in a purely statical aspect. That this is so appears even more clearly when we examine his general conception of the unity, gradation and function of the sciences. That the sciences are organically connected is a thought common to him and to his distinguished predecessor Roger Bacon. " I that hold it for a great impedi- ment towards the advancement and further invention of knowledge, that particular arts and sciences have been dis- incorporated from general knowledge, do not understand one

1 This better known in the order of nature is nowhere satisfactorily explained by Bacon. Like his classification of causes, and in some degree his notion of form itself, it comes from Aristotle. See An. Post. 71 b 33; Topic, 141 b 5; Eth. Nic. 1095 a 30. It should be observed that many writers maintain that the phrase should be hotiora natura; others, noiiora naturae. See Fowler's N. 0. p. 199 note.

2 N. 0. ii, 17. ' Ibid. i. 51. * Ibid. i. 75. 6 Ibid. ii. 2.

and the same thing which Cicero's discourse and the note and conceit of the Grecians in their word circle learning do intend. For I mean not that use which one science hath of another for ornament or help in practice; but I mean it directly of that use by way of supply of light and information, which the particulars and instances of one science do yield and present for the framing or correcting of the axioms of another science in their very truth and notion." 6 In accordance with this, Bacon placed at the basis of the particular sciences which treat of God, nature and man, one fundamental doctrine, the Prima Philosophia, or first philosophy, the function of which was to display the unity of nature by connecting into one body of truth such of the highest

axioms of the subordinate sciences as were not special to one science, but common to several.' This first philosophy had also to investigate what are called the adventitious or tran- scendental conditions of essences, such as Much, Little, Like, Unlike, Possible, Impossible, Being, Nothing, the logical dis- cussion of which certainly belonged rather to the laws of reasoning than to the existence of things, but the physical or real treatment of which might be expected to yield answers to such questions as, why certain substances are numerous, others scarce; or why, if like attracts like, iron does not attract iron. Following this summary philosophy come the sciences proper, rising like a pyramid in successive stages, the lowest floor being occupied by natural history or experience, the second by physics, the third, which is next the peak of unity, by metaphysics. 8 The knowledge of the peak, or of the one law which binds nature together, is perhaps denied to man. Of the sciences, physics, as has been already seen, deals with the efficient and material, i.e. with the variable and transient, causes of things. But its inquiries may be directed either towards concrete bodies or towards abstract qualities. The first kind of investigation rises little above mere natural history; but the other is more important and paves the way for metaphysics. It handles the configurations and the appetites or motions of matter. The configurations, or inner structure of bodies, include dense, rare, heavy, light, hot, cold, &c.,~ in fact, what are elsewhere called simple natures. Motions 9 are either simple or compound, the latter being the sum of a number of the former. In physics, however, these matters are treated only as regards their material or efficient causes, and the result of inquiry into any one case gives no general rule, but only facilitates invention in some similar instance. Metaphysics, on the other hand, treats of the formal or final cause 10 of these same substances and qualities, and results in a general rule. With regard to forms, the investiga- tion may be directed either towards concrete bodies or towards qualities. But the forms of substances " are so perplexed and complicated, that it is either vain to inquire into them at all, or such inquiry as is possible should be put off for a time, and not entered upon till forms of a more simple nature have been rightly investigated and discussed." 11 "To inquire into the form of a lion, of an oak, or gold, nay, even of water or air, is a vain pursuit; but to inquire the form of dense, rare, hot, cold, &c, as well configurations as motions, which in treating of physic I have in

6 Valerius Terminus, iii. 228-229.

7 Cf. N. 0. ii. 27. Bacon nowhere enters upon the questions of how such a science is to be constructed, and how it can be expected to possess an independent method while it remains the mere recep- tacle for the generalizations of the several sciences, and consequently has a content which varies with their progress. His whole conception of Prima Philosophia should be compared with such a modern work as the First Principles of Herbert Spencer. . ■ ‘•

8 It is to be noticed that this scale of nature corresponds with the scale of ascending axioms.

9 Cf. also for motions, N. O. ii. 48.

10 The knowledge of final causes does not lead to works, and the con- sideration of them must be rigidly excluded from physics. Yet there is no opposition between the physical and final causes; in ultimate resort the mind is compelled to think the universe as the work, of reason, to refer facts to God and Providence. The idea of final cause is also fruitful in sciences which have to do with human action. (Cf. De Aug. iii. cc. 4, 5; Nov. Org. i. 48, ii. 2.)

11 De Aug. iii. 4. In the Advancement (Works, iii. 355) it is dis- tinctly said that they are not to be inquired into. One can hardly see how the Baconian method could have, applied to concrete substances.

great part enumerated (I call them forms of the first class), and which (like the letters of the alphabet) are not many, and yet make up and sustain the essences and forms of all substances — this, I say, it is which I am attempting, and which constitutes and defines that part of metaphysic of which we are now inquir- ing.” Physics inquires into the same qualities, but does not push its investigations into ultimate reality or reach the more general causes We thus at last attain a definite conclusion with regard to forms, and it appears clear that in Bacon’s belief the true function of science was the search for a few fundamental physical qualities, highly abstract and general, the combinations of which give rise to the simple natures and complex phenomena around us. His general conception of the universe may therefore

be called mechanical or statical; the cause of each phenomenon is sup- posed to be actually contained in the phenomenon itself, and by a sufficiently accurate process could be sifted out and brought to light. As soon as the causes are known man regains his power over nature, for " whosoever knows any form, knows also the utmost possibility of superinducing that nature upon every variety of matter, and so is less restrained and tied in operation either to the basis of the matter or to the condition of the efficients." 1

Nature thus presented itself to Bacon's mind as a huge congeries of phenomena, the manifestations of some simple and primitive qualities, which were hid from us by the complexity of the things themselves. The world was a vast labyrinth, amid the windings of which we require some clue or thread whereby we may track our way to knowledge and thence to power. This thread, the filum labyrinthi, is the new method of induction. But, as has been frequently pointed out, the new method could not be applied until facts had been observed and collected. This is an indispensable preliminary. " Man, the servant and inter- preter of nature, can do and understand so much, and so much only, as he has observed in fact or in thought of the course of nature; beyond this he neither knows anything nor can do anything." The proposition that our knowledge of nature necessarily begins with observation and experience, is common to Bacon and many contemporary reformers of science, but he laid peculiar stress upon it, and gave it a new meaning. What he really meant by observation was a competent natural history or collection of facts. " The firm foundations of a purer natural philosophy are laid in natural history." 2 " First of all we must prepare a natural and experimental history, sufficient and good; and this is the foundation of all." 3 The senses and the memory, which collect and store up facts, must be assisted; there must be a ministration of the senses and another of the memory. For not only are instances required, but these must be arranged in such a manner as not to distract or confuse the mind, i.e. tables and arrangements of instances must be constructed. In the preliminary collection the greatest care must be taken that the mind be absolutely free from preconceived ideas; nature is only to be conquered by obedience; man must be merely receptive. " All depends on keeping the eye steadily fixed upon the facts of nature, and so receiving their images simply as they are; for God forbid that we should give out a dream of our own imagina- tion for a pattern of the world; rather may He graciously grant to us

to write an apocalypse or true vision of the footsteps of the Creator imprinted on his creatures." * Concealed among the facts presented to sense are the causes or forms, and the problem therefore is so to analyse experience, 5 so to break it up into pieces, that we shall with certainty and mechanical ease arrive at a true conclusion. This process, which forms the essence of the new method, may in its entirety, as a ministration to the reason, be called a logic; but it differs widely from the ordinary or school logic in end, method and form. Its aim is to acquire command over nature by knowledge, and to invent new arts, whereas the old logic strove only after dialectic victories and the

1 Thus the last step in the theoretical analysis gives the first means for the practical operation. Cf. Aristotle, Eth. Nic. iii. 3. 12, tai tv r% ytvkaa. Cf. also Nov. Org. i. 103.

2 Cogitationes {Works, iii. 187). 3 N. 0. 11. 10.

- Pref. to Instaur. Cf. Valerius Term. (Works, iii. 224), and N. O. i. 68, 124. « Pref. to Inst.

discovery of new arguments. In method the difference is even more fundamental. Hitherto the mode of demonstration had been by the syllogism; but the syllogism is, in many respects, an incompetent weapon. It is compelled to accept its first principles on trust from the science in which it is employed; it cannot cope with the subtlety of nature; and it is radically vitiated by being founded on hastily and inaccurately abstracted notions of things. For a syllogism consists of propositions, propositions of words, and words are the symbols of notions. Now the first step in accurate progress from sense to reason, or true philosophy, is to frame a bona nolio or accurate conception of the thing; but the received logic never does this. It flies off at once from experience and particulars to the highest and most general propositions, and from these descends, by the use of middle terms, to axioms of lower generality. Such a mode of procedure may be called anticipatio naturae (for in it reason is allowed to prescribe to things), and is opposed to the true method, the interpretatio naturae, in which reason follows and obeys nature, discovering her secrets by obedience and sub- mission to rule. Lastly, the very form of induction that has been used by logicians in the collection of their instances is a weak and useless thing. It is a mere enumeration of a few known facts, makes no use of exclusions or rejections, concludes precariously, and is always liable to be overthrown by a negative instance. 6 In radical

opposition to this method the Baconian induction begins by supplying helps and guides to the senses, whose un- assisted information could not be relied on. Notions were formed carefully, and not till after a certain process of induction was completed. 7 The formation of axioms was to be carried on by a gradually ascending scale. " Then and only then may we hope well of the sciences, when in a just scale of ascent and by successive steps, not interrupted or broken, we rise from particulars to lesser axioms; and then to middle axioms, one above the other; and last of all to the most general." 8 Finally the very form of induction itself must be new. " The induction which is to be available for the discovery and demonstration of sciences and arts must analyse nature by proper rejections and exclusions; and then, after a sufficient number of negatives, come to a conclusion on the affirmative Instances, which has not yet been done, or even attempted, save only by Plato. 9 . . . And this induction must be used not only to discover axioms, but also in the formation of notions." 10 This view of the function of exclusion is closely connected with Bacon's doctrine of forms,

6 Bacon's summary is valuable. " In the whole of the process which leads from the senses and objects to axioms and conclusions, the demonstrations which we use are deceptive and incompetent. The process consists of four parts, and has as many faults. In the first place, the impressions of the sense itself are faulty, for the sense both fails us and deceives us. But its shortcomings are to be supplied and its deceptions to be corrected. Secondly, notions are all drawn from the impressions of the sense, and are indefinite and con- fused, whereas they should be definite and distinctly bounded. Thirdly, the induction is amiss which infers the principles of sciences by simple enumeration, and does not, as it ought, employ exclusions and solutions (or separations) of nature. Lastly, that method of discovery and proof according to which the most general principles are first established, and then intermediate axioms are tried and proved by them, is the parent of error and the curse of all science." — N. 0. i. 69.

7 N. O. i. 105. *Ibid,_ i. 104; cf. i. 19-26.

9 This extract gives an answer to the objection sometimes raised that Bacon is not original in his theory of induction. He certainly admits that Plato has used a method somewhat akin to ,his own ; but it has frequently been contended that his induction is nothing more than the iirdyoiyq of Aristotle (see Remusat's

Bacon, &c, pp. 310-315, and for a criticism, Waddington, Essais de Logique, p. 261. sqq.) This seems a mistake. Bacon did not understand by in- duction the argument from particulars to a general proposition ; he looked upon the exclusion and rejection, or upon elimination, as the essence of induction. To this process he was led by his doctrine of forms, of which it is the necessary consequence] it is the infallible result of his view of science and its problem, and is as original as that is. Whoever accepts Bacon's doctrine of cause must accept at the same time his theory of the way in which the cause may be sifted out from among the phenomena. It is evident that the Socratic search for the essence by an analysis of instances — an induction ending in a definition — has a strong resemblance to the Baconian inductive method. m N. 0. i. 103.

and is in fact dependent upon that theory. But induction is neither the whole of the new method, nor is it applicable to forms only. There are two other grand objects of inquiry: the one, the transformation of concrete bodies; the other, the investigation of the latent powers and the latent schematism or configuration. With regard to the first, in ultimate result it depends upon the theory of forms; for whenever the compound body can be regarded as the sum of certain simple natures, then our knowledge of the forms of these natures gives us the power of superinducing a new nature on the concrete body. As regards the latent process (latens processus) which goes on in all cases of generation and continuous development or motion, we examine carefully, and by quantitative measurements, the gradual growth and change from the first elements to the completed thing. The same kind of investigation may be extended to many bases of natural motion, such as voluntary action or nutrition; and though inquiry is here directed towards concrete bodies, and does not therefore penetrate so deeply into reality as in research for forms, yet great results may be looked for with more confidence. It is to be regretted that Bacon did not complete this portion of his work, in which for the first time he approaches modern conceptions of change. The latent configuration (latens schematistnus) or inward structure of the parts of a body must be known before we can hope to superinduce a new nature upon it. This can only be discovered by analysis, which will disclose the ultimate constituents (natural particles, not atoms) of bodies,

and lead back the discussion to forms or simple natures, whereby alone can true light be thrown on these obscure questions. Thus, in all cases, scientific explanation depends upon knowledge of forms; all phenomena or secondary qualities are accounted for by being referred to the primary qualities of matter.

The several steps in the inductive investigation of the form of any nature flow readily from the definition of the form itself. For that is always and necessarily present when the nature is present, absent when it is absent, decreases and increases accord- ing as the nature decreases and increases. It is therefore requisi te for the inquiry to have before us instances in which the nature is present. The list of these is called the table of Essence and Presence. Secondly, we must have instances in which the nature is absent; only as such cases might be infinite, attention should be limited to such of them as ate most akin to the instances of presence. 1 The list in this case is called table of Absence in Proximity. Thirdly, we must have a number of instances in which the nature is present in different degrees, either increasing or decreasing in the same subject, or variously present in different subjects. This is the table of Degrees, or Comparison. After the formation of these tables, we proceed to apply what is perhaps the most valuable part of the Baconian method, and that in which the author took most pride, the process of exclusion or rejection. This elimination of the non-essential, grounded on the funda- mental propositions with regard to forms, is the most important of Bacon's contributions to the logic of induction, and that in which, as he repeatedly says, his method differs from all previous philosophies. It is evident that if the tables were complete, and our notions of the respective phenomena clear, the process of exclusion would be a merely mechanical counting out, and would infallibly lead to the detection of the cause or form. But it is just as evident that these conditions can never be adequately fulfilled. Bacon saw that his method was impracticable (though he seems to have thought the difficulties not insuperable), and therefore set to work to devise new helps, adminicula. These he enumerates in ii., Aph. 21: — Prerogative Instances, Supports of Induction, Rectification of Induction, Varying the Investiga- tion according to the Nature of the Subject, Prerogative Natures, Limits of Investigation, Application to Practice, Preparations for Investigation, the Ascending and Descending Scale of Axioms. The remainder of the Organum is devoted to a consideration of the twenty -seven classes of Prerogative Instances, and though it contains much that is both

luminous and helpful, it adds little to our knowledge of what constitutes the Baconian method.

1 That is to say, differing in nothing save the absence of the nature under investigation.

On the other heads we have but a few scattered hints. But although the rigorous requirements of science could only be fulfilled by the employment of all these means, yet in their absence it was permissible to draw from the tables and the exclusion a hypothetical conclusion, the truth of which might be verified by the use of the other processes; such an hypothesis is called fantastically the First Vintage (Vindemialio). The inductive method, so far as exhibited in the Organum, is exemplified by an investigation into the nature of heat.

Such was the method devised by Bacon, and to which he ascribed the qualities of absolute certainty and mechanical simplicity. But even supposing that this method were accurate and completely unfolded, it is evident that it could only be made applicable and produce fruit when the phenomena of the universe have been very completely tabulated and arranged. In this demand for a complete natural history, Bacon also felt that he was original, and he was deeply impressed with the necessity for it; 2 in fact, he seems occasionally to place an even higher value upon it than upon his Organum. Thus, in the preface to his series of works forming the third part of the Instauratio, he says: ” It comes, therefore, to this, that my Organum, even if it were completed, would not without the Natural History much advance the Instauralion of the Sciences, whereas the Natural History without the Organum would advance it not a little.” 3 But a complete natural history is evidently a thing impossible, and in fact a history can only be collected by attending to the requirements of the Organum. This was seen by Bacon, and what may be regarded as his final opinion on the question is given in the important letter to Jean Antoirie Baranzano 4 (” Redemptus “: 1590-1622): — ” With regard to the multitude of instances by which men may be deterred from the attempt, here is my answer. First, what need to dissemble? Either store of instances must be procured, or the business must be given up. All other ways, however enticing, are impassable. Secondly, the prerogatives of instances, and the mode of experi- menting upon experiments of light (which I shall hereafter explain), will diminish the multitude of them very much. Thirdly, what matter, I ask, if the description of the instances should fill six times as many volumes

as Pliny's History ? . . . For the true natural history is to take nothing except instances, connections, observations and canons." 5 The Organum and the History are thus correlative, and form the two equally necessary sides of a true philosophy; by their union the new philosophy is produced.

Summary. — Two questions may be put to any doctrine which professes to effect a radical change in philosophy or science. Is it original ? Is it valuable ? With regard to the first, it has been already pointed out that Bacon's induction or inductive method is distinctly his own, though it cannot and need not be maintained that the general spirit of his philosophy was entirely new. 6

The value of the method is the separate and more difficult question. It has been assailed on the most opposite grounds. Macaulay, while admitting the accuracy of the process, denied its efficiency, on the ground that an operation performed naturally was not rendered more easy or efficacious by being subjected to analysis. 7 This objection is curious when confronted with Bacon's reiterated assertion that the natural method pursued by the unassisted human reason is distinctly opposed to his; and it is besides an argument that tells so strongly against many sciences, as to be comparatively worthless when applied to any one. There are, however, more formidable objections against the method. It has been pointed out, 3 and with perfect justice,

2 Distrib. Op. (Works, iv. 28) ; Parasceve (ibid. 251, 252, 255-256); Descrip. Glob. Intel, ch. 3.

3 Works, ii. 16; cf. N. O. i. 130.

4 A Barnabite monk, professor of mathematics and philosophy at Annecy.

5 Letters and Life, vii. 377.

6 For a full discussion of Bacon's relation to his predecessors and contemporaries, see Fowler's TV. O. introd. § 13.

7 Cf. what Bacon says, N. 0. i. 130.

8 Brewster, Life of Newton (1855) (see particularly vol. ii. 403, 405) ; Lasson, Vber Bacon von Verulam's wissenschaftliche Principien

that science in its progress has not followed the Baconian method, that no one discovery can be pointed to which can be definitely ascribed to the use of his rules, and that men the most celebrated for their scientific acquirements, while paying homage to the name of Bacon, practically set at naught his most cherished precepts. The reason of this is not far to seek, and has been pointed out by logicians of the most diametrically opposed schools. The mechanical character both of the natural history and of the logical method applied to it, resulted necessarily from Bacon's radically false conception of the nature of cause and of the causal relation. The whole logical or scientific problem is treated as if it were one of co-existence, to which in truth the method of exclusion is scarcely applicable, and the assumption is constantly made that each phenomenon has one and only one cause. 1 The inductive formation of axioms by a gradually ascending scale is a route which no science has ever followed, and by which no science could ever make progress. The true scient'fic procedure is by hypothesis followed up and tested by verification; the most powerful instrument is the deductive method, which Bacon can hardly be said to have recognized. The power of framing hypothesis points to another want in the Baconian doctrine. If that power form part of the true method, then the mind is not wholly passive or recipient; it anticipates nature, and moulds the experience received by it in accordance with its own constructive ideas or conceptions; and yet further, the minds of various investigators can never be reduced to the same dead mechanical level. 2 There will still be room for the scientific use of the imagination and for the creative flashes of genius. 3

If, then, Bacon himself made no contributions to science, if no discovery can be shown to be due to the use of his rules, if his method be logically defective, and the problem to which it was applied one from its nature incapable of adequate solution, it may not unreasonably be asked, How has he come to be looked upon as the great leader in the reformation of modern science? How is it that he shares with Descartes the honour of inaugurating modern philosophy? To this the true answer seems to be that Bacon owes his position not only to the general spirit of his philosophy, but to the manner in which he worked into a con-

(1860); Liebig, €ber Francis Bacon von Verulam, &c. (1863). Although Liebig points out how little science proceeds according to Bacon's rules, yet his other criticisms seem of extremely little value. In a very offensive and quite unjustifiable tone, which is severely commented on by Sigwart and Fischer, he attacks the Baconian methods and its results. These results he claims to find in the Sylva Sylvarum, entirely ignoring what Bacon himself has said of the nature of that work (N. 0. i. 117; cf. Rawley's Pref. to the 5. S.), and thus putting a false interpretation on the experiments there noted. It is not surprising that he should detect many flaws, but he never fails to exaggerate an error, and seems sometimes com- pletely to miss the point of what Bacon says. (See particularly his remarks on S. S. 33, 336.) The method he explains in such a way as to show he has not a glimpse of its true nature. He brings against Bacon, of all men, the accusations of making induction start from the undetermined perceptions of the senses, of using imagination, and of putting a quite arbitrary interpretation on phenomena. He crowns his criticism by expounding what he considers to be the true scientific method, which, as has been pointed out by Fischer, is simply that Baconian doctrine against which his attack ought to have been directed. (See his account of the method, Vber Bacon, 47-49 ; K. Fischer, Bacon, pp. 499-502.)

1 Mill, Logic, ii. pp. 115, 116, 329, 330.

8 Whewell, Phil, of Ind. Sc. ii. 399, 402-403 ; Ellis, Int. to Bacon's Works, i. 39, 61 ; Brewster, Newton, ii. 404; Jevons, Princ. of Science ii. 220. A severe judgment on Bacon's method is given in Diihring's able but one-sided Kritische Gesch. d. Phil., in which the merits of Roger Bacon are brought prominently forward.

3 Although it must be admitted that the Baconian method is fairly open to the above-mentioned objections, it is curious and significant that Bacon was not thoroughly ignorant of them, but with deliberate consciousness preferred his own method. We do not think, indeed, that the notiones of which he speaks in any way correspond to what Whewell and Ellis would call " conceptions or ideas furnished by the mind of the thinker "; nor do we imagine that Bacon would have admitted these as necessary elements in the inductive process. But he was certainly not ignorant of what may be called a deductive method, and of a kind of hypothesis. This is clear from the use he makes of the Vindemiatio, from certain hints as to the testing of axioms, from

his admission of the syllogism into physical reasoning, and from what he calls Experientia Literata. The function of the

nected system the new mode of thinking, and to the incomparable power and eloquence with which he expounded and enforced it. Like all epoch-making works, the Novum Organum gave ex- pression to ideas which were already beginning to be in the air. The time was ripe for a great change; scholasticism, long decaying, had begun to fall; the authority not only of school doctrines but of the church had been discarded; while here and there a few devoted experimenters were turning with fresh zeal to the unwithered face of nature. The fruitful thoughts which lay under and gave rise to these scattered efforts of the human mind, were gathered up into unity, and reduced to system in the new philosophy of Bacon. 4 It is assuredly little matter for wonder that this philosophy should contain much that is now inapplicable, and that in many respects it should be vitiated by radical eriors. The details of the logical method on which its author laid the greatest stress have not been found of practical service; 5 yet the fundamental ideas on which the theory rested, the need for rejecting rash generalization, and the necessity for a critical analysis of experience, are as true and valuable now as they were then. Progress in scientific discovery is made mainly, if not solely, by the employment of hypothesis, and for that no code of rules can be laid down such as Bacon had devised. ‘ Yet the framing of hypothesis is no mere random guesswork; it is left not to the imagination alone, but to the scientific imagination. There is required in the process not merely a preliminary critical induction, but a subsequent experimental comparison, verifica- tion or proof, the canons of which can be laid down with precision. To formulate and show grounds for these laws is to construct a philosophy of induction, and it must not be forgotten that the first step towards the accomplishment of the task was made by Bacon when he introduced and gave prominence to the powerful logical instrument of exclusion or elimination.

It is curious and significant that in the domain of the moral and metaphysical sciences his influence has been perhaps more powerful, and his authority has been more frequently appealed to, than in that of the physical. This is due, not so much to his expressed opinion that the inductive method was applicable to all the sciences, 6 as to the generally practical, or, one may say, Vindemiatio has 1 been already pointed out; with regard to axioms, he says (N. O. i. 106), ” In establishing axioms by this

kind of in- duction, we must also examine and try whether the axiom so estab- lished be framed to the measure of these particulars, from which it is derived, or whether it be larger or wider. And if it be larger and wider, we must observe whether, by indicating to us new particulars, it confirm that wideness and largeness as by a collateral security, that we may not either stick fast in things already known, or loosely grasp at shadows and abstract forms, not at things solid and realized in matter." (Cf. also the passage from Valerius Terminus, quoted in Ellis's note on the above aphorism.) Of the syllogism he says, " I do not propose to give up the syllogism altogether. S. is incompetent for the principal things rather than useless for the generality. In the mathematics there is no reason why it should not be employed. It is the flux of matter and the inconstancy of the physical body which requires induction, that thereby it may be fixed as it were, and allow the formation of notions well defined. In physics you wisely note, and therein I agree with you, that after the notions of the first class and the axioms concerning them have been by induction well made out and defined, syllogism may be applied safely; only it must be restrained from leaping at once to the most general notions, and progress must be made through a fit succession of sterns." — (" Letter to Baranzano," Letters and Life, vii. 377). And with this may be compared what he says of mathematics {Nov. Org. ii. 8; Parasceve, vii.). In his account of Experientia Literata {De Aug. v. 2) he comes very near to the modern mode of experi- mental research. _ It is, he says, the procedure from one experiment to another, and it is not a science but an art or learned sagacity (resembling in this Aristotle's iyxlvoia), which may, however, be enlightened by the precepts of the Interpretatio. Eight varisties of such experiments are enumerated, and a comparison is drawn between this and the inductive method; "though the rational method of inquiry by the Organon promises far greater things in the end, yet this sagacity, proceeding by learned experience, will in the meantime present mankind with a number of inventions which lie near at hand." (Cf. N. O. i. 103.)

4 See the vigorous passage in Herschel, Discourse on the Study of Natural Philosophy, § 105 ; cf. § 96 of the same work.,

6 Bacon himself seems to anticipate that the progress of science would of itself render his method antiquated (Nov. Org. i. 130).

6 Nov. Org. i. 127.

positive spirit of his System. Theological questions, which had tortured the minds of generations, are by him relegated from the province of reason to that of faith. Even reason must be restrained from striving after ultimate truth; it is one of the errors of the human intellect that it will not rest in general principles, but must push its investigations deeper. Experi- ence and observation are the only remedies against prejudice and error. Into questions of metaphysics, as commonly under- stood, Bacon can hardly be said to have entered, but a long line of thinkers have drawn inspiration from him, and it is not without justice that he has been looked upon as the originator and guiding spirit of what is known as the empirical school.

Bacon's Influence. — It is impossible within our limits to do more than indicate the influence which Bacon's views have had on subsequent thinkers. The most valuable and complete discussion of the subject is contained in T. Fowler's edition of the Novum Organum (introd. § 14). It is there argued that, both in philo- sophy and in natural science, Bacon's influence was immediate and lasting. Under the former head it is pointed out (i.) that the fundamental principle of Locke's Essay, that all our ideas are product of sensation and reflection, is briefly stated in the first aphorism of the Novum Organum, and (ii.) that the whole atmosphere of that treatise is characteristic of the Essay. Bacon is, therefore, regarded by many as the father of what is most characteristic in English psychological speculation. As he himself said, he " rang the bell which called the wits 'together." In the sphere of ethics he is similarly regarded as a forerunner of the empirical method. The spirit of the De Augmentis (bk. vii.) and the inductive method which is discussed in the Novum Organum are at the root of all theories which have constructed a moral code by an inductive examination of human conscious- ness and the results of actions. Among such theories utilitarian- ism especially is the natural result of the application to the phenomenon of conduct of the Baconian experimental method. In this connexion, however, it is important to notice that Hobbes, who had been Bacon's secretary, makes no mention of Baconian induction, nor does he in any of his works make any critical reference to Bacon himself. It would, therefore, appear that Bacon's influence was not immediate.

In the sphere of natural science, Bacon's importance is attested by references to his work in the writings of the principal scientists, not only English, but French, German and Italian. Fowler {op. cit.) has collected from Descartes, Gassendi, S. Sorbiere, Jean Baptiste du Hamel, quotations which show how highly Bacon was regarded by the leaders of the new scientific movement. Sorbiere, who was by no means partial to things English, definitely speaks of him as " celuy qui a le plus puissamment solicite les interests de la physique, et excite le monde a, faire des ex- periences " {Relation d'un voyage en Angleterre, Cologne, 1666, pp. 63-64). It was, however, Voltaire and the encyclopaedists who raised Bacon to the pinnacle of his fame in France, and hailed him as " le pere de la philosophie experimentale " {Lettres sur les Anglois). Condillac, in the same spirit, says of him, " personne n'a mieux connu que lui la cause de nos erreurs." So the EncyclopHie, besides giving a eulogistic article " Baconisme," speaks of him (in d'Alembert's preliminary discourse) as " le plus grand, le plus universel, et le plus eloquent des philosophes." Among other writers, Leibnitz and Huygens give testimony which is the more valuable as being critical. Leibnitz speaks of Bacon as " divini ingenii vir," and, like several other German authors, classes him with Campanella; Huygens refers to his " bonnes methodes." If, however, we are to attach weight to English writers of the latter half of the 17th century, we shall find that one of Bacon's greatest achievements was the impetus given by his New Atlantis to the foundation of the Royal Society {q.v.). Dr Thomas Sprat (1635-17 13), bishop of Rochester and first historian of the society, says that Bacon of all others " had the true imagination of the whole extent" of the enterprise, and that in his works are to be found the best arguments for the experi- mental method of natural philosophy {Hist, of the Royal Society, pp. 35-36, and Thomas Tenison's Baconiana, pp. 264-266). In this connexion reference should be made also to Cowley's

Ode to the Royal Society, and to Dr John Wallis's remarks in Hearne's Preface to P. Langtoft's Chronicle (appendix, num. xi.). Joseph Glanvill, in his Scepsis Scientifica (dedication) says, " Solomon's house in the New Atlantis was a prophetic scheme of the Royal Society "; and Henry Oldenburg {c. 1615-1677), one of the first secretaries of the society, speaks of the new eagerness to obtain scientific data as " a work begun by the single care and conduct of the excellent Lord Verulam." Boyle, in whose works there are frequent eulogistic references to Bacon, regarded

himself as a disciple and was indeed known as a second Bacon. The predominating influence of Bacon's philosophy is thus clearly established in the generation which succeeded his own. There is abundant evidence to show that in the uni- versities of Oxford and Cambridge (especially the latter) the new spirit had already modified the old curricula. Bacon has fre- quently been disparaged on the ground that his name is not mentioned by Sir Isaac Newton. It can be shown, however, that Newton was not ignorant of Bacon's works, and Dr Fowler explains his silence with regard to them on three grounds: (1) that Bacon's reputation was so well established that any definite mention was unnecessary, (2) that it was not customary at the time to acknowledge indebtedness to contemporary and recent writers, and (3) that Newton's genius was so strongly mathe- matical (whereas Bacon's great weakness was in mathematics) that he had no special reason to refer to Bacon's experimental principles.

If the foregoing examples are held sufficient to establish the influence of Bacon on the intellectual development of his im- mediate successors, it follows that the whole trend of typically English thought, not only in natural science, but also in mental, moral and political philosophy, is the logical fulfilment of Baconian principles. He argued against the tyranny of auth- ority, the vagaries of unfettered imagination and the academic aims of unpractical dialectic; the vital energy and the reasoned optimism of his language entirely outweigh the fact that his contributions to the stock of actual scientific knowledge were practically inconsiderable. It may be freely admitted that in the domain of logic there is nothing in the Organum that has not been more instructively analysed either by Aristotle himself or in modern works; at the same time, there is probably no work which is a better and more stimulating introduction to logical study. Its terse, epigrammatic phrases sink into the fibre of the mind, and are a healthy warning against crude, immature generalization.

While, therefore, it is a profound mistake to regard Bacon as a great constructive philosopher, or even as a lonely pioneer of modern thought, it is quite unfair to speak of him as a trifler. His great work consists in the fact that he summed up the faults which the widening of knowledge had disclosed in medieval thought, and in this sense he stands high among those who were in many parts of 16th-century Europe striving towards a new intellectual activity.

Bibliography. Editions. — The classical edition is that of R. L. Ellis, J. Spedding and D. D. Heath, 1st ed., 1857; 2nd ed., 1870 (vols, i.-iii., philosophical writings; iv.-v., translations; vi.-vii., literary and professional works). B. Montagu's edition (17 vols., 1825-1834) is full but unscholarly. An extremely useful reprint (in one volume) of the philosophical works (with a few not strictly philosophical), based on the first Ellis-Spedding edition, was pub- lished by J. M. Robertson (London, 1905); besides the original introductions, it contains a useful summary by the editor of the various problems of Bacon's life and thought. Numerous cheap editions have lately been published, e.g. in the " World's Classics " (1901), and " New Universal Library" series (1905); Sidney Lee, English Works of Francis Bacon (London, 1905).

Of particular works there are numerous editions in all the chief languages. The following are the most important: — T. Fowler, Novum Organum (Oxford, 1878; ed. 1889), with notes, full introduction on Bacon's philosophy in all its relations, and a most valuable bibliography. This superseded the edition of G. W. Kitchin (Oxford, 1855). The Essays have been edited more than twenty times since 1870 ; the following editions may be mentioned: — Archbishop Whately (6th ed., 1864); W. Aldis Wright (Lond., 1862); F. Storr and Gibson (Lond., 1886); E. A. Abbott (Lond., 1879); John Buchan (Lond., 1879); A. S. West (Cambridge, 1897); W. Evans (Edinburgh, 1897). A facsimile reprint of the 1st edition was pub- lished in New York (1904). Advancement of Learning: — W. Aldis

*$2

Wright (Camb., 1866; 5th ed., 1900); F. G. Selby (1892-1895); H. Morley (1905); and, with the New Atlantis, in the "World's Classics" series (introduction by Prof. T. Case, Lond., 1906). Wisdom of the Ancients and New Atlantis, in " Cassell's National Library " (1886 and 1903). G. C. M. Smith, New Atlantis (1900). J. Fiirstenhagen, Kleinere Schriftcn (Leipzig, 1884).

Biography. — J. Spedding, The Life and Letters of Lord Bacon (1861), Life and Times of Francis Bacon (1878); also Dr Rawley's Life in the Ellis-Spedding editions, and J. M. Robertson's reprint (above) ; W. Hepworth Dixon, Personal History of Lord Bacon (Lond., 1861), and Story of Lord Bacon's Life (ib. 1862); John Campbell, Lives of the Chancellors (Lond., 1845), ii. 51; P. Woodward, Early Life of Lord Bacon (1902); T. Fowler, Francis Bacon in " English Philos." series (Lond., 1881); R. W. Church's Bacon,

in ” Men of Letters ” series (1884).

Philosophy. — Beside the introductions in the Ellis-Spedding and T. Fowler editions, and general histories of philosophy, see: — Kuno Fischer, Fr. Bacon (1856, 2nd ed., 1875, Eng. trans, by John Oxenford, Lond., 1857); Ch. de Remusat, Bacon, sa vie . . . et son influence (1857, ed. 1858 and 1877); G. L. Craik, Lord Bacon, his Writings and his Philosophy (3 vols., 1846-1847, ed. i860) ; A. Dorner, De Baconis Philosophia (Berlin, 1867; London, 1886); J. y. Liebig, Vber F. B. v. Verulam (Mannheim, 1863) ; Ad. Lasson, Uber B. v. Verulam’ s wissenschaftliche Principien (Berl., i860); E. H. Bohmer, Vber F. B. v. Verulam (Erlangen, 1864); Ch. Adam, Philos. de Francis Bacon (Paris, 1890); Barthelemy St Hilaire, Etude sur Francis Bacon (Paris, 1890) ; R. W. Church, op. cit. ; H. Heussler, F. Bacon und seine geschichtliche Stellung (Breslau, 1889); H. Hoff- ding, History of Modern Philosophy (Eng. trans., 1900); J. M. Robertson, Short History of Freethought (Lond., 1906); Sidney Lee, Great Englishmen of the 16th century (Lond., 1904). For the relations between Bacon and Ben Jonson see The Tale of the Shakespeare Epitaphs by Francis Bacon (New York, 1888); for Bacon’s poetical gifts see an article in the Fortnightly Review (March 1905).

For the Bacon-Shakespeare controversy see Shakespeare.

(R. Ad.; J. M. M.)

BACON, JOHN (1 740-1 799), British sculptor, was born in Southwark on the 24th of November 1740, the son of Thomas Bacon, a cloth-worker, whose forefathers possessed a considerable estate in Somersetshire. At the age of fourteen he was bound apprentice in Mr Crispe’s manufactory of porcelain at Lambeth, where he was at first employed in painting the small ornamental pieces of china, but by his great skill in moulding he soon attained the distinction of being modeller to the work. While engaged in the porcelain works his observation of the models executed by different sculptors of eminence, which were sent to be burned at an adjoining pottery, determined the direction of his genius; he devoted himself to the imitation of them with so much success that in 1758 a small figure of Peace sent by him to the Society for the Encouragement of Arts received a prize, and the highest premiums given by that society were adjudged to him nine times between the years 1763 and 1776. During his apprentice- ship he also improved the method of working statues in artificial stone, an art which he afterwards

carried to perfection. Bacon first attempted working in marble about the year 1763, and during the course of his early efforts in this art was led to improve the method of transferring the form of the model to the marble (technically " getting out the points") by the invention of a more perfect instrument for the purpose. This instrument pos- sessed many advantages above those formerly employed; it was more exact, took a correct measurement in every direction, was contained in a small compass, and could be used upon either the model or the marble. In the year 1769 he was adjudged the first gold medal for sculpture given by the Royal Academy, his work being a bas-relief representing the escape of Aeneas from Troy. In 1770 he exhibited a figure of Mars, which gained him the gold medal of the Society of Arts and his election as A.R.A. As a consequence of this success he was engaged to execute a bust of George III., intended for Christ Church, Oxford. He secured the king's favour and retained it throughout life. Considerable jealousy was entertained against him by other sculptors, and he was commonly charged with ignorance of classic style. This charge he repelled by the execution of a noble head of Jupiter Tonans, and many of his emblematical figures are in perfect classical taste. He died on the 4th of August 1799 and was buried in Whitfield's Tabernacle. His various productions which may be studied in St Paul's cathedral, London, Christ Chuich and Pembroke College, Oxford, the Abbey church, Bath,

and Bristol cathedral, give ample testimony to his powers. Perhaps his best works are to be found among the monuments in Westminster Abbey.

See Richard Cecil, Memoirs of John Bacon, R.A. (London, 1801) • and also vol. i. of R. Cecil's works, ed. J. Pratt (1811).

BACON, LEONARD (1802-1881), American Congregational preacher and writer, was born in Detroit, Michigan, on the 19th of February 1802, the son of David Bacon (1771-1817), missionary among the Indians in Michigan and founder of the town of Tallmadge, Ohio. The son prepared for college at the Hartford (Conn.) grammar school, graduated at Yale in 1820 and at the Andover Theological Seminary in 1823, and from 1825 until his death on the 24th of December 1881 was pastor of the First Church (Congregational) in New Haven, Connecticut, occupying a pulpit which was one of the most conspicuous in

New England, and which had been rendered famous by his predecessors, Moses Stuart and Nathaniel W. Taylor. In 1866, however, though he was never dismissed by a council from his connexion with that church, he gave up the active pastorate. He was, from 1826 to 1838, an editor of the Christian Spectator (New Haven); was one of the founders (1843) °f t ne New Englander (later the Yale Review) ; founded in 1848 with Dr R. S. Storrs, Joshua Leavitt, Dr Joseph P. Thompson and Henry C. Bowen, primarily to combat slavery extension, the Independent, of which he was an editor until 1863; and was acting professor of didactic theology is the theological department of Yale University from 1866 to 1871, and lecturer on church polity and American church history from 187 1 until his death. Gradually, after taking up his pastorate, he gained greater and greater influence in his denomination, until he came to be regarded as perhaps the most prominent Congregationalist of his time, and was sometimes popularly referred to as " The Congregational Fop'e of New England." In all the heated theological controversies of the day, particularly the long and bitter one concerning the views put forward by Dr Horace Bushnell, he was conspicuous, using his influence to bring about harmony, and in the councils of the Congregational churches, over two of which, the Brooklyn councils of 1874 and 1876. he presided as moderator, he manifested great ability both as a debater and as a parliamentarian. In his own theological views he was broad-minded and an advocate of liberal orthodoxy. In all matters concerning the welfare of his community or the nation, moreover, he took a deep and constant interest, and was particularly identified with the temperance and anti-slavery movements, his services to the latter constituting probably the most important work of his life. In this, as in most other controversies, he took a moderate course, condemning the apologists and defenders of slavery on the one hand and the Garrisonian extremists on the other. His Slavery Discussed in Occasional Essays from 1833 to 1846 (1846) exercised considerable influence upon Abraham Lincoln, and in this book appears the sentence, which, as rephrased by Lincoln, was widely quoted: " If that form of government, that system of social order is not wrong — if those laws of the Southern States, by virtue of which slavery exists there, and is what it is, are not wrong — nothing is wrong." He was early attracted to the study of the ecclesiastical history of New England and was frequently called upon to deliver commemorative addresses, some of which were published in book and pamphlet form. Of these, his Thirteen

Historical Discourses (1839), dealing with the history of New Haven, and his Four Commemorative Discourses (1866) may be especially mentioned. The most im- portant of his historical works, however, is his Genesis of the New England Churches (1874). He published A Manual for Young Church Members (1833) ; edited, with a biography, the Select Prac- tical Writings of Richard Baxter (1831) ; and was the author of a number of hymns, the best-known of which is the one beginning, " O God, beneath Thy guiding hand Our exiled fathers crossed the sea."

There is no good biography, but there is much biographical material in the commemorative volume issued by his congregation, Leonard Bacon, Pastor of the First Church in New Haven (New Haven, 1882), and there is a good sketch in Williston Walker's Ten New England Leaders (New York, 1901).

Leonard Bacon's sister Delia Bacon (1811-1859), born in Tallmadge, Ohio, on the 2nd of February 181 1, was a teacher in schools in Connecticut, New Jersey and New York, and then, until about 1852, conducted in various eastern cities, by methods devised by herself, classes for women in history and literature. She wrote Tales of the Puritans (1831), The Bride of Fort Edward (1839), based on the story of Jane M'Crea, partly in blank verse, and The Philosophy of the Plays of Shakespeare Unfolded (1857), for which alone she is remembered. This book, in the preparation of which she spent several years in study in England, where she was befriended by Thomas Carlyle and especially by Nathaniel Hawthorne, was intended to prove that the plays attributed to Shakespeare were written by a coterie of men, including Francis Bacon, Sir Walter Raleigh and Edmund Spenser, for the purpose of inculcating a philosophic system, for which they felt that they themselves could not afford to assume the responsibility. This system she professed to dis- cover beneath the superficial text of the plays. Her devotion to this one idea, as Hawthorne says, " had thrown her off her balance," and while she was in England she lost her mind entirely. She died in Hartford, Connecticut, on the 2nd of September 1859.

There is a biography by her nephew, Theodore Bacon, Delia Bacon: A Sketch (Boston, 1888), and an appreciative chapter, "Recollections of a Gifted Woman," in Nathaniel Hawthorne's

Our Old Home (Boston, 1863).

Leonard Bacon's son Leonard Woolsey Bacon (1830-1907). graduated at Yale in 1850, was pastor of various Congregational and Presbyterian churches, and published Church Papers (1876); A Life Worth Living: Life of Emily Bliss Gould (1878); Irenics and Polemics and Sundry Essays in Church History (1895); History of American Christianity (1898); and The Congrega- tionalists (1904). (W. Wr.)

BACON, SIR NICHOLAS (1509-1579), lord keeper of the great seal of England during the reign of Queen Elizabeth, was the second son of Robert Bacon of Drinkstone, Suffolk, and was born at Chislehurst. He was educated at Corpus Christi College, Cambridge, graduating B.A. in 1527, and afterwards spent some time in Paris. Having returned to England and entered Gray's Inn, he was called to the bar in 1533, and four years later began his public life as solicitor of the court of augmentations. Quickly becoming a person of importance he obtained a number of estates, principally in the eastern counties, after the dissolution of the monasteries, and in 1545 became member of parliament for Dartmouth. In 1 546 he was made attorney of the court of wards and liveries, an office of both honour and profit; in 1550 became a bencher and in 1552 treasurer of Gray's Inn. Although his sympathies were with the Protestants, he retained his office in the court of wards during Mary's reign, but an order was issued to prevent him from leaving England. The important period in Bacon's life began with the accession of Elizabeth in 1558. Owing largely to his long and close friendship with Sir William Cecil, afterwards Lord Burghley, his brother-in-law, he was appointed lord keeper of the great seal in December of this year. and was soon afterwards made a privy councillor and a knight. He was instrumental in securing the archbishopric of Canterbury for his friend Matthew Parker, and in his official capacity pre- sided over the House of Lords when Elizabeth opened her first parliament. In opposition to Cecil, he objected to the policy of making war on France in the interests of the enemies of Mary queen of Scots, on the ground of the poverty of England; but afterwards favoured a closer union with foreign Protestants, and seemed quite alive to the danger to his country from the allied and aggressive religious policy of France and Scotland. In 1559 he was authorized to exercise the full jurisdiction of lord chan- cellor. In 1564 he fell temporarily into the royal disfavour and was dismissed from court, because Elizabeth suspected he was concerned in the publication of a

pamphlet, ” A Declaration of the Succession of the Crowne Imperial! of Ingland,” written by John Hales (q.v.), and favouring the claim of Lady Catherine Grey to the English throne. Bacon’s innocence having been admitted he was restored to favour, and replied to a writing by Sir Anthony

Browne, who had again asserted the rights of the house of Suffolk to which Lady Catherine belonged. He thoroughly distrusted Mary queen of Scots; objected to the proposal to marry her’tb the duke of Norfolk; and warned Elizabeth that serious consequences for England would follow her restoration. He seems to have disliked the proposed marriage between the English queen and Francis, duke of Anjou, and his distrust of the Roman Catholics and the French was increased by the massacre of St Bartholomew. As a loyal English churchman he was ceaselessly interested in ecclesiastical matters, and made suggestions for the better observation of doctrine and discipline in the church. He died in London on the 20th of February 1579 and was buried in St Paul’s cathedral, his death calling forth many tributes to his memory. He was an eloquent speaker, a learned lawyer, a generous friend; and his interest in education led him to make several gifts and bequests for educational purposes, including the foundation of a free grammar school at Redgrave. His figure was very corpulent and ungainly. Elizabeth visited him several times at Gorhambury, and had previously visited him atRedgrave. He was twice married and by his first wife, Jane, had three sons and three daughters. His second wife was Anne (d. 1610), daughter of Sir Anthony Cooke, by whom he had two sons. Bacon’s eldest son, Nicholas (c. 1 540-1624), was member of parliament for the county of Suffolk and in 161 1 was created premier baronet of England. This baronetcy is still held by his descendants. His second and third sons, Nathaniel (c. 1550-1622 and Edward (c. 1 550-1618), also took some part in public life, and through his daughter, Anne, Nathaniel was an ancestor of the marquesses Townshend. His sons by his second wife were Anthony (1558-1601), a diplomatist of some repute, and the illustrious Francis Bacon (q.v.).

See G. Whetstone, “Remembraunce of the life of Sir N. Bacon,” in the Frondes Caducae (London, 18 16); J. A. Froude, History of England, passim (London, 1881 f.).

BACON, ROGER (c. 1214-c. 1294), English philosopher and man of science, was born near Ilchester in Somerset. His family appears to have been in good circumstances, but in the stormy

reign of Henry III. their property was despoiled and several members of the family were driven into exile. Roger completed his studies at Oxford, though not, as current traditions assert, at Merton or at Brasenose, neither of which had then been founded. His abilities were speedily recognized by his contemporaries, and he enjoyed the friendship of such eminent men as Adam de Marisco and Robert Grosseteste, bishop of Lincoln.

Very little is known of Bacon's life at Oxford; it is said he took orders in 1 233, and this is not improbable. In the following year, or perhaps later, he crossed over to France and studied at the university of Paris, then the centre of intellectual life in Europe. The two great orders, Franciscans and Dominicans, were in the vigour of youth, and had already begun to take the lead in theological discussion. Alexander of Hales was the oracle of the Franciscans, while the rival order rejoiced in Albertus Magnus and Thomas Aquinas.

The scientific training which Bacon had received, mainly from the study of the Arab writers, showed him the manifold defects in the systems reared by these doctors. Aristotle was known but in part, and that part was rendered well-nigh unintelligible through the vileness of the translations; yet not one of those professors would learn Greek. The Scriptures read, if at all, in the erroneous versions were being deserted for the Sentences of Peter Lombard. Physical science, if there was anything deserv- ing that name, was cultivated, not by experiment in the Aristo- telian way, but by arguments deduced from premises resting on authority or custom. Everywhere there was a show of know- ledge concealing fundamental ignorance. Bacon, accordingly, withdrew from the scholastic routine and devoted himself to languages and experimental research. The only teacher whom he respected was a certain Petrus de Maharncuria Picardus, or of Picardy, probably identical with a certain mathematician, Petrus Peregrinus of Picardy, who is perhaps the author of a MS. treatise, De Magnete, contained in the Bibliotheque Imperiale at Paris. The contrast between the obscurity of such a man and

the fame enjoyed by the fluent young doctors roused Bacon's indignation. In the Opus Minus and Opus Tertium he pours forth a Violent tirade against Alexander of Hales, and another

professor, not mentioned by name, but spoken of as alive, and blamed even more severely than Alexander. This anonymous writer, 1 he says, acquired his learning by teaching others, and adopted a dogmatic tone, which has caused him to be received at Paris with applause as the equal of Aristotle, Avicenna, or Averroes..

Bacon, during his stay in Paris, acquired considerable renown. He took the degree of doctor of theology, and seems to have received the complimentary title of doctor mirabilis. In 1250 he was again at Oxford, and probably about this time entered the Franciscan order. His fame spread at Oxford, though it was mingled with suspicions of his dealings in the black arts and with some doubts of his orthodoxy. About 1257, Bonaventura, general of the order, interdicted his lectures at Oxford, and commanded him to place himself under the superintendence of the body at Paris. Here for ten years he remained under supervision, suffering great privations and strictly prohibited from writing anything for publication. But his fame had reached the ears of the papal legate in England, Guy de Foulques, who in 1265 became pope as Clement IV. In the following year he wrote to Bacon, ordering him notwithstanding any injunctions from his superiors, to write out and send to him a treatise on the sciences which he had already asked of him when papal legate. Bacon, whose previous writings had been mostly scattered tracts, capitula quaedam, took fresh courage from this command of the pope. He set at naught the jealousy of his superiors and brother friars, and despite the want of funds, instruments, materials for copying and skilled copyists, completed in about eighteen months three large treatises, the Opus Majus, Opus Minus and Opus Tertium, which, with some other tracts, were despatched to the pope. We do not know what opinion Clement formed of them, but before his death he seems to have bestirred himself on Bacon's behalf, for in 1268 the latter was permitted to return to Oxford. Here he continued his labours in experi- mental science and also in the composition of complete treatises. The works sent to Clement he regarded as preliminaries, laying down principles which were afterwards to be applied to the sciences, The first part of an encyclopaedic work probably remains to us in the Compendium Studii Philosophiae (1271). In this work Bacon makes a vehement attack upon the ignorance and vices of the clergy and monks, and generally upon the insufficiency of the existing studies. In 1278 his books were condemned by Jerome de Ascoli, general of the Franciscans, afterwards Pope Nicholas

IV., and he himself was thrown into prison for fourteen years. During this time, it is said, he wrote the small tract De Retardandis Senectutis Accidentibus , but this is merely a tradition. In 1292, as appears from what is probably his latest composition, the Compendium Studii Theologiae, he was again at liberty. The exact time of his death cannot be determined; 1294 is probably as accurate a date as can be fixed upon.

Works and Editions. — Leland said that it is easier to collect the leaves of the Sibyl than the titles of the works written by Roger Bacon; and though the labour has been somewhat lightened by the publications of Brewer and Charles, referred to below, it is no easy matter even now to form an accurate idea of his actual productions. An enormous number of MSS. are known to exist in British and French libraries, and probably

1 Brewer thinks this unknown professor is Richard of Cornwall, but the little we know of Richard is not in harmony with the terms in which he is elsewhere spoken of by Bacon. Erdmann conjectures Thomas Aquinas, which is extremely improbable, as Thomas was unquestionably not the first of his order to study philosophy. Cousin and Charles think that Albertus Magnus is aimed at, and certainly much of what is said applies with peculiar force to him. But some things do not at all cohere with what is otherwise known of Albert. It is worth pointing out that Brewer, in transcribing the passage bearing on this (Op. Ined. p. 327), has the words fratrum puerulus, which in his marginal note he interprets as applying to the Franciscan order. In this case, of course, Albert could not be the person referred to, as he was a Dominican. But Charles, in his transcription, entirely omits the important word fratrum.

not all have yet been discovered. Many are transcripts of works or portions of works already published and, therefore, require no notice. 2

The works hitherto printed (neglecting reprints) are the following: — (1) Speculum Alchimiae (1541) — translated into English (1597); French, A Poisson (1890); (2) De Mirabili Potestate Artis et Naturae (1542) — English translation (1659): (3) Libellus de Retardandis Senectutis Accidentibus (1590) — translated as the ” Cure of Old Age,” by Richard Brown (London, 1683); (4) Sanioris Medicinae Magistri D. Rogeri Baconis Anglici.de Arte Chymiae Scripta (Frankfort, 1603) — a collection of small tracts containing Excerpta de Libro Avicennae de Anima,

Breve Breviarium, Verbum Abbreviatum, 3 Secretum Secretorum, Tractatus Trium Verborum, and , Speculum Secretorum; (5) Perspectiva (1614), which is the fifth part of the Opus Majus;

(6) Specula Malhematica, which is the fourth part of the same;

(7) Opus Majus ad Clementem IV., edited by S. Jebb (1733) and J. H. Bridges (London, 1897); (8) Opera hactenus Inedita, by J. S. Brewer (1859), containing the Opus Tertium, Opus Minus, Compendium Studii Philosophiae and the De Secretis Operibus Naturae; (9) De Morali Philosophia (Dublin, i860, see below); (10) The Greek Grammar of R. Bacon and a Fragment of his Hebrew Grammar, edited with introduction and notes by E. S. Nolan and S. A. Hirsch (1902); (n) Metaphysica Fratris Rogeri, edited by R. Steele, with a preface (1905); (12) Opera hactenus inedita, by Robert Steele (1905).

How these works stand related to one another can only be determined by internal evidence. The smaller works, chiefly on alchemy, are unimportant, and the dates of their composition cannot be ascertained. It is known that before the Opus Majus Bacon had already written some tracts, among which an unpublished work, Computus Naturalium r on chronology, belongs probably to the year 1263; while, if the dedication of the De Secretis Operibus be authentic, that short treatise must have been composed before 1 249.

It is, however, with the Opus Majus that Bacon's real activity begins. It has been called by Whewell at once the Encyclopaedia and the Organum of the 13th century.

Part I. (pp. 1-22), which is sometimes designated De Utiliiate Scientiarum, treats of the four ofendicula, or causes of error. These are, authority, custom, the opinion of the unskilled many, and the concealment of real ignorance with pretence of knowledge. The last error is the most dangerous, and is, in a sense, the cause of all the others. The ojfendicula have sometimes been looked upon as an anticipation of Francis Bacon's Idola, but the two classifications have little in common. In the summary of this part, contained in the Opus Tertium, Bacon shows very clearly his perception of the unity of science and the necessity of encyclo- paedic treatment.

Part II. (pp. 23-43) treats of the relation between philosophy and theology. All true wisdom is contained in the Scriptures, at least

implicitly; and the true end of philosophy is to rise from the imperfect knowledge of created things to a knowledge of the Creator. Ancient philosophers, who had not the Scriptures, received direct illumination from God, and only thus can the brilliant results attained by them be accounted for.

Part III. (pp. 44-57) treats of the utility of grammar, and the necessity of a true linguistic science for the adequate comprehension either of the Scriptures or of books on philosophy.

2 The more important MSS. are: — (1) The extensive work on the fundamental notions of physics, called Communia Naturalium, which is found in the Mazarin library at Paris, in the British Museum, and in the Bodleian and University College libraries at Oxford; (2) on the fundamental notions of mathematics, De Communibus Mathematicae, part of which is. in the Sloane collection, part in the Bodleian; (3) Baconis Physica, contained among the additional MSS. in the British Museum; (4) the fragment called Quinta Pars Compendia Theologiae, in the British Museum; (5) the Compendium Studii Theologiae, in the British Museum; (6) the logical fragments, such as the Summulae Dialectices, in the Bodleian, and the glosses upon Aristotle's physics and metaphysics in the library at Amiens. See Little, The Grey Friars in Oxford (1892).

3 At the close of the Verb. Abbrev. is a curious note, concluding with the words, " ipse Rogerus fuit discipulus fratris Albertil"

The necessity of accurate acquaintance with any foreign language and of obtaining good texts, is a subject Bacon is never weary of descanting upon. A translator should know thoroughly the language he is translating from, the language into which he is translating, and the subject of which the book treats.

Part IV. (pp. 57-255) contains an elaborate treatise on mathematics, " the alphabet of philosophy," maintaining that all the sciences rest ultimately on mathematics, and progress only when their facts can be subsumed under mathematical principles. This fruitful thought he illustrates by showing how geometry is applied to the action of natural bodies, and demonstrating by geometrical figures certain laws of physical forces. He also shows

how his method may be used to determine some curious and long-discussed problems, such as the light of the stars, the ebb and flow of the tide, the motion of the balance. He then proceeds to adduce elaborate and sometimes slightly grotesque reasons tending to prove that mathematical knowledge is essential in theology, and closes this section of his work with two comprehensive sketches of geography and astronomy. That on geography is particularly good, and is interesting as having been read by Columbus, who lighted on it in Petrus de Alliaco's Imago Mundi, and was strongly influenced by its reasoning.

Part V. (pp. 256-357) treats of perspective. This was the part >f his work on which Bacon most prided himself, and in it, we may "add, he seems to owe most to the Arab writers Kindi and Alhazen. The treatise opens with an able sketch of psychology, founded upon, but in some important respects varying from, Aristotle's De Anima. The anatomy of the eye is next described ; this is done well and evidently at first hand, though the functions of the parts are not given with complete accuracy. Many other points of physiological optics are touched on, in general erroneously. Bacon then discusses vision in a right line, the laws of reflection and refraction, and the construction of mirrors and lenses. In this part of the work, as in the preceding, his reasoning depends essentially upon his peculiar view of natural agents and their activities. His fundamental physical maxims are matter and force ; the latter he calls virtus, species, imago agentis, and by numberless other names. Change, or any natural phenomenon, is produced by the impression of a virtus or species on matter — the result being the thing known. Physical action is, therefore, impression, or transmission of force in lines, and must accordingly be explained geometrically. This view of nature Bacon con- sidered fundamental, and it lies, indeed, at the root of his whole philosophy. To the short notices of it given in the 4th and 5th parts of the Opus Majus, he subjoined two, or perhaps three, extended accounts of it. We possess at least one of these in the tract De Multiplicatione Specierum, printed as part of the Opus Majus by Jebb (pp. 358-444). We cannot do more than refer to Charles for discussions as to how this theory of nature is connected with the metaphysical problems of force and matter, with the logical doctrine of universals, and in general with Bacon's theory of knowledge.

Part VI. (pp. 445-477) treats of experimental science, domina omnium scientiarum. There are two methods of knowledge: the one by argument, the other by experience. Mere argument is

never sufficient; it may decide a question, but gives no satisfaction or certainty to the mind, which can only be convinced by immediate inspection or intuition. Now this is what ex- perience gives. But experience is of two sorts, external and internal ; the first is that usually called experiment, but it can give no complete knowledge even of corporeal things, much less of spiritual. On the other hand, in inner experience the mind is illuminated by the divine truth, and of this supernatural enlightenment there are seven grades.

Experimental science, which in the Opus Tertium (p. 46) is distinguished from the speculative sciences and the operative arts in a way that forcibly reminds us of Francis Bacon, is said to have three great prerogatives over all other sciences: — (1) It verifies their conclusions by direct experiment; (2) It discovers truths which they could never reach; (3) It investigates the secrets of nature, and opens to us a knowledge of past and future. As an instance of his method, Bacon gives an investigation into

the nature and cause of the rainbow, which is really a very fine specimen of inductive research.

The seventh part of the Opus Majus (De Morali Philosophia) , not given in Jebb's edition, is noticed at considerable length in the Opus Tertium (cap. xiv.). Extracts from it are given by Charles (pp. 339-348).

As has been seen, Bacon had no sooner finished this elaborate work than he began to prepare a summary to be sent along with it. Of this summary, or Opus Minus, part has come down and is published in Brewer's Op. Ined. (313-389), from what appears to be the only MS. The work was intended to contain an abstract of the Opus Majus, an account of the principal vices of theology, and treatises on speculative and practical alchemy. At the same time, or immediately after, Bacon began a third work as a pre- amble to the other two, giving their general scope and aim, but supplementing them in many points. The part of this work, generally called Opus Tertium, is printed by Brewer (pp. 1-310), who considers it to be a complete treatise. Charles, however, has given good grounds for supposing that it is merely a preface, and that the work went on to discuss grammar, logic (which Bacon thought of little service, as reasoning was innate), mathe- matics, general physics, metaphysics and moral philosophy. He founds his argument mainly on passages in the Communia Naturalium, which indeed prove distinctly that it was sent to Clement, and

cannot, therefore, form part of the Compendium, as Brewer seems to think. It must be confessed, however, that nothing can well be more confusing than the references in Bacon's works, and it seems well-nigh hopeless to attempt a complete arrangement of them until the texts have been coEated and carefully printed.

All these large works Bacon appears to have looked on as preliminaries, introductions, leading to a great work which should embrace the principles of all the sciences. This great work, which is perhaps the frequently-referred-to Liber Sex Scientiarum, he began, and a few fragments still indicate its outline. First appears to have come the treatise now called Compendium Studii Philosophise (Brewer pp. 393-519), containing an account of the causes of error, and then entering at length upon grammar. After that, apparently, logic was to be treated; then, possibly, mathematics and physics; then speculative alchemy and experimental science. It is, however, very difficult, in the present state of our knowledge of the MSS., to hazard even conjectures as to the contents and nature of this last and most comprehensive work.

Bacon's fame in popular estimation has always rested on his mechanical discoveries. Careful research has shown that very little can with accuracy be ascribed to him. He certainly describes a method of constructing a telescope, but not so as to lead one to conclude that he was in possession of that instrument. Burning-glasses were in common use, and spectacles it does not appear he made, although he was probably acquainted with the principle of their construction. His wonderful predictions (in the De Secretis) must be taken cum grano salis; he believed in astrology, in the doctrine of signatures, and in the philosopher's stone, and knew that the circle had been squared. For his work in connexion with gunpowder, the invention of which has been claimed for him on the gr.ound of a passage in his De mirabili potestate artis et naturae, see Gunpowder.

Summary. — The 13th century, an age peculiarly rich in great men, produced few, if any, who can take higher rank than Roger Bacon. He is in every way worthy to be placed beside Albertus Magnus, Bonaveiftura, and Thomas Aquinas. These had an infinitely wider renown in their day, but modern criticism has restored the balance in his favour, and is even in danger of erring in the opposite direction. Bacon, it is now said, was not appreciated by his age because he was in advance of it; he is no schoolman, but a modern thinker, whose conceptions of science

are more just and clear than are even those of his more celebrated namesake. 1 In this view there is certainly some truth, but it is much exaggerated. As a general rule, no man can be completely dissevered from his national antecedents and 1 See Diihring, Kritische Ges. d. Phil. 192, 249-251.

surroundings, and Bacon is not an exception. Those who take up such an extreme position regarding his merits have known too little of the state of contemporary science, and have limited their comparison to the works of the scholastic theologians. We never find in Bacon himself any consciousness of originality; he is rather a keen and systematic thinker, working in a well- beaten track, from which his contemporaries were being drawn by theology and metaphysics.

Bibliography. — The best work on Roger Bacon is perhaps that of E. Charles, Roger Bacon, sa vie, ses ouvrages, ses doctrines d'apres des lextes inedits (1861). Against the somewhat enthusiastic estimate and modern interpretation given in this work, are Schneider in his Roger Bacon, Eine Monographic (Augsburg, 1873); K. Werner, Die Psychol .... des Roger Bacon and Die Kosmologie . . . des Roger Bacon (Vienna, 1879) ; S. A. Hirsch, Early English Hebraists (1899) ; Book of Essays (London, 1905), deals with Bacon as a Hebraist. The new matter contained in the publications of Charles and Brewer was summarized by H. Siebert, Roger Bacon: Inaugural Disserta- tion (Marburg, 1861). Cf. also J. K. Ingram, On the Opus Majus of Bacon (Dublin, 1858); Cousin, "Fragments phil. du moyen age " (reprinted from Journal des savans, 1848) ; E. Saisset, " Pre- curseurs et disciples de Descartes," pp. 1-58 (reprinted from Revue de deux mondes, 1861); K. Prantl, Gesch. der Logik, iii. 120-129 (a severe criticism of Bacon's logical doctrines) ; Held, Roger Bacon's praktische Philosophic (Jena, 1881); Karl Pohl, Das Verhdltniss d. Philos. zur Theol. bei Roger Bacon (Neustrelitz, 1893); articles in Westminster Review, lxxxi. 1 and 512; A. Parrot, Roger Bacon et ses contemporains (1894) ; E. Fluegel, Roger Bacons Stellung in d. Gesch. d. Philos. (1902); S. Vogl, Die Physik Roger Bacos (1906). For the popular legend see Famous Histcrie of Fryer Bacon (London, 1615; reproduced in Thorns, Early Prose Romances, iii.); R. Greene's Friar Bacon and Friar Bungay (1587 or 1588), and in publication of the Percy Society, vol. xv. 1844, A

Piece of Friar Bacon's Brazen Heade's Prophesie (1604). For Bacon as a classical scholar see J. E. Sandys, Hist, of Class. Schol. (2nd ed., 1906), cxxxi. (R. Ad. ; X.)

BACON (through the 0. Fr. bacon, Low Lat. baco, from a Teutonic word cognate with " back," e.g. O. H. Ger. pacho, M. H. Ger. backe, buttock, flitch of bacon), the flesh of the sides and back of the pig, cured by salting, drying, pickling and smoking.

BACONTHORPE [Bacon, Baco, Bacconius] , JOHN (d. 1346), known as " the Resolute Doctor," a learned Carmelite monk, was born at Baconthorpe in Norfolk. He seems to have been the grandnephew of Roger Bacon (Brit. Mus. Add. MS. 19. 116). Brought up in the Carmelite monastery of Blakeney, near Walsingham, he studied at Oxford and Paris, where he was known as " Princeps " of the Averroists. Renan, however, says that he merely tried to justify Averroism against the charge of hetero- doxy. In 1329 he was chosen twelfth provincial of the English Carmelites. He appears to have anticipated Wycliffe in advocat- ing the subordination of the clergy to the king. In 1333 he was sent for to Rome, where, we are told, he first maintained the pope's authority in cases of divorce; but this opinion he retracted. He died in London in 1346. His chief work, Doctoris resoluti Joannis Bacconis Anglici Carmelitae radiantissimi opus super quattuor sententiarum libris (published 1510), has passed through several editions. Nearly three centuries later, it was still studied at Padua, the last home of Averroism, and Lucilio Vanini speaks of him with great veneration.

See Brucker, Hist. Crit. iii. 865; Stockl, Phil. d. Mittel. ii. 1044-1045; Haureau, Phil. Scot. ii. 476; K. Prantl, Ges. d. Logik, iii. 318. For information as to his life, not found otherwise and of doubtful accuracy, see J. B. de Lezana's Annates Sacri, iv.

BACSANYI, JANOS (1 763-1845), Hungarian poet, was born at Tapolcza on the nth of May 1763. In 1785 he published his first work, a patriotic poem, The Valour of the Magyars. In the same year he obtained a situation as clerk in the treasury at Kaschau, and there, in conjunction with other two Hungarian patriots, edited the Magyar Museum, which was suppressed by the government in 1792. In the following year he was deprived of his clerkship; and in 1794, having taken part in the conspiracy of Bishop Martinovich, he was thrown into the state prison of the Spielberg, near Briinn, where he remained for two years. After his release he took a considerable share in the Magyar Minerva, a

literary review, and then proceeded to Vienna, where he obtained a post in the bank, and married. In 1809 he trans- lated Napoleon's proclamation to the Magyars, and, in con- sequence of this anti-Austrian act, had to take refuge in Paris.

After the fall of Napoleon he was given up to the Austrians, who allowed him to reside at Linz, on condition of never leaving that town. He published a collection of poems at Pest, 1827 (2nd ed. Buda, 1835), and also edited the poetical works of Anyos and Faludi. He died at Linz on the 12th of May 1845.

BACTERIOLOGY. The minute organisms which are com- monly called " bacteria " r are also known popularly under other designations, e.g. " microbes," " micro-organisms," " micro- phytes," " bacilli," " micrococci." All these terms, including the usual one of bacteria, are unsatisfactory; for " bacterium," " bacillus " and " micrococcus " have narrow technical mean- ings, and the other terms are too vague to be scientific. The most satisfactory designation is that proposed by Nageli in 1857, namely " schizomycetes," and it is by this term that they are usually known among botanists; the less exact term, however, is also used and is retained in this article since the science is com- monly known as " bacteriology." The first part of this article deals with the general scientific aspects of the subject, while a second part is concerned with the medical aspects.

I. The Study of Bacteria

The general advances which have been made of late years in the study of bacteria are clearly brought to mind when we reflect that in the middle of the 19th century these organisms were only known to a few experts and in a few forms as curiosities of the microscope, chiefly interesting for their minuteness and motility. They were then known under the name of " animal- culae," and were confounded with all kinds of other small organisms. At that time nothing was known of their life-history, and no one dreamed of their being of importance to man and other living beings, or of their capacity to produce the profound chemical changes with which we are now so familiar. At the present day, however, not only have hundreds of forms or species been described, but our knowledge of their biology has so ex- tended that we have entire laboratories equipped for their study, and large libraries devoted solely to this subject. Furthermore, this branch of science has become so complex that the bacterio- logical departments of medicine, of agriculture, of sewage, &c,

have become more or less separate studies.

The schizomycetes or bacteria are minute vegetable organisms devoid of chlorophyll and multiplying by repeated bipartitions. They consist of single cells, which may be spherical, oblong or cylindrical in shape, or of filamentous or other aggregates of cells. They are characterized by the absence of ordinary sexual reproduction and by the absence of an ordinary nucleus. In the two last-mentioned characters and in their manner of division the bacteria resemble Schizo- phyceae (Cyanophyceae or blue-green algae), and the two groups of Schizophyceae and Schizomycetes are usually united in the class Schizophyta, to indicate the generally received view that most of the typical bacteria have been derived from the Cyano- phyceae. Some forms, however, such as " Sarcina," have their algal analogues in Palmellaceae among the green algae, while Thaxter's group of Myxobacteriaceae suggests a relationship with the Myxomycetes. The existence of ciliated micrococci together with the formation of endospores — structures not known in the Cyanophyceae — reminds us of the flagellate Protozoa, e.g. Monas, Chromulina. Resemblances also exist between the endo- spores and the spore-formations in the Saccharomycetes, and if Bacillus inflatus, B. venlriculus, &c, really form more than one spore in the cell, these analogies are strengthened. Schizomycetes such as Clostridium, Plectridium, &c, where the sporiferous cells enlarge, bear out the same argument, and we must not forget that there are extremely minute " yeasts," easily mistaken for Micro- cocci, and that yeasts occasionally form only one spore in the cell.

Nor must we overlook the possibility that the endospore-formation in non-motile bacteria more than merely resembles the development of azygospores in the Conjugatae, and some Ulothricaceae, if reduced in size, would resemble them. Meyer regards them as chlamydospores, and Klebs as " carpospores " or possibly chlamydospores similar to the endospores of yeast. 1 Gr. fiaK-rifpiov, Lat. bacillus, little rod or stick.

Definition.

The former also looks on the ordinary disjointing bacterial cell as an oidium, and it must be admitted that since Brefeld's dis-

covery of the frequency of minute oidia and chlamydosporcs among the fungi, the probability that some so-called bacteria — and this applies especially to the branching forms accepted by some bacteriologists — are merely reduced fungi is increased. Even the curious one-sided growth of certain species which form sheaths and stalks — e.g. Bacterium vermiforme, B. pediculalum — can be matched by Algae such as Oocardium, Hydrurus, and some Diatoms. It is clear then that the bacteria are very possibly a heterogeneous group, and in the present state of our knowledge their phylogeny must be considered as very doubtful.

Nearly all bacteria, owing to the absence of chlorophyll, are saprophytic or parasitic forms. Most of them are colourless, but

FlG. I. — Preparations showing various types of cilia

A. Bacillus subtilis. Cohn, and

Spirillum undula, Ehrenb.

B. Planococcus cilreus (Menge),

Migula. [sard), Migula.

C. Pseudomonas pyocyanea (Ges-

D. P. macroselmis, Migula.

E. P. syncyanea (Ehrenb.),

Migula.

various forms of bacteria and the and their arrangement.

F. Bacillus typhi, Gaffky.

G. B. vulgaris (Hauser), Migula. H. Microspira Comma (Koch),

Schroeter. J, K. Spirillum rubrum, Es-

marsch. L, M. 5. undula(Mii\er) , Ehrenb.

(All after Migula.)

a few secrete colouring matters other than chlorophyll. In size \heir cells are commonly about o-ooi mm. (i micromillimetre or i n) in diameter, and from two to five times that length, but

smaller ones and a few larger ones are known. Some of the shapes assumed by the cells are shown in fig. i .

That bacteria have existed from very early periods is clear from their presence in fossils; and although we cannot accept all the conclusions drawn from the imperfect records of the Dlstrlbu- roc ts j and may dismiss as absurd the statements that time. geologically immured forms have been found still living,

the researches of Renault and van Tieghem have shown pretty clearly that large numbers of bacteria existed in Carbon- iferous and Devonian times, and probably earlier.

Schizomycetes are ubiquitous as saprophytes in still ponds and ditches, in running streams and rivers, and in the sea, and especi- ally in drains, bogs, refuse heaps, and in the soil, and wherever organic infusions are allowed to stand for a short time. Any

tioa la space.

History.

liquid (blood, urine, milk, beer, &c.) containing organic matter, or any solid food-stuff (meat preserves, vegetables, &c), allowed to stand exposed to the air soon swarms with bacteria, if moisture is present and the temperature not ab- Distribm- normal. Though they occur all the world over in the air and on the surface of exposed bodies, it is not to be supposed that they are by any means equally distributed, and it is questionable whether the bacteria suspended in the air ever exist in such enormous quantities as was once believed. The evidence to hand shows that on heights and in open country, especially in the north, there may be few or even no Schizomycetes detected in the air, and even in towns their distribution varies greatly; sometimes they appear to exist in minute clouds, as it were, with interspaces devoid of any, but in laboratories and closed spaces where their cultivation has been promoted the air may be considerably laden with them Of course the distribution of bodies so light and small is easily influenced by movements, rain, wind, changes of temperature, &c. As parasites, certain Schizomycetes inhabit and prey upon the organs of man and animals in varying degrees, and the conditions for their growth and distribution are then very com- plex. Plants appear to be less subject to their attacks — possibly, as has been suggested, because the acid fluids of the higher vege- table organisms are less suited for the

development of Schizomy- cetes; nevertheless some are known to be parasitic on plants. Schizomycetes exist in every part of the alimentary canal of animals, except, perhaps, where acid secretions prevail; these are by no means necessarily harmful, though, by destroying the teeth for instance, certain forms may incidentally be the forerunners of damage which they do not directly cause.

Little was known about these extremely minute organisms before i860. A. van Leeuwenhoek figured bacteria as far back as the 17th century, and 0. F. M tiller knew several important forms in 1773, while Ehrenberg in 1830 had advanced to the commencement of a scientific separation and grouping of them, and in 1838 had proposed at least sixteen species, distributing them into four genera. Our modern more accurate though still fragmentary knowledge of the forms of Schizomycetes, however, dates from F. J. Cohn's brilliant researches, the chief results of which were published at various periods between 1853 and 1872; Cohn's classification of the bacteria, published in 1872 and extended in 1875, has in fact dominated the study of these organisms almost ever since. He proceeded in the main on the assumption that the forms of bacteria as met with and described by him are practically constant, at any rate within limits which are not wide: observ- ing that a minute spherical micrococcus or a rod-like bacillus regularly produced similar micrococci and bacilli respectively, he bAsed his classification on what may be considered the constancy of forms which he called species and genera. As to the constancy of form, however, Cohn maintained certain reservations which have been ignored by some of his followers. The fact that Schizomycetes produce spores appears to have been discovered by Cohn in 1857, though it was expressed dubiously in 1872; these spores had no doubt been observed previously. In 1876, however, Cohn had seen the spores germi- nate, and Koch, Brefeld, Pratzmowski, van Tieghem, de Bary and others confirmed the discovery in various species.

The supposed constancy of forms in Cohn's species and genera received a shock when Lankester in 1873 pointed out that his Bacterium rubescens (since named Beggiatoa roseo-persicina, Zopf) passes through conditions which would have been described by most observers influenced by the current doctrine as so many separate " species " or even " genera,"— that in fact forms known as Bacterium, Micrococcus, Bacillus, Leptothrix, &c, occur as phases in one life-history. Lister put forth similar ideas about the same time; and Billroth came forward in 1874 with the

extravagant view that the various bacteria are only different states of one and the same organism which he called Cocco-bacteria scplica. From that time the question of the pleomorphism (mutability of shape) of the bacteria has been hotly discussed; * > *«t it is now generally agreed that, while a

certain number of forms may show different types of cell during the various phases of the life-history, 1 yet the majority of forms are uniform, showing one type of cell throughout their life-history. The question of species in the bacteria is essentially the same as in other groups of plants; before a form can be placed in a satisfactory classificatory position its whole life- history must, be studied, so that all the phases may be known. In the meantime, while various observers were building up our knowledge of the morphology 9f bacteria, others were laying the foundation of what is known of the relations of these organisms to fermentation and disease — that ancient will-o'-the-wisp " spontaneous generation " being revived by the way. When Pasteur in 1857 showed that the lactic fermentation depends on the presence of an organism, it was already known from the researches of Schwann (1837) and Helmholtz (1843) that fermentation and putrefaction are intimately connected with the presence of organisms derived from the air, and that the preservation of putrescible substances depends on this principle. In 1862 Pasteur placed it beyond reasonable doubt that the ammoniacal fermentation of urea is due to the action of a minute Schizomycete; in 1864 this was confirmed by van Tieghem, iind in 1874 by Cohn, who named the organism Micrococcus rireae. Pasteur and Cohn also pointed out that putrefaction is but a special case of fermentation, and before 1872 the doctrines of Pasteur were established with respect to Schizomycetes. Meanwhile two branches of inquiry had arisen, so to speak, from the above. In the first place, the ancient question of " spontaneous generation " received fresh impetus from the difficulty of keeping such minute organisms as bacteria from reaching and developing in organic infusions; and, secondly, the long-suspected analogies between the phenomena of fer-mentation and those of certain diseases again made themselves felt, as both became better understood. Needham in 1745 had declared that heated infusions of organic matter were not deprived of living beings; Spallanzani (1777) had replied that

more careful heating and other precautions prevent the appearance of organisms in the fluid. Various experiments by Schwann, Helmholtz, Schultz, Schroeder, Dusch and others led to the refutation, step by step, of the belief that the more minute organisms, and particularly bacteria, arose de novo in the special cases quoted. Nevertheless, instances were adduced where the most careful heating of yolk of egg, milk, hay-infusions, &c, had failed, — the boiled infusions, &c, turning putrid and swarming with bacteria after a few hours.

In 1862 Pasteur repeated and extended such experiments, and paved the way for a complete explanation of the anomalies; Cohn in 1872 published confirmatory results; and it became clear that no putrefaction can take place without bacteria or some other living organism. In the hands of Brefeld, Burdon- Sanderson, de Bary, Tyndall, Roberts, Lister and others, the various links in the chain of evidence grew stronger and stronger, and every case adduced as one of "spontaneous generation" fell to the ground when examined. No case of so-called " spon- taneous generation" has withstood rigid investigation; but the discussion contributed to more exact ideas as to the ubiquity, minuteness, and high powers of resistance to physical agents of the spores of Schizomycetes, and led to more exact ideas of antiseptic treatments. Methods were also improved, and the application of some of them to surgery at the hands of Lister, Koch and others has yielded results of the highest value.

Long before' any clear ideas as to the relations of Schizomycetes to fermentation and disease were possible, various thinkers at different times had suggested that resemblances existed between the phenomena of certain diseases and those of fermentation, and the idea that a virus or contagium might be something of the nature of a minute organism capable of spreading and

1 Cladothrix dicholoma, for example, which is ordinarily a branched, filamentous, sheathed form, at certain seasons breaks up into a number of separate cells which develop a tuft of cilia and escape from the sheath. Such a behaviour is very similar to the production of zoospores which is so common in many filamentous algae.

reproducing itself had been entertained. Such vague notions began to take more definite shape as the ferment theory of Cagniard de la Tour (1828), Schwann (1837) an d Pasteur made way, especially in the hands of the last-named savant. From

about 1870 onwards the " germ theory of disease " has passed into acceptance. P. F. O. Rayer in 1850 and Davaine had observed the bacilli in the blood of animals dead of anthrax (splenic fever), and Pollender discovered them anew in 1855. In 1863, imbued with ideas derived from Pasteur's researches on fermentation, Davaine reinvestigated the matter, and put forth the opinion that the anthrax bacilli caused the splenic fever; this was proved to result from inoculation. Koch in 1876 published his observations on Davaine's bacilli, placed beyond doubt their causal relation to splenic fever, discovered the spores and the saprophytic phase in the life-history of the organism, and cleared up important points in the whole question (figs. 7 and 9). In 1870 Pasteur had proved that a disease of silkworms was due to an organism of the nature of a bacterium; and in 18 71 Oertel showed that a Micrococcus already known to exist in diphtheria is intimately concerned in producing that disease. In 1872, therefore, Cohn was already justified in grouping together a number of "pathogenous" Schizomycetes. Thus arose the foundations of the modern " germ theory of disease;" and, in the midst of the wildest conjectures and the worst of logic, a nucleus of facts was won, which has since grown, and is growing daily. Septicaemia, tuberculosis, glanders, fowl-cholera, relapsing fever, and other diseases are now brought definitely within the range of biology, and it is clear that all contagious and infectious diseases are due to the action of bacteria or, in a few cases, to fungi, or to protozoa or other animals.

Other questions of the highest importance have arisen from the foregoing. About 1880 Pasteur first showed that Bacillus anthracis cultivated in chicken broth, with plenty of oxygen and at a temperature of 42-43 C, lost its virulence after a few "generations," and ceased to kill even the mouse; Toussaint and Chauveau confirmed, and others have extended the observations. More remarkable still, animals inoculated with such " attenuated " bacilli proved to be curiously resistant to the deadly effects of subsequent inoculations of the non-attenuated form. In other words, animals vaccinated with the cultivated bacillus showed immunity from disease when reinoculated with the deadly wild form. The questions as to the causes and nature of the changes in the bacillus and in the host, as to the extent of immunity enjoyed by the latter, &c, are of the greatest interest and importance. These matters, however, and others such as phagocytosis (first described by Metchnikoff in 1884), and the epoch-making discovery of the opsonins of the blood by Wright,

do not here concern us (see II. below).

Morphology.— Sizes, Forms, Structure, b°c. — The Schizomycetes consist of single cells, or of filamentous or other groups of cells, according as the divisions are completed at once or not. While some unicellular forms are less than

Form and structure.

ift (ooi mm.) in diameter, others have cells measur ing 4n or 5yii or even 7/1 or &fi in thickness, while the length may vary from that of the diameter to many times that measurement. In the filamentous forms the individual cells are often difficult to observe until reagents are applied (e.g. fig. 14), and the length of the rows of cylindrical cells may be many hundred times greater than the breadth. Similarly, the diameters of flat or spheroidal colonies may vary from a few times to many hundred times that of the individual cells, the divisions of which have produced the colony. The shape of the individual cell-wall. cell (fig. 1) varies from that of a minute sphere to that of a straight, curved, or twisted filament or cylinder, which is not necessarily of the same diameter throughout, and may have flattened, rounded, or even pointed ends. The rule is that the cells divide in one direction only — i.e. transverse to the long axis — and therefore produce aggregates of long cylindrical shape; but in rarer cases isodiametric cells divide in two or three directions, producing flat, or spheroidal, or irregular colonies, the size of which is practically unlimited. The bacterial

cell is always clothed by a definite cell-membrane, as was shown by the plasmolysihg experiments of Fischer and others. Unlike the cell-wall of the higher plants, it gives usually no Cell-wal. reactions of cellulose, nor is chitin present as in the fungi, but it consists of a proteid substance and is apparently a modification of the general protoplasm. In some cases, how- ever, as in B. tuberculosis, analysis of the cell shows a large amount of cellulose. The cell-walls in some forms swell up into a gelatinous mass so that the cell appears to be surrounded in the unstained condition by a clear, transparent space. When the swollen wall is dense and regular in appearance the term ” capsule ” is applied to the sheath as in Leuconostoc. Secreted pigments (red, yellow,

green and blue) are sometimes deposited in the wall, and some of the iron-bacteria have deposits of oxide of iron in the membranes.

noerv Mam 330

Fig. 2. — The various phases of germination of spores of Bacillus ramosus (Fraenkel), as actually observed in hanging drops under very high powers.

A. The spore sown at 11 a.m., as shown at a, had swollen (b) perceptibly by noon, and had germinated by 3.30 p.m., as shown at c : in d at 6 P.M., and e at 8.30 p.m.; the resulting filament is segmenting into bacilli as it elongates, and at midnight (/) consisted of twelve such segments.

B, C. Similar series of phases in the order of the small letters in each cape, and with the times of observation attached. At /and g occurs the breaking up of the filament into rodlets.

D. Germinating spores in various stages, more highly magnified, and showing the different ways of escape of the filament from the spore-membrane. (H. M. W.)

The substance of the bacterial cell when suitably prepared and stained shows in the larger forms a mass of homogeneous protoplasm containing irregular spaces, the vacuoles, contents, which enclose a watery fluid. Scattered in the proto- plasm arc usually one or more deeply-staining granules. The protoplasm itself may be tinged with colouring matter, bright red, yellow, &c, and may occasionally contain substances other than the deeply-staining granules. The occurrence of a starch-like substance which stains deep blue with iodine has been clearly shown in some' forms even where the bacterium is growing on a medium containing no starch, as shown by Ward and others. In other forms a substance (probably glycogen or amylo-dextrin) which turns brown with iodine has been observed. Oil and fat drops have also been shown to occur, and in the sulphur-bacteria numerous fine granules of sulphur.

The question of the existence of a nucleus in the bacteria is

one that has led to much discussion and is a problem of some

Nucleus, difficulty. In the majority of forms it has not hitherto

been possible to demonstrate a nucleus of the type

which is so characteristic of the higher plants. Attention has

accordingly been directed to the deeply-staining granules mentioned above, and the term chromatin-granules has been applied to them, and they have been considered to represent a rudimentary nucleus. That these granules consist of a material similar to the chromatin of the nucleus of higher forms is very doubtful, and the comparison with the nucleus of more highly organized cells rests on a very slender basis. The most recent works (Vejdovsky, Mcncl), however, appear to show that nuclei of a structure and mode of division almost typical are to be found in some of the largest bacteria. It is possible that a similar structure has been _ e v . , a

overlooked or is in- < ,v – 'iV\\\«. .•«i!!! | i!.i visible in forms owing

their small size, anu ;..\m; \\|i ! J ! \:i!!i!!!i/.\^^!!} that there may another type (leus — the nucleus — such as Schaudinn believed to be the case in B. biUschlii. Many bacteria when sus- pended in a fluid exhibit a power of independent move- ment which is, of course, quite dis- t i n c t from the Brownian move- ment — a non-vital phenomenon com- mon to all finely- divided particles suspended in a fluid. Independent move- ment is effected by special motile or- gans, the cilia or flagella. These structures are in- visible, with ordin- ary illumination in living cells or un- stained prepara- tions, and can only A. Mixed zoogloea found as a pellicle on the

Fig. 3. — Types of Zoogloea. (After Zopf .)

be made clearly visible by special methods of prepar- ation and staining first used by Loffler. By these methods the cilia are seen to

surface of vegetable infusions, &c. ; it consists of various forms, and contains cocci (a) and rodlets, in series (ftandc), &c. B. Egg-shaped mass of zoogloea of Beggiatoa roseo-persicina {Bacterium -rubescens of Lankester) ; the gelatinous swollen walls of the large crowded cocci are fused into a common gelatinous envelope, be fine protoplasmic C. Reticulate zoogloea of the same, outgrowths of the D, E, H. Colonies of Myconostoc enveloped ,.„n iCr. \ „t +1,*. in diffluent matrix,

cell (.He- 1; 01 tne R Branchcd f rut i C ose zoogloea of Cladothrix same nature as thoco (slightly magnified) .

of the zoospores and G. £oogloea of Bacterium merismopedioides, anthcrozoids of iZoˆf, containing cocci arranged in tablets,

algae, mosses, &c.

These cilia appear to be attached to the cell-wall, being unaffected by plasmolysis, but Fischer states that they really are derived from the central protoplasm and pass through minute pores in the wall. The cilia may be present during a short period only in the life of a Schizomycete, and their number may vary according to the medium on which the organism is growing. Nevertheless, there is more or less constancy in the type of distribution, &c, of the cilia for each species when growing at its best. The chief results may be summed up as follows: some species, e.g. B. anthracis, have no cilia; others have only one flagellum at one pole (Monotrichous), e.g. Bacillus pyocyaneus (fig. 1, C, D), or one at each pole; others again have a tuft of several cilia

Cflta,

Vegetative state.

at one pole (Lopkotrichous) , e.g. B. syncyaneus (fig. i, E), or at each pole (Amphitrichous) (fig, i, J, K, L); and, finally, many actively motile forms have the cilia springing all round (Peritrichous), e.g. B. vulgaris (fig. i, G). It is found, however, that strict reliance cannot be placed on the distinction between the Monotrichous, Lopkotrichous and Amphitrichous conditions, since one and the same species may have one, two or more cilia at one or both poles; nevertheless some stress may usually be laid on the existence of one or two as opposed to several — e.g. five or six or more — at one or each pole.

In Beggiatoa, a filamentous form, peculiar, slow, oscillatory movements are to be observed, reminding us of the movements of Oscillatoria among the Cyanophyceae. In these cases no cilia have been observed, and there is a firm cell-wall, so the movement remains quite un- explained.

Fig. 4. — TypesofSpore- formation in Schizomy- cetes. (After Zopf.)

A. Various stages in the development of the endogenous spores in a Clostridium — the small letters indicate the order.

B. Endogenous spores of the hay bacillus.

C. A chair of cocci of Leuconostoc mesenter- ioides, with two " resting spores," i.e. arthrospores. (After van Tieghem.)

D. A motile rodlet with one cilium and with a spore formed inside.

E. Spore – formation in Vibrio – like © and Spirillum-like (a. b, d) Schizomycetes.

F. Long rod-likeform con- taining a spore (these are the so – called " Kopfchenbactenen " of German authors).

Vibrio form with spore. (After Prazmowski.) Clostridium — one cell contains two spores. (After Prazmowski.) Spirillum containing many spores (a), which are liberated at b by the breaking up of the parent cells.

Germination of the spore of the hay bacillus (B. subtilis) — the axis of growth of the germinal rodlet is at right angles to the long axis of the spore. Germination of spore of Clostridium butyricum — the axis of

growth coincides with the long axis of the spore. While many forms are fixed to the substratum, others are free, being in this condition either motile or immotile. The chief of these forms are described below.

Cocci: spherical or spheroidal cells, which, according to their relative (not very well defined) sizes are spoken of as Micro-cocci, Macrococci, and perhaps Manas forms.

Rods or rodlets: slightly or more considerably elongated cells which are cylindrical, biscuit-shaped or somewhat fusiform. The cylindrical forms are short, i.e. only three or four times as long as broad {Bacterium), or longer (Bacillus) ; the biscuit- shaped ones are Bacteria in the early stages of division. Clostridia, &c, are spindle-shaped.

Filaments really consist of elongated cylindrical cells which remain united end to end after division, and they may break up later into elements such as those described above. Such fila- ments are not always of the same diameter throughout, and their segmentation varies considerably. They may be free or attached at one (the ” basal “) end. A distinction is made between simple filaments {e.g. Leplothrix) and such as exhibit a false branching (e.g. Cladoihrix).

Curved and spiral forms. Any of the elongated forms described above may be curved or sinuous or twisted into a corkscrew- like spiral instead of straight. If the sinuosity is slight we have the Vibrio form; if pronounced, and the spiral wind- ing well marked, the forms are known as Spirillum, Spiro- chete, &c. These and similar terms have been applied partly to individual cells, but more often to filaments consisting of several cells; and much confusion has arisen from the diffi- culty of defining the terms themselves.

In addition to the above, however, certain Schizomycetes present

G. H. I.

K.

L.

FiG. 5. — Characteristic groups of Micro- cocci. (After Cohn.) A. Micrococcus pro- digiosus. B. M. vaccinae. C. Zoogloea stage of a Micrococcus, forming a close membrane on infusion — Pasteur’s Myco- derma. (Very highly magnified.)

aggregates in the form of plates, or solid or hollow and irregular branched colonies. This may be due to the successive divisions occurring in two or three planes instead of only across the long axis (Sarcina), or to displacements of the cells after division.

Growth and Division. — Whatever the shape and size of the individual cell, cell-filament or cell-colony, the immediate visible results of active nutrition are elongation of the cell and its division into two equal halves, tio ˆ across the long axis, by the formation of a septum, which either splits at once or remains intact for a shorter or longer time. This process is then repeated and so on. In the first case the separated cells assume the char- acter of the parent- cell whose division gave rise to them; in the second case they form filaments, or, if the further elongation and

divisions of the cells proceed in differ- ent directions, plates or spheroidal or other shaped colonies. It not unfrequently hap- pens, however, that groups of cells break away from their former connexion as longer or shorter straight or curved filaments, or as solid masses. In some filamentous forms this ” fragmentation ” into multicellular pieces of equal length or nearly so is a normal phenomenon, each partial filament repeat- ing the growth, division and fragmentation as before (cf. figs. 2 and 6). By rapid divi- sion hundreds of thousands of cells may be produced in a few hours, 1 and, according to the species and the con- ditions (the medium, temper- ature, &c), enormous col- lections of isolated cells may cloud the fluid in which they are cultivated, or form de- posits below or films on its surface; valuable characters are sometimes obtained from these appearances. When these dense ” swarms ” of vegetative cells become fixed in a matrix of their own swollen contiguous cell-walls, they pass over into a sort of resting state as a so-called zoogloea (fig. 3).

One of the most remarkable phenomena in the life-history of the Schizomy- cetes is the forma- tion of this zoogloea stage, which corresponds to the ” palmella ” condition of the lower Algae. This occurs as a membrane on the surface of

a,

Fig. 6. — Bacillus megaterium.

(After de Bary.) a chain of motile rodlets still growing and dividing (bacilli).

b, a pair of bacilli actively growing

and dividing. p, a rodlet in this condition (but divided into four segments) after treatment with alcoholic iodine solution.

c, d, e, f, successive stages in the

development of the spores.

r, a rodlet segmented in four, each segment containing one ripe spore.

g 1 , g % , g 3 , early stages in the ger- mination of the spores (after being dried several days) ; hi, i, k, I and m, successive stages in the germination of the spore.

h

the medium, or as irregular

clumps or branched masses (sometimes several inches across) submerged in it, and consists of more or less gelatinous matrix enclosing innumerable ” cocci,” ” bacteria,” or other elements of the Schizomycete concerned. Formerly regarded as a distinct genus — the natural fate of all the various

1 Brefeld has observed that a bacterium may divide once every half-hour, and its progeny repeat the process in the same time. One bacterium might thus produce in twenty-four hours a number of segments amounting to many millions of millions.

forms — the zoogloea is now known to be a sort of resting condition of the Schizomycetes, the various elements being glued together, as it were, by their enormously swollen and diffluent cell-walls becoming contiguous. The zoogloea is formed by active division of single or of several mother-cells, and the progeny appear to go on secreting the cell-wall substance, which then absorbs many times its volume of water, and remains as a consistent matrix, in which the cells come to rest. The matrix — i.e. the swollen cell-walls — in some cases consists mainly of cellulose, in others chiefly of a proteid substance; the matrix in some cases is horny and resistant, in others more like a thick solution of gum. It is intelligible from the mode of formation that foreign bodies may become entangled in the gelatinous matrix, and compound zoogloeae may arise by the apposition of several distinct forms, a common event in macerating troughs (fig. 3, A). Characteristic forms may be assumed by the young loogloea of different species, — spherical, ovoid, reticular, fila mentous, fruiticose, lamellar, &c, — but these vary considerably as the mass increases or comes in contact with others. Older A

FIG. 7. — Bacillus anthracis. (After Koch.)

A. Bacilli mingled with blood-corpuscles from the blood of a guinea-pig ; some of the bacilli dividing.

B. The rodlets after three hours’ culture in a drop of aqueous humour. They grow out into long leptothrix-like filaments, which

become septate later, and spores are developed in the segments.

zoogloeae may precipitate oxide of iron in the matrix, if that metal exists in small quantities in the medium. Under favourable conditions the elements in the zoogloea again become active, and move out of the matrix, distribute themselves in the surrounding medium, to grow and multiply as before. If the zoogloea is formed on a solid substratum it may become firm and horny; immersion in water softens it as described above.

The growth of an ordinary bacterium consists in uniform elongation of the rodlet until its length is doubled, followed

by division by a median septum, then by the simul- mefl<"o/" taneous doubling in length of each daughter cell, again growth. followed by the median division, and soon (figs. 13, 14).

If the cells remain connected the resulting filament repeats these processes of elongation and subsequent division uniformly so long as the conditions are maintained, and very accurate measurements have been obtained on such a form, e.g. B. ramosus. If a rodlet in a hanging drop of nutrient gelatine is fixed under the microscope and kept at constant temperature, a curve of growth can be obtained recording the behaviour during many hours or days. The measured lengths are marked off on ordinates erected on an abscissa, along which the times are noted. The curve obtained on joining the former points then brings out a number of facts, foremost among which are (1) that as long as the conditions remain constant the doubling periods — i.e. the times taken by any portion of the filament to double its length — are constant, because each cell is equally iit, 6

active along the whole length; (2) there are optimum, minimum and maximum temperatures, other conditions remaining constant, at which growth begins, runs at its best and is soon exhausted, respectively; (3) that the most rapid cell-division and maximum growth do not necessarily accord with the best conditions for the life of the organism; and (4) that any sudden alteration of temperature brings about a check, though a slow rise may accelerate growth (fig. 8). It was also shown that exposure to light, dilution or exhaustion of the food-media, the presence of traces of poisons or metabolic products check growth or even bring it to a standstill; and the death or injury of any single cell in the filamentous series shows its effect on the curve by lengthening the doubling period, because its potential

progeny have been put out of play. Hardy has shown that such a destruction of part of the filament may be effected by the attacks of another organism.

280

260 240 220 200 180 160 140

120 100 80 60 40 20

Zprrv. 233 5.35

3‘5 3.30

p263

/

/

fj22.

‘233

3 I

/J 20,

0. /

57

flli

> I

fj 130

/Jltt j IJ105I

/J W j

Tem i

0.

fj3

•) /

UJO/

S^L

ir, f i ,e P

12/j

dat-4

TWSS

Jximp

da/k

¥

5.15 6.20 7.7

SO

8 97 DW 9 Willi 10 tO- US} 927 356 1030 11

Spores.

Fig. 8. — Curve of growth of a filament of Bacillus ramosus (Fraenkel), constructed from data such as in fig. 4. The abscissae represent intervals of time, the ordinates the measured lengths of the growing filament. Thus, at 2.33 p.m. the length of the filament was 6 m; at 5.45, 20 fi; at 8 p.m., 70 /j. and so on. Such curves show differences of steepness according to the temperature (see temp, curve), and to alterations of light (lamp) and darkness. (H. M. W.)

A very characteristic method of reproduction is that of spore-formation, and these minute reproductive bodies, which represent a resting stage of the organism, are now known in many forms. Formerly two kinds of spores were described, arthrospores and endospores. An arthrospore, however, is riot a true spore but merely an ordinary vegetative cell which separates and passes into a condition of rest, and such may occur in forms which form endospores, e.g. B. subtilis, as well as in species not known to form endospores. The true spore or endospore begins with the appearance of a minute granule in the protoplasm of a

vegetative cell; this granule enlarges and in a few hours has taken to itself all the protoplasm, secreted a thin but very resistive envelope, and is a ripe ovoid spore, smaller than the mother-cell and lying loosely in it (cf. figs. 6, 9, 10, and 11). In the case of the simplest and most minute Schizomycetes

»

I

&

6 &

B

Fig. 9.

(Micrococcus, &c.) no definite spores have been discovered; any one of the vegetative micrococci may commence a new series of cell by growth and division. We may call these forms " asporous," at any rate provisionally.

The spore may be formed in short or long segments, the cell- wall of which may undergo change of form to accommodate itself to the contents. As a rule only one spore is formed in a cell, and the process usually takes place in a bacillar segment. In some cases the spore-forming protoplasm gives a blue reaction with iodine solutions. The spores may be developed in cells which are actively swarming, the move- ments not being interfered with by the process (fig. 4, D). The so-called " Kopfchenbacterien " of older writers are simply bacterioid segments with a spore at one end, the mother cell-wall having adapted itself to the outline of the spore (fig. 4, F). The ripe spores of Schizomy- cetes are spherical, ovoid or long-ovoid in shape and extremely minute (e.g. those of Bacillus subtilis measure 0-0012 mm. long by 0.0006 mm. broad according to Zopf), highly refractive and colourless (or very dark, probably owing to the high index of refraction and minute size). The membrane may be relatively thick, and even exhibit shells or strata.

The germination of the spores has now been observed in several

forms with care. The spores are capable of germination at once, or they may be kept for months and even years, and are very resistant against desiccation, heat and cold, &c. In a suit- able medium and at a proper temperature the germination is completed in a few hours. A, Bacillus anthra- The spore swells and elongates and the cis. (After de Bary.) contents grow forth to a cell like that which Two of the long fila produced it, in some cases clearly breaking which spores 10 are through the membrane, the remains of being developed. The which may be seen attached to the young specimen was culti- germinal rodlet (figs. 5, 9 and n); in other vated in broth, and cases the surrounding membrane of the httle S too small— s P ore swells and dissolves. The germinal they should be of the cell then grows forth into the forms typical same diameter trans- for the particular Schizomycete concerned, versely as the seg- The conditions for spore-formation differ. m < B. tS ' Bacillus sub- Anaerobic species usually require little tilis. (After de oxygen, but aerobic species a free supply. Bary.) '1, fragments Each species has an optimum temperature of filaments with ripe anc j man y are known to require very special fn the fo°d-media. The systematic interference germination of the with these conditions has enabled bacterio- spores, the remains logists to induce the development of so- spore at- ca n e(j asporogenous races, in which the " formation of spores is indefinitely postponed, changes in vigour, virulence and other pro- perties being also involved, in some cases at any rate. The addition of minute traces of acids, poisons, &c, leads to this change in some forms; high temperature has also been used successfully.

The difficult subject of the classification ‘ of bacteria dates 1 The difficulties presented by such minute and simple organisms as the Schizomycetes are due partly to the few ” characters ‘ which they possess and partly to the dangers of error in manipulating them; it is anything but an easy matter either to trace the whole development ot a single form or to recognize with certainty any one stage in the development unless the others are known. This being the case, and having regard to the minuteness and ubiquity of these organisms, we should be very careful in accepting evidence as to the continuity or otherwise of any two forms which falls short of direct and uninterrupted observation. The outcome of all these considerations is that, while recognizing that the ” genera ” and ” species ” as defined by Cohn must be recast, we are not warranted in uniting any forms the continuity of which has not been directly

spores ; 2-5, sive stages

rmi . ores o’f the tached to the minal rodlets.

from the year 1872, when Cohn published his system, which was extended in 1875; this scheme has in fact dominated _ ‘

the study of bacteria ever since. Zopf in 1885 proposed tloh% a scheme based on the acceptance of extreme views of pleomorphism; his system, however, was extraordinarily

mi

m

Jiff*

Fig. 10.— pellicle. B.

■Bacillus subtilis. Motile rodlets.

(After Strasburger.) A. C. Development of spores.

Siflilif`

« ; t

Zoogloea

impracticable and was recognized by him as provisional only. Systems have also been brought forward based on the formation of arthrospores and endospores, but as explained above this is eminently unsatisfactory, as arthrospores are not true spores and both kinds of reproductive bodies are found in one and the same form. Numerous attempts have been made to construct schemes of classification based on the power of growing colonies

9 A.M.

B

10 .4-0

1Z .50

4 P.M.

Fig. 11.- — Stages in the development of spores of Bacillus ramosus (Fraenkel), in the order and at the times given, in a hanging drop culture, under a very high power. The process begins with the for- mation of brilliant granules (A, B) ; these increase, and the brilliant substance gradually balls together © and forms the spores (D), one in each segment, which soon acquire a membrane and ripen (E). (H. M. W.)

to liquefy gelatine, to secrete coloured pigments, to ferment certain media with evolution of carbon dioxide or other gases, or to induce pathological conditions in animals. None of these systems, which are chiefly due to the medical bacteriologists, has maintained its position, owing to the difficulty of applying the characters and to the fact that such properties are physio- logical and liable to great fluctuations in culture, because a given organism may vary greatly in such respects according to its degree of vitality at the time, its age, the mode of nutrition

observed; or, at any rate, the strictest rules should be followed in accepting the evidence adduced to render the union of any forms probable.

and the influence of external factors on its growth. Even when used in conjunction with purely morphological characters, these physiological properties are too variable to aid us in the dis- crimination of species and genera, and are apt to break down at critical periods. Among the more characteristic of these schemes adopted at various times may be mentioned those of Miquel (1891), Eisenberg (I801), and Lehmann and Neumann (1897). Although much progress has been made in determining the value and. constancy of morphological characters, we are still in need of a sufficiently comprehensive and easily applied scheme of classification, partly owing to the existence in the literature of imperfectly described forms the life-history of which is not yet known, or the microscopic characters of which have not been examined with sufficient accuracy and thoroughness. The principal attempts at morphological classifications recently brought forward are those of de Toni and Trevisan (1889), Fischer (1897) and Migula (1897). Of these systems, which alone are available in any practical scheme of classifi- Kheme S cat i° n > tne tw0 most important and most modern are those of Fischer

and Migula. The extended investiga- tions of the former on the number and distribution of cilia (see fig. 1) led him to propose a scheme of classification based on these and other morphological characters, and differing essentially from any preceding one. This scheme may be tabulated as follows :■

I. Order — Haplobacterinae. Vegetative body unicellular; spheroidal, cylindrical or spirally twisted; isolated or con- nected in filamentous or other growth series.

•1. Family — Coccaceak. Vegetative cells spheroidal.

(a) Sub-family — Allococcaceae. Division in all or any planes, colonies indefinite in shape and size, of cells in short chains, irregular clumps, pairs or isolated: — Micrococcus (Cohn), cells non-motile; Planococcus (Migula), cells motile.

(6) Sub-family — Homococcaceae. Division planes regular and definite: — Sarcina (Goods.), cells non-motile; growth and division in three successive planes at right angles, resulting in packet-like groups; Plano- sarcina (Migula), as before, but motile ; Pediococcus (Lindner), division planes at right angles in two successive planes, and cells in tablets of four or more ; Streptococcus (Billr.), divisions in one plane only, resulting in chains of cells.

2. Family — Bacixlaceae. Vegetative cells cylindric (rodlets) ,

ellipsoid or ovoid, and straight. Division planes always

perpendicular to the long axis.

(a) Sub-family — Bacilleae. Sporogenous rodlets cylindric, not altered in shape: — Bacillus (Cohn), non-motile; Bactrinium (Fischer), motile, with one polar flagellum (monotrichous) ; Bactrillum (Fischer), motile, with a terminal tuft of cilia (lophotrichous) ; Bactridium (Fischer), motile, with cilia all over the surface (peritrichous).

(6) Sub-family — Clostridieae. Sporogenous rodlets, spindle-shaped: — Clostridium (Prazm.), motile (peri- trichous).

(c) Sub-family — Plectridieae. Sporogenous rodlets, drum- stick-shaped : — Plectridium (Fischer), motile (peri- trichous).

3. Family — Spirixlaceae. Vegetative cells, cylindric but

curved more or less spirally. Divisions perpendicular to the long axis: — Vibrio (Muller-Lofrler) , comma- shaped, motile, monotrichous; Spirillum (Ehrenb.), more strongly curved in open spirals, motile, lopho- trichous ; Spirochaete (Ehrenb.), spirally coiled in numerous close turns, motile, but apparently owing to flexile movements, as no cilia are found. II. Order — Trichobacterinae. Vegetative body of branched or unbranched cell-filaments, the segments of which separate as swarm-cells (Gonidia). 1. Family — TriChobacteriaceae. Characters those of the Order.

(0) Filaments rigid, non-motile, sheathed: — Crenothrix (Cohn), filaments unbranched and devoid of sulphur particles; Thiothrix (Winogr.), as before, but with sulphur particles; Cladothrix (Cohn), fila- ments branched in a pseud»-dichotomous manner.

(b) Filaments showing slow pendulous and creeping movements, and with no distinct sheath: — Beggiatoa (Trev.), with sulphur particles.

The principal objections to this system are the following: — (1) The extraordinary difficulty in obtaining satisfactory preparations showing the cilia, and the discovery that these motile organs are not formed on all substrata, or are only developed during short periods of activity while the organism is young and vigorous, render this character almost nugatory. For instance, B. megatherium and B. subtilis pass in a few hours after commencement of growth from a motile stage with peritrichous cilia, into one of filamentous growth preceded by casting of the cilia. (2) By far the majority of the described species (over 1000) fall into the three genera — Micro- coccus (about 400), Bacillus (about 200) and Bactridium (about 150), so that only a quarter or so of the forms are selected out by the other genera. (3) The monotrichous and lophotrichous condi- tions are by no means constant even in the motile stage; thus Pseudomonas rosea (Mig.) may have I, 2 or 3 cilia at either end, and would be distributed by Fischer's classification between Bac- trinium and Bactrillum, according; to which state was observed. In Migula's scheme the attempt is made to avoid some of these difficulties, but others are introduced by his otherwise clever devices for dealing with these puzzling little organisms.

The question, What is an individual ? has given rise to much difficulty, and around it many of the speculations regarding pleo- morphism have centred without useful result. If a tree fall apart into its constituent cells periodically we should have the same difficulty on a larger and more complex, scale. The fact that every bacterial cell in a species in most cases appears equally capable of performing all the physiological functions of the species has led most authorities, however, to regard it as the individual — a view which cannot be consistent in those cases where a simple or branched filamentous series exhibits differences between free apex and fixed base and so forth. It may be doubted whether the discussion is profitable, though it appears necessary in some cases — e.g. con- cerning pleomorphy — to adopt some definition of individual.

Myxobacteriaceae.— To the two divisions of bacteria, Haplo bacterinae and Trichobacterinae, must now be added a third division, Myxobacterinae. One of the first members of this group,

Chondromyces crocalus, was described as long ago as 1857 by Berkeley, but its nature was not understood and it was ascribed to the Hyphomycetes. In 1892, however, Thaxter re- discovered it and showed its bacterial nature, founding for it and some allied forms the group Myxobacteriaceae. Another form, which he described as Myxobacter, was shown later to be the same as Polyangium vitellinum de- scribed by Link in 1795, the "exact nature of which had hitherto been in doubt. Thaxter's observations and conclusions were called in question by some botanists, but his later observa- tions and those of Baur have established firmly the position of the group. The peculiarity of the group lies in the fact that the bacteria form plasmodium- like aggregations and build themselves up into sporogenous structures of definite form super- ficially similar to the cysts of the Mycetozoa (fig. 12). Most of the forms in question are found growing on the dung of herbi- vorous animals, but the bacteria occur not only in the alimentary canal of the animal but also free in the air. The Myxobacteria are most easily obtained by keeping at a temperature of 30-35° C. in the dark dung which has lain exposed to the air for at least eight days. The high temperature is favourable to the growth of the bacteria but

B

Fig. 12. Myxococcus

Polyangium primigenum, red fructification on dog's dung.

C. Chondromyces apiculatus, orange fructification on antelope's dung.

D. Young fructification.

E. Single cyst germinating.

(A, B. afterQuehl ; C-E,after Thax- ter.) From Strasburger's Lehrbueh der Botanik, by permission of Gustar Fischer.

rb4

inimical to that of the fungi which are so common on this sub- stratum.

The discoveries that some species of nitrifying bacteria and

perhaps pigmented forms are capable of carbon-assimilation,

that others can fix free nitrogen and that a number FU “dnt* ‘/ of decompositions hitherto unsuspected are accom- Aarter/a.” plished by Schizomycetes, have put the questions of

nutrition and fermentation in quite new lights. Apart from numerous fermentation processes such as rotting, the soaking of skins for tanning, the preparation of indigo and of tobacco, hay, ensilage, &c, in all of which bacterial fermenta- tions are concerned, attention may be especially directed to the following evidence of the supreme importance of Schizomycetes in agriculture and daily life. Indeed, nothing marks the attitude of modern bacteriology more clearly than the increasing attention which is being paid to useful fermentations. The vast majority of these organisms are not pathogenic, most are harmless and

t0:0 \LUf , J0.30 2.13?

Z.35 Z.$8 .

5.20

Fig. 13. — -A series of phases of germination of the spore o. B. ramosus sown at 8.30 (to the extreme left), showing how the growth can be measured. If we place the base of the filament in each case on a base line in the order of the successive times of observation recorded, and at distances apart proportional to the intervals of time (8.30, 10.0, 10.30, 11.40, and so on) and erect the straightened-out filaments, the proportional length of each of which is here given for each period, a line joining the tips of the filaments gives the curve of rrowth. (H. M. W.)

many are indispensable aids in natural operations important to man.

Fischer has proposed that the old division into saprophytes and parasites should be replaced by one which takes into account other peculiarities in the mode of nutrition of bacteria. The nitrifying, nitrogen-fixing, sulphur- and iron-bacteria he regards as monotrophic, i.e. as able to carry on one particular series of fermentations or decompositions only, and since they require no organic food materials, or at least are able to work up nitrogen or carbon from inorganic sources, he regards them as primitive forms in this respect and terms them Prototrophic. They may be looked upon as the nearest existing representatives of the

primary forms of life which first obtained the power of working up non-living into living materials, and as playing a correspondingly important rdle in the evolution of life on our globe. The vast majority of bacteria, on the other hand, which are ordinarily termed saprophytes, are saprogenic, i.e. bring organic material to the putrefactive state — or saprophilous, i.e. live best in such putrefying materials — or become zymogenic, i.e. their metabolic products may induce blood-poisoning or other toxic effects (facultative parasites) though they are not true parasites. These

forms are termed by Fischer Metatrophic, because they require various kinds of organic materials obtained from the dead remains of other organisms or from the surfaces of their bodies, and can utilize and decompose them in various ways {Poly trophic) or, if monotrophic, are at least unable to work them up. The true parasites — obligate parasites of de Bary — are placed hy Fischer in a third biological group, Paratrophic bacteria, to mark the importance of their mode of life in the interior of living organisms where they live and multiply in the blood, juices or tissues.

When we reflect that some hundreds of thousands of tons of urea are daily deposited, which ordinary plants are Unable to assimilate until considerable changes have been under- v gone, the question is of importance, What happens in bacteria. the meantime? In effect the urea first becomes carbonate of ammonia by a simple hydrolysis brought about by bacteria, more and more definitely known since Pasteur, van Tieghem and Cohn first described them. Lea and Miquel further proved that the hydrolysis is due to an enzyme— urase — separable with difficulty from the bacteria concerned. Many forms in rivers, soil, manure heaps, &c, are capable of bringing about this change to ammonium carbonate, and much of the loss of volatile ammonia on farms is preventible if the facts are apprehended. The excreta of urea alone thus afford to the soil enormous stores of nitrogen combined in a form which can be rendered available by bacteria, and there are in addition the supplies brought down in rain from the atmosphere, and those due to other living debris. The researches of later years have demonstrated that a still more inexhaustible supply of nitrogen is made available by the nitrogen-fixing bacteria of the soil. There are in all cultivated soils forms of bacteria which are capable of forcing the inert free nitrogen to combine with other elements into compounds assimilable by plants. This was long asserted as probable before Winogradsky showed that the con- clusions of M. P. E. Berthelot,

A. Laurent and others were right, and that Clostridium pasteurianum, for instance, if pro- tected from access of free oxygen by an envelope of aerobic bacteria or fungi, and provided with the carbohydrates and minerals necessary for its growth, fixes nitrogen in proportion to the amount of sugar consumed. This interesting case of symbiosis is equalled by yet another case. The work of numerous observers has shown that the free nitrogen of the atmosphere is brought into combination in the soil in the nodules filled with bacteria on the roots of Leguminosae, and since these nodules are the morphological expression of a symbiosis between the higher plant and the bacteria, there is evidently here a case similar to the last.

As regards the ammonium carbonate accumulating in the soil from the conversion of urea and other sources, we know from Winogradsky's researches that it undergoes oxidation in two stages owing to the activity of the so-called " nitrifying " bacteria (an unfortunate term inasmuch as " nitrification " refers merely to a particular phase of the cycle of changes undergone by nitrogen). It had long been known that under certain conditions large quantities of nitrate (saltpetre) are formed on exposed heaps of manure, &c, and it was supposed that direct oxidation of the ammonia, facilitated by the presence of porous bodies, brought this to pass. But research showed that this process of nitrification is dependent on temperature, aeration and moisture, as is life, and that while nitre-beds can infect one another, the process is stopped by sterilization. R. Warington, J. T. S.chloessing, C. A. Muntz and others had proved that nitrification was promoted by some organism, when Winogradsky hit on the happy idea of isolating the organism by using gelatinous silica, and so avoiding the difficulties which Warington had shown to exist with the organism in presence of organic nitrogen, owing to its refusal to nitrify on gelatine or other nitrogenous media. Winogradsky's investigations resulted in the discovery that two kinds of bacteria are concerned in nitrification; one of these, which he terms the Nitroso-bacteria, is only capable, of bringing about the oxidation of the ammonia to nitrous acid, and the astonishing result was obtained that

this can be done, in the dark, by bacteria to which only pure mineral salts — e.g. carbonates, sulphates and chlorides of

ammonium, sodium and magnesium — were added. In other words these bacteria can build up organic matter from purely mineral sources by assimilating carbon from carbon dioxide in the dark and by obtaining their nitrogen from ammonia. The energy liberated during the oxidation of the nitrogen is regarded as splitting the carbon dioxide molecule, — in green plants it is the energy of the solar rays which does this. Since the supply of free oxygen is dependent on the activity of green plants the process is indirectly dependent on energy derived from the sun, but it is none the less an astounding one and outside the limits of our previous generalizations. It has been suggested that urea is formed by polymerization of ammonium carbonate, and formic aldehyde is synthesized from C0 2 and OH 2 . The Nitro-bacteria are smaller, finer and quite different from the nitroso-bacteria, and are incapable of attacking and utilizing ammonium carbonate. When the latter have oxidized ammonia to nitrite, however, the former step in and oxidize it still further to nitric acid. It is probable that important ■ consequences of these actions result from the presence of nitrifying bacteria in rotten stone,

Fig. 14 — Stages in the formation of a colony of a variety of Bacillus {Proleics) vulgaris (Hauser), observed in a hanging drop. At 1 1 A.M. a rodlet appeared (A) ; at 4 p.m. it had grown and divided and broken up into eight rodlets (B) ; C shows further develop- ment at 8 p.m., D at 9.30 p.m. — all under a high power. At E, F, and G further stages are drawn, as seen under much lower power. (H. M. W.)

decaying bricks, &c, where all the conditions are realized for preparing primitive soil, the breaking up of the mineral con- stituents being a secondary matter. That ” soil ” is thus pre- pared on barren rocki and mountain peaks may be concluded with some certainty.

In addition to the bacterial actions which result in the oxidiza- tion of ammonia to nitrous acid, and of the latter to nitric acid, the reversal of such processes is also brought about by numerous bacteria in the soil, rivers, &c. Warington showed some time ago that many species are able to reduce nitrates to nitrites, and such reduction is now known to occur very widely in nature. The researches of Gayon and Dupetit, Giltay and Aberson and others have shown, moreover, that bacteria exist whi ;h carry such reduction still further, so that ammonia or even fre«-. nitrogen may escape. The importance of these results is evident in ex-

plaining an old puzzle in agriculture, viz. that it is a wasteful process to put nitrates and manure together on the land. Fresh manure abounds in de-nitrifying bacteria, and these organisms not only reduce the nitrates to nitrites, even setting free nitrogen and ammonia, but their effect extends to the undoing of the work of what nitrifying bacteria may be present also, with great loss. The combined nitrogen of dead organisms, broken down to ammonia by putrefactive bacteria, the ammonia of urea and the results of the fixation of free nitrogen, together with traces of nitrogen salts due to meteoric activity, are thus seen to undergo various vicissitudes in the soil, rivers and surface of

the globe generally. The ammonia may be oxidized to nitrites and nitrates, and then pass into the higher plants and be worked up into proteids, and so be handed on to animals, eventually to be broken down by bacterial action again to ammonia; or the nitrates may be degraded to nitrites and even to free nitrogen or ammonia, which escapes.

That the Leguminosae (a group of plants including peas, beans, vetches, lupins, &c.) play a special part in agriculture was known even to the ancients and was mentioned by Pliny Bacteria (Historic Naturalis, viii.). These plants will not only and grow on poor sandy soil without any addition of nitro- Legumin- genous manure, but they actually enrich the soil on osae ‘ which they are grown. Hence leguminous plants are essential in all rotation of crops. By analysis it was shown by Schulz-Lupitz in 1 88 1 that the way in which these plants enrich the soil is by increasing the nitrogen-content. Soil which had been cultivated for many years as pasture was sown with lupins for fifteen years in succession; an analysis then showed that the soil contained more than three times as much nitrogen as at the beginning of the experiment. The only possible source for this increase was the atmospheric nitrogen. It had been, however, an axiom with botanists that the green plants were unable to use the nitrogen of the air. The apparent contradiction was explained by the experiments of H. Hellriegel and Wilfarth in 1888. They showed that, when grown on sterilized sand with the addition of mineral salts, the Leguminosae were no more able to use the atmospheric nitrogen than other plants such as oats and barley. Both kinds of plants required the addition of nitrates to the soil. But if a little water in which arable soil had been shaken up was added to the sand, then the leguminous plants flourished in the absence of nitrates and showed an increase in nitrogenous material. They had clearly made use of the nitrogen of the air. When these plants

were examined they had small swellings or nodules on their roots, while those grown in sterile sand without soil-extract had no nodules. Now these peculiar nodules are a normal characteristic of the roots of leguminous plants grown in ordinary soil. The experiments above mentioned made clear for the first time the nature and activity of these nodules. They are clearly the result of infection (if the soil extract was boiled before addi- tion to the sand no nodules were produced), and their presence enabled the plant to absorb the free nitrogen of the air.

The work of recent investigators has made clear the whole process. In ordinary arable soil there exist motile rod-like bacteria, Bacterium radicicola. These enter the root-hairs of leguminous plants, and pass- ing down the hair in the form of a long, slimy (zoogloea) thread, pene- trate the tissues of the root. As a result the tissues become hyper- trophied, producing the well-known nodule. In the cells of the nodule the bacteria multiply and develop, drawing material from their host. Many of the bacteria ex- hibit curious involution forms (" bacteroids "), which are finally broken down and their products absorbed by the plant. The nitrogen of the air is absorbed by the nodules, being built up into the bacterial cell and later handed on to the host-plant. It appears from bacterium can even absorb free nitrogen when grown in cultures

Fig. 15. — Invasion of leguminous roots by bacteria.

a, cell from the epidermis of root of Pea

with " infection thread " (zoogloea) pushing its way through the cell- walls. (Alter Prazmowski.)

b, free end of a root-hair of Pea ; at the

right are particles of earth and on the left a mass of bacteria. Inside the hair the bacteria are pushing their way up in a thin stream. (From Fischer's Vorlestmgen iiber Bakterien.)

the observations of Maze that the

outside the plant. We have here a very interesting case of sym- biosis as mentioned above. The green plant, however, always

keeps the upper hand, restricting the development of the bacteria to-the nodules and later absorbing them for its own use. It should be mentioned that different genera require different races of the bacterium for the production of nodules.

The important part that these bacteria play in agriculture led to the introduction in Germany of a commercial product (the so-called ” nitragin “) consisting of a pure culture of the bacteria, which is to be sprayed over the soil or applied to the seeds before sowing. This material was found at first to have a very uncertain effect, but later experiments in America, and the use of a modified

preparation in Eng- |||(|i..y. land, under the direc- tion of Professor Bottomley, have had successful results; it is possible that in the future a preparation of this sort will be widely used.

Theapparentspecial- ization of these bacteria to the leguminous plants has always been a very striking fact, for similar bacterial nod- ules are known only in two or three cases out- side this particular group. However, Pro- fessor Bottomley an- nounced at the meeting of the British Association for the Advancement of Science in 1907 that he had succeeded in breaking down this specialization and by a suitable treatment had caused bacteria from leguminous nodules to infect other plants such as cereals, tomato, rose, with a marked effect on their growth. If these results are con- firmed and the treat-

«.

nat. size.

Fig. 16. root nodule of the lupin, (From Woromv.)

b, longitudinal section through root and

nodule, g, fibro-vascular bundle. w, bacterial tissue. (After Woromv.)

c, cell from bacterial tissues showing nucleus and protoplasm filled with bacteria.

i, bacteria from nodule of lupin, normal

undegenerate form. e and /, bacteroids from Vicia villosa

and Lupinus albus. (After Morck.)

(From Fischer's Vorlesungen iiber Bakterien.)

ment can be worked commercially, the importance to agriculture of the discovery cannot be overestimated; each plant will provide, like the bean and vetch, its own nitrogenous manure, and larger crops will be produced at a decreased cost.

Another important advance is in our knowledge of the part played by bacteria in the circulation of carbon in nature. The

enormous masses of cellulose deposited annually on bacteria.' tfl e earth's surface are, as we know, principally the

result of chlorophyll action on the carbon dioxide of the atmosphere decomposed by energy derived from the sun; and although we know little as yet concerning the magnitude of other processes of carbon-assimilation — e.g. by nitrifying bacteria — it is probably comparatively small. Such cellulose is gradually reconverted into water and carbon dioxide, but for some time nothing positive was known as to the agents which thus break up the paper, rags, straw, leaves and wood, &c, accumulating in cesspools, forests, marshes and elsewhere in such abundance. The work of van Tieghem, van Senus, Fribes, Omeliansky and others has now shown that while certain anaerobic bacteria decompose the substance of the middle lamella — chiefly pectin compounds — and thus bring about the isolation of the cellulose fibres when, for instance, flax is steeped or " retted," they are

unable to attack the cellulose itself. There exist in the mud of marshes, rivers and cloacae, &c, however, other anaerobic bacteria which decompose cellulose, probably hydrolysing it first and then splitting the products into carbon dioxide and marsh gas. When calcium sulphate is present, the nascent methane induces the formation of calcium carbonate, sulphuretted hydrogen and water. We have thus an explanation of the occurrence of marsh gas and sulphuretted hydrogen in bogs, and it is highly probable that the existence of these gases in the intestines of herbivorous animals is due to similar putrefactive changes in the undigested cellulose remains.

Cohn long ago showed that certain glistening particles observed in the cells of Beggiatoa consist of sulphur, and Winogradsky and Beyerinck have shown that a whole series of sulphur bacteria of

the genera Thiothrix, Chromatium, bacteria. Spirillum, Monas, &c, exist, and play important parts in the circulation of this element in nature, e.g. in marshes, estuaries, sulphur springs, &c. When cellulose bacteria set free

Fig. 17. — A plate-culture of a bacillus which had been exposed for a period of four hours behind a zinc stencil-plate, in which the letters C and B were cut. The light had to traverse a screen of water before passing through the C, and one of aesculin (which filters out the blue and violet rays) before passing the B. The plate was then incubated, and, as the figure shows, the bacteria on the C-shaped area were all killed, whereas they developed elsewhere on the plate (traces of the B are just visible to the right) and covered it with an opaque growth. (H. M. W.)

marsh gas, the nascent gas reduces sulphates — e.g. gypsum — with liberation of SH_2, and it is found that the sulphur bacteria thrive under such conditions by oxidizing the SH_2 and storing the sulphur in their own protoplasm. If the SH_2 runs short they oxidize the sulphur again to sulphuric acid, which combines with any calcium carbonate present and forms sulphate again. Similarly nascent methane may reduce iron salts, and the black mud in which these bacteria often occur owes its colour to the FeS formed. Beyerinck and Jegunow have shown that some partially anaerobic sulphur bacteria can only exist in strata at a certain depth below the level of quiet waters where SH_2 is being set free below by the bacterial decompositions of vegetable mud and rises to meet the atmospheric oxygen coming down from above, and that this zone of physiological activity rises and falls with the variations of partial pressure of the gases due to the rate of evolution of the SH_2. In the deeper parts of this zone the bacteria absorb the SH_2, and, as they rise, oxidize it and store up the sulphur; then ascending into planes more highly oxygenated, oxidize the sulphur to SO_3. These bacteria therefore employ SH_2 as their respiratory substance, much as higher plants employ carbohydrates — instead of liberating energy as heat by the respiratory combustion of sugars, they do it by oxidizing hydrogen sulphide. Beyerinck has shown that Spirillum desulphuricans, a definite anaerobic form, attacks and reduces sulphates, thus undoing the work of the sulphur bacteria as certain de-nitrifying bacteria reverse the operations of nitro-bacteria. Here again, therefore, we have Sulphur, taken

into the higher plants as sulphates, built up into proteids, decomposed by putrefactive bacteria and yielding SH2 which the sulphur bacteria oxidize; the resulting sulphur is then again oxidized to SOs and again combined with calcium to gypsum, the cycle being thus complete.

Chalybeate waters, pools in marshes near ironstone, &c, abound in bacteria, some of which belong to the remarkable

genera Crenothrix, Cladothrix and Leptothrix, and bacteria, contain ferric oxide, i.e. rust, in their cell-walls.

This iron deposit is not merely mechanical but is due to the physiological activity of the organism which, according to Winogradsky, liberates energy by oxidizing ferrous and ferric oxide in its protoplasm — a view not accepted by H. Molisch. The iron must be in certain soluble conditions, however, and the soluble bicarbonate of the protoxide of chalybeate springs seems most favourable; the hydrocarbonate absorbed by the cells is oxidized, probably thus —

$$2FeC0\ 3 + 30H\ 2 + 0 = Fe\ 2\ (OH)\ 6 + 2C0\ 2\ .$$

The ferric hydroxide accumulates in the sheath, and gradually passes into the more insoluble ferric oxide. These actions are of extreme importance in nature, as their continuation results in the enormous deposits of bog-iron ore, ochre, and — since Molisch has shown that the iron can be replaced by manganese in some bacteria — of manganese ores.

Considerable advances in our knowledge of the various chromogenic bacteria have been made by the studies of Beyerinck, Lankester, Engelmann, Ewart and others, and have bacteria, assumed exceptional importance owing to the discovery that Bacteriopurpurin — the red colouring matter con- tained in certain sulphur bacteria — absorbs certain rays of solar energy, and enables the organism to utilize the energy for its own life-purposes. Engelmann showed, for instance, that these red-purple bacteria collect in the ultra-red, and to a less extent in the orange and green, in bands which agree with the absorption spectrum of the extracted colouring matter. Not only so, but the evident parallelism between this absorption of light and that by the chlorophyll of green plants, is completed by the demonstration

that oxygen is set free by these bacteria — i.e. by means of radiant energy trapped by their colour-screens the living cells are in both cases enabled to do work, such as the reduction of highly oxidized compounds.

The most recent observations of Molisch seem to show that bacteria possessing bacteriopurpurin exhibit a new type of assimilation — the assimilation of organic material under the influence of light. In the case of these red-purple bacteria the colouring matter is contained in the protoplasm of the cell, but in most chromogenic bacteria it occurs as excreted pigment on and between the cells, or is formed by their action in the medium. Ewart has confirmed the principal conclusions concerning these purple, and also the so-called chlorophyll bacteria (B. viride, B. chlorinum, &c), the results going to show that these are, as many authorities have held, merely minute algae. The pigment itself may be soluble in water, as is the case with the blue-green fluorescent body formed by B. pyocyaneus, B. fluorescens and a whole group of fluorescent bacteria. Neelson found that the pigment of B. cyanogenus gives a band in the yellow and strong lines at E and F in the solar spectrum — an absorption spectrum almost identical with that of triphenyl-rosaniline. In the case of the scarlet and crimson red pigments of B. prodigiosus, B. ruber, &c, the violet of B. violacens, B. janthinus, &c, the red- purple of the sulphur bacteria, and indeed most bacterial pig- ments, solution in water does not occur, though alcohol extracts the colour readily. Finally, there are a few forms which yield their colour to neither alcohol nor water, e.g. the yellow Micro- coccus cereus-flavus and the B. berolinensis. Much work is still necessary before we can estimate the importance of these pig- ments. Their spectra are only imperfectly known in a few cases, and the bearing of the absorption on the life-history is still a mystery. In many cases the colour-production is de- pendent on certain definite conditions — temperature, presence of oxygen, nature of the food-medium, &c. Ewart's important discovery that some of these lipochrome pigments occlude

oxygen, while others do not, may have bearings on the facultative anaerobism of these organisms.

A branch of bacteriology which offers numerous problems of importance is that which deals with the organisms so common in milk, butter and cheese. Milk is a medium not only admirably suited to the growth of bacteria, but, bacteria as a matter of fact, always contaminated with these organisms in the ordinary

course of supply. F. Lafar has stated that 20% of the cows in Germany suffer from tuberculosis, which also affected 17-7% of the cattle slaughtered in Copen- hagen between 1891 and 1893, and that one in every thirteen samples of milk examined in Paris, and one in every nineteen in Washington, contained tubercle bacilli. Hence the desirability of sterilizing milk used for domestic purposes becomes imperative.

Fig. 18. — A similar preparation to fig. 17, except that two slit-like openings of equal length allowed the light to pass, and that the light was that of the electric arc passed through a quartz prism and casting a powerful spectrum on the plate. The upper slit was covered with glass, the lower with quartz. The bacteria were killed over the clear areas shown. The left-hand boundary of the clear area corre- sponds to the line F (green end of the blue), and the beginning of the ultra-violet was at the extreme right of the upper (short) area. The lower area of bactericidal action extends much farther to the right, because the quartz allows more ultra-violet rays to pass than does glass. The red-yellow-green to the left of F were without effect. (H. M. W.)

No milk is free from bacteria, because the external orifices of the milk-ducts always contain them, but the forms present in the normal fluid are principally those which induce such changes as the souring or ” turning ” so frequently observed in standing milk (these were examined by Lord Lister as long ago as 1873- 1877, though several other species are now known), and those which bring about the various changes and fermentations in butter and cheese made from it. The presence of foreign germs, which may gain the upper hand and totally destroy the flavours of butter and cheese, has. led to the search for those particular forms to which the approved properties are due. A definite bacillus to which the peculiarly fine flavour of certain butters is due, is said to be largely employed in pure cultures in American dairies, and in Denmark certain butters are said to keep fresh much longer owing to the use of pure cultures and the treatment employed to suppress the forms which cause rancidity. Quite distinct is the search for the germs which cause undesirable changes, or ” diseases “; and great strides have been made in discovering the bacteria concerned in rendering milk ” ropy,” butter ” oily ” and ” rancid,” &c. Cheese in its numerous forms contains myriads of bacteria, and some of these are now known to be concerned in the various processes of ripening and other changes affecting the product, and although little is known as to the exact part played by any species, practical applications of the discoveries of the

decade 1800-1000 have been made, e.g. Edam cheese. The Japanese have cheeses resulting from the bacterial fermentation of boiled Soja beans.

That bacterial fermentations are accompanied by the evolution of heat is an old experience; but the discovery that the "spontaneous " combustion of sterilized cotton-waste does mious' not occur simply if moist and freely exposed to oxygen, bacteria, but results when the washings of fresh waste are added, has led to clearer proof that the heating of hay-stacks, hops, tobacco and other vegetable products is due to the vital activity of bacteria and fungi, and is physiologically a conse- quence of respiratory processes like those in malting. It seems fairly established that when the preliminary heating process of fermentation is drawing to a close, the cotton, hay, &c, having been converted into a highly porous friable and combustible mass, may then ignite in certain circumstances by the occlusion of oxygen, just as ignition is induced by finely divided metals. A remarkable point in this connexion has always been the necessary conclusion that the living bacteria concerned must be exposed to temperatures of at least 70 C. in the hot heaps. Apart from the resolution of doubts as to the power of spores to withstand such temperatures for long periods, the discoveries of Miquel, Globig and others have shown that there are numerous bacteria which will grow and divide at such temperatures, e.g. B. thermophilus, from sewage, which is quite active at 70 C, and B. Ludwigi and B. ilidzcnsis, &c, from hot springs, &c.

The bodies of sea fish, e.g. mackerel and other animals, have long been known to exhibit phosphorescence. This phenomenon is due to the activity of a whole series of marine esceat "^ bacteria of various genera, the examination and bacteria, cultivation of which have been successfully carried out by Cohn, Beyerinck, Fischer and others. The cause of the phosphorescence is still a mystery. The suggestion that it is due to the oxidation of a body excreted by the bacteria seems answered by the failure to filter off or extract any such body. Beyerinck's view that it occurs at the moment peptones are worked up into the protoplasm cannot be regarded as proved, and the same must be said of the suggestion that the phosphores- cence is due to the oxidation of phosphoretted hydrogen. The conditions of phosphorescence are,

the presence of free oxygen, and, generally, a relatively low temperature, together with .a medium containing sodium chloride, and peptones, but little or no carbohydrates. Considerable differences occur in these latter respects, however, and interesting results were obtained by Beyerinck with mixtures of species possessing different powers of enzyme action as regards carbohydrates. Thus, a form termed Photobaclerium phosphorescens by Beyerinck will absorb maltose, and will become luminous if that sugar is present, whereas P. Pflugeri is indifferent to maltose. If then we prepare densely inseminated plates of these two bacteria in gelatine food-medium to which starch is added as the only carbohydrate, the bacteria grow but do not phosphoresce. If we now streak these plates with an organism, e.g. a yeast, which saccharifies starch, it is possible to tell whether maltose or levulose and fructose are formed; if the former, only those plates containing P. phosphorescens will become luminous; if the latter, only those containing P. Pflugeri. The more recent researches of Molisch have shown that the luminosity of ordinary butcher's meat under appropriate conditions is quite a common occurrence. Thus of samples of meat bought in Prague and kept in a cool room for about two days, luminosity was present in 52 % of the samples in the case of beef, 50% for veal, and 39% for liver. If the meat was treated previously with a 3 % salt solution, 89 % of the samples of beef and 65 % of the samples of horseflesh were found to exhibit this phenomenon. The cause of this luminosity is Micrococcus phosphorens, an immotile round, or almost round organism. This organism is quite distinct from that causing the luminosity of marine fish.

It has long been known that the production of vinegar depends on the oxidization of the alcohol in wine or beer to acetic acid,

~ .,., . the chemical process being probably carried out in two Oxidizing . K. . , .,,,,,, ,.

bacteria, stages, viz. the oxidation of the alcohol leading to

the formation of aldehyde and water, and the further

oxidation of the aldehyde to acetic acid. The process may even

go farther, and the acetic acid be oxidized to CO2 and OH 2 ;

the art of the vinegar-maker is directed to preventing the

accomplishment of the last stage. These oxidations are brought about by the vital activity of several bacteria, of which four — Bacterium aceti, B. pasteurianum, B. kiitzingianum, and B. xylinum — have been thoroughly studied by Hansen and A. Brown. It is these bacteria which form the zoogloea of the " mother of vinegar," though this film may contain other organisms as well. The idea that this film of bacteria oxidizes the alcohol beneath by merely condensing atmospheric oxygen in its interstices, after the manner of spongy platinum, has long been given up; but the explanation of the action as an incom- plete combustion, depending on the peculiar respiration of these organisms — much as in the case of nitrifying and sulphur bacteria — is not clear, though the discovery that the acetic bacteria will not only oxidize alcohol to acetic acid, but further oxidize the latter to C0 2 and OH 2 supports the view that the alcohol is absorbed by the organism and employed as its respirable substance. Promise of more light on these oxidation fermentations is afforded by the recent discovery that not only bacteria and fungi, but even the living cells of higher plants, contain peculiar enzymes which possess the remarkable property of " carrying " oxygen— much as it is carried in the sulphuric acid chamber — and which have there fore been termed oxydases. It is apparently the presence of these oxydases which causes certain wines to change colour and alter in taste when poured from bottle to glass, and so exposed to air. Much as the decade from 1880 to 1890 abounded with investiga- tions on the reactions of bacteria to heat, so the following decade was remarkable for discoveries regarding the effects of other forms of radiant energy. The observations a ndu S ht. of Downes and Blunt in 1877 left it uncertain whether the bactericidal effects in broth cultures exposed to solar rays were due to thermal action or not. Further investigations, in

Fig. 19. — Ginger-beer plant, showing yeast {Saccharomyces pyri- formis) entangled in the meshes of the bacterium (B. vcrmiforme). (H. M. W.)

which Arloing, Buchner, Chmelewski, and others took part, have led to the proof that rays of light alone are quite capable of kill- ing these organisms. The principal questions were satisfactorily settled by Marshall Ward's experiments in 1892-1893, when he showed that even the spores of B. anthracis, which withstand temperatures of 100° C. and upwards, can be killed by exposure to rays of reflected light at temperatures far below anything injurious, or even favourable to growth. He also showed that the

bactericidal action takes place in the absence of food materials, thus proving that it is not merely a poisoning effect of the altered medium. The principal experiments also indicate that it is the rays of highest refrangibility — the blue- violet and ultra-violet rays of the spectrum — which bring about the destruction of the organisms (figs. 17, 18). The practical effect of the bactericidal action of solar light is the destruction of enormous quantities of germs in rivers, the atmosphere and other exposed situations, and experiments have shown that it is especially the pathogenic bacteria — anthrax, typhoid, &c. — which thus succumb to light-action; the discovery that the electric arc is very rich in bactericidal rays led to the hope that it could be used for disinfecting purposes in hospitals, but mechanical difficulties intervene. The recent application of the action of bactericidal rays to the cure of lupus is, however, an extension of the same discovery. Even when the light is not sufficiently intense, or the exposure is too short tc kill the spores, the experiments show that attenuation of virulence,

may result, a point of extreme importance in connexion with the lighting and ventilation of dwellings, the purification of rivers and streams, and the general diminution of epidemics in nature. As we have seen, thermophilous bacteria can grow at high temperatures, and it has long been known that some forms develop on ice. The somewhat different question of and com. * ne resistance of ripe spores or cells to extremes of heat and cold has received attention. Ravenel, Macfadyen and Rowland have shown that several bacilli will bear exposure for seven days to the temperature of liquid air (-192° C. to -183 C.) and again grow when put into normal conditions. More recent experiments have shown that even ten hours' exposure to the temperature of liquid hydrogen – 252 C. (21° on the absolute scale) failed to kill them. It is probable that all these cases of resistance of seeds, spores, &c, are to be connected with the fact that completely dry albumin does not lose its coagulability on heating to 110° C. for some hours, since it is well known that completely ripe spores and dry heat are the conditions of extreme experiments.

No sharp line can be drawn between pathogenic and non-pathogenic Schizomycetes, and some of the most marked steps in the progress of our modern knowledge of these bacteria" C or g

amsms depend on the discovery that their patho- genicity or virulence can be modified — diminished or increased — by definite treatment, and, in the natural course of epidemics, by alterations in the environment. Similarly we are unable to divide Schizomycetes sharply into parasites and sapro- phytes, since it is well proved that a number of species — facul- tative parasites — can become one or the other according to circumstances. These facts, and the further knowledge that many bacteria never observed as parasites, or as pathogenic forms, produce toxins or poisons as the result of their decom- positions and fermentations of organic substances, have led to important results in the applications of bacteriology to medicine. Bacterial diseases in the higher plants have been described, but the subject requires careful treatment, since several points suggest doubts as to the organism described being the in plants. cause °f the disease referred to their agency. Until recently it was urged that the acid contents of plants explained their immunity from bacterial diseases, but it is now known that many bacteria can flourish in acid media. Another objection was that even if bacteria obtained access through the stomata, they could not penetrate the cell-walls bounding the intercellular spaces, but certain anaerobic forms are known to ferment cellulose, and others possess the power of penetrating the cell-walls of living cells, as the bacteria of Leguminosae first described by Marshall Ward in 1887, and confirmed by Miss Dawson in 1898. On the other hand a long list of plant-diseases has been of late years attributed to bacterial action. Some , e.g. the Sereh disease of the sugar-cane, the slime fluxes of oaks and other trees, are not only very doubtful cases, in which other organisms such as yeasts and fungi play their parts, but it may be regarded as extremely improbable that the bacteria are the primary agents at all; they are doubtless saprophytic forms which have gained access to rotting tissues injured by other agents. Saprophytic bacteria can readily make their way down the dead hypha of an invading fungus, or into the punctures made by insects, and Aphides have been credited with the bacterial infection of carnations, though more recent researches by Woods go to show the correctness of his conclusion that Aphides alone are responsible for the carnation disease. On the other hand, recent investigation has brought to light cases in which bacteria are certainly the primary agents in diseases of plants. The principal features are the stoppage of the vessels and consequent wilting of the shoots; as a rule the cut vessels on transverse sections of the shoots appear brown and choked with a dark yellowish slime in which bacteria may be detected, e.g.

cabbages, cucumbers, potatoes, Sic. In the carnation disease and in certain diseases of tobacco and other plants the seat of bacterial action appears to be the parenchyma, and it may be that Aphides or other piercing insects infect the plants, much as insects convey pollen from plant to plant, or

(though in a different way) as mosquitoes infect man with malaria. If the recent work on the cabbage disease may be accepted, the bacteria make their entry at the water pores at the margins of the leaf, and thence via the glandular cells to the tracheids. Little is known of the mode of action of bacteria on these plants, but it may be assumed with great confidence that they excrete enzymes and poisons (toxins), which diffuse into the cells and kill them, and that the effects are in principle the same as those of parasitic fungi. Support is found for this opinion in Beyerinck's discovery that the juices of tobacco plants affected with the disease known as " leaf mosaic," will induce this disease after filtration through porcelain.

In addition to such cases as the kephir and ginger-beer plants (figs. 19, 20), where anaerobic bacteria are associated with yeasts, several interesting examples of symbiosis among bacteria are now known. Bacillus chauvaei biˆi s . ferments cane-sugar solutions in such a way that normal butyric arid, inactive lactic acid, carbon dioxide, and

Fig. 20. — The ginger-beer plant.

A. One of the brain-like gelatinous masses into which the mature " plant " condenses. .

B. The bacterium with and without its gelatinous sheaths (cf. fig. 19).

C. Typical filaments and rodlets in the slimy sheaths.

D. Stages of growth of a sheathed filament — a at 9 A.M., b at 3 P.M., cat 9 p.m., dat 1 1. a.m. next day, eat 3 p.m., fat 9 p.m., gat 10.30 A.M. next day, h at 24 hours later. (H. M. W.)

hydrogen result; Micrococcus acidi-paralactici, on the other hand, ferments such solutions to optically active paralactic acid. Nencki showed, however, that if both these organisms occur together, the resulting products contain large quantities of normal butyl alcohol, a substance neither bacterium can produce alone. Other observers have brought forward other cases. Thus

neither B. coli nor the B. denitrificans of Burri and Stutzer can reduce nitrates, but if acting together they so completely undo the structure of sodium nitrate that the nitrogen passes off in the free state. Van Senus showed that the concurrence of two bacteria is necessary before his B. amylobacler can ferment cellulose, and the case of mud bacteria which evolve sulphuretted hydrogen below which is utilized by sulphur bacteria above has already been quoted, as also that of Winogradsky's Clostridium

paskurianum, which is anaerobic, and can fix nitrogen only if protected from oxygen by aerobic species. It is very probable that numerous symbiotic fermentations in the soil are due to this co-operation of oxygen-protecting species with anaerobic ones, e.g. Tetanus.

Astonishment has been frequently expressed at the powerful activities of bacteria — their rapid growth and dissemination, the extensive and profound decompositions and fermentations induced by them, the resistance of their spores to dessication, heat, &c. — but it is worth while to ask how far these properties are really remarkable when all the data for comparison with other organ- isms are considered. In the first place, the extremely small size and isolation of the vegetative cells place the protoplasmic contents in peculiarly favourable circumstances for action, and we may safely conclude that, weight for weight and molecule for molecule, the protoplasm of bacteria is brought into contact with the environment at far more points and over a far larger surface than is that of higher organisms, whether — as in plants — it is distributed in thin layers round the sap-vacuoles, or — as in animals— is bathed in fluids brought by special mechanisms

to irrigate it. Not only so, the isolation of the cells facilitates the ex- change of liquids and gases, the passage in of food materials and out of enzymes and products of metabolism, and thus each unit of protoplasm obtains opportunities of immediate action, the results of which are re- moved with equal rapidity, not attainable

_ . , , , in more complex multi-

Fig. 21.— A plate-culture colony of a ,,, „„,...•,„. Tn species of Bacillus— Proteus (Hauser) cellul f r organisms. io —on the fifth day. The flame-like put the matter in another processes and outliers are composed of way, if we could imagine writhing filaments, and the contours a u the living cells of a

Slight l-geoa

having given up the specializations of func- tion impressed on them during evolution and simply carry- ing out the fundamental functions of nutrition, growth, and multiplication which mark the generalized activities of the bacterial cell, and at the same time rendered as accessible to the environment by isolation and consequent extension of surface, we should doubtless find them exerting changes in the fermentable fluids necessary to their life similar to those exerted by an equal mass of bacteria, and that in proportion to their approximation in size to the latter. Ciliary movements, which undoubtedly contribute in bringing the surface into contact with larger supplies of oxygen and other fluids in unity of time, are not so rapid or so extensive when compared with other standards than the apparent dimensions of the microscopic field. The microscope magnifies the distance traversed as well as the organism, and although a bacterium which covers 9-10 cm. or more in 15 minutes — say o-i mm. or 100 ju per second— appears to be darting across the field with great velocity, because its own small size — say 5X1 /* — comes into comparison, it should be borne in mind that if a mouse 2 in. long only, travelled twenty times its own length, i.e. 40 in., in a second, the distance traversed in 15 minutes at that rate, viz. 1000 yards, would not appear excessive. In a similar way we must be careful, in our wonder it the marvellous rapidity of cell-division and growth of bacteria, that we do not exaggerate the significance of the phenomenon. It takes any ordinary rodlet 30-40 minutes to double its length and divide into two equal daughter cells when growth is at its best; nearer the minimum it may require 3-4 hours or even much longer. It is by no means certain that even the higher rate is greater than that exhibited by a tropical bamboo which

are continually changing while , the , Qak or f fa

colony moves as a whole. Slichtlv ° magnified. ,(H. M. W.)

will grow over a foot a' day, or even common grasses, or asparagus, during the active period of cell-division, though the phenomenon is here complicated by the phase of extension due to intercalation of water. The enormous extension of surface also facilitates the absorption of energy from the environment, and, to take one case only, it is impossible to doubt that some source of radiant energy must be at the disposal of those prototrophic forms which decompose carbonates and assimilate carbonic acid in the dark and oxidize nitrogen in dry rocky regions where no organic materials are at their disposal, even could they utilize them. It is usually stated that the carbon dioxide molecule is here.

M

&&X£*

Iff

^

Fig. 22. — Portions of a colony such as that in fig. 21, highly magni- fied, showing the kinds of changes brought about in a few minutes, from A to B, and B to C, by the growth and ciliary movements of the filaments. The arrows show the direction of motion. (H. M. W.)

split by means of energy derived from the oxidation of nitrogen, but apart from the fact that none of these processes can proceed until the temperature rises to the minimum cardinal point, Engelmann's experiment shows that in the purple bacteria rays are used other than those employed by green plants, and especi- ally ultra-red rays not seen in the spectrum, and we may probably conclude that " dark rays" — i.e. rays not appearing in the visible spectrum — are absorbed and employed by these and other colourless bacteria. The purple bacteria have thus two sources of energy, one by the oxidation of sulphur and another by the absorption of " dark rays." Stoney (Scient. Proc. R. Dub. Soc, 1893, p. 154) has suggested yet another source of energy, in the bombardment of these minute masses by the molecules of the environment, the velocity of which is sufficient to drive them well into the organism, and carry energy in of which they can avail themselves.

Authorities. — General: Fischer, The Structure and Functions of

Bacteria (Oxford, 1900, 2nd ed.), German (Jena, 1903); Migula, System der Bakterien (Jena, 1897); and in Engler and Prantl, Die natiirlichen Pflanzenfamilien, I. Th. 1 Abt. a; Lafar, Technical Mycology (vol. i. London, 1898); Mace, Traite pratique de bakterio- logie (5th ed. 1904). Fossil bacteria: Renault, " Recherches sur les Bacteriacees fossiles," Ann. des Sc. Nat., 1896, p. 275. Bacteria in Water: Frankland and Marshall Ward. " Reports on the Bac- teriology of Water," Proc. R. Soc. vol. li. p. 183, vol. liii. p. 245, vol. lvi. p. 1 ; Marshall Ward, " On the Biology of B. ramosus," Proc. R. Soc, vol. lviii. p. I ; and papers on Bacteria of the river Thames in Ann. of Bot. vol. xii. pp. 59 and 287, and vol. xiii. p. 197. Cell-membrane, &c. : Biitschli, Weitere Ausfiihrungen uber den Bau der Cyanophyceen und Bakterien (Leipzig, 1896); Fischer, Unters. uber den Bau der Cyanophyceen und Bakterien (Jena, 1897) ; Rowland, " Observations upon the Structure of Bacteria," Trans. Tenner Institute, 2nd ser. 1899, p. 143, with literature. Cilia: Fischer, " Unters. uber Bakterien," Pringsh. Jahrb. vol. xxvii. ; also the works of Migula and Fischer already cited. Nucleus: Wager in Ann. Bot. vol. ix. p. 659; also Migula and Fischer, I.e. ; Vejdovsky, " Uber den Kern der Bakterien und seine Teilung," Cent. f. Bakl. Abt. II. Bd. xi. (1904) p. 481 ; ibid. " Cytologisches uber die Bakterien der Prager Wasserleitung," Cent. f. Bakt. Abt. II. Bd. xv. (1905); Mencl, " Nachtrage zu den Strukturverhaltnissen von Bakterium gammari " in Archiv f. tProtistenkunde, Bd. viii. (1907), p. 257. Spores, &c. : Marshall Ward, " On the Biology of B. ramosus," Proc. R. Soc, 1895, vol. lviii. p. 1; Sturgis, " A Soil Bacillus of the type o f de Bary's B. megatherium," Phil. Trans.

vol. cxci. p. 147; Klein, L., Ber. d. deutschen bot. Gesellsch. (1889), Bd. vii.; and Cent. f. Bakt. und Par. (1889), Bd. vi. Classification: Marshall Ward, " 6n the Characters or Marks employed for classify- ing the Schizomycetes," Ann. of Bot., 1892, vol. vi. ; Lehmann and Neumann, Atlas and Essentials of Bacteriology; also the works of Migula and Fischer already cited. Myxobacteriaceae : Berkeley, Introd. to Cryplogamic Botany (1857), p. 313; Thaxter, "A New Order of Schizomycetes," Bot. Gaz. vol. xvii. (1892), p. 389; and " Further Observations on the Myxobacteriaceae," ibid. vol. xxiii. (1897), p. 395,and " Notes on the Myxobacteriaceae," ibid.vo. xxxvii. (1904), p. 405; Baur, "

Myxobakterienstudien," Arch. f.Protisten- kunde, Bd. v. (1904), p. 92; Smith, " Myxobacterja," Jour, of Botany, 1901, p. 69; Quehl, Cent.f. Bakt. xvi. (1896), p. 9. Growth: Marshall Ward, " On the Biology of B. ramosus," Proc. R. Soc. vol. lviii. p. I (1895). Fermentation, &c. : Warington, The Chemical Action of some Micro-organisms (London, 1888); Winogradsky, " Recherches sur les organismes de la nitrification," Ann. de I'Inst. Past., 1890, pp. 213, 257, 760, 1891, pp. 92 and 577; "Sur l'assimilation de l'azote gazeux, &c," Compt. Rend., 12 Feb. 1894; " Zur Microbiologie des Nitrifikationsprozesses," Cent. f. Bakt. Abt. II. Bd. ii. (1896), p. 415; " Ueber Schwefel-Bakterien," Bot. Zeitg., 1887, Nos. 31-37; Beitr. zur Morph. u. Phys. der Bakterien, H. I (1888); "Ueber Eisenbakterien," Bot. Zeitg., 1888, p. 261; and Omeliansky, " Ueber den Einfluss der organischen Substanzen auf die Arbeit der nitrifizierenden Organismen," Cent. f. Bakt. Abt. II Bd. v. (1896); Schorler, " Beitr. zur Kenntniss der Eisenbak- terien," Cent. 'f. Bakt. Abt. II. Bd. xii. (1904), p. 681 ; Marshall Ward, " On the Tubercular Swellings on the Roots of Vicia Faba,' Phil. Trans., 1877, p. 539; Hellriegel and Wilfarth, " Unters. uber die Stickstoffnahrung der Gramineen u. Leguminosen," Beit. Zeit. d. Vereins fur die Rubenzuckerindustrie (Berlin, 1888); Nobbe and Hiltner, Landw. Versuchsstationen (1899), Bd. 51, p. 241, and Bd. 52, P- 455; Maze, Annates de VInstitut Pasteur, t. II, p. 44, and t. 12, p i (1897); Prazmowski, Land. Versuchsstationen, Bd. 37 (1890), p. 161, Bd. 38 (1891), p. 5; Frank, Landw. Jahrb. Bd. 17 (1888), p. 441; Omelianski, " Sur la fermentation de la cellulose," Compt. Rend., 4 Nov. 1895; van Senus, Beitr. zur Kenntn. der Cellulose- gdhru'ng (Leiden, 1890); van Tieghem, " Sur la fermentation de la cellulose," Bull, de la soc. bot. de Fr. t.xxvi. (1879), p. 28; Beyennck " Ueber Spirillum desulphuricans, &c," Cent.f. Bakt. Abt. II. Bd. 1. (1895), p- 1; Molisch, Die Pflanze in ihren Beziehungen zum Eisen (Jena,' 1892). Pigment Bacteria: Ewart, "On the Evolution of Oxygen from Coloured Bacteria," Linn. Journ., 1897, vol. xxxiii. p. 123; Molisch, Die Purpurbakterien (Jena, 1907). Oxydases and Enzymes: Green, The Soluble Ferments and Fermentation (Cam- bridge, 1899). Action of Light, &c. : Marshall Ward, " The Action of Light on Bacteria," Phil. Trans., 1893, p. 961, and literature. Resistance to Cold, &c: Ravenel, Med. News, 1899, vol. lxxiv. ; Macfadyen and Rowland, Proc. R. Soc. vol. lxvi. pp. 180, 339, and 488; Farmer, " Observations on the Effect of Desiccation of Albumin upon its Coagulability," ibid. p. 329. Pathogenic Bacteria: Baumgarten, Pathologische Mykologie (1890); Kolle and Wasser- mann, Handbuch der pathogenen Mikroorganismen (1902-1904); and

numerous special works in medical literature. Immunity: Ehrlich, ” On Immunity with Special Reference to Cell-life,” Proc. R Soc. vol. lxvi. p. 424; Calcar, ” Die Fortschritte der Immunitats- und Spezifizetatslehre seit 1870,” Progressus Rei Botanicae, Bd. I. Heft 3(1907). Bacteriosis: Migula, I.e. p. 322, has collected the literature; see also Sorauer, Handbuch der Pflanzenkrankheiten, I. (1905), pp. 18-93, f° r later literature. Symbiosis: Marshall Ward, ” Symbiosis,” Ann. of Bot. vol. xiii. p. 549, and literature.

(H. M. W.; V. H. B.)

II. Pathological Importance

The action of bacteria as pathogenic agents is in great part merely an instance of their general action as producers of chemical change, yet bacteriology as a whole has become so extensive, and has so important a bearing on subjects widely different from one another, that division of it has become essential. The science will accordingly be treated in this section from the patho- logical standpoint only. It will be considered under the three following heads, viz. (1) the methods employed in the study; (2) the modes of action of bacteria and the effects produced by them; and (3) the facts and theories with regard to immunity against bacterial disease.

The demonstration by Pasteur that definite diseases could be produced by bacteria, proved a great stimulus to research in the etiology of infective conditions, and the result Historical was a rapid advance in human knowledge. An all- summary. importan) . f actor j n this remarkable progress was the introduction by Koch of solid culture media, of the ” plate- method,” &c, an account of which he published in 1881. By means of these the modes of cultivation, and especially of separa- tion, of bacteria were greatly simplified. Various modifications

have since been made, but the routine methods in bacteriological procedure still employed are in great part those given by Koch. By 1876 the anthrax bacillus had been obtained in pure culture by Koch, and some other pathogenic bacteria had been observed in the tissues, but it was in the decade 1880-1890 that the most important discoveries were made in this field. Thus the organisms of suppuration, tubercle, glanders, diphtheria, typhoid fever, cholera, tetanus, and others were identified, and their relationship to the individual diseases established. In the last decade of the 19th century the chief discoveries were of the

bacillus of influenza (1892), of the bacillus of plague (1894) and of the bacillus of dysentery (1898). Immunity against diseases-caused by bacteria has been the subject of systematic research from 1880 onwards. In producing active immunity by the attenuated virus, Duguid and J. S. Burdon-Sanderson and W. S. Greenfield in Great Britain, and Pasteur, Toussaint and Chauveau in France, were pioneers. The work of Metchnikoff, dating from about 1884, has proved of high importance, his theory of phagocytosis {vide infra) having given a great stimulus to research, and having also contributed to important advances. The modes by which bacteria produce their effects also became a subject of study, and attention was naturally turned to their toxic products. The earlier work, notably that of L. Brieger, chiefly concerned ptomaines {vide infra), but no great advance resulted. A new field of inquiry was, however, opened up when, by filtration a bacterium-free toxic fluid was obtained which produced the important symptoms of the disease— in the case of diphtheria by P. P. E. Roux and A. Yersin (1888), and in the case of tetanus a little later by various observers. Research was thus directed towards ascertaining the nature of the toxic bodies in such a fluid, and Brieger and Fraenkel (1890) found that they were proteids, to which they gave the name ” toxalbumihs.” Though subsequent researches have on the whole confirmed these results, it is still a matter of dispute whether these proteids are the true toxins or merely contain the toxic bodies precipitated along with them. In the United Kingdom the work of Sidney Martin, in the separation of toxic substances from the bodies of those who have died from certain diseases, is also worthy of mention. Immunity against toxins also became a subject of investigation, and the result was the discovery of the antitoxic action of the serum of animals immunized against tetanus toxin by E. Behring and Kitazato (1890), and by Tizzoni and Cattani. A similar result was also obtained in the case of diphtheria. The facts with regard to passive immunity were thus established and were put to practical application by the introduction of diphtheria antitoxin as a therapeutic agent in 1894. The technique of serum preparation has become since that time greatly elaborated and improved, the work of P. Ehrlich in this respect being specially noteworthy. The laws of passive immunity were shown to hold also in the case of immunity against living organisms by R. Pfeiffer (1894), and various anti-bacterial sera have been introduced. Of these the antistreptococcic serum of A. Marmorek (1895) is one of the best known. The principle’s of protective inoculation have been developed and practically

applied on a large scale, notably by W. M. W. Haffkine in the case of cholera (1893) and plague (1896) , and more recently by Wright and Semple in the case of typhoid fever. One other discovery of great importance may be mentioned, viz. the agglutinative action of the serum of a patient suffering from a bacterial disease, first described in the case of typhoid fever independently by Widal and by Griinbaum in 1896, though led up to by the work of Pfeiffer, Gruber and Durham and others. Thus a new aid was added to medical science, viz. serum diagnosis of disease. The last decade of the iqth century will stand out in the history of medical science as the period in which serum therapeutics and serum diagnosis had their birth.

In recent years the relations of toxin and antitoxin, still obscure, have been the subject of much study and controversy. It was formerly supposed that the injection of attenuated cultures or dead organisms — vaccines in the widest sense — was only of service in producing immunity as a preventive measure against the corresponding organism, but the work of

Sir Almroth Wright has shown that the use of such vaccines may be of service even after infection has occurred, especially when the resulting disease is localized. In this case a general reaction is stimulated by the vaccine which may aid in the destruction of the invading organisms. In regulating the administration of such vaccines he has introduced the method of observing the opsonic index, to which reference is made below. Of the discoveries of new organisms the most important is that of the Spirochaete pallida in syphilis by Schaudinn and Hoffmann in 1905; and although proof that it is the cause of the disease is not absolute, the facts that have been established .constitute very strong presumptive evidence in favour of this being the case. It may be noted, however, that it is still doubtful whether this organism is to be placed amongst the bacteria or amongst the protozoa.

The methods employed in studying the relation of bacteria to disease are in principle comparatively simple,but considerable experience and great care are necessary in applying of study, them and in interpreting results. In any given disease there are three chief steps, viz. (1) the discovery of a bacterium in the affected tissues by means of the microscope; (2) the obtaining of

the bacterium in pure culture; and (3) the production of the disease by inoculation with a pure culture. By means of microscopic examination more than one organism may sometimes be observed in the tissues,but one single organism by its constant presence and special relations to the tissue changes can usually be selected as the probable cause of the disease, and attempts towards its cultivation can then be made. Such microscopic examination requires the use of the finest lenses and the application of various staining methods. In these latter the basic aniline dyes in solution are almost exclusively used, on account of their special affinity for the bacterial proto- plasm. The methods vary much in detail, though in each case the endeavour is to colour the bacteria as deeply, and the tissues as faintly, as possible. Sometimes a simple watery solution of the dye is sufficient, but very often the best result is obtained by increasing the staining power, e.g. by addition of weak alkali, application of heat, &c, and by using some substance which acts as a mordant and tends to fix the stain to the bacteria. Excess of stain is afterwards removed from the tissues by the use of decolorizing agents, such as acids of varying strength and concentration, alcohol, &c. Different bacteria behave very differently to stains; some take them up rapidly, others slowly, some resist decolorization, others are easily decolorized. In some instances the stain can be entirely removed from the tissues, leaving the bacteria alone coloured, and the tissues can then be stained by another colour. This is the case in the methods for staining the tubercle bacillus and also in Gram's method, the essential point in which latter is the treatment with a solution of iodine before decolorizing. In Gram's method, however, only some bacteria retain the stain, while others lose it. The tissues and fluids are treated by various histological methods, but, to speak generally, examination is made either in films smeared on thin cover-glasses and allowed to dry, of in thin sections cut by the microtome after suitable fixation and harden- ing of the tissue. In the case of any bacterium discovered, observation must be made in a long series of instances in order to determine its invariable presence.

In cultivating bacteria outside the body various media to serve as food material must be prepared and sterilized by heat. The general principle in their preparation is to supply the nutriment for bacterial growth in a form as nearly similar as possible to that of the natural habitat of the organisms — in the case of pathogenic bacteria, the natural fluids of the body. The media

are used either in a fluid or solid condi- tion, the latter being obtained by a process of coagulation, or by the addition of a gelatinizing agent, and are placed in glass tubes or flasks plugged with cotton- wool. To mention examples, blood serum solidified at a suitable temperature is a highly suitable medium, and various media are made with extract of meat as a basis, with the addition of gelatine or agar as solidify- ing agents and of non-coagulable proteids (commercial ” pep-

Calttva tiott.

tone “) to make up for proteids lost by coagulation in the preparation. The reaction of the media must in every case be carefully attended to, a neutral or slightly alkaline reaction being, as a rule, most suitable; for delicate work it may be necessary to standardize the reaction by titration methods. The media from the store-flasks are placed in glass test-tubes or small flasks, protected from contamination by cotton-wool plugs, and are sterilized by heat. For most purposes the solid media are to be preferred, since bacterial growth appears as a discrete mass and accidental contamination can be readily recognized. Cultures are made by transferring by means of a sterile platinum wire a little of the material containing the bacteria to the medium. The tubes, after being thus inoculated, are kept at suitable temperatures, usually either at 37° C, the temperature of the body, or at about 20° C, a warm summer temperature, until growth appears. For maintaining a constant temperature incubators with regulating apparatus are used. Subsequent cultures or, as they are called, ” subcultures,” may be made by inoculating fresh tubes, and in this way growth may be maintained often for an indefinite period. The simplest case is that in which only one variety of bacterium is present, and a ” pure culture ” may then be obtained at once. When, however, several species are present together, means must be adopted for separating them. For this purpose various methods have been devised, the most important being the plate-method of Koch. In this method the bacteria are distributed in a gelatine or agar medium liquefied by heat, and the medium is then poured out on sterile glass plates or in shallow glass dishes, and allowed to solidify. Each bacterium capable of growth gives rise to a colony visible to the naked eye, and if the colonies are sufficiently apart, an inoculation can be made from any one to a tube of culture-medium and a pure culture obtained. Of course, in applying the method means must be adopted for suitably diluting the bacterial mixture. Another important method consists in inoculating an

animal with some fluid con- taining the various bacteria. A pathogenic bacterium present may invade the body, and may be obtained in pure culture from the internal organs. This method applies especially to pathogenic bacteria whose growth on culture media is slow, e.g. the tubercle bacillus.

The full description of a particular bacterium implies an account not only of its microscopical characters, but also of its growth characters in various culture media, its biological properties, and the effects produced in animals by inoculation. To demonstrate readily its action on various substances, cer- tain media have been devised. For example, various sugars — lactose, glucose, saccharose, &c. — are added to test the fermen- tative action of the bacterium on these substances; litmus is added to show changes in reaction, specially standardized media being used for estimating such changes; peptone solution is commonly employed for testing whether or not the bacterium forms indol; sterilized milk is used as a culture medium to determine whether or not it is curdled by the growth. Some- times a bacterium can be readily recognized from one or two characters, but not infrequently a whole series of tests must be made before the species is determined. As our knowledge has advanced it has become abundantly evident that the so-called pathogenic bacteria are not organisms with special features, but that each is a member of a group of organisms possessing closely allied characters. From the point of view of evolution we may suppose that certain races of a group of bacteria have gradually acquired the power of invading the tissues of the body and producing disease. In the acquisition of pathogenic properties some of their original characters have become changed, but in many instances this has taken place only to a slight degree, and, furthermore, some of these changes are not of a permanent' character. It is to be noted that in the case of bacteria we can only judge of organisms being of different species by the stability of the characters which distinguish them, and numerous examples might be given where their characters become modified by comparatively slight change in their environment. The cultural as well as the microscopical

characters of a pathogenic organism may be closely similar to other non-pathogenic members of the same group, and it thus

comes to be a matter of extreme difficulty in certain cases to state what criterion should be used in differentiating varieties. The tests which are applied for this purpose at present are chiefly of two kinds. In the first place, such organisms may be differentiated by the chemical change produced by them in various culture media, e.g. by their fermentative action on various sugars, &c, though in this case such properties may become modified in the course of time. And in the second place, the various serum reactions to be described below have been called into requisition. It may be stated that the introduction of a particular bacterium into the tissues of the body leads to certain properties appearing in the serum, which are chiefly exerted towards this particular bacterium. Such a serum may accordingly within certain limits be used for differentiating this organism from others closely allied to it (vide infra).

The modes of cultivation described apply only to organisms which grow in presence of oxygen. Some, however — the strictly anaerobic bacteria — grow only in the absence of oxygen; hence means must be adopted for excluding this gas. It is found that if the inoculation be made deep down in a solid medium, growth of an anaerobic organism will take place, especially if the medium contains some reducing agent such as glucose. Such cultures are called ” deep cultures.” To obtain growth of an anaerobic organism on the surface of a medium, in using the plate method, and also for cultures in fluids, the air is displaced by an indifferent gas, usually hydrogen.

In testing the effects of bacteria by inoculation the smaller rodents, rabbits, guinea-pigs, and mice, are usually employed. One great drawback in certain cases is that such Ma. ‘ animals are not susceptible to a given bacterium, or that the disease is different in character from that in the human subject. In some cases, e.g. Maltafeverandrelapsingfever, monkeys have been used with success, but in others, e.g. leprosy, none of the lower animals has been found to be susceptible. Discretion must therefore be exercised in interpreting negative results in the lower animals. For purposes of inoculation young vigorous cultures must be used. The bacteria are mixed with some indifferent fluid, or a fluid culture is employed. The injections are made by means of a hypodermic syringe into the subcutaneous tissue, into a vein, into one of the serous sacs, or more rarely into some special part of the body. The animal, after injection, must be kept in favourable surroundings, and any resulting symptoms noted. It may die, or may be killed at any

time desired, and then a post-mortem examination is made, the conditions of the organs, &c, being observed and noted. The various tissues affected are examined microscopically and cultures made from them; in this way the structural changes and the relation of bacteria to them can be determined.

Though the causal relationship of a bacterium to a disease may be completely established by the methods given, another very important part of bacteriology is concerned with the poisons or toxins formed by bacteria. These toxins may become free in the culture fluid, and the living bacteria may then be got rid of by filtering the fluid through a filter of unglazed porcelain, whose pores are sufficiently small to retain them. The passage of the fluid is readily effected by negative pressure o/toxias? produced by an ordinary water exhaust-pump. The effects of the filtrate are then tested by the methods used in pharmacology. In other instances the toxins are re- tained to a large extent within the bacteria, and in this case the dead bacteria are injected as a suspension in fluid. Methods have been introduced for the purpose of breaking up the bodies of bacteria and setting free the intracellular toxins. For this purpose Koch ground up tubercle bacilli in an agate mortar and treated them with distilled water until practically no deposit remained. Rowland and Macfadyen for the same purpose intro- duced the method of grinding the bacilli in liquid air. At this temperature the bacterial bodies are extremely brittle, and are thus readily broken up. The study of the nature of toxins requires, of course, the various methods of organic chemistry. Attempts

to obtain them in an absolutely pure condition have, however, failed in important cases. So that when a ” toxin ” is spoken of, a mixture with other organic substances is usually implied. Or the toxin may be precipitated with other organic substances, purified toacertain extentbyre-solution,re-precipitation, &c.,and desiccated. A ” dry toxin ” is thus obtained, though still in an impure condition. Toxic substances have also been separated by corresponding methods from the bodies of those who have died of certain diseases, and the action of such substances on animals is in some cases an important point in the pathology of the disease. Another auxiliary method has been applied in this department, viz. the separation of organic substances by filtration under high pressure through a colloid membrane, gelatine supported in the pores of a porcelain filter being usually employed. It has been found, for example, that a toxin may pass through such a filter while an antitoxin may not. The methods of

producing immunity are dealt with below.

The fact that in anthrax, one of the first diseases to be fully studied, numerous bacilli are present in the blood of infected animals, gave origin to the idea that the organisms •

might produce their effect by using up the oxygen as a L n

work on this subject is highly suggestive, and opens up new possibilities with regard to the investigation of bacterial action within the body. Not only are the general symptoms of poisoning in bacterial disease due to toxic substances, but also the tissue changes, many of them of inflammatory nature, in the neighbourhood of the bacteria. Thus, to mention examples, diphtheria toxin produces inflammatory oedema which may be followed by necrosis; dead tubercle bacilli give rise to a tubercle-like nodule, &c. Furthermore, a bacillus may give rise to more than one toxic body, either as stages in one process of change or as distinct products. Thus paralysis following diphtheria is in all probability due to a different toxin from that which causes the acute symptoms of poisoning or possibly to a modification of it sometimes formed in specially large amount. It is interesting to note that in the case of the closely analogous example of snake venoms, there may be separated from a single venom a number of toxic bodies which have a selective action on different animal tissues.

Regarding the chemical nature of toxins less is known than regarding their physiological action. Though an enormous amount of work has been done on the subject, no toxins. important bacterial toxin has as yet been obtained in a pure condition, and, though many of them are probably of proteid nature, even this cannot be asserted with absolute certainty. Brieger, in his earlier work, found that alkaloids were formed by bacteria in a variety of conditions, and that some of them were poisonous. These alkaloids he called ptomaines. The methods used in the investigations were, however, open to objection, and it is now recognized that although organic bases may sometimes be formed, and may be toxic, the important toxins are not of that nature. A later research by Brieger along with Fraenkel pointed to the extracellular toxins of diphtheria, tetanus and other

diseases being of proteid nature, and various other observers have arrived at a like conclusion. The general result of such research has been to show that the toxic bodies are, like proteids, precipitable by alcohol and various salts; they are soluble in water, are somewhat easily dialysable, and are rela- tively unstable both to light and heat. Attempts to get a pure toxin by repeated precipitation and solution have resulted in the production of a whitish amorphous powder with highly toxic properties. Such a powder gives a proteid reaction, and is no doubt largely composed of albumoses, hence the name tox-albumoses has been applied. The question has, however, been raised whether the toxin is really itself a proteid, or whether it is not merely carried down with the precipitate. Brieger and Boer, by precipitation with certain salts, notably of zinc, obtained a body which was toxic but gave no reaction of any form of proteid. There is of course the possibility in this case that the toxin was a proteid, but was in so small amount that it escaped detection. These facts show the great difficulty of the problem, which is probably insoluble by present methods of analysis; the only test, in fact, for the existence of a toxin is its physiological effect. It may also be mentioned that many toxins have now been obtained by growing the particular organism in a proteid-free medium, a fact which shows that if the toxin is a proteid it may be formed synthetically by the bacterium as well as by modifica- tion of proteid already present. With regard to the nature of intracellular toxins, there is even greater difficulty in the investi- gation and still less is known. Many of them, probably also of proteid nature, are much more resistant to heat; thus the intra- cellular toxins of the tubercle bacillus retain certain of their effects even after exposure to ioo° C. Like the extracellular toxins they may be of remarkable potency; for example, fever is produced in the human subject by the injection into the blood of an extremely minute quantity of dead typhoid bacilli.

We cannot as yet speak definitely with regard to the part played by enzymes in these toxic processes. Certain toxins Enzymes, resemble enzymes as regards their conditions of pre- cipitation and relative instability, and the fact that in most cases a considerable period intervenes between the time of injection and the occurrence of symptoms has been adduced in support of the view that enzymes are present. In the case of

diphtheria Sidney Martin obtained toxic albumoses in the spleen, which he considered were due to the digestive action of an enzyme formed by the bacillus in the membrane and absorbed

into the circulation. According to this view, then, a part at least of the directly toxic substance is produced in the living body by enzymes present in the so-called toxin obtained from the bacterial culture. Recent researches go to show that enzymes play a greater part in fermentation by living ferments than was formerly supposed, and by analogy it is likely that they are also concerned in the processes of disease. But this has not been proved, and hitherto no enzyme has been separated from a pathogenic bacterium cap- able of forming, by digestive or other action, the toxic bodies from proteids outside the body. It is also to be noted that, as in the case of poisons of known constitution, each toxin has a minimum lethal dose which is proportionate to the weight of the animal and which can be ascertained with a fair degree of accuracy.

The action of toxins is little understood. It consists in all probability of disturbance, by means of the chemical affinities of the toxin, of the highly complicated molecules of living cells. This disturbance results in disintegration to a varying degree, and may produce changes visible on microscopic examination- In other cases such changes cannot be detected, and the only evidence of their occurrence may be the associated symptoms. The very important work of Ehrlich on diphtheria toxin shows that in the molecule of toxin there are at least two chief atom groups — one, the " haptophorous," by which the toxin molecule is attached to the cell protoplasm; and the other the "toxo-phorous," which has a ferment-like action on the living molecule, producing a disturbance which results in the toxic symptoms. On this theory, susceptibility to a toxin will imply both a chemical affinity of certain tissues for the toxin molecule and also sensitive- ness to its actions, and, furthermore, non-susceptibility may result from the absence of either of these two properties.

A bacterial infection when analysed is seen to be of the nature of an intoxication. There is, however, another all-important factor concerned, viz. the multiplication of the living R organisms in the tissues; this is essential to, and infection. regulates, the supply of toxins. It is important that these two essential factors should be kept clearly in view, since the means of defence against any disease may depend upon the power either of neutralizing toxins or of killing the organisms producing them. It is to be noted that there is no fixed relation between toxin production and bacterial multiplication in the body, some of the organisms most active as toxin producers having comparatively little power of invading the tissues.

We shall now consider how bacteria may behave when they have gained entrance to the body, what effects may be produced, and what circumstances may modify the disease in any particular case. The extreme instance of bacterial aucttonot invasion is found in some of the septicaemias in the disease. lower animals, e.g. anthrax septicaemia in guinea-pigs, pneumococcus septicaemia in rabbits. In such diseases the bacteria, when introduced into the subcutaneous tissue, rapidly gain entrance to the blood stream and multiply freely in it, and by means of their toxins cause symptoms of general poisoning. A widespread toxic action is indicated by the lesions found^- cloudy swelling, which may be followed by fatty degeneration, in internal organs, capillary haemorrhages, &c. In septicaemia in the human subject, often due to streptococci, the process is similar, but the organisms are found especially in the capillaries of the internal organs and may not be detectable in the peripheral circulation during life. In another class of diseases, the organisms first produce some well-marked local lesion, from which secondary extension takes place by the lymph or blood stream to other parts of the body, where corresponding lesions are formed. In this way secondary abscesses, secondary tubercle glanders and nodules, &c, result; in typhoid fever there is secondary invasion of the mesenteric glands, and clumps of bacilli are also found in internal organs, especially the spleen, though there may be little tissue change around them. In all such cases there is seen a selective character in the distribution of the lesions, some organs being in any disease much more liable to infection than others. In still

another class of diseases the bacteria are restricted to some particular part of the body, and the symptoms are due to toxins which are absorbed from it. Thus in cholera the bacteria are practically confined to the intestine, in diphtheria to the region of the false membrane, in tetanus to some wound. In the last-mentioned disease even the local multiplication depends upon the presence of other bacteria, as the tetanus bacillus has practically no power of multiplying in the healthy tissues when introduced alone.

The effects produced by bacteria may be considered under the following heads: (i) tissue changes produced in the vicinity

Tissue of the Dacter i a > either at the primary or secondary changes, foci; (2) tissue changes produced at a distance by absorption of their toxins ; (3) symptoms. The changes in the vicinity of bacteria are to be regarded partly as the direct result of the action of toxins on living cells, and partly as indicating a reaction on the part of the tissues. (Many such changes are usually grouped together under the heading of ” inflammation ” of varying degree — acute, subacute and chronic.) Degeneration and death of cells, haemorrhages, serous and fibrinous exudations, leucocyte emigration, proliferation of connective tissue and other cells, may be mentioned as some of the fundamental changes. Acute inflammation of various types, suppuration, granulation-tissue formation, &c, represent some x of the complex resulting processes. The changes produced at a distance by distribution of toxins may be very manifold — ■ cloudy swelling and fatty degeneration, serous effusions, capillary haemorrhages, various degenerations of muscle, hyaline degenera- tion of small blood-vessels, and, in certain chronic diseases, waxy degeneration, all of which may be widespread, are examples of the effects of toxins, rapid or slow in action. Again, in certain cases the toxin has a special affinity for certain tissues. Thus in diphtheria changes in both nerve cells and nerve fibres have been found, and in tetanus minute alterations in the nucleus and protoplasm of nerve cells.

The lesions mentioned are in many instances necessarily accompanied by functional disturbances or clinical symptoms, Symptoms. var yi n g according to site, and to the nature and degree of the affection. In addition, however, there occur in bacterial diseases symptoms to which the correlated structural changes have not yet been demonstrated. Amongst these the most important is fever with increased protein metabolism, attended with disturbances of the circulatory and respiratory Systems. Nervous symptoms, somnolence, coma, spasms, con- vulsions and paralysis are of common occurrence. All such phenomena, however, are likewise due to the disturbance of the molecular constitution of living cells. Alterations in metabolism are found to be associated with some of these, but with others no corresponding physical change can be demonstrated. The action of toxins on various glands, producing diminished or increased functional activity, has a close analogy to that of certain drugs. In short, if we place aside the outstanding exception of tumour growth, we may say that practically all the important phenomena met with in disease may be experimentally produced

by the injection of bacteria or of their toxins.

The result of the entrance of a virulent bacterium into the tissues of an animal is not a disease with hard and fast characters, but varies greatly with circumstances. With regard bffity!' ' to the subject of infection the chief factor is suscepti- bility; with regard to the bacterium virulence is all- important. Susceptibility, as is well recognized, varies much under natural conditions in different species, in different races of the same species, and amongst individuals of the same race. It also varies with the period of life, young subjects being more , susceptible to certain diseases, e.g. diphtheria, than adults. Further, there is the very important factor of acquired suscepti- bility. It has been experimentally shown that conditions such as fatigue, starvation, exposure to cold, &c, lower the general resisting powers and increase the susceptibility to bacterial infection. So also the local powers of resistance may be lowered by injury or depressed vitality. In this way conditions formerly

believed to be the causes of disease are now recognized as playing their part in predisposing to the action of the true causal agent, viz. the bacterium. In health the blood and internal tissues are bacterium-free; after death they offer a most suitable pabulum for various bacteria; but between these two extremes lie states of varying liability to infection. It is also probable that in a state of health organisms do gain entrance to the blood from time to time' and are rapidly killed off. The circumstances which alter the virulence of bacteria will be referred to again in connexion with immunity, but it may be stated here that, as a general rule, the virulence of an organism towards an animal is increased by sojourn in the tissues of that animal. The increase of virulence becomes especially marked when the organism is inoculated from animal to animal in series, the method of passage. This is chiefly to be regarded as an adaptation to surroundings, though the fact that the less virulent members of the bacterial species will be liable to be killed off also plays a part. Conversely, the virulence tends to diminish on cultivation on artificial media outside the body, especially in circumstances little favourable to growth.

By immunity is meant non-susceptibility to a given disease, or to experimental inoculation with a given bacterium or toxin. The term must be used in a relative sense, and account must always be taken of the conditions present. An ,mmunH y- animal may be readily susceptible to a disease on experimental inoculation, and

yet rarely or never suffer from it naturally, because the necessary conditions of infection are not supplied in nature. That an animal possesses natural immunity can only be shown on exposing it to such conditions, this being usually most satisfactorily done in direct experiment. Further, there are various degrees of immunity, and in this connexion conditions of local or general diminished vitality play an important part in increasing the susceptibility. Animals naturally susceptible may acquire immunity, on the one hand by successfully passing through an attack of the disease, or, on the other hand, by various methods of inoculation. Two chief varieties of artificial immunity are now generally recognized, differing chiefly accord- ing to the mode of production. In the first — active immunity-ˆ a reaction or series of reactions is produced in the body of the animal, usually by injections of bacteria or their products. The second — passive immunity — is produced by the transference of a quantity of the serum of an animal actively immunized to a fresh animal; the term is applied because there is brought into play no active change in the tissues of the second animal. The methods of active immunity have been practically applied in preventive inoculation against disease; those of passive immunity have given us serum therapeutics. The chief facts with regard to each may now be stated.

1. Active Immunity.— The key to the artificial establishment of active immunity is given by the fact long established that recovery from an attack of certain infective diseases is accom- panied by protection for varying periods of time against a subsequent attack. Hence follows the idea of producing a modified attack of the disease as a means of prevention — a principle which had been previously applied in inoculation against smallpox. Immunity, however, probably results from certain substances introduced into the system during the disease rather than from the disease itself; for by properly adjusted doses of the poison (in the widest sense), immunity may result without any symptoms of the disease occurring. Of the chief methods used in producing active immunity the first is by in- oculation with bacteria whose virulence has been diminished, i.e. with an ” attenuated virus.” Many of the earlier methods of attenuation were devised in the case of the anthrax bacillus, an organism which is, however, somewhat exceptional as regards the relative stability of its virulence. Many such methods consist, to speak generally, in growing the organism outside the body under somewhat unsuitable conditions, e.g. at higher temperatures

than the optimum, in the presence of weak anti- septics, &c. The virulence of many organisms, however, becomes diminished when they are grown on the ordinary artificial media, and the diminution is sometimes accelerated by passing a current

of air over the surface of the growth. Sometimes also the virulence of a bacterium for a particular kind of animal becomes lessened on passing it through the body of one of another species. Cultures of varying degree of virulence may be obtained by such methods, and immunity can be gradually increased by inoculation with vaccines of increasing virulence. The immunity may be made to reach a very high degree by ultimately using cultures of intensified virulence, this " supervirulent " character being usually attained by the method of passage already explained. A second method is by injection of the bacterium in the dead condition, whereby immunity against the living organism may be produced. Here manifestly the dose may be easily controlled, and may be gradually increased in successive inoculations. This method has a wide application. A third method is by injections of the separated toxins of a bacterium, the resulting immunity being not only against the toxin, but, so far as present knowledge shows, also against the living organism. In the development of toxin-immunity the doses, small at first, are gradually in- creased in successive inoculations; or, as in the case of very active toxins, the initial injections are made with toxin modified by heat or by the addition of various chemical substances. Immunity of the same nature can be acquired in the same way against snake and scorpion poisons, and against certain vegetable toxins, e.g. ricin, abrin, &c.

In order that the immunity may reach a high degree, either the bacterium in a very virulent state or a large dose of toxin must ultimately be used in the injections. In such cases the immunity is, to speak generally, specific, i.e. applies only to the bacterium, or toxin used in its production. A certain degree of non-specific immunity or increased tissue resistance may be produced locally, e.g. in the peritoneum, by injections of non- pathogenic organisms, peptone, nucleic acid and various other substances. In these cases the immunity is without specific character, and cannot be transferred to another animal. Lastly, in a few instances one organism has an antagonistic action to another; for

example, the products of B. pyocyaneus have a certain protective action against B. anlhracis. This method has, however, not yielded any important practical application.

2. Passive Immunity: Anli-sera.— -The development of active immunity by the above methods is essentially the result of a reactive process on the part of the cells of the body, though as yet we know little of its real nature. It is, however, also accompanied by the appearance of certain bodies in the blood serum of the animal treated, to which the name of anti-substances is given, and these have been the subject of extensive study. It is by means of them that immunity (passive) can be trans- ferred to a fresh animal. The development of anti-substances is, however, not peculiar to bacteria, but occurs also when alien cells of various kinds, proteins, ferments, &c, are injected. In fact, organic molecules can be divided into two classes according as they give rise to anti-substances or fail to do so. Amongst the latter, the vegetable poisons of known constitution, alkaloids, glucosides, &c, are to be placed. The molecules which lead to the production of anti-substances are usually known as antigens, and each antigen has a specific combining affinity for its corre- sponding anti-substance, fitting it as a lock does a key. The antigens, as already indicated, may occur in bacteria, cells, &c, or they may occur free in a fluid. Anti-substances may be arranged, as has been done by Ehrlich, into three main groups. In the first group, the anti-substance simply combines with the antigen, without, so far as we know, producing any change in it. The antitoxins are examples of this variety. In the second group, the anti-substance, in addition to combining with the antigen, produces some recognizable physical change in it; the precipitins and agglutinins may be mentioned as examples. In the third group, the anti-substance, after it has combined with the antigen, leads to the union of a third body called complement (alexine or cytase of French writers), which is present in normal serum. As a result of the union of the three substances, a dissolving or digestive action is often to be observed. This is the mode of action of the anti-substances in the case of a haemolvtic or bacteriolytic serum. So far as bacterial immunity

is concerned, the anti-serum exerts its action either on the toxin or on the bacterium itself; that is, its action is either antitoxic or anti-bacterial. The properties of these two kinds of serum may now be considered.

The term “antitoxic ” signifies that serum has the power of neutralizing the action of the toxin, as is shown by mixing them together outside the body and then injecting them into an animal. The antitoxic serum when injected se “„m* c previously to the toxin also confers immunity (passive) against it; when injected after the toxin it has within certain limits a curative action, though in this case its dose requires to be large. The antitoxic property is developed in a susceptible animal by successive and gradually increasing doses of the toxin. In the earlier experiments on smaller animals the potency of the toxin was modified for the first injections, but in preparing antitoxin for therapeutical purposes the toxin is used in its unaltered condition, the horse being the animal usually employed. The injections are made subcutaneously and afterwards intravenously; and, while the dose must be gradually increased, care must be taken that this is not done too quickly, otherwise the antitoxic power of the serum may fall and the health of the animal suffer. The serum of the animal is tested from time to time against a known amount of toxin, i.e. is. standardized. The unit of antitoxin in Ehrlich’s new standard is the amount requisite to antagonize 100 times the minimum lethal dose of a particular toxin to a guinea-pig of 250 grm. weight, the indication that the toxin has been antagonized being that a fatal result does not follow within five days after the injection. In the case of diphtheria the antitoxic power of the serum may reach 800 units per cubic centimetre, or even more. The laws of antitoxin production and action are not confined to bacterial toxins, but apply also to other vegetable and animal toxins, resembling them in constitution, viz. the vegetable toxalbumoses and the snake-venom .group referred to above.

The production of antitoxin is one of the most striking facts of biological science, and two important questions with regard to it must next be considered, viz. how does the antitoxin act? and how is it formed within the body? Th’eo- an titoxia. retically there are two possible modes of action: antitoxin may act by means of the cells of the body, i.e. in- directly or physiologically; or it may act directly on the toxin, i.e. chemically or physically. The second view may now be said to be established, and, though the question cannot be fully discussed here, the chief grounds in support of a direct action may be given, (a) The action of antitoxin on toxin, as tested by neutralization effects, takes place more quickly in concen- trated than in weak solutions, and more quickly at a warm (within certain limits) than at a cold

temperature, (b) Antitoxin acts more powerfully when injected along with the toxin than when injected at the same time in another part of the body; if its action were on the tissue-cells one would expect that the site of injection would be immaterial. For example, the amount necessary to neutralize five times the lethal dose being deter- mined, twenty times that amount will neutralize a hundred times the lethal dose. In the case of physiological antagonism of drugs this relationship does not hold, (c) It has been shown by C. J. Martin and Cherry, and by A. A. Kanthack and Cobbett, that in certain instances the toxin can be made to pass through a gelatine membrane, whereas the antitoxin cannot, its molecules being of larger size. If, however, toxin be mixed with antitoxin for some time, it can no longer be passed through, presumably because it has become combined with the antitoxin.

Lastly it may be mentioned that when a toxin has some action which can be demonstrated in a test-tube experiment, for example, a dissolving action on red corpuscles, this action may be annulled by previously adding the antitoxin to toxin; in such a case the intervention of the living tissues is excluded. In view of the fact that antitoxin has a direct action on toxin, we may say that theoretically this may take place in one of two ways. It may produce a disintegration of the toxin molecule, or it may combine with it to produce a body whose combining affinities are satisfied. The latter view, first advocated by

Ehrlich, harmonizes with the facts established with regard to toxic action and the behaviour of antitoxins, and may now be regarded as established. His view as to the dual composition of the toxin molecule has already been mentioned, and it is evident that if the haptophorous or combining group has its affinity satisfied by union with antitoxin, the toxin will no longer combine with living cells, and will thus be rendered harmless. One other important fact in support of what has been stated is that a toxin may have its toxic action diminished, and may still require the same amount of antitoxin as previously for neutral- ization. This is readily intelligible on the supposition that the toxophorous group is more labile than the haptophorous. There is, however, still dispute with regard to the exact nature of the union of toxin and antitoxin. Ehrlich ‘s view is that the two

substances form a firm combination like a strong acid and a base. He found, however, that if he took the largest amount, of toxin which was just neutralized by a given amount of antitoxin, much more than a single dose of toxin had to be added before a single dose was left free. For example, if ioo doses of toxin were neutralized by a unit of antitoxin (v. supra) it might be that 125 doses would need to be added to the same amount of antitoxin before the mixture produced a fatal result when it was injected. This result, which is usually known now as the " Ehrlich phenomenon," was explained by him on the supposition that the " toxin " does not represent molecules which are all the same, but contains molecules of different degrees of combining affinity and of toxic action. Accordingly, the most actively toxic molecules will be neutralized first, and those which arc left over, that is, uncombined with antitoxin, will have a weaker toxic action. This view has been assailed by Thorvald Madsen and S. A. Arrhenius, who hold that the union of toxin and antitoxin is comparatively loose, and belongs to the classof reversible actions, being comparable in fact with the union of a weak acid and base. If such were the condition there would always be a certain amount both of free toxin and of free antitoxin in the mixture, and in this case also considerably more than a dose of toxin would have to be added to a " neutral mixture " before the amount of free toxin was increased by a dose, that is, before the mixture became lethal. It may be stated that while in certain instances the union of toxin and antitoxin may be reversible, all the facts established cannot be explained on this simple hypothesis of reversible action. Stiil another view, advocated by Bordet, is that the union of toxin and antitoxin is rather of physical than of strictly chemkal nature, and repre- sents an interaction of colloidal substances, a sort of molecular deposition by which the smaller toxin molecule becomes en- tangled in the larger molecule of antitoxin. Sufficient has been said to show that the subject is one of great intricacy, and no simple statement with regard to it is as yet possible. We are probably safe in saying, however, that the molecules of a toxin are not identical but vary in the degree of their combining affinities, and also in their toxic action, and that, while in some cases the combination of anti-substances has been shown to be reversible, we are far from being able to say that this is a general law.

The origin of antitoxin is of course merely a part of the general question regarding the production of anti-substances in general,

as these all combine in the same way with their homo- ofan*'- 00

1°S° US substances and have the same character of ioxia. specificity. As, however, most of the work has been

done with regard to antitoxin production we may consider here the theoretical aspect of the subject. There are three chief possibilities: (a) that the antitoxin is a modification of' the toxin; (b) that it is a substance normally present, but produced in excess under stimulation of the toxin; (c) that it is an entirely new product. The first of these, which would imply a process of a very remarkable nature, is disproved by what is observed after bleeding an animal whose blood contains antitoxin. In such a case it has been shown that, without the introduction of fresh toxin, new antitoxin appears, and therefore flrast be produced by the living tissues. The second theory is the more probable a priori, and if established removes the

necessity for the third. It is strongly supported by Ehrlich, who, in his so-called " side-chain " {Seitenkette) theory, explains antitoxin production as an instance of regeneration after loss. Living protoplasm, or in other words a biogen molecule, is regarded as consisting of a central atom group {Leistungskern) , related to which are numerous secondary atom groups or side-chains, with unsatisfied chemical affinities. The side-chains constitute the means by which other molecules are added to the living molecule, e.g. in the process of nutrition. It is by means of such side-chains that toxin molecules are attached to the protoplasm, so that the living molecules are brought under the action of the toxophorous groups of the toxins. In antitoxin production this combination takes place, ch a i" though not in sufficient amount to produce serious theory. toxic symptoms. It is further supposed that the combination being of somewhat firm character, the side-chains thus combined are lost for the purposes of the cell and are there- fore thrown off. By the introduction of fresh toxin the process is repeated and the regeneration of side-chains is increased. Ultimately the regeneration becomes an over-regeneration and free side-chains produced in excess are set free and appear in the blood as antitoxin molecules. In other words the substances, which when forming part of the cells fix the toxin to the cells, constitute antitoxin molecules when free in the serum. This theory, though not yet established, certainly affords the most satisfactory explanation at present available. In support of it there is the remarkable fact, discovered by A. Wassermann and Takaki in the case of tetanus, that there do exist in the nervous system molecules with combining affinity for the tetanus toxin. If. for

example, the brain and spinal cord removed from an animal be bruised and brought into contact with tetanus toxin, a certain amount of the toxicity disappears, as shown by injecting the mixture into another animal. Further, these molecules in the nervous system present the same susceptibility to heat and other physical agencies as does tetanus antitoxin. There is therefore strong evidence that antitoxin molecules do exist as part of the living substance of nerve cells. It has, moreover, been found that the serum of various animals has a certain amount of antitoxic action, and thus the basis for anti- toxin production, according to Ehrlich's theory, is afforded. The theory also supplies the explanation of the power which an animal possesses of producing various antitoxins, since this depends ultimately upon susceptibility to toxic action. The explanation is thus carried back to the complicated constitution of biogen molecules in various living cells of the body. It may be added that in the case of all the other kinds of anti-substances, which are produced by a corresponding reaction, we have examples of the existence, of traces of them in the blood serum under normal conditions. We are, accordingly, justified in definitely concluding that their appearance in large amount in the blood, as the result of active immunization, represents an increased production of molecules which are already present in the body, either in a free condition in its fluids or as constituent elements of its cells.

In preparing anti-bacterial sera the lines of procedure correspond to those followed in the case of antitoxins, but the bacteria themselves in the living or dead condition or their maceration products are always used in the injections, i"!'" Sometimes dead bacteria, living virulent bacteria, serum. and living supervirulent bacteria, are used in succes- sion, the object being to arrive ultimately at a high dosage, though the details vary in different instances. The serum of an animal thus actively immunized has powerful protective properties towards another animal, the amount necessary for protection being sometimes almost inconceivably small. As a rule it has no action on the corresponding toxin, i.e. is not antitoxic. In addition to the protective action, such a serum may possess activities which can be demonstrated outside the body. Of these the most important are (a) bac- teriolytic or lysogenic action, (b) agglutinative action, and (c) opsonic action. The first of these, lysogenic or bacteriolytic action, consists in

the production of a change in the corresponding bacterium whereby it becomes granular, swells up and ultimately may

undergo dissolution. Pfeiffer was the first to show ienfcˆ 80 ” ˆat this occurred when the bacterium was injected action. into the peritoneal cavity of the animal immunized

against it, and also when a little of the serum of such an animal was injected with the bacterium into the peri- toneum of a fresh, i.e. non-immunized animal. Metchnikoff and Bordet subsequently devised means by which a similar change could be produced in vitro, and analysed the conditions necessary for its occurrence. It has been completely established that in this phenomenon of lysogenesis there are two substances con- cerned, one specially developed or developed in excess, and the other present in normal serum. The former (Immunkorper of Ehrlich, substance sensibilisatrice of Bordet) is the more stable, resisting a temperature of 6o° C, and though giving the specific character to the reaction cannot act alone. The latter is ferment- like and much more labile than the former, being readily de- stroyed at 60° C. It may be added that the protective power is not lost by exposure to the temperature mentioned, this apparently depending upon a specific anti-substance. Further- more, lysogenic action is not confined to the case of bacteria but obtains also with other organized structures, e.g. red corpuscles (Bordet, Ehrlich and Morgenroth), leucocytes and spermatozoa (Metchnikoff). That is to say, if an animal be treated with injections of these bodies, its serum acquires the power of dissolving or of producing some disintegrative effect in them. The development of the immune body with specific combining affinity thus presents an analogy to antitoxin production, the difference being that in lysogenesis another substance is necessary to complete the process. It can be shown that in many cases when bacteria are injected the serum of the treated animal has no bacteriolytic effect, and still an immune body is present, which leads to the fixation of complement ; in this case bacterio- lysis does not occur, because the organism is not susceptible to the action of the complement. In all cases the important action is the binding of complement to the bacterium by means of the corresponding immune body; whether or not death of the bacterium occurs, will depend upon its susceptibility to the action of the particular complement, the latter acting like a toxin or digestive ferment. It is to be noted that in the process of

immunization complement does not increase in amount; accordingly the immune serum comes to contain immune body much in excess of the amount of complement necessary to complete its action. An important point with regard to the therapeutic application of an anti-bacterial serum, is that when the serum is kept in vitro the complement rapidly disappears, and accordingly the complement necessary for the production of the bactericidal action must be supplied by the blood of the patient treated. This latter complement may not suit the immune body, that is, may not be fixed to the bacterium by means of it, or if the latter event does occur, may fail to bring about the death of the bacteria. These circumstances serve, in part at least, to explain the fact that the success attending the use of anti-bacterial sera has been much inferior to that in the case of antitoxic sera.

Another property which may be possessed by an anti-bacterial serum is that of agglutination. By this is meant the aggrega-

tion into clumps of the bacteria uniformly distributed tinatfoa.' m an indifferent fluid; if the bacterium is motile its

movement is arrested during the process. The pro- cess is of course observed by means of the microscope, but the clumps soon settle in the fluid and ultimately form a sediment, leaving the upper part clear. This change, visible to the naked eye, is called sedimentation. B. J. A. Charrin and G. E. H. Roger first showed in the case of B. pyocyaneus that when a small quantity of the homologous serum {i.e. the serum of an animal immunized against the bacterium) was added to a fluid culture of this bacillus, growth formed a sediment instead of a uniform turbidity. Gruber and Durham showed that sedimentation occurred when a small quantity of the homologous serum was added to an emulsion of the bacterium in a small test-tube, and

found that this obtained in all cases where Pfeiffer's lysogenic action could be demonstrated. Shortly afterwards Widal and also Griinbaum showed that the serum of patients suffering from typhoid fever, even at an early stage of the disease, agglu- tinated the typhoid bacillus — a fact which laid the foundation of serum diagnosis. A similar phenomenon has been demonstrated in the case of Malta fever, cholera, plague, infection with B. coli, " meat-poisoning " due to Gartner's bacillus, and various other infections. As regards the mode of action of agglutinins, Gruber and Durham considered that it consists in a change in the

envelopes of the bacteria, by which they swell up and become adhesive. The view has various facts in its support, but F. Kruse and C. Nicolle have found that if a bacterial culture be filtered germ-free, an agglutinating serum still produces some change in it, so that particles suspended in it become gathered into clumps. E. Duclaux, for this reason, considers that agglutinins are coagulative ferments.

The phenomenon of agglutination depends essentially on the union of molecules in the bacteria — the agglutinogens — with the corresponding agglutinins, but another essential is the presence of a certain amount of salts in the fluid, as it can be shown that when agglutinated masses of bacteria are washed salt-free the clumps become resolved. The fact that agglutinins appear in the body at an early stage in a disease has been taken by some observers as indicating that they have nothing to do with immunity, their development being spoken of as a reaction of infection. This conclusion is not justified, as we must suppose that the process of immunization begins to be developed at an early period in the disease, that it gradually increases, and ultimately results in cure. It should also be stated that agglutinins are used up in the process of agglutination, apparently combining with some element of the bacterial structure. In view of all the facts it must be admitted that the agglutinins and immune bodies are the result of corresponding reactive processes, and are probably related to one another. The development of all antagonistic substances which confer the special character on antimicrobic sera, as well as antitoxins, may be expressed as the formation of bodies with specific combining affinity for the organic substance introduced into the system — toxin, bacterium, red corpuscle, &c, as the case may be. The bacterium, being a complex organic substance, may thus give rise to more than one antagonistic or combining substance.

By opsonic action is meant the effect which a serum has on bacteria in making them more susceptible to phagocytosis by the white corpuscles of the blood (q.v.). Such an effect may be demonstrated outside the body by making a a %i %f ”” c suitable mixture of (a) a suspension of the particular bacterium, (b) the serum to be tested, and © leucocytes of a normal animal or person. The mixture is placed in a thin capillary tube and incubated at 37° C. for half an hour; a film preparation is then made from it on a glass slide, stained by a suitable method and then examined microscopically. The number of bacteria contained within a number of, say fifty, leucocytes can be

counted and the average taken. In estimating the opsonic power of the serum in cases of disease a control with normal serum is made at the same time and under precisely the same conditions. The average number of bacteria contained within leucocytes in the case tested, divided by the number given by the normal serum, is called the phagocytic index. Wright and Douglas showed that under these conditions phagocytosis might occur when a small quantity of normal serum was present, whereas it was absent when normal salt solution was substituted for the serum; the latter thus contained substances which made the organisms susceptible to the action of the phagocytosis. They further showed that this substance acted by combining with the organisms and apparently producing some alteration in them; on the other hand it had no direct action on the leuco- cytes. This opsonin of normal serum is very labile, being rapidly destroyed at 55 C; that is, a serum heated at this temperature has practically no greater effect in aiding phago- cytosis than normal salt solution has. Various observers had previously found that the serum of an animal immunized against

a particular bacterium had a special action in bringing about phagocytosis of that organism, and it had been found that this property was retained when the serum was heated at 55° C. It is now generally admitted that at least two distinct classes of substances are concerned in opsonic action, that thermostable immune opsonins are developed as a result of active immunization and these possess the specific properties of anti-substances in general, that is, act only on the corresponding bacterium. On the contrary the labile opsonins of normal serum have a com- paratively general action on different organisms. It is quite evident that the specific immune-opsonins may play a very important part in the phenomena of immunity, as by their means the organisms are taken up more actively by the phagocytic cells, and thereafter may undergo rapid disintegration.

The opsonic action of the serum has been employed by Sir A. Wright and his co-workers to control the treatment of bacterial infections by vaccines; that is, by injections of varying amounts of a dead culture of the corresponding bacterium. The object in such treatment is to raise the opsonic index of the serum, this

being taken as an indication of increased immunity. The effect of the injection of a small quantity of vaccine is usually to produce an increase in the opsonic index within a few days. If then an additional quantity of vaccine be injected there occurs a fall in the opsonic index (negative phase) which, however, is followed later by a rise to a higher level than before. If the amounts of vaccine used and the times of the injection are suit- ably chosen, there may thus be produced by a series of steps a rise of the opsonic index to a high level. One of the chief objects in registering the opsonic power in such cases is to avoid the introduction of additional vaccine when the opsonic index is low, that is, during the negative phase, as if this were done a further diminution of the opsonic action might result. The principle in such treatment by means of vaccines is to stimulate the general production of anti-substances throughout the body, so that these may be carried to the sites of bacterial growth, and aid the destruction of the organisms by means of the cells of the tissues. A large number of favourable results obtained by such treatment controlled by the observation of the opsonic index have already been published, but it would be unwise at present to offer a decided opinion as to the ultimate value of the method.

Active immunity has thus been shown to be associated with the presence of certain anti-substances in the serum. After these substances have disappeared, however, as they always do in the course of time, the animal still possesses immunity for a varying period. This apparently depends upon some altera- tion in the cells of the body, but its exact nature is not known.

The destruction of bacteria by direct cellular agency both in natural and acquired immunity must not be overlooked. The behaviour of certain cells, especially leucocytes, in infective conditions led Metchnikoff to place great importance on phagocytosis. In this process there are two factors concerned, viz. the ingestion of bacteria by the cells, and the subsequent intracellular digestion. If either of these is wanting or interfered with, phagocytosis will necessarily fail as a means of defence. As regards the former, leucocytes are guided chiefly by chemiotaxis, i.e. by sensitiveness to chemical substances in their surroundings — a property which is not peculiar to them but is possessed by various unicellular organisms, including motile bacteria. When the cell moves from a less to a greater degree of concentration, i.e. towards the focus of production, the chemiotaxis is termed positive; when the con- verse obtains, negative. This apparently purposive movement has been pointed out by M. Verworn to

depend upon stimula- tion to contraction or the reverse. Metchnikoff showed that in animals immune to a given organism phagocytosis is present, whereas in susceptible animals it is deficient or absent. He also showed that the development of artificial immunity is attended by the appearance of phagocytosis; also, when an anti-serum is injected into an animal, the phagocytes which formerly were indifferent might move towards and destroy the bacteria. In the light of all the facts, however, especially those

with regard to anti-bacterial sera, the presence of phagocytosis cannot be regarded as the essence of immunity, but rather the evidence of its existence. The increased ingestion of bacteria in active immunity would seem to depend upon the presence of immune opsonins in the serum. These, as already explained, are true anti-substances. Thus the apparent increased activity of the leucocytes is due to a preliminary effect of the opsonins on the bacteria. We have no distinct proof that there occurs in active immunity any education of the phagocytes, in Metchnikoff's sense, that is, any increase of the inherent ingestive or digestive activity of these cells. There is some evidence that in certain cases anti-substances may act upon the leucocytes, and to these the name of " stimulins " has been given. We cannot, however, say that these play an important part in immunity, and even if it were so, the essential factor would be the development of the substances which act in this way. While in immunity there probably occurs no marked change in the leucocytes themselves, it must be admitted that the increased destruction of bacteria by these cells is of the highest importance. This, as already pointed out, depends upon the increase of opsonins, though it is also to be noted that in many infective conditions there is another factor present, namely a leucocytosis, that is, an increase of the leucocytes in the blood, and the defen- sive powers of the body are thereby increased. Evidence has been brought forward within recent years that the leucocytes may constitute an important source of the antagonistic sub- stances which appear in the serum. Much of such evidence possesses considerable weight, and seeing that these cells possess active digestive powers it is by no means improbable that sub- stances with corresponding properties may be set free by them. To ascribe such powers to them exclusively is, however^ not justifiable. Probably the lining endothelium of the blood-vessels as well as other tissues of the body participate in the production of anti-substances.

The subject of artificial immunity has occupied a large proportion of bacteriological literature within recent years, and our endeavour has been mainly to indicate the general laws which are in process of evolution. When the

Natural Immunity.

facts of natural immunity are examined, we find that no single explanation is possible. Natural immunity against toxins must be taken into account, and, if Ehrlich's view with regard to toxic action be correct, this may depend upon either the absence of chemical affinity of the living molecules of the tissues for the toxic molecule, or upon insensitiveness to the action of the toxophorous group. It has been shown with regard to the former, for example, that the nervous system of the fowl, which possesses immunity against tetanus toxin, has little combining affinity for it. The non-sensitiveness of a cell to a toxic body when brought into immediate relationship cannot, however, be explained further than by saying that the disintegrative changes which underlie symptoms of poisoning are not brought about. Then as regards natural powers of destroying bacteria, phago- cytosis aided by chemiotaxis plays a part, and it can be understood that an animal whose phagocytes are attracted by a particular bacterium will have an advantage over one in which this action is absent. Variations in chemiotaxis towards different organisms probably depend in natural conditions, as well as in active immunity, upon the opsonic content of the serum. Whether bacteria will be destroyed or not after they have been ingested by the leucocytes will depend upon the digestive powers of the latter, and these probably vary in different species of animals. The blood serum has a direct bactericidal action on certain bacteria, as tested outside the body, and this also varies in differ- ent animals. Observations made on this property with respect to the anthrax bacillus at first gave the hope that it might explain variations in natural immunity. Thus the serum of the white rat, which is immune to anthrax, kills the bacillus; whereas the serum of the guinea-pig, which is susceptible, has no such effect. . Further observations, however, showed that this does not hold as a general law. The serum of the susceptible rabbit, for example, is bactericidal to this organism, whilst the serum of the immune dog is not. In the case of the latter animal the serum

contains an opsonin which leads tophagocytosis of the bacillus, and the latter is then destroyed by the leucocytes. It is quite evident that bactericidal action as tested in vitro outside the body does-not correspond to the degree of immunity possessed by the animal under natural conditions. We may say, however, that there are several factors concerned in natural immunity, of which the most important may be said to be the three following, viz. variations in the bactericidal action of the serum in vivo, varia- tions in the chemiotactic or opsonic properties of the serum in vivo, and variations in the digestive properties of the leucocytes of the particular animal. It is thus evident that the explanation of natural immunity in any given instance may be a matter of difficulty and much complexity.

Authorities.— Bacteriological literature has become so extensive that it is impassible to give here references to original articles, even the more important. A number of these, giving an account of classical researches, were translated from French and German, and published by the New Sydenham Society under the title Micro- parasites in Disease: Selected Essays, in 1886. The following list contains some of the more important books published within recent years. Abbott, Principles of Bacteriology (7th ed., London, 1905) ; Crookshank, Bacteriology and Infective Diseases (with bibliography, 4th ed., London, 1896); Duclaux, Traite de microbiologie (Paris, 1899-1900); Eyre, Bacteriological Technique (Philadelphia and London, 1902) ; Fliigge, Die Mikroorganismen (3rd ed., Leipzig, 1896) ; Fischer, Vorlesungen uber Baklerien (2nd ed., Jena, 1902) ; Gunther, Einfuhrung in das Studium der Bakteriologie (6th ed., Leipzig, 1906); Hewlett, Manual of Bacteriology (2nd ed., London, 1902) ; Hueppe, Principles of Bacteriology (translation, London, 1899) ; Klein, Micro-organisms and Disease (3rd ed., London, 1896) ; Kolle and Wassermann, Handbuch der pathogenen Mikroorganismen (Jena, 1904) (supplements are still being published ; this is the most important work on the subject) ; Loffler, Vorlesungen uber die geschichtliche Entwickelung der Lehre von der Bacterien (Leipzig, 1887); M'Farland, Text-book upon the Pathogenic Bacteria (5th ed., London, 1906) ; Muir and Ritchie, Manual of Bacteriology (with bibliography, 4th ed., Edin. and Lond., 1908) ; Park, Pathogenic Micro-organisms (London, 1906) ; Sternberg, Manual of Bacteriology (with full bibliography, 2nd ed., New York, 1896) ; Woodhead, Bacteria and their products (with bibliography, London, 1 891). The bacteriology of the infective diseases (with bibliography) is fully given in the System of

Medicine, edited by Clifford Allbutt, (2nd ed., London, 1907). For references consult Centralbl. fur Bakter. u. Parasitenk. (Jena) ; also Index Medicus. The most import- ant works on immunity are: Ehrlich, Studies in Immunity (English translation, New York, 1906), and MetchmkoR, Immunity in Infective Diseases (English translation, Cambridge, 1905). (R. M.*)

BACTRIA (Bactriana), the ancient name of the country between the range of the Hindu Kush (Paropamisus) and the Oxus (Amu Darya), with the capital Bactra (now Balkh); in the Persian inscriptions Bakhtri. It is a mountainous country with a moderate climate. Water is abundant and the land is very fertile. Bactria was the home of one of the Iranian tribes (see Persia: Ancient History). Modern authors have often used the name in a wider sense, as the designation of the whole eastern part of Iran. As there can be scarcely any doubt that it was in these regions, where the fertile soil of the mountainous country is everywhere surrounded and limited by the Turanian desert, that the prophet Zoroaster preached and gained his first adherents, and that his religion spread from here over the western parts of Iran, the sacred language in which the Avesta, the holy book of Zoroastrianism, is written, has often been called ” old Bactrian.” But there is no reason for this extensive use of the name, and the term ” old Bactrian ” is, therefore, at present completely aban- doned by scholars. Still less foundation exists for the belief, once widely spread, that Bactria was the cradle of the Indo-Euro- pean race; it was based on the supposition that the nations of Europe had immigrated from Asia, and that the Aryan languages (Indian and Iranian) stood nearest to the original language of the Indo-Europeans. It is now acknowledged by all linguists that this supposition is quite wrong, and that the Aryans prob- ably came from Europe. The eastern part of Iran seems to have been the region where the Aryans lived as long as they formed one people, and whence they separated into Indians and Iranians.

The Iranian tradition, preserved in the Avesta and in Firdousi’s Shahnama, localizes a part of its heroes and myths in the east of Iran, and has transformed the old gods who fight with the great

snake into kings of Iran who fight with the Turanians. Many modern authors have attempted to make history out of these stories, and have created an old Bactrian empire of great extent, . the kings of which had won great victories over the Turanians: But this historical aspect of the myth is of late origin: it is nothing but a reflex of the great Iranian empire founded by the

Achaemenids and restored by the Sassanids. The only historical fact which we can learn from the Iranian tradition is that the contrast and the feud between the peasants of Iran and the nomads of Turan was as great in old times as it is now: it is indeed based upon the natural geographical conditions, and is therefore eternal. But a great Bactrian empire certainly never existed; the Bactrians and their neighbours were in old times ruled by petty local kings, one of whom was Vishtaspa, the protector of Zoroaster. Ctesias in his history of the Assyrian empire (Diodor. Sic. ii. 6 ff .) narrates a war waged by Ninus and Semiram, against the king of Bactria (whom some later authors, e.g. Justin i. 1, call Zoroaster). But the whole Assyrian history of Ctesias is nothing but a fantastic fiction; from the Assyrian inscriptions we know that the Assyrians never entered the eastern parts of Iran.

Whether Bactria formed part of the Median empire, we do not know; but it was subjugated by Cyrus and from then formed one of the satrapies of the Persian empire. When Alexander had defeated Darius III., his murderer Bessus, the satrap of Bactria, tried to organize a national resistance in the east. But Bactria was conquered by Alexander without much difficulty; it was only farther in the north, beyond the Oxus, in Sogdiana, that he met with strong resistance. Bactria became a province of the Macedonian empire, and soon came under the rule of Seleucus, king of Asia (see Seleucid Dynasty and Hellenism). The Macedonians (and especially Seleucus I. and his son Antiochus I.) founded a great many Greek towns in eastern Iran, and the Greek language became for some time dominant there. The many difficulties against which the Seleucid kings had to fight and the attacks of Ptolemy II., gave to Diodotus, satrap of Bactria, the opportunity of making himself independent (about 255 B.C.) and of conquering Sogdiana. He was the founder of the Graeco-Bactrian kingdom. Diodotus and his successors were able to maintain themselves against the attacks of the Seleucids; and when Antiochus III., ” the Great,” had been defeated by the Romans (190 B.C.), the Bactrian king Euthydemus and his son Demetrius crossed the Hindu Kush and began the conquest of eastern Iran and the Indus valley. For a short time they wielded great power; a great Greek empire seemed to have arisen far in the East. But this empire was torn by internal dissensions and continual usurpations. When Demetrius advanced far into India one of his generals, Eucratides, made himself king of Bactria, and soon in every province there arose new usurpers, who pro-

claimed themselves kings and fought one against the other. Most of them we know only by their coins, a great many of which are found in Afghanistan and India. By these wars the dominant position of the Greeks was undermined even more quickly than would otherwise have been the case. After Demetrius and Eucratides, the kings abandoned the Attic standard of coinage and introduced a native standard; at the same time the native language came into use by the side of the Greek. On the coins struck in India, the well-known Indian alphabet (called Brahmi by the Indians, the older form of the Devanagari) is used; on the coins struck in Afghanistan and in the Punjab the Kharoshthi alphabet, which is derived directly from the Aramaic and was in common use in the western parts of India, as is shown by one of the inscriptions of Asoka and by the recent discovery of many fragments of Indian manuscripts, written in Kharoshthi, in eastern Turkestan (formerly this alphabet has been called Arianic or Bactrian Pali ; the true name is derived from Indian sources).

The weakness of the Graeco-Bactrian kingdoms was shown by their sudden and complete overthrow. In the west the Arsacid empire had risen, and Mithradates I. and Phraates II. began to conquer some of their western districts, especially Areia (Herat). But in the north a new race appeared, Mongolian tribes, called

Scythians by the Greeks, amongst which the Tochari, identical With the Yue-chi (q.v.) of the Chinese, were the most important. In 159 B.C., according to Chinese sources, they entered Sogdiana, in 139 they conquered Bactria, and during the next generation they had made an end to the Greek rule in eastern Iran. Only in India the Greek conquerors (Menander, Apollodotus) maintained themselves some time longer. But in the middle of the 1st century B.C. the whole of eastern Iran and western India belonged to the great ” Indo-Scythian ” empire. The ruling dynasty had the name Kushan (Kushana), by which they are called on their coins and in the Persian sources. The most famous of these kings is Kanishka (ca. 123-153), the great protector of Buddhism. The principal seat of the Tochari and the Kushan dynasty seems to have been Bactria; but they always maintained the eastern parts of modern Afghanistan and Baluchistan, while the western regions (Areia, i.e. Herat, Seistan and part of the Helmund valley) were conquered by the Arsacids. In the 3rd

century the Kushan dynasty began to decay; about a.d. 320 the Gupta empire was founded in India. Thus the Kushanas were reduced to eastern Iran, where they had to fight against the Sassanids. In the 5 th century a new people came from the east, the Ephthalites (q.v.) or " white Huns," who subjected Bactria (about 450); and they were followed by the Turks, who first appear in history about a.d. 560 and subjugated the country north of the Oxus. Most of the small principalities of the Tochari or Kushan became subject to them. But when the Sassanian empire was overthrown by the Arabs, the conquerors immediately advanced eastwards, and in a few years Bactria and the whole Iran to the banks of the Jaxartes had submitted to the rule of the caliph and of Islam.

Bibliography. — For the earlier times see Persia. For the Graeco-Bactrian and Indo-Scythian kingdoms see (beside articles on the separate kings): — H. H. Wilson, Ariana Antigua (1841); Cunningham, "The Greeks of Bactriana, Ariana and India" in Numismatic Chronicle, N. Ser. viii.xii. ; A. von Sallet, Die Nach folger Alexanders des Grossen in Baktrien und Indien (1879); P. Gardner, The Coins of the Greek and Scythic Kings of India (1886, Catalogue of Greek Coins in the British Museum, x.) ; A. von Gutschmid, Geschicjite Irans und seiner Nachbarldnder von Alexander dent Grossen bis zum Untergang der Arsaciden (1888); A. Stein, " Zoroastrian 'Deities on Indo-Scythian Coins," Babylonian and Oriental Record, i. 1887 (cf. Cunningham, ib. ii. 1888); Vincent A. Smith, " The Kushan or Indo-Scythian Period of Indian History," Journal of the R. Asiatic Soc, 1903 (cf. his Early History 'of India, 2nd ed. 1908) ; W. W. Tarn, " Notes on Hellenism in Bactria and India" in Journ. of Hellenic Studies, xxii. 1902. For the history and character of the Indian alphabet cf. J. Btthler, " Indische Palaographie " (in Grundriss der indo-arischen Philologie, Bd. i.). From the Greek authors only a few notices have been preserved, especially by Justin (and in the prologues of Trogus) and Strabo ; for the later times we get some information from the Byzantine authors and from Persian and Armenian sources; cf. Th. Noldeke's translation of Tabari (Geschichte der Per ser und Araber zur Zeit der Sasaniden, 1890) and J. Marquart, " Eransahr " (Abhandlungen der koniglichen Ges. d. Wissenschaften zu Gottingeh, 1901). The Chinese sources are given by Deguignes, " Recherches sur quelques evenements qui concernent l'histoire des rois grecs de la Bactriane," Mem. de I'acad. des inscriptions, xxv. ; E. Specht, "Etudes sur l'Asie centrale d'apres les historiens chinois " in Journal asiatique, 8

serie, ii. 1883, 9 serie, x. 1897; Sylvain Levi, ” Notes sur les Indo-scythiens,” Journal asiatique, 9 serie ix., x. and others. (Ed. M.)

BACUP, a market town and municipal borough in the Rossendale parliamentary division of Lancashire, England, on the river Irwell, 203 m. N.N.W. from London, and 22 N. by E. from Manchester, on the Lancashire & Yorkshire railway. Pop. (1901) 22,505. It is finely situated in a narrow valley, surrounded by wild, high-lying moorland. It is wholly of modern growth, and contains several handsome churches and other buildings, while among institutions the chief is themechanics' institute and library. The recreation grounds presented in 1893 by Mr. J. H. Maden, M.P., are beautifully laid out. Cotton spinning and power-loom weaving are the chief of numerous manufacturing industries, and there are large collieries in the vicinity. The principle of coroperation is strongly developed, and a large and handsome store contains among other departments a free library for members. The borough was incorporated in 1882, and the corporation consists of a mayor,- 6 aldermen and 17 councillors. Area, 6120 acres, In 1841 the population of the chapelry was only 1526.

One of the hills in the vicinity is fortified with a great ancient earthwork and ditch.

BADAGAS (literally “a Telugu man”), a tribe inhabiting the Nilgiri Hills, in India, by some authorities declared not to be an aboriginal or jungle race. They are probably Dravidian by descent, though they are in religion Hindus of the Saiva sect. They are supposed to have migrated to the Nilgiris from Mysore about a.d. 1600, after the breaking up of the kingdom of Vijayanagar. They are an agricultural people and far the most numerous and wealthy of the hill tribes. They pay a tribute in grain, &c, to the Tod? 3. Their language is a corrupt form of Kanarese. At the census of 1901 they numbered 34,178.

See J. W. Breeks, An Account of the Primitive Tribes of the Nilgiris (1873); Nilgiri Manual, vol. i. pp. 218-228; Madras Journ. of Sci. and Lit. vol. viii. pp. 103-105; Madras Museum Bulletin, vol. ii., no. 1, pp. 1-7.

BADAJOZ (formerly sometimes written Badajos), a frontier province of western Spain, formed in 1833 of districts taken from the province of Estremadura (q.v.), and bounded on the N. by Ciceres, E. by Cordova and Ciudad Real, S. by Seville and Huelva,

and W. by Portugal. Pop. (1900) 520,246; area, 8451 sq. m. Badajoz is thus the largest province of the whole kingdom. Although in many districts there are low ranges of hills, the surface is more often a desolate and monotonous plain, flat or slightly undulating. Its one large river is the Guadiana, which traverses the north of the province from east to west, fed by many tributaries; but it is only at certain seasons that the river-beds fill with any considerable volume of water, and the Guadiana may frequently be forded without difficulty. The climate shows great extremes of heat in summer and of cold in winter, when fierce north and north-west winds blow across the plains. In the hot months intermittent fevers are prevalent in the Guadiana valley. The rainfall is scanty in average years, and only an insignificant proportion of the land is irrigated, while the rest is devoted to pasture, or covered with thin bush and forest. Agriculture, and the cultivation of fruit, including the vine and olive, are thus in. a very backward condition; but Badajoz possesses more livestock than any otherSpanish province. Its acorn-fed swine are celebrated throughout Spain for their hams and bacon, and large herds of sheep and goats thrive where the pasture is too meagre for cattle. The exploitation of the mineral resources of Badajoz is greatly hindered by lack of water and means of communication; in 1903, out of nearly 600 mines registered only 26 were at work. Their output consisted of lead, with very small quantities of copper. The local industries are not of much importance: they comprise manufactures of woollen and cotton stuffs of a coarse description, soaps, oils, cork and leather. The purely commercial interests are more im- portant than the industrial, because of the transit trade to and from Portugal through no less than seven custom-houses. Many parts of the province are inaccessible except by road, and the roads are ill-made, ill-kept and wholly insufficient. The main line of the Madrid-Lisbon railway passes through Villanueva de la Serena, Merida and Badajoz; at Merida it is joined by the railways going north to Caceres and South to Zafra, where the lines from Huelva and Seville unite. After Badajoz, the capital (pop. (1900) 30,899), the principal towns are Almen- dralejo (12,587), Azuaga (14,192), Don Benito (16,565), Jerez de los Caballeros (10,271), Merida (11,168) and Villanueva de la Serena (13,489); these, and also the historically interesting village of Albuera, are described in separate articles. Other small towns, chiefly important as markets for agricultural produce, are Albuquerque (9030), Cabeza del Buey (7566), Campanario (7450), Fregenal de la Sierra (9615), Fuente de Cantos (8483), Fuente del Maestre

(6934), Llerena (7049), Montijo (7644), Olivade Jerez (8348), Olivenza (9066), San Vicente de Alcantara (7722), and Villafranca de los Barros (0954). Very few in- habitants emigrate from this province, where the birth-rate considerably exceeds the death-rate. Education, even primary, is in a very backward condition.

BADAJOZ, the capital of the Spanish province described above; situated close to the Portuguese frontier, on the left

bank of the river Guadiana, and the Madrid-Lisbon railway. Pop. (1900) 30,899. Badajoz is the see of a bishop, and the official residence of the captain-general of Estremadura. It occupies a slight eminence, crowned by the ruins of a Moorish castle, and overlooking the Guadiana. A strong wall and bastions, with a broad moat and outworks, and forts on the surrounding heights, give the city an appearance of great strength. The river, which flows between the castle-hill and the powerfully armed fort of San Cristobal, is crossed by a magnificent granite bridge, originally built in 1460, repaired in 1597 and rebuilt in 1833. The whole aspect of Badajoz recalls its stormy history; even the cathedral, built in 1258, resembles a fortress, with massive embattled walls. Badajoz was the birthplace of the statesman Manuel de Godoy, duke of Alcudia (1767-1851), and of thepainterLuisdeMorales(i 509-1 586). Two pictures by Morales, unfortunately retouched in modern times, are preserved in the cathedral. Owing to its position the city enjoys a considerable transit trade with Portugal; its other industries include the manufacture of linen, woollen and leather goods, and of pottery. It is not mentioned by any Roman historian, and first rose to importance under Moorish rule. In 103 1 it became the capital of a small Moorish kingdom, and, though temporarily held by the Portuguese in 1168, it retained its independence until 1229, when it was captured by Alphonso IX. of Leon. As a frontier fortress it underwent many sieges. It was beleaguered by the Portuguese in 1660, and in 1705 by the Allies in the War of the Spanish Succession. During the Peninsular War Badajoz was unsuccessfully attacked by the French in 1808 and 1809; but on the 10th of March 1811, the Spanish commander, Jose Imaz, was bribed into surrendering to the French force under Marshal Soult. A British army, commanded by Marshal Beresford, endeavoured

to retake it; and on the 16th of May defeated a relieving force at Albuera, but the siege was abandoned in June. The fortress was finally stormed on the 6th of April 18 1 2, by the British under Lord Wellington, and carried with terrible loss. It was then delivered up to a two day's pillage. A military and republican rising took place here in August 1883, but com- pletely failed.

BADAKSHAN, including Wakhan, a province on the north- east frontier of Afghanistan, adjoining Russian territory. Its north-eastern boundaries were decided by the Anglo-Russian agreement of 1873, which expressly acknowledged "Badakshan with its dependent district Wakhan " as " fully belonging to the amir of Kabul," and limited it to the left or southern bank of the Oxus. Much of the interior of the province is still unex- plored. On the west, Badakshan is bounded by a line which crosses the Turkestan plains southwards from the junction of the Kunduz and Oxus rivers till it touches the eastern water- divide of the Tashkurghan river (here called the Koh-i-Chungar), and then runs south-east, crossing the Sarkhab affluent of the Khanabad (Kunduz) , till it strikes the Hindu Kush. The southern boundary is carried along the crest of the Hindu Kush as far as the Khawak pass, leading from Badakshan into the Panjshir valley. Beyond this it is indefinite. It is known that the Kafirs occupy the crest of the Hindu Kush eastwards of the Khawak, but how far they extend north of the main watershed is not ascertainable. The southern limits of Badakshan become definite again at the Dorah pass. The Dorah connects Zebak and Ishkashim at the elbow, or bend, of the Oxus with the Lutku valley leading to Chitral. From the Dorah eastwards the crest of the Hindu Kush again becomes the boundary till it effects a junction with the Muztagh and Sarikol ranges, which shut off China from Russia and India. Skirting round the head of the Tagdumbash Pamir, it finally merges into the Pamir boundary, and turns westwards, following the course of the Oxus, to the junction of that river and the Khanabad (Kunduz). So far as the northern boundary follows the Oxus stream, under the northern slopes of the Hindu Kush, it is only separated by the length of these slopes (some 8 or 10 m.) from the southern boundary along the crest. Thus Badakshan reaches out an arm into the Pamirs eastwards — bottle-shaped — narrow at the neck (represented by the northern slopes of the Hindu Kush), and

swelling out eastwards so as to include a part of the great and little Pamirs. Before the boundary settlement of 1873 the small states of Roshan and Shignan extended to the left bank of the

Oxus, and the province of Darwaz, on the other hand, extended to the right bank. Now, however, the Darwaz extension norths wards is exchanged for the Russian Pamir extension westwards, and the river throughout is the boundary between Russian and Afghan territory, the political boundaries of those provinces and those of Wakhan being no longer coincident with their geographical limits.

The following are the chief provincial subdivisions of Badakshan, omitting Roshan and Shignan: — On the west Rustak, Kataghan, Ghori, Narin and Anderab; on the north Darwaz, Ragh and Shiwa; on the east Charan, Ishkashim, Zebak and Wakhan; and in the centre Faizabad, Farkhar, Minjan and Kishm. There are others, but nothing certain is known about these minor subdivisions.

The conformation of the mountain districts, which comprise all the southern districts of Badakshan and the northern hills and valleys of Kafiristan, is undoubtedly analogous to that of the rest of the Hindu Kush westwards. The water-divide of the Hindu Kush from the Dorah to the Khawak pass, i.e. through the centre of Kafiristan, has never been accurately traced; but its topographical conformation is evidently a continuation of that which has been observed in the districts of Badakshan to the west of the Khawak. The Hindu Kush represents the southern edge of a great central upheaval or plateau. It breaks up into long spurs southwards, deep amongst which are hidden the valleys of Kafiristan, almost isolated from each Other by the rugged and snow-capped altitudes which divide them. To the north the plateau gradually slopes away towards the Oxus, falling from an average altitude of 15,000 ft. to 4000 ft. about Faizabad, in the centre of Badakshan, but tailing off to 1100 at Kunduz, in Kataghan, where it merges into the flat plains bordering the Oxus.

The Kokcha river traverses Badakshan from south-east to north-west, and, with the Kunduz, drains all the northern slopes of the Hindu Kush west of the Dorah pass. Some of its sources 1 are near Zebak, close to the great bend of the Oxus northwards, so that it cuts off all the mountainous area included within that bend from the rest of Badakshan. Its chief affluent is the Minjan, which Sir George Robertson found to be a considerable stream where it approaches the Hindu Kush close under the Dorah-‘ Like the Kunduz, it probably drains the northern slopes of the Hindu Kush by deep lateral valleys, more or less parallel to the crest,

reaching westwards towards the Khawak pass. From the Oxus (1000 ft.) to Faizabad (4000 ft.) and Zebak (8500 ft.) the course of the Kokcha offers a high road across Badakshan; between Zebak and Ishkashim, at the Oxus bend, there is but an insignificant pass of 9500 ft.; and from Ishkashim by the Panja, through the Pamirs, is the continuation of what must once have been a much-traversed trade route connecting Afghan Turkestan with Kashgar and China. It is undoubtedly one of the great continental high-roads of Asia. North of the Kokcha, within the Oxus bend, is the mountainous district of Darwaz, of which the physiography belongs rather to the Pamir type than to that of the Hindu Kush.

A very remarkable meridional range extends for 100 m. northwards from the Hindu Kush (it is across this range that the route from Zebak to Ishkashim lies), which determines the great bend of the Oxus river northwards from Ishkashim, and narrows the valley of that river into the formation of a trough as far as the next bend westwards at Kala Wamar. The western slopes of this range drain to the Oxus either north-westwards, by the Kokcha and the Ragh, or else they twist their streams into the Shiwa, which runs due north across Darwaz. Here again we find the main routes which traverse the country following the rivers closely. The valleys are narrow, but fertile and populous. The mountains are rugged and difficult; but there is much of the world-famous beauty of scenery, and of the almost phenomenal agricultural wealth of the valleys of Bokhara and Ferghana to be found in the as yet half-explored recesses of Badakshan.

The principal domesticated animal is the yak. There are also large flocks of sheep, cows, goats, ponies, fine dogs and Bactrian camels. The more important wild animals are a large wild sheep (Ovis poli), foxes, wolves, jackals, bears, boars, deer and leopards; amongst birds, there are partridges, pheasants, ravens, jays, sparrows, larks, a famous breed of hawks, &c. ■ Badakshan proper is peopled by Tajiks, Turks and Arabs, who speak the Persian and Turki languages, and profess the orthodox doctrines of the Mahommedan law adopted by the Sunnite sect; while the mountainous districts are inhabited by Tajiks, professing the Shi'ite creed and speaking distinct dialects in different districts.

History .—Badakshan, part of the Greek Bactiia, was visited by

Hsiian Tsang in 630 and 644. The Arabian geographers of the 10th century speak of its mines of ruby and lapis lazuli, and give notices of the flourishing commerce and large towns of Waksh and Khotl, regions which appear to have in part corresponded with Badakshan. In 1272-1273 Marco Polo and his companions stayed for a time in Badakshan. During this and the following Centuries the country was governed by kings who claimed to be descendants of Alexander the Great. The last of these kings was Shah Mahommed, who died in the middle of the 15th century, leaving only his married daughters to represent the royal line. Early in the middle of the 16th century the Usbegs obtained possession of Badakshan, but were soon expelled, and then the country was generally governed by descendants of the old royal dynasty by the female line. About the middle of the 18th century the present dynasty of Mirs established its footing in the place of the old one which had become extinct. In 1765 the country was invaded and ravaged by the ruler of Kabul. During the first three decades of the 19th century it was overrun and depopulated by Kohan Beg and his son Murad Beg, chiefs of the Kataghan Usbegs of Kunduz. When Murad Beg died, the power passed into the hands of another tlsbeg, Mahommed Amir Khan. In 1859 the Kataghan Usbegs were expelled; and Mir Jahander Shah, the representative of the modern royal line,was reinstatedat Faizabad under the supremacy of the Afghans. In 1867 he was expelled by Abdur Rahman and replaced by Mir Mahommed Shah, and other representatives of the same family. (T. H. H.*)

BADALOCCHIO, SISTO, surnamed Rosa (1581-1647), Italian painter and engraver, was born at Parma. He was of the school of Annibale Carracci, by whom he was highly esteemed for design. His principal engravings are the series known as Raphael's Bible, which were executed by him in conjunction with Lanfranco, another pupil of Carracci. The best of his paintings, which are few in number, are at Parma. He died at Bologna.

BADALONA (anc. Baetulo), a town of north-eastern Spain, in the province of Barcelona; 6 m. N.E. of the city of Barcelona, on the left bank of the small river Besos, and on theMediterranean Sea. Pop. (1900) 19,240. Badalona has a station on the coast railway from Barcelona to Perpignan in France, and a small harbour, chiefly important for its fishing and boat-building trades. There are gas, chemical and mineral-oil works in the town, which also manufactures woollen and cotton goods, glass, biscuits, sugar and brandy; while the surrounding fertile plains produce an abundance of grain, wine and fruit. Badalona thus largely

contributes to the export trade of Barcelona, and may, in fact, be regarded as its industrial suburb.

BADBY, JOHN (d. 1410), one of the early Lollard martyrs, was a tailor (or perhaps a blacksmith) in the west Midlands, and was condemned by the Worcester diocesan court for his denial of transubstantiation. Badby bluntly maintained that when Christ sat at supper with his disciples he had not his body in his hand to distribute, and that " if every host consecrated at the altar were the Lord's body, then there be 20,000 Gods in England." A further court in St Paul's, London, presided over by Archbishop Arundel, condemned him to be burned at Smith- field, the tournament ground just outside the city walls. It is said that the prince of Wales (afterwards Henry V.) witnessed the execution and offered the sufferer both life and a pension if he would recant ; but in Walsingham's words, "the abandoned villain declined the prince's advice, and chose rather to be burned than

to give reverence to the life-giving sacrament. So it befell that this mischievous fellow was burnt to ashes, and died miserably in his sin."

BADDELEY, ROBERT (c. 1732-1794), English actor, is said to have been first a cook to Samuel Foote, " the English Aris- tophanes," and then a valet, before he appeared on the stage. In 1761, described as " of Drury Lane theatre," he was seen at the theatre in Smock Alley, Dublin, as Gomez in Dryden's Spanish Friar. Two years later he was a regular member of the Drury Lane company in London, where he had a great success in the low comedy and servants' parts. He remained at this theatre and the Haymarket until his death. He was the original Moses in the School for Scandal. Baddeley died on the 20th of November 1794. He bequeathed property to found a home for decayed actors, and also £3 per annum to provide wine and cake in the green-room of Drury Lane theatre on Twelfth Night. The ceremony of the Baddeley cake has remained a regular institution.

His wife Sophia Baddeley (1745-1786), an actress and singer, was born in London, the daughter of a sergeant-trumpeter named Snow. She was a woman of great beauty, but excessive vanity and notorious conduct. At the age of eighteen she ran away with Baddeley, then acting at Drury Lane, and she herself made her first appearance on the stage there on the 27th of April 1765, as Ophelia. Later, as a singer, she obtained engagements at Ranelagh and Vauxhall. Though separated from her husband on

account of her misconduct, she still played several years in the same company. Her beauty and her extravagance rendered her celebrated, but the money which she made in all sorts of ways was so freely squandered that she was obliged to take refuge from her creditors in Edinburgh, where she made her last appear* ance on the stage in 1784.

See Memoirs of Mistress Sophia Baddeley, by Mrs Elizabeth Steele, 6 vols. (1781).

BADEN, a town and watering-place of Austria, in lower Austria, 17 m. S. of Vienna by rail. Pop. (1900) 12,447. It is beautifully situated at the mouth of the romantic Helenenthal, on the banks of the Schwechat, and has become the principal summer resort of the inhabitants of the neighbouring capital. It possesses a new Kurhaus, fifteen bathing-establishments, a parish church in late Gothic style, and a town-hall, which contains interesting archives. The warm baths, which gave name to the town, are thirteen in number, with a temperature of from 72° F. to 97 F., and contain, as chief ingredient, sulphate of lime. They rise for the most part at the foot of the Calvarienberg (1070 ft.), which is composed of dolomitic limestone, and are mostly used for bathing purposes. Several members of the Austrian imperial family have made Baden their summer residence and have built here beautiful villas. There are about 20,000 visitors annually. Baden possesses several parks and is surrounded by lovely and interesting spots, of which the most frequented is the picturesque valley of the Helenenthal, which is traversed by the Schwechat. Not far from Baden, the valley is crossed by the magnificent aqueduct of the Vienna waterworks. At the entrance to the valley, on the right bank of the river, lie the ruins of the 12th-century castle of Rauheneck, and at its foot stands the Chateau Weilburg, built in 1820-1825 by Arch- duke Charles, the victor of Aspern. On the left bank, just opposite, stands the ruined castle of Rauhenstein, dating also from the 12th century. About 4 m. up the valley is Mayerling, a hunting-lodge, where the crown prince Rudolph of Austria was found dead in 1889. Farther up is Alland, whence a road leads to the old and well-preserved abbey of Heiligenkreuz. It possesses a church, in Romanesque style, dating from the nth century, with fine cloisters and the tombs of several members of the Babenberg family. The highest point in the neighbour- hood Of Baden is the peak of the Hoher Lindkogel (2825 ft.), popularly called the Eiserne Thor, which is ascended in about three hours.

The celebrity of Baden dates back to the days of the Romans, who knew it by the name of Thermae Pannonicae, and remains of their occupation still exist. It received its charter as a town

in 1480, and although sacked at various times by Hungarians and Turks, it soon flourished again.

See J. Schwarz, Die Hcilguellen von Baden bei Wien (Vienna, 3rd ed.,

1900).

BADEN, or Baden-Baden (to distinguish it from other places of the name), a town and fashionable watering-place of Germany, in the grand-duchy of Baden, 23 m; S. by W. of Karlsruhe, with which it is connected by a branch of the Mannheim and Basel railway. Its situation — on a hill 600 ft. high, in the beautiful valley of the Black Forest— its extensive pleasure-grounds, gardens and promenades, and the brilliancy of the life that is led during the season, have long attracted crowds of visitors from all parts of the world. The resident population was in 1885, 12,779; in 1895, 14,862; and in 1905, 16,238; but the number of visitors exceeds 70,000 annually. Until the war of 1870, the prevailing nationality was French, but of late years Americans, Russians and English are the more numerous. The hot springs are twenty-nine in number, and vary in temperature from 37 to 54° R., i.e. from 115 to 153 Fahr. They flow from the castle rock at the rate of 90 gallons per minute, and the water is conveyed through the town in pipes to supply the different baths. There are two chief bathing-establishments, accounted the most elegant in Europe. The waters of Baden-Baden are specific in cases of chronic rheumatism and gout, paralysis, neuralgia, skin diseases and various internal complaints, such as stone and uric acid. The town proper is on the right bank of the Oos, but the principal resorts of the visitors are en the left. A Conner sationshaus and a Trinkhalle or pump-room, a theatre and a picture-gallery, library and reading-room are among the chief buildings. The public gaming-tables, which for so many years were a striking feature, are now abolished, The only building of much antiquarian interest, with the excep- tion of the castles, is the parish church, which dates from the 15th century, and contains the tombs of

several of the margraves. The churches include a Lutheran, an English, in the Norman style of architecture, and a Russian, with beautiful frescoes; while on tKe Michaelsberg is the Greek chapel, with a gilded dome, which was erected over the tomb of a son of the Rumanian prince Michel Stourdza, who died here in 1863.

The springs of Baden were known to the Romans, and the foundation of the town is referred to the emperor Hadrian by an inscription of somewhat doubtful authenticity. The name of Aurelia Aquensis was given to it in honour of Aurelius Severus, in whose reign it would seem to have been well known. Frag- ments of its ancient sculptures are still to be seen, and in 1847 remains of Roman vapour baths, well preserved, were discovered just below the New Castle. From the 14th century down to the close of the 17th, Baden was the residence of the margraves, to whom it gave its name. They first dwelt in the Old Castle, the ruins of which still occupy the summit of a hill above the town, but in 1479 they removed to the New Castle, which is situated on the hill-side nearer to the town, and is remarkable for its subterranean dungeons. During the Thirty Years' War Baden suffered severely from the various combatants, but especially from the French, who pillaged it in 1643,' and laid it in ashes in 1689. The margrave Louis William removed to Rastatt in 1706. Since the beginning of the 19th century the government has greatly fostered the growth of the town.

See Wettendorfer, Der Kurort Baden-Baden (2nd ed., 1898); Schwarz, Die Heilquellen von Baden-Baden (4th ed., 1902).

BADEN, a town in the Swiss canton of Aargau, on the left bank of the river Limmat, 14 m. by rail N.W. of Zurich. It is now chiefly visited by reason of its hot sulphur springs, which are mentioned by Tacitus (Hist. i. cap. 67) and were very fashionable in the 15th and 16th centuries. They are especially efficacious in cases of gouty and rheumatic affections, and are much frequented by Swiss invalids, foreign visitors being but few in number. They lie a little north of the old town, with which they are now connected by a fine boulevard. Many Roman remains have been found in the gardens of the Kursaal. The town is very picturesque, with its steep and narrow streets, and its one surviving gateway, while it is dominated on the west by the ruined castle of Stein,

formerly a stronghold of the Habsburgs, but destroyed in 1415 and again in 1712. In 1415 Baden (with the Aargau) was con- quered by the Eight Swiss Confederates, whose bailiff inhabited

the other castle, on the right bank of the Limmat, which defends the ancient bridge across that river. As the conquest of the Aargau was the first made by the Confederates, their delegates (or the federal diet) naturally met at Baden, from 1426 to about 1712, to settle matters relating to these subject lands, so that during that period Baden was really the capital of Switzerland. The diet sat in tke old town-hall or Rathaus, where was also signed in 1 714 the treaty of Baden which put an end to the war between France and the Empire, and thus completed the treaty of Utrecht (1713). Baden was the capital of the canton of Baden, from 1798 to 1803, when the canton of Aargau was created. To the N.W. of the baths a new industrial quarter has sprung up of late years, the largest works being for electric engineering. In 1900 the permanent population of Baden was 6050 (German-speaking, mainly Romanists, with many Jews), but it is greatly swelled in summer by the influx of visitors.

One mile S. of Baden, on the Limmat, is the famous Cistercian monastery of Wettingen (1227-1841 — the monks are now at Mehrerau near Bregenz), with splendid old painted glass in the cloisters and magnificent early 17th-century carved stalls in the choir of the church. Six miles W. of Baden is the small town of Brugg (2345 inhabitants) in a fine position on the Aar, and close to the remains of the Roman colony of Vindonissa (Windisch), as well as to the monastery (founded 13 10) of Konigsfelden, formerly the burial-place of the early Habsburgs (the castle of Habsburg is but a short way off), still retaining much fine painted glass.

See Barth. Fricker, Geschichte der Stadt und Bader zu Baden (Aarau, 1880). (W. A. B. C.)

BADEN, GRAND DUCHY OF, a sovereign state of Germany, lying in the south-west corner of the empire, bounded N. by the kingdom of Bavaria and the grand-duchy of Hesse-Darmstadt; W. and practically throughout its whole length by the Rhine, which separates it from the Bavarian Palatinate and the imperial province of Alsace-Lorraine; S. by Switzerland, and E. by the kingdom of Wurttemberg and part of Bavaria. The country has an area cf 5823 sq. m. and consists of a considerable portion of the eastern half of the fertile valley of the Rhine and of the mountains which form its boundary. The mountainous part is by far the most extensive, forming, indeed, nearly 80% of the whole area. From the Lake of Constance in the south to the river Neckar in the north is a portion of the Black Forest or Schwarzwald,

which is divided by the valley of the Kinzig into two districts of different elevation. To the south of the Kinzig the mean height is 3100 ft., and the loftiest summit, the Feldberg, reaches about 4898 ft-, while to the north the mean height is only 2100 ft, and the Belchen, the culminating point of the whole, does not exceed 4480 ft. To the north of the : Neckar is the Odenwald Range,withameanof i44oft.,andintheKatzenbuckel, an extreme of 1980 ft. Lying between the Rhine and the Dreisam is the Kaiserstuhl, an independent volcanic group, nearly 10 m. in length and 5 in breadth, the highest point of which is 1760 ft. The greater part of Baden belongs to the basin of the Rhine, which receives upwards of twenty tributaries from the highlands; the north-eastern portion of the territory is also watered by the Main and the Neckar. A part, however, of the eastern slope of the Black Forest belongs to the basin of the Danube, which there takes its rise in a number of mountain streams. Among the numerous lakes which belong to the duchy are the Mummel, Wilder, Eichener and Schluch, but none of them is of any size. The Lake of Constance (Boden-See) belongs partly to Bavaria and Switzerland.

Owing to its physical configuration Baden presents great extremes of heat and cold. The Rhine valley is the warmest district in Germany, but the higher elevations of the Black Forest record the greatest degrees of cold experienced in the south. The mean temperature of the Rhine valley is approximately 50 F. and that of the high table-land, 43 F. July is the hottest and January the coldest month in the year.

The mineral wealth of Baden is not great; but iron, coal, zinc and lead of excellent quality are produced, and silver, copper, gold, cobalt, vitriol and sulphur are obtained in small quantities. Peat is found in abundance, as well as gypsum, china-clay, potters' earth and salt. The mineral springs of Baden are very numerous and have acquired great celebrity, those of Baden-Baden, Badenweiler, Antogast, Griesbach, Freiersbach and Petersthal being the most frequented.

In the valleys thcsoil is particularly fertile, yielding luxuriant crops of wheat, maize, barley, spelt, beans, potatoes, flax, hemp, hops, beetroot and tobacco; and even in the more mountainous

parts rye, wheat arid oats are extensively cultivated. There is a considerable extent of pasture land, and the rearing of cattle, sheep, pigs and goats is largely practised. Of game, deer, wild boars, hares, snipe and partridges are fairly abundant, while the mountain streams yield trout of excellent quality. The culture of the vine increases, and the wines, which are characterized' by a mildness of flavour, are in good demand. The gardens and orchards supply great abundance of fruits, especially almonds and walnuts; and bee-keeping is common throughout the country. A greater proportion of Baden than of any other of the south German states is occupied by forests. In these the predominant trees are the fir and pine, but many others, such as the chestnut, are well represented. A third, at least, of the annual supply of timber is exported.

Population. — At the beginning of the 19th century Baden was only a margraviate, with an area little exceeding 1300 sq. m., and a population of 2io,oco. Since then it has from time to time acquired additional territory, so that its area now amounts to 5823 sq. m., and its population (1905) to 2,009,320, of whom about 60% are Roman Catholics, 37% Protestants, ij % Jews, and the remainder of other confessions. Of the population, about one-half may be classified as rural, i.e. living in communities of less than 2000 inhabitants; while the density of the popu- lation is about 330 to the square mile. The country is divided into the following districts, with the .respective chief towns and populations as shown :—

District.

Chief towns.

Pop. (1905).

(1) Mannheim

Mannheim

162,607

Heidelberg

49439

(2) Karlsruhe

Karlsruhe

111,200

Pforzheim

59.307

(3) Freiburg-im-Breisgau

Freiburg

74,102

(4) Constance

Constance

24,818

The capital of the duchy is Karlsruhe, and among important towns other than the above are Rastatt, Baden-Baden, Bruchsal and Lahr. The population is most thickly clustered in the north and in the neighbourhood of the Swiss town of Basel. The inhabitants of Baden are of various originˆthose to the north of the Murg being descended from the Alemanni and those to the south from the Franks, while the Swabian plateau derives its name and its population from another race. (See Wurttemberg.)

Industries. — Of the area, 56-8 % is cultivated and 38 % forest, but the agricultural industry, which formerly yielded the bulk of the wealth of the country, is now equalled, if not surpassed, by the industrial output, which has attained very considerable dimensions. The chief articles of manufacture are machinery, woollen and cotton goods, silk ribbons, paper, tobacco, leather, china, glass, clocks, jewellery and chemicals. Beet sugar is also largely manufactured, and the inhabitants of the Black Forest have long been celebrated for their dexterity in the manufacture of wooden ornaments and toys, musical boxes and organs.

The exports of Baden, which coincide largely with the in- dustries just mentioned, are of considerable importance, but the bulk of its trade consists in the transit of goods. The country is well furnished with roads and railways, the greater proportion of the latter being in the hands of the state. A line runs the whole length of the land, for the most part parallel with the Rhine,

while branches cross obliquely from east to west. Mann- heim is the great emporium for the export of goods down the Rhine and has a large river traffic. It is also the chief manu-

facturing town of the duchy and the seat of administrative government for the northern portion of the country.

Education and Religion.— 'The educational establishments of Baden are numerous and flourishing, and public education is entirely in the hands of the government. There are two universities, the Protestant at Heidelberg and the Roman Catholic at Freiburg-im-Breisgau, and a celebrated technical college at Karlsruhe. The grand-duke is a Protestant; under him the Evangelical Church is governed by a nominated council and a synod consisting of the " prelate," 48 elected, and 7 nominated lay and clerical members. The Roman Catholic archbishop of Freiburg is metropolitan of the Upper Rhine.

Constitution and Government. — The government of Baden is an hereditary monarchy, with the executive power vested in the grand-duke, while the legislative authority is shared by him with a representative assembly {Landtag) consisting of two chambers. The upper chamber is composed of all the princes of the reigning family who are of full age; the chiefs of the mediatized families; the archbishop of Freiburg; the president of the Protestant Evangelical church; a deputy from each of the universities and from the technical high school, eight members elected by the territorial nobility for four years, three repre- sentatives of the chamber of commerce, two of that of agri- culture, one of that of trades, two mayors of municipalities/ one burgomaster of lesser towns, one member of a district council, and eight members (two of them legal functionaries) nominated by the grand-duke. The lower chamber consists of 73 popular representatives, of whom 24 are elected by the burgesses of certain towns and 49 by the rural communities. Every citizen of 25 years of age, who has not been convicted and is not a pauper, has a vote. The elections are, however, indirect; the citizens nominating the W ahlmdnner (deputy electors) and the latter electing the representatives. The chambers meet at least every two years. The members of the lower chamber are elected for four years, half the number retiring at the expiration of every two years. The executive consists of four departments of state ˆ-those of the interior, of foreign affairs and of the grand-ducal house, of finance, and of justice, ecclesiastical affairs and educa- tion. The chief sources of revenue are direct and indirect taxes, domains and railways. The last are worked by the state, and the sole public debt, amounting to about 22 millions sterling, is attributable to this head. The supreme courts of justice of the duchy are in Karlsruhe, Freiburg, Offenburg, Heidelberg, Mosbach, Waldshut, Constance and Mannheim, whence appeals lie to the Reichsgericht (supreme tribunal of the empire) in Leipzig. By virtue of a convention with

Prussia, of 187 1, the Baden army forms a portion of the Prussian army.

History. — During the middle ages the district which now forms the grand-duchy of Baden was ruled by various counts, prominent among whom were the counts and dukes of Zahringen. In 1 1 1 2 Hermann, a son of Hermann, margrave of Verona (d. 1074), and grandson of Bertold, duke of Carinthia and count' of Zahringen, having inherited some of the German estates of his family, called himself margrave of Baden, and from this date the separate history of Baden may be said to begin. Hermann appears to have called himself by the title of margrave, and riot the more usual title of count, owing to the connexion of his family with the margraviate of Verona. His son and grandson, both named Hermann, added to their territories, which about 1200 were divided, and the lines of Baden-Baden and Baden-Hochberg were founded, the latter of which was divided about a century later into the branches of Baden-Hochberg and Baden-Sausenberg. The family of Baden-Baden was very successful in increasing the area of its possessions, which after several divisions were united by the margrave Bernard I. in 1391. Bernard, a soldier of some renown, continued the work of his predecessors, and obtained other districts, including Baden-Hochberg, the ruling family of which died out in 1418. ■ During the 15th century a war with the count palatine of the 4 Rhine deprived Margrave Charles I. (d. 1475) of a part of his territories, but these losses were more than repaired by his son and successor, Christopher I. In 1503 the family of Baden-

Sausenberg became extinct, and the whole of Baden was united by Christopher, who divided it, however, before his death in 1527 among his three sons. One of these died childless in 1533, and in 1535 his remaining sons, Bernard and Ernest, having shared their brother's territories, made a fresh division and founded the lines of Baden-Baden and Baden-Pforzheim, called after 1565 Baden-Durlach. Further divisions followed, and the weakness caused by these partitions was accentuated by a rivalry, between the two main branches of the family. This culminated in open warfare, and from 1584 to 1622 Baden-Baden was in the possession of one of the princes of Baden-Durlach. Religious differences added to this rivalry. During the

period of the Reformation some of the rulers of Baden adhered to the older and some adopted the newer faith, and the house was similarly divided during the Thirty Years' War. Baden suffered severely during this struggle, and both branches of the family were exiled in turn. The treaty of Westphalia in 1648 restored the status quo, and the family rivalry gradually died out. During the wars of the reign of Louis XIV. the margraviate was ravaged by the French troops, and the margrave of Baden-Baden, Louis William (d. 1707), was prominent among the soldiers who resisted the aggressions of France. In 177 1 Augustus George of Baden-Baden died without sons, and his territories passed to Charles Frederick of Baden-Durlach, who thus became ruler of the whole of Baden.

Although in 1771 Baden was united under a single ruler it did not form a compact territory, and its total area was only ' about 1350 sq. m. Consisting of a number of isolated districts lying on either bank of the upper Rhine, it was the work of Charles Frederick to acquire the intervening stretches of land, and so to give territorial unity to his country. Beginning to reign in 1738 and coming of age in 1746, this prince is the most notable of the rulers of Baden. He was interested in the development of agriculture and commerce; sought to improve education and the administration of justice, and was in general a wise and liberal ruler. His opportunity for territorial aggrand- dizement came during the Napoleonic wars. When war broke out between France and Austria in 1792 the Badenese fought for Austria; consequently their country was devastated and in 1706 the margrave was compelled to pay an indemnity, and to cede his territories on the left bank of the Rhine to France. Fortune, however, sqon returned to his side. In 1803, largely owing to the good offices of Alexander I., emperor of Russia, he received the bishopric of Constance, part of the Rhenish Palatinate, and other smaller districts, together with the dignity of a prince elector. Changing sides in 1805 he fought for Napoleon, with the result that by the peace of Pressburg in that yeer he obtained the Breisgau and other territories at the expense of the Habsburgs. In 1806 he joined the Confederation of the Rhine, declared himself a sovereign prince, became a grand-duke, and received other additions of territory. The Baden contingent continued to assist France, and by the peace of Vienna in 1809 the grand- duke was rewarded with accessions of territory at the expense of the kingdom of Wiirttemberg. Having quadrupled the area of Baden, Charles Frederick died in June 1811, and was suc- ceeded by his

grandson, Charles, who was married to Stephanie des Beauharnais (d. i860), an adopted daughter of Napoleon. Charles fought for his father-in-law until after the battle of Leipzig in 1813, when he joined the Allies.

In 18 1 5 Baden became a member of the Germanic confederation established by the Act of the 8th of June, annexed to the Final Act of the congress of Vienna of the 9th of June. In the hurry of the winding-up of the congress, however, the vexed question of the succession to the grand-duchy had not been settled. This was soon to become acute. By the treaty of the 1 6th of April 1816, by which the territorial disputes between Austria and Bavaria were settled, the succession to the Baden Palatinate was guaranteed to Maximilian I., king of Bavaria, in the expected event of the extinction of the line of Zahringen. As a counterblast to this the grand-duke Charles issued in 181 7 a pragmatic sanction (Hausgesetz) declaring the counts of Hochberg, the issue of a morganatic marriage between the grand-duke Charles

Frederick and Luise Geyer von Geyersberg (created Countess Hochberg), capable of succeeding to the crown. A controversy between Bavaria and Baden resulted, which was only decided in favour of the Hochberg claims by the treaty signed by the four great powers and Baden at Frankfort on the 10th of July 1819. Meanwhile the dispute had produced important effects in Baden. In order to secure popular support for the Hochberg heir, Charles in 1818 granted to the grand-duchy, under article xiii. of the Act of Confederation, a liberal constitution, under which two chambers were constituted and their assent declared necessary for legislation and taxation. The outcome was of im- portance far beyond the narrow limits of the duchy; for all Germany watched the constitutional experiments of the southern states. In Baden the conditions were not favourable to success. The people, belonging to the ” Celtic fringe ” of Germany, had fallen during the revolutionary period completely under the influence of French ideas, and this was sufficiently illustrated by the temper of the new chambers, which tended to model their activity on the proceedings of the Convention in the earliec days of the French Revolution. On the other hand, the new grand-duke Louis, who had succeeded in 1818, was unpopular, and the administration was in the hands of hide-bound and inefficient bureaucrats. The result was a deadlock; and, even before the promulgation of the Carlsbad decrees in October 1 8 19 the grand-duke had prorogued the chambers, after three months of sterile debate. The reaction that followed was as severe in Baden as elsewhere

in Germany, and culminated in 1823, when, on the refusal of the chambers to vote the military budget, the grand-duke dissolved them and levied the taxes on his own authority. In January 1825, owing to official pressure, only three Liberals were returned to the chamber; a law was passed making the budget presentable only every three years, and the constitution ceased to have any active existence.

In 1830 Louis was succeeded as grand-duke by his half-brother Leopold, the first of the Hochberg line. The July Revolution led to no disturbances in Baden; but the new grand-duke from the first showed liberal tendencies. The elections of 1830 were not interfered with; and the result was the return of a Liberal majority. The next few years saw the introduction, under successive ministries, of Liberal reforms in the constitution, in criminal and civil law, and in education. In 1832 the adhesion of Baden to the Prussian Zollverein did much for the material prosperity of the country. With the approach of the revolutionary year 1848, however, Radicalism once more began to lift up its head. At a popular demonstration held at Offenburg on the 1 2th of September 1847, resolutions were passed demanding the conversion of the regular army into a national militia which should take an oath to the constitution, a progressive income- tax and a fair adjustment of the interests of capital and labour.

The news of the revolution of February 1848 in Paris brought this agitation to a head. Numerous public meetings were held at which the Offenburg programme was adopted, and on the 4th of March, under the influence of the popular excitement, it was accepted almost unanimously by the lower- chamber. As in other German states, the government bowed to the storm, proclaimed an amnesty and promised reforms. The ministry was remodelled in a more Liberal direction; and a new delegate was sent to the federal diet at Frankfort, empowered to vote for the establishment of a parliament for united Germany. The disorders, fomented by republican agitators, none the less continued; and the efforts of the government to suppress them with the aid of federal troops led to an armed insurrection. For the time this was mastered without much difficulty; the in- surgents were beaten at Kandern on the 20th of April; Freiburg, which they held, fell on the 24th; and on the 27th a Franco- German ” legion,” which had invaded Baden from Strassburg, was routed at Dossenbach.

At the beginning of 1849, however, the issue of a new constitution, in accordance with the resolutions of the Frankfort

parliament, led to more serious trouble. It did little to satisfy the Radicals, who were angered by the refusal of the second chamber to agree to their proposal for the summoning of a

constituent assembly (10th of February 1849). The new insurrection that now broke out was a more formidable affair than the first. A military mutiny at Rastatt on the 1 1 th of May showed that the army sympathized with the revolution, which was proclaimed two days later at Offenburg amid tumultuous scenes. On the same day (13th of May) a mutiny at Karlsruhe forced the grand-duke to take to flight, and the next day he was followed by the ministers, while a committee of the diet under Lorenz Brentano (1813-1891), who represented the more moderate Radicals as against the republicans, established itself in the capital to attempt to direct affairs pending the establishment of a provisional government. This was accomplished on the 1st of June, and on the 10th the " constituent diet," consisting entirely of the most " advanced " politicians, assembled. It had little chance of doing more than make speeches; the country was in the hands of an armed mob of civilians and mutinous soldiers; and, meanwhile, the grand-duke of Baden had joined with Bavaria in requesting the armed intervention of Prussia, which was granted on the condition that Baden should join the League of the Three Kings.

From this moment the revolution in Baden was doomed, and with it the revolution in all Germany. The Prussians, under Prince William (afterwards emperor), invaded Baden in the middle of June. The insurgent forces were under the command of the Pole, Ludwig von Mieroslawski (1814-1878), who reduced them to some semblance of order. On the 20th he met the Prussians at Waghausel, and was completely defeated; on the 35th Prince William entered Karlsruhe; and at the end of the month the members of the provisional government, who had taken refuge at Freiburg, dispersed. Such of the insurgent leaders as were caught, notably the ex-officers, suffered military execution; the army was dispersed among Prussian garrison towns; and Baden was occupied for the time by Prussian troops. The grand-duke returned on the 19th of August, and at once dissolved the diet. The elections resulted in a majority favourable to the new ministry, and a series of laws were passed of a

reactionary tendency with a view to strengthening the government.

The grand-duke Leopold died on the 24th of April 1852, and was succeeded by his second son, Frederick, as regent, the eldest, Louis (d. 22nd of January 1858), being incapable of ruling. 1 The internal affairs of Baden during the period that followed have comparatively little general interest. In the greater politics of Germany, Baden, between 1850 and 1866, was a con- sistent supporter of Austria; and in the war of 1866 her con- tingents, under Prince William, had two sharp engagements with the Prussian army of the Main. Two days before the affair of Werbach (24th of July), however, the second chamber had petitioned the grand-duke to end the war and enter into an offensive and defensive alliance with Prussia. The grand-duke had from the first been opposed to the war with Prussia, but had been forced to yield owing to popular resentment at the policy of Prussia in the Schleswig-Holstein question (q.v.). The ministry, now at one, resigned; Baden announced her with- drawal from the German confederation; and on the 17th of August a treaty of peace and alliance was signed with Prussia. The adhesion of Baden to the North German confederation was prevented by Bismarck himself, who had no wish to give Napoleon III. so good an excuse for intervention; but it was the opposition of Baden to the formation of a South German confederation that made the ultimate union inevitable. The troops of Baden took a conspicuous share in the war of 1870; and it was the grand-duke of Baden, who, in the historic assembly of the German princes at Versailles, was the first to hail the king of Prussia as German emperor.

The internal politics of Baden, both before and after 1870, centre in the main round the question of religion. The signing on the 28th of June 1859 of a concordat with the Holy See, by which education was placed under the oversight of the clergy and the establishment of religious orders was facilitated, led to a constitutional struggle, which ended in 1863 with the victory

1 Frederick assumed the title of grand-duke on the 5th of September 1856.

of Liberal principles, the communes being made responsible for education, though the priests were admitted to a share in the management. The quarrel between Liberalism and Clericalism was, however, not ended. In 1867, on the accession to the premiership of Julius von Jolly (1823-1891), several constitu-

tional changes in a Liberal direction were made; responsibility of ministers, freedom of the press, compulsory education. In the same year (6th of September) a law was passed to compel all candidates for the priesthood to pass the government examina* tions. The archbishop of Freiburg resisted, and, on his death in April 1868, the see was left vacant. In 1869 the introduction of civil marriage did not tend to allay the strife, which reached its climax after the proclamation of the dogma of papal infallibility in 1870. The " Kulturkampf " raged in Baden, as in the rest of Germany; and here as elsewhere the government encouraged the formation of Old Catholic communities. Not till 1880, after the fall of the ministry of Jolly, was a reconciliation with Rome effected; in 1882 the archbishopric of Freiburg was again filled up. The political tendency of Baden, meanwhile, mirrored that of all Germany. In 1891 the National Liberals had but a majority of one in the diet; from 1893 they could maintainˆ them- selves only with the aid of the Conservatives ; and in 1897 a coali- tion of Ultramontanes, Socialists, Social-democrats and Radicals (Freisinnige) , won a majority for the opposition in the chamber.

Amid all these contests the wise and statesmanlike moderation of the grand-duke Frederick won him universal esteem. By the treaty under which Baden had become an integral part of the German empire, he had reserved only the exclusive right to tax beer and spirits; the army, the post-office, railways and the conduct of foreign relations were placed under the effective control of Prussia. In his relations with the German empire, too, Frederick proved himself rather a great German noble than a sovereign prince actuated by particularist ambitions; and his position as husband of the emperor William I.'s only daughter, Louise (whom he had married in 1856), gave him a peculiar influence in the councils of Berlin. When, on the 20th of Sep- tember 1906, the grand-duke celebrated at once the jubilee of his reign and his golden wedding, all Europe combined to do him honour. King Edward VII. sent him, by the hands of the duke of Connaught, the order of the Garter. But more significant, perhaps, was the tribute paid by the Temps, the leading Parisian paper. " Nothing more clearly demonstrates the sterile paradox of the Napoleonic work," it wrote, " than the history of the grand- duchy. It was Napoleon, and he alone, who created this whole state in 1803 to reward in the person of the little margrave of Baden a relative of the emperor of Russia. It was he who after Austerlitz aggrandized the margravate at the expense of Austria; transformed it into a sovereign principality and raised it to a

grand-duchy. It was he too who, by the seculariza- tion on the one hand and by the dismemberment of Wurttem- berg on the other, gave the grand-duke 500,000 new subjects. He believed that the recognition of the prince and the artificial ethnical formation of the principality would be pledges of security for France. But in 1813 Baden joined the coalition, and since then that nation created of odds and ends (de brie et de broc) and always handsomely treated by us, had not ceased to take a leading part in the struggles against our country. The grand-duke Frederick, grand-duke by the will of Napoleon, has done France all the harm he could. But French opinion itself renders justice to the probity of his character and to the ardour of his patriotism, and nobody will feel surprise at the homage with which Germany feels bound to surround his old age." He died at Mainau on the 28th of September 1907, and was succeeded by his son, the grand-duke Frederick II.

Bibliography. — Das Grossherzoglum Baden in geographischer . . . Hinsicht dargestellt (Karlsruhe, 1885); Wielandt, Das Staats-recht des Grossherzogtums Baden (Freiburg, 1895); F. von Weech, Badische Geschichte (Karlsruhe, 1890); Die Zahringer in Baden (Karlsruhe, 1881); Baden unter den Grossherzbgen Karl Friedrich. Karl Ludwig (Freiburg, 1863); Geschichte der badischen Verfassung (Karlsruhe, 1868); and Baden in den Jahren 1852 bis 1877 (Karls- ruhe, 1877); C. F. Nebenius and F. von Weech, Karl Friedrich von Baden (Karlsruhe, 1868) ; L. H. Hausser, Denkwurdigkeiten zur Geschichte der badischen Revolution (Heidelberg, 1851); L. Mil Her,

Badische Landtagsgeschichte (Berlin, 1899-1902) ; E. von Chrismar, Cenealogie des Gesamlhauses Baden yom 16, Jahrhundert bis heule (Gotha, 1892); E. H. Meyer, Badisches Volksleben im 19. Jahrhundert (Strassburg, 1900); F. J. Mone, Quellensammlung zur badischen Landesgeschichte (Karlsruhe, 1848-1867) ; ' Badische Biographien, edited by F. von Weech (Karlsruhe, 1875-1891).

BADENOCH, a district of south-east Inverness-shire, Scotland, bounded on the N. by the Monadhliath mountains, on the E. by the Cairngorms and Braemar, on the S. by Atholl and the Grampians, and on the W. by Lochaber. Its area is somewhat

undefined, but it may be estimated to measure 36 m. from N.E. to S.W. and 15 m. from N. to S. Excepting the valley of the Spey and the great glens, it is almost entirely a wild mountainous tract* many hills exceeding 3000 ft. in height, and contains in the foirests of Alder, Drumochter, Gaick and Feshie some of the best deer country in the Highlands. Loch Laggan and Loch Ericht are the principal lakes, and the district is abundantly watered by the Spey and its numerous tributaries. It is traversed, from Dalnaspidal to Boat of Garten, by the Highland railway. There are very few industries, and population groups itself at Kingussie and other places on or near the Spey. From 1229 to 1313 the lordship of Badenoch was owned by the Comyns. In 1371 Robert II. granted it to his son Alexander Stewart, 1st earl of Buchan (1343-1405), the " Wolf of Badenoch." Reverting to the crown, it was bestowed in 1452 upon the 1st earl of Huntly, and still gives the title of lord of Badenoch to the marquess of Huntly.

BADENWEILER, a health resort and watering place of the grand-duchy of Baden, Germany, 28 m. N. by E. by rail from Basel, at the western edge of the Black Forest. It is sheltered by the Blauen (3820 ft.) and the climate is excellent. Its new parish (Evangelical) church (1897) is built at the foot of the nth-century castle which belonged to the margraves of Baden, and was destroyed by the French during the wars of Louis XV. The place is visited by 5000 people annually, partly for its warm mineral springs (70 F.), partly for its whey cure, and partly on account of its equable climate and picturesque surroundings. There are a Kurkaus, built in 1853, and a park of 15 acres; also a grand-ducal castle, refitted in 1887-1888. In 1784 well- preserved Roman baths were discovered here. The permanent population is about 600.

BADGER, the common name for any animal of the Musteline subfamily Melinae or the typical genus Meles (see Carnivgra). The name is probably derived from " badge," device, on account of the marks on the head; or it may be identical with the term separately noticed below, the French blaireau being used in both senses. The members of the typical genus have the lower jaw so articulated to the upper, by means of a transverse condyle firmly locked into a long cavity of the cranium, that dislocation of the jaw is all but impossible, and this enables those creatures to main- tain their hold with the utmost tenacity. The European badger (Meles laxus or M. meles) is from 25 in. to 29 in. long, with a tail of about 8 in. ; the general hue of the fur is grey above and black on the under parts; the head is white, with a black

stripe on each side. In habits it may be taken as typical of the subfamily. It is nowhere abundant, but is found over the northern parts of Europe and Asia, and is a quiet, inoffensive animal, nocturnal and solitary in its habits, sleeping by day in its burrow, and issuing forth at night to feed on roots, beech-mast, fruits, the eggs of birds, small quadrupeds, frogs and insects. It is said also to dig up the nests of wasps in order to eat the larvae, as the ratel — a closely allied South African form — is said to rob the bees of their honey. The male and female are seldom seen together, and are supposed to trace each other by the odour of the secretion in the anal glands. Fossil remains of the badger have been found in England in deposits of Pleistocene age. In eastern Persia this species is replaced by the Persian badger (M. canescens) ; two species — the white-tailed badger (M. leucurus) and the Chinese badger (If. chinensis) occur in eastern Asia; and another (M . anacuma) is found in Japan. The American badger {Taxidea americana) ranges over the greater part of the United States, and in habits closely resembles the European species, but seems to be more carnivorous. When badgers were more

abundant than they now are, their skins, dressed with the hair attached, were commonly used for pistol furniture. They are now chiefly valued for the hair, that of the European badger being used in the manufacture of the best shaving-brushes while the softer hair of the American species is employed for the same purpose, and also for painters' pencils, and the fur is used for articles of ladies' apparel and trimmings. The Malay badger (Mydaus meliceps) is confined to the mountains of Java (where it is called the teledu), Sumatra and Borneo. The head and body are about 15 in. long, and the tail no more than an inch; the fur is dark brown, with the top of the head, neck and a broad dorsal stripe, white. Like the skunk, this animal can eject the foetid secretion of the anal glands. The sand-badgers (Arctonyx) are Asiatic; the best-known species (A: collaris) ranges from the eastern Himalayas to Burma; the smaller A. taxoUes -is found in Assam, Arakan and perhaps in China; and there is probably another in Tibet. In these the tail is much longer in proportion to the body than in the rest of the group.

The badger does not usually seek to attack, but, when driven to bay, its great muscular power and tough hide render it a formidable antagonist. The cruel sport of badger-drawing was formerly popular throughout Great Britain, but was prohibited about the middle of the 19th century, together with bear-baitirig and bull-baiting. The badger-ward, who was usually attached to a

bear-garden, kept his badger in a large box. Whenever a drawing was arranged, bets were made as to how many times the dog, usually a bull-terrier, would draw the badger, i.e. pull it out of its box, within a given number of minutes. As scon as the dog succeeded in doing this the animals were parted, often by the attendants biting their tails, and the badger was again shuts up in his box, which, at a signal from the time-keeper, was again opened. Another method of baiting this animal is thus described in the Encyclopaedia of Sport: ” They dig a place in the earth about a yard long, so that one end is four feet deep. At this end a strong stake is driven down. Then the badger’s tail is split, a chain put through it, and fastened to the stake with such ability that the badger can come up to the other end of the place. The dogs are brought and set upon the poor animal who sometimes destroys several dogs before it is killed.” The colloquial ” to badger ” (i.e. worry or tease) is a metaphorical derivative, and ” drawing a badger” is similarly used in a figurative sense.

BADGER, a term of uncertain derivation (possibly derived from bagger, in allusion to the hawker’s bag) for a dealer in food, such as corn or victuals (more expressly, fish, butter or cheese), which he has purchased in one place and brought for sale to another place; an itinerant dealer, corresponding to tie modern hawker or huckster. An English statute of 1552 which sum- marized, and prescribed penalties against, the offences of en- grossing, forestalling and regrating, specially exempted badgers from these penalties, but required them to be licensed by three justices of the peace for the county in which they dwelt. A statute of 1 562-1 563, after declaring that many people took up the trade of badgering ” seeking only to live easily and to leave their honest labour,” enacted that badgers should be licensed for a year only, should be householders of three years’ standing in the county in which they were licensed, and should enter into re- cognizances not to engross or forestall. An act of 1844 abolished the offence of badgering, and repealed the statutes passed in relation to it. The word is still in common use in country districts.

BADGHIS (” home of the winds “), a district on the north-west of Afghanistan, between the Murghab and Hari Rud rivers, extend- ing as far northward as the edge of the desert of Sarakhs. ; It includes the Chul formations through which the Russo-Afghan boundary runs. This region was surveyed by the boundary com- mission of 1885. Since that date it has been largely settled by the amir with purely Afghan tribes.

BADHAM, CHARLES (1813-1884), English scholar, was born at Ludlow, in Shropshire, on the 18th of July 1813. His father, Charles Badham, translator of Juvenal and an excellent classical scholar, was regius professor of physic at Glasgow; his mother was a cousin of Thomas Campbell, the poet. When about seven

years old, Badham was sent to Switzerland, where he became a pupil of Pestalozzi. He was afterwards transferred to Eton, and in 1830 was elected to a scholarship at Wadham College, Oxford, but only obtained a third class in classics (1836), a failure which may have been due to his dislike of the methods of study then in fashion at Oxford, at a time when classical scholar- ship was in a very unsatisfactory condition. Shortly after taking his degree in 1837 Badham went to Italy, where he occupied himself in the study of ancient MSS., in particular those of the Vatican library. It was here that he began a life-long friendship with G. C. Cobet. He afterwards spent some time in Germany, and on his return tc England was incorporated M.A. at Peter- house, Cambridge, in 1847. Having taken holy orders, he was appointed headmaster of Louth grammar school, Lincolnshire (1851-1854), and subsequently headmaster of Edgbaston proprietary school, near Birmingham. In the interval he had taken the degree of D.D. at Cambridge (1852). In i860 he received the honorary degree of doctor of letters at the university of Leiden. In 1866 he left England to take up the professorship of classics and logic in Sydney University, which he held until his death on the 26th of February 1884. He was twice married. Dr Badham's classical attainments were recognized by the most famous European critics, such as G. C. Cobet, Ludwig Preller, W. Dindorf, F. W. Schneidewin, J. A. F. Meineke, A. Ritschl and Tischendorf. Like many schoolmasters who are good scholars and even good teachers, he was not a professional success; and his hasty temper and dislike of anything approach- ing disingenuousness may have stood in the way of his advance- ment. But it is strange that a scholar and textual critic of his eminence and of European reputation should have made com- paratively little mark in his native country. He published editions of Euripides, Helena and Iphigenia in Tauris (1851), Ion (1851); Plato's Philebus (1855, 1878); Laches and Euthy- demus (1865), Phaedrus (1851), Symposium (1866) and De Platonis Epistolis (1866). He also contributed to Mnemosyne (Cobet's journal) and other classical

periodicals. His Adhortatio ad Discipulos Academiae Sydniensis (1869) contains a number of emendations of Thucydides and other classical authors. He also published an article on ” The Text of Shakespere ” in Cambridge Essays (1856); Criticism applied to Shakespere (1846) ; Thoughts on Classical and Commercial Education (1864). A collected edition of his Speeches and Lectures delivered in Australia (Sydney, 1890) contains a memoir by Thomas Butler.

BADIUS, JODOCUS or Josse (1462-1535), sometimes called Badius Ascf.nsius from the village of Asche, near Brussels, where he was born, an eminent printer at Paris, whose establish- ment was celebrated under the name of Prelum Ascensianum. He was himself a scholar of considerable repute, had studied at Brussels and Ferrara, and before settling in Paris, had taught Greek for several years at Lyons. He illustrated with notes several of the classics which he printed, and was the author of numerous pieces, amongst which are a life of Thomas a. Kempis, and a satire on the follies of women, entitled Navicula Stultarum Mulierum.

BADLESMERE, BARTHOLOMEW, Baron (1275-1322), English nobleman, was the son and heir of Gunselm de Badles- mere (d. 1301), and fought in the English army both in France and Scotland during the later years of the reign of Edward I. In 1307 he became governor of Bristol Castle, and afterwards Edward II. appointed him steward of his household; but these marks of favour did not prevent him from making a compact with some other noblemen to gain supreme influence in the royal council. Although very hostile to Earl Thomas of Lancaster, Badlesmere helped to make peace between the king and the earl in 13 1 8, and was a member of the middle party which detested alike Edward’s minions, like the Despensers, and his violent enemies like Lancaster. The king’s conduct, however, drew him to the side of the earl, and he had already joined Edward’s enemies when, in October 1321, his wife, Margaret de Clare, refused to admit Queen Isabella to her husband’s castle at Leeds in Kent; The king captured the castle, seized and im- prisoned Lady Badlesmere, and civil war began. After the

defeat of Lancaster at Boroughbridge, Badlesmere was taken and hanged at Canterbury on the 14th of April 1322. His son and heir, Giles, died without children in 1338.

BADMINTON, or Great Badminton, a village in the southern

parliamentary division of Gloucestershire, England, 100 m. W. of London by the Great Western railway (direct line to south Wales). Here is Badminton House, the seat of the dukes of Beaufort, standing in a park some 10 m. in circumference. ■ The manor of Badminton was acquired in 1608 from Nicolas Boteler (to whose family it had belonged for several centuries) by Thomas, Viscount Somerset (d. 1650 or 1651), third son of Edward, 4th earl of Worcester, and was given by his daughter and heiress Elizabeth to Henry Somerset, 3rd marquess of Worcester and 1st duke of Beaufort (1629-1699), who built the present mansion (1682) on the site of the old manor house. It is a stone building in Palladian style, and contains a number of splendid paintings and much fine wood-carving. The parish church of St. Michael stands close to it. Thisis a Grecian building (1785), with a richly ornamented ceiling and inlaid altar-pavement; it also contains much fine sculpture in the memorials to former dukes, and is the burial-place of Field Marshal Lord Raglan, who was the youngest son of the 5th duke of Beaufort. Raglan Castle, near Monmouth, now a beautiful ruin, was the seat of the earls and the 1st marquess of Worcester, until it was besieged by the Parliamentarians in 1646, and after its capitulation was dismantled.

BADMINTON, a game played with rackets and shuttlecocks, its name being taken from the duke of Beaufort's seat in Gloucestershire. The game appears to have been first played in England about 1873, but before that time it was played in India, where it is still very popular. The Badminton Association in England was founded in 1895, and its laws were framed from a code of rules drawn up in 1887 for the Bath Badminton Club and based on the original Poona (1876) rules. In England the game is almost always played in a covered court. The All England championships for gentlemen's doubles, ladies' doubles, and mixed doubles were instituted in 1899, and for gentlemen's singles and ladies' singles in 1900; and the first championship between England and Ireland was played in 1904. Badminton may be played by daylight or by artificial light, either with two players on each side (the four-handed or double game) or with one player on each side (the two-handed or single game). The game consists entirely of volleying and is extremely fast, a single at Badminton being admitted to require more staying power than a single at lawn tennis. There is much scope for judgment and skill, e.g. in " dropping " (hitting the shuttle

Diagram of Court. — In the two- , handed game, the width of the

“‘• court is reduced to 17 ft. and . the long service lines are dis- j pensed with, the back boundary ,: lines being used as the long “I service lines, and the lines j dividing the half courts being .j produced to meet the back J boundary lines. The net posts 6 6 ; are placed either on the side jj boundary lines or at any dis- ; ,; tance not exceeding 2 ft. outside 6 6 ‘, the said lines; thus in the four- j handed game, the distance be- : tween the posts is from 20 to i 24 ft., and in the two-handed ,j game, from 17 to 21 ft. N.B. — j With the exception of the net ; line, the dotted lines on the £ court apply only to the court for a ‘ 6 ˆ the two-handed game.

; Back Boundary Line i

Long Service Line

IRight half ‘ court

Short Service Line

Short Service Line

LongSer

Right half 1

ice Line

; Back Boundary Line i

gently just over the net) and in ” smashing ” (hitting the shuttle with a hard downward stroke). The measurements of the court are shown on the accompanying plan.

The Badminton hall should be not less than 18 ft. high. Along the net line is stretched a net 30 in. deep, from 17 to 24 ft. long according to the position of the posts, and edged on the top with whife tape 3 in. wide. The top of the net should be 5 ft. from

the ground at the centre and 5 ft. 1 in. at the posts. The shuttle-cock (or shuttle) has 16 feathers from z\ to 2% in. long, and weighs from 73 to 85 grains. The racket (which is of no specified size,

shape or -weight") is strung with strong fine gut and "weighs as a rule about 6 oz.

The game is for 15 or, rarely, for 21 aces, except in ladies' singles, when it is for 1 1 aces ; and a rubber is the best of three games. Games of 2 1 aces are played only and always in matches decided by a single game, and generally in handicap contests. The right to choose ends or to serve first in the first game of the rubber is decided by tossing. If the side which wins the toss chooses first service, the other side chooses ends, and vice versa; but the side which wins the toss may call upon the other side to make first choice. The sides change ends at the beginning of the second game, and again at the beginning of the third game, if a third game is necessary. In the third game the sides change ends when the side which is leading reaches 8 in a game of 15 aces, and 6 in a game of n aces, or, in handicap games, when the score of either side reaches half the number of aces required to win the game. In matches of one game (21 aces) the sides change ends when the side which is leading has scored 1 1 aces. The side winning a game serves first in the next game, and, in the four-handed game, either player on the side that has won the last game may take first service in the next game.

In a game of is aces, when the score is " 13 all " the side which first reaches 13 has the option of " setting " the game to 5, and when the score is " 14 all " the side which first reaches 14 has the option of " setting " the game to 3, i.e. the side which first scores 5 or 3 aces, according as the game has been " set " at " 13 all " or " 14 all," wins. In ladies' singles, when the score is " 9 all " the side first reaching 9 may " set " the game to 5, and when the score is " 10 all " the side which first reaches 10 may " set " the game to 3. In games of 21 aces, the game may be " set " to 5 at " 19 all " and to 3 at " 20 all." There is no " setting " in handicap games.

In the four-handed game, the player who serves first stands in his right-hand half court and serves to the player who is standing in the opposite right-hand half court, the other players meanwhile standing anywhere on their side of the net. As soon as the shuttle is hit by the server's racket, all the players may stand anywhere on their side of the net. If the player served to returns the shuttle, i.e. hits it into any part of his opponents' court before it touches the ground, it has to be returned by one of the " in " (serving) side, and then by one of the " out " (non-serving) side,

and so on, until a ” fault ” is made or the shuttle ceases to be ” in play.” 1 If the ” in ” side makes a ” fault,” the server loses his ” hand ” (serve), and the player served to becomes the server; but no score accrues. If the ” out ” side makes a ” fault,” the ” in ” side scores an ace, and the players on the ” in ” side change half courts, the server then serving from his left half court to the player in the opposite left half court, who has not yet been served to. Only the player served to may take the service, and only the ” in ” side can score an ace. The first service in each innings is made from the right- hand half court. The side that starts a game has only one ” hand ” in its first innings; in every subsequent innings each player on each side has a ” hand,” the partners serving con- secutively. While a side remains ” in,” service is made alter- nately from each half court into the half court diagonally opposite, the change of half courts taking place whenever an ace is scored. If, in play, the shuttle strikes the net but still goes over, the stroke is good; but if this happens in service and the service is otherwise good, it is a ” let,” i.e. the stroke does not count, and the server must serve again, even if the shuttle has been struck by the player served to, in which case it is assumed that the shuttle would have fallen into the proper half court. It is a ” let,” too, if the server, in attempting to serve, misses the shuttle altogether. It is a good stroke, in service or in play, if the shuttle falls on a line, or, in play, if it is followed

1 The shuttle is ” in play ” from the time it is struck by the server’s racket until it touches the ground, or touches the net without going over, or until a ” fault ” is made.

over the net with the striker’s racket, or passes outside eithei of the net posts and then drops inside any of the boundary lines of the opposite court. Mutatis mutandis, the above remarks apply to the two-handed game, the main points of difference being that, in the two-handed game, both sides change ha\i courts after each ace is scored and the same player takes con- secutive serves, whereas in the double game only the serving side changes half courts at an added ace and a player may not -take two consecutive serves in the same game.

It is a ” fault ” (a) if the service is overhand, i.e. if the shuttle when struck is higher than the server’s waist; (b) if, in serving, the shuttle does not fall into the half court diagonally opposite that from which service is made; (c) if, before the shuttle is struck by the server, both feet of the server and of the player served to are not inside their respective half courts, a foot on a

line being deemed out of court; (

For full information on the laws of the game the reader is referred to the Laws of Badminton and the Rules of the Badminton Association, published annually (London). See also an article by S. M. Massey in the Badminton Magazine (February 1907), reprinted in a slightly revised form in the Badminton Gazette (November 1907). Until October 1907 Lawn Tennis and Badminton was the official organ of the Badminton Association; in November 1907 the Badminton Gazette became the official organ.

BADNUR, a town of British India, the headquarters of the district of Betul in the Central Provinces. It consists, besides the European houses, of two bazaars. Pop. (1901) 5766. There is a good serai or inn for native travellers, and a dak bungalow or resting-place for Europeans. Not far from Badnur is Kherla, the former residence of the Gond rajas, where there is an old fort, now in ruins, which used to be held by them.

BADRINATH, a village and celebrated temple in British India, in the Garhwal district of the United Provinces. It is situated on the right bank of the Vishnuganga, a tributary of the Alak- nanda river, in the middle of a valley nearly 4 m. in length and 1 in breadth. The village is small, containing only twenty or thirty huts, in which reside the Brahmans and the attendants of the temple. This building, which is considered a place of high sanctity, is by no means equal to its great celebrity. It is about 40 or 50 ft. in height, built in the form of a cone, with a small cupola, on the top of which is a gilt ball and spire, and contains the shrine of Badrinath, dedicated to an incarnation of Vishnu. The principal idol is of black stone and is 3 ft. in height. Badrinath is a favourite resort of pilgrims from all parts of India. In ordinary years the number varies from 7000 to 10,000; but every twelfth year, when the festival of Kumbh- mela is celebrated, the concourse of persons is said to be 50,000. In addition to the gifts of votaries, the temple enjoys a further source of revenue from the rents of villages assigned by former rajas. Successive temples have been shattered by avalanches, and the existing building is modern. It is situated among mountains rising 23,000 ft. above the level of the sea. Elevation of the site of the temple, 10,294 ft.

BADULLA, the capital of the province of Uva, Ceylon, 54 m. S. E. of Kandy. It is the seat of a government agent and district judge,

besides minor courts. It was in Kandyan times the home of a prince who ruled Uva as a principality. Badulla stands 2222 ft. above sea-level; the average annual rainfall is 79J in.; the average temperature, 73 . The population of the town in 1901 was 5924; of the Badulla district, 186,674. There is a botanic garden; and the town, being almost encircled by a river— the Badullaeya — and overshadowed by the Naminaeooly Kande range of mountains (highest peak 6680 ft.), is very

picturesquely situated. The railway terminus at Bandarawella is 18 m. from Badulla. Tea is cultivated by the planters, and rice, fruit and vegetables by the natives in the district.

BAEDEKER, KARL (1801-1859), German publisher, was born at Essen on the 3rd of November 1801. His father had a printing establishment and book-shop there, and Karl followed the same business independently in Coblenz. Here he began to issue the first of the series of guide-books with which his name is associated. They followed the model of the English series instituted by John Murray, but developed in the course of years so as to cover the greater part of the civilized world, and later were issued in English and French as well as German. Baedeker's son Fritz carried on the business, which in 1872 was transferred to Leipzig.

BAEHR, JOHANN CHRISTIAN FELIˆ (1798-1872), German philologist, was born at Darmstadt on the 13th of June 1798. He studied at the university of Heidelberg where he was appointed professor of classical philology in 1823, chief librarian in 1832, and on the retirement of G. F. Creuzer became director of the philological seminary. He died at Heidelberg on the 29th of November 1872. His earliest works were editions of Plutarch's Alcibiades (1822), Philopoemen, Flamininus, Pyrrhus (1826), the fragments of Ctesias (1824), and Herodotus (1830-1835, 1S55-1862) . But most important of all were his works on Roman litera- ture and humanistic studies in the middle ages: Geschichte der rdmischen Litteratur (4th ed., 1868-1870), and the supplementary volumes, Die christlichen Dichter und Geschichtschreiber Roms (2nd ed.,1872), Die christlich-romische Theologie (1837), Geschichte der rdmischen Litteratur im karolingischen Zeitalter (1840).

BAEL FRUIT (Aegle marmelos). Aegle is a genus of the botanical natural order Rutaceae, containing two species in tropical Asia and one in west tropical Africa. The plants are trees bearing strong spines, with alternate, compound leaves each with three leaflets and panicles of sweet-scented white flowers. Aegle marmelos, the bael- or bel-fruit tree (also known as Bengal quince), is found wild or cultivated throughout India. The tree is valued for its fruit, which is oblong to pyriform in shape, 2-5 in. in diameter, and has a grey or yellow rind and a sweet, thick orange-coloured pulp. The unripe fruit is cut up in slices, sun-dried and used as an astringent; the ripe fruit is described as sweet, aromatic and cooling. The wood is yellowish- white, and hard but not durable. The name Aegle is from one of the Hesperides, in reference to the golden fruit; marmelos is Portuguese for quince.

BAENA, a town of southern Spain, in the province of Cordova; 32 m. by road S.E. of the city of Cordova. Pop. (1900) 14,539. Baena is picturesquely situated near the river Marbella, on the slope of a hill crowned with a castle, which formerly belonged to the famous captain Gonzalo de Cordova. Farming, horse- breeding, linen-weaving and the manufacture of olive-oil are the chief local industries. The nearest railway station is Luque (pop. 4972), 4 m. S.E. on the Jaen-Lucena line. The site of the Roman town (Baniana or Biniana) can still be traced, and various Roman antiquities have been disinterred. In 1292 the Moors under Mahommed II. of Granada vainly besieged Baena, which was held for Sancho IV. of Castile; and the five Moorish heads in its coat-of-arms commemorate the defence.

BAER, KARL ERNST VON (1792-1876), German biologist, was born at Piep, in Esthonia, on the 29th of February 1792. His father, a small landowner, sent him to school at Reval, which he left in his eighteenth year to study medicine at Dorpat University. The lectures of K. F. Burdach (1776-1847) suggested research in the wider field of life-history, and as at that time Germany offered more facilities for, and greater encouragement to, scientific work, von Baer went to Wtirzburg, where J. I. J. Dollinger (1770-1841), father of the Catholic theologian, was professor of anatomy. In teaching von Baer, Dollinger gave a direction to his studies which secured his future pre-eminence in the science of organic development. He collaborated with C. H. Pander (1 794-1865) in researches on the evolution of the chick, the results of which were first published in Burdach's treatise on physiology. Continuing his investigations alone von Baer ex-

tended them to the evolution of organisms generally, and after a

sojourn at Berlin he was invited by his old teacher Burdach, who had become professor of anatomy at Konigsberg, to join him as prosector and chief of the new zoological museum (18 17). Von Baer's great discovery of the human ovum is the subject of his Epistola de Ovo Mammalium et Hominis Genesi (Leipzig, 1827), and in the following year he published the first part of his History of the Evolution of Animals (Ueber die Entwickelungsgeschichte der Thiere), the second part following in 1837. In this work he demonstrated first, that the Graafian follicles in the ovary are not the actual eggs, but that they contain the spherical vesicle, which is the true ovum, a body about the one hundred and twentieth of an inch in diameter, wherein he the properties transmitting the physical and mental characteristics of the parent or grandparent, or even of more remote ancestors. He next showed that in all vertebrates the primary stage of cleavage of the fertilized egg is followed bymodification into leaf like germ layers— skin, muscular, vascular and mucous — whence arise the several organs of the body by differentiation. He further discovered the gelatinous, cylindrical cord, known as the chorda dorsalis, which passes along the body of the embryo of vertebrates, in the lower types of which it is limited to the entire inner skeleton, while in the higher the backbone and skull are developed round it. His " law of corre sponding stages " in the development of vertebrate embryos was exemplified in the fact recorded by him about certain specimens preserved in spirit which he had omitted to label. " I am quite unable to say to what class they belong. They may be lizards, or small birds, or very young mammalia, so complete is the similarity in the mode of formation of the head and trunk in these animals. The extremities are still absent, but even if they had existe.d in the earliest stage of the development we should learn nothing, because all arise from the same fundamental form." Again, in his History of Evolution he suggests, "Are not all animals in the beginning of their development essentially alike, and is there not a primary form common to all ?" (i. p. 223). Notwith- standing this, the " telic " idea, with the archetypal theory which it involved, possessed von Baer to the end of his life, and explains his inability to accept the theory of unbroken descent with modification when it was propounded by Charles Darwin and A. R. Wallace in 1858. The influence of von Baer's discoveries has been far-reaching and abiding. Not only was he the pioneer in that branch of biological

science to which Francis Balfour, gathering up the labours of many fellow-workers, gave coherence in his Comparative Embryology (1881), but the impetus to T. H. Huxley's researches on the structure of the medusae came from him (Life, i. 163), and Herbert Spencer found in von Baer's " law of development " the " law of all development " (Essays, i. 30). In 1834 von Baer was appointed librarian of the Academy of Sciences of St Petersburg. In 1835 he published his Development of Fishes, and as the result of collection of all available informa- tion concerning the fauna and flora of the Polar regions of the empire, he was appointed leader of an Arctic expedition in 1837, The remainder of his active life was occupied in divers fields of research, geological as well as biological, an outcome of the latter being his fine monograph on the fishes of the Baltic and Caspian Seas. One of the last works from his prolific pen was an interest- ing autobiography published at the expense of the Esthonian nobles on the celebration of the jubilee of his doctorate in 1864. Three years afterwards he received the Copley medal. He died at Dorpat on the 28th of November 1876. (E. Cl.)

BAER, WILLIAM JACOB (i860-), American painter, was bornonthe 29thof January i86oin Cincinnati, Ohio. Hestudied at Munich in 1880-1884. He had much to do with the revival in America of the art of miniature-painting, to which he turned in 1892, and was the first president of the Society of Painters in Miniature, New York. Among his miniatures are " The Golden Hour," " Daphne," " In Arcadia " and " Madonna with the Auburn Hair."

BAETYLUS (Gr. /JatriAos, fiairvKiov), a word of Semitic origin (= bethel) denoting a sacred stone, which was supposed to be endowed with life. These fetish objects of worship were meteoric stones, which were dedicated to the gods or revered as symbols of the gods themselves (Pliny, Nat. Hist. xvii. 9; Photius, Cod. 242).

In Greek mythology the term was specially applied to the stone supposed to have been swallowed by Cronus (who feared mis- fortune from his own children) in mistake for his infant son Zeus, for whom it had been substituted by Uranus and Gaea, his wife's parents {Etymologicum Magnum, s.v.). This stone was carefully

preserved at Delphi, anointed with oil every day and on festal occasions covered with raw wool (Pausanias x. 24) . In Phoenician mythology, one of the sons of Uranus is named Baetylus. Another famous stone was the effigy of Rhea Cybele, the holy stone of Pessinus, black and of irregular form, which was brought to Rome in 204 B.C. and placed in the mouth of the statue of the goddess. In some cases an attempt was made to give a more regular form to the original shapeless stone: thus Apollo Agyieus was represented by a conical pillar with pointed end, Zeus Meilichius in the form of a pyramid. Other famous baetylic idols were those in the temples of Zeus Casius at Seleucia, and of Zeus Teleios at Tegea. Even in the declining years of paganism, these idols still retained their significance, as is shown by the attacks upon them by ecclesiastical writers.

See Munter, Vber die vom Himmel gefallenen Steine (1805) ; Bosigk, De Baetyliis (1854); and the exhaustive article by F. Lenormant in Daremberg and Saglio's Dictionary of Antiquities.

BAEYER, JOHANN FRIEDRICH WILHELM ADOLF VON

(1835-), German chemist, was born at Berlin on the 31st of October 1835, his father being Johann Jacob von Baeyer (1794-1885), chief of the Berlin Geodetical Institute from 1870. He studied chemistry under R. W. Bunsen and F. A. Kekule, and in 1858 took his degree as Ph.D. at Berlin, becoming privat- docent a few years afterwards and assistant professor in 1866. Five years later he was appointed professor of chemistry at Strassburg, and in 1875 he migrated in the same capacity to Munich. He devoted himself mainly to investigations in organic chemistry, and in particular to synthetical studies by the aid of " condensation " reactions. The Royal Society of London awarded him the Davy medal in 1881 for his researches on indigo, the nature and composition of which he did more to elucidate than any other single chemist, and which he also succeeded in preparing artificially, though his methods were not found commercially practicable. To celebrate his seventieth birthday his scientific papers were collected and published in two volumes (Gesammelte Werke, Brunswick, 1905), and the names of the headings under which they are grouped give some idea of the range and extent of his chemical work: — (1) organic arsenic compounds, (2) uric acid group, (3) indigo, (4) papers arising from indigo researches, (5) pyrrol and pyridine bases,

(6) experiments on the elimination of water and on

condensation,

(7) the phthaleins, (8) the hydro-aromatic compounds, (9) the terpenes, (10) nitroso compounds, (n) furfurol, (12) acetylene compounds and ” strain ” {Spannungs) theory, (13) peroxides, (14) basic properties of oxygen, (15) dibenzalacetone and tri-phenylamine, (16) various researches on the aromatic and (17) the aliphatic series.

BAlSZA (anc. Beatia) , a town of southern Spain, in the province of Jaen; in the Loma de Ubeda, a mountain range between the river Guadalquiver on the S. and its tributary the Guadalimar on theN. Pop. (1900) 14,379. Baeza has a station 3 m. S.W. on the Linares-Almeria railway. Its chief buildings are those of the uni-versity (founded in 1 533, and replaced by a theological seminary) , the cathedral and the Franciscan monastery. The Cordova and Ubeda gates, and the arch of Baeza, are among the remains of its old fortifications, which were of great strength. The town has little trade except in farm-produce; but its red dye, made from the native cochineal, was formerly celebrated. In the middle ages Baeza was a flourishing Moorish city, said to contain 50,000 inhabitants; but it was sacked in 1239 by Ferdinand III. of Castile, who in 1248 transferred its bishopric to Jaen. It was the birthplace of the sculptor and painter, Gaspar Becarra.

BAFFIN, WILLIAM (1584-1622), English navigator and discoverer. Nothing is known of his early life, but it is con- jectured that he was born in London of humble origin, and gradually raised himself by his diligence and perseverance. The earliest mention of his name occurs in 161 2, in connexion with

an expedition in search of a North- West Passage, under the orders of Captain James Hall, whom he accompanied as chief pilot. Captain Hall was murdered in a fight with the natives on the west coast of Greenland, and during the two following years Baffin served in the Spitsbergen whale-fishery, at that time controlled by the Muscovy Company. In 161 5 he entered the service of the Company for the discovery of the North-West Passage, and accompanied Captain Robert Bylot as pilot of the little ship ” Discovery,” and now carefully examined Hudson Strait. The accuracy of Baffin’s tidal and astronomical observa-tions on this voyage was confirmed in a remarkable manner by Sir Edward Parry, when passing over the same ground, two centuries later (1821). In the following year Baffin again sailed as pilot of the ” Discovery,” and passing up Davis Strait dis- covered

the fine bay to the north which now bears his name, together with the magnificent series of straits which radiate from its head and were named by him Lancaster, Smith and Jones Sounds, in honour of the generous patrons of his voyages. On this voyage he had sailed over 300 m. farther north than his predecessor Davis, and for 236 years his farthest north (about lat. 77° 45') remained unsurpassed in that sea. All hopes, however, seemed now ended of discovering a passage to India by this route, and in course of time even Baffin's discoveries came to be doubted until they were re-discovered by Captain Ross in 1 818. Baffin next took service with the East India Company, and in 1617-1619 performed a voyage to Surat in British India, and on his return received the special recognition of the Company for certain valuable surveys of the Red Sea and Persian Gulf which he had made in the course of the voyage. Early in 1620 he again sailed to the East, and in the Anglo- Persian attack on Kishm in the Persian Gulf, preparatory td the reduction of Ormuz, he received his death-wound and died on the 23rd of January 1622. Besides the importance of his geographical discoveries, Baffin is to be remembered for the importance and accuracy of his numerous scientific and magnetic observations, for one of which (the determination of longitude at sea by lunar observation) the honour is claimed of being the first of its kind on record.

BAFFIN BAY and BAFFIN LAND, an arctic sea and an insular tract named after the explorer William Baffin. Baffin or Baffin's Bay is part of the long strait which separates Baffin Land from Greenland. It extends from about 69° to 78° N. and from 54° to 76 W. From the northern end it is connected (1) with the polar sea northward by Smith Sound, prolonged by Kane Basin and Kennedy and Robeson Channels; (2) with the straits which ramify through the archipelago to the north-west by narrow channels at the head of Jones Sound, from which O. Sverdrup and his party conducted explorations in 1900- 1902; (3) with the more southerly part of the same archipelago by Lancaster Sound. Baffin Bay was explored very fully in 1616 by Baffin. The coasts are generally high, precipitous and deeply indented. The most important island on the east side is Disco, to the north of Disco Bay, Greenland. During the greater part of the year this sea is frozen, but, while hardly ever free of ice, there are normally navigable channels along the coasts from the beginning of June to the end of September connected by transverse channels. The bay is noted as a "centre of the whale and seal fishery. At more than one point a depth exceeding 1000 fathoms has been

ascertained.

Baffin Land is a barren insular tract, included in Franklin district, Canada, with an approximate area of 236,000 sq. m., situated between 6i° and 90 W. and 62 and 74 N. The eastern and northern coasts are rocky and mountainous, and are deeply indented by large bays including Frobisher and Home Bays, Cumberland Sound and Admiralty Inlet. Baffin Land is separated from Greenland by Baffin Bay and Davis Strait, from Ungava by Hudson Strait, from Keewatin and Melville Peninsula by Fox Channel and Fury-and-Hecla Strait, from Boothia Peninsula and North Somerset by the Gulf of Boothia and Prince Regent Inlet, and from North Devon by Lancaster Sound. Various names are given to various parts of the land — thus the north-western part is called Cockburn Land, farther

east is North Galloway; on the extreme eastern peninsula are Cumberland and Penny Lands, while the southern is called Meta Incognita; in the west is Fox Land. In the southern part of the interior are two large lakes, Amadjuak, which lies at an altitude of 289 ft., and Nettiling or Kennedy.

BAGAMOYO, a seaport of German East Africa in 6° 22′ S., 38* 55′ E. Pop. about 18,000, including a considerable number of British Indians. Being the port on the mainland nearest the town of Zanzibar, 26 m. distant, Bagamoyo became the starting- point for caravans to the great lakes, and an entrepdt of trade with the interior of the continent. It possesses no natural harbour. The beach slopes gently down and ships anchor about 2 m. off the coast. The town is oriental in character. The buildings include the residence of the administrator, barracks, a govern- ment school for natives, a mosque and Hindu temple, and the establishment of the Mission du Sacrl Cceur, which possesses a large plantation of coco-nut palms. Bagamoyo is in telegraphic communication with Zanzibar and with the other coast towns of German East Africa, and has regular steamship communica- tion with Zanzibar. Of the explorers who made Bagamoyo the starting-point for their journeys to the interior of Africa, the most illustrious were Sir Richard Burton, J. H. Speke, J. A. Grant and Sir H. M. Stanley.

BAGATELLE (French, from Ital. bagatella, bagata, a trifle), primarily a thing of trifling importance. The name, though French, is given to a game which is probably of English origin; though its connexion with the shovel-board of Cotton's Complete Gamester is very douhtful. Strutt does not mention it. The game is very likely a modification of billiards, and is played on an oblong board or table varying in size from 6 ft. by i| ft. to 10 ft. by 3 ft. The bed of the table is generally made of slate, although, in the smaller sizes, wood covered with green cloth is often used. The sides are cushioned with india-rubber. The head is semi-circular and fitted with 9 numbered cups set into the bed, their numbers showing the amount scored by putting a ball into them. An ordinary billiard-cue and nine balls, one black, four red and four white, are used. The black ball is placed upon a spot about 9 in. in front of hole 1, and about 18 in. from the player's end of the board a line (the baulk) is drawn across it, behind' which is another spot for the player's ball. (These measurements of course differ according to the size of the table.) Some modern tables have pockets as well as cups.

Bagatelle Proper. — The black ball having been placed on the upper spot, the players " string " for the lead, the winner being that player who plays his ball into the highest hole. Any number may play, either separately, or in sides. Each player in turn plays all eight balls up the table, no score being allowed until a ball has touched the black ball, the object being to play as many balls as possible into the holes, the black ball counting double. Balls missing the black at the beginning, those rolling back across the baulk-line, and those forced off the table are " dead " for that round and removed. The game is decided by the aggregate score made in an agreed number of rounds.

Sans Egal.— This is a French form of the game. Two players take part* one using the red and one the white balls. After stringing for lead, the leader plays at the black, forfeiting a ball if he misses. His opponent then plays at the black if it has not been touched, otherwise any way he likes, and each then plays alternately, the object being to hole the black and his own balls, the winner being the one who scores the highest number of points. If a player holes one of his opponent's balls itis scored for his opponent. The game is decided by a certain number of rounds, or by points, usually 21 or 31. In other matters the rules of bagatelle apply.

The Cannon Game. — This is usually considered the best and

most scientific of bagatelle varieties. Tables without cups are sometimes used. As in billiards three balls are required, the white, spot-white and black, the last being spotted and the non-striker's ball placed midway between holes 1 and 9. The object of the game is to make cannons (caroms), balls played into holes, at the same time counting the number of the holes, but if a ball falls into a hole during a play in which no cannon in. 7

is made the score counts for the adversary. If the striker's ball is holed he plays from baulk; if an object-ball, it is spotted as at the beginning of the game. A cannon counts 2; missing the white object-ball scores 1 to the adversary; missing the black, 5 to the adversary. If there are pockets, the striker scores 2 for holing the white object-ball and 3 for holing the black, but a cannon must be made by the same stroke; otherwise the score counts for the adversary. I

1 The Irish Cannon Game. — The rules of the cannon game apply, except that in all cases pocketed balls count for the adversary.
-.■■.<

Mississippi. — This variation is played with a bridge pierced with 9 on more arches, according to the size of the table, the arches being numbered from 1 upwards. All nine balls are usually played, though the black is sometimes omitted, each player having a round, the object being to send the balls through the arches. This may not be done directly, but the balls must strike a cushion first, the black, if used, counting double the arch made. If a ball is played through an arch, without first striking a cushiori, the score goes to the adversary, but another ball, lying in front of the bridge, may be sent through by the cue-ball if the latter has struck a cushion. If a ball falls into a cup the striker scores the value of the cup as well as of the arch.

Trou Madame.— This is a game similar to Mississippi, with the exceptions that the ball need not be played on to a cushion, and that, if a ball falls into a cup, the opponent scores the value of the cup and not the striker.

Bell-Bagatelle is played on a board provided with cups, arches from which bells hang, and stalls each marked with a number. The ball is played up the side and rolls down the board, which is slightly inclined, through the arches or into a cup or stall, the winner scoring the highest with a certain number of balls.

BAGDAD, or Baghdad, a vilayet of Asiatic Turkey, situated between Persia and the Syrian desert, and including the greater part of ancient Babylonia. The original vilayet extended from Mardin On the N. to the Persian Gulf on the S., and from the river Khabor on the W. to the Persian frontier on the E. From the middle of the 17th century, when this region was annexed by the Turks, until about the middle of the 19th century, the vilayet of Bagdad was the largest province of the Turkish empire, constituting at times an almost independent principality. Since then, however, it has lost much of its im- portance and all of its independence. The first reduction in size occurred in 1857, when some of the western portion of the vilayet was added to the newly created sanjak of Zor. In 1878 the Mosul vilayet was created out of its northern, and in 1884 the Basra vilayet out of its southern sanjaks. At the present time it extends from a point just below Kut' el-Amara to a point somewhat above Tekrit on the Tigris, and from a point somewhat below Samawa to a point a little above Anah on the Euphrates; It is still, territorially, the largest province of the empire, and includes some of the most fertile lands in the Euphrates-Tigris valleys; but while possessing great possibilities for fertility, by far the larger portion of the vilayet is to-day a desert, owing to the neglect of the irrigation canals on which the fertility of the valley depends. From the latitude of Bagdad northward the region between the two rivers is an arid, waterless, limestone steppe, inhabited only by roving Arabs. From the latitude of Bagdad southward the country is entirely alluvial soil, deposited by the rivers Tigris and Euphrates, possessing great possibilities of fertility, but absolutely flat and subject to inundations at the time of flood of the two rivers. At that season much of the country, including the immediate surroundings of Bagdad; is under water. During the rest of the year a large part of the country is a parched and barren desert, and much of the re- mainder swamps and lagoons. Wherever there is any pretence . at irrigation, along the banks of the two great rivers and by the few canals which are still in existence, the yield is enormous, and the shores of the Tigris and Euphrates in the neighbour- hood of Bagdad and Hilla seem to be one great palm garden. Sultan Abd-ul-Hamid II. personally acquired large tracts of land in various parts of the vilayet. These so-called senniehs are

well farmed and managed, in conspicuous contrast with the surrounding territory. Canals and dikes have been constructed to control and distribute the much-needed water, and the officials are housed in new buildings of substantial appearance. Indeed, wherever one finds a new and prosperous-looking village, it may be assumed to belong to the sultan. These senniehs are an advantage to the country in that they give security to their immediate region and certain employment to some part of its population. On the other hand, they withdrew large tracts of fertile and productive land from taxation (one-half of the cultivated land of the vilayet was said to be administered for the sultan's privy purse), and thus greatly reduced the revenue of the vilayet.

The chief city of the vilayet is its capital, Bagdad. Between the Euphrates and the Arabian plateau lie the sacred cities of Kerbela or Meshed-Hosain, and Nejef Or Meshed Ali, with a population of 20,000 to 60,000 each, while a number of towns, varying in population from 3000 to 10,000, are found along the Euphrates (Anah, Hit, Ramadieh, Musseyib, Hilla, Diwanieh and Samawa) and the Tigris (Tekrit, Samarra and Kut el- Amara). The settled population lies entirely along the banks of these streams and the canals and lagoons westward of the Euphrates, between Kerbela and Nejef. Away from the banks of the rivers, between the Euphrates and the Tigris and between the latter and the Persian mountains, are tribes of wandering Arabs, some of whom possess great herds of horses, sheep, goats, asses and camels, while in and by the marshes other tribes, in the transition stage from the nomadic to the settled life, own great herds of buffaloes. Of the wandering Arab tribes, the most powerful is the great tribe of Shammar, which ranges over all Mesopotamia. In January and February they descend as low as the neighbourhood of Diwanieh in such numbers that even Bagdad is afraid. Here and there are regions occupied by a semi-sedentary population, called Madan, occupying reed huts huddled around mud castles, called meftul. These, like the Bedouin Arabs, are practically independent, waging constant warfare among themselves and paying an uncertain tribute to the Turkish government. In general, Turkish rule is confined to the villages, towns and cities along the river banks, in and by which garrisons are located. Since the time (1868-1872) of Midhat Pasha, who did much to bring the independent Arab tribes under control, the Turkish government has been, however, gradually strengthening its grip on the country and extending the area of conscription and taxation. But

from both the racial and religious standpoint, the Arab and Persian Shi'as, who constitute the vast bulk of the population, regard the Turks as foreigners and tyrants.

Of crops the vilayet produces wheat (which is indigenous), rice, barley (which takes the place of oats as food for horses), durra (a coarse, maize-like grain), sesame, cotton and tobacco; of fruits, the date, orange, lemon, fig, banana and pomegranate. The country is naturally treeless, except for the tamarisk, which grows by the swamps and along the river-beds. Here and there one sees a solitary sifsaf tree, or a small plantation of poplars or white mulberries, which trees, with the date-palm, constitute the only timber of the country. The willows reported by some travellers are in reality a narrow-leaved variety of poplar.

Besides the buffaloes and a few humped Indian oxen, there are no cattle in the country. Of wild animals, the pig, hyena, jackal, antelope and hare are extremely numerous; lions are Still found, and wolves and foxes are not uncommon. Snipe and various species of wild fowl are found in the marshes, and ! pelicans and storks abound along the banks of the Euphrates and Tigris. Fish are caught in great numbers in the rivers and marshes, chiefly barbel and carp, and the latter attain so great a size that one is a sufficient load for an ass. The principal exports of the province are coarse wool, hides, dates and horses. At various points, especially at Hit, and from Hit southward along the edge of the Arabian plateau occur bitumen, naphtha and white petroleum springs, all of which remain undeveloped. The climate is very hot in summer, with a mean temperature of 97 F. From April to November no rain falls; in November the rains commence, and during the winter the thermometer falls to 46 F.

Cholera is endemic in some parts of the vilayet, and before 1875 the same was true of the bubonic plague. At that date this disease was stamped out by energetic measures on the part of the government, but it has reappeared again in recent years, introduced apparently from India or Persia by pilgrims. There are four great centres of pilgrimage for Shi'ite Moslems in the vilayet, Samarra, Kazemain, a suburb of Bagdad, Kerbela and Nejef. These are visited annually by tens of thousands of pilgrims, not only from the surrounding regions, but also from Persia and India; many of whom bring their dead to be buried in the neighbourhood of the sacred tombs.

Unpleasant, but not dangerous, is another disease, the so-called

“Bagdad date-mark,” known elsewhere as the “Aleppo button,” &c. This disease extends along the rivers Tigris and Euphrates, and the country adjacent from Aleppo and Diarbekr to the Persian Gulf, although there are individual towns and regions in this territory which seem to be exempt. It shows itself as a boil, attacking the face and extremities. It appears in two forms, known to the natives as male and female respectively. The former is a dry scaly sore, and the latter a running, open boil. It is not painful but leaves ugly scars. The natives all carry somewhere on their face, neck, hands, arms or feet the scars of these boils which they have had as children. European children born in the country are apt to be seriously disfigured, as in their case the boils almost invariably appear on the face, and whereas native children have as a rule but one boil, those born of European parents will have several. Adult foreigners visiting the country are also liable to be attacked, and women, especially, rarely escape disfigurement if they stay in the country for any length of time. The boils last for about a year, after which there is no more likelihood of a recurrence of the trouble than in the case of smallpox.

The area of the vilayet is 54,480 sq. m. The population is estimated at 852,000; Christians, 8000, principally Nestorians or Chaldaeans; Jews, 54,000; Moslems, 790,000, of whom the larger part are Shi’as.

See G. le Strange, Baghdad under the Abbasid Caliphate (1901); The Lands of the Eastern Caliphate (Cambridge, 1905) ; V. Cuinet, La Turquie d’Asie (Paris, 1890); J. P. Peters, Nippur (New York and London, 1897); Ed. Sachau, Am Euphrat und Tigris (Leipzig, 1900); A. V. Geere, By Nile and Euphrates (Edinburgh, 1904)- (J. P. Pe.)

BAGDAD, or Baghdad, the capital of the Turkish vilayet of the same name. It is the headquarters of the VI. Army Corps, which garrisons also the Basra and Mosul vilayets. It lies on both sides of the river Tigris, in an extensive desert plain which has scarcely a tree or village throughout its whole extent, in latitude 33° 20′ N., longitude 44 24′ E. At this point the Tigris and the Euphrates approach each other most nearly, the distance between them being little more than 25 m. At this point also the two rivers are connected by a canal, the northernmost of a series of canals which formerly united the two great waterways, and at the same time irrigated the intervening plain. This canal, the Sakhlawieh (formerly Isa), leaves the Euphrates a few miles above Feluja and

the bridge of boats, near the ruins of the ancient Anbar. As it approaches Bagdad it spreads out in a great marsh, and finally, through the Masudi canal, which encircles western Bagdad, enters the Tigris below the town. At the time of Chesney's survey of the Euphrates in 1838 this canal was still navigable for craft of some size. At present it serves no other purpose than to increase the floods which periodically turn Bagdad into an island city, and some- times threaten to overwhelm the dikes which protect it and to submerge it entirely.

The original city of Bagdad was built on the western bank of the Tigris, but this is now, and has been for centuries, little more than a suburb of the larger and more important city on the eastern shore, the former containing an area of only 146 acres within the walls, while the latter extends over 591 acres. Both the eastern and the western part of the city were formerly enclosed by brick walls, with large round towers at the principal angles and smaller towers intervening at shorter distances, the whole surrounded by a deep fosse. There were three gates in the

western city and four in the eastern; one of the latter, however, on the north side, called " Gate of the Talisman " from an Arabic inscription bearing the date a.d. 1220, has remained closed since the capture of the city by Murad IV. in 1638. These walls all fell into decay long since; at places they were used as brick quarries, and finally the great reforming governor, (1868-1872), Midhat Pasha, following the example set by many European cities, undertook to destroy them altogether and utilize the free space thus obtained as a public park and esplanade. His plans were only partially carried out. At present fragments of the walls exist here and there, with the great ditch about them, while elsewhere a line of mounds marks their course. A great portion of the ground within the wall lines is not occupied by buildings, especially in the north-western quarter; and even in the more populous parts of the city, near the river, a considerable space between the houses is occupied by gardens, where pomegranates, figs, oranges, lemons and date-palms grow in great abundance, so that the city, when seen at a distance, has the appearance of rising out of the midst of trees.

Along the Tigris the city spreads out into suburbs, the most

important of which is Kazemain, on the western side of the river northward, opposite which on the eastern side lies Muazzam. The former of these is connected with western Bagdad by a very primitive horse-tramway, also a relic of Midhat Pasha's reforms. The two parts of the city are joined by pontoon bridges, one in the suburbs and one in the main city. The Tigris is at this point some 275 yds. wide and very deep. Its banks are of mud, with no other retaining walls than those formed by the founda- tions of the houses, which are consequently always liable to be undermined by the action of the water. The western part of the city, which is very irregular in shape, is occupied entirely by Shi'as. It has its own shops, bazaars, mosques, &c, and constitutes a quarter by itself. Beyond the wall line on that side vestiges of ancient buildings are visible in various directions, and the plain is strewn with fragments of bricks, tiles and rubbish. A burying-ground has also extended itself over a large tract of land, formerly occupied by the streets of the city. The form of the new or eastern city is that of an irregular oblong, about 1500 paces in length by 800 in breadth. The town has been built without the slightest regard to regularity; the streets are even more intricate and winding than those in most other Eastern towns, and with the exception of the bazaars and some open squares, the interior is little else than a labyrinth of alleys and passages. The streets are unpaved and in many places so narrow that two horsemen can scarcely pass each other; as it is seldom that the houses have windows facing the thoroughfares, and the doors are small and mean, they present on both sides the gloomy appearance of dead walls. All the buildings, both public and private, are constructed of furnace- burnt bricks of a yellowish-red colour, principally derived from the ruins of other places, chiefly Madain (Ctesiphon), Wasit and Babylon, which have been plundered at various times to furnish materials for the construction of Bagdad.

The houses of the richer classes are regularly built about an interior court. The ground floor, except for the serdab, is given up to kitchens, store-rooms, servants' quarters, stables, &c. The principal rooms are on the first floor and open directly from a covered veranda, which is reached by an open staircase from the court. These constitute the winter residence of the family, reception rooms, &c. The roofs of the houses are all flat, surrounded by parapets of sufficient height to protect them from the observation of the dwellers opposite, and separate them from their neighbours. In the summer the population sleeps and dines upon the roofs, which thus constitute to all intents a third storey.

The remainder of the day, so far as family life is concerned, is spent in the serdab, a cellar sunk somewhat below the level of the courtyard, damp from frequent wettings, with its half windows covered with hurdles thatched with camel thorn and kept dripping with water. Occasionally the serdabs are provided with punkahs.

Sometimes, in the months of June, July and August, when the ske.rki or south wind is blowing, the thermometer at break

of day is known to stand at 112 F., while at noon it rises to 1 1 9° and a little before two o'clock to 122°, standing at sunset at 114 , but this scale of temperature is exceptional. Ordinarily during the summer months the thermometer averages from about 75° at sunrise to 107* at the hottest time of the day. Owing to the extreme dryness of the atmosphere and the fact that there is always a breeze, usually from the N.W., this heat is felt much less than a greatly lower temperature in a more humid atmosphere. Moreover, the nights are almost invariably cool.

Formerly Bagdad was intersected by innumerable canals and aqueducts which carried the water of both the Euphrates and the Tigris through the streets and into the houses. To-day these have all vanished, with the exception of one aqueduct which still conveys the water of the Tigris to the shrine of Abd al-Qadir (ul-Kadir). The present population draws its water directly from the Tigris, and it is distributed through the city in goat-skins carried on the backs of men and asses. There is, of course, no sewerage system, the surfaces of the streets serving that purpose, and what garbage and refuse is not consumed by the dog scavengers washes down into the Tigris at the same place from which the water for drinking is drawn. As a consequence of these insanitary conditions the death-rate is very high, and' in case of epidemics the mortality is enormous. At such times a large part of the population leaves the city and encamps iri the desert northward.

The principal public buildings of the city, such as they are, lie in the eastern section along the river bank. To the north, just within the old wall line, stands the citadel, surrounded by a high wall, with a lofty clock-tower which commands an excellent view. To the south of this, also on the Tigris, is the serai or palace of the Turkish governor, distinguished rather for extent than grandeur. It is comparatively modern, built at different periods, a large and confused structure without proportion, beauty or strength. Somewhat farther southward, just below the pontoon bridge,

stands the custom house, which occupies the site and is built out of the material of the medreseh or college of Mostansir (a.d. 1233). Of the original building of the : caliph Mostansir all that remains is a minaret and a small portion of the outer walls. Farther down are the imposing buildings of the British residency. The German consulate also is on the river-front. As in all Mahommedan cities, the mosques are conspicuous objects. Of these very few are old. The Marjanieh mosque, not far from the minaret of Mostansir, although its body is modern, has some remains of old and very rich arabesque work on its surface, dating from the 14th century. The door is formed by a lofty arch of the pointed form guarded on both sides with red bands exquisitely sculptured and having numerous inscriptions. The mosque of Khaseki, supposed to have been an old Christian church, is chiefly distinguished for its prayer niche, which, instead of being a simple recess, is crowned by a Roman arch, with square pedestals, spirally fluted shafts and a rich capital of flowers, with a fine fan or shell-top in the Roman style. The building in its present form bears the date of a.d. 1682, but the sculptures which it contains belong probably to the time of the caliphate. The minaret of Suk el-Ghazl, in the south-eastern part of the city, dates from the 13 th century. The other mosques, of which there are about thirty within the walls, excluding the chapels and places of prayer, are all of recent erection. Most of them are surmounted by bright-coloured cupolas and minarets. The Mosque of the Vizier, on the eastern side of the Tigris, near the pontoon bridge, has a fine dome and a lofty minaret, and the Great Mosque in the square of el Meidan, in the neighbourhood of the serai, is also a noble building.

The other mosques do not merit any particular attention, and in general it may be said that Bagdad architecture is neither distinctive nor imposing. Such attractions as the buildings possess are due rather to the richly coloured tiles with which many of them are adorned, or to inscriptions, like the Kufic inscription, dated a.d. 944, on the ruined tekke of the Bektash dervishes in western Bagdad. More important than the mosques

proper are the tomb mosques. Of these, the most important and most imposing is that of Kazemain, in the n6rthern suburb of the western city. Here are buried the seventh and ninth of the

successors of Ali, recognized by Shi'as, namely Musa Ibn Ja'far el-Kazim, and his grandson, Mahommed Ibn Ali el-Jawad. In its present form this mosque dates from the 19th century. The ; two great domes above the tombs, the four lofty minarets and part of the -facade of this shrine, are overlaid with gold, and from whatever direction the traveler approaches Bagdad, its glittering domes and minarets are the first objects which meet his eye. It is one of the four great shrines of the Shi'ite Moslems in the vilayet of Bagdad. Christians are not allowed to enter its precincts, and the population of the Kazemain quarter is so fanatical that it is difficult and even dangerous to approach it.

In the suburb of Muazzam, on the western side of the river, is the tomb of Abu Hanifa (?.».), the canon lawyer. There is a large mosque with a painted dome connected with this tomb, which is an object of veneration to the Sunni Moslems, but it seems cheap and unworthy in comparison with the magnificent shrine of Kazemain. On the same side of the river, lower down, is the shrine of Abd al-Qadir al-Jilani (of Jilan), founder of the Qftdirite (Kadaria) sect of dervishes, also a noted i place of pilgrimage. The original tomb was erected about a.d. 1253, but the present fine dome above the grave is later by at least two or three centuries. The possessor or controller of this wealthy mosque is the nakib, locally pronounced najeeb, or marshal of the nobles, whose office is to determine who are Se'ids,. i.e. entitled to wear the green turban. He is second only to the governor or vali pasha in power, and indeed his influence is often greater than that of the official ruler of the vilayet. Just outside of the wall of the western city lies the tomb and shrine of Ma'ruf Karkhi, dating from a.d. 1215, which also is a place of pilgrimage. Close to this stands the so-called tomb of Sitte Zobeide (Zobaida), with its octagonal base and pineapple dome, one of the most conspicuous and curious objects in the neighbourhood of Bagdad. Unfortunately it is rapidly falling into decay. K. Niebuhr reports that in his day (a .d. i 7 50) this tomb bore an inscription setting forth that Ayesha Khanum, the wife of the governor of Bagdad, was buried here in 1488, her grave having been made in the ancient sepulchre of the lady Zobeide (Zobaida), granddaughter of Caliph Mansur and wife of Harun al-Rashid, who died in a.d. 831. The tomb was restored at the time of her burial, at which date it was already ancient, and it was evidently believed to be the tomb of Zobeide. Con- temporary historians, however, state that Zobeide was actually buried in Kazemain, and moreover, early writers, who describe the neighbouring tomb and shrine of

Ma'ruf Karkhi, make no reference to this monument.

About 3 m. west of Bagdad, on the Euphrates road, in or by a grove of trees, stands the shrine and tomb of Nabi Yusha or Kohen Yusha, a place of monthly pilgrimage to the Jews, who believe it to be the place of sepulture of Joshua, son of Josedech, the high priest at the close of the exilian period. This is one of four similar Jewish shrines in Irak; the others being the tomb of Ezra on the Shatt el-Arab near Korna, the tomb of Ezekiel in the village of Kefil near Kufa, and the well of Daniel near Hillah. This shrine is also venerated by Moslems, who call it the tomb of Yusuf (Joseph). The Jews bury here their chief priests, a right the Moslems at times contest, and in 1889 a serious conflict between Jews and Moslems resulted from an attempt of the former to exercise this right.

There are said to be about thirty khans or caravanserais in Bagdad for the reception of pilgrims and merchants and their goods, none of which is of any importance as a building, with the single exception of the khan el-Aurtmeh adjoining the Marjanieh .mosque, to which it formerly belonged. This dates ■from a.d. 1356, and is said to occupy the site of an ancient Christian church. Its vaulted roof is a fine specimen of Saracenic brickwork. In recent years the demands of modern travel have led to the establishment of a hotel, which affords comfortable accommodation according to European methods. There is

also an English club-house. There are said to be about fifty baths in Bagdad, but in general they are inferior in construction and accommodation. The bazaars of Bagdad are extensive and well stocked, and while not so fine in construction as those of some other Eastern cities, they are more interesting in their contents and industries, because Bagdad has on the whole been less affected by foreign innovations. Several of the bazaars are vaulted over with brickwork, but the greater number are merely covered with flat beams which support roofs of dried leaves or branches of trees and grass. The streets of the entire business section of the city are roofed over in this manner, and in the summer months the shelterfrom the sun is very grateful, but in the winter these streets are extremely trying to the foreign visitor, owing to their darkness and their damp and chilly atmosphere.

Bagdad is about 500 m. from the Persian Gulf, following the course of the river. It maintains steam communication with

Basra, its port, which is situated on the Shatt el-Arab, somewhat more than 50 m. from the Persian Gulf, by means of two lines of steamers, one English and one Turkish. British steamers were first placed upon the Tigris as a result of the expedition of Colonel F. R. Chesney, in 1836. Since that time, a British gun-boat has been stationed before the residency, and British steamers have been allowed to navigate the river. Only two of thesej however, maintain a weekly connexion with Basra, and they are quite inadequate to the freight traffic between the two cities; The more numerous vessels of the Turkish service are so small, so inadequately equipped and so poorly handled, that they are used for either passenger or freight transport only by those who cannot secure the services of the British steamers. The navigation of the Tigris during the greater party of its course from Bagdad to Korna is slow and uncertain. The river, running through an absolutely flat country, composed entirely of alluvial soil, is apt to change its channel. In flood time the country at places becomes a huge lake, through which it is extremely difficult to find the channel. In the dry season, the autumn and winter, on the other hand, there is danger of ground- ing on the constantly shifting flats and shoals. To add to the uncertainties of navigation, the inhabitants along the eastern bank of the stream frequently dig new canals for irrigation pur- poses, which both reduces the water of the river and tends to make it shift its channel. Above Bagdad there are no steamers on the Tigris, but sailing vessels of 30 tons and more navigate the river to Samarra and beyond. The characteristic craft for local service in the immediate environment of Bagdad is the kufa, a circular boat of basket-work covered with bitumen, often of a size sufficient to carry five or six horses and a dozen men. These boats have been employed from the remotest antiquity through all this region, and are often depicted on the old Assyrian monuments. Equally ancient are the rafts called kellek, constructed of inflated goat-skins, covered with a frame- work of wood, often supporting a small house for passengers, which descend the Tigris from above Diarbekr. The wood of these rafts is sold in Bagdad, and constitutes, in fact, the chief supply of wood in that city.

Bagdad also lies on a natural line of communication between Persia and the west, the ancient caravan route from Khorasan debouching from the mountains at this point, while another natural caravan route led up the Euphrates to Syria and the Mediterranean and still another up the Tigris to Armenia and the Black Sea. It was its situation at the centre of the lines of

communication between India and Persia and the west, both by land and water, which gave the city its great importance in early times. With the change of the methods of transportation its importance has naturally declined. The trade of Persia with the west now passes either through the ports of the Persian Gulf or northward over Trebizond, while India communicates with the west directly through the Suez Canal. Bagdad is; therefore, a decayed city. Money is scarce ; among all classes, and the wages of common labourers are scarcely half what is paid in Syria. It is still, however, the centre of distribution for a very large, if scantily populated, country, and it also derives much profit from pilgrims, lying as it does on the route which Shi'ite

pilgrims from Persia must take on their way to the sacred cities. It also possesses important shrines of its own which cause many pilgrims to linger there, and wealthy Indians not infrequently choose Bagdad as a suitable spot in which to end their days in the odour of sanctity. There has also sprung up of late years considerable direct trade between the European and American markets and Bagdad, and several foreign houses, especially English, have established themselves there. Germany also has invaded this market.

The staple articles of export are hides, wool and dates. The export trade of Bagdad amounts to about £750,000 annually, and the import trade to about £2,000,000. The imports consist of oil, cheap cottons, shoes and other similar goods, which are taking the place of the picturesque native manufactures. Even the Bedouin Arabs wear headdresses of cheap European cotton stuff purchased in Bagdad or thereabouts, while the common water vessels throughout the country are five-gallon, petroleum tins, which also furnish metal for the manufacture of various utensils in the native bazaars.

Bagdad is in communication with Europe by means of two lines of telegraph, one British and one Turkish, and two postal services. There is a British consul-general, who is also political agent to the Indian government. His state is second only to that of the British ambassador at Constantinople. Besides the gunboat in the river, he has a guard of sepoys, and there is an Indian post-office in the residency. Formerly the British govern- ment

maintained a camel-post across the desert to Damascus. This was abandoned about 1880 when the Turks established a similar service. By means of the Turkish camel-post letters reached Damascus in nine days. There is also a Russian consul- general at Bagdad, and French, Austrian and American consuls.

The Euphrates Valley (or Bagdad) railway scheme, which had previously been discussed, was brought forward prominently in 1899, and Russian proposals to undertake it were rejected. British proposals followed, but were opposed by the Germans, who, as controlling the line to Konia in Asia Minor, claimed preference in the matter. A provisional convention was granted to a German company by the Porte, and an irade was obtained in 1902. In 1903 there was considerable discussion as to the placing of the line under international control, and the question aroused special interest in England in view of the short route which the line would provide to India, in connexion with fast steamship services in the Mediterranean and the Persian Gulf. It was decided by the British government that the proposals made to this effect did not offer sufficient security. The financial arrangement as finally agreed upon was that German financiers should control 40% of the capital of the line; French (through the Imperial Ottoman Bank), 30%; Austrian, Swiss, Italian and Turkish, 20%; and the Anatolian Railway Company, ro %. In 1904 the line was completed from Konia through Eregli to Bulgurli. In 1908 an irade sanctioned the extension icross the Taurus to Adana, and so to Helif near Mardin (522m.).

The population of Bagdad is estimated variously from 70,000 to 200,000; perhaps halfway between may represent approximately the reality. More than two-thirds of the population are Moslems, mostly Shi'as, with the exception of the official classes. There are about 34,000 Jews occupying a quarter of their own in the north-western part of the city; while in a neighbouring quarter dwell upwards of 6000 Christians, chiefly so-called Chaldaeans or Nestorians. The Carmelites maintain a mission in Bagdad, as does also the (English) Church Missionary Society. The Jews are the only part of the population who are provided with schools. A school for boys was established by the Alliance Israelite in 1865, and one for girls in 1899. Besides these, there is also an apprentice school for industrial training.

The Jews constitute the wealthiest and most intelligent portion of the population. A large part of the foreign trade is in their hands, and at the season of the sheep-shearing their agents and

representatives are found everywhere among the Bedouins and Madan Arabs of the interior, purchasing the wool and selling various commodities in return. They are the bankers of the country, and it is through their communications that the traveller

is able to obtain credit. They are also the dealers in antiquities, both genuine and fraudulent. Next to them in enterprise and prosperity are the Persians. The porters of the town are all Kurds, the river-men Chaldaean Christians. Every nation retains its peculiar dress. The characteristic, but by no means attractive, street dress of the Moslem women of the better class comprises a black horse-hair visor completely covering the face and projecting like an enormous beak, the nether extremities being encased in yellow boots reaching to the knee and fully displayed by the method of draping the garments in front.

Bagdad is governed by a pasha, assisted by a council. The pasha and the higher officials in general come from Constantinople, but a very large portion of the other Turkish officials seem to come from the town of Kerkuk. They constitute a class quite distinct from the native Arab population, and Ihey and the Turkish government in general are intensely unpopular among the Arabs, an unpopularity increased by their religious differences, the Arabs being as a rule Shi'ites, the Turks Sunnites. Besides the court of superior officers, which assists the pasha in the general administration of the province, there is also a mejlis or mixed tribunal for the settlement of municipal and commercial affairs, to which both Christian and Jewish merchants are admitted. Besides these, there are the religious heads of the community, especially the nakib and Jewish high priest, who possess an undefined and extensive authority in their own communities. The Jewish chief priest may be said to be the successor of the exilarch or resh galutha of the earlier period.

History. — There are in or near Bagdad a few remains of a period antedating Islam, the most conspicuous of which are the ruins of the palace of Chosroes at Ctesiphon or Madain, about 15 m. below Bagdad on the east side of the river. Almost equally conspicuous, and a landmark through the whole region, is the ruin called Akerkuf, in the desert, about 9 m. west- ward of Bagdad. This consists of a huge tower of unburned brick resting on a small hill of debris, the whole rising to a height of 100 ft. or more above the plain, in the centre of a network of ancient canals. Inscribed bricks found in the neighbourhood seem to

connect this ruin with Kurigalzu, king of Babylon about 1300 B.C. Under substantially its present name, Akukafa, it is mentioned as a place of importance in connexion with the canals as late as the Abbasid caliphate. . Within the limits of the city itself, on the west bank of the Tigris, are the remains of a quay, first observed by Sir Henry Rawlinson, at a period of low water, in 1849, built of bricks laid in bitumen, and bearing an inscription of Nebuchadrezzar, king of Babylon. Baghdadu was an ancient Babylonian city, dating back perhaps as far as 2000 B.C., the name occurring in lists in the library of Assur-bani-pal. It is also mentioned on the Michaux stone, found on the Tigris near the site of the present city, and dating from the time of Tiglath- Pileser I. (1100 B.C.) The quay of Nebuchadrezzar, mentioned above, establishes the fact that this ancient city of Baghdadu was located on the site of western or old Bagdad (see further under Caliphate: Abbasids, sections 2 foil.). References in the Jewish Talmud show that this city still continued to exist at and after the commencement of our era; but according to Arabian writers, at the time when the Arab city of Bagdad was founded by the caliph Mansur, there was nothing on that site except an old convent. One may venture to doubt the literal accuracy of this statement. It is clear that the ancient name, at least, still held firm possession of the site and was hence inherited by the new city.

The Arab city, the old or round city of Bagdad, was founded by the caliph Mansur of the Abbasid dynasty on the west side of the Tigris just north of the Isa canal in a.d. 762. It was a mile, in diameter, built in concentric circles, with the mosque and palace of the caliph in the centre, and had four gates toward the four points of the compass. It grew with great rapidity. The suburb of Rusafa, on the eastern bank, sprang up almost immedi- ately, and after the siege and capture of the round city by Mamun, in 814, this became the most important part of the capital. The period of the greatest prosperity of Bagdad was the period from its foundation until the death of Mamun, the

successor of Harun, in 833 . During this period the city, including both sides of the river, was 5 m. across within the walls, and it is said to have had a population Of 2,000,000 souls. In literature, art and science, it divided the supremacy of the world with

Cordova; in commerce and wealth it far surpassed that city. How its splendour impressed the imagination may be seen from the stories of the Arabian Nights. It was the religious capital of all Islam, and the political capital of the greater part of it, at a time when Islam bore the same relation to civilization which Christendom does to-day. As in Spanish Islam, so in the lands of the eastern caliphate, the Jews were treated relatively with favour. The seat of the exilarch or resh galutha was trans- ferred from Pumbedita(PumbedItha or Pombeditha) inBabylonia to Bagdad, which thus became the capital of oriental Judaism; from then to the present day the Jews have played no mean part in Bagdad.

Situated in a region where there is no stone, and practically no timber, Bagdad was built, like all the cities of the Babylonian plain, of brick and tiles. Its buildings depended for their effect principally on mass and gorgeous colouring. Like old Babylon, also, Bagdad was celebrated throughout the world for its brilliant- coloured textile fabrics. So famous was the silk of Bagdad, manufactured in the Attabieh quarter (named after Attab, a contemporary of the Prophet) , that the place-name passed over into Spanish, Italian, French and finally into English in the form of " tabby," as the designation of a rich-coloured watered silk. Depending on coloured tiles and gorgeous fabrics for their rich effects, nothing of the buildings of the times of Harun al-Rashid or Marnun, once counted so magnificent, have come down to us. All have perished in the numerous sieges and inundations which have devastated the city.

With the rise of the Turkish body-guard under Mamun's successor, Mo'tassim, began the downfall of the Abbasid dynasty, and with it of the Abbasid capital, Bagdad. Mo'tassim founded Samarra, and for fifty-eight years caliph and court deserted Bagdad (see Caliphate, sect. C). Then, in a.d. 865, Mosta'in, attempting to escape from the tyranny of the Turkish guard, fled back again to Bagdad. The attempt was futile, Bagdad was besieged and taken, and from that time until their final downfall the Abbasid caliphs were mere puppets, while the real rulers were successively the Turkish guard, the Buyids and the Seljuks. But during all this period the caliphs continued to be the religious heads of Islam and their residence its capital. Bagdad, accord- ingly, although fallen from its first eminence, continued to be a city of the first rank, and during most of that period still the richest and most splendid city in the world. Its religious import- ance is attested by the number of its great shrines dating

from those times; as for its wealth and size, while, as stated above, few remains of the actual buildings of that period survive, we still have abundant records describing their character, their size and their position. With the last century of the caliphates began a more rapid decline. From the records of that period it seems that the present city is identical in the position of its walls and the space occupied by the town proper with Bagdad at the close of the 1 2th century, the period when this rapid decline had already advanced so far that the western city is described by travellers as almost in ruins, and the eastern half as containing large unin- habited spaces. With the capture of the city by the Mongols, under Hulagu (Hulaku), the grandson of Jenghiz Khan, in 1258, and the extinction of the Abbasid caliphate of Bagdad, its im- portance as the religious centre of Islam passed away, and it ceased to be a city of the first rank, although the glamour of its former grandeur still clung to it, so that even to-day in Turkish official documents it is called the ” glorious city.”

The Tatars retained possession of Bagdad for a century and a half, until about a.d. 1400. Then it was taken by Timur, from whom the sultan Ahmed Ben Avis fled, and, finding refuge with the Greek emperor, contrived later to repossess himself of the city, whence he was finally expelled by Kara Yusuf of the Kara-Kuyunli (“Black Sheep”) Mongols in 1417. About 1468 the descendants of the latter were driven out by Uzun Hasan or Cassim of the Ak-Kuyunli (” White Sheep “) Mongols. He and

his descendants reigned in Bagdad until Shah Ismail I., the founder of the Safawid royal house of Persia, made himself master of the place (c. 1502 or 1508). From that time it continued for a long period an object of contention between the Turks and the Persians. It was taken by Suleiman I. the Magnificent and re-taken by Shah Abbas the Great, in 1620. Eighteen years later, in 1638, it was besieged by Sultan Murad IV., with an army of 300,000 men and, after an obstinate resistance, forced to surrender, when, in defiance of the terms of capitulation, most of the inhabitants were massacred.

Since that period it has remained nominally a part of the Turkish empire; but with the decline of Turkish power, and the general disintegration of the empire, in the first half of the 18th century, a then governor-general, Ahmed Pasha, made it an independent pashalic. Nadir Shah, the able and energetic usurper of the Persian throne, attempting to annex the province once more to Persia, besieged the city, but Ahmed defended it with such

courage that the invader was compelled to raise the siege, after suffering great loss. Turkish authority over the pashalic was again restored in the first part of the 19th century.

Authorities. — Allen's Indian Mail (1874); J- S. Buckingham, Travels in Mesopotamia (1827) ; Sir R. K. Porter, Travels in Georgia. Persia, Armenia and Ancient Babylonia (1821-1822) ; J. M. Kinneir, Geographical Memoir of the Persian Empire (1813); F. R. Chesney. Expedition (1850) ; J. B. L. J. Rousseau, Description du pachalik de Bagdad (1809) ; J. R. Wellsted, City of the Caliphs; A. N. Groves, Residence in Baghdad (1830-1832); Transactions of Bombay Geog. Soc. (1856) ; G. le Strange, Description of Mesopotamia and Baghdad about a.d. goo; "Greek Embassy to Baghdad in a.d. 917," in Journal Royal Asiatic Society, 1895, 1897; Baghdad under the Abbasid Caliphate (1901). (H. C. R.; J. P. Pe.)

BAGS, a town and municipality of the state of Rio Grande do Sul, Brazil, about 176 m. by rail W.N.W. of the city of Rio Grande do Sul. Pop. of the municipality (1890) 22,692. It is situated in a hilly region 774 ft. above sea-level, and is the commercial centre of a large district on the Uruguayan border in which pastoral occupations are largely predominant. This region is the watershed for southern Rio Grande do Sul, from which streams flow E. and S.E. to the Atlantic coast, and N.W. and S.W. to the Uruguay river. The town dates from colonial times, and has always been considered a place of military importance because of its nearness to the Uruguay frontier, only 25 m. distant. It was captured by the Argentine general Lavalle in 1827, and figured conspicuously in most of the civil wars of Argentina. It is also much frequented by Uruguayan revolutionists.

BAGEHOT, WALTER (1826-1877), English publicist and economist, editor of the Economist newspaper from i860 to his death, was born at Langport, Somerset, on the 3rd of February 1826, his father being a banker at that place. Bagehot was altogether a remarkable personality, his writings on different subjects exhibiting the same bent of mind and characteristics,—philosophic reflectiveness, practical common-sense, a bright and buoyant humour, brilliant wit and always a calm and tolerant judgment of men and things. Though he belonged to the Liberal party in politics he was essentially of conservative disposition, and often spoke with sarcastic boastfulness to his Liberal friends of the stupidity and tenacity of the English mind in adhering to old ways, as displayed in city and country alike. His life was

comparatively uneventful, as he early gave up to literature the energies which might have gained him a large fortune in business or a great position in the political world. He took his degree at the London University in 1848, and was called to the bar in 1852, but from an early date he joined his father in the banking business of Stuckey & Co. in the west of England, and during a great part of his life, while he was editor of the Economist, he managed the London agency of the bank, lending its surplus money in " Lombard Street," and otherwise attending to its London affairs. He became also an underwriter at Lloyd's, taking no part, however, in the active detailed business, which was done for him by proxy.

Bagehot's connexion with the Economist began in 1858, about which time he married a daughter of the first editor, the Right Hon. James Wilson, at that time secretary of the treasury, and afterwards secretary of finance in India. Partly through this

connexion he was brought into the inside of the political life of the time. He was an intimate friend of Sir George Cornewall Lewis, and was afterwards in constant communication with many of the political chiefs, especially with Gladstone, Robert Lowe and Grant Duff, and with the permanent heads of the great departments of state. In the city in the same way he was intimate with the governor and directors of the Bank of England, and with leading magnates in the banking and commercial world; while his connexion with the Political Economy Club brought him into contact in another way with both city and politics. His active life in business and politics, however, was not of so absorbing a kind as to prevent his real devotion to literature, but the literature largely grew out of his activities, and of no one can it be said more truly than of Bagehot that the atmosphere in which he lived gave tone and colour and direction to his studies, one thing of course acting and reacting on another. The special note of his books, apart from his remarkable gift of conversational epigrammatic style, which gives a peculiar zest to the writing, is the quality of scientific dispassionate description of matters which were hardly thought of previously as subjects of scientific study. This is specially the case with the two books which perhaps brought him the most reputation, The English Constitution (1867) and Lombard Street (1873). They are both

books of observation and description. The English constitution is described, not from law books and as a lawyer would describe it, but from the actual working, as Bagehot himself had witnessed it, in his contact with ministers and the heads of government departments, and with the life of the society in which the politicians moved. The true springs and method of action are consequently described with a vivid freshness which gives the book a wonderful charm, and makes it really a new departure in the study of politics. It is the same with Lombard Street. The money market is there pictured as it really was in 1850-1870, and as Bagehot saw it with philosophic eyes. Beginning with the sentence, " The objects which you see in Lombard Street are the Bank of England, the joint stock banks, the private banks and the discount houses," he describes briefly and clearly the respective functions of these different bodies in the organism of the city, according to his own close observation as a banker himself, knowing the ways and thoughts of the men he describes, and as a man of business likewise in other ways, knowing at first hand the relation of banking to the trade and commerce of the country. Lombard Street is perhaps a riper work than The English Constitution, as its foundation was really laid in 1858 in a series of articles which Bagehot then wrote in the Economist, though it was not published till the early 'seventies, after it had been twice rewritten and revised with infinite labour and care. Lombard Street, like The English Constitution in political studies, is thus a new departure in economic and financial studies, apply- ing the same sort of keen observation which Adam Smith used in the analysis of business generally to the special business of banking and finance in the complex modern world. It is, perhaps, not going too far to say that the whole theory of a one-reserve system of banking and how to work it, and of the practical means of fixing an " apprehension minimum " below which the reserve should not fall, originated in Lombard Street and the articles which were the foundation of it; and the subsequent conduct of banking in England and throughout the world has been infinitely better and safer in consequence. A like note is also struck in Physics and Politics (1869) , which is a description of the evolution of communities of men. The materials here are derived mainly from books, the surface to be observed being so extensive, but the attitude is precisely the same, that of a scientific observer. To a certain extent the Physics and Politics had even a more remarkable influence on opinion, at least on foreign opinion, than The English Constitution or Lombard Street. It " caught on " as a development of the theory of evolution in a new

direction, and Darwin himself was greatly interested, while one of the pleasures of Bagehot's later years was to receive a translation of the book into the Russian language. In Literary Studies (1879) and Economic Studies (1880), published after his death, there is more scope than in the books already mentioned

for other characteristics besides those of the scientific observer, but observation always comes to the front, as in the account of Ricardo, whom Bagehot describes as often, when he is most theoretical, really describing what a first-rate man of business would do and think in actual transactions. The observation, of course, is that of a type of business man in the city to which-Ricardo as well as Bagehot belonged, though Ricardo could hardly look at it from the outside as Bagehot was able to do.

Bagehot had great city, political and literary influence, to which all his activities contributed, and much of his influence was lasting. In politics and economics especially his habit of scientific observation affected the tone of discussion, and both, the English constitution and the money market have been better understood generally because he wrote and talked and diffused his ideas in every possible way. He was unsuccessful in two or three attempts to enter parliament, but he had the influence of far more than an ordinary member, as director of the Economist and as the adviser behind the scenes of the ministers and per- manent heads of departments who consulted him. His death, on the 24th of March 1877, occurred at Langport very suddenly, when he was in the fullest mental vigour and might have looked forward to the accomplishment of much additional work and the exercise of even wider influence.

It is impossible to give a full idea of the brightness and life of Bagehot's conversation, although the conversational style of his writing may help those who did not know him person- ally to understand it. With winged words he would transfix a fallacy or stamp a true idea so that it could not be forgotten. He was certainly greater than his books and always full of ideas. The present writer recalls two notions he had, not for writing new books himself, but as something that might be done. One was that there might be a history of recent politics with new lights if some one were to do it who knew the family connexions and history of English politicians. This was apropos of the passage of a certain bill through parliament, when the head of the department in the House of Commons failed and the manage- ment of the measure was taken by the chancellor of the

exchequer himself, a relative of the permanent head of the department concerned, who was thus able to carry his own ideas in legislation notwithstanding the failure of his political chief. Another book he wished to see written was an account of the differences in the administrative systems of England and Scotland, by which he had been greatly impressed, the differences not being in detail, but in fundamental idea and in form, so that no judicial or other officers in the one were represented in the other by corresponding functionaries. Many other illustrations might be given of his fulness of ideas which helped to make him an ideal editor. Reference must also be made to the assistance which Bagehot gave as a journalist to the study of statistics. From the manipulation of figures he was most averse, and he rather boasted that he was unable to add up. But he was a most excellent mathematician, and no one could be so careful as he was about the logic of the figures got together for his articles, which he always most carefully scrutinized. He would frequently point out that his figures were illustrative merely, and did not by themselves establish an argument. He was always anxious, again, to impress on those about him that a subject could not be studied with the help of figures and accounts alone. Whether it was insurance, or banking, or underwriting, or shipowning, he insisted that some one who knew the business should see the writing before it was published. Knowing so many departments of business from actual experience, he was a host in himself as referee, but when in doubt he would always consult some one who knew the facts; and he used his great influence so well that in subsequent years it inspired indirectly not a few who were hardly aware of his claims to be a statistician at all. (R. Gn.)

BAGELKHAND, or Baghelkhand, a tract of country in central India, occupied by a collection of native states. The Bagelkhand agency is under the political superintendence of the governor-general's agent for central India, and under the direct jurisdiction of a political agent who is also superintendent

of the Rewa state, residing ordinarily at Sutna or Rewa. The agency consists of Rewa state and eleven minor states and estates, of which the more important are Maihar, Nagode and Sohawal. The total area is 14,323 sq. m., and the population in

1901 was 1,555,024, showing a decrease of 11% in the decade, due to the results of famine. The rainfall was very deficient in 1895-1897, causing famine in 1897; and in 1899-1900 there vvas drought in some sections. The agency was established in March 1871. Until that date Bagelkhand was under the Bundelkhand agency, with which it is geographically and historically connected; a general description of the country will be found under that heading. According to Wilson, in his Glossary of Indian Terms, the Baghelas, who give their name to this tract of country, are a branch of the Sisodhyia Rajputs who migrated eastward and once ruled in Gujarat.

■BAGGARA ("Cowherds"), African "Arabs" of Semitic origin, so called because they are great cattle owners and breeders. They occupy the country west of the White Nile between the Shilluk territory and Dar Nuba, being found principally in Kordofan. They are true nomad Arabs, having intermarried little with the Nuba, and have preserved most of their national characteristics. The date of their arrival in the Sudan is un- certain: they appear to have drifted up the Nile valley and to have dispossessed the original Nuba population. A purely pastoral people, they move from pasture to pasture, as food becomes deficient. The true Baggara tribesmen employ oxen as saddle and pack animals, carry no shield, and though many possess firearms the customary weapons are lance and sword. They have always had the reputation of being resolute fighters. Engaged from the earliest times in the slave trade, they were among the first, as they were certainly the most fervent, sup- porters of the mahdi when he rose in revolt against the Egyptians (1882). They constituted his real fighting force, and to their fanatical courage his victories were due. Their decision to follow him out of their own country to Khartum brought about the fall of that city. The mahdi's successor, the khalifa Ab- dullah, was a Baggara, and throughout his rule the tribe held the first place in his favour. They have been described as " men who look the fiends they really are — of most sinister expression, with murder and every crime speaking from their savage eyes. Courage is their only good quality." They are famous, too, as hunters of big game, attacking even elephants with sword and spear. G. A. Schweinfurth declares them the best-looking of the Nile nomads, and the men are types of physical beauty, with fine heads, erect athletic bodies and sinewy limbs. There is little that is Semitic in their appearance. Their skins vary in colour from a dark red-brown to a deep black; but their features are regular and free of negro character- istics. In mental

power they are much superior to the indigenous races around them. They have a passion for fine clothes and ornaments, tricking themselves out with glass trinkets, rings and articles of ivory and horn. Their mode of hair-dressing (mop-fashion) earned them, in common with the Hadendoa, the name of " Fuzzy-wuzzies " among the British soldiers in the campaigns of 1884-98.

See G. A. Schweinfurth, Heart of Africa (1874) ; Sir F. R. Wingate, Mahdism and the Egyptian Sudan (1891), Anglo-Egyptian Sudan, edited by Count Gleichen (1905); A. H. Keane, Ethnology of the Egyptian Sudan (1S84).

BAGGESEN, JENS IMMANUEL (1764-1826), Danish poet, was born on the 15th of February 1764 at Korsor. His parents were very poor, and before he was twelve he was sent to copy documents at the office of the clerk of the district. He was a melancholy, feeble child, and before this he had attempted suicide more than once. By dint of indomitable perseverance, he managed to gain an education, and in 1782 entered the university of Copenhagen. His success as a writer was coeval with his earliest publication; his Comical Tales in verse, poems that recall the Broad Grins that Colman the younger brought out a decade later, took the town by storm, and the struggling young poet found himself a popular favourite at twenty-one. He then tried serious lyrical writing, and his tact, elegance of

manner and versatility, gained him a place in the best society. This sudden success received a blow in 1789, when a very poor opera, Holge Danske, which he had produced, was received with mockery and a reaction against him set in. He left Denmark in a rage and spent the next years in Germany, France and Switzerland. He married at Berne in 1790, began to write in German and published in that language his next poem, Alpenlicd, In the winter of the same year he returned to his mother-country, bringing with him as a peace-offering his fine descriptive poem, the Labyrinth, in Danish, and was received with unbounded homage. The next twenty years were spent in incessant restless wanderings over the north of Europe, Paris latterly becoming his nominal home. He continued to publish volumes alternately in Danish and German. Of the latter the most important was the idyllic epos in hexameters called Parthenais (1803). In 1806 he returned to Copenhagen to find the young Ohlenschlager installed as the great poet of the day, and he himself beginning to lose his previously unbounded popularity. Until 1820 he resided

in Copenhagen, in almost unceasing literary feud with some one or other, abusing and being abused,' the most important feature of the whole being Baggesen's determination not to allow Ohlenschlager to be considered a greater poet than himself. He then left Denmark for the last time and went back to his beloved Paris, where he lost his second wife and youngest child in 1822, and after the miseries of an imprisonment for debt, fell at last into a state of hopeless melancholy madness. In 1826, having slightly recovered, he wished to see Denmark once more, but died in the freemasons' hospital at Hamburg on his way, on the 3rd of October, and was buried at Kiel. His many- sided talents achieved success in all forms of writing, but his domestic, philosophical and critical works have long ceased to occupy attention. A little more power of restraining his egotism and passion would have made him one of the wittiest and keenest of modern satirists, and his comic poems are deathless. The Danish literature owes Baggesen a great debt for the firm- ness, polish and form which he introduced into it — his style being always finished and elegant. With all his faults he stands as the greatest figure between Holberg and Ohlenschlager. Of all his poems, however, the loveliest and best is a little simple song, There was a time when I was very little, which eve,ry Dane, high or low, knows by heart, and which is matchless in its simplicity and pathos. It has outlived all his epics. (E: G.)

BAGGING, the name given to the textile stuff used for making bags (see also Sacking and Tarpaulin). The material- used was originally Baltic hemp, while in the beginning of the 19th century Sunn hemp or India hemp was also employed. Modern requirements call for so many different types of bagging that it is not surprising to find all kinds of fibres used for this purpose. Most bagging is now made from yarns of the jute fibre. The cloth is, in general, woven with the plain weave, and the warp threads run in pairs, but large quantities of bags are made from cloths with single warp threads. In both cases the weave used for the cloth is that shown at A in the figure, but when double threads

of warp are used, the arrangement is q Cm^^m^^ equivalent to the weave shown at B.

The interlacings of the two sets of warp ^^ , ,,»_,

and weft for single and double warp are D <^_^+^^9& shown respectively at C and D, the

black marks indicating the warp threads, and the white or blanks showing the weft. The particular style of bagging depends, naturally, upon the kind of material it is intended to hold. The coarsest type of bagging is perhaps that known as ” cotton bagging,” which derives its name from the fact that it is used in the manufacture of bags for transporting raw cotton from the United States of America. It is a heavy fabric 42 in. wide, and weighs from 2 to 2! tb per yard, A similar, but rather finer make, is used for Sea Island and other fine cotton, and for any species of fibrous material; but for grain, spices, sugar, flour, coffee, manure, &c, the threads of warp and weft must lie closer, and the warp is usually single. For transporting such

substances as sugar, it is not uncommon to line the bag with paper, which excludes foreign matter, and minimizes the loss. Although there are large quantities of seamless bags woven in the loom, the greater part of the cloth is woven in the ordinary way. It is then cut up into the required sizes by hand and by special machines, and afterwards sewn by one of the chain-stitch or straight-stitch bag sewing-machines.

BAGHAL, a small native state in the Punjab, India. It is one of the group known as the Simla Hill states, and has an area of 124 sq. m.; pop. (1901) 25,720, showing an increase of 5 % in the decade; a revenue £3300.

BAGHERIA, a town of the province of Palermo, Sicily, 8 m. by rail E. by S. of Palermo. Pop. (1901) 18,218. It contains many villas of the aristocracy of Palermo, the majority of which were erected in the 18th century, but have now fallen into decay.

BAGILLT, a town of Flintshire, North Wales, 145 m. from Chester, on the London & North Western railway, in the ancient parish of Holywell. Pop. (1901) 2637. Its importance is due to its zinc, lead, iron, alkali and kindred works, and its collieries. Above Bagillt is Bryn Dychwelwch, ” Hill of Retreat,” so called from the retreat effected by Owen Gwynedd, when pursued by Henry II., with superior numbers. Near is Mostyn Hall, dating from the time of Henry VI., the seat of one of the oldest Welsh families. Here are antiquities and MSS. (old British history and Welsh, brought from Gloddaeth), a harp dated 1568, torques (lorchau), &c.

Henry VII., then earl of Richmond, is said to have been concealed here in the reign of Richard III., when the lord of Mostyn was Richard ap Howel.

BAGIMOND'S ROLL. In 1274 the council of Lyons imposed a tax of a tenth part of all church revenues during the six follow- ing years for the relief of the Holy Land. In Scotland Pope Gregory X., entrusted the collection of this tax to Master Boia- mund (better known as Bagimund) de Vitia, a canon of Asti, whose roll of valuation formed the basis of ecclesiastical taxation for some centuries. Boiamund proposed to assess the tax, not according to the old conventional valuation but on the true value of the benefices at the time of assessment. The clergy of Scotland objected to this innovation, and, having held a council at Perth in August 1275, prevailed upon Boiamund to return to Rome for the purpose of persuading the pope to accept the older method of taxation. The pope insisted upon the tax being collected accord- ing to the true value, and Boiamund returned to Scotland to superintend its collection. A fragment of Bagimond's Roll in something very like its original form is preserved at Durham, and has been printed by James Raine in his Priory of Coldingham (Publications of the Surtees Society, vol. xii.). It gives the real values in one column and tenth parts in another column of each of the benefices in the archdeaconry of Lothian: The actual taxation to which this fragment refers was not the tenth collected by Boiamund but the tenth of all ecclesiastical property in Eng- land, Scotland, Wales and Ireland granted by Pope Nicholas IV. to Edward I. of England in the year 1 288. The fragment should therefore be regarded as supplementary to the Taxatio Ecclesi- aslica Angliae et Walliae printed by the Record Commissioners in 1802. Although no contemporary copy of Bagimond's Roll is known to exist, at least three documents give particulars of the taxation of the Church of Scotland in the 16th century, which are based upon the original roll.

See Statuta Ecclesiae Scoticanae (Bannatyne Club, Edinburgh,

1866).

BAGIRMI, a country of north-central Africa, lying S.E. of Lake Chad and forming part of the Chad circumscription of French Congo. It extends some 240 m. north to south and has a breadth of about 150 m., with an area of 20,000 sq. m. The population in 1903 was estimated at 100,000, having been greatly reduced as the result of wars and slave-raiding. By including districts S. and

S.E. occupied by former vassal states, the area and population of Bagirmi would be more than doubled. The surface of the country, which lies about 1000 ft. above sea-level, is almost flat with a very slight inclination N. to Lake Chad. It forms part of what seems to be the basin of an immense lake, of which Chad is the remnant. The soil is clay. The river Shari

(q.v.) forms the western boundary. Numerous tributaries of the Shari flow through the country, but much of the water is absorbed by swamps and sand-obstructed channels, and seasons of drought are recurrent. The southern part of the country is the most fertile. Among the trees the acacia and the dum-palm are common. Various kinds of rubber vine are found. The fauna includes the elephant, hippopotamus, lion and several species of antelope. Ants are very numerous. Millet and sesame are the principal grains cultivated. Rice grows wild, and several kinds of Poa grass are used as food by the natives. Cotton and indigo are grown to a considerable extent, especially by Bornu immigrants. The capital is Chekna, on a tributary of the Shari, the former capital, Massenia, having been destroyed in 1898. Fort Lamy at the confluence of the Logone and Shari, and Fort de Cointet on the middle Shari, are French posts round which towns have grown. Trade is chiefly with Yola, a town on the Benue in British Nigeria, and with Khartum via Wadai. There is also an ancient caravan route which runs through Kanem and across the Sahara to Tripoli.

The population of Bagirmi is mixed. Negroid peoples predominate, but there are many pastoral Fula and Arabs. The Bagirmese proper are a vigorous, well-formed race of Negroid-Arab blood, who, according to their own traditions, came from the eastward several centuries ago, a tradition borne out by their language, which resembles those spoken on the White Nile. On their arrival they appear to have taken the place of the Bulala dynasty. They subdued the Fula and Arabs already settled in the district, and after being converted to Islam under Abdullah, their fourth king (about 1600), they extended their authority over a large number of tribes living to the south and east. The most important of these tribes are the Saras, Gaberi, Somrai, Gulla, Nduka, Nuba and Sokoro. These pagan tribes were repeatedly raided by the Bagirmese for slaves. Most of them are of a primitive type and appear to be dying out. The Saras are remarkable for their herculean stature, and are one of the most promising of African races. Tree worship is prevalent among the Somrai and the Gaberi. All the tribes believe in a supreme being

whose voice is the thunder. Polygamy is general in upper Bagirmi, where some traces of a matriarchal stage of society linger, one small state being called Beled-el-Mra, " Women's Land," because its ruler is always a queen.

Bagirmi was made known to Europe by the travels of Dixon Denham (1823), Heinrich Barth (1852), who was imprisoned by the Bagirmese for some time, Gustav Nachtigal (1872), and P. Matteucci and A. M. Massari (1881). The country in 1871 had been conquered by the sultan of Wadai, and about 1890 was over-run by Rabah Zobeir (q.v.) who subsequently removed farther west to Bornu. About this time French interest in the countries surrounding Lake Chad was aroused. The first expedition led thither through Bagirmi met with disaster, its leader, Paul Crampel, being killed by order of Rabah. Subsequent missions were more fortunate, and in 1897 Emile Gentil, the French commissioner for the district, concluded a treaty with the sultan of Bagirmi, placing his country under French protection. A resident was left at the capital, Massenia, but on Gentil's withdrawal Rabah descended from Bornu and forced sultan and resident to flee. It was not until after the death of Rabah in battle and the rout of his sons (1901) that French authority was firmly established. Kanem, a country north of Bagirmi and subject in turn to it and to Wadai, was at the same time brought under French control. So far as its European rivals are concerned, the French right to these regions is based on the Franco-German convention of the 15th of March 1894 and the Anglo-French declaration of the 21st of March 1899. ,

See H. Barth, Travels and Discoveries in North and Central Africa (London, 1857-1858); G. Nachtigal, Sahara und Sudan (Berlin, 1879-1889) ; E. Gentil, La Chute de VEmpire de Rabah (Paris, 1902). Abo French Congo.

BAGNACAVALLO, BARTOLOMMEO (1484-1542), Italian painter. His real name was Ramenghi, but he received the cognomen Bagnacavallo from the little village where he was born. He studied first under Francia, and then proceeded to

Rome, where he became a pupil of Raphael. While studying under him he worked along with many others at the decoration

of the gallery in the Vatican, though it is not known what portions are his work. On his return to Bologna he quickly took the leading place as an artist, and to him were due the great improve- ments in the general style of what has been called the Bolognese school. His works were considered to be inferior in point of design to some other productions of the school of Raphael, but they were distinguished by rich colouring and graceful delineation. They were highly esteemed by Guido Reni and the Carracci, who studied them carefully and in some points imitated them. The best specimens of Bagnacavallo's works, the " Dispute of St Augustine," and a " Madonna and Child," are at Bologna.

BAGNERES-DE-BIGORRE, a town of south-western France, capital of an arrondissement in the department of Hautes- Pyrenees, 13 m. S.S.E. of Tarbes on a branch line of the Southern railway. Pop. (1906) 6661. It is beautifully situated on the left bank of the Adour, at the northern end of the valley of Campan, and the vicinity abounds in picturesque mountain scenery. The town is remarkably neat and clean and many of the houses are built or ornamented with marble. It is one of the principal watering-places in France, and has some fifty mineral springs, characterized chiefly by the presence of sulphate of lime or iron. Their temperature ranges approximately from 50° to 122 Fahr., and they are efficacious in cases of rheumatism, nervous affections, indigestion and other maladies. The season begins in May and terminates about the end of October, during which time the population is more than doubled. The Pro- menade des Coustous is the centre of the life of Bagneres. Close by stands the church of St Vincent of the 14th and 15th centuries. The old quarter of the town, in which there are several old houses, contains a graceful octagonal tower of the 15th century, the remains of a Jacobin monastery. ■ The Neothermes, occupying part of the casino, and the Thermes (dating from 1824), which has a good library, are the principal bathing-establishments; both are town property. The other chief buildings include the Carmelite church, remains of the old church of St Jean, a museum and the town-hall. Bagneres has tribunals of first instance and of commerce, and a communal college. The manufacture of barege, a light fabric of silk and wool, and the weaving and knit- ting of woollen goods, wood-turning and the working of marble found in the neighbourhood and imported from elsewhere, are among the industries, and there are also slate quarries. Bagneres was much frequented by the Romans,

under whom it was known as Vicus Aquensis, but afterwards lost its renown. It begins to appear again in history in the 12th century when Centulle III., count of Bigorre, granted it a liberal charter. The baths rose into permanent importance in the 16th century, when they were visited by Jeanne d'Albret, mother of Henry IV., and by many other distinguished persons.

BAGNERES-DE-LUCHON, a town of south-western France, in the department of Haute-Garonne, 87 m. S.S.W. of Toulouse, on a branch line of the Southern railway from Montrejeau. Pop. (1006) 3448. The town is situated at the foot of the central Pyrenees in a beautiful valley at the confluence of the One and the Pique. It is celebrated for its thermal springs and as a fashionable resort. Of the promenades the finest and most frequented are the Allees d'Etigny, an avenue planted with lime-trees, at the southern extremity of which is the Thermes, or bathing-establishment, one of the most complete in existence. The springs, which number 48, vary in composition, but are chiefly impregnated with sulphate of sodium, and range in temperature from 62 to 150°. A large casino was opened in the town in 1877. The discovery of numerous Roman remains attests the antiquity of the baths, which are identified with the Onesiorum Thermae of Strabo. Their revival in modern times dates from the latter half of the 18th century, and was due to Antoine Megret d'Etigny, intendant of Auch.

BAGOAS, a Persian name (Bagoi), a shortened form of names like Bagadata, " given by God," often used for eunuchs. The best-known of these (" Bagoses " in Josephus) became the confidential minister of Artaxerxes III. He threw in' his lot with the

Rhodian condottiere Mentor, and with his help succeeded in subjecting Egypt again to the Persian empire (probably 342 B.C.). Mentor became general of the maritime provinces, suppressed the rebels, and sent Greek mercenaries to the king, while Bagoas administered the upper satrapies and gained such power that he was the real master of the kingdom (Diod. xvi. 50; cf. Didymus, Comm. in Demosth. Phil. vi. 5). He became very wealthy by confiscating the sacred writings of the Egyptian temples and giving them back to the priests for large bribes (Diod. xvi. 51). When the high priest of Jerusalem, Jesus, murdered his brother Johannes in the temple, Bagoas (who had supported Johannes) put a new tax on the Jews and entered the temple, saying that he was purer than the murderer who performed the priestly office (Joseph. Ant. xi. 7.1). In 338 Bagoas killed the king and all his

sons but the youngest, Arses {q.v.), whom he raised to the throne; two years later he murdered Arses and made Darius III. king. When Darius attempted to become independent of the powerful vizier (xtXiapxos), Bagoas tried to poison him too; but Darius was warned and forced him to drink the poison himself (Diod. xvii. 5; Johann. Antioch, p. 38, 39 ed. Muller; Arrian ii. 14. 5; Curt. vi. 4. 10). A later story, tbat Bagoas was an Egyptian and killed Artaxerxes III. because he had killed the sacred Apis (Aelian, Var. Hist. vi. 8), is without historical value. Bagoas' house in Susa, with rich treasures, was presented by Alexander to Parmenio (Plut. Alex. 39); his gardens in Babylon, with the best species of palms, are mentioned by Theophrastus {Hist. Plant, ii. 6; Plin. Nat. Hist. xiii. 41). Another eunuch, Bagoas, was a favourite of Alexander the Great (Dicae- archus in Athen. xiii. 6036; Plut. Al. 67; Aelian, Var. Hist. 3.23; Curt. vi. 5. 23; x. 1. 25 ff.). (Ed. M.)

BAG-PIPE (Celt, piob-mala, ullan-piob, cuislean, cuislin; Fr. cornemuse, chalemie, musette, sourdeline, chevrelte, loure; Ger. Sackpfeife, Dudelsack; M. H. Ger. Suegdbalch 1 ; Ital. cornamusa, piva, zampogna, surdelina; Gr. &o-ko.v\os (?) ; Lat. ascaulus (?), tibia utricularis, utricularium; med. Lat. chorus), a complex reed instrument of great antiquity. The bag-pipe forms the link between the syrinx {q.v.) and the primitive organ, by furnishing the principle of the reservoir for the wind- supply, combined with a simple method of regulating the sound- producing pressure by means of the arm of the performer. The bag-pipes consists of an air-tight leather bag having three to five apertures, each of which contains a fixed stock or short tube. The stocks act as sockets for the reception of the pipes, and as air-chambers for the accomodation and protection of the reeds. The pipes are of three kinds: (1) a simple valved insufflation tube or " blow-pipe," by means of which the performer fills the bag reservoir; (2) the " chaunter " (chanter)or the melody-pipe, having according to the variety of the bag-pipe a conical or a cylindrical bore, lateral holes, and in some cases keys and a bell; the " chaunter " is invariably made to speak by means of a double-reed; (3) the " drones," jointed pipes with cylindrical bore, generally terminating in a bell, but having no lateral holes and being capable, therefore, of producing but one fixed note.

The main characteristic of the bag-pipe is the drone ground bass which sounds without intermission. Each drone is fitted with a beating-reed resembling the primitive " squeaker " known to all country lads; it is prepared by making a cut partly across a piece

of cane or reed, near the open end, and splitting back from this towards a joint or knot, thus raising a tongue or flap. The beating-reed is then fixed in a socket of the drone, which fits into the stock. The sound is produced by the stream of air forced from the bag into the drone-pipe by the pressure of the performer's arm, causing the tongue of reed to vibrate over the aperture, thus setting the whole column of air in vibra- tion. The drone-pipe, like all cylindrical tubes with reed mouth- pieces, has the acoustic properties of the closed pipe and produces the note of a pipe twice its length. The drones are tuned by means of sliding-joints.

1 See E. G. Graff, Deutsche Interlinearversionen der Psalmen (from a I2th-cent. Windberg MS. at Munich), p. 384, Ps. lxxx. 2. " nemet den Sulmen unde gebet den Suegdbalch."

The blow-pipe and the chaunter occupy positions at opposite extremities of the bag, which rests under the arm of the performer while the drones point over his shoulder. These are the main features in the construction of the bag-pipe, whose numerous varieties fall into two classes according to the method of inflating the bag: (1) by means of the blow-pipe described above; (2) by means of a small bellows connected by a valved feed-pipe with the bag and worked by the other arm or elbow to which it is attached by a ribbon or strap.

Class I. comprises: (a) the Highland bag-pipe; (b) the old Irish bag-pipe; (c) the cornemuse; (d) the bignou or biniou (Breton bag-pipe); 0) the Calabrian bag-pipe; (J) the ascaulus of the Greeks and Romans; (g) the tibia utricularis; ih) the chorus. To Class U. belong: (a) the musette; (b) the North- umbrian or border bag-pipe; (c) the Lowland bag-pipe; (d) the union pipes of Ireland; (

I. The Highland Bag-pipe.- — The construction of the Highland pipes is practically that given above. The chaunter consists of a conical wooden tube terminating in a bell and measuring from 14 to 16 in. including the reed. There are seven holes in front and one at the back for the thumb of the left hand, which fingers the upper holes while the right thumb merely supports the instru- ment. The holes are stopped by the under part of the joints of the

fingers. There is in addition a double hole near the bell, which is never covered, and merely serves to regulate the pitch. As the double reed is not manipulated by the lips of the performer, only nine notes are obtained from the chaunter, as shown : —

- 1

=S=P=

The notes do not form any known diatonic scale, for in addition to the C and F being too sharp, the notes are not strictly in tune with each other. Donald MacDonald, in his treatise on the bag-pipe 3 states that " the piper is to pay no attention to the flats and sharps marked on the clef, as they are not used in pipe music; yet the pipe imitates several different keys which are real, but ideal on the bag-pipe, as the music cannot be transposed for it into any other key than that in which it is first played or marked." Mr Glen, the great dealer in bag-pipes, gave it as his opinion " that if the chaunter were to be made perfect in any one scale, it would not go well with the drones. Also, there would not be nearly so much music produced (if you take into consideration that it has only nine invariable notes) as at present it adapts itself to the keys of A maj., D maj., B min., G maj., E min. and A min. Of course we do not mean that it has all the intervals necessary to form scales in all those keys, but that we find it playing tunes that are in one or other of them." 4 Mr Ellis considers that the natural scale of the chaunter of the bag-pipe corresponds most nearly with the Arab scale of Zalzal, a celebrated lutist who died c. a.d. 800.

The three drones are usually tuned to A, the two smallest one octave below the A of the chaunter, and the largest two octaves below. The three principal methods of tuning the drones are shown as follows : — ■

David Glen. 5 Angus Mackay. 8

A. J. Ellis.

Chaunter.

Chaunter.

Chaunter.

P

5!

Drores.

&mˆ

zim-

sbl

ˆ

The excessive use of ornamental notes on the Highland bag-pipe has arisen from a technical peculiarity of the instrument, which makes a repetition of the same note difficult without the interpolation of what is known among pipers as ” cuts ” or ” warblers,” i.e. grace notes fingered with great rapidity (see below for an example). These warblers, which consist not only of single notes but of groups of

1 These harmonics may be obtained by good performers by what is known as ” pinching ” or only partially covering the B and C holes and increasing the wind pressure.

2 The notes marked with asterisks are approximately a quarter of a tone sharp.

3 ” Complete Tutor for attaining a thorough knowledge of the pipe music,” prefixed to A Collection of the Ancient Martial Music of Caledonia called Piobaireachd, as performed on the Great Highland Bag-pipe, Edinburgh, c. 1805.

1 Paper on ” The Musical Scales of Various Nations,” by Alex. J. Ellis, F.R.S., Jrnl. Soc. Arts, 1885, vol. xxxiii. p. 499.

6 Tutor for the Highland Bag-pipe, by David Glen (Edinburgh, [899).

6 Tutor for the Highland Bag-pipe, by Angus Mackay (Edinburgh,

1839).

from three to seven notes, not consecutive but in leaps, assist in relieving the constant discord with the drone bass. Skilful pipers have been known to introduce warblers of as many as eleven notes between two beats in a bar.

The use of musical notation for the Highland pipe tunes is a recent innovation; the pipers used verbal equivalents for the notes; for instance, the piobaireachd Coghiegh nha Shie, ” War of peace,” 7 which opens as shown here, was taken down by Capt. Niel MacLeod

JL

m

=&

p

Ep±3=

m f-

p

p j

p

g±EFEE-ggE

r E

^

from the piper John M’Crummen of Skye as verbally taught to apprentices as follows : —

” Hodroho, hodroho, haninin, hiechin, Hodroha, hodroho, hodroho, hachin, Hiodroho, hodroho, haninin, hiechin,” &c. The conclusion of the tune is thus expressed :

‘ Hiundratatateriri, hiendatatateriri, hiundratata- teriri, hiundratatateriri.” 8 Written down this seems a mere unintelligible jumble, but could we hear it, as sounded by the pipers, with due regard for the rhyth- mical value of notes, it would be a very different matter. Alexander Campbell 9 relates that a melody had to be taken down or translated ” from the syllabic jargon of illiterate pipers into musical characters, which, when correctly done, he found to his astonishment to coincide exactly with musical notation.”

A Highland bag-pipe of the 15th century, dated MCCCCIX., in the possession of Messrs J. & R. Glen of Edinburgh, was exhibited at the Royal Military Exhibition in London in 1890 10 (see fig. I (4)). There were two drones, inserted in a single stock in the form of a wide-spread fork, and tuned to A in unison with the lowest note of the chaunter, which had seven finger-holes in front and a thumb-hole at the back.

Fig. 1. — (1) Cornemuse. (2) Irish bag-pipe. (3) Musette. (4) Highland bag-pipe, a.d. 1409. (5) Border bag-pipe.

(From Capt. C. R. Day's Descriptive Catalogue of Musical Instruments exhibited at the Royal Military Exhibition, by permission of Eyre & Spottiswoode.)

The old Irish Bag-pipe. — Very little is known about this instrument. It is mentioned in the ancient Brehon Laws, said to date from the 5th century (they are cited in compilations of the 10th century), in describing the order of precedence of the king's body- guard and household in the Crith Gabhlach: " Poets, harpers, pipers, horn-blowers and jugglers have their place in the south-east part of the house." u The word used for (bag-) pipers is Cuislen- na'igh, a word associated with reed instruments (cuiscrigh = reeds ; O'Reilly's Irish-English Dictionary, Dublin, 1864). The old Irish bag-pipe, of which we possess an illustration dated 1581, 12 had a long conical chaunter with a bell and apparently seven holes in front and a thumb-hole behind; there were two drones of different lengths — one very long — both set in the same stock. It is exceed- ingly difficult to procure any accurate information concerning the development of the bag-pipe in Ireland until it assumed the present form, known as the union-pipes, which belong to Class II.

7 A Collection of A ncient Piobaireachd or Highland Pipe Music by Arigus Mackay (Edinburgh, 1839), p. 128.

8 A Collection of Piobaireachd or Pipe Tunes as verbally taught by the M'Crummen Pipers on the Isle of Skye to their apprentices, as taken from John M'Crummen (or Crimmon) by Niel MacLeod of Gesto, Skye. (Edinburgh, 1880).

9 Albyn's Anthology, vol. i. p. 90.

10 Descriptive Catalogue of the Musical Instruments exhibited at the Royal Military Exhibition, London, i8qo, Eyre &

Spottiswoode, 1 89 1, pi. ix. A, and description p. 57.

11 Ancient Laws of Ireland, Brehon Law Tracts, published by the Commissioners for publishing the Ancient Laws and Institutions of Ireland (Dublin, 1879), vol. iv. pp. 338 and 339.

18 John Derrick, Image of Ireland and Discoverie of Woodkarne (London, 1581), pi. ii.

ˆ

Petit bourdon.

3=

Gros bourdoa.

The cornemuse and chalemie were the bag-pipes in use in France, Italy and the Netherlands before the advent of the musette, to which they bear the same relation as the old Irish bag-pipe does to the union-pipes, or the cornemusa or piva to the sampogna or surdelina in Italy. Two kinds of cornemuses were known in France during the 1 6th and 17th centuries, differing in one important structural detail, which affected the timbre of the instruments. Pere Marin Mersenne 1 has given a detailed description of these varieties and of the musette, with very clear illustrations of the instruments and all their parts. The cornemuse or chalemie used by shepherds, and as a solo instrument (see fig. 1 (1)), was similar to the High- land bag-pipe; it consisted of a leather bag, inflated by means of a valved blow-pipe; a large drone {gros bourdon) 2 J ft. long included the beating-reed, which measured 2I in., and was fixed in the stock; the small drone (petit bourdon), I ft. in length including a reed 2 in. long, also had a beat- ing-reed and was fixed in the same stock as the chaunter. The two drones were tuned to C. The chaunter had a conical bore and a double reed like an oboe, but hidden within the stock; it could be taken out and played separately, when the compass given by the eight holes (seven in front and a thumb-hole) C to C could be increased by a third to E, by overblowing the D and E an octave by p or £— pressure of the breath and lips on the reed, ˆf ‘ now taken directly into the mouth. The second kind of cornemuse was played only in concert

with a family of instruments known as Hautbois de Poitou, a hautbois having the reed enclosed in an air-chamber, just as is the case with the reeds of the bag-pipe. This cornemuse had but one drone which could, like the others, be lengthened for tuning by drawing out the joint ; the reed was not a beating-reed but a double reed like that of the chaunter; this constitutes the main difference between the two cornemuses. The chaunter had eight holes, the lowest of which was covered by a key enclosed in a perforated box.

The Sackpfeife or Dudelsack of Germany was an instrument of some importance made in no less than five sizes, all described and illustrated by Michael Praetorius. 2 They consist of the Grosser Bock or double- bass bag-pipe, af ormidable-lookinginstrument with a single cylindrical drone of a great length, terminating, as did the chaunter also, in a curved ram's horn (to which the name was due). The chaunter had seven finger-holes and a vent-hole in front, and a thumb-hole at the back. The drone was tuned to G, an octave below the chaunter.

Compass of chaunter.

Compass of chaunter.

E3-to— :

=to=t

Drone.

5

Drone.

Sackpfeife or Dudelsack. Bock.

The Bock, of similar construction, was pitched a fourth higher in C. The Schaferpfeife had two drones in Bb and F. Praetorius explains that the upper notes of the chaunter of this sackpfeife had a faulty intonation which could not be corrected owing to the absence of the thumb-hole, usual in all other varieties of the instrument.

,, , Compass of

Compass of chaunter.

chaunter. m

” „ ** ■ «^ Drones-

Drones.

Schaferpfeife. Hummelchen.

The Hummelchen had two drones tuned to F and C. The Dudey or treble sackpfeife was the smallest of the family, and had three drones tuned to El>, Bb and Eb, and a chaunter with a compass ranging from F or Eb to C or D.

Compass of chaunter. Drones.

3^

-I

S=E

=f^

Compass of chaunter.

Praetorius also mentions a different kind of sackpfeife he saw in

Magdeburg (see op. cit. Theatrum, pi. v., No. 4), which was somewhat larger

than the schaferpfeife and pitched a

rp third lower. There were two chaun-

ters mounted in one stock, each having three holes in front and one for the thumb at the back. The right-hand chaunter sounded the five notes D, E, F, G, A, and the left-hand chaunter, G, A, B, C, D. The performer was thus able to play simple two-part 'melodies on the Magdeburg bag-pipe. Praetorius mentions in addition the French bag-pipe (musette), similar in pitch to the hummelchen, but inflated by means of the bellows.

1 L'Harmonie universelle, vol. ii. bk. v. pp. 282-287 and 305 (Paris,

1636-1637)-

2 Syntagma Musicum, part ii., De Organographia (Wolfenbiittel, 161 8); republished in Band xiii. of the PublicaHonen der Gesellschaft fur Musikforschung (Berlin, 1884), chap. xix. and pi. v., xi., xiii.

The Calabrian bag-pipe has a bag of goatskin with the hair left on, and is inflated by means of a blow-pipe. There are two drones and two chaunters, all fixed in one stock. Each chaunter has three or four finger-holes and the right-hand pipe has the fourth covered by a key enclosed in a perforated box; both drones and chaunter have double reeds.

The ancient Greek bag-pipe (see Askaules), and the Roman tibia utricularis, belonged to this class of instrument, inflated by the mouth, but it is not certain that they had drones (see below, History).

II. The second class of instruments, inflated by means of a small bellows worked by the arm, has as prototype the musette (see fig. I (3)) , which is said to have been evolved during the 15th century; 3 from the end of the 15th century there were always musette players 4 at the French court, and we find the instrument fully developed at the beginning of the 17th century

when Mersenne 6 gives a full description of all its parts. The chief characteristic of the musette was a certain rustic Watteau-like grace. The face of the performer was no longer distorted by inflating the bag; for the long cumber- some drones was substituted a short barrel droner, containing the necessary lengths of tubing for four or five drones, reduced to the smallest and most compact form. The bores were pierced longi- tudinally through the thickness of the wood in parallel channels, communicating with each other in twos or threes and providing the requisite length for each drone. The reeds were double " hautbois " reeds all set in a wooden stock or box within the bag ; by means of regulators or slides, called layettes, moving up and down in longi- tudinal grooves round the circumference of the barrel, the length of the drone pipes could be so regulated that a simple harmonic bass, consisting mainly of the common chord, could be obtained. The chaunter, of narrow cylindrical bore, was also _

furnished with a double reed and had eleven holes, ~

four of which had keys, giving a compass of twelve notes from F to C. This number of holes was not invariable. After Mersenne's time, Jean Hotteterre (d. 1678), a court musician, belonging to the band known as the Musique de la Grande E\curie? in which he played the dessus de hautbois, introduced certain improvements in the drones of the musette. 7 His son Martin Hotteterre (d. 1 7 12) added a second chaunter to the musette, shorter than the first, to which it was attached instead of being inserted into the stock. The Hotteterre chaunter, known as le petit chalumeau, had six keys, whereas the grand, chalumeau had seven, besides eight finger-holes and a vent- hole in the bell. All these keys were actuated by the little finger of the left hand and the thumb of the right hand, which were not required to stop holes on the large chaunter. The grand and petit chalumeaux are figured in detail with keys and holes in a rare and anonymous work by Borjon (or Bourgeon 8), who gives much interesting information concerning one of the most popular instru- ments of his day. The bellows, he states, borrowed from the organ, were added to the musette about forty or fifty years before he wrote his treatise. The compass of the improved musette of Hotteterre was as shown : —

P-

3E3Eg:

£

ˆE

P

£ = *£ = %

s

678

I

-%

t =

e£

-3ˆ

JfLˆL.

the eight holes of the grand chalumeau.

the seven keys of the grand chalumeau.

the six keys of the petit chalumeau.

The four or five drones were ■»-

usually tuned thus: (gf _J E? i :

The chaunters and drones were — – — 1 ^^^V f * I

pierced with a very narrow cylin- drical bore, and double reeds were used throughout, causing them to speak as closed pipes, which accounts for the deep pitch of these relatively short pipes (see Aulos). Martin Hotteterre was hardly the first to introduce the second chaunter for the bag-pipe, since

3 See E. Thoinan, Les Hotteterre et les Chedeville, celebres facteurs de flutes, hautbois, bassons et musettes (Paris, 1894), p. 23. It is probable, however, that M. Thoinan, who makes this statement, has not considered the possibility of the word musette applying in this case to the small rustic hautbois or dessus de

bombarde, also written muse, muset, musele, which occurs in many ballads of the 13th, 14th and 15th centuries. See Fr. Godefroy, Dictionnaire de I'ancienne langue 'francaise du IX' au XV' siecle (Paris, 1888).

4 Musettes de Poitou; probably the cornemuses used in concert with the Hautbois de Poitou.

6 Op. cit. vol. ii. bk. v. pp. 287-292.

• See Ernest Thoinan, op. cit. pp. 15 et seq. (cf. Jules Ecorcheville, " Quelques documents sur la musique de la Grande Ecurie du Roi " in Intern. Mus. Ges., Sammelband ii. 4, p. 625 and table 2, " Grands Hautbois ").

7 Methode pour la musette, fife, by Hotteterre le Romain (Paris, 1737), 4to, chap. xvi.

8 Traite de la musette avec une nouvelle mithode, &c. (Lyons, 1672), pp. 25-27 and plate. A copy of this work is in the British Museum.

Praetorius in 1618 figures and describes the Magdeburg sackpfeife with two chaunters, but without keys and with a conical bore.

The surdelina or sampogna is described and illustrated by Merseime 1 as the musette de Naples; its construction was very complicated. Mersenne states that the instrument was invented by Jean Baptiste Riva (who was living in Paris in 1620), Dom Julio and Vincenze; but Mersenne seems to have made alterations himself in the original instrument, which are not very clearly explained. There were two chaunters with narrow cylindrical bore and having both ringer-holes and' keys; and two drones each h iving ten keys. The four pipes were fixed in the same stock, and double reeds were used throughout ; the bag was inflated by means of bellows. Passenti of Venice published a collection of melodies for the zampogna in 1628, under the title of Canora Zampogna.

The modern Lowland bag-pipe differs from the Highland bag-pipe mainly in that it is blown by bellows instead of by the mouth.

The Northumbrian or Border bag-pipe, also blown by means of bellows, is chiefly distinguished by having a chaunter stopped at the lower end so that when all the holes are closed, the pipe is silent. There are seven finger-holes, one for the thumb, and a varying number of keys. The four drones are fixed in one stock and are tuned by means of stoppers, so that, as in the musette, any one of them may be silenced. A fine Northumbrian bag-pipe 2 from the collection of the Rev. F. W. Galpin is illustrated (fig. I. (5)).

The union pipes of the 1 8th century, or modern Irish bag-pipe, blown by bellows (see fig. 1. (2)), had one chaunter with seven finger-holes, one thumb-hole and eight keys, which together gave the chromatic scale in two octaves. The drones were tuned to A in different octaves, and three regulators or drones with keys, played by the elbow, produced a kind of harmony ; the regulators correspond to the sliders on the drone-barrel of the musette.

, History of the Bag-pipe. — There is reason to believe that the Origin of the bag-pipe must be sought in remote antiquity. No instrument in any degree similar to it is represented on any of the monuments of Egypt or Assyria known at the present day; we are, nevertheless, able to trace it in ancient Persia and by inference in Egypt, in Ghaldaea and in ancient Greece. The most characteristic feature of the bag-pipe is not the obvious bag or air-reservoir from which the instrument derives its name in most languages, but the fixed harmony of the buzzing drones. The principle of the drone, i.e. the beating- reed sunk some three inches down the pipe, was known to the ancient Egyptians. In a pipe discovered in a mummy-case and now in the museum at Turin, was found a straw beating- reed in position. The arghoul (q.v.), a modern Egyptian instru- ment, possesses the characteristic feature of drone and chaunter without the bag. The same instrument occurs once in the hieroglyphs, being sounded as-it, and once on a mural painting preserved in the Musee Guimet and reproduced by Victor Loret. 3 During Jacques de Morgan’s excavations in Persia some terra- cotta figures of musicians, dating from the 8th century B.C., were discovered in a tell (mound) at Susa, 4 two of which appear to be playing bag-pipes; the chaunter, curved in the shape of a hook’ from the stock, is clearly visible, the bag under the arm is indicated, and the lips aire pursed as if in the act of blowing, but the insufflation tube is absent; a round hole in one of the figures suggests its presence formerly.

Among the names of musical instruments in Daniel iii. 5 and 15, the sixth, generally but wrongly rendered ” dulcimer,” is thought by many scholars to signify a kind of bag-pipe (see commentaries on Daniel and the theological encyc). This belief is based on the supposition that the Aramaic sumponya is a loan-word from the Greek, being a mispronunciation of wvia. The, argument is, however, exceedingly weak. In the first place, the date of the book of Daniel is matter of con- troversy, hingeing partly on precisely such questions as the true significance and derivation of sumponya, Second, it is possible that the word sumponya is a late interpolation. Third, its exact form is uncertain; in verse 10, sipponya is used of the same instrument, suggesting a derivation from the Gr. aio>v (tube or pipe). Fourth, even if cvfx4>oiVla is the source of the word, there is very little evidence that it was used for any particular

1 Op. cit. bk. v. p. 293.

‘Illustrated and described by Capt. C. R. Day, Descriptive Catalogue, pi. ix. fig. C, p. 62.

‘ L’Egypte au temps des Pharaons — la vie, la science et I’ art; avec Photogravures, &c. (Paris, 1889) !2mo, p. 139. ‘ *See DiUgation en Perse, by J. de Morgan (Paris, 1900), vol. i. pi. viii., Nos. 10 and 14.

instrument. The original natural sense of avfiˆiavia is ” con- cord of sound,” “a concordant interval,” and the evidence of its use for a particular instrument is of the 2nd century B.C., and, even so, very slight. Only one passage (Polyb. xxvi. 10. 5) really bears on the question, and there the translation of the word depends on a context the reading of which is uncertain (see Symphonia). It is, however, curious that the bag-pipe was known in Italy and Spain during the middle ages, the two countries through which Eastern culture was intro- duced into Europe, by the name of zampogna or sampogna, which strongly recall the Chaldaean sumponya; and further that in the same countries the word sinfonia should be co- existent with zampogna and have the original meaning attached to the classical ovufyosvia, ” a concord of sound.” A single passage only in Dion Chrysostom (see Askaules) is enough to prove that the instrument was known in Greece in a.d. ioo. 6 The Greeks had undoubtedly received some kind of bag-pipe from Egypt (in the form of the as-it), or from Chaldaea, but it remained a rustic instrument used only by shepherds and peasants. This conclusion is supported by allusions in Aristo- phanes and in

Plato's Crito, which undoubtedly refer to the drone: " This, dear Crito, is the voice which I seem to hear murmuring in my ears like the sound of the flute (aulos) in the ears of the mystic; that voice, I say, is humming in my ears." 6 Aristophanes, in his play The Acharnians, indulges in a flight of satire at the expense of the musical Boeotians, by making a band of Theban pipers play a Boeotian merchant and his slave into town. The musicians are dubbed i(bumblebee pipers " (/fortSauXioi, 1. 866) by the exasperated inhabitants. The verb used here for "blowing" is dtvaav, the very word applied to blowing or inflating the bellows (vaa), and not the usual verb auXeTv, to play the aulos. Another instrument, mentioned by Aristophanes in Lysistrata (11. 1242 and 1245), which was probably a kind of bag-pipe, is also derived from ma, i.e. physallis, the "concrete,"' and physateria* the "collective" 7 form of the instrument. We leave the realm of inference for that Of certainty when we reach the reign of Nero, who had a passion for the Hydraulus (see Organ : H istory) and the tibia utricularis. 9

That the bag-pipe was introduced by the Romans into the British Isles is a conclusion supported by the discovery in thfe foundations of the praetorian camp at Richborough of a small bronze figure of a Roman soldier playing the tibia utricularis; The Rev. Stephen Weston, who made a communication on the subject to Archaeologia, 10 points out further the interesting fact in connexion with the instrument, that the Romans had instituted colleges for training pipers on the bag-pipe, a practice followed in the Highlands in the 18th century and notably in Skye. Gruterus u mentions among the fraternities a Corpus et Collegium Utriculariorum, and Spon 12 also quotes the Collegia Utricular. The bag-pipe in question appears to have two drones in front pointing towards the right shoulder, and although no chaunter is shown in the design, both hands are held in correct positions over the spot where it ought to be; it may have been broken off. The bronze figure has been reproduced from drawings by Edward King in three positions. 13 The statement made by several writers on music that a bag-pipe is represented on a contorniate of Nero is erroneous, as a verification of certain references will show. 14 The error is due in the first 1 place to

6 Dion Chrysostom, ed. Adolphus Emperius (Brunswick, M1844); p. 728 or lxxi. (R) 381. See Pauly-Wissowa, Realencyclopadie,"s.v. " Askaules." – ■'■■■■,.

6 54, B. Jowatt's Eng. translation (Oxford, 1892).

7 A suggestion the writer owes to Mr G. Barwick of the British Museum. ‘

8 See ” Researches into the Origin of the Organs of the Ancients,’? by Kathleen Schlesinger, Sammelband ii. Intern. Musik. Ces. vol. ii, 1901, pp. 188-202.

9 Suetonius, iVm>, 54 (S. Clarke’s translation and text).

10 Archaeologia, vol. xvii. pp. 176-179 (London, 1814).

11 Inscriptiones aniiquae totius orbis rotnani (Heidelberg, ifioar-1603). .•:.-.,

12 Miscell. erudit. antiquitatis.

13 Munimenta antiqua, vol. ii. (London, 1799), p. 22, pi. xx. fig. £,.

14 See Montfaucon, Supple de Vaniiq. expltquie, vol. iii. pi. lxxiii., Nos. 1 and 2, and explanation p. 189; Francesco Bianchini. &

Fig. 2.

Montfaucon, who misunderstood the explanation of Bianchini’s drawing which he reproduced. The contorniate referred to is one containing the hydraulic organ, and the legend Laurentinus Aug., but no bag-pipe. Bianchini gives a drawing of a bag-pipe with two long drones, which, he says, was copied from a marble relief over the gateway of the palace of the prince of Santa Croce in Rome, near the church of San Carlo ad Catinarios. If the drawing be accurate and the sculpture of classical Roman period, it would corroborate the details of the instrument held by the little bronze figure of the Roman soldier.

From England the bag-pipe spread to Caledonia and Ireland, where it took root, identifying itself with the life of the people, as a military instrument held in great esteem by the Celtic races. The bag-pipe was used at weddings and funerals, and at all festivals; to lighten labour, during the 18th century, as for instance in Skye, in 1786, when the inhabitants were engaged in

roadmaking, and each party of labourers had its bag-piper. It was used in old mysteries at Coventry in 1534. Readers who wish to follow closely the history of the bag-pipe in the British Isles should consult Sir John Graham Dalyell's Musical Memoirs of Scotland (London, 1849, with illustrative plates).

On the downfall of the Roman empire, the bag-pipe, sharing the fate of other instruments, probably lingered for a time among itinerant musicians, actors, jug- glers, &c, reappearing later in primi- tive guise with the stamp of naivete which characterizes the productions of the early middle ages, and with a new name, chorus (q.r.). An illustration of a Persian bag-pipe dating from the 6th century a.d. (reign of Chosroes II.) is to be found on the great arch at Takht-i-Bostan (see fig. 2). This very crude representation of the bag-pipe can only be useful as evidence that centuries which elapsed between the moulding of the figurine found in the tell at Susa, mentioned above, and the carving in the rock at Takht-i-Bostan, the instrument had survived. The reign of Chosroes was noted for its high standard of musical culture. The fault probably lies with the draughtsman, who drew the sculptures on the arch for the book. Nothing more is heard henceforth of the tibia utricularis. If the drawings of the early medieval bag-pipes, which are by no means rare in MSS. and monuments of the gth to the 13th century, are to be trusted, it seems hard to under- stand the raison d'etre of the instrument shorn of its drones, to see how it justified its existence except as an ill-understood reminiscence. What could be the object of laboriously inflating a bag for the purpose of making a single chaunter speak, which could be done so much more satisfactorily by taking the reed itself into the mouth, as was the practice of the Greeks and Romans? There is a fine psalter in the library of University Court, Glasgow, 1 belonging to the Hunterian collection, in which King David is represented, as usual in the 12th century, playing or rather tuning a harp, surrounded by musicians playing bells, rebec, guitar fiddle (in 'cello position), quadruple pipes or ganistrum, and a bag-pipe with long chaunter having a well- defined stock. The insufflation tube appears to have been left out, and there are no drones to be seen.

. There are interesting specimens of bag-pipes in Spanish illu- minated MSS. such as the magnificent volume of the Cantigas di Santa Maria, in the Escurial, compiled for King Alphonso the Wise (13th century). There are fifty-one separate figures of instru- mentalists forming a kind of introduction to the canticles, and among the instruments are three bag-pipes, one of which is a

remarkable instrument having no less than four long drones and two chaunters which by an error of the draughtsmen are repre-tribai gpneribus instr. mus. veterum, Romae, 1742, pi. »■, Nos. 12 and 13, and p. H; Suetonius, Vitae Neronis, ed. Charles Patin, cap. 41, p. 304, where the contorniate in question, whose musical instrument differs essentially from Bianchini s and Montfauoon's, is figured.

•See Catalogue of the Exhibition of Illuminated MSS. at the Burlingtoa Fine Arts Club, 1908, No. .31...

-Ancient Persian bag-pipe.

(From Sir Robert Porter's Travels in Georgia, Persia, &c, vol. ii. p. 177. pi- Ixiv.)

during the fourteen

sented as being blown from the piper's mouth. The fifty-' nt musicians have been reproduced in black and white by Juan F. Riafio 2 and also by Don F. Aznar. 3 Another fine Spanish MS. in the British Museum, Add. MS. 18,851, of the end of the 1 Jth century, illustrated by Flemish artists for presentation to Queen Isabella, displays a profusion of musical instruments in innumer-able concert scenes; there are bag-pipes on f. 13,41 2 b and 419; one of these has two drones, one conical, the other cylindrical, bound together, and a curved chaunter.

The most trustworthy evidence we have of the medieval bag-pipe is the fine Highland bag-pipe dated 1409, and belong- ing to Messrs J. & R. Glen, described above. Edward Buhle 4 points out that from the 13th century the bag-pipe became a court instrument played by minnesingers and troubadours, as seen in literature and in the MSS. and monuments. It was about 1250 that the human or animals' heads were used as stocks and as bells for the chaunters. The opinion advanced that the bellows were first added to the bag-pipe in Ireland seems untenable and is quite unsupported by facts; the bellows were in all probability added to the union-pipes in imitation of the musette. In the Image of Ireland and Discoverie of Woodkarne, by John Derrick, 1 581, the Irish insurgents are portrayed in pictures full of life and character, as led to rebellion and pillage by a piper armed with a bag- pipe, similar to the Highland bag-pipe. The cradle of the musette is inconceivable anywhere but in France, among the courtiers and elegant world, turning from the pomps and luxuries

of court life to an artificial admiration and cult of Nature, idealized to harmonize with silks and satins. The cornemuse of shepherds and rustic swains became the fashionable instrument, but as inflating the bag by the breath distorted the performer's face, the bellows were substituted, and the whole instrument was refined in appearance and tone-quality to fit it for its more exalted position. The Hotteterre family and that of Chedeville were past masters of the art of making the musette and of playing upon it; they counted among their pupils the highest and noblest in the land. The cult of the musette con- tinued throughout the 17th and 18th centuries until the 'seventies, when its popularity was on the wane and musettes figured largely in sales. 6 Lully introduced the musette into his operas, and in 1758 the list of instruments forming the orchestra at the Opera includes one musette. 6

Illustrations of bag-pipes are found in the miniatures of the following MSS. in the British Museum. — 2 B. VII. f. 192 and 197; Add. MS. 34,294 (the Sforza Book), f. 62, vol. i.; Burney, 275, f. 715; Add. MS. 17,280, f. 238"; Add. MS. 24,686 (Tennysor Psalter), L 17"; Add. MS. 17,280, f. 82"; Add. MS. 24,681, f. 44; Add. MS. 32,454; Add. MS. 11,867, f- 3»; &c. &c. (K. S.)

BAGRATION, PETER, Prince (1765-1812), Russian general descended from the noble Georgian family of the Bagratidet was born in 1765. He entered the Russian army in 1782, anH served for some years in the Caucasus. He was engaged in the siege of Ochakov (1788), and in the Polish campaign of 1794, being present at the taking of Praga and Warsaw. His merits were recognized by Suvarov, whom he accompanied in the Italian and Swiss campaign of 1799, winning particular distinction by the capture of the town of Brescia. In the wars of 1805 his achievements were even more brilliant. With a small rearguard he successfully resisted the repeated attacks of forces five times his own numbers (Hollabrunn), and though half his men fell, the retreat of the main army under Kutusov was thereby secured. At Austerlitz he was engaged against the left wing of the French army, under Murat and Lannes, and at Eylau, Heilsberg and Friedland he fought with the most resolute and stubborn courage. In 1808 by a daring. march across the frozen Gulf of Finland he captured the Aland Islands, and in 1809 he commanded against the Turks at the battles of Rassowa and Tataritza. In 181 2 he

2 Notes of Early Spanish Music (London, 1887), pp. 120 and 121.

3 Idumentario EspaHola (Madrid, 1880).

4 Die musihalischen Inslrumente in den Miniaturen des fruhen MiUelalters, p. 50 (Leipzig, 1903).

‘ An interesting pamphlet by Eugene de Bricqueville, Les Musettes (Paris, 1894), p. 36, with illustrations.

6 See Antoine Vidal, Les Instruments d archet (Paris, 1871), vol. 1 p. 81, note 1. L

commanded the 2nd army of the West, and though defeated at Mogilev (23rd July), rejoined the main army under Barclay,, and led the left wing at Borodino (7th Sept.), where he received a mortal wound. A monument was erected in his honour by the tsar Nicholas I. on the battlefield of Borodino.

BAGSHOT BEDS, in geology, a series of sands and clays of shallow- water origin, some being fresh-water, some marine. They belong to the upper Eocene formation of the London and Hamp- shire basins (England), and derive their name from Bagshot Heath in Surrey; but they are also well developed in Hampshire and the Isle of Wight. The following divisions are generally

accepted : —

Upper Bagshot Beds Barton sand, and Barton clay. Middle ,, „ Bracklesham beds.

Lower ,, „ Bournemouth beds, Alum Bay beds,

and Bovey Tracey beds (?).

The lower division consists of pale-yellow, current-bedded sand and loam, with layers of pipeclay and occasional beds of flint pebbles. In the London basin, wherever the junction of the Bagshot beds with the London clay is exposed, it is clear that no sharp line can be drawn between these formations. The Lower Bagshot beds may be observed at Brentwood, Billericay and Highbeech in Essex; outliers, capping hills of London clay, occur at Hampstead, Highgate and Harrow. In Surrey consider- able

tracts of London clay are covered by heath-bearing Lower Bagshot beds, as at Weybridge, Aldershot, Woking, &c. The " Ramsdell clay," N. W. of Basingstoke, belongs to this formation. In the Isle of Wight the lower division is well exposed at Alum Bay (660 ft.) and White Cliff Bay (140 ft.); here it consists of unfossiliferous sands (white, yellow, brown, crimson and every intermediate shade), and clays with layers of lignite and ferruginous sandstone. Similar beds are visible at Bournemouth, and in the neighbourhood of Poole, Wareham, Corfe and Studland.

The leaf-bearing clays of Alum Bay and Bournemouth are well known, and have yielded a large and interesting series of plant remains, including Eucalyptus, Caesalpinia, Populus, Platanus, Sequoia, Aralia, Poly podium, Osmunda, Nipadites and many others. The sands and clays of Bovey Tracey (see Bovey Beds) are probably of the same age. The clays of this formation are of great value for pottery manufacture; they are extensively mined in the vicinity of Wareham and Corfe, whence they are shipped from Poole and are consequently known as "Poole clays"; similarly, "Teignmouth clay" is obtained from the Bovey beds. Alum was formerly obtained from the clays of Alum Bay; and the lignites have been used as fuel near Corfe and at Bovey.

The Bracklesham beds {q.v>) are sometimes classed with the overlying Barton clay as Middle Bagshot. In the London basin the Barton beds are unknown. In Surrey and Berkshire the Bracklesham beds are from 20 to 50 ft. thick; in Alum Bay they are 100 ft., with beds of lignite in the lower portion; and about here they are sharply marked off from the Barton clay by a bed of conglomerate formed of flint pebbles. The Upper Bagshot beds, Barton sand and Barton clay, are from 140 to 200 ft. thick in the Isle of Wight.

The Agglestone (or Haggerstone) rock and Puckstone rock, near Studland in Dorsetshire, are formed of large indurated masses of the Lower Bagshot beds that have resisted the weather; Creechbarrow near Corfe is another striking feature due to the same beds. Many of the sarsen stones or greywethers of S.E. England have been derived from Bagshot strata.

See Memoirs of the Geological Survey (England) : — " Geology of the Isle of Wight," new edition (1889); " The Geology of London and Part of the Thames Valley," vol. i. (1889) ; and " The Geology of the Country around Bournemouth " (1898).

BAHADUR KHEL, an Indian salt-mine in the Kohat district of the North- West Frontier Province, in the range of hills south of the village of Bahadur Khel between Kohat and Bannu. For a space of 4 m. in length by a quarter of a mile in breadth there exists an exposed mass of rock-salt with several large hillocks of salt on either side. The quarries extend over an area 1 m. long by half a mile broad, and the salt is hewn out in large blocks with picks and wedges. The Indian government

formerly maintained a large preventive establishment for the preservation of the revenue, but it was withdrawn in 1898. Consumption of Kohat salt is restricted, on account of its paying less duty, to the tracts lying to the north of the Indus and to the frontier tribes. In 1903 the rate was fixed at R.iJ per maund, against R.2 for the rest of India. The mines are under the control of the Northern India Salt Department.

BAHADUR SHAH I., a Mogul emperor of Hindustan, a.d. 1 707-171 2, the son and successor of Aurangzeb. At the time of the latter's death his eldest surviving son, Prince Muazim, was governor of Kabul, and in his absence the next brother, Azam Shah, assumed the functions of royalty. Muazim came down from Kabul, and with characteristic magnanimity offered to share the empire with his brother. Azam would not accept the proposal and was defeated and slain on the plains of Agra. Muazim then ascended the throne under the title of Bahadur Shah. He was a man of 64 and died five years later. During his lifetime the empire was already falling to pieces before the inroads of the Sikhs and Mahrattas, and through internal dissensions.

BAHADUR SHAH II., the last of the Mogul emperors of Hindustan, 1837-1857. He was a titular emperor only, since from the time of the defeat of Shah Alam at Buxar in 1764 all real power had resided with the East India Company ; but all proclamations were still worded under " The King's Realm and the Company's rule." His sole importance is due to the use made of his name during the Mutiny of 1857. Always feeble in character, he was at that time old, and, from the first, was wholly at the mercy of the mutinous soldiery in Delhi, who were controlled by a council called the Barah Topi, or Twelve Heads. His papers, seized after the fall of Delhi, are full of senile complaint of the disrespect and discourtesy which he suffered from them. At the time of the assault he fled to the Tomb of Humayun, 6 m. from Delhi, where he was captured by Major Hodson. In January 1858 he was brought to trial for rebellion and for complicity in the murder of

Europeans. The trial lasted more than two months. The substance of the king's defence was that he had been a mere instrument in the hands of the mutineers. On the 29th of March he was found guilty and sentenced to imprisonment for life. He was transported to Rangoon, and died there on the 7 th of November 1862.

BAHAMAS (Lucayos), an archipelago of the British West Indies. It is estimated to consist of 29 islands, 661 cays and 2387 rocks* and extends along a line from Florida on the north- west to Haiti on the south-east, between Cuba and the open Atlantic, over a distance of about 630 m., from 80° 50′ to 72 50′ W., and 22 25′ to 26 40′ N. The total land area is estimated at 5450 sq. m., of which the main islands occupy 4424 sq. m., and the population was 43,52iini88iands3,735ini9oi. Some 12,000 of these are whites, the remainder coloured. The main islands and groups, beginning from the north-west, are as follows: Little and Great Abaco, with Great Bahama to the west; Eleuthera (a name probably corrupted- from the Spanish Isla de Tierra), Cat, Watling, or Guanahani, and Rum Cay on the outer line towards the open ocean, with New Providence, the Exuma chain and Long Island forming an inner line to the west, and still farther west Andros (named from Sir Edmund Andros, governor of Massachusetts, &c, at the close of the 17th century; often spoken of as one island, but actually divided into several by narrow straits) ; and finally the Crooked Islands, Mayaguana and Inagua. The Turks and Caicos islands continue the outer line, and belong geographically to the archipelago, but not politically. The surrounding seas are shallow for the most part, but there are three well-defined channels— the Florida or New Bahama channel, between the north-western islands and Florida, followed by the Gulf Stream, the Providence channels (north-east and north-west) from which a depression known as the Tongue of Ocean extends southward along the east side of Andros, and the Old Bahama channel, between the archipelago and Cuba. The Andros islands have a length of 95 m. and an area of 1600 sq. m.; Great Abaco is 70 m. long and its area is 680 sq. m. ; Great Inagua is 34 m. long with an area of 530 sq. m.,

and Grand Bahama 66 m., with an area of 430 sq. m. But the most important island, as containing the capital, Nassau, is New

Providence, which is only 19! m. in length, with an area of 85 sq. m. This island supported apopulation in 1901 of 12,534. In point of population the next most important islandisEleuthera (8733), followed by the Andros Islands (5347) and Cat Island (4658). The Abaco and Exuma groups and Long Island each support populations exceeding 3000, and there are smaller populations on Grand Bahama, the Crooked Islands, Inagua, Mayaguana, Watling, Rum Cay and the Biminis, though these last, which are two very small north-western islands, are rela- tively densely populated with 545 persons.

Physical Geography. — The islands are of coral formation and low-lying. The rock on the surface is as hard as flint, but underneath it gradually softens and furnishes an admirable stone for building which can be sawn into blocks of any size, hardening on exposure to the atmosphere. The highest hill in the whole range of the islands (in Cat Island) is only 400 ft. high. It is a remarkable fact that, except in the island of Andros, no streams of running water aire to be found in the whole group. The inhabitants derive their water supply from wells. As a result of the porosity of the rock, many of the wells feel the influence of the sea and exhibit an ebb and flow. There is an extensive swampy lagoon in Eleuthera, the water of which isiresh or nearly so; and brackish lagoons also occur, as in Watling Island. An artificial lake in New Providence, constructed for the use of the turtle-catchers, is noted as exhibiting an extraordinary degree of phosphorescence. A remarkable natural phenomenon is that of the so-called ” banana holes,” which frequently occur in the limestone. Their formation has been attributed to the effect of rotting vegetation on the rock, but without certainty. These holes are of various depths up to about 40 ft., and of curiously regular form. The Mermaid’s Pool in New Providence, which is deeper still, is partly filled with water.

Geology. — The Bahamas consist almost entirely of aeolian deposits (cf. Bermudas) and coral reefs. The aeolian deposits, which form the greater part of the islands, frequently rise in rounded hills and ridges to a height of 100 or 200 ft., and in Cat Island nearly 400 ft. They vary in texture from a fine-grained compact oolite to a coarse-grained rock composed of angular or rounded fragments, and they commonly exhibit strongly marked false bedding. The material is largely calcareous, and has probably been derived from the disintegration of the reefs, and from the shells of animals living in the shallows. When freshly exposed the rock is soft, but by the action of rain and sea it

becomes covered with a hard crust. The surface is often remarkably honeycombed, and the rock weathers into pinnacles, pillars and arches of extraordinary shapes. On the island of Andros there is an extremely fine white marl almost resembling a chalky ooze. The coral reefs are of especial interest from their bearing on the general question of the formation of coral reefs.

Nassau. — The scenery of the islands is picturesque, gaining beauty from the fine colouring of the sea and the rich vegetation. Nassau is a winter health-resort for many visitors from the United States and Canada. The town lies on a safe harbour on the north shore of New Providence, sheltered by the small Hog Island. There is a depth of 14 ft. at low-water spring-tide on the bar. The town extends along the shore, and up a slightly elevated ridge behind it. It contains the principal public build- ings, and some interesting old forts, dating from the middle and ■close of the 18th century, though the subterranean works below Fort Charlotte are attributed to an earlier period. From the same century dates the octagonal building which, formerly a gaol, now contains a good public library. The sea-bathing is excellent. The months of February and March are the principal season for visitors. There is direct connexion with New York by steamers, which make the journey in about four days; and there is also connexion with Miami in Florida.

Climate, Flora, Fauna.-ˆ-The climate of the Bahamas adds to their attractions. The mean temperature of the hottest months (June to September) is 88° F., and that of the coldest (January to March) 66°. In a series of observations of winds about one

half have been found to indicate a direction from north-east or east. Hurricanes occur from July to October, and May to October are reckoned as the rainy months. The rainfall recorded in 1 90 1 at Nassau amounted to 63-32 in. Where a mantle of soil covers the rock it is generally thin but very fertile. A well-defined area in New Providence is known as the “pine barrens,” from the tree which principally grows in this rocky soil. Elsewhere three types of soil are distinguished — a black soil, of decayed vegetable matterˆ where the land is under forest, a reddish clay, and a white soil occurring along the shores. Andros Island and the Abaco Islands may be specially noted for their profusion of large timber, including mahogany, mastic, lignum vitae, iron and bullet woods, and many others. Un- fortunately the want both of labour and of roads renders it impossible to turn much of this valuable timber to useful account, although attempts have been

made to work it in Abaco. The fruits and spices of the Bahamas are very numerous, the fruit equalling any in the world. The produce of the islands includes tamarinds, olives, oranges, lemons, limes, citrons, pomegranates, pine-apples, figs, sapodillas, bananas, sour-sops, melons, yams, potatoes, gourds, cucumbers, pepper, cassava, prickly pears, sugar-cane, ginger, coffee, indigo, Guinea corn and pease. Tobacco and cascarilla bark also flourish; and cotton is indi- genous and was woven into cloth by the aborigines. But although oranges, pine-apples and some other fruits form important articles of commerce, it is only rarely that systematic and thorough methods of cultivation are prosecuted. Cotton has been found to suffer much from insect pests. Sisal is grown in increasing quantity. The Bahamas are far poorer in their fauna than in their flora. It is said that the aborigines had a breed of dogs which did not bark, and a, small coney is also mentioned. The guana also is indigenous to the islands. Oxen, sheep, horses and other live-stock introduced from Europe thrive well, but little attention is paid to stock-rearing. There are many varieties of birds to be found in the woods of the Bahamas; they include flamingoes and the beautiful humming-bird, as well as wild geese, ducks, pigeons, hawks, green parrots and doves. The waters of the Bahamas swarm with fish; the turtle procured here is particularly fine, and the sponge fishery is of importance. In some islands there are rich salt ponds, but their working has decreased. The portion of Nassau harbour known as the Sea Gardens exhibits an extraordinarily beautiful development of, marine organisms.

Government, Trade, &°c. — The colony, of the-Bahamas is under a British governor, who is assisted by an executive council of nine members, partly official, partly unofficial; and by a legislative council of nine members nominated by the crown. There is also a legislative assembly of 29 members, representing 15 electoral districts; the franchise being extended to white and coloured men of 21 years of age at least, resident in the colony for not less than twelve months, and possessing land of a value of £5 or more, or being householders for six months at a rental not less than £2 : 18s. in New Providence, or £1 :4s. mother islands. The members' qualification is the possession of real or personal estate to the value of £200. The average annual revenue and expenditure may be set down at about £75,000, expenditure somewhat exceeding revenue. There is a public debt of about £105,000. The average annual value of imports is somewhat over £300,000, and of exports £200,000. The average annual tonnage

of shipping, entering and clearing, exceeds 1,000,000. The government supports elementary free schools, controlled by a nominated board of education, while committees partly elected exercise local supervision. There are higher schools and a Queen's College in Nassau. Nassau is the seat of a bishopric of the Church of England created in 186 1. The Bahamas are without railways, but there are good roads in New Providence, and a few elsewhere. A cable connects Nassau with West Jupiter in Florida.

History. — The story of the Bahamas is a singular one, and bears principally upon the fortunes of New Providence, which, from the fact that it alone possesses a perfectly safe harbour for vessels drawing more than 9 ft., has always been the seat of

government when it was not the headquarters of lawlessness. San Salvador, however, claims historical precedence as the land- fall of Columbus on his memorable voyage. Cat Island was long supposed to be the island first reached by Columbus (12 th October 1492) and named by him San Salvador. Then the distinction was successively transferred to the neighbouring Watling, Great Turk, and Mariguana; but in 1880 the American marine surveyor, G. V. Fox, identified San Salvador, on seemingly good grounds, with Samana (Atwood Cay) , which lies about midway between Watling and Mariguana. The chief difficulty is its size, for, if Samana is the true San Salvador, it must have been considerably larger then than now. Watling Island is generally accepted as the landfall.

Columbus passed through the islands, and in one of his letters to Ferdinand and Isabella he said," This country excels all others as far as the day surpasses the night in splendour; the natives love their neighbours as themselves; their conversation is the sweetest imaginable; their faces always smiling; and so gentle and so affectionate are they, that I swear to your highness there is not a better people in the world." But the natives, innocent as they appeared, were doomed to utter destruction. Ovando, the governor of Hispaniola (Haiti), who had exhausted the labour of that island, turned his thoughts to the Bahamas, and in 1509 Ferdinand authorized him to procure labourers from these islands. It is said that reverence and love for their departed relatives was a marked feature in the character of the aborigines,

and that the Spaniards made use of this as a bait to trap the unhappy natives. They promised to convey the ignorant savages in their ships to the ” heavenly shores ” where their departed friends now dwelt, and about 40,000 were transported to Hispaniola to perish miserably in the mines. From that date, until after the coloniza- tion of New Providence by the British, there is no record of a Spanish visit to the Bahamas, with the exception of the extra- ordinary cruise of Juan Ponce de Leon, the conqueror of Porto Rico, who passed months searching the islands for Bimini, which was reported to contain the miraculous ” Fountain of Youth.” This is in South Bimini, and has still a local reputation for healing powers.

It is commonly stated that in 1629 the British formed a settlement in New Providence, which they held till 1641, when the Spaniards expelled them. This, however, refers to the Providence Island off the Mosquito Coast; it was only in 1646 that Eleuthera was colonized, and in 1666 New Providence, by settlers from the Bermudas. In 1670 Charles II. made a grant of the islands to Christopher, duke of Albemarle, and others. Governors were appointed by the lords proprietors, and there are copious records in the state papers of the attempts made to develop the resources of the islands. But the buccaneers or pirates who had made their retreat here offered heavy opposition; in 1680 there was an attack by the Spaniards, and in July 1703 the French and Spaniards made a descent on New Providence, blew up the fort, spiked the guns, burnt the church and carried off the governor, with the principal inhabit- ants, to Havana. In October the Spaniards made a second descent and completed the work of destruction. It is said that when the last of the governors appointed by the lords proprietors, in ignorance of the Spanish raid, arrived in New Providence, he found the island without an inhabitant. It again, however, became the resort of pirates, and the names of many of the worst of these ruffians are associated with New Providence; the notorious Edward Teach, called Blackbeard, who was afterwards killed in action against two American ships in 17 18, being chief among the number.

At last matters became so intolerable that the merchants of London and Bristol petitioned the crown to take possession and restore order, and Captain Woodes Rogers was sent out as the first crown governor and arrived at New Providence in 17 18. Many families of good character now settled at the Bahamas, and some progress was made in developing the resources of the colony, although this was interrupted by the tyrannical conduct

of some of the governors who succeeded Captain Woodes Rogers. At this time the pine-apple was introduced as an article of cultivation at Eleuthera; and a few years subsequently, during

the American war of independence, colonists arrived in great numbers, bringing with them wealth and also slave labour. Cotton cultivation was now attempted on a large scale. In 1 783, at Long Island, 800 slaves were at work, and nearly 4000 acres of land under cultivation. But the usual bad luck of the Bahamas prevailed; the red bug destroyed the cotton crops in 1788 and again in 1 794, and by the year 1800 cotton cultivation was almost abandoned. There were also other causes that tended to retard the progress of the colony. In 1776 Commodore Hopkins, of the American navy, took the island of New Providence; he soon, however, abandoned it as untenable, but in 1781 it was retaken by the Spanish governor of Cuba. The Spaniards retained nominal possession of the Bahamas until 1783, but before peace was notified New Providence was recaptured by a loyalist, Lieutenant-Colonel Deveaux, of the South Carolina militia, in June r783.

In 1784 and 1786 sums were voted in parliament to indemnify the descendants of the old lords proprietors, and the islands were formally reconveyed to the crown. The Bahamas began again to make a little progress, until the separation of Turks and Caicos Islands in 1848, which had been hitherto the most productive of the salt-producing islands, unfavourably affected the finances. Probably the abolition of the slave-trade in 1834 was not without its effect upon the fortunes of the landed proprietors. The next event of importance in the history of the Bahamas was the rise of the blockade-running trade, consequent on the closing of the southern ports of America by the Federals in 1861. At the commencement of 1865 this trade was at its highest point. In January and February 1865 no less than 20 steamers arrived at Nassau, importing 14,182 bales of cotton, valued at £554,675. The extraordinary difference between the normal trade of the islands and that due to blockade-running will be seen by comparing the imports and exports before the closing of the southern ports in i860 with those of 1864. In the first year the imports were £234,029, and the exports £i57 > 35°! while in the second year the imports were £5,346,112, and the exports £4,672,398. The excitement, extravagance and waste existing at Nassau during the days of blockade-running exceed belief. Individuals may have profited largely, but the Bahamas probably benefited little. The government managed to pay its debt

amounting to £43,786, but crime increased and sickness became very prevalent. The cessation of the trade was marked, however, by hardly any disturbance; there were no local failures, and in a few months the steamers and their crews departed, and New Providence subsided into its usual state of quietude. This, however, was not fated to last long, for in October 1866 a most violent hurricane passed over the island, injuring the orchards, destroying the fruit-trees, and damaging the sponges, which had proved hitherto a source of profit. The hurricane, too, was followed by repeated droughts, and the inhabitants of the out-islands were reduced to indigence and want, a condition which is still, in some measure, in evidence.

See the valuable General Descriptive Report on the Bahama Islands, by Sir G. T. Carter (governor, 1898-1904), issued in place of the ordinary annual report by the Colonial Office, London, 1902; also Governor R. W. Rawson's Report, 1866; Stark's History and Guide to the Bahama Islands (Boston, Mass., 1891); Bahama Islands (Geog. Soc. of Baltimore), ed. G. B. Shattuck (New York, 1905). For geology see A. Agassiz, " A Reconnaissance of the Bahamas and of the Elevated Reefs of Cuba in the steam yacht ' Wild Duck,' January to April 1893," Bull. Mus. Comp. Zool. Harvard, vol. xxvi. no. I,

1894.

BAHAWALPUR, or Bhawalpuk, a native state of India, within the Punjab, stretching for more than 300 m. along the left bank of the Sutlej, the Punjnud and the Indus. It is bounded on the N. and E. by Sind and the Punjab, and on the S. by the Rajputana desert. It is the principal Mahommedan state in the Punjab, ranking second only to Patiala. Edward Thornton thus described the general aspect of the state: —

" Bahawalpur is a remarkably level country, there being no considerable eminence within its limits, as the occasional sand-hills, seldom exceeding 50 or 60 ft. in height, cannot be considered excep- tions. The cultivable part extends along the river line for a distance of about 10 m. in breadth from the left or eastern bank. In the

sandy part of the desert beyond this strip of fertility both men and beasts, leaving the beaten path, sink as if in loose snow. Here, too, the sand is raised into ever-ehanging hills by the force of the wind sweeping over it. In those parts of the desert which have a hard level soil of clay, a few stunted mimosas, acacias and other shrubs are produced, together with rue, various bitter and aromatic plants, and occasionally tufts of grass. Much of the soil of the desert appears to be alluvial; there are numerous traces of streams having formerly passed over it, and still, where irrigation is at all practicable, fertility in the clayey tract follows; but the rains are scanty, the wells few and generally ioo ft. deep or more."

The area covers 15,918 sq. m.; pop. (1901) 720,877, showing an increase of n % on the previous decade; estimated gross revenue, £146,700; there is no tribute. The chief, whose title is nawab, is a Mahommedan of the Daudputra family from Sind, and claims descent from Abbas, uncle of, the Prophet. The dynasty established its independence of the Afghans towards the end of the 18th century, and made a treaty with the British in 1838 to which it has always been loyal. The benefits of canal irrigation were introduced in the 'seventies, and the revenue thus doubled. The territory is traversed throughout its length by the North-Western and Southern Punjab railways. There are an arts college and Anglo-vernacular schools.

The town of Bahawalpur is situated near the left bank of the Sutlej, and has a railway station 65 m. from Mooltan. It has a magnificent palace, which is visible from far across the Bikanir desert; it was built in 1882 by Nawab Sadik Mahommed Khan. Pop. (1901) 18,546.

BAHIA, an Atlantic state of Brazil, bounded N. by the states of Piauhy, Pernambuco and Sergipe, E. by Sergipe and the Atlantic, S. by Espirito Santo and Minas Geraes, and W. by Minas Geraes and Goyaz. Its area is 164,650 sq. m., a great part of which is an arid barren chapada (plateau), traversed from S. to N. and N.E. by the drainage basin of the Sao Francisco river, and having a general elevation of 1000 to 1700 ft. above that river, or 2300 to 3000 ft. above sea-level. On the W. the chapada, with an elevation of 2300 ft. and a breadth of 60 m., forms the western boundary of the state and the water-parting between the Sao Francisco and the Tocantins. East of the Sao Francisco it may be divided into three distinct regions: a rough limestone plateau rising gradually to the culminating ridges of the Serra da

Chapada; a gneissose plateau showing extensive exposures of bare rock dipping slightly toward the coast; and a narrower plateau covered with a compact sandy soil descending to the coastal plain. The first two have a breadth of about 200 m. each, and are arid, barren and inhospitable, except at the dividing ridges where the clouds from the sea are deprived of some of their moisture. The third zone loses its arid character as it approaches the coast, and is better clothed with vegetation. The coastal plain varies in width and character: in some places low and sandy, or swampy, filled with lagoons and intersecting canals; in others more elevated, rolling and very fertile. The climate corresponds closely to these surface features, being hot and dry throughout the interior, hot and humid, in places unhealthy, along the coast. Cattle-raising was once the principal industry in the interior, but has been almost extinguished by the devastating droughts and increasing aridity caused by the custom of annually burning over the campos to improve the grass. In the agricultural regions sugar, cotton, tobacco, cacao, coffee, mandioca and tropical fruits are produced. The exports also include hides, mangabeira rubber, piassava fibre, diamonds, cabinet woods and rum. The population is largely of a mixed and unprogressive character, and numbered 1,919,802 in 1890. There is but little immigration and the vegetative increase is low. The capital, Sao Salvador or Bahia (q-v.), which is one of the principal cities and ports of Brazil, is the export town for the Reconcavo, as the fertile agricultural district surrounding the bay is called. The principal cities of the state are Alagoinhas and Bom Fim (formerly Villa Nova da Rainha) on the main railway line running N. to the Sao Francisco, Cachoeira and Santo Amaro near the capital in the Reconcavo, Caravellas and Ilheos on the southern coast, with tolerably good harbours, the former being the port for the Bahia & Minas railway, Feira de Santa Anna on the border of the sertao and long celebrated for

its cattle fair3, and Jacobina, an inland town N.W. of the capital, on the slopes of the Serra da Chapada, and noted for its mining industries, cotton and tobacco. The state of Bahia includes four of the original captaincies granted by the Portuguese crown — Bahia, Paraguassu, Ilheos and Porto Seguro, all of which reverted to the direct control of that government in 1549, During the war with Holland several efforts were made to conquer this captaincy, but without success. In 1823 Bahia became a province of the empire, and in 1889 a state in the republic. Its government consists- of a governor elected for four years, and a general

assembly of two chambers, the senators being elected for six years and the deputies for two years. (A. J. L.)

BAHIA, or Sao Salvador, a maritime city of Brazil and capital of the state of Bahia, situated on the Bay of All Saints {Bahia de Todos os Santos), and on the western side of the peninsula separating that bay from the Atlantic, in 13 S. lat. and 38 30′ W. long. Pop. (1890) 174,412; (est. 1900) 200,000. The com- mercial section of the city occupies a long, narrow beach between the water-line and bluffs, and contains the arsenal, exchange, custom-house, post-office, railway station, market and principal business houses. It has narrow streets badly paved and drained, and made still more dirty and offensive by the surface drainage of the upper town. Communication with the upper town is effected by means of two elevators, a circular tramway, and steep zigzag roads. The upper town is built on the western slope of a low ridge, the backbone of the peninsula, and rises from the edge of the bluffs to altitudes of 200 to 260 ft. above the sea-level, affording magnificent views of the bay and its islands. There are wider streets, comfortable residences, and attractive gardens in this part of the city. Here also are to be found the churches, schools, theatres, asylums, and hospitals, academies of law and medicine, governor's palace, public library, and museum, and an interesting public garden on the edge of the bluff, overlooking the bay. The city is served by four street-car lines, connecting the suburbs with both the upper and lower towns. In 1966 contracts were made to reconstruct some of these lines'for electric traction. The railways radiating from the city to inland points are the Bahia & Alagoinhas which is under construction to Joazeiro, on the Sao Francisco river, a short line to Santo Amaro, and two lines — the Bahia Central and the Nazareth tramway- extending inland from points on the opposite -side of the bay. The port of Bahia, which has one of the best and most accessible harbours on the east coast of South America, has a large coastwise and foreign trade, and is also used as a port of call by most of the steamship lines trading between Europe and that continent. Bahia was founded in 1549 by Thome de Souza, the first Portuguese governor-general of Brazil, and was the seat of colonial adminis- tration down to 1763. It was made the seat of a bishopric in 1551, and of ah archbishopric in 1676, and until 1905 was the metropolis of the Roman Catholic Church in Brazil. The city was captured in 1624 by the Dutch, who held it only a few months. Always conservative in character, the city hesitated in adhering to the declaration of independence in 1822, and also to the

declaration of the republic in 1889. Much of its commercial and political importance has been lost, also, through the decay of industrial activity in the state, and through the more vigorous competition of the agricultural states of the south. (A. J.L.)

BAHIA BLANCA, a city and port of Argentina, on the Naposta river, 3 m. from its outlet into a deep, well-sheltered bay of the same name. Pop. (est. 1903) 11,600. It is situated in the extreme southern part of the province of Buenos Aires and is 447 m. by rail S.W. of the national capital. The opening to settlement of the national territories of La Pampa and Neuquen has contributed largely to the growth and importance of Bahia Blanca. It is the natural shipping-port for these territories and for the southern districts of the province of Buenos Aires, from which great quantities of wheat and wool are exported. The bay has long been recognized as one of the best on the Argentine coast, and when the channel is properly dredged, will admit steamers of 30 ft. draught at low-water. The Argentine government has located its principal naval station here, at the

Puerto MilitaT, between the city and the entrance to the bay. The port, whose trade is increasing rapidly, is connected with the neighbouring and interior producing districts by five or six lines of railway and their branches. Bahia Blanca dates from 1828, when a fort and trading post were located here, but its development as a commercial centre began only in 1885, when its first railway line was opened. In 1908 direct railway communication was opened with Mendoza and San Juan. Though situated near the mountainous section of southern Buenos Aires, the immediate vicinity of the city is low and swampy, its water is brackish, and it has been decidedly unhealthy; but a water supply from the Sauce Grande, 50 m. distant, was projected in 1906, and this, with better drainage and street paving, was expected to improve matters. The mean annual temperature is 60°, and the average annual rainfall is 19 in. The city has street cars, electric-lights and telephone service, and the port has a shipping pier 1640 ft. long, with spacious warehouses and several miles of railway sidings.

BAHR, the Arabic for “sea,” with the diminutive bahira. Bahr also signifies a. river, especially one with a large body of water, e.g.

the Nile, and is sometimes used to designate the dry bed of a river.

BAHRAICH or Bharaich, a town and district of British India, situated in the Fyzabad division of the United Provinces. The town is on the river Sarju. Since the opening of the railway the place has begun to flourish. It contains the most popular place of pilgrimage in Oudh, the tomb of Masaud, a champion of Islam, slain in battle by the confederate Rajputs in 1033, which is resorted to by MahOmmedans and Hindus alike. There is also a Mussulman monastery, and the ruined palace of a nawab of Oudh. The American Methodists have a mission here. Pop.

(1901) 27,304.

The district of Bahraich contains an area of 2647 sq. m. It consists of three tracts: (1) in the centre, an elevated triangular plateau, projecting from the base of the Himalayas for about 50 m. in a south-easterly direction — average breadth, 13 m., area, 670 sq. m.; (2) the great plain of the Gogra, on the west, about 40 ft. below the level of the plateau; and (3) on the east, another lesser area of depression, comprising the basin of the Rapti. The tarai, or the forest and marshy tracts along the southern slopes of the Himalayas, gradually merge within the district into drier land, the beds of the streams become deeper and more marked, the marshes disappear, and the country assumes the ordinary appearance of the plain of the Ganges. The Gogra skirts the district for 114 m.; and the Rapti, with its branch the Bhalka, drains the high grounds. In 1901 the population was 1,051,347, showing an increase of 5% in the decade. A considerable trade is conducted with Nepal, chiefly in timber, A line of railway has been opened through the district to Nepalganj on the frontier. As th&re are no canals in the district, irrigation is obtained solely from wells, tanks and rivers. The district is purely agricultural in character, and is one of large estates, 78% being held by taluqdars, of whom the four chief are the raja of Kapurthala, the maharaja of Balrampur, the raja of Nanpara and the raja of Payagpur. , Little is known of the history of the district before the Mahom medan invasion in a.d. 1033. Masaud was defeated and slain by the nobles of Bahraich in 1033, and the Mabommedans did not establish their authority over the country till the middle of the 13th century. About 1450 the Raikwars, or Rajput adventurers, made themselves masters of the western portion of the district, which they retain to this day. In 1816 by the treaty of Segauli the Nepal tarai was ceded to the British, but was given

back in i860. During the Mutiny the district was the scene of considerable fighting, and after its close a large portion was distributed in jagirs to loyal chiefs, thus originating the taliiqdari estates of the present day.

BAHRAM (V arahrdn, in Gr. Ovapapavr)s or Obpapavys, the younger form of the old Verethragna, the name of a Persian god, “the killer of the dragon Verethra”), the name of five Sissanid kings.

1. Bahr am I. (a.d. 274-277). From a Pahlavi inscription we

learn that he was the son (not, as the Greek authors and Tabari say, the grandson) of Shapur I., and succeeded his brother Hormizd (Ormizdas) I., who had only reigned a year. Bahrain I. is the king who, by the instigation of the magians, put to a cruel death the prophet Mani, the founder of Manichaeism. Nothing else is known of his reign.

2. Bahram II. (277-294), son of Bahrain I. During his reign the emperor Cams attacked the Persians and conquered Ctesiphon (283), but died by the plague. Of Bahram II. ‘s reign some theological inscriptions exist (F. Stolze and J. C. Andreas, Persepolis (Berlin, 1882), and E. W. West, ” Pahlavi Literature ” in Grundriss d.iranischen Philologie, ii. pp. 75-129). ‘

3. Bahram III., son of Bahram II., under whose rule he had been governing Sejistan (therefore called Saganshah, Agathias iv. 24, Tabari). He reigned only four months (in 294), and was succeeded by the pretender Narseh.

4. Bahram IV. (389-399), son and successor of Shapur III., under whom he had been governor of Kirman; therefore he was called Kirmanshah (Agathias iv. 26; Tabari). Under him or his predecessor Armenia was divided between the Roman and the Persian empire. Bahram IV. was killed by some mal- contents.

5. Bahram V. (420-439), son of Yazdegerd I., after whose sudden death (or assassination) he gained the crown against the opposition of the grandees by the help of al-Mondhir, the Arabic dynast of Hira. He promised to rule otherwise than his father, who had been very energetic and at the same time tolerant in religion. So Bahram V. began a systematic persecution of the Christians, which led to a war with the Roman empire. But he had little success, and soon concluded a treaty by which both

empires promised toleration to the worshippers of the two rival religions, Christianity and Zoroastrianism. Bahram de- posed the vassal king of the Persian part of Armenia and made it a province. He is a great favourite in Persian tradition, which relates many stories of his valour and beauty, of his victories over the Romans, Turks, Indians and Negroes, and of his ad- ventures in hunting and in love; he is called Bahram Gor, " the wild ass," on account of his strength and courage. In reality he seems to have been rather a weak monarch, after the heart of the grandees and the priests. He is said to have built many great fire- temples, with large gardens and villages (Tabari). (Ed. M.)

BAHRDT, KARL FRIEDRICH (1741-1792), German theo- logian and adventurer, was born on the 25th of August 1 741 at Bischofswerda, where his father, afterwards professor, canon and general superintendent at Leipzig, was pastor. At the age of sixteen young Bahrdt, a precocious lad whose training had been grossly neglected, began to study theology under the orthodox mystic, Christian August Crusius (1715-1775), who in 1757 had become first professor in the theological faculty. The boy varied the monotony of his studies by pranks which revealed his unbalanced character, including an attempt to raise spirits with the aid of Dr Faust's H ollenzwang. His orthodoxy' was, however, unimpeachable, his talent conspicuous, and in 1761 he was appointed lecturer on biblical exegesis, and preacher (Katechef) at the church of St Peter. His eloquence soon gave him a reputation, and in 1766 he was appointed professor extra- ordinarius of biblical philology. Two years later, however, the scandals of his private life led to his dismissal. In spite of this he succeeded in obtaining the chair of biblical antiquities in the philosophical faculty at Erfurt. The post was unpaid, and Bahrdt, who had now married, lived by taking pupils and keeping an inn. He had meanwhile obtained the degree of doctor of theology from Erlangen, and was clever enough to persuade the Erfurt authorities to appoint him professor designate of theology. His financial troubles and coarse and truculent char- acter, however", soon made the town too hot to hold him; and in 1 77 1 he was glad to accept the offer of the post of professor of theology and preacher at Giessen.

Thus far B ahrdt 's orthodoxy had counterbalanced his character ; but at Giessen, where his behaviour was no less objectionable than elsewhere, he gave a handle to his enemies by a change

in his public attitude towards religion. The climax came with the publication of his Neueste Ofenbarnngen Gottes in Briejen und Erzahlungen (1773-1775), purporting to be a ” model version ” of the New Testament, rendered, with due regard to enlightenment, into modern German. The book is remembered solely through Goethe’s scornful attack on its want of taste; its immediate effect was to produce Bahrdt’s expulsion from Giessen. He was lucky enough at once to find a post as principal of the educational institution established in his chateau at Marschlinsby the Swiss statesman Ulysses von Salis (1728-ˆ1800). The school had languished since the death of its founder and first head, Martin Planta (1727-1772), and von Salis hoped to revive it by reconstituting it as a ” Philanthropin ” under Bahrdt’s management. The experiment was a failure; Bahrdt, never at ease under the strict discipline maintained by von Salis, resigned in 1777, and the school was closed. At the invita- tion of the count of Leiningen-Dachsburg, Bahrdt now went as general superintendent to Durkheim on the Hardt; his luckless translation of the Testament, however, pursued him, and in 1778 he was suspended by a decision of the high court of the Empire. In dire poverty he fled, in 1779, to Halle, where in spite of the opposition of the senate and the theologians, he obtained through the interest of the Prussian minister, von Zedlitz, permission to lecture on subjects other than theology. Forced to earn a living by writing, he developed an astound- ing literary activity. His orthodoxy had now quite gone by the board, and all his efforts were directed to the propa- ganda of a ” moral system ” which should replace supernatural Christianity.

By such means Bahrdt succeeded in maintaining himself until, on the death of Frederick the Great, the religious reaction set in at the Berlin court. The strain of writing had forced him to give up his lectures, and he had again opened an inn on the Weinberg near Halle. Here he lived with his mistress and his daughters — he had repudiated his wife — in disreputable peace until 1789, when he was condemned to a year’s imprisonment for a lampoon on the Prussian religious edict of 1788. His year’s enforced leisure he spent in writing indecent stories, coarse polemics, and an autobiography which is described as ” a mixture of lies, hypocrisy and self-prostitution.” He died on the 23rd of April 1792.

See life, with detailed bibliography, by Paul Tschakert in Herzog-

Hauck, Realencyklopddie; a more favourable account is given in J. M. Robertson's Short History of Freethought, ii. 278.

BAHREIN ISLANDS, a group of islands situated about 20 m. east of the coast of El Hasa, in the Persian Gulf, a little to the south of the port of El Katif, which, if rightly identified with the ancient Gerrha, has been celebrated throughout history as the mart of Indian trade, the starting-point of caravans across Arabia. The largest of the group is called Bahrein. It is about 27 m. long from north to south and about 10 wide — a low flat space of sandy waste with cultivated oases and palm groves of great luxuriance and beauty. The rocky hill of Jebel Dukhan (the " mountain of the mist ") rises in the midst of it to a height of 400 ft. The rest of the group are of coral formation. The next island in size to Bahrein is Moharek, curved in shape, and about 5 m. long by | m. in breadth. It lies 1 m. to the north of Bahrein. Sitrah (4 m. long) Nebbi, Saleh, Sayeh, Khasifeh and Arad (f m. long) com- plete the group. Of these minor islands Arad alone retains its classical name.

The climate is mild, but humid, and rather unhealthy. The soil is for the most part fertile, and produces rice, pot herbs and fruits, of which the citrons are especially good. Water is abun- dant. Fish of all kinds abound off the coast, and are very cheap in the markets. The inhabitants are a mixed race of Arab, Omanite and Persian blood, slender and small in their physical appearance; they possess great activity and intelligence, and are known in all the ports of the Persian Gulf for their commercial and industrial ability.

The sea around the Bahrein islands is shallow, so shallow as to admit only of the approach of native craft, and the harbour is closely shut in by reefs. There is very little doubt that it was

from these islands that the Puni, or Phoenicians, emigrated north- wards to the Mediterranean. Bahrein has always been the centre of the pearl fishing industry of the Persian Gulf. There are about 400 boats now employed in the pearl fisheries, each of them paying a tax to the Sheik. The pearl export from Linja is valued at about £30,000 to £35,000 per annum.

The capital town of Bahrein is Manameh, a long, straggling, narrow town of about 8000 inhabitants, chiefly of the Wahabi sect. Manameh is adjacent to the most northern point of the island, and looks across the narrow strait to Moharek.

Fish and sea-weed form the staple food of the islanders. The water-supply of Moharek is probably unique. It is derived from springs which burst through the beds below sea-level with such force as to retain their freshness in the midst of the surrounding salt water. Scattered through the islands are some fifty villages, each possessing its own date groves and cultivation, forming features in the landscape of great fertility and beauty. Most of these villages are walled in for protection.

The Portuguese obtained possession of the islands in 1507, but were driven from their settlements in that quarter by Shah Abbas in 1622. The islands afterwards became an object of contention between the Persians and Arabs, and at last the Arabian tribe of the Athubis made themselves masters of them in 1784.

The present Sheik of Bahrein (who lives chiefly at Moharek) is of the family of El Kalifa. This ruling race was driven from the mainland,(where they held great possessions) by the Turks about 1850. In the year 1867 the Persians threatened Bahrein, and in 1875 the Turks laid their hands on it. British interference in both cases was successful in maintaining the integrity of Arab rule, and the Bahrein islands are now under British protection.

To the south-west of the picturesque belts of palm trees which stretch inland from the northern coast of Bahrein, is a wide space of open sandy plain filled with gigantic tumuli or earth mounds, of which the outer layers of gravel and clay have been hardened by the weather action of centuries to the consistency of conglomerate. Within these mounds are two-chambered sepulchres, built of huge slabs of limestone, several of which have been opene'd and examined by Durand, Bent and others, and found to Contain relics of undoubted Phoenician design. Scattered here and there throughout the islands are isolated mounds, or smaller groups* all of which are of the same appearance; and probably of similar origin. (T. H. H.*)

BAHR-EL-GHAZAL, the chief western affluent of the river Nile, N.E. Africa, which it joines in 9 30′ N., 30 25′ E. The Bahr-el-Ghazal (Gazelle river) is a deep stream formed by the junction of many rivers, of which the Jur (see below) is the most important. The basin of the Ghazal is a large one, extending north-west to Darfur, and south-west to the Congo watershed. The main northern feeder of the Ghazal is a large river, whose headwaters are in the country west of 24 E. where the Nile, Congo and Shari watersheds meet. Reinforced by intermittent streams from the

hills of Darfur and by considerable rivers flow-‘ ing north from Dar Fertitj this river after reaching as far north as about io° 30′ pursues a general south-easterly direction until it joins the Ghazal 87 m. above the Deleb confluence (see below). This main northern feeder passes through the country of ! the Homr Arabs and Bahf-el-Homr may be adopted as its name. On many maps it is marked as the Bahr-el-Arab, a designation also used as an alternative name for the Lol ‘ another tributary of the Ghazal, which eventually unites with the : Bahr-el-Homri The Bahr-el-Homr in its lower reaches was in 1906 completely blocked by sudd (q.v.), and then brought no water into thg Bahr-el-Ghazal. The Sudan government, however, sent engin- eering parties to remove the sudd blocks and open out a con- tinuous waterway. This Bahr-el-Homr < is the only affluent of

1 The Lol is also called the Kir, a name given likewise to the lower course of the Bahr-el-Homr. The confusion of names* is partly attributable to the fact that each tribe has a different name for the same stream. It is also due in part .to the belief that there was a large river flowing between the Bahr-el-Homr and the Lol. This third river, generally .called the Kir, has proved to be only the lower course of the Lol of Bahr-el-Arab.

importance which has tributaries coming from north of the main stream; the rest of the very numerous affluents have their rise in the hilly country which stretches from Albert Nyanza in a general north-west direction as far as 23 E., and forms the water- shed between the Nile basin and that of the Congo. affluents The most westerly is the Lol or Bahr-el- Arab. It rises, as the Boro or Telgona, in Dar Fertit, and receives from the south and south-west the Raga, Sopo, Chel and Bongo. Dem Zobeir, formerly the chief station of Zobeir Rahama (q.v.), is near the Biri tributary of the Chel, in f 40′ N., 26 10 E. The Lol maintains a fairly straight course east to about 28 E., when it turns north-east, and in about 285° E., g%° N., joins the Bahr- el-Homr. The chief of the southern affluents, and that tributary of the Ghazal which contributes the largest volume of water, is the Jur, known in its upper course as the Sue, Swe or Souch. The Sue rises north of 4° N. in about 29° E., within three or four days’ journey of the navigable waters of the Mbomu, a northern sub- tributary of the Congo. After flowing north for several hundred miles the Sue, now the Jur, is joined

on the left bank, in about 7 30′ N. , 28 E. , by the Wau , a considerable river whose headwaters are west of those of the Jur. The united stream now turns east and joins the Ghazal through a lake-like expansion (see below). The town of Wau (7 42′ N., 28 3′ E.), on the Jur, is the capital of the Bahr-el -Ghazal province of the Anglo-Egyptian Sudan. Meshra-er-Rek, the chief station and trading centre of the first European visitors to the country, is on a backwater south of this lake. Between the Jur and the Nile, and following a course generally parallel with these rivers, several streams run north from the Congo-Nile watershed and join the Bahr-el-Ghazal. The Tonj, the most westerly of these rivers, joins the Jur a little above its confluence with the Ghazal. The Rohl (or Yalo), farther east, empties into a wide channel known as Khor Deleb, which joins the Ghazal some 9 m. above Lake No, and from the confluence the stream is known as the Deleb. Lake No is little more than a depression into which the waters of the Ghazal system pass near the point of junction with the Bahr-el- Jebel. The lake is about 7 m. long from west to east, and the Bahr-el-Jebel, after passing through its eastern corner, changes its name to Bahr-el-Abiad or White Nile.

In their upper courses all the southern affluents of the Ghazal flow across a plateau of ferruginous laterite, their valleys having steep banks. North of 7 20′ N. (where rapids interrupt the currents) the valleys open out and the rivers wind in tortuous channels often choked by sandbanks. This alluvial region, flooded in the rainy season, gives place about 9 N. to a sea of swamps, forming in fact part of the huge swamp region of the Nile (q.v.). Through these swamps it is almost impossible to trace the course of the various rivers. The Bahr-el-Ghazal itself is described as a drainage channel rather than a true river. From the confluence of the Lol with the Jur, above which point none of the rivers is called Bahr-el-Ghazal, to the junction with the Nile at Lake No, is a distance of about 200 m. Just above the Lol confluence the Jur broadens out and forms a lake (Ambadi) 10 m. long and over a mile broad at low water and very much larger in flood time. This lake is the home of many sudd plants of the ” swimming ” variety — papyrus and ambach are absent. The Balaeniceps rex, elsewhere rare, is found here in large numbers. At first the Ghazal flows north with lagoon-like expansions having great breadth and little depth — nowhere more than 13 ft. Turning north-east the channel becomes narrower and deeper, and is characterized by occasional reaches of papyrus. Finally, the Ghazal turns east and again becomes broader until Lake No is

reached. As a rule the banks in this section are marked by anthills and scrub. The anthills in one valley are so close together ” that they somewhat resemble a gigantic graveyard ” (Sir William Garstin). The rise of the Ghazal river in flood time is barely 3 ft., a depth sufficient, however, to place an enormous area of country under water.

Exploration of the River. — ‘Rumours of the existence of the Bahr-el-Ghazal led some of the Greek geographers to imagine that the source of the Nile was westward in the direction of Lake Chad. The first map on which the course of the Ghazal

is indicated with anything like accuracy is that of the French cartographer d’Anville, published in 1772. The exploration of the river followed the ascent of the White Nile by the Egyptian expeditions of 1839-1842. For a considerable portion of the period between 1853 and 1865 John Petherick, a Welshman, originally a mining engineer, explored the Ghazal region, particu- larly the main stream and the Jur. In 1 859 a Venetian, Giovanni Miani, penetrated the southern regions of the Ghazal basin and was the first to bring back reports of a great river (the Welle) flowing west -beyond the Nile watershed. In 1862 a Frenchman named Lejean surveyed the main river, of which he published a map. In 1863 Miss Alexandrine Tinnd (q.v.) with a large party of friends and scientists ascended the Ghazal with the intention of seeing how far west the basin of the Nile extended. The chief scientists of the party were the Germans, Theodor von Heuglin and Hermann Steudner. Considerable additions to the knowledge of the region were made by this expedition, five out of the nine white members of which died from blackwater fever. 1 Georg Schweinfurth (q.v.) between 1869 an d 1871 traversed the whole of the southern district, and crossing the watershed discovered the Welle. The efforts to destroy the slave trade in ■the Ghazal province led (1879-1881) to the further exploration of the river and its tributaries by Gessi Pasha, the Italian governor under General C. G. Gordon. Wilhelm Junker (q.v.) about the same period also explored the southern tributaries of the Ghazal. These were carefully surveyed, and the Jur (Sue) followed throughout its course by Lieutenant A. H. Dye and other members of the French mission under Colonel (then Captain) J. B. Marchand, which crossing from the Congo (Oct. 1897) reached Fashoda on the White Nile in July 1898.

Like the Baln%el-Jebel the Bahr-el-Ghazal is liable to be choked by sudd. Gessi Pasha was imprisoned in it for some six weeks.

The river became almost blocked by the accumulation of this obstruction during the rule of the Mahdists. In 1901 and following years the sudd was removed by British officers from the Bahr-el-Ghazal, the Jur and other rivers. Uninter- rupted steamboat communication was thus established during the flood season between Khartum and Wau, a distance of some 930 m. In 1905-1907 R. C. Bayldon, a British naval officer, Capt. C. Percival and Lieut. D. Comyn partly explored the northern and western affluents of the Ghazal, and threw some light on the puzzling hydrography and nomenclature of those tributaries.

See Nile and the authorities there quoted, especially Sir William Garstin's Report upon the Basin of the Upper Nile, Egypt, No. 2 (1904), and Capt. H. G. Lyons's The Physiography of the River Nile and its Basin (Cairo, 1906) ; also The Geographical Journal, vol. xxx. (1907)- (W. E. G. ; F. R. C.)

BAHUT (a French word of unknown origin), a portable coffer or chest, with a rounded lid covered in leather, garnished with nails, used for the transport of clothes or other personal luggage, — it was, in short, the original portmanteau. This ancient receptacle, of which mention is made as early as the 14th century — its traditional form is still preserved in many varieties of the modern travelling trunk, — sometimes had its leather covering richly ornamented, and occasionally its interior was divided into compartments; but whatever the details of its construction it was always readily portable. Towards the end of the 1 7th cen- tury the name fell into desuetude, and was replaced by "coffer " (q.v.), which probably accounts for its misuse by the French romantic writers of the early 19th century. They applied it to almost any antique buffet, cupboard or wardrobe, and its use has now become hopelessly confused.

In architecture, this term is also used for a dwarf-wall of plain masonry, carrying the roof of a cathedral or church and masked or hidden behind the balustrade.

BAHYA, IBN PAQUDA, a Jewish ethical writer who flourished at Saragossa in the nth century. In 1040 he wrote in Arabic a treatise, Duties of the Heart. This book was one of the most significant and influential Jewish works of the middle ages. Bahya portrays an intensely spiritual conception of religion, and rises at times to great heights of impassioned mysticism.

1 Including Miss Tinne's mother and aunt and Dr Steudner.

The Law, in the rabbinical sense, was reverenced by Bahya, and he converted it into part and parcel of the Jew's inner life. The book is divided into ten parts: — the Unity of God; Contemplation; Worship; Trust; Consecration; Humility; Repentance; Self -Examination; the Ascetic Life; the Love of God. Some selections from Bahya's work have been rendered into English by E. Collins. ' (I. A.)

BAIAE, an ancient city of Campania, Italy, 10 m. W. of Neapolis, on the Sinus Baianus, a bay on the W. coast of the Gulf of Puteoli. It is said to derive its name from Bcuos, the helmsman of Ulysses, whose grave was shown there; it was originally, perhaps, the harbour of Cumae. It was principally famous, however, for its warm sulphur springs, remarkable for their variety and curative properties (Pliny, Hist. Nat. xxxi. 4), its mild climate, and its luxuriant vegetation (though in summer there was some malaria in the low ground). It was already frequented, especially by the rich, at the end of the republican period; and in Strabo's day it was as large as Puteoli. Julius Caesar possessed a villa here, the remains of which are probably to be recognized in some large substructures on the ridge above the 16th-century castle. Baiae was a favourite residence of the emperors. Nero built a huge villa probably on the site now> occupied by the castle. Hadrian died in Caesar's villa in a.d. 138, and Alexander Severus erected large buildings for his mother. Baiae never became, however, an independent town, but formed part of the territory of Cumae. Three glass vases with views of the coast and its buildings were published by H. Jordan in Archaologische Zeitung (1868, 91). The luxury and immorality of the life of Baiae under both the republic and the empire are frequently spoken of by ancient writers.

Near Baiae was the villa resort of Bauli, so called from the / JoaiiAia (stalls) in which the oxen of Geryon were' concealed by Hercules. By some it is identified with the modern village of Bacoli (owing to a presumed similarity to the ancient name), 2 m. S.S.E. of Baiae; by others with the Punta dell' Epitafno, 1 m. N.E. of Baiae (see G. B. de Rossi in Notizie degli scavi, 1888, 709). At Bauli, Pompey and Hortensius possessed villas, the former on the hills, while that of the latter, on the shores of the Lacus Lucrinus, was remarkable for its tame lampreys and as the scene

of the dialogue in the second book of Cicero's Academica Prior a; it afterwards became imperial property and was the scene of Agrippina's murder by Nero. It was from Bauli to Puteoli that Caligula built his bridge of boats.

Of the once splendid villas and baths of Baiae and its district, the foundations of which were often thrown far out into the sea, considerable, though fragmentary, remains exist. It is not, as a rule, possible to identify the various buildings, and the names which have been applied to the ruins are not authenticated. At Baiae itself there exist three large and lofty domed buildings, two octagonal, one circular, and all circular in the interior, of opus reticulatum and brick, which, though popularly called temples, are remains of baths or nymphaea. The Punta dell' Epitafno also is covered with remains, while at Bacoli are several ruins — to the north of the village a small theatre, called the tomb of Agrippina; under the village the remains of a large villa; to the E. the remains of a large water reservoir, the so-called Cento Camerelle; to the S. another with a vaulted ceiling, known as the piscina mirabilis, measuring 230 by 85 ft. The villa of Marius, which was bought by Lucullus, and after- wards came into the possession of the imperial house, was the scene of the death of Tiberius. It is sometimes spoken of as Baiana, sometimes as Misenensis, and is perhaps to be sought at Bacoli (Th. Mommsen in Corp. Inscrip. Latin., x., Berlin, 1883, 1748), though Beloch inclines to place it on the promontory S. of Misenum, and this perhaps agrees better with the description given by Phaedrus.

Baiae was devastated by the Saracens in the 8th century and entirely deserted on account of malaria in 1500.

See J. Beloch, Campanien (2nd ed., Breslau, 1890), 180 seq.

(T.As.)

'BAfBURT, a town of Asiatic Turkey, on the direct carriage road from Trebizond to Erzerum, situated on both banks of the

Churuk river, which here traverses an open cultivated plateau (altitude, 5100 ft.), before turning east. It is the chief place of a kaza under Erzerum; the bazaar is poor, and there is no special industry in the town. The houses run up the hillsides on both banks of the river to a considerable height. On an isolated mass of rock, on the left bank, is the old castle, with extensive walls partly ruined, built originally by the Armenians and restored by

the Seljuks. The principal gate with some Arabic inscriptions stands at the S.W. corner. There are remains of a vaulted chamber, a Christian church, a mosque and two covered staircases to the river. A fine view is seen from the summit over the plain and the Pontic ranges to the north. The population numbers 10,000, mostly Turkish with some Armenians. The place was occupied by the Russians under General Paskevich during their invasion of 1829, and was the farthest point westward then reached by them. (F. R. M.)

BAIDAWl ("Abdallah ibn 'Umar al-BaidawI), Mahommedan critic, was born in Fars, where his father was chief judge, in the time of the Atabek ruler Abu Bakr ibn Sa'd (1226-1260). He himself became judge in Shiraz, and died in Tabriz about 1286. His chief work is the commentary on the Koran entitled The Secrets of Revelation and the Secrets of Interpretation (Asrdr ut- tanzU wa Asrdr ut-ta' wil). This work is in the main a digest of the great Mu'tazalite commentary (al-Kashshaf) of Zamakhsharl (q.v.) with omissions and additional notes. By the orthodox Moslems it is considered the standard commentary and almost holy, though it is not complete in its treatment of any branch of theological or linguistic knowledge of which it treats, and is not always accurate (cf. Th. Noldeke's Geschichte des Qorans, Gottingen, i860, p. 29). It has been edited by H. O. Fleischer (2 vols., Leipzig, 1846-1848; indices ed. W. Fell, Leipzig, 1878). There are many editions published in the East. A selection with numerous notes was edited by D. S. Margoliouth as Chresto- mathia Beidawiana (London, 1894). Many supercommentaries have been written on Baidawi's work. He was also the author of several theological treatises.

See C. Brockelmann's Geschichte der arabischen Litteratur (Weimar, 1898), vol. i. pp. 416-418. (G. W. T.)

BAfF, JEAN ANTOINE DE (1532-1589), French poet and member of the Pleiade, was born at Venice in 1532. He was the natural son of the scholar Lazare de Ba'if, who was at that time French ambassador at Venice. Thanks, perhaps, to the surroundings of his childhood, he grew up an enthusiast for the fine arts, and surpassed in zeal all the leaders of the Renaissance in France. His father spared no pains to secure the best possible education for his son. The boy was taught Latin by Charles Estienne, and Greek by Ange Vergece, the Cretan scholar and calligraphist who designed Greek types for Francis I. When he was eleven years old he was put under the care of the famous Jean Daurat (q.v.).

Ronsard, who was eight years his senior, now began to share his studies. Claude Binet tells how young Baif, bred on Latin and Greek, smoothed out the tiresome beginnings of the Greek language for Ronsard, who in return initiated his companion into the mysteries of French versification. Baif possessed an extraordinary facility, and the mass of his work has injured his reputation. Besides a number of volumes of short poems of an amorous or congratulatory kind, he trans- lated or paraphrased various pieces from Bion, Moschus, Theocritus, Anacreon, Catullus and Martial. He resided in Paris, and enjoyed the continued favour of the court. He founded in 1567 an acadimie de musique et de poisie, 1 with the idea of establishing a closer union between music and poetry; his house became famous for the charming concerts which he gave, entertainments at which Charles IX. and Henry III. frequently flattered him with their presence. Baif elaborated a system for regulating French versification by quantity. In this he was not a pioneer. Jacques de la Taille had written in 1562 the Maniere de faire des vers en francais comme en grec et en latin (printed 1573), and other poets had made experiments in the same direction. The 16th-century poets did not realize the

1 For an account of this academy see Edouard Frfemy, Les Origines de I' Acadimie Francaise (1887).

' incompatibility of the system of quantity with French rhythm. Baif's innovations included a line of 15 syllables known as the vers baifin. He also meditated reforms in French spelling. His theories are exemplified in Etrenes de poezie Franzoeze an vers mezures (1514). His works were published in 4 volumes, entitled (Euvres en rime (1573), consisting of Amours, Jeux, Passetemps, et Poemes, containing, among much that is now hardly readable, some pieces of infinite grace and delicacy. His sonnet on the Roman de la Rose was said to contain the whole argument of that celebrated work, and Colletet says it was on everybody's lips. He also wrote a celebrated sonnet in praise of the massacre of Saint Bartholomew. Baif was the author of two comedies, L' Eunuque, 1565 (published 1573), a free trans- lation of Terence, and Le Brave (1567), an imitation of the Miles Gloriosus, in which the characters of Plautus are turned into Frenchmen, the action taking place at Orleans. Ba'if published a collection of Latin verse

in 1577, and in 1576 a popular volume of Mimes, enseignemens et proverbes. He died in 1589. His father, Lazare de Ba'if, 1 published a translation of the Electra of Sophocles in 1537, and afterwards a version of the Hecuba; he was an elegant writer of Latin verse, and is commended by Joachim du Bellay as having introduced certain valuable words into the French language.

The (Euvres en rime (5 vols., 1881-1890) of J. A. de Ba'if form part of the Pleiade francaise of M. Ch. Marty-Laveaux. See also Becq de Fouquieres, Poesies choisies de J. A. de Baif (1874), vvith a valuable introduction; and F. Brunetiere, Hist, de la lilt, fransaise dassique (1904, bk. iii. pp. 398-422).

BAIKAL (known to the Mongols as Dalai-nor, and to the Turkish tribes as Bai-kul), a lake of East Siberia, the sixth in size of all the lakes of the world and the largest fresh-water basin of Eurasia. It stretches from S.W. to N.E. (51 29′ to 55° 50′ N. lat. and 103 40′ to 110° E. long.), separating the government of Irkutsk from that of Transbaikalia, and has a length of 386 m. and a width of from 20 m. to 50 m. Its southern extremity pene- trates into the high plateau of Asia, and the lake lies entirely in the Alpine zone which fringes that plateau on the north-west. Its area is 13,200 sq. m., i.e. nearly as great as Switzerland. The length of its coast-line is 525 m. along the western, and 640 m. along the eastern shore. Its altitude has been estimated at 1587 ft. (Chersky) and at 1679ft. (Suess) — 118 ft. above the level of the Angara at Irkutsk (Zapiski Russ. Geog. Soc. xv., 1885); but 1500 ft. would seem to be a more correct altitude (Izvestia East Sib. Branch, xxviii. 1, 1897). Its level is subject to slight oscillations, and after a heavy five weeks' rain in 1869 it rose 7 ft., an immense territory at the mouth of the Selenga being submerged.

A hydrographic survey of this lake was made by Drizhenko in 1897-1902. The elongated hilly island of Olkhon, and the peninsula of Svyatoi Nos, which forms its continuation on the opposite eastern shore, divide the lake into two basins. The deepest part is in the south-east, at the foot of the Khamar- daban border-ridge of the high plateau. An elongated trough, 66 m. long, reaches there a depth of over 600 fathoms, with a maximum depth of 880 fathoms, i.e. about 5280 ft. below the level of the ocean. As a rule the bottom of the lake has very steep slopes : the 100-fathom and even the 250-fathom lines run close to the shores, that is to say, the steepness of the sur- rounding mountains (4600 to 6000 ft.) continues beneath the surface. At the mouth of the Selenga, however, which enters from the south-

east, pouring into it the waters and the alluvial deposits from a drainage area of 173,500 sq. m., a wide delta is thrust out into the lake, reducing its width to 20 m. and spreading under its waters, so as to leave only a narrow channel, 230 to 247 fathoms deep, along the opposite coast. The depth of the middle portion of the lake has not yet been measured, but must exceed 500 fathoms. It was expected that an under- ground ridge would be found connecting Olkhon with Svyatoi Nos; but depths exceeding 622 fathoms have been sounded even along that line. As to the northern basin, the configuration of its bottom is in accordance with the high mountains which

1 See L. Pinvert, Lazare de Ba'if, 1496 ?-i547 (1900).

surround it, and most of its area has a depth exceeding 400 fathoms, the maximum depths along three lines of soundings taken across it being 491, 485, and 476 fathoms respectively. The water is beautifully clear.

Temperature. — The surface-layers of this immense basin are heated in the summer up to temperatures of 55I to 57° F., both close to the shores and at some distance from the mouth of the Selenga ; but these warmer layers are not deep, and a uniform temperature of nearly 39 F. is generally found at a depth of 20 fathoms, as also on the surface in the middle of the lake. At a depth of 500 fathoms there is a nearly uniform temperature of 38 . At various places round the shores, e.g. the mouth of the Barguzin, hot springs exist. The lake freezes usually at the end of December, or in the beginning of January, so solidly that a temporary post-horse station is erected on the ice in the middle of the lake, and it remains frozen till the second half of May. The evaporation from this large basin exercises a certain influence on the climate of the surrounding country, while the absorption of heat for the thawing of the ice has a notable cooling effect in early summer.

Rivers. — Lake Baikal receives over 300 streams, mostly short mountain torrents, besides the Upper Angara, which enters its north-east extremity, the Barguzin, on the east, and the Selenga on the south-east. Its only outflow is the lower Angara, which issues through a rocky cleft on the west shore. The Irkut no longer reaches the Baikal, though it once did so. After approaching its south-west extremity it abandons the broad valley which leads to the lake, and makes its way northwards through a narrow gap in the mountains and joins the Angara at

Irkutsk.

Mountains. — With the exception of the delta of the Selenga, Lake Baikal is surrounded by lofty mountains. The Khamar-daban border-ridge (the summit of a mountain of the same name is 5300 ft. above the lake), falling with steep cliffs towards the lake, fringes it on the south; a massive, deeply-ravined highland occupies the space between the Irkut and the Angara; the Onot and Baikal ridges (also Primorskiy) run along its north- west shore, striking it diagonally; an Alpine complex of yet unexplored mountains rises on its north-east shore; the Barguzin range impinges upon it obliquely in the east; and the Ulan- burgasu mountains intrude into the delta of the Selenga.

Geology.— It is certain that in previous geological ages Lake Baikal had a much greater extension. It stretched westwards into the valley of the Irkut, and up the lower valleys of the Upper Angara and the Barguzin. Volcanic activity took place around its shores at the end of the Tertiary or during the Quaternary Age, and great streams of lava cover the Sayan and Khamar-daban mountains, as well as the valley of Irkut. Earth- quakes are still frequent along its shores.

Fauna. — The fauna, explored by Dybowski and Godlewski, and in 1900-2 by Korotnev, is much richer than it was supposed to be, and has quite an original character; but hypotheses as to a direct communication having existed between Lake Baikal and the Arctic Ocean during the Pest-Tertiary or Tertiary ages are not proved. Still, Lake Baikal has a seal {Phoca vitulina, Phoca baikalensis of Dybowski) quite akin to the seals of Spitsbergen, marine sponges, polychaetes, a marine mollusc (ancilodoris) , and some marine gammarids. The waters of the lake swarm with fish (sturgeons and salmonidae), and its herring (Salmo omul) is the chief product of the fisheries, though notably fewer have been taken within the last forty or fifty years. Planktonis very abundant. The little Lake Frolikha, situated close to the northern extremity of Lake Baikal and communicating with it by means of a river of the same name, contains a peculiar species of trout, Salmo eryihreas, which is not known elsewhere. Generally, while there is a relative poverty of zoological groups, there is a great wealth of species within the group. Of gammarids, there are as many as 300 species, and those living at great depths (330 to 380 fathoms) tend to assume abyssal characters similar to those displayed by the deep-sea fauna of the ocean.

Navigation. — Navigation of the lake is rendered difficult both by sudden storms and by the absence of good bays and ports.

The principal port en the western shore, Listvinichnoe, near the outflow of the Angara, is an open roadstead at the foot of steep mountains. Steamers ply from it weekly to Misovaya (Posolskoe) on the opposite shore, a few times a year to Verkhne- Angarsk, at the northern extremity of the lake, and frequently to the mouth of the Selenga. Steamers ascend this river as far as Bilyutai, near the Mongolian frontier, and bring back tea, imported via Kiakhta, while grain, cedar nuts, salt, soda, wool and timber are shipped on rafts down the Khilok, Chikoi and Uda (tributaries of the Selenga), and manufactured goods are taken up the river for export to China. Attempts are being made to render the Angara navigable below Irkutsk down to the Yenisei. In winter, when the lake is covered with ice 3 ft. to 4 ft. thick, it is crossed on sledges from Listvinichnoe to Misovaya. But a highway, available all the year round, was made in 1863-1864 around its southern shore, partly by blasting the cliffs, and it is now (since 1905) followed by the trans- Siberian railway. Further, a powerful ice-breaker is used to ferry trains across from Listvinichnoe to Misovaya.

Authorities. — Drizhenko, ” Hydrographic Reconnoitring of Lake Baikal,” in Jzvestia Russ. Geogr. Soc. (1897, 2) ; Russian Addenda to Ritter’s Asia, East Siberia, Baikal, &c. (1895); Chersky’s Geological Map of Shores of Lake Baikal, 6f m. to the inch, in Zapiski of Russ. Geogr. Soc. xv. (1886) ; ” Report of Geological Exploration of Shores of Lake Baikal,” in Zapiski of East Siberian Branch of Russ. Geogr. Soc. xii. (1886) ; Obruchev, “Geology of Baikal Mountains,” Izvestia of same Society (1890, xxi. 4 and 5) ; Dybowski and Godlewski on ” Fauna,” in same periodical (1876) ; Witkowski, on ” Seals “; Yakovlev’s ” Fishes of Angara,” in same periodical (1890-1893); “Fishing in Lake Baikal and its Tributaries,”’ in same periodical (1886-1890); and La Geographie (No. 3, 1904). (P.A. K.;J.T. Be.)

BAIKIE, WILLIAM BALFOUR (1824-1864), Scottish explorer, naturalist and philologist, eldest son of Captain John Baikie, R.N , was born at Kirkwall, Orkney, on the 21st of August 1824. He studied medicine at Edinburgh, and, on obtaining his M.D. degree, joined the royal navy in 1848. He early attracted the

notice of Sir Roderick Murchison, through whom he was appointed surgeon and naturalist to the Niger expedition sent out in 1854 by Macgregor Laird with government support. The death of the senior officer (Consul Beecroft) occurring at Fernando Po, Baikie succeeded to the command. Ascending the Benue about 250 m. beyond the point reached by former explorers, the little steamer ” Pleiad ” returned and reached the mouth of the Niger, after a voyage of 118 days, without the loss of a single man. The expedition had been instructed to endeavour to afford assistance to Heinrich Barth (q.v.), who had in 1851 crossed the Benue in its upper course, but Baikie was unable to gain any trustworthy information concerning him. Returning to England, Baikie gave an account of his work in his Narrative of an Exploring Voyage up the Rivers Kworaand Binue. . . (London, 1856). In March 1857 Baikie — with the rank of British consul — started on another expedition in the ” Pleiad.” After two years spent in exploring the Niger, the navigating vessel was wrecked in passing through some of the rapids of the river, and Baikie was unable longer to keep his party together. All returned home but himself; in no way daunted, he determined single-handed to carry out the purposes of the expedition. Landing from a small boat, with one or two native followers, at the confluence of the Niger and Benue, he chose Lokoja as the base of his future operations, it being the site of the model farm established by the expedition sent by the British government in 1841, and abandoned within a twelve-month on the death of most of the white settlers (see Capt. W. Allen, R.N., and T. R. H. Thomson, M.D., A Narrative of the Expedition . . . to the River Ni°er in 1841, London, 1848). After purchasing the site, and concluding a treaty with the Fula emir of Nupe, he proceeded to clear the ground, build houses, form enclosures and pave the way for a future city. Numbers flocked to him from all neighbouring districts, and in his settlement were representatives of almost all the tribes of West- Central Africa. To the motley commonwealth thus formed he acted not merely as ruler, but also as physician, teacher and priest. In less than five years he had opened up the navigation of the Niger, made

roads, and established a market to which the native produce was brought for sale and barter. He had also collected vocabu- laries of nearly fifty African dialects, and translated portions of the Bible and prayer-book into Hausa. Once only during his residence had he to employ armed force against the surrounding tribes. While on his way home, on leave of absence, he died at Sierra Leone on the 30th of November 1864. He had done much

to establish British influence on the Niger, but after his death the British government abolished the consulate (1866), and it was through private enterprise that some twenty years later the district where Baikie had worked so successfully was finally secured for Great Britain (see Nigeria).

Baikie's Observations on the Hausa and Fulfulde (i.e. Fula) Languages was privately printed in 1861, and his translation of the Psalms into Hausa was published by the Bible Society in 1881. He was also the author of various works concerning Orkney and Shetland. A monument to his memory was placed in the nave of the ancient cathedral of St Magnus, Kirkwall.

BAIL, 1 in English common law, the freeing or setting at liberty of one arrested or imprisoned upon any action, either civil or criminal, on surety taken for his appearance on a certain day and at a place named. The surety is termed bail, because the person arrested or imprisoned is placed in the custody of those who bind themselves or become bail for his due appearance when required. So he may be released by them if they suspect that he is about to escape and surrendered to the court, when they are discharged from further liability. The sureties must be sufficient in the opinion of the court, and, as a rule, only house- holders are accepted; in criminal cases the solicitor or an accomplice of the person to be bailed, a married woman or an infant would not be accepted. Bail is obligatory in all summary cases. It is also obligatory in all misdemeanours, except such as have been placed on the level of felonies, viz. obtaining or attempting to obtain property on false pretences, receiving property so obtained or stolen, perjury or subornation of perjury, concealment of birth, wilful or indecent exposure of the person, riot, assault in pursuance of a conspiracy to raise wages, assault upon a peace-officer in the execution of his duty or upon any one assisting him, neglect or breach of duty as a peace-officer, any prosecution of which the costs are payable out of the county or borough rate or fund. In cases of treason, bail can only be granted by a secretary of state or the king's bench division. A person charged with felony is not entitled as of right to be released on bail. The power of admitting a prisoner to bail is discretionary and not ministerial, and the chief consideration in the exercise of that discretion must be the likelihood of the prisoner failing to appear at the trial. This must be gauged from the nature of the evidence in support of the accusation, the position of the accused and the severity of the punishment which his conviction will entail, as well as the independence of the

sureties. The Bail Act 1898 gives a magistrate power, where a person is charged with felony or certain misdemeanours, or where he is committed for trial for any indictable offence, to dispense with sureties, if in his opinion the so dispensing will not tend to defeat the ends of justice. A surety may be examined on oath as to his means, while the court may also require notice to be given to the plaintiff, prosecutor or police. A person who has been taken into custody for an offence without a warrant, and cannot be brought before a court of summary jurisdiction within twenty-four hours, may be admitted to bail by a superintendent or inspector of police; and in a borough, if a person is arrested for a petty misdemeanour, he may be bailed by the constable in charge of the police-station. Bail in civil matters, since the abolition of arrest on mesne process, is virtually extinct. It took the form of an instrument termed a

1 The ultimate origin of this and cognate words is the Lat. bajulus, properly a bearer of burdens or porter, later a tutor or guardian, and hence a governor or custodian, from which comes " bailiff " ; from bajulare is derived the French bailler, to take charge of, or to place in charge of, and " bail " thus means " custody," and is applied to the person who gives security for the appearance of the prisoner, the security given, or the release of the prisoner on such security.

bail-bond, which was prepared in the sheriff's office after arrest, and executed by two sufficient sureties and the person arrested.

In admiralty proceedings in rem, bail is often required for procuring the release of arrested ships or cargo. It is. also given without the arrest of the ship, as a substitution 01 personal security for that of the res, generally in an amount to cover the claim and costs.

In the United States, bail (in a sum fixed by the committing magistrate) is a matter of right in all cases where a sentence of death cannot be inflicted (Rev. Stat. § 1015). In those where such a sentence can be inflicted, it may be allowed by one of the judges of the United States courts at his discretion {ibid. § 1016).

BAILEN, or Baylen, a town of southern Spain, in the province of

Jaen; 21 m. by road N. of the city of Jaen. Pop. (1900) 7420. Bailen is probably the ancient Baecula, where the Romans, under P. Cornelius Scipio the elder, signally defeated the Carthaginians in 209 and 206 B.C. In its neighbourhood, also, in 1212, was fought the great battle of Las Navas de Tolosa, in which, according to the ancient chroniclers, the Castilians under Alphonso VIII, slew 200,000 Moors, and themselves only lost 25 men. Although this estimate is absurd, the victory of the Christians was complete. The capitulation of Bailen, signed at Andujar by the French general Dupont, on the 23rd of July 1808 after several days' hard fighting, involved the surrender of 17,000 men to the Spaniards, and was the first severe blow suffered by the French in the Peninsular War.

BAILEY, GAMALIEL (1807-1859), American journalist, was born at Mount Holly, New Jersey, on the 3rd of December 1807. He graduated at the Jefferson Medical College in Philadelphia in 1827. After editing for a short time a religious journal, the Methodist Protestant, at Baltimore, he removed in 1831 to Cincinnati, Ohio, where at first he devoted himself almost exclusively to the practice of medicine. He was also a lecturer on physiology at the Lane Theological Seminary, and at the time of the Lane Seminary debates (February 1834) between the pro-slavery and the anti-slavery students, and the subsequent withdrawal of the latter, he became an ardent abolitionist. In 1836 he joined James G. Birney in the editorial control of the Philanthropist; in the following year he succeeded Birney as editor, and conducted the paper in spite of threats and acts of violence — the printing-office being thrice wrecked by a mob — until 1847. From 1843 also he edited a daily paper, the Herald. In 1847 he assumed control of the new abolitional organ, the National Era, at Washington, D.C. Here also his paper was the object of attack by pro-slavery mobs, at one time in 1848 the editor and printers being besieged in their office for three days. This paper had a considerable circulation, and in it, in 1851-1852, Mrs. H. B. Stowe's Uncle Tom's Cabin was first published. Bailey died at sea in the course of a trip to Europe on the 5th of June 1859.

BAILEY, NATHAN or Nathaniel (d. 1742), English philo- logist and lexicographer. He compiled a Dictionarium Britan- nicum: a more complcat universal etymological English dictionary than any extant, bearing the date 1730, but supposed to have been published in 1721. This was a great improvement on all previous attempts, and formed the basis of Dr Johnson's great work.

Bailey, who was a Seventh-day Baptist (admitted 1691), had a school at Stepney, near London, and was the author of Dictionarium Domesticum and several other educational works. He died on the 27th of June 1742.

BAILEY, PHILIP JAMES (1816-1902), English poet, author of Festus, was born at Nottingham on the 22nd of April 1816. His father, who himself published both prose and verse, owned and edited from 1845 to 1852 the Nottingham Mercury, one of the chief journals in his native town. Philip James Bailey received a local education until his sixteenth year, when he matriculated at Glasgow University. He did not, however, take his degree, but moved in 1835 to London and entered Lincoln's Inn. Without making serious practice of the law he settled at Basford, and for three years was occupied with the composition of Festus, which appeared anonymously in 1839.

Its success, both in England and America, was immediate. It passed through a dozen editions in the country of its birth, and nearly three times as many in the United States; and when in 1889 its author was able to publish a " Jubilee Edition," he could feel that it was one of the few poems of .its time which was known to both the older and the younger generations. Its author is known almost exclusively by his one voluminous poem, for though Bailey published other verses he is essentially a man of one book. Festus has undergone many changes and incorporations, but it remains a singular example of a piece of work virtually completed in youth, and never supplanted or reinforced by later achievements of its author. It is a vast pageant of theology and philosophy, comprising in some twelve divisions an attempt to represent the relation of God to man and of man to God, to emphasize the benignity of Providence, to preach the immortality of the soul, and to postulate " a gospel of faith and reason combined." It contains fine lines and dignified thought, but its ambitious theme, and a certain incoherency in the manner in which it is worked out, prevent it from being easily readable by any but the most sympathetic student. Bailey died on the 6th of September 1902.

BAILEY, SAMUEL (1791-1870), British philosopher and author, was born at Sheffield in 179 1. He was among the first of those Sheffield merchants who went to the United States to establish trade connexions. After a few years in his father's business, he retired with an ample fortune from all business concerns, with the exception of the Sheffield Banking Company, of which he was

chairman for many years. Although an ardent liberal, he took little part in political affairs. On two occasions he stood for Sheffield as a " philosophic radical," but without success. His life is for the most part a history of his numerous and varied publications. His books, if not of first-rate import- ance, are marked by lucidity, elegance of style and originality of treatment. He died suddenly on the 18th of January 1870, leaving over £80,000 to the town of Sheffield. His first work, Essays on the Formation and Publication of Opinions, published anonymously in 1821 (2nd ed., 1826; 3rd ed., 1837), attracted more attention than any of his other writings. A sequel to it ap- peared in 1829, Essays on the Pursuit of Truth (2nd ed., 1844). Between these two were Questions in Political Economy, Politics, Morals, &Y. (1823), and a Critical Dissertation on the Nature, Measure, and Causes of Value (1825), directed against the opinions of Ricardo and his school. His next publications also were on economic or political subjects, Rationale of Political Representation (1835), and Money and its Vicissitudes (1837), now practically forgotton; about the same time also appeared some of his pamphlets, Discussion of Parliamentary Reform, Right of Primogeniture Examined, Defence of Joint-Stock Banks. In 1842 appeared his Review of Berkeley's Theory of Vision, an able work, which called forth rejoinders from J. S. Mill in the Westminster Review (reprinted in Dissertations) , and from Ferrier in Blackwood (reprinted in Lectures and Remains, ii). Bailey replied to his critics in a Letter to a Philosopher (1843), &c. In 1851 he published Theory of Reasoning (2nd ed., 1852), a discussion of the nature of inference, and an able criticism of the functions and value of the syllogism. In 1852 he published Discourses on Various Subjects; and finally summed up his philosophic views in the Letters on the Philosophy of the Human Mind (three series, 1855, 1858, 1863). In 1845 he published Maro, a poem in four cantoes (85 pp., Longmans), containing a description of a young poet who printed 1000 copies of his first poem, of which only 10 were sold. He was a diligent student of Shakespeare, and his last literary work was On the Received Text of Shakespeare' s Dramatic Writings and its Improvement (1862). Many of the emendations suggested are more fantastic than felicitous.

The Letters contain a discussion of many of the principal problems in psychology and ethics. Bailey can hardly be classed as belonging either to the strictly empirical or to the idealist school, but his general tendency is towards the former. (1) In

regard to method, he founds psychology entirely on introspection. He thus, to a certain extent, agrees with the Scottish school, but he differs from them in rejecting altogether the doctrine of mental faculties. What have been designated faculties are, upon his view, merely classified

facts or phenomena of consciousness. He criticizes very severely the habitual use of metaphorical language in describing mental operations. (2) His doctrine of perception, which is, in brief, that " the perception of external things through the organs of sense is a direct mental act or phenomenon of consciousness not susceptible of being resolved into anything else," and the reality of which can be neither proved nor disproved, is not worked out in detail, but is supported by elaborate and sometimes subtle criticisms of all other theories. (3) With regard to general and abstract ideas and general propositions, his opinions are those of the empirical school, but his analysis frequently puts the matter in a new light. (4) In the theory of morals, Bailey is an advocate of utilitarianism (though he objects to the term " utility " as being narrow and, to the un- thinking, of sordid content), and works out with great skill the steps in the formation of the " complex " mental facts involved in the recognition of duty, obligation, right. He bases all moral phenomena on five facts: — (1) Man is susceptible to pleasure (and pain); (2) he likes (or dislikes) their causes; (3) he desires to reciprocate pleasure and pain received ; (4) he expects such reciproca- tion from others; (5) he feels more or less sympathy with the same feelings in his fellows {Letters, 3rd series).

See A. Bain's Moral Science; Th. Ribot, La Psychologie anglaise contemp.; J. F. Ferrier, Philos. Remains (Edinb. and Lond., 1875), PP- 35I-38I-

BAILEY (said to be a corruption of Ballium by some, and derived by others from the Fr. bailie, a corruption of bataillc, because there the soldiers were drilled in battle array), the open space between the inner and outer lines of a fortification. Sometimes there were more than one, as the Inner and Outer Bailey, there are in England the Old Bailey at London and at York, and the Upper and Nether Baileys at Colchester.

BAILIFF and BAILIE (from Late Lat. bajulivus, adjectival form of bajulus, a governor or custodian; cf. Bail), a legal officer to whom some degree of authority, care or jurisdiction is committed. Bailiffs are of various kinds and their offices and duties vary greatly.

The term was first applied in England to the king's officers generally, such as sheriffs, mayors, &c, and more particularly to the chief officer of a hundred. The county within which the sheriff exercises his jurisdiction is still called his bailiwick, while the term bailiff is retained as a title by the chief magistrates of various towns and the keepers of royal castles, as the high bailiff of Westminster, the bailiff of Dover Castle, &c. Under the manorial system, the bailiff, the steward and the reeve were important officers; the bailiff managed the property of the manor and superintended its cultivation (see Walter of Henley, Husbandry , R. Hist. Soc, 1890).

The bailiff of a franchise or liberty is the officer who executes writs and processes, and impanels juries within the franchise. He is appointed by the lord of such franchise (who, in the Sheriffs Act 1887, § 34, is referred to as the bailiff of the franchise).

The bailiff of a sheriff is an under-officer employed by a sheriff within a county for the purpose of executing writs, processes, distraints and arrests. As a sheriff is liable for the acts of his officers acting under his warrant, his bailiffs are annually bound to him in an obligation with sureties for the faithful discharge of their office, and thence are called bound bailiffs. They are also often called bum-bailiffs, or, shortly, bums. The origin of this word is uncertain; the New English Dictionary suggests that it is in allusion to the mode of catching the offender. Special bailiffs are officers appointed by the sheriff at the request of a plaintiff for the purpose of executing a particular process. The appointment of a special bailiff relieves the sheriff from all responsibility until the party is arrested and delivered into the sheriff's actual custody.

By the County Courts Act 1888, it is provided that there shall be one or more high-bailiffs, appointed by the judge and removable by the lord-chancellor; and every person discharging the duties of high-bailiff is empowered to appoint a sufficient number of able and fit persons as bailiffs to assist him, whom he can dismiss at his pleasure. The duty of the high-bailiff is to serve all summonses and orders, and execute all the warrants, precepts

and writs issued out of the court. The high bailiff is responsible for all the acts and defaults of himself, and of the bailiffs appointed to assist him, in the same way as a sheriff of a county is responsible for the acts and defaults of himself and his officers. By the same

act (§49) bailiffs are answerable for any connivance, omission or neglect to levy any such execution. No action can be brought against a bailiff acting under order of the court without six days' notice (§54). Any warrant to a bailiff to give possession of a tenement justifies him in entering upon the premises named in the warrant, and giving possession, provided the entry be made between the hours of 9 a.m. and 4 p.m. (§ 142). The Law of Distress Amendment Act 1888 enacts that no person may act as a bailiff to levy any distress for rent, unless he is authorized by a county-court judge, to act as a bailiff.

In the Channel Islands the bailiff is the first civil officer in each island. He is appointed by the crown, and generally holds office for life. He presides at the royal court, and takes the opinions of the jurats; he also presides over the states, and represents the crown in all civil matters. Though he need not necessarily have had legal training, he is usually selected from among those who have held some appointment at the island bar.

In the United States the word bailiff has no special significance. It is sometimes applied to the officer who takes charge of juries and waits upon the court. The officer who corresponds to the English sheriff's bailiff is termed a deputy or under-sheriff.

Bailie.— -In Scotland the word bailiff has taken the form of " bailie," signifying a superior officer or magistrate of a municipal corporation. Bailies, by virtue of their office, are invested with certain judicial and administrative powers within the burgh for which they are appointed. They sit as police-court magis- trates, being assisted usually by a paid legal adviser, called an " assessor," and, in the larger burghs, act as a licensing court. It is usually said that a bailie is analogous to the English alder- man, but this is only in so far as he is a person of superior dignity in the council, for, unlike an alderman, he continues to sit for the ward for which he has been elected after selection as a bailie. He is always appointed from within the council, and his term of office is only that of an ordinary councillor, that is, for not more than three years. Bailie to give sasine was the person who appeared for the superior at the ceremony of giving sasine. This

ceremony was abolished in 1845. The Bailie of Holyrood, or Bailie of the Abbey, was the official who had jurisdiction in all civil debts contracted within the precincts of the sanctuary (? .i'.). (T. A. I.)

Bailli. — In France the bailiff (bailli), or seneschal in feudal days, was the principal officer of any noble importance. He it was who held the feudal court of assizes when the lord was not present himself. A great noble often also had a privStt, where small matters were settled, and the preparatory steps taken relative to the more important cases reserved for the assizes. Among the great officers of the crown of France a grand-seneschal formerly figured until the reign of Philip Augustus, when the last holder of the office was not replaced by a successor. It is also under Philip Augustus that local bailiffs first make a definite appearance. In the ordinance of 1100, by which the king, about to set forth on the crusade, arranged for the administration of the kingdom during his absence, they figure as part of a general system. Probably the first royal bailiffs or seneschals were the seigniorial bailiffs of certain great fiefs that had been reunited to the crown, their functions still continuing after the annexation. Their essential function was at first the surveillance of the royal provosts (prevdts), who until then had had the sole administration of the various parts of the domain. They concentrated in their own hands the produce of the provostships, and they organized and led the men who by feudal rules owed military service to the king. They had also judicial functions, which, at first narrowly restricted in applica- tion, became much enlarged as time went on, and they held periodical assizes in the principal centres of their districts. When the right of appeal was instituted, it was they who heard the appeals from sentences pronounced by inferior royal judges and by the seigniorial justices. Royal cases, and cases in which a noble was defendant, were also reserved for th«m. The royal bailli or seneschal (no real difference existed between the two offices, the names merely changing according to the district), was for long the king's principal representative in the provinces,

and the bailliage or the sinichaussie was then as important administratively as judicially. But the political power of the bailiffs was greatly lessened when the provincial governors were

created. They had already lost their financial powers, and their judicial functions now passed from them to their lieutenants.

By his origin the bailiff had a military character; he was an officer of the " short robe " and not of the " long robe," which in those days was no obstacle to his being well versed in precedents. But when, under the influence of Roman and canon law, the legal procedure of the civil courts became learned, the bailiff often availed himself of a right granted him by ancient public law: that of delegating the exercise of his functions to whomsoever he thought fit. He delegated his judicial functions to lieutenants, whom he selected and discharged at will. But as this delegation became habitual, the position of the lieutenants was strengthened; in the r6th century they became royal officers by title, and even dispossessed the bailiffs of their judiciary prerogatives. The tribunal of the bailliage or senichaussie underwent yet another transformation, becoming a stationary court of justice, the seat of which was fixed at the chief town. During the 15th and 16th centuries ambulatory assizes diminished in both frequency and importance. In the 17th and 18th centuries they were no more than a survival, the lieutenant of such a bailliage having preserved the right to hold one assize each year at a certain locality in his district. The ancient bailiff or bailli d'ipte still existed, however; the judgments in the tribunal of the bailliage were delivered in his name, and he was responsible for their execution. So long as the military service of the ban and arriere ban, due to the king from all fief-holders, was maintained (and it was still in force at the end of the 17th century), it was the bailiffs who organized it. Finally the bailliage became in principle the electoral district for the states-general, the unit represented therein by its three estates. The justiciary nobles retained their judges, often called bailiffs, until the Revolution. These judges, who were competent to decide questions as to the payment of seigniorial dues\ could not, legally at all events, themselves farm those revenues.

See Dupont Ferrier, Les Officiers royaux des bailliages et sene-chaussees et les institutions monarc.hiqv.es locales en France A la fin du moyen Age (1902) ; Armand Br.ette, Recueil de documents relatifs d la convocation des etats-generaux de 1789 (3 vols. 1904) (vol. iii. gives the condition of the bailliages and senechaussees in I789)- (J- P. E.)

BAILLET, ADRIEN (1640-1706), French scholar and critic, was born on the 13th of June 1649, at the village of Neuville near

Beauvais, in Picardy. His parents could only afford to send him to a small school in the village, but he picked up some Latin from the friars of a neighbouring convent, who brought him under the notice of the bishop of Beauvais. By his kindness Baillet received a thorough education at the theological seminary, and was afterwards appointed to a post as teacher in the college of Beau- vais. In 1676 he was ordained priest and was presented to a small vicarage. He accepted in 1680 the appointment of librarian to M. de Lamoignon, advocate-general to the parlement of Paris, of whose library he made a catalogue raisonne (35 vols.), all written with his own hand. The remainder of his life was spent in incessant, unremitting labour; so keen was his devotion to study that he allowed himself only five hours a day for rest. He died on the 21st of January 1706. Of his numerous works the following are the most conspicuous: (1) Histoire de Hollande depuis la treve de i6ogjusqu'd, 1690 (4 vols. 1693), a continuation of Grotius, and published under the name of La Neuville, (2) Les Vies des saints ... (4 vols. 1701), (3) Des Satires personelles, traite historique et critique de celles qui portent le titre d Anti (2 vols. 1689), (4) Vie de Descartes (2 vols. 1 69 1) , (5) ;1 uleurs dtguisis sous des noms Strangers, empruntis, cVc. (1690), (6) Jugemens des savans sur les principaux outrages des auteurs (9 vols. 1685-1686). The last is the most cele- brated and useful of all his works. At the time of his death he was engaged on a Dictionnaire universelle ecclesiastique. The praise bestowed on the Jansenists in the Jugemens des savans brought down on Baillet the hatred of the Jesuits, and his Vie des saints, in which he brought his critical mind to bear on the question of miracles, caused some scandal. His Vie de Descartes is

a mine of information on the philosopher and his work, derived from numerous unimpeachable authorities.

See the edition by M. de la Monnoye of the Jugemens des savans (Amsterdam, 4 vols. 1725), which contains the Anti-Baillet of Gilles, Menage and an Abrege de la vie de Mr Baillet.

BAILLIE, LADY GRIZEL (1665-1746), Scottish song-writer, eldest daughter of Sir Patrick Hume or Home of Polwarth, afterwards earl of Marchmont, was born at Redbraes Castle, Berwickshire, on the 25th of December 1665. When she was twelve years old she carried letters from her father to the Scottish patriot, Robert Baillie of Jerviswood, who was then in prison. Home's friendship for Baillie made him a suspected man, and the king's troops occupied Redbraes Castle. He remained in hiding for some time

in a churchyard, where his daughter kept him supplied with food, but on hearing of the execution of Baillie (1684) he fled to Holland, where his family soon after joined him. They returned to Scotland at the Revolution. Lady Grizel married in 1692 George Baillie, son of the patriot. She died on the 6th of December 1746. She had two daughters, Grizel, who married Sir Alexander Murray of Stanhope, and Rachel, Lady Binning. Lady Murray had in her possession a MS. of her mother's in prose and verse. Some of the songs had been printed in Allan Ramsay's Tea-Table Miscellany. "And werena my heart light I wad dee," the most famous of Lady Grizel's songs, originally appeared in Orpheus Caledonius (1725).

Memoirs of the Lives and Characters of the Right Hon. George Baillie of Jerviswood and Lady Grisell Baillie, by their daughter, Lady Murray of Stanhope, were printed in 1822. George Baillie's Correspondence (1702-1708) was edited by Lord Minto for the Bannatyne Club in 1842. " The Legend of Lady Grizelda Baillie " forms one of Joanna Baillie's Metrical Legends of Exalted Character.

BAILLIE, JOANNA (1762-1851), British poet and dramatist, was born at the manse of Bothwell, on the banks of the Clyde, on the nth of September 1762. She belonged to an old Scottish family, which claimed among its ancestors Sir William Wallace. At an early period she moved with her sister Agnes to London, where their brother, Dr Matthew Baillie, was settled. The two sisters inherited a small competence from their uncle, Dr William Hunter, and took up their residence at Hampstead, then on the outskirts of London, where they passed the remainder of their lives. Joanna Baillie had received an excellent education, and began very early to write poetry. She published anonymously in 17130 a volume called Fugitive Verses; but it was not till 1798 that she produced the first volume of her " plays on the passions " , under the title of A Series of Plays. Her design was to illustrate each of the deepest and strongest passions of the human mind, such as hate, jealousy, fear, love, by a tragedy and a comedy, in each of which should be exhibited the actions of an individual under the influence of these passions. The first volume was published anonymously, but the authorship, though at first attributed to Sir Walter Scott, was soon discovered. The book had considerable success and was followed by a second volume in 1802, a third in 1812 and three volumes of Dramas in 1836. Miscellaneous Plays appeared in 1804, and the Family Legend in 1810. Miss Baillie herself intended her plays not for the closet

but for the stage. The Family Legend, brought out in 1810 at Edinburgh, under the enthusiastic patronage of Sir Walter Scott, had a brief though brilliant success; De Monfort had a short run in London, mainly through the acting of John Kemble and Mrs Siddons; Henriquez and The Separation were coldly received. With very few exceptions, Joanna Baillie's plays are unsuited for stage exhibition. Not only is there a flaw in the fundamental idea, viz. that of an individual who is the embodiment of a single passion, but the want of incident and the direction of the attention to a single point, present insuperable obstacles to their success as acting pieces. At the same time they show remarkable powers of analysis and acute observation and are written in a pure and vigorous style. Joanna Baillie's reputation does not rest entirely on her dramas; she was the author of some poems and songs of great beauty. The best of them are the Lines to Agnes Baillie on her Birthday, The Kitten, To a Child and some of her adaptations of Scottish songs, such as Woo'd and Married an'a'. Scattered throughout the dramas are also some lively and

beautiful songs, The Chough and the Crow in Orra, and the lover's song in the Phantom. Miss Baillie died on the 23rd of February 1851, at the advanced age of 89, her faculties remaining unim- paired to the last. Her gentleness and sweetness of disposition made her a universal favourite, and her little cottage at Hamp- stead was the centre of a brilliant literary society.

See Joanna Baillie's Dramatic and Poetical Works (London, 1851).

BAILLIE, ROBERT (1602-1662), Scottish divine, was born at Glasgow. Having graduated there in 1620, he gave himself to the study of divinity. In 1631, after he had been ordained and had acted for some years as regent in the university, he was appointed to the living of Kilwinning in Ayrshire. In 1638 he was a member of the famous Glasgow Assembly, and soon after he accompanied Leslie and the Scottish army as chaplain or preacher. In 1642 he was made professor of divinity at Glasgow, and in the following year was selected as one of the five Scottish clergymen who were sent to the Westminster Assembly. In 1649 he was one of the commissioners sent to Holland for the purpose

of inviting Charles II. to Scotland, and of settling the terms of his admission to the government. He continued to take an active part in all the minor disputes of the church, and in 1 66 1 was made principal of Glasgow University. He died in August of the following year, his death being probably hastened by his mortification at the apparently firm establishment of episcopacy in Scotland. Baillie was a man of learning and ability; his views were not extreme, and he played but a secondary part in the stirring events of the time. His Letters, by which he is now chiefly remembered, are of first-rate historical importance, and give a very lively picture of the period.

A complete memoir and a full notice of all his writings will be found in D. Laing's edition of the Letters and Journals of Robert Baillie (1637-1662), Bannatyne Club, 3 vols. (Edinburgh, 1841-1842). Among his works are Ladensium auTOKarAKpio-is, an answer to Lysimachus Nicanor, an attack on Laud and his system, in reply to a publication which charged the Covenanters with Jesuitry; Ana- baptism, the true Fountain of Independency, Brownisme, Antinomy, Familisme, &c, a sermon; An Historical Vindication of the Govern- ment of the Church of Scotland ; The Life of William (Laud) now Lord Archbishop of Canterbury Examined (London, 1643); A Parallel of the Liturgy with the Mass Book, the Breviary, the Ceremonial and other Romish Rituals (London, 1661).

BAILLIE, ROBERT (d. 1684), Scottish conspirator, known as Baillie of Jerviswood, was the son of George Baillie of St. John's Kirk, Lanarkshire. He incurred the resentment of the Scottish government by rescuing, in June 1676, his brother-in-law Kirkton, a Presbyterian minister who had illegally been seized and confined in a house by Carstairs, an informer. He was fined £500, remaining in prison for four months and then being liberated on paying one-half the fine to Carstairs. In despair at the state of his country he determined in 1683 to emigrate to South Carolina, but the plan came to nothing. The same year Baillie, with some of his friends, went to London and entered into communication with Monmouth, Russell and their party in order to obtain redress; and on the discovery of the Rye House Plot he was arrested. Questioned by the king himself he repudiated any knowledge of the conspiracy, but with striking truthfulness would not deny that he had been consulted with the view of an insurrection in Scotland. He was subsequently loaded with irons and sent back a prisoner to Scotland. Though there was no evidence whatever to support his connexion with the plot, he

was fined £6000 and kept in close confinement. He was already in a languishing state when on the 23rd of December 1684 he was brought up again before the high court on the charge of treason. He was pronounced guilty on the following day and hanged the same afternoon at the market cross at Edinburgh with all the usual barbarities. His shocking treatment was long remembered as one of the worst crimes committed by the Stuart administration in Scotland. Bishop Burnet, who was his cousin, describes him as "in the presby terian principles but ... a man of great piety and virtue, learned in the law, in mathematics and in languages." He married a sister of Sir Archibald Johnston, Lord Warriston, and left a son, George, who took refuge in Holland, afterwards returning with William III. and being restored to his estates.

BAILLY, JEAN SYLVAIN (1 736-1 793), French astronomer and orator, was born at Paris on the 15th of September 1736. Originally intended for the profession of a painter, he preferred writing tragedies until attracted to science by the influence of Nicolas de Lacaille. He calculated an orbit for the comet of 1 7 59 (Halley's), reduced Lacaille's observations of 515 zodiacal stars, and was, in 1763, elected a member of the Academy of Sciences. His Essai sur la thtorie des satellites de Jupiter (1766), an expansion of a memoir presented to the Academy in 1763, showed much original power; and it was followed up in 1771 by a noteworthy dissertation Sur les infgalitts de la lumiere des satellites de Jupiter. Meantime, he had gained a high literary reputation by his Aloges of Charles V., Lacaille, Moliere, Corneille and Leibnitz, which were issued in a collected form in 1770 and 1790; he was admitted to the French Academy (February 26, 1784), and to the Academie des Inscriptions in 1785, when Fontenelle's simultaneous membership of all three Academies was renewed in him. Thenceforth, he devoted himself to the history of science, publishing successively: — Hisloire de I'astro- nomie ancienne (177s); Histoire de V astronomie moderne (3 vols. 1779-1782); Lettres sur I'origine des sciences (1777); Lettres sur I'Allantide de Platon (1779); and Traite de I' astronomie indienne et orientate (1787). Their erudition was, however, marred by speculative extravagances.

The cataclysm of the French Revolution interrupted his studies. Elected deputy from Paris to the states-general, he was chosen president of the Third Estate (May 5, 1789), led the famous proceedings in the Tennis Court (June 20), and acted as mayor of Paris (July 15, 1789, to November 16, 1791). The dispersal by the

National Guard, under his orders, of the riotous assembly in the Champ de Mars (July 17, 1791) rendered him obnoxious to the infuriated populace, and he retired to Nantes, where he composed his Memoires d'un Umoin (published in 3 vols, by MM. Berville and Barriere, 1821-1822), an incom- plete narrative of the extraordinary events of his public life. Late in 1793, Bailly quitted Nantes to join his friend Pierre Simon Laplace at Melun; but was there recognized, arrested and brought (November 10) before the Revolutionary Tribunal at Paris. On the 12th of. November he was guillotined amid the insults of a howling mob. He met his death with patient dignity; having, indeed, disastrously shared the enthusiasms of his age, but taken no share in its crimesˆ

Notices of his life are contained in the Moges by Merard de Saint Just, Delisle de Salles, Lalande and Lacretelle; in a memoir by Arago, read' the 26th of February 1844 before the Academie des Sciences, and published in Notices biographiques, t. ii. (1852). See also Delambre, Histoire de V astronomie au i8me siecle, p. 735, and Lalande, Bibliographic astronomique, p. 730.

BAILMENT (from Fr. bailler, to place in charge of, cf. Bail), in law, a delivery of goods from one person called the bailor, to another person called the bailee, for some purpose, upon a contract, express or implied, that after the purpose has been fulfilled they shall be redelivered to the bailor, or otherwise dealt with according to his direction, or kept till he reclaims them. The following is Chief Justice Holt's classification of bailments in Coggs v. Bernard, 1704, 1 Sm. L.C. 167, which is generally adopted. (1) Depositum, or bailment without reward, in order that the bailee may keep the goods for the bailor. In this case, the bailee has no right to use the thing entrusted to him, and is liable for gross negligence, but not for ordinary negligence. Thus, where a customer had deposited some securities with his banker (who received nothing for his services) and they were stolen by a cashier, it was held that as there was no proof of gross negligence the banker was not liable (Giblin v. McMullen, 1868, L.R. 2 P.C. 317). (2) Commodatum, or loan, where goods or chattels that are useful are lent to the bailee gratis, to be used by him. The bailee may be justly considered as representing himself to the bailor to be a person of competent skill to take care of the thing lent (Wilson v. Brett, 1843, 11 M. & W. 113), and the transaction being a gratuitous loan, and one for the advantage of the bailee solely, he is bound to use great diligence in the protection of the thing bailed and will be responsible even for slight negligence.

Thus, where a

horse was lent to. the defendant to ride, it was held that it did not warrant him in allowing his servant to do so (Bringloe v. Morrice, 1676, 1 Mod. 210). But where a horse was for sale and the vendor allowed the defendant to have the horse for the purpose of trying it; it was held that he had a right to allow a competent person upon the horse to try it (Camoys v. Scurr, “1840, 9 C. & P. 383). (3) Locatio rei, or lending for hire. In the case of hiring the bailee is bound to use such diligence as a prudent man Would exercise towards his own property. Thus, where the defendant hired a horse, and it having fallen ill, prescribed for it himself instead of calling in a veterinary surgeon, he was held liable for the \oss(Dean v. Keate, 1811, 3 Camp. 4). (4) Vad turn, pawn or pledge; a bailment of personal property as a security for a debt. In this case the pledgee is bound to use ordinary diligence in guarding the thing pledged. (5) Locatio operis faciendi, where goods are delivered to be carried, or some- thing is to be done about them for a reward to be paid to the bailee. In this case, the bailee is bound to use ordinary diligence in preserving the property entrusted to him. (6) Mandatum, a delivery of goods to somebody, who is to carry them, or do something about them gratis. The liabilities of a mandatory and of a depository are exactly the same ; neither is liable for anything short of gross negligence.

See further under Banks and Banking; Carrier; Diligence; Factor; Hiring; Inns and Innkeepers; Lien; Negligence; Pledge; Pawnbroking; Principal and Agent, &c.

BAILY, EDWARD HODGES (1788-1867), British sculptor, was born at Bristol on the 10th of March 1788. His father, who was a celebrated carver of figureheads for ships, destined him for a commercial life, but even at school the boy showed his natural taste and remarkable talents by producing numerous wax models and busts of his schoolfellows, and afterwards, when placed in a mercantile house, still carried on his favourite employ- ment. Two Homeric studies, executed for a friend, were shown to J. Flaxman, who bestowed on them such high commendation that in 1807 Baily came to London and placed himself as a pupil under the great sculptor. In 1809 he entered the academy

schools. In 181 1 he gained the academy gold medal for a model of " Hercules restoring Alcestis to Admetus," and soon after exhibited " Apollo discharging his Arrows against the Greeks " and " Hercules casting Lichas into the Sea." In 1821 he was elected R.A., and exhibited one of his best pieces, " Eve at the Fountain." He was entrusted with the carving of the bas-reliefs on the south side of the Marble Arch in Hyde Park, and executed numerous busts and statues, such as those of Nelson in Trafalgar Square, of Earl Grey, of Lord Mansfield and others. Baily died at Holloway on the 22nd of May 1867.

BAILY, FRANCIS (1 774-1844), English astronomer, was born at Newbury in Berkshire, on the 28th of April 1774. After a tour in the unsettled parts of North America in 1 796-1 797, his journal of which was edited by Augustus de Morgan in 1856, he entered the London Stock Exchange in 1799. The successive publication of Tables for the Purchasing and Renewing of Leases (1802), of The Doctrine of Interest and Annuities (1808), and The Doctrine of Life- Annuities and Assurances (1810), earned him a high reputation as a writer on life-contingencies; he amassed a fortune through diligence and integrity and retired from business in 1825, to devote himself wholly to astronomy. He had already, in 1820, taken a leading part in the foundation of the Royal Astronomical Society ; and its gold medal was awarded him, in 1827, for ,his preparation of the Astronomical Society's Catalogue of 2881 stars (Memoirs R. Astr. Soc. ii.). The reform of the Nautical Almanac in 1829 was set on foot by his protests; he recommended to the British Association in 1837, and in great part executed, the reduction of Joseph de Lalaride's and Nicolas de Lacaille's catalogues containing about 57,000 stars; he superintended the compilation of the British Association's Catalogue of 8377 stars (published 1845); and revised the catalogues of Tobias Mayer, Ptolemy, Ulugh Beg, Tycho Brahe, Edmund Halley and Hevelius {Memoirs R. Astr. Soc. iv,, xiii.).

His notice of " Baily's Beads," during an annular eclipse of the

sun on the 15th of May 1836, at Inch Bonney in Roxburghshire, started the modern series of eclipse-expeditions. The pheno- menon, which depends upon the inequalities of the moon's limb, was so vividly described by him as to attract an unprece- dented amount of attention to the totality of the 8th of July 1842, observed by Baily himself at Pavia. He completed and discussed H. Foster's pendulum-experiments, deducing from them an ellipticity for the earth of -5-8"? (Memoirs R. Astr. Soc. vii.);

corrected for the length of the seconds-pendulum by introducing a neglected element of reduction; and was entrusted, in 1843, w ith the reconstruction of the standards of length. His laborious operations for determining the mean density of the earth, carried on by Henry Cavendish's method (1838-1842), yielded for it the authoritative value of 5 • 66. He died in London, on the 30th of August 1844. Baily's Account of the Rev. John Flamsteed (1835) is of fundamental importance to the scientific history of that time. It included a republication of the British Catalogue.

See J. Herschel's Memoir of F. Baily, Esq. (1845), also prefixed to Baily's Journal of a Tour, with a list of his writings; Month. Not. R. Astr. Soc. xiv. 1844.

BAILY, WILLIAM HELLIER (1819-1888), English palaeon- tologist, nephew of E. H. Baily the sculptor, was born at Bristol on the 7th of July 1819. From 1837 to 1844 he was Assistant Curator in the Bristol Museum, a post he relinquished to join the staff of the Geological Survey in London. In 1854 he became assistant naturalist, under Edward Forbes and afterwards under Huxley. In 1857 he was transferred to the Irish branch of the Geological Survey, as acting palaeontologist, and retained this post until the end of his life. He was the author of many papers on palaeontological subjects, and of notes on fossils in the explanatory memoirs of the Geological Survey of Ireland. He published (1867-1875) a useful work entitled Figures of Charac- teristic British Fossils, with Descriptive Remarks, of which only the first volume, dealing with palaeozoic species, was issued. The figures were all drawn on stone by himself. He died at Rathmines near Dublin on the 6th of August 1888.

BAIN, ALEXANDER (1818-1903), Scottish philosopher and educationalist, was born on the nth of June 1818 in Aberdeen, where he received his first schooling. In early life he was a weaver, hence the punning description of him as Wee- vir, rex philosophorum. In 1836 he entered Marischal College, and came under the influence of John Cruickshank, professor of mathematics, Thomas Clark, professor of chemistry, and William Knight, professor of natural philosophy. His college career was distinguished, especially in mental philosophy, mathematics and physics. Towards the end of his arts course he became a contributor to the Westminster Review (first article " Electrotype and Daguerreotype," September 1840). This was the beginning of his connexion with John Stuart Mill, which led to a life-long friendship. In 1841 he became sub- stitute for Dr Glennie, the

professor of moral philosophy, who, through ill-health, was unable to discharge the active duties of the chair. This post he occupied for three successive sessions, during which he continued writing for the Westminster, and also in 1842 helped Mill with the revision of the MS. of his System of Logic. In 1843 ne contributed the first review of the book to the London and Westminster. In 1845 he was appointed professor of mathematics and natural philosophy in the Andersonian University of Glasgow. A year later, preferring a wider field, he resigned the position and devoted himself to literary work. In 1848 he removed to London to fill a post in the board of health, under Edwin Chadwick, and became a prominent member of the brilliant circle which included George Grote and John Stuart Mill. In 1855 he pub- lished his first large work, The Senses and the Intellect, followed in 1859 by The Emotions and the Will. These treatises won for him a position among independent thinkers. He was examiner in logical and moral philosophy (1857-1862 and 1864-1869) to the university of London, and in moral science in the Indian Civil Service examinations.

In i860 he was appointed by the crown to the new chair of

logic and English in the university of Aberdeen (created on the amalgamation of the two colleges, King's and Marischal, by the Scottish Universities Commission of 1858). Up to this date neither logic nor English had received adequate attention in Aberdeen, and Bain devoted himself to supplying these deficiencies. He succeeded not only in raising the standard of education generally in the north of Scotland, but also in forming a school of philosophy and in widely influencing the teaching of English grammar and composition. His efforts were first directed to the preparation of English textbooks: Higher English Grammar (1863), followed in 1866 by the Manual of Rhetoric, in 1872 by A First English Grammar, and in 1874 by the Companion to the Higher Grammar. These works covered a large field and their original views and methods met with wide acceptance. But the other subject of his chair also called for attention. His own philosophical writings already published, especially The Senses and the Intellect (to which was added, in 1861, The Study of Character, including an Estimate of Phrenology), were too large for effective use in the class-room. Accordingly in 1868, he

published his Manual of Mental and Moral Science, mainly a condensed form of his treatises, with the doctrines re-stated, and in many instances freshly illustrated, and with many important additions. The year 1870 saw the publication of the Logic. This, too, was a work designed for the use of students; it was based on J. S. Mill, but differed from him in many particulars, and had as distinctive features the treatment of the doctrine of the conservation of energy in connexion with causation and the detailed application of the principles of- logic to the various sciences. His services to education in Scotland were now recognized by the conferment of the honorary degree of doctor of laws by the university of Edinburgh in 187 1. Next came two publications in "The International Scientific Series," namely, Mind and Body (1872), and Education as a Science (1879).

All these works, from the Higher English Grammar down- wards, were written by Bain during his twenty years' professoriate at Aberdeen. To the same period belongs his institution of the philosophical journal Mind; the first number appeared in January 1876, under the editorship of a former pupil, G. Croom Robertson, of University College, London. To this journal Bain contributed many important articles and discussions; and in fact he bore the whole expenses of it till Robertson, owing to ill-health, resigned the editorship in 1891, when it passed into other hands. Bain resigned his professorship in 1880 and was succeeded by William Minto, one of his most brilliant pupils. Nevertheless his interest in thought, and his desire to complete the scheme of work mapped out in earlier years, remained as keen as ever. Accordingly, in 1882 appeared the Biography of James Mill, and accompanying it John Stuart Mill: a Criticism, with Personal Recollections. Next came (1884) a collection of articles and papers, most of which had appeared in magazines, under the title of Practical Essays. This was suc- ceeded (1887, 1888) by a new edition of the Rhetoric, and along with it, a book On Teaching English, being an exhaustive application of the principles of rhetoric to the criticism of style, for the use of teachers; and in 1894 he published a revised edition of The Senses and the Intellect, which contains his last word on psychology. In 1894 also appeared his last contribution to Mind. His last years were spent in privacy at Aberdeen, where he died on the 18th of September 1903. He married twice but left no children.

Bain's life was mainly that of a thinker and a man of letters. But he also took a keen interest and frequently an active part in the

political and social movements of the day; and so highly did the students of Aberdeen rate his practical ability, that, after his retirement from the chair of logic, they twice in suc- cession elected him lord rector of the university, each term of office extending over three years. He was a strenuous advocate of reform, especially in the teaching of sciences, and supported the claims of modern Slanguages to a place in the curriculum. A marble bust of him stands in the public library and his portrait hangs in the Marischal College.

Wide as Bain's influence has been as a logician, a grammarian

and a writer on rhetoric, his reputation rests on his psychology. At one with Johannes Muller in the conviction psychologus neme nisi physiologus,he was the first in Great Britain during the 19th century to apply physiology in a thoroughgoing fashion to the elucidation of mental states. He was the originator of the theory of psycho-physical parallelism, which is used so widely as a working basis by modern psychologists. His idea of applying the natural history method of classification to psychical phenomena gave scientific character to his work, the value of which was enhanced by his methodical exposition and his command of illustration. In line with this, too, is his demand that psychology shall be cleared of metaphysics; and to his lead is no doubt due in great measure the position that psychology has now acquired as a distinct positive science. Prof. Wm. James calls his work the " last word " of the earlier stage of psychology, but he was in reality the pioneer of the new. Subsequent psycho-physical investigations have all been in the spirit of his work; and although he consistently advocated the introspective method in psychological investigation, he was among the first to appreciate the help that may be given to it by animal and social and infant psychology. He may justly claim the merit of having guided the awakened psychological interest of British thinkers of the second half of the 19th century into fruitful channels. He emphasized the importance of our active experiences of movement and effort, and though his theory of a central innervation sense is no longer held as he propounded it, its value as a suggestion to later psychologists is great. His autobiography, published in 1904, contains a full list of his works, and also the history of the last thirteen years of his life by W. L. Davidson of Aberdeen University, who further contributed to Mind (April 1904) a review of Bain's services to philosophy.

Works (beside the above) : — Edition with notes of Paley's Moral

Philosophy (1852); Education as a Science (1 879) ; Dissertations on lead- ing philosophical topics (1903, mainly reprints of papers in Mind) ; he collaborated with J. S. Mill and Grote in editing James Mill's Analysis of the Phenomena of the Human Mind (1869), and assisted in editing Grote's Aristotle and Minor Works; he also wrote a memoir pre- fixed to G. Croom Robertson's Philosophical Remains (1894). (See Psychology and Association of Ideas.) (W. L. D.)

BAIN, ANDREW GEDDES (1797-1864), British geologist, was a native of Scotland. In 1820 he emigrated to Cape Colony, and carried on for some years the business of a saddler at Graaf Reinet. During the Kaffir War in 1833-34 he took command of a provisional battalion raised for the defence of the frontier. Later he was engaged to construct a military road through the Ecca Pass, and displayed engineering talents which led to his being permanently employed as surveyor of military roads under the corps of Royal Engineers. This occupation created an interest in geology, which was fostered in 1837 by the loan of Lyell's Elements. He discovered the remains of many reptilia, including the Dicynodon, which was obtained from the Karroo Beds near Fort Beaufort and described by Owen. Devoting all his spare energies to geological studies, Bain prepared in 1852 the first comprehensive geological map of South Africa, a work of great merit, which was published by the Geological Society of London in 1856. He died at Cape Town in 1864.

Obituary by Dr R. N. Rubidge, in Geol. Mag. January 1865, p. 47; also Trans. Geol. Soc. S. Africa, vol. ii. part v., June 1896 (with portrait).

BAINBRIDGE, JOHN (1582-1643), English astronomer, was bprn at Ashby-de-la-Zouch, in Leicestershire. He started as a physician and practised for some years, kept a school and studied astronomy. Having removed to London, he was admitted (November 6, 1618) a licentiate of the college of physicians, and attracted notice by a publication concerning the comet of 1618. Sir Henry Savile (1549-1622) thereupon appointed him in 1619 to the Savilian chair of astronomy just founded by him at Oxford ; Bainbridge was incorporated of Mcrton College and became, in 163 1 and 1635 respectively, junior and senior reader of Linacre's lectures. He died at Oxford on the 3rd of November 1643. He wrote An Astronomical Description of the late Comet (1619); Canicularia (1648); and translated Proclus' De Sphaera, and Ptolemy's De Planetarum Hypolhesibus (1620). Several

manuscript works by him exist in the library of Trinity College, Dublin.

See Munk's College of Physicians, i. 175; Wood's Athenae (Bliss), iii. 67; Biographia Britannica, i. 419.

BAINBRIDGE, WILLIAM (1774-1833), commodore in the United States navy, was born on the 7th of May 1774 in Princeton, New Jersey. At the age of fourteen he went to sea in the merchant service, and was in command of a trading schooner at an early age. The American trading vessels of that period were supposed to be excluded by the navigation laws from commerce with the British West Indian Islands, though with the concealed or very slightly disguised assistance of the planters, they engaged in a good deal of contraband commerce. The war between France and Great Britain tended further to make the carrying trade of neutrals difficult. Bainbridge had therefore to expect, and when he could to elude or beat off, much interference on the part of French and British cruisers alike. He is said to have forced a British schooner, probably a privateer, which attacked him when on his way from Bordeaux to St Thomas, to strike, but he did not take possession. On another occasion he is said to have taken a man out of a British ship in retaliation for the impressment of an American seaman by H.M.S. "Indefatigable," then commanded by Sir Edward Pellew. When the United States navy was organized in 1798 he was included in the corps of naval officers, and appointed to the schooner " Retaliation." She was on one occasion seized by the French but afterwards released. As captain of the brig " Norfolk " of 18 guns, he was employed in cruising against the French, who were as aggressive against American commerce as the English. He was also sent to carry the tribute which the United States still condescended to pay to the dey of Algiers, in order to secure exemption from capture for its merchant ships in the Mediterranean — a service which he performed punctually, though with great disgust. When the United States found that bribing the pirate Barbary states did not secure exemption from their outrages, and was constrained at last to use force, he served against Algiers and Tunis. His ship, the " Philadelphia," ran aground on the Tunisian coast, and he was for a time imprisoned. On his release he returned for a time to the merchant service in order to make good the pecuniary loss caused by his captivity. When the war of 181 2 broke out between Great Britain and the United States, Bainbridge was appointed to command the United States frigate " Constitu- tion " (44), in succession to Captain Isaac Hull (q.v.). The " Con- stitution" was a very fine ship of 1533 tons, which had already captured the " Guerriere." Under Bainbridge she was sent to

cruise in the South Atlantic. On the 29th of December 1812 he fell in with H.M.S. ” Java,” a vessel of 1073 tons, formerly the French frigate ” Renommee ”(4°)- She was on her way to the East Indies, carrying the newly appointed lieutenant-governor of Bombay. She had a very raw crew, including very few real seamen, and her men had only had one day’s gunnery drill. The United States navy paid great attention to its gunnery, which the British navy, misled by its easy victories over the French, had greatly neglected. In these conditions the fate of the ” Java ” was soon sealed. She was cut to pieces and forced to surrender, after suffering heavy loss, and inflicting very little on the ” Constitution.” After the conclusion of the war with Great Britain, Bainbridge served against the Barbary pirates once more. During his later years he served on the board of navy commissioners. He died on the 28th of July 1833. (D. H.)

BAINDIR (anc. Caystrus), a town in Asiatic Turkey in the Aidin vilayet, situated in the valley of the Kuchuk Menderes. Pop. under 10,000, nearly half Christian. It is connected with Smyrna by a branch of the Aidin railway, and has a trade in cotton, figs, raisins and tobacco.

BAINES, EDWARD (.1774-1848), English newspaper-pro- prietor and politician, was born in 1774 at Walton-le-Dale, near Preston, Lancashire. He was educated at the grammar schools of Hawkshead and Preston, and at the age of sixteen was apprenticed to a prhVer in the latter town. After remaining there four years and a half he removed to Leeds, finished his apprentice-«hip, and at once started in business for himself. He was always

a most assiduous student, and quickly became known as a man of great practical shrewdness and ability, who took a keen interest in political and social movements. His political opinions led him to sympathize with nonconformity and he soon joined the Independents. In 1801 the assistance of party friends enabled him to buy the Leeds Mercury. Provincial newspapers did not at that time possess much influence; it was no part of the editor’s duty to supply what are now called ” leading articles,” and the system of reporting was defective. In both respects Baines made a complete change in the Mercury. His able political articles gradually made the paper the organ of Liberal opinion in Leeds, and the connexion of the Baines family with the paper made their influence powerful for many years in this direction. Baines soon began to take a prominent part in politics; he was an ardent advocate of parliamentary reform, and it was mainly by his

influence that Macaulay was returned for Leeds in 1832; and in 1834 he succeeded Macaulay as member. He was re- elected in 1835 and 1837, but resigned in 1841. In parliament he supported the Liberal party, but with independent views. Like his son Edward after him, he strongly advocated the separation of church and state, and opposed government inter- ference in national education. His letters to Lord John Russell on the latter question (1846) had a powerful influence in deter- mining the action of the government. He died in 1848. ‘ His best-known writings are: — The History, Directory and Gazetteer of the County of York; History, Directory and Gazetteer of the County of Lancaster; History of the County Palatine and Duchy of Lancaster. He was also the author of a History of the Wars of Napoleon, which was continued under the title of A History of the Reign of George III.

His Life (1861) has been written by his son, Sir Edward Baines (1800-18.90), who was editor and afterwards proprietor of the Leeds Mercury, M.P. for Leeds (1859-1874), and was knighted in 1880; his History of the Cotton Manufacture (1835) was long a standard authority. An elder son, Matthew Talbot, Baines (1790-1860), went to the bar, and became recorder of Hull (1837). He became M.P. for Hull in 1847, and in 1849 president of the Poor Law Board. In 1852 he was returned for Leeds, and again became president of the Poor Law Board (till 1855). In 1856 he entered the cabinet as chancellor of the duchy of Lancaster.

BAINI, GIUSEPPE (1775-1844), Italian priest, musical critic and composer of church music, was born at Rome on the 21st of October 1775. He was instructed in composition by his uncle, Lorenzo Baini, and afterwards by G. Jannaconi. In 1814 he was appointed musical director to the choir of the pontifical chapel, to which he had as early as 1802 gained admission in virtue of his fine bass voice. His compositions, of which very few have been published, were very favourable specimens of the severe ecclesi- astical style; one in particular, a ten-part Miserere, composed for Holy Week in 182 1 by order of Pope Pius VII., has taken a permanent place in the services of the Sistine chapel during Passion Week. Baini held a higher place, however, as a musical critic and historian than as a composer, and his Life of Palestrina (Memorie storico-critiche della vita e delle ‘ opere di Giovanni Pierluigi da Palestrina, 1828) ranks as one of the best works of its class. The phrase 77 Principe della Musica, which has become finally associated with the name of Palestrina, originates with this biography. Giuseppe Baini died on the 21st of

May 1844 in Rome.

BAIRAM, a Perso-Turkish word meaning ” festival,” applied in Turkish to the two principal festivals of Islam. The first of these, according to the calendar, is the “Lesser Festival,” called by the Turks Kiltshuk Bairam (“Lesser Bairam”), or Sheker Bairam (“Sugar Bairam”), and by Arabic-speaking Moslems ‘Id al-Fitr (“Festival of Fast-breaking”), or Al-‘id as- saghir (“Lesser Festival”). It follows immediately the ninth or the fasting-month, Ramadan, occupying the first three days of the tenth month, Shawwal. It is, therefore, also called by Turks Ramazan Bairam, and exhibits more outward signs of rejoicing than the technically “Greater Festival.” Official receptions are held on it, and private visits paid; friends con- gratulate one another, and presents are given; new clothes

are put on, and the graves of relatives are visited. The second, or ” Greater Festival,” is called by the Turks Qurhan Bairam, Sacrifice Bairam,” and by Arabic speakers Al-‘id al-kabir, ” Greater Festival,”, or ‘Id al-adha, “Festival of Sacrifice.” It falls on the tenth, and two or three following days, of the last month, Dhu-l-hijja, when the pilgrims each slay a ram, a he-goat, a cow or a camel in the valley of Mina in commemoration of the ransom of Ishmael with a ram. Similarly throughout the Moslem world, all who can afford it sacrifice at this time a legal animal, and either consume the flesh themselves or give it to the poor. Otherwise it is celebrated like the ” Lesser Festival,” but with less ardour. Both festivals, of course, belong to a lunar calendar, and move through the solar year every thirty-two years.

See Lane’s Modern Egyptians, chap. xxv. ; Miehell, Egyptian Calendar; Hughes, Dictionary of Islam, pp. 192 ff . ; Sir R. Burton, Pilgrimage, chaps, vii., xxx. (D. B. Ma.)

BAIRD, SIR DAVID (1757-1829), British general, was born at Newbyth in Aberdeenshire in December 1757. He entered the British army in 1773, and was sent to India in 1779 with the 73rd (afterwards 71st) Highlanders, in which he was a captain. Immediately on his arrival, Baird was attached to the force commanded by Sir Hector Munro, which was sent forward to assist the detachment of Colonel Baillie, threatened by Hyder Ali.

In the action which followed the whole force was destroyed, and Baird, severely wounded, fell into the hands of the Mysore chief. The prisoners, who were most barbarously treated, remained captive for over four years. Baird's mother, on hearing that her son and other prisoners were in fetters, is said to have remarked, " God help the chiel chained to oor Davie." The bullet was not extracted from Baird's wound until his release. He became major in 1787, visited England in 1789, and purchased a lieutenant-colonelcy in 1790, returning to India in the following year. He held a brigade command in the war against Tippoo, and served under Cornwallis in the Seringapatam operations of 1792, being promoted colonel in 1795. Baird served also at the Cape of Good Hope as a brigadier-general, and he returned to India as a major-general in 1798. In the last war against Tippoo in 1799 Baird was appointed to the senior brigade commandinthearmy. At thesuccessful assaultof Seringa- patam Baird led the storming party, and was soon a master of the stronghold in which he had long been a prisoner. He had been disappointed that the command of the large contingent of the nizam was given to Colonel Arthur Wellesley; and when after the capture of the fortress the same officer obtained the governorship, Baird judged himself to have been treated with injustice and disrespect. He afterwards received the thanks of parliament and of the East India Company for his gallant bearing on that important day, and a pension was offered to him by the Company, which he declined, apparently from the hope of receiving the order of the Bath from the government. General Baird commanded the Indian army which was sent in 1801 to co-operate with Abercromby in the expulsion of the French from Egypt. Wellesley was appointed second in command, but owing to ill-health did not accompany the expedition. Baird landed at Kosseir, conducted his army across the desert to Kena on the Nile, and thence to Cairo. He arrived before Alexandria in time for the final operations. On his return to India in 1802, he was employed against Sindhia, but being irritated at another appointment given to Wellesley he relin- quished his command and returned to Europe. In 1804 he was knighted, and in 1805-1806, being by now a lieutenant-general, he commanded the expedition against the Cape of Good Hope with complete success, capturing Cape Town and forcing the Dutch general Janssens to surrender. But here again his usual ill luck attended him. Commodore Sir Home Popham persuaded Sir David to lend him troops for an expedition against Buenos Aires; the successive' failures of operations against this place involved the recall of Baird, though on his return home he was

quickly re-employed as a divisional general in the Copenhagen expedition of 1807. During the bombardment of Copenhagen Baird was wounded. Shortly after his return, he was sent out to the Peninsular War in command of a considerable force

which was sent to Spain to co-operate with Sir John Moore, to whom he was appointed second in command. It was Baird's misfortune that he was junior by a few days both to Moore and to Lord Cavan, under whom he had served at Alexandria, and thus never had an opportunity of a cMef command in thfe field. At the battle of Corunna he succeeded to the supreme command after Moore's fall, but shortly afterwards his left arm was shattered, and the command passed to Sir John Hope. He again obtained the thanks of parliament for his gallant servicesy and was made a K.B. and a baronet. Sir David married Miss Campbell-Preston, a Perthshire heiress, in 1810. ■ He was not employed again in the field, and personal and political enmities caused him to be neglected and repeatedly passed over. He was not given the full rank of general until 1814, and his governor- ship of Kinsale was given five years later. In 1820 he was appointed commander-in-chief in Ireland, but the command was soon reduced, and he resigned in 1822. He died on the 18th of August 1829.

See Theodore Hook's Life of Sir David Baird.

BAIRD, HENRY MARTYN (1832-1906), American historian and educationalist, a son of Robert Baird (1 798-1863), a Presbyterian preacher and author who worked earnestly both in the United States and in Europe for the cause of temperance, was born in Philadelphia, Pennsylvania, on the 17th of January 1832. He spent eight years of his early youth with his father in Paris and Geneva, and in 1850 graduated at New York University. He then lived for two years in Italy and Greece, was a student in the Union Theological Seminary in New York city from 1853 to 1855, and in 1856 graduated at the Princeton Theological Seminary. He was a tutor for four years in the College of New Jersey (now Princeton University), and from 1859 until his death was professor of Greek language and litera- ture in New York University. He is best known, however,, as a historian of the Huguenots. His work, 'which appeared in three parts, entitled respectively History of the Rise of the Huguenots 0} France (2 vols., 1879), The Huguenots and Henry of Navarre (2 vols., 1886), and The Huguenots and the Revocation of the Edict of Nantes (2 vols., 1895), is characterized by painstaking thoroughness, by a judicial temper, and by scholarship of a high

order. He also published Modern Greece, A Narrative of a Residence and Travels in that Country (1856); a biography of his father, The Life of the Rev. Robert Baird, D.D. (1866); and Theodore Beza, the Counsellor of the French Reformation (1899). He died in New York city on the nth of November 1906.

His brother, Charles Washington Baird (1828-1887), a graduate of New York University (1848) and of the Union Theological Seminary (1852), and the minister in turn of a Dutch Reformed church at Brooklyn, New York, and of a Presbyterian church at Rye, New York, also was deeplyinter- ested in the history of the Huguenots, and published a scholarly work entitled The History of the Huguenot Emigration to America (2 vols., 1885), left unfinished at his death.

BAIRD, JAMES (1802-1876) Scottish iron-master, was born at Kirkwood, Lanarkshire, on the 5th of December 1802, the son of a coal-master. In 1826 his father, two brothers and himself leased coalfields at Gartsherrie and in the vicinity, and in 1828 iron mines near by, and in 1830 built blast furnaces. In this year the father retired, the firm of William Baird & Co. was organized, and James Baird assumed active control. His improvements in machinery largely increased the output of his furnaces, which by 1864 had grown in number to nearly fifty, producing 300,000 tons annually and employing 10,000 hands. The brothers became great land- owners, and James wasM. P. for the Falkirk burghs in 1851ˆ185 2and 1852-1857. He died at his estate near Ayr on the 20th of June 1876, leaving property valued at three million pounds. He had been during his life a great public benefactor, founding schools and the Baird Lectures (1871) for the defence of orthodox theologyˆ and in 1873 the Baird Trust of £500,000 to enable the Established Church of Scotland to cope with the spiritual needs of the masses.- He was twice married but left no children.

BAIRD, SPENCER FULLERTON (1823-1887), American naturalist, was born in Reading, Pennsylvania, on the 3rd of

February 1823. Hegraduated at Dickinson College, Carlisle, Penn- sylvania in 1840, and next year made an ornithological excursion through the mountains of Pennsylvania, walking, says one of his

biographers, ” 400 m. in twenty-one days, and the last day 60 m.” In 1838 he met J. J. Audubon, and thenceforward his studies were largely ornithological, Audubon giving him a part of his own collection of birds. After studying medicine for a time, Baird became professor of natural history in Dickinson College in 1845, assuming also the duties of the chair of chemistry, and giving instruction in physiology and mathematics. This variety of duties in a small college tended to give him that breadth of scientific interest which characterized him through life, and made him perhaps the most representative general man of science in America. For the long period between 1850 and 1878 he was assistant-secretary of the Smithsonian Institution, Washing- ton, and on the death of Joseph Henry he became secretary. From 1871 till his death he was U.S. Commissioner of Fish and Fisheries. While an officer of the Smithsonian, Baird’s duties included the superintendence of the labour of workers in widely different lines. Thus, apart from his assistance to others, his own studies and published writings cover a broad range: iconography, geology, mineralogy, botany, anthropology, general zoology, and, in particular, ornithology; while for a series of years he edited an annual volume summarizing progress in all scientific lines of investigation. He gave general superin- tendence, between 1850 and i860, to several government expedi- tions for scientific exploration of the western territories of the United States, preparing for them a manual of Instructions to Collectors. Of his own publications, the bibliography by G. Brown Goode, from 1843 to the close of 1882, includes 1063 entries, of which 775 were short articles in his Annual Record. His most important volumes, on the whole, were Birds, in the series of reports of explorations and surveys for a railway route from the Mississippi river to the Pacific ocean (1858), of which Dr Elliott Coues says (as quoted in the Popular Science Monthly, xxxiii. 553) that it ” exerted an influence perhaps stronger and more widely felt than that of any of its predecessors, Audubon’s and Wilson’s not excepted, and marked an epoch in the history of American ornithology “; Mammals of North America: Descriptions based on Collections in the Smithsonian Institution (Philadelphia, 1859) ; and the monumental work (with Thomas Mayo Brewer and Robert Ridgway) History of North American Birds (Boston, 1875 — 1884; ” Land Birds,” 3 vols., ” Water Birds,” 2 vols). He died on the ioth of August 1887 at the great marine biological laboratory at Woods Hole, Massachusetts, an institution which was largely the result of his own efforts, and which has exercised a wide effect upon both scientific and economic ichthyology.

BAIRNSDALE, a town of Tanjil county, Victoria, Australia, on the Mitchell river, 171 m. by rail E. of Melbourne. Pop. (1901) 3074. It lies near the head of a lagoon called Lake King, which is open to the sea, and affords regular communication by water with Melbourne. In the district, which is chiefly pastoral, there are several goldfields, with both alluvial and reef mining. The town has tanneries, and cheese and butter factories. There is an active shipping trade with Melbourne in maize and other grain, hops, fruit and dairy produce.

BAITER, JOHANN GEORG (1801-1877), Swiss philologist and textual critic, was born at Zurich on the 31st of May 1801. Having received his early education in his native place, he went (1818) to the university of Tubingen, but from want of funds was obliged to return to Zurich, where for several years he was a private tutor. From 1824 to 1829 he studied at Munich under Friedrich Thiersch; at Gottingen, under Georg Dissen; at Konigsberg, under Christian Lobeck. From 1833 to 1876 he was Oberlehrer at the gymnasium in Zurich, where he died on the ioth of October 1877. Baiter's strong point was textual criticism, applied chiefly to Cicero and the Attic orators; he was very successful in hunting up the best MS. authorities, and his collations were made with the greatest accuracy. Most of his works were produced in collaboration with other scholars, such as Orelli, who regarded him as his right-hand man. He edited Isocrates, Panegyricus (1831); with Sauppe, Lycurgus, Leocralca

.».

(1834) and Oratores Atlici (1838-1850); with Orelli and Winckelmann, a critical edition of Plato (1839-1842), which marked a distinct advance in the text, two new MSS. being laid under contribution; with Orelli, Babrius, Fabellae Iambicae nuper repertae (1845); Isocrates, in the Didot collection of classics (1846). He had for some time been associated with Orelli in his great work on Cicero, and assisted in Ciceronis Scholiastae (1833) undOnomasticon Tullianum(i8ˆ6-i&3&). ForiheFastiConsulares and Triumphales he was alone responsible. With Orelli and (after his death) Halm, he assisted in the second edition of the Cicero, and, with Kayser, edited the same author for the Tauchnitz series (1 860-1 869) . New editions of Orelli's Tacitus and Horace were also due to him. It is worth noting that, with Sauppe, he translated Leake's Topography of Athens.

BAIUS, or de Bay, MICHAEL (1513-1589), Belgian theologian, was born at Melun in Hainault in 1513. Educated at Louvain University, he studiedphilosophy and theology with distinguished success, and was rewarded by a series of academic appointments. In 1552 Charles V. appointed him professor of scriptural inter- pretation in the university. In 1563 he was nominated one of the Belgian representatives at the council of Trent, but arrived too late to take an important part in its deliberations. At Louvain, however, he obtained a great name as a leader in the anti-scholastic reaction of the 16th century. The champions of this reaction fought under the banner of St Augustine; and Baius' Augustinian predilections brought him into conflict with Rome on questions of grace, free-will and the like. In 1567 Pius V. condemned seventy-nine propositions from his writings in the Bull Ex omnibus ajjlictionibus. To this Baius submitted; though certain indiscreet utterances on the part of himself and his supporters led to a renewal of the condemnation in 1579 by Gregory XIII. Baius, however, was not disturbed in the tenure of his professorship, and even became chancellor of Louvain in 1575. He died, still in the enjoyment of these two dignities, in 1589. Baius is chiefly interesting as a forerunner of the more celebrated Cornelius Jansen (see Jansen). His writings are described by Harnack as a curious mixture of Catholic orthodoxy and unconscious tendencies to Protestantism; their most noticeable point is the great importance they attach to the fact of sin, both original and actual.

His principal works were published in a collected form at Cologne, 1696, 1 vol. 4to, in two parts; some large treatises have not been published. There is an excellent study of both books and author by Linsenmann, Michael Baius, unddie Grundlegung des Jansenismus, published at Tubingen in 1867.

BAIZE (16th century Fr. baies, cf. English "bay"), a material probably named from its original colour, though a derivation is also suggested from the Fr. baie, as the cloth is said to have been originally dyed with Avignon berries. It is generally a coarse, woollen cloth with a long nap and is commonly dyed green or red. It is now also made of cotton. The manufacture is said to have been introduced into England in the 16th century by refugees from France and the Netherlands. It is used chiefly for curtains, linings, &c, and sometimes, in the lighter makes, for clothing. Table baize is a kind of oilcloth used as a cheap and easily-cleaned covering for tables.

BAJOCIAN, in geology, the name proposed in 1849 by d'Orbigny for the rocks of Middle Jurassic age which are well developed in the neighborourhood of Bayeux, Calvados. The Bajocian stage is practically equivalent to the Inferior Oolite of .British geologists. It corresponds fairly closely with the Lower and Middle Brown Jura of Quenstedt, and with the Dogger of Oppel. By means of the fossil ammonites the Bajocia strata have been subdivided into the following zones, in descend- ing order: —

Zone of Parkinsonia Parhinsoni and Cosmoceras garantianurti ■ Coeloceras subcoronatum (Humphriesianum)

" Sonninia Romani

" Stephaeoceras Sowerbyi

" Harpoceras concavum

" " Murchisonae) _Substage Aalenien

" " opalinum \ of Mayer-Eymar.

It should be remarked that some European geologists prefer

to include the Parkinsonia zone in the base of the overlying Bathonian (

The Bajocian rocks of Europe are mostly limestones of various kinds, very frequently oolitic. At Bayeux, the type district, they are ferruginous oolites; in the Jura and Lorraine a coral limestone overlies a crinoidal variety; calcareous sandy and marly beds occur in Maine and Anjou; in Poitou the limestone is dolomitic and bears nodules of chert. Rocks of the same age, as recognized by their fossil contents, have a wide range; they are found in north Africa, Goa, Somaliland, German East Africa, and north-west Madagascar; through southern Europe they may be followed into Turkestan, and- the Kota-Maleri beds of the Upper Gondwana series of India may possibly belong to this stage. In South America they appear in Bolivia, Chile and Argentina; in North America, in British Columbia, Dakota, Mexico, Oregon and California. The Bajocian sea also included parts of New South Wales, New Zealand (Flag Hills beds?), Borneo and Japan, and it

extended into the polar region of eastern Greenland and Franz Josef Land.

In addition to the ammonites already mentioned, the large belemnites (Megateuthis giganteus) and terebratulas (T. perovalis) are worthy of notice; crinoids and corals were abundant, and so also were certain forms of Trigonia (T. costata), Pleurotomaria and Cidaris.

See Jurassic; also A. de Lapparent, Traite de geologie, vol. ii. (5th ed., 1906); and H. B. Woodward, “The Jurassic Rocks of Britain,” vol. iv., 1894 (Mem. Geol. Survey); both works contain references to original papers. (J. A. H.)

BAJOUR, or Bajaur, a small district peopled by Pathan races 6i Afghan origin, in the North- West Frontier Province of India. It is about 45 m. long by 20. broad, and lies at a high level to the east of the Kunar valley, from which it is separated by a continuous line of rugged frontier hills, forming a barrier easily passable at one or two points. Across this barrier the old road from Kabul to India ran before the Khyber Pass was adopted as the main route. Bajour is inhabited almost exclusively by Tarkani (Tarkalanri) Pathans, sub-divided into Mamunds, Isazai, and Ismailzai, numbering together with a few Mohmands, Utmauzais, &c, about 100,000. To the south of Bajour is the wild mountain district of the Mohmands, a Pathan race. To the east, beyond the Panjkora river, are the hills of Swat, dominated by another Pathan race. To the north is an inter- vening watershed between Bajour and the small state of Dir; and it is over this watershed and through the valley of Dir that the new road from Malakand and the Punjab runs to Chitral. The drainage of Bajour flows eastwards, starting from the eastern slopes of the dividing ridge which overlooks the Kunar and terminating in the Panjkora river, so that the district lies on a slope tilting gradually downwards from the Kunar ridge to the Panjkora. Nawagai is the chief town of Bajour, and the khan of Nawagai is under British protection for the safe-guarding of the Chitral road. Jandol, one of the northern valleys of Bajour, has ceased to be of political importance since the failure of its chief, Umra Khan, to appropriate to himself Bajour, Dir, and a great part of the Kunar valley. It was the active hostility between the amir of Kabul (who claimed sovereignty of the same districts) and Umra Khan that led, firstly to the demarcation agreement of 1893 which fixed the boundary of Afghanistan in Kunar; and, secondly, to the invasion of Chitral by Umra Khan (who was no party to the boundary settlement) and

the siege of the Chitral fort in 1895.

An interesting feature in Bajour topography is a mountain spur from the Kunar range, which curving eastwards culminates in the well-known peak of Koh-i-Mor, which is visible from the Peshawar valley. It was here, at the foot of the mountain, that Alexander found the ancient city of Nysa and the Nysaean colony, traditionally said to have been founded by Dionysus. The Koh-i-Mor has been identified as the Meros of Arrian's history — the three-peaked mountain from which the god issued. It is also interesting to find that a section of the Kafir community of Kamdesh still claim the same Greek origin as did the Nysaeans ; still chant hymns to the god who sprang from Gir Nysa (the

mountain of Nysa); whilst they maintain that they originally migrated from the Swat country to their present habitat in the lower Bashgol. Long after Buddhism had spread to Chitral, Gilgit, Dir and Swat; whilst Ningrahar was still full of monasteries and temples, and the Peshawar valley was recognized as the seat of Buddhist learning, the Kafirs or Nysaeans held their own in Bajour and in the lower Kunar valley, where Buddhismapparently never prevailed. It is probable that the invader Baber (who has much to say about Bajour) fought them there in the early years of the 1 6th century, when on his way to found the Mogul dynasty of India centuries after Buddhism has been crushed in northern India by the destroyer Mahmud.

The Gazetteers and Reports of the Indian government contain nearly all the modern information available about Bajour. The autobiography of Baber (by Leyden and Erskine) gives interesting details about the country in the 16th century. For the connexion between the Kafirs and the ancient Nysaeans of Swat, see R. G. S. Journal, vol. vii., 1896. (T. H. H.*)

BAJZA, JOSEPH (1804-1858), Hungarian poet and critic, was born at Sziicsi in 1804. His earliest contributions were made to Kisfaludy's Aurora, a literary paper of which he was editor from 1830 to 1837. He also wrote largely in the Kritiscke Blatter, the Athenaeum, and the Figyelmezo or Observer. His criticisms on dramatic art were considered the best of these mis- cellaneous writings. In 1830 he published translations of some foreign dramas, Auslandische Biihna, and in 1835 a collection of his own poems. In 1837 he was made director of the newly established national theatre at Pest. He then, for some years, devoted himself to historical writing, and published in succession the Historical

Library (Tdrtereti Konyvtdr), 6 vols., 1843-1845; the Modern Plutarch (Uj Plutarch), 184 5-1847 ; and the Universal History (Vildgtoritet), 1847. These works are to some extent translations from German authors. In 1847 Bajza edited the journal of the opposition, Ellenor, at Leipzig, and in March 1848 Kossuth made him editor of his paper, Kossuth Hirlapja. In 1850 he was attacked with brain disease and died in 1858.

BAKALAI (Bakale, Bangouens), a Bantu negroid tribe inhabiting a wide tract of French Congo between the river Ogowe and 2° S. They appear to be immigrants from the south-east, and have been supposed to be connected racially with the Galoa, one of the Mpongwe tribes and the chief river- people of the Ogowe. The Bakalai have suffered much from the incursions of their neighbours the Fang, also arrivals from the south-east, and it may be that they migrated to their present abode under pressure from this people at an earlier date. They are keen hunters and were traders in slaves and rubber; the slave traffic has been prohibited by the French authorities. Their women display considerable ingenuity in dressing their hair, often taking a whole day to arrange a coiffure ; the hair is built up on a substructure of clay and a good deal of false hair incorporated; a coat of red, green or yellow pigment often completes the effect. The same colours are used to decorate the hut doors. The villages, some of which are fortified with pali- sades, are usually very dirty; chiefs and rich men own planta- tions which are situated at some distance from the village and to which their womenfolk are sent in times of war. The Bakalai of Lake Isanga cremate their dead; those of the Upper Ogowe throw the bodies into the river, with the exception of those killed in war. The body of a chief is placed secretly in a hut erected in the depths of the forest, and the village is deserted for that night, in some cases altogether; the slaves of the deceased are (or were) sacrificed, and his wives scourged and secluded in huts for a week. ” Natural ” deaths are attributed to the machinations of a sorcerer, and the poison-ordeal is often practised. Of their social organization little is known, but it appears that nearly all individuals refrain from eating the flesh of some particular animal.

BAKE, JAN (1787-1864), Dutch philologist and critic, was born at Leiden on the 1st of September 1787, and from 1817 to 1854 he was professor of Greek and Roman literature at the university. He died on the 26th of March 1864. His principal works are: — Posidonii Rhodii Reliquiae Doctrinae (1810); Cleomedis

Circularis Doctrina de Sublimitate (1820); Bibliotheca

Critica Nova (1825-1831) and Scholica Hypomnemata (1837-1862), a collection of essays dealing mainly with Cicero and the Attic orators; Cicero, De Legibus (1842) and De Oratore (1863); the Rhetorica of Apsines and Longinus (1849).

His biography was written (in Dutch) by his pupil Bakhuizen van der Brink (1865); for an appreciation of his services to classical literature see L. Miiller, Geschichte der klassischen Philologie in den Niederlanden (1869).

BAKER, SIR BENJAMIN (1840-1907), English engineer, was born near Bath in 1840, and, after receiving his early training in a South Wales ironworks, became associated with Sir John Fowler in London. He took part in the construction of the Metropolitan railway (London), and in designing the cylindrical vessel in which Cleopatra's Needle, now standing on the Thames Embankment, London, was brought over from Egypt to England in 1877-1878. By this time he had already made himself an authority on bridge-construction, and shortly afterwards he was engaged on the work which made his reputation with the general public — the design and erection of the Forth Bridge. On the completion of this undertaking in 1890 he was made K.C.M.G., and in the same year the Royal Society recognized his scientific attainments by electing him one of its fellows. Twelve years later at the formal opening of the Assuan dam, for which he was consulting-engineer, he was created K.C.B. Sir Benjamin Baker, who also had a large share in the introduc- tion of the system widely adopted in London of constructing intra-urban railways in deep tubular tunnels built up of cast iron segments, obtained an extremely large professional practice, ranging over almost every branch of civil engineering, and was more or less directly concerned with most of the great engineering achievements of his day. He was also the author of many papers on engineering subjects. He died at Pangbourne, Berks, on the 19th of May 1907.

BAKER, HENRY (1698-1774), English naturalist, was born in London on the 8th ofMay 1698. After serving an apprentice- ship with a bookseller, he devised a system of instructing the deaf and dumb, by the practice of which he made a considerable fortune.

It brought him to the notice of Daniel Defoe, whose youngest daughter Sophia he married in 1729. A year before, under the name of Henry Stonecastle, he was associated with Defoe in starting the Universal Spectator attd Weekly Journal. In 1740 he was elected fellow of the Society of Antiquaries and of the Royal Society. He contributed many memoirs to the Transactions of the latter society, and in 1744 received the Copley gold medal for microscopical observations on the crystal- lization of saline particles. He was one of the founders of the Society of Arts in 1754, and for some time acted as its secretary. He died in London on the 25th of November 1774. Among his publications were The Microscope made Easy (1743), Employment for the Microscope (1753), and several volumes of verse, original and translated, including The Universe, a Poem intended to restrain the Pride of Man (1727). His name is perpetuated by the Bakerian lecture of the Royal Society, for the foundation of which he left by will the sum of £100.

BAKER, SIR RICHARD (1568-1644/5), author of the Chronicle of the Kings of England and other works, was probably born at Sissinghurst in Kent, and entered Hart Hall, Oxford, as a commoner in 1584. He left the university without taking a degree, studied law in London and afterwards travelled in Europe. In 1593 he was chosen member of parliament for Arundel, in 1594 his university conferred upon him the degree of M.A., and in 1,597 ne was elected to parliament as the repre- sentative of East Grinstead. In 1603 he was knighted by King James I., in 1620 he acted as high sheriff at Oxfordshire where he owned some property, and soon afterwards he rnarried Margaret, daughter of Sir George Mainwaring, of Ightfield, Shropshire. By making himself responsible for some debts of his wife's family, he was reduced to great poverty, which led to the seizure of his Oxfordshire property in 1625. Quite penniless, he took refuge in the Fleet prison in 1635, an d was still in con- finement when he died on the 18th of February 1644 (1645). He was buried in the church of St Brid«, Fleet Street, London.

During his imprisonment Baker spent his time mainly in writing. His chief work is the Chronicle of the Kings of England from the Time of the Romans' Government unto the Death of King James (1643, and many subsequent editions). It was translated into Dutch in 1649, and was continued down to 1658 by Edward Phillips, a nephew of John Milton. For many years the Chronicle was extremely popular, but owing to numerous inaccuracies its historical value is very slight. Baker also wrote Cato Variegatus

or Catoes Morall Distichs, Translated and Paraphrased by Sir Richard Baker, Knight (London, 1636); Meditations on the Lord's Prayer (1637); Translation of New Epistles by Moonsieur D' Balzac (1638); Apologie for Laymen's Writing in Divinity, with a Short Meditation upon the Fall of Lucifer (1641); Motives for Prayer upon the seaven dayes of ye weeke (1642); a transla- tion of Malvezzi's Discourses upon Cornelius Tacitus (1642), and TheatrumRedivivum, or The Theatre Vindicated, a reply to the Histrio-Mastix of William Prynne (1642). He also wrote Meditations upon several of the psalms of David, which have been collected and edited by A. B. Grosart (London, 1882).

See J. Granger, Biographical History of England to the Revolution (London, 1804); Biographia Britannica, corrected by A. Kippis (London, 1778-1793).

BAKER, SIR SAMUEL WHITE (1821-1893), English explorer, was born in London on the 8th of June 182 1. He was educated partly in England and partly in Germany. His father, a West India merchant, destined him for a commercial career, but a short experience of office work proved him to be entirely un- suited to such a life. On the 3rd of August 1843 he married Henrietta Biddulph Martin, daughter of the rector of Maisemore, Gloucestershire, and after two years in Mauritius the desire for travel took him in 1846 to Ceylon, where in the following year he founded an agricultural settlement at Nuwara Eliya, a mountain health-resort. Aided by his brother, he brought emigrants thither from England, together with choice breeds of cattle, and before long the new settlement was a success. During his residence in Ceylon he published, as a result of many adven- turous hunting expeditions, The Rifle and the Hound in Ceylon (1853), and two years later Eight Years' Wanderings in Ceylon (1855). After a journey to Constantinople and the Crimea in 1856, he found an outlet for his restless energy by undertaking the supervision of the construction of a railway across the Dobrudja, connecting the Danube with the Black Sea. After its completion he spent some months in a tour in south-eastern Europe and Asia Minor. It was during this time that he met in Hungary the lady who (in i860) became his second wife, Florence, daughter of Finnian von Sass, his first wife having died in 1855. In March 1861 he started upon his first tour of explora- tion in central Africa. This, in his own words, was undertaken " to discover the sources of the Nile, with the hope of meeting the East African expedition under Captains Speke and Grant somewhere about the Victoria Lake." After a year spent on the Sudan-Abyssinian border, during which time he

learnt Arabic, explored the Atbara and other Nile tributaries, and proved that the Nile sediment came from Abyssinia, he arrived at Khartum, leaving that city in December 1862 to follow up the course of the White Nile. Two months later at Gondokoro he met Speke and Grant, who, after discovering the source of the Nile, were following the river to Egypt. Their success made him fear that there was nothing left for his own expedition to accomplish; but the two explorers generously gave him information which enabled him, after separating from them, to achieve the discovery of Albert Nyanza, of whose existence credible assurance had already been given to Speke and Grant. Baker first sighted the lake on the 14th of March 1864. After some time spent in the exploration of the neighbourhood, during which Baker demonstrated that the Nile flowed through the Albert Nyanza — of whose size he formed an exaggerated idea— he started upon his return journey, and reached Khartum after many checks in May 1865. In the following October he returned to England with his wife, who had accompanied him throughout the whole of the perilous and arduous journey. In recognition ,of the achievements by which Baker had indissolubly linked his name

with the solution of the problem of the Nile sources, the Royal Geographical Society awarded him its gold medal, and a similar distinction was bestowed on him by the Paris Geographical Society. In August 1866 he was knighted. In the same year he published The Albert N'yanza, Great Basin of the Nile, and Explorations of the Nile Sources, and in 1867 The Nile Tributaries of Abyssinia^ both books quickly going through several editions. In 1868 he published a popular story called Cast up by the Sea. In 1869 he attended the prinee of Wales, afterwards King Edward VII., in a tour through Egypt. In the same year, at the request of the khedive Ismail, Baker undertook the command of a military expedition to the equatorial regions of the Nile, with the object of suppressing the slave-trade there and opening the way to commerce and civilization. Before starting from Cairo with a force of 1 700 Egyptian troops — many of them discharged convicts — he was given the rank of pasha and major-general in the Ottoman army. Lady Baker, as before, accompanied him. The khedive appointed him governor-general of the new territory for four years at a salary of £10,000 a year; and it was not until the expiration of that time that Baker returned to Cairo, leaving his

work to be carried on by the new governor, Colonel Charles George Gordon. He had to contend with innumerable difficulties —the blocking of the river by sudd, the bitter hostility of officials interested in the slave-trade, the armed opposition of the natives — but he succeeded in planting in the new territory the foundations upon which others could build up an administration. He returned to England with his wife in 1874, and in the following year purchased the estate of Sandford Orleigh in South Devon, where he made his home for the rest of his life. He published his narrative of the central African expedition under the title of Ismailia (1874). Cyprus as I saw it in 18 jg was the result of a visit to that island. He spent several winters in Egypt, and travelled in India, the Rocky Mountains and Japan in search of big game, publishing in 1890 Wild Beasts and their Ways. He kept up an exhaustive and vigorous correspondence with men of all shades of opinion upon Egyptian affairs, strongly opposing the abandonment of the Sudan and subsequently urging its reconquest. Next to these, questions of maritime defence and strategy chiefly attracted him in his later years. He died at Sandford Orleigh on the 30th of December 1893.

See, besides his own writings, Sir Samuel Baker, a Memoir, by T. Douglas Murray and A. Silva White (London, 1895).

BAKER, THOMAS (1656-1740), English antiquary, was born on the 14th of September 1656 at Lanchester, Durham. He was the grandson of Colonel Baker of Crook, Durham, who won fame in the civil war by his defence of Newcastle against the Scots. He was educated at the free school at Durham, and proceeded thence in 1672 to St John's College, Cambridge, where he afterwards obtained a fellowship. Lord Crew, bishop of Durham, collated him to the rectory of Long-Newton in his diocese in 1687, and intended to give him that of Sedgefield with a prebend had not Baker incurred his displeasure by refusing to read James II. 's Declaration of Indulgence. The bishop who disgraced him for this refusal, and who was after- wards specially excepted from William's Act of Indemnity, took the oaths to that king and kept his bishopric till his death. Baker, on the other hand, though he had opposed James, refused to take the oaths to William; he resigned Long-Newton on the 1st of August 1690, and retired to St John's, in which he was protected till the 20th of January 1716-1717, when he and one – and – twenty others were deprived of their fellowships. After the passing of the Registering Act in 1723, he could not be prevailed on to comply with its requirements by registering his annuity of £40, although that

annuity, left him by his father, with £20 per annum from his elder brother's collieries, was now his whole subsistence. He retained a lively sense of the injuries he had suffered; and inscribed himself in all his own books, as well as in those which he gave to the college library, socius ejectus, and in some rector ejectus. He continued to reside in the college as commoner-master till his sudden death from apoplexy on the 2nd of July 1746. The whole of his valuable books and manuscripts he bequeathed to the university. The only works

he published were, Reflections on Learning, showing the Insufficiency thereof in its several particulars, in order to evince the usefulness and necessity of Revelation (Lond., 1700-17 10) and the preface to Bishop Fisher's Funeral Sermon for Margaret, Countess of Richmond and Derby (1708) — both without his name. His valuable manuscript collections relative to the history and antiquities of the university of Cambridge, amounting to thirty- nine volumes in folio and three in quarto, are divided between the British Museum and the public library at Cambridge,ˆ-the former possessing twenty-three volumes, the latter sixteen in folio and three in quarto.

The life of Baker was written by Robert Masters (Camb., 1784), and by Horace Walpole in the quarto edition of his works.

BAKER, VALENTINE [Baker Pasha] (1827-1887), British soldier, was a younger brother of Sir Samuel Baker {q.v.). He was educated at Gloucester and in Ceylon, and in 1848 entered the Ceylon Rifles as an ensign. Soon transferred to the 12 th Lancers, he saw active service with that regiment in the Kaffir war of 1852-53. In the Crimean War Baker was present at the action of Traktir (or Tchernaya) and at the fall of Sevastopol, and in 1859 he became major in the 10th Hussars, succeeding only a year later to the command. This position he held for thirteen years, during which period the highest efficiency of his men was reached, and outside the regiment he did good service to his arm by his writings. He went through the wars of 1866 and 1870 as a spectator with the German armies, and in 1873 he started upon a famous journey through Khorassan. Though he was unable to reach Khiva the results of the journey afforded a great deal of political, geographical and military information, especially as to the advance of Russia in central Asia. In 1874 he was back in England and took up a staff appointment at Aldershot. Less than a year later Colonel Baker's career in the British army came to an untimely end. He was arrested on a charge of indecent assault

upon a young woman in a railway carriage, and was sentenced to a year's imprisonment and a fine. His dismissal from the service was an inevitable consequence ; it must be stated, however, that the view taken of the circumstances by good authorities was that Baker's conduct, when judged by conventional standards, admitted of considerable extenuation. He himself never opened his mouth in self-defence. Two years later, having meanwhile left England, he entered the service of Turkey in the war with Russia. At first in a high position in the gendarmerie, he was soon transferred to Mehemet's staff, and thence took over the command of a division of infantry. With this division Baker sustained the brilliant rearguard action of Tashkessan against the troops of Gourko. Promoted Ferik (lieutenant-general) for this feat, he continued to command Suleiman's rearguard with distinction. After the peace he was employed in an administrative post in Armenia, where he remained until 1882. In this year he was offered the command of the newly formed Egyptian army, which he accepted. On his arrival at Cairo, however, the offer was withdrawn and he only obtained the command of the Egyptian police. In this post he devoted by far the greater amount of his energy to the training of the gendarmerie, which he realized would be the reserve of the purely military forces.

When the Sudan War broke out, Baker, hastening with 3500 men to relieve Tokar, encountered the enemy under Osman Digna at El Teb. His men became panic-stricken at the first rush and allowed themselves to be slaughtered like sheep. Baker himself with a few of his officers succeeded by hard fighting in cutting a way out, but his force was annihilated. British troops soon afterwards arrived at Suakin, and Sir Gerald Graham took the offensive. Baker Pasha accompanied the British force, and guided it in its march to the scene of his defeat, and at the desperately-fought second battle of El Teb he was wounded. He remained in command of the Egyptian police until his death in 1887. Amongst his works may be mentioned Our National Defences (i860), War in Bulgaria, a Narrative of Personal Ex- perience (London, 1879), Clouds in the East (London, 1876).

BAKER CITY, a city and the county-seat of Baker county, Oregon, U.S.A., about 337 m. E. by S. of Portland. Pop. (1896ˆ

2604; (1000)6663 (1 01 7 foreign-born); (1910)6742. The city is served by the Oregon Railroad & Navigation Company, and by the Sumpter Valley railway, a short line (62 m.) extending from Baker City to Austin, Oregon. Baker City lies in the valley of Powder river, at the base of the Blue Mountains, and has an elevation. of about 3440 ft. above the sea. It is the largest city in eastern Oregon, and is the centre of important mining, lumber, farming and live-stock interests. It was laid out as a town in 1865, became the county-seat in 1868, and was chartered as a city in 1874. The county and the city were named in honour of Edward Dickinson Baker (1811-1861), a political leader, orator and soldier, who was born in London, England, was taken to the United States in 1&15, was a representative in Congress from Illinois in i845-i846and 1849-1851, served in the Mexican War as a colonel (1846-1847), became a prominent lawyer in California and later in Oregon, was a Republican member of the United States Senate in 1860-186 1 and was killed at Ball's Bluff , Virginia, on the 2 istof Octoberin 1 86 1 , while serving as a colonel in the Federal army.

BAKEWELL, ROBERT (1725-1795) English agriculturist, was born at Dishley, Leicestershire, in 1725; His father, a farmer at the same place, died in 176c, and Robert Bakewell then took over the management of the estate. By visiting a large number of farms all over the country, he had already acquired a wide theoretical knowledge of agriculture and stock-breeding; and this knowledge he now put to practical use at Dishley. His main object was to improve the breed of sheep and oxen, and in this he was highly successful, his new Leicestershire breed of sheep attaining within little more than half a century an international reputation, while the Dishley cattle (also known as the new Leicestershire long-horn) became almost as famous. He extended his breeding experiments to horses, producing a new and particu- larly useful type of farm-horse. He was the first to establish the trade in ram-letting on a large scale, and founded the Dishley Society, the object of which was to ensure purity of breed. The value of his own stock was quickly recognized, and in one year he made 1 200 guineas from the letting of a single ram. Bakewell's agricultural experiments were not confined to stock-breeding. His reputation stood high in every detail of farm-management, and as an improver of grass land by systematic irrigation he had no rival. He died on the 1st of October 1795.

BAKEWELL, ROBERT (1 768-1843), English geologist, was born in 1 768. He was an able observer, and deserving of mention as one

of the earliest teachers of general and practical geology. His Introduction to Geology (1813) contained much sound information, and reached a fifth edition in 1838. The second edition was translated and published in Germany, and the third and fourth editions were reprinted in America by Professor Silliman of Yale College. Bakewell as author also of an Introduction to Mineralogy (1819), and of Travels comprising Observations made during a Residence in the Tarentaise, &c. (2 vols., 1823). He died at Hampstead on the 15th of August 1843.

BAKEWELL, a market-town in the western parliamentary division of Derbyshire, England, on the river Wye, 25 m. N.N.W. of Derby, on the Midland railway. Pop. of urban district (1901) 2850. The church of All Saints is mentioned in Domesday, and tradition ascribes the building of its nave to King John, while the western side of the tower must be older still. Within are some admirable specimens of encaustic tiles, and several monuments of the Vernon and Manners families; while an ancient rUnic rood- stone stands in the churchyard. Zinc and marble are worked in the neighbourhood. The cotton manufacture was established in the town by Sir Richard Arkwright. Bakewell is noted for a chalybeate spring, of use in cases of chronic rheumatism, and there are baths attached to it. A kind of jam-cake, called a ” Bakewell pudding,” gives another sort of fame to the place, The almshouses, known as St John’s hospital, were founded in 1602; and in 1637 a free grammar school was endowed by Lady Grace Manners. Among modern buildings may be mentioned the Bakewell and High Peak Institute, and the town hall and museum. On Castle Hill, in the vicinity, are the remains of an earthwork, said to have been raised by Edward the Elder in 924., Within the parish are included the mansions of Burton Closes

and Castle Hill. Two miles from, the town, amidst beautiful gardens and meadows, is Haddon Hall. To the east lies the magnificent domain of Chatsworth. The scenery of the neighbourhood, in both the Wye and the Derwent valleys, is very beautiful; the village of Eyam (pronounced Eem) near the Derwent may be noticed as specially picturesque. The plague of 1665, carried hither from London, almost depopulated this village, and the name of the rector, William Mompesson, attracted wide notice on account of his brave attempts to combat the outbreak.

BAKHCHI-SARAI (Turk, for ” garden-palace “), a town of Russia, in the government of Taurida, situated in a narrow gorge in the

Crimea, 20 m. by rail S:S.W. of Simferopol. From the close of the 15 th century down to 1783 it was the residence of the Tatar khans of the Crimea; and its streets wear a decidedly oriental look. The principal building, the palace, or Khan-sarai, was originally erected in 1519 by Abdul-Sahal-Ghirai, destroyed in 1736, and restored at Potemkin's Command for the reception of Catherine II. Attached to it is a mausoleum, which contains the tombs of many of the khans. There are in the place no fewer then thirty-six mosques. The population consists for the most part of Tatars. Bakhchi-sarai manufactures morocco, sheep- skin cloaks, agricultural implements, sabres and cutlery. Pop. (1897) 12,955. Two and a half miles to the east is Chufut-Kaleh (or Jews' city), formerly the chief seat of the Karaite Jews of the Crimea, situated on lofty and almost inaccessible cliffs; it is now deserted except by the rabbi. Between Bakhchi-sarai and Chuf ut-kaleh is the Uspenskiy monastery, clinging like a swallow's nest to the face of the cliffs, and the scene of a great pilgrimage on the 15th (29th) of August every year.

BAKHMUT, a town of Russia, in the government of Ekaterinoslav, near the river from which it derives its name, 136 m. E. of the town of Ekaterinoslav. It owed its origin in the latter half of the 17th century to the discovery of salt-springs, and now produces coal, salt, alabaster and quicksilver, and manufactures steel rails. Pop. (1897) 19,416.

BAKHTIARI, one of the great nomad tribes of Persia, whose camping-grounds are in the hilly district, known as the Bakhtiari province. This province extends from Chaharmahal (west of Isfahan) in the E., to near Shushter in the W., and separated from Luristan in the N. by the Dizful river (Ab i Diz), and in the S touches Behbahan and Ram Hormuz. The Bakhtiari are divided into the two great divisions Haft-lang and Chahar-lang, and a number of branches and clans, and were known until the 15th century as the " Great Lurs," the "Little Lurs " being the tribes settled in the district now known as Luristan, with Khorremabad as capital. According to popular tradition the Lurs originally came from Syria in the 10th century, but it is now held that they were in Persia long, perhaps fifteen centuries, before. They speak the Lur language, a Persian dialect. The Bakhtiari number about 38,000 or 40,000 families, under 200,000 souls, while the area of the district occupied by them is about 25,000 sq. m. In the middle of the 19th century they could put 20,000 well-equipped horsemen into the field, but in consequence of misrule and long-lasting feuds between the different branches, which the govern-

ment often fostered, or even instigated, the. district has become poor, and it would now be difficult to find 4000 horsemen. The province is under the governor-general of Arabistan, and pays a yearly tribute of about £5000. The chiefs of the Bakhtiari in 1897, having obtained the shah's permission for improving the road between Shushter or Ahvaz and Isfahan, an iron suspension bridge with a span of 120 ft. was erected over the Karun river at Gudar i Bulutek; another, with a span of 70 ft., over the Bazuft river at Pul i.Amarat; and a stone bridge over the Karun at Do-pu-lan,

For accounts of the Bakhtiari see Mrs Bishop (Isabella Bird), Journeys in Persia and Kurdistan (London, 1893); C. de Bode, Travels in Luristan (London, 1841); Lord Curzon, Persia and the Persian Question, vol. ii. 283-303 (London, 1892); Sir H. Layard, Early A dventures in Persia (London, 1894). (A. H.-S.)

BAKING, the action of the verb " to bake," a word, in various forms, common to Teutonic languages (cf.Ger. backen), meaning to cook by dry heat. "Baking" is thus primarily applied to

the process of preparing bread, arid is aiso applied to the hardening by heat or " firing " of pottery, earthenware or bricks. (See Bread; Ceramics and Brick.)

BAKIS (i.e. " speaker," from /Safo>), a general name for the inspired prophets and dispensers of oracles who flourished in Greece from the 8th to the 6th century B.C. Suidas mentions three: a Boeotian, an Arcadian and an Athenian. The first, who was the most famous, was said to have been inspired by the nymphs of the Corycian cave. His oracles, of which speci- mens are extant in Herodotus and Pausanias, were written in hexameter verse, and were considered to have been strikingly fulfilled. The Arcadian was said to have cured the women of Sparta of a fit of madness. Many of the oracles which were current under his name have been attributed to Onomacritus.

Herodotus viii. 20, 77, ix. 43; Pausanias iv. 27, ix. 17, x. 12; Schol. Aristopb. Pax, 1070; see Gottling, Opuscula Academica (1869).

BAK6CZ, TAMAS, Cardinal (1442-1521), Hungarian ecclesi- astic

and statesman, was the son of a wagoner, adopted by his uncle, who trained him for the priesthood and whom he succeeded as rector of Tetel (1480). Shortly afterwards he became one of the secretaries of King Matthias I., who made him bishop of Gyor and a member of the royal council (1490). Under Wladislaus II. (1490-1516) he became successively bishop of Eger, the richest of the Hungarian sees, archbishop of Esztergom (1497), cardinal (1500), and titular patriarch of Constantinople (1510). From 1490 to his death in 1521 he was the leading statesman of Hungary and mainly responsible for her foreign policy. It was solely through his efforts that Hungary did not accede to the leagrˆ of Cambrai, was consistently friendly with Venice, and formea a family compact with the Habsburgs. He was also the only Magyar prelate who seriously aspired to the papal throne. In 15 13, on the death of Julius II., he went to Rome for the express purpose of bringing about his own election as pope. He was received with more than princely pomp, and all but succeeded in his design, thanks to his extraordinary adroitness and the command of an almost unlimited bribing-fund. Eat Venice and the emperor played him false, and he failed. He returned to Hungary as papal legate, bringing with, him the bull of Leo X. proclaiming a fresh crusade against the Turks. But the crusade degenerated into a jacquerie which ravaged the whole kingdom, and much discredited Bakocz. He lost some of his influence at first after the death of Wladislaus, but continued to be the guiding spirit at court, till age and infirmity confined him almost entirely to his house in the last three years of his life. Bakocz was a man of great ability but of no moral principle whatever. His whole life was a tissue of treachery. He was false to his benefactor Matthias, false to Matthias's son Janos Corvinus (q.v.), whom he chicaned out of the throne, and false to his accomplice in that transaction, Queen Beatrice. His rapacity disgusted even an age in which every one could be bought and sold. His attempt to incorporate the wealthy diocese of Transylvania with his own primatial province was one of the principal causes of the spread of the Reformation in Hungary. He left a fortune of many millions. His one re- deeming feature was a love of art; his own cathedral was a

veritable Pantheon.

See Vilmos Fraknoi, Tam&s Bakocz (Hung.) (Budapest, 1889).

(R. N. B.)

BAKRI [Aba ‘Ubaid ‘Abdallah ibn ‘Abd ul-*Aziz ul-Bakri] , (1040-1094), Arabian geographer, was born at Cordova. His best-known work is the dictionary of geographical names which occur in the poets, with an introduction on the seats of the Arabian tribes. This has been edited by F. Wustenfeld (Gottingen, 1876-1877). Another of his works was a general geography of the world, which exists in manuscript. The part referring to North Africa was edited by M’G. de Siane (Algiers,

1857).

See C. Brockelmann’s Gesch. der Arab. Litteratur (Weimar, 1898), vol. i. p. 476.

BAKU, a government of Russian Transcaucasia, stretching along the west coast of the Caspian Sea from 41 50′ to 38 30′ N. lat., and bounded on the W. by the government of EHsavetpol and the province of Daghestan, and on the S. by Persia. It

includes the Kuba plain on the north-east slope of the Caucasus; the eastern extremity of that range from the Shadˆdagh (13,960 ft.) and the Bazardyuz (14,727 ft.) to the Caspian, where it terminates in the Apsheron peninsula; the steppes of the lower Kura and Aras on the south of the Caucasus, and a narrow coast-belt between the Anti-Caucasus and the Caspian. The last-mentioned region lies partly round the Kizil-agach Bay, opening to the south. Area of government, 15,172 sq. m. Both slopes of the Caucasus are very fertile and well irrigated, with fine forests, fields of rice and other cereals, and flourishing gardens. The steppes of the Kura are also fertile, but require artificial irrigation, especially for cotton. In addition to agriculture and cattle-breeding, the vine and mulberry are extensively grown. The Apsheron peninsula is dry and bare of vegetation; but within it are situated the famous petroleum wells of Baku. These, which go down to depths of 700 to 1700 ft., yield crude naphtha, from which the petroleum or kerosene is distilled; while the heavier residue (mazut) is used as lubricating oil and for fuel, for instance in the locomotives of the Transcaspian railway. Whereas in 1863 the output was only 5500 tons of crude naphtha, in 1904 it amounted to 9*833, 600 tons; but business was much injured by a serious lire in 1905. The oil-fields lie around the town of Baku: the largest, that of Balakhany-Sabunchi-Romany (6 sq. m.), is 8ˆ m. north of the town; that of Bibi-Eybat, is 3ˆ m. south; the ” black town ” (Nobel’s) is 2 m. south-east; and beyond the last names is the ” white town ” (Rothschild’s). The lighter oil is

conveyed to Batum on the Black Sea in pipes, and is there shipped for export; the heavier oils reach the same port and the ports of Novorossiysk and Poti, also on the Black Sea, in tank railway-cars. At Surakhani, 13 m. east of the town, is the now disused temple of the Parsee fire-worshippers, who were attracted thither by the natural fountains of inflammable gas.

The government is divided into six districts, the chief towns of which are Baku (the capital of the government), Geok-chai (pop. 2247 in 1897), Kuba (15,346), Lenkoran (8768), Salyany (10,168), in district of Jevat, and Shemakha (20,008). The population numbered 828,511 in 1897, of whom the major part were Tatars; other races were Russians, the Iranian tribes of the Tates (89,519) and Talysh (34,994), Armenians (52,233) and the Caucasian mountaineers known as Kurins.

BAKU, the chief town of the government of the same name, in Russian Transcaucasia, on the south side of the peninsula of Apsheron, in 40 21′ N. and 49 50′ E. It is connected by rail with the south Russian railway system at Beslan, the junction for Vladikavkaz (400 m.), via Derbent and Petrovsk, with Batum (560 m.) and Poti (536 m.) on the Black Sea via Tiflis. A long stone quay next the harbour is backed by the new town climbing up the slopes behind. To the west is the old town, consisting of steep, narrow, winding streets, and presenting a decidedly oriental appearance. Here are the ruins of a palace of the native khans, built in the 1 6th century; the mosques of the Persian sHahs, built in 1078 and now converted into an arsenal; nearer the sea the " maidens' tower," transformed into a lighthouse; and not far from it remains of ancient walls projecting above the sea, and showing traces of Arabic architecture of the 9th and 10th centuries. Beside the harbour are engineering works, dry docks and barracks, stores and workshops belonging to the Russian Caspian fleet. Besides the petroleum refineries the town possesses oil- works (for fuel), flour-mills, sulphuric acid works and tobacco factories. Owing to its excellent harbour Baku is a chief depot for merchandise coming from Persia and Transcaspia — raw cotton, silk, rice, wine, fish, dried fruit and timber— and for Russian manufactured goods. The climate is extreme, the mean temperature for the year being 58 F., for January 38°, for July 8o °; annual rainfall 9-4 in. A wind of exceptional violence blows sometimes from the N.N.W. in winter. Pop. (i860) 13,381; (1897) 112,253; (1900) 179,133- The town is mentioned by the Arab geographer, Masudi, in the 10th century. From 1 509 it was in the possession of the Persians. The Russians captured it from

them in 1723, but restored it in 1735; it was incorporated in the Russian empire in 1806. In 1904-1905,

in consequence of the general political anarchy, serious conflicts took place here between the Tatars and the Armenians, and two-thirds of the Balakhani and Bibi-Eybat oil-works were burned.

See Marvin, The Region of the Eternal Fire (ed. 1891) and J. D. Henry, Baku, an Eventful History (1906). (P. A. K.)

BAKUNIN, MIKHAIL (1814-1876), Russian anarchist, was born of an aristocratic family at Torjok, in the government of Tver, in 1814. As an officer of the Imperial Guard, he saw service in Poland, but resigned his commission from a disgust of despotism aroused by witnessing the repressive methods employed against the Poles. He proceeded to Germany, studied Hegel, and soon got into touch with the leaders of the young German movement in Berlin. Thence he went to Paris, where he met Proudhon and George Sand, and also made the acquaintance of the chief Polish exiles. From Paris he journeyed to Switzerland, where he resided for some time, taking an active share in all socialistic movements. While in Switzerland he was ordered by the Russian government to return to Russia, and on his refusal his property was confiscated. In 1848, on his return to Paris, he published a violent tirade against Russia, which caused his expulsion from France. The revolutionary movement of 1848 gave him the opportunity of entering upon a violent campaign of democratic agitation, and for his participation in the Dresden insurrection of 1849 he was arrested and condemned to death. The death sentence, however, was commuted to imprisonment for life, and he was eventually handed over to the Russian authorities, by whom he was imprisoned and finally sent to eastern Siberia in 1855. He received permission to remove to the Amur region, whence he succeeded in escaping, making his way through Japan and the United States to England in 1861. He spent the rest of his life in exile in western Europe, principally in Switzerland. In 1869 he founded the Social Democratic Alliance, which, however, dissolved in the same year, and joined the International (?.».). In 1870 he attempted a rising at Lyons on the principles afterwards exemplified by the Paris Commune. At the Hague congress of the International in 1872 he was outvoted and

expelled by the Marx party. He retired to Lugano in 1873 and died at Bern on the 13th of June 1876.

Nothing can be clearer or more frank and comprehensive in its destructiveness than the revolutionary anarchism of Bakunin. He rejects all the ideal systems in every name and shape, from the idea of God downwards; and every form of external authority, whether emanating from the will of a sovereign or from universal suffrage. " The liberty of man," he says in his Dieu et l'£tat (published posthumously in 1882) " consists solely in this, that he obeys the laws of nature, because he has himself recognized them as such, and not because they have been imposed upon him externally by any foreign will whatsoever, human or divine, collective or individual." In this way will the whole problem of freedom be solved, that natural laws be ascertained by scientific discovery, and the knowledge of them be universally diffused among the masses. Natural laws being thus recognized by every man for himself, he cannot but obey them, for they are the laws also of his own nature; and the need for political organization,administration and legislation will at once disappear. Nor will he admit of any privileged position or class, for "it is the peculiarity of privilege and of every privileged position to kill the intellect and heart of man. The privileged man, whether he be privileged politically or economically, is a man depraved in intellect and heart." " In a word, we object to all legislation, all authority, and all influence, privileged, patented, official and legal, even when it has proceeded from universal suffrage, convinced that it must always turn to the profit of a dominating and exploiting minority, against the interests of the immense majority enslaved." Bakunin's methods of realizing his revolu- tionary programme are not less frank and destructive than his principles. The revolutionist, as he would recommend him to be, is a consecrated man, who will allow no private interests or feelings, and no scruples of religion, patriotism or morality, to turn him aside from his mission, the aim of which is by all available means to overturn the existing society. (See Anarchism.)

BA-KWIRI, a Bantu nation of German Cameroon, West Africa. According to tradition they are migrants from the eastward. The " Brushmen," for that is the meaning of their name, are grouped in about sixty separate clans. They are a lively intelligent people, brave fighters and daring hunters, and in their love of songs, music and elocution are superior to many negro races. Their domestic affections are strongly developed. Their chief physical

peculiarity is the great disparity between the size and complexion of the sexes, most of the women being much shorter and far lighter in colour than the men. The Ba- Kwiri are generous and open-handed among themselves; but the law of blood for blood is mercilessly fulfilled, even in cases of accidental homicide. Their religion is ancestor- worship blended with witchcraft and magic. They believe in good and evil spirits, those of the forests and seas being especially feared. In common with their neighbours the Dualla (q.v.) the Ba-Kwiri possess a curious drum language. By drum-tapping news is conveyed from clan to clan. Slaves and women are not allowed to master this language, but all the initiated are bound to repeat it so as to pass the messages on. The Ba-Kwiri have also a horn language peculiar to themselves.

BALA, a market-town and urban district of Merionethshire, N. Wales, at the north end of Bala Lake, 17 m. N.E. of Dolgelley (Dolgellau). Pop. (1901) 1554. It is little more than one wide street. Its manufactures are flannel, stockings, gloves and hosiery (for which it was well known in the 18th century). The Tower of Bala (some 30 ft. high by 50 diameter) is a tumulus or " moat-hill," formerly thought to mark the site of a Roman camp. The theological college of the Calvinistic Methodists and the grammar school- (endowed), which was founded in 1712, are the chief features, together with the statue of the Rev. Thomas Charles, the distinguished theological writer, to whom was largely due the foundation of the British and Foreign Bible Society. Bala Lake, the largest in Wales (4 m. long by some f m. wide), is subject to sudden and dangerous floods, deep and clear, and full of pike, perch, trout, eel and gwyniad. The gwyniad (Caregonus) is peculiar to certain waters, as those of Bala Lake, and is fully described by Thomas Pennant in his Zoology (1776).

The lake {Llyn Tegid) is crossed by the Dee, local tradition having it that the waters of the two never mix, like those of Alpheus and the sea.

BALAAM (cy?? Bii'am; BaXaoju; Vg. Balaam; the ety- mology of the name is uncertain), a prophet in the Bible. Balaam, the son of Beor, was a Gentile seer; he appears in the history of the Israelites during their sojourn in the plains of Moab, east of Jordan, at the close of the Forty Years' wandering, shortly before the death of Moses and the crossing of the Jordan. Israel had conquered two kings of eastern Palestine-ˆSihon, king of the Amorites, and Og, king of Bashan. Balak, king of Moab, became

alarmed, and sent for Balaam to curse Israel; Balaam came after some hesitation, but when he sought to curse Israel Yahweh compelled him to bless them.

The main passage concerning Balaam in Num. xxii-xxv.; it consists of a narrative which serves as a framework for seven oracular poems, the first four being of some length and the last three very brief. The story is doubtless based on ancient traditions, current in various forms; the Old Testament references are not wholly consistent.

The narrative in Num. xxii. ff. is held to be compiled with editorial additions from the two ancient documents (900-700 B.C.) commonly denoted by the symbols J and E. The distribution of the material between the two documents is uncertain; but some such scheme as the following is not improbable. The references to portions the origin of which is especially uncertain are placed in brackets ().

The present narrative, therefore, is not really a single continuous story, but may be resolved into two older accounts. In combining these two and using them as a framework for the poems, the compilers have altered, added and omitted. Naturally, when both documents made statements which were nearly identical, one might be omitted; so that neither account need be given in full in the composite passage. The two older accounts,

as far as they are given here, may have run somewhat thus: restorations of supposed omissions are given in square brackets [].

(i) J. xxii. 3&-S« to ” Beor ” (5c to ” to the land ” — 7, 11, 17, 18). Balak, king of Moab, alarmed at the Israelite conquests, sends elders of Moab and Midian to Balaam, son of Beor, to the land of Ammon, to induce him to come and. curse Israel. He sends back word that he can only do what Yahweh commands.

The land of Ammon. The current Hebrew Text has the land of ammo,i.e. as EV, ” his people,” but Ammon is read by the Samaritan Pentateuch, the Syriac and Vulgate Versions and some Hebrew MSS., and is accepted by many modern scholars.

xxii. 22-350 to ” Balaam, ” also “Go” and “So Balaam went.” Nevertheless Balaam sets out with two servants to go to Balak, but the Angel of Yahweh meets him, At first the Angel is seen only by the iass, which arouses Balaam’s anger by its efforts to avoid the Angel. The ass is miraculously enabled to speak to Balaam. Yahweh at last enables Balaam to see the Angel, who tells him that he would have slain him but for the ass. Balaam offers to go back, but is told to go on.

Speaking animals are a common feature of folk-lore; the only other case in the Old Testament is the serpent in Eden. Maimonides suggested that the episode of the Angel and the conversation with the ass is an account of a vision; similar views have been held by E. W. Hengstenberg and other Christian scholars. Others, e.g. Volck in Hauck’s Realencyklopddie (s. ” Bileam “), regard the state- ments about the ass speaking; as figurative; the ass brayed, and Balaam translated , the sound into words. The ordinary literal Interpretation is more probable; but it does not follow that the authors of the Pentateuch intended the story to be taken as his- torical in its details. It need hardly be said that the exact accuracy of such narratives is not an essential part of the Christian faith ; no such doctrine is laid down by the creeds and confessions.

xxii. 36, 39, xxiv. 1, 2, 10-14, 25. Balak meets Balaam and they go together [and offer sacrifices] ; Balaam, however, blesses Israel by divine inspiration; Balak remonstrates, but Balaam reminds him of his message and again blesses Israel. Then Balaam goes home. (For the relation of the poems to J’s narrative, see below.)

(ii.) E. xxii. 2, 3a, 56 ” to Pethor, which is by the river,” 8-10, 12-16, 19-21, 370, to “unto me,” 38. Balak, king of Moab, alarmed at the conquests of Israel, sends the princes of Moab to Balaam at Pethor on the Euphrates, that he may come and curse

Israel.

A. Jeremias, Das Alte Testament im Lichte des alien Orients, p. 278, adopts Marquart’s view that the ” River ” {nahar) is the so-called ” River ” (better ” Ravine ” nahal) of Egypt or Musri, on the southern frontier of Judea. So too Winckler, in the new edition of E. Schrader’s Die Keilinschriften und das Alte Testament. It has been usual to keep nahar and take it in its ordinary sense when used absolutely, i.e. the Euphrates, and to

identify Pethor with a Pitru on a tributary of the Euphrates, mentioned in an inscription of Shalmaneser II. Deut. xxiii. 4 places Pethor in Mesopotamia.

God appears to him in a dream and forbids him to go; The princes return and report to Balak, who sends them back to put further pressure on Balaam. God in another dream per- mits him to go, on condition that he speaks what God tells him. He goes with the princes of Moab. Balak meets them, and Balaam warns him that he can only speak what God tells him.

xxii. 40, 41, xxiii. 1-6,11-17. Balak offers sacrifices, but Yahweh inspires Balaam with a blessing on Israel. Balak remonstrates and Balaam explains. They try to get a more favourable result by sacrificing on a different spot, and by placing Balaam on the top of Pisgah to view Israel, but he is again compelled to bless Israel. After further remonstrances and explanations [Balaam goes home]. (For the relation of the poems to E's narrative, see below.)

Deut. xxiii. 3-6 1 summarizes E's account of this incident, adding, however, the feature that the Ammonites were associated with the Moabites, possibly an imperfect reminiscence of the reference to Ammon in J. Joshua, in his farewell speech to the Israelites, 2 also refers to this episode. The Priestly Code 3 has a different story of Balaam, in which he advises the Midianites how they may bring disaster on Israel by seducing the people

1 Quoted Neh. xiii. I f. 2 Tosh. xxiv. 9, 10. E; cf. Micah vi. 5.

3 Num. xxxi. 8 (quoted Josh. xiii. 22), 16. These references are not necessarily inconsistent with JE; but they are probably based on an independent tradition. The date of the Priestly Code is ca. 400 B.C.

from their loyalty to Yahweh. Later on he is slain in battle, fighting in the ranks of Midian.

It is often supposed that the name of the king of Edom, 4 Bela, son of Beor, is a corruption of Balaam, and that, therefore, one form of the tradition made him a king of Edom.

The Poems fall into two groups: the first four, in xxiii. I.- xxiv. 19, are commonly regarded as ancient lyrics of the early monarchy, perhaps in the time of David or Solomon, which J and E inserted in their narrative. Some recent critics, 6 however, are inclined to

place them in the post-exilic period, in which case a late editor has substituted them for earlier, probably less edifying, oracles. But the features which are held to indicate late date may be due to editorial revision.

The first two are found in an E setting, and therefore, if ancient, formed part of E.

The First, xxiii. 7-10, prophesies the unique exaltation of Israel, and its countless numbers.

The Second, xxiii. 18-24, celebrates the moral virtue of Israel, the monarchy and its conquests.

Again the second couple are connected with J.

The Third, xxiv. 3-9, also celebrates the glory and conquests of the monarchy.

A gag, in verse 7, can hardly be the Amalekite king of 1 Sam. xv.; Amalek was too small and obscure. The Septuagint and other Greek Versions and Sam. Pent, have Gog, which would imply a post-exilic date, cf. Ezek. xxxix. Probably both Agag and Gog are textual corruptions. Og has been suggested, but does not seem a great improvement.

The Fourth, xxiv. 14-19, announces the coming of a king, possibly David, who shall conquer Edom and Moab.

The remaining poems are usually regarded as later additions; thus the Oxford Hexateuch on Num. xxiv. 20-24. " The three concluding oracles seem irrelevant here, being concerned neither with Israel nor Moab. It has been thought that they were added to bring the cycle up to seven."

The Fifth h 'xxiv. 20, deals with the ruin of Amalek. It is of uncertain date; if the historical Amalek is meant, it may be early; but Amalek may be symbolical.

The Sixth, xxiv. 21 f., deals with the destruction of the Kenite state by Assyria; also of uncertain date, Assyria being, according to some,; the ancient realm of Nineveh, according to others the Seleucid kingdom of Syria, which was also called Assyria.

The Seventh, xxiv. 23 f., speaks of the coming of ship's from the West, to attack Assur and "Eber"; it may refer to the conquest of

Persia by Alexander the Great. An interesting, but doubtful, emendation makes this poem describe the ruin of Shamal, a state. in N. W. Syria.

•In the New Testament Balaam is cited as a type of avarice ; 6 in Rev. ii. 14 we read of false teachers at Pergamum who held the ” teaching of Balaam, who taught Balak to cast a stumbling- block “before the children of Israel, to eat things sacrificed to idols, and to commit fornication.” . ■ ■>’

: Balaam has attracted much interest, alike from Jews, Christians and Mahommedans. Josephus 7 paraphrases the story more stm\ and speaks of Balaam: as the best prophet of his time, but with a disposition ill adapted to resist temptation. Philo describes him in the Ufe of Moses as a great magician; elsewhere 8 he speaks of ” the sophist Balaam, being/’ i.e. symbolizing, ” a vain crowd of contrary and warring opinions”; and again 9 as ” a vain people “; both phrases being based on a mistaken etymology Of the name Balaam. The later Targums and the Talmuds represent him as a typical sinner; and there are the usual worthless Rahbinicalfables, e.g. that he was blind of one eye; that he was the Elihu of Job; that, as one of Pharaoh’s counsellors, he was governor of a city of Ethiopia, and rebelled against Pharaoh; Moses was sent against him by Pharaoh at the head of; an .army, and stormed the city and put Balaam to flight, &c. &c.

4 Ge;n. xxxvi. 32.

5 For names and reasons, see Gray, Numbers, 314.

6 2 Peter ii. 16, 17′ (also refers to the ass speaking), Jude xi.

7 Ant.W.d. s Quod. Del. Potiori, § 20. – 9 De Cherub., §10.

Curiously enough, the Rabbinical (Yalkut) identification of Balaam with Laban, Jacob’s father-in-law, has been revived from a very different standpoint, by a modern critic. 1

The Mahommedans, also, have various fables concerning Balaam. He was one of the Anakim, or giants of Palestine ; he read the books of Abraham, where he got the name Yahweh, by virtue of which he predicted the future, and got from God whatever he

asked. It has been conjectured that the Arabic wise man, commonly called Luqman (q.v.), is identical with Balaam. The names of their fathers are alike, and “Luqman ” means devourer, swallower, a meaning which might be got out of Balaam by a popular etymology.

If we might accept the various theories mentioned above, Balaam would appear in one source of J as an Edomite, in another as an Ammonite ; in E as a native of the south of Judah or possibly as ah Aramaean ; in the tradition followed by the Priestly Code probably as a Midianite. All these peoples either belong to the Hebrew stock or are closely connected with it. We may conclude that Balaam was an ancient figure of traditions originally common to all the Hebrews and their allies, and after- wards appropriated by individual tribes ; much as there are various St Georges.

The chief significance of the Balaam narratives for the history of the religion of Israel is the recognition by J and E of the genuine inspiration of a non-Hebrew prophet. Yahweh is as much the God of Balaam as he is of Moses. Probably the original tradition goes back to a- time when Yahweh was recognized as a deity of a circle of connected tribes of which the Israelite tribes formed a part. But the retention of the story without modification may imply a continuous recognition through some centuries of the idea that Yahweh revealed his will to nations other than Israel.

Apparently the Priestly Code ignored this feature of the story.

Taking the narratives as we now have them, Balaam is a companion figure to Jonah, the prophet who wanted to go where he was not sent, over against the prophet who ran away from the mission to which he was called.

Bibliography. — Ewald, Geschichte des Volkes Israel 3 , Bd. ii. p. 298; Hengstenberg’s Die Geschichte Bileams und seine Weis-sagungen (1842); the commentaries on the scriptural passages, especially G. B. Gray on Numbers xxii.xxiv. ; and the articles on ” Balaam ” (Bileam) in Hamburger’s Realencyclop&die fiir Bibel und Talmud, Hastings’ Bible Diet., Black and Cheyne’s Encyclo paedia Biblica, Herozog-Hauck’s Realencyklopddie. For the analysis into earlier documents, see also the Oxford Hexateuch, Estlin Carpenter and Harford-Battersby. (W. H. Be.)

BALADHURI (Abu-l-‘Abbas Ahmad ibn Yahya ibn Jabir al-

Baladhuri), Arabian historian, was a Persian by birth, though his sympathies seem to have been strongly with the Arabs, for Mas'udI refers to one of his works in which he refuted the Shu'ubites (see Abu 'Ubaida). He lived at the court of the caliphs al-Mutawakkil and al-Musta'In and was tutor to the son of al-Mu'tazz. He died in 892 as the result of a drug called balddhur (hence his name) . The work by which he is best known is the Futuh ul-Buldan (Conquests of Lands), edited by M. J. de Goeje as Liber expugnationis regionum (Leiden, 1870 ; Cairo, 1901). This work is a digest of a larger one, which is now lost. It contains an account of the early conquests of Mahomet and the early caliphs. Baladhuri is said to have spared no trouble in collecting traditions, and to have visited various parts of north Syria and Mesopotamia for this purpose. Another great historical work of his was the Ansdb ul-Askraf (Genealogies of the Nobles), of which he is said to have written forty parts when he died. Of this work the eleventh book has been published by W. Ahlwardt (Greifswald, 1883), and another part is known in manuscript (see Journal of the German Oriental Society, vol. xxxviii. pp. 382-406). He also made some translations from Persian into Arabic. (G. W. T.)

BALAGHAT {i.e. " above the ghats or passes," the highlands), a district of British India in the Nagpur division of the Central Provinces. The administrative headquarters are at the town of Burha. The district contains an area of 3 1 3 2 sq. m. It forms the eastern portion of the central plateau which divides the

l T. Steuernagel, Einwanderung der israelilischen Stdmme (1901).

province from east to west. These highlands, formerly known as the Raigarh Bichhia tract, remained desolate and neglected until 1866, when the district of Balaghat was formed, and the country opened to the industrious and enterprising peasantry of the Wainganga valley. Geographically the district is divided into three distinct parts :•— (1) The southern lowlands, a slightly undulating plain, comparatively well cultivated and drained by the Wainganga, Bagh, Deo, Ghisri and Son rivers. (2) The long narrow valley known as the Mau Taluka, lying between the hills and the Wainganga river, and comprising a long, narrow, irregular-shaped lowland tract, intersected by hill ranges and peaks covered with dense jungle, and running generally from north to south. (3) The lofty plateau, in which is situated the Raigarh Bichhia tract, comprising irregular ranges of hills, broken into numerous valleys, and generally running from east

to west. The highest points in the hills of the district are as follows: — Peaks above Lanji, 2300 or 2500 feet; Tepagarh hill, about 2600 ft. ; and Bhainsaghat range, about 3000 ft. above the sea. The principal rivers in the district are the Wainganga, and its tributaries, the Bagh, Nahra and Uskal ; a few smaller streams, such as the Masmar, the Mahkara, &c ; ; and the Ban jar, Halon and Jamunia, tributaries of theNerbudda, which drain a portion of the upper plateau. In the middle of the .19th' century the upper part of the district was an impenetrable- waste. About that time one Lachhman Naik established the first villages on the Paraswara plateau. But a handsome Buddhist temple of cut stone, belonging to some remote period, is suggestive of a civilization which had disappeared before historic times. The population in 1901 was 326,521, showing a decrease of 15% in the decade, due to the effects of famine. A large part of the area is still covered with forest, the most valuable timber-tree being sal. There are few good roads. The Gondia- Jubbulpore line of the Bengal-Nagpur railway traverses the Wainganga valley in the west of the district. The district suffered very severely from the famine of 1896-1897. It suffered again in 1900, when in April the number of persons relieved rose above 100,000.

BALAGUER, VICTOR (1824-1901), Spanish politician and author, was born at Barcelona on the nth of December 1824, and was educated at the university of his native town. His precocity was remarkable ; his first dramatic essay, Pepin el jorobado, was placed on the Barcelona stage when he was fourteen years of age, and at nineteen he was publicly "crowned " after the production of his second play, Don Enrique el Dadivoso. From 1843 to 1868 he was the chief of the Liberal party in Barcelona, and as proprietor and editor of El Conseller did much to promote the growth of local patriotism in Catalonia. But it was not till 1857 that he wrote his first poem in Catalan- — a copy of verses to the Virgin of Montserrat. Henceforward he frequently adopted the pseudonym of "lo Trovador de Montserrat " ; in 1859 he helped to restore the " Juegos Florales," and in 1861 was proclaimed mestre de gay saber. He was removed to Madrid, took a prominent part in political life, and in 1867 emigrated to Provence. On the expulsion of Queen Isabella, he returned to Spain, represented Manresa in the Cortes, and in 1871-1872 was successively minister of the colonies and of finance. He resigned office at the restoration, but finally followed his party in rallying to the dynasty ; he was appointed vice-president of congress, and was subsequently a senator. He died at Madrid on the 14th of

January 1901. Long before his death he had become alienated from the advanced school of Catalan nationalists, and endeavoured to explain away the severe criticism of Castile in which his Historia de Cataluna y de la Corona de Aragon (1860ˆ1863) abounds. This work, like his Historia politica y literaria de los trovadores (1878-1879), is inaccurate, partial and unscientific; but both books are attractively written and have done great service to the cause which Balaguer once upheld. As a poet he is imitative: reminiscences of Quin tana are noticeable in his patriotic songs, of Zorrilla in his historical ballads, of Byron in his lyrical poems. He wrote too hastily to satisfy artistic canons ; but if he has the faults he has also the merits of a pioneer, and iri Catalonia his name will encmrt.

BALAKIREV, MILI ALEXEIV1CH (1836-), Russian

musical composer, was born at Nijni-Novgorod on the 31st of December 1836. He had the advantage as a boy of living with Oulibichev, author of a Life of Mozart, who had a private band, and from whom Balakirev obtained a valuable education in music. At eighteen, after a university course in mathematics, he went to St Petersburg, full of national ardour, and there made the acquaintance of Glinka. Round him gathered Cesar Cui (b. 1835), and others, and in 1862 the Free School of Music was established, by which, and by Balakirev's personal zeal, the modern school of Russian music was largely .stimulated. In 1 869 Balakirev was appointed director of the imperial chapel and conductor of the Imperial Musical Society. His influence as a conductor, and as an organizer of Russian music, give him the place of a founder of a new movement, apart even from his own compositions, which though few in number are remarkable in themselves. His works consist largely of songs and collections of folk-songs, but include a symphony (first played in England in 1 901), two symphonic poems (" Russia " and " Tamara "), and four overtures, besides pianoforte pieces. His orchestral works are of the " programme-music " order, but all are brilliant examples of the highly coloured, elaborate style characteristic of' modern Russian composers, and developed by Balakirev's disciples, such as Borodin and Rimsky-Korsakov.

BALAKLAVA, a village in the Crimea, east of Sevastopol, famous

for a battle in the Crimean War. The action of Balaklava (October 25th, 1854) was brought about by the advance of a Russian field army under General Liprandi to attack the allied English, French and Turkish forces besieging Sevastopol. The ground on which the engagement took place was the Vorontsov ridge (see Crimean War), and the valleys on either side of it. Liprandi's corps formed near Traktir Bridge, and early on the 25th of October its advanced guard moved southward to attack the ridge, which was weakly occupied by Turkish battalions behind slight entrenchments. The two nearest British divisions were put into motion as soon as the firing became serious, but were prevented by their orders from descending at once into the plain, and the Turks had to meet the assault of greatly superior numbers. They made a gallant resistance, but the Russians quickly cleared the ridge, capturing several guns, and their first line was followed by a heavy mass of cavalry which crossed the ridge and descended into the Balaklava plain. At this moment the British cavalry division under the earl of Lucan was in the plain, but their commander was prevented from engaging the Russians by the tenor of his orders. One of his brigades, the Heavy (4th and 5th Dragoon Guards, 1st, 2nd and 6th Dragoons) under Brigadier-General J. Y. Scarlett, was in the Balaklava plain; the other, the Light Brigade under Lord Cardigan (4th and 13 th Light Dragoons now Hussars, 8th and nth Hussars and 17th Lancers) in the valley to the north of the Vorontsov ridge. All these regiments were very weak in numbers. The Russian cavalry mass, after crossing the ridge, moved towards Balaklava; a few shots were fired into it by a Turkish battery and a moment later the Heavy Brigade charged. The attack was impeded at first by obstacles of ground, but in the melie the weight of the British troopers gradually broke up the enemy, and the charge of the 4th Dragoon Guards, delivered against the flank of the Russian mass, was decisive. The whole of the Russian cavalry broke and fled to the ridge. This famous charge occupied less than five minutes from first to last, and at the same time some of the Russian squadrons, attempting to charge the 93rd Highlanders (who were near Balaklava) were met by the steady volleys of the " thin red line," and fled with the rest. The defeated troops retreated past the still inactive Light Brigade, on whose left a French cavalry brigade was now posted. The Russians were at this juncture reinforced by a mixed force on the Fedukhine heights; Liprandi's infantry occupied the captured ridge, and manned the guns taken from the Turks. The cavalry defeated by the Heavy Brigade was re-formed in the northern valley behind the field guns, and infantry, cavalry and artillery

were on both the Fedukhine and the Vorontsov heights. Thus, in front of the Light Brigade was a valley over a mile long, at the end of which

was the enemy's cavalry and twelve guns, and on the ridges on either side there were in all twenty-two guns, with cavalry and infantry. It was under these circumstances that an order was given by the British headquarters, which led to the charge for which above all Balaklava is remembered. It was carried to Lord Lucan by Captain L. E. Nolan, 15th Hussars, and ran as follows: — " Lord Raglan wishes the cavalry to advance rapidly to the front and try to prevent the enemy carrying away the guns . . . French cavalry is on your left." Lucan, seeing no attempt on the part of the enemy to move guns, questioned Nolan, who is said to have pointed down the valley to the artillery on the plain; whereupon Lucan rode to Lord Cardigan, the commander of the Light Brigade, and repeated Lord Raglan's order and Nolan's explanation. The Light Brigade then advanced straight to its front, and soon came under fire from the guns on both flanks. Nolan was killed as he rode across the front of the brigade, perhaps with the intention of changing its direction to the Vorontsov ridge. Five minutes later the guns in front began to fire with telling effect. The pace was increased, though the " charge " was not sounded, and Cardigan and those of his men who remained mounted, rode up to and through the Russian line of guns. Small parties even charged the Russian cavalry in rear and on either flank. The French 4th Chasseurs d'Afrique made a dashing charge which drove the Russians off the Fedukhine heights, though at considerable loss. Lucan had meanwhile called up the Heavy Brigade to support the Light, but it lost many men and horses and was quickly withdrawn. Only two formed bodies of theLightBrigadefoundtheirway back. The.i3th Light Dragoons mustered but ten mounted men at the evening parade ; the brigade as a whole had lost 247 men and 497 horses out of a total strength of 673 engaged in the charge, which lasted twenty minutes from first to last. The two infantry divisions which now approached the field were again halted, and Liprandi was left undisturbed on the Vorontsov ridge and in possession of the captured guns. The result of the day was thus unfavour- able to the allies, but the three chief incidents of the engagement — the two cavalry charges and the fight of the 93rd Highlanders — gave to it all the prestige of a victory. The impression created by the conduct of the Light Brigade was forcibly expressed in Tennyson's well-known ballad, and in spite of the equally cele-

brated remark of the French general Bosquet, C'est magnifique mais ce n'est pas la giwrre, it may be questioned whether the moral effect of the charge did not outweigh the very serious loss in trained men and horses involved.

BALALAIKA, a stringed instrument said to have retained its primitive form unchanged, very popular in Russia among the peasants, more especially in Ukraine. The instrument has a triangular soundboard to which is glued a vaulted back, forming a body having a triangular base, enabling it to stand upright. To the body is added a fretted neck strung with two, three or four strings, generally so tuned as to produce a minor chord when sounded together. The strings are generally plucked with the fingers, but the peasants obtain charming " glissando " effects by sweeping the strings lightly one after the other with the fingers or side of the hand. The Balalaika is common to the Slav races, who use it to accompany their folk-songs and dances. It is also to be seen in the hands of gipsies at rural festivities and fairs.

BALANCE (derived through the Fr. from the Late Lat. bilanlia, an apparatus for weighing, from bi, two, and lanx, a dish or scale) , a term originally used for the ordinary beam balance or weighing machine with two scale pans, but extended to include (with or without adjectival qualification) other apparatus for measuring and comparing weights and forces. In addition to beam and spring balances (see Weighing Machines), apparatus termed " torsion balances," in which forces are measured or compared by their twisting moment on a wire, are used, especially in gravitational, electrostatic and magnetic experiments (see Gravitation and Electrometer). The term also connotes the idea of equality or equalization; e.g. in the following expressions: " balance," in bookkeeping, the amount which equalizes the debit and credit accounts; " balance wheel,"

in horology, a device for equalizing the relaxing of a watch or clock spring (see Clock) ; the " balancing of engines/' the art of minimizing the total vibrations of engines when running, and consisting generally in the introduction of masses which induce vibrations opposed to the vibrations of the essential parts of the engine.

BALANCE OF POWER, a phrase in international law for such a " just equilibrium " between the members of the family of nations as should prevent any one of them from becoming sufficiently strong to enforce its will upon the rest. The principle involved in this, as Hume pointed out in his Essay on the Balance of Power, is as old as history, and was perfectly familiar to the ancients both as political theorists and as practical statesmen. In its essence it is no more than a precept of commonsense born of experience and the instinct of self-preservation; for, as Polybius very clearly puts it (lib. i. cap; 83) : " Nor is such a principle to be despised, nor should so great a power be allowed to any one as to make it impossible for you afterwards to dispute with him on equal terms concerning your manifest rights." It was not, however, till the beginning of the 17th century, when the science of international law took shape at the hands of Grotius and his successors, that the theory of the balance of power was formulated as a fundamental principle of diplomacy. According to this the European states formed a sort of federal community, the fundamental condition of which was the pre- servation of the balance of power, i.e. such a disposition of things that no one state or potentate should be able absolutely to pre- dominate and prescribe laws to the rest; and, since all were equally interested in this settlement, it was held to be the interest, the right and the duty of every power to interfere, even by force of arms, when any of the conditions of this settlement were infringed or assailed by any other member of the community'. 1 This principle, once formulated, became an axiom of political science. It was impressed as such by Fenelon, in his Instructions, on the young duke of Burgundy; it was proclaimed to the world by Frederick the Great in his Anti-Mackiavel; it was re-stated with admirable clearness in 1806 by Friedrich von Gentz in his Fragments on the Balance of Power. It formed the basis of the coalitions against Louis XIV. and Napoleon, and the occasion, or the excuse, for most of the wars which desolated Europe between the congress of Mtinster in 1648 and that of Vienna in 18 14. During the greater part of the 1.9th century it was obscured by the series of national upheavals which have re- modelled the map of Europe; yet it underlay all the efforts of diplomacy to stay or to direct the elemental forces let loose by the Revolution, and with the restoration of comparative calm it has once more emerged as the motive for the various political alliances of which the ostensible object is the preserva- tion of peace (see Europe: History).

An equilibrium between the various powers which form the

family of nations is, in fact, — as Professor L. Oppenheim (Internat. Law, i. 73) justly points out — essential to the very existence of any international law. In the absence of any central authority, the only sanction behind the code of rules established by custom or denned in treaties, known as ” inter- national law,” is the capacity of the powers to hold each other in check. Were this to fail, nothing could prevent any state sufficiently powerful from ignoring the law and acting solely according to its convenience and its interests.

See, besides the works quoted in the article, the standard books on International Law (q.v,). (W. A. P.)

BALANCE OF TRADE, a term in economics belonging originally to the period when the ” mercantile theory” prevailed, but still in use, though not quite perhaps in the same way as at its origin. The ” balance of trade ” was then identified with the sum of the precious metals which a country received in the course of its trading with other countries or with particular countries. There was no doubt an idea that somehow or other the amount of the precious metals received represented profit on the trading, and each country desired as much profit as possible. Princes and sovereigns, however, with political aims in view, were not 1 Emerich de Vattel, Le Droit des gens (Leiden, 1758).

close students of mercantile profits, and would probably have urged the acquisition of the precious metals as an object of trade even if they haid realized that the country as a whole was ex- porting ” money’s worth ” in order to buy the precious metals which were desired for political objects. The ” mercantile theory ” was exploded by Adam Smith’s demonstration that gold and silver were only commodities like others with no special virtue in them, and that they would come into a country when there was a demand for them, according to the amount, in pro- portion to other demands, which the country could afford to pay; but the ideas in which the theory itself has originated have not died out, and the idea especially of a ” balance of trade ” to which the rulers of a country should give attention is to be found in popular discussions of business topics and in politics, the general notion being that a nation is prosperous when its statistics show a ” trade balance “in its favour and unprosperous when the reverse is shown. In modern times the excess of imports over exports or of exports over imports, shown in the statistics of foreign trade, has also come to be identified in popular speech with the ” balance of trade,” and many minds are no doubt imbued with the

ideas (1) that an excess of imports over exports is bad, and (2) an excess of exports over imports is the reverse, because the former indicates an ” unfavourable ” and the latter a ” favourable ” trade balance. In the former case it is urged that a nation so circumstanced is living on its capital. Exact remedies are not suggested, although the idea of preventing or hampering foreign imports as a means of developing home trade and of thus altering the supposed disastrous trade balance is obviously the logical inference from the arguments. A con- sideration of these ideas and of recent discussions about imports and exports, appears accordingly to be needed, although the ” mercantile theory ” is itself exploded.

The phrase ” balance of trade,” then, appears to be an application of a trader’s language in his own business to the larger affairs of nations or rather of the aggregate of individuals in a nation engaged in foreign trade; A trader in his own books sets his sales against his purchases, and the amount by which the former exceed the latter is his trade balance or profit. What is true of the individual, it is assumed, must be true of a nation or of the aggregate of individual traders in a nation engaged in the foreign trade. If their collective sales amount to more than their collective purchases the trade balance will be in their favour, and they will have money to receive. Contrariwise, if their purchases amount to more than their sales, they will have to pay money, and they will presumably be living on their capital. The argument fails, however, in many ways. Even as regards the experience of the individual trader, it is to be observed that he may or may not receive his profit, if any, in money. As a rule he does not do so. As the profit accrues he may invest it either by employing labour to add to his machinery or warehouses, or by increasing his stock-in-trade, or by adding to his book debts, or by a purchase of stocks or shares outside his regular business. At the end of a given period he may or may not have an increased cash balance to show as the result of his profitable trading. Even if he has an increased cash balance, according to the modern system of business, this might be a balance at hi3 bankers’, and they in turn may have invested the amount so that there is no stock of the precious metals, of ” hard money,” anywhere to represent it. And the argument fails still further when applied to the transactions between nations, or rather, to use the phrase already employed, between the aggregate of individuals in nations engaged in the foreign trade. It is quite clear that if a nation, or the individuals of a nation, do make profit in their

foreign trading, the amount may be invested as it accrues— in machinery, or warehouses, or stock-in-trade, or book debts, or stocks and shares purchased abroad, so that there may be no corresponding ” balance of trade ” to bring home. There is no doubt also that what may be is in reality what largely happens. A prosperous foreign trade carried on by any country implies a continuous investment by that country either abroad or at home, and there may or may not be a balance receivable in actual gold and silver.

Iri another particular the argument also fails. In the aggregate of individual trading with various countries, there may some- times be purchases and sales as far as the individuals are concerned, but not purchases and sales as between the nations. For ■ example, goods are exported from the United Kingdom, ammunition and stores and ships,’ which appear in the British returns as exports, and which have really been sold by individual British traders to individuals abroad; but these sales are not set off by any purchases on the other’ side which come into the international account, as the set-off is a loan by the people of one country to the people or government of another. The same with the export of railway and other material when goods are exported for the purpose of constructing railways or other works abroad. The sales are made by individuals in the United Kingdom to individuals abroad; but there is no set-off of purchases on the 6ther side. Mutatis mutandis the same explanation applies to the remittance of goods by one country to another, or by indi- viduals in one country to individuals in another to pay the interest or repay the capital of loans which have been received in former times. These are all cases of the movement of goods irrespective of international sales and purchases, though the movements themselves appear in the international records of imports and exports, and therefore it seems to be assumed, though without any warrant, in the international records of the balance of trade. There is yet another failure in the comparison. The individual trader would include in his sales and purchases services such as repairs performed by him for others, and similar services which others do for himself; but no similar accounts are kept of the corresponding portions of international trade such as the earning of freights and commissions, although in strictness, it is obvious, they belong as much to international trade as the

imports and exports themselves, which cannot therefore show a complete ” balance of trade.”

The illusions which may result then from the confusion of ideas between a balance of trade or profit, and a balance of cash paid or received, and from the identification of an excess of imports over exports or of exports over imports with the balance of trade itself, though they are not the same things, hardly need description. The believers in such illusions are not entitled to any hearing as economists, however, much they may be accepted in the market-place or among politicians.

The “balance of trade ” and “the excess of imports over exports ” are thus simply pitfalls for the amateur and the unwary. On the statistical side, moreover, there is a good deal more to be urged in order to impress the student with care and attention. The records of imports and exports themselves may vary from the actual facts of international purchases and sales. The actual values of the goods imported and paid for by the nation may vary from the published returns of imports, which are, by the necessity of the case, only estimated values. And so with the exports. The actual purchases and sales may be some- thing very different. A so-called sale may prove abortive through its not being paid for at all, the debtor failing altogether. In any case the purchases of a year may not be paid for by the sales of the year, and the ” squaring ” of the account may take a long time. Still more the estimates of value may be so taken as not to give even an approximately correct account as far as the records go. Thus in the plan followed in the United Kingdom imports are valued as at the port where they arrive and exports at the port where they are despatched from— a plan which so far places them on an equal footing for the purpose Of striking a balance of trade. But in the import and export records of the United States a different plan is followed. The imports are no longer valued as at the port of arrival with the freight and other charges included, but as at the port of shipment. The results on the balance of trade drawn out must accordingly be quite different in the two cases. With other Countries similar differ- ences arise. To deduce then from records of imports and exports any conclusions as to the excess of imports or exports at different times is a work of enormous statistical difficulty. Excellent illustrations will be found in J. Holt Schooling’s British Trade Book (1908).

The country which presents the most interesting questions in connexion with the study is the United Kingdom, with its largely

preponderating foreign trade: Its annual imports and exports, excluding bullion, exceed 800 millions sterlings and the bullion one year with another is 100 millions more. Its excess of imports, moreover, between the middle and end of the 19th century gradually rose from a small figure to 180 millions sterling annually, and occasioned the popular discussion referred to respecting an " adverse " balance of trade, and particularly the belief existing in many quarters that the nation is living on its capital. The result has been a new investigation of the subject, so as to bring out and present the credits to which the country is entitled in its trade as a shipowner and commission merchant, and to exhibit at the same time the magnitude of British foreign investments, which cannot be less than 2000 millions sterling and must bring in an enormous annual income. Other countries such as France, Germany, Belgium, Holland, Denmark, Norway and Sweden, are in the same condition, though their foreign trade is not on the same scale, and similar rules apply to the reading of their import and export accounts. The United States is a conspicuous instance of a country which in the first decade of the 20th century was still in the position of a borrower and had a large excess of exports, though there were signs of a change in the opposite direction. New countries generally, such as Canada, Australia and the South American countries, resemble the United States. Comparisons are made difficult by the want of uniformity in the methods of stating the figures, but that different countries have to be grouped according as they are indebted or creditor countries is undeniable, and no study of the trade statistics is possible without recognition of the underlying economic circumstances.

In conclusion it may be useful to repeat the main propositions laid down as to the balance of trade. (1) A " balance of trade " to the individual trader, from whose experience the phrase comes, is not necessarily, as is supposed, a balance received or receivable in the precious metals. It may be invested as it accrues — in machinery, or warehouses, or stock-in-trade, or in book debts, or in stocks and shares or other property outside the trader's business, as well as in cash. (2) What is true of the individual trader is also true of the aggregate of individuals engaged in the foreign trade of a country. Cash is only one of the forms in which they may elect to be paid. (3) The imports and exports recorded in the statistical returns of a country do not correspond with the purchases and sales of individual traders, as the sales especially may be set off by loans, while the so-called

imports may include remittances of interest and of capital repaid. (4) When capital is repaid the country receiving it need not be living on it, but may be investing it at home. (5) The foreign trading of countries may also comprise many transactions, such as the earning of freights and commissions, which ought to appear in a proper account showing a balance of trade, as similar transactions appear in an individual trader's account, but which are not treated as imports or exports in the statistical returns of a nation's foreign trade. (6) Import and export returns themselves are not the same as accounts of purchases and sales; the values are only estimates, and must not be relied on literally without study of the actual facts. (7) Import and export returns in different countries are not in all cases taken at the same point, there being important variations, for instance, in this respect between the returns of two great countries, the United Kingdom and the United States, which are often compared, but are really most difficult to compare. (8) The United Kingdom is a con- spicuous instance of a country which has a great excess of imports over exports in consequence of its large lending abroad in former times; while its accounts are specially affected by the magnitude of its services as a trading nation carrying passengers and goods all over the world, which do not result, however, in so-called "exports." The United States, on the other hand, is a con- spicuous instance of an indebted nation, which has or had until lately few or no sums to its credit in foreign trade except the visible exports, (g) The various countries of the world naturally fall into groups. The nations of western Europe, such as France, Germany, Belgium, Holland, Sweden and Norway, fall into a

group with Great Britain as creditor nations, while Canada, Australasia and the South American countries fall into a group with the United States as undeveloped and indebted countries, So also of other countries, each belongs naturally to one group or another. (10) The excess of imports or exports may vary indefinitely at different times according as a creditor country is receiving or lending at the time, or according as a debtor country is borrowing or paying off its debts at the time, but the permanent characteristics are always to be considered. (R.Gn.)

BALANOGLOSSUS, the general name given to certain peculiar,

opaque, worm-like animals which live an obscure life under stones, and burrow in the sand from between tide-marks down to the abyssal regions of the sea. Their colour is usually some tone of yellow with dashes of red, brown and green, and they frequently emit a pungent odour. The name has reference to the tongue-shaped muscular proboscis by which the animal works its way through the sand. The proboscis is not the only organ of locomotion, being assisted by the succeeding segment

of the body, the buccal segment or collar. By the waves of contrac- tion executed by the proboscis accompanied by inflation of the collar, progression is effected, some- times with marvellous rapidity. The third body region or trunk may attain a great length, one or two feet, or even more, and is also muscular, but the truncal muscles are of subordinate import- ance in locomotion, serving princi- pally to promote the peristaltic contractions of the body by which the food is carried through the gut. The function of alimentation is closely associated with that of locomotion, somewhat as in the burrowing earthworm; in the ex- cavation of its burrows the sand is passed through the body, and any nutrient matter that may ad- here to it is extracted during its passage through the intestine, the exhausted sand being finally ejected through the vent at the orifice of the burrow and appearing at low i.—Ptychodera flava tide as & worm casting- In accor d-

Fig.

(New Caledonia), from ... ... , . ,.

above; about life size. ance Wlth thls manner of feeding, the mouth is kept permanently open and prevented from collapsing by a pair of skeletal cornua belonging to a sustentacular apparatus (the nuchal skeleton), the body of which lies within the narrow neck of the proboscis; the latter is inserted into the collar and surrounded by the anterior free flap of this segment of the body.

When first discovered by J. F. Eschscholtz at the Marshall Islands in 1825, Balanoglossus was described as a worm-like animal belonging to the Echinoderm order of Holothurians or sea-cucumbers. In 1865 Kowalevsky discovered that the organs of respiration consist of numerous pairs of gill-slits leading from the digestive canal through the thickness of the body- wall to the exterior. On this account the animal was subsequently placed by

Gegenbaur in a special class of Vermes, the Entero- pneusta. In 1883-1886 Bateson showed by his embryological researches that the Enteropneusta exhibit chordate (vertebrate) affinities in respect of the coelomic, skeletal and nervous systems as well as in regard to the respiratory system, and, further, that the gill-slits are formed upon a plan similar to that of the gill- slits of Amphioxus, being subdivided by tongue-bars which depend from the dorsal borders of the slits.

Coelom and Pore-canals. — In correspondence with the tri-regional differentiation of the body in its external configuration, the coelom (body-cavity, perivisceral cavity) is divided into three portions com- pletely separated from one another by septa : — (1) proboscis-coelom, or first body-cavity; (2) the collar-coelom, or second body-cavity;

(3) truncal coelom, or third body-cavity. Of these divisions of the coelom the first two communicate with the exterior by means, of a pair of ciliated pore-canals placed at the posterior end of their re- spective segments. The proboscis-pores are highly variable, and frequently only one is present, that on the left side; sometimes the pore-canals of the proboscis unite to open by a common median orifice, and sometimes their communication with the proboscis- coelom appears to be occluded, and finally the pore-canals may be quite vestigial. The collar-pores are remarkable for their constancy ; this is probably owing to the fact that they have become adapted to a special function, the inhalation of water to render the collar turgid during progression. There are reasons for supposing that the truncal coelom was at one time provided with pore-canals, but supposed vestiges of these structures have only been described for one genus, Spengelia,m which they lie near the anterior end of the truncal coelom.

Enteron. — Not only is the coelom thus subdivided, but the enteron (gut, alimentary canal, digestive tube) itself shows indications of three main subsections in continuity with one another: — (1) pro- boscis-gut (Eicheldarm, stomochord, vide infra) ; (2) collar-gut (buccal cavity, throat) ; (3) truncal gut extending from the collar to the vent.

Stomochord. — The proboscis-gut occurs as an outgrowth from the anterior dorsal wall of the collar-gut, and extends forward into the basal (posterior) region of the proboscis, through the neck into the proboscis-coelom, ending blindly in front. Although

an integral portion of the gut, it has ceased to assist in alimentation, its epithe- lium undergoes vacuolar differentiation and hypertrophy, and its lumen becomes more or less vestigial. It has, in fact, become metamorphosed into a resistant supporting structure resembling in some respects the notochord of the true Chorda ta, but probably not directly comparable with the latter structure, being related to it solely by way of substitution. On account of the presence and mode of origin (from the gut-wall) of this organ Bateson introduced the term hemichorda as a phyletic name for the class Enteropneusta. As the proboscis-gut appears to have undoubtedly skeletal properties, and as it also has topographical relations with the mouth, it has been designated in English by the non-committal term stomochord. It is not a simple diverticulum of the collar-gut, but a complex structure possessing paired lateral pouches and a ventral convexity (ventral caecum) which rests in a concavity at the f.ont end of the body of the nuchal skeleton (fig. 3). In some species (Spengelidae) there is a long capillary vermiform extension of the stomochord in front. The nuchal skeleton is a non-cellular laminated thickening of base- ment-membrane underlying that portion of the stomochord which lies between the above-mentioned pouches and the orifice into the throat. At the point where the stomochord opens into the buccal cavity the nuchal skeleton bifurcates, and the two cornua thus produced pass obliquely backwards and downwards embedded in the wall of the throat, often giving rise to projecting ridges that bound a dorsal groove of the collar-gut which is in continuity with the wall of the stomochord (fig. 3)

Nervous System. — At the base of the epidermis (which is in general ciliated) there is over the entire surface of the body a layer of nerve- fibres, occurring immediately outside the basement-membrane which separates the epidermis from the subjacent musculature. The nervous system is thus essentially epidermal in position and diffuse in distribution; but an interesting concentration of nerve-cells and fibres has taken place in the collar-region, where a medullary tube, closed in from the outside, opens in front and behind by anterior and posterior neuropores. This is the collar nerve-tube. Sometimes the central canal is wide and uninterrupted between the two neuropores; in other cases it becomes broken up into a large number of small closed medullary cavities, and in others again it is obsolete. In one family, the Ptychoderidae, the medullary tube of the collar is connected at intermediate points with the epidermis by means of a variable number of unpaired outgrowths from its dorsal wall,

generally containing an axial lumen derived from and in continuity with the central canal. These hollow roots terminate blindly in the dorsal epidermis of the collar, and place the nervous layer of the latter in direct connexion with the fibres of the nerve-tube. The exact significance of these roots is a matter for speculation, but it seems possible that they are epiphysial structures remotely com- parable with the epiphysial (pineal) complex of the craniate verte- brates. In accordance with this view there would be also some probability in favour of regarding the collar nerve-tube of the Enteropneusta as the equivalent of the cerebral vesicle only of Amphioxus and the Ascidian tadpole, and also of the primary fore- brain of vertebrates.

Special thickenings of the diffuse nervous layer of the epidermis occur in certain regions and along certain lines. In the neck of the proboscis the fibrous layer is greatly thickened, and other intensi- fications of this layer occur in the dorsal and ventral middle lines of the trunk extending to the posterior end of the body. The dorsal epidermal nerve-tract is continued in front into the ventral wall of the collar nerve-tube, and at the point of junction there is a circular commissural thickening following the posterior rim of the collar and affording a special connexion between the dorsal and ventral nerve- tracts. From the ventral surface of the collar nerve-tube numerous motor fibres may be seen passing to the subjacent musculature. These fibres are not aggregated into roots.

GUI-slits. — The possession of gilt-slits is as interesting a feature in the organization of Balanoglossus as is the presence of tracheae in Peripatus. These gill-slits occupy a variable extent of the anterior portion of the trunk, commencing immediately behind the collar- trunk septum. The branchial bars which constitute the borders of the clefts are of two kinds: — (i) Septal bars between two contiguous clefts, corresponding to the primary bars in A mphioxus; (2) Tongue- bars. The chief resemblances ~3n, between Balanoglossus and “Jt*” Amphioxus in respect of ~-a,Y. ˆg gjn_ s iits may be stated briefly as follows: — (a) the presence of two kinds of branchial bars in all species and also of small cross- bars (synapticula) in many species; (/S) numerous gill- slits, from forty to more than a hundred pairs; (7) the addition of new gill-slits by fresh perforation at the posterior

end of the pharynx throughout life. The chief differences are, that (a) the ***”• tongue-bar is the essential

V/& ° r S an °f tne gill-slit in

Balanoglossus, and exceeds

Fig. 2. — Structure of branchial region, the septal bars in bulk,

let*

be, coelom. tb, tongue-bars. ds, mesentery. pr, ridge. w, vessel.

vn, ventral nerve.

gp, gill-pore. dn, dorsal nerve. dv, vessel. ce, oesophagus. vs, mesentery.

while in Amphioxus the reverse is the case; (b) the tongue-bar contains a large coelomic space in Balano- glossus, but is solid in Am- phioxus; (c) the skeletal rods in the tongue-bars of

Balanoglossus are double ; (d) the tongue-bar in Balanoglossus does not fuse with the ventral border of the cleft, but ends freely below, thus producing a continuous U-shaped cleft. The meaning of this singular contrast between the two animals may be that we have here an instance of an interesting gradation in evolution. From serving primitively as the essential organ of the cleft the tongue-bar may have undergone reduction and modification, becoming a secondary bar in Amphioxus, subordinate to the primary bars in size, vascu- larity and development ; finally, in the craniate vertebrates’ it would then have completed its involution, the suggestion having been made that the tongue-bars are represented by the thymus- primordia.

Gill-pouches and Gill-pores. — Only rarely do the gill-slits open freely and directly to the exterior (fig. 1). In most species of Balano- glossus each gill-slit may be said to open into its own atrial chamber or gill-pouch; this in its turn opens to the exterior by a minute gill-pore. There are, therefore, as many gill-pouches as there are gill-slits and as many gill-pores as pouches. The gill-pores occur on each side of the dorsal aspect of the worm in a longitudinal series at the base of a shallow groove, the branchial groove. The respira- tory current of water is therefore conducted to the exterior by different means from that adopted by Amphioxus, and this difference is so great that the theory which

seeks to explain it has to postulate radical changes of structure, function and topography.

Excretory and Vascular Systems. — It seems likely that the coelomic

gjre-canals were originally excretory organs, but in the existing nteropneusta the pore-canals (especially the collar canals) have, as we have seen, acquired new functions or become vestigial, and the function of excretion is now mainly accomplished by a structure peculiar to the Enteropneusta called the glomerulus, a vascular complex placed on either side of the anterior portion of the stomo- chord, projecting into the proboscis-coelom. The vascular system itself is quite peculiar, consisting of lacunae and channels destitute of endothelium, situated within the thickness of the basement- membrane of the body-wall, of the gut-wall and of the mesenteries. The blood, which is a non-corpuscular fluid, is propelled forwards by the contractile dorsal vessel and collected into the central blood- sinus; this lies over the stomochord, and is surrounded on three sides by a closed vesicle, with contractile walls, called the pericardium (Herzblase). By the pulsation of the pericardial vesicle (best observed in the larva) the blood is driven into the glomerulus, from which it issues by efferent vessels which effect a junction with the ventral (sub-intestinal) vessel in the trunk. The vascular system does not readily lend itself to morphological comparison between such widely different animals as Balanoglossus and Amphioxus, and the reader is therefore referred to the memoirs cited at the end of this article for further details.

Reproductive System. — The sexes are separate, and when mature are sometimes distinguished by small differences of colour in the genital region. Both male and female gonads consist of more or less lobulated hollow sacs connected with the epidermis by short ducts. In their disposition they are either uniserial, biserial or multiserial. They occur in the branchial region, and also extend to a variable distance behind it. In exceptional cases they are either confined to the branchial region or excluded from it. When

they are arranged in uniserial or biserial rows the genital ducts open into or near the branchial grooves in the region of the pharynx and in a corresponding position in the post-branchial region. An im- portant feature is the occurrence in some species (Ptychoderidae) of paired longitudinal pleural or lateral folds of

the body which are mobile, and can be approximated at their free edges so as to close in the dorsal surface, embracing both the median dorsal nerve-tract and the branchial grooves with the gill-pores, so as to form a tem- porary peri-branchial and medullary tube, open behind where the folds cease. On the other hand, they can be spread out horizontally so as to expose their own upper side as well as the dorsal surface

agntsfr

mm

mrf e

Fig. 3. — Structure of anterior end.

a, Arrow from proboscis-cavity (pc) passing to left of peri-cardium (per) and out through proboscis pore-canal.

b 1 , arrow from central canal of neurochord (enc) passed out through anterior neuropore.

V-, ditto, through posterior neuro- pore.

c, arrow intended to pass from 1st gill-pouch through collar pore-canal into collar-coelom («)•

cts, posterior limit of collar. dv, dorsal vessel passing into

central sinus (bs). eV, efferent vessel passing into

ventral vessel (vv). epr, epiphysial tubes. st, stomochord. vs, ventral septum of proboscis. sk, body of nuchal skeleton. m, mouth. th, throat. tb, tongue-bars. tc, trunk coelom.

of the body (fig. 1). These folds are called the genital pleurae because they contain the bulk of the gonads. Correlated with the presence of the genital pleurae there is a pair of vascular folds of the basement membrane proceeding from the dorsal wall of the gut in the post- branchial portion of the branchio-genital region, and from the dorsal angles made by the pleural folds with the body-wall in the pharyn- geal region ; they pass, in their most fully developed condition, to the free border of the genital pleurae. These vascular membranes are called the lateral septa. Since there are many species which do not possess these genital pleurae, the question arises as to whether their presence or their

absence is the more primitive condition. Without attempting to answer this question categorically, it may be pointed out that within the limits of the family [Ptychoderidae) which is especially characterized by their presence there are some species in

which the genital pleurae are quite obsolete, and yet lateral septa occur (e.g. Ptychodera ruficollis), seeming to indicate that the pleural folds have in such cases been secondarily suppressed.

Development. — The development of Balanoglossus takes place according to two different schemes, known as direct and indirect, correlated with the occurrence in the group of two kinds of ova, large and small. Direct development, in which the adult form is achieved without striking metamorphosis by a gradual succession of stages, seems to be confined to the family Balanoglossidae. The remaining two families of Enteropneusta, Ptychoderidae and Spengelidae, contain species of which probably all pursue an indirect course of develop- ment, culminating in a metamorphosis by which the adult form is attained. In these cases the larva, called Tornaria, is pelagic and transparent, and possesses a complicated ciliated seam, the longi- tudinal ciliated band, often drawn out into convoluted bays and lappets. In addition to this ciliated band the form of the Tornaria is quite characteristic and unlike the adult. The Tornaria larva offers a certain similarity to larvae of Echinoderms (sea-urchins, star-fishes, and sea-cucumbers), and when first discovered was so described. It is within the bounds of possibility that Tornaria actually does indicate a remote affinity on the part of the Entero- pneusta to the Echinoderms, not only on account of its external form, but also by reason of the possession of a dorsal water-pore com- municating with the anterior body-cavity. In the direct develop- ment Bateson showed that the three divisions of the coelom arise as pouches constricted off from the archenteron or primitive gut, thus resembling the development of the mesoblastic somites of Amphioxus . It would appear that while the direct development throws light upon the special plan of organization of the Enteropneusta, the indirect development affords a clue to their possible derivation. However this may be, it is sufficiently remarkable that a small and circum- scribed group like the Enteropneusta, which presents such a com-

paratively uniform plan of composition and of external form, should follow two such diverse methods of development.

Distribution. — Some thirty species of Balanoglossus are known, distributed among all the principal marine provinces from Greenland to New Zealand. The species which occurs in the English Channel is Ptychodera sarniensis. The Ptychoderidae and Spengelidae are predominantly tropical and subtropical, while the Balanoglossidae are predominantly arctic and temperate in their distribution. One of the most singular facts concerning the geographical distribution of Enteropneusta has recently been brought to light by Benham, who found a species of Balanoglossus, sensu stricto, on the coast of New Zealand hardly distinguishable from one occurring off Japan. Finally, Glandiceps abyssicola (Spengelidae) was dredged during the " Challenger " expedition in the Atlantic Ocean off the coast of Africa at a depth of 2500 fathoms.

Authorities. — W. Bateson, " Memoirs on the Direct Development of Balanoglossus," Quart. Journ. Micr. Sci. (vols, xxiv.-xxvi., 1884-1886); W. B. Benham, "Balanoglossus otagoensis, n. sp," Q. J. M. S. (vol. xlii. p. 497, 1899); Yves Delage and Ed. Herouard, Traite de zoologie concrete (t. viii.), " Les Procordes " (1898); S. F. Harmer, " Note on the Name Balanoglossus," Proc. Camb. Phil. Soc. (x. p. 190, 1900) ; T. H. Morgan, " Memoirs on the In- direct Development of Balanoglossus," Journ. Morph. (vol. v., 1891, and vol. ix., 1894); W. E. Ritter, " Harrimania maculosa, a new Genus and Species of Enteropneusta from Alaska," Papers from the Harriman Alaska Exhibition (ii.), Proc. Washington Ac. (ii. p. in, 1900); J. W. Spengel, " Die Enteropneusten," Eighteenth Monograph on the Fauna una Flora des Golfes von Neapel (1893) ; A. Willey, " Enteropneusta from the South Pacific, with Notes on the West Indian Species," Zool. Results (Willey), part iii., 1899; see also Q. J. M. S. (vol. xlii. p. 223, 1899) ; J. P. Hill, " The Enteropneusta of Funafuti," Mem. Austral. Mus. (iii., 1897-1898); M. Caullery and F. Mesnil, " Balanoglossus Kochleri, n. sp. English Channel," C. R. Soc. Biol. Iii. p. 256 (1900). (A. W.*)

BALARD, ANTOINE JEROME (1802-1876), French chemist, was born at Montpellier on the 30th of September 1802. He started as an apothecary, but taking up teaching he acted as chemical assistant at the faculty of sciences of his native town, and then became professor of chemistry at the royal college and school of pharmacy and at the faculty of sciences. In 1826 he discovered in

sea-water a substance which he recognized as a previously unknown element and named bromine. The reputa- tion brought him by this achievement secured his election as successor to L. J. Thenard in the chair of chemistry at the faculty of sciences in Paris, and in 1851 he was appointed professor of chemistry at the College de France, where he had M. P. E. Berthelot first as pupil, then as assistant and finally as colleague. He died in Paris on the 30th of April 1876. While the discovery of bromine and the preparation of many of its compounds was his most conspicuous piece of work, Balard was an industrious chemist on both the pure and applied sides. In his researches on the bleaching compounds of chlorine he was the first to advance the view that bleaching-powder is a double compound of calcium

chloride and hypochlorite; and he devoted much time to the problem of economically obtaining soda and potash from sea-water, though here his efforts were nullified by the discovery of the much richer sources of supply afforded by the Stassfurt deposits. In organic chemistry he published papers on the decomposition of ammonium oxalate, with formation of oxamic acid, on amyl alcohol, on the cyanides, and on the difference in constitution between nitric and sulphuric ether.

BALA SERIES, in geology, a series of dark slates and sand- stones with beds of limestone which occurs in the neighbourhood of Bala, Merionethshire, North Wales. It was first described by A. Sedgwick, who considered it to be the upper part of his Cambrian System. The series is now placed at the top of the Ordovician System, above the Llandeilo beds. The Bala limestone is from 20 to 40 ft. thick, and is recognizable over most of North Wales; it is regarded as the equivalent of the Coniston limestone of the Lake District. The series in the type area consists of the Hirnant limestone, a thin inconstant bed, which is separated by 1400 ft. of slates from the Bala limestone, below this are more slates and volcanic rocks. The latter are represented by large contem- poraneous deposits of tuff and felsitic lava which in the Snowdon District are several thousand feet thick. In South Wales the Bala Series contains the following beds in descending order: — the Trinucleus seticornis beds (Slade beds, Redhill shales and Sholes- hook limestone), the Robeston Wathen beds, and the Dicrano- graptus shales. The typical graptolites are, in the upper part, Dicellograptus anceps and D. complanatus; in the lower part, Pleurograptus linearis and Dicranograptus Clingani. In Shrop- shire this series is represented by the Caradoc and Chirbury Series; in southern Scotland by the Hartfell and Ardmillan Series,

and by similar rocks in Ireland. See Caradoc Series and Ordovician System.

BALASH (in the Greek authors, Balas; the later form of the name Vologaeses) , Sassanian king in a.d. 484-488, was the brother and successor of Peroz, who had died in a battle against the Hephthalites (White Huns) who invaded Persia from the east. He put down the rebellion of his brother Zareh, and is praised as a mild and generous monarch, who made concessions to the Christians. But as he did nothing against his enemies, he was, after a reign of four years, deposed and blinded, and his nephew, Kavadh I., raised to the throne. (Ed. M.)

BALASORE, a town and district of British India, in the Orissa division of Bengal. The town is the principal one and the administrative headquarters of the district, and is situated on the right bank of the river Burabalang, about 7 m. from the sea-coast as the crow flies and 16 m. by the river. There is a station on the East Coast railway. The English settlement of Balasore, formed in 1642, and that of Pippli in its neighbourhood seven years earlier, became the basis of the future greatness of the British in India. The servants of the East India Company here fortified themselves in a strong position, and carried on a brisk investment in country goods, chiefly cottons and muslins. They flourished in spite of the oppressions of the Mahommedan governors, and when needful asserted their claims to respect by arms. In 1688, affairs having come to a crisis, Captain William Heath, commander of the company's ships, bombarded the town. In the 1 8th century Balasore rapidly declined in importance, on account of a dangerous bar which formed across the mouth of the river. At present the bar has 1 2 to 1 5 f t. of water at spring- tides, but not more than 2 or 3 ft. at low water in the dry season. Large ships have to anchor outside in the open roadstead. The town still possesses a large maritime trade, despite the silting-up of the river mouth. Pop. (1901) 20,880.

The district forms a strip of alluvial land between the hills and the sea, varying from about 9 to 34 m. in breadth; area, 2085 sq. m. The hill country rises from the western boundary line. The district naturally divides itself into three well-defined tracts — (1) The salt tract, along the coast; (2) The arable tract, or rice country; and (3) The submontane tract, or jungle lands. The salt tract runs the whole way down the coast, and forms a desolate strip a few miles broad. Towards the beach it rises into sandy ridges, from 50 to 80 ft. high, sloping inland and covered with a

vegetation of low scrub jungle. Sluggish brackish streams creep along between banks of fetid black mud. The sandhills on the verge of the ocean are carpeted with creepers and the wild convolvulus. Inland, it spreads out into prairies of coarse long grass and scrub jungle, which harbour wild animals in plenty; but throughout this vast region there is scarcely a hamlet, and only patches of rice cultivation at long intervals. From any part of the salt tract one may see the boundary of the inner arable part of the district fringed with long lines of trees, from which every morning the villagers drive their cattle out into the saliferous plains to graze. The salt tract is purely alluvial, and appears to be of recent date. Towards the coast the soil has a distinctly saline taste.

Salt used to be largely manufactured in the district by evaporation, but the industry is now extinct. The arable tract lies beyond the salt lands, and embraces the chief part of the district. It is a long dead-level of rich fields, with a soil lighter in colour than that of Bengal or Behar; much more friable, and apt to split up into small cubes with a rectangular cleavage. A peculiar feature of the arable tract is the Pats (literally cups) or depressed lands near the river-banks. They were probably marshes that have partially silted up by the yearly overflow of the streams. These pats bear the finest crops. ‘ As a whole, the arable tract is a treeless region, except around the villages, which are en- circled by fine mango, pipal, banyan and tamarind trees, and intersected with green shady lanes of bamboo. A few palmyras, date-palms and screw-pines (a sort of aloe, whose leaves are armed with formidable triple rows of hook-shaped thorns) dot the expanse or run in straight lines between the fields. The sub- montane tract is an undulating country with a red soil, much broken up into ravines along the foot of the hills. Masses of laterite, buried in hard ferruginous clay, crop up as rocks or slabs. At Kopari, in Kila Ambohata, about 2 sq. m. are almost paved with such slabs, dark-red in colour, perfectly flat and polished like plates of iron. A thousand mountain torrents have scooped out for themselves picturesque ravines, clothed with an ever-fresh verdure of prickly thorns, stunted gnarled shrubs, and here and there a noble forest tree. Large tracts are covered with sal jungle, which nowhere, however, attains to any great height.

Balasore district is watered by six distinct river systems: those of the Subanrekha, the Burabalang, the Jamka, the Kansbans and the Dhamra.

The climate greatly varies according to the seasons of the year. The hot season lasts from March to June, but is tempered by cool sea-breezes; from June to September the weather is close and oppressive; and from October to February the cold season brings the north-easterly winds, with cool mornings and evenings.

Almost the only crop grown is rice, which is largely exported by sea. The country is exposed to destructive floods from the hill-rivers and also from cyclonic storm-waves. The district is traversed throughout its entire length by the navigable Orissa coast canal, and also by the East Coast railway from Calcutta to Madras. The seaports of Balasore, Chandbali and Dhamra conduct a very large coasting trade. The exports are almost confined to rice, which is sent to Ceylon, the Maldives and Mauritius. The imports consist of cotton twist and piece goods, mineral oils, metals, betel-nuts and salt. In 1901 the population was 1,071,197, an increase of 9 % in the decade.

BALASSA, BALINT, Baron or KekkQ and Gyarmat (1551- 1594), Magyar lyric poet, was born at Kekko, and educated by the reformer, Peter Bornemissza, and by his mother, the highly gifted Protestant zealot, Anna Sulyok. His first work was a translation of Michael Bock's Wiirtzgertlein filr die krancken Seelen, to comfort his father while in prison (1 570-1 572) for some political offence. On his father's release, Balint accompanied him to court, and was also present at the coronation diet of Pressburg in 1 572. He then joined the army and led a merry life at the fortress of Eger. Here he fell violently in love with Anna Losonczi, the daughter of the hero of Temesvar, and evidently, from his verses, his love was not unrequited. But a new mis- tress speedily dragged the ever mercurial youth away from her,

and deeply wounded, she gave her hand to Krisztof Ungnad. Naturally Balassa only began to realize how much he loved Anna when he had lost her. He pursued her with gifts and verses, but she remained true to her pique and to her marriage vows, and he could only enshrine her memory in immortal verse. In 1574 Balint was sent to the camp of Gaspar Bekesy to assist him against Stephen Bathory; but his troops were encountered and scattered on the way thither, and he himself was severly wounded and taken prisoner. His not very rigorous captivity

lasted for two years, and he then disappears from sight. We next hear of him in 1584 as the wooer and winner of Christina Dobo, the daughter of the valiant commandant of Eger. What led him to this step we know not, but it was the cause of all his subsequent mis- fortunes. His wife's greedy relatives nearly ruined him by legal processes, and when in 1586 he turned Catholic to escape their persecutions they declared that he and his son had become Turks. His simultaneous desertion of his wife ied to his expulsion from Hungary, and from 1589 to 1594 he led a vagabond life in Poland, sweetened by innumerable amours with damsels of every degree from cithara players to princesses. The Turkish war of 1 594 recalled him to Hungary, and he died of his wounds at the siege of Esztergom the same year. Balassa's poems fall into four divisions: religious hymns, patriotic and martial songs, original love poems, and adaptations from the Latin and German. They are all most original, exceedingly objective and so excellent in point of style that it is difficult even to imagine him a contemporary of Sebastian Tinodi and Peter Ilosvay. But his erotics are his best productions. They circulated in MS. for generations and were never printed till 1874, when Farkas Deak discovered a perfect copy of them in the Radvanyi library. For beauty, feeling and transporting passion there is nothing like them in Magyar literature till we come to the age of Michael Csokonai and Alexander Petofi. Balassa was also the inventor of the strophe which goes by his name. It consists of nine lines — aabccbddb, or three rhyming pairs alternating with the rhyming third, sixth and ninth lines.

See Aron Szilady, Balint Balassa's Poems (Hung."> Budapest, 1879- '(R. N. B.)

BALATON (Plattensee), the largest lake of middle Europe, in the south-west of Hungary, situated between the counties of Veszprem, Zala and Somogy. Its length is 48 m., average breadth 3I to t,\ m., greatest breadth i\ m., least breadth a little less than 1 m. It covers 266 sq. m. and has an extreme depth of 149 ft. Its northern shores are bordered by the beautiful basaltic cones of the Bakony mountains, the volcanic soil of which produces grapes yielding excellent wine; the southern consist partly of a marshy plain, partly of downs. The most beautiful point of the lake is that where the peninsula of Tihany projects in the waters. An ancient church of the Benedictines is here situated on the top of a hill. In a tomb therein is buried Andrew I. (d. 1061), a king of the Hungarian Arpadian dynasty. The temperature of the lake varies greatly, in a manner resembling that of the sea, and many

connect its origin with a sea of the Miocene period, the waters of which are said to have covered the Hungarian plain. About fifty streams flow into the lake, which drains into the Danube and is well stocked with fish. It often freezes in winter. Lake Balaton is of growing importance as a bathing resort.

BALAYAN, a town and port of entry of the province of Batangas, Luzon, Philippine Islands, at the head of the Gulf of Balayan, about 55 m. S. by W. of Manila. Pop. (1903) 8493, Subsequently in October 1903, Calatagan (pop. 2654) and Tuy (pop. 2430) were annexed. Balayan has a healthful climate, and is in the midst of a fertile district (with a volcanic soil), which produces rice, cane-sugar, cacao, coffee, pepper, cotton, Indian corn, fruit (oranges, bananas, mangoes, &c.) and native dyes. Horses and cattle are raised for market in considerable numbers. The fisheries are important. The native language is Tagalog.

BALBI, ADRIAN (1 782-1848), Italian geographer, was bom at Venice on the 25th of April 1782. The publication of his Prospetto polilico-geografico dello stato attuale del globo (Venice,

1808) obtained his election to the chair of professor of geography at the college of San Michele at Murano; in 1811-1813 he was professor of physics at the Lyceum of Fermo, and afterwards became attached to the customs office at his native city. In 1820 he visited Portugal, and there collected materials for his Essai statistique sur le royaume de Portugal el d'Algarve, published in 1822 at Paris, where the author resided from 1821 until 1832. This was followed by Varielis politiques el stalistiques de la monarchie portugaise, which contains some curious observations respecting that country under the Roman sway. In 1826 he published the first volume of his Alias ethnographique du globe, on classification des peuples anciens el modernes d'apres lews langues, a work of great erudition. In 1832 appeared the Abrege de Geographic, which, in an enlarged form, was translated into the principal languages of Europe. Balbi retired to Padua and there died on the 14th of March 1848. His son, Eugenio Balbi (1812-1884), followed a similar career, being professor of geography at Pavia, and publishing his father's Scritti Geografici (Turin, 1841), and original works in Gea, ossia la terra (Trieste, 1854-1867) and Saggio di geografia (Milan, 1868).

BALBO, CESARE, Count (1789-1853), Italian writer and statesman, was born at Turin on the 21st of November 1789. His father, Prospero Balbo, who belonged to a noble Piedmontese family, held a high position in the Sardinian court, and at the time of Cesare's birth was mayor of the capital. His mother, a member of the Azeglio family, died when he was three years old; and he was brought up in the house of his great-grandmother, the countess of Bugino. In 1798 he joined his father at Paris. From 1808 to 18 14 Balbo served in various capacities under the Napoleonic empire at Florence, Rome, Paris and in Illyria. On the fall of Napoleon he entered the service of his native country. While his father was appointed minister of the interior, he entered the army, and undertook political missions to Paris and London. On the outbreak of the revolution of 1821, of which he disapproved, although he was suspected of sympathizing with it, he was forced into exile; and though not long after he was allowed to return to Piedmont, all public service was denied him. Reluctantly, and with frequent endeavours to obtain some appointment, he gave himself up to literature as the only means left him to influence the destinies of his country. This accounts for the fitfulness and incompleteness of so much of his literary work, and for the practical, and in many cases temporary, element which runs through even his most elaborate productions. The great object of his labours was to help in securing the inde- pendence of Italy from foreign control. Of true Italian unity he had no expectation and no desire, but he was devoted to the house of Savoy, which he foresaw was destined to change the fate of Italy. A confederation of separate states under the supremacy of the pope was the genuine ideal of Balbo, as it was the ostensible one of Gioberti. But Gioberti, in his Primato, seemed to him to neglect the first essential of independence, which he accordingly inculcated in his Speranze or Hopes of Italy, in which he suggests that Austria should seek compensation in the Balkans for the inevitable loss of her Italian provinces. Preparation, both military and moral, alertness and patience were his constant theme. He did not desire revolution, but reform; and thus he became the leader of a moderate party, and the steady opponent not only of despotism but of democracy. At last in 1848 his hopes were to some extent satisfied by the constitution granted by the king. He was appointed a member of the commission on the electoral law, and became first constitutional prime-minister of Piedmont, but only held office a few months. With the ministry of d' Azeglio, which soon after got into power, he was on friendly terms, and his pen continued the

active defence of his political principles till his death on the 3rd of June 1853. The most important of his writings are historico-political, and derive at once their majesty and their weakness from his theocratic theory of Christianity. His style is clear and vigorous, and not unfrequently terse and epigrammatic. He published Quattro Novelle in 1829; Storia d'Italia sotto i Barbari in 1830; Vita di Dante, 1839; Medita zioni Sloriche, 1842-1845; Le Speranze d'ltalia, 1844; Pensieri

sulla Storia d'ltalia, 1858; Delia Monorchia rappresentativa in Italia (Florence, 1857).

See E. Ricotti, Delia Vita e degli Scritti di Cesare Balbs (1856); A. Vismara, Bibliografia di Cesare Balbo (Milan, 1882).

BALBOA, VASCO NUfiEZ DE (c. 1475-1517), the discoverer of the Pacific, a leading figure among the Spanish explorers and conquerors of America, was born at Jerez de los Caballeros, in Estremadura, about 1475. Though poor, he was by birth a gentleman (hidalgo) . Little is known of his life till 1 5or , when he followed Rodrigo de Bastidas in his voyage of discovery to the western seas. He appears to have settled in Hispaniola, and took to cultivating land in the neighbourhood of Salvatierra, but with no great success, as his debts soon became oppressive. In 1509 the famous Ojeda (Hojeda) sailed from San Domingo with an expedition and founded the settlement of San Sebastian. He had left orders with Enciso, an adventurous lawyer of the town, to fit out two ships and convey provisions to the new settlement. Enciso set sail in 15 10, and Balboa, whose debts made the town unpleasant to him, managed to accompany him by concealing himself, it is said, in a cask of " victuals for the voyage," which was conveyed from his farm to the ship. The expedition reached San Sebastian to find Ojeda gone and the settlement in ruins. While Enciso was undecided how to act, Balboa proposed that they should sail for Darien, on the Gulf of Uraba, where he had touched when with Bastidas. – His proposal was accepted and a new town was founded, named Sta Maria de la Antigua del Darien; but quarrels soon broke out among the adventurers, and Enciso was deposed, thrown into prison and finally sent off to Spain with Balboa's ally, the alcalde Zamudio. Being thus left in authority, Balboa began to conquer the surrounding country, and by his bravery, courtesy, kindness of heart and just dealing gained the friendship of several native chiefs. On one of these excursions he heard for the first time, from the cacique Comogre, of the ocean on the other side of the mountains and of the gold of

Peru. Soon after his return to Darien he received letters from Zamudio, informing him that Enciso had complained to the king, and had obtained a sentence condemning Balboa and summoning him to Spain. In his despair at this message Vasco Nunez resolved to attempt some great enterprise, the success of which he trusted would conciliate his sovereign. On the 1st of September 1513 he set out with one hundred and ninety Spaniards (Francisco Pizarro among them) and one thousand natives; on the 25th or 26th of September he reached the summit of the range, and sighted the Pacific. Pizarro and two others were sent on to reconnoitre; one of these scouts, Alonzo Martin, was the first European actually to embark upon the new-found ocean, in St Michael's Gulf. On the 29th of September Balboa himself arrived upon the shore, and formally took possession of the " Great South Sea " in the name of the Spanish monarch. He remained on the coast for some time, heard again of Peru, visited the Pearl Islands, and thence returned to Darien, which he entered in triumph with a great booty on the 18th of January 15 14. He at once sent messengers to Spain bearing presents, to give an account of his discoveries; and the king, Ferdinand the Catholic, partly reconciled to his daring subject, named him Adelantado of the South Sea, or admiral of the Pacific, and governor of Panama and Coyba. None the less an expedition sailed from Spain under Don Pedro Arias de Avila (generally called Pedrarias Davila) to replace Balboa in the government of the Darien colony itself. Mean- while the latter had crossed the isthmus and revisited the Pacific several (some say more than twenty) times; plans of the con- quest of Peru and of the exploration of the western ocean began to shape themselves in his mind; and with a view to these projects, materials for shipbuilding were gathered together upon the Pacific coast, and two light brigantines were built, launched and armed. With these Vasco Nunez now took possession of the Pearl Islands, and, had it not been for the weather, would have reached the coast of Peru. But his career was stopped by the jealousy of Pedrarias, who pretended that Balboa proposed to throw off his allegiance, and enticed him to Acla, near Darien, by a crafty message. As soon as he had him in his power, he threw

him into prison, had him tried for treason, and forced the judge to condemn him to death. The sentence was carried into pxecution on the public square of Ada in 1517. From a reck- less

adventurer, Balboa had developed into an able general, an excellent colonial administrator, and a statesman of mature / ■ldgment and brilliant foresight.

See G. F. de Oviedo, Historia general . . . de las Jndias (1526, bk xxxix. chs. 2, 3); D. M. T. Quintana, Vidas de Espanoles celebres; M. F. de Nuvarrete, Coleccion de los Viajes y Descubri- mientos (1825-1837); J. Acosta, Compendio historico de la Nueva Granada (1848) ; O. Peschel, Geschkhte der Erdkunde (1865, p. 237), and Zeitalter der Entdeckungen, pp. 442-3 &c; Washington Irving s Voyages and Discoveries of the Companions of Columbus (l8 3l)» and Varela's notes on the same in Biblioteca del Comercio del Plata (Monte Video); Ferdinand Denis, art. " Vasco Nunez de Balboa," in Now. Biog. Gen.

BALBRIGGAN, a market-town and seaport of Co. Dublin, Ireland, in the north parliamentary division, 2if m. N.N.E. of Dublin by the Great Northern railway. Pop. (1901) 2236. The harbour, though dry at low tides, has a depth of 14 ft. at high- water springs, and affords a good refuge from the east or south- east gales. There are two piers, and a railway viaduct of eleven arches crosses the harbour. The town has considerable manu- factures of cottons and hosiery, " Balbriggan hose " being well known. The industry was founded by Baron Hamilton in 1761. There is some coast trade in grain, &c, and sea-fishery is pro- secuted. Balbriggan is much frequented as a watering-place in summer.

BALBUS, literally " stammerer," the name of several Roman families. Of the Acilii Balbi, one Manius Acilius Balbus was consul in 150 B.C., another in 114. To another family belonged T. Ampius Balbus, a supporter of Pompey, but afterwards pardoned by Julius Caesar (cf. Cic. ad Fam. vi. 12 and xiii. 70). We know also of Q. Antonius Balbus, praetor in Sicily in 82 B.C., and Marcus Atius Balbus, who married Julia, a sister of Caesar, and had a daughter Atia, mother of Augustus. The most important of the name were the two Cornelii Balbi, natives of Gades (Cadiz).

1. Lucius Cornelius Balbus (called Major to distinguish him from his nephew) was born early in the last century B.C. He is generally considered to have been of Phoenician origin. For his services against Sertorius in Spain, the Roman citizenship was conferred upon him and his family by Pompey. Becoming friendly with all parties, he had much to do with the formation of the First Triumvirate, and was one of the chief financiers in Rome. He was careful to ingratiate himself with Caesar, whom he

accompanied when propraetor to Spain (61), and to Gaul (58) as chief engineer (praefectus fabrum). His position as a naturalized foreigner, his influence and his wealth naturally made Balbus many enemies, who in 56 put up a native of Gades to prosecute him for illegally assuming the rights of a Roman citizen, a charge directed against the triumvirs equally with himself. Cicero, Pompey and Crassus all spoke on his behalf, and he was acquitted. During the civil war he endeavoured to get Cicero to mediate between Caesar and Pompey, with the object of preventing him from definitely siding with the latter; and Cicero admits that he was dissuaded from doing so, against his better judgment. Subsequently, Balbus became Caesar's private secretary, and Cicero was obliged to ask for his good offices with Caesar. After Caesar's murder, Balbus seems to have attached himself to Octavian; in 43 or 42 he was praetor, and in 40 consul — an honour then for the first time conferred on an alien. The year of his death is not known. Balbus kept a diary of the chief events in his own and Caesar's life (Suetonius, Caesar, 81). The 8th book of the Bell. Gall. , which was probably written by his friend Hirtius at his instigation, was dedicated to him.

Cicero, Letters (ed. Tyrrell and Purser, iv. introd. p. 62) and Pro Balbo; see also E. Jullien, De L. Cornelia Balbo Maiore (1886).

2. Lucius Cornelius Balbus (called Minor), nephew of the above, received the Roman citizenship at the same time as his uncle. During the civil war, he served under Caesar, by whom he was entrusted with several important missions. He also took part in the Alexandrian and Spanish wars. He was rewarded for his services by being admitted into the college of pontiffs.

In 43 he was quaestor in Further Spain, where he amassed a large fortune by plundering the inhabitants. In the same year he crossed over to Bogud, king of Mauretania, and is not heard of again until 21, when he appears as proconsul of Africa. Mommsen thinks that he had incurred the displeasure of Augustus by his conduct as praetor, and that his African appointment after so many years was due to his exceptional fitness for the post. In 19 Balbus defeated the Garamantes, and on the 27th of March in that year received the honour of a triumph, which was then for the first time granted to one who was not a Roman citizen by birth, and for the last time to a private individual. He built a theatre in the capital, which was dedicated on the return of Augustus from Gaul in 13 (Dio Cassius liv. 2 5 ; Pliny, Nat. Hist. xxxvi. 12. 60). Balbus appears to have

given some attention to literature. He wrote a play of which the subject was his visit to Lentulus in the camp of Pompey at Dyrrhachium, and, according to Macrobius {Saturnalia, iii. 6), was the author of a work called ‘Eˆ?7i?rt(ca, dealing with the gods and their worship. See Velleius Paterculus ii. 51 ; Cicero, ad Ait. viii. 9 ; and on both the above the exhaustive articles in Pauly-Wissowa, Realencyclo- pddie, iv. pt. i. (1900).

BALCONY (Ital. balcone from balco, scaffold; cf. O. H. Ger. balcho, beam, Mod. Ger. Balken, Eng. balk), a kind of platform projecting from the wall of a building, supported by columns or console brackets, and enclosed with a balustrade. Sometimes balconies are adapted for ceremonial purposes, e.g. that of St Peter’s at Rome, whence the newly elected pope gives his blessing urbi et orbi. Inside churches balconies are sometimes provided for the singers, and in banqueting halls and the like for the musicians. In theatres the ” balcony ” was formerly a stage-box, but the name is now usually confined to the part of the auditorium above the dress circle and below the gallery.

BALDE, JAKOB (1604-1668), German Latinist, was born at Ensisheim in Alsace on the 4th of January 1604. Driven from Alsace by the marauding bands of Count Mansfeld, he fled to Ingolstadt where he began to study law. A love disappoint- ment, however, turned his thoughts to the church, and in 1624 he entered the Society of Jesus. Continuing his study of the humanities, he became in 1628 professor of rhetoric at Innsbruck, and in 1635 at Ingolstadt, whither he had been transferred by his superiors in order to study theology. In 1 63 3 he was ordained priest. His lectures and poems had now made him famous, and he was summoned to Munich where, in 1638, he became court chaplain to the elector Maximilian I. He remained in Munich till 1650, when he went to live at Landshut and afterwards at Amberg. In 1654 he was transferred to Neuberg on the Danube, as court preacher and confessor to the count palatine. In the opinion of his contemporaries, Balde revived the glories of the Augustan age, and Pope Alexander VII. and the scholars of the Netherlands combined to do him honour; even Herder regarded him as a greater poet than Horace. While such judg- ments are naturally exaggerated, there is no doubt that he takes a very high place among modern Latin poets. He died at Neuberg on the gth of August 1668.

A collected edition of Balde’s works in 4 vols, was published at Cologne in 1650; a more complete edition in 8 vols, at Munich,

1729; also a good selection by L. Spach (Paris and Strassburg, 1871). An edition of his Latin lyrics appeared at Regensburg in 1884. There are translations into German of his finer odes, by J. Schrott and M. Schleich (Munich, 1870). See G. Westermayer, Jacobus Balde, sem Leben und seine Werke (1868) ; J. Bach, Jakob Balde (Freiburg, 1904). BALDER, a Scandinavian god, the son of Odin or Othin. The story of his death is given in two widely different forms, by Saxo in his Gesta Danorum (ed. Holder, pp. 69 ff.) and in the prose Edda (Gylfaginning, cap. 49).

See F. Kauffmann, Balder: Mythus und Sage (Strassburg, 1902). For other works, see Teutonic Peoples, § 7.

BALDERIC, the name given to the author of a chronicle of the bishops of Cambrai, written in the nth century. This Gesta episcoporum Cambracensium was for some time attributed to Balderic, archbishop of Noyon, but ii now seems tolerably certain that the author was an anonymous canon of Cambrai. The work is of considerable importance for the history of the north of France during the nth century, and was first published in 1615.

The best edition is in the Monumenta Germaniae historica. Scriptores, Bd. vii. (Hanover and Berlin, 1826-1892), which contains an introduction by L. C. Bethmann.

See Histoire litteraire de la France, tome viii. (Paris, 1865-1869).

BALDI, BERNARDINO (1533-1617), Italian mathematician and miscellaneous writer, was descended of a noble family at Urbino, in which city he was born on the 6th of June 1533. He pursued his studies at Padua with extraordinary zeal and success, and is said to have acquired, during the course of his life, no fewer than sixteen languages, though according to Tiraboschi the inscription on his tomb limits the number to twelve. The appearance of the plague at Padua obliged him to retire to his native city, .whence he was, shortly afterwards, called to act as tutor to Ferrante (Ferdinand) Gonzaga, from whom he received the rich abbey of Guastalla. He held office as abbot for twenty- five years, and then retired to his native town. In 161 2 he was employed by the duke as his envoy to Venice, where he dis- tinguished himself by the congratulatory oration he delivered before the Venetian senate

on the election of the new doge, Andrea Memmo. Baldi died at Urbino on the 12th of October 1617. He was, perhaps, the most universal genius of his age, and is said to have written upwards of a hundred different works, the chief part of which have remained unpublished. His various works give satisfactory evidence of his abilities as a theologian, mathema- tician, geographer, antiquary, historian and poet. The Cronica dei Matematici (published at Urbino in 1 707) is an abridgment of a larger work, on which he had bestowed twelve years of labour, and which was intended to contain the lives of more than two hundred mathematicians. His life has been written by Affo, Mazzuchelli and others.

BALDINGER, ERNST GOTTFRIED (1738-1804), German physician, was born near Erfurt on the 13th of May 1738. He studied medicine at Erfurt, Halle and Jena, and in 1761 was entrusted with the superintendence of the military hospitals connected with the Prussian encampment near Torgau. He published in 1765 a treatise De Militum Morbis, which met with a favourable reception. In 1768 he became professor of medicine at Jena, whence he removed in 1773 to Gbttingen, and in 1785 to Marburg, where he died of apoplexy on the 21st of January 1804. Among his pupils were S. T. Sommerring and J. F. Blumenbach. Some eighty-four separate treatises are mentioned as having proceeded from his pen, in addition to numerous papers scattered through various collections and journals.

BALDINUCCI, FILIPPO (1624-1696), Italian writer on the history of the arts, was born at Florence. His chief work is entitled Notizie de'Professori del Disegno da Cimabue . . . (dal 1260 sino al 1670), and was first published in six vols. 4to, 1681- 1728. The capital defect of this work is the attempt to derive all Italian art from the schools of Florence. A good edition is that by Ranalli (5 vols. 8vo, Florence, 1845-1847). Baldinucci's whole works were published in fourteen vols, at Milan, 1808-1812.

BALDNESS l (technically alopecia, from bXinfqˆ, a fox, foxes often having bald patches on their coats), the result of loss of hair, particularly on the human scalp. So far as remediable alopecia is concerned, two forms may be distinguished: one the premature baldness so commonly seen in young men, due to alopecia seborrheica, the other alopecia areata, now regarded as an epidemic disease.

Alopecia seborrhoica is that premature baldness so constantly

seen, in which the condition steadily advances from the forehead backwards, until only a fringe of hair is left on the head. It is always due to the underlying disease seborrhoea, and though it progresses steadily if neglected, is yet very amenable to treatment. The two drugs of greatest value in this trouble are sulphur and salicylic acid, some eighteen grains of each added to an ounce of vaseline making a good application. This should be rubbed well into the scalp daily for a prolonged period. Where the greasiness is objected to, the following salicylic lotion may be substituted,

1 The adjective " bald " M. E. " balled " is usually explained as literally " round and smooth like a ball," but it may be connected with a stem bal, white or shining. The Greek (j>a\aKpos certainly suggests some such derivation.

though the vaseline application has probably the greater value: — 1$ Ac. salicyl. 3i — iv; 01. ricini 5» — vi; 01. ros. geran. Tit x; Spt. vini ad 5vi. The head must be frequently cleansed, and in very mild cases a daily washing with soap spirit will at times effect a cure unaided.

Alopecia areata is characterized by the development of round patches more or less completely denuded of hair. It is most commonly observed on the scalp, though it may occur on any part of the body where hair is naturally present. The patches are rounded, smooth and somewhat depressed owing to the loss of a large proportion of the follicles. At the margin of the patches short broken hairs are usually to be seen. Clinical evidence is steadily accumulating to show that this disease may be transmitted. Organisms are invariably present, in some cases few in number, but in others very abundant and forming a continuous sheath round the hair. They were first described by Dr George Thin, who gave them the name of Bacterium decalvens. The disease must be distinguished from ringworm — especially the bald variety; but though this is at times somewhat difficult clinically, the use of the microscope leaves no room for doubt. It must be remembered that for patients under forty years of age', time alone will generally bring about the desired end, though treatment undoubtedly hastens recovery. After forty every year added to the patient's age makes the prognosis less good. The general hygiene and mode of life of the sufferer must be very carefully attended to, and any weakness suitably treated. The following lotion should be applied daily to the affected parts, at first cautiously, later more vigorously, and in stronger solution:

— 1$ Acidi lactici 3i — Si; 01. ricini 3 ii ; Spt. vini ad giv.

The loss of hair following acute fevers must be treated by keeping the hair short, applying stimulating lotions to the scalp, and attending to the general hygiene of the patient.

BALDOVINETTI, ALESSIO (142 7-1499), Florentine painter, was born on the 14th of October 1427, and died on the 29th of August 1499. He was a follower of the group of scientific realists and naturalists in art which included Andrea del Castagno, Paolo Uccello and Domenico Veneziano, the influence of the last-named master being particularly manifest in his work. Tradition, probable in itself though not attested by contemporary records, says that he assisted in the decorations of the chapel of S. Egidio in Santa Maria Nuova, carried out during the years 1441-1451 by Domenico Veneziano and in conjunction with Andrea del Castagno. That he was commissioned to complete the series at a later date (1460) is certain. In 1462 Alessio was employed to paint the great fresco of the Annunciation in the cloister of the Annunziata, which still exists in ruined condition. The remains as we see them give evidence of the artist's power both of imitating natural detail with minute fidelity and of spacing his figures in a landscape with a large sense of air and distance; and they amply verify two separate statements of Vasari concerning him: that " he delighted in drawing landscapes from nature exactly as they are, whence we see in his paintings rivers, bridges, rocks, plants, fruits, roads, fields, cities, exercise- grounds, and an infinity of other such things," and that he was an inveterate experimentalist in technical matters. His favourite method in wall-painting was to lay in his compositions in fresco and finish them a secco with a mixture of yolk of egg and liquid varnish. This, says Vasari, was with the view of protecting the painting from damp; but in course of time the parts executed with this vehicle scaled away, so that the great secret he hoped to have discovered turned out a failure. In 1463 he furnished a cartoon of the Nativity, which was executed in tarsia by Giuliano de Maiano in the sacristy of the cathedral and still exists. From 1466 date the groups of four Evangelists and four Fathers of the Church in fresco, together with the Annunciation on an oblong panel, which still decorate the Portuguese chaptl in the church of S. Miniato, and are given in error by Vasari to Pietro Pollaiuolo. A fresco of the risen Christ between angels inside a Holy Sepulchre in the chapel of the Rucellai family, also still existing, belongs to 1467. In 1471 Alessio undertook important works for the church of Sta Trinita on the commission of Bongianni Gianfigliazzi. First, to paint an

altar-piece of the

Virgin and Child with six saints; this was finished in 1472 and is now in the Academy at Florence: next, a series of frescoes from the Old Testament which was to be completed according to contract within five years, but actually remained on hand for fully sixteen. In 1497 the finished series, which contained many portraits of leading Florentine citizens, was valued at a thousand gold florins by a committee consisting of Cosimo Rosselli, Benozzo Gozzoli, Perugino and Filippino Lippi; only some defaced fragments of it now remain. Meanwhile Alessio had been much occupied with other technical pursuits and researches apart from painting. He was regarded by his contemporaries as the one craftsman who had rediscovered and fully understood the long disused art of mosaic, and was employed accordingly between 1481 and 1483 to repair the mosaics over the door of the church of S. Miniato, as well as several of those both within and without the baptistery of the cathedral.

These are the recorded and datable works of the master; others attributed to him on good and sufficient internal evidences are as follows: — A small panel in the Florence Academy, with the three subjects of the Baptism, the Marriage of Cana and the Transfiguration; this was long attributed to Fra Angelico, but is to all appearance early work of Baldovinetti: an Annunciation in the Uffizi, formerly in the church of S. Giorgio; unmistakably by the master's hand though given by Vasari to Peselino: several Madonnas of peculiarly fine and characteristic quality; one in the collection of Madame Andre at Paris acquired direct from the descendants of the painter, a second, formerly in the Duchatel collection and now in the Louvre, a third in the posses- sion of Mr Berenson at Florence. All these are executed with the determined patience and precision characteristic of Baldo-vinetti; two, those at the Louvre and in the Andre collection, are distinguished by beautiful landscape backgrounds; and all, but especially the example in the Louvre, add a peculiar and delicate charm to the quality of grave majesty which Alessio's works share with those of Piero della Francesca and others of Domenico Veneziano's following. They probably belong to the years 1460-1465. In the later of his preserved works, while there is no abatement of precise and laborious finish, we find beginning to prevail a certain harshness and commonness of type, and a lack

of care for beauty in composition, the technical and scientific searcher seeming more and more to predominate over the artist.

See also Vasari, ed. Milanesi, vol. ii. ; Crowe-Cavalcaselle, Hist, of Painting in Italy, vol. ii. ; Bernhard Berenson, Study and Criticism of Italian Art, 2nd series. (S. C.)

BALDRIC (from 0. Fr. baudrei, O. Ger. balderich, of doubtful origin; cognate with English ” belt “), a belt worn over one shoulder, passing diagonally across the body and under the other arm, either as an ornament or a support for a sword, bugle, &c.

BALDUINUS, JACOBUS, Italian jurist of the 13th century, was by birth a Bolognese, and is reputed to have been of a noble family. He was a pupil of Azo, and the master of Odofredus, of Hostiensis, and of Jacobus de Ravanis, the last of whom has the reputation of having first applied dialectical forms to legal science. His great fame as a professor of civil law at the university of Bologna caused Balduinus to be elected podestd of the city of Genoa, where he was entrusted with the reforms of the law of the republic. He died at Bologna in 1225, and has left behind him some treatises on procedure, the earliest of their kind.

BALDUS DE UBALDIS, PETRUS (1327-1406), Italian jurist, a member of the noble family of the Ubaldi (Baldeschi), was born at Perugia in 1327, and studied civil law there under Bartolus, being admitted to the degree of doctor of’ civil law at the early age of seventeen. Federicus Petrucius of Siena is said to have been the master under whom he studied canon law. Upon his pro- motion to the doctorate he at once proceeded to Bologna, where he taught law for three years ; after which he was advanced to a professorship at Perugia, where he remained for thirty-three years. He taught law subsequently at Pisa, at Florence, at Padua and at Pavia, at a time when the schools of law in those universities disputed the palm with the school of Bologna. He died at Pavia on the 28th of- April 1406. The extant works of Baldus hardly bear out the great reputation which, he acquired

amongst his contemporaries, due partly to the active part he took in public affairs, and partly to the fame he acquired by his consultations, of which five volumes have been published (Frankfort, 1589). Baldus was the master of Pierre Roger de Beaufort, who became pope under the title of Gregory XL, and

whose immediate successor, Urban VI., summoned Baldus to Rome to assist him by his consultations in 1380 against the anti-pope Clement VII. Cardinal de Zabarella and Paulus Castrensis were also amongst his pupils. His Commentary on the Liber Feudoruni; is considered to be one of the best of his works, which were unfortunately left by him for the most part in an incomplete state. His brothers Angelus (1328-1407) and Petrus (1335-1400) were of almost equal eminence witrr himself as jurists.

BALDWIN I. (d. 1205), emperor of Romania, count of Flanders and Hainaut, was one of the most prominent leaders of the fourth crusade, which resulted in the capture of Constantinople, the conquest of the greater part of the East Roman empire, and the foundation of the Latin empire of Romania. The imperial crown was offered to, and refused by, Henry Dandolo, doge of Venice. The choice then lay between Baldwin and Boniface of Montferrat. Baldwin was elected (9th of May 1204), and crowned a week later. He was young, gallant, pious and virtuous, one of the few who interpreted and observed his crusading vows strictly; the most popular leader in the host. The empire of Romania was organized on feudal principles; the emperor was feudal superior of the princes who received portions of the conquered territory. His own special portion consisted of Constantinople, the adjacent regions both on the European and the Asiatic side, along with some outlying districts, and several islands including Lemnos, Lesbos, Chios and Tenos. The territories had still to be conquered; and first of all it was necessary to break the resistance of the Greeks' in Thrace and secure Thessalonica. In this enterprise (summer of 1204) Baldwin came into collision with Boniface of Montferrat, the rival candidate for the empire, who was to receive a large territory in Macedonia with the title of king of Saloniki. He hoped to make himself quite independent of the empire, to do no homage for his kingdom, and he opposed Baldwin's proposal to march to Thessalonica. The antagonism between Flemings and Lombards aggravated the quarrel. Baldwin insisted on going to Thessalonica; Boniface laid siege to Hadrianople, where Baldwin had established a governor; civil war seemed inevitable. An agreement was effected by the efforts of Dandolo and the count of Blois. Boniface received Thessalonica as a fief from the emperor, and was appointed commander of the forces which were to march to the conquest of Greece.

During the following winter (1 204-1 205) the Franks prosecuted conquests in Bithynia, in which Henry, Baldwin's brother, took

part. But in February the Greeks revolted in Thrace, relying on the assistance of John (Kaloyan), king of Bulgaria, whose overtures of alliance had been unwisely rejected by the emperor. The garrison of Hadrianople was expelled. Baldwin along with Dandolo, the count of Blois, and Marshal Villehardouin, the historian, marched to besiege that city. The Bulgarian king led to its relief an army which far outnumbered that of the crusaders. The Frank knights fought desperately, but were utterly defeated (14th of April 1205); the count of Blois was slain, and the emperor captured. For some time his fate was uncertain, and in the meanwhile Henry, his brother, assumed the regency. Not till the middle of July was it definitely ascer- tained that he was dead. It seems that he was at first treated well as a valuable hostage, but was sacrificed by the Bulgarian monarch in a sudden outburst of rage, perhaps in consequence of the revolt of Philippopolis, which passed into the hands of the Franks. One contemporary writer says that his hands and feet were cut off, and he was thrown into a valley where he died on the third day; but the manner of his death is obscure. King John himself wrote to Pope Innocent III. that he died in prison. His brother Henry was crowned emperor in August.

Authorities. — Villehardouin, La Conquete de Constantinople (ed. De Wailly, Paris, 1872; ed. Bouchet, 2 vols., Paris, 1891); Robert

de Clari, La Prise de Constantinople (in Hopf's Chronigues greco-romaines); Ernoul, Chronique (ed. Mas Latrie, Paris, 1871); Nicetas (ed. Bonn, 1835); George Acropolites, vol. i. (ed. Heisenberg, Leipzig, 1903) ; Documents in Tafel and Thomas, Urkunden zur elteren Handels- und Staatsgeschichte der Republik Venedig (Vienna,

1856). . , „

Modern Works. — Ducange, Histoire de Vempire de Constantinople sous les empereurs jrancais (Paris, 1657); Gibbon, Decline and Fall, vol. vi. (ed. Bury, 1898) ; G. Finlay, History cf Greece, vol. iv. (Oxford, 1877) ; Pears, The Fall of Constantinople (London, 1885) ; Hopf, " Griechische Geschichte," in Ersch and Gruber's Encyklopadie, vol. lxxxv. (Leipzig, 1870); Gerland,

Geschichte des lateinischen Kaiserreiches von Konstantinopel, part i. (Homburg v. d. Hohe, 1905). (J. B. B.)

BALDWIN II. (1217-1273), emperor of Romania, wasayounger son of Yolande, sister of Baldwin I. Her husband, Peter of Courtenay, was third emperor of Romania, and had been followed by his son Robert, on whose death in 1228 the succession passed to Baldwin, a boy of eleven years old. The barons chose John of Brienne (titular king of Jerusalem) as emperor-regent for life; Baldwin was to rule the Asiatic possessions of the empire when he reached the age of twenty, was to marry John's daughter Mary, and on John's death to enjoy the full imperial sovereignty. The marriage contract was carried out in 1234. Since the death of the emperor Henry in 12 16, the Latin empire had declined and the Greek power advanced; and the hopes that John of Brienne might restore it were disappointed. He died in 1237. The realm which Baldwin governed was little more than Con- stantinople. His financial situation was desperate, and his life was chiefly occupied in begging at European courts. He went to the West in 1236, visited Rome, France and Flanders, trying to raise money and men to recover the lost territory of his realm. His efforts 1 met with success, and in 1240 he returned to Constantinople (through Germany and Hungary) at the head of a considerable army. Circumstances hindered him from accom- plishing anything with this help, and in 1245 he travelled again to the West, first to Italy and then to France, where he spent two years. The empress Maria and Philip of Toucy governed during his absence. He was happy to be able to get money from King Louis IX. in exchange for relics. In 1 249 he was with King Louis at Damietta. The extremity of his financial straits reduced him soon afterwards to handing over his only son Philip to merchants as a pledge for loans of money. Louis IX. redeemed the hostage-. The rest of his inglorious reign was spent by Baldwin in mendicant tours in western Europe. In 1261 Constantinople was captured by Michael Palaeologus, and Baldwin's rule came to an end. He escaped in a Venetian galley to Negropont, and then proceeded to Athens, thence to Apulia, finally to France. As titular emperor, his role was still the same, to beg help from the western powers. In 1267 he went to Italy; his hopes were centred in Charles of Anjou. Charles seriously entertained the idea of conquering Constantinople, though various complications hindered him from realizing it. He made a definite treaty with Baldwin to this intent (May 1267). During the next year Baldwin and his son Philip lived on pensions from Charles. In October 1273 Philip married

Beatrice, daughter of Charles, at Foggia. A few days later Baldwin died.

See authorities for Baldwin I. above; also Norden, Das Papsttum und Byzanz (Berlin 1903). (J. B. B.)

BALDWIN I., prince of Edessa (1098-1100), and first king of Jerusalem (iioo-i 1 18), was the brother of Godfrey of Bouillon (q.v.). He was originally a clerk in orders, and held several prebends; but in 1096 he joined the first crusade, and accompanied his brother Godfrey as far as Heraclea in Asia Minor. When Tancred left the main body of the crusaders at Heraclea, and marched into Cilicia, Baldwin followed, partly in jealousy, partly from the same political motives which animated Tancred. He wrested Tarsus from Tancred's grip (September 1097), and left there a garrison of his own. After rejoining the main army at Marash, he received an invitation from an Armenian named Pakrad, and moved eastwards towards the Euphrates, where he occupied Tell-bashir. Another invitation followed from Thoros of Edessa; and to Edessa Baldwin came, first as protector, and then, when Thoros was assassinated, as his successor (March 1098). For two years he ruled in Edessa (1098-1100), marrying

an Armenian wife, and acting generally as the intermediary between the crusaders and the Armenians. During these two years he was successful in maintaining his ground, both against the Mahommedan powers by which he was surrounded, and from which he won Samosata and Seruj (Sarorgia), and against a conspiracy of his own subjects in 1098. At the end of 1099 he visited Jerusalem along with Bohemund I.; but he returned to Edessa in January 1100. On the death of Godfrey he was summoned by a party, in Jerusalem to succeed to his brother. A lay reaction against the theocratic pretensions of Dagobert, who was counting on Norman support, was responsible for the summons; and in the strength of that reaction Baldwin was able to become the first king of Jerusalem. He was crowned on Christmas Day, 1100, by the patriarch himself; but the struggle of church and state was not yet over, and in the spring of noi Baldwin had Dagobert suspended by a papal legate, while later in the year the two disagreed on the question of the contribution to be made by the patriarch towards the defence of the Holy Land. The struggle ended in the deposition of Dagobert and the triumph of Baldwin (1102).

As Baldwin had secured the supremacy of the lay power in

Jerusalem, so he extended into a compact kingdom the poor and straggling territories to which he had succeeded. This he did by an alliance with the Italian trading towns, especially Genoa, which supplied in return for the concession of a quarter in the conquered towns, the instruments and the skill for a war of sieges, in which the coast towns of Palestine were successively reduced. Arsuf and Caesarea were captured in 1101; Acre in 1104; Beirut and Sidon in n 10 (the latter with the aid of the Venetians and Norwegians). Meanwhile Baldwin repelled in successive years the attacks of the Egyptians (1102, 1103, 1105), and in the latter years of his reign (1115-1118) he even pushed south- ward at the expense of Egypt, penetrating as far as the Red Sea, and planting an outpost at Monreal. In the north he had to compose the dissensions of the Christian princes in Tripoli, Antioch and Edessa (1109-1110), and to help them to maintain their ground against the Mahommedan princes of N.E. Syria, especially Maudud and Aksunk-ur, amirs of Mosul. In this way Baldwin was able to make himself into practical suzerain of the three Christian principalities of the north, though the suzerainty was, and always continued to be, somewhat nominal. In 11 18 he died, after an expedition to Egypt, during which he captured Farama, and, as old Fuller says, ” caught many fish, and his death in eating them.”

Baldwin was one of the ” adventurer princes ” of the first crusade, and as such he stands alongside of Bohemund, Tancred and Raymund. On the whole he was the most successful of his class. By his defence of the lay power against a nascent theo-cracy, and by his alliance with the Italian towns, he was the real founder of the Latin kingdom of Jerusalem. Events worked for him: he might never have come to the throne, unless Bohemund had fallen into the hands of Danishmend; and the dissensions among the Mahommedans alone made possible the subsequent consolidation of his kingdom. But he had virtii as well as Jortuna; and on his tombstone it was written that he was ” a second Judas Maccabaeus, whom Kedar and Egypt, Dan and Damascus dreaded.” As king, he still retained something of the clerk in the habit of his dress; but he was at the same time a warrior so impetuous, as to be sometimes foolhardy, and his policy was on the whole anti-clerical. He may be accused of greed: his life was not chaste; and the two defects met in his rejection of his Armenian wife and his marriage to the rich Sicilian widow Adelaide (1113). But “on the holiest soil of history, he gave his people a fatherland ” ; and Fulcher of

Chartres, his chaplain, who paints at the beginning of Baldwin's reign the terrors of the lonely band of Christians in the midst of their foes, can celebrate at the end the formation of a new nation in the East, (qui fuimus occidentales, nunc facti sumus orientates) — an achievement which, so far as it was the work of any one man, was the work of Baldwin I.

Literature. — The Historia Hierosolymitana of Fulcher, who had accompanied Baldwin- as chaplain to Edessa, and had lived in

Jerusalem during his reign, is the primary authority for Baldwin's career. There is a monograph on Baldwin by Wolff (Konig Baldwin I. von Jerusalem), and his reign is sketched in R. Rohricht's Geschichte des Konigreichs Jerusalem (Innsbruck, 1898) C. i.-iv. (E. Br.)

BALDWIN II., count of Edessa (1100-1118), king of Jerusalem (1118-1131), originally known as Baldwin de Burg, was a son of Count Hugh of Rethel, and a nephew of Godfrey of Bouillon and Baldwin I. He appears-on the first crusade at Constanti- nople as one of Godfrey's men; and he helped Tancred to occupy Bethlehem in June 1099. After the capture of Jerusalem he served for a time with Bohemund at Antioch; but when Baldwin of Edessa became king of Jerusalem, he summoned Baldwin de Burg, and left him as count in Edessa. From Edessa Baldwin conducted continual forays against the Mahommedan princes; and in the great foray of 1104, in which he was joined by Bohemund, he was defeated and captured at Balich. Tancred became guardian of Edessa during Baldwin's captivity, and did not trouble himself greatly to procure his release. Baldwin, however, recovered his liberty at the beginning of 1108, and at once entered upon a struggle with Tancred for the recovery of Edessa. In September 1108 he regained his principality; but the struggle with Tancred continued, until it was composed by Baldwin in 1109. For the next ten years Baldwin ruled his principality with success, if not without severity. Planted in the farthest Christian outpost in northern Syria, he had to meet many attacks, especially from Mardin and Mosul, in revenge for the provocation offered by his own forays and those of the restless Tancred. In 11 10 he was besieged in Edessa, and relieved by Baldwin I.; in n 14 he repelled an attack by Aksunkur of Mosul;

in in 5 he helped to defeat Aksunkur at Danith. At the same time, if Matthew of Edessa may be trusted, he also carried his arms against the Armenians, and plundered in his avarice every Armenian of wealth and position. In 1 1 18 he was on his way to spend Easter at Jerusalem, when he received the news of the death of Baldwin I.; and when he arrived at Jerusalem, he was made king, chiefly by the influence of the patriarch Arnulf. In a reign of thirteen years, Baldwin II. extended the kingdom of Jerusalem to its widest limits. His reign is marked by almost incessant fighting in northern Syria. In n 19, after the defeat and death of Roger of Antioch, he defeated the amirs of Mardin and Damascus at Danith; in subsequent years he extended his sway to the very gates of Aleppo. In 1 1 23 he was captured by Balak of Mardin, and confined in Kharput with Joscelin, his successor in the county of Edessa, who had been captured in the previous year. During his captivity Eustace Graverius became regent of Jerusalem, and succeeded, with the aid of the Venetians, in repelling an Egyptian attack, and even in capturing Tyre, n 24. In n 24 Baldwin II. succeeded in securing his liberty, under conditions which he instantly broke; and he at once embarked on strenuous and not unsuccessful hostilities against Aleppo and Damascus (1124-1127), exacting tribute from both. During his reign he twice acted as regent in Antioch (1119, 1130), and in 1126 he married his daughter Alice to Bohemund II. In n 28 he offered the hand of his eldest daughter, Melisinda, to Fulk of Anjou, who had been recommended to him by Honorius II. In n 29 Fulk came and married Melisinda, and in 1131, on the death of Baldwin, he succeeded to the crown.

Baldwin II. had much of the churchmanship of Godfrey and Baldwin I.; but he appears most decidedly as an incessant warrior, under whom the Latin domination in the East stretched, as Ibn al-Athir writes, in a long line from Mardin in the North to el-Arish on the Red Sea — a line only broken by the Mahommedan powers of Aleppo, Hamah, Horns and Damascus. The Franks controlled the great routes of trade, and took tolls of the traders; and in 1130 their power may be regarded as having reached its height.

Literature. — Fulcher of Chartres narrates the reign of Baldwin II. down to 1 127; for the rest of the reign the authority is William of Tyre. R. Rohricht, Geschichte des Konigreichs Jerusalem (Innsbruck, 1898), C. vii.-x., is the chief modern authority. (E. Br.)

BALDWIN III., king of Jerusalem (1143-1162), was the eldest ssn

of Fulk of Jerusalem by his wife Melisinda. He was born in

1 130, and became king in 1143, under the regency of his mother, which lasted till 1152. He came to the throne at a time when the attacks of the Greeks in Cilicia, and of Zengi on Edessa, were fatally weakening the position of the Franks in northern Syria; and from the beginning of his reign the power of the Latin kingdom of Jerusalem may be said to be slowly declining, though as yet there is little outward trace of its decay to be seen. Edessa was lost, however, in the year after Baldwin's accession, and the conquest by Zengi of this farthest and most important outpost in northern Syria was already a serious blow to the kingdom. Upon it in 1147 there followed the second crusade; and in that crusade Baldwin III., now some eighteen years of age, played his part by the side of Conrad III. and Louis VII. He received them in Jerusalem in 1148; with them he planned the attack on Damascus and with them he signally failed in the attack. In 1149, after the failure of the crusade, Baldwin III. appeared in Antioch, where the fall of Raymund, the husband of the princess Constance, made his presence necessary. He regulated affairs in Antioch, and tried to strengthen the north of Palestine generally against the arm of Zengi's successor, Nureddin, by renewing the old and politic alliance with Damascus interrupted since 1 147, and by ceding Tellbas.hir, the one remnant of the county of Edessa, to Manuel of Constantinople. In 1152 came the inevitable struggle between the young king and his mother, who had ruled with wisdom and vigour during the regency and was unwilling to lay down the reins of power. Baldwin originally planned a solemn coronation, as the signal of his emancipation. Dissuaded from that course, he nevertheless wore his crown publicly in the church of the Sepulchre. A struggle followed: in the issue, Baldwin agreed to leave his mother in possession of Jerusalem and Nablus, while he retained Acre and Tyre for himself. But he repented of the bargain; and a new struggle began, in which Baldwin recovered, after some fighting, the possession of his capital. From these internal dissensions Baldwin was now summoned to the north, to regulate anew the affairs of Antioch and also those of Tripoli, where the death of Count Raymund had thrown on his shoulders the cares of a second regency. On his return to Jerusalem he was successful in repelling an attack by an army of Turcomans; and his success encouraged him to attempt the siege of Ascalon in the spring of 1153. He was successful: the "bride of Syria," which had all but become the property of the crusaders in 1099, but had since defied the arms

of the Franks for half a century, became part of the kingdom of Jerusalem. From n 56 to 1158 Baldwin was occupied in hostilities with Nureddin. In n 56 he had to submit to a treaty which cut short his territories; in the winter of 1157-1158 he besieged and captured Harim, in the territory once belonging to Antioch: in n 58 he defeated Nureddin himself. In the same year Baldwin married Theodora, a near relative of the East Roman emperor Manuel; while in 1 1 59 he received a visit from Manuel himself at Antioch. The Latin king rode behind the Greek emperor, without any of the insignia of his dignity, at the entry into Antioch; but their re- lations were of the friendliest, and Manuel — as great a physician as he was a hunter — personally attended to Baldwin when the king was thrown from his horse in attempting to equal the emperor's feats of horsemanship. In the same year Baldwin had to undertake the regency in Antioch once more, Raynald of Chatillon, the second husband of Constance, being captured in battle. Three years later he died (1162), without male issue, and was succeeded by his brother Amalric I.

Baldwin III. was the first of the kings of Jerusalem who was a native of the soil of Palestine. His three predecessors had all been emigrants from the West. His reign also marks a new departure from another point of view. His predecessors had been men of a type half military, half clerical — at once hard fighters and sound churchmen. Baldwin was a man of a subtler type — a man capable of dealing with the intrigues of a court and with problems of law, and, as such, suited for guiding the middle age of the kingdom, which the different qualities of his predecessors had been equally suited to found. Like his brother, Amalric I., he was a clerkly and studious king versed

in law, and ready to discuss points of dogma. In an excellent sketch of Baldwin's character (xvi. cii,), William of Tyre tells us that he spent his spare time in reading and had a particular affection for history; that he was well skilled in the jus con- suetudinarium of the kingdom (afterwards recorded by lawyers like John of Ibelin and Philip of No vara as " the assizes of Jerusalem "); and that he had the royal faculty for remembering faces, and could generally be trusted to address by name

anybody whom he had once met, so that he was more popular with high and low than any of his predecessors. He had, William also reports, a gift of impromptu eloquence, and a faculty both for saying witty things pleasantly at other people's expense and for listening placidly to witticisms directed against himself; while he was generous to excess without needing to make ex- actions in order to support his generosity, and always respected the Church. If in his youth he had been prone to gambling, and before his marriage with Theodora had been somewhat lax in his morals, when he became a man he put away childish things ; his married life was a shining example to his people and he was abstemious both in food and drink, holding that " excess in either was an incentive to the worst of crimes." Even his enemy, Nureddin, said of him, when he died — " the Franks have lost such a prince that the world has not now his like."

Literature. — William of Tyre is the great primary authority for his reign; Cinnamus and Ibn-al-athir {see Bibliography to the article Crusades) give the Byzantine and Mahommedan point of view. His reign is described by R. Rohricht, Geschichte des Konig- reichs Jerusalem (Innsbruck, 1898), C. xiii.-xvi. (E. Br.)

BALDWIN IV., the son of Amalric I. by his first wife Agnes, ruled in Jerusalem from 11 74 to n 83, when he had his nephew Baldwin crowned in his stead. Educated by William of Tyre, Baldwin IV. came to the throne at the early age of thirteen; and thus the kingdom came under the regency of Raymund II. of Tripoli. Happily for the kingdom whose king was a child and a leper, the attention of Saladin was distracted for several years by an attempt to wrest from the sons of Nureddin the inheritance of their father — an attempt partially successful in n 74, but only finally realized in 1 183. The problems of the reign of Baldwin IV. may be said to have been two— his sister Sibylla and the fiery Raynald of Chatillon, once prince of Antioch through marriage to Constance (1153-1159), then a captive for many years in the hand of the Mahommedans, and since 1 1 76 lord of Krak (Kerak), to the east of the Dead Sea. Sibylla was the heiress of the kingdom; the problem of her marriage was important. Married first to William of Montferrat, to whom she bore a son, Baldwin, she was again married in n 80 to Guy of Lusignan; and dissen- sions between Sibylla and her husband on the one side, and Baldwin IV. on the other, troubled the latter years of his reign. Meanwhile Raynald of Krak took advantage of the position of his fortress, which lay on the great route of trade from Damascus and Egypt, to plunder the caravans (1182), and thus helped to

precipitate the inevitable attack by Saladin. When the attack came, Guy of Lusignan was made regent by Baldwin IV., but he declined battle and he was consequently deposed both from his regency and from his right of succession, while Sibylla's son by her first husband was crowned king as Baldwin V. in 1 183. For a time Baldwin IV. still continued to be active; but in 1 1 84 he handed over the regency to Raymund of Tripoli, and in 1185 he died.

Literature. — The narrative of William of Tyre concludes with Baldwin IV. 's transfer of the regency to Raymund of Tripoli. R. Rohricht describes the reign of Baldwin IV., Geschichte des Konigreichs Jerusalem (Innsbruck, 1898), C. xix.-xxi. (E. Br.)

BALDWIN V., the son of Sibylla (daughter of Amalric I.) by her first husband, William of Montferrat, was the nominal king of Jerusalem from n 83 to 1186, under the regency of Raymund of Tripoli. His reign is marked by the advance of Saladin and by dissensions between the government and Guy of Lusignan.

BALDWIN, JAMES MARK (1861-), American philosopher, was born at Columbia, S.C., and educated at Princeton and several German universities. He was professor of philosophy in the university of Toronto (1889), of psychology at Princeton (1893), and subsequently (1903) of philosophy and psychology in

Johns Hopkins University. Prominent among e>. perimental psychologists, he was one of the founders of the Psychological Review. In 1892 he was vice-president of the International Congress of Psychology held in London, and in 1897-1898 president of the American Psychological Association ; he received a gold medal from the Royal Academy of Arts and Sciences of Denmark (1897), was honorary president of the International Congress of Criminal Anthropology held in Geneva in 1896, and was made an honorary D.Sc. of Oxford University. Apart from articles in the Psychological Review, he has written: — Handbook of Psychology (1890); translation of Ribot's German Psychology of To-day (1886); Elements of Psychology (1893); Social and Ethical Interpretations in Mental Development (1898); Story of the Mind (1898); Mental Development in the Child and the Race (1896); Thought and Things (London and New York, vol. i., 1906). He also contributed largely to the Dictionary of Philosophy and Psychology (1901-1905), of which he was editor-in-chief.

BALDWIN, ROBERT (1804-1858), Canadian statesman, was born at York (now Toronto) on the 12th of May 1804. His father, William Warren Baldwin (d. 1844), went to Canada from Ireland in 1798; though a man of wealth and good family and a devoted member of the Church of England, he opposed the religious and political oligarchy which was then at the head of Canadian affairs, and brought up his son in the same principles. Robert Baldwin was called to the Bar in 1825, and entered into partnership with his father. In 1829 he was elected a member of the parliament of Upper. Canada for the town of York, but was defeated in the following year and retired for a time into private life. During the next six years, he so constantly advocated a responsible executive as the one cure for the political and economic evils of the time that he was known as " the man of one idea." In 1836 he was called by Sir Francis Bond Head (1793-1875), the lieutenant-governor, to the executive council, but finding himself without influence, and compelled to countenance measures to which he was opposed, he resigned within a month. Though a reformer, he strongly disapproved of the rebellion of 1837-1838. On the union of the two Canadas he became (1841) a member of the executive council under Lord Sydenham, but soon resigned on the question of responsible government. In 1 842 he formed the first Liberal administration, in connexion with Mr (afterwards Sir) L. H. Lafontaine, but resigned the next year, after a quarrel with the governor-general, Sir Charles Metcalfe, on a question of patronage, in which he felt that of responsible government to be involved. At the general election which followed, the governor-general was sustained by a narrow majority, but in 1848 the Liberals were again returned to power, and he and Mr Lafontaine formed their second administration under Lord Elgin and carried numerous important reforms, including the freeing from sectarian control of the Provincial University and the introduction into Upper Canada of an important municipal system.

Internal dissensions soon began to appear in the Liberal party, and in 1851 Mr Baldwin resigned. The special struggle leading to his resignation was an attempt to abolish the court of chancery of Upper Canada, whose constitution was due to a measure introduced by Baldwin in 1849. The attempt, though defeated, had been supported by a majority of the representatives from Upper Canada, and Baldwin's fastidious conscience took it as a vote of want of confidence. A deeper reason was his inability to approve of the advanced views of the Radicals, or " Clear Grits,"

as they came to be called. On seeking re-election in York, he declined to give any pledge on the burning question of the Clergy Reserves and was defeated. In 1858 the Liberal- Conservative party, formed in 1854 by a coalition, attempted to bring him out as a candidate for the upper house, which was at this date elective, but though he had broken with the advanced reformers, he could not approve of the tactics of their opponents, and refused to stand. He died on the 9th of December 1858. Even those who most bitterly attacked his measures admitted the purity and unselfishness of his motives. After the concession of responsible government, he devoted himself to bringing about

a good understanding between the English and French-speaking inhabitants of Canada, and his memory is held as dear among the French Canadians as in his native province of Ontario.

See J. C. Dent, Canadian Portrait Gallery (1880). His life, by the Hon. Geo. W. Ross, is included in The Makers of Canada series (Toronto) . ,

BALE, JOHN (1405-1563), bishop of Ossory, English author, was born at Cove, near Dunwich in Suffolk, on the 21st of November 1495. At the age of twelve he entered the Carmelite monastery at Norwich, removing later to the house of " Holme," probably the abbey of the Whitefriars at Hulne near Alnwick. Later he entered Jesus College, Cambridge, and took his degree of B. D. in 1529. At Cambridge he came under the influence of Cranmer and of Thomas Wentworth, 1st Baron Wentworth, and became an ardent partisan of the Reformers. He laid aside his monastic habit, and, as he himself puts it with character- istically brutal violence, " that I might never more serve so execrable a beast, I took to wife the faithful Dorothy." He obtained the living of Thornden, Suffolk, but in 1534 was summoned before the archbishop of York for a sermon against the invocation of saints preached at Doncaster, and afterwards before Stokesley, bishop of London, but he escaped through the powerful protection of Thomas Cromwell, whose notice he is said to have attracted by his miracle piays. He was an un- scrupulous controversialist, and in these plays he allows no considerations of decency to stand in the way of his denuncia- tions of the monastic system and its supporters. The prayer of Infidelitas which opens the second act

of his Thre Laws (quoted by T. Warton, Hist. Eng. Poetry, sect. 41) is an example of the lengths to which he went in profane parody. These coarse and violent productions were well calculated to impress popular feeling, and no doubt Cromwell found in him an invaluable instrument. But on his patron's fall in 1 540 Bale fled with his wife and children to Germany. He returned on the accession of Edward VI. He received the living of Bishopstoke, Hampshire, being promoted in 1552 to the Irish see of Ossory. He refused to be Consecrated by the Roman rite, which still obtained in the Irish church, and won bis point, though the dean of Dublin entered a protest against the revised office during the ceremony (see his Vocacyon of John Bale to the Bishopperycke of Ossorie, Harl. Misc. vol. vi.). He pushed his Protestant propaganda in Ireland with no regard to expediency, and when the accession of Mary inaugurated a reaction in matters of religion, it was with difficulty that he was got safely out of the country. He tried to escape to Scotland, but on the voyage was captured by a Dutch man-of-war, which was driven by stress of weather to St. Ives in Cornwall. Bale was arrested on suspicion of treason, but soon released. At Dover he had another narrow escape, but he eventually made his way to Holland and thence to Frankfort and Basel. During his exile he devoted himself to writing. After his return, on the accession of Elizabeth, he received (1560) a prebendal stall at Canterbury. He died in November 1563 and was buried in the cathedral.

The scurrility and vehemence with which " foul-mouthed Bale," as Wood calls him, attacked his enemies does not destroy the value of his contributions to literature, though his strong bias against Roman Catholic writers does detract from the critical value of his works. Of his mysteries and miracle plays only five have been preserved, but the titles of the others, quoted by himself in his Catalogus, show that they were animated by the same political and religious aims. The Thre Laws of Nature, Moses and Christ, corrupted by the Sodomytes, Pharisees and Papystes most wicked (pr. 1538 and again in 1562) was a morality play. The direction for the dressing of the parts is instructive: " Let Idolatry be decked like an old witch, Sodomy like a monk of all sects, Ambition like a bishop, Covetousness like a Pharisee or spiritual lawyer, False Doctrine like a popish doctor, and Hypocrisy like a gray friar." A Tragedye; or enterlude many- festing the chief promyses of God unto Man . . . (1538, printed in Dodsley's Old Plays, vol. 1), The Temptacyon of our Lorde (ed. A. B. Grosart in Miscellanies of the Fuller Worthies

Library, vol. i., 1870), and A brefe Comedy or Enterlude of Johan Baptystes

preachynge in the Wyldernesse, 6*c. (Harl. Misc. vol. i.) were all written in 1538. His plays are doggerel, but he is a figure of some dramatic importance as the author of Kynge Johan (c.1548), which marks the transition between the old morality play and the English historical drama. It does not appear to have directly influenced the creators of the chronicle histories. To the authors of the Troublesome Raigne of King John (1591) it was apparently unknown, but it is noteworthy that an attempt, however feeble, at historical drama was made fourteen years before the production of Gorboduc. Kynge Johan (ed. J, P. Collier, Camden Soc. 1838) is itself a polemic against the Roman Catholic Church. King John is represented as the champion ot* English rites against the Roman see:—

" This noble Kynge Johan, as a faythfull Moses Withstode proude Pharao for his poore Israel."

But the English people remained in the bondage of Rome, — " Tyll that duke Josue, whych was our late Kynge Henrye, Clerely brought us out in to the lande of mylke and honye."

Elsewhere John is called a Lollard and accused of " heretycall langage," and he is finally poisoned by a monk of Swinestead. Allegorical characters are mixed with the real persons. Ynglonde vidua, represents the nation, and the jocular element is provided by Sedwyson (sedition) , who would have been the Vice in a pure morality play. One actor was obviously intended to play many parts, for stage directions such as " Go out Ynglond, and dress for Clargy " are by no means uncommon. The MS. of Kynge Johan was discovered between 183 1 and 1838 among the corpora- tion papers at Ipswich, where it was probably performed, for there are references to charitable foundations by King John in the town and neighbourhood. It is described at the end of the MS. as two plays, but there is no obvious division, the end of the first act alone being noted. The first part is corrected by Bale and the latter half is in 'his handwriting, but his name nowhere occurs. In the list of his works, however, he gives a play De Joanne Anglorum Rege, written in idiomate materno.

But Bale's most important work is Illustrium majoris Britan- niae scriptorum, hoc est, Angliae, Cambriae, ac Scotiae Summarium . . . (Ipswich and Wesel, for John Overton, 1548, 1549). This

contained five centuries, but another edition, almost entirely rewritten and containing fourteen centuries, was printed at Basel with the title Scriptorum illustrium majoris Britanniae . . . Catalogus (1557—1559). The chronological catalogue of British authors and their works was partly founded on the Collectanea and Commentarii of John Leland, but Bale was an indefatigable collector and worker, and himself examined many of the valuable libraries of the Augustinian and Carmelite houses before their dissolution. In his notebook he records as an instance of the wholesale destruction in progress: " I have bene also at Norwyche, our second citye of name, and there all the library monuments are turned to the use of their grossers, candelmakers, sopesellers, and other worldly occupyers ... As much have I saved there and in certen other places in Northfolke and South- folke concerning the authors names and titles of their workes, as I could, and as much wold I have done through out the whole realm, yf I had been able to have borne the charges, as I am not." His work is therefore invaluable, in spite of the inaccuracies and the abuse lavished on Catholic writers, for it contains much information that would otherwise have been hopelessly lost.

A list of Bale's works is to be found in Athenae Cantabrigienses (vol. i. pp. 227 et seq.). Beside the reprints already mentioned, The Examinations of Lord Cobham, William Thorpe and Anne Askewe, &c. were edited by the Rev. H. Christmas for the Parker Society in 1849. Bale's autograph note-book is preserved in the Selden Collection of the Bodleian Library, Oxford. It contains the materials he collected for his two published catalogues arranged alphabetically, with no attempt at ornament of any kind, and with- out the personalities which deface his completed work. He also gives in most cases the sources from which his information was derived. This book was prepared for publication with nates by Dr R. Lane Poole, with the help of Miss Mary Bateson, as Index Britanniae Scriptorum quos .... collegit Ioannes Baleus (Clarendon Press, 1902), forming part ix. of Anecdota Oxoniensia.

John Pits or Pitseus (1560-1616), an English Catholic exile, founded on Bale's work his Relationum historicarum de rebus anglicis tomus primus (Paris, 1619), better known by its running title of

De illustribus Angliae scriptoribus. This is really the fourth book of a more extensive work. He omits the Wycliffite and Protestant divines mentioned by Bale, and the most valuable section is the lives of the Catholic exiles resident in Douai and other French towns. He does not scruple to assert (Nota de Joanne Bale) that Bale's Catalogus was a misrepresentation of Leland's matter, though there is every reason to believe that he was only acquainted with Leland's work at second-hand, through Bale.

BALE. (1) (A word common to Teutonic languages, in O. Eng. balu, cf. Icelandic bol), evil, suffering, a word obsolete except in poetry, and more common in the adjectival form " baleful." In early alliterative poetry it is especially used antithetically with " bliss." (2) (O. Eng. bad, a blazing fire, a funeral pyre) , a bonfire, a northern English use more common in the tautological " bale-fire," with sometimes a confused reference from (1) to evil. (3) (A word of doubtful origin, possibly connected with " ball "), a bundle of merchandise, especially of cotton, wool or hay, packed with a cover, or fastened with bands of metal, &c. for transportation; the weight and capacity varies with the goods. (4) (Properly " bail," from Fr. bailie, possibly connected with Lat. bacula, a tub), to empty water out of a boat by means of a bail or bucket.

BALEARIC ISLANDS {Baleares), an archipelago of four large and eleven small islands in the Mediterranean Sea, off the east coast of Spain, of which country it forms a province. Pop. (1 900) 311,649; area, 1935 sq. m. The archipelago, which lies between 38 40′ and 40° 5′ N:, and between i° and 5 E., comprises two distinct groups. The eastern and larger group, corresponding with the ancient Insulae Baleares, comprises the two principal members of the archipelago, Majorca (Spanish, Mallorca) and Minorca (Spanish, Menorca), with seven islets: — Aire, Aucanada, Botafoch, Cabrera, Dragonera, Pinto and El Rey. The western group, corresponding with the ancient Pityusae or Pine Islands, also comprises two relatively large islands, Iviza (Spanish, Ibiza or, formerly, Ivica) and Formentera, with the islets of Ahorcados, Conejera, Pou and Espalmador. Majorca, Minorca and Iviza are described in separate articles. Formentera is described with Iviza. The total population of the eleven islets only amounted to 171 in 1900, but all were inhabited. None of them is of any importance except Cabrera, which is full of caverns, and was formerly used as a place of banishment. In 1808 a large body of Frenchmen were landed here by their Spanish captors, and allowed almost to perish of starvation.

The origin of the name Baleares is a mere matter of conjecture; it is obvious, however, that the modern Majorca and Minorca are obtained from the Latin Major and Minor, through the Byzantine forms MawpiKa and MivopiKa; while Iviza is plainly the older Ebusus, a name probably of Carthaginian origin. The Ophiusa of the Greeks (Colubraria of the Romans) is now known as Formentera.

Geology. — The strata which form the Balearic Isles fall naturally into two divisions. There is an older series, ranging from the Devonian to the Cretaceous, which is folded and faulted and forms all the higher hills, and there is a newer series of Tertiary age, which lies nearly horizontal and rests unconformably upon the older beds. The direction of the folds in the older series is in Iviza nearly west to east, in Majorca south-west to north-east, and in Minorca south to north, thus forming an arc convex towards the south-east. The Devonian is visible only in Minorca, the Trias being the oldest system represented in the other islands. The higher part of the Cretaceous is absent, and it appears to have been during this period that the principal folding of the older beds took place. The Eocene beds are nummulitic. There is a lacustrine group which has usually been placed in the Lower Eocene, but the discovery of Anthracotherium magnum in the interbedded lignites proves it to be Oligocene, in part at least. The Miocene included a limestone with Clypeasler. Pliocene beds also occur.

Climate, Fauna, Flora. — The climate of the archipelago, though generally mild, healthy and favourable to plant life, is by no means uniform, owing to the differences of altitude and shelter from wind in different islands. The fauna and flora resemble those of the Mediterranean coasts of Spain or France.

Inhabitants.— -The islanders are a Spanish race, very closely akin to the Catalans; but the long period of Moorish rule has left its mark on their physical type and customs. In character they are industrious and hospitable, and pique themselves on their loyalty and orthodoxy. Crime is rare. There are higher schools in the principal towns, and the standard of primary education is well up to the average of Spain. Vaccination is common except in the cities, — the women often performing the operation themselves when medical assistance cannot be got. Castilian is spoken by the upper and commercial classes; the lower and agricultural employ a dialect resembling that of the Catalans.

Commerce. — Fruit, grain, wine and oil are produced in the islands, and there is an active trade with Barcelona in fresh fish, including large quantities of lobsters. Shoemaking is one of the most prosperous industries. There is not a very active trade direct with foreign countries, as the principal imports — cotton, leather, petroleum, sugar, coal and timber — are intro- duced through Barcelona. The export trade is chiefly with the Peninsula, France, Italy, Algeria and with Cuba and Porto Rico. Most of the agricultural products are sent to the Peninsula; wine, figs, marble, almonds, lemons and rice to Europe and Africa.

Administration.— The administration of the Balearic Islands differs in no respect from that of the other Spanish provinces on the mainland. There are five judicial districts (partidos judiciales), named after their chief towns — Inca, Iviza, Manacor, Palma and Port Mahon.

History. — Of the origin of the early inhabitants of the Balearic Islands nothing is certainly known, though Greek and Roman writers refer to the Boeotian and Rhodian settlements. There are numerous sepulchral and other monuments, which are generally believed to be of prehistoric origin. According to general tradition the natives, from whatever quarter derived, were a strange and savage people till they received some tincture of civilization from the Carthaginians, who early took possession of the islands and built themselves cities on their coasts. Of these cities, Port Mahon, the most important, still retains the name which is derived from the family of Mago. About twenty- three years after the destruction of Carthage the Romans accused the islanders of piracy, and sent against them Q. Caecilius Metellus, who soon reduced them to obedience, settled amongst them 3000 Roman and Spanish colonists, founded the cities of Palma and Pollen tia (Pollensa), and introduced the cultivation of the olive. Besides valuable contingents of the celebrated Balearic slingers, the Romans derived from their new conquest mules (from Minorca), edible snails, sinope and pitch. Of their occupation numerous traces still exist, — the most remarkable being the aqueduct at Pollensa. In a.d. 423 the islands were seized by the Vandals and in 798 by the Moors. They became a separate Moorish kingdom in 1009, which, becoming extremely obnoxious for piracy, was the object of a crusade directed against it by Pope Paschal II., in which the Catalans took the lead. This expedition was frustrated at the time, but was resumed by James I. of Aragon, and the Moors were expelled in 1232. During their occupation the island was populous and productive, and an

active commerce was carried on with Spain and Africa. King James conferred the sovereignty of the isles on his third son, under whom and his successor they formed an independent kingdom up to 1349, from which time their history merges in that of Spain. In 1521 an insurrection of the peasantry against the nobility, whom they massacred, took place in Majorca, and was not suppressed without much bloodshed. In the War of the Spanish Succession all the islands declared for Charles; the duke of Anjou had no footing anywhere save in the citadel of Mahon. Minorca was reduced by Count Villars in 1707; but it was not till June 1715 that Majorca was subjugated, and meanwhile Port Mahon was captured by the English under General Stanhope in 1708. In 17 13 the island was secured te them by the peace of Utrecht; but in 1756 it was invaded by a force of 12,000 French, who, after defeating the British under Admiral Byng, captured Port Mahon. Restored to England in

1763, tlie island remained in possession of the British till 1782, when it was retaken by the Spaniards. Again seized by the British in 1798, it was finally ceded to Spain by the peace of Amiens in 1803. When the French invaded Spain in 1808, the Mallorquins did not remain indifferent; the governor, D. Juan Miguel de Vives, announced, amid universal acclamation, his resolution to support Ferdinand VII. At first the Junta would take no active part in the war, retaining the corps of volunteers, that was formed for the defence of the island; but finding it quite secure, they transferred a succession of them to the Penin- sula to reinforce the allies. Such was the animosity excited against the French when their excesses were known to the Mallorquins, that some of the French prisoners, conducted thither in 1810, had to be transferred with all speed to the island of Cabrera, a transference which was not effected before some of them had been killed.

Bibliography. — For a general account of the islands, the most valuable books are Die Balearen geschildert in Wort und Bild, by the archduke Ludwig Salvator of Austria (Leipzig, 1896); Les lies oubliSes, by G. Vuillier (Paris, 1904), the first edition of which has been translated under the title of The Forgotten lifes (London, 1896)— and Islas Baledres, an illustrated volume of 1423 pages, by P. Pifferrer, in the series ” Espafia ” (Barcelona, 1888). An article by George Sand in the Revue des deux mondes (1841) also deserves notice. The following are monographs on

special subjects : — The Story of Majorca and Minorca, by Sir C. R. Marknam (London 1908) ; IUustrationes florae insularum Balearium, by M. Willkomm (Stuttgart, 1881-1892); Monuments primitifs des des baleares, by E. Cartailhac (Mission scientifique du minister e de Vinstruction publique, Toulouse, 1892). The British Foreign Office Reports for the Consular District of Barcelona give some account of the- movement of commerce (London, annual). Much of the material available for a scientific history will be found in La Histona general del regno baledrico, by J. Dametoand V. Mut (Majorca, 1632- 1650). For the period of Moorish rule, see Bosquejo histonco de la domination islamita en las islas Baledres, by A. Campaner y Fuertes (Palma, 1888). See also the elaborate treatise Les Relations de la France avec le royaume de Majorque, by A. Lecoy de la Marche (Paris, 1892).

BALES [Balesius] , PETER (1 547-1610?), English calli- graphist, one of the inventors of shorthand writing, was born in London in 1547, and is described by Anthony Wood as a ” most dexterous person in his profession, to the great wonder of scholars and others.” We are also informed that ” he spent several years in sciences among Oxonians, particularly, as it seems, in Gloucester Hall; but that study, which he used for a diversion only, proved at length an employment of profit.” He is mentioned for his skill in micrography in Holinshed’s Chronicle. ” Hadrian Junius,” says Evelyn, ” speaking as a miracle of somebody who wrote the Apostles’ Creed and the beginning of St John’s Gospel within the compass of a farthing: what would he have said of our famous Peter Bales, who, in the year 1575, wrote the Lord’s Prayer, the Creed, Decalogue, with two short prayers in Latin, his own name, motto, day of the month, year of the Lord, and reign of the queen, to whom he presented it at Hampton Court, all of it written within the circle of a single penny, inchased in a ring and borders of gold, and covered with a crystal, so accurately wrought as to be very plainly legible; to the great admiration of her majesty, the whole privy council, and several ambassadors then at court?” Bales was likewise very dexterous in imitating handwritings, and between 1576 and 1590 was employed by Secretary Walsing- ham in certain political manoeuvres. We find him at the head of a school near the Old Bailey, London, in 1590, in which year he published his Writing Schoolemaster , in three Parts. This book included an Arte of Brachygraphie, which is one of the earliest attempts to construct a system of shorthand. In 1595 he had a great trial of skill with one Daniel Johnson, for a golden pen of £20 value, and won it; and a contemporary author

further relates that he had also the arms of calligraphy given him, which are azure, a pen or. Bales died about the year 1610.
BALFE, MICHAEL WILLIAM (1808-1870), Irish musical composer, was born on the 15th of May 1808, at Dublin. His musical gifts became apparent at an early age. The only instruction he received was from his father, who was a dancing master, and from amusician, C. E. Horn (1786-1849). Between 1814 and

1 81 5 he played the violin for his father's dancing-classes, and at the age of seven composed a polacca. In 181 7 he appeared as a violinist in public, and in this year composed a ballad, first caJJed " Young Fanny " and afterwards, when sung in Paul Pry by Madame Vestris, " The Lovers' Mistake." On the death of his father in 1823 he was engaged in the orchestra of Drury Lane, and being in possession of a small but pleasant baritone voice, he chose the career of an operatic singer. An unsuccessful d6but was made at Norwich in Der Freischiitz. In 1825 he was taken to Rome by Count Mazzara, being introduced to Cherubini on the way. In Italy he wrote his first dramatic work, a ballet, La Pirouse. At the close of 1827 he appeared as Figaro in Rossini's Barbiere, at the Italian opera in Paris. Balfe soon returned to Italy, where, during the next nine years, he remained, singing at various theatres and composing a number of operas. During this time he married Mdlle Luisa Roser, a Hungarian singer whom he had met at Bergamo. Fetis says that the public indig- nation roused by an attempt at " improving " Meyerbeer's opera II Crociato by interpolated music of his own compelled Balfe to throw up his engagement at the theatre La Fenice in Venice. By this time he had produced his first complete opera, J Rivali di se stessi, at Palermo in the carnival season of 1829-1830; the opera Un Avvertimento ai gelosi at Pavia; and Enrico Quarto at Milan, where he had been engaged to sing with Malibran at the Scala. He returned to England in the spring of 1833, and on the 29th of October 1835 his Siege of Rochelle was produced and rapturously received at Drury Lane. Encouraged by his success, he produced The Maid of Artois on the 27th of May 1836 — the success of the opera being confirmed by the exquisite singing of Malibran. Balfe was a prolific composer, as may be seen from the following imperfectlistof his English operas alone: 2 — Siegeof Rochelle(\? >$5); The Maid of Artois (1836); Catherine Grey (1837); Joan of Arc (1837); Falstaff (1838, Lablache in title-r61e); Amelia, or the Love Test (1838); Keolanthe (1841); The Bohemian Girl, his best known work (1844); The Daughter of St. Mark (1844); The

Enchantress (1845); The Bondman (1846); The Devil's in it (1847); The Maid of Honour (1847); The Sicilian Bride (1852); The Rose of Castile (1857); Satanella (1858); Bianca (i860); The Puritan's Daughter (1861); The Armourer of Nantes (1863); Blanche de Nevers (1863). Balfe also wrote several operas for the Opera Comique and Grand Opera in Paris, where MM. Scribe and St George provided him with the libretti for his LePuits d 'amour (1843) and his Les Quatre Fits Aymon (1844). His L'Etoile de Seville was written in 1845 for the Academie Royale. The fact that Balfe was an Irishman, who produced operas in English, French and Italian with conspicuous success, is in itself interesting. When to this we add the record of his operatic impersonations on the stage, the European success of his Bohemian Girl, his picturesque retirement into Hertfordshire in 1864 as a gentleman farmer, and above all the undeniable gift for creating such pure melodies as his songs "When other Hearts" and "I dreamt that I dwelt in marble halls," it is idle to refuse him a prominent place in the history of music. He wrote much that was trivial, but also much that was enduring. He died on the 20th of October 1870, and was buried at Kensal Green. In 1882 a medallion portrait of him was unveiled in Westminster Abbey.

BALFOUR, ARTHUR JAMES (1848-), British statesman, eldest son of James Mai tland Balfour of Whittingehame, Hadding- tonshire, and of Lady Blanche Gascoyne Cecil, a sister of the third marquess of Salisbury, was born on the 23th of July 1848. He was educated at Eton and Trinity College, Cambridge. In i874hebecameM.P. intheConservativeinterestforHertford.and represented that constituency until 1885. When, in the spring of 1878, Lord Salisbury became foreign minister on theresignation of the fifteenth Lord Derby , Mr B alf ourbecamehis private secretary. In that capacity he accompanied his uncle to the Berlin congress, and gained his first experience of international politics in con- nexion with the settlement of the Russo-Turkish conflict. It was at this time also that he became known in the world of letters, the intellectual subtlety and literary capacity of his Defence of Philosophic Doubt (1879) suggesting that he might make a reputation as a speculative thinker. Belonging, however, to a

class in which the responsibilities of government are a traditional duty, Mr Balfour divided his time between the political arena and the study. Being released from his duties as private secretary by

the general election of 1880, he began to take a rather more active part in parliamentary affairs. He was for a time politically associated with Lord Randolph Churchill, Sir Henry Drummond Wolff and Sir John (then Mr) Gorst, the quartette becoming known as the ” Fourth Party,” and gaining notoriety by the freedom of the criticisms directed by its leader, Lord Randolph Churchill, against Sir Stafford Northcote, Lord Cross and other prominent members of the ” old gang.” In these sallies, however, Mr Balfour had no direct share. He was thought to ,be merely amusing himself with politics. It was regarded as doubtful whether his health could withstand the severity of English winters, and the delicacy of his physique and the languor of his manner helped to create the impression that, however great his intellec- tual powers might be, he had neither the bodily strength nor the energy of character requisite for a political career. He was the ” odd man ” of the Fourth Party, apparently content to fetch and carry for his colleagues, and was believed to have no definite ambitions of his own. His reputation in the parliament of 1880- 1886 was that of a dilettante, who allied himself with the three politicians already named from a feeling of irresponsibility rather than of earnest purpose; he was regarded as one who, on the rare occasions when he spoke, was more desirous to impart an academic quality to his speeches than to make any solid contribution to public questions. The House, indeed, did not take him quite seriously. Members did not suspect the reserve of strength and ability beneath what seemed to them to be the pose of a parlia- mentary fldneur; they looked upon him merely as a young member of the governing classes who remained in the House because it was the proper thing for a man of family to do. As a member of the coterie known as the ” Souls ” he was, so to speak, caviare to the general. Indolence was supposed to be the keynote of his character — a refined indolence, not, however, without cleverness of a somewhat cynical and superior order.

That these views were not shared by Lord Salisbury was suffi- ciently shown by the fact that in his first administration (June 1885-January 1886) he made Mr Balfour president of the Local Government Board, and in forming his second administration (July 1886) secretary for Scotland with a seat in the cabinet. These offices gave few opportunities for distinction, and may be regarded merely as Mr Balfour’s apprenticeship to departmental responsibilities. The accidents of political life suddenly opened out to him a career which made him, next to Lord Salisbury, the most prominent, the most admired and the most attacked Con-

servative politician of the day. Sir Michael Hicks-Beach, who was chief secretary for Ireland, suffered from an affection of the eyes and found it desirable to resign, and Lord Salisbury appointed his nephew in his stead. The selection took the political world by surprise, and was much criticized. By the Irish Nationalists it was received with contemptuous ridicule, for none suspected Mr Balfour's immense strength of will, his debating power, his ability in attack and his still greater capacity to disregard criticism. The debates on the Crimes Bill and the Irish Land Bill quickly undeceived them, and the steady and even remorseless vigour with which the government of Ireland was conducted speedily convinced the House of Commons and the country that Mr. Balfour was in his right place as chief secretary. His policy was that of " coercion " — the fearless administration of the Crimes Act, — coupled with remedial legislation; and he enforced the one while he proceeded with the other, regardless of the risk of out- rage outside the House and of insult within. Mr Balfour's work in this office covered one of the most turbulent and most exciting periods in'modern parliamentary history and Irish administration. With a courage that never faltered he broke down the Plan of Campaign in Ireland, and in parliament he not only withstood the assaults of the Irish Nationalists, but waged successful warfare with the entire Home Rule party. He combined an obstinacy of will with a mastery of facts unsurpassed by any of his predecessors in the secretaryship. Events, it is true, were in his favour. The disclosures before the Parnell Commission, the O'Shea divorce

proceedings, the downfall of Mr Parnell and the disruption of the Irish party, assisted him in his task; but the fact remains that by persistent courage and undeviating thoroughness he reduced crime in Ireland to a vanishing point. His work was also constructive, for he broadened the basis of material prosperity and social progress by creating the Congested Districts Board in 1890. During this period, from 1886-1892, moreover, he developed gifts of oratory which made him one of the most effective of public speakers. Impressive in matter rather than in manner of delivery, and seldom rising to the level of eloquence in the sense in which that quality was understood in a House which had listened to Bright and Gladstone, his speeches were logical and convincing, and their attractive literary form delighted a wider audience than that which listens to the mere politician.

In 1888 Mr Balfour served on the Gold and Silver Commission, currency problems from the standpoint of bimetallism being among the more academic subjects which had engaged his attention. On the death of Mr W. H. Smith in 1891 he became first lord of the treasury and leader of the House of Commons, and in that capacity introduced in 1892 a Local Government Bill for Ireland. The Conservative government was then at the end of its tether, and the project fell through. For the next three years Mr Balfour led the opposition with great skill and address. On the return of the Unionists to power in 1895 he resumed the leadership of the House, but not at first with the success expected of him, his management of the abortive education proposals of '96 being thought, even by his own supporters, to show a disinclination for the continuous drudgery of parlia- mentary management under modern conditions. But after the opening session matters proceeded more smoothly, and Mr Balfour regained his old position in the estimation of the House and the country. He had the satisfaction of seeing a bill pass for providing Ireland with an improved system of local govern- ment, and took an active share in the debates on the various foreign and domestic questions that came before parliament during 1895-1900. His championship of the voluntary schools, his adroit parliamentary handling of the problems opened up by the so-called " crisis in the Church " caused by the Protestant movement against ritualistic practices, and his pronouncement in favour of a Roman Catholic university for Ireland — for which he outlined a scheme that met with much adverse criticism both from his colleagues and his party, — were the most important aspects of Mr Balfour's activity during these years. His speeches and work throughout this period took a wider range than before his accession to the leadership of the Commons. During the illness of Lord Salisbury in 1898, and again in Lord Salisbury's absence abroad, he was in charge of the foreign office, and it fell to his lot to conduct the very critical negotiations with Russia on the question of railways in North China. To his firmness, and at the same time to the conciliatory readiness with which he accepted and elaborated the principles of a modus vivendi, the two powers owed the avoidance of what threatened to be a dangerous quarrel. As a member of the cabinet responsible for the Transvaal negotiations in 1899 he bore his full share of controversy, and when the war opened so disastrously he was the first to realize the necessity for putting the full military strength of the country into the field. At the general election of 1900 he was returned for East Manchester (which he had represented

since 1885) by a majority of 2453, and continued in office as first lord of the treasury. His leadership of the House of Commons in the first session of the new parliament was marked by considerable firmness in the suppression of obstruetion, but there was a slight revival of the criticisms which had been current in 1896. Mr Balfour's inability to get the maximum amount of work out of the House was largely due to the situation in South Africa, which absorbed the intellectual energies of the House and of the country and impeded the progress of legislation.

The principal achievements of the long session of 1002 (which extended to the autumn) were the passing of the Education Act, —entirely reorganizing the system of primary education, abolishing the school boards and making the county councils the local authority; new rules of procedure; and the creation

of the Metropolitan Water Board; and on all these questions, and particularly the two first, Mr Balfour's powers as a debater were brilliantly exhibited.

On Lord Salisbury's resignation on the nth of July 1902, Mr Balfour succeeded him as prime minister, with the cordial approval of all sections of the Unionist party. For the next three and a half years his premiership involves the political history of England, at a peculiarly interesting period both for foreign and domestic affairs. Within a few weeks Mr Balfour had reconstituted the cabinet. He himself became first lord of the treasury and lord privy seal, v/ith the duke of Devonshire (remaining lord president of the council) as leader of the House of Lords; Lord Lansdowne remained foreign secretary, Mr (afterwards Lord) Ritchie took the place of Sir Michael Hicks-Beach (after- wards Lord St Aldwyn) as chancellor of the exchequer, Mr J. (Chamberlain remained colonial secretary, his son Austen being postmaster-general with a seat in the cabinet. Mr G. Wyndham as chief secretary for Ireland was included in the cabinet; Lord Selborne remained at the admiralty, Mr St John Brodrick (afterwards Lord Midleton) war minister, Lord George Hamilton secretary for India, and Mr Akers-Douglas, who had been first commissioner of works, became home secretary; Lord Balfour of Burleigh remained secretary for Scotland, Lord Dudley suc-

ceeded Lord Cadogan as lord lieutenant of Ireland, and Lord Londonderry became president of the Board of Education (with Sir William Anson as parliamentary secretary in the House of Commons). Mr Balfour's brother Gerald (b. 1853), who had entered public life as his private secretary when at the Local Government Board, and had been chief secretary for Ireland from 1895-1900, retained his position (since 1900) as president of the Board of Trade.

The new prime minister came into power practically at the same moment as the king's coronation (see Edward VII.) and the end of the South African War (see Transvaal). The task of clearing up after the war, both in South Africa and at home, lay before him; but his cordial relations with Mr Chamberlain (?.».), and the enthusiastic support of a large parliamentary majority, made the prospects fair. For a while no cloud appeared on the horizon: and the Liberal party were still disorganized (see Campbell-Bannerman and Rosebery) over their attitude towards the Boers. Mr Chamberlain went to South Africa in the late autumn, with the hope that his personality would in- fluence the settlement there; and the session of 1903 opened in February with no hint of troubles to come. A difficulty with Venezuela, resulting in British and German co-operation to coerce that refractory republic, caused an explosion of anti- German feeling in England and some restlessness in the United States, but the government brought the crisis to an end by tactful handling and by an ultimate recourse to arbitration. The two chief items of the ministerial parliamentary programme were the extension of the new Education Act to London and Mr Wyndham's Irish Land Purchase Act, by which the British exchequer should advance the capital for enabling the tenants in Ireland to buy out the landlords. Moreover, the budget was certain to show a surplus and taxation could be remitted. As events proved, it was the budget which was to provide a cause of dissension, bringing a new political movement into being, and an issue overriding all the legislative interest of the session. Mr Ritchie's remission of the shilling import-duty on corn led to Mr Chamberlain's crusade in favour of tariff reform and colonial preference, and as the session proceeded the rift grew in the Unionist ranks.

In the separate article on Mr Chamberlain the progress of this movement is sufficiently narrated. From this moment it is only necessary here to realize Mr Balfour's position. He had always admitted the onesidedness of the English free-trade system, and had supported the desirability of retaliating against unfair

competition and " dumping " by foreign countries. But Mr Chamberlain's new programme for a general tariff, with new taxes on food arranged so as to give a preference to colonial products, involved a radical alteration of the established fiscal system, and such out-and-out Unionist free-traders in the cabinet

as Mr Ritchie and Lord George Hamilton, and outside it, like Lord Hugh Cecil and Mr Arthur Elliot (secretary to the treasury), were entirely opposed to this. Mr Balfour was anxious to avoid a rupture, doubtful of the feeling of the country, uncertain of the details by which Mr Chamberlain's scheme could be worked out. As leader of the party and responsible for the maintenance of so great a political engine, he was anxious not to be precipitate. He was neither for nor against the new movement, and professed to hold " no settled convictions " on the subject. Mr Chamberlain rested his case largely on the alleged diminution in British trade, and the statistics therefore required investigation before the government could adopt any such programme. From the middle of May, when Mr Chamberlain began to press the matter, Mr Balfour had a difficult hand to play, so long as it was uncertain how the party would follow the new lead. The Board of Trade was asked to supply full figures, and while its report was awaited the uncertainty of attitude on the part of the government afforded grateful opportunity for opposition mischief-making, since the Liberal party had now the chance of acting as the conservative champions of orthodox economics. Another opportunity for making political capital was provided by the publication of the report of the royal commission on the Boer War under Lord Elgin's chairmanship, which horrified the country by its disclosures (August 26th) as to the political and military muddling which had gone on, and the want of any efficient system of organization.

The session ended in August without any definite action on the fiscal question, but in the cabinet the discussions continued. On the 1 6th of September Mr Balfour published a pamphlet on " Insular Free Trade," and on the 18th it was announced that Lord George Hamilton and Mr Ritchie had resigned, Lord Balfour of Burleigh and Mr Arthur Elliot following a day or two later. These were the strait free-traders, but at the same time Mr Chamberlain resigned also. The correspondence between Mr Chamberlain and Mr Balfour (September gth and 16th) was published, and presented the latter in the light of a sympathizer with some form of fiscal union with the colonies, if practicable, and in favour of retaliatory duties, but unable to believe that the country was yet

ready to agree to the taxation of food required for a preferential tariff, and therefore unwilling to support that scheme; at the same time he encouraged Mr Chamberlain to test the feeling of the public and to convert them by his missionary efforts outside the government. Mr Chamberlain on his side emphasized his own parliamentary loyalty to Mr Balfour. In his pamphlet on ” Insular Free Trade ” the prime minister reviewed the economic history since Cobden’s time, pointed to the falsification of the promises of the early free-traders, and to the fact that England was still the only free-importing country, and insisted that he was ” in harmony with the true spirit of free-trade ” when he pleaded for ” freedom to negotiate that freedom of exchange may be increased.” This manifesto was at first taken, not only as the platform of the government, but also as that from which its resigning free-trade members had dis- sented; and the country was puzzled by a statement from Lord George Hamilton that Mr Balfour had circulated among his colleagues a second and different document, in fuller agreement with Mr Chamberlain. The situation was confused by personal suspicion and distrust as well as by economic difficulties. But the public noted that the duke of Devonshire, whose orthodoxy was considered typical, remained in the cabinet.

The crisis, however, soon developed further, owing to explanations between the free-trade Unionists. On October 1st Mr Balfour spoke at Sheffield, reiterating his views as to free-trade and retaliation, insisting that he ” intended to lead,” and declaring that he was prepared at all events to reverse the traditional fiscal policy by doing away with the axiom that im- port duties should only be levied for revenue purposes. The speech was enthusiastically received by the National Union of Conservative Associations, who had year by year flirted with protectionist resolutions, and who were known to be predomin- antly in sympathy with Mr Chamberlain. But the free-traders did not like Mr Balfour’s formula as to reversing the traditional

fiscal policy of import taxes for revenue only. Next day the duke of Devonshire resigned, a step somewhat bitterly resented by Mr Balfour, who clearly thought that his sacrifices in order to conciliate the duke had now been made in vain. During this critical fortnight the duke had apparently acquiesced in Mr

Balfour's compromise, and had co-operated in reconstituting the ministry; his nephew and heir had been made financial secretary to the treasury, while Mr Alfred Lyttelton was appointed colonial secretary, Mr Austen Chamberlain chancellor of the exchequer, Mr Brodrick secretary for India, Mr H. O. Arnold-Forster war minister, Lord Stanley postmaster-general and Mr Graham Murray secretary for Scotland. Lord London- derry now became president of the council, Lord Lansdowne leader of the House of Lords, and Lord Salisbury, son of the late premier, who as Lord Cranborne had for three years been under-secretary for foreign affairs, was included in the cabinet as lord privy seal.

During the remainder of 1903 the struggle within the Unionist party continued. Mr Chamberlain spoke all over the country, advocating a definite scheme for reorganizing the budget, so as to have more taxes on imports, including food, but proposing to adjust the taxation so as to improve the position of the working-classes and to stimulate employment. The free-trade Unionists, with the duke of Devonshire, Lord Goschen, Lord James and Lord Hugh Cecil, as their chief representatives, started a Free Food league in opposition to Mr Chamberlain's Tariff Reform league; and at a great meeting at Queen's Hall, London, on the 24th of November their attitude was made plain. They rejected Mr Chamberlain's food-taxes, discredited his statistics, and, while admitting the theoretical orthodoxy of retaliation, criticized Mr Balfour's attitude and repudiated his assumption that retaliation would be desirable. Finally in December came the appointment of Mr Chamberlain's Tariff Commission. There was no doubt about the obstinacy and persistencyof both sections, and both were fighting, not only to persuade the public, but for the capture of the party and of its prime minister. Both sides were inclined to claim him; neither could do so without qualifica- tion. His dialectical dexterity in evading the necessity of expressing his fiscal opinions further than he had already done became a daily subject for contemptuous criticism in the Liberal press; but he insisted that in any case no definite action could be taken till the next parliament; and while he declined to go the " whole hog " — as the phrase went — with Mr Chamberlain, he did nothing to discourage Mr Chamberlain's campaign. Whether he woi,.-ld eventually follow in the same direction, or would come back to the straiter free-trade side, continued to be the political conundrum for month after month. Minor changes were made in the ministry in 1903, Mr Brodrick going to the India office and Mr Arnold-Forster becoming minister for war; but Mr Balfour's

personal influence remained potent, the govern- ment held together, and in 1904 the Licensing Bill was success- fully carried. Though a few Unionists transferred their allegiance, notably Mr. Winston Churchill, and by-elections went badly, Mr Balfour still commanded a considerable though a dwindling majority, and the various contrivances of the opposition for combining all free-traders against the government were obstructed by the fact that anything tantamount to a vote of censure would not be supported by the ” wobblers ” in the ministerial party, while the government could always manage to draft some ” safe ” amendment acceptable to most of them. This was notably shown in the debate on Mr Black’s motion on the 18th of May. On the 3rd of October Mr Balfour spoke at Edinburgh on the fiscal question. The more aggressive protectionists among Mr Chamberlain’s supporters had lately become very confident, and Mr Balfour plainly repudiated ” protection ” in so far as it meant a policy aiming at supporting or creating home industries by raising home prices; but he introduced a new point by declaring that an Imperial Conference would be called to discuss with the colonies the question of preferential tariffs if the Unionist government obtained a majority at the next general election. The Edinburgh speech was again received with con- flicting interpretations, and much discussion prevailed as to the

conditions of the proposed conference, and as to whether it was or was not an advance, as the Chamberlainites claimed, towards Mr Chamberlain. Meanwhile the party was getting more and more disorganized, and the public were getting tired of the apparent mystification. The opposition used the situation to make capital in the country, and loudly called for a dissolution.

It -was plain indeed that the fiscal question itself was ripe for the polls; Board of Trade statistics had been issued in prpfusion, and the whole case was before the country. But, though Mr Chamberlain declared his desire for an early appeal to the electors, he maintained his parliamentary loyalty to Mr Balfour. There were, moreover, public reasons why a change of government was undesirable. From 1903 onwards the question of army reform had been under discussion, and the government was anxious to get this settled, though in fact Mr Brodrick’s and Mr Arnold-Forster’s schemes for reorganization failed to obtain any general support. And while foreign affairs were being admirably conducted by Lord Lansdowne, they were critical enough to make it dangerous to contemplate a ” swopping of horses.” The

Russo-Japanese War might at any moment lead to complications. The exercise by Russian warships of the right of search over British ships was causing great irritation in English commercial circles during 1904; after several incidents had occurred, the stopping of the P. & 0. steamer ” Malacca ” on July 13th in the Red Sea by the Russian volunteer cruiser ” Peterburg ” led to a storm of indignation, and the sinking of the ” Knight Commander ” (July 24th) by the Vladivostok squadron intensified the feeling. On the 23rd of October the outrageous firing by the Russian Baltic fleet on the English fishing-fleet off the Dogger Bank in the North Sea was within an ace of causing war. It was not till the 28th that Mr Balfour, speaking at Southampton, was able to announce that the Russian government had expressed regret, and that an international commission would inquire into the facts with a view to the responsible persons being punished. Apart from the importance of seeing the Russo-Japanese War through, there were important negotiations on foot for a renewal or revision of the treaty with Japan; and it was felt that on these grounds it would be a mistake for the government to allow itself to be driven into a premature dissolution, unless it found itself unable to maintain a majority in parliament. At the same time the government’s tenure of office was obviously drawing to its close; the usual interpretation of the Septennial Act involved a dissolution either in 1905 or 1906, and the government whips found increased difficulty in keeping a majority at Westminster, since neither the pronounced Chamberlainites nor the convinced free-trade Unionists showed any zeal, and a large number of the uncertain Unionists did not intend to stand again for parliament.

The events of the session of 1905 soon foreshadowed the end. The opposition were determined to raise debates in the House of Commons on the fiscal question, and Mr Balfour was no less determined not to be caught in their trap. These tactics of avoidance reached their culminating point when on one occasion Mr Balfour and his supporters left the House and allowed a motion hostile to tariff reform to be passed netn. con. Though the Scottish Churches Bill, the Unemployed Bill and the Aliens Bill were passed, a complete fiasco occurred over the redistribu – tion proposals, which pleased nobody and had to be withdraws* owing to a blunder as to procedure; and though on the 17th 0/ July a meeting of the party at the foreign office resulted in verbal assurances of loyalty, only two days later the government was caught in a minority of four on the estimates for the Irish Land Commission. For a few days it was uncertain whether they would

resign or dissolve, but it was decided to hold on.

The real causes, however, which kept the government in office, were gradually losing their validity. The Russo-Japanese War came to an end; the new offensive and defensive alliance with Japan was signed on the 12th of August; the successful Anglo-French agreement, concluded in April 1904, had brought out a vigorous expression of cordiality between England and France, shown in an enthusiastic exchange of naval visits; and the danger, which threatened in the early summer, of complications

with France and Gemany over Morocco, was in a fair way of being dispelled by the support given to France by Great Britain. The Liberal leaders had given public pledges of their adhesion to Lord Lansdowne's foreign policy, and the fear of their being unable to carry it on was no longer a factor in the public mind. The end came in November 1905, precipitated by a speech made by Mr Balfour at Newcastle on the 14th, appealing for unity in the party and the sinking of differences, an appeal plainly addressed to Mr Chamberlain, whose supporters— the vast majority of the Unionists — were clamouring for a fighting policy. But Mr Chamberlain was no longer prepared to wait. On the 21st of November at Bristol he insisted on his programme being adopted, and Mr Balfour was compelled to abandon the position he had held with so much tactical dexterity for two years past. Amid Liberal protests in favour of immediate dissolution, he resigned on the 4th of December; and Sir Henry Campbell-Bannerman, being entrusted by the king with the formation of a government, filled his cabinet with a view to a general election in January. The Unionists went to the polls with divided counsels, and sustained a crushing defeat, remarkable nevertheless for the comparative success of the tariff reformers. While Mr Chamberlain had a signal personal triumph in all the divisions of Biimingham, Mr Balfour himself was defeated by a large majority in Manchester.

Being in a miserable minority in parliament (157 Unionists against 379 Liberals, 51 Labour members, and 83 Nationalists), some form of consolidation among the Unionists was immediately necessary, and negotiations took place between Mr Balfour and Mr Chamberlain which resulted in the patching up of

an agree- ment (expressed in a correspondence dated February 14th), and its confirmation at a meeting of the party at Lansdowne House a few days later. The new compact was indicated in Mr Balfour's letter, in which he declared that " fiscal reform is, and must remain, the first constructive work of the Unionist party; its objects are to secure more equal terms of competition for British trade and closer commercial union with the colonies; and while it is at present unnecessary to prescribe the exact methods by which these objects are to be attained, and inexpedient to permit differences of opinion as to these methods to divide the party, though other means are possible, the establishment of a moderate general tariff on manufactured goods, not imposed for the purpose of raising prices, or giving artificial protection against legitimate competition, and the imposition of a small duty on foreign corn, are not in principle objectionable, and should be adopted if shown to be necessary for the attainment of the ends in view or for purposes of revenue." Mr Balfour's leadership of the whole party was now confirmed; and a seat was found for him in theCity of London by the retirement of Mr Gibbs.

The downfall of Mr Balfour's administration, and the necessity of reorganizing the Unionist forces on the basis of the common platform now adopted, naturally represented a fresh departure under his leadership, the conditions of which to some extent depended on the opportunities given to the new opposition by the proceedings of the Radical government (see Campbell-Bannerman, Sir H.; and Asquith, H. H.). His own adminis- tration had been wrecked, through no initiative of his, by the dissensions over the fiscal question. But his wide range of know- ledge and interests, his intellectual finesse, his personal hold over his supporters, his statesmanlike grasp upon imperial problems and his oratorical ability, had been proved to a remarkable degree; and in foreign affairs his tenure of power had been conspicuously successful. He left his country indeed in a posi- tion of strength abroad, which it had not held since the Crimean War. His institution of the permanent Committee of Imperial Defence, and of the new Army Council (1004), were reforms of the highest importance, resulting from the report of a " trium- virate " consisting of Lord Esher, Sir John Fisher and Sir George Clarke, appointed in November 1903. The Unionist regime as a whole, however, had collapsed. Its ministers had become " stale." The heavy taxation of the war years was still retained, to the disgust especially of the income-tax payers; and

new issues arose over the Education Act, labour questions, I

and the introduction of Chinese labour into South Africa (in 1904), which were successfully used against the government in the constituencies. The result was an electoral defeat which indicated, no doubt, a pronounced weakening of Mr Balfour's position in public confidence. This verdict, however, was one based mainly on temporary reasons, which were soon to be over-shadowed by the new issues involved in the change of ministry. As a matter of fact, a year of opposition had not passed before his power in the House of Commons, even with so small a party behind him, was once more realized. The immense Radical majority started with a feeling of contempt for the leader who had been rejected at Manchester, but by 1907 he had completely reasserted his individual pre-eminence among parliamentarians. Mr Balfour had never spoken more brilliantly, nor shone more as a debater, than in these years when he had to confront a House of Commons three-fourths of which was hostile. His speech at Birmingham (November 14, 1907), fully accepting the principles of Mr Chamberlain's fiscal policy, proved epoch-making in consolidating the Unionist party — except for a small number of free-traders, like Lord Robert Cecil, who continued to hold out — in favour of tariff reform; and during 1908 the process of recuperation went on, the by-elections showing toamarked degree the increased popular support given to the Unionist candidates. This recovery was due also to the forcible-feeble character of the Radical campaign against the House of Lords, the unpopularity of the Licensing Bill, the failure of the government to arrive at an education settlement, the incapacity of its Irish administra- tion, its apparent domination by the " little navy " section, and its dallying with Socialism in the budget of 1909. The rejection of this budget in December by the House of Lords led to a desperate struggle at the polls in January 1910, but the confident hopes of the Unionists were doomed to disappointment. They won back over a hundred seats, returning 273 strong, but were still in a minority, the Liberals numbering 275, Labour members 40, and Irish Nationalists 82. Mr Balfour himself was elected for the City of London by an enormous majority.

Mr Balfour's other publications, not yet mentioned, include Essays and Addresses (1893) and The Foundations of Belief, being Notes introductory to the Study of Theology (1895). He was made LL.D. of Edinburgh University in 1881; of St Andrews University in 1885; of Cambridge University in 1888 ; of Dublin and

Glasgow Universities in 1891; lord rector of St Andrews University in 1886; of Glasgow University in 1890; chancellor of Edinburgh University in 1891; member of the senate London University in 1888; and D.C.L. of Oxford University in 1891. He was president of the British Association in 1904, and became a fellow of the Royal Society in 1888. He was known from early life as a cultured musician, and became an enthusiastic golf player, having been captain of the Royal and Antient Golf Club of St Andrews in 1894-1895. (H. Ch.)

BALFOUR, FRANCIS MAITLAND (1851-1882), British biolo- gist, younger brother of Arthur James Balfour, was born at Edinburgh on the 10th of November 1851. At Harrow school he showed but little interest in the ordinary routine, but in one of the masters, Mr George Griffith, he fortunately found a man who encouraged and aided him in the pursuit of natural science, a taste for which, and especially for geology, had been cultivated in him by his mother from an early age. Going into residence at Trinity College, Cambridge, in 1870, he was elected a natural science scholar of his college in the following year, and although his reading was not ordered on the lines usual for the Schools, he obtained the second place in the Natural Science Tripos of December 1873. A course of lectures on embryology, delivered by Sir Michael Foster in 187 1, definitely turned his attention to animal morphology, and, after his tripos, he was selected to occupy one of the two seats allocated to the university of Cambridge at the Naples zoological station. The research work which he began there contributed in an important degree to his election as a fellow of Trinity in 1874; and also afforded him material for a series of papers (published as a monograph in 1878) on the Elasmobranch fishes, which threw new light on

the development of several organs in the Vertebrates, in particular of the uro-genital and nervous systems. His next work was to write a large treatise, Comparative Embryology, in two volumes; the first, published in 1880, dealing with the Invertebrates, and the second (1881) with the Vertebrates. This book displayed a vigorous scientific imagination, always controlled by a logical sense that rigidly distinguished between proved fact and mere hypothesis, and it at once won wide recognition, not only as an admirable digest of the numberless

observations made with regard to the development of animals during the quarter of a century preceding its publication, but also on account of the large amount of original research incorporated in its pages. Balfour's reputation was now such that other universities became anxious to secure his services, and he was invited to succeed Professor George Rolleston at Oxford and Sir Wyvilie Thomson at Edinburgh. But although he was only a college lecturer, holding no official post in his university, he declined to leave Cambridge, and in the spring of 1882 the university recognized his merits by instituting a special professorship of animal morphology for his benefit. Unhappily he did not deliver a single professorial lecture. During the first term after his appointment he was incapacitated from work by an attack of typhoid fever. Going to the Alps to recruit his health, he perished, probably on the 19th of July 1882, in attempting the ascent of the Aiguille Blanche, Mont Blanc, at that time unsealed. Besides being a brilliant morphologist, Balfour was an accomplished naturalist, and had he lived would probably have taken a high place among British taxonomists.

BALFOUR, SIR JAMES, Bart, (of Denmyine and Kinnaird) (c. 1600-16*57), Scottish annalist and antiquary. He was well acquainted with Sir William Segar and with Dugdale, to whose Monasticon he contributed. He was knighted by Charles I. in 1630, was made Lyon king-at-arms in the same year, and in 1633 baronet of Kinnaird. He was removed from his office of king-at-arms by Cromwell and died in 1657. Some of his numerous works are preserved in the Advocates' library at Edinburgh, together with his correspondence — from which rich collection Haig published Balfour's Annates of Scotland in 4 vols. 8vo (1824-1825). See Sibbald, Memoria Balfouriana (1699).

BALFOUR, SIR JAMES (of Pittendreich) (d. 1583 or 1584), Scottish judge and politician, son of Sir Michael Balfour of Montquhanny, was educated for the legal branch of the church of Scotland. In June 1547, together with Knox and others taken at St Andrews, he was condemned to the French galleys, but was released in 1549, abjured the reformers, entered the service of Mary of Guise, and was rewarded with some considerable legal appointments. Subsequently he went over to the lords of the congregation and then betrayed their plans. After Mary's arrival in Scotland he became one of her secretaries, in 1565 being reported as her greatest favourite after Rizzio. 1 He obtained the parsonage of Flisk in Fife in 1561, was nominated a lord of session, and in 1563 one of the commissaries of the court which

now took the place of the former ecclesiastical tribunal; in 1565 he was made a privy-councillor, and in 1566 lord-clerk-register, and was knighted. According to Mary his murder was intended together with Rizzio's in 1566. An adherent of Bothwell, he was deeply implicated in Darnley's murder, though not present at the commission of the crime. By his means Darnley was lodged at Kirk o' Field, his brothers' house. He was supposed to have drawn up the bond at Craig- millar for the murder; he signed it, was made under Bothwell deputy-governor of Edinburgh Castle, and is said to have drawn up the marriage-contract between Bothwell and Mary. When, however, the fall of Bothwell was seen to be impending he rapidly changed sides and surrendered the castle to Murray, stipulating for his pardon for Darnley's murder, the retention of the priory of Pittenweem, and pecuniary rewards. He was appointed president of the court of session on resigning the office of lord- clerk-register. He was present at the battle of Langside with the regent in 1568, and was accused of having advised Mary to 1 Cal. of State Pap. (Scottish), ii. 218, 250.

leave Dunbar to her ruin, and of having betrayed to her enemies the casket letters. The same year, however, in con- sequence of renewed intrigues with Mary's faction, he was dismissed, and next year was imprisoned on the charge of complicity in Darnley's murder. He succeeded in effecting his escape by means of bribery, the expenses of which he is said to have paid by intercepting the money sent from France to Mary's aid. In August 1571, during the regency of Lennox, an act of forfeiture was passed against him, but next year he was again playing traitor and discovering the secrets of his party to Morton, and he obtained a pardon from the latter in 1573 and negotiated the pacification of Perth the same year. Distrusted by all parties, he fled to France, where he seems to have remained till 1580. In 1579 his forfeiture was renewed by act of parliament. In January 1580 he wrote to Mary offering her his services, and in June protested his desire to be useful to Elizabeth, lamented the influence of the Jesuits, and intended a journey to Dieppe to hear some good Protestant preaching. 2 On the 27 th of December of the same year he returned to Scotland and effected the downfall and execution of Morton by producing a bond, probably that in defence of Bothwell and to promote his marriage with Mary, and giving evidence of the latter's knowledge of BothwelPs intention to murder Darnley. In July 1581 his cause was reheard; he was acquitted of murder by assize, and shortly afterwards in 1581 or

1582 he was restored to his estates and received at court. His career, one of the blackest in the annals of political perfidy and crime, closed shortly before the 24th of January 1584. He was the greatest lawyer of his day, and part-author at least of Balfour's Practicks, the earliest text-book of Scottish law, not published, however, till 1754. He married Margaret, daughter and heir of Michael Balfour of Burleigh, by whom, besides three daughters, he had six sons, the eldest of whom was created Baron Balfour of Burleigh in 1607. 3

Bibliography. — See article in the Diet, of Nat. Biog. and authorities there quoted; Balfour's Practicks (1754) and introductory preface; A. Lang's Hist, of Scotland, vol. ii. and authorities (1902); Sir J. Melville's Memoirs (Bannatyne Club, 1827); Cal. of State Papers — Register of Privy Council of Scotland, i.-iii. ; Scottish Series (Thorpe), i. and ii. (Bain), ii.-iv. ; The Border Papers, i. ; Hamilton Papers, ii. (Foreign). (P. C. Y.)

BALFOUR, ROBERT (known also as Balforetjs) (1550?- 1625?), Scottish philosopher, was educated at St Andrews and the university of Paris. He was for many years principal of the Guienne College at Bordeaux. His great work is his Commentarii in Organum Logicum Aristotelis (Bordeaux, 1618); the copy in the British Museum contains a number of highly- eulogistic poems in honour of Balfour, who is described as Graium aemulus acer. Balfour was one of the scholars who contributed to spread over Europe the fame of the prae- fervidum ingenium Scotorum. His contemporary, Dempster, called him the " phoenix of his age, a philosopher profoundly skilled in the Greek and Latin languages, and a mathematician worthy of being compared with the ancients." His Cleomedis meteora, with notes and Latin translation, was reprinted at Leiden as late as 1820.

See Dempster, Historia Ecclesiastica Gent. Scotorum; Irving's Lives of the Scottish Writers; Anderson's Scottish Nation, i. 217.

BALGUY, JOHN (1686-1748), English divine and philosopher, was born at Sheffield on the 12th of August 1686. He was educated at the Sheffield grammar school and at St John's College, Cambridge, graduated B.A. in 1706, was ordained in 1710, and in 17 n obtained the small living of Lamesley and Tanfield in Durham. He married in 1715. It was the year in which Bishop Hoadley preached the famous sermon on " The Kingdom of Christ," which gave rise to the " Bangorian con- troversy"; and Balguy, under the nam de plume of Silvius, began his career of

authorship by taking the side of Hoadley in this controversy against some of his High Church opponents.

2 Cal. of State Pap. (Foreign), 1579-1580, p. 294.

3 The title was attainted in 17 16, through the 5th baron's complicity in the Jacobite rising of 1715. In 1869 it was restored to Alexander Hugh Bruce (b. 1849), as 6th baron; he became one of the most influential of contemporary Scottish noblemen, on the Conservative side in politics, and was secretary for Scotland from 1895 to 1903.

In 1726 he published A letter to a Deist concerning the Beauty and Excellency of Moral Virtue, and the Support and Improvement which it receives from the Christian Religion, chiefly designed to show that, while a love of virtue for its own sake is the highest principle of morality, religious rewards and punishments are most valuable, and in some cases absolutely indispensable, as sanctions of conduct. In 1727 he was made a prebendary of Salisbury by his friend Hoadley. He published in the same year the first part of a tractate entitled The Founda- tion of Moral Goodness, and in the following year a second part, Illustrating and enforcing the Principles- contained in the" former. The aim of the work is two-fold — to refute the theory of Hutcheson regarding the basis of rectitude, and to establish the theory of Cudworth and Clarke, that virtue is conformity to reason — the acting according to fitnesses which arise out of the eternal and immutable relations of agents to objects. In 1 7 29 he became vicar of Northallerton, in the county of York. His next work was an essay on Divine Rectitude: or, a Brief Inquiry concerning the Moral Perfections of the Deity, particularly in respect of Creation and Providence. It is an at temp t to show that the same moral principle which ought to direct human life may be perceived to underlie the works and ways of God: goodness in the Deity not being a mere disposition to benevolence, but a regard to an order, beauty and harmony, which are not merely relative to our faculties and capacities, but real and absolute; claiming for their own sakes the reverence of all intelligent beings, and alone answering to the perfection of the divine ideas. Balguy wrote several other terse and readable tracts of the same nature, which he collected and published in a single volume in

1734. In 1741 he published an Essay on Redemption , containing somewhat advanced views. Redemption as taught in Scripture means, according to him, ” the deliverance or release of mankind from the power and punishment of sin, by the meritorious sufferings of Jesus Christ,” but involves no translation of guilt, substitution of persons or vicarious punishment. Freed from these ideas, which have arisen from interpreting literally expressions which are properly figurative, the doctrine, he argues, satisfies deep and urgent human wants, and is in perfect consistence and agreement with reason and rectitude. His last publication was a volume of sermons, pervaded by good sense and good feeling, and clear, natural and direct in style. He died at Harrogate on the 21st of September 1748. A second volume of sermons appeared in 1750 (3rd ed. in 2 vols., 1760).

BALI, an island of the East Indies, E. of Java, from which it is separated by Bali Strait, which is shallow, and scarcely over a mile in width at its narrowest point. Bali is 93 m. in length, and its greatest breadth is 50 m. The area is 2095 sq. m. In 1882, for administrative purposes, Bali was separated from Java and combined with the island of Lombok to form the Dutch residency of Lombok and Bali. Politically its divisions are two: — ‘■ (1) the two districts, Buleleng and Jembrana, on Dutch territory; and (2) the autonomous states of Klung Lung, Bangli, Mengui, Badung and Tabanan. Buleleng, on the north-west, is the chief town. The population on Dutch territory in the whole residency in the year 1905 was 523,535. Bali belongs physically to Java; the climate and soil are the same and it has mountains of proportionate height. There are several lakes of great depth and streams well fitted for the purposes of irrigation, of which full advantage is taken by the natives. The geological formation includes (like that of Java) three regions — the central volcanic, the southern peninsula of Tertiary limestone, and alluvial plains between the older formations. The highest volcanoes, Tabanan, Batur and Gunung Agung (Bali Beak), have respectively heights of 7545 ft., 7383 ft., and 10,497 ft., the central chain having an average altitude of 3282 ft. As regards flora and fauna Bali is associated with Java. The deep strait which separates it on the east from Lombok was taken by A. R. Wallace (q.v.) as representing the so-called Wallace’s Line, whereby he demarcated the Asiatic from the Australian fauna.

The natives of Bali, though of the same stock as the Javanese, and resembling them in general appearance, exceed them in stature and muscular power, as well as in activity and enterprise.

They are skilful agriculturists and artisans, especially in textile fabrics and the manufacture of arms. Though native rule is tyrannical and arbitrary, especially in the principalities of Badung and Tabanan, trade and industry could not flourish if insecurity of persons and property existed to any great extent. The natives have also a remedy against the aggression of their rulers in their own hands; it is called Metilas, consists in a general rising and renunciation of allegiance, and proves mostly successful. Justice is administered from a written civil and criminal code. Slavery is abolished. Hinduism, which was once the religion of Java, but has been extinct there for four centuries, is still in vogue in the islands of Bali and Lombok, where the cruel custom of widow-burning (suttee) is still practised, and the Hindu system of the four castes, with a fifth or Pariah caste (called Chandala), adhered to. It appears partly blended with Buddhism, partly overgrown with a belief in Kalas, or evil spirits. To appease these, offerings are made to them either direct or through the mediation of the Devas (domestic or agrarian deities); and if these avail not, the Menyepi or Great Sacrifice is resorted to. In the course of this ceremony, after the sacrifice, men rush in all directions carrying torches; the women also carry fire-brands, or knock on the houses with rice-crushers and other heavy implements, and thus the evil spirits are con- sidered to be driven away. The Mahommedan religion occurs among the coastal population. The Balinese language belongs to the same group of the Malayan class as the Javanese, Sundanese, Madurese, &c, but is as distinct from each of these as French is from Italian. It is most nearly akin to the Sasak language spoken in Lombok and on the east coast of Bali. The literary language has embodied many of its ingredients from the Old Javanese, as spoken in Java at the time of the fall of Majapahit (15th century), while the vulgar dialect has kept free from such admixture. Javanese influence is also traceable in the use of three varieties of speech, as in the Javanese language, according to the rank of the people addressed. The alphabet is with some modifications the same as the Javanese, but more complicated. The material universally used for writing on is the prepared leaf of the lontar palm. The sacred literature of the Balinese is written in the ancient Javanese or Kawi language, which appears to be better understood here than it is in Java. A general decline in culture is manifest in the Balinese. Of the early history of their island the Balinese know nothing. The oldest tradition they possess refers to a time shortly after the overthrow of the Majapahit dynasty in Java, about the middle of the 1 5th century; but it has been

supposed that there must have been Indian settlers here before the middle of the 1st century, by whom the present name, probably cognate with the Sanskrit balin, strong, was in all likelihood imposed. It was not till 1633 that the Dutch attempted to enter into alliance with the native princes, and their earliest permanent settlement at Port Badung only dates from 1845. Their influence was extended by the results of the war which they waged with the natives about 1847-49.

The only roadstead safe all the year round is Temukus on the north coast. The rivers are not navigable. Agriculture is the chief means of subsistence; rice being a crop of particular importance. Other crops grown for export are coffee, tobacco, cocoa and indigo. Gold-working, the making of arms and musical instruˆ ments, wood-carving, cotton, silk and gold thread weaving are of importance. There are numerous Arab and Chinese traders.

See R. Van Eck, Schetsen van het eiland Bali, Tijdsch. van Nederl. Indie (1878-1879); J. Jacobs, Eeenigen tijd onder de Baliers (Batavia, 1883) ; H. Tonkes, Volkskunde von Bali (Halle, 1888) ; Liefrinck, De rijst cultuur op Bali, Indische Gids. (1886).

BALIKISRI {Balukiser) , a town of Asia Minor, capital of the Karasi sanjak in the vilayet of Brusa, altitude 575 ft., situated on rising ground above a fertile plain which drains to the Sea of Marmora. Pop. 20,000 (Moslems, 15,000; Christians, 5000). It is a centre of trade in opium, silk and cereals, com- municating by carriage roads with Panderma. The sanjak is rich in mineral wealth; silver mines are worked at Balia and boracite mines at Susurlu. At or near Balikisri was the Roman town of Hadrianutherae, founded, as its name commemorates, by the emperor Hadrian.

BALIOL, the name of a family which played an important part in the history of Scotland. The founder of the family in England was a Norman baron, Guy or Guido de Baliol, who held the fiefs of Bailleul, Dampierre, Harcourt and Vinoy in Normandy. Coming to England with William the Conqueror, he received lands in the north of England from William II., and his son, or grandson, Bernard or Barnard de Baliol, built a fortress in Durham called Castle Barnard, around which the town of Barnard Castle grew.

The first burgesses probably obtained their privileges from him. Bernard fought for King Stephen during the civil war, was present at the battle of the Standard in August 1 138, and was taken prisoner at the battle of Lincoln in February 1 141. The date of his death is uncertain. Dugdale only believes in the existence of one Bernard de Baliol, but it seems more probable that the Bernard de Baliol referred to after 1 167 was a son of the elder Bernard, and not the same individual. If so the younger Bernard was one of the northern barons who raised the siege of Alnwick, and took William the Lion, king of Scotland, prisoner in July 1 1 74. He also confirmed the privileges granted by his father to the burgesses of Barnard Castle, and was succeeded by his son Eustace. Practically nothing is known of Eustace, or of his son Hugh who succeeded about 12 15. Hugh's son and successor, John de Baliol, who increased his wealth and position by a marriage with Dervorguila (d. 1290), daughter of Alan, earl of Galloway, is said to have possessed thirty knights' fees in England and one half of the lands in Galloway. He was one of the regents of Scotland during the minority of Alexander III., but in 1255 was deprived of this office and his lands forfeited for treason. He then appeared in England fighting for Henry III. against Simon de Montfort, and was taken prisoner at the battle of Lewes in 1 264. About 1 263 he established several scholarships at Oxford, and after his death in 1269 his widow founded the college which bears the name of the family. He left four sons, three of whom died without issue, and in 1278 his lands came to his son, John de Baliol (q.v.), who was king of Scotland from 1292 to 1296, and who died in Normandy in 131.5. John's eldest son by his marriage with Isabel, daughter of John de Warenne, earl of Surrey, was Edward de Baliol who shared his father's captivity in England in 1296. Subsequently crossing over to France, he appears to have lived mainly on his lands in Normandy until 1324, when he was invited to England by King Edward II., who hoped to bring him forward as a candidate for the Scottish crown. A favourable opportunity, however, did not arise until after the death of King Robert the Bruce in 1329, when Edward III. had succeeded his father on the English throne. Although Edward did not give Baliol any active assistance, the claimant placed himself at the head of some disinherited Scottish nobles, raised a small army and sailed from Ravenspur. Landing at Kinghorn in Fifeshire in August 1332, he gained a complete victory over the Scots under Donald, earl of Mar, at Dupplin Moor, took Perth, and on the 24th of September was crowned king of Scotland at Scone. He then acknowledged Edward III. as

his superior, but soon afterwards was defeated at Annan (where his brother, Henry de Baliol, was slain) and compelled to fly to England. Regaining his kingdom after the defeat of the Scots at Halidon Hill in July 1333, Baliol surrendered the whole of the district formerly known as Lothian to Edward, and did homage for Scotland to the English king. His party, however, was weakened by disunion, and he won no serious support in Scotland. Entirely dependent on Edward, he again sought refuge in England, and took a very slight part in the war waged on his behalf. He returned to Scotland after the defeat of King David II. at Neville's Cross in 1346. After making an absolute surrender of Scotland to Edward III. in 1356 at Roxburgh in return for a pension, Edward de Baliol died at Wheatley near Doncaster in 1367.

A cadet branch of the Baliol family was descended from Ingelram, or Engelram, a son of the younger Bernard de Baliol. Ingelram's wife was the daughter and heiress of William de Berkeley, lord of Reidcastle in Forfarshire, and chamberlain of Scotland, and by her he had a son Henry, who became chamberlain about 1223. Henry married Lora or Lauretta, a daughter

of Philip de Valoines (Valsques), lord of Panmure, and in 1234 inherited part of the rich English fiefs of the Valoines family. He sided with the English barons against John in 121 5, and accompanied Henry III. to France in 1242. He died in 1246. It is probable but not certain that Henry's son was Alexander de Baliol, lord of Cavers in Teviotdale, and chamberlain of Scotland. Alexander took a leading part in Scottish affairs during the latter part of the 13 th century, and is first mentioned as chamberlain in 1287. He snared in the negotiations between the Scottish nobles and Edward I. of England which culminated in the treaty of Salisbury in 1289, and the treaty of Brigham in 1290. Probably deprived of his office as chamberlainabout 1 296 he may have shared the imprisonment of his kinsman, John de Baliol the king. He then fought in Scotland for Edward, and was summoned to several English parliaments. His wife was Isabella de Chilham, through whom he obtained lands in Kent. He died about 1309, leaving a son, Alexander, whose son, Thomas, sold the estate of Cavers to William, earl of Douglas, in 1368. Thomas is the last of the Baliols mentioned in the Scottish records.

A late and dubious tradition asserts that the family name became

so discredited owing to the pusillanimous conduct of John and Edward Baliol that it was abandoned by its owners in favour of the form Baillie.

See John of Fordun, Chronica gentis Scolorum, edited by W. F. Skene (Edinburgh, 1871-1872) ; Andrew of Wyntoun, The Orygynale Cronykil of Scotland, edited by David Laing (Edinburgh, 1 872-1 879) ; Gesta Edwardi de Carnarvan, by a canon of Bridlington, edited by W. Stubbs (London, 1883) ; W. Dugdale, The Baronage of England (London, 1675-1676) ; R. Surtees, The History of Durham (London, 1816-1840); Documents and Records illustrating the History of Scotland, edited by F. T. Palgrave (London, 1837); Documents illustrative of the History of Scotland (1286-1306), edited by J. Steven- son (Edinburgh, 1 870); Calendar of Documents relating to Scotland, edited by J. Bain (Edinburgh, 1881-1888).

BALIOL, JOHN DE (1249-13 15), king of Scotland, was a son of John de Baliol (d. 1269) of Barnard Castle, Durham, by his wife Dervorguila, daughter of Alan, earl of Galloway, and became head of the Baliol family (see above) and lord of extensive lands in England, France and Scotland on his elder brother's death in 1278. Little else, however, is known of his early life. He came into prominence when the Scottish throne became vacant in 1290 owing to the death of Margaret, the " maid of Norway," a granddaughter of King Alexander III., and was one of the three candidates for the crown whose pretensions were seriously considered. Claiming through his maternal grandmother, Margaret, the eldest daughter of David, earl of Huntingdon (d. 12 19), who was a grandson of King David I., Baliol's principal rival was Robert Bruce, earl of Annandale, and the dispute was the somewhat familiar one of the eldest by descent against the nearest of kin. Meanwhile the English king, Edward I., was closely watching the trend of affairs in Scotland and was invited to settle this dispute. It is doubtful what rights, if any, the English kings had over Scotland, but when Edward met the Scottish nobles at Norham in May 1291, he demanded a formal recognition of his position as overlord of Scotland. After some delay this was tacitly admitted by the nobles, and acknowledged by Baliol and the other competitors, who all agreed to abide by his decision. A court of eighty Scotsmen and twenty-four Englishmen was then appointed to try the question. Traversing the statements made in favour of Bruce, Baliol claimed by the principles of feudal law for an indivisible inheritance, and on the advice of the court Edward decided in his favour. Having sworn

fealty to the English king, Baliol was crowned king of Scotland at Scone on the 30th of November 1292; in his new capacity he did homage to Edward at Newcastle, and in January 1293 released the English king from all promises and obligations made while the kingdom of Scotland was in his hands. These amicable relations were soon disturbed. A Scottish vassal carried his case to Edward as Baliol's overlord, and Baliol himself was soon summoned to the English court to answer a suit brought against him. After a short struggle he admitted Edward's right, and in May 1294 attended a parliament in London. He soon quarrelled with his overlord, the exact point at issue being doubtful, and returned

to Scotland. Consequent on the dispute which had broken out between England and France, a council of twelve was appointed to assist him, and it was decided to defy Edward. Englishmen were dismissed from the Scottish court, their fiefs were con-: fiscated, and an alliance was concluded with Philip IV., king of France. War broke out, but Baliol did not take the field in person. Invading Scotland, Edward met with a feeble resistance, and at Brechin in July 1296 Baliol surrendered his kingdom to Antony Bek, bishop of Durham, as the representative of the English king. About the same time he appeared before Edward at Montrose, and delivered to him a white rod, the feudal token of resignation. With his son, Edward, he was taken a prisoner to England, remaining in captivity until July 1299, when he was released at the request of Pope Boniface VIII. He lived for some time under the pope's supervision, and seems to have passed his remaining days quietly on his French estates. He died in Normandy early in 1315, leaving several children by his wife, Isabel, a daughter of John de Warenne, earl of Surrey (d. 1304).

See Documents andRecords illustrating the History ofScotland,edited by F. T. Palgrave (London, 1837); Documents illustrative of the History of Scotland, 1286-1306, edited by J. Stevenson (Edinburgh, 1870); J. H. Burton, History of Scotland, vol. ii. (Edinburgh, 1905); A. Lang, History of Scotland, vol. i. (Edinburgh, 1904) ; Sir H. Maxwell, Robert the Bruce (London, 1897) ; Calendar of Documents relating to Scotland, edited by J.

Bain (Edinburgh, 1881-1888). Also Scotland : History.

BALIUAG, a town of the province of Bulacan, Luzon, Philip- pine Islands, on the Quifigua river, 29 m. (by rail) N.N.W. of Manila. Pop. (1903) 21,008, including the population (7072) of Bustos, which was annexed to Baliuag in that year after the census was taken. Baliuag is served by an extension of the railway between Manila and Dagupan. It is the trade centre of a fertile agricultural district, and manufactures bamboo hats, silk and native fibre goods.

BALKAN PENINSULA, the most easterly of the three large peninsulas which form the southern extremities of the European continent. Its area, 184,779 sq. m., is about 35,000 sq. m. less than that of the Iberian Peninsula, but more than twice that of the Italian. Its northern boundary stretches from the Kilia mouth of the Danube to the Adriatic Sea near Fiume, and is generally regarded as marked by the courses of the rivers Danube, Save and Kulpa. On the E. it is bounded by the Black Sea, the Sea of Marmora, and the Aegean; on the S. by the Mediterranean; on the W. by the Ionian Sea and the Adriatic. With the exception of the Black Sea coast and the Albanian littoral, its shores are considerably indented and flanked by groups of islands. The Peninsula in its general contour resembles an inverted pyramid or triangle, terminating at its apex in a subsidiary peninsula, the Peloponnesus or Morea. Its surface is almost entirely mountainous, the only extensive plains being those formed by the valleys of the Danube and Maritza, and the basin of Thessaly drained by the Salambria (ancient Peneus). The Danubian plain, lying, for the most part, outside the Penin- sula, is enclosed, on the north, by the Carpathians; and on the south by the Balkans, from which the Peninsula derives its name. These ranges form together the great semicircular mountain-chain, known as the anti-Dacian system, through which the Danube finds a passage at the Iron Gates. The other mountain-systems display great complexity of formation; beginning with the Dinaric Alps and the parallel ranges of Bosnia, they run, as a rule, from north-west to south-east; the great chain of Rhodope traverses the centre of the Peninsula, throwing out spurs towards the Black Sea and the Aegean; farther west are the lofty Shar Dagh and the mountains of Montenegro and Albania, continued by the Pindus range and the heights of Acarnania and Aetolia. The principal summits are Olympus (9794 ft.), overlooking the Gulf of Salonica; Musalla (9631) and Popova Shapka (8855), both in the Rhodope system; Liubotrn in the Shar Dagh (8989); Elin, in the Perin Planina

(8794); Belmeken in southern Bulgaria (chain of Dospat, 8562); Smolika in the Pindus range (8445); • Dormitor in northern Montenegro (8294) ; Kaimakchalan in central Macedonia (8255) ;

and Kiona in Aetolia (8235). Owing to the distribution of the mountain-chains, the principal rivers flow in an easterly or south- easterly direction; the Danube falls into the Black Sea; the Maritza, Mesta, Struma {Strymon), Vardar and Salambria into the Aegean. The only considerable rivers flowing into the Adriatic are the Narenta, Drin and Viossa. The principal lakes are those of Ochrida, Prespa, Scutari and Iannina. The climate is more severe than that of the sister peninsulas, and the temperature is liable to sudden changes. The winter, though short, is often intensely cold, especially in the Danubian plain and in Thrace, the rigorous climate of which is frequently alluded to by the Latin poets. Bitter north-easterly winds prevail in the spring, and snow is not uncommon even in the low-lying districts of Greece. The autumn weather is generally fine and clear.

Geology. — Broadly speaking, the Balkan Peninsula may be divided into four areas which geologically are distinct. There is a central region, roughly triangular in shape, with its base resting upon the

I Tertiary

I Cretaceous. Includes Triassio j a- Jurassic not yet separately ‘ defined.

Triassic Carboniferous

Archaean & Btetamoiphic

frttl Plutonic Rocks U Volcanic Rocks o Active’ Volcanoes

Jurassic

Aegean Sea and its apex in Servia. On two sides this area is bordered by belts of folded beds which form on the west the mountain ranges of the Adriatic and Ionian coasts, and on the north the chain of the Balkans. Finally, beyond the Balkans lies the great Rumanian depression, occupied chiefly by undisturbed Cretaceous and Tertiary strata. The central region, although wedged in between two belts of folding, is not affected by the folds of either, excepting near its margins. It consists largely of crystalline and schistose rocks. The core is formed by the

mountain masses of Rhodope, Belasitza, Perin and Rila; and here Palaeozoic and Mesozoic beds are absent, and the earliest sedimentary deposits belong to the Tertiary period and lie flat upon the crystalline rocks. Upon the margins, however, Cretaceous beds are found. The eastern parts of Greece are composed almost entirely of Cretaceous beds, but nevertheless they must be considered to belong to the central area, for the folds which affect them are nearly at right angles to those of the western chains. In general, however, the central area is one of faulting rather than of folding, and the sedimentary beds sometimes lie in troughs formed by faults. Extensive volcanic outbursts occurred in this region during the Tertiary period. In the western folded belt the strike of the folds is N.W.-S.E., or N.N.W.S.S.E. There are many local irregularities, but the general direction's maintained as far as the southern extremity of Greece, where the folds show a tendency to curve towards Crete. In the north, Carboniferous beds are present, and the Trias and the Jura take a considerable part in the formation of the chain. The Sarmatian beds are also involved in the folds, indicating that the folding was not completed till Pliocene times. In the south, the older beds disappear and the whole chain is formed chiefly of Cre taceous beds, though Eocene and probably Jurassic rocks are

present. The Eocene beds are folded, but the marginal Pliocene beds are not, and the final folding seems to have taken place during the Miocene period. (For the Balkans, see Bulgaria.)

Area and Population. — The following figures show the area and population of the various political divisions of the Balkan Peninsula in 1909 ; see also the articles on the separate countries.

Pop. per

Political Divisions.

Area in sq. m.

Pop. in 1909.

sq. m.

Croatia-Slavonia (south of the Save

•

and Kulpa) ....

(about) 8,200

(about) 1,200,000

146-3

Servia .....

18,782

2,493,770

132-2

Bulgaria (with Eastern Rumelia) .

37.240

4,028,239

88-

The Dobrudja (Rumania)

5,896

258,242

43-9

Dalmatia (Austria)

4,923

591-597

I20-I

Montenegro ....

3,255

3”,564

94

Bosnia and Herzegovina (Austria-

Hungary) ....

19,696

1,568,092

70-9

Sanjak of Novibazar (Turkish)

2,84c

153,000

53-5

Albania, Macedonia and other

Turkish possessions .

62,744

5,812,300

92-6

Greece

24,400

2,631,952

107-8

187,976

19,048,756

ioi-3

For full details as to the physical features, natural products, population, customs, trade, finance, government, religion,

education, language, literature, antiquities, history, politics, &c, of the Balkan lands, see Albania, Bosnia and Herzegovina, Bulgaria, Croatia-Slavonia, Dalmatia, Dobrudja, Greece, Illyria, Macedonia, Montenegro, Novibazar, Servia and Turkey.

Races. — The Peninsula is inhabited by a great variety of races, whose ethnological limits are far from corresponding with the existing political boundaries. The Turkish population, descended in part from the Ottoman invaders of the 14th and 1 5th centuries,

in part from colonists introduced at various epochs from Asia by the Turkish government, declined considerably during the 19th century, especially in the countries withdrawn from the sultan's authority. It is diminishing in Thessaly; it has entirely dis-

appeared in the rest of Greece, almost entirely in Servia; and it continues to decrease in Bulgaria notwithstanding the efforts of the authorities to check emigration. It is nowhere found in compact masses except in north-eastern Bulgaria and the region between Adrianople, the Black Sea and the Sea of Marmora. Elsewhere it appears in separate villages and isolated districts, or in the larger towns and their immediate neighbourhood. The total Turkish population of the Peninsula scarcely exceeds 1,800,000. The Slavonic population, including the Serbo-Croats and Bulgars, is by far the most numerous; its total aggregate exceeds 10,000,000. The majority of the Serbo-Croats left their homes among the Carpathians and settled in the Balkan Peninsula in the 7th century. The distinction between the Serbs of the more central region and the Croats of the north-west, was first drawn by the early Byzantine chroni- clers, and was well established by the 12th cen- tury. It does not correspond with any valid linguistic or racial difference; but in the course of time a strong religious difference arose. Along the Croatian and Dalmatian coast there existed a well-developed Latin civiliza- tion, which was sustained by constant intercourse with Italy; and, under its influence, the Serbo-Croatian immigrants were converted to the Roman Catholic Church. In the wild and mountainous interior, however, the Byzantine Church had few or no rivals and the Orthodox creed prevailed. The Orthodox Serbs inhabit the kingdom of Servia, Old Servia (or Novibazar and north-western Macedonia), Montenegro, Herzegovina and parts of Bosnia. The Roman Catholic Croats predominate in Dalmatia, north-western Bosnia and Croatia-Slavonia. Monte- negro, like the other mountainous regions, adhered to the Greek Church; it

received a number of Orthodox Servian refugees at the beginning of the 15th century, when the Turks occupied Servia. The numbers of the Serbo-Croats may be estimated at about 5,600,000. The Bulgars, who descend from a fusion of the Slavonic element with a later Ugro-Finnish immigration, inhabit the kingdom of Bulgaria (including Eastern Rumelia), parts of the Dobrudja and the greater part of Macedonia, except Old Servia and the Aegean littoral. Apart from their colonies in Bessarabia and elsewhere, they may be reckoned at 4,400,000. Only a portion of the widely-spread Ruman or Vlach race, which extends over a great part of Transylvania, south Hungary and Bessarabia, as well as the Rumanian kingdom, falls within the limits of the Peninsula. It is found in numerous detached settlements in Macedonia, Albania and northern Greece, and in colonies of recent date in Servia and Bulgaria. The nomad Vlachs or Tzintzars of these countries call themselves Arumani or " Romans "; they are a remnant of the native Latinized population which received an increase from the immigration of Daco-Roman refugees, who fled southwards during the 3rd century, after the abandonment of Dacia by Aurelian. (See Vlachs.) The entire Ruman population of the Balkan countries may be set down approximately at 600,000. The Albanians, who call themselves Shkupetar or Arber, are the representatives of the primitive Illyrian population; they inhabit the Adriatic lit- toral from the southern frontier of Montenegro to the northern boundary of Greece, in which country they are found in consider- able numbers. They have shown a tendency to advance in a north-easterly direction towards the Servian frontier, and the movement has been encouraged for political reasons by the Turkish government. The whole Albanian nation possibly numbers from 1,500,000 to 1,600,000. The Greeks, whose immigration from Asia Minor took place in pre-historic times, are, next to the Albanians, the oldest race in the Peninsula. Their maritime and commercial instincts have led them from the earliest times to found settlements on the sea-coast and the islands. They inhabit the Black Sea littoral from Varna to the Bosporus, the shores of the Sea of Marmora and the Aegean, the Aegean archipelago, the mainland of Greece, Epirus and the western islands as far north as Corfu. In Constantinople they

probably exceed 300,000. They are seldom found in large

numbers at any great distance from the sea, and usually congregate in the principal towns and commercial centres, such as Adrianople, Constantza, Varna and Philippopolis; there are also detached colonies at Melnik, Stanimaka, Kavakly, Niegush and elsewhere. The Greek inhabitants of the Peninsula and adjacent islands probably number 4,500,000. The remainder of the population is for the most part composed of Armenians, Jews and gipsies. The Armenians, like the Greeks, congregate in the principal centres of trade, especially at Constantinople; their numbers were greatly reduced by the massacres of 1896. The Jews are most numerous at Salonica where they form half the population. The gipsies are scattered widely throughout the Peninsula; they are found not only in wandering troops, as elsewhere in Europe, but in settlements or cantonments in the neighbourhood of towns and villages.

Religions. — Owing to the numerous conversions to Islam which followed the Turkish conquest, the Mahommedan population of the Peninsula is largely in excess of the purely Turkish element. More than half the Albanian nation and 35 % of the inhabitants of Bosnia and Herzegovina adopted the creed of the conquering race. Among the Bulgars and Greeks the conversions were less numerous. The Bulgarian Mahommedans, or Pomaks, who inhabit the valleys of Rhodope and certain districts in northern Bulgaria, are numerically insignificant ; the Greek followers of Islam are almost confined to Crete. The whole Moslem population of the Peninsula is about 3,300,000. The great bulk of the Christian population belongs to the Orthodox Church, of which the oecumenical patriarch at Con- stantinople is the nominal head, having precedence over all other ecclesiastical dignitaries. The Bulgarian, Servian, Montenegrin and Greek churches are, however, in reality autocephalous. The Bulgarian church enjoys an exceptional position, inasmuch as its spiritual chief, the exarch, who resides at Constantinople, controls the Bulgarian prelates in European Turkey as well as those in the kingdom of Bulgaria. On the other hand, the Greek prelates in Bulgaria are subject to the patriarch. Religious and political questions are intimately connected in eastern Europe. The heads of the various religious communities are the only representatives of the Christian population recognized by the Turkish government; they possess a seat in the local administrative councils and supervise the Christian schools. The efforts of the several branches of the Orthodox Church to obtain a separate organization in the Turkish dominions are to be attributed

exclusively to political motives, as no difference of dogma divides them. The Serbo-Croats of Dalmatia, and Croatia-Slavonia, some of the Gheg tribes in Albania , about 21 % of the Bosnians, a still smaller number of Bulgarians in the kingdom and in Macedonia and a few Greeks in the islands belong to the Roman Catholic Church. A certain number of Bulgars at Kukush in Macedonia and elsewhere form a ” uniate ” church, which accepts the authority and dogma of Rome, but preserves the Ortho- dox rite and discipline. The Armenians are divided between the Gregorian and Uniate-Armenian churches, each under a patriarch. The other Christian confessions are numerically inconsiderable. The Gagaiizi in Eastern Bulgaria, a Turanian and Turkish-speaking race, profess Christianity.

Languages. — Until comparatively recent times Turkish and Greek were the only languages systematically taught or officially recog- nized in the Balkan lands subject to Turkish rule. The first, the speech of the conquering race, was the official language; the second, owing to the intellectual and literary superiority of the Greeks, their educational zeal and the privileges acquired by their church, became the language of the upper classes among the Christians. The Slavonic masses, however, both Servian and Bulgarian, preserved their language, which saved these nationalities from extinction. The Servian dialect extending into regions which escaped the Turkish yoke, enjoyed certain advantages denied to the Bulgarian : in free Montenegro the first Slavonic printing-press was founded in 1493; at Ragusa, a century later, Servian literature attained a high degree of excellence. Bulgarian, for nearly four centuries, ceased to be a written language except in a few monasteries; a literary revival, which began about the middle of the 18th century, was the first symptom of returning national consciousness. The Servian, Bulgarian and Rumanian languages have borrowed largely from the Turkish in their vocabularies, but not in their structural forms, and have adopted many words from the Greek. Modern Greek has also a large number of Turkish words which are rejected in the artificial literary language. The revival of the various Balkan nationalities was in every case accompanied or preceded by a literary movement ; in Servian literature, under the influence of Obradovich and Vuk Karajich, the popular idiom, notwithstanding the opposi- tion of the priesthood, superseded the ecclesiastical Russian- Slavonic; in Bulgaria the eastern dialect, that of the Sredna Gora, prevailed. Among the Greeks, whose literature never suffered a complete eclipse, a

similar effort to restore the classical tongue re- sulted in a kind of compromise ; the conventional literary language, which is neither ancient nor modern, differs widely from the ver-

nacular. Albanian, the only surviving remnant of the ancient Thraco-Illyrian speech, affords an interesting study to philologists. It undoubtedly belongs to the Indo-European family, but its earlier forms cannot, unfortunately, be ascertained oˆing to the absence of literary monuments. Certain remarkable analogies between Albanian and the other languages of the Peninsula, especially Bulgarian and Rumanian, have been supposed to point to the influence exercised by the primitive speech upon the idioms of the immigrant races.

History. — The great Slavonic immigration, which changed the ethnographic face of the Peninsula, began in the 3rd century a.d. and continued at intervals throughout the following four centuries. At the beginning of this movement the Byzantine empire was in actual or nominal possession of all the regions south of the Danube; the greater part of the native Thraco-Illyrian population of the interior had been romanized and spoke Latin. The Thracians, the progenitors of the Vlachs, took refuge in the mountainous districts and for some centuries disappeared from history: originally an agricultural people, they became nomad shepherds. In Albania the aboriginal Illyrian element, which preserved its ancient language, main- tained itself in the meuntains and eventually forced back the immigrant race. The Greeks, who occupied the maritime and southern regions, were driven to the sea-coast, the islands and the fortified towns. Slavonic place-names, still existing in every portion of the Peninsula, bear witness to the multitude of the invaders and the permanency of their settlements. In the 6th century the Slavs penetrated to the Morea, where a Slavonic dialect was spoken down to the middle of the 15 th century. In the 7 th the Serbo-Croats invaded the north-western regions (Croatia, Servia, Bosnia, Herzegovina, Montenegro and northern Albania); they expelled or assimilated the Illyrian population, now represented in Dalmatia by the slavonized Morlachs or Mavro-Vlachs, and appropriated the old Roman colonies on the Adriatic coast. At the end of the 7th century the Bulgars, a Turanian race, crossed the Danube and subjected the Slavonic inhabitants of Moesia and Thrace, but were soon assimilated by the conquered population, which had already become partly civilized. Under their tsar Krum (802-815) the Bulgars invaded the districts of Adrianople and central Macedonia; under Simeon (893-927), who fixed his

capital at Preslav, their empire extended from the Adriatic to the Black Sea. In 971 ” the first Bulgarian empire ” was overthrown by the emperor John Zimisces, but Bulgarian power was soon revived under the Shishman dynasty at Ochrida. In 1014 Tsar Samuel of Ochrida, who had conquered the greater part of the Peninsula, was defeated at Belasitza by the Greek emperor Basil II., and the ” western Bulgarian empire ” came to an end. In the 10th century the Vlachs reappear as an independent power in Southern Macedonia and the Pindus district, which were known as Great Walachia (MeyaXr] BXaxta). The Serbs, who owing to the dis- sensions of their zhupans or chiefs, had hitherto failed to take a prominent part in the history of the Peninsula, attained unity under Stephen Nemanya (1169-1195), the founder of the Nemaˆ nyich dyna-sty. A new Bulgarian power, known as the ” second ” or ” Bulgaro-Vlach empire,” was founded at Trnovo in 1186 under the brothers Ivan and Peter Asen, who led a revolt of Vlachs and Bulgars against the Greeks. In 1204 Constantinople was captured by the Latins of the Fourth Crusade, and Baldwin of Flanders was crowned emperor; the Venetians acquired several maritime towns and islands, and Frankish feudal dynasties were established in Salonica, Athens, Achaea and elsewhere. Greek rule, however, survived in the despotate of Epirus under princes of the imperial house of the Angeli. The Latin tenure of Constantinople lasted only 57 years; the imperial city was recaptured in 1261 by Michael VIII. Palaeologus, but most of the feudal Latin states continued to exist till the Turkish con- quest; the Venetians retained their possessions for several centuries later and waged continual wars with the Turks. In 1230 Theodore of Epirus, who had conquered Albania, Great Walachia and Macedonia, was overthrown at Klokotnitza by Ivan Asen II., the greatest of Bulgarian monarchs (1218-1241), who defeated Baldwin at Adrianople and extended his sway over most of the Peninsula. The Bulgarian power declined after

his death and was extinguished at the battle of Velbuzhd (1330) by the Servians under Stephen Urosh III. A short period of Servian predominance followed under Stephen Dushan (1331-i35S) whose realm included Albania, Macedonia, Epirus, Thessaly and northern Greece. The Servian incursion was followed by a great Albanian emigration to the southern regions of the Peninsula. After Dushan’s death his empire disappeared, and

Servia fell a prey to anarchy. For a short time the Bosnians, under their king Stephen Tvrtko (1353-1391), became the principal power in the west of the Peninsula. The disorganisation and internecine feuds of the various states prepared the way for the Ottoman invasion. In 1356 the Turks seized Gallipoli; in 1361 the sultan Murad I. established his capital at Adrianople; in 1389 the fate of the Slavonic states was decided by the rout of the Servians and their allies at Kossovo. The last remnant of Bulgarian national existence disappeared with the fall of Trnovo in 1393, and Great Walachia was con- quered in the same year. Under Mahommed II. (1451-1481) the Turks completed the conquest of the Peninsula. The despotate of Epirus succumbed in 1449, the duchy of Athens in 1456; in 1453 Constantinople was taken and the decrepit Byzantine empire perished ; the greater part of Bosnia submitted in 1463; the heroic resistance of the Albanians under Scanderbeg collapsed with the fall of Croia (1466), and Venetian supremacy in Upper Albania ended with the capture of Scutari (1478). Only the mountain stronghold of Montenegro and the Italian city-states on the Adriatic coast escaped subjection. In the 16th century under Solyman the Magnificent (15 20-1 566) the Ottoman power attained its greatest height; after the un- successful siege of Vienna (1683) it began to decline. The period of decadence was marked in the latter half of the 18th century by the formation of practically independent pashaliks or fiefs, such as those of Scutari under Mahommed of Bushat, Iannina under Ali of Tepelen, and Viden under Pasvan-oglu. The detachment of the outlying portions of the empire followed. Owing to the uncompromising character of the Mahommedan religion and the contemptuous attitude of the dominant race, the subject nationalities underwent no process of assimilation during the four centuries of Turkish rule; they retained not only their language but their religion, manners and peculiar characteristics, and when the power of the central authority waned they still possessed the germs of a national existence. The independence of Greece was acknowledged in 1829, that of Servia (as a tributary principality) in 1830. No territorial changes within the Peninsula followed the Crimean War; but the continuance of the weakened authority of the Porte tended indirectly to the independent development of the various nationalities. The Ionian Islands were ceded by Great Britain to Greece in 1864. The great break-up came in 1878. The abortive treaty of San Stefano, concluded in that year, reduced the Turkish possessions in the Peninsula to Albania, Epirus, Thessaly and a portion of southern Thrace. A large Bulgarian principality

was created extending from the Danube to the Aegean and from the Black Sea to the river Drin in Albania; it received a considerable coast-line on the Aegean and abutted on the Gulf of Salonica under the walls of that town. At the same time the frontiers of Servia and Montenegro were enlarged so as to become almost contiguous, and Montenegro received the ports of Antivari and Dulcigno on the Adriatic. From a strategical point of view the Bulgaria of the San Stefano treaty threatened Salonica, Adrianople and Constantinople itself; and the great powers, anticipating that the new state would become a Russian dependency, refused their sanction to its provisions. The treaty of Berlin followed, which limited the principality to the country between the Danube and the Balkans, created the autonomous province of Eastern Rumelia south of the Balkans, and left the remainder of the proposed Bulgarian state under Turkish rule. The Montenegrin frontier laid down at San Stefano was considerably curtailed, Dulcigno, the district north-east of the Tara, and other territories being restored to Turkey; in addition to Nish, Servia received the districts of Pirot and Vranya on the east instead of the Ibar valley on the

west; the Dobrudja, somewhat enlarged, was ceded to Rumania' which surrendered southern Bessarabia to Russia, Bosnia and Herzegovina were handed over to Austrian administration; under a subsequent convention with Turkey, Austria sent troops into the sanjak of Novibazar. The complete independence of the principalities of Servia, Rumania and Montenegro was recognized. The claims of Greece, ignored at San Stefano, were admitted at Berlin; an extension of frontier, including Epirus as well as Thessaly, was finally sanctioned by the powers in 1880, but owing to the tenacious resistance of Turkey only Thessaly and the district of Arta were acquired by Greece in 1881. Rumania was proclaimed a kingdom in that year, Servia in 1882. In 1880, after a naval demonstration by the powers, Dulcigno was surrendered to Montenegro in compensation for the districts of Plava and Gusinye restored to Turkey. In 1886 the informal union of Eastern Rumelia with Bulgaria was sanctioned by Europe, the districts of Tumrush (Rhodope) and Krjali being given back to the sultan. In 1897 Crete was withdrawn from Turkish administration, and the Greco-Turkish War of that year was followed by the cession to Turkey of a few strategical points on the Thessalian frontier. In 1908 Bosnia and Herzegovina were annexed to the Dual Monarchy, and Bulgaria (including Eastern Rumelia) was proclaimed an independent kingdom.

The growth and development of the Balkan nations have, to a great extent, been retarded by the international jealousies arising from the Eastern Question. The possibility of the young states entering into a combination which jojfj,,-^. would enable them to offer a united resistance to tion. foreign interference while simultaneously effecting a compromise in regard to their national aims, has at various times occupied the attention of Balkan politicians. Among the earliest advocates of this idea was Ristich, the Servian statesman. During the reaction against Russia which followed the war of 1877 informal discussions were conducted with this object, and it was even suggested that a reformed or constitutional Turkey might find a place in the confederation. The movement was favourably regarded by King Charles of Rumania and Prince Alexander of Bulgaria. But the revolt of Eastern Rumelia, followed by the Servo-Bulgarian War and the coercion of Greece by the powers, embittered the rivalry of the various races, and the project was laid aside. It was revived in a somewhat modified form in 189 1 by Tricoupis, who suggested an offensive alliance of the Balkan states, directed against Turkey and aiming at a partition of the Sultan's possessions in Europe. The scheme, which found favour in Servia, was frustrated by the opposition of Stamboloff, who denounced it to the Porte. In 1897 a Bulgarian proposal for joint pacific action with a view to obtaining reforms in Macedonia was rejected by Greece.

Authorities. — Special bibliographies are appended to the separate articles which deal with the various political divisions of the Peninsula. For a general description of the whole region, its inhabitants, political problems, &c, see " Odysseus," Turkey in Europe (London, 1900), a work of exceptional interest and value. See also The Balkan Question, ed. L. Villari (London, 1905) ; W. Miller, Travels and Politics in the Near East (London, 1898); L. Lamouche, La Peninsule balkanique (Paris, 1899),; H. C. Thomson, The Outgoing Turk (London, 1897) ; T. Joanne, Etats du Danube et des Balkans (Paris, 1895) ; R. Millet, Souvenirs des Balkans (Paris, 1891) ; V. Cambon, Autour des Balkans (Paris, 1890) ; P. J. Hamard, Par delh V Adriatique et les Balkans (Paris, 1890); E. de Laveleye, La Peninsule des Balkans (Brussels, 1886). For geology see F. Toula, " Materialien zu einer Geologie der Balkan-halbinsel," Jahr. k.-k. geol. Reicksanst. (Vienna, vol. xxxiii. 1883), pp. 61-114; A. Bittnel. M. Neumayr, &c, Denks. k. Akad. Wiss. Wien, math.-nat. CI., vol. x!. (1880) ; A. Philippson, Der Peloponnes (Berlin, 1892) ; J. Cvijic, ' " Die Tektonik der Balkanhalbinsel," C. R. IX. Cong. geol. inter. Vienne, pp. 347-370

(1904). For the condition of the Peninsula before the Treaty of Berlin, see E. Ruffer, Die Balkanhalbinsel und ihre V biker (Bautzen, 1869); Mackenzie and Irby, Travels in the Slavonic Provinces of Turkey (London, 1866); and A. Boue, La Turquie, d'Europe (Paris, 1840). W. Miller, The Balkans (London, 1896), sketches the history of Bulgaria, Montenegrp, Rumania and Servia. See also Sir E. Hertslet, The Map of Europe by Treaty, esp. vol. iv. (London, 1875-1891); J. D. Bourchier, "A Balkan Confederation," in the Fortnightly Review (London, September 1891); the Austrian and Russian staff maps, and the ethnographical map? of Kiepert and Peucker. (J. D. B.)

BALKASH, or Balkhash (called by the Kirghiz Ak-denghiz or Ala-denghiz and by the Chinese Si-hai), a lake of Asiatic Russia, in the Kirghiz steppes, between the governments of Semipalatinsk and Semiryechensk, in 45 to 47 N. and 73° 30′ to 79 E., about 600 m. to the east of Lake Aral. It is fourth in size of the lakes in Eurasia, having an area of 7 115 sq. m., and lies at an altitude of 900 ft. It has the shape of a broad crescent, about 430 m. long from W.S.W. to E.N.E., having its concave side turned southwards; its width varies from 36 to 53 m. Its north-western shore is bordered by a dreary plateau, known as the Famine Steppe (Bek-pak-dala). The south-east shore, on the contrary, is low, and bears traces of having extended formerly as far as the Sasyk-kul and the Ala-kul. The Kirghiz in 1903 declared that its surface had been rising steadily during the preceding ten years, though prior to that it was dropping. The chief feeder of the lake is the Hi, which rises in the Khan- tengri group of the Tian-shan Mountains. The Karatal, the Aksu and the Lepsa also enter from the south-east, and the Ayaguz from the north-east. The first three rivers make their way with difficulty through the sands and reeds, which at a quite recent time were covered by the lake. Although it has no outlet, its waters are relatively fresh. It freezes generally from November to April. Its greatest depth, 35 ft., is along the north-west shore. The fauna of the lake and of its tributaries – — explored by Nikolsky — is more akin to the fauna of the rivers of the Tarim basin than to that of the Aral; it also does not contain the common frog. It seems, therefore, probable that Lake Balkash stood formerly in communication through lakes Ebi-nor and Ayar (Telli-nor) with the lake that formerly filled the Lukchun depression (in 89J E. long, and 425 N. lat.),

but researches show that a connexion with Lake Aral — at least in recent times — was improbable. The lake has been investigated by L. S. Berg (see Petermanns Mitteilungen, 1903).

BALKH, a city of Afghanistan, about 100 m. E. of Andkhui and some 46 m. S. of the Oxus. The city, which is identical with the ancient Bactra or Zainaspa, is now for the most part a mass of ruins, situated on the right bank of the Balkh river, 1 200 ft. above the sea. It comprises about 500 houses of Afghan settlers, a colony of Jews and a small bazaar, set in the midst of a waste of ruins and many acres of debris. Entering by the west (or Akcha) gate, one passes under three arches, which are probably the remnants of a former Jama Masjid. The outer walls (mostly in utter disrepair) are about 6| to 7 m. in perimeter, and on the south-eastern borders are set high on a mound or rampart, indicating a Mongol origin. The fort and citadel to the north-east are built well above the town on a barren mound and are walled and moated. There is, however, little left but the remains of a few pillars. The Masjid Sabz, with its green-tiled dome, is said to be the tomb of a Khwaja, Abul Narsi Parsar. Nothing but the arched entrance remains of the Madrasa, which is traditionally not very old. The earlier Buddhist constructions have proved more durable than the Mahommedan buildings. The Top-i-Rustam is 50 yds. in diameter at the base and 30 yds. at the top, circular and about 50 ft. high. Four circular vaults are sunk in the interior and four passages have been pierced below from the outside, which probably lead to them. The base of the building is constructed of sun-dried bricks about 2 ft. square and 4 or 5 in. thick. The Takht-i-Rustam is wedge-shaped in plan, with uneven sides. It is apparently built of pise mud {i.e. mud mixed with straw and puddled). It is possible that in these ruins we may recognize . the Nan Vihara of the Chinese traveller Hsiian Tsang. There are the remains of many other topes (or stupas) in the neigh- bourhood. The mounds of ruins on the road to Mazar-i- Sharif probably represent the site of a city yet older than those on which stands the modern Balkh. The town is gar- risoned by a few hundred kasidars, the regular troops of Afghan Turkestan being cantoned at Takhtapul, near Mazar- i-Sharif. The gardens to the north-east contain a caravanserai, which is fairly well kept and comfortable. It forms one side of a courtyard, which is shaded by a group of magnificent chenar trees.

The antiquity and greatness of the place are recognized by the native populations, who speak of it as the Mother of Cities. Its foundation is mythically ascribed to Kaiomurs, the Persian

Romulus ; and it is at least certain that, at a very early date, it was the rival of Ecbatana, Nineveh and Babylon. For a long time the city and country was the central seat of the Zoroastrian religion, the founder of which is said to have died within the walls. From the Memoirs of Hsiian Tsang, we learn that, at the time of his visit in the 7th century, there were in the city, or its vicinity, about a hundred Buddhist convents, with 3000 devotees, and that there was a large number of stupas, and other religious monuments. The most remarkable was the Nau Behar, Nava Bihara or New Convent, which possessed a very costly statue of Buddha. A curious notice of this building is found in the Arabian geographer Yaqut. Ibn-Haukal, an Arabian traveller of the 10th century, describes Balkh as built of clay, with ramparts and six gates, and extending half a parasang. He also mentions a castle and a mosque. Idrlsi, in the 12th century, speaks of its possessing a variety of educational establishments, and carrying on an active trade. There were several important commercial routes from the city, stretching as far east as India and China. In 1220 Jenghiz Khan sacked Balkh, butchered its inhabitants and levelled all the buildings capable of defence,— treatment to which it was again subjected in the 14th century by Timur. Notwithstanding this, however, Marco Polo can still, in the following century, describe it as " a noble city and a great." Balkh formed the government of Aurangzeb in his youth. In 1736 it was conquered by Nadir Shah. Under the Durani monarchy it fell into the hands of the Afghans; it was conquered by Shah Murad of Kunduz in 1820, and for some time was subject to the khan of Bokhara. In 1850 Mahommed Akram Khan, Barakzai, captured Balkh, and from that time it remained under Afghan rule.

See Hsiian Tsang, tr. by Julien, vol. i. pp. 29-32 ; Burnes's Travels in Bokhara (1831-1833); Ferrier's Travels; Vambery's Bokhara (1873) ; Report of the Russo -Afghan Boundary Commission of 1884.-1883. (T. H.,H>)

BALL, SIR ALEXANDER JOHN, Bart. (1759-1809), British rear-admiral and governor of Malta, came of a Gloucestershire family. He entered the navy, and in 1778 was promoted lieutenant. Three years later began a close association with Rodney, and, two days after his chief's crowning victory of April 12, 1782, Ball was promoted commander, and in 1783 he became captain. At this time he spent a year in France with the double purpose of learning the language and living economically. Nelson, then a captain, was at this time by no means favourably impressed by

his future friend and comrade, and spoke of him as a ” great coxcomb.” It was not until 1790 that Ball received a command. From that year, however, he was continuously employed. In 1798, assistance rendered by him to Nelson’s ship in heavy weather caused the latter to forget his former animosity, and from that time the two were close friends. Under Nelson’s command Ball took part in the battle of the Nile, and his ship, the ” Alexander,” was the particular opponent of Brueys’ flagship, ” L’Orient,” which blew up. Two months later he was ordered to the blockade of Malta, which was kept up without a break for the next two years. Ball committed the blockade to his first lieutenant, and himself led the marines and local militia, which made the siege on the land side. His care for his men laid the foundations of his popularity with the Maltese which continued till his death. After the fall of Malta, Ball practically retired from the service, in spite of Nelson’s urgent entreaty that he should continue afloat, and from 1801 (when he was made a baronet) to 1809 he was governor of Malta, where he endeared himself to the people by his regard for their interests, and his opposition to the policy of treating the island as a conquered dependency. His friendship with Lord Nelson, whose letters prove his high regard for him, was only broken by death. Ball died on the 20th of October 1809 and was buried in Malta. Sir Alexander Ball was kind to Coleridge and is highly praised by him in The Friend, ” The Third Landing Place.” There are numerous mentions of Ball in Nelson’s Despatches, in Sir H. Nicolas’ edition.

BALL, JOHN (d. 1381), an English priest who took a prominent part in the peasant revolt in 1381. Little is known of his early years, but he lived probably at York and afterwards at Colchester. He gained considerable fame as a preacher by expounding the doctrines of John Wycliffe, but especially by his insistence on the principle of social equality. These utterances brought him into collision with the archbishop of Canterbury, and on three occasions he was committed to prison. He appears also to have been excommunicated, and in 1366 all persons were forbidden to hear him preach. His opinions, however, were not moderated, nor his popularity diminished by these measures, and his words had a considerable effect in stirring up the rising which broke out in June 1381. Ball was then in prison at

Maidstone; but he was quickly released by the Kentish rebels, to whom he preached at Blackheath from the text, ” When Adam delved and Eve span, Who was then a gentleman?” He urged his hearers to kill the principal lords of the kingdom and the lawyers; and he was afterwards among those who rushed into the Tower of London to seize Simon of Sudbury, archbishop of Canterbury. When the rebels dispersed Ball fled to the midland counties, but was taken prisoner at Coventry and executed in the presence of Richard II. on the 15th of July 1381. Ball, who was called by Froissart ” the mad priest of Kent,” seems to have possessed the gift of rhyme. He undoubtedly voiced the feelings of the lower orders of society at that time.

See Thomas Walsingham, Historia Anglicana, edited by -H. T. Riley (London, 1863-1864); Henry Knighton, Chronicon, edited • by J. R. Lumby (London, 1889-1895); Jean Froissart, Chroniques, edited by S. Luce and G. Raynaud (Paris, 1 869-1 897); C. E. Maurice, Lives of English Popular Leaders in the Middle Ages (London, 1875) ; C. Oman, The Great Revolt of 1381 (Oxford, 1906).

BALL, JOHN (1585-1640), English puritan divine, was born at Cassington, Oxfordshire, in October 1585. After taking his B.A. degree from St Mary’s Hall, Oxford, in 1608, he went into Cheshire to act as tutor to the children of Lady Cholmondeley. He adopted Puritan views, and after being ordained without subscription, was appointed to the small curacy of Whitmore in Staffordshire. He was soon deprived by John Bridgeman, the high church bishop of Chester, who put him to much suffering. He became a schoolmaster and earned a wide and high reputation for his scholarship and piety. He died on the 20th of October 1640. The most popular of his numerous works was A Short Catechisme, containing all the Principal Grounds of Religion (14 editions before 1632). His Treatise of Faith (1632), and Friendly Trial of the Grounds tending to Separation (1640), the latter of which defines his position with regard to the church, are also valuable.

BALL, JOHN (1818-1889), Irish politician, naturalist and Alpine traveller, eldest son of an Irish judge, Nicholas Ball, was born at Dublin on the 20th of August 1818. He was educated at the Roman Catholic College at Oscott near Birmingham, and at Christ’s College, Cambridge. He showed in early years a taste for natural science, particularly botany; and after leaving Cambridge he travelled in Switzerland and elsewhere in Europe, studying his

favourite pursuits, and contributing papers on botany and the Swiss glaciers to scientific periodicals. In 1846 he was made an assistant poor-law commissioner, but resigned in 1847, and in 1848 stood unsuccessfully as a parlia- mentary candidate for Sligo. In 1849 ne was appointed second poor-law commissioner, but resigned in 1852 and successfully contested the county of Carlow in the Liberal interest. In the House of Commons he attracted Lord Palmerston's attention by his abilities, and in 1885 was made under-secretary for the colonies, a post which he held for two years. At the colonial office he had great influence in furthering the cause of natural science, particularly in connexion with equipment of the Palliser expedition in Canada, and with Sir W. Hooker's efforts to obtain a systematic knowledge of the colonial floras. In 1858 he stood for Limerick, but was beaten, and he then gave up politics and devoted himself to natural history. He was first president of the Alpine Club (founded 1857), and it is for his work as an Aloinist that he is chiefly remembered, his well-known Alpine

Guide (London, 1863-1868) being the result of innumerable climbs and journeys and of careful observation recorded in a clear and often entertaining style. He also travelled in Morocco (1871) and South America (1882), and recorded his observations in books which were recognized as having a scientific value. He died in London on the 21st of October 1889.

BALL, THOMAS (1819-), American sculptor, was born at Charlestown, Massachusetts, on the 3rd of June 1819. He was the son of a house-and-sign-painter, and after starting, self-taught, as a portrait painter he turned his attention in 1 8 5 1 to sculpture, his earliest work being a bust of Jenny Lind. At thirty- five he went to Florence for study; there, with an interval of work in Boston, Massachusetts, in 1857-1865, he remained for more than thirty years, being one of the artistic colony which included the Brownings and Hiram Powers. He returned to America in 1897, and lived in Montclair, New Jersey, with a studio in New York City. His work includes many early cabinet busts of musicians (he was an accomplished musician himself, and was the first in America to sing " Elijah "), and later the equestrian statue of Washington in the Boston public gardens, probably his best work; Josiah Quincy in City Hall Square, Boston; Charles Sumner in the public gardens of Boston; Daniel Webster in Central Park, New York City; the Lincoln Emancipation group at Washington; Edwin Forrest as " Coriol- anus," in the Actors' Home, Philadelphia, and the Washington monument in Methuen,

Massachusetts. His work has had a marked influence on monumental art in the United States and especially in New England. In 1891 he published an auto- biographical volume, My Three Score Years and Ten.

BALL (in Mid. Eng. bai; the word is probably cognate with " bale," Teutonic in origin, cf. also Lat. follis, and Gr. waXka.), any rounded body, particularly one with a smooth surface, whether used for games, as a missile, or applied to such rounded bodies as the protuberance at the root of the thumb or the big toe, to an enarthrosis, or " ball socket " joint, such as that of the hip or shoulder, and the like. A ball, as the essential feature in nearly every form of game requiring physical exertion, must date from the very earliest times. A rolling object appeals not only to a human baby but to a kitten and a puppy. Some form of game with a ball is found portrayed on Egyptian monuments, and is played among the least advanced of savage tribes at the present day. In Homer, Nausicaa was playing at ball with her maidens when Odysseus first saw her in the land of the Phaeacians (Od. vi. 100). And Halios and Laodamas performed before Alcinous and Odysseus with ball play, accompanied with dancing (Od. viii. 370). The Hebrews, the least athletic of races, have no mention of the ball in their scriptures. Among the Greeks games with balls (a < £cupaivtv8a would seem to be a game of catch played by two or more, where feinting is. used as a test of quickness and skill. Pollux (i. x. 104) mentions a game called emaKvpos, which has often been looked on as the origin of football. It seems to have been played by two sides, arranged in lines; how far there was any form of " goal " seems uncertain. Among the Romans there appear to have been three types or sizes of ball, the pila, or small ball, used in catching games, the paganica, a heavy ball stuffed with feathers, and the follis, a leather ball filled with air, the largest of the three. This was struck from player to player, who wore a kind of gauntlet on the arm. There was a game known as trigon, played by three players standing in

the form of a triangle, and played with the foliis, and also one known as harpastum, which seems to imply a " scrimmage " among several players for the ball. 1 These games are known to us through the Romans, though the names are Greek. The various modern games played with a ball or balls and subject to rules are

treated under their various names, such as polo, cricket, football, &c.

From Fr. bal, bailer, to dance (late Lat. ballare, and hence connected with ” ballad,” ” ballet “) comes ” ball,” meaning a dance, and especially a social gathering of people for the purpose of dancing.

BALLADE, the technical name of a complicated and fixed form of verse, arranged on a precise system, and having nothing in common with the word ballad, except its derivation from the same Low Latin verb, ballare, to dance. In the 14th and -15th centuries it was spelt balade. In its regular conditions a ballade consists of three stanzas and an envoi; there is a refrain which is repeated at the close of each stanza and of the envoi. The entire poem should contain but three or four rhymes, as the case may be, and these must be reproduced with exactitude in each section. These rules were laid down by Henri de Croi, whose V Art el science de rhetorique was first printed in 1493, and he added that if the refrain consists of eight syllables, the ballade must be written in hui tains (eight-line stanzas), if of ten syllables in dizains (ten-line), and so on. The form can best be studied in an example, and we quote, as absolutely faultless in execution, the famous ” Ballade aux Enfants Perdus,” composed by Theodore de Banville in 1861 : —

. ” Je le sais bien que Cy there est en deuil!

Que son jardin, soufflete par l’erage, O mes amis, n’est plus qu’un sombre ecueil

Agonisant sous le soleil sauvage.

La solitude habite son rivage. Qu’importe! allons vers les pays fictifs! Cherchons la plage ou nos desirs oisifs

S’abreuveront dans le sacre mystere Fait pour un chceur d’esprits contemplatifs:

Embarquons-nous pour la belle Cythere,

” La grande mer sera notre cercueil ;

Nous servirons de proie au noir naufrage, Le feu du ciei punira notre orgueil

Et l'aiguillon nous garde son outrage.

Qu'importe! allons vers le clair paysage! Malgre la mer jalouse et les recifs, Venez, portons comme des fugitifs,

Loin de ce monde au souffle deletere. Nous dont les cceurs sont des ramiers plaintifs,

Embarquons-nous pour la belle Cythere.

" Des serpents gris se trainent sur le seuil

Ou souriait Cypris, la chere image Aux tresses d'or, la vierge au doux accueil!

Mais les Amours sur le plus haut cordage

Nous chantent l'hymne adore du voyage. Heros caches dans ces corps maladifs, Fuyons, partons sur nos legers esquifs,

Vers le divin bocage ou la panthere Pleure d'amour sous les rosiers lascifs:

Embarquons-nous pour la belle Cythere.

Envoi. " Rassasions d'azur nos yeux pensifs! Oiseaux chanteurs, dans la brise expansifs,

Ne souillons pas nos ailes sur la terre. Volons, charmes, vers les dieux primitifs! Embarquons-nous pour la belle Cythere."

This is the type of the ballade in its most elaborate and highly-finished form, which it cannot be said to have reached until the 14th century. It arose from the canzone de ballo of the Italians, but it is in Provencal literature that the ballade first takes a modern form. It was in France, however, and not until the reign of Charles V., that the ballade as we understand it began to flourish; instantly it became popular, and in a few years the out-put of these poems was incalculable. Machault, Froissart, Eustache Deschamps and Christine de Pisan were among the poets who cultivated the ballade most abundantly. Later, those

1 Martial (iv. 19. 6) calls the harpastum, pulverulentum, implying that it; involves a considerable amount of exertion.

of Alain Chartier and Henri Baude were famous, while the form was chosen by Francois Villon for some of the most admirable

and extraordinary poems which the middle ages have handed down to us. Somewhat later, Clement Marot composed ballades of great precision of form, and the fashion culminated in the 17 th century with those of Madame Deshoulieres, Sarrazin, Voiture and La Fontaine. Attacked by Moliere, and by Boileau, who wrote

" La ballade asservie a ses vieilles maximes, Souvent doit tout son lustre au caprice des rimes,"

the ballade went entirely out of fashion for two hundred years, when it was resuscitated in the middle of the 19th century by Theodore de Banville, who published in 1873 a volume of Trente-six ballades joyeuses, which has found many imitators. The ballade, a typically French form, has been extensively employed in no other language, except in English. In the 15th and 16th centuries many ballades were written, with more or less close attention to the French rules, by the leading English poets, and in particular by Chaucer, by Gower (whose surviving ballades, however, are all in French) and by Lydgate. An example from Chaucer will show that the type of strophe and rhyme arrangement was in medieval English: —

" Madame, ye been of all beauty shrine

As far as circled is the mappemound ; For, as the crystal, glorious ye shine,

And like ruby been your cheekes round.

Therewith ye been so merry and so jocund That at a revel when that I see you dance,

It is an oinement unto my wound, Though ye to me ne do no daliance.

" For though I weep of teares full' a tine [cask] ,

Yet may that woe my hearte not confound; Your seemly voice, that ye so small out-twine,

Maketh my thought in joy and bliss abound.

So courteously I go, with love bound, That to myself I say, in my penance,

Sufficeth me to love you, Rosamound, Though ye to me ne do no

daliance.

” Was never pike wallowed in galantine,

As I in love am wallowed and y-wound ; For which full oft I of myself divine

That I am true Tristram the second.

My love may not refrayed [cooled down] be nor afound I burn ay in an amorous pleasance. [foundered] ;

Do what you list, I will your thrall be found, Though ye to me ne do no daliance.”

The absence of an envoi will be noticed in Chaucer’s, as in most of the medieval English ballades. This points to a relation with the earliest French form, in its imperfect condition, rather than with that which afterwards became accepted. But a ballade without an envoi lacks that section whose function is to tie together the rest, and complete the whole as a work of art. After the 1 6th century original ballades were no more written in English until the latter part of the 19th, when they were re-introduced, almost simultaneously, by Algernon Charles Swinburne, Austin Dobson, Andrew Lang, Edmund Gosse and W.E.Henley; but D. G. Rossetti’s popular translation of Villon’s ” Ballade of Fair Ladies ” may almost be considered an original poem, especially as it entirely disregards the metrical rules of the ballades. Mr. Dobson’s ” The Prodigals ” (1876) was one of the earliest examples of a correct English specimen. In 1880 Mr Lang published a volume of Ballades in Blue China, which found innumerable imitators. The modern English ballades have been, as a rule, closely modelled on the lines laid down in the 15th century by Henri de Croi. With the exception of the sonnet, the ballade is the noblest of the artificial forms of verse cultivated in English literature. It lends itself equally well to pathos and to mockery, and in the hands of a competent poet produces an effect which is rich in melody without seeming fantastic or artificial. (E. G.)

BALLADS. The word ” ballad ” is derived from the O. Fr. bailer, to dance, and originally meant a song sung to the rhythmic movement of a dancing chorus. Later, the word, in the form of ballade (q.v.), became the technical term for a particular form of old-fashioned French poetry, remarkable for its involved and

recurring rhymes. ” Laisse moi aux Jeux Floraux de Toulouse toutes ces vieux poesies Francoises comme ballades,” says Joachim du Bellay in 1550; and Philaminte, the lady pedant of Moliere’s Femmes Savantes, observes —

” La ballade, a mon gout, est une chose fade, Ce n’en est plus la mode, elle sent son vieux temps.”

In England the term has usually been applied to any simple tale told in simple verse, though attempts have been made to confine it to the subject of this article, namely, the literary form of popular songs, the folk-tunes associated with them being treated in the article Song. By popular songs we understand what the Germans call Volkslieder, that is, songs with words composed by members of the people, for the people, handed down – by oral tradition, and in style, taste and even incident, common to the people in all European countries. The beauty of these purely popular ballads, their directness and freshness, has made them admired even by the artificial critics of the most artificial periods in literature. Thus Sir Philip Sydney confesses that the ballad of Chevy Chase, when chanted by ” a blind crowder,” stirred his blood like the sound of trumpet. Addison devoted two articles in the Spectator to a critique of the same poem. Montaigne praised the naivete of the village carols; and Malherbe preferred a rustic chansonnette to all the poems of Ronsard. These, however, are rare instances of the taste for popular poetry, and though the Danish ballads were collected and printed in the middle of the 16th century, and some Scottish collections date from the beginning of the 18th, it was not till the publication of Allan Ramsay’s Evergreen and Tea Table Mis- cellany, and of Bishop Percy’s Reliques (1765), that a serious effort was made to recover Scottish and English folk-songs from the recitation of the old people who still knew them by heart. At the time when Percy was editing the Reliques, Madame de Chenier, the mother of the

celebrated French poet of that name, composed an essay on the ballads of her native land, modern Greece; and later, Herder and Grimm and Goethe, in Germany, did for the songs of their country what Scott did for those of Liddesdale and the Forest. It was fortunate, perhaps, for poetry, though unlucky for the scientific study of the ballads, that they were mainly regarded from the literary point of view. The influence of their artless melody and straightforward diction may be felt in the lyrics of Goethe and of Coleridge, of Words- worth, of Heine and of Andre Chenier. Chenier, in the most affected age even of French poetry, translated some of the Romaic ballads; one, as it chanced, being almost identical with that which Shakespeare borrowed from some English reciter, and put into the mouth of the mad Ophelia. The beauty of the ballads and the interest they excited led to numerous forgeries and modern interpolations, which it is seldom difficult to detect with certainty. Editors could not resist the temptation to interpolate, to restore, and to improve the fragments that came in their way. The marquis de la Villemarque, who first drew attention to the ballads of Brittany, is not wholly free from this fault. Thus a very general scepticism was awakened, and when questions came to be asked as to the date and authorship of the Scottish traditional ballads, it is scarcely to be wondered at that Dr Chambers attributed most of them to the accomplished Lady Wardlaw, who lived in the middle of the 18th century.

The vexed and dull controversy as to the origin of Scottish folk-songs was due to ignorance of the comparative method, and of the ballad literature of Europe in general. The result of the discussion was to leave a vague impression that the Scottish ballads were perhaps as old as the time of Dunbar, and were the production of a class of professional minstrels. These minstrels are a stumbling-block in the way of the student of the growth of ballads. The domestic annals of Scotland show that her kings used to keep court-bards, and also that strollers, jongleurs, as they were called, went about singing at the doors of farm-houses and in the streets of towns. Here were two sets of minstrels who had apparently left no poetry; and, on the other side, there was a number of ballads that claimed no author. It was the easiest and most satisfactory inference that the courtly minstrels made the verses, which the wandering crowders

imitated or corrupted. But this theory fails to account, among other things, for the universal sameness of tone, of incident, of legend, of primitive poetical formulae, which the Scottish ballad

possesses, in common with the ballads of Greece, of France, of Provence, of Portugal, of Denmark and of Italy. The object, therefore, of this article is to prove that what has long been acknowledged of nursery tales, of what the Germans call M birchen, namely, that they are the immemorial inheritance at least of all European peoples, is true also of some ballads. Their present form, of course, is relatively recent: in centuries of oral recitation the language altered automatically, but the stock situations and ideasof many romantic ballads are of dateless age and world-wide diffusion. The main incidents and plots of the fairy tales of Celts and Germans and Slavonic and Indian peoples, their unknown antiquity and mysterious origin, are universally recog- nized. No one any longer attributes them to thiSor that author, or to this or that date. The attempt to find date or author for a genuine popular song is as futile as a similar search in the case of a Marchen. It is to be asked, then, whether what is confessedly true of folk-tales, — of such stories as the Sleeping Beauty and Cinderella, — is true also of folk-songs. Are they, or have they been, as universally sung as the fairy tales have been narrated? Do they, too, bear traces of the survival of primitive creeds and primitive forms of consciousness and of imagination? Are they, like Marchen, for the most part, little influenced by the higher religions, Christian or polytheistic? Do they turn, as Marchen do, on the same incidents, repeat the same stories, employ the same machinery of talking birds and beasts? Lastly, are any specimens of ballad literature capable of being traced back to extreme antiquity? It appears that all these questions may be answered in the affirmative; that the great age and universal diffusion of the ballad may be proved; and that its birth, from the lips and heart of the people, may be contrasted with the origin of an artistic poetry in the demand of an aristocracy for a separate epic literature destined to be its own possession, and to be the first development of a poetry of personality, — a record of individual passions and emotions. After bringing forward examples of the identity of features in European ballad poetry, we shall proceed to show that the earlier genre of ballads with refrain sprang from the same primitive custom of dance, accom- panied by improvised song, which still exists in Greece and Russia, and even in valleys of the Pyrenees.

There can scarcely be a better guide in the examination of the notes or marks of popular poetry than the instructions which M. Ampere gave to the committee appointed in 1852-1853 to search for the remains of ballads in France. M. Ampere bade the

collectors look for the following characteristics: — ” The use of assonance in place of rhyme, the brusque character of the recital, the textual repetition, as in Homer, of the speeches of the persons, the constant use of certain numbers, — as three and seven,- — and the representation of the commonest objects of every-day life as being made of gold and silver.” M. Ampere might have added that French ballads would probably employ a ” bird chorus,” the use of talking-birds as messengers; that they would repeat the plots current in other countries, and display the same non-Christian idea of death and of the future world (see ” The Lyke-wake Dirge “), the same ghostly superstitions and stories of metamorphosis, and the same belief in elves and fairies, as are found in the ballads of Greece, of Provence, of Brittany, Denmark and Scotland. We shall now examine these supposed common notes of all genuine popular song, supplying a few out of the many instances of curious identity. As to brusqueness of recital, and the use of assonance instead of rhyme, as well as the aid to memory given by reproducing speeches verbally, these are almost unavoidable in all simple poetry preserved by oral tradition. In the matter of recur- ring numbers, we have the eternal —

” Trois belles filles *

L’y en a’z une plus belle que le jour,”

who appear in old French ballads, as well as the ” Three Sailors,” whose adventures are related in the Lithuanian and Provencal originals of Thackeray’s Little Billee. Then there is ” the league,

the league, the league, but barely three,” of Scottish ballads; and the rptd 7roi > Acuad, three golden birds, which sing the prelude to Greek folk-songs, and so on. A more curious note of primitive poetry is the lavish and reckless use of gold and silver. H. F. Tozer, in his account of ballads in the Highlands of Turkey, remarks on this fact, and attributes it to Eastern influences. But the horses’ shoes of silver, the knives of fine gold, the talking ” birds with gold on their wings,” as in Aristophanes, are common to all folk-song. Everything almost is gold in the Kalewala (q.v.), a so-called epic formed by putting into juxtaposition all the popular songs of Finland. Gold is used as freely in the ballads,

real or spurious, which M. Verkovitch has had collected in the wilds of Mount Rhodope. The Captain in the French song is as lavish in his treatment of his runaway bride,— ” Son amant l’habille, • Tout en or et argent “;

and the rustic in a song from Poitou talks of his faucille d’or, just as a variant of Hugh of Lincoln introduces gold chairs and tables. Again, when the lover, in a ballad common to France and to Scotland, cuts the winding-sheet from about his living bride — ” il tira ses ciseaux d’or fin.” If the horses of the Klephts in Romaic ballads are gold shod, the. steed in Willie’s Lady is no less splendidly accoutred, —

” Silver shod before, And gowden shod behind.”

Readers of Homer, and of the Chanson de Roland, must have observed the same primitive luxury of gold in these early epics, in Homer reflecting perhaps the radiance of the actual ” golden Mycenae.”

Next as to talking-birds. These are not so common as in Mdrchen, but still are very general, and cause no surprise to their human listeners. The omniscient popinjay, who ” up and spoke ” in the Border minstrelsy, is of the same family of birds as those that, according to Talvj, pervade Servian song; as the rpia ‘irov\aiaa which introduce the story in the Romaic ballads; as the wise birds whose speech is still understood by exceptionally gifted Zulus; as the wicked dove that whispers temptation in the sweet French folk-song; as the ” bird that came out of a bush, on water for to dine,” in the Water o’ Wearies Well.

In the matter of identity of plot and incident in the ballads of various lands, it is to be regretted that no such comparative tables exist as Von Hahn tried, not very exhaustively, to make of the ” story-roots ” of Mdrchen. Such tables might be com- piled from the learned notes and introductions of Prof. Child to his English and Scottish Popular Ballads (1898). A common plot is the story of the faithful leman, whose lord brings home ” a braw new bride, ” and who recovers his affection at the eleventh hour. In Scotland this is the ballad of Lord Thomas and Fair Annie; in Danish it is Skiaen Anna. It occurs twice in M. Fauriel’s collection of Romaic songs. Again, there is the familiar ballad about a girl who pretends to be dead, that she may be borne on a bier to meet her lover. This occurs not only in Scotland, but in the popular songs of Provence (collected by Damase Arbaud) and in those of

Metz (Puymaigre), and in both countries an incongruous sequel tells how the lover tried to murder his bride, and how she was too cunning, and drowned him. Another familiar feature is the bush and briar, or the two rose trees, which meet and plait over the graves of unhappy lovers, so that all passers-by see them, and say in the Provencal, — ” Diou ague l’amo Des paures amourous.”

Another example of a very widespread theme brings us to the ideas of the state of the dead revealed in folk-songs. The Night Journey, in M. Fauriel’s Romaic collection, tells how a dead brother, wakened from his sleep of death by the longing of love, bore his living sister on his saddle-bow, in one night, from Bagdad to Constantinople. In Scotland this is the story of Proud Lady Margaret; in Germany it is the song which Burger converted into Lenore; in Denmark it is Aage und Else; in Brittany the dead foster-brother carries his sister to the apple close of the Celtic paradise (Barzaz Breiz). Only in Brittany

do the sad-hearted people think of the land of death as an island of Avalon, with the eternal sunset lingering behind the flowering apple trees, and gleaming on the fountain of forgetfulness. In Scotland the channering worm doth chide even the souls that come from where, ” beside the gate of Paradise, the birk grows fair enough.” The Romaic idea of the place of the dead, the garden of Charon, whence ” neither in spring or summer, nor when grapes are gleaned in autumn, can warrior or maiden escape,” is likewise pre-Christian. In Provencal and Danish folk-song, the cries of children ill-treated by a cruel step-mother awaken the departed mother, —

” ‘Twas cold at night and the bairnies grat, The mother below the mouls heard that.”

She reappears in her old home, and henceforth, ” when dogs howl in the night, the step-mother trembles, and is kind to the children.” To this identity of superstition we may add the less tangible fact of identity of tone. The ballads of Klephtic exploits in Greece match the Border songs of Dick of the Cow and Kinmont Willie. The same simple delight of living animates the short Greek Scolia and their counterparts in France. Everywhere in these happier climes, as in southern Italy, there are snatches of popular verse that make but one song of rose trees, and apple blossom, and the nightingale that sings for maidens loverless, —

” II ne chante pas pour moi, J’en ai un, Dieu merci,”

says the gay French refrain.

It would not be difficult to multiply instances of resemblance between the different folk-songs of Europe; but enough has, perhaps, been said to support the position that some of them are popular and primitive in the same sense as Mdrchen. They are composed by peoples of an early stage who find, in a natural improvisation, a natural utterance of modulated and rhythmic speech, the appropriate relief of their emotions, in moments of high- wrought feeling or on solemn occasions. ” Poesie ” (as Puttenham well says in his Art of English Poesie, 1589) “is more ancient than the artificiall of the Greeks and Latines, and used of the savage and uncivill, who were before all science and civilitie. This is proved by certificate of mer- chants and travellers, who by late navigations have surveyed the whole world, and discovered large countries, and wild people strange and savage, affirming that the American, the Perusine, and the very Canniball do sing and also say their highest and holiest matters in certain riming versicles.” In the same way Aristotle, discoursing of the origin of poetry, says {Poet. c. iv.), eyhvrjaav rtjv ■wobqoiv «k t&v avToaxˆSiaffixarwv. M. de la Villemarque in Brittany, M. Pitre in Italy, Herr Ulrich in Greece, have described the process of improvisation, how it grows out of the custom of dancing in large bands and accom- panying the figure of the dance with song. ” If the people,” says M. Pitre, ” find out who is the composer of a canzone, they will not sing it.” Now in those lands where a blithe peasant life still exists with its dances, like the kolos of Russia, we find ballads identical in many respects with those which have died out of oral tradition in these islands. It is natural to conclude that originally some of the British ballads too were first impro- vised, and circulated in rustic dances. We learn from M. Bujeaud and M. de Puymaigre in France, that all ballads there have their air or tune, and that every dance has its own words, for if a new dance comes in, perhaps a fashionable one from Paris, words are fitted to it. Is there any trace of such an operatic, lyrical, dancing peasantry in austere Scotland ? We find it in Gawin Douglas’s account of —

” Sic as we clepe wenches and daraosels, In’gersy greens, wandering by spring wells, Of bloomed branches, and flowers white and red, Plettand their lusty chaplets for their head, Some sang ring-sangs, dances, ledes, and rounds.”

Now, ring-sangs are ballads, dancing songs; and Young Tamlane, for instance, was doubtless once danced to, as we know it

possessed an appropriate air. Again, Fabyan, the chronicler (quoted by Ritson) says that the song of triumph over Edward II. , " was after many days sung in dances, to the carols of the

maidens and minstrels of Scotland." We might quote the Compldynl of Scotland to the same effect. " The shepherds, and theii wyvis sang mony other melodi sangs, . . . than efter this sueit celestial harmony, tha began to dance in ane ring." It is natural to conjecture that, if we find identical ballads in Scotland, and in Greece and Italy, and traces of identical customs — customs crushed by the Reformation, by Puritanism, by modern so-called civilization, — the ballads sprang out of the institution of dances, as they still do in warmer and pleasanter climates. It may be supposed that legends on which the ballads are composed, being found as they are from the White Sea to Cape Matapan, are part of the stock of primitive folk-lore. Thus we have an immemorial antiquity for the legends, and for the lyrical choruses in which their musical rendering was improvised. We are still at a loss to discover the possibly mythological germs of the legends; but, at all events, some ballads may be claimed as distinctly popular, and, so to speak, impersonal in matter and in origin. It would be easy to show that survivals out of this stage of inartistic lyric poetry linger in the early epic poetry of Homer and in the French epopSes, and that the Greek drama sprang from the sacred choruses of village vintagers. In the great early epics, as in popular ballads, there is the same directness and simplicity, the same use of recurring epithets, the " green grass," the " salt sea," the " shadowy hills," the same repetition of speeches and something of the same barbaric profusion in the use of gold and silver. But these resemblances must not lead us into the mistake of supposing Homer to be a collection of ballads, or that he can be properly translated into ballad metre. The Iliad and the Odyssey are the highest form of an artistic epic, not cqmposed by piecing . together ballads, but developed by a long series of noble &.0180I, for the benefit of the great houses which entertain them, out of the method and materials of popular song.

We have here spoken mainly of romantic ballads, which retain in the refrain a vestige of the custom of singing and dancing; of a period when " dance, song and poetry itself began with a

communal consent ” (Gummere, The Beginnings .of Poetry, p. 93, 1901). The custom by which a singer in a dancing-circle chants a few words, the dancers chiming in with the refrain, is found by M. Junod among the tribes of Delagoa Bay (Junod, Chantes et contes des Ba Ronga, 1897). Other instances are the Australian song-dances (Siebert, in Howitt’s Native Tribes of South-East Australia, Appendix 1904; and Dennett, Folk-Lore of the Fiort). We must not infer that even among the aborigines of Australia song is entirely ” communal.” Known men, inspired, they say, in dreams, or by the All Father, devise new forms of song with dance, which are carried all over the country; and Mr Howitt gives a few examples of individual lyric. The history of the much exaggerated opinion that a whole people, as a people, composed its own ballads is traced by Prof. Gummere in The Beginnings of Poetry, pp. 1 16-163. Some British ballads retain traces of the early dance-song, and most are so far ” com- munal ” in that, as they stand, they have been modified and interpolated by many reciters in various ages, and finally (in The Border Minstrelsy) by Sir Walter Scott, and by hands much weaker than his (see The Young Tamlane). There are cases in which the matter of a ballad has been derived by a popular singer from medieval literary romance (as in the Arthurian ballads), while the author of the romance again usually borrowed, like Homer in the Odyssey, from popular Mdrchen of dateless antiquity. It would be an error to suppose that most romantic folk-songs are vulgarizations of literary romance — a view to which Mr Courthope, in his History of English Poetry, and Mr Henderson in The Border Minstrelsy (1902), incline — and the opposite error would be to hold that this process of borrowing from and vulgarization of literary medieval romance never occurred. A good illustration of the true state of the case will be found in Child’s introduction to the ballad of Young Beichan. Gaston Paris, a great authority, holds that early popular poetry is ” improvised and contemporary with its facts ” (Histoire poelique de Charlemagne). If this dictum be applied to such ballads as ” The Bonny Earl o’ Murray,” ” Kinmont

Willie,” ” Jamie Telfer ” and ” Jock o’ the Side,” it must appear that the contemporary poets often knew little of the events and knew that little wrong. We gather the true facts from contemporary letters and despatches. In the ballads the facts are confused and distorted to such a degree that we must suppose them to have been composed in a later generation on the basis of erroneous oral tradition; or, as in the case of The Queen’s Marie,

to have been later defaced by the fantastic interpolations of reciters. To prove this it is only necessary to compare the historical Border ballads (especially those of 1 595-1600) with Bain's Border Papers (1894-1896). Even down to 1750, the ballads on Rob Roy's sons are more or less mythopoeic. It seems probable that the existing form of most of our border ballads is not earlier than the generation of 1603-1633, after the union of the crowns. Even when the ballads have been taken from recitation, the reciter has sometimes been inspired by a " stall copy," or printed broadsheet.

Authorities, — The indispensable book for the student of ballads is Child's English and Scottish Popular Ballads, published in 1897- 1898 (Boston, U.S.A.). Professor Child unfortunately died without summing up his ideas in a separate essay, and they must be sought in his introductions, which have never been analysed. He did not give much attention to such materials for the study of ancient poetry as exist copiously in anthropological treatises. In knowledge of the ballads of all European peoples he was unrivalled, and his biblio- graphy of collections of ballads contains some four hundred titles, (Child, vol. v.. pp. 455-468). ' The most copious ballad makers have been the Scots and English, the German, Slavic, Danish, French and Italian peoples; for the Gaelic there is but one entry, Campbell of Islay's Lea har na Feinne (London, 1872). The general biblio- graphy occupies over sixty pages, and to this the reader must be referred, while Prof. Gummere's book, The Beginnings of Poetry, is an adequate introduction to the literature, mainly continental, of the ballad question, which has received but scanty attention in England. For the relation of ballad to epic there is no better guide than Comparetti's The Kaiewala, of which there is an English translation. For purely literary purposes the best collection of ballads is Scott's Border Minstrelsy in any complete edition. The best critical modern edition is that of Mr T. F. Henderson; his theory of ballad origins is not that which may be gathered from Professor Child's introductions. (A. L.)

BALLANCE, JOHN (1830-1893), New Zealand statesman, eldest son of Samuel Ballance, farmer, of Glenavy, Antrim, Ulster, was born on the 27th of March 1839. He was educated at a national school, and, on leaving, was apprenticed to an ironmonger at Belfast. He became a clerk in a wholesale ironmonger's house in Birmingham, and migrated to New Zealand, intending to start in business there as a small jeweller. After settling at Wanganui, however, he took an opportunity, soon offered, of founding a

newspaper, the Wanganui Plerald, of which he became editor and remained chief owner for the rest of his life. During the fighting with the Maori chief Titokowaru, in 1867, Ballance was concerned in the raising of a troop of volunteer horse, in which he received a ■ commission. Of this he was deprived owing to the appearance in his newspaper of articles criticizing the management of the campaign. He had, however, behaved well in the field, and, in spite of his dismissal, was awarded the New Zealand war medal. He entered the colony's parliament in 1875 and, with one interval (1881-1884), sat there till his death. Ballance was a member of three ministries, that of Sir George Grey (1877-1879) ; that of Sir Robert Stout (1884- 1887); and that of which he himself was premier (1891-1893). His alliance with Grey ended with a notorious and very painful quarrel. In the Stout government his portfolios were those of lands and native affairs; but it was at the treasury that his prudent and successful finance made the chief mark. As native minister his policy was pacific and humane, and in his last years he contrived to adjust equitably certain long-standing difficulties relating to reserved lands on the west coast of the North Island. He was resolutely opposed to the sale of crown lands for cash, and advocated with effect their disposal by perpetual lease. His system of state-aided " village settlements," by which small farms were allotted to peasants holding by lease from the crown, and money lent them to make a beginning of building and cultivation, has been on the whole successful. To Ballance, also, was due the law reducing the life-tenure of legislative councillors

to one of seven years. He was actively concerned in the advocacy of woman suffrage. But his best known achievement was the imposition, in 1891, of the progressive land-tax and progressive income-tax still levied in the colony. As premier he brought together the strong experimental and progressive party which long held office in New Zealand. In office he showed debating power, constructive skill and tact in managing men; but in 1893, at the height of his success and popularity, he died at Wellington of an intestinal disease after a severe surgical opera- tion. Quiet and unassuming in manner, Ballance, who was a well-read man, always seemed fonder of his books and his chess- board than of public bustle; yet his loss to New Zealand political life was great. A statue was erected to his memory in front of Parliament House,

Wellington. (W. P. R.)

BALLANCHE, PIERRE SIMON (1776-1847), French philo- sopher of the theocratic school, was born at Lyons. Naturally delicate and highly-strung, he was profoundly stirred by the horrors of the siege of Lyons. His sensitiveness received a second blow in an unsuccessful love affair, which, however, he bore with fortitude. He devoted himself to an examination of the nature of society and his work brought him into connexion with the literary circle of Chateaubriand and Madame Recamier. His great work is the Palingtne'sie, which is divided into three parts, Uorphie, La formule, La ville des expiations. The first deals with the prehistoric period of the world, before the rise of religion; the second was to be an endeavour to deduce a universal law from known historical facts; the third to sketch the ultimate state of perfection to which humanity is moving. Of these the first alone was completed, but fragments of the other parts exist. Perhaps the most valuable part, of the work is the general introduction. His last work, Vision d'HSbal, intended as part of the Ville des expiations, describes the chief of a Scottish clan, who, gifted with second sight, gives semi-prophetic utter- ances as to the course of world-history. In 1841 Ballanche was elected a member of the French Academy. He died in 1847. A collected edition of his works in nine volumes was begun in 1830. Four only appeared. In 1833 a second edition in six volumes was published. As a man, Ballanche was warm-hearted and enthusiastic, but he was endowed with a too-vivid imagina- tion and his strange thoughts are expressed in equally bizarre language. To give a connected account of his views is difficult; their full development should be studied in relation with his life-history, the stages of which are curiously parallel to his theory of the progress of man, the fall, the trial, the perfection.

As has been said, he belonged to the theocratic school, who, in opposition to the rationalism of the preceding age, emphasized the principle of authority, placing revelation above individual reason, order above freedom and progress. But Ballanche made a sincere endeavour to unite in one system what was valuable in the opposed modes of thinking. He held with the theocratists that individualism was an impracticable view; man, according to him, exists only in and through society. He agreed further with them that the origin of society was to be explained, not by human desire and efforts, but by a direct revelation from God. Lastly, with De Bonald, he reduced the problem of the origin of society to that of the origin of language, and held that language was a

divine gift. But at this point he parts company with the theocratists, and in this very revelation of lan- guage finds a germ of progress. Originally, in the primitive state of man, speech and thought are identical; but gradually the two separate; language is no longer only spoken, it is also written and finally is printed. Thus the primitive unity is broken up; the original social order which co-existed with, and was dependent on it, breaks up also. New institutions spring up, upon which thought acts, and in and through which it even draws nearer to a final unity, a palingenesis. The volition of primitive man was one with that of God but it becomes broken up into separate volitions which oppose themselves to the divine will, and through the oppositions and trials of this world work onward to a second and completer harmony. Humanity, therefore, passes through three stages, the fall from perfection, the period of trial and the final re-birth or return to perfection. In the dim records of mythical times may be traced the obscure outlines of primitive society and of its fall. Actual history exhibits the conflict of two great principles, which may be said to be realized in the patricians and plebeians of Rome. Such a distinction of caste is regarded by Ballanche as the original state of historical society; and history, as a whole, he considers to have followed the same course as that taken by the Roman plebs in its attempts to attain equality with the patriciate. On the events through which the human race is to achieve its destiny Ballanche

gives few intelligible hints. The sudden flash which disclosed to the eyes of Hebal the whole epic of humanity cannot be reproduced in language trammelled by time and space. Scattered throughout the works of Ballanche are many valuable ideas on the connexion of events which makes possible a philosophy of history; but his own theory does not seem likely to find more favour than it has already received. Besides the Palingenesie, Ballanche wrote a poem on the siege at Lyons (unpublished) ; Du sentiment considers dans la litterature et dans les arts (1801); Antigone, a prose poem (1814); Essai sur les institutions sociales (1818), intended as a prelude to his great work; Le Vieillard et le jeune homme, a philosophical dialogue (1819); L'Homme sans nom, a novel (1820).

See Ampere, Ballanche (Paris, 1848) ; Ste Beuve, Portraits contemporains, vol. ii. ; Damiron, Philosophie de XIX' siecle; Eugene Blum, " Essai sur Ballanche " (in Critique Philos., 30th June 1887) ; Gaston Frainnet, Essai sur la philos. de P. S. Ballanche (Paris, 1903, containing unpublished letters, portraits

and full bibliography); C. Huit, La Vie et les ceuvres de Ballanche (1904). An admirable analysis of the works composing the Palinginesie is given by Barchou, Revue des deux mondes (1831), t. 2. pp. 410-456.

BALLANTINE, WILLIAM (1812-1887)/ English serjeant-at- law, was born in London on the 3rd of January 181 2, being the son of a London police-magistrate. He was educated at St Paul's school, and called to the bar in 1834. He began in early life a varied acquaintance with dramatic and literary society, and his experience, combined with his own pushing character and acute intellect, helped to obtain for him very soon a large practice, particularly in criminal cases. He became known as a formidable cross-examiner, his great rival being Serjeant Parry (1816-1880). The three great cases of his career were his successful prosecution of the murderer Franz Miiller in 1864, his skilful defence of the Tichborne claimant in 187 1 and his defence of the gaekwar of Baroda in 1875, his fee in this last case being one of the largest ever known. Ballantine became a serjeant-at-law in 1856. He died at Margate on the 9th of January 1887, having previously published more than one volume of reminiscences. Serjeant Ballantine 's private life was decidedly Bohemian; and though he earned large sums, he died very poor. . BALLANTYNE, ROBERT MICHAEL (1825-1894), Scottish writer of fiction, was born at Edinburgh on the 24th of April 1825, and came of the same family as the famous printers and publishers. When sixteen years of age he went to Canada and was for six years in the service of the Hudson's Bay Company. He returned to Scotland in 1847, and next year published his first book, Hudson's Bay: or, Life in the Wilds of North America. For some time he was employed by Messrs Constable, the publishers, but in 1856 he gave up business for the profession of literature, and began the series of excellent stories of adventure for the young with which his name is popularly associated. The Young Fur-Traders (1856), The Coral Island (1857), The World of Ice (1859), Ungava: a Tale of Eskimo Land (1857), The Dog Crusoe (i860), The Lighthouse (1865), Deep Down (1868), The Pirate City (1874), Erling the Bold (1869), The Settler and the Savage (1877), and other books, to the numberof upwards of a hundred, followed in regular succession, his rule being in every case to write as far as possible from personal knowledge of the scenes he described. His stories had the merit of being thoroughly healthy in tone and possessed considerable graphic force. Ballantyne was also no mean artist, and exhibited some of his water-colours at the Royal Scottish

Academy. He lived in later years at Harrow, and died on the 8th of February 1894, at Rome, where he had gone to attempt to shake off the results of overwork. He wrote a volume of Personal Reminiscences of Book-making (1893).

BALLARAT [Ballaarat] and BALLARAT EAST, a city and a town of Grenville county, Victoria, Australia, 74 m. by rail W.N.W. of Melbourne. The city and Ballarat East, separated only by the Yarrowee Creek, are distinct municipalities. Pop. of Ballarat (1901) 25,448, of Ballarat East, 18,262. Ballarat is the second city and the chief gold-mining centre of the state. The alluvial gold-fields were the richest ever opened up, but as these deposits have become exhausted the quartz reefs at deep levels have been exploited, and several mines are worked at depths exceeding 2000 ft. The city is the seat of Anglican and Roman Catholic bishops. It has a number of admirable public buildings, while, among several parks and recreation grounds, mention must be made of the fine botanical garden, 750 acres in extent,

where, in Lake Wendouree, pisciculture is carried on with great success. The school of mines is the most important in Australia and is affiliated to the university of Melbourne. Ballarat is an important railway centre and its industries include woollen-milling, brewing, iron-founding, flour-milling and distilling. Owing to its elevation of 1438 ft. it has an exceptionally cool and healthy climate. Although the district is principally devoted to mining it is well adapted for sheep-farming, and some of the finest wool in the world is produced near Ballarat. The existence of the towns is due to the heavy immigration which followed upon the discovery of the gold-fields in 1851. In 1854, in their resistance of an arbitrary tax, the miners came into armed conflict with the authorities; but a commission was appointed to in- vestigate their grievances; and a charter was granted to the town in 1855. In 1870 Ballarat was raised to the rank of a city.

BALLAST (O. Swed. barlast, perhaps from bar, bare or mere, and last, load), heavy material, such as gravel, stone or metal, placed in the hold of a ship in order to immerse her sufficiently to give adequate stability. In botany ” ballast- plants ” are so-called because they have been introduced into countries in which they are not indigenous through their seeds being carried in such

ballast. A ship ” in ballast ” is one which carries no paying cargo. In modern vessels the place of ballast is taken by water-tanks which are filled more or less as required to trim the ship. The term is also applied to materials like gravel, broken slag, burnt clay, &c, used to form the bed in which the sleepers or ties of a railway track are laid, and also to the sand which a balloonist takes up with him, in order that, by throwing portions of it out of the car from time to time, he may lighten his balloon when he desires to rise to a higher level.

BALLATER (Gaelic for ” the town on a sloping hill “), a village in the parish of Glenmuick, Aberdeenshire, Scotland, 670 ft. above the sea, on the left bank of the Dee, here crossed by a fine bridge, 43! m. ! by rail W. by S. of Aberdeen. It is the terminus of the Deeside railway and the station for Balmoral, 9 m. to the W. Founded in 1770 to provide accommodation for the visitors to the mineral wells of Pannanich, 15 m. to the E., it has since become a popular summer resort. It contains the Albert Memorial Hall and the barracks for the sovereign’s body- guard, used when the king is in residence at Balmoral. Red granite is the chief building material of the houses. Ballatrich farm, where Byron spent part of his boyhood, lies some 4 m. to the E. Ballater has a mean temperature of 44-6° F., and an average annual rainfall of 33-4 in.

BALLENSTEDT, a town of Germany, in the duchy of Anhalt, on the river Getel, 20 m. E. of Quedlinburg by rail. Pop. (1900) 5423. It is pleasantly situated under the north-eastern declivity of the Harz mountains. The inhabitants are mostly engaged in agriculture and there is practically no other industry. The palace of the dukes of Anhalt, standing on an eminence, contains a library and collections of various kinds, including a good picture gallery. It is approached by a fine avenue of trees and is surrounded by a well-wooded park. In the Schlosskirche the grave of Albert the Bear, margrave of Brandenburg (1100- 1170) has been discovered.

BALLET, a performance in which dancing, music and panto-mime are involved. Originally derived from the (Sicilian) Gr. (SaXXtfew, to dance, the word has passed through the Med. Lat. ballare (with ballator as synonymous with saltator) to the Ital. ballare and baUata, to the Fr. ballet, to the O. Eng. word ballette, and to ballad. In O. Fr., according to Rousseau, ballet signifies ” to dance, to sing, to rejoice “; and thus it incorporates three distinct modern words, ” ballet, ball and ballad.” Through the

gradual changes in the amusements of different ages, the meaning of the first two words has at length become limited to dancing, and the third is now confined to singing. But, although ballads are no longer the vocal accom- paniments to dances round the maypole, old ballads are still sung to dance tunes. The present acceptation of the word ballet is-— a theatrical representation in which a story is told only by gesture, accompanied by music, which should be characterized by stronger emphasis than would be employed with the voice. The dancing

should be connected with the story but is more commonly inci- dental. The French word was found to be so comprehensive as to require further definition, and thus the above-described would be distinguished as the ballet d' action or pantomime ballet, while a single scene, such as that of a village festival with its dances, would now be termed a divertissement.

The ballet d'action, to which the changed meaning of the word is to be ascribed, and therewith the introduction of modern ballet, has been generally attributed to the 15th century. Novelty of entertainment was then sought for in the splendid courts of Italy, in order to celebrate events which were thought great in their time, such as the marriages of princes, or the triumphs of their arms. Invention was on the rack for novelty, and the skill of the machinist was taxed to the utmost. It has been supposed that the art of the old Roman pantomimi was then revived, to add to the attractions of court-dances. Under the Roman empire the pantomimi had represented either a mythological story, or perhaps a scene from a Greek tragedy, by mute gestures, while a chorus, placed in the background, sang cantica to narrate the fable, or to describe the action of the scene. The question is whether mute pantomimic action, which is the essence of modern ballet, was carried through those court entertainments, in which kings, queens, princes and princesses, took parts with the courtiers; or whether it is of later growth, and derived from professional dances upon the stage. The former is the general opinion, but the court entertainments of Italy and France were masques or masks which included declamation and song, like those of Ben Jonson with Inigo Jones for the court of James I.

The earliest modern ballet on record was that given by Bergonzio di Botta at Tortona to celebrate the marriage of the duke of Milan in 1489. The ballet, like other forms of dancing, was developed and perfected in France; it is closely associated with the history

of the opera; but in England it came much later than the opera, for it was not introduced until the 18th century, and in the first Italian operas given in London there was no ballet. During the regency of Lord Middlesex a ballet-master was appointed and a corps of dancers formed. The ballet has had three distinct stages in its development. For a long time it was to be found only at the court, when princely entertainments were given to celebrate great occasions. At that time ladies of the highest rank performed in the ballet and spent much time in practising and perfecting themselves for it. Catherine de'Medici introduced these entertainments into France and spent large sums of money on devising performances to distract her son's attention from the affairs of the state. Baltasarini, otherwise known as Beaujoyeulx, was the composer of a famous entertainment given by Catherine in 1581 called the " Ballet Comique de la Reyne." This marks an era in the history of the opera and ballet, for we find here for the first time dance and music arranged for the display of coherent dramatic ideas. Henry IV., Louis XIII. and XIV. were all lovers of the ballet and performed various characters in them, and Richelieu used the ballet as an instrument for the expression of political purposes. Lully was the first to make an art of the composition of ballet music and he was the first to insist on the admission of women as ballet dancers, feminine characters having hitherto been assumed by men dressed as women. When Louis XIV. became too fat to dance, the ballet at court became unpopular and thus was ended the first stage of its development. It was then adopted in the colleges at prize distributions and other occasions, when the ballets of Lully and Quinault were commonly performed. The third period in the history of the ballet was marked by its appear- ance on the stage, where it has remained ever since. It should be added that up till the third period dramatic poems had accom- panied the ballet and the dramatic meaning was helped out with speech and song; but with the advent of the third period speech disappeared and the purely pantomime performance, or ballet d'action, was instituted.

The father of ballet dancing as we know it at the present day was Jean Georges Noverre (q.v.). The ballet d'action was really invented by him; in fact, the ballet has never advanced beyond the stage to which he brought it; it has lather gone back. The

essence of Noverre's theory was that mere display was not enough to ensure interest and life for the ballet; and some years ago Sir Augustus Harris expressed a similar opinion when he was asked wherein lay the reason of the decadence of the modern ballet. Noverre brought to a high degree of perfection the art of present- ing a story by means of pantomime, and he never allowed dancing which was not the direct expression of a particular attitude of mind. Apart from Noverre, the greatest ballet-master was undoubtedly Gaetano Ap'olline Balthazare Vestris (q.v.), who modestly called himself le dieu de la danse, and was, indeed, the finest male dancer that Europe ever produced. Gluck composed Iphig&nie en Aulide in conjunction with Vestris. In 1750 the two greatest dancers of the day performed together in Paris in a ballet-opera called Llandre et Hiro; the dancers were Vestris and Madame Camargo (q.v.), who introduced short skirts in the ballet.

The word " balette " was first used in the English language by Dryden in 1667, and the first descriptive ballet seen in London was The Tavern Bilkers, which was played at Drury Lane in 1702. Since then the ballet in England has been purely exotic and has merely followed on the lines of French develop- ments. The palmy days of the ballet in England were in the first half of the 19th century, when a royal revenue was spent on the maintenance of this fashionable attraction. Some famous dancers of this period were Carlotta Grisi, Mdlle Taglioni (who is said to have turned the heads of an entire generation), Fanny Elssler, Mdlle Cerito, Miss P. Horton, Miss Lucile Grahn and Mdlle Carolina Rosati. In later years Kate Vaughan was a remarkably graceful dancer of a new type in England, and, in Sir Augustus Harris's opinion, she did much to elevate the modern art. She was the first to make skirt-dancing popular, although that achievement will not be regarded as an unmixed benefit by every student of the art. Skirt-dancing, in itself a beautiful exhibition, is a departure from true dancing in the sense that the steps are of little importance in it; and we have seen its development extend to a mere exhibition of whirling draperies under many-coloured lime-lights. The best known of Miss Vaughan's disciples and imitators (each of whom has contributed something to the art on her own account) were Miss Sylvia Grey and Miss Letty Lind. Of the older and classical school of ballet-dancing Adeline Genee became in London the finest exponent. But ballet-dancing, affected by a tendency in modern entertainment to make less and less demands on the in- telligence and intellectual appreciation

of the public, and more and moredemands on the eye — the sense most easily affected— has gradually developed into a spectacle, the chief interest of which is quite independent of dancing. Thousands of pounds are spent on dressing a small army of women who do little but march about the stage and group themselves in accordance with some design of colour and mass; and no more is asked of the intelli- gence than to believe that a ballet dressed, for example, in military uniform is a compliment to or glorification of the army. Only a few out of hundreds of members of the corps de ballet are really dancers and they perform against a background of colour afforded by the majority. It seems unlikely that we shall see any revival of the best period and styles of dancing until a higher standard of grace and manners becomes fashionable in society. With the constantly increasing abolition of ceremony, courtliness of manner is bound to diminish; and only in an atmosphere of ceremony, courtesy and chivalry can the dance maintain itself in perfection.

Literature. — One of the most complete books on the ballet is by the Jesuit, Claude Francois Menestrier, Des ballets anciens et modernes, l2mo (1682). He was the inventor of a ballet for Louis XIV. in 1658; and in his book he analyses about fifty of the early Italian and French ballets. See also Noverre, Lettres sur la danse (1760; new ed. 1804); Castel-Blaze, La Danse et les ballets (1832), and Les Origines de I'opera (1869).

BALL-FLOWER, an architectural ornament in the form of a ball inserted in the cup of a flower, which came into use in the latter part of the 13th, and was in great vogue in the early part of the 14th century. It is generally placed in rows at equal distances in the hollow of a moulding, frequently by the sides of mullions. The earliest known is said to be in the west part of

Salisbury cathedral, where it is mixed with the tooth ornament. It seems to have been used more and more frequently, till at Gloucester cathedral, in the south side, it is in profusion.

BALLIA, a town and district of British India, in the Benares division of the United Provinces. The town is situated on the left bank of the Ganges, below the confluence of the lesser Sarju. It is really an aggregation of rural villages. Pop. (1901) 15,278. The district of Ballia, constituted in 1879, occupies an angle at the junction of the Gogra with the Ganges, being bordered by two districts of Behar. It contains an area of 1245 sq. m. Owing to the great pressure on the soil from the density of the population, to

the reluctance to part with land characteristic of small proprietors, to the generally great productiveness of land and to the very light assessment of government revenue, land in Ballia, for agricultural purposes merely, has a market value higher than in almost any other district. It commonly brings in Rs. 200 per bigha, or £20 per acre, and sometimes double that figure. In 1901 the population was 987,768, showing a decrease of 5% in the decade. The principal crops are rice, barley, other food-grains, pulse, sugar-cane and opium. There are practically no manufactures, except that of sugar. Trade is carried on largely by way of the two bordering rivers.

BALLINA, a seaport and market-town of county Mayo, Ireland, in the north parliamentary division, on the left bank of the river Moy, with a station on the Killala branch of the Midland Great Western railway. Pop. of urban district (1901) 4505. Across the river, and therefore in county Sligo, is the suburb of Ardnaree, connected with Ballina by two bridges. In Ardnaree is the Roman Catholic cathedral (diocese of Killala), with an east window of Munich glass, and the ruins of an Augus- tinian abbey (1427) adjoining. There is a Roman Catholic diocesan college and the Protestant parish church is also in Ardnaree. A convent was erected in 1867. In trade and population Ballina is the first town in the county. The salmon- fishery and fish-curing are important branches of its trade; and it has also breweries and flour-mills and manufactures snuff and coarse linen. On the 25th of August r798, Ballina was entered by the French under General Humbert, marching from their landing-place at Killala. In the neighbourhood there is the interesting cromlech of the four Maels, which, if actually erected over the criminals whose name it bears, is proved by the early annals of Ireland to belong to the 7th century a.d. Their story relates that these men, foster-brothers of Cellach, bishop of Kilmore-Moy, murdered him at the instigation of Guaire Aidhne, king of Connaught, but were themselves executed at Ardnare (Ard-na-riaghadh, the hill of the executions) by the bishop's brother. The Moy is a notable salmon river for rod- fishing and its tributaries and the neighbouring lakes contain trout.

BALLINASLOE, a market town of county Galway, Ireland, in the east parliamentary division, 91 m. W. of Dublin, on the Midland Great Western main line. Pop. of urban district (1901) 4904. The river Suck, an affluent of the Shannon, divides it into two parts, of which the eastern was in county Roscommon until 1 898. The town contains remains of a castle of Elizabethan date. Industries

include brewing, flour-milling, tanning, hat- making and carriage-building. Trade is assisted by water- communication through the Grand canal to the Shannon. The town is widely celebrated for its great annual cattle-fair held in October, at which vast numbers of cattle and sheep are offered for sale. Adjoining the town is Garbally Castle, the seat of the earl of Clancarty, into the demesne of which the great fair extends from the town.

BALLISTICS (from the Gr. fiaWetv, to throw), the science of throwing warlike missiles or projectiles. It is now divided into two parts: — Exterior Ballistics, in which the motion of the projectile is considered after it has received its initial impulse, when the projectile is moving freely under the influence of gravity and the resistance of the air, and it is required to de- termine the circumstances so as to hit a certain object, with a view to its destruction or perforation; and Interior Ballistics, in which the pressure of the powder-gas is analysed in the bore

of the gun, and the investigation is carried out of the requisite charge of powder to secure the initial velocity of the projectile, without straining the gun unduly. The calculation of the stress in the various parts of the gun due to the powder pressure is dealt with in the article Ordnance.

I. Exterior Ballistics. In the ancient theory due to Galileo, the resistance of the air is ignored, and, as shown in the article on Mechanics (§ 13), the trajectory is now a parabola. But this theory is very far from being of practical value for most purposes of gunnery; so that a first requirement is an accurate experimental knowledge of the resistance of the air to the projectiles employed, at all velocities useful in artillery. The theoretical assumptions of Newton and Euler (hypotheses magis mathematicae quam naturales) of a resistance varying as some simple power of the velocity, for instance, as the square or cube of the velocity (the quadratic or cubic law), lead to results of great analytical complexity, and are useful only for provisional extrapolation at high or low velocity, pending further experiment.

The foundation of our knowledge of the resistance of the air, as

employed in the construction of ballistic tables, is the series of experiments carried out between 1864 and 1880 by the Rev. F. Bashforth, B.D. (Report on the Experiments made with the Bashforth Chronograph, &c, 1865-1870; Final Report, &c, 1878-1880; The Bashforth Chronograph, Cambridge, 1890). According to these experiments, the resistance of the air can be represented by no simple algebraical law over a large range of velocity. Abandoning therefore all a priori theoretical assumption, Bashforth set to work to measure experimentally the velocity of shot and the resistance of the air by means of equidistant electric screens furnished with vertical threads or wire, and by a chronograph which measured the instants of time at which the screens were cut by a shot flying nearly horizontally. Formulae of the calculus of finite differences enable us from the chronograph records to infer the velocity and retardation of the shot, and thence the resistance of the air.

As a first result of experiment it was found that the resistance of similar shot was proportional, at the same velocity, to the surface or cross section, or square of the diameter. The resistance R Can thus be divided into two factors, one of which is d 2 , where d denotes the diameter of the shot in inches, and the other factor is denoted by p, where p is the resistance in pounds at the same velocity to a similar I -in. projectile; thus R = d?p, and the value of p, for velocity ranging from 1600 to 2150 ft. per second (f/s) is given in the second column of the extract from the abridged ballistic table below.

These values of p refer to a standard density of the air, of 534-22 grains per cubic foot, which is the density of dry air at sea-level in the latitude of Greenwich, at a temperature of 62° F. and a barometric height of 30 in.

But in consequence of the humidity of the climate of England it is better to suppose the air to be (on the average) two-thirds saturated with aqueous vapour, and then the standard temperature will be reduced to 6o° F., so as to secure the same standard density; the density of the air being reduced perceptibly by the presence of the aqueous vapour.

It is further assumed, as the result of experiment, that the resistance is proportional to the density of the air; so that if the standard density changes from unity to any other relative density denoted by t, then R = rd?p, and t is called the coefficient of tenuity.

The factor t becomes of importance in long range high angle fire, where the shot reaches the higher attenuated strata of the atmosphere; on the other hand, we must take t about 800 in a calculation of shooting under water.

The resistance of the air is reduced considerably in modern projectiles by giving them a greater length and a sharper point, and by the omission of projecting studs, a factor k, called the coefficient of shape, being introduced to allow for this change.

For a projectile in which the ogival head is struck with a radius of 2 diameters, Bashforth puts k = 0-975; on the other hand, for a flat-headed projectile, as required at proof -butts, k = i-8, say 2 on the average.

For spherical shot ic is not constant, and a separate ballistic table must be constructed ; but k may be taken as 1 -7 on the average.

Lastly, to allow for the superior centering of the shot obtainable with the breech-loading system, Bashforth introduces a factor a, called the coefficient of steadiness.

This steadiness may vary during the flight of the projectile, as the shot may be unsteady for some distance after leaving the muzzle, afterwards steadying down, like a spinning-top. Again, a may increase as the gun wears out, after firing a number of rounds.

Collecting all the coefficients, t, k, a, into one, we put

(1) R = nd i p = nd i f(v), where

(2) n = KOT,

and n is called the coefficient of reduction.

By means of a well-chosen value of n, determined by a few experiments, it is possible, pending further experiment, with the most recent design, to utilize Bashforth's experimental results carried out with old-fashioned projectiles fired from muzzle-loading guns. For instance, « = o-8 or even less is considered a good average for the modern rifle bullet.

Starting with the experimental values of p, for a standard projectile, fired under standard conditions in air of standard density, we proceed to the construction of the ballistic table. We first determine the time / in seconds required for the velocity of a

shot, d inches in diameter and weighing w lb, to fall from any initial velocity V(f/s) to any final velocity i > (f/s). The shot is supposed to move horizontally, and the curving effect of gravity is ignored.

If At seconds is the time during which the resistance of the air, R lb, causes the velocity of the shot to fall Af (f/s), so that the velocity drops from v + %Av to v — §Av in passing through the mean velocity v, then

(3) RA/ = loss of momentum in second-pounds,

= w(v + l&v)lg-w(v — iAv)/g = wAv/g so that with the value of R in (1),

(4) At = wAv [nd 1 pg. We put

(5) wJnd 2 = C,

and call C the ballistic coefficient (driving power) of the shot, so that

(6) At = CAT, where

(7) ” AT = Avjgp,

and AT is the time in seconds for the velocity to drop Av of the standard shot for which C = I , and for which the ballistic table is calculated.

Since p is determined experimentally and tabulated as a function of d, the velocity is taken as the argument of the ballistic table; and taking Ad = 10, the average value of p in the interval is used to determine AT.

Denoting the value of T at any velocity v by T (v), then

(8) T(i») = sumof all the preceding values of AT plus an arbi- trary constant, expressed by the notation

(9) T(») = 2(A»)/f/ > + a constant, or fdv/gp + a constant, in which p is supposed known as a function of v.

The constant may be any arbitrary number, as in using the table the difference only is required of two tabular values for an initial velocity V and final velocity v ; and thus

(10) T(V) -T(») = S^Av/gp arfidv/gp;

and for a shot whose ballistic coefficient is C (n) (= C[T(V)-TW].

To save the trouble of proportional parts the value of T(u) for unit increment of v is interpolated in a full-length extended ballistic table for T.

Next, if the shot advances a distance As ft. in the time At, during which the velocity falls from v+%Av to v — ^Av, we have

(12) RAs = loss of kinetic energy in foot-pounds

-Mi(»+iAti)Vg— w(v — iAv) 2 /g=*wvAv/g, so that

(13) As=wvAv/nd?pg = CAS, where

(14) AS=vAv/gp = vAT,

and AS is the advance in feet of a shot for which C = i, while the velocity falls Av in passing through the average velocity v.

Denoting by S(v) the sum of all the values of AS up to'any assigned velocity v,

(15) S(t))=2(AS)+ a constant, by which S(») is calculated from AS, and then between two assigned velocities V and v,

(16) S(V)-S(»).

: y v AT =y^orf^

'dv tf W J.tf' and if s feet is the advance of a shot whose ballistic coefficient is C,

(17) i = C[S(V)-SW].

In an extended table of S, the value is interpolated for unit increment of velocity.

A third table, due to Sir W.D. Niven, F.R.S., called the degree table, determines the change of direction of motion of the shot while the velocity changes from V to v, the shot flying nearly horizontally.

To explain the theory of this table, suppose the tangent at the point of the trajectory, where the velocity is v, to make an angle i

radians with the horizon.

Resolving normally in the trajectory, and supposing the resistance of the air to act tangentially,

(18) v(di/dt) = g cos i,

where di denotes the infinitesimal decrement of i in the infinitesimal increment of time dt.

In a problem of direct fire, where the trajectory is flat enough for cos i to be undistinguishable from unity, equation (16) becomes

(19) v(di/dt) = g, or di/dt = g/v ; so that we can put

(20) Ai/ At = g/v,

if v denotes the mean velocity during the small finite interval of time At, during which the direction of motion of the shot changes through Ai radians.

If the inclination or change of inclination in degrees is denoted by S or A5,

(21) S/i8o = i/w, so that

180 ■ l8og At_

1 — v ‘

(22) AS = ~Ai

and if S and i change to D and I for the standard projectile,

180

/ \ « t AT Av . „

(23) Al = g— = Tp , AD = -

AT a — , and

(24) I(V) -I(v) = 2.1? ° r f t % D

of D(») and I(») are obtained by summation with the arithmometer, and entered in their respective columns.

For some purposes it is preferable to retain the circular measure, i radians, as being undistinguishable from sin i and tan 1 when i is small as in direct fire.

The last function A, called the altitude function, will be explained when high angle fire is considered.

These functions, T, S, D, 1, A, are shown numerically in the follow- ing extract from an abridged ballistic table, in which the velocity is taken as the argument and proceeds by an increment of 10 f/s; the column for p is the one determined by experiment, and the remaining columns follow by calculation in the manner explained above. The initial values of T, S, D, I, A must be accepted as belonging to the anterior portion of the table.

In any region of velocity where it is possible to represent p with sufficient accuracy by an empirical formula composed of a single power of v, say if*, the integration can be effected which replaces the summation in (10), (16), and (24); and from an analysis of the Krupp experiments Colonel Zabudski found the most appropriate index m in a region of velocity as given in the following table, and the corresponding value of gp, denoted by/ (t>)or V/k or its equivalent O, where r is the retardation. ”

Abridged Ballistic Table.

V.

P-

AT.

T.

|.s.

S.

AD.

D.

AI.

I.

AA.

A.

f/s

1600 1610 1620 1630

II-4I6

11-540 11-662 11-784

•0271 ■0268 •0265

•0262

27-5457 27-5728 27-5996 27-6261

43-47 43-27 43-08 42-90

18587-00 18630-47 18673-74 18716-82

•03 1 1 •0306 ■0301 •0296

49-7729 49-8040 49-8346 49-8647

•000543 •000534 •000525 •000517

•868675 ■869218 •869752 •870277

37-77 37-63 37-48 37-35

8470-36 8508-13 8545-76 8583-24

1640 1650 1660 1670

11-909 12-030 12-150

12-268

•0260

•0257

•0255 •0252

27-6523 27-6783 27-7040 27-7295

42-72 42-55 42-39 42-18

18759-72 18802-44 18844-99 18887-38

■0291

•0287 ■0282 ■0277

49-8943 49-9234 49-9521 49-9803

•000508 ■000500 •000492 •000484

•870794 •871302 •871802 •872294

37-21 37-09 36-96 36-80

8620-59 8657-80 8694-89

873I-85

1680 1690 1700 1710

12-404

12-536

12-666

12-801

•0249 •0247

•0244 •0242

27-7547 27-7796 27-8043 27-8287

41-98 41-78 41-60 41-41

18929-56 18971-54 19013-32 1905492

■0273 ■0268 •0264 ■0260

50-0080 50-0353 50-0621 50-0885

•000476 •000468 •000461 ■000453

■872778

•873254 •873722

•874183

36-65 36-50 36-35 36-21

8768-65 8805-30 8841-80 8878-15

1720

1730 1740 1750

12-900

13059 13-191 13-318

•0239 •0237 •0234

■0232

27-8529 27-8768 27-9005 27-9239

41-23 41-06 40-90 40-69

19096-33

I9I37-56

19178-62

19219-52

•0256 •0252

•0248 ■0244

50-II45

50-1401 50-1653 50-1901

•000446 ■000439 •000432 •000425

•874636 •875082 •875521 •875953

36-07 35-94 35-81 35-65

8914-36

8950-43 8986-37 9022-18

1760

1770 1780 1790

13-466 13-591

13-733 13-862

•0230 •0227

•0225 •0223

27-9471 27-9701 27-9928 28-0153

40-53 40-33 40-19 40-00

19260-21 19300-74 19341-07 19381-26

■0240 •0236 •0233 •0229

50-2145 50-2385 50-2621 50-2854

•000419 •000412 ■000406 •000400

•876378

•876797 •877209 •877615

35-53 35-37 35-26

35-n

9057-83 9093-36 9128-73 916399

1800 1810 1820 1830

14-002

14-149 14-269 14-414

•0221 •0219 •0217 •0214

28-0376 28-0597 28-0816 28-1033

39-81 39-68 39-51 39-34

19421-26 19461-07 19500-75 19540-26

•0225 •0222 •0219 •0216

50-3083 50-3308

50-353O

50-3749

•000393 •000388 •000382 •000376

•878015 ■878408 •878796 •879178

34-96 34-86

34-73 34-59

9199-10 9234-06 9268-92 9303-65

1840

1850

i860

1870

14-552 14-696 14-832 14-949

•0212 •02IO •0209 •0207

28-1247 28-1459 28-1669 28-1878

39-17

39-oi

38-90 38-75

19579-60 ‘ 19618-77 19657-78 1969668

•0212 •0209 •0206 •0203

50-3965

50-4I77

50-4386

50-4592

•000370 •000365 •000360 ■000355

•879554 •879924 •880289 •880649

34-46 34-33 34-25

34- H

9338-24 9372-70 9407-03 9441-28

1880 1890 1900 1910

15-090 15-224 15-364 15-496

•0205 •0203 •0201 •0199

28-2085 28-2290 28-2493 28-2694

38-61 38-46 38-32 38-19

19735-43 19774-04 19812-50 19850-82

•0200 ■0198

•OI95 •0192

50-4795 50-4995

50-5I93

50-5388

•000350 •000345 •000340 •000335

•881004 •881354 •881699 •882039

34-02

33-91

33‘8o

33-69

9475-42 9509-44 9543-35 9577-15

1920

1930 1940 1950

15-656 15-809 15-968 16-127

•0197 ■OI96 ■OI94 •OI92

28-2893 28-3090 28-3286 28-3480

38-01

37-83 37-66

37-48

19889-01 19927-02

19964-85 20002-51

•0189 •0186 •0184 •0181

50-558o

50-5769 50-5955 50-6139

■000330 •000325 •000320 •000316

•882374 •882704 ■883029 •883349

33-55 33-40 33-26 33-12

961084

9644-39 967779

97II-05

i960

1970

1980

1990

16-302 16-484 16-689 16-888

•OI9O •OI87 •OI85 •O183

28-3672 28-3862 28-4049 28-4234

37-26 36-99 36-73 36-47

20039-99 20077-25 20114-24 20150-97

■0178

•0175 •0172 •0169

50-6320 50-6498 50-6673 50-6845

•00031 1 •000305 •000300 •000295

•883665 •883976 •884281 •884581

32-94 32-71 32-48 32-26

9744-17

9777-n

9809-82 9842-30

2000 2010 2020 2030

17-096 17-305

I7-5I5

17-752

•Ol8l •OI78 •OI76 ■OI74

28-4417 28-4598 28-4776 28-4952

36-21 35-95 35-65 35-35

20187-44 20223-65 20259-60 20295-25

•0166 •0163 •0160 •0158

50-7014 50-7180

50-7343 50-7503

•000290 •000285 •000280 •000275

•884876 •885166 •885451 •885731

32-05 31-83 31-57

3I-32

9874-56 9906-61 9938-44 9970-01

2040 2050

206O

2070

17-990 18-229 18-463 18-706

•OI7I •OI69 •O167 •OI65

28-5126 28-5297 28-5466 28-5633

35-o6

34-77 34-49 34-21

20330-60 20365-66 20400-43 20434-92

•0155 •0152 •0149

•0147

50-7661 50-7816 50-7968 50-8117

•000270 •000265 •000260 •000256

•886006 •886276 •886541 ■886801

31-07 30-82 30-58 30-34

ioooi-33

10032-40 10063-33 10093-80

2080 2090

2I0O

2110

18-978 19-227 19-504 19-755

•OI63 •Ol6o •OI58 •OI56

28-5798 28-5961 28-6121 28-6279

33-93

33-6o

33-34 33-02

20469-13 20503-06 20536-66 20570-00

•0144 •0141 •0139 •0136

50-8264 50-8408 50-8549 50-8688

•000251 ■000247 •000242 •000238

•887057 •887308

•887555 ■887797

30-10

29-82

29-59 29-32

10124-14 10154-24 10184-06 10213-65

2120 2130

2I4O

2150

20-010 20-294

20-551

20-8II

•OI54 •0152 ■0I50 •OI49

28-6435 28-6589 28-6741 28-6891

32-76 32-50 32-25 3200

20603-02

20635-78 20688-28 20700-53

•0134 •0132 •0129 •0127

50-8824 50-8958 50-9090 509219

•000234 •000230 •000226 •000222

•888035 •888269 •888499 •888725

29-10

28-88 28-66 28-44

10242-97 10272-07 10300-95 10329-61

BALLISTICS

273

V.

m.

log*.

Cr = gp =/(z>) = v m /k.

3600 2600 1800

1370

1230

970

790

1-55 1.7

2

3 5 3 2

2-3909520 2-9038022 3-8807404 7-0190977 13-1981288 7-2265570 4-3301086

1,1-55 xlog” 1 3-6090480 i/ 1-7 Xlog -1 3-0961978 v* Xlog -1 4-1192596 t > 3 Xlog -1 8-9809023 v 6 Xlog _1 i4-8oi87i2 v s Xlog- 1 8-7734430 f 2 Xlog” 1 5-6698914

The numbers have been changed from kilogramme-metre to pound- foot units by Colonel Ingalls, and employed by him in the calcula- tion of an extended ballistic table, which can be compared with the result of the abridged table. The calculation can be carried out in each region of velocity from the formulae : — ■

(25) T(V)-T(v) = kj-»dv, S(V)-S(p) = fefV +1

I(V)-I(») = g*rV’»- 1 < fo,

and the corresponding integration.

The following exercises will show the application of the ballistic table. A slide rule should be used for the arithmetical operations, as it works to the accuracy obtainable in practice.

Example I. — Determine the time / sec. and distance s ft. in which the velocity falls from 2150 to 1600 f/s

(a) of a 6-in. shot weighing loolb, taking 71 = 0-96,

(b) of a rifle bullet, o-303-in. Calibre, weighing half an ounce, taking n = o-8.

V.

v.

T(V).

T(»).

tIC. S(V).

S(i >).

s/C.

2150

1600

28-6891

27-5457

I-I434

20700-53

18587-00

2H3-53

d.

VI.

C.

tic.

/.

s/C.

s.

(a) (b)

6 0-303

100

1/32

2-894 0-426

1 -1434

I-I434

3-3°7

0-486

2H3-53 2H3-53

61 14 (2038yds.) 900 (300 yds.)

The first equation leads, as before, to

(28) < = C{T(V)-T(iO),

. (29) * = C{S(V)-S(i>)}.

The integration of (24) gives

2j=constant-g/ = g(|T-0,

if T denotes the whole time of flight from O to the point B (fig. 1), where the trajectory cuts the line of sight ; so that |T is the time to the vertex A, where the shot is flying parallel to OB. Integrating (27) again,

(31) y=g(hTt-m = teKT-t);

and denoting T — t by t', and taking g= 32f/s 2 ,

_ (32) y = 16«',

which is Colonel Sladen's formula, employed in plotting ordinates of a trajectory.

At the vertex A, where y-H, we have t = t' = iT, so that

_ (33) _ H = igT 2 ,

which for practical purposes, taking g = 32, is replaced by

(34) H = 4T 2 , or (2T) 2 .

Thus, if the time of flight of a shell is 5 sec, the height of the vertex of the trajectory is about 100 ft. ; and if the fuse is set to burst the shell one- tenth of a second short of its impact at B, the height of the burst is 7-84, say 8 ft.

The line of sight Ox, considered horizontal in range table results, may be inclined slightly to the horizon, as in shooting up or

down a moderate slope, without appreciable modification of (28) and (29), and y or PM is still drawn vertically to meet OB in M.

Given the ballistic coefficient C, the initial velocity V, and a range of R yds. or X = 3R ft., the final velocity v is first calculated from (29) by

(35) SM = S(V)-X/C, and then the time of flight T by

(36) T = C{T(V)-T(»)1.

Denoting the angle of departure and descent, measured in degrees and from the line of sight OB by and /3, the total deviation in the range OB is (fig. 1)

(37) « =

T

Example 2. — Determine the remaining velocity v and time of flight / over a range of 1000 yds. of the same two shot, fired with the same muzzle velocity V = 2150 f/s.

(38) T(».) = T(V)- and now the degree table for D(v) gives

C

= J{T(V) + T(*)};

(39) (40)

S.

s/C.

S(V).

S(»).

Vjjk

T(V).

TW-

tic.

t.

(a) (b)

3000 3000

1037 7050

20700-53

20700-53

19663-53 13650-53

1861 920*

28-6891 28-6891

28-1690 23-0803

0-5201 5-6088

1-505 2-387

In the calculation of range tables for direct fire, defined officially as “fire from guns with full charge at elevation not exceeding 15 ,” the vertical component of the resistance of the

(4i)

Fig. 1.

air may be ignored as insensible, and the actual velocity and its horizontal component, or component parallel to the line of sight, are undistinguishable.

The equations of motion are now, the co-ordinates x and y being measured in feet,

dt 2 C ‘ d”y rfF = ~g

- These numbers are taken from a part omitted here of the abridged ballistic table.

(26) (27)

♦ = C{D(V)-D(» #)),

S = C|DW-DW).

This value of is the tangent elevation (T.E) ; the quadrant elevation (Q.E.) is — S, where S is the angular depression of the line of sight OB ; and if O is h ft. vertical above B, the angle S at a range of R yds. is given by

sin S = A/3R,

or, for a small angle, expressed in minutes, taking the radian as

3438'.

(42) S = ii46ft/R.

So also the angle /J must be increased by S to obtain the angle at which the shot strikes a horizontal plane — the water, for instance.

A systematic exercise is given here of the compilation of a range table by calculation with the ballistic table ; and it is to be compared with the published official range table which follows.

A discrepancy between a calculated and tabulated result will serve to show the influence of a slight change in the coefficient of reduction n, and the muzzle velocity V.

Example 3. — Determine by calculation with the abridged ballistic table the remaining velocity v, the time of flight t, angle of elevation , and descent # of this 6-in. gun at ranges 500, 1000, 1500, 2000 yds., taking the muzzle velocity V = 2I50 f/s, and a coefficient of reduction 71 = 0-96. [For Table see p. 274.]

An important problem is to determine the alteration of elevation for firing up and down a slope. It is found that the alteration of the tangent elevation is almost insensible, but the quadrant elevation requires the addition or subtraction of the angle of sight.

Example. — Find the alteration of elevation required at a range of 3000 yds. in the exchange of fire between a ship and a fort 1200ft. high, a 12-in. gun being employed on each side, firing a shot weighing 850 lb with velocity 2150 f/s. The complete ballistic table, and the method of high angle fire (see below) must be employed.

BALLISTICS

‘ Range.

5. ■

j/C.

S(v).

v.

T(f).

tic.

t.

1 > o).

t) .

D(i > „).

*/c

*.

< 8/C.

0.

20700-53

2150

28-6891

o-oooo

0-000

28-6891

2150

50-9219

0-0000

0-000

0-0000

0-000

500

1500

M8

20182-53

1999

28-4399

0-2492

0-720

28-5645

2071

50-8132

0-1087

0-315

0-1135

0-328

1000

3000

1036

19664-53

1862

28-1711

0-5180

1-497

28-4301

1994

50-6913

0-2306

0-666

0-2486

0-718

1500

4500

1554

19146-53

1732

27-8815

0-8076

2-330

28-2853

1918

50-5542

0-3677

1-062

0-4085

1-181

2000

6000

2072

18628-53

1610

27-5728

1-1163

3-225

28-1310

i«43

50-4029

0-5190

1-500

0-5989

1-734

(weight, 13 H) 4 oz. Charge] gravimetric density,

(nature, cordite, size 30.

55-Qi

0-504

Range Table For 6-inch Gun.

d. •„ *.-i„ (Palliser shot, Shrapnel shell. Pr °J ectlle I Weight, 100 ft.

Muzzle velocity, 2154 f/s. Nature of mounting, pedestal. Jump,

nil.

Remain- ing

To strike an object

10 ft.

high

Slope of De-

5′ elevation or depression alters point of impact.

Eleva-

Range.

Fuse

scale for

T. and P.

middle

50 % of rounds should fall in.

Time of

Penetra- tion into Wrought Iron.

Later-

Velocity.

range

scent.

ally or Verti-

tion.

No. 54

Flight.

must be

Range.

Marks I.,

Length.

Breadth.

Height.

known to

cally.

II., or III.

f/s.

yds.

1 in.

yds.

yds.

/

yds.

yds.

yds.

yds.

sees.

in.

2154

0-00

o-oo

13-6

2122

1 145

687

125

0-14

4

100

i

4

0-4

0-16

13-4

2091

635

38i

125

0-29

9

200

1

0-4

0-31

13-2

2061

408

245

125

o-43

13

300

1

0-4

o-47

13-0

2032

316

190

125

0-58

17

. 400

1}

0-4

0-62

12-8

2003

260

156

125

0-72

21

500

if

o-5

0-2

0-78

12-6

1974

211

127

125

0-87

26

600

2

o-5

0-2

o-95

12-4

1946

183

no

125

I-OI

30

700

n

o-5

0-2

i-n

12-2

1909

163

98

125

116

34

800

o-5

0-2

1-28

12-0

1883

143

85

125

131

39

900

3

0-6

03

1-44

II-8

1857

130

78

125

1-45

43

1000

3 t

o-6

0-3

i-6i

n-6

1830

118

7i

125

i-6o

47

1100

3t

0-6

o-3

1-78 .

u-4

1803

no

66

125

1-74

51

1200

4,

o-6

0-3

1-95

n-2

1776

101

61

125

1-89

55

1300

4 t

o-7

0-4

2-12

n-o

1749

93

56

125

2-03

59

1400

4l

o-7

0-4

2-30

io-8

1722

86

52

125

2-18

1 3

1500

5

0-7

0-4

2-47

io-6

1695

; 80

48

125

2-32

1 7

1600

5i

25

o-8

o-5

2-65

io-5

1669

7i

43

125

2-47

1 11

1700

51

25

0-9

o-5

2-84

10-3

1642

67

40.

100

2-6l

1 16

1800

6*

‘25

1-0

o-5

3-03

ro-i

1616

61

37

100

2-76

1 22

1900

6|

25

i-i

o-6

3-23

9.9

1591

57

34

100

2-91

1 27

2000

7

25

1-2

o-6

3-4i

9-7

The last column in the Range Table giving the inches of penetration into wrought iron is calculated from the remaining velocity by

an empirical formula, as explained in the article Armour Plates.

High Angle and Curved Fire. — ” High angle fire,” as defined officially, ” is fire at elevations greater than 15°,” and “curved fire is fire from howitzers at all angles of elevation not exceeding 15 .” In these cases the curvature of the trajectory becomes considerable, and the formulae employed in direct fire must be modified; the method generally employed is due to Colonel Siacci of the Italian artillery.

Starting with the exact equations of motion in a resisting medium,

(43)

= — r cos i = •

dx ds’

(44)

and eliminating r,

(45)

ePy dP~~

. . dy

- rS mt-g=-r Ts –

dx d?y dy tPx _ dx dt dP dt dP ~ g dt and this, in conjunction with

(46)

. d\> dy Idx taat =Jx=Tt/7f

_ (dx d?y_dy dV\ / (dx\ 2 ~ \dt dH dt dt 2) I \dt) ,

j; = -„cos :

d tan

(47)

reduces to

(48) ... ...

di v cos i

the equation obtained, as in (18), by resolving normally in the trajectory, but di now denoting the increment of i in the increment of time dt.

Denoting dxjdt, the horizontal component of the velocity, by q, so that

(49) v cos i = q, equation (43) becomes

(50) dq/dt = — r cos i, and therefore by [(48)

(51) dq _ dq dt _rv di ~ dt di ~~ g ‘

It is convenient to express rasa function of v in the previous notation

15.2) Cr = f(v),

and now

(53) dq _. vf(v) di Cg ‘

an equation connecting q and i. Now, since v = q sec i

(54) * dt _ „ sec i ” *

dq f(q sec *’)’ and multiplying by dxjdt or q,

(55) dx C q sec i dq~ f(q sec i)’

and multiplying by dyfdx or tan i,

(56) dy _ C q sec i tan i _ dq~ f (q sec t) • *

also

(57) di = Cg

dq q sec i ./ (q sec i)'

(58) d tan i C g sec i

dq ~q.f(q sec i)' from which the values of t, x, y, i, and tan i are given by integration with respect to q, when sec i is given as a function of q by means of (5 1) .

Now these integrations are quite intractable, even for a very simple mathematical assumption of the function f(v) , say the quad- ratic or cubic law, /(») = v 2 /k or v 3 /k.

But, as originally pointed out by Euler, the difficulty can be turned if we notice that in the ordinary trajectory of practice the quantities i, cos i, and sec i vary so slowly that they may be replaced by their mean values, r/, cos i;, and sec 7;, especially if the trajectory, when considerable, is divided up in the calculation into arcs of small curvature, the curvature of an arc being defined as the angle between the tangents or normals at the ends of the arc.

Replacing then the angle i on the right-hand side of equations (54) — (56) by some mean value 77, we introduce Siacci's pseudo- velocity u defined by

(59) « = g sec 7;,

so that u is a quasi-component parallel to the mean direction of the tangent, say the direction of the chord of the arc.

BALLISTICS

Integrating from any initial pseudo-velocity U,

(60) , r C v du

(61) fudu

(62) . fudu

and supposing the inclination i to change from to radians over the arc.

(63) (64)

— 6 = Ct cos m I ... k > ‘ ‘J «/(«)

tan tan « = C? sec 17 f^r-

But according to the definition of the functions T, S, I and D of the ballistic table, employed for direct fire, with u written for v,

(65) (66)

(67)

/u du jp =S(U)-S(„),

J «

Now calculate the pseudo-velocity U4, from

(81) u# < =V4, cos <£ sec 77,

and then, from the given values of 4> and 0, calculate u g from either of the formulae of (72) or (73) : —

(82) iw-iw- ‘V-^ .

”’ ^ ” C cos 77 Then with the suffix notation to denote the beginning and end of the arc <£— 0,

(84) #< 9 = C[T(«*)-T<« 9)] ,

(85) #* s =Ccos>j[S(w*)— S(« 8)] ,

^ . *©.- tan *- C ” c ‘ [I W-S5] ’ A now denoting any finite tabular difference of the function between the initial and final (pseudo-) velocity.

cdu 7W

= I(U)-I(«);

<=C[T(U)-T(m)] , ar = Ccosi, [S(U)-S(«)] , y = Csin, [S(U)-S(«)] ,. -9 = Ccos, [I(U)-I(m)] ,

and therefore

(68)

(69) (70)

(71)

_ (72) tan0-tane = Csec,il(U)-I(«)”] , while, expressed in degrees,

(73) 0°-e° = Ccos7, [D(U)-D(«)] .

The equations (66)-(7i) are Siacci’s, slightly modified by General Mayevski ; and now in the numerical applications to high angle fire we can still employ the ballistic table for direct fire.

It will be noticed that 77 cannot be exactly the same mean angle in all these equations; but if 77 is the same in (69) and (70),

(74) 7/* = tan 77,

so that 77 is the inclination of the chord of the arc of the trajectory, as in Niven’s method of calculating trajectories (Proc. R. S., 1877): but this method requires 77 to be known with accuracy, as 1 % variation in 77 causes more than I % variation in tan 17.

The difficulty is avoided by the use of Siacci’s altitude-function A or A(w), by which y/x can be calculated without introducing sin 77 or tan 77, but in which 17 occurs only in the form cos 77 or sec 17, which varies very slowly for moderate values of 77, so that 77 need not be calculated with any great regard for accuracy, the arithmetic mean %{+6) of and being near enough for 77 over any arc —0 of moderate extent.

Now taking equation (72), and replacing tan “9, as a variable final tangent of an angle, by tan i or dy/dx,

(75)

y

Pi

P rr-~~ Ms i ~~

‘ ~->Jq’ m >

9ˆ Sit Mi

0*8

/ Ml

Qs_Ni \£ jc

Fig. 2.

QJ

tan*-g =

C sec 77 [l(U)-I(M)l, and integrating with respect to x over the arc considered, *tantf.:y = CsecT7 [xl (U) f'l(u)dx~.

(76)

But

(77)

f'mdx=f v l(u)^du

— C cos 77 1 I (u) Cl . J x v ; gf(u)

= Ccost7 [A(U)-A(«)] in Siacci's notation ; so that the altitude-function A must be calcu- lated by summation from the finite difference AA, where

(78) , . T , ,ttA« T , . _

AA = I(m)— = I(«)AS,

or else by an integration when it is legitimate to assume that /(d) =V m [k in an interval of velocity in which m mav be supposed constant.

Dividing again by x, as given in (76),

from which y/x can be calculated, and thence y.

In the application of Siacci's method to the calculation of a tra- jectory in high angle fire by successive arcs of small curvature starting at the beginning of an arc at an angle <;> with velocity v-0 is first settled upon, and now

(80) ,«=j(0+0)

is a good first approximation for 77.

Also the velocity v g at the end of the arc is given by (87) v l) = u g sec 9 cos 77.

Treating this final velocity v and angle as the initial velocity v$ and angle of the next arc, the calculation proceeds as before (fig. 2).

In the long range high angle fire the shot ascends to such a height that the correction for the tenuity of the air becomes important, and the curvature — of an arc should be so chosen that y e , the height ascended, should be limited to about 1000 ft., equivalent to a fall of 1 inch in the barometer or 3 % diminution in the tenuity factor t.

A convenient rule has been given by Captain James M. Ingalls, U.S.A., for approximating to a high angle trajectory in a single arc, which assumes that the mean density of the air may be taken as the density at two-thirds of the estimated height of the vertex; the rule is founded on the fact that in an unresisted parabolic trajectory the average height of the shot is two-thirds the height of the vertex, as illustrated in a jet of water, or in a stream of bullets from a Maxim gun.

The longest recorded range is that given in 1888 by the 9-2-in. gun to a shot weighing 380 lb fired with velocity 2375 f/s at elevation 40°; the range was about 12 m., with a time for flight of about 64 sec, shown in fig. 2.

A calculation of this trajectory is given by Lieutenant A. H. Wolley-Dod, R.A., in the Proceedings R.A. Institution, 1888, employ- ing Siacci's method and about twenty arcs; and Captain Ingalls, by assuming a mean tenuity-factor 7- = 0-68, corresponding to a height of about 2 m., on the estimate that the shot would reach a height of 3 m., was able to obtain a very accurate result, working in two arcs over the whole trajectory, up to the vertex and down again (Ingalls, Handbook of Ballistic Problems).

Siacci's altitude-function is useful in direct fire, for giving im- mediately the angle of elevation required for a given range of R yds. or X ft., between limits V and v of the velocity, and also the angle of descent 0.

In direct fire the pseudo-velocities U and u, and the real

velocities V and v, are undistinguishable, and sec 77 may be replaced by unity so that, putting y = o in (79),

“.♦-c [l(V)4ij.

Also

(89)

so that

(90)

tan 0-tan = C [I(V) -L(»)]

tan/3 = C

[ti-iw] ..

or, as (88) and (90) may be written for smalfangles,

(91) sin2* = 2 C [l(V)-£f] ,

(92) « V -2C [||-I W] .

To simplify the work, so as to look out the value of sin 20 without the intermediate calculation of the remaining velocity v, a double- entry table has been devised by Captain Braccialini Scipione

{Problemi del Tiro, Roma, 1883), and adapted to yd., ft., in. and lb units by A. G. Hadcock, late R.A., and published in the Proc. R.A. Institution, 1898, and in Gunnery Tables, 1898.

In this table

(93) sin 2<£ = Ca,

where a is a function tabulated for the two arguments, V the initial velocity, and R/C the reduced range in yards.

The table is too long for insertion here. The results for and /}, as calculated for the range tables above, are also given there for

comparison.

Drift. — An elongated shot fired from a rifled gun does not move in a vertical plane, but as if the mean plane of the tra- jectory was inclined to the true vertical at a small angle, 2° or 3°; so that the shot will hit the mark aimed at if the back sight is tilted to the vertical at this angle 8, called the permanent angle of deflection (see Sights).

This effect is called drift and the reason of it is not yet understood very clearly.

It is evidently a gyroscopic effect, being reversed in direction by a change from a right to a left-handed twist of rifling, and being increased by an increase of rotation of the shot.

The axis of an elongated shot would move parallel to itself only if fired in a vacuum; but in air the couple due to a sidelong motion tends to place the axis at right angles to the tangent of the trajectory, and acting on a rotating body causes the axis to precess about the tangent. At the same time the frictional drag damps the nutation and causes the axis of the shot to follow the tangent of the trajectory very closely, the point of the shot being seen to be slightly above and to the right of the tangent, with a right-handed twist. The effect is as if there was a mean sidelong thrust w tan S on the shot from left to right in order to deflect the plane of the trajectory at angle S to the vertical. But no formula has yet been invented, derived on theoretical principles from the physical data, which will assign by calculation a definite magnitude to 8.

An effect similar to drift is observable at tennis, golf, base-ball and cricket; but this effect is explainable by the inequality of pressure due to a vortex of air carried along by the rotating

ball, and the deviation is in the opposite direction of the drift observed in artillery practice, so artillerists are still awaiting theory and crucial experiment.

After all care has been taken in laying and pointing, in accord- ance with the rules of theory and practice, absolute certainty of hitting the same spot every time is unattainable, as causes of error exist which cannot be eliminated, such as variations in the air and in the muzzle-velocity, and also in the steadiness of the shot in flight.

To obtain an estimate of the accuracy of a gun, as much actual practice as is available must be utilized for the calculation in accord- ance with the laws of probability of the 50% zones shown in the range table (see Probability.)

II. Interior Ballistics The investigation of the relations connecting the pressure, volume and temperature of the powder-gas inside the bore of the gun, of the work realized by the expansion of the powder, of the

V

Vj

f. ...’”” %

c

H

y’: > <^^

K

■■’ y^ ^^~~~~

P

- D

A

s’ M

B

h) n

5- ■

Fig. 3. dynamics of the movement of the shot up the bore, and of the stress set up in the material of the gun, constitutes the branch of interior ballistics.

A gun may be considered a simple thermo-dynamic machine or heat-engine which does its work in a single stroke, and does not act in a series of periodic cycles as an ordinary steam or gas-

engine.

An indicator diagram can be drawn for a gun (fig. 3) as for a

21 20 19 18 17 16 15 14 13 12 11 10 9 8 7

/”-,

•’ ‘,„ Observed Pressures, j Jˆ 20 ‘ 1 TONS

;

‘f

-4ˆ18-6 TON8 B.L.C 2

/amide \ w

j£ 16-6 TONS EXE. •‘ 156 TONS

6

SL _L “I 8QOO-

＋ _ _ „ˆ_

X – - ; x –

_L _ [_ Boooe

:

＞:t _ _ ±z~

;t _ – *’ XT

«-£t – - -? «‘i

J.gt_ _ _ _ _ ■ _,＜＝ – ? „± "

of – X – - 723”,’ ˆ‘iTISBr

§t – - *＞5k * s i :

■-t x A§$- \i.i ~zt.

8.C _ ■ _ 7-s& T s’c£ igocsfc

t

>5_ _ _ _ _ s* £ r£5!j::_ ;g ”

IP – - -it «ˆ – ; »s£E Js —

st – - – - – , < £* ,&X- – jtifcfc

-fit – - Z’. ˆKi IS ft

1st – - – _ ,lk , ** – - – Z % –

iX. – _ zw** ,*.’•- ;

-it – .ˢˆ’ Z _ Tur

«oT ./ˆ ** j

-2t: ˆi;S’ , ; ” ~ ~e&

1

ro-r .*■*£” .■ ■ -x

-X gˆ” e.y*mˆi~ ----j-

_X,«« > ˆ -, ”””’ ~ XX

X” „ r --- – - ZL.ZE

9

Dt

•nslty’ os ■«• -, s ” -fto -2a so – -s* -««9 «s -so

2 4

Travel in feet

6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42

Pressure Curves, from Chronoscope experiments in 6 inch gun of 100 calibres, with various Explosives.

Fig. 4.

steam-engine, representing graphically by a curve CPD the relation between the volume and pressure of the powder-gas; and in addition the curves AQE of energy e, AvV of velocity v, and A/T of time t can be plotted or derived, the velocity and energy at the muzzle B being denoted by V and E.

After a certain discount for friction and the recoil of the gun, the net work realized by the powder-gas as the shot advances AM is represented by the area ACPM, and this is equated to the kinetic energy e of the shot, in foot-tons,

(1)

2240

(‘ + #««)£

in which the factor ˆ(k 2 /(P)ta.n 2 & represents the fraction due to the rotation of the shot, of diameter d and axial radius of gyration k, and 5 represents the angle of the rifling; this factor may be ignored in the subsequent calculations as small, less than 1 %.

The mean effective pressure (M.E.P.) in tons per sq. in. is represented in fig. 3 by the height AH, such that the rectangle AHKB is equal to the area APDB; and the M.E.P. multiplied by Jird 2 , the cross-section of the bore in square inches, gives in tons the mean effective thrust of the powder on the base of the shot ; and multiplied again by I, the length in inches of the travel AB of the shot up the bore, gives the work realized in inch-tons; which work is thus equal to the M.E.P. multiplied by jrdH — B — C, the volume in cubic inches of the rifled part AB of the bore, the difference between B the total volume of the bore and C the volume of the powder-chamber.

3000

Equating the muzzle-energy and the work in foot-tons § V’_B-C.

224O. 2g

M.E.P. =

(2)

E =

(3)

12

TO V 2

•XM.E.P.

-C

2240 2g B –

Working this out for the 6-in. gun of the range table, taking L = 2i6 in., we find B-ˆC = 6ioo cub. in., and the M.E.P. is about 64 tons per sq. in.

But the maximum pressure may exceed the mean in the ratio of 2 or 3 to I, as shown in fig. 4, representing graphically the result of Sir Andrew Noble's experiments with a 6-in. gun, capable of being lengthened to 100 calibres or 50 ft. (Proc. R.S., June 1894).

On the assumption of uniform pressure up the bore, practically realizable in a Zalinski pneumatic dynamite gun, the pressure-curve would be the straight line HK of fig. 3 parallel to AM; the energy- curve AQE would be another straight line through A ; the velocity- curve Ai»V, of which the ordinate v is as the square root of the energy, would be a parabola ; and the acceleration of the shot being constant, the time-curve AtT will also be a similar parabola.

If the pressure falls off uniformly, so that the pressure-curve is a straight line PDF sloping downwards and cutting AM in F, then the energy-curve will be a parabola curving downwards, and the velocity-curve can be represented by an ellipse, or circle with centre F and radius FA ; while the time-curve will be a sinusoid.

O" 40 2 4

Tmuel in feet

8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

Velocity Curves, from Chronoscope experiments in 6 inch gun of

too calibres, with Cordite.

42 44 46

Fig. 5.

But if the pressure-curve is a straight line F'CP sloping upwards, cutting AM behind A in F', the energy-curve will be a parabola curving upwards, and the velocity-curve a hyperbola with center at F'.

These theorems may prove useful in preliminary calculations where the pressure-curve is nearly straight; but, in the absence of any observable law, the area of the pressure-curve must be read off by a planimeter, or calculated by Simpson's rule, as an indicator diagram.

To measure the pressure experimentally in the bore of a gun, the crusher-gauge is used as shown in fig. 6, nearly full size; it records the maximum pressure by the compression of a copper cylinder in its interior; it may be placed in the powder-chamber, or fastened in the base of the shot.

In Sir Andrew Noble's researches a number of plugs were inserted in the side of the experimental gun, reaching to the bore and carry- ing crusher-gauges, and also chronographic appliances which regis- tered the passage of the shot in the same manner as the electric screens in Bashforth's experiments; thence the velocity and energy of the shot was inferred, to serve as an independent control of the crusher-gauge records (figs. 4 and 5).

As a preliminary step to the determination of the pressure in the bore of a gun, it is desirable to measure the pressure obtained by exploding a charge of powder in a closed vessel, varying the weight of the charge and thereby the density of the powder-gas.

The earliest experiments of this nature are due to Benjamin Robins in 1743 and Count Rumford in 1792; and their method has been revived by Dr Kellner, War Department chemist, who

employed the steel spheres of bicycle ball-bearings as safety-valves, loaded to register the pressure at which the powder- gas will blow off, and thereby check the indications of the crusher-gauge (Proc. R.S., March 1895). Chevalier d'Arcy, 1760.

also experimented on the pressure of powder and the velocity of the bullet in a musket barrel; this he accomplished by short-

ening the barrel succes- sively, and measuring the velocity obtained by the ballistic pendulum; thus reversing Noble's procedure of gradually leng- thening the gun.

But the most modern results employed with gunpowder are based on the experiments of Noble and Abel (Phil. Trans., I 875-1 880-1 892- 1894 and following years).

(P) Oaseheclt

(B) Cap

Fig. 5.

A charge of powder, or other explosive, of varying weight P lb, is fired in an explosion-chamber (fig. 7, scale about £) of which the volume C, cub. in., is known accurately, and the pressure p, tons per sq. in., was recorded by a crusher-gauge (fig. 6).

The result is plotted in figs. 8 and 9, in a curve showing the relation between p and D the gravimetric density, which is the specific gravity of the P lb of powder when filling the volume C, cub. in., in

Explosion Vessel

Fig. 7.

a state of gas; or between p and v, the reciprocal of D, which may be called the gravimetric volume (G. V.), being the ratio of the volume of the gas to the volume of an equal weight of water. The results are also embodied in the following Table ;— –

Table i.

Pressure in Tons per sq. in.

G.D.

G.V.

Pebble Powder.

Cordite.

0-05

20-00

0-855

3-00

6

16-66

I -00

3‘8o

8

12-50

1-36

5-40

0-10

IO-OO

1-76

7-10

12

8-33

2-06

870

-. H

7-14

2-53

10-50

V 15

6-66

2-73

11-36

16

6-25

2-96

12-30

18

5-55

3-33

14-20

20

5-00 ■

3-77

16-00

22

4-54

4-26

17-90

24

4-17

4-66

19-80

25

4-00

4-88

20-63

26

3-84

5-10

21-75

3°

3-33

6-07

26-00

35

2-85

7-35

31-00

40

2-50

8-73

36-53

45

2-22

10-23

42-20

50

2-00

11-25

48-66

55

I-8I

13-62

55-86

60

1-66

15-55

63-33

The term gravimetric density (G.D.) is peculiar to artillerists; it is required to distinguish between the specific gravity (S. G.) of the powder filling a given volume in a state of gas, and the specific gravity of the separate solid grain or cord of powder.

Thus, for instance, a lump of solid lead of given S. G., when formed into a charge of lead shot composed of equal spherules closely packed, will have a G.D. such that

(4)

G.D. of charge of lead shot I , _ S.G. of lump of solid lead
-6*^2-0-7403;

while in the case of a bundle of cylindrical sticks of cordite,

(5) G.D. of charge of cordite I 6?

S.G. of stick of cordite ~ 6 W 3 ~ ° 9 ° 67 –

At the standard temperature of 62 ° F. the volume of the gallon of 10 lb of water is 277-3 cub. in. ; or otherwise, 1 cub. ft. or 1728

cub.

PRESSURES OBSERVED IN A CLOSED VESSEL WITH VARIOUS EXPLOSIVES

5 65

/

7

no J

35ft

/

‘■S a

/

K*41

.<

/

/■

£■ + <»

.<*■,

%

r

z

<

W

<;(,

10*”

***30**

cfc

±*

w

D*A

■>«. ,

po*|

1* =>

«”■

u

t *

a.

a

•IS -20 -25 -30 -35 -40 -45 -50 -55 -60 -65 -70 -75 -SO -8S

gravimetric density of products of explosion Fig. 8.

in. of water at this temperature weighs 62-35 lb, and therefore I lb of water bulks 1728 -=-62-35 = 27-73 CUD – in.

Thus if a charge of P lb of powder is placed in a chamber of volume C cub. in., the

(6) G.D. = 27;73P/C, G.V. = 0/27-73 P.

Sometimes the factor 27-68 is employed, corresponding to a density of water of about 62-4 lb per cub. ft., and a temperature 12° C, or 54° F. ■■_■■.

With metric units, measuring P’ in kg., and C in litres, the G.D. = P/C, G.V. = C/P, no factor being required.

From the Table I., or by quadrature of the curve in fig. 9, the work E in foot-tons realized by the expansion of 1 lb of the powder from one gravimetric volume to another is inferred; for if the average pressure is p tons per sq. in., while the gravimetric

volume changes from v — |Az> to v--%Av, a change of volume of 27-73 Av cub. in., the. work done is 27-73 P &? inch-tons, or

(7) A£ = 2 • 3 1 pAv foot-tons ;

and the differences AE being calculated from the observed values of p, a summation, as in the ballistic tables, would give E in a tabular form, and conversely from a table of E in terms of Zf, we can infer the value of p. ■

On drawing off a little of the gas from the explosion vessel it was found that a gramme of cordite-gas at 0° C. and standard atmospheric pressure occupied 700 ccs., while the same gas compressed into 5 ccs. at the temperature of explosion had a pressure of 16 tons per sq. in., or 16X2240+ 14-7 =2440 atmospheres, of 14-7 lb per sq. in. ; one ton per sq. in. being in round numbers 150 atmospheres.

The absolute centigrade temperature T is thence inferred from the gas equation

(8) R = MT = M>/273.

which, with £ = 2440, 11 = 5, p — i, t> =7oo, makes T=4758, a tem- perature of 4485 C. or 8105 F.

PRESSURE IN A CLOSED VESSEL OBSERVED AND CALCULATED

92

530

£28

111 86

%»

32 30 28 26 24 22 20

IS

16 14 12 10 8 6

!

\

l/ > 20

S’«

0- 16 “14

£ 12 r 10 u 8

\

\

\

1

l_

N\

,\

^

= s;

....

oi 2

£

2

3

!. ? 4 5 6 7 9 10 11 12 13 14- 1

5 16 17 19 19 2

gravimetric volume Fig 9.

In the heading of the 6-in. range table we find the description of the charge.

Charge: weight 13 lb 4 oz. ; gravimetric density 55-01/0-504; nature, cordite, size 30.

So that P = 13-25, the G. D. =0-504, the upper figure 55-01 denoting the specific volume of the charge measured in cubic inches per lb, filling the chamber in a state of gas, the product of the two numbers 55-01 and 0-504 being 27-73; and the chamber capacity = 13-25X55-01=730 cub. in., equivalent to 25-8 in. or 2-15 ft. length of bore, now called the equivalent length of the chamber (E.L.C.).

If the shot was not free to move, the closed chamber pressure due to the explosion of the charge at this G.D. (= 0-5) would be nearly 49 tons per sq. in., much too great to be safe.

But the shot advances during the combustion of the cordite, and the chief problem in interior ballistics is to adjust the G.D. of the charge to the' weight of the shot so that the advance of the shot during the combustion of the charge should prevent the maximum pressure from exceeding a safe limit, as shown by the maximum ordinate of the pressure curve CPD in fig. 3.

Suppose this limit is fixed at 16 tons per sq. in., corresponding in Table I. to a G.D., 0-2 ; the powder-gas will now occupy a volume 6 = §0 = 1825 cub. in., corresponding to an advance of the shot 1X2-15=3-225 ft.

Assuming an average pressure of 8 tons per sq. in., the shot will have acquired energy 8 X Jird 2 X 3-225 = 730 foot-tons, and a velocity about v = 1020 f/s, so that the time over the 3-225 ft. at an average velocity 510 f/s is about 0-0063 sec.

Comparing this time with the experimental value of the time occupied by the cordite in burning, a start is made for a fresh esti- mate and a closer approximation.

Assuming, however, that the agreement is close enough for practical requirement, the combustion of the cordite may be considered complete at this stage P, and in the subsequent expansion it is assumed that the gas obey3 an adiabatic law in which the pressure varies inversely as some m' h power of the volume.

The work done in expanding to infinity from p tons per sq. in.

at volume b cub. in. is then pb/(m — i) inch-tons, or to any

volume B cub. in. is

(9)

pb

. [(tn.

It is found experimentally that m = i-2 is a good average value to take for cordite; so now supposing the combustion of the charge of the 6-in. is complete in 0-0063 sec., when p = i6 tons per sq. in., 6 = 1825 cub. in., and that the gas expands adiabatically up to the muzzle, where

(10) B_ 2i6 + 2 5 -8

b 2-5X25-8 " we find the work realized by expansion is 2826 foot-tons, sufficient to increase the velocity from 1020 to 2250 f/s at the muzzle.

This muzzle velocity is about 5 % greater than the 2150 f/s of the range table, so on these considerations we may suppose about 10 % of work is lost by friction in the bore; this is expressed by saying that the factor of effect is/ = o-9-

The experimental determination of the time of burning under the influence of the varying pressure and density, and the size of the grain, is thus of great practical importance, as thereby it is possible to estimate close limits to the maximum pressure that will be reached in the bore of a gun, and to design the chamber so that the G.D. of the charge may be suitable for the weight and accelera- tion of the shot. Empirical formulas based on practical experience are employed for an approximation to the result.

A great change has come over interior ballistics in recent years, as the old black gunpowder has been abandoned in artillery after holding the field for six hundred years. It is replaced by modern explosives such as those indicated on fig. 4, capable of giving off a very much larger volume of gas at a greater tem- perature and pressure, more than threefold as seen on fig. 8, so that the charge may be reduced in proportion, and possessing the military advantage of being nearly smokeless. (See Ex- plosives.)

The explosive cordite is adopted in the British service; it derives the name from its appearance as cord in short lengths, the composition being squeezed in a viscous state through the hole

in a die, and the cordite is designated in size by the number ■ of hundredths of an inch in the diameter of the hole. Thus the cordite, size 30, of the range table has been squeezed through a hole 0-30 in. diameter.

The thermochemical properties of the constituents of an explosive will assign aji upper limit to the volume, temperature and pressure of the gas produced by the combustion; but much experiment is required in addition. Sir Andrew Noble has published some of his results in the Phil. Trans., 1905-1906 and following years.

Authorities. — Tartaglia, Nova Scientia (1537); Galileo (1638); Robins, New Principles of Gunnery (1743); Euler (trans, by Hugh Brown), The True Principles of Gunnery (1777); Didion, Helie, Hugoniot, Vallier, Baills, &c, Balistique (French) ; Siacci, Balistica (Italian) ; Mayevski, Zabudski, Balistique (Russian) ; La Llave, Ollero, Mata, &c, Balistica (Spanish) ; Bashforth, The Motion of Projectiles (1872); The Bashforth Chronograph (1890); Ingalls, Exterior and Interior Ballistics, Handbook of Problems in Direct and Indirect Fire; Bruff, Ordnance and Gunnery; Cranz, Compendium der Ballistik (1898); The Official Text-Book of . Gunnery (1902); Charbonnier, Balistique (1905) ; Lissak, Ordnance and Gunnery (1907). (A. G. G.)

BALLOON, a globular bag of varnished silk or other material impermeable to air, which, when inflated with gas lighter than common air, can be used in aeronautics, or, according to its size, &c, for any purpose for which its ability to rise and float in the atmosphere adapts such a mechanism. ” Balloon ” in this sense was first used in 1783 in connexion with the invention of the brothers Montgolfier, but the word was in earlier use (derived from Ital. ballone, a large ball) as meaning an actual ball or ball-game, a primitive explosive bomb or firework, a form of chemical retort or receiver, and an ornamental globe in architecture; and from the appearance and shape of an air balloon the word is also given by analogy to other things, such as a “balloon skirt” in dress, “balloon training” in horti- culture. (See Aeronautics, and Flight and Flying).

BALLOT (from Ital. ballotta, dim. of bulla, a ball), the modern method of secret-voting employed in political, legislative and judicial assemblies, and also in the proceedings of private clubs and corporations. The name comes from the use of a little ball

dropped according to choice into the right receptacle ; but nowadays it is used for any System of secret- voting, even though no such ball is employed. In ancient Athens, the dicasts, in giving their verdict, generally used balls of stone (psephi) or of metal (sponduli) . Those pierced in the centre, or black in colour, signified condemnation; those unpierced, or white, signified acquittal. The boxes were variously arranged ; but generally a brass box received both classes of votes, and a wooden box received the unused balls. In the assembly, cases of privilegia, such as ostracism, the naturalization of foreigners or the release of state-debtors, were decided by secret-voting. The petalism, or voting by words on olive-leaves, practised at Syracuse, may also be mentioned. At Rome the ballot was introduced to the comitia' by the Leges Tabellariae, of which the Lex Gabiana (139 B.C.) relates to the election of magistrates, the Lex Cassia (137 B.C.) to judicia populi, and the Lex Papiria (131 B.C.) to the enactment and repeal of laws. The wooden tabellae, placed in the cisla or wicker box, were marked U. R. (uti rogas) and A. {antique) in the case of a proposed law; L. {libera) and D. {damno) in the case of a public trial; in the case of an election, puncta were made opposite the names or initials of the candi- dates. Tabellae were also used by the Roman judices, who expressed their verdict or judgment by the letters A. {absoho), C. (condemno), and N. L. {non liquet). In modern times voting by ballot is usually by some form of writing, but the use of the ball still persists (especially in clubs), and a " black ball " is the regular term for a hostile vote.

Great Britain. — In Great Britain the ballot was suggested for use in parliament by a political tract of the time of Charles II. It was actually used by the Scots parliament of 1662 in proceed- ing on the Billeting Act, a measure proposed by Middleton to secure the ostracism of Lauderdale and other political opponents who were by secret-vote declared incapable of public office. The plan followed was this: each member of parliament wrote, in a disguised hand, on a piece of paper, the names of twelve suspected persons; the billets were put in a bag held by the registrar; the bag was then sealed, and was afterwards opened and its contents ascertained in the exchequer chamber, where the billets were immediately burned and the names of the ostracised concealed on oath. The Billeting Act was repudiated by the king, and the ballot was not again heard of till 1705, when Fletcher of Saltoun, in his measure for a provisional government of Scotland by annual parliaments in the event of Queen Anne's death, proposed secret-voting to protect members from court

influence. The gradual emancipation of the British parliament from the power of the crown, and the adoption of a strictly representative system of election, not only destroyed whatever reason may once have existed for the ballot in delibera- tive voting, but rendered it essential that such voting should be open. It was in the agitations for parliamentary reform at the beginning of the 19th century that the demand for the ballot in parliamentary elections was first seriously made. The Bentha- mites advocated the system in 181 7. At the so-called Peterloo Massacre (1819) several banners were inscribed with the ballot. O'Connell introduced a bill on the subject in 1830 ; and the original draft of Lord John Russell's Reform Bill, probably on the suggestion of Lords Durham and Duncannon, provided for its introduction. Later on the historian Grote became its chief supporter in the House of Commons; and from 1833 to 1839, in spite of the ridicule cast by Sydney Smith on the " mouse- trap," and on Grote's " dagger-box, in which you stab the card of your favourite candidate with a dagger," 1 the minority for the ballot increased from 106 to 217. In 1838 the ballot was the fourth point of the People's Charter. In the same year the abolition of the land qualification introduced rich commercial candidates to the constituencies. Lord Melbourne's cabinet declared the question open. The cause, upheld by Macaulay, Ward, Hume (in his resolutions, 1848) and Berkeley, was streng- thened by the report of Lord Hartington's Select Committee

1 For a description of Grote's card-frame, in which the card *vas punctured through a hole, and was thus never in the voter's hands, see Spectator, 25th February 1837..

(15th March 1870), to the effect that corruption, treating and intimidation by priests and landlords took place to a large extent at both parliamentary and municipal elections in England and Ireland; and that the ballot, if adopted, would probably not only promote tranquillity at elections, but protect voters from undue influence, and introduce greater freedom and purity in voting, provided secrecy was made inviolable except in cases where a voter was found guilty of bribery, or where an invalid vote had been given.

Meanwhile in Australia the ballot had been introduced by the

Constitution Act of South Australia (1856), and in other colonies at the same date. In South Australia (Electoral Act of 1858) the returning-officer put his initials on the voting-card, which the voter was directed, under pain of nullity, to fold so that the officer might not see the vote which was indicated by a cross. In Victoria, under the Electoral Act of 1865, the officer added to his initials a number corresponding to the voter's number on the register. In Tasmania the chief peculiarity was that (as in South Australia) the card was not put directly by the voter into the box, but handed to the officer, who put it there (this being thought a security against double-voting or voting" with a non-official card, and also against the voter carrying away his card). In 1869, at Manchester and Stafford in England, test-ballots were taken on the Australian system as practised hi Victoria — the voting-card containing the names of all the candidates, printed in different colours (for the benefit of illiterate voters), and the voter being directed to score out the names of those he did not support, and then to place the card (covered by an official envelope) in the box. It was found at Manchester that the voting was considerably more rapid, and therefore less expensive, than under the old system; that only 80 cards out of 11,475 were rejected as informal; and that, the representatives of candidates being present to check false statements of identity, and the public outside being debarred from receiving information what voters had voted, the ballot rather decreased the risk of personation. At Manchester the cards were not numbered consecutively, as in Victoria, so that (assuming the officials to be free from corruption) no scrutiny could have detected by whom particular votes were given. At Stafford the returning-officer stamped each card before giving it to the voter, the die of the stamp having been finished only on the morning of the election. By this means the possibility was excluded of what was known as " the Tasmanian Dodge," by which a corrupt voter gave to the returning-officer, or placed in the box, a blank non-official ticket, an d» carried out from the booth his official card, which a corrupt agent then marked for his candidate, and gave so-marked to corrupt voter No. 2 (before he entered the booth) on condition that he also would bring out his official card, and so on ad libitum; the agent thus obtaining a security for his bribe, unless the corrupt voter chose to disfranchise himself by making further marks on the card. At the close of 1870 the ballot was employed in the election of members for the London School Board under the Education Act of that year.

In 1872 W. E. Forster's Ballot Act introduced the ballot in all parliamentary and municipal elections, except parliamentary elections for universities; and the code of procedure prescribed by the act was adopted by the Scottish Education Board in the first School Board election (1873) under the Education (Scotland) Act 1872. The Ballot Act not only abolished public nominations of candidates, but dealt with the offence of persona- tion and the expenses of elections.

As practised in the United Kingdom, a white paper is used on which the names of the candidates are printed in alphabetical order, the voter filling up with a X the blank on the right-hand opposite the name he votes for. The paper, before being given out, is marked by the presiding-officer on both sides with an official stamp, which is kept secret, and cannot be used for a second election within seven years. The paper is marked on the back with the same number as the counterfoil of the paper which remains with the officer. This counterfoil is also marked with the voter's number on the register, so that the vote may be identified on a scrutiny; and a mark on the register shows that

the voter has received a ballot-paper. The voter folds up the paper so as to conceal his mark, but to show the stamp to the officer, and deposits it in the box, which is locked and sealed, and so constructed that papers cannot be withdrawn without unlocking it. Papers inadvertently spoiled by the voters may be exchanged, the officer preserving separately the spoiled papers. If a voter is incapacitated from blindness, or other physical cause, or makes before the officer a declaration of inability to read, or when the poll is on a Saturday declares himself a Jew, the officer causes the paper to be marked as the voter directs, and keeps a record of the transaction. A voter who claims to vote after another has voted in respect of the same qualification, obtains a (green) paper which is not placed in the box, but preserved apart as a " tendered " paper. He must, however, declare his identity and that he has not already voted. The presiding-officer at the close of the poll has to account to the returning-officer for the papers entrusted to him, the number being made up by — (1) papers in the box, (2) spoiled papers, (3) unused papers and (4) tendered papers. During the voting (for which schoolrooms and other public rooms are available, and for which a separate compartment must be provided for every 150 electors entitled to vote at a station) agents of candidates are allowed to be present in the polling-station, but they, as well as the officials, are sworn to secrecy as regards who have voted, and

for whom; and they are prohibited from interfering with the voter, inducing him to show his vote, or attempting to ascertain the number on the back of the paper. These agents are also present with the returning-officer when he counts the papers and the votes, rejecting those papers — (1) which want the official mark on the back; (2) on which votes are given for more candidates than the voter is entitled to vote for; (3) on which anything except the number on the back is marked or written by which the voter can be identified; (4) which are unmarked, or so marked that it is uncertain for whom the vote is given. The counted and rejected papers, and also the " tendered " papers, counterfoils and marked register (which have not been opened), are, in parliamentary elections, transmitted by the returning officer to the clerk of the crown in chancery in England, or the sheriff-clerk in Scotland, who destroys them at the end of one year, unless otherwise directed by an order of the House of Commons, or of some court having jurisdiction in election petitions. Such petitions either simply dispute the accuracy of the return on the ground of miscounting, or wrongous rejection or wrongous admission of papers, in which case the court examines the counted and rejected papers; or make allegations of corruption, &c. on which it may be necessary to refer to the marked counterfoils and ascertain how bribed voters have voted. Since the elections of 1874 much discontent has been expressed, because judges have rejected papers with trifling (perhaps accidental) marks other than the X upon them, and because elections have been lost through the failure of the officer to stamp the papers. For this purpose the use has been suggested of a perforating instead of an embossing stamp, whije a dark-ground paper with white voting-spaces would make misplaced votes impossible.

The BallotAct introduced several new off ences, such as forgingof papers or fraudulently defacing or destroying a paper or the official mark; supplying a paper without due authority; fraudulently' putting into the box a non-official paper; fraudulently taking a paper out of the station without due authority^ destroying, taking, opening or otherwise interfering with a box or packet of papers then in use for election purposes. These -offences and attempts to commit them are punishable in the case of officers and clerks with imprisonment for two years, with or without hard labour. In other cases the term of imprisonment is six months.

The ballot was long criticized as leading to universal hypocrisy

and deception; and Sydney Smith spoke of “voters, in dominos, going to the poll in sedan-chairs with closely-drawn curtains.” The observed effect of a secret ballot has been, however, gradually to exterminate undue influence. The alarm of ” the confessional ” seems to be unfounded, as a Catholic penitent is not bound to

confess his vote, and if he did so, it would be a crime in the confessor to divulge it.

Continental Europe. — The ballot is largely employed in European countries. In France, where from 1840 to 1845 the ballot, or scrutin, had been used for deliberative voting in the chamber of deputies, its use in elections to the Corps Legislatif was carefully regulated at the beginning of the Second Empire by the Organic Decree of the 2nd of February 1852. Under this law the voting was superintended by a bureau consisting of the deputy returning-officer (called president of the section), four unpaid assessors selected from the constituency and a secretary. Each voter presents a polling-card, with his designation, date of birth and signature (to secure identity), which he had previously got at the Mairie. This the president mutilates, and the vote is then recorded by a ” bulletin,” which is not official, but is generally printed with a candidate’s name, and given to the voter by an agent outside, the only conditions being that the bulletin shall be ” sur papier blanc, sans signes exterieurs, et prepare en dehors de l’assemblee.” The total number of votes given (there being only one member in each electoral district) is checked by reference to ” la feuille d’appel et inscription des votants,” the law still supposing that each voter is publicly called on to vote. If the voter, when challenged, cannot sign his polling-card, he may call a witness to sign for him. The following classes of bulletins are rejected: — ” illisibles, blancs, ne con tenant pas une designation suffisante; sur lesquels les votants se sont fait connaitre; con tenant le nom d’une personne n’ayant pas prete le serment prescrit” (i.e. of a person not nominated). Only the votes pronounced bad by the bureau in presence of representative scrutineers are preserved, in case these should be called for during the ” Session pour verification des Pouvoirs.” Practically the French ballot did not afford secrecy, for you might observe what bulletin the voter took from the agent, and follow him up

the queue into the polling-place; but the determined voter might conceal his vote even from the undue influence of government by scratching out the printed matter and writing his vote. This was always a good vote and scrutiny of good votes was impossible. The ballot is still used in the elections to the National Assembly, but in the Assembly itself only in special cases, as e.g. in the election of a ” rapporteur.” Under the law of 10th August 187 1 the conseils generaux (departmental councils) are elected by ballot.

In Piedmont the ballot formed part of the free constitutional government introduced by Charles Albert in March 1848; it was extended to Italy in 1861. Voting for the Italian chamber of deputies takes place under the law of 20th November 1859, and in public halls (not booths), to which admission is gained by showing a certificate of inscription, issued by the mayor to each qualified voter. A stamped blue official paper, with a memorandum of the law printed on the back (bolletino spiegato), is then issued to the elector; on this he writes the name of a candidate (there being equal electoral colleges) or, in certain exceptional cases, gets a confidential friend to do so, and hands the paper folded-up to the president of the bureau, who puts it in the box (urna), and who afterwards presides at the public “squittinio dei suffragi.” Greece is the only European country in which the ball-ballot is used. The voting takes place in the churches, each candidate has a box on which his name is inscribed, one half (white) being also marked ” yes,” the other half (black) ” no.” The voter, his citizenship or right to vote in the eparchy being verified, receives one ball or leaden bullet for each candidate from a wooden bowl, which a clerk carries from box to box. The voter stretches his arm down a funnel, and drops the ball into the ” yes ” or ” no ” division. The vote is secret, but there is apparently no check on ” yes ” votes being given for all the candidates, and the ball or bullet is imitable.

The earlier history of the ballot in Hungary is remarkable. Before 1848 secret voting was unknown there. The electoral law of that year left the regulation of parliamentary elections to the county and town councils, very few of which adopted the ballot. The mode of voting was perhaps the most primi- tive on record. Each candidate had a large box with his name

superscribed and painted in a distinguishing colour. On entering the room alone the voter received a rod from 4 to 6 feet in length (to prevent concealment of non-official rods on the voter’s

person), which he placed in the box through a slit in the lid. By the electoral law of 1874 the ballot in parliamentary elections in Hungary was abolished, but was made obligatory in the elections of town and county councils, the voting being for several persons at once.

In Prussia, Stein, by his Stddteordnung, or municipal corporation act of 1808, introduced the ballot in the election of the municipal assembly (Stadtverordnetenversammlung). Under the German constitution of 1867, and the new constitution of the 1st of January 1871, the elections of the Reichstag were to be conducted by universal suffrage under the ballot in con- formity with the electoral law of the 31st of May 1869.

America. — At the first elections in America voting was viva voce; but several of the colonies early provided for the use of written or printed ballots. By 1 7 7 5 ballots were used in the New England states, in Pennsylvania, Delaware, North Carolina and South Carolina; they were introduced in New Jersey in 1776, and in New York in 1778, so that, at the time the constitution of the United States was adopted, viva voce voting prevailed at public elections only in Maryland, Virginia and Georgia. Of the new states which later entered the Union, only Illinois, Kentucky, Missouri and Arkansas did not have a ballot system when they became states. During the first half of the 19th century, Maryland, Georgia, Arkansas (1846) and Illinois (1848) adopted the ballot. In Missouri ballot-voting was introduced to some localities in 1845, Dut not until 1863 was it generally adopted in that state. Virginia did not provide for voting by ballot until 1869, and in Kentucky viva voce voting continued until 18 19, but while the use of ballots was thus required in voting, and most of the states had laws prescribing the form of ballots and providing for the count of the vote, there was no provision making it the duty of any one to print and distribute the ballots at the polling-places on election day. In the primitive town meetings ballots had been written by the voters, or, if printed, were furnished by the candidates. With the development of elections, the task of preparing and distributing ballots fell to political committees for the various parties. The ballot- tickets were thus prepared for party-lists of candidates, and it was not easy for any one to vote a mixed ticket, while, as the voter received the ballot within a few feet of the polls, secrecy was almost impossible, and intimidation and bribery became both easy and frequent.

Soon after the adoption of the Australian ballot in Great Britain, it was introduced in Canada, but no serious agitation was begun for a similar system in the United States until 1885. In 1887 bills' for the Australian ballot were actively urged in the legislatures of New York and Michigan, although neither became law. A Wisconsin law of that year, regulating elections in cities of over 50,000 population, incorporated' some features of the Australian system, but the first complete law was enacted by Massachusetts in 1888. This Massachusetts statute provided for the printing and distribution of ballots by the state to contain the names of all candidates arranged alphabetically for each office, the electors to vote by marking the name of each candidate for whom they wished to vote. At the presidential election of 1888 it was freely alleged that large sums of money had been raised on an unprecedented scale for the purchase of •votes, and this situation created a feeling of deep alarm which gave a powerful impetus to the movement for ballot reform. In 1 889 new ballot laws were enacted in nine states: two states bordering on Massachusetts, Connecticut and Rhode Island; four states in the middle- west, Indiana, Michigan, Wisconsin and Minnesota; two southern states, Tennessee and Missouri; and Montana, in the far west. The Connecticut law, however, marked but little improvement over former conditions, since it provided only for official envelopes in which the unofficial party ballots should be voted. The Indiana law provided for a single or " blanket " ballot, but with the names of candidates arranged in party-groups, and a method of voting for all of the candidates in a party-group by a single

mark. Michigan and Missouri also adopted the party-group system. The other states followed the Massachusetts law providing for a blanket ballot with the candidates arranged by offices.

The new ballot system had its first practical demonstration at the Massachusetts election of 1880, and its success led to its rapid adoption in many other states. In 1890 ballot laws were passed in seven states: Vermont, Mississippi, Wyoming and Washington provided for the Massachusetts plan, although Vermont afterwards adopted the system of party-groups, which Maryland used from the first. The New York and New Jersey laws of 1800, however, only provided for official ballots for each party, and

allowed ballots obtained outside of the polling-booths to be used. In 1891 seventeen additional states and two terri- tories adopted the Australian ballot system. All of these pro- vided for a blanket ballot; but while the Massachusetts arrange- ment was adopted in Arkansas, Nebraska, New Hampshire, North and South Dakota, Kentucky, Texas and Oregon, the system of party groups was followed in Colorado, Delaware, Illinois, Maine, Ohio, Pennsylvania and West Virginia. Cali- fornia had the Massachusetts arrangement of names, but added on the ballot a list of party names, by marking one of which a voter would cast his vote for all of the candidates of that party. Pennsylvania placed all the candidates not in a party-group in alphabetical order.

Iowa adopted the Australian ballot system in 1892; Alabama and Kansas in 1893; Virginia in 1894; Florida in 1895; and Louisiana and Utah in 1896. In 1895, too, New York adopted the blanket ballot in place of separate party ballots, but arranged the names of candidates in party columns. The only state to abandon the blanket ballot after once adopting it was Miss- ouri which in 1897 returned to the system of separate ballots, with no provision for booths where the ballot might be marked in secret. (See the article," Present Status of the Ballot Laws/' by Arthur Ludington in Amer. Pol. Science Rev.iar May 1909.)

Owing to the large number of officials chosen at one time in American elections, the form and appearance of the ballot used is very different from that in Great Britain. At the quadrennial presidential election in New York state, for example, the officers to be voted for by each elector are thirty-six presidential electors, one congressman, state-governor, lieutenant-governor and five other state officers, a member for each house of the state legislature, several judges, a sheriff, county-clerk and other county officers. The column with the list of the candidates of each party for all of these offices is 2 to 3 ft. in length; and as there are often eight to ten party-tickets in the field, the ballot-paper is usually from 18 to 20 in. in width. Each voter receives one of these " blanket " ballots on entering the polling-place, and retires to a booth to mark either a party column or the individual candidates in different columns for whom he wishes to vote. Where, as in Massachusetts, the names of candidates are arranged by offices instead of in party-lists, every voter must mark the name of each individual candidate for whom he wishes to vote. Connecticut, New Jersey, Missouri, North and South Carolina, Georgia and New Mexico use the system of separa te

party ballots. (See also Voting, Voting Machines, Election, Representation.)

BALLOU, HOSEA (1771-1852), American Universalist clergy- man, was born in Richmond, New Hampshire, on the 30th of April 1 771. He was a son of Maturin Ballou, a Baptist minister, was self-educated, early devoted himself to the ministry, became a convert to Universalism in 1789, and in 1794 became a pastor of a congregation at Dana, Massachusetts. He preached at Barnard, Vermont, and the surrounding towns in 1801-1807; at Portsmouth, New Hampshire, in 1807-1815; at Salem, Massa-chusetts, in 1815-1817; and as pastor of the Second Universalist Church in Boston from December 1817 until his death there on the 7th of June 1852. He founded and edited The Universalist Magazine (18 19; later called The Trumpet) and The Universalist Expositor (1831; later The Universalist Quarterly Review); wrote about 10,000 sermons, many hymns, essays and polemic theological works; and is best known for Notes on the Parables (1804), A Treatise on Atonement (1805) and Examination of the Doctrine of a Future Retribution (1834); in these, especially

the second, he showed himself the principal American expositor of Universalism. His great contribution to his Church was the body of denominational literature he left. From the theology of John Murray, who like Ballou has been called " the father of American Universalism," he differed in that he divested Uni-versalism of every trace of Calvinism and opposed legalism and trinitarian views.

Consult the biography by Thomas Whittemore (4 vols., Boston, 1854—1855) and that by Oscar F. Safford (Boston, 1889) ; and J.. C. Adams, Hosea Ballou and the Gospel Renaissance (Boston, 1904).

His grand-nephew, Hosea Ballou (1796-1861), born in Halifax, Vermont, on the 18th of October 1796, preached to Universalists in Stafford, Connecticut (1815-1821); and in Massachusetts, in Roxbury (1821-1838) and in Medford (1838- 1853); and in 1853 was elected first president of Tufts College at Medford, serving in that office until shortly before his death, which took place at Somerville, Massachusetts, on the 27th of May 1861. He was the first (1847) to urge the necessity of a Universalist denominational college, and this did much towards the establishment of Tufts. He was associated with the elder Hosea Ballou in editing The Universalist Quarterly Review, edited an edition of Sismondi's

History of the Crusades (1833); and wrote the Ancient History of Universalism, down to a.d. 553 (1829; 2nd ed., 1842).

Maturin Murray Ballou (1820-1895), son of the first Hosea, was a pioneer in American illustrated journalism, edited Gleason's Pictorial and Ballou' s Monthly and many collections of quotations, and in, 1872 became editor-in-chief of the Boston Daily Globe, of which he was one of the founders. He wrote a life of his father (i860), and a History of Cuba (1854).

BALLSTON SPA, a village and the county-seat of Saratoga county, New York, U.S.A., about 7 m. S. of Saratoga Springs. Pop. (1890) 3527; (1900) 3923; (1910 TJ.'S. Census) 4138. It is served by the Delaware & Hudson railway, and is con- nected with Saratoga Springs, Albany, and Schenectady by electric lines. There are several manufacturing establishments, among which are one of the largest manufactories of paper-bags in the United States and a large tannery. It is, however, as a popular summer resort that Ballston Spa is best known. Many fine chalybeate and other springs rising through solid rock from a depth of about 650 ft. furnish a highly effervescent water of considerable medicinal and commercial value. The village has the Ballston Spa public library, the Saratoga county law library and the Saratoga county court house. Ballston Spa, which was named in honour of the Rev. Eliphalet Ball, an early settler, was settled about 1787 by the grandfather of Stephen A. Douglas, and was incorporated in 1855.

SeeE. F. Prose, Centennial Hist, of Ballston Spa, 1908.

BALLYCASTLE, a seaport and watering-place on the north coast of Co. Antrim, Ireland, in the north parliamentary division, situated on a bay of the same name opposite Rathlin Island. Pop. (1901) 1481. It is connected with the Northern Counties (Midland) railway at Ballymoney by the Ballycastle light railway. The town consists of two divisions, about a quarter of a mile apart and connected by a fine avenue. Towards the close of the 18th century Mr Hugh Boyd, obtaining the estate, devoted himself to the extension and improvement of the town, establishing manufactures, endowing charities and building churches; and succeeded in producing a temporary vitality. Upwards of £150,000, including a large government grant, is said to have been expended upon the pier and harbour; but the violence of the sea overthrew the one and the other became filled with sand. To the east of the town are the remains of Bonamargy Abbey, the

burial-place of many of the Mac- Donnell family. The Carey brook, by the side of which the abbey stands, was formerly called the Margy, and on its waters- according to tradition dwelt the four children of Lir, changed to swans by their step-mother until St Columba released them from enchantment. (See P. W. Joyce, Old Celtic Romances.) With this well-known romance is connected the wide-spread belief in Ireland of ill-fortune following the killing of a stvan. Coal-seams, formerly extensively worked, and from an unknown

period of antiquity, appear in the cliffs towards Fair Head, and the fisheries are important. The coast-scenery and the view from the hill of Knocklayd are notable.

BALLYMENA, a town of Co. Antrim, Ireland, in the mid parliamentary division, on the Braid, an affluent of the Maine, 2 m. above their junction. Pop. of urban district (1901) 10,886. It is 33 m. N.N.W. of Belfast on the Northern Counties (Midland) railway. Branch lines run to Larne and to Parkmore on the east coast. The town owes its prosperity chiefly to its linen trade, introduced in 1733, which gives employment to the greater part of the inhabitants. Brown linen is a specialty. Iron ore is raised in the neighbourhood. Antiquities in the neighbour- hood are few and the present buildings of Ballymena Castle and Galgorm Castle are modern. Gracehill, however, a Moravian settlement, was founded in 1 746.

BALLYMONEY, a market town of Co. Antrim, Ireland, in the north parliamentary division, 53 m. N.N.W. from Belfast by the Northern Counties (Midland) railway. Pop. of urban district (1901) 2952. The Ballycastle railway joins the main line here. The trade of the town is prosperous, brewing, distil- ling and tanning being carried on, besides the linen manufacture common to the whole county. Soap, candles and tobacco are also manufactured, and the town is a centre for local agricultural trade. Near the neighbouring village of Dervock (4! m. N.) is a cottage shown by an inscription to have been the home of the ancestors of William McKinley, president of the United States.

BALLYMOTE, a market town of Co. Sligo, Ireland, in the south parliamentary division, 14 m. S. of Sligo by the Midland Great

Western railway. Pop. (1901) 997. It is a centre for some agricultural trade and has carriage-building works. There are remains of a strong castle, built by the powerful earl of Ulster, Richard de Burgh, in 1300, and the scene of hostilities in 1641 and 1652. Ruins are also seen of a Franciscan foundation attributed to the 13th century; it was a celebrated seat of learning and an extant memorial of the work of its monks is the Book of Ballymote (c. 1391) in the possession of the Royal Irish Academy, a miscellaneous collection in prose and verse of historical, genealogical and romantic writings. There are also, near the town, ruins of a house of the Knights of St John (1303).

BALLYSHANNON, a seaport and market-town of Co. Donegal, Ireland, in the south parliamentary division, at the mouth of the Erne; on the Bundoran branch of the Great Northern railway. Pop. (1901) 2359. The river is here crossed by a bridge of twelve arches, which connects the town with the suburb of The Port. B elow the bridge the river forms a beautiful cascade, 150 yds. wide, with a fall at low water of 16 ft. Here is the salmon leap, where the fish are trapped in large numbers, but also assisted to mount the fall by salmon-ladders. The fisheries are of great value, and there is an export trade to England in salmon, which are despatched in ice. The harbour is a small exposed creek of Donegal Bay, and is only accessible to small vessels owing to a bar. Previous to the Union Ballyshannon returned two members to the Irish parliament and it was in- corporated by James I. There are slight remains of a castle of the O'Donnells, earls of Tyrconnell, where the English, on attempting to besiege it, were defeated and lost heavily in their retreat across the river, in 1597. There are numerous raths or encampments in the vicinity and other remains. Coolmore, 3 m. N.W., is a bathing-resort.

BALM, a fragrant herb, Melissa officinalis, of the Deadnettle order (Labiatae) with opposite, ovate, crenulated leaves, which are wrinkled above, and small white or rose-spotted flowers. It is a native of central and southern Europe; it is often grown in gardens and has become naturalized in the south of England and grows apparently wild as a garden escape in North America. The name is from the Greek nk\i

BALMACEDA, JOSE MANUEL (1838-1891), president of the republic of Chile, was born in Santiago in 1838. His parents were wealthy, and in his early days he was chiefly concerned in

industrial and agricultural enterprise. In 1865 he was one of the

representatives of the Chilean government at the general South American congress at Lima, and after his return obtained great distinction as an orator in the national assembly. After discharging some diplomatic missions abroad, he became success sively minister of foreign affairs and of the interior under the presidency of Senor Santa Maria, and in the latter capacity carried compulsory civil marriage and several other laws highly obnoxious to the clergy. In 1886 he was elected president; but, in spite of his great capacity, his imperious temper little fitted him for the post. He was soon irreconcilably at variance with the majority of the national representatives, and on the 1st of January 1891 he sought to terminate an intolerable situation by refusing to convoke the assembly: and ordering the continued collection of the taxes on his own authority. This led to the Chilean Civil War of 1891, which ended in the overthrow of Balmaceda, who committed suicide on the 18th of September, the anniversary of his elevation to the presidency.

BALMAIN, a town of Cumberland county, N.S.W., Australia, on the western shore of Darling Harbour, Port Jackson, 2 m. by water from Sydney and suburban to it. Pop. (1901) 30,881. It is the home of great numbers of the working classes of Sydney and some of the largest factories and most important docks are situated here. Saw-mills, iron foundries, chemicals, glass and soap works, shipbuilding yards and a cocoanut-oil factory in connexion with the soap-manufacture at Port Sunlight, England,are among the chief industrial establishments. Balmain became a municipality in i860.

BALMERINO, JAMES ELPHINSTONE, 1st Baron (c. 1553- 161 2), Scottish politician, was the third son of Robert, 3rd Lord Elphinstone (d. 1602). Rising to power under James VI. he became a judge and a royal secretary; he accompanied the king to London in 1603 and was made Lord Balmerino, or Balmerinoch, in 1604. In 1605 he became president of the court of session, but his ardour for the Roman Catholic religion brought about his overthrow. In 1 599 on the king's behalf, but without the king's knowledge, he had sent a letter to Clement VIII. in which he addressed the pope in very cordial terms. A copy of this letter having been, seen by Elizabeth, the English queen asked James for an explanation, whereupon both the king and the secretary declared it was a forgery. There the matter rested until 1608, when the existence of the letter was again referred to during some controversy between James and Cardinal Bellarmine. Interrogated afresh Balmerino admitted that he had

written the compromising letter, that he had surreptitiously obtained the king's signature, and that afterwards he had added the full titles of the pope. In March 1 609 he was tried, attainted and sentenced to death, but after a brief imprisonment he was released and he died at Balmerino in July 161 2. , ,

Balmerino's elder son John (d. 1649) was permitted to take his father's title in 1 613. In 1634 he was imprisoned for his opposition, to Charles I. in Scotland, and by a bare majority of the jury he was found guilty of " leasing-making " and was sentenced to death. But popular sympathy was strongly in his favour; the poet Drummond of Hawthornden and others interceded for him, and after much hesitation Charles pardoned him. Balmerino, however, did not desist from his opposition to the king. A chief among the Covenanters and a trusted counsellor of the marquess of Argyll, he presided over the cele- brated parliament which met in Edinburgh in August 1641, and was one of the Scottish commissioners who visited England in 1644. He died in February 1649 and was succeeded as 3rd lord by his son John (1623-1704), who in 1669 inherited from his uncle James the title of Lord Coupar. John's son John, 4th Lord Balmerino (1652-1736), was a lawyer of some repute and, although a sturdy opponent of the Union, was a Scottish repre- sentative peer in i7ioand 1713. John's son Arthur (1688-1746) who became 6th Lord Balmerino on the death of his half-brother John in January 1746, is famous as a Jacobite. He joined the partisans of James Edward, the Old Pretender, after the battle of Sheriffmuir in November 1715, and then lived for some time in exile, returning to Scotland in 1733 when his father had

secured for him a pardon. He was one of the first to join Charles Edward in 1745; he marched with the Jacobites to Derby, fought at Falkirk and was captured at Culloden. Tried for treason in Westminster Hall he was found guilty, and was beheaded on the nth of August 1746, behaving both at his trial and at his execution with great constancy and courage. On his death without issue his titles became extinct.

BALMES, JAIME LUCIANO (1810-1848), Spanish ecclesiastic, eminent as a political writer and a philosopher, was born at Vich in Catalonia, on the 28th of August 18 10, and died there on the

9th of July 1848. Having attacked the regent Espartero and been exiled he founded and edited on his return the El Pensa- miento de la Nation, a Catholic and Conservative weekly; but his fame rests principally on El Protestantismo comparado con el Catolicismo-en sus relaciones con la Civilisation Europea (3 vols., 1842-1844, 6th edition, 1879; Eng. trans. London, 1849), an able defence of Catholicism on the ground that it represents the spirit of obedience or order, as opposed to Protestantism, the spirit of revolt or anarchy. From the historical standpoint it is of little value. The best of his philosophical works, which are clear expositions of the scholastic system of thought, are the Filosofia Fondamental (4 vols., 1846, Eng. trans, by H. F. Brownson, 2 vols. New York, 1856), and the Curso de Filosofia Elemental (4 vols., 1847), which he translated into Latin for use in seminaries.

See A. de Blanche-Raffin, Jacques Balmis, sa vie et ses ouvrages (Paris, 1849); and E. Bullon Fernandez, Jaime Balmes y sus oberas (Madrid, 1903).

BALMORAL CASTLE (Gaelic, "the majestic dwelling"), a private residence of the British sovereign, in the parish of Crathie and Braemar, Aberdeenshire, Scotland, on the right bank of the Dee (here spanned by a fine suspension bridge), 9 m. W. of Ballater and at a height of 900 ft. above the sea. The property formerly belonged to the Farquharsons of Inverey, from whom it was acquired by Sir Robert Gordon, whose trustees disposed of the lease in 1848 to the prince consort, by whom the whole estate was purchased in 1852 and bequeathed to Queen Victoria. The castle is built of granite in the Scots baronial style, with an eastern tower 100 ft. high commanding a superb view — Ballochbuie and Braemar to the W., Glen Gairn to the N., Lochnagar and the beautiful valley of the Dee to the S. On Craig Gowan (1319 ft.), a hill 1 m. to the south, have been erected memorial cairns to Queen Victoria, the prince consort, Princess Alice and other members of the royal family of Great Britain. The parish church of Crathie (1903), replacing the kirk of 1806, is 15 m. to the W., and about 2 m. farther west stands Abergeldie Castle, another Highland royal residence, an ancient building to which modern additions have been made, inhabited by King Edward VII. when prince of Wales, and after his acces- sion to the throne used as a shooting-lodge.

BALNAVES, HENRY (isi2?-i579), Scottish politician and reformer, born at Kirkcaldy about 1512, was educated at St Andrews and on the continent, where he adopted Protestant views. Returning

to Scotland, he continued his legal studies and in 1538 was appointed a lord of session. He married about the same time Christian Scheves, and in 1539 was granted the estate of Halhill in Fife, after which he is generally named. Before 1540 he was sworn of James Vs. privy council, and was known as one of the party in favour of the English alliance and of an ecclesiastical reformation. He is also described as treasurer to James {Letters and Papers, 1543, i. 64), but the regent Arran appointed him secretary in the new government of the infant Queen Mary (January 1543). He promoted the act permitting the reading of the Scriptures in the vulgar tongue, and was one of the commissioners appointed to arrange a marriage treaty between the little queen and the future Edward VI. In London he was not considered so complaisant as some of the other commissioners, and was not made privy (0 all the engagements taken by his colleagues (ib. i. 834). But Beton "loved him worst of all," and, when Arran went over to the priestly party, Balnaves was, in November 1543, deprived of his offices and imprisoned in Blackness Castle.

Thence he was released by the arrival of Hertford's fleet in the following May, and from this time he became a paid agent of the English cause in Scotland. He took no part in the murder of Beton, but was one of the most active defenders of the castle of St Andrews. He received £100 from Henry VIII. in December 1546, was granted an annuity of £125 by Protector Somerset in 1547 and was made English paymaster of the forces in St Andrews. When that castle surrendered to the French in July Balnaves was taken prisoner to Rouen. Somerset made vain efforts to procure his release and continued his pension. He made himself useful by giving information to the English govern- ment, and even Mary Tudor sent him £50 as reward in June 1554. Balnaves also busied himself in writing what Knox calls " a comfortable treatise of justification," which was found in MS. with a preface by Knox, among the reformer's papers, and was published at Edinburgh in 1584 under the title The Confession of Faith.

In 1557 Balnaves was permitted to return to Scotland and regain his property; probably it was thought that Mary Tudor's burnings would have cooled the ardour of his English affections, and that in the war threatening between two Catholic countries, Balnaves would serve his own. The accession of Queen Elizabeth changed the situation, and Mary of Guise had reasons for accusing him of "practices out of England" (Salisbury MSS. i. 155). He took, in fact, an active part in the rising of 1559 and was commissioned

by the Congregation to solicit the help of the English government through Sir Ralph Sadleir at Berwick. He was also selected one of the Scots representatives to negotiate with the duke of Norfolk in February 1560. In 1563 he was restored to his office as lord of session, and was one of those appointed by the General Assembly to revise the Book of Discip- line. He was one of Bothwell's judges for the murder of Darnley in 1567, and in 1568 he accompanied Moray to the York inquiry into Queen Mary's guilt. He resigned his judicial office in 1574, and died in 1579 at Edinburgh. He has been claimed as a Scots bard on the strength of one ballad, " O gallandis all, I cry and call," which is printed in Allan Ramsay's Evergreen (2 vols.

1724-1727).

See Letters and Papers of Henry VIII. (1 540-1 545); Bain's and Thorp's Cal. of Scottish State-Papers ; English Domestic and Foreign Cats.; Acts of Engl. Privy Council; Reg. P.C., Scotland; Reg. Great Seal of Scotland; Hamilton Papers; Border Papers; Knox, Works; Burnet, Reformation; Froude, Hist. (A. F. P.)

BALNEOTHERAPEUTICS (Lat. balneum, a bath, and Gr. dtpairevew, to treat medically). The medical treatment of disease by internal and external use of mineral waters is quite distinct from " hydrotherapy," or the therapeutic uses of pure water. But the term " balneotherapeutics " has gradually come to be applied to everything relating to spa treatment, including the drinking of waters and the use of hot baths and natural vapour baths, as well as of the various kinds of mud and sand used for hot applications. The principal constituents found in mineral waters are sodium, magnesium, calcium and iron, in combination with the acids to form chlorides, sulphates, sulphides and carbonates. Other substances occasionally present in sufficient quantity to exert a therapeutic influence are arsenic, lithium, potassium, manganese, bromine, iodine, &c. The chief gases in solution are oxygen, nitrogen, carbonic acid and sulphuretted hydrogen. Argon and helium occur in some of the " simple thermal " and " thermal sulphur waters." There are few doctors who would deny the great value of special bathing and drinking cures in certain morbid conditions. In the employ- ment of the various mineral waters, many of the spas adopt special means by which they increase or modify their influence, e.g. the so-called " aromatic " or " medicated " baths, in which substances are mixed to exert a special influence on the skin and peripheral nerves. Of these the " pine-needle " bath has the greatest repute; it is made by adding

a decoction of the needles or young shoots of firs and pines. Fir wood oil (a mixture of ethereal oils) or the tincture of an alcoholic extract acts equally well. The volatile ethereal constituents are sup- posed to penetrate the skin and to stimulate the cutaneous

circulation and peripheral nerves, being eliminated later by the ordinary channels. Similar effects follow the addition to the bath of aromatic herbs, such as camomile, thyme, &c. For a full-sized bath 1 3 to 2 lb of herbs are tied in a muslin bag and infused in a gallon of boiling water; the juices are then ex- pressed and the infusion added to the bath. Astringent baths are prepared in a similar way from decoctions of oak bark, walnut leaves, &c. In many spas on the European continent baths are prepared from peat or mud mixed with hot mineral water. Mineral peat consists of decomposing vegetable soil that has been so long in the neighbourhood of the medicinal spring that it has undergone peculiar and variable chemical changes. This is mixed with the hot mineral water until the bath has the desired consistency, the effect on the patient being in almost direct proportion to the density. These baths vary greatly in composition. Mud baths are chiefly prepared from muddy deposits found in the neighbourhood of the springs, as at St Amand. They act like a large poultice applied to the surface of the body, and in addition to the influence of the temperature, they exert a considerable mechanical effect. The pulse is accelerated some 6 to 12 beats a minute, the respiration number rises, and the patient is thrown into a profuse perspira- tion. They have very great value in gouty and rheumatic conditions and in some of the special troubles of women.

There are certain conditions in which mineral water treatment is distinctly contra-indicated. Advanced cardiac disease and cardiac cases with failure of compensation must pre-eminently be treated at home, not at a spa. Advanced arterio-sclerosis, any form of serious organic visceral disease, advanced cirrhosis, pulmonary tuberculosis with a tendency to haemoptysis, much elevation of temperature or emaciation, are all entirely unsuited for this form of treatment. Serious organic nervous diseases, great nervous depression and old cases of paralysis are all contra-indicated. Any trouble, however suited in itself for spa treatment, must be considered inapplicable if complicated with pregnancy.

In advising balneotherapeutic treatment in any case, all the conditions and habits of the patient — pecuniary, physical and psychical — must be considered, as the spa must be fitted to the patient, not the patient to the spa. Besides the particular disease, the idiosyncrasy of the patient must be considered, the same morbid condition in different people requiring very different treatment. Retarded convalescence is a condition often treated at

the spas, although hygienic surroundings, both mental and physical, are usually all that is necessary to ensure complete recovery. After rheumatic fever, however, if the joints remain painful and the heart is dilated, the thermal gaseous saline water of Nauheim, augmented by Schott's resistance movements, will often appear to work wonders. Chronic rheumatism, where there is much exudation round a joint or incipient stiffness of a joint, may be relieved by hot thermal treatment, especially when combined with various forms of massage and exercises. Simple thermal waters, hot sulphur springs and hot muriated waters are all successful in different cases. Chronic muscular rheuma- tism can also be benefited in a similar manner. Diseases of the nervous system are on the whole treated by these means with small success. Mental diseases other than very mild cases of depression should be considered inapplicable. Neurasthenics are sometimes treated at chalybeate or thermal muriated saline spas; but such treatment is entirely secondary to the general management of the case. Neuralgic affections and the later stages of neuritis, especially when dependent on gout or rheuma- tism, are often relieved or cured. Abdominal venosity (ab- dominal plethora), a feature of obesity, glycosuria, &c, are extremely well fitted for this form of treatment. The alkaline sulphated waters, the bitter waters and the common salt waters can all be prescribed, and after a short course can be supple- mented with various forms of active and passive exercises. Diseases of the respiratory organs are far more suited for climatic treatment than for treatment by baths. Anaemia can usually be better or equally well treated at home, or by seaside residence or a sea voyage, though many physicians prescribe chloride of

sodium waters, followed by a course of iron waters at some suitably situated spa. In the anaemia dependent on malarial infection, the muriated or alkaline sulphated waters at spas of considerable elevation and combined with iron and arsenic are often very beneficial. Gravel and stone, if of the uric acid variety, can be treated with the alkaline waters, but the case must be under Constant observation lest the urine become too alkaline and a deposition of phosphates take place on the already formed uric acid stone. Gout is so variable both in cause and effect that much discrimination is required in its treatment. Where the patient is of " full habit," with portal stagnation, the sulphated alkaline or mild bitter waters are indicated, especially those of Carlsbad and Marienbad; but the use of these strong waters must be followed by a long rest under strict hygienic conditions.

Where this is impossible, a milder course must be advised, as at Homburg, Kissingen, Harrogate, Wies- baden, Baden-Baden, &c. For very delicate patients, and where time is limited, the simple thermal waters are preferable.

For radiant heat and light baths and electric baths of all kinds, see Electrotherapeutics; and for compressed air baths, Aerotherapeutics. (See also Baths, Therapeutics, and the articles on diseases.)

BALQUHIDDER (Gaelic, "the farm in the back-lying country "), a village and parish of Perthshire, Scotland. Pop. of parish (1901) 605. The village lies 2 m. W. of the station of the same name on the Caledonian railway from Callander to Oban, and 27! m. N.W. of Stirling. It is situated at the east end of Loch Voil, a lake at the foot of the Braes of Balquhidder. The Maclaurins acquired the district as early as the 9th century and occupied it for several hundred years until ousted by the Macgregors, a neighbouring clan, who had repeatedly raided their lands, and in 1558 slew the chief and many of his followers. Balquhidder was the scene of some of the exploits of Rob Roy, who died there in 1 734. His grave in the old kirkyard is marked by a stone ornamented with rude carving, executed probably centuries before his time. Another ancient stone is said tradi- tionally to cover the grave of Angus, the Columban missionary, who was the first to carry on Christian work in this part of the Highlands.

BALRAMPUR, a town of British India near the river Rapti, 28 m. from Gonda, in the Gonda district of the United Provinces. Pop. (1901) 16,723. It gives its name to one of the largest talukdari estates in the province. The raja, Sir Drigbijai Singh K.C.S.I., was conspicuously loyal during the Mutiny, and was rewarded with accessions of territory and hereditary privileges. His death in 1882 gave rise to prolonged litigation and the estate was thrown into chancery. The income is estimated at £1 20,000, paying a revenue of £46,000. Numerous schools and hospitals are supported. Balrampur contains a. large palace, a handsome modern temple and an Anglo-vernacular school.

BALSAM (from Gr. (i6.\crafxov, through Lat. balsamum, con- tracted by popular use to O. Fr. basme, mod. Fr. bdme; Eng. balm), a term properly limited to such resins or oleo-resins as contain benzoic acid or cinnamic acid or both. Those balsams which conform to this definition make up a distinct class, allied to each other by their composition, properties and uses. Those

found in commerce are the balsam of Peru, balsam of Tolu, liquid storax and liquidambar. Balsam of Peru is the produce of a lofty leguminous tree, Myroxylon Pereirae, growing within a limited area in San Salvador, Central America and introduced into Ceylon. It is a thick, viscid oleo-resin of a deep brown or black colour and a fragrant balsamic odour. It is used in per- fumery. Though contained in the pharmacopeias it has no special medicinal virtues. Balsam of Tolu is produced from Myroxylon toluiferum. It is of a brown colour, thicker than Peru balsam, and attains a considerable degree of solidity on keeping. It also is a product of equatorial America, but is found over a much wider area than is the balsam of Peru. It is used in perfumery and as a constituent in cough syrups and lozenges. Liquid storax or styrax preparatus, is a balsam yielded by Liquid- ambar orientalis, a native of Asia Minor. It is a soft resinous substance, with a pleasing balsamic odour, especially after it

has been kept for some time. It is used in medicine as an external application in some parasitic skin diseases, and internally as an expectorant. An analogous substance is derived from Liquidambar Altingia in Java. Liquidambar balsam is derived from Liquidambar styraciflua, a tree found in the United States and Mexico. It contains cinnamic acid, but not benzoic acid.

Of so-called balsams, entirely destitute of cinnamic and benzoic constituents, the following are found in commerce : — Mecca balsam or Balm of Gilead, from Commiphora opobalsamum, a tree growing in Arabia and Abyssinia, is supposed to be the balm of Scripture and the ftaXaaˆov of Theophrastus. When fresh it is a viscid fluid, with a penetrating odour, but it solidifies with age. It was regarded with the utmost esteem among the nations of antiquity and to the present day it is peculiarly prized among the people of the East. For balsam of copaiba see Copaiba. Under the name of wood oil, or Gurjun balsam, an oleo-resin is procured in India and the Eastern Archipelago from several species of Dipterocarpus, chiefly D. turbinatus, which has the odour and properties of copaiba and has been used for the same purposes. Wood oil is also used as a varnish in India and forms an effective protection against the attacks of white ants. Canada balsam or Canada' turpentine is the oleo-resin yielded by Abies balsamea, a tree that grows in. Canada and the northern parts of the United

States. It is a very transparent substance, some- what fluid when first run, but thickening considerably with age, possessed of a delicate yellow colour and a mild terebinthous otlour. It contains 24 % of essential oil, 60 % of resin soluble in alcohol, and 16 % of resin soluble only in ether. Its chief uses are for mounting preparations for the microscope and as a cement for glass in optical work.

The garden' balsam is an annual plant, Impatiens balsamina, and the balsam apple is the fruit of Momordica balsamina, nat. order Cucurbitaceae.

BALSH AM, HUGH DE (d. 1286), English churchman, appears first as sub-prior of the monastery of Ely. On the death of William of Kilkenny in 1256 the monks elected him bishop of Ely, to the annoyance of Henry III. who had handed over the temporalities of the see to John de Waleran. The election was confirmed by the pope in 1257 and Hugh set to work to repair the harm done to the diocese by the intruder. In 1 280 the bishop obtained a charter allowing him to replace the secular brethren residing in his hospital of St John at Cambridge by "studious scholars " ; a second charter four years later entirely differentiated these scholars from the brethren of the hospital, and for them Hugh de Balsham founded and endowed the college of Peterhouse.

BALTA, a town in the Russian government of Podolia, between the Dniester and the Bug, 131 m. by rail N.N. W. of Odessa. It carries on a large trade in cattle, horses and grain, and has two annual fairs, held at Whitsuntide and in June. A variety of industries, such as tallow-melting, soap-boiling, tile-making and brewing, are carried on. The Jews form a very considerable part of the population, which in 1867 numbered 14,528, and in 1897, 23,393. Balta was in great part destroyed by the Russians in 1780.

BALTARD, LOUIS PIERRE (1 764-1846), French architect and engraver, was born in Paris on the 9th of July 1764. He was originally a landscape painter, but in his travels through Italy was so much struck with the beauty of the Italian buildings, that he changed his profession and devoted himself to architec- ture. In his new occupation he achieved great success, and was selected to prepare the plans for some of the largest public edifices in Paris. His reputation, however, is chiefly based on his great skill in engraving . Among the best known of his plates are the drawings of Paris (Paris et ses monuments, 2 vols, fol., 1803),

the engravings for Denon's Egypte, the illustrations of Napoleon's wars (La Colonne de la grande armee), and those contained in the series entitled the Grand prix de V 'architecture, which for some time he carried on alone. He also gained dis- tinction as an engraver of portraits. Baltard died in Paris on the 22nd of January 1846.

Two of his children were also architects. Of these the more important was Victor Baltard (1805-1874), who was born in Paris on the 19th of June 1805. In 1803 he gained the prix de Rome at the ficole des beaux-arts for designing a military school. He was largely instrumental in introducing a regular scheme of fresco decoration by modern artists in the churches of Paris, to take the place of the heterogeneous collections of pictures of all kinds with which their walls had been promiscuously decorated. He built many additions to existing churches, and also the ehurch of St Augustin, in which he united the structural values of stone and steel. His most popular achievement was, however, the building of the central market in Paris. Victor Baltard also built the slaughter houses and the cattle market of La Villette. He died in Paris on the 13th of January 1874, after a life of great activity in his profession.

BALTIC SEA .(Scand. and Ger. Ostsee; Russ. Baltiyskoe More), a sea extending between 54° and 66° N. lat., and 9 and 30 E. long., surrounded by the territories of Sweden, Russia, Germany and Denmark. Its greatest length is about 960 m.; greatest breadth about 400 m.; and length of coast-line, 5000 m. ; the central axis runs approximately from south-west to north-east. The Baltic is connected with North Sea by the winding channel between the south of Scandinavia and the Cimbrian peninsula. This channel is usually included in the Baltic. The part of it west of a line joining the Skaw with Christiania fjord receives the name of Skagerrak; the part east of this line is called the Kattegat. At its southern end the Kattegat is blocked by the Danish islands, and it communicates with the Baltic proper by narrow channels called the Sound, the Great Belt and the Little Belt. The real physical boundary between the North Sea and the Baltic is formed by the plateau on which the islands Zealand, Funen and Laaland are situated, and its prolongation from the islands Falster and M5en to the coasts of Mecklenburg and Rugen.

East of this plateau the Baltic proper forms a series of hollows or troughs. The first, or Bornholm deep, lies east of the island of Bornholm, and is separated from the next, or Gotland deep, by

the Middelbank. Beyond the Middelbank the Danziger Tiefe, an isolated depression, lies to the south-east, while to the north-east the Gotland basin, the largest and deepest of all, extends north-eastwards to the Gulf of Finland. Along the Swedish coast a deep channel runs northward from outside the island of Oland; this is entirely cut off to the south and east by a bank which sweeps eastward and northward from near Karlskrona, and on which the island of Gotland stands, but it communicates at its northern end with the Gotland deep, and near the junction opposite Landsort is the deepest hole in the Baltic (420 metres = 230 fathoms).

An unbroken ridge, extending from Stockholm to Hango in Finland, separates the Baltic basin proper from the depression between Sweden and the Aland Isles, to which the name Aland Haf has been given. North of the Aland Haf a ridge defines the southern edge of another depression, the Bothnian Sea, which in turn is separated from the most northerly division, the Gulf of Bothnia, by a ridge across the narrow Quarken or Kvarken Strait. The Gotland deep may be said to extend directly into the Gulf of Finland, an arm of the Baltic, running eastwards for about 250 m., and separating Finland from Esthonia. Between Esthonia and Courland is the Gulf of Riga, a shallow inlet of roughly circular form, about 100 m. in diameter, and nowhere more than 27 fathoms deep.

According to recent computations the total area of the Baltic, including the Skagerrak and Kattegat, is 166,397 sq. m., and its volume 6907 cub. m., giving a mean depth of 36 fathoms, which is markedly less than that of any other arm of the sea of similar area.

In the deeper hollows in the south part of the Baltic the bottom consists almost invariably of either soft brown or grey mud or hard clay, while on the shallow banks and near the low coasts fine sand, of white, yellow or brown colour with small pebbles, is usually found.

At the time of the last great subsidence, in glacial times, an arm of the sea extended across Sweden, submerging a great part of the littoral up to the Gulf of Bothnia, and including the Coasts—

present Jakes Vener, Hjelmar and Malar. During changes t j 1 j g p er ; 0(j tne wa ters of the northern Baltic were suf- “baracter fi c ‘ ent ‘y sa ˆ [t f° r oysters to flourish. The subsequent ” ‘ upheaval restricted direct communication with the open

sea to the Danish channels, and the Baltic waters became fresher: the oyster disappeared, but a number of cold salt-water fishes and crustaceans, and even seals, became acclimatized. It has been suggested that the presence of the remains of these animals indicates a communication to the north with the Arctic Ocean; but in view of the severe climatic conditions still prevailing at the time, this seems an unnecessary assumption. In the next stage of its history the Baltic is transformed by further elevation into a vast freshwater lake, the Ancylus lake of G. de Geor (named from the remains of the mollusc Ancylus fluviatilis), which is supposed to have covered an area of about 220,000 sq. m., including the whole of the present Baltic area and a large part of Finland, with Lake Ladoga. Then followed a subsidence, which not only re-established communication through the Danish channels, but allowed the Baltic to become sufficiently salt for such forms as Cardium edule and Littorina littorea. At this time the Gulf of Bothnia must have suffered greater depres- sion than the Baltic proper, for the deposits of that epoch show a thickness of 100 metres (328 ft.) near Hernosand, but of only 25 metres (82 ft.) in the neighbourhood of Gotland. After this period of subsidence the process of elevation set in which gave the Baltic its present form and physical condition, and appears to be still in progress. Dr R. Sieger has traced a series of isobasic lines, or lines of equal rate of elevation, for portions of Sweden and Finland ; these indicate that the movement is now almost nil along the axial lines of the Baltic and the Gulf of Finland, but increases in amplitude northwards to the Gulf of Bothnia and in the direction of the main ridge of the massif of southern Sweden. At Stockholm the rate of elevation is approximately 0-47 metre (= 1-54 ft.) in a century.

The coast of the Baltic is rocky only in the island-studded region at the head of the Baltic basin proper — a submerged lake-district — and the littoral generally is a typical morainic land, the work of the last great Baltic glacier. The southern margin of the Baltic is of peculiar interest. From Schleswig eastwards to Liibeck Bay the coast is pierced by a number of narrow openings or Fohrden, the result of encroachment of the sea caused by subsidence. East of Ltibeck, as far as the mouth of the Oder, these give place to Bodden, ramified openings studded with islands: the structure

here resembles that of Scania in southern Sweden, a region once joined to both Denmark and Pomerania by an isthmus which was severed by tectonic move- ments. Beyond the Oder the coast-line is unbroken as far as the Gulf of Danzig. It is then cut into by the estuaries of the Vistula, the Pregel and the Memel. Here the westerly Winds have full play, and the coast is rimmed by a continuous line of dunes, which cut off the two great lagoons of the Frisches Haff and Kurisches Haff by sandspits or Nehrungen.

The drainage area of the Baltic is relatively large. According to the measurements of Sir J. Murray it extends to 461,450 sq. sea m. (= 611,700 sq. English m.) The largest river-basin included in it is that of the Neva in the east, and next in size come the Vistula and the Oder in the south. The narrow parallel troughs, at right angles to the coast, which form the drainage-system of Sweden and western Finland, are a remarkable feature.

Levellings from Swinemiinde show that the mean level of the surface of the Baltic at that point is 0-093 metres (= -305 ft.) below Level tne sur f ace °f the North Sea at Amsterdam, and 0-066

metres (= -216 ft.) below its level at Ostend. A line of levels from Swinemiinde through Eger to the Adriatic showed the mean level of the surface of the Baltic to be 0-499 metres (i-6 ft.) above that of the Adriatic Sea. The mean level of the surface of the Baltic rises about 0-5 metres (i-6 ft.) from the coast of Holstein to Memel, probably as a result of the prevailing westerly winds; this mean difference is exceeded with strong westerly winds, and dis- appears or is reversed with easterly winds. The waves of the Baltic are usually short and irregular, often dangepous to navigation. Destructive waves, probably caused by distant earthquakes, called Seebaren (cf. English ” bores “) have been recorded.

The range of the tides is about one foot at Copenhagen; within the Baltic proper ordinary tides are scarcely perceptible. There is, however, a distinctly marked annual rise and fall due to meteorological influences having a mean range of about 11-4 cm. (0-37 ft.), at Travemiinde, and 13-9 cm. (0-46 ft.) at Swinemiinde, /the maximum occurring at the end of the summer rainy period in August.

The circulation of water in the Baltic proper must beconsidered apart from the circulation in the channels connecting it with the

_. . North Sea; and in this relation the plateau connecting

urcuia- ˆ jgj an(j s poster and Moen with the coast of Mecklen-

”’ burg and Riigen must be taken as the dividing line. In

the great basins and hollows from Riigen to the Gulfs of Bothnia and Finland the upper layers of water, from 30 to 70 metres (16 to 38 fathoms) in thickness, have almost the same salinity throughout. In these waters a vertical circulation is kept up by convection

currents. Beneath these layers are masses of salter water, through which a thermal wave of small amplitude is slowly propagated to the bottom by conduction. These strata are practically stagnant, deficient in oxygen and surcharged with carbonic acid. Their salter waters must have been originally derived from outside, and must therefore have passed over the plateau between Falster and Mecklenburg, but their horizontal extension is checked by the ridges separating the deep hollows in the Baltic from each other. The in- flow to the deep basins is intermittent, probably with a long period of flux and reflux.

The circulation in the channels connecting the Baltic proper with the North Sea is of a complex character. It is necessary in the first place to distinguish clearly between outflowing and inflowing waters; in practice this is easily done, as the outflowing water always contains less than 30 parts pro mille of salt, and the inflowing water more than 32 pro mille. The Baltic receives much more water by rainfall, discharge of rivers, &c, than it loses by evaporation; hence a surplus must be got rid of by an outflowing current which may be named the ” Baltic Stream.” The following general laws may be laid down with regard to this : — ■

1. That the Baltic Stream must be a surface current, because it originates from a redundancy of fresh water.

2. That, on account of the earth’s rotation, the main part of the Baltic Stream must keep close to the coast of the Scandinavian peninsula.

3. That it must be a periodic stream, because the discharge of the rivers into the Baltic varies with the season of the year. In spring and summer the water from the Baltic is sufficiently abun- dant to inundate the whole surface of the Kattegat and Skagerrak, but in winter the sources of the Baltic current are for the most part

dried up by the freezing of the land water.

All the waters which enter the Skagerrak or Kattegat as undercurrents can be found at the surface of the North Sea (q.v.). They may be divided according to their origin and salinity as follows: —

(a) Ocean water of 35 pro mille salinity or more.

(b) North Seawatex, the predominant water in the North Sea area, of 34 to 35 pro mille salinity.

(c) Bank water, 32 to 34 pro mille, which forms a broad edging covering the coast banks of Holland, Germany, Denmark and Norway.

The deepest water stratum in the Skagerrak is certainly of oceanic origin; it has been found to suffer changes of long period, and it is probably not always composed of water derived from the same part or the same depth of the North Atlantic; this water is, as a rule, deficient in oxygen. The ” North Sea ” water, of 34 to 35 pro mille salinity, does not appear at the surface in the Skagerrak, except as a strip along part of the coast of Jutland, but it is always found as an undercurrent overlying the oceanic water. It enters into all the deep coast channels, and into the Christiania fjord, but it is not always found in the deep channels of the Kattegat. The principal time of inflow of North Sea water is during_ spring and summer. The bank- water of 32 to 34 pro mille salinity is found all along the continental coast of the North Sea and North Atlantic/and it may therefore enter the Skagerrak either from the North Sea or from the north along the coast of. Norway. It is probable indeed that an influx of this water occurs from both directions — in August and September from the south, and in the late winter and early spring from the north. The seasonal changes in the distribution of the bank-waters in different parts of the coast are too complex to be briefly explained; their relations to the times of occurrence of various fisheries of the region present many remarkable features, which have been investigated in recent years by the Swedish Commission.

On the west and south coasts of Sweden, arid in the Skagerrak south-east of Norway, navigation is interfered with by ice only in severe winters, and then the ice is usually drifting, comoact sea-ice being very rare. Between Stockholm and Visby navigation

usually ceases at the end of December and begins again about the 10th of April. During very severe winters the Aland Sea is covered with thick ice available for traffic. The south part of the Gulf of Bothnia is covered with ice every winter along the coasts, but rarely,: if ever, in its central part. Navigation is interrupted by drifting ice from about the middle of November to the beginningof May, though the port of Hernosand has been known to remain open during a whole winter. The northern Quarken is covered with traversable ice every third or fourth year. The northern part of the Gulf of Bothnia is frozen every winter. In the Gulf of Finland the sea is closed to navigation by ice for about 150 day's in the year; but navigation is rendered possible throughout the winter by the use of ice-breakers.

See references to different parts of the subject in the standard books of A. Penck, A. de Lapparent, E. Suess and others. Also Credner, Die Entstehung der Ostsee (Leipzig, 1895); G. de Geer, Om Skandinaviens niv&f ordndringar under quartarperioden (Stockholm, 1888); R. Sieger, Seeenschwankungen und Strandverschiebungen in Skandinavien (Berlin, 1.893) : O-Pettersson, " Review of Swedish Hydrographic Research," Scottish Geographical Magazine (1894); N. Ekholm, Om klimatets andringar i geologisk och historisk tid. Ymer (Stockholm, 1899); Publications of the International Council for the Study of the Sea (Copenhagen, since 1902). (H. N. D.)

BALTIMORE, GEORGE CALVERT, ist Baron (c. 1580-1632), English statesman, son of Leonard Calvert, and Alice, daughter of John Crosland of Crosland, was born at Kipling in Yorkshire and educated at Trinity College, Oxford. After travelling on the continent, he entered the public service as secretary to Robert Cecil, afterwards earl of Salisbury. In 1606 he was appointed clerk of the crown in Connaught and Clare, in 1608 a clerk of the council, and was returned to parliament for Bossiney in 1609. He assisted James I. in his discourse against Vorstius, the Arminian theological professor of Leiden, and in 161 3 took charge of the Spanish and Italian correspondence. The same year he was sent on a mission to Ireland to investigate grievances. For these services he was rewarded by knighthood in 161 7, followed by a secretaryship of state in 1619 and a pension of £2000 a year in 1620. He represented successively Yorkshire (1621) and Oxford

University (1624) in the House of Commons, where it fell to him in his official capacity to communicate the king's policy and to obtain supplies. He was distrusted by the parliament, and was in favour of the unpopular alliance with Spain and the Spanish marriage. Shortly after the failure of the scheme he declared himself a Roman Catholic, and on the 1 2th of February 1625 threw up his office, when he was created Baron Baltimore of Baltimore and received a grant of large estates in Ireland. Henceforth he was seen little in public life and his attention was directed to colonial enterprise, with which his name will be always associated. He had established a small settlement in Newfoundland in 162 1, for which under the name of Avalon he procured a charter in 1623, and which he himself visited in 1627. In consequence of disputes and the' unsuitable nature of the climate he sailed thence for Virginia, but was forbidden to settle there unless he took the oaths of allegiance and supremacy. He returned home, and died on the 15th of April 1632 before a new concession was secured, the charter of Maryland passing the great seal on the 20th of June 1632 in favour of his son Cecilius, second Lord Baltimore, who founded the colony. Baltimore married Anne, daughter of George Mynne of Hurlingfordbury, Hertfordshire, by whom he had six sons and five daughters. He wrote Carmen funebre in D. Hen. Untonum (1596); The Answer to Tom Tell-Troth . . . (1642) is also attributed to him, and Wood mentions Baltimore as having composed " something concerning Maryland." His letters are to be found in various publications, including Strafford's Letters, Clarendon State Papers and the Calendars of State Papers.

Bibliography. — George and Cecilius Calvert by William Hand Browne (1890) ; article by C. H. Firth in the Diet, of Nat. Biog. with references there given; Wood's Athenae Oxonienses (Bliss) ii. 522; Doyle's, The English in America; Discourse on the Life and Character of Sir G. Calvert by J. P. Kennedy (1845), with the Review and the Reply to the same; London Magazine, June 1768; "Sir G. Calvert," by L. W. Wilhelm (Maryland Hist. Soc, 14th April 1884) ; The Nation, vol. 70, p. 95 ; American Historical Review, vol. 5, p. 577.

BALTIMORE, a city and seaport, and the metropolis of Maryland, U.S.A., the 7th city in population in the United States. It is at the head of tide-water on the Patapsco river and its middle and north-west branches where they form an estuary 12 m. from the entrance of their waters into Chesapeake Bay, in lat. 39 17′ N. and long. 76 37′ W., about 172 m. by water from the Atlantic

Ocean, 40 m. by railN.W. from Washington, 26 m. N. by W. from Annapolis, 97 m. S.W. from Philadelphia, and 184 m. from New York. Pop. (1890) 434,439; (1900) 508,957 of whom 79,258 were negroes, and 68,600 foreign-born (of these 33,208 were natives of Germany, 10,493 0I Russia, 9690 of Ireland, 2841 of England, 2811 of Poland, 2321 of Bohemia and 2042 of Italy); (1910, census) 558,485.. It is served by the Baltimore & Ohio, the Philadelphia, Baltimore & Washington (the Pennsyl- vania system), the Baltimore & Annapolis Short Line, the Baltimore, Chesapeake & Atlantic; the Northern Central; the Western Maryland and the Maryland & Pennsylvania railways; and by steamship lines running directly to all the more important ports on the Atlantic coast of the United States, to ports in the West Indies and Brazil, to London, Liverpool, Southampton, Bristol, Leith, Glasgow, Dublin, Belfast, Havre, Antwerp, Rotterdam, Bremen, Hamburg and other European ports.

The city extends nearly 65 m. from E. to W., and except on the W. side a little more than 5 m. from N. to S., covering an area of about 32 sq. m. The ground on which it is built is for the most part gently rolling; originally some portions were swampy and others were marked by precipitous heights, but the swamps have been drained and filled and the heights rounded off, Jones's Falls, a small stream shut in between granite walls several feet in height, crosses the N. boundary line a short distance W. of its middle, flows S. E. to the S.E. corner of the main business quarter, and there meets the north-west branch of the Patapsco, in which lies the harbour, defended at its entrance by the historic Fort McHenry, built at the S.E. extremity of Locust Point, an irregular peninsula extending S.E., on which are grain-elevators and a number of wharves, including those of the Baltimore & Ohio railway.

That part of the city which lies E. of Jones's Falls is known as East Baltimore, and is in turn nominally divided into Fells' Point to the S. and E., now a shipbuilding and manufacturing quarter, and Old Town to the N. and W. In the Old Town still remain a few specimens of eighteenth century architecture, including several old-fashioned post-houses, which used to furnish entertainment for travellers starting for the Middle West by way of the old Cumberland Road beginning at Fort Cumber- land, and from Baltimore to Fort Cumberland by a much older turnpike. The more inviting portion of the modern city lies on the western side of Jones's Falls, and the principal residential districts are in the northern half of the city. A little S. from the centre of the city,

Baltimore Street, running E. and W., and Charles Street, running N. and S., intersect; from this point buildings on these two streets are numbered N., S., E. and W., while buildings on other streets are numbered N. and S. from Baltimore Street and E. and W. from Charles Street. Baltimore Street is the chief business thoroughfare; S. of it as well as a little to the N. is the wholesale, financial and shipping district; while West Lexington Street, a short distance to the N., and North Howard and North Eutaw Streets, between Fayette and Franklin Streets, have numerous department and other retail stores. In North Gay Street also, which runs N.E. through East Baltimore, there are many small but busy retail shops. North Charles Stieet, running through the district in which the more wealthy citizens live, is itself lined with many of the most substantial and imposing residences in the city. Mount Vernon Place and Washington Place, intersecting near the centre of the city, Eutaw Place farther N.W., and Broadway running N. and S. through the middle of East Baltimore, are good examples of wide streets, having squares in the middle, adorned with lawns, flower-beds and fountains.

The buildings of the principal business quarter have been erected since 1904, when a fire which broke out on Sunday the 7 th of February destroyed all the old ones within an area of 150 acres. Within a year after the fire, however, 225 places of business were again occupied and 170 more were building. A city ordinance prohibited the erection of any building more than 185 ft. in height, and prescribed a uniform height for those in the same neighbourhood; a large portion of the new buildings are of either three or four storeys, but a few tall ones range from ten to sixteen. The principal materials of which they are built are limestone, granite, marble and bricks, and terra-cotta of various colours.

The city hall, the post-office and the court-house, standing in a row, and each occupying a separate block along E. Fayette Street in almost the exact centre of the city, are three of Balti- more's most imposing buildings, and all of them narrowly escaped destruction by the great fire. The city hall, completed in 1875, in the Renaissance style, consists of a centre structure of four storeys surmounted by an iron dome 260 ft. high, and two connect- ing wings of three storeys surmounted by a mansard roof; the entire outer facing is of white Maryland marble. The post-office, completed in 1890, is built of Maine granite. The court-house, completed in 1899, is of white marble, with mural paintings by La Farge, E. H. Blashfield and C. Y. Turner. Two of

the principal library buildings — the Peabody and the Enoch Pratt —

are faced with white marble. Among the churches may be mentioned the Roman Catholic cathedral, surmounted by a dome 125 ft. high — Baltimore being the seat of a Roman Catholic archbishopric, the highest in rank in the United States; the First Presbyterian church (decorated Gothic), with a spire 250 ft. high; the Grace Episcopal church — Baltimore being the seat of a Protestant Episcopal bishopric; the First Methodist Episcopal church; and the synagogues of the Baltimore Hebrew Congregation and the Oheb Shalom Congregation. Other notable buildings are the custom-house, the Masonic Temple, the Maryland Club-house, the Mount Royal station of the Baltimore & Ohio railway, and the buildings of the Johns Hopkins hospital. There are several good bridges across Jones's Falls.

On an elevated site at the intersection of Washington Place — a continuation of N. Charles Street — with Mount Vernon Place standsa white marble monument in honour of George Washington, the eldest of the monuments in his honour in the United States. The corner-stone was laid in 1815 and the monument was completed in 1829. The base is 50 ft. sq. and 24 ft. high; on this stands a Doric column, 25 ft. in diameter at the base and 130 ft. high, which is surmounted by a statue of Washington 16 ft. high. A winding stairway in the interior leads to a parapet at the top. In the square by which the monument is surrounded are also statues of George Peabody by W. W. Story (a replica of the one in London), Roger Brooke Taney by W. H. Rinehart, and John Eager Howard by Emmanuel Fremiet; and bronze pieces representing Peace, War, Force and Order, and a figure of a lion by Antoine L. Barye. The Henry Walters collection of paintings, mostly by modern French artists, and of Chinese and Japanese bronzes, ivory carvings, enamels, porcelain and paintings is housed in the Walters Art Gallery at the S. end of Washington Place; at the south-east corner of the square is the Peabody Institute with its conservatory of music and collection of rare books, of American paintings, and of casts, including the Rinehart collection of the works of William H. Rinehart who was a native of Maryland. In Monu- ment Square near the post-office and the court-house is the white marble Battle Monument,

erected in 1815 to the memory of those who had fallen in defence of the city in the previous year; it is 52 ft. high, the column being in the form of a bundle of Roman fasces, upon the bands of which are inscribed the names of those whom it commemorates; and the whole is surmounted by a female figure, the emblematical genius of the city. To this monument and the one in honour of Washington, Baltimore owes the name ” The Monumental City,” frequently applied to it. A small monument erected to the memory of Edgar Allan Poe stands in the Westminster Presbyterian churchyard, where he is buried; there is another monument to his memory in Druid Hill Park. In Greenmount Cemetery in the north central part of the city are the graves of Junius Brutus Booth, Mme Elizabeth Patterson Bonaparte (1785-1879), the wife of Jerome Bonaparte, Johns Hopkins, John McDonogh and Sidney Lanier.

In 1908 there were in the city under the jurisdiction of the department of public parks and squares 13 parks of 10 acres or more each and 33 squares, and the total acreage of parks was 2188 acres and of squares 86-53 acres. Chief among the parks is Druid Hill Park in the N.W. containing 672-78 acres and famous for its natural beauty. Clifton Park, of 311-26 acres, 2 m. E. of Druid Hill and formerly a part of the Johns Hopkins estate, passed into the possession of the city in 1895. Patterson Park in the extreme S.E., of 125-79 acres, is a favourite resort for the inhabitants of East Baltimore.

Education. — Baltimore ranks high as an educational centre. Johns Hopkins University (?.».) is a leading institution of the United States for graduate study. The Peabody Institute, founded in 1859 by George Peabody, who was for some years a resident of Baltimore, is an important factor in the promotion of science, literature and the fine arts. Goucher College (Meth- odist, 1888) for women, is one of the best institutions of the kind in southern United States. The older of the two state normal schools, opened in 1867, is located here. Morgan College (Methodist), opened in 1876, offers the advantages of a m. 10

college education to the coloured young people. Loyola College, founded in 1852, and various other institutions are for the training of the Catholics.

The/ McDonogh farm school, about 12 m. N.W., with a farm of 835 acres, a printing-office, and carpenter and machine shops prepares poor boys to enter any college in the country. The

institution owes its origin to a bequest left by John McDonogh. Among the professional schools are the university of Maryland and Baltimore University — each of which offers courses in law, medicine and dentistry — the Baltimore Medical College, the College of Physicians and Surgeons, the Woman's Medical College, the Baltimore College of Dental Surgery, the Maryland College of Pharmacy (since 1904 part of the university of Maryland), the Baltimore Law School, St Joseph's Seminary and St Mary's Seminary, which, established by the Society of St Sulpice in 1791, is said to be the oldest Catholic theological seminary in the United States. The city also has a Polytechnic Institute, as well as high schools for white and for coloured pupils. The principal libraries are those of Johns Hopkins University, Peabody Institute, Maryland Historical Society, and the Bar Association; and the Enoch Pratt, the New Mercantile, and Maryland Diocesan (Protestant Episcopal).

The charitable institutions of Baltimore are numerous. Several such institutions supported wholly or in part by the state of Maryland (q.v.) are located here, and besides these there are scores of others. A representative list includes: — • the Charity Organization Society, the primary object of which is to organize the work of the others; the Baltimore Association for the Improvement of the Condition of the Poor, which seeks to discourage indiscriminate alms-giving; the Bay View asylum or city poorhouse; the Children's Aid Society; the Thomas Wilson Fuel-Saving Society, for furnishing coal at low rates; the Woman's Industrial Exchange, for assisting women in need to support themselves; Johns Hopkins hospital, noted for the excellence of its equipment especially for heating and ventilating; Saint Joseph's general hospital; hospital for the women of Maryland of Baltimore city; nursery and child's hospital; Baltimore eye, ear and throat charity hospital; Maryland hospital for the insane; the Sheppard asylum, intended especi- ally for the cure of the insane; the Sheppard and Enoch Pratt hospital; the Baltimore orphan asylum; Saint Vincent's infant asylum; the Thomas Wilson sanatorium for children, intended for children under three years of age, who are suffering from disease, during the warm summer months; the Free Summer Excursion Society, for affording a change of air to the indigent sick; home for the incurables; homes for the aged; homes for friendless children; institutions for the blind; and institutions for the deaf and dumb.

Water for the city taken from Jones's Falls and Gunpowder river a few miles N. of the city limits, is brought through tunnels, and

is stored in eight reservoirs having an aggregate capacity of 2275 million gallons. The whole system is owned by the munici- pality and can furnish about 300 million gallons daily. After the fire $10,000,000 was appropriated for a new sewage system (begun 1906). In 1900 the Maryland legislature empowered the city to borrow $1,350,000 to establish a municipal lighting plant, but in 1909 private concerns still supplied the streets with light.

Commerce. — The harbour, which consists of three parts, is excellent. Its entrance at Fort McHenry is a channel 600 ft. wide, with a minimum draft (1907) of 31 ft. of water. The depth is continued with an increased width for a mile and a quarter to near Fells' Point, where the width is contracted to one-fourth of a mile with a depth of 16 ft. Above this entrance it widens into an ellipse a mile long, half a mile broad and 1 5 ft. deep. The third or inner harbour has a depth of 14 ft. and pene- trates far into the city. Vessels of the largest class can lie at the Locust Point wharves and Canton, and vessels of 4000 tons can use the inner harbour W. of the mouth of Jones's Falls. By 1905 $5,000,000 had been appropriated since the great fire for new docks. In 1908 the city ranked fourth among the Atlantic ports of the United States in the amount of its exports ($82,113,496), and fourth in the amount of its imports ($23,722,045).

2K)Q

BALTIMORE

That Baltimore has grown rapidly as a manufacturing city since 1880 is seen from the fact that in that year there were but 3683 manufacturing establishments, with a total annual product valued at $78,417,304, as compared with 6359 establishments (of which 2274 were Under the factory system) in 1900 producing commodities valued at $161,249,240 ($135,107,626 under the factory system); in 1905 there were 2163 establishments under the factory system with a total annual product valued at $151,546,580, an increase of 12-2% in the five years. The city ranked eighth among the manufacturing centres of the United States, as regards the value of products, in the three successive censuses of 1880, 1890 and 1900. In 1905 it was ninth. Balti- more is noted particularly as the most important centre in the United States of the canning and preserving industry. The output in 1905 ($5,981,541) of the city's establishments for the canning and preserving of fruits and vegetables was 7-7 % of that of the whole United States; in 1900 it had been 15 % of the country's

total. What seems to have been the first oyster-canning establishment in America was built in Baltimore (by a Thomas Kensett) in 1820, and oyster-canning as a distinct industry on a permanent footing was begun here in 1850. The term “cove oysters,” now applied to canned oysters every- where, was originally applied to the oysters found in the coves on the W. side of the Chesapeake Bay, above the mouth of the Potomac. Up to 1900, after which year oyster canneries began to be built in the southern states, especially in Mississippi, Baltimore was the centre of the oyster-canning industry. Baltimore is also a well-known centre for the manufacture of clothing, in which in 1905 ($22,684,656) it ranked fourth among the cities of the United States; for cigar and cigarette-making (1905, $4,360,366); for the manufacture of foundry and machine shop products (1905, $6,572,925), of tinware (1905, $5,705,980), oi shirts (1905, $5,710,783), of cotton-duck (the output of sail- duck being about three-fourths of the total for the United States), bricks (about 150,000,000 annually), and fertilizers; it also manufactures furniture, malt liquors,and confectionery, and many other commodities in smaller amounts. The markets, especially the Lexington market, are noted for the abundance and great variety of their produce. The proximity of coal-mines, the abundance and variety of food supplies furnished by the state, the great quantity and variety of the city’s manufactured goods, the excellent shipping facilities, and the consequent low cost of living, are prominent features of the physical life of the city.

Government. — Although the charter under which Baltimore is governed came into effect as late as 1898, it is only the second one for the city, the first one having been in force for 101 years. The mayor is now elected for a term of four years; he must be at least twenty-five years of age and must have property in the city valued at $2000 or more, on which he shall have paid taxes for two years preceding his election. Great responsibility is centred upon him by giving him power to appoint the heads of departments and sub-departments, subject to the approval of the second branch of the council, and permitting him to remove at pleasure for six months after an appointment; in appointing a board or commission, however, he is required to choose the members from more than one political party. He has five days in which to veto an ordinance, and an affirmative vote of three-fourths of the members of each branch of the council is required to pass an ordinance over his veto. The council, constituting the legislative department, consists of two branches. The first branch

is composed of one member from each ward, elected for a term of four years; the second branch of two members from each of four districts, and a president elected by the city at large, all for a term of four years; a property qualification is prescribed for members of each branch. All municipal officers are elected in May in order to separate municipal from state and national elections. No street franchise can be granted for a longer term than twenty-five years, and the right to regulate the exercise of each and every franchise is reserved to the mayor and council. A board of estimate, composed of the mayor, the city solicitor, the comptroller, the president of the second branch of the city council, and the president of the board of

public improvements, has control over appropriations, th« council having power to decrease the amount of any item but not to enlarge it. To create a debt for any purpose other than to meet a temporary deficiency, the mayor and council must first obtain the consent of both the state legislature and the city electorate. The department of education is intrusted to an unsalaried board of nine commissioners, appointed by the mayor with the approval of the second branch of the council for a term of six years, three retiring every two years. This board appoints a superintendent, six or more assistant superintendents, and the teachers of the high schools and the Polytechnic Institute, also the other teachers, but only according to the superintendent's recommendation on the basis of merit.

History. — Baltimore was named in honour of the Lords Baltimore, the founders of the province of Maryland, but no settlement was made here until nearly 100 years after the planting of the colony; meanwhile at least two other town- sites, on which it was hoped permanent towns might be estab* lished, had received the same name, but nothing came of either. Finally, however, while the provincial legislature was still engaged in the practice of directing places to be laid out for towns, where, as events proved there was nothing to give these towns more than a mere paper existence, that body in 1729 directed seven commissioners to purchase 60 acres of land on the N. side of the Patapsco and lay it out in sixty equal lots as the town of Baltimore. Three years later, at the instance of the same body, Jones-Town (Old Town) was laid out on the opposite side of Jones's Falls, and in 1745 these two towns were consolidated. About the same time the resources of the interior, for which Baltimore was to become a trade centre, were being rapidly developed by the Germans. Prior to 1752, in which year there

were only twenty-five houses with two hundred inhabitants, the growth of the city had indeed been slow; but only a year or two later wheat loaded in its harbour was for the first time shipped to Scotland; during the war between the French and the English at this time some of the unfortunate Acadians found new homes here; in 1767 Baltimore was made the county seat; by the beginning of the War of Independence its population had grown to 6755; and in 1780 it was made a port of entry. The city early became an important shipping centre; during both the War of Independence and the War of 181 2 many privateers were sent out from it, and in the interval between these wars, the ship-owners of Baltimore had their share in the world's carrying trade, the " Baltimore clippers " becoming famous. In 1797 Baltimore received its first charter, having been governed until then from Annapolis and through commissions with very limited powers; at the same time the Fells' Point settlement, founded about 1730 by William Fells, a ship carpenter, was annexed. During the War of Independence, the Continental Congress, frightened from Philadelphia in 1776, sat for several weeks in a hall in W. Baltimore Street near Liberty Street; during the same war also fortifications were first erected on the site of the present Fort M'Henry. This fort effectively protected the city in 1814 when attacked by the British, and it was during the attack that Francis Scott Key, detained on one of the British attacking vessels, composed the " Star Spangled Banner." In i860 all three of the candidates opposed to Lincoln — Douglas, Breckinridge and Bell — were nominated here, and here in 1864 President Lincoln was nomi- nated for a second term. The city has been the meeting-place of Other important conventions, and is sometimes called " The Convention City." At the outbreak of the Civil War on the 19th of April 1861, the Sixth Massachusetts regiment, while passing through Baltimore, was attacked by a mob and several men were killed on both sides; in the following month the city was subjected to military rule and so continued until the close of the war. From 1856 to i860 Baltimore was under the control of the American or Know-Nothing party, and suffered greatly from election riots and other disorders, until as a remedy the control of the police system was taken from the mayor and council and exercised by the state government. Soon after the Civil War a Democratic " machine " got firm control of the city,

and although a struggle to overthrow the machine was begun in earnest in 1875 by a coalition of the reform clement of the Democratic party with the Republican party, it was not till 1895 that the coalition won its first decisive victory at the polls. Even then the efforts of the Republican mayor were at first thwarted by the council, which passed an ordinance over his veto, taking from him the power of appointment and vesting it in themselves; the Maryland court of appeals, however, soon decided that the council had exceeded its powers, and an im- portant outcome of the reform movement was the new charter of 1898. Annexations of suburban territory in 1888 and 1890 greatly increased the area of the city.

Authorities. — J. H. Hollander, Guide to the City of Baltimore (Baltimore, 1893); T. P. Thomas, "The City Government of Baltimore " (in Johns Hopkins University Studies in Historical and Political Science, Baltimore, 1896) ; St G. L. Sioussat, "Baltimore, the Monumental City " (in L. P. Powell, Historic Towns of the Southern States, New York, 1900) ; J. T. Scharf, Chronicles of Baltimore (Baltimore, 1874).

BALTZAR, THOMAS (c. 1630-1663), German violinist, was born at Liibeck. He visited England in 1656 and made a great impression on Evelyn and Anthony Wood. In 1661 he was appointed leader of the king's famous band of twenty-four violins, but his intemperate habits cut short his career within two years. Nothing like his violin-playing had ever been heard in England before, and in all probability the instrumental music of Henry Purcell owes much to its influence.

BA-LUBA, a Bantu negroid race with several subdivisions; one of the most important and cultivated peoples of Central Africa. They are distributed over eight degrees of longitude between Lakes Tanganyika, Mweru and Bangweulu in the east, and the Kasai in the west. In the east, where they are found in the greatest racial purity, they founded the states of Katanga, Urua and Uguha; in the west they have intermixed to some extent with the Ba-Kete aborigines, whom they have partially dispossessed, dividing them into two portions, one to the north, the other to the south. To the western Ba-Luba the name Ba-Shilange has been given. With the Ba-Luba are connected the founders of the great Lunda empire — now divided between Belgian Congo and Angola — ruled by a monarch entitled Muata Yanvo (Jamvo). The westward movement of the Ba-Luba took place in comparatively recent times, the end of the 18 th century or the beginning of the 19th.

Shortly afterwards a chief named Kalamba Mukenge founded a large state. There followed in 1870 a remarkable politico-religious revolution, the result of which was the establishment of a cult of hemp-smoking, connected with a secret society termed Bena Riamba; the members of this abandoned their old fetish worship and adopted a form of communism of which the central idea was the blood- brotherhood of all the members. Towards the east hemp- smoking becomes less common.

The Ba-Luba practise circumcision and scar-tattooing is common; tooth-filing is very frequent in the east, though in the west it is comparatively rare; the fashion of dressing the hair is very varied and often extremely fantastic. Their houses, which are built by the women, are rectangular; on the Lulua, however, pile-houses, square in shape, are found. They are an agricultural people, but work in the fields is relegated to the women and slaves; the men are admirable craftsmen and are renowned for their wood-carving, cloth-weaving and iron-work. In the west, bows and arrows are the chief weapons, in the east spears principally are used. The old form of religion still obtains in the east, which was untouched by the communistic movement mentioned, and charms of all sorts, as well as carved anthropo- morphic figures, are extremely common. The Ba-Luba are a fine race physically and seem very prosperous, though in the extreme west considerable deterioration, physical, moral and cultural, has taken place.

BALUCHISTAN, a country within the borders of British India which, like Afghanistan, derives its name from its dominant race of inhabitants. It extends from the Gomal river to the Arabian Sea, and from the borders of Persia and Afghanistan to those of the Punjab and Sind, It is divided into two main

divisions, British Baluchistan, which is a portion of British India under the chief commissioner, and the foreign territories under the administration or superintendence of the same officer as agent to the governor-general. The former portion, with an area of 9403 sq. m., consists principally of tracts ceded to the British government by Afghanistan under the treaty of Gandamak (1879), and formally declared to be part of British India in 1887. The second class comprises three subdivisions, namely areas directly administered, native states and tribal areas. The directly-administered districts include areas acquired in various ways. Some portions are held on lease from the khan of Kalat; while others are tribal areas in which it has been decided for various

reasons that revenue shall be taken. ‘ They include the whole of the Zhob and Chagai political agencies, the eastern portion of the Quetta tahsil and other tracts, among which may be mentioned the Bolan Pass, comprising 36,401 sq. m. in all. The whole of the northern boundary, with the north-eastern Corner • and the railway which traverses Baluchistan through Quetta up to New Chaman on the Afghan-Baluch frontier, is therefore in one form or other under direct British control. The remainder of the territory (79,382 sq. m.) belongs to the native states of Kalat (including Makran and Kharan) and Las Bela. Tribal areas, in the possession of the Marri and Bugti tribes, cover 7129 sq. m.

Baluchistan as a whole is a sparsely populated tract covering a larger area than any Indian province save Burma, Madras and Bengal. Three hundred miles of its mountain walls facing the Indus are south of the railway from the Indus to Quetta, and about 250 north of it. The railway with the passes and plains about it, and the dominant hills which surround Quetta, divide Baluchistan into two distinct parts. North of the railway line, hedged in between Afghanistan and the plains of the Indus, stretch the long ridges of rough but picturesque highlands, which embrace the central ranges of the Suliman system (the prehistoric home of thePathanhighlander), where vegetation is of ten alpine, and the climate clear and bracing and subject to no great extremes of temperature. The average breadth of this northern Pathan district is 150 m., but it narrows to less than 100 m. on the line of the Gomal, and expands to more than 200 m. on the line of the railway. Here all the main drainage either runs northwards to the Gomal, passing through the uplands that lie west of the Suliman Range; or it gathers locally in narrow lateral valleys at the back of these mountains and then bursts directly eastwards through the limestone axis of the hills, making for the Indus by the shortest transverse route. South of the railway lies a square block of territory, measuring rcughly 300 m. by 300, primarily the home of the Brahui and the Baluch; but within that block are included almost, every conceivable phase of climate and representatives of half the great races of Asia. Here, throughout the elevated highlands of the Kalat plateau which are called Jalawan, the drainage gathers into channels which cut deep gorges in the hills, and passes eastwards into the plains of Sind. Beyond and south of the hydrographical area of the Jalawan highlands the rivers and streams of the hills either run in long straight lines to the Arabian Sea, north of Karachi, or, curving gradually westwards, they disappear in the inland

swamps which form so prominent a feature in this part of south-west Asia. A narrow width of the coast districts collects its waters for dis- charge into the Arabian Sea direct. This section includes Makran. Baluchistan thus becomes naturally divided into two districts, north and south, by an intervening space which contains the Sind-Pishin railway. This intervening space comprises the wedge-shaped desert of Kach Gandava (Gandava), which is thrust westwards from the Indus as a deep indentation into the mountains, and, above it, the central uplands which figure on the map as " British Baluchistan "—where lies Quetta. All Baluchistan has now been surveyed. From the great Indus series of triangles bases have been selected at intervals which have supported minor chains of triangulation reaching into the heart of the country. These again have been con- nected by links of more or less regularity, so that, if the Baluchistan triangulation lacks the rigid accuracy of a " first

class" system, it at least supports good topography on geo- graphical scales.

From Domandi, at the junction of the Gomal and Kundar rivers, the boundary between Baluchistan and Afghanistan follows the Northern. Kundar stream for about 40 m. to the south-west. It then leaves the river and diverges northwards, so as to include a section of the plain country stretching away towards Lake Ab-i-Istada, before returning to the skirts of the hills. After about 100 m. of this divergence it strikes the Kadanai river, turning the northern spurs of the Toba plateau (the base of the Kwaja Amran (Kojak) Range, and winds through the open plains west of the Kojak. Here, however, the boundary does not follow the river. It deserts it for the western edge of the Toba plateau (8000 ft. high at this point), till it nears the little railway station of New Chaman. It then descends to the plains, returns again to the hills 40 m. south of Chaman, and thenceforward is defined by hill ranges southwards to Nushki. The eastern boundary of this northern section of Baluchistan is the " red line " at the foot of the frontier hills, which defines the border of British India. This part of Baluchistan thus presents a buffer system of independent tribes between the British frontier and Afghanistan. But the independence of the Pathan people south of the Gomal is not as the independence of the Pathans (Waziris, Afridis, &c.) who live

north of it. It is true that the Indian government interferes as little with the internal jurisdiction of the tribal chiefs amongst the Pathans of the Suli- man Range as it does with that of the northern chiefs; but the occupation of a line of posts on the Zhob river, which flanks that range almost from end to end on the west, places the doors of communication with Afghanistan in British hands, and gives com- mand of their hills. It thus tends to the maintenance of peace and order on the southern frontier to a degree that does not exist in the north.

The central range of the Suliman hills is the dominant feature in the geography of northern Baluchistan. The central line or axis of the range lies a little east of the meridian of 70 E., and it is geo- logically composed of one or more great folds of the Cretaceous series. Towards the northern extremity of the range occur a group of peaks, which together form an oblong block or "' massif ' amongst the neighbouring ridges known as " Kaisargarh " amongst the Sherani clansmen who occupy it; and as the " Takht- i-Suliman " (Solomon's throne), generally, on the frontier, from the fact of a celebrated shrine of that name existing near its southern abutment. The massif of the Takht is a high tableland (about 8000 ft. above sea-level), bounded on its eastern and western edges by high, rugged and steep parallel ridges. The western ridge culminates on the north in the peak of Kaisargarh (11,300 ft.), and the eastern in a block, or detached headland, on the south, where rests the immortal " zirat " or shrine (11,070 ft.). This tableland is formed by a huge cap of coral limestone, estimated by Griesbach at from 4000 to 5000 ft. in thickness. At each end the tableland is rent by gorges which deepen, amidst stupendous precipices, to the channel of the Draband or " Gat " on the north, and of the Dhana on the south. These two channels carry the rush of mountain streams from the western slopes of the massif right across the axis of the mountains and through the intervening barrier of minor ridges to the plains of the Indus. The plateau is covered with a fairly thick growth of the chilghosa or " edible " pine, and a sprinkling of juniper, on the higher slopes. It was ascended and surveyed for the first time in 1883.

From the summit of the Kaisargarh peak a magnificent view is obtained which practically embraces the whole width of northern Baluchistan. Westwards, looking towards Afghanistan, line upon line of broken jagged ridges and ranges, folds in the Cretaceous series overlaid by coarse sandstones and shales, follow each other in order, preserving their approximate parallelism until they touch the borders of Baluchistan. Immediately on the west

of the Kaisar- garh there towers the Shingarh Mountain, a geological repetition of the Kaisargarh ridge, black with pines towards the summit and crowned with crags of coral limestone. Beyond it are the grey out- lines of the close-packed ridges which enclose the lower reaches of the Zhob and the Kundar. As they pass away southwards this grid- iron formation strikes with a gentle curve westwards, the narrow enclosed valleys widening out towards the sources of the rivers, where ages of denudation have worn down the folds and filled up the hollows with fruitful soil, until at last they touch the central water- . divide, the key of the whole system, on the Quetta plateau. Thus the upper parts of the Zhob valley are comparatively open and fertile, with flourishing villages, and a cultivation which has been greatly developed under British rule, and are bounded by long, sweeping, gentle spurs clothed with wild olive woods containing trees of immense size. The lower reaches of the Zhob and Kundar are hemmed in by rugged limestone walls, serrated and banded with deep clefts and gorges, a wilderness of stony desolation. Looking eastwards from the Kaisargarh, one can again count the backs of innumerable minor ridges, smaller wrinkles or folds formed during a process of upheaval of the Suliman Mountains, at the close of a great volcanic epoch which has hardly yet ceased to give evidence of its existence. On the outside edge, facing the Indus plains, is a more strictly regular, but higher and more rugged, ridge of hills which marks the Siwaliks. The Baluch Siwaliks afford us strange

glimpses into a recent geological past, when the same gigantic mam- mals roamed along the foot of these wild hills as once inhabited the tangled forests below the Himalaya. Between the Takht Mountain and the Siwaliks, the intervening belt of ridge and furrow has been greatly denuded by transverse drainage— a system of drainage which we now know to have existed before the formation of the hills, and to have continued to cut through them as they gradually rose above the plain level. Where this intervening band is not covered by recent gravel deposits, it exhibits beds of limestone, clays and sandstone with fossils, which, in age, range from the Lower Eocene to the Miocene. Beyond the Siwaliks, still looking eastwards, are the sand waves of the Indus plain; a yellow sea broken here and there with the shadow of village orchards and the sheen of cultivation, extending to the long black sinuous line which denotes the fringe of trees bordering the Indus. Such is the scene which Solomon is said to have invited his Indian bride to gaze upon for the last

time, as they rested on the crags of the southern buttress of the Takht — where his shrine exists to this day. To that shrine thousands of pilgrims, Mahommedans and Hindus alike, resort on their yearly pilgrimages, in spite of its dangerous approach. All this country, so far, is independent Baluchistan within the jurisdiction of the Baluchistan Agency, with the exception of certain clans of the Sheranis on the eastern slopes of the Takht-i-Suliman, north of the Vihowa, who are under the North- West Frontier Province adminis- tration. Wedged in between the railway and the Indus, but still north of the railway, is a curious mass of rough mountain country, which forms the southern abutment of the Suliman system. The strike of the main ridges forming that system is almost due north and south till it touches 30° N. lat. Here it assumes a westerly curve, till it points north-west, and finally merges into the broad band of mountains which hedge in the Quetta and Pishin uplands on the north and east.

At this point, as might be expected, are some of the grandest peaks and precipices in Baluchistan. Khalifat on the east of Quetta, flanking the Harnai loop of the Sind-Pishin railway; Takatu to the north ; Chahiltan (Chiltan) on the south-west ; and the great square- headed Murdar to the south — all overlook the pretty cantonment from heights which range from 10,500 to 11,500 ft. Lying in the midst of them, on an open plain formed by the high-level tributaries of the Lora (which have also raised the Pishin valley to the north), 5500 ft. above the sea, is Quetta. The mass of twisted flexures, the curved wrinkles that end the Suliman system, is occupied by true Baluchis, the Marri and Bugti sections of the great Rind confedera- tion of tribes owning an Arabic origin. There are no Pathans here. To the north of them are the Bozdars, another Rind clan ; and these Rind tribes form the exception to the general rule of Pathan occupa- tion of northern Baluchistan. Amongst the Pathans, the Kakars and Dumars of Pishin, with the Mando Khel of Zhob, are the most prominent tribal divisions.

The curved recession of the Suliman Ranges to the north-west leaves a space of flat alluvial desert to the south, which forms a sort of inlet or bay striking into the Baluchistan mountain Central system. The point of this desert inlet receives the drainage of two local basins, the Bolan and the Nari. Both drain south-eastwards from the central Quetta-Pishin plateau and both have served for railway alignment. Being fed by tributaries which for the most part drain narrow valleys where gradual denudation has washed bare the flat-backed slopes of limestone ridges, and

which consequently send down torrents of rapidly accumulating rainfall, both these central lines of water-course are liable to terrific floods. The drainage of the Bolan and Nari finally disappears in the irrigated flats of the alluvial bay (Kach Gandava), which extends 130 m. from the Indus to Sibi at the foot of the hills, and which offers (in spite of periodic Indus floods) an opportunity for railway approach to Baluchistan such as occurs nowhere else on the frontier. Kach Gandava, whilst its agricultural development has in no way receded, is now rivalled by many of the valleys of the highlands. Its climate debars it from European occupation. It is a land of dust-storms and poisonous winds; a land where the thermometer never sinks below 100° F. in summer, and drops below freezing-point in winter; where there is a deadly monotony of dust-coloured scenery for the greater part of the year, with the minimum of rain and the maximum of heat. The Quetta and Pishin plateau to which it leads is the central dominant water-divide of Baluchistan and the base of the Kandahar highway.

An irregularly-shaped block of upland territory, which includes all the upper Lora tributaries, and the Toba plateau beyond them; resting on the Kwaja Amran (Kojak) Range (with an British. advanced loop to include the Chaman railway terminus) on the west; reaching south through Shorarud to Nushki; includ- ing the basins of the Bolan and Nari as far as Sibi to the south-east; stretching out an arm to embrace the Thai Chotiali valley on the east, and following the main water-divide between the Zhob and Lora on the north, is called British Baluchistan. It is leased from Kalat, and forms a distinctive province, being brought under the ordinary forms of civil administration in British India. Beyond it, north and south, lies independent Baluchistan, which is under British political control. Its administrative staff is usually composed of military officers. The degree of independence enjoyed by the various districts of Baluchistan may be said to vary in direct proportion to their

distance from Quetta. No part of Baluchistan is beyond the reach of the political officer, but there are many parts where he is not often seen. The climate of British Baluchistan is dry and bracing — even exhilarating — but the extremes of temperature lead to the develop- ment of fever in very severe forms. On the whole it

is favourable to European existence.

South-west of the dividing railway lies the great block of Southern Baluchistan. Within this area the drainage generally trends south Southern. an< ˆ west, either to the Arabian Sea or to the central swamps of Lora and Mashkel. The Hab river, which forms the boundary west of Karachi; the Purali (the ancient Arabus), which drains the low-lying flats of Las Bela ; the Hingol (the ancient Tomerus) and the Dasht, which drain Makran, are all considerable streams, draining into the Arabian Sea and forming important arteries in the network of internal communication. An exception to the general rule is found in the Mulla, which carries the floods of the Kalat highlands into the Gandava basin and forms one of the most important of the ancient highways from the Indus plains to Kandahar. The fortress of Kalat is situated about midway between the sources of the Bolan and the Mulla, near a small tributary of the Lora (the river of Pishin and Quetta), about 6800 ft. above sea-level, on the western edge of a cultivated plain in the very midst of hills. (See Kalat.) To the north are the long sweeping lines of the Sara wan ridges, enclosing narrow fertile valleys, and passing away to the south-west to the edge of the Kharan desert. East and south are the rugged bands of Jalawan, amongst which the Mulla rises, and through which it breaks in a series of magnificent defiles in order to reach the Gandava plain. Routes which converge on Kalat from the south pass for the most part through narrow wooded valleys, enclosed between steep ridges of denuded hills, and, following the general strike of these ridges, they run from valley to valley with easy grades. Kalat is the " hub " or centre, from which radiate the Bolan, the Mulla and the southern Lora affluents; but the Lora drains also the Pishin valley on the north ; the two systems uniting in Shorawak, to lose themselves in the desert and swamps to the west of Nushki, on the road to Seistan. Sixty miles south of Kalat, and beyond the Mulla sources, commences another remarkable hydrographic system which includes all southern and south-western Baluchistan. To the west lies the Kharan desert, with intermittent river channels enclosed and often lost in sand-waves ere they reach the Mashkel swamps on the far borders of Persia. To the south-west are the long sweeping valleys of Rakshan and Panjgur, which, curving northwards, likewise discharge their drainage into the Mashkel. Directly south are the beginnings of the meridional arteries, the Hab, the Purali and the Hingol, which end in the Arabian Sea, leaving a space of mountainous seaboard (Makran) south of the

Panjgur and west of the Hingol, which is watered (so far as it is watered at all) by the long lateral Kej river and several smaller mountain streams. Thus southern Baluchistan comprises four hydrographical sections. First is the long extension from Kalat, southwards, of that inconceivably wild highland country which faces the desert of Sind, the foot of which forms the Indian frontier. This is the land of the Brahui, and the flat wall of its frontier lime- stone barrier is one of the most remarkable features in the configura- tion of the whole line of Indian borderland. For the first 60 m. from the sea near Karachi the Hab river is the boundary of Sind, and here, across the enclosing desolation of outcropping ridges and intervening sand, a road may be found into Makran. But from the point where the boundary leaves the Hab to follow the Kirthar range not a break occurs (save one) in 150 m. of solid rock wall, rising many thousands of feet straight from the sandy plain. The one break, or gorge, which allows the Kej waters to pass, only forms a local gateway into a mass of impracticable hills. Secondly, to the west of this mountain wilderness, stretching upwards from the sea in a wedge form between the Brahui highlands and the group of towering peaks which enclose the Hingol river and abut on the sea at Malan, are the alluvial flats and delta of the Purali, forming the little province of Las Bela, the home of the Las Rajput. In this hot and thirsty corner of Baluchistan, ruled by the Jam or Cham, there is a fairly wide stretch of cultivation, nourished by the alluvial detritus of the Purali and well irrigated. In a little garden to the south of the modern town of Bela (the ancient Armabel) is the tomb of Sir Robert Sandeman, who spent the best part of an energetic and active life in the making of Baluchistan.

The boundary between Baluchistan and Afghanistan, starting from Nushki, cuts across the Lora hamun, leaving the frontier post of Chagai to Baluchistan, and from this point to the boundary. Malik Siah Koh it is based partly on the central moun- tainous water-divide already referred to, and partly runs in straight lines through the desert south of the salt swamps of the Gaud-i-Zirreh. It thus passes 50 m. to the south of the Helmund, entirely shutting off that valley and the approach to Seistan between the Helmund and the Gaud-i-Zirreh (the only approach from the east in seasons of flood) from Baluchistan. But it leaves a connected line of desert route between Nushki and Seistan, which is open in all ordinary seasons, to the south, and this route has been largely de- veloped, posts or serais having been

established at intervals and wells having been dug. There is already a promising khafila traffic along it and the railway has been extended from Quetta to Nushki.

Geology? — The mountain ranges of Baluchistan consist chiefly of Cretaceous and Tertiary beds, which are thrown into a series of folds running approximately parallel to the mountain ridges. The folds are part of an extensive system arranged as if in a festoon hanging southwards between Peshawar and Mount Ararat, but with the outer folds looped up at Sibi so as to form the subsidiary festoon of the Suliman and Bugti Hills. Outside the folds lie the horizontal deposits of the Makran coast, and within them lies the stony desert of north-western Baluchistan. In the broader depressions between the mountain ridges the beds are said to be but little disturbed. Besides the Cretaceous and Tertiary beds, Jurassic rocks are known to take a considerable part in the formation of the hills of British Baluchistan. Triassic beds lie along the south side of the upper Zhob, and Fusulina limestone has also been found there. With the exception of the later Tertiary beds the deposits are mostly marine. But in the upper Cretaceous and lower Tertiary, especially in north-western Baluchistan, there is an extensive development of volcanic tuffs and conglomerates, which are probably contem- poraneous with the Deccan Traps of India. Great masses of syenite and diorite were intruded during the Tertiary period, and within the curve of the folded belt a line of recent volcanic cones stretches from western Baluchistan into eastern Persia. In Baluchistan these volcanoes appear to be extinct; though the Koh-i-Tafdan, beyond the Persian frontier, still emits vapours at frequent intervals. The lavas and ashes which form these cones are mostly andesitic. Mud ” volcanoes ” occur upon the Makran coast, but it is doubtful whether these are in any way connected with true volcanic agencies.

So far as is known, the mineral wealth of Baluchistan is incon- siderable. Coal has been worked in the Tertiary beds along the Harnai route to Quetta, but the seams are thin and the quality poor. A somewhat thick and viscid form of mineral oil is met with at Khattan in the Marri country; and petroleum of excellent quality has been found in the Sherani hills and probably occurs in other portions of the Suliman Range. Sulphur has long been worked on a small scale in the Koh-i-Sultan, the largest of the volcanoes of western Baluchistan.

Races. — Within the Baluchistan half of the desert are to be

found scattered tribes of nomads, called Rekis (or desert people), the Mohamadani being the most numerous. They are probably of Arab origin. This central desert is the Kir, Kej, Katz or Kash Kaian of Arabic medieval geography and a part of the ancient Kaiani kingdom; the prefix Kej or Kach always denoting low- level flats or valleys, in contradistinction to mountains or hills. The Mohamadani nomads occupy the central mountain region, to the south of which lie the Mashkel and Kharan deserts, in- habited by a people of quite different origin, who possess some- thing approaching to historical records. These are the Naushir- wanis, a purely Persian race, who passed into Baluchistan within historic times, although the exact date is uncertain. The Naushirwanis appear to be identical with the Tahuki or Tahukani who are found in Perso-Baluchistan. (A place Taoce is mentioned by Nearchus, by Strabo and by Ptolemy.) They are a fine manly race of people, in many respects superior to their modern com- patriots of Iran. Between the Naushirwanis of the Kharan desert and Mashkel, and the fish-eating population of the coast, enclosed in the narrow valleys of the Rakshan and Kej tributaries, or about the sources of the Hingol, are tribes innumerable, remnants of races which may be recognized in the works of Herodotus, or may be traced in the records of recent immigration. Equally scattered through the whole country, and almost everywhere recognizable, is the underlying Persian population (Tajik), which is sometimes represented by a locally dominant tribe, but more frequently by the agricultural slave and bondsman of the general community. Such are the Dehwars orDehkans, and the Durzadas (Derusiaei of Herod, i. 1 2 5) , who extend all through Makran, and, as slaves, are called Nakibs. The Arabs have naturally left their mark most strongly impressed on the ethnography of Baluchistan. All Rind tribes claim to be of Arab origin and of Koraish extraction. As the Arabs occupied all southern Baluchistan and Seistan from a very early date, and finally spread through the Sind valley, where they remained till the 12th century, their genealogical records have become much obscured and it is' probable that there is not

1 See W. T. Blanford, " Geological Notes on the Hills in the neighbourhood of the Sind and Punjab Frontier between Quetta and Dera Ghazi Khan," Mem. Geol. Surv. India, vol. xx. pt. 2 (1883) ; E. Vredenburg, " A Geological Sketch of the Baluchistan Desert, and part of Eastern Persia," Mem. Geol. Surv. India, vol. xxxi. pt. 2 (1901); E. Vredenburg, " On the Occurrence of a Species of Halor- ites in the Trias of Baluchistan," Rec. Geol. Sum.

India, vol. xxxi. (1904), pp. 162-166, pis. 17, 18.

now a pure Arab in the country. It is as builders or engineers that they have established their most permanent records, Makran being full of the relics of their irrigation works constructed in times when the climatic conditions of Baluchistan must have been very different from what they are now. Lower Sind also contains a great wealth of architectural remains, which may be found to the west of the Indus as well as in the delta. One particular tribe (the Kalmats) , who left their name on the Makran coast and subsequently dominated Bela and Sind, west of the Indus, for a considerable period, exhibit great power of artistic design in their sepulchral monuments. The Dravidian races (Brahuis), who are chiefly represented by the Kambaranis and Mingals or Mongals (the latter are doubtless of Tatar origin), spread through southern Baluchistan as well as the eastern hills, and are scattered irregularly through the mountain tracts south of Kharan. The ancient Oreitae mentioned by Arrian are probably represented by the tribe of Hot, who, as original masters of the soil, are exempt from taxation. The name Brahui is (according to Bellew) but a corruption of Ba-rohi (or ” hillmen “) in a language derived from Sanskrit which would represent the same term by Parva-ka. So that the Hapuc&vtoi (Herod, iii. 92) may be recognized as surviving in the Brahui, and in the name (Parkan) of a mountain-bred stream which is a tributary of the Hingol. Amongst other aboriginal tribes to whom reference is made by very early writers are the Boledi, who give their name to the Bolida valley, a tributary of the Kej. The Boledi were once the ruling race of southern Baluchistan, which was originally called Boledistan, and it seems possible that this may be the real origin of the much-disputed name of the country generally. Bola was an Assyrian term for Bael or Bel, the god of the Phoenicians and Druids. The Bol6di ruling family were in 1906 represented by but one living member, a lady, who was agovernmentpensioner. The fast-diminishing Sajidis (Sajittae) and Saka (Sacae) are others of the more ancient races of Baluchistan easily recognizable in classical geography. Most recent of all are the Gitchkis. The Gitchkis derive from a Rajput adventurer who flourished in the early part of the 1 7 th century. They are now the dominant race in Panjgur and Kej, from whence they ousted the Boledis. For three generations they remained Hindus; since then there has

arisen amongst them a strange new sect called Zikari, with exceedingly loose notions of morality. The sect, however, appears to be fast merging into orthodox Mahommedanism. A Baluch (or rather Makran) race which deserves attention is that of the Gadaras, who once gave the name Gadrosia to Southern Baluchistan. According to Tate the Gadaras are now repre- sented by Sidi half-castes— those Makrani ” boys ” who are so well known in the mercantile marine as stokers and firemen. It seems unlikely that this modern admixture of Asiatic and African blood represents the ” Asiatic Ethiopian ” of Herodotus, which was more probably a direct connexion of the Himyaritic Arab builders of ” bunds ” and revetments who spread eastwards from Arabia. Bellew finds in the Gadara the Garuda (eagles) of San- skrit, who were ever in opposition to the Naga (snakes) of Scythic origin. Southern Baluchistan affords a most interesting field for the ethnographer. It has never yet been thoroughly explored in the interests of ethnographical science.

The Baluch character is influenced by its environment as much as by its origin, so that it is impossible to select any one section of the general community as affording a satisfactory sample of popular Baluch idiosyncrasies. They are not a homogeneous race. Peoples of Arab extraction intermixed with people of Dravidian and Persian stock are all lumped together under the name of Baluch. The Marri and Bugti tribes, who occupy the most southern buttresses of the Suliman Mountains, are Rind Baluchis, almost certainly of Arab extraction. They came to Sind either with the Arab conquerors or after them, and remained there mixed up with the original Hindu inhabitants. The Arab type of Baluch extends through the whole country at intervals, and includes all the finest and best of Baluch humanity. Taking the Rind Baluch as the type opposed to the Afridi Pa than, the Baluch is easier to deal with and to control than the Pathan, owing to his tribal organization and his freedom from bigoted

fanaticism or blind allegiance to his priest. The Baluch is less turbulent, less treacherous, less bloodthirsty and less fanatical than the Pathan. His frame is shorter and more spare and wiry than that of his neighbour to the north, though generations have given to him too a bold and manly bearing. It would be difficult to match the stately dignity and imposing presence of a Baluch chief of the Marri or Bugti clans. His Semitic features are those of the Bedouin and he carries himself as straight and as loftily as any Arab gentleman. Frank and open in his manners, fairly truthful, faithful to his word, temperate and enduring, and look-

ing upon courage as the highest virtue, the true Baluch of the Derajat is a pleasant man to have dealings with. As a revenue payer he is not so satisfactory, his want of industry and the pride which looks upon manual labour as degrading making him but a poor husbandman. He is an expert rider; horse-racing is his national amusement, and the Baluch breed of horses is celebrated throughout northern India. Like the Pathan he is a bandit by tradition and descent and makes a first-rate fighting man, but he rarely enlists in the Indian army. He is nominally a Mahomme- dan, but is neglectful of the practices of his religion. The relations of the modern Baluch with the government of India were entirely transformed by the life work of Sir Robert Sandeman.(g.p.).

The strategical position of Great Britain in Baluchistan is a very important factor in the problem of maintaining order and good administration in the country. The ever-restless

Strategic interest

Pathan tribes of the Suliman hills are held in check by the occupation of the Zhob valley; whilst the central dominant position at Quetta safeguards the peace and security of Kalat, and of the wildest of the Baluch hills occupied by the Marris and Bugtis, no less than it bars the way to an advance upon India by way of Kandahar. Nominally all the provinces and districts of Baluchistan, with the exception of the ceded territory which we call British Baluchistan, are under the khan of Kalat, and all chiefs acknowledge him as their suzerain. But it may be doubted if this suzerainty was ever complete, or could be maintained at all but for the assistance of the British govern- ment. The Baluch is still essentially a robber and a raider (a trait which is common to all tribes), and the history of Baluch- istan is nothing but a story of successful robberies, of lawless rapine and bloodshed, for which plunder and devastation were accounted a worthy and honourable return.

Extensive changes have taken place in the climatic condition of the country — changes which are some of them so recent as to be noted by surveyors who have found the remains of forests Climate in districts now entirely desiccated. Possibly the ordinary processes of denudation and erosion, acting on those recent deposits which overlie the harder beds of the older series, may have much to say to these climatic changes, and the wanton destruction of forests may have assisted the efforts of nature ; but

it is difficult to understand the widespread desiccation of large areas of the Baluch highlands, where evidences of Arab irrigation works and of culti- vation still attest to a once flourishing agricultural condition, without appealing to more rapidly destructive principles for the change. There is ample proof throughout the country of alterations of level within recent geologic periods; and there have even been compressions, resulting in a relative rise of the ground, over the crests of anticlinal folds, within historic record. “Proof that this compression is still going on was given on 20th December 1892, when a severe earth- quake resulted from the sudden yielding of the earth’s crust along what appears to be an oid line of fault, west of the Kawaja Amran range, whereby an adjustment took place indicated by a shortening of some 25 ft. on the railway line which crossed the fault.” Nor should the evidences of active volcanic agency afforded by the mud volcanoes of the coast be overlooked. It is probably to climatic changes (whatever their origin may have been), rather than to the effects of tribal disturbances, that the Arab’s disappearance from the field of trade and agriculture must be attributed. The total area of Baluchistan is 132,315 sq. m. and its population in 1901 was 914,551. The population is largely nomadic. The fact that so many as 15,000 camels have been counted in the Popula- Bolan Pass during one month of the annual Brahui ttom migration indicates the dimensions which the movement assumes. The religion of the country is so overwhelmingly Mahom- medan that out of every 100,000 inhabitants 94,403 are Mussulman, and only 4706 Hindus, while the balance is made up by Christians, Sikhs and other denominations. Out of the total number 280 in the thousand are literates. The chief languages spoken are ver- naculars of Baluchistan, Pushtu, Panjabi, Urdu and Sindhi, The

Baluchi language belongs to the Iranian branch of the Aryan sub-family of the Indo-European family. It is divided into two main dialects which are so different that speakers of, the one are almost unintelligible to speakers of the other. These two dialects are separated by the belt of Brahui and Sindhi speakers who occupy the Sarawan and Jalawan hills, and Las Bela. Owing probably to the fact that Makran was for many generations under the rule of the Persian kings, the Baluchi spoken on the west of the province, which is also called Makrani, is more largely

impregnated with Persian words and expressions than the Eastern dialect. In the latter the words in use for common objects and acts are nearly all pure Baluchi, the remainder of the language being borrowed from Persian, Sindhi and Panjabi. There is no indigenous literature, but many specimens of poetry exist in which heroes and brave deeds are commemorated, and a good many of these have been collected from time to time. The philological classification of the Brahui dialect has been much disputed, but the latest enquiries, conducted by Dr G. A. Grierson, have resulted in his placing it among the Dravidian languages. It is remarkable to find in Baluchistan a Dravidian tongue, surrounded on all sides by Aryan languages, and with the next nearest branch of the same family located so far away as the Gond hills of central India. Brahui has no literature of its own, and such knowledge as we possess of it is due to European scholars, such as Bellew, Trumpp and Caldwell. Numerically the Brahuis are the strongest race in Baluchistan. They number nearly 300,000 souls. Next to them and numbering nearly 200,000 are Pathans. After this there is a drop to 80,000 mixed Baluchis and less than 40,000 Lasis (Lumris) of Las Bela. There are thirteen indigenous tribes of Pathan origin, of which the Kakars (q.v.) are by far the most important, numbering more than 100,000 souls. They are to be found in the largest numbers in Zhob, Quetta, Pishin and Thal-Chotiali, but there are a few of them in Kalat and Chagai also. The most important Baluch tribes are the Marris, the Bughtis, the Boledis, the Domkis, the Magassis and the Rinds. Owing partly to the tribal system, and partly to the levelling effect of Islam, nothing similar to the Brahmanical system of social precedent is to be found in Baluchistan.

History— Of the early history of this portion of the Asiatic continent little or nothing is known. The poverty and natural strength of the country, combined with the ferocious habits of the natives, seem to have equally repelled the friendly visits of inquisitive strangers and the hostile incursions of invading armies. The first distinct account which we have is from Arrian, who, with his usual brevity and severe veracity, narrates the march of Alexander through this region, which he calls the country of the Oreitae and Gadrosii. 1 He gives a very accurate account of this forlorn tract, its general aridity and the necessity of obtaining water by digging in the beds of torrents ; describes the food of the inhabitants as dates and fish; and adverts to the occasional occurrence of fertile spots, the abundance of aromatic and thorny shrubs and fragrant plants, and the violence of the

monsoon in the western part of Makran. He notices also the impossibility of supporting a large army, and the consequent destruction of the greater part of the men and beasts which accompanied the expedition of Alexander. In the 8th century this country was traversed by an army of the Caliphate.

The precise period at which the Brahuis gained the mastery cannot be accurately ascertained; but it was probably about two and a half centuries ago. The last raja of the Hindu dynasty found himself compelled to call for the assistance of the mountain shepherds, with their leader, Kambar, in order to check the encroachments of a horde of depredators, headed by an Afghan chief, who infested the country and even threatened to attack the seat of government. Kambar successfully performed the service for which he had been engaged; but having in a few years quelled the robbers against whom he had been called in, and finding himself at the head of the only military tribe in the country, he formally deposed the raja and assumed the government.

The history of the country after the accession of Kambar is as obscure as during the Hindu dynasty. It would appear, however, that the sceptre was quietly transmitted to Abdulla Khan, the fourth in descent from Kambar, who, being an intrepid and ambitious soldier, turned his thoughts towards the conquest of Kach Gandava, then held by different petty chiefs under the authority of the nawabs of Sind.

After various success, the Kambaranis at length possessed themselves of the sovereignty of a considerable portion of that

1 See V. A. Smith, Early Hist, of India (ed. 1908), p. 103 seq.

fruitful plain, including the chief town, Gandava. It was during this contest that the famous Nadir Shah advanced from Persia to the invasion of Hindustan; and while at Kandahar he despatched several detachments into Baluchistan and estab- lished his authority in that province. Abdulla Khan, however, was continued in the government of the country by Nadir's orders; but he was soon after killed in a battle with the forces of the nawabs of Sind. He was succeeded by his eldest son, Haji Mahommed Khan, who abandoned himself to the most tyrannical and licentious way of life and alienated his subjects by oppressive taxation. In these circumstances Nasir. Khan, the second son of Abdulla Khan, who had accompanied the

victorious Nadir to Delhi, and acquired the favour and confidence of that monarch, returned to Kalat and was hailed by the whole population as their deliverer. Finding that expostulation had no effect upon his brother, he one day entered his apartment and stabbed him to the heart. As soon as the tyrant was dead, Nasir Khan mounted the musnud amidst the universal joy of his subjects; and immediately transmitted a report of the events which had taken place to Nadir Shah, who was then encamped near Kandahar. The shah received the intelligence with satisfaction, and despatched a firman, by return of the messenger, appointing Nasir Khan beglar begi (prince of princes) of all Baluchistan. This event took place in the year 1739.

Nasir Khan proved an active, politic and warlike prince. He took great pains to re-establish the internal government of all the provinces in his dominions, and improved and fortified the city of Kalat. On the death of Nadir Shah in 1747, he acknowledged the title of the king of Kabul, Ahmad Shah (Durani). In 1758 he declared himself entirely independent; upon which Ahmad Shah despatched a force against him under one of his ministers. The khan, however, raised an army and totally routed the Afghan army. On receiving intelligence of this discomfiture, the king himself marched with strong rein- forcements, and a pitched battle was fought in which Nasir Khan was worsted. He retired in good order to Kalat, whither he was followed by the victor, who invested the place with his whole army. The khan made a vigorous defence; and, after the royal troops had been foiled in their attempts to take the city by storm or surprise, a negotiation was proposed by the king which terminated in a treaty of peace. By this treaty it was stipulated that the king was to receive the cousin of Nasir Khan in marriage; and that the khan was to pay no tribute, but only, when called upon, to furnish troops to assist the armies, for which he was to receive an allowance in cash equal to half their pay. The khan frequently distinguished himself in the subsequent wars of Kabul; and, as a reward for his services, the king bestowed upon him several districts in perpetual and entire sovereignty. Having succeeded in quelling a dangerous rebellion headed by his cousin Bertram Khan, this able prince at length died in extreme old age in the month of June 1795, leaving three sons and five daughters. He was succeeded by his eldest son, Mahmud Khan, then a boy of about fourteen years. During the reign of this prince, who has been described as a very humane and indolent man, the country was distracted by sanguinary broils; the governors of several

provinces and districts withdrew their allegiance; and the dominions of the khans of Kalat gradually so diminished that they now com- prehend only a small portion of the provinces formerly subject to Nasir Khan.

In 1839, when the British army advanced through the Bolan Pass towards Afghanistan, the conduct of Mehrab Khan, the ruler of Baluchistan, was considered so treacherous and dangerous as to require " the exaction of retribution from that chieftain," and " the execution of such arrangements as would establish future security in that quarter." General Willshire was accord- ingly detached from the army of the Indus with 1050 men to assault Kalat. A gate was knocked in by the field-pieces, and the town and citadel were stormed in a few minutes. Above 400 Baluches were slain, among them Mehrab Khan himself; and 2000 prisoners were taken. Subsequent inquiries have, however, proved that the treachery towards the British was not

on the part of Mehrab Khan, but on that of his vizier, Mahommed Hussein, and certain chiefs with whom he was in league, and at whose instigation the British convoys were plundered in their passage through Kach Gandava and in the Bolan Pass. The treacherous vizier, however, made our too credulous political officers believe that Mehrab Khan was to blame; his object being to bring his master to ruin and to obtain for himself all power in the state, knowing that Mehrab's successor was only a child. How far he succeeded in his object history has shown. In the following year Kalat changed hands, the governor estab- lished by the British, together with a feeble garrison, being overpowered. At the close of the same year it was reoccupied by the British under General Nott. In 1841 Nasir Khan II., the youthful son of the slain Mehrab Khan, was recognized by the British, who soon after evacuated the country.

From the conquest of Sind by the British troops under the command of General Sir Charles Napier in 1843 up to 1854 no diplomatic intercourse occurred worthy of note between the British and Baluch states. In the latter year, however, under the governor-generalship of the marquess of Dalhousie, General John Jacob, C.B., at the time political superintendent and commandant on the Sind frontier, was deputed to arrange and

conclude a treaty between the Kalat state, then under the chieftainship of Nasir Khan and the British government. This treaty was executed on the 14th of May 1854 and was to the following effect: —

" That the former offensive and defensive treaty, concluded in 1841 by Major Outram between the British government and Nasir Khan II., chief of Kalat, was to be annulled.

" That Nasir Khan II., his heirs and successors, bound themselves to oppose to the utmost all the enemies of the British government, and in all cases to act in subordinate co-operation with that govern- ment, and to enter into no negotiations with other states without its consent.

" That should it be deemed necessary to station British troops in any part of the territory of Kalat, they shall occupy such positions as may be thought advisable by the British authorities.

" That the Baluch chief was to prevent all plundering on the part of his subjects within or in the neighbourhood of British territory.

" That he was further to protect all merchants passing through his territory, and only to exact from them a transit duty, fixed by schedule attached to the treaty ; and that, on condition of a faithful performance of these duties, he was to receive from the British government an annual subsidy of Rs.50,000 (£5000)."

The provisions of the above treaty were most loyally performed by Nasir Khan up to the time of his death in 1856. He was succeeded by his brother, Mir Khodadad Khan, when a youth of twelve years of age, who, however,"did not obtain his position before he had put down by force a rebellion on the part of his turbulent chiefs, who had first elected him, but, not receiving what they considered an adequate reward from his treasury, sought to depose him in favour of his cousin Sher dil Khan. In the latter part of 1857, the Indian rebellion being at its height and the city of Delhi still in the hands of the rebels, a British officer (Major Henry Green) was deputed, on the part of the British government, to reside as political agent with the Khan at Kalat and to assist him by his advice in maintaining control over his turbulent tribes. This duty was successfully performed until 1863, when, during the temporary absence of Major Malcolm Green, the then political agent, Khodadad Khan was, at the

instigation of some of his principal chiefs, attacked while out riding by his cousin, Sher dil Khan, and severely wounded. Khodadad 'fled in safety to a residence close to the British border, and Sher dil Khan was elected and proclaimed Khan. His rule was, however, a short one, for early in 1864, when proceeding to Kalat, he was murdered in the Gandava Pass; and Khodadad was again elected chief by the very men who had only the previous year caused his overthrow, and who had lately been accomplices to the murder of his cousin. After the above events Khodadad maintained his precarious position with great difficulty; but owing to his inability to govern his un- ruly subjects without material assistance from the British government, which they were not disposed to give, his country gradually fell into the greatest anarchy; and, consequently, some of the provisions of the treaty of 1854 having been

broken, diplomatic relations were discontinued with the Kalat state after the end of 1874.

After this the chiefs of Las and Wad, the Marris and Bugtis, Kej and Makran all threw off their allegiance, and anarchy became so widespread that the British government again inter- fered. The treaty of 1854 was renewed in 1876 by Lord Lytton (under Sandeman's advice), and the khan received substantial aid from the government in the form of an annual subsidy of a lakh of rupees, instead of the Rs. 50,000 previously assigned to him. The treaty of 1854 was a treaty cf alliance offensive and defensive. The treaty of 1876 renewed these terms, but utterly changed the policy of non-intervention which was maintained by the former, by the recognition of the sirdars as well as the khan, and by the appointment of the British government as referee in cases of dispute between them. British troops were to be located in the khan's country; Quetta was founded; telegraphs and railways were projected; roads were made; and the reign of law and order established. The nebulous claims of Afghanistan to Sibi and Pishin were disposed of by the treaty of Gandamak in the spring of 1879, and the final consolidation of the existing form of Kalat administration was effected by Sandeman's expedition to Kharan in 1883, and the reconciliation of Azad Khan, the great Naushirwani chief, with the khan of Kalat. British Baluchistan was incorporated with British India by the resolution of 1st November 1887, and divided into two districts — Quetta-Pishin and Thai Chotiali — to be administered by a deputy - commissioner and a regular staff.

In 1890 and 1891 were carried out that series of politico- military expeditions which resulted in the occupation of the Zhob valley, the foundation of the central cantonment of Fort Sandeman, and the extension of a line of outposts which, com- mencing at Quetta, may be said to rest on Wana north of the Gomal. The effect of these expeditions, and of this extension of military occupation, has been to reduce the independent Pathan tribes of the Suliman mountains to effective order, and to put a stop to border raiding on the Indus plains south of the Gomal. In 1893 serious differences arose between the khan of Kalat and Sir James Browne, who succeeded Sir Robert Sandeman as agent to the governor-general in Baluchistan, arising out of Mir Khodadad Khan's outrageous conduct in the management of his own court, and the treatment of his officials. Finally, the khan was deposed, and his son Mir Mahmud Khan succeeded in November 1893. Since then the most important change in Baluch administration has been the perpetual lease and transfer of management to British agency of the Nushki district and Niabat, with all rights, jurisdiction and administrative power, in lieu of a perpetual rent of Rs.9000 per annum. This was effected in July 1899. This secures the direct control of the great highway to Seistan which has been opened to khafila and railway traffic.

The revenues of the khan of Kalat consist partly of subsidies and partly of agricultural revenue, the total value being about Rs.500,000 per annum. Since 1882 he has received Rs.25,000 as government rent for the Quetta district, besides Rs. 30,000 in lieu of transit duties in the Boian; this has been in- creased lately by Rs.9000 as already stated. In 1899 the total imports of Kalat were valued at Rs. 700,000, and the exports at Rs. 505,000.

Authorities. — The Seistan Boundary Report of 1873 by Sir F. Goldsmid; Floyer, Unexplored Baluchistan (London, 1882); T. Thornton, Life of Sandeman (London, 1896); G. P. Tate, Kalat, a Memoir (Calcutta, 1896); Sir T. Holdich, "Ethnographic and Historical Notes on Makran," Calcutta, 1892 {Survey Report); " Antiquities, Ethnography, &c, of Las Bela and Makran," Calcutta, 1894 (Survey Report); " Ancient and Medieval Makran," vol. vii. R.G.S. Journal (1896); " Perso-Baluch Boundary," vol. ix. R.G.S. Journal (1897); M'Mahon, "The Southern Borderland of Afghan- istan," vol. x. Journal R.G.S. (1897). Notes on Sir R. Sandeman's tours in Baluchistan will be found in vols, v., xii., xiii. and xiv. of the R.G.S. Proceedings; Popular Poetry of the Baloches, by M. Longworth-Dames (2 vols., Roy. As. Soc. 1907). (T. H. H.*)

BALUCHISTAN, a province of Persia consisting of the western part of Baluchistan (q.v.) in a wider sense. Persian Baluchistan has an area of about 60,000 sq. m., and lying along the nor- thern shore of the Arabian Sea, is bounded E. by British and

independent Baluchistan, N. by Seistan and the central Persian desert, and W. by Kerman. The country has little water and only a small part of it is under cultivation, the remainder being composed of arid, waterless plains, deserts — some stony, others with moving sands — barren hills and mountains. The principal rivers are the Mashkid and that of Bampur which flow away from the sea and are lost in depressions called hamuns. The rivers which flow into the sea are unimportant and dry during the greater part of the year. Persian Baluchistan forms an administrative division of the province of Kerman and is sub-divided into the following twenty districts: — (1) Bampur; (2) Serhad; (3) Dizek; (4) Jalk; (5) Sib; (6) Irafshan; (7) Magas; (8) Serbaz; (9) Lashar; (10) Champ; (11) Fannuj; (12) Bazman; (13) Aptar; (14) Daman; (15) Aprandagan; (16) Asfehgeh; (17) Surmij; (18) Meskutan; (19) Pushteh; (20) Makran, the country of the Ichthyophagi, with the sub- districts Kasrkand, Geh, Bint, Dasht, Kucheh and Bahu. The total population of Baluchistan is under 200,000. The province was practically independent until the occupation of Bampur by Persian troops in 1849, and over some of the extreme eastern districts Persian supremacy was not recognized until 1872.

BALUE, JEAN (c. 1421-1491), French cardinal and minister of Louis XL, was born of very humble parentage at Angle in Poitou, and was first patronized by the bishop of Poitiers. In 1461 he became vicar-general of the bishop of Angers. His activity, cunning and mastery of intrigue gained him the appreciation of Louis XL, who made him his almoner. In a short time Balue became a considerable personage. In 146s he received the bishopric of Evreux; the king made him le premier du grant conseil, and, in spite of his dissolute life, obtained for him a cardinalate (1468). But in that year Balue was com- promised in the king’s humiliation by Charles the Bold at Peronne and excluded from the council. He then intrigued with Charles against his master: their secret correspondence was intercepted, and on the 23rd of April 1469 Balue was thrown into prison,

where he remained eleven years, but not, as has been alleged, in an iron cage. In 1480, through the intervention of Pope Sixtus IV., he was set at liberty, and from that time lived in high favour at the court of Rome. He received the bishopric of Albano and afterwards that of Palestrina. In 1484 he was even sent to France as legate a latere. He died at Ancona in 1491.

See Henri Forgeot, ” Jean Balue, cardinal d’Angers ” (1895), in the Bibliothique de I’ecole des hautes Studes.

BALUSTER (through the Fr. from the Ital. balaustro, so- called from a supposed likeness to the flower of the fioXahoTiov, or wild pomegranate; the word has been corrupted in English into ” banister “), a small moulded shaft, square or circular, in stone or wood and sometimes in metal, supporting the coping of a parapet or the rail of a staircase, an assemblage of them being known as a balustrade. The earliest examples are those shown in the bas-reliefs representing the Assyrian palaces, where they were employed as window balustrades and apparently had Ionic capitals. They do not seem to have been known to either the Greeks or the Romans, but early examples are found in the balconies in the palaces at Venice and Verona. In the hands of the Italian revivalists they became features of the greatest importance, and were largely employed for window balconies and roof parapets.

The term ” baluster shaft ” is given to the shaft dividing a window in Saxon architecture. In the south transept of the abbey at St Albans, England, are some of these shafts, supposed to have been taken from the old Saxon church. Norman bases and capitals have been added, together with plain cylindrical Norman shafts.

BALUSTRADE, a parapet or low screen consisting of a coping or rail supported on balusters (

BALUZE, ETIENNE (1630-1718), French scholar, was born at Tulle on the 24th of November 1630. He was educated at his native town and took minor orders. As secretary to Pierre de Marca, archbishop of Toulouse, he won the appreciation of that learned prelate to such a degree that at his death Marca left him all his papers. Thus it came about that Baluze produced the first complete edition of Marca’s treatise De libertatibus Ecclesiae Gallicanae (1663), and brought out his Marca hispanica (1688 f.). About 1667 Baluze entered Colbert’s service, and until 1700 was

in charge of the invaluable library belonging to that minister and to his son the marquis de Seignelai. He enriched it prodigiously (see the history of the Colbertine library in the Cabinet des Manuscrits by M. Leopold Delisle, vol. i.), and Colbert rewarded him by obtaining various benefices for him, and the post of king's almoner (1679). Subsequently Baluze was appointed professor of Canon law at the College de France on the 31st of December 1689, and directed that great institution from 1707 to 1710.

The works which place him in the first rank of the scholars of his time are the Capitularia Regwn Francorum (1674; new edition enlarged and corrected in 1780); the Nova Collectio Conciliorum (4 vols., 1677); the Miscellanea (7 vols., 1678-1715; new edition revised by Mansi, 4 vols, f., 1761-1764); the Letters of Pope Innocent III. (1682); and, finally, the Vitae Paparum Avenionensium, 1305-1394 (1693). But he was unfortunate enough to take up the history of Auvergne just at the time when the cardinal de Bouillon, inheritor of the rights, and above all of the ambitious pretensions of the La Tour family, was endeavouring to prove the descent of that house in the direct line from the ancient hereditary counts of Auvergne of the 9th century.

As authentic documents in support of these pretensions could not be found, false ones were fabricated. The production of spurious genealogies had already been begun in the Histoire de la maison d' Auvergne published by Christophe Justel in 1645; and Chorier, the historian of Dauphiny, had included in the second volume of his history (167 2) a forged deed which connected the La Tours of Dauphiny with the La Tours of Auvergne. Next a regular manufactory of forged documents was organized by a certain Jean de Bar, an intimate companion of the cardinal. These rogues were skilful enough, for they succeeded in duping the most illustrious scholars; Dom Jean Mabillon, the founder of Diplomatics, Dom Thierry Ruinart and Baluze himself, called as experts, made a unanimously favourable report on the 23rd of July 1695. But cardinal de Bouillon had many enemies, and a war of pamphlets began. In March 1698 Baluze in reply wrote a Letter which proved nothing. Two years later, in 1700, Jean de Bar and his accomplices were arrested, and after a long and searching inquiry were declared guilty in 1704. Baluze, nevertheless, was obstinate in his opinion. He was convinced that the incriminated documents were genuine and proposed to do JustePs work anew. Encouraged and financially supported by the cardinal de Bouillon, he first produced a Table genialogique in 1705, and then in 1709 a Histoire gintalogique de la maison d"

Auvergne, with “Proofs,” among which, unfortunately, we find all the deeds which had been pronounced spurious. In the following year he was suddenly engulfed in the disgrace which overtook his intriguing patron: deprived of his appointments, pensions and benefices, he was exiled far from Paris. None the less he continued to work, and in 171 7 published a history of his native town, Historiae Tutelensis libri tres. Before his death he succeeded in returning to Paris, where he died uncon- vinced of his errors on the 28th of July 1718. Was he dupe or accomplice? The study of his correspondence with the cardinal gives the impression that he was the victim of clever cheats.

The history of the forgeries committed in the interests of the house of Bouillon forms a curious and instructive episode in the history of_ French scholarship in the time of Louis XIV. It is to be found in the Manuel de diplomatique by A. Giry ; and above all in a note to the CEuvres de Saint-Simon by M. de Boislisle (vol. xiv. PP- 533-55 8) • The bibliography of Baluze’s researches has been made by M. Rene Fage (1882, 1884) and his Life told by M. Emile Fage (1899). To these we must add an amusing book by G. Clement- Simon, La Gaieti de Baluze; documents biographiques et litteraires

(1888). Baluze’s will has been published by M. Leopold Delisle {Bibliotheque de Vftcole de Charles, 1872) ; his papers are now in the Bibliotheque Nationale in Paris, and in the Bibliotheque de l’Arsenal {Revue historique, t. xcviii. p. 309). See also the article by Arthur de Boislisle in the Revue des questions historigues for October 1908. (C. B.*)

BALZAC, HONORfi DE (1790-1850), French novelist, was born at Tours on the 20th of May 1799. His father, Bernard Francois, never called himself de Balzac and Honore only assumed the particle after 1830. But the father had equally little right to the name of Balzac at all, for his birth-certificate has been recently discovered. The true name was ” Balssa,” and this in various forms (” Balsa,” ” Balsas “) has been traced for more than a century before the novelist’s birth as that of a family of day-labourers or very small peasant proprietors in the parish of Canezac, department of the Tarn. It is probable that the novelist himself was not aware of this, and his father appears to have

practised some mystification as to his own professional career. In and after the Revolution, however, he actually attained positions of some importance in the commissariat and hospital departments of the army, and he married in 1797 Anne Charlotte Laure Sallambier, who was a beauty, an heiress, and a woman of considerable faculty. She survived her son; the father died in 1829. There were two sisters (the elder, Laure, afterwards Madame Surville, was her brother's favourite and later his biographer), and a younger brother, Henri, of whom we hear little and that little not very favourable.

Honore was put out to nurse till he was four years old, and in 1806, when he was seven, was sent to the college (grammar school) of Vendˆme, where he remained till April 1813 as a strict boarder without -any holidays. From this he passed as a day-boy to the college of Tours. His father's official work was transferred to Pans the year after, and Balzac came under the teaching of a, royalist private schoolmaster, M. Lepitre, and others. He left school altogether in 1816, being then between seventeen and eighteen. His experiences at Vendome served as base for much of Louis Lambert, and he seems to have been frequently in disgrace. Later, his teachers appear to have found him remark- able neither for good nor for evil. He was indeed never a scholar ; but he must have read a good deal, and as he certainly had no time for it later, much of this reading must have been done early.

The profession which Balzac's father chose for him was the law; and he not only passed through the schools thereof, and duly obtained his licence, but had three years' practical experience in the offices of a notary and a solicitor (avoue), for the latter of whom, M. Guillonnet-Merville, he seems to have had a sincere respect. But though no man of letters has ever had, in some ways, such a fancy for business, no man of business could ever come out of such a born man of letters. And when in 1820 (the licence having been obtained and M. Balzac, senior, having had some losses) the father wished the son to become a practising lawyer in one or another branch, Honore revolted. His family had left Paris, and they tried to starve him into submission by establishing him in a garret with a very small allowance. Here he began to write tragedies, corresponded (in letters which have fortunately been preserved) with his sister Laure, and, most important of all, attempted something in prose fiction. The tragedy Cromwell was actually completed and read to friends if not to others; nay more, the manuscript exists in the hands of M. Spoelberch de Lovenjoul, the great authority on Balzac's life and

biblio- graphy; but it has never been published. The novels, Cocqsigrue and Stella, proved abortions, but were only the first of many attempts at his true way until he found it. Drama he never abandoned; but for him it was always an error.

The garret-period from 1820 to 1822 was succeeded by another of equal length at home, but before it had finished (1821) he found his way into print with the first of the singular productions which (and that not entirely or finally) have taken a sort of outside place in his works under the title of (Euvres dejeunesse. The incunabula of Balzac were Les Deux Hector, ou Les Deux Families bretonnes, and Charles Pointel, ou Mon Cousin de la main gauche. They were followed next year by six others :—L' Heritiere de Birague; Jean Louis, ou La Fille trouvee; Clotilde de Lusignan,

ou Le Beau Juif; Le Centenaire, ou Les Deux Beringheld; Le Vicaire des Ardennes; Le Tartare, ou Le Retour de I'exile. And these were again followed up in 1823 by three more: La Derniere Fee, ou La Nouvelle Lampe merveilleuse; Michel et Christine et la suite; L'Anonyme, ou Ni pere ni mere. In 1824 came Annette et le criminel, a continuation of the Vicaire; in 1825, Wann-Chlore, which afterwards took the less extravagant title of Jane la pdle. These novels, which filled some two score volumes originally, were published under divers pseudonyms (" Lord R'hoone," an anagram of " Honore," " Horace de Saint Aubin," &c), and in actual collaboration with two or three other writers. But though there is not yet in them anything more than the faintest dawn of the true Balzac, though no one of them is good as a whole, and very few parts deserve that word except with much qualification, they deserve far more study than they have usually received, and it is difficult to apprehend the true Balzac until they have been studied. They ceased for a time, not because of the author's conviction of their badness (though he entertained no serious delusions on this subject), nor because they failed of a certain success in actual money return, but because he had taken to the earliest, the most prolonged, and the most disastrous of his dabblings in business — this time as a publisher to some extent and still more as a printer and type-founder. Not very much was known about his experiences in this way (except their general failure, and the result in hampering him with a load of debt directly for some ten years and indirectly for the whole of his life) till in 1903 MM. Hanotaux and Vicaire published the results of their inquiries into the actual accounts of the concern. There seems to have been no reason why it should not have succeeded,

and there has been claimed for it first, that it pro- vided Balzac with a great amount of actual detail which he utilized directly in the novels, and secondly, that it gave him at whatever cost a still more valuable experience of practical life — the experience which has so often been wanting to men of letters. Anyhow, from 1825 to 1828, the future author of the Comidie humaine was a publisher, printer and type-founder; and in the last year he had to abscond, or something like it, under pressure of debts which were never fully settled till 1838, and then by a further obligation of ninety thousand francs, chiefly furnished by his mother and never repaid to her.

It was Balzac's habit throughout his life to relieve the double pressure of debt and of work by frequent excursions into the country and abroad. On this occasion he fled to Brittany with an introduction to a M. and Mme. de Pommereul, who received him hospitably in their chateau near Fougeres. Here he obtained some of the direct material, and most of the scenery and atmo- sphere, for what he himself recognized as his first serious attempt in novel-writing, Les Chouans, or, as it was at first called, Le Dernier Chouan. This book (obviously written in direct following of Scott, of whom Balzac was a lifelong admirer) has been very variously judged — those who lay most stress on his realism thinking little of it, while those who maintain that he was always a romantic " with a difference " place it higher. It has at any rate brilliant colouring, some very vivid scenes, and almost more passion as well as " curtain " at its ending than any other of his books. Though not without a touch of melodrama it differs utterly from the confused and tedious imitations of Mrs Radcliffe, M. G. Lewis and C. R. Maturin which fill most of the (Euvres de jeunesse. At the same time Balzac was engaged on a very different work, the analytic-satirical sketches which compose the Physiologie du mariage, and which illustrate his other and non-romantic side, again with some crudity, but again also with a vast advance on his earlier productions. Both were published in the year 1829, from which his real literary career unquestion- ably starts. It had exactly twenty-one years to run.

The history of these twenty one years, though (in consequence mainly of the diligence and luck as a collector of the above named M. de Lovenjoul) the materials for it are large and con- stantly accumulating, has never been arranged in a really standard biography, and there seems to be an increasing habit of con- centrating the attention on parts of it. It divides itself under three heads mainly, the history of Balzac's business affairs, that

of his loves and friendships and that of his actual work. The first has some small resemblance to Scott's similar experiences, though in Balzac's case there was no great crash but a lifelong pressure; on the other hand, his debts were brought upon him by a long course not so much of extravagance in actual expendi- ture (though there was something of this) as of financial irregu- larities of almost every description,— anticipations of earnings, costly methods of production (he practically wrote his novels on a succession of printed revises), speculations, travel, and lastly the collection of curiosities. As regards the second, although his fashion of life made him by turns a hermit and a vagrant, he was on good terms with most of the famous men of letters of his day from Hugo downwards, and seems never to have quarrelled with any man, except with some of his editors and pub- lishers, by his own fault. Balzac was indeed, in no belittling sense of the word, one of the most good-natured of men of genius. But his friendships with the other sex are of much more importance, and not in the least matters of mere gossip. His sister Laure, as has been said, and a school-friend of hers, Mme Zulma Carraud, played important andnotquestionable parts as his correspondents. But at least three ladies, all of a rank higher than his own, figure as his " Egerias" to such an extent that it is hardly extravagant to say that Balzac would not have been Balzac without them. These are Madame de Berny, a lady connected with the court of the ancien rigime, much older than himself and the mother of nine children, to whom he was introduced in 1821, who became to him La dilecta, who was the original of Mme de Mortsauf in Le Lys dans la valUe, and who seems to have exercised an excellent influence on him in matters of taste till her death in 1836; the marquise de Castries, who took him up for a time and dropped him, and who has been supposed to have been his model for his less impeccable ladies of fashion; and lastly, the Polish-Russian countess Evelina Hanska, who after addressing, as V Etr anger e, a letter to him as early as 1832, became his idol, rarely seen but constantly corresponded with, for the last eighteen years, and his wife for the last few months of his life. Some of his letters to her have long been known, but the bulk of them constituted the greatest recent addition to our knowledge of him as given in the two volumes of Lettres a I'Urangere. Of hers we have practically none and it is exceedingly hard to form any clear idea of her, but his devotion is absolutely beyond

question.

Business, friendship and love, however, much more other things, were in Balzac's case always connected with and on the whole quite secondary to work. He would even sometimes resist the commands by which at long intervals Mme Hanska would summon him to see her, and abstract the greater part of his actual visits to her in order to serve this still more absorbing mistress. He had, as we have seen, worked pretty hard, even before 1820, and his work had partly taken forms not yet mentioned — political pamphlets and miscellaneous articles which are now accessible in the Edition definitive of his works, and hardly one of which is irrelevant to a just conception of him. Nor did he by any means abandon these by-works after 1829; indeed, he at one time started and almost entirely wrote, a periodical called the Revue parisienne. He wrote some dramas and planned many more, though the few which reached the stage left it again promptly. Balzac's dramas, as they appear in his works, consist of Vautrin, Les Ressources de Quinola, Pamila Giraud (arranged for the stage by others), La Mardtre and Mer cadet le faiseur, the last of which has, since his death, been not unsuccessful. But on the whole he did devote himself to his true vocation, with a furious energy beside which even Scott's, except in his sadder and later days, becomes leisurely. Balzac generally wrote (dining early and lightly, and sleeping for some hours immediately after dinner) from midnight till any hour in the following day — stretches of sixteen hours being not unknown, and the process being often continued for days and weeks. Besides his habit of correcting a small printed original into a long novel on the proofs, he was always altering and re-shaping his work, even before, in 1842, he carried out the idea of building it all into one huge structure— the Comedie humaine with its subdivisions of Scenes de la vie parisienne,

Etudes philosophiques, &c. Much pains have been spent upon this title and Balzac's intentions in selecting it. But the "Human Comedy," as a description for mere studies of life as his, will explain itself at once or else can never be explained.

Of its constituents, however, some account must be given, and this can be best done through an exact and complete list of the whole work by years, with such abbreviated notes on the chief constituents as may lead up to a general critical sum- mary. Of the two capital works of 1829, we have spoken. 1830, the epoch year, saw part (it was not fully published till the next) of La Peau

de chagrin, one of the crudest, but according to some estimates, one of the greatest of the works, full of romantic extravagance and surplusage, but with an engrossing central idea — the Nemesis of accomplished desire— powerfully worked out; La Maison du chat qui pelote, a triumph of observa- tion and nature, together with a crowd of things less in bulk but sometimes of the first excellence — El Verdugo, £tude de femme, La Paix du menage, Le Bal de sceaux, La Vendetta, Gobseck, Une Double Famille, Les Deux Rives, Adieu, L' Elixir de longue vie, Sarrazine, Une Passion dans le desert and Un £pisode sous la Terreur. In 1831, La Peau de chagrin appeared complete, accompanied by Le R&quisitionnaire, Les Proscrits, Le Chef-d'oeuvre inconnu (a masterpiece fortunately not unrecognized), Jesus Christ en Flandre and Mattre Cornelius. 1832 gave Madame Firmiani, Le Message, Le Colonel Chabert and Le Cure" de Tours (two stories of contrasted but extraordinary excellence), La Bourse, La Femme abandonnie, Louis Lambert (autobiographical and philosophic) , La Grenadier e and Les Mar ana (a great favourite with the author).* In 1833 appeared Ferragus, chef des divorants, the first part of L'Histoire des treize (a collection in the more extravagant romantic manner, very popular at the time, and since a favourite with some, but few, good judges), Le Medecin de campagne (another pet of the author's, and a kind of intended document of his ability to support the cause of virtue, but, despite certain great things, especially a wonderful popular " legend of Napoleon," a little heavy as a whole), the universally admitted masterpiece of Eugenie Grandet, and L'lllustre Gaudis- sart (very amusing) . 1833 also saw the beginning of a remarkable and never finished work — out of his usual scope but exceedingly powerful in parts — the Contes drolatiques, a series of tales of Old France in Old (or at least Rabelaisian) French, which were to have been a hundred in number but never got beyond the third batch of ten. They often borrow the licence of their 15th and 1 6th century models; but in La Succube and others there is undoubted genius and not a little art. 1834 continued the Treize with La Duchesse de Langeais and added La Recherche de I'absolu (one of Balzac's great studies of monomania, and thought by some to be the greatest, though others prefer Le Chef-d'auvre inconnu), La Femme de trente ans (the chief example of the author's caprice for re-handling, and very differently judged as a whole) , with yet another of the acknowledged triumphs, Le Pere Goriot. On the whole, this year's work, though not the author's largest, is perhaps his most unique. Next year (1835) followed Melmoth riconcilie (a tribute to the great influence

which Maturin exercised, not over Balzac only, at this time in France) , Un Drame au bord de la mer, the brilliant, if questionable, conclusion of Les Treize, La Fille aux yeux d'or, Le Contrat de mariage and Seraphita. This last, a Swedenborgian rhapsody of great beauty in parts, has divided critics almost more than anything else of its writer's, some seeing in it (with excuse) nothing but the short description given above in three words, the others (with justice) reckoning it his greatest triumph of style and his nearest attempt to reach poetry through prose. 1836 furnished La Messe de I'athee, Interdictioti, Facino Cane, Le Lys dans la valUe (already referred to and of a somewhat sickly sweetness), L' Enfant maudit, La Vieille Fille and Le Secret des Ruggieri (connected with the earlier Les deux Reves under the general title, Sur Catherine de Medicis, and said to have been turned out by Balzac in a single night, which is hardly possible). In 1837 were published Les Deux Poetes, destined to form part of Illusions perdues, Les Employes, Gambara and another capital work, Hisloire de la grandeur et de la decadence

de Cesar Birotteau, where Balzac's own unlucky experiences in trade are made thoroughly matter of art. 1838 was less fruitful, contributing only Le Cabinet des antiques, which had made an earlier partial appearance, La Maison Nucingen and Une Fille d' Eve. But 1839 made amends with the second part of Illusions perdues, Un Grand Homme de province a Paris (one of Balzac's minor diploma-pieces), Le Cure de village (a very considerable thing), and two smaller stories, Les Secrets de la princesse de Cadignan and Massimilla Doni. Pierrette, Z. Marcos, Un Prince de la Boheme and Pierre Grassou followed in 1840, and in 1841 Une Tenebreuse Affaire (one of his most remarkable workings- up of the minor facts of actual history), Le Martyr Calviniste (the conclusion of Sur Cathirine de Medicis), Ursule Mirouet (an admirable story), La Fausse Maitresse and Memoires de deux jeunes mariees, on which again there have been very different opinions. 1842 supplied Albert Savarus (autobiographical largely) , Un Debut dans la vie, the very variously named and often rehandled Rabouilleuse (which, since Taine's exaltation of it, has often been taken as a Balzacian quintessence), and Autre 6tude de femme, yet another rehandling of earlier work. In 1843 came the introduction of the completed Sur Catherine de Medicis Honorine and La Muse du departement (almost as often

reconstructed as La Femme de trente ans), with Comment aiment les jeunes filles (a similar rehandling intended to start the collected Splendeurs et miseres des courtisanes) , and a further instalment of Illusions perdues, Les Souffrances d'un inventeur. Three out of the next four years were astonishingly fruitful. 1844 gave Modeste Mignon (a book with a place to itself, and said to be founded on a story actually written by Madame Hanska), Gaudissart II., A combien V amour revient aux vieillards (a second part of the Splendeurs), Biatrix (one of the most powerful if not of the most agreeable), and the first and very promising part of Les Paysans. Only Un Homme d'affaires came out in 1845, but this was made up in 1846 by Les Comediens sans le savoir (sketched earlier), another part of the Splendeurs, Oil menent les mauvais chemins, the first, part of Les Parents pauvres, La Cousine Bette (sometimes considered the topmost achievement of Balzac's genius), and the final form of a work first issued fifteen years earlier and often retouched, Petites miseres de la vie conjugate. 1847 was even richer, with Le Cousin Pons (the second part of Les Parents pauvres, and again a master- piece), the conclusion of the Splendeurs, La Derniere Incarnation de Vautrin, L'Envers de I'histoire contemporaine (which had been on and off the stocks for five years) , and the unfinished Depute d'Arcis. This was the last scene of the comedy that appeared in the life of its author. The conclusion of the DeputS d'Arcis, published in 1853, and those of Les Paysans and Les Petits Bourgeois which appeared, the first in this year, the second wholly in 1855, are believed or known to be by Balzac's friend, Charles Rabou (1803-187 1).

This immense and varied total stands to its author in a somewhat different relation from that of any other work to any other writer. It has been well said that the whole of Balzac's production was always in his head together; and this is the main justification for his syllabus of it as the " Comedy." Some part never came out of, his head into print; we have numerous titles of work (sometimes spoken of in his letters as more or less finished) of which no trace remains, or only fragmentary MS. sketches. One apparently considerable book, La Bataille, which was to be devoted to the battle of Essling, and for which he actually visited the ground, is frequently referred to as in pro- gress from the time of his early letters to Madame Hanska onwards; but it has never been found. Another result of this relation was the constant altering, re-shaping, re-connecting of the different parts. That if Balzac had lived as long as Hugo, and

had preserved his faculties as well, he could never have finished the Comedie, is of course obvious: the life of Methuselah, with the powers of Shakespeare, would not suffice for that. But that he never would — even if by some impossibility he could — is almost equally certain. Whether there is any mark of decline in his latest work has been disputed, but there could hardly have been farther advance, and the character of the

whole, not easy to define, is much less hard to comprehend; if prejudice be kept out of the way. That character was put early, but finally, by Victor Hugo in his funeral discourse on Balzac, whose work he declared, with unusual terseness, among oiher phrases of more or less gorgeous rhetoric, to be ” observation and imagination.” It may be doubted whether all the volumes written on Balzac (a reasoned catalogue of the best of which will be found below) have ever said more than these three words, or have ever said it more truly if the due stress be laid upon the ” and.” On the other side, most of the mistakes about him have arisen from laying undue stress on one of the two qualities, or from considering them separately rather than as inextricably mixed and blended. It is this blending which gives him his unique position. He is an observer of the most exact, the most minute, the most elaborate; but he suffuses this observation with so strange and constant an imaginative quality that he is, to some careful and experienced critics, never quite ” real ” — or almost always something more than real. He seems accustomed to create in a fashion which is not so much of the actual world as of some other, possible but not actual — no matter whether he deals with money or with love, with Paris or with the provinces, with old times or with new. A further puzzle has arisen from the fact that though Balzac has virtuous characters, he sees humanity on the whole ” in black “: and that, whether he actually prefers the delineation of vice, mis- fortune, failure, or not, he produces as a rule in his readers the sensation familiarly described as “uncomfortable.” His morality has been fiercely attacked and valiantly defended, but it is absolutely certain that he wrote with no immoral intention, and with no indifference to morality. In the same way there has been much discussion of his style, which seldom achieves beauty, and sometimes falls short of correctness, but which still more seldom lacks force and adequacy to his own purpose. On the whole, to write with the shorthand necessary here, it is idle to claim for Balzac an absolute supremacy in the novel, while it may be questioned whether any single book of his, or any scene of a book, or even any single character or

situation, is among the very greatest books, scenes, characters, situations in literature. But no novelist has created on the same scale, with the same range; none has such a cosmos of his own, pervaded with such a sense of the originality and power of its creator.

Balzac's life during these twenty years of strenuous production has, as regards the production itself, been already outlined, but its outward events, its distractions or avocations — apart from that almost weekly process' of "raising the wind," of settling old debts by contracting new ones, which seems to have taken up no small part of it — must now be shortly dealt with. Besides constant visits to the Margonne family at Sache in Touraine, and to the Carrauds at Frapesle in Berry, he travelled frequently in France. He went in 1833 to Neuchatel for his first meeting with Madame Hanska, to Geneva later for his second, and to Vienna in 1835 for his third. He took at least two flights to Italy, in more or less curious circumstances. In 1838, he went on a journey to Sardinia to make his fortune by melting the silver out of the slag-heaps of Roman mines, — a project, it seems, actually feasible and actually accomplished, but in which he was anticipated. The year before, tired of Paris apartments, he had bought ground at Ville d' Avray, and there constructed, certainly at great, though perhaps exaggerated expense, his villa of Les Jardies, which figures largely in the Balzacian legend. His rash and complicated literary engagements, and (it must be added) his disregard of them when the whim took him, brought him into frequent legal difficulties, the most serious of which was a law-suit with the Revue de Paris in 1836. In 183 1, and again in 1834, he had thought of standing for election as Deputy, and in the latter year he actually did so both at Cambrai and Angouleme; but it is not certain that he received any votes. He also more than once took steps to become a candidate for the Academy, but retired on several occasions before the voting, and when at last, in 1849, he actually stood, he only obtained two votes.

As early as the Genevan meeting of 1833, Madame Hanska had formally promised to marry Balzac in the case of her husband's

death, and this occurred at the end of 1841. She would not, however, allow him even to visit her till the next year had

expired, and then, though he travelled to St Petersburg and the engage- ment was renewed after a fashion, its fulfilment was indefinitely postponed. For some years Balzac met his beloved at Baden, Wiesbaden, Brussels, Paris, Rome and elsewhere. Only in September 1847 was he invited on the definite footing of her future husband to her estate of Wierzschovnia in the Ukraine; and even then the visit, interrupted by one excursion to Paris and back, was prolonged for more than two years before (on the 14th of March 1850) the wedding actually took place. But Balzac's own Peau de chagrin was now reduced to its last morsel. His health, weakened by his enormous labours, had been ruined by the Russian cold and his journeyings across Europe. The pair reached the house at Paris in the rue Fortunee, which Balzac had bought for his wife and filled with his collections, at the end of May. On Sunday, the 1 7th of August, Victor Hugo found Balzac dying, attended by his mother, but not by his wife. He actually died at half-past eleven that night and was buried on the 20th, the pall-bearers being Hugo himself, Dumas, Sainte-Beuve (an enemy, but in this case a generous one) and the statesman Baroche, in Pere La Chaise, where Hugo delivered the speech cited above.

Bibliography. — The extraordinarily complicated bibliography of Balzac will be found all but complete in the Histoire des oiuvres (1875 an d later), attached by M. Spoelberch de Love-njoul to the Edition definitive, and supplemented by him in numerous smaller works, A utour de Balzac, Une Page perdue de Balzac, &c. Summaries of it will be found appended to the introductory critical notices of each volume of the English translation edited by Saintsbury (London, 1 895-1898) , which also contains a short Memoir and general criticism. Before the Edition definitive (1869 onwards), the works had been issued during the author's life in various forms and instalments, the earliest Comidie humaine being of 1 842 to 1 846 in sixteen volumes. For many years, however, the edition best known was that referred to in Browning as " all Balzac's novels fifty volumes long," really fifty-five small and closely ■printed 24mos kept stereotyped with varying dates by Michel (Calmann) Levy, which did not contain the miscellaneous works and was not arranged according to the author's last disposition, but did include the CEuvres de jeunesse. These were not reprinted in the Edition definitive, but this gives the miscellaneous works in four volumes, an invaluable volume of correspondence, and the Histoire des ceuvres as cited. To this was added, in 1893, another volume, Repertoire des oiuvres de

Balzac, in which the history of the various personages of the Comidie is tracked throughout and ranged under separate articles by MM. Cerfbeer and Christophe with extraordinary pains, and with a result of usefulness which should have protected it from some critical sneers. In 1899 appeared, as the first volume of CEuvres posthumes, an instalment of the Lettres d V elrangere, and in 1906 a second (up to 1844) with a portrait of Madame Hanska, and other illustrations.

Works on Balzac are very numerous, and some of them are of much importance. Sainte-Beuve and Balzac fell out, and a furious dia- tribe by the novelist on the critic is preserved ; but the latter's post- mortem examination in Causeries du lundi, vol. ii., is not unfair, though it could hardly be cordial. Gautier, who was a very intimate and trusty friend of Balzac, has left an excellent study, mainly personal, reprinted in his Portraits contemporains. Lamartine produced a volume, not of much value, on Balzac in 1866; and minor contemporaries — Gozlan, Lemer, Champfleury — supplied some- thing. But the series of important studies of Balzac, based on the whole of his work and not biased by friendship or enmity, begins with Taine's Essay of 1858, reprinted in volume form, 1865. Even then the CEuvres diverses were accessible only by immense labour in the scattered originals, and the invaluable Correspondance not at all. It was not till the reunion of all in the Edition definitive was completed, that full study of man and work was possible. To this edition itself was attached a sort of official critical introduction, L'CEuvre de Balzac, by M. Marcel Barriere (1890). But this is largely occupied by elaborate analyses of the different books, and the purely critical part is small, and not of the first value. Better are M. Paul Flat's Essais sur Balzac (2 vols., 1893-1894), which busy themselves especially with tracing types of character. Important and hew biographical details (including the proper spelling of the name) were given in M. Edmond Bire's Honore de Balzac (1897). The Balzac ignore of A. Cabanes (1899) is chiefly remarkable for its investiga- tions of Balzac's fancy for occult studies, and the first part {Balzac imprimeur) of MM. Hanotaux and Vicaire's La Jeunesse de Balzac (1903) mentioned above, for its dealing with the printing business and the intimacy with Madame de Berny. Two most important studies of Balzac in French, are those of M. A. Le Breton, Balzac, Vhomme et I'auvre (1905), a somewhat severe, but critical and very well- informed examination, and M. Ferdinand Brunetiere's Honore de Balzac (1906), a brilliant but rather one-sided panegyric on the subject

as the evolver of the modern novel proper, and a realist and

observer par excellence. In English, translations of separate books are innumerable; of the whole, besides that mentioned above, but containing a few things there omitted, an American version by Miss Wormeley and others may be mentioned. The most elaborate monograph in English, till recently, was F. Wedmore's Balzac (1887), with a useful bibliography up to the time. The recent additions to our knowledge are utilized in Miss Mary F. Sandars' Balzac (1904), a rather popular, but full and readable summary, chiefly of the life, from all but the latest documents, and W. H. Helm's Aspects of Balzac (1905), which is critical as well as anec- dotic. The present writer, besides the critical and biographical essays referred to above, prefixed a shorter one to a translation of Les Chouans executed by himself in 1890. (G. Sa.)

BALZAC, JEAN LOUIS GUEZ DE (1594-1654), French author, was born at Angouleme in 1594. At the age of eighteen he travelled in Holland with Theophile de Viaud, with whom he later exchanged bitter recriminations. He was early befriended by the due d'Epernon and his son Louis, Cardinal de la Valette, who took him to Rome. His letters written to his acquaintances and to many who held a high position at the French court gained for him a great reputation. Compliments were showered upon him, he became an habitue of the Hotel de Rambouillet, and his head appears to have been turned a little by his success. Richelieu was lavish of praise and promises, but never offered Balzac the preferment he expected. In 1624 a collection of his Lettres was published, and was received with great favour. From the chateau of Balzac, whither he had retired, he continued to correspond with Jean Chapelain, Valentin Conrart and others. In 1634 he was elected to the Academy. He died at Angouleme on the 18th of February 1654. His fame rests chiefly upon the Lettres, a second collection of which appeared in 1636. Recueil de nouvelles lettres was printed in the next year. His letters, though empty and affected in matter, show a real mastery of style, introducing a new clearness and precision into French prose and encouraging the development of the language on national lines by emphasizing its most idiomatic elements. Balzac has thus the credit of executing in French prose a reform parallel to Malherbe's in verse. In 1631 he published an eulogy of Louis XIII. entitled Le Prince; in 1652 the Socrate chretien, the best of his longer works; Aristippe ou de la Cour in 1658; and several dissertations on style.

His CEuvres were collected (2 vols.) in 1665 by Valentine Conrart. There are numerous English translations from Balzac, dating from the 17th century.

BAM, a town of Persia in the province of Kerman, situated 115 m. S.E. of the city of Kerman at an elevation of 3600 ft. on both banks of the river Bam. Pop. about 13,000. It is the capital of the Bam-Narmashir district and has extensive groves of date-palms and gardens. Outside the town stands the famous citadel with walls 40 ft. in height. This citadel was, even as late as the beginning of the 19th century, the strongest fortified place in Persia, and owed its strength to the Afghans who took Bam in 1719 and were not finally expelled until 1801. Post and telegraph offices have been established there since 1903.

BAMBERG, a town and archiepiscopal see of Germany, in the kingdom of Bavaria. Pop. (1885) 31,521; (1905) 45,308. It lies on an open plain on the river Regnitz, 2 m. above its junction with the Main, and 39 m. north of Nuremberg by rail- way. The upper town is built on seven hills, each crowned by a church, while the lower, still partially surrounded by walls and ditches, is divided by the river and Ludwigskanal into three districts. The cathedral is a noble late Romanesque building with four imposing towers. It was founded in 1004 by the emperor Henry II., finished in 1012, afterwards partially burnt, and rebuilt in the 13th century. Of its many works of art may be mentioned the magnificent marble tomb of the founder and his wife, the empress Cunigunde, carved by Tilman Riemen- schneider between 1499 and 1513, and an equestrian statue of the emperor Conrad III. Other noteworthy churches are the Jakobskirche, an 11th-century Romanesque basilica; the St Martinskirche; the Marienkirche or Obere Pfarrkirche (1320-1387), which has now been restored to its original pure Gothic style. The Michaelskirche, 12th-century Romanesque (restored), on the Michaelsberg, was formerly the church of a Benedictine monastery secularized in 1803, which now contains

the Biirgerspital, or alms-house, and the museum and municipal art collections. Of the bridges connecting the sections of the lower town the most interesting is the Obere Brilcke, completed in 1455. Halfway across this, on an artificial island, is the

Rathaus (rebuilt 1744-1756). The royal lyceum, formerly a Jesuit college, contains notable collections and the royal library of over 300,000 volumes. The picturesque Old Palace (Alte Residenz) was built in 1591 on the site of an old residence of the counts of Babenberg. The New Palace (1 698-1 704) was formerly occupied by the prince-bishops, and from 1864 to 1867 by the deposed King Otto of Greece. Noteworthy among the monuments of the town is the Maximilian fountain (1880), with statues of Maximilian I. of Bavaria, the emperor Henry II. and his wife, Conrad III. and St Otto, bishop of Bamberg. At a short distance from the town is the Altenburg (1266 ft.), a castle occupied from 1251 onwards by the bishops of Bamberg. It was destroyed in 1553 by Albert, margrave of Brandenburg, but has been partly restored. The schools include the lyceum for philosophy and Catholic theology (a survival of the university suppressed in 1803), a seminary, two gymnasia, a Realschule, and several technical schools, including one for porcelain- painting. The industries of the town include cotton spinning and weaving, silk spinning, the manufacture of tobacco, ropes, metal-ware, furniture, &c. The market gardens of the neigh- bourhood are famous, and there is a considerable shipping trade by the river and the Ludwigskanal.

Bamberg, first mentioned in 902, grew up by the castle (Babenberch) which gave its name to the Babenberg family {q.v.). On their extinction it passed to the Saxon house, and in 1007 fhe emperor Henry II. founded the see. From the middle of the 13 th century onward the bishops were princes of the Empire. The see was secularized in 1802 and in 1803 assigned to Bavaria.

A brief history of the bishopric is given in the Catholic Encyclo- paedia (London and New York, 1909), with bibliography. For general and special works on the town see Ulysse Chevalier, Topo- bibliographie (Montbeliard, 1894-1899), s. v.

BAMBERGER, LUDWIG (1823-1899), German economist and politician, was born of Jewish parents on the 22nd of July 1823 at Mainz. After studying at Giessen, Heidelberg and Gottingen, he entered on the practice of the law. When the revolution of 1848 broke out he took an active part as one of the leaders of the republican party in his native city, both as popular orator and as editor of one of the local papers. In 1849 he took part in the republican rising in the Palatinate and Baden; on the restoration of order he was condemned to death, but he had escaped to Switzerland. The next years he spent in exile, at first in London,

then in Holland; in 1852 he went to Paris, where, by means of private connexions, he received an appointment in the bank of Bischoffheim & Goldschmidt, of which he became managing director, a post which he held till 1866. During these years he saved a competence and gained a thorough acquaintance with the theory and practice of finance. This he put to account when the amnesty of 1866 enabled him to return to Germany. He was elected a member of the Reichstag, where he joined the National Liberal party, for like many other exiles he was willing to accept the results of Bismarck's work. In 1868 he published a short life of Bismarck in French, with the object of producing a better understanding of German affairs, and in 1870, owing to his intimate acquaintance with France and with finance, he was summoned by Bismarck to Versailles to help in the discussion of terms of peace. In the German Reichstag he was the leading authority on matters of finance and economics, as well as a clear and persuasive speaker, and it was chiefly owing to him that a gold currency was adopted and that the German Imperial Bank took its present form; in his later years he wrote and spoke strongly against bimetallism. He was the leader of the free traders, and after 1878 refused to follow Bismarck in his new policy of protection, state socialism and colonial development; in a celebrated speech he declared that the day on which it was introduced was a dies nefaslus for Germany. True to his free trade principles he and a number of followers left the National Liberal party and formed the so-called " Secession " in 1880. He

was one of the few prominent politicians 1*00 consistently maintained the struggle against state socialism on the one hand and democratic socialism on the other. In 1892 be retired from political life and died in 1899. Bamberger was a clear and attractive writer and was a frequent contributor on political and economic questions to the Nation and other periodicals. His most important works are those on the currency, on the French war-indemnity, his criticism of socialism and his apology for the Secession.

An edition of his collected works (including the French life of Bismarck) was published in 1894 in five volumes. After his death in 1899 appeared a volume of reminiscences, which, though it does not extend beyond 1866, gives an interesting picture of his share in the revolution of 1848, and of his life in Paris. (J. W. HE.)

BAMBINO, IL (Itai. for " the Babe "), the name given, in art to the image of the infant Jesus in swaddling clothes common in Roman

Catholic churches. The most famous is the miracle- working Santissimo Bambino in the church of Ara Coeli at Rome, the festival of which is celebrated on the feast of the Epiphany (January 6).

BAMBOO, the popular name for a tribe of grasses, Bambuseae, which are large, often tree-like, with woody stems. The stems spring from an underground root-stock and are often crowded to form dense clumps; the largest species reach 120 ft. ir>

Fig. 1. — Bambusa arundinacea, an Indian bamboo. 1, Leafy shoot. 2, Branch of inflorescence. 3, Spikelet. 4, Flower.

height. The slender stem is hollow, and, as generally in grasses, has well-marked joints or nodes, at which the cavity is closed by a strong diaphragm. The branches are numerous and in some species spiny; the narrow, often short, leaf-blade is usually jointed at the base and has a short stalk, by which it is attached to the long sheath. The spikelets are usually many-flowered and variously arranged in racemes or panicles. The flower differs from that of the majority of grasses in having usually three lodicules and six stamens. Many species bloom annually, but others only at intervals sometimes of many years, when the individuals of one and the same species are found in bloom over large areas. Thus on the west coast of India the simultaneous blooming of Bambusa arundinacea (fig. 1), one of the largest species, has been observed at intervals of thirty -two years. After ripening of the seed, the leafless flowering culms always die down. The Bambuseae contain twenty-three genera and occur through- out the tropical zone, but very unevenly distributed; they also extend into the sub-tropical and even into the temperate zone. Tropical Asia is richest in species; in Africa there are very few. In Asia they extend into Japan and to 10,000 ft. or more on the

Himalayas; and in the Andes of South America they reach the snow-line.

The fruit in Bambusa, Arundinaria and other genera resembles the grain generally characteristic of grasses, but in Dendrocalamus and others it is a nut, while rarely, as in

Melocanna, it is fleshy and suggests an apple in size and appearance. The uses to which all the parts and products of the bamboo are applied in Oriental countries are almost endless. The soft and succulent shoots, when just beginning to spring, are cut off and served up at table like asparagus. Like that vegetable, also, they are earthed over to keep them longer fit for consumption; and they afford a con- tinuous supply during the whole year, though it is more abundant in autumn. They are also salted and eaten with rice, prepared in the form of pickles or candied and preserved in sugar. As the plant grows older, a species of fluid is secreted in the hollow joints, in which a concrete substance once highly valued in the East for its medicinal qualities, called tabaxir or tabascheer, is gradually developed. This substance, which has been found to be a purely siliceous Ancretion, is possessed of peculiar optical properties. As a medicinal agent the bamboo is entirely inert, and it has never been received into the European materia medica.

The grains of the bamboo are available for food, and the Chinese have a proverb that it produces seed more abundantly in years when the rice crop fails, which means, probably, that in times of dearth the natives look more after such a source of food. The Hindus eat it mixed with honey as a deli- cacy, equal quantities being put into a hollow joint, coated externally with clay, and thus roasted over a fire. The fleshly fruit of Melocanna is baked and eaten. The plant is a native of India, but is sometimes cultivated as in Mauritius. It is, however, the stem of the bamboo which is applied to the greatest variety of uses. Joints of sufficient size form water buckets; smaller ones are used as bottles, and among the Dyaks of Borneo they are employed as cooking vessels. Bamboo is extensively used as a timber wood, and houses are frequently made entirely out of the products of the plant; complete sections of the stem form posts or columns; split up, it serves for floors or rafters; and, interwoven in lattice-work, it is employed for the sides of rooms, admitting light and air. The roof is sometimes of bamboo solely, and when split, which is accom- plished with the greatest ease, it can be formed into laths or planks. It is employed in shipping of all kinds; some of the strongest plants are selected for masts of boats of moderate size, and the masts of larger vessels are sometimes formed by the union of several bamboos built up and joined together.

The bamboo is employed in the construction of all kinds of agricultural and domestic implements and in the materials and implements required in fishery. Bows are made of it by the union

of two pieces with many bands; and, the septa being bored out and the lengths joined together, it is employed, as we use leaden pipes, in transmitting water to reservoirs or gardens. From the light and slender stalks shafts for arrows are obtained; and in the south-west of Asia there is a certain species of equally slender growth, from which writing-

Fig, 2. — Bamboo {Bambusa vulgaris), very much reduced. Grows 20 to 50 ft high.

pens or reeds are made. A joint forms a holder for papers 01 pens, and it was in a joint of bamboo that silk-worm eggs were carried from China to Constantinople during the reign of Justinian. The outer cuticle of Oriental species is so hard that it forms a sharp and durable cutting edge, and it is so siliceous that it can be used as a whetstone. This outer cuticle, cut into thin strips, is one of the most durable and beautiful materials for basket-making, and both in China and Japan it is largely so employed. Strips are also woven into cages, chairs, beds and other articles of furniture, Oriental wicker-work in bamboo being unequalled for beauty and neatness of workmanship. In China the interior portions of the stem are beaten into a pulp and used for the manufacture of the finer varieties of paper. Bamboos are imported to a considerable extent into Europe for the use of basket-makers, and for umbrella and walking-sticks. In short, the purposes to which the bamboo is applicable are almost endless, and well justify the opinion that ” it is one of the most wonderful and most beautiful productions of the tropics, and one of Nature’s most valuable gifts to uncivilized man ” (A. R. Wallace, The Malay Archipelago).

A number of species of bamboo are hardy under cultivation in the British Isles. A useful and interesting account of these and their cultivation will be found in the Bamboo Garden, by A. B. Freeman-Mitford. They are mostly natives of China and Japan and belong to the genera Arundinaria, Bambusa and Phyllostachys; but include a few Himalayan species of Arundinaria.- They may be propagated by seed (though owing to the rare occurrence of fruit, this method is seldom applicable), by division and by cuttings. They are described as hungry plants which well repay generous treatment, and will flourish in a rich, not too stiff loam, and for the first year or two should be well mulched. They should be sheltered from winds and well watered during the growing period. When being transplanted the roots must be disturbed as little as possible. The following may be

mentioned; Arundinaria simoni, a fine plant which in the bamboo garden at Kew has reached 18 ft. in height, and not infrequently flowers and fruits in Britain; A. japonica, a tall and handsome plant generally grown in gardens under the name Bambusa metaM; A. nilida, “by far the daintiest and most attractive of all its genus, and remarkably hardy “; Bambusa palmata, with leaves a foot or more long and three inches broad; B. tesselata; B. quadrangularis, remarkable for its square stems; Phyllostachys mitis, growing to 60 ft. high in its native home, China and Japan; and P. nigra, so called from the black stem, a handsome species.

BAMBURGH, or Bamborough, a village in the Berwick-upon-Tweed parliamentary division of Northumberland, England, on the sea-coast, 2\ m. E. of Belford station on the North Eastern railway, and 54 m. N. of Newcastle. It was a royal borough previous to the Norman Conquest and returned two members to parliament in the reign of Edward I. Its ancient castle occupies a magnificent position close to the sea on an almost perpendicular rock, 150 ft. in height, accessible only on the south-east side.

The first erection is ascribed by the Saxon chronicles to King Ida of Northumberland. The castle buildings are of various dates from the Norman period and are of great strength and dignity. They include a massive keep and the remains of an apsidal chapel dedicated to St Peter. In the village, the church is dedicated to St Aidan, who was bishop of Lindisfarne or Holy Island, which lies off the coast to the north, about 634. It is a fine cruciform building, mainly of Early English date, with a crypt beneath the chancel. In the churchyard is a monument to Grace Darling (1815-1842), the brave rescuer of some of the crew of the ship ” Forfarshire ” in 1838. The Longstone Lighthouse, where her father was keeper, stands on an outer rock of the Fame Islands, which stretch north-eastward for 6 m. from the coast at Bamburgh.

The town of Bamburgh (Bebbanburgh) sprang up round the ancient castle. During the struggle for the crown between William Rufus and Robert of Normandy, Bamburgh was besieged by William, who, finding the defence too strong, erected and garrisoned a new castle before Bamburgh called

” Malveisin ” or ” Evil neighbour.” Earl Robert of Northumberland, who was in command of Bamburgh, having been defeated in a sally, the castle surrendered to William in November 1095. The first mention of Bamburgh as a borough does not occur until 1169, when the men paid 25 marks to an aid. Henry III. by charter of 1254-1255 granted the burgesses their town at an annual fee farm rent of 26 marks, of which they were acquitted in 1318 and 1327 “on account of the robberies and fires inflicted on them by the Scots.” Edward III. in 1332 confirmed the charter of Henry III., and granted further that the town should be a free borough governed by four bailiffs, that it should be enclosed by a wall and that the burgesses should have a gild merchant. He also altered the market-day from Sunday to Wednesday, and gave licence for the fairs, which had been held ” from time immemorial ” on the feasts of SS. Oswald and Aidan, to continue for three extra days. During the Scottish wars of the reign of Henry V., Bamburgh again suffered severely, so much so that in 1439 the burgesses had decreased in number from 120 to 13. These again petitioned for a remission of their farm, which in 1446 was reduced to £10 yearly. Bamburgh was twice taken by the Yorkists in the Wars of the Roses and twice recovered by Queen Margaret. In 1463, after it had been recovered a second time by the queen, Henry VI. stayed there for a year, but after the battle of Hexham it was again taken by the Yorkists, and the castle and town were then so much injured that from that time there is no mention of the burgesses or their privileges. Bamburgh returned two members to parliament in 1295 and again in Edward III.‘s reign, but since then has never been represented. In 1384 Lord Neville received licence to dig for sea-coal in Bamburgh, and mines of coal and lead existed there as late as 1681.

BAMBUTE (sometimes incorrectly called Batwa), a race of pygmies of the Semliki Forest, on the western borders of the Uganda Protectorate between Albert Nyanza and Albert Edward Nyanza. They probably form merely a branch of the pygmy race of Equatorial Africa, represented farther west by H. von Wissmann’s Batwa (q.v.). Their complexion varies from reddish-yellow to brownish-black, with head-hair often of a russet-brown, and body-hair, black and bristly on upper lip, chin, chest, axillae and pubes, yellowish and fleecy on cheeks, back and limbs. Their average height is 4 ft. 9 in. Even when forced to keep clean, their skins give out a rancid odour, some- thing (Sir H. H. Johnston says) between the smell of a monkey and a negro. Their

faces are remarkable for the long upper lip, and the bridgeless nose with enormous alae (the cartilage of the nose above the nostrils). Like the Batwa they are nomad hunters, building only huts of sticks and leaves, and living in the forest, where they hunt the largest game with no weapon but a tiny bow from which they shoot poisoned arrows. Sir H. H. Johnston states that the Bambute have a good idea of drawing, and with a sharpened stick can sketch in sand or mud the beasts and birds known to them. The Bambute do not tattoo or scar, nor have they any love of ornament, wearing no ear-rings, necklets, anklets, &c. The upper incisors and canines are sharpened to a point. In the forests they go quite naked. They speak a corrupted form of the dialects of their negro neighbours. They have a peculiar way of singing their words. Their voices are low and musical and the pronunciation is singularly staccato, every syllable being separately uttered. They show no trace of spirit or ancestor worship, but have. some idea that thunder, lightning and rain are manifestations of an Evil Power, and that the dead are reincarnated in the red bush-pig. They have no tribal government, accepting as temporary lawgiver some adept hunter. Marriage is by pur- chase; polygamy seems to exist, but the domestic affections are strong. The dead are buried in dug graves, and food, tobacco and weapons are often placed with the corpse. The Bambute are very musical, though they are uninventive as regards instruments. They have many songs which they sing well and they dance with spirit.

See A. de Quatrefages, The Pygmies (Eng. edit. 1895); Sir H. H. Johnston, Uganda Protectorate (1902).

BAMFORD, SAMUEL (1788-1872), English labour politician, was born at Miston, near Middleton, Lancashire, on the 28th of February 1788. Himself a stalwart weaver, he was opposed to physical force movements and did all he could to restrain the violent resistance to trade oppression which was so common; yet through attending and speaking at the meeting (1819) at Peterloo, Manchester (q.v.) , which was intended to be a peaceful gathering to petition for Parliamentary reform and a repeal of the Corn Law but ended in a massacre, he was arrested for a breach of the law, convicted and sentenced to twelve months' imprisonment. He was the author of several widely popular poems (principally in the Lancashire dialect) showing sympathy with the conditions of his class, and his Passages in the Life of a Radical (1840-1844) is an authoritative history of the condition of the working classes in the years succeeding the battle of

Waterloo. He died at Harpurhey on the 13th of April 1872, and was accorded a public funeral, attended by thousands.

BAMIAN, a once renowned city of Afghanistan, situated about 80 m. N.W. of Kabul. Its remains lie in a valley of tfce Hazara country, on the chief road from Kabul towards Turkestan, and immediately at the northern foot of that prolongation of the Indian Caucasus now called Koh-i-Baba. The passes on the Kabul side are not less than 11,000 and 12,000 ft. in absolute height, and those immediately to the north but little inferior. The height of the valley was fixed at about 8500 ft., and the surrounding country carefully surveyed by Major Pelham J. Maitland and the Hon. M. G. Talbot, during the progress of the Russo- Afghan Boundary Commission in November 1885. The river draining the valley is one of the chief sources of the Sarkhab (Surkhab) or Aksarai, an important tributary of the Upper Oxus. The prominences of the cliffs which line the valley are crowned by the remains of numerous massive towers, whilst their pre-cipitous faces are for 6 or 7 m. pierced by an infinity of ancient cave-dwellings, some of which are still occupied. The actual site of the old city is marked by mounds and remains of walls, and on an isolated rock in the middle of the valley are consider- able ruins of what appears to have been the acropolis, now known to the people as Ghulgulah. But the most famous remains at Bamian are two colossal standing idols, carved in the cliffs on the north side of the valley. They are nj ft. and 120 ft. high respectively. These images, which have been much injured, apparently by cannon-shot, are cut in niches in the rock, and both images and niches have been coated with stucco. There is an inscription, not yet interpreted, over the greater idol, and on each side of its niche are staircases leading to a chamber near the head, which shows traces of elaborate ornamentation in azure and gilding. These chambers are used by the amir as store-houses for grain. The surface of the niches also has been painted with figures. In one of the branch valleys is a similar colossus, some- what inferior in size to the second of these two; and there are indications of other niches and idols. Chahilburj, 28 m. from Zari, on the road to Balkh by the Balkhab, at the east end of the Sokhtagi valley; Shahr-i-Babar, about 45 m. above Chahil- burj; and Gawargin, 6 m. above Shahr-i-Babar, are all fortified sites of about the same age as the relics at Bamian. At Haibak there is a very perfect excavation called the Takht-i- Rustam (a general name for all incomprehensible constructions amongst the modern inhabitants of Afghan Turkestan), which consists of an

annular ditch enclosing a platform, with a small house about 21 ft. square above it, all cut out of the solid rock. There are hundreds of caves in this neighbourhood, all pointing to a line of Buddhist occupation connecting Balkh with Kabul. As seen from the rock of Ghulgulah, Bamian, with its ruined towers, its colossi, its innumerable grottos, and with the singular red colour of its barren soil, presents an impressive aspect of desolation and mystery.

That the idols of Bamian, about which so many conjectures have been uttered, were Buddhist figures, is ascertained from the narrative of the Chinese pilgrim, Hsiian-Tsang, who saw them in their splendour in a.d. 630, and was verified by the officers above named, who discovered other Buddhist caves and excavations in the valleys of the Balkhab and Sarikol.

Still vaster than these was a recumbent figure, 2 m. east of Bamian, representing Sakya Buddha entering Nirvana, i.e. in act of death. This was " about 1000 ft. in length." No traces of this are alluded to by modern travellers, but in all likelihood it was only formed of rubble plastered (as is the case still with such Nirvana figures in Indo-China) and of no durability. For a city so notable Bamian has a very obscure history. It does not seem possible to identify it with any city in classical geography: Alexandria ad Caucasum it certainly was not. The first known mention of it seems to be that by Hsuan-Tsang, at a time when apparently it had already passed its meridian, and was the head of one of the small states into which the empire of the White Huns had broken up. At a later period Bamian was for half a century, ending a.d. 12 14, the seat of a branch of the Ghori dynasty, ruling over Tokharistan, or the basin of the Upper Oxus. The place was long besieged, and finally annihilated (1222) by Jenghiz Khan, whose wrath was exasperated at the death of a favourite grandson by an arrow from its walls. There appears to be no further record of Bamian as a city; but the character of ruins at Ghulgulah agrees with traditions on the spot in indicating that the city must have been rebuilt after the time of the Mongols and again perished. In 1840, during the British occupation of Kabul, Bamian was the scene of an action in which Colonel William H. Dennie with a small force routed Dost Mahommed Khan, accompanied by a number of Uzbeg chiefs.

See Hon. M. G. Talbot, " The Rock-cut Caves and Statues of Bamian," Journal R. Austral. Soc. vol. xviii. part 3 ; and J. A. Gray, At the Court of the Amir (1895). (T. H. H.*)

BAMPTON, JOHN (c. 1690-17 51), English divine, was a member of Trinity College, Oxford, where he graduated M.A. in 171 2, and for some time canon of Salisbury. He died on the 2nd of June 1 7 51, aged 61. • His will directs that eight lectures shall be delivered annually at Oxford in the University Church on as many Sunday mornings in full term, " between the commencement of the last month in Lent term and the end of the third week in Act term, upon either of the following subjects: — to confirm and establish the Christian faith, and to confute all heretics and schismatics; upon the divine authority of the Holy Scriptures; upon the authority of the writings of the primitive fathers, as to the faith and practice of the primitive Church; upon the divinity of our Lord and Saviour Jesus Christ; upon the divinity of the Holy Ghost; upon the articles of the Christian faith as comprehended in the Apostles' and Nicene Creeds." The lecturer, who must be at least a Master of Arts of Oxford or Cambridge, was formerly chosen yearly by the heads of colleges, on the fourth Tuesday in Easter term, and no one can be chosen a second time. The series of lectures began in 1780, and is still continued, though since 1895 elections are only made in alternate years through a depreciation of the revenue of the fund. The endowment provides £120 for each lecturer, and the lectures have to be published within two months of their delivery. Among the lecturers have been Heber in 181 5 (The Personality and Office of the Christian Comforter); R. Whately in 1822 (Party Feeling in Religion); R. D. Hampden in 1832 (The Scholastic Philosophy in relation to Christian Theology) ; E. M. Goulburn in 1850 (The Resurrection of the Body); H. L. Mansel in 1858 (The Limits of Religious Thought) ; H. P. Liddon in 1866 (The Divinity of our Lord); E. Hatch in 1880 (The Organization of the Early Christian Churches); C. Bigg in 1886 (Christian Platonists of Alexandria); C. Gore in 1891 (The Incarnation); W. Sanday in 1893 (Inspiration) ; J. R. Illingworth in 1894 (Personality, Human and Divine); W. R. Inge in 1899 (Christian Mysticism), &c. A complete list is given in the Oxford Historical Register. The institution has done much to preserve a high standard in English theology; and the lectures as a whole form a historically interesting collection of apologetic literature.

BAMPUR, a town of Persia, in the province of Baluchistan, 330 m. S.E. of Kerman, in 27 12′ N., 6o° 24′ E., at an elevation of 1720 ft.

Pop. about 2000. It is the capital of the province and situated on the banks of the Bampur river which flows from east to west and empties itself about 70 m. W. into a hamun, or depression, 50 m. in length, and called Jaz-morian. The old

citadel of Bampur which crowned an elevation about 100 ft. in height, 3 m. north of the river, having completely fallen in ruins, a new fort called Kalah Nasseri, was built at Fahraj, 15 m. further east, in the eighties; and P'ahraj, which now has a population of about 2500, has become more important than Bampur. Fahraj, which is also known as Pahura, Paharu, Puhra, is by some identified as the Poura where Alexander the Great halted on his march from India, but others are more in favour of another Fahraj near Bam, or even of Bampur itself.

BAMRA, a feudatory state of India, in the province of Bengal. Area 1988 sq. m.; pop. (1901) 123,378; estimated revenue £5000; tribute £100. Most of the country is forest, producing only timber and lac but said to be rich in iron ore. The northern border is touched by the Bengal-Nagpur railway, with a station at Bamra town. The state is one of the five Uriya feudatories, which were transferred from the Central Provinces to Bengal, on the reconstitution of that province in October 1905. The capital is Deogarh.

BAN, a word taken from the root of a verb common to many Teutonic languages and meaning originally " to proclaim " or

to announce." The Late Lat. form of the word is bannum.

In the laws of the Franks and kindred tribes the word had three main uses: first in the general sense of a proclamation, secondly, for the fine incurred for disobeying such proclamation, and thirdly for the district over which proclamations were issued.

It was the frequent use of proclamations or bans, commanding or forbidding certain actions under a threat of punishment, which caused the second of these uses to arise out of the first, as the idea of wrong-doing became associated with the proclama- tion or ban. This bannum dominicum, as it was called, was employed by all feudal lords, from the king downwards, against offenders, and played an important part in the administration of justice in feudal times. It usually took the form of an order to make some amend for wrong-doing, which, if not complied with, was followed by the withdrawal of all protection from the offender,

i.e. by outlawry.

After the break-up of the Carolingian empire another use oi the word arose in France. ” Ban ” had occasionally been used in a restricted sense referring only to the summons calling out the host; and as France became separated from the Empire, French law and custom seized upon this use, and soon the men liable to military service were known as ” the ban.” A variant form of this word was heriban or ariban, and it is possible that some confusion between the early syllables of this word and the word arriere led to a distinction between the ban and the arriere-ban or retro-bannum. At all events this distinction arose; the ban referring to the vassals called out by the king, and the arriere-ban to the sub-vassals called upon by the vassals in their turn. As in England, the liability to military service was often commuted for a monetary payment, and there were various exemptions. In the 17th and 18th centuries the ban and arriere-ban were lacking in discipline when called out, and were last summoned in 1758. Local levies, however, called out between this date and the Revolution were sometimes referred to by these names.

InthemedievalEmpireandin Germany the word “ban” retained the special sense of punishment. The German equivalent of ban is Acht, and the sentence soon became practically one of outlawry. Connected possibly with the power enjoyed in earlier times by the assemblies of freemen of outlawing an offender, it was fre quently used by the emperor, or German king, and the phrase ” under the ban ” is very common in medieval history. The execution of this sentence of placing an offender under the imperial ban, or Reichsacht, was usually entrusted to some prince or noble, who was often rewarded with a portion of the outlaw’s lands. It was, iowever, only a serious punishment when the king or his supporters were strong enough to enforce its execu- tion. Employed not only against individuals but also against towns and districts, it was sometimes divided into the Acht and the Oberacht, i.e. partial or complete outlawry. Documents of the time show that the person placed under the imperial ban drew down absolute destitution upon his relatives and frequently death upon himself. At first this sentence was the act of the

emperor or king himself, but as the Empire became more German, and its administration less personal, it was entrusted to the imperial aulic council (Rcichshofrat), and to the imperial court of justice or imperial chamber {Reichskammergericht). These courts were deprived of this power in 1711, retaining only the right of suggesting its use. The imperial ban had, however, been used for the last time in 1706, when Maximilian Emanuel, elector of Bavaria, was placed under it.

There are many other uses of the word in the sense of a prohibition. In earlier French law the ban of wine or bannum vini, was the exclusive right of a lord to sell wine during a stated number of days, and the ban of March and April forbade the pasturing of cattle in certain fields during these months. There were also other similar uses dating from feudal times. In modern French law the phrase rupture de ban described, previous to 1885, the departure without notice of any released criminal living under the special surveillance of the police. The French govern- ment still retains the rights of appointing an obligatory place of residence for any criminal, and any escape from this place is a rupture de ban. A Scandinavian use of the word gives it the sense of a curse. This usage mingling with the use which spiritual lords shared with temporal lords of issuing the ban over their dependents, has become in a special sense ecclesiastical, and the sentence of excommunication is frequently referred to as ” under the papal ban.” The word is also used in this way by Shakespeare and Milton. The modern English use of the phrase ” under the ban ” refers to any line of conduct condemned by custom or public opinion. In its earlier and general sense as a proclamation, the ban may be said to have been suspended by the writ. The word, however, survives in the sense of a proclamation in the ” banns of marriage ” (q.v.).

The Persian word ban, meaning lord or master, was brought into Europe by the Avars. It was long used in many parts of south-eastern Europe, especially in southern Hungary, to denote the governors of military districts called banats, and is almost equivalent to the German margrave. After enjoying very extensive powers the bans were gradually reduced, both in numbers and importance. Since 1868, however, the governor of Croatia and Slavonia has been known as the ban of Croatia, Slavonia and Dalmatia, but his duties are civil and not military. He is appointed by the emperor of Austria, as king of Hungary, and has a seat in the upper house of the Hungarian parliament.

See Du Cange, Glossarium, tome i. (Niort, 1883); H. Brunner, Grundzuge der deulschen Rechtsgeschichte (Leipzig, 1901); E. P. Boutaric, Institutions militaires de la France (Paris, 1863); Pere G. Daniel, Histoire de la milice franˆaise (Paris, 1721).

BANANA, a gigantic herbaceous plant belonging to the genus Musa (nat. ord. Musaceae) . It is perennial, sending up from an underground root-stock an apparent stem 15 or 20 ft. high, consisting of the closely-enveloped leaf-sheaths, the corresponding blades, each sometimes 10 ft. in length, forming a spreading crown. A true stem develops at the flowering period; it grows up through the hollow tube formed by the sheaths, emerges above and bears a large number of inconspicuous tubular flowers closely crowded in the axils of large, often brightly-coloured, protecting bracts. The fruits form dense clusters.

The genus Musa contains about 40 species, widely distributed throughout the tropics of the Old World, and in some cases introduced into the New World. In many parts of the tropics they are as important to the inhabitants as are the grain plants to those living in cooler regions. They are most successfully cultivated in a hot, damp, tropical climate. The northern limit. of their cultivation (usually Musa Cavendishii) is reached in Florida, south of 20 lat., the Canary Islands, Egypt and south Japan, the southern limit in Natal and south Brazil. There has been considerable discussion as to whether the banana was growing in America before the discovery of the New World. It has been suggested that it may have been carried by ocean currents or in some earlier intercourse between the Old and New Worlds. The evidence, however, of its existence in America at the time of the discovery of the new continent is not very definite. The unripe fruit is rich in starch, which in ripening changes into sugar. The

most generally used fruits are derived from Musa paradisiaca, of

which an enormous number of varieties and forms exist in

cultivation. The sub-species sapienlum (formerly regarded as a

distinct species M. sapientum) is the source of the fruits generally

known in England as bananas, and eaten raw, while the name

plantain is given to forms of

the species itself M. para- j|ˆ . gˆ

disiaca, which require cooking.

The species is probably a native

of India and southern Asia.

Other species which are used

as fruits are M. acuminata in

the Malay Archipelago, M . Fehi

in Tahiti, and M. Cavendishii,

the so-called Chinese banana, in

cooler countries; the fruit of

the last-named has a thinner

rind and a delicate, fragrant

flesh' The species, the fruits of

which require cooking, are of

much greater importance as an

article of food. These often

reach a considerable size ;

forms are known in East

Africa which attain nearly 2 ft.

in length with the thickness of

a man's arm. A form of M.

Banana (Musa sapientum).

corniculata, from Cochin China and the Malay Archipelago, produces only a single fruit, which, however, affords an adequate meal for three men. The hardly-ripe fruit is stewed whole or cut in slices and roasted or baked.

Banana-meal is an important food-stuff; the fruit is peeled arid

cut in strips, which are then dried and pounded in a mortar. In East Africa and elsewhere, an intoxicating drink is prepared from the fruit. The root-stock which bears the leaves is, just before the flowering period, soft and full of starch, and is some- times used as food, as in the case of the Abyssinian species, M. Ensete.

The leaves cut in strips are plaited to form mats and bags; they are also largely used for packing and the finer ones for cigarette papers. Several species yield a valuable fibre, the best of which is ” Manila hemp ” (q.v.) from M . textilis.

The following is the composition of the flour, according to Hutchison: water, 13%; proteid,4%; fat, 0-5%; ‘■ carbo- hydrates, 80%; salts, 2-5%. It would require about eighty bananas of average size to yield the amount of energy required daily, and about double that number to yield the necessary amount of proteid. Hence the undue abdominal development of those who live mainly on this article of diet (Hutchison). In recent years the cultivation of the banana in Jamaica for the American and also for the English market has been greatly developed.

BANAS, or Bunas, the name of three rivers of India. (1) A river of Rajputana, which rises in the Aravalli range in Udaipur, drains the Udaipur valley, and after a course of 300 m. flows into the Chambal. (2) A river of the Shahabad district of Bengal, which forms the drainage channel between the Arrah canal and the Sone canals system, and finally falls into the Gangi nadi. (3) A river of Chota Nagpur in Bengal, which rises in the state of Chang Bhakar and falls into the Sone near Rampur.

BANAT (Hungarian Bdnsdg), a district in the south-east of Hungary, consisting of the counties of Torontal, Temes and Krasso-Szoreny. The term, in Hungarian, means generally a frontier province governed by a ban and is equivalent to the German term Mark. There were in Hungary several banats, which disappeared during the Turkish wars, as the banat of Dalmatia, of Slavonia, of Bosnia and of Croatia. But when the word is used without any other qualification, it indicates the Temesvar banat, which strangely acquired this title after the peace of Passarowitz (1718), though it was never governed by a ban. The Banat is bounded E. by the Transylvanian Alps, S. by the Danube, W. by the Theiss and N. by the Maros, and has an

area of 1 1,260 sq. m. It is mountainous in the south and south-east, while in the north, west and south-west it is flat and in some places marshy. The climate, except in the marshy parts, is generally healthy. It is well-watered, and forms one of the most fertile districts of Hungary. Wheat, barley, oats, rye, maize, flax, hemp and tobacco are grown in large quantities, and the products of the vineyards are of a good quality. Game is plentiful and the rivers swarm with fish. The mineral wealth is great, including copper, tin, lead, zinc, iron and especially coal. Amongst its numerous mineral springs, the most important are those of Mehadia, with sulphurous waters, which were already known in the Roman period as the Thermae Herculis. The Banat had in 1900 a population of 1,431,329 inhabitants. According to nationality there were 578,789 Rumanians, 362,487 Germans, 251,938 Servians and 170,124 Magyars. The chief town is Temesvar (pop. 53,033), and other places of importance are Versecz (25,199), Lugos (16,126), Nagybecskerek (26,407), Nagykikinda (24,843) and Pancsova (19,044).

The Banat was conquered by the Turks in 1552, and remained a Turkish sanjak (province) till 17 16, when Prince Eugene of Savoy liberated it from the Turkish yoke. It received the title of Banat after the peace of Passarowitz (1718), and remained under a military administration until 1751, when Maria Theresa introduced a civil administration. During the Turkish occupation the district was nearly depopulated, and allowed to lie almost desolate in marsh and heath and forest. Count Claudius Mercy (1666-1734), who was appointed governor of Temesvar in 1720, took numerous measures for the regeneration of the Banat. The marshes hear the Danube and Theiss were cleared, roads and canals were built at great expense of labour, German artisans and other settlers were attracted to colonize the district, and agriculture and trade encouraged. Maria Theresa also took a great interest in the Banat, colonized the land belonging to the crown with German peasants, founded many villages, encouraged the exploitation of the mineral wealth of the country, and generally developed the measures introduced by Mercy. In 1779 the Banat was again incorporated with Hungary. After the revolution of 1848-1849, the Banat together with another county (Bacs) was separated from Hungary, and created into a distinctive Austrian crown land, but in i860 it was definitely incorporated with Hungary.

See Leonhard Bohm, Geschichte des Temeser Banats (2 vols., Leipzig, 1861); Johann Heinrich Schwicker, Geschichte des Temeser Banats (Pest, 1872).

BANATE (a corruption of Panaiti, their real name), or Ban- nock, as they are now usually called, a tribe of North American Indians of Shoshonean stock. They were sometimes known as " Robber Indians." Their former range was southern Idaho and eastern Oregon. They are now divided between the Fort Hall and Lemhi reservations, Idaho. They were generally friendly with the whites, but in 1866 and in 1877-78 there were serious outbreaks. They number about 500.

BANBRIDGE, a town of Co. Down, Ireland, in the west parliamentary division, on the Bann, 23 m. S.W. of Belfast on a branch of the Great Northern railway, standing on an eminence. Pop. of urban district (1901) 5006. To mitigate a steep ascent, a central carriage-way, 200 yds, long, is cut along the main street to a depth of 15 ft., the opposite terraces being connected by a bridge. Banbridge is an entirely modern town. It is the principal seat of the linen trade in the county, and has extensive cloth and thread factories, bleachfields and chemical works. A. memorial in Church Square commemorates the Franklin expedition to the discovery of the North-West Passage, and in particular Captain Francis Crozier, who was born at Banbridge in 1796 and served on the expedition.

BANBURY, a market-town and municipal borough in the Banbury parliamentary division of Oxfordshire, England, on the river Cherwell and the Oxford canal, 86 m. N.W. of London by the northern line 06 the Great Western railway. Pop. (1901 12,968. The canal communicates northward with the Grand Junction and Warwick canals, and there are branch lines of the Great Central railway to the main line at Woodford, and of the

London & North-Western railway to Bletchley. The town is the centre of a rich agricultural district, and there is a large manufacture of agricultural implements; while other industries include rope and leather works and brewing. Banbury cakes, consisting of a case of pastry containing a mixture of currants, have a reputation of three centuries' standing. A magnificent Gothic parish church was destroyed by fire and gunpowder in 1 790 to make way for a building of little merit in Italian style. The ancient Banbury Cross, celebrated in a familiar nursery rhyme, was destroyed by Puritans in 1610. During the 17th century the

inhabitants of Banbury seem to have been zealous Puritans, and are frequently satirized by contemporary dramatists. At a somewhat earlier period the grammar school, now extinct, was of such repute as to be chosen as the model for the constitution of the school of St Paul's. A school of science was erected in 1 86 1, and there is a municipal secondary and technical school. Some fine old timbered houses remain in the streets. Of the castle built in n 25 there are only the barest traces. Wroxton Abbey, 2 m. N. W., shows slight remains of the original Augustinian priory; but the present beautiful gabled building, picturesquely situated, dates mainly from 1618. Broughton Castle, 2-jm. S.W., is the most noteworthy house in the county. The oblong block of buildings, fronted by lawns, is surrounded by a moat and protected by a gate-house, part of which dates from 1301, at which date the chapel and a part of the house were also built. There is also work of the 15th century and the Elizabethan period. The house is the seat of Lord Saye and Sele, having been in the Fiennes family since the reign of Henry VII. (1485- 1509). Here Pym and Hampden and other leaders of the Parliamentarians were wont to meet in 1640. Without the gate is a fine Decorated church. Banbury is governed by a mayor, 6 aldermen and 18 councillors. Area, 4633 acres.

In the year 556 Banbury (Beranbyrig, Banesberie) was the scene of a battle between Cynric and Ceawlin and Britons. It was assessed at 50 hides in the Domesday survey and was then held by the bishop of Lincoln. Allusions to the market occur as early as 1138, and Henry II. by charter confirmed a market on Thursday and granted a fair at Whitsun. The first charter of incorporation was granted by Queen Mary in 1553, and instituted a common council consisting of a bailiff, 12 aldermen and 12 chief burgesses ;li court of record, one justice of the peace, a Thursday market and two annual fairs. James I. confirmed this charter in 1608. with some additions, including a weekly wool-market, a horse-market and two additional annual fairs. Both these charters were surrendered in 1683 in favour of a new charter, but were resumed in 1688. In 1718 George I. granted a new charter, which held until the Municipal Corporations Act of 1835. From the date of Queen Mary's charter until the Re-distribution of Seats Act of 1885 the borough was represented by one member in parliament.

See Alfred Beesley, History of Banbury (London, 1841).

BANCHIERI, ADRIANO (c. 1557-1634), Bolognese composer for

church and stage, organist, writer on music and poet. He founded the ilecademia Florida of Bologna. Like Orazio Vecchi he was interested in converting the madrigal tp dramatic purposes. He disapproved of the monodists with all their revolutionary harmonic tendencies, about which he expressed himself vigorously in his Modema Practica Musicale (Venice, 1613), while systema- tizing the legitimate use of the monodic art of thorough-bass.

BANCROFT, GEORGE (1800-1891), American historian and statesman, was born in Worcester, Mass., on the 3rd of October 1800. His family had been in America since 163 2, and his father, Aaron Bancroft, was distinguished as a revolutionary soldier, clergyman and author. The son was educated at Phillips Academy, Exeter, at Harvard University, at Heidelberg, Gottingen and Berlin. At Gottingen he studied Plato with Heeren, New Testament Greek with Eichhorn and natural science with Blumenbach. His heart was in the work of Heeren, easily the greatest of historical critics then living, and the forerunner of the modern school; it was from this master that Bancroft caught his enthusiasm for minute pains-taking erudition. He concluded his years of preparation by a European tour, in the

course of which he received kind attention from almost every distinguished man in the world of letters, science and art; among others, from Goethe, Humboldt, Schleiermacher, Hegel, Byron, Niebuhr, Bunsen, Savigny, Cousin, Constant and Manzoni. Bancroft's father was a Unitarian, and he had devoted his son to the work of the ministry; but the young man's first experi- ments at preaching, shortly after his return from Europe in 1822, were unsatisfactory, the theological teaching of the time having substituted criticism and literature for faith. His first position was that of tutor in Harvard. Instinctively a humanist, he had little patience with the narrow curriculum of Harvard in his day and the rather pedantic spirit with which classical studies were there pursued. Moreover, he had brought from Europe a new manner, full of the affections of ardent youth, and this he wore without ease in a society highly satisfied with itself; the young knight-errant was therefore subjected to considerable ridicule. A little volume of poetry, translations and original pieces, pub- lished in 1823 gave its author no fame. As time passed, and

custom created familiarity, his style, personal and literary, was seen to be the outward symbol of a firm resolve to preserve a philosophic calm, and of an enormous underlying energy which spent itself in labour, ” ohne Hast, aber auch ohne Rast.” He found the conventional atmosphere of Cambridge uncongenial, and with a friend he established the Round Hill school at Northampton, Mass. This was the first serious effort made in the United States to elevate secondary education to the plane on which it belonged.

Although born into aWhig family, yet Bancroft’s studies carried him irresistibly into the Democratic party. Whi’e a teacher in his own school he was elected to the state legislature as a Democrat, but under pressure from the family of his first wife, who were ardent Whigs, he refused to serve. In 1831 he likewise declined the nomination of the Massachusetts Democrats for secretary of state. By this time he was influential in the councils of his party, and President Van Buren appointed him collector of the port of Boston, a position which he filled with success. Two of his appointees were Orestes Brownson and Nathaniel Hawthorne. In 1844 he was the Democratic candidate for the governorship, but he was defeated. In 1845 he entered Polk’s cabinet as secretary of the navy, serving until 1846, when for a month he was acting secretary of war. During this shoft period in the cabinet he established the naval academy at Annapolis, gave the orders which led to the occupation of California, and sent Zachary Taylor into the debatable land between Texas and Mexico. He also continued his pleadings for the annexation of Texas, as extending ” the area of freedom,” and though a Democrat, took high moral ground as to slavery; he likewise made himself the authority on the North- Western Boundary question. In 1846 he was sent as minister to London, where he lived in constant companionship with Macaulay and Hallam. On his return in 1849 ne withdrew from public life, residing in New York. In 1866 he was chosen by Congress to deliver the special eulogy on Lincoln; and in 1867 he was appointed minister to Berlin, where he remained until his resignation in 1874. Thenceforward he lived in Washington and Newport, dying at Washington on the 17 th of January 1801. His latest official achievements were the greatest. In the San Juan arbitration he displayed great versatility and skill, winning his case before the emperor with brilliant ease. The naturalization treaties which he negotiated successively with Prussia and the other north German states were the first international recognition of the right of expatriation, a principle

since incorporated in the law of nations.

In spite of the exacting and severe routine of the Round Hill school, Bancroft contributed frequently to the North American Review and to Walsh's American Quarterly; he also made a translation of Heeren's work on The Politics of Ancient Greece. In 1834 appeared the first volume of the History of the United States. The second followed in 1837, an d others as the exigencies of public life permitted Supplementary to the first volume was an article published by him in the North American Review for 1835 on " The Documentary History of the Revolution." This

article not merely brought the new method to the notice of the reading public, but revealed to it the wealth of material available. The nature and extent of his studies, the solidity of his work, and the philosophic spirit which animates both, explain the enthusiasm with which the earlier volumes of Bancroft were received. Their sale at home was very large; they were re- printed in England and translated immediately into Danish, Italian, German and French. The latest volumes were con- sidered by all competent judges quite as important as their predecessors. When the author was preparing to return from Berlin, the Royal Academy made him their guest at a public dinner, an unprecedented honour; and the universities of Berlin, Heidelberg and Munich united in a testimonial of regard. At Washington he was the confidential advisor of statesmen to the end of his life and the unofficial dean of the best society.

Bancroft's historical creed is best set forth in the address he delivered on the semi-centennial of the New York Historical Society in 1854. In philosophy he found the basis for positing a collective human will, revealing in its activities the materials for determining ethical laws. Since there must be the same conservation of energy in morals as elsewhere, the eternal reason is the divine Logos. History, therefore, is God working in examples. It must be a unit, its forces constant and its totality an organic whole. Within this the individual moves and acts with liberty and responsibility; for each, in will, affection and intellect is consubstantial with the rest. Truth, morals and justice are subject to no evolution; but the collective man evolves better forms of knowledge and behaviour. The organization of society, therefore, produces successive states, in each of which the principle of freedom is better established than in the antecedent. Permanency in republican government is, therefore, based upon corresponding experience and culture, and its possibilities grow ever stronger. The relation of American democracy to the systems which have preceded it forms the latest proof of these contentions. As Heeren's pupil, he laid enormous stress on the importance of original authorities. In dealing with documentary evidence he sought to apply very stringent rules: — (1) Carefully distinguish between original authority and historical memorials or aids; for example, between a fact recorded at first- or second-hand knowledge, and a decision of principle by authority. (2) Represent every man from his own standpoint; judge him from your own. His collections of original materials were vast; beginning with his residence in England, he brought together at enormous pains and expense the authenticated copies of archives, family papers, and personal journals written by historic per- sonages, which now constitute an invaluable treasure in the New York public library. They are from every land and from every people with which American origins are connected. His use of this material was not always according to accepted standards. To avoid dryness and prolixity he condensed quotations, and occasionally employed the Thucydidean method of abridgment or representation in place of fact catalogues. During his long life enormous strides were made by others in collecting the materials of American history, and while in the main he kept pace with them by ruthless revision, yet even the latest edition of his work disregards some minor facts which others knew for the insertion of much which the author alone knew.

Bancroft's imagination and enthusiasm were alike exuberant. His

pages abound in fine and acute insight. His generalizations are vivid and enlightening. He spared no pains to acquire true style, frequently rewriting his chapters, and sometimes testing passages of philosophy and description in eight different forms. Yet to a certain extent he lacked the representative power and often failed to conceal his art, many pages ringing with artificial tones. But, after making all allowances, it remains true that he had a pefect senre of proportion, sound maxims and thorough common-sense. He was of that greatest human type: a man of the present, valuing justly the past and no dreamer. In the nature and extent of his studies, in the solidity of his work, and in the philosophic spirit which animated his life he ranks as the foremost historian of the United States, and as an American historian second to none of his European contemporaries in

the same line. He displayed the heroic, epic value of American history, its unity with the great central stream, and dispelled for ever the extravagant conceptions of a sentimental world just emerging from the visionary philosophy of the 18th century.

See M. A. de Wolfe Howe, The Life and Letters of George Bancroft (New York, 1908;. (W. M. S.)

BANCROFT, HUBERT HOWE (1832-), American his- torical writer, was born at Granville, Ohio, on the 5th of May 1832. From 1852 to 1868 he was a bookseller in San Francisco. During this period he accumulated a great library of historical material, and at last gave up business in order to devote himself to the publication of his Native Races of the Pacific States (5 vols. 1874-1876), History of the Pacific States of North America (21 vols. 1882-1890), and other works. For the collection of data he necessarily relied upon the labours of a corps of assistants, and the publications named represent, properly speaking, an encyclo- paedia rather than a unified history; but as a storehouse of material their value is great and is likely to be enduring. In 1905 Bancroft's vast collection was acquired by the university of California. An account of his methods of work is given in his Literary Industries 1890).

BANCROFT, RICHARD (1 544-1610), archbishopof Canterbury, was born at Farn worth in Lancashire in 1544. He was educated

at Cambridge, first at Christ's College and afterwards at Jesus College. He took his degree of B.A. in 1567 and that of M.A. in 1570. Ordained about that time, he was named chaplain to Richard Cox, then bishop of Ely, and in 1575 was presented to the rectory of Teversham in Cambridgeshire. The next year he was one of the preachers to the university, and in 1 584 was presented to the. rectory of St Andrew's, Holborn. His abilities, and his zeal as a champion of the church, secured him rapid promotion. He graduated B.D. in 1580 and D.D. five years later. In 1585 he was appointed treasurer of St Paul's cathedral, London, and in 1586 was made a member of the ecclesiastical commission. On the 9th of February 1589 he preached at Paul's Cross a sermon on 1 John iv. 1, the substance of which was a passionate attack on the Puritans. He described their speeches and proceedings, caricatured their motives, denounced the exercise of the right of private judgment, and set forth the divine right of bishops in such strong language that one of the queen's councillors held it to amount to a threat against the supremacy of the crown. In the following year Bancroft was made a prebendary of St Paul's; he had been canon of West- minster since 1587. He was chaplain successively to Lord Chancellor Hatton and Archbishop Whitgift. In June 1597 he was consecrated bishop of London; and from this time, in consequence of the age and incapacity for business of Archbishop Whitgift, he was virtually invested with the power of primate, and had the sole management of ecclesiastical affairs. Among the more noteworthy cases which fell under his direction were the proceedings against " Martin Mar-Prelate," Thomas Cart- wright and his friends, and John Penry, whose " seditious writings " he caused to be intercepted and given up to the lord keeper. In 1600 he was sent on an embassy, with others, to Embden, for the purpose of settling certain matters in dispute between the English and the Danes. This mission, however, failed. Bancroft was present at the death of Queen Elizabeth. He took a prominent and truculent part in the famous conference of prelates and Presbyterian divines held at Hampton Court in 1604. By the king's desire he undertook the vindication of the practices of confirmation, absolution, private baptism and lay excommunication; he urged, but in vain, the reinforcement of an ancient canon, "'that schismatics are not to be heard against bishops"; and in opposition to the Puritans' demand for certain alterations in doctrine and discipline, he besought the king that care might be taken for a praying clergy; and that, till men of learning and sufficiency could be found, godly homilies might be

read and their number increased. In March 1604 Bancroft, on Whitgift's death, was appointed by royal writ president of convocation then assembled; and he there presented a book of canons collected by himself. It was adopted and received the royal approval, but was strongly opposed and set aside by

parliament two months afterwards. In the following November he was elected successor to Whitgift in the see of Canterbury. He continued to show the same zeal and severity as before, and with so much success that Lord Clarendon, writing in his praise, expressed the opinion that " if Bancroft had lived, he would quickly have extinguished all that fire in England which had been kindled at Geneva." He was as lenient with the offences of the orthodox as he was rigid in suppressing heresy and schism. In 1605 he was sworn a member of the privy council. The same year he engaged in a contest with the judges, and exhibited articles of complaint against them before the lords of the council ; but these complaints were overruled. His aim was really to make the ecclesiastical courts independent of the law by speciously magnifying the royal authority over them. He enforced discipline and exact conformity within the church with an iron hand; and over 200 clergymen were deprived of their livings for disobedience to the ex animo form of subscription. In 1608 he was chosen chancellor of the university of Oxford. One of his latest public acts was a proposal laid before parliament for improving the revenues of the church, and a project for a college of controversial divinity at Chelsea. In the last few months of his life he took part in the discussion about the consecration of certain Scottish bishops, and it was in pursuance of his advice that they were consecrated by several bishops of the English church. By this act were laid the foundations of the Scottish Episcopal church. Bancroft was "the chief overseer" of the authorized version of the Bible. He died at Lambeth Palace on the 2nd of November 1610. His literary remains are not extensive, but show him to have been an able writer.

BANCROFT, SIR SQUIRE (1841-), English actor and manager, was born near London on the 14th of May 1841. His first appearance on the stage was in 186 1 at Birmingham, and he played in the provinces with success for several years. His first London appearance was in 1865 in Wooler's A Winning Hazard at the Prince of Wales's theatre off Tottenham Court Road, then under the management of Effie Marie Wilton (b. 1840), whom he married in 1868. Mr and Mrs Bancroft were associated in the production of all the Robertson comedies .—Society (1865), Ours

(1866), Caste (1867), Play (1868), School (1869) and M.P. (1870), and, after Robertson's death, in revivals of the old comedies, for which they surrounded themselves with an ad mirable company. Lytton's Money (1872), Boucicault's London Assurance (1877), and Diplomacy — an adaptation of Sardou's Dora — were among their premieres, which helped to make the little playhouse famous. The Bancroft management at the Prince of Wales's constituted a new era in the development of the English stage, and had the effect of reviving the London interest in modern drama. In 1879 they moved to the Hay- market, where Sardou's Odette (for which they engaged Madame Modjeska) and Fidora, W. S. Gilbert's Sweethearts and Pinero's Lords and Commons, with revivals of previous successes, were among their productions. Having made a considerable fortune, they retired in 1885, but Mr Bancroft (who was knighted in 1897) joined Sir Henry Irving in 1889 to play the abbe La tour in a revival of Watts Phillips's Dead Heart.

See Mr and Mrs Bancroft, on and off the Stage (1888), and The Bancrofts: Recollections of Sixty Years (1909), by themselves.

BAND, something which " binds " or fastens one thing to another, hence a cord, rope or tie, e.g. the straps fastening the sheets to the back in book-binding. The word is a variant of " bond," and is from the stem of the Teutonic bindan, to bind. From the same source comes " bend," properly to fasten the string* to the bow, so as to constrain and curve it, hence to make into the shape of a "bent" bow, to curve. In the sense of " strap," a flat strip of material, properly for fastening anything, the word is ultimately of the same origin but comes directly into English from the French bande. In architecture the term is applied to a sort of flat frieze or fascia running horizontally round a tower or other parts of a building, particularly the base tables in perpendicular work, commonly used with the long shafts characteristic of the 13th century. It generally has a bold, projecting moulding above and below, and is carved

sometimes with foliages, but in general with cusped circles or quatrefoils, in which frequently are shields of arms.

The two small strips of linen, worn at the neck as part of legal,

clerical and academic dress, are known as “bands”; they are the survival of the falling collar of the 17th century. These bands are usually of white linen, but the secular clergy of the Roman Church wear black bands edged with white. The light cardboard or chip boxes now used to carry millinery were formerly made to carry the neck-bands, whence the name of “band-box.” ‘

In the sense of company or troop, ” band ” is probably also connected with bindan, to bind. It came into English from the French., The meaning seems to have originated in Romanic, cf. Italian, Spanish and Portuguese banda, and thence came into Teutonic. It has usually been taken (see Ducange, Gloss. s.v. banda) to be due to the ” band ” or sash of a particular colour worn as a distinctive mark by a troop of soldiers. Others refer it to the medieval Latin bandum, banner, a strip or ” band ” of cloth fastened to a pole. In this sense the chief application is to a company of musicians (see Orchestra), particularly when used in armies or navies, a military band.

Military Bands. — In all countries bands are organized and maintained in each infantiy regiment or battalion if the latter is the unit. The strength of these bands and the number and nature of their instruments vary considerably, as also do the rank and status of the bandmaster. The buglers and drummers belonging to the companies are generally massed under the sergeant-drummer and on the march play alternately with the band. ■ In action the British custom is to use the bandsmen as stretcher-bearers, but on the continent of Europe the bands are as far as possible kept in hand under the regimental commanders and play the troops into action; and in all countries the available bands, drums and bugles are ordered to play during the final assault. The training of bandmasters for the British service is carried out at Kneller Hall, Hounslow, an institution founded in 1857 and placed under direct control of the war office in 1867. The average strength of the various classes of instrument in the band of a British line regiment has been stated as— twenty flutes, oboes, clarinets and bassoons, four horns, eight saxhorns, six trumpets and cornets, three trombones, two drums. The buglers and drummers are in the proportion of one of each per company. The saxophone, which is the character- istic instrument of military bands in other countries, has not found favour with the British authorities. Another specially military instrument, universal in the Russian army and more or less common to others, is the so-called ” Jingling Johnny,” a frame of small bells that is sharply shaken in the accented parts of the music. The ” glockenspiel ” is

also fairly common. The peculiar instrument of Scottish regiments is the bagpipes. Cavalry, and more rarely artillery corps in the various armies, have small bands. The mounted arms, however, have little need of music as compared with the infantry, the order and ease of whose marching powers are immensely enhanced by the music of a good regimental band. In the navies of various countries bands are maintained on board flag-ships and sometimes on boaTd other large ships.

BANDA, a town and district of British India, in the Allahabad division of the United Provinces. The town is near the right bank of the river Ken, 95 m. S. W. of Allahabad. The population in 1901 was 2-2,565. The town possesses 65 mosques and 168 Hindu temples. It was formerly, but is no longer, a military cantonment.

The district ii the most barren and backward portion Of the province. It contains an area of 3061 sq. m. In some parts it rises into irregular uplands and elevated plains, interspersed with detached rocks of granite; in others it sinks into marshy lowlands, which frequently remain under water during the rainy season. The sloping country on the bank of the Jumna is full of ravines. To the S.E. the Vindhya chain of hills takes its origin in a low range not exceeding 500 ft. in height, and forming a natural boundary of the district in that direction. The principal river of the district is the Jumna, which flows from

north-west to south-east, along the N.E. boundary of the district, for 125 m. In 1901 the population was 631,058, showing a decrease of 11 % in the decade, due to the effects of famine. The black soil of the district yields crops of which the principal are millet, other food-grains, pulse, rice, cotton and oil-seeds. Banda cotton enjoys a high repute in the market. A branch railway from Manikpur to Jhansi traverses the length of the district, which is also crossed by the East Indian main line to Jubbulpore.

Banda, which forms one of the districts included under the general name of Bundelkhand, has formed an arena of contention for the successive races who have struggled for the sovereignty of India. Kalinjar town, then the capital, was unsuccessfully besieged by Mahmud of Ghazni in a.d. 1023; in 1196 it was taken by Kutab-ud-din, the general of Muhammad Ghori; in !545 by Shere Shah, who, however, fell mortally wounded in the assault. About the year 1735 the raja of Kalin jar's territory, including the present district of Banda, was bequeathed to Baji Rao, the

Mahratta peshwa; and from the Mahrattas it passed by the treaties of 1802-1803 to the Company. At the time of the Mutiny the district, which was poverty-stricken and over-taxed, joined the rebels. The town of Banda was recovered by General Whitlock on the 20th of April 1858. The fiscal system was remodelled, and the district has since enjoyed a greater degree of prosperity only interrupted by famine.

BANDA ISLANDS, a group of the Dutch East Indies, consisting of three chief and several lesser islands in the Banda Sea, south of Ceram, belonging to the residency of Amboyna. The main islands are Great Banda or Lontor; Banda Neira to its north; Gunong Api, west of Banda Neira; Wai or Ai still farther west, with Run on its south-west; Pisang, north of Gunong Api; and Suwangi, north-west again. The total land area is about 16 sq. m. A volcanic formation is apparent in Lontor, a sickle- shaped island which, with Neira and Gunong Api, forms part of the circle of a crater. The arrangement is comparable with Santorin in the Aegean Sea. Gunong Api (Fire Mountain), 2200 ft. high, is an active volcano, and its eruptions and earthquakes have frequently brought destruction, as notably in 1852, when the damage was chiefly due to a huge wave of the sea. Banda, the chief town, on Neira, is a pleasant settlement, commanded by two Dutch forts of the early 1 7th century, Nassau and Belgica. The largest island, Lontor, was found too unhealthy to be the site of the principal settlement; but the climate of the islands generally, though hot, is not Unhealthy. In the space between Lontor, Neira and Gunong Api there is a good harbour, with entrances on either side, which enable vessels to enter on either of the monsoons. Between Gunong Api and Neira there is a third channel, but it is navigable for small vessels only. The principal articles of commerce in the Banda group are nutmegs and mace. The nutmeg is indigenous. The native population having been cleared off by the Dutch, the plantations were worked by slaves and convicts till the emancipation of i860. The intro- duction of Malay and Chinese labourers subsequently took place. The plantations (perken) were originally held by the conquerors of the natives, the government monopolizing the produce at a fixed rate; but in 1873 the government monopoly was abolished. The production amounts annually to nearly 1,500,000 lb of nutmegs, and 350,000 lb of mace. The nutmegs are grown, in accordance with natural conditions, under the shade of other trees, usually the canari. Jalti or jatti wood is cultivated on the small island of Rosingen. The total population of the islands is about 9500, of which some

7000 are descendants of the natives introduced a,s slaves from neighbouring islands, and are Christians or Mahommedans.

The Banda Islands were discovered and annexed by the Portuguese Antonio D'Abreu in 151 2; but in the beginning of the 17 th century his countrymen were expelled by the Dutch. In 1608 the British built a factory on Wai, which was demolished by the Dutch as soon as the English vessel left. Shortly after, however, Banda Neira and Lontor were resigned by the natives to the British, and in 1620 Run and Wai were added to their dominions; but in spite of treaties into which they had entered

the Dutch attacked and expelled their British rivals. In 1654 they were compelled by Cromwell to restore Run, and to make satisfaction for the massacre of Amboyna; but the English settlers not being adequately supported from home, the island was retaken by the Dutch in 1664. They remained in undis- turbed possession until 1796, when the Banda Islands were taken by the British. They were restored by the treaty of Amiens in the year 1800, again captured, and finally restored by the treaty of Paris concluded in 18 14.

BANDANA, or Bandanna, a word probably derived through the Portuguese from the Hindustani bdndhnii, which signified a primitive method of obtaining an effect in dyeing by tying up cloth in different places to prevent the particular parts from receiving the dye. The name was given to richly coloured silk handkerchiefs produced by this process, of which bright colours were characteristic. Bandanas are now commonly made of cotton and produced in Lancashire, whence they are exported. The effect is also produced by a regular process in calico printing, in which the pattern is made by discharging the colour.

BANDELIER, ADOLPH FRANCIS ALPHONSE (1840-), American archaeologist, was born in Bern, Switzerland, on the 6th of August 1840. When a youth he emigrated to the United States. After 1880 he devoted himself to archaeological and ethnological work among the Indians of the south-western United States, Mexico and South America. Beginning his studies in Sonora (Mexico), Arizona and New Mexico, he made himself the leading authority on the history of this region, and — with F. H. Cushing

and his successors — one of the leading authorities on its prehistoric civilization. In 1892 he abandoned this field for Ecuador, Bolivia and Peru, where he continued ethnological, archaeological and historical investigations. In the first field he was in a part of his work connected with the Hemenway Archaeological Expedition and in the second worked for Henry Villard of New York, and for the American Museum of Natural History of the same city. Bandelier has shown the falsity of various historical myths, notably in his conclusions respecting the Inca civilization of Peru. His publications include: three studies ” On the Art of War and Mode of Warfare of the Ancient Mexicans,” ” On the Distribution and Tenure of Lands and the Customs with respect to Inheritance among the Ancient Mexicans,” and ” On the Social Organization and Mode of Government of the Ancient Mexicans ” (Harvard University, Peabody Museum of American Archaeology and Ethnology, Annual Reports, 1877, 1878, 1879); Historical Introduction to Studies among the Sedentary Indians of New Mexico, and Report on the Ruins of the Pueblo of Pecos (188 1) ; Report of an Archaeo- logical Tour in Mexico in 1881 (1884); Final Report of Investiga- tions among the Indians of the South-western United Stales (1890- 1892, 2 vols.); Contributions to the History of the South-western Portion of the United States carried on mainly in the years from 1880 to 1885 -(1890), — all these in the Papers of the Archaeological Institute of America, American Series, constituting vols, i.-v.; ” The Romantic School of American Archaeologists ” (New York Historical Society, 1885); The Gilded Man (El Dorado) and other Pictures of the Spanish Occupancy of America (1893); and a report On the Relative Antiquity of Ancient Peruvian Burials (American Museum of Natural History, Bulletin, v. 30, 1904). He also edited The Journey of Alvar Nunez Cabeza deVaca . . . from Florida to the Pacific, 1528-1536 (1905), translated into English by his wife.

BANDELLO, MATTEO (1480-1562), Italian novelist, was born at Castelnuovo, near Tortona, about the year 1480. He received a very careful education, and entered the church, though he does not seem to have prosecuted his theological course with great zeal. For many years he resided at Mantua, and superintended the education of the celebrated Lucrezia Gonzaga, in whose honour he composed a long poem. The decisive battle of Pavia, which gave Lombardy into the hands of the emperor, compelled Bandello to fly; his house at Milan was burnt and his property confiscated. He took refuge with Cesare Fregoso, an Italian

general in the French service, whom he accompanied into France. In 1550 he was raised to the bishopric of Agen, a town in which

he resided for many years before his death in 1562. Bandello wrote a number of poems, but his fame rests entirely upon his extensive collection of Novelle, or tales (1554, 1573), which have been extremely popular. They belong to that species of literature of which Boccaccio's Decameron and the queen of Navarre's Heptameron are, perhaps, the best known examples. The common origin of them all is to be found in the old French fabliaux, though some well-known tales are evidently Eastern, and others classical. Bandello's novels are esteemed the best of those written in imitation of the Decameron, though Italian critics find fault with them for negligence and inelegance of style. They have little value from a purely literary point of view, and many of them are disfigured by the grossest obscenity. Histori- cally, however, they are of no little interest, not only from the insight into the social life of the period which they afford, but from the important influence they exercised on the Elizabethan drama. The stories on which Shakespeare based several of his plays were supplied by Bandello, probably through Belleforest or Paynter.

BANDER ABBASI (also Bender Abbas, and other forms), a town of Persia, on the northern shore of the Perisan Gulf in 27 11′ N., and 56° 17′ E., forming part of the administrative division of the " Persian Gulf ports," whose governor resides at Bushire. It has a population of about 10,000, an insalubrious climate and bad water.

Bander Abbasi was called Gombrun (Gombroon, Gamaroon; Cambarao, Comorao of Portuguese writers) until 1622, when it received its present name (the "port of Abbas") in honour of the reigning shah, Abbas I., who had expelled the Portuguese in 1614, and destroyed the fort built by them in 161 2. The English, however, were permitted to build a factory there, and about 1620 the Dutch obtained the same privilege. On the capture of the .island of Hormuz (Ormus) in 1622 by the English and Persians a large portion of its trade was transferred to Bander Abbasi. During the remainder of the 17th century the traffic was considerable, but in the 18th prosperity declined and most of the trade was removed to Bushire. In 1759 the English factory was destroyed by the French, and though afterwards re-established it has long been abandoned. The ruins of the factory and other buildings lie west of the present town. About 1740 Nadir Shah

granted the town and district with the fort of Shamil and the town pf Minab, together with the islands of Kishm, Hormuz (Ormus) and Larak, to the Arab tribe of the Beni Ma'Ini in return for a payment of a yearly rent or tribute. About 40 years later Sultan bin Ahmad, the ruler of Muscat, having been appealed to for aid by the Arab inhabit- ants of the place against Persian misrule, occupied the town, and obtained a firman from the Persian government confirming him in his possession on the condition of his paying a yearly rent of a few thousand tomans. The islands were considered to be the property of Muscat. In 1852 the Persians expelled the Muscat authorities from Bander Abbasi and its district, but retired when Muscat agreed to pay an increased rent. By a treaty concluded between Persia and Muscat in 1856 it was stipulated that Bander Abbasi town and district and the islands were to be considered Persian territory and leased to Muscat at an annual rent of 14,000 tomans (£6000). The treaty was to have been in force for twenty years, but in 1866 the Persians took advantage . of the assassination of Seyed Thuweini, the sultan of Muscat, to instal as governor of Bander Abbasi and district a nominee of their own who agreed to pay a rent of 20,000 tomans per annum. Further difficulties arising between Persia and Muscat, and the ruler of the latter, then in possession of a powerful fleet, threatening to blockade Bander Abbasi, the Persian government solicited the good offices of the British government, and the lease was renewed for another eight years upon payment of 30,000 tomans per annum (then about £12,000). This was in 1868. In the same year, however, the sultan of Muscat was expelled by a successful revolt, and the Persian government, in virtue of a clause in the lease allowing them to cancel the contract if a conqueror obtained possession of Muscat, installed their own governor at Bander Abbasi and

have retained possession of the place ever since (see Curzon, Persia, ii. 424).

Bander Abbasi has a lively trade, exporting much of the produce of central and south-eastern Persia and supplying imports to those districts and Khofasan. It has telegraph and post offices, and the mail steamers of the British India Steam Navigation Company call at the port weekly. Great Britain and Russia are represented there by consuls. From 1890- 1905 the total value of

the exports and imports from and into Bander Abbasi averaged about £660,000 per annum, £260,000 (£155,000 British) being for exports, £400,000 (£340,000 British) imports. Of the 255,000 tons of shipping which in 1905 entered Bander Abbasi 237,000 were British. (A. H.-S.)

BANDER LINGAH, or Linga, a town of Persia on the northern shore of the Persian Gulf and about 300 m. by sea from Bushire, in 26 33′ N., 54° 54′ E. Pop. about 10,000. It forms part of the administrative divisions of the ” Persian Gulf ports,” whose governor resides at Bushire. The annual value of the exports and imports from and into Bander Lingah from 1890 to 1905 averaged about £800,000, but nearly half of that amount is represented by pearls which pass in transit from the fisheries on the Arab coast to Bombay. Like many other Persian Gulf ports, Bander Lingah was for many generations a hereditary patrimony of the Sheikh of an Arab tribe, in this case the Juvasmi tribe, and it was only in 1898 that the Arabs were expelled from the place by a Persian force. It is the chief port for the Persian province of Laristan (under Fars), and has a thriving trade with Bahrein and the Arab coast. It has a British post office, and the steamers of the British India Company call there weekly. Of the 133,000 tons of shipping which in 1905 entered the port 104,500 were British.

BANDEROLE (Fr. for a “little banner”), a small flag or streamer carried on the lance of a knight,, or flying from the mast-head of a ship in battle, &c; in heraldry, a streamer hanging from beneath the crook of a bishop’s crosier and folding over the staff; in architecture, a band used in decorative sculp- ture of the Renaissance period for bearing an inscription, &c. Bannerol, in its main uses the same as banderole, is the term especially applied to the square banners carried at the funerals of great men and placed over the tomb.

BANDICOOT, any animal of the marsupial genus Perameles, which is the type of a family Peramelidae. The species, about a dozen in number, are widely distributed over Australia, Tasmania, New Guinea and several of the adjacent islands. They are of small size and live entirely on the ground, making nests of dried leaves, grass and sticks in holiow places and forming burrows in which they pass a great part of the day. Though feeding largely on worms and insects they ravage gardens and fields, on which account they are detested by the colonists. The name is often extended to the family.

BANDICOOT-RAT, the Anglo-Indian name for a large rat (Nesocia bandicota), inhabiting India and Ceylon, which measures from 12 to 15 in. to the root of the tail, while the tail itself measures from n to 13 in. The name is said to be a corruption of the Telegu pandi-koku. It differs from typical rats of the genus Mus by its broader incisors, and the less distinct cusps on the molars. Other species of the genus are found from Palestine to Formosa, as well as in central Asia. The typical species frequents villages, towns and cultivated grounds all over India and Ceylon, but is specially common in the south of the peninsula. (See Rodentia.)

BANDIERA, ATTILIO (1811-1844) and EMILIO (1819-1844), Italian patriots. The brothers Bandiera, sons of Baron Bandiera, an admiral in the Austrian navy, were themselves members of that service, but at an early age they were won over to the ideas of Italian freedom and unity, and corresponded with Giuseppe Mazzini and other members of the Giovane Italia (Young Italy), a patriotic and revolutionary secret society. During the year 1843 the air was full of conspiracies, and various ill-starred attempts at rising. against the Italian despots were made. The Bandieras began to make propaganda among the officers and men of the Austrian navy, nearly all Italians, and actually planned to

seize a warship and bombard Messina. But having been betrayed they fled to Corfu early in 1844. Rumours reached them there of agitation in the Neapolitan kingdom, where the people were represented as ready to rise en masse at the first appearance of a leader; the Bandieras, encouraged by Mazzini, consequently determined to make a raid on the Calabrian coast. They got together a band of about twenty men ready to sacrifice their lives for an idea, and set sail on their desperate venture on the 1 2th of June 1844. Four days later they landed near Cotrone, intending to go to Cosenza, liberate the political prisoners and issue their proclamations. But they did not find the insurgent band which they had been told awaited them, and were betrayed by one of their party, the Corsican Boccheciampe, and by some peasants who believed them to be Turkish pirates. A detachment of gendarmes and volunteers was sent against them, and after a short fight the whole band were taken prisoners and escorted to Cosenza, where a number of Calabrians who had taken part in a previous rising were also under arrest. First the Calabrians were tried by court-martial, and a large number condemned to death or the galleys. The raiders' turn came next, and the whole party, save the traitor Boccheciampe, were- condemned to be shot, but in the case of eight of them the sentence was commuted to the

galleys. On the 23rd of July the two Bandieras and their nine companions were executed; they cried Viva I' Italia I as they fell.

The Neapolitan government was undoubtedly within its right in executing the Bandieras, and the material results of this heroic but unpractical attempt were nil. But the moral effect was enormous throughout Italy, the action of the authorities was universally condemned, and the martyrdom of the Bandieras bore fruit in subsequent revolutions. It also created a great impression in England, where it was believed that the Bandieras' correspond- ence with Mazzini (q.v.) had been tampered with, and that information as to the proposed expedition had been forwarded to the Austrian and Neapolitan governments by the British foreign office; recent publications, however, especially the biography of Sir James Graham, tend to exculpate the British government.

See G. Ricciardi, Storia dei Fratelli Bandiera (Florence, 1863) ; F. Venosta, / Fratelli Bandiera (Milan, 1863) ; and Carlo Tivaroni's L'ltalia durante il dominio austriaco, vol. iii. p. 149 (Turin, 1894).

(L. V.*)

BANDINELLI, BARTOLOMMEO r BACCIO (1493-1560), Florentine sculptor, was the son of an eminent goldsmith, and from him Bandinelli obtained the first elements of drawing. Show- ing a strong inclination for the fine arts, he was early placed under Rustici, a sculptor, and a friend of Leonardo da Vinci, with whom he made rapid progress. The ruling motive in his life seems to have been jealousy both of Benvenuto Cellini and of Michel- angelo, one of whose cartoons he is said to have torn up and destroyed. He is regarded by some as inferior in sculpture only to Michelangelo, with whom a comparison unfavourable to Bandinelli is tempted in such works as the marble colossal group of Hercules and Cacus in the Piazza del Gran Duco, and the group of Adam and Eve in the Bargello. Among his best works must be reckoned the bassi-rilievi in the choir of the cathedral of Florence; his copy of the Laocoon; and the figures of Christ and Nicodemus on his own tomb.

BANDINI, ANGELO MARIA (1726-1800), Italian author, was born at Florence on the 25th of September 1726. Having been left an orphan in his infancy, he was supported by his uncle, Giuseppe Bandini, a lawyer of some note. He received his educa- tion

among the Jesuits, and showed a special inclination for the study of antiquities. His first work was a dissertation, De Veterum Saltationibus (4749). In 1747 he undertook a journey to Vienna, in company with the bishop of Volterra, to whom he acted in the capacity of secretary. He was introduced to the emperor and took the opportunity of dedicating to that monarch his Specimen Litteraturae Florentinae, which was then printing at Florence. On his return he took orders, and settled at Rome, passing the whole of his time in the library of the Vatican, and in those of the cardinals Passionei and Corsini. The famous obelisk

of Augustus, at that time disinterred from the ruins of the Campus Martius, was described by Bandini in a learned folio volume De Obelisco Augusti. Shortly after he was compelled to leave Rome on account of his health and returned to Florence, where he was appointed librarian to the valuable library bequeathed to the public by the abbe Marucelli. In 1756 he was preferred by the emperor to a prebend at Florence, and appointed principal librarian to the Laurentian library. During forty-four years he continued to discharge the duties of this situation, and died in 1800, generally esteemed and regretted. On his deathbed he founded a public school, and bequeathed the remainder of his fortune to other charitable purposes. The most important of his numerous works are the Catalogus Codd. MSS. Graec, Lai., ItaL, Bib., Laurent., 8 vols (1 767-1 778), and theVita e Lettcre d' Amerigo Vespucci, 1745.

BANDOLIER, or Bandoleer (from Fr. baitdouliere, Ital. bandoliera, a little band), a belt worn over the shoulder, particularly by soldiers to carry cartridges. In the 17th century wooden cases were hung to the belt to contain powder charges. The modern bandolier carries the cartridges either in loops sewn to the belt, or in small pouches, similarly attached, containing strips of several cartridges. It has been extensively adopted in the British army, especially for mounted troops.

BANDON, or Bandonbridge, a market-town of county Cork, Ireland, in the south-east parliamentary division, picturesquely situated in a broad open valley on both sides of the river Bandon. Pop. (1901) 2830. It is 20 m. S.W. of the city of Cork by the Cork, Bandon & South Coast railway. It is an important agricultural

centre and there are distilleries, breweries and flour-mills. The open park of Castle Bernard (earl of Bandon), on the riverside, is attractive, and 2 m. below Bandon on the river is Innishannon, the head of navigation. Bandon was founded early in the 17th century by Richard Boyle, earl of Cork, and was incorporated by James I. It returned two members to the Irish parliament and thereafter one to the Imperial parliament until 1885. After the destruction of the walls by the Irish in 1689, Bandon long resisted the admission of Catholic inhabitants.

BANEBERRY, or Herb Christopher, popular names for Actaea spicata (nat. ord. Ranunculaceae) , a poisonous herb with long-stalked compound leaves, small white flowers and black berries, found wild in copses in limestone districts in the north of England. It is widely distributed in the north temperate zone.

BANER (Banner, Banier), JOHAN (1596-1641), Swedish soldier in the Thirty Years' War, was born at Djursholm Castle on the 23rd of June 1596. Entering the Swedish army, he served with distinction in the wars with Russia and Poland, and had reached high rank when, in 1630, Gustavus Adolphus landed in Germany. As one of the king's chief subordinates, Baner served in the campaign of north Germany, and at the first battle of Bireitenfeld he led the right wing of Swedish horse. He was present at the taking of Augsburg and of Munich, and rendered conspicuous service at the Lech and at Donauworth. At the unsuccessful assault on Wallenstein's camp at the Alte Veste Baner received a wound, and, soon afterwards, when Gustavus marched towards Liitzen, his general was left in com- mand in the west, where he was opposed to the imperial general Aldringer. Two years later, as Swedish field-marshal, Baner, with 16,000 men, entered Bohemia, and, combined with the Saxon army, marched on Prague. But the complete defeat of Bernhard of Saxe-Weimar in the first battle of Nordlingen stopped his victorious advance. After this event the peace of Prague placed the Swedish army in a very precarious position, but the victories won by the united forces of Baner, Wrangel and Torstensson, at Kyritz and Wittstock (4th Oct. 1636), restored the paramount influence of Sweden in central Germany. Even the three combined armies, however, were decidedly inferior in force to those they defeated, and in 1637 Baner was completely unable to make headway against the enemy. Rescuing with great difficulty the beleaguered garrison of Torgau, he retreated beyond the Oder into Pomerania. In 1639, however, he again overran northern Germany, defeated the Saxons at Chemnitz

and invaded Bohemia itself. The winter of 1640-1641 Baner spent in the west. His last achievement was an audacious coup-de-main on the Danube. Breaking camp in mid-winter (a very rare event in the 17 th century) he united with the French under the comte de Guebriant and surprised Regensburg, where the diet was sitting. Only the break-up of the ice pre- vented the capture of the place. Baner thereupon had to retreat to Halberstadt. Here, on the 10th of May 1641, he died, after designating Torstensson as his successor. He was much beloved by his men, who bore his body with them on the field of Wolfenbuttel. Baner was regarded as the best of Gustavus's generals, and tempting offers (which he refused) were made him by the emperor to induce him to enter his service. His son received the dignity of count.

See Baner s Bref till Axel Oxenstjerna (Stockholm, 1 893) ; B. P. von Chemnitz, Koniglichen Schwedscher in Deutschland gefiihrten Kriegs; Martin Veibull, Sveriges Storhedsted (Stockholm, 1881); Lundblad, Johan Baner (Stockholm, 1823); Ardwisson, Trittioariga Krigets maerhiaerdigaste personer (Stockholm, 1861).

BANFF, a royal, municipal and police burgh, seaport and capital of Banffshire, Scotland. Pop. (1901) 7161. It is beautifully situated on high ground, on the left bank of the mouth of the Deveron, 50 m. N.W. of Aberdeen by the Great North of Scotland railway. It is a place of great antiquity, its first charter'having been granted by Malcolm IV. in 1163, and further privileges were conferred by Robert Bruce in 1324 and Robert II. in 1372. Of the old castle on the hill by the sea, in which Archbishop Sharp was born, scarcely a trace remains; but upon its site was erected the modern Banff Castle, belonging to the earl of Seafield. The chief public edifices include the county buildings; town hall, surmounted by a spire 100 ft. high; Chalmers hospital (founded by Alexander Chalmers of Clunie, a merchant and shipowner of the town) ; a masonic hall of tasteful design; and the academy, a modern structure in the Grecian style, to which there is attached an extensive museum, containing examples of the early mechanical genius of James Ferguson, the astronomer. Of the museum, which originally belonged to the defunct Banff Institution and was afterwards taken over by the town council, Thomas Edward — the " working naturalist," whose life was so sympathetically written by Samuel Smiles — was curator for a few years. The principal manufactures comprise woollens, leather, rope and sails, and there are also breweries, distilleries, iron foundries, brick-yards and timber-yards, besides some ship-

building. The fishing trade is also important. The exports mainly consist of grain, cattle, fish, dairy produce and potatoes; the imports of coal and timber. There is a railway station at Bridge of Banff communicating, via Inyeramsay, with Aberdeen, and another at the harbour, communicating with Portsoy and Keith. The burgh is under the jurisdiction of a provost and council, and unites with Macduff, Elgin, Cullen, Inverurie, Kintore and Peterhead in returning one member to parliament. The Cassie Gift arose out of a bequest by Alexander Cassie of London, a native of Banff, who left £20,000 to the poor of the town — the interest being divided twice a year. Duff House, immediately adjoining the town, is a seat of the duke of Fife. It was built in 1 740-1 745, after designs by Robert Adam, at a cost of £70,000. The duke of Cumberland rested here on the way to Culloden. The house contains a fine collection of pictures and an interesting armoury. The park is nearly ten miles in circumference. The house, together with that portion of the park immediately surrounding it (about 140 acres), was presented to the towns of Banff and Macduff by the duke of Fife in November 1906.

BANFFSHIRE, a north-eastern county of Scotland, bounded N. by the Moray Firth, E. and S. by Aberdeenshire, and W. by Elgin and Inverness. It has an area of 403,364 acres, or 633ˆ sq. m. The surface is diversified. The northern half is mostly a fine, open, undulating country of rich, highly-cultivated soil. The southern is mountainous, but extensive farms are found in its fertile glens. Some of the mountains are thick with forests, some present a beautiful intermixture of rock and copse, while others are covered with brown heath. The principal mountains are all in the south; among them are Cairngorm, on the confines

of the shires of Banff and Inverness (4084 ft.), famous for its amber-coloured quartz crystals, the ” cairngorms ” of Scots jewelry; Ben Rinnes (2775 ft.); Corryhabbie (2563); Cook’s Cairn (2478) ; Cam an t-Saidhe (2401) ; and the Buck of Cabrach (2368). No great rivers belong wholly to Banffshire. For a considerable part of their courses the Spey forms the western and the Deveron the eastern boundary of the county. But Banffshire streams are comparatively short, the chief being the Avon, Fiddich, Isla, Buckie, Deskford — with a series of cascades — and Livet. Most of them are stocked with trout and the Spey and

Deveron are famous for their salmon. The great glens are distinguished for their romantic scenery, the chief being Glen Avon, Glen Barry, Glen Fiddich, Glen Isla, Glen Livet, and Glen Rinnes. The largest lochs are in the extreme south: Loch Avon (2300 ft. above the sea), Loch Builg (1586) and Loch Etchachan (3100).

Geology. — The geology of Banffshire is closely connected with that of the neighbouring counties of Aberdeen and Elgin, from which it is divided by no natural boundaries. The greater portion is occupied by crystalline schists of sedimentary origin belonging to the Eastern Highland sequence. The groups which are typically developed comprise (1) slates, black schists and phyllites with thin black limestone, sometimes containing tremolite, (2) the main limestone, (3) the quartzite (Schiehallion). These form subparallel belts trending north-east and south-west from the seacoast between Cullen and Portsoy southwards by Keith and Dufftown to the head waters of the Avon beyond Tomintoul. Some excellent sections of the phyllites are to be seen on the shore between Sandend, near Portsoy, and Findlater Castle, near Cullen, and in the railway cutting near Mulben, west of Keith. The main limestone has been worked at Fprdyce, near Grange east of Keith, and at Keith and Dufftown. The quartzite, which is regarded as probably the highest member of the series, forms prominent ridges due to the more rapid erosion of the phyllites, mica-schists and limestones occupying the inter- vening hollows. It appears on the coast between Cullen and Buckie, it forms the Durn Hill near Portsoy, the Binn of Cuilen, the Knock Hill, Ben Aigan and various ridges trending southwards from Grange by Glen Fiddich towards Tomintoul. In the north-east part of the county there is a large development of slate with interbedded grey- wackes and pebbly grits, which occupies the coast section between Macduff and Troup Head except a small part at Gamrie. The slate, has been quarried for roofing purposes. No fossils have been found in these strata and their age is uncertain. The metamorphic sedi- ments have been pierced by acid and basic igneous intrusions, partly before and partly after the folding and metamorphism of the strata. The older acid and basic materials appear as sheets injected along the lines of bedding of the sediments and are traceable for consider- able distances. They are foliated in places, the planes of schistosity being more or less parallel with the planes of bedding in the schists. The older acid recks are represented by the sills of granite and augen- gneiss occurring west of Portsoy, south of Fordyce and near Keith, while

the older basic rocks are illustrated by the belt of gabbro, epidiorite and hornblende-schist which stretches southwards from the coast at Portsoy, by Rothiemay to Huntly in Aberdeenshire. Veins and bosses of serpentine are associated with these basic in- trusions at Portsoy and near Grange, one of the veins being traceable at intervals from the shore southwards in the direction of Knock Hill. The later intrusions are represented by the Ben Rinnes mass of granite and its basic modification, the Netherly diorite, east of Rothes. Various mineral localities occur throughout the county, of which some of the most important occur on the shore at Portsoy, as for example the gabbro masses in Portsoy Bay with enstatite, hypersthene and labradorite, the graphic granite with microcline, muscovite and tourmaline at East Head, the chiastolite-schist west of the marble quarry, the mottled serpentine with strings of chryso- tile. Resting unconformably on these metamorphic rocks, Old Red sandstone strata are met with in a few places. Thus, they cross the Spey and appear in the Tynet Burn east of Fochabers, and extend eastwards to Buckie. Outliers of these beds appear on the Shore near Cullen and south of Fordyce, while the largest area extends from Gamrie east by Pennan on the north coast of Aberdeen- shire to Aberdeen. The strata consist mainly of conglomerates and red sandstones, which, at Gamrie and at Tynet, are associated with a band of limestone nodules embedded in a clayey matrix, contain- ing fish remains. The more abundant species occurring at Gamrie, as determined by Dr R. H. Traquair, are Diplacanthus striatus, Rkadinacanlhus, Cheiracanlhus Murchisoni, Pterichthys Milleri, Coccosteus decipiens. In view of the fossil evidence these beds have been referred to the middle or Orcadian division of this formation. In the interior near Tomintoul, another large deposit, composed of conglomerate and sandstone, occurs, which may be of the same age, though no fossils have as yet been obtained from these beds. There is a widespread covering of boulder clay especially in the northern part bordering the shore, where it contains fragments of shells and includes numerous boulders which have been carried eastwards

from the high grounds west of the Moray Firth. In the brickclays at Blackpots to the north-west of Banff, fragments of shells also occur together with Jurassic fossils. Shelly sands have been re- corded near the Ord south of Tillynaught near Portsoy, and shells have been found in stratified deposits on the shore near Gamrie.

Agriculture. — The soil is in general rich and productive, yielding

fair crops of wheat, and excellent crops of barley, oats, &c. ; and the grass and green crops are equally abundant. Oats is the predominant crop, but the demands of distillers keep up the acreage of barley. The cattle and stock hold a high characcer and form the staple agricultural industry. There is also a considerable amount of dairy farming. Among landlords who did much to encourage agricultural enterprise and to plant and reclaim lands, were the earls of Fife and the earls of Findlater, afterwards earls of Seafield. It was a Seafield who, in 1846, received the honorary gold medal of the Highland and Agricultural Society of Scotland, for his immense and thriving plantations of useful timber-trees, in the counties of Banff, Moray and Nairn. From the year 181 1 to 1845, he had planted 18,938,224 Scots firs, 11,904,798 larches, 843,450 hard- woods; making the enormous aggregate of 31,686,472 forest trees, planted in 8223 acres of enclosed ground. The Banffshire Agri- cultural Association holds shows periodically for all sorts of stock and produce and agricultural implements.

Manufactures and Trade. — Woollen factories are found in Dufftown, Rothiemay and Gollachy, and engineering works in Banff, Portsoy and Keith. Distilleries are numerous and their product has a high repute. A fishing and miscellaneous trade is done at the harbours of Banff, Macduff, Buckie, Gardenstown, Portsoy, Cullen and Port Gordon ; but fishing is also carried on at numerous creeks or harbours along the coast. The herring season lasts from June to September, white fishing all the year round. The fishery districts centre in Banff and Buckie. Banffshire contains large limestone deposits, and granite is also quarried.

The systems of the Great North of Scotland and the Highland railways serve the chief towns of the county and provide communication in one direction with Aberdeen, and in another with Elgin, Nairn and Inverness.

The population of Banffshire in 1891 was 61,684, and in 1901 61,488, or 97 to the square mile. In 1901 there were 499 persons speaking Gaelic and English. The chief towns are Banff (pop. in 1901, 7161), Buckie (6549), and Keith (4753), with Cullen (1936), Portsoy (1878) and Dufftown (1823). The county returns one member to parliament; the royal burghs, Banff and Cullen, belong- ing to the Elgin group of parliamentary burghs. Banffshire, with Aberdeen and Kincardine shires, forms a sheriffdom, and there is a resident sheriff-substitute at Banff, who sits also at Keith, Buckie and Dufftown. Most of the schools

are under school-board juris- diction. Several of them earn grants for higher education, and the county council, out of the ” residue grant,” subsidizes classes in agriculture, navigation, veterinary science and cookery and laundry work. The teachers of the county, with those of the shires of Aberdeen and Elgin, benefit by the bequest of James Dick (1743- 1828), a West India merchant, who left over £110,000 to promote the higher learning of the schoolmasters of these shires. The annual income of £4000 is distributed among the dominies who have qualified by examination to become beneficiaries.

History. — Of the northern Picts who originally possessed the land few remains now exist beyond the cairns that are found in the districts of Rothiemay, Ballindalloch, Boharm, Glen Livet and elsewhere. ” Cairn ” also occurs in many place names. The advance of the Romans was practically prevented by the mountains in the south, but what is believed to have been a Roman camp may still be made out in Glen Barry. Danish invaders were more persevering and more successful. Many bloody conflicts took place between them and the Scots. Near Cullen a fierce encounter occurred in 960, and a sculptured stone at Mortlach is said to commemorate a signal victory gained by Malcolm II. over the Norsemen in 1010. The shire was the scene of much strife after the Reformation. In Glen Livet the Roman Catholics, under the marquess of Huntly, worsted the Protestants under the earl of Argyll. From 1624 to 1645 was a period of almost incessant struggle, and the Covenanting troubles, combined with the frequent conflicts of the clans, were productive of serious evils. But the Jacobite risings of 171s and 1745 left the county comparatively untouched, and thereafter it became settled.

See W. Cramond, Annals of Banff (New Spalding Club) (Aberdeen, 1891); Dr Gordon, Chronicles of Keith, Grange, &c. (Glasgow, 1880); Banffshire Year-Booh (Banff) ; Professor Dickie, Botanist’s Guide to Aberdeen, Banff, &c. (Aberdeen, i860); Inventory of Charters of Cullen (Banff, 1887); and Inventory of Charters of Banff (Banff); Robertson’s Collections for a History of the Shires of Aberdeen and Banff (Spalding Club) ; W. Watt, Aberdeenshire and Banff (Edinburgh, 1900).

BANFFY, DEZSO [Desiderius], Baron (1843-), Hunga- rian statesman, the son of Baron Daniel Banffy and Anna Gyarfas, was born at Klausenburg on the 28th of October 1843, and educated at the Berlin and Leipzig universities. As lord lieutenant of the county of Belso-Szolnok, chief captain of Kovar and curator of the Calvinistic church of Transylvania, • Banffy exercised considerable political influence outside parlia- ment from 1875 onwards, but his public career may be said to have begun in 1892, when he became speaker of the house of deputies. As speaker he continued, however, to be a party-man (he had always been a member of the left-centre or government party) and materially assisted the government by his rulings. He was a stringent adversary of the radicals, and caused some sensation by absenting himself from the capital on the occasion of Kossuth's funeral on the 1st of April 1894. On the 14th of January 1895, the king, after the fall of the Szell ministry, entrusted him with the formation of a cabinet. His programme, in brief, was the carrying through of the church reform laws with all due regard to clerical susceptibilities, and the mainten- ance of the Composition of 1867, whilst fully guaranteeing the predominance of Hungary. He succeeded in carrying the remaining ecclesiastical bills through the Upper House, despite the vehement opposition of the papal nuncio Agliardi, a triumph which brought about the fall of Kalnoky, the minister for foreign affairs, but greatly strengthened the ministry in Hungary. In the ensuing elections of 1896 the government won a gigantic majority. The drastic electoral methods of Banffy had, however, contributed somewhat to this result, and the corrupt practices were the pretext for the fierce opposition in the House which he henceforth had to encounter, though the measures which he now introduced (the Honved Officers' Schools Bill) would, in normal circumstances, have been received with general enthusi- asm. Banffy's resoluteness enabled him to weather all these storms, and his subsequent negotiations with Austria as to the quota and commercial treaties, to the considerable political advantage of Hungary, even enabled him for a time to live at peace with the opposition. But in 1898 the opposition, now animated by personal hatred, took advantage of the ever- increasing difficulties of the government in the negotiations with Austria, and refused to pass the budget till a definite understanding had been arrived at. They refused to be satisfied with anything short of the dismissal of Banffy, and passion ran so high that on the 3rd of January 1899 Banffy fought a duel with his most bitter opponent, Horanszky. On the 26th of February Banffy resigned, to save the country from its "

ex-lex," or unconstitutional situation; he was decorated by the king and received the freedom of the city of Buda. Subsequently he contributed to overthrow the Stephen Tisza administration, and in May 1905 joined the Kossuth ministry.

See article " Banffy," bv Marczall, in Pallas Nagy Lexikona, K6t 17. ' (R. N. B.)

BANG, HERMANN JOACHIM (1858-), Danish author, was born of a noble family in the island of Zealand. When he was twenty he published two volumes of critical essays on the realistic movement. In 1880 he published his novel Haablose Slaegter (" Families without hope "), which at once aroused attention. After some time spent in travel and a successful lecturing tour in Norway and Sweden, he settled in Copenhagen, and produced a series of novels and collections of short stories, which placed him in the front rank of Scandinavian novelists. Among his more famous stories are Faedra (1883) and Tine (1889). The latter won for its author the friendship of Ibsen and the enthusi- astic admiration of Jonas Lie. Among his other works are: — Del hvide Hus (The White House, 1898), Excentriske Noveller (1885), Stttle Eksistenzer (1886), Liv og Dod (Life and Death, 1899), Englen Michael (1902), a volume of poems (1889) and of recollections (Ti Aar, 1891).

BANGALORE, a city of India, the capital of the native state of Mysore, and the largest British cantonment in the south of India. It is 3113 ft. above the sea, and 219 m. W. of Madras by rail. Pop. (1901) 69,447. The foundation of the present fort

was laid by a descendant of Kempe-Goude, a husbandman of the neighbouring country, who, probably in the 16th century, had left his native village to avoid the tyranny of the wadeyar of that place, and settled on a spot a few miles to the north of Bangalore. To the peaceful occupation of a farmer he added that of a warrior, and his first exploit was the conquest of this place, where, and at Savendrug, his family subsequently erected fortresses. Banga- lore, with other possessions, was, however, wrested from them by Bijapur. Somewhat later we find it enumerated among the jagirs of Shahji, father of Sivaji, the founder of the Mahratta sway; and at an early period of his career in the service of the Bijapur state, that adventurer seemed to have fixed his residence there. It appears to have passed into the possession of Venkaji, one of the sons of Shahji; but he having occupied Tanjore, deemed Bangalore too distant,

especially under the circumstances of the times, to be safe. He accordingly, in 1687, entered into a bargain for its sale to Chikka Deva, raja of Mysore, for three lakhs of rupees; but before it could be completed, Kasim Khan, commander of the forces of Aurangzeb, marched upon the place and entered it almost without resistance. This event, however, had no other result than to transfer the stipulated price from one vendor to another; for that general, not coveting the possession, immediately delivered it over to Chikka Deva on payment of the three lakhs. In 1758, Nanjiraj, the powerful minister of the raja, caused Bangalore to be granted, as njagir or fief, to Hyder AH, afterwards usurper of Mysore, who greatly enlarged and strengthened the fort, which, in 1760, on his expulsion from Seringapatam, served as his refuge from destruction. The fort formed the traditional scene of the first captivity of Sir David Baird after Baillie's defeat at Perambakam in 1780. The prison cell of Sir David and his fellow-captive is from 12 to 15 ft. square, with so low a roof that a man can scarcely stand upright in it. In 1 79 1 it was stormed by a British army commanded by Lord Cornwallis. In 1799 the district was included by the treaty of Seringapatam within the territory of the restored raja of Mysore. It formed the headquarters of the British administration of Mysore from 1831 to 1881. When the state of Mysore was restored to its raja in 1881, the civil and military station of Bangalore was permanently reserved under British jurisdiction as an " assigned tract." It has an area of 13 sq. m., and had in 1901 a population of 89,399, showing a decrease of 10 % in the decade, due to plague. Bangalore is the headquarters of a military district, its elevation rendering it healthy for British troops, with accommodation for a strong force of all arms and an arsenal in the old fort. It is the headquarters of a brigade in the 9th division of the Indian army. A considerable number of European pensioners reside here. There is a modern palace for the maharaja. There is an aided Roman Catholic college, besides many schools for Europeans. A permanent water-supply has been introduced and there is a complete system of drainage. Bangalore is an important railway centre. There are several cotton mills. The city suffered severely from plague in 1899 and 1900.

The district of Bangalore borders on the Madras district of Salem. The main portion consists of the valley of the Arkavati river, which joins the Cauvery on the southern frontier. Its area is 3079 sq. m. In 1901 the population was 789,664, showing an increase of 1 5 % in the decade. The district is crossed by several lines of

railway. Outside Bangalore city there is a woollen mill, which turns out blankets, cloth for greatcoats, and woollen stuffs.

BANGANAPALLE, a state of southern India, surrounded by the Madras district of Kurnool. Area, 255 sq. m. ; pop. (1901) 32,264, showing a decrease of 9% in the decade; estimated revenue £6400, of which a large portion is alienated in grants to junior branches of the family; no tribute. The excessive expenditure of the nawab, Syed Fateh Ali Khan, and the general inefficiency of the administration caused much anxiety to the government, and in February 1905 he was temporarily removed from the administration of the state. The town of Banganapalle is not far from the branch of the Southern Mahratta railway from Guntakal to Bezwada.

BANGASH, a small tribe of Pathans in the Kohat district of the North- West Frontier Province of India. They occupy the hills between Thai and Kohat, and number 3000 fighting men. Formerly they owned the whole of Kurram, but owing to the encroachments of the Turis, they moved eastwards, dispossessed the Orakzais, drove them north and took their territory in the Kohat district, which they now occupy to the west of the Khattak country. The Khattaks and Bangashes are of excep- tionally good physique and make excellent soldiers.

BANGKOK, the capital of Siam, on the river Me Nam, about 20 m. from its mouth, in ioo° 30′ E., 13 45′ N. Until modern times the city was built largely on floating pontoons or on piles at the edges of the innumerable canals and water-courses which formed the thoroughfares, but to meet the requirements of modern life, well-planned roads and streets have been constructed in all directions, crossing the old canals at many points and lined with well-built houses, for the most part of brick, in which the greater part of the erstwhile riparian population now resides. The centre of the city is the royal palace (see Siam), situated in a bend of the river and enclosed by walls. At a radius of nearly a mile is another wall within which lies the closely-packed city proper, and beyond which the town stretches away to the royal parks on the north and to the business quarter, the warehouses, rice-mills, harbour and docks on the south. The whole town covers an area of over 10 sq. m. Two companies provide Bangkok with a

complete system of electric tramways, and the streets are lined with shade-trees and lit by electricity. All over the town are scattered beautiful Buddhist temples, which with their coloured tile roofs and gilded spires give it a peculiar and notable appearance. Many fine buildings are to be seen — the various public offices, the arsenal, the mint, the palaces of various princes and, in addition to these, schools, hospitals, markets and Christian churches of many denominations, chiefly Roman Catholic. There are four railway stations in Bangkok, the termini of the lines which connect the provinces with the capital.

The climate of Bangkok has without doubt recently changed. It has become hotter and less humid. Though a minimum temperature below 60° F. is still recorded in January and December, a maximum of over 100° is reached during the hot weather months and at the beginning of the rains, whereas up to the year 1900 a maximum of 93 was considered unusually high. The cause of this change is not known, but it is attributed to extensive drainage and removal of vegetation in the immediate neighbourhood of the town. The annual rainfall amounts to rather over 50 in.

A four-mile reach of the Me Nam, immediately below the city proper, forms the port of Bangkok. From 250 to 400 yds. broad and of good depth right up to the banks, the river offers every convenience for the berthing and loading of ships, though a bar at its mouth, which prevents the passage of vessels drawing more than 12 ft., necessitates in the case of large ships a partial loading and unloading from lighters outside. The banks of the port are closely lined with the offices, warehouses and wharves of commercial houses, with timber yards and innumerable rice-mills, while the custom house, the harbour master's office and many of the foreign legations and consulates are also situated here. Of the 750 steamships which cleared the port in 1904, three out of every seven were German, two were Norwegian and one was British, but in 1905 two new companies, one British and the other Japanese, arranged for regular services to Bangkok, thereby altering these proportions. It is notable that the heavy trade with Singapore shows a tendency to decrease in favour of direct trade with Europe. A fleet of small steamers, schooners and junks, carries on trade with the towns and districts on the east and west coasts of the Gulf of Siam. The trade of Bangkok is almost entirely in the hands of Europeans and Chinese. The principal exports are rice and teak, and the principal imports, cotton and silk goods and gold-leaf. The value of trade, which

more than doubled between the years 1900 and 1907, amounted in the latter year to £5,600,000 imports and £7,100,000 exports. Of the total trade, 75% is with the British empire. Many of the best known mercantile firms and banks of the Far East have

branches in Bangkok. The unit of currency is the tical (see Siam) .

The government of Bangkok is entrusted to the minister of the capital, a member of the cabinet. Under this minister are the police, sanitary, harbour master's and revenue offices. The police force is an efficient and well-organized body of 3000 men headed by a European commissioner of police. The sanitary department consists of a board of health, a bacteriological laboratory and an engineer's office, all managed with expert European assistance. Under the act of 1905, the want of which was long felt, the port and the city water-ways are controlled by the harbour master. Local revenues are collected by the revenue office. The ordinary law courts are under the control of the ministry of justice, but in accordance with the extra-territorial rights enjoyed by foreign powers in Siam, each consulate has attached to it a court, having jurisdiction in all cases in which a subject of the power represented by such consulate is defendant.

The population, which is estimated at 450,000, is mixed. Mingling with Siamese and Chinese, who form the major part, may be seen persons of almost every race to be found between Bombay and Japan, while Europeans of different nationalities number over 1000. The death-rate is high, especially among children, owing to the prevalence of cholera, smallpox and fevers during the dry weather. Sanitation, however, is improving and much good has resulted from the boring of numerous artesian wells which yield good water.

Before 1769 Bangkok was nothing but an agricultural village with a fort on the river bank. In that year, however, it was seized by the warrior, Paya Tak, as a convenient point from which to attack the Burmese army then in occupation of Siam, and upon his becoming king it was chosen as the capital of the country. (See Siam.) (W. A.G.)

BANGOR, a seaport and market-town of Co. Down, Ireland, in the north parliamentary division, on the south side of Belfast Lough, 12m. E.N.E. of Belfast, on a branch of the Belfast & County Down railway. Pop. of urban district (1901) 5903. It carries on a considerable trade in cotton and linen and embroidered muslin.

It is greatly frequented as a watering-place, especially by the people of Belfast, and there are golf links and important regattas held by the Royal Ulster Yacht Club. Slight remains are to be seen of an abbey of Canons Regular, founded in the middle of the 6th century by St Comgall, and rebuilt, on a scale of magni- ficence which astonished the Irish, by St Malachy O'Morgair in the first half of the 12th century. Bangor was incorporated by James I. and returned two members to the Irish parliament.

BANGOR, a city, port of entry, and the county-seat of Penobscot county, Maine, U.S.A., at the confluence of the Kenduskeag stream with the Penobscot river, and at the head of navigation on the Penobscot, about 60 m. from the ocean, and about 75 m. N.E. of Augusta. Pop. (1890) 19,103; (1900) 21,850, of whom 3726 were foreign-born and 176 were negroes; (1910, census) 24,803. A bridge (about 1300 ft. long) across the Penobscot connects Bangor with Brewer (pop. in 1910, 5667). Bangor is served directly by the Maine Central railway, several important branches radiating from the city, and by the Eastern Steamship line; the Maine Central connects near the city with the Bangor & Aroostook railway (whose general offices are here) and with the Washington County railway. The business portion of the city lies on both sides of the Kenduskeag and for about 3 m. along the W. bank of the Penobscot, which is here quite low, while many fine residences are on the hillsides farther back. Bangor is the seat of three state institutions — the Eastern Maine general hospital, the Eastern Maine insane hospital and the law school of the University of Maine — and of the Bangor Theological Seminary (Congregational), incorporated in 1814, opened at Hampden in 1816, removed to Bangor in 1819, and empowered in 1905 to confer degrees in divinity. The city has several public parks, a public library and various charitable institutions, among which are a children's home, a home for aged men, a home for aged women and a deaconesses' home. Among the principal buildings are the county court house, the Federal building, the city hall and the opera house. The Eastern

Maine Music Festival is held in Bangor in October of each year. The rise of the tide here to a height of 17 ft. makes the Penobscot navigable for large vessels; the Kenduskeag furnishes good water-power; and the city is the trade centre for an extensive

agricultural district. The Eastern Maine State Fair is held here annually. Bangor is one of the largest lumber depots in the United States, and also ships considerable quantities of ice. The city's foreign trade is of some importance; in 1907 the imports were valued at $2,720,594, and the exports at $1,272,247. Bangor has various manufactures, the most important of which (other than those dependent upon lumber) are boots and shoes (including moccasins); among others are trunks, valises, saws, stoves, ranges and furnaces, edge tools and cant dogs, saw-mill machinery, brick, clothing, cigars, flour and dairy products. In 1905 the city's factory products were valued at $3,408,355. The muni- cipality owns and operates the water-works (the water-supply being drawn from the Penobscot by the Holly system) and an electric-lighting plant; there is also a large electric • plant for generation of electricity for power and for commercial lighting, and in Bangor and the vicinity there were in 1908 about 60 m. of electric street-railway.

Bangor has been identified by some antiquarians as the site of the mythical city of N orumbega, and it was reported in 1656 that Fort Norombega, built by the French, was standing here; but the authentic history of Bangor begins in 1769 when the first settlers came. The settlement was at first called Conduskeag and for a short time was locally known as Sunbury. In 1791 the town was incorporated, and through the influence of the Rev. Seth Noble, the first pastor, the name was changed to Bangor, the name of one of his favourite hymn-tunes. During the war of 181 2 a British force occupied Bangor for several days (in September 1814), destroying vessels and cargoes. Bangor was chartered as a city in 1834. In 1836 a railway from Bangor to Old Town was completed ; this was the first railway in the state ; Bangor had, also, the first electric street-railway in Maine (1889), and one of the first iron steamships built in America ran to this port and was named " Bangor."

BANGOR (formerly Bangor Fawr, as distinguished from several other towns of this name in Wales, Ireland, Brittany, &c), a city, municipal (1883) and contributory parliamentary borough (Carnarvon district), seaport and market-town of Carnarvonshire, N. Wales, 240 m. N.W. of London by the London & North Western railway. Pop. (1901) 11,269. It consists of Upper and Lower, the Lower practically one street. Lying near the northern entrance of the Menai Straits, it attracts many visitors. Buildings include the small cathedral, disused bishop's palace, deanery ,'smallRoman Catholic church and other churches, the University College of N.

Wales (1883), with female students' hall, Independent, Baptist, Normal and N. Wales Training Colleges. The cruciform cathedral, with a low pinnacled tower, stands on the site of a church which the English destroyed in 1071 (dedicated to, and perhaps founded, about 525, by St Deiniol). Sir G. Scott restored the present cathedral, 1866-1875, after it had been burned in the time of Owen Glendower, destroyed in 1211, and, in 1102 and 1212, severely handled. Bishop Dean {temp. Henry VII.) rebuilt the choir, Bishop Skevyngton (1532) added tower and nave. Lord Penrhyn's slate-quarries, at Bethesda, 6 m. off, supply the staple export from Port Penrhyn, at the mouth of the stream Cegid.

The Myvyrian Archaeology (408-484) gives the three principal bangor (college) institutions as follows: — the bangor of Illtud Farchawg at Caer Worgorn (Wroxeter) ; that of Emrys (Ambrosius) at Caer Caradawg; bangor wydrin (glass) in the glass isle, Afallach; bangor Illtud, or Llanilltud, or Llantwit major (by corruption), being a fourth. In each of the first three were 420 saints, succeeding each other (by hundreds), day and night, in their pious offices.

BANGORIAN CONTROVERSY, a theological dispute in the early 18th century which originated in 17 16 with the posthumous publication of George Hickes's (bishop of Thetford) Constitution of the Christian Church, and the Nature and Consequences of Schism, in which he excommunicated all but the non-juring

churchmen. Benjamin Hoadly (q.v.), the newly-appointed bishop of Bangor, scented the opportunity and wrote a speedy and able reply, Preservative against the Principles and Practices of Non-Jurors, in which his own Erastian position was recom- mended and sincerity proposed as the only test of truth. This was followed by his famous sermon, preached before George I. on the 3 1st of March 1 7 1 7, on The Nature of the Kingdom or Church of Christ. In this discourse " he impugned the idea of the existence of any visible church at all, ridiculed the value of any tests of orthodoxy, and poured contempt upon the claims of the church to govern itself by means of the state." He identified the church with the kingdom of Heaven — it was therefore " not of this world," and Christ had not delegated His authority to any representatives. Both book and sermon were reported on by a committee appointed by the Lower House of Convocation in May, and steps would have been taken by the archbishop and bishops had not the government stepped in (Hoadly denied that this was at his request) and prorogued Convocation till November. Hoadly

himself wrote A Reply to the Representations of Convoca- tion and also answered his principal critics, among whom were Thomas Sherlock (q.v.), then dean of Chichester, Andrew Snape, provost of Eton, and Francis Hare, then dean of Worcester. These three men, and another opponent, Robert Moss, dean of Ely, were deprived of their royal chaplaincies. Hoadly was shrewd enough not to answer the most brilliant, though com- paratively unknown, of his antagonists, William Law. Though the controversy went on, its most important result had already been achieved in the silencing of Convocation, for that body, though it had just " seemed to be settling down to its proper work in dealing with the real exigencies of the church" when the Hoadly dispute arose, did not meet again for the despatch of business for nearly a century and a half. (See Convocation.)

BANGWEULU, a shallow lake of British Central Africa, formed by the head streams of the Congo. It lies between io° 38′ and n° 31′ S. and is cut by 30° E. Bangweulu occupies the north-west part of a central basin in an extensive plateau, and is about 3700 ft. above the sea. The land slopes gently to the depression from the south, east and north, and into it drain a considerable number of streams, turning the greater part into a morass of reeds and papyrus. The term Bangweulu is some- times applied to the whole depression, but is properly confined to the area of clear water. Only on its south-west and western sides are the banks of the lake clearly defined. The greatest extent of open water is about 60 m. N. to S. and 40 m. E. to W. Long narrow sandbanks almost separate Chif unawuli, the western pari of the lake, from the main body of water, while the water surface is further diminished by a number of islands. The largest of these islands, Kirui (Chiru), lies on the east side of the lake close to the swamp. Kisi (Chishi) is a small island occupying a central position just south of n° S., and Mbawali, 20 m. long by 3 broad, lies south of Kisi. South of Bangweulu the swamp extends to 1 2° 10′ S. Into this swamp on its east side flows the Chambezi, the most remote head stream of the Congo. Without entering the lake the Chambezi mingles its waters in the swamp with those of the Luapula. The Luapula, which leaves Bang- weulu at its most southern point, is about a mile wide at the out- flow, but soon narrows to 300 or so yds. West of the Luapulu and near its outflow lies Lake Kampolombo, 20 m. long and 8 broad at its southern end. A sandy track separates Bangweulu from Kampolombo, and a narrow forest-clad tongue of land called Kapata intervenes between the Luapula and Kampolombo.

Various channels lead, however, from the river to the lake. The Luapula flows south through the swamp some 50 m. and then turns west and afterwards north (see Congo). The flood waters of the Chambezi and other streams, which deposit large quantities of alluvium, are gradually solidifying the swamp, while the Luapula is believed to be, though very slowly, draining Bangweulu. The waters of the lake do not appear to be anywhere more than 15 ft. deep.

Though heard of by the Portuguese traveller, Francisco de Lacerda, in 1798, Bangweulu was first reached in 1868 by David Livingstone, who died six years later among the swamps to the

south. It was partially surveyed in 1883 by the French traveller, Victor Giraud, and first circumnavigated by Poulett Weatherley in 1896.

See P. Weatherley in Geog. Journ. vol. xii. (1898) and vol. xiv. p. 561 (1899) ; L.A.Wallace in Geog. Journ. vol. xxix. (i907),with map by O.L. Beringer. Giraud's Les Lacsde V Afrique equatoriale (Paris, 1890) and Livingstone's Last Journals (1874) may also be consulted. BANIM, JOHN (1798-1842), Irish novelist, sometimes called the " Scott of Ireland," was born at Kilkenny on the 3rd of April 1798. In his thirteenth year he entered Kilkenny College and devoted himself specially to drawing and painting. He pursued his artistic education for two years in the schools connected with the Royal Society at Dublin, and afterwards taught drawing in Kilkenny, where he fell in love with one of his pupils. His affection was returned, but the parents of the young lady interfered and removed her from Kilkenny. She pined away and died in two months. Her death made a deep impression on Banim, whose health suffered severely and permanently. In 1820 he went to Dublin and settled finally to the work of literature. He published a poem, The Celts' Paradise, and his Damon and Pythias was performed at Covent Garden in 182 1. During a short visit to Kilkenny he married, and in 1822 planned in conjunction with his elder brother Michael (1 796-1874), a series of tales illustrative of Irish life, which should be for Ireland what the Waverley Novels were for Scotland. He then set out for London, and supported himself by writing for magazines and for the stage. A volume of miscellaneous essays was published

anonymously in 1824, called Revelations of the Dead Alive. In April 1825 appeared the first series of Tales of the O'Hara Family, which achieved immediate and decided success.. One of the most powerful of them, Crohoore of the Bill Hook, was by Michael Banim. In 1826 a second series was published, containing that excellent Irish novel, The Nowlans. John's health had given way, and the next effort of the " O'Hara family " was almost entirely the production of his brother Michael. The Croppy, a Tale of iyp8 (1828) is hardly equal to the earlier tales, though it con- tains some wonderfully vigorous passages. The Denounced, The Mayor of Windgap, The Ghost Hunter (by Michael Banim), and The Smuggler followed in quick succession, and were received with considerable favour. John Banim, meanwhile, had become much straitened in circumstances. In 1829 he went to France, and while he was abroad a movement to relieve his wants was set on foot by the English press, headed by John Sterling in The Times. A sufficient sum was obtained to remove him from any danger of actual want, and to this government added in 1836 a pension of £150. He returned to Ireland in 1835, and settled in Windgap Cottage, a short distance from Kilkenny; and there, a complete invalid, he passed the remainder of his life, dying on the 13th of August 1842. Michael Banim had acquired a con- siderable fortune which he lost in 1840 through the bankruptcy of a firm with which he had business relations. After this disaster he wrote Father Connell (1842), Clough Fionn (1852), The Town of the Cascades (1862). Michael Banim died at Booterstown on the 30th of August 1874.

The true place of the Banims in literature is to be estimated from the merits of the O'Hara Tales; their later works, though of considerable ability, are sometimes prolix and are marked by too evident an imitation Of the Waverley Novels. The Tales, how- ever, are masterpieces of faithful delinea tion. The strong passions, the lights and shadows of Irish peasant character, have rarely been so ably and truly depicted. The incidents are striking, sometimes even horrible, and the authors have been accused of straining after melodramatic effect. The lighter, more joyous side of Irish character, which appears so strongly in Samuel Lover, receives little attention from the Banims.

See P. J. Murray, Life of John Banim (1857).

BANJALUKA (sometimes written Banialuka, or Bainaluka), the capital of a district bearing the same name, in Bosnia. Pop. (1895) 13,666, of whom about 7000 were Moslems. Banjaluka

lies on the river Vrbas, and at the terminus of a military railway which meets the Hungarian state line at Jasenovac, 30 m. N.N.W. Banjaluka is the seat of Roman Catholic and Orthodox bishops, a district court, and an Austrian garrison. It is at the head of a

narrow defile, shut in by steep hills on the east and west but expanding on the north to meet the valley of the Save. A small stream called the Crkvina enters the Vrbas from the north-east and in the angle thus formed stand the citadel and barracks, with the 16th-century Ferhadiya Jamia, largest and most beautiful of more than 40 mosques in the city. The celebrated Roman baths are all in ruins, except one massive, domed building, dating from the 6th century and still in use, although modern baths are also open, for the development of the hot .springs. Other noteworthy buildings are the Franciscan and Trappist monasteries, a girls' school, belonging to the Sisterhood of the Sacred Blood of Nazareth, a real-school and a Turkish bazaar. Coal, iron, silver and other minerals are found in the adjoining hills; and the city possesses a government tobacco factory, a brewery, cloth-mills, gunpowder-mills, a model farm and many corn-mills, worked by the two rapid rivers.

Banjaluka is probably the Roman fort, marked, in the Tabula Peutingeriana, as Castra, on the river Urbanus and the road from Salona on the Adriatic to Servitium in Pannonia. The origin of its later name, meaning the " Baths of St Luke," is uncertain. In the 15th century, the fall of Jajce, a rival stronghold 22 m. S., led to the rapid rise of Banjaluka, which was thenceforward the scene of many encounters between Austrians and Turks; notably in 1527, 1688 and 1737. No Bosnian city had greater prosperity or importance in the last half of the 18th century. In 1831, Hussein Aga Borberli, called the " Dragon of Bosnia," or Zmaj Bosanski, set forth from Banjaluka on his holy war against the sultan Mahmud II. (See Bosnia.)

BANJERMASIN (Dutch Bandjermasin), the chief town in the Dutch portion of the island of Borneo, East Indies, on the river Martapura, near its junction with the Barito, 24 m. from the mouth of the Barito in a bay of the south coast. The town is the seat of the Dutch resident of South and East Borneo. Its buildings stand on either bank of the river, but many of the inhabitants (who number nearly 50,000) occupy houses either floating on, or built on piles in the river. As larg-e vessels can sail up to the town, it is a trade centre for the products of the districts along the banks of the Barito and Martapura, such as benzoin, rattans,

wax, gold, diamonds, iron and weapons. In 1700 the East Indian Company established a factory here; but the place was found to be unhealthy, and the Company's servants were finally attacked by the natives, whom they repulsed with great difficulty. The settlement was abandoned. The English again seized Banjermasin in 1811, but restored it in 1817. Of the commercial community the Chinese are a very important portion, and there is also a considerable number of Arabs. The district of Banjermasin was incorporated by the Dutch in consequence of the war of i860, in regard to the succession in the sultanate, which had been under their protection since 1787. The town of Martapura was the seat of the sultan from 1771. The inland portion of the district is covered with forest, while the flat and swampy seaboard is largely occupied by rice-fields. The inhabitants are mostly Dyaks.

BANJO, a musical instrument with strings plucked by fingers or plectrum, popular among the American negroes and introduced by them into Europe. The word is either a corruption of "bandore" or "pandura" (q.v.), an instrument of the guitar type, or is derived from " bania," the name of a similar primitive Senegambian instrument.

The banjo consists of a body composed of a single piece of vellum stretched like a drum-head over a wooden or metal hoop to ensure the requisite degree of resonance; the parchment may be tightened or slackened by means of a series of screws disposed round the circumference of the hoop. Attached to the body, which has no back, is a long neck, terminating in a flat head acting as a peg-box and bent back slightly at an obtuse angle from the neck. There are five, six or nine strings to the banjo; they are fastened to a tail-piece as in the violin, pass over a low bridge, on the body, and are strained over the nut or ridge at the end of the neck, where they are threaded through holes and wound round the tuning-pegs fixed in the back of the head in Oriental fashion, as in the lute (q.v.). The strings are stopped

by the pressure of the fingers against the finger-board which lies over the front of the neck; the correct positions for the formation of the intervals of the scale are indicated in some banjos by frets consisting of metal or wooden bands inlaid in the finger-board. The vibrating length of the strings from bridge to nut is 24 in. for

all except the highest in pitch, known as the ” chanterelle,” ” melody ” or ” thumb string,” which is only 16 in. long; its tuning peg is inserted half-way up the neck. The chanterelle is not, as in other stringed instruments, in its position as the highest in pitch, but is placed next the lowest string for convenience in playing it with the thumb . In the tables of accordance here given, the chan- terelle is indicated by a X . The five-stringed banjo is tuned either

r3t

S 4 3 2 I

The six-stringed is tuned

or i<

_ — – -

-*•

543

=*t

6543

The nine-stringed banjo has three thumb strings thus XXX

x

9= –

987654321

The G clef is used in notation, but the notes sound an octave lower than they are written. The banjo is usually a transposing instru- ment in the sense that, when playing with other instruments, the A corresponds to the C of the piano or violin; the key of A major is therefore the first to be mastered. The chanterelle does not lie over the finger-board and is always played open by the thumb.

The banjo is held so that the neck is even with the left shoulder and the body rests on the right thigh; the front of the instrument is held inclined at an angle, allowing the performer to see all the strings. When played as a solo instrument, a plectrum may be

used with good effect to produce rapid scale and arpeggio passages, or to produce the tremolo or sustained notes as on the mandoline (q.v.). The best results are obtained by means of a tortoise-shell plectrum about the size of a shilling, 1 having the contact-edges highly polished, bevelled and terminating in a point. The tone of the banjo is louder and harder than that of the guitar, Chords of two, three and four notes can be played on it.

The banjo or bania of the African negro having grass strings is still in use on the coast of Guinea. The banjo was made known in England through companies of coloured minstrels from the United States, one of which came over to London as early as 1846. (K. S.)

BANK, 2 known also as ” Polish Bank ” and ” Russian Bank ” a card-game. An ordinary pack is used. Five or six players is a convenient number. Each contributes an arranged stake to the pool. The dealer gives three cards to each player and turns up another; if this is not lower than an eight (ace is lowest) he goes on till such a card is exposed. The player on the dealer’s left, without touching or looking at his cards, can bet the amount of the pool, or any part of it, that among his cards is one that is higher (of the same suit) than the turn-up. If he wins, he takes the amount from the pool; if he loses, he pays it to the pool. Each player does the same in turn, the dealer last. Whenever the pool is exhausted, a fresh stake is put into the pool. After a round is over the deal passes. No player may touch his cards until he has made his bet; the penalty is a fine to the pool of twice the stake, and the loss of his right to bet during that round.

BANKA (Banca, Bangka), an island of the Dutch East Indies, off the east coast of Sumatra, from which it is separated by Banka Strait, which is about 9 m. wide at its narrowest point. On the east, the broader, island-studded Caspar Strait separates Banka from Billiton. Banka is 138 m. in length; its. extreme breadth is 62 m., and its area, including a few small adjacent islands, 4460

1 See A. H. Nassau*Kennedy, I.S.M., Banjo-Plcctring.

2 For the commercial ” bank ” see Banks and Banking.

sq. m. The soil is generally dry and stony, and the greater part of the surface is covered with forests, in which the logwood tree especially abounds. The hills, of which Maras in the north is the highest (2760 ft.), are covered with vegetation to their summits.

Geologically, Banka resembles the Malay Peninsula, its formations being mainly granite, Silurian and Devonian slate, frequently covered with sandstone, laterite (red ironstone clay) of small fertility, and alluvium. The granite extends from W.N. W. to S.S.E., forming the short, irregular hill-chains. As these lie generally near the east coast, it follows that the rivers of the west coast are the longer. There are no volcanoes. The chief rivers (Jering, Kotta and Waringin) are navigable for some 19 m. from their mouths and are used for the transport of tin. Banka is principally noted for the production of this mineral, which was discovered here in 17 10 and is a government monopoly. It occurs in lodes and as stream-tin, and is worked by Chinese in large numbers who inhabit villages of their own. The island is divided into nine mining districts, including about 120 mines, under government control, with 12,000 workmen, which have produced as much as 1 2,000 tons of tin in a year. From May to August, the period of .the south-east monsoon, the climate of Banka is dry and hot; but the mean annual rainfall reaches 120 in. annually, rain occurring on an average on 168 days each year. The wet, cool season proper is from November to February, accompanying the north-west monsoon. The heavy rainfall is of great importance to the tin-streaming industry. The total population of the island (1 905) is 1 1 5, 1 89, including4o,ooo Chinese and 70,000 natives. These last are mainly composed of immigrant Malayan peoples. The aborigines are represented by a few rude hill-tribes, who resemble in physique the Battas of Sumatra. Rice, pepper, gambier, coffee and palms are cultivated, and fishing and the collection of forest produce are further industries, but none of these is of importance. The chief town is Muntok at the north end of Banka Strait.

See H. Zondervan, Banka en Zijne bewoners (Amsterdam, 1895), with bibliography; T. Posewitz, Die ZAnn-insehi im Indischen Ocean. For geology and the tin-mines, Jaarboek vor het Mijnivezen in Ned. Ind. (Amsterdam, 1877-1884).

BANKER-MARKS, or Masons' Marks. The "banker" is the stone bed or bench upon which a mason works, hence the term (so well known to the trade) of banker-marks, which, as Mr Whitley has pointed out, is more appropriate than that of masons' marks, since the setters, who are usually selected from amongst the best workmen, make no marks upon the stone {Leamington Spa Courier, nth of August 1888). These must not be confused with other marks sometimes cut on stones as directions to the setters, and so used and employed to the present time. Banker-marks are

met with throughout the civilized world, and in fact are to be found on all old buildings of conse- quence, ecclesiastical or otherwise. Professor T. Hayter Lewis well observed, ” Go where you will, in England, France, Sicily, Palestine, you will find all through the buildings of the 12th century the same carefully worked masonry, the same masons’ tool-marks, the same way of making them.” Such masons’ marks are to be traced graved on all the chief stones of what is known as Norman work. Norman tooling, so far as Hayter Lewis could discover, came from the north, and west of Europe. Since then we get marks made with a ” toothed chisel,” but however or wherever chiselled the intention was the same. The system followed provided an infallible means of connecting the individual craftsman with his work, an evidence of identity that could not be gainsaid.

Naturally, because of their simplicity, certain designs were followed much more frequently than others, while occasionally some of a very elaborate character are to be detected. Undoubtedly not a few were suggestive of the initials of the names of the masons, and others were reminiscent of certain animals, objects, &c, but no proof has yet been offered of their being alphabetical in design, or arranged so as to distinguish • the members of. different lodges or companies; the journeymen selected any design they cared to adopt.

Singular to state, marks were chosen by gentlemen and others

who joined the opeiative masonic lodges of the 16th and later centuries, and they were as carefully registered in the mark-books as those selected by operatives for trade purposes. The same marks are to be seen in the registers used by fathers and sons, and not always with a slight difference, as some have stated, to secure identification. What should be noted also is that other trades used precisely similar marks and for a like object, so that the idea of their having a mystical meaning, or being utilized for any other object but the one named, seems groundless.

The late George Godwin, F.R.S., F.S.A., &c, drew attention to the subject of ” masons’ marks in various countries ” in a communication to the Society of Antiquaries in 1841, and also at

a little later period (vide Archaeologia, vol. xxx. p. 113). To him is the credit due of first drawing attention to ” these signs ” in England. It is noteworthy how little such marks are noticed, even in buildings which are visited by archaeologists quite frequently, until a few are pointed out, and then they meet the eye to an astonishing number. In the Sessional Papers, 1868- 1869, of the Royal Institute of British Architects, No. 9, may be found numerous samples of the marks from various parts of Europe in illustration of the paper by Godwin.

No better plan has been followed in modern times to connect the work done with the worker in stone, and it is probable that a second mark, observable on some blocks, may serve to indicate the overseer. There are even three or more sometimes.

The same system was adopted at the building of Truro cathedral, only the marks were inserted on the bed of each stone instead of at the side as usual, the result being that they ceased to be seen after being placed in situ. Mr Hughan obtained copies of these marks from Mr James Bubb, the first clerk of the works, and from his successor, Mr Robert Swain, and had them published in the Freemason, 13th of November 1886. He remarked at the same time that ” many of these designs will be familiar to students of ancient ecclesiastical and other buildings at home and abroad.” Some are interesting specimens.

A Historical Treatise on Early Builders’ Marks (Philadelphia, U.S.A., 1885) by Mr G. F. Fort, a’nd Masons’ Marks from Buildings hi IheCounties of Lancaster and Chester, with Noteson theGeneralHistory of Masons’ Marks (Historic Society of Lancashire and Cheshire, vol. vii. N.S.), by W. Harry Rylands, F.S.A., may be consulted with advantage. The latter declares that ” the Runic theory is as unlikely and as untenable as that which places the origin of these marks in the absurd alphabets given by Cornelius Agrippa, who died early in the 16th century.” Victor Didron copied some 4000 during a tour in France in 1836 and pointed out their value (Ann. Arch., 1845). (W. J. H.*)

BANKET, a South African mining term, applied to the beds of auriferous conglomerate, chiefly occurring in the Witwatersrand gold-fields (see Gold). The name was given to these beds from their resemblance to a sweetmeat, known in Dutch as ” banket,” resembling almond hard-bake. The word is the same as ” banquet,” and is derived ultimately from ” bank ” or ” bench,” meaning table-feast, hence applied to any delicacy or to various

kinds of confectionery, a use now obsolete in English.

BANK HOLIDAYS, in the United Kingdom, those days which by the Bank Holidays Act 1871 are kept as close holidays in all banks in England and Ireland and Scotland respectively. Before the year 1834, the Bank of England was closed on certain saints' days and anniversaries, about thirty- three days in all. In 1834 these were reduced to four — Good Friday, 1st of May, 1st of November and Christmas Day. By the act of 1871, carried through the House of Commons by Sir J. Lubbock (afterwards Lord Avebury), the following were constituted bank holidays in England and Ireland — Easter Monday, the Monday in Whitsun week, the first Monday of August, the 26th of December if a week-day; and by the Bank Holiday (Ireland) Act 1903, March 17 th as a special bank holiday for Ireland (see Feasts and Festivals). In Scotland — New Year's Day, Christmas Day, Good Friday, the 1st Monday of May, the 1st Monday of August. If Christmas Day and New Year's Day fall on a Sunday, the next Monday following is the bank holiday. No person is compelled to make any payment or to do any act upon a bank holiday which he would not be compelled to do or make on Christmas Day or Good Friday, and the making of a payment

or the doing of an act on the following day is equivalent to doing it on the holiday. By the same act it was made lawful for the sovereign from time to time, as it should seem fit, to appoint by proclamation, in the same manner as public fasts or days of public thanksgiving, any day to be observed as a bank holiday throughout the United Kingdom or any part of it, or to substitute another day when in any special case it appears inexpedient to the sovereign in council to keep the usual bank holiday. (See further Holiday.)

BANKIPUR, an ancient village on the Hugli river in the Bengal Presidency, near the modern Palta above Barrackpore. It has disappeared from the map, but is famous as the principal settlement of the ill-fated Ostend Company, the one great effort made by Germany to secure a foothold in India. The Ostend Company was formed in 1722-1723, and with a capital of less than a million sterling founded two settlements, one at Coblom (Covelong) on the Madras coast between the English Madras and the Dutch Sadras, and the other on the Hugli between the English Calcutta and the Dutch Chinsura. Both English and Dutch were offended and in 1727, in order to obtain the European guarantee for the Pragmatic Sanction, the court of Vienna resolved to

sacrifice the Company and suspended its charter. It became bankrupt in 1784 and ceased to exist in 1793. But in the mean-time in 1733 the English and Dutch stirred up the Mahommedan general at Hugli to pick a quarrel. He attacked Bankipur and the garrison of only fourteen persons set sail for Europe. Thus German interests disappeared from India.

BANK-NOTES. For our present purpose we include in this description all paper substitutes for metallic currency whether issued by banks, governments or other financial institutes.

Early bank-notes were simply printed forms in which the amounts were written by hand. They were usually for large amounts (£40 and upwards) and were printed upon water-marked paper; and, although no precautions were taken in the engraving to prevent fraudulent imitation, forgeries were comparatively rare. But, when at the end of the 18th century small notes for £1 and £2 were put in circulation, forgery became rife, as many as 352 persons being convicted of this crime in England in a single year; and from that time to the present a constant trial of skill has been going on between the makers of bank-notes and the counterfeiters. Engine-turned ornaments and emblematical figures or viev/s introduced in the engraving, in conjunction with special water-marks in the paper, held the forgers somewhat in check until the discovery of photography put into the hands of the counterfeiter a most dangerous weapon, by the aid of which complicated patterns and vignettes could be perfectly reproduced. To prevent such reproduction Henry Bradbury in 1856 intro- duced anti-photographic bank-note printing, in which the essential portions of the note were printed in one colour and over this another protective colour was placed. A photograph of a note printed in this way presented a confused mingling of the two colours; but with the advance of photographic knowledge means were found of obtaining a photograph of either colour separate from the other, and it consequently became necessary to introduce a third colour and to secure a special photographic relation between the three colours to prevent their separation.

Photography, however, although the most dangerous weapon of the counterfeiter, is not the only means of imitation available, a fact which is sometimes overlooked. A note may be perfectly secure against photographic reproduction, but from the absence of other necessary features may be easily copied by an engraver of ordinary skill. There are two systems of engraving employed in

bank-notes: — (1) line-engraving in which the lines are cut into the steel or copper plates; and (2) relief-engraving in which the lines stand up above the plate as in wood-engraving. In the former, adapted to the process called plate-printing, the ink is delivered from the lines in the plate to the paper pressed upon it; in the latter, adapted to surface-printing, the ink is spread upon the face of the lines and printed as in typography. Plate-printing gives by far the finer and sharper impression, but as there is a perceptible body of ink transferred to the paper from the cut lines, it has been supposed that an impression from plate would

be more easily photographed than one from surface where only a film of ink is spread upon the top of the raised lines. But surface-printing being much less sharp and distinct than plate- printing, imperfect copies of notes for which that process is used are the more likely to escape detection. The plates upon which the early notes were engraved being of copper quickly wore out and had to be constantly replaced. The result was great differ- ence in the appearance of the notes, those printed from new plates being sharp and clear, while others, printed from old plates, were pale and blurred. These differences were a great assistance to the forger, as the public, being accustomed to variations of appearance between different genuine notes, were less apt to remark the difference between these and counterfeits.

In the early part of the 19th century, Jacob Perkins (1766- 1849) introduced into England from America what is known as the transfer-process, in which the original engraving on steel is hardened and an impression taken from it on a soft steel cylinder, which in its turn is hardened and pressed into a soft printing- plate. By this means as many absolutely identical plates can be produced as may be required, and being hardened they will yiˆW a very large number of prints without any appreciable deterioration. Another method of securing uniformity is the multiplication of plates by electro-deposition, the surface of the copper-electrotype plates being protected by the deposit of a film of steel which effectually prevents the wearing of the copper and can be renewed at will.

The water-mark of the paper, on which formerly reliance was placed almost exclusively, puts a difficulty in the way of the

counterfeiter, but experience has shown that in ordinary circumstances it does not in itself afford adequate protection. The means by which it can be imitated are well known, and, since a distinct water-mark is incompatible with strong paper, the life of a water-marked note is much shorter than that of one printed upon plain paper. The best bank-note paper is made from pure linen rags and was formerly made by hand. Machine-made paper is however now largely used, as it possesses all the strength of hand-made and is much more uniform in thickness and texture.

In documents which pass current as money it is obviously the duty of the bank or government issuing them to take all reasonable means to prevent the public from being defrauded by the substitution of counterfeits; and a bank whose circulation depends upon the confidence of the public must do so in its own interests to insure the acceptance of its notes. This principle is now recognized by all issuing institutions, but in practice there is room for improvement in the issues of many important establishments, partly because of the disinclination of the directors of a bank to change the form of an issue to which the public is accustomed, partly because of the difficulty of deciding what is really a secure note, and in certain cases because, owing to exceptional circumstances, an issue may be practically immune from forgery although the notes themselves present little or no difficulty in imitation. The features essential to the security of an issue are (1) absolute identity in appearance of all notes of the issue; (2) adequate protection by properly-selected colours against photographic reproduction; and (3) high-class engraving comprising geometric lathe work and well-executed vignettes. In addition it is important that the design of the note should be striking and pleasing to the eye, and the inscription legible.

The notes of the Bank of England are printed in the bank from surface-plates in black without colour or special protection except the water-mark in the paper. They are never reissued after being once returned to the bank, and their average life is very short, about six weeks, so that a dirty or worn Bank of England note is practically never seen. This arrangement, coupled with the difficulty of negotiating forged notes in England, the lowest denomination being £5, accounts for the comparative immunity from forgery of the bank's issues.

BANK RATE, a term used in financial circles to designate the rate of discount charged in the chief monetary centres by the state or leading bank, as opposed to the open-market rate. (See Market:

Money market.) in. 11

BANKRUPTCY (from Lat. bancus or Fr. banque, table or counter, and Lat. ruptus, broken), the status of a debtor who has been declared by judicial process to be unable to pay his debts. Although the terms ” bankruptcy ” and ” insolvency ” are sometimes used indiscriminately, they have in legal and commercial usage distinct significations. When a person’s financial liabilities are greater than his means of meeting them, he is said to be ” insolvent ” ; but he may nevertheless be able to carry on his business affairs by means of credit, paying old debts by incurring new ones, and he may even, if fortunate, regain a position of solvency without his creditors ever being aware of his true condition. And even when his insolvency becomes public and default occurs, a debtor may still avert bankruptcy if he is able to effect a voluntary arrangement with his creditors. A debtor may thus be insolvent without becoming bankrupt, but he cannot be a bankrupt without being insolvent, for bankruptcy is a legal declaration of his insolvency and operates as a statutory system for the administration of his property, which is thereby taken out of his personal control.

In primitive communities bankruptcy systems were unknown. Individual creditors were left to pursue their remedies by such means as the law or practice of the community might sanction, and these were generally of a very drastic methods. character. Under the Roman law of the Twelve Tables, the creditors might, as a last resort, cut the debtor’s body into pieces, each of them taking his proportionate share; and although Blackstone in quoting this law appears to cast some doubt upon its too literal interpretation, there can be no doubt that the power of selling the debtor and his family into slavery was one which was habitually exercised in Grsece, Rome, and generally among the nations of antiquity. Even among the Jews, whose legislation was of a comparatively humane character, this practice is illustrated by the Old Testament story of the woman who sought the help of Elisha, saying, ” Thy servant my husband is dead . . . and the creditor is come to take unto him my two children to be bondmen.” The savage severity of these earlier laws was, however, found to be inconsistent with the development of more humane ideas and the growth of popular rights; and tended, as in the case of Greece and Rome, to create serious disturbance in political relations between the patricians, who generally composed the wealthier or creditor class, and the plebeians, in whose ranks the majority of debtors were to be found. Later

legislation consequently substituted imprisonment in a public prison for the right of selling the person of the debtor. Under the feudal systems of Europe the state generally insisted on its subjects being left free for military service, and debts could not therefore be enforced against the person of the debtor; but as trade began to develop it was found necessary to provide some means of bringing personal pressure to bear upon debtors for the purpose of compelling them to meet their obligations, and under the practice of the English courts of law the right of a creditor to enforce his claims by the imprisonment of his debtor was gradually evolved (although no express legal enactment to that effect appears at any time to have existed), and this practice continued until comparatively recent times.

Without some system of enforcing payment of debts it would have been impossible for the commerce of the world to have attained its present proportions; for modern com- merce is necessarily founded largely on credit, and &”* >• credit could not have existed without the power of objects. enforcing the fulfilment of financial contracts. On the other hand remedies against a debtor’s person, and still more against the persons of his family, are not only inconsistent with the growth of opinion among civilized communities, but are in themselves worse than futile, inasmuch as they strike at the root of all personal effort on the part of a debtor to retrieve his position and render a return to solvency impossible. Hence the necessity of devising some system which is just to creditors while not unduly harsh upon debtors, which discriminates between involuntary inability to meet obligations and wilful

U

refusal or neglect, and which secures to creditors as between themselves an equitable share of such of the debtor’s assets as may be available for the payment of his liabilites. These are the objects which the bankruptcy laws have primarily in view. Another object, which has not always been so fully recognized as it might appear to deserve, has marked the most recent legislation, namely, the fostering of a higher tone of commercial morality and the protection of the trading community at large from the evils arising through the reckless abuse of credit and the

unnatural trade competition thereby engendered. It must be admitted that these objects are of a somewhat conflicting character, and wherever the state has interfered with the view of securing an efficient system of bankruptcy, legislation the task has been found to be extremely difficult. Not only have the conflicting interests of the debtor and his creditors to be taken into account, but the method to be adopted in dealing with his property has also given rise to much conflict of opinion, and to a lack of uniformity and consistency in the legislation which dealt with it. The debtor's property was naturally regarded as belonging to the creditors, but it could not be distributed among them until it was realized, and until their respective right and interests were determined by competent authority. In some cases claims to rank as creditors are of doubtful validity. In others the creditor holds securities, the value of which requires investigation, or he claims a preference to which he may or may not be legally entitled. Creditors have thus conflicting interests as between themselves, and are there- fore incapable of acting together as a homogeneous body. Hence the necessity for calling in the aid of professional assignees or trustees, solicitors and other agents, who made it their special business to deal with such matters, exercising both administrative and quasi-judicial functions, in return for the remuneration which they receive out of the property for their services. Professional interests, which are not always identical with the interests of the debtor or the creditors, are thus called into existence, and these interests have from time to time exercised a powerful influence in shaping the course of legislation. While the law of bankruptcy has therefore been largely the product of commercial development, it has necessarily been of Blow and gradual growth, tentative in its character, and subject to oscillation between the extremes of conflicting interests according to the temporary and varying predominance of each of these interests from time to time. No intelligible grasp of the principles which underlie the history of bankruptcy legislation in England, and no satisfactory explanation of the fluctuating tendencies which have marked its progress, are possible without bearing these considerations in view.

Bankruptcy in England.

The subject was originally dealt with in the sole interest of creditors; it was considered fraudulent for a debtor to procure History n * s own bankruptcy. Thus the earliest English statute on the subject, 34 & 35 Henry VIII. c. 4 (a.d. 1542), was directed

against fraudulent debtors, and; gave power to the lord chancellor and other high officers to seize their estates arid divide them among the creditors, but afforded no relief to the debtor from his liabilities. Subsequent legislation modified this attitude and introduced the principle of granting relief to the bankrupt with or without the consent of the creditors, where he conformed to the provisions of the bankruptcy law, and under the act of 1825 the debtor was allowed himself to initiate proceedings. Since 1542 about forty acts of parliament have been passed, dealing with the many aspects of the subject, and slowly expanding, modifying and building up the highly complex system of administration which now exists.

The courts exercising jurisdiction originally, consisted of

commissioners appointed by the lord chancellor. But in 1831

r* ˆ i a special court of bankruptcy was established, con- Court of
... c . . . J .,, . . , ‘

1831. sisting of six commissioners with four judges as a

court of review, and official assignees attached to the court for the purpose of getting in the distributing the bank- rupt’s assets. Non-traders were originally excluded from the

nigtmot

creditors.

bankruptcy court, and a special court called the ” court for relief of insolvent debtors ” was instituted for their benefit, in which relief from the liability to imprisonment could be.obtained on surrender of their property, but they were not discharged from their debts, subsequently-acquired property remaining liable. Both of these courts were subsequently abolished, non- traders were permitted to obtain the benefit of the bankruptcy laws, including a discharge, and in 1863 the system of official assignees was swept away, and a new court of bankruptcy created with one of the vice-chancellors at its head as chief judge, and a number of subordinate registrars or inferior judges under him. This court has also now been abolished, and the business is administered by a judge of the high court specially appointed for the purpose by the lord chancellor, with registrars of the high court, who deal with the ordinary judicial routine of bankruptcy procedure in the London district, while similar duties

are performed by the county-court judges throughout the country.

But the questions which have proved the most difficult to deal with, and which more than any others have been the cause of fluctuating and inconsistent legislation, have un- doubtedly been those relating to the share which the creditors ought to have in the administration of the proceedings, and to special arrangements effected between a debtor and his creditors under conditions more or less beyond the control of the court. These two questions are largely intermixed, and the history of English legislation on these points and its results throw much light on the causes of the failure of the many attempts which have been made by the most eminent legal authorities to bring the law into a satisfactory condition. The right of creditors to exercise some control in bankruptcy over the realization of the debtor's property through an assignee chosen by themselves was recognized at an early date, but this right was exercised subject to the supervision of the court which investigated the claims of creditors and deter- mined who were entitled to take part in the proceedings.. Pro- vision was also made for the interim protection of the debtor's property by official assignees attached to the court, who took possession until the creditors could be consulted, and under the supervision of the court audited the accounts of the creditor's assignee. So long as this system continued substantial justice was generally secured; the claims of creditors were strictly investigated and only those who clearly proved their right before a competent court were entitled to take part in the proceedings. The bankrupt was released from his obligations, but only after strict inquiries into his conduct and under the exercise of judicial discretion. The accounts of assignees were also strictly investigated, and the costs of solicitors and other agents were taxed by officers of the court. But the system was found to be cumbrous, to lead to delay and too often to the absorption of a large part of the estate in costs, over the incurring' of which there was a very ineffective control. Hence arose a demand for larger powers on the part of creditors, and the introduction into the bankruptcy procedure of the system of " arrangements " between the debtor and his creditors, either for the payment of a composition, or for the liquidation of the estate free from the control of the court. At first these arrange- ments were carefully guarded. Under the act of 1825 a proposal for payment of a composition might be adopted only after the debtor had passed his examina- l82S ls3t tion in court, and with

the consent of nine-tenths in 1842, 1849. number and value of his creditors assembled at a meeting. Upon such adoption the bankruptcy proceedings were superseded. Dissenting creditors, however, were not bound by the resolution, but could still take action against the debtor's subsequently-acquired property. These powers were not found to be sufficiently elastic and the act failed to give public satisfac- tion. Attempts were made by the acts of 1831 and 1842 to remedy the defects complained of by a reconstitution of the bankruptcy court and its official system. But these measures also failed because they were based on the assumption that judicial bodies could exercise effective control over administrative

action, a control for which they are naturally unsuited, and which they could only carry out by cumbrous and expensive methods of procedure. Under the act of 1849 a totally new principle was introduced by the provision that a deed of arrange- ment executed by six-sevenths in number and value of the creditors for £10 and upwards should be binding upon all the creditors without any proceedings in or supervision by the court. But the determination of the question who were or were not creditors was practically left to the debtor himself, without any opportunity for testing by independent investigation the claims of those who signed the deed to control the administration of the estate. It is not difficult to see, in the light of subsequent experience, how likely this provision was to encourage fraudulent arrangements, and to introduce laxity in the administration of debtors' estates. A modification of the too stringent conditions of the act of 1825, which would have enabled a bankrupt to pay a composition on his debts, with the consent of a large proportion of his bona-fide creditors, and subject to the approval of the court, after hearing the objections of dissenting creditors, would doubtless have proved a beneficial reform, but the act of 1849 proceeded on a very different principle. Instead of reforming, it practically abolished judicial control. By avoiding Scylla it fell into Charybdis. To give any majority of creditors the power to release a debtor from his obligations to non-assenting creditors without full disclosure of his affairs, and without any exercise of judicial discretion or any investigation into the causes of the failure, or the conduct of the debtor, would in any circumstances have been to introduce a

new and mischievous principle into legislation, for it would necessarily destroy the essential feature of such arrangements, that they are voluntary contracts, the responsibility for which lies solely with the parties entering into them. But to give such a power to creditors whose claims were subject to no independent investigation was to invite inevitable confusion and failure.

Yet this was the dominating principle of English bankruptcy legislation for nearly thirty-five years. Its effect under the act IA6I of 1849 was > however, to some extent modified by

subsequent decisions of the courts that to make a composition arrangement binding it must be accompanied by a complete cessio bonorum; but this qualification was removed by the act of 1861 which made such arrangements binding without a cessio and reduced the majority required to make a deed of arrangement binding on all the creditors, to a majority in number and three-fourths in value of those whose claims amounted to £10 and upwards. The result was an enormous increase in fraudulent arrangements. The then attorney- general, Sir Robert Collier, in introducing an amending act in 1869, described the abuses which had grown up under the 1849 and 1861 acts, as having the effect of enabling a bankrupt to " defraud those to whom he was indebted and to set them at defiance"; while Lord Cairns, the lord chancellor, in the House of Lords expressed the opinion that the large increase which had taken place in the annual insolvency of the country during the preceding years could not " be attributed to depression of trade but must be traced to the enormous facilities which are given to debtors who wish to be released from their debts on easy terms." And yet in the legislation which ensued these facts were entirely ignored or lost sight of.

It is indeed a curious illustration of the difficulties which have attended bankruptcy legislation in England that the very measure 1869 (tk e act °^ '869) which was introduced to remedy this

deplorable condition of affairs, was twelve years after- wards denounced in parliament by the president of the Board of Trade (Mr Joseph Chamberlain) as "the most unsatisfactory and most unfortunate of the many attempts which had been made to deal with the subject" and as " the object of the almost unanimous condemnation of all classes." How was this? Under the act of 1869, the procedure under a bankruptcy petition was certainly rendered effective. Meetings of creditors were presided over and

creditors' claims were, for voting purposes, adjudicated upon by the registrar of the court; the bankrupt had to pass a public examination in court, which although chiefly left to the trustee

appointed by the creditors, afforded some opportunity for investigation; and the bankrupt could not obtain his discharge without the approval of the court and in certain circumstances the consent of the creditors. An independent official, the comptroller in bankruptcy, was appointed, whose duty it was to examine the accounts of trustees, call them to account for any misfeasance, neglect or omission, and refer the matter to the court for the exercise of disciplinary powers where necessary. These provisions were well calculated to promote sound administration, but they were, unfortunately, rendered nugatory by provisions relating to what were practically private arrangements on similar lines to those which had rendered previous legislation ineffective. In some respects the evil was aggravated. Deed* of arrangements were nominally abolished, but under sections 125 and 126 of the act a debtor was empowered, to present a petition to the court for liquidation of his affairs by " arrangement," or for payment of a composition, whereupon a meeting of creditors was summoned from a list furnished by the debtor, and without any judicial investigation .of claims., a majority in number and three-fourths in value of those who lodged proofs of debt, and who were present in person or by proxy at the meeting, might by resolution agree to liquidation by arrangement or to the accept- ance of the composition. Such resolution thereupon became binding upon all the creditors, without any act of approval by the court, any judicial examination of the debtor, or any official supervision over the trustee's accounts. The debtor was not permitted to present a bankruptcy petition against himself, and consequently his only method of procedure was that which thus removed the matter from the supervision and control of the court, and as about nine-tenths- of all the proceedings under the act of 1869 were initiated by debtors, it followed that only about ones- tenth was submitted to proper investigation. It is true that the creditors might refuse to assent to the debtor's proposal, and that any creditor for £50 or upwards could present a petition in bankruptcy, but even where this course was adopted, the proceedings under the petition were, as a rule, stayed by the court if the debtor subsequently presented a proposal for liquidation or composition, and the creditor was left to pay the expenses of his petition if the requisite majority voted for the debtor's proposal.

So far, there- fore, as the act was concerned, every inducement was held out to the adoption of a course which took the examination of the debtor > the conditions of his discharge and the audit of the trustee's accounts, out of the control of the court.

The establishment of a bankruptcy court, with its searching powers of investigation and its power of enforcing penalties on .misconduct, can only be defended on the ground that the administration of justice is a matter affecting the t ^^ ° of interests of the community at large. But apart from Acts. the injury done to these interests by reducing the administration of justice to a question of barter and arrangement between the individuals immediately concerned, one of the chief reasons why the acts of 1849, 1861 and 1869 proved failures, lies in the obvious fact that the creditors Of a particular estate are not, as appears to have been assumed, a homogeneous or organized body 'capable of acting together in the administration of a bank- rupt estate. In the case of a few special and highly organized trades it may be otherwise, but in the great majority of cases the creditors have but little knowledge of each other or means of organized action, while they have neither the time nor the inclinaˆ tion to investigate the complicated questions which frequently arise, and which are therefore left in the hands of professional trustees or legal agents. But the appointment of trustees under these acts, instead of being the spontaneous act of the creditors, was frequently due to touting on the part of such agents them- selves, or to individual creditors whose interests were not always identical with those of the general body. According to G. Y. Robson, the author of a standard work on the subject, the arbitrary powers conferred by the act of 1861 " led to great abuses, and in many cases creditors were forced to accept a composition, the approval of which had been obtained by a secret understanding between the debtor and favoured creditors, and not unfrequently by the creation of fictitious debts." These evils

were greatly aggravated by the decisions of the court relating to proofs on bills of exchange, under which it was held that the holder of a current bill could prove on the bankrupt estate of an indorser, although the bill was not yet due, and the acceptor was perfectly solvent and able to meet it at maturity. Thus in large

mercantile failures, bankers and other holders of first-class bills could prove and vote on the estates of their customers, for whom the bills had been discounted, and thus control the entire proceedings, although they had no ultimate interest in the estate. But probably the greatest source of the abuses which arose under the act of 1869 was the proxy system established by the act and by the rules which were subsequently made to carry it out. The introduction of proxies was no doubt intended to give absent creditors an opportunity of expressing their opinions upon any question which might arise. But the system was too often used for the purpose of stifling the views of those who took an indepen- dent part in the proceedings. The form of proxy prescribed by the rules contained no limitation of the powers of the proxy holder and no impression of the opinion of the creditor. It simply appointed the person named in it as " my proxy," and these magic words gave the holder power to act in the creditor's name on all questions that might be raised at any time during the bankruptcy. Hence arose a practice of canvassing for proxies, which were readily given under the influence of plausible representations, such as the holding out of the prospect of a large composition, but which, when once obtained, could be used for any purpose what soever except the receipt of a dividend. Thus it frequently happened > that the entire proceedings were controlled by pro- fessional proxy holders, in whose hands these documents acquired a marketable value. They were not only used to vote for liquida tion by arrangement instead of bankruptcy proceedings, but not infrequently the matter took the form of a bargain between an accountant and a solicitor, under which the former became trustee and the latter the solicitor in the liquidation, without any provision for control over expenditure or for any audit of the accounts. Even where a committee of inspection was appointed to exercise functions of control and audit, they too were often appointed by the proxy-holders, and not infrequently shared in the benefits. On the other hand, where the amount of debts represented by the proxy-holder was insufficient to carry the appointment of a trustee and committee, the votes could be sold to swell the chances of some other candidate. Hence ensued a system of trafficking in these instruments, the cost of which had in the long run to come out of the estate. The result was that undesirable persons were too frequently appointed, whose main object was to extract from the estate as much as possible in the. shape of costs of administration. The debtor was practically powerless to prevent this result. If he attempted to do so he sometimes became a target

for the exercise of revenge. His discharge, which under liquidation by arrangement was entirely a matter for the creditors, might be refused indefinitely; and so largely and harshly was this power exercised under the proxy system, especially where it was supposed that the debtor had friends who could be induced to come to his aid, that a special act of parliament was passed in 1887, authorizing the court to deal with cases where, under the act of 1869, a debtor had not been able to obtain a release from his creditors. On the other hand, the complaisant debtor, although he had incurred large obligations in the most reckless manner, often succeeded in stifling investiga- tion and obtaining his release without difficulty as a return for his aid in carrying out the arrangement.

The result of such a system could not be other than a failure. After the act of 1869 had been in operation for ten years, the comptroller in bankruptcy reported that out of 13,000 annual failures in England and Wales, there were only 1000 cases (or about 8 %) “to which the more important provisions of the act for preventing abuses by insolvent debtors and professional agents applied; the other 12,000 cases (or 92%) escaping the provisions which refer to the examination and discharge of bank- rupts, and to the accounts, charges and conduct of the agents employed.” It is not to be supposed that all the cases in the latter class were marked by the abuses which have been here described.

In a large number the proceedings were conducted by agents of high character and standing, and with a due regard to the interests of the creditors. But the facilities for fraudulent and collusive arrangements afforded by the act, and the want of effective control over administration, inevitably tended to lower the morale of the latter, and to throw it into the hands of the less scrupulous members of the profession. The demand for reform, therefore, came from all classes of the business community. No fewer than thirteen bills dealing with the subject were introduced into the House of Commons during the ten years succeeding 1869. At length in 1879 a memorial, which was authoritatively described as ” one of the most influential memorials ever presented to any government,” was forwarded to the prime minister by a large body of bankers and merchants in the city of London. The matter was then referred to the president of the Board of Trade (Mr Ghamberlain) , who made exhaustive inquiries, and in 1881 introduced a measure which, with some amendments, finally became law under the title of the

Bankruptcy Act 1883.

Hitherto the question had been dealt with as one of legal procedure ; it was now treated as an act of commercial legislation, the main object of which, while providing by carefully framed regulations for the equitable distribution of a of 1883. debtor's assets, was to promote and enforce the prin- ciples of commercial morality in the general interests of the trading community. One of the chief features of the act of 1883 is the separation which it has effected between the judicial and the administrative functions which had previously been exercised by the court, and the transfer of the latter to the Board of Trade as a public department of the state directly responsible to parliament. Under the powers conferred by the act a new depart- ment was subsequently created under the title of the bank- ruptcy department of the Board of Trade, with an officer at its head called the inspector-general in bankruptcy. This depart- ment exercises, under the direction of the Board of Trade, a general supervision over all the administrative work arising under the act. It has extensive powers of control over the appointment of trustees, and conducts an audit of their accounts ; and it may, subject to appeal to the court, remove them from office for misconduct, neglect or unfitness. A report upon the proceedings under the act is annually presented to parliament by the Board of Trade, and although the department is practically self-supporting, a nominal vote is each year placed upon the public estimates, thus bringing the administration under direct parlia- mentary criticism and control. The act also provides for the appointment and removal by the Board of Trade of a body of officers entitled official receivers, with certain prescribed duties having relation both to the conduct of bankrupts and to administration of their estates, including the interim manage- ment of the latter until the creditors can be consulted. These officers act in their respective districts under the general authority and directions of the Board of Trade, being also clothed with the status of officers of the courts to which they are attached. While effecting this supervision and control by a public department directly responsible to parliament, the main objects of the measure were to secure — (1) An independent and public investigation of the debtor's conduct; (2) The punishment of commercial mis- conduct and fraud in the interests of public morality; (3) The summary and inexpensive administration of small estates where the assets do not exceed £300 by the official receiver, unless a majority in number and three-fourths in value

of the creditors voting resolve to appoint a trustee ; (4) Full control in other cases by a majority in value, over the appointment of a trustee and a committee of inspection; (5) Strict investigation of proofs of debt, with regulations as to proxies and votes of creditors; (6) An independent audit and general supervision of the pro- ceedings and control of the funds in all cases. Besides amending and consolidating previous bankruptcy legislation, the measure also contains special provisions for the administration under bankruptcy law of the estates of persons dying insolvent (§125); and for enabling county courts to make administration orders for payment by instalments in lieu of immediate committal to prison, I in

not exceed £50 (§ 122). It also provides for the getting in and administration by the Board of Trade of unclaimed dividends and undistributed balances on estates wound up under previous bankruptcy acts (§ 162). Lastly, it amends the procedure under the Debtors Act of 1 869, dealing with criminal offences committed by bankrupts (which, prior to 1869, had been treated as part of the bankruptcy law), by enacting that when the court orders a prosecution of any person for an offence under that act, it shall be the duty of the director of public prosecutions to institute and carry on the prosecution.

An amending act, under the title of the Bankruptcy Act 1890 was passed in that year, mainly with the view of supple- menting and strengthening some of the provisions 1890 °^ *- ne ac t °f I 8^3, more particularly with regard to the

conditions under whichabankrupt shouldbedischarged or schemes of arrangement or composition be approved by the court. It also dealt with a variety of matters of detail which experience had shown to require amendment, with the view of more fully carrying out the intentions of the legislature as embodied in the principal act. These two acts are to be construed as one and may be cited collectively as the Bankruptcy Acts 1883 and 1890. They are further supplemented by a large body of general rules made by the lord chancellor with the concurrence of the president of the Board of Trade, which may be added to, revoked or altered from time to time by the same authority. These rules are laid before parliament and have the force of law.

Besides these general acts, various measures dealing with special interests connected with bankruptcy procedure have from time to time been passed since 1883, the chief of Acts." which are as follows, viz., the Bankruptcy Appeals (County Courts) Act 1884; the Preferential Payments in Bankruptcy Act 1888, regulating the priority of the claims of workmen and clerks, &c. for wages and salaries; and the Bank- ruptcy (Discharge and Closure) Act 1887, dealing with unclosed bankruptcies under previous acts.

It would be out of place in this article to attempt to answer the question how far later legislation has solved the difficult problems which prior to 1883 were found so intractable, 1906.'°' ° kut it may be mentioned that in 1906 the Board of Trade appointed a committee to inquire into and report upon the effect of the provisions of the laws in force at the time in the United Kingdom in relation to bankruptcy, deeds of arrangement and composition by insolvent debtors with their creditors, and the prevention and punishment of frauds by debtors on their creditors, and any points and matters upon which the existing laws seemed to require amendment. The committee received a vast amount of evidence as well as documents and memoranda from chambers of commerce, trade protection societies and influential public bodies. The scope of the inquiry was not limited to English law and procedure, but also embraced that of Germany, France, Australia, Scotland and Ireland. The report of the committee was issued in 1908 (Cd. 4068), and reference may be made to it for much valuable information. The committee reported that the result of their inquiry did not disclose any dissatisfaction on the part of the commercial com- munity with the main features of the existing law and procedure. But there were certain special incidents of the law and branches of its administration upon which the committee made recom- mendations. One was the prosecution and punishment of debtors who had committed fraud on their creditors or caused loss to them by improper and reckless trading. The existing procedure was complained of as being dilatory, cumbersome and expensive, and the committee were of an opinion that where a debtor had committed an offence for which he could and ought to be prosecuted, prosecution and conviction, with adequate punishment, ought to follow speedily and decisively, and the chief recommendation of the committee was that, while the existing procedure should be left untouched, offences ought also to be punishable on summary conviction before magistrates and justices, and the provisions of the Summary Jurisdiction Acts

applied to them, and that where an order for a prosecution is made on an application by the official receiver of a bankruptcy

court and based on his report, that court should have power to order the official receiver to conduct the prosecution before the court of summary jurisdiction. The committee also reported that numerous delinquencies by insolvent debtors in the conduct of their affairs, or which had contributed to the losses sustained by their creditors, were not punishable or even cognizable by courts having bankruptcy jurisdiction unless or until a debtor who had a receiving order against him, or became a bankrupt, applied for an order sanctioning a composition or scheme of arrangement with his creditors, or for an ordei discharging him from his debts. The most prominent of these delinquencies which were brought to the notice of the committee were — failure by a debtor to keep any books or any proper or adequate books of account in his business; trading with knowledge of insolvency; gambling and speculation leading to, or contributing to, the debtor's insolvency or bankruptcy; failure properly to account for any substantial deficiency of assets. The committee received a large body of evidence in favour of making delinquencies such as have been described punishable by imprisonment. Evidence was also given as to the laws in force in Germany, France and Scotland, from which it appeared that such delinquencies, especially that of keeping no books of account, can be severely dealt with as criminal offences.

After carefully weighing the evidence on both sides the committee recommended that the failure or omission by a debtor who becomes bankrupt to have kept any books of account, or proper books of account, within two years next preceding his bankruptcy, in a trade or business carried on by him, if without excuse, should be made by law an offence punishable on summary conviction by imprisonment, subject to four important limitations, namely, that the law should define what books of account a person carrying on a trade or business must keep, following in this respect the law in force in France and Germany; that failure or omission by a debtor to have kept the required books should only be punishable in the event of a debtor becoming bankrupt and of the liquidated debts proved in the bankruptcy exceeding £200 in amount; that no prosecution of a debtor for failure or omission to keep books of account should take place before the lapse of two years from the passing of the law; that a debtor should not be punished if he could show that his failure or omission to keep proper books was honest and

excusable and did not contribute to his insolvency, and that no prosecution should be instituted for the offence except by order of the bankruptcy court. The committee made recommendations of much the same character with regard to punishing some of the other delinquencies men- tioned above. There were also recommendations by the com- mittee as to trading bv undischarged bankrupts, as to the realization of estate on bankruptcy, as to the operation of the law of relation back of a bankruptcy trustee's title, as to the law relating to the after-acquired property of an undischarged bankrupt, and dealings with such property, and with respect to married women and their liabilities under bankruptcy law. The committee also reported on the law and practice relating to voluntary deeds of arrangement between a debtor and his creditors and on the compulsory regulation of assignments of book debts, and of agreements for the hire and purchase of chattels.

In addition to this report the annual reports of the Board of Trade, which are accompanied by elaborate tables of statistics, and by copious illustrations both of the working of the system and of the characteristic features and causes Results of current insolvency, are published as parliamentary lathm*' papers, and may be usefully consulted by those interested in the subject. It appears from these reports that the total number of insolvencies dealt with under the bankruptcy acts during the ten years ending 31st December 1905, was 43,141, involving estimated liabilities amounting to £61,685,678, and estimated assets amounting to £26,001,417. It may also be pointed out that: according to the official figures, the cost of bankruptcy administration under the present system has very considerably decreased as compared with that under the act of 1869. Estates are also closed at much shorter intervals, and, what is more important from a public point of view, it appears

that while the estimated liabilities of bankrupt estates during the ten years ending 1883 amounted on an average to £22,380,000 per annum, the estimated liabilities during the ten years ending 1905 only averaged £6,168,567 per annum. But during the latter period there was an annual average of 3426 private arrangements involving a further estimated annual liability of £4,166,354 entered into outside of the Bankruptcy Acts by

insolvent debtors. There are no means of ascertaining the corresponding amount of liabilities on private arrangements outside of the Bankruptcy Acts prior to 1883, and therefore a complete com- parison is impossible; but it is evident that on any method of computation there has been a very great diminution in the trading insolvency of England and Wales, while it is also clear as a matter of general knowledge in commercial circles, that a great decrease in the proportion of fraudulent trade and reckless speculation has been a marked feature of private trading during the period in question.

The cost of bankruptcy administration is provided for: (1) by fees charged to bankrupt estates, (2) by interest on balances at the credit of such estates with the bankruptcy estates account, and (3) by interest on unclaimed funds at the credit of estates under former Bankruptcy Acts.

Out of this are paid the salaries of all the officers of the depart- ment, including the official receivers; the remuneration due in respect of bankruptcy services to the county court registrars; pensions, &c, payable to retired officers under the present and previous Bankruptcy Acts; cost of bankruptcy prosecutions; and rents, stationery, travelling and other incidental expenses. The system is self-supporting and involves no charge upon the tax- payers of the country. It has been objected that inasmuch as the act professes to be based on the principle of enforcing commercial morality in the interests of the general community, the cost of administering it should not be charged entirely to the bankruptcy estates concerned. But when it is considered that a large part of the revenue of the department is derived from funds to which estates administered under the present act have contri- buted nothing, this objection does not appear to be well founded. For the convenience of readers who may require more detailed information, the accompanying summary of some of the more important provisions of the law relating to bankruptcy ofproˆ ‘ procedure is submitted. It must be borne in mind, cedure. however, that the subject is in some of its branches extremely intricate, and that both the law and the procedure are being constantly affected by a considerable body of judicial interpretation, while the acts also contain detailed provisions with regard to many questions incident to the ad- ministration of bankruptcy. A reference to the latest text- books or competent professional advice will always be advisable for those who have the misfortune to be practically interested either as debtors or as creditors in bankruptcy proceedings.

The Deeds of Arrangement Act 1887, although not falling strictly within the scope of the bankruptcy law, may also, in consequence of its important bearing upon the question of insolvency in England and Wales, be here noticed. It has been pointed out that, under the Bankruptcy Acts of 1849 and 1861, non-official arrangements by deed between a debtor and the general body of his creditors were not only officially recognized, but were in certain circumstances made binding on all the creditors, including those who refused to assent to them. Under the act of 1869, although such deeds were no longer recognized or made binding on non-assenting creditors, the proceedings under the " liquidation by arrange- ment " and " composition " clauses were practically private arrangements by resolution instead of deed, and were proved by experience to be open to the same abuses. It has also been shown that under the act of 1883 no arrangements either by deed or by resolution have any force against dissenting creditors, unless confirmed after full investigation and 'approval of the bankruptcy courts. Private arrangements, therefore, cease to. form any part of the bankruptcy system. But they are, never- theless, binding as voluntary contracts between the debtor and such creditors as assent to them. Being, however, in the nature

Deeds of arrange- ment.

of assignments of the debtor's property, they are either deemed fraudulent if the benefit of the assignment is limited to a portion of the creditors, or, if it is extended to all they become acts of bankruptcy, and, like any other voluntary assignment, are liable to be invalidated if made within three months prior to the petition on which a receiving order is made against the debtor. Treated as voluntary assignments, which are not binding on those who do not assent to them, such arrangements, where honestly entered into and carried out by capable administration, in many cases form a useful and expeditious method of liquidating a debtor's affairs, and where the debtor's insolvency has been brought about without any gross misconduct they will probably always be largely resorted to. The danger attending them is that even in cases where the debtor has been guilty of mis- conduct, a private arrangement may be used to screen his conduct from investigation, while in many cases it may be made the medium for the concealment of fraudulent preferences. The absence of any independent audit of the trustees' accounts may also encourage or conceal irregularities in administration. Previous to 1887, however, much inconvenience arose from the

fact that the execution of these private arrangements was frequently kept secret, and fresh credit was obtained by the debtor without any opportunity being afforded for the new creditors becoming acquainted with the fact that they were dealing with an insolvent person, and that in many cases they were simply supplying the means for meeting past obligations in respect of which the debtor had already committed default. The Deeds of Arrangement Act 1887 was therefore passed to compel the disclosure of such arrangements, by declaring them void unless registered within seven days after the first execution by the debtor or by any creditor. Registration is effected by lodging with the registrar of bills of sale at the central office of the Supreme Court a true copy of the deed and of every inventory and schedule attached thereto, together with an affidavit by the debtor, stating the total estimated amount of property and liabilities, the total amount of composition, if any, and the names and addresses of the creditors. Where the debtor's residence or place of business is outside the London bankruptcy district, the registrar is required to forward a copy of the deed to the registrar of the county court of the district where the debtor's residence or place of business is situated. Both the central and the local registers are open to public inspection on payment of a small fee and general publicity is secured by the action of various trade agencies, which make a practice of extracting and publishing the information for the benefit of those interested. By section 25 of the Bankruptcy Act 1890, every trustee under a deed of arrangement is required to transmit to the Board of Trade within thirty days of the 1st of January in each year an account of his receipts and pay- ments and such accounts are open to the inspection of any creditor on payment of a small fee. They are not, however, subject to any kind of audit or control by the department. The registrar is also required to make periodical returns of the deeds thus registered to the Board of Trade, in order that a report of proceedings under the Deeds of Arrangement Act may be included in the annual report which the department is required to make on proceedings under the Bankruptcy Acts. Full statistics of such proceedings are accordingly included in these reports, from which it appears that during the ten years ended 31st December 1905 the total number of registered deeds of arrangement was 34,273, with estimated liabilities amounting to £41,663,541, and estimated assets to £23,020,483.

Summary of Bankruptcy Procedure. — Subject to certain special

provisions in the case of what are termed ” small bankruptcies ” (see below) , the following summary sets forth some of the more important provisions of the various acts and rules relating to bankruptcy administration grouped under convenient heads to facilitate reference. In some cases the effect of legal decisions has been embodied in the summary.

Preliminary Proceedings.

Petition and Receiving Order. — Any court exercising bankruptcy jurisdiction in the district in which he resides or carries on business

in England or Wales may make a receiving order against a debtor, whether a trader or not, either on his own petition or on that of a creditor or creditors whose claims aggregate not less than £50. In the case of a creditor’s petition proof must be given of the debt, and of the commission of an act of bankruptcy within three months preceding the date of the petition. An act of bankruptcy is com- mitted if the debtor fails to satisfy the creditor’s claim upon a bankruptcy notice; if he makes an assignment for the benefit of his creditors generally; if he absconds or keeps house; if he gives notice of suspension of payments; if his goods are sold or seized under execution; if he files in court a declaration of inability to pay his debts; or if he grants a fraudulent preference or conveyance. These acts are here enumerated in the order in which they most frequently occur in practice.

Object and Effect of Receiving Order. — The object of the order is to protect the debtor’s property until the first meeting of creditors, and to bring the debtor and his affairs within the jurisdiction of the court. Its effect is to stay all separate action against the debtor, and to constitute the official receiver attached to the court receiver of the debtor’s property, although the legal title still remains in the debtor. Where there is an estate or business to be managed the official receiver may appoint a special manager, who receives such remuneration as the creditors, or failing them the Board of Trade, may determine. As a consequence of the order the following obligations are imposed upon the debtor: — He must make out and submit to the official

receiver within a prescribed period a statement of his affairs, containing the names and addresses of his creditors, the amount of their claims and the securities held by them, and the nature and value of his assets; and accounting for his deficiency. Any material omission or false statement of his losses or expenses is a misdemeanour under the Debtors Act, unless he can prove that he had no intention to defraud. The statement is open to the in- spection of creditors. He must also in every case submit to a public examination in court, in which the official receiver, the trustee and any creditor who has proved his debt may take part. His evidence may be used against him. He may further be specially examined by the court at any time with reference to his dealings or property. He must attend the first meeting of creditors, wait upon the official receiver, trustee and special manager, and give all necessary informa- tion, and generally do all acts which may reasonably be required of him with the view of securing a full investigation of his affairs. He may be arrested if there is reasonable ground for believing that he is about to abscond, destroy papers or remove goods, or if he fails without good cause to attend any examination ordered by the court. The court may also for a period of three months order his letters to be re-addressed by the post-office to the official receiver or trustee. With regard to persons other than the debtor, any person capable of giving information respecting the debtor, his dealings or property, may be examined by the court, and a summary order may be made against such person for delivery of any property belonging to the debtor.

First Meeting of Creditors.

This meeting is summoned by the official receiver, notice being given in the London Gazette and in a local paper, and sent by post to each creditor. A summary of the statement of affairs should accompany the notice, with any observations by the official receiver which he may think fit to make. The object of the meeting is to decide whether any proposal for payment of a composition or for a scheme of arrangement submitted by the debtor is to be entertained, or whether an application should be made to the court to adjudicate the debtor bankrupt. In the latter case the meeting may by an ordinary resolution appoint a trustee with or without a committee of inspection. It may also give any directions as to the administra- tion of the estate. The meeting should be held at the place most convenient for the majority of the creditors. It is presided over by the official receiver or his deputy, who, subject to appeal to the court, admits or rejects

proofs for the purpose of voting. For the transaction of business three creditors qualified to vote, or all the creditors if fewer than three, must be present or represented. Only persons who have proved their debts are entitled to vote, and detailed regulations respecting proofs and the valuation of securities are laid down in the first and second schedules to the act of 1883. One of the chief alterations in the law on this point is the condition imposed on creditors on bills of exchange to deduct from their claims the value of the liability of prior obligants before voting, thus cancelling the power of controlling the proceedings previously possessed by persons who had no real interest in the estate. Votes may be given in person or by proxy, and stringent regulations are laid down with the view of preventing the abuse of proxies. General proxies entitling the holder to exercise all the powers which the creditor could exercise if present may be given to the official feceiver or to any person in the regular employment of the creditor. Special proxies may be given to any person to vote for specified resolutions, or for the appointment of specified persons as trustee and committee. Only official foVms can be used, and the blanks must be filled up in the handwriting of the creditor or some person in his regular employ- ment, including the authorized agent of a creditor resident abroad. A proxy must be lodged with the official receiver not later than four o'clock on the day before the meeting or adjourned meeting at which

it is to be used. Resolutions are ordinary, special or extraordinary. An ordinary resolution is carried by a majority in value of the creditors voting; a special resolution by a majority in number and three-fourths in value of such creditors. The only instance of a resolution other than these is that required for the approval of a composition or scheme which requires a majority in number and three-fourths in value of all the creditors who have proved. The majority of questions arising at a meeting are decided by an ordinary resolution.

Adjudication.

If the creditors so resolve, or if a composition or scheme of arrange- ment is not proposed by the debtor or entertained by the creditors, or if entertained is not approved by the court, or if without reason- able excuse the debtor fails to furnish a proper statement of his affairs, or if his public examination is adjourned sine die, the court adjudicates the debtor bankrupt and thereupon his property vests in a trustee, and, subject to the

payment of the costs and fees of administration, is divisible among his creditors until all his debts are paid in full with interest at the rate of 4 % per annum.

Effect on Bankrupt. — The bankrupt is bound to aid the trustee in his administration, and if he wilfully fails to deliver up any part of his property he is guilty of contempt of court. He is also liable to criminal prosecution under the Debtors Act if with intent to defraud he conceals or removes property to the value of £10 or upwards; or if he fails to deliver to the trustee all his property, books, documents, &c. ; or if he knowingly permits false debts to be proved on his estate without disclosure; or mutilates, falsifies, destroys or parts with books or accounts; or attempts to account for his property by fictitious losses; or if within four months next before presentation of a bankruptcy petition, he obtains property on credit by false representation; or pledges or disposes of, otherwise than in the ordinary way of his trade, any property which has not been paid for; or by misrepresentation obtains the assent of his creditors to any agreement with reference to his affairs. He is also under the act of 1883, guilty of misdemeanour if before his discharge he obtains credit for more than £20 from any person without inform- ing such person that he is an undischarged bankrupt. It is the duty of the official receiver to report any such facts to the court, and if the court is satisfied that there is a reasonable probability of con- viction, it is required to order a prosecution which is then conducted by the director of public prosecutions.

Disqualifications. — A bankrupt cannot during his bankruptcy or until five years after his discharge, unless the bankruptcy is annulled or he obtains his discharge with a certificate by the court that the bankruptcy was caused by misfortune without misconduct, act as a member of the legislature, or as a justice of the peace, mayor, alderman, councillor, guardian or overseer of the poor, member of a sanitary authority, school, highway or burial board, or select vestry in any part of the United Kingdom.

Annulment. — An order of adjudication may be annulled if the court is of opinion that it should not have been made, or that the bankrupt's debts are paid in full, or if a composition or scheme of arrangement is approved by the court after adjudication.

Discharge. — The court may also at any time after the conclusion of the bankrupt's public examination, and after hearing the official receiver, the trustee and any creditor, to all of whom

previous notice of the application must be given, grant the bankrupt a dis- charge either absolutely or under conditions, but subject to the following qualifications, viz.: — (1) If the bankrupt has committed a criminal offence connected with the bankruptcy, the application must be refused unless for special reasons the court determines otherwise. (2) If the assets are not equal in value to ten shillings in the pound of the unsecured liabilities (unless the bankrupt can show that he is not responsible) ; or if proper books have not been kept; or if the bankrupt has traded after knowledge of insolvency; or has contracted debts without reasonable probability of payment; or failed to account for his deficiency; or contributed to the bank- ruptcy by rash speculation, gambling, culpable neglect or by un- justifiable expenses; or has taken or defended legal proceedings on frivolous grounds; or has within three months preceding the receiving order given an undue preference; or has increased his liabilities with the view of making his assets equal to ten shillings in the pound; or has previously been bankrupt or made an arrange- ment with creditors; or has been guilty of any fraud or fraudulent breach of trust; then the court shall, on proof of any of these facts, either (a) refuse the discharge, or (b) suspend it for a period of not less than two years, or until a dividend of not less than ten shillings in the pound has been paid ; or © qualify the order by the condition that judgment is entered up against the bankrupt for payment of any unpaid balance of his debts, or of part of such balance out of his future earnings or property. The bankrupt may, however, after two years apply to the court to modify the conditions if he is unable to comply with them. An order of discharge releases the debtor from all his obligations except debts due to the crown, and other obligations of a public character which can only be discharged with the consent of the Treasury, debts incurred by fraud, and judgment debts in an action for seduction or as a co-respondent in a matri- monial suit or under an affiliation order, which are only released to such extent and subject to such conditions as the court may expressly order. The release of the bankrupt does not operate as a release

of any partner or co-obligant with him. Neither does it release the bankrupt from liability to criminal prosecution.

Composition or Scheme of Arrangement. After a receiving order has been made the debtor may submit a proposal for the payment of a composition, or for the liquidation of his affairs, by a trustee or otherwise, without adjudication. The proposal must be lodged with the official receiver in sufficient time to allow notice, together with a report by that officer, to be sent to the creditors before the meeting is held at which it is to be considered. If the proposal isentertained at the meeting by a majority in number and three-fourths in value of all the creditors who have proved their debts, and if it is thereafter approved by the court, it becomes binding upon all creditors who would be bound by an order of dis- charge had the debtor been adjudicated bankrupt. A similar proposal may be made after adjudication, and if entertained by the creditors and approved by the court, the adjudication may be annulled. The debtor's release will be subject to the terms of the scheme, but his future acquired property will not pass to the creditors unless there is an express stipulation to that effect. If default is made in carrying out the scheme, or if it is found that it cannot proceed without injustice or undue delay, the court may at any time adjudicate the debtor bankrupt, in which case the scheme will fall to the ground, except in respect of past transactions under it. The approval of a composition or scheme does not release the debtor from his liabilities under the criminal law, nor from the necessity of undergoing a public examination which must, in fact, be held and concluded before the approval of the court is applied for. Also before such approval is given a report must be filed by the official receiver upon its terms and on the conduct of the debtor, and the court must be satisfied after hearing that officer and any creditor, that the proposal is reasonable and calculated to benefit the creditors, and that no criminal offences connected with the bankruptcy have been committed by the debtor. Further, if any fact is proved which would have prevented the debtor from obtaining an absolute or unconditional order of discharge had he been adjudged bankrupt, the composition or scheme cannot be approved unless it provides reasonable security for the payment of not less than seven shillings and sixpence in the pound on all the unsecured debts. Where a trustee is appointed to carry out the composition or scheme, all the provisions of the act with reference to the remuneration of the trustee, the custody of funds, the audit of his accounts and the control exercised by the Board of Trade apply in the same manner as they would under an adjudication. Further, the provisions relating to the administration of property, proof of debts, dividends, &c, will

also apply, so far as the nature of the case and the terms of the arrangement admit.

Property divisible among the Creditors. No part of the law of bankruptcy is more intricate, or has been the subject of more litigation than this, and any detailed view of the effect of legal decisions can only be gathered by a perusal of the cases; but the following general principles may be stated: — The term " property " includes not only property of which the bankrupt is the true owner, but property in his possession, order or disposition in his trade or business with the consent of the true owner, in such circumstances that he is the reputed owner thereof. The application of the doctrine of reputed ownership has been considerably restricted in recent years by the growth of alleged trade customs, in accordance with which property is frequently lent under a contract of " hire and purchase " or otherwise; and by the decisions of the courts that where such custom is sufficiently proved the doctrine does not apply. Further, the trustee's title not only includes property in the actual possession of the bankrupt, but relates back to the date of the first act of bankruptcy committed by him within the three months preceding the presentation of the bankruptcy petition, and thus invalidates all payments and assignments to creditors made during that period with knowledge on the part of the creditor or assignee of the commission of the act of bankruptcy. In such cases the trustee may, therefore, require the money or property to be restored to the estate. And even where no prior act of bankruptcy is proved, any payment made to a creditor with the view of giving such creditor a preference over the other creditors, within the three months preceding the presentation of the petition on which the payer is made bankrupt, is rendered void as against his trustee. Settlements of property within the two years preceding the bank- ruptcy, unless made before and in consideration of marriage, or made in good faith for valuable consideration, are also void, as are similar settlements within ten years, unless it is proved that the settlor was (independently of the settled property) solvent at the date of the settlement, and that the interest in the property passed to the trustees on the execution of the deed. The same rule applies to covenants to settle in consideration of marriage future-acquired property in which the debtor had no interest at the date of the marriage (other than property acquired by the bankrupt through his wife), if such -property is not actually transferred before the bankruptcy. Executions by a creditor not completed at the date of

the receiving order are also void, and the proceeds of an execution in the hands of the sheriff must, with certain exceptions and subject to deduction of costs, be handed over to the trustee. Bur all property

held by the bankrupt on trust, and tools of trade, wearing apparel and bedding to a total value not exceeding £20, are excluded from the property divisible among the creditors. With respect to property acquired by the bankrupt, whether by gift or legacy, or consisting of accumulations of business or other profits after the commencement of the bankruptcy, and before he obtains his discharge, the trustee's title also prevails ; but bona-fide transactions by the debtor for value, other than transactions relating to freehold property, appear to be valid. Where the bankrupt is a beneficed clergyman the trustee may, subject to certain provisions for the due discharge of the duties of the office, apply for the sequestration of the profits of the benefice; and where he is in receipt of a salary, income or pension, &c, the court may order any part thereof to be paid to the trustee, but where he is an officer of trie army, navy or civil service, such order is only to be made with the consent of the chief of the department concerned. Claims of Creditors and Dividends.

In the distribution of the debtor's property certain claims are entitled to priority over others. Thus the landlord, although not entitled to a preference out of the funds in the hands of the trustee, can distrain for unpaid rent on the goods and effects of the debtor remaining on the landlord's premises, but where the distraint is levied after the commencement of the bankruptcy this right is limited by the act of 1890 to six months' rent due before adjudica- tion, the remainder of his claim ranking for dividend with the claims of other creditors. Various gas and water companies have also statutory powers of distraint under special acts, but the policy of recent legislation has been to discourage any extension of such privileges. Where the bankrupt holds an office of trust in any savings bank or friendly society, any balance in his hands due to such bank or society has been held under the acts relating to these bodies to be payable in preference to any other claim against the estate. Other preferential claims are regulated by the Bankruptcy Acts and by the Preferential Payments in Bankruptcy Act of 1888, and include taxes, parochial and other local rates for not more than one year, wages and salaries for four months, but not exceeding £50 (limited in the case of ordinary labourers and workmen to two months' wages not exceeding £25), and agricultural labourers'

claims not exceeding one year s wages, if hired by special contract for payment of a lump sum at the end of a year. These claims are entitled to preference not only over funds in the hands of the trustee, but also over the proceeds of any distraint levied by the landlord within the three months prior to the receiving order, the latter in that case becoming a preferred creditor for the amount so paid. Articled clerks and apprentices may also be allowed repayment of a proportion of the premium on their unexpired agreements. On the other hand, usual trade discounts (exceeding 5 %) must be deducted from traders' proofs, and the following claims are postponed until the general creditors are paid in full, viz. claims by a married woman for loans to the husband for the purposes of his business, claims for loans advanced to any person in business at a rate of interest varying with the profits, and claims for interest in excess of 5 % per annum. Subject to these exceptions all debts proved in the bankruptcy must be paid pari passu. Any surplus after payment of 20s. in the pound and interest at the rate of 4 % per annum, from the date of the receiving order, is payable to the bankrupt.

Proofs of Debt. — AH claims and liabilities present or future, certain or contingent, arising out of obligations incurred before the date of the receiving order are provable in the bankruptcy, an estimate of the liability in the case of contingent debts being made by the trustee subject to appeal to the court. But demands in the nature of un- liquidated damages arising otherwise than by reason of a contract, promise or breach of trust are not provable. A secured creditor if he proves must either surrender his security, or value the security and prove for the balance; and the trustee can thereupon, subject to the creditor's power in certain circumstances to amend the valuation, take over the security by paying the amount of the valuation, or may require it to be realized. He may be required by the creditor to elect which of these courses he will adopt, failing which the equity of redemption will vest in the creditor. For further regulations as to proofs, the time within which they must be lodged for voting and for dividend, and the manner of dealing with them, reference should be made to the first and second schedules of the act of 1883 and the rules relating thereto.

Dividends. — After payment of costs of administration and prefer- ential debts, it is the duty of the trustee to distribute the estate with all convenient speed, — the first dividend within four months after the first meeting of creditors, and subsequent dividends at intervals of not more than six months, but the

declaration may be postponed for sufficient reason by the committee of inspection. Notice of the intention to declare a dividend is gazetted and sent to each- creditor mentioned in the bankrupt's statement of affairs who has not proved. The notice should state the last day for proving in order to participate in the distribution, and should be given not more than two months before the declaration. When the dividend is declared, notice of the amount due, and of the place where the same is payable, is sent to each creditor who has proved, with a statement showing particulars of the estate. And provision must be made for creditors at a distance, who have not had time to prove, for disputed claims, and for debts the subject of claims not

yet determined. Creditors who fail to prove before the declaration of a dividend are entitled to receive their dividends on proving before any subsequent dividend is declared, but cannot disturb the distribution of any dividend already declared. Before dis- tributing a final dividend notice is sent to every creditor whose claim has been notified to the trustee, but not finally established, with an intimation that unless so established within a specified period he will be excluded from participation in the estate. In the case of a bankrupt firm the joint creditors are not entitled to receive a dividend out of the separate property of the bankrupts until all the separate creditors are paid in full.

Trustee's Administration ,

While the interim preservation and management of the estate is conducted by or under the direct supervision of officers appointed by and responsible to the Board of Trade, the ultimate realization and distribution of the assets devolve upon the trustee appointed by the creditors. But besides acting as receiver prior to the first meeting of creditors, the official receiver also becomes trustee by operation of law on the making of an order of adjudication. He vacates the office when a trustee is appointed by the creditors, and certified by the Board of Trade, but again becomes trustee on the creditors' trustee being released, dying, resigning or being removed from office. As the bankrupt's property vests in the trustee for the time being, and passes from trustee to trustee by operation of law, and without any formal act of conveyance, the continuity of the office is thus secured.

Appointment of Trustee. — A trustee may be appointed by a majority in value of the creditors voting, at the first or any subsequent meeting, or the appointment may be left to the committee of inspection. In either case the appointment is subject to confirma- tion by the Board of Trade, who may object on the ground that the creditors have not acted in good faith in the interests of the general body, or that the person appointed is not fit to act, or occupies such a position in relation to the debtor, to any creditor, or to the estate, as makes it difficult for him to act with impartiality, or that in any previous case he has been removed from office for misconduct or for failure without good cause to render his accounts for audit. An appeal from such objection to the High Court lies at the instance of a majority in value of the creditors, but in the absence of an appeal it is fatal to the appointment. Before being confirmed, the trustee- elect must also furnish security to the satisfaction of the Board of Trade, and such security must be kept up to the amount originally fixed, or to such lesser amount as that department may require throughout the tenure of the trusteeship, failing which the trustee is liable to be removed from office. Where the creditors fail to appoint a trustee, the Board of Trade may do so, but such appointment may at any time be superseded by the creditors.

Removal. — The trustee may be removed by the creditors at a meeting summoned for the purpose without reason assigned, or by the Board of Trade for misconduct, or for incapacity or failure to perform his duties, or on either of the other personal grounds of objection to which the appointment is open. But the removal is in like manner subject to appeal at the instance of creditors. If a receiving order is made against a trustee he thereby vacates office. He may also, with the consent of a general meeting of creditors, resign, but his resignation does not operate as a release from his liability to account for his administration.

Powers and Duties. — The trustee is required to take immediate possession of the bankrupt's property, including deeds, books and accounts, and has the powers of a receiver in the High Court for the purpose of enforcing delivery. After payment of the costs of administration it is his duty to distribute the estate in dividends as speedily as possible. He may also, and with the sanction of the committee, or, where there is none, with that of the Board of Trade, carry on the business so far as is necessary to a beneficial winding- up, institute or defend legal proceedings, employ a solicitor to do any business previously sanctioned by

the same authority, com- promise debts and claims, raise money on mortgage, sell property on credit, or divide the estate where practicable among the creditors in its existing form. He may, without special sanction, but subject to any directions which may be given by the creditors in general meeting, or failing them by the committee, sell the property or any part of it for cash, including business goodwill and book debts, and either by public auction or private treaty, and generally exercise all the powers which the bankrupt might before adjudication have exercised in relation to the property, or which are by the Bankruptcy Act conferred on the trustee.

Where any part of the property is held subject to onerous obligations, such as the payment of rent, &c, the trustee may disclaim the same, subject in certain cases to the leave of the court, and the disclaimer operates to determine all interest in or liability in respect of the property on the part of the estate. The trustee is required to keep a record book (which is commenced by the official receiver), containing minutes of the proceedings in the bankruptcy, and a cash book in the prescribed form, in which all receipts ai.d payments by him must be entered. All monies received must forthwith be paid into an account at the Bank of England, entitled the " Bankruptcy Estates Account," which is under the control of the Board of Trade, unless where in special circumstances the sanction of that depart-

ment is obtained to the opening of a local banking account, but in no circumstances must estate monies be paid to the trustee's private account. When monies are required for the purpose of the estate, special cheques or money orders are issued by the Board of Trade on the application of the trustee.

Control over Trustee. — In his administration of the estate the trustee is subject to control by the committee of inspection, the creditors, the court and the Board of Trade. The committee is appointed by the creditors, and must consist of not more than five nor less than three creditors or authorized representatives of creditors. It acts by a majority present at a meeting, and should be convened once 'a month unless it otherwise diiects. If no committee is appointed, the Board of Trade may give any direction or permission which might have been given by a committee. Directions given by the committee, if not inconsistent with the provisions of the act, are binding on the trustee, unless contrary to or overruled by those of the creditors or of the court. The official receiver or trustee m-.y summon a meeting of the

creditors at any time to ascertain their wishes, and must do so when so required by one-sixth in value of the creditors or when directed by the court. The Board of Trade may also direct the official receiver to summon a meeting for the purpose of reviewing any act done by the trustee or any resolution of the committee of inspection. Further, the trustee may apply to the court for directions in any particular matter, and the court may also, on the application of any person aggrieved reverse or modify any act of the trustee, or make such order as it deems just. The directions of the court override those of the creditors. The Board of Trade is required to take general cognizance of the conduct of trustees, to inquire into any complaints by creditors, and in the event of any trustee not faithfully performing his duties, to take such action, including the power of removal, as may *be expedient. It may also direct a local investigation of the trustee's books and accounts, and may require him to answer any inquiries, or may apply to the court to examine him on oath. If any loss has arisen to the estate from any misfeasance, neglect or omission of the trustee, it may require him to make it good. The orders of the Board of Trade under the powers conferred by the act may be enforced by the court by committal of the trustee or otherwise.

Audit of Accounts. — The trustee's accounts must be audited by the committee of inspection not less than once in every three months ; and once in every six months, as well as at the close of the administra- tion, the record and cash books must also be submitted with the vouchers, and the committee's certificate of audit to the Board of Trade for final audit. If it appears that the trustee has retained more than £50 in hand for more than ten days without a satisfactory explanation, he may be removed from office, surcharged with interest at the rate of 20 % per annum and lose all claim to remuneration.

Remuneration. — The trustee's remuneration is fixed by the creditors or by the committee if so authorized by them. It must be in the nature of a percentage on the amount of the realization and on the dividends. If one-fourth of the creditors in number or value dissent from the resolution, or if the bankrupt satisfies the Board of Trade that the remuneration is excessive, the Board may review the same and fix the remuneration. A trustee may not receive any remuneration for services rendered in any other capacity, e.g. as solici- tor, auctioneer, &c, beyond that voted to him as trustee; nor may he share his remuneration with the bankrupt, the solicitor or other person employed about the

bankruptcy; or receive from any person any gift, or other pecuniary or personal benefit in connexion therewith.

Costs. — A trustee receiving remuneration is not allowed the costs of any other person in respect of duties which ought to be performed by himself. All bills of solicitors and other agents employed must be taxed before payment, as being in accordance with the prescribed scales of costs ; and the taxing master must satisfy himself that the employment has been properly authorized before the work was done. All bills of costs must be delivered to the trustee within seven days of the request for the same, otherwise the estate may be distributed without regard to such costs.

Release. — When the property, so far as it is capable of realization, has been realized and distributed, the trustee must apply to the Board of Trade for his release, forwarding to each creditor a notice of his having done so, together with a copy of his final accounts, and the Board of Trade, after preparing and considering a report on the same, and the objections of any person interested, may, subject to appeal to the High Court, grant or withhold the release. If a release is withheld, the court may, on the application of any person interested, make such order against the trustee as it thinks just. The release when granted operates as a removal from office, and thereupon the official receiver again becomes trustee, and is thus in a position, even after the nominal close of the bankruptcy, to deal with any circumstances which may arise, or which have not been foreseen and provided for.

Small Bankruptcies. When the official receiver reports, or the court is otherwise satisfied that the debtor's propeity is not likely to realize more than £300, the court may make ah order for the summary administration of the estate, in which case, if the debtor is adjudged bankrupt, the official receiyer in the ordinary course becomes and remains trustee, and certain other modifications are effected with the view of simplifying

and accelerating the procedure. The chief of these modifications are as follows, viz. the Board of Trade acts as committee of inspec- tion; there is no advertisement of the proceedings in a

local paper; in legal proceedings all questions of law and fact are determined by the court without a jury ; adjudication may be made on a report by the official receiver before the first meeting of creditors where no composition or scheme is proposed; meetings of creditors may be held in the town where the court sits or the official receiver's office is situated; notice to creditors of meetings other than the first meeting, or of application by a debtor for his discharge, are dispensed with in the case of creditors for amounts not exceeding £2. Costs, other than a solicitor's charges, may be paid witfiout taxation ; and the time for declaring the first dividend is extended to six months, but the whole estate must be realized and distributed within this period if practicable. No modification, however, is permitted in the procedure relating to the public examination and discharge of the bankrupt. Notwithstanding that an order has been made for summary administration, the creditors may at any time by a resolu- tion passed by a majority in number and three-fourths in value of those voting at the meeting, appoint a trustee in place of the official receiver, in which case the summary order ceases to be operative.

Scottish Bankruptcy Legislation.

In Scotland, as in England, the law of bankruptcy arose as a remedy against the frauds of insolvent debtors. It was declared by an act of the Scottish parliament (1621,0. 18) that no debtor after insolvency should fraudulently diminish the fund belonging to his creditors, and if a deed of assignment was gratuitously executed after the contracting of debt in favour of a near relation or a confidential friend, fraudulent dealing was to be presumed. The act 1696, c. 5, settled the definition of a notour or notorious bankrupt, a question which had previously engaged the attention of the judges of the court of session. The statute defines " a notour bankrupt " to be any debtor who, being under diligence by horning or caption, at the instance of his creditors, shall be either imprisoned, or retire to the abbey or any other privileged place, or flee or abscond for his personal security, or defend his person by force, and who shall afterwards be found, by sentence of the lords of session, to be insolvent. Bankruptcy as thus denned was, it is said, intended to afford a remedy against fraudulent preference by debtors, and not as the ground-work of a general process of distribution, although by later statutes it became a necessary requisite of every such process. The exceptions recognized in the act of 1696, of persons absent from Scotland and therefore not liable to imprisonment, or of persons

exempted therefrom by special privileges, were removed by later legislation. The old English distinction between traders and non-traders, it will be observed, is not recognized in Scottish law. The statute made null and void all voluntary dispositions, assignations and other deeds made after or within sixty days before bankruptcy.

In 1856 was passed the Bankruptcy (Scotland) Act, by which the law of bankruptcy in Scotland is mainly regulated. By this act, notour (i.e. legally declared) bankruptcy was constituted: — ■

1. By sequestration (or adjudication in England and Ireland); and

2. By insolvency concurring either — (a) with a duly executed charge for payment or (b) with sale of effects belonging to the debtor under a poinding or under a sequestration for rent, or making application for the benefit of cessio bonorum.

Notour bankruptcy continues, in cases of sequestration, until the debtor has obtained his discharge and in other cases until insolvency ceases. Sequestration may be awarded of the estate of any person in the following cases: —

1. Living debtor subject to jurisdiction of Scottish courts — (a) on his own petition with concurrence of qualified creditors, or (b) on petition of qualified creditors, provided he be a notour bankrupt, and have had a dwelling-house or place of business in Scotland within the previous year.

2. In the case of a deceased debtor, subject at his death to the jurisdiction of the court — (a) on the petition of his mandatory; or (b) on the petition of qualified creditors (§ 13).

Sequestration may be awarded either by the court of session or by the sheriff. A sequestration may be recalled by a majority in number and four-fifths in value of the creditors, who may prefer to wind up the estate by private arrangement. If the

sequestration proceeds, the creditors hold a meeting, and by a majority in value elect a trustee to administer the estate, and three commissioners (being creditors or their mandatories) to assist and control the administration and declare the dividends. The bankrupt (under pain of imprisonment) must give all the information in his power regarding his estate and he must be publicly examined on oath before the sheriff; and ” conjunct and confident persons ” may likewise be examined. The bank- rupt

may be discharged either by composition or without composition. In the latter case (1) by petition with concurrence of all the creditors, or (2) after six months with concurrence of a majority and four-fifths in value of the creditors, or (3) after eighteen months with concurrence of a bare majority in number and value, or (4) after two years without concurrence. In the last case the judge may refuse the application if he thinks the bankrupt has fraudulently concealed his effects or wilfully failed to comply with the law. This act was amended by the Bankruptcy and Real Securities Act 1857, which deals with the cost of competition for trusteeships; the Bankruptcy Amendment (Scotland) Act i860, which enables the court to recall a sequestration where it is more convenient that the estate should be wound up in England or Ireland; and the Bankruptcy Amendment Act (Scotland) 1875, which makes the wages of clerks, shopmen and servants preferential claims for a period not exceeding four months and an amount not exceeding £50, while the claims of workmen are placed on a similar footing for a period not exceeding two months. Some important changes were subsequently introduced, one of the principal being that effected by the Debtors (Scotland) Act 1880, which abolished imprisonment for debt, but which,' like its English prototype (the Debtors Act 1869), contains a series of important provisions for the punishment of fraudulent bankrupts. Under these pro- visions the laws of the two countries on that subject are practically assimilated, although some minor differences still survive. One of the most important of these differences is, that while the Scottish act makes the failure, within the three years prior to the sequestration, to keep " such books and accounts as, accord- ing to the usual course of any trade or business in which he (the debtor) may have been engaged, are necessary to exhibit or explain his transactions " a criminal offence, the English act contains no provision of an analogous character; the non-keeping of such books being treated as a fact to be taken into account in dealing with the debtor's application for his discharge but not coming within the scope of the criminal law. On the other hand, there are a few minor trading irregularities dealt with in the English act which are not specifically included in that of Scotland. Another important distinction is that under the Scottish act the same offences may be treated differently, accord- ing as they are brought for trial before the court of justiciary or a sheriff and jury, in which case the maximum penalty is two years' imprisonment; or before a sheriff without a jury, in which case the penalty is limited to imprisonment for a period not

exceeding sixty days. This distinction admits of a useful elasticity in the administration of the law, having regard to the comparative importance of the case, which is hardly possible under the English act.

Another most important modification of the law is effected by the Debtors Act 1880, combined with the Bankruptcy and Cessio Act 1881, and the Act of Sederunt anent Cessios of the 22nd of December 1882. Under the law existing prior to these enactments, the process of cessio bonorum operated chiefly as a means for obtaining release from imprisonment for debt on a formal surrender by a debtor of all his goods and estate. But under this process the debtor was not entitled to a discharge, and his future-acquired property was still subject to diligence at the instance of unsatisfied creditors. By abolishing im- prisonment for debt (except in regard to crown debts and public rates and assessments), the legislature also practically abolished this use of the process of cessio, and the process itself would probably have become obsolete, but for certain changes effected by the act of 1881, which have given it a different and more extended scope. Among these changes may be noted (1)

the extension to ” any creditor of a debtor who is notour bankrupt,” without reference to the amount of his debt, of the right hitherto limited to the debtor himself, to petition the court for a decree of cessio, the prayer of the petition, whether presented by the debtor or by a creditor, being ” to appoint a trustee to take the management and disposal of the debtor’s estate for behoof of his creditors “; (2) the discretionary power given to the court upon such petition to award sequestration under the bankruptcy act, in any case where the liabilities of the debtor exceed £200; and (3) the right of the debtor to apply for his discharge under similar conditions to those obtaining in the case of sequestration. An important modification of the law relating to discharge which equally affects a debtor under the Bankruptcy and Cessio Acts, is also effected by the provision of the act of 1881, which requires, in addition to the concurrence of creditors, the fulfilment of one of the following conditions, viz., ” (a) That a dividend of five shillings in the pound has been paid out of the estate of the debtor, or that security for payment thereof has been found to the satisfaction of the creditors; or (b) that the failure to pay five

shillings in the pound has, in the opinion of the sheriff, arisen from circumstances for which the debtor cannot justly be held responsible." Orders of cessio are only made in the sheriff courts, and when made, the court also appoints a trustee, who conducts the proceedings without the control exercised by the creditors in a sequestration. Under these conditions it will be seen that the original purpose and con- stitution of the ' process of cessio has entirely disappeared, and it has now become a modified form of official bankruptcy procedure, with a less elaborate routine than in the case of sequestration, and one perhaps more suitable to the smaller class of cases, to which in practice it is limited.

The Bankruptcy Frauds and Disabilities (Scotland) Act 1884 applies to sequestrations and decrees of cessio the criminal provisions of § 31 of the English Bankruptcy Act 1883, relating to the obtaining of credit for £20 and upwards by an undischarged bankrupt, without disclosure of his position. It also places the law relating to the disqualifications attaching to such bankrupts on a similar footing to that of the English act.

The Judicial Factors Act of 1889 contains a provision calculated to check excessive costs of administration, by requiring that where the remuneration of a trustee under a sequestration is to be fixed by the commissioners, intimation of the rate of re- muneration is to be given to the creditors and to the accountant of court before being acted on, and the latter officer is empowered, subject to appeal, to modify the same if he deems it expedient. It may be pointed out that the Deeds of Arrangement Act 1887, which applies to England and Ireland, does not apply to Scotland, and there is no analogous provision requiring registra- tion of private deeds of assignment for the benefit of creditors as a condition of their validity in that country.

Finally, it is to be noted that the office-of accountant in bank- ruptcy, which was established by the Bankruptcy Act of 1856, has under the Judicial Factors Act 1889 been abolished, the duties being merged in those of the office of accountant of the court of session.

Irish Bankruptcy Legislation. The Irish law of bankruptcy is regulated by the two leading Irish statutes of 1857 and 1872, together with the Irish Debtors Act 1872, and corresponds in its main features to some of the older English enactments, with modifications adopted from the English act of 1869. It may be pointed out, however, that the system of liquidation by

arrangement and composition without the approval or control of the court, which proved fatal to the success of the latter, has not at any time been imported into the Irish law. A special act was passed in 1888 for establishing local bankruptcy courts in certain districts in Ireland, and an act was also passed in 1889, applying the main provisions of the English Act of 1888, relating to preferential payments in bank- ruptcy, to Ireland.

The Deeds of Arrangement Act 1887, which has been already discussed above under the head of English bankruptcy legislation, also applies in its main provisions to Ireland, and as supplemented

by the Irish Deeds of Arrangement Amendment Act 1890, places the law relating to this branch of insolvency procedure upon a similar footing in both countries, so far as regards the publicity of such deeds. The last-mentioned act also requires a similar registration of all petitions for arrangement under the Bankruptcy Act 1857. (J. Sm.*)

Comparative Law

British Empire. — In most parts of the British empire the law of bankruptcy has been modelled upon the English system. This is particularly the case in Australia and New Zealand. Victoria, South Australia, Western Australia and New Zealand follow the lines of the existing English acts. In Queensland, Tasmania and New South Wales the system is rather that of the English act of 1869, leaving more to the creditors' manage- ment and less to officialism.

One point may be mentioned in which the Australian colonies have improved on the English system. Under the English acts a bankrupt is under no obligation to apply for his discharge. The result is that the United Kingdom contains a population of 70,000 undischarged bankrupts — a manifest danger to the trading community. Under the bankruptcy systems of New South Wales, Victoria and New Zealand, a bankrupt is bound to apply for his discharge within a fixed period, otherwise he is guilty of a contempt of court.

In Canada, under the British North America Act 1867, the Dominion parliament has exclusive legislative power in regard to bankruptcy and insolvency: but there is no existing Dominion act on the subject. A Dominion act was passed in 1875, but repealed

in 1880. The failure of this act may perhaps be ascribed to the diversity of the pre-existing provincial systems, embracing such contrasts as the English law of Ontario, and the French code based on cessio bonorum — which ruled in Quebec. Bank- ruptcy is dealt with in a fragmentary way by the provincial legislatures by acts regulating such matters as priority of execution creditors, fraudulent assignments and preferences, imprisonment of debtors, administration of estates of deceased insolvents.

In Cape Colony and Natal English law is substantially followed. In the Transvaal, where Roman-Dutch law prevails, the law governing the subject is the Insolvency Law, No. 13 of 1895. It provides for voluntary surrender and compulsory sequestration. The law of the Orange River Colony is similar.

In British Guiana, Gambia, Jamaica, Hong Kong, Mauritius, Grenada, Trinidad, Tobago and the Straits Settlements the law is modelled on the English pattern.

In India insolvency is regulated by the Indian Insolvency Act 1848, extended by the Act XL of 1889.

An English bankrupt, it may be added, is entitled to plead his discharge in England as a defence in a colonial court. The explanation is this. The English act vests all the bankrupt's property, whether in the United Kingdom or in the colonies, in his trustee in bankruptcy. Having thus denuded him of every-thing, it has been held to follow that the bankrupt's discharge must also receive recognition in a colonial court.

France. — Bankruptcy in France is regulated by the Commercial Code of 1807, amended and supplemented by the law of 9th June 1838. By Article 437 of the code bankruptcy is defined as the state of a trader who is unable to meet his commercial engagements. Simple insolvency of this kind is known in France as faillite. Insolvency attended with circumstances of mis-conduct or fraud is known as banqueroute simple or banqueroute frauduleuse. Only a trader can become bankrupt. The debt, too, for obtaining adjudication must be a commercial debt, the laws regulating bankruptcy being designed exclusively for the protection of commerce. To be made a bankrupt a trader need not be insolvent: it is sufficient that he has suspended payment. Commercial companies of all kinds are liable to be declared bankrupt in the same manner as individual traders. A trader-debtor can be adjudicated bankrupt upon his own petition, or

upon the petition of a creditor, or by the court itself propria motu. A petitioning debtor must within fifteen days file at the

office of the Tribunal of Commerce of the district, a declaration of suspension, with a true account of his conduct and of the state of his affairs, showing his assets, debts, profits and losses and personal expenses. On adjudication the Tribunal of Com- merce appoints a person, called a syndic provisoire, to manage the bankrupt's estate, and a juge commissaire is also named to supervise the syndic. A bankruptcy terminates by an ordinary composition {concordat), a sale of the debtor's assets {union), or a composition by relinquishment of assets. It is a striking feature of the French system, and highly creditable to French commercial integrity, that a discharge in bankruptcy, even when accompanied by a declaration d'excusabililS, leaves the unpaid balance a debt of honour. At the time of the French Revolution the National Convention passed a resolution that any man who contracted a debt should never be free from liability to pay it. The spirit of this resolution still survives, for until a trader has paid every penny that he owes he is not rehabilitated and remains under the stigma of various dis- abilities: he has no political rights, he cannot hold any public office, or act as a stockbroker, or sit on a jury. Banqueroute simple is where the bankrupt has been guilty of grave faults in the conduct of his business, such as extravagance in living, hazardous speculation or preferring creditors. Banqueroute frauduleuse involves the worse delinquency of fraud. Both banqueroute simple and banqueroute frauduleuse are punish- able, — the latter with penal servitude ranging from five to twenty years.

Germany. — Bankruptcy in Germany is governed by a code passed in 1877. Prior to this each state had its system and the law was " wholly chaotic." The same distinction is drawn in Germany as in France between mere commercial failure and bankruptcy, simple or fraudulent. Simple bankruptcy is established by such offences as gambling, dealing in " futures," disorderly book-keeping or extravagance in living: fraudulent bankruptcy, by offences of a deeper dye — the concealment of property, the falsifying of books, the manufacture of fictitious debts and the giving of illegal preferences. Both kinds of bankruptcy are punishable, fraudulent bankruptcy by penal

servitude, or in case of mitigating circumstances, by imprisonment for not less than three months. Accessories in fraudulent bankruptcies are liable to penal servitude — for instance, a creditor who conspires with the debtor to secure an advantage to the prejudice of the other debtors. The creditors are called together within one month from the date of adjudication, and at their meeting they may appoint a committee of their number to advise with the trustee. It is the duty of the court to see that the trustee performs his functions. Estates are liquidated with great rapidity. In order that the creditors may receive dividends at the earliest moment, it is customary to sell the assets by auction. The creditors by a majority in number and three- fourths in value may accept a composition, but such an arrange- ment must have the approval of the court. The fees are very moderate: in an ordinary bankruptcy the attorney's fees do not, it is said, exceed £5.

Italy. — Bankruptcy in Italy is regulated by the Commercial Code of 1883 (Part III.). Only merchants can pass through the bankruptcy court. Merchants are defined by the code as those who, as an habitual profession, engage in commercial business. This definition includes merchant companies. Bankruptcy proceedings may be taken either by the debtor or by a creditor for a commercial debt, or may be ordered by the court. The amount of the debt is immaterial: a small sum will suffice, provided its non-payment is proof of insolvency. Bankruptcy can only be declared where there is insolvency. The judgment adjudicating a debtor bankrupt deprives the bankrupt of the right to administer his affairs, and nominates a trustee to realize the property under the superintendence of a judge and a commission of creditors. All the property of the bankrupt, movable and immovable, is sold by auction and distributed in dividends. This is one way of closing the bankruptcy, but it may also be closed by an arrangement. No minimum percentage is required for such arrangement, but it must have the assent of creditors

representing three-fourths of the bankrupt's indebtedness, Composition before bankruptcy is not recognized by Italian law. . Bankrupts are liable to criminal proceedings involving punishments more or less heavy for offences against the law, e.g, for not keeping books in the way prescribed by law.

United States. — After much fragmentary legislation the bankruptcy system of the United States is now embodied in the National Bankruptcy Act of 1898, as amended by the act of 1903. The acts of bankruptcy under the act may be summarized as follows: where a debtor (1) removes any of his property to hinder or delay his creditors; (2) being insolvent, transfers property with intent to prefer a creditor; (3) suffers any creditor to obtain a preference; (4) makes a general assignment for the benefit of his creditors; (5) " admits in writing his inability to pay his debts and his willingness to be adjudicated a bankrupt on that ground." These. acts of bankruptcy do not include, it will be observed, non-payment by a debtor of his debts. A debtor can therefore only be adjudicated a bankrupt on the ground of indebtedness with his own consent in writing. Pre- sumably the legislature thought that the desire to obtain the protection and privilege of bankruptcy would be a sufficient inducement to confess insolvency, where such insolvency, in fact, exists.

To constitute a fraudulent preference it is not necessary, as it is

under English law, that the payment should be made " with a view to prefer " the favoured creditor. It is enough that the creditor is preferred. This avoids the nice questions of legal casuistry which have embarrassed th£ English courts, and it is the more rational rule, for creditors are not concerned with a debtor's intention. Any person, trader or non-trader, may avail himself of the act, but, in the case of a corporation, there is this peculiarity: it may be petitioned against but cannot petition.

Insolvency is construed in a practical sense; that is, a person is insolvent where the aggregate of his property, at a fair valuation, is insufficient to pay his debts; but he is not necessarily insolvent because his realized assets are insufficient to meet his liabilities.

Involuntary proceedings can only be taken against debtors owing $1000 or over, with certain exceptions. A petitioning creditor's debt must amount to $500.

The administration of the law of bankruptcy is entrusted to the district courts and is exercised through the medium of certain officers appointed by the courts and called referees. The creditors' appoint a trustee or trustees of the estate.

So soon as his judicial examination is over the bankrupt may offer his creditors a composition, but to take effect the composition must be approved by the court after hearing objections.

The discharge is the key to the efficiency of every bankruptcy system. By the control which the court thus holds, it is enabled to bring its moral censorship to bear on a debtor's conduct and so maintain a high standard of commercial integrity. Under the United States system the judge is to investigate the merits of the application and to discharge the bankrupt, unless he has (1) committed an offence punishable by imprisonment; (2) with intent to conceal his financial condition, destroyed, con- cealed, or failed to keep books of account or records from which such condition might be ascertained; or (3) obtained property on credit from any person upon a materially false statement in writing made to such person for the purpose of obtaining such property on credit; or (4) at any time, subsequent to the first day of the four months immediately preceding the filing of the petition, transferred, removed, destroyed or concealed any of his property with intent to hinder, delay or defraud his creditors; or

(5) in voluntary proceedings been granted a discharge in bankruptcy within six years; or (6) in the course of proceedings in bankruptcy refused to obey any lawful order of or to answer any material question approved by the court.

It is significant that the italicized qualifications were added to the act of 1898 by the experience of five years of its working. (E. MaJ

BANKS, GEORGE LINNAEUS (1821-1881), British miscel- laneous writer, was born at Birmingham on the 2nd of March 1821. After a brief experience in a variety of trades, he became at the age of seventeen a contributor to various newspapers, and subsequently a playwright, being the author of two plays, a couple of burlesques and several lyrics. Between 1848 and 1864 he edited in succession a variety of newspapers, including the Birmingham Mercury and the Dublin Daily Express, and published several volumes of miscellaneous prose and verse. He died in London on the 3rd of May 1881.

BANKS, SIR JOSEPH, Bart. (1743-18 20), English naturalist, was born in Argyle Street, London, on the 13th of February 1743. His father, William Banks, was the son of a successful Lincoln- shire doctor, who became sheriff of his county, and represented Peterborough in parliament; and Joseph was brought up as the son of a rich man. In 1760 he went to Oxford, where he showed a decided taste for natural science and was the means of introducing botanical lectures into the university. In 1764 he came into possession of the ample fortune left by his father, and in 1766 he made his first scientific expedition to Newfound- land and Labrador, bringing back a rich collection of plants and insects. Shortly after his return, Captain Cook was sent by the government to observe the transit of Venus in the Pacific Ocean, and Banks, through the influence of his friend Lord Sandwich, obtained leave to join the expedition in the ” Endeavour,” which was fitted out at his own expense. He made the most careful preparations, in order to be able to profit by every opportunity, and induced Dr Daniel Solander, a distinguished pupil of Linnaeus, to accompany him. He even engaged draughts- men and painters to delineate such objects of interest as did not admit of being transported or preserved. The voyage occupied three

years and many hardships had to be undergone; but the rich harvest of discovery was more than adequate compensa- tion. Banks was equally anxious to join Cook's second expedition and expended large sums in engaging assistants and furnishing the necessary equipment; but circumstances obliged him to relinquish his purpose. He, however, employed the assistants and materials he had collected in a voyage to Iceland in 1772, returning by the Hebrides and Staff a. In 1778 Banks succeeded Sir John Pringle as president of the Royal Society, of which he had been a fellow from 1.766, and held the office until his death. In 1781 he was made a baronet; in 1795 he received the order of the Bath; and in 1797 he was admitted to the privy council. He died at Isleworth on the 19th of June 1820. As president of the Royal Society he did much to raise the state of science in Britain, and was at the same time most assiduous and success- ful in cultivating friendly relations with scientific men of all nations. It was, however, objected to him that from his own predilections he was inclined to overlook and depreciate the labours of the mathematical and physical sections of the Royal Society and that he exercised his authority somewhat despotically. He bequeathed his collections of books and botanical specimens to the British Museum. His fame rests rather on what his liberal- ity enabled other workers to do than on his own achievements.

See J. H. Maiden, Sir Joseph Banks (1909).

BANKS, NATHANIEL PRENTISS (1816-1894), American politician and soldier, was born at Waltham, Massachusetts, on the 30th of January 1816. He received only a common school education and at an early age began work as a bobbin- boy in a cotton factory of which his father was superintendent. Subsequently he edited a weekly paper at Waltham, studied law and was admitted to the bar, his energy and his ability as a public speaker soon winning him distinction. He served as a Free Soiler in the Massachusetts house of representatives from 1849 to 1853, and was speaker in 1851 and 1852; he was president of the state Constitutional Convention of 1853, and in the same year was elected to the national House of Repre- sentatives as a coalition candidate of Democrats and Free Soilers. Although re-elected in 1854 as an American or " Know- Nothing," he soon left this party, and in 1855 presided over a Republican convention in Massachusetts. At the opening of the Thirty-Fourth Congress the anti-Nebraska men gradually

united in supporting Banks for speaker, and after one of the

bitterest and most protracted speakership contests in the history of congress, lasting from the 3rd of December 1855 to the 2nd of February 1856, he was chosen on the 133rd ballot. This has been called the first national victory of the Republican party. Re-elected in 1856 as a Republican, he resigned his. seat in December 1857, and was governor of Massachusetts from 1858 to 1 86 1, a period marked by notable administrative and educa-tional reforms. He then succeeded George B. McClellan as president of the Illinois Central railway. Although while governor he had been a strong advocate of peace, he was one of the earliest to offer his services to President Lincoln, who appointed him in 1861 major-general of volunteers. Banks was one of the most prominent of the volunteer officers. When McClellan entered upon his Peninsular Campaign in 1862 the im- portant duty of defending Washington from the army of " Stone- wall " Jackson fell to the corps commanded by Banks. In the spring Banks was ordered to move against Jackson in the Shenandoah Valley, but the latter with superior forces defeated him at Winchester, Virginia, on the 25th of May, and forced him back to the Potomac river. On the 9th of August Banks again encountered Jackson at Cedar Mountain, and, though greatly outnumbered, succeeded in holding his ground after a very sanguinary battle. He was later placed in command of the garrison at Washington, and in November sailed from New York with a strong force to replace General B. F. Butler at New Orleans as commander of the Department of the Gulf. Being ordered to co-operate with Grant, who was then before Vicksburg, he invested the defences of Port Hudson, Louisiana, in May 1863, and after three attempts to carry the works by storm he began a regular siege. The garrison surrendered to Banks on the 9th of July, on receiving word that Vicksburg had fallen. In the autumn of 1863 Banks organized a number of expeditions to Texas, chiefly for the purpose of preventing the French in Mexico from aiding the Confederates, and secured possession of the region near the mouths of the Nueces and the Rio Grande. But his Red River expedition, March-May 1864, forced upon him by superior authority, was a complete failure. In August 1865 he was mustered out of the service, and from 1865 to 1873 he was again a representative in congress, serving as chairman of the committee on foreign affairs. A personal quarrel with President Grant led in 1872, however, to his joining the Liberal-Republican revolt in supportof Horace Greeley, and as the Liberal-Republican and Democratic candidate he was defeated for re-election. In 1874 he was successful' as a Democratic candidate, serving one term

(1875-1877). Having rejoined the Republican party in 1876, he was United States marshal for Massachusetts from 1879 until 1888, when for the ninth time he was elected to Congress. He retired at the close of his term (1891) and died at Waltham on the 1st of September 1894.

BANKS, THOMAS (1735-1805), English sculptor, son of a surveyor who was land steward to the duke of Beaufort, was born in London on the 29th of December 1735. He was taught drawing by his father, and in 1750 was apprenticed to a wood- carver. In his spare time he worked at sculpture, and before 1772, when he obtained a travelling studentship and proceeded to Rome, he had already exhibited several fine works. Return- ing to England in 1779 he found that the taste for classic poetry, ever the source of his inspiration, no longer existed, and he spent two years in St Petersburg, being employed by the empress Catherine, who purchased his " Cupid tormenting a Butterfly." On his return he modelled his colossal " Achilles mourning the loss of Briseis," a work full of force and passion; and thereupon he was elected, in 1784, an associate of the Royal Academy and in the following year a full member. Among other works in St Paul's cathedral are the monuments to Captain Westcott and Captain Burges, and in Westminister Abbey to Sir Eyre Coote. His bust of Warren Hastings is in the National Portrait Gallery. Banks's best-known work is perhaps the colossal group of " Shakespeare attended by Painting and Poetry," now in the garden of New Place, Stratford-on-Avon, He died in London on the 2nd of February 1805.

BANKS AND BANKING

as a business

BANKS AND BANKING. The word "bank," in the economic sense, covers various meanings which all express one object, a contribution of money for a common purpose. Thus Bacon, in his essay on Usury, while explaining "how the discommodities of it may be best avoided and the commodities retained," refers to a " bank or common stock " as an expression with which his readers would be familiar. Originally connected with the idea of a mound or bank of earth— hence with that of a monte, an Italian word describing a heap — the term has been gradually applied to several classes of institutions established for the general purpose of dealing with money.

The manner in which a bank prospers is explained by David Ricardo, in his Proposals for an Economical and Secure Currency,

in a passage where he tells us that a bank would never Banking ˆe established if it obtained no other profits but those

derived from the employment of its own capital. The

reaˆ advantage of a bank to the community it serves commences only when it employs the capital of others. The money which a bank controls in the form of the deposits which it receives and sometimes of the notes which it issues, is loaned out by it again to those' who desire to borrow and can show that they may be trusted. A bank, in order to carry on business successfully, must possess a sufficient capital of its own to give it the standing which will enable it to collect capital belonging to others. But this it does not hoard. It only holds the funds with which it is entrusted till it can use them, and the use is found in the advances that it makes. Some of the deposits merely lie with the bank till the customer draws what he requires for his ordinary everyday wants. Some, the greater part by far, of the deposits enable the bank to make advances to men who employ the funds with which they are entrusted in reproductive industry, that is to say, in a manner which not only brings back a greater value than the amount originally lent to them, but assists the business development of the country by setting on foot and maintaining enterprises of a profitable description. It is possible that some part may be employed in loans required through extravagance on the part of the borrower, but these can Only be a small proportion of the whole, as it is only through reproductive industry that the capital advanced by a banker can really be replaced. A loan sometimes, it is true, is repaid from the proceeds of the sale of a security, but this only means a transfer of capital from one hand to another; money that is not transferred in this way must be made by its owner. Granted that the security is complete, there is only one absolute rule as to loans if a bank desires to conduct its business on safe lines, that the advance should not be of fixed but of floating capital. Nothing seems simpler than such a business, but no business requires closer attention or more strong sense and prudence in its conduct. In other ways also, besides making loans, a well- conducted bank is of much service to the business prosperity of a country, as for example by providing facilities for the ready transmission of money from those who owe money to those to whom it is due. This is particularly obvious when the debtor lives in one town or

district and the creditor in another at a considerable distance, but the convenience is very great under any circumstances. Where an easy method of transmission of cash does not exist, we become aware that a ” rate of exchange ” exists as truly between one place and another in the same country as between two places in different countries. The assistance that banking gives to the industries of a community, apart from these facilities, is constant and most valuable.

With these preliminary remarks on some main features of the business, we may pass on to a sketch of the history of modern

banking. Banks in Europe from the 16th century on- de’veiop” war£ k may be divided into two classes, the one described meat. as ” exchange banks,” the other as ” banks of deposits.”

These last are banks which, besides receiving deposits, make loans, and thus associate themselves with the trade and general industries of a country. The exchange banks included in former years institutions like the Bank of Hamburg and the Bank of Amsterdam. These were established to deal with foreign exchange and to facilitate trade with other countries.

The others— founded at very different date&— -were established as, or early became, banks of deposit, like the Bank of England, the Bank of Venice, the Bank of Sweden, the Bank of France, the Bank of Germany and others. Some reference to these will be made later. The exchange banks claim the first attention. Important as they were in their day, the period of their activity is now generally past, and the interest in their operations has become mainly historical.

In one respect, and that a very important one, the business carried on by the exchange banks differed from banking as generally understood at the present time. No exchange bank had a capital of its own nor did it require any for the performance of the business. The object for which exchange banks were established was to turn the values with which they were entrusted into ” current money,” ” bank money ” as it was called, that is to say, into a currency which was accepted immedi- ately by merchants without the necessity of testing the value of the coin or the bullion brought to them. The ” value ” they provided was equal to the ” value ” they received, the only difference being the amount of the small charge they made to their customers, who gained by dealing with them more than

equivalent advantages.

Short notices of the Bank of Amsterdam, which was one of the most important, and of the Bank of Hamburg, which survived the longest, its existence not terminating till 1873, will suffice to explain the working of these institutions.

The Amsterdamsche Wisselbank, or exchange bank, known later as the Bank of Amsterdam, was established by the ordinance of the city of Amsterdam of 31st January 1609. The increased commerce of Holland, which made Amsterdam a leading city in international dealings, led to the establishment of this bank, to which any person might bring money or bullion for deposit, and might withdraw at pleasure the money or the worth of the bullion. The ordinance which established the bank further required that all bills of 600 gulden (£50), or upwards — this limit was, in 1643, lowered to 300 gulden (£25) — should be paid through the bank, or in other words, by the transfer of deposits or credits at the bank. These transfers came afterwards to be known as ” bank money.” The charge for making the transfers was the sole source of income to the bank. The bank was established without any capital of its own, being understood to have actually in its vaults the whole amount of specie for which ” bank money ” was outstanding. This regulation was not,’ however, strictly observed. Loans were made at various dates to the Dutch East India Company. In 1795 a report was issued showing that the city of Amsterdam was largely indebted to the bank, which held as security the obligations of the states of Holland and West Friesland. The debt was paid, but it was too late to revive the bank, and in 1820 ” the establishment which for generations had held the leading place in European commerce ceased to exist.” (See Chapters on the Theory and History of Banking, by Charles F. Dunbar, p. 105.)

Similar banks had been established in jVIiddelburg,(March 28th, 1616), in Hamburg (1619) and in Rotterdam (February 9th, 1635). Of these the Bank of Hamburg carried on much the largest business and survived the longest. It was not till the 15th of February 1873 that its existence was closed by the act of the German parliament which decreed that Germany should possess a gold standard, and thus removed those conditions of the local medium of exchange — silver coins of very different intrinsic values — whose circulation had provided an ample field for the operations of the bank. The business of the Bank of Hamburg had been conducted in absolute accordance with the regulations

under which it was founded.

The exchange banks were established to remedy the inconvenience to which merchants were subject through the uncertain value of the currency of other countries in reference to that of the city where the exchange bank carried on its business. The following quotation from Notes on Banking, written in 1873, explains the method of operation in Hamburg. " In this city, the most vigorous offshoot of the once powerful Hansa, the latest representative of the free commercial cities of medieval Europe,

there still remains a representative of those older banks which were once of the highest importance in commercial affairs. Similar institutions greatly aided the prosperity of Venice, Genoa, Amsterdam and Nuremberg. The Bank of Hamburg is now the last survivor of these banks, whose business lay in the assistance of commerce, not by loans, but by the local manufacture, so to speak, of an international coinage. In a city of the highest rank of commercial activity, but greatly circumscribed in territory, continually receiving payments for merchandise in the coin of other countries, a common standard of value was a matter of primary necessity. The invention of bank money, that is, of a money of account which could be transferred at pleasure from one holder to another, enabled the trade of the place to be carried on without any of those hindrances to business which must have followed on the delay and expense attendant on the verification of various coins differing from each other in weight, intrinsic value, standard of purity of metal, in every point in fact in which coins can differ from each other. By supplying a currency of universal acceptation the Bank of Hamburg greatly contributed to the prosperity of that city." The regulations being strictly carried out, the currency was purely metallic; the " Mark Banco " being merely the representative of an equal value of silver.

For the earliest example of a bank for the receipt of deposits carrying on a business on modern lines, we must turn, as in the case of the exchange banks, to a great commercial city of the middle ages. Private banking in Venice began as an adjunct of

the business of the campsores or dealers in foreign moneys. ” As early as 1270 it was deemed necessary to require them to give security to the government as the condition of carrying on their business, but it is not shown that they were then receiving deposits. In an act of the 24th of September 1318, however, entitled Bancherii scriptae dent plegiarias consulibus, the receipt of deposits by the campsores is recognized as an existing practice, and provision is made for better security for the depositors.” From this act it becomes clear that between 1270 and 13 18 the money-changers of Venice were becoming bankers, just as the same class of men became in Amsterdam a couple of centuries later, and as later still the goldsmiths in London.

Of the early banks in Europe, the bank in Venice, the Banco di Rialto, was established by the acts of the Venetian senate of The first I 5ˆA an(i !587- This appears to have been the first public public bank in that city and in Europe. The senate

£ul£’? by the act of the 3rd of May l6191 established b y the

npe ‘ side of the Banco di Rialto a second public bank known as the Banco Giro, or Banco del Giro, which ultimately became the only public bank of the city and was for generations famous throughout Europe as the Bank of Venice. Earlier than this the campsores or dealers in foreign moneys had carried on the business. The Bank of Venice (Banco del Giro) appears to have been called into existence by the natural developments of trade, but some banks have been established by governments and have beerf of great service to the development of the countries in which they have carried on their business. Of these, the Bank of Sweden (the Riksbank), established in 1656, is the earliest. This bank still exists and has always been the state bank of Sweden. It was founded by a Swede named Palmstruck, who also invented the use of the bank note — perhaps adapted for use in Europe is the better expression to employ, as notes were current in China about a.d. 800. The first bank note was issued by the Riksbank in 1658. An enquete made by the French government in 1729 recognizes the priority of Sweden in this matter, and declares the bank note to be an admirable Swedish invention, designed to facilitate commerce.

European Countries United Kingdom. — English banking may be traced back to the dealings in money carried on by the goldsmiths of London and thus certainly to the 16th century; but it has been so greatly

_ 1 A translation of the act of the 3rd of May 1619 may be found in the appendix to the Quarterly Journal of Economics (Boston, L.S.A.) for April 1892. These documents present a distinct picture 01 banking in its true sense.

influenced by the working of the Bank of England and by the acts of parliament connected with that institution, that a re- ference to this bank's foundation and development must precede any attempt at a detailed history of banking in the p ouaa – a . ; United Kingdom. The Bank of England was founded tmn ot the in 1694.] As, in the case of some of the earlier con- Bank of tinental banks, a loan to the government was the fi • ˆ *' aˆd, • ... origin of its establishment. The loan, which was £1,200,000, was subscribed in little more than ten days, between Thursday, 21st June, and noon of Monday, 2nd July 1694. ,On Tuesday, 10th July, the subscribers appointed Sir John Houblon the governor, and Michael Godfrey (who was killed during the siege of Namur on the 17th of July 1695) deputy-governor. Michael Godfrey wrote a pamphlet explaining the purposes for which the bank was established and the use it would be to the country. The pamphlet supplies some curious illustrations of the dangers which some persons had imagined might arise from the establish- ment of the bank and its connexion with William III., depre- cating the fear " lest it should hereafter joyn with .the prince to make him absolute and so render parliaments useless."

The governor and the deputy-governor, having thus been appointed, the first twenty-four directors were elected on Wednesday, nth July 1694. Two of them were brothers of the governor, Sir John Houblon. They were descended from James Houblon, a Flemish refugee who had escaped from the persecution of Alva. All the directors were men of high mercantile standing. The business of the bank was first carried on in the Mercers' chapel. It continued there till the 28th of September, when they moved to Grocers' Hall. They were tenants of the Grocers' Hall till 1732. The first stone of the building now occupied by the bank was laid on the 1st of August 1732. The bank has remained on the same site ever since. The structure occupied the space previously covered by the house and gardens of Sir John Houblon, the first governor, which had been bought for the purpose. Between 1 764 and 1 788 the wings were erected. In 1780 the directors, alarmed at the dangerous facilities which the adjacent church of St Christopher le Stocks might give to a mob, obtained parliamentary powers and acquired the fabric, on the site of which much of the present building stands.

The structure was developed to its present form about the commencement of the 19th century. ‘

The bank commenced business with fifty-four assistants, the salaries of whom amounted to £4350. The total number employed in 1847 was Upwards of nine hundred and their salaries exceeded £210,000. Mr Thomson Hankey stated that in 1867 upwards of one thousand persons were employed, and the salaries and wages amounted to nearly £260,000, besides pensions to superannuated clerks of about £20,000 more. The number of persons of all classes employed in 1906 (head office and eleven branches) was about 1400.

Originally established to advance the government a loan of £1 ,200,000, the management of the British national debt has been confided to the Bank of England from the date of its foundation, and it has remained the banker of the government ever since. The interest on the stock in which the debt is inscribed has always been paid by the bank, originally half-yearly, now quarterly, and the registration of all transfers of the stock itself is carried on by the bank, which assumes the responsibility of the correct- ness of these transfers. The dignity which the position of banker to the government gives; the monopoly granted to it of being the only joint-stock bank allowed to exist in England and Wales till 1826, while the liability of its shareholders was limited to the amount of their holdings, an advantage which alone of English banks it possessed till 1862; the privilege of issuing notes which since 1833 have been legal tender in England and Wales every- where except at the bank itself; the fact that it is the banker of the other banks of the country and for many years had the control of far larger deposits than any one of them individually —all these privileges gave it early a pre-eminence which it still maintains, though more than one competitor now holds larger

1 The clearest account of its early days is found in Thorold Rogers’ History of the First Nine Years of the Bank of England.

deposits, and though, collectively, the deposits of the other banks

of the country which have offices in London many times overpass its own. Some idea of the strength of its position may be gained from the fact that stocks are now inscribed in the bank books to an amount exceeding 1250 millions sterling.

In one sense, the power of the Bank of England is greater now than ever. By the act of 1844, regulating the note-issue of the country, the Bank of England became the sole Charter s0l lrce from which legal tender notes can be obtained; Act. a power important at all times, but pre-eminently so

in times of pressure. The authority to supply the notes required, when the notes needed by the public exceed in amount the limit fixed by the act of 1844, was granted by the government at the request of the bank on three occasions only between 1844 and 1906. Hence the Bank of England becomes the centre of interest in times of pressure when a ” treasury letter ” permitting an excess issue is required, and holds then a power the force of which can hardly be estimated.

One main feature of the act of 1844 was the manner in which the issue of notes was dealt with, as described by Sir Robert Peel in parliament on the 6th of May 1844 : — “Two departments of the bank will be constituted: one for the issue of notes, the other for the transaction of the ordinary business of banking. The bullion now in the possession of the bank will be transferred to the issue depart ment. The issue of notes will be restricted to an issue of £14,000,000 upon securities — the remainder beingissueduponbullionandgoverned in amount by the fluctuations in the stock of bullion.” The bank was required to issue weekly returns in a specified form (previously to the act of 1844 it was necessary only to publish every month a balance-sheet for the previous quarter), and the first of such returns was issued on the 7th of September 1844. The old form of return contained merely a statement of the liabilities and assets of the bank, but in the new form the balance-sheets of the Issue Department and the Banking Department are shown separately. A copy of the weekly return in both the old and new forms will be found in A History of the Bank of England, p. 290, by A. Andreades (Eng. trans., 1909); see also R. H. I. Palgrave, Bank Rate and the Money Market, p. 297.

One result of the division of the accounts of the bank into two departments is that, if through any circumstance the Bank of England be called on for a larger sum in notes or specie than the

notes held in its banking department (technically spoken of as the ” Reserve “) amount to, permission has to be obtained from the government to ” suspend the Bank Act ” in order to allow the demand to be met, whatever the amount of specie in the ” issue department ” may be. Three times since the passing of the Bank Act — during the crises of 1847, 1857 an d 1866 — authority has been given for the suspension of that act. On one of these dates only, in 1857, the limits of the act were exceeded; on the other two occasions the fact that the permission had been given stayed the alarm. It should be remembered, whenever the act of 1844 is criticized, that since it came into force there has been no anxiety as to payment in specie of the note circulation; but the division of the specie held into two parts is an arrangement not Bank rate. w ithout disadvantages. Certainly since the act of 1844 became law, the liability to constant fluctuations in the Bank’s rate of discount — one main characteristic of the English money market — has greatly increased. To charge the responsibility of the increase in the number of those fluctuations on the Bank Act alone would not be justifiable, but the working of the act appears to have an influence in that direction, as the effect of the act is to cut the specie reserve held by the bank into two parts and to cause the smaller of these parts to receive the whole strain of any demands either for notes or for specie. Meanwhile the demands on the English money market are greater and more continuous than those on any other money market in the world. Of late years the changes in the bank rate have been frequent, and the fluctuations even in ordinary years very severe. From the day when the act came into operation in 1844, to the close of the year 1906, there had been more than 400 changes in the rate. The hopes which Sir Robert Peel expressed in 1844, that after the act came into force commercial crises would cease, have not been realized.

The number of changes in the bank rate from 1876 1 to 1906 in England, France, Germany, Holland and Belgium were as follows : —

England. France. Germany. Holland. Belgium.

There has been frequent discussion among bankers and occasionally with the government as to the advantage it might be to grant the Bank of England an automatic power to augment the note issue on securities when necessary, similar to that possessed by the Bank of Germany (Reichsbank) . One of the hindrances to the success of euch a plan has been that the government, acting on

the advice

1 The date 1876 is taken as being that when the Imperial Bank of Germany came into full operation.

of the treasury, required an extremely high rate of interest, of which it would reap the advantage, to be paid on the advances made under these conditions. Those who made these suggestions did not bear in mind that the mere fact of so high a rate of interest being demanded intensifies the panic, a high rate being associated as a rule with risks in business. The object of the arrangement made between the Reichsbank and the treasury of the empire of Germany is a different one — to provide the banking accommodation required and to prevent panic, hence a rate of only 5 % has been generally charged, though in 1899 the rate was 7 % for a short time. As is often the case in business, a moderate rate has been accompanied by higher profit. The duty on the extra issue between 1881, when the circulation of the Bank of Germany first exceeded the authorized limit, and the close of the year 1906 amounted to £839,052. Thus a considerable sum was provided for the relief of taxation, while business proceeded on its normal course. The proposal made by Mr Lowe (afterwards Lord Sherbrooke) in 1873 was to charge 12 %, a rate which presupposes panic. Hence the negotiations came to nothing. Theact of 1844 remains unaltered. The issue on securities allowed by it to the Bank of England was originally £14,000,000. This has since been increased under the provisions of the act to £18,450,000 (29th March 1901). Hence against the notes issued by the bank less gold by £4,450,000 is now held by the bank than would have been the case had the arrangements as to the securities re- mained as they were in 1844.

The Bank of England has, from the date of its establishment, possessed a practical, though perhaps not an absolutely legal, monopoly of issuing notes in London. It became gradually surrounded by a circle of private banks, some of considerable power.

The state papers included in F. G. Hilton Price's Handbook of London Bankers (1876) contain some of the earliest records about the establishment of banking in England. The first of these is a petition, printed in the original Italian, p„ «.* to Queen Elizabeth, of Christopher Hagenbuck and his banking. partners in November 1581, representing " that he had found out a method and form in which it will be possible to institute an office into

which shall enter every year a very large sum of money without expense to your Majesty," so " that not only your Majesty will be able to be always provided with whatever notable sum of money your Majesty may wish, but by this means your State and people also; and it shall keep the country in abundance and remove the extreme usuries that devour your Majesty and your people." Hagenbuck proposed to explain his plan on condition that he should receive "6% every year of the whole mass of money " received by the office for twenty years. The queen agreed " to grant to the said Christopher and partners 4 % for a term of twenty years, and to confirm the said grant under the great seal." The document is signed by Francis Walsingham, but nothing further appears to have come of it. When we compare the date of this document with that of the establishment of the Banco della Piazza di Rialto at Venice, it is not unlikely that the idea of the establishment of a bank was floating in the minds of people connected with business and had become familiar to Hagenbuck from commerce with Venice. Other state papers in 1621 and 1622 and again in 1662 and 1666 contain somewhat similar proposals which however were never carried into practice. >

The little London Directory, 1677, contains a list of goldsmiths mentioned as keeping " running cashes." Of these firms described in 1677, five houses were carrying on business in 1876. Three of these, or firms immediately descended from them, Child & Co. of Temple Bar, Martin & Co. of Lombard Street (as Martin's Bank, Ltd.), and Hoare & Co. of Fleet Street, are still carrying on business. Barnetts, Hoare & Co. and Willis, Percival & Co. have been absorbed since 1876, the first by Lloyds Bank (1884), the second by the Capital and Counties (1878). Many of the goldsmiths carried on a considerable business. Thus the books of Edward Blackwell, who was an eminent goldsmith and banker in the reign of Charles II., show that the king himself, the queen mother, Henrietta Maria, James, duke of York, the prince of Orange, Samuel Pepys, the East India Company, the Goldsmiths' Company and other city companies did business with him. Sir John Houblon, the first governor of the Bank of England, kept an account with Blackwell, who was, however, ruined by the closing of the exchequer in 1672. But his son married into the family of Sir Francis Child, and his grandsons became partners in Child's Bank.

Besides the banks in London already mentioned, one in the provinces claims to have been established before the Bank of England. Smiths' of Nottingham, since amalgamated with the Union of London Bank, is stated to have been founded in 1688. Others also claim considerable antiquity. The old Bank of Bristol (Bailey, Cave & Co.) was founded in 1750; the business amalgamated with Prescott & Co., Ltd., of London. The Hull Old Bank (Pease & Co.) dated from 1754; this business also still continues (amalgamated, 1894, with the York Union Banking Co., Ltd., and since with Barclay & Co., Ltd.). The banks of Gurney & Co., established at the end of the 1 8th century in the eastern counties, have with numerous other banks of similar standing amalgamated with the firm of Barclay & Co., Ltd., of Lombard Street.

The business of banking had been carried on by the gold- smiths of the city, who took deposits from the time of James I. onwards, and thus established " deposit-banking " as early as that reign. This is described in a pamphlet published in 1676, entitled The Mystery of the New-Fashioned Goldsmiths or Bankers Discovered, quoted by Adam Anderson in his History of the Great Commercial Interests of the British Empire, vol. ii. p. 402. During the Civil War " the goldsmiths or new-fashioned bankers began to receive the rents of gentlemen's estates remitted to town, and to allow them and others who put cash into their hands some interest for it, if it remained but for a single month in their hands, or even a lesser time. This was a great allurement for people to put their money into their hands, which would bear interest till the day they wanted it. And they could also draw it out by £100 or £50, &c, at a time, as they wanted it, with infinitely less trouble than if they had lent it out on either real or personal security. The consequence was that it quickly brought a great quantity of cash into their hands; so that the chief or greatest of them were now enabled to supply Cromwell with money in advance on the revenues as his occasion required, upon great advantage to themselves."

The Bank of England, as stated before, was incorporated by the act of 1694. The position of the other banks at that time was defined by that act and the act of 1697, which declared that no bank, that is, no joint-stock bank, was " to be established within England during the continuance of the Bank of England," and also by the act of 1708, which provided that " during the

continuance of the Bank of England, no company or partnership exceeding six persons in England " should " borrow, owe or take up any sum or sums of money on their bills or notes payable on demand or at any less time than six months from the borrowing thereof." This was confirmed by the act of 1800. No change of importance was made till the act of 1826, which prohibited " bank notes under £5," and the second Banking Act of that year which allowed the establishment of co-partnerships of more than six persons, which necessarily were joint-stock companies, beyond 65 m. from London. The act of 1833 allowed the establishment of joint-stock banks within the 65 m. limit, and took away various restrictions of the amounts of notes for less than £50. But the power of issuing notes was not allowed to joint-stock banks within the 65 m. radius.

In the early days in England, issuing notes formed, as Bagehot says in his Lombard Street, the introduction to the system of deposit-banking — so much so, that a bank which had not the power of issuing notes could scarcely exist out of London.

Bank notes in England originated in goldsmiths' notes. Goldsmiths received deposits of moneys and gave notes or receipts for such moneys payable on demand. The London bankers continued to give their customers notes or deposit-receipts for the sums left by them until about 1781, when in lieu of such notes they gave them books of cheques. Before the invention of cheque-books, the practice of issuing notes was considered so essentially the main feature of banking, that a prohibition of issue was con- sidered an effectual bar against banking. Accordingly the prohibitory clause in the act of 6 Anne, c. 50, 1707 (in Record edition), which was repeated in the Bank of England Act 1708, 7 Anne, c. 30, § 66 (in Record edition), prohibiting more than six

persons from issuing promissory notes, was intended to prevent any bank being formed with more than six partners, and was so understood at the time; and it did have the effect of preventing any joint-stock bank being formed.

The prohibition, as already related, was modified in the year 1826 and removed in 1833. Even then the privilege of limitation of liability was not permitted to any other bank but the Bank of England. The result was that when joint-stock banks were first

formed man}' persons of good means were kept back from becoming shareholders, that is to say partners, in banks. For up to the date of the act of 1862 permitting " limited liability," every shareholder in a joint-stock bank was liable to the extent of the whole of his means (see the article Company). Even as late as 1858 when the Western Bank of Scotland and 1878 when the City of Glasgow Bank failed, very great hardship was inflicted on many persons who had trusted with over confidence to the management of those banks. The failure of the City of Glasgow Bank was the cause of the Companies Act of 1879, passed to enable unlimited companies to adopt limited liability. In limited companies the shareholder who has paid up the nominal amount of his holding is not liable for any further amount, unless the company issues bank notes, in which case the shareholders are liable in the same way as if the company were registered as an unlimited company. The facilities allowed by this act were used by almost every joint-stock bank in the United Kingdom except those banks which were at that date limited by charter or by special act.

To return to the early history of banking — thus, as no bank could be formed with more than six partners during the whole of the period from 1694 to 1826 and 1833, the majority of the banks formed throughout England and Wales banks* for more than a century were necessarily small and usually isolated firms. Further, when a partner died, his capital not infrequently went out of the business; then a fresh partner with sufficient means had to be found, constant change was the result, and confidence, "a plant of slow growth," could not thrive, except in those instances when a son or a relation filled the vacancy.

The banks in the country districts had frequently branches in the small market- towns close to them; those in London had never more than one office. These banks were sometimes powerful and generally well managed, a considerable number being established by members of the Society of Friends.

The restriction of partners in private banks to the number of six continued till 1862. By the act of that year they were allowed to be ten. This power, however, did not extend to issuing private banks, which were restricted to six partners as before. The power of increasing bank partnerships to ten has been made but little use of. The difficulties of carrying on business on a large scale by private firms were augmented by certain legal technicalities which practically rendered large private banks impossible in

ordinary circumstances. Hence banking business did not begin to assume its present form till almost half-way through the 19th century. The gradual change followed the passing of the acts of 1826-1833, of 1844-1845, of 1862 and of 1879. Incidentally the act of 1844 had an unex- pected influence on the constitution of the banking system. After favouring the existence of small banks for many years, it gradually led, as the time arrived when the establishment of large and powerful banks in England and Wales became neces- sary, to their formation. No new bank of issue whatever was allowed to be established — restrictions were placed on the English issuing banks — private issuing banks with not more than six partners were allowed to remain, to amalgamate with other private issuing banks and to retain their joint issues. The joint-stock banks which possessed issues were also allowed to continue these, but when two joint-stock banks amalgamated, the continuing bank only retained its issue. Also when a private issuing bank was formed into or joined a joint-stock bank, the issue lapsed.

The greater number of the provincial banks in England and Wales had been banks of issue up to 1844. The act of 1844

restricted their power of issuing notes, which at that date and even subsequently continued to be of importance to them, in such a manner that, as Sir R. H. Inglis Palgrave stated in giving evidence before the committee of the House of Commons at the banking inquiry of 1875, these banks possessed in their issues a property they could use, but were not able to sell. The statistics forming part of Appendix 14 to the report of the select committee of the House of Commons on banks of issue (1875) give interesting information as to the proportion of notes in circulation to the deposits of banks in various districts of the country and at various dates. The statements were supplied by twenty-one banks, some in agricultural districts, some in places where manufactures flourished, some in mixed districts, commercial and agricultural, or industrial and manufacturing. In' all of these, the inquiry being carried as far back as 1844, the propor- tion of the circulation to the banking deposits had greatly diminished in recent years. In several cases the deposits

had increased three-fold in the time. In one case it was five times as large, in another nearly seven times, in another nearly twelve and a half times. The proportion of the circulation to the deposits had very largely diminished in that time. In one instance, from being about one-third of the deposits, at which proportion it had remained for five years consecutively, it fell to 9% at the end of the term. In another from being 22% it had diminished to 15 % of the total. In all cases where the detail was given it had diminished greatly.

The Bank Act of 1844 was arranged with the intention of concentrating the note issues on the Bank of England in order to secure the monopoly of that bank as the one issuer in England and Wales. The result was that nearly all the provincial banks in England had by 1906 lost the right of issue. Doubtless all were destined to do so before long, a result by which banking in England and the industries of the country must lose the advantage which the local issues have been to Scotland and Ireland. Had the English country banks been allowed, as the Scottish banks were, to associate together and to retain their issues, powerful banks would many years since have been established throughout England and Wales, and the amalgamations of recent years would have been carried through at a much earlier date, and on terms much more favourable to the public.

No security was ever required to be given for the local issues in the United Kingdom. The provisions of the acts of 1844- 1845 which compel the Irish and Scottish banks to hold Security specie against the notes issued beyond the legal limit, issue. d° not ma ke the coin held a security for them. The

legislation of 1879 which made the note issues a first charge, with unlimited liability, on the total assets of the joint- stock banks which accepted the principle of limited liability for the rest of their business; has been the only recognition by the state of the duty to the note-holders of rendering them secure. It has been a real disadvantage to England that this duty has never been sufficiently recognized, and that the provincial note issue, which is a very convenient power for a bank to possess, and incidentally a considerable advantage to its customers, has been swept away without any attempt being made to remedy its deficiencies. There may be objections raised to a note circulation secured by the bonds of the government, but the security of the note issues of the national banks of the United States made against such bonds, has scarcely ever been questioned.

A different policy was followed by Sir Robert Peel in Scotland and in Ireland from that which he established in England. By the acts of 1844-1845 the Scottish and Irish banks were allowed to exceed their authorized issues on holding specie to the amount of the excess, and no restrictions were placed on amalgamations among banks in these countries. In Scotland and in Ireland notes for less than £5 continued to be allowed. The result has been that the ten large banks in Scotland, and six of the nine banks in Ireland, possess the power of issuing notes. The large proportion of local branches in these countries has been greatly assisted by this power.

Originally, besides the Bank of England, nearly all the provincial banks in England and Wales possessed the privilege of issue. These banks continued their operations as previously during the time while the Bank Act was discussed in parliament. Amounts When the arrangements which that act created were made ”’ ”’”’”’^ public, nine banks, of which eight were private and one ‘

was a joint-stock bank, ceased to issue their notes prior to the 12th of October 1844, when the act came into operation. Of these, the Western District Joint-Stock Banking Co. was dissolved, one of the private banks was closed, the remaining seven issued Bank of England notes and were allowed certain privileges for doing this. By the act of 1844 the maximum circulation of the English issuing banks was fixed at the average circulation of the twelve weeks before the 27th of April 1844.

The number of the banks to which the privilege of circulation was then allowed and the amount of notes permitted were, in England : —

207 private banks with an authorized issue of . . £5,153,417

72 joint-stock banks with an authorized issue of . . 3,478,230

£8,631,647

The actual circulation of the country in October 1844 was as follows: — ■■

Notes in Circulation. — The monthly return of the circulation ending the 12th of October 1844 (stamps and taxes, 25th October);

England.

Bank of England £20,228,800

Private banks 4,674,162

Joint-stock banks . . . . . 3>33i,5i6

Scotland. Chartered, private and joint-stock banks

Ireland. Bank of Ireland . . .

Private and joint-stock banks

Total .

2,987,665

3,597,850 2,456,261

£37,276,254

In May 1907 the number and amounts were reduced to : —

Authorized Issue. Actual Issue. 12 Private banks . . £482,744 £122,536

17 Joint-stock banks . . 1,084,836 437.693

The reason why the actual circulation of these banks is so far below the authorized issue is that under existing circumstances their circulation can only extend over a very limited area. The notes of country banks are now almost unknown except in the immediate neighbourhood of the places where they are issued; though they may all be payable in London, yet there is often considerable difficulty in getting them cashed.

The average circulation in 1906 was as follows: —

Bank of England £28,890,000

Private banks 124,000

Joint-stock banks 429,000

Scotland Ireland

Total in England

Total in United Kingdom

29,443,000 7,477,000 6,452,000

£43,372,000

This shows an'apparent increase of more than £6,000,000 since 1844. The decrease of the country circulation in England and the increase 01 the Scottish and Irish circulations may be set off against each other. The increase is mainly in the notes of the Bank of England. In 1844 the number of banking offices in England and Wales was 976, while in 1906 there were more than 5880. Each of these offices must hold some till- money, and of this Bank of England notes almost always form a part. Hence it is probable that a large part of the increase in the circulation of the Bank of England since 1844 is held in the tills of the banks in England and Wales, and that the active note circulation of the United Kingdom is but little larger than it was.

It may be added that the government received from the note circulation for a typical year (ending 5th of April 1904), out of the profits of issue (Bank of England) £184,930, 2s. 2d., and also com- position for the duties on the bills and notes of the banks of England and Ireland and of country bankers, £120,768, 18s. 6d.

In 1906 the banking business of England was carried on practi- cally by about ten private and sixty joint-stock banks of which more than one was properly a private firm under a joint-stock form of organization. Though the number of individual banks had diminished, the offices had greatly increased.

The records of the numbers of banks in the United Kingdom have up to quite recent years been very imperfect. Such as exist were made by individual observers. The banks of England and Wales are believed to have been 350 in number in 1792. Those registered from 1826 to 1842 were:—

Joint-stock.

6 35

Private.

1826 . . .554

1827 . . .465 1833 . . .416 1842 ... 311 118

The number of banking offices in England and Wales was estimated by Mr. William Leatham in 1840 as being 697. The Banking Almanac for 1845 gives the number in 1844 for England and Wales as 336 private bank offices and 640 joint-stock offices, Scotland 368 offices, Ireland 180 offices.

The number of inhabitants to each office was as follows in 1844 and 1906: —

Number of Bank- ing Offices.

Number of

Inhabitants to

each Office.

England and Wales Isle of Man . Scotland .... Ireland ....

1844. 976

368 180

1906.

5527

23

1180

777

1844. 16,305

7,120

45.417

1906.

5885 2417

379°

5738

In United Kingdom

1524

7507

17.526

553°

In the latter years of the 18th century and the early years of the 19th, the note circulation was a very important part of the business, but about that date the deposits began to be, as they have continued since, far more important. It is unfortunately impossible to give any trustworthy statistics of the position of banking in the United Kingdom extending back for more than forty or fifty years. Even the Scottish banks, who have been less reticent as to their position than the English banks, did not publish their accounts generally till 1865. The figures of the total deposits and cash balances in the Irish joint-stock banks were published collectively from the year 1840 by the care of Dr Neilson Hancock, but it is only of quite recent years that any statement of the general position other than an esti- mate has been possible owing to the long-continued reluctance of many banks to allow any publication of their balance-sheets. A paper by W. Newmarch, printed in the Journal of the Statistical Society for 1 85 1 , supplies the earliest basis for a trustworthy estimate. According to this the total amount of deposits, including the Bank of England, in England and Wales, Scotland and Ireland, may have been at that date from £250,000,000 to £360,000,000. The estimate in Palgrave's Notes on Banking (1872), excluding deposits in dis- count houses and the capitals of banks, was from £430,000,000 to £450,000,000. The corresponding amounts at the close of 1906 were, in round figures, including acceptances &c, £997,000,000. The total resources, including capitals and reserves and note circulation (in round figures £177,500,000), were for 1906: — ■ England and Wales —

Bank of England and other banks. £922,297,000

Scotland 135,042,000

Ireland 73,707,000

Isle of Man 898,000

Clearing.

£l,i3i.944.° ° The progressive growth in bank deposits since it has been possible to keep a record of their amounts, affords some means of checking roughly the correctness of the estimates of 1851 and 1872. Broadly speaking, it may be said that the bank deposits of the United Kingdom have about doubled since 1872.

The purely city banks bad associated themselves in a ” Clearing House ” certainly by 1776. An entry in the books of the Grass-hopper, 1 namely—” 1773 to quarterly charge for use of the Clearing-room of i9/6d.,” points to an earlier and perhaps less definitely organized system of settlement. A house was taken for the purpose in 1810, in which year the number of banking houses who settled their accounts with each other at the ” Clearing House ” was forty-six (Gilbart’s History and Principles of Banking, p. 78). The Bank of England has never been a member of the Clearing House, though it ” clears on one side,” i.e. its claim on the clearing bankers is made through the Clearing House, but the claims of the clearing bankers on the bank are forwarded direct to Threadrieedle Street twice or thrice daily. Nor did the banks in Fleet Street or at Charing Cross belong to it. In 1858 the clearing of country cheques was added through arrangements made by Lord Avebury, then Sir John Lubbock. The ” country clearing ” is a great assistance to business, as it enables a cheque drawn on the most distant village in England to be dealt with as conveniently as a cheque on London. Of the forty-nine banks in London in 1 ” The Grasshopper ” in Lombard Street, by John Biddulph Masters (1892).

1844, twenty-six were connected with the Clearing House. At that time only private banks were allowed to be members. In 1854 the joint-stock banks made their way into that body, and in 1906 the numbers were one private bank and eighteen joint- stock banks who joined in the clearing — nineteen banks in all.

Practically at the present time every large transaction in the United Kingdom is settled by cheque, that is, by a series of ledger transfers, notes and specie being but the small change by which the fractional amounts are paid. A large proportion of these transactions are arranged through the operation of the London Clearing House. This is facilitated by the fact that every bank in the United Kingdom has an agent in London.

The annual circulation shown by the London Clearing House is more than £12,000,000,000. No one asks what stock of gold is held by the bank on which the cheques are drawn, or what the bank itself keeps in reserve. The whole is taken in faith on a welt-founded trust. It is the most easily worked paper circulation and circulating medium in existence. Like the marvellous tent of the fairy Paribanou, it expands itself to meet every want and contracts again the moment the strain is passed. (See the article by R. H. Inglis Palgrave on ” Gold and the Banks,” Quarterly Review, January 1906.)

If we add to the returns of the London Clearing House those of the clearing houses in the large towns of England, Ireland and Scotland, and the numerous exchanges which occur daily, and the large number which the different offices of banks with a great many branches settle among themselves, and the number drawn by one customer of a bank and paid to another, we may form some notion of the vast amount of the yearly turnover in cheques. This may be roughly estimated to be at least twice as great as that registered by the London Clearing House. The earliest authentic statement as to the clearing is found in the Appendix to the Second Report, Committee of House of Commons, Banks of Issue (1841).

In 1839 the figures of the London clearings

were £954,401,600, 29 banks.

In 1840 „ „ „ „ 978,496,800, 29 „

In 1899 „ „ ,, „ 9,150,269,000, 19 „

In 1900 ,, ,, ,, ,, 8,960,170,000, 19 ,,

In 1906 „ 12,711,334,000, 18 „

In 1695, shortly after the establishment of the Bank of England, the Scottish parliament passed an act for the establishment of a public bank. Amongst the first names is that of Thomas Coutts, a name still commemorated in one banks. of the most substantial banks in London. The terms of the establishment were more favourable than those connected with the establishment of the Bank of England, for they obtained the exclusive privilege of banking for twenty- one years without giving any consideration whatever. It may have been the natural caution of the country, or the fact that William III. was then king, which led to the Bank of

Scotland being prohibited under a heavy penalty from lending money under any circumstances to the king. It is the only Scottish bank established by act of parliament. The directors began at a very early period to receive deposits and to allow interest thereon, also to grant cash credit accounts, a minute of the directors respecting the mode of keeping the latter being dated so far back as 1729.

Though the system of branches forms now so marked a feature of banking in Scotland, a good many years had to pass before they obtained any hold. It was not till about the year 1 700 that the directors of the Bank of Scotland established branches at Glasgow, Aberdeen, Dundee and Montrose, but so little encourage- ment was given to these branches, the expenses far exceeding the profits arising from them, that the directors resolved to close them. In 1731 another attempt was made, and agencies were established at Glasgow, Aberdeen and Dundee. But after a trial of two years they were discontinued. It was not till 1774 that branches were again established by the bank.

Soon after the establishment of the Bank of Scotland the directors began to issue notes, or, as they were then called, bills or tickets, for £100, £50, £20, £10, and £5. In 1704 £1 notes were issued for the first time. In 1727 the Royal Bank of Scotland was established by a charter of incorporation, — which granted them ” perpetual succession and a common seal.” There was a great rivalry between the two companies. The British Linen Company was incorporated in 1746 for the

purpose of undertaking the manufacture of linen, but by 1763 they found it best to confine their operations to banking trans- actions. This bank also was incorporated by charter.

The note circulation was always an important item in the Scottish banks. Thus in the case of the Bank of Dundee, the receiving money from the public did not commence till 1792. Up to that time the whole business of the bank from 1764 onwards, twenty-eight years in all, had consisted in its issue of notes, which had varied from about £23,000 to £56,000. The Bank of

Dundee was amalgamated with the Royal Bank of Scotland in 1864, when its deposits amounted in round figures to £700,000 and its note circulation to £41,000. After 1792, the money deposited with the banks in Scotland rapidly increased, but the habit of hoarding savings in a chest up to amounts of £10 or £20 continued to a much later period (History of the Dundee Banking Co.).

Private banking never appears to have had any considerable hold in Scotland. In 1819 eight private banks were in existence. These had all disappeared by 1844. In 1906 there were only ten banks of issue in Scotland, which practically carried on the whole business of the country. There were two other small banks established comparatively recently. These ten banks had, in 1906, 1 180 branches.

The history of the growth and expansion of Scottish banking since 1826 is, as far as can be traced, as follows: —

Date.

Deposits.

Number of Offices.

1826 1841

1856 1872

1906

£21,000,000

27,000,000 (63,000,000 /

I and capital) 1 92,000,000 i J including all 1 1 liabilities f I and capital J f 135,042,000 “1 J including all 1 1 liabilities f 1_ and capital J

167 = 1 to every 13,170 inhabitants. 380 = 1 .„ 6,600 „

585 = 1 .. 5.230 „ 790 = 1 „ 4,250

1,180 = 1 „ 3,790

Against every note issued in excess of the limit allowed by the acts of 1844-1845, gold has to be held at the offices of the issuing

banks in Scotland and Ireland. The amount of the specie to be thus held was, as explained by Sir Robert Peel in his speech of the 25th of April 1845, to be ascertained by the average amount of the note- issue for four weeks preceding. The object of the holding of this amount of specie by the bank which issued the notes was designed by Sir Robert Peel to cause the circulating medium of the country, being partly of notes and partly of specie, to fluctuate in the same manner as if it had been a metallic circulation only. The specie held in Scotland and Ireland against the note-issue is not a special security for the note circulation, but is placed in the banks there for this purpose. The influence ascribed to the working of the note circulation in the earlier part of the 19th century accounts for this legislation, which, as Sir Robert Peel stated in his speech of the 6th of May 1844, was intended to " ensure the uniform equivalency of bank notes to coin." It is not applicable to the present position of the circulating medium of the United Kingdom, which now con- sists mainly of a circulation of cheques. This differs absolutely from what was contemplated by Sir Robert Peel ; no attempt is or can be made to cause such a paper circulation to fluctuate as if it were one of specie only. One result of the limitation of the power of note- issue to the banks in Scotland which possessed that power in 1845 has been that no important bank has been established in that country since. Notes are so largely employed in ordinary business in Scotland that a bank which does not possess the power, practically cannot carry on business and supply the needs of its customers. This limitation in the number of the banks has, however, not been accompanied by any deficiency in the supply of banking accommo- dation to the people. There is a larger number of banking offices in proportion to the population in Scotland than in England and Wales or Ireland.

The large number of branches must, however, be a cause of great expense, and in several other respects it is obvious that a business carried on in such thinly peopled districts as are found in many parts' of Scotland, must be conducted at a disadvantage in comparison with those banks which deal with more active centres of commerce. Although the profit derived from their large issue of notes may be thought to be considerable, yet, when we consider the many expenses incurred in conducting a large note circulation, the cost of printing, stamp duty, and the charges on importing gold from London when the circulation exceeds the limit fixed by the act of 1845. no small

Irish banks.

deductions must be made from the apparent profit to be derived from this head, if there is any direct profit at all.

On the other hand, the great number of branches possessed by the Scottish banks tends beyond doubt to their stability and prosperity. The network of banks on the surface of Scotland is as important to the development of the prosperity of the country as the network of the railways. It has caused a great economy of capital, as the universal practice of people, even of the most moderate means, is to lodge their money with the banks.

The early history of banking in Ireland was marked by legislation even less favourable to the formation of a steady and dependable system than in England, and in 1695 several of the principal merchants in Dublin met to- gether for the purpose of forming a public bank for Ireland on the model of the Bank of England. For many years this proposal met with no favour. It was not till 1783 that the Bank of Ireland was established and commenced its business. The first governor was David La Touche, junior, and two other members of his family were amongst the first board of directors. The bank met with very great success, but the jealousy against rival establishments was extreme. By the act forming the Bank of Ireland it was enacted that no company or society exceeding six in number, except the Bank of Ireland, should borrow or take up money on their bills or notes payable on demand. In the year 1821 the act was so far modified as to permit the establish- ment of banking companies exceeding six in number at a distance of 50 m. from Dublin. In 1824, in consequence of the ambiguity of that act, an act had to be passed to explain it. It was not till 1845 that the restriction as to the 50-m. limit was withdrawn.

The establishment of any other bank but the Bank of Ireland was for a long time hindered by the legislation on the subject. Some of the restrictions were so extraordinary that it will be interesting to refer to three of the more important acts. •

1741, 15 Geo. II. — Partnerships authorized for the purpose of trade and manufacture; but such partnerships were not to exceed nine in number, nor was the capital stock of such co- partnership to exceed, at ant time, the sum of £10,000.

1780-1781, 21 and 22 Geo. III. — “Anonymous Partnership Act,”

— limited liability not to exceed £50,000, but " business of banking or discounters of money" expressly excluded.

1 759, 33 Geo. II. — By this act a person while he continued a banker could not make a marriage settlement on a son or daughter, a grandson or granddaughter, so as to be good against his creditors, though for a valuable consideration, and though such creditors were not creditors at the time the grant was made. This act gave power to creditors over all conveyances by bankers affecting real estates; and all dispositions after the 10th of May 1760 by bankers of real or leasehold interest therein to or for children were made void as against creditors, though for valuable consideration and though not creditors at the time. No banker to issue notes or receipts bearing interest after the 10th of May 1760. Some of these enactments appear to be in force at the present day; suggestions have been made, though apparently unsuccessfully, for their repeal.

So extraordinary were the views of the common people that a banker in Dublin of the name of Beresford having made himself very unpopular, a " large assemblage of ignorant country people having previously collected a quantity of Beresford's notes, publicly burnt them, crying out with enthusiasm while the promises to pay on demand were consuming, 'What will he do now; his bank will surely break.' "

The number of banks which failed in Ireland in earlier times was extraordinary ; thus Sir Robert Peel in his speech of the 9th of June 1845 on the Bank Act of that year, made a quotation "from the report of the committee of Irish exchanges, which sat in 1804. At that period there were fifty registered banks, but they all failed, and their failures, I know personally, led to the most fearful distress." Since the legislation of 1845, however, the business has been carried on with equally extraordinary steadiness and success, and at the present time is on a footing fully equal to that of any other part of the United Kingdom.

The earlier history of banking in Ireland pursued very closely the same process of development as in England. Circulation preceded and fed deposits. The credit which the banks obtained

by the ready acceptance of their notes brought customers to their counters, and thus the existing system, fortunate in excellent managers, was built up gradually and surely.

Alone in the three kingdoms, Ireland maintains the same limit of authorized circulation as that established by Peel's Act of 1845. Not one of the six banks which had the privilege of issue at that period has lost it since.

The names of the banks carrying on business in Ireland, the years when they were established and their position in 1906, are as follows : —

Capital of Irish Joint-Stock Banks in 1906

Name of Bank and Year when established.

Capital paid-up.

Rate of

Dividend

per annum.

Bank of Ireland . 1783 Hibernian Bank* . 1824 Provincial Bank . 1825 Northern Banking Co. 1825 Belfast Banking Co. 1827 National Bank . . 1835 Ulster Banking Co. . 1836 Royal Bank* . . 1836 Munster Bank, Ltd.* 1864

£2,769,230

500,000 540,000 500,000 500,000 1,500,000 500,000 300,000 200,000

11

10

20

i8i

36

- Thus marked are not banks of issue. Banking, like every other business, has to pass through periods of difficulty. The severity of these in the case of banking is iftensified by the vast number of interests affected. crises." S These, on the one hand, are world-wide in their scope, on the other they touch every home in the country. The stringency of such a time in England has since the passing of the act of 1844 been greatly enhanced by a doubt being some- times felt as to whether a relaxation of the act of 1844 would be allowed. In any case, some little time must elapse before the assent of the ministers of the crown to the request of the Bank of England can be known. Since 1844 there have been five periods of pressure, — during 1847, 1857, 1866, 1870 and 1890. Of these in three, 1847, 1857 and 1866, the difficulties reached panic.

The crisis of 1847 was brought on by the speculation in railway enterprise which had gone on since 1845. So little had the anxieties of the autumn been anticipated that the bank rate of discount was 3 % on the 1st of January. It was raised to 3I % on the 14th and to 4 % on the 21st. It became 5 % on 8th April, 5! % on 5th August, 6 % on 30th September and 8 % on 25th October. This was the highest. It was lowered to 7 % on 22nd November, on 2nd December to 6 % and on 23rd December to 5 %. An announcement was made on the 1st of October that no advances would be made on public securities. This was followed by general anxiety and alarm.

The reserve of the bank was rapidly reduced to a very low ebb.

Bank of England Reserve of Specie.

1847, 16th October £3,070,000

,, 23rd October 1,990,000

,, 30th October 1,600,000

Meanwhile the anxiety and alarm prevailing were causing a general hoarding of coin and bank notes, and it really appeared not unlikely that the banking department of the Bank of England might be compelled to stop payment while there was more than

£6,000,000 of specie in the issue department. The chancellor of the exchequer (Sir C. Wood, afterwards Lord Halifax) was urged by many deputations and remonstrances to relax the Bank Act, but he declined. At last, on the 22nd or 23rd of October, some of the leading city bankers had an interview with the prime minister (Lord John, afterwards Earl, Russell), and on their explaining the necessities of the position, the desired relaxation was given. The official letter (25th October) recommended " the directors of the Bank of England, in the present emergency, to enlarge the amount of their discounts and advances upon approved security." A high rate, 8 %, was to be charged to keep these operations within reasonable limits; a bill of in- demnity was promised if the arrangement led to a breach of the law. The extra profit derived was to be for the benefit of the

public. The effect of the government letter in allaying the panic was complete.

The crisis of 1857 was the last occasion of an official inquiry. This is contained in the Report and Evidence of the Select Committee of the House of Commons on the Bank Acts (1857, 1858). The evidence given by Mr Sheffield Neave, the governor, and Mr Bonamy Dobree, deputy-governor of the bank in 1858, gives a vivid picture not only of what occurred, but of what might be expected to recur on such occasions. The wildest alarm prevailed, exchequer bills were scarcely saleable, and the bank itself sold £3,000,000 government securities at a considerable loss. • The extreme pressure was relaxed by the letter issued by the government on the 12th of November 1857, signed by Lord Palmerston, then premier, and Sir G. C. Lewis, which allowed a temporary relaxation of the Bank Act of 1844. The public alarm, however, was so great that it was not until the 21st of November that the severity of the pressure was in any way diminished. On the 20th of November the notes issued to the public on securities beyond the statutory limit (then £14,47 5,000) reached the sum of £928,000. By the next week the issue was almost down to the limit, and in the week following it was within the limit. On the 1st of January 1858 the bank rate was lowered to 8 % and the anxiety gradually passed away. Had the treasury letter been issued earlier, the pressure might not have been so severe, and the governor of the bank expressed a strong opinion that, if it had been later, it would not have been sufficient. November 1857 was the only occasion when the limits of the Bank Act as to issue were actually passed.

During the crisis of May 1866 £4,000,000 left the bank on one day in notes and coin, and the reserve of the bank was reduced in the return of the 1st of June of that year to £415,000. The bank rate was raised to 10 % and permission was given by the government to suspend the act. This, however, was not done. Tradition says that the bank asked the bankers, during the period of heaviest pressure of that terrible crisis — pressure more severe than anything that had taken place before or that has occurred since, to pay in every night the notes they had drawn out in the morning which were still in their tills at the close of the day, and that hence the legal limit was never ex- ceeded. But it was not till the 6th of August that the rate was reduced to 8 %.

The effect of the crisis of October 1890 was far less severe. This was due to the judgment and skill displayed by the governor (Mr Lidderdale) and the directors of the bank, who imported £3,000,000 in gold from Paris. The reserve in that year never dropped below £10,000,000, and before the end of November the anxiety had greatly passed away. ” Caution prevailed, but not panic, and the distinction is a very clear one.” (See arts, on ” Crises,” Dictionary of Political Economy, vol. i.)

The most important requirement of banking in the United Kingdom is still the establishment of an efficient specie reserve. The reserve in the banking department of the Bank of England averaged : —

£8,500,000 in 1845. £11,600,000 in 1875.

8,400,000 in 1855. 15,100,000 in 1885.

8,000,000 in 1865. 29,900,000 in 1895.

£23,500,000 in 1906.

This provides but a narrow basis for the whole business re- quirements of the country. Though much larger than in several previous years, it cannot be regarded as adequate. The figures fluctuate more severely than these decen- Tbe “* e ” nial averages show, and the progress has not been one question. of uniform increase. Thus the £15,100,000 in 1885 was followed by £12,700,000 in 1888. The £29,900,000 of 1895 was followed by £34,600,000 in 1896 and £21,200,000 in 1899.

Beyond, or side by side with, the reserve of the Bank of England there are the reserves held by the other banks. Part of these are

held in the form of balances at the Bank of England, part in specie and bank notes in their own tills. The latter, hence, are not unlikely to be estimated twice over. The published figures on this point are meagre.

The expectations expressed by Sir Robert Peel in his speech

on the bank charter and the currency of the 6th of May 1844 have not yet been fulfilled. ” I rejoice,” he said, ” on public grounds, in the hope that the wisdom of parliament will at length devise measures which shall inspire just confidence in the medium of exchange, shall put a check on improvident speculations, and shall ensure the just reward of industry and the legitimate profit of commercial enterprise conducted with integrity and controlled by provident calculation.”

The extreme measures which have been required since the act Df 1844 point out for themselves the necessity for reform. Three times since the date of the Bank Act of 1844 it has been needful to give permission for the suspension of that act which forms the very foundation of the monetary system of Great Britain. This, whenever it has occurred, has exercised a very injurious effect on credit abroad, as well as on prosperity at home.

The British money-market, the clearing-house of the world, is, in consequence of the smallness of its reserve, exposed to greater fluctuations than that of any other country. These fluctuations may arise from the need of meeting the requirements of other countries for specie or those arising from domestic trade. The recorded excess of imports over exports, £147,000,000 in 1906, though the difference is eventually balanced by the ” in- visible ” exports, gives foreign nations at times a power over the British money-market greater than has ever previously been the case. The current must always have a tendency to flow outwards ; this is enhanced by the great increase in the number of foreign banks which have branches in England. The need of providing sufficient reserves to meet requirements thus occasioned is obvious.

As regards the banks in which British interests are concerned in British colonies and other countries we can only speak briefly. It

must not be overlooked that in the Dominion of Canada British there are 29 banks, many of them large, managed ban/tins muc h on the Scottish principle with capitals of nearly abroad. £19,000,000 and deposits of about £140.000,000. These banks have more than 1200 offices. In Australia and New Zealand there are 24 banks with capitals of nearly £18,000,000 and deposits of about £130,000,000 The number of offices is nearly 1700. There are, including the three Presidency banks, about 15 banks doing business mainly in India — in some cases connecting neighbouring countries and places like Bangkok, Hong-Kong and Zanzibar. These banks have capitals of more than £5,000,000 and deposits of fully £36,000,000 and over 210 offices. There are at least 8 banks in South and West Africa with capitals of nearly £5,000,000, deposits of nearly £50,000,000 and nearly 370 offices. There are 5 banks, including the Colonial Bank, in other British territories with capitals of about £1,000,000 and deposits of £3,300,000, and about 25 offices. ‘ There are thus, besides many private firms doing very considerable business, more than 80 joint-stock British banks working in the colonies with capitals amounting to £48,000,000, deposits £360,000,000 and offices 3505. Outside British territories there ate 6 banks, principally in South America, with nearly £4,000,000 capital, £36,000,000 deposits and about 60 offices. There are 6 large banks doing business principally in the East with more than £6,700,000 capitals, £77,000,000 deposits and 106 offices; and 7 other banks, including Barings, with about £4,500,000 capitals and £22,000,000 deposits There are thus about 20 British banks doing business in foreign countries with capitals amounting to £15,200,000, deposits £135,000,000 and offices 173.

In this statement we have included only the more important banks, which collectively wield about £63,000,000 capital and more than £495,000,000 deposits — in all about £560,000,000 of resources operating at about 3700 offices situated in places as different from each other and as widely separated as California and Hong-Kong, Constantinople and New Zealand.

France. — In France the first bank of issue, originally called the Banque Ginerale, was established in 17 16 by John Law, the author of the Mississippi Scheme and the Systeme. Law’s bank, which had been converted into the Banque Royale in 1718, and its notes guaranteed by the king (Louis XV.), came to an end in 1721; an attempt at reconstruction was made in 1767, but the bank thus established was suppressed in 1793. Other banks, some issuing notes, then carried on operations with limited

success, but these never attained any real power. There were many negotiations on the subject of the establishment of a bank in 1796. The financial difficulties of the times prevented any immediate result, but the advice of those engaged in this plan was of great assistance to Napoleon I., who, aided by his minister Mollien, founded in 1800 the Bank of France, which has remained

from that time to the present by far the most powerful financial institution in the country. The objects for which it was established were to support the trade and industry of France and to supply the use of loanable capital at a moderate charge. These functions it has exercised ever since with great vigour and great judgment, extending itself through its branches and towns attached to branches over the whole country. At its establishment and for some time subsequently the operations of the bank did not extend over the whole of France. Departmental banks with the privilege of issue had been formed under a law adopted in 1803. At the close of 1847 there were nine of these banks existing in as many of the larger towns. In 1848, however, they were absorbed into the Bank of France, which has since possessed an exclusive privilege of issue, and in 1863 took over the Bank of Savoy after that province was united to France.

The Bank of France has successfully surmounted many political as well as financial troubles both during and since the times of Napoleon I. The overthrow of the government of Louis Philippe in 1848, the war with Germany in 1870, the many difficulties that followed when the Commune reigned in Paris in 1 87 1, the payment of the war indemnity — not completed till 1873 — were all happily overcome. Great pains, too, have been taken, especially of recent years, to render services to large and small businesses and to agri- cultural industry. In 1877 the offices of the Bank of France were 78 in number; in 1906 they were 447, including the towns " con- nected with the branches "—an arrangement which, without putting the bank to the expense of opening a branch, gives the place con- nected many of the advantages which a branch cmifers. The quantity of commercial paper discounted is very large™ More than 20,000,000 bills were discounted in 1906, the total amount being £559,234,996. The advances on securities were in the same year £106,280,124. The rate of discount in Paris is as a rule lower and the number of alterations fewer than in London. From May 1900 to January 1906 there was no change, the rate remaining uni- formly at 3 %. Bills as low as 4s. 2d. are admitted to discount, including those

below 8s.; about 232,000 of this class were dis- counted in 1906. Since the 27th of March 1890 loans of as small an amount as £10 are granted. In most cases three ” names ” must be furnished for each Dill, or suitable guarantees or security given, but these necessary safeguards have not to be furnished in such a manner as to hamper applicants for loans unduly. In this manner the Bank of France is of great service to the industry of the country. It has never succeeded, however, in attracting deposits on anything like the scale of the Bank of England or the banks of the English- speaking peoples, but it held, as stated in the balance-sheet for the 23rd of December 1906, about £35,000,000 in deposits, of which £14,000,000 was on account of the treasury and £21,000,000 for individuals, and the amount held in this manner gradually increases. The report for 1904 says ” each year the movement in these in- creases, and this economical and safe mode of effecting receipts and payments is more and more appreciated by the public.” In one respect the Bank of France stands at a great advantage in connexion with this branch of its business. The average amount held in this manner for individuals during 1906 was about £23,000,000. As the accounts numbered 77,159 the average for each account was comparatively small. Accounts so subdivided give a great proba- bility of permanence. The figures of the accounts for 1904 were as follows : —

11,178 current accounts, with power of discount. 4,576 simple current accounts. 26,709 current accounts, with advances. 24,106 accounts, deposits.

Total 66,569 accounts, against 59,182 at the end of 1903.

At the present time the Bank of France operates chiefly through its enormous note circulation (averaging in 1906 £186,300,000), by means of which most business transactions in France are carried on.

The limits of the circulation of the Bank of France and the dates when it has been extended are as follows : — ■

Dates.

15th March 1848 27th April, 2nd May 1848 2nd December 1849 12th August 1870 . 14th August 1870 . 29th December 1871 15th July 1872 30th January 1884 25th January 1893 17th December 1897 In 1906

Millions of

Converting the

Francs.

Franc as 25 = £1

350

£14,000,000

548

452

18,000,000

525

21,000,000

1800

32,000,000

2400

96,000,000

2800

112,000,000

3200

128,000 000

35O0

140,000,000

4000

160,000,000

5000

200,000,000

5800

232,000,000

GERMAN]

Most business transactions in France are liquidated, not in cheques as in England, but in notes of the Bank of France. These, owing to their convenience, are preferred to specie. This is accumulated in the vaults of the Bank of France, which in 1906 held on average £115,000,000 gold and £42,000,000 silver. The gold held by the Bank of France is generally considerably larger in amount than that held by the Bank of England, which in the autumn of 1890 had to borrow £3,000,000 in gold from the Bank of France at the time of the Baring crisis. The large specie reserve of the bank has given stability to the trade of France, and has enabled the bank to manage its business without the numerous fluctuations in the rate of discount which are constantly occurring in England. It is true that the holding this very large amount of specie imposes a very heavy burden on the shoulders of the shareholders of the bank, but they do not complain. The advantage to business from the low rate of interest which has to be paid for the use of borrowed capital in France is a great advantage to the trade and industry of that country.

The mass of the reserve in France is so great that the movements of the precious metals, when they are the result only of natural causes, are allowed to go on without corresponding movements in the discount rate. But it must be remembered that this large reserve is held in part against a gigantic note issue, and also that the trade activity and enterprise of the French people are less

intense than in either the United Kingdom or Germany; thus it is much easier for the Bank of France to maintain a steady rate of discount.

Besides the Bank of France, several great credit institutions carry ori business in the country ; as the Banque de Paris et des Pays-Bas (capital and reserve, £3,729,000; other liabilities, deposits, &c, £14,842,000), the Banque Francaise pour le Commerce et V Industrie (£2,450,000; and £3,505,000), the Credit Lyonnais (£14,000,000; and £82,570,000), the Comptoir National d'Escompte de Paris (£6,772,000; and £47,593,000), the Societe Generate pour favoriser le developpement du Commerce et de I' Industrie en France (£7,469,000 ; and £45,800,000), and the Societe Generale de Credit Indusiriel et Commercial (£1,600,000; and £10,060,000).

There is also the Credit Fonder de France with a very considerable capital, but the business done is so largely that of mortgages that it can hardly be included among banks, though it carries on in some measure the business of banking.

Besides the six important joint-stock banks mentioned above, there exists in France a large number of banks, principally in the provinces, carrying on a very considerable business. Little is known as to their deposits, but their business appears to be conducted with great prudence and discretion. One hundred and eighty-two of these firms were members of the French Country Bankers' Associa- tion in 1898. They carry on business in 66 out of the 86 depart- ments into which France is divided. More than one of these banks has several offices — one possessing 18, including the head office. These branches are situated in the small towns in the vicinity. In this the business follows more the English method of small branches. The French Country Bankers' Association holds its meetings in Paris, where matters of interest to bankers are discussed. (See Bankers' Magazine, July 1898.)

Germany. — Besides the Imperial Bank of Germany, the Reichsbank," there are about 140 banks doing business in the states which form the German empire. These credit and industrial banks with their large resources have had an immense influence in bringing about the astonishing industrial develop- ment of their country. Five banks possess the right of uncovered note-issue ; these are : —

The Imperial Bank of Germany with right of issue £23,641 ,450

The Bank of Saxony ,, ,, „ 838,500

The Bank of Bavaria „ „ „ 1,600,000

The Bank of Wurttemberg „ „ „ 500,000

The Bank of Baden „ „ „ 500,000

£27.079.950

At the Bank of Germany the coin and bullion held is sometimes larger than at the Bank of England. The statement of the specie in the weekly accounts includes silver. The amounts held in gold and silver are only separated once a year, when the balance-sheet is published. The figures of the balance-sheet for the 3 1 st of December 1906 showed in round numbers £24,000,000 gold and £9,000,000 silver. As far as the capital is concerned the £18,000,000 of the Bank of England considerably exceeds the £9,000,000 of the Bank of France and the £12,200,000 of the Bank of Germany. The note circulation of both the other banks is considerably larger than that of the Bank of England, that of the Bank of France being £186,300,000, and of the Imperial Bank of Germany £69,000,000 in

1906.

The capitals and reserves of the German banks, including those of banks established to do business in other countries, as South America and the Far East, and of the Bank of Germany, are about £133,000,000, with further resources, including deposits, notes and

mortgage bonds, amounting to fully £414,000ˆ000. The amount of the capital compares very closely with that of the capitals of the banks of the United Kingdom. The deposits are increasing. The deposits, however, are not the whole of the resources of the German banks. The banks make use, besides, of their acceptances in a manner which is not practised by the banks of other countries, and the average note circulation of the Reichsbank, included in the statement given above, is between £60,000,000 and £70,000,000.

A large and apparently increasing proportion of the resources of the German banks is employed in industrial concerns, some of which are beyond the boundaries of the empire. The dangers of this practice have called forth many criticisms in Germany,

among which may be quoted the remarks of Caesar Strauss and of Dr R. Koch, the president of the Reichsbank. Dr Kock especially points out the need of the development of powerful banks in Germany unconnected with speculative business of this kind. The object of employing their funds thus is the higher rate of interest to be obtained from these investments than from discounting bills or making loans at home. But such an employment of the resources of a bank is opposed to all regular rules of business and of banking tradition, which abstains from making fixed investments of any large part of the resources of a bank. On the other hand, Dr Koch observes that the risks of the one " reserve system " mentioned by Bagehot are not to be feared in Germany. 1

The recent movement in favour of concentration among the banks has been described by Dr E. Depitre and Dr Riesser, who give particulars of the business done by these banks, which does not correspond with banking as practised in the United Kingdom, being more of an industrial character.

There are also many private banking firms in Germany which do a considerable amount of business.

The Reichsbank, by far the most powerful banking institution in Germany, is managed by the bank directory appointed by the chancellor of the empire. The shareholders join in the management through a committee, of which each member must be qualified by holding not less than three shares. The government exercises complete powers of control through the chancellor of the empire. The influence of the Imperial Bank now permeates, by means of its branches, all the separate kingdoms of the empire — the uniformity of coinage introduced through the laws of 1871- 1873 rendering this possible. The Imperial Bank assists business principally in twc ways — first, through the clearing system (Giro-Verkehr), which it has greatly developed, and secondly, through the facilities given to business by its note circulation. The Imperial Bank also receives deposits, and' cheques are drawn against these, but in Germany notes are principally used in pay- ments for ordinary business.

Before the Reichsbank was established, Hamburg was the first, and for a long time the only, example of a clearing in Germany. This was taken up by the Reichsbank when it established its office in Hamburg in the time-honoured building which had belonged to the Hamburg Clearing House. Similar business had

long been undertaken by the Bank of Prussia. This was absorbed and de- veloped by the Reichsbank in 1876. Through the" clearing system " money can be remitted from any of the 443 places in which there is an office of the Reichsbank, to any of these places, without charge either to the sender or the receiver. It is sufficient that the person to whom the money is to be remitted should have an account at the bank. Any person owing him money in the remotest parts of the empire may go to the office of the bank which is most convenient to him and pay in the amount of his debt, which is credited on the following day at the office of the bank, without charge, to the account of his creditor wherever he may reside. The person who makes the payment need not have any account with the bank. The impetus given to business by this arrangement has been very considerable. It practically amounts to a money-order system without charge or risk of loss in transmission. From Hamburg and Bremen to the frontiers of Russia, from the shores of the Baltic to the frontiers of Switzerland, the whole of the empire of Germany has thus become for monetary purposes one country only. The amount of these transfers for the year 1906 exceeded £1,860,000,000.

The note circulation is also a powerful factor of the business of the Reichsbank. It is governed by the law of 1875 and the amend- ing law of 1899, corresponding in some degree to Peel's act of 1844, which regulates the note circulation of the Bank of England. An uncovered limit, originally £12,500,000, increased to £14,811,450 by the lapse of the issues of other banks allowed to it, has been ex- tended by these and by the act of the 5th of June 1902 to £23,641,450. Against the notes thus issued which are not represented by specie, treasury notes (Reichskassenschcine , the legal tender notes of the

1 See Vortrdge und Aufsdtze hauptsdchlich aus dem Handels- und Wechselrecht, von Dr R. Koch, pp. 163-164. – '

empire) l and notes of the issuing banks which are allowed to be reckoned as specie or discounted bills, must be held — maturing not later than three months after being taken — with, as a rule, three, but never less than two, good indorsements. There is also a

pro- vision that at least one-third of the notes in circulation must be covered by current German notes, money, notes of the imperial treasury, and gold in bullion or foreign coin reckoned at £69, 12s. per pound fine. The Reichsbank is bound by law to redeem its notes in current German money. It is stated that this may be gold coin or silver thalers, or bar-gold at the rate of 1392 marks (£69, 12s. reckoning marks as 20 = £l) the pound fine of gold. In practice, however, facilities have not always been given by the Reichsbank for the payment of its obligations in gold, though the importance of this is admitted. In the balance-sheet for 1906 the bills held amounted to £67,000,000, and the loans and advances to £14,200,000. The notes issued averaged for the year £69ˆ000,000. The gold held amounted, 30th December 1906, to £24,069,000. If the condition of business requires that the notes in circulation should exceed the limits allowed by the law, the bank is permitted to do this on the payment of 5 % on the surplus. In this respect the German act differs from the English act, which allows no such automatic statu- tory power of overpassing the limit of issue. Some good authorities consider that this arrangement is an advantage for the German bank, and the fact that it has been made use of annually since 1895 appears to show that it is needed by the business requirements of the country. Of late years the excess of issue of the Reichsbank has been annual and large, having been £25,267,000 on the 29th of September 1906 and £28,632,000 on the 31st of December of the same year. The amount of the duty paid on the excess issue in the year 1906 was £184,764, and the total amount paid thus from 1876 to 1906 was £839,052. The increase of the uncovered limit (untaxed limit of issue called in Germany the ” note reserve “) has not been sufficient to obviate the need for an excess of issue beyond the limit.

In accordance with a law passed in 1906 the Imperial Bank issues notes (Reichsbanknoten) of the value of 20 marks (£1), and 50 marks (£2, 10s.) in addition to the 5, 10, 100 and 1000 mark notes (5s., 10s., £5. £5°) previously in circulation. Imperial paper currency of the value of 20 or 50 marks (£1 and £2, 10s.) had previously existedonly in the form of treasury notes (Reichskassenscheine) ; these will in consequence be withdrawn from circulation.

The amendment of the banking law of Germany, passed in 1899, not only affects the position of the Reichsbank, but that of the four other note-issuing banks. The capital of the Reichsbank has been raised by the bill of that year to £9,000,000. The reserve

fund has been raised out of surplus profits to £3,240,000. This exceeds the amount required by the act of 1899, which was £3,000,000. The amending act further diminishes the dividend receivable lay the stockholders of the Reichsbank and increases the share which the government will obtain.

The arrangement with the four note-issuing banks is designed to cause them to work in harmony with the Reichsbank when the Reichsbank has to raise its bank-rate in order to protect its gold reserves. The official published rate of discount of the Reichsbank is to be binding on the private note-issuing banks after it has reached or when it reaches 4 %. At other times they are not to discount at more than J % below the official rate of the Reichs- bank, or in case the Reichsbank itself discounts at a lower rate than the official rate, at more than J % below that rate. If the Reichs- bank discounts below the official rate, it is to announce that fact in the Gazette.

The subject being important, we quote from the amending act the sections governing the discount rate: — Gesetz, betreffend die Abdnderung des Bankgesetzes vom 14. Mdrz 1875; vom 7. Juni 1899, Artikel 7, 5. 1. The private note-issuing banks are bound by Arlikel 7, 5. 2, after the 1st of January 1901 : — ” (1) Not to discount below the rate published in S. 15 of the bank law, so long as this rate attains or exceeds 4 %, and (2) moreover, not to discount at more than J % below the Reichsbank rate, published in S. 15 of the bank law, or in case the Reichsbank itself discounts at a lower rate, not to discount at more than | % below that rate.“_

It remains to be seen whether the note-issuing banks will find these conditions too onerous, and rather than be bound by them will give up their right of issuing notes. The object of the enactment is apparently to protect the specie reserve of the Reichsbank, but it may be doubted whether, considering the importance of the other banks of Germany — none of which is bound by similar conditions — relatively to the note-issuing banks, the restrictions put on the note-issuing banks will have any practical effect.

Since 1870 banking has made immense progress in Germany, but it may be some time before the habit of making payments by cheque instead of specie or notes becomes general.

Authorities. — Parliamentary Papers: Report, together with

Minutes of Evidence and Accounts, from the Select Committee on the High Price of Gold Bullion, House of Commons, 8th of June 1810;

1 The imperial treasury is bound to pay the state notes in cash. at any time when this is required, but an independent fund of cash set apart for this purpose does not exist. See Handwiirterbuch der Staatswissenschaften, vol. v. art. " Papiergeld," p. 97 (Jena, 1893; ed. I. Conrad, L. Elstei, W. Lexis ana rv Loning).

Reports, Committee of Secrecy on Bank of England Charier, House of Commons, 1832; Select Committee on Banks of Issue, House of Commons, 1840; First and Second Reports, Select Committee on Banks of Issue, House of Commons, 1841 ; First and Second Reports, Secret Committee on Commercial Distress, House of Commons, 1848; Report, Select Committee on Bank Acts, House of Commons, 1857; Report, Select Committee on Bank Acts, House of Commons, 1858; Report, Select Committee on Banks of Issue, House of Commons, 1875; Report from Secret Committee of the House of Lords on the Causes of the Distress which has for some time prevailed among the Commercial Classes, and how far it had been affected by the Laws for regulating the Issue of Bank Notes payable on demand, session 1847-1848; Analysis of the Minute 1 ; of Evidence taken before the Select Committee of the House of Commons on Banks of Issue, 1875, with a selection from the evidence, by R. H. Inglis Palgrave, London, 1876 (printed for private circulation).

General Information. — Articles on banking, &c, Dictionary of Political Economy, edited by R. II. Inglis Palgrave (Macmillan & Co., 1 894- 1.906); Handworterbuch der Staatswissenschaften, edited by Conrad, Elster, Lexis and Loning, 1899; Worterbuch der Volks- wirthschaft, 2 vols. (ed. Elster, 1898) ; Dictionnaire des finances, edited under the direction of Leon Say, by L. Foyot and A. Lanjalley (1889) ; Dictionnaire du commerce, de V Industrie et de la banque, edited by A. Raffalovich and Yves Guyot; Bankers' Magazine, commenced 1844, to present time; Journal of the Institute of Bankers, commenced 1879, to present time ; Bankers' Magazine (New York) ; Economist news- paper, commenced 1843, to present time; Banking Almanac, com- menced 1845, to present time; Reports of the Comptroller of the Currency (Washington).

Early. — De Monetarum Augmento, variations et diminutione, Tractatus varii (1509); A proposal to supply His Majesty with

twelve or fourteen Millions of Money {or more if requir'd), by A. D. of Grey's Inn, Esq., and some Others, his Friends (1697) ; Hayes' Negociators' Magazine of Monies and Exchanges, 1730; Lord King, Thoughts on Bank Restrictions (1804) ; The Theory of Money with considerations on the Bank of England (181 1); William Cobbett, Paper against Gold and Glory against Prosperity, 2 vols. (1815); Circulating Credit with Hints for improving the Banking System of Britain, by a Scottish Banker (1832); W. Leckie, Bank Restriction (1841); Debates in the House of Commons on Sir R. Peel's Bank Bills of 1844 and 1845, reprinted verbatim from " Hansard's Parliamentary Debates," 1875; Gilbart's Works, 6 vols. (1865); The History, Principles and Practice of Banking, by J. W. Gilbart, edited and revised by A. S. Michie, 1882; Thomson Hankey, Principles of Banking (1867); Walter Bagehot, Lombard Street (1873), a brilliant picture of the city at that date (new ed., 1906); A. S. Cobb, Threadneedle Street, a reply to "Lombard Street" (1891); John Dun, British Banking Statistics (1876); R. H. Inglis Palgrave, Notes on Banking; George Rae, The Country Banker (1886), and several editions later (many sound hints on practice); J. George Kiddy, The Country Banker's Handbook, 4th ed. (1903); C. F. Dunbar, Chapters on the Theory and History of Banking (1891); Charles Gairdner, The Making of the Gold Reserves (1891); J. B. Attfield, English and Foreign Banks (1893) (refers to management of banks) ; T.B.Moxon, English Practical Banking, 10th ed. (1899) ; A. Crump, The Key to the London Money Market (1872) ; W. Y. Duncan, Notes on the Rate of Discountin London, 3 vols., 1822-1856, 1856-1866, 1866-1873, privately printed, Edinburgh, 1856, 1867 and 1877; R. H. Inglis Palgrave, Bank Rate and the Money Market in England, France, Germany, Holland and Belgium, 1844-1900 (1903); Ernest Seyd, The Bank of England Note Issue and its Error (1874); Ernest Seyd, London Banking and Bankers' Clearing House System ; Ernest Seyd, The Silver Question in 1893 ; Walter Bagehot, Depreciation of Silver (1877) ; Ernest Seyd, Bullion and the Foreign Exchanges (1868) ; Clare, The A B C of the Foreign Exchanges (1895, 2nd ed. 1895); Tracts, by Lord Overstone (183 7-1 857); Select Tracts on Money, &c, reprinted privately by Lord Overstone, 1856-1859 (containing much valuable and interesting information on early history) ; A. Crump, A Practical Treatise on Banking, Currency and the Exchanges (1866); Bonamy Price, Currency and Banking (1876) (the interest of this volume to the student of banking is found mainly in the correspondence between Mr Henry Hucks Gibbs (Lord Aldenham) and Professor Bonamy Price on the reserve of the Bank of England) ; R. H.

Inglis Palgrave, On the Influence, of a Note Circulation in the Conduct of Banking Business, read before the Manchester Statistical Society, 1877; Edgar Jaffe, Das englische Bankwesen (Leipzig, 1905) ; A History of Banks (1837) ; D. Hard- castle, Banks and Bankers (1843); W. J. Lawson, The History of Banking (1850); R. Baxter, The Panic of 1866 (1866); F. G. H. Price, A Handbook of London Bankers (1876) ; Conant, History of Modern Banks of Issue (New York, 1896); History of Banking in all Leading Nations, 4 vols. (New York, 1896); Viscount Goschen, Essays and Addresses on Economic Questions, 1865-1893 (1905), (arts, on ” Seven per cent,” ” Two per cent,” ” Our cash reserves and central stock of gold “) ; C. F. Dunbar, Economic Essays, edited by O. M. W. Sprague (1904), (containing many articles on banking, particularly in the United States).

Bank of England. — T. Fortune, A Concise and Authentic History of the Bank of England (1802); John Francis, History of the Bank of England (1847); J. E. Thorold Rogers, The First Nine Years of

the Bank of England (1887), B. B. Turner, Chronicles of the Bank of England(iSgy) ; T. A. Stephens, Bibliography of the Bank of England (1897); A. Andreades, Histoire de la banque d’Angleterre (1904; Eng. trans., 1909) ; Sir F. Schuster, The Bank of England and the State

(1906).

History of Banking Houses. — L. H. Grindon, Manchester Banks and Bankers (1877) ; J. B. Martin, ” The Grasshopper ” in Lombard Street (1892); M. Phillips, Banks, Bankers, and Banking in Northumberland, Durham and North Yorkshire (1894); C. H. Cave, History of Banking in Bristol (1899); Bidwell, Annals of an East Anglian Bank (1900) ; Richardson, Coutts & Co., Bankers, Edinburgh and London; H. T. Easton, History of a Banking House (Smith, Payne & Smiths) (1903); J. Hughes, Liverpool Banks and Bankers,

1760-1837 (1906).

Scotland. — W. H. Logan, The Scottish Banker (1847); Robert

Somers, The Scotch Banks and System of Issue (1873) ; W. Mitchell, Scotch Banks and Limited Liability (1879) ; A. W. Kerr, History of Scotch Banking (1884); A. W. Kerr, Scottish Banking, 1865-1896 (1898); Boase, A Century of Banking in Dundee (1867).

Ireland. — M?.lcolm Dillon, History and Development of Banking in Ireland (1889).

British Colonies. — Edward B. Hamilton, A Manual of the Law and Practice of Banking in Australia and New Zealand (1880); Banking in Australasia (1883); The Canadian System of Banking and the National Banking System of the United States (Toronto, 1890) ; Journal of the Canadian Bankers' Association (Montreal).

France. — Annuaire-Chaix, Les Principales Societes par actions (1905); A. Raffalovich, Le Marche financier (1905).

Germany. — Dr W. Scharling, Bank Politik (Jena, 1900) ; Die Reichsbank, 1876-iQOO (a history and description of the operations of the bank) ; Dr Adolf Weber, Depositenbanken und Spekulations- banken, Ein Vcrgleich deutschen und englischen Bankwesens (Leipzig, 1902) ; Dr Felix Hecht, Die Mannheimer Banken, 1870 bis 1900 (Leipzig, 1902) ; Siegfried Buff, Das Kontokurrentgeschdft im deutschen Bankwcrbe (Stuttgart and Berlin, 1904) ; Dr Riesser, Zur Entwicklungsgeschichte der deutschen Grossbanken mit besonderer Rilcksichl auf die Konzentralionsbestrebungen (1905); G. M. Boisse- vain, Duitsche en Engelsche Deposito-Banken (1905).

Italy. — La Banca Popolare di Milano (1881).

Austria. — Compass, Finanzielles Jahrbuch fiir Osterreich-Ungarn (Vienna).

Japan. — The House of Mitsui (Tokio) ; The Law and the By-Laws of the Nippon Kogyo Ginko {The Industrial Bank of Japan) (1903).

H. W. Wolff, People's Banks (1893). (On systems worked by Schulze-Delitzsch, Raiffeisen, Luzzatti, Banche Popolari, Dr Wollem- borg, Popular Banks in Belgium, Switzerland, France, England).

(R. H. I. P.) United States

The early history of the American colonies is strewn, like that of most new countries, with many crude experiments in banking and currency issues. Most of these colonial enterprises, however, were projects for the issue of paper money rather than the creation of commercial banks. Speculative banking was checked to a large extent in the colonies by the Bubble Act (6 Geo. I. c. 18), which v/as passed in England after the bursting of the South Sea Bubble. This act, which forbade the formation of banking companies without a special charter, was in 1740 extended to the colonies.

The serious history of banking in the United States may be said to have begun with the foundation of the Bank of Penn- sylvania. This bank originated in the project of a number of the citizens of Philadelphia to supply the continental army with rations. The first bills, issued in 1780, were nothing more than interest-bearing notes payable at a future time. The advances in continental money made by the shareholders were secured by bills of exchange for £1 50,000, drawn on the American envoys in Europe, but not intended to be negotiated.

A further outgrowth of the needs of the continental govern- ment was the Bank of North America, which was authorized by congress on May 26, 1781. The act gave to Robert Morris, the financier, power to create a bank with a capital of $400,000, to be increased if desirable. Morris arranged with the Bank of Pennsylvania to take over its holdings of foreign bills and paid in cash its claims against the Federation. The Bank of North America did not begin business until the 7th of January 1782, and there was so much doubt of the power of the continental congress to charter a bank that it was thought advisable to obtain a charter from the state of Pennsylvania. Under this charter the bank continued to operate until it was absorbed in the national banking system in 1863, and it may be considered the oldest organized banking institution in the United States.

The bank did much, during the first eight years after its organiza- tion, to restore order to the chaos of Federation finances. It loaned to Morris, as government superintendent of finance, $1,249,975, ˚f which $996,581 was repaid in cash and the re- mainder by surrendering the stock in the bank owned by the government.

The Bank of the United States. — A national bank of issue was one of the essential parts of the system built up by Alexander

Hamilton in organizing the finances of the Federal government under the constitution of 1789. The first " Bank of the United States" was accordingly incorporated in 1791, with a capital of $10,000,000, divided into 25,000 shares of $400 each. This bank issued circulating notes, discounted commercial paper and aided the government in its financial operations. The government subscribed one-fifth of the capital, but paid for it. by a roundabout process which actually resulted in the loan of the amount by the bank to the treasury. Other loans were made by the bank to the government, which gradually carried the obligation by the end of 1795 to $6,200,000. In order to meet these obligations, the government gradually disposed of its bank stock, until by 1802 its entire holdings had been disposed of at a profit of $671,860. The bank did not publish regular reports, but a statement submitted by Gallatin to congress for January 24, 1811, showed resources of $24,183,046, of which $14,578,294 was in loans and discounts, $2,750,000 in United States stock and $5,009,567 in specie.

The expiration of the charter of the bank in 181 1 was the occasion of a party contest, which prevented renewal and added greatly to the financial difficulties of the government in the war with Great Britain which began in the next year. Although foreign shareholders were not permitted to vote by proxy, and the twenty-five directors were required to be citizens of the United States, the bank was attacked on the ground of foreign ownership as well as on the constitutional ground that congress had no power to create such an institution.

The government was compelled in the war of 181 2 to rely on the state banks. Their suspension of specie payments, in 1814, made it very difficult for the treasury to transfer funds from one part of the Union to the other, because the notes of one section did not circulate readily in another. Gallatin left on record the opinion that the suspension of specie payments " might have been prevented at the time when it took place, had the former Bank of the United States been still in existence."

The financial condition of the government became so bad during the war that the second Bank of the United States was authorized in April 1816. The general project was that of Alexander J. Dallas, who in October 1814 had become secretary of the treasury. The capital of the new bank was $35,000,000, and the government again appeared as owner of one-fifth of the stock, which was paid in a stock note. The president of the United

States was authorized to appoint five of the twenty- five directors and public funds were to be deposited in the bank, ” unless the secretary of the treasury shall at any time otherwise order and direct.” The right of congress to charter the bank came before the Supreme Court in 1819 in the famous case of McCidloch v. Maryland. Chief Justice Marshall rendered the decision that the right to create the bank was within the implied powers granted by the Federal constitution, and that it was not competent for the states to levy taxes upon the circulating notes of the bank or upon its property except in common with other property.

The second Bank of the United States was not well managed in the early part of its career, but was upon a firmer foundation under the presidency of Langdon Cheves in 1819. Its policy greatly benefited commerce, but invited bitter complaints from the private dealers in exchange, who had been enabled to make excessive profits while the currency was below par, because of its different values in different states and the constant fluctuations in these values. The Bank, in the language of the report of Senator Samuel Smith of Maryland in 1832, furnished “a currency as safe as silver, more convenient, and more valuable

than silver, which through the whole western and southern and interior parts of the Union, is eagerly sought in exchange for silver; which, in those sections, often bears a premium paid in silver; which is, throughout the Union, equal to silver, in payment to the government, and payments to individuals in business.”

The bank in 1835 had attained a circulation of; $23,075,422 loans of $59,232,445; and deposits of $5,061,456. The institution was ultimately destroyed by the open enmity of President Jackson, who in 1833 had suspended the deposit of public money in its custody. This policy known as the ” removal of the deposits,” excited a bitter political controversy in which Clay and Webster led the opposition, but Jackson was supported by the public (see Jackson, Andrew). The Federal charter of the bank expired in 1836. Under a charter obtained by President Nicholas Biddle from the state of Pennsylvania, the bank continued its

business, but without success, and in 1841 it went into liquidation.

The State Banks. — The Bank of the United States found powerful rivals during its life and successors after its death in the banks chartered by the separate states. In the unde- veloped state of the country in the early days there was much unsound and speculative banking. The most successful systems were those of New York and New England, where the surplus capital of the country in the early days was chiefly concentrated. The least successful banking systems were those in the newer and poorer sections of the country, and they grew progressively worse as poverty and inexperience added to the difficulty of setting aside capital for investment in the tools of exchange.

The termination of the first charter of the Bank of the United States was followed by a banking mania. In Pennsylvania a bill authorizing 41 new banks was passed over the veto of the governor, and 37 of them were in operation in 1814. Similar movements in other states increased the number of banks in four years (1811-1815) from 88 to 208. The amount of specie was not adequate to support the mass of credit which these banks created, and what therewas in the country drifted toNew England, which was upon a metallic basis. A number of banks collapsed in 1814, and business prostration was prolonged for several years. The banking laws of the states varied considerably. Some states authorized the iˆsue of notes upon state bonds, many of which, especially at the outbreak of the Civil War,proved valueless. In New England, however, a system prevailed which required the prompt redemption of the banks' notes at par. The New England Bank was the pioneer of this movement in 1814. In 1824 what was known as the " Suffolk system " of redemption came into operation. This system provided for the deposit by a bank in the Suffolk Bank in Boston of a redemption fund, from which the notes were redeemed and afterwards sent home by the Suffolk Bank for collection. This system, with slight modifica- tions, continued in successful operation until 1858. The circula- tion of the New England banks in 1858 was less than $40,000,000 and the redemptions in the course of the year through the Suffolk Bank were $400,000,000. It was the essential merit claimed for the system that it tended to keep the volume of the circulation constantly adjusted to the requirements of business. A branch redemption agency was established at Providence. Legal sanction was given to the system in Vermont by an act of 1842, which levied a tax of 1 % upon bank capital, but remitted this tax to any

bank which should ” keep a sufficient deposit of funds in the city of Boston, and should at that city uniformly cause its bills to be redeemed at par.”

The period from 1836 to 1842 was a trying one for American banking. It was preceded by another great expansion in financial ventures, made without sufficient circulating capital or adherence to conservative banking methods. Foreign capital had come into the country in considerable amounts after the English crisis of 1825, the entire debt of the general government was paid off and a tremendous speculation occurred in public lands, which were expected to advance rapidly in value as the result of immigration and the growth of the country. The sales of public lands in 1836, on the eve of the crisis, reached 20,074,870 acres I

and brought receipts to the treasury of $25,167,833. How essentially speculative was the mass of these sales is indi- cated by the fact that such receipts declined in 1842 to only $1,417,972. President Jackson pricked the bubble of speculation by the ” Specie circular ” of July n, 1836, requiring payments for public lands to be made only in specie or notes of specie value. Practically every bank in the Union stopped pay- ment, and banking capital fell from $358,442,692 in 1840 to $196,894,309 in 1846. As usual in periods of business collapse the shrinkage of capital did not follow at once the outbreak of the panic, but was the result of gradual liquidation. Specie payments were resumed in 1838, but there was another crash in 1842, after the United States Bank finally suspended.

In New York, which was becoming the chief commercial state of the Union, the banks of New York City were generally sound, but several different systems were tried of securing the circulating notes. The ” safety-fund system,” inaugurated in 1829, provided for a contribution by each bank towards a fund to meet the deficit of any contributing bank which might fail with assets insufficient to meet its liabilities. It was the intention of the act to protect by this fund only the bank-notes, but it was treated as a fund for the payment of all the liabilities of a failed bank and in consequence the fund was exhausted by important failures which occurred in the panics of 1837 and 1857. Before 1843 the issue of notes was not controlled by the state, so that in several cases there were illegal over-issues.

What was called the ” free-banking system ” was inaugurated in New York by the act of 1838. This system permitted any body of

persons, complying with the requirements of the law, to form a bank and issue circulation secured by the deposit of various classes of public bonds. This system was in operation at the outbreak of the Civil War, was imitated in several other states, and became in a measure the model of the national banking system. The state banks of Indiana and Ohio were among the most successful of the state banks, being modelled somewhat on the European plan of a central bank. They held in their states an exclusive charter for issuing notes and had branches at important points throughout the state. Under the manage- ment of Hugh McCulloch, afterwards secretary of the treasury, the bank of Indiana weathered the crisis of 1857 without sus- pending specie payments, and retired its circulation when gold went to a premium in 1862.

One of the defects of the state system of note-issues was the inconvenience which it occasioned. Notes issued outside a state could not safely be received without careful scrutiny as to the responsibility of their issuers. The systems prevailing in New England, in Louisiana, in Ohio and in Indiana were eminently successful, and proved the soundness of the issue of bank-notes upon the assets of a well-conducted commercial bank. But the speculation fostered by loose banking laws in some other states, and the need for uniformity, cast a certain degree of dis- credit upon the state banks, and prepared the way for the acceptance of a uniform banking system in 1864.

The power of note-issue formed a more important part of banking resources before the Civil War than in later years, because the deposit system had not attained its full development. Thus in 1835 circulation and capital of state banks combined were about $335,000,000 and deposits were only $83,000,000, in 1907 circulation and capital of national banks $1,430,000,000, while deposits were $4,322,000,000 — in the earlier period deposits forming less than one-third of the other two items and in the later period three times the other items. The circulation of the state banks fluctuated widely at different periods. A maximum of $149,185,890 was attained in 1837, to decline to $106,968,572 three years later and to a minimum of $58,563,608 in 1843. From this point there was a tendency upward, with some variations, which put the circulation in 1845 at $89,608,71 1 ;

1848, $128,506,091; 1850, $131,366,526; 1854, $204,689,207;

1856, $195,747,950; 1858, $155,208,344; i860, $207,102,477;

1863, $238,677,218.

Other leading items of the accounts of the state banks for representative years are as follows: —

State Banking Progress, 1835-1863.

No. of Year.	Banks.	Capital Stock.	Loans and Discounts.	Deposits.
1835	704	$231,250,337	$365,163,834	$83,081,365
1845	707	206,045,969	288,617,131	88,020,646
1850				

824

217,317,211

364,204,078

109,586,595

1855

1307

332,177,288

576,144,758

190,400,342

i860

1562

421,880,095

69l.945.58o

253,802,129

1863

1466

405,045,829

648,601,863

393,686,226

The National Banking System. — The creation of the national banking system was mainly the outcome of the financial necessities of the Federal government in the Civil War. It was found difficult to float government bonds at profitable rates, and Mr Chase, the secretary of the treasury, devised the scheme of creating a compulsory market for the bonds by offering special privileges to banks organized under Federal charters, which would issue circulating notes only when secured by the deposit of government bonds. But this plan, authorized by the act of 25th

February 1863 (supplemented by the act of 3rd June 1864), was not sufficient to give predominance to the national banks. The state banking systems in the older states were so firmly entrenched in the confidence of the commercial community that it became necessary to provide for imposing a tax of 10% upon the face-value of the notes of state banks in circulation after the 1st of July 1866. The state banks were thus driven out of the note-issuing business, some being converted into national banks, while others continued their commercial business under state laws without the privilege of note-issue. A remarkable growth in the national banking system took place; in 1864 there were 453 national banks with an aggregate capital of $79,366,950, and in 1865 there were 1014 banks with an aggregate capital of $242,542,982.

The national banking system was specially marked by the issue of circulating notes upon United States bonds. Any national bank desiring to issue notes might by law deposit with the United States treasurer bonds of the United States to an amount not exceeding its capital stock, and upon such bonds it might receive circulation equal to 90% of their par- value. No bank could be established which did not invest one-third of its capital in bonds. This was changed in 1874 so as to reduce the requirement to 25%, with a maximum mandatory require- ment of $50,000. Notes were taxed at the rate of 1 % per annum. The banks obtained from the provision for circulation the benefit of what was described by critics as " double interest," being credited with the interest on bonds in the custody of the treasury department, and being also able to lend their notes to the public. But several deductions had to be made: notes could not be issued to the full par-value of the bonds; the tax of 1 % upon circulation reduced by that amount the profit which would otherwise be earned; and the banks had to set aside in gold or other lawful money what was needed for redemption purposes and for reserves. As the banks suspended specie payments at the close of 1861 and great masses of government paper-money were issued, gold ceased to be a medium of exchange except in California, and the new banks redeemed their notes in govern- ment paper. The gold- value of the bank-notes, therefore, rose and fell with that of government notes until the resumption of pay- ments in specie by the national treasury on the 1st of January

1879.

The amount of bank-notes in circulation proved in practice to be

influenced largely by the price of bonds. The maximum originally set for bank circulation was $300,000,000. This was increased in 1870 by $54,000,000, and in 1875 the limit was removed. The circulation reached $362,651,169 on the 1st of January 1883, but afterwards declined materially as bonds became scarce and the price rose. The fact that circulation could be issued to only 90 % of the par- value of the bonds greatly reduced the net profits on circulation when the price of 4 % bonds rose in 1889 above 129 and other classes of bonds rose in like ratio. The circulation of bank-notes fell as low as $167,927,574 on the 1st of July 1891, but afterwards increased somewhat as

the supply of bonds was increased to meet the treasury deficiencies of 1894-1896 and the expenses of the war with Spain.

The national banks supported the government cordially in the measures taken to bring about resumption of gold payments on the 1st of January 1879 under the law of 1875. The banks held more than $125,000,000 in legal tender notes, of which sum nearly one-third was held in New York City. A run upon the treasury for the redemption of these notes would have exhausted the gold funds laboriously accumulated by secretary Sherman and compelled a new suspension. But the banks appointed a committee to co-operate with the treasury, declined to receive gold longer as a special deposit, and resolved to receive and pay balances without discrimination between gold and government notes. Thus resumption was accomplished without jar, and as early as the 17th of December 1878 gold sold at par in paper.

The silver legislation enacted by Congress in 1878 and 1890 caused uneasiness in banking circles, and the banks discriminated against silver dollars and silver certificates in their cash. When the treasury began to lose gold heavily, however, in 1893, a combination of leading bankers in New York, Boston, Phila- delphia, Baltimore and Chicago turned over a large part of their holdings to replenish the government reserves. About 150 national banks suspended during the panic of 1893, but 84 of these afterwards resumed business. As in former periods of depression, the system suffered the greatest decline during the years of liquidation following the actual panic, the number of banks falling from 3856 on the 1st of June 1893 to 3585 on the 1 st of June 1899, an< i aggregate capital falling during the same period from $698,454,665 to $610,028,895.

A new extension was given to the national banking system by the provisions of the gold standard law of 14th March 1900. Banks were authorized to issue circulation to the full par- value of bonds deposited, and the tax upon circulation was reduced from 1 % to I of 1 % in the case of circulation which was secured by the 2% refunding bonds, which were authorized by this law. By issuing 2 % bonds in exchange for those paying a higher interest, at approximately the market-price, it became possible to obtain a given amount of notes upon a smaller investment in bonds, independent of other provisions of the law. Under these provisions the volume of notes outstanding, secured by bonds, which stood on the 31st of October 1899 at $207,920,774, reached on the same date in 1900, $298,829,064; in 1901, $328,198,613; in 1902, $335,783,189; in 1903, $380,650,821; in 1904, $424,530,581; in 1905, $490,037,806; in 1906, $536,933,169; and in 1907 $562,727,614.

The lowest denomination of national bank-notes authorized by law is $5, and not more than one-third of any bank's issues can be of this denomination. The government issues notes for $1 and $2, as well as for higher denominations. The largest amount of bank-notes of One denomination is in bills for $10, which on the 31st of October 1907 constituted $249,946,530 in total outstanding issues of $609,905,441. Of this total circula- tion $562,727,614 was secured by bonds, and the remainder, $47,252,852, was covered by lawful money in the government treasury, deposited for the redemption and retirement of the notes as they might be received.

An important extension of the national system resulted from the authority given by the act of 1900 to incorporate national banks with a capital as low as $25,000, in places having a population not in excess of 3000. The previous minimum limit had been $50,000. Under this provision there were incorporated to the 31st of October 1907 2389 national banks with capitals of less than $50,000, with aggregate capital of $62,312,500, of which 272 banks were conversions of state and private institu- tions, 752 were reorganizations and 1365 were new institutions.

The national banks possess most of the powers of commercial banks, but are not permitted to hold real estate other than their banking houses, unless taken for debt. Five reports are required each year to the comptroller of the currency at dates selected by him without notice, and each bank is subject to the visitation of bank examiners acting under the comptroller. No reserves

against notes are required by existing law except 5%, which is

kept in Washington for current redemption purposes. The redemption system is defective in that redemptions are not authorized at other places, and the notes reach the treasury on an average only about once in two years. For many years the banks were prohibited from retiring more than $3,000,000 of notes monthly, but the limit was raised by an act of 4th March 1907 to $9,000,000 per month.

Reserves are required against deposits to the amount of 2 5 % in so-called ” reserve cities,” and 15% in what are called the ” country banks ” outside of reserve cities. Not all these amounts, however, are required to be kept in cash. The three central reserve cities, where cash is required, with only trifling deductions, are New York, Chicago and St Louis. In other reserve cities, which in 1908 numbered forty, the banks are permitted to deposit half their cash in national banks in central reserve cities, while country banks may deposit three-fifths of their cash in any reserve city. The shareholders of national banks are subject in case of liquidation to double liability upon their shares, and this is now the rule in most of the conservative state banking systems. National bank-notes are not legal tender, but are receivable by the government for all obligations except customs dues.

The panic of 1907 imposed a severe strain upon the cash resources of the banks of New York City, but did not cause any such considerable number of failures as occurred in 1893.

Payment of cheques in currency was suspended in New York on the 28th of October 1907, and continued until about the beginning of the year 1908. The panic was precipitated by over-specula- tion by a group of national banks, followed by the suspension of the Knickerbocker Trust Company on the 22nd of October with deposits of $48,000,000. Then came runs on other companies, a deficit in the required reserves of New York banks of$38,838,825in the week of 2nd November, and arrangements for the importation of foreign gold to an amount which soon approached $100,000,000. With an increase during the autumn

of about $77,000,000 in national bank circulation, a transfer of $72,000,000 from the treasury to the banks, and a further decline in required reserves in New York during the next week, the amount of currency which was added to the circulation or disappeared during a few weeks of the panic amounted to more than $275,000,000, or nearly one-tenth of the usual volume of circulation in the country. The total bank-note circulation on the 28th of December 1907 had risen to $687,340,835; but this amount was abnormal and was reduced somewhat during the spring of 1908.

The position of the trust companies, especially those of the city of New York, was one of the disturbing features of the panic. These companies were comparatively a small factor in New York finance at the time of the panic of 1893. The capitalization of all the trust companies in the United States, even as late as 1897, was only $106,968,253, and individual deposits were $566,922,205. The capital of these companies had risen in 1907 to $276,146,081 and their deposits to $2,061,623,035. The trust companies of New York were required by the' law of the state to maintain only 5% of their demand deposits in cash in their vaults. Whilst most of them had also large amounts on deposit in national banks, these reserves proved inadequate to sustain the vast mass of credit which was built upon them. The absolute amount of the reserves, however, was perhaps less important than the class of business to which some of the less conservative of these companies had committed themselves. Instead of keeping their assets liquid by purchases of commercial paper and loans on first-class negotiable securities, they had in some cases engaged in speculative underwritings and had locked up their funds in enterprises requiring a long time for their consummation.

It was these combined influences which led to distrust of the Knickerbocker Trust Company, and to the runs upon that company and others during the late days of October and early November. The result was to reduce the total resources of the forty-eight trust companies of Greater New York from. $1,205,019,700 on the 2 2nd of August 1907 to $858, 674,000 on the 19th of December 1907. Individual deposits subject to cheque fell from $692,744,900 to $437,733,400. Such a reduction of resources

within so short a time, most of it being accomplished within a few weeks, has hardly ever been recorded in the history of bank-

ing, and the fact that the stronger companies were able to call in their cash and meet such demands was evidence to a certain extent that the criticisms upon them were exaggerated. The necessity for stronger reserves and for greater safeguards against speculative operations was so strongly impressed upon the public mind, however, that several restrictive measures were enacted at the session of the New York legislature in 1908, designed to prevent any abuses of this sort in the future.

The function of issuing notes, which is exclusively a privilege of national banks, has diminished in importance in America, as other methods of transferring credit have attained a wide develop- ment. This has not only been true of the national banks them- selves, but has accounted for the development alongside the national banking system of state banks, private banks and trust companies, which have not had the privilege of note-issue, but have obtained other privileges sometimes greater than those of the national banks.

The aggregate resources of all classes of banks in the United States have greatly increased in recent years. The folio wi ng table shows the increase in the chief items of the accounts of national banks for repre- sentative years from the reports made nearest to the beginning of the

year :

Progress of National Banks, 1865-1908

No. of

Year.

Banks.

Loans and Discounts.

Individual Deposits.

1865

638

$166,448,718

$183,479,636

1870

1615

688,875,203

546,236,881

1875

2027

955.862,58o

682,846,607

1880

2052

933.543.66i

755.459,966

1885

2664

1,234,202,226

987,649,055

1890

3326

1,811,686,891

1,436,402,685

1895

3737

1,991,913.123

1,695,489,346

1897

3661

1,901,160,110

1,639,688,393

1899

3590

2,214,394.838

2,225,269,813.

1900

3602

2,479,819,494

2,380,610,361

1901

3942

2,706,534,643

2,623,997,521

1902

4291

3.038,255.447

2,964,417.965

1903

4666

3,303,148,091

3,152,878,796

1904

5180

3,469,195,043

3,300,619,898

1905

5528

3,728,166,086

3,612,499,598

1906

59i 1

4,071,041,164

4,088,420,135

1907

6288

4.463,267,629

4.115.650,294

1908

6625

4.585.337.094

4.176,873,717

The combined returns of state and private banks, savings banks and loan and trust companies in the United States show a growth within a few years which is indicated by the principal items of their accounts : —

Resources of State Banks, Trust Companies, &c.

Items.

1897.

1907.

Capital stock Surplus and profits Loans Deposits . Total Resources .

$380,090,778 382,436,990 2,231,013,262 3.324.254.807 4,258,677,065

$807,178,262

924,655,010

6,099,897,535

8,776,755,207

11,168,514,516

The aggregate banking power of the United States, as computed by the comptroller of the currency in his annual report for 1907, increased from $5,150,000,000 in 1890 to $17,824,800,000 in 1907, and the banking power of foreign countries from $10,835,000,000 to $27,034,200,000, representing an increase for all reporting countries from $15,985,000,000 to $44,859,000,000.

The system of clearing cheques has attained a higher development in the United States than in any other country, except perhaps, Great Britain. Clearing-houses exist in about 112 leading cities, and the aggregate clearings for the year ending 30th September 1907 reached $154,662,515,258. The New York Clearing-House in- evitably does a large proportion of this business; its clearings constituted in 1906 67.2 % of the total clearings in 55 of the larger cities. The volume of clearings fluctuates greatly with the volume of stock-exchange transactions and with the business pros- perity of the country. An indication of these fluctuations at New York is afforded by the following table, taken from Conant's Prin- ciples of Money and Banking, brought down to 1907.

The Clearing-House Committee of the New York Clearing-House exercises a powerful influence over the banking situation through its ability to refuse aid in emergencies to a bank which is unwisely conducted. This power was used in the panic of 1907 to

eliminate several important, but speculative, financial interests from control of national banks. Only national and state banks and the sub-

ENGLISH LAW]

BANKS AND BANKING

349

Variations in Clearings at New York

Average

Per cent

Year.

Daily

Balances to

Remarks.

Clearings.

Clearings.

1870

$90,274,479

372

1873

115,885,794

4-15

Great business activity.

1874

74,692,574

5-62

Industrial depression.

1881

159,232,191

3-66

Renewal of railway building.

1885

82,789,480

5-12

Results of bank panic.

1890

123,074,139

4-65

Business expansion.

1894

79,704,426

6-54

Depression following panic.

1896

96,232,442

6-28

Free silver panic.

1899

189,961,029

5-37

Renewed confidence and activity.

1901

254,193,639

4-56

Culmination of industrial flota- tions.

1904

195,648,514

5-20

Diminished stock-exchange and business activity.

1906

342,422,773

3,69

Stock-market activity.

Treasury were members of the Clearing-House at this time. Their weekly reports of condition were awaited every Saturday as an index of the state of the money-market and the exchanges ; but this index was incomplete and sometimes misleading, because regular weekly reports were not made by trust companies. It was announced early in 1908 by the state superintendent of banking that he would exercise a power vested in him by law to require weekly reports in future from trust companies, so that the two classes of reports would present a substantially complete mirror of banking conditions in New York.

Authorities. — William M. Gouge, A History of Paper Money and Banking in the United States (Philadelphia, 1833) ; Condy Raguet, A Treatise on Currency and Banking (Philadelphia, 1840) ; J. S. Gibbons, The Banks of New York, their Dealers, the Clearing-House and the Panic of 185? (New York, 1858) ; Albert S. Bolles. Financial History of the United States (3 vols., New York, 1884-1886); Charles F. Dunbar, Chapters on the Theory and History of Banking (New York and London, 1891); Horace White, Money and Banking (Boston, 1902) ; Charles A. Conant, A History of Modern Banks of Issue (New York, 1896); Alexander D. Noyes,

Thirty Years of American Finance (New York, 1898); Davis Rich Dewey, Financial History of the United States (New York and London, 1903) ; John C. Schwab, The Confederate States of America, 1861-186$ (New York, 1901); David Kinley, The Independent Treasury of the United States (New York, 1893) ; Report of the Monetary Commission of the Indianapolis Convention (Chicago, 1898) ; Charles A. Conant, The Principles of Money and Banking (2 vols., New York, 1905) ; William G. Sumner, A History of American Currency (New York, 1884); Amos Kidder Fiske, The Modern Bank (New York, 1904); William G. Sumner, A History of Banking in the United States (New York, 1896), being vol. i. in A History of Banking in All the Leading Nations; John Jay Knox, History of Banking in the United States (rev. ed., New York, 1900); and R. C. H. Catterall, The Second Bank of the United States (Chicago, 1903).

Much statistical information is contained in the annual reports of the comptroller of the currency of the United States, published annually at Washington. (C. A. C.)

English Law affecting Banks and their

Customers

Issue of Notes. — The legislation which culminated in the Bank Charter Acts of 1844 and 1845 secured to the Bank of England the absolute monopoly of the note issue within the city of London and a 3-m. radius. Outside that radius, and within 65 m. of the city, there is a concurrent right in banks, consisting of six or less than six persons, established before 1844, and issuing notes at that date; beyond the 65-m. radius the privilege may Be exercised by all banks established before 1844, an d then issuing notes, who have not since lost their right to do so by bankruptcy, abandonment of business, or temporary suspension of issue. According to some authorities, the effect of 20 and 21 Vict, cap. 49, sec. 12 [re-enacted Companies Consolidation Act 1908, sec. 286 (d)] was to sanction the increase in the constitution of any bank issuing notes outside the 3-m. and within the 65-m. radius from six to ten persons without affecting the power to issue notes. The rule as formulated above is, however, that enunciated by Bowen J. in Capital and Counties Bank v. Bank of England, 1889; 61 L.T. 516. The increase in the number of joint-stock banks and the gradual absorption of the smaller and older concerns have had the effect of minimizing the output of notes other than those issued by the Bank of England, and, as exem-

plified by the case of The Attorney-General v. Birkbeck, 12 Q.B.D. 57, it would seem impossible to devise any scheme by

which the note-issuing power of an absorbed bank could be continued to the new or amalgamated body. But a bank having the right would not necessarily lose it by absorbing other banks (Capital and Counties Bank v. Bank of England). Foreign banks may establish branches in Great Britain on complying with the regulations imposed on them by the Companies Consolidation Act 1908, but cannot apparently issue notes, even though payable abroad.

Deposit Business. — The term ” bank of deposit ” gives a mistaken idea of the real relation between banker and customer. So long ago as 1*848 it was decided by the House of R el „ aon Lords in Foley v. Hill, 2 H. of L. 28, that the real between relation between banker and customer was that of bankerand debtor and creditor, not in any sense that of trustee customer – and cestui que trust, or depositee and depositor, as had been formerly supposed and contended. The ordinary process by which a man pays money in to his account at his banker’s is in law simply lending the money to the banker; it fixes the banker with no fiduciary relation, and he is in no way responsible to the customer for the use he may make of the money so paid in. And as being a mere debt, a customer’s right to recover money paid in is barred on the expiration of six years by the Statute of Limitations, if there has been no payment meantime on account of principal or interest, and no acknowledgment sufficient to bar the statute (Pott v. Clegg, 16 M. & W. 321). Such a state of affairs, however, is hardly likely to arise, inasmuch as, in the absence of specific appropriation, earlier drawings out are attri- buted to the earlier payments in, as in the ordinary case of current accounts, and so the items on the credit and debit side cancel each other. An apparent exception to this system of appropriation exists in cases where a man wrongfully pays into his own account moneys held by him in a fiduciary capacity. In such circumstances he is presumed to have drawn out his own moneys rather than those affected by the trust, and so long as the account is in credit, any balance will be attributed to the trust money. As between contending claims to the money, based on different breaches of trust, the ordinary rule of appro- priation will apply.

It has often been suggested that the only method of withdrawing money from a banker is by cheque, that the presentation of a cheque is a condition precedent to the liability of the

banker to repay. This is not so; such Che i" es – a view being inconsistent with the cases establishing the effect of the Statute of Limitations on money left in a banker's hands, and with the numerous cases in which a balance at a bank has been attached as a simple and unconditional debt by a garnishee order, as, for instance, in Rogers v. Whiteley, 1892, A.C. 118. The banker's position with regard to cheques is that, superadded to the relation of debtor and creditor, there is an obligation to honour the customer's cheques provided the banker has a sufficient and available balance in his hands for the purpose (Foley v. Hill). If, having such funds in his hands, the banker dishonours a cheque, he is liable to the customer in substantial damages without proof of actual injury having accrued (Rolin y. Steward, 14 C.B. 595). Where several cheques are presented simultaneously and the available balance is insufficient to pay all, the banker should pay as many as the funds will cover, and is not bound to discriminate between particular cheques. It would seem a legitimate condition that a cheque should be drawn in the ordinary recognized form, not in one raising any question or doubt as to its validity or effect. Cheques drawn to " wages or order," " petty cash or order," or the like, are common, and are sometimes regarded as payable to bearer. Such payees are not, however, " fictitious or non-existent persons," so as to render the cheques payable to the bearer under sec. 7, subs. 3 of the Bills of Exchange Act 1882, nor can such payees endorse. Some banks refuse to pay such cheques, and it is conceived they are justified in so doing. Money paid in so shortly before the presentation of the cheque that there would not have been time to pass it through the books of the bank would not be treated as available for drawing against. If a person have an account at one branch of a bank, he is not entitled to draw cheques on another branch

where he has either no account or is overdrawn, but the bank has, as against the customer, the right to combine accounts at different branches and treat them as one account {Garnet v. M'Ewen, L.R. 8 Ex. 10). Funds are not available so long as a garnishee order, founded on a judgment against the customer, is pending, since it attaches all moneys on current account irrespective of the amount of the judgment (Rogers v. Whilelcy).

The very questionable practice of post-dating cheques has been the source of considerable doubt and inconvenience to bankers. The use of such documents enables the drawer to obtain the results of a bill at a fixed future tiate without the expense of a regular bill-stamp. But the Bills of Exchange Act i882,sec. 13, subs. i, provides that " a bill is not invalid by reason only that it is ante-dated or post-dated, or that it bears date on a Sunday." The banker cannot therefore refuse to pay a cheque presented after the apparent date of its issue on the ground that he knows it to have been post-dated. On the other hand, he is entitled and indeed bound to refuse payment if such a cheque is presented before the apparent date of its issue (Morley v. Culverwell, 7 M. & W. at p. 178). Revocation of authority to pay a cheque must come to the banker's conscious knowledge and be unequivocal both in terms and method of communication. He is not bound to act on an unconfirmed telegram {Curtice v. London City & Midland Bank [1908] , 1 K.B. 203). The banker's authority to pay cheques is terminated by the death, insanity or bankruptcy of the customer, or by notice of an available act of bankruptcy committed by him.

The banker is bound to observe secrecy with respect to the customer's account, unless good cause exists for disclosure, and the obligation does not cease if the account becomes overdrawn {Hardy v. Veasey, L.R. 3 Ex. 107). In England a cheque is not an assignment of funds in the banker's hands (Bills of ˆExchange Act 1882, sec. 53). The holder of the cheque has therefore no claim on the banker in the event of payment being refused, his remedy being against the drawer and endorser, if any. On this section is also based the custom of English bankers not to pay part of the amount of a cheque where there are funds, though not sufficient to meet the whole amount. The section does not apply to Scotland, where it would seem that the bank is bound to pay over what funds it has towards satisfaction of the cheque. A banker is entitled to hold paid cheques as vouchers until there has been a settlement of account between him and the customer. The entries in a pass-book constitute prima facie evidence against the banker, and when returned by the customer without comment, against him; but the proposition that such return constitutes a settlement of account has been much dis- puted. Indeed where forgery is the ground of repudiation of a cheque, no dealings or omissions of the customer with regard to the pass-book would seem to preclude him from objecting to being debited and throwing the loss on the banker (Kepitigalla Rubber Co. v.

National Bank of India, 25 Times L.R. 402). As against the banker, however, credit entries in the pass-book cannot be disputed if the customer has altered his position in reliance thereon, and cheques drawn against an apparent balance must be honoured (Holland v. Manchester &* Liverpool District Bank, 25 Times L.R. 386).

The rule by which the holder of a cheque has no direct recourse against the banker who dishonours it, holds good even where the banker has before issue marked the cheque as good for the amount, such marking not amounting to an acceptance by the banker. As between banker and banker, however, such marking or certifying probably amounts to a binding representation that the cheque will be paid, and, if done by request of the drawer, the latter cannot subsequently revoke the authority to pay. In certain circumstances, marking at the instance of the person presenting the cheque for payment may amount to an under-taking by the banker to hold the money for his benefit (In re Beaumont [1902] , 1 Ch. p. 895).

A banker either paying or collecting money on a cheque to which the person tendering it for payment or collection has no title or a defective title is prima facie liable to the true owner for conversion or money had and received, notwithstanding he acted

in perfect good faith and derived no benefit from the operation. Payment of an open cheque, payable to bearer either originally or by endorsement, is, however, in all cases a good payment and discharge (Charles v. Blackwell, 2 C.P.D. at p. 158). Limited protection in other cases has been extended by legislation to the banker with regard to both payment and collection of cheques, usually on the principle of counterbalancing some particular risk imposed on him by enactments primarily designed to safe- guard the public.

By sec. 19 of the Stamp Act 1853, the banker paying a draft or order payable to order on demand, drawn upon him, was relieved from liability in the event of the endorsement having been forged or unauthorized. This enactment was not repealed by the Bills of Exchange Act 1882, and, in London City & Mid- land Bank v. Gordon (1903), A.C. 240, was held to cover the case of drafts drawn by a branch of a bank on its head office. Sec. 60 of the Bills of Exchange Act 1882 extends like protection to the banker in the case of cheques, the definition of which therein as ” bills drawn on a banker payable on demand ” debars drafts of

the above-mentioned description. Such definition, involving the unconditional character of the instrument, also precludes from the protection of this section the documents now frequently issued by corporations and others, which direct bankers to make payments on a specific attached receipt being duly signed (London City &* Midland Bank v. Gordon). Sec. 17 of the Revenue Act 1883, however, applies to these documents the crossed cheques sections of the Bills of Exchange Act 1882 (see Bavius, Jr., &" Sims v. London & South-Western Bank [1900], 1 Q.B. 270), while denying them the position of negotiable instruments, and a banker paying one of them crossed, in accordance with the crossing and in the absence of any indication of its having been transferred, could probably claim immunity under sec. 80. The Bills of Exchange Act 1882 contains no direct prohibition against a banker paying a crossed cheque otherwise than in accordance with the crossing, but if he do so he is liable to the true owner for any loss suffered by him in consequence of such payment (sec. 79), and is probably unable to charge his customer with the amount. A banker paying a crossed cheque in accordance with its ostensible tenor obtains protection under sec. 80 and the proviso to sec. 79. Questions have arisen as to the bearing of the crossed cheques sections when a crossed cheque drawn on one branch of a bank is paid in for collection by a customer at another branch; but the transaction is so obviously a legitimate and necessary one that either by the collecting branch may be regarded as a separate bank for this purpose, or sec. 79 may be ignored as inapplic- able (Gordon v. London City 6* Midland Bank [1902], 1 K.B. 242C.A.).

The collection of crossed cheques for a customer being virtu- ally incumbent on a banker, qualified immunity is accorded him in so doing by sec. 82, a final exposition of which was given by the House of Lords in London Citybf Midland Bank v. Gordon (1903), A.C. 240. To come within its provisions, the banker must fulfil the following conditions. He must receive the cheque from, and the money for, a customer, i.e. a person with whom he has definite and existing business relations (see Great Western Ry. Co. v. London & County Bank [1901], A.C. 414). He must take the cheque already crossed generally or specially to himself. His own crossing under sec. 77 is absolutely inefficacious in this connexion. He must take the cheque and receive the money in good faith and without negligence. Negligence in this relation is the omission to exercise due care in the interest of the true owner, not necessarily the customer. To avoid this disquali-

fication of negligence, the banker must see that the endorsements, where necessary, are ostensibly correct; he must satisfy himself of the authority where an endorsement is per procuration; he must not take for private account a cheque which on its face indicates that the holder is in possession of it as agent, or in_an official capacity, or for partnership purposes (Hannan's Lake View Central Ld. v. Armstrong & Co., 16 Times L.R. 236; Bevan v. National Bank, 23 Times L.R. 65); he must not take a cheque marked " account payee " for an account other than that

indicated (Bevan v. National Bank). It is further demonstrated by the Gordon case that , the banker only secures protec- tion so long as he is acting strictly as a conduit pipe, or as agent for the customer. If he put himself in the position of owner of the cheque, he no longer fulfils the condition of receiving the money only for the customer. In the Gordon case, adoption of the not uncommon practice of crediting cheques as cash in the bank's books before the money was actually received was held equivalent to taking then as transferee or owner, and to debar the bank from the protection of sec. 82. The anxiety and in- convenience caused to bankers by this unexpected decision was ultimately removed by the Bills of Exchange (Crossed Cheques) Act 1906, which enacts that a banker receives payment of a crossed cheque for a customer within the meaning of sec. 82 of the Bills of Exchange Act 1882, notwithstanding that he credits his customer's account with the amount of the cheque before receiving payment thereof. Apparently the scope of this act must be confined to its immediate object, and it does not affect the relations and rights between the banker and his customer or parties to the cheque arising from such crediting as cash. For instance, the customer, in the absence of agreement to the con- trary, may at once draw against cheques so credited, while the banker may still debit the customer with the amount of the cheque if returned unpaid, or sue the drawer or indorser thereon.

The protection to the collecting banker is in no way affected by the cheque being crossed " not negotiable," or by the nature of the fraud or crime by which the cheque was obtained by the customer or any previous possessor, although there are dicta

which have been interpreted in the contrary sense. Nor does the fact that the customer is overdrawn deprive the banker of the character of a collecting agent, unless the cheque be de- finitely given and taken in reduction of such overdraft. Where the conditions requisite for protection exist, the protection covers not only the receipt of the money, but all operations usual in business and leading up to such receipt, on the basis of the customer's title being unimpeachable. The provisions of the crossed cheques sections of the Bills of Exchange Act 1882 are extended to dividend warrants by sec. 95 of that act, and to certain orders for payment issued by^. customer of a banker by sec. 17 of the Revenue Act 1883, as before stated. But the wording of the Bills of Exchange (Crossed Cheques) Act 1906, specifying as it does cheques alone, appears to exclude docu- ments of both these classes from its operation. With regard to the orders for payment, inasmuch as the same section which brings them within the crossed cheques sections expressly pro- vides that they shall not be negotiable, a banker would probably be protected only in taking them from the specified payee, though this distinction has been ignored in some recently decided cases.

Where a banker incurs loss through forgery or fraud in circum- stances not covered by statutory protection, his right to relief, Fraud. ^ an y > must depend on general principles. He cannot charge his customer with payments made on. a forgery of that customer's signature, on the ground either that he is presumed to know such signature or that the payment is un- authorized. But if the customer has accredited the forgery, or, having knowledge or reasonable ground for belief that it has been committed, has failed to warn the banker, who has thereby suffered loss or prejudice, the customer will be held estopped from disputing the banker's right to debit him with the amount (Vagliano v. Bank of England [1891], A.C. 107; M'Kenziev. British Linen Co. 6 A.C. 82; Ewing v. Dominion Bank [1904], A.C. 806). The doctrine of the fictitious person as payee may also exonerate a banker who has paid an order bill to a wrongful possessor. Payment on a forgery to an innocent holder is pay- ment under mistake of fact; but the ordinary right of the payor to recover money so paid is subordinated to the necessity of safe- guarding the characteristics of negotiability. Views differ as to whether the recovery is precluded only where the opportunity of giving notice of dishonour is lost or prejudiced by delay in reclaiming payment, or whether mere possibility of damage is sufficient (cf. London &* River Plate Bank v. Bank of Liverpool

[1896] , 1 Q.B. 7, and Imperial Bank of Canada v. Bank of Hamilton [1903] , A.C. 49).

Cases have frequently arisen where the carelessness of a customer in filling up cheques has enabled a person to fraudulently increase the sum for which such cheques were originally drawn. In Colonial Bank of Australasia v. Marshall [1906] , A.C. 559, the judicial committee of the privy council held that the affording such facilities for forgery was no breach of the customer's duty to his banker, and that the latter was not entitled to debit the customer with more than the original amount. As before stated, the customer's dealings with the pass-book cannot, in the present state of the authorities, be relied on as debarring him from disputing unauthorized payments appearing therein.

The payment of bills accepted payable at the bank is not, like the payment of cheques, an essential obligation of the banker, and the risk involved is enhanced by the fact that the banker must pay or refuse payment at once, no interval valuables. being allowed for verification of endorsements. The abolition or modification of the practice has frequently been advocated, but it is "one of the facilities which competition compels bankers to extend to their customers. On the same basis stands the receipt of a customer's valuables for safe custody. The question of the banker's responsibility for the loss of goods so deposited with him was raised, but not decided, in an action brought by Mrs Langtry against the Union Bank of London in 1896. Certain jewels belonging to her had been delivered up by the bank to an unauthorized person on a forged order. The case was settled; but bankers being desirous to ascertain their real position, many legal opinions were taken on the point, and after consideration of these, the Central Association of Bankers issued a memorandum, in which they stated that the best legal opinion appeared to be that a distinction must be drawn between cases in which valuables were by mistake delivered to the wrong person and cases in which they were destroyed, lost, stolen or fraudu- lently abstracted, whether by an officer of the bank or some other person. That in the former case the question of negligence did not arise, the case being one of wrongful conversion of the goods by a voluntary act for which the bank was liable apart from any question of negligence. That, in the second case, that of loss or theft r the banker, being a gratuitous bailee, would only be liable if he had failed to use such care as an ordinary prudent man would take of valuables of his own. The latter rule is practically that laid down in Giblin v. MacMullen, L.R. 2 P.C. 318, but in

estimating the amount of care to be taken by the banker, the nature of the goods, if known or suspected, and the exceptional means of protection at the disposition of bankers, such as strong-rooms, must be taken into consideration. Methods of obviating both classes of risk by means of special receipts have frequently been suggested, but such receipts do not appear to have come into general use.

Theoretically, bankers are supposed to refuse accounts which are either expressedly or are known to be trust accounts. In practice, however, it is by no means uncommon to Trustees find accounts opened with a definite heading indicating the fiduciary capacity. In other cases, circumstances exist which affect the banker with notice of that capacity. In either case, however, the obligation to honour the customer's cheque is the predominant factor, and the banker, is not bound or entitled -to question the propriety or object of the cheque, unless he has very clear evidence of impending fraud (Gray v. Johnston, L.R. 3 H. of L. 1). Even though the banker have derived some personal benefit from the transaction, it cannot be impeached unless the banker's conduct amount in law to his being party or privy to the fraud, as where he has stipulated or pressed for the settlement or reduction of an ascertained overdraft on private account, which has been effected by cheque on the trust account (Coleman v. Bucks &° Oxon Union Bank [1897], 2 Ch. 243). A banker is entitled, in dealing with trust moneys,known to be such, to insist on the authority of the whole body of trustees, direct and not deputed, and this is probably the safest course to adopt. Scarcely larger responsibility devolves on Joint Stock Banks appointed custodian trustees under the Public Trustee Act 1906*

a remunerative position involving custody of trust funds and securities, and making and receiving payments on behalf of the estate, while leaving the active direction thereof in the hands of the managing trustees.

Other incidents of the ordinary practice of banking are the discounting of bills, the keeping of deposit accounts, properly so called, and the making of advances to customers, ‘atiag. e i tner by way of definite loan or arranged overdraft. So far as the discounting of bills is concerned, there is little to differentiate the position of the banker from that of any ordinary bill-discounter. It has been contended, however, that the peculiar attribute of the banker’s lien entitled him to hold funds of the customer against his liability on current discounted bills. This contention was ultimately disposed of by Bowen v. Foreign &* Colonial Gas Company, 22 W.R. 740, where it was pointed out that the essential object of a customer’s discounting bills with his banker was to feed the current account, and that a possible liability constituted no set-off against an existing debt. Whether a particular bill has been taken for discount or collection is a question of fact. As in the payment’of bills, so in the collec- tion of them, there is no statutory protection whatever for the banker; as against third parties he can only rely either on the customer’s title or his own as a holder for value, if no forged endorsement intervene and he can establish a con- sideration.

A deposit account, whether at call or on fixed notice, does not constitute any fiduciary relation between the depositor and the banker, but merely a debt due from the latter to the accounts, former. It has been suggested that cheques can be drawn against deposit account on call, and, though a banker might safely honour such a cheque, relying, if necessary, on his right of lien or set-off, there appears no legal right in the customer to enforce such payment. Deposit receipts given by bankers are exempt from stamp duty, even though they contain an undertaking with respect to payment of principal and interest. They are clearly not negotiable instruments, but it is difficult to deduce from the cases how far dealings with them may amount to an equitable assignment of the moneys they represent. Prob- ably deliberate definite transfer, coupled with endorsement, would confer an effective title to such moneys. Where, as is not uncommon, the form of deposit note includes a cheque, the banker could not refuse to pay were the cheque presented and any superadded formalities complied with.

There is no obligation on a banker to permit his customer to overdraw, apart from agreement express or implied from course of business. Drawing a cheque or accepting Overdrafts a jˆjjj p a y a bi e a t the banker’s which there are not funds advances. to me et is an implied request for an overdraft, which the banker may

or may not comply with. Interest is clearly chargeable on overdrafts whether stipulated for or not. There is no direct authority establishing this right in the banker, and interest is not usually recoverable on mere debts, but the charge is justifiable on the ground of the universal custom of bankers, if not otherwise. The charging of compound interest or interest with periodical rests has been supported where such system of keeping the accounts has been brought to the notice of the customer by means of the pass-book, and not objected to by him, but in the present attitude of the courts towards the pass-book some further recognition would seem necessary. Such system of charging interest, even when fully recognized, only prevails so long as the relation of banker and customer, on which it is founded, continues in force; the taking a mortgage for the existing debt would put an end to it.

The main point in which advances made by bankers differ from those made by other people is the exceptional right pos- sessed by bankers of securing repayment by means of the banker's lien. The banker's lien is part of the law merchant and entitles him, in the absence of agreement express or implied to the contrary, to retain and apply, in dis- charge of the customer's liability to him, any securities of the customer coming into his possession in his capacity as banker. It includes bills and cheques paid in for collection (Currie v.

Lien.

Misa, 1 A.C. 564). Either by virtue of it, or his right of set- off, the banker can retain moneys paid in by or received for the credit of the customer, against the customer's debt to him. Goods deposited for safe custody or moneys paid in to meet particular bills are exempt from the lien, the purpose for which they come to the banker's hands being inconsistent with the assertion of the lien. The existence of the banker's lien entitles him to sue all parties to bills or cheques by virtue of sec. 27, subs. 3 of the Bills of Exchange Act, and to the extent of his advances his title is independent of that of the previous holder. Moreover, the banker's lien, though so termed, is really in effect an implied pledge, and confers the rights of realization on default pertaining to that class of bailment. But with regard to the exercise of his lien, as in many other phases of his relation to his customer, the banker's strict rights may be curtailed or circumscribed by limitations arising out of course of business. The principle, based either on general equity or estoppel and independent of definite

agreement or consideration, requires that when dealings between banker and customer have for a reasonable space of time proceeded on a recognized footing, the banker shall not suddenly break away from such established order of things and assert his strict legal rights to the detriment of the customer. By the operation of this rule, the banker may be precluded from asserting his lien in particular cases, as for instance for an over-draft on one account against another which had habitually been kept and operated on separately. It equally prevents the dishonouring of cheques in circumstances in which they have hitherto been paid independent of the actual available balance.

Restrictions arising from course of business can of course be put an end to by the banker, but only on reasonable notice to the customer and by providing for outstanding liabilities under-taken by the latter in reliance on the continuance of the pre-existing state of affairs (see Buckingham v. London 6″ Midland Bank, 12 Times L.R. 70). As against this, the banker can, ir. some cases, fortify his position by appeal to the custom of bankers. The validity of such custom, provided it be general and reason- able, has frequently been recognized by the courts. Any person entering on business relf tions with a banker must be taken to contemplate the existence of such custom and implicitly agree that business shall be conducted in accordance therewith. Practical difficulty has been suggested with regard to proof of any such custom not already recognized in law, as to how far i.', can be established by the evidence of one party, the bankers, unsupported by that of members of the outside public, in most cases impossible to obtain. It is conceived, however, that on the analogy of local custom and the Stock Exchange rules, such outside evidence could be dispensed with, and this is the line apparently indicated with relation to the pass-book by the court of appeal in Vagliano's case (23 Q.B.D. at p. 245). The unquestionable right of the banker to summarily debit his cus-tomer's account with a returned cheque, even when unindorsed by the customer and taken by the banker in circumstances constituting him a transferee of the instrument, is probably referable to a custom of this nature. So is the common practice of bankers to refuse payment of a so-called " stale " cheque, that is, one presented an unreasonable time after its ostensible date; although the fact that some banks treat a cheque as stale after six months, others not till after twelve, might be held to militate against the validity of such custom, and lapse of time is not included by the Bills of Exchange Act among the matters working

revocation of the banker's duty, and authority to pay his customer's cheque. Indirectly, this particular custom obtains some support from sec. 74 (2) of the Bills of Exchange Act, although the object of that section is different.

That section does, however, import the custom of bankers into the reckoning of a reasonable time for the presentation of a cheque, and with other sections clears up any doubts which might have arisen on the common law as to the right of the holder of a cheque, whether crossed or not, to employ his banker for its collection, without imperilling his rights against prior parties in case of dishonour. On dishonour of a cheque paid in for

collection, the banker is bound to give notice of dishonour. Being in the position of an agent, he may either give notice to his principal, the customer, or to the parties liable on the bill. The usual practice of bankers has always been to return the cheque to the customer, and sec. 49, subs. 6 of the Bills of Exchange Act is stated to have been passed to validate this custom. Inasmuch as it only provides for the return of the dishonoured bill or cheque to the drawer or an endorser it appears to miss the case of a cheque to bearer or become payable to bearer by blank endorsement prior to the customer's.

Where a bank or a banker takes a mortgage, legal or equitable, or a guarantee as cover for advances or overdraft, there is nothing necessarily differentiating the position from that of any other mortgagee or guaranteed party. It has, however, fallen to banks to evoke some leading decisions with respect to the former class of security. InLondon Joint Stock Bank v. Simmons ([1892] , A.C. 201) the House of Lords, professedly explaining their previous decision in Sheffield v. London Joint Slock Bank, 13 A.C. 333, determined that negotiable securities, commercial or otherwise, may safely be taken in pledge for advances, though the person tendering them is, from his known position, likely to be holding them merely as agent for other persons, so long as they are taken honestly and there is nothing tangible, outside the man's position, to arouse suspicion. So again in Lloyd's Bank v. Cooke [1907] , 1 K.B. 794, the bank vindicated the important principle that the common law of estoppel still obtains with regard to biils, notes and cheques, save where distinctly annulled or abrogated

by the Bills of Exchange Act, and that therefore a man putting inchoate negotiable instruments into the hands of an agent for the purpose of his raising money thereon is responsible to any one taking them bona fide and for value, although the agent may have fraudulently exceeded and abused his authority and the case does not fall within the provisions of the Bills of Exchange Act.

With regard to guarantees, the main incidents peculiarly affecting bankers are the following. The existence of a guarantee does not oblige the banker to any particular system of keeping the account. So long as it is not unfairly manipulated to the detriment of the guarantor, there is no obligation to put moneys paid in, without appropriation, to the guaranteed rather than to the unguaranteed account, and on the termination of a guarantee, the banker may close the account, leaving it to be covered by the guarantee, and open a new one with the customer, to which he may devote payments in, not otherwise appropriated. Where by its nature or terms a continuing guarantee is revocable either summarily or on specified notice, difficult questions may arise on such revocation as to the banker's duty and obligations towards the customer, who has probably incurred liabilities on the strength of the credit afforded by the guarantee. Although the existence of a guaran- tee does not bind the banker to advance up to the prescribed limit, he could not well, on revocation, immediately shut off all facilities from the customer without notice, while subsequent purely voluntary advances might not be covered by the guaran- tee. These contingencies should therefore be fully provided for by the guarantee, particularly the crucial period of the pendency of notice.

Authorities. — The Institute of Bankers (London), Questions on Banking Practice (6th ed., 1909); J. Douglas Walker, A Treat- ise on Banking Law (2nd ed., 1885); Chalmers, Bills of Exchange (7th ed., 1909); Sir J. R. Paget, The Law of Banking (2nd ed., 1908) ; H. Hart, The Law of Banking (2nd ed., 1906). (J. R. P.)

BANKSIA, an Australian genus of shrubs and trees (natural order Proteaceae), with leathery leaves often deeply cut and handsome dense spikes of flowers. It is named after Sir Joseph Banks (g.v.). The plants are grown in England for their handsome foliage as evergreen greenhouse shrubs.

BANKURA, a town and district of British India, within the

Burdwan division of Bengal. The town has a population of 20,737 The district has an area of 2621 sq. m., and in 1901 its population was 1,116,411, showing an increase of 4% in the decade. It is bounded on the N. and E. by Burdwan district;

on the S. by Midnapur district; and on the W. by Manbhum district. Bankura forms a connecting link between the delta of the Ganges on the E. and the mountainous highlands of Chota Nagpur on the W. Along its eastern boundary adjoining Burdwan district the country is flat and alluvial, presenting the appearance of the ordinary paddy lands of Bengal. Going N. and W., however, the surface gradually rises into long undulating tracts; rice lands and swamps give way to a region of low thorny jungle or forest trees; the hamlets become smaller and more scattered, and nearly disappear altogether in the wild forests along the western boundary. Large quantities of lac and tussur silk are gathered in the hilly tract. The stone quarries and minerals are little worked. There are indigo factories and two coal-mines. Both cotton and silk are woven, and plates, &c, are carved from soap-stone. The old capital of the country was at Bishnupur, which is still the chief centre of local industries. The north-east part of the district is skirted by the East Indian railway beyond the river. Damodar. The Midnapur- Jherria line of the Bengal-Nagpur railway passes through the district, and there is a line from Howrah to Bankura. The climate of Bankura is generally healthy, the cold season being bracing, the air whole-some and dry, and fogs of rare occurrence. The district is exposed to drought and also to destructive floods. It suffered in the famines of 1866, 1874-1875 and 1896-1897. The temperature in the hot season is very oppressive and relaxing. The Bishnupur raj was one of the largest estates in Bengal in the end of the 1 8th century, but it was sold for arrears of revenue shortly after the conclusion of the permanent settlement in 1793.

BANN, the principal river in the north of Ireland. Rising in the Mourne mountains in the south of the Co. Down it runs N.W. until it enters Lough Neagh (q.v.), which it drains N.N.W. to an estuary at Coleraine, forming Lough Beg immediately below the larger lough. The length of its valley (excluding the lesser windings of the river) is about 90 m. The total drainage area, including the other important feeders of Lough Neagh, is about

2300 sq. xn., extending westward to the confines of the Co. Fermanagh, and including parts of the Cos. Down and Antrim, Armagh and Monaghan, Tyrone and Londonderry. The river has valuable salmon fisheries, but is not of much importance for navigation. Above Lough Neagh it is known as the Upper Bann and below as the Lower Bann.

BANNATYNE, GEORGE (1545-? 1608), collector of Scottish poems, was a native of Newtyle, Forfarshire. He became an Edinburgh merchant and was admitted a burgess in 1 587. Some years earlier, in 1568, when the " pest " raged in the capital, he retired to his native county and amused himself by writing out copies of poems by 15th and early 16th century Scots poets. His work extended to eight hundred folio pages, divided into five parts. The MS. descended to his only daughter Janet, and later to her husband's family, the Foulises of Woodhall and Ravelston, near Edinburgh. From them it passed to the Advocates' library, where it is still preserved. This MS., known as the " Bannatyne Manuscript," constitutes with the " Asloan " and " Maitland Folio " MSS. the chief repository of Middle Scots poetry, especi- ally for the texts of the greater poets Henryson, Dunbar, Lyndsay and Alexander Scott. Portions of it were reprinted (with modifications) by Allan Ramsay in his Ever Green (1724), and later, and more correctly, by Lord Hailes in his Ancient Scottish Poems (1770). The entire text was issued by the Hunterian Club (1873-1902) in a handsome and generally accurate form. The name of Bannatyne was honoured in 1823 by the foundation in Edinburgh of the Bannatyne Club, devoted to the publication of historical and literary material from Scottish sources. The thirty-third issue of the club (1829) was Memorials of George Bannatyne (1545-1608), with a memoir by Sir Walter Scott and an account of the MS. by David Laing.

See also Gregory Smith, Specimens of Middle Scots (1902).

BANNERET (Fr. banneret, from banniere, banner, elliptical for seigneur or chevalier banneret, Med. Lat. banneretus), in feudalism, the name given to those nobles who had the right to lead their vassals to battle under their own banner. Ultimately bannerets obtained a place in the feudal hierarchy between

barons and knights bachelors, which has given rise to the idea that they are the origin of King James I.'s order of baronets. Selden, indeed, points out that "the old stories" often have baronetti for bannereti, and he points out that in France the title had become hereditary; but he himself is careful to say (p. 680) that banneret " hath no relation to this later title." The title of knight banneret, with the right to display the private banner, came to be granted for distinguished service in the field. " No knight banneret," says Selden, of the English custom, " can be created but in the field, and that, when either the king is present, or at least his royal standard is displayed. But the creation is almost the self -same with that in the old French ceremonies by the solemn delivery of a banner charged with the arms of him that is to be created, and the cutting of the end of the pennon or streamer to make it a square or into the shape of a banner in case that he which is to be created had in the field his arms on a streamer before the creation." The creation of bannerets is traceable, according to Selden, to the time of Edward I. " Under these bannerets," he adds, " divers knights bachelors and esquires usually served; and according to the number of them, the bannerets received wages." The last authentic instance of the creation of a knight banneret was that of John Smith, created banneret at the battle of Edgehill by Charles I. for rescuing the royal standard from the enemy.

See Selden, Titles of Honor (3rd ed., London, 1672), p. 656; Du Cange, Glossarium (Niort, 1883), s.v. " Bannereti."

BANNERS, FEAST OF (Jap. Nobori-no-Sekku), a Japanese festival in honour of male children held on the 5th of May. Every householder who has sons fastens a bamboo pole over his door and hangs from it gaily-coloured paper fishes, one for each of his boys. These fishes are made to represent carp, which are in Japanese folklore symbolical of health and longevity. The day is recognized as a national holiday.

For banners in general see Flag.

BANNISTER, CHARLES (1738-1804), English actor and singer, was born in Gloucestershire, and after some amateur and provincial experience made his first London appearance in 1762 as Will in The Orators at the Haymarket. Gifted with a fine bass voice, Bannister acquired a reputation as a singer at Ranelagh and elsewhere, as well as an actor, and was received with such favour that Garrick engaged him for Drury Lane. He died on the 26th of

October 1804.

His son John Bannister (1760- 1836), born at Deptford on the 1 2th of May 1760, first studied to be a painter, but soon took to the stage. His first formal appearance was at the Haymarket in 1778 as Dick in The Apprentice. The same year at Drury Lane he played in James Miller's version of Voltaire's Mahomet the part of Zaphna, which he had studied under Garrick. The Palmira of the cast was Mrs Robinson (" Perdita "). Bannister was the best low comedian of his day. As manager of Drury Lane (1802) he was no less successful. He retired in 1815 and died on the 7th of November 1836. He never gave up his taste for painting, and Gainsborough, Morland and Rowlandson were among his friends.

See Adolphus's Memoirs of John Bannister (2 vols., 1838).

BANNOCK (adapted from the Gaelic, and apparently connected with Lat. panis, bread), the term used in Scotland and the north of England for a large, flattish, round sort of bun or cake, usually made of barley-meal, but also of wheat, and sometimes with currants.

BANNOCK, the name of a county in the south-east of the state of Idaho, U.S.A., and of a river in the same state, which rums northward in Oneida county into the Snake or Lewis river. It is taken from that of the Bannock Indians (see Banate), a corruption of the native Panatii.

BANNOCKBURN, a town of Stirlingshire, Scotland. Pop. (1901) 2444. It is situated on the " burn " from which its name is derived, the Bannock (Gaelic, ban oc, " white, shining stream"), a right-hand affluent of the Forth, which was once a considerable river. The town lies 2J m. S.S.E. of Stirling by the Caledonian railway, and now has thriving manufactures of woollens (chiefly

tweeds, carpets and tartans) and leather, though at the beginning of the 19th century it was only a village. The Bore Stone, in which Bruce planted his standard before the battle in which he defeated Edward II. in 1314 (see below), is preserved by an iron grating. A mile to the west is the Gillies' Hill, now finely wooded, over which the Scots' camp – followers appeared to complete the discomfiture of the English, to which event it owes its name. Bannockburn House was Prince Charles Edward's headquarters in January 1746 before the fight at Falkirk.

The famous battle of Bannockburn (24th June 1314) was fought for the relief of Stirling Castle, which was besieged by the Scottish forces under Robert Bruce. The English governor of Stirling had promised that, if he were not relieved by that date, he would surrender the castle, and Edward II. hastily collected an army in the northern and midland counties of England. Bruce made no attempt to defend the border, and selected his defensive position on the Bannock Burn, 25 m. S. of Stirling. His front was covered by the marshy bed of the stream, his left flank by its northerly bend towards the Forth, his right by a group of woods, behind which, until the English army appeared, the Scots concealed themselves. Two corps were left in the open in observation, one at St Ninian's to watch the lower course of the burn, one to guard the point at which the Falkirk-Stirling road crosses the burn. On the 23rd the van of the army of Edward, which numbered about 60,000 against the 40,000 of the Scots, appeared to the south of the burn and at once despatched two bodies of men towards Stirling, the first by the direct road, the other over the lower Bannock Burn near its junction with the Forth. The former was met by the Scottish outpost on the road, and here occurred the famous single combat in which Robert Bruce, though not fully armed for battle, killed Sir Henry Bohun. The English corps which took the other route was met and after a severe struggle defeated by the second Scottish outpost near St Ninian's. The English army assembled for battle on the following day. Early on St John's day the Scottish army took up its assigned positions. Three corps of pikemen in solid masses formed the first line, which was kept out of sight behind the crest until the enemy advanced in earnest. A line of " pottes " (military pits) had been previously dug to give additional pro- tection to the front, which extended for about one mile from wing to wing. The reserve under Bruce consisted of a corps of pikemen and a squadron of 500 chosen men-at-arms under Sir Robert Keith, the marischal of Scotland. The line of the defenders was unusually dense; Edward, in forming up on an equal front with greatly superior numbers, found his army almost hopelessly cramped. The attacking army was formed in an unwieldy mass of ten " battles," each consisting of horse and foot, and the whole formed in three lines each of three " battles," with the tenth " battle " as a reserve in rear. In this order the English moved down into the valley for a direct attack, the cavalry of each '"' battle " in first line, the foot in second. Ignoring the lesson of Falkirk (q.v.), the mounted men rode through the morass and up the slope, which was now crowned by the three great masses of the Scottish

pikemen. The attack of the English failed to make any gap in the line of defence, many knights and men-at- arms were injured by falling into the pits, and the battle became a melee, the Scots, with better fortune than at Falkirk and Flodden, presenting always an impenetrable hedge of spears, the English, too stubborn to draw off, constantly trying in vain to break it down. So great was the press that the ” battles ” of the second line which followed the first were unable to reach the front and stood on the slope, powerless to take part in the battle on the crest. The advance of the third English line only made matters worse, and the sole attempt to deploy the archers was crushed with great slaughter by the charge of Keith’s mounted men. Bruce threw his infantry reserve into the battle, the arrows of the English archers wounded the men-at-arms of their own side, and the remnants of the leading line were tired and disheartened when the final impetus to their rout was given by the historic charge of the ” gillies,” some thousands of Scottish camp- followers who suddenly emerged from the woods, blowing horns, waving such weapons as they possessed, and holding aloft

improvised banners. Their cries of ” slay, slay! ” seemed to the wearied English to betoken the advance of a great reserve, and in a few minutes the whole English army broke and fled in dis-order down the slope. Many perished in the burn, and the demoralized fugitives were hunted by the peasantry until they re-crossed the English border. One earl, forty-two barons and bannerets, two hundred knights, seven hundred esquires and probably 10,000 foot were killed in the battle and the pursuit. One earl, twenty-two barons and bannerets and sixty-eight knights fell into the hands of the victors, whose total loss of 4000 men included, it is said, only two knights.

See J. E. Shearer, Fact and Fiction in the Story of Bannockburn

(1909).

BANNS OF MARRIAGE (formerly bannes, from A.S. gebann, proclamation, Fr. ban, Med. Lat. bannum), the public legal notice of an impending marriage. The church in earliest days was forewarned of marriages (Tertullian,ylJ Uxorem, De Pudicitia, c. 4). The first canonical enactment on the subject in theEnglish

church is that contained in the nth canon of the synod of Westminster in London (a.d. 1200), which orders that " no marriage shall be contracted without banns thrice published in the church, unless by special authority of the bishop." It is, however, believed that the practice was in France as old as the 9th century, and certainly Odo, bishop of Paris, ordered it in n 76. Some have thought that the custom originated in the ancient rule that all " good knights and true," who elected to take part in the tournaments, should hang up their shields in the nearest church for some weeks before the opening of the lists, so that, if any " impedi- ment " existed, they might be " warned off." By theLateran Council of 1215 the publication of banns was made compulsory on all Christendom. In early times it was usual for the priest to betroth the pair formally in the name of the Blessed Trinity; and sometimes the banns were published at vespers, sometimes during mass. In the United Kingdom, under the canon law and by statute, banns are the normal preliminary to marriage; but a marriage may also be solemnized without the publication of banns, by obtaining a licence or a registrar's certificate. In America there is no statutory requirement; and the practice of banns (though general in the colonial period) is practically con- fined to the Roman Catholics.

BANNU, a town and district of British India, in the Derajat division of the North- West Frontier Province. The town (also called Edwardesabad and Dhulipnagar) lies in the north-west Corner of the district, in the valley of the Kurram river. Pop. (1901) 14,300. It forms the base for all punitive expeditions to the Tochi Valley and Waziri frontier.

The district of Bannu, which only consists of the Bannu and Marwat tahsils since the constitution of the North- West Frontier Province in 1901, contains an area of 1680 sq. m. lying north of the Indus. The cis-Indus portions of Bannu and Dera Ismail Khan now comprises the new Punjab district of Mianwali. In addition to the Indus the other streams flowing through the district are the Kurram (which falls into the Indus) and its tributary the Gambila. The valley of Bannu proper, stretching to the foot of the frontier hills, forms an irregular oval, measuring 60 m. from north to south and about 40 m. from east to west. In 1901 the population was 231,485, of whom the great majority were Mahommedans. The principal tribes inhabiting the district are: (1) Waziri Pathans, recent immigrants from the hills, for the most part peaceable and good cultivators; (2) Marwats, a Pathan race, inhabiting the lower and more sandy portions of the Bannu

valley; (3) Bannuchis, a mongrel Afghan tribe of bad physique and mean vices. The inhabitants of this district have always been very independent and stubbornly resisted the Afghan and Sikh predecessors of the British. After the annexation of the Punjab the valley was administered by Herbert Edwardes so thoroughly that it became a source of strength instead of weakness during the Mutiny. The inhabitants of the valley itself are now peaceful, but it is always subject to incursion from the Waziri tribes in the Tochi valley and the neighbouring hills. Salt is quarried on government account at Kalabagh and alum is largely obtained in the same neigh- bourhood. The chief export is wheat. A military road leads

from Bannu town towards Dera Ismail Khan. The Indus, which is nowhere bridged within the district, is navigable for native boats throughout its course of 76 m. The chief frontier tribes on the border are the Waziris, Battannis and Dawaris. All these are described under their separate names.

BANSDA, a native state in the south Gujarat division of Bombay, India, belonging to the Surat agency. Area, 215 sq. m. Pop. (iqoi) 40,382, showing a decrease of 2% in the decade; estimated revenue £19,508. Its chief is a rajput. About half the totalarea of the state is cultivable, but the bulk is forested.

BANSHEE (Irish bean sidhe; Gaelic ban sith, ” woman of the fairies “), a supernatural being in Irish and general Celtic folklore, whose mournful screaming, or ” keening,” at night is held to foretell the death of some member of the household visited. In Ireland legends of the banshee belong more particu- larly to certain families in whose records periodic visits from the spirit are chronicled. A like ghostly informer figures in Brittany folklore. The Irish banshee is held to be the distinction only of families of pure Milesian descent. The Welsh have the banshee under the name gwrach y Rhibyn (witch of Rhibyn). Sir Walter Scott mentions a belief in the banshee as existing in the highlands of Scotland (Demonology and Witchcraft, p. 351). A Welsh death-portent often confused with the gwrach y Rhibyn and banshee is the cyhyraeth, the groaning spirit.

See W. Wirt Sikes, British Goblins (1880).

BANSWARA (literally ” the forest country”), a rajput feudatory state in Rajputana, India. It borders on Gujarat and is bounded on the N. by the native states of Dungarpur and Udaipur or

Mewar; on the N.E. and E. by Partabgarh; on the S. by the dominions of Holkar and the state of Jabua' and on the W. by the state of Rewa Kantha. Banswara state is about 45 m. in length from N. to S., and 33 m. in breadth from E. to W., and has an area of 1946 sq. m. The population in 1901 was 165,350. The Mahi is the only river in the state and great scarcity of water occurs in the dry season. The Banswara chief belongs to the family of Udaipur. During the vigour of the Delhi empire Banswara formed one of its depend- encies; on its decline the state passed under the Mahrattas. Wearied out by their oppressions, its chief in 1812 petitioned for English protection, on the condition of his state becoming tributary on the expulsion of the Mahrattas. The treaty of 1818 gave effect to this arrangement, Britain guaranteeing the prince against external enemies and refractory chiefs; he, on his part, pledging himself to be guided by her representative in the administration of his state. The chief is assisted in the adminis- tration by a hamdar or minister. The estimated gross revenue is £17,000 and the tribute £2500. The custom of suttee, or widow-burning, has long been abolished in the state, but the people retain all their superstitions regarding witches and sorcery; and as late as 1870, a Bhil woman, about eighty years old, was swung to death at Kushalgarh on an accusation of witchcraft. The perpetrators of the crime were sentenced to five years' rigorous imprisonment, but they had the sympathy of the people on their side. The chief town is Banswara, situated about 8 m. W. of the Mahi river, surrounded by an old disused rampart and adorned by various Hindu temples, with the battlements of the chief's palace overlooking it. Its population in 1 901 was 7038. The petty state of Kushalgarh is feudatory to Banswara.

BANTAM, the westernmost residency of the island of Java, Dutch East Indies, bounded W. by the Strait of Sunda, N. by the Java sea, E. by the residencies of Batavia and Preanger, and S. by the Indian Ocean. It also includes. Princes Island and Dwars-in-den-weg (" right-in-the-way ") Island in Sunda Strait, as well as several smaller islands along the coasts. Bantam had a population in 1897 of 709,339, including 302 Europeans, 1959 Chinese and 89 Arabs and other Asiatic foreigners. The natives are Sundanese, except in the northern or Serang division, where they are Javanese. The coast is low r lying and frequently marshy. The northern portion of the residency constitutes the most fertile portion, is generally flat with a hilly group in the middle, where the two inactive volcanoes, Karang and Pulosari,

are founds while the north-western corner is occupied by the isolated Gede Mountain. The southern portion is covered by the Kendang (Malay for ” range “) Mountains extending into the Preanger. The rivers are only navigable at their mouths. Various geysers and cold and warm sulphur springs are found in the centre of the residency, and on a ridge of the Karang Mountain is the large crater-lake Dano, a great part of which was drained by the government in 1835 for rice cultivation. Pulse (kachang), rice and coffee are the principal products of cultivation; but in the days of government culture sugar, indigo and especially pepper were also largely grown. The former considerable fishing and coasting trade was ruined by the eruption of Krakatoa in 1883, a large stretch of coast line and the seaport towns of Charingin and Anjer being destroyed by the inundation. The prosperity of the residency was further affected by a cattle plague in 1879, followed by a fever epidemic which carried off 50,000 people, and except in the rice season there is a considerable emigration of natives. Bantam contains five native regencies or territorial divisions, namely, Serang, Anjer, Pandeglang, Charingin, Lebak. The principal towns are Serang, the capital of the residency, Chilegon, Pandeglang, Menes and Rangkas Betug. The chief town, Serang, is situated 2-3 m. from Bantam Bay on the high road from Batavia. The port of Serang is Karangantu, on Bantam Bay, and close by is the old ruined town of Bantam, once the capital of the kingdom of Bantam, and before the foundation of Batavia the principal commercial port of the Dutch East India Company. The ruins include the remains of the former pepper warehouses, the old factory, called Fort Speelwijk, belonging to the company, the fortified palace of the former sultans and a well-preserved mosque thought to have been built by the third Mahommedan ruler of Bantam about 1562-1576, and containing the tombs of various princes of Bantam. Before the Dutch conquest Bantam was a powerful Mahommedan state, whose sovereign extended his conquests in the neighbouring islands of Borneo and Sumatra. In 1595 the Dutch expelled the Portuguese and formed their first settlement. A British factory was established in 1603 and continued to exist till the staff was expelled in 1682. In 1683 the Dutch reduced the sultan to vassalage, built the fort of Speelwijk and monopolized the port, which had previously been free to all comers; and for more than a century afterwards Bantam was one of the most important seats of commerce in the East Indies. In 181 1 after Batavia had

surrendered to the British, Bantam soon followed; but it was restored to the Dutch in 1814. Two years later, however, they removed their chief settlement to the more elevated station of Serang, or Ceram, 7 m. inland, and in 181 7 the ruin of Bantam was hastened by a fire. •

For ” Bantam ” fowls see Poultry.

BANTIN, or Banting, the native name of the wild ox of Java, known to the Malays as sapi-utan, and in zoology as Bos (Bibos) sondaicus. The white patch on the rump distinguishes the bantin from its ally the gaur (q.v.). Bulls of the typical bantin of Java and Borneo are, when fully adult, completely black except for the white rump and legs, but the cows and young are rufous. In Burma the species is represented by the tsaine, or h’saine, in which the colour of the adult bulls is rufous fawn. Tame bantin are bred in Bali, near Java, and exported to Singapore. (See Bovidae.)

BANTRY, a seaport, market-town and seaside resort of Co. Cork, Ireland, in the west parliamentary division, 58 m. S.W. of Cork by the Cork, Bandon & South Coast railway, on the bay of the same name. Pop. (1901) 3109. It is an important centre both for sea fisheries and for sport with the rod. It is the ter- minus of the railway, and a coaching station on the famous ” Prince of Wales ” route (named after King Edward VII.) from Cork to Glengarriff and Killarney. The bay, with excellent anchorage, is a picturesque inlet some 22 m. long by 3 to 6 broad, with 12 to 32 fathoms of water. It is one of the headquarter stations of the Channel Squadron, which uses the harbour at Castletown Bearhaven on the northern shore, behind Bear Island, near the mouth of the bay. It was the scene of attempts by the French to invade Ireland in 1689 and 1796, and troops of

William of Orange were landed here in 1697. There are several islands, the principal of which are Bear Island and Whiddy, off the town. Ruins of the so-called ” fish palaces ” testify to the failure of the pilchard fishery in the 18th century.

BANTU LANGUAGES. The greater part of Africa south of the equator possesses but one linguistic family so far as its native inhabitants are concerned. This clearly-marked division of human speech has been entitled the Bantu, a name invented by Dr W. H. I. Bleek, and it is, on the whole, the fittest general term with which to designate the most remarkable group of African

languages. 1

It must not be supposed for a moment that all the people who speak Bantu languages belong necessarily to a special and definite type of negro. On the contrary, though there is a certain physical resemblance among those tribes who speak clearly-marked Bantu dialects (the Babangi of the upper Congo, the people of the Great Lakes, the Ova-herero, the Ba-tonga, Zulu-Kaffirs, Awemba and some of the East Coast tribes), there is nevertheless a great diversity in outward appearance, shape of head and other physical characteristics, among the negroes who inhabit Bantu Africa. Some tribes speaking Bantu languages are dwarfs or dwarfish, and belong to the group of -Forest Pygmies. Others betray relationship to the Hottentots; others again cannot be distinguished from the most exaggerated types of the black West African negro. Yet others again, especially on the north, are of Gala (Galla) or Nilotic origin. But the general deduction to be drawn from a study of the Bantu languages, as they exist at the present day, is that at some period not more than 3000 years ago a powerful tribe of negroes speaking the Bantu mother-language, allied physically to the negroes of the south-western Nile and southern Lake Chad basins (yet impregnated with the Caucasian Hamite), pushed themselves forcibly from the very heart of Africa (the region between the watersheds of the Shari, Congo and western Nile) into the southern half of the continent, which at that time was probably sparsely populated except in the north-west, east and south. The Congo basin and the south-western watershed of the Nile at the time of the Bantu invasion would have been occupied on the Atlantic seaboard by West Coast negroes, and in the centre by negroes of a low type and by Forest Pygmies; the eastern coasts of Victoria Nyanza and the East African coast region down to opposite Zanzibar probably had a population partly Nilotic-negro and partly Hottentot-Bushman. From Lakes Tanganyika and Nyasa south-westwards to the Cape of Good Hope the population was Forest-negro, Nilotic-negro, Hottentot and Bushman. Over nearly all this area the Bantu swept; and they assimilated or absorbed the vast majority of the preceding populations, of which, physically or linguistically, the only survivors are the scattered tribes of pygmies in the forests of south-west Nile land, Congo basin and Gabun, the central Sudanese of the N.E. Congo, a few patches of quasi- Hottentot, Hamitic and Nilotic peoples between Victoria Nyanza and the Zanzibar coast, and the Bushmen and Hottentots of south-west Africa. The first area of decided concentration on the part of the

Bantu was very probably Uganda and the shores of Tanganyika. The main line of advance south-west trended rather to the east coast of Africa than to the west, but bifurcated at the south end of Lake Tanganyika, one great branch passing west between that lake and Nyasa, and the other southwards. Finally, when the Bantu had reached the

1 Bantu (literally Ba-ntu) is the most archaic and most widely spread term for " men," " mankind," " people," in these languages. It also indicates aptly the leading feature of this group of tongues, which is the governing of the unchangeable root by prefixes. The syllable ntu is nowhere found now standing alone, but it originally meant " object," or possibly " person." It is also occasionally used as a relative pronoun — " that " that which," " he who." Com bined with different prefixes it has different meanings. Thus (in the purer forms of Bantu languages) muntu means a man," bantu means " men," kintu means " a thing," bintu " things," kantu means " a little thing," tuntu " little things," and so on. This term Bantu has been often criticized, but no one has supplied a better, simpler designation for this section of Negro languages, and the name has now been definitely consecrated by usage.

south-west corner of Africa, their farther advance was checked by two causes: first, the concentration in a healthy, cattle- rearing part of Africa of the Hottentots (themselves only a superior type of Bushman, but able to offer a much sturdier resistance to the big biack Bantu negroes than the crafty but feeble Bushmen), and secondly, the arrival on the scene of the Dutch and British, but for whose final intervention the whole of southern Africa would have been rapidly Bantuized, as far as the imposition of language was concerned.

The theory thus set forth of the origin and progress of the Bantu and the approximate date at which their great southern exodus commenced, is to some extent attributable to the present writer only, and has been traversed at different times by other writers on the same subject. In the nearly total absence of any historical records, the only means of building up Bantu history lies in linguistic research, in the study of existing dialects, of their relative degree of purity, of their connexion one with the other

and of the most widely-spread roots common to the majority of the Bantu languages. The present writer, relying on linguistic evidence, fixed the approximate date at which the Bantu negroes left their primal home in the very heart of Africa at not much more than 2000 years ago; and the reason adduced was worth some consideration. It lay in the root common to a large proportion of the Bantu languages expressing the domestic fowl — kuku {nkuku, ngoko, nsusu, nguku, nku). Now the domestic fowl reached Africa first through Egypt, at the time of the Persian occupation — not before 500 to 400 B.C. It would take at that time at least a couple of hundred years before — from people to people and tribe to tribe up the Nile valley — the fowl, as a domestic bird, reached the equatorial regions of Africa. The Muscovy duck, introduced by the Portuguese from Brazil at the beginning of the 17th century, is spreading itself over Negro Africa at just about the same rate. Yet the Bantu people must have had the domestic fowl well established amongst themselves before they left their original home, because throughout Bantu Africa (with rare exceptions and those not among the purest Bantu tribes) the root expressing the domestic fowl recurs to the one vocable of kuku. 1 Curiously enough this root kuku resembles to a marked degree several of the Persian words for " fowl," and is no doubt remotely derived from the cry of the bird. Among those Negro races which do not speak Bantu languages, though they may be living in the closest proximity to the Bantu, the name for fowl is quite different. 2 The fowl was only introduced into Mada- gascar, as far as researches go, by the Arabs during the historical period, and is not known by any name similar to the root kuku. Moreover, even if the fowl had been (and there is no record of this fact) introduced from Madagascar on to the east coast of Africa, it would be indeed strange if it carried w. ; th it to Cameroon, to the White Nile and to Lake Ngami one and the same name. It may, however, be argued that such a thing is possible, that the introduction of the fowl south of the equator need not be in any way coincident with the Bantu invasion, as its name in North Central Africa may have followed it everywhere among the Bantu peoples. But all other cases of introduced plants or animals do not support this idea in the least. The Muscovy duck, for instance, is pretty well distributed throughout Bantu Africa, but it has no common widely-spread name. Even tobacco (though the root " taba " turns up unexpectedly in remote parts of Africa) assumes totally different designations in different Bantu tribes. The Bantu, moreover, remained faithful to a great

1 In Lu'ganda and other languages of Uganda and the Victoria Nyanza, and also in Runyoro on the Victoria Nile, the word for " fowl " is enkoko. In Ki-Swahili of Zanzibar it is kuku. In Zulu it is inkuku. In some of the Cameroon languages it is lokoko, ngoko, ngok, and on the Congo it is nkogo, nsusu. On the Zambezi it is nkuku ; so also throughout the tribes of Lakes Nyasa and Tangan- yika, and most dialects of South Africa.

1 From this statement are excepted those tongues classified as " semi-Bantu." In some languages of the Lower Niger and of the Gold Coast the word for " fowl " is generally traceable to a root kuba. This form kuba also enters the Cameroon region, where it exists alongside of -koko. Kuba may have arisen independently, or have been derived from the Bantu kuku.

number of roots like " fowl," which referred to animals, plants, implements and abstract concepts known to them in their original home. Thus there are the root-words for ox (-fiombe, -ombe, -nte), goat {-budi, -buzi, -buri), pig {-guluba), pigeon (-jiba), buffalo (nyati) , dog (mbwa) , hippopotamus (-bugu, gubu) , elephant (-jobo, -joko), leopard (ngwi), house (~zo, -do, -yumba, -anda, -dago, -dabo), moon (-ezi), sun, sky, or God (-juba), water {-ndi, -ndiba, mandiba), lake or river (-anza), 3 drum (ngoma), name {-ina or jina), wizard (nganga), belly, bowel {-vu, -vumo) , buttocks (-tako); adjectives like -bi (bad), ent (white); the numerals, 2, 3, 4, s, 10 and 100; verbs like/wa (to die), ta (to strike, kill), la (da) or lia (di, did) (to eat). The root words cited are not a hundredth part of the total number of root words which are practically common to all the spoken dialects of Bantu Africa. Therefore the possession amongst its root-words of a common name for " fowl " seems to the present writer to show con- clusively that (1) the original Bantu tribe must have possessed the domestic fowl before its dispersal through the southern half of Africa began, and that (2) as it is historically certain that the fowl as a domestic bird did not reach Egypt before the Persian conquest in 525 B.C., and probably would not have been trans- mitted to the heart of Africa for another couple of hundred years, the Bantu exodus (at any rate to the south of the equatorial region) may safely be placed at a date not much anterior to 2100 years ago.

The creation of the Bantu type of language (pronominal- prefix) was certainly a much more ancient event than the exodus from the Bantu mother-land. Some form of speech like Fula, Kiama (Tern), or Kposo of northern Togoland, or one of the languages of

the lower Niger or Benue, may have been taken up by ancient Libyan, Hamite or Nilotic conquerors and cast into the type which we now know as Bantu, — a division of sexless Negro speech, however, that shows no obvious traces of Hamitic (Caucasian) influence. We have no clue at present to the exact birth-place of the Bantu nor to the particular group of dialects or languages from which it sprang. Its origin and near relationships are as much a puzzle as is the case with the Aryan speech. Perhaps in grammatical construction (suffixes taking the place of prefixes) Fula shows some resemblance; and Fula possesses the concord in a form considerably like that of the Bantu, as well as offering affinities in the numerals 3 and 4, and in a. few nominal, pronominal and verbal roots. The Timne and cognate languages of Sierra Leone and the north Guinea coast use pronominal prefixes and a system of concord, the employment of the latter being precisely similar to the same practice in the Bantu languages; but in word-roots (substantives, numerals, pronouns, verbs) there is absolutely no resemblance with this north Guinea group of prefix-using languages. In the numerals 2, 3, 4, and sometimes 5, and in a few verbal roots, there is a distinct affinity between Bantu and the languages of N. Togoland, the Benue river, lower Niger, Calabar and Gold Coast. The same thing may be said with less emphasis about the Madi and possibly the Nyam-Nyam (Makarka) group of languages in Central Africa though in none of these forms of speech is there any trace of the concord. Prefixes of a simple kind are used in the tongues Of Ashanti, N. Togoland, lower Niger and eastern Niger delta, Cross River and Benue, to express differences between singular and plural, and also the quality of the noun; but they do not correspond to those of the Bantu type, though they sometimes fall into ” classes.” In the north-west of the Bantu field, in the region between Cameroon and the north-western “basin of the Congo, the Cross river and the Benue, there is an area of great extent occupied by languages of a ” semi-Bantu ” character, such as Nki, Mbudikum, Akpa, Mbe, Bayon, Manyafi, Bafut and Bansho, and the Munshi, Tarawa, Kororofa, Kamuku and Gbari of the central and western Benue basin. The resemblances to the Bantu in certain word-roots are of an obvious nature; and prefixes in a very simple form are generally used for singular and plural, but the rest of the concord is very doubtful. Here, however, we have the nearest relations of the Bantu, so far as

3 Whence the many nyanza, nyanja, nyasa, mwanza, of African geography.

etymology of word-roots is concerned. Further evidence of slight etymological and even grammatical relationships may be traced as far west as the lower Niger and northern and western Gold Coast languages (and, in some word-roots, the Mandingo group). The Fula language would offer some grammatical resemblance if its suffixes were turned into prefixes (a change which has actually taken place in the reverse direction in the English language between its former Teutonic and its modern Romanized conditions; cf. ” offset ” and ” set-off,” ” upstand- ing ” and ” standing-up “).

The legends and traditions of the Bantu peoples themselves invariably point to a northern origin, and a period, not wholly removed from their racial remembrance, when they were strangers in their present lands. Seemingly the Bantu, somewhat early in their migration down the east coast, took to the sea, and not merely occupied the islands of Pemba and Zanzibar, but travelled as far afield as the Comoro archipelago and even the west coast of Madagascar. Their invasion of Madagascar must have been fairly considerable in numbers, and they doubtless gave rise to the race of black people known traditionally to the Hovas as the. Va-zimba.

The accompanying map will show pretty accurately the distribution of the Bantu-speaking Negroes at the present day.

Sir H.H Johnston, del.

Emery Walker sc

It will be seen by a glance at this map that the areas in which are spoken Bantu languages of typical structure and archaic form are somewhat widely spread. Perhaps on the whole the most archaic dialects at the present day are those of Mount Elgon, Ruwenzori, Unyoro, Uganda, the north coast of Tanganyika and of the Bemba country to the south-west of Tanganyika; also those in the vicinity of Lake Bangweulu, and the Nkonde and Kese dialects of the north and north-east coasts of Lake Nyasa; also (markedly) the Subiya speech of the western Zambezi. Another language containing a good many original Bantu roots and typical features is the well-known Oci-herero of Damaraland (though this S.W.

African group also presents marked peculiarities and some strange divergencies). Kimakonde, on the east coast of Africa, is a primitive Bantu tongue; so in its roots, but not in its prefixes, is the celebrated Ki-swahili of Zanzibar. Ci-bodzo of the Zambezi delta is also an archaic type of great interest. The Zulu-Kaffir language, though it exhibits marked changes and deviations in vocabulary and phonetics (both probably of recent date), preserves a few characteristics of the hypothetical mother-tongue: so much so that, until the languages of the Great Lakes came to be known, Zulu-Kaffir was regarded as the most archaic type of Bantu speech, a position from which it is now completely deposed. It is in some features unusually divergent from the typical Bantu.

Classification.— With our present knowledge of the existing Bantu tongues and their affinities, it is possible to divide them approxi mately into the following numbered groups and subdivisions, com- mencing at the north-eastern extremity of the Bantu domain, where, on the whole, the languages approximate nearest to the hypothetical parent speech.

(i) The Uganda-Unyoro group. This includes all the dialects between the Victoria Nile and Busoga on the east and north, the east coast of Lake Albert, the range of Ruwenzori and the Congo Forest on the west; on the south-east and south, the south coast of the Victoria Nyanza, and a line from near Emin Pasha Gulf to the Malagarazi river and the east coast of Tanganyika. On the south-west this district is bounded more or less by the Rusizi river down to Tanganyika. It includes the district of Busoga on the north-east and all the archipelagoes and inhabited islands of the Victoria Nyanza even as far east as Bukerebe, except those islands near the north-east coast. The dialects of Busoga, the Sese Islands and the west coast of Lake Victoria are closely related to the lan- guage of the kingdom of Uganda. Allied to, yet quite distinct from the Uganda sub-section, is that which is usually classified as Unyoro. 1 This includes the dialects spoken by the Hima (Hamitic aristocracy of these equatorial lands — Uru-hima, Ru-hinda, &c), Ru-songora, Ru-iro, Ru-toro, Ru-tusi, and all the kindred dialects of Karagwe, Busiba, Ruanda, Businja and Bukerebe. Ki-rundi, of the Burundi country at the north end of Tanganyika, and the other languages of eastern Tanganyika down to Ufipa are closely allied to the Unyoro sub-section of group I, but perhaps adhere more closely to group 12. The third independent sub-section of this group is Lu-konjo, the language which is spoken on the southern flanks of the Ruwen- zori Range

and thence southwards to Lake Kivu and the eastern limits of the Congo Forest.

(2) The second group on the geographical list is Lihuku-Kuamba, the separate and somewhat peculiar Bantu dialects lingering in the lands to the south and south-west of Albert Nyanza (Mboga country). Lihuku (or Libvanuma) is a very isolated type of Bantu, quite apart from the Uganda-Unyoro groups, with which it shows no special affinity at all, though in close juxtaposition. Its alliance with Kuamba of western Ruwenzori is not very close. Other affinities are with the degraded Bantu dialects (Ki-bira, &c.) of the Ituri-. Aruwimi forests. Kuamba is spoken on the west and north slopes of Ruwenzori. Both Kuamba and Lihuku show a marked relation- ship with the languages on the northern Congo and Aruwimi, less in grammar than in vocabulary.

(3) The Kavirondo- Ma saba section. This group, which includes the Lu-nyara, Luwanga, Lukonde and Igizii of the north-east and eastern shores of the Victoria Nyanza and the northern Kavirondo and Mount Elgon territories, is related to the Luganda section more than to any group of the Bantu tongues, but it is a very distinct division, in its prefixes the most archaic. It includes the languages spoken along the western flanks of Mount Elgon, those of Bantu Kavirondo, and of the eastern coast-lands of the Victoria Nyanza (Igizii).

(4) The Kikuyu-Kamba group of British East Africa, east of the Rift valley. It includes, besides the special dialects of Kikuyu and Ukambani, all the scattered fragments of Bantu speech on Mount Kenya and the upper Tana river (Dhaicho).

(5) The Kilimanjaro (Chaga-Siha) group, embracing the rather peculiar dialects of Mount Kilimanjaro, Mount Meru and Ugweno,

(6) The Pokomo-Nyika-Giriama-Taveita group represents the Bantu dialects of the coast province of British East Africa, between (and including) the Tana river on the north and the frontier of German East Africa on the south.

(7) Swahili, the language of Zanzibar and of the opposite coast, a form of speech now widely spread as a commercial language over Eastern and Central Africa. Swahili is a somewhat archaic Bantu dialect, indigenous probably to the East African coast south of the Ruvu (Pangani) river, which by intermixture with Arabic has

become the lingua franca of eastern Africa between the White Nile and the Zambezi. It was almost certainly of mainland origin, distinct from the original local dialects of Zanzibar and Pemba, which may have belonged to group No. 6. There are colonies of Swahili-speaking people at Mombasa, Malindi, Lamu, and even as far north as the Shebeli river in Somaliland, also along the coast of German and Portuguese East Africa as far south as Angoche. In the coast-lands between the Ruvu or Pangani river on the north and the Kilwa settlements on the south, the local languages and dialects are more or less related to Swahili, though they are independent languages. Amongst these may be mentioned Bondei, Shambala (north of the Ruvu), Nguru, Zeguha, Ki-mrima and Ki-zaramo.

(8) This group might be described as Kaguru-Sagala-Kami. It is one which occupies the inland territories of German East Africa, between the Swahili coast dialects on the east and the domain of the Nyamwezi (No. 1 1) on the west. On the north this group is bounded by the non-Bantu languages of the Masai, Mbugu and Taturu, and on the south by the Ruaha river. This group includes Kigogo and Irangi.

1 In using the forms Uganda, Unyoro, the writer accepts the popular mis-spelling. These countries should be called Buganda and Bunyoro, and their languages Luganda and Runyoro.

(9) The dialects of the Comoro Islands, between the East African coast and Madagascar, are styled Hi-nzua or A nzuani and Shi-ngazija. They are somewhat closely related to Swahili.

(10) The archaic Makonde or Mabiha of the lower Ruvuma, and the coast between Lindi and Ibo; this might conceivably be attached to the Swahili branch.

(11) The Nyamwezi group includes all the dialects of the Nyam-wezi country west of Ugogo as far north as the Victoria Nyanza (where the tongues melt into group No. 1), and bounded on the south by the Upper Ruaha river, and on the west by the eastern borderlands of Tanganyika. The Nyamwezi genus penetrates south-west to within a short distance of Lake Rukwa. A language of this group was at one time a good deal spoken in the southern

part of the Belgian Congo, having been imported there by traders who made themselves chiefs.

(12) The Tanganyika languages (Ki-rega, Kabwari, Kiguha, &c). These dialects are chiefly spoken in the regions west-north-west, and perhaps north and east of Tanganyika, from the vicinity of Lake Albert Edward on the north and the Lukuga outlet of Tanganyika on the south. On the west they are bounded by the Congo Forest and the Manyema genus (No. 13). The languages on the east coast of Tanganyika (Ki-rundi, Kigeye, &c.) seem to be more nearly connected with those of group No. 1 (Uganda-Unyoro), yet perhaps they are more conveniently included here.

(13) The Manyema (Baenya) group includes most of the corrupt Bantu dialects between the western watershed of Tanganyika and the main stream of the Luapula-Congo, extending also still farther north, and comprising (seemingly) the languages of the Aruwimi basin, such as Yalulema, Soko, Lokele, Kusu, Tu-rumbu, &c. On the west the Manyema group is bounded by the languages of the Lomami valley, which belong to groups Nos. 15 and 16; on the east the Manyema genus merges into the much purer Bantu dialects of groups Nos. 1 and 12. An examination of the Lihuku-Kuamba section (No. 2) shows these tongues to be connected with the Man- yema group. The Kibira dialects of the north-eastern Congo Forest (Ituri district) may perhaps be placed in this section. 1

(14) The Rua-Luba-Lunda-Marungu group (in which are included Kanyoka, Lulua and Ki-tabwa)occupies a good deal of the south central basin of the Congo, between the south-west coast-line of Tanganyika on the east and the main streams of the Kasai and Kwango on the west, between the Bakuba country on the north and the Zambezi watershed on the south.

(15) The Bakuba assemblage of Central Congo dialects (Songe, Shilange, Babuma, &c.) probably includes all the Bantu languages between the Lomami river on the east and the Kwa-Kasai and Upper Kwilu on the west. Its boundary on the north is perhaps the Sankuru river.

(16) The Balolo group consists of all the languages of the Northern Congo bend (bounded on the north, east and west by the main stream of the Congo), and perhaps the corrupt dialects of the Northern Kasai, Kwilu and Kwango (Babuma, Bahuana, Bambala, Ba-yaka, Bakutu, &c), where these are not nearer allied

to Teke (No. 18) or to Bakuba.

(17) The Bangala-Bobangi-Liboko group comprises the commercial languages of the Upper Congo (Ngala, Bangi, Liboko, Poto, Ngombe, Yanzi, &c.) and all the known Congo dialects along and to the north and sometimes south of the main stream, from as far west as the junction of the Sanga to as far east as the Rubi and Lomami rivers, and those between the Congo and the Lower Ubangi river and up the Ubangi, as far north as the limits of the Bantu domain (about 3° 30′ N.). Allied to these perhaps are the scarcely-known forms of speech in the basin of the Sanga river, besides the ” Ba-yanzi ” dialects of Lakes Mantumba and Leopold II.

(18) The Bateke (Batio) group. This may be taken roughly to include most of the Bantu dialects west of the Sanga river, north-west of the Lower Congo, south of the Upper Ogowe and Ngoko rivers and east of the Atlantic coast-lands.

(19) The Di-Kele and Benga dialects of Spanish Guinea and the Batanga coast of German Cameroon.

(20) The Fait or Pangwe forms of speech (so corrupt as to be only just recognizable as Bantu), which occupy the little-known interior of German Cameroon and French Gabun, down to the Ogowe, and as far east and north as the Sanga, Sanaga and Mbam rivers, and the immediate hinterland of the ” Duala” Cameroon.

(21) The Duala group, which on the other hand is of a much purer Bantu type, includes the languages spoken on the estuary and delta of the Cameroon river.

(22) The Isubu-Bakwiri group of the coast-lands north of Cameroon delta (Ambas Bay), and on the west slopes of Cameroon Mts.

1 It is an important and recently discovered fact (delineated in the work of the Baptist missionaries and of the Austrian traveller Dr Franz Thonner) that theCongo at its northern and north-eastern bend, between the Rubi river and Stanley Falls, lies outside the Bantu field. The Bondonga and Wamanga languages are not Bantu. They are allied to the Mbuba- Momfu of the Ituri and Nepoko, and also to the Mundu of the Egyptian Sudan. The Mundu group extends westward to the Ubangi river, as far south as 3 30′ N. See George Grenfell and the Congo, by Sir Harry

Johnston; and Dans la Grande Forit de I'Afrique equatoriale, by Franz Thonner (1899)'.

(23) The Bantu dialects of Fernando P6 (Ediya, Bateti, Bani, &c.) distantly allied to Nos 24, 2 and 13.

(24) The Barondo-Bakundu group, which begins on the north at the Rio del Rey on the extremity of the Bantu field, near the estuary of the Cross river. This group may also include Barombi and Basa, BoHken, Abo, Nkosi and other much-debased dialects, which are spoken on the eastern slopes of the Cameroon mountains and on the Cameroon river (Magombe), and thence to the Sanaga and Nyong rivers. Eastwards and north-eastwards of this group, the languages (such as Mbe, Bali, Nki, Mbudikum, Bdfut, Bayon) may be described as " semi-Bantu," and evincing affinities with the forms of speech in the basin of the Central Benue river and also with the Fail (No. 20).

(25) Turning southwards again from the north-westernfnost limit of the Bantu, we meet with another group, the Mpongwe-Orungu and Aduma languages of French Gabun, and the tongues of the Lower Ogowe and Fernan Vaz promontory.

(26) These again shade on the south into the group of Kakongo dialects of the Loango and Sete Kama coast — such as Ba-kama, Ba-nyanga, Ma-yombe, Ba-vili, Ba-kamba and Ka-kongo (Kabinda).

(27) The Kongo language group comprises the dialects along the lower course of the Congo from its mouth to Stanley Pool ; also the territory of the old kingdom of Congo, lying to the south of that river (and north of the river Loje) from the coast eastwards to the watershed of the river Kwango (and the longitude, more or less, of Stanley Pool).

(28) In the south the Kongo dialects melt imperceptibly into the closely-allied Angola language. This group may be styled in a general way Mbundu, and it includes the languages of Central Angola, such as Ki-mbundu, Mbamba, Ki-sama, Songo, U-mbangala. The boundary of this genus on the east is probably the Kwango river, beyond which the Lunda languages begin (No. 14). On the north, the river Loje to some extent serves as a frontier between the Kongo and Mbundu tongues. On the south the boundary of group No. 28 is approximately the nth degree of south latitude.

(29) Very distinct from the Ki-mbundu speech (though with connecting forms) is the Oci-herero group, which includes the Hereto language of Damaraland, the Umbundu of the Bihe highlands of south Angola, the Nano of the Benguela coast, and Si-ndonga, Ku- anyama and Oci-mbo of the southern regions of Portuguese Angola and the northern half of German South-West Africa. The languages of group No. 29 probably extend as far inland as the Kwito and Kubango rivers, in short, to the Zambezi watershed. On the south they are confronted with the Hottentot languages. The Haukoin or Hill Damaras — a Negro race of unexplained affinities and ap- parently speaking a Hottentot language — occupy an enclave in the area of Hereto speech.

(30) What may be -called the Kiboko or Kibokwe (also Kiok'o) family of eastern Angola is a language-group which seems to offer affinities to the languages of the Upper Zambezi and to those of groups Nos. 28 and 29. It extends eastwards into the south-western portion of the Belgian Congo, and includes the Lubale of northern Barotseland and the sources of the river Zambezi, and possibly the Gangela of south-western Angola.

(31) Southwards of group No. 30 is that of the Barotseland lan- guages, of which the best-known form — almost the only one that is effectively illustrated — is Si-luyi. To Si-luyi may be related the Mabwnda of Western Barotseland. The dialects of the Ambwela, A-mbwe, Ma-bukushu and A-kwamashi are probably closely related.

(32) Next is a group which might be styled the Subiya-Tonga-Ila, though some authorities think that Tonga and Ila deserve to be ranked as an independent group. There is, however, a close alliance in structure between the languages of each of the two subsections. The Tonga subgroup would include the dialects of the Ba-tetela, the Ba-ila (Mashukulumbwe) and of all Central Zambezia. Ci-subiya is the dominant language of South-West Zambezia, along a portion of the Zambezi river south of Barotseland, and in the lands lying between the Zambezi and the Chobe-Linyante river. Subiya is one of the most archaic of Bantu languages, more so than Tonga. Both are without any strong affinity to Oci-herero, and only evince a slight relationship with the Zulu group (No. 44).

(33) The Bisa or Wisa family includes the languages of Iramba, Bausi, Lukinga, in the southernmost projection of the Belgian Congo, and the dialects of Lubisa and Ilala between the Chambezi

river and Lake Bangweulu on the north, and the Luangwa river on the east and south ; perhaps also some of the languages along the course of the Upper Luapula river.

(34) With it is closely allied that of the Bemba or Emba dialects. This interesting genus occupies the ground between the south-west and south coasts of Tanganyika, Lake Mweru, and the Upper Cham- bezi river. The Ki-bemba domain may be taken to include the locally-modified Ki-lungu and Ki-mambwe of South and South-East Tanganyika.

(35) What may be called the North Nyasa or Nkonde group comprises all the dialects of the north-west and north coasts of Lake Nyasa (such as Ici-wandia and Iki-nyikiusa) and Ishi-nyi%a of the Nyasa-Tanganyika plateau, and extends perhaps as far north west as the Fipa country (Iki-fipa), and the shores of Lake Rukwa (Ici-wungu) in the vicinity of the Nyamwezi domain (No. n). Iki-fipa, however, has some affinities to the Tanganyika and western Victoria- Nyanza languages (groups Nos. I and 12).

(36) The western part of Nyasaland, south of group No. 35, is occupied by the Tumbuka section, which includes the languages of the Tumbuka, Henga and A-tonga peoples, and occupies the area between the western shores of Lake Nyasa and the Upper Luangwa river.

(37) Eastwards of No. 35 (North Nyasa group) lies the Kinga speech of the lofty Livingstone mountains, which is sufficiently distinct from its neighbours to be classified as a separate group.'

(38) East of the Livingstone mountains and west of the Ruaha river, south also of the Unyamwezi domain, extends the Sango-Ben-a-Hehe-Sutu group.

(39) The extensive Yao genus of languages stretches from just behind the coast of the Lindi settlements in German East Africa (Ki-mviera) south-westward across the Ruvuma river to the north- east shores of Lake Nyasa (Ki-kese), and thence back to the valley of the Lujenda-Ruvuma (Cingindo), and southwards in various dialects of the Yao language to the south-east corner of Lake Nyasa and the region east of the Shire river, between Lake Nyasa, the Shire high- lands and Mt.Mlanje. Itisonly since the

middle of the 19th century that the Yao language has conquered territory to the south of Lake Nyasa. There still remain within its domain colonies of Nyanja- speaking people.

(40) Eastwards of the Yao domain, and bounded on the north by the range of that language in the Ruvuma valley and by the separate group of Ki-makonde (No. 10), ranges the well-marked Makua genus. The languages thus described occupy the greater part of Portuguese East Africa away from the watershed of Lake Nyasa. The Makua language is probably divided into the following dialects : — 1-medo, I-lomwe, I-lugulu and Anguru. There are other dialects unnamed in the Angoji coast-region, where, however, strong colonies of Swahili-speaking people are settled. The southern part of the Makua, domain is occupied by the Ci-cuambo of the Quelimane district.

(41) Nyanja, perhaps the most extensive group of cognate languages in the Bantu field, is principally associated with the east and west shores of the southern half of Lake Nyasa. It also covers all the valley of the Shire, except portions of the Shire highlands, down to the junction of that stream with the Zambezi, and further, the lands on both banks of the Zambezi down to and including its delta. West of Lake Nyasa, the Nyanja domain extends in the Senga language to the river Luangwa and the Central Zambezi, also along both banks of the Central Zambezi. South of the Central Zambezi, Nyanja dialects are spoken as far west as the Victoria Falls. Thence they extend eastwards over Mashonaland to the sea- coast. With this family may also be associated the languages of the Portuguese coast-region south of the Zambezi as far as Inham- bane. The principal dialects of the Nyanja language are the Ci- nyanja of Eastern Nyasaland, Ci-peta and Ci-maravi of South-West Nyasaland to as far as the watershed of the Luangwa river, the Ci-mafianja of the Shire highlands, Ci-mobo and Ci-machinjiri of the Shire valley, Ci-sena or Ci-nyungwe of Tete and Sena (Zambezi), and Ci-mazaro of the Lower Zambezi. The Luangwa regions, as already mentioned, are occupied by the distinct but closely-allied Senga language. South of the Central Zambezi there are Ci-nanzwa in the region near the Victoria Falls, Ci-nyai, Shi-kalana, Ci-shuna (Ci- gonw), Ci-loze, and possibly Ci-shangwe (or Ci-hlangane) and Shi- lenge which link on to the Beira coast dialects. In the delta of the Zambezi is to be found Ci-podzo, a very distinct language, yet one which belongs to the Nyanja genus. Ci-shangane, Chopi or Shi- lenge and other dialects of the Beira and Inhambane coast-lands and of Manika have been much influenced by Zulu dialects (Tebele and

Ronga).

(42) The well-marked Bechuana language group has very distinct features of its own. This includes all the Bantu dialects of the Bechuanaland protectorate west of the Guai river. Bechuana dialects (such as Ci-vcnda, Se-suto, Se-pcli, Se-roloh, Se-xlapi, &c.) cover a good deal of the north and west of the Transvaal, and extend over all the Orange River Colony and Bechuanaland. Se-suto is the language of Basuteland; Se-rolon, Se-mangwalo, of the Eastern Kalahri; Se-kololo is the court language of Barotseland; Ci-venda and Se-pedi or Peli are the principal dialects of the Transvaal. Group No. 42, in fact, stretches between the Zambezi on the north and the Orange river on the south, and extends westward (except for Hottentot and Bushmen interruptions) to the domain of the Oci-herero.

(43) The Ronga {Tonga) languages of Portuguese South-East Africa (Gazaland, Lower Limpopo valley, and patches of the North Transvaal (Shi-gwamba), Delagoa Bay) are almost equally related to the Nyanja group (41) on the one hand, and to Zulu on the other, probably representing a mingling of the two influences, of which the latter predominates.

(44) Lastly comes the Zulu-Kaffir group, occupying parts of Rhodesia, the eastern portion of the Transvaal, Swaziland, Natal and the eastern half of Cape Colony. In vocabulary, and to some degree in phonetics, the Zulu language (divided at most into three dialects) is related in some phonetic features to No. 42, and of course to No. 43; otherwise it stands very much alone in its developments. ft may have distant relations in groups Nos. 29 and 32. Dialects of Zulu (Tebele and Ki-ngoni or Ci-nongi) are spoken at the present day in South-West Rhodesia and in Western Nyasaland and on the

plateaus north-east of Lake Nyasa, carried thither by the Zulu raiders of the early 19th century.

The foregoing is only an attempt to classify the known forms of Bantu speech and to give their approximate geographical limits. The writer is well aware that here and there exist small patches of languages spoken by two or three villages which, though emphati- cally Bantu, possess isolated characters making them not easily included within any of the above-mentioned groups; but too de- tailed a reference to these languages would be wearisome and perhaps puzzling. Broadly speaking, the domain

of Bantu speech seems to be divided into four great sections: — - (a) the languages of the Great Lakes and the East Coast down to and including the Zambezi basin; (b) the South-Central group (Bechuana-Zulu) ; (c) the languages of the South-West, from the southern part of the Belgian Congo to Damaraland and the Angola-Congo coast; and (d) the Western group, including all the Central and Northern Congo and Cameroon languages, and probably also group No. 2 of the Albert Nyanza and Semhki river.

Common Features. — There is no mistaking a Bantu language, which perhaps is what renders the study of this group so interesting and encouraging. Tht homogeneity of this family is so striking, as compared with the inexplicable confusion of tongues which reigns in Africa north of the Bantu borderland, that the close relationships of these dialects have perhaps been a little exaggerated by earlier writers.

The phonology of the Western group (d) is akin to that of the Negro languages of Western and West-Central Africa. A small portion of (b) the South-Central group (Zulu) has picked up clicks, perhaps borrowed from the Hottentots and Bushmen. Other- wise, the three groups (a), (b) and © are closely related in phonology, and never, except here and there on the borders of the Western group, adopt the peculiar Wesi African combinations of kp and gb, which are so characteristic of African speech between the Upper Nile and the Guinea coast.

The following propositions may be laid down to define the special or peculiar features of the Bantu languages : —

(1) They are agglutinative in their construction, the syntax being formed by adding prefixes principally and also suffixes to the root, but no infixes (that is to say, no mutable syllable incorporated into the middle of the root- word). 1

(2) The root excepting its terminal vowel is practically unchang- ing, though its first or penultimate vowel or consonant may be modified in pronunciation by the preceding prefix, or the last vowel in the same way by the succeeding suffix.

(3) The vowels of the Bantu languages are always of the Italian type, and no true Bantu language includes obscure sounds like 6 and ii. Each word must end in a vowel (though in some modern dialects in Eastern Equatorial, West and South Africa the terminal vowel may be elided in rapid pronunciation, or be dropped, or

absorbed in the terminal consonant, generally a nasal). No two consonants can come together without an intervening vowel, except in the case of a nasal, labial or sibilant. 2 No consonant is doubled. Apparent exceptions occur to this last rule where two nasals, two r's or two d's come together through the elision of a vowel or a labial.

(4) Substantives are divided into classes or genders, indicated by the pronominal particle prefixed to the root. These prefixes are used either in a singular or in a plural sense. With the exception of the " abstract" prefix Bu (No. 14), no singular prefix can be used as a plural nor vice versa. There is a certain degree of correspond- ence between the singular and plural prefixes (thus No. 2 prefix serves almost invariably as a plural to No. 3 ; No. 8 corresponds as a plural to No. 7). The number of prefixes common to the whole group is perhaps sixteen. The pronominal particle or prefix of the noun is attached as a prefix to the roots of the adjectives, pronouns, prepositions and verbs of the sentence which are connected with the governing noun; and though in course of time these particles may differ in form from the prefix of the substantive, they were akin in origin. (This system is the " concord " of Dr Bleek. 3) The pronominal particles, whether in nominative or accusative case, must always precede the nominal, pronominal, adjectival and verbal roots, though they often follow the auxiliary prefix-participles used in conjugating verbs, 4 and the roots of some prepositions.

1 These features are characteristic of almost all the Negro lan- guages of Africa.

2 This does not preclude the aspiration of consonants, or the occasional local change of a palatal into a guttural.

3 As already mentioned, a somewhat similar concord is also present as regards the suffixes of the Fula and the Kiama (Tent) languages in Western Africa, and as regards the prefixes of the Timne language of Sierra Leone ; it exists likewise in Hottentot and less markedly in many Aryan, Semitic and Hamitic tongues.

4 An apparent but not a real exception to this rule is in the second person plural of the imperative mood, where an abbreviated form of the pronoun is affixed to the verb. Other phases of the verb may be occasionally emphasized by the repetition of the governing pronoun at the end.

(5) The root of the verb is the second person singular of the imperative.

(6) No sexual gender is recognized in the pronouns and concord. Sexual gender may be indicated by a male ” prefix ” of varying form, often identical with a word meaning ” father,” while there is a feminine prefix, na or nya, connected with the root meaning ” mother,” or a suffix ka or kazi, indicating ” wife,” ” female.” The 1st and 2nd prefixes invariably indicate living beings and are Usually restricted to humanity.

The sixteen original prefixes of the Bantu languages are given below in the most archaic forms to be found at the present day. The still older types of these prefixes met with in one or two languages, and deduced generally by the other forms of the particle used in the syntax, are given in brackets. It is possible that some of these prefixes resulted from the combination of a demonstrative pronoun and a prefix indicating quality or number.

Old Bantu Prefixes. Singular. _ Plural.

Class 1. Vmu- (Ngu-mu-). 1 Class 2. Aba (Mba-ba or Nga-ba). 1 „ 3. Vmu- (Ngu-mu-). ,, 4. Imi- (Ngi-mi-).

,, 5. Idi (Ndi-di-). ,, 6. Ama- (Nga-ma-).

„ 7- Iki- (Nki-ki-). _ „ 8. Ibi- (Mbi-bi-).

,, 9. I-n- or l-ni- (?Ngi-ni-). ,, 10. Iti-, Izi-, Iti-n-, Izi-n-

(?Ngi-ti-). „ 11. Ulu (Ndu-du-). ,, 12. Utu QNtu-tu-); often

diminutive in sense. ,, 13. Aka (} Nka-ka-) ; usually diminutive, sometimes honorific. „ 14. Ubu- (IMbu-bu-); sometimes used in a plural sense;

generally employed to indicate abstract nouns.

„ 15. Uku (?Nku-ku-); identical with the preposition “to,”

used as an infinitive with verbs, but also with

certain nouns indicating primarily functions of

the body.

„ 16. Apa (Mpa-pa-); locative; applied to nouns and other

forms of speech to indicate place or position ;

identical with the adverb ” here,” as Ku- is with

” there.”

To these sixteen prefixes, the use of which is practically common

to all members of the family, might perhaps be added No. 17, Ft- or

Vi-, a prefix in the singular number, having a diminutive sense,

which is found in some of the western and north-western Bantu

tongues, chiefly in the northern half of the Congo basin and

Cameroon. It is represented as far east (in the form of I-) as the

Manyema language on the Upper Congo, near Tanganyika. This

prefix cannot be traced to derivation from any others among the

sixteen, certainly not to No. 8, as it is always used in the singular.

Its corresponding plural prefix is No. 12 (Tu-). Prefix No. 18 is

Ogu-, which has, as a plural prefix, No. 19, Aga-. These are both

used in an augmentative sense, and their use seems to be confined

to the Luganda and Masaba dialects, and perhaps some branches of

the Unyoro language. These, like No. 17, are regular prefixes, since

they are supplied with the concord (git and go). Lastly, there is

the 20th prefix, M11-, which is really a preposition meaning ” in

”

or ” into,” often combined in meaning with another particle, -ni,

used always as a suffix. 2 The 20th prefix, Mu-, however, does not

seem to have a complete concord, as it is only used adjectivally or

as a preposition and has no pronominal accusative.

The concord may be explained thus: — Let us for a moment re-construct the original Bantu mother-tongue (as attempts are some- times made to deduce the ancient Aryan from a comparison of the most archaic of its daughters) and propound sentences to illustrate the repetition of pronominal particles known as the concord.

Old Bantu. Babo mbaba-ntu 3 babi ba-bo-ta. tu-Ja-oga.

They these-they person they bad they who kill we fear them. Rendered into the modern dialect of Luganda this would be : —

Bo aba-ntu babi iabota tu-ia-tia.

They these-they person they bad they who kill we them fear.

(They are bad people who kill ; we fear them.)

Old Bantu.

Ngu-mu-ti wguno ngH-gwa ku-wgw-mbona.

- This tree this here this falls; thou this seest?

Rendered into Kiguha of North-West Tanganyika, this would be: —

f/muti guno gMgwa ugwmona?

It tree this here it falls; thou it seest?

(The tree falls; dost thou see it?)

The prefixes and their corresponding particles have varied greatly

in form from the original syllables, as the various Bantu dialects

1 The full hypothetical forms of_ the prefixes as joined with definite articles — Ngumu, Mbaba, Ngimi, Ngama and so on — are added in brackets. Forms very like these are met with still in the Mt. Elgon languages (Group No. 3) and in Subiya group (No. 32).

2 This is prominently met with in East Africa, and also in the various Bechuana dialects of Central South Africa, where it takes the form of 8 at the end of words.

‘ Or perhaps nga-ba-ntu (afterwards na-ba-, aba-) ; the form Kgabantu is actually met with in Zulu-Kaffir ; also ngumuntu.

became more and more corrupt. Assuming these prefixes to have consisted once of two distinct particles, such as, for example, Nos. 1 and 3, Ngu-mu-, or the 6th plural prefix Nga-ma-, the first syllable seems to have been of the nature of a demonstrative pronoun, and the second more like a numeral or an adjective. Mu- probably meant ” one,” and Ma- a collective numeral of indefinite number, applied to liquids (especially water), a tribe of men, a herd of beasts — any- thing in the mass. 4 In the corresponding particles of the concord as applied^ tq adjectives, verbs and pronouns, sometimes the first syllable, Ngu or Nga was taken for the concord and sometimes the second mu or ma. This would account for the seemingly inexplicable lack of correspondence between the modern prefix and its accompany- ing particle, which so much puzzled Bleek and other early writers on the Bantu languages. In many of these tongues, for example, the particle which corresponds at the present day to the plural prefix Ma- is not always Ma, but more often Ga-, Ya-, A-; while to Mu- (Classes 1 and 3) the corresponding particle besides mu is gw-, gw-, u-, wu-, yu-, ii-, &c.

The second prefix, Ba- or Aba-, is, in the most archaic Bantu speech (the languages of Mt. Elgon), Baba- in its definite form (Ngaba sometimes in Zulu-Kaffir). The concord is ba in all the less corrupt Bantu tongues, but this plural prefix degenerates into Va-, Wa-, Ma-, and A-. The concord of the 4th prefix, Mi-, is gi-, i, ji, and sometimes mi. The commonest form of the 5th prefix at the present day is Li- (the older and more correct is Di-), and its concord is the same; this 5th prefix is often dropped (the concord remaining) or becomes Ri-, I-, Ji-, and Ni-. The 7th prefix, Ki-, in many non-related dialects pursues a parallel course

through Ci- into Si- (— Shi) and Si- and its concord resembles it. The 8th prefix is still more variable. In its oldest form this is Ibi- or Mbibi-. It is invariably the plural of the 7th. It becomes in different forms of Bantu speech Vi-, Pi-, Fi-, Fy-, PH-, Si-, I-, By-, Bzi-, Psi-, Zwi-, Zi- and Ri-, with a concord that is similar. The loth prefix, which was originally Ti- or Tin-, or Zi- or Zin-, becomes Jin-, Rin-, Din-, Lin-, 0m-, Bon-., &c. The n in this prefix is really the singular prefix No. 9, which is sometimes retained in the plural, and some- times omitted. In the case of the 10th prefix, the concord or corre- sponding pronoun persists long after the prefix has fallen out of use as a definite article. Thus, though it is absent as a plural prefix for nouns in the Swahili of Zanzibar, it reappears in the concord. For instance: — Nombe hizi zangu — Cows these mine (These cows are mine), although Nombe has ceased to be zinombe in the plural, the Zi- particle reappears in hizi and zangu. In fact, the persistence of this concord, which exists in almost every known Bantu language in connexion with the 10th prefix, shows that prefix to have been in universal use at one time. The nth prefix Lu seems to be de- scended from an older form, Ndu-. Its commonest type is Lu-, but it sometimes loses the L and becomes U-, and in the more archaic dialects is usually pronounced Du- or Ru-. It is also Nu- in one or two languages. The 12th prefix (Tu-), always used in a diminutive sense, disappears in many of these languages. Where met with it is generally Tu- or To-, but sometimes the initial T becomes R (Ru-, Ro-) or L(Lu-, Lo-) or even Y(Yo-), the concord following the fortunes of the prefix. The 13th prefix (Ka-) is sometimes confused with the 7th (Ki) and merged into it and vice versa. Ka- very often takes the 8th prefix as a plural, more commonly the 12th, sometimes the 14th. This prefix (Ka-) entirely disappears in the north-western section of the Bantu languages. Bleek thought that it persisted in the attenuated form of E- so characteristic of the Cameroon and northern Congo languages, but later investigations show this E> to be a reduction of Ki- (Ke-) the 7th prefix. The 14th prefix Bu- is very persistent, but frequently loses its initial letter B, which is either softened into V or W, or disappears altogether, the prefix becoming V- or O- or Ow-. Sometimes this prefix becomes palatized into By- or events- (C-). The concord follows suit. The 15th prefix, Ku-, occasionally loses its initial K or softens into Hu or % v or strengthens into Gu. Its concord under these circumstances some- times remains in the form of Ku-. The 16th, Pa-, prefix is one of the most puzzling in its distribution and its phonetic changes. A very large number of the Bantu languages in the north, east and west have a dislike to

the consonant P, which they frequently trans- mute into an aspirate (H), or soften into V, W, or F, or simply drop out. There is too much evidence in favour of this prefix having been originally Pa- or Mpa-pa to enable us to give it any other form in reconstructing the Bantu mother-tongue. Yet in the most archaic Bantu dialects to the north of the Victoria Nyanza it is nowhere found in the form of Pa-. It is either Ha- (and Ha- changes eastward into Sa- !) or Wa-} But for its existence in this shape in the language of Uganda one might almost be led to think that the 1 6th locative prefix began as Ha-, and by some process without a parallel changed in the east and south to the form of Pa-. There are, however, a good many place names in the northern part of the Uganda protectorate, in the region now occupied by Nilotic negroes, which begin with Pa-. These place names would seem to be of ancient Bantu origin in a

4 Likewise ba- may have meant ” two ” (Bantu root Bali = two) ; a dual first and then a plural.

6 Wa- in Luganda. In Lusoga (north coast of Victoria Nyanza} Wa- becomes To (Gha).

land from which the Bantu negroes were subsequently driven by Nilotic invaders from the north. They may be relics therefore of a time before the Pa- prefix of those regions had changed to the modern form of Ha-. In S.W. and N.W. Cameroon the initial p of the 16th prefix reappears in two or three dialects; but elsewhere in North-West Bantu Africa and in the whole basin of the Congo, except the extreme south and south-east, the form Pa- is never met with; it is Va-, Wa-, Ha-, Fa-, or A-. In the Secuana group of dialects it is Fa- or Ha-; in the Luyi language of Barotselaiid it assumes the very rare form of Ba-, while the first prefix is weakened to .4-.

The pronouns in Bantu are in most cases traceable to some such general forms as these : —

I, me, my .... ngi, mi, 1 ngu. Thou, thee, thy . . . gwe, ku; -ko.

He or she, him, her, his, &c . a-, ya-, wa- (nom.) ; also ngu-

(which becomes yu-, ye-, wu-, hu-, «-) ; -mu (ace.) ; -ka, kwe

(poss.) ; there is also another form, ndi (nom. and poss.) in the Western Bantu sphere. We, us, our .... isu, swi, tu-, ti-; tu (ace);

itu (poss.). Ye, you, your . . . inu, mu, nyu-, nyi-, -ni;

-nu, mu (ace.) ; inu (poss.). They, them, their . . . babo, ba ; ba (ace.) ; -babo

(poss.). The Bantu verb consists of a practically unchangeable root which is employed as the second person singular of the imperative. To this root are prefixed and suffixed various particles. These are worn-down verbs which have become auxiliaries or they are_ re- duced adverbs or prepositions. It is probable (with one exception) that the building up of the verbal root into moods and tenses has taken place independently in the principal groups of Bantulanguages, the arrangement followed being probably founded on a fundamental system common to the original Bantu tongue. The exception alluded to may be a method of forming the preterite tense, which seems to be shared by a great number of widely-spread Bantu languages. This may be illustrated by the Zulu tanda, love, which changes to tandile, have loved, did love. This -ileov -Hi may become in other forms -idi, didi, -ire, -ine, but is always referable back to some form like -Hi or He, which is probably connected with the root H or di {ndi or ni), which means ” to be ” or ” exist.” The initial i in the particle -He often affects the last or penultimate syllable of the verbal root, thereby causing one of the very rare changes which take place in this vocable. In many Bantu dialects the root pa, (which means to give) becomes pele in the preterite (no doubt from an original pa-ile) . Likewise the Zulu tandile is a contraction of tanda-ile. Two other frequent changes of the terminal vowel of the common root are those from a (which is almost invariably the terminal vowel of Bantu verbs), (i), into e to form the subjunctive tense, (2) into i to give a negative sense in certain tenses. With these exceptions the vowel a almost invariably terminates verbal roots. The de- partures from this rule are so rare that it might almost be included among the elementary propositions determining the Bantu lan- gauges. And these instances when they occur are generally due’ (as in Swahili) to borrowed foreign words (Arabic, Portuguese or English). 2 This point of the terminal a is the more interesting because, by changing the terminal vowel of the verbal root and possibly adding a personal prefix, one can make nouns from verbs. Thus in Luganda senyua is the verbal root for ” to pardon.” ” A pardon ” or ” forgiveness ” is ki-senyuo. ” A pardoner ” might

be mu-senyui. In Swahili patanisa would be the verbal root for ” con- ciliate”; mpatanasi is a ” conciliator,” and upataniso is “con-ciliation.” Another marked feature of Bantu verbs is their power of modifying the sense of the original verbal root by suffixes, the affixion of which modifies the terminal vowel and sometimes the preceding consonant of the root. Familiar forms of these variations and their usual meanings are as follows : —

Supposing an original Bantu root, tanda, to love ; this may become tandwa . . . . to be loved.

tandeka or tandika . . to be lovable. tandUa or tandela 3 . .to love for, with, or by some

other person. tandiza (or -eza) \ . .to cause to love. tandisa (or -esa) *) tandana .; . . .to love reciprocally.

1 Mi is possibly a softening of ngi, ni; ngi becomes in some dialects nji, ndi, ni or mbi; there is in some of the coast Cameroon languages, and in the north-eastern Congo, a word mbi, mba for ” I,” ” me,” which seems to be borrowed from the Sudanian Mundu tongues. The possessive pronoun for the first person is devired from two forms, -ami and -ungi {-am, -angu’, -anji, -ambi, &c).

2 An exception to this rule is the verbal particle li or di, which means ” to be.” 3 Or-ira, era.

1 This form may also appear as lo, as for instance aka — to be on fire becomes aia, to set on fire.

The suffix -aka or anga sometimes appears and gives a sense of con tinuance to the verbal root. Thus tanda may become tandaka in the sense of ” to continue loving.” 5

The negative verbal particle in the Bantu languages may be traced back to an original ka, ta or sa, ki, ti or si in the Bantu mother- tongue. Apparently in the parent language this particle had already these alternative forms, which resemble those in some West African Negro languages. In the vast majority of the Bantu dialects at the present day, the negative particle in the verb (which nearly always coalesces with the pronominal particle) is descended from this ka, ta or sa, ki, ti or si, assuming the forms of ka, ga, nga, sa, ta, ha, a, ti, si, hi, &c. It has coalesced to such an extent in some cases with the pronominal particle that the two are no longer soluble, and it is only by the

existence of some intermediate forms (as in the Kongo language) that we are able to guess at the original separation between the two. Originally the negative particle ka, sa, &c, was joined to the pronominal particles, thus: —

Ka-ngi ..... not I.

(Therefore Ka-ngi tanda = not I love.)

Ka-ku or ka-wu

Ka-a

Ka-tu Ka-nu Ka-ba

not thou, not he, she. not we. not ye. not they.

In like manner sa would become sa-ngi, sa-wu, &c. But very early in the history of Bantu languages ka-ngi, or io-»gi,became contracted into kai, sai, and finally, ki, si ; ka-ku or ka-wu into ku ; and kaa or saa have always been ka or sa. Sometimes in the modern languages the negative particle (such as ti or si) is used without any vestige of a pronoun being attached to it, and is applied indifferently to all the persons. Occasionally this particle has fallen out of use, and the 'negative is expressed (1) by stress or accent; (2) by suffix (traceable to a. root -pe or -ko) answering to the French pas, and having the same sense; and (3) by the separate employment of an adverb. If not a few Bantu languages, the verb used in a negative sense changes its terminal -a to -»'. The subjunctive is very frequently formed by changing the terminal -a to -e : thus, tanda = love ; -tande = may love.

Bibliography. — A Comparative Grammar of South African Languages (in two parts, left unfinished), by Dr W. I. Bleek (London, 1869) ; A Sketch of the Modern Languages of Africa, by R. N. Cust (1882) ; Comparative Grammar of the South African Bantu Languages. by Father J. Torrend (1894; mainly composed on a study of the languages of the Central Zambezi, interesting, but erroneous in some deductions, and incomplete). In Sir H. H. Johnston's The Kiliman- jaro Expedition (1884), British Central Africa (1898), and The Uganda Protectorate (1902-1904), there are illustrative vocabularies; and in George Grenfell and the Congo (1908) the Congo groups of Bantu speech are carefully classified, also the Fernandian and Cameroon. In the numerous essays of Carl Meinhof on the original structure of the Bantu mother-speech, and on existing languages in East and South-East

Africa, in the Mittheilungen des Seminars fur Orientalische Sprachen, Berlin (also issued separately through Brock- haus, Leipzig, 1899), and also in his Grundztige einer vergleichenden Grammatik der Bantusprachen (Berlin, 1906), a vast amount of valu- able information has been collected, but Meinhof 's deductions there- from are not in every case in accord with those of other authorities. The Swahili-English Dictionary, by Dr L. Krapf (London, 1882), contains a mass of not well-sorted but invaluable information con- cerning the Swahili language as spoken on the coast of East Africa, especially regarding many words now becoming obsolete. A similar mine of information is to be found in An Encyclopaedic Dictionary of the Mananja (Mang'anja) Language of British Central Africa, by the Rev. D. C. Scott (1891). Other admirable works are the Dictionary of the Congo Language, by the Rev. Holman Bentley (1891), and The Folklore of Angola, and a Grammar of Kimbundu, by Dr. Heli Chate- lain. The many handbooks and vocabularies written and published by Bishop Steere on the languages of the East African coast-lands are of great importance to the student, especially as they give forms of the prefixes now passing out of use. The Introductory Handbook of the Yao Language, by the Rev. Alexander Hetherwick, illustrates very fully that peculiar and important member of the East African group. Vocabularies of various Congo languages have been compiled by Dr. A. Sims; more important works oil this subject have been published by the Rev. W. H. Stapleton {Comparative Handbook of Congo Languages), and by Rev. John Whitehead {Grammar arid, Dictionary of the Bobangi Language (London, 1899). E. Torday has illustrated the languages of the Western Congo basin {Kwango, Kwilu, northern Kasai) in the Journal of the Royal Anthropological Institute. There is a treatise on the Lunda language of the south- western part of the Belgian Congo, in Portuguese, by Henrique de Carvalho, who also in his Ethnographia da Expedicao portugueza

6 In choosing this common root tanda, and applying it to the above various terminations, the writer is not prepared to say that it is associated with all of them in any one Bantu language. Although tanda is a common verb in Zulu, it has not in Zulu all these variations, and in some other language where it may by chance exhibit all the variations its own form is changed to londa or randa.

BANVILLEˆ-BAPHOMET

ao Muata Yanvo goes deeply into Bantu language questions. The Duala language of Cameroon has been illustrated by the Baptist missionary Saker in his works published about i860, and since 1900 by German missionaries and explorers (such as Schuler)._ The German work on the Duala language is mostly published in the Mittheilungen des Seminars fur Orientalische Sprachen (Berlin) ; see also Schuler's Grammatik des Duala. The Rev. S. Koelle, in his Polyglotta Africana, published in 1851, gave a good many interesting vocabularies of the almost unknown north-west Bantu borderland, as well as of other forms of Bantu speech of the Congo coast and Congo basin. J. T. Last, in his Polyglotta Africana Orientalis, has illustrated briefly many of the East African dialects and languages, some otherwise touched by no one else. He has also published an excellent grammar of the Kaguru language of the East African high- lands (Usagara). The fullest information is now extant regarding the languages of Uganda and Unyoro, in works by the missionaries of the Church Missionary Society (Pilkington, Blackledge, Hattersley, Henry Duta and others). Mr Crabtree, of the same mission, has collected information regarding the Masaba dialects of Elgon, and these have also been illustrated by Mr C. W. Hobley, and by Sir H. H. Johnston (Uganda Protectorate), and privately by Mr S. A. Northcote. Mr A. C. Madan has published works on the Swahili language and on the little-known Senga of Central Zambezia and Wisa 01 North-East Rhodesia (Oxford University Press). Jacottet (Paris, 1902) has in his Grammaire Subiya provided an admirable study of the Subtya and Luyi languages of Barotseland, and in 1907, Edwin W. Smith (Oxford University Press) brought out a Handbook of the Ila Lan- guage (Mashukulumbwe). The Rev. W. Govan Robertson is the author of a complete study of the Bemba language. Mrs Sydney Hinde has illustrated the dialects of Kikuyu and Kamba. F. Van der Burgt has published a Dictionary of Kirundi (the language spoken at the north end of Tanganyika). Oci-herero of Damaraland has chiefly been illustrated by German writers, old and new; such as Dr Kolbe and Dr P. H. Brincker. The northern languages of this Herero group have been studied by members of the American Mission at Bailundu under the name of Umbundu. Some information on the languages of the south-western part of the Congo basin and those of south-eastern Angola may be found in the works of Capello and Ivens and of Henrique de Carvalho and Commander V. L. Cameron. The British, French and German missionaries have published many

dictionaries and grammars of the different Secuana dialects, notable amongst which is John Brown's Dictionary of Secuana and Meinhof's Study of the Tii-venda. The grammars and dictionaries of Zulu-Kaffir are almost too numerous to catalogue. Among the best are Maclaren's Kafir Grammar and Roberts' Zulu Dictionary. The works of Boyce, Appleyard and Bishop Colenso should also be consulted. Miss A. Werner has written important studies on the Zulu click-words and other grammatical essays and vocabularies of the Bantu languages in the Journal of the African Society between 1902 and 1906. The Tebele dialect of Zulu has been well illustrated by W. A. Elliott in his Dictionary of the Tebele and Shuna languages (London, 1897). The Ronga {Tonga, Si-gwamba, Hlengwe, &c.) are dealt with in the Grammaire Ronga (Lausanne, 1896) of Henri Junod. Bishop Smyth and John Mathews have

fmblished a vocabulary and short grammar of the Xilenge (Shilenge) anguage of Inhambane (S.P.C.R., 1902). The journal Anthropos (Vienna) should also be consulted. (H. H. J.)

BANVILLE, THEODORE FAULLAIN DE (1823-1891), French poet and miscellaneous writer, was born at Moulins in the Bourbonnais, on the 14th of March 1823. He was the son of a captain in the French navy. His boyhood, by his own account, was cheerlessly passed at a lycee in Paris; he was not harshly treated, but took no part in the amusements of his companions. On leaving school with but slender means of support, he devoted himself to letters, and in 1842 published his first volume of verse (Les Cariatides), which was followed by Les Stalactites in 1846. The poems encountered some adverse criticism, but secured for their author the approbation and friendship of Alfred de Vigny and Jules Janin. Henceforward Banville's life was steadily devoted to literary production and criticism. He printed other volumes of verse, among which the Odes funambulesques (Alencon, 1857) received unstinted praise from Victor Hugo, to whom they were dedicated. Later, several of his comedies in. verse were produced at the Theatre Francais and on other stages; and from 1853 onwards a stream of prose flowed from his industrious pen, including studies of Parisian manners, sketches of well-known persons {CamSes parisiennes, &c), and a series of tales {Contes bourgeois, Contes Mroiques, 6*c), most of which were republished in his collected works (1875-1878). He also wrote freely for reviews, and acted as dramatic critic for more than one newspaper. Throughout a life spent mainly in Paris, Banville's genial character and cultivated mind won him the friendship of the chief men of letters of his time. He was also intimate with

Frederick-Lemaltre and other famous actors. In 1858 he was decorated with the legion of honour, and was promoted to be an officer of the order in 1886. He died in Paris on the 15th of March 1 89 1, having just completed his sixty-eighth year. Banville's claim to remembrance rests mainly on his poetry. His plays are written with distinction and refinement, but are deficient in dramatic power; his stories, though marked by fertility of invention, are as a rule conventional and unreal. Most of his prose, indeed, in substance if not in manner, is that of a journalist. His lyrics, however, rank high. A careful and loving student of the finest models, he did even more than his greater and somewhat older comrades, Victor Hugo, Alfred de Musset and Theophile' Gautier, to free French poetry from the fetters of metre and mannerism in which it had limped from the days of Malherbe. In the Odes funambulesques and elsewhere he revived with perfect grace and understanding the rondeau and the

villanelle, and like Victor Hugo in Les Orientates, wrote pantoums (pantuns) after the Malay fashion. He published in 187 2 a Petit traiti diversification franqaise'm exposition of his metrical methods. He was a master of delicate satire, and used with much effect the difficult humour of sheer bathos, happily adapted by him : from some of the early folk-songs. He has somewhat rashly been compared to Heine, whom he profoundly admired; but if he lacked the supreme touch of genius, he remains a delightful writer, who exercised a wise and sound influence upon the art of his generation.

Among his other works may be mentioned the poems, Jdylles prussiennes (1871), and Trente-six ballades joy euses (1875); the prose tales, Les Saltimbanques (1853); Esquisses parisiennes (1859) and Contes feeriques; and the plays, Le Feuilleton d' Aristophane (1852), Gringoire (1866), and Deidamia (1876).

See also J. Lemaitre, Les Contemporains (first series, 1885) ; Sainte-Beuve, Causeries du lundi, vol. xiv. ; Maurice Spronck, Les Artistes liiteraires (1889). (C.)

BANYAN, or Banian (an Arab corruption, borrowed by the Portuguese from the Sanskrit vanij, "merchant"), the Ficus Indica, or Bengalensis, a tree of the fig genus. The name was originally given by Europeans to a particular tree on the Persian Gulf beneath which some Hindu " merchants " had built a pagoda. In Calcutta the word was once generally applied to a native broker or head clerk in any business or private house, now usually known as sircar. Bunya, a corruption of the word common in Bengal generally, is usually applied to the native grain-dealer. Early writers sometimes use the term generically for all Hindus in western India. Banyan was long Anglo-Indian, for an undershirt, in allusion to the body garment of the Hindus, especially the Banyans.

Banyan days is a nautical slang term. In the British navy there were formerly two days in each week on which meat formed no part of the men's rations. These were called banyan days,, in allusion to the vegetarian diet of the Hindu merchants. Banyan hospital also became a slang term for a hospital for animals, in reference to the Hindu's humanity and his dislike of taking the life of any animal.

BAOBAB, A dansoniadigitata(na,tural order Bombaceae), a.na.tive of tropical Africa, one of the largest trees known, its

stem reaching 30 ft. in diameter, though the height is not great. . It has a large woody fruit, containing a mucilaginous pulp, with a pleasant cool taste, in which the seeds are buried. The bark yields a strong fibre which is made into ropes and woven into cloth. The wood is very light and soft, and the trunks of living trees are often excavated to form houses. The name of the genus was given by Linnaeus in honour of Michel Adanson, a celebrated French botanist and traveller.

BAPHOMET, the imaginary symbol or idol which the Knights Templars were accused of worshipping in their secret rites. The term is supposed to be a corruption of Mahomet, who in several medieval Latin poems seems to be called by this name. J, von Hammer-Purgstall, in his Mysterium Baphometis relevatum, 6>"c.,and Die Schuld der Templer, revived the old charge against the Templars. The word, according to his interpretation, signi- fies the baptism of Metis, or of fire, and is, therefore, connected with the impurities of the Gnostic Ophites (q.v.). Additional

evidence of this, according to Hammer-Purgstall, is to be found in the architectural decorations of the Templars' churches.

An elaborate criticism of Hammer- Purgstall's arguments was made in the Journal des Savans, March and April 1819, by M. Raynouard, a well-known defender of the Templars. (See also Hallam, Middle Ages, c. i. note 15.)

BAPTISM. The Gr. words /3o7rrw nbs and (Jaimcr pa (both of which occur in the New Testament) signify " ceremonial washing," from the verb jStumfco, the shorter form /3dxT

The texts of the New Testament relating to Christian baptism, given roughly in chronological order, are the following: —

a.d. 55-60, Rom. vi. 3, 4; 1 Cor. i. 12-17, vi. 11, x. 1-4, xii. 13, xv. 29; Gal. iii. 27.

a.d. 60-65, Col. ii. n, 12; Eph. iv. 5, v. 26.

a.d. 60-70, Mark x. 38, 39.

a.d. 80-ˆ90, Acts i. 5, ii. 38-41, viii. 16, 17, x. 44-48, xix. 1-7, xxii. 16; 1 Pet. iii. 20, 21; Heb. x. 22.

A.D. 90-100, John iii. 3-8, iii. 22, iii. 26, iv. 1, 2.

Uncertain, Matt, xxviii. 18-20; Mark xvi. 16.

The baptism of John is mentioned in the following: —

a.d. 60-70, Mark i. 1-1 1.

a.d. 80-90, Matt. iii. 1-16.”; Luke iii. 1-22, vii. 29, 30; Acts i. 22, x. 37, xiii. 24, xviii. 25, xix. 3, 4.

a.d. 90-100, John i. 25-33, iii. 23, x. 40.

It is best to defer the question of the origin of Christian baptism until the history of the rite in the centuries which followed has been sketched, for we know more clearly what baptism became after the year 100 than what it was before. And that method on which a great scholar 1 insisted when studying the old Persian religion is doubly to be insisted on in the study of the history of baptism and the cognate institution, the eucharist, namely, to avoid equally ” the narrowness of mind which clings to matters of fact without rising to their cause and connecting them with the series of associated phenomena, and the wild and uncontrolled spirit of comparison, which, by com- paring everything, confounds everything.”

Our earliest detailed accounts of baptism are in the Teaching of the Apostles (c.90-120) and in Justin Martyr.

The Teaching has the following: —

1. Now concerning baptism, thus baptize ye: having spoken beforehand all these things, baptize into the name of the Father and of the Son and of the Holy Spirit, in living water.

2. But if thou hast not living water, baptize into other water; if thou canst not in cold, in warm.

3. But if thou hast not either, pour water upon the head thrice, in the name of the Father and of the Son and of the Holy Spirit.

4. Now before the baptism, let him that is baptizing and him that is being baptized fast, and any others who can; but thou biddest

him who is being baptized to fast one or two days before.

The ” things spoken beforehand ” are the moral precepts known as the two ways, the one of life and the other of death, with which the tract begins. This body of moral teaching is older than the rest of the tract, and may go back to the year a.d. 80. ‘

Justin thus describes the rite in ch. lxi. of his first Apology, (c. 140) :—

1 James Darmesteter, in ” Introd. to theVendidad,” in the Sacred Books of the East.

” I will also relate the manner in which we dedicated ourselves to God when we had been made new through Christ. As many as are persuaded and believe that what we teach and say is true, and undertake to be able to live accordingly, are instructed to pray and entreat God with fasting, for the remission of their sins that are past, we praying and fasting with them. Then they are brought by us where there is water, and are regenerated in the same manner in which we were ourselves regenerated. For in the name of God, the Father and Lord of the universe, and of our Saviour Jesus Christ and of the Holy Spirit, they then receive the washing with water.”

In the sequel Justin adds: —

” There is pronounced over him who chooses to be born again, and has repented of his sins, the name of God the Father and Lord of the universe, he who leads to the laver the person that is to be washed calling Him by this name alone. For no one can utter the name of the ineffable God, and this washing is called Illumina- tion (Gr. omo-fws), because they who learn these things are illuminated in their understandings. And in the name of Jesus Christ, who was crucified under Pontius Pilate, and in the name of the Holy Ghost, who through the prophets foretold all things about Jesus, he who is illuminated is washed.”

In ch. xiv. of the dialogue with Trypho, Justin asserts, as against Jewish rites of ablution, that Christian baptism alone can purify those who have repented. ” This,” he says, ” is the water of life. But the cisterns which you have dug for yourselves are broken and profitless to you. For what is the use of that baptism which cleanses the flesh and body alone? Baptize the soul from wrath, from envy and from hatred; and, lo! the body is pure.”

In ch. xliii. of the same dialogue Justin remarks that " those who have approached God through Jesus Christ have received a circumcision, not carnal, but spiritual, after the manner of Enoch."

In after ages baptism was regularly called illumination. Late in the 2nd century Tertullian describes the rite of baptism in his treatise On the Resurrection of the Flesh, thus:

1. The flesh is washed, that the soul may be freed from stain.

2. The flesh is anointed, that the soul may be consecrated.

3. The flesh is sealed (i.e. signed with the cross), that the soul also may be protected.

4. The flesh is overshadowed with imposition of hands, that the soul also may be illuminated by the Spirit.

5. The flesh feeds on the body and blood of Christ, that the soul also may be filled and gated with God.

6. He also mentions elsewhere that the neophytes, after baptism, were given a draught of milk and honey. (The candi- date for baptism, we further learn from his tract On Baptism, prepared himself by prayer, fasting and keeping of vigils.)

Before stepping into the font, which both sexes did quite naked, the neophytes had to renounce the devil, his pomps and angels. Baptisms were usually conferred at Easter and in the season of Pentecost which ensued, and by the bishop or by priests and deacons commissioned by him.

Such are the leading features of the rite in Tertullian, and they reappear in the 4th century in the rites of all the orthodox churches of East and West; Tertullian testifies that the Marcionites observed the particulars numbered one to six, which must therefore go back at least to the year 1 50. About the year 300, those desirous of being baptized were (a) admitted to the catechumenate, giving in their names to the bishop, (b) They were subjected to a scrutiny and prepared, as to-day in the western churches the young are prepared for confirmation. The catechetic course included instruction in monotheism, in the folly of polytheism, in the Christian scheme of salvation, &c. (c) They were again and again exorcized, in order to rid them of the lingering taint of the worship of demons, (d) Some days or even

weeks beforehand they had the creed recited to" them. They might not write it down, but learned it by heart and had to repeat it just before baptism. This rite was called in the West the traditio and redditio of the symbol. The Lord's Prayer was communicated with similar solemnity in the West

{traditio precis). The creed given in Rome was the so-called Apostles' Creed, originally compiled as we now have it to exclude Marcionites. In the East various other symbols were used. (e) There followed an act of unction, made in the East with the oil of the catechumens blessed only by the priest, in the West with the priest's saliva applied to the lips and ears. The latter was accompanied by the following formula: " Effeta, that is, be thou opened unto odour of sweetness. But do thou flee, O Devil, for the judgment of God is at hand." (/) Renunciation of Satan. The catechumens turned to the west in pronouncing this; then turning to the east they recited the creed, (g) They stepped into the font, but were not usually immersed, and the priest recited the baptismal formula over them as he poured water, generally thrice, over their heads, (h) They were anointed all over with chrism or scented oil, the priest reciting an appro- priate formula. Deacons anointed the males, deaconesses the females, (i) They put on white garments and often baptismal wreaths or chaplets as well. In some churches they had worn cowls during the catechumenate, in sign of repentance of their sins, (j) They received the sign of the cross on the brow; the bishop usually dipped his thumb in the chrism and said: " In name of Father, Son and Holy Ghost, peace be with thee." In laying his hands on their heads the bishop in many places, especially in the West, called down upon them the sevenfold spirit, (k) The first communion followed, with milk and honey added. (I) Usually the water in the font was exorcized, blessed and chrism poured into it, just before the catechumen entered it. (m) Easter was the usual season of baptism, but in the East Epiphany was equally favoured. Pentecost was sometimes chosen. We hear of all three feasts being habitually chosen in Jerusalem early in the 4th century, but fifty years later baptisms seem to have been almost confined to Easter. The preparatory fasts of the catechumens must have helped to establish the Lenten fast, if indeed they were not its origin.

Certain features of baptism as used during the earlier centuries must now be noticed. They are the following: — (1) Use of fonts; (2) Status of baptizer; (3) Immersion, submersion or aspersion; (4) Exorcism; (5) Baptismal formula and trine immersion; (6) The age of baptism; (7) Confirmation; (8) Disciplina arcani; (9) Regeneration; (10) Relation to repent- ance; (n) Baptism for the dead; (12) Use of the name; (13) Origin of the institution; (14) Analogous rites in other religions.

1. Fonts. — The New Testament, the Didache, Justin, Tertullian and other early sources do not enjoin the use of a font, and contemplate in general the use of running or living water. It was a Jewish rule that in ablutions the water should run over and away from the parts of the body washed. In acts of martyrdom, as late as the age of Decius, we read of baptisms in rivers, in lakes and in the sea. In exceptional cases it sufficed for a martyr to be sprinkled with his own blood. But a martyr's death in itself was enough. Nearchus (c. 2 50) quieted the scruples of his unbaptized friend Polyeuctes, when on the scaffold he asked if it were possible to attain salvation without baptism, with this answer: " Behold, we see the Lord, when they brought to Him the blind that they might be healed, had nothing to say to them about the holy mystery, nor did He ask them if they had been baptized; but this only, whether they came to Him with true faith. Wherefore He asked them, Do ye believe that I am able to do this thing ? "

Tertullian (c. 200) writes (de Bapt. iv.) thus : " It makes no difference whether one is washed in the sea or in a pool, in a river or spring, in a lake or a ditch. Nor can we distinguish between those whom John baptized (tinxit) in the Jordan and those whom Peter baptized in the Tiber." The custom of baptizing in the rivers when they are annually blessed at Epiphany, the feast of the Lord's baptism, still survives in Armenia and in the East generally. Those of the Armenians and Syrians who have retained adult baptism use rivers alone at any time of year.

The church of Tyre described by Eusebius (H.E. x. 4) seems to have had a font, and the church order of Macarius, bishop

of Jerusalem (c. 3 11-335), orders the font to be placed in the same building as the altar, behind it and on the right hand; but the same order lays down that a font is not essential in cases of illness for " the Holy Spirit is not hindered by want of a vessel."

2. Status of Baptizer.— Ignatius (Smyrn. viii.) wrote that it is not

lawful to baptize or hold an agape (Lord's Supper) without the bishop. So Tertullian (de Bapt. xvii.) reserves the right of admitting to baptism and of conferring it to the summus sacerdos or bishop, Cyprian (Epist. lxxiii. 7) to bishops and priests. Later canons continued this restriction; and although in outlying parts of Christendom deacons claimed the right, the official churches accorded it to presbyters alone and none but bishops could perform the confirmation or seal. In the Montanist churches women baptized, and of this there are traces in the earliest church and in the Caucasus. Thus St Thekla baptized herself in her own blood, and St Nino, the female evangelist of Georgia, baptized king Mirian (see " Life of Nino," Studia Biblica, 1903). In cases of imminent death a layman or a woman could baptize, and in the case of new-born children it is often necessary.

3. Immersion or Aspersion. — The Didache bids us " pour water on the head," and Christian pictures and sculptures ranging from the 1st to the 10th century represent the baptizand as standing in the water, while the baptizer pours water from his hand or from a bowl over his head. Even if we allow for the difficulty of representing complete submersion in art, it is never- theless clear that it was not insisted on; nor were the earliest fonts, to judge from the ruins of them, large and deep enough for such an usage. The earliest literary notices of baptism are far from conclusive in favour of submersion, and are often to be regarded as merely rhetorical. The rubrics of the MSS., it is true, enjoin total immersion, but it only came into general vogue in the 7th century, " when the growing rarity of adult baptism made the Gr. word 03cnmf co) patient of an interpreta- tion that suited that of infants only." 1 The Key of Truth, the manual of the old Armenian Baptists, archaically prescribes that the penitent admitted into the church shall advance on his knees into the middle of the water and that the elect one or bishop shall then pour water over his head.

4. Exorcism.— The Didache and Justin merely prescribe fasting, the use of which was to hurry the exit of evil spirits who, in choosing a nidus or tenement, preferred a well-fed body to an emaciated one, according to the belief embodied in the interpolated saying of Matt. xvii. 21: "This kind (of demon) goeth not forth except by prayer and fasting." The exorcisms tended to become longer and longer, the later the rite. The English prayer-book excludes them, as it also excludes the renunciation of the devil and all his angels, his pomps and works. These elements were old, but scarcely primitive; and the archaic rite of the Key

of Truth (see Paulicians) is without them. Basil, in his work On the Holy Spirit, confesses his ignorance of how these and other features of his baptismal rite had originated. He instances the blessing of the water of baptism, of the oil of anointing and of the baptizand himself, the use of anointing him with oil, trine immersion, the formal renunciation of Satan and his angels. All these features, he says, had been handed down in an unpublished and unspoken teaching, in a silent and sacramental tradition.

5. The Baptismal Formula. — The trinitarian formula and trine immersion were not uniformly used' from the beginning, nor did they always go together. The Teaching of the Apostles, indeed, prescribes baptism in the name of Father, Son and Holy Ghost, but on the next page speaks of those who have been baptized into the name of the Lord — the normal formula of the New Testament. In the 3rd century baptism in the name of Christ was still so widespread that Pope Stephen, in opposition to Cyprian of Carthage, declared it to be valid. From Pope Zachariah (Ep. x.) we learn that the Celtic missionaries in baptizing omitted one or more persons of the Trinity, and this was one of the reasons why the church of Rome anathematized

1 Rogers' essay on Baptism and Christian Archaeology in Studia Biblica, vol. v.

them; Pope Nicholas, however (858-867), ih the Responsa ad consulta Bulgarorum, allowed baptism to be valid tanlum in nomine Christi, as in the Acts. Basil, in his work On the Holy Spirit just mentioned, condemns " baptism into the Lord alone " as insufficient. Baptism " into the death of Christ " is often specified by the Armenian fathers as that- which alone was essential.

Ursinus, ah African monk (in Gennad. de Scr. Eccl. xxvii.), Hilary (de Synodis, Ixxxv.), the synod of Nemours (a.d. 1284), also asserted that baptism into the name of Christ alone was valid. The formula of Rome is, " I baptize thee in the name of Father and Son and Holy Spirit." In the East, " so-and-so, the servant of God, is baptized," &c. The Greeks add A men after each person, and conclude with the words, " Now and ever and to aeons of aeons, amen." ;.

We first find in Tertullian trine immersion explained from the triple invocation, Nam nee semel, sed ter, ad singula nomina in personas singulas linguimur: ” Not once, but thrice, for the several names, into the several persons, are we dipped ” (adv. Prax. xxvi.). And Jerome says: ” We are thrice plunged, that the one sacrament of the Trinity may be’ shown forth.” On the other hand, in numerous fathers of East and West, e.g. Leo of Rome, Athanasius, Gregory of Nyssa, Theophylactus, Cyril of Jerusalem and others, trine immersion was regarded as being symbolic of the three days’ entombment of Christ; and in the Armenian baptismal rubric this interpretation is enjoined, as also in an epistle of Macarius of Jerusalem addressed to the Armenians (c. 330). ‘ In Armenian writers this interpretation is further associated with the idea of baptism into the death of Christ.

Trine immersion then, as to the origin of which Basil confesses his ignorance, must be older than either of the rival explanations. These are clearly aetiological, and invented to explain an existing custom, which the church had adopted from its pagan medium. For pagan lustrations were normally threefold; thus Virgil writes (Aen. vi. 229): Tersocios pura circumlulit unda. Ovid (Met. vii. 189 and Fasti, iv. 315), Persius (ii. 16) and Horace (Ep. i. 1. 37) similarly Speak of trine lustrations; and on the last mentioned passage the scholiast Aero remarks: “He uses the words thrice purely, b.ecause people in expiating their sins, plunge themselves in thrice.” Such examples of the ancient usage encounter us everywhere in Greek and Latin antiquity.

6. Age of Baptism.— In the oldest Greek, Armenian, Syrian and other rites of baptism, a service of giving a Christian (i.e. non-pagan) name, or of sealing a child on its eighth day, is found. According to it the priest, either at the door of the church or at the home, blessed the : infant, sealed it (this not in Armenia) with the sign of the cross on its forehead, and prayed that in due season (kv /taipy tvdkroi) or at the proper time (Armenian) it may enter the holy Catholic church. This rite announces itself as the analogue of Christ’s circumcision.

On the fortieth day from birth another rite is prescribed, of churching the child, which is now taken into the church with its mother. Both are blessed by the clergy, whose petition now is that God ” may preserve this child and cause him to grow up by the unseen grace of His power and made him worthy in due season of the washing of baptism.” As the first rite corresponds to the circumcision and naming of Jesus, so does the second to His

presentation in the temple. These two rites really begin the catechumenate or period of instruction in the faith and discipline of the church. It depended on the individual how long he would wait for initiation. Whenever he felt inclined, he gave in his name as a candidate. This was usually done at the beginning of Lent. The bishop and clergy next examined the candidates one by one, and ascertained from their neighbours whether they had led such exemplary lives as to be worthy of admission. In case of strangers from another church certificates of character had to be produced. If a man seemed unworthy, the bishop dis- missed him until another occasion, when he might be worthier; but if all was satisfactory he was admitted, in the West as a competens or asker, in the East as a <£u>rif6#ej'os, i.e. one in course of being illumined. Usually two sponsors made themselves

responsible for the past life of the candidate and for the sincerity of his faith and repentance. The essential thing was that a man should come to baptism of his own free will and not under compulsion or from hope of gain. Macariusof Jerusalem (op. cit.) declares that the grace of the spirit is given in answer to our prayers and entreaties for it, and that even a font is not needful, but only the wish and desire for grace. Tertullian, however, in his work On Baptism, holds that even that is not always enough. Some girls and boys at Carthage had asked to be baptized, ami there were some who urged the granting of their request on the score that Christ said : " Forbid them not to come unto Me " (Matt. xix. 14), and: "To each that asketh thee give" (Luke vi. 30). Tertullian replies that " We must beware of giving the holy thing to dogs and of casting pearls before swine." He cites 1 Tim. v. 22: " Lay not on thy hands hastily, lest thou share in another's sins." He denies that the precedents of the eunuch

baptized by Philip or of Paul baptized without hesitation by Simon (to which the other party appealed) were relevant. He dwells on the risk run by the sponsors, in case the candidates for whose purity they went bail should fall into sin. It is more expedient, he concludes, to delay baptism. Why should persons still in the age of innocence be in a hurry to be baptized and win : remission of sins ? Let people first learn to feel their need of salvation, so that we may be sure of giving it only to those who really want it. Especially let the unmarried postpone it. The risks of the age of puberty are extreme. Let people have married or be anyhow steeled in continence before they are admitted to – baptism. It would appear from the homilies of Aphraates (c. 340) that in the Syriac church also it was usual to renounce the married relation after baptism. Cyril of Jerusalem, in his Catecheses, insists on ” the longing for the heavenly polity, on the goodly resolution and attendant hope ” of the catechumen (Pro. Cat. ch. i.). If the resolution be not genuine, the bodily washing, he says, profits nothing. ” God asks for nothing else except a goodly determination. Say not: How can my sins be wiped out? I tell thee, by willing, by believing ” (ch. viii.).
So again (Cat. I. ch. iii.) ” God gives not his holy treasures to the dogs; but where he sees the goodly determination, there he bestows the seed of salvation. . . . Those then who would receive the spiritual saving seal have need of a determination

and will of their own. . . . Grace has need of faith on our part." In Jerusalem, therefore, whither believers flocked from all over Christendom to be buried, the official point of view as late as a.d. 350 was entirely that of Tertullian. Tertullian's scruples were not long respected in Carthage, for in Cyprian's works (c. 250.) we already hear of new-born infants being baptized. In the same region of Africa, however, Monica would not let her son Augustine be baptized in boyhood, though he clamoured to be. She was a conservative. In the Greek world thirty was a usual age in the 4th century for persons to be baptized, in imitation of Christ. It is still the age preferred by the Baptists of Armenia. But it was often delayed until the deathbed, for the primitive idea that mortal sins committed after baptism were sins against the Holy Spirit and unforgivable, still influenced men, and survived among the Cathars up to the 14th century. The fathers, however, of the 4th century emphasized already the danger of deferring the rite until men fall into mortal sickness, when they may be unconscious or paralysed or otherwise unable to profess their faith and repentance, or to swallow the viaticum. Gregory Theologus therefore (c. 340) suggests the age of three years as suitable for baptism, because by then a child is old enough, if not to understand the questions put to him, at any rate to speak and make the necessary responses. Gregory sanctions the baptism of infants only where there is imminent danger of death. " It

is better that they should be sanctified without- their own sense

of it than that they pass away unsealed and uninitiated.” And

he justifies his view by this, that circumcision, which foreshadowed

the Christian seal (cr4 > payis), was imposed on the eighth day on

those who as yet had no use of reason. He also urges the analogue

of ” the anointing of the doorposts, which preserved the first-born

by things that have no sense.” On such grounds was justified

the transition of a baptism which began as a spontaneous act of

self-consecration into an opus operatum. How long after this it was before infant baptism became normal inside the Byzantine church, we do not exactly know, but it was natural that mothers should insist on their children being liberated from Satan and safeguarded from demons as soon as might be. The change came more quickly in Latin than in Greek Christendom, and very slowly indeed in the Armenian and Georgian churches. Augustine’s insistence on original sin, a doctrine never quite accepted in his sense in the East, hurried on the change.

7. Confirmation. — In the West, however, the sacrament has been saved from becoming merely magical by the rite of confirma- tion or of reception of the Spirit being separated from the baptism of regeneration and reserved for an adult age. The English church confirms at fifteen or sixteen; the Roman rather earlier. The catechetic course, which formerly preceded the complete rite, now intervenes between its two halves; and the sponsors who formerly attested the worthiness of the candidate and received him up as anadochi out of the font, have become god-parents, who take the baptismal vows vicariously for infants who cannot answer for themselves. In the East,on the contrary, the complete rite is read over the child, who is thus confirmed from the first. The Roman church already foreshadowed the change and gave a

peculiar salience to confirmation as early as the 3rd century, when it decreed that persons already baptized by heretics, but reverting to the church should not be baptized over again, but only have hands laid on them. It was otherwise in Africa and the East. Here they insisted in such cases on a repetition of the entire rite, baptism and confirmation together. The Cathars (q.v.) of the middle ages discarded water baptism altogether as being a Jewish rite, but retained the laying on of hands with the traditio precis as sufficient initiation. This they called the spiritual baptism, and interpreted Matt, xxviii. 19, as a command to practise it, and not water baptism.

8. DiscipHna arcani. — The communication to the candidates of the Creed and Lord's Prayer was a solemn rite. Cyril of Jerusalem, in his instruction of the catechumens, urges them to learn the Creed by heart, but not write it down. On no account must they divulge it to unbaptized persons. The same rule already meets us in Clement of Alexandria before the year 200. In time this rule gave rise to what is called the Disciplina arcani. Following the fashion of the pagan mysteries in which men were only permitted to gaze upon the sacred objects after minute lustrations and scrupulous purifications, Christian teachers came to represent the Creed, Lord's Prayer and Lord's Supper as mysteries to be guarded in silence and never divulged either to the unbaptized or to the pagans. And yet Justin Martyr, Tertullian and other apologists of the 2nd century had. found nothing to conceal from the eye and ear of pagan emperors and their ministers. In the 3rd century this love of mystification reached the pitch of hiding even the gospels from the unclean eyes of pagans. Probably Mgr. Pierre Battifol 1 is correct in supposing that the Disciplina arcani was more or less of a make-believe, a bit of belletristic trifling on the part of the over-rhetorical Fathers of the 4th and 5th centuries. It is in them that the atmosphere of mystery attains a maximum of intensity. They clearly felt themselves called upon to out-trump the pagan Mystae. Yet it is inconceivable that men and women should spend years, even whole lives, as catechumens within the pale of the church, and really remain ignorant all the time of the Trinitarian Epiclesis used in baptism, of the Creed, and above all of the Lord's Prayer. Wherever the Disciplina arcani, i.e. the obligation to keep secret the formula of the threefold name, the creed based on it and the Lord's Prayer, was taken seriously, it was akin to the scruple which exists everywhere among primitive religionists against revealing to the profane the knowledge of a

powerful name or magic formula. The name of a deity was often kept secret and not allowed to be written down,as among the Jews.

9. Regeneration. — The idea of regeneration seldom occurs in

the' New Testament, and perhaps not at all in connexion with

baptism; for in the conversation with Nicodemus, John iii. 3-8,

the words " of water and " in v. 5 offend the context, spiritual

1 litudes historiques, Essai sur Disc. arc. (Paris 1902).

re-birth alone being insisted upon in vv. 3, 6, 7 and 8; moreover, Justin Martyr, who cites v. 5, seems to omit them. Nor is there any mention of water in ch. i. 13, where, according to the oldest text, Christ is represented as having been born or begotten not of blood, nor of the will of the flesh, nor of the will of man, but of God.

In 1 Pet. i. 3, it is said of the saints that God the Father begat them anew unto a living hope by the resurrection of Jesus, and in v. 23 that they have been begotten again, not of corruptible seed, but of incorruptible through the word of God. But here again it is not clear that the writer has in view water baptism or any rite at all as the means and occasion of regenera- tion. In the conversation with Nicodemus we seem to overhear a protest against the growing tendency of the last years of the* 1st century to substitute formal sacraments for the free afflatu? of the spirit, and to "crib, cabin and confine" the gift of prophecy. -, The passage where re-birth is best put forward in connexion with baptism is Luke iii. 22, where ancient texts, including the Gospel of the Hebrews, read, " Thou art my beloved Son, this day have I begotten Thee." These words were taken in the sense that Jesus was then re-born of the Spirit an adoptive Son of God and Messiah; and with this reading is bound up the entire adoptionist school of Christology. It apparently underlies the symbolizing of Christ as a fish in the art of the catacombs, and in the literature of the 2nd century. Tertullian prefaces with this idea his work on baptism. Nos pisciculi secundum IXGTN nostrum Jesum Christum in aqua nascimur. " We little fishes, after the example of our Fish Jesus Christ, are born in the water." So about the year 440 the Gaulish poet Orientius wrote of Christ; Piscis natus aquis, auctor baptismatis ipse est. " A fish born of the waters is himself

originator of baptism."

But before his time and within a hundred years of Tertullian this symbolism in its original significance bad become heretical, and the orthodox were thrown back on another explanation of it. This was that the word IXGTS is made up of the letters which begin the Greek words meaning " Jesus Christ, Son of God, Saviour." An entire mythology soon grew up around the idea of re-birth. The font was viewed as the womb of the virgin mother church, who was in some congregations, for example, in the early churches of Gaul, no abstraction, but a divine aeon watching over and sympathizing with the children of her womb, the recipient even of hymns pf praise and humble supplications. Other mythoplastic growths succeeded, one of. which must be noticed. The sponsors or anadochi, who, after the introduction of infant baptism came to be called god-fathers and god-mo thersy were really in a spiritual relation to trie children they took up Out of the font. This relation was soon by the canonists identified With the blood-tie- which connects real parents with their qfl> . spring, and the corollary, drawn that children, who in baptism had the same god-parent,, were real brothers and sisters, who might not marry either each the other or real children of the said god-parent. The reformed churches have set aside this fiction, but in the Latin and Eastern churches it has created a distinct and very powerful marriage taboo, .

io. Relation to Repentance. -ˆBscptism, justified, the believer, that is to say, constituted him a saint whose past sins were abolished. Sin after baptism excluded the sinner afresh from the divine grace and from the sacraments. He fell back into the status of: a catechumen, and it was much discussed from ,the 2nd century onwards whether he could be restored to the church at,all, and, if so, how. A rite was devised, called exhomologesis, by which, after a fresh term of repentance, marked by austerities more strict than any Trappist monk imposes on himself to-day, the persons lapsed from grace could re-enter the church. In effect this rite was a repetition of baptism, the water of the font alone being omitted. Such restoration could in the earlier church only be effected once. A second lapse from the state of grace entailed perpetual exclusion from the sacraments, the means of salvation. As has been remarked above, the terror of post- baptismal sin and the fact that only one restoration was allowable influenced many as late as the 4th century to remain catechumens a'l their lives, and, like Constantine, to receive baptism on the

deathbed alone. The same scruples endured among the medieval Cathars. (See Penance and Novatianus.)

ii. Baptism for the Dead. — Paul, in i Cor. xv. 29, glances at this as an established practice familiar to those whom he addresses. Three explanations are possible: (1) The saints before they were quickened or made alive together with Christ, were dead through their trespasses and sins. In baptism they were buried with Christ and rose, like Him, from the dead. We can, therefore, paraphrase v. 29 thus: ” Else what shall they do which are baptized for their dead selves ?” &c. It is in behalf of his own sinful, i.e. dead self, that the sinner is baptized and receives eternal life. (2) Contact with the dead entailed a pollution which lasted at least a day and must be washed away by ablutions, before a man is re-admitted to religious cult. This was the rule among the Jews. Is it possible that the words ” for the dead ” signify ” because of contact with the dead ” ? (3) Both these explanations are forced, and it is more probable that by a make-believe common in all religions, and. not un- known in the earliest church, the sins of dead relatives, about whose salvation their survivors were anxious, were transferred into living persons, who assumed for the nonce their names and were baptized in their behalf, so in vicarious wise rendering it possible for the sins of the dead to be washed away. The Mormons have this rite. The idea of transferring sin into another man or into an animal, and so getting it purged through him or it, was widespread in the age of Paul and long afterwards. Chrysostom says that the substitutes were put into the beds of the deceased, and assuming the voice of the dead asked for baptism and remission of sins. Tertullian and others attest this custom among the followers of Cerinthus and Marcion.

12. Use of the Name. — In Acts iv. 7, the rulers and priests of the Jews summon Peter and inquire by what power or in what name he has healed the lame. Here a belief is assumed which pervades ancient magic and religion. Only so far as we can get away from the modern view that a person’s name is a trifling accident, and breathe the atmosphere which broods over ancient religions, can we understand the use of the name in baptisms, exorcisms, prayers, purifications and consecrations. For a name carried with it, for those who were so blessed as to be acquainted with it, whatever power and influence its owner wielded in heaven or on

earth or under the earth. A vow or prayer formulated in or through a certain name was fraught with the prestige of him whose name it was. Thus the psalmist addressing Jehovah cries (Ps. liv. 1): “Save me, O God, by Thy name, and judge me in Thy might.” And in Acts iii. 16, it is the name itself which renders strong and whole the man who believed therein. In Acts xviii. 15, the Jews assail Paul because he has trusted and appealed to the name of a Messiah whom they regard as an overthrower of the law; for Paul believed that God had invested Jesus with a name above all names, potent to constrain and overcome all lesser powers, good or evil, in heaven or earth or under earth. Baptism then in the name or through the name or into the name of Christ placed the believer under the influence and tutelage of Christ’s person- ality, as before he was in popular estimation under the influence of stars and horoscope. Nay, more, it imported that personality into him, making him a limb or member of Christ’s body, and immortal as Christ was immortal. Nearly all the passages in which the word name is used in the New Testament become more intelligible if it be rendered personality. In Rev. xi. 13, the revisers are obliged to render it by persons, and should equally have done so in iii. 4: “Thou hast a few names (i.e. persons) in Sardis which did not defile their garments.” (See Con- secration.)

13. Origin of Christian Baptism. — When it is asked, Was this a continuance of the baptism of John or was it merely the baptism of proselytes? — a distinction is implied between the two latter which was not always real. In relation to the publicans and soldiers who, smitten with remorse, sought out John in the wilderness, his baptism was a purification from their past and so far identical with the proselyte’s bath; but so far as it raised

Messianic hope, it advanced them further than that bath could do, and assured them of a place in the kingdom of God, soon to be established — this, without imposing circumcision on them; for the ordinary proselyte was circumcised as well as baptized. For the Jews, however, who came to John, his baptism could not have the significance of the proselyte’s baptism, but rather accorded with another baptism undergone by Jews who wished to consecrate their lives by stricter study and practice of the law. So Epictetus remarks that he only really understands Judaism who knows ” the baptized Jew ” (rov ˆefia/xnevov). We gather from Acts xix. 4, that John had merely baptized in the name of the coming Messiah, without identifying him with Jesus of Nazareth. The apostolic age supplied this identification, and the

normal use during it seems to have been " into Christ Jesus," or " in the name of the Lord Jesus Christ," or " of Jesus Christ " simply, or " of the Lord Jesus Christ." Paul explains these formulas as being equivalent to " into the death of Christ Jesus," as if the faithful were in the rite raised from death into everlasting life. The likeness of the baptismal ceremony with Christ's death and resurrection ensured a real union with him of the believer who underwent the ceremony, according to the well-known principle in sacris simulata pro veris accipi.

But opinion was still fluid about baptism in the apostolic age, especially as to its connexion with the descent of the Spirit. The Spirit falls on the disciples and others at Pentecost without any baptism at all, and Paul alone of the apostles was baptized. So far was the afflatus of the Spirit from being conditioned by the rite, that in Acts x. 44 ff., the gift of the Spirit was first poured out upon the Gentiles who heard the word preached so that they spoke with tongues, and it was only after these manifestations that they were baptized with water in the name of Jesus Christ at the instance of Peter. We can divine from this passage why Paul was so eager himself to preach the word, and left it to others to baptize.

But as a rule the repentant underwent baptism in the name of Christ Jesus, and washed away their sins before hands were laid upon them unto reception of the Spirit. Apollos, who only knew the baptism of John (Acts xviii. 24), needed only instruction in the prophetic gnosis at the hands of Priscilla and Aquila in order to become a full disciple. On the other hand, in Acts xix. 1-7, twelve disciples, for such they were already accounted, who had been baptized into John's baptism, i.e. into the name of him that should follow John, but had not even heard of the Holy Spirit, are at Paul's instance re-baptized into the name of the Lord Jesus. Then Paul himself lays hands on them and the Holy Ghost comes upon them, so that they speak with tongues and prophecy. Not only do we hear of these varieties of practice, but also of the laying on of hands .together with prayer as a substantive rite unconnected with baptism. The seven deacons were so ordained. And this rite of laying on hands, which was in antiquity a recognized way of transmitting the occult power or virtue of one man into another, is used in Acts ix. 17, by Ananias, in order that Paul may recover his sight and be filled with the Holy Ghost. Saul and Barnabas equally are separated for a certain missionary work by imposition of hands with prayei and fasting, and are so sent forth by the Holy Ghost. It was also a way of healing the sick

(Acts xxviii. 8), and as such accompanied by .anointing with oil (Jas. v. 14). The Roman church then had early precedents for separating confirmation from baptism. It would also appear that in the primitive age confirmation and ordination were one and the same rite; and so they continued to be among the dissident believers of the middle ages, who, however, often dropped the water rite alto- gether. (See Cathars.) More than one sect of the 2nd century- rejected water baptism on the ground that knowledge of the truth in itself makes us free, and that external material washing of a perishable body cannot contribute to the illumination of the inner man, complete without it. St Paul himself recognizes (1 Cor. vii. 14) that children, one of whose parents only is a believer, are ipso facto not unclean, but holy. Even an unbe- lieving husband or wife is sanctified by a believing partner. If we remember the force of the words 0710s ayiaˆu (cf. 1 Cor.

i. 2), here used of children and parents, we realize how far off was St Paul from the positions of Augustine.

The question arises whether Jesus Himself instituted baptism as a condition of entry into the Messianic kingdom. The fourth gospel (iii. 22, and iv. 1) asserts that Jesus Himself baptize'd on a greater scale than the Baptist, but immediately adds that Jesus Himself baptized not, but only His disciples, as if the writer felt that he had too boldly contradicted the older tradition of the other gospels. Nor in these is it recorded that the disciples baptized during their Master's lifetime; indeed the very contrary is implied. There remain two texts in which the injunction to baptize is attributed to Jesus, namely, Mark xvi. 16 and Matt, xxviii. 18-20. Of these the first is part of an appendix headed " of Ariston the elder " in an old Armenian codex, and taken perhaps from the lost compilations of Papias; as to the other text, it has been doubted by many critics, e.g. Neander, Harnack, Dr Armitage Robinson and James Martineau, whether it repre- sents a real utterance of Christ and not rather the liturgical usage of the region in which the first gospel was compiled. The circumstance, unknown to these critics when they made their conjectures, that Eusebius Pamphili, in nearly a score of citations, substitutes the words " in My Name " for the words " baptizing them into the name of the Father and of the Son and of

the Holy Ghost," renders their conjectures superfluous. Aphraates also in citing the verse substitutes " and they shall believe in Me " — a paraphrase of " in My Name." The first gospel thus falls into line with the rest of the New Testament.

14. Analogous Rites in other Religions (see also Purification). — The Fathers themselves were the first to recognize that " the devil too had his sacraments," and that the Eleusinian, Isiac, Mithraic and other mystae used baptism in their rites of initiation. But it is not to be supposed that the Christians borrowed from these or from any Gentile source any essential features of their baptismal rites. Baptism was long before the advent of Jesus imposed on proselytes, and existed inside Judaism itself.

It has been remarked that the developed ceremony of baptism, with its threefold renunciation, resembles the ceremony of Roman law known as emancipalio, by which the palria potestas (or power of life and death of the father over his son) was extinguished. Under the law of the XII. Tables the father lost it, if he three times sold his child. This suggested a regular procedure, according to which the father sold his son thrice into mancipium, while after each sale the fictitious vendee enfranchized the son, by manumissio vindicta, i.e. by laying his rod (vindicta) on the slave and claiming him as free (vindicatio in libertatem). Then the owner also laid his rod on the slave, declaring his intention to enfranchise him, and the praetor by his addictor confirmed the owner's declaration. The third manumission thus gave to the son and slave his freedom. It is possible that this common ceremony of Roman law suggested the triple abrenunciatio of Satan. Like the legal ceremony, baptism freed the believer from one (Satan) who, by the mere fact of the believer's birth, had power of death over him. And as the legal manumission dissolved a son's previous agnatic relationships, so, too, the person baptized gave up father and mother, &c, and became one of a society of brethren the bond between whom was not physical but spiritual. The idea of adoption in baptism as a son and heir of God was almost certainly taken by Paul from Roman law.

The ceremony of turning to the west three times with renunciation of the Evil One, then to the east, is exactly paralleled in a rite of purification by water common among the Malays and described by Skeat in his book on Malay magic. If the Malay rite is not derived through Mahommedanism from Christianity, it is a remarkable example of how similar psychological conditions can produce almost identical rites.

The idea of spiritual re-birth, so soon associated with baptism, was of wide currency in ancient religions. It is met with in Philo of Alexandria and was familiar to the Jews. Thus the proselyte is said in the Talmud to resemble a child and must bathe in the name of God. The Jordan is declared in 2 Kings v. 10 to be a cleansing medium, and Naaman's cure was held to pre-figure Christian baptism. Jerome relates that the Jew who taught him

Hebrew communicated to him a teaching of the Rabbi Baraciba, that the inner man who rises up in us at the fourteenth year after puberty {i.e. at 29) is better than the man who is born from the mother's womb.

In a Paris papyrus edited by Albr. Dieterich (Leipzig, 1903) under the title of Eine Mithrasliturgie, an ancient mystic describes his re-birth in impressive language. In a prayer addressed to " First birth of my birth, first beginning (or principle) of my beginning, first spirit of the spirit in me," he prays " to be restored to his deathless birth (genesis), albeit he is let and hindered by his underlying nature, to the end that according to the pressing need and spur of his longing he may gaze upon the deathless principle with deathless spirit, through the deathless water, through the solid and the air; that he may be re-born through reason (or idea), that he may be consecrated, and the holy spirit breathe in him, that he may admire the holy fire, that he may behold the abyss of the Orient, dread water, and that he may be heard of the quickening and circumambient ether; for this day he is about to gaze on the revealed reality with deathless eyes; a mortal born of mortal womb, he has been enhanced in excellence by the might of the All-powerful and by the right hand of the Deathless one," &c.

This is but one specimen of the pious ejaculations, which in the first centuries were rising from the lips of thousands of mystae, in Egypt, Asia Minor, Italy and elsewhere. The idea of re-birth was in the air; it was the very keynote of all the solemn initiations and mysteries— Mythraic, Orphic, Eleusinian — through which re- pentant pagans secured pardon and eternal bliss. Yet there is not much evidence that the church directly borrowed many of its ceremonies or interpretations from outside sources. They for the most part originated among the believers, and not improbably the outside cults borrowed as much from the church as it from them.

Authorities. — The following ancient works are recommended :

Tertullian, De Baptismo (edition with introd. J. M. Lupton, 1909); Cyril of Jerusalem, Catecheses ; Basil, De Spiritu Sancto; Constitutiones Apostolicae; Gregory Nazianzen, Or at. 40; Gregory Nyss., Oratio in eos qui differunt baptismum; Sacramentary of Serapion of Thmuis; Augustine, De Baptismo contra Donahstas; Jac. Goar, Rituale Graecorum (gives the current Greek rites) ; F. C. Conybeare, Rituale Armenorum (the oldest forms of Armenian and Greek rites); Gerard G. Vossius, De Baptismo (Amsterdam, 1648) ; Edmond Martene, De Ant. Ecclesiae Ritibus (gives Western rites) (Bassani, 17-88). The modern literature is infinite; perhaps the most ex- haustive works are W. F. Hofling, Das Sacrament der Taufe (Erlangen, J859); Jos. Bingham's Antiquities (London, 1834), and W, Wall, On Infant Baptism (London, 1707) ; J. Anrich, Das antike Mysterien- wesen (Gottingen, 1 894), details the corresponding rites of the Greek mysteries, also A. Dieterich, Eine Mithras Liturgie (Leipzig, 1903) ; J. C. Suicer, Thesaurus, sub voce fiavnaiia; Ad. Harnacky Dogmen- geschichte (Freiburg im Br. 1 894); L. Duchesne, Origines du culte Chretien (Paris, 1898); Mgr. P. Batiffol, Etudes historiques (Paris, !904); J- C. W. Augusti, Denkwiirdigkeiten (Leipzig, 1829-1831); Monumenta Ecclesiae Liturˆica by Dom Cabrol and Dom Leclercq (Paris, 1902) (a summary of all liturgical passages given in the early Fathers); Corblet, Histoire du sacrement de bapteme (2 vols. Paris, 1881-1882). (F. C. C.)

BAPTISTE, NICOLAS ANSELME (1761-1835), French actor, was born in Bordeaux on the 18th of June 1761, the elder son of Joseph Francois Anselme, a popular actor. His mother played leading parts in tragedy, and both his parents enjoyed the pro- tection of Voltaire and the friendship of Lekain. It was probably under the auspices of the latter that Nicolas Anselme made his first appearance as de Belloy in Gaston et Bayard; and shortly afterwards, under the name of Baptiste, he made a contract to play young lover parts at Arras, where he also appeared in opera and even in pantomime. From Rouen, where he had three successful years, his reputation spread to Paris and he was summoned to the new theatre which the comedian Langlois-Courcelles had just founded, and where he succeeded, not only in making an engagement for himself, but in bringing all his family, father, mother, wife and brother. They were thu* distinguished in the playbills: Baptiste, atnS, Baptiste p'ere, Baptiste cadet, Madame Baptiste mere, Madame Baptiste bru. This resulted in the pun of calling a play in which they all appeared une piece de baptistes. Nicolas soon obtained the public favour, sDecially in

La Martelliere's mediocre Robert, chef de

brigands, and as Count Almaviva, in Beaumarchais' La Mere Coupable. His success in this was so great that the directors of the Theatre de la Republique— -who had already secured Talma, Dugazon and Madame Vestris— hastened to obtain his services, and, in order to get him at once (1793), paid the 20,000 francs forfeit which he was obliged to surrender on breaking his contract. Later he, as well as his younger brother, became sociitaire. Nicolas took all the leading parts in comedy and tragedy. As he grew older his special forte lay in noble fathers. After a brilliant career of thrity-five years of uninterrupted service, he retired in 1828. But, after the revolution of 1830, when the Theatre Francais was in great straits, the brothers Baptiste came to the rescue, reappeared on the stage and helped to bring back its prosperity. The elder died in Paris on the 1st of December 1835. The younger brother, Paul Eustache Anselme, known as Baptiste cadet (1765-1839), was also a comedian of great talent, and had a long and brilliant career at the Comedie Francaise, where he made his d&but in 1792 in L' Amour et I'interU.

BAPTISTERY (Baptisterium, in the Greek Church (puma-ri \pu>v), the separate hall or chapel, connected with the early Christian Church, in which the catechumens were instructed and the sacrament of baptism administered. The name baptistery is also given to a kind of chapel in a large church, which serves the same purpose. The baptistery proper was commonly a circular building, although sometimes it had eight and sometimes twelve sides, and consisted of an ante-room (irpoav\tos oZkos) where the catechumens were instructed, and where before baptism they made their confession of faith, and an inner apartment where the sacrament was administered. In the inner apartment the principal object was the baptismal font (KoXvpˆdpa, or piscina), in which those to be baptized were immersed thrice. Three steps led down to the floor of the font, and over it was suspended a gold or silver dove; while on the walls were com- monly pictures of the scenes in the life of John the Baptist. The font was at first always of stone, but latterly metals were often used. Baptisteries belong to a period of the church when great numbers of adult catechumens were baptized, and when im- mersion was the rule.

We find little or no trace of them before Constantine made Christianity the state religion, i.e. before the 4th century; and as early as the 6th century the baptismal font was built in the porch of the church and then in the church itself. After the 9th century few baptisteries were built, the most noteworthy of later date being those at Pisa, Florence, Padua, Lucca and Parma. Some of the older baptisteries were very large, so large that we hear of councils and; synods being held in them. It was necessary to make them large, because in the early Church it was customary for the bishop to baptize all the catechumens in his diocese (and so baptisteries are commonly found attached to the cathedral and not to the parish churches), and also because the rite was performed only thrice in the year. (See Baptism.) During the months when there were no baptisms the baptistery doors were sealed with the bishop's seal. Some baptisteries were divided into two patts to separate the sexes; sometimes the church had two baptisteries, one for each sex. A fireplace was often provided to warm the neophytes after immersion. Though baptisteries were forbidden to be used as burial-places by the council of Auxerre (578) they were not uncommonly used as such. Many of the early archbishops of Canterbury were buried in the baptistery there. Baptisteries, we find from the records of early councils, were first built and used to correct the evils arising from the practice of private baptism. As soon as Christianity made such progress that baptism became the rule, and as soon as immersion gave place to sprinkling, the ancient baptisteries were no longer necessary. They are still in general use, however, in Florence and Pisa. The baptistery of the Lateran must be the earliest ecclesiastical building still in use. A large part of it remains as built by Constantine. The central area, where is the basin of the font, is an octagon around which stand eight porphyry columns, with marble capitals and entablature of classical form; outside these are an ambulatory and outer walls forming a larger octagon. Attached to one side, towards the Lateran basilica, is a fine

porch with two noble porphyry columns and richly carved capitals, bases and entablatures. The circular church of Santa Costanza, also of the 4th century, served as a baptistery and contained the tomb of the daughter of Constantine. This is a remarkably perfect structure with a central dome, columns and mosaics of classical fashion. Two side niches contain the earliest known mosaics of distinctively Christian subjects. In one is represented Moses receiving the Old Law, in the other Christ delivers to St Peter the New Law — a charter sealed with the X P

monogram.

Another baptistery of the earliest times has recently been excavated at Aquileia. Ruins of an early baptistery have also been found at Salona. At Ravenna exist two famous baptisteries encrusted with fine mosaics, one of them built in the middle of the 5th century, and the other in the 6th. To the latter date also belongs: a large baptistery decorated with mosaics at Naples.

In the East the metropolitan baptistery at Constantinople still stands at the side of the mosque which was once the patriarchal church of St Sophia; and many others, in Syria, have been made known to us by recent researches, as also have some belonging to the churches of North Africa. In France the most famous early baptistery is St Jean at Poitiers, and other early examples exist at Riez, Frejus and Aix. In England, a detached baptistery is known to have been associated with the cathedral of Canterbury.

See Hefele's Concilien, passim; Du Cange, Glossary, article "Baptisterium"; Eusebius, Hist. Eccl. x. 4; Bingham's Anti- quities of the Christian Church, book xi. (W. R. L.)

BAPTISTS, a body of Christians, distinguished, as their name imports, from other denominations by the view they hold respect- ing the ordinance of baptism (q.v.). This distinctive view, common and peculiar to all Baptists, is that baptism should be administered to believers only. The mode of administration of the ordinance has not always been the same, and some Baptists (e.g. the Mennonites) still practise baptism by pouring or sprinkling, but among those who will here be styled modern Baptists, the mode of administration is also distinctive, to wit, immersion. It should, however, be borne in mind that immersion is not peculiar to the modern Baptists. It has always been recognized by Paedobaptists as a legitimate mode, and is still practised to the exclusion of other modes by a very large proportion of paedobaptist Christendom (e.g. the Orthodox Eastern Church). We shall distinguish here between two main groups of Baptists in Europe; the Anabaptists, now practically extinct, and the modern Baptists whose churches are in nearly every European country and in all other countries where white men reside.

I. The Anabaptists

The great spiritual movement of the 15th and 16th centuries had

for its most general characteristic, revolt against authority. This showed itself not merely in the anti-papal reformation of Luther, but also in the anti-feudal rising of the peasants and in a variety of anti-ecclesiastical movements within the reformation areas themselves. One of the most notable of these radical anti-ecclesiastical movements was that of the Zwickau prophets, (Marcus Stiibner, Nikolaus Storch and Thomas Mtinzer) : the most vigorous and notorious that of the Munster Anabaptists. Although they have been called the " harbingers " of the Anabaptists, the characteristic teaching of the Zwickau prophets wasnotAnabaptism. (See, however, Anabaptists.) For although Miinzer repudiated infant baptism in theory, he did not relinquish its practice, nor did he insist on the re-baptism of believers. The characteristic teaching of the Zwickau movement, so closely linked with the peasant rising, was the great emphasis laid upon the " inner word." Divine revelation, said Miinzer, was not received from the church, nor from preaching, least of all from the dead letter of the Bible; it was received solely and directly from the Spirit of God. It is this daring faith in divine illumination that brings the Zwickau teachers most nearly into touch with the Anabaptists. But if they are not typical of Anabap- tism, still less are the later representatives of the movement in the last sad months at Munster.

The beginnings of the Anabaptist movement proper were in

Zurich, where Wilheld Reubli (1480-1554), Konrad Grebel (d. 1526), Felix Manz (d. 1527) and Simon Strumpf separated from Zwingli and proposed to form a separate church. They repudiated the use of force, advocated a scriptural communism of goods, and asserted that Christians must always exercise love and patience towards each other and so be independent of worldly tribunals. But their most radical doctrine was the rejection of infant baptism as unscriptural. They rapidly gained adherents, among whom was Hans Brodli, pastor of Zollikon. Their refusal, however, to baptize infants, and the formation of a separate church as the outcome of this refusal, brought upon them the condemnation of Zwingli, and a number of them were banished. This act of banishment, however, drove Jorg Blaurock, Konrad Grebel and others to take the step which definitely instituted " Anabaptism " : they baptized one another and then partook of

the Lord's Supper together. This step took them much farther than the repudiation of paedobaptism. It formed a new religious community, Which sought to fashion itself on the model of primitive Christianity, rejecting all tradition and accretions later than New Testament records. Its members claimed to get back to the simple church founded on brotherly love. The result was that their numbers grew with astonishing rapidity, and scholarly saints like Balthasar Hubmaier (ca. 1480-1528) and Hans Denck (ca. 1495- 1527) joined them. Hubmaier brought no new adherents with him, and in 1525 himself baptized 300 converts. This baptism, however, was not immersion. Blaurock and Grebel baptized each other, and many adherents, kneeling together in an ordinary room. Hubmaier baptized his 300 from one bucket. The mode was sprinkling or pouring. In all this the Anabaptists had maintained one central article of faith that linked them to the Zwickau prophets, belief in conscience, religious feeling, or inner light, as the sole true beginning or ground of religion; and one other article, held with equal vigour and sincerity, that true Christians are like sheep among wolves, and must oh no account defend themselves from their enemies or take vengeance for wrong done. Very soon this their faith was put to fiery test. Not only were Catholics and Protestants opposed to them on doctrinal grounds, but the secular powers, fearing that the new teaching was potentially as revolutionary as Mtinzer's radicalism had been, soon instituted a persecution of the Anabaptists. On the 7th of March 1 5 26 the Zurich Rath issued an edict threatening all who were baptized anew with death by drowning, and in 1529 the emperor Charles V., at the diet of Spires, ordered Anabaptists to be put to death with fire and sword without even the form of ecclesiastical trial. A cruel persecution arose. Manz was drowned at Zurich and Michael Sattler (ca. 1495-1527) burned to death after torture in 1527; Hubmaier was burned in 1528 and Blaurock in 1529, and Sebastian Franck (1499-1542) asserts that the number of slain was in 1530 already about 2000. Two results followed from this persecution. First, the development of a self-contained and homogeneous community was made impossible. No opportunity for the adoption of any common confession was given. Only a few great doctrines are seen to have been generally held by Anabaptists — such as the baptism of believers only, the rejection of the Lutheran doctrine of justification by faith as onesided and the simple practice of the breaking of bread. This last, the Anabaptist doctrine of the Lord's Supper, was to the effect that brothers and sisters in Christ should partake in remembrance of the death of Christ, and that

they should thereby renew the bond of brotherly love as the basis of neighbourly life. In the second place, the persecu- tion deprived the Anabaptists of the noble leaders who had preached non-resistance and at the same time provoked others to an attitude of vengeance which culminated in the horrors of Munster. For Melchior Hofmann (ca. 1498-1543 or 1544) having taken the Anabaptist teaching to Holland, there arose in Haarlem a preacher of vengeance, Jan Matthisson or Matthyszoon (Matthys) (d. 1534) by name, who, prophesying a speedy end of the world and establishment of the kingdom of heaven, obtained many adherents, and despatched Boekebinder and de Kniper to Munster. Here the attempt was made to realise Matthisson's

ideals. All who did not embrace Anabaptism were driven from Munster (1533), and Bernt Knipperdolling (ca. 1495-1536) became burgomaster. The town was now besieged and Matthis- son was killed early in 1534. John (Johann Bockelson) of Leiden (1 510-1536) took his place and the town became the scene of the grossest licence and cruelty, until in 1535 it was taken by the besieging bishop. Unhappily the Anabaptists have always been remembered by the crimes of John of Leiden and the revelry of Munster. They should really be known by the teaching and martyrdom of Blaurock, Grebel and Hubmaier, and by the gentle learning and piety of Hans Denck — of whom, with many hundred others, " the world was not worthy."

For the teaching of the Anabaptists, see Anabaptists.

Reference has already been made to the reason why a common Anabaptist confession was never made public. Probably, how- ever, the earliest confession of faith of any Baptist community is that given by Zwingli in the second part of his Elenchus contra Catabaplistas, published in 1527. Zwingli professes to give it entire, translating it, as he says, ad verbum into Latin. Whatever opinion may be held as to the orthodoxy of the seven articles of the Anabaptists, the vehemence with which they were opposed, and the epithets of abuse which were heaped upon the unfortunate sect that maintained them, cannot fail to astonish those used to toleration. Zwingli, who details these articles, as he says, that the world may see that they are " fanatical, stolid, audacious, impious," can scarcely be acquitted of unfairness in joining together two of them, — the fourth and fifth, — thus making the article treat " of the avoiding of abominable pastors in the church " (Super devitatione abominabilium pastorum in Ecclesia), though there is nothing about pastors in the fourth

article, and nothing about abominations in the fifth, and though in a marginal note he himself explains that the first two copies that were sent him read as he does, but the other Copies make two articles, as in fact they evidently are. It is strange that the Protestant Council of Zurich, which had scarcely won its own liberty, and was still in dread of the persecution of the Romanists, should pass the decree which instituted the cruel persecution of the Anabaptists.

After Munster had fallen the harassed remnants of the Anabaptists were gathered together under Menno Simonis, who joined them in 1537. His moderation and piety held in check the turbulence of the more fanatical amongst them. He died in 1 561 after a life passed amidst continual dangers, and con- flicts. His name remains as the designation of the Mennonites (q.v.), who eventually settled in the Netherlands under the protection of William the Silent, prince of Orange.

Of the introduction of Anabaptist views into England we have no certain knowledge. Fox relates that " the registers of London make mention of certain Dutchmen counted for Anabaptists, of whom ten were put to death in sundry places in the realm, anno 1535; other ten repented and were saved." In 1536 King Henry VIII. issued a proclamation together with articles concerning faith agreed upon by Convocation, in which the clergy are told to instruct the people that they ought to repute and take " the Anabaptists' opinions for detestable heresies and to be utterly condemned." Thomas Fuller (1608- 1661) tells us from Stow's Chronicles that, in the year 1538, " four Anabaptists, three men and one woman, all Dutch, bare faggots at Paul's Cross, and three days after a man and woman of their sect was burnt in Smithfield." In the reign of Edward VI., after the return of the exiles from Zurich, John Hooper (bishop of Gloucester and Worcester, d. 1555) writes to his friend Bullinger in 1549, that he reads "a public lecture twice in the day to so numerous an audience that the church cannot contain them," and adds, " the Anabaptists flock to the place and give me much trouble." It would seem that at this time they were united together in communities separate from the established Church. Latimer, in 1552, speaks of them as segregating themselves from the company of other men. In the sixth examination of John Philpot (1516-1555) in 1555 we are told that Lord Riche said to him, " All heretics do boast of the Spirit of God, and every one would have a church by himself, as Joan of Kent and the Anabaptists." Philpot was imprisoned

soon after Mary's accession in 1553; and it is very pleasing to find, amidst the records of intense bitterness and rancour which characterized these times, and with which Romanist and Protestant alike assailed the persecuted Anabaptists, a. letter of Philpot's, to a friend of his, " prisoner the same time in New-gate," who held the condemned opinions. His friend had written to ask his judgment concerning the baptism of infants. Philpot in a long reply, whilst maintaining the obligation of infant baptism, yet addresses his correspondent as, " dear brother, saint, and fellow-prisoner for the truth of Christ's gospel "; and at the close of his argument he says, " I beseech thee, dear brother in the gospel, follow the steps of the faith of the glorious martyrs in the primitive church, and of such as at this day follow the same."

Many Anabaptist communities existed in England toward the end of the 16th century, particularly in East Anglia, Kent and London. Their most notable representative was Robert Cooke, but they were more notorious for heretical views as to the Virgin Mary (see Anabaptists) than for their anti-paedobaptist position. It was for these views that Joan Boucher of Kent was burnt in 1550. There is no doubt that these prepared the way for the coming of the modern Baptists, but " the truth is that, while the Anabaptists in England raised the question of baptism, they were almost entirely a foreign importation, an alien element; and the rise of the Baptist churches was wholly independent of them."

II. The Modern Baptists

1. Great Britain and Ireland. — If the Anabaptists of England were not the progenitors of the modern Baptist church, we must look abroad for the beginnings of that movement. Although there were doubtless many who held Baptist views scattered among the Independent communities, it was not until the time of John Smith or Smyth (d. 161 2) that the modern Baptist movement in England broke away from Brownism. Smyth was appointed preacher of the city of Lincoln in 1600 as an ordained clergyman, but became a separatist in 1605 or 1606, and, soon after, emigrated under stress of persecution with the Gains- borough Independents to Amsterdam. With Thomas Helwys {ca. 1560-ca. 1616) and Morton he joined the " Ancient " church there, but, coming under Mennonite teaching in 1609, he separated from the

Independents, baptized himself (hence he is called the " Se-baptist ") , Helwys and others probably according to the Anabaptist or Mennonite fashion of pouring. These then formed the first English Baptist Church which in 161 1 published "a declaration of faith of English people remaining at Amsterdam in Holland." The article relating to baptism is as follows: — " That every church is to receive in all their members by baptism upon the confession of their faith and sins, wrought by the preaching of the gospel according to the primitive institution and practice. And therefore churches constituted after any other manner, or of any other persons, are not according to Christ's testament. That baptism or washing with water is the outward manifestation of dying unto sin and walking in newness of life; and therefore in no wise appertaineth to infants." They held " that no church ought to challenge any prerogative over any other "; and that " the magistrate is not to meddle with religion, or matters of conscience nor compel men to this or that form of religion." This is the first known expression of absolute liberty of conscience in any confession of faith.

Smyth died in Holland, but in 161 2 Helwys returned to England with his church and formed the first Baptist church worshipping on English soil. The church met in Newgate Street, London, and was the origin of the " General " Baptist denomina- tion. Helwys and his followers were Arminians, repudiating with heat the Calvinistic doctrine of predestination. They thus differed from other Independents. "They also differed on the power of the magistrate in matters of belief and conscience. It was, in short, from their little dingy meeting house . . . that there flashed out, first in England, the absolute doctrine of Religious Liberty " (Prof. Masson). Leonard Busher, the author of "Religious Peace: or a Plea for Liberty of Conscience," was a member of this church.

The next great event in the history of the Baptists (though it should be mentioned that the last execution for heresy in England by burning was that of a Baptist, Edward Wightman, at Lichfield 1612) is the rise of the first Calvinistic or Particular Baptist Church. This was the Jacob church in Southwark, which numbered among its members JohnLothropp or Lathrop (d. 1653) , Praise-God Barbon {ca. 1596-1679), Henry Jcssey (1601-1663), Hanserd Knollys {ca. 1590-1691) and William Kiffin (1616-1701). It was originally Independent but then became Baptist. From this six other churches sprang, five of which were Baptist. Before the Jacob church, however, had itself become Baptist, it dismissed

from its membership a group of its members (the church having grown beyond what was regarded as proper limits) who, in 1633, became the first Particular Baptist Church.

Thus there were now in existence in England two sets of Baptists whose origins were quite distinct and who never had any real intercourse as churches. They differed in many respects. The General Baptists were Arminian, owing to the influence of the Mennonite Anabaptists. The Particular Baptists were Calvinist, springing as they did from the Independents. But on the question of Baptism both groups, while they utterly rejected the baptism of infants, were as yet unpledged to immersion and rarely practised it. The development of their doctrine as to baptism was marked along three lines of dispute: — (1) who is the proper administrator of baptism? (2) who are the proper sub- jects? and (3) what is the proper mode ? Eventually agreement was reached, and in 1644 a Confession of Faith was published in the names of the Particular Baptist churches of London, now grown to seven, "commonly (though falsely) called Anabaptist."

The article on baptism is as follows: — "That baptism is an ordinance of the New Testament given by Christ to be dispensed only upon persons professing faith, or that are disciples, or taught, who, upon a profession of faith, ought to be baptized." " The way and manner of dispensing this ordinance the Scripture holds out to be dipping or plunging the whole body under water." They further declare (particularly in order that they may avoid the charge of being Anabaptists) that " a civil magistracy is an ordinance of God," which they are bound to obey. They speak of the " breathing time " which they have had of late, and their hope that God would, as they say, " incline the magistrates' hearts so for to tender our consciences as that we might be pro- tected by them from wrong, injury, oppression and molestation " ; and then they proceed: " But if God withhold the magistrates' allowance and furtherance herein, yet we must, notwithstanding, proceed together in Christian communion, not daring to give place to suspend our practice, but to walk in obedience to Christ in the profession and holding forth this faith before mentioned, even in the midst of all trials and afflictions, not accounting our goods, lands, wives, children, fathers, mothers, brethren, sisters, yea, and our own lives, dear unto us, so that we may finish our course with joy; remembering always that we ought to obey God rather than men." They end their confession thus: " If any take this that we have said to be heresy, then do we with the apostle freely confess, that after the way which they call heresy worship

we the God of our fathers, believing all things which are written in the Law and in the Prophets and Apostles, desiring from our souls to disclaim all heresies and opinions which are not after Christ, and to be stedfast, unmovable, always abounding in the work of the Lord, as knowing our labour shall not be in vain in the Lord." The " breathing time " was not of long continuance. Soon after the Restoration (1660) the meetings of nonconformists were continually disturbed and preachers were fined or imprisoned. One instance of these persecutions will, perhaps, be more impressive than any general statements. In the records of the Broadmead Baptist Church, Bristol, we find this remark: " On the 29th of November 1685 our pastor, Brother Fownes, died in Gloucester jail, having been kept there for two years and about nine months a prisoner, unjustly and maliciously, for the testimony of Jesus and preaching the gospel. He was a man" of great learning, of a sound judgment, an able preacher, having'great knowledge in divinity, law, physic, &c; a bold and patient sufferer for the Lord Jesus and the gospel he preached."

With the Revolution of 1688, and the passing of the Act of Toleration in 1689, the history of the persecution of Baptists, as well as of other Protestant dissenters, ends. The removal of the remaining disabilities, such as those imposed by the Test and Corporation Acts repealed in 1828, has no special bearing on Baptists more than on other nonconformists. The ministers of the " three denominations of dissenters," — Presbyterians, Independents and Baptists, — resident in London and the neighbourhood, had the privilege accorded to them of presenting on proper occasions an address to the sovereign in state, a privilege which they still enjoy under the name of " the General Body of Protestant Dissenting Ministers of the three Denominations." The " General Body " was not organized until 1727.

The Baptists, having had a double origin, continued for many years in two sections — those who in accordance with Arminian views held the doctrine of " General Redemption," and those who, agreeing with the Calvinistic theory, held the doctrine of " Particular Redemption "; and hence they were known respectively as General Baptists and Particular Baptists. In the 18th century many of the General Baptists gradually adopted the Arian, or, perhaps, the Socinian theory; whilst, on the other

hand, the Calvinism of the Particular Baptists in many of the churches became more rigid, and approached or actually became Antinomianism. In 1770 the orthodox portion of the General Baptists, mainly under the influence of Dan Taylor (b. 1738), formed themselves into a separate association, under the name of the General Baptist New Connection, since which time the " Old Connection " has gradually merged into the Unitarian denomination. By the beginning of the 19th century the New Connection numbered 40 churches and 3400 members. The old General Baptists " still keep up a shadowy legal existence." Towards the end of the 18th century many of the Particular Baptist churches became more moderate in their Calvinism, a result largely attributable to the writings of Andrew Fuller. Up to this time a great majority of the Baptists admitted none either to membership or communion who were not baptized, the principal exception being the churches in Bedfordshire and Hertfordshire, founded or influenced by Bunyan, who maintained that difference of opinion in respect to water baptism was no bar to communion. At the beginning of the 19th century this question was the occasion of great and long-continued discussion, in which the celebrated Robert Hall (1764-1831) took a principal part. The practice of mixed communion gradually spread in the denomination. Still more recently many Baptist churches have considered it right to admit to full membership persons professing faith in Christ, who do not agree with them respecting the ordinance of baptism. Such churches justify their practice on the ground that they ought to grant to all their fellow-Christians the same right of private judgment as they claim for themselves. It may not be out of place here to correct the mistake, which is by no means uncommon, that the terms Particular and General as applied to Baptist congregations were intended to express this difference in their practice, whereas these terms related, as has been already said, to the difference in their doctrinal views. The difference now under consideration is expressed by the terms " strict " and " open," according as communion (or membership) is or is not confined to persons who, according to their view, are baptized.

In 1891, largely under the influence of Dr John Clifford, a leading General Baptist, the two denominations, General and Particular, were united, there being now but one body called " The Baptist Union of Great Britain and Ireland." This Union, however, is purely voluntary, and some Baptist churches, a few of them prosperous and powerful, hold aloof from their sister churches so

far as organization is concerned.

There are other Baptist bodies outside the Baptist Union beside certain isolated churches. Throughout England there are many "Strict " Baptist churches which really form a separate denomination. For the most part they are linked together according to geographical distribution in associations, such as the " Metropolitan Association of Strict Baptist Churches," and the " Suffolk and Norfolk Association of Particular Baptist Churches." In the latter case the name " Particular " is preferred, but the association holds aloof from other Baptist churches because its principles are " strict."

There is, however, no national Union. Indeed, the Strict Baptists are themselves divided into the " Standard " and " Vessel " parties — names derived from the " Gospel Standard " and " Earthen Vessel," the organs of the rival groups.

The general characteristic of the Strict Baptists is their rigorous adherence to a type of Calvinistic theology now generally obsolete, and their insistence upon baptism as the condition of Christian communion. Their loose organization makes it impossible to obtain accurate statistics, but the number of their adherents is small. There is a strict Baptist Missionary Society (founded i860, re- founded 1897) which conducts mission work in South India. The income of this society was £1146 in 1905. It comprises 730 church members and 72 pastors and workers.

The Baptists early felt the necessity of providing an educated ministry for their congregations. Some of their leading pastors had been educated in one or other of the English universities. Others had by their own efforts obtained a large amount of learning, amongst whom Dr John Gill was eminent for his knowledge of Hebrew, as shown in his Exposition of the Holy Scriptures, a work in 9 vols, folio, 1746-1766. Edward Terrill, who died in 1685, left a considerable part of his estate for the instruction of young men desiring to be trained for the ministry, under the superintendence of the pastor of the Broadmead Church, Bristol, of which he was a member. Other bequests for the same purpose were made, and from the year 1720 the Baptist Academy, as it was then called, received young men as students for the ministry among the Baptists. In 1770 the Bristol Education Society was formed to enlarge this academy; and about the year 181 1 the present Bristol Baptist College was erected. In the north of England a similar education society was formed in

1804 at Bradford, Yorkshire, which has since been removed to Rawdon, near Leeds. In London another college was formed in 1810 at Stepney; it was removed to Regent's Park in 1856. The Pastors' College in connexion with the Metropolitan Tabernacle was insti- tuted in 1856, and in 1866 the present Baptist College at Manchester was instituted at Bury in the interests of the " Strict " Baptist views. Besides these, which were voluntary colleges not under denominational control, the General Baptists maintained a college since 1797, which, since the amalgamation of the two Baptist bodies, has become also a voluntary institution, though previously sup- ported by the General Baptist Association. It is called the " Mid- land Baptist College," and is situated in Nottingham. There is also a Baptist theological college in Glasgow, and there are two colleges in Wales and one in Ireland. The total number of students in these institutions is about 210.

The Baptists were the first denomination of British Christians to undertake in a systematic way that work of missions to the heathen, which became so prominent a feature in the religious activity of the 19th century. As early as the year 1784 the North- amptonshire Association of Baptist churches resolved to recom- mend that the first Monday of every month should be set apart for prayer for the spread of the gospel. Shortly after, in 1792, the Baptist Missionary Society was formed at Kettering in Northampton- shire, after a sermon on Isaiah lii. 2, 3, preached by William Carey (1761-1834), the prime mover in the work, in which he urged two points: " Expect great things from God; attempt great things for God." In the course of the following year Carey sailed for India, where he was joined a few years later by Marshman and Ward, and the mission was established at Serampore. The great work of Dr Carey's life was the translation of the Bible into the various languages and dialects of India. The society's operations are now carried on, not only in the East, but in the West Indies, China, Africa (chiefly on the Congo river), and Europe.

In regard to church government, the Baptists agree with the Con- gregationalists that each separate church is complete in itself, and has, therefore, power to choose its own ministers and to make such regulations as it deems to be most in accordance with the purpose of its existence, that is, the advancement of the kingdom of Christ. A comparatively small section of the denomination maintain that a " plurality of elders " or pastors is required for the complete organiza- tion of every separate

church. This is the distinctive peculiarity of those churches in Scotland and the north of England which are known as Scotch Baptists. The largest church of this section, consisting of approximately 500 members, originated in Edinburgh in 1765, be- fore which date only one Baptist church — that of Keiss in Caithness, formed about 1 750 — appears to have existed in Scotland. The greater number of the churches are united in association voluntarily formed, all of them determined by geographical limits. The associa- tions, as well as the churches not in connexion with them, are united together in the Baptist Union of Great Britain and Ireland, formed in 1813 by the Particular Baptists. This union, however, exerts no authoritative action over the separate churches. One import- ant part of the work of the union is the collection of information in which all the churches are interested. In 1909 there were in the United Kingdom: Baptist churches, 3046; chapels, 4124; sittings, 1,450,352; members, 424,008; Sunday school teachers, 58,687; Sunday scholars, 578,344; local preachers, 5615; and pastors in charge, 2078. . TT .

At the beginning of the 20th century the Baptist Union collected a “Twentieth Century Fund” of £250,000, which has largely assisted the formation of new churches, and gives an indication of

the unity and virility of the denomination. A still stronger evidence to the sartie effect was given by the Religious Census taken in 1904. While this only applied to London, its results are valuable as showing the comparative strength of the Baptist Church. These results are to the effect that in all respects the Baptists come second to the Anglicans in the following three particulars: — (1) Percentage of attendances at public worship contributed by Baptists, 10-81 (London County), 10-70 (Greater London) ; (2) aggregate of attend- ances, 54-597; (3) number of places of worship, 443.

2. The Continent of Europe. — During the 19th century what we have called the modern Baptist movement made its appear- ance in nearly every European country. In Roman Catholic countries Baptist churches were formed by missionaries coming from either England or America: work in France began in 1832, in Italy

missions were started in 1866 (Spezia Mission) and in 1884 (Baptist Missionary Society, which also has a mission in Brittany), and in Spain in 1888. In Protestant countries and in Russia the Baptist movement began without missionary intervention from England or America. J. G. Oncken (1800- 1884) formed the first church in Hamburg in 1834, and thereafter Baptist churches were formed' in other countries as follows: — Denmark (1839), Holland and Sweden (1848), Switzerland (1849), Norway (i860), Austria and Rumania (1869), Hungary (1871), and Bulgaria (1884). Baptist churches also began to be formed in Russia and Finland in the 'fifties and 'sixties.

3. British Colonies. — In every colony the Baptists have a considerable place. There are unions of Baptist churches in the following colonies: — New South Wales, Victoria, S. Australia, Western Australia, Queensland, New Zealand, Tasmania, Canada (four Unions) and S. Africa. The work in S. Africa is assisted by the Baptist South African Missionary and Colonial Aid Society, having its seat in London.

The Baptist World Alliance was formed in 1905, when the first Baptist World Congress was held in London. The preamble of the constitution of this Alliance sufficiently indicates its nature: " Whereas, in the providence of God, the time has come when it seems fitting more fully to manifest the essential oneness in the Lord Jesus Christ, as their God and Saviour, of the churches of the Baptist order and faith throughout the world, and to promote the spirit of fellowship, service and co-operation among them, while recognizing the independence of each particular church and not assuming the functions of any existing organization, it is agreed to form a Baptist alliance, extending over every part of the world." This alliance does in fact include Baptists in every quarter of the globe, as will be seen from the following statistics : —

Churches.

Members.

United States —

National Baptist Convention

16,996

2,110,269

Southern Baptist Convention

20,431

1,832,638

” Disciples of Christ ”

11. 157

1,235,798

Thirty-five Northern States

8,894

986,821

Fourteen other Bodies

7,921

4H,775

Australasia . . . .

270

23,253

Canada . . . .

985

103,062

S.Africa .....

52

4,865

United Kingdom . . .

2,934

426,563

Austria Hungary . . .

37

9,783

Denmark ....

29

3,954

Finland . . . .

43

2,301

France . . .

28

2,278

Germany

180

32,462

Italy

53

1,375

Mexico and Central America .

58

1,820

Netherlands ....

22

1,413

Norway ....

39

2,849

Rumania and Bulgaria .

5

374

1 Russia and Poland . . . .

131

24,136

S. America ....

63

3,641

Spain . . . . .

7

245

Sweden . . . .

567

43,305

Switzerland . . . .

8

796

West Indies . . . .

318

42,31°

Ceylon ....

25

1,044

China . .

137

12,160

1 The figures for Russia include only the German-speaking Baptists. It is impossible to ascertain the numbers of properly Russian Baptists. Estimates have been made which vary from 60,000 to I oo.ooo.

India

1,215

121,716

Japan

Palestine ....

40 1

2,326 106

Philippines .... Congo ..... West Africa

4 21 10

425

4,673

629

Total

72,681

7,454,165

In 1909 the comparative totals were roughly: — 72,988 churches ; 7,480,940 members. In both sets of figures the Disciples of Christ (U.S.A.) are included.

Literature. — Thomas Crosby, The History of the English Baptists (4 vols. London, 1 738-1740); D. Masson, Life of John Milton in Connexion with the History of his Time (6 vols. 1859-1880, new ed. 1881, &c.) ; B. Evans, The Early English Baptists, i. ii. (1862- 1864) ; H. C. Vedder, A Short History of the Baptists (London, 1897) ; A. H. Newman, A Manual of Church History (Philadelphia, 1900- 1903) ; R. Heath, Anabaptism (1895) ; C. Williams, The Principles and Practices of the Baptists (1903); E, C. Pike, The Story of the Anabaptists (1904) ; J. H. Shakespeare, Baptist and Congregational Pioneers; J. G. Lehmann, Geschichte der deutschen Baptisten (1896- 1900) ; G. Tumbiilt, Die Wiederlaufer (Bielefeld, 1899) ; The Baptist Handbook (annually); The Baptist World Congress, 1905; The Religious Census of London (1904). (N. H. M.)

4. United States of America. — The first Baptist Church in America was that founded in the Providence settlement on

Narragansett Bay under the leadership of Roger Williams iq.v.). Having been sentenced to banishment (October 1635) by the Massachusetts Court because of his persistence in advocat- ing separatistic views deemed unsettling and dangerous, to escape deportation to England he betook himself (January 1636) to the wilderness, where he was hospitably entertained by the natives who gave him a tract of land for a settlement. Having been joined by a few friends from Massachusetts, Williams founded a commonwealth in which absolute religious liberty was combined with civil democracy. In the firm convic- tion that churches of Christ should be made up exclusively of regenerate members, the baptism of infants appeared to him not only valueless but a perversion of a Christian ordinance. About March 1639, with eleven others, he decided to restore believers' baptism and to form a church of baptized believers. Ezekiel Holliman, who had been with him at Plymouth and shared his separatist views, first baptized Williams and Williams baptized the rest of the company. Williams did not long continue to find satisfaction in the step he had taken. Believing that the ordinances and apostolic church organization had been lost in the general apostasy, he became convinced that it was pre- sumptuous for any man or company of men to undertake their restoration without a special divine commission. He felt com- pelled to withdraw from the church and to assume the position of a seeker. He continued on friendly terms with the Baptists of Providence, and in his writings he expressed the conviction that their practice came nearer than that of other communities to the first practice of Christ.

In November 1637 John Clarke (1609-1676), a physician, of religious zeal and theological acumen, arrived at Boston, where, instead of the religious freedom he was seeking, he found the dominant party in the Antinomian controversy on the point of banishing the Antinomian minority, including Mrs Anne Hutchinson (q.v.) andherfamily, John Wheelwright (c. 1 592-1679), and William Coddington (1601-1678). Whether from sympathy with the persecuted or aversion to the persecutors, he cast in his lot with the former and after two unsuccessful attempts at settlement assisted the fugitives in forming a colony on the island of Aquidnek (Rhode Island), procured from the Indians through the good offices of Williams. By 1641 there were, according to John Winthrop, " professed Anabaptists " on the island, and Clarke was probably their leader. Robert Lenthall, who joined the Newport company in 1640 when driven from Massa- chusetts, probably brought with him antipaedobaptist

con- victions. Mrs Scott, sister of Mrs Hutchinson, is thought to have been an aggressive antipaedobaptist when the colony was founded. Mark Lucar, who was baptized by immersion in London in January 1642 (N.S.) and was a member of a Baptist church there, reached Newport about 1644. A few years later we find

him associated with Clarke as one of the most active members of the Newport church, and as the date of the organization is uncertain, there is some reason to suspect that he was a constituent member,and that asabaptizedman he took the initiative in baptizing and organizing. At any rate we have in Lucar an interesting connecting link between early English and American Baptists.

The Providence church maintained a rather feeble existence after Williams's withdrawal, with Thomas Olney (d. 1682), William Wickenden, Chad Brown (d. 1665) and Gregory Dexter as leading members. A schism occurred in 1652, the last three with a majority of the members contending for general redemp- tion and for the laying on of hands as indispensable to fellowship, Olney, with the minority, maintaining particular redemption and rejecting the laying on of hands as an ordinance. Olney's party became extinct soon after his death in 1 68 2 . The surviving church became involved in Socinianism and Universalism, but maintained a somewhat vigorous life and, through Wickenden and others, exerted considerable influence at Newport, in Connecticut, New York and elsewhere. Dexter became, with Williams and Clarke, a leading statesman in Rhode Island and Providence Plantations.

The Newport church extended its influence into Massachusetts, and in 1649 we find a group of Baptists at Rehoboth, with Obadiah Holmes as leader. The intolerance of the authorities rendered the prosecution of the work impracticable and these Massachusetts Baptists became members of the Newport church. In 1651 Clarke, Holmes and Joseph Crandall of the Newport church made a religious visit to Lynn, Mass. While holding a meeting in a private house they were arrested and were compelled to attend the church services of the standing order. For holding an unlawful meeting and refusing to participate quietly in the public service they were fined, imprisoned and otherwise maltreated. While in England on public business in 1652, Clarke

published III News from New England, which Contained an impressive account of the proceedings against himself and his brethren at Lynn, and an earnest and well- reasoned plea for liberty of conscience.

Henry Dunster (1612-1659), the first president of the college at Cambridge (Harvard), had by 1653 become convinced that " visible believers only should be baptized." Being unwilling to hold his views in abeyance, he relinquished in 1654, under circum- stances of considerable hardship, the work that he greatly loved.

In 1663 John Myles (1621-1683), a Welsh Baptist who had been one of Cromwell's Tryers, with his congregation, took refuge in Massachusetts from the intolerance of the government of Charles II. They were allowed to settle in Rehoboth, Mass., and even after they were discovered to be Baptists they were allowed to remain on condition of establishing their meeting- place at a considerable distance from that of the standing order. Myles did much to promote the growth of the Baptist Church in Massachusetts, and was of service to the denomination in Boston and elsewhere. Thomas Gould of Charlestown seems to have been in close touch with President Dunster and to have shared his antipaedobaptist views as early as 1654. Some time before 1665 several English Baptists had settled in the neighbourhood of Boston and several others had adopted Baptist views. These, with Gould, were baptized (May 1665) and joined with those who had been baptized in England in a Church covenant. The church was severely persecuted, the members being frequently imprisoned and fined and denied the use of a building they had erected as a meeting-house. Long after the Act of Toleration (1 689) was- in full force in England , the Boston Baptists pleaded in vain for the privileges to which they were thereby entitled, and it required the most earnest efforts of English Baptists and other dissenters to gain for them a recognition of the right to exist. A mandate from Charles II. (July 1679), in which the Massachusetts authorities were sharply rebuked for denying to others the liberty to secure which they themselves had gone into exile, had produced little effect.

In 1682 William Screven (1629-1713) and Humphrey Church- wood, members of the Boston church, gathered and organized, With the co-operation of the mother church, a small congregation

at Kittery, Me. Persecution led to migration, Screven and some of

the members making their way to South Carolina, where, with a number of English Baptists of wealth and position, what became the First Baptist church in Charleston, was organized (about 1684). This became one of the most important of early Baptist centres, and through Screven's efforts Baptist principles became widely disseminated throughout that region. The withdrawal of members to form other churches in the neighbourhood and the intrusion of Socinianism almost extinguished the Charleston church about 1746.

A few Baptists of the general (Arminian) type appeared in Virginia from 17 14 onward, and were organized and fostered by missionaries from the English General Baptists. By 1727 they had invaded North Carolina and a church was constituted there.

From 1643 onward antipaedobaptists from New England and elsewhere had settled in the New Netherlands (New York). Lady Deborah Moody left Massachusetts for the New Nether- lands in 1643 because of her antipaedobaptist views and on her way stopped at New Haven, where she won to her principles Mrs Eaton, the wife of the governor, Theophilus Eaton. She settled at Gravesend (now part of Brooklyn) having received from the Dutch authorities a guarantee of religious liberty. Francis Doughty, an English Baptist, who had spent some time in Rhode Island, laboured in this region in 1656 and baptized a number of converts. This latter proceeding led to his banish- ment. Later in the same year William Wickenden of Providence evangelized and administered the ordinances at Flushing, but was heavily fined and banished. From 1711 onward Valentine Wightman (1681-1747) of Connecticut (General Baptist) made occasional missionary visits to New York at the invitation of Nicolas Eyres, a business man who had adopted Baptist views, and in 1714 baptized Eyres and several others, and assisted them in organizing a church. The church was well-nigh wrecked(i 730) by debt incurred in the erection of a meeting-house. A number of Baptists settled on Block Island about 1663. Some time before 1724 a Baptist»churcn> (probably Arminian) was formed at Oyster Bay.

The Quaker colonies, with their large measure of religious liberty, early attracted a considerable number of Baptists from New England, England and Wales. About 1 684 a Baptist church was founded at Cold Spring, Bucks county, Pa., through the efforts of Thomas Dungan, an Irish Baptist minister who had spent some time in Rhode Island. The Pennepek church was

formed in 1688 through the labours of Elias Keach, son of Benjamin Keach (1640-1704), the famous English evangelist. Services were held in Philadelphia under the auspices of the Pennepek church from 1687 onward, but independent organization did not occur till 1698. Several Keithian Quakers united with the church, which ultimately became possessed of the Keithian meeting-house. Almost from the beginning general meetings had been held by the churches of these colonies. In 1707 the Philadelphia Association was formed as a delegated body " to consult about such things as were wanting in the churches and to set them in order." From its inception this body proved highly influential in promoting Baptist co-operation in missionary and educational work, in efforts to supply the churches with suitable ministers and to silence unworthy ones, and in maintaining sound doctrine. Sabbatarianism appeared within the bounds of the association at an early date and Seventh-day Baptist churches were formed (1705 onward).

The decades preceding the " Great Awakening " of 1 740-1 743 were a time of religious declension. A Socinianized Arminianism had paralysed evangelistic effort. The First Church, Providence, had long since become Arminian and held aloof from the evangelism of Edwards, Whitefield and their coadjutors'. The First Church, Boston, had become Socinianized and discountenanced the revival. The First Church, Newport, had been rent asunder by Arminianism, and the nominally Calvinistic remnant had itself become divided on the question of the laying on of hands and showed no sympathy with the Great Awakening. The First Church, Charleston, had been wrecked by Socinianism. The General (Six Principles) Baptists of Rhode Island and

Connecticut had increased their congregations and membership, and before the beginning of the 18th century had inaugurated annual associational meetings. But the fact that the Great Awakening in America was conducted on Calvinistic principles was sufficient to prevent their hearty co-operation. The churches of the Philadelphia Association were organized and engaged to some extent in missionary endeavour, but they showed little interest in the Edwards-Whitefield movement. And yet the Baptists ultimately profited by the Great Awakening beyond almost any of the denominations. In many New England

communities a majority in the churches of the standing order bitterly opposed the new evangelism, and those who came under its influence felt constrained to organize ” Separate ” or” New Light ” churches. These were severely persecuted by the dominant party and were denied even the scanty privileges that Baptists had succeeded in gaining. As the chief objection of the ” Separates ” to the churches of the standing order was their refusal to insist on personal regeneration as a term of membership, many of them were led to feel that they were inconsistent in requiring regenerate membership and yet administering baptism to unconscious infants. In several cases entire ” Separate ” churches reached the conviction that the baptism of infants was not only without Scriptural warrant but was a chief corner-stone of state-churchism, and transformed themselves into Baptist churches. In many cases a division of sentiment came to prevail on the matter of infant-baptism, and for a while mutual toleration prevailed; but mixed churches had their manifest disadvantages and separation ultimately ensued.

Among the Baptist leaders gained from Congregationalism as a result of the awakening was Isaac Backus (1724-1806), who became the New England champion in the cause of religious liberty and equality, and the historian of his denomination. To Daniel Marshall (d. 1784) and Shubael Stearns, ” New Light ” evangelists who became Baptists, the spread of Baptist principles and the multiplication of Baptist churches throughout the southern colonies were in great measure due. The feeble Baptist cause in Virginia and North Carolina had been considerably strengthened by missionaries from the churches of the Philadelphia Association, including Benjamin Griffith, John Gano (1727-1804), John Thomas, Benjamin Miller, Samuel Eaton, John Garrard and David Thomas, and several churches, formed or reformed under their influence, united with the association. In 1776 the Ketockton Association ,was formed by this group of churches. The Virginia colonial government, in earlier days cruelly intolerant, gave a limited toleration to Baptists of this type; but the ” Separate ” Baptists were too enthusiastic and too much alive to the evils of state control in religious matters to be willing to take out licences for their meetings, and soon came into sharp conflict with the authorities. Stearns was an evangelist of great power. With Marshall, his brother-in-law, and about a dozen fellow-believers he settled at Sandy Creek, North Carolina, and in a few years had built up a church with a membership of more than six hundred. Marshall afterward organized and

ministered to a church at Abbott's Creek about 30 m. distant. From these centres " Separate " Baptist influence spread throughout North and South Carolina and across the Georgia border, Marshall himself finally settling and forming a church at Kiokee, Georgia. From North Carolina as a centre " Separate " Baptist influence permeated Virginia and extended into Kentucky and Tennessee. The Sandy Creek Association came to embrace churches in several colonies, and Stearns, desirous of preserving the harmonious working of the churches that recognized his leadership, resisted with vehemence all proposals for the formation of other associations.

From 1760 to 1770 the growth of the " Separate " Baptist body in Virginia and the Carolinas was phenomenal. Evangelists like Samuel Harris (1724-C.1704) and John Waller (1741-1802) stirred whole communities and established Baptist churches where the Baptist name had hitherto been unknown. The Sandy Creek Association, with Stearns as leader, undertook to " un-fellowship ordinations, ministers and ichurches that acted independently,;" and ,pr©voked .such ˆopppaitian ihat a -division .

of the association became necessary. The General Association of Virginia and the Congaree Association of South Carolina now took their places side by side with the Sandy Creek. The Virginia " Separate " Baptists had more than doubled their numbers in the two years from May 1771 to May 1773. In 1774 some of the Virginia brethren became convinced that the apostolic office was meant to be perpetuated and induced the association to appoint an apostle. Samuel Harris was the unanimous choice and was solemnly ordained. Waller and Elijah Craig (1 743-1800) were made apostles soon afterward for the northern district. This arrangement, soon abandoned, was no doubt suggested by Methodist superin tendency. In 1775 Methodist influence appeared in the contention of two of the apostles and Jeremiah Walker for universal redemption. Schism was narrowly averted by conciliatory statements on both sides. As a means of preserving harmony the Philadelphia Confession of Faith, a Calvinistic document, with provision against too rigid a construction, was adopted and a step was thus taken toward harmonizing with the " Regular " Baptists of the Philadelphia type. When the General Association was sub- divided (1783), a General Committee, made up of delegates from each district association, was constituted to consider matters that might be for the good of the whole society. Its chief work was to continue the

agitation in which for some years the body had been successfully engaged in favour of religious equality and the entire separation of church and state. Since 1780 the " Separate " Baptists had had the hearty co-operation of the " Regular " Baptists in their struggle for religious liberty and equality. In 1787 the two bodies united and agreed to drop the names " Separate " and " Regular." The success of the Baptists of Virginia in securing step by step the abolition of everything that savoured of religious oppression, involving at last the disestablishment and the disendowment of the Episcopal Church, was due in part to the fact that Virginia Baptists were among the foremost advocates of American independence, while the Episcopal clergy were loyalists and had made themselves obnoxious to the people by using the authority of Great Britain in extorting their tithes from unwilling parishioners, and that they secured the co-operation of free-thinking statesmen like Thomas Jefferson and James Madison and, in most measures, that of the Presbyterians.

The Baptist cause in New England that had profited so largely from the Great Awakening failed to reap a like harvest from the War of Independence. The standing order in New England represented the patriotic and popular party. Baptists lost favour by threatening to appeal to England for a redress of their grievances at the very time when resistance to English oppression was being determined upon. The result was slowness of growth and failure to secure religious liberty. Though a large proportion of the New England Baptists co-operated heartily in the cause of independence, the denomination failed to win the popularity that comes from successful leadership.

About 1762 the Philadelphia Association began to plan for the establishment of a Baptist institution of learning that should serve the entire denomination. Rhode Island was finally fixed upon, partly as the abode of religious liberty and because of its intelligent, influential and relatively wealthy Baptist constituency, the consequent likelihood of procuring a charter from its legislature, and the probability that the co-operation of other denominations in an institution under Baptist control would be available. James Manning (1738-1791), who had just been graduated from Princeton with high honours, was thought of as a suitable leader in the enterprise, and was sent to Rhode Island (1763) to confer with leading men, Baptist and other. As a result a charter was granted by the legislature in 1764, and after a few years of preliminary work at Warren (where the first degrees ever bestowed by a Baptist institution were conferred in 1 7 69),

Providence was chosen as thehomeof the college (1770). Here, with Manning as president and Hezekiah Smith (1737- 1805), his class-mate at Princeton, as financial agent and in- fluential supporter, the institution (since 1804 known as Brown University) was for many years the only degree-conferring

institution controlled by Baptists. The Warren Association (1767) was organized under the influence of Manning and Smith on the model of the Philadelphia, and became a chief agency for the consolidation of denominational life, the promotion of denominational education and the securing of religious liberty. Hezekiah Smith was a highly successful evangelist, and through his labours scores of churches were constituted in New England. As chaplain in the American Revolutionary Army he also exerted a widespread influence.

The First Church, Charleston, which had become almost extinct through Arminianism in 1746, entered upon a career of remarkable prosperity in 1749 under the leadership of Oliver Hart (1723-1795), formerly of the Philadelphia Association. In 1 7 51 the Charleston Association was formed, also on the model of the Philadelphia, and proved an element of denominational strength. The association raised funds for domestic missionary work (1755 onward) and for the education of ministers (1756 onward). Brown University shared largely in the liberality of members of this highly-cultivated and progressive body. Among the beneficiaries of the education fund was Samuel Stillman (1737-1807), afterward the honoured pastor of the Boston church. The most noted leader of the Baptists of South Carolina during the four decades following the War of Independence was Richard Furman (1755-1825), pastor of the First Church, Charleston. The remarkable numerical progress of Baptists in South Carolina from 1787 to 1812 (from 1620 members to 11,325) was due to the ” Separate ” Baptist movement under Stearns and Marshall far more than to the activity of the churches of the Charleston Association. Both these types of Baptist life per- meated Georgia, the latter making its influence felt in Savannah, Augusta and the more cultivated communities, the former evangelizing the masses. Many negro slaves became Baptists in Virginia, the Carolinas and Georgia. In most cases they became members of the churches of the white Baptists; but

in Richmond, Savannah and some other towns they were encouraged to have churches of their own.

By 1812 there were in the United States 173,972 Baptist church members, the denominational numerical strength having consider- ably more than doubled since the beginning of the 19th century.

Foreign Missions. — Baptists in Boston and vicinity, Phila- delphia and Charleston, and a few other communities had from the beginning of the 19th century taken a deep interest in the missionary work of William Carey, the English missionary, and his coadjutors in India, and had contributed liberally to its support. The conversion to Baptist views of Adoniram Judson (q.v.) and Luther Rice (1812), who had just been sent, with others, by the newly-formed American Board of Commissioners for Foreign Missions to open up missionary work in India, marks an epoch in American Baptist history. Judson appealed to his American brethren to support him in missionary work among the heathen, and Rice returned to America to organize missionary societies to awaken interest in Judson's mission. In January 1813 there was formed in Boston " The Baptist Society for the Propagation of the Gospel in India and other Foreign Parts." Other societies in the Eastern, Middle and Southern states speedily followed. The desirability of a national organization soon became manifest, and in May 1814 thirty-three delegates, representing eleven states, met in Philadelphia and organized the " General Missionary Convention of the Baptist Denomina- tion in the United States of America for Foreign Missions." As its meetings were to be held every three years it came to be known as the " Triennial Convention." A Board of Com- missionerswas appointed with headquarters in Philadelphia(trans- f erred in 1 8 26 to Boston) . The need of a larger supply of educated ministers for home and for mission work alike soon came to be profoundly felt, and resulted in the establishment of Columbian College, Washington (now George Washington University), with its theological department (1821), intended to be a national Baptist institution. Destitution on the frontiers led the Triennial Convention to engage extensively in home mission work (181 7 onward), and in 1832 the American Baptist Home Mission Society was constituted for the promotion of this work. The need of an

organ for the dissemination of « information, and the quickening of interest in the missionary and educational enterprises of the Triennial Convention, led Rice to establish the Latter Day

Luminary (1816) and the Columbian Star, a weekly journal (1822). From the first the attempt to rouse the denomination to organized effort for the propagation of the gospel met with much opposition, agents of the Convention being looked upon by the less intelligent pastors and churches as highly-paid and irresponsible collectors of money to be used they knew not how, or for purposes of which they disapproved. The fact that Rice was unduly optimistic and allowed the enterprises of the Con- vention to become almost hopelessly involved in debt, and was constrained to use some of the fund collected for missions to meet the exigencies of his educational and journalistic work, intensified the hostility of those who had suspected from the beginning the good faith of the agents and denied the scriptural authority of boards, paid agents, paid missionaries, &c. So virulent became the opposition that in several states, as Tennes- see and Kentucky, the work of the Convention was for years excluded, and a large majority in each association refused to receive into their fellowship those who advocated or contributed to its objects. Hyper-Calvinism, ignorance and avarice co-operated in making the very name " missions " odious, ministerial education an impertinent human effort to supplant a spirit-called and spirit-endowed ministry, Sunday-schools and prayer- meetings as human institutions, the aim of which was to interfere with the divine order, and the receiving of salaries for ministerial work as serving God for hire or rather as serving self. To counteract this influence, Baptist State Conventions were formed by the friends of missions and education, only contributing churches, associations, missionary societies and individuals being invited to membership (182 1 onward — Massachusetts had effected state organization in 1802). These became highly efficient in promoting foreign and domestic missions, Sunday- school organization, denominational literature and education. Nearly every state soon had its institutions of learning, which aspired to become universities.

Before 1844 the sessions of the Triennial Convention had occa- sionally been made unpleasant by harsh anti-slavery utterances by Northern members against their Southern brethren and somewhat acrimonious rejoinders by the latter. The controversy between Francis Wayland and Richard Fuller (1804-1876) on the slavery question ultimately convinced the Southern brethren that separate organization for missionary work was advisable. The Southern Baptist Convention, with its Home and Foreign Missionary Boards, and (later) its Sunday-school Board, was

formed in 1845. Since then Northern and Southern Baptists, though in perfect fellowship with each other, have found it best to carry on their home and foreign missionary work through separate boards and to have separate annual meetings. In 1905 a General Baptist Convention for America was formed for the promotion of fellowship, comity and denomina- tional esprit de corps, but this organization is not to interfere with the sectionalorganizationsortoundertake any kindof administrative work.

Since 1845 Northern and Southern Baptists alike have greatly increased in numbers, in missionary work, in educational insti- tutions, in literary activity and in everything that pertains to the equipment and organization of a great religious denomination. Since 1812 they have increased in numbers from less than 200,000 to more than 5,000,000. In 1812 American Baptists had no theo- logical seminary; in 1906 they had 11 with more than 100 instructors, 1300 students, and endowments and equipments valued at about $7,000,000. In 1812 they had only one degree-conferring college with a small faculty, a small student body and almost no endowment; in 1906 they had more than 100 universities and colleges with endowment and equipment valued at about $30,000,000, and an annual income of about $3,000,000. In 1812 the value of church property was small ; in 1906 it was estimated at $100,000,000. Then a single monthly magazine, with a circulation of a few hundreds, was all that the denomination possessed in the way of periodical literature; in 1906 its quarterlies, monthlies and weeklies were numbered by hundreds. The denomination has a single publishing concern (the American Baptist Publication Society) with an annual business of nearly $1,000,000 and assets of $1,750,000.

Baptists in the Dominion of Canada had their rise about the close of the 18th century in migrations from the United States. They have been reinforced by considerable numbers of English, Welsh and Scottish Baptists. They are divided into four sections :— those of the Maritime Provinces, with their Convention, their Home and Foreign Mission Boards, an Education Board and a Publication Board, and with M'Master University (Arts. Theological and

Academic departments) as its educational institution; those of Manitoba and the North-west, with Brandon College as its educational institution; and those of British Columbia, Canadian Baptists numbered 120,000 in 1909, and are considered in the above general estimates. (A. H. N.)

BAR, FRANCOIS DE (1538-1606), French scholar, was born at Seizencourt, near St Quentin, and having studied at the university of Paris entered the order of St Benedict. He soon became prior of the abbey of Anchin, near Pecquencourt, and passed much of his time in the valuable library of the abbey, studying ecclesiastical history, especially that of Flanders. He also made a catalogue of the manuscripts at Anchin and annotated many of them. During the French Revolution his manuscripts passed to the library at Douai. Bar died at Anchin on the 25 th of March 1606.

See J. Lelong, Bibliotheque historique de la France (Paris, 1768-1778); C. C. A. Dehaisnes, ” Catalogue des manuscrits de Douai, in the’ Catalogue gSneral des manuscrits des bibliotheques des departe- ments, t. vi. (Paris, 1849-1885).

BAR, a town of Russia, in the government of Podolia, 50 m. N.E. of Kamenets, on an affluent of the Bug. Pop. (1897) 10,614. It was formerly called Rov. Its present designation was bestowed upon it in memory of Bari in Italy (where she was born) by Bona Sforza, the consort of Sigismund I. of Poland, who rebuilt the town after its destruction in 1452 by the Tatars. From 1672 to 1699 it remained in possession of the Turks. In 1768 a confederation of the Polish nobles (see next article) against the Russians was formed in the town, which was shortly after taken by storm, but did not become finally united to Russia till the partition of 1793.

BAR, CONFEDERATION OF, a famous confederation of the Polish nobles and gentry formed at the little fortress of Bar in Podolia in 1768 to defend the internal and external independ- ence of Poland against the aggressions of the Russian government as represented by her representative at Warsaw, Prince Nicholas Repnin. The originators of this confederation were Adam Krasinski, bishop of Kamenets, Osip Pulawski and Michael Krasinski. King Stanislaus was at first inclined to mediate between the confederates and Russia; but finding this impossible, sent a force against them under the grand hetman Ksawery Branicki and two generals, who captured Bar. Nevertheless, a

simultaneous outbreak of a. jacquerie in Little-Russia contributed to the extension of the confederation throughout the eastern province of Poland and even in Lithuania. The confederates, thereupon, appealed for help abroad and contributed' to bring about a war between Russia and Turkey. So serious indeed was the situation that Frederick II. advised Catherine to come to terms with the confederates. Their bands under Ignaty Malchewsky, Michael Pac and Prince Charles Radziwill ravaged the land in every direction, won several engagements over the Russians, and at last, utterly ignoring the king, sent envoys on their own account to the principal European powers. In 1770 the Council of the Confederation was transferred from its original seat in Silesia to Hungary, from whence it conducted diplomatic negotiations with France, Austria and Turkey with the view of forming a league against Russia. The court of Versailles sent Dumouriez to act as commander-in-chief of the confederates, but neither as a soldier nor as a politician did this adroit adventurer particularly distinguish himself, and his account of his experiences is very unfair to the confederates. Among other blunders, he pronounced King Stanislaus a tyrant and a traitor at the very moment When he was about to accede to the Confederation. The king thereupon reverted to the Russian faction and the Confederation lost the confidence of Europe. Nevertheless, its army, thoroughly reorganized by Dumouriez, gallantly main- tained the hopeless struggle for some years, and it was not till 1776 that the last traces of it disappeared.

See Alexander Kraushar, Prince Repnin in Poland (Pol.) (Warsaw, 1900); F. A. Thesby de Belcour, The Confederates of Bar (Pol.) (Cracow, 1895) ; Charles Francois Dumouriez, Memoires et corres- pondence (Paris, 1834). (R. N. B.) .

BAR (0. Fr. barre, Late Lat. barra, origin unknown), in physical geography, a ridge of sand or silt crossing an estuary under water or raised by wave action above sea-level, forming an impediment

to navigation. When a river enters a tidal sea its rate of flow is cftecked and the material it carries in suspension is deposited in a shifting bar crossing the channel from bank to bank. Where the channel is only partly closed, a spur of this character is called a " spit." A bar may be produced by tidal action only in an estuary or narrow gulf (as at Port Adelaide) where the tides sweep the loose sand backwards and forwards, depositing it where the motion of the water is checked. Nahant Bay, Mass., is bordered by the ridge of Lynn Beach, which separates it from Lynn Harbor, and ties

Nahant to the mainland by a bar formed in this way.

BAR, THE. This term, as equivalent to the profession of barrister (q.v.), originated in the partition or bar dividing the English law-courts into two parts, for the purpose of separating the members and officials of the court from the prisoners or suitors, their advocates and the general public. Theoretically, this division of the court is still maintained in England, those who are entitled to sit within the bar including king's counsel, barristers with patents of precedence, Serjeants (till the order died out) and solicitors, while the other members of the bar and the general public remain without. Parties in civil suits who appear in person are allowed to stand on the floor within the bar instead of, as formerly, appearing at the bar itself. In criminal trials the accused still stands forward at the bar. There is also a " bar " in parliament. In the House of Commons it remains literally a bar — a long brass rod hidden in a tube from which it is pulled out when required to mark the technical boundary of the House. Before it appear those who are charged with having violated the privileges of the House; below it also sit those members who have been returned at bye-elections, to await their introduction to the House and the taking of the oath of allegiance. In the House of Lords the place where Mr Speaker and the members of the House of Commons stand when sum- moned by Black Rod is called " the bar."

The " call to the bar " in England, by which a law student at one of the Inns of Court is converted into a barrister, is dealt with under Inns or Court. The exclusive privilege of calling to the bar belongs to those bodies, which also exercise disciplinary power over their members; but it was widely felt by members of the bar in recent years that the benchers or governing body with their self-elected members did not keep a sufficiently watchful eye on the minutiae of the profession. Consequently, in 1883, a bar committee was formed for the purpose of dealing with all matters relating to the profession, such as the criticizing of proposed legal reforms, and the expression of opinions on matters of professional etiquette, conduct and practice. In 1894 the committee was dissolved, and succeeded by the general council of the bar, elected on a somewhat wider basis. It is composed of a due proportion of king's counsel and outer barristers elected by voting-papers sent to all barristers having an address in the Law List within the United Kingdom. Its expenses are paid by contributions from the four Inns of Court. Its powers are not disciplinary, but it would draw the attention of the benchers to

any gross violation of the professional etiquette of the bar.

Each state in America has its own bar, consisting of all attorneys-at-law residing within it who have been admitted to practice in its courts. Generally attorneys are admitted in one court to practice in all courts. Each of the United States courts has a bar of its own. An attorney of a state cannot practise in a court of the United States unless he has been admitted to it, or to one of the same class in another district or circuit. He cannot appear in the Supreme Court of the United States unless specially admitted and sworn as an attorney of that court, which is done on motion in case of any one who has practised for three years in the highest courts of his state and is in good standing at its bar. In most of the states there is a state bar association, and in some cities and counties local bar associations. These consist of such members of its bar as desire thus to asso- ciate, the object being to guard and advance the standards of the profession. Some own valuable libraries. These associations have no official recognition, but their influence is considerable in

recommending and shaping legislation respecting the judicial establishment and procedure. They also serve a useful purpose in instituting or promoting proceedings to discipline or expel unworthy attorneys from the bar. There is an American Bar Association, founded in 1878, composed of over 3500 members of different states of like character and position. Some of these associations publish annually a volume of transactions. The rights, duties and liabilities of counsellor-at-law are stated under Attorney. As members of the bar of the state in which they practise they are subject to its laws regulating such practice, e.g. in some states they are forbidden to advertise for divorce cases (New York Penal Code [1902] § 148a) (1905, People v. Taylor [Colorado] , 75 Pac. Rep. 914). It is common throughout the United States for lawyers to make contracts for ” contingent fees,” i.e. for a percentage of the amount recovered. Such contracts are not champertous and are upheld by the courts, but will be set aside if an unconscionable bargain be made with the client (Deering v. Scheyer [N.Y.] , 58 App. D. 322). So also by the U.S. Supreme Court {Wright v. Tebbets, 91 U.S. 252; Taylor v. Benis, no U.S. 42). The reason for upholding such contracts is • that otherwise poor persons would often fail of securing or

protecting their property or rights. In fact such contracts are seldom set aside, though no doubt the practice is capable of abuse.

BARA BANKI, a town and district of British India in the Fyzabad division of the United Provinces. The town, which forms one municipality with Nawabganj, the administrative headquarters of the district, is 17 m. E. of Lucknow by railway. The population of Bara Banki alone in 1901 was 3020. There is some trade in sugar and cotton.

The district has an area of 1758 sq. m. It stretches out in a level plain interspersed with numerous jhils or marshes. In the upper part of the district the soil is sandy, while in the lower part it is clayey and produces finer crops. The principal rivers are the Gogra, forming the northern boundary, and the Gumti, flowing through the middle of the district. In 1856 it came, with the rest of Oudh, under British rule. During the Sepoy war of 1857-1858 the whole of the Bara Banki talukdars joined the mutineers, but offered no serious resistance after the capture of Lucknow. The cultivators are still, for the most part, tenants- at-will, rack-rented* and debt-ridden. In 1901 the population was 1,179,323, showing an increase of 4 % in the decade. The principal crops are rice, wheat, pulse and other food-grains, sugar-cane and opium. Both the bordering rivers are navi- gable; and the district is traversed by two lines of the Oudh and Rohilkhand railway, with branches. Trade in agricultural produce is active.

BARABOO, a city and the county-seat of Sauk county, Wisconsin, U.S.A., about 37 m. N.W. of Madison, on the Baraboo river, a tributary of the Wisconsin. Pop. (1890) 4605; (1900) 5751, of whom 732 were foreign-born; (1905) 5835; (1910) 6324. The city is served by the Chicago & North-Western railway, which maintains here an engine house and extensive machine shops, and of which it is a division headquarters. Baraboo has an attractive situation on a series of hills about 1000 ft. above sea-level. In the vicinity are Devil's Lake (3 m. S.) and the famous Dells of the Wisconsin river (near Kilbourn, about 12 m. N.), two summer resorts with picturesque scenery. The principal public buildings are the court-house (in a small public park), the public library and a high school. Dairying and the growing of small fruits are important industries in the surrounding region; and there is a large nursery here. Stone quarried in the vicinity is exported, and the city is near the centre of the Sauk county iron range. Among the manufactures are woollen goods, towels,

canned fruit and vegetables, dairy products, beer, and circus wagons (the city is the headquarters of the Ringling and the Gollmar circuses). The first permanent settlement here was made in 1839. Baraboo was named in honour of Jean Baribault, an early French trapper, and was chartered as a city in 1882.

BARABRA, a name for the complex Nubian races of the Egyptian Sudan, whose original stock is Hamitic-Berber, long

modified by negro crossings. The word is variously derived from Berberi, i.e. people of Berber, or as identical with Barabara, figuring in the inscription on a gateway of Tethmosis I. as the name of one of the 113 tribes conquered by him. In a later inscription of Rameses II. at Karnak (c. 1300 B.C.) Beraberata is given as that of a southern conquered people. Thus it is suggested that Barabra is a real ethnical name, confused later with Greek and Roman barbarus, and revived in its proper meaning subsequent to the Moslem conquest. A tribe living on the banks of the Nile between Wadi Haifa and Assuan are called Barabra. (See further Nubia.)

BARACALDO, a river-port of north-eastern Spain, in the province of Biscay; on the left bank of the river Nervion or Ansa (in Basque, Ibaizabal), 5 m. by rail N.W. of Bilbao. Pop. (1900) 15,013. Few Spanish towns have developed more rapidly than Baracaldo, which nearly doubled its population between 1880 and 1900. During this period many immigrant labourers settled here; for the ironworks and dynamite factory of Bara- caldo prospered greatly, owing to the increased output of the Biscayan mines, the extension of railways in the neighbourhood, and the growth of shipping at Bilbao. The low flat country round Baracaldo is covered with maize, pod fruit and vines.

BARACOA, a seaport city of N.E. Cuba, in Santiago province. Pop. (1907) 5633. The town lies, under high hills on a small circular harbour accessible to small craft. The country round about is extremely rugged. The hill called the ” Anvil of Baracoa ” (about 3000 ft.) is remarkable for its extremely regular formation. It completely dominates the city’s background, and is a well-known sailors’ landmark. The town is the trading centre of a large plantation region behind it and is the centre of the banana and cocoanut export trade. There is a fort dating from the middle of the 18th century. Baracoa is the oldest town in Cuba, having been settled by Diego Velazquez in 1512. It held from its foundation the honours of a city. From 151 2 to 1 514 it was the

capital of the island, and from 1518 to 1522 its church was the cathedral of the island's first diocese. Both honours were taken from it to be given to Santiago de Cuba; and for two centuries after this Baracoa remained an obscure village, with little commerce. In the 16th century it was re- peatedly plundered by pirates until it came to terms with them, gave them welcome harbourage, and based a less precarious existence upon continuous illicit trade. Until the middle of the 1 8th century Baracoa was almost without connexion with Havana and Santiago. In the wars of the end of the century it was a place of deposit for French and Spanish corsairs. At this time, too, about 100 fugitive immigrant families from Santo Domingo greatly augmented its industrial importance. In 1807 an unsuccessful attack was made upon the city by an English force. In 1826 the port was opened to foreign commerce.

BARAHONA DE SOTO, LUIS (.i535?-i595), Spanish poet, was born about 1535 at Lucena (Cordova), was educated at Granada, and practised as a physician at Cordova. His principal poem is the Primera parte de la Angelica (1586), a continuation of the Orlando furioso; the second part was long believed to be lost, but fragments of it have been identified in the anonymous Didlogos de la monteria, first printed in 1890; the Didlogos also embody fragments of a poem by Barahona entitled Los Principios del mundo, and many graceful lyrics by the same writer have been published by Francisco Rodriguez Marin. Cervantes describes Barahona as " one of the best poets not only in Spain, but in the whole world "; this is friendly hyperbole. Nevertheless Barahona has high merits: poetic imagination, ingenious fancy, and an exceptional mastery of the methods transplanted to Spain from Italy. His Angilica has been reproduced in facsimile (New York, 1904) by Archer M. Huntington.

See F. Rodriguez Marin, Luis Barahona de Soto, estudio biografico , bibliografico, y critico (Madrid. 1903) ; Didlogos de la monteria, edited by F. R. de Uhagon (Madrid, 1890). (J. F.-K.)

BARANTE, AMABLE GUILLAUME PROSPER BRUGIERE,

Baron de (1782ˆ1866), French statesman and historian, the son of an advocate, was born at Riom on the iothof June 1782. At the age of sixteen he entered the Ecole Polytechnique at

Paris, and at twenty obtained his first appointment in the civil service. His abilities secured him rapid promotion, and in 1806 he obtained the post of auditor to the council of state. After being employed in several political missions in Germany, Poland and Spain, during the next two years, he became prefect of Vendee. At the time of the return of Napoleon I. he held the prefecture of Nantes, and this post he immediately resigned. On the second restoration of the Bourbons he was made councillor of state and secretary-general of the ministry of the interior. After filling for several years the post of director-general of indirect taxes, he was created in 181 9 a peer of France and was prominent among the Liberals. After the revolution of July 1830, M. de Barante was appointed ambassador to Turin, and five years later to St Petersburg. Throughout the reign of Louis Philippe he remained a supporter of the government; and after the fall of the monarchy, in February 1848, he withdrew from political affairs and retired to his country seat in Auvergne. Shortly before his retirement he had been made grand cross of the Legion of Honour. Barante's Histoire des dues de Bourgogne de la maison de Valois, which appeared in a series of volumes between 1824 and 1828, procured him immediate admission to the French Academy. Its narrative qualities, and purity of style, won high praise from the romantic school, but it exhibits a lack of the critical sense and of scientific scholarship. Amongst his other literary works are a Tableau de la litter ature francaise au dixhuitieme stick, of which several editions were published; Des communes et de Varistocratie (1821); a French translation of the dramatic works of Schiller; Questions constitutionnelles (1850); Histoire de la Convention Nationale, which appeared in six volumes between 1851 and 1853; Histoire du Directoire de la Republique francaise (1855); Etudes historiques et bio- graphiques (1857); La Vie politique de M. Royer-Collard (1861). The version of Hamlet for Guizot's Shakespeare was his work. He died on the 22nd of November 1866.

His Souvenirs were published by his grandson (Paris, 1890-99). See also the article by Guizot in the Revue des deux Monies, July 1867.

BARASAT, a subdivisional town in the district of the Twenty- four Parganas, Bengal, India. For a considerable time Barasat town was the headquarters of a joint magistracy, known as the " Barasat District," but in 1861, on a readjustment of boundaries

Barasat district was abolished by order of government, and was converted into a subdivision of the Twenty-four Parganas. Pop. (1901) 8634. It forms a striking illustration of the rural character of the so-called ” towns ” in Bengal, and is merely an agglomeration of 41 separate villages, in which all the operations of husbandry go on precisely as in the adjacent hamlets.

BARATIER, JOHANN PHILIPP (1721-1740), German scholar of precocious genius, was born at Schwabach near Nuremberg on the 10th of January 1721. His early education was most carefully conducted by his. father, the pastor of the French church at Schwabach, and so rapid was his progress that by the time he was five years of age he could speak French, Latin and Dutch with ease, and read Greek fluently. He then studied Hebrew, and in three years was able to translate the Hebrew Bible into Latin or French. He collected materials for a dictionary of rare and difficult Hebrew words, with critical and philological observations; and when he was about eleven years old translated from the Hebrew Tudela’s Itinerarium. In Tiis fourteenth year he was admitted master of arts at Halle, and received into the Royal Academy at Berlin. The last years of his short life he devoted to the study of history and antiquities, and had collected materials for histories of the Thirty Years’ War and of Antitrinitarianism, and for an Inquiry concerning Egyptian .Antiquities. His health, which had always been weak, gave way completely under these labours, and he died on the 5th of October 1740. He had published eleven separate works, and left a great quantity of manuscript.

BARATYNSKI, JEWGENIJ ABRAMOVICH (1800-1844), Russian poet, was educated at the royal school at St Petersburg and then entered the army. He served for eight years in Finland, where he composed his first poem Eda. Through the interest of friends he obtained leave from the tsar to retire from

the army, and settled in 1827 near Moscow. There he completed his chief work The Gipsy, a poem written in the style of Pushkin. He died in 1844 at Naples, whither he had gone for the sake of the milder climate.

A collected edition of his poems appeared at St Petersburg, in 2 vols, in 1835; later editions, Moscow 1869, and Kazan 1884.

BARB. (1) (From Lat. barba, a beard), a term used in various senses, of the folds of mucous membrane under the tongue of

horses and cattle, and of a disease affecting that part, of the wattles round the mouth of the barbel, of the backward turned points of an arrow and of the piece of folded linen worn over the neck by nuns. (2) (From Fr. barbe, meaning ” from Barbary “), a name applied to a breed of horses imported by the Moors into Spain from Barbary, and to a breed of pigeons.

BARBACENA, an inland town of Brazil, in the state of Minas Geraes, 150 m. N.N.W. of Rio de Janeiro and about 3500 ft. above sea-level. The surrounding district is chiefly agricultural, producing coffee, sugar-cane, Indian corn and cattle, and the town has considerable commercial importance. It is also noted for its healthiness and possesses a large sanatorium much frequented by convalescents from B.io de Janeiro during the hot season. Barbacena was formerly a principal distributing centre for the mining districts of Minas Geraes, but this distinction was lost when the railways were extended beyond that point.

BARBADOS, or Barbadoes, an island in the British West Indies. It lies 78 m. E. of St Vincent, in 13° 4′ N. and 59° 37′ W.; is 21 m. long, 14! m. at its broadest, and 166 sq. m. (106,470 acres) in extent (roughly equalling the Isle of Wight). Its coasts are encircled with coral reefs, extending in some places 3 m. seaward. In its configuration the island is elevated but not mountainous. Near the centre is its apex, Mount Hillaby (1100 ft.), from which the land falls on all sides in a series of terraces to the sea. So gentle is the incline of the hills that in driving over the well- constructed roads the ascent is scarcely noticeable. The only natural harbour is Carlisle Bay on the south-western coast, which, however, is little better than a shallow roadstead, only accessible to light draught vessels.

Geology. — The oldest rocks of Barbados, known as the Scotland series, are of shallow water origin, consisting of coarse grits, brown sandstones and sandy clays, in places saturated with petroleum and traversed by veins of manjak. They have been folded and denuded, so as to form the foundation on which rest the later beds of the island. Upon the denuded edges of the Scotland beds lies the Oceanic series. It includes chalky limestones, siliceous earths, red clay, and, at the top, a layer of mudstone composed mainly of volcanic dust. The limestones contain Globigerina and other Foraminifera, the siliceous beds are made of Radiolaria, sponge spicules and diatoms, while the red clay closely resembles the red clay of the deepest parts of the oceans. There can be no doubt that the whole series was laid

down in deep waters. The Oceanic series is generally overlaid directly, and unconformably, by coral limestones; but at Bissex Hill, at the base of the coral limestones, and resting unconformably upon the Oceanic series, there is a Globigerina marl. The Coral Limestone series lies indifferently upon the older beds. Although of no great thickness it covers six-sevenths of the island, rising in a series of steps or platforms to a height of nearly 1100 ft.

Even the Scotland series probably belongs to the Tertiary system, but owing to the want of characteristic fossils, it is impossible to determine with any degree of certainty the precise homotaxis of the several formations. Jukes-Browne and Harrison ascribe the Scotland beds to the Eocene or Oligocene period, the Oceanic series to the Miocene, the Bissex Hill marls to the Pliocene, and the coral limestones partly to the Pliocene and partly to the Pleistocene. But these correlations rest upon imperfect evidence.

Sandstone, and clays suitable for brick-making, are found in the district of Scotland, so called from a fancied resemblance to the Highlands of North Britain. The only other mineral product is manjak, a species of asphalt, also found in this district and to some extent exported.

Climate, &c. — The climate of Barbados is pleasant. The

seasons are divided into wet and dry, the latter (extending from December to the end of May) being also the cold season. The temperature ranges from 70 F. to 86° F., rarely, even on the coldest days, falling below 65 F. The average annual rainfall is about 60 in., September being the wettest month. For eight months the invigorating N.E. trade winds temper the tropical heat. The absence of swamps, the porous nature of the soil, and the extent of cultivation account for the freedom of the island from miasma. Fever is unknown. The climate has a beneficial effect on pulmonary diseases, especially in their earlier stages, and is remarkable in arresting the decay of vital power consequent upon old age. Leprosy occurs amongst the negroes, and elephan- tiasis is so frequent as to be known as ” Barbados leg.”

Industries. — The cultivation of sugar was first introduced in the middle of the 17 th century, and owing to the cheapness of labour, the extreme fertility of the soil and the care bestowed on its cultivation, became the staple product of the island. Cotton growing has recently become of importance. The few other industries include rum distilleries and factories for chemicals, ice and tobacco. A railway 28 m. long runs from Bridgetown partly round the coast. The island is a place of call for almost all the steamships plying to and from the West Indies, and is a great centre of distribution. There is direct communication at frequent intervals with England, the United States, Canada and the other West Indian islands.

Population and Administration. — The greater part of the inhabitants belong to the Church of England, which exceeds in numbers the combined total of all other denominations. The island is the see of a bishop, who, with the clergy of all creeds, is paid by the government. The chief educational establishment is Codrington College, founded by Colonel ChristopherCodrington, who in 1 7 10 bequeathed two estates to the Society for the Propaga- tion of the Gospel. It trains young men for holy orders and is affiliated to the university of Durham. Harrison College and The Lodge are secondary schools for boys, Queen's College for girls. There are several second grade and a large number of primary schools. The colony possesses representative institutions but not responsible government. The crown has a veto on legislation and the home government appoints the public officials, excepting the treasurer. The island is administered by a governor, assisted by an executive council, a legislative council of 9 nominated members, and a house of assembly of 24 members elected on a limited franchise. Barbados is the headquarters of the Imperial Agricultural Department of the West Indies, to which (under Sir Daniel Morris) the island owes the development of cotton growing, &c. The majority of the population consists of negroes, passionately attached to the island, who have a well-marked physiognomy and dialect of their own, and are more intelligent than the other West Indian negroes. They outnumber the whites by 9 to 1. Barbados is one of the most densely populated areas in the world. In 1901 the numbers amounted to 195,588, or 1178 to the sq. m., and in 1906 they were 196,287. There are no crown lands nor forests.

Towns. — Bridgetown (pop. 21,000), the capital, situated on the S.W. coast, is a pretty town nestling at the foot of the hills leading to the uplands of the interior. It has a cathedral, St

Michael's, which also serves as a parish church. In Trafalgar Square stands the earliest monument erected to the memory of Nelson. There are a good many buildings, shops, pleasure grounds, a handsome military parade and exquisite beaches. Pilgrim, the residence of the governor, is a fine mansion about a mile from the city. Fontabelle and Hastings are fashionable suburban watering-places with good sea-bathing. Speighstown (1500) is the only other town of any size.

History. — Opinions differ as to the derivation of the name of the island. It may be the Spanish word for the hanging branches of a vine which strike root in the ground, or the name may have been given from a species of bearded fig-tree. In the 16th-century maps the name is variously rendered St Bernardo, Bernados, Barbudoso, Barnodos and Barnodo. There are more numerous traces of the Carib Indians here than in any other of the Antilles. Barbados is thought to have been first visited by the Portuguese.

Its history has some special features, showing as it does the process of peaceful colonization, for the island, acquired without conquest, has never been out of the possession of the British. It was touched in 1605 by the British ship " Olive Blossom," whose crew, finding it uninhabited, took possession in the name, of James I.; but the first actual settlement was made in 1625, at the direction of Sir William Courteen under the patent of Lord Leigh, afterwards earl of Marlborough, to whom the island had been granted by the king. Two years later, a compromise having been effected with Lord Marlborough, a grant of the island was obtained by the earl of Carlisle, whose claim was based on a grant, from the king, of all the Caribbean islands in 1624; and in 1628 Charles Wolferstone, a native of Bermuda, was appointed governor. In the same year sixty-four settlers arrived at Carlisle Bay and the present capital was founded. During the Civil War in England many Royalists sought refuge in Barbados, where, under Lord Willoughby (who had leased the island from the earl of Carlisle) , they offered stout resistance to the forces of the Commonwealth. Willoughby, however, was ultimately defeated and exiled. After the Restoration, to appease the planters, doubtful as to the title under which they held the estates which they had converted into valuable properties, the proprietary or patent interest was abolished, and the crown took over the government of the island; a duty of 45 % on all exports being imposed to satisfy the claims of the patentees. In 1684, under the governorship of Sir Richard Dutton, a census was taken, according to which the population then consisted of 20,000

whites and 46,000 slaves. The European wars of the 18th century caused much suffering, as the West Indies were the scene of numerous battles between the British and the French. During this period a portion of the 45 % duty was returned to the colony in the form of the governor's salary. In the course of the American War of Independence Barbados again experienced great hardships owing to the restrictions placed upon the importation of provisions from the American colonies, and in 1778 the distress became so acute that the British government had to send relief. For three years after the peace of Amiens in 1802 the colony enjoyed uninterrupted calm, but in 1805 it was only saved from falling into the hands of the French by the timely arrival of Admiral Cochrane. Since that date, however, it has remained unthreatened in the possession of the British. The rupture between Great Britain and the United States in 181 2 caused privateering to be resumed, the trade of the colony being thereby almost destroyed. This led to an agitation for the repeal of the 4§ % duty, but it was not till 1838 that the efforts to secure this were successful. The abolition of slavery in 1834 was attended by no ill results, the slaves continuing to work for their masters as hired servants, and a period of great prosperity succeeded. The proposed confedera- tion of the Windward Islands in 1876, however, provoked riots, which occasioned considerable loss of life and property, but secured for the people their existence as a separate colony. Hurricanes are the scourge of Barbados, those of 1780, 1831; and 1898 being so disastrous as to necessitate relief measures on the part of the home government.

See Ligon, History of Barbados (1657); Oldmixon, British Empire in America (1741); A Short History of Barbados (1768); Remarks upon the Short History (1768); Poyer, History of Barbados (1808); Capt. Thorn. Southey, Chron. Hist, of W. Indies (1827); Schomburgk, History of Barbados (1848) ; J. H. S. Moxby, Account of a West Indian Sanatorium (1886); N. D. Davis, The Cavaliers and Roundheads of Barbados (1887) ; J. H. Stark, History and Guide to Barbados (1893); R. T. Hill, Cuba and Porto Rico (1897). For geology, see A. J. Jukes-Browne and J. B. Harrison, " The Geology of Barbados," Quart. Journ. Geol. Soc. London, vol. xlvii. (1891), pp. 197-250, vol. xlviii. (1892), pp. 170-226; J. W. Gregory, " Con- tributions to the Palaeontology and Physical Geology of the West Indies," ibid. vol. li. (1895), pp. 255-310; G. F. Franks and J. B. Harrison, " The Globigerina-marls and Basal Reef-rocks of Bar- bados," ibid. vol. liv. (1898), pp. 540-555; J. W. Spencer, "On the Geological and Physical Development of

Barbados; with Notes on Trinidad," ibid. vol. lviii. (1902), pp. 354-367.

BARBARA, SAINT, a virgin martyr and saint of tbs Roman Catholic and Orthodox Eastern Churches, whose festival day is December 4th. Her legend is that she was immured in a tower

by her father who was opposed to her marriage; that she was converted to Christianity by a follower of Origen, and that when her father learnt this, he beheaded her. The place of her martyrdom is variously given as Heliopolis, as a town of Tuscany, •and as Nicomedia, Bithynia, about the year 235. St Barbara is the patron saint of armourers and gunsmiths, and her protection is sought specially against lightning.

BARBARIAN (Gr. /Jdp/3apos), the name among the early Greeks for all foreigners. The word is probably onomatopoetic, designed to represent the uncouth babbling of which languages other than their own appeared to the Greeks to consist. Even the Romans were included in the term. The word soon assumed an evil meaning, becoming associated with the vices and savage natures of which they believed their enemies to be possessed. The Romans adopted the word for all peoples other than those under Graeco-Roman influence and domination. It has long become synonymous with a general lack of civilization.

BARBARO, ERMOLAO (Hehmolaus Barbarus) (1454-1493), Italian scholar, was born at Venice on the 21st of May 1454. At an early age he was sent to Rome, where he studied under Pomponius Laetus. He completed his education at the uni- versity of Padua, where he was appointed professor of philosophy in 1477. Two years later he revisited Venice, but returned to Padua when the plague broke out in his native city. He was sent on various missions to persons of high rank, amongst them Pope Innocent VIII., by whom he was nominated to the im- portant office of patriarch of Aquileia (1491). The Venetian senate, however, refused to ratify the appointment, which, contrary to the law, he had accepted without first obtaining its sanction. He was banished and forced to resign the patriarchate, under the threat of being punished vicariously by the confiscation of his father's property. Barbarus remained at Rome, in receipt of a small

pension from the pontifical government, until his death (probably from the plague) on the 14th of June 1493 (according to some, two years later). He edited and translated a number of classical works, of which the most important were: Castigationes Plinianae (1492), in which he boasted of having made 5000 corrections in the text of Pliny's Natural History; Themistius' Paraphrases of certain works of Aristotle (1480); Aristotle's Rhelorica (published in 1 544) ; Castigationes in Pomponium Melam

(i493)-

BARBAROSSA ("Redbeard"), the name given by the Christians to a family of Turkish admirals and sea rovers of the 1 6th century, — Arouj and Khizr (alias Khair-ed-Din) and Hassan the son of Khair-ed-Din. As late as 1840, Captain Walsin Esterhazy, author of a history of the Turkish rule in Africa, ventured the guess that " Barbarossa " was simply a mispronunciation of Baba Arouj, and the supposition has been widely accepted. But the prefix Baba was not applied to Arouj by contemporaries. His name is given in Spanish or Italian form as " Orux " or " Harrach " or " Ordiche." The contemporary Arab chronicle published by S. Rang and F. Denis in 1837 says explicitly that Barbarossa was the name applied by Christians to Khair-ed-Din. It was no doubt a nickname given to the family on account of their red or tawny beards (Lat. barba) . The founder of the family was Yakub, a Roumeliot, probably of Albanian blood, who settled in Mitylene after its conquest by the Turks. He was a coasting trader and skipper, and had four sons — Elias, Isaak, Arouj and Khizr, all said to have been born after 1482. Khizr became a potter and Isaak a trader. Elias and Arouj took to sea roving. In an action with a galley of the Knights of Saint John, then established at Rhodes, Elias was killed and Arouj taken prisoner; the latter was ransomed by a Turkish pasha and returned to the sea. For some time he served the Mamelukes who still held Egypt. During the conflict between the Mamelukes and the sultan Selim I., he considered it more prudent to transfer himself to Tunis. The incessant conflicts among the Berber princes of northern Africa gave him employment as a mercenary, which he varied by piratical raids on the trade of the Christians. At Tunis he was joined by Khizr, who took, or was endowed with, the name of Khair-ed-Din. Isaak soon followed his brothers. Arouj and Khair-ed-Din joined the exiled Moors of Granada in

raids on the Spanish coast. They also pushed their fortunes by

fighting for, or murdering and supplanting, the native African princes. Their headquarters were in the island of Jerba in the Gulf of Gabes. They attempted in 1 5 1 2 to take Bougie from the Spaniards, but were beaten off, and Arouj lost an arm, shattered by an arquebus shot. In 1 5 14 they took Jijelli from the Genoese, and after a second beating at Bougie in 1515 were called in by the natives of Cherchel and Algiers to aid them against the Spaniards. They occupied the towns and murdered the native ruler who called them in. The Spaniards still held the little rocky island which gives Algiers its name and forms the harbour. In 1518 Arouj was drawn away to take part in a civil war in Tlemcen. He promptly murdered the prince he came to support and seized the town for himself. The rival party then called in the Spaniards, by whom Arouj was expelled and slain while fleeing at the Rio Salado. Khair-ed-Din clung to his possessions on the coast and appealed to the sultan Selim I. He was named beylerbey by the sultan, and with him began the establishment of Turkish rule in northern Africa. For years he was engaged in subduing the native princes, and in carrying on warfare with the Christians. In 1519 he repelled a Spanish attack on Algiers, but could not expel his enemies from the island till 1529. As a combatant in the forefront of the war with the Christians he became a great hero in Islam> arid dreaded by its enemies underbids name of Barbarossa. In 1 534 he seized Tunis, acting as capitan pasha for the sultan Suleiman. The emperor Charles, V. intervened on behalf of the native prince, retook the town, and destroyed great part of Barbarossa's fleet. The corsair retaliated by leading what remained of his navy on a plundering raid to the Balearic Islands. During the remainder of his life — till 1547 — Barbarossa, though still beylerbey of northern Africa, was mainly engaged as capitan pasha in co-operating with the armies of the sultan Suleiman in the east. He was absent from Algiers when it was attacked by Charles V. in 1 541 . In 1 543-1 544 he commanded the fleet which Suleiman sent to the coast of Provence to support Francis I. Barbarossa would not allow the bells of the Christian churches to be rung while his fleet was at anchor in the ports. He plundered the coast of Italy on his way back to Constantinople. When he died in his palace at Constantinople he was succeeded as beylerbey of Africa by his son Hassan. Hassan Barbarossa, like his father, spent most of his life in the Levant, but was occasionally in Africa when the influence of his family was required to suppress the disorders of the Turkish garrisons. He left it for the last time in 1 567, and is said by Hammer-Purgstall to have been present at Lepanto in 1

57 1. His last years are obscure.

Authorities. — The History of the Ottoman Empire, by Joseph von Hammer-Purgstall (French translation J. J. Hellert, 1835-1843), contains accounts of the Barbarossas, but requires to be corrected by other authorities. See La Fondation de la rSgence d' Alger, histoire des Barberousse, chronique arabe du XVI* me siecle published by Sander Rang and Ferdinand Denis, Paris, 1837 — for a curious Moslem version of their story. H. D. de Grammont has collected later evidence in his Histoire d' Alger (Paris, 1887); and he discusses the origin of the name in a paper contributed to the RSvue Africaine, No. 171. Their campaigns are told in a readable way with the advantage of technical knowledge by Ad. Jurien de la Graviˆre in Les Corsaires barbaresques el la marine de Soliman le Grand (1887), and Doria et Barberousse (1886). The History of the Maritime Wars of the Turks, by Hajji Khalifa (translated by J. Mitchell for the Oriental Translation Fund, 1831), is said to have been founded on evidence collected by order of the sultan Suleiman.

BARBAROUX, CHARLES JEAN MARIE (1767-1794), French revolutionist, was educated at first by the Oratorians of Marseilles, then studied law, and became a successful advocate. He was appointed secretary (greffier) to the commune of Marseilles, and in 1792 was commissioned to go to the Legislative Assembly and demand the accusation of the directory of the department of Bouches-du-Rhone, as accomplice in a royalist movement in Aries. At Paris he was received in the Jacobin club and entered into relations with J. P. Brissot and the Rolands. It was at his instigation that Marseilles sent to Paris the battalion of volunteers which contributed to the insurrection of the 10th of August 1792 against the king. Returning to Marseilles he helped to repress a royalist movement at Avignon and an ultra- Jacobin movement

at Marseilles, and was elected deputy to the Convention by 775 votes out of 776 voting. From the first he posed as an opponent of the Mountain, accused Robespierre of aiming at the dictator- ship (25th of September 1792), attacked Marat, and proposed to break up the commune of Paris. Then he got the act of accusa- tion against Louis XVI. adopted, and in the trial voted for his death ”

without appeal and without delay." During the final struggle between the Girondists and the Mountain, he refused to resign as deputy and rejected the offer made by the sections of Paris to give hostages for the arrested representatives. He succeeded in escaping, first to Caen, where he organized the civil war, then to Saint-Emilion near Bordeaux, where he wrote his Mimoires, which were published in 1822 by his son, and re-edited in 1866. Discovered, he attempted to shoot himself, but was only wounded, and was taken to Bordeaux, where he was guillotined when his identity was established.

See Ch. Vatel, Charlotte Corday el les Girondins (Paris, 1873); A. Aulard, Les Orateurs de la Legislative et de la Convention (Paris, 2nd ed., 1906).

BARBARY, the general designation of that part of northern Africa bounded E. by Egypt, W. by the Atlantic, S. by the Sahara and N. by the Mediterranean, comprising the states of Morocco, Algeria, Tunisia and Tripoli. The name is derived from the Berbers, the chief inhabitants of the region.

BARBARY APE, a tailless monkey inhabiting Algeria, Morocco, and the rock of Gibraltar (where it may have been introduced), and referable to the otherwise Asiatic group of macaques, in which it alone represents the subgenus Inuus. This monkey, Macacus inuus, is light yellowish-brown above and yellowish-white below, with the naked part of the face flesh-coloured. It is entirely terrestrial in habits, at least on Gibraltar, and goes about in droves.

BARBARY PIRATES. The coast population of northern Africa has in past ages been addicted to piratical attacks on the shores of Europe opposite. Throughout the decline of the Roman empire, the barbarian invasions, the Mahommedan conquest and the middle ages, mere piracy always existed by the side of the great strife of peoples and religions. In the course of the 14th century, when the native Berber dynasties were in decadence, piracy became particularly flagrant. The town of Bougie was then the most notorious haunt of these " skimmers of the sea." But the savage robber powers which, to the dis- grace of Europe, infested the commerce and the coasts, not only of the Mediterranean but even for a time of the ocean; who were not finally suppressed till the 19th century was well advanced; and who are properly known as the Barbary pirates, arose in the 16th century, attained their greatest height in the 17th, declined gradually throughout

the 18th and were extinguished about 1830. Isolated cases of piracy have occurred on the Rif coast of Morocco even in our time, but the pirate communities which lived by plunder and could live by no other resource, vanished with the French conquest of Algiers in 1830. They are intimately connected with the general history of northern Africa from about 1492 to their end. The story of the establishment of Turkish rule in northern Africa and of the revolutions of Morocco must be sought under the heads of Turkey, Tripoli, Tunisia, Algeria and Morocco.

In dealing with the pirates, it will be sufficient to note a few leading dates. The conquest of Granada in 1492 by the Catholic sovereigns of Spain drove man/ Moors into exile. They revenged themselves by piratical attacks on the Spanish coast. They had the help of Moslem adventurers from the Levant, of whom the most successful were Arouj and his brother Khair-ed-Din, natives of Mitylene, both of whom were known to the Christians by the nickname of Barbarossa (q.v.) or " Redbeard." Spain in self-defence began to conquer the coast towns of Oran, Algiers and Tunis. Arouj having fallen in battle with the Spaniards in 1 5 18, his brother Khair-ed-Din appealed to Selim, the sultan of Turkey, who sent him troops. He drove the Spaniards in 1529 from the rocky island in front of Algiers, where they had a fort, and was the founder of the Turkish power. From about 1518 till the death of Uluch Ali in 1 587, Algiers was the main seat

of government of the beylerbeys of northern Africa, who ruled over Tripoli, Tunisia and Algeria. From 1587 till 1659, they were ruled by Turkish pashas, sent from Constantinople to govern for three years; but in the latter year a military revolt in Algiers reduced the pashas to nonentities. From 1659 onwards, these African cities, though nominally forming parts of the Turkish empire, were in fact anarchical military republics which chose their own rulers and lived by plunder.

It may be pointed out that during the first period (1518-1587) the beylerbeys were admirals of the sultan, commanding great fleets and conducting serious operations of war for political ends. They were slave-hunters and their methods were ferocious, but their Christian enemies were neither more humane nor more chivalrous. After 1587, plunder became the sole object of their successors — plunder of the native tribes on land and of all who went upon the*sea. The maritime side of this long-lived brigandage was conducted by the captains, or reises, who formed a class or even a corporation. Cruisers were fitted out by

capitalists and commanded by the reises. Ten per cent of the value of the prizes was paid to the treasury of the pasha or his successors, who bore the titles of Agha or Dey or Bey. Bougie was the chief shipbuilding port and the timber was mainly drawn from the country behind it. Until the 17th century the pirates used galleys, but a Flemish renegade of the name of Simon Danser taught them the advantage of using sailing ships. In this century, indeed, the main strength of the pirates was supplied by renegades from all parts of Christendom. An English gentleman of the distinguished Buckinghamshire family of Verney was for a time among them at Algiers. This port was so much the most formidable that the name of Algerine came to be used as synonymous with Barbary pirate, but the same trade was carried on, though with less energy, from Tripoli and Tunis — as also from towns in the empire of Morocco, of which the most notorious was Salli. The introduction of sailing ships gave increased scope to the activity of the pirates. While the galleys, being unfit for the high seas, were confined to the Mediterranean and the coast, the sailing vessels ranged into the Atlantic as far as the Canaries or even to Iceland. In 1631 a Flemish renegade, known as Murad Reis, sacked Baltimore in Ireland, and carried away a number of captives who were seen in the slave-market of Algiers by the French historian Pierre Dan.

The first half of the 17th century may be described as the flowering time of the Barbary pirates. More than 20,000 captives were said to be imprisoned in Algiers alone. The rich were allowed to redeem themselves, but the poor were condemned to slavery. Their masters would not in many cases allow them to secure freedom by professing Mahommedanism. A long list might be given of people of good social position, not only Italians or Spaniards, but German or' English travellers in the south, who were captives for a time. The chief sufferers were the inhabitants of the coasts of Sicily, Naples and Spain. But all traders belonging to nations which did not pay blackmail in order to secure immunity were liable to be taken at sea. The payment of blackmail, disguised as presents or ransoms, did not always secure safety with these faithless barbarians. The most powerful states in Europe condescended to make payments to them and to tolerate their insults. Religious orders — the Redemptionists and Lazarites — were engaged in working for the redemption of captives and large legacies were left for that purpose in many countries. The continued existence of this African piracy was indeed a disgrace to Europe, for it was due to the jealousies of

the powers themselves. France encouraged them during her rivalry with Spain; and when she had no further need of them they were supported against her by Great Britain and Holland. In the 1 8th century British public men were not ashamed to say that Barbary piracy was a useful check on the competition of the weaker Mediterranean nations in the carrying trade. When Lord Exmouth sailed to coerce Algiers in 1816, he ex- pressed doubts in a private letter whether the suppression of piracy would be acceptable to the trading community. Every power was, indeed, desirous to secure immunity for itself and more or less ready to compel Tripoli, Tunis, Algiers, Salli and

the rest to respect its trade and its subjects. In 1655 the British admiral, Robert Blake, was sent to teach them a lesson, and he gave the Tunisians a severe beating. A long series of expeditions was undertaken by the British fleet during the reign of Charles II., sometimes single-handed, sometimes in combination with the Dutch. In 1682 and 1683 the French bombarded Algiers. On the second occasion the Algerines blew the French consul from a gun during the action. An extensive list of such punitive expeditions could be made out, down to the American operations of 1801-5 and 1815. But in no case was the attack pushed home, and it rarely happened that the aggrieved Christian state refused in the end to make a money payment in crder to secure peace. The frequent wars among them gave the pirates numerous opportunities of breaking their engagements, of which they never failed to take advantage.

After the general pacification of 181 5, the suppression of African piracy was universally felt to be a necessity. The insolence of a Tunisian squadron which sacked Palma in the island of Sardinia and carried off 158 of its inhabitants, roused widespread indignation. Other influences were at work to bring about their extinction. Great Britain had acquired Malta and the Ionian Islands and had now many Mediterranean subjects. She was also engaged in pressing the other European powers to join with her in the suppression of the slave trade which the Barbary states practised on a large scale and at the expense of Europe. The suppression of the trade was one of the objects of the congress of. Vienna. Great Britain was called on to act for Europe, and in- 1816 Lord Exmouth was sent to obtain treaties from Tunis and

Algiers. His first visit produced diplomatic documents and promises and he sailed for England. While he was negotiating, a number of British subjects had been brutally ill-treated at Bona, without his knowledge. The British govern- ment sent him back to secure reparation, and on the 27th of August, in combination with a Dutch squadron under Admiral Van de Capellen, he administered a smashing bombardment to Algiers. The lesson terrified the pirates both of that city and of Tunis into' giving up over 3000 prisoners and making fresh promises. But they were not reformed and were not capable of reformation. Algiers renewed its piracies and slave-taking, though on a smaller scale, and the measures to be taken with it were discussed at the conference or congress of Aix-la-Chapelle in 1818. In 1824 another British fleet under Admiral Sir Hairy Neal had again to bombard Algiers. The great pirate city was not in fact thoroughly tamed till its conquest by France in 1830.

Authorities. — The Histoire d' Alger of H. D. de Grammont (Paris, 1887) is based on original authorities. Sir R. L. Playfair's Scourge of Christendom (London, 1884) gives the history of the British con- sulate in Algiers. The main authorities for the early history of the Barbary states are : — Luis del Marmol Carvajal, Description de Africa (Granada, 1573) ; Diego de Haedo, Topographia e Historia General de Argel (Valladolid, 1612) ; and Pere Pierre Dan, Histoire de Barbarie et de ses corsaires (Paris, 1637). The readable treatises of Ad. Jurien de la Graviere, all published in Paris, Doria el Barberousse (1886), Les Corsaires barbaresgues (1887), Les Chevaliers de Malte (1887), and La Guerre de Chypre (1888), deal with the epoch of the beylerbeys and the regular wars. For American work see Gardner Weld Allen, Our Navy and the Barbary Corsairs (New York, 1905). (D. H.)

BARBAULD, ANNA LETITIA (1743-1825), English poet and miscellaneous writer, was born at Kibworth-Harcourt, in Leicestershire, on the 20th of June 1743. Her father, the Rev. John Aikin, a Presbyterian minister and schoolmaster, taught his daughter Latin and Greek. In 1758 Mr Aikin removed his family to Warrington, to act as theological tutor in a dissenting academy there. In 1773 Miss Aikin published a volume of Poems, which was very successful, and co-operated with her brother, Dr John Aikin, in a volume of Miscellaneous Pieces in Prose. In 1774 she married Rochemont Barbauld, a member of a French Protestant family settled in England. He had been educated in- the academy at Warrington, and was minister of a Presbyterian church at

Palgrave, in Suffolk, where, with his wife's help, he established a boarding school. Her admirable Hymns in Prose and Early Lessons were written for their pupils. In 1785 she left England for the continent with her husband, whose health was seriously impaired. On their return about

two years later, Mr Barbauld was appointed to a church at Hampstead. In 1802 they removed to Stoke Newington. Mrs Barbauld became well known in London literary circles. She collaborated with Dr Aikin in his Evenings at Home; in 1795 she published an edition of Akenside's Pleasures of Imagination, with a critical essay; two years later she edited Collins's Odes; in 1804 she published a selection of papers from the English Essayists, and a selection from Samuel Richardson's corre- spondence, with a biographical notice; in 18 10 a collection of the British Novelists (50 vols.) with biographical and critical notices; and in 18 11 her longest poem, Eighteen Hundred and Eleven, giving a gloomy view of the existing state and future prospects of Britain. This poem anticipated Macaulay in contemplating the prospect of a visitor from the antipodes regarding at a future day the ruins of St Paul's from a broken arch of Blackfriars Bridge. Mrs Barbauld died on the 9th of March 1825.; her husband had died in 1808. A collected edition of her works, with memoir, was published by her niece, Lucy Aikin, in 2 vols., 1825.

See A. L. le Breton, Memoir of Mrs Barbauld (1874) ; G. A. Ellis, Life and Letters of Mrs A. L. Barbauld (1874) ; an d Lady Thackeray Ritchie, A Book of Sibyls (1883).

BARBECUE (Span, barbacoa), originally a framework on posts placed over a fire on which to dry or smoke meat; hence, a gridiron for roasting whole animals, and in Cuba an upper floor on which fruit or grain is stored. In the United States the word means an open-air feast, either political or social, where whole anijnals are roasted and eaten and hogsheads of beer and other vast quantities of food and drink consumed.

BARBED WIRE, a protective variety of fencing, consisting usually of several strands of wire twisted together with sharp spikes or points clinched or fastened into the strands.

In the United States, barbed wire for fencing was originally suggested to meet conditions existing in the western states, by reason of the large cattle-raising industry in sections where timber was scarce. Prior to its introduction, a No. 9 round or oval

iron wire was popular on the frontier of the United States and' in South America, as a fencing material. Large amounts were used annually for this purpose, but iron lacked strength, and single wire strand was not fully satisfactory on account of stretching in warm and contracting in cold weather, and of thus being broken. Cattle would rub against a smooth fence, and this constant pressure loosened the posts and broke the wire. To overcome this defect, ingenious people — the most successful being farmers — set themselves to find a way by which wire could be used and at the same time be free from destruction by the animals it was intended to confine. This investigation resulted in the invention of barbed wire. Soon after, automatic machinery was invented for rapidly and cheaply placing the barb upon the smooth wire, so that the cost of barbed wire is much less than the cost of smooth wire when it was in general use. So immediately did barbed wire find favour with the farmers of the United States, and, in fact, all over the world, that the manufacture of wire was revolutionized.

The history of barbed wire fencing is of recent date. In the United States — the real home of this industry — patents were taken out by Lucien B. Smith, Kent, Ohio, in 1867; by William B. Hunt, of Scott, N.Y., at almost the same time; and by Michael Kelly, of New York, a year later. The practical begin- ning of the industry, however, "was in the patents issued to Joseph F. Glidden, De Kalb, 111., 1874, on barbed fence wire, and during the same year, to Joseph F. Glidden and Phineas W. Vaughan, for a machine to manufacture the same. These inventions were the foundation of the system of patents undei which barbed wire has been protected and sold. The develop- ment of the barbed wire industry would hardly have been possible without steel. Iron wire, used for fencing prior to the introduc- tion of steel, was not suitable, seeing that iron does not possess sufficient tensile strength and lacks homogeneity, qualities which Bessemer and open-hearth steels possess in a high degree.

The advantages of galvanized barbed wire fencing are that it is almost imperishable, is no burden on the posts; does not

oppose the wind with enough surface to rack the posts, thus allowing water to settle around them and rot them; is

economical, not only in the comparative cheapness of its first cost but also in the amount of land covered by it; and is effective as a barrier against all kinds of stock and a protection against dogs and wild beasts. Cattle, once discovering what it is, will not press against it, nor even go near it, and thus it becomes an effective means of dividing the farmer's ranch into such fields as he may desire. It is quickly and cheaply constructed, and has the advantage of freedom from harbouring weeds. It affords no impediment to the view. A man can see across his farm, and ascertain what is going on in every portion within the scope of vision, as plainly as if there were no fences. It does not contribute to the formation of snow drifts as do other kinds of efficient fence. This makes it a favourite form of fencing for railroads and along highways. Finally, barbed wire composed of two wires twisted together, once firmly put in place, will retain its taut condition through many seasons without repair. The fact of the wire being twisted allows it to adapt itself to all the varying temperatures.

The introduction of barbed wire met with some opposition in America on supposed humanitarian grounds, but ample and extended tests, both of the economy and the humanity of the new material, silenced this objection. Now no American farmer, especially in the west, ever thinks of putting any other kind of fencing on his farm, unless it may be the new types of meshed wire field fencing which have been coming so generally into use since 1899. Generally speaking, the use of barbed wire fencing in other countries has not been as extensive as in the western United States. While it has been used on a comparatively large scale in Argentina and Australia, both these countries use a much larger quantity of plain wire fence, and in Argentina there is an important consumption of high-carbon oval fence wire of great strength, which apparently forms the only kind of fence that meets the conditions in a satisfactory manner.

It is interesting to note the largely increased demand for meshed wire field fencing in the more thickly settled- portions of the United States, and along the lines of railway. Beginning with 1899, there has been an annual increase in this demand, owing to the scarcity and high cost of labour, and the discontinuing of the building of rail fences. Meshed wire is considered by many a better enclosure for small animals, like sheep and hogs, than the barbed wire fence. Barbed wire has been popular with railroads, but of late meshed wire fencing has been substituted with advantage, the fabric being made of wires of larger diameter than

formerly, to insure greater stability. The popularity of barbed wire is best shown by the following statistics : —

Approximate Production for the United States

Year.	Tons barbed wire.	Tons meshed field fencing.
1874	5	
1875	300	
1876	1,500	
1877	7,000	
1878	13,000	
1879	25,000	
1880	40,000	
1890	125,000	
1900	200,000	50,000

1907

250,000

425,000

Barbed wire is usually shipped to customers on wooden spools, each holding approximately 100 lb or 80 to 100 rods. A hole is provided through the centre of the spool for inserting a bar, on which the reel can revolve for unwinding the wire as it is put up. After the wire is stretched in place, it is attached to the wooden posts by means of galvanized steel wire staples, ordinarily made from No. 9 wire. They are cut with a sharp, long, diagonal point and can be easily driven into the posts. On account of the rapid decay and destruction of wooden posts, steel posts have become popular, as also have reinforced concrete posts, which add materially to the durability of the fence. It is essential that barbed wire should be stretched with great care. For this purpose a suitable barbed wire stretcher is necessary.

Barbed wire fencing is now manufactured in various patterns. The general process may be outlined briefly as follows: — The wire is made of soft Bessemer or Siemens-Martin steel, and is drawn in the wire mill in the usual way. Galvanizing is done by a con- tinuous process. The coil of wire to be galvanized is placed on a reel. The first end of the wire is led longitudinally through an annealing medium — either red-hot lead or heated fire-brick tubes— -of sufficient

length to soften the wire. From the annealing furnace, the wire is fed longitudinally through a bath of muriatic acid, which removes the scale, and from the acid, after a thorough washing in water, the wire passes through a bath of spelter, heated slightly above the melting point. After coming from the spelter and being cooled by water, the wire is wound on suitable take-up blocks into finished coils. From 30 to 60 wires are passing simultaneously in parallel lines through this continuous galvanizing apparatus, thus insuring a large output. The galvanizing gives the wire a bright finish and serves to protect it from the corrosive action of the atmosphere. There is a considerable demand for painted fencing, in the manu- facture of which the galvanizing is dispensed with, and the spools of finished barbed wire, as they come from the barbing machine,

are submerged in paint and dried. The barbing and twisting to- gether of the two longitudinal strand wires is done by automatic machinery. A brief description of the manufacture of 2 and 4 point Glidden wire is as follows: — Two coils of wire on reels are placed behind the machine, designed to form the main or strand wires of the fence. One of the main wires passes through the machine longitudinally. One or two coils of wire are placed on reels at either side of the machine for making 2 or 4 point wire respectively. These wires are fed into the machine at right angles to the strand wire. At each movement of the feeding mechanism, when fabri- cating 2 point wire, one cross wire is fed forward. A diagonal cut forms a sharp point on the first end. The wire is again fed forward and instantly wrapped firmly around one strand wire and cut off so as to leave a sharp point on the incoming wire as before, while the bit of pointed wire cut off remains as a double-pointed steel barb attached firmly to the strand wire. This wire armed with barbs at regular intervals passes on through a guide, where it is met by a second strand wire — a plain wire without barbs. The duplex strand wires are attached to a take-up reel, which is caused to revolve and take up the finished barbed wire simultaneously and in unison with the barbing machine. In this way the strand wires are loosely twisted into a 2-ply strand, armed with barbs projecting at right angles in every direction.

When once started, the operation of barbed wire making is con- tinuous and rapid. The advantage of two strands is the automatic adjustment to changes of temperature. When heat expands the strands, the twist simply loosens without causing a sag, and when cold contracts them, the twist tightens, all without materially altering the relative lengths of the combined wires. A barbed wire machine produces from 2000 to 3000 lb of wire per day of ten hours.

In some American states, the use of barbed wire is regulated by law, but as a rule these laws apply to placing barbed wire on high- ways. Others prohibit the use of barbed wire fencing to indicate the property line between different owners, unless both agree to its use. In some states the use of barbed wire is prohibited unless it has a top rail of lumber.

Barbed wire is also employed in connexion with ” obstacles ” in field fortifications, especially in what are known as ” high wire en- tanglements.” Pointed stakes or ” pickets,” 4 ft. high, are planted in rows and secured by ordinary wire to holdfasts or pegs

in the ground. Each picket is connected to all around it, top and bottom, by lengths of barbed wire.

In England, where the use of barbed wire has also become common, the Barbed Wire Act 1893 enacted that, where there is on any land adjoining a highway within the county or district of a local authority, a fence which is made with barbed wire (i.e. any wire with spikes or jagged projections), or in which barbed wire has been placed, and where such barbed wire may probably be injurious to persons or animals lawfully using the highway, the local authority may require the occupier of the land to abate the nuisance by serving notice in writing upon him. If the occupier fails to do so within the specified time, the local authority may apply to a court of summary juris- diction, and such court, if satisfied that the barbed wire is a nuisance, may by summary order direct the occupier to abate it, and on his failure to comply with the order within a reasonable time, the local authority may execute it and recover in a summary manner from the occupier the expenses incurred.

BARBEL (Barbus vulgaris), a fish of the Cyprinid family, which is an inhabitant of the rivers of central Europe, and is very locally distributed in England. It has four barbels (Lat. barba, beard; fleshy appendages hanging from the mouth), and the first ray of the short dorsal fin is strong, spine-like and serrated behind. It attains a weight of 50 lb on the continent of Europe. The genus of which it is the type is a very large one, comprising about 300 species from Europe, Asia and Africa, among which is the mahseer or mahaseer, the great sporting fish of India.

BARBfi-MARBOIS, FRANCOIS, Marquis de (1745-1837), French politician, was born at Metz. He began his public career as intendant of San Domingo under the old regime. At the close of 1789 he returned to France, and then placed his services at the disposal of the revolutionary government. In 1791 he was sent to Regensburg to help de Noailles, the French ambassador, in the negotiations with the diet of the Empire concerning the

possessions of German princes fn Alsaee and Lorraine. Suspected of treason, he was arrested on his return but set at liberty again. In 1795 he was elected to the Council of the Ancients, where the

general moderation of his attitude, especially in his opposition to the exclusion of nobles and the relations of emigre's from public life, brought him under suspicion of being a royalist, "though he pronounced a eulogy on Bonaparte for his success in Italy. At the coup d'itat of the 18th Fructidor (September 4) 1797, he was arrested and transported to French Guiana. Transferred to Oleron in 1799, he owed his liberty to Napoleon, after the 18th Brumaire. In 1801 he became councillor of state and director of the public treasury, and in 1802 a senator. In 1803 he negotiated the treaty by which Louisiana was ceded to the United States, and was rewarded by the First Consul with a gift of 152,000 francs. In 1805 he was made grand officer of the legion of honour and a count, and in 1808 he became president of the cour des comptes. In return for these favours, he addressed Napoleon with servile compliments; yet in 18 14 he helped to draw up the act of abdication of the emperor, and declared to the cour des comptes, with reference to the invasion of France by the allies, " united for the most beautiful of causes, it is long since we have been so free as we now are in the presence of the foreigner in arms." In June 1814, Louis XVIII. najmed him peer of France and confirmed him in his office as president of the cour des comptes. Deprived of his positions by Napoleon during the Hundred Days he was appointed minister of justice in the ministry of the due de Richelieu (August 1815). In this office he tried unsuccessfully to gain the confidence of the ultra-royalists, and withdrew at the end of nine months (May 10, 1816).

In 1830, when Louis Philippe assumed the reins of government, Barbe-Marbois went, as president of the cour des comptes, to compliment him and was confirmed in his position. It was the sixth government he had served and all with servility. He held his office until April 1834, and died on the 12th of February 1837. He published various works, of which may be mentioned : Re" flexions sur la colonie de Saint-Domingue (1794), De la Guyane, 6Vc. (1822), an Histoire de la Louisiane el la cession de cette colonie par la France aux &ats-Unis, b"c. (1828), and the story of his transportation after the 18th Fructidor in Journal d'un dSportS nonjugi, 2 vols. (1834).

BARBER (from Lat. barba, beard) , one whose occupation it is to shave or trim beards, a hairdresser. In former times the barber's craft was dignified with the title of a profession, being conjoined with the art of surgery. In France the barber-surgeons were separated from the perruquiers, and incorporated as a distinct body in the reign of Louis XIV. In England barbers first received

incorporation from Edward IV. in 1461. By 32 Henry VIII. c. 42, they were united with the company of surgeons, it being enacted that the barbers should confine them- selves to the minor operations of blood-letting and drawing teeth, while the surgeons were prohibited from " barbery or shaving." In 1745 barbers and surgeons were separated into distinct corporations by 18 George II. c. 15. The barber's shop was a favourite resort of idle persons; and in addition to its attraction as a focus of news, a lute, viol, or some such musical instrument, was always kept for the entertainment of waiting customers. The barber's sign consisted of a striped pole, from which was suspended a basin, symbols the use of which is still preserved. The fillet round the pole indicated the ribbon for bandaging the arm in bleeding, and the basin the vessel to receive the blood.

See also Beard, and Annals of the Barber Surgeons of London

(1890).

BARBERINI, the name of a powerful Italian family, originally of Tuscan extraction, who settled in Florence during the early part of the nth century. They acquired great wealth and influence, and in 1623 Maffeo Barberini was raised to the papal throne as Urban VIII. He made his brother, Antonio, a dis- tinguished soldier, and two nephews, cardinals, and gave to a third nephew, Taddeo, the principality of Palestrina. Great jealousy of their increasing power was excited amongst the neighbouring princes, and Qdoardo Farnese, duke of Parma,

made war upon Taddeo, and defeated the papal troops. After the death of Urban in 1644 his successor, Innocent X., showed hostility to the Barberini family. Taddeo fled to Paris, where he died in 1647, and with him the family became extinct in the male line. His daughter Cornelia married Prince Giulio Cesare Colonna di Sciarra in 1728, who added her name to his own. On the death of Prince Enrico Barberini-Colonna the name went to his daughter and heiress Donna Maria and her husband Marquis Luigi Sacchetti, who received the title of prince of Palestrina and permission to bear the name of Barberini. The fine Barberini palace and library in Rome give evidence of their wealth and magnificence. The ruthless way in which they plundered ancient buildings to adorn their own palaces is the origin of the saying, " Quod non fecerunt barbari, fecerunt Barberini."

See A. von Reumont, Geschichte der Stadt Rom (Berlin, 1868), iii.

b. 611-612, 615, 617, &c. ; Almanack de Gotha (Gotha, 1902); J. H. Douglas, The Principal Noble Families of Rome (Rome, 1905).

BARBERRY {Berberis vulgaris), a shrub with spiny- toothed leaves, which on the woody shoots are reduced to forked spines, and pale yellow flowers in hanging racemes, which are succeeded by orange-red berries. It is a member of the botanical natural order Berberidaceae, and contains about 100 species in the north temperate zone and in the Andes of South America extending into Patagonia. The order is nearly allied to the buttercup order in having the parts of the flowers all free and arranged in regular succession below the ovary which consists of only one carpel. It is distinguished by having the sepals, petals and stamens in multiples of 2, 3 or 4, never of 5. The berries of Berberis are edible; those of the native barberry are sometimes made into preserves. The alkaloid berberine (q.v.) occurs in the roots.

BARBERTON, a town of the Transvaal, 283 m. by rail (175 m. in a direct line) E. of Pretoria and 136 m. W.N.W. of Delagoa Bay. Pop. (1904) 2433, of whom 1 2 14 were whites. Barberton lies 2825 ft. above the sea and is built on the side of a valley named De Kaap, from a bold headland of the Drakensberg which towers above it. The chief town of a district of the same name, it owes its existence to the discovery of gold in the Kaap valley, and dates from 1886. There are several fine public buildings grouped mainly round President Square. The town is connected with the Lourenco Marques-Pretoria trunk railway by a branch line, 35 m. long,- which runs N.E. through fine mountainous country and joins the main line at Kaapmuiden. During the war of 1899-1902 the Boers were driven out of Barberton (13th of September 1900) by General (afterwards Sir John) French.

BARBETTE (Fr. diminutive of barbe, a beard), a platform inside a fortification raised sufficiently high for artillery placed thereon to be able to fire en barbette, viz. over the top of the parapet; also in warships a raised platform, protected by armour on the sides, upon which guns are mounted en barbette.

BARBEY D'AUREVILLY, JULES AMEDEE (1808-1889), French man of letters, was born at Saint-Sauveur-le-Vicomte (Manche) on the 2nd of November 1808. His most famous novels are Une Vieille Maltresse (1851), attacked at the time of its publication on the charge of immorality; L' Ensorcelee (1854), an episode of the royalist rising among the Norman peasants against the first

republic; the Chevalier Destouches (1864); and a collection of extraordinary stories entitled Les Diaboliques (1874). Barbey d'Aurevilly is an extreme example of* the eccentricities of which the Romanticists were capable, and to read him is to understand the discredit that fell upon the manner. He held extreme Catholic views and wrote on the most risqui subjects; he gave himself aristocratic airs and hinted at a mysterious past, though his parentage was entirely bourgeois and his youth very hum-drum and innocent. In the 'fifties d'Aurevilly became literary critic of the Pays, and a number of his essays, contributed to this and other journals, were collected as Les CEuvres et les hommes du XIX" sie.cle (1861-1865). Other literary studies are Les Romanciers (1866) and Goethe et Diderot (1880). He died in Paris on the 23rd of April 1889. Paul Bourget describes him as a dreamer with an exquisite sense of vision, who sought and found in his work a refuge from the

uncongenial world of every day. Jules Lemaitre, a less sympathetic critic, finds in the extraordinary crimes of his heroes and heroines, his reactionary views, his dandyism and snobbery, an exaggerated Byronism.

See also Alcide Dusolier, Jules Barbey d'Aurevilly (1862), a collec- tion of eulogies and interviews; Paul Bourget, Preface to d'Aure- villy's Memoranda (1883); Jules Lemaitre, Les Contemporains • Eugene Grele, Barbey d'Aurevilly, sa vie et son asuvre (1902) ; Rene Doumic, in the Revue des deux mondes (Sept. 1902).

BARBEYRAC, JEAN (1674-1744), French jurist, the nephew of Charles Barbeyrac, a distinguished physician of Montpellier, was born at Beziers in Lower Languedoc on the 15th of March 1674. He removed with his family into Switzerland after the revocation of the edict of Nantes, and there studied jurisprudence. After spending some time at Geneva and Frankfort-on-Main, he became professor of belles-lettres in the French school of Berlin. Thence, in 171 1, he was called to the professorship of history and civil law at Lausanne, and finally settled as professor of public law at Groningen. He died on the 3rd of March 1744. His fame rests chiefly on the preface and notes to his translation of Pufendorf's treatise De Jure Naturae et Gentium. Jn funda- mental principles

he follows almost entirely Locke and Pufendorf ; but he works .out with great skill the theory of moral obligation, referring it to the command or will of God. He indicates the distinction, developed more fully by Thomasius and Kant, between the legal and the moral qualities of action. The principles of international law he reduces to those of the law of nature, and combats, in so doing, many of the positions taken up by Grotius. He rejects the notion that sovereignty in any way resembles property, and makes even marriage a matter of civil contract. Barbeyrac also translated Grotius's De Jure Belli et Pads, Cumberland's De Legibus Naturae, and Pufendorf's smaller treatise De Officio Hominis et Civis. Among his own productions are a treatise, De la morale des peres, a history of ancient treaties contained in the Supplement au grand corps diplomatique, and the curious Traite du jeu (1709), in which he defends the morality of games of chance.

BARBICAN (from Fr. barbacane, probably of Arabic or Persian origin), an outwork for the defence of a gate or draw- bridge; also a sort of pent-house or construction of timber to shelter warders or sentries from arrows or other missiles.

BARBIER, ANTOINE ALEXANDRE (1765-1825), French librarian and bibliographer, was born on the nth of January 1765 at Coulommiers (Seine-et-Marne). He took priest's orders, from which, however, he was finally released by the pope in 1801. In 1 794 he became a member of the temporary commission of the arts, and was charged with the duty of distributing among the various libraries of Paris the books that had been confiscated during the Revolution. In the execution of this task he dis- covered the letters of Huet, bishop of Avranches, and the MSS. of the works of Fenelon. He became librarian successively to the Directory, to the Conseil d'Etat, and in 1807 to Napoleon, from whom he carried out a number of commissions. He produced a standard work in his Dictionnaire des ouvrages anonymes et pseudonymes (4 vols., 1806-1809; 3rd edition 1872-1879). Only the first part of his Examen critique des dictionnaires historiques (1820) was published. He had a share in the founda- tion of the libraries of the Louvre, of Fontainebleau, of Compiegne and Saint-Cloud; under Louis XVIII. he became administrator of trie king's private libraries, but in 1822 he was deprived of all his offices. Barbier died in Paris on the 5th of December 1825.

See also a notice by his son, Louis Barbier, and a list of his works prefixed to the 3rd edition of the Diet, des ouvrages anonymes et

pseudonymes.

BARBIER, HENRI ADGUSTE (1805-1882), French dramatist and poet, was born in Paris on the 29th of April 1805. Inspired by the revolution of July he poured forth a series of eager, vigorous poems, denouncing, crudely enough, the evils of the time. They are spoken of collectively as the Iambes (183 1), though the designation is not strictly applicable to all. As the name suggests, they are modelled on the verse of Andre Chenier. They include La Curee, La Popularity, L'Idole, Paris, Dante, Quatre-vingt-treize and Varsovie. The rest of Barbier's poems

are forgotten, and when, in 1869, he received the long delayed honour of admission to the Academy, Montalembert expressed the general sentiment in his Barbier? mais il est mortl It was even asserted, though without foundation, that he was not the real author of the Iambes. He died at Nice on the 13th of February 1882. He collaborated with L6on de Wailly in the libretto of Berlioz's opera, Benvenuto Cellini, and his works include two series of poems on the political and social troubles of Italy and England, printed in later editions of Iambes et poemes. See also Sainte-Beuve, Portraits contemporains, vol. ii.

BARBIER, LOUIS, known as the Abbe de la Riviere (1593- 1670), French bishop, was born of humble parents in Vaudelain- court, near Compiegne. He entered the church and made his way by his wit and cleverness, until he was appointed tutor, and then became the friend and adviser, of Gaston d'Orleans, brother of Louis XIII. He thus gained an entrance to the court, became grand almoner of the queen, and received the revenue of rich abbeys. In March 1655 he was named bishop of Langres, but he spent his time at court, where his wit was always in demand, and where he gained great sums by gambling. He died very rich.

BARBIERI, GIOVANNI FRANCESCO (otherwise called Guercino, from his squinting), (1 591-1666), Italian historical painter, was born at Cento, a village not far from Bologna. His artistic powers were developed very rapidly, and at the age of seventeen he was associated with Benedetto' Gennari (1550-1610), a well-known painter of the Bolognese school. The fame of the young painter spread beyond his native village, and in 161 5 he removed to Bologna, where his paintings were much admired. His first style was formed after that of the Caracci; but the strong colouring and shadows employed by Caravaggio made a deep impression on his mind, and for a considerable period his productions showed

evident traces of that painter's influence. Some of his latest pieces approach rather to the manner of his great contemporary Guido, and are painted with more lightness and clearness. Guercino was esteemed very highly in his lifetime, not only by the nobles and princes of Italy, but by his brother artists, who placed him in the first rank of painters. He was remarkable for the extreme rapidity of his execution; he completed no fewer than 106 large altar-pieces for churches, and his other paintings amount to about 1 44. His most famous piece is thought to be .the St Petronilla, which was painted at Rome for Gregory XV. and is now in the Capitol. In 1626 he began his frescoes in the Duomo at Piacenza. Guercino continued to paint and teach up to the time of his death in 1666. He had amassed a handsome fortune by his labours. His life, by J. A. Calvi, appeared at Bologna in 1808.

His brother, Paolo Antonio Barbieri (1603-1649), was a celebrated painter of still life and animals. He chose for his subjects fruits, flowers, insects and animals, which he painted after nature with a lively tint of colour, great tenderness of pencil, and a strong character of truth and life.

BARBITON, or Barbitos (Gr. /3dp/3ww or /3dpj3tros; Lat. barbitus; Pers. barbai, barbud), an ancient stringed instrument known to us from the Greek and Roman classics, but derived from Persia. Theocritus (xvi. 45), the Sicilian poet, calls it an instrument of many strings, i.e. more than seven, which was by the Hellenes accounted the perfect number, as in the cithara of the best period. Anacreon 1 (a native of Teos in Asia Minor) sings that his barbitos only gives out erotic tones. Pollux (Onomasticon iv. chap. 8, § 59) calls the instrument barbiton or barymite (from fiapvs, heavy and /tiros, a string), an instru- ment producing deep sounds; the strings were twice as long as those of the pectis and sounded an octave lower. Pindar (in Athen. xiv. p. 635), in the same line wherein he attributes the introduction of the instrument into Greece to Terpander, tells us one could magadize, i.e. play in two parts at an interval of an octave on the two instruments. The word barbiton was frequently used for the lyre itself. Although in use in Asia Minor, Italy,

1 See Bergk's Poetae Lyrici Graeci (4th ed., 1882), p. 291, fr. 143 [113]; and p. 311, 23 [1], 3; and 14 [9], 34, p. 306.

Sicily, and Greece, it is evident that the baibiton never won for itself a place in the affections of the Greeks of Hellas; it was regarded as a barbarian instrument affected by those only whose tastes in matters of art were unorthodox. It had fallen into disuse in the days of Aristotle, 1 but reappeared under the Romans.

In spite of the few meagre shreds of authentic information extant concerning this somewhat elusive instrument, it is possible nevertheless to identify the barbiton as it was known among the Greeks and Romans. From the Greek writers we know that it was an instrument having some feature or features in common with the lyre, which warranted classification v/ith it. From the Persians and Arabs we learn that it was a kind of rehab or lute, or a chelys-lyre, 2 first introduced into Europe through Asia Minor by way of Greece, and centuries later into Spain by the Moors, amongst whom it was in the 14th century known as al-barbet? There is a stringed instrument, as yet unidentified by name, of which there are at least four different representations in sculpture, 4 which combines the characteristics of both lyre and rebab, having the vaulted back and gradual narrowing to

form a neck which are typical of the rebab and the stringing of the lyre. In outline it resembles a large lute with a wide neck, and the seven strings of the lyre of the best period, or sometimes nine, fol- lowing the decadent lyre. Most authors in reproducing these sculp- tures showing the barbiton represent the instrument as boat-shaped and without a neck, as, for instance, Carl Engel. This is due to the fact that the part of the instrument where neck joins body is in deep shadow, so that the correct out- ine can hardly be distinguished, being almost hidden by hand on one side and drapery on the other.

The barbiton, as pictured here, had probably undergone con- siderable modification at the hands of the Greeks and had diverged from the archetype. The barbiton, however, although it underwent many changes, retained until the end the charac- teristics of the instruments of the Greek lyre whose strings were plucked, whereas the rebab was sounded by means of the bow at the time of its introduction into Europe. At some period not yet determined, which we can but conjecture, the barbat approximated to the form of the large lute (q.v.). An instrument called barbiton was known in the early part of the 1 6th 6 and during the 17 th century. It was a kind of

1 Polit. viii. (v.), 6, ed. Susemihl-Hicks (1894), pp. 6o4(= l34la 40) and 632 ; Daremberg and Saglio, Diet, d'ant. gr. et rom., article " Lyre," p. 1450, for a few more references to the classics.

2 Johnson's Persian-Arabic-English dictionary : barbat, a harp or lute, barbatzan, player upon lute, pi. barabit; G. W. Freytag, Lexicon Arabico-Latinum, i. p. 102: barbat (Persian and Arabic), barbitus, genus testudinis, plerumque sex septemve chordis instructum (rotundam habet formam in Africa); Lexicon Aegidii Forcellini (Prato, 1858); " Barbito aurataque chely ac doctis fidibus per- sonare " (Martianus Capella i. 36); G. B. Doni, Lyra Barberina, ii. index.

3 Enumeration of Arab Musical Instruments, xiv. c.

4 (a) See C. Clarac, Musee du Louvre, vol. i. pi. 202, No. 261. (6) Accompanying illustration. See also Kathleen Schlesinger, Orchestral Instruments, part ii., " Precursors of the Violin Family," fig. 108 and p. 23, pp. 106-107, fig. 144 and appendix, (c) Sarcophagus in the cathedral of Girgenti in Sicily, illustrated by Carl Engel, Early History of the Violin Family, p. 112. A cast is preserved in the sepulchral basement at the British Museum. Domenico, Lo Faso Pietra-Santa, le antichita delta Sicilia (Palermo, 1834), vol. 3, pi. 45 (2), text p. 89. (d) G. Zoega, Antike Basreliefe von Rom (Giessen, 1812), atlas, pi. 98, sarcophagus representing a scene in the story of Hippolytus and Phaedra.

6 In Jacob Locher's Navis Stultifera (Basel, 1506), titulus 7, is an illustration of a small harp and lute with the legend nee cytharam tangit nee barbiton.

Barbiton, from a bas-relief in the Louvre, " Achilles at Scyros."

theorbo or bass-lute, but with one neck only, bent back at right angles to form the head. Robert Fludd 6 gives a detailed description of it with an illustration: — "Inter quas instru- menta non nulla barbito simillima effinxerunt cujus modi sunt ilia quae vulgo appellantur theorba, quae sonos graviores reddunt chordasque nervosas habent." The people called it theorbo, but the scholar having identified it with the instrument of classic Greece and Rome called it barbiton. The barbiton had nine pairs of gut strings, each pair being in unison. Dictionaries of the 1 8th century support Fludd's use of the name barbiton. G. B. Doni 7 mentions the barbiton, defining it in his index as Barbitos seu major chelys iialice liorba, and deriving it from lyre and cithara

in common with testudines, tiorbas and all tortoiseshell instruments. Claude Perrault, 8 writing in the 18th century, states that ” les modernes appellent notre luth barbiton ” (the moderns call our lute barbiton). Constantijn Huygens 9 declares that he learnt to play the barbiton in a few weeks, but took two years to learn the cittern.

The barbat was a variety of rebab (q.v.), a bass instrument, differing only in size and number of strings. This is quite in accordance with what we know of the nomenclature of musical instruments among Persians and Arabs, with whom a slight deviation in the construction of an instrument called for a new name. 10 The word barbud applied to the barbiton is said to be derived n from a famous musician living at the time of Chosroes II. (a.d. 590-628), who excelled in playing upon the instrument. From a later translation of part of the same authority into German 12 we obtain the following reference to Persian musical instruments: ” Die Sanger stehen bei seinem Gastmahl; in ihrer Hand Barbiton 1 ‘* und Leyer*”-‘ und Laute CiiiJ und Fl6te Uv –) und Deff (Handpauke).” Mr Ellis, of the Oriental Department of the British Museum, has kindly supplied the original Persian names translated above, i.e. (i.) barbut, (ii.) chang, (iii.) rubdb, (iv.) nei. The barbut and rubab thus were different instruments as late as the 19th century in Persia. There were but slight differences if any between the archetypes of the pear-shaped rebab and of the lute before the application of the bow to the former — both had vaulted backs, body and neck in one, and gut strings plucked by the fingers. (K. S.)

BARBIZON, a French village, near the forest of Fontainebleau, which gave its name to the ” Barbizon school ” of painters, whose leaders were Corot, Rousseau, Millet and Daubigny, together with Diaz, Dupre, Jacque, Francais, Harpignies and others. They put aside the conventional idea of ” subject ” in their pictures of landscape and peasant life, and went direct to the fields and woods for their inspiration. The distinctive note of the school is seen in the work of Rousseau and of Millet, each of whom, after spending his early years in Paris, made his home in Barbizon. Unappreciated, poor and neglected, it was not until after years of struggle that they attained recognition and success They both died at Barbizon — Rousseau in 1867 and Millet in 1875. It is difficult now to realize that their work, so unaffected and beautiful, should have been so hardly received. To under- stand this, it is necessary to remember the conflicts that existed between the classic and romantic schools in the first half of the

19th century, when the classicists, followers of the tradition of

6 Historia Utriusque Cosmi (Oppenheim, 1617), torn. i. tract ii. part ii. lib. iv. cap. i. p. 226.

7 Lyra Barberina, vol. ii. index, and also vol. i. p. 29.

8 ” La Musique des anciens,” CEuvres completes (ed. Amsterdam, 1727), torn. i. p. 306.

9 De Vita propria sermonum inter liberos libri duo (Haarlem, 1817). See also Edmund van der Straeten, La Musique aux Pays-Bas, vol. ii. p. 349.

10 See The Seven Seas, a dictionary and grammar of the Persian language, by Ghazi ud-din Haidar, king of Oudh, in seven parts (Lucknow, 1822) (only the title of the book is in English). A review of this book in German with copious quotations by von Hammer- Purgstall is published in Jahrbiicher der Uteratur (Vienna, 1826), Bd. 35 and 36; names of musical instruments, Bd. 36, p. 292 et seq. See also R. G. Kiesewetter, Die Musik der A raber, nach Originalquellen dargeslellt (Leipzig, 1843, p. 91, classification of instruments).

11 The Seven Seas, part i. p. 153 ; Jahrb. d. Literatur, Bd. 36, p. 294.

12 Fr. Ruckert, Grammatik, Poetik und Rhetorik der Perser, nach dem 7 ten Bde. des Hefts Kolzum (Gotha, 1874), p. 80.

David, wer< the predominant school. The romantic movement, with Gerica.ilt, Bonington and Delacroix, was gaining favour. In 1824 Constable's pictures were shown in the Salon, and confirmed tl.e younger men in their resolution to abandon the lifeless peda ltry of the schools and to seek inspiration from nature. In t/iose troubled times Rousseau and Millet unburdened their souls to their friends, and their published lives contain many letters, some extracts from which will express the ideals which these trtists held in common, and show clearly the true and firmly -baaed foundation on which their art stands. Rousseau wrote, " It is good composition when the objects represented are not there solely as they are, but when they contain under a

natural appearance the sentiments which they have stirred in our souls. . . . For God's sake, and in recompense for the life He has given us, let us try in our works to make the manifestation of life our first thought: let us make a man breathe, a tree really vegetate." And Millet — " I try not to have things look as if chance had brought them together, but as if they had a necessary bond between themselves. I want the people I represent to look as if they really belonged to their station, so that imagination cannot conceive of their ever being anything else. People and things should always be there with an object. I want to put strongly and completely all that is necessary, for I think things weakly said might as well not be said at all, for they are, as it were, deflowered and spoiled — but I profess the greatest horror for uselessness (however brilliant) and filling up. These things can only weaken a picture by distracting the attention toward secondary things." In another letter he says — " Art began to decline from the moment that the artist did not lean directly and naively upon impressions made by nature. Cleverness naturally and rapidly took the place of, nature, and decadence then began. ... At bottom it always comes to this: a man must be moved himself in order to move others, and all that is done from theory, however clever, can never attain this end, for it is impossible that it should have the breath of life." The ideas of the " Barbizon school " only gradually obtained acceptance, but the chief members of it now rank among the greater artists of their time.

See D. Croal Thomson, The Barbizon School (1891), with a full list of the French authorities to be consulted; Jules Breton, Nos psintres du siecle, Paris, 1000.

BARBON, NICHOLAS (c. 1640-1698), English economist, probably the son of Praise-god Barbon, was born in London, studied medicine at Leiden, graduated M.D. at Utrecht in 1661, and was admitted an honorary fellow of the College of Physicians in 1664. He took a considerable part in the rebuilding of London after the great fire of 1666, and has a claim to be considered the institutor of fire-insurance in England, which he started some- where about 1680. He was M.P. for Bramber in 1690 and 1695. He founded a land bank which, according to contemporaries, was fairly successful and was united with that of John Briscoe in 1696. He died in 1698. His writings are interesting as ex- pressing views much in advance of his time and very near akin to those of modern times on such important topics as value, rent and foreign trade. The more important were Apology for the Builder; or a Discourse showing the Cause and Effects of the Increase of

Building (1685); A Discourse of Trade (1690); and A Discourse Concerning Coining the New Money Lighter (1696).

BARBON (Barebone or Barebones), PRAISE-OOD (c. 1596- 1679), English leather-seller and Fifth Monarchy man, was admitted freeman of the Leathersellers Company on the 20th of January 1623 and liveryman on the 13th of October 1634. About the same time he became minister to a congregation which assembled at his own house, " The Lock and Key," in Fleet Street, where his preaching attracted large audiences. The exact nature of his religious opinions is not perfectly clear. He is styled by his enemies a Brownist and Anabaptist, i.e. probably Baptist, but he wrote two books in support of paedo- baptism, and his congregation had separated from a larger one of Baptists on that point of controversy. Later he belonged to the sect of Fifth Monarchy men. He was the object of the abuse and ridicule of the opposite party, and his meetings were fre-

quently disturbed by riots. On the 20th of December 1641 his house was stormed by a mob and he narrowly escaped with his life. Barbon, who was a man of substantial property, was summoned by Cromwell on the 6th of June 1653 as a member for London to the assembly of nominees called after him in derision Barebone's Parliament. His name is occasionally mentioned, but he appears to have taken no part in the debates. In 1660 he showed great activity in endeavouring to prevent the Restoration. He published Needham's book, News from Brussels in a Letter from a Near Attendant on His Majesty's Person . . .,' which retailed unfavourable anecdotes relating to Charles's morals, and on the 9th of February he presented the petition to the Parliament, which proposed that all officials should abjure the Stuarts, and all publicly proposing the Restoration should be deemed guilty of high treason. His conduct drew upon him several royalist attacks. On the 31st of March he was obliged to sign an engagement to the council not to disturb the peace, and on the 26th of November 1661 he was arrested, together with John Wildman and James Harrington, and was imprisoned in the Tower till the 27th of July 1662, when he was released on bail. Barbon, who was married, was buried on the 5th of January 1680. He was the author of A Discourse tending to prove . . . Baptism . . . to be the ordinance of Jesus Christ. As also that the Baptism of Infants is warentable (1642), the preface of which shows a spirit of wide religious tolerance; and A Reply to the Frivolous and Impertinent answer of R. B. and E. B. to the Discourse of P. B. (1643).

BARBOUR, JOHN (? 1316-1395), Scottish poet, was born, perhaps in Aberdeenshire, early in the 14th century, approxi- mately 1316. In a letter of safe-conduct dated 1357, allowing him to go to Oxford for study, he is described as archdeacon of Aberdeen. He is named in a similar letter in 1364 and in another in 1368 granting him permission to pass to France, probably for further study, at the university of Paris. In 1372 he was one of the auditors of exchequer, and in 1373 a clerk of audit in the king's household. In 1375 (he gives the date, and his age as 60) he composed his best known poem The Brus, for which he received, in 1377, the gift of ten pounds, and, in 1378, a life- pension of twenty shillings. Additional rewards followed, including the renewal of his exchequer auditorship (though he may have continued to enjoy it since his first appointment) and ten pounds to his pension. The only biographical evidence of his closing years is his signature as a witness to sundry deeds in the " Register of Aberdeen " as late as 1392. According to the obit-book of the cathedral of Aberdeen, he died on the 13th of March 1395. The state records show that his life-pension was not paid after that date.

Considerable controversy has arisen regarding Barbour's literary work. If he be the author of the five or six long poems which have been ascribed to him by different writers, he adds to his importance as the father of Scots poetry the reputation of being one of the most voluminous writers in Middle English, certainly the most voluminous of all Scots poets.

(1) The Brus, in twenty books, and running to over 13,500 four-accent lines, in couplets, is a narrative poem with a purpose partly historical, partly patriotic. It opens with a description of the state of Scotland at the death of Alexander III. (1 286) and concludes with the death of Douglas and the burial of the Bruce's heart (1332). The central episode is the battle of Bannockburn. Patriotic as the sentiment is, it is in more general terms than is found in later Scots literature. The king is a hero of the chivalric type common in contemporary romance; freedom is a " noble thing" to be sought and won at all costs; the opponents of such freedom are shown in the dark colours which history and poetic propriety require; but there is none of the complacency of the merely provincial habit of mind. The lines do not lack vigour; and there are passages of high merit, notably the oft- quoted section beginning "A! fredome is a noble thing." Despite a number of errors of fact, notably the confusion of the three Bruces in the person of the hero, the poem is historically

trustworthy as compared with contemporary verse-chronicle, and especially with the Wallace of the next century. No one

has doubted Barbour's authorship of the Brus, but argument has been attempted to show that the text as we have it is an edited copy, perhaps by John Ramsay, a Perth scribe, who wrote out the two extant texts, preserved in the Advocates' library, Edinburgh, and in the library of St John's College, Cambridge. Extensive portions of the poem have been incor- porated by Wyntoun (q.v.) in his Chronicle. The first printed edition extant is Charteris's (Edinburgh, 1571); the second is Hart's (Edinburgh, 1616).

• (2) Wyntoun speaks (Chronicle III. iii.) of a " Treteis " which Barbour made by way of " a genealogy " of " Brutus lynagis "; and elsewhere in that poem there are references to the arch- deacon's "Stewards Oryginale." This "Brut" is unknown; but the reference has been held by some to be to (3) a Troy-book, based on Guido da Colonna's Historic Destructionis Troiae. Two fragments of such a work have been preserved in texts of Lydgate's Troy-book, the first in MS. Camb. Univ. Lib. Kk. v. 30, the second in the same and in MS. Douce 148 in the Bodleian library, Oxford. This ascription was first made by Henry Bradshaw, the librarian of Cambridge University; but the con- sensus of critical opinion is now against it. Though it were proved that these Troy fragments are Barbour's, there remains the ques- tion whether their identification with the book on the Stewart line is justified. The scale of the story in these fragments forces us to doubt this identification. They contain 595 + 3118 = 3713 lines and are concerned entirely with " Trojan " matters. This would be an undue allowance in a Scottish " genealogy."

(4) Yet another work was added to the list of Barbour's works by the discovery in the university library of Cambridge, by Henry Bradshaw, of a long Scots poem of over 33,000 lines, dealing with Legends of the Saints, as told in the Legenda Aurea and other legendaries. The general likeness of this poem to Barbour's accepted work in verse-length, dialect and style, and the facts that the lives of English saints are excluded and those of St Machar (the patron saint of Aberdeen) and St Ninian are inserted, made the ascription plausible. Later criticism, though divided, has tended in the contrary direction, and has based its strongest

negative judgment on the consideration of rhymes, assonance and vocabulary (see bibliography). That the ” district ” of the author is the north-east of Scotland cannot be doubted in the face of a passage such as this, in the fortieth legend (St Ninian), 11, 1359 et seq.

” A lytil tale 3et herd I tel,

hat in to my tyme befel,

of a gudman, in murrefe [Moray] borne

in elgyne [Elgin] , and his kine beforne,

and callit was a faithful man

vith al fame fat hyme knew than ;

& jus mare trastely I say,

for I kend hyme weile mony day.

John balormy ves his name,

a man of ful gud fame.” But whether this north-east Scots author is Barbour is a question which we cannot answer by means of the data at present available.

(5) If Barbour be the author of the Legends, then (so does one conclusion hang upon another) he is the author of a Gospel story with the later life of the Virgin, described in the prologue to the Legends and in other passages as a book ” of the birth of Jhesu criste ” and one ” quhare-in I recordit the genology of our lady sanct Mary.”

(6) In recent years an attempt has been made to name Barbour as the author of the Buik of Alexander (a translation of the Roman a” Alexandre and associated pieces, including the Vceux duPaon), as known in the unique edition, c. 1580, printed at the Edinburgh press of Alexander Arbuthnot. The ” argument ” as it stands is nothing more than an exaggerated inference from parallel- passages in the Bruce and Alexander; and it makes no allowance for the tags, epithets and general vocabulary common to all writers of the period. Should the assumption be proved to be correct, and should it be found that the ” Troy fragments were written first of all, followed by Alexander and Bruce or Bruce and

Alexander, and that the Legends end the chapter," it will be by " evidence " other than that which has been produced to this date.

For Barbour's life see Exchequer Rolls of Scotland, ii. and iii.; Registrum Episcopatus Aberdonensis (Spalding Club) ; Rymer's Foedera.

Works. — (i)The Brus MSS. and early editions u.s. Modern editions: J. Pinkerton, 3 vols. (1790) (called by the editor " the first genuine edition," because printed from the Advocates' Library text, but carelessly); Jamieson (1820); Cosmo Innes (Spalding Club, 1856); W. W. Skeat (Early English Text Society, 1870- 1889; reprinted, after revision by the editor, by the Scottish Text Society, 1893-1895). On the question of the recension of Barbour's text, see J. T. T. Brown, The Wallace and The Bruce restudied (Bonn, 1900). (2 and 3) Troy Fragments. C. Horstmann has printed the text in his Legendensammlung (ut infra). See Bradshaw, Transactions of the Cambridge Antiquarian Society (1866); the prolegomena in Horstmann's edition; Skeat, Brus (S. T. S. edit. u.s. pp. xlvi. et seq.) ; Koppel, " Die Fragmente von Barbours Trojanerkrieg," in Englische Studien, x. 373 ; Panton and Donaldson, The Gest Historiale of the Destruction of Troye (E. E. T. S. pt. ii. Introd. pp. x. et seq.) ; G. Neilson (ut infra) ; and J. T. T. Brown (ut supra) passim. (4) Legends of the Saints. C. Horstmann, who upholds Barbour's authorship, has printed the text in his Barbours des schottischen Nationaldichters Legendensammlung nebst den Fragmenten seines Trojanerkrieges, 2 vols. (Heilbronn, 1881-1882), and that of the legend of St Machor in his Altenglische Legenden. Neue Folge (Heilbronn, 1881) pp. 189-208. A later edition by W. M. Metcalfe, who disputes Barbour's claim, appeared in 1896 (Legends of the Saints in the Scottish Dialect of the Fourteenth Century, 3 vols., Scottish Text Society). See the introductions to these editions; also Skeat and Koppel u.s., and P. Buss, Sind die von Horstmann herausgegebenen schottischen Legenden ein Werk Barberes? (Halle, 1886) (cf. Anglia, be. 3, 1886). (5) For the Gospel-story evidence see Metcalfe, u.s. I. xxix. (6) On the Alexander Book and its assumed relationships, see G. Neilson, John Barbour, Poet and Translator (1900) (a reprint from the Transactions of the Philological Society); J. T. T. Brown u.s., "Postscript," pp. 156-171; and Athenaeum, 17th of November, 1st and 8th December 1900, and the 9th of February 1901. (G. G. S.)

BARBUDA, an island in the British West Indies. It lies 25 m. N. of Antigua, of which it is a dependency, in 17 33′ N. and 6i c 43′ W.,

and it has an area of 62 sq. m. Pop. (1901) 775. It is flat and densely wooded. On the western side there is a large lagoon, separated from the sea by a spit of sand. The part of the island under cultivation is very fertile, and the air is remarkable for its purity. Cattle and horses are bred and wild deer are still found. Salt and phosphates of lime are exported. The island was annexed by Great Britain in 1628 and was bestowed in 1680 upon the Codrington family who, for more than 200 years, held it as a kind of feudal fief.

BARBY, a town of Germany, in the kingdom of Prussia, on the left bank of the Elbe, 82 m. S.W. of Berlin on the direct railway to Cassel. Pop. (1900) 5136. It has two evangelical churches and a seminary for school teachers, which is housed in the former castle of the lords of Barby. The industries are mainly agricultural, but there are sugar factories and breweries. Here from 1749 to 1809 was a settlement of the Herrnhut evangelical brotherhood.

BARCA (mod. Merj), an ancient city founded in the territory of Cyrene in the middle of the 6th century B.C. Rising quickly to importance it became a rival of the older city, and gave its name to the western province of the latter's territory. The name as a provincial designation is still in occasional use, but is now applied to all the province of Bengazi. Barca is said to have owed its origin to Greek refugees flying from the tyranny of Arcesilaus II. (see Cyrene), but it is certain that it was rather a Libyan than a Greek town at all times. A Persian force invited by the notorious Pheretima, mother of Arcesilaus III., in revenge for Barcan support of a rival faction, sacked it towards the close of the 6th century and deported a number of its inhabitants to Bactria. Under Ptolemaic rule it began to decline, like Cyrene, and its port Ptolemais (Tolmeita) took its place: but after the Arab conquest (a.d. 641) it became the chief place of the Cyrenaica for a time and a principal station on the Kairawan road. Though now a mere village, Merj is still the chief centre of administration inland, and has a fort and small garrison. No ruins of earlier period than the late Roman and early Arab seem to be visible on the site. The latter lies, like Cyrene, about ten miles from the coast on the crest of Jebel Akhdar, here sunk to a low downland. It owed its early prosperity to its easy access to the sea, and to the fact that natural conditions in Cyrenaica and the

Sahara behind it, tend to divert trade to the west of the district — a fact which is exemplified by the final survival of Berenice (mod. Bengazi). Merj stands in a rich but ill-cultivated stretch of red soil. (D. G. H.)

BARCAROLE, or Barcarolle (Ital. barcaruola, a boat-song), properly a musical term for the songs sung by the Venetian gondoliers, and hence for an instrumental or vocal composition, generally in 6-8 time, written in imitation of their characteristic rhythm.

BARCELONA, a maritime province of north-eastern Spain, formed in 1833 out of districts belonging to the ancient kingdom of Catalonia, and bounded on the N.E. and E. by Gerona; S. by the Mediterranean Sea; S.W. by Tarragona; and W. and N.W. by Lerida. Pop. (1900) 1,054,541;' area 2968 sq. m. Apart from a few tracts of level country along the coast and near Igualada, Manresa, Sabadell and Vich, almost the whole surface consists of mountain ranges, often densely wooded, rich in minerals and intersected by deep ravines. These ranges are outliers of the Pyrenees, which extend along the northern frontier, forming there the lofty Sierra del Gadi with the peak of Tosa (83 1 7 ft.) . Towards the sea, the altitudes become gradually less, although not with a uniform decrease; for several isolated peaks and minor ranges such as Montserrat and Monseny rise conspicuously amid the lower summits to a height of 4000-6000 ft. The central districts are watered by the Llobr6gat, which rises at the base of the Sierra del Cadi, and flows into the sea near Barcelona, the capital, after receiving many small tributaries. The river Ter crosses the eastern extremity of the province.

Barcelona can be divided into three climatic zones; a temperate one near the sea, where even palm and orange trees grow; a colder one in the valleys and plains, more inland; and a colder still among the mountains, where not a few peaks are snow-clad for a great part of the year. Agriculture and stock-keeping are comparatively unimportant in this province, which is the centre of Spanish industry and commerce. In every direction the country looks like a veritable hive of human activity and enterprise, every town and village full of factories, and alive with the din of machinery. Lead, zinc, lignite, coal and salt are worked, and there are numerous mineral springs; but the prosperity of the province chiefly depends on its transit trade and manufactures.

These are described in detail in articles on the chief towns. Barcelona (pop. 1900, 533,000), Badalona (19,240), Cardona (3855), Igualada (10,442), Manresa (23,252), Mataro (19,704), Sabadell (23,294), Tarrasa (15,956), Vich (11,628) and Villanueva y Geltru (11,856). Berga (5465), perhaps the Roman Castrum Bergium, on the Llobregat, is the home of the Catalonian cotton industry. None of the rivers is navigable, and the roads are in general indifferent and insufficient. The province is better off in regard to railways, of which there are 349 m. Important lines radiate from the city of Barcelona north-east along the coast to Gerona and to Perpignan in France ; south-west along the coast to Tarragona and Valencia; and west to Saragossa and Madrid. Several local railways link together the principal towns. For a general description of the people, and for the history of this region see Catalonia. The population is greater and increases more rapidly than that of any other Spanish province, a fact due not to any large excess of births over deaths, but to the industrial life which attracts many immigrants. In the last quarter of the 19th century the increase exceeded 200,000, while the average yearly number of emigrants was below 2000. In point of education this province is quite among the first in Spain, and as far back as 1880 there were 97,077 children enrolled on the school registers; the figures have since steadily increased.

BARCELONA, formerly the capital of Catalonia, and since 1833 the capital of the province of Barcelona in eastern Spain, in 41 23′ N. and 2° n' E., on the Mediterranean Sea, and at the head of railways from Madrid, Saragossa, and Perpignan in France. Pop. (1900) 533,000. Barcelona is a flourishing city and the principal seaport of Spain. It is built on the sloping edge of a small plain between the rivers Besos, on the north, and Llobregat, on the south. Immediately to the south-west the fortified hills of

Montjuich rise to an altitude of 650 ft., while the view is bounded on the west by the heights which culminate in Tibidabo (1745 ft.), and en the north-east by the Mon tanas Matas. The greater part of the space thus enclosed is occupied by comparatively modern suburbs and gardens of almost tropical luxuriance, strongly contrasting with the huge factories and busy port of the original city in their midst.

Barcelona was formerly surrounded by a strong line of ramparts, and defended, or more correctly, overawed by a citadel on the north-east, erected in 17 15 by Philip V.; but these fortifications being felt as a painful restriction on the natural development of

the city, were, in spite of the opposition of the central government, finally abolished by the local authorities in 1845. The walls of the moat were utilized for the cellars of the houses which soon occupied the site of the ramparts, and the ground, which had been covered by the citadel, was laid out in gardens. A rapid extension of the city to the north-west took place, and in i860 an elaborate plan for the laying out of new districts received the royal sanction. Barcelona thus comprises an old town, still consisting for the most part of irregular and narrow streets, and a new town built with all the symmetry and precision of a premeditated scheme. The buildings of the old town are chiefly of brick, from four to five storeys in height, with flat roofs, and other oriental peculiarities; while in the new town hewn stone is very largely employed, and the architecture is often of a modern English style. To the east, on the tongue of land that helps to form the port, lies the suburb of Barceloneta. It owes its origin to the marquis de la Mina, who, about 1754, did much for the city, and is regularly laid out, the houses being built of brick after a uniform pattern. The main street or axis of the old town is the Rambla, which has a fine promenade planted with plane-trees running down the middle, and contains the principal hotels and theatres of the city. The most important suburbs are Gratia, Las Corts de Sarria, Horta, San Andres de Palomar, San Gervasio de Cassolas, San Martin de Provensals and Sans. Exclusive of these, the city contains about 334,000 inhabitants, an increase of nearly 150,000 since 1857. Large numbers of immigrant artisans joined the population during the latter half of the 19th century, attracted by the great develop- ment of industry. Barcelona is the see of a bishop, and, like most Spanish towns, has a large number of ecclesiastical build- ings, though by no means so many as it once possessed. N« fewer than eighteen convents were still standing in 1873. The cathedral, erected between 1298 and 1448 on Monte Taber, an oval hill which forms the highest point of the Rambla, is one of the finest examples of Spanish Gothic; although it is not designed on a great scale and some parts have been freely modernized. It contains the early 14th-century tomb of Santa Eulalia, the patron saint of the city, besides many other monu- ments of artistic or historical interest. Its stained glass windows are among the finest in Spain, and it possesses archives of great value. Santa Maria del Mar, Santa Ana, Santos Justo y Pastor, San Pedro de las Puellas, and San Pablo del Campo are all churches worthy of mention.

The educational institutions of Barcelona have from an early period been numerous and important. The university (Universidad Literaria), which was originally founded in 1430 by the magistracy of the city, and received a bull of confirmation from Pope Nicholas V. in 1450, possessed at that time four faculties and thirty-one chairs all endowed by the corporation. It was suppressed in 1714, but restored in 1841, and now occupies an extensive building in the new town. There are, besides, an academy of natural sciences, a college of medicine and surgery — confirmed by a bull of Benedict XIII. in 1400 — an academy of fine arts, a normal school, a theological seminary, an upper industrial school, an institution for the education of deaf- mutes, a school of navigation and many minor establishments. Gratuitous instruction of a very high order is afforded by the Board of Trade to upwards of 2000 pupils. The principal charitable foundations are the Casa de Caridad or house of charity, the hospital general, dating from 1401, and the foundling hospital. The principal civic and commercial buildings are the

Casa Consistorial, a fine Gothic hall (1369-1378), the Lonja or exchange (1383), and the Aduana or custom-house (1792). At the seaward end of the Rambla is a large ancient structure, the Atarazanas or Afsenals, which was finished about 1243, and partly demolished in the 19th century to give a better view to the promenade. Remains of the former royal state of Barce- lona are found in the Palacio Real of the kings of Aragon and the Palacio de la Reina. At the highest part of the city, in the Calle del Paradis, are some magnificent columns, and other Roman remains, which, however, are hidden by the surrounding buildings. Means of public recreation are abundantly supplied. There are many theatres, the two most important being the Teatro Principal, and the Teatro del Liceo, a very fine building, originally erected in 1845 on the site of a convent of Trinitarian monks. The number of restaurants and similar places of evening resort is very great, and there are several public courts where the Basque game of pelota can be witnessed.

The so-called port of Barcelona was at first only an open beach, on the east, slightly sheltered by the neighbouring hills, but at an early period the advantage of some artificial protection was felt.

In 1438 Don Alphonso V. granted the magistracy a licence to build a mole; and in 1474 the Moll de Santa Creu was officially begun. Long after this, however, travellers speak of Barcelona as destitute of a harbour; and it is only in the 17th century that satisfactory works were undertaken. Until modern times all the included area was shut off from the open sea by a sand-bank, which rendered the entrance of large vessels impossible. An extension of the former mole, and the construction of another from the foot of Montjuich, have embraced a portion of the sea outside of the bank, and a convenient shelter is thus afforded for the heaviest battleships. From 1873 the work of extension and improvement was carried on systematically, with the addition of new quays, greater storage room, and better means for handling cargo. After thirty years of steady development, further plans were approved in 1903. At this time the port included an inner harbour, with a depth of 18 to 30 ft. at low tide, and an outer harbour with a depth of 20 to 35 ft. In the following year 8075 vessels of nearly 5,000,000 tons entered the port. Barcelona is well supplied with inland communication by rail, and the traffic of its streets is largely facilitated by tramway lines running from the port as far as Gratia and the other chief suburbs. • Barcelona has long been the industrial and commercial centre of eastern Spain— a pre-eminence which dates from the 12th and 13th centuries. It received a temporary check from the disasters of the Spanish- American War of 1898; but less than a year later it paid about £550,000 in industrial and commercial taxes, or more than 1 1 % of the whole amount thus collected in the kingdom; and within five years it had become a port of regular call for thirty-five important shipping companies. It also con- tained the head offices of thirteen other lines, notably those of the Transatlantic Mail Company, which possessed a fleet of twenty-five fine steamships. Trades and industries give occupa- tion to more than 1 50,000 hands of both sexes. The spinning and weaving of wool, cotton and silk are the principal industries, but the enterprising spirit of the Catalans has compelled them to try almost every industry in which native capital could attempt to compete with foreign, especially since the institution of the protectionist tariffs of 1892. The native manufacturers are quite able to compete in peninsular markets with foreign rivals. This prosperity has been in part due to the great development of means of communication around the city and in the four Catalan provinces. Comestibles, raw materials, and combustibles form the greater part of the imports, but this great manufactory also imports a considerable quantity of foreign manufactured goods. The principal exports

are wines, cereals, olive-oil, cotton goods, soap, cigarette-paper, furniture and barrels, boots, shoes and leather goods, and machinery.

Barcino, the ancient name of the city, is usually connected with that of the Carthaginian Hamilcar Barca, its traditional . founder in the 3rd century B.C. After the Roman conquest, it received from Augustus (27 b.c.-a.d. 14) the name of Julia Faventia (afterwards Augusta and Pia), with the status of a

Roman colony; and thenceforward it rapidly grew to be the leading mart of the western Mediterranean, rivalling Tarraco (Tarragona) and Massilia (Marseilles) as early as the 2nd century a.d. As its remains testify, the Roman city occupied Monte Taber. The bishopric of Barcelona was founded in 343. In 415 and 531, the Visigoths chose Barcelona as their temporary capital; in 540 and 599 church councils were held there. Barcinona or Bardjaluna, as it was then called, was captured by the Moors in 713, and in 801 it passed, with the rest of Catalonia, under the dominion of the Franks. From 874 the counts of Barcelona ruled as independent monarchs. But the accession of larger resources due to the union between Catalonia and Aragon in 1149, brought the city to the zenith of its fame and wealth. Its merchant ships vied with those of Genoa, Venice and Ragusa, trading as far west as the North Sea and the Baltic, and as far east as Alexandria. In 1258 Jamesl. of Aragon empowered Barcelona to issue its famous Consulado del Mar, a code of maritime law recognized as authoritative by many European states. Consuls represented Barcelona at the principal commercial centres on or near the Mediterranean; and the city was among the first communities to adopt the practice of marine insurance. But the union of Castile and Aragon in 1479 favoured other cities of Spain at the expense of Barcelona, whose com- mercial supremacy was transferred to the ports of western Spain by the discovery of America in 1492. The citizens attributed their misfortunes to the ” Castilian” government, and a strong party anong them favoured annexation by France. In 1640 Barcelona was the centre of the Catalonian rebellion against Philip IV., and threw itself under French protection. In 1652 it returned to its allegiance, but was captured by the duke of Vend6me in 1697. At the peace of Ryswick, in the same year, it was restored to the Spanish monarchy. During the War of the Succession (1 701-17 14) Barcelona adhered to the house of Austria. The seizure of Montjuich in 1705, and the subsequent capture of the city by the earl of Peterborough, formed one of his most brilliant achievements. In 17 14 it was

taken after an obstinate resistance by the duke of Berwick in the interests of Philip V., and at the close of the war was reluctantly reconciled to the Bourbon dynasty. In 1809 the French invaders of Spain obtained possession of the fortress and kept the city in sub- jection until 1 8 14. Since then it has shared in most of the revolutionary movements that have swept over Spain, and has frequently been distinguished by the violence of its civic com- motions. For the historic antagonism between the Catalans and the other inhabitants of Spain was strengthened by the industrial development of Barcelona. Among the enterprising and shrewd Catalans, who look upon their rulers as reactionary, and reserve all their sympathies for the Provencal neighbours whom they so nearly resemble in race, language and temperament, French influence and republican ideals spread rapidly; taking the form partly of powerful labour and socialist organizations, partly of less reputable bodies, revolutionary and even anarchist. Strikes are very common, seventy-three having occurred in such a year of comparative quiet as 1903; but the causes of disturb- ance are almost as often political as economic, and the annals of the city include a long list of revolutionary riots and bomb outrages. A strange contrast is presented by the co-existence of these turbulent elements with the more old-fashioned Spanish society of Barcelona. Church festivals, civic and ecclesiastical processions are almost as animated and picturesque as in Seville itself; and many medieval customs continue to flourish side by side with the most modern features of industrial life, giving to Barcelona a character altogether unique among Spanish cities.

The literature relating to Barcelona is extensive. For a general description of the city, see A. A. P. Arimon, Barcelona antigua y moderna, two illustrated folio volumes (Madrid, 1850); and J. Artigas y Feiner, Guia itineraria de Barcelona (Barcelona, 1888). For the antiquities, see S. Sampere, Topografia antigua de Barcelona (1890). The economic history of the city is dealt with by A. Cap- many in his Memorias historicas sobra la marina, comercio, y artes de la antigua ciudad de Barcelona (Madrid, 1779-1792); and, for its political history, the same work should be consulted, together with Historias e conquestas dels comtes de Barcelona, by T. Tomich (Barcelona, 1888), and the Coleccio de documents inedits del Arxin

municipal de la ciutat de Barcelona (Barcelona, 1892). The spread of the revolutionary movement is traced by M. Gil Maestre, in his El Anarquismo en Espana, y el especial de Barcelona (Madrid, 1897), and in his La Criminaltdad en Barcelona (Barcelona, 1886).

BARCELONA, a town and port of Venezuela, capital of the state of Bermudez, on the Neveri river, 3 m. from its mouth and 12 m. by rail from the port of Guanta, which has superseded the incommodious river port in the trade of this district. Pop. (est. 1904) 13,000. Built on the border of a low plain and having a mean annual temperature of 82 F., the town has the reputa- tion of being unhealthy. There are salt works and important coal deposits in its vicinity, the latter at Naricual and Capiricual, 12 m. distant by rail. Though the adjacent country is fertile, its prosperity has greatly declined, and the exports of coffee, sugar, cacao and forest products are much less important than formerly. The town dates from 1637, when it was located at the foot of the Cerro Santo and was called Nueva Barcelona; it reached a state of much prosperity and commercial importance before the end of the century. The War of Independence, however, and the chronic political disorders that followed nearly ruined its industries and trade.

BARCELONNETTE, a town in the department of Basses- Alpes, in the S.E. of France. Pop. (1906) 2075. It is built at a height of 3717 ft. on the right bank of the Ubaye river, on which it is the most important place. It is situated in a wide and very fertile valley, and is surrounded by many villas, built by natives who have made their fortune in Mexico, and are locally known as les Americains. The town itself is mainly composed of a long street (flanked by two others), which is really the road from Grenoble to Cuneo over the Col de l'Argentiere (6545 ft.). The only remarkable buildings in the town are a striking clock-tower of the 15th century (the remains of a Franciscan convent) and the Musee Chabrand, which contains a very complete collec- tion of birds, both European and extra-European.

Refounded in 1231 by Raymond Berenger IV., count of Provence (he was of the family of the counts of Barcelona, whence the name of the town he rebuilt), Barcelonnette passed to Savoy in 1388 (formal cession in 1419), and in 1713 by the treaty of Utrecht was ceded to France in exchange for the valleys of Exilles, Fenestrelles, and Chateau Dauphin (Castel- delfino). It was the birth-place of J. A. Manuel (1775-1827), the well-known

Liberal orator at the time of the Restoration of 1815, after whom the principal square of the town is named.

See F. Arnaud, Barcelonnette et ses environs (Guide du C. A. F.) (1898), and La Vallee de Barcelonnette (1900). (W. A. B. C.)

BARCLAY, ALEXANDER (c. 1476-1552), British poet, was born about 1476. His nationality is matter of dispute, but William Bulleyn, who was a native of Ely, and probably knew him when he was in the monastery there, asserts that he was born " beyonde the cold river of Twede "; moreover, the spelling of his name and the occasional Scottish words in his vocabulary point to a northern "origin. His early life was spent at Croydon, but it is not certain whether he was educated at Oxford or Cambridge. It may be presumed that he took his degree, as he uses the title of " Syr " in his translation of Sallust, and in his will he is called doctor of divinity. From the numerous incidental references in his works, and from his knowledge of European literature, it may be inferred that he spent some time abroad. Thomas Cornish, suffragan bishop in the diocese of Bath and Wells, and provost of Oriel College, Oxford, from 1493 to 1 507, appointed him chaplain of the college of St Mary Ottery, Devonshire. Here he translated Sebastian Brant's Ship of Fools, and even introduced his neighbours into the satire: —

" For if one can flatter, and beare a Hauke on his fist, He shall be parson of Honington or Cist."

The death of his patron in 15 13 apparently put an end to his connexion with the west, and he became a monk in the Benedictine monastery of Ely. In this retreat he probably wrote his eclogues, but in 1520 " Maistre Barkleye, the Blacke Monke and Poete " was desired to devise " histoires and convenient raisons to florisshe the buildings and banquet house withal" at the meeting between Henry VIII. and Francis I. at the Field of the Cloth of Gold. He at length became a Franciscan monk

of Canterbury. It is presumed that he conformed with the change of religion, for he retained under Edward VI. the livings of Great. Baddow, Essex, and of Wokey, Somerset, which he had received in 1546, and was presented in 1552 by the dean and chapter of Canterbury to the rectory of All Hallows, Lombard Street, London. He died shortly after this last preferment at Croydon, Surrey, where he was buried on the 10th of June 1552. All the evidence in Barclay's own work goes to prove that he was sincere

in his reproof of contemporary follies and vice, and the gross accusations which John Bale 1 brings against his moral character may be put down to his hatred of Barclay's cloth.

The Ship of Fools was as popular in its English dress as it had been in Germany. It was the starting-point of a new satirical literature. In itself a product of the medieval conception of the fool who figured so largely in the Shrovetide and other pageants, it differs entirely from the general allegorical satires of the preceding centuries. The figures are no longer abstrac- tions; they are concrete examples of the folly of the bibliophile who collects books but learns nothing from them, of the evil judge who takes bribes to favour the guilty, of the old fool whom time merely strengthens in his folly, of those who are eager to follow the fashions, of the priests who spend their time in church telling " gestes " of Robin Hood and so forth. The spirit of the book reflects the general transition between allegory and narrative, morality and drama. The Narrenschiff of Sebastian Brant was essentially German in conception and treatment, but his hundred and thirteen types of fools possessed, neverthe- less, universal interest. It was in reality sins and vices, however, rather than follies that came under his censure, and this didactic temper was reflected in Barclay. The book appeared in 1494 with woodcuts said to have been devised and perhaps partly executed by Brant himself. In these illustrations, which gave an impulse to the production of " enblems " and were copied in the English version, there appears a humour quite absent from the text. In the Latin elegiacs of the Stultifera Navis (1497) of Jacob Locher the book was read throughout Europe. Barclay's The Shyp of Folys of the Worlde was first printed by Richard Pynson in 1509. He says he translated " oute of Laten, Frenche, and Doche," but he seems to have been most familiar with the Latin version. He used a good deal of freedom in his translation, " sometyme addynge, sometyme detractinge and tak- inge away suche thinges as semeth me necessary and superflue." The fools are given a local colour, and Barclay appears as the unsparing satirist of the social evils of his time. At the end of nearly every section he adds an envoi of his own to drive home the moral more surely. The poem is written in the ordinary Chaucerian stanza, and in language which is more modern than the common literary English of his day.

Certayne Ecloges of Alexander Barclay, Priest, written in his youth, were probably printed as early as 1513, although the earliest extant edition is that in John Cawood's reprint (1570) of

the Ship of Fools. They form, with the exception of Henryson's Robin and Makyn, the earliest examples of the English pastoral. The first three eclogues, in the form of dialogues between Coridon and Comix, were borrowed from the Miseriae Curialium of Aeneas Sylvius Piccolomini (Pope Pius II.), and contain an eulogy of John Alcock, bishop of Ely, the founder of Jesus College, Cambridge. The fourth is based on Mantuan's eclogue, De consuetudine divitum erga poetas, with large additions. It contains the " Descrypcion of the towre of Virtue and Honour," an elegy on Sir Edward Howard, lord high admiral of England, who perished in the attack on the French fleet in the harbour of Brest in 15 13. The fifth, printed by Wynkyn de Worde, also without date, is entitled the " Fyfte Eglog of Alexandre Barclay of the Cytezen and the uplondyshman " and is also based on Mantuan. Two shepherds, Amintas and Faustus, discuss the familiar theme of the respective merits of town and country life, and relate a quaint fable of the origin of the different classes of society. Barclay's pastorals contain many pictures of rustic life as he knew it. He describes for instance the Sunday games in the village, football, and the struggle for food at great feasts; 1 Script. III. Maj. Brit. (1557, Cent. ix. No. 66).

but his eclogues were, like his Italian models, also satires on social evils. The shepherds are rustics of the Colin Clout type, and discuss the follies and corruptions around them. Barclay-had, however, no sympathy with the anti-clerical diatribes of John Skelton, whom he more than once attacks. Bale mentions an Anti-Skeltonum which is lost. His other works are: — The Castell of Laboure (Wynkyn de Worde, 1506), from the French of Pierre Gringoire; the Introductory to write and to pronounce Frenche (Robert Copland, 1521); The Myrrour of Good Maners (Richard Pynson, not dated), a translation of the De quatuor virtutibus of Dominicus Mancinus; Crony ck compyled in Latyn by the renowned Sallust (Richard Pynson, no date), a translation of the Bellum Jugurthinum; The Lyfe of the glorious Martyr Saynt George (R. Pynson, c. 1530). The Lyfe of Saynte Thomas, And Haython's Cronycle, both printed by Pynson, are also attributed to Barclay, but on very doubtful grounds.

See T. H. Jamieson's edition of the Ship of Fools (Edinburgh, 1874), which contains an account of the author and a

bibliography of his works; and J. W. Fairholt's edition of The Cylezen and Uplondysh- man (Percy Soc. 1847), which includes large extracts from the other eclogues; also Zarncke's edition of Brant (Leipzig, 1854); and Dr Fedor Fraustadt, tfber das Verhaltnis von Barclays Ship of Fools zu den lateinischen, franzosischen und deutschen Quellen (1894). A prose version of Locher's Stultifera Navis, by Henry Watson, was printed by Wynkyn de Worde in 1518.

BARCLAY, JOHN (1582-1621), Scottish satirist and Latin poet, was born, on the 28th of January 1582, at Pont-a-Mousson, where his father William Barclay held the chair of civil law. His mother was a Frenchwoman of good family. His early education was obtained at the Jesuit College. While there, at the age of nineteen, he wrote a commentary on the Thebaid of Statius. In 1603 he crossed with his father to London. Barclay had persistently maintained his Scottish nationality in his French surroundings, and probably found in James's accession an opportunity which he would not let slip. He did not remain long in England, where he is supposed to have published the first part of his Satyricon, for in 1605 when a second edition of that book appeared in Paris, he was there, having already spent some time in Angers, and being now the husband of a French girl, Louise Debonaire. He returned to London with his wife in 1606, and there published his Sylvae, a collection of Latin poems. In the following year the second part of the Satyricon appeared in Paris. Barclay remained on in London till 1ˆ16. In 1609 he edited the De Potestate Papae, an anti-papal treatise by his father, who had died in the preceding year, and in 16 11 he issued an Apologia or " third part " of the Satyricon, in answer to the attacks of the Jesuits and others who were probably embittered by the tone of the earlier parts of the satire. A so-called " fourth part," with the title of Icon Animorum, appeared in 1614. James I. is said to have been attracted by his scholarship, but particulars of this, or of his life in London generally, are not avail- able. In 1616 he went to Rome, for some reason unexplained, and there resided till his death on the 15 th of August 1621. He appears to have been on better terms with the Church and notably with Bellarmine; for in 1617 he issued, from a press at Cologne, a Paraenesis ad Sectarios, an attack on the position of Protestantism. The literary effort of his closing years was his best-known work the Argents, completed about a fortnight before his death, which has been said to have been hastened by poison. The romance was printed in Paris in the same year.

Barclay's contemporary reputation as a writer was of the highest; by his strict scholarship and graceful style he has deserved the praise of modern students. The Satyricon, a severe satire on the Jesuits, is modelled on Petronius and catches his lightness of touch, though it shows little or nothing of the tone of its model, or of the unhesitating severity and coarseness of the humanistic satire of Barclay's age. The Argenis is a long romance, with a monitory purpose on the dangers of political intrigue, probably suggested to him by his experiences of the league in France, and by the catholic plot in England after James's acces- sion. The work has been praised by all parties; and it enjoyed for more than a century after his death a remarkable popularity. Most of the innumerable editions are supplied with a key to

the characters and names of the story. Thus AneroStus is Clement VIII; Arx non eversa is the Tower of London; Hip- pophilus and Radirobanes are the names of the king of Spain; Hyanisbe is Queen Elizabeth; Mergania, by an easy anagram, is Germany; Usinulca, by another, is Calvin. The book is of historical importance in the development of 17th- century romance, including especially Fenelon's Telemaque. Ben Jonson appears, from an entry at Stationers' Hall on the 2nd of October 1623, to have intended to make a translation. Barclay's shorter poems, in two books, were printed in the Delitiae Poetarum Scotorum (Amsterdam, 1637, i. pp. 76-136). In the dedication, to Prince Charles of England, he refers to his earlier publication, the Sylvae.

The best account of Barclay is the preface by Jules Dukas in his bibliography of the Satyricon (Paris, 1889). This supersedes the life in Bayle's Dictionary, which had been the sole authority. A " fifth part " of the Satyricon appears in most of the editions, by Alethophilus (Claude Morisot). For the Argenis, see the disser- tations by Leon Boucher (Paris, 1874), and Dupond (Paris, 1875). The Icon Animorum was Englished by Thomas May in 1631 {The Mirrour ofMindes, or Barclay's Icon Animorum). Barclay's works have never been collected.

BARCLAY, JOHN (1734-1798), Scottish divine, was born in Perthshire and died at Edinburgh. He graduated at St Andrews, and after being licensed became assistant to the parish minister of Errol in Perthshire. Owing to differences with the minister, he left in 1763 and was appointed assistant to Antony Dow of Fettercairn, Kincardine. In this parish he became very popular, but his opinions failed to give satisfaction to his presbytery. In

1772 he was rejected as successor to Dow, and was even refused by the presbytery 'the testimonials requisite in order to obtain another living. The refusal of the presbytery was sustained by the General Assembly, and Barclay thereupon left the Scottish church and founded congregations at Sauchyburn, Edinburgh and London. His followers were sometimes called Bereans, because they regulated their conduct by a diligent study of the Scriptures (Acts xvii. 11). They hold a modified form of Calvinism.

His works, which include many hymns and paraphrases of the psalms, and a book called Without Faith, without God, were edited by J. Thomson and D. Macmillan, with a memoir (1852).

BARCLAY, ROBERT (1648-1690), one of the most eminent writers belonging to the Society of Friends, or Quakers, was born in 1648 at Gordonstown in Morayshire. His father had served under Gustavus Adolphus, and pursued a somewhat tortuous course through the troubles of the civil war. Robert was sent to finish his education in Paris, and it appears he was at one time inclined to accept the Roman Catholic faith. In 1667, however, he followed the example of his father, and joined the recently-formed Society of Friends. In 1670 he married a Quaker lady, Christian Mollison of Aberdeen. He was an ardent theological student, a man of warm feelings and considerable mental powers,, and he soon came prominently forward as the leading apologist of the new doctrine, winning his spurs in a controversy with one William Mitchell. The publication of fifteen Theses Theologiae (1676) led to a public discussion in Aberdeen, each side claiming a victory. The most prominent of the Theses was that bearing on immediate revelation, in which the superiority of this inner light to reason or scripture is sharply stated. His greatest work, An Apology for the True Christian Divinity, was published in Latin at Amsterdam in 1676, and was an elaborate statement of the grounds for holding certain fundamental positions laid down in the Theses. It was translated by its author into English in 1678, and is " one of the most impressive theological writings of the century." It breathes a large tolerance and is still perhaps the most important manifesto of the Quaker Society. Barclay experienced to some extent the persecutions inflicted on the new society, and was several times thrown into prison. He travelled extensively in Europe (once with Penn and George Fox), and had several interviews with Elizabeth, princess palatine. In later years he had much influence with James II., who as duke of York had given to twelve members of the society a patent of the province of East New Jersey, Barclay being made

governor (1682-88). He is said to have visited James with a view to making terms of accommodation with William of Orange,

whose arrival was then imminent. He died on the 3rd of Sctober 1690.

BARCLAY, WILLIAM (1 546-1608) Scottish jurist, was born in Aberdeenshire in 1546. Educated at Aberdeen University, he went to France in 1573, and studied law under Cujas, at Bourges, where he took his doctor's degree. Charles III., duke of Lorraine, appointed him professor of civil law in the newly – founded university of Pont-a-Mousson, and also created him counsellor of state and master of requests. In 1603, however, he was obliged to quit France, having incurred the enmity of the Jesuits, through his opposition to their proposal to admit his son John (q.v.) a member of their society. Returning to England, he was offered considerable preferment by King James on condition of becoming a member of the Church of England. This offer he refused, and returned to France in 1604, when he was appointed professor of civil law in the university of Angers. He died at Angers in 1608. His principal works were De Regno et Regali Potestate, &*c. (Paris, 1600), a strenuous defence of the rights of kings, in which he refutes the doctrines of George Buchanan, " Junius Brutus " (Hubert Languet) and Jean Boucher; and De Potestate Papae, &*c. (London, 1609), in opposition to the usurpation of temporal powers by the pope, which called forth the celebrated reply of Cardinal Bellarmine; also commentaries on some of the titles of the Pandects.

BARCLAY DE TOLLY, MICHAEL ANDREAS, called by the Russians Michael, Prince Bogdanovich (1761-1818), Russian field marshal, was born in Livonia in 1 7 6 1 . He was a descendant of a Scottish family which had settled in Russia in the 17th century. He entered the Russian army at an early age. In 1788-1789 he served against the Turks, in 1790 and 1794 against the Swedes and Poles. He became colonel in 1798 and major-general in 1799. In the war of 1806 against Napoleon, Barclay took a distinguished part in the battle of Pultusk and was wounded at Eylau, where his conduct won him promotion to the rank of lieut. -general. In 1808 he commanded against the Swedes in Finland, and in 1809 by a rapid and daring march over the frozen Gulf of Bothnia he

surprised and seized JJmeo. In 1810 he was made minister of war, and he retained the post until 1813. In 18 1 2 Barclay was given command of one of the armies operating against Napoleon. There was very keen opposition to the appointment of a foreigner as commander-in-chief, and after he was defeated at Smolensk the outcry was so great that he resigned his command and took a subordinate place under the veteran Kutusov. Barclay was present at Borodino, but left the army soon afterwards. In 1813 he was re-employed in the field and took part in the campaign in Germany. After the battle of Bautzen he was reinstated as commander-in-chief of the Russian forces, and in this capacity he served at Dresden, Kulm and Leipzig. After the last battle he was made a count. He took part in the invasion of France in 1814 and at Paris received the baton of a field marshal. In 181 5 he was again commander-in-chief of the Russian army which invaded France, and he was made a prince at the close of the war. He died at Insterburg in Prussia on the 14th (16th) of May 1818.

BARCOCHEBAS, Bar-Cochab, or Bar Kokba (" son of a star "), the name given in Christian sources to one Simeon, the leader in the Jewish revolt against Rome in the time of Hadrian (a.d. 132-135). The name does not appear in the Roman historians. In Rabbinic sources he is called Bar (Ben) Coziba, " son of deceit," which perhaps reflects the later verdict of con- demnation recorded after his failure (root an "to be false"). Cochab is, therefore, the name either of his father or of his home. But it is recorded that the Rabbi 'Aqlba (q.v.), who recognized him as Messiah, applied Num. xxiv. 17 to him, reading not Cochab ("a star"), but Cosiba ("goes forth from Jacob"); thus Bar-cochab is a Messianic title of the " man of Cozeba " (cf. Chron. iv. 22) whose original name was recalled by later Rabbis with sinister intention. At first the Romans paid little attention to the insurgents, who were able to strike coins in the name of Simeon, prince of Israel, and Eleazar the priest, and to persecute the Christians, who refused to join the revolt. But troops were collected and the various fortresses occupied by the

Jews were successively reduced. The end came with the fall of Beth-thar (Bethar). Extraordinary stories were told of the prowess of Barcochebas and of the ordeals to which he subjected his soldiers in the way of training.

See Eusebius H.E. iv. 6; Dio Cassius xix. 12-14; Schiirer, Gesch. d. jiid. Volkes, 3rd ed. i. 682 ff . ; Derenbourg, Hist, de la Palest. 423 ff . (distinguishes Barcochebas from Simeon) ; Schlattler,

Gesch. Israels, 2nd ed. 303 ff.; articles Jews and Palestine, History; also art. s.v. " Bar Kokba " in Jewish Encyc. (S. Krauss).

BARD, a word of Celtic derivation (Gaelic baird, Cymric bardh, Irish bard) applied to the ancient Celtic poets, though the name is sometimes loosely used as synonymous with poet in general. So far as can be ascertained, the title bards, and some of the privileges peculiar to that class of poets, are to be found only among Celtic peoples. The name itself is not used by Caesar in his account of the manners and customs of Gaul and Britain, but he appears to ascribe the functions of the bards to a section of the Druids, with which class they seem to have been closely connected. Later Latin authors, such as Lucan (Phar. p. 447), Festus (De Verb. Sign, s.v.), and Ammianus Marcellinus (bk. xv.), used the term Bardi as the recognized title of the national poets or minstrels among the peoples of Gaul and Britain. In Gaul, however, the institution soon disappeared; the purely Celtic peoples were swept back by the waves of Latin and Teutonic conquest, and finally settled in Wales, Ireland, Brittany and the north of Scotland. There is clear evidence of the existence of bards in all these places, though the known relics belong almost entirely to Wales and Ireland, where the institution was more distinctively national. In Wales they formed an organized society, with hereditary rights and privileges. They were treated with the utmost respect and were exempt from taxes or military service. Their special duties were to celebrate the victories of their people and to sing hymns of praise to God. They thus . gave poetic expression to the religious and national sentiments of the people, and therefore exercised a very powerful influence. The whole society of bards was regulated by laws, said to have been first distinctly formulated by Hywell Dha, and to have been afterwards revised by Gruffydd ap Conan. At stated intervals great festivals were held, at which the most famous bards from the various districts met and contended in song, the umpires being generally the princes and nobles. Even after the conquest of Wales, these congresses, or Eisteddfodau, as they were called (from the Welsh eisledd, to sit), continued to be summoned by royal commission, but from the reign of Elizabeth the custom has been allowed to fall into abeyance. They have not been since summoned by royal authority, but were revived about 1822, and are held regularly at the present time. In modern Welsh, a bard is a poet whose vocation has been recognized at an Eisteddfod. In Ireland also the bards were a distinct class with peculiar and hereditary privileges. They appear to have been divided into

three great sections: the first celebrated victories and sang hymns of praise; the second chanted the laws of the nation; the third gave poetic genealogies and family histories. The Irish bards were held in high repute, and frequently were brought over to Wales to give instruction to the singers of that country.

In consequence, perhaps, of Lucan ‘s having spoken of carmina bardi, the word bard began to be used, early in the 17 th century, to designate any kind of a serious poet, whether lyric or epic, and is so employed by Shakespeare, Milton and Pope. On the other hand, in Lowland Scots it grew to be a term of contempt and reproach, as describing a class of frenzied vagabonds.

See Ed. Jones, Relics of the Welsh Bards (1784) ; Walker, Memoirs of the Irish Bards (1786); Owen Jones, Myvyrian Archaeology of Wales (3 vols., 1801-1807); W. F. Skene, Four Ancient Books of Wales (2 vols., 1868).

BARDAI§AN, an early teacher of Christianity in Mesopotamia, the writer of numerous Syriac works which have entirely perished ‘ (with one possible exception, the Hymn of the Soul in the Acts of Thomas), and the founder of a school which was soon branded as heretical. According to the trustworthy Chronicle of Edessa, he was born in that city on the nth Tammuz (July), a.d. 154.

1 The Book of the Laws of the Countries, referred to below, is th- work of a disciple of Bardaisan.

His parents were of rank and probably pagan; according to Barhebraeus, he was in youth a priest in a heathen temple at Mabbog. Another probable tradition asserts that he shared the education of a royal prince who afterwards became king of Edessa — perhaps Abgar bar Manu, who reigned 202-217. He is said to have converted the prince to Christianity, and may have had an important share in christianizing the city. Epi- phanius and Barhebraeus assert that he was first an orthodox Christian and afterwards an adherent of Valentinus; but Eusebius and the Armenian Moses of Chorene reverse the order, stating that in his later days he largely, but not completely, purged himself of his earlier errors. The earliest works attributed to him (by Eusebius and others) are polemical dialogues against Marcionism and

other heresies; these were afterwards translated into Greek. He also wrote, probably under Caracalla, an apology for the Christian religion in a time of persecution. But his greatest title to fame was furnished by his hymns, which, according to St Ephrem, numbered 1 50 and were composed in imitation of the Davidic psalter. He thus became the father of Syriac hymnology, and from the favour enjoyed by his poems during the century and a half that intervened between him and St Ephrem we may conclude that he possessed original poetic genius. This would be clearly proved if (as is not unlikely) the beautiful Hymn of the Soul incorporated in the apocryphal Acts of Thomas could be regarded as proceeding from his pen; it is practically the only piece of real poetry in Syriac that has come down to us. Perhaps owing to the persecution under Caracalla mentioned above, Bardaisan for a time retreated into Armenia, and is said to have there preached Christianity with indifferent success, and also to have composed a history of the Armenian kings. Porphyry states that on one occasion at Edessa he interviewed an Indian deputation who had been sent to the Roman emperor, and questioned them as to the nature of Indian religion. He was undoubtedly a man of wide culture. He died (according to the patriarch Michael) in 222.

For our knowledge of Bardaisan's doctrine we are mainly dependent on the hostile witness of St Ephrem, and on statements by Greek writers who had no acquaintance with his works in their original form. His teaching had certain affinities with gnosticism. Thus he certainly denied the resurrection of the body; and so far as we can judge by the obscure quotations from his hymns furnished by St Ephrem he explained the origin of the world by a process of emanation from the supreme God whom he called " the Father of the living." On the other hand the dialogue known as the Book of the Laws of the Countries, which was written by a disciple and is quoted by Eusebius as a genuine exposition of the master's teaching — while it recognizes the influence of the celestial bodies over the body of man and throughout the material sphere and attributes to them a certain delegated authority 1 — upholds the freedom of the human will and can in the main be reconciled with orthodox Christian teaching. On this M. Nau has based his effort (see Une Biographie inedite de Bardesane Vastrologue, Paris, 1897; Le Livre des lois des pays, Paris, 1899) to clear Bardaisan of the reproach of gnosticism, maintaining that the charge of heresy arises from a misunderstanding of certain astrological speculations. It must be

admitted that it is impossible to reconstruct Bardaisan's system from the few fragments remaining of his own work and therefore a certain verdict cannot be given. But the ancient testimony to the connexion of Bardaisan with Valentinianism is strong, and the dialogue probably represents a modification of Bardesanist teaching in the direction of orthodoxy. The later adherents of the school appear to have moved towards a Manichean dualism.

The subject is exhaustively discussed in Hort's article " Bardaisan ' in Diet. Christ. Biog. , and a full collection of the ancient testimonies will be found in Harnack's Altchristliche Litteratur, vol. i. pp. 184 ff. (N. M.)

BARDILI, CHRISTOPH GOTTFRIED (1761-1808), German philosopher, was born at Blaubeuren in Wtirttemberg, and died

1 Even Ephrem allows that Bardaisan was in principle a mono-theist.

at Stuttgart. His system has had little influence in Germany; Reinhold (q.v.) alone expounded it against the attack 1 of Fichte and Schelling. Yet in some respects his ideas opened the way for the later speculations of Schelling and Hegel. He dissented strongly from the Kantian distinction between matter and form of thought, and urged that philosophy should consider only thought in itself, pure thought, the ground or possibility of being. The fundamental principle of thought is, according to him, the law of identity; logical thinking is real thinking. The matter upon which thought operated is in itself indefinite and is- rendered definite through the action of thought. Bardili worked out his idea in a one-sided manner. He held that thought has in itself no power of development, and ultimately reduced it to arithmetical computation. He published Grundriss der ersten Logik (Stuttgart, 1800); Uber die Gesetze der Ideen- association (Tubingen, 1796); Brief e Uber den Ursprung der Metaphysik (Altona, 1798); Philos. Elementarlehre (Landshut, 1802-1806); Beitrdgezur Beurteilung des gegenwdrtigen Zustandes der Vernunfllehre (Landshut, 1803).

See C. L. Michelet, Geschichte der letzten Systeme; J. E. Erdmann, Versuch einer Geschichte d. neu. Phil. Bd. iii. pt. i. ; B's und Reinholds Brief wechsel.

BARDOUX, AGENOR (1829-1897), French statesman, was a native of Bourges. Established as an advocate at Clermont, he did not

hesitate to proclaim his republican sympathies. In 1871 he was elected deputy of the National Assembly, and re-elected in 1876 and in 1877. In the chamber he was president of the group of the left centre, standing strongly for the republic but against anti-clericalism. After the coup d'etat of the 16th of May, he was one of the leaders of the " 363." In the republican chamber elected after the 16th of May, he became minister of public instruction (December 1877), and proposed various republican laws, notably on compulsory primary education. He resigned in 1879. He was not re-elected in 1881, but in December 1882 was named senator for life. He wrote essays on Les Legistes et leur influence sur la societe franqaise (1878); Le Comte de Montlosier et le Gallicanisme (1881); and published in 1882 his Dix Annies de vie politique.

BARDOWIEK, a village of Germany, in the Prussian province of Hanover, 3 m. N. of Liineburg on the navigable Ilmenau. Pop. 2000. Its trade consists entirely in agricultural produce. The Gothic parish church (c. 1400) incorporates remains of a cathedral of vast dimensions.

Bardowiek was founded in the 8th century by Charlemagne, who established a bishopric in it, and until its destruction by Henry the Lion in 1 189, it was the most prosperous commercial city of north Germany. Its name is derived from the Longobardi, the tribe for whom it was the home and centre, and from it the colonizaˆ tion of Lombardy started.

BARDSEY (i.e. "Bards' Island": cf. Anglesey, "Angles' Island "; Welsh, Ynys Enlli, " isle of the current "), an island at the northern extremity of Cardigan Bay. The " sound "' between Aberdaron point and the island is some 4 m. wide. Bardsey is included in Carnarvonshire, North Wales (but traditionally in S. Wales). On the N.W. side it has high cliffs. It is about 2\ m. long by J m. broad, with an area cf some 370 acres, a third of which is hilly. Barley and oats are grown. On the S.E. side is a fairly deep harbour. On the N.E. are the ruins of the tower of St Mary's abbey (13th century). There is no Anglican church, the inhabitants being Dissenters. They are farmers and fishermen. The light-house, with fixed light, 140 ft. high and visible for 17 m., is locally celebrated. The rectory of Aberdaron (on the mainland, opposite Bardsey), Penmachno and Llangwnadl(Llangwynhoedl), in Lleyn (S. Carnarvonshire), belong to St John's College, Cambridge. St Dubricius made the sanctuary famous, and died here in 612. Here was the burial-place of all the monks whose

friends could afford to go thither with their bodies. All the great abbeys of England sent their quota. Roads to Bardsey — with the monks' wells, found at intervals of 7 to 9 m.— run from north, east and south. The remnant of priests fled thither (after the great massacre of Bangor-is-coed in 613, by Ethelfride of Northumbria) by the road of the Rivals (. Yn Eifl)

hill, S. Carnarvonshire, on which Pistyll farm still gives food gratis to all pilgrims or travellers. A part of the isle is one great cemetery of about 3 to 4 acres, with rude, rough graves as close to each other as possible, with slabs upon them. Though Aberdaron rectory does not belong to the isle, the farm " Cwrt " (Court), where the abbot held his court, still goes with Bardsey, which was granted to John Wynn of Bodvel, Carnarvonshire, after the battle and partial sack of Norwich by the Puritans in the Civil War; passing through Mary Bodvel to her husband, the earl of Radnor, who sold it to Dr Wilson of York. The doctor, in turn, sold it to Sir John Wynn, of Glynllifon and Bodfean Hall, Carnarvonshire. One of the Wynns, the 3rd Baron Newborough, was, at his wish, buried here. The archaeology and history of the isle are voluminous. Lady Guest's Mabinogion translation (i. p. 115, e d. of 1838) gives an account of the (legendary) Bardsey House of Glass, into which Merlin (Myrddin) took a magic ring, originally kept at Caerleon-on-Usk.

BAREGES, a town of south-western France, in the department of Hautes-Pyrenees, in the valley of the Bastan, 25 m. S.S.W. of Bagneres-de-Bigorre by road. The town, which is situated at an altitude of 4040 ft., is hardly inhabited in the winter. It is celebrated for its warm sulphurous springs (75 to in° F.), which first became generally known in 1675 when they were visited by Madame de Maintenon and the duke of Maine, son of Louis XIV. The waters, which are used for drinking and in baths, are efficacious in the treatment of wounds and ulcers and in cases of scrofula, gout, skin diseases, &c. There is a military hospital, founded in 1760. The town was formerly much exposed to avalanches and floods, which are now less frequent owing to the construction of embankments and replant- ing of the hillsides. It is a centre for mountain excursions. The light silk and wool fabric called barege takes its name from the place, where it was first made.

BAREILLY, or Bareli, a city and district of British India in the Bareilly or Rohilkhand division of the United Provinces. The city is situated on the Ramganga river, 812 m. N.W. from Calcutta by rail. Pop. (1901) 131,208. The principal buildings are two mosques built in the 17th century; a modern fort over- looking the cantonments; the railway station, which is an important junction on the Oudh and Rohilkhand line; the palace of the nawab of Rampur, and the government college. Bareilly is the headquarters of a brigade in the 7th division of the eastern army, corps. The chief manufactures are furniture and upholstery. Bareilly college is a seat of upper class learning for the surrounding districts. It is conducted by an English staff, and its course includes the subjects for degrees in the Calcutta University.

The district of Bareilly has an area of 1 580 sq. m. It is a level country, watered by many streams, the general slope being towards the south. The soil is fertile and highly cultivated, groves of noble trees abound, and the villages have a neat, prosperous look. A tract of forest jungle, called the tarai, stretches along the extreme north of the district, and teems with large game, such as tigers, bears, deer, wild pigs, &c. The river Sarda or Gogra forms the eastern boundary of the district and is the principal stream. Next in importance is the Ramganga, which receives as its tributaries most of the hill torrents of the Kumaon mountains. The Deoha is another great drainage artery and receives many minor streams. The Gomati or Gumti also passes through the district. The population in 1001 was 1,090,117. The Mahommedans are chiefly the descendants of Yusafzai Afghans, called the Rohilla Pathans, who settled in the country about the year 1720. The Rohillas were formerly the ruling race of the tract of country called Rohilkhand, and are men of a taller stature, a fairer complexion and a more arrogant air than the general inhabitants of the district. Bishop Heber described them as follows: — ” The country is burdened with a crowd of lazy, profligate, self-called sawars (cavaliers), who, though many of them are not worth a rupee, conceive it derogatory to their gentility and Pathan blood to apply themselves to any honest industry, and obtain for the most part a precarious livelihood by sponging on the industrious tradesmen and farmers,

on whom they levy a sort of blackmail, or as hangers-on to the wealthy and noble families yet remaining in the province. These men have no visible means of maintenance, and no visible occupation except that of lounging up and down with their

swords and shields, like the ancient Highlanders, whom in many respects they much resemble." The Rohillas, after fifty years' precarious independence, were subjugated in 1774 by the confederacy of British troops with the nawab cf Oudh's army, which formed so serious a charge against Warren Hastings. Their territory was in that year annexed to Oudh. In 1801 the nawab of Oudh ceded it to the Company in commutation of the subsidy money. During the Mutiny of 1857 the Rohillas took a very active part against the English, but since then they have been disarmed. Both before and after that year, however, the Bareilly Mahommedans have distinguished themselves by fanatical tumults against the Hindus. The district is irrigated from the Rohilkhand system of government canals. There are no manufactures except for domestic use and little external trade. Several lines of the Oudh and Rohilkhand railway pass through the district.

BARENTIN, a town of northern France, in the department of Seine-Inferieure, 1 1 m. N.N.W. of Rouen by rail. Pop. (1006) 5245. The town is situated in the valley of the Austreberthe, a small affluent of the Seine, here crossed at a height of 100 ft. by a fine railway viaduct 540 yds. long. The manufacture of cotton fabrics is' the principal industry.

BARENTS, WILLEM (d. 1597), Dutch navigator, was born about the middle of the 16th century. In 1 594 he left Amsterdam with two ships to search for a north-east passage to eastern Asia, He reached the west coast of Novaya Zemlya, and followed it northward, being finally forced to turn back when near its northern extremity. In the following year he commanded another expedition of seven ships, which made for the strait between the Asiatic coast and Vaygach Island, but was too late to find open water;- while his third journey equally failed of its object and resulted in his death. On this occasion he had two ships, and on the outward journey sighted Bear Island and Spitsbergen, where the ships separated. Barents' vessel, after rounding the north of Novaya Zemlya, was beset by ice and he was compelled to winter in the north; and as his ship was not released early in 1597, his party left her in two open boats on the 13th of June and most of its members escaped. Barents himself, however, died on the 30th of June 1597. In 1871 the house in which he wintered was discovered, with many relics, which are preserved at the Hague, and in 1875 part of his journal was found.

See The Three Voyages of Barents, by Gerrit de Veer, translated

by the Hakluyt Society (1876) from de Veer's text (Amsterdam, 1598).

BARENTS SEA, that part of the Arctic Ocean which is demarcated by the north coast of Europe, the islands of Novaya Zemlya, Franz Josef Land and Spitsbergen, and smaller intervening islands; it was named after the Dutch navigator. Omitting the great inlet of the White Sea in the south, it extends from about 67 to 80° N., and from 20° to 60° E. The southern part, off the Murman coast of the Kola peninsula, is sometimes called the Murman Sea.

BARERE DE VIEUZAC, BERTRAND (1755-1841), one of the most notorious members of the French National Convention, was born at Tarbes in Gascony on the 10th of September 1755. The name of Barere de Vieuzac, by which he continued to call himself long after the renunciation of feudal rights on the famous 4th of August, was assumed from a small fief belonging to his father, a lawyer at Vieuzac. He began to practise as an advocate at the parlement of Toulouse in 1770, and soon earned a con- siderable reputation as an orator; while his brilliant and flowing style as a writer of essays led to his election as a member of the Academy of Floral Games of Toulouse in 1788. At the age of thirty he married. Four years later, in 1789, he was elected deputy by the estates of Bigorre to the states-general, which met in May. He had made his first visit to Paris in the preceding year. His personal appearance, his manners, social qualities and liberal opinions, gave him a good standing among the multitude of provincial deputies then thronging into Paris. He

attached himself at first to the constitutional party; but he was less known as a speaker in the Assembly than as a journalist. His paper, however, the Point du Jour, according to Aulard, owes its reputation not so much to its own qualities as to the fact that the painter David, in his famous picture of the " Oath in the Tennis Court," has represented Barere kneeling in the corner and writing a report of the proceedings as though for posterity. The reports of the debates of the National Assembly in the Point du Jour, though not inaccurate, are as a matter of fact very incomplete and very dry. After the flight of the king to Varennes, Barere passed over to the republican party, though he continued

to keep in touch with the duke of Orleans, to whose natural daughter, Pamela, he was tutor. Barere, however, appears to have been wholly free from any guiding principle; conscience he had none, and his conduct was regulated only by the determination to be on the side of the strongest. After the close of the National Assembly he was nominated one of the judges of the newly instituted court of cassation from October 1791 to September 1792. In 1792 he was elected deputy to the National Convention for the department of the Hautes-Pyrenees. At first he voted with the Girondists, attacked Robespierre, ” a pygmy who should not be set on a pedestal,” and at the trial of the king voted with the Mountain for the king’s death ” with- out appeal and without delay.” He closed his speech with a sentence which became memorable: ” the tree of liberty could not grow were it not watered with the blood of kings.” Ap- pointed member of the Committee of Public Safety on the 7 th of April 1793, he busied himself with foreign affairs; then, joining the party of Robespierre, whose resentment he had averted by timely flatteries, he played an important part in the second Committee - of Public Safety — after the 17th of July 1793 — and voted for the death of the Girondists. He was thoroughly unscrupulous, stopping at nothing to maintain the supremacy of the Mountain, and rendered it great service by his rapid work, by the telling phases of his oratory, and by his clear expositions of the problems of the day. On the 9th Thermidor (July 27th, 1794) Barere hesitated, then he drew up the report outlawing Robespierre. In spite of this, in Germinal of the year III. (the 21st of March to the 4th of April 1795), the Thermidorians decreed the accusation of Barere and his colleagues of the Terror, Collot d’Herbois and Billaud-Varenne, and he was sent to the Isle of Oleron. He was removed to Sairites, and thence escaped to Bordeaux, where he lived in concealment for several years. In 1795 he was elected member of the Council of Five Hundred, but was not allowed to take his seat. Later he was used as a secret agent by Napoleon I., for whom he carried on a diplomatic correspondence. On the fall of Napoleon, Barere played the part of royalist, but on the final restoration of the Bourbons in 181 5 he was banished for life from France as a regicide, and then withdrew to Brussels and temporary oblivion. After the revolution of July 1830 he reappeared in France, was reduced by a series of lawsuits to extreme indigence, accepted a small pension assigned him by Louis Philippe (on whom he had heaped abuse and railing), and died, the last survivor of the Committee of Public Safety, on the 1 3th of January 1 84 1 . (See also French

Revolution.}

The Memoires ie B- Barfre . . . puUi&s par MM. H. Cornet . . . et David (d Angers) . . . pricSdis d'une notice historique (Paris, 1824- 1844) are false, but contain valuable information; Carnot's Notice, which is very good, was published separately in 1842. See F. A. Aulard, Les Orateurs de la Constituante (Paris, 1882); Les Orateurs de la Convention (2nd ed., Paris, 1905). Macaulay's essay on Barere, {Edinburgh Review, vol. 79) is eloquent, but incorrect.

BARETTI, GIUSEPPE MARC ANTONIO (1719-1789), Italian critic, was born at Turin in 1 7 19. He was intended by his father for the profession of law, but at the age of sixteen fled from Turin and went to Guastalla, where he was for some time employed in a mercantile house. His leisure hours he devoted to literature and criticism, in which he became expert. For many years he led a wandering life, supporting himself chiefly by his writings. At length he arrived in London, where he remained for a considerable time. He obtained an appointment as secretary to the Royal Academy of Painting, and became acquainted with

Johnson, Garrick and others of that society. He was a frequent visitor at the Thrales'; and his name occurs repeatedly in Boswell's Life. In 1769 he was tried for murder, having had the misfortune to inflict a mortal wound with his fruit knife on a man who had assaulted him on the street. Johnson among others gave evidence in his favour at the trial, which resulted in Baretti's acquittal. He died in May 1789. His first work of any importance was the Italian Library (London, 1757), a useful catalogue of the lives and works of many Italian authors. The Letter e famigliari, giving an account of his travels through Spain, Portugal and France during the years 1761-1765, were well received, and when afterwards published in English (4 vols., 1770), were highly commended by Johnson. While in Italy on his travels Baretti set on foot a journal of literary criticism, to which he gave the title of Frusta letteraria, the literary scourge. It was published under considerable difficulties and was soon discontinued. The criticisms on contemporary writers were sometimes just, but are frequently disfigured by undue vehemence and coarseness. Among his other numerous works may be mentioned a useful Dictionary and Grammar of the Italian Language, and a dissertation on Shakespeare and Voltaire. His collected works were published at Milan in 1838.

BARFLEUR, a small seaport of north-western France, overlooking the Bay of the Seine, in the department of Manche, 22J m. N.N.E. of Valognes by rail. Pop. (1906) 1069. In the middle ages Barfleur was one of the chief ports of embarkation for England. In n 20 the " White Ship," carrying Prince William, only son of Henry I., went down outside the harbour. About 2 m. to the north is Cape Barfleur, with a lighthouse 233 ft. high.

BARFURUSH, a town of Persia, in the province of Mazandaran in 36 32′ N., and 52° 42′ E., and on the left bank of the river Bawul [Babul] , which is here crossed by a bridge of eight arches, about 15 m. distant from the southern shore of the Caspian Sea, where the small town of Meshed i Sar serves as a port. It is the commercial capital of Mazandaran, and 26 m. distant from Sari and 90 m. from Teheran. Pop. about 50,000. Built in a low and swampy country and approached by deep and almost impassable roads, Barfurush would not seem at all favourably situated for the seat of an extensive inland trade; it is, however, peopled entirely by merchants and tradesmen, and is wholly indebted for its present size and importance to its commercial prosperity. The principal articles of its trade are rice and cotton, some sugar cane (nai shakar), flax (Katun) and hemp (Kanab) are also grown. The town is of peculiar structure and aspect, being placed in the midst of a forest of tall trees, by which the buildings are so separated from one another, and so concealed, that, except in the bazars, it has no appearance of a populous town. The streets are broad and neat, though generally unpaved, and kept in good order. No ruins are to be seen as in other Persian towns; the houses are comfortable, in good repair, roofed with tiles and enclosed by substantial walls. There are no public buildings of any importance., and the only places of interest are the bazars, which extend fully a mile in length, and consist of substantially built ranges of shops covered with roofs of wood and tiles, and well stored with commodities. There are about ten commodious caravanserais and a number of colleges (medresseh), the place being as much celebrated for learning as for commerce. On an island in a small lake east of the town is a garden, called Bagh i Shah (garden of the Shah), with ruined palaces and baths. At Meshed i Sar, the port, or roadstead of Barfurush, the steamers of the Caucasus and Mercury Company call weekly, and a brisk shipping trade is carried on between it and other Caspian ports.

Barfurush was formerly called Mamatlr. The present name is from a settlement called Barfurush-deh, which was added to the old cityA.D. 1012. (A.H.-S.)

BARGAIN 1 AND SALE, in English law, a contract whereby property, real or personal, is transferred from one person — called the bargainor — to another — called the bargainee — for a

1 From O. Fr. bargaigne, a word of doubtful origin, appearing in many Romance languages, cf. Ital. bargagno; it is connected with Late Lat. barcaniare, to traffic, possibly derived from barca, a barge.

valuable consideration; but the term is more particularly used to describe a mode of conveyance of lands. The disabilities under which a feudal owner very frequently lay gave rise to the practice of conveying land by other methods than that of feoffment with livery of seisin, that is, a handing over of the feudal possession. That of " bargain and sale " was one. Where a man bargained and sold his land to another •for pecuniary consideration, which might be merely nominal, and need not necessarily be actually paid, equity held the bargainor to be seised of the land to the use of the bargainee. The Statute of . Uses (1535), by converting the bargainee's interest into a legal estate, had an effect contrary to the intention of its framers. It made bargain and sale an easy means of secret or private conveyance, a policy to which the law was opposed. To remedy this defect, a statute (called the Statute of Enrolments) was passed in the same year, which provided that every conveyance by bargain and sale of freehold lands should be enrolled in a court of record or with the custos rolulorum of the county within six months of its date. The Statute of Enrolments applied only to estates of inheritance or for life, so that a bargain and sale of an estate for years might be made without enrolment. This in turn was the foundation of another mode of conveyance, namely, lease and release, which took the place of the deed of bargain and sale, so far as regards freehold. Bargain and sale of copyhold estates, which operates at common law, is still a mode of conveyance in England in the case of a sale by executors, where a testator has directed a sale of his estate to be made, instead of devising it to trustees upon trust to sell.

See also Conveyancing.

BARGE (Med. Lat. barca, possibly connected with Lat. baris, Gr. |

8ap«, a boat used on the Nile), formerly a small sailing vessel, but now generally a flat-bottomed boat used for carrying goods on inland navigations. On canals ‘barges are usually towed, but are sometimes fitted with some kind of engine; the men in charge of them are known as bargees. On tidal rivers barges are often provided with masts and sails (” sailing barges “), or in default of being towed, they drift with the current, guided by a long oar or oars (” dumb-barges “)• Barges used for un- loading, or loading, the cargo of ships in harbours are sometimes called “lighters” (from the verb “to light ” = to relieve of a load). A state barge was a heavy, often highly ornamented vessel used for carrying passengers on occasions of state cere- monials. The college barges at Oxford are houseboats moored m the river for the use of members of the college rowing clubs. In New England the word barge frequently means a vehicle, usually covered, with seats down the side, used for picnic parties or the conveyance of passengers to or from piers or railway stations.

BARGEBOARD (probably from Med. Lat. bargus, or barcus, a scaffold, and not from the now obsolete synonym ” vergeboard “), the boards fastened to the projecting gables of a roof to give strength to the same and to mask or hide the horizontal timbers of the roof to which they were attached. Bargeboards are some- times moulded only or carved, but as a rule the lower edges were cusped and had tracery in the spandrels besides being otherwise elaborated. The richest example is one at Ockwells in Berkshire, England, which is moulded and carved as if it were intended for internal work.

BARGHEST, Barguest or Bargest, the name given in the north of England, especially in Yorkshire, to a monstrous goblin- dog with huge teeth and claws. The spectre-hound under various names is familiar in folk-lore. The Demon of Tedworth, the Black Dog of Winchester and the Padfoot of Wakefield all shared the characteristics of the Barghest of York. In Wales its counter- part was Gwyllgi, “the Dog of Darkness,” a frightful apparition of a mastiff with baleful breath and blazing red eyes. In Lanca- shire the spectre-hound is called Trash or Striker. In Cambridge- shire and on the Norfolk coast it is known as Shuck or Shock. In the Isle of Man it is styled Mauthe Doog. It is mentioned by Sir Walter Scott in ” The Lay of the Last Minstrel “— ” For he was speechless, ghastly, wan Like him of whom the story ran Who spoke the spectre hound in Man.”

A Welsh variant is the Cwn Anmtn, or ” dogs of hell.” The

barghest was essentially a nocturnal spectre, and its appearance was regarded as a portent of death. Its Welsh form is confined to the sea-coast parishes, and on the Norfolk coast the creature is supposed to be amphibious, coming out of the sea by night and travelling about the lonely lanes. The derivation of the word barghest is disputed. ” Ghost ” in the north of England is pronounced ” guest,” and the name is thought to be burh-ghest, ” town-ghost.” Others explain it as German Berg-geist, ” moun- tain demon,” or Bar-geist, ” bear-demon,” in allusion to its alleged appearance at times as a bear. The barghest has a kinsman in the Rongeur d’Os of Norman folklore. A belief in the spectre-hound still lingers in the wild parts of the north country of England, and in Nidderdale, Yorkshire, nurses frighten children with its name.

See Wirt Sikes, British Goblins (1880) ; Notes and Queries, first series, ii. 51; Joseph Ritson, Fairy Tales (Lond. 1831), p. 58; Lancashire Folklore (1867) ; Joseph Lucas, Studies in Nidderdale (Pateley Bridge, 1882).

BARHAM, RICHARD HARRIS (1788-1845), English humourist, better known by his nom de plume of Thomas Ingoldsby, was born at Canterbury on the 6th of December 1788. At seven years of age he lost his father, who left him a small estate, part of which was the manor of Tappington, so frequently mentioned in the Legends. At nine he was sent to St Paul’s school, but his studies were interrupted by an accident which shattered his arm and partially crippled it for life. Thus deprived of the power of bodily activity, he became a great reader and diligent student. In 1807 he entered Brasenose College, Oxford, intending at first to study for the profession of the law. Circumstances, however, induced him to change his mind and to enter the church. In 1813 he was ordained and took a country curacy; he married in the following year, and in 182 1 removed to London on obtaining the appointment of minor canon of St Paul’s cathedral. Three years later he became one of the priests in ordinary of the King’s Chapel Royal, and was appointed to a city living. In 1826 he first contributed to Blackwood’s Magazine; and on the establishment of Bentley’s Miscellany in 1837 he began to furnish the series of grotesque metrical tales known as The Ingoldsby Legends. These became very popular, were published in a collected form and have since passed through numerous editions In variety and whimsicality of rhymes these verses have hardly a rival since the days of Hudibras. But beneath this obvious popular quality there lies a store of solid antiquarian learning, the fruit of patient enthusi- astic research, in out-of-the-way old books, which few

readers who laugh over his pages detect. His life was grave, dignified and highly honoured. His sound judgment and his kind heart made him the trusted counsellor, the valued friend and the frequent peacemaker; and he was intolerant of all that was mean and base and false. In politics he was a Tory of the old school; yet he was the lifelong friend of the liberal Sydney Smith, whom in many respects he singularly resembled. Theo- dore Hook was one of his most intimate friends. Barham was a contributor to the Edinburgh Review and the Literary Gazette; he wrote articles for Gorton's Biographical Dictionary; and a novel, My Cousin Nicholas (1834). He retained vigour and freshness of heart and mind to the last, and his last verses (" As I laye a-thynkynge ") show no signs of decay. He died in London after a long, painful illness, on the 17 th of June

A short memoir, by his son, was prefixed to a new edition of Ingoldsby in 1847, and a fuller Life and Letters, from the same hand, was published in 2 vols, in 1870.

BAR HARBOR, a well-known summer resort of Hancock county, Maine, U.S.A., an unincorporated village, in the town- ship of Eden, on Frenchman's Bay, on the E. side of Mount Desert Island, about 45 m. S.E. of Bangor. Pop. of the township (1900) 4379; (1910) 4441; of the village (1910), about 2000, greatly increased during the summer season. Bar Harbor is served by the Maine Central railway and by steamship lines to New York, Boston, Portland and other ports. The summer climate is cool, usually too cool for sea-bathing, but there is A

large open-air salt water swimming bath. Rugged mountains from iooo to 1500 ft. in height, a coast with deep indentations and lined with bold cliffs, a sea dotted with rocky islets, clear lakes, sparkling rivulets, deep gorges, and wooded glens are features of the attractive scenery here and in the vicinity. Several fine hotels and a number of costly residences occupy a plateau along the shore and the hillsides farther back. The Kebo Valley Club has fine golf links here; and since 1900 an annual horse show and fair has been held at Robin Hood Park at the foot of Newport Mountain. Bar Harbor is usually a summer rendezvous of the North Atlantic Squadron of the United States Navy. The name Bar Harbor, which displaced East Eden, was suggested by

the bar which appears at low water between it and Bar Island. Although the first summer hotel was built here in 1855, Bar Harbor's development as a summer resort began about 1870, after some artists had visited the place, and made it widely known through their pictures. (See Mount Desert.)

BAR-HEBRAEUS or Abu'l-Faraj, a maphrian or catholicus of the Jacobite (Monophysite) Church in the 13th century, and (in Dr. Wright's words) " one of the most learned and versatile men that Syria ever produced." Perhaps no more industrious compiler of knowledge ever lived. Simple and uncritical in his modes of thought, and apparently devoid of any striking originality, he collected in his numerous and elaborate treatises the results of such research in theology, philosophy, science and history as was in his time possible in Syria. Most of his works were written in Syriac, but some few in Arabic, which had long before his time supplanted Syriac as a living speech.

The son of a physician of Jewish descent, Bar-Hebraeus was born in 1226 at Malatiah on the upper Euphrates. His youth was passed in the troublous times of the Mongol advance into western Asia, and his father eventually retired to Antioch, where Bar-Hebraeus completed his education. In 1 246 he was ordained at Tripolis as Jacobite bishop of Gubas near Malaria, and a year later was transferred to the neighbouring diocese of Lakabhln, whence in 1253 he passed to be bishop of Aleppo. Deposed almost immediately by an ecclesiastical superior on account of disputes about the patriarchate, he was restored to his see in 1258, and in 1264 was promoted by the patriarch Ignatius III. to be maphrian — the next rank below that of patriarch — an office which he held till his death at Maragha in 1286. He seems to have been a model of devotion to his ecclesiastical duties and to have won the respect of all parties in his diocese.

It is mainly as an historian that Bar-Hebraeus interests the modern student. His great historical work — the Syriac Chronicle — is made up of three parts. The first J is a history of secular events from the Creation to his own time, and in its later portions gives valuable information regarding the history of south-east Europe and western Asia. A compendium in Arabic of this secular history was made by Bar-Hebraeus under the title ai-Mukhtasar fi'd-Duwal (Compendious History of the Dynasties). The second and third parts 2 of the Chronicle deal with the history of the Church, the second being mainly concerned with the patriarchate of Antioch, and the third with the eastern branch of the Syrian

Church. Of special value to theologians is the Ausar Raze (Storehouse of Secrets), a critical and doctrinal commentary on the text of the Scriptures. Of this many portions have been edited by various scholars, and a valuable study of the work, together with a biography and estimate of its author, has been published by J. Gottsberger (Barhebraus und seine Scholien zur heiligen Schrift, Freiburg i. B., 1900).

A full list of Bar-Hebraeus's other works, and of editions of such of them as have been published, will be found in W. Wright's Syriac Literature, pp. 268-281. The more important of them are: — (1) Kethabha dhe-Bhabhatha (Book of the Pupils of the Eyes), a treatise on logic or dialectics; (2) Hewath Hekhmetha (Butter of Wisdom), an exposition of the whole philosophy of Aristotle; (3) Sullaka Haunanaya (Ascent of the Mind), a treatise on astronomy and

1 Imperfectly edited and translated by Bruns and Kirsch in 1789. There is now a better edition by Bedjan (Paris, 1890). * * Edited and translated by Abbeloos and Lamy (Paris and Louvain, 1872-187?),

cosmography, edited and translated by F. Nau (Paris, 1899); (4) various medical works; (5) Kethabha dhe-Semhe (Book of Ravs), a treatise on grammar; (6) ethical works; (7) poems; (8) Kethabha dhe-Thunnaye Meghahhekhanl (Book of Entertaining Stories), edited and translated by E. A. W. Budge (London, 1897).

(N. M.)

BARI, a tribe of Nilotic negroes, living on the banks of the upper Nile some 200 m. N. of Albert Nyanza. They have as neigh- bours .the Dinka to the north, the Madi to the south, and the Galla to the east. The men are tall and thin, the women fat and under middle height. Their colour is a deep dead brown. The men and unmarried girls go practically naked, the married ' women wearing a goatskin dyed red. The body is ornamented with red clay and the lower incisors are often extracted. Their sole wealth is cattle and their chief food milk and blood; meat is only eaten when a cow happens to die. They live in round grass huts with conical roofs. Twins are considered unlucky, the mother is divorced by her husband and her family must refund part of the marriage-price. The dead are buried in the hut; a square grave is dug in which the body is arranged in a sitting position with the hands tied behind the back. The most important men in the

country are the rainmakers, who are reverenced even more than the chiefs, and, indeed, are famous among the surrounding tribes. The Bari warriors have been much recruited for the Egyptian army and were formerly used as slave-hunters by the Arab traders.

See Sir Samuel Baker, The Albert N'yanza (London, 1866); Friedrich Muller, Die Sprache der Bari (Vienna, 1864); G. Casati, Ten Years in Equatoria (London, 1891); W. Junker, Travels in Africa (English eel., 1890-1892) ; R. C. Owen, Bari Grammar (1908).

BARI (anc. Barium), a seaport and archiepiscopal see of Apulia, Italy, capital of the province of Bari, situated on a small peninsula projecting into the Adriatic, 69 m. N.W. of Brindisi by rail. Pop. (1901) 77,478. The town consists of two parts, the closely built old town on the peninsula to the N., and the new town to the S., which is laid out on a rectangular plan. The former contains the cathedral of S. Sabino, begun in 1035 but not completed till 1171: the exterior preserves in the main the fine original architecture (notably the dome and campanile), but the interior has been modernized. Not far off is the church of S. Nicola, founded in 1087 to receive the relics of this saint, which were brought from Myra in Lycia, and now lie beneath the altar in the crypt. The facade is fine, and the interigr, divided into three naves by columns, with galleries over the aisles, has fortunately not been restored; the vaulting of the crypt has, however, been covered with modern stucco. The church is one of the four Palatine churches of Apulia (the others being the cathedrals of Acquaviva and Altamura, and the church of Monte S. Angelo sul Gargano). Adjacent is the small church of S. Gregorio, belonging also to the nth century. The castle, built in 11 69, and strengthened in 1233, lies on the W. side of the old town: it is now used as a prison. The old harbour lies on the E. side of the peninsula, and the new on the W. In the new town is the Ateneo, containing the provincial museum, with a large collection of vases found in the district, in which the pre-Hellenic specimens are especially important (M. Mayer in Romische Mitteilungen, 1897, 201; 1899, 13; 1904, 188, 276). Bari is the seat of the command of the IX. army corps, and the most important commercial town in Apulia. It manufactures olive oil, soap, carbon sulphide and playing-cards, and has a large iron foundry.

Barium does not seem to have been a place of great im- portance in early antiquity; only bronze coins struck by it have been

found. In Roman times it was the point of junction between the coast road and the Via Traiana; there was also a branch road to Tarentum from Barium. Its harbour, mentioned as early as 181 B.C., was probably the principal one of the district in ancient times, as at present, and was the centre of a fishery. But its greatest importance dates from the time when it became, in 852, a seat of the Saracen power, and in 885, the residence of the Byzantine governor. In 1071 it was captured by Robert Guiscard. In 1095 Peter the Hermit preached the first crusade there. In n 56 it was razed to the ground, and has several times suffered destruction. In the 14th century it became an

independent duchy, and in 1558 was left by Bona Sforza to Philip II. of Spain and Naples. (T. As.)

BARILI, a town of the province of Cebu, island of Cebu, Philippine Islands, on the Barili river, 2 m. from its mouth and about 35 m. S.W. of Cebu, the capital. Pop. (1903) 31,617. It has a relatively cool and healthful climate. Its people are agriculturists and raise Indian corn, sibucao, hemp, cacao and coffee. The language is Cebu-Visayan.-

B ARING, the name of a family of English financiers and bankers. The firm of Baring Brothers was founded by Francis Baring (1740-1810), whose father, John Baring, son of a Lutheran minister at Bremen, had come to England from Germany, and started a cloth manufactory at Larkbear, near Exeter. Francis Baring was born at Larkbear, and in due course was placed in a London commercial firm. In 1770, in conjunction with his brother John, Francis Baring established a banking-house in London, and before he died in 18 10 had so developed the business that he was regarded as the first merchant in Europe. He was for many years a director of the East India Company, and chair- man in 1 79 2-1 793, receiving a baronetcy for his services. From 1 784-1806 he sat almost continuously in parliament as a Whig. He left five sons, of whom the eldest, Sir Thomas Baring (1772- was a well-known art-patron and collector. The control

of the business passed to his second son, Alexander (1774-1848), better known as Lord Ashburton, who had already been highly successful in extending the firm's operations in America, where

his marriage with the daughter of William Bingham, a wealthy resident of Philadelphia and United States senator, secured him considerable influence with the American commercial community. From 1806-1835 he represented various constituencies in parliament where he strongly opposed reform. In 1834 he became president of the Board of Trade and master of the mint in Sir Robert Peel's first administration, and the following year was raised to the peerage as Baron Ashburton. His business capacity and intimate acquaintance with American customs and institutions caused his appointment in 1842 as commissioner to the United States to negotiate the settlement of the north-eastern boundary question and other matters in dispute between the two countries, and he concluded in that year at Washington the treaty, commonly known as the Ash- burton treaty, by which the frontier between Maine and Canada was fixed. After his death in 1848 the affairs of the house were managed by Thomas Baring (1 799-1873), the son of Sir Thomas Baring. Thomas Baring represented Huntingdon in parliament from 1844 till his death. His elder brother, Sir Francis Thornhill Baring (1 796-1866), sat for Portsmouth from 1826-1865. From 1839-1841 he was chancellor of the exchequer, and from 1840-1852 first lord of the admiralty. In 1866 he was created Baron Northbrook, the barony being converted in 1876 into an earldom in favour of his eldest son Thomas George Baring (1826-1904). The latter, the 1st Earl of Northbrook, was occupied almost entirely with public-affairs, and filled at different times many important official positions. He is best remembered as viceroy of India, which office he held from 1872-1876, but his last public position was first lord of the admiralty (1880-1885). With the death of Thomas Baring, Edward Charles Baring (i828-i897),sonof Henry Baring, M. P., and grandson of Sir Francis Baring, became head of the firm of Baring Brothers, and in 1885 was raised to the peerage as Baron Revelstoke. The house of Baring then stood at the height of its prosperity. During the following years a large amount of English capital was advanced to the Argentine Republic, Barings undertaking the loans and guaranteeing the interest. Through the continued default of the Argentinegovernment , B arings became seriously involved, their heavy obligations precipitating a general financial crisis. Towards the end of 1890 it became known that the firm was on the eve of suspending payment, with liabilities amounting to £21,000,000. The prompt action of the Bank of England, which in conjunction with the leading joint-stock banks of the United Kingdom took over these liabilities, averted further disaster, and

the firm of Baring Brothers was subsequently reorganized as a limited company with a capital of £1,000,000.

Besides those already referred to, various other members of the Baring family have achieved public distinction, notably Charles Baring (1807-1879), bishop of Durham, and Evelyn Baring, 1st Earl of Cromer {q.v.).

BARING-GOULD, SABINE (1834-), English novelist, was born at Exeter on the 28th of January 1834. After graduating at Clare College, Cambridge, he spent some years in travel, and became in 1864 curate of Horbury, Yorkshire; then perpetual curate of Dalton, in the same county, in 1867; and in 1871 rector of East Mersea, Essex. On his father's death in 1872 he inherited the estate of Lew Trenchard, North Devon, where his family had been settled for nearly three centuries, and he exchanged his Essex living for the rectory of Lew Trenchard in 1881. He had a ready pen, and began publishing books on one subject or another — fiction, travel, history, folk-lore, religion, mythology, from 1854 onwards. His novel Mehalah (1880), the scene of which is laid on the east coast of England, was an excellent story, and among many others may be mentioned John Herring (1883), a tale of the west country; Court Royal (1886); Red Spider (1887); The Penny comequicks (1889); Cheap Jack Zita (1893); and Broom Squire (1896), a Sussex tale. His contributions to the study of topography, antiquities and folk-lore, while popularly written, were also full of serious research and real learning, notably his Book of Were-wohes (1865), Curious Myths of the Middle Ages (1866), Curious Survivals (1892). He produced at the same time many volumes of sermons and popular theology, and edited (1871-1873) The Sacristy, a quarterly review of ecclesiastical art and literature.

Living the life of the rapidly disappearing English "squarson," and full of cultivated interests, especially in humanizing the local village mind, and investigating and recording the good things of old-time, his many-sided activities were shown in every direction and his literary facility made his work known far and wide. His familiarity with the country-side and his interest in folk-lore were of special utility in recovering and preserving for publication a large mass of English popular song, and in assisting the new English movement for studying and appreciating the old national ballad-music.

BARINGO, a lake ot British East Africa, some 30 m. N. of the

equator in the eastern rift-valley. It is one of a chain of lakes which stud the floor of the valley and has an elevation of 3325 ft. above the sea. It is about 16 m. long by 9 broad and has an irregular outline, the northern shore being deeply indented. Its waters are brackish. Fed by several small streams it has no outlet; The largest of the rivers which enter it, the Tigrish and the Nyuki, run north through a flat marshy country which extends south of the lake. This district, inhabited by the negro tribe of Njamusi, was by the first explorers called Njemps. It is a fertile grain-growing region containing two considerable villages; The Njamusi are peaceful agriculturists who show marked friendliness to Europeans. N. of the lake rise the Karosi hills; to the E. the land rises in terraces to the edge of the Laikipia escarpment. A characteristic of the country in the neighbour hood of the lake are the " hills " of the termites (white ants). They are hollow columns 10 to 1 2 ft. high and from 1 ft. to 18 in. broad. The greater kudu, almost unknown elsewhere in East Africa, inhabits the flanks of the Laikipia escarpment to the east of the lake and comes to the foot-hills around Baringo to feed.

The existence of Lake Baringo was first reported in Europe by Ludwig Krapf and J. Rebmann, German missionaries stationed at Mombasa, about 1850; in J. H. Speke's map of the Nile sources (1863) Baringo is confused with Kavirondo Gulf of Victoria Nyanza; it figures in Sir H. M. Stanley's map (1877) as a large sheet of water N.E. of Victoria Nyanza. Joseph Thomson, in his journey through the Masai country in 1883, was the first white man to see the lake and to correct the exaggerated notions as to its size. Native tradition, however, asserts that the lake formerly covered a much larger area.

BARISAL, a town of British India, headquarters of Backergunje district in Eastern Bengal and Assam, situated on a river of the same name. Pop. (1901) 18,978. It is an important centre of river trade, on the steamer route through the Sundarbans

from Calcutta to the Brahmaputra. It contains a first grade college and several schools. There are a public library, established by subscription in 1858; and a students' union, for helping the sick and poor and promoting the intellectual and physical improvement of boys. Barisal has given its name to a

curious physical phenomenon, known as the " Barisal guns," the cause of which has not been satisfactorily explained. These are noises, like the report of cannon, frequently heard in the channels of the delta of the Brahmaputra, at the rising of the tide.

BARIUM (symbol Ba, atomic weight 137-37 [0=i6]), one of the metallic chemical elements included in the group of the alkaline earths. It takes its name from the Greek /3api»s (heavy) on account of its presence in barytes or heavy spar which was first investigated in 1602 by V. Casciorolus, a shoemaker of Bologna, who found that after ignition with combustible sub- stances it became phosphorescent, and on this account it was frequently called Bolognian phosphorus. Ini774K.W. Scheele, in examining a specimen of pyrolusite, found a new substance to be present in the mineral, for on treatment with sulphuric acid it gave an insoluble salt which was afterwards shown to be identical with that contained in heavy spar. Barium occurs chiefly in the form of barytes or heavy spar, BaS0 4 , and witherite, BaCOa, and to a less extent in baryto-calcite, baryto-celestine, and various complex silicates. The metal is difficult to isolate, and until recently it may be doubted whether the pure metal had been obtained. Sir H. Davy tried to electrolyse baryta, but was unsuccessful; later attempts were made by him using barium chloride in the presence of mercury. In this way he obtained an amalgam, from which on distilling off the mercury the barium was obtained as a silver white residue. R. Bunsen in 1854 electrolysed a thick paste of barium chloride and dilute hydro-chloric acid in the presence of mercury, at ioo° C, obtaining a barium amalgam, from which the mercury was separated by a process of distillation. A. N. Guntz (Comptes rendus, 1001, 133, p. 872) electrolyses a saturated solution of barium chloride using a mercury cathode and obtains a 3% barium amalgam; this amalgam is transferred to an iron boat in a wide porcelain tube and the tube slowly heated electrically, a good yield of pure barium being obtained at about iooo C. The metal when freshly cut possesses a silver white lustre, is a little harder than lead, and is extremely easily oxidized on exposure; it is soluble in liquid ammonia, and readily attacks both water and alcohol.

Three oxides of barium are known, namely,, the monoxide, BaO, the dioxide, Ba0 2 , and a suboxide, obtained by heating BaO with magnesium in a vacuum to noo° (Guntz, loc. Git., 1906, p. 359). The monoxide is formed when the metal burns in air, but is usually prepared by the ignition of the nitrate, oxygen and oxides

of nitrogen being liberated. It can also be obtained by the ignition of an intimate mixture of the carbonate and carbon, and in small quantities by the ignition of the iodate. It is a greyish coloured solid, which combines very energetically with water to form the hydroxide, much heat being evolved during the combination; on heating to redness in a current of oxygen it combines with the oxygen to form the dioxide, which at higher temperatures breaks up again into the monoxide and oxygen.

Barium hydroxide, Ba(OH) 2 , is a white powder that can be obtained by slaking the monoxide with the requisite quantity of water, but it is usually made on the large scale by heating heavy spar with small coal whereby a crude barium sulphide is obtained. This sulphide is then heated in a current of moist carbon dioxide, barium carbonate being formed, BaS-r-H 2 0-r-C0 2 =BaC03-r-H 2 S, and finally the car- bonate is decomposed by a current of superheated steam, BaC08+H 2 = Ba(OH) 2 + C0 2 , leavingaresidue of the hydroxide. It is a white powder moderately soluble in cold water, readily soluble in hot water, the solution possessing an alkaline reaction and absorbing carbon dioxide readily. The solution, known as baryta-water, finds an extensive application in practical chemistry, being used in gas-analysis for the determination of the amount of carbon dioxide in the atmosphere; and also being used in organic chemistry as a hydrolysing agent for the decomposition

of complex ureides and substituted aceto-acetic esters, whili E. Fischer has used it as a condensing agent in the preparation of a- and /8-acrose from acrolein dibromide. A saturated solu- tion of the hydroxide deposits on cooling a hydrated form Ba(OH) 2 8H 2 0, as colourless quadratic prisms, which on ex posure to air lose seven molecules of water of crystallization.

Barium dioxide, Ba0 2 , can be prepared as shown above, or in the hydrated condition by the addition of excess of baryta- water to hydrogen peroxide solution, when it is precipitated in the crystalline condition as Ba0 2 -8H 2 0. These crystals on heating to 130 C. lose the water of crystallization and leave a residue of the anhydrous peroxide. In the Brin process for the manufacture of oxygen, barium dioxide is obtained as an intermediate product by heating barium monoxide with air under pressure. It is a grey coloured powder which is readily decomposed by dilute acids with the production of hydrogen peroxide.

Barium chloride, BaCl 2 -2H 2 0, can be obtained by dissolving

witherite in dilute hydrochloric acid, and also from heavy spar by ignition in a reverberatory furnace with a mixture of coal, limestone and calcium chloride, the barium chloride being extracted from the fused mass by water, leaving a residue of insoluble calcium sulphide. The chloride crystallizes in colourless rhombic tables of specific gravity 3-0 and is readily soluble in water, but is almost insoluble in concentrated hydrochloric acid and in absolute alcohol. It can be obtained in the anhydrous condition by heating it gently to about 120 C. It has a bitter taste and is a strong poison. Barium bromide is prepared by saturating baryta-water or by decomposing barium carbonate with hydrobromic acid. It crystallizes as BaBr 2 2H 2 iso morphous with barium chloride. Barium bromate, Ba(BrOj) 2 , can be prepared by the action of excess of bromine on baryta- water, or by decomposing a boiling aqueous solution of 100 parts of potassium bromate with a similar solution of 74 parts of crystallized barium chloride. It crystallizes in the monoclinic system, and separates from its aqueous solution as Ba(Br03) 2 -H 2 0. On heating, it begins to decompose at 260-265° C. Barium chlorate, Ba(C103) 2 , is obtained by adding barium chloride to sodium chlorate solution; on concentration of the solution sodium chloride separates first, and then on further evaporation barium chlorate crystallizes out and can be purified by recrystal-lization. It can also be obtained by suspending barium carbonate in boiling water and passing in chlorine. It crystallizes in mono-clinic prisms of composition Ba(C103) 2 -H 2 0, and begins to decompose on being heated to 250° C. Barium iodate, Ba(I03) 2 , is obtained by the action of excess of iodic acid on hot caustic baryta solution or by adding sodium iodate to barium chloride solution. It crystallizes in monoclinic prisms of composition Ba(IOa) 2 -H 2 0, and is only very sparingly soluble in cold water.

Barium carbide, BaC 2 , is prepared by a method similar to that in use for the preparation of calcium carbide (see Acetylene). L. Maquenne has also obtained it by distilling a mixture of barium amalgam and carbon in a stream of hydrogen. Barium sulphide, BaS, is obtained by passing sulphuretted hydrogen over heated barium monoxide, or better by fusion of the sulphate with a small coal. It is a white powder which is readily decomposed by water with the formation of the hydroxide and hydrosulphide. The phosphorescence of the sulphide obtained by heating the thiosulphate is much increased by adding uranium, bismuth, or thorium before ignition (/. pr. Chem., 1905, ii. p. 196).

Barium sulphate, BaSO.j, is the most abundant of the naturally

occurring barium compounds (see Barytes) and can be obtained artificially by the addition of sulphuric acid or any soluble sulphate to a solution of a soluble barium salt, when it is precipitated as an amorphous white powder of specific gravity 4-5. It is practically insoluble in water, and is only very slightly soluble in dilute acids; it is soluble to some extent, when freshly prepared, in hot concentrated sulphuric acid, and on cooling the solution, crystals of composition BaS0 4 -H 2 S04 are deposited. It is used as a pigment under the name of ” permanent white ” or blanc fixe.

Barium nitride, BajN 2 , is obtained as a brownish mass by

passing nitrogen over heated barfum amalgam. It is decomposed by water with evolution of hydrogen, and on heating in a current of carbonic oxide forms barium cyanide (L. Maquenne). Barium amide, Ba(NH 2) 2) is obtained from potassammonium and barium bromide.

Barium nitrate, Ba(N0 3) 2 , is prepared by dissolving either the carbonate or sulphide in dilute nitric acid, or by mixing hot saturated solutions of barium chloride and sodium nitrate. It crystallizes in octahedra, having a specific gravity of 3.2, and melts at 507° C. (T. Carnelley). It is decomposed by heat, and is largely used in pyrotechny for the preparation of green fire. Barium carbonate, BaC0 3 , occurs rather widely distributed as witherite (q.v.) , and may be prepared by the addition of barium chloride to a hot solution of ammonium carbonate, when it is precipitated as a dense white powder of specific gravity 4-3; almost insoluble in water.

Barium and its salts can be readily detected by the yellowish-green colour they give when moistened with hydrochloric acid and heated in the Bunsenflame, or by observation of their spectra, when two characteristic green lines are seen. In solution, barium salts may be detected by the immediate precipitate they give on the addition of calcium sulphate (this serves to distinguish barium salts from calcium salts), and by the yellow precipitate of barium chromate formed on the addition of potassium chromate. Barium is estimated quantitatively by conversion into the sulphate. The atomic weight of the element

has been determined by C. Marignac by the conversion of barium chloride into barium sulphate, and also by a determination of the amount of silver required to precipitate exactly a known weight of the chloride; the mean value obtained being 136-84; T. W. Richards (Zeit. anorg. Chem., 1893, 6, p. 89), by determining the equivalent of barium chloride and bromide to silver, obtained the value 137-44. For the relation of barium to radium, see Radioactivity.

BARKER, EDMUND HENRY (1788-1839), English classical scholar, was born at Hollym in Yorkshire. He entered Trinity College, Cambridge, as a scholar in 1807, but left the university without a degree, being prevented by religious scruples from taking the oath then required. He had previously obtained (in 1809) the Browne medal for Greek and Latin epigrams. After acting as amanuensis to the famous Samuel Parr, the vicar of Hatton in Warwickshire, he married and settled down at Thetford in Norfolk, where he lived for about twenty-five years. He was in the habit of adding the initials O.T.N, (of Thetford, Norfolk) to the title-page of his published works. In later life he became involved in a law-suit in connexion with a will, and thus exhausted his means. In 1837-1838 he was a prisoner for debt in the king's bench and in the Fleet. He died in London on the 21st of March 1839. Barker was a prolific writer on classical and other subjects. In addition to contributing to the Classical Journal, he edited portions of several classical authors for the use of schools. He was one of the first commentators to write notes in English instead of Latin. In a volume of letters he disputed the claims of Sir Philip Francis to the authorship of th« Letters of Junius; his Parriana (1828) is a vast and ill- digested compilation of literary anecdotes and criticisms. He also saw through the press the English edition of Lempriere's Classical Dictionary (revised by Anthon) and of Webster's English Dictionary. It is as a lexicographer, however, that Barker is chiefly known. While at Hatton, he conceived the design of a new edition of Stephanus's Thesaurus Graecae Linguae. The work was undertaken by A. J. Valpy, and, although not expressly stated, it was understood that Barker was the re- sponsible editor. When a few parts had appeared, it was severely criticized in the Quarterly Review (xxii., 1820) by Blomfield; the result was the curtailment of the original plan of the work and the omission of Barker's name in connexion with it. It was completed in twelve volumes (1816-1828). The strictures of the Quarterly were answered by Barker in his Aristarchus Anti- Blomfieldianus, which, although

unconvincing, was in turn answered by Bishop Monk. He also published notes on the Etymologicum Gudianum, and collaborated with Professor Dunbar of Edinburgh in a Greek and English Lexicon (1831). The

editio princeps (1820) of the treatise attributed to Arcadius, IlepJ tovwv, was published by him from a Paris MS. Continental scholars entertained a more favourable opinion of him than those of his own country. He expressed contempt for the minute verbal criticism of the Porsonian school, in which he was himself deficient.

An account of his life will be found in the Gentleman's Magazine for May 1839 ; see also Notes and Queries (6th series , xii. p. 443), where a full list of his works is given.

BARKER'S MILL, a mechanical contrivance invented by a Dr Barker about the end of the 17th century. It consisted of a hollow vertical cylinder, provided with a number of horizontal arms fitted with lateral apertures; the contrivance is mounted so as to rotate about the vertical axis. By allowing water to enter the vertical tube, a rotation, due to the discharge through the lateral orifices, is set up.

BARKING, a market-town in the Romford parliamentary division of Essex, England, on the river Roding near its junction with the Thames, 8 m. E. of Fenchurch Street station and Liverpool Street station, London, by the London, Tilbury & Southend and Great Eastern railways. Pop. of urban district of Barking town (1891) 14,301; (1901) 21,547. The church of St Margaret is Norman with perpendicular additions, and con- tains many monuments of interest. Barking was celebrated for its nunnery, one of the oldest and richest in England, founded about 670 by Erkenwald, bishop of London, and restored in 970 by King Edgar, about a hundred years after its destruction by the Danes. The abbess was a baroness ex officio, and the revenue at the dissolution of the monasteries was £1084. There remains a perpendicular turreted gateway. There is also an ancient market-house, used as a town-hall. Victoria Gardens form a public pleasure-ground, and there are recreation grounds. The Gaslight and Coke Company's works at Beckton are in the parish, and also extensive rubber works. At the mouth of the Roding (Barking Creek) are great sewage works, receiving the Northern Outfall sewer from London. There are also chemical works, and some shipping trade, principally in timber and fish. Barking is a suffragan bishopric in the diocese of St

Albans.

BARKLY EAST, a town of Cape province, South Africa, capital of a district of the same name, and 80 m. by rail E.S.E. of Aliwal North. The town lies north of the Drakensberg on the Kraai tributary of the Orange river at an elevation of 5831 ft. The district has an area of 1564 sq. m. and a population (1904) of 8490, of whom 50 % are whites. The chief occupation followed is sheep-farming, the pasturage being excellent. Like Barkly West, the town and district are named after Sir Henry Barkly, governor of Cape Colony, 1870-1877.

BARKLY WEST, a town of Cape province, South Africa, 21 m. N. W. of Kimberley, capital of a district and of an electoral division of the same name in Griqualand West. It is built on the right bank of the Vaal, here spanned by a bridge. Pop. (1904) 1037. Originally called Klipdrift, the town was the first founded by the diggers after the discovery in 1867 of diamonds along the valley of the Vaal, and it had for some years a large floating population. On the discovery of the " dry diggings " at Kim- berley, the majority of the diggers removed thither. Barkly West remains, however, the centre of the alluvial diamonds industry. The diamonds of this district are noted for their purity and lustre, and are generally associated with other crystals — garnets, agates, quartz and chalcedonies.

Barkly West electoral division includes the whole of Griqualand West save the Kimberley division. It is divided into the fiscal districts of Barkly West, Hay and Herbert, with a total pop. (1904) of 48,388, of whom 12,170 are whites (see Griqualand).

BARLAAM AND JOSAPHAT, one of the most popular and widely disseminated of medieval religious romances, which owes its importance and interest to the fact that it is a Christianized version of the story of Gautama Siddharta, the Buddha, with which it agrees not only in broad outline but in essential details.

The Christian story first appears in Greek among the works of John (q.v.) of Damascus, who flourished in the early part of the 8th century, and who, before he adopted the monastic life, had

held high office at the court of the caliph Abu Ja'far al-Mansur,

as his father Sergius is said to have done before him.

The outline of the Greek story is as follows: — St Thomas had converted the people of India, and after the eremitic life originated in Egypt, many Indians adopted it. But a powerful pagan king arose who hated and persecuted the Christians, especially the ascetics. After this king, Abenner by name, had long been child- less, a boy greatly desired and matchless in beauty, was born to him and received the name of Josaphat. The king, in his joy, summons astrologers to predict the child's destiny. They foretell glory and prosperity beyond those of all his predecessors. One sage, most learned of all, assents, but intimates that the scene of this glory will be, not the paternal kingdom, but another in- finitely more exalted, and that the child will adopt the faith which his father persecutes.

The boy shows a thoughtful and devout turn. King Abenner, troubled by this and'by the remembrance of the prediction, selects a secluded city, in which he causes a splendid palace to be built, where his son should abide, attended only by tutors and servants in the flower of youth and health. No stranger was to have access, and the boy was to be cognizant of none of the sorrows of humanity, such as poverty, disease, old age or death, but only of what was pleasant, so that he should have no inducement to think of the future life; nor was he ever to hear a word of Christ and His religion.

Prince Josaphat grows up in this seclusion, acquires all kinds of knowledge and exhibits singular endowments. At. length, on his urgent prayer, the king reluctantly permits him to pass the limits of the palace, after having taken all precautions to keep painful objects out of sight. But through some neglect of orders, the prince one day encounters a leper and a blind man, and asks of his attendants with pain and astonishment what such a spectacle should mean. These, they tell him, are ills to which man is liable. Shall all men have such ills? he asks. And in the end he returns home in deep depression. Another day he falls in with a decrepit old man, and stricken with dismay at the sight, renews his questions and hears for the first time of death. And in how many years, continues the prince, does this fate befall man? and must he expect death as inevitable? Is there no way of escape? No means of eschewing this wretched state of decay? The attendants reply as may be imagined; and Josaphat goes home more pensive than ever, dwelling on the certainty of death and on what shall be thereafter.

At this time Barlaam, an eremite of great sanctity and knowledge, dwelling in the wilderness of Sennaritis, divinely warned, travels to India in the disguise of a merchant, and gains access to Prince Josaphat, to whom he imparts the Christian doctrine and commends the monastic life. Suspicion arises and Barlaam departs. But all attempts to shake the prince's convictions fail. As a last resource the king sends for Theudas, a magician, who removes the prince's attendants and substitutes seductive girls; but all their blandishments are resisted through prayer. The king abandons these efforts and associates his son in the government. The prince uses his power to promote.religion, and everything prospers in his hands. At last Abenner himself yields to the faith, and after some years of penitence dies. Josaphat surrenders the kingdom to a friend called Barachias and departs for the wilderness. After two years of painful search and much buffeting by demons he finds Barlaam. The latter dies, and Josaphat survives as a hermit many years. King Barachias afterwards arrives, and transfers the bodies of the two saints to India, where they are the source of many miracles.

Now this story is, mutatis mutandis, the story of Buddha. It will suffice to recall the Buddha's education in a secluded palace, his encounter successively with a decrepit old man, with a man in mortal disease and poverty, with a dead body, and, lastly, with a religious recluse radiant with peace and dignity, and his consequent abandonment of his princely state for the ascetic life in the jungle. Some of the correspondences in the two stories are most minute, and even the phraseology, in which some of the details of Josaphat's history are described, almost literally renders the Sanskrit of the Lalita Vistara. More than that, the

very word Joasaph or Josaphat (Arabic, Yudasatf) is a corruption of Bodisat due to a confusion between the Arabic letters for Y and B, and Bodisatva is a common title for the Buddha in the many birth-stories that clustered round the life of the sage. There are good Masons for thinking that the Christian story did not originate with John of Damascus, and a strong case has been made out by Zotenberg that it reflects the religious struggles and disputes of the early 7th century in Syria, and that the Greek text was edited by a monk of Saint Saba named John, his version being the source of all later texts and translations. How much older than this the Christian story is, we cannot tell, but it is interesting to remember that it embodies in the form of a speech the " Apology " of the 2nd-century philosopher Aristides. After its appearance among the writings of John of Damascus, it was

incorporated with Simeon Metaphrastes' Lives of the Saints (c. 950), and thence gained great vogue, being translated into almost every European language. A famous Icelandic version was made for Prince Hakon early in the 13th century. In the East, too, it took on new life and Catholic missionaries freely used it in their propaganda. Thus a Tagala (Philippine) translation was brought out at Manila in 1 7 1 2. Besides furnishing the early playwrights with material for miracle plays, it has supplied episodes and apologues to many a writer, including Boccaccio, John Gower and Shakespeare. Rudolph of Ems about 1220 expanded it into a long poem of 16,000 lines, celebrating the victory of Christian over heathen teaching. The heroes of the romance have even attained saintly rank. Their names were inserted by Petrus de Natalibus in his Catalogus Sanctorum (c. 1380), and Cardinal Baronius included them in the official Marlyrologium authorized by Sixtus ¥.(1585-1 590) under the date of the 27 th of November. In the Orthodox Eastern Church " the holy Josaph, son of Abener, king of India " is allotted the 26th of August. Thus unwittingly Gautama the Buddha has come to official recognition as a saint in two great branches of the Catholic Church, and no one will say that he does not deserve the honour. A church dedicated Divo Josaphat in Palermo is probably not the only one of its kind.

The identity of the stories of Buddha and St Josaphat was recognized by the historian of Portuguese India, Dipgo do Couto (1542-1616), as may be seen in his history {Dec. v. liv. vi. cap. 2). In modern times the honour belongs to Laboulaye (1859), Felix Liebrecht in i860 putting it beyond dispute. Subsequent researches have been carried out by Zotenberg, Max Miiller, Rhys Davids, Braunholtz and Joseph Jacobs, who published his Barlaam and Josaphat in 1896.

BAR-LE-DUC, a town of north-eastern France, capital of the department of Meuse, 50 m. E.S.E. of Chalons-sur-Marne, on the main line of the Eastern railway between that town and Nancy. Pop. (1906) 14,624. The lower, more modern and busier part of the town extends along a narrow valley, shut in by wooded or vine-clad hills, and is traversed throughout its length by the Ornain, which is crossed by several bridges. It is limited towards the north-east by the canal from the Marne to the Rhine, on the south-west by a small arm of the Ornain, called the Canal des Usines, on the left bank of which the upper town (Ville Haute) is situated. The Ville Haute, which is reached by staircases and steep narrow thoroughfares, is intersected by a long, quiet street,

bordered by houses of the 1 5th, 16th and 17th centuries. In this quarter are the remains (16th century) of the chateau of the dukes of Bar, dismantled in 1670, the old clock-tower and the college, built in the latter half of the 16th century. Its church of St Pierre (14th and 15th centuries) contains a skilfully-carved effigy in white stone of a half-decayed corpse, the work of Ligier Richier (1500-1572), a pupil of Michelangelo — erected to the memory of Rene de Chalons (d. 1 544). The lower town contains the official buildings and two or three churches, but these are of little interest. Among the statues of distinguished natives of the town is one to Charles Nicolas Oudinot, whose house serves as the h6tel-de-ville. Bar-Ie-Duc has tribunals of first instance and of commerce, a board of trade arbitrators, a lycee, a training-college for girls, a chamber of commerce, a branch of the Bank of France and an art museum. The industries of the town include iron-founding and the manufacture of machinery, corsets, hosiery,

flannel goods, jam and wall-paper, and brewing, cotton spinning and weaving, leather-dressing and dyeing. Wine, timber and iron are important articles of commerce.

Bar-le-Duc was at one time the seat of the countship, later duchy, of Bar, the history of which is given below. Though probably of ancient origin, the town was unimportant till the 10th century when it became the residence of the counts.

Counts and Dukes of Bar. In the middle of the 10th century the territory of Bar (Barrois) formed a dependency of the Empire. In the nth century its lords were only counts by title; they belonged to the house of Mousson (which also possessed the countships of Montbeliard and Ferrette), and usually fought in the French ranks, while their neighbours, the dukes of Lorraine, adhered to the German side. Theobald I., count of Bar, was an ally of Philip Augustus, as was also his son Henry II., who distinguished himself at the battle of Bouvines in 12 14. But sometimes the counts of Bar bore arms against France. In 1301 Henry III. having made an alliance with Edward I. of England, whose daughter he had married, was vanquished by Philip the Fair, who forced him to do homage for a part of Barrois, situated west of the Meuse, which was called Barrois mouvant. In 1354 Robert, count of Bar, who had married the daughter of King John, was made marquis

of Pont-a -Mousson by the emperor Charles IV. and took the title of duke of Bar. His successor, Edward III., was killed at Agincourt in 1415. In 1419 Louis of Bar, brother of the last-named, a cardinal and bishop of Chalons, gave the duchy of Bar to Rene of Anjou, the grandson of his sister Yolande, who married Isabella, duchess of Lorraine. Yolande of Anjou, who in 1444 had married Ferri of Lorraine, count of Vaudemont, became heiress of Nicholas of Anjou, duke of Calabria and of Lorraine, in 1473, and of Rene of Anjou, duke of Bar, in 1480; thus Lorraine, with Barrois added to it, once more returned to the family of its ancient dukes. United with Lorraine to France in 1634, Barrois remained, except for short intervals, part of the royal domain. It was granted in 1738 to Stanislaus Leszczynski, ex-king of Poland, and on his death in 1766 was once more attached to the crown of France. (M.P.*)

BARLETTA (anc. Barduli), a seaport town and episcopal see of Apulia, Italy, on the E.S.E. coast, in the province of Bari, 345 m. W.N. W. of Bari by rail. Pop. (1901)42,022. Itsimport- ance dates from the time of the Hohenstaufen. The Gothic church of S. Sepolcro was built at the close of the 1 2th century, and the Romanesque cathedral was begun at the same period, but added to later. In front of the former church stands a bronze statue, 14 ft. in height, of the emperor Heraclius. The castle behind the cathedral dates from 1537. The harbour is good. It was cleared by 508 sailing-vessels and 461 steamers, the latter with a total tonnage of 364,904 in 1904; the exports were of the value of £180,699 (principally wine, sulphur, oil, tartar and tartaric acid) , and the imports £92,486 (coal, timber and sundries) .

In the neighbourhood (between Andria and Cora to), during the siege of Barletta by the French in 1503, the town being defended by the Spanish army, a combat took place between thirteen picked knights of Italy and France, which resulted in favour of the former: it has been celebrated by Massimo d' Azeglio in his Disfida di Barletta. Seven miles to the N.W. are the salt-works of Barletta, now known under the name of Margherita di Savoia. (T. As.)

BARLEY (Hordeum sativum), a member of the grass family, and an important cereal which belongs peculiarly to temperate regions. It originated from a wild species, H. spontaneum, a native of western Asia and has been cultivated from the earliest times. Three subspecies or races are recognized, (i.) H. sativum, subsp. distichum (described by Linnaeus as a distinct species, H.

distichon), two-rowed barley. Only the middle spikelet of each triplet is fertile; the ear has therefore only two longitudinal rows of grain, and the spikes are strongly compressed laterally. This approaches most nearly to the wild stock, from which it is distinguished by the non-jointed axis and somewhat shorter awns. This is the race most commonly grown in the British Isles and in central Europe, and includes a large number of sub-races and varieties among which are the finest mal ting-

barleys. The chief sub-races are (a) peacock, fan or battledore barley, described by Linnaeus as a distinct species, H . zeocriton, with erect short ears about 2% in. long, broad at the base and narrow at the tip, suggesting an open. fan or peacock's tail; (6) erect-eared barleys (var. erectum) with erect broad ears and closely-packed plump grains; (c) nodding barleys (var. nutans). The ripe ears of the last hang so as to become almost parallel with the stem; they are narrower and longer than in (b), owing to the grains being placed farther apart on the rachis; it includes the Chevalier variety, one of the best for malting purposes, (ii.) H. sativum, subsp. hcxastichum, six-rowed barley (the H. hexastichon of Linnaeus) . All the flowers of each triplet of spikelets on both sides of the rachis are fertile and produce ripe fruits; hence the ear produces six longitudinal rows of grain. The ears are short, erect, and the grain thin and coarse; the straw is also short. It is a hardy race, but owing to the poor quality of the grain is rarely met with in Great Britain, (iii.) H. sativum, subsp. vulgare, bere, bigg or four-rowed barley (the H. vulgare of Linnaeus). All the flowers of each triplet are fertile as in (ii.), but the rows are not arranged regularly at equal distances round the rachis. The central fruits of each triplet form two regular rows, but the lateral spikelets form not four straight single rows as in (ii.), but two regular double rows, the whole ear appearing irregularly four-rowed. This race seems to be of later origin than the others. The ears are erect, about 25 in. long, the grains thinner and longer than in the two-rowed race, and the awns stiff and firmly adhering to the flowering glume. The var. pallidum is the barley most frequently cultivated in northern Europe and northern Asia. This race was formerly used for malt and beer, but owing to its larger amount of gluten as compared with starch it is less adapted for brewing than the two-rowed sorts. To this belong the varieties naked barley (H. coeleste and It. nudum) and Himalayan barley (H. trifurcatum and H . aegiceras). In both the fruits fall out freely from the glume, and in the latter the awns are three-pronged and shorter than the grain.

Barley is the most hardy of all cereal grains, its limit of cultivation extending farther north than any other; and, at the same time, it can be profitably cultivated in sub-tropical countries. The opinion of Pliny, that it is the most ancient aliment of mankind, appears to be well-founded, for no less than three varieties have been found in the lake dwellings of Switzerland, in deposits belonging to the Stone Period. According to Professor Heer these varieties are the common two-rowed (H. distichum), the large six-rowed (H. hexastichum, var. densum), and the small six-rowed (H. hexastichum, var. sanctum). The last variety is both the most ancient and the most commonly found, and is the sacred barley of antiquity, ears of which are frequently represented plaited in the hair of the goddess Ceres, besides being figured on ancient coins. The cultivation of barley in ancient Egypt is indicated in Exod. ix. 31. Till within recent times barley formed an important source of food in northern countries, and barley cakes are still to some extent eaten. Owing, however, to its poverty in that form of nitrogenous compound called gluten, so abundant in wheat, barley-flour cannot be baked into vesiculated bread; still it is a highly- nutritious substance, the salts it contains having a high propor- tion of phosphoric acid. The following is the composition of barley-meal according to Von Bibra, omitting the salts: —

Water 15 per cent.

Nitrogenous compounds . 12-981 „

Gum 6-744 1.

Sugar ..... 3-200 Starch ..... 59-950 ,, Fat 2-170 „

Barley is now chiefly cultivated for malting (see Malt) to prepare spirits and beer (see Brewing), but it is also largely employed in domestic cookery. For the latter purpose the hard, somewhat flinty grains are preferable, and they are prepared by grinding off the outer cuticle which forms ” pot barley.” When the attrition is carried further, so that the grain is reduced to small round pellets, it is termed ” pearl barley.” Patent barley is either pot or pearl barley reduced to flour. Under the name decoctum hordei, a preparation of barley is included in the

British Pharmacopoeia, which is of value as a demulcent and emollient drink in febrile and inflammatory disorders.

Cultivation. — Apart from the growth-habits of the plant itself, the consideration that chiefly determines the routine of barley cultivation is the demand on the part of the maltster for uniformity of sample. Less care is required in its cultivation when it is intended for feeding live-stock. It is essential that the grains on the maltster's floor should germinate simultaneously, hence at the time of reaping, the whole crop must be as nearly as possible in the same stage of maturity. On rich soils the crop is liable to grow too rapidly and yield a coarse, uneven sample, consequently the best barley is grown on light, open and preferably calcareous soils, while if the condition of the soil is too high it is often reduced by growing wheat before the barley.

Barley (see Agriculture, Crops and Cropping) is a rapidly-growing and shallow-rooted plant. The upper layer of the soil must therefore be free from weeds, finely pulverized and stocked with a readily-available supply of nutriment. In most rotations barley is grown after turnips, or some other " cleaning " crop, with or without the interposition of a wheat crop. The roots are fed off by sheep during autumn and early winter, after which the ground is ploughed to a depth of 3 or 4 in. only in order not to put the layer of soil fertilized by the sheep beyond reach of the plant. The ground is then left unworked and open to the crumbling influence of frost till towards the end of winter, when it is stirred with the cultivator followed by the harrows, or in some cases ploughed with a shallow furrow. The seed, which should be plump, light in colour, with a thin skin covered by fine wrinkles, is sown in March and early April l at the rate of from 8 to 12 pecks to the acre and lightly harrowed in. As even distribution at a uniform depth is necessary, the drill is preferred to the broadcast-seeder for barley sowing. In early districts seeding may take place as early as February, provided a fine tilth is obtainable, but it rarely extends beyond the end of April. If artificial manures are used, a usual dressing consists of 2 or 3 cwt. of superphosphate to the acre at the time of sowing, followed, if the ground is in poor condition, by 1 cwt. of nitrate of soda when the plant is showing. Nitrogen must, however, be applied with caution as it makes the barley rich in albumen, and highly albuminous barley keeps badly and easily loses its germinating capacity. Farm-yard manure should also be avoided. After-cultivation may comprise rolling, harrowing (to preserve the fineness of the tilth) and in some districts hoeing. Barley is

cut, either with scythe or machine, when it is quite ripe with the ears bending over. The crop is often allowed to lie loose for a day or two, owing to the belief that sunshine and dews or even showers mellow it and improve its colour. It may even be stacked without tying into sheaves, though this course involves greater expendi- ture of labour in carrying and afterwards in threshing. There is a prejudice against the use of the binder in reaping barley, as it is impossible to secure uniformity of colour in the grain when the stalks are tightly tied in the sheaf, and the sun has not free access to those on the inside. In any case it must not be stacked while damp, and if cut by machine is therefore sometimes tied in sheaves and set up in stooks as in the case of wheat. The above sketch indicates the general principles of barley-cultivation, but in practice they are often modified by local custom or farming exigencies.

Barley is liable to smut and the other fungus diseases which attack wheat (q.v.), and the insect pests which prey on the two plants are also similar. The larvae of the ribbon-footed corn-fly {Chlorops taeniopus) caused great injury to the barley crop in Great Britain in 1893, when the plant was weakened by extreme drought. A fair crop of barley yields about 36 bushels .(56 lb to the bushel) per acre, but under the best conditions 40 and 50 bushels may be obtained. The yield of straw is from 15 to 20 cwt. per acre. Barley-straw is considered inferior both as fodder and litter.

BARLEY-BREAK, an old English country game frequently, mentioned by the poets of the 17th and 18th centuries. It was

1 Barley is occasionally sown in autumn to provide keep for sheep in the following spring.

played by three pairs composed of one of each sex, who were stationed in three bases or plots, contiguous to each other. The couple occupying the middle base, called hell or prison, endeavoured to catch the other two, who, when chased, might break to avoid being caught. If one was overtaken, he and his companion were Condemned to hell. From this game was taken the expression “the last couple in hell,” often used in old plays.

BARLEY-CORN, a grain of barley, and thus a measure taken from the length of a grain of barley, three of which (sometimes four) were considered to make up an inch. The barley-corn has been personified as representing the malt liquor made from barley, as

in Burns's song " John Barleycorn."

BARLOW, SIR GEORGE HILARO (1 762-1847), Anglo-Indian statesman, was appointed to the Bengal Civil Service in 1778, and in 1788 carried into execution the permanent settlement of Bengal. When the marquess of Cornwallis died in 1805, Sir George Barlow was nominated provisional governor-general, and his passion for economy and retrenchment in that capacity has caused him to be known as the only governor-general who diminished the area of British territory; but his nomination was rejected by the home government, and Lord Minto was appointed. Subsequently Barlow was created governor of Madras, where his want of tact caused a mutiny of officers in 1809, similar to that which had previously occurred under Clive. In 181 2 he was recalled, and lived in retirement until his death in February 1847. He was created a baronet in 1803.

BARLOW, JOEL (1754-1812), American poet and politician, born in Redding, Fairfield county, Connecticut, on the 24th of March 1 754. He graduated at Yale in 1778, was a post-graduate student there for two years, and from September 1780 until the close of the revolutionary war was chaplain in a Massachusetts brigade. He then, in 1783, removed to Hartford, Connecticut, established there in July 1784 a weekly paper, the American Mercury, with which he was connected for a year, and in 1 786 was admitted to the bar. At Hartford he was a member of a group of young writers including Lemuel Hopkins, David Humphreys, and John Trumbull, known in American literary history as the " Hartford Wits." He contributed to the Anarchiad, a series of satirico-political papers, and in 1787 published a long and ambitious poem, The Vision of Columbus, which gave him a considerable literary reputation and was once much read. In 1788 he went to France as the agent of the Scioto Land Company, his object being to sell lands and enlist immigrants. He seems to have been ignorant of the fraudulent character of the company, which failed disastrously in 1790. He had previously, however, induced the company of Frenchmen, who ultimately founded Gallipolis, Ohio, to emigrate to America. In Paris he became a liberal in religion and an advanced republican in politics. He remained abroad for several years, spending much of his time in London; was a member of the obnoxious " London Society for Constitutional Information "; published various radical essays, including a volume entitled Advice to the Privileged Orders (1792), which was proscribed by the British government; and was made a citizen of France in 1792. He was American consul at

Algiers in 1795-1797, securing the release of American prisoners held for ransom, and negotiating a treaty with Tripoli (1796). He returned to America in 1805, andlived near Washing- ton, D.C., until 181 1, when he became American plenipotentiary to France, charged with negotiating a commercial treaty with Napoleon, and with securing the restitution of confiscated American property or indemnity therefor. He was summoned for an interview with Napoleon at Wilna, but failed to see the emperor there; became involved in the retreat of the French army; and, overcome by exposure, died at the Polish Village of Zarnowiec on the 24th of December 1812. In 1807 he had pub- lished in a sumptuous volume the Columbiad, an enlarged edition of his Vision of Columbus, more pompous even than the original; but, though it added to his reputation in some quarters, on the whole it was not well received, and it has subsequently been much ridiculed. The poem for which he is now best known is his mock heroic Hasty Pudding (1793). Besides the writings mentioned above, he published Conspiracy of Kings, a Poem addressed to

the Inhabitants of Europe from another Quarter of the Globe (1 792) ; View of the Public Debt, Receipts and Expenditure of the United States (1800); and the Political Writings of Joel Barlow (2nd ed., 1796). He also published an edition, ” corrected and enlarged,” of Isaac Watt’s Imitation of the Psalms of David (1786).

See C. B. Todd’s Life and Letters of Joel Barlow (New York and London, 1886); and a chapter, “The Literary Strivings of Joel Barlow,” in M. C. Tyler’s Three Men of Letters (New York and London, 1895).

BARLOW, PETER (1776-1862), English writer on pure and applied mathematics, was born at Norwich in 1776 and died on the 1st of March 1862. In 1806 he was appointed mathematical master in the Woolwich Academy, and filled that post for forty- one years. In 1823 he was made a fellow of the Royal Society, and two years later received the Copley medal. Steam loco- motion received much attention at his hands, and he sat on the railway commissions of 1836, 1839, 1842, 1845. He received many distinctions from British and foreign scientific societies. Barlow’s principal works axe— Elementary Investigation of the Theory of

Numbers (181 1); New Mathematical and Philosophical Dictionary (1814); Essay on Magnetic Attractions (1820). The investigations on magnetism led to the important practical discovery of a means of rectifying or compensating compass errors in ships. Besides compiling numerous useful tables, he contributed largely to the Encyclopaedia Melropolitana.

BARM (a word common to Teutonic languages), the scum formed on the top of malt liquor when fermenting; yeast used to leaven bread, or to set up fermentation in liquor.

BARMECIDES, more accurately Barmakids, a noble Persian family which attained great power under the Abbasid caliphs. Barmak, the founder of the family, was a Persian fire-worshipper, and is supposed to have been a native of Khorasan. According to tradition, his wife was taken for a time into the harem of Abdallah, brother of Kotaiba the conqueror of Balkh, and became the mother of Khalid b. Barmak the Barmecide. Barmak subsequently (about a.d. 736) rebuilt and adorned his native city of Balkh after the rebellion of Harith. The family prospered, and his grandson Yahya b. Khalid was the vizier of the caliph Mahdi and tutor of Harun al-Rashid. His sons Fadl and Ja'far (the Giafar of the Arabian Nights) both occupied high offices under Harun. The story of their disgrace, though romantic, is not improbable. 'Harun, it is said, found his chief pleasure in the society of his sister 'Abbasa and Ja'far, and in order that these two might be with him continuously without breach of etiquette, persuaded them to contract a purely formal marriage. The conditions were, however, not observed and Harun, learning that 'Abbasa had borne a son, caused Ja'far suddenly to be arrested and beheaded, and the rest of the family except Mahommed, Yahya's brother, to be imprisoned and deprived of their property. It is probable, however, that Harun's anger was caused to a large extent by the insinuations of his courtiers that he was a mere puppet in the hands of a powerful family. See further Caliphate, section C, §§ 4, 5.

The expression "Barmecide Feast," to denote an imaginary banquet, is drawn from one of the tales (" The Barber's Tale of his Sixth Brother ") in the Arabian Nights, in which a series of empty dishes is served up to a hungry man to test his sense of humour by one of the Barmecides (see edition by L. C. Smithers, Lond., 1894, vol. i. 317).

BARMEN, a town of Germany, in the Prussian Rhine province and

the governmental district of Dtisseldorf. Pop. (1816) 19,030; (1890) 116,144; (1905) 156,148. It is served by the main railway from Berlin to Aix-la-Chapelle, and lies immediately east of Elberfeld, with which it virtually forms one town. It stretches for some 4 m. along the narrow valley of the river Wupper, which, within the municipal boundaries, is crossed by twenty bridges. High wooded hills surround it. It is divided into three main districts, Upper, Middle and Lower Barmen, and is connected, throughout its length, with Elberfeld, by railway, tramway, and a suspended trolley line, hanging over the bed of the Wupper. It contains nine Evangelical and two Roman Catholic churches, a stately modern town hall, a Hall of Fame (Ruhmes-

halle), with statues of the emperors William I. and Frederick III., a theatre, a picture-gallery, an ethnographical museum, and ar exchange. There are many public monuments, one to Bismarck another to the poet Emil Rittershaus (1834-1897), a native of the town, and one commemorative of the Franco-German War of 1870-71. There are several high-grade public schools, academies of technical science, engineering and textile industry, and a missionary theological seminary. Barmen is one of the most important manufacturing centres of Germany. The rapid development of its commercial activity only dates from the beginning of the 19th century. It is the chief seat of ribbon weaving in Germany, and manufactures thread, lace, braids, cotton and cloth goods, carpets, silks, machinery, steel wares, plated goods and buttons, the last industry employing about 15,000 hands. There are numerous bleaching-fields, print-fields and dyeworks famous for their Turkey-red, soap works, chemical works and potteries. There are also extensive breweries. Its export trade, particularly to the United States, is very considerable. The hills lying S. of the town are laid out in public grounds. Here are a health resort, a tower commanding an extensive view, and numerous villas. Barmen, although mentioned in chronicles in the nth century, did not attain civic rights until 1808, when it was formed into a municipality by the grand-duke of Berg.

See A. Shadwell, Industrial Efficiency (1906), for a good description of the industrial aspect.

BARMOTE COURT (also written Berghmote, Barghmote, Bargemote, Barmoot), a name applied to courts held in the lead-mining districts of Derbyshire, England, for the purpose of determining the customs peculiar to the industry and also for the settlements of any disputes which may arise in connexion there-

with. Barmote courts are of very ancient origin, having been in existence in the reign of Edward I. Their jurisdiction extends both to the crown lands in the duchy of Lancaster and to those under individual ownership, comprising seven clearly defined districts. Owing to the progress made in modern mining, many of the customs and much of the procedure had become obsolete, and their powers were regulated by the High Peak Mining Customs and Mineral Courts Act 1851. An appeal from the jurisdiction of the courts lies by way of certiorari.

BARMOUTH (Abermaw, mouth of the Maw, or Mawddach, in Cardigan Bay, the only haven in Merionethshire, North Wales), a small seaport on the north of the estuary. Pop. of urban district (1901), 2214. The ride to Dolgelley (Dolgellau) is fine. The parish church, Llanaber, i£ m. from Barmouth, is on a cliff overlooking the sea. Barmouth is a favourite bathing place, on the Cambrian railway. It is a centre for coaching in summer, especially to and through the Vale of Llangollen.

BARNABAS, in the New Testament, the surname, according to Acts iv. 36, given by the apostles (possibly in contrast to Joseph Barsabbas, Acts i. 23) to Joseph, " a Levite, a man of Cyprus by birth," who, though like Paul not of the Twelve, came like him to rank as an apostle (Acts xiv. 4, 14, 1 Cor. ix. 6; see Apostle). The Greek rendering of this Semitic name (wis irapo(cXi7

with i Cor. xiv. 3). It is perhaps significant that his first appearance is of the generously helpful kind described in Acts iv. 36 f . Yet we must beware of regarding Barnabas as merely a fine character; he plays too prominent a part in the New Testament for any such limitation. Thus, he next appears as braving the suspicions which dogged the ex-persecutor Saul (Paul) — possibly an old acquaintance in Hellenist circles at Jerusalem (cf. vi. 9, ix. 29) — and introducing him to the older apostles (ix. 27). More suggestive still of high repute as a man of insight and authority is his mission from the Jerusalem Church to inspect and judge of the new departure in the Gospel at Antioch, in Acts xi. 22. This means very much, though his modesty led him to call in the aid of his friend Saul to cope with the new and expanding situation (25 f.). After their brief joint visit to Judaea and Jerusalem (xi. 30, xii. 25) we next get a glimpse of Barnabas as

still chief among the spiritual leaders of the Antiochene Church, and as called by the Spirit, along with Saul, to initiate the wider mission of the Gospel, outside Syria even, in regions beyond (xiii. 2, 4). He led the way to his native Cyprus; but in the crucial struggle with the magician Bar- Jesus, in- the presence of the governor of the island (xiii. 7 ff .), Saul seems to have come so decisively to the front, that henceforth, for the author of Acts he takes the lead, and Barnabas appears as his colleague (see xiii. 13, " Paul and his company," and note the turning back of Mark, the kinsman of Barnabas). The fact that at Lystra the natives styled Barnabas, Zeus, and Paul, Hermes, while suggest- ing that Barnabas was the man of nobler mien, proves that Paul was the chief speaker (xiv. 12); and the notices in the Pauline epistles fully bear out the view that " the gospel of the Gentiles " which they preached was in conception Paul's (Gal. ii. 1-9). Indeed, Barnabas's vacillation at Antioch, as recorded in Gal. ii. 11 ff. (whether it preceded or followed their mission in Acts xiii. -xiv.), shows that, while gifted with true intuitions, he was not strong in thinking out his position to all its issues on principle, and that it was here that Paul was so immensely his superior. But what Barnabas did see with full reasoned conviction, he was staunch in upholding; thus he upheld the general cause of Gentile freedom from the obligation of circumcision (as distinct from perfect religious equality with Jewish believers) at the Jerusalem conference (Acts xv.). With this stand for principle, however, his main work, as a great link in the transition of the Gospel from its Jewish to its universal mission, reached its climax; and Acts transfers its attention wholly to Paul, after explaining how their roads parted under rather painful circumstances (xv. 37 ff.).

When Barnabas sails away with Mark to resume work in Cyprus, the mists of history hide him from our sight. Only now and again do we catch fugitive and increasingly doubtful glimpses of him and his work. We learn from 1 Cor. ix. 6 that he adhered to Paul's principle of self-support in his mission work, and from Col. iv. 10 that his name was well known and respected at Colossae about a.d. 60. Tradition, which early regards him as one of the seventy (Clem. Alex.) , carries him, plausibly enough, to Alexandria (Clem. Horn. i. 8, ii. 4; cf. the ascription to him of the Alexandrine Epistle of Barnabas). But the evidence for his having visited Rome (later tradition says also Milan) is stronger because more varied (Clem. Recog. i. 7, cf. Horn. i. 7; the early Actus Petri Vercellenses; and the late Cypriot Encomium), especially if we might trust the Western ascription to him of the epistle to the

Hebrews, which begins with Tertullian (De Pud. 20) . But this may itself be mere inference from its self-description (xiii. 22), as a ” word of exhortation,” to the ” son of exhorta- tion ” (Acts iv. 36) as its author. The legend of his missionary labours in Cyprus, including martyrdom at Salamis, is quite late atid untrustworthy. The date of his death is uncertain, but he was probably no longer living when Acts was written (c. a.d. 75-80).

His was essentially a mediating role. He filled a position intermediate between Jewish and Pauline Christianity — one characteristic of Christian Hellenists generally. Hence he is spoken of with respect in the Clementines; while Paul, as a radical in relation to the Law, is discountenanced. If we could

confidently credit him with the authorship of the epistle to the Hebrews, we could conceive his theological standpoint more exactly. But, in any case, the Barnabas of history was a greater man than the Barnabas of modern tradition.

See W. Cunningham, Epistle of Barnabas, pp. xlvii.-lxii. ; 0. Braunsberger, DerApostel Barnabas, sein Leben . . . (Mainz, 1876); articles s.v. in Ency. Biblica and Hastings’s Dictionary of the Bible.

The Epistle of Barnabas is one of the apocryphal books of the New Testament. At the end of the Codex Sinaiticus of the 4th century, as a sort of appendix to the New Testament, there stands an ” Epistle of Barnabas.” Here it is followed by the Shepherd of Hermas, while in an nth-century MS., which contains also the Didache, it is followed by two writings which themselves form an appendix to the New Testament in the Codex Alexandrinus. This means that it once enjoyed quasi- canonical authority, a fact amply borne out by what Eusebius (H. E. iii. 25) says as to its standing in the ancient Church. It was at Alexandria that its authority was greatest. Clement comments on it, as on the canonical scriptures, in his Hypotyposes; Origen cites it in the same spirit as scripture (C. Celsum, i. 63, De Princ. iii. 2, 4, 7). Clement, too, ascribes it to ” the apostle ” or ” the prophet ” Barnabas (Strom, ii. 6, 31, cf. ii. 20, 116), with explicit reference to Paul’s fellow-apostle. Internal evidence makes this ascription impossible, nor does the epistle itself lay any claim to such authorship. Lightfoot, indeed, suggests that its author was ” some unknown namesake ” of the famous Barnabas: but it is simpler to suppose that it was fathered upon the latter by the Alexandrian Church, ready to believe that so favourite a writing was of

apostolic origin.

" That Alexandria, the place of its earliest reception, was also the place of its birth, is borne out by the internal evidence of style and interpretation, which is Alexandrian throughout " (Lightfoot). The picture,, too, which it gives of the danger lest the Christianity of its readers should be unduly Judaic in feeling and practice, suits well the experiences of a writer living in Alexandria, where Judaism was immensely strong. Further, he shows an " astonishing familiarity with the Jewish rites," in the opinion of a modern Jew (Kohler in the Jewish Encycl.); so much so, that the latter agrees with another Jewish scholar in saying that " the writer seems to have been a converted Jew, whose fanatic zeal rendered him a bitter opponent of Judaism within the Christian Church. ' ' These opinions must overrule the view of some Christian scholars that the writer often blunders in Jewish matters, the fact being that his knowledge is derived from the Judaism of Alexandria 1 rather than Palestine. But we need not therefore regard the author as of Jewish birth. It is enough, and more in keeping with the thought as a whole, to regard him as .having been in close contact with Judaism, possibly as a proselyte. He now uses his knowledge to warn his readers, with intense passion, against all compromise between Judaism and the Gospel. In this he goes so far as to deny any historical connexion between the two, maintaining with all the devices of an extravagant allegorism, including the Rabbinic Gematria based on the numerical values of letters (ix. 7 f.), that the Law and Prophecy, as meant by God, had never been given to Israel as a people. The Divine oracles had ever pointed to the Christian Covenant, and had been so understood by the men of God in Israel, whereas the apostate people had turned aside to keep the ceremonial letter of the Law at the instigation of an evil angel (ix. 4). In this way he takes in succession the typical Jewish institutions — Circumcision, Foods, Ablutions, Covenant, Sabbath, Temple — showing their spiritual counterpart in the New People and its ordinances, and that the Cross was prefigured from the first. Such insight (gnosis) into the reality of the case he regards as the natural issue of Christian faith; and it is his main object to help his readers to attain such spirituality— the more so that, by similar insight applied to the signs of the times, he knows and can show that the end of the present age is imminent (i. 5, 7-iv.). The burden of his epistle, then, is, " Let us become

'His reference to the wide prevalence of circumcision beyond Israel (ix. 6) is perhaps simply an exaggeration, more or less

conscious.

spiritual, a perfect temple unto God ” (iv. 1 1) ; and that not only by theoretic insight, but also by practical wisdom of life. In order to enforce this moral, he passes to ” another sort of gnosis and instruction ” (xviii. 1), viz. the precepts of the ” Two Ways,” cited in a slightly different form from that found in the first part of the Teaching of the Apostles. The modifications, however, are all in a more spiritual direction, in keeping with the genuinely evangelic spirit which underlies and pervades even the allegorical ingenuities of the epistle.

Its opening shows it to have been addressed to a Church, or rather a group of Churches, recently visited by the writer, who, while not wishing to write as an authoritative ” teacher ” so much as one who has come to love them as a friend (i. 8, cf. ix. 9), yet belongs to the class of ” teachers ” with a recognized spiritual gift (charisma) , referred to e.g. in the Didache. He evidently feels in a position to give his gnosis with some claim to a deferential hearing. This being so, the epistle was probably written, not to Alexandria, but rather by a ” teacher “of the Alexandrine Church to some body of Christians in Lower Egypt among whom he had recently been visiting. This would explain the absence of specific address, so that it appears as in form a ” general epistle,” as Origen styles it. Its date has been much debated. But Lightfoot’s reading of the apocalyptic passage in ch. iv. — with a slight modification suggested by Sir W. M. Ramsay — is really conclusive for the reign of Vespasian (a.d. 70-79). The main counter- view, in favour of a date about a.d. 130, can give no natural account of this passage, while it misconstrues the reference in ch. xvi. to the building of the spiritual temple, the Christian Church. Thus this epistle is the earliest of the Apostolic Fathers, and as such of special interest. Its central problem, the relation of Judaism and Christianity — of the Old and the New forms of a Covenant which, as Divine, must in a sense abide the same — was one which gave the early Church much trouble; nor, in absence of a due theory of the education of the race by gradual development, was it able to solve it satisfactorily.

Literature. — Besides collected editions of the Apostolic Fathers, see O. Braunsberger, Der Apostel Barnabas, . . . u. der ihm

beigelegte Brief (Mainz, 1876); W. Cunningham, Epistle of Barnabas (1877); sections in J. Donaldson, The Apostolic Fathers; E. Reuss, Theologie chretienne, vol. ii., and in M. von Engelhardt, Das Christenthum Juslins des Mdrtyrers; and Lightfoot's fragmentary essay in his Clement of Rome, ii. 503-512. See also Apocryphal Literature, section " New Testament. "

Gospel of Barnabas.— We read in antiquity, e.g. in the Decretum Gelasii, of an apocryphal Gospel of Barnabas (see Apocryphal Literature), but we have no knowledge of its contents. There exists, however, in a single MS. in Italian a Iongish gospel with this title, written from a Mahommedan standpoint, but probably embodying materials partly Gnostic in character and origin. The Italian MS. was found by the Deist, John Toland, in a private collection at Amsterdam (see his Nazarenus, 17 18); subsequently it came into the possession of Prince Eugene of Savoy, and finally was obtained with Eugene's library by the imperial library at Vienna. It has been edited, with an English translation (1907) by (Rev.) Lonsdale and Laura Ragg, who hold that it was the work of a Christian renegade to Mahommedanism about the i3th-i6th century. See also preliminary notice in the Journal of Theol. Studies, vi. 424 ff. The old view held by Toland and others that the Italian was a translation from the Arabic is demonstrably wrong. The Arabic marginal notes are apparently partly pious ejaculations, partly notes for the aid of Arabic students. The work is highly imaginative and often grotesque, but it is pervaded by an unusually high ethical enthusiasm. (J. V. B.)

BARNACLE, a name applied to Crustacea of the division Cirripedia or Thyrostraca. Originally, the name was given to the stalked barnacles (Lepadidae of C. Darwin), which attach themselves in great numbers to drift-wood and other objects floating in the sea and are one of the chief agents in the fouling of ships' bottoms during long voyages. The sessile barnacles (Balanidae of Darwin) or " acorn-shells " are found in myriads, encrusting the rocks between tide-marks on all coasts. One of

the most extraordinary and persistent myths of medieval natural history, dating back to the 1 2th century at least, was the cause of transferring to these organisms the name of the barnack or bernacle goose (Bernicla branta) . This bird is a winter visitor to Britain, and its Arctic nesting-places being then unknown, it was fabled to originate within the shell-like fruit of a tree growing by the sea-shore. In some variants of the story this shell is said to grow as a kind of mushroom on rotting timber in the sea, and is

obviously one of the barnacles of the genus Lepa-s. Even after

4′

1. Scalpellum rostratum, Darwin, sponges, New South Wales;

Philippine Islands. (4’), tergum; (4*), scutum.

2. Pollicipes cornucopiae. Leach, 5. Balanus tintinnabulum, Linn.,

European seas. Atlantic.

3. Tubicinella trachealis, Shaw, 5’. Section of Balanus, Linn.

attached to whales. 6. Coronula diadema, Linn., at-

4. Acasta sulcata, Lamk., in tached to whales.

the scientific study of zoology had replaced the fabulous tales of medieval writers, it was a long time before the true affinities of the barnacles were appreciated, and they were at first classed with the Mollusca, some of which they closely resemble in external appearance. It was not till Vaughan Thompson demonstrated, in 1830, their development from a free-swimming and typically Crustacean larva that it came to be recognized that, in Huxley’s graphic phrase, ” a barnacle may be said to be a Crustacean fixed by its head and kicking the food into its mouth with its legs.” For a systematic account of the barnacles and their allies, see the article Thyrostraca. (W.T.Ca.)

BARNARD, LADY ANNE (1750-1825), author of the ballad ” Auld Robin Gray,” the eldest daughter of James Lindsay, 5th earl of Balcarres, was born at Balcarres House, Fife, on the 1 2th of December 1750. She was married in 1793 to Andrew Barnard, a son of the bishop of Limerick, for whom she obtained from Henry Dundas (1st Viscount Melville) an appointment as colonial secretary at the Cape of Good Hope. Thither the Barnards went in March 1797, Lady Anne remaining at the Cape until January 1802. A remarkable series of letters written by Lady Anne thence to Dundas, then secretary for war and the colonies, was published in 1901 under the title South Africa a Century Ago. In 1806, on the reconquest of the Cape by the British, Barnard was reappointed colonial secretary, but Lady Anne did not accompany him thither, where he died in 1807. The rest of her life was passed in London, where she died on the 6th of May

1825. ” Auld Robin Gray ” was written by her in 1772, to music by the Rev. William Leeves (1748-1828), as he admitted in 1812. It was published anonymously in 1783, Lady Anne only acknowledging the authorship of the words two years before her death in a letter to Sir Walter Scott, who subsequently edited it for the Bannatyne Club with two continuations.

See the memoir by W. H. Wilkins, together with the original text of ” Auld Robin Gray,” prefixed to South Africa a Century Ago.

BARNARD, FREDERICK AUGUSTUS PORTER (1809-1889), American scientist and educationalist, was born in Sheffield, Massachusetts, on the 5th of May 1809. In 1828 he graduated, second on the honour list, at Yale. He was then in turn a tutor at Yale, a teacher (1831-1832) in the American Asylum for the

Deaf and Dumb at Hartford, Connecticut, and a teacher (1832-1838) in the New York Institute for the Instruction of the Deaf and Dumb. From 1838 to 1848 he was professor of mathematics and natural philosophy, and from 1848 to 1854 was professor of chemistry and natural history in the University of Alabama, for two years, also, filling the chair of English literature. In 1854 he was ordained as deacon in the Protestant Episcopal Church. In the same year he became professor of mathematics and natural philosophy in the University of Mississippi, of which institution he was chancellor from 1856 until the outbreak of the Civil War, when, his sympathies being with the North, he resigned and went to Washington. There for some time he was in charge of the map and chart department of the United States Coast Survey. In 1864 he became the tenth president of Columbia College (now Columbia University) in New York City, which position he held until the year before his death, his service thus being longer than that of any of his predecessors. During this period the growth of the college was rapid; new departments were established; the elective system was greatly extended; more adequate provision was made for graduate study and original research, and the enrolment was increased from about 150 to more than 1000 students. Barnard strove to have educa- tional privileges extended by the university to women as well as to men, and Barnard College, for women (see Columbia University), established immediately after his death, was named in his

honour. He died in New York City on the 27th of April 1889. Barnard was a versatile man, of catholic training, a classical and English scholar, a mathematician, a physicist, and a chemist, a good public speaker, and a vigorous but some- what prolix writer on various subjects, his annual reports to the Board of Trustees of Columbia being particularly valuable as discussions of educational problems. Besides being the editor-in-chief, in 1872, of Johnson's Universal Cyclopaedia, he published a Treatise on Arithmetic (1830); an Analytical Grammar with Symbolic Illustration (1836); Letters on Collegiate Government (1855); and Recent Progress in Science (1869),

See John Fulton's Memoirs of Frederick A. P. Barnard (New York,

1896).

BARNARD, GEORGE GREY (1863-), American sculptor, was born at Bellefonte, Pennsylvania, on the 24th of May 1863. He first Studied at the Art Institute, Chicago, and in 1883-1887 worked in P. T. Cavelier's atelier at Paris. He lived in Paris for twelve years, returning to America in 1896; and with his first exhibit at the Salon of 1894 he scored a great success. His principal works include, "The Boy" (1885); "Cain" (1886), later destroyed; " Brotherly Love," sometimes called " Two Friends " (1887); the allegorical " Two Natures " (1894, in the Metropolitan Museum, New York City) ; " The Hewer " (1902, at Cairo, Illinois); " Great God Pan " (in Central Park, New York City); the " Rose Maiden "; the simple and graceful "Maidenhood"; and sculptural decorations for the new Capitol building for the state of Pennsylvania at Harrisburg.

BARNARD, HENRY (1811-1900), American educationalist, was born in Hartford, Connecticut, on the 24th of January 181 1. He graduated at Yale in 1830, and in 1835 was admitted to the Connecticut bar. In 1837-1839 he was a member of the Connecticut legislature, effecting in 1838 the passage of a bill, framed and introduced by himself, which provided for " the better supervision of the common schools " and established a board of " commissioners of common schools " in the state. Of this board he was the secretary from 1838 till its abolition in 1842, and during this time worked indefatigably to reorganize and reform the common school system of the state, thus earning a national reputation as an educational reformer. In 1843 he was appointed by the governor of Rhode Island agent to examine the public schools of the state, and recommended improvements; and

his work resulted in the reorganization of the school system two years later. From 1845 to 1849 he was the first commissioner of public schools in the state, and his administration was marked by a decided step in educational progress. Returning to Connecticut, he was, from 1851 to 1855, " superintendent of common schools," and principal of the State Normal School at New

Britain, Conn. From 1859 to i860 he was chancellor of the University of Wisconsin and agent of the board of regents of the normal school fund; in 1866 he was president of St John's College, Annapolis, Maryland; and from 1867 to 1870 he was the first United States commissioner of education, and in this position he laid the foundation for the subsequent useful work of the Bureau of Education. His chief service to the cause of education, however, was rendered as the editor, from 1855 to 1 88 1, of the American Journal of Education, the thirty-one volumes of which are a veritable encyclopaedia of education, orte of the most valuable compendiums of information on the subject ever brought together through the agency of any one man. He also edited from 1838 to 1842, and again from 1851 to 1854, the Connecticut Common School Journal, and from 1846 to 1849 the Journal of the Rhode Island Institute of Instruction. He died at Hartford, Conn., on the 5th of July 1900. Among American educational reformers, Barnard is entitled to rank next to Horace Mann of Massachusetts.

See a biographical sketch by A. D. Mayo in the Report of the Com- missioner of Education for 1 896-1 897 (Washington, 1898), and W. S. Monroe's Educational Labours of Henry Barnard (Syracuse, 1893).

BARNARD, JOHN, English musician, was a minor canon of St Paul's in the reign of Charles I. He was the first to publish a collection of English cathedral music. It contains some of the finest 16th-century masterpieces, ranging from the " faux-bourdon " style of Tallis's Preces and Responses to the most developed types of full anthem. The text, however, is not trustworthy.

BARNARD CASTLE, a market-town in the Barnard Castle parliamentary division of Durham, England, 17 m. W. of Darlington by a branch of the North Eastern railway. Pop. of urban district (1901) 4421. It is beautifully situated on the steep left bank of the Tees. A noteworthy building in the town is the

octagonal town-hall, dating from 1747. There are a few picturesque old houses, and a fragment of an Augustinian convent. St Mary's church, in a variety of styles from Norman onward, contains some curious monuments; but the building of chief interest is the castle, which gives the town its name, and is the principal scene of Sir Walter Scott's Rokeby. The remains extend over a space of more than six acres. A remarkable building known as the Bowes' Mansion and Museum, bequeathed in 1874 to the town by a descendant of Sir George Bowes, contains a valuable collection of works of art. In the vicinity of the' town are Egglestone Abbey, beautifully situated on the Yorkshire bank of the river, Rokeby Park on the same bank, at the confluence of the Greta, and the massive 14th century castle of Raby to the north-east. The principal manufacture is shoe-thread. The corn-market is important.

As part of the lordship of Gainford, Barnard Castle is said to have been granted by William Rufus to Guy Baliol Bernard, son of Guy Baliol, who built the castle, and called it after himself, Castle Bernard. To the men of the town which grew up outside the castle walls he gave, about the middle of the 12th century, a-charter making them burgesses and granting them the same privileges as the town of Richmond in Yorkshire. This charter was confirmed by Bernard Baliol, son of the above Bernard. Other confirmation charters were granted to the town by Hugh, John, and Alexander Baliol. The castle and lordship remained in the hands of the Baliols until John Baliol, king of Scotland, forfeited them with his other English estates in 1296. Barnard Castle was then seized by Anthony, bishop of Durham, as being within his palatinate of Durham. Edward I., however, denied the bishop's rights and granted the castle and town to Guy Beauchamp, earl of Warwick, whose descendants continued to hold them until they passed to the crown by the marriage of Anne Nevill with Richard III., then duke of Gloucester. In 1630 Barnard Castle was sold to Sir Henry Vane, and in the same year the castle is said to have been unroofed and dismantled for the sake of the materials of which it was built. Tanning leather was formerly one of the chief industries of the town. In 1614 an act for " knights and burgesses to have place in parliament for the county palatine and city of Durham and borough of Barnard

Castle ” was brought into the House of Commons, but when the act was finally passed for the county and city of Durham, Barnard Castle was not included.

BARNARDO, THOMAS JOHN (1845-1905), English philanthropist, and founder and director of homes for destitute children, was born at Dublin, Ireland, in 1845. His father was of Spanish origin, his mother being an Englishwoman. With the intention of qualifying for medical missionary work in China, he studied medicine at the London hospital, and later at Paris and Edin- burgh, where.he became a fellow of the Royal College of Surgeons. His medical work in the east end of London during the epidemic of cholera in 1865 first drew his attention to the great numbers of homeless and destitute children in the cities of England. Encouraged by the support of the seventh earl of Shaftesbury and the first Earl (?airns, he gave up his early ambition of foreign missionary labour, and began what was to prove his life’s work. The first of the ” Dr Barnardo’s Homes ” was opened in 1867 in Stepney Causeway, London, where are still the headquarters of the institution. From that time the work steadily increased until, at the time of the founder’s death, in 1905, there were established 112 district ” Homes,” besides mission branches, throughout the United Kingdom. The object for which these institutions were started was to search for and to receive waifs and strays, to feed, clothe, educate, and, where possible, to give an industrial training suitable to each child. The principle adopted has been that of free and immediate admission; there are no restrictions of age or sex, religion or nationality; the physically robust and the in- curably diseased are alike received, the one necessary qualification being destitution. The system under which the institution is carried on is broadly as follows : — the infants and younger girls and boys are chiefly ” boarded out ” in rural districts; girls above fourteen years of age are sent to the industrial training homes, to be taught useful domestic occupations; boys above seventeen years of age are first tested in labour homes and then placed in employment at home, sent to sea or emigrated; boys of between thirteen and seventeen years of age are trained for the various trades for which they may be mentally or physically fitted. Besides the various branches necessary for the foregoing work, there are also, among others, the following institutions:— a rescue home for girls in danger, a convalescent seaside home, and a hospital for sick waifs. In 1872 was founded the girls’ village home at Barkingside, near Ilford, with its own church and sanatorium, and between sixty and

seventy cottage homes, forming a real ” garden city “; and there Barnardo himself was buried. In 1901, through the generosity of Mr E. H. Watts, a naval school was started at North Elmham, near Norwich, to which boys are drafted from the homes to be trained for the navy and the mercantile marine. Perhaps the most useful of all the varied work instituted by Barnardo is the emigration system, by which means thousands of boys and girls have been sent to British colonies, chiefly to Canada, where there are distributing centres at Toronto and Winnipeg, and an industrial farm of some 8000 acres near Russell in Manitoba. The fact that in Canada less than 2 % of the children sent out proved failures confirmed Barnardo’s conviction that ” if the children of the slums can be removed from their surroundings early enough, and can be kept sufficiently long under training, heredity counts for little, environment for almost everything.” In 1899 the various institutions and organizations were legally incorporated under the title of ” The National Association for the reclamation of Destitute Waif Children,” but the institution has always been familiarly known as ” Dr Barnardo’s Homes.” Barnardo laid great stress on the religious teaching of the children under his care. Each child is brought up under the influence and teaching of the denomination of the parents. The homes are divided into two sections for religious teaching, Church of England and Non-conformists; children of Jewish and Roman Catholic parentage are, where possible, handed over to the care of the Jewish Board of Guardians in London, and to Roman Catholic institutions, respectively. From the foundation of the homes in 1867 to the date of Barnardo’s death, nearly 60,000 children had been rescued, trained and placed out in life. Barnardo died of angina pectoris

in London on the 19th of September 1905. A national memorial was instituted to fofm a fund of £250,000 to relieve the various institutions of all financial liability and to place the entire work on a permanent basis. Dr William Baker, formerly the chairman of the council, was selected to succeed the founder of the homes as director. Barnardo was the author of many books dealing with the charitable work to which he devoted his life.

His biography (1907) was written by his wife (the daughter of Mr William Elmslie) and J. Marchant.

BARNAUL, a town of Asiatic Russia, government of Tomsk, standing in a plain bounded by offshoots of the Altai Moun- tains, and on the Barnaulka river, at its confluence with the Ob, in lat.

53 20′ N. and long. 83 46′ E., 220 m. S. of Tomsk. It is the capital of the Altai mining districts, and besides smelting furnaces possesses glassworks, a bell-foundry and a mint. It has also a meteorological observatory, established in i84i,a mining school and a museum with a rich collection of mineral and zoological specimens. Barnaul was founded in 1730 by A. Demidov, to whose memory a monument has been erected. Pop.

(1900) 29,850.

BARNAVE, ANTOINE PIERRE JOSEPH MARIE (1761-1793), one of the greatest orators of the first French Revolution, was born at Grenoble in Dauphine, on the 22nd of October 1761. He was of a Protestant family. His father was an advocate at the parlement of Grenoble, and his mother was a woman of high birth, superior ability and noble character. He was educated by his mother because, being a Protestant, he could not attend school, and he grew up at once thoughtful and passionate, studious and social, handsome in person and graceful in manners. He was brought up to the law, and at the age of twenty-two made himself favourably known by a discourse pronounced before the local parlement on the division of political powers. Dauphine was one of the first of the provinces to feel the excitement of the coming revolution; and Barnave was foremost to give voice to the general feeling, in a pamphlet entitled Esprit des edits en- registris mililairement le 20 mat 1788. He was immediately elected deputy, with his father, to the states of Dauphine, and took a prominent part in their debates. A few months later he was transferred to a wider field of action. The states-general were convoked at Versailles for the 5th of May 1 789, and Barnave was chosen deputy of the tiers Stat for his native province. He soon made an impression on the Assembly, became the friend of most of the leaders of the popular party, and formed with Adrien Duport and Alexandre Lameth (q.v.) the group known during the Constituent Assembly as ” the triumvirate.” He took part in the conference on the claims of the three orders, drew up the first address to the king, and supported the proposal of Sieyes that the Assembly should declare itself National. Until 1 791 he was one of the principal members of the club known later as the Jacobins, of which he drew up the manifesto and first rules (see Jacobins). Though a passionate lover of liberty, he hoped to secure the freedom of France and her monarchy at the same time. But he was almost unawares borne away by the mighty currents of the time, and he took part in the attacks on the monarchy, on the clergy, on church property, and on the pro- vincial parlements. With the one

exception of Mirabeau, Barnave was the most powerful orator of the Assembly. On several occasions he stood in opposition to Mirabeau. After the fall of the Bastille he wished to save the throne. He advocated the suspensory veto, and the establishment of trial by jury in civil causes, but voted with the Left against the system of two chambers. His conflict with Mirabeau on the question of assigning to the king the right to make peace or war (from the 16th to the 23rd of May 1791) was one of the most striking scenes in the Assembly. In August 1790, after a vehement debate, he fought a duel with J. A. M. de Cazales, in which the latter was slightly wounded. About the close of October 1 790 Barnave was called to the presidency of the Assembly. On the death of Mirabeau a few months later, Barnave paid a high tribute to his worth and public services, designating him the Shakespeare of oratory. On the arrest of the king and the royal family at Varennes, while attempting to escape from France, Barnave was

one of the three appointed to conduct them back to Paris. On the journey he was deeply affected by the mournful fate of Marie-Antoinette, and resolved to do what he could to alleviate their sufferings. In one of his most powerful speeches he main- tained the inviolability of the king's person. His public career came to an end with the close of the Constituent Assembly, and he returned to Grenoble at the beginning of 1 7 9 2 . His sympathy and relations with the royal family, to whom he had submitted a plan for a counter-revolution, and his desire to check the downward progress of the Revolution, brought on him suspicion of treason. Denounced (15th of August 1792) in the Legislative Assembly, he was arrested and imprisoned for ten months at Grenoble, then transferred to Fort Barraux, and in November 1793 to Paris. The nobility of his character was proof against the assaults of suffering. " Better to suffer and to die," he said, " than lo$e one shade of my moral and political character." On the 28th of November he appeared before the Revolutionary Tribunal. He was condemned on the evidence of papers found at the Tuileries and executed the next day, with Duport- Dutertre.

Barnave's (Euvres poslhumes were published in 1842 by Berenger (de la Drdme) in 4 vols. See F. A. Aulard, Les Orateurs de Vassemblee constituante (Paris, 1882).

BARNBY, SIR JOSEPH (1838-1896), English musical composer and conductor, son of Thomas Barnby, an organist, was born at York on the 12th of August 1838. He was a chorister at York minster from the age of seven, was educated at the Royal Academy of Music under Cipriani Potter and Charles Lucas, and was appointed in 1862 organist of St Andrew's, Wells Street, London, where he raised the services to a high degree of excellence. He was conductor of " Barnby's Choir " from 1864, and in 1871 was appointed, in succession to Gounod, conductor of the Albert Hall Choral Society, a post he held till his death. In 1875 he was precentor and director of music at Eton, and in 1892 became principal of the Guildhall School of Music, receiving the honour of knighthood in July of that year. His works include an oratorio Rebekah, Ps. xcvii., many services and anthems, and two hundred and forty-six hymn-tunes (published in 1897 in one volume), as well as some part-songs (among them the popular " Sweet and Low "), and some pieces for the organ. As a conductor he possessed the qualities as well as the defects of the typical north-countryman; if he was wanting in the higher kind of imagination or ideality, he infused into those who sang under him something of his own rectitude and precision. He was largely instrumental in stimulating the love for Gounod's sacred music among the less educated part of the London public, although he displayed little practical sympathy with opera. On the other hand, he organized a remarkable concert performance of Parsifal at the Albert Hall in London in 1884. He conducted the Cardiff Festivals of 1892 and 1895. He died in London on the 28th of January 1896, and after a special service in St Paul's cathedral was buried in Norwood Cemetery.

BARNES, ALBERT (1798-1870), American theologian, was born at Rome, New York, on the ist of December 1798. He graduated at Hamilton College, Clinton, N.Y., in 1820, and at che Princeton Theological Seminary in 1823, was ordained as a Presbyterian minister by the presbytery of Elizabethtown, New Jersey, in 1825, and was the pastor successively of the Presbyterian Church in Morristown, New Jersey (1825-1830) and of the First Presbyterian Church of Philadelphia(i830-i867). He held a prominent place in the New School branch of the Presbyterians, to which he adhered on the division of the de- nomination in 1837; he had been tried (but not convicted) for heresy in 1836, the charge being particularly against the views expressed by him in Notes on Romans (1835) of the imputation of the sin of Adam, original sin and the atonement; the bitter- ness stirred up by this

trial contributed towards widening the breach between the conservative and the progressive elements in the church. He was an eloquent preacher, but his reputation rests chiefly on his expository works, which are said to have had a larger circulation both in Europe and America than any others of their class. Of the well-known Notes on the New Testament

it is said that more than a million volumes had been issued by 1870. The Notes on Job, the Psalms, Isaiah and Daniel, found scarcely less acceptance. Displaying no original critical power, their chief merit lies in the fact that they bring in a popular (but not always accurate) form the results of the criticism of others within the reach of general readers. Barnes was the author of several other works of a practical and devotional kind, and a collection of his Theological Works was published in Philadelphia in 1875. ■ He died in Philadelphia on the 24th of December

1870.

BARNES, BARNABE (1569 ?i6o9), English poet, fourth son of Dr Richard Barnes, bishop of Durham, was born in Yorkshire, perhaps at Stonegrave, a living of his father's, in 1568 or 1569. In 1586 he was entered at Brasenose College, Oxford, where Giovanni Florio was his servitor, and in 1591 went to France with the earl of Essex, who was then serving against the prince of Parma. On his return he published Parthenophil and Par thenophe, Sonnettes, Madrigals, Elegies and Odes (ent. on Stationers' Register 1593), dedicated to his " dearest friend," William Percy, who contributed a sonnet to the eulogies prefixed to a later work, Offices. Parthenophil was possibly printed for private circulation, and the copy in the duke of Devonshire's library is believed to be unique. Barnes was well acquainted with the work of contemporary French sonneteers, to whom he is largely indebted, and he borrows his title, apparently, from a Neapolitan writer of Latin verse, Hieronymus Angerianus. It is possible to outline a story from this series of love lyrics, but the incidents are slight, and in this case, as in other Eliza- bethan sonnet-cycles, it is difficult to dogmatize as to what is the expression of a real personal experience, and what is intellectual exercise in imitation of Petrarch. Parthenophil abounds in passages of great freshness and beauty, although its elaborate conceits are sometimes over-ingenious and strained. Barnes took the part of Gabriel Harvey and even experimented in classical metres. This partisanship is sufficient to account for the abuse of

Thomas Nashe, who accused him, apparently on no proof at all, of stealing a nobleman's chain at Windsor, and of other things. Barnes's second work, A Divine Centurie of Spirituall Sonnetts, appeared in 1595. He also wrote two plays: — The Divil's Charter (1607), a tragedy dealing with the life of Pope Alexander VI., which was played before the king; and The Battle of Evesham (or Hexham), of which the MS., traced to the beginning of the 18th century, is lost. In 1606 he dedicated to King James Offices enabling privat Persons for the speciall service of all good Princes and Policies, a prose treatise containing, among other things, descriptions of Queen Elizabeth and of the earl of Essex. Barnes was buried at Durham in December 1609.

His Parthenophil and Spirituall Sonnetts were edited by Dr A. B. Grosart in a limited issue in 1875; Parthenophil was included by Prof. E. Arber in vol. v. of An English Garner; see also the new edition of An English Garner (Elizabethan Sonnets, ed. S. Lee, 1904, pp. lxxv. et seq.). Professor E. Dowden contributed a sympathetic criticism of Barnes to The Academy of Sept. 2, 1876.

BARNES, SIR EDWARD (1776-1838), British soldier, entered the 47th regiment in 1792, and quickly rose to field rank. He was promoted lieutenant-colonel in 1807, and colonel in 1810, and two years later went to the Peninsula to serve on Wellington's staff. His services in this capacity gained him further promotion, and as a major-general he led a brigade at Vittoria and in the Pyrenean battles. He had the cross and three clasps for his Peninsula service. As adjutant-general he served in the campaign of 1815 and was wounded at Waterloo. Already a K. C . B . , he now received the Austrian order of Maria Theresa, and the Russian order of St Anne. In 1819 began his connexion with Ceylon, of which island he was governor from 1824 to 1831. He directed the construction of the great military road between Colombo and Kandy, and of many other lines of communication, made the first census of the population, and introduced coffee cultivation on the West Indian system (1824). In 183 1 he received the G.C.B., and from 1831 to 1853 he was commander-in-chief in India, with the local rank of general. On his return home, after two unsuccessful attempts to secure the seat, he became M.P. for Sudbury in 1837, but he died in the following

year. Sir Edward Barnes' portrait was painted, for Ceylon, by John Wood, and a memorial statue was erected in Colombo.

BARNES, JOSHUA (1654-1712), English scholar, was born in London on the 10th of January 1654. Educated at Christ's Hospital and at Emmanuel College, Cambridge, he was in 1695 chosen regius professor of Greek, a language which he wrote and spoke with the utmost facility. One of his first publications was entitled Gerania; a New Discovery of a Little Sort of People, anciently discoursed of, called Pygmies (1675), a whimsical sketch to which Swift's Voyage to Lilliput possibly owes something. Among his other works are a History of that Most Victorious Monarch Edward III. (1688), in which he introduces long and elaborate speeches into the narrative; editions of Euripides (1694) and of Homer (1711), also one of Anacreon (1705) which contains titles of Greek verses of his own which he hoped to publish. He died on the 3rd of August 1712, at Hemingford, near St Ives, Hunts.

BARNES, ROBERT (1495-1540), English reformer and martyr, born about 1495, was educated at Cambridge, where he was a member, and afterwards prior of the convent of Austin Friars, and graduated D.D. in 1523. He was apparently one of the Cambridge men who were wont to gather at the White Horse Tavern for Bible-reading and theological discussion early in the third decade of the 16th century. In 1526, he was brought before the vice-chancellor for preaching a heterodox sermon, and was subsequently examined by Wolsey and four other bishops. He was condemned to abjure or be burnt; and preferring the former alternative, was committed to the Fleet prison and afterwards to the Austin Friars in London. He escaped thence to Antwerp in 1528, and also visited Wittenberg, where he made Luther's acquaintance. He also came across Stephen Vaughan, an agent of Thomas Cromwell and an advanced reformer, who recommended him to Cromwell: " Look well," he wrote, " upon Dr Barnes' book. It is such a piece of work as I have not yet seen any like it. I think he shall seal it with his blood" {Letters and Papers of Henry VIII. v. 593). In 1 53 1 Barnes returned to England, and became one of the chief intermediaries between the English government and Lutheran Germany. In 1535 he was sent to Germany, in the hope of inducing Lutheran divines to approve of Henry's divorce from Catherine of Aragon, and four years later he was employed in negotiations connected with Anne of Cleves's marriage. The policy was Cromwell's, but Henry VIII. had already in 1538 refused to adopt Lutheran theology, and the statute of Six Articles (1539), followed by the king's disgust with Anne of Cleves (1540), brought the agents of that policy to ruin. An attack

upon Bishop Gardiner by Barnes in a sermon at St Paul's Cross was the signal for a bitter struggle between the Protestant and reactionary parties in Henry's council, which raged during the spring of 1540. Barnes was forced to apologize and recant; and Gardiner delivered a series of sermons at St Paul's Cross to counteract Barnes' invective. But a month or so later Cromwell was made earl of Essex, Gardiner's friend, Bishop Sampson, was sent to the Tower, and Barnes reverted to Lutheranism. It was a delusive victory. In July, Cromwell was attainted, Anne of Cleves was divorced and Barnes was burnt (30th July 1540). He also had an act of attainder passed against him, a somewhat novel distinction for a heretic, which illustrates the way in which Henry VIII. employed secular machinery for ecclesiastical purposes, and regarded heresy as an offence against the state rather than against the church. Barnes was one of six executed on the same day: two, William Jerome and Thomas Gerrard, were, like himself, burnt for heresy under the Six Articles; three, Thomas Abel, Richard Fetherstone and Edward Powell, were hanged for treason in denying the royal supremacy. Both Lutherans and Catholicˆ on the con- tinent were shocked. Luther published Barnes' confession with a preface of his own as Bekenntnis des Glaubens (1540), which is included in Walch's edition of Luther's Werke xxi. 186.

See Letters and Papers of Henry VIII. vols, iv.xv. passim; Wriothesley's Chronicle; Foxe's Acts and Monuments, ed. G. Town send- Burnet's Hist, of the Ref., ed. Pocock; Dixon's Hist, of the

Church; Gairdner's Church in the XVIth Century; Pollard's Henry VIII. and Cranmer; Herzog-Hauck, Realencyklopadie, 3rd ed. (A. F. P.)

BARNES, THOMAS (1785-1841), British journalist, was bom about 1785. Educated at Christ's Hospital and Pembroke College, Cambridge, he came to London and soon joined the famous literary circle of which Hunt, Lamb and Hazlitt were prominent members. Upon the retirement of Dr Stoddart in 181 7 he was appointed editor of The Times, a position which he held until his death, when he was succeeded by Delane. Lord Lyndhurst gave expression to a very widely-held opinion when he described him as " the most powerful man in the country." He died on the 7 th of May 1841.

BARNES, WILLIAM (1800-1886), the Dorsetshire poet, was born on the 22nd of February 1800, at Rushay, near Pentridge in Dorset, the son of John Barnes and Grace Scott, of the farmer class. He was a delicate child, in direct contrast to a strong race of forebears, and inherited from his mother a refined, retiring disposition and a love for books. He went to school at Sturminster Newton, where he was considered the clever boy of the school; and when a solicitor named Dashwood applied to the master for a quick-witted boy to join him as pupil, Barnes was selected for the post. He worked with the village parson in his spare hours at classics and studied music under the organist. In 1818 he left Sturminster for the office of one Coombs at Dorchester, where he continued his evening education with another kindly clergy- man. He also made great progress in the art of wood-engraving, and with the money he received for a series of blocks for a work called Walks about Dorchester, he printed and published his first book, Orra, a Lapland Tale, in 1 8 2 2 . In the same year he became engaged to Julia Miles, the daughter of an excise officer. In 1823 he took a school at Mere in Wiltshire, and four years later married and settled in Chantry House, a fine old Tudor mansion in that; town. The school grew in numbers, and Barnes occupied all his spare time in assiduous study, reading during these years authors so diverse in character as Herodotus, Sallust, Ovid, Petrarch, Buffon and Burns. He also began to write poetry, and printed many of his verses in the Dorset County Chronicle. His chief studies, however, were philological; and in 1829 he published An Etymological Glossary of English Words of Foreign Derivation. In 1832 a strolling company of actors visited Mere, and Barnes wrote a farce, The Honest Thief, which they produced, and a comedy which was played at Wincanton. Barnes also wrote a number of educational books, such as Elements of Perspective, Outlines of Geography, and in 1833 first began his poems in the Dorsetshire dialect, among them the two eclogues " The'Lotments "and" ABito'Sly Coorten," in the pages of the local paper. In 1835 he left Mere, and returned to Dorchester, where he started another school, removing in 1837 into larger quarters. In 1844 he published Poems of Rural Life in the Dorset Dialect. Three years later Barnes took holy orders, and was appointed to the cure of Whitcombe, 3 m. from Dor- chester. He had been for some years upon the books of St John's College, Cambridge, and took the degree of B.D. in 1850. He resigned Whitcombe in 1852, finding the work too hard in connexion with his mastership; and in June of that year he sustained a severe bereavement by the death of

his wife. Con- tinuing his studies in the science of language, he published his Philological Grammar in 1854, drawing examples, from more than sixty languages. For the copyright of this erudite work he received £5. The second series of dialect poems, Hwomely Rhymes, appeared in 1859 (2nd ed. 1863). Hwomely Rhymes contained some of his best-known pieces, and in the year of its publication he first began to give readings from his works. As their reputation grew he travelled all over the country, delighting large audiences with his quaint humour and natural pathos. In 1 86 1 he was awarded a civil list pension of £70 a year, and in the next year published Tiw, the most striking of his philological studies, in which the Teutonic roots in the English language are discussed. Barnes had a horror of Latin forms in English, and would have substituted English compounds for many Latin forms in common use. In 1862 he broke up his school, and

removed to the rectory of Winterborne Came, to which he was presented by his old friend, Captain Seymour Dawson Damer. Here he worked continuously at verse and prose, contributing largely to the magazines. A new series of Poems of Rural Life in the Dorset Dialect appeared in 1862, and he was persuaded in 1868 to publish a series of Poems of Rural Life in Common English, which was less successful than his dialect poems. These latter were collected into a single volume in 1879, and on the 7th of October 1886 Barnes died at Winterborne Came. His poetry is essentially English in character; no other writer has given quite so simple and sincere a picture of the homely life and labour of rural England. His work is full of humour and the clean, manly joy of life; and its rusticity is singularly allied to a literary sense and to high technical finish. He is indeed the Victorian Theocritus; and, as English country life is slowly swept away before the advance of the railway and the telegraph, he will be more and more read for his warm-hearted and fragrant record of rustic love and piety. His original and suggestive books on the English language, which are valuable in spite of their eccen- tricities, include: — Se Gefylsta: an Anglo-Saxon Delectus (1849); A Grammar and Glossary of the Dorset Dialect (1864) ; An Outline of English Speech-Craft (1878); and A Glossary of the Dorset Dialect (Dorchester, 1886).

See The Life of William Barnes, Poet and Philologist (1887), by his daughter, Lucy E. Baxter, who is known as a writer on art by the pseudonym of Leader Scott; and a notice by Thomas Hardy in the Athenaeum (16th of October 1886).

BARNET, a residential district in the mid or St Albans parliamentary division of Hertfordshire, England; 10 m. N. of London, served by the main line and branches of the Great Northern railway. The three chief divisions are as follows : — (1) Chipping or High Barnet, a market town and urban district (Barnet), pop. (1001) 7876. The second epithet designates its position on a hill, but the first is given it from the market granted to the abbots of St Albans to be kept there, by Henry II. Near the town, round a point marked by an obelisk, was fought in 1-4 71 the decisive battle between the houses of York and Lancaster, in which the earl of Warwick fell and the Lancastrians were totally defeated. The town is on the Great North Road, on which it was formerly an important coaching station. A large annual horse and cattle fair is held. (2) East Barnet, 2 m. S.E. of Chipping Barnet, has an ancient parish church retaining Norman portions, though enlarged in modern times. Pop. of East Barnet Valley urban district, 10,094. (3) New Barnet lies 1 m. E. by S. from Chipping Barnet.

Frtern Barnet, in the Enfield parliamentary division of Middlesex, lies 3 m. S. of Chipping Barnet. Pop. of urban district, 11,566. The prefix recalls the former lordship of the manor possessed by the friary of St John of Jerusalem in Clerken- well, London. Friern Barnet adjoins Finchley on the north and Whetstone on the south, the whole district being residential.

BARNETT, JOHN (1802-1890), English musical composer, son of a Prussian named Bernhard Beer, who changed his name on settling in England as a jeweller, was born at Bedford, and at the age of eleven sang on the Lyceum stage in London. His good voice led to his being given a musical education, and he soon began writing songs and lighter pieces for the stage. In 1834 he published a collection of Lyrical Illustrations of the Modern Poets \ His Mountain Sylph — with which his name is chiefly connected — received a warm welcome when produced at the Lyceum on August 25, 1834, as the first modern English opera: and it was followed by another opera Fair Rosamund in 1837, and by Farinelli in 1839. He had a large connexion as a singing-master at Cheltenham, and published Systems and Singing-masters (1842) and School for the Voice (1 844) . He died on the

1 6th of April 1 890.

His nephew, John Francis Barnett (1837-)> son of John's brother, Joseph Alfred, also a professor of music, carried on the traditions of the family as a composer and teacher. He obtained a queen's scholarship at the Royal Academy of Music, and developed into an accomplished pianist, visiting Germany to study in 1857 and playing at a Gewandhaus concert at Leipzig in i860. He came into notice as a composer with his symphony

in A minor (1864), and followed this with a number of compose tions for orchestra, strings or pianoforte. His cantata The Ancient Mariner was brought out at Birmingham in 1867, and another, Paradise and the Peri, in 1870, both with great success. In 1873 his most important work, the oratorio The Raising of Lazarus, was written, and in 1876 produced at Hereford. Many other cantatas, pianoforte pieces, &c. were composed by him, and successfully brought out; and he took an active part as a professor in the work of the Guildhall School of Music and Royal College of Music.

BARNETT, SAMUEL AUGUSTUS (1844-), English clergy- man and social reformer, was born at Bristol on the 8th of February 1844, the son of Francis Augustus Barnett, an iron manufacturer. After leaving Wadham College, Oxford, in 1866, he visited the United States. Next year he was ordained to the curacy of St Mary's, Bryanston Square, and took priest's orders in 1868. In 1872 he became vicar of St Jude's, Commercial Street, Whitechapel, and in the next year married Henrietta Octavia Rowland, who had been a co-worker with Miss Octavia Hill and was no less ardent a philanthropist than her husband. Mr and Mrs Barnett worked hard for the poor of their parish, opening evening schools for adults, providing them with music and reasonable entertainment, and serving on the board of guardians and on the managing committees of schools. Mr Barnett did much to discourage outdoor relief, as tending to the pauperization of the neighbourhood. At the same time the conditions of indoor relief were improved, and the various charities were co-ordinated, by co-operation with the Charity Organization Society and the parish board of guardians. In 1875 Arnold Toynbee paid a visit, the first of many, to White- chapel, and Mr Barnett, who kept in constant touch with Oxford, formed in 1877 a small committee, over which he presided himself, to consider the organization of university extension in London, his chief assistants being Leonard Montefiore, a young Oxford man, and Frederick Rogers,

a member of the vellum binders' trade union. The committee received influential support, and in October four courses of lectures, one by Dr S. R. Gardiner on English history, were given in Whitechapel. The Barnetts were also associated with the building of model dwellings, with the establishment of the children's country holiday fund and the annual loan exhibitions of fine art at the Whitechapel gallery. In 1884 an article by Mr Barnett in the Nineteenth Century discussed the question of university settlements. This resulted in July in the formation of the University Settlements Associa- tion, and when Toynbee Hall was built shortly afterwards Mr Barnett became its warden. He was a select preacher at Oxford in 1895-1897, and at Cambridge in 1900; he received a canonry in Bristol cathedral in 1893, but retained his wardenship of Toynbee Hall, while relinquishing the living of St Jude's. In June 1906 he was preferred to a canonry at Westminster, and when in December he resigned the wardenship of Toynbee Hall the position of president was created so that he might retain his connexion with the institution. Among Canon Barnett's works is Practicable Socialism (1888, 2nd ed. 1894), written in conjunc- tion with his wife.

BARNFIELD, RICHARD (1574-1627), English poet, was born at Norbury, Staffordshire, and baptized on the 13th of June 1574. His obscure though close relationship with Shakespeare has long made him interesting to students and has attracted of late years further attention from the circumstance that important dis- coveries regarding his life have been made. Until recently nothing whatever was known about the facts of Barnfield's career, whose very existence had been doubted. It was, however, discovered by the late Dr A. B. Grosart that the poet was the son of Richard Barnfield (or Barnefield) and Maria Skrymsher, his wife, who weje married in April 1 572. They resided in the parish of Norbury, in Staffordshire, on the borders of Salop, where the poet was baptized on the 13th of June 1574. The mother died in giving birth to a daughter early in 1581, and her unmarried sister, Elizabeth Skrymsher, seems to have devoted herself to the care of the children. In November 1589 Barnfield matricu- lated at Brasenose College, Oxford, and took his degree in

February 1592. He " performed the exercise for his master's gown," but seems to have left the university abruptly, without

proceeding to the M.A. It is conjectured that he came up to London in 1593, and became acquainted with Watson, Drayton, and perhaps with Spenser. The death of Sir Philip Sidney had occurred while Barnfield was still a school-boy, but it seems to . have strongly affected his imagination and to have inspired some of his earliest verses. In November 1 594, in his twenty-first year, Barnfield published anonymously his first work, The ■Affectionate Shepherd, dedicated with familiar devotion to Penelope, Lady Rich. This was a sort of florid romance, in two books of six-line stanza, in the manner of Lodge and Shakespeare, dealing at large with " the complaint of Daphnis for the love of Ganymede." As the author expressly admitted later, it was an expansion or paraphrase of Virgil's second eclogue —

"Formosum pastor Corydon ardebat Alexin." This poem of Barnfield's was the most extraordinary specimen hitherto produced in England of the licence introduced from Italy at the Renaissance. Although the poem was successful, it did not pass without censure from the moral point of view. Into the conventional outlines of The Affectionate Shepherd the young poet has poured all his fancy, all his epithets, and all his coloured touches of nature. If we are not repelled by the absurd subject, we have to admit that none of the immediate imitators of Venus and Adonis has equalled the juvenile Barnfield in the picturesque- ness of his " fine ruff-footed doves," his " speckled flower call'd sops-in-wine," or his desire " by the bright glimmering of the starry light, to catch the long-bill'd woodcock." Two months later, in January 1595, Barnfield published his second volume, Cynthia, with certain Sonnets, and this time signed the preface, which was dedicated, in terms which imply close personal rela tions, to William Stanley, the new earl of Derby. This is a book of extreme interest ; it exemplifies the earliest study both of Spenser and Shakespeare. " Cynthia " itself, a panegyric on Queen Elizabeth, is written in the Spenserian stanza, of which it is probably the earliest example extant outside The Faerie Queene. This is followed by a sequence of twenty sonnets, which have the extraordinary interest that, while preceding the publication of Shakespeare's sonnets by fourteen years, they are closer to them in manner than are any others of the Elizabethan age. They celebrate, with extravagant ardour, the charms of a young man whose initials seem to have been J. U. or J. V., and of whom nothing else seems known. These sonnets, which preceded even the Amoretti of Spenser, are of unusual merit as poetry, and would rank as high in quality as

in date of publication if their subject- matter were not so preposterous. They show the influence of Drayton's Idea, which had appeared a few months before; in that collection also, it is to be observed, there had appeared amatory sonnets addressed to a young man. If editors would courageously alter the gender of the pronouns, several of Barnfield's glowing sonnets might take their place at once in our anthologies. Before the publication of his volume, however, he had repented of his heresies, and had become enamoured of a "lass" named Eliza (or Elizabeth), whom he celebrates with effusion in an " Ode." This is probably the lady whom he presently married, and as we find him a grandfather in 1626 it is unlikely that the wedding was long delayed. In 1598 Barnfield published his third volume, The Encomion of Lady Pecunia, a poem in praise of money, followed by a sort of continuation, in the same six-line stanza, called " The Complaint of Poetry for the Death of Liberality." In this volume there is already a decline in poetic quality. But an appendix of " Poems in diverse Humours " to this volume of 1598 presents some very interesting features. Here appears what seems to be the absolutely earliest praise of Shakespeare in a piece entitled " A Remembrance of some English Poets," in which the still unrecognized author of Venus and Adonis is celebrated by the side of Spenser, Daniel and Drayton. Here also are the sonnet, " If Music and sweet Poetry agree," and the beautiful ode beginning " As it fell upon a day," which were until recently attributed to Shakespeare himself. In the next year, 1599, The Passionate Pilgrim was published, with the words " By W. Shakespeare " on the title-page. It was long supposed that this attribution was

correct, but Barnfield claimed one of the two pieces just mentioned, not only in 1 598, but again in 1605. It is certain that both are his, and possibly other things in The Passionate Pilgrim also; Shake- speare's share in the twenty poems of that miscellany being doubtless confined to the five short pieces which have been definitely identified as his. In the opinion of the present writer the sonnet beginning " Sweet Cytherea " has unmistakably the stamp of Barnfield, and is probably a gloss on the first rapturous perusal of Venus and Adonis; the same is to be said of " Scarce had the sun," which is aut Barnfield, aut diabolus. One or two other contributions to The Passionate Pilgrim may be conjectured, with less confidence, to be Barnfield's. It has been stated that the poet was now studying the law at Gray's Inn, but for this the writer is unable to discover the authority, except that several members of that society are

mentioned in the course of the volume of 1598. In all probability Barnfield now married and withdrew to his estate of Dorlestone (or Darlaston) , in the county of Stafford, a house romantically situated on the river Trent, where he hence- forth resided as a country gentleman. In 1605 he reprinted his Lady Pecunia, and this was his latest appearance as a man of letters. His son Robert Barnfield and his cousin Elinor Skrymsher were his executors when his will was proved at Lichfield; his wife, therefore, doubtless predeceased him. Barnfield died at Dorlestone Hall, and was buried in the neighbouring parish church of St Michael's, Stone, on the 6th of March 1627. The labours of Dr Grosart and of Professor Arber have thrown much light on the circumstances of Barnfield's career. He has taken of late years a far more prominent place than ever before in the history of English literature. This is due partly to the remarkable merit of his graceful, melodious and highly-coloured verse, which was practically unknown until it was privately printed in 1876 (ed. Grosart, Roxburghe Club), and at length given to the public in 1882 (ed. Arber, English Scholars' Library). It is also due to the mysterious personal relation of Barnfield to Shakespeare, a relation not easy to prove in detail, as it is built up on a great variety of small indications. It is, however, obvious that Barnfield warmly admired Shakespeare, whose earliest imitator he may be said to have been, and that between 1595 and 1600 the younger poet was so close to the elder that the compositions of the former could be confused with those of the latter. Barnfield died, as a poet, in his twenty-fifth year. Up to that time he had dis- played a talent which, if he had pursued it, might have placed him very high among the English poets. As it is, he will always interest a certain number of readers as being, in his languid "Italianate " way, a sort of ineffectual Meleager in the rich Elizabethan anthology.

Besides the editions already cited, The Affectionate Shepherd was edited by Mr J. O. Halliwell-Phillipps for the Percy Society (Early English Poetry, vol. xx.) ; The Encomion of Pecunia and some other poems by J. Boswell (Roxburghe Club, 1816) ; and by J. P. Collier in Illustrations of Old English Literature (vol. i.,1866). (E.G.)

BARNIM, the name of a district between the Spree, the Oder and the Havel, which was added to the mark of Brandenburg during the 13th century. In the 15th century it was divided into upper and lower Barnim, and these names are now borne by two circles (Kreise) in the kingdom of Prussia.

BARNIM, the name of thirteen dukes who ruled over various divisions of the duchy of Pomerania. The following are the most important:—

Barnim I. (c. 1209-1278), called the Good, was the son of Bogislaus II., duke of Pomerania-Stettin, and succeeded to this duchy on his father's death in 1 2 20. After he became of age he was engaged in a long struggle with external enemies, and in 1250 was compelled to recognize the supremacy of the margrave of Brandenburg. Having in 1264 united the whole of Pomerania under his rule, Barnim devoted his energies to improving its internal condition. He introduced German settlers and customs into the duchy, founded many towns, and was extremely generous towards ecclesiastical foundations. He died on the 13th or 14th of November 1278.

Barnim III. (c. 1303-1368), called the Great, was the son of Otto I., duke of Pomerania-Stettin, and took a prominent part in the defence and government of the duchy before -his father's

death in 1344. A long and intermittent struggle with the representatives of the emperor Louis IV., who had invested his own son Louis with the mark of Brandenburg, enabled him to gain military experience and distinction. A victory gained by him in August 1332 was mainly instrumental in freeing Pomerania for a time from the vexatious claim of Brandenburg to supremacy over the duchy, which moreover he extended by conquest. Barnim assisted the emperor Charles IV. in his struggle with the family of Wittelsbach. He died on the 24th of August 1368.

Barnim XL (1501-1573), son of Bogislaus X., duke of Pomerania, became duke on his father's death in 1523. He ruled for a time in common with his elder brother George; and after George's death in 153J he shared the duchy with his nephew Philip I., retaining for himself the duchy of Pomerania-Stettin. The earlier years of his rule were troubled by a quarrel with the margrave of Brandenburg, who wished to annex Pomerania. In 1529, however, a treaty was made which freed Pomerania from the supremacy of Brandenburg on condition that if the ducal family became extinct the duchy should revert to Brandenburg. Barnim adopted the doctrines of Martin Luther, and joined the league of Schmalkalden, but took no part in the subsequent war. But as this attitude left him without supporters he was obliged to submit to the emperor Charles V., to pay a heavy fine, and to accept the Interim, issued from Augsburg in May 1548. In 1569 Barnim handed over his duchy to his grandrnephew, John Frederick, and died at Stettin on the 2nd of June 1573.

BARNSLEY (Black, or properly Bleak Barnsley), a market town and municipal borough in the Barnsley parliamentary division of the West Riding of Yorkshire, England, 15 m. N. of Sheffield. Pop. (1891) 35,427; (i9°i) 41,086. It is served by the Midland, Great Central, Lancashire & Yorkshire, Great Northern, and Hull & Barnsley railways. It is in the parish of Silkstone, which gives name to important collieries. It is situated on rising ground west of the river Dearne, and, though it loses in attraction owing to its numerous factories, its neighbourhood has considerable natural beauty. Among the principal buildings and institutions are several churches, of which the oldest, the parish church of St Mary, was built in 182 1 on an early site; court house, public

hall, institute and free library. Among several educational institutions, the free grammar school dates from 1665; and a philosophical society was founded in 1828. A monument was erected in 1905 to prominent members of the Yorkshire Miners' Association. The park was presented in 1862 by the widow of Joseph Locke, M.P. The manufacture of iron and steel, and the weaving of linen and other cloth, are the two principal industries; but there are also bleachfields, printfields, dyeworks, sawmills, cornmills and malt-houses; and the manufacture of glass, needles and wire is carried on. There are large coalfields in the neighbourhood, which, indeed, extend under the town. Coal and coke are largely exported to London and Hull . In the vicinity, Monk B retton Priory, a Cluniac foundation of 1 1 57, retains a Perpendicular gatehouse, some Decorated domestic remains, and fragments of the church. Wentworth Castle, built in 1730 by Thomas, earl of Strafford, stands in a singularly beautiful park, and contains a fine collection of portraits of historical interest. Besides the communications afforded by railway, Barnsley has the advantage of connexion with the Aire and Calder Navigation system of canals. The borough is under a mayor, six aldermen and eighteen councillors. Area, 2385 acres.

At the time of the Domesday survey Ilbert de Lacy held Barnsley by gift of William the Conqueror as part of the honour of Pontefract, and the overlordship remained in his family until the reign of Stephen, when it was granted by Henry de Lacy to the monks of Pontefract. Henry III. in 1249 granted the prior and convent of Pontefract a market every Wednesday at Barnsley, and a fair on the vigil and feast of St Michael and two following days, and Henry VIII. in 151 2 granted them a new fair on the day of the Conversion of St Paul and two following days. The monastery evidently also held another fair there called St Ellen's fair, for in 1583 Queen Elizabeth granted this fair and St Paul's fair and the market " lately belonging to the dissolved monastery of Pontefract " to one Henry Burdett, and Ralph and Henry his

sons for their lives. Besides these charters and others granting land in Barnsley to the monks of Pontefract there is very little history of the town, since it was not until after the introduction of the linen manufacture in 1744 that it became really important. Before that time the chief industry had been wire-drawing, but this trade began to decrease about the end of the 18th century, just as the linen trade was becoming important. In 1869 Barnsley was incorporated.

See Rowland Jackson, The History of the Town and Township of Barnsley (1858); Victoria County History — Yorkshire.

BARNSTABLE, a seaport township and the county-seat of the county of the same name, in Massachusetts, U.S.A. Pop. (1900) 4364, of whom 391 were foreign-born; (1910, U. S. census) 4676. Barnstable is served by the New York, New Haven & Hartford Railway. It is situated between Cape Cod Bay on the N. and Nantucket Sound on the S., extending across Cape Cod. The soil of the township, unlike that of other parts of the county, is well adapted to agriculture, and the principal industry is the growing of vegetables and the supplying of milk and poultry for its several villages, nearly all of which are summer resorts. At Hyannis is a state normal school (1897; co-educa- tional). Cranberries are raised in large quantities, and there are oyster and other shell fisheries. In the 1 7th century the mackerel and whale fisheries were the basis of economic life; the latter gave way later to the cod and other fisheries, but the fishing industry is now relatively unimportant. Much of the county is a region of sands, salt-marshes, beach-grass and scattered woods. From 1865 to 1895 the county diminished 20-1 % in population. Barnstable was settled and incorporated in 1639 (county created 1685), and includes among its natives James Otis and Lemuel Shaw.

See F. Freeman, The History of Cape Cod: the Annals of Barnstable County (2 vols., Boston, 1858, 1862; and other impressions i860 to

1869).

BARNSTAPLE, a seaport, market town and municipal borough, in the Barnstaple parliamentary division of Devonshire, England, on the river Taw, near the north coast. Pop. (1901) 14,137. It is served by the London & South-Western, the Great Western, and the Lynton & Barnstaple railways. The Taw is here crossed by a stone bridge of sixteen arches, said to have been built in the 12th or 13th century. The town manu- factures lace, gloves, sail-cloth and fishing-nets, and has extensive potteries, tanneries, sawmills and foundries, while shipbuilding is also carried on. The harbour admits only small coasting vessels. The public buildings and institutions include a guildhall (1826), a free grammar school and a large market-place. The poet John Gay was born in the vicinity, and received his educa- tion at the grammar school, which at an earlier period had numbered Bishop Jewel among its pupils. It was founded in the 14th century, in connexion with a

chantry. There are also some curious Jacobean almshouses. JThe borough is under a mayor, six aldermen and eighteen councillors. Area, 2236 acres.

Barnstaple (Berdestaple, Barnstapol, Barstaple, also Barum) ranks among the most ancient of royal boroughs. As early as Domesday, where it is several times mentioned, there were forty burgesses within the town and nine without, who rendered 40s. Tradition claims that King Athelstan threw up defensive earth-works here, but the existing castle is attributed to Joel of Totnes, who held the manor during the reign of William the Conqueror, and also founded a Cluniac priory, dedicated to St Mary Magdalene. From this date the borough and priory grew up side by side, but each preserving its independent privileges and rights of government until the dissolution of the latter in 1535. In Edward II. 's reign the burgesses petitioned for the restoration of rights bestowed by a pretended charter from Athelstan. Th6 existence of this charter was denied, but the desired privileges were conceded, including the right to elect a mayor. The earliest authenticated charter is that of Henry I., which was confirmed in a charter of Henry II. The later charter states that the burgesses should have customs similar to those granted to London, and further charters confirmed the same right. A charter of Queen Mary in 1556 added some new privileges, and specified that the common council should consist of a mayor, two aldermen

and twenty-four chief burgesses. James I., by a charter dated 1610, increased the number of chief burgesses to twenty-five and instituted a recorder, a clerk of the market, justices of the peace and other officers. This charter was confirmed in 161 1 and 1689, and held force until the Municipal Corporations Act of 1835, which established six aldermen and eighteen councillors. The borough sent two members to parliament in 1295, and so continued to do until the Redistribution of Seats Act of 1885, when the representation was merged in that of the county. Barnstaple was once famous for its woollen trade, now entirely declined, and as early as the reign of Edward III. was an important naval port, with an extensive shipping trade. That this prosperity was not altogether uninterrupted is testified by the fact that, at the time of the Armada, the mayor pleaded inability to contribute three ships, on account of injuries to trade consequent on the

war with Spain. The Friday market and the annual four days' fair in September are held by immemorial prescription.

See J. B. Gribble, Memorials of Barnstaple (Barnstaple, 1830).

BARNUM, PHINEAS TAYLOR (1810-1891), American show- man, was born in Bethel, Connecticut, on the 5th of July 1810, his father being an inn- and store-keeper. Barnum first started as a store-keeper, and was also concerned in the lottery mania then prevailing in the United States. After failing in business, he started in 1829 a weekly paper, The Herald of Freedom, in Danbury; after several libel suits and a prosecution which resulted in imprisonment, he moved to New York in 1834, and in 1835 began his career as a showman, with his pur- chase and exploitation of a coloured woman, Joyce Heth, reputed to have been the nurse of George Washington, and to be over a hundred and sixty years old. With this woman and a small company he made well-advertised and successful tours in America till 1839, though Joyce Heth died in 1836, when her age was proved to be not more than seventy. After a period of failure, he purchased Scudder's American Museum, New York, in 1 84 1 ; to this he added considerably, and it became one of the most popular shows in the United States. He made a special hit by the exhibition, in 1842, of Charles Stratton, the celebrated " General Tom Thumb " (see Dwarf). In 1844 Barnum toured with the dwarf in England. A remarkable instance of his enterprise was the engagement of Jenny Lind to sing in America at $1000 a night for one hundred and fifty nights, all expenses being paid by the entrepreneur. The tour began in 1850. Barnum retired from the show business in 1855, but had to settle with his creditors in 1857, and began his old career again as showman and museum proprietor. In 187 1 he established the " Greatest Show on Earth," a travelling amalgamation of circus, menagerie and museum of " freaks," &c. This show, incorporated in the name of " Barnum, Bailey & Hutchinson," and later as " Barnum & Bailey's " toured all over the world. In 1907 the business was sold to Ringling Brothers. Barnum wrote several books, such as The Humbugs of the World (1865), Struggles and Triumphs (1869), and his Autobiography (1854, and later editions). He died on the 7 th of April 1891.

BAROCCHIO (or Barozzi), GIACOMO, called Da Vignola (1507-1573), Italian architect, was born at Vignola in the Modenese territory on the 1st of October 1507. His early work was conducted at Bologna, Piacenza, Assisi and Perugia, until he

was summoned to Rome as papal architect under Pope Julius III. In 1564 he succeeded Michelangelo as the architect of St Peter's, and executed various portions of that fabric, besides a variety of works in Rome. The designs for the Escorial were also supplied by him. ■ He is the author of an excellent work on the Five Orders of Architecture (Rome, 1563), and another work on Practical Perspective (Rome, 1583). To his extensive acquirements and exquisite taste were superadded an amenity of manners and a noble generosity that won the affection and admiration of all who knew him. He died in Rome on the 7 th of July 1573. He was an eminent upholder of the classic style at a period when the style known as baroque was corrupting the architecture of Italy. The term baroque owes its origin to the Spanish word barrueco or berrueco, an imperfectly round pearl, and is not derived from the architect Barocchio, whose name so in. 14

much resembles it. Yet it is curious that it was much used to describe a debased form of architecture encouraged by the Jesuits whose church in Rome was built by Barocchio.

BAROCCI (or Baroccio), FEDERIGO (1528- 161 2), Italian painter, was born at Urbino, where the genius of Raphael inspired him. In his early youth he travelled to Rome, where he painted in fresco and was warmly commended by Michelangelo. He then returned to Urbino, where, with the exception of some short visits to Rome, he continued to reside till his death. He acquired great fame by his paintings of religious subjects, in the style of which he to some extent imitated Correggio. His own followers were very numerous, but according to Lanzi (Hist, of Painting) carried their master's peculiarities to excess. Barocci also etched from his own designs a few prints, which are highly finished, and executed with great softness and delicacy.

BARODA, a native state of India, within the Gujarat province of Bombay, but in direct relations with the governor-general. It consists of four isolated divisions, each of which is interlaced in the most intricate fashion with British territory or with other native states. Three of these divisions — Kadi, Baroda and Nausari — are in Gujarat proper; the fourth, Amreli with Okhamandal, is in the peninsula of Kathiawar. The total area covers 8099 sq. m. In 1901 the population was 1,952,692, showing a decrease of 19 % in the decade, compared with an increase of 1 1 % in the preceding decade. This decrease was due partly to the famines of 1896-1897 and 1900-1901, partly to the

epidemics of cholera and fever which accompanied them, and partly to the plague which attacked the state in as great measure as the surrounding presidency.

The princes of Baroda were one of the chief branches of the Mahratta confederacy, which in the 18 th century spread devasta- tion and terror over India. About 1721 one Pilaji gaekwar carved a fertile slice of territory out of Gujarat, and afterwards received the title of " Leader of the Royal Troops " from the peshwa. During the last thirty-two years of the century the house fell a prey to one of those bitter and unappeasable family feuds which are the ruin of great Indian families. In 1800 the inheritance descended to a prince feeble in body and almost idiotic in mind. British troops were sent in defence of the hereditary ruler against all claimants; a treaty was signed in 1802, by which his independence of the peshwa and his de- pendence on British government were secured. Three years later these and various other engagements were consolidated into a systematic plan for the administration of the Baroda territory, under a prince with a revenue of three-quarters of a million sterling, perfectly independent in all internal matters, but practically kept on his throne by subsidiary British troops. For some time the history of the gaekwars was very much the same as that of most territorial houses in India: an occasional able minister, more rarely an able prince; but, on the other hand, a long dreary list of incompetent heads, venal advisers and taskmasters oppressive to the people. At last a fierce family feud came to a climax. In 1873 an English committee of inquiry was appointed to investigate various complaints of oppression against the gaekwar, Malhar Rao, who had recently succeeded to the throne after being for a long time kept in prison by his brother, the former gaekwar. No real reform resulted, and in 1874 an attempt at poisoning the British resident led to the gaekwar being formally accused of the crime and tried by a mixed commission. The result of the trial (1875) was a failure to obtain a unanimous verdict on the charge of poisoning; the viceroy, Lord Northbrook, however, decided to depose Malhar Rao on the ground of gross misgovernment, the widow of his brother and predecessor, Khande Rao, being permitted to adopt an heir from among the descendants of the founder of the family. This heir, by name Sayaji Rao, then a boy of twelve years in the humble home of a Deccani cultivator, was educated by an English tutor, the administration being meanwhile placed for eight years under the charge of Sir T. Madhava Rao, formerly diwan of Travancore, one

of the ablest and most enlightened of Indian statesmen. The result was a' conspicuous success The gaekwar showed himself a model prince, and his territories

became as well governed and prosperous as a British district. He repeatedly visited Europe in company with his wife. In 1887 the queen-empress conferred upon him at Windsor the insignia of G.C.S.I., and in 1892 upon his wife the Imperial order of the crown of India.

The gross revenue of the state is more than a million sterling. In 1 901 the state currency of Babashai rupees was withdrawn, and the British rupee was introduced. The regular military force consists of a field battery, with several regiments of cavalry and battalions of infantry. In addition, there is an irregular force of horse and foot. Compulsory education has been carried on experimentally since 1893 in the Amreli division with apparent success* the compulsory age being 7 to 12 for boys and 7 to 10 for girls. Special measures are also adopted for the education of low castes and aboriginal tribes. There is a female training college under a Christian lady superintendent. The Kala Bhavan, or technical school, has departments for drawing, carpentry, dyeing, weaving and agriculture. There is also a state museum under a European director, and a state library. Portions of the state are crossed by the Bombay & Baroda and the Rajputana railways. In addition, the state has constructed three railways of its own, on three different gauges. Other railways are in contemplation. The state possesses a cotton mill.

The city of Baroda is situated on the river Viswamitri, a station on the Bombay & Baroda railway, 245 m, N. of Bombay by rail. Pop. (1901) 103,790. The whole aspect of the city has been changed by the construction of handsome public buildings, the laying-out of parks and the widening of the streets. An excellent water-supply is provided from the Ajwa lake. The cantonments, garrisoned by a native infantry regiment, are under British jurisdiction, and have a population of 4000. The city contains a college and many schools. The chief hospitals are called after the countess of Dufferin, Sayaji Rao and Jamnabai, the widow of Khande Rao.

See Baroda Gazetteer, 1908.

BAROMETER (from Gr. /3dpo$, pressure, and nhpov, measure), an instrument by which the weight or pressure of the atmosphere is measured. The ordinary or mercurial barometer consists of a tube about 36 in. long, hermetically closed at the upper end and containing mercury. In the ” cistern barometer ” the tube is placed with its open end in a basin of mercury, and the atmospheric pressure is measured by the difference of the heights of the mercury in the tube and the cistern. In the ” siphon barometer ” the cistern is dispensed with, the tube being bent round upon itself at its lower end; the reading is taken of the difference in the levels of the mercury in the two limbs. The ” aneroid ” barometer (from the Gr. a- privative, and vqpos, wet) employs no liquid, but depends upon the changes in volume experienced by an exhausted metallic chamber under varying pressures. ” Baroscopes ” simply indicate variations in the atmospheric pressure, without supplying quantitative data. ” Barographs ” are barometers which automatically record any variations in pressure.

Philosophers prior to Galileo had endeavoured to explain the action of a suction pump by postulating a principle that ” Nature Historical, abhorred a vacuum.” When Galileo observed that a common suction pump could not raise water to a greater height than about 32 ft. he considered that the ” abhorrence ” was limited to 32 ft., and commended the matter to the attention of his pupil Evangelista Torricelli. Torricelli perceived a ready explanation of the observed phenomenon if only it could be proved that the atmosphere had weight, and the pressure which it exerted was equal to that of a 32-ft. column of water. He proved this to be the correct explanation by reasoning as follows: — If the atmosphere supports 32 feet of water, then it should also support a column of about 2j ft. of mercury, for this liquid is about 135 times heavier than water. This he proved in the following manner. He selected a glass tube about a quarter of an inch in diameter and 4 ft. long, and hermetically sealed one of its ends; he then filled it with mercury and, applying his finger to the open end, inverted it in a basin containing mercury. The mercury instantly sank to nearly 30 in. above the surface

of the mercury in the basin, leaving in the top of the tube an apparent vacuum, which is now called the Torricellian vacuum; this experiment is sometimes known as the Torricellian experiment. Torricelli’s views rapidly gained ground,

notwithstanding the objections of certain philosophers. Valuable confirmation was afforded by the variation of the barometric column at different elevations. Rene Descartes and Blaise Pascal predicted a fall in the height when the barometer was carried to the top of a mountain, since, the pressure of the atmosphere being diminished, it necessarily followed that the column of mercury sustained by the atmosphere would be diminished also. This was experimentally observed by Pascal's brother-in-law, Florin Perier (1605-1672), who measured the height of the mercury column at various altitudes on the Puy de D6me. Pascal himself tried the experiment at several towers in Paris, — Notre Dame, St Jacques de la Boucherie, &c. The results of his researches were embodied in his treatises De I'iquilibre des liqueurs and De la pesanteur de la masse d'air, which were written before 1651, but were not published till 1663 after his death. Corroboration wasalsoaffordedbyMarinMersenne and Christiaan Huygens. It was not long before it was discovered that the height of the column varied at the same place, and that a rise or fall was accompanied by meteorological changes. The instrument thus came to be used as a means of predicting the weather, and it was frequently known as the weather-glass. The relation of the barometric pressure to the weather is mentioned by Robert Boyle, who expressed the opinion that it is exceedingly difficult to draw any correct conclusions. Edmund Halley, Leibnitz, Jean Andre Deluc (1727-1817) and many others investigated this subject, giving rules for predicting the weather and attempting explanations for the phenomena. Since the height of the barometric column varies with the elevation of the station at which it is observed, it follows that observations of the barometer afford a means for measuring altitudes. The early experiments of Pascal were developed by Edmund Halley, Edme Mariotte, J. Cassini, D. Bernoulli, and more especially by Deluc in his Recherches sur les modifications de I'atmosphere (1772), which contains a full account of the early history of the barometer and its applications. More highly mathematical investigations have been given by Laplace, and also'by Richard Riihlmann (Barometrischen Hohenmessung., Leipzig, 1870). The modern aspects of the relation between atmospheric pressure and the weather and altitudes are treated in the article Meteorology.

Many attempts have been made by which the variation in the height of the mercury column could be magnified, and so more exact measurements taken. It is not possible to enumerate in this article the many devices which have been proposed; and the

reader is referred to Charles Hutton's Mathematical and Philosophical Dictionary (181 5), William Ellis's paper on the history of the barometer in the Quarterly Journal of the Royal Meteorological Society, vol. xii. (1886), and E. Gerland and F. Traumuller's Geschichte der physikalischen Experimentierkunst (1899). Descartes suggested a method which Huygens put into practice. The barometer tube was expanded into a cylindrical vessel at the top, and into this chamber a fine tube partly filled with water was inserted. A slight motion of the mercury occasioned a larger displacement of the water, and hence the changes in the barometric pressure were more readily detected and estimated. But the instrument failed as all water-barometers do, for the gases dissolved in the water coupled with its high vapour tension destroy its efficacy. The substitution of methyl salicylate for the water has been attended with success. Its low vapour tension (Sir William Ramsay and Sydney Young give no value below 70° C), its low specific gravity (1-18 at 10° C), its freedom from viscosity, have contributed to its successful use. In the form patented by C. O. Bartrum it is claimed that readings to -ooi of an inch of mercury can be taken without the use of a vernier.

The diagonal barometer, in which the upper part of the tube is inclined to the lower part, was suggested by Bernardo Ramazzini (1633-1714), and also by Sir Samuel Morland (or Moreland). This form has many defects, and even when the

tube is bent through 45° the readings are only increased in the ratio of 7 to 5. The wheel barometer of Dr R. Hooke, and the steel-yard barometer, endeavour to magnify the oscillation of the mercury column by means of a float resting on the surface of the mercury in the cistern; the motion of the float due to any alteration in the level of the mercury being rendered apparent by a change in the position of the wheel or steel-yard. The pendant barometer of G. Amontons, invented in 1695, con- sists of a funnel-shaped tube, which is hung vertically with the wide end downwards and closed in at the upper end. The tube contains mercury which adjusts itself in the tube so that the length of the column balances the atmospheric pressure. The instability of this instrument is obvious, for any jar would cause the mercury to leave the tube.

The Siphon Barometer (fig. 1) consists of a tube bent in the form of a siphon, and is of the same diameter throughout. A graduated scale passes along the whole length of the tube, and the height of the barometer is ascertained by taking the difference of the readings of the upper and lower limbs respectively. This instrument may also be read by bringing the zero-point of the gradu- ated scale to the level of the surface of the lower limb by means of a screw, and reading off the height at once from the surface of the upper limb. This barometer requires no correction for errors of capillarity or capacity. Since, however, impurities are contracted by the mercury in the lower limb, which is usually in open contact with the air, the satisfac- tory working of the instrument comes soon to be seriously interfered with.

Fig. 2 shows the Cistern Barometer in its essential and simplest form. This barometer is subject to two kinds of error, the one arising from capillarity, and the other from changes in the level of the surface of the cis- tern as the mercury rises and falls in the tube, the latter being tech- nically called the error of capacity. If a glass tube of small bore be plunged into a vessel containing mercury, it will be observed that the level of the mercury in the tube is not in the line of that of the mercury in the vessel, but somewhat below it, and that the surface is convex. The capillary depression is inversely proportional to the diameter of the tube. In standard barometers, the tube is about an inch in diameter, and the error due to capillarity is less than -ooi of an inch. Since capillarity depresses the height of the column, cistern barometers require an addition to be made to the observed height, in order to give the true pressure, the amount depending, of course, on the diameter of the tube.

The error of capacity arises in this way. The height of the barometer is the perpendicular distance between the surface of the mercury in the cistern and the upper surface of the mercurial column. Now, when the barometer falls from 30 to 29 inches, an inch of mercury must flow out of the tube and pass into the cistern, thus raising the cistern leve.1; and, on the other hand, when the barometer rises, mercury must flow out of the cistern into the tube, thus lowering the level of the mercury in the cistern. Since the scales of barometers are usually engraved on their brass cases, which are fixed (and, consequently, the zero-point from which the scale is graduated is also fixed), it follows that, from the incessant changes in the level of the cistern, the readings would be sometimes too high and sometimes too low, if no provision were made against this source of error.

A simple way of correcting the error of capacity is — to ascertain (1) the neutral point of the instrument, or that height at which the zero of the scale is exactly at the height of the surface of the cistern, and (2) the rate of error as the barometer rises or falls above this point, and then apply a correction proportional to

Fig. 1.

Siphon

Barometer.

Fig. 2.

Cistern

Barometer.

this rate. The instrument in which the error of capacity is satisfactorily (indeed, entirely) got rid of is Forlin's Barometer. Fig. 3 shows how this is effected. The upper part ,

of the cistern is formed of a glass cylinder, through barometer. which the level of the mercury may be seen. The bottom is made like a bag, of flexible leather, against which a screw works. At the top of the interior of the cistern is a small piece of ivory, the point of which coincides with the zero of the scale. By means of the screw, which acts on the flexible cistern bottom, the level of the mercury can be raised or depressed so as to bring the ivory point exactly to the surface of the mercury in the cistern. In some barometers the cistern is fixed t and the ivory point is brought to the level of the mercury in the cistern by raising or depressing the scale.

In constructing the best barometers three materials are employed, viz.: — (1) brass, for the case, on which the scale is engraved; (2) glass, for the tube containing the mercury; and (3) the mercury itself. It is evident that if the coefficient of expansion of mercury and brass were the same, the height of the mer- cury as indicated by the brass scale would be the true height of the mercurial column. But this is not the case, the coefficient of expansion for mercury being considerably greater than that for brass. The result is that if a baro- meter stand at 30 in. when the temperature of the whole instrument, mercury and brass, is 3 2 , it will no longer stand at 30 in. if the Fig. 3. — Fortin's temperature be raised to 69 ; in fact, it will Barometer, then

stand at 30-1 in. This increase in the height of the column by the tenth of an inch is not due to any increase of pressure, but altogether to the greater expansion of the mercury at the higher temperature, as compared correc- with the expansion of the brass case with the engraved tions of the scale by which the height is measured. In order, barometer therefore, to compare with each other with exactness readla& – barometric observations made at different temperatures, it is necessary to reduce them to the heights at which they would stand at some uniform temperature. The temperature to which such observations are reduced is 32 Fahr. or o° cent.

If English units be used (Fahrenheit degrees and inches), this

correction is given by the formula x = -H — I0 ~ Q ˆ ; in the

centigrade-centimetre system the correction is -0001614 HT (H being the observed height and T the observed temperature). Devices have been invented which determine these corrections mechanically, and hence obviate the necessity of applying the above formula, or of referring to tables in which these corrections for any height of the column and any temperature are given.

The standard temperature of the English yard being 62 and not 3 2 , it will be found in working out the corrections from the above formula that the temperature of no correction is not 32 but 28-5°. If the scale be engraved on the glass tube, or if the instrument be furnished with a glass scale or with a wooden scale, different corrections are required. These may be worked out from the above formula by substituting for the coefficient of the expansion of brass that of glass, which is assumed to be 0-00000498, or that of wood, which is assumed to be o. Wood, however, should not be used, its expansion with temperature being un- steady, as well as uncertain.

If the brass scale be attached to a wooden frame and be free to move up and down the frame, as is the case with many siphon barometers, the corrections for brass scales are to be used, since the zero-point of the scale is brought to the level of the lower limb; but if the brass scale be fixed to a wooden frame, the corrections for brass scales are only applicable provided the zero of the scale be fixed at (or nearly at) the zero line of the column, and be free to expand upwards. In siphon barometers, with which an observation is made from two readings on the scale, the

scale must be free to expand in one direction. Again, if only the upper part of the scale, say from 27 to 31 in., be screwed to a wooden frame, it is evident that not the corrections for brass scales, but those for wooden scales must be used. No account need be taken of the expansion of the glass tube containing the mercury, it being evident that no correction for this expansion is required in the case of any barometer the height of which is measured from the surface of the mercury in the cistern.

In fixing a barometer for observation, it is indispensable that it be hung in a perpendicular position, seeing that it is the perpendicular distance between the surface of the barometer. mercur y i n the cistern and the top of the column which is the true height of the barometer. The surface of the mercury column is convex, and in noting the height of the barometer, it is not the chord of the curve, but its tangent which is taken. This is done by setting the straight lower edge of the vernier, an appendage with which the barometer is furnished, as a tangent to the curve. The vernier is made to slide up and down the scale, and by it the height of the barometer may be read true to 0-002 or even to o-ooi in.

It is essential that the barometer is at the temperature shown by the attached thermometer. No observation can be regarded as good if the thermometer indicates a temperature differing from that of the whole instrument by more than a degree. For every degree of temperature the attached thermometer differs from the barometer, the observation will be faulty to the extent of about 0-003 m -> which in discussions of diurnal range, &c, is a serious amount.

Before being used, barometers should be thoroughly examined as to the state of the mercury, the size of cistern (so as to admit of low readings) , and their agreement with some known standard instrument at different points of the scale. The pressure of the atmosphere is not expressed by the weight of the mercury sustained in the tube by it, but by the perpendicular height of the column. Thus, when the height of the column is 30 in., it is not said that the atmospheric pressure is 14-7 lb on the square inch, or the weight of the mercury filling a tube at that height whose transverse section equals a square inch, but that it is 30 in.,

meaning that the pressure will sustain a column of mercury of that height.

It is essential in gasometry to fix upon some standard pressure to which all measurements can be reduced. The height of the standard mercury column commonly used is 76 cms. (29-922 in.) of pure mercury at o°; this is near the average height of the barometer. Since the actual force exerted by the atmosphere varies with the intensity of gravity, and therefore with the position on the earth's surface, a place must be specified in defining the standard pressure. This may be avoided by expressing the force as the pressure in dynes due to a column of mercury, one square centimetre in section, which is supported by the atmosphere. If H cms. be the height at o°, and g the value of gravity, the pressure is 13-596 Hg dynes (13-596 being the density of mercury) . At Greenwich, where g = 98 1 • 1 7 , the standard pressure at o° is 1,013,800 dynes. At Paris the pressure is 1,013,600 dynes. The closeness of this unit to a mega-dyne (a million dynes) has led to the suggestion that a mega-dyne per square centimetre should be adopted as the standard pressure, and it has been adopted by some modern writers on account of its convenience of calculation and independence of locality.

The height of the barometer is expressed in English inches in England and America, but the metric system is used in all scientific work excepting in meteorology. In France metric an(ˆ most European countries, the height is given in readings, millimetres, a millimetre being the thousandth part of a metre, which equals 39-37079 English inches. Up to 1869 the barometer was given in half-lines in Russia, which, equalling the twentieth of an English inch, were readily reduced to English inches by dividing by 20. The metric barometric scale is now used in Russia. In a few European countries the French or Paris line, equalling 0-088814 in., is sometimes used. The English measure of length being a standard at 62 Fahr., the old French measure at 61-2°, and the metric scale at 32 ,

it is necessary, before comparing observations made with the three barometers, to reduce them to the same temperature, so as to neutralize the inequalities arising from the expansion of the scales by heat.

The sympiezometer was invented in 18 18 by Adie of Edinburgh. It is a revived form of Hooke's marine barometer. It consists of a glass tube, with a small chamber at the top and an open cistern

below. The upper part of the tube ˆter.*’ is filled with air, and the lower part and cistern with glycerin. When atmospheric pressure is increased, the air is compressed by the rising of the fluid; but when it is diminished the fluid falls, and the contained air expands. To correct for the error arising from the increased pressure of the contained air when its temperature varies, a thermometer and sliding-scale are added, so that the instrument may be adjusted to the temperature at each observation. It is a sensitive instrument, and well suited for rough purposes at sea and for travelling, but not for exact observation. It has long been superseded by the Aneroid, which far exceeds it in handiness.

Aneroid Barometer. — Much obscurity surrounds the invention of barometers in which variations in pressure are rendered apparent by the alteration in the volume of an elastic chamber. The credit of the invention is usually given to Lucien Vidie, who patented his instrument in 1845, but similar instruments were in use much earlier. Thus in 1799 Nicolas Jacques Conte (1755-1805), director of the aerostatical school at Meudon, and a man of many parts — a chemist, mechanician and painter, — devised an instrument in which the lid of the metal chamber was sup- ported by internal springs; this instru- ment was employed during the Egyptian campaign for measur- ing the altitudes of the war-balloons. Al- though Vidie patented his device in 1845, the commercial manufacture E. Bourdon’s patent of

Fig. 4. — Aneroid Barometer, of aneroids only followed after

the metallic manometer in 1849, when Bourdon and Richard placed about 10,000 aneroids on the market. The production was stopped by an action taken by Vidie against Bourdon for infringing the former’s patent, and in 1858 Vidie obtained 25,000 francs (£1000) damages.

Fig. 4 represents the internal construction, as seen when the face is removed, but with the hand still attached, of an aneroid which differs only slightly from Vidie’s form, a is a flat circular metallic box, having its upper and under surfaces corrugated in concentric circles. This box or chamber being partially exhausted of air, through the short tube b, which i’s subsequently made air-tight by soldering, constitutes a spring, which is affected by every variation of pressure in the external atmosphere, the corrugations on its surface increasing its elasticity. At the centre of the upper surface of the exhausted chamber there is a solid cylindrical projection x, to the top of which the principal lever

cde is attached. This lever rests partly on a spiral spring at d; it is also supported by two vertical pins, with perfect freedom of motion. The end e of the lever is attached to a second or small lever /, from which a chain g extends to h, where it works on a drum attached to the axis of the hand, connected with a hair spring at h, changing the motion from vertical to horizontal, and regulating the hand, the attachments of which are made to the metallic plate i. The motion originates in the corrugated elastic box a, the surface of which is depressed or elevated as the weight of the atmosphere is increased or diminished, and this motion is communicated through the levers to the axis of

the hand at h. The spiral spring on which the lever rests at d is intended to compensate for the effects of alterations of temperature. The actual movement at the centre of the exhausted box, whence the indications emanate, is very slight, but by the action of the levers is multiplied 657 times at the point of the hand, so that a movement of the 220th part of an inch in the box carries the point of the hand through three inches on the dial. The effect of this combination is to multiply the smallest degrees of atmospheric pressure, so as to render them sensible on the index. Vidie's instrument has been improved by Vaudet and Hulot. Eugene Bourdon's aneroid depends on the same principle. The aneroid requires, however, to be repeatedly compared with a mercurial barometer, being liable to changes from the elasticity of the metal chamber changing, or from changes in the system of levers which work the pointer. Though aneroids are con- structed showing great accuracy in their indications, yet none can lay any claim to the exactness of mercurial barometers. The mechanism is liable to get fouled and otherwise go out of order, so that they may change 0-300 in. in a few weeks, or even indicate pressure so inaccurately and so irregularly that no confidence can be placed in them for even a few days, if the means of com- paring them with a mercurial barometer be not at hand.

The mercurial barometer can be made self registering by con centrating the rays from a source of light by a lens, so that they strike the top of the mercurial column, and having graphs. a sneet °f sensitized paper attached to a frame and placed behind a screen, with a narrow vertical slit in the line of the ray s. The mercury being opaque throws a part of the paper in the shade,

while above the mercury the rays from the lamp pass unobstructed to the paper. The paper being carried steadily round on a drum at a given rate per hour, the height of the column of mercury is photographed continuously on the paper. From the photograph the height of the barometer at any instant may be taken. The principle of the aneroid barometer has been applied to the construction of barographs. The lever attached to the collapsible chamber terminates in an ink-fed style which records the pressure of the atmosphere on a moving ribbon. In all continuously registering barometers, however, it is necessary, as a check, to make eye-observations with a mercury standard barometer hanging near the registering barometer from four to eight times daily.

See Marvin, Barometers and the Measurement of Atmospheric Pressure (1901); and C. Abbe, Meteorological Apparatus (1888). Reference may also be made to B. Stewart and W. W. H. Gee, Practical Physics (vol. i. 1901), for the construction of standard barometers, their corrections and method of reading.

BAROMETRIC LIGHT, the luminous glow emitted by mercury in a barometer tube when shaken. It was first observed by Jean Picard, and formed the subject of many experiments at the hands of Francis Hawksbee. The latter showed that the Torricellian vacuum was not essential to the phenomenon, for the same glow was apparent when mercury was shaken with air only partially rarefied. The glow is an effect of the electricity generated by the friction of the mercury and the air in the barometer tube.

BARON, MICHEL (1653-17 29), French actor (whose family-name, originally was Boyron), was born in Paris, the son of a leading actor (d. 1655) and of a talented actress (d. 1662). At the age of twelve he joined the company of children known as the Petits Comldiens Dauphins, of which he was the brightest star. Moliere was delighted with his talent, and with the king's permission secured him for his own company. In consequence of a misunderstanding with Moliere's wife, the actor withdrew from the dramatist's company, but rejoined it in 1670, reappear- ing as Domitien in Corneille's Tile et Berenice, and in his Psyche. He remained in this company until Moliere's death. He then became a member of the company at the H6tel de Bourgogne, and from this time until his retirement in 1691 was undisputed master of the French stage, creating many of the leading r61es in Racine's tragedies, besides those in two of his own comedies, L'Homme d bonnes fortunes (1686), and La Coquette (1687). He also wrote

Les Enlevements (1685), Le Dibauchi (1689), and translated and acted two plays of Terence. In 1720 Baron re- appeared at the Palais Royal, and his activity on the stage was I

renewed in a multitude of parts. He died on the 22nd of December 1729.

His son Etienne Michel Baron (1676-1711) was also a fine actor, and left a son and two daughters who all played at the Comedie Francaise.

See George Monval, TJn Comedien amateur d'art (1893) ; also the Abbe d'Allamial's Lettres d. mylord XXX. sur Baron et la demoiselle Lecouvreur, in F. G.J. S. Andrieux's Collection des memoires sur Vart dramatique (1822).

BARON. This word, of uncertain origin, was introduced into England at the Conquest to denote " the man " {i.e. one who had done him " homage ") of a great lord, and more especially of the king. All who held " in chief " {i.e. directly) of the king were alike barones regis, bound to perform a stipulated service, and members, in theory at least, of his council. Great nobles, whether earls or not, also spoke of their tenants as " barons," where lesser mag- nates spoke of their ." men " {homines). This was especially the case in earldoms of a palatine character, such as Chester, where the earl's barons were a well-recognized body, the Venables family, " barons of Kinderton," continuing in existence down to 1679. In the palatinate of Durham also, the bishop had his barons, among whom the Hiltons of Hilton Castle were usually styled " Barons of Hilton " till extinct in 1746. Other families to whom the title was accorded, independently of peerage dignity and on somewhat uncertain grounds, were " the barons of Greystock," " the barons of Stafford," and the Cornwalls, " barons of Burford." Fantosme makes Henry II. speak of " mes baruns de Lundres "; John's charter granting permission to elect a mayor speaks of " our barons of our city of London," and a London document even speaks of " the greater barons of the city." The aldermen seem to have been loosely deemed equiva- lent to barons and were actually assessed to the poll-tax as such under Richard II. In Ireland the palatine character of the great lordships made the title not uncommon {e.g. the barons of Galtrim, the barons of Slane, the barons of the Naas).

As all those who held direct of the crown by military service (for those who held " by serjeanty " appear to have been classed

apart), from earls downwards, were alike ” barons,” the great difference in their position and importance must have led, from an early date, to their being roughly divided into ” greater ” and ” lesser ” barons, and indeed, under Henry II., the Dialogus de Scaccario already distinguishes their holdings as ” greater ” or ” lesser ” baronies. Within a century of the Conquest, as we learn from Becket’s case (1164), there arose the practice of sending to the greater barons a special summons to the council, while the lesser barons, it is stipulated in Magna Carta (1215), were to be summoned only through the sheriffs. Thus was introduced a definite distinction, which eventually had the effect of restricting to the greater barons the rights and privileges of peerage.

Thus far the baron’s position was connected with the tenure of land; in theory the barons were those who held their lands of the king; in practice, they were those who so held a large amount of land. The great change in their status was effected when their presence in that council of the realm which became the House of Lords was determined by the issue of a writ of summons, dependent not on the tenure of land, but only on the king’s will. Camden’s statement that this change was made by Henry III. after ” the Barons’ War ” was long and widely accepted, but it is now assigned, as by Stubbs, to Edward I., and the earliest writs accepted as creating hereditary baronies are those issued in his reign. It must not, however, be supposed that those who received such summons were as yet distinguished from commoners by any style or title. The only possible prefix at that time was Dominus (lord), which was regularly used by simple knights, and writs of summons were still issued to the lowest order of peers as knights {chevaliers) only. The style of baron was first introduced by Richard II. in 1387, when he created John de Beauchamp, by patent, Lord de Beauchamp and baron of Kidderminster , to make him ” unum parium et baronum regni nostri.” But it was not till 1433 that the next ” baron ” was created, Sir John Cornwall being then made baron of Fanhope. In spite, however, of these innovations, the former

was only summoned to parliament by the style of ” John Beauchamp of Kidderminster,” and the latter by that of ” John Cornwall, knight.” Such creations became common under Henry VI., a transition period in peerage styles, but ” Baron ” could not

evict ” Sire,” ” Chevalier ” and ” Dominus.” Patents of creation contained the formula ” Lord A. (and) Baron of B.,” but the grantee still styled himself ” Lord “only, and it is an histori- cally interesting fact that to this day a baron is addressed in cor- respondence, not by that style, but as ” the Lord A.,” although all peers under the rank of Duke are spoken of as ” lords,” while they are addressed in correspondence by their proper styles. To speak of” Baron A.” or ” Baron B.” is an unhistorical and quite recent practice. When a barony, however, is vested in a lady it is now the recognized custom to speak of her as baroness, e.g. Baroness Berkeley.

The solemn investiture of barons created by patent was performed by the king himself, by enrobing the peer in the scarlet ” robe of estate ” during the reading of the patent, and this form continued till 13 Jac. I., when the lawyers declared that the delivery of the letters patent without ceremony was sufficient. The letters patent express the limits of inheritance of the barony. The usual limit is to the grantee and heirs male of his body, occasionally, in default of male issue, to a collateral male relative (as in the case of Lord Brougham, i86o)or (as in the case of Lord Basset, 1797, and Lord Burton, 1897) to the heirs- male of a daughter, and occasionally (as in the case of Lord Nelson, 1801) to the heirs-male of a sister. Sometimes also (as in the case of the barony of Rayleigh, 182 1) the dignity is bestowed upon a lady with remainder to the heirs-male of her body. The coronation robes of a baron are the same as those of an earl, except that he has only two rows of spots on each shoulder; and, in like manner, his parliamentary robes have but two guards of white fur, with rows of gold lace; but in other respects they are the same as those of other peers. King Charles II. granted to the barons a coronet, having six large pearls set at equal distances on the chaplet. A baron’s cap is the same as a viscount’s. His style is ” Right Honourable ” ; and he is addressed by the king or queen, ” Right Trusty and Well- beloved.” His children are by courtesy entitled to the prefix “The Honourable.”

Barons of the Exchequer were formerly six judges (a chief baron and five puisne barons) to whom the administration of justice was committed in causes betwixt the king and his subjects relative to matters of revenue. Selden, in his Titles of Honour, conjectures that they were originally chosen from among the barons of the kingdom, and hence their name; but it would probably be more exact to say that they were officers of a branch of the king’s Curia , which was theoretically composed of his ”

barons." The title has become obsolete since 1875, when the court of exchequer was merged in the High Court of Judicature.

Barons of the Cinque Ports (originally Hastings, Dover, Hythe, Romney and Sandwich) were at first the whole body of their freemen, who were so spoken of in royal charters. But the style was afterwards restricted to their mayors, jurats, and (prior to 1 831) members of the House of Commons elected by the Cinque Ports, two for each port. Their right to the title is recognized in many old statutes, but in 1606 the use of the term in a message from the Lower House drew forth a protest from the peers, that " they would never acknowledge any man that sitteth in the Lower House to the right or title of a baron of parliament " {Lords' Journals). It was the ancient privilege of these " barons " to bear a canopy over the sovereign at his or her coronation and retain it as their perquisite. They petitioned as " barons of the Cinque Ports " to attend the coronation of Edward VII., and a deputation was allowed to do so.

Baron and Feme, in English law, is a phrase used for husband and wife, in relation to each other, who are accounted as one person. Hence, by the old law of evidence, the one party was excluded from giving evidence for or against the other in civil questions, and a relic of this is still preserved in the criminal law.

Baron and Feme, in heraldry, is the term used when the coats- of-arms of a man and his wife are borne per pale in the same

escutcheon, the man's being always on the dexter side, and the woman's on the sinister. But in this case the woman is supposed not to be an heiress, for then her coat must be borne by the husband on an escutcheon of pretence. (See Heraldry.)

The foreign title of baron is occasionally borne by English subjects, but confers no precedence in the United Kingdom. It may be Russian, e.g. Baron Dimsdale (1762); German, e.g. Baron Stockmar, Baron Halkett (Hanoverian); Austrian, e.g. Baron Rothschild (1822), Baron de Worms; Italian, e.g. Baron Heath; French, e.g. Baron de Teissier ; French-Canadian, e.g. Baron de Longueil (1700); Dutch, e.g. Baron Mackay (Lord Reay). (J. H. R.)

The Foreign Title. — On the continent of Europe the title baron, though the same in its origin, has come, owing to a variety of causes, to imply a rank and status very different from its con-notation in the United Kingdom, and again varies considerably in

different countries. Originally baro meant no more than ” man,” and is so used in the Salic and other ” barbarian ” laws; e.g. Si quis mortaudii barum vel feminam, &c. (Lex Aleman. tit. 76). In this way, too, it was long preserved in the sense of ” husband,” as in the Assize of Jerusalem (MSS. cap. 98) : Si Von appelle aucune chose femme qui aura baron, et il la veul dejfendre, il la peut defendre de son cors, &c. Gradually the word seems to have come to mean a ” strong or powerful man,” and thus generally ” a magnate.” Finally, in France in the 12th century the general expression barones was introduced in a restricted sense, as applied properly to all lords possessing an important fief, subject to the rule of primogeniture and thus not liable to be divided up, and held of one overlord alone. Sometimes it in- cluded ecclesiastical lordships of the first rank. In the 13th century the Register of King Philip Augustus places the barones regis Francie next to the dukes and counts holding in chief, the title being limited to vassals of the second rank. Towards the end of the century the title had come to mean that its bearer held his principal fief direct from the crown, and was therefore more important than that of count, since many counts were only mediate vassals. Thus the kings in granting a duchy or countship as an apanage to their brothers or sons used the phrase in comitatum et baroniam. From this period, how- ever, the title tends to sink in comparative importance. When, in the 14th century, the feudal hierarchy was com- pleted and stereotyped, the barons are ranked not only below counts, but below viscounts, though in power and possessions many barons were superior to many counts. In any case, until the 17th century, the title of baron could only be borne by the holder of a territorial barony; and it was Louis XIV. who first cheapened the title in France by creating numerous barons by royal letters. This entire dissociation of the title from *the idea of feudal rights and obligations was completed by Napoleon’s decree of March 1, 1808, reviving the ancient titles. By this instrument the title of baron was to be borne ex officio by a number of high officials, e.g. ministers, senators, councillors of state, archbishops and bishops. It was given to the 37 mayors who attended the coronation, and could be claimed by any mayor who had served to the emperor’s satis- faction for ten years, and by any member of an electoral college who had attended three sessions. The title was made to descend in order of primogeniture to legitimate or adopted sons and to the nephews of bishops, the sole condition being that proof must be presented of an actual income of 15,000 fr., of which one- third should descend with the title. The

creation of barons was con- tinued by Louis XVIII. , Charles X. and Louis Philippe, and, suspended at the revolution of 1848, was revived again on a generous scale by Napoleon III. The tolerant attitude of the Third Republic towards titles, which it does not officially recognize, has increased the confusion by facilitating the assump- tion of the title on very slender grounds of right. The result has been that in France the title of Baron, unless borne by the re- cognized representative of a historic name, not only involves no political status, but confers also but very slight social distinction.

The same is true, mutatis mutandis, of most other European countries, and notably of Italy. In Austria and Germany the

case is somewhat different. Though in Latin documents of the middle ages the term barones for liberi domini was used, it was not until the 17th century that the word Baron, perhaps under the influence of the court of Versailles, began to be used as the equivalent of the old German Freiherr, or free lord of the Empire. The style Freiherr {liber dominus) implied originally a dynastic status, and many Freiherren held countships without taking the title of count. When the more important of them styled themselves counts, the Freiherren sank into an inferior class of nobility. The practice of conferring the title Freiherr by imperial letters was begun in the 16th century by Charles V., was assumed on the ground of special imperial concessions by many of the princes of the Empire, and is now exercised by all the German sovereigns. Though the practice of all the children taking the title of their father has tended to make that of Baron compara- tively very common, and has dissociated it from all idea of territorial possession, it still implies considerable social status and privilege in countries where a sharp line is drawn between the caste of ” nobles ” and the common herd, whom no wealth or intellectual eminence can place on the same social level with the poorest Adeliger. In Japan the title baron (Dan) is the lowest of the five titles of nobility introduced in 1885, on the European model. It was given to the least important class of territorial nobles, but is also bestowed as a title of honour without reference to territorial possession.

See du Cange, Glossarium, s. ” Baro ” (ed. Niort, 1883); John

Selden, Titles of Honor, p. 353 (ed. 1672) ; Achille Luchaire, Manuel des institutions franqaises (Paris, 1892); Maurice Prou, art. ” Baron ” in La Grande Encyclopedie. (W. A. P.)

BARONET. Although the origin of this title has been the subject of learned speculation, it is not known for certain why it was selected as that of “a new Dignitie between Barons and Knights ” created by James I. The object of its institution was to raise money for the crown, as was also done by the sale of peerage dignities under this sovereign. But the money was pro- fessedly devoted to the support of troops in Ulster, that is, each grantee was to be liable for the pay of thirty men, at 8d. a day for three years. This amounted to £1095, which was the sum paid for the honour. When it was instituted, in May 161 1, the king, to keep the baronetage select, covenanted that he would not create more than two hundred, and that only those who had £1000 a year in landed estate and whose paternal grand- fathers had borne arms should receive the honour. But these qualifications were before long abandoned. As an inducement to apply for it, it was made to confer the prefix of ” Sir ” and ” Lady ” (or ” Dame “), and was assigned precedence above knights, though below the younger sons of barons. Eight years later (30th of September 1619), the baronetage of Ireland was instituted, the king pledging himself not to create more than a hundred baronets. Meanwhile, questions had arisen as to the exact precedence of the baronets, and James by royal decree (28th of May 161 2) had announced that it was his intention to rank them below the younger sons of barons. As this had the effect of stopping applications for the honour, James issued a fresh commission (18th of November 1614) to encourage them, and finally, as ” the Kinges wants might be much relieved out of the vanities and ambition of the’ gen trie ” (in Chamberlain’s words), he granted, in 1616, the further privilege that the heirs apparent of baronets should be knighted on coming of age.

The baronetage of Nova Scotia was devised in 1624 as a means of promoting the ” plantation ” of that province, and James announced his intention of creating a hundred baronets, each of whom was to support six colonists for two years (or pay 2000 marks in lieu thereof) and also to pay 1000 marks to Sir William Alexander (afterwards earl of Stirling), to whom the province had been granted by charter in 162 1. For this he was to receive a ” free barony ” of 16,000 acres in Nova Scotia, and to become a baronet of ” his Hienes Kingdom of Scotland.” James dying at this point, Charles I. carried out the scheme, creating the first

Scottish baronet on the 28th of May 1625, covenanting in the creation charter that the baronets ” of Scotland or of Nova Scotia ” should never exceed a hundred and fifty in number, that

their heirs apparent should be knighted on coming of age, and that no one should receive the honour who had not fulfilled the conditions, viz. paid 3000 marks (£166, 13s. 4d.) towards the plantation of the colony. Fouryears later (1 7thof November 1629) the king wrote to ” the contractors for baronets,’ 1 recognizing that they had advanced large sums to Sir William Alexander for the plantation on the security of the payments to be made by future baronets, and empowering them to offer a further induce- ment to applicants; and on the same day he granted to all Nova Scotia baronets the right to wear about their necks, suspended by an orange tawny ribbon, a badge bearing an azure saltire with a crowned inescutcheon of the arms of Scotland and the motto ” Fax mentis honestae gloria.” As the required number, how- ever, could not be completed, Charles announced in 1633 that English and Irish gentlemen might receive the honour, and in 1634 they began to do so. Yet even so, he was only able to create a few more than a hundred and twenty in all. In 1638 the creation ceased to carry with it the grant of lands in Nova Scotia, and on the union with England (1707) the Scottish creations ceased, English and Scotsmen alike receiving thenceforth baronetcies of Great Britain.

It is a matter of dispute whether James I. had kept faith with the baronets of England as to limiting their number; but his son soon rejected the restriction freely. Creations became one of his devices for raising money; blank patents were hawked about, and in 1641 Nicholas wrote that baronetcies were to be had for £400 or even for £3 50; a patent was offered about this time to Mr Wrottesley of Wi-ottesley for £300. On the other hand, the honour appears to have been bestowed for nothing on some ardent royalists when the great struggle began.

Cromwell created a few baronets, but at the Restoration the honour was bestowed so lavishly that a letter to Sir Richard Leveson (3rd of June 1660) describes it as ” too common,” and offers to procure it for any one in return for £300 or £400. Sir William Wiseman, however, is said to have given £500.

The history of the baronetage was uneventful till 1783, when in consequence of the wrongful assumption of baronetcies, an old arid then increasing evil, a royal warrant was issued (6th of

December) directing that no one should be recognized as a baronet in official documents till he had proved his right to the dignity, and also that those created in future must register their arms and pedigree at the Heralds' College. In consequence of the opposition of the baronets themselves, the first of these two regulations was rescinded and the evil remained unabated. Since the union with Ireland (1800) baronets have been created, not as of Great Britain or of Ireland, but as of the United Kingdom.

In 1 834 a movement was initiated by Mr Richard Broun (whose father had assumed a Nova Scotia baronetcy some years before), to obtain certain privileges for the order, but on the advice of the Heralds' College, the request was refused. A further petition, for permission to all baronets to wear a badge, as did those of Nova Scotia, met with the same fate in 1836. Meanwhile George IV. had revoked (19th. of December 1827), as to all future creations the right of baronets' eldest sons to claim knighthood. Mr Broun claimed it as an heir apparent in 1836, and on finally meeting with refusal, publicly assumed the honour in 1842, a foolish and futile act. In 1854 Sir J. Kingston James was knighted as a baronet's son, and Sir Ludlow Cotter similarly in 1874, on his coming of age; but when Sir Claude de Crespigny's son applied for the honour (17th of May 1895), his application was refused, on the ground that the lord chancellor did not consider the clause in the patent (1805) valid. The reason for this decision appears to be unknown.

Mr Broun's subsequent connexion with a scheme for reviving the territorial claims of the Nova Scotia baronets as part of a colonizing scheme need not be discussed here. A fresh agitation was aroused in 1897 by an order giving the sons of life peers precedence over baronets, some of whom formed themselves, in 1898, into " the Honourable Society of the Baronetage " for the maintenance of its privileges. But'a royal warrant was issued on the 15th of August 1898, confirming the precedence complained of as an infringement of their rights. The above body, however,

has continued in existence as the " Standing Council of the Baronetage," and succeeded in obtaining invitations for some representatives of the order to the coronation of King Edward VII. It has been sought to obtain badges or other distinctions for

baronets and also to purge the order of wrongful assumptions, an evil to which the baronetage of Nova Scotia is peculiarly exposed, owing to the dignity being descendible to collateral heirs male of the grantee as well as to those of his body. A departmental committee at the home office was appointed in 1906 to consider the question of such assumptions and the best means of stopping them.

All baronets are entitled to display in their coat of arms, either on a canton or on an inescutcheon, the red hand of Ulster, save those of Nova Scotia, who display, instead of it, the saltire of that province. The precedency of baronets of Nova Scotia and of Ireland in relation to those of England was left undetermined by the Acts of Union, and appears to be still a moot point with heralds. The premier baronet of England is Sir Hickman Bacon, whose ancestor was the first to receive the honour in 161 1.

See Pixley's History of the Baronetage; Playfair's " Baronetage " (in British Family Antiquity, vols, vi.-ix.); Foster's Baronetage; G. E. Cokayne's Complete Baronetage; Nichols, "The Dignity of Baronet " (in Herald and Genealogist, vol. iii.) (J. H. R.)

BARONIUS, CAESAR (1538-1607), Italian cardinal ?nd ecclesiastical historian, was born at Sora, and was educated at Veroli and Naples. At Rome he joined the Oratory in i557under St Philip Neri (q.v.) and succeeded him as superior in 1593. Clement VIII., whose confessor he was, made him cardinal in 1596 and librarian of the Vatican. At subsequent conclaves he was twice nearly elected pope, but on each occasion was opposed by Spain on account of his work On the Monarchy of Sicily, in which he supported the papal claims against those of the Spanish government. Baronius is best known by his Annales Ecclesiastici, undertaken by the order of St Philip as an answer to the Magdeburg Centuries. After nearly thirty years of lecturing on the history of the Church at the Vallicella and being trained by St Philip as a great man for a great work, he began to write, and produced twelve folios (1588-1607). In the Annales he treats history in strict chronological order and keeps theology in the background. In spite of many errors, especially in Greek history, in which he had to depend upon secondhand information, the work of Baronius stands as an honest attempt to write history, marked with a sincere love of truth. Sarpi, in urging Casaubon to write against Baronius, warns him never to charge or suspect him of bad faith, for no one who knew him could accuse him of disloyalty to truth. Baronius makes use of the words of St

Augustine: ” I shall love with a special love the man who most rigidly and severely corrects my errors.” He also undertook a new edition to the Roman martyrology (1586), which he purified of many inaccuracies.

His Annales, which end in 1 198, were continued by Rinaldi (9 vols., 1676-1677); by Laderchi (3 vols., 1728-1737); and by Theiner C3 vols., 1856). The most useful edition is that of Mansi (38 vols., “Lucca, 1 738-1 759), giving Pagi’s corrections at the foot of each page. (E. Tn.)

BARONY, the domain of a baron (q.v.). In Ireland counties are divided into ” baronies,” which are equivalent to the ” hundreds ” (q.v.) in England, and seem to have been formed out of the territories of the Irish chiefs, as each submitted to English rule (General Report of the Census of England, iv. 181, 1873). In Scotland the term is applied to any large freehold estate even when held by a commoner. Barony also denotes the rank or dignity of a baron, and the feudal tenure ” by barony.”

BAROQUE, a technical term, chiefly applicable to architecture, furniture and household decoration. Apparently of Spanish origin — a barrueco is a large, irregularly-shaped pearl — the word was for a time confined to the craft of the jeweller. It indicates the more extravagant fashions of design that were common in the first half of the 18th century, chiefly in Italy and France, in which everything is fantastic, grotesque, florid or incongruous — : irregular shapes, meaningless forms, an utter lack of restraint and simplicity. The word suggests much the same order of ideas as rococo.

BAROSS, 6AB0R (1848-1892), Hungarian statesman, was born at Trencsen on the 6th of July 1848, and educated at Esztergom. He was for a time one of the professors there under Cardinal Kolos Vaszary. After acquiring considerable local reputation as chief notary of his county, he entered parliament in 1875. He at once attached himself to Kalman Tisza and remained faithful to his chief even after the Bosnian occupation had alienated so many of the supporters of the prime minister. It was he who drew up the reply to the malcontents on this occasion, for the first time demonstrating his many-sided ability and his genius for sustained hard work. But it was in the field of economics that he princi- pally achieved his fame. In 1883 he was appointed secretary to the ministry of ways and communications. Baross, who had prepared himself for quite another career, and had only

become acquainted with the civilized West at the time of the Composition of 1867, mastered, in an incredibly short time, the details of this difficult department. His zeal, conscientiousness and energy were so universally recognized, that on the retirement of Gabor Kemeny, in 1886, he was appointed minister of ways and com- munications. He devoted himself especially to the development of the national railways, and the gigantic network of the Austro- Hungarian railway system and its unification is mainly his work. But his most original creation in this respect was the zone system, which immensely facilitated and cheapened the circulation of all wares and produce, and brought the remotest districts into direct communication with the central point at Budapest. The amal- gamation of the ministry of commerce with the ministry of ways in 1889 further enabled Baross to realize his great idea of making the trade of Hungary independent of foreign influences, of increasing the commercial productiveness of the kingdom and of gaining every possible advantage for her export trade by a revision of tolls. This patriotic policy provoked loud protests both from Austria and Germany at the conference of Vienna in 1890, and Baross was obliged somewhat to modify his system. This was by no means the only instance in which his commercial policy was attacked and even hampered by foreign courts. But wherever he was allowed a free hand he introduced epoch-making reforms in all the branches of his department, including posts, telegraphs, &c. A man of such strength of character was not to be turned from his course by any amount of opposition, and he rather enjoyed to be alluded to as " the iron-handed minister." The crowning point of his railway policy was the regulation of the Danube at the hitherto impassable Iron-Gates Rapids by the con- struction of canals, which opened up the eastern trade to Hungary and was an event of international importance. It was while inspecting his work there in March 1892 that he caught a chill, from which he died on the 8th of May. The day of his burial was a day of national mourning, and rightly so, for Baross had dedicated his whole time and genius to the promotion of his country's prosperity.

See L&szlo Petrovics, Biography of Gabriel Baross (Hung. Eperies, 1892). (R. N. B.)

BAROTAC NUEVO, a town of the province of Iloilo, Panay, Philippine Islands, near the Jalaur river, above its mouth on the S.E. coast, and about 15 m. N.E. of Iloilo, the capital. Pop. (1903) 9904; in 1903 after the census had been taken the neighbouring

town of Dumangas (pop. 12,428) was annexed to Barotac Nuevo. The town lies in a fertile plain and deals in rice, trepang and pina. Here, in what was formerly Dumangas, are a fine church and convent, built of iron, pressed brick and marble. Dumangas was destroyed by fire in June 1900, during a fight with insurgents, but its rebuilding was begun in May 1901.

BAROTSE, BAROTSELAND, a people and country of South Central Africa. The greater part of the country is a British protectorate, forming part of Rhodesia. The Barotse are the paramount tribe in the region of the Upper Zambezi basin, but by popular usage the name is also applied to contiguous subject tribes, Barotseland being the country over which the Barotse paramount chief exercises authority. The present article treats (i)of the people, (2) of the country, (3) of the establishment of the British protectorate and of subsequent developments.

1. The Barotse. — These people, originally known as Aalui, have

occupied the extensive plain through which the Zambezi passes from 14 35′ S. to 16 25′ S. throughout the reigns of twenty-two successive paramount chiefs and therefore approximately since the commencement of the 1 7 th century. Previously, for an indefinite period, they dwelt on the Kabompo river, 200 m. to the N.E. of their present country, and here the descendants of a section of the tribe which did not migrate still remain, under the name Balok- wakwa (men of the ambuscade), formerly known as Aalukolui. That the Barotse at a still more remote period emigrated from the far north-east is indicated by vague tradition as well as by a certain similarity in type and language to some tribes living in that direction, though the fact that natives from Mashonaland can understand those at Lialui (the Barotse capital) has led to the assumption by some writers that the Barotse are an offshoot of the Mashona. The variety in type among the Mashona and the homogeneity of the Barotse would rather point to an opposite conclusion.

Early in the igth century a section of the Basuto tribe known as Makololo trekked from the south of what is now the Orange River Colony and fought their way through Bechuanaland and the Kalahari to the land of the Barotse, whom they ultimately

subdued. Their chief, Sebituane, who as an administrator and general was far in advance of his compeers, established the rule of his house for some forty years, until about 1865 an organized rebellion of the Barotse led to the almost complete extinction of this Makololo oligarchy and the reinstatement of the original dynasty. It was the Makololo who gave the Barotse their present name (Rotse, plain — JSwrotse, country of the plain — Murotse, man of the plain — Afarotse, people of the plain, the latter being inaccurately rendered .Barotse, Ba being the equivalent of Ma in certain other languages).

The Barotse proper are comparatively few in number, but as is inferred from the fact that for many generations they have held in sway a country two and a half times the size of Great Britain, they are the intellectual and physical superiors of the vast majority of the negro races of Africa. Very black, tall in stature, deep in chest and comparatively speaking refined in feature, a Barotse is readily distinguishable amidst a mixed group of natives. Being numerically small they form an oligarchy in which, with few exceptions, each man holds rank in a chief-tainship of which there are three grades. Next to the chiefs rank their descendants who have not themselves acquired chief's rank and hold an intermediate position as freeborn; all others, whether members of the subject-tribes or prisoners of war, being, up to 1906, mere slaves. This class was also graded. Slaves might own slaves who in their turn might own slaves, the highest grade always being directly responsible to some Barotse chief. As a reward of gallantry or ability the paramount chief occasion- ally conferred chief's rank on individuals not of Barotse birth, and these ipso facto assumed the name and privileges of the Barotse. It was a counterpart of the feudal system of Europe in which every grade from king to serf found a place. In 1906 the paramount chief, by proclamation, abolished the state of slavery, an act which, however, left untouched the predominant position of the Barotse and their rights to chieftainship. The paramount chief shares with a queen (Mokwai) his authority and prerogatives. The Mokwai is not the wife but the eldest sister of the ruling chief. With his death her privileges lapse. Theoretically, these co-rulers are equal, neither may promulgate a national decree without the assent of the other, but each has a capital town, councillors and absolute authority in a province, the two having joint authority over all other provinces. In their code of laws the Barotse show an advance on the standard of probably any other African negro state. By right, an accused chief

is tried by his peers, each of whom in rotation from junior to senior gives his verdict, after which the president reports the finding of the court to the paramount chief, who passes sentence. As to their religious beliefs the Barotse imagine the sun to be the embodiment of a great god whose sole care is for the amelioration of man. Him they worship, though more pains are taken to appease evil spirits, in whose existence they also believe, to whom every evil to which man is heir is attributed.

The spirits of ancestors — especially of deceased chiefs — are also objects of worship. Christianity, of a Protestant evangelical type, was first introduced into the country in 1884 by Francois Coillard and has made some progress among the people, among the converts being Letia, eldest son and heir of Lewanika, the paramount chief.

2. Barotseland. — This term includes, in the sense of the country in which the authority of the paramount Barotse chief is acknowledged, not only the lands of the Barotse proper, but the territory of fifteen contiguous and subject tribes. This vast territory extends approximately from the Kwito river in the west to the Kafue river in the east, and from the Congo- Zambezi watershed in the north to the Linyante or Kwando river and Zambezi in the south, and may be divided into three groups : —

(a) Central provinces directly administered by the paramount chief from the capital Lialui (a town on the Zambezi), by the Mokwai from Nalolo, and by two chiefs of the blood from Sesheke ;

(b) Outlying provinces over which, in the absence of a central local system of government, Barotse chiefs administer districts under the direction of the paramount chief; and

(c) Tribes over which the local chiefs are permitted to retain their position subject to the payment of annual tribute and to their doing homage in person at Lialui when called upon to do so.

With the publication of the king of Italy's award in 1905 in the Anglo-Portuguese Barotse Boundary dispute (see below), the term Barotseland may be said to have acquired a second meaning. By this award the western and part of the northern section of Barotseland as described above were declared to be outside the dominion of the paramount chief and therefore not in the British sphere of influence, while tribal boundaries were complicated by

the introduction of a longitudinal and latitudinal frontier. Though this award altered the political boundaries, ethnologically Barotseland remains much as above described, The area of the country under British protection is about 182,000 sq. m.

Excluding the ridge of high ground running east and west which, culminating at a height of 5000 ft., forms the Congo- Zambezi water-parting, the extreme east (Batoka) and the district in the immediate vicinity of the Victoria Falls (q.v.) throughout which, with local variations, a red laterite clay predominates, the main physical features of Barotseland may be described as a series of heavy white sand undulations covered with sub- tropical forest vegetation. These are intersected by alluvium- charged valleys through which streams and rivers flow inwards towards the central basin of the Upper Zambezi. There is evidence that this has at one time been the site of a large lake. These valleys, which towards the close of the wet season become inundated, afford rich cattle pasture, the succulence of which prevents cattle losing condition towards the end of the dry season, as is the case in many parts of Africa. There seems to be little or no indication of mineral wealth in the white sand area, but in the north and east there is not only every prospect of a great agricultural and pastoral future but also of consider- able mining development. Though basalt predominates in the neighbourhood of the Victoria Falls and large fields of granite crop up on the Batoka plateau and elsewhere, there is every indication of the existence of useful minerals in these districts. Gold, copper, tin, lead, zinc and iron have been discovered.

Much of the area of Barotseland is within the healthy zone, the healthiest districts being the Batoka and Mashikolumbwe plateaus in the east with extreme altitudes of 4400 and 4150 ft. respectively, and the line of the Congo-Zambezi watershed which rises to 5000 ft. in many places. The Zambezi valley from the Victoria Falls (3000 ft.) to the Kabompo confluence (3500 ft.), though involving little or no risk to health to the traveller, cannot be considered suitable for white settlement. Taking into consideration the relative value of altitude to latitude, the plateauland of Barotseland compares very favourably with existing conditions elsewhere, being several degrees more temperate than would be expected. Approximately the mean

maximum and minimum temperatures stand at 8o° and 55° F. respectively, with an extreme range of ioo° to 35 and a mean annual temperature of 68° to 70 . The rainfall varies according to district from 22 to 32 in. a year and has shown extraordinary stability. Since 1884, the first year in which a record was taken by Frangois Coillard, Barotseland has known no droughts, though South Africa has suffered periodically in this respect.

The Zambezi, as would be expected, forms a definite boundary line in the distribution of many species of fauna and flora. In these respects, as well as from an ethnological standpoint, Barotseland essentially belongs not to South but to Central Africa. The great river has also served to prevent the spread from South Africa into Barotseland of such disastrous cattle diseases as tick fever and lung sickness.

3. The Establishment of British Suzerainty. — By the charter granted to the British South Africa Company in October 1889, the company was allowed to establish its rule in the regions north of the Middle Zambezi not included in the Portuguese dominions, and by a treaty of the nth of June 1891 between Great Britain and Portugal it was declared that the Barotse kingdom was within the British sphere of influence. The dispute between the contracting powers as to what were the western limits of Barotseland was eventually referred to the arbitration of the king of Italy, who by his award of the 30th of May 1905, fixed the frontier at the Kwando river as far north as 22° E., then that meridian up to the 13° S., which parallel it follows as far east as 24° E., and then that meridian to the Belgian Congo frontier. In the meantime the British South Africa Company had entered into friendly relations with Lewanika (q.v.), the paramount chief of the Barotse, and an administrator was appointed on behalf of the company to reside in the country. A native police force under the command of a British officer was raised and magistrates and district commissioners appointed. In the internal affairs of the Barotse the company did not interfere, and the relations between the British and Barotse have been uniformly friendly. The pioneers of Western civilization were not, however, the agents of the Chartered Company, but missionaries. F. S. Arnot, an Englishman, spent two years in the country (1882-1884) and in 1884 a mission, fruitful of good results, was established by the Societe des Missions Evangeliques de Paris. Its first agent was Francois Coillard (1834-1904), who had previously been engaged

in mission work in Basutoland and who devoted the rest of his life to the Barotse. Though always an admirer of British institutions and anxious that the country should ultimately fall under British jurisdiction, Coillard in the interests of his mission was in the first instance anxious to delay the advent of white men into the country. It was contrary to his advice that Lewanika petitioned the " Great White Queen " to assume a protectorate over his dominions, but from the moment Great Britain assumed responsibility and the advance of European civilization became inevitable, all the influence acquired by Coillard's exceptional personal magnetism and singleness of purpose was used to prepare the way for the extension of British rule. Only those few pioneers who knew the Barotse under the old conditions can fully realise what civilization and England owe to the co-operation of this high-minded Frenchman.

Under the Chartered Company's rule considerable progress has been made in the development of the resources of the country, especially in opening up the mining districts in the north. The seat of the administration, Kalomo, is on the " Cape to Cairo " railway, about midway between the Zambezi and Kafue rivers. The railway reached the Broken Hill copper mines, no m. N. of the Kafue in 1906, and the Belgian Congo frontier in 1910. From Lobito Bay in Portuguese West Africa a railway was being built in 1909 which would connect with the main line near the Congo frontier. This would not only supply Barotseland with a route to the sea alternative to the Beira and Cape Town lines, but while reducing the land route by many hundred miles would also supply a seaport outlet 1700 m. nearer England than Cape Town and thus create a new and more rapid mail route to southern Rhodesia and the Transvaal. The Zambezi also, with Kebrabasa

as its one bar to navigation between Barotseland and the sea, will supply a cheap line of communication. (See Rhodesia.) See David Livingstone, Missionary Travels and Researches in South Africa (London, 1857) ; Major Serpa Pinto, How I crossed Africa (London, 1881); F. Coillard, On the Threshold of Central Africa (London, 1897) ; Major A. St H. Gibbons, Exploration and Hunting in Central Africa (London, 1898), Africa South to North through Marotseland (London, 1904) ; " Journeys in Marotseland," Geographical Journal, 1897; "Travels in the Upper Zambezi Basin," Geographical Journal, 1901 ; A. Bertrand, Aux pays des Barotse, haut Zambeze (Paris, 1898); Col. Colin Harding, In Remotest Barotse- land (London, 1905) ; C. W. Mackintosh, Coillard of the Zambesi (London, 1907), with a bibliography ; L.

Decle, Three Years in Savage Africa (London, 1898). Consult also the annual reports of the British South Africa Company, published in London. (A. St H. G.)

BAROUCHE (Ger. barutsche, Span, barrocho, Ital. baroccio; from Lat. bi-rotus, double- wheeled) , the name of a sort of carriage, with four wheels and a hood, arranged for two couples to sit inside facing one another.

BARQUISIMETO, a city of western Venezuela, capital of the state of Lara, on the Barquisimeto river, 101 m. by rail S.W. of Tucacas, its port on the Caribbean coast. Pop. (est. 1899) 40,000. It is built in a small, fertile valley of the Merida Cordilleras, 1985 ft. above sea-level, has a temperate, healthy climate with a mean annual temperature of 78° F., and is surrounded by a highly productive country from which are exported coffee, sugar, cacao and rum. It is also an important distributing centre for neighbouring districts. The city is the seat of a bishopric, is regularly laid out and well built, and is well provided with educational and charitable institutions. Barquisimeto was founded in 1522 by Juan de Villegas, who was exploring the neighbourhood for gold, and it was first called Nueva Segovia after his native city. In 1807 its population had risen to 15,000, principally through its commercial importance, but on the 26th of March 181 2 it was totally destroyed by an earthquake, and with it 1500 lives, including a part of the revolutionary forces occupying the town. It was soon rebuilt and is one of the few cities of Venezuela which have recovered from the ravages of the war of independence and subsequent disorders.

BARR, a town of Germany, in the imperial province of Alsace-Lorraine, on the Kirneck, 13 m. N. from Schlettstadt by rail. It has an Evangelical and a Roman Catholic church and considerable tanneries. There is an active trade in wine and timber. Pop. (1900) 5243.

BARRA, or B array (Scand. Baraey, isle of the ocean), an island of the outer Hebrides, Inverness-shire, Scotland. Pop. (1901) 2362. It lies about 5 m. S.W. of South Uist, is 8 m. in length and from 2 to 4 m. in breadth, save at the sandy isthmus 2 m. below Scurrival Point, where it is only a few hundred yards broad. The rock formation is gneiss. The highest hill is Heaval (1260 ft.) and there are several small lochs. The chief village is Castlebay, at which the Glasgow steamer calls once a week. This place derives its name from the castle of Kishmul standing on a rock in the

bay, which was once the stronghold of the M'Neills of Barra, one of the oldest of Highland clans. There are remains of ancient chapels, Danish duns and Druidical circles on the island. There is communication by ferry with South Uist. The parish comprises a number of smaller islands and islets — among them Frida, Gighay, Hellisay, Flodda to the N.E., and Vatersay, Pabbay, Mingalay (pop. 13s) and Berneray to the S.E. — and contains 4000 acres of arable land and 18,000 acres of meadow and hill pasture. The cod, ling and herring fisheries are important, and the coasts abound with shell-fish, especially cockles, for which it has always been famous. On Barra Head, the highest point of Berneray, and also the most southerly point of the outer Hebrides chain, is a light- house 680 ft. above high water.

BARRACKPUR, a town and magisterial subdivision of British India, in the district of Twenty-four Parganas, Bengal. The town is the largest cantonment in Lower Bengal, having accommodation for two batteries of artillery, the wing of a European regiment and two native battalions. Its name is said to be derived from the fact of troops having been stationed here since 1772. It is a station on the Eastern Bengal railway. Job

Charnock, the founder of Calcutta, erected a bungalow and established a small bazaar here in 1689. The cantonment is situated on the left bank of the Hugh; it has also a large bazaar and several large tanks, and also a parade ground. To the south of the cantonment is situated the park, created by the taste and public spirit of Lord Wellesley. Within the park is situated the Government House, a noble building begun by Lord Minto, and enlarged into its present state by the marquess of Hastings. The park is beautifully laid out, and contains a small menagerie. Its most interesting feature is now Lady Canning's tomb; Barrack-pur played an important part in the two Sepoy mutinies of 1824 and 1857, but the details of these belong to the general history of British rule in India. North Barrackpur had a population in 1901 of 12,600 and south Barrackpur of 19,307.

Barrackpur subdivision was formed in 1904. It contains an area of 190 sq. m., which, at the census of 1901 , had a population of 206,31 1, a large proportion being workers in the mills on the left bank of the Hugli.

BARRACKS (derived through the French from the Late Lat. barra, a bar), the buildings used for the accommodation of military or naval forces, including the quarters for officers, warrant officers, non-commissioned officers and men, with their messes and recreation establishments, regimental offices, shops, stores, stables, vehicle sheds and other accessory buildings for military or domestic purposes. The term is usually applied to permanent structures of brick or stone used for the peace occupation of troops; but many hut barracks of corrugated iron lined with wood have been built, generally in connexion with a training ground for troops, and in these the accommodation given is somewhat less than in permanent barracks, and con- ditions more nearly approach those of a military encampment.

British System. — The accommodation to be given in British military barracks is scheduled in the Barrack Synopsis, which contains " statements of particulars, based upon decisions which have, from time to time, been laid down by authority, as regards the military buildings authorized for various units, and the accommodation and fittings to be provided in connexion therewith." Each item of ordinary accommodation is described in the synopsis, and the areas and cubic contents of rooms therein laid down form the basis of the designs for any new barrack buildings. Supplementary to the synopsis is a series of " Standard Plans," which illustrate how the accommodation may be conveniently arranged; the object of the issue of these plans is to put in convenient form the best points of previous designs, and to avoid the necessity of making an entirely fresh design for each building that is to be erected, by using the standard type modified to suit local conditions. External appearance is considered with regard to the materials to be used, and the position the buildings are to occupy; convenience Of plan and sound sanitary construction being the principal objects rather than external effect, designs are usually simple, and depend for architectural effect more on the grouping and balance of the parts than on ornamentation such as would add to expense. The synopsis and standard plans are from time to time revised, and brought up to date as improvements suggest themselves, and increases in scale of accommodation are authorized, after due consideration of the financial effect; so that systematic evolution of barrack design is carried on.

Modem British Barracks. — A description of a modern barrack for a battalion of infantry will give an idea of the standard of accommodation which is now authorized, and to which older

barracks are gradually remodelled as funds permit. The un married soldiers are quartered in barrack-rooms usually planned to contain twelve men in each; this number forms a convenient division to suit the organization of the company, and is more popular with the men than the larger numbers which were formerly the rule in each barrack-room; there is a greater privacy, whilst the number is not too small to keep up the feeling of barrack-room comradeship which plays an important part in the soldier's training. The rooms give 600 cub. ft. of air per man, and have windows on each side: the beds are spaced between the windows so that only one bed comes in a corner, and

not more than two between any two windows: inlet ventilators are fixed high up in the side walls, and an extract shaft warmed by the chimney flue keeps up a circulation of air through the room: the door is usually at one end of the room and the fire-place at the opposite end: over each man's bed is a locker and shelf where he keeps his kit, and his rifle stands near the head of his bed. Convenient of access from the door to the barrack-room is the ablution-room with basins and foot-bath ; also disconnected by a lobby is a water-closet and urinal for night use, others for day use being provided in separate external blocks. Baths are usually grouped in a central bath-house adjacent to the cook-house, and have hot water laid on. For every two or four barrack-rooms, a small single room is provided for the occupation of the sergeant in charge, who is responsible for the safety of a small Store, where men may .leave their rifle and kit when going on furlough. Adjacent to the barrack blocks and next to the cook-house are arranged the dining-rooms where the men assemble for their meals; no food is now served in the barrack-rooms, and the air in them is thus kept much purer and fresher than under the old

J_Ablution Room &c.

n ri

Double Company Block

N.C.O.J* and Store

Verandah

□

Stairs

□

Double Company Block 8 Barrack rooms on each floor

u

system. The dining-rooms are lofty and well ventilated, and are warmed by hot water; tables and forms are arranged so as to make the most of the space, and room is provided for all the men to dine simultaneously.

Next to the dining-room is the cook-house where the meals for a half battalion are cooked, and served direct to the dining-rooms on each side. Wash-up rooms are arranged off the serving-lobby with plate-racks and shelves for the storage of the crockery after it has been washed. The cooking apparatus is designed for economical use of coal fuel, and, if carefully used, consumes little more than 5 lb of coal per man per day. The cook-house is well lighted and ventilated by a top lantern; tables, dressers, and pastry slab are provided for preparing and serving the meals, and a sink for washing kitchen utensils. Under the kitchen block is a basement containing the boiler for heating the dining-rooms and another for the supply of hot water to baths and sinks, with in some cases also a hot-air furnace for heating drying-rooms, for drying the men's clothing when they come in wet from a route-march or field day. Not far from the barrack blocks is placed the recreation establishment or soldiers' club, where the rank and file may go for relaxation and amusement when off duty; this establishment has, on the ground floor, a large and lofty room with* a stage at one end for lectures or entertainments, and at the other

end is a supper bar, extending across the room, where mineral waters and other light refreshments are sold; tables are also arranged for suppers. A grocery shop is provided where the men and their families may purchase goods bought under regimental arrangements at wholesale prices, and sold without more profit than is necessary to keep the institution self-supporting. On the first floor are billiard and games room, reading-room and library, and writing-room. The manager's quarter and kitchen premises complete the establishment. Near the recreation establishment is

the canteen, devoted solely to the sale of beer, and not permitted to vie in attractiveness with the recreation establishment. A bar is provided for the soldiers, a separate room for corporals, and a jug department for the supply of the families;this building also has a manager's quarter attached to it, and an office for the checking of accounts.

For the senior non-commissioned officers a sergeants' mess is provided, containing dining-room, reading-room and billiard-room, with kitchen premises and liquor store, which also has a jug department for the sergeants' families. The single non-commissioned officers have all their meals in this mess, and the married members also use it as a club. The warrant officers, and the proportion of non-commissioned officers and men who are on the married establishment, are provided with accommodation at some little distance from the men's barracks. In all recent schemes, on open sites, self-contained cottages have been built, and these are more popular than the older pattern of tenement buildings approached by common staircases or verandahs. The warrant officers are allowed a living-room, kitchen, and scullery, with three bedrooms and a bathroom. The married soldiers have a living-room, scullery, and one, two, or three bedrooms according to the size of their families. A laundry is provided adjacent to the married quarters, equipped with washing-troughs, wringer, drying-closet, and ironing-room; and the women are encouraged to use this in preference to doing washing in their cottages.

Officers' Quarters. — At a little distance from the men's barracks, and usually looking over the parade or cricket ground, is the officers' mess. This building has an entrance-hall with band alcove, where the band plays on guest nights; on one side of the hall is the mess-room (or dining-room) , and on the other the ante- room (or reading-room), whilst the billiard-room and kitchen are kept to the back so that lantern lights can be arranged for. A mess office is provided, and all the accessories required for the mess waiters' department, including pantry, plate-closet and cellarage, and for the kitchen or mess-man's department, with also a quarter for the mess-man . The officers' quarters are usually arranged in wings extending the frontage of the mess building, and in a storey over the mess itself. Each officer has a large room, part of which is partitioned off for a bedroom, and the field officers aje allowed two rooms. The soldier servant, told off to each officer, has a small room allotted for cleaning purposes, and bathrooms, supplied with hot water

from the mess kitchen, are centrally situated. A detached house, containing three sitting- rooms, seven bed- and dressing-rooms, bathroom, kitchen, serv- ants' hall, and the usual accessories, is provided for the command- ing officer: also a smaller house, having two sitting-rooms, four bedrooms, bath, kitchen, &c, for the quartermaster. Other regi- mental married officers are not provided for, and have to arrange to house themselves, a lodging allowance being usually granted.

Regimental Accessories. — Apart from the buildings providing accommodation, others are required for administrative and military purposes. These are the guard house and regimental offices, the small-arm ammunition store, the fire-engine house, the drill and gymnastic hall, and the medical inspection block with dispensary, where the sick are seen by a medical officer and either prescribed for or sent into hospital, as may be necessary. Stables are provided for the officers' and transport horses, and a vehicle shed and storehouse for the mobilization equipment. Stores are required for bread, meat, coal, clothing, and for musketry, signalling, and general small stores under the quartermaster's •charge — also workshops for armourers, carpenters, plumbers, painters and glaziers, shoemakers, and tailors. Mention of the

fives court, recreation ground and parade ground completes the description of a battalion barrack.

Cavalry Barracks. — The accommodation provided for cavalry is very similar to that already described for infantry. The barrack blocks are arranged to suit the organization of the regiment, and are placed so that the men can turn out readily and get to their horses. Detached buildings are provided for cavalry troop stables, one block for the horses of each troop. Formerly stables were often built for convenience with the barrack-rooms over them; but this system has been abandoned on sanitary grounds, to the benefit of both men and horses. Each horse is given 1 500 cub. ft. of air space, the horses' heads are turned to the outer walls, and provision is made, by traversed air-ducts below the mangers, for fresh air to be supplied to the horses while lying down. Above the horses' heads are windows which are arranged to open inwards, being hinged at the bottom and fitted with hopper cheeks to avoid direct draught. Ridge ventilation and skylights are given, so that all parts of the stable are well lighted and airy.

Gast-iron mangers and hay-racks are provided, and the horses are

separated by bails, with chains to manger brackets and heel posts; saddle brackets are fixed to the heel posts. Each stable has a troop store, where spare saddles and gear are kept; also an expense forage store, in which the day's ration, after issue in bulk from the forage barn, is kept until it is given out in feeds. The stables are paved with blue Staffordshire paving bricks, graded to a collecting channel carrying the drainage well clear of the building, before it is taken into a gully.

The space -between the blocks of stables is paved with cement concrete to form a yard, and horse-troughs, litter-sheds and dung-pits are provided. Officers' stables are built in separate blocks, and usually have only one row of stalls; the stalls are divided by partitions, and separate saddle-rooms are provided. Stalls and loose boxes in infirmary stables give 2000 cub. ft. of air space per horse and are placed at some distance from the troop stables in a separate enclosure. A forge and shoeing shed is provided in a detached block near the troop stables. A forage barn and granary is usually built to hold a fortnight's supply, and a chaff-cutter driven by horse power is fixed close by. Cavalry regiments each have a large covered riding school, and a number of open maneges, for exercise and riding instruction.

Artillery, &c. — The accommodation provided for horse and field artillery is arranged to suit their organization in batteries and brigades, and is generally similar to that already described, with the addition of vehicle sheds for guns and ammunition wagons, and special shops for wheelers and saddlers. Accommodation for other units follows the general lines already laid down, but has to be arranged to suit the particular organization and requirements of each unit.

Garrison Accessories. — In every large military station in addition to the regimental buildings which have been described, a number of buildings and works are required for the service of the garrison generally. Military hospitals are established at home and abroad for the treatment of sick officers and soldiers as well as their wives and families. Military hospitals are classified as follows: — First-grade hospitals are large central hospitals serving important districts. These hospitals are complete in themselves and fully equipped for the carrying out of operations of all kinds; they generally contain wards for officers, and may have attached to them separate isolation hospitals for the treatment of infectious cases, and military families' hospitals for women and children. Second-grade hospitals are smaller in size

and less fully equipped, but are capable of acting independently and have operation rooms. Third-grade hospitals or reception stations are required for small stations principally, to act as feeders to the large hospitals, and to deal with accident and non-transportable cases. The principles of construction of military hospitals do not differ materially from the best modern civil practice; all are now built on the pavilion system with connecting corridors arranged so as to interfere as little as possible with the free circulation of air between the blocks. The site is carefully selected and enclosed with railings. The administration block

is centrally placed, with ward blocks on each side, and accessory buildings placed where most convenient; the isolation wards are in a retired position and divided off from the hospital enclosure. Ward blocks usually have two storeys, and the ordinary large wards provide 1200 cub. ft. of air space per patient. A due proportion of special case and other special wards is arranged in which the space per patient is greater or less, as necessary.

Army schools are built to give slightly more liberal accommodation than is laid down as the minimum by the Board of Education, but the principles of planning are much the same as in civil elementary schools. Schools are usually placed between the married quarters and the barracks, so as to serve both for the instruction of the men, when working for educational certificates, and for the education of the children of the married soldiers. Garrison churches are built when arrangements for the troops to attend divine service at neighbouring places of worship cannot well be made. Only two military prisons now remain, viz. Dover and Curragh, and these are for soldiers discharged from the service with ignominy. For ordinary sentences detention barracks and branch detention barracks are attached to the military commands and districts: these are constructed in accordance with the home office regulations; but crime in the army fortunately continues to decrease, and little accommodation has recently been added. Barrack expense stores for the issue of bedding, utensils and other stores for which the troops depend upon the Army Service Corps, are necessary in all barracks; and in large stations a supply depot for the issue of provisions, with abattoir and bakery attached to it, may be necessary. An engineer office with building yard and workshops to deal with

the ordinary duties in connexion with the upkeep of War Department property is required at every station, and for large stations such as Aldershot, it may be necessary to undertake special water supply schemes, works for disposal of sewage, and for the supply of electricity or gas for lighting the barracks. The system of roads, pipes and mains within the barracks are in all cases maintained by the Royal Engineers, as well as the buildings themselves. District and brigade offices are necessary for the administration of large units, and quarters for the general officer commanding and the headquarters staff may sometimes be required.

Location of Barracks. — The selection of a healthy site for a barrack building or new military station is a matter of great importance. In the earlier days of barrack construction, barracks were, for political reasons, usually built in large towns, where troops would be at hand for putting down disturbances, and cramped and inconvenient buildings of many storeys, were erected on a small piece of ground often surrounded by the worst slums of the city; such, for example, were the Ship Street barracks in Dublin, and the cavalry barracks at Hulme, Manchester. Worse still were cases where an existing building, such as the Linen Hall in Dublin, was purchased, and converted into barracks with little regard for the convenience of the occupants, and a total disregard for the need of a free circulation of pure air in and about the buildings, which is the first condition of health. In the present day, except in a few cases where strong local influence is allowed to prevail to retain troops in towns, where their presence, and perhaps the money they spend, are appreciated for patriotic or other motives, every opportunity is taken to move troops from the vicinity of crowded towns, and quarter them in barracks or hutments built in the open country. Due regard can then be given to sanitary location, and military training can more effectively be carried out. With improvements in communication by rail, road and telegraph, support to the civil power in case of disturbance can always be afforded in good time, without permanently stationing troops in the actual locality where their assistance may be needed. It has been recognized ever since the Crimean War, that the leading principle of barrack policy must, in the future, be to facilitate in peace time the training of the army for war, and that this can only be done by quartering troops in large bodies, including all branches of the service, in positions where they have space for training,

gun and rifle practice, and manceuvring. The camps at Alder,

shot, Colchester, Shorncliffe and Curragh were accordingly started between 1856 and i860, and the same policy has since been continued by the acquisition of Strensall Common, near York, Kilworth domain, near Fermoy, the lease of a portion of Dartmoor and a large area at Glen Imaal in Co. Wicklow, and the purchase of the Stobs estate in Scotland and of a large part of Salisbury Plain.

Barrack Construction. — The history of barrack construction in Great Britain is an interesting study, but can only be touched on briefly. As long as operations in the field were carried on by troops levied especially for the war in hand, no barracks apart from fortifications were required, except those for the royal bodyguard; and even after the standing army exceeded those limits, the necessity for additional barracks was often avoided by having recourse to the device of billeting, i.e. quartering the soldiers on the populations of the towns where they were posted. This, however, was a device burdensome to the people, subversive of discipline, and prejudicial to military efficiency in many ways, while it exposed the scattered soldiers to many temptations to disloyalty. Hence barracks were gradually provided, at first in places where such an arrangement was most necessary owing to the paucity of the population, or where concentration of troops was most important, owing to the disaffection of some of the inhabitants. The earliest barracks of which there is any record as regards England, were those for the foot guards, erected in 1660. Among the earliest of those still existing are the Royal Barracks at Dublin, dating from 1700, and during the 18th century barracks were built in several parts of Ireland; but in England it was at the end of the 18th and beginning of the 19th century that most of the earlier barracks were constructed. So long as barracks,were mainly in connexion with fortresses their construction naturally fell to the duty of the King's Engineers, afterwards the Corps of Engineers, working under the master-general of the ordnance. About 1 796, however, a special civil department was formed under the commissioners for the affairs of barracks, to deal with barracks apart from fortifications. In 1816 we find a warrant appointing a civilian comptroller of the barrack department to deal with the erection and upkeep of barracks and barrack hospitals not within fortified places. This warrant gives one of the earliest records of the nature of accommodation provided, and a few extracts from it are worth notice. No definite regulations as to cubic or floor space per man are laid down; but in the infantry, twelve men,

and in the cavalry, eight men are allotted to one room. ” Bed-steads or berths ” are allowed, ” a single one to each man, or a double one to two men,” or ” hammocks where necessary.” The married soldier’s wife is barely recognized, as shown by the following extract: — ” The Comptroller of the barrack department may, if he sees fit, and when it in no shape interferes with or straitens the accommodation of the men, permit (as an occasional indulgence, and as tending to promote cleanliness, and the conˆ venience of the soldier) four married women per troop or company* of sixty men, and six per troop or company of a hundred men, to be resident within the barracks; but no one article shall on this account be furnished by the barrack-masters, upon any consideration whatever. And if the barrack-masters perceive that any mischief, or damage, arises from such indulgence, the commanding officer shall, on their representation, displace such women. Nor shall any dogs be suffered to be kept in the rooms of any barrack or hospital.” Another regulation says: ” Where kitchens are provided for the soldiers, they shall not be allowed to dress their provisions in any other places.” In about 1818 the civil barrack department was abolished on account of abuses which had grown up, and the duke of Wellington as master- general of the ordnance and commander-in-chief transferred to the corps of Royal Engineers the duties of construction and maintenance of barracks. In 1826 a course of practical archi- tecture was started at the school of military engineering at Chatham under Lieutenant-Colonel (afterwards Sir Charles) Pasley, the first commandant of the school, who himself wrote an outline of the course. Wellington interested himself in the

barrack question, and under his orders single iron bedsteads were substituted for; the wooden berths, two tiers high, in which two men slept in the same bed, then a certain cubical space per man was allotted, and cook-houses and ablution-rooms were added. Next, sergeants’ messes were started, and ball courts allowed for the recreation of the men. It was not, however, till after the Crimean War that public attention was directed by the report dated 1857 of the royal commission on the sanitary state of the army, to the high death-rate, and certain sanitary defects in barracks and hospitals, such as overcrowding, defective ventilation, bad drainage and insufficient means of cooking and

cleanliness, to which this excessive mortality was among other causes assigned.

In 1857 a commission appointed for improving the sanitary condition of barracks and hospitals made an exhaustive inspection of the barracks in the United Kingdom, and reported in 1 86 1. This was followed by similar commissions to examine the barracks in the Mediterranean stations and in India. These commissions, besides making valuable recommendations for the improvement of almost every barrack inspected by them, laid down the general sanitary principles applicable to the arrangement and construction of military barracks and hospitals; and in spite of the lapse of time, the reports repay close study by any one interested in sanitary science as applied to the construc- tion and improvement of such buildings. The names of Sidney Herbert (afterwards Lord Herbert of Lea), Captain (afterwards Sir Douglas) Galton, R.E., and John Sutherland, M.D., stand out prominently among those who contributed to the work. The commission was constituted a standing body in 1862, and continues its work to the present day, under the name of the Army Sanitary Committee, which advises the secretary of state for war on all sites for new barracks or hospitals, also upon type plans, especially as to sanitary details, and principles of sanitary construction and fitments. A definite standard of accommoda tion was laid down, which formed the basis of the first issue of the Barrack Synopsis in 1865. A general order dated 1845 had directed that a space of 450 to 500 cub. ft. per man should be provided in all new barracks at home stations; but this had not been applied in existing barracks or buildings appropriated as such, and when detailed examination was made, it was found that some men had actually less than 250 cub. ft., and out of accommodation for nominally 76,813 soldiers, 2003 only had 600 cub. ft. per man, which was the minimum scale now laid down by the royal commission of 1857. To give every soldier his allotted amount of 600 cub. ft., meant a reduction in accommodation of the barracks by nearly one- third the number. Many buildings were condemned as being entirely unsuitable for use as barracks; in other cases improvements were possible by alterations to buildings and opening-up of sites. Ventilation of the rooms was greatly improved, cook-houses, ablution-rooms and sanitary accessories were carefully examined and a proper scale laid down. Separate quarters for the married soldiers did not exist in many barracks, and in some instances married men's beds were found in the men's barrack-rooms without even a

screen to separate them; in other cases, married people were accommodated together in a barrack-room, with only a blanket hung on a cord as a screen between the different families. The recommendations of the committee resulted in a single room being allotted to all married soldiers, and this accommoda- tion has gradually improved up to the comfortable cottage now provided.

From the time of this first thorough inquiry into barrack accommodation, steady and systematic progress has been made. Although lack of funds has always hampered rapid progress, and keeps the accommodation actually existing below the standard aimed at, much has been done to improve the soldiers' condition in this respect. Numerous regimental depots and other barracks were built under the Military Forces Localization Act of 1872. The Barracks Act of 1890 replaced the worn-out huts at Aldershot, Colchester, Shorncliffe and Curragh by convenient and sanitary permanent buildings, and further additions and improvements have been made under the Military Works Acts

of 1897, 1899 and 1901. As some evidence of the practical result of the care and money that has been expended on this work, it is interesting to note that while, in 1857, the annual rate of mortality in the army at home per 1000 men was 17-5 (compared with 9-2 for the civil male population of corresponding age), forty years later, in 1897, the rate of mortality in the army was only 3-42 per 1000. No doubt, improved barrack accommodation contributed greatly to this result. Barrack construction work remained in the hands of the Corps of Royal Engineers until 1904, when a civil department was again formed under an architect styled " director of barrack construction," to deal with the construction of barracks at home stations, and the construction and maintenance of military hospitals.

British Colonial. — Barracks at colonial stations are governed by the general scale of accommodation in the Barrack Synopsis, modified according to the climate of the station, in the direction of increase in floor area and height of rooms. In the planning of rooms for occupation in tropical or sub-tropical countries provision has to be made for the freest possible circulation of air through the buildings. The walls have to be protected by verandahs from the direct rays of the sun, and the special local domestic arrangements have to be taken into con- sideration. For example, in hot countries it is usually undesir- able to have kitchens directly attached to the dwelling-houses, sanitary

arrangements vary according to the methods adopted, and in some cases it is necessary to provide a free circulation of air below the ground floors of all inhabited buildings by raising them off the ground some 4 ft. The aspect of the buildings will usually be arranged so as to catch the prevailing wind, and the mode of construction varies greatly according to the custom and resources of the country.

Indian Barracks. — In India, barracks for the British troops are built by the Royal Engineer officers detailed for military work duties, assisted by military foremen, who pass through the civil engineering colleges, and by a native subordinate staff. The scale of accommodation to be provided is laid down in the Indian army regulations, and is for the private soldier more liberal than is allowed by the home government for any of the colonial stations. The barrack-rooms are lofty and airy, with verandahs all round, and clerestory windows. Roofs are usually of double tiling. The allowance of space is 90 sq. ft. per man in rooms 16 ft. high, with, in addition, a day room adjoining for the use of the men for their meals or as a sitting-room. Recreation establish- ments are liberally provided for, and other means of recreation, such as bowling and skittle alleys, fives courts, plunge baths and cricket grounds, are given. Separate blocks of married quarters are provided, and schools for the children. Hospital accommo- dation on a higher scale than at home is necessary; but hill sanatoria have in recent years done much to improve the health of the troops by giving change of air, during the hot weather, to a large proportion of the men and families. Piped water supplies have replaced the old wells at many stations, and attention is being directed to improved cooking and sanitary arrangements. Naval Barracks. — In recent years, large naval barracks have been built, notably at Portsmouth, Chatham and Devonport. These differ from military barracks principally in that they keep up the system of board-ship life to which the men are accustomed. Large barrack-rooms are provided with caulked floors like ships' decks, and have rows of hammocks slung across them; these are stowed in the day-time, when the rooms are used as mess-rooms. Ablution and sanitary arrangements are grouped together on the basement floors. Fine recreation establishments and canteens have been built. The officers' messes have splendid public rooms, but the officers' quarters are not so large as in military barracks, though no doubt spacious to the naval officer, accustomed as he is to a small cabin. Married quarters for the men are not provided except in connexion with coastguard stations.

Other Countries. — A great number of the German and French barracks are erected in the form of a large block of three or four storeys containing all the accommodation and accessories for officers, married and single non-commissioned officers and men, of a complete battalion or regiment in one building. Some of the

modern barracks, however, are arranged more on the pavilion system with separate blocks; but the single block system is well liked on account of its. compactness and the facility it gives for supervision; it is also more satisfactory from the architectural point of view. The system of allotment and arrangement of accommodation for these two great armies does not differ much, except in detail, from that adopted by the British army. The floor and cubic space allotted per man is a little less; accommoda- tion for officers is not usually provided, except to a limited extent, unless the barracks are on a country site. The German army, however, now provides every regiment with a fine officers' mess-house furnished at the public expense. Married quarters for some of the non-commissioned officers are provided, but not for privates. American barracks are interesting, as providing for perhaps a higher class of recruit than usual; they are well designed and superior finish internally is given . The barracks are arranged usually on the separate block system, and centre round a post-exchange or soldiers' club, which is a combined recreation establishment, gymnasium and sergeants' mess, with bath-house attached. Canteens for the sale of liquor were abolished in 1901. See The Barrack Synopsis (1905) ; The Handbook of Design and Construction of Military Buildings (1905) ; The Army Regulations, India, vol. xii. (E. N. S.)

BARRANDE, JOACHIM (1799-1883), Austrian geologist and palaeontologist, was born at Saugues, Haute Loire, on the nth of August 1 799, and educated in the Ecole Polytechnique at Paris. Although he had received the training of an engineer, his first appointment was that of tutor to the due de Bordeaux (afterwards known as the comte de Chambord), grandson of Charles X., and when the king abdicated in 1830, Barrande accompanied the royal exiles to England and Scotland, and afterwards to Prague. Settling in that city in 1831, he became occupied in engineering works, and his attention was then attracted to the fossils from the Lower Palaeozoic rocks of

Bohemia. The publication in 1839 of Murchison's Silurian System incited Barrande to carry on syste- matic researches on the equivalent strata in Bohemia. For ten years (1840-1850) he made a detailed study of these rocks, engaging workmen specially to collect fossils, and in this way he obtained upwards of 3500 species of graptolites, brachiopoda, mollusca, Crustacea (particularly trilobites) and fishes. The first volume of his great work, Systeme silurien du centre de la Bohime (dealing with trilobites), appeared in 1852; and from that date until 1881, he issued twenty-one quarto volumes of text and plates. Two other volumes were issued after his death in 1887 and 1894. It is estimated that he spent nearly £10,000 on these works. In addition he published a large number of separate papers. In recognition of his important researches the Geological Society of London in 1855 awarded to him the Wollaston medal.

The term Silurian was employed by Barrande, after Murchison, in a more comprehensive sense than was justified by subsequent knowledge. Thus the Silurian rocks of Bohemia were divided into certain stages (A to H) — the two lowermost, A and B without fossils (Azoic), succeeded by the third stage, C, which included the primordial zone, since recognized as part of the Cambrian of Sedgwick. The fourth stage (Etage D), the true lower Silurian, was described by Barrande as including isolated patches of strata with organic remains like those of the Upper Silurian. These assemblages of fossils were designated " Colonies," and regarded as evidence of the early introduction into the area of species from neighbouring districts, that became locally extinct, and reappeared in later stages. The interpretation of Barrande was questioned in 1854 by Edward Forbes, who pointed to the disturbances, overturns and crumplings in the older rocks as affording a more reasonable explanation of the occurrence of strata with newer fossils amid those containing older ones. Other geologists sub sequently questioned the doctrine of " Colonies." In 1880 Dr J. E. Marr, from a personal study in the field, brought forward evidence to show that the repetitions of the fossiliferous strata on which the " Colonies " were based were due to faults. The later stages of Barrande, F, G and H, have since been shown by Emanuel Friedrich Heinrich Kayser (b. 1845) to be Devonian.

Despite these modifications in the original groupings of the strata, it is recognized that Barrande " made Bohemia classic ground for the study of the oldest fossiliferous formations." He died at Frohsdorf on the 5th of October 1883.

See " Sketch of the Life of Joachim Barrande," Geol. Mag. (1883), p. 529 (with portrait).

BARRANQUILLA, a city and port of Colombia, South America, capital of a province of the same name in the department of Atlantico, on the left bank of the Magdalena river about 7 m. above its mouth and 185 m. by rail from its seaport, Puerto Colombia. Pop. (est. 1902) 31,000. Owing to a dangerous bar at the mouth of the Magdalena the trade of the extensive territory tributary to that river, which is about 60 % of that of the entire country, must pass in great part through Barranquilla and its seaport, making it the principal commercial centre of the republic. Savanilla was used as a geaport until about 1890, when shoals caused by drifting sands compelled a removal to Puerto Colombia, a short distance westward, where a steel pier, 4000 ft. in length; has been constructed to facilitate the handling of freight. The navigation of the Magdalena is carried on by means of light- draught steamboats which ascend to Yeguas, 14 m. below Honda, where goods are transhipped by rail to the latter place, and thence by pack animals to Bogota, or by smaller boats to points farther up the river. Barranquilla was originally founded in 1629, but attracted no attention as a commercial centre until about the middle of the 19th century, when efforts were initiated to secure the trade passing through Cartagena. The city is built on a low plain, is regularly laid out, and has many fine warehouses, public buildings and residences, but its greater part, however, Consists of mud-walled cabins supported by bamboo (guadua) framework and thatched with rushes. The water-supply is drawn from the Magdalena, and the city is provided with telephone, electric light and tram services. Owing to periodical inundations, the sur- rounding country is but little cultivated, and the greater part of the population, which is of the mixed type common to the low- lands of Columbia, is engaged in no settled productive occupation. BARRAS, PAUL FRANCOIS NICOLAS, Comte de (1755- 1829), member of the French Directory of 1795-1799, was descended from a noble family of Provence, and was bom at Fox-Amphoux. At the age of sixteen he entered the regiment of Languedoc as "gentleman cadet," but embarked for India in 1776. After an adventurous voyage he reached Pondicherry and shared in the defence of that city, which ended in its capitulation to the British on the 18th of October 1778. The garrison being released, Barras returned to France. After taking part in a second expedition to the East Indies in 1782-1783, he left the army and occupied the following years

with the frivolities con- genial to his class and to his nature. At the outbreak of the Revolution in 1789, he espoused the democratic cause, and became one of the administrators of the department of the Var. In June 1792 he took his seat in the high national court at Orleans; and later in that year, on the outbreak of war with the kingdom of Sardinia, he became commissioner to the French army of Italy, and entered the Convention (the third of the national assemblies of France) as a deputy for the department of the Var. In January 1793 he voted with the majority for the death of Louis XVI. Much of his time, however, was spent in missions to the districts of the south-east of France; and in this way he made the acquaintance of Bonaparte at the siege of Toulon. As an example of the incorrectness of the Barras Memoirs we may note that the writer assigned 30,000 men to the royalist defending force, whereas it was less than 12,000; he also sought to minimize the share taken by Bonaparte in the capture of that city.

In 1794 Barras sided with the men who sought to overthrow the Robespierre faction, and their success in the coup d' Mat of 9 Thermidor (27th of July) brought him almost to the front rank. In the next year, when the Convention was threatened by the malcontent National Guards of Paris, it appointed Barras to command the troops engaged in its defence. His nomination of Bonaparte as one of his subalterns led to the adoption of vigorous measures, which ensured the dispersion of the royalists and

malcontents in the streets near the Tuileries, 13 Vendemiaire (5th of October 1795). Thereupon Barras became one of the five Directors who controlled the executive of the French republic. Owing to his intimate relations with Josephine de Beauharnais, he helped to facilitate a marriage between her and Bonaparte; and many have averred, though on defective evidence, that Barras procured the appointment of Bonaparte to the command of the army of Italy early in the year 1796. The achievements of Bonaparte gave to the Directory a stability which it would not otherwise have enjoyed; and when in the summer of 1797 the royalist and constitutional opposition again gathered strength, Bonaparte sent General Augereau (q.v.), a headstrong Jacobin, forcibly to repress that movement by what was known as the coup d'etat of 18 Fructidor (4th September). Barras and the

violent Jacobins now carried matters with so high a hand as to render the government of the Directory odious; and Bonaparte had no difficulty in overthrowing it by the coup d'etat of 18-19 Brumaire(9th-iothof November). Barrassawtheneedofachange and was to some extent (how far will perhaps never be known) an accomplice in Bonaparte'a designs, though he did not suspect the power and ambition of their contriver. He was left on one side by the three Consuls who took the place of the five Directors and found his political career at an end. He had amassed a large fortune and spent his later years in voluptuous ease. Among the men of the Revolution few did more than Barras to degrade that movement. His immorality in both public and private life was notorious and contributed in no small degree to the downfall of the Directory, and with it of the first French Republic. Despite his profession of royalism in and after 1815, he remained more or less suspect to the Bourbons; and it was with some difficulty that the notes for his memoirs were saved from seizure on his death on the 29th of January 1829.

Barras left memoirs in a rough state to be drawn up by his literary executor, M. Rousselin de St Albin. The amount of alteration which they underwent at his hands is not fully known; but M. George Duruy, who edited them on their publication in 1895, has given fairly satisfactory proofs of their genuineness. For other sources respecting Barras see the Memoirs of Gohier, Larevelliere-Lepeaux and de Lescure; also Sciout, Le Directoire (4 vols., Paris, 1895- 1897), A. Sorel, V Europe et la Revolution francaise (esp. vols. v. and vi., Paris, 1903-1904), and A. Vandal, L'Avenement de Bonaparte (Paris, 1902-1904). (J. Hl. R.)

BARRATRY (O. Fr. bareter, barater, to barter or cheat), in English criminal law, the offence (more usually called common barratry) of constantly inciting and stirring up quarrels in dis- turbance of the peace, either in courts or elsewhere. It is an offence both at common law and by statute, and is punishable by fine and imprisonment. By a statute of 1726, if the person guilty of common barratry belonged to the profession of the law, he was disabled from practising in the future. It is a cumulative offence, and it is necessary to prove at least three commissions of the act. For nearly two centuries there had been no record of an indictment having been preferred for this offence, but in 1889 a case occurred at the Guildford summer assizes, R. v. Bellgrove {The Times, 8th July 1889). As, however, the defendant was convicted of another offence, the charge was not proceeded upon. (See Pollock and Maitland, History of English Law; Russell,

Crimes and Misdemeanours; Stephen, Criminal Law.)

In marine insurance barratry is any kind of fraud committed upon the owner or insurers of a ship by a master with the intention of benefiting himself at their expense. Continental jurists give a wider meaning to barratry, as meaning any wilful act by the master or crew, by whatever motive induced, whereby the owners or charterers are damnified. In bills of lading it is usual to except it from the shipowners' liability (see Affreightment).

In Scotland, barratry is the crime committed by a judge who. is induced by bribery to pronounce judgment.

BARRE, ISAAC (1726-1802), British soldier and politician, was born at Dublin in 1 7 26, the son of a French refugee. He was educated at Trinity College, Dublin, entered the army, and in 1759 was with Wolfe at the taking of Quebec, on which occasion he was wounded in the cheek. His entry into parliament in 1761 under the auspices of Lord Shelburne, who had selected him " as a bravo to run down Mr Pitt," was characterized by a virulent

attack on Pitt, of whom, however, he became ultimately a devoted adherent. A vigorous opponent of the taxation of America, his mastery of invective was powerfully displayed in his championship of the American cause, and the name " Sons of Liberty," which he had applied to the colonists in one of his speeches, became a common designation of the American organizations directed against the Stamp Act, as well as of later patriotic clubs. His appointment in 1 782 to the treasurership of the navy, which carried with it a pension of £3200 a year, at a time when the government was ostensibly advocating economy, caused great discontent; subsequently, however, he received from the younger Pitt the clerkship of the pells in place of the pension, which thus was saved to the public. Becoming blind, he retired from office in 1790 and died on the 20th of July 1802.

BARRE, a city of Washington county, Vermont, U.S.A., in the north central part of the state, about 6 m. S.E. of Montpelier. Pop. (1890) 4146; (1900) 8448, of whom 2831 were foreign-born; (1910, census) 10,734. It is served by the Central Vermont and the Montpelier & Wells River railways, and is connected by electric street railways with Montpelier. Barre is an important seat of the granite industry, and manufactures monuments and tombstones, stone-cutting implements and other machinery. In 1905 the city's factory products were valued at $3,373,046, of

which 86-9 % was the value of the monuments and tombstones manufactured. Among its institutions are the Aldrich public library and Goddard Seminary (1870; Universalist). There is a beautiful granite statue of Burns (by J. Massey Rhind), erected in 1899 by the Scotsmen of Barre. The water-works are owned and operated by the municipality. Settled soon after the close of the War of Independence, the township of Barre (pop. in 1910, 4194) was organized in 1793 and named in honour of Isaac Barre (1726-1802), a defender of American rights in the British parliament. The present city, chartered in 1894, was originally a part of the township.

BARREL (a word of uncertain origin common to Romance languages; the Celtic forms, as in the Gaelic baraill, are derived from the English), a vessel of cylindrical shape, made of staves bound together by hoops, a cask; also a dry and liquid measure of capacity, varying with the commodity which it contains (see Weights and Measures). The term is applied to many cylindrical objects, as to the drum round which the chain is wound in a crane, a capstan or a watch; to the cylinder studded with pins in a barrel-organ or musical-box; to the hollow shaft in which the piston of a pump works; or to the tube of a gun. The "barrel" of a horse is that part of the body lying between the shoulders and the quarters. For the system of vaulting in architecture known as " barrel- vaulting " see Vault.

BARREL-ORGAN (Eng. "grinder-organ," "street-organ," "hand-organ," "Dutch organ"; Fr. orgue de Barbaric, orgue d'Allemagne, orgue mecanique, cabinet d'orgue, serinette; Ger. Drehorgel, Leierkasten; Ital. organetto amanovella, organo tedesco), a small portable organ mechanically played by turning a handle. The barrel-organ owes its name to the cylinder on which the tunes are pricked out with pins and staples of various lengths, set at definite intervals according to the scheme required by the music. The function of these pins and staples is to raise balanced keys connected by simple mechanism with the valves of the pipes, which are thus mechanically opened, admitting the stream of air from the wind-chest. The handle attached to the shaft sets the cylinder in slow rotation by means of a worm working in a fine-toothed gear on the barrel-head; the same motion works the bellows by means of cranks and connecting rods on the shaft. The wind is thereby forced into a reservoir, whence it passes into the wind-chest, on the sides of which are grouped the pipes. The barrel revolves slowly from back to front, each revolution as a rule playing one complete tune. A notch-pin in the barrel- head,

furnished with as many notches as there are tunes, enables the performer to shift the barrel and change the tune. The ordinary street barrel-organ had a compass varying from 24 to 34 notes, forming a diatonic scale with a few accidentals, generally F#, G#, C#. There were usually two stops, one for the open pipes of metal, the other for the closed wooden pipes. Barrel-organs

have been made with as many as three or four cylinders set in a circular revolving frame, but these more elaborate instruments were mainly used in churches 1 and chapels, a purpose for which they were in great demand for playing hymns, chants and voluntaries during the 18th and early 19th centuries. A barrel-organ was built for Fulham church by Wright, and a large instrument with four barrels was constructed by Bishop for Northallerton church in 1820.

The origin of the barrel-organ is now clearly established, and many will doubtless be surprised to find that it must be sought in the Netherlands as early as the middle of the 15 th century, and that accurate and detailed diagrams of every part of the mechanism for a large stationary barrel-organ worked by hydraulic power were published in 161 5. There are letters patent preserved in the archives of Belgium appointing a certain organ-builder, Jehan van Steenken, dit Aren, ” Master of organs which play of themselves “; in the original Flemish Meester van crgelen spelende bij hen selven. 2 This organ was not a portable one like English street-organs, but a more imposing instrument, as we learn from other documents giving a detailed account of the moneys paid to Maistre Jehan for conveying the organs

T” 1 ‘ ““IT 1 . I “M”J”.‘li: .,’».,■’ 11 v:mi,.| ,»..,., H ‘l yiˆ-. ii’ H ‘ nji i| |,. . , i . I l| l , || . ‘l| i|!i| J -rr

Fig. 1. — Large stationary barrel-organ worked by hydraulic power, from Solomon de Caus, Les Raisons des forces mouvantes (Frankfort- on-Main, 1615).

from Bruges to Brussels. 3 Steenken was, by virtue of the same letters patent, awarded an annual pension of fifty Rhenish florins in consideration of the services rendered to the duke of Burgundy, and on condition of his submitting to his liege Philip

the Good all other instruments he might make in the future. There is nothing singular in the early date of this invention, for the 15 th century was distinguished for the extraordinary impulse which the patronage and appreciation of the dukes of Burgundy

1 This practice had evidently not been adopted in Germany, as the following instance will show. The use of barrel-organs (Dreh-orgeln) in country churches was seriously recommended by an anonymous writer in two German papers at the beginning of the 19th century (Beobachter an der Spree, Berlin, 22nd October 1821, and in Mdrkische Boten, Nos. 138 and 139, 1821). The organist Wilke of Leipzig published in reply an article in the Allgem. musik. Zeitung (1822, pp. 777 et seq.) in which " he very properly repudiated such a laughable recommendation."

2 Archives generates du reyaume de Belgique, Chambre des Comptes, No. 2, 449 r°. cf. 52 r°. ; and Edmund van der Straeten, La Musique aux Pays-Bas, vol. vii. pp. 230-232.

3 Van der Straeten, op. cit. p. 299.

gave to automatic contrivances of all kinds, carillons, clocks, speaking animals and other curiosities due to P'lemish genius.* No contemporary illustration is forthcoming, but in 161 5 Solomon de Caus, who avowedly owed his inspiration to Hero and Vitruvius, describes a number of hydraulic machines, amongst which is the barrel-organ, 6 illustrating his description by means of several large drawings and diagrams very carefully carried out. De Caus' organ, entitled " Machine par laquelle Ton fera sonner un jeu d'orgues par le moyen de l'eau," was built up on a wall a foot thick. In the illustrations the barrel is shown to be divided into bars, and each bar into eight beats for the quavers. The whole drum is pierced with holes at the inter-secting points, the pins being movable, so that when the performer grew tired of one tune, he could re-arrange the pins to form another. The four bellows are set in motion by means of ropes strained over pulleys and attached to four cranks on the rotating shaft. Solomon de Caus lays no claim to the invention of this organ, but only to the adaptation of hydraulic power for re-volving the drum; on the contrary, in a dissertation on the invention of hydraulic machines a*nd organs, he states that there was evidently some difference between the organs of the ancients and those of his day, since there is no mention in the classics of any musical wheel by means of which tunes could be played in

several parts — the ancients, indeed, seem to have used their fingers on the keyboard to sound their organs. The eighteen keys drawn in one diagram bear names, beginning at the left, D, C, B, A, G, F, F#, E, D, C, B, A, G, F, E, D, C, B; De Caus states that only half the keyboard is given for want of space; the compass, therefore, prob- ably was as shown, with a few acci- dentals. A barrel-organ, also worked £B r 3 ” rEFizTzjEEE by hydraulic power, is somewhat “*”

fantastically drawn by Robert Fludd in a work 6 published two years after that of Solomon de Caus. This diagram is of no value except as a curiosity, for the author betrays a very imperfect knowledge of the mechanical principles involved. The piece of music actually set on de Caus’ barrel-organ, six bars of which can be made out, 7 consists of a madrigal, ” Chi fara fed’ al del,” by Alessandro Striggio, written in organ tablature by Peter Philips, organist of the Chapel Royal, Brussels, at the end of the 16th century. 8 A French barrel- organ 9 in the collection of the Brussels Conservatoire, bearing the date ” 5 Mars 1797,” has the following compass with flats, beginning at the left : — ‘

,£

&k

m

JEL

E£E*~£

Fir

g^^^fi

*&t

Other evidences of the origin of the barrel-organ are not wanting. The inventory of the organs and other keyboard instruments belonging to the duke of Modena, drawn up in 1598, contains two entries of an organo Tedesco. w In England these organs were also known as ” Dutch organs,” and the name clung to the instrument even in its diminutive form of hand-organ of the itinerant musician. In Jedediah Morse’s description of the

4 Van der Straeten, op. cit. p. 231.

5 Solomon de Caus, Les Raisons des forces mouvantes (Frankfort, 1615), problems 25, 28, 29, 30.

6 Historia utriusque cosmi (Oppenheim, 1617), t. i., experimentum viii. p. 483.

7 Op. cit. problem 29 shows the arrangement of the bellows for the wind-supply. In problem 30 is drawn a large section of the barrel, showing six bars of music represented by the pin tablature, which can be actually deciphered by the help of the keyboard in- cluded in the drawing. These diagrams are admirably clear and of real technical value. A copy of this work is in the library of the British Museum.

8 See also E. van der Straeten, who has translated Philips' setting into modern notation, op. cit. t. vi. pp. 506 and giQ.

9 See V. C. Mahillon, Catalogue descriptif (Brussels, 1896), No. 1137, P- 371-

10 Tedesco was applied by Italians to both German and Dutch. Count Valdrighi, Musurgiana I. Serandola, Pianoforte, Salterio (Modena, 1879), pp. 27 and 28; and E. van der Straeten, op. cit. vol. vi. p. 122.

manners and customs of the Netherlands, 1 we find the following allusion:—" The diversions of the Dutch differ not much from those of the English, who seem to have borrowed from them the neatness of their drinking booths, skittle and other grounds . . : which form the amusements of the middle ranks, not to mention their hand-organs and other musical inventions." An illustration of the hand-organ of that period is given in Knight's London, 2 being one of a collection of street views published by Dayes in 1789. In a description of Bartholomew Fair, as held at the beginning of the 18th century, is a further reference to the Dutch origin of the barrel-organ: — "A band at the west-end of the town, well known for playing on winter evenings before Spring Garden Coffee House, opposite Wigley's great exhibition room, consisted of a double drum, a Dutch organ, the tambourine, violin, pipes and the Turkish jingle used in the army. This band

was generally hired at one of the booths of the fair." 3 Mr Thomas Brown relates that one Mr Stephens, a Poultry author, proposed to parliament for any one that should presume to keep an organ in a Publick House to be fined £20 and made incapable of being an ale-draper for the future. 4 In 1 73 7 Horace Walpole writes 5 : — " I am now in pursuit of getting the finest piece of music that ever was heard; it is a thing that will play eight tunes. Handel and all the great musicians say that it is beyond anything they can do, and this may be performed by the most ignorant person, and when you are weary of those eight tunes, you may have them changed for any other that you like." . The organ was put in a lottery and fetched £1000.

There was a very small barrel-organ in use during the 18th and 19th centuries, known as the bird-organ (Fr. serinette, turlutaine, merline). One of these now in the collection of the Brussels Conservatoire is described by V. C. Mahillon. 6 The instrument is in the form of a book, on the back of which -p— is the title " Le chant des oiseaux, Tome vi."

- There are ten pewter stopped pipes giving the

scale of G with the addition of Fb and A two octaves higher. The whole instrument measures approximately 8 X 5ˆ X 2|in. and plays eight tunes. Mozart wrote an Andante 7 for a small barrel-organ.

For an illustration of the construction of the barrel-organ during the 18th century, consult P. M. D. J. Engramelle, La Tonotechnie ou I'art de noter les cylindres et tout ce qui est susceptible de notage dans les instruments de concerts mechaniqueS (Pans, 1775), with engravings (not in the British Museum); and for a clear diagram of the modern instrument the article on " Automatic Appliances connected with Music," by Dr E. J. Hopkins, in Grove's Dictionary of Music and Musicians, vol. i. (1904), p. 134. (K. S.)

BARREN ISLAND, a volcanic island in the Bay of Bengal. It has an irregularly circular form of about 2 m. in diameter, composed of an outer rim rising to a height of from 700 to 1000 ft., with a central cone the altitude of which is 1015 ft. This cone rises from a depth of 800 fathoms below the sea. It was active between 1789 and 1832, but has since been dormant.

BARRES, MAURICE (1862-), French novelist and poli- tician, was

born at Chaimes (Vosges) on the 22nd of September 1862; he was educated at the lycee of Nancy, and in 1883 went to Paris to continue his legal studies. He was already a con- tributor to the monthly periodical, Jeune France, and he now issued a periodical of his own, Les Taches d'encre, which survived for a few months only. After four years of journalism he went to Italy, where he wrote Sous I'mil des barbares (1888), the first volume of a trilogie du moi, completed by Un Homme libre (1889) , and Le Jardin de Bir&nice (1891). He divided the world into moi and the barbarians, the latter including all those anti- pathetic to the writer's individuality. These apologies for

1 Jedediah Morse American Geography, part ii. p. 334 (Boston, Mass., 1796).

2 Knight's London, vol. i. p. 144.

3 Hone's Every Day Book, i. p. 1248.

1 Collection of all the Dialogues written by Mr Thomas Brown (London, 1704), p. 297.

6 Hone's Every Day Book, ii. pp. 1452-1453.

- See Catalogue desdriptif (Ghent, 1880), Nos. 461 and 462.

7 Breitkopf and Hartel's Critically revised edition of Mozart's Works, series x. no. 10.

individualism were supplemented by L'Ennemideslois (1892), and an admirable volume of impressions of travel, Du sang, de la voluptS et de la mort (1893). His early books are written in an elaborate style and are often very obscure. Barres carried his theory of individualism into politics as an ardent partisan of General Boulanger. He directed a Boulangist paper at Nancy, and was elected deputy in 1889, retaining his seat in the legis- lature until 1893. His play, Une Journee parlementaire, was produced at the Comedie Francaise in 1894. In 1897 he began his trilogy, Le Roman de Venergie nationale, with the publication of Les DeracinSs. The series is a plea for local patriotism, and for the preservation of the distinctive qualities of the old French provinces. The first narrates the adventures of seven young Lcrrainers, who set out to conquer fortune in Paris. Six of them survive in the second novel of the trilogy, L'Appelau soldat (1900), which gives the history of Boulangism; the sequel, Leurs figures (1902), deals with the Panama scandals. Later works are:

— Scenes et doctrines du nationalisme (1902); Les AmitiSs franchises (1903), in which he urges the inculcation of patriotism by the early study of national history; Ce que j'ai vu a Rennes (1904); Au service de I'Allemagne (1905), the experiences of an Alsatian conscript in a German regiment; Le Voyage de Sparte (1906). M. Barres was admitted to the French Academy in 1906.

See also R. Doumic, Les Jeunes (1896) ; J. Lionnet, L' Evolution des idees (1903) ; Anatole France, La Vie HiiSraire (4th series, 1892).

BARRETT, LAWRENCE (1838-1891), American actor, was born of Irish parents in Paterson, New Jersey, on the 4th of April 1838. His family name was Brannigan. He made his first stage appearance at Detroit as Murad in The French Spy in 1853. In December 1856 he made his first New York appearance at the Chambers Street theatre as Sir Thomas Clifford in The Hunchback. In 1858 he was in the stock company at the Boston Museum. He served with distinction in the Civil War as captain in the 28th Massachusetts infantry regiment. From 1867 to 1870, with John M'Cullough, he managed the California theatre, San Francisco. Among his many and varied parts may be mentioned Hamlet, Lear, Macbeth, Shylock,Richard III., Wolsey , Benedick, Richelieu, David Garrick, Hernani, Alfred Evelyn, Lanciotto in George Henry Boker's (1823-1890) Francesca da Rimini, and James Harebell in The Man 0′ Airlie. He played Othello to Booth's Iago and Cassius to his Brutus. He acted in London in 1867, 1881, 1883 and 1884, his Richelieu in Bulwer Lytton's drama being considered his best part. He wrote a life of Edwin Forrest in the American Actors Series (Boston, 1881), and an admirable sketch of Edwin Booth in Edwin Booth and his Contemporaries (Boston, 1886). He died on the 20th of March

1891.

BARRETT, LUCAS (1837-1862), English naturalist and geologist, was born in London on the 14th of November 1837, and educated at University College school and at Ebersdorf. In 1855 he accompanied R. Mc Andrew on a dredging excursion from the Shetlands to Norway and beyond the Arctic Circle; and subsequently made other cruises to Greenland and to the coast of Spain. These expeditions laid the foundations of an extensive knowledge' of the distribution of marine life. In 1855 he was engaged by Sedgwick to assist in the Woodwardian Museum at Cambridge, and during the following three years he aided the

professor by delivering lectures. He discovered bones of birds in the Cambridge Greensand, and he also prepared a geological map of Cambridge on the one-inch Ordnance map. In 1859, when twenty-two years of age, he was appointed director of the Geological Survey of Jamaica. He there determined the Cretaceous age of certain rocks which contained Hippurites, the new genus Barrettia being named after him by S, P. Woodward; he also obtained many fossils from the Miocene and newer strata. He was drowned at the early age of twenty-five, on the 18th of December 1 86 2, while investigating the sea-bottom off Kingston,

Jamaica.

Obituary by S. P. Woodward in Geologist (Feb. 1863), p. 60.

BARRETT, WILSON (1846-1904), English actor, manager and

playwright, was born in Essex on the 18th of February 1846, the

son of a farmer. He made his first appearance on the stage at Halifax in 1864, and then played in the provinces alone and with his wife, Caroline Heath, in East Lynne. After managerial experiences at Leeds and elsewhere, in 1879 he took the management of the old Court theatre, where he introduced Madame Modjeska to London, in an adaptation of Schiller's Maria Stuart, Adrieme Lecouvreur, La Dame aux camelias and other plays. It was not till 1881, however, when he took the Princess's theatre, that he became well known to the public in the emotional drama, The Lights o' London, by G. R. Sims. The play which made him an established favourite was The Silver King by Henry Arthur Jones, perhaps the most successful melodrama ever staged, produced in 1882 with himself as Wilfred Denver, his brother George (an excellent comedian) in the cast, and E. S. Willard (b. 1853) as the " Spider," — this being the part in which Mr Willard, afterwards a well-known actor both in America and England, first came to the front. Barrett played this part for three hundred nights without a break, and repeated his London success in W. G. Wills's Claudian which followed. In 1884 he appeared in Hamlet, but soon returned to melodrama, and though he had occasional seasons in London he acted chiefly in the provinces. In 1886 he

made his first visit to America, repeated in later years, and in 1898 he visited Australia. During these years the London stage was coming under new influences, and Wilson Barrett's vogue in melodrama had waned. But in 1895 he struck a new vein of success with his drama of religious emotion, The Sign of the Cross, which crowded his theatre with audiences largely composed of people outside the ordinary circle of playgoers. He attempted to repeat the success with other plays of a religious type, but not with equal effect, and several of his later plays were failures. He died on the 22nd of July 1904. Wilson Barrett was a sterling actor of a robust type and striking physique, not remarkable for intellectual finesse, but excelling in melodrama, and very successful as the central figure on his own stage.

BARRHEAD, a police burgh of Renfrewshire, Scotland, situated on the Levern, 75 m. S.W. of Glasgow by the Glasgow & South-Western railway. Pop. (1901) 9855. Founded in 1773, it has gradually absorbed the villages of Arthurlie, Dovecothall and Grahamston, and become a thriving town. The chief industries include bleaching, calico-printing, cotton-spinning, weaving, iron and brass founding, engineering and the manu- facture of sanitary appliances. Neilston (pop. 2668), about 2 m. S.W., has bleachfields and print-works, and 2 m. N. by E. lie Hurlet, where are important manufactures of alum and other chemicals, and Nitshill (pop. 1242) with chemical works, quarries and collieries.

BARRICADE, or Barricado (from the Span, barricada, from barrica, a cask, casks filled with earth having been early used to form barricades), an improvised fortification of earth, paving-stones, trees or any materials ready to hand, thrown up, especially across a street, to hinder the advance of an enemy; in the old wooden warships a fence or wooden rail, supported by stanchions and strengthened by various materials, extending across the quarter-deck as a protection during action.

BARRIE, JAMES MATTHEW (i860-), British novelist and dramatist, was born at Kirriemuir, a small village in Forfar- shire, on the 9th of May i860. He was educated at the Dumfries academy and Edinburgh University. He has told us in his quasi-autobiographical Margaret Ogilvy that he wrote tales in the garret before he went to school, and at Edinburgh wrote the greater part of a three-volume novel, which a publisher pre-sumed was the work of a clever lady and offered to publish for £100. The offer was not accepted, and it was through journalism that he found his way to literature. After a short period of

waiting in Edinburgh, he became leader-writer on the Nottingham Journal in February 1883. To this paper he contributed also special articles and notes, which provided an opening and training for his personal talent. He soon began to submit articles to London editors, and on the 17th of November 1884 Mr Frederick Greenwood printed in the St James's Gazette his article on "An Auld Licht Community." With the encouragement of this able

editor, more Auld Licht "Idylls" followed; and in 1885 Ms Barrie moved to London. He continued to write for the St James's Gazette and for Home Chimes (edited by Mr F. W. Robinson). He was soon enlisted by Mr Alexander Riach for the Edinburgh Evening Dispatch, which in turn led to his writing (over the signature " Gavin Ogilvy ") for Dr Robertson Nicoll's British Weekly. Later he became a contributor to the Scots (afterwards National) Observer, edited by W. E. Henley, and also to the Speaker, upon its foundation in 1890. In 1887 he pub- lished his first book, Better Dead. It was a mere jeu d'esprit, a specimen of his humorous journalism, elaborated from the St James's Gazette. This was followed in 1888 by Avid Licht Idylls, a collection of the Scots village sketches written for the same paper. They portrayed the life and humours of his native village, idealized as "Thrums," and were the fruits of early observation and of his mother's tales. " She told me everything," Mr Barrie has written, " and so my memories of our little red town were coloured by her memories." Kirriemuir itself was not wholly satisfied with the portrait, but " Thrums " took its place securely on the 'literary map of the world. In the same year he published An Edinburgh Eleven, sketches from the British Weekly of eminent Edinburgh students; also his first long story, When a Man's Single, a humorous transcription of his experiences as journalist, particularly in the Nottingham office. The book was introduced by what was in fact another Thrums "Idyll," on a higher level than the rest of the book. In 1889 earned Window in Thrums. This beautiful book, and the Idylls, gave the full measure of Mr Barrie's gifts of humanity, humour and pathos, with abundant evidence of the whimsical turn of his wit, and of his original and vernacular style. In 1891 he made a collection of his lighter papers from the St James's' Gazette and published them as My Lady Nicotine. In 189 1 appeared his first long novel, The Little Minister, which had been first published serially in Good Words. It introduced, not with unmixed success, extrane- ous elements, including the winsome heroine Babbie, into the familiar life of Thrums, but

proved the author's possession of a considerable gift of romance. In 1894 he published Margaret Ogilvy, based on* the life of his mother and his own relations with her, most tenderly conceived and beautifully written, though too intimate for the taste of many. The book is full Of revelations of great interest, to admirers of Mr Barrie's genius: The following year came Sentimental Tommy, a story tracing curiously the psychological development of the " artistic temperament " in a Scots lad of the people. R. L. Stevenson supposed himself to be portrayed in the hero, but it may be safely assumed that the author derived his material largely from introspection. The story was completed by a sequel, Tommy and Grizel, published in 1900. The effect of this story was somewhat marred by the comparative failure of the scenes in society remote from Thrums. In 1902 he published The Little White Bird, a pretty fantasy, wherein he gave full play to his whimsical invention, and his tenderness for child life, which is relieved by. the genius of sincerity from a suspicion of mawkishness. This book contained the episode of " Peter Pan," which afterwards suggested the play of that name. In the meantime Mr Barrie had been developing his talent as a dramatist. In 1892 Mr Toole had made a great success at his own theatre of Barrie's Walker, London, a farce founded on a sketch in When a Man's Single. In 1893 Mr Barrie married Miss Ansell (divbrced in 1909), who had acted in Walker, London. In this year he wrote, with Sir A. Conan Doyle, a play called Jane Annie. He found more success, however, in The Professor's Love-Story in 1895; and in 1897 the popularity of his dramatized version of The Little Minister probably confirmed him in a predilection for drama, evident already in some of his first Sketches in the Nottingham Journal. In 1900 Mr Bourchier produced The Wedding Guest, which was printed as a supplement to the Fortnightly Review in December of the same year. After the publication of The Little White Bird, Mr Barrie burst upon the town as a popular and prolific playwright. The struggling journalist of the early 'nineties had now become one of the most prosperous literary men of the day. In 1903 no fewer than three plays from his hand held the stage — Quality Street, The Admirable

Crichten and Little Mary. The year 1904 produced Peter Pan, a kind of poetical pantomime, in which the author found scope for

some of his most characteristic and permanently delightful gifts. In 1905 Aiice-Sit-by-the-Fireand in 1908 What Every WomanKnows were added to the list. As dramatist Mr Barrie brought, to a sphere rather ridden by convention, a method wholly uncon- ventional and a singularly fresh fancy, seasoned by a shrewd touch of satirical humour; and in Peter Pan he proved himself a Hans Andersen of the stage. In literature, the success of ” Thrums ” produced a crop of imitations, christened in derision by W. E. Henley the ” Kailyard School,” though the imitations were by no means confined to Scotland. In this school the Auld Licht Idylls and A Window in Thrums remained unsurpassed and unapproached. The Scots village tale was no novelty in literature – — witness John Gait, the Chronicles of Carlingford and George MacDonald. Yet Mr Barrie, in spite of a dialect not easy to the Southron, contrived to touch a more intimate and more responsive chord. With the simplest materials he achieved an almost unendurable pathos, which yet is never forced; and the pathos is salted with humour, while about the moving homeliness of his humanity play the gleams of a whimsical wit. Stevenson,” in a letter to Mr Henry James, in December 1892, said justly of Barrie that ” there was genius in him, but there was a journalist on his elbow. ‘ ‘ This genius found its most perfect and character- istic expression in the humanity of ” Thrums ” and the bizarre and tender fantasy of Peter Pan.

See also J. M. Barrie and His Books, by J. A. Hamerton (Horace Marshall, 1902) ; and for bibliography up to May 1903, English Illustrated Magazine, vol. xxix. (N.S.j, p. 208. (W. P. J.)

BARRIE, the capital of Simcoe county, Ontario, Canada, 56 m. N. of Toronto, on Lake Simcoe, an important centre on the Grand Trunk railway. It contains several breweries, carriage factories, boat-building and railway shops, and manufactories of woollens, stoves and leather. It is also a summer resort and the starting-point for the numerous Lake Simcoe steamers. Pop. (1901) 5949.

BARRIERE, THEODORE (1823-1877), French dramatist, was born in Paris in 1823. He belonged to a family of map engravers which had long been connected with the war department, and spent nine years in that service himself. The success of a vaudeville he had performed at the Beaumarchais and which was immediately snapped up for the repertory of the Palais Royal, showed him his real vocation. During the next thirty years he signed, alone or in collaboration, over a hundred plays; among the most successful were: La Vie de boheme (1849), adapted from Henri Murger’s

book with the novelist's help; Manon Lescaut (1851); Les Filles de marbre (1853); L'Hiritage de Monsieur Plumet (1858); Les Faux Bonshommes (1856) with Ernest Capendu; Malheureux vaincus (1865), which was forbidden by the censor; Le Gascon (1878). Barriere died in Paris on the 16th of October 1877.

See also Revue des deux mondes (March 1859).

BARRIER TREATY, the name given first to the treaty signed on 29th of October 1709 between Great Britain and the states-general of the United Netherlands, by which the latter engaged to guarantee the Protestant succession in England in favour of the house of Hanover; while Great Britain undertook to procure for the Dutch an adequate barrier on the side of the Netherlands, consisting of the towns of Furnes, Nieuport, Ypres, Menin, Lille, Tournai, Conde, Valenciennes, Maubeuge, Charleroi, Namur, Halle, Damme, Dendermond and the citadel of Ghent. The treaty was based on the same principle of securing Holland against French aggression that had inspired that of Ryswick in 1698, by the terms of which the chief frontier fortresses of the Netherlands were to be garrisoned by Dutch troops. A second Barrier Treaty was signed between Great Britain and Holland on 29th of January 17 13, by which the strong places designed for the barrier were reduced to Furnes, the fort of Knocke, Ypres, Menin, Tournai, Mons, Charleroi and the citadel of Ghent, and certain fortresses in the neighbourhood of that city and of Bruges; Great Britain undertaking to obtain the right for the Dutch to garrison them from the future sovereign of the Spanish Netherlands. Its

terms were included in the treaty of Rastatt, between the emperor and France, signed on the 7th of March 1714. A third Barrier Treaty was signed in November 1715.

See Jean Dumont, Corps universel diplomatique, &c. (1726-1731), vol. viii.

BARRIII, ANTONIO GIULIO (1836-), Italian novelist, was born at Savona, and was educated for the legal profession, which he abandoned for journalism in Genoa. He was a volunteer in the campaign of 1859 and served with Garibaldi in 1866 and 1867. From 1865 (Capitan Dodero) onwards he published a large number of books of fiction, which had wide popularity, his work being commonly compared with that of Victor Cher- buliez. Some of the best of the later ones are Santa Cecilia (1866), Come un Sogno (1875), and L'Olmo e V Edera (1877). His Raggio di Dio

appeared in 1899. Barrili also wrote two plays and various volumes of criticism, including II rinnovamento letter ario italiano (1890). He was elected to the Italian chamber of deputies in 1876; and in 1889 became professor of Italian literature at Genoa.

BARRING-OUT, a custom, formerly common in English schools, of barring the master out of the school premises. A typical example of this practice was at Bromfield school, Cumberland, where William Hutchinson says " it was the custom, time out of mind, for the scholars, at Fasting's Even (the beginning of Lent) to depose and exclude the master from the school for three days." During this period the school doors were barricaded and the boys armed with mock weapons. If the master's attempts to re-enter were successful, extra tasks were inflicted as a penalty, and willingly performed by the boys. On the third day terms of capitulation, usually in Latin verse, were signed, and these always conceded the immediate right to indulge in football and a cockfight. The custom was long retained at Eton and figures in many school stories.

BARRINGTON, DAINES (172 7-1800) ,Englishlawyer, antiquary and naturalist, was born in 1727, fourth son of the first Viscount Barrington. He was educated for the profession of the law, and after filling various posts, was appointed a Welsh judge in 1757 and afterwards second justice of Chester. Though an indifferent judge, his Observations on the Statutes, chiefly the more ancient, from Magna Charta to 21st James I., cap. 27, with an appendix, being a proposal for new-modelling the Statutes (1766), had a high reputation among historians and constitutional antiquaries. In 1773 he published an edition of Orosius, with Alfred's Saxon version, and an English translation with original notes. His Tracts on the Probability of reaching the North Pole (1775) were written in consequence of the northern voyage of discovery undertaken by Captain C. J. Phipps, afterwards Lord Mulgrave (1744-1792). Barrington's other writings are chiefly to be found in the publications of the Royal and Antiquarian Societies, of both of which he was long a member, and of the latter vice- president. Many of these were collected by him in a quarto volume entitled Miscellanies on various Subjects (1781). He contributed to the Philosophical Transactions for 1780 an account of Mozart's visit at eight years of age to London. In his Miscel- lanies on varied subjects he included this with accounts of four other prodigies, namely, Crotch, Charles and Samuel Wesley, and Garrett Wellesley, Lord Mornington. Among the most curious and

ingenious of his papers are his Experiments and Observations on the Singing of Birds, and his Essay on the Language of Birds. He died on the 14th of March 1800 and was buried in the Temple church.

BARRINGTON, GEORGE (b. 1755), an Irishman with a curious history, was born at Maynooth on the 14th of May 1755, the son of a working silversmith named Waldron. In 1 7 7 1 he robbed his schoolmaster at Dublin and ran away from school, becoming a member of a touring theatrical company under the assumed name of Barrington. At Limerick races he joined the manager of the company in pocket-picking. The manager was detected and sentenced to transportation, and Barrington fled to London, where he assumed clerical dress and continued his pocket-picking. At Covent Garden theatre he robbed the Russian prince Orlov of a snuff-box, said to be worth £30,000. He was

detected and arrested, but as Prince Orlov declined to prosecute, was discharged, though subsequently he was sentenced to three years' hard labour for pocket-picking at Drury Lane theatre. On his release he was again caught at his old practices and sentenced to five years' hard labour, but influence secured his release on the condition that he left England. He accordingly went for a short time to Dublin, and then returned to London, where he was once more detected pocket-picking, and, in 1790, sentenced to seven years' transportation. On the voyage out to Botany Bay a conspiracy was hatched by the convicts on board to seize the ship. Barrington disclosed the plot to the captain, and the latter, on reaching New South Wales, reported him favourably to the authorities, with the result that in 1792 Barrington obtained a warrant of emancipation (the first issued), becoming subsequently superintendent of convicts and later high constable of Paramatta. In 1796 a theatre was opened at Sydney, the principal actors being convicts, and Barrington wrote the prologue to the first production. This prologue has obtained a wide publicity. It begins: —

" From distant climes, o'er widespread seas, we come, Though not with much eclat or beat of drum ; True patriots we, for, be it understood, We left our country for our country's good."

Barrington died at a ripe old age at Paramatta, but the exact date is not on record. He was the author of A Voyage to Botany Bay (London, 1801); The History of New South Wales (London, 1802); The History of New Holland (London, 1808).

BARRINGTON, JOHN SHUTE, ist Viscount (1678-1734), English lawyer and theologian, was the son of Benjamin Shute, merchant, and was born at Theobalds, in Hertfordshire, in 1678. He received part of his education at the university of Utrecht; and, after returning to England in 1698, studied law in the Inner Temple. In 1 701 he published several pamphlets in favour of the civil rights of Protestant dissenters, to which class he belonged. On the recommendation of Lord Somers he was employed to induce the Presbyterians in Scotland to favour the union of the two kingdoms, and in 1 708 he was rewarded for this service by being appointed to the office of commissioner of the customs. From this, however, he was removed on the change of administra- tion in 1 7 1 1 ; but his fortune had, in the meantime, been improved by the bequest of two considerable estates, — one of them left him by Francis Barrington of Tofts, whose name he

assumed by act of parliament, the other by John Wildman of Becket. Barrington now stood at the head of the dissenters. On the accession of George I. he was returned to parliament for Berwick-upon-Tweed; and in 1720 the king raised him to the Irish peerage, with the title of Viscount Barrington of Ardglass. But having unfortunately engaged in the Harburg lottery, one of the bubble speculations of the time, he was expelled from the House of Commons in 1723, — a punishment which was considered much too severe, and was thought to be due to personal malice of Walpole. In 1725 he published his principal work, entitled Miscellanea Sacra or a New Method of considering so much of the History of the Apostles as is contained in Scripture, 2 vols. 8vo, — afterwards reprinted with additions and corrections, in 3 vols. 8vo, 1770, by his son Shute. In the same year he published An Essay on the Several Dispensa- tions of God to Mankind. He died on the 14th of December 1 734.

BARRINGTON, SAMUEL (1720-1800), British admiral, was the fourth son of the ist Viscount Barrington. He entered the navy at an early age and in 1747 had worked his way to a post-captaincy. He was in continuous employment during the peace of 1 748-1756, and on the outbreak of the Seven Years' War served with Hawke in the Basque roads in command of the " Achilles " (60). Ini759the" Achilles " captured a powerful French priva- teer, after two hours' fighting. In the Havre-de-Grace ex- pedition of the same year Barrington's ship carried the flag of Rear-Admiral Rodney, and in 1760 sailed with John Byron to destroy the Louisburg fortifications. At the peace in 1763 Barrington had been almost continuously afloat for twenty-two years. He was next appointed in 1768 to the frigate " Venus " as governor to the duke of Cumberland, who remained with him in all ranks from midshipman to rear-admiral. In 1778 the

duke's flag-captain becaitie rear-admiral and weiit to the West Indies, while in conjunction With the army he took the island of Santa Lucia from the French, arid repulsed the attempt of the Comte d'Estaing to" retake it. Superseded after a time by Byron, he remained as that officer's second-in-command and was present at Grenada and St. Kitts (6th and 22nd of July 1770). On his return home, he was offered, but refused, the command of the Channel fleet. His last active service was the relief of Gibraltar in October 1782. As admiral he flew his flag for a short time in 1790, but was not employed in the French revolutionary wars. He died in 1800.

See Ralfe, Naval Biographies, i. 120; Charnock, Biographia Navalis, vi. 10.

BARRINGTON, SHUTE (1734-1826), youngest son of the ist Viscount Barrington, was educated at Eton and Oxford, and after holding some minor dignities was made bishop of Llandaff in 1769. In 1782 he was translated to Salisbury and in 1791 to Durham. He was a vigorous Protestant, though willing to grant Roman Catholics " every degree of toleration short of political power and establishment." He published several volumes of sermons and tracts, and wrote the pclitical life of his brother, Viscount Barrington.

BARRINGTON, WILLIAM WILDMAN SHUTE, 2nd Viscount (1717-1793), eldest son of the ist Viscount Barrington, was born on the 15th of January 1717. Succeeding to the title in 1734, he spent some time in travel, and in March 1740 was returned to parliament as member for Berwick-upon-Tweed. Having taken his seat in the Irish House of Lords in 1 745, he was appointed one of the lords commissioners of the admiralty in 1 746, and was one of the " managers " of the impeachment of Simon, Lord Lovat. In 1754 he became member of parliament for Plymouth, in 1755 was made a privy councillor and secretary at war, and in 1761 was transferred to the office of chancellor of the exchequer. In 1762 he became treasurer of the navy, and in 1765 returned to his former position of secretary at war. He retained this office until December 1778, and during four months in 1782 was joint postmaster-general. He married in 1740 Mary, daughter of Mr Henry Lovell, but left no children. He died at Becket on the ist of February 1793, and was buried in Shrivenham church.

See Shute Barrington, Political Life of William Wildman, Viscount Barrington (London, 18 14).

BARRISTER, in England and Ireland the term applied to the highest class of lawyers who have exclusive audience in all the superior courts, the word being derived from the " bar " (q.v.) In the law courts. Every barrister in England must be a member of one of the four ancient societies called Inns of Court, viz. Lincoln's Inn, the Inner and Middle Temples, and Gray's Inn, and in Ireland, of the King's Inns. The existence of the English societies as schools can be traced back to the 13th century, and their rise is attributed to the clause in Magna Carta, by which the Common Pleas were fixed at Westminster instead of following the king's court, and the professors of law were consequently

brought together in London. Associations of lawyers acquired houses of their own in which students were educated in the common law, and the degrees of barrister (corre- sponding to apprentice or bachelor) and sergeant (corresponding to doctor) were conferred. These schools of law are now repre- sented by the Inns of Court (q.v.).

Students are admitted as members of the Inns of Court, on paying certain fees and on passing a general (elementary) examination or (alternatively) producing evidence of having passed a public examination at a university; their subsequent call to the bar depends on their keeping twelve terms (of which there are four in each year) , and passing certain further examinations (see English Law ad fin.). A term is ” kept ” by dining six times (three for a student whose name is on the books of a university) in hall. This is a relic of the older system in which examinations were not included, the only requisite being a certificate from a barrister that the student had read for twelve months in his chambers. Dining in hall then applied a certain social test, which has now become unmeaning. The profession I of barrister is open to almost every one; but no person connected

with the law in any inferior capacity or who is a chartered or professional accountant, can enter an Inn of Court as a student until he has entirely and bona fide ceased to act or practise in such capacity. Some of the Inns also make a restriction that their members shall not be engaged in trade. A form of admission has to be filled up, containing a declaration to this effect, and mentioning inter alia the age, nationality, condition in life and occupation of the applicant. Previous to the student’s call this declaration must be repeated, and he must further declare that he is not in holy orders, has not held any clerical preferment and has not performed any clerical functions during the year preceding. Subject to the above, practising solicitors of not less than five years’ standing may be called to the bar without keep- ing any terms, upon passing the necessary examinations, and, per contra, a barrister of the same standing may, without any period of apprenticeship, become a solicitor upon passing the final examination for solicitors. Irish barristers of three years’ standing may be called to the English bar without passing any examination upon keeping three terms, and so also may

barristers of those colonies where the professions of barrister and solicitor are still kept distinct. No one can become a barrister till he is twenty-one years old.

The benchers of the. different Inns of Court have the right of rejecting any applicant for membership with or without cause assigned; and foot sufficient reasons, subject to an appeal to the common-law Jiadges as visitors of the Inns, they may refuse to call a stwieirt to the bar, or may expel from their society or from the proiession (" dis-bar " or "■ dis-bench ") even barristers or bencheis. The benchers appear to take cognizance of any kind i of misconduct, whether professional or not, which they may deem unworthy of the rank of barrister. The grade of barrister comprehends the attorney-general and solicitor-general (appointed by and holding office solely at the will of the government of the day), who rank as the heads of the profession, king's counsel and ordinary practitioners, sometimes technically known as " utter barristers."

The peculiar business; of barristers is the advocacy of causes in open court, but ito England a great deal of other business falls into their hands;. They are the chief conveyancers, and the pleadings (i.e.. the counter statements of parties previous to joining issue) are in all but. the simplest cases drafted by them. There was formerly, indeed, a separate class of conveyancers and special pleaders, being persons who kept the necessary number of terms qualifying for a call but who, instead of being called, took out licences, granted for one year only, but renewable, to practise u«der the bar, but now conveyancing and special pleading fcjom part of the ordinajry work of a junior barrister. The higbg* rank among barristers is that of king's or queen's counseA. They lead in court, and give opinions on cases submittwltothem, but they do not accept conveyancing or pleading, WM

1 A king's counsel is appointed by letters patent to be " one of His Majesty's counsel learned iu the law." The appointment rests with the lord chancellor, to whom the barrister desiring a silk gown makes application. There is no definite time required to elapse between " call " and application for a seat within the bar, but it is generally understood that a barrister must be of at least ten years' standing before he is appointed a king's counsel. The first king's counsel was Sir Francis Bacon, who was appointed by Queen Elizabeth " queeo's counsel extraordinary," and received a payment, by way of ' pledge and fee," of £40 a year, payable half-

yearly. Succeeding king's counsel received a similar payment, until its abolition m 1ˆ31. There was not another appointment of a king's counsel until 1668, when Lord Chancellor Francis North was so honoured. From 1775 king's counsel may be said to have become a regular order. Their number was very small so late as the middle of the, 19th century (20. in 1789; 30 in 1810; 28 in 1850), but at the beginning of the 20th century there were over 250. A king's counsel may not, unless by special licence, take a brief against the cirown, but such a licence is, never refused unless the crown desires his services in the case. ■■

special class of business has its own practitioners, so that the bar may almost be said to be divided into several professions. The most marked distinction is that between barristers practising in chancery and barristers practising in the courts of common law. The fusion of law and equity brought about by the Judicature Acts 1873 and 1875 was expected in course of time to break down this distinction; but to a large extent the separa- tion between these two great branches of the profession remains. There are also subordinate distinctions in each branch. Counsel at common law attach themselves to one or other of the circuits into which England is divided, and may not practise elsewhere unless under special conditions. In chancery the king's counsel for the most part restrict themselves to one or other of the courts of the chancery division. Business before the court of probate, divorce and admiralty, the privy council and parliamentary committees, exhibits, though in a less degree, the same tendency to specialization. In some of the larger provincial towns there are also local bars of considerable strength. The bar of Ireland exhibits in its general arrangements the same features as the bar of England. For the Scottish bar, see under Advocates, Faculty of. There is no connexion whatever between the Scottish and English bars. A distinctive dress is worn by barristers when attending the courts, consisting of a stuff gown, exchanged for one of silk (whence the expression " to take silk ") when the wearer has attained the rank of king's counsel, both classes also having wigs dating in pattern and material from the 1 8th century.

Counsel is not answerable for anything spoken by him relative to the cause in hand and suggested in the client's instructions, even though it should reflect on the character of another and prove absolutely groundless, but if he mention an untruth of his own invention, or even upon instructions if it be impertinent to the matter in hand, he is then liable to an action from the party injured. Counsel may also be punished by the summary power of

the court or judge as for a contempt, and by the benchers of the inn to which he may belong on cause shown.

The rank of barrister is a necessary qualification for nearly all offices of a judicial character, and a very usual qualification for other important appointments. Not only the judgeships in the superior courts of law and equity in England and in her colonies, but nearly all the magistracies of minor rank— recorder- ships, county court judgeships, &c. — are restricted to the bar. The result is a unique feature in the English system of justice, viz. the perfect harmony of opinion and interest between the bar as a profession and all degrees of the judicial bench. Barristers have the rank of esquires, and are privileged from arrest whilst in attendance on the superior courts and on circuit, and also from serving on juries whilst in active practice.

Revising Barristers are counsel of not less than seven years' standing appointed to revise the lists of parliamentary voters.

Barristers cannot maintain an action for their fees, which are regarded as gratuities, nor can they, by the usage of the profession , undertake a case without the intervention of a solicitor, except in criminal cases, where a barrister may be engaged directly, by having a fee given him in open court, nor is it competent for them to enter into any contract for payment by their clients with respect to litigation.

See J. R. V. Marchant, Barrister-at-lavi : an Essay on the legal position, of Counsel in England (1905).

BARROIS, CHARLES (1851-), French geologist, was born at Lille on the 21st of April 1851, and educated at the college in that town, where he studied geology under Prof. Jules Gosselet and qualified as D. es Sc. To this master he dedicated his first comprehensive work, Recherches sur le terrain critace supiriewr de V Angleterre et de Vlrlande, published in the MSmoires de la sociite giologique du Nord in 1876. In this essay the palaeontological zones in the Chalk and Upper Greensand of Britain were for the first time marked out in detail, and the results of Dr Barrois's original researches have formed the basis of subsequent work, and have in all leading features been confirmed. In 1876 Dr Barrois was appointed a collaborateur to the French Geological Survey,, and in 1877 professor of geology in the university

‘ of Lille. In other memoirs, among which may be mentioned those on the Cretaceous rocks of the Ardennes and of the Basin of Oviedo, Spain; on the (Devonian) Calcaire d’Erbray; on the Palaeozoic rocks of Brittany and of northern Spain; and on the granitic and metamorphic rocks of Brittany, Dr Barrois has proved himself an accomplished petrologist as well as palaeontologist and field-geologist. In 1881 he was awarded the Bigsby medal, and in 1901 the Wollaston medal by the Geological Society of London. He was chosen member of the Institute (Academy of Sciences) in 1904.

BARROS, JOAO DE (1496-1570), called the Portuguese Livy, may be said to have been the first great historian of his country. Educated in the palace of King Manoel,he early conceived the idea of writing history, and, to prove his powers, composed, at the age of twenty, a romance of chivalry, the Chronicle of the Emperor Clarimundo, in which he is said to have had the assistance of Prince John, afterwards King John III. The latter, on ascending the throne, gave Barros the captaincy of the fortress of St George of Elmina, whither he proceeded in 1522, and he obtained in 1525 the post of treasurer of the India House, which he held until 1528. The pest of 1530 drove him from Lisbon to his country house near Pombal, and there he finished a moral dialogue, Rhopica Pneuma, which met with the applause of the learned Juan Luis Vives. On his return to Lisbon in 1532 the king appointed Barros factor of the India and Mina House — positions of great responsibility and importance at a time when Lisbon was the European emporium for the trade of the East. Barros proved a good administrator, displaying great industry and a disinterestedness rare in that age, with the result that he made but little money where his pre- decessors had amassed fortunes. At this time, John III., wishful to attract settlers to Brazil, divided it up into captaincies and gave that of Maranhao to Barros, who, associating two partners in the enterprise with himself, prepared an armada of ten vessels, carry- ing nine hundred men, which set sail in 1539. Owing to the ignorance of the pilots, the whole fleet suffered shipwreck, which entailed serious financial loss on Barros, yet not content with meeting his own obligations, he paid the debts of those who had perished in the expedition. During all these busy years he had continued his studies in his leisure hours, and shortly after the Brazilian disaster he offered to write a history of the Portuguese in India, which the king accepted. He began work forthwith, but, before printing the first part, he again

proved his pen by publishing a Portuguese grammar (1540) and some more moral Dialogues. The first of the Decades of his Asia appeared in 1552, and its reception was such that the king straightway charged Barros to write a chronicle of King Manoel. His many occupations, however, prevented him from undertaking this book, which was finally composed by Damiao de Goes (q.v.). The Second Decade came out in 1553 and the Third in 1563, but the Fourth and final one was not published until 161 5, long after the author's death. In January 1568 Barros retired from his re- munerative appointment at the India House, receiving the rank of fidalgo together with a pension and other pecuniary emoluments from King Sebastian, and died on the 20th of October 1570. A man of lofty character, he preferred leaving his children an example of good morals and learning to bequeathing them a large pecuniary inheritance, and, though he received many royal benefactions, they were volunteered, never asked for. As an historian and a stylist Barros deserves the high fame he has always enjoyed. His Decades contain the early history of the Portuguese in Asia and reveal careful study of Eastern historians and geo- graphers, as well as of the records of his own country. They are distinguished by clearness of exposition and orderly arrangement. His style has all the simplicity and grandeur of the masters of historical writing, and the purity of his diction is incontestable. Though, on the whole, impartial, Barros is the narrator and apologist of the great deeds of his countrymen, and lacks the critical spirit and intellectual acumen of Damiao de Goes. Diogo do Couto continued the Decades, adding nine more, and a modern edition of the whole appeared in Lisbon in 14 vols, in '1778-1788. The title of Barros's work is Da Asia de Joao de Barros, dos feitos que os Portugnezes fizeram no descukrimento e

conquista dos mares e terras do Oriente, and the edition is accom- panied by a volume containing a life of Barros by the historian Manoel Severim de Faria and a copious index of all the Decades. An Italian version in 2 vols, appeared in Venice in 1561-1562 and a German in 5 vols, in 182 1. Clarimundo has gone through the following editions: 1522, 1555, 1601, 174s, 1791 and 1843, alf published in Lisbon. It influenced Francisco de Moraes (q.v.): cf. Purser, Palmerin of England, Dublin, 1904, pp. 440 et seq.

The minor works of Barros are described by Innocencio da Silva: Diccionario Bibliographico Portuguez, vol. iii. pp. 320-323 and vol. x. pp. 187-189, and in Severim de Faria's Life, cited above. A

com- pilation of Barros's Varia was published by the visconde de Azevedo (Porto, 1869). (E. Pr.)

BARROT, CAMILLE HYACINTHE ODILON (1791-1873),

French politician, was born at Villefort (Lozere) on the 19th of September 1791. He belonged to a legal family, his father, an advocate of Toulouse, having been a member of the Convention who had voted against the death of Louis XVI. Odilon Barrot's earliest recollections were of the October insurrection of 1795. He was sent to the military school of Saint-Cyr, but presently removed to the Lycee Napoleon to study law and was called to the Parisian bar in 181 1. He was placed in the office of the conventionel Jean Mailhe, who was advocate before the council of state and the court of cassation and was proscribed at the second restoration. Barrot eventually succeeded him in both positions. His dissatisfaction with the government of the restoration was shown in his conduct of some political trials. For his opposition in 1820 to a law by which any person might be arrested and detained on a warrant signed by three ministers, he was summoned before a court of assize, but acquitted. Although intimate with Lafayette and others, he took no actual share in their schemes for the overthrow of the government, but in 1827 he joined the association known as Aide-toi, le ciel t'aidera.

He presided over the banquet given by the society to the 221 deputies who had signed the address of March 1830 to Charles X.,

and threatened to reply to force by force. After the ordinances of the 26th of July 1830, he joined the National Guard and took an active part in the revolution. As secretary of the municipal commission, which sat at the hotel-de-ville and formed itself into a provisional government, he was charged to convey to the chamber of deputies a protest embodying the terms which the advanced Liberals wished to impose on the king to be elected. He supported the idea of a constitutional monarchy against the extreme Republicans, and he was appointed one of the three commissioners chosen to escort Charles X. out of France. On his return he was nominated prefect of the department of the Seine. His concessions to the Parisian mob and his extreme gentleness towards those who demanded the prosecution of the ministers of Charles X. led to an unflattering comparison With Jerdme Petion under similar circumstances. Louis Philippe's government was far from satisfying his desires for reform, and he persistently urged the " broadening of the bases of the monarchy," while he protested his loyalty to the dynasty. He was returned to the chamber of deputies for the department of Eure in 1831. The day after the demonstration of June 1832 on the occasion of the funeral of General Lamarque, he made himself indirectly the mouthpiece of the Democrats in an interview with Louis Philippe,

which is given at length in his MSmoires. Subsequently,- in pleading before the court of cassation on behalf of one of the

rioters, he secured the annulling of the judgments given by the council of war. The death of the duke of Orleans in 1842 was a blow to Barrot's party, which sought to substitute the regency of the duchess of Orleans for that of the duke of Nemours in the event of the succession of the count of Paris. In 1846 Barrot made a tour in the Near East, returning in time to take part a second time in the preliminaries of revolution. He organized banquets of the disaffected in the Various cities of France, and demanded electoral reform to avoid revolution. He did noi foresee the strength of the outbreak for which his eloquence had prepared the way, and clung to the programme of 1830. He tried to support the regency of the duchess in the chamber on the 24th: o£ February, only to find that the time was past- for.

half-measures. He acquiesced in the republic and gave his adhesion to General Cavaignac. He became the chief of Louis Napoleon's first ministry in the hope of extracting Liberal measures, but was dismissed in 1849 as soon as he had served the president's purpose of avoiding open conflict. After the coup d'Stat of December 185 1 he was one of those who sought to accuse Napoleon of high treason. He was imprisoned for a short time and retired from active politics for some ten years. He was drawn once more into affairs by the hopes of reform held out by Emile Ollivier, accepting in 1869 the presidency of an extra-parliamentary committee on decentralization. After the fall of the empire he was nominated by Thiers, whom he had supported under Louis Philippe, president of the council of state. But his powers were now failing, and he had only filled his new office for about a year when he died at Bougival on the 6th of August 1873. He had been sufficiently an optimist to believe in the triumph of the liberal but non-republican institutions dear to him under the

restoration, under Louis Philippe and Louis Napoleon successively. He was unable to foresee and unwilling to accept the consequences of his political agitation in 1830 and 1848, and in spite of his talents and acknowledged influence he thus failed to secure the honours won by more uncompromising politicians. He was described by Thureau-Dangin as " le plus solennel des indecis, le plus meditatif des irreflechis, le plus heureux des ambitieux, le plus austere des courtisans de la foule."

His personal relations with Louis Philippe and Napoleon, with his views on the events in which he was concerned, are described in the four volumes of his Memoires, edited by Duvergier de Hauranne in 1875-1876. See also Thureau-Dangin, Hist, de la monarchie de juillet.

BARROW, ISAAC (1630-1677), English mathematician and divine, was the son of Thomas Barrow, a linen-draper in London, belonging to an old Suffolk and Cambridgeshire family. His uncle was Bishop Isaac Barrow of St Asaph (1614-1680). He was at first placed for two or three years at the Charterhouse school. There, however, his conduct gave but little hopes of his ever succeeding as a scholar. But after his removal from this estab- lishment to Felsted school in Essex, where Martin Holbeach was master, his disposition took a happier turn; and having soon made considerable progress in learning, he was in 1643 entered at St Peter's College, and afterwards at Trinity College, Cam- bridge, where he applied himself to the study of literature and science, especially of natural philosophy. He at first intended to adopt the medical profession, and made some progress in anatomy, botany and chemistry, after which he studied chrono- logy, geometry and astronomy. He then travelled in France and Italy, and in a voyage from Leghorn to Smyrna gave proofs of great personal bravery during an attack made by an Algerine pirate. At Smyrna he met with a kind reception from the English consul, Mr Bretton, upon whose death he afterwards wrote a Latin elegy. From this place he proceeded to Con- stantinople, where he received similar civilities from Sir Thomas Bendish, the English ambassador, and Sir Jonathan Dawes, with whom he afterwards contracted an intimate friendship. While at Constantinople he read and studied the works of St Chry- sostom, whom he preferred to all the other Fathers. He resided in Turkey somewhat more than a year, after which he proceeded to Venice, and thence returned home through Germany and Holland in 1659.

Immediately on his reaching England he received ordination

from Bishop Brownrig, and in 1660 he was appointed to the Greek professorship at Cambridge. When he entered upon this office he intended to have prelected upon the tragedies of Sophocles; but he altered his intention and made choice of Aristotle's rhetoric. His lectures on this subject, having been lent to a friend who never returned them, are irrecoverably lost. In July 1662 he was elected professor of geometry in Gresham College, on the recommendation of Dr John Wilkins, master of Trinity College and afterwards bishop of Chester; and in May 1663 he was chosen a fellow of the Royal Society, at the first election made by the council after obtaining their charter. The same year the executors oi Henry Lucas, who, according to the

terms of his will, had founded a mathematical chair at Cambridge, fixed upon Barrow as the first professor; and although his two professorships were not inconsistent with each other, he chose to resign that of Gresham College, which he did on the 20th of May 1664. In 1669 he resigned his mathematical chair to his pupil, Isaac Newton, having now determined to renounce the study of mathematics for that of divinity. Upon quitting his professorship Barrow was only a fellow of Trinity College; but his uncle gave him a small sinecure in Wales, and Dr Seth Ward, bishop of Salisbury, conferred upon him a prebend in that church. In the year 1670 he was created doctor in divinity by mandate; and, upon the promotion of Dr Pearson to the see of Chester, he was appointed to succeed him as master of Trinity College by the king's patent, bearing the date of the 13th of February 1672. In 1675 Dr Barrow was chosen vice-chancellor of the university. He died on the 4th of May 1677, and was interred in Westminster Abbey, where a monument, surmounted by his bust, was soon after erected by the contributions of his friends.

By his English contemporaries Barrow was considered a mathematician second only to Newton. Continental writers do not place him so high, and their judgment is probably the more correct one. He was undoubtedly a clear-sighted and able mathematician, who handled admirably the severe geometrical method, and who in his Method of Tangents approximated to the course of reasoning by which Newton was afterwards led to the doctrine of ultimate ratios; but his substantial contribu- tions to the science are of no great importance, and his lectures upon elementary principles do not throw much light on the difficulties surrounding the border-land between mathematics and philosophy. (See Infinitesimal Calculus.) His Sermons have long enjoyed a high reputation; they are weighty pieces of reasoning,

elaborate in construction and ponderous in style.

His scientific works are very numerous. The most important are : — Euclid's Elements; Euclid's Data; Optical Lectures, read in the public school of Cambridge; Thirteen Geometrical Lectures; The Works 0} Archimedes, the Four Books of Apollonius's Conic Sections, and Theodosius's Spherics, explained in a New Method ; A Lecture, in which Archimedes' Theorems of the Sphere and Cylinder are investigated and briefly demonstrated ; Mathematical Lectures, read in the public schools of the university of Cambridge. The above were all written in Latin. His English works have been collected and published in four volumes folio.

See Ward, Lives of the Gresham Professors, and Whewell's biography prefixed to the 9th volume of Napier's edition of Barrow's Sermons.

BARROW, SIR JOHN (1764-1848), English statesman, was born in the village of Dragley Beck in the parish of Ulverston in Lancashire, on the 19th of June 1764. He started in life as superintending clerk of an iron foundry at Liverpool and after- – wards taught mathematics at a school in Greenwich. Through the interest of Sir George Staunton, to whose son he taught mathematics, he was attached on the first British embassy to China as comptroller of the household to Lord Macartney. Hb soon acquired a good knowledge of the Chinese language, on which he subsequently contributed interesting articles to the Quarterly Review, and the account of the embassy published by Sir George Staunton records many of Barrow's valuable contributions to literature and science connected with China.

Although Barrow ceased to be officially connected with Chinese affairs after the return of the embassy in 1794, he always took much interest in them, and on critical occasions was frequently consulted by the British government. In 1797 he accompanied Lord Macartney, as private secretary, in His important and delicate mission to settle the government of the newly acquired colony of the Cape of Good Hope. Barrow was entrusted with the task of reconciling . the Boers and Kaffirs and of reporting on the country in the interior. On his return from his journey, in the course of which he visited all parts of the colony, he was appointed auditor-general of public accounts. He now decided to settle in South Africa, married Anne Maria Triiter, and in 1800 bought a house in Cape Town. But the surrender of the colony at

the peace of Amiens (1802) upset this plan. He returned to England in 1804, was appointed by Lord Melville second secretary to the admiralty, a post which he held for

forty years. He enjoyed the esteem and confidence of all the eleven chief lords who successively presided at the admiralty board during that period, and more especially of King William IV. while lord high admiral, who honoured him with tokens of his personal regard. Barrow was a fellow of the Royal Society, and in 1821 received the degree of LL.D. from Edinburgh University. A baronetcy was conferred on him by Sir Robert Peel in 1835. He retired from public life in 1845 and devoted himself to writing a history of the modern Arctic voyages of discovery (1846), of which he was a great promoter, as well as his autobiography, published in 1847. He died suddenly on the 23rd of November 1848.

Besides the numerous articles in the Quarterly Review already mentioned, Barrow, published among other works, Travels in China (1804); Travels into the Interior of South Africa (1806); and lives of Lord Macartney (1807), Lord Anson (1839), Lord Howe (1838). He was also the author of several valuable contributions to the seventh edition of the Encyclopaedia Britannica.

See Memoir of John Barlow, by G. F. Staunton (1852).

BARROW, a river of south-eastern Ireland. It rises in the Slieve Bloom mountains, and flows at first easterly and then almost due south, until, on joining the Suir, it forms the estuary of the south coast known as Waterford Harbour. Including the 12 m. of the estuary, the length of its valley is rather more than 100 m., without counting the lesser windings of the river. The total area of drainage to Waterford Harbour (including the basin of the Suir) is 3500 sq. m., and covers the whole of the county Kilkenny, with parts of Waterford, Cork and Limerick, Tipperary, Carlow, King's and Queen's counties. The chief towns on the banks of the Barrow are Athy (where it becomes navigable and has a junction with the Grand Canal), Carlqw, Bagenalstown and New Ross. The chief affluent is the Nore, which it receives from the north-west a little above New Ross. The scenery on its banks is in parts very beautiful.

BARROW (from A.S. beorh, a mount or hillock), a word found occasionally among place-names in England applied to natural eminences, but generally restricted in its modern applica- tion to denote an ancient grave-mound. The custom of con- structing barrows or mounds of stone or earth over the remains of the dead was a characteristic feature of the sepulchral systems of primitive times. Originating in the common sentiment of humanity, which desires by some visible memorial to honour and perpetuate the memory of the dead, it was practised alike by peoples of high and of low development, and continued through all the stages of culture that preceded the introduction of Christianity. The primary idea of sepulture appears to have been the provision of a habitation for the dead; and thus, in its perfect form, the barrow included a chamber or chambers where the tenant was surrounded with the prized possessions of his previous life. A common feature of the earlier barrows is the enclosing fence, which marked off the site from the sur- rounding ground. When the barrow was of earth, this was effected by an encircling trench or a low vallum. When the barrow was a stone structure, the enclosure was usually a circle of standing stones. Sometimes, instead of a chamber formed above ground, the barrow covered a pit excavated for the interment under the original surface. In later times the mound itself was frequently dispensed with, and the interments made within the enclosure of a trench, a vallum or a circle of standing stones. Usually the great barrows occupy conspicuous sites; but in general the external form is no index to the internal construction and gives no definite indication of the nature of the sepulchral usages. Thus, while the long barrow is characteristic of the Stone Age, it is impossible to tell without direct examina- tion whether it may be chambered or unchambered, or whether the burials within it may be those of burnt or of unburnt bodies.

In England the long barrow usually contains a single chamber, entering by a passage underneath the higher and wider end of the mound. In Denmark the chambers are at irregular intervals along the body of the mound, and have no passages leading into them. The long barrows of Great Britain are often from 200 to

400 ft. in length by 60 to 80 ft. wide. Their chambers are rudely but strongly built, with dome-shaped roofs, formed by over- lapping the successive courses of the upper part of the side walls. In Scandinavia, on the other hand, such dome-roofed chambers are unknown, and the construction of the chambers as a rule is megalithic, five or six monoliths supporting one or more

capstones of enormous size. Such chambers, denuded of the covering mound, or over which no covering mound has been raised, are popularly known in England as ” cromlechs ” and in France as ” dolmens ” (see Stone Monuments). The prevailing mode of sepulture in all the different varieties of these structures is by the deposit of the body in a contracted position, accompanied by weapons and implements of stone, occasionally by ornaments of gold, jet or amber. Vessels of clay, more or less ornate in character, which occur with these early interments of unburnt bodies, have been regarded as food-vessels and drinking-cups, differing in character and purpose from the cinerary urns of larger size in which the ashes of the dead were deposited after cremation.

The custom of burning the body commenced in the Stone Age, before the long barrow or the dolmen had passed out of use. While cremation is rare in the long barrows of the south of England, it is the rule in those of Yorkshire and the north of Scotland. In Ireland, where the long barrow form is all but unknown, the round barrow or chambered cairn prevailed from the earliest Pagan period till the introduction of Christianity. The Irish barrows occur in groups in certain localities, some of which seem to have been the royal cemeteries of the tribal confederacies, whereof eight are enumerated in an ancient Irish manuscript, the Leabhaf na h-Uidhfi, compiled c. a.d. iioo. The best-known of these is situated on the banks of the Boyne above Drogheda, and consists of a group of the largest cairns in Ireland. One, at New Grange, is a huge mound of stones and earth, over 300 ft. in diameter and 70 ft. in height. Around its base are the remains of a circle of large standing stones. The chamber, which is 20 ft. high in the centre, is reached by a passage about 70 ft. in length. In the Loughcrew Hills, Co. Meath, there is a group of about thirty stone barrows or cairns, mostly chambered, their bases measuring from 5 or 6 to 60 yds. in diameter. They are unusually inter- esting from the fact that many of the exposed slabs in the walls of the chambers are ornamented with spirals and other devices, rudely incised. As in the case of the long barrows, the traditional form of the circular, chambered barrow was retained through various changes in the sepulchral customs of the people. It was the natural result of the practice of cremation, however, that it should induce a modification of the barrow structure. The chamber, no longer regarded as a habitation to be tenanted by the deceased, became simply a cist for the reception of the urn which held his ashes. The

degradation of the chamber naturally produced a corresponding degradation of the mound which covered it, and the barrows of the Bronze Age, in which cremation was common, are smaller and less imposing than those of the Stone Age, but often surprisingly rich in the relics of the life and of the art "workmanship of the time. In addition to the varied and beautiful forms of implements and weapons^ — frequently ornamented with a high degree of artistic taste — armlets and other personal ornaments in gold, amber, jet and bronze are not uncommon. The barrows of the bronze period, like some of those of the Stone Age, appear to have been used as, tribal or family cemeteries. In Denmark as many as seventy deposits of burnt interments have been observed in a single mound, indicat- ing its use as a burying-place throughout a long succession of years.

In the Iron Age there was less uniformity in the burial customs. In some of the barrows in central France, and in the wolds of Yorkshire, the interments include the arms and accoutrements of a charioteer, with his chariot, harness and horses. In Scandinavia a custom, alluded to in the sagas, of burying the viking in his ship, drawn up on land, and raising a barrow over it, is exemplified by the ship-burials discovered in Norway. The ship found in the Gokstad mound was 78 ft. long, and had a mast and sixteen pairs of oars. In a chamber abaft the mast the viking had been laid, with his weapons, and together with him were

buried twelve horses, six dogs and a peacock. An interesting example of the great timber-chambered barrow is that at Jelling in Jutland, known as the barrow of Thyre Danebod, queen of King Gorm the Old, who died about the middle of the ioth century. It is a mound about 200 ft. in diameter, and over 50 ft. in height, containing a chamber 23 ft. long, 8 ft. wide and 5 ft. high, formed of massive slabs of oak. Though it had been entered and plundered in the middle ages, a few relics were found when it was reopened, among which were a silver cup,ornamented with the interlacing work characteristic of the time and some personal ornaments. It is highly illustrative of the tenacity with which the ancient sepulchral usages were retained even after the introduction of Christianity that King Harold, son and successor of Gorm the Old, who is said to have christianized all Denmark and Norway, followed the pagan custom of erecting a chambered

tumulus over the remains of his father, on the summit of which was placed a rude pillar-stone, bearing on one side the memorial inscription iri runes, and on the other a representation of the Saviour of mankind distinguished by the crossed nimbus surrounding the head. The so-called Kings' Hows at Upsala in Sweden rival those of Jelling in size and height. In the chamber of one, opened in 1829, there was found an urn full of calcined bones; and along with it were ornaments of gold showing the characteristic workmanship of the 5th and 6th centuries of the Christian era. Along with the calcined human bones were bones of animals, among which those of the horse and the dog were distinguished.

Comparing the results of the researches in European barrows with such notices of barrow-burial as may be gleaned from early writings, we find them mutually illustrative.

The Homeric account of the building of the barrow of Hector (//. xxiv.) brings vividly before us the scene so often suggested by the examination of the tumuli of prehistoric times. During nine days wood was collected and brought, in carts drawn by oxen, to the site of the funeral pyre. Then the pyre was built and the body laid upon it. After burning for twenty-four hours the smouldering embers were extinguished with libations of wine. The white and calcined bones were then picked out of the ashes by the friends and placed in a metallic urn, which was deposited in a hollow grave or cist and covered over with large well-fitting stones. Finally, a barrow of great magnitude was heaped over the remains and the funeral feast was celebrated. The obsequies of Achilles, as described in the Odysfey, were also celebrated with details which are strikingly similar to those observed in tumuli both of the Bronze and Iron Ages. The body was brought to the pile in an embroidered robe and jars of unguents and honey were placed beside it. Sheep and oxen were slaughtered at the pile. The incinerated bones were collected from the ashes and placed in a golden urn along with those of Patroclus, Achilles's dearest friend. Over the remains a great and shapely mound was raised on the high headland, so that it might be seen from afar by future generations of men.

Herodotus, describing the funeral customs of the Scythians, states that, on the death of a chief, the body was placed upon a couch in a chamber sunk in the earth and covered with timber, in which were deposited all things needful for the comfort of the deceased in the other world. One of his wives was strangled and

laid beside him, his cup-bearer and other attendants, his charioteer and his horses were killed and placed in the tomb, which was then filled up with earth and an enormous mound raised high over all. The barrows which cover the plains of ancient Scythia attest the truth of this description. A Siberian barrow, described by Demidov, contained three contiguous chambers of unhewn stone. In the central chamber lay the skeleton of the ancient chief, with his sword, his spear, his bow and a quiver full of arrows. The skeleton reclined upon a sheet of pure gold, extending the whole length of the body, which had been wrapped in a mantle broidered with gold and studded with precious stones. Over it was extended another sheet of pure gold. In a smaller chamber at the chiefs head lay the skeleton of a female, richly attired, extended upon a sheet of pure gold and similarly covered with a sheet of the same metal. A golden chain adorned her neck and her arms were

encircled with bracelets of pure gold. In a third chamber, at the chief's feet, lay the skeleton of his favourite horse with saddle, bridle and stirrups.

So curiously alike in their general features were the sepulchral usages connected with barrow-burial over the whole of Europe, that we find the Anglo-Saxon Saga of Beowulf describing the chambered tumulus with its gigantic masonry "held fast on props, with vaults of stone," and the passage under the mound haunted by a dragon, the guardian of the treasures of heathen gold which it contained. Beowulf's own burial is minutely described in terms which have a strong resemblance to the parallel passages in the Iliad and Odyssey. There is first the preparation of the pile, which is hung round with helmets, shields and coats of mail. Then the corpse is brought and laid in the midst; the pile is kindled and the roaring flame rises, mingled with weeping, till all is consumed. Then, for ten long days, the warriors labour at the rearing of his mighty mound on the headland, high and broad, to be seen afar by the passers-by on land and sea.

The pyramids of Egypt, the mausolea of the Lydian kings, the circular, chambered sepulchres of Mycenae, and the Etruscan tombs at Caere and Volci, are lineally descended from the chambered barrows of prehistoric times, modified in construction according to the advancement of architectural art at the period of their erection. There is no country in Europe destitute of more or less abundant proofs of the almost universal

prevalence of barrow-burial in early times. It can also be traced on both sides of the basin of the Mediterranean, and from Asia Minor across the continent to India, China and Japan.

In the new world as well as in the old, similar customs prevailed from a very remote period. In the great plains of North America the dead were buried in barrows of enormous magnitude, which occasionally present a remarkable similarity to the barrows of Great Britain. In these mounds cremation appears more frequently than inhumation; and both are accompanied by implements, weapons and ornaments of stone and bone. The pottery accompanying the remains is often elaborately ornamented, and the mound builders were evidently possessed of a higher development of taste and skill than is evinced by any of the modern aboriginal races, by whom the mounds and their contents are regarded as utterly mysterious.

It is not to be wondered at that customs so widely spread and so deeply rooted as those connected with barrow-burial should have been difficult to eradicate. In fact, compliance with the Christian practice of inhumation in the cemeteries sanctioned by the church, was only enforced in Europe by capitularies denounc- ing the punishment of death on those who persisted in burying their dead after the pagan fashion or in the pagan mounds. Yet even in the middle ages kings of Christian countries were buried with their swords and spears, and queens with their spindles and ornaments; the bishop was laid in his grave with his crozier and comb; the priest with his chalice and vestments; and- clay vessels filled with charcoal (answering to the urns of heathen times) are found in the churches of France and Denmark.

Authorities. — Canon W. Greenwell, British Barrows (London, 1877) ; Dr J. Thurnam, ” On Ancient British Barrows,” in Archaeo- logia, vols. 42, 43 (1869) ; J. R. Mortimer, Forty Years’ Researches in Burial Mounds of East Yorkshire (London, 1905) ; J. Anderson, Scotland in Pagan Times, (Edinburgh, 1886) ; Dr T. H. Bryce, ” Records of Explorations among the Cairns of Arran and Bute, in Proceedings of the Society of Antiquaries of Scotland, vols. 36, 37, 38 (1901-1903) ; W. C. Borla.se, The Dolmens of Ireland (London, 1897) ; Dictionnaire archeologique de la Gaule (Paris, 1875) ; A. P. Madsen, Gravhoie og Gravfundfra Stenalderen i £>anmar£(Copenhagen, 1900) ; S. Miiller, Nordische Altertumskunde aus Danemark und Schleswig (Strassburg, 1897) ; O. Montelius, The Civilization of Sweden in Heathen Times (London, 1888), and, Der Orient und Europa

(Stockholm, 1899); E. Cartailhac, Les Ages prehistoriques de I'Espagne et du Portugal (Paris, 1886) ; W. Gowland, " The Dolmens and Burial Mounds in Japan," in Archaeologia, vol. 55 (1897); C. Thomas, "Report on the Mound Explorations of the Bureau of Ethnology " (Twelfth Annual Report for 1890-1891, Washington, 1894,) (J- An.)

BARROWE, HENRY (? 1550-1593), English Puritan and Separatist, was born about 1550, at Shipdam, Norfolk, of a family related by marriage to the lord keeper Bacon, and

probably to Aylmer, bishop of London. He matriculated at Clare Hall, Cambridge, in November 1566, and graduated B.A. in 1560-1570. Afterwards he " followed the court " for some time, leading a frivolous if not licentious life. He was a member of Gray's Inn for a few years from 1576, but was never called to the bar. About 1580 or 158 1 he was deeply impressed by a sermon, whereupon he retired to the country, and was led by study and meditation to the strictest form of Puritanism. Sub- sequently, in what manner is not known, he came into intimate relations with John Greenwood, the Separatist leader, whose views (probably due, in part at least, to Browne's influence) he adopted without reserve. Though not strictly resident in London at this time, he was associated with " the brethren of the Separation" there, in whose secret meetings his natural earnestness and eloquence made him conspicuous. Greenwood having been' imprisoned in the Clink, Barrowe came from the country to visit him, and on the 19th of November 1586 was detained by the gaoler and brought before Archbishop Whitgif t. He insisted on the illegality of this arrest, refused either to take the ex officio oath or to give bail for future appearance, and was committed to the Gatehouse. After nearly six months' detention and several irregular examinations before the high commissioners, he and Greenwood were formally indicted (May 1587) for re- cusancy under an act originally directed against Papists. They were ordered to find heavy bail for comformity, and to remain in the Fleet Prison until it was forthcoming. Barrowe continued a prisoner for the remainder of his life, nearly six years, sometimes in close confinement, sometimes having " the liberty of the prison." He was subjected to several more examinations, once before the privy council at Whitehall on the 18th of March 1588, as a result

of petition to the queen. On these occasions he vigorously maintained the principle of separatism, denouncing the prescribed ritual of the Church as ” a false worship,” and the bishops as oppressors and persecutors. During his imprisonments he was engaged in written controversy with Robert Browne (down to 1588), who had yielded a partial submission to the established order, and whom he therefore accounted a renegade. He also wrote several vigorous treatises in defence of separatism and congregational independency, the most important being: — A True Description of the Visible Congregation of the Saints, &c. (1589); A Plain Refutation of Mr Gijford’s Booke, intituled A Short Treatise Gainst the Donalistes of England (1 590-1 591) , and A Brief Discovery of the False Church (1591). Others were written in conjunction with his fellow-prisoner, Greenwood. These writings were taken charge of by friends and mostly printed in Holland. By 1590 the bishops thought it advisable to try other means of convincing or silencing these indomitable controversialists, and sent several conforming Puritan ministers to confer with them, but without effect. At length it was resolved to proceed on a capital charge of ” devising and circu- lating seditious books,” for which, as the law then stood, it was easy to secure a conviction. They were tried and sentenced to death on the 23rd of March 1593. What followed is, happily, unique in the history of English misrule. The day after sentence they were brought out as if for execution and respited. On the 31st of March they were taken to the gallows, and after the ropes had been placed about their necks were again respited. Finally they were hanged early on the, morning of the 6th of April. The motive of all this is obscure, but there is some evidence that the lord treasurer Burghley endeavoured to save their lives, and was frustrated by Whitgift and other bishops.

The opinions of Browne and Barrowe had much in common, but were not identical. Both maintained the right and duty of the Church to carry out necessary reforms without awaiting the permission of the civil power; and both advocated congregational independency. But the ideal of Browne was a spiritual democracy, towards which separation was only a means. Barrowe, on the other hand, regarded the whole established church order as polluted by the relics of Roman Catholicism, and insisted on separation as essential to pure worship and discipline (see further Congregationalism). Barrowe has been

credited by H. M. Dexter and others with being the author of the ” Marprelate Tracts “; but this is improbable.

Authorities. — H. M. Dexter, The Congregationalism of the Last Three Hundred Years; F. J. Powicke, Henry Barrowe and the Exiled Church. See also B. Brook, Lives of the Puritans; and Cooper, Athenae Cantabrigienses (1861), vol. ii.

BARROW-IN-FURNESS, a seaport and municipal, county and parliamentary borough of Lancashire, England, 2645 ni. N.W. by N. from London, on the Furness railway. Pop. (1891) 51,712; (1901) 57,586. It lies on the seaward side of the hammer-shaped peninsula forming part of the district of Furness, between the estuary of the Duddon and Morecambe Bay, where a narrow channel intervenes between the mainland and the long low island of Walney, on which the erection of a strong fort was undertaken by the War Office in 1904. In 1905 the connexion of Walney with the mainland by a bridge was undertaken. In the channel is Barrow Island (among others) which is connected with the mainland, reclamation having been carried on until only a narrow channel was left, which was utilized as docks. Barrow is of modern and remarkably rapid growth. Its rise was dependent primarily on the existence and working of the veins of pure haematite iron ore in the district of Furness (q.v.). At the outset Barrow merely exported the ore to the furnaces of South Wales and the midlands. At the beginning of the 19th century this export amounted at most to a few thousand tons, and though by the middle of the century it had reached some 50,000 in 1847 the population of Barrow was only 325. In 1846 the first section of the Furness railway was opened, connecting Barrow with the mines near Dal ton; in the ensuing years a great increase in trade justified the opening of further com- munications, and in 1859 the iron works of Messrs Schneider & Hannay were instituted. The Barrow Haematite Steel Company (1866) absorbed this company, and a great output of steel produced by the Bessemer process was begun. Other industries followed. Of these the shipbuilding works have sur- passed the steel works in importance, the celebrated firm of Vickers, Sons & Maxim having a yard where they construct numerous vessels of war as well as others. There are also a petroleum storage establishment, a paper-pulp factory, jute works, and engineering and wagon works.

The docks in the strait between Barrow Island and the main- land were constructed in 1867, and named the Devonshire and Buccleuch docks. The Ramsden docks are a subsequent exten- sion. These are 24 ft. in depth. There are also a graving dock 500 ft. long, a depositing dock accommodating vessels of 16 ft.

draught, and two electric cranes each able to lift 150 tons. The Furness railway company is the dock authority. Passenger steamers run on weekdays to Belfast.

The town is laid out in rectangular form, and contains several handsome churches, municipal buildings, exchange and other public buildings. An electric tramway service connects the outskirts and the centre. There are statues of Lord Frederick Cavendish (assassinated at Dublin, 1882), in front of the town-hall, and of Sir James Ramsden (d. 1896), managing director of the Furness railway and first mayor of Barrow, to whom, together with the dukes of Devonshire and Buccleuch, the town owed mtfch of its rise in the middle of the 19th century. The cottage inhabited by George Romney the painter from 1742 to 1755 has been preserved from demolition and retained as a memorial. Educational institutions include a school of science and art, a girls' high school and a technical school. Barrow is a suffragan bishopric in the diocese of Carlisle. The parliamentary borough (1885), falling within the North Lonsdale division of the county, returns one member. The town was incorporated in 1867, and became a county borough in 1888. The corporation consists of a mayor, 8 aldermen and 24 councillors. Area, 11,023 acres.

BARRY, SIR CHARLES (1795-1860), English architect, was born in London on the 23rd of May 1795, the son of a stationer. He was articled to a firm of architects, with whom he remained till 181 7, when he set out on a three years' tour in Greece and Italy, Egypt and Palestine for the purpose of studying

architecture. On his return to England in 1820 he settled in London. One of the first works by which his abilities as an architect became generally known was the church of St Peter at Brighton, completedin 1826. He built many other churches ; but the marked preference for Italian architecture, which he acquired during his travels, showed itself in various important undertakings of his earlier years. In 1831 he completed the Travellers' Club in Pall Mall, a splendid work in the Italian style and the first of its kind built in London. In the same style and on a grander scale he built in 1837 the Reform Club. He was also engaged on numerous private mansions in London, the finest being Bridgewater House (1847). Birmingham possesses one of his best works in King Edward's grammar school, built in the Tudor style between 1833 and 1836. For Manchester be designed

the Royal Institution of Fine Arts (1824) and the Athenaeum (1836) ; and for Halifax the town-hall. He was engaged for some years in reconstructing the Treasury buildings, Whitehall. But his masterpiece, notwithstanding all unfavourable criticism, is the Houses of Parliament at Westminster (1 840-1860). Barry was elected A.R.A. in 1840 and R.A. in the following year. His genius and achievements were recognized by the representative artistic bodies of the principal European nations; and his name was enrolled as a member of the academies of art at Rome, Berlin, St Petersburg, Brussels and Stockholm. He was chosen F.R.S. in 1849 and was knighted by Queen Victoria in 1852. He died suddenly at Clapham near London on the 12th of May i860, and his remains were interred in Westminster Abbey. As a landscape gardener he was no less brilliant than as an architect, and in connexion with the building of the Houses of Parliament he formed schools of modelling, stone and wood carving, cabinet-making, metal-working, glass and decorative painting, and of encaustic tile-making. In 1867 appeared a life of him by his son Bishop Alfred Barry. A claim was thereupon set up on behalf of Pugin, the famous architect, who was dead and who had been Barry's assistant, to a much larger share in the work of designing the Houses of Parliament than was admitted in Dr Barry's narrative. The controversy raged for a time, but without substantiating Pugin's claim.

His second son, Alfred Barry (1826-), was educated at King's College, London, and Trinity College, Cambridge, where he was 4th wrangler and gained a first-class in the classical tripos in 1848. He was successively sub-warden of Trinity College, Glenalmond (1849-1854), head-master of Leeds grammar school (1854-1862), principal of Cheltenham College (1862-1868), and principal of King's College, London (1868-1883). He was canon of Worcester from 1871 to 1881, and of Westminster from 1881 to 1884. From 1884 to 1889 he served as bishop of Sydney and primate of Australia, and on his return to England he was assistant bishop in the diocese of Rochester from 1889 to 1891, and rector of St James's, Piccadilly, from 1895 to 1900. He was appointed canon of Windsor in 1891 and assistant bishop in West London in 1897. Besides the life of his father mentioned above, he published numerous theological works.

Another son, Edward Middleton Barry (1830-1880), was also an architect. He acted as assistant to his father during the latter years of Sir Charles's life. On the death of his father, the duty of completing the latter's unfinished work devolved upon him.

Amongst other buildings thus completed were the Houses of Parliament at Westminster (see Architecture, fig. 91, and Plate X. fig. 118), and Halifax town-hall (Id. fig. 90). In 1 86 1 he was elected an associate of the Royal Academy; and in 1869 a full academician. From 1873 till his death he held the Academy's professorship of architecture. Among other buildings designed by him were Covent Garden theatre, Charing Cross and Cannon Street hotels, the Birmingham and Midland Institute, new galleries for the National Gallery and new chambers for the Inner Temple. He died on the 27th of January, 1880.

The youngest son, Sir John Wolfe Wolfe-Barry (1836-

), the eminent engineer, who assumed the additional name of

Wolfe in 1898, was educated at Glenalmond, and was articled as

engineering pupil to Sir John Hawkshaw, with whom he was

associated in the building of the railway bridges across the

Thames at Charing Cross and Cannon Street. In 1867 he begant to practise on his own account, and soon gained an extensive connexion with railway companies, both in Great Britain and! in other countries. Among the works on which he was engaged! were extensions of the Metropolitan District railway, the St Paul's station and bridge of the London, Chatham & Dover railway, the Barry Docks of the Barry railway company near Cardiff, and the Tower and new Kew bridges over the Thames. On the completion of the Tower Bridge in 1894, he was made a C.B., becoming K.C.B. three years later. He served on several royal commissions, including those on Irish Public Works (1886- 1890), Highlands and Islands of Scotland (1889-1890), Accidents to Railway Servants (1899-1900), Port of London (1900-1902), and London Traffic (1903-1905). He was elected president of the Institution of Civil Engineers in 1896, and published books on Railway Appliances (1874), and, with Sir F. J. Bramwell, on Railways and Locomotives (1882).

BARRY, ELIZABETH (1658-1713), English actress, of whose early life the details are meagre. At first she was so unsuccessful on the stage as to be more than once dismissed; but she was coached by her lover the earl of Rochester, who had laid a wager that in a short time he would make a first-rate actress of her, and the

results confirmed his judgment. Mrs Barry's performance as Isabella, queen of Hungary, in the earl of Orrery's Mustapha, was said to have caused Charles II. and the duke and duchess of York so much delight that the duchess took lessons in English from her, and when she became queen she gave Mrs Barry her coronation robes in which to appear as Elizabeth in Banks's Earl of Essex. Mrs Barry is said to have created over 100 parts, and she was particularly successful in the plays of Thomas Otway. Betterton says that her acting gave " success to plays that would disgust the most patient reader." Dryden pronounced her " always excellent." Cibber is authority for the statement that it was on her behalf that benefits, which up to that time were reserved for authors, were first established for actors by command of James II. Mrs Barry had a child by Lord Rochester and a second by Sir George Etheredge, both of whom were provided for by their fathers. In 1 709 she retired from the stage and died on the 7th of November 17 13.

BARRY, JAMES (1 741-1806), English painter, was born at Cork on the 1 ith of October 1 741. His father had been a builder, and, at one time of his life, a coasting trader between the two countries of England and Ireland. To this business of trader James was destined, and he actually made when a boy several voyages; but he manifested such an aversion to the life and habits of a sailor as to induce his father to suffer him to pursue his own inclinations, which led strongly towards drawing and study. At the schools in Cork to which he was sent he was regarded as a prodigy. About the age of seventeen he first attempted oil-painting, and between that and the age of twenty-two, when he first went to Dublin, he produced several large pictures, which decorated his father's house, such as " Aeneas escaping with his Family from the Flames of Troy," "Susanna and the Elders," " Daniel in the Lions' Den," &c. At this period he also produced the painting which first brought him into public notice, and gained him theacquaintanceand patronageof Edmund Burke. The picture was founded on an old tradition of the land- ing of St Patrick on the sea-coast of Cashel, and of the conversion and baptism of the king of that district by the patron saint of Ireland. It was exhibited in London in 1762 or 1763. •

By the liberality of Burke and his other friends, Barry in the latter part of 1765 was enabled to go abroad. He went first to Paris, then to Rome, where he remained upwards of three years, from Rome to Florence and Bologna, and thence home through Venice. His letters to the Burkes, giving an account of Raphael,

Michelangelo, Titian and Leonardo da Vinci, show remarkable insight. Barry painted two pictures while abroad, an Adam and Eve, and a Philoctetes, neither of them of any merit. Soon after his return to England in 1 771 he produced his picture of Venus, which was compared, though with little justice, to the Galatea of Raphael, the Venus of Titian and the Venus de Medici. In 1773 he exhibited his " Jupiter and Juno on Mount Ida." His

" Death of General Wolfe," in which the British and French soldiers are represented in very primitive costumes, was considered as a falling-off from his great style of art. His fondness for Greek costume was assigned by his admirers as the cause of his reluctance to paint portraits. His failure to go on with a portrait of Burke which he had begun caused a misunderstanding with his early patron. The difference between them is said to have been widened by Burke's growing intimacy with Sir Joshua Reynolds, and by Barry's feeling some little jealousy of the fame and fortune of his rival " in a humbler walk of the art." About the same time he painted a pair of classical subjects, Mercury inventing the lyre, and Narcissus looking at himself in the water, the last suggested to him by Burke. He also painted a historical picture of Chiron and Achilles, and another of the story of Stratonice, for which last the duke of Richmond gave him a hundred guineas. In 1 7 73 it was proposed to decorate the interior of St Paul's with historical and sacred subjects; but the plan fell to the ground, from not meeting with the concurrence of the bishop of London and the archbishop of Canterbury. Barry was much mortified at the failure, for he had in anticipation fixed upon the subject he intended to paint — the rejection of Christ by the Jews when Pilate proposes his release. In 1773 he published An Inquiry into the real and imaginary Obstructions to the Acquisi- tion of the Arts in England, vindicating the capacity of the English for the fine arts and tracing their slow progress hitherto to the Reformation, to political and civil dissensions, and lastly to the general direction of the public mind to mechanics, manufactures and commerce. In 1774 a proposal was made through Valentine Green to Reynolds, West, Cipriani, Barry, and other artists to srnament the great room of the Society for the Encouragement of \rts, Manufactures and Commerce in the Adelphi with historical md allegorical paintings. This proposal was at the time rejected by the artists themselves; but in

1777 Barry made an offer to paint the whole on condition of being allowed the choice of his subjects, and being paid by the society the expenses of canvas, paints and models. His offer was accepted, and he finished the series of pictures at the end of seven years to the entire satisfac- tion of the members of the society, who granted him two exhibi- tions, and at different periods voted him 50 guineas, their gold medal and 200 guineas. Of the six paintings making up the series, only one, that of the Olympic Games, shows any artistic power.

Soon after his return from the continent Barry had been chosen a member of the Royal Academy; and in 1782 he was appointed professor of painting in the room of Mr Penny with a salary of £30 a year. Among other things, he insisted on the necessity of purchasing a collection of pictures by the best masters as models for the students, and proposed several of those in the Orleans collection. This recommendation was not relished, and in 1799 Barry was expelled from the academy, soon after the appearance of his Letter to the Dilettanti Society, a very amusing but eccentric publication, full of enthusiasm for his art and at the same time of contempt for the .living professors of it. After the loss of his salary, a subscription was set on foot by the earl of Buchan to relieve him from his difficulties, and to settle him in a larger house to finish his picture of Pandora. The subscription amounted to £1000, with which an annuity was bought, but on the 6th of February 1806 he was seized with illness and died on the 22nd of the same month. On the 14th of March his remains were interred in St Paul's.

As an artist, Barry was more distinguished for the strength of his conceptions, and for his resolute and persistent determination to apply himself only to great subjects, than for his skill in designing or for beauty in his colouring. His drawing is rarely good, his colouring frequently wretched. He was extremely impulsive and unequal; sometimes morose, sometimes sociable and urbane; jealous of his contemporaries, and yet capable of pronouncing a splendid eulogy on Reynolds.

BARRY, SIR REDMOND (1813-1880), British colonial judge, son of Major-General H. G. Barry, of Ballyclough, Co. Cork, was educated at a military school in Kent, and at Trinity College, Dublin, and was called to the Irish bar in 1838. He emigrated

to Australia, and after a short stay at Sydney went to Melbourne, with which city he was ever afterwards closely identified. After

practising his profession for some years, he became commissioner of the court of requests, and after the creation in 185 1 of the colony of Victoria, out of the Port Phillip district of New South Wales, was the first solicitor-general with a seat in the legisla- tive and executive councils. Subsequently he held the offices of judge of the Supreme Court, acting chief -justice and administrator of the government. He represented Victoria at the London International Exhibition of 1862 and at the Philadelphia Exhibition of 1876. He was knighted in i860 and was created K.C.M.G. in 1877. Sir Redmond Barry was the first person in Victoria to take an interest in higher education, and induced the local government to expend large sums of money upon that object. He was the founder of the university of Melbourne (1853), of which he was the first chancellor, was president of the Melbourne public library (1854), national gallery and museum, and was one of the first to foster the volunteer movement in Australia. To his exertions is due the prosperity of the two institutions with which his memory is identified.

BARRY, SPRAN6ER (17 19-17 77), British actor, was born in Dublin on the 23rd of November 1719, the son of a silversmith, to whose business he was brought up. His first appearance on the stage was at the Smock Alley theatre on the 5th of February 1744, and his engagement at once increased its prosperity. His first London appearance was made in 1 746 as Othello at Drury Lane. Here his talents were speedily recognized, and in Hamlet and Macbeth he alternated with Garrick, arousing the latter's jealousy by his success as Romeo. This resulted in his leaving' Drury Lane for Co vent Garden in 1750, accompanied by Mrs Cibber, his Juliet. Both houses now at once put on Romeo and Juliet for a series of rival performances, and Barry's impersona- tion was preferred by the critics to Garrick's. In 1758 Barry built the Crow Street theatre, Dublin, and later a new theatre in Cork, but he was not successful as a manager and returned to London to play at the Haymarket, then under the manage- ment of Foote. As his second wife, he married in 1768 the actress Mrs Dancer (1734-1801), and he and Mrs Barry played under Garrick's management, Barry appearing in 1767, after ten years' absence from the stage, in Othello, his greatest part. In 1774 they both moved to Covent Garden, where Barry re- mained until his death on the 10th of January 1777. He was a singularly handsome man, with the advantage of height which Garrick lacked.

His second wife, Ann Street Barry, was born in Bath in 1 734, the daughter of an apothecary. Early in life she married an actor of

the name of Dancer, and it was as Mrs Dancer that she made her first recorded appearance in 1758 as Cordelia to Spranger Barry's Lear at the Crow Street theatre. During the next nine years she played all the leading tragic parts, but without any great success, and it was not until she came to Drury Lane with Barry that her reputation advanced to the high point at which it afterwards stood. After his death, she remained at Covent Garden and married a man much younger than herself, named Crawford, being first billed as Mrs Crawford in 1778. Her last appearance is said to have been as Lady Randolph in Douglas at Covent Garden in 1798. This part, and that of Desdemona, were among her great impersonations; in both she was considered by some critics superior to Mrs Siddons, who expressed her fear of her in one of her letters. She died on the 29th of November 1801 and was buried in Westminster Abbey.

BARRY, an urban district and seaport of Glamorganshire, Wales, on the Bristol Channel, 1 53 m. by rail from London and 8 m. S.W. from Cardiff. Its station is a terminus on the Barry railway, which starts at Hafod in the Rhondda Valley, where it joins the Taff Vale railway, having also junctions. with the same line for Aberdare and Merthyr at Treforest, and for Cardiff and Penarth at Cogan, and with the Great Western main line at Peterstone and St Fagans. A branch from the main line at Tyn-y-caeau connects with the Rhymney railway, the London & North- Western railway, and the Brecon & Merthyr railway. The Vale of Glamorgan railway (which is worked by

the Barry company and has a junction with the Great Western railway at Bridgend) affords a direct route to Barry from the Llynvi, Ogmore and Garw coalfields. The urban district of Barry, with a population in 1901 of 27,030, comprises the ecclesiastical parishes of Barry, Cadoxton, Merthyr-Dovan, and a portion of Sully in which is included Barry Island (194 acres), now, however, joined to the mainland. The total popu- lation of this area in 1881 was only about 500, that of Barry village alone being only 85. A small brook named Barri runs here into the sea, whence the place was formerly known in Welsh as Aber-Barri, but the name of both the river and the island is supposed to be derived from Baruch, a Welsh saint of the 7th century, who had a cell on the island. His chapel (which still existed in Leland's

time) was a place of pilgrimage in the middle ages. According to Giraldus, his own family derived its name de Barri from the island which they once owned.' One of the followers of Fitzhamon settled at Barry about the end of the nth century, building there a castle of which only a gateway remains. Besides the small old parish churches of Merthyr- Dovan and Cadoxton, and the rebuilt parish church of Barry, there are four modern churches (in one of which Welsh services are held). There are about thirty nonconformist chapels, in nearly a third of which the services are Welsh. There are also a Roman Catholic church, and one for German and Scandinavian seamen. The other public buildings are a county intermediate school for 250 boys and girls, built in 1896, a free library (opened in 1892) with four branch reading-rooms, a seamen's institute, the Barry market, built in 1890 at a cost of £3500 (but now used as a concert-hall), and Romilly hall for public meetings.

Barry owes its seaport to the determination of a number of colliery owners to secure an alternative port to Cardiff, with an independent railway to it from the coalfields. After failing in 1883, they obtained parliamentary powers for this purpose in 1884, and the first sod of the new dock at Barry was cut in November of that year. The docks are 114 acres in extent, and have accommodation for the largest vessels afloat. Dock No. 1, opened on the 18th of July 1889, is 73 acres (with a basin of 7 acres) and occupies the eastern side of the old channel between the island and the mainland, having a well-sheltered deep-sea entrance. There is good anchorage between Barry and Sully islands. Dock No. 2 (34 acres) was opened on the iotb of October 1898. There are 41 acres of timber-ponds and three large graving-docks. For loading the coal there are thirty fixed and seven movable coal-hoists. The total tonnage of the exports in 1906 was 9,757,380 (all of which, except 26,491 tDns, was coal), and of the imports 506,103 tons.

BAR-SALlBl, JACOB or DIONYSIUS, 1 the best-known and most voluminous writer in the Syrian Jacobite church of the T2th century, was, like Bar-Hebraeus, a native of Malatia on the Upper Euphrates. In .11 54 he was created bishop of Mar'ash by the patriarch Athanasius VIII.; a year later the diocese of Mabbog was added to his charge. In 1166 Michael I., the successor of Athanasius, transferred him to the metropolitan see of Amid in Mesopotamia, and there he remained till his death in 1 1 71. A long account of his writings, with copious extracts from some of them, has been given by Assemani (Bibl. Orient, ii. pp. 1 56-2 1

1) ; and W. Wright (Syriac Literature, pp. 246-2 50) has added further particulars as to the MSS. in which they are contained. Probably the most important are his exhaustive commentaries on the text of the Old and New Testaments, in which he has skilfully interwoven and summarized the inter- pretations of previous writers such as Ephrem, Chrysostom, Cyril, Moses Bar-Kepha and John of Dara, whom he mentions together in the preface to his commentary on St Matthew. Among his other main works are a treatise against heretics, containing inter alia a. polemic against the Jews and the Mahom- medans; liturgical treatises, epistles and homilies. His com- mentaries on the Gospels were to some extent used by Dudley Loftus in the 17th century. But the systematic editing of his

•Jacob was his baptismal name; Dionysius he assumed when consecrated to the bishopric.

works was only begun in 1903 with H. Labourt's edition and translation of his Exposition of the Liturgy (Paris). His com- mentaries on the Gospels have been edited and translated by J. Sedlacek and J. B. Chabot (Fasc. I., Paris, 1906), and the Syriac text of the treatise against the Jews has been edited by J. de Zwaan (Leiden, 1906). Bar-Salibi was undoubtedly an able theologian; his vigour combined with terseness in argument is well seen, for instance, in the introductory sections of his commentary on St Matthew. Of his originality it is hard to judge, as he does not usually indicate in detail the sources of his arguments and interpretations. He does not, however, claim for himself to be more than a compiler, at least in his com- mentaries. His Syriac style is good, considering the lateness of the period at which he wrote. (N. M.)

BARSI, a town of British India, in the Sholapur district of Bombay, lying within a tract entirely surrounded by the Nizam's dominions. Pop. (1901) 24,242. Barsi is a flourishing centre of trade, exporting to Bombay large quantities of cotton and oil-seeds. It has several factories for ginning and pressing cotton — some on a large scale. It is connected with the main line of the Great Indian Peninsula railway by a light railway.

BAR-SUR-AUBE, a town of north-eastern France, capital of an arrondissement in the department of Aube, 34 m. E. by S. of Troyes on the main line of the Eastern railway between that town and Belfort. Pop. (1906) 4276. Bar-sur-Aube lies at the foot of hills on the right bank of the Aube at its confluence with the

Bresse. A circle of boulevards occupies the site of the old ramparts, fragments of which still remain. Of the ecclesiastical buildings, the most noteworthy are St Pierre and St Maclou, both dating mainly from the end of the 12th century. St Pierre has wooden exterior galleries and two fine Gothic porches. The sacristy oi St Maclou is conjectured to have formed the chapel of the castle of the counts of Bar, of which the square tower flanking the north side of the church formed the entrance. The town is the seat of a sub-prefect, and the public institutions include a tribunal of first instance and a communal college. Flour-milling, tanning, and the manufacture of brandy, hosiery and agricultural implements are carried on. The wine of the district is much esteemed.

Traces of a Roman settlement have been found on hills to the south of the town. Under the domination of the counts of Champagne, it became the scene of important fairs which did not cease till 1648. In 1814 several actions between the French and the army of the allies took place at Bar-sur-Aube (see Napoleonic Wars).

BAB-SUR-SEINE, a town of eastern France, capital of an arrondissement in the department of Aube, on the left bank of the Seine, 20 m. S.E. of Troyes by the Eastern railway. Pop. (1906) 2812. The town lies at the foot of a wooded hill on which stand the ruins of the castle of the counts of Bar, and is composed chiefly of one long street, bordered in places by houses of the 16th century. Its principal building is the church of St Etienne, of the 16th and 17th centuries, which contains some fine stained glass. Bar-sur-Seine has a sub-prefecture and a tribunal of first instance. Tanning, dyeing, flour-rnilling, brandy-distilling and the manufacture of glass are among the industries. The Canal de la Haute-Seine begins at this point. The town was devastated in 1359 by the English, when, according to Froissart, no fewer than 900 mansions were burnt. Afterwards it suffered greatly in the religious wars of the 16th century.

BART, JEAN (1651-1 702), French naval commander, son of a fisherman, was born in Dunkirk on the 21st of October 1651. He served when young in the Dutch navy, but when war broke; out between Louis XIV. and Holland in 1672 he entered the French service. He gained great distinction in the Mediterranean, where he held an irregular sort of commission, not being then able from his low birth to receive a command in the navy. His success was so great, however, that he was made a lieutenant in 1679. He

rose rapidly to the rank of captain and then to that of admiral. The peace of Ryswick put a close to his active service. Many anecdotes are narrated of the courage and blunt< ness of the uncultivated sailor, who became the popular hero

of the French naval service. The town of Dunkirk has honoured his memory by a statue and by naming a public square after him. See Richer, Vie de Jean Bart (1780), and many editions since; Vanderest, Histoire de Jean Bart.

BARTAN, more correctly Bartin, a town in the vilayet of Kastamuni, Asiatic Turkey, retaining the name of the ancient village Parthenia and situated near the mouth of the Bartan-su (anc. Parthenius), which formed part of the boundary between Bithynia and Paphlagonia. Various aetiological explanations of the name Parthenius were given by the ancients, e.g. that the maiden Artemis hunted on its banks, or that the flow of its waters was gentle and maiden-like. The town, which is the residence of a kaimakam, is built on two low limestone hills and its streets are paved with limestone blocks. It is noted for the fine box- wood grown in the vicinity, is a port of call for Black Sea coasting steamers and carries on a considerable trade with Constantinople which might be increased were it not for the obstruction of the harbour by a bar. Pop. 8677, according to Cuinet, La Turquie d'Asie (1894).

B ARTELS, HANS VON (1856-), German painter, was born in Hamburg, the son of Dr N. F. F. von Bartels, a Russian government official. He studied first under the marine painter R. Hardorff in Hamburg, then under C. Schweitzer in Diisseldorf and C. Oesterley in Hamburg, and finally at the Berlin School of Art. After travelling extensively, especially in Italy, he settled in Munich in 1885 and was appointed professor of painting in 1891. An oil painter of great power, he is one of the leading German water-colour painters, mainly of marines and scenes of fishing life, painted with rude vigour and a great display of technical skill. He excels in storm scenes and in depicting the strong, healthy fishing-folk of the northern coasts. He became an honorary member of leading English, German, Dutch, Belgian and Austrian art societies. Among his principal works are:— " Sturmflut " (Berlin Gallery) ; " Lonely Beach " (Hungarian

National Gallery) ; ” Potato Harvest — Rugen ” (Prague) ; ” Storm — Bornholm ” (German emperor’s collection) ; and ” Moonlight on the Zuyder Zee” (New Pinakothek, Munich).

BARTENSTEIN, a town of Germany, in the kingdom of Prussia, on the Alle, 34 m. S. of Konigsberg by rail. Pop. (1000 6805. It has a considerable trade in corn and live stock, and its industries comprise founding and carriage-building, tannerieSj breweries and potteries. Bartenstein is celebrated for the treaty concluded here on the 26th of April 1807, between Prussia and Russia.

BARTER (from Fr. barater, to truck, to exchange), the ex- change of commodities for commodities, in contra-distinction to the exchange of commodities for money. Barter was the simplest form of trading among primitive communities, but its inconveniences led, at an early stage of civilization , to the adoption of metals as mediums of exchange. Barter, however, is still very common in dealings with uncivilized peoples, and traders in many countries find that the most satisfactory method of effecting exchange is to furnish themselves with such commodities as weapons, tools and ornaments, which are more readily taken than money.

For the history of barter and the steps by which a system of currency was gradually evolved, see Money. Consult also W. S. Jevons, Money and the Mechanism of Exchange; A. Marshall, Economics ; W. Ridgeway, Origin of Currency and Weight Standards.

BARTET (Regnault), JEANNE JULIA (1854-), French actress, was born in Paris and trained at the Conservatoire. In 1872 she began a successful career at the Vaudeville, and in 1879 was engaged at the Comedie Frangaise, of which she became a socittaire in 1880. For many years she played the chief parts both in tragedy and comedy, her grand style and exquisite finesse making her supreme among the younger actresses on the French stage. She had a season in London in 1908, when her consummate art was displayed in a number of parts.

BARTH, HEINRICH (1821-1865), German explorer, was born at Hamburg on the 16th of February 1821, and educated at Berlin University, where he graduated in 1844. He had already visited Italy and Sicily and had formed a plan to journey through

the Mediterranean countries. After studying Arabic in London he

set out on his travels in 1845. From Tangier he made his way overland throughout the. length of North Africa, visiting the sites of the ancient cities of Barbary and Cyrenaica. He also travelled through Egypt, ascending the Nile to Wadi Haifa and crossing the desert to Berenice. While in Egypt he was attacked and wounded by robbers. Crossing the Sinai peninsula he traversed Palestine, Syria, Asia Minor, Turkey and Greece, everywhere examining the remains cf antiquity; and returned to Berlin in 1847. For a time he was engaged there as Privat- docent, and in preparing for publication the narrative of his Wanderurigen durch die Kiistenldnder des Mittelmeeres, which appeared in 1849.

At the instance of Bunsen and other scientists, Barth and Adolf Overweg, a Prussian astronomer, were appointed colleagues of James Richardson, an explorer of the Sahara who had been selected by the British government to open up commercial relations with the states of the central and western Sudan. The party left Tripoli early in 1850, but the deaths of Richardson (March 1851) and Overweg (September 1852) left Barth to carry on the mission alone. He returned to Europe in September 1855, after one of the most fruitful expeditions ever undertaken in inner Africa. In addition to journeys across the Sahara, Barth traversed the country from Lake ‘Chad and Bagirmi on the east to Timbuktu on the west and Cameroon on the south, making prolonged sojourns in the ancient sultanates or emirates of Bornxi, Kano, Nupe, Sokoto and Gando and at Timbuktu. He studied minutely the topography, history, civilizations and resources of the countries he visited. The story of his travels was published simultaneously in English and German, under the title Travels and Discoveries in North and Central Africa (1857-1858, 5 vols.). For accuracy, interest, variety and extent of information Barth’s Travels have few rivals among works of the kind. It is a book that will always rank as a standard authority on the regions in question, of which a great part, under the name of Nigeria, has since come under British rule. Except a C.B., Barth himself received no recognition of his services from the British government. He returned to Germany, where he prepared a collection of Central African vocabularies (Gotha, 1862-1866). In 1858 he undertook another journey in Asia Minor, and in 1862 visited Turkey in Europe. In the following year he was appointed professor of geography at Berlin University and president of the Geographical Society. He died at Berlin on the 25th of November 1865.

See Schubert’s Heinrich Barth, der Bahnbrecher der deulschen

Afrikaforschung (Berlin, 1897). An edition of the Travels in two volumes was published in London in 1890 (Minerva Library of Famous Books).

BARTH, KASPAR VON (1587-1658), German philologist, was born at Kustrin in the province of Brandenburg on the 21st of June 1587. He was an extremely precocious child, and was looked upon as a marvel of learning. After studying at Gotha, Eisenach, Wittenberg and Jena, he travelled extensively, visiting most of the countries of Europe. Too independent to accept any regular post, he lived alternately at Halle and on his property at Sellerhausen near Leipzig. In 1636, his library and MSS. at Sellerhausen having been destroyed by fire, he removed to the Paulinum at Leipzig, where he died on the 17th of September 1658. Barth was a very voluminous writer; his works, which were the fruits of extensive reading arid a retentive memory, are unmethodical and uncritical and marred by want of taste and of clearness. He appears to have been excessively vain and of an unamiable disposition. Of his writings the most important are; Adversaria (1624), a storehouse of miscellaneous learning, dealing not only with classical but also with medieval and modern writers; and commentaries on Claudian (1612, 1650) and Statius (1664).

BARTH, a town of Germany, in the kingdom of Prussia, on the Barther Bodden, a lake connecting with the Baltic, 15 m. N.W. from Stralsund by rail. Pop. (1900) 7070. It contains a fine Gothic Protestant church (St Mary's) dating from the 13th century and has several educational establishments, notably a

school of seamanship. Its industries comprise iron-founding, ship-building, brewing, and the manufacture of cigars, leather and tinned fish. There is an active export trade in grain.
BARTHEXEMY, ANATOLE JEAN-BAPTISTE ANTOINE DE

(1821-1004), French archaeologist and numismatist, was born at Reims on the 1st of July 1821, and died at Ville d'Avray on the 27th of June 1904. In collaboration with J. Geslin de Bourgogne he published Etudes sur la revolution en Bretagne in 1858, and between 1855 and 1879 an exhaustive work in six volumes on the Anciens evttches de Bretagne; histoire et monu- ments. In

1880 appeared the Choix de documents inedits sur Vhistoire de la ligue en Bretagne, by himself alone. But it was, above all, his numismatical work which established his reputation. This included several popular publications, such as the Nouveau manuel complet de numismatique ancienne (1851; second edition, revised, 1890), and the Nouveau manuel complet de numismatique du moyen Age et moderne (1853; new edition revised by Adrien Planchet), and a large number of monographs and articles in the technical reviews. The following may be specially mentioned: Numismatique merovingienne (1865); Essai sur la monnaie parisis (1874); Note sur Vorigine de la monnaie tournoise (1896); and in the series of instructions issued by the Comite des travaux historiques et scientifiques he edited the number on La Numis- matique de la France (1891). In 1897 he was elected a member of the Academie des Inscriptions et Belles-lettres.

His younger brother, Edouard Marie, comte de Barthelemy, who was born in Angers in 1830, has published a number of documents upon the ancient French nobility and upon the history of Champagne.

BARTHELEMY, AUGUSTE MARSEILLE (1796-1867), French satirical poet, was born atMarseilles in 1796. His name can hardly be separated from that of his friend and compatriot, J. P. A. Mery (1798-1866), with whom he carried on so intimate a collaboration that it is not possible to distinguish their person- alities in their joint works. After having established some local reputation as a poet, Barthelemy went to Paris, where by one of his first efforts, Le Sacre de Charles X (1825) he gained the favour of the court. His energies, however, were soon enlisted in the service of the opposition party. In 1825 appeared a clever political satire, Les Sidiennes, followed by La Villeliade ou la prise du chdteau de Rivoli (1827), La Corbieriide (1827), La Peyronniide(i&27) , the joint productions of Barthelemy and Mery. The success was immediate and pronounced; fifteen editions of the Villeliade were called for during the year. A rapid succes- sion of political squibs and satires was now poured forth by the authors, among the most remarkable being Biographie des quarante de Vacadtmie jrancaise (1826) and NapoUon en Egypte (1828), which passed through nearly a dozen editions in a year. In 1829 Barthelemy was imprisoned and fined 1000 francs for the publication of their Fils de I'homme, a poem on the duke of Reichstadt, Napoleon's son. The Revolution of 1830 liberated him; and in company with Mery, he celebrated the triumph of the

people in one of their most brilliant efforts, L' Insurrection. From March 1831 to April 1832 they produced a series of verse satires issued weekly, the Nimesis, attacking the government and ministers of Louis Philippe. The small pension of which Barthelemy was the recipient was stopped. When the publication ceased there was a strong suspicion that Barthelemy had been paid for his silence. In 1832 he published an anonymous poem, supporting some acts of the government which were peculiarly obnoxious to the Liberal party. This change of front destroyed his influence and his later writings passed unnoticed. For the next few years he enjoyed a handsome pension from the govern- ment and refrained from all satirical writing. He again resumed his old style in 1844 but without the former success. From that date he contented himself with merely occasional poems. Barthelemy died on the 23rd of August 1867 at Marseilles. Joseph Mery was an ardent romanticist and wrote a great number of stories now forgotten. He produced several pieces at the Paris theatres, and also collaborated with Gerard de Nerval in adapta- tions from Shakespeare and in other plays. He received a pension from Napoleon III. and died in Paris on the 16th of June 1866.

The Qiuvres of Barthelemy and Mery were collected, with a notice by L. Reybaud, in 1831 (4 vols.). See also Barthelemy et Mery Studies specialement dans leurs rapports avec la ttgende napoleonienne, by Jules Garsou in vol. lviii. of the Memoires of the Academie Royale . . . de Belgique, which contains full information on both authors.

BARTHELEMY, FRANCOIS, Marquis de (1747 or 1750- 1830), French politician, was educated by his uncle the abbe Jean Jacques Barthelemy for a diplomatic career, and after serving as secretary of legation in Sweden, in Switzerland and in England, was appointed minister plenipotentiary in Switzerland, in which capacity he negotiated the treaties of Basel with Prussia and Spain (1795). Elected a member of the Directory in May 1797, through royalist influence, he was arrested at the coup d'etat of the 18 Fructidor (17th of September 1797) and deported to French Guiana, but escaped and made his way to the United States and then to England. He returned to France after the 18 Brumaire, entered the senate in February 1800 and contributed to the establishment of the consulship for life and the empire. In 1 814 he abandoned Napoleon, took part in the drawing up of the constitutional charter and was named peer of France. During the Hundred Days he lived in concealment, and after the second

Restoration obtained the title marquis, and in 1819 introduced a motion in the chamber of peers tending to render the electoral law more aristocratic.

His Papiers have been published by J. Kaulek, 4 vols. (Paris, 1886-1888). See A. Sorel, L'Europe et la Revolution jrancaise, iv. (Paris, 1892); L. Sciout, Le Directoire (Paris, 1895).

BARTHELEMY, JEAN JACQUES (1716-1795) French writer and numismatist, was born on the 20th of January 1 7 16 at Cassis, in Provence. He was educated first at the college of the Oratory in Marseilles, and afterwards at that of the Jesuits in the same city. While studying for the priesthood, which he intended to join, he devoted much attention to oriental languages, and was introduced by his friend M. Cary of Marseilles to the study of classical antiquities, particularly in the department of numismatics. In 1744 he went to Paris with a letter of introduction to M. Gros de Boze, perpetual secretary of the Academy of Inscriptions andBelles-le ttres and keeper of the royal collection of medals. He became assistant to de Boze, on whose death (1 7 53) he became keeper of the medals. In 1755 he accompanied the French ambassador, M. de Stainville, afterwards due de Choiseul, to Italy, where he spent three years in archaeological research. Choiseul had a great regard for Barthelemy, and on his return to France, Barthelemy became an inmate of his house, and received valuable preferments from his patron. In 1789, after the publication of his Voyage du jeune Anacharsis, he was elected a member of the French Academy. During the Revolution Barthelemy was arrested as an aristocrat. The Committee of Public Safety, however, were no sooner informed by the duchess of Choiseul of the arrest, than they gave orders for his immediate release, and in 1793 he was nominated librarian of the Bibliotheque Nationale. He refused this post but resumed his old functions as keeper of medals, and enriched the national collection by many valuable accessions. Barthelemy died on the 30th of April 1795.

Barthelemy was the author of a number of learned works on antiquarian subjects, but the great work on which his fame rests is Voyage du jeune Anacharsis en Grece, vers le milieu du quatrieme si'ecle avant I'ere chretiennc (4 vols., 1787). He had begun it in 1757 and had been working on it for thirty years. The hero, a young Scythian descended from the famous philosopher Ana- charsis, is supposed to repair to Greece for instruction in his early youth, and after making the tour of her republics, colonies

and islands, to return to his native country and write this book in his old age, after the Macedonian hero had overturned the Persian empire. In the manner of modern travellers, he gives an account of the customs, government and antiquities of the country he is supposed to have visited; a copious introduction supplies what- ever may be wanting in respect to historical details; whilst various dissertations on the music of the Greeks, on the literature of the Athenians, and on the economy, pursuits, ruling passions, manners and customs of the surrounding states supply ample

information on the subjects of which they treat. Mtidern scholarship has superseded most of the details in the Voyage, but the author himself did not imagine his book to be a register of accurately ascertained facts; he rather intended to afford to his countrymen, in an interesting form, some knowledge of Greek civilization. The Charicles of W. A. Becker is an attempt in a similar direction, but, though superior in scholarship, it wants the charm of style of the Anacharsis.

Barthelemy's correspondence with Paolo Paciaudi, chiefly on antiquarian subjects, was edited with the Correspondance inedite du comte de Caylus in 1877 by Ch. Nisard; his letters to the comte de Caylus were published by Antoine Serieys as Voyage en Italie (1801) ; and his letters to Mme du Deffand, with whom he was on intimate terms, in the Correspondance complete de Mme du Deffand avec la duchesse de Choiseul, Vabbe Barthelemy et M. Craufurt (3 vols., 1866), edited by the marquis de Sainte-Aulaire. See also Memoires sur la vie de Vabbe Barthelemy, ecrits par lui-meme (1824), with a notice by Lalande. His CEuvres completes (4 vols. 1821), contain a notice by Villenave.

BARTHELEMY SAINT-HILAIRE, JULES (1805-1895), French philosopher and statesman, was born at Paris on the 19th of August 1805. In his early years he was an active political journalist, and from 1826 to 1830 opposed the reactionary policy of the king in Le Globe. At the revolution of 1830 he signed the protestation of the journalists on the 28th of July 1830. After 1830. he contributed to different newspapers — -Le Constitutionnel, Le National and the Courrier JranQais — until 1833, when he gave up politics in order to devote himself to the

history of ancient philosophy, undertaking a translation of Aristotle, which occupied him the greater part of his life (1837-1892). The reputation which he gained from this work won for him the chair of ancient philosophy at the College de France (1838) and a seat at the Academy of Moral and Political Science (1839). After the revolution of 1848 he was elected as a republican deputy; but was obliged to withdraw after the coup d'etat of Louis Napoleon. In 1855 he went as member of the international commission to Egypt to report on the possibility of the proposed Suez canal, and by the articles which he wrote he contributed largely to making the project popular in France. Elected deputy again in 1869, he joined the opposition to the Empire, and in 1871 bent all his efforts to the election of Thiers as president of the republic, acting afterwards as his secretary. Appointed senator for life in 1875, he took his place among the moderate republicans, and from September 1880 to November 1881 was minister of foreign affairs in the cabinet of Jules Ferry. The most important event of his administration was the annexation of Tunis under the form of a French protectorate, which he actively promoted. He died on the 24th of November 1895. His principal works, besides the translation of Aristotle and a number of studies connected with the same subject, are Des Vedas (1854), Du Bouddhisme (1856) and Mahomet et le Coran (1865).

BARTHEZ, or Barthes, PAUL JOSEPH (1734-1806), French physician, was born on the nth of December 1734 at Montpellier. He was educated at Narbonne and Toulouse, and began the study of medicine at Montpellier in 1750, taking his doctor's degree in 1753. In 1756 he obtained the appointment of physician to the military hospital in Normandy attached to the army of observation commanded by Marshal d'Estrees, but a severe attack of hospital fever compelled him to leave this post. In 1757 his services were required in the medical staff of the army of Westphalia, where he had the rank of consulting physician, and on his return to Paris he acted as joint editor of the Journal des savants and the Encyclopidie methodique. In 1759 he obtained a medical professorship at Montpellier, and in 1774 he was created joint chancellor of the university. In 1778 he published his most famous work, Nouveaux eltmens de la science de Vhomme, in which he employs the expression " vital principle " as a convenient term for the cause of the phenomena of life, without committing himself to either a spiritualistic or a materialistic view of its nature. Taking the degree of doctor of civil law in

1780, he secured the appointment of counsellor to the Supreme Court of Aids at Montpellier, but he soon took up his residence in Paris, having been nominated consulting physician to the king, in. 1 ?

On the outbreak of the French Revolution he lost much of his fortune and retired to Carcassonne, where he devoted himself to the study of theoretical medicine. It was from this retreat that he gave to the world his Nouvelle mecanique des mouvemens de Vhomme et des animaux, which appeared in 1798. In 1802 he published his Trailement des maladies goutteuses, and he afterwards occupied himself in preparing for the press a new edition of his Eiimens de la science de Vhomme, of which he just lived to see the publication. His health had been declining for some years before his death, which took place soon after his removal to Paris, on the 15th of October 1806. He bequeathed his books and manuscripts to J. Lordat, who published two volumes of his Consultations de midecine in 1810. His Traiti du beau was also published posthumously in 1807.

BARTHOLINUS, GASPARD [Caspar Berthelsen], (1585- 1629), physician, was born in 1585 at Malmo, in Sweden. His precocity was extraordinary; at three years of age he was able to read, and in his thirteenth year he composed Greek and Latin orations and delivered them in public. When he was about eighteen he went to the university of Copenhagen and afterwards studied at Rostock and Wittenberg. He then travelled through Germany, the Netherlands, England, France and Italy, and was received with marked respect at the different universities he visited. In 1613 he was chosen professor of medicine in the university of Copenhagen, and filled that office for eleven years, when, falling into a dangerous illness, he made a vow that if he should recover he would apply himself solely to the study of divinity. He fulfilled his vow by becoming professor of divinity at Copenhagen and canon of Roskilde. He died on the 13th of July 1629 at Soro in Zeeland.

Of his sons, Thomas (1616-1680) was born at Copenhagen, where, after a long course of study in various universities of Europe, he was appointed successively professor of mathematics (1647) and anatomy (1648). During his tenure of the latter chair he.distinguished himself by observations on the lymphatics. In 1661 he retired to Hagestaed. In 1670 his house and library were burnt, and in consideration of his loss he was appointed physician to the king, with a handsome salary, and librarian to

the university of Copenhagen. He died at Hagestaed in 1680. Another son, Erasmus (1625-1698), born at Roskilde, spent ten years in visiting England, Holland, Germany and Italy, and filled the chairs of mathematics and medicine at Copenhagen. He discovered double refraction in Iceland spar (Experimenta cry stalli islandici disdiaclastici, Copenhagen, 1669). He died at Copenhagen in 1698. In the third generation Caspar Thomeson (i655-i738),sonof Thomas, also taught anatomy at Copenhagen, his name being associated with the description of one of the ducts of the sublingual gland and of the glandulae Bartholini, while his younger brother, Thomas (1659-1690), was a student of northern antiquities who published Antiquitatum Danicarum libri tres in 1689.

BARTHOLOMEW, SAINT, one of the twelve apostles, regard- ing whose early life we know nothing, unless in accordance with a widely spread belief he is to be identified with Nathanael (q.v.). If so, Bartholomew is probably a patronymic, the apostle's full name being Nathanael Bartolmai, i.e. the son of Tolmai. On the other hand, according to a Syrian tradition, Bartholomew's original name was Jesus, which he dropped owing to its being the name of the Master Himself. In the synoptic gospels Bartholomew is never mentioned except in the lists of the apostles, where his name always appears after Philip's. He is said to have gone, after the ascension of the Lord, on a missionary tour to India (then a very wide geographical designation) where, according to a story in Eusebius {H.E. v. 10), he left behind him a copy of St Matthew's gospel. According to the traditional account he was flayed alive and then crucified with his head downwards, at Albanopolis in Armenia, or, according to Nice phorus, at Urbanopolis in Cilicia. In works of art he is generally represented with a large knife, the instrument of his martyrdom, or, as in Michelangelo's " Last Judgment," with his own skin hanging over his arm. The festival of St Bartholomew is cele- brated on the 24th of August.

H

Dr Nestle has drawn attention to the fact that in the Syriac translation of Eusebius' history the nameTolmai, i.e. Bartholomew, takes the place of Matthias, the apostle who was

appointed in place of Judas (i. 12, cf. ii. I, iii. 25and29). If this identification can be made out there would, in the list of apostles as finally constituted, be two men who bore the patronymic Bartholomew. See further Expository Times, ix. pp. 566 ff. (1898).

BARTHOLOMEW, JOHN (1831-1893), Scottish cartographer, was born at Edinburgh on the 25th of December 1831. His father had a cartographical establishment there and he was educated in the work. He was subsequently assistant to the German geographer August Petermann, until in 1856 he took up the management of his father's firm. For this establishment, now known as the Edinburgh Geographical Institute, Bartholomew built up a reputation unsurpassed in Great Britain for the pro- duction of the finest cartographical work. Among his numerous publications mention may be specially made of the series of maps of Great Britain reduced from the Ordnance Survey to scales of 5 in. and j in. to 1 m., with relief shown by contours and a systematic scale of colours. The 5 in. series, which was extended (and its principles applied to many other works) by Mr J. G. Bartholomew, who succeeded his father in the business, is the finest of its kind ever produced. John Bartholomew died in London on the 29th of March 1893.

BARTHOLOMEW FAIR, a fair held in West Smithfield, London, on St Bartholomew's Day (24th of August, O.S.) from 1133 to 1855. The charter authorizing its holding was granted by Henry I. to his former minstrel, Rahere, who had taken orders and had founded the priory of St Bartholomew close by. For many centuries the fair lasted a fortnight, but in 1691 it was shortened to four days only. In 1641 it had become so large that it involved no less than four parishes: Christ Church, Great and Little St Bartholomew's and St Sepulchre's. It was customary for the lord mayor of London to open the fair form- ally on St Bartholomew's Eve, and on his way to stop at Newgate where he received from the governor a cup of sack. In 1753, owing to the change in the calendar, the fair was proclaimed on the 3rd of September. During its earlier history the fair grew to be a vast national market and the chief cloth sale in the kingdom. Down to 1854 it was usual for the representative of the Merchant Taylors' Gild to proceed to the cloth fair which formed part of Bartholomew fair, and test the measures used for selling cloth there by the company's silver yard. The fair was finally closed in 1855.

For a full account see Prof. H. Morley, Memoirs of Bartholomew

Fair (1859).

BARTIZAN (according to the New English Dictionary, from bertizenc, a Scottish corruption of ” bratticing ” or ” brattishing,” from O. Fr. bretesche, and meaning a battlemented parapet; apparently first used by Sir Walter Scott), a small battlemented turret, corbelled out at the angle of a wall or tower to protect a warder and enable him to see around him. Bartizans generally are furnished with oylets or arrow-slits.

BARTLETT, JOHN (1820-1905), American publisher and compiler, was born in Plymouth, Massachusetts, on the 14th of June 1820. He became a bookseller and publisher in Cam- bridge, Mass., and from 1865 to 1889, when he retired, was a member of the bookselling and publishing firm of Little, Brown & Co., in Boston. In 1855 he published the first edition of his Familiar Quotations, subsequently greatly expanded and long the best-known collection of the sort, and in 1894 (although it had been copyrighted five years before), after many years’ labour, he published his New and Complete Concordance or Verbal Index to Words, Phrases and Passages in the Dramatic Works of Shakespeare; with a Supplementary Concordance to the Poems — surpassing any of its predecessors in the number and fulness of its citations from the poet’s writings.. In all of his work he was greatly assisted by his wife, a daughter of Sidney Willard (1780-1856), professor of Hebrew at Harvard from 1807 to 1831. Bartlett died at Cambridge, Mass., on the 3rd of December 1905.

BARTLETT, JOHN RUSSELL (1 805-1 886), American histori- cal and linguistic student, was born in Providence, Rhode Island, on the 23rd of October 1805. From his first to his eighteenth

year iie lived in Kingston, Canada; he was then in turn, from 1824 to 1836, a clerk in a dry goods store, a book-keeper and a bank cashier at Providence, and for more than ten years after 1836 he was a bookseller in New York City, returning to Pro vidence in 1850. In 1850-1853 he was the commissioner on the part of the United States for the survey of the boundary between the United States and Mexico, but owing to the lack of funds did not finish the work. After being superseded by another commissioner upon the accession of President Franklin Pierce, he published A Personal Narrative of Explorations and Incidents in Texas, New Mexico, California, Sonora and Chihuahua (2 vols., 1854), which, contains much valuable scientific and historical material concerning the south-west. From. 1855 to 1872 he .was

secretary of state of Rhode Island, and while serving in this capacity thoroughly re-arranged and classified the state records, and prepared various bibliographies and compilations, relating chiefly to the history of the state. He is chiefly remembered however, for his Dictionary of Americanisms (1848), a pioneer work, which, although later dialect changes have, of course, deprived it of completeness or final authoritativeness, is still of value to students of language and remains the chief contribution to the subject. He died in Providence on the 28th of 1 May 1886.

BARTLETT, PAUL WAYLAND (1865ˆ), American sculptor, was born in New Haven, Connecticut, the son of Truman H. Bartlett, an art critic and sculptor. When fifteen he began to study at Paris under Fremiet, modelling from animals in the Jardin des Plantes. He won a medal at the Paris Salon of 1887. Among his principal works are: “The Bear Tamer,” in the Metropolitan Museum of Art, New York; the. equestrian statue of Lafayette, in the Place du Carrousel, Paris, presented to the French Republic by the school children of America; the power- ful and virile Columbus and Michelangelo, in the Congressional Library, Washington, D.C.; the “Ghost Dancer,” in the Pennsylvania Academy, Philadelphia; the ” Dying Lion “; the equestrian statue of McClellan in Philadelphia; and a statue of Joseph Warren in Boston, Massachusetts. His bronze patinas of reptiles, insects and fish are also remarkable.

BARTOLI, DANIELLO (1608-1685), Italian Jesuit priest, was born at Ferrara and entered the Society of Jesus in 1623. Debarred from the foreign mission field,’ he attained high dis- tinction as a preacher and as a teacher of rhetoric in Genoa, Florence and Rome. He wrote (in Italian) a book called The Learned Man as a counterblast to the widespread reading of romances, and also a history of his order in 6 vols. (Rome, 1650- 1673), which is particularly informing with regard to the early work of the society in Asia. He died at Rome.

A’collected edition of his works, in 12 vols., was published by Mari- etti at Turin, 1825-1856; another in 50 vols, at Florence in 1826.

BARTOLINI, LORENZO (1777-1850), Italian sculptor, was born in Vernio in Tuscany. After acquiring great skill and reputation as a modeller in alabaster, he went in 1797 to Paris, where he studied painting under Desmarets, and afterwards sculpture under F. F.

Lemot. The bas-relief " Cleobis and Biton," with which he gained the second prize of the Academy in 1803, at once established his fame as a sculptor and gained for him a number of influential patrons. He executed many minor pieces for Denon, besides busts of Mehul and Cherubim. His great patron, however, was Napoleon, for whom he executed a colossal bust, and who sent him to Carrara to found a school of sculpture. Here he remained till after the fall of Napoleon, and then took up his residence in Florence, where he resided till his death. His works are varied and include an immense number of bustSc. The best are, perhaps, the group of Charity, the " Hercules and Lichas " and the " Faith in God," whjfh exemplify the highest types of Bartolini's style. Popular opinion in Italy associates his qualities as a sculptor with those of Thorwaldsen and Canova,

BARTOLOMMEI, MARQUIS FERDINANDO (1821-1869), Italian revolutionist and statesman, who played jin important part in the political events of Tuscany from 1848 to i860. From the beginning of the revolutionary movement Bartolommei was always an ardent Liberal, and although belonging to an old and

nbble Florentine family his sympathies were with the democratic party rather than with the moderately liberal aristocracy. In 1 84 7-1 848 his house was a centre of revolutionary committees, and during the brief constitutional regime he was much to the fore. After the return of the grand duke Leopold II. in 1849 under Austrian protection, Bartolommei was present at a requiem service in the church of Santa Croce for those who fell in the late campaign against Austria; on that occasion disorders occurred and he was relegated to his country estate in consequence (1851). Shortly afterwards he was implicated in the distribution of seditious literature and exiled from Tuscany for a year. He settled at Turin for a time and established relations with Cavour and the Piedmontese liberals. He subsequently visited France and England, and like many Italian patriots became enamoured of British institutions. He returned to Florence in 1853; from that time onward he devoted himself to the task of promoting the ideas of Italian independence and unity among the people, and although carefully watched by the police, he kept a secret printing-press in his palace in Florence. Finding that the nobility still hesitated at the idea of uncompromising hostility to the

house of Lorraine, he allied himself more firmly with the popular party, and found an able lieutenant in the baker Giuseppe Dolfi (1818-1869), an honest and whole-hearted enthusiast who had great influence with the common people. As soon as war between Piedmont and Austria appeared imminent, Bartolommei organized the expedition of Tuscan volunteers to join the Piedmontese army, spending large sums out of his own pocket for the purpose, and was also president of the Tuscan branch of the Societa Nazionale (see under La Farina and Cavotjr). He worked desperately hard conspiring for the overthrow of the grand duke, assisted by all the liberal elements, and on the 27th of April 1859, Florence rose as one man, the troops refused to fire on the people, and the grand duke departed, never to return. Sapristil pas un carreau cassS I was the comment of the French minister to Tuscany on this bloodless revolution. A provisional government was formed and Bartolommei elected gonfaloniere. He had much opposition to encounter from those who still believed that the retention of the grand duke as a constitutional sovereign and member of an Italian confederation was possible. In the summer elections were held, and on the meeting of parliament Bartolommei's unitarian views prevailed, the assembly voting the resolution that the house of Lorraine had forfeited its rights and that Tuscany must be united to Italy under King Victor Emmanuel. Bartolommei was made senator of the Italian kingdom and received various other honours. His last years were spent in educational and philanthropic work. He died on the 15th of June 1869, leaving a widow and two daughters.

The best biography of Bartolommei is contained in II Rivolgimento Toscano e Vazione popolare, by his daughter Matilde Gioli (Florence, 1905), but the author attributes perhaps an undue preponderance to her father in the Tuscan revolution, and is not quite fair towards Bettino Ricasoli (q-v.) and other leaders of the aristocratic party. Cf. Lettere e documenti di B. Ricasoli (Florence, 1887-1896), and D. Zanichelli's Lettere politiche di B. Ricasoli, V. Peruzzi, N. Corsini, e C. Ridolfi (Bologna, 1898).

BARTOLOMMEO DI PAGHOLO, FRA (1475-1517), the Italian historical and portrait painter, — rknown also as Baccio (short for Bartolommeo) Deixa Porta (because he lived near the Porta Romana). was born at Soffignano, near Florence, in 1475, and died at Florence in 151 7. He received the first elements of his artistic education from Cosimo Roselli; and after leaving him, devoted himself to the study of the great works of Leonardo da

Vinci. Of his early productions, which are distinguished for their grace and beauty, the most important is the fresco of the Last Judgment, in which he was assisted by his friend Mariotto Albertinelli. While he was engaged upon some pieces for the convent of the Dominican friars, he made the acquaintance of Savonarola, who quickly acquired great influence over him, and Bartolommeo was so affected by his cruel death, that he soon after entered the convent, and for some years gave up his art. He had not long resumed it, in obedience to his superior, when Raphael came to Florence and formed a close friendship with

him. Bartolommeo learned from the younger artist the rules of perspective, in which he was so skilled, while Raphael owes to the frate the improvement in his colouring and handling of drapery, which was noticeable in the works he produced after their meeting. Some years afterwards he visited Rome, and was struck with admiration and a feeling of his own inferiority when he contemplated the masterpieces of Michelangelo and Raphael. With the latter, however, he remained on the most friendly terms, and when be departed from Rome, left in his hands two unfinished pictures which Raphael completed. Fra Bartolommeo's figures had generally been small and draped. These qualities were alleged against him as defects, and to prove that his style was not the result of want of power, he painted the magnificent figure of St Mark (his masterpiece, at Florence), and the undraped figure of St Sebastian. The latter was so well designed, so naturally and beautifully coloured, and so strongly expressive of suffering and agony, that it was found necessary to remove it from the place where it had been exhibited in the chapel of a convent. The majority of Bartolommeo's compositions are altar-pieces. They are remarkable for skill in the massing of light and shade, richness and delicacy of colouring, and for the admirable style in which the drapery of the figures is handled, Bartolommeo having been the first to introduce and use the lay-figure with joints.

BARTOLOZZI, FRANCESCO (17 25-181 5), Italian engraver, was born at Florence. He was originally destined to follow the profession of his father, who was a gold- and silver-smith; but he manifested so much skill and taste in designing that he was placed under the superintendence of two Florentine artists, who instructed him in painting. After devoting three years to that art, he went to Venice and studied engraving. He made very rapid progress, and executed some works of considerable import- ance at Venice.. He then removed 'for a short time to Rome, where he

completed a set of engravings representing events from the life of St Nilus, and, after returning to Venice, set out for London in 1764. For nearly forty years he resided in London, and produced an enormous number of engravings, the best being those of Clytie, after Annibale Caracci, and of the Virgin and Child, after Carlo Dolce. A great proportion of them are from the works of Cipriani and Angelica Kauffmann. Bartolozzi also contributed a number of plates to Boydell's Shakespeare Gallery. In 1802 he was invited to Lisbon as director of the National Academy. He remained in Portugal till his death. His son Gaetano Stephano (1757-1821), also an engraver, was the father of Madame Vestris.

BARTOLUS (1314-13S7), Italian jurist, professor of the civil law at the university of Perugia, and the most famous master of the dialectical school of jurists, was born in 13 14, at Sassoferrato, in the duchy of Urbino, and hence is generally styled Bartolus de Saxoferrato. His father was Franciscus Severi, and his mother was of the family of the Alfani. He studied the civil law first of all under Cinus at Perugia, and afterwards under Oldradus and Jacobus de Belvisio at Bologna, where he was promoted to the degree of doctor of civil law in 1334. His great reputation dates from his appointment to a chair of civil law in the university of Perugia, 1343, where he lectured for many years, raising the character of the law school of Perugia to a level with that of Bologna. He died in 1357 at Perugia, where a magnificent monument recorded the interment of his remains in the church of San Francisco, by the simple inscription of " Ossa Bartoli." Bartolus left behind him a great reputation, and many writers have sought to explain the fact by attributing to him the introduction of the dialectical method of teaching law; but this method had been employed by Odofredus, a pupil of Accursius, in the previous century, and the successors of Odofredus had abused it to an extent which has rendered their writings in many instances unprofitable to read, the subject matter being overlaid with dialectical forms. It was the merit of Bartolus, on the other hand, that he employed the dialectical method with advantage as a teacher, and discountenanced the abuse of it; but his great reputation was more probably owing to the circumstance that he revived the exegetical system of teaching law (which had beet

neglected since the ascendancy of Accursius) in a spirit which

gave it new life, whilst he imparted to his teaching a practical interest, from the judicial experience which he had acquired while acting as assessor to the courts at Todi and at Pisa before he undertook the duties of a professorial chair. His treatises On Procedure and On Evidence are amongst his most valuable works, whilst his Commentary on the Code of Justinian has been in some countries regarded as of equal authority with the code itself.

BARTON, BENJAMIN SMITH (1766-1815), American natural- ist, was born at Lancaster, Pennsylvania, in 1766, studied for two years at Edinburgh, and afterwards graduated at Gottingen. He settled at Philadelphia, and soon obtained a considerable practice. In 1789 he was appointed professor of botany and natural history in the College of Philadelphia, now the University of Pennsylvania ; he was made professor of materia medica in 1795, and on the death of Dr Benjamin Rush in 1813 he obtained the chair of practical medicine. In 1802 he was chosen president of the American Philosophical Society, of which he was a strong supporter. Barton was the author of various works on natural history, botany and materia medica, his Elements of Botany (1803) being the best known. He died at Philadelphia on the 19th of December 181 5.

BARTON, BERNARD (1784-1849), English poet, was born at Carlisle on the 31st of January 1784. His parents were Quakers, and he was commonly known as the Quaker poet. After some experience of business, he became, in 1809, clerk to Messrs Alexander's bank at Woodbridge, Suffolk, and retained this post till his death. His first volume of verse — Metrical Effusions — was published in 181 2. It brought him into corre spondence with Southey, and shortly afterwards, through the medium of a set of complimentary verses, he made the acquaint- ance of Hogg. From this time onwards to 1828 Barton pub- lished various volumes of verse. After 1828 his work appeared but rarely in print, but his Household Verses published in 1845 secured him, on the recommendation of Sir Robert Peel, a Civil List pension of £100 a year, £1200 having already been raised for him by some members of the Society of Friends. Barton is chiefly remembered for his friendship with Charles Lamb, which arose, curiously enough, out of a remonstrance addressed by him to the author of Essays of Elia on the freedom with which the Quakers had been handled in that volume. When Barton contemplated resigning his bank clerkship and supporting himself entirely by literature, Lamb strongly dissuaded him. " Keep to your bank," he wrote, "

and the bank will keep you." Barton died at Woodbridge on 19th February 1849. His daughter Lucy married Edward FitzGerald.

See Poems and Letters of Bernard Barton, selected by Lucy Barton, with a biographical notice by Edward FitzGerald (1849).

BARTON, CLARA (1821-), American philanthropist, was born in Oxford, Massachusetts, in 1821. She was educated at the Clinton Liberal Institute (then in Clinton, New York). Ill-health compelled her to give up the profession of teaching, which she had taken up when she was only sixteen years old, and from 1854 to 1857 she was a clerk in the Patent Office at Washington. During the Civil War she distributed large quantities of supplies for the relief of wounded soldiers; and at its close she organized at Washington a bureau of records to aid in the search of missing men for whom inquiries were made. In con- nexion with this work, which was continued for about four years, she identified and marked the graves of more than twelve thousand soldiers in the National Cemetery at Andersonville, Georgia. In 1869 she went for her health to Switzerland. Upon her arrival at Geneva she was visited by members of the International Committee of the Red Cross, who sought her co-operation in the work of their society. The United States had declined to become a party to the treaty of Geneva on the basis of which the Red Cross Society was founded, but upon the outbreak of the Franco- Prussian War Miss Barton went with members of this society to the seat of hostilities and assisted them in organizing their military. hospitals. In 1871 she superintended the distribution of relief to the poor in Strassburg, and in 1872 performed a like service in Paris. For her services she was decorated with the Iron Cross by

the German emperor. In 1873 she returned to the United States, where she at once began her efforts to effect the organization of the United States branch of the Red Cross and to bring her country into the treaty of Geneva, which efforts were successful in 1881-1882. She was the first president of the American Red Cross, holding the position until 1904: and represented the United States at the International conference held at Geneva, 1884; Karlsruhe, 1887; Rome, 1892; Vienna, 1897; and St Petersburg, 1903. She was the author of the American amendment to the constitutipn of the Red Cross which provides that the society shall distribute relief not only in war but in times of such other calamities as famines, floods, earthquakes, cyclones,and pestilence, and in accordance with this amended constitution, she conducted the society's relief for sufferers from

the yellow fever in Florida (1887), the flood at Johnstown, Pennsylvania (1889), the famine in Russia (1891), the hurricane along the coast of South Carolina (1893), the massacre in Armenia (1896), the Spanish-American War in Cuba (1898), the hurricane at Galveston, Texas (1900), and several other calamities. Upon her retirement from the Red Cross she incorporated and became president of " The National First Aid of America " for " first aid to the injured." She wrote An Official History of the Red Cross (1882), The Red Cross in Peace and War (1898), A Story of the Red Cross (1904), and Story of my Childhood (1907).

BARTON, ELIZABETH (c. 1 506-1 534), " the maid of Kent," was, according to her own statement, born in 1506 at Aldington, Kent. She appears to have been a neurotic girl, subject to epilepsy, and an illness in her nineteenth year resulted in hysteria and religious mania. She was at the time a servant in the house of Thomas Cobb, steward of an estate near Aldington owned by William Warham, archbishop of Canterbury. During her convalescence she passed into trances lasting for days at a time, and in this state her ravings were of such " marvellous holiness in rebuke of sin and vice " that the country folk believed her to be inspired. Cobb reported the matter to Richard Masters, the parish priest, who in turn acquainted Archbishop Warham. The girl having recovered, and finding herself the object of local admiration, was cunning enough, as she confessed at her trial, to feign trances, during which she continued her prophecies. Her fame steadily growing, the archbishop in 1526 instructed the prior of Christ Church, Canterbury, to send two of his monks to hold an inquiry into the case. One of these latter, Edward Bocking, obtained her admission as a nun to St Sepulchre's convent, Canterbury. Under Bocking's instruction Barton's prophecies becam,e still more remarkable, and attracted many pilgrims, who believed her to be, as she asserted, in direct communication with the Virgin Mary. Her utterances were cunningly directed towards political matters, and a profound and widespread sensation was caused by her declaration that should Henry persist in his intention of divorcing Catherine he " should no longer be king of this realm ... and should die a villain's death." Even such men as Fisher, bishop of Rochester, and Sir Thomas More, corresponded with Barton. On his return from France in 1532 Henry passed through Canterbury and is said to have allowed the nun to force herself into his presence, when she made an attempt to terrify him into abandoning his marriage.

After its solemnization in May 1533, her utterances becoming still more treasonable, she was examined before Cranmer (who had in March succeeded to the archbishopric on Warham's death) and confessed. On the 25th of September Bocking and another monk, Hadley, were arrested, and in November, Masters and others were implicated. The maid and her fellow prisoners were examined before the Star Chamber, and were by its order publicly exposed at St Paul's Cross, where they each read a confession. In January 1534 by a bill ol attainder the maid and her chief accomplices were condemned to death, and were executed at Tyburn on the 20th of April. It has been held that her confession was extracted by force, and therefore valueless, but the evidence of her imposture seems conclusive. :

See Froude, History of England; Burnet, History of the Reformation; Lingard, History of England; F. A. Gasquet, Henry VIII.

and the English Monasteries (ch. iii. 1899 ed.); T. E. Bridgett, Life of Blessed John Fisher (1888); vols. vi. and vii. of Letters and Papers of Henry VIII.; James Gairdner, The English Church in the 16th Century (1899); Strype, Memorials, I. i. 271, and Cranmer; a detailed account of the case is contained in the published Act of Attainder 25 Henry VIII. c. 12.

BARTON BEDS, in geology, the name given to a series of softish grey and brown clays, with layers of sand, of Upper Eocene age, which are found in the Hampshire Tertiary basin, where they are particularly well exposed in the cliffs of Barton, Hordwell, and in the Isle of Wight. Above the highly fossili- ferous Barton Clay there is a sandy series with few fossils; these are the Headon Hill or Barton Sands. Either of these names is preferable to the term " Upper Bagshot Beds," which has been applied to these sands. The Barton Beds are absent from the London basin, and the Upper Bagshot Sands of that area are probably at' a lower horizon than the Barton Sands. The term " Bartonien " was introduced by Mayer-Eymar in 1857 for the continental equivalents of the series.

Hampshire basin and ,-, . . .

Isle of Wight. Pans basm "

Barton Sands 140-200 ft. 7 R . . (Limestone of St puen. Barton Clay ˆ2-255 ft. \ Bartonie ” j ˆJJSffi*

Fusus longaevus, Volulilithes luctatrix, Ostrea gigantea, Pectunculus (Glycimeris) deleta are characteristic fossils; fishes {Lamna, Arius, &c.) and a crocodile (Diplocynodon) are also found in the Barton Clay. The sands are very pure and are used in glass making.

See ” Geology of the Isle of Wight,” Mem. Geol. Survey (2nd ed., 1889) ; and ” The Geology of the Country around Southampton,” Mem. Geol. Survey (1902). (J. A. H.)

BARTON-UPON-HUMBER, a market town in the N. Lindsey or Brigg parliamentary division of Lincolnshire, England, the terminus of a branch of the Great Central railway, 44 m. N. by E. of Lincoln. Pop. of urban district (1901) 5671. It lies beneath low hills, on flat ground bordering the Humber, but the centre of the town is a mile from the river. The church of St Peter has a remarkable west tower of pre-Conquest workman- ship, excepting the early Norman top . storey. Against the western face is a low building of the date of the lower tower- storeys, measuring 15 ft. by 12, with rude, deeply-splayed windows. The tower itself is arcaded in the two lower storeys, having round arches in the lower and triangular in the upper, and there is a round-headed S. doorway and a triangular- headed N. doorway. The rest of the church is Decorated and Perpendicular. The church of St Mary is fine Early English with Perpendicular clerestory. Industries include brick-making, malting, and rope-making. Barton appears in Domesday, when the ferry over the Humber existed. As a port, moreover, it subsequently rose into some importance, for it was able to supply eight ships and men to the expedition of Edward III. to Brittany.

BARUCH, the name (meaning ” Blessed ” in Hebrew) of a character in the Old Testament (Jer. xxxvi., xxxvii., xliii.), associated with the prophet Jeremiah, and described as his secretary and spokesman.

Book of Baruch. This deutero-canonical book of the Old Testament is placed by the LXX. between Jeremiah and Lamentations, and in the Vulgate after Lamentations. It consists of several parts, which cohere so badly that we are obliged to assume plurality of authorship.

Contents. — The book consists of the following parts:: —

i. 1-14. The historical preface with a description of the origin and purpose of the book.

i. 1 5— ii- 5. A confession of sin used by the Palestinian Remnant. This confession was according to i. 14 sent from Babylon (i. 4, 7) to Jerusalem to be read ” on the day of the feast and on the days of the solemn assembly.” The confession is restricted to the use of the remnant at home (see next para- graph). In this confession there is a national acknowledgment of sin and a recognition of the Exile as a.righteous judgment.

ii. 6-iii. 8. A confession of the captives in Babylon and a prayer for restoration. This confession opens as the former

(in i. 15) with the words found also in Daniel ix. 7, ” To the Lord our God belongeth righteousness, &c.” The confession is o\ the Exiles and not of the remnant in Palestine, as Marshall has pointed out. Thus it is the Exiles clearly who are speaking in ii. 13, ” We are but a few left among the heathen where thou hast scattered us “; ii. 14, ” Give us favour in the sight of them which have led us away captive “; iii. 7, ” We will praise thee in our captivity “; iii. 8, ” We are yet this day in our captivity where thou hast scattered us.” On the other hand the speakers in the confession in i. 1 5 — ii. 5 are clearly the remnant in Jerusalem, i. 15, ” To the Lord our God belongeth righteousness, but unto us confusion of face … to the men of Judah and the inhabitants of Jerusalem.” The Exiles are mentioned by way of contrast to the speakers; ii. 4, 5, ” He hath given them to be in subjection to all the kingdoms that are round about us to be a reproach among all the people round about where the Lord hath scattered them. Thus were they cast down . . . because we sinned against the Lord our God.” 1

iii. o-iv. 4. The glorification of wisdom, that is, of the Law. Israel is bidden to walk in the light of it; it is the glory of Israel and is not to be given to another.

iv. 5-v. 9. Consolation of Israel with the promise of deliver- ance and lasting happiness and blessing to Jerusalem.

Integrity. — From the foregoing description it seems clear that the book is derived from a plurality of authors. Most scholars, such as Fritzsche, Hitzig, Kneucker, Hilgenfeld, Reuss, agree in

assuming that i.-iii. 8 and iii. 9-v. 9 are from distinct writers. But some critics have gone farther. Thus Rothstein (Kautzsch, Apok. und Pseud, i. 213-215) holds that there is no unity in iii. 9-v. 9, but that it is composed of two independent writings — iii. 9-iv. 4 and iv. 5-v. 9. Marshall (Hastings' Bible Dictionary, i. 251-254) gives a still more complex analysis. He finds in it the work of four distinct writers: i. 1-14, i. 1 5— iii. 8, iii. 9-iv. 4, iv. 5-v. 9. The evidence for a fourfold authorship is strong though not convincing. In any case i.-iii. 8 and iii. 9-v. 9 must be ascribed to different authors.

Original Language.— (1) Some scholars, as Ewald, Kneucker, Davidson, Rothstein and Konig, believe that the whole book was originally written in Hebrew; (2) Fritzsche, Hilgenfeld, Reuss, Gifford, Schurer, and Toy advocate a Hebrew original of i.-iii. 8 and a Greek original of the rest; (3) Marshall argues that i.-iii. 8 is translated from a Hebrew original, iii. 9-iv. 4 from an Aramaic, and the rest from the Greek; (4) and lastly, Bertholdt, Havernick and Noldeke regard the Greek as the primi- tive text. The last view must be put aside as unworkable. For the third no convincing evidence has been adduced, nor does it seem likely that any can be. We have therefore to decide between the two remaining theories. In any case we can hardly err in admitting a Hebrew original of i.-iii. 8. For (1) we have such Hebraisms as ov . . . «r' awj > = iˆy . . . tb-n (ii. 26); o5 . . . «cei = D» . . . itrs (ii. 4, 13, 29; iii. 8); Siv . . . to rvtvfia. avTW = nnn . . . ttk (ii. 7). (2) We have meaningless expressions which are really mistranslations of the Hebrew. It is noteworthy that these mistranslations are for the most part found in Jeremiah— a fact which has rightly drawn scholars to the conclusion that we owe the LXX of Baruch i.-iii. 8, and of Jeremiah to the same translator. Thus in i. 9 we have 5«r/uom)S, "prisoner," where the text had "udo and the Greek should have been rendered " locksmith." The same mistranslation is found in Jer. xxiv. 1, xxxvi. (xxix.) 2. Next in ii. 4 we have ii.f3a.TOv, " wilderness," where the text had fiDE > and the translation should have tianaxuv. The same misrendering is found several times in Jeremiah. Again epydf taQai is used in i. 22, ii. 21, 22, 24 as a translation of iay in the sense of " serving," where 5ov\eveiv ought to have been the rendering. So also in Jer. xxxiv. (xxvii.) 11, xxxvii. (xxx.) 8, &c. Again in 7r6Xew 'lovSa nal el-oidev '\epov

1 Toy (Jewish Enc. ii. 556) thinks that the " them" in ii. 4, 5 may be a scribal slip and that we have here not the confession of the

Palestinian remnant and that of the Exiles, but simply a juxta-position of two forms of confession.

(xxxiii.) 10, &c, where the translator should have given a-Xaretwj'. * For jSoju/Sijaw (ii. 29) pnn we should have irXrjflos. (3) Finally there are passages where by re-translation we dis-cover that the translator either misread his text or had a corrupt text before him. Thus pawa in i. 10 is a corrupt translation of nmo as elsewhere in a dozen passages of the LXX. In iii. 4 redvriKdT(j3V = > w — which the translator should have read

as 'X!t? = av9p*TCb)V.*

From the above instances, which could be multiplied, we have no hesitation in postulating a Hebrew original of i.— iii. 8.

As regards iii. o-v. 9 the case is different. This section is free from such notable Hebraisms as we have just dealt with, and no convincing grounds have been advanced to prove that it is a translation from a Semitic original.

Date.— The dates of the various constituents of the book are quite uncertain. Ewald, followed by Gifford and. Marshall, assigns i.— iii. 8 to the period after the conquest of Jerusalem by Ptolemy I. in 320 B.C.; Reuss to some decades later; and Fritzsche, Schrade, Keil and Toy to the time of the Maccabees. Hitzig, Kneucker and Schurer assume: that it was written after a.d. 701 Ryle and James (Pss. of Solomon, pp. lxxii.-lxxvii.) hold that iv. 31-v. 9 is dependent oh the Greek version of Ps. xi., and that, accordingly, Baruch was reduced to its present form after a.d. 70. The most probable of the above dates appears to be that main- tained by Fritzsche, that is, if we understand by the- Maccabean times the early decades of the 2nd cent. B.C. For during the palmy days of the Maccabean dynasty the Twelve tribes were supposed to be in Palestine. The idea that the Jewish Kingdom embraced once again the entire nation easily arose when the Maccabees extended their dominion northwards over Samaria and Galilee and eastwards beyond the Jordan. This belief displaced the older one that the nine and a half tribes were still in captivity. With the downfall of the Maccabean dynasty, however, the older idea revived in the 1st cent. a.d. To the beginnings of the 2nd cent. a.d. the view of the dead given in ii. 17 would point, where it is

said that those whose spirits had been taken from their bodies would not give glory unto the Lord. The statement as to the desolate condition of the Temple in ii. 26 is with Kneucker to be rejected as an interpolation.*

Canonicity. — The Book of Baruch was never accepted as canonical by the Palestinian Jews (Baba Batra i4>), though the Apostolic Constitutions, v. 10, state that it was read in public worship on the 10th day of the month Gorpiaeus, but this state- ment can hardly be correct. It was in general use in the church till its canonicity was rejected by the Protestant churches and accepted by the Roman church at the council of Trent.*

Literature. Versions and Editions.— The. versions are the two Latin, a Syriac, and an Arabic. The Latin one in the Vulgate belongs to a time prior to Jerome, and is tolerably literal. Another, somewhat later, was first published by Jos. Maria Caro in 1688, and was reprinted by Sabatier, side by side with the ante-Hieronymian one, in his Bibliorum Sacrorum Latinae Versiones Antiquae. It is founded upon the preceding one, and is less literal. The Syriac and Arabic versions, printed in the London Polyglot, are literal. The Hexaplar-Syriac version made by Paul, bishop of Telia, in the beginning of the 7th century has been published by Ceriani.

The most convenient editions of the Greek text are Tischendorf 's in the second volume of his Septuagint, and Swete's in vol. iii.; Fritzsche's in Libri Apocryphi Veteris Testamenti Graece (1871). The best editions of the book are Kneucker's Das Buck Baruch (1879); Gifford's in the Speaker's Apoc. ii. See also the articles in the Encyc. Biblica, Hastings' Bible Dictionary; Schurer, History of Jewish People.

Apocalypse of Baruch. The discovery of this long lost apocalypse was due to Ceriani. This apocalypse has survived only in the Syriac version of which Ceriani discovered a 6th century MS. in the Milan library. Of this he published a Latin translation in 1866 (Monumenta Sacra, I. ii. 73 98), which Fritzsche reproduced in 1871 (Libri Apocryphi V.T., pp. 654-699), and the text in 1871 (Mon. Sacra. V. ii.i 13-180), and subsequently

1 In ii. 25 we have the word aimatoK-q with the extraordinary meaning of " plague " as in Jer. xxxix. (xxxii.) 36.

in photo-lithographic facsimile in 1883. Chaps. Ixxviii.lxxxvi., indeed, of this book have long been known. These constitute Baruch's

epistle to the nine and a half tribes in captivity, and have been published in Syriac and Latin in the London and Paris Polyglots, and in Syriac alone from one MS. in Lagarde's Libri V T. Apocryphi Syr. (1861); and by Charles from ten MSS. (Apocalypse of Baruch, 1896, pp. 124 167). The entire book was translated into English by the last-named writer (op. cit. pp. 1-167), and into German by Ryssel (Kautzsch's Apok. und Pseud., 1900, ii. pp. 413-446).

The Syriac is translated from the Greek; for Greek words are occasionally transliterated, and passages, can be explained only on the hypothesis that the wrong alternative meanings of certain Greek words were followed by the translator. The Greek in turn is derived from the Hebrew, for unintelligible expressions in the Syriac can be explained and the text restored by re transla- tion into Hebrew. Thus in xxi. 9, n, 12, xxiv. 2, Ixii. 7 we have an unintelligible antithesis, " those who sin and those who are justified." The source of the error can be discovered by retranslation. The Syriac in these passages is a stock rendering of Succuowrdai, and this in turn of- pis. But pis means not only Sucatovadai but also Skoios tlvox, and this is the very meaning required by the context in the above passages: " those who sin and those who are righteous." 2 Again xliv. 12 the text reads: " the new world which does not turn to corruption those who depart on Us beginning and has no mercy on those who depart to torment." Here " on its beginning" is set over antithetically against " to torment," whereas the context requires " to its blessedness." The words " on its beginning " — le-ira, a corruption of rwKa— " to its blessedness." Again in lvi. 6 it is said that the fall of man brought grief, anguish; pain, trouble and boasting into the world. The term " boasting " in this connexion cannot' be right. The word=(caiix'7M a=rT ^ !in (?). corrupt for nWro, "disease." A further ground for inferring a Hebrew original is to be found in the fact that paronomasiae not infrequently discover themselves in the course of retranslation into Hebrew. One instance will suffice. In xlviii. 35, " Honour will be turned, into shame, strength humiliated into contempt . . . and beauty will 'become a scorn" contains three such: 'Bn 1 ? rrn» 'biv in hx it ty pf?pi> -prr 1133 (see Charles, Apoc. Bar. pp. xliv.-liii). The necessity of postulating a Hebrew original was first shown by the present writer, and has since been maintained by WeUhausen (Skizzen u. Vorarbeiten, vi. 234), by Ryssel (Apok. und Pseudepig. A. T., 1900, ii. 411), and Ginzberg (Jewish Encyclopaedia, ii. 555).

Different Elements in the Book and their Dates. — As there are undoubtedly conflicting elements in the book, it is possible to assume either a diversity of authorship or a diversity of sources The latter*

view is advocated by Ryssel and Ginzberg, the former by Kabisch, de Faye, R. H. Charles and Beer (Herzog's Real,- enc., art. " Pseudepigraphen des Alten Testaments," p. 250): A short summary may here be given of the grounds on which the present writer has postulated a diversity of authorship. If the letter to the tribes in captivity (Ixxviii.-lxxxvi.) be disregarded, the book falls into seven sections separated by fasts, save in one . case (after xxxv.) where the text is probably defective. These sections, which are of unequal length, are — (1) i.~v. 6; (2) v. 7-viii. ; (3) ix.-xii. 4; (4) xii. 5-xx.; (5) xxi.xxxv.; (6) xxxvi. xlvi.; (7) xlvii.lxxvii. These treat of the Messiah and the Messianic kingdom, the woes of Israel in the past and the destruc tion of Jerusalem in the present, as well as of theological questions relating to, original sin, free will, works, the number of the saved, the nature of the resurrection body, &c, The views expressed on several of the above subjects are often conflicting. In one class of passages there is everywhere manifest a vigorous optimism as to Israel's ultimate well-being on earth, and the blessedness of the chosen people in the Messianic kingdom is sketched in glowing and sensuous colours (xxix., xxxix.-ˆxl., lxiii.-lxxiv.). Over against these passages stand others of a hopelessly pessimistic character; wherein, alike as to Israel's

2 Ryssel has adopted Charles's restoration of the text in these passages and practically also in xliv. 12. but without acknowledgment.

present and future destiny oh earth, there is written nothing save " lamentation, and mourning, and woe." The world is a scene of corruption, its evils are irremediable, its end is nigh, and the advent of the new and spiritual world at hand- The first to draw attention to the composite elements in this book was Kabisch (Jahrbiicher f. protest. Theol., 1891, pp. 66-107). This critic regarded xxiv, 3-xxix., xxxvi.-xl. and liii.lxxiv. as independent sources written before the fall of Jerusalem, a.d. 70, and his groundwork, which consists of the rest of his book, with the exception of a few verses, as composed after that date. All these elements were put together by a Christian contemporary of Papias. Many of these conclusions were arrived at inde pendently by a French scholar, De Faye {Les Apocalypses juives, 1892, pp. 25-28, 76-103, 192-204). The present writer {Apocalypse of Baruch, 1896, pp. liii.-lxvii.), after submitting the book to a fresh study, has come to the following conclusions: — The book is of

Pharisaic authorship and composed of six independent writings — A 1 , A 2 , A 3 , B 1 , B 2 , B 3 . The first three were composed when Jerusalem was still standing and the Messiah and the Messianic kingdom were expected: A 1 , a mutilated apocalypse = xxvii.-xxx. 1; A 2 , the Cedar and Vine Vision = xxxvi.-xl.; A 3 , the Cloud Vision = liii.-lxxiv. The last three were written after a.d. 70, and probably before 90. Thus B 3 = lxxxv. was written by a Jew in exile, who, despairing of a national restoration, looked only for a spiritual recompense in heaven. The rest of the book is derived from B 1 and B 2 , written in Palestine after a.d. 70. These writings belong to very different types of thought. In B 1 the earthly Jerusalem is to be rebuilt, but not so in B 2 ; in the former the exiles are to be restored, but not in the latter; in the former a Messianic kingdom without a Messiah is expected, but no earthly blessedness of any kind in the latter, &c. B 1 = i.-ix. 1 , xxxii. 2-4, xliii.-xliv. 7, xlv.-xlvi., lxxvii.-lxxxii., lxxxiv., lxxxvi.-lxxxvii. B 2 = ix.-xxv., xxx. 2-xxxv., xli.-xlii., xliv. 8-15, xlvii.-lii., lxxv.-lxxvi., lxxxiii. The final editor of the work wrote in the name of Baruch the son of Neriah.

The above critical analyses -were attacked and rejected by Clemen {Stud, und Krit., 1898, 211 sqq.). He fails, however, in many cases to recognize the difficulties at issue, and those which cannot be ignored he sets down to the conflicting apocalyptic traditions, on which the author was obliged to draw for his subject-matter, Though Ryssel (Kautzsch, Apok. u. Pseud, des A. T. ii. 409) has followed Clemen, neither has given any real explanation of the disorder of the book as it stands at present. Beer {op. cit.) agrees that xxxvi.-xl. and liii.-lxx. are of different authorship from the rest of the book and belong to the earlier date. ,

Relation to 4 Ezra.— The affinities of this book and 4 Ezra are so numerous (see Charles, op. cit. 170-171) that Ewald and Ryle assumed identity of authorship. But their points of divergence are so weighty (see op. cit. pp. lxix.-lxxi.) that this view cannot be sustained. Three courses still remain open. If we assume that both works are composite, we shall perforce admit that some of the constituents of 4 Ezra are older than the latest of Baruch, and that other constituents of Baruch are decidedly older than the remaining ones of 4 Ezra. On the other hand, if we assume unity of authorship, it seems impossible to arrive at finality on the chronological relations of these two works. Langen, Hilgenfeld, Wieseler, Stahelin, Renan, Hausrath, Drummond, Dillmann, Rosenthal, Gunkel, have maintained on various grounds the priority of 4 Ezra; and Schiirer, Bissell, Thomson, Deane, Kabisch, De Faye, Wellhausen, and Ryssel the priority of Baruch on grounds no less convincing.

Relation to Rabbinical Literature. — A very close relation subsists between our book and rabbinical literature. Indeed in some instances the parallels are so close that they are almost word for word. The description of the destruction of Jerusalem by angels in vi.-viii. is found also in the Pesikta Rabbati 26 (ed. Friedmann 131a). By means of this passage we are, as Ginzberg has shown, able tc correct the corrupt reading " the holy Ephod " (vi. 7), u>-iipn iiBst into "the holy Ark," i.e. rnpn.jpn, .•■ What, might be taken as poetic fancies in our text are recounted as historical facts in rabbinical literature. Thus the words (x. 18):

" And ye priests, take ye the keys of the sanctuary, And cast them into the height of heaven, And give them to the Lord and say: 'Guard Thine own house; for lo we are found unfaithful stewards,' "

are given in various accounts of the fall of Jerusalem. (See Ta'anith, 29a; Pesikt. R., loc. cit.; Yalqut Shim'oni on Is. xxi; Aboth of Rabbi Nathan vii.). Even the statement that the bodies of Sennacherib's soldiers were burned while their garments and armour remained unconsumed has its parallel in Sank. 94a.

Integrity of the Book. — In lxxvii. 19 it is said that Baruch wrote two epistles, one to the nine and a half tribes and the other to the two and a half at Babylon. The former is found in lxxviii -r Ixxxvi,; the latter is lost, but is probably preserved either wholly or in part in the Book of Baruch, hi. 9-iv. 29 (see Charles, op. cit.) ; pp. lxv.-lxvii). On the other hand, it is not necessary to infer from lxxv. that an account of Baruch's assumption was to be looked for in the book.

Authorities. — The literature is fully cited in Schiirer, Gesch. in. 223-232, and R. H. Charles, Apocalypse of Baruch, pp. xxx.-xliii. Ginzberg's article in the Jewish Encyclopaedia, ii. 551-556, is a fresh and valuable contribution.

Rest of the Words of Baruch. This book was undoubtedly written originally by a Jew but was subsequently revised by a Christian, as has been shown by Kohler in the Jewish Quarterly Review (1893), pp. 407-409. It passed under a double name in the Abyssinian Church, where it was known both as " the Rest of the Words of Baruch " and " the Rest of the Words of Jeremiah." Its Greek name is the latter — rd irapaKeiiroixeva. 'lepejxiov irporjTOV. It has been preserved in Greek, Ethibpic, Armenian and Slavonic. The Greek was first printed at Venice in 1609, next by Ceriani in 1868 in his Mon. Sacra, v. n-i8;by Harris, The Rest of the Words of Baruch, in 1889; and Bassiliev, Anec. Graeco-Byzantina, i. 308 sqq. (1893). The book begins like the Syriac Apocalypse of Baruch with an account of the removal of the sacred vessels of theTemple before its capture by the Chaldees. Baruch remains in Jerusalem and Jeremiah accompanies the Exiles to Babylon. After 66 years' exile Jeremiah brings back the Jews to Jerusalem, but refuses to admit such as had brought with them heathen wives. Then follows a vision of Jeremiah which is Christian.

Harris regards the book in its r present form as an eirenicon addressed to the Jews by a Christian after the rebellion of Bar Cochba (Barcochebas) and written about 136. Though the original work was dependent on the Apocalypse of Baruch it cannot have been written much before the close of the 1st cent. a.d. Its terminus ad qiiem is at present indeterminable.

(R. H. C.)

BARUGO, a town on the north coast of the province of Leyte, island of Leyte, Philippine Islands, on Carigara Bay. Pop. (1963) 12,360. It exports large quantities of hemp and copra, and irnports rice, petroleum, and cotton-goods.

BARWANI, a native state of India, in the Bhopawar agency in central India. It lies in the Satpura mountains, south of the Nerbudda. Area, 1178 sq. m.; pop. (1901) 76,136. Many of the inhabitants are Bhils. The chief, whose title is Rana, is a Rajput of the Sisodhyia clan, connected with the Udaipur family. Though the family lost most of its possessions during theMahratta invasion in the 14th century, it never became tributary to any Malwa chief. The forests are under an English official. The town of Barwani is situated near the left bank of the Nerbudda. The population in 190 1 was 6277.

BARYATINSKY, ALEXANDER IVANOVICH, Prince (1814- 1879), Russian soldier and governor of the Caucasus, wasprivately educated, entered the school of the ensigns of the Guard in his seventeenth year and, on the 8th of November 1833, received his commission of cornet in the Life Guards of the cesarevich Alexander. In 1835 he served with great gallantry in the Caucasus, and on his return to St Petersburg was rewarded with a gold sword " for valour." On the first of January 1836 he was attached to the suite of Alexander, and in 1845 was again ordered off to the Caucasus and again most brilliantly distinguished himself, especially in the attack on Shamyl's , stronghold, for which he received the order of St George, In 1846 he assisted

Fieldmarshal Paskievich to suppress the Cracow rising. From 1848 to 1856 he took a leading part in all the chief imlitary events in the Caucasus, his most notable exploits being his victory at Mezeninsk in 1850 and his operations against Shamyl at Chechen. His energetic and at the same time systematic tactics inaugurated a new era of mountain warfare. On the 6th of January 1853 he was appointed adjutant-general and, on July 5th of the same year, chief of the staff. In 1854 he took part in the brilliant Kiiriik Dere campaign. On the 1st of January 1856 he became commander-in-chief of the Caucasian army, and, subsequently, governor of the Caucasus. As an administrator he showed himself fully worthy of his high reputation. Within three years of his appointment, the whole of the eastern Caucasus was subdued and the long elusive Shamyl was taken captive. Baryatinsky also conquered many of the tribes of the western Caucasus dwelling between the rivers Laba and Byelaya. For these fresh services he was created a fieldmarshal. But his health was now entirely broken by his strenuous labours, and on the 6th of December 1862 he was, at his own request, relieved of his post. He spent the last days of his life abroad and died at Geneva, after forty-eight years of active service.

See A. L. Zisserman, Fieldmarshal Prince A. I, Baryatinski (Russ.) (Moscow, 1888-1891).

BARYE, ANTOINE LOUIS (1796-1875), French sculptor, was born in Paris on the 24th of September 1796. Like many of the sculptors of the Renaissance he began life as a goldsmith. After studying under Bosio, the sculptor, and Gros, the painter, he was in 1818 admitted

to the Ecole des Beaux Arts. But it was not till 1823, when he was working for Fauconnier, the goldsmith, that he discovered his real bent from watching the wild beasts in the Jardin des Plantes, making vigorous studies of them in pencil drawings worthy of Delacroix and then modelling them in sculpture on a large or small scale. In 1831 he exhibited his " Tiger devouring a Crocodile," and in 1832 had mastered a style of his own in the " Lion and Snake." Thenceforward Barye, though engaged in a perpetual struggle with want, exhibited year after year these studies of animals — admirable groups which reveal him as inspired by a spirit of true romance and a feeling for the beauty of the antique, as in " Theseus and the Minotaur " (1847)," Lapitha and Centaur " (1 848) , and numerous minor works now very highly valued. Barye was no less successful in sculpture on a small scale, and excelled in representing animals in their most familiar attitudes. As examples of his larger work we may mention the Lion of the Column of July, of which the plaster model was cast in 1839, various lions and tigers in the gardens of the Tuileries, and the four groups — War, Peace, Strength, and Order (1854). In 1852 he cast his bronze " Jaguar devouring a Hare." The fame he deserved came too late to the sculptor. He was made professor at the museum in 1854, and was elected to the Academy of Fine Arts in 1868. He died on the 25th of June 1875. The mass of admirable work left to us by Barye entitles him to be regarded as the greatest artist of animal life of the French school, and as the creator of a new class of art which has attracted such men as Fre.miet, Peter, Cain, and Gardet, who are regarded with justice as his worthiest followers.*

Authorities. — Emile Lame, Les Sculpteurs d'animaux; M. Barye (Paris. 1856); Gustave Planche, " M. Barye," Revue des deux mondes (July 1851); Theophile Silvestre, Histoires des artistes vivants (Paris, 1856) ; Arsene Alexandre, " A. L. Barye," Les Artistes celebres, ed. E. Muntz (Paris, 1889) (with a bibliog.) ; Charles DeKay, Life and Works of A. L. Barye (1889), published by the Barye Monument Assoc, of New York; Jules Claretie, Peintres et sculpteurs contemporains (1882); Roger Ballu, L'CEuvre de Barye (1890); Charles Sprague Smith, Barbizon Days (1903). (H. Fr.)

BARYTES, a widely distributed mineral composed of barium sulphate (BaSO.j). Its most striking feature and the one from which it derives its name barytes, barite (from the Greek /3apfa, heavy) or heavy spar, is its weight. Its specific gravity of 4- 5 is about twice as great as that of salt and of many other colourless, transparent and glassy minerals not unlike barytes in general appearance. The mineral is usually found in a state of consider-, able chemical purity, though

small amounts of strontium and calcium sulphates may isomorphously replace the barium sulphate: ammonium sulphate is also sometimes present, whilst

clay, silica, bituminous matter, &c, may be enclosed as impurities.

Crystals of barytes are orthorhombic and isomorphous with the strontium and lead sulphates (celestite and anglesite) ; they are usually very perfectly developed and present great variety of form. The simplest are rhomb-shaped tables (fig. 1) bounded by the two faces of the basal pinacoid © and the four faces of the prism (m); the angle between the prism-faces (mm) is 78 23', whilst that between c and m is go°. The mineral has a very perfect cleavage parallel to the faces c and m, and the cleavage surfaces are perfectly smooth and bright. The crystals of prismatic habit represented in figs. 2 and 3 are bounded by the domes d and / and the basal pinacoid c; fig. 4 is a plan of a still

Fig. 1.

Fig. 2.

Fig. 3.

>-1

a'

r-i.

*1 y" *r ,*

fi'

V /' ^

*o']_*

c

... A/// /]

d

[j

2t

v'

a

Fig. 4.

more complex crystal. Twinning is represented only by twin-lamellae, which are parallel to the planes m and / and are of secondary origin, having been produced by pressure.

Crystals of barytes may be transparent and colourless, or white and opaque, or of a yellow, brown, bluish or greenish colour. Well developed crystals are extremely common, but the mineral occurs also in a granular, earthy, or stalactitic condition. It is known as cawk in the Derbyshire lead mines. The " crested " or " cock's comb " barytes occurs as rounded aggregations of thin lamellar crystals.

Barytes is of common occurrence in metalliferous veins, especially those which yield ores of lead and silver; some of the largest and most perfect crystals of colourless barytes were obtained from the lead mines near Dufton in Westmorland. It is found also in beds of iron ore, and the haematite mines of the Cleator Moor district in west Cumberland have yielded many extremely fine crystals, specimens of which may be seen in all mineral collections. In the neighbourhood of Nottingham, and other places in the Midlands, barytes forms a cementing material in the Triassic sandstones; amber-coloured crystals of the same mineral are found in the fuller's earth at Nutfield in Surrey; and the septarian nodules in London Clay contain crystals of barytes as well as of calcite. Crystals are found as a rarity in the amygdaloidal cavities of igneous rocks.

Artificially prepared crystals of barytes may be obtained by allowing a solution of a soluble barium salt to diffuse slowly into a solution of a soluble sulphate. Barium chloride is present in some natural waters, and when this is the case the interaction of sulphates results in a deposition of barytes, as has occurred in the pipes and water-boxes of the Newcastle-on-Tyne coal mines.

Commercially, barytes is used in the preparation of barium compounds, as a body for certain kinds of paper and cloth, and as a white pigment (" permanent white "). The finely powdered and washed mineral is too crystalline and consequently of insufficient opacity to be used alone as a paint, and is therefore mixed with " white lead," of which material it is also used as an adulterant. (L. J. S.)

BARYTOCALCITE, a rare mineral found only at Alston Moor in Cumberland, where it occurs as diverging groups of white transparent crystals lining cavities in the Mountain Limestone.

The crystals belong to the monoclinic system and are usually prismatic or blade-shaped in habit. The hardness is 4, and the sp. gr. 3-65. There are perfect cleavages parallel to the prism faces inclined at an angle of 73 6', and a less perfect cleavage parallel to the basal plane, the angle between which and the prism faces is 77 6'; the angles between these three cleavages thus approximate to the angles (74 55') between the three cleavages of calcite, and there are other points of superficial resem- blance between these two minerals. Chemically, barytocalcite is a double salt of barium and calcium carbonates, BaCa(C0 3) 2 , thus differing from the orthorhombic bromlite (q.v.) which is an isomorphous mixture of the two carbonates. (L. J. S.)

BARYTONE, or Baritone (Ital. baritono, from Gr. (japwovos, deep sounding), a musical term for the male voice whose range lies between those of the tenor and of the bass — a high bass rather than a low tenor; also the name of an obsolete stringed instru- ment like the viola da Gamba, and of the small Bt» or C saxhorn. BASALT, in petrology, one of the oldest rock names, supposed to be derived from an Ethiopian word basal, signifying a stone which yields iron; according to Pliny, the first basalts were obtained in Ethiopia. In current usage the term includes a large variety of types of igneous rock belonging to the basic subdivision, dark in colour weathering to brown, and comparatively rich in magnesia and iron. Somebasalts are in large measure glassy (tachylites) , and many are very fine grained and compact; but it is more usual for them to exhibit porphyritic structure, showing larger crystals of olivine, augite or felspar in a finely crystalline groundmass. Olivine and augite are the commonest porphyritic minerals in basalts, the former green or yellowish (and weathering to green or brown serpentine), the latter pitch-black. Porphyritic plagioclase felspars, however, are also very common, and may be one or two inches in length, though usually not exceeding a quarter of an inch; when fresh they are dark grey with smooth lustrous cleavage surfaces; when decomposed they become turbid, and assume grey or greenish shades. Basaltic lavas are frequently spongy or pumiceous, especially near their surfaces; and, in course of time, the steam cavities become filled with secondary

minerals such as calcite, chlorite and zeolites. Another characteristic of this group of rocks is the perfection with which many of them show prismatic or columnar jointing, a structure often called " basaltic jointing."

The minerals of basaltic rocks have a fairly uniform character throughout the whole group. In microscopic section the olivine is pale green or colourless, and is very frequently more or less altered to serpentine. The secondary mineral begins to form upon the surfaces and along the cracks of the olivine, gradually producing a mesh-work in the interstices of which small kernels of olivine remain; and when the process is completed the mesh structure persists in the resulting pseudomorph, giving a clear indication as to its history. The augite is mostly brown, often with a purplish tinge, hardly at all dichroic, but frequently showing zonal or hour-glass structure, and various types of twinning. It weathers to chlorite, uralite, calcite, &c. The plagioclase felspar, if fresh, is transparent and appears simple in ordinary light, but when polarized breaks up into a series of bars of different colours owing to its complex twinned structure. Practically all varieties of this mineral from anorthite to albite are known to occur in basalt, but by far the commonest species are bytownite and labradorite. Weathering destroys the limpid character of the fresh mineral, producing turbid pseudomorphs containing epidote, calcite, white micas, kaolin, &c. When these minerals occur as phenocrysts their crystalline outlines may be very perfect (though, especially in the olivine, corrosion and partial resorption may give rise to rounded or irregular forms) .

In the groundmass, or second generation of crystal, not only are ' the ingredients smaller, but their crystals are less perfect; yet in many basalts small lath-shaped felspars and minute prisms of

augite, densely crowded together, form the matrix. With these there may be a greater or less amount of brown, isotropic glass. Olivine rarely occurs as an ingredient of the groundmass. In the vitreous basalts sometimes very few crystallized minerals are observable; the greater part of the rock is a dark brown glassy material, almost opaque even in the thinnest sections, and gener- ally charged with black grains of magnetite, skeleton crystals of augite or felspar, spherulites, perlitic cracks, or steam vesicles. In other basaltic rocks no glassy material appears, but the whole mass is thoroughly crystallized; rocks of this nature are generally known to British petrologists as dolerites (q.v.). Till recent years it was widely believed by continental geologists that the pre-Tertiary basalts differed so fundamentally from their Tertiary and recent

representatives that they were entitled to be regarded as a distinct class. For the older rocks the names anamesite, diabase porphyrite, diabas-mandel-stein, or melaphyre were used, and are still favoured by many writers, to indicate varieties and states of more or less altered basalts and dolerites, though no longer held to differ in any essential respects from the better preserved basalts. Still older is the term trap, which is derived from a Swedish word meaning " a stair," for in many places superposed sheets of basalt weather with well-marked step- like or terraced features. This designation is still used as a general term for the whole suite of basaltic rocks by many geologists and travellers (e.g. trap-dikes, the " traps " of the Deccan).

In the early years of the 19th century a great controversy convulsed the geological world as to the origin of the older basalts or " floetz-traps." Werner, the Saxon mineralogist, and his school held them to be of aqueous origin, the chemical precipitates deposited in primeval seas, but Hutton and a number of French geologists maintained that they were really volcanic rocks emitted by craters now extinct (see Geology: Historical).

Of the less common minerals of basalt, a few may be mentioned. Black hornblende, dark brown in thin sections, and often corroded, is not uncommon, especially in intrusive basalts. Hypersthene occurs also, usually replacing olivine. Black mica (biotite) is not infrequently to be seen. Sapphire, garnet and zircon are rare. Minerals of the felspathoid group occur in a large number of basaltic rocks; nepheline and leucite are the most common, but haiiyne is occasionally present. If nepheline entirely replaces felspar, the rock is known as nepheline-basalt; if the replacement is only partial the term nepheline-basanite is used. Similarly there are leucite-basalts and leucite-basanites. The nepheline is in small six-sized prisms, and usually cannot be detected with the unaided eye. Even with the help of the microscope nepheline basalts are not always easy to determine, as the crystals may be exceedingly small and imperfect, and they readily decompose into analcite and zeolites. In some cases only the presence of an anisotropic substance, with weak double refraction and readily attacked by acids (the so-called " nephelinitoid "), can be made out. This substance may be imperfectly crystallized nepheline, or a peculiar glass which is rich in soda. Most nepheline basalts are fine grained, very dark coloured rocks, and belong to the Tertiary period. They are fairly common in some parts of Germany and occur also in Tripoli, Asia Minor, Montana, Cape Verde Islands, &c. Leucite-basalts contam small rounded crystals of leucite in place of plagioclase felspar. Rocks of this group are well known in the Eifel, and other volcanic districts in Germany, also in

Bohemia, Italy, Java, Montana, Celebes, &c. The minerals haiiyne, nosean, sodalite and melilite tend to occur with some frequency in nepheline and leucite-basalts, though rare in ordinary basalts. Melilite, a lime-alumina-silicate, is characteristic of certain very basic rocks, the melilite-basalts. It is pale yellow or colourless in thin sections, and yields peculiar and characteristic dark blue polarization colours. This rare group of rocks is known to occur in Bohemia, Swabia and South Africa. Perofskite, in small dark brown cubic crystals, is a constant accessory in these rocks. The augite is usually violet coloured, and shows zonal and hour-glass structures. Green augite may occur in the nepheline-basalts, and aegerine (soda-iron-augite) is occasionally found in them.

The distribution of basalts is world-wide; and in some places

they occur in immense masses, and cover great areas. In Washington, Oregon, and Idaho many thousands of square miles are occupied by Basaltic-lava flows. In the Sandwich Islands and Iceland they are the prevalent lavas; and the well-known columnar jointed basalts of Skye, Staffa, and Antrim (Giant's Causeway) form a southward extension of the Icelandic volcanic province, with which they are connected by the similar rocks of the Faeroe Islands. In the Deccan in India great basaltic lava fields are known; and Etna and Vesuvius emit basaltic rocks. In older geological periods they were not less common; for example, in the Carboniferous in Scotland. (J. S. F.)

BASCOM, JOHN (1827-), American educationalist and philosophical writer, was born at Genoa, New York, on the 1st of May 1827. He graduated at Williams College in 1849 and at the Andover Theological Seminary in 1855, was professor of rhetoric at Williams College from 1855 to 1874,' and was president of the University of Wisconsin and professor of mental and moral philosophy there from 1874 to 1887. In 1887-1801 and in 1901-1903 he was lecturer in sociology, and in 1891-1901 professor of economics in Williams College. He retired in 1903. Among his publications may be mentioned: Aesthetics (1862); Philo- sophy of Rhetoric (1865); Science, Philosophy, and Religion (1871); Philosophy of English Literature (187 4) ; Philosophy of Religions (1876);. Problems in Philosophy (1885); The New Theology (1891); Social Theory (1895); Evolution and Religion (1896); Growth of "Nationality in the United States (1899); and God and His Goodness

(1901).

BASE. (1) (Fr. bas, Late Lat. bassus, low; cf. Gr. fiadvs) an adjective meaning low or deep, and so mean, worthless, or wicked. This sense of the word has sometimes affected the next, Which is really distinct. (2) (Gr. /3a

In chemistry the term denotes a substance which combines with an acid to form a salt. In inorganic chemistry such com- pounds are almost invariably oxides or hydroxides, and water Js eliminated during the combination; but in organic chemistry many compounds exist, especially ammonia derivatives; which directly combine with acids. Chemical bases are consequently antithetical to acids; and an acid is neutralized by a base with the production of a salt. They reverse certain colour reactions of acids, e.g. turn red litmus blue; this is termed an " alkaline reaction."

In architecture the " base " is the lowest member of a column or shaft. In Egyptian and Greek architecture it is the raised slab in stone or cement on which the primitive timber column was placed, to keep it dry. Afterwards it was always reproduced in Egypt, even although the column, being in stone, ho longer required it; a custom probably retained because, being of a much larger circumference than the lower part of the column, it gave increased stability. In Assyrian architecture, where it served to carry wooden posts or columns, it took the form of a large torus moulding with enrichments. In Persian archi- tecture the base was much higher than in any other style, and was elaborately carved. In primitive Greek work the base consisted of the stone plinth as found in Crete and Tiryns, and of three small steps at Mycenae. In archaic Greek work it has already disappeared in the Doric order, but in the Ionic and Corinthian orders it is more or less richly moulded, the most elaborate examples being those found in the temple of Apollo at Branchidae in Milesia. For the contour of the mouldings see Orders. The Roman orders all have the favourite design known as the Attic base. Romanesque bases were rude but vigorous copies of the old classic base, and were often decorated with projections or spurs (Fr. grijfes) at the angles of the square dies, thus connecting them with the square base. In the Early English

style, these spurs followed the conventional design of the period, and about the same time the mouldings were deeply sunk and occasionally cut downwards, so that they would have held water if used externally. Later, the base becomes less bold in treat- ment, but much more complex in its contours, and in the 15th century is given

an unusual height with two stages, the lower one constituting a kind of plinth, which is sometimes known as the ground table, or the base course.

‘ A Base Court (Fr. basse com, i.e. the lower court), is the first open space within the gates of a castle. It was used for exercising cavalry, and keeping live stock during a siege. (See Enceinte).

The Base of a Waix or Ground Table, in architecture, is the mouldings round a building just above ground; they mostly consist of similar members to those above described and run round the buttresses. The flat band between the plinth and upper mouldings is frequently panelled and carved with shields, as in Henry VII. Chapel at Westminster.

BASE-BALL (so-called from the bases and ball used), the national summer sport of the United States, popular also through- out Canada and in Japan. Its origin is obscure. According to some authorities it is derived from the old English game of rounders (q.v.), several variations of which were played in America during the colonial period; according to other authori- ties, its resemblance to rounders is merely a coincidence, and it had its origin in the United States, probably at Cooperstown, New York, in 1839, when, it is said, Abner Doubleday (later a general in the U.S. army) devised a scheme for playing it. About the beginning of the 19’th century a game generally known as ” One Old Cat ” became popular with schoolboys in the North Atlantic states; this game was played by three boys, each fielding and batting in turn, a run being scored by the batsman running to a single base and back without being put out. Two Old Cat, Three Old Cat, and Four Old Cat were modifications of this game, having respectively four, six, and eight players. A development of this game bore the name of town-ball, and the Olympic Town-Ball Club of Philadelphia was organized in 1833. Matches between organized base-ball clubs were first played in the neighbourhood of New York, where the Washington Baseball Club was founded in 1843. The first regular code of rules was drawn up in 1845 by the Knickerbocker Baseball Club and used in its matches with the Gotham, Eagle and Empire Clubs of New York, and the Excelsior, Putnam, Atlantic and Eckford clubs of Brooklyn. In 1858 the first National Associa- tion was organized, and, while its few simple laws were generally similar to the corresponding rules of the present code, the ball was larger and ” livelier,” and the pitcher was compelled to deliver it with a full toss, no approach to a throw being allowed. The popularity of the game spread rapidly, resulting in the organization of many famous clubs, such as the Beacon and Lowell of Boston, the

Red Stockings of Cincinnati, the Forest City of Cleveland and the Maple Leaf of Guelph, but, owing to the sharp rivalry between the foremost teams, semi-profes- sionalism soon crept in, although in those days a man who played for a financial consideration always had some other means of livelihood, as the income to be derived from playing ball in the summer time was not enough to support him throughout the year. In spite of its popularity, the game acquired certain undesirable adjuncts. The betting and pool selling evils became prominent, and before long the game was in thorough disrepute. It was not only generally believed that the matches were not played on their merits, but it was known that players themselves were not above selling contests. At that time many of the journals of the day foretold the speedy downfall of the sport. A convention of those interested financially and otherwise in the game, was held in 1867 in Philadelphia, and an effort was made to effect a reformation. That the sport even then was by no means insignificant can be seen from the fact that in that convention some 500 organizations were represented. While the work done at the convention did not accomplish all that was expected, it did produce certain reforms, and the sport grew rapidly thereafter both in the eastern and in the middle western part of the United States. In the next five years the

interest in the game became so great that it was decided to send a representation of American base-ball players to England; and two clubs, the Bostons, who were the champions that year, and the Athletics, former champions, crossed the Atlantic and played several exhibition games with each other. While success- ful in exciting some interest, the trip did not succeed in populariz- ing base-ball in Great Britain. Fifteen years later two other nines of representative American base-ball players made a general tOur of Australia and various other countries, completing their trip by a contest in England. This too, however, had little effect and later attempts to establish base-ball in England have likewise been unsuccessful. But in America the game continued to prosper. The first entirely professional club was the Cincinnati Red Stockings (1868). Two national associations were formed in 1871, one having jurisdiction over professional clubs and the other over amateurs. In 1876 was formed the National League, of. eight clubs under the presidency of Nicholas E. YouBg* which contained the expert ball-players of the country. There were so many people in the United States who wanted*

to see profes- sional base-ball that this organization proved too small to, furnish the desired number of games, and hence in 1882 the American Association was formed. For a time it seemed that there would be room for both organizations; but there was considerable rivalry, and it was not until an agreement was made between the two organizations that they were able to work together in harmony. They practically controlled professional base-ball for many years, although there were occasional attempts to overthrow their authority, the most notable being the formation in 1890 of a brotherhood of players called the Players' League, organized for the purpose of securing some of the financial benefits accruing to the managers, as well as for the purpose of abolishing black-listing and other supposed abuses. The Players' League proved not sufficiently strong for the task, and fell to pieces. For some years the National League consisted of twelve clubs organized as stock companies, representing cities as far apart as Boston and St Louis, but in 1900 the number was reduced to eight, namely, Boston, Brooklyn, Chicago, Cincinnati, New York, Pittsburg, Philadelphia and St Louis. Certain aggressive and dissatisfied elements took advantage of this change to organize a second great professional association under the presidency of B. B. Johnson, the " American League," of eight clubs, six of them in cities where the National League was already represented. Most of the clubs of both leagues flourish financially, as also do the many minor associations which control the clubs of the different sections of the country, among which are the Eastern League, the American Association, Western League, Southern Association, New England League, Pacific League and the different state leagues. Professional base-ball has not been free from certain objectionable elements, of which the unnecessary and rowdyish fault-finding with the umpires has been the most evident, but the authorities of the different leagues have lately succeeded, by strenuous legislation, in abating these, Of authorities on base-ball, Henry Chadwick (d. 1908) is the best known.

Amateur base-ball, in its organized phase, is played mostly by school and university clubs as well as those of athletic associa- tions. The first college league was formed in 1879 and comprised Harvard, Princeton, Amherst, Brown and Dartmouth, Yale joining a year later. The Eastern College League, with Columbia, Harvard, Princeton and Yale, followed in 1887. This was after- wards dissolved and at present the most important universities of the eastern states are members of no league, although such organizations exist in New England and different parts of the west and south. Amateur base-ball has progressed along the same fines as

professional, although the college playing rules formerly differed in certain minor points from those of the professional leagues.

The following is a general description of the field and of the manner in which the game is played, but as the game has become highly complicated, situations may arise in playing in which general statements do not strictly hold. Any smooth, level field about 150 yds. long and 100 yds. broad will serve for a

base-ball ground. Upon this field is marked out with white chalk a square, commonly called the diamond, smooth, like a cricket pitch, the sides of' which measure 30 yds. each, and the nearest corner of which is distant about 30 yds. from the limit of the field. This corner is marked with a white plate, called the home-base or plate, five-sided in shape, two of the sides being 1 ft. long and that towards the pitcher 17 in. At the other three corners and attached to pegs are white canvas bags 15 in. square filled with some soft material, and called, beginning at the right as one looks towards the field, first-base, second-base and third- base respectively. The lines from home-base to first, and from home to third are indefinitely prolonged, and called foul-lines. The game is play«d by two sides of nine men each, one of these taking its turn at the bat while the other is in the field endeavour- ing, as provided by certain rules, to put out the side at bat. Each side has nine turns, or innings, at bat, unless the side last at bat does not need its ninth innings in order to win; a tie at the end of the ninth innings makes additional innings necessary. A full game usually takes from i| to 2 hrs. to play. Three batsmen are put out in each innings, and the side scoring the greatest number of runs (complete encircling of the bases without being put out) wins. A runner who is not put out but fails to reach home-base does not score a run; but is " left on base."

Implements of the Game. — The ball, which is 9-9J in. in circumference and weighs 5-51 oz., is made of yarn wound upon a small core of vulcanized rubber and covered with white leather, which may not be intentionally discoloured. The bat must be round, not over 2 f in. in diameter at the thickest part, nor more than 42 in. in length- It is usually made of ash or some other hard wood, and the handle may be wound with twine. Three- cornered spikes are usually worn on the players' shoes. The catcher and first-baseman (v. infra) may wear a glove of any size on one hand; the gloves worn by all other players may not measure more than 14 in. round the palm nor weigh more than 10 oz.

The Players. — The fielding side consists of (a) the pitcher and

catcher, called the battery, (b) the first-baseman, second- baseman, third-baseman and short-stop, calfed infielders, and (c) the left-fielder, centre-fielder and right-fielder, called outr fielders.

The pitcher, who delivers the ball to the batsman, is the most important member of the side. In the act of pitching, which is throwing either over or underhand, he must keep one foot in contact with a white plate, called the pitcher's plate, 24 in. long and 6 in: wide, placed 60-5 ft. from the back of the home-base. Before 1875 the pitcher was obliged to deliver the ball with a full toss only, but about that time a disguised underhand throw, which greatly increased the pace, began to be used so generally that it was soon legalized, and the overhand throw followed as a matter of course. As long as the arm was held stiff no curve could be imparted to the flight of the ball in the air, but with the increase of pace came the possibility of doing this by a movement of the wrist as the ball left the hand, the twist thus given causing the ball, by the pressure on the air, to swerve to one side or the other, or downwards, according to the position of the hand and fingers as the ball is let go. The commonest of these swerving deliveries, and the first one invented, is the out-curve, the ball coming straight towards the batsman until almost within reach of his bat, when it suddenly swerves away from him towards the right, if he be right-handed. The other important curves are the in- curve, shooting sharply to the left, and the drop, with their many variations, nearly every pitcher using some favourite curve; Change of pace, disguised as well as possible, is also an important part of pitching strategy, as well as variation of the delivery and the play upon the known weaknesses or idiosyncrasies of the batsman. Good control over the ball is a necessity, as four "balls " called by the umpire,— that is, balls not over the base, or over the base and not between the shoulder and knee of the batsman,-— entitle the batsman to become a base-runner and take his first base. If the pitcher disregards the restrictions placed upon him by the rules {e.g. he may not, while in position, make a motion to deliver the ball to the batsman without actually*

delivering it, or to first -base, while that base is occupied by a runner, without completing the throw) , he is said to have made a balk, which permits a base runner to advance a base. In fielding batted balls the pitcher takes all that come directly to him, especially slow ones which the ether fielders cannot reach in time. One of his

duties is to " back up " the first-baseman in order to stop balls thrown wide, and to cover first-base in place of the baseman whenever that player has to leave his base to field a ground ball. On occasion he also backs up other positions. The catcher usually stands about 1 yd. behind the home plate, and he must never be more than 10 ft. behind the home plate when the pitcher delivers the ball to the batsman. He generally catches the ball from the pitcher before it strikes the ground, and, when a man of the opposing side has succeeded in getting to a base, must be on the alert to head this opponent off should he endeavour to steal the next base, i.e. run to it while the pitcher is delivering the ball to the batsman. For this reason the catcher must be a quick, strong and

tottorm Position Itn Monf

*Bottora PonTtlan flifnt Nam**

Potition of Stcofd BM$tmt

accurate thrower. As the catcher alone faces the whole field, he is able to warn the pitcher when to throw to a base in order to catch a runner napping off the base, and by secretly signalling to the pitcher (usually by means of signs with his fingers) he directs what kind of a ball is to be pitched, so that he may be in the proper position to receive the ball, be it high or low, to left or right. Some pitchers, however, prefer to reserve their choice of balls and there- fore do the signalling them- selves. The catcher wears a mask, a breast-pad, and a large glove, without which the position would be a very dangerous one.

As every batsman upon hitting the ball must run for the first-base, the first- baseman must be a sure catch of balls thrown to head runners off, even those thrown too low, high or wide. A tall man is usually chosen for this position. The second – baseman usually stands about 30 ft. to the right of second-base and back of the line between the bases, and attends to balls batted to his side of the diamond. He also backs up any exposed position and must be ready to cover second-base whenever a runner tries to steal down from first-base, or whenever there is a runner on second-base, a duty which he shares with the short-stop, whose position corresponds to that of the second-baseman on the left side of the diamond. Short-stop must be a quick and accurate thrower and a lively fielder, as he is required to back up second-and third-base. Both he and the second-baseman must field ground balls cleanly and are often called upon to catch fly balls also. The requirements of third-baseman are

very similar, but he must be an exceptionally good thrower, as he has the longest distance to throw to the first-base; and as he plays nearer to the batsman than do the second-baseman and the short-stop, the balls batted in his direction are apt to be faster and more difficult to field. One of the third-baseman's chief duties is to be ready to run in towards the batsman to field " bunts," i.e. balls blocked by allowing them to rebound from a loosely held bat. These commonly roll slowly in the

Cff?A«rs Positron

Potition of flight Fitldof

Diagram of Base-ball Field.

direction of third-baseman, who, in order to get them to first-base in time to put the runner out, must run in, pick them up, usually with one hand, so as to be in position to throw without the loss of an instant, and " snap " them to the first-baseman, i.e. throw them underhand without taking time to raise his body to an erect position. Many of these bunts can be fielded either by the pitcher or, if they drop dead in front of the home-plate, by the catcher. The positions of the three outfielders can be seen on the diagram. Their duties consist of catching all " flies " batted over the heads of the infielders (i.e. high batted balls that have not touched the ground) , stopping and returning ground balls that pass the infield, and backing up the baseman. The accompanying diagram indicates the territory roughly allotted to the different fielders. " Backing up " is a very prominent feature in fielding. Even the pitcher, for example, should run behind the first-baseman when the ball is thrown to the latter by another, in order to stop a widely thrown or missed ball,

which, if allowed to pass, would enable the runner to gain one or more additional bases. Bases vacated by their basemen while field- ing balls must often, also, be promptly covered by an- other player. The general rule of defence strategy is similar to that in cricket, namely, to have as many men as possible at the probable point of attack. There is usually an infield and an outfield captain for the special purpose of call- ing the name of the player who is to take a certain fly ball, to prevent collisions.

The batsman stands three – quarters facing the pitcher within a parallelo- gram ("box") 6 ft. long and 4 ft. wide, the lines of which he may not overstep, on penalty of being declared out. His object is to get to first-base without being put out. This he may do in several

ways. (1) He may make a " safe-hit," i.e. one that is " fair " but cannot be caught, or fielded in time to put him out. (2) He is entitled to first-base if the

Potition of Stiort Stop

Posltt'01 o] toft fioldtr*

9

fition of

Petition Ctotro Pitlo'of

pitcher pitches four bad balls, at none of which he (the batsman) has struck. (3) He may be unavoidably struck by a pitched ball, in which case he is given his base. (4) He may, except in certain specified cases, after a third strike, if the catcher has failed to catch the third one, earn his base if he can reach it before the catcher can throw the ball to the first-baseman, and the first- baseman, with the ball in his possession, touch first-base. (5) He may reach his base by an error of some fielder, which may be either a muffed fly, a failure to stop and field a ground ball, a muffed thrown ball or a bad throw. Only balls batted within the foul-lines (see diagram) are fair. All others are " fouls," and the batsman cannot run on them. All foul-struck balls are called strikes until two strikes have been called by the umpire, after which fouls are not counted.

Batting, as in cricket, is a science by itself, although compara- tively more stress is laid on fielding than in cricket. A good batsman can place the ball in any part of the field he chooses by meeting the ball at different angles. He may make a safe hit either by hitting the ball on the ground directly through the infield out of reach of the fielders, or so hard that it cannot be

BASEDOW

461

stopped. In the last case a failure to stop and field it does not count as an " error " (misplay) for the fielder, even though it came straight at him, the decision as to errors appearing in the score (v. infra) depending upon the official scorer of the home club. The batsman may also hit safely by placing the ball over the heads of the infielders, but not far enough to be caught by the outfielders, or over the heads of the outfielders themselves, or he may bunt successfully.

A hit by which two bases can be made (without errors by opponents) is a " two-base-hit," one for three bases a " three-base-hit," and one for four bases a " home-run." The batsman may be put out in various ways. For example, he is out (1) if he fails to bat in the order named in the published batting-list; (2) if he fails to take his position within one minute after the umpire has summoned him; (3) if he makes a foul hit which is caught before it strikes the ground (a ball barely ticked by the bat [" foul-tip "] does not count) ; (4) if he oversteps the batting-lines; (5) if he intentionally obstructs or interferes with the catcher; (6) if he unsuccessfully attempts the third strike and the ball hits his person or is caught by the catcher (under certain conditions he is out whether the ball is so caught or not), or, not being caught, is thrown to first-base and held there by an opposing player before the batsman can get there; (7) if a fair ball be caught before striking the ground; (8) if any fair ball is fielded to first-baseman before he reaches the base. The batsman becomes a base-runner the moment he starts for first-base. He may, when he first reaches first-base, overrun his base (provided he turns to his right in returning to it) without risk of being put out, but thereafter can be put out by being touched with the ball in the hands of a fielder unless some part of the runner's person is in contact with the base. When a fair or foul ball struck by a batsman on his side is caught on the fly, he must retouch his base, or be put out if the baseman receives the ball before he can do so. A runner on first-base is forced to run to second as soon as a fair ball is batted, or, being on second with another runner on first, he is forced to run to third. This is called being " forced off his base." In such a situation the forced runner can be put out if the ball is thrown to the baseman at the next base before the runner gets there. He does not require to be touched with the ball. The runner on first is entitled, however, to advance to second without risk of being put out if the batsman becomes similarly entitled to first-base (e.g. on being unavoidably struck by the ball, or on four balls) . Frequently, if the ball is batted to the infield while a runner is on first-base, the fielder tosses it to second-baseman, putting out the runner, and the second-baseman has still time to throw the ball to first-base ahead of the batsman, thus completing a " double play." Triple plays are sometimes made when there are runners on two or on all of the bases. Base-running is one of the important arts of base-ball play. A good base-runner takes as long a lead off the base as he dares, starts to run the moment the pitcher makes the first movement to deliver the ball, and if necessary throws himself with a slide, either feet or head first, on to the objective base, the reason for the slide being to make it more difficult for the baseman to touch the runner, having to stoop in order to do so, thus

losing time. A base-runner is out if he interferes with an opponent while the latter is fielding a ball or if he is hit by a batted ball. An example of modern base-running is offered by the " double steal," carried out, e.g., when there is a runner on first-base and a runner on third-base. The runner on first starts for second leisurely in order to draw a throw to second by the catcher. If the catcher throws, the runner on third runs for the home-plate, the second- baseman returning the ball to the catcher in order to put the runner out. The play often results in a score, but the runner is frequently caught if the throws are quick and accurate, or when the catcher deceives the runner by throwing, not to the player at second-base, but to a man stationed for the purpose much nearer the home-plate, this man intercepting the ball and return- ing it to the catcher if the runner on third is attempting to score, or letting it pass to the player on second-base, if the runner on third does not make the attempt.

Team batting is the co-operation of batsman and base-runner. The commonest example is the " hit and run " play, e.g. when a

runner is on first-base. After the runner has ascertained by a false start which infielder, whether second-baseman or short-stop, will cover second-base, the batsman signals to the runner that he will hit the next ball. As soon as the pitcher delivers the ball the runner starts for second and the batsman hits the ball to that part of the infield vacated by the fielder who has gone to receive the ball at second from the catcher. If successful this play results in a safe hit, while the runner not infrequently makes, not only second, but third-base as well. Another instance of team batting is when a runner is on third-base and the batsman signals that he will hit the next ball. This enables the runner to get a long start, making his scoring nearly certain if the batsman succeeds in hitting the ball fairly. If the ball is hit without the signal and consequent long start by the runner, the latter is frequently put out at the plate, as the infielder who fields the ball will ignore the batsman and throw the ball to the catcher to head off the runner and prevent a run being scored. In close games the " sacrifice-hit," a part of team batting, is an important element. It consists, when a runner is on base, of a hit by the batsman resulting in his own retirement but the advancement to the next base of the runner. The sacrifice-hit is most frequently a bunt, as this gives the batsman the best chance of reaching first-base safely, besides surely advancing the runner. Another kind of sacrifice-hit is a long fly to the outfield. On such a hit a runner on third-base (as on the other bases) must remain on the base until after the ball is caught, but the distance from the outfield to the home-plate is so great that a fast runner can generally beat the ball and score his run. When men are

on bases, coaches are allowed to stand near first and third bases to direct the runners.

One umpire, who has absolute jurisdiction over all points of play, usually officiates in base-ball, but, in important games, two umpires are often employed, one of them standing behind the catcher and calling the good and bad balls pitched, and the other, posted in the infield, giving decisions on plays at the bases.

In cases where the game is tied after nine innings, extra ones are played, the umpire " calling " a game when it becomes too dark to play. In case of rain, play is suspended by the umpire, who calls the game if the rain continues for one half-hour. Should play be permanently interrupted the game counts if five innings have been completed by each side.

Scoring. — The base-ball score shows, in vertical columns, (1) how many times each player has been at bat (bases taken on balls and sacrifice-hits not counted); (2) how many runs he has scored; (3) how many base-hits he has made; (4) how many sacrifice-hits he has made; (5) how many opponents he has put out; (6) how many "assists," i.e. times he has assisted in putting out (e.g. stopping a ground ball and throwing it to first-base) ; (7) the number of errors he has made, wild pitches and "passed balls," i.e. not held by the catcher, as well as balks and bases on balls, not being counted as errors but set down under the regular columns, together with the record of stolen bases, extra long hits, double and triple plays, batsmen struck out by each pitcher, the number of men struck by each pitcher with the ball, the time of the game and the name of the umpire.

Careful record is kept of the batting, fielding, pitching and base-running averages of both professional and amateur players. To find the batting record of a player, divide the number of hits made by the number of times at bat. To find a fielding record, divide the number of accepted chances by the total chances, e.g. A.B. put 1 188 men out, and assisted sixty-four times, while making fifteen errors; his fielding average is therefore 1252 divided by 1267, or 988, 1000 being perfect fielding.

See Spalding's Base-ball Guide, in Spalding's Athletic Library, published annually; How to Play Base-ball, by T. H. Murnane, Spalding's Athletic Library ; The Book of School and College Sports, by R. H. Barbour (New York, 1904). (E. B.)

BASEDOW, JOHANN BERNHARD (1723-1790), German educational reformer, was born at Hamburg on the nth of September 1723, the son of a hairdresser. He was educated at the Johanneum in that town, where he came under the influence of the rationalist H. S. Reimarus (1694-1768), author of the

famous Wolfenbiitteler Fragmente, published by Leasing. In 1744 he went to Leipzig as a student of theology, but gave him- self up entirely to the study of philosophy. This at first induced sceptical notions; a more profound examination of the sacred writings, and of all that relates to them, brought him back to the Christian faith, but, in his retirement, he formed his belief after his own ideas, and it was far from orthodox. He returned to Hamburg, and between 1749 and 1753 was private tutor in a nobleman's family in Holstein. Basedow now began to exhibit his really remarkable powers as an educator of the young, and acquired so much distinction that, in 1753, he was chosen professor of moral philosophy and belles-lettres in the academy of Soro in Denmark. On account of his theological opinions he was in 1761 removed from this post and transferred to Altona, where some of his published works brought him into great disfavour with the orthodox clergy. He was forbidden to give further instruction, but did not lose his salary; and, towards the end of 1767, he abandoned theology to devote himself with the same ardour to education, of which he conceived the project of a general reform in Germany. In 1768 appeared his Vorstel- lung an Mensckcnfreunde fur Schulen, nebst dent Plan eines Elementarbuches der mcnschlichen Erkenntnisse, which was strongly influenced by Rousseau's Mmile. He proposed the reform of schools and of the common methods of instruction, and the establishment of an institute for qualifying teachers, — soliciting subscriptions for the printing of his Elementarwerk, where his principles were to be explained at length, and illus- trated by plates. The subscriptions for this object amounted to 15,000 Talers (£2250), and in 1774 he was able to publish the work in four volumes. It contains a complete system of primary education, intended to develop the intelligence of the pupils and to bring them, so far as possible, into contact with realities, not with mere words. The work was received with great favour, and Basedow obtained means to establish an institute for education at Dessau, and to apply his principles in training disciples, who might spread them over all Germany. The name of Philanthropin which he gave to the institution appeared to him the most expressive of his views; and he

engaged in the new project with all his accustomed ardour. But he had few scholars, and the success by no means answered his hopes. Nevertheless, so well had his ideas been received that similar institutions sprang up all over the land, and the most prominent writers and thinkers openly advocated the plan. Basedow, un- fortunately, was little calculated by nature or habit to succeed in an employment which required the greatest regularity, patience and attention; his temper was intractable, and his management was one long quarrel with his colleagues. He resigned his direc- torship of the institution in 1778, and it was finally closed in 1793. Basedow died at Magdeburg on the 25th of July 1790.

See H. Rathmann, Beitrage zur Lebensgeschichle Basedows (Magde- burg, 1791); J. C. Meyer, Leben, Charakter und Schriften Basedows (2 vols., Hamburg, 1791-1792); G. P. R. Hahn, Basedow und sein Verhaltnis zu Rousseau (Leipzig, 1885); A. Pinloche, Basedow et le philanthropinisme (Paris, 1890) ; C. Gossgen, Rousseau und Basedow

(1891).

BASE FEE, in law, a freehold estate of inheritance which is limited or qualified by the existence of certain conditions. In modern property law the commonest example of a base fee is an estate created by a tenant in tail, not in possession, who bars the entail without the consent of the protector of the settlement. Though he bars his own issue, he cannot bar any remainder or reversion, and the estate (i.e. the base fee) thus created is deter- minable on the failure of his issue in tail. An, example of this kind of estate was introduced by George Eliot into the plot of Felix Holt. Another example of a base fee is an estate descend- ible to heirs general, but terminable on an uncertain event; for example, a grant of land to A and his heirs, tenants of the manor of Dale. The estate terminates whenever the prescribed qualifi- cation ceases. An early meaning of base fee was an estate held not by free or military service, but by base service, i.e. at the will of the lord.

BASEL (Fr. Bdle), one of the most northerly of the Swiss cantons, and the only one (save Schaffhausen) that includes any

territory north of the Rhine. It is traversed by the chain of .the Jura, and is watered by the Birs and the Ergolz, both tributaries (left) of the Rhine. It is traversed by railways from Basel to Olten (25 m.) and to Laufen (14! m.), besides local lines from Basel to Fluhen (8 m.) for the frequented pilgrimage resort of Mariastein, and from

Liestal to Waldenburg (8f m.), From 1803 to 1814 the canton was one of the six " Directorial " cantons of the Confederation. Since 1833 it has been divided into two half cantons, with independent constitutions.

One is that of Basel Stadt or Bale Ville, including, besides the city of Basel, the three rural districts (all to the north of the Rhine) of Riehen, Bettingen and Klein Hiiningen (the latter now united to the city). The total area of this half canton is 13-7 sq. m. only, of which n sq. m. are classed as " productive," forests occupying 1-5 sq. m., but its total population in 1000 was 112,227 (of whom 3066 inhabited the rural, districts), mainly German-speaking, and numbering 73,063 Protestants, 37,191 Romanists (including the Old Catholics), and 1897 Jews. The cantonal constitution dates from 1889. The executive of seven members and the legislature (Grossrat) of 130 members, as well as the one member sent to the Federal Slander at and the six sent to the Federal Nationalrat, are all elected by a direct popular vote for the term of three years. Since 1875, 1000 citizens can claim a popular vote {facultative Referendum) von all bills, or can exercise the right of initiative whether as to laws oj; the revision of the cantonal constitution.

The other half canton is that of Basel Landschaft or Bale Campagne, which is divided into four administrative districts and comprises seventy -four communes, its capital being Liestal. Its total area is 165 sq. m., of which all but 5 sq. m, is reckoned "productive" (including 55-9 sq. m, of forests). In 1900 its total population was 68,497, nearly all German-speaking, while there were 52,763 Protestants, 15,564 Romanists, and 130 Jews.

The cantonal constitution dates from 1892, The executive of 5 members and the legislature or Landrat (one member pec 800 inhabitants or fraction over 400), as .well as the single member sent to the Federal Standerat and the three sentto the Federal Nationalrat, are all elected by a direct popular vote for three years. The " obligatory Referendum "obtains in the case of all laws, while 1500 citizens have the right of " initiative " whether as to laws or the revision of the cantonal constitution. Silk ribbon weaving, textile industries and the manufacture of tiles are carried on. (w. A. B. C.)

BASEL (Fr. Bdle, but Bade is a wholly erroneous form; Ital. Basilea), the capital of the Swiss half canton of Basel Stadt or Bale Ville. It is now the second most populous (109,161 inhabit- ants) town (ranking after Zurich) in the Swiss Confederation, while it is reputed to be the richest, the number of resident millionaires (in francs)

exceeding that of any other Swiss town. Both facts are largely due to the opening (1882) of the St Gotthard railway, as merchandise collected from every part of north and central Europe is stored in Basel previous to being redistributed by means of that line. Hence the city has an extremely large and flourishing transit trade, despite the rather dingy appearance of its older portions. The city is divided by the Rhine into Gross Basel (south) and Klein Basel (north), the former being by far the larger. There are several bridges over the river, the old wooden bridge having been replaced in 1905 by one built of stone. The central or main railway station is in Gross Basel, while the Baden station is in Klein Basel. The most prominent building in the city is the cathedral or Minister, built of deep red sand- stone, on a terrace high above the Rhine. It was consecrated in 1019, but was mainly rebuilt after the disastrous earthquake of 1356 that nearly ruined the city. The public meetings of the great oecumenical council (1431-1449) were held in the choir, while the committees sat in the chapter-house. Erasmus lived in Basel 1521-1529, and on his death there (1536) was buried in the cathedral, attached to which are cloisters, in which various celebrated men are buried, e.g. Oecolampadius (d. 1531), Grynaeus (d. 1541), Buxtorf (d. 1732). The 16th-century Rathaus or town hall has recently been restored. In the museum is a fine collection of works of art by Holbein (who lived in Basel from

1528 to iS3i), while the historical museum (in the old Franciscan church) contains many treasures, and among them the fragments of the famous Dance of Death, wrongly attributed to Holbein. The university (founded by Pius II. in 1460) is the oldest in Switzerland, and of late years has been extended by the con- struction of detached buildings for the study of the natural sciences, e.g. the Vesalianum and the Bernoullianum. The university library is very rich, and contains the original MSS. of the acts of the great oecumenical council. There are a number of modern monuments in the city, the most important being that set up to the memory of the Swiss who fell in the battle of St Jakob (1444), won by the French. Basel is the seat of the chief missionary society in Switzerland, the training school for mis- sionaries being at St Chrischona, 6 m. out of the city.

The town was founded in a.d. 374 by the emperor Valentinian, from whose residence there it takes its name. In the 5th century the bishop of Augusta Rauricorum (now called Kaiser Augst), 77 m. to the east,

moved his see thither. Henceforth the history of the city-is that of the growing power, spiritual and temporal, of the bishops, whose secular influence was gradually supplanted in the 14th century by the advance of the rival power of the burghers. In 1356 the city was nearly destroyed by a great earthquake. After long swaying between the neighbouring Rhine cities and the Swiss Confederation, it was admitted into the latter in 1501. It later became one of the chief centres of the Reformation movement in Switzerland, so that the bishop retired in 1525 to Porrentruy, where he resided till 1792, finally settling at Soleure in 1828, the bishopric having been wholly reorganized since 1814. As in other Swiss towns the trade gilds got all political power into their hands, especially by the 18th century. They naturally favoured the city at the expense of the rural districts, so that in 1832 the latter proclaimed their independence, and in 1833 were organized into the half canton of Basel Landschaft, the city forming that of Basel Stadt.

See Easier Biographien (3 vols., 1 900-1905) ; Basler Chroniken (original chronicles), (5 vols., Leipzig, 1872-1890); H. Boos, Geschichte von Basel, vol. i. (to 1501) alone published (1877); A. Burckhardt, Bilder aus d. Geschichte von Basel (3 vols., 1869-1882) ; Festschrift z. 400ten Jahrestage d. ewig. Bundes zwisch. B. und den Eidgenossen (1901) ; T. Geering, Handel und Industrie d. Stadt Basel (1885) ; A. Heusler, Verfassungsgeschichte d. Stadt Basel im Mittelalter (i860), and Rechtsquellen von Basel (2 vols., 1 856-1 865); L. A. Stacker, Basler, Stadtbilder (1890); L. Stouff, Pouvoir temporel des eveques de Bdle (2 vols., Paris, 189 1); R. Thommen, Gesch. d. Universitdt B., 1532-1632 (1889); Urkundenbuch d. Landschaft B. (pub. from 1881), and ditto for the city (pub. from 1890); W. Vischer, Gesch. d. Universitdt B., 1460-1529 (i860) ; R. Wackernagel, Gesch. d. Stadt Basel (3 vols., 1906 sqq.); K. Weber, Die Revolution im Kanton Basel, 1830-1833 (1907) ; G. Gautherot, La Republique rauracienne (1908). (W. A. B. C.)

BASEL, CONFESSION OF, one of the many statements of faith produced by the Reformation. It was put out in 1534 and must be distinguished from the First and Second Helvetic Confessions, its author being Oswald Myconius, who based it on a shorter confession promulgated by Oecolampadius, his predecessor in the church at Basel. Though it was an attempt to bring into line with the reforming party both those who still inclined to the old faith and the anabaptist section, its publica- tion provoked a good deal of controversy, especially on its statements concerning the Eucharist, and the people of Strass- burg even reproached those of Basel with celebrating a Christless supper. Up to the year 1826 the Confession (sometimes

also known as the Confession of Miihlhausen from its adoption by that town) was publicly read from the pulpits of Basel on the Wednesday of Passion week in each year. In 1872 a resolution of the great council of the city practically annulled it.

BASEL, COUNCIL OF. A decree of the council of Constance (9th of October 1417) sanctioned by Martin V. had obliged the papacy periodically to summon general councils. At the expiry of the first term fixed by this decree, Martin V. did, in fact, call together at Pavia a council, which it was necessary to transfer almost at once to Siena,. owing to an epidemic, and which had to be dissolved owing to circumstances still imperfectly known, justas it was beginning to discuss the subject of reform (1424).

The next council was due to assemble at the expiry of seven years, i.e. in 143 1; with his usual punctuality, Martin V. duly convoked it for this date to the town of Basel, and selected to preside over it the cardinal Julian Cesarini, a man of the greatest worth, both intellectually and morally. Martin himself, however, died before the opening of the synod.

From Italy, France and Germany the fathers were slow in appearing at Basel. Cesarini devoted all his energies to the war against the Hussites, until the disaster of Taus forced him hastily to evacuate Bohemia. The progress of heresy, the reported troubles in Germany, the war which had lately broken out between the dukes of Austria and Burgundy, and finally, the small number of fathers who had responded to the summons of Martin V., caused that pontiff's successor, Eugenius IV., to think that the synod of Basel was doomed to certain failure. This opinion, added to the desire which he had of himself pre- siding over the council, induced him to recall the fathers from Germany, whither his health, impaired of late, probably owing to a cerebral congestion, rendered it all the more difficult for him to go. He commanded the fathers to disperse, and appointed Bologna as their meeting-place in eighteen months' time, his intention being to make the session of the council coincide with some conferences with representatives of the Greek church, which were to be held there with a view to union (18th December 1431).

This order led to an outcry among the fathers of Basel and incurred the deep disapproval of the legate Cesarini. The Hussites, it was said, would think that the Church was afraid to face them; the laity would accuse the clergy of shirking reform; in short, this failure of the councils would produce disastrous effects. In vain did the pope explain his reasons and yield certain points; the fathers would listen

to nothing, and, relying on the decrees of the council of Constance, which amid the troubles of the schism had proclaimed the superiority, in certain cases, of the council over the pope, they insisted upon their right of remaining assembled, hastily beat up the laggards, held sessions, promulgated decrees, interfered in the government of the papal countship of Venaissin, treated with the Hussites, and, as repre- sentatives of the universal Church, presumed to impose laws upon the sovereign pontiff himself. Eugenius IV. resolved to resist this supremacy, though he did not dare openly to repudiate a very widespread doctrine considered by many to be the actual foundation of the authority of the popes before the schism. However, he soon realized the impossibility of treating the fathers of Basel as ordinary rebels, and tried a compromise; but as time went on, the fathers became more and more intractable, and between him and them gradually arose an impassable barrier.

Abandoned by a number of his cardinals, condemned by most of the powers, deprived of his dominions by condottieri who shamelessly invoked the authority of the council, the pope made concession after concession, and ended on the 15th of December 1433 by a pitiable surrender of all the points at issue in a bull, the terms of which were dictated by the fathers of Basel, that is, by declaring his bull of dissolution null and void, and recogniz- ing that the synod had not ceased to be legitimately assembled. It would be wrong, however, to believe that Eugenius IV. ratified all the decrees coming from Basel, or that he made a definite submission to the supremacy of the council. No express pronouncement on this subject could be wrung from him, and his enforced silence concealed the secret design of safeguarding the principle of sovereignty.

The fathers, who were filled with suspicion, would only allow the legates of the pope to preside over them on condition of their recognizing the superiority of the council; the legates ended by submitting to this humiliating formality, but in their own name only, thus reserving the judgment of the Holy See. Nay more, the difficulties of all kinds against which Eugenius had to contend, the insurrection at Rome, which forced him to escape by the Tiber, lying in the bottom of a boat, left him at .first little chance of resisting the enterprises of the council. Emboldened by their success, the fathers approached the subject of reform, their principal object being to curtail the power and resources of the papacy. This is why, besides the disciplinary

measures which regulated the elections, the celebration of divine service, the periodical holding of diocesan synods and provincial councils, are found also decrees aimed at some of the ” rights ” by which the popes had extended their power, and helped out their finances at the expense of the local churches. Thus annates (q.v.) were abolished, the abuse of “reservation” of the patron- age of benefices by the pope was much limited, and the right claimed by the pope of ” next presentation ” to benefices not yet vacant (known as gratiae expectativae) was done away with altogether. By other decrees the jurisdiction of the court of Rome was much limited, and rules were even made for the election of popes and the constitution of the Sacred College. The fathers continued to devote themselves to the subjugation of the Hussites; they also intervened, in rivalry with the pope, in the negotiations between France and England which led only to the treaty of Arras, concluded by Charles VII. with the duke of Burgundy; finally, they investigated and judged numbers of private cases, lawsuits between prelates, members of religious orders and holders of benefices, thus themselves falling into one of the serious abuses for which they had most blamed the court of Rome.

The democratic character of the assembly of Basel was the result both of its composition and of its organization; not only was the number of prelates in it always small in comparison with that of the doctors, masters, representatives of chapters, monks or clerks of inferior orders, but the influence of the superior clergy had all the less weight because, instead of being separated into ” nations,” as at Constance, the fathers divided themselves according to their tastes or aptitudes into four large committees or “deputations” (deputationes) , one concerned with questions of faith (Jidei), another with negotiations for peace (pads), the third with reform (reformatorii), the fourth with what they called ” common concerns ” {pro communions). Every decision made by three of these ” deputations ” — and in each of them the lower clergy formed the majority — was ratified for the sake of form in general congregation, and if necessary led to decrees promulgated in session. It was on this account that the council could sometimes be called, not without exaggera- tion, ” an assembly of copyists ” or even ” a set of grooms and scullions.”

Eugenius IV., however much he may have wished to keep on good terms with the fathers of Basel, was neither able nor willing to accept or observe all their decrees. The question of the union with the Greek church, especially, gave rise to a misunder- standing between them

which soon led to a rupture. The emperor John Palaeologus, pressed hard by the Turks, showed a great desire to unite himself with the Catholics; he consented to come with the principal representatives of the Greek church to some place in the west where the union could be concluded in the presence of the pope and of the Latin council. Hence arose a double negotiation between him and Eugenius IV. on the one hand and the fathers of Basel on the other. The chief object of the latter was to fix the meeting-place at a place remote from the influence of the pope, and they persisted in suggesting Basel or Avignon or Savoy, which neither Eugenius nor the Greeks Would on any account accept. The result was that Palaeologus accepted the offers of the pope, who, by a bull dated the 18th of September 1437, again pronounced the dissolution of the council of Basel, and summoned the fathers to Ferrara, where on the 8th of January 1438 he opened a new synod which he later transferred to, Florence. In this latter town took place the momentary union, which was more apparent than real, between the Latin and the Greek church (6th July 1439). During this time the council of Basel, though abandoned by Cesarini and most of its members, persisted none the less, under the presidency of Cardinal Aleman, in affirming its oecumenical character. On the 24th of January 1438 it suspended Eugenius IV., and went on in spite of the intervention of most of the powers to pronounce his deposition (25th June 1439), finally giving rise to a new schism by electing on the 4th of November Amadeus VIII., duke of Savoy, as pope, who took the name of Felix V.

This schism lasted fully ten years, although the antipope found

hardly any adherents outside of his own hereditary states, those of Alphonso of Aragon, of the Swiss confederation and certain universities. Germany remained neutral ; Charles VII. of France confined himself to securing to his kingdom by the Pragmatic Sanction of Bourges, which became law on the 13th of July 1438, the benefit of a great number of the reforms decreed at Basel; England and Italy remained faithful to Eugenius IV. Finally, in 1447 Frederick III., king of the Romans, after negotiations with Eugenius, commanded the burgomaster of Basel not to allow the presence of the council any longer in the imperial city. In June 1448 the rump of the council migrated to Lausanne. The antipope, at the instance of France, ended by abdicating (7th April 1449). Eugenius IV. died on the 23rd of February 1447, an d the fathers of Lausanne, to save appearances, gave their support to his successor, Nicholas V., who had already been governing the Church for two years. Trustworthy evidence, they said, proved to them that this pontiff accepted the dogma of the superiority of the council as it had been defined at Con-

stance and at Basel. In reality, the struggle which they had carried on in defence of this principle for seventeen years, with a good faith which it is impossible to ignore, ended in a defeat; The papacy, which had been so fundamentally shaken by the great schism of the West, came through this trial victorious. The era of the great councils of the 15th century was closed; the constitution of the Church remained monarchical.

Authorities.— Mansi, vol. xxix.-xxxi.; Aeneas Sylvius, De rebus Basileae gestis (Fefmo, 1803) ; Hefele, Conciliengeschichte, vol. vii. (Freiburg-im-Breisgau, 1874) ; O. Richter, Die Organisation ttnd Geschdftsordnung des Baseler Konzils (Leipzig, 1877) ; Monumenta Conciliorum generalium seculi xv., Scriptorum, vol. i., ii. and iii. (Vienna, 1857-1895) ; J. Haller, Concilium Basiliense, vol. i.-v. (Basel,"l896-I904) ; G. Perouse, Le Cardinal Louis Aleman, president du concile de Bdle (Paris, 1904). Much useful material will also be found in J. C. L. Gieseler's Ecclesiastical History, vol. iv. p. 312, &c, notes (Eng. trans., Edinburgh, 1853). (N. V.-)

BASEMENT, the term applied to the lowest storey of any building placed wholly or partly below the level of the ground. It is incorrectly applied to the ground storey of any building, even when, as for instance in the case of Somerset House, London, the ground floor is of plain or rusticated masonry, and the upper storey which it supports is divided up and decorated with columns or pilasters.

BASHAHR, or Bisahir, a Rajput hill state, within the Punjab, amid the Himalayan mountains, with an area of 3820 sq. m. and a population in 1901 of 80,582. In 1898, the raja being of weak intellect and without heir, the administration was undertaken by a British official. In 1906 there were some local troubles owing to the refusal of the people to pay taxes. The revenue is obtained chiefly from land and forests, the latter being leased to the British government.

BASHAN, a region lying E. of the Jordan, and towards its source. Its boundaries are not very well defined, but it may be said in general to have been north of the territory of Gilead. The name first appears in Hebrew history in connexion with the wanderings of the Israelites. According to Numbers xxi. 33, the tribes after the rout of Sihon, king of the Amorites, turned to go by the land of Bashan; and its king, Og, met them at Edrei, and was there defeated and slain. The value of this narrative is a matter of much dispute. The gigantic stature of the king, and the curious details about his " bedstead " (Deut. iii. n) are regarded as suggestive of legend; to say nothing of the lateness of all

the documents relating to the wars of Og,and the remoteness of Bashan from the regions of the Israelites' wandering. The story, however, had so firm a hold on Hebrew tradition that it can hardly fail to have some basis in fact; and an invasion by Israel of Bashan before coming to Jordan is by no means an improbability.

The great stature of Og is explained in the passage of Deuter- onomy mentioned by the statement that he was of the remnant of the aboriginal Rephaim. This was a race distinguished by lofty stature; and in Genesis xiv. 5 we find them established in Ashteroth-Karnaim (probably the same as Ashtaroth, which, as we shall see, was an important city of Bashan). The territor>'

was allotted on the partition of the conquered land to the eastern division of the tribe of Manasseh (Numbers xxxiii. 33; Josh. xiii. 29). One of the cities of refuge, Golan, was in Bashan (Deut. iv. 43). By Solomon, Bashan, or rather " the region of Argob in Bashan," containing " threescore great cities with walls and brazen bars," was assigned to the administrative district of Ben-Geber, one of his lieutenants (1 Kings iv. 13, compare ver. 19). In the days of Jehu the country was taken from Israel by Hazael, king of Syria (2 Kings x. 33). This is the last historical event related in the Old Testament of Bashan. In the poetical and prophetic books it is referred to in connexion with the products for which it was noted. From a passage in the " Blessing of Moses " (Deut. xxxiii. 22) it seems to have been inhabited by lions. Elsewhere it is referred to in connexion with its cattle (Deut. xxxii. 14; Ezek. xxxix. 18), which seem to have been proverbial for ferocity (Ps. xxii. 12); Amos (iv. 1) calls the wealthy women of Samaria, who oppressed the poor, " kine of Bashan." It is also noted for its mountain (Ps. lxviii. ij), and especially for oaks, which are coupled with the cedars of Lebanon (Isa. ii. 13; compare xxxiii. 9; Zechariah xi. 2). Oars were made from them (Ezek. xxvii. 6).

The boundaries of Bashan may to some extent be deduced from the indications afforded in the earlier historical books. Og dwelt at Ashteroth, and did battle with the Israelites at Edrei (Deut. i. 4). In Deut. iii. 4, " the region of Argob " with its threescore cities is mentioned; Mt. Hermon is referred to as a northern limit, and Salecah is alluded to in addition to the other cities already mentioned. Josh. xii. 4 and Josh. xiii. 29 confirm this. Josephus

(Ant. iv. 5. 3; Wars, ii. 6. 3) enumerates four provinces of Bashan, Gaulanitis, Trachonitis, Auranitis and Batanaea. Gaulanitis (which probably derived its name from the city of refuge, Golan, the site of which has not yet been discovered) is represented by the modern Jaulan, a province extending from the Jordan lakes to the Haj Road. Josephus (Wars, iv. 1 . 1) speaks of it as divided into two sections, Gamalitis and Sogana. Trachonitis (mentioned in Luke iii. 1 as in the territory of Philip the tetrarch) adjoined the territory of Damascus, Auranitis and Batanaea. This corresponds to the Trachones of Strabo (xvi. 20), and the modern district of the Leja; inscriptions have been found in the Leja. giving Trachon as its former name. Auranitis is the Hauran of Ezekiel xlvii. 16, and of the modern Arabs. It is south of the Jaulan and north of Gilead. According to Porter (Journal Soc. Lit., 1854, p. 303), the name is locally restricted to the plain south of the Leja and the narrow strip on the west; although it is loosely applied by strangers to the whole country east of the Jaulan. The fourth province, Batanaea, which still is remembered in the name ‘ Ard el-Bathaniyeh, lies east of the Leja and the Hauran plain, and includes the Jebel ed-Druz or Hauran mountain.

The identification of Argob, a region of the kingdom of Og, is a matter of much difficulty. It has been equated on philological grounds to the Leja. But these arguments have been shown to be shaky if not baseless, and the identification is now generally abandoned. The confidence with which the great cities of Og were identified with the extensive remains of ancient sites in the Leja and Hauran has also been shown to be without justification. All the so-called ” giant cities of Bashan ” without exception are now known to be Greco-Roman, not earlier than the time of Herod, and, though in themselves of very high architectural and historical interest, have no connexion whatever with the more ancient periods. No tangible traces of Og and his people, or even of their Israelite supplanters, have yet been found.

This fact somewhat weakens the various identifications that have been proposed for the cities of Bashan enumerated by name. Edrei for example is identified with Ed-Dera’a. This is perhaps the most satisfactory comparison, for besides the Greco-Roman remains there is an extensive subterranean city of unknown date, which may be of great antiquity, though even this is still sub jtidice. The other identifications that have commanded most acceptance are as follows: — Ashteroth Karnaim, also called Ashtaroth and (Josh. xxi. 27) Be-eshterah, has been identified

with Busrah (Bostra), where are very important Herodian ruins, but

there is no tangible evidence yet adduced that the history of this site is of so remote antiquity. From the similarity of the names, it has also been sought at Tell Ashari and Tell 'Ashtera. The true site can be determined, if at all; by excavation only; identifications based on mere outward similarity of names have always been fruitful sources of error. Salecah is perhaps less doubtful; it is a remarkable name, and a ruin similarly styled, Salkhat, is to be seen in the Hauran. It is inhabited by Druses. Another town in eastern Manasseh, namely Kenath, has been identified by Porter with Kanawat, which may be correct.

In the later history Bashan became remarkable as a refuge for outlaws and robbers, a character it still retains. The great sub-terranean " city " at Ed-Dera'a has been partially destroyed by the local sub-governor, in order to prevent it becoming a refuge of fugitives from justice or from government requirements (conscription, taxation, &c). Strabo refers to a great cave in Trachonitis capable of holding 4000 robbers. Arab tradition regards it as the home of Job; and it is famous as being the centre of the Ghassanid dynasty. The Hauran is one of the principal habitations of the sect of the Druses (q.v.).

The physical characteristics of Bashan are noteworthy. Volcanic in origin — the Jebel ed-Druz is a group of extinct volcanoes — the friable volcanic soil is extraordinarily fertile. It is said to yield wheat eighty-fold and barley a hundred. The oaks for which the country was once famous still distinguish it in places.

Bibliography. — Inaddition to books mentioned under Palestine see the following: — U. J. Seetzen, Reisen durch Syrien, Palastina, Phonicien, &c. (4 vols., 1854); Rev. J. L. Porter, Five Years in Damascus (2 vols., 1855); The Giant Cities of Bashan (out of date, but some of the descriptions good, 1865) ; J. G. Wetzstein, Reise-bericht uber Hauran und die Trachonen (Berlin, i860) ; Sir R. F. Burton and C. F. T. Drake, Unexplored Syria (1872) ; G. Schumacher, The Jaulan (1888) ; Abila, Pella and Northern Ajlun (1890) ; Across the Jordan (1886), (Palestine Exploration Fund); Rev. W. Ewing, A Journey in the Hauran (with a large collection of inscriptions) ; Palestine Exploration Fund Quarterly Statement, 1895; W. H. Waddington's Inscriptions of Syria may also be consulted ; Dussaud (Rene) and Frederic Macler, Voyage archeologique au Safd et dans le Djabel ed-Druz (1901). In 1900 an important survey of the Hauran and neighbouring regions was made under American auspices, directed by Dr Enno Littmann; the publication of the great harvest of results was begun in 1906. (R. A.

S. M.)

BASHI-BAZOUK, the name given to a species of irregular mounted troops employed by the Turks. They are armed and maintained by the government but do not receive pay. They do not wear uniform or distinctive badges. They fight either mounted or dismounted, chiefly the latter, but are incapable of undertaking serious work, because of their lack of discipline. Their uncertain temper has sometimes made it necessary for the Turkish regular troops to disarm them by force, but they are often useful in the work of reconnaissance and in outpost duty. They are accused, and generally with justice, of robbery and maltreatment of the civil population, resembling in those things, as in their fighting methods and value, the Croats, Pandours and Tolpatches of 18th-century European armies. The term is also used of ,a mounted force, existing in peace time in various provinces of the Turkish empire, which performs the duties of gendarmerie.

BASHKALA, the chief town of a sanjak of the vilayet of Van in Asiatic Turkey. It is a military station, situated at an eleva- tion of 7500 ft. above sea -level in the valley of the Great Zab river. It stands on the east slope of lofty bare mountains, overlooking a wide valley on the farther side of which flows the Zab. On a knoll above is a ruined fortress formerly occupied by a Kurdish Bey. The population numbers some 10,000, principally Kurds, but including 1500 Armenians and 1000 Jews. The place is important as the centre of the Hakkiari sanjak, a very difficult mountain district to the south-west containing numerous tribes of Kurds and Nestorian Christians, and also the many Kurdish tribes along the Persian frontier. The houses are well built of sun-dried brick, and the streets are wide and fairly clean. Good smiths' and carpenters' work is

done. The bazaar is small, although a thriving trade is done with the mountain districts. Owing to the great elevation the winter is extremely severe, and the summer of short duration. Wheat, barley, millet and sesame are cultivated on the plain, but fruit and vegetables have mostly to be imported from Persia. Roads lead to Van, Urmia in Persia and Mosul through the Nestorian country. The Kurd and Nestorian tribes in the wilder parts of the Hakkiari Mountains are under slight govern- ment control, and are permitted to pay tribute and given self- government in a large degree. (F. R. M.)

BASHKIRS, a people inhabiting the Russian governments of Ufa, Orenburg, Perm and Samara, and parts of Vyatka, especi- ally on the slopes and confines of the Ural, and in the neighbour- ing plains. They speak a Tatar language, but some authorities think that they are ethnically a Finnish tribe transformed by Tatar influence. The name Bashkir or Bash-kurt appears for the first time in the beginning of the 10th century in the writings of Ibn-Foslan, who, describing his travels among the Volga- Bulgarians, mentions the Bashkirs as a Warlike and idolatrous race. The name was not used by the people themselves in the 10th century, but is a mere nickname. ';■■

Of European writers, the first to mention the Bashkirs are Joannes de Piano Carpini (c. 1 200-1 260) and William of Rubru- quis (1220-1293). These travellers, who fell in with them in the upper parts of the river Ural, call them Pascatir, and assert that they spoke at that time the same language as the Hun- garians. Till the arrival of the Mongolians, about the middle of the 13th century, the Bashkirs were a strong and independent people and troublesome to their neighbours, the Bulgarians and Petchenegs. At the time of the downfall of the Kazan kingdom they were in a weak state. In 1556 they voluntarily recognized the supremacy of Russia, and, in consequence, the city of Ufa was founded to defend them from the Kirghiz, and they weTe subjected to a fur-tax. In 1676 they rebelled under a leader named Seit, and were with difficulty reduced; and again in 1707, under Aldar and Kusyom, on account of ill-treatment by the Russian officials. Their third and last insurrection was in ! 73S> at the time of the foundation of Orenburg, and it lasted for six years. In 1786 they were freed from taxes; and in 1798 an irregular army was formed from among them. They are now divided into cantons and give little trouble, though some differ- ences have arisen between them and the government about land questions. By mode of life the Bashkirs are divided into settled and nomadic. The former are engaged in agriculture, cattle- rearing and bee-keeping, and live without want. The nomadic portion is subdivided, according to the districts in which they wander, into those of the mountains and those of the steppes. Almost their sole occupation is the rearing of cattle; and they attend to that in a very negligent manner, not collecting a sufficient store of winter fodder for all their herds, but allowing part of them to perish. The Bashkirs are usually very poor, and in winter live partly on a kind of gruel called yuryu, and badly prepared cheese named sMrt. They are hospitable but suspicious, apt to plunder and to the last degree lazy. They have large heads, black hair, eyes narrow and flat, small fore- heads, ears always sticking out and a swarthy skin. In general, they are strong and muscular,

and able to endure all kinds of labour and privation. They profess Mahommedanism, but know little of its doctrines. Their intellectual development is low.

See J. P. Carpini, Liber Tartarorum, edited under the title Relations des Mongols ou Tartares, by d'Avezac (Paris, 1838) ; Gulielmus de Rubruquis, The Journey of William of Rubruck to the Eastern Parts of the World, translated by W. W. Rockhill (London, 1900) ; Semenoff, Slovar Ross. Imp., s.v. ; Frahn, " De Baskiris," in Mem. de I' Acad, de St-Petersbourg (1822); Florinsky, in Westnik Evropi (1874); and Katarinskij, Dictionnaire Bashkir-Russe (1900).

BASHKIRTSEFF, MARIA CONSTANTINOVA [MARIE] (1860-1884), Russian artist and writer, was born at Gavrontsi in the government of Pultowa in Russia on the 23rd of November i860. When Marie was seven years old, as her father (marshal of the nobility at Pultowa) and her mother were unable through incompatibility to live together, Madame Bashkirtseff with her

little daughter left Russia to spend the winters at Nice or in Italy, and the summers at German watering-places. Marie acquired an education superior to that given to most girls of her rank. She could read Plato and Virgil in the original, and write four languages with almost equal facility. A gifted musician, she at first hoped to be a singer, and studied seriously fn Italy to that end; her voice, however, was not strong enough to stand hard work and failed her. Meanwhile she Was also learning to draw. When she lost her voice she devoted herself to painting, and in 1877 settled in Paris, where she worked steadily in Tony Robert-Fleury's studio. In 1880 she exhibited in the salon a portrait of a woman; in 1881 she exhibited the "Atelier Julianj"; in 1882 "Jean et Jacques"; in 1884 the " Meeting;" and a portrait in pastel of a lady— her cousin— now in the Luxembourg gallery, for which she was awarded a mention honorable. Her health, always delicate, could not endure the labour she imposed on herself in addition to the life of fashion in which she became involved as a result of her success as an artist, and she died of consumption on the 31st of October 1884, leaving a small series of works of remarkable promise. From her childhood Marie Bashkirtseff kept an autobiographical journal; but the editors of these brilliant confessions {Journal de Marie Bashkirtseff, 1890), aiming apparently at captivating the reader's interest by the girl's precocious gifts and by the names of the various distinguished persons with whom she came in contact, so treated certain portions as to draw down vehement protest. This, to some extent, has brought into question the stamp of truthfulness which constitutes the chief merit

of this extra- ordinarily interesting book. A further instalment of Marie Bashkirtseff literature was published in the shape of letters between her and Guy de Maupassant, with whom she started a correspondence under a feigned name and without revealing her identity.

See Mathilde Blind, A Study of Marie Bashkirtseff (T. Fisher Unwin, 1892); The Journal of Marie Bashkirtseff: an Exposure and a Defence, by " S." (showing that there is throughout a mistake of four years in the date of the diary); Black and White, 6th Feb. and nth April 1891, pp. 17, 304; The Journal of Marie Bashkirtseff, translated, with an introduction, by Mathilde Blind (2 vols., London, 1890); The Letters of Marie Bashkirtseff (1 vol.). (B. K.)

BASIL, 1 known as Basil the Great (c. 330-379), bishop of Caesarea, a leading churchman in the 4th century, came of a famous family, which gave a number of distinguished supporters to the Church. His eldest sister, Macrina, was celebrated for her saintly life; his second brother was the famous Gregory of Nyssa; his youngest was Peter, bishop of Sebaste; and his eldest brother was the famous Christian jurist Naucratius. There was in the whole family a tendency to ecstatic emotion and enthusiastic piety, and it is worth noting that Cappadocia had already given to the Church men like Firmilian and Gregory Thaumaturgus. Basil was born about 330 at Caesarea in Cappadocia. While he was still a child, the family lemoved to Pontus; but he soon returned to Cappadocia to live with his mother's relations, and seems to have been brought up by his grandmother Macrina. Eager to learn, he went to Constantin- ople and spent four or five years there and at Athens, where he had Gregory (q.v.) of Nazianzus for a fellow-student. Both men were deeply influenced by Origen, and compiled the well- known anthology of his writings, known as Philocalia (edited by J. A. Robinson, Cambridge, 1893). It was at Athens that he Seriously began to think of religion, and resolved to seek out the most famous hermit saints in Syria and Arabia, in order to learn from them how to attain to that enthusiastic piety in

1 The name Basil also belongs to several other distinguished churchmen. (1) Basil, bishop of Ancyra from 336 to 360, a semi-Arian, highly favoured by the emperor Constantine, and a great polemical writer ; none of his works are extant. (2) Basil of Seleucia (fl. 448-458), a bishop who shifted sides continually in the Eutychia'n controversy, and who wrote extensively; his works were published in Paris in 1622. (3) Basil of Ancyra, fl. 787; he opposed image- worship at the second council of Nicaea, but afterwards

retracted. (4) Basil of Achrida, archbishop of Thessalonica about 1 155; he was a stanch upholder of the claims of the Eastern Church against the widening supremacy of the papacy.

which he delighted, and how to keep his body under by macera- tion and other ascetic devices. After this we find him at the head of a convent near Arnesi in Pontus, in which his mother Emilia, now a widow, his sister Macrina and several other ladies, gave themselves to a pious life of prayer and charitable works. He was not ordained presbyter until 365, and his ordination was probably the result of the entreaties of his ecclesiastical superiors, who wished to use his talents against the Arians, who were numerous in that part of the country and were favoured by the Arian emperor, Valens, who then reigned in Constantinople. In 370 Eusebius, bishop of Caesarea, died, and Basil was chosen to succeed him. It was then that his great powers were called into action. Caesarea was an important diocese, and its bishop was, ex officio, exareh of the great diocese of Pontus. Hot-blooded and somewhat imperious, Basil was also generous and sym- pathetic. "His zeal for orthodoxy did not blind him to what was good in an opponent; and for the sake of peace and charity he was content to waive the use of orthodox terminology when it could be surrendered without a sacrifice of truth." He died in 379.

The principal theological writings of Basil are his De Spiritu Sancto, a lucid and edifying appeal to Scripture and early Chris- tian tradition, and his three books against Eunomius, the chief exponent of Anomoian Arianism. He was a famous preacher, and many of his homilies, including a series of lenten lectures on the Hexaemeron, and an exposition of the psalter, have been preserved. His ascetic tendencies are exhibited in the Moralia and Regidae, ethical manuals for use in the world and the cloister respectively. His three hundred letters reveal a rich and observant nature, which, despite the troubles of ill-health and ecclesiastical unrest, remained optimistic, tender and even playful. His principal efforts as a reformer were directed towards the improvement of the liturgy, and the reformation of the monastic orders of the East. (See Basilian Monks.)

Bibliography.— Editions of his works appeared at Basel (1532) ; Paris, by J. Gamier and P. Maranus (1 721-1730), and by L. de Sinner (1839). Migne's Patrol, ser. graec. 29-32; De Spiritu Sancto, ed. C. F. H. Johnston (Oxford, 1892); Liturgia, ed. A. Robertson

(London, 1894). See also the patrologies, e.g. that of O. Bardenhewer, and the histories of dogma, e.g. those of A. Harnack and F. Loofs.

BASIL I. (d. 886), known as the "Macedonian", Roman emperor in the East, was born of a family of Armenian {not Slavonic) descent, settled in Macedonia. He spent a part of his boyhood in captivity in Bulgaria, whither his family was carried by the Bulgarian prince Krum in 813. He succeeded in escaping and was ultimately lucky enough to enter the service of Theo- philitzes, a relative of the Caesar Bardas (uncle of Michael III.), as groom. It seems that while serving in this capacity he visited Patrae with his master, and gained the favour of Danielis, a very wealthy lady of that place, who received him into her household, and endowed , him with a fortune. He earned the notice of Michael III. by winning a victory in a wrestling match, and soon became the emperor's boon companion and was appointed chamberlain (parakoemomenos). A man of his stamp, advancing unscrupulously on the road of fortune, had no hesitation in divorcing his wife and marrying a mistress of Michael, Eudocia Ingerina, to please his master. It was commonly believed that Leo VI., Basil's successor and reputed son, was really the son of Michael. The next step was to murder the powerful Caesar Bardas, who, as the emperor was devoted to amusement, virtu- ally ruled the empire; this was done with the emperor's consent by Basil's own hand (April 866), and a few weeks later Basil was raised to the imperial dignity. Hitherto few perhaps had divined in the unprincipled adventurer, who shared in the debauches of the imperial drunkard, the talents of a born ruler. On the throne he soon displayed the serious side of his nature and his exceptional capacities for administration. In September 867 he caused his worthless benefactor to be assassinated, and reigned alone. He inaugurated a new age in the history of the empire, associated with the dynasty which he founded, — " the Mace- donian dynasty" it is usually called; it would be more instructive to call it " Armenian." It was a period of territorial expansion,

during which the empire was the strongest power in Europe. The great legislative work which Basil undertook and his suc- cessor completed, and which may be described as a revival of Justinianean law, entitles him to the designation of a second Justinian (the Basilica, a collection of laws in sixty books; anrl the manuals known as the Prochiron and Epanagoge. For this legislation see Basilica and Roman Empire, Later). His financial administration was prudent. His ecclesiastical policy was marked by a wish to keep on good terms with Rome. One of his first acts was to exile the patriarch Photius

and restore his rival Ignatius, whose claims were supported by the pope. Yet he had no intention of yielding to Rome's pretensions beyond a Certain point. The decision of the Bulgarian tsar Michael to submit the new Bulgarian Church to the jurisdiction of Constantinople was a great blow to Rome, who had hoped to secure it for herself. In 877 Photius became patriarch again, and there was a virtual though not a formal breach with Rome. Thus the independence of the Greek Church may be said to date from the time of Basil. His reign was marked by a troublesome war with the Paulician heretics, an inheritance from his predecessor; the death of their able chief Chrysochir led to the definite sub- jection of this little state, of which the chief stronghold was Tephrice on the upper Euphrates, and which the Saracens had helped to bid a long defiance to the government of Constantinople. There was the usual frontier warfare with the Saracens ill Asia Minor. Cyprus was recovered, but only retained for seven years . Syracuse was lost, but Bari was Won back and those parts of Calabria which had been occupied by the Saracens. The last successes opened a new period of Byzantine domination in southern Italy. Above all, New Rome was again mistress of the sea, and especially of the gates of the Adriatic. Basil reigned nineteen years as sole sovereign. His death (29th of August 886) was due to a fever contracted in consequence of a serious accident in hunting. A stag dragged him from his horse by fixing its antlers in his belt. He was saved by an attendant who cut him loose with a knife. His last act was to cause his saviour to be beheaded, suspecting him of the intention to kill and not to rescue. Basil is one of the most remarkable examples of a man, without education and exposed to the most demoralizing in- fluences, manifesting extraordinary talents in the government of a great state, when he had climbed to the throne by acts of unscrupulous bloodshed.

Sources. — Vita Basilii, by his grandson Constantine VII. (bk v. of the Continuation of Theophanes, ed. Bonn); Genesius (ed Bonn) ; Vita Euthymii, ed. De Boor (Berlin, 1888). Of the Arabic sources Tabari is the most important.

Modern Works. — Finlay, History of Greece, vol. ii. (Oxford, 1877) ; Gibbon, Decline and Fall, vols. v. and vi. (ed. Bury, London, 1898) ; Hergenrother, Photius, Patriarch von Cottstantinopel, vol. ii. (Regensburg, 1867). (J- B. B.)

BASIL II. (c. 958-1025), known as Btjlgaroktonos (slayer of Bulgarians), Roman emperor in the East, son of Romanus II. and Theophano, great-great-grandson of Basil I., was born about 958 and crowned on the 22nd of April 960. After their father's death

(963) he and his younger brother Constantine were nominal emperors during the actual reigns of Nicephorus Phocas, their stepfather, and John Tzimisces. On the death of the latter (10th of January 976) they assumed the sovereignty without a colleague', but throughout their joint reign Constantine exercised no power and devoted himself chiefly to pleasure. This was in accordance with the Byzantine principle that in the case of two or more co-regnant basileis only one governed. Basil was a brave soldier and a superb horseman; he was to approve himself a strong ruler and an able general. He did not at first display the full extent of his energy. The administration remained in the hands of the eunuch Basileios (an illegitimate son of Romanus I.), president of the senate, a wily and gifted man, who hoped that the young emperors would be his puppets. Basil waited and watched without interfering, and devoted himself to learning the details of administrative business and instructing himself in military science. During this time the throne was seriously endangered by the rebellion of an ambitious general who aspired to play the part of Nicephorus Phocas or Tzimisces. This was Bardas

Sclerus, whom the eunuch deposed from his post of general in the East. He belonged to the powerful landed aristocracy of Asia Minor, whose pretensions were a perpetual menace to the throne. He made himself master of the Asiatic provinces and threatened Constantinople. To oppose him, Bardas Phocas, another general who had revolted in the previous reign and been interned in a monastery, was recalled. Defeated in two battles, he was vic- torious in a third and the revolt was suppressed (979). Phocas remained general in the East till 987, when he rebelled and was proclaimed emperor by his troops. It seems that the minister Basileios was privy to this act, and the cause was dissatisfaction at the energy which was displayed by the emperor, who showed that he was determined to take the administration into his own hands and personally to control the army. Phocas advanced to the Hellespont and besieged Abydos. Basil obtained timely aid, in the shape of Varangian mercenaries, from his brother-in-law Vladimir, the Russian prince of Kiev, and marched to Abydos. The two armies were facing each other, when Basil galloped forward, seeking a personal combat with the usurper who was riding in front of his lines. Phocas, just as he prepared to face him , fell from his horse and was found to be dead. This ended the rebellion.

The fall of Basileios followed; he was punished with exile and the confiscation of his enormous property. Basil made ruthless war upon the system of immense estates which had grown up in Asia Minor and which his predecessor, Romanus I., had en- deavoured to check. (For this evil and the legislation which was aimed at it see Roman Empire, Later.) He .sought to protect the lower and middle classes.

Basil gained some successes against the Saracens (99s); but his most important work in the East was the annexation of the principalities of Armenia. He created in those highlands a strongly fortified frontier, which, if his successors had been capable, should have proved an effective barrier against the invasions of the Seljuk Turks. The greatest achievement of the reign was the subjugation of Bulgaria. After the death of Tzimisces (who had reduced only the eastern part of the Bulgarian kingdom), the power of Bulgaria was restored by the Tsar Samuel, in whom Basil found a worthy foe. The emperor's first efforts against him were unsuccessful (981), and the war was not resumed till 996, Samuel in the meantime extending his rule along the Adriatic coast and imposing his lordship on Servia. Eastern Bulgaria was finally recovered in 1000; but the war continued with varying successes till 1014, when the Bulgarian army suffered an overwhelming defeat. Basil blinded 1 5,000 prisoners, leaving a one-eyed man to every hundred to lead them to their tsar, who fainted at the sight and died two days later. The last sparks of resistance were extinguished in 1018, and the great Slavonic realm lay in the dust. The power of Byzantium controlled once more the Illyrian peninsula. Basil died in December 1025 m the midst of preparations to send a naval expedition to recover Sicily from the Saracens.

Basil's reign marks the highest point of the power of the Eastern empire since Justinian I. Part of the credit is due to his predecessors Nicephorus and Tzimisces, but the greater part belongs to him. He dedicated himself unsparingly to the laborious duties of ruling, and he had to reckon throughout with the ill-will of a rich and powerful section of his subjects. He was hard and cruel, without any refinement or interest in Culture. In a contemporary psalter (preserved in the library of St Mark at Venice) there is a portrait of him, with a grey beard, crowned and robed in imperial costume.

Authorities. — Leo Diaconus (ed. Bonn, 1828) ; Psellus, History (ed. Sathas, London, 1899) ; George Cedrenus (Chronicle, transcribed from the work of John Scylitzes, vol. ii., ed. Bonn, 1839); Zonaras, bk. xvii. (ed. Bonn, vol. iii., 1897); Cecaumenus, Strategikon (ed. Vasilievski and Jernstedt, St Petersburg, 1896); Yahya of Antioch

(contemporary Asiatic chronicle), extracts with Russian translation by Rosen (St Petersburg, 1883); Al Mekin (Elmacinus), Historia Saracenica (ed. with Latin translation by Erpenius. Leiden, 1625); " Laws (Novellae) of Basil " (ed. Zacharia von Lingenthal, in Jus Graeco-Romanum, vol. iii., 1853); Finlay, Hist, of Greece; Gibbon, Decline and Fall; G. Schlumberger, V Epopee byzantine, part i. and part ii. (Paris, 1896, 1900). (J. B. B.)

BASIL (Russ. Vasily), the name of four grand-dukes of Moscow and tsars of Muscovy.

Basil I. Dmitrevich (1371-1425), son of Dmitri (Demetrius) Donskoi, whom he succeeded in 1389, married Sophia, the daughter of Vitovt, grand-duke of Lithuania. In his reign the grand-duchy of Muscovy became practically hereditary, and asserted its supremacy over all the surrounding princi- palities. Nevertheless Basil received his yarluik, or investiture, from the Golden Horde and was compelled to pay tribute to the grand khan, Tokhtamuish. He annexed the princi- pality of Suzdal to Moscovy, together with Murom, Kozelsk Peremyshl, and other places; reduced the grand-duchy of Rostov to a state of vassalage; and acquired territory from the republic of Great Novgorod by treaty. In his reign occurred the invasion of Timur (1395), who ruined the Volgan regions, but did not penetrate so far as Moscow. Indeed Timur's raid was of service to the Russian prince as it all but wiped out the Golden Horde, which for the next twelve years was in a state of anarchy. During the whole of this time no tribute was paid to the khan, though vast sums of money were collected in the Moscow treasury for military purposes. In 1408 the Mirza Edigei ravaged Muscovite territory, but was unable to take Moscow. In 141 2, however, Basil found it necessary to pay the long-deferred visit of sub- mission to the Horde. The most important ecclesiastical event of the reign was the elevation of the Bulgarian, Gregory Tsamblak, to the metropolitan see of Kiev (1425) by Vitovt, grand-duke of Lithuania; the immediate political consequence of which was the weakening of the hold of Muscovy on the south-western Russian states. During Basil's reign a terrible visitation of the " Black Death " decimated the population.

See T. Schiemann, Russland bis ins 17. Jahrhundert (Gotha,

1885-1887).

Basil II., called Temny (" the Blind ") (141 5-1462), son of the preceding, succeeded his father as grand-duke of Moscow in 1425. He was a man of small ability and unusual timidity, though not

without tenacity of purpose. Nevertheless, during his reign Moscow steadily increased in power, as if to show that the personality of the grand-dukes had become quite a subor- dinate factor in its development. In 1430 Basil was seized by his uncle, George of Halicz, and sent a prisoner to Kostroma; but the nation, dissatisfied with George, released Basil and in 1433 he returned in triumph to Moscow. George, however, took the field against him and Basil fled to Novgorod. On the death of George, Basil was at constant variance with George's children, one of whom, Basil, he had blinded; but in 1445 the grand-duke fell into the hands of blind Basil's brother, Shemyak, and was himself deprived of his sight and banished to Uglich (1445). The clergy and people, however, being devoted to the grand-duke, assisted him not only to recover his throne a second time, but to put Shemyak to flight, and to seize Halicz, his patrimony. During the remainder of Basil II. 's reign he slowly and un- obtrusively added district after district to the grand-duchy of Muscovy, so that, in fine, only the republics of Novgorod and Pskov and the principalities of Tver and Vereya remained independent of Moscow. Yet all this time the realm was overrun continually by the Tatars and Lithuanians, and -suffered severely from their depredations. Basil's reign saw the foundation of the Solovetsk monastery and the rise of the khanate of the Crimea. In 1448 the north Russian Church became virtually independent of the patriarchal see of Constantinople by adopting the practice of selecting its metropolitan from among native priests and prelates exclusively.

See S. M. Solovev, History of Russia (Russ.), (Petersburg, 1895).

Basil III., Ivanovich (1479-1533), tsar of Muscovy, son of Ivan HI. and Sophia Palaeologa, succeeded his father in 1505. A crafty prince, with all the tenacity of his race, Basil succeeded in incorporating with Muscovy the last remnants of the ancient independent principalities, by accusing the princes of Ryazan and Syeversk of conspiracy against him, seizing their persons, and annexing their domains (1517-1523). Seven years earlier (24th of January 1 510) the last free republic of old Russia, Pskov, was deprived of its charter and assembly-bell, which were sent

to Moscow, and tsarish governors were appointed to rule it. Basil also took advantage of the difficult position of Sigismund of Poland

to capture Smolensk, the great eastern fortress of Poland (1512), chiefly through the aid of the rebel Lithuanian, Prince Michael Glinsky, who provided him with artillery and engineers from western Europe. The loss of Smolensk was the first serious injury inflicted by Muscovy on Poland and only the exigencies of Sigismund compelled him to acquiesce in its surrender (1522). Equally successful, on the whole, was Basil against the Tatars. Although in 15 19 he was obliged to buy off the khan of the Crimea, Mahommed Girai, under the very walls of Moscow, towards the end of his reign he established the Russian influence on the Volga, and in 1530 placed the pretender Elanyei on the throne of Kazan. Basil was the first grand-duke of Moscow who adopted the title of tsar and the double-headed eagle of the East Roman empire. By his second wife, Helena Glinska, whom he married in 1526, Basil had a son Ivan, who succeeded him as Ivan IV.

See Sigismund Herberstain, Rerum Moscoviticarum Commentarii (Vienna, 1549) ; P. A. Byelov, Russian History Previous to the Reforms of Peter the Great (Russ.), (Petersburg, 1895); E. I. Kashprovsky, The War of Basil III. with Sigismund I. (Russ.), (Nyezhin,

1899).

Basil IV., Shuisky (d. 1612), tsar of Muscovy, was during the reigns of Theodore I. and Boris Godunov, one of the leading boyars of Muscovy. It was he who, in obedience to the secret orders of Tsar Boris, went to Uglich to inquire into the cause of the death of Demetrius, the infant son of Ivan the Terrible, who had been murdered there by the agents of Boris. Shuisky obsequiously reported that it was a case of suicide; yet, on the death of Boris and the accession of his son Theodore II., the false boyar, in order to gain favour with the first false Demetrius, went back upon his own words and recognized the pretender as the real Demetrius, thus bringing about the assassination of the young Theodore. Shuisky then plotted against the false Demetrius and procured his death (May 1606) also by publicly confessing that the real Demetrius had been indeed slain and that the reigning tsar was an impostor. This was the viler in him as the pseudo-Demetrius had already forgiven him one conspiracy. Shuisky's adherents thereupon proclaimed him tsar (19th of May 1606). He reigned till the 19th of July 1610, but was never generally recognized. Even in Moscow itself he had little or no authority, and was only not deposed by the dominant boyars because they had none to put in his place. Only the popularity of his heroic cousin, Prince Michael Skopin-Shuisky, who led his armies and fought his battles for him, and soldiers from Sweden, whose assistance he purchased by

a disgraceful cession of Russian territory, kept him for a time on his unstable throne. In 1610 he was deposed, made a monk, and finally carried off as a trophy by the Polish grand hetman, Stanislaus Zolkiewski. He died at Warsaw in 161 2.

See D. I. Ilovaisky, The Troubled Period of the Muscovite Realm (Russ.), (Moscow, 1894) ; S. I. Platonov, Sketches of the Great Anarchy in the Realm of Moscow (Petersburg, 1899); D. V. Tsvyeltev, Tsar Vasily Shuisky (Russ.), (Warsaw, 1901-1903) ; R. Nisbet Bain, Slavonic Europe, ch. viii. (Cambridge, 1907). (R. N. B.)

BASILIAN MONKS, those who follow the rule of Basil the Great. The chief importance of the monastic rule and institute of St Basil lies in the fact that to this day his reconstruction of the monastic life is the basis of the monasticism of the Greek and Slavonic Churches, though the monks do not call themselves Basilians. St Basil's claim to the authorship of the Rules and other ascetical writings that go under his name, has been ques- tioned; but the tendency now is to recognize as his at any rate the two sets of Rules. Probably the truest idea of his monastic system may be derived from a correspondence between him and St Gregory Nazianzen at the beginning of his monastic life, the chief portions whereof are translated by Newman in the Church of the Fathers, " Basil and Gregory," §§ 4, 5. On leaving Athens Basil visited the monasteries of Egypt and Palestine; in the latter country and in Syria the monastic life tended to become more and more eremitical and to run to great extravagances in the matter of bodily austerities (see Monasticism). When (c. 360) Basil formed his monastery in the neighbourhood of

Neocaesarea in Pontus, he deliberately set himself against these tendencies. He declared that the cenobitical life is superior to the eremitical; that fasting and austerities should not interfere with prayer or work; that work should form an integral part of the monastic life, not merely as an occupation, but for its own sake and in order to do good to others; and therefore that monasteries should be near towns. All this was a new departure in monachism. The life St Basil established was strictly ceno- bitical, with common prayer seven times a day, common work, common meals. It was, in spite of the new ideas, an austere life, of the kind called contemplative, given up to prayer, the reading of the Scriptures and heavy field-work. The so-called Rules (the Longer and the Shorter) are catechisms of the spiritual life rather than a body of regulations for the corporate working of a com- munity, such as is now understood by a monastic rule. Appar- ently no vows were taken, but obedience, personal poverty, chastity, self-denial, and the other monastic virtues were

strongly enforced, and a monk was not free to abandon the monastic life. A novitiate had to be passed, and young boys were to be educated in the monastery, but were not expected to become monks.

St Basil's influence, and the greater suitability of his institute to European ideas, ensured the propagation of Basilian monachism; and Sozomen says that in Cappadocia and the neighbouring provinces there were no hermits but only cenobites. However, the eastern hankering after the eremitical life long survived, and it was only by dint of legislation, both ecclesiastical (council of Chalcedon) and civil (Justinian Code), that the Basilian cenobitic form of monasticism came to prevail throughout the Greek-speaking lands, though the eremitical forms have always maintained themselves.

Greek monachism underwent no development or change for four centuries, except the vicissitudes inevitable in all things human, which in monasticism assume the form of alternations of relaxation and revival. The second half of the 8th century seems to have been a time of very general decadence; but about the year 800 Theodore, destined to be the only other creative name in Greek monachism, became abbot of the monastery of the Studium in Constantinople. He set himself to reform his monastery and restore St Basil's spirit in its primitive vigour. But to effect this, and to give permanence to the reformation, he saw that there was need of a more practical code of laws to regulate the details of the daily life, as a supplement to St Basil's Rules. He therefore drew up constitutions, afterwards codified (see Migne, Patrol. Graec. xcix., 1 704-1 757), which became the norm of the life at the Studium monastery, and gradually spread thence to the monasteries of the rest of the Greek empire. Thus to this day the Rules of Basil and the Constitutions of Theodore the Studite, along with the canons of the Councils, constitute the chief part of Greek and Russian monastic law.

The spirit of Greek monachism, as regenerated by Theodore, may best be gathered from his Letters, Discourses and Testa- ment. 1 Under the abbot were several officials to superintend the various departments; the liturgical services in the church took up a considerable portion of the day, but Theodore seems to have made no attempt to revive the early practice of the Studium in this matter (see Acoeheti); the rest of the time was divided between reading and work; the latter included the chief handi- crafts, for the monks, only ten in number, when Theodore became abbot, increased under his rule to over a thousand. One kind of work practised with great zeal and success by the Studite monks, was the copying of manuscripts, so that to them and to the schools that went forth from them we owe a

great number of existing Greek MSS. and the preservation of many works of classical and ecclesiastical antiquity. In addition to this, literary and theo- logical studies were pursued, and the mysticism of pseudo- Dionysius was cultivated. The life, though simple and self-denying and hard, was not of extreme austerity. There was a division of the monks into two classes, similar to the division in vogue in later time in the West into choir-monks and lay-brothers. The life of the choir-monks was predominantly contemplative,

1 Specimen passages, and also a general picture of the life, will be found in Miss Alice Gardner's Theodore of Studium, ch. v.

being taken up with the church services and private prayer and study; the lay-brothers carried on the various trades and external works. There is little or no evidence of works of charity outside the monastery being undertaken by Studite monks. Strict per- sonal poverty was enforced, and all were encouraged to approach confession and communion frequently. Vows had been imposed on monks by the council of Chalcedon (451). The picture of Studite life is the picture of normal Greek and Slavonic monachism to this day.

During the middle ages the centre of Greek monachism shifted from Constantinople to Mount Athos. The first monastery to be founded here was that of St Athanasius (c. 960), and in the course of the next three or four centuries monasteries in great numbers: — Greek, Slavonic and one Latin — were established on Mount Athos, some twenty of which still survive.

Basilian monachism spread from Greece to Italy and Russia. Rufinus had translated St Basil's Rules into Latin (c. 400) and they became the rule of life in certain Italian monasteries. They were known to St Benedict, who refers his monks to " the Rule of our holy Father Basil," — indeed St Benedict owed more of the ground-ideas of his Rule to St Basil than to any other monastic legislator. In the 6th and 7th centuries there appear to have been Greek monasteries in Rome and south Italy and especially in Sicily. But during the course of the 8th, 9th and 10th centuries crowds of fugitives poured into southern Italy from Greece and Sicily, under stress of the Saracenic, Arab and other invasions; and from the middle of the 9th century Basilian monasteries, peopled by Greek-speaking monks, were established in great numbers in Calabria and spread northwards as far as Rome.

Some of them existed on into the 1 8th century, but the only survivor now is the monastery founded by St Nilus (c. 1000) at Grottaferrata in the Alban Hills. Professor Kirsopp Lake has (1903) written four valuable articles (Journal of Theological Studies, iv., v.) on "The Greek monasteries of South Italy"; he deals in detail with their scriptoria and the dispersal of their libraries, a matter of much interest, in that some of the chief collections of Greek MSS. in western Europe — as the Bessarion at Venice and a great number at the Vatican— come from the spoils of these Italian Basilian houses.

Of much greater importance was the importation of Basilian monachism into Russia, for it thereby became the norm of monachism for all the Slavonic lands. Greek monks played a considerable part in the evangelization of the Slavs, and the first Russian monastery was founded'at Kiev (c. 1050) by a monk from Mount Athos. The monastic institute had a great development in Russia, and at the present day there are in the Russian empire some 400 monasteries of men and 100 of women, many of which support hospitals, almshouses and schools. In the other Slavonic lands there are a considerable number of monasteries, as also in Greece itself, while in the Turkish dominions there are no fewer than 1 00 Greek monasteries. The monasteries are of three kinds : cenobia proper, wherein full monastic common life, with personal poverty, is observed; others called idiorrhythmic, wherein the monks are allowed the use of their private means and lead a generally mitigated and free kind of monastic life ; and the lauras, wherein the life is semi-eremitical. Greek and Slavonic monks wear a black habit. The visits of Western scholars in modern times to Greek monasteries in search of MSS. — notably to St Catherine's on Mount Sinai, and to Mount Athos — has directed much attention to contemporary Greek monachism, and .the accounts of these expeditions commonly contain descriptions, more or less sympathetic and intelligent, of the present-day life of Greek monks. The first such account was Robert Curzon's in parts iii. (1834) and iv. (1837) of the Monasteries of the Levant; the most recent in English is Athelstan Riley's Athos (1887). The life is mainly given up to devotional contemplative exercises; the church services are of extreme length; intellectual study is little cultivated; manual labour has almost disappeared; there are many hermits on Athos (q.v.).

The ecclesiastical importance of the monks in the various branches of the Orthodox Church lies in this, that, as bishops must be celibate, whereas the parochial clergy must be married,

the bishops are all recruited from the monks. But besides this they

have been a strong spiritual and religious influence, as is recognized even by those who have scant sympathy with monastic ideals (see Harnack, What is Christianity? Lect. xiii., end).

Outside the Orthodox Church are some small congregations of Uniat Basilians. Besides Grottaferrata, there are Catholic Basilian monasteries in Poland, Hungary, Galicia, Rumania; and among the Melchites or Uniat Syrians.

There have been Basilian nuns from the beginning, St Macrina, St Basil's sister, having established a nunnery which was under his direction. The nuns are devoted to a purely contemplative life, and in Russia, where there are about a hundred nunneries, they are not allowed to take final vows until the age of sixty. They are very numerous throughout the East.

Authorities. — In addition to the authorities for different portions of the subject-matter named in the course of this article, may be mentioned, on St Basil and his Rules, Montalembert, Monks of the West, second part of bk. ii., and the chapter on St Basil in James O. Hannay's Spirit and Origin of Christian Monasticism (1,903). On the history and spirit of Basilian Monachism, Helyot, Hist, des Ordres Religieux, i. (1714); Heimbucher, Orden und Kongregationen (1907), i., £ 11; Abbe Marin, Les Moines de Constantinople (1897); Karl Holl, Enthusiasmus und Bussgewalt heim griechischen Monchtum (1898); Otto Zockler, Askese und Monchtum, pp. 285-309 (1897). For general information see Wetzer und Welte, Kirchenlexicon (ed. ii.), art. " Basilianer," and Herzog-Hauck, Realencyklopddie (ed. iii.), in articles " Monchtum," " Orientalische Kirche," and " Athos- berg," where copious references will be found. (E. C. B.)

BASILICA, a word of Greek origin (see below), frequently used in Latin literature and inscriptions to denote a large covered building that could accommodate a considerable number of people. Strictly speaking, a basilica was a building of this kind situated near the business centre of a city and arranged for the convenience of merchants, litigants and persons engaged on the public service; but in a derived sense the word might be used for any large structure wherever situated, such as a hall of audience (Vitruv. vi. 5. 2) or a covered promenade (St Jerome, Ep. 46) in a private palace; a riding school {basilica eguestris exercitatoria, C.I.L. vii. 965); a market or store for flowers (basilica floscellaria [Notitia]), or other kinds of goods (basilica vestiaria, C.I.L. viii. 20156), or a hall of meeting for a religious body. In this derived sense the word came naturally to be

applied to the extensive buildirigs used for Christian worship in the age of Constantine and his successors. .

The question whether this word conveyed to the ancients any special architectural significance is a difficult one, and some writers hold that the name betokened only the use of the building, others that it suggested also a certain form. Our knowledge of the ancient basilica as a civil structure is derived primarily from Vitruvius, and we learn about it also from existing remains and from incidental notices in classical writers and in inscriptions. If we review all the evidence we are led to the conclusion that there did exist a normal form of the building, though many examples deviated therefrom. This normal form we shall under- stand if we consider the essential character of the building in the light of what Vitruvius tells us of it.

Vitruvius treats the basilica in close connexion with the forum, to which in his view it is an adjunct. In the earlier classical times, both in Greece and Italy, business of every kind, political, commercial and legal, was transacted in the open forum, and there also were presented shows and pageants. When business increased and the numbers of the population were multiplied, it was found convenient to provide additional accommodation for these purposes. Theatres and amphitheatres took the per- formances and games. Markets provided for those that bought and sold, while for business of more important kinds accommoda- tion could be secured by laying out new agorae or fora in the immediate vicinity of the old. At Rome this was done by means of the so-called imperial fora, the latest and most splendid of which was that of Trajan. These fora corresponded to the later Greek or Hellenistic agora, which, as Vitruvius tells us, was of regular form and surrounded by colonnades in two stories, and they had the practical use of relieving the pressure on the

original forum (Cic, ad Alt. iv. 16). The basilica was a structure intended for the same purposes. It was to all intents and purposes a covered forum, and in its normal form was constituted by an arrangement of colonnades in two stories round a rect- angular space, that was not, like the Greek agora, open, but covered with a roof. Vitruvius writes of it as frequented by merchants, who would find in it shelter and quiet for the trans- action of their business. Legal tribunals were also set up in it, though it is a mistake to suppose the basilica a mere law court. The magistrates who presided

over these tribunals had some- times platforms, curved or rectangular in plan, provided as part of the permanent fittings of the edifice.

According to Vitruvius (v. i. 4, cf. also vi. 3. 9) the building is to be in plan a rectangle, not more than three times nor less than twice as long as it is broad. If the site oblige the length to be greater, the surplus is to be cut off to form what he calls chalcidica, by which must be meant open vestibules. The interior is divided into a central space and side aisles one-third the width of this. The ground plan of the basilica at Pompeii (fig. 1) illustrates this description, though the superstructure did not correspond to the Vitruvian scheme. The columns between nave and aisles, Vitruvius proceeds, are the same height as the width of the latter, and the aisle is covered with a flat roof forming a terrace (contignatio) on which people can walk. Sur- rounding this on the inner side is a breastwork or parapet (pluleum), which would conceal these promenaders from the view of the merchants in the basilica below. On the top of this parapet stood the upper row of columns, three-quarters as high as the lower ones. The spaces between these columns, above the

*m tum*imiˆmip tjˆ-jˆsimˆsˆmpi*

H „ ® B 9 1 1 IS SJ _ a g!

m m

a a

4

m

4B3I

a B. ISBSIBBBESBII

3

Fig. 1. — 'Basilica at Pompeii. 1, Portico (Chalcidicum) ; 2, hall of basilica; 3, aisles; 4, altar; 5, tribunal; 6, offices.

top of the pluteum, would be left free for the admission of light to the central space, which was covered by a roof called by Vitruvius (v. 1. 6) mediana testudo. Nothing is said about a permanent tribunal or about an apse.

How far existing remains agree with the Vitruvian scheme will be seen as we proceed. We have now to consider the derivation of the word " basilica," the history of the form of building, and its architectural scheme as represented in actual relics.

The word " basilica " is a Latinized form of the Greek adjective f}as gtool, and it is an accredited theory, though it is by no means proved, that we have here the origin of the later basilica. It is difficult to see why this was called " royal " except for some special but accidental reason such as can in this case be divined. There are other instances in which a term that becomes specific has been derived from some one specimen accidentally named. " Labyrinth " is one case in point, and " basilica " may be another. It is true that we do not know what was the shape of the King Archon's portico, but the same name (|8acrtAeu>s ctoo.) was given to the grand structure erected by Herod the Great along the southern edge of the Temple platform at Jerusalem, and this corresponded to the Vitruvian scheme of a columned fabric, with nave and aisles and clerestory lighting.

Whether the Roman basilicas, with which we are chiefly concerned, were derived directly from the Athenian example, or mediately from this through structures of the same kind

erected in the later Greek cities, is hard to say. We should naturally look in that direction for the prototypes of the Roman basilicas, but as a fact we are not informed of any very early basilicas in these cities. The earliest we know of is the existing basilica at Pompeii, that may date back into the 2nd century B.C., whereas basilicas made their appearance at Rome nearly at the beginning of that century. The first was erected by M. Porcius Cato, the censor, in 184 B.C., and was called after his name Basilica Porcia. Cato had recently visited Athens and had been struck by the beauty of the city, so that it is quite possible that the importation was direct.

Rome soon obtained other basilicas, of which the important Basilica Fulvia-Aemilia came next in point of time, till by the age of Augustus there were at least five in the immediate neigh- bourhood of the forum, the latest and most extensive being the Basilica Julia, which ran parallel to its southern side, and is shown in plan in fig. 2. The great Basilica Ulpia was built

- ○ =r_ * * fJfKJfi' '* * • = * = » = *

*f 4ip^#^*

iff

ffi

*rr? ^ ^ * * ■* * » + + *+ * **

m

m

p-*-m*

P~W

1 UJ-JJL ? LLLf 1 1

Fig. 2. — Plan of Basilica Julia, Rome. (From Baedeker's Central Italy, by permission of Karl Baedeker.)

by Trajan in connexion with his forum about a.d. 112, and a fragment of the Capitoline plan of Rome gives the scheme ol it (fig. 3), while an attempted restoration of the interior by Canina is shown in fig. 4. The vaulted basilica of Maxen- tius or Constantine on the Via Sacra dates from the beginning of the 4th century, and fig. 5 gives the section of it. The number of public basilicas we read of at Rome alone amounts to about a score, while many private basilicas, for business or recreation, must also have existed, that in the palace of Domitian on the Palatine being the best known. In provincial cities in Italy, and indeed all over the empire, basilicas were almost universal, and in the case of Italy we have proof of this as early as the date of the death of Augustus, for Suetonius (Aug. 100) tells us that the body of that emperor, when it was brought from Nola in Campania to Rome, rested " in basilica cujusque oppidi." As regards existing examples, neither in the peninsula nor the provinces can it be said that these give any adequate idea of

Fig. 3. — Plan of Basilica Ulpia, from Capitoline plan of Rome.

the former abundance and wide distribution of basilicas. Northern Africa contributes one or two examples, and a plan is given of that at Timgad (fig. 6). The Gallic basilicas, which must have been very numerous, are represented only by the noble structure at Trier (Treves), which is now a single vast hall 180 ft. long, 90 ft. wide and 100 ft. high, commanded at one end by a spacious apse. There is reason to conjecture that this is the basilica erected by Constantine, and some authorities believe that originally it had internal

colonnades. In England basilicas remain in part at Silchester (fig. 7), Uriconium (Wroxeter),

Fig. 4. — Interior view of Trajan's Basilica (Basilica Ulpia), as restored by Canina.

Chester (?) and Lincoln, while three others are mentioned in inscriptions (C.I.L. vii. 287, 445, 965).

A comparison of the plans of existing basilicas shows con- siderable variety in form. Some basilicas (Julia, Ulpia, Pompeii) have the central space surrounded by galleries supported on columns or piers, according to the normal scheme, and the newly excavated Basilica Aemilia, north of the Roman forum, agrees with these. In some North African examples, in the palace basilica of Domitian, and at Silchester, there are colon- nades down the long sides but not across the ends. Others (Trier I?], Timgad) have no interior divisions. One (Maxentius) is entirely a vaulted structure and in form resembles the great halls of the Roman Thermae. At Pompeii, Timgad and Sil- chester, there are fixed tribunals, while vaulted apses that may

Fig. 5. — Section of the Basilica of Maxentius or Constantine (Temple of Peace).

have contained tribunals occur in the basilica of Maxentius. In the Basilica Julia there was no tribunal at all, though we know that the building was regularly used for the centumviral court (Quint, xii. 5. 6), and the same was the case in the Ulpia, for the semicircular projection at the end shown on the Capitoline- plan, was not a vaulted apse and was evidently distinct from the basilica.

In view of the above it might be questioned whether it is safe to speak of a normal form of the basilica, but when we consider the vast number of basilicas that have perished compared to the few that have survived, and the fact that the origins and tradi- tions of the building show it to have been, as Vitruvius describes it, essentially a columned structure, there is ample justification for the view expressed earlier in this article. There can be little doubt that the earlier basilicas, and the majority of basilicas taken as a whole, had a central space with galleries, generally

in two stories, round it, and some arrangement for clerestory

lighting. Later basilicas might vary in architectural scheme, while affording the same sort of accommodation as the older ones.

The relation of the civil basilica of the Romans to the Christian church has been extensively discussed, and the reader will find the controversy ably summarized in Kraus's Geschichte der christlichen Kunst, bk. 5. There is nothing remarkable in the fact that a large church was called a basilica, for the term was applied, as we have seen, to structures of many kinds, and we even find " basilica " used for the meeting-place of a pagan religious association (Rom. Mitt. 1 89 1, p. 109). The similarity in some respects of the early Christian churches to the normal form of the columned basilica is so striking, that we can understand how the theory was once held that Christian churches were the actual civil basilicas turned over from secular to religious uses. There is no evidence for this in the case of public basilicas, and it stands to reason that the demands on these for secular purposes would remain the same whether Christianity were the religion of the empire or not. Moreover, though there are one or two civil basilicas that resemble churches, the latter differ in some

*most important respects 1*1 Forum*

from the form of the basilica that we have recognized as normal. The early Christian basilicas, at any rate in the west, had very seldom, if ever, galleries over the side aisles, and their interior is always , dominated by the semi- dome of an apse that terminates the central nave, whereas, with the doubtful exception of Silchester (Archaeologia, liii. 549), there is no instance known of a vaulted apse in a columned civil basilica of the normal kind.

When buildings were first expressly erected for Christian worship, in the 3rd or perhaps already in the 2nd century a.d. (Leclercq, Manuel, ch. iii. " Les edifices chretiens avant la paix de l'eglise "), they probably took the form of an oblong interior

Fig. 6. — Plan of Basilica adjoining the Forum of the Roman city of Timgad, in North Africa.

(From Gsell's Monuments antiques de VAlgerie, by permission of A. Fontemoing.)

terminated by an apse. After the time of Constantine, when the

numbers of the faithful were enormously increased, side aisles were added, and in this way the structure came to assume an appearance similar to that of the civil basilica. A striking confirmation of this view has recently come to light at S. Saba on the Aventine at Rome, where a small and very early church, without aisles, has been discovered beneath the floor of the present basilica.

There are, on the other hand, instances in which private basilicas in palaces and mansions were handed over to the Christians for sacred uses. We know that to have been the case with the basilicas of S. Croce in Gerusalemme and S. Maria Maggiore at Rome, which originated in the halls of the Sessorian and Liberian palaces respectively, granted by Constantine to the Christians. We may adduce also as evidence of the same practice a passage in bk. x. ch. 7 1 of the theological romance known as The Recognitions of Clement, probably dating from the early half of the 3rd century, in which we are told that Theophilus of Antioch, on his conversion by St Peter, made over " the basilica of his house " for a church. But however this may have been, with, perhaps, the single exception of S. Croce, the existing Christian basilicas were erected from the ground for their sacred purpose. At Rome the columns, friezes and other materials of the desecrated temples and public buildings furnished abundant materials for their construction. The decadence of art is plainly shown by the absence of rudimentary architectural knowledge in these

TTT1

Fig. 7. — Plan of Basilica adjoining the Forum of the

Roman city at Silchester, Hants.

(From Archaeologia, vol. liii.)

reconstructions. Not only are columns of various heights and diameters made to do duty in the same colonnade, but even different orders stand side by side (e.g. Ionic, Corinthian and Composite at S. Maria in Trastevere) ; while pilasters assume a horizontal position and serve as entablatures, as at S. Lorenzo fuori le Mura. There being no such quarry of ready-worked materials at Ravenna, the noble basilicas of that city are free from these defects, and exhibit greater unity of design and harmony of proportions.

An early Christian basilica may be thus described in its main features: — A porch supported on pillars (as at S. Clemente) gave

admission into an open court or atrium, surrounded by a colonnaded cloister (S. Clemente, Old St Peter's, S. Ambrogio at Milan, Parenzo). In the centre of the court stood a cistern or fountain (cantharus, phiale), for drinking and ablutions. In close contiguity to the atrium, often to the west, was the baptistery, usually octagonal (Parenzo). The church was entered through a long narrow porch (narthex), beyond which penitents, or those under ecclesiastical censure, were forbidden to pass. Three or more lofty doorways, according to the number of the aisles, set in marble cases, gave admission to the church. The doors them- selves were of rich wood, elaborately carved with scriptural subjects (S. Sabina on the Aventine), or of bronze similarly adorned and often gilt. Magnificent curtains, frequently embroidered with sacred figures or scenes, closed the entrance, keeping out the heat of summer and the cold of winter.

The interior consisted of a long and wide nave, sometimes as much as 80 ft. across, terminating in a semicircular apse, with one or sometimes (St Paul's, Old St Peter's, St John Lateran) two aisles on each side, separated by colonnades of marble pillars supporting horizontal entablatures (Old St Peter's,- S. Maria Maggiore, S. Lorenzo) or arches (St Paul's, S. Agnese, S. Clemente, the two basilicas of S. Apollinare at Ravenna). Above the pillars

the clerestory wall rose to a great height, pierced in its upper part by a range of plain round-headed windows. The space between the windows and the colonnade (the later triforium-space) was usually decorated with a series of mosaic pictures in panels. The colonnades sometimes extended quite to the end of the church (the Ravenna basilicas), sometimes ceased seme little distance from the end, thus admitting the formation of a transverse aisle or transept (St Paul's, Old St Peter's, St John Lateran). Where this transept occurred it was divided from the nave by a wide arch, the face and soffit of which were richly decorated with mosaics. Over the crown of the arch we often find a bust of Christ or the holy lamb lying upon the altar, and, on either side, the evangel- istic symbols, the seven candlesticks and the twenty-four elders. Another arch spanned the semicircular apse, in which the church always terminated. From Carolingian times this was designated the arch of triumph, because a cross was suspended from it.

The conch or semi-dome that covered the apse was always covered with mosaic pictures, usually paintings of our Lord, either seated or standing, with St Peter and St Paul, and other apostles and saints, on either hand. The beams of the roof were sometimes concealed by a

flat ceiling, richly carved and gilt. The altar, standing in the centre of the chord of the apse on a raised platform reached by flights of steps, was rendered conspicuous by a lofty canopy supported by marble pillars (ciborium, baldacchino) , from which depended curtains of the richest materials. Beneath the altar was the confessio, a subterranean chapel, containing the body of the patron saint, and relics of other holy persons. This was approached by descending flights of steps from the nave or aisles. The confessio in some cases reproduced the original place of interment of the patron saint, either in a catacomb-chapel or in an ordinary grave, and thus formed the sacred nucleus round which the church arose. We have good examples of this arrange- ment at St Peter's and St Paul's at Rome, and S. Apollinare in Classe, Ravenna. It was copied in the original cathedral of Canterbury. The bishop or officiating presbyter advanced from his seat in the centre of the semicircle of the apse to the altar, and celebrated the Eucharist with his face to the congregation below. At the foot of the altar steps a raised platform, occupying the upper portion of the nave, formed a choir for the singers, readers and other inferior clergy. This oblong space was separated from the aisles and from the western portion of the nave by low marble walls or railings (cancelli). From these walls projected ambones or pulpits with desks, also of marble, ascended by steps.

The exterior of the basilicas was usually of an extreme plain- ness. The vast brick walls were unrelieved by ornament, save occasionally by arcading as at S. Apollinare in Classe, Ravenna, and had no compensating grace of outline or beauty of proportion. An exception was madefortheentrancefront, which was sometimes covered with plates of marble mosaics or painted stucco (Old St Peter's, S. Lorenzo). But in spite of any decorations the external

Fig. 8. — S. Apollinare in Classe, Ravenna.

effect of a basilica must always have been heavy and unattractive. S. Apollinare in Classe at Ravenna (fig. 8) affords a typical

example. The campanile if a later addition. Within, apart from the beautiful mosaic decoration, a fine effect was produced by the arch of triumph and the apse, which terminated the nave and dominated the whole vast space of the interior.

To pass from general description to individual churches, the first place must be given, as the earliest and grandest examples of the type, to the world-famous Roman basilicas; those of St Peter, St Paul and St John Lateran, " omnium urbis et orbis ecclesiarum mater et caput." It is true that no one of these exists in its original form, Old St Peter's having been entirely removed in the 16th century to make room for its magnificent successor; and both St Paul's and St John Lateran having been greatly

Fig. 9. — Facade of old St Peter's, Rome.

injured by fire, and the last named being so completely modern- ized as to have lost all interest. Of the two former, however, we possess drawings and plans and minute descriptions, which give an accurate conception of the original buildings. To com- mence with St Peter's, from the illustrations annexed (figs. 9, 10,

11) it will be seen that the church was entered through a vast colonnaded atrium, 212 ft. by 235 ft., with a fountain in the centre, — the atrium being preceded by a porch mounted by a noble flight of steps. The church was 212 ft. wide by 380 ft. long; the nave, 80 ft. in width, was six steps lower than the side aisles, of which there were two on each side. The four dividing colon- nades were each of twenty- two Corinthian columns. Those next the nave sup- ported horizontal entabla- tures. The inner colonnades bore arches, with a second clerestory. The main clere- story walls were divided into two rows of square panels containing mosaics, and had windows above. The tran- Fig. 10. — Ground-Plan of the original sept projected beyond the

Basilica of St Peter's at Rome. o, Porch.

body of the church,— a very

h, Altar, protected by a unusual arrangement. The

double screen. ˆ of remarkably small

dimensions, was screened off by a double row of twelve wreathed columns of Parian marble. The pontifical chair was placed in the centre of the curve of the apse, on a platform raised several steps above the presbytery. To the right and left the seats of the cardinals followed the line of the apse. At the

b, Atrium.

c, Cloisters.

d, Narthex.

e, Nave. /, /, Aisles, g, Bema.

i, Bishop's throne in

centre of the apse. k. Sacristy. I, Tomb of Honorius. m, Church of St Andrew.

centre of the chord stood the high altar beneath a ciborium, resting on four pillars of porphyry. Beneath the altar was the subterranean chapel, the centre of the devotion of so large a

Fig. 11. — Sectional view of the old Basilica of St Peter, before its destruction in the 16th century.

portion of the Christian world, believed to contain the remains of St Peter ; a vaulted crypt ran round the foundation wall of the apse in which many of the popes were buried. The roof showed its naked beams and rafters.

The basilica of St Paul without the walls, dedicated 324 a.d., rebuilt 388-423, remained in a sadly neglected state, but sub- stantially unaltered, till the disas- trous fire of 1823, which reduced the nave to a calcined ruin. Its) plan and dimensions (figs. 12, 13) were almost identical with those of St Peter's.

The only parts of the modernized five-aisled basilica of St John Lateran (of which we have a plan in its original state, Agincourt, pi. lxxiii. No. 22) which retain any interest, are the double-vaulted aisle which runs round the apse, a most unusual arrangement, and the baptistery. The latter is an octagonal building standing some little distance from the basilica to the south. Its roof is supported by a double range of columns, one above the other, encircling the bap- tismal basin sunk below the floor. Of the three-aisled basilicas the best example is the Liberian or S. Maria Maggiore dedicated 365, and reconstructed 432 A.D. Its internal length to the chord of the apse is 250 ft. by 100 ft. in breadth. The Ionic pillars of grey granite, uniform in style, twenty on each side, form a colonnade of great dignity and beauty, unfor- tunately broken towards the east by intrusive arches opening into chapels. The clerestory, though modern, is excellent in

Fig. 12. — Ground- Plan of St Paul's, Rome, before its destruction by fire.

a, Narthex. d, Altar.

b, Nave. e, Bema.

c, c, Side aisles. /, Apse.

Fig. 13.— Section of the Basilica of St Paul, Rome.

style and arrangement. Corinthian pilasters divide the win- dows, beneath which are very remarkable mosaic pictures of subjects from Old Testament history, generally supposed t.o

date from the pontificate of Sixtus III., 432-440. The face of the arch of triumph presents also a series of mosaics illustrative of the infancy of our Lord, of great value in the history of art. The apse is of later date, reconstructed by Paschal I. in 818.

Of the remaining Roman basilicas that of S. Sabina on the Aventine is of special interest as its interior, dating from about a.d. 430, has preserved more of the primitive aspect than any- other. Its carved wooden doors of early Christian date are of unique value, and in the spandrils of its inner arcades, upborne by splendid antique Corinthian columns, are some good specimens of opus seclile or mosaic of cut marble. The ancient roof is an open one. The basilicas of S. Lorenzo fuori le Mura and S. Agnese deserve particular notice, as exhibiting galleries corres- ponding to those of the civil basilicas and to the later triforium, carried above the aisles and returned across the entrance end. It is doubtful, however, whether these galleries are part of the original schemes. The architectural history of S. Lorenzo's is curious. When originally constructed in a.d. 432, it consisted of a short nave of six bays, with an internal narthex the whole height of the building. In the 13th century Honorius III. dis- orientated the church by pulling down the apse and erecting a nave of twelve bays on its site and beyond it, thus converting the original nave into a square-ended choir, the level being much raised, and the magnificent Corinthian columns half buried. As a consequence of the church being thus shifted completely round, the face of the arch of triumph, turned away from the present entrance, but towards the original one, is invested with the usual mosaics (Agincourt, pi. xxviii. Nos. 29, 30, 31). The basilica of S. Agnese, of which we give a section (fig. 14), is a small but

Fig. 14. — Section of Basilica of S. Agnese at Rome.

interesting building, much like what S. Lorenzo must have been before it was altered. '

Though inferior in size, and later in date than most of the basilicas already mentioned, that of S. Clemente is not surpassed in interest by any one of them. This is due to its having retained its original ritual arrangements and church-fittings more per- fectly than any other. These fittings have been removed from the earlier church, lying below the existing building, which at some unknown date and for some unrecorded reason was abandoned and filled up with earth, while a new building was erected upon it as a foundation. The most probable account is that the earlier church was so completely overwhelmed in the ruin of the city in 1084, when Robert Guiscard burnt all the public buildings from the Lateran to the Capitol, that it was found simpler and more convenient to build a new edifice at a higher level than to repair the old one. The annexed plan (fig. 15) and view (fig. 16) show the peculiarities of the existing building. The church is preceded by an atrium, the only perfect example remaining in Rome, in the centre of which is the can- tharus or fountain for ablutions. The atrium is entered by a portico made up of earlier fragments very carelessly put together. The chorus cantorum, which occupies about one-third of the nave, is enclosed by a low marble screen, about 3 ft. high, a work of the 9th century, preserved from the old church but newly arranged. The white marble slabs are covered with patterns in low relief, and are decorated with ribbons of glass mosaic of the 13th century. These screen-walls stand quite free of the pillars, leaving a passage between. On the ritual north stands the gospel-ambo, of octagonal form, with a double flight of steps westwards and eastwards. To the west- of it stands the great

Paschal candlestick, with a spiral shaft, decorated with mosaic. Opposite, to the south, is the epistle-ambo, square in plan, with two marble reading-desks facing east and west, for the reading of the epistle and the gradual respectively. The sanctuary is raised two steps above the choir, from which it is divided by another portion of the same marble screen. The altar stands beneath a lofty ciborium, supported by marble columns, with a

Fig. 15. — Plan of Basilica of S. Clemente in Rome.

Porch. 5, Aisle for women.

Atrium. 6, Chorus cantorum.

Nave. 7, Altar.

Aisle for men. 8, Gospel-ambo.

9, Epistle-ambo.

10, Confessio.

1 1 , Bishop's throne.

canopy on smaller shafts above. It retains the rods and rings for the curtains to run on. Behind the altar, in the centre of the curved line of the apse, is a marble episcopal throne, bearing the monogram of Anastasius who was titular cardinal of this church in 1108. The conch of the apse is inlaid with mosaics of quite the end of the 13th century. The subterranean church, disinterred by the zeal of Father Mullooly, the prior of the adjacent Irish Dominican convent, is supported by columns of very rich marble of various kinds. The aisle walls, as well as those of the narthex, are covered with fresco-paintings of various dates from the 7th to the nth century, in a marvellous state of preservation, (See St Clement, Pope and Martyr, and his Basilica in Rome, by Joseph Mullooly, O.P., Rome, 1873.)

The fullest lists of early Christian basilicas outside Rome are given in Kraus's Realencyklopa'die der christlichen Alterthilmer, Freiburg i. B., 1882, art. " Basilica," and more recently in Leclercq's Manuel d'arcMologie chritienne, Paris 1907, vol. i. App. i., " Essai de Classement des Principaux Monuments." Only a few characteristic specimens in different regions can here be noticed. In Italy, apart from Rome, the most remarkable basilican churches are the two dedicated to S. Apollinare at Ravenna. They are of smaller dimensions than those of Rome, but the design and proportions are better. The cathedral of this city, a noble basilica with double aisles, erected by Arch- bishop Ursus, a.d. 400 (Agincourt, pi. xxiii. No. 21), was un- fortunately destroyed on the erection of the present tasteless building. Of the two basilicas of S. Apollinare, the earlier, S. Apollinare Nuovo, originally an Arian church erected by Theodoric, 493-525, measuring 315 ft. in length by 115 ft. in breadth, has a nave 51 ft. wide, separated from the single aisles by colonnades of twenty-two pillars, supporting arches, a small

. ■ i.»jTjj»Gpi«iˆpi

WL

1 yl

1 ,

Fig. 16. — Interior of S. Clemente in Rome.

prismatic block bearing a sculptured cross intervening with very happy effect between the capital and the arch. Below the windows a continuous band of saintly figures, male on one side and female on the other, advancing in stately procession towards Our Lord and the Virgin Mother respectively, affords one of the most beautiful examples of mosaic ornamentation to be found

in any church (fig. 17). The design of the somewhat later and smaller church of S. Apollinare in Classe, a.d. 538-549, measur- ing 216 ft. by 104 ft., is so similar that they must have pro- ceeded from the same architect (Agincourt, pi. lxxiii. No. 35).

The cathedral on the island of Torcello near Venice, originally built in the 7th century, but largely repaired c. a.d. iooo, deserves special attention from the fact that it preserves, in a more perfect state than can be seen else- where, the arrangements of the seats in the apse (fig. 18). The bishop's throne occupies the centre of the arc, approached by a steep flight of steps. Six rows of stone benches for the presbyters, rising one above another like the seats in a theatre, follow the curve on either side — the whole being singularly plain and almost rude. The altar stands on a plat- form; the sanctuary is divided from the nave by a screen of six pillars. The walls of the apse are inlaid with plates of marble. The church is 125 ft. by 75 ft. The narrow aisles are only 7 ft. in width.

Another very remarkable basilica, less known than it deserves to be, is that of Parenzo in Istria, c. a.d. 542. Few basilicas have sustained so little alteration. From the annexed ground- plan (fig. 19) it will be seen that it retains its atrium and a baptistery, square without, octagonal within, to the west of it. Nine pillars divide each aisle from the nave, some of them borrowed from earlier buildings. The capitals are Byzantine. The choir occupies the three easternmost bays. The apse, as at Torcello, retains the bishop's throne and the bench for the presbyters apparently unaltered. The mosaics are singularly gorgeous, and the apse walls, as at Torcello, are inlaid with rich marble and mother-of-pearl. The dimensions are small — 121 ft. by 32 ft. (See Kunstdenkmale des osterreichischen Kaiserreichs, by Dr

G. Heider and others.)

In the Eastern church, though the erection of St Sophia at Constantinople introduced a new type which almost entirely superseded the old one, the basilican form, or as it was then termed dromical, from its shape being that of a race-course (dromes), was originally as much the rule as in the West. The earliest church of which we have any clear account, that of

Fig. 17. — Arches of S.Apol linare Nuovo, Ravenna.

Fig. 18. — Apse of Basilica, Torcello, with Bishop's throne and seats for the clergy.

(From a drawing by Lady Palgrave.)

Paulinusat Tyre, a.d. 313-322, described by Eusebius (Hist. Eccl. x ' 4 § 37)i was evidently basilican, with galleries over the aisles,

and had an atrium in front. That erected by Constantine at Jerusalem, on the side of the Holy Sepulchre, 3ˆ3, followed the same plan (Euseb., Vit. Const, iii. c. 29), as did the original churches of St Sophia and of the Apostles at Constantinople. Both these buildings have entirely passed away, but we have an excellent example of an oriental basilica of the same date still standing in the church of the Nativity at Bethlehem, rebuilt

r.::v.::x::x:x:nr.7.is,*

Fig. 19. — Ground-Plan of Cathedral of Parenzo, Istria. o, Cloistered atrium, d, Chorus cantorum. h. Belfry. +, Narthex. e, Altar. i, Chapel of St Andrew.

b, Nave. /, Bishop's throne.

c, c, Aisles. g, Baptistery.

by Justinian in the 6th century (fig. 20) . Here we find an oblong atrium, a vestibule or narthex, double aisles with Corinthian columns, and a transept, each end of which terminates in an apse, in addition to that in the usual position. Beneath the centre of the transept is the subterranean church of the Nativity (Vogue, Les Uglises de la Terre Sainte, p. 46).

Constantinople preserved till recently a basilican church of the 5th century, that of St John Studios, 463, now a ruin. It had a nave and

side aisles divided by columns supporting a horizontal entablature, with another order supporting arches forming a gallery above. There was the usual apsidal termination. The chief difference between the Eastern and Roman basilicas is in the galleries. This feature is very rare in the West, and only occurs in some few examples, the antiquity of which is questioned at Rome but never at Ravenna. It is, on the other hand, a characteristic feature of Eastern churches, the galleries being intended for women, for whom privacy was more studied than in the West (Sa\zaiherg,Altchrist. Baudenkmale von Constantinople).

Other basilican churches in the East which deserve notice are those of the monastery of St Catherine on Mt. Sinai built by Justinian, that of Dana between Antioch and Bir of the same date, St Philip at Athens, Bosra in Arabia, Xanthus in Lycia, and the very noble church of St Demetrius at Thessalonica. Views and descriptions of most of these may be found in Texier and Pullan's Byzantine Architecture, Couchaud's Choix d'iglises byzantines, and the works of the count de Vogue. In the Roman province of North Africa there are abundant remains of early Christian churches, and S. Gsell, Les Monuments antiques de I'Algirie, has noticed more than 130 examples. Basilicas of strictly early Christian date are not now to be met with in France, Spain or Germany, but the interesting though very plain " Basse CEuvre " at Beauvais may date from Carolingian times, while

Germany can show at Michelstadt in

the Odenwald an unaltered basilica of

the time of Charles the Great. The

fine-columned basilica of St Mauritius,

near Hildesheim, dates from the nth

century, and the basilican form has

been revived in the noble modern

basilica at Munich. t, „. , , ,

t, , , , , biG. 20. — Plan of church

England can show more early of the Nat i vity , Bethle .

Christian survivals than France or hem. 1, Narthex; 2, nave;

Germany. In the course of the ex- 3. 3> aisles.

cavation of the Roman city of Sil-

chester, there was brought to light in 1892 the remains of a

small early Christian basilica dating from the 4th century of

which fig. 21 gives the plan (Archaeologia, vol. liii.). It will be

fl

noted that the apse is flanked by two chambers, of the nature of sacristies, cut off from the rest of the church, and known in

ecclesiastical terminology as pro- thesis and diaconicon. These features, rare in Italy, are almost universal in the churches of North Africa and Syria. Another existing English basilica of early date is that of Brixworth in Northamptonshire, probably erected by Saxulphus, abbot of Peterborough, c. a.d. 680.

p IG> 2 j pi an f early It. consisted of a nave divided from

Christian Basilica of about its aisles by quadrangular piers sup- the 4th century at Silchester, porting arches turned in Roman

brick, with clerestory windows above, and a short chancel terminating in an apse, outside which, as at St Peter's at Rome, ran a circumscribing crypt entered by steps from the chancel. At the west end was a square porch, the walls of which were carried up later in the form of a tower.

The first church built in England under Roman influence was the original Saxon cathedral of Canterbury. From the annexed ground-plan (fig. 22), as conjecturally restored from Eadmer's description, we see that it was an aisled basilica, with an apse at either end, containing altars standing on raised platforms approached by steps. Beneath the eastern platform was a crypt, or confessio, containing relics, " fabricated in the likeness of the confessionary of St Peter at Rome " (Eadmer). The western apse, dedicated to the Blessed Virgin, contained the bishop's throne. From this and other indications Willis thinks that this

Hants

(From Archaeologia, liii.)

CLOISTER

I

■ ■ ■ *a b b*

I c|

NAVE Fl CHOIR E|

■ ■■■■■

EAST

Fig. 22. — Ground-Plan of the original Cathedral at Canterbury, as restored by Willis.

A, High altar. G, Our Lady's altar.

B, Altar of our Lord. H, Bishop's throne.

C, C, Steps to crypt. K, South porch with altar.

D, Crypt. L, North porch containing E 1 ,-.«. . ■ school.

F I Chorus cantorum. M) Archbishop do's tomb.

was the original altar end, tne eastern apse being a subsequent addition of Archbishop Odo, c. 950, the church having, been thus turned from west to east, as at the already-described basilica of S. Lorenzo at Rome. The choir, as at S. Clemente's, occupied the eastern part of the nave, and like it was probably enclosed by breast-high partitions. There were attached porches to the north and south of the nave. The main entrance of the church was through that to the south. At this sulhdure, according to Eadmer, " all disputes from the whole kingdom, which could not legally be referred to the king's court, or to the hundreds and counties, received judgment." The northern porch contained a school for the younger clergy.

Authorities. — Vitruvius, De Archileclura, v. 1, vi. 3, 9; Huelsen, The Roman Forum (1906); Mau, Pompeii: its Life and Art; C. Lange, Hails und Halle; Canina, Edifizii di Roma Antica; Ciampini, Vetera Monimenta; Seroux dAgincourt, L'Histoire de I'art par les monumens; Bunsen and Plattner, Beschreibung der Stadt Rom; Gutensohn and Knapp, Basiliken des christlichen Roms ; Zestermann, Die antiken u. die christlichen Basiliken; Hubsch, Die allchrisilichen Kirchen; Messmer, Ober den Ursprung, &c, der Basilica; Leta-rouilly, Edifices de Rome moderne; Von Quast, Altchristliche Bau-

werke von Ravenna; Texier and Pullan, Byzantine Architecture; Vogue, Eglises de la Terre Samte; Syrie Centrale, Architecture, &c. ; Couchaud, Choix d' eglises byzantines; Dehio und von Bezold, Die kirchliche Baukunst des Abendlandes; Holtzinger, Die altchristliche Architectur in systematischer Darstellung; Kraus, Geschichte der christlichen Kunst; Leclercq, Manuel d ' archfologie chretienne (Paris, 1907). (E. V.;G. B. B.)

BASILICA, a code of law, drawn up in the Greek language, with a view to putting an end to the uncertainty which prevailed throughout the East Roman empire in the 9th century as to the authorized sources of law. This uncertainty had been brought about by the conflicting opinions of the jurists of the 6th century as to the proper interpretation to be given to the legislation of the emperor Justinian, from which had resulted a system of teaching which had deprived that legislation of all authority, and the imperial judges at last were at a loss to know by what rules of law they were to regulate their decisions. An endeavour had been made by the emperor Leo the Isaurian to remedy this evil, but his attempted reform of the law had

*been rather calcu- lated to increase its uncertainty; and it was reserved foi Basil the Macedonian to show himself worthy of the throne, which he had usurped, by purifying the administration of justice and once more reducing the law into an intelligible code. There has been considerable controversy as to the part which the emperor Basil took in framing the new code. There is, however, no doubt that he abrogated in a formal manner the ancient laws, which had fallen into desuetude, and the more probable opinion would seem to be, that he caused a revision to be made of the ancient laws which were to continue in force, and divided them into forty books, and that this code of laws was subsequently enlarged and distributed into sixty books by his son Leo the Philosopher. A further revision of this code is stated to have been made by Constantine Porphyrogenitus, the son and successor of Leo, but this statement rests only on the authority of Theodoras Balsamon, a very learned canonist of the 12th century, who, in his preface to the Nomocanon of Patriarch Photius, cites passages from the Basilica which differ from the text of the code as revised by the emperor Leo. The weight of authority, however, is against any further revision of the code having been made after the formal revision which it underwent in the reign of the emperor Leo, who appointed a commission of jurists under the presidency of Sympathius, the captain of the body-guard, to revise the work of his father, to which he makes allusion in the first of his Novellae. This latter conclusion is the more probable from the circumstance, that the text of the code, as revised by the emperor Leo, agrees with the citations from the Basilica which occur in the works of Michael Psellus and Michael Atta- liates, both of them high dignitaries of the court of Constanti- nople, who lived a century before Balsamon, and who are silent as to any second revision of the code having taken place in the reign of Constantine Porphyrogenitus, as well as with other citations from the Basilica, which are found in the writings of Mathaeus Blastares and of Constantine Harmenopulus, both «*f whom wrote shortly after Balsamon, and the latter of whom was far too learned a jurist and too accurate a lawyer to cite any but the official text of the code.*

Authors are not agreed as to the origin of the term Basilica, by which the code of the emperor Leo is now distinguished. The code itself appears to have been originally entitled The Revision of the Ancient Laws (1ˆ avaKadapffis tcov Trakaiwv vbuwv); next there came into use the title 17 e£r7icopra/3i|3Xos, derived from the division of the work into sixty books; and finally, before the conclusion of the 10th century, the code came to be designated 6 |8ocriXuc6s, or to ftaaihuia., being elliptical forms of 6 j3a

the ancient Greek language, the adjective (ScunXiKos could not well be derived.

No perfect MS. has been preserved of the text of the Basilica, and the existence of any portion of the code seems to have been ignored by the jurists of western Europe, until the important bearing of it upon the study of the Roman law was brought to their attention by Viglius Zuichemus, in his preface to his edition of the Greek Paraphrase of Theophilus, published in 1533. A century, however, elapsed before an edition of the sixty books of the Basilica, as far as the MSS. then known to exist supplied materials, was published in seven volumes, by Charles Annibal Fabrot, under the patronage of Louis XIII. of France, who assigned an annual stipend of two thousand livres to the editor during its publication, and placed at his disposal the royal printing-press. This edition, although it was a great undertaking and a work of considerable merit, was a very imperfect representation of the original code. A newly-restored and far more complete text of the sixty books of the Basilica was published at Leipzig in six volumes (1833-1870), edited by K. W. E. Heimbach and G. E. Heimbach. It may seem strange that so important a body of law as the Basilica should not have come down to us in its integrity, but a letter has been preserved, which was addressed by Mark the patriarch of Alexandria to Theodorus Bal- samon, from which it appears that copies of the Basilica were in the 12th century very scarce, as the patriarch was unable to procure a copy of the work. The great bulk of the code was an obstacle to the multiplication of copies of it, whilst the necessity for them was in a great degree superseded by the publication from time to time of synopses and encheiridia of its contents, composed by the most eminent jurists, of which a very full account will be found in the Histoire au droit byzantin, by the advocate Mortreuil, published in Paris in 1846.

BASILICATA, a territorial division of Italy, now known as the province of Potenza, which formed a part of the ancient Lucania (?.».). It is bounded N. by the province of Foggia, N.E. by those of Bari and Lecce, E. by the Gulf of Taranto (for a distance of 24 m.), S. by the province of Cosenza, and W. by the Mediterranean(for a distance of 10 m. only), and by the provinces of Salerno and Avellino. It has an area of 3845 sq. m. The province is as a whole mountainous, the highest point being the Monte Pollino (7325 ft.) on the boundary of the province of Cosenza, while the Monte Vulture, at

the N.W. extremity, is an extinct volcano (4365 ft.). It is traversed by five rivers, the Bradano, Basento, Cavone or Salandrella, Agri and Sinni. The longest, the Bradano, is 104 m. in length; all run S.E. or E. into the Gulf of Taranto. The province is traversed from W. to E. by the railway from Naples to Taranto and Brindisi, which passes through Potenza and reaches at Metaponto the line along the E. coast from Taranto to Reggio di Calabria. A branch line runs N. from Potenza via Melfi to Rocchetta S. Antonio, a junction for Foggia» Gioia del Colle and Avellino (the second of these lines runs through the province of Potenza as far as Palazzo S. Ger- vasio), while a branch S. from the Naples and Taranto line at Sicignano terminates at Lagonegro, on the W. edge of the province. Communications are rendered difficult by the moun- tainous character of the interior. The mountains are still to some extent clothed with forests; in places the soil is fertile, especially along the Gulf of Taranto, though here malaria is the cause of inefficient cultivation. Olive-oil is the most important product. The total population of the province was 490,705 in 1001. The chief towns are Potenza (pop. 1901, 16ˆ186), Avig- Iiana(i8,3i3), Matera(i7,237),Melfi (14,649), Rionero in Vulture (n, 809) , Lauria (1 0,099) •

BASILIDES, one of the most conspicuous exponents of Gnosticism, was living at Alexandria probably as early as the first decades of the 2nd century. It is true that Eusebius, in his Chronicle, dates his first appearance from ˆa.d. 133, but according to Eusebius, Hist. Eccl. iv. 7 §§ 6-8, Agrippa Castor, who lived under Hadrian (117-138), already wrote a polemic against him, so that his activity may perhaps be set back to a date earlier than 138. Basilides wrote an exegetical work in twenty-four books on ” his ” gospel, but which this was is not known. In addition to this there are certain writings by his son Isidorus Ilept irpoavovs i/‘i>x‘7 s ; ‘EˆyqnKa. on the prophet Parchor (ITapxwp); ‘HdiKa. The surviving fragments of these works are collected and commented on in Hilgenfeld’s Ketzer- geschichte, 207-218. The most important fragment published by Hilgenfeld (p. 207), part of the 13th book of the Exegetica, in

the Acta Archelai et Manetis c. 55, only became known in its complete form later, and was published by L. Traube in the Sitzungsbericht der Miinchener Akad., phil. histor. Kl. (1903), PP- 533-549- Irenaeus {Adv. Haer. i. 24 §§ 3-7) gives a sketch of Basilides’ school of thought, perhaps derived from Justin’s Syntagma. Closely related to this is the account in the Syntagma of Hippolytus, which is preserved in Epiphanius, Haer. 24, Philaster, Haer.. 32, and Pseudo-Tertullian, Haer. 45 These are completed and confirmed by a

number of scattered notices in the Stromateis of Clemens Alexandrinus. An essenti- ally different account, with a pronounced monistic tendency, is presented by the so-called Philosophumena of Hippolytus (vii. 20-27; x – z 4)- Whether this last account, or that given by Irenaeus and in the Syntagma of Hippolytus, represents the original system of Basilides, has been the subject of a long controversy. (See Hilgenfeld p. 205, note 337.) The most recent opinion tends to decide against the Philosophumena; for, in its composition, Hippolytus appears to have used as his principal source the compendium of a Gnostic author who has introduced into most of the systems treated by him, in addition to the employment of older sources, his own opinions or those of his sect. The Philosophumena, therefore, cannot be taken into account in describing the teaching of Basilides (see also H. Stachelin, " Die gnostischen Quellen Hippolyts " in Texle und Untersuchungen, yi. 3; and the article Gnosticism). A comparison of the surviving fragments of Basilides, moreover, with the outline of his system in Irenaeus-Hippolytus (Syn- tagma) shows that the account given by the Fathers of the Church is also in the highest degree untrustworthy. The principal and most characteristic points are not noticed by them. If we assume, as we must needs do, that the opinions which Basilides promulgates as the teaching of the " barbari " (Acta Archelai c. 55) were in fact his own, the fragments prove him to have been a decided dualist, and his teaching an interesting further development of oriental (Iranian) dualism. Entirely consistent with this is the information given by the Acta Archelai that Basilides, before he came to Alexandria, had appeared publicly among the Persians (fuit praedicator apud Persas); and the allusion to his having appealed to prophets with oriental names, Barkabbas and Barkoph (Agrippa in Eusebius Hist. Eccl. iv. 7 § 7) . So too his son Isidorus explained the pro- phecies of a certain Parchor (= Barkoph) and appealed to the prophecies of Cham 1 (Clemens Alexandrinus, Stromal, vi. 6 § 53). Thus Basilides assumed the existence of two principles, not derivable from each other: Light and Darkness. These had existed for a long time side by side, without knowing any- thing of each other, but when they perceived each other, the Light had only looked and then turned away; but the Darkness, seized with desire for the Light, had made itself master, not indeed of the Light itself, but only of its reflection {species, color). Thus they had been in a position to form this world: unde nee perfectum bonum est in hoc mundo, et quod est, valde est exiguum. This speculation is clearly a development of that which the Iranian cosmology has to tell about the battles be- tween Ahura-Mazda and Angro-Mainyu (Ormuzd and Ahriman) . The Iranian optimism has been replaced here by a strong pessim- ism. This material world is no

longer, as in Zoroastrianism, essentially a creation of the good God, but the powers of evil have created it with the aid of some stolen portions of light. This is practically the transference of Iranian dualism to the more Greek antithesis of soul and body, spirit and matter (cf . Irenaeus i. 24 § 5: animae autem eorum solam esse salutcm, corpus enim natura corruptible existit). The fundamental dualism of Basilides is confirmed also by one or two other passages. In the parable of the rich man and Lazarus, Basilides saw the proof of naturam sine radice et sine loco rebus super – venientem (Acta Archelai). According to Clemens, Strom, iv. 12 § 83, &c, Basilides taught that even those who have not sinned in act, even Jesus himself, possess a sinful nature. It is possibly also in connexion with the dualism of his fundamental

1 =Nimrod = Zoroaster, cf. Pseudo-Clement, Homil. ix. 3. Recogn. iv. 27.

views that he taught the transmigration of souls (Origen in Ep. ad Rom. lib. v..; Opp. de la Rue iv. 549; cf. Clemens, Excerpta ex Theodoto, § 28). Isidorus set up celibacy, though in a modified form, as the ideal of the perfect (Clemens, Strom, iii. 1 § 1, &c). Clemens accuses Basilides of a deification of the Devil (Otiafav rbv Sia/ foXov), and regards as his two dogmas that of the Devil and that of ..the transmigration of souls {Strom. iv. 12 § 85: cf. v. 11. § 75). It is remarkable too that Isidorus held the existence of two souls in man, a good and a bad (Clemens, Strom, ii. 20 113); with which may be compared the teaching of Maiii about the two souls, which it is impossible to follow F, . Ch. Baur in excluding, 1 and also the teaching of the Pistis Sophia (translated by C. Schmidt, p. 182, &c). According to Clemens (Strom, ii. 20 §; 112), the followers of Basilides spoke of 1rvtv410.TO.Tiva wpocrripTri/xevo. TV ~Koyt,KJj ipvxv Kara rivaTb.pa.xov koX avyxvo-w apxwrjV. that is to say, here also is assumed an original confusion and intermingling. Epiphanius too tells us that the teaching of Basilides had its beginning in the question as to the origin of evil (Haer. xxiv. 6).

Now, of this sharply defined dualism there is scarcely a trace in the system described by the Fathers of the Church. It is there fore only with caution that we can use them to supplement our knowledge of the true Basilides, The doctrine described by them that from the supreme God (the innatus pater) had emanated 365 heavens with

their spirits, answers originally to the astrono- mical conception of the heavens with their 365 daily aspects (Irenaeus i. 24. 7; Trecentorum autem sexaginta quinque caelorum locales positiones distribuunt similiter ut mathematici) . When, therefore, the supreme God is called by the name Afipacraˆ or Aj3pa£as, which contains the numerical value 365 , it is worthy of remark that the name of the Persian god Mithras (Meldpas) also was known in antiquity to contain this numerical value (Jerome in A mos 3; Opp. Vallarsi VI. i. 257). Speculations about the Perso- Hellenistic Mithras appear to have been transferred to the Gnostic Abraxas. Further, if the Pater innatus be surrounded by a series of (from five to seven) Hypostases (according to Irenaeus i. 24. 3; NoOs, Aoyos, Qpovrjais, 2o$£a, Aiiva/us; according to Clemens, Strom, iv. 25 § 164, AiKaioavvr) and Wprivri may perhaps be added), we are reminded of the Ameshas-spentas which surround Ahura- Mazda. Finally, in the system of Basilides, the (seven ?) powers from whom this world originates are accepted as the lowest emanations of the supreme God. This conception which is repeated in nearly every Gnostic system, of (seven) world-creating angels, is a specifically oriental speculation. The seven powers which create and rule the world are without doubt the seven planetary deities of the later Babylonian religion. If, in the Gnostic systems, these become daemonic or semi-daemonic forces, this points to the fact that a stronger monotheistic religion (the Iranian) had gained the upper hand over the Babylonian, and had degraded its gods to daemons. The syncretism of the Babylonian and the Persian religion was also the nursing-ground of Gnosticism. When, then, Basilides identified the highest angel of the seven, the creator of the worlds, with the God of the Jews, this is a development of the idea which did not occur until late, possibly first in the specifically Christian circles of the Gnostics. We may note in this connexion that the system of Basilides ascribes the many battles and quarrels in the world to the privileged position given to his people by the God of the Jews. 2

It is at this point that the idea of salvation is introduced into the system. The confusion in the world has meanwhile risen to such a pitch that the supreme God sends his Nous, who is also called Christ, into the world (Irenaeus i. 24. 4). According to Clemens, the Saviour is termed itvtvfta bioKovovfievov {Strom. ii; 8 § 36) or Slclkovos (Excerpta ex Theodoto, § 16). It is im-

1 The materials are in Baur, Das manichaische Religionssystem (1831), p. 162, &c.

2 Whether the myth of the creation of the first man by the angels,

which recurs in many Gnostic systems, found a place also in the system of Basilides, cannot be determined with any certainty. Philastrius, however, says : kominem autem ab angelis factum assent, while according to Epiphanus xxiv. 2, men are created by the God of the Jews.

possible certainly to determine how Basilides conceived the relation of this Saviour to Jesus of Nazareth. Basilides himself (Strom, iv. 12 § 83) knows of an earthly Jesus and denies the principle of his sinlessness (see above). According to the account given by Irenaeus, the Saviour is said to have appeared only as a phantasm; according to the Excerpta ex Theodoto, 17, the Diakonos descended upon Jesus at His baptism in the form of a dove, for which reason the followers of Basilides celebrated the day of the baptism of Jesus, the day of the kiri4 > aveia as a high festival (Clemens, Strom, i. 21 § 18). The various attempts at combination probably point to the fact that the purely mythical figure of a god-saviour (Heros) was connected first by Basilides with Jesus of Nazareth. As to what the conception of Basilides was of the completion of the process of redemption, the available sources tell us next to nothing. According to an allusion in Clemens, Strom, ii. 8 § 36, with the mission of the Saviour begins the great separation of the sexes, the fulfilment and the restora- tion of all things. This agrees with the beginning of the specula- tion of Basilides. Salvation consists in this, that that which was combined for evil is once more separated.

Among the later followers of Basilides, actual magic played a determining part. They hand down the names of the rulers of the several heavens as a weighty secret. This was a result of the belief, that whoever knew the names of these rulers would after death pass through all the heavens to the supreme God. In accordance with this, Christ also, in the opinion of these followers of Basilides, was in the possession of a mystic name (Caulacau = iih IS Jes. xxviii. 10) by the power of which he had descended through all the heavens to earth, and had then again ascended to the Father. Redemption, accordingly, could be conceived as simply the revelation of mystic names. In this connexion the name Abraxas and the Abraxas gems must be remembered. Whether Basilides himself had already given this magic tendency to Gnosticism cannot be decided.

Basilides, then, represents that form of Gnosticism that is closest to Persian dualism in its final form. His doctrine is most closely related to that of Satornil (Saturninus) . From most of the other Gnostic sects, with the exception perhaps of the Jewish- Christia'h Gnosticism, he is distinguished by the fact that With him the figure of

the fallen female god (Sophia Achamoth), and, in general, the idea of a fall within the godhead is entirely wanting. So far as we can see, on the other hand, Basilides appears actually to represent a further development of Iranian dualism, which later produced the religious system of Mani.

Accounts of the teaching of Basilides are to be found in all the more complete works on Gnosticism (see bibliography to the article Gnosticism). The original sources are best reproduced in Hilgejifeid, Ketzergeschichte des Urchristentums (1884), pp. 195-230. See also Kruger, article " Basilides," in Herzog-Hauck, Realencyklopadie, ed. 3. (W. Bo.)

BASILISK (the fiaaiXicricos of the Greeks, and Tsepka (cockatrice) of the Hebrews), a name given by the ancients to a horrid monster of their own imagination, to which they attributed the most malignant powers and an equally fiendish appearance. The term is now applied, owing to a certain fanciful resemblance, to a genus of lizards belongingto the family Iguanidae,the speciesof which are characterized by the presence,in the males, of ah erectile crest on the head, and a still higher, likewise erectile crest — beset with scales — on the back, and another on the long tail. Basiliscus americanus reaches the length of one yard; its colour is green and brown, with dark crossbars, while the crest is reddish. This beautiful, strictly herbivorous creature is rather common amidst the luxuriant vegetation on the banks of rivers and streams of the Atlantic hot lands of Mexico and Guatemala. The lizards lie upon the branches of trees overhanging the water, into which they plunge at the slightest alarm. Then they propel themselves by rapid strokes of the hind limbs, beating the water in a semi-erect position andletting the long rudder-like tail drag behind. They are universally known as pasa-rios, i.e. ferrymen.

BASIM, a town of India, in the Akola district, Berar, 52 m. SiS.E. from Akola station of the Great Indian Peninsula railway. Pop. (1901) 13,823. Until 1905 it was the headquarters of the district of Basim, which had an area of 2949 sq. m.; but in that

year the district was abolished, its component taluks being divided between the districts of Akola and Yeotmal. Its Western portion, the Basim taluk, consists of a fertile tableland, about 1000 ft. above sea-

level, sloping down westward and southward to the rich valley of the Penganga; its eastern portion, the taluks of Mangrul and Pasud, mainly of a succession of low hills covered with poor grass. In the Pasud taluk, however, there are wide stretches of woodland, while some of the peaks rise to a height of 2000 ft., the scenery (especially during the rains) being very beautiful. The climate of the locality is better than that of the other districts of Berar; the hot wind which blows during the day in the summer months being succeeded at night by a cool breeze. The principal crops are millet, wheat, other food grains, pulse, oilseeds and cotton; there is some manufacture of cotton-cloth and blankets, and there are ginning factories in the town. In 1901 the population was 353, 410, showing a decrease of 11 % in the decade, due to the famine of 1899-1900, which was severely felt in the district.

BASIN, THOMAS (1412-1491), bishop of Lisieux and historian, was born probably at Caudebec in Normandy, but owing to the devastation caused by the Hundred Years' War, his childhood was mainly spent in moving from one place to another. In 1424 he went to the university of Paris, where he became a master of arts in 1429, and afterwards studied law at Louvain and Pavia. He attended the council of Ferrara, and was soon made canon of the church at Rouen, professor of canon law in the new university of Caen and vicar-general for the bishop of Bayeux. In 1447 he became bishop of Lisieux. He was much involved in the wars between the English and French and was employed by Charles VII. of France, and by his successor Louis XL, at whose request Basin drew up a memorandum setting forth the misery of the people and suggesting measures for alleviating their condition. In 1464 the bishop joined the league of the Public Weal, and fell into disfavour with the king, who seized the temporalities of his see. After exile in various places Basin proceeded to Rome and renounced his bishopric. At this time (1474) Pope Sixtus IV. bestowed upon him the title of arch- bishop of Caesarea. Occupied with his writings Basin then passed some years at Trier, and afterwards transferred his residence to Utrecht, where he died on the 3rd of December 1491. He was buried in the church of St John, Utrecht.

Basin's principal work is his Historiae de rebus a Carolo VII. et Ludovico XI. Francorum regibus eorumque in tempore in Gallia gestis. This is of considerable historical value, but is marred to some extent by the author's dislike for Louis XL At one time it was regarded as the work of a priest of Liege, named Amelgard, but it is now practically certain that Basin was the writer. He also wrote a suggestion for reform in the administration of justice entitled Libellus

de Optimo ordine forenses lites audiendi et defer endi; an Apologia, written to answer the charges brought against him by Louis XL; a Brevi- loquium, or allegorical account of his own misfortunes; a Peregrinatio; a defence of Joan of Arc entitled Opinio et consilium super processu et condemnatione Johanne, dicte Puelle, and other miscellaneous writings. He wrote in French, Advis de Monseigneur de Lysieux au roi (Paris, 1677).

See the edition of the Historiae, by J. E. J. Quicherat ■ (Paris, 1855-1859) ; also G. du F. de Beaucourt, Charles VII et Louis Xl d'apres Thomas Basin (Paris, 1858).

BASIN, or Bason (the older form bacin is found in many of the Romanic languages, from the Late Lat. baccinus or bacchinus, probably derived from bacca, a bowl), a round vessel for holding liquids. Hence the term has various technical uses, as of a dock constructed with flood-gates in a tidal-river, or of a widening in a canal for unloading barges; also, in physical geography, of the drainage area of a river and its tributaries.

In geology, " basin " is equivalent to a broad shallow syncline, i.e. it is a structure proper to the bed rock of the district covered by the term; it must not be confused with the physiographic river basin, although it occasionally happens that the two coincide to some extent. Some of the better known geological basins in England are, the London basin, a shallow trough or

syncline of Tertiary, Cretaceous and Jurassic rocks; the Hamp- shire basin, of similar formations; and the numerous coal basins, e.g. the S. Wales coalfield, the Forest of Dean, N. Staffordshire coalfield, &c. The Paris basin is made of strata similar to those in the London and Hampshire basins. Strictly speaking, a structural basin is formed of rock beds which exhibit a centro- clinal dip; an elongated narrow syncline or trough is not a basin. " Rock-basins " are comparatively small, steep-sided depressions that have been scooped out of the solid rock in mountainous regions, mainly through the agency of glaciers (see Cirque). Lakes sometimes occupy basins that have been caused by the removal in solution of some of the more soluble constituents (rock salt, &c.) in the underlying strata; occasion- ally lake basins have been formed directly by crustal movements.

BASINET (a diminutive of "basin"), a form of helmet or headpiece. The original small basinet was a light open cap, with a peaked crown. This was used alternately to, and even in conjunction with, the large heavy heaume. But in the latter half of the 13th century the

basinet was developed into a com- plete war head-dress and replaced the heaume. In this form it was larger and heavier, had a vizor (though not always a pivoted vizor like that of the later armet), and was connected with the gorget by a " camail " or mail hood, the head and neck thus being entirely covered. It is always to be recognized by its peaked crown. The word is spelt in various forms, " bassinet," " bascinet," " bacinet," or " basnet." The form " bassinet " is used for the hooded wicker cradle or peram- bulator for babies.

BASINGSTOKE, a market-town and municipal borough of Hampshire, England, 48 m. W.S.W. from London by the London & SoUth-Western railway; served also by a branch of the Great Western railway. Pop. (1901) 9793. The church of St Michael and All Angels is a fine specimen of a late Perpen- dicular building (principally of the time of Henry VIII.) . The chapel of the Holy Ghost is a picturesque ruin, standing in an ancient cemetery, built for the use of the local gild of the Holy Ghost which was founded in 1525, but flourished for less than a century. Close to the neighbouring village of Old Basing are remains of Basing House, remarkable as the scene of the stubborn opposition of John, fifth marquess of Winchester, to Cromwell, by whom it was taken after a protracted siege in 1645. A castle occupied its site from Norman times. Numerous prehistoric relics have been discovered in the district, and a large circular encampment is seen at Winklebury Hill. Basingstoke has considerable agricultural trade, and brewing, and the manufacture of agricultural implements, and of clothing, are carried on. The Basingstoke canal, which connects the town with the river Wey and so with the Thames, was opened about 1794, but lost its trade owing to railway competition. It was offered for sale by auction unsuccessfully in 1904, but was bought in 1903. The municipal borough is under a mayor, four aldermen and twelve councillors. Area, 4195 acres.

Basingstoke is a town of great antiquity, and excavations have brought to light undoubted traces of Roman occupation. The first recorded historical event relating to the town is a victory won here by ˆEthelred and Alfred over the Danes in 871. According to the Domesday survey it had always been a royal manor, and comprised three mills and a market. A charter from Henry III. in 1256 granted to the men of Basingstoke the manor and hundred of that name and certain other privileges, which were confirmed by Edward III., Henry V. and Henry VI. As compensation for loss sustained by a serious fire, Richard II. in 1392 granted to the men of Basingstoke the rights of a corpora- tion and a common seal. A charter from James I. dated 1622 instituted two bailiffs, fourteen capital burgesses, four justices

of the peace, a high steward and under steward, two serjeants- at-mace and a court of record. Charles I. in 1641 changed the corporation to a mayor, seven aldermen and seven burgesses. Basingstoke returned two members to parliament in 1295, 1302 and 1306, but no writs are extant after this date. In 1 202-1 203 the market day was changed from Sunday to Monday, but in 1 2 14 was transferred to Wednesday, and has not since been

changed. Henry VI. granted a fair at Whitsun to be held near the chapel of the Holy Ghost. The charter from James I. confirmed another fair at the feast of St Michael the Archangel, and that of Charles I. granted two fairs on Basingstoke Down at Easter and on the 10th and nth of September. The wool . trade flourished in Basingstoke at an early date, but later appears to have declined, and in 163 1 the clothiers of Basingstoke were complaining of the loss of trade and consequent distress.

See Victoria County History— Hants; F. G. Baigent and J. E. Millard, History of Basingstoke (Basingstoke, 1889).

BASIN-STAND, a piece of furniture consisting of a small stand, usually supported on three legs, and most commonly made of mahogany or rosewood, for holding a wash-hand basin. The smaller varieties were used for rose-water ablutions, or for the operation of hair-powdering. The larger ones, which possessed sockets for soap-dishes, were the predecessors of the ample modern wash-hand stand. Both varieties, often of very elegant form, were in extensive use throughout a large part of the 18th century.

BASKERVILLE, JOHN (1706-1775), English printer, was born at Wolverley in Worcestershire on the 28th of January 1706. About 1726 he became a writing master at Birmingham, and he seems to have had a great talent for calligraphy and for cutting inscriptions in stone. While at Birmingham he made some important improvements in fhe process of japanning, and gained a considerable fortune. About the year 1750 he began to make experiments in type-founding, producing types much superior in distinctness and elegance to any that had hitherto been employed. He set up a printing-house, and in 1757 published his first work, a Virgil in royal quarto, followed, in 1758, by his famous edition of Milton. In that year he was appointed printer to the university of Cambridge, and undertook editions of the

Bible and the Book of Common Prayer. The Horace, published in 1762, is distinguished even among the productions of the Baskerville press for its correctness and for the beauty of the paper and type. ‘ A second Horace appeared in 1770 in quarto, and its success encouraged Baskerville to publish a series of quarto editions of Latin authors, which included Catullus, Tibullus, Propertius, Lucretius, Terence, Sallust and Florus. This list of books issued by Baskerville from his press lends some irony to the allegation that he was a person of no education. These books are admirable specimens of typography; and Baskerville is deservedly ranked among the foremost of those who have advanced the art of printing. His contemporaries asserted that his books owed more to the quality of the paper and ink than to the type itself, but the difficulty in obtaining specimens from the Baskerville press shows the estimation in which they are now held. His wife, Sarah Baskerville, carried on the business for some time after his death, which took place on the 8th of January 1775.

BASKET, a vessel made of twigs, cane or rushes, as well as of a variety of other materials, interwoven together, and used for holding, protecting or carrying any commodity. The process of interweaving twigs, rushes or leaves, is practised among the rudest nations of the world ; and as it is one of the most universal of arts, so also does it rank among the most ancient industries, being probably the origin of all the textile arts of the world. Decorative designs in old ceramic ware are derived from the marks left by the basket mould used before the invention of the potter’s wheel, and in the willow pattern on old china, and the basket capitals or mouldings of Byzantine architecture, the influence of the basketmaker’s art is clearly traceable. Essenti- ally a primitive craft, its relative importance is in inverse ratio to the industrial development of a people.

The word ” basket ” has been generally identified with the Latin bascauda, as in Martial (xiv. 99) : —

” Barbara de pictis veni bascauda Britannis: Sed me iam mavult dicere Roma suam.”

But its etymology is unknown, and the New English Dictionary states that there is no evidence to connect basket with bascauda, which denotes rather a tub, tray or brazen vessel.

in. 16

Among many uncivilized tribes, baskets of a superior order are made

and applied to various useful purposes. The North American Indians prepare strong water-tight Wattape baskets from the roots of a species of abies, and these they frequently adorn with very pretty patterns made from the dyed quills of their native porcupine, Erethizon dorsatum. Wealthy Americans have formed collections of the beautiful ware treasured as heir- looms in Indian families, and large prices have been paid for baskets made by the few squaws who have inherited the tradi- tions and practice of the art, as much as £300 having been given for one specimen. It has been computed that baskets to the value of £1, 000,000 were recently drawn from California and Arizona within two years. The Indians of South America weave baskets equally useful from the fronds of the Carnahuba and other palms. The Kaffirs and Hottentots of South Africa are similarly skilful in using the Ilala reed and the roots of plants; while the Abyssinians and the tribes of Central Africa display great adroitness in the art of basket-weaving.

Basket-making, however, has by no means been confined to the fabrication of those simple and useful utensils from which its name is derived. Of old, the shields of soldiers were fashioned of wicker-work, either plain or covered with hides. Xenophon, in his story of the Thirty Tyrants at Athens, relates that the exiled Greeks who had seized on the Peiraeus made themselves shields of whitened osiers; and similar weapons of defence are still constructed by modern savages. The huts of the earliest settlers in Rome and in western Europe generally were made of osier work plastered with clay. Some interesting remains of British dwellings of this nature found near Lewes in 1877 were described by Major-General H.L. F. Pitt-Rivers in Archaeo- logia, vol. xlvi. pp. 456-458. Boats of the same material, covered with the skins of animals, attracted the notice of the Romans in Britain; they seem to have been of the ordinary boat-shape. The basketwork boats mentioned by Herodotus as being used on the Tigris and Euphrates were round and covered with bitumen. Boats of this shape are still used on these rivers, and boats of analogous construction are employed in crossing the rivers of India, in which the current is not rapid. Nor have methods of making much changed. The strokes employed in the construction of basket-work found in Etruscan tombs and now exhibited in the Museo Etrusco at Florence, and in similar articles discovered in Egyptian tombs, are the same as those used by the English basket-maker to-day. General Pitt-Rivers, on comparing the remains excavated near Lewes with a modern hamper in his possession, found the method to be identical.

Since about the middle of the igtii century the character of basket-work in England has been greatly modified. The old English cradle,

reticule, and other small domestic wares, have been driven out of the market by cheap goods made on the continent of Europe, and the coarse brown osier packing and hampers have been largely superseded by rough casks and cases made from cheap imported timber. This loss has, however, been more than counterbalanced by the production of work of a higher class, such as finely made chairs, tables, lounges and other articles of furniture; luncheon and tea-baskets and similar requisites of travel. In addition to the foregoing the chief categories of English manufacture are: vegetable and fruit baskets, transit and travelling hampers, laundry and linen baskets, partition baskets for wine, and protective wicker cases for fragile ware such as glass carboys, stone and other bottles. Wicker shields or cases made from cane pith, for the protec- tion of shells, have been introduced by the English military authorities. Some evidence of the above-mentioned develop- ments is afforded by a comparison of the wages lists of the London Union of Journeymen Basketmakers issued in 1865 and in 1896. The former consists of 87 printed pages; the latter of 144 pages, and these more closely set.

No machinery is used in basket-making. A considerable training and natural aptitude go to form the expert workman, for the ultimate perfection of shape and beauty of texture de- pend upon the more or less perfect conception of form in the

craftsman's mind and on his power to impress it on a recal- citrant material. In England at least, he rarely uses a mould; every stroke made has a permanent effect on the symmetry of the whole work and no subsequent pressure will alter it. Wages in London vary from 25s. to 50s. per week according to aptitude. The Basketmakers' Company is one of the oldest craft gilds of the city of London and still exists.

Employment is given by the London Association for the Welfare of the Blind to a number of partially or wholly blind workpeople, who are engaged in the making of some of the coarser kinds of baskets; but the work, which bears obvious traces of its origin, is not commercially remunerative, and 'the association depends for partial support on the contributions of the charitable, and on supplementary sales of fine or fancy work produced under ordinary conditions and largely imported. Similar associations exist in some English provincial towns, in Edinburgh, in Dublin and Belfast, and in certain European cities.

The materials which are actually employed in the construction of basket-work are numerous and varied, but it is from certain species of willow that the largest supply of basket-making materials is produced. Willows for basket-work are extensively grown on the continent of Europe, whence large quantities are exported to Great Britain and the United States; but no rods surpass those of English growth for their tough and leathery texture, and the finest of basket-making willows are now culti- vated in England — in Leicestershire, Nottinghamshire and the valleys of the Thames and the Trent. In the early part of the 19th century, considerable attention was given in Britain to the cultivation of willows suitable for basket-making, and the industry was first stimulated by premiums offered by the Society of Arts. Mr William Scaling of Basford, Notts, was a most successful grower and published some admirable pamphlets on the cultivation of willows. The most extensive English willow plantation or salicetum (Lat. salix, willow) of the present day is that planted by Mr W. P. Ellmore at Thurmaston near Leicester, and consists of about 100 acres of the finest qualities. Mr Ellmore, a practical basket-maker, successfully introduced some valuable continental varieties (see Osier).

Willows are roughly classed by the basket-maker into " osier " and " fine." The former consists of varieties of the true osier, Salix viminalis; the latter of varieties of Salix triandra, S. pur- purea and some other species and hybrids of tougher texture. For the coarsest work, dried unpeeled osiers, known as " brown stuff," are used; for finer work, " white (peeled) stuff " and " buff " (willows stained a tawny hue by boiling them previous to peeling). Brown stuff ife sorted, before it reaches the work- man, into lengths varying from 35 ft. to 8 or 10 ft., the smallest being known in London and the home counties as " hike," the largest as " great," and the intermediate sizes as " long small," " threepenny " and " middleboro." White and buff rods are more carefully sorted, the smallest, about 2 ft. or less, being known as " small tack," and rising sizes as " tack," " short small," " small," " long small," " threepenny," " middleboro " and " great." Rods of two to three years' growth, known as " sticks," are used to form the rigid framework of the bottoms and lids of square work. In every case, except the last, the stuff is soaked in tanks to render it pliable before use — brown from three to seven days, white and buff from half-an-hour to half a day. The rods are used whole for ordinary work, but for baskets of slight and finer texture each is divided into " skains " of different degrees of size. " Skains " are osiers cleft into three or four parts, by means of an implement called a " cleaver," which is a wedge-shaped tool of boxwood inserted at

the point or top end of the rod and run down through its entire length. They are next drawn through an implement resembling the common spokeshave, keeping the grain of the split next the iron or stock of the shave, while the pith is presented to the steel edge of the instrument, and in order to bring the split into a shape still more regular, it is passed through another implement called an upright, consisting of a flat piece of steel, each end of which is fashioned into a cutting edge, like that of an ordinary

chisel and adjusted to the required width by means of a thumb-screw.

The tools required by a basket-maker are few and simple. They consist, besides the foregoing, of a shop-knife for cutting out material; a picking knife for cutting off the protruding butts and tops of the rods after the work is completed; two or three bodkins of varying sizes; a flat piece of iron somewhat narrowly triangular in shape for driving the work closely to- gether; a stout pair of shears and a " dog " or " commander " for straightening sticks. The employer supplies a screw block or vice for gripping the bottom and cover sticks oi square work, and a lapboard on which the workman fixes the upsetted bottom while siding up the basket. This is the full kit. A common round or oval basket may, however, be made with no other tools than a shop-knife and a bodkin. On the continent of Europe shapes or blocks are in use on which the fabric is in some cases woven.

The technicalities of basket-making may be easily followed by a glance at the illustration here reproduced by the courtesy of the Society of Arts. 1 It will be seen that the " bye-stakes " are merely inserted in the " upsett," whereas the stakes are driven in at each side of the "bottom- sticks " and pricked up to form the rigid framework of the side. When the "bottom- stick " and " stake " are formed of one and the same continuous rod, it is termed a "league." If the bottom is made on a hoop the butts of the stakes are " sliped," i.e. cut away with a long cut of the shop-knife, and turned tightly round the hoop; they are then said to be " scal- lomed "on. The chief strokes used in con- structing an ordinary basket are : — the " slew " — two or more rods woven together; the " rand," rods woven in singly; the " fitch," two rods tightly worked alternately one under the other, employed for skeleton work such as cages and waste-paper baskets; the "pair," two rods worked alternately one over the other, used for filling up bottoms and covers of round and oval baskets; and the " wale," three or more rods worked alternately, forming a string or binding course. Various forms of plaiting, roping and tracking are

used for bordering off or finishing.

An ordinary oval basket is made by preparing the requisite number of bottom sticks, preserving their length greater than the required width of the bottom. They are ranged in pairs on the floor parallel to each other at small intervals, in the direction of the longer diameter of the basket, thus forming what may be called the " woof," for basket-work is literally a web. These parallel rods are then crossed at right angles by two pairs of the largest osiers, on the butt ends of which the workman places his feet; and they are confined in their places by being each woven alternately over and under the parallel pieces first laid down and their own butts which form the end bottom sticks. The whole now forms what is technically called the '"' slath," which is the foundation of the basket. Next other rods are taken and

1 See the report of a paper by T. Okey, published in the Journal of the Society of Arts, January nth, 1907.

woven under and over the sticks all round the bottom until it be of sufficient size, and the woof be occupied by them. Thus the bottom or foundation on which the superstructure is to be raised is finished. This latter part is accomplished by sharpen- ing the large ends of as many long and stout osiers as may be necessary to form the stakes or skeleton. These are forced between the bottom sticks from the edge towards the centre, and are turned up or " upset " in the direction of the sides; then other rods are woven in and out between each of them, until the basket is raised to the intended height, or, more correctly speaking, the depth it is to receive. The edge or border is finished by turning down the ends of the stakes, now standing up, behind and in front of each other, whereby the whole is firmly and compactly united, and it is technically known as the " belly." A lid is constructed on the same plan as that of the bottom, and tied on with hinges formed of twisted rods; simple handles may be made by inserting similar rods by the sides of two opposite stakes and looping them under the border to form rope-like handles of three strands. This is the most simple kind of basket, from which others differ only in being made with finer materials and in being more nicely executed; but in these there is considerable scope for taste and fancy, and articles are produced of extreme neatness and in- genuity in construction.

In addition to willows many other materials are employed in the fabrication of wicker-work. Among the more important of these is the stem of Calamus viminalis or other allied species — the cane or rattan of commerce — which is used whole or made into skains. Since 1880 the central pith of this material, known as " cane-pulp " or " cane-pith," has been largely used in Great Britain and on the continent of Europe in the manufacture of furniture and other finer classes of work. About the same period plaited rush and straw, often coloured, came into use together with enamelled skains of cane. It must be admitted, however, that basket-work in these developments has encroached somewhat on the domain of cabinet-making; for wood and nails are now much used in constructing basket-work chairs, tables and other furniture.

With splits of various species of bamboo the Japanese and Chinese manufacture baskets of unequalled beauty and finish. The bamboo wicker-work with which the Japanese sometimes encase their delicate egg-shell porcelain is a marvellous example of manipulation, and they and the Chinese excel in the applica- tion of bamboo wicker-work to furniture. In India " Cajan " baskets are extensively made from the fronds of the Palmyra palm, Borassus flabelliformis, and this manufacture has been established in the Black Forest of Germany, where it is now an important and characteristic staple. Among the other materials may be enumerated the odorous roots of the khus-khus grass, Anatherum muricatum, and the leaves of various species of screw pine, used in India and the East generally. The fronds of the palm of the Seychelles, Lodoicea sechellarum, are used for very delicate basket-work in those islands. Strips of the New Zealand flax plant, Phormium tenax, are made into baskets in New Zealand. Esparto fibre is used' in Spain and Algeria for rude fruit baskets. Various species of Maranta yield basket materials in the West Indies and South America; and the Tirite, a species of Calalhea, a member of the order Zingiber aceae, is also employed similarly in Trinidad. Baskets are also fre- quently made from straw, from various sedges {Cyperus), and from shavings and splints of many kinds of wood.

The chief centres of English basket manufacture outside London are Thurmaston near Leicester, Basford near Notting- ham, and Grantham. Large but decreasing quantities of light basket-work are made for the English market in Verdun, in the department of the Aisne, and in other parts of France; and great quantities of fancy and other work are produced in Belgium, in the Netherlands and in Germany, notably at Lichtenfels in Bavaria, at Sonnefeld in Saxony and in the Black Forest.

The import and export values of baskets and basket-ware, and of willows and rods for basket-making, have been enumerated in the Boa-rd of Trade returns for the United Kingdom since 1900, in which

year basket-ware from foreign countries was imported to the value of £239,402. In 1 90 1 the imports increased to £264,183; then they declined to £227,070 in 1905. The main sources of supply are shown in this comparison of 1900 and 1905 : —

Belgium

Holland

France

Germany

Japan

Portugal

1900.

£72,031

58.214 55,870

33.155 8,140 5,066

1905.

£77,766

54,407 27,910 22,892 25.536 3,971

+£5,735

— 3,807

— 27,960

— 10,263

+ 17,396

1,095

The increase from Japan (for 1904 the value was £52,377) and the

decrease from France are remarkable.

The import values of foreign willows increased from £52,219 in 1900 to £62,286 in 1905, the most important exporting countries being :—■

1900.

1905-

Germany

Belgium

Holland

£22,594

18,800

9,771

£34.752

11,864 12,750

+£12,158

- 6,936 + 2,979

Small British re-exports of willows (£1808 in 1900 and £371 in 1905) and of baskets (£3785 in 1900 and £6633 in 1905) to foreign parts and British possessions are tabulated. No particulars of exports of British produce and manufacture are specified in the returns. (T. O.)

BASKET-BALL, a game adapted to the open air, but usually played upon the floor of a gymnasium and in the cold season. It was the invention, in 1891, of James Naismith, an instructor in the gymnasium of the Young Men's Christian Association training-school at Springfield, Massachusetts. A demand had arisen for a game for the gymnasium class, which would break the monotony and take the place, during the winter months, of football and baseball, and which was not too rough to be played indoors. The idea of the game was first published in the Tri- angle, the school paper. It soon became one of the most popular indoor games of America, for girls as well as for men, and spread to England and elsewhere.

Basket-ball is played on a marked-off space 60 ft. by 40 ft. in extent, though in the open air the dimensions may be greater. In the middle of each short side and 10 ft. above the floor or ground, is placed a basket consisting of a net suspended from a metal ring 18 in. in diameter, backed, at a distance of 6 in., by a back-board 6 ft. long and 4 ft. high. The object of the game is to propel an inflated, leather-covered ball, 30 in. in circumference, into the opponents' basket, which is the goal, by striking it with the open hands. The side wins that scores most goals during two periods of play divided by an interval of rest. Although there is practically no limit to the number of players on each side, all indoor matches are played by teams of five, in positions opposing one another as in lacrosse, centre, right and left forwards and right and left guards (or backs). A referee has the general supervision of the game and decides when goals have been properly scored, and an umpire watches for infringements of the rules, which constitute fouls. There are also a scorer and timekeeper.

The game is started with the two opposing centres standing within a 4-foot ring in the middle of the floor. The referee puts the ball in play by tossing it into the air over the heads of the centres, who jump into the air for its possession or endeavour to bat it towards the opposing goal. From this moment the ball is in play until it falls into a basket, or passes the boundary-lines, or a foul is made. After a goal has been scored, the ball is again put in play by the referee in the centre. Should it be thrown across the boundary, a player of the opposing side, standing on the line at the point where the ball went over, puts it in play by passing or throwing it to one of his own side in any direction, there being no off-side rule — another point of similarity to lacrosse. His opponents, of course, try to prevent the pass or intercept the throw, thus securing the ball themselves. When a foul has been called, a player of the opposing side is allowed a " free throw " for his opponents' basket from a mark 15 ft. distant from it and without interference. A goal scored from a

free throw counts one point; one scored while the ball is in play counts two. Hacking, striking, holding and kicking are foul, but a player may interfere with an opponent who has the ball so long as he uses one arm only and does not hold. A player must throw the ball from where he gets it, no running with it being allowed excepting when continuously bounding it on the floor. Basket-ball is an extremely fast game and admits of a high degree of combination or

team-play. The principal qualifica- tions of a good player are quickness of movement and of judg- ment, coolness, endurance, accuracy and self-control. Good dodging, throwing, passing and team-play are the important requisites of the game, which is looked upon as excellent winter training for outdoor games. Basket-ball, with somewhat modified rules, is extremely popular with young women.

See Spalding's Basket-Ball Guide; and George T. Hepbron, How to Play Basket-Bail ; and Spalding's Basket-Ball Guide for Women.

BASNAGE, JACQUES (1653-1723), French Protestant divine, was the eldest son of the eminent lawyer Henri Basnage, sieur de Franquenay (1615-1695), and was born at Rouen in Nor- mandy in 1653. He studied classical languages at Saumur and afterwards theology at Geneva. He was pastor at Rouen (his native place) from 1676 till 1685, when, on the revocation of the edict of Nantes, he obtained leave of the king to retire to Holland. He settled at Rotterdam as a minister pensionary till 1601, when he was chosen pastor of the Walloon church. In 1 709 the grand pensionary A. Heinsius (1641-1720) secured his election as one of the pastors of the Walloon church at the Hague, intend- ing to employ him mainly in civil affairs. Accordingly he was engaged in a secret negotiation with Marshal d'Uxelles, pleni- potentiary of France at the congress of Utrecht — a service which he executed with so much success that he was entrusted with several important commissions, all of which he discharged with great ability. In 17 16 Dubois, who was at the Hague at the instance of the regent Orleans, for the purpose of negotia- ting the Triple Alliance between France, Great Britain and Holland, sought the advice of Basnage, who, in spite of the fact that he had failed to receive permission to return to France on a short visit the year before, did his best to further the negotia- tions. The French government also turned to him for help in view of the threatened rising in the Cevennes. Basnage had welcomed the revival of the Protestant church due to the zeal of Antoine Court; but he assured the regent that no danger of active resistance was to be feared from it, and, true to the principles of Calvin, he denounced the rebellion of the Camisards (q.v.) in his Instructions pastorales aux Reforme's de France sur I'obiissance due aux souverains (Paris, 1720), which was printed by order of the court and scattered broadcast in the south of France. Basnage died on the 22nd of September 1723.

Basnage was a good preacher and a prolific writer. His works include several dogmatic and polemical treatises, but the most important are the historical. Of these may be mentioned Histoire de

la religion des iglises reformees (Rotterdam, 1690), the Histoire de I'eglise depuis JSsus-Christ jusqu'd prtsent (ib. 1699) — both of them written from the point of view of Pro- testant polemics — and, of greater scientific value, the Histoire des Juifs (Rotterdam, 1706, Eng. trans. 1708) and the Antiquites judaiques ou remarques critiques sur la republique des Hebreux (17 13). He. also wrote short explanatory introductions and notes to a collection of copper-plate engravings, much valued by connoisseurs, called Histoires du Vieux et du Nouveau Testament, representees par des figures gravies en taille-douce par R. de Hooge (Amsterdam, 1704).

BASOCHE, or Bazoche, with the analogous forms Basoque, Basogue and Bazouges; from the Lat. basilica, in the sense of law courts, a French gild of clerks, from among whom legal representatives (procureurs) were recruited. This gild was very ancient, even older than the gild of the procureurs, with which it was often at variance. It dated, no doubt, from the time when the profession of procureur (procurator, advocate or legal representative) was still free in the sense that persons rendering that service to others when so permitted by the law were not yet public and ministerial officers. For this purpose there was

established near rach important juridical centre a group of clerks, that is to say, of men skilled in law (or reputed to be so), who at first would probably fill indifferently the rdles of repre- sentative or advocate. Such was the origin of the Basoche of the parlement of Paris; which naturally formed itself into a gild, like other professions and trades in the middle ages. But this organization eventually became disintegrated, dividing up into more specialized bodies: that of the advocates, whose history then begins; and that of legal representatives, whose profession was regularized in 1344, and speedily became a sale- able charge. The remnant of the original clerks constituted the new Basoche, which thenceforward consisted only of those who worked as clerks for the procureurs, the richer ones among them aspiring themselves to attain the position of procureur. They all, however, retained some traces of their original conditions. " They are admitted," writes an 18th-century author, " to plead before M. le lieutenant civil sur les r&feres 1 and before M. le juge auditeur; so that the procureurs of these days are but the former clerks of the Basoche, admitted to officiate in important cases in preference to other clerks and to their exclusion." From its ancient past the Basoche had also preserved certain picturesque forms and names. It was called the " kingdom of the Basoche," and for a long time its chief, elected each year in general assembly, bore the title of " king." This he had to give up towards the end of the 16th century,

by order, it is said, of Henry III., and was thenceforth called the " chancellor." The Basoche had besides its maitres des requites, a grand court-crier, a referendary, an advocate-general, a procureur-general, a chaplain, &c. In early days, and until the first half of the 16th century, it was organized in companies in a military manner and held periodical reviews or parades (montres), sometimes taking up arms in the king's service in time of war. Of this there survived later only an annual cavalcade, when the members of the Basoche went to the royal forest of Bondy to cut the maypole, which they afterwards set up in the court-yard of the Palais. We hear also of satirical and literary entertainments given by clerks of the Palais de Justice, and of the moralities played by them in public, which form an important element in the history of the national theatre; but at the end of the 16th century these performances were restricted to the great hall of the Palais.

To the last the Basoche retained two principal prerogatives. (1) In order to be recognized as a qualified procureur it was necessary to have gone through one's " stage " in the Basoche, to have been entered by name for ten years on its register. It was not sufficient to have been merely clerk to a procureur during the period and to have been registered at his office. This rule was the occasion of frequent conflicts during the 17th and 18th centuries between the members of the Basoche and the procureurs, and on the whole, despite certain decisions favouring the latter, the parlement maintained the rights of the Basoche. Opinion was favourable to it because the certificats de complaisance issued by the procureurs were dreaded. These certificats held good, moreover, in places where there was no Basoche. (2) The Basoche had judiciary powers recognized by the lav/. It had disciplinary jurisdiction over its members and decided personal actions in civil law brought by one clerk against another or by an outsider against a clerk. The judgment, at any rate if delivered by a maitre des requetes, was authoritative, and could only be contested by a civil petition before the ancient council of the Basoche. The Chatelet of Paris had its special basoche, which claimed to be older even than that of the Palais de Justice, and there was contention between them as to certain rights. The clerks of the procureurs at the cour des comptes of Paris had their own Basoche of great antiquity, called the " empire de Galilee." The Basoche of the Palais de Justice had in its ancient days the right to create provostships in localities within the jurisdiction of the parlement of Paris, and thus there sprang up a certain number of local basoches. Others were independent in origin; among such being the " regency " of Rouen and the Basoche of the parlement of Toulouse.

1 A procedure for obtaining a provisional judgment on urgent cases.

See also Repertoire de jurisprudence des Guyot; Recueil des Statuts du royaume de la basoche (Paris, 1654) ; L. A. Fabre, Etudes historiques sur Us clercs de la basoche (Paris, 1856). (J. P. E.)

BASQUE PROVINCES (Provincias V ascongadas) , a division of north-eastern Spain, comprising the three provinces of Alava, Biscay or Vizcaya and Guipuzcoa. Pop. (1900) 603,396; area 2739 sq.m., the third in density in Spain. The territory occupied by the Basque Provinces forms a triangle bounded on the west and south by the provinces of Santander, Burgos and Logrono, on the east by Navarre, on the north by France and the Bay of Biscay. The French Pays Basque forms part of the arrondisse- ments of-Bayonne and Mauleon. For an account of the people, their origin, customs and language, see Basques. Of the Pro- vinces, Guipuzcoa is the only one which is wholly Basque, Alava is the least so. Its capital, Vitoria, is said to have been founded by the Gothic king Leovigild (581). Older than these divisions, the date of which is uncertain, the ancient limits of the dioceses of Pamplona, Bayonne and Calahorra, probably corresponded more nearly to the boundaries of the ancient tribes, the Autrigones, the Caristi, the Varduli and the Vascones, with their still differing dialects, than do these civil provinces.

Leaving aside the legendary and uncertain portion of their history, we find the Provinces in some districts dependent allies of Navarre, in others of Castile. In Biscay the counts of Haro were lords of Biscay from 1093 to 13 50. There was a short union with Castile under Pedro the Cruel, but the definitive union did not take place till 1370. In Alava the ruling power was the con- federation of Arriaga (so called after its meeting place), which united the province to the crown of Castile in 1332. Guipuzcoa, which had been dependent sometimes on Navarre, sometimes on Castile, was definitively united to Castile in 1 200. From the year 1425 the provinces were desolated by party wars among the lesser nobles (parientes may ores) but these came to an end in 1460- 1498, when Henry IV. and Ferdinand-the Catholic strengthened the power of the towns and forbade the erection of any fortified house in the country. Though the three Basque Provinces were thus united to the crown of Spain, they still remained a land apart (tierra apartada). Their juntas acted to some extent in common; and although no written federal pact is known to

have existed, they employed, as the symbol of their unity, a seal with the word Iruracbat, " The Three One," engraved upon it. They preserved their own laws, customs, fueros (see Basques), which the Spanish kings swore to observe arid maintain. Unless countersigned by the juntas the decrees of Cortes and Spanish legislation or royal orders had no force in the Provinces. In the junta of 1481 Guipuzcoa alone proposed a treaty of friendship, peace and free trade for ten years with England, and this was signed in Westminster, on the 9th of March 1482 (see Rymer, Focdera). The Basques still made their own treaties with England and France and are mentioned apart from Spain in the treaty of Utrecht (1713). They still preserved in their municipal institutions the old style of re- publicas derived from the civilates and respublicae of ancient Rome. This kind of independence and autonomy lasted un- challenged until the death of Ferdinand VII. in 1833, when, in default of male heirs, his brother Don Carlos claimed the throne, confirmed the Basque fueros, and raised the standard of revolt against his niece, Isabel II. A seven years' war followed, in which an English legion under Sir George de Lacy Evans and a naval force under Lord John Hay took part. It was ended by the Convenio de Vergara (August 31st, 1839) in which the con- cession and modification of the fueros was demanded. The troubled period which followed the expulsion of Isabel II. in 1868 gave opportunity for a second Carlist war from 1872 to 1876. This ended, unlike the former one, in the utter defeat of the Carlist forces, and left the Provinces at the mercy of the government, without terms or agreement. In general govern- ment and legislation the Provinces were then assimilated to the rest of the nation. After 1876, the Provincial parliaments (dipulaciov.es) were elected like the other provincial councils of Spain, deprived of many privileges and subjected to the ordinary interference of the civil governors. But their representatives,

assisted by the senatois and deputies of the Basque Provinces in the Cortes, negotiated successive pacts, each lasting several years, securing for the three Provinces their municipal and provincial self-government, and the assessment, distribution and collection of their principal taxes and octroi duties, on the understanding that an agreed sum should be paid annually to the state, subject to an increase whenever the national taxation of other provinces was augmented. In December 1906, after long discussion, the contribution of the Basque Provinces to the state, according to the law of the 21st of July 1876, was fixed for the next twenty years; for the first ten years at 8,soo,ood pesetas, for the next ten an additional 500,000 pesetas, from 31st December 1916 to 31st December 1926,

the province of Guipuzcoa paying in addition 700,000 pesetas to the treasury. These pacts have hitherto been scrupulously observed, and as the local authorities levy the contribution after their own local customs, landed property and the industrial and commercial classes are less heavily taxed in these territories than in the rest of Spain. Enough is raised, however, besides the amount handed over to the government, to enable the schools, roads, harbours and public works of every kind to be maintained at a standard which compares very favourably with other parts of Spain. When the three provinces sent in their first contingent of con- scripts in 1877, it was found that all but about sixty knew how to read and write, and succeeding contingents have kept up this high standard.

In agriculture the Basque Provinces and the Pays Basque were great cider countries, but during the 19th century this was gradually replaced by wine-growing. The chief industries of the Basque Provinces are the sea fisheries and iron mining. Some of the mines round Bilbao have been worked from pre- historic times. In 1905 the Basque Provinces produced 5,302,344 tons of iron, over five millions of which came from Biscay, out of a total of 9,395,314 tons for the whole of Spain. More than the half of this total 5,845,895 tons, was exported to England. The sw,ords of Mondragon in Guipuzcoa were renowned before those of Toledo. Eibar in the same province has long been a small-arms factory. There in the 19th century Senor Zuloaga successfully revived the artistic inlaying of gold and silver in steel and iron.

Bibliography. — Of older works, though often uncritical, R. P. Henao's Averiguaciones de las Antigiiedades de Cantabria (Salamanca, 1688), is still valuable (new edition, 1894). For all that relates to the manners and customs of the people, Corografia de Guipuzcoa, by R. P. M. de Larramendi, S.J., is indispensable. Written about 1750, it was first printed in Barcelona in 1882 (later edition, San Sebastian, 1896). There are excellent chapters on the Basque Provinces in the Introduction a la Historia Natural, y a la Geografia Fisica de Espana, by D. Guillermo Bowles (Madrid, 1775). El Guipuzcoano instruido (San Sebastian, 1780), in the form of a dictionary, gives full details of the life, the rights, duties and obligations of a Basque citizen of that date. The Diccionario Geografico-Historico de Espana, tome i., ii. El Reyno de Navarra Senorio de Vizcaya y Provincias de Alava y Guipuzcoa (Madrid, 1802), is full of local information, but with a strong bias in favour of the central government. The best works on the various editions of the fueros are Historia de la Legislation . . . civil deEspaHa, by A. Marichalar, Marques de Montesa,,and Cayetano Manrique ; Fueros

de Navarra Vizcaya, Guipuzcoa y Alava (Madrid, 2nd ed., 1868) ; and the Notitia de las cosas memorables de Guipuzcoa, by D. Pablo de Gorosabel (Tolosa, 1890-1901), the last volume of which by C. de Echegaray, gives the legislative acts down to May 1900. Las Provincias V ascongadas a Fines de la Edad Media, by D. Carmelo de Echegaray (San Sebastian, 1895), is, excellent. There is a Historia de Bizcaya, by Dr E. de Labayru, and a Compendio of the same by Fermin Herran (Bilbao, 1903). D. Carmelo de Eche- garay, Cronista de las Provincias Vascongadas, with his colleagues D. Serapio Mugica, F. Soraluce, and other historians, has ex- amined, catalogued and indexed the municipal archives of all the towns, without which no true history can be written. Several discoveries of important missing documents and MSS-. were thus made. The development of the Basque mining industry is fully described in Las Minas de hierro de la provincia de Vizcaya, progressos realizados en esta region derde 1870 hasta 1899 (Bilbao, 1900). (W. We.)

BASQUES, a people, inhabiting the three Basque Provinces — Biscay, Alava and Guipuzcoa — and Navarre in Spain, and the arrondissement of Bayonne and Maul6on in France. The number of those who can be considered in any sense pure Basques is

probably about 600,000 in Europe, with perhaps 100,000 emigrants in the Americas, chiefly in the region of La Plata in South America. The word Basques is historically derived from Vascones, which, written Wascones, has also given the name Gascons to a very different race. The Basques call themselves Eskualdunak, i.e. ” those who possess the Eskttara,” and their country Eskual-Herria.

Language. — The original and proper name of the language is Eskuara (euskara, uskara), a word the exact meaning of which has not yet been ascertained, but which probably corresponds with the idea ” clearly speaking.” The language is highly interesting and stands as yet absolutely isolated from the other tongues of Europe, though from the purely grammatical point of view it recalls the Magyar andFinnic languages. It is an agglutinative, incorporating and polysynthetic system of speech; in the general series of organized linguistic families it would take an intermediate place between the American on the one side and the Ugro-Altaic or Ugrian on the other.

Basque has no graphic system of its own and uses the Roman character, either Spanish or French; a few particular sounds are indicated in modern writings by dotted or accented letters. The alphabet would vary according to the dialects. Prince L. L. Bonaparte counts, on the whole, thirteen simple vowels, thirty- eight simple consonants. Nasal vowels are found in some dialects as well as " wet " consonants — ty, dy, ny, &c. The doubling of consonants is not allowed and in actual current speech most of the soft consonants are dropped. The letter r can- not begin a word, so that rationem is written in Basque arrazoin.

Declension is replaced by a highly developed postpositional system; first, the definite article itself a (plural ak) is a post- position — zaldi, " horse," zaldia " the horse," zaldiak, " the horses." The declensional suffixes or postpositions, which, just like our prepositions, may be added to one another, are postponed to the article when the noun is definite. The principal suffixes are k. the mark of the plural, and of the singular nominative agent; n, " of " and " in "; i, " to "; z, " by "; ik, " s,pme "; ko, "from," "of"(Lat. a); tik, "from" (Late); tzat, kotzat, tzako, " for "; kin, gaz, " with "; gatik, " for the sake of"; gana, " towards "; ra, rat, " to," " into," " at," &c. Of these suffixes some are joined to the definite, others to the indefinite noun, or even to both.*

The personal pronouns, which to a superficial observer appear closely related to those of the Semitic or Hamitic languages, are ni, "I"; hi, " thou"; gu, " we "; zu, "you" in modern times, zu has become a polite form of " thou," and a true plural " you " {i.e. more than one) has been formed by suffixing the pluralizing sign k — zuek. The pronouns of the third person are mere demonstratives. There are three: hura or kura, " that "; hau or kau, "this"; ori or kori, "this" or "that." Other unexplained forms are found in the verbal inflexions, e.g. d, it, and t, "I" or "me"; d-akus-t, " it see I " = I see it; d-arrai-t, " it follows me." The demonstratives are used as articles: gazt-en-or, " this younger one "; andre-ori, " this lady at some distance." The reflective " self " is expressed by burn, " head." The relative does not exist, and in its place is used as a kind of verbal participle with the ending n: doa, "he goes"; doana, " he who is going "; in the modern Basque, however, by imitation of French or Spanish, the interrogative zein, zoin, is used as a relative. Other interrogatives are nor, " who "; zer, " what "; zembait, "how much," &c. Bat, "one"; batzu, "several"; bakotch, "each"; norbait, "some one"; hanitz or hainitz, "much"; elkar, "both"; are the most common indefinite pronouns. The numeral system is vicesimal; e.g. 34 is hogoi ta hamalaur, " twenty and fourteen." The numbers from one to

ten are: 1, bat; 2, bi; 3, hiru; 4, lau; 5, bortz or bost; 6, sei; 7, zazpi; 8, zortzi; 9, bederatzi; 10, hamar; 20, hogoi or hogei; 40, berrogoi (i.e. twice twenty); 100, ehun. There is no genuine word for a thousand.

The genders in Basque grammar are distinguished only in the verbal forms, in which the sex of the person addressed is indicated by a special suffix; so that eztakit means, " I do not know it "; but to a woman one says also: eztakinat, " I do not

know it, oh woman!" To a man one says: eztakiat (for cz- takikat), " I do not know it, oh man!" moreover, certain dialectic varieties have a respectful form : eztakizut, " I do not know it, you respectable one," from which also a childish form is derived, eztakichul, "I do not know it, oh child!"

The Basque conjugation appears most complicated, since it incorporates not only the subject pronouns, but, at the same time, the indirect and direct complement. Each transitive form may thus offer twenty-four variations—" he gives it," " he gives it to you," " he gives them to us," &c, &c. Primitively there were two tenses only, an imperfect and a present, which were distinguished in the transitive verb by the place of the personal subject element: dakigu, " we are knowing it " (gu, i.e. we), and ginaki, " we were knowing it"; in the intransitive by a nasalization of the radical: niz, "■ I am "; nintz, " I was." In modern times a conjectural future has been derived by adding the suffix ke, dakiket, " I will, shall or probably can know it." 'No proper moods are known, tut subjunctive or conjunctive forms are formed by adding a final n, as dakusat, " I am looking at it"; dakusadan, "if I see it." No voices appear to have been used in the same radical, so that there are separate transitive and intransitive verbs.

In its present state Basque only employs its regular conjugation exceptionally; but it has developed, probably under the influence of neo-Latin, a most extensive conjugation by combining a few auxiliary verbs and what may be called participles, in fact declined nouns: ikusten dut, " I have it in seeing," " I see it "; ikusiko dut, " I have it to be seen," " I will see it," &c. The principal auxiliaries are: izan, " to be "; and ukan, " to have"; but edin, " to can "; eza, " to be able "; egin, " to make ";joan, " to go "; eroan, " to draw," " to move," are also much used in this manner.

The syntax is simple, the phrases are short and generally the order of words is: subject, complement, verb. The determining element follows

the determined: gizon handia, " man great the " — the great man; the genitive, however, precedes the nomina- tive — gizonaren etchea, " the man's house." Composition is common and it has caused several juxtaposed words to be combined and contracted, so that they are partially fused with one another — a process called polysyntheticism; odei, " cloud," and ots, "noise," form odots, "thunder"; belar, "forehead," and oin, " foot," give belaun, " knee," front of the foot. The vocabulary is poor; general and synthetic words are often wanting; but particular terms abound. There is no proper term for " sister," but arreba, a man's sister, is distinguished from ahizpa, a woman's sister. We find no original words for abstract ideas, and God is simply " the Lord of the high."

The vocabulary, however, varies extremely from place to place and the dialectic varieties are very numerous. They have been summed up by Prince L. L. Bonaparte as eight; these may be reduced to three principal groups: the eastern, com- prising the Souletine and the two lower Navarrese; the central formed by the two upper Navarrese, the Guipuzcoan and the Labourdine; and the western, formed by the Biscayan, spoken too in Alava. These names are drawn from the territorial subdivisions, although the dialects do not exactly correspond with them.

Ethnology and Anthropology. — The earliest notices of the geography of Spain, from the 5th century B.C., represent Spain as occupied by a congeries of tribes distinguished mainly as Iberi, Celtiberi and Celts. These had no cohesion together, and unless temporarily united against some foreign foe, were at war with one another and were in constant movement; the ruder tribes being driven northwards by the advancing tide of Mediterranean civilization. The tribes in the south in Baetica had, according to Trogus and Strabo, written laws, poems of ancient date and a literature. Of this nothing has reached us. We have only some inscriptions, legends on coins, marks on pottery and on megalithic monuments, in alphabets slightly differing, and belonging to six geographical districts. These still await an interpreter; but they show that a like general language was once spoken through the whole of Spain, and for a short distance on

the northern slope of the Pyrenees. The character of the letters is clearly of Levant origin, but the particular alphabets, to which each may be referred, and their connexion, if any, with the Basque, are

still undetermined. It was early remarked by the classical scholars among the Basques after the Renaissance that certain names in the ancient toponymy of Spain, though transcribed by Greek and Latin writers, i.e. by foreigners, ignorant of the language, yet bear a strong resemblance to actual place-names in Basque (e.g. Iliberis, Iriberry) ; and in a few cases (Mondiculeia, Mendigorry; Iluro, Oloron) the site itself shows the reason of the name. Andres de Poza (1587), Larramendi (1760), Juan B. Erro (1806) and others had noted some of these facts, but it was W. von Humboldt (1821) who first aroused the attention of Europe to them. This greater extension of a people speaking a language akin to the Basque throughout Spain, and perhaps in Sicily and Sardinia, has been accepted by the majority of students, though some competent Basque scholars deny it; and the certain connexion of the Basques, either with the Iberians or Celtiberians, whether in race or language, cannot be said to be conclusively proved as long as the so-called Celtiberian inscriptions remain uninterpreted. (See also Iberians.)

After so many centuries of close contact and interpenetration with other peoples, we can hardly expect to find a pure physical type among the present Basques. All that we can expect is to be able to differentiate them from their neighbours. The earliest notice we have of the Basques, by Einhard (778), speaks of their wonderful agility. The next, the pilgrim of the Codex Calixtinus (12th century), says the Basques are fairer in face (facie candl- jliores) than the Navarrese.

Anthropologists no longer rely solely on craniology, and the measurement of the skull, to distinguish race. The researches of Aranzadi (1889 and 1905) and of Collignon (1899) show them as less fair than northern Europeans, but fairer than any of the southern .races; not so tall as the Scandinavians, Teutons or British, but taller than their neighbours of southern races. There is no tendency to prognathism, as in some of the Celts. The profile is often very fine; the carriage is remarkably upright. Neither markedly brachycephalous nor dolichocephalous, the skull has yet certain peculiarities. In the conjunction of the whole physical qualities, says Collignon, there is a Basque type, differing from all those he has studied in Europe and northern Africa. There are differences of type among themselves, yet, when they emigrate to South America, French and Spanish Basques are known simply as Basques, distinct from all other races.

On the origin of the Basques, the chief theories are:— (1) that they are descended from the tribes whom the Greeks and Latins called

Iberi; (2) that they belong to some of the fairer Berber tribes (" Eurafrican," Herve) and through the ancient Libyans, from a people depicted on the Egyptian monuments; (3) the Atlantic theory, that they belong to a lost Atlantic continent, whose inhabitants were represented by the Guanches of the Canary Islands, and by a fair race on the western coast of Africa; (4) that they are an indigenous race, who have never had any greater extension than their present quarters.

The remains of prehistoric races hitherto discovered in Spain throw little light on the subject, but some skulls found in south- eastern Spain in the age of metal resemble the Basque skulls of Zaraus.

The megalithic remains, the dolmens, menhirs, cromlechs and stone circles are said to resemble more closely those of northern Africa than the larger remains of Brittany and of the British Isles. Aristotle tells us that the Iberi fixed obelisks round the tomb of each warrior in number equal to the enemies he had slain (Polit. vii. c. 2. 6), but proof is wanting that these Iberi were Basques.

Iberian inscriptions "have been found on the so-called loros de guisando, rude stone bulls or boars, on other monuments of northern Spain and in ancient sepulchres; some of these figures, e.g. at the Cerro de los Santos in Murcia, recall the physical type of the modern Basques, but they are associated with others of very varied types. Of the religion of the Basques anterior to Christianity, little |

is certainly known. The few notices we have point to a worship of the elements, the sun, the moon and the morning star, and to a belief in the immortality of the unburnt and unburied body. The custom of the couvade, attributed by Strabo to the Cantabri, is unknown among the modern Basques. As elsewhere, the Romans assimilated Basque local deities to their own pantheon, thus we find Deo Baicorrixo (Baigorry) and HerauscorHsehe in Latin inscriptions. But the name which the Basques them- selves give to the Deity is Jaincoa, Jaungoikoa, which may mean lord or master, Lord of the high; but in the dialect of. Roncal, Goikoa means " the moon," and Jaungoikokoa would mean " Lord of the moon." The term Jaun, lord or master, Etcheko Jauna, the lord or master of the house, is applied to every householder.

There is no aid to be got from folk- tales; none can be con- sidered exclusively Basque and the literature is altogether too modern. The first book printed in Basque, the Linguae Vas~ conum Primitiae, the poems of Bernard d'Echepare, is dated 1545. The work which is

considered the standard of the language is the Protestant translation of the New Testament made by Jean de Licarrague, under the auspices of Jeanne d'Albret, and printed at La Rochelle in 1571. The pastorales are open-air dramas, like the moralities and mysteries of the middle ages. They are derived from French materials; but a dancing-chorus, invariably introduced, and other parts of the miseˆen-scene, point to possibly earlier traditions. No MS. hitherto discovered is earlier than the 18th century. The greater part of the other literature is religious and translated. It is only recently that a real literature has been attempted in Basque with any success.

In spite of this modernity in literature there are other matters which show how strong the conservatism of the Basques really is. Thus, in dealing with the language, the only true measure of the antiquity of the race, we find that all cutting instruments are of stone; that the week has only three days. There are also other survivals now fast disappearing. Instead of the plough, the Basques used the lay a, a two-pronged short-handled steel digging fork, admirably adapted to small properties, where labour is abundant. They alone of the peoples of western Europe have preserved specimens of almost every class of dance known to primitive races. These are (1) animal (or possibly totem) dances, in which men personate animals, the bear,: the fox, the horse, &c; (2) dances to represent agriculture and the vintage performed with wine-skins; (3) the simple arts, such as weaving, where the dancers, each holding a long coloured ribbon, dance round a pole on which is gradually formed a pattern like a Scotch tartan; (4) war-dances, as the sword-dance and others; (5) religious dances in procession before the Host and before the altar; (6) ceremonial dances in which both sexes take part at the beginning and end of a festival, and to welcome dis- tinguished people. How large a part these played in the life of the people, and the value attached to them, may be seen in the vehement defence of the religious dances by Father Larramendi, S.J., in his Corografia de GuipHzcoa, and by the large sums paid for the privilege of dancing the first Saul Basque on the stage at the close of a Pastorale.

The old Basque house is the product of a land where stone and timber were almost equally abundant. The front-work is of wood with carved beams; the balconies and huge over-hanging roof recall the Swiss chalet, but the side and back walls are of stone often heavily buttressed. The cattle occupy the ground- floor, and the first storey is reached often by an outside staircase. The carven tombstones with their ornaments resemble those of Celtic countries, and are found also at Bologna in Italy.

In customs, in institutions, in administration, in civil and political life there is no one thing that we can say is peculiarly and exclusively Basque; but their whole system taken together marks them off from other people and especially from their neighbours.

Character. — The most marked features in the Basque character are an intense self-respect, a pride of race and an obstinate conservatism. Much has been written in ridicule of the claim of all Basques to be noble, but it was a fact both in the laws oi

Spain, in the fueros and in practice. Every Basque freeholder (vecino) could prove himself noble and thus eligible to any office. They are not a town race; a Basque village consists of a few houses; the population lives in scattered habitations. They do not fear solitude, and this makes them excellent emigrants and missionaries. They are splendid seamen, and were early renowned as whale fishermen in the Bay of Biscay. They were the first to establish the cod-fishery off the coast of Newfound- land. They took their full part in the colonization of America. Basque names abound in the older colonial families, and Basque newspapers have been published in Buenos-Aires and in Los Angeles, California. As soldiers they are splendid marchers; they retain the tenacity and power of endurance which the Romans remarked in the Iberians and Celtiberians. They are better in defence than in attack. The failure to take Bilbao was the turning-point in both Carlist wars. In civil institutions and in the tenures of property the legal position of women was very high. The eldest born, whether boy or girl, inherited the ancestral property, and this not only among the higher classes but among the peasantry also. In the fueros an insult done to a woman, or in the presence of a woman, is punished more severely than a similar offence among men. This did not prevent women from working as hard as, or even harder than, the men. All authors speak of the robust appearance of the women-rowers on the Bidassoa, and of those who loaded and unloaded the ships in Bilbao.

Institutions. — In their municipal institutions they kept the old Roman term respublica for the civitds and the territory belonging to it. All municipal officers were elective in some form or other, and there is hardly any mode of election, from universal suffrage to nomination by a single person chosen by lot, that the Basques have not tried. The municipalities sent deputies to the juntas or

parliaments of each province. These assemblies took place originally in the open air, as in other parts of the Pyrenees, under trees, the most celebrated of which is the oak of Guernica in Biscay, or under copses, as the Bilzaar in the French Pays Basque. The cortes of Navarre met at Pamplona. Delegates from the juntas met annually to consider the common interests of the three provinces. Besides the separate municipalities and the juntas, there were often associations and assemblies of three or five towns, or of three or four valleys, to preserve the special privilege or for the special needs of each. Hence was formed a habit of self- government, the practice of legislative, judicial and administra- tive functions, which resulted gradually in a code of written or unwritten laws embodied in the fueros or fors of each province, and the cartas-pueblos of the towns. In form these fueros or charters are often grants from the lord or sovereign; in reality they are only a confirmation or codification of unwritten cus- tomary laws in practice among the people, the origin of which is lost in antiquity. The kings of Castile, of Spain and of Navarre were obliged at their accession, either in person, or by deputy, to swear to observe these fueros; and this oath was really kept. While the cortes were trampled upon and absolutism reigned both in Spain and in France, the Basque fueros were respected ; in Spain to the middle of the 10th century and in France down to the Revolution. The fueros thus observed made the Basque provinces a land apart (una tierra apartadd), a self-governing republic {una verdadera autonomia), under an absolute monarchy, to which, however, they were always loyal. And this independ- ence was acknowledged, not only in local, but also in international and European treaties, as in art. 15 of the treaty of Utrecht 1713. So the act of the 3rd of June 1876, which assimilated the Basque Provinces to the rest of Spain, acknowledged the true self- government which they had enjoyed for centuries.

The circumstances and methods which enabled the Basques to preserve this independence were, first, the isolation caused by their peculiar language; next, the mountainous and easily- defended nature of the country, its comparative poverty and the possession of a sea-board. Then there were the rights and the safeguards which the fueros themselves gave against encroach- ments. The rights were : — freedom of election to all offices and to the juntas; exemption from all forced military service except for

the defence of the country and under their own officers; and payment beforehand exacted for all service beyond their own frontiers (this did not of course exclude voluntary service of individuals in the Spanish or French armies). Then there was free trade with foreign nations, and especially between the Basques of

both nations. The customs' frontier of Spain really began on the Ebro. Then no decree or sentence of the royal authorities could have effect in the provinces except countersigned by the junta. Otherwise the resisting and even the killing of a royal officer was no murder. But chiefest of all the safeguards was the provision that no tax or contribution should be levied or paid to the crown till all petitions had been heard and wrongs re- dressed; that such a vote should be the last act of the junta or cortes, and the money should be paid not as a demand of right or a tax, but as a free gift and above all a voluntary one. It was paid in a lump sum, and the repartition and levying were left entirely in the hands of the junta and the municipalities.

As a further precaution against the inroads of absolutism, no lawyer was allowed to be a deputy to the junta and all clergy were likewise excluded. The Basques considered that men of these professions would be always on the side of tyranny. One lawyer (letrado) was present at the juntas for consultation on the points of law, but he was not allowed to vote. So strictly was this observed that after the battle of Vitoria in 1813, when it was difficult to get together a quorum for the reorganization of the country, the letrado, though one of the most active and influential members in consultation, was not allowed to vote.

The relations between Church and State among the Basques have been very remarkable. They are a highly religious people, eminently conservative in their religious practices. In religion alone, through Ignatius de Loyola of Guipuzcoa and Francis Xavier of Navarre, they have left their mark upon Europe. They have kept the earliest form of Christian marriage and of the primitive order of deaconesses, forgotten elsewhere in the West. The feast of Corpus Christi instituted by Pope Urban IV. (1262) still appears in Basque almanacs as Phesta-berria, the New Feast. The earliest notice that we have of them speaks of their liberality to the clergy; yet with all this religious conservatism they have never allowed themselves to be priest-ridden. They constantly resisted the attempts of the crown to force upon them the authority of the Spanish bishops. When Ferdinand the Catholic came to Biscay in 1477 to swear to the fueros, he was compelled to send back the bishop of Pamplona whom he had brought with him. No strange priest could enter the town when the junta was sitting, and in some places if a deputy was seen speaking to a priest before a session he lost his vote for that day. The bishops had no share in ecclesiastical patronage in Guipuzcoa; all was in the hands of the king, of the nobles or of the municipalities, or else the priests were chosen by competitive examination or elected by

the people. They would not allow the priest to inter- fere with the games or dances, and when the drama was forbidden in all Spain in 1757 by the authority of the Spanish bishops, the cortes of Navarre compelled the king to withdraw the order.

For a stranger coming from lands of larger farms and apparently higher cultivation, the agriculture of the Basques seems poor, but the old scattered homesteads show a sense of security that has been lacking in many parts of Spain ; and the Basques have shown great adaptability in suiting their agriculture to new conditions, helped by the presence of the courts at San Sebastian and Biarritz. When the old self-sufficient village industries declined, in consequence of the invention of machinery and manufacture elsewhere, the Basques entered at once upon emigration to the agricultural parts of the Americas, and the result has been that the Basque Provinces and the Pays Basque probably have never been more prosperous than they are now, and perhaps a new Eskual-herria and a new Eskuara are being built up in the distant lands to which they are such valued immigrants.

Bibliography. — For so restricted a literature the Essai d'une bibliographic de la langue basque, by Julien Vinson (Paris, 189 1), with the volume of additions and corrections, 1898, is practically exhaustive, and is a mine of information on the principal works. See also for the language, A. Oihenart, Notitia utriusque Vasconiae (Paris. 1638 and 1656), 4to., ch. xiv. ; Fl. Lecluse, Manuel de la

gue basque (Toulouse, 1826); C. Ribary, Essai sur la langue basque (1866), translated from the Hungarian by Julien Vinson (Paris, 1877); W. J. Van Eys, Grammaire comparee des dialectes basques (Paris, London, Amsterdam, 1879) ; Prince L. L. Bonaparte, Le Verbe basque en tableaux (London, 1864-1869); J. Vinson, articles in Revue de linguistique (Paris, 1867-1906); L'Abbe Ithurry, Grammaire basque (Bayonne, 1 895-1906); Dr H. Schuc- hardt, Die Entstehung der Bezugsformen des Baskischen (Wien, 1893) ; W. J. Van Eys, Dictionnaire basque-frangais (Paris, 1873); R- M. de Azkue, Diccionario vascongado espanol-francais (Tours, 1906) ; Monumenta Linguae Ibericae, edidit Aemilius Hubner, fol. (Berlin, '893) (texts and introduction good; analysis and interpretation faulty). Other works of interest on various subjects are: — Went- worth Webster, Basque Legends (London, 1877 and 1879) ; Puyol y

Camps, " La Epigraphia Numismatica Iberica," in tomo xvi. of Boletin de la Real Acidemia de la Historia (Madrid, 1890), (for geographical distribution of the alphabets) ; T. de Aranzadi, El Pueblo Euskalduna. Estudio de Antropologia (San Sebastian, 1889) ; and the same author's Existe una raza Euskara ? Sus caracteres antropologicos (1905); La Tradition au pays basque (Paris, 1899), (a collection of papers by local authorities) ; Julien Vinson, Les Basques et le pays basque (Paris, 1882), a sufficient survey for the general reader; the same author's Le Folk-Lore du pays basque (Paris, 1883), treats of the Pastorales and embraces the whole Folk-Lore ; Le Codex de Saint- Jacques de Compostella, lib. iv. (Paris, 1882), by R. P. F. Fita and J. Vinson, gives the first Basque vocabu- lary; Les Coutumes generates gardees et observees au pais & baillage de Labourt (Bordeaux, 1700) ; G. Olphe-Galliard, Le Paysan basque a travers les ages (Paris, 1905) ; Pierre Yturbide, Le Pays de Labourd avant 1789 (Bayonne, 1905), (for the time of the English domination); Henry O'Shea, La Tombe basque (Pau, 1889), (valuable for the comparison of Basque and Celtic sepulchral ornament). See also the bibliography to Basque Provinces. (W. We. ; J. Vn.)

BASRA (written also Busra, Bassora and Bussora), the name of a vilayet of Asiatic Turkey, and of its capital. The vilayet has an area of 16,470 sq. m., formed in 1884 by detaching the southern districts of the Bagdad vilayet. It includes the great marshy districts of the lower Euphrates and Tigris, and of their joint stream, the Shatt el-Arab, and a sanjak on the western shore of the Persian Gulf. A settled population is found only along the river banks. Except the capital, Basra, there are no towns of importance. Korna, at the junction of the two great rivers; Amara on the Tigris; Shatra on the Shatt el-Hai' canal, connecting the Tigris and Euphrates; Nasrieh, at the junction of that canal with the Euphrates and Suk esh-Sheiukh, on the lower reaches of the Euphrates, are the principal settlements, with a population varying from 3000 to 10,000 or somewhat less. Along the Shatt el-Arab and the lower reaches of the Tigris and Euphrates there are vast plantations of date-palms, which produce the finest dates known. Here and there are found extensive rice-fields; liquorice, wheat, barley and roses are also cultivated in places. But in general the ancient canals on which the fertility of the country depends have been allowed to go to ruin. The whole land is subject to inundations which render settled agriculture impracticable, and the population consists chiefly of nomadic and semi-nomadic tribes whose wealth consists in herds of buffaloes, horses, sheep and goats. The principal exports are wool, dates, cereals, gum, liquorice- root and horses. The climate is humid and

unhealthy. The population is estimated at about 200,000 almost exclusively Moslems, of whom three-quarters are Shi'ites. There are about 4000 Jews and perhaps 6000 Christians, among whom are reckoned the remains of the curious sect of Sabaeans or Mandaeans, whose headquarters are in the neighbourhood of Suk esh-Sheiukh.

The capital of the vilayet, also called Basra, is situated in 47 34′ E. long, and 32 N. lat., near the western bank of the Shatt el-Arab, about 55 m. from the Persian Gulf. The town proper lies on the canal el-'Assar about \ to 2 m. W. of the Shatt el-Arab. There are no public buildings of importance. The houses are meanly built, partly of sun-dried and partly of burnt bricks, with flat roofs surrounded by parapets. The bazaars are miserable structures, covered with mats laid on rafters of date trees. The streets are irregular, narrow and unpaved. The greater part of the area of the town is occupied by gardens and plantations of palm-trees, intersected by a number of little canals, cleansed twice daily with the ebb and flow of the tide, which rises here about 9 ft. These canals are navigated by small

boats, called bellem (plur. ablam), resembling dug-outs in form, but light and graceful. At high-tide, accordingly, the town presents a very attractive appearance, but at low-tide, when the mud banks are exposed, it seems dirty and repulsive, and the noxious exhalations are extremely trying. The whole region is subject to inundations. The town itself is unhealthy and strangers especially are apt to be attacked by fever. Basra is the port of Bagdad, with which it has steam communication by an English line of river steamers weekly and also by a Turkish line. The Shatt el-Arab is deep and broad, easily navigable for ocean steamers, and there is weekly communication by passenger steamer with India, while two or more freight lines, which also take passengers, connect Basra directly with the Mediterranean, and with European and British ports. It is the great date port of the.world, and the dates of Basra are regarded as the finest in the market. Besides dates the principal articles of export are wool, horses, liquorice, gum and attar of roses. The annual value o) the exports is approximately £1,000,000 and of the imports a little more. The foreign trade is almost exclusively in the hands of the English, but of late the Germans have begun to enter the market, and the Hamburg-American line of steamers has estab- lished direct communication. Since 1898 there has been a British consul at Basra (before that time he was a representative of the Indian government). France and Russia also maintain consular establishments at Basra. The settled population of Basra is probably under 50,000, but how much it is impossible to estimate. It is a heterogeneous mixture of all the nations and religions of the East — Turks, Arabs, Persians,

Indians, Armenians, Chaldaeans and Jews. Of the latter there are about 1900, engaged in trade and commerce. Fewest in number are the Turks, comprising only the officials. Most numerous are the Arabs, chiefly Shi'ites. The wealthiest and most influential personage in the capital and the vilayet is the nakib, or marshal of the nobility {i.e. descendants of the family of the prophet, who are entitled to wear the green turban). Basra is a station of the Arabian mission of the Dutch Reformed Church of America.

History. — The original city of Basra was founded by the caliph Omar in a.d. 636 about 8 m. S.W. of its present site, on the edge of the stony and pebbly Arabian plateau, on an ancient canal now dry. The modern town of Zobeir, a sort of health suburb, occupied by the villas of well-to-do inhabitants of Basra, lies near the ruin mounds which mark the situation of the ancient city. In the days of its prosperity it rivalled Kufa and Wasit in wealth and size, and its fame is in the tales of the Arabian Nights. With the decay of the power of the Abbasid caliphate its importance declined. The canals were neglected, communication with the Persian Gulf was cut off and finally the place was abandoned altogether. The present city was conquered by the Turks in 1668, and since that period has been the scene of many revolutions. It was taken in 1777 after a siege of eight months by the Persians under Sadik Khan. In about a year it fell again into the hands of the Turks, who were again deprived of it by the sheikh of the Montefik (Montafiq) Arabs. The town was in the October following recovered by Suleiman Pasha, who encountered the sheikh on the banks of the Euphrates and put him to flight; it has since remained in the hands of the Turks. (J. P. Pe.)

BASS, the name of a family of English brewers. The founder of the firm, William Bass (b. 1720), was originally a carrier, one of his chief clients being Benjamin Printon, a Burton-on- Trent brewer. By 1 7 7 7 Bass had saved a little money, and seeing the growing demand for Burton beer he started as a brewer himself. The principal market for Burton beer at that time was in St Petersburg, whither the beer could be sent by water direct from Burton via the Trent and Hull, and William Bass managed to secure a tolerable share of the large Russian orders. But in 1822 the Russian government placed a prohibitory duty on Burton ales, and the Burton brewers were forced into cultivating the home market. William Bass opened up a connexion with London, and established a fairly profitable home trade. A misunderstanding between the East India Company and the London brewers who were the proprietors of Hodgson's India

Pale Ale, at that time the standard drink of Englishmen in the East, resulted in Bass being asked to supply a beer which would withstand the Indian climate and be generally suitable to the Indian market. After a series of experiments he produced what is still known as Bass's pale ale. This new and lighter beer at once became popular all over India, and Bass's firm became the largest in Burton. After William Bass's death the business was carried on by his son, M. T. Bass, and then by his grandson, Michael Thomas Bass (1799-1884). In 1827 a vessel laden with Bass's beer was wrecked in the Irish Channel. A large proportion of the cargo was however salved and sold at Liverpool, where it met with great approval in the local market, and through this chance circumstance the firm opened up a regular trade in the north-west of England and Ireland. " Bass " was, however, little drunk in London till 1851, when it was supplied on draught at the Exhibition of that year, since which time its reputation has been world-wide. In 1880 the business was turned into a limited liability company. Michael Thomas Bass, besides actively conducting and extending the firm's operations, was a man of great public spirit and philanthropy, and the towns of Burton and Derby are largely indebted to his munificence. He took a keen interest in all questions affecting the welfare of the working classes, and was largely instrumental in securing the abolition of imprisonment for debt. On his death, prior to which he had taken into partnership Messrs Ratcliff and Gretton, two of the leading officials of the brewery, converting the business into a limited company known as Messrs Bass, Ratcliff & Gretton, Ltd., the control of the firm passed to his sons, Michael Arthur Bass and Hamar Bass (d. 1898). Michael Arthur Bass (1837-1909), after twenty one years in parliament as member first for Stafford, then for two divisions of Staffordshire, was in 1886 raised to the peerage as Baron Burton; by a special patent of 1897 the peerage descended to his daughter, Nellie, the wife of Mr J. E. Baillie of Dochfour, the baronetcy descend ing to his nephew W. A. Hamar Bass (b. 1879).

BASS (the same word as " base," and so pronounced, but influenced in spelling by the Ital. basso), deep, low; especially in music, the lower part in the harmony of a composition, the lowest male voice, or the lowest -pitched of a class of instruments, as the bass-clarinet.

Bass or bast (a word of doubtful origin, pronounced bo's) is the fibrous bark of the lime tree, used in gardening for tying up plants, or to make mats, soft plaited baskets, &c. Basswood is the American

lime-tree, Tilia Americana; white basswood is T. heterophylla.

The name bass is also given to a fish closely resembling theperch.

BASSA, a province of the British protectorate of Northern Nigeria, occupying the angle made by the meeting of the Benue river with the Niger. It has an area of 7000 sq. m., with a population estimated at about one and a half millions. It is bounded N. by the Benue, W. by the Niger, S. by the frontier of Southern Nigeria, and E. by the province of Muri. The province is heavily forested, and is estimated to be one of the richest of the protectorate in natural products. It has never been pene- trated by Moslem influence, and is inhabited in the greater part by warlike and unruly pagans. Early in the 16th century the Igbira (Okpoto or Ibo) were one of the most powerful pagan peoples of Nigeria and had their capital at Iddah. At a later period the Bassas conquered the western portion of the state and the Munshis the eastern, while the Okpoto still held the south and a wedge-shaped district partially dividing the Munshis and Bassas. The Bassas are a very remarkable pagan race who permeate the entire protectorate of Northern Nigeria, and are to be found in small colonies in almost every province. They are clever agriculturists, naturally peaceful and industrious. The Munshis, though also good agriculturists, are a warlike and most unruly race, as are also the Okpoto.

The districts which now comprise the province of Bassa came nominally under British control in 1900, but up to the year 1903 administrative authority was confined to the western half with ,Dekina (in 7 3′ E., 7 41′ N.) for its capital. In December of 1903 a disturbance resulting in the murder of the British resident

led to the despatch of a military expedition, and as a result of the operations the frontiers of the districts under control were extended to the borders of the Munshi country in about 8° E. The western portion of the province, occupied by friendly and peaceful tribes upon the Niger, has been organized for administra- tion on the same system as the rest of the protectorate. Courts of justice are operative and taxes are peacefully collected. The Okpoto, however, remain turbulent, as do their neighbours the Munshis. Spirits, of which the importation is forbidden in Northern Nigeria, are freely smuggled over the border from Southern Nigeria. Arms and powder are also imported. The slave-trade is still alive in this district, and an overland route for slaves is believed to have been established through eastern Bassa to the Benue. In consequence of the natural wealth of the province, there are trading establishments of the Niger Company

and of Messrs Holt on the Niger and Benue, and colonies of native traders have penetrated the country from the north. Roman Catholic and Protestant missions are established at Dekina and Gbebe.

BASSANO, JACOPO DA PONTE (1510-1592), Venetian painter, was born at Bassano. He was educated by his father, who was himself an artist, and then completed his studies at Venice. On the death of his father he returned to Bassano and settled there. His subjects were generally peasants and villagers, cattle and landscapes, with some portraits and historical designs. His figures are well designed, and his animals and landscapes have an agreeable air of simple nature. His compositions, though they have not much eloquence or grandeur, have abundance of force and truth; the local colours are well observed, the flesh- tints are fresh and brilliant, and his chiaroscuro and perspective are unexceptionable. He is said to have finished a great number of pictures; but his genuine works are somewhat rare and valuable — many of those which are called originals being copies either by the sons of Bassano or by others. Bassano's style varied considerably during his lifetime. He naturally was at first a copier of his father, but his productions in this style are not of great value. He was then strongly attracted by the lightness and beautiful colouring of Titian, and finally adopted the style which is recognized as his own. Although he painted few great pictures, and preferred humble subjects, yet his altar piece of the Nativity at Bassano is estimated highly by the best judges, and in Lanzi's opinion is the finest work of its class.

BASSANO, a city of Venetia, Italy, in the province of Vicenza, 24 m. N.E. of Vicenza and 30 m. N. of Padua by rail, at the foot of the Venetian Alps. Pop. (1901) town, 7553; commune, 15,097. It is well situated upon the Brenta, which is here spanned by a covered wooden bridge, and commands fine views. The castle, erected by the Ezzelini in the 13th century, lies in the upper portion of the town, above the river; a tower, erected by a member of the same family, is a conspicuous feature. The museum and cathedral and some of the other churches contain pictures by the da Ponte family (16th and early 17th century), surnamed Bassano from their birth-place; Jacopo is the most eminent of them. The museum also contains drawings and letters of the sculptor Antonio Canova. The church of S. Francesco, begun in the 12th century in the Lombard Romanesque style, was continued in the 13th in the Gothic style. Some of the houses have traces of paintings on their facades. In the nth century Eccelin, a German, obtained fiefs in this district from Conrad II. and founded the family of the Ezzelini, who were prominent in the history of North Italy in the 13th and 14th

centuries. Bassano apparently came into existence about a.d. iooq. Its possession was disputed between Padua and Vicenza; it passed for a moment under the power of Gian Galeazzo Visconti of Milan, who fortified it. At the beginning of the 15th century it went over to Venice; its industries flourished under Venetian government, especially its printing- press and manufacture of majolica, the latter of which still continues. On the 8th of September 1796 an action was fought here between the French and the Austrians, in which the French were victorious. (T. As.)

BASSARAB or Bassaraba, the name of a dynasty in Rumania, which ruled Walachia from the dawn of its history until 1658.

BASS CLARINET

49 1

The origin of the name and family has not yet been explained. It undoubtedly stands in close connexion with the name of the province of Bessarabia, which oriental chroniclers gave in olden times to the whole of Walachia. The heraldic sign, three heads of negroes in the Bassarab shield, seems to be of late western origin and to rest on a popular etymology connecting the second haif of the word with Arabs, who were taken to signify Moors (blacks). The other heraldic signs, the crescent and the star, have evidently been added on the same supposition of an oriental origin of the family. The Servian chroniclers connect its origin with their own nationality, basing this view upon the identifica- tion of Sarab with Sorb or Serbia. All this is mere conjecture. It is, however, a fact that the first appearance of the Bassarabs as rulers (knyaz, ban or voivod) is in the western part of Rumania (originally called Little Walachia) , and also in the southern parts of Transylvania— the old dukedoms of Fogarash and Almash, which are situated on the right bank of the Olt (Aluta) and extend south to Severin and Craiova. Whatever the origin of the Bassarabs may be, the foundation of the Walachian princi- pality is undoubtedly connected with a member of that family, who, according to tradition, came from Transylvania and settled first in Campulung and Tirgovishtea. It is equally certain that almost every one of the long line of princes and voivods bore a Slavonic surname, perhaps due to the influence of the Slavonic Church, to which the Rumanians belonged. Starting from the 13th Century the Bassarabs soon split into two rival factions, known in history as the descendants of the two brothers Dan and Dragul. The form Drakul — devil — by which this line is known in history is no doubt a nickname given by the rival line. _ It has fastened on the family on

account of the cruelties perpetrated by Vlad Drakul (1433-1446) and Vlad Tsepesh (1456-1476), who figure in popular legend as representa- tives of the most fiendish cruelty. The feud between the rival dynasties lasted from the beginning of the 15th century to the beginning of the 17th.

The most prominent members of the family were Mircea (1386-1418), who accepted Turkish suzerainty; Neagoe, the founder of the famous cathedral at Curtea de Argesh (q.v.); Michael, surnamed the Brave (1592-1601); and Petru Cercel, famous for his profound learning, who spoke twelve languages and carried on friendly correspondence with the greater scholars and poets of Italy. He was drowned by the Turks in Constan- tinople in 1590 through the intrigues of Mihnea, who succeeded him on the throne of Walachia. The British Museum possesses the oldest MSS. of the Rumanian Gospels, once owned by this Petru Cercel, and containing his autograph signature. The text was published by Dr M. Gaster at the expense of the Rumanian government. Mateiu Bassarab (1633-1654) established the first printing-press in Rumania, and under his influence the first code of laws was compiled and published in Bucharest in 1654. The Bassarab dynasty became extinct with Constantine Sherban in 1658. See Rumania: Language and Literature. (M. G.)

BASS CLARINET (Fr. clarinette basse; Ger. Bass-Klarinette; Ital. clarinetto basso or clarone), practically the A, Bb or C clarinet speaking an octave lower; what therefore has been said con- cerning the fingering, transposition, acoustic properties and general history of the clarinet (q.v.) also applies to the bass clarinet. Owing to its greater length the form of the bass clarinet differs from that of the clarinets in that the bell joint is bent up in front of the instrument, terminating in a large gloxinea-shaped bell, and that the mouthpiece is attached by means of a strong ligature and screws to a serpent-shaped crook of brass or silver. The compass of the modern orchestral bass clarinet is in the main the same as that of the higher clarinets in C, Bb and A, but an octave lower, and therefore for the bass clarinet

in C is fe £ f— (jgS ~ — ! f° r t ˆ le Dass clarinet in Bb the real sounds

are one tone, and for the bass clarinet in A ij tone lower, although the notation is the same for all three.

Sometimes the treble clef is used in notation for the bass clarinet. It

must then be understood that the instrument in C speaks an

octave lower, the bass clarinet in Bb a major ninth and the bass clarinet in A a minor tenth lower. The tenor clef is also fre- quently used in orchestral works.

The quality of tone is less reedy in the bass clarinet than in the higher instruments. It resembles the bourdon stop on the organ, and in the lowest register, more especially, the tone is somewhat hollow and wanting in power although mellower than tha t of the bassoon. In the lowest octave the instrument speaks slowly and is chiefly used for sustained bass or melody notes; rapid passages are impossible.

The modern orchestral model may be fitted with almost every kind of key-mechanism, including the Boehm, and the degree of perfection and ingenuity attained has removed the all but insuperable difficulties which stood in the way of the original inventors who, not understanding key-work, made many futile attempts to bridge the necessarily great distance between the finger-holes by making the bore serpentine, boring the holes obliquely, &c.

The low pitch of the bass clarinet (8 ft. tone) contrasted with the moderate length of the instrument — whose bore measures only some 42 to 43 inches from mouthpiece to bell, whereas that of the bassoon, an instrument of the same pitch, is twice that length — is a puzzle to many. An explanation of the fact is to be found in the peculiar acoustic properties of the cylindrical tube played by means of a reed mouthpiece characterizing the clarinet family, which acts as a closed pipe speaking an octave lower than an open pipe of the same length, and overblowing a twelfth instead of an octave. This is more fully explained in the articles Clarinet and Aulos.

The construction of the bass clarinet demands the greatest care. The bore should theoretically be strictly cylindrical throughout its length from mouthpiece to bell joint; the slightest deviation from mathematical accuracy, such as an undue widening of the bell from the point where it joins the body to the mouth of the bell, would tend to muffle the lower notes of the instrument and to destroy correct intonation.

The origin of the bass clarinet must be sought in Germany, where Heinrich Grenser of Dresden, one of the most famous instrument-makers of his day, made the first bass clarinet in 1793. The basset horn (q.v.) or tenor clarinet, which had reached the height of its popularity, no doubt suggested to Grenser, who was more especially

renowned for his excellent fagottos, the possibility of providing for the clarinet a bass of its own. One of these earliest attempts in the form of a fagotto, stamped " A. Grenser, Dresden," with nine square-flapped brass keys working on knobs, is in the Grossherzogliches Museum at Darmstadt and was lent to the Royal Military Exhibition, London 1890. 1 Two other early specimens, 2 belonging originally to Adolphe Sax and to M. de Coussemaker, are now respectively preserved in the museums of the Brussels Conservatoire and of the Berlin Hochschule (Snoeck Collection). The tubes are of great thickness and the holes are bored obliquely through the walls. Both instruments are in A.

Attempts were made in Italy to overcome the mechanical difficulties by making the bore of the bass clarinet serpentine. A specimen by Nicolas Papalini of Pavia 3 in the museum of the Brussels Conservatoire has the serpentine bore pierced through two slabs of pear- wood; the two halves, each forming a vertical section of the instrument, are fitted together with wooden pins. The outside length is only 2 ft. 35 in. and there are nineteen finger-holes.

Joseph Uhlmann of Vienna 4 constructed a bass clarinet, also termed " bass basset horn," with twenty-three keys and a com- pass from Bb through four complete octaves with all chromatic

1 See Captain C. R. Day, Descriptive Catalogue (London, 1891), No. 266, p. 125.

2 See Victor Mahillon, Catalogue descriptif, vol. ii. (1896), pp. 224-. 226, No. 940.

3 See Captain C. R. Day, op. cit. p. 123, pi. v. B. and p. 123, No. 262.

4 See Dr Schafhautl's report on the Munich exhibition, Bericht der Beurtheilungscommission fur Musikinstrumente (Munich, 1855), P- 153-

semitones. These instruments resemble the saxophones (q.v.), having the bell joint bent up in front and the crook almost at right angles backwards, but the bore of the saxophone is conical.

Georg Streitwolf (i 7 79-1 83 7) , an ingenious musical instrument-

maker of Gottingen, produced in 1828 a bass clarinet with a compass extending from Ab to F, nineteen keys and a fingering the same as that of the clarinet with but few exceptions. In form it resembled the fagotto and had a crook terminating in a beak mouthpiece. The Streitwolf bass clarinet was adopted in 1 834 by the Prussian infantry as bass to the wood-wind. 1 Streitwolf's first bass clarinets were in C, but later he constructed instruments in Bb as well. Like the basset horn, Streitwolf's instruments had the four chromatic open keys extending the compass downwards to Bb. The tone was of very fine quality. One of these instru- ments is in the possession of Herr C. Kruspe of Erfurt, 2 and another is preserved in the Berlin collection at the Hochschule.

It was, however, the successive improvements of Adolphe Sax (Paris, 1814-1894), working probably from Grenser's and later from Streitwolf's models, which produced the modern bass clarinet, and following up the work of Halary and Buffet in the same field, he secured its introduction into the orchestra at the opera. The bass clarinet in C made its first appearance in opera in 1836 in Meyerbeer's Huguenots, Act V., where in a fine passage the lower register of the instrument is displayed to advantage, and later in Dinorah {Le pardon de Ploermel). Two years later (1838) at the theatre of Modena a bass clarinet by P. Maino of Milan, differing in construction from the Sax model, was independently introduced into the orchestra. 3 Wagner employed the bass clarinet in Bb and C in Tristan und Isolde where at the end of Act II. it is used with great effect to characterize the reproachful utterance of King Mark, thus:*

(K. S.)

BASSEIN, a district and town in the Irrawaddy division of Lower Burma, in the delta of the Irrawaddy. The district has been reduced to 4127 sq. m., from 8954 sq. m. in 1871, having given up a large tract to the district of Myaungmya formed in 1896.

A mountain range called the Anauk-pet Taungmyin stretches through the district from N. to S. along the coast. The principal river of the district is the Irrawaddy, which debouches on the sea at its eastern extremity through a delta intersected with salt water creeks, among which the Pyamalaw, Pyinzalu, Kyunt6n, and Ngawun Shagegyi or Bassein river rank as im- portant arms of the sea. Irrawaddy and Inyegyi are the only two lakes in the district. The delta of the Irrawaddy forms, wherever cultivable, a vast sheet of rice, with cotton, sesamum, and tobacco as subsidiary crops. In 1901 the population was 391,427.

Bassein, the chief town and port, is the capital of the district and division, and is situated on the eastern bank of the Bassein river, one of the main arteries by which the waters of the Irra- waddy discharge themselves into the sea. It forms an important seat of the rice trade with several steam rice mills, and has great capabilities both from a mercantile and a military point of view, as it commands the great outlet of the Irrawaddy. It fell before the British arms, in May 1852, during the second Burmese war. In 1901 it had a population of 31,864. The vessels of the Irra- waddy Flotilla Company ply between Rangoon and Bassein, &c, by inland waters, and a railway opened in 1903 runs north- eastward through the centre of the district, to Henzada and Letpadan.

BASSELIN, OLIVIER (c. 1400-e. 1450), French poet, was born in the Val-de-Vire in Normandy about the end of the 14th century. He was by occupation a fuller, and tradition still points out the site of his mill. His drinking songs became famous under the name of Vaux-de-Vire, corrupted in modern times into " vaudeville." From various traditions it may be gathered that Basselin was

1 See Allgemeine musikalische Zeitung (Leipzig, 1834), Bd. xxxvi. March, p. 193.

2 See Wilhelm Altenburg, Die Klarinette (Heilbronn, 1904-1905), P- 33- 3 See W. Altenburg, op. cit. p. 34.

4 Orchestral score, p. 284.

killed in the English wars about the middle of the century, possibly at the battle of Formigny (1450). At the beginning of the 17th century a collection of songs was published by a Norman lawyer, Jean Le Houx, purporting to be the work of Olivier Basselin. There seems to be very little doubt that Le Houx was himself the author of the songs attributed to Basselin, as well as of those he acknowledged as his own.

It has been suggested that Basselin's name may be safely con- nected with some songs preserved in the Bibliotheque Nationale at Paris, and published at Caen in 1866 by M. Armand Gaste. The question is discussed in M. V. Patard's La Verits dans la question Olivier Basselin el Jean le Houx A propos du Vau-de- Vire (1897). A. Caste's edition (1875) of the Vaux-de-Vire was translated (1885) by J. P. Muirhead.

BASSES-ALPES, a department of south-eastern France, formed in 1

790 out of the northern portion of Provence. It is bounded N. by the department of the Hautes Alpes, E. by Italy and the department of the Alpes Maritimes, S. by that of the Var, and W. by those of Vaucluse and the Dr6me. Its area is about 2698 sq. m., while its greatest length is 895 m. and its greatest breadth 56 m. Pop. (1906) 113,126. The river Durance passes through the western part of this department, receiving (left), as affluents, the Ubaye, the Bleone and the Asse (the entire course of each of these rivers is included within the department) as well as the Verdon, the upper course of which is within the department, while the lower course forms its southern limit. It is a poor and hilly district, the highest summits (the loftiest is the Aiguille de Chambeyron, 11,155 ft-) rising round the head waters of the Ubaye. The department is divided into five arrondissements (Digne, Barcelonnette, Castellane, Forcalquier, and Sisteron), 30 cantons and 250 communes. It forms the bishopric of Digne, formerly in the ecclesiastical province of Embrun, but since 1802 in that of Aix-en-Provence. Its chief towns are Digne, Barcelon- nette, Castellane, Forcalquier, and Sisteron. It is poorly supplied with railways (total length 1095 m.), the main line from Grenoble to Avignon running through it from Sisteron to Manosque, and sending off two short branch lines to Digne (14 m.) and to Forcalquier (9 m.). It is a poor department from the material point of view, being very mountainous and containing many mountain pastures. But these pastures have been much damaged by the Provencal shepherds to whom they are let out, while the forests have been very much thinned (though extensive re- afforestments are now being carried out) so that the soil is very dry and made drier by exposure to the southern sun. From near the head of the Ubaye valley the pass of the Col de PArgentiere (6545 ft.) leads over from Barcelonnette to Cuneo, in Italy: it was perhaps traversed by Hannibal, and certainly in 1 5 1 5 by Francis I.

See C.J.J. M. Feraud, Histoire, gSographie et statistique du Departe- ment des Basses-Alpes (Digne, 1861). (W. A. B. C.)

BASSES-PYRENEES, a department of south-western France, at the angle of the Bay of Biscay, formed in 1790, two-thirds of it from Beam and the rest from three districts of Gascony— Basse-Navarre, Soule and Labourd. The latter constitute the Basque region of France (see Basques) and cover the west of the department. Basses-Pyren6es is bounded N. by Landes and Gers, E. by Hautes-Pyrenees (which has two enclaves forming five communes within this department), S. by Spain, and W. by the Atlantic Ocean. Pop. (1906) 426,817. Area, 2977 sq. m. The whole of the south of the department is occu- pied by the western and lower summits of the Pyrenees. The remainder

consists of a region of heaths and plateaus to the north- east of the Gave de Pau, and of hills divided by numberless fertile valleys to the west of that river. The height of the mountains of the southern frontier increases gradually from west to east. The peak of the Rhune, to the south of St Jean de Luz, rises only to 2950 ft.; and on the border of the Basque country the mean height of the summits is not much greater. The peak of Orhy alone, in the south of the valley of Mauleon, reaches 6618 ft. But beyond that of Anie (8215 ft.), on the meridian of Orthez, which marks the boundary of Beam, much loftier elevations appear, — Mourrous (9760 ft.), on the border of Hautes-Pyrenees, and the southern peak of Ossau (9465 ft.). The frontier between France and Spain, for the most part,

follows the crest-line of the main range. Forts guard the upper valleys of the Nive and the Aspe, along which run important passes into Spain. The general direction of the rivers of the department is towards the north-west. The streams almost all meet in the Adour through the Gave de Pau, the Bidouze, and the Nive. In the north-east the two Luys flow directly to the Adour, which they join in Landes. In the south-west the Nivelle and the Bidassoa flow directly into the sea. The lower course of the Adour forms the boundary between Basses-Pyre- nees and Landes; it enters the sea a short distance below Bayonne over a shifting bar, which has often altered the position of its mouth. The Gave de Pau, a larger stream than the Adour, passes Pau and Orthez, but its current is so swift that it is only navigable for a few miles above its junction with the Adour. On the left it receives the Gave d'Oloron, formed by the Gave d'Ossau, descending from the Pic du Midi, and the Gave d'Aspe, which rises in Spain. An important affluent of the Gave d'Oloron, the Saison or Gave de Mauleon, descends from; the Pic d'Orhy. From the Pic des Escaliers, which rises above the forest of Iraty, the Bidouze descends northwards; while the forest, though situated on the southern slope of the chain, forms a part of French territory. The Nive, a beautiful river of the Basque country, takes its rise in Spain; after flowing past St Jean-Pied-de-Port, formerly capital of French Navarre and fortified by Vauban to guard the pass of Roncevaux, it joins the Adour at Bayonne. The Nivelle also belongs only partly to France and ends its course at St Jean-de-Luz. The Bidassoa, which is only important as forming part of the frontier, contains the He des Faisans, where the treaty of the Pyrenees was con- cluded (1659), and debouches between Hendaye (France) and Fuenterrabia (Spain).

The climate of the department is mild and it has an abundant rainfall, partly due to the west wind which drives the clouds from the gulf of Gascony. The spring is rainy; the best seasons are summer and autumn, the heat of summer being moderated by the sea. The winters are mild. The air of Pau agrees with invalids and delicate constitutions, and St Jean-de-Luz and Biarritz are much frequented by winter visitors.

Despite extensive tracts of uncultivated land, the department is mainly agricultural. Maize and wheat are the chief cereals; potatoes, flax and vegetables are also produced. Pasture is abundant, and horses, cattle, sheep and pigs are largely reared. The vine is grown on the lower slopes sheltered from the north wind, the wines of Jurancon, near Pau, being the most renowned. Of the fruits grown, chestnuts, cider-apples, and pears are most important. About one-thirteenth of the department consists of woods, a very small proportion of which belong to the govern- ment, the rest to the communes and private individuals.

The department furnishes salt, building-stone, and other quarry products. There are mineral springs at Eaux-Bonnes, Eaux- Chaudes, Cambo-les-Bains (resorted to by the Basques on St John's Eve), St Christau, and Salies. At Le Boucau, 3 m. from Bayonne, there are large metallurgical works, the Forges de V Adour, and chemical works. The manufactures of the depart- ment include woollen caps and sashes, cord slippers, chocolate, and paper, and there are also tanneries, saw- and flour-mills. " Bayonne hams " and other table delicacies are prepared at Orthez. There is a considerable fishing population at Bayonne and St Jean-de-Luz. Bayonne is the principal port. Exports consist chiefly of timber, mine-props, minerals, wine, salt and resinous products. Coal, minerals, phosphates, grain and wool are leading imports. The interior commerce of the department is, however, of greater importance to its inhabitants; it takes the form of exchange of products between the regions of mountain and plain. The railway lines of Basses-Pyrenees, the chief of which is that from Bayonne to Toulouse via Orthez and Pau, belong to the Southern Company. The Adour, the Nive and the Bidouze are navigable on their lower courses. The depart- ment has five arrondissements — Pau, Bayonne, Oloron, Orthez and Mauleon, divided into 41 cantons and 559 communes. It constitutes the diocese of Bayonne, comes within the educational circumscription {a-cademie) of Bordeaux and belongs to the

district of the XVIII. army corps. Pau, the capital and seat of a court of appeal, Bayonne, Oloron, Biarritz, Orthez, Eaux- Bonnes, and St

Jean-de-Luz are the principal towns. The following places are also of interest: — Lescar, which has a church of the 1 2th and 16th century, once a cathedral; Montaner, with a stronghold built in 1380 by Gaston Phoebus, count of Foix and viscount, of Beam; and Sauveterre, a town finely situ- ated on the Gave d'Oloron, with an old bridge, remains of a feudal castle, and a church in the Romanesque and Gothic styles.

BASSET, or Bassette, a French game of cards played by five persons with a pack of fifty-two cards. Once very popular, it is now practically obsolete. It is said to be of Venetian origin and to have been introduced into France by Justiniani, the ambassador of Venice in the second half of the 17th century. It resembles lansquenet (q.v.) in a general way, in that it is played between a banker and several punters, the players winning or losing according as cards turned up match those already exposed or not.

BASSET HORN (Fr. Cor de Basset, or Cor de Bassette; Ger. Bassethorn, Basshom; Ital. Corno di Bassette), a wood-wind instrument, not a " horn," member of the clarinet family, of which it is the tenor. The basset horn consists of a nearly cylindrical tube of wood (generally cocus or box- wood), having a cylindrical bore and ter- minating in a metal bell wider than that of the clarinet. For convenience in reaching the keys and holes, the modern instrument is usually bent or curved either near the mouthpiece or at the bell, which is turned upwards. The older models were bent in the middle at an obtuse angle, and had at the bottom of the lower joint, near the bell, a wooden block, inside which the bore was refiexed, and bent down upon itself. 1 The basset horn has the same fingering as the clarinet, and corresponds to the tenor of that instrument, being pitched a fifth below the clarinet in C. The alto clarinet in Eb is often substituted for the basset horn, especially in military bands, but the instruments differ in three particulars: — (1) The basset horn has a metal bell instead of the pear- shaped contracted bell of the alto clarinet. (2) The bore of the basset horn is wider than that of the alto clarinet in Eb, or of the tenor clarinet in F. (3) The tube of the basset horn is longer than that of the clarinet, and contains four additional long keys, worked by the thumb of the right hand, which in the clarinet ^^vkfor Mellon.) by is only used to steady the instru- ment. These keys give the basset horn

compass of two tones downwards to F gl- — ;-

Fig. 1.

,n extended whereas the

Eb clarinet only extends to G EL

and the F clarinet to

A §JEEjjj . — (actual sounds). This brings the compass of the basset horn to a range of four octaves from

;=£=

*; , actual sounds §f_*

=#==£

—I

1 An instrument of this type, stamped " H. Grenser, S. Wiesner, Dresden," is in the collection of the Rev. F. W. Galpin, of Hatfield, Broad Oak.*

Like the clarinet, the basset horn is a transposing instrument, its music being written a fifth higher than the actual sounds. The treble clef is used in notation for all but the lowest register. The technical capabilities of the basset horn are the same as for the clarinet, except that the extra low notes from A to F (actual sounds) can only be intoned slowly and staccato; the notes of the upper register being better represented in the clarinet are seldom used in orchestral music.

The tone of the basset horn is extremely reedy and rich, especially in the medium and low registers; the tone colour is similar to that of the clarinet without its brilliancy; it is mellow and sensuous, but slightly sombre, and therefore well adapted for music of an elegiac funereal character.

The basset horn flourished mainly in Germany, where at the end of the 18th century it was the favourite solo instrument of many celebrated instrumentalists, such as Czerny, David, Lotz, Springer, &c. Among the great masters, Mozart seems to have been foremost in his appreciation of this beautiful instrument. In his Requiem, the reed family is represented by two basset horns having independent

parts, and two bassoons. Mozart has also used the instrument with great effect in his opera La Clemenza di Tito, where he has written a fine obbligato for it in the aria "Non piu di Flori "; in Zauberflole; and in chamber music, viz. short adagio for two basset horns and bassoon, and another for two clarinets and three basset horns (Series 10 of Breitkopf & Hartel's complete edition). Beethoven employed it in his Prometheus overture. Mendelssohn used it in military music, and in two concerted pieces for clarinet and basset horn with pianoforte accompaniment, in F and D min., opp. 113 and 114, dedicated to Heinrich and Carl Barmann.

The archetypes of the basset horn are the same as those of the clarinet (q.v.). The basset horn was the outcome of the desire, prevailing during the 16th and 17th centuries, to obtain complete families of instruments to play in concert. The invention of the basset horn in 1770 is attributed to a clarinet maker of Passau, named Horn, whose name was given to the instrument; by a misnomer, the basset horn became known in Italy as corno di bassetto, and in France as cor de basset. In 1 782, Theodore Lotz of Pressburg made some modifications in the instrument, which was further improved by two instrumentalists of Vienna, Anton and Johann Stadler, and finally in 181 2 by Iwan Mueller, a famous clarinettist, who invented the alto clarinet in El> from the basset horn, by giving the latter a construction and fingering analogous to those of the clarinet in Bl?, which he took as his model, instead of the clarinet in C.

See J. G. H. Backofen, Anweisung zur Klarinette, nebst einer kurzen Abhandlung iiber das Basset-Horn, with illustration, p. 37 (Leipzig, Breitkopf & Hartel, 1803); Iwan Mueller, Anweisung zu der neuen Clarinette und der Clarinette-alto, nebst einigen Bemer- kungen filr Instrumentenmacher (Leipzig, Freidrich Hofmeister, 1826, with illustrations; Gottfried Weber, " fjber Clarinette und Bassethorn," Cacilia, Band xi. pp. 35-37 (Mainz, 1834); Wilhelm Altenburg, Die Clarinette, ihre Entstehung und Eniwickelung bis zur Jetztzeit in akustischer, technischer u. musikalischer Beziehung (Heil- bronn, 1904), pp. 16-32; good heliogravures of early basset horns in Descriptive Catalogue of the Musical Instruments at the Royal Military Exhibition, London, 1890, compiled by Capt. C. R. Day (1891), pi. v.

(K. S.)

BASSI, LAURA MARIA CATERINA (1711-1778), an Italian lady eminently distinguished for her learning, was born at Bologna in 171 1. On account of her extraordinary attainments she received a

doctor's degree, and was appointed professor in the philosophical college, where she delivered public lectures on experimental philosophy till the time of her death. She was elected member of many literary societies and carried on an extensive correspondence with the most eminent European men of let ters. She was well acquainted with classical literature, as well as with that of France and Italy. In 1738 she married Giuseppe Verrati, a physician, and left several children. She died in

1778.

1 Cantor Lectures on Musical Instruments, their Construction and Capabilities, by A. J. Hipkins, p. 15; Henri Lavoix, Histoire de V instrumentation depuis le seizieme Steele jusqu'd, nos jours (Paris, 1878), on p. 123 the date is given as 1777.

BASSI, UGO (1800-1849), Italian patriot, was born at Cento, and received his early education at Bologna. An unhappy love affair induced him to become a novice in the Barnabite order when eighteen years old. He repaired to Rome, where he led a life of study and devotion, and entered on his ministry in 1833. It was as a preacher that he became famous, his sermons attract- ing large crowds owing to their eloquence and genuine enthusiasm. He lived chiefly at Bologna, but travelled all ovef Italy preaching and tending the poor, so poor himself as to be sometimes almost starving. On the outbreak of the revolutionary movements in

1848, when Pope Pius IX. still appeared to be a Liberal and ah Italian patriot, Bassi, filled with national enthusiasm, joined General Durando's papal force to protect the frontiers as army chaplain. His eloquence drew fresh recruits to the ranks, and he exercised great influence over the soldiers and people. When the pope discarded all connexion with the national movement, it was only Bassi who could restrain the Bolognese in their indignation. At Treviso, where he had followed Guidotti's volunteers against the Austrians, he received three wounds, delighted to shed his blood for Italy (1 2th of May, 1848). He was taken to Venice, and on his recovery he marched unarmed at the head of the volunteers in the fight at Mestre. After the pope's flight from Rome and the proclamation of the Roman republic, Bassi took part with Garibaldi's forces against the French troops sent to re-establish the temporal power. He exposed his life many times while tending the wounded under fire, and when Garibaldi was forced to leave Rome with his volunteers the faithful monk followed him in his wanderings to San Marino. When the legion broke up Garibaldi escaped, but Bassi and a fellow-

Garibaldian, Count Livraghi, after endless hardships, were captured near Comacchio. On being brought before the papal governor, Bassi said: " I am guilty of no crime save that of being an Italian like yourself. I have risked my life for Italy, and your duty is to do good to those who have suffered for her." The governor would have freed the prisoners; but he did not dare, and gave them over to an Austrian officer. They were escorted to Bologna, falsely charged before a court martial with having been found with arms in their hands (Bassi had never borne arms at all) , and shot on the 8th of August,

1849. Bassi is one of the most beautiful figures of the Italian revolution, a gentle unselfish soul, who, although unusually gifted and accomplished, had an almost childlike nature. His execution excited a feeling of horror all over Italy.

Countess Martinengo gives a charming sketch of his life in her Italian Characters (2nd ed., London, 1901); see also Zironi, Vita del Padre Ugo Bassi (Bologna, 1879); F. Venosta, " Ugo Bassi, Martire di Bologna," in the Pantheon dti Martiri Italiani (Milan, 1863). (L. V.)*

BASSIANUS, JOANNES, Italian jurist of the 12th century. Little is known of his origin, but he is said by Corolus de Tocco to have been a native of Cremona. He was a professor in the law school of Bologna, the pupil of Bulgarus (q.v.), and the master of Azo (q.v.). The most important of his writings which have been preserved in his Summary on the Aulhenlica, which Savigny regarded as one of the most precious works of the school of the Gloss-writers. Joannes, as he is generally termed, was remark- able for his talent in inventing ingenious forms for explaining his ideas with greater precision, and perhaps his most celebrated work is his " Law-Tree," which he entitled Arbor Arborum, and which has been the subject of numerous commentaries. The work presents a tree, upon the branches of which the various kinds of actions are arranged after the manner of fruit. The civil actions, or actiones stricti juris, being forty-eight in number, are arranged on one side, whilst the equitable or praetorian actions, in number one hundred and twenty-one, are arranged on the other side. A further scientific division of actions was made by him under twelve heads, and by an ingenious system of notation the student was enabled to class at once each of the civil or praetorian actions, as the case might be, under its proper head in the scientific division. By the side of the tree a few glosses were added by Joannes to explain and justify his classifica- tion. His Lectures on the Pandects and the Code, which were col- lected by his pupil Nicolaus Furiosus,have unfortunately perished.

BASSOMPIERRE, FRANCOIS DE (1579-1646), French courtier, son of Christophe de Bassompierre (1547-1596), was born at the castle of Harrouel in Lorraine. He was descended from an old family which had for generations served the dukes of Burgundy and Lorraine, and after being educated with his brothers in Bavaria and Italy, was introduced to the court of Henry IV. in 1 598. He became a great favourite of the king and shared to the full in the dissipations of court life. In 1600 he took part in the brief campaign in Savoy, and in 1603 fought in Hungary for the emperor against the Turks. In 1614 he assisted Marie de' Medici in her struggle against the nobles, but upon her failure in 1617 remainedloyal totheKing Louis XIII. and assisted the royalists when they routed Marie's supporters at Ponts-de-Ce in 1620. His services during the Huguenot rising of 1621-22 won for him the dignity of marshal of France. He was with the army of the king during the siege of La Rochelle in 1628, and in 1629 distinguished himself in the campaign against the rebels of Languedoc. In 161 5 Bassompierre had purchased from Henri, due de Rohan (1579-1638), the coveted position of colonel- general of the Swiss and Grisons; on this account he was sent to raise troops in Switzerland when Louis XIII. marched against Savoy in 1629, and after a short campaign in Italy his military career ended. As a diplomatist his career was a failure. In 162 1 he went to Madrid as envoy extraordinary to arrange the dispute concerning the seizure of the Valteline forts by Spain, and signed the fruitless treaty of Madrid. In 1625 he was sent into Switzerland on an equally futile mission, and in 1626 to London to secure the retention of the Catholic ecclesiastics and attendants of Henrietta Maria, wife of Charles I. The personal influence of Henry IV. had deterred Bassompierre from a marriage with Charlotte de Montmorency, daughter of the constable Montmorency, afterwards princesse de Conde, and between 1614 and 1630 he was secretly married to Louise Marguerite, widow of Francois, prince de Conti, and through her became implicated in the plot to overthrow Richelieu on the " Day of Dupes " 1630. His share was only a slight one, but his wife was an intimate friend of Marie de' Medici, and her hostility to the cardinal aroused his suspicions. By Richelieu's orders, Bassompierre was arrested at Senlis on the 25th of February 1631, and put into the Bastille, where he remained until Richelieu's death in 1643. Cm his release his offices were restored to him, and he passed most of his time at the castle of Tillieres in Normandy, until his death on the 12th of October 1646. He left a son, Francois de la Tour, by the

princesse de Conti, and an illegitimate son, Louis de Bassom- pierre, afterwards bishop of Saintes. His Memoir es, which are an important source for the history of his time, were first pub- lished at Cologne in 1665. He also left an incomplete account of his embassies to Spain, Switzerland and England (Cologne, 1668) and a number of discourses upon various subjects.

The best edition of the MSmoires is that issued by the Society de l'Histoire de France (Paris, 1877) ; see also G. Tallemant des Reaux, Historiettes de la princesse de Conti, el du marechal de Bassompierre (Paris, 1 854-1 860).

BASSOON (Fr. basson; Ger. Fagotl; Ital. fagotto), a wood- wind instrument with double reed mouthpiece, a member of the oboe (q.v.) family, of which it is the bass. The German and Italian names of the instrument were bestowed from a fancied resemblance to a bundle of sticks, the bassoon being the first instrument of the kind to be doubled back upon itself; its direct ancestor, the bass pommer, 6 ft. in length, was quite straight. The English and French names refer to the pitch of the instru- ment as the bass of the wood-wind.

The bassoon is composed of five pieces, which, when fitted together, form a wooden tube about 8 ft. long (93 in.) with a conical bore tapering from a diameter of if in., at the bell, to A in. at the reed. The tube is (Joubled back upon itself, the shorter joint extending to about two-thirds of the length of the longer, whereby the height of the instrument is reduced to about 4 ft. The holes are brought into a convenient position for the fingers by the device of boring them obliquely through the thickness of the wood. The five pieces are: — (1) the bell; (2) the long joint, forming the upper part of the instrument when

played, although its notes are the lowest in pitch; (3) the wing overlapping the long joint and having a projecting flap through which are bored three holes; (4) the butt or lower end of the instrument (when played) containing the double bore necessitated by the abrupt bend of the tube upon itself. Both bores are pierced in one block of wood, the prolongation of the double tube being usually stopped by a flat oval pad of cork in the older models, whereas the modern instruments have instead a U-shaped tube; (5) the crook, a narrow curved metal tube about 12 in. long, to which is attached the double reed forming the mouthpiece.

The performer holds the instrument in a diagonal position; the lower part of the tube (the butt joint) played by the right hand resting

against his right thigh, and the little bell, turned upwards, pointing over his left shoulder; a strap round the neck affords additional support. The notes are produced by means of seven holes and 16, 17, or 19 keys. The mechanism and finger- ing are very intricate. Theo- retically the whole construction of the bassoon is imperfect and arbitrary, important acoustic prin- ciples being disregarded, but these mechanical defects only enhance its value as an artistic musical instrument. The player is obliged to rely very much on his ear in order to obtain a correct intona- tion, and next to the strings no instrument gives greater scope to the artist.

The bassoon has an eight foot tone, the compass extending from

to Ab treble

or in modern

instruments by means of addi- tional mechanism to C or even

IN

These extra

high notes are from their extreme sweetness called vox humana. The pitch of the bassoon ap- parently lies two octaves below that of the oboe, since the lowest note of both is B, but in reality the interval is only a twelfth, as may be ascertained by comparing their fundamental scales. On the bassoon the fundamental scale is that of F maj., obtained by open- ing and closing the holes; the notes downwards from F to

Front view. Back view.

Fig. 1. — Bassoon with 17 keys,

Savary Model.

(Rudall, Carte & Co.)

Bb

w

to kˆ = are extra notes obtained by means of

interlocking keys on the long joint, worked by the left thumb; they have no counterpart on the oboe and do not belong to the

fundamental scale of the bassoon. The fundamental scale of the oboe is that of C, although the compass has been extended a

tone to Bfc>

Therefore the difference in pitch be-

tween the bassoon and the oboe is a twelfth. In the first

1 At Wagner's instigation, the wind-instrument- maker, W. Heckel of Biebrich-am-Rhein, made bassoons with an extra key, extending the compass downwards to A.

E=

P^ E

are

register of the bassoon, seven semitones

obtained, as stated above, by means of keys in the long joint and bell; the next eight notes (holes and keys) each produce two sounds — the fundamental tone, and, by increased pressure of the breath, its harmonic octave. The remaining notes are obtained by cross fingering and by overblowing the notes of the

\>m- _

fundamental scale a twelfth as far as Al> gSfc^dgfejijp: which

forms the normal compass. From A to Eb the vox humana notes are produced by the help of small harmonic holes opened by means of keys at the top of the wind joint; exceptional players obtain, without additional keys, two or more higher' harmonic notes, which, however, are only used by virtuosi. This then forms the intricate scheme of fingering for the bassoon, and in order to appreciate the efforts of such instrument makers as Carl Almenrader in Germany, Triebert and Jancourt in France, Sax in Belgium, Cornelius Ward and Morton in England, to introduce improvements based upon acoustic principles, it is necessary to understand what these general principles are, and why they have been disregarded in the bassoon. In all tubes the note given by the vibrating air column is influenced

directly by the length of the tube, but very little, if at all, by the diameter of the bore. The pitch, however, is greatly affected by the diameter of the opening, whether lateral or at the bell, through which the vibrating column of air is again brought into com- munication with the outer air. The tube only sounds the normal note in proportion to its length, when the diameter of the lateral opening is equal to the internal diameter of the tube at the opening. As in most of our early wood-wind instruments the holes would in that case have been too large to be stopped by the fingers, and key-mechanism was still primitive, instrument- makers resorted to the expedient of substituting a hole of smaller diameter nearer the mouthpiece for one of greater diameter in the position the hole should theoretically occupy. This import- ant principle was well understood by the Romans, and perhaps even by the ancient Greeks, as is proved by existing specimens of the aulos (q.v.) and by certain passages from the classics. 1

Another curious acoustic phenomenon bears upon the con- struction of wind instruments, and especially upon the bassoon. When the diameter of the lateral opening or bell is smaller than that of the bore, the portion of the tube below the hole, which should theoretically be as though non-existent, asserts itself, lowering the pitch of the note produced at the hole and damping the tone; this is peculiarly noticeable in the A of the bassoon

ClzEjjfEE whose hole is much too high and too small in

diameter. 2 To cite an example of the scope of Carl Almenrader's improvements in the bassoon, he readjusted the position of the A hole, stopped by the third finger of the right hand, boring lower down the tube, not one large hole, but two of medium diameter, covered by an open key to be closed by the same finger from the accustomed position; one of these A holes communi- cates with the narrower bore in the butt joint, and the other with the wider bore. The effect is a perfectly clear, full and accurate tone. Almenrader's other alterations were made on the same principle, and produced an instrument more perfect Brechanically and theoretically than Savary's, but lacking some of the characteristics of the bassoon. In Germany Almenrader's improvements 3 have been generally adopted and his model with 16 keys is followed by most makers, and notably by Heckel of Biebrich. 4

1 Macrobius in Somn. Scip. lib. ii. cap. 4. 5.

3 Gottfried Weber, " Verbesserungen des Fagotts," in Cacilia (Mainz,

1825), vol. ii. p. 123.

3 See Traite sur le perfectionnement du basson, avec 2 tableaux, par Charles Almenrader (Mayence, Schott), and also the above mentioned article by Gottfried Weber in Cacilia, whose explanations are clearer than those of the inventor.

- *For a description of the modern instrument see Victor Charles Mahillon, Catalogue descriptif et analytique du musee instrumental du Conservatoire Royal de Musique (Bruxelles, 1896), vol. ii. pp. 275-276, No. 999.*

The unwieldy bass pommers of the 15th and 16th centuries led to many attempts to produce a more practical bass for the orchestra by doubling back the long tube of the instrument. Thus transformed, the pommer became a fagotto. The invention of the bassoon or fagotto is ascribed to Afranio, a canon of Ferrara, in a work by his nephew, Theseus Ambrosius Albonesius, entitled Introdudio in Chaldaicam Ling-uam . . . et descripiio ac Simulacrum Phagoti Afranii (Pavia, 1539). The illustration of the instrument, showing front and back views (p. 179), taken in conjunction with the detailed description (pp. 33-38), at once disposes of the suggestion that the phagotus of Afranio and the fagotto or bassoon were in any way related; the author himself is greatly puzzled as to the etymology of the word. The phagotus in fact, resembles nothing so much as the musical curiosity known as flute-d-bec & colonnef but double and played by bellows, assigned by G. Chouquet to the 16th century. This flute consisted of a column, with base and capital, both stopped, the vent and the whistle being concealed within perforated brass boxes, in the upper and lower parts of the column. Afranio's phagotus consisted of two similar twin columns with base and capital containing finger-holes and keys; between the columns in front was a shorter column for ornament, and at the back of it another Still shorter whose capital could be lifted, and a sort of bellows or bag-pipe inserted by means of which the instrument was sounded. The first instrument was made, we are told, by Ravilius of Ferrara., from Afranio's design. 6 Mersenne, 7 who does not seem to have any difficulty in understanding the con- struction of Afranio's phagotus, does not consider him the inventor of the fagotto or bassoon, but of another kind of fagotto which he classes with the Neapolitan sourdeline, a complicated kind of musette 8 (see Bag-Pipe). Afranio's instrument consists, he states, of two bassons as it were interconnected by tubes and blown by bellows. As in the sourdeline, these only speak when the springs (keys) are open. He disposes of Theseus Albonesius's fanciful etymology of the name by showing it to be nothing but the

French word fagot, and that it was applied because the instrument consists of two or more " flutes," bound or fagotees together. There is no evidence that the phagotus contained a reed, which would account for Mersenne calling the pipes flutes. Mersenne's statements thus seem to uphold the theory that Afranio's phagotus was only a double flute A colonne with bellows. Evidence is at hand that in 1555 a contrabass wind instrument was well known as fagotto. In the catalogue of the musical instruments belonging to the Flemish band of Marie de Hongrie in Spain, we find the following: " Ala dicha princesa y al dicho matoto dos ynstrumentos de musica contrabaxos, que llaman fagotes, metidos en dos caos redondas como parece por el dicho entrego." 9

Sigmund Schnitzer 10 of Nuremberg (d. 1578), a maker of wind instruments who attained considerable notoriety, has been

6 As far as is known only three of these curious instruments are in existence; two in the museum of the Conservatoire, Paris, and one in Brussels; all three bear a trefoil as maker's mark; the smallest, in F, is reproduced in the Catalogue of the Musical Instru- ments exhibited at the Royal Military Exhibition, London, 1890, by Capt. C. R. Day (London, 1891), pi. iv. F. It is also described (with- out illustration) in Mahiilon's Catalogue, p. 201, No. 189. The two flutes in Paris, measuring 73 cm. and 94 cm., are described by Gustave Chouquet, Le Musee du Conservatoire National de Musique — Catalogue descriptif et raisonne (Paris, 1884), Nos. 409 and 410, p. 106.

p An Italian translation of the description is given by Count L. F. Valdrighi in Musurgiana, No. 4 (Milano, 1881), " II Phagotus di Afranio," p. 40 et seq. (without illustration). An illustration of the phagotus is given by W. J. von Wasielewski in Cesch. d. In- strumentalmusik im XVI. Jahrh. (Berlin, 1878), pi. v. and vi., text p. 74.

7 See L'Harmonie universelle (Paris, 1636), part ii. p. 305.

8 Ibid., illustrated and described, bk. v. p. 293.

9 See Edm. van der Straeten, Hist, de la musique aux Pays-Bas, vol. vii. pp. 433, 436, 448.

10 J- J- Quantz, Frederick the Great's flute-master, gives France the credit of transforming the bombard (pommer) into the bassoon, and the schalmey into oboe, see Versuch einer An- weisung dieFlote traversiere zu spielen (Berlin, 1752), p. 24 and again p. 241, § 6.

named as the probable author of the transformation of pommer into bassoon.

We learn from an historical work of the 18th century, that he was renowned " almost everywhere " as a maker of fagotte of extraordinary size, of skilful wbrkmanship and pure intonation, speaking easily, Schnitzer's instruments were so highly ap- preciated not only all over Germany, but also in France and Italy, that he was kept continually at work producing fagotte for lovers of music. 1

An earlier chronicler of the artistic celebrities and craftsmen of Nuremberg, Johann Ncudorfer, writing in 1549, names Sigmund Schnitzer merely as Pfeifenmacher und Stadtpfeifer. Had he been also noted as an inventor of a new form of instru- ment, the fellow-citizen and contemporary chronicler would not have failed to note the fact. If Schnitzer had been the first to reduce the great length of the bass pommer by doubling the tube back upon itself, he would hardly have been handed down to posterity as the clever craftsman who made fagottos of extra- ordinary size;, Doppelmaier, who chronicles in these eulogistic terms, wrote nearly two centuries after the supposed invention of the fagotto, the value of which was realized later by retro- spection.*

An explanation may perhaps be found in Eisel's statement about the I)eutscher Basson, which he distinguishes from the Basson (our bassoon). " The Deutsche Bassons, Fagotte or Bombardi, as our German ancestors termed them, before music was clothed in Italian and French style, are no longer in use " (Eisel wrote in 1738) " and therefore it is unnecessary to waste paper on them." 3 This refers, of course, to the bombard or bass pommer, the extraordinarily long instruments which Schnitzer made so successfully. From this it would seem that our bassoon was not of German origin. In the meanwhile we get a clue to the early history of the pommer in transition, but we find it under a different name in no way connected with fagotto. In order to shorten the unwieldy proportions of the tenor pommer in C, and to increase its portability, it was constructed out of a block of wood of rather more than double the diameter of the pommer, in which two bores were cut, communicating at the bottom of the instrument which was flat. The bell and the crook containing the double reed mouthpiece were side by side at the top. This instrument, which had six holes in front and one at the back as well as two keys,

was known as the dulceian, dolcian, doucaine, and also in France as courtaud and in England as the curtail, curtal, 1 curtoll, &c, being mentioned in 1582—" The common blcting musick of ye Drone, Hobius (Hautboy) and Curtoll." The next step in the evolution produced the double curtail, a converted bass pommer an octave below the single curtail and therefore identical in pitch as in construction with the early fagotto in C. The instrument is shown in fig. 2, the reproduction ofa drawing in the MS. of The Academy of Armoury by Randle Holme, 5 written some time before 1688. At the side of the drawing is the following description: " A double curtaile. 6

1 J. G. Doppelmaier, Historische Nachricht von den Nurnbergi- schen Mathematicis und Kilnstlern (Niirnberg, 1730), p. 293.

2 See " Nachrichten von Kiinstlern und Werkleuten Nilrnbergs aus dem Jahre 1549," in R. Eitelberger von Edelberg's Quellen- schriften fur Kunstgeschichte und Kunsttechnik des Mittelalters (Vienna, 1875), vols, viii.-x.

3 See J. J. Eisel, MuSicus autodidactus oder der sich selbst informie- rende Musicus (Erfurt, 1738), pp. 104 and 100, and also J. Mattheson, Das neu-eroffnete Orchester (Hamburg, 1713), " Basson," from whom Eisel borrowed.

4 See the New English Dictionary, and Bateman upon Bartholinus, 423, I, margin.

6 British Museum, Harl. MS. 2034, fol. 2076, a reference com- municated by Augustus Hughes-Hughes from his valuable appendix to part iii. (Instrumental Music and Works on Music) of a Catalogue of MS. Music in the British Museum (London, 1908-1909). The Appendix contains a list of typical musical instruments represented in illuminated MSS. , or described in other MSS.in the British Museum , with brief description and full references.

6 Compare Randle Holme's double curtail with the dolcian in C, pi. vi. H. of Capt. C. R. Day's catalogue, and with a dolcian or single curtail by J.C. Denner in Paul de Wit's Katalog des Musikhistorischen Museums von Paul de Wit (Leipzig, 1903), p. 127, No. 380, and illust. p. 121 (Collection now transferred to Cologne). Consult also

ZZ7

Fig. 2. — Old English

This is double the bigness of the single, mentioned ch. xvi. n. 6 " (the MS. begins at ch. xvii. of bk. 3) " and is played 8 notes deeper. It is as it were 2 pipes fixed in on(e) thick bass pipe, one much longer than the other, from the top of the lower comes a crooked pipe of brass in which is fixed a reed, through it the wind passeth to make the instrument make a sound. It hath 6 holes on the outside and one on that side next the man or back part and 2 brass keys, the highest called double La. sol re, and the other double B mi."

We may therefore conclude that the satirical name fagotto., presumably bestowed in Italy, since the French equivalent fagot was never used for the basson, was not necessarily applied to the new form of pommer at the outset, but in any case before 1555; that the very term Phagolo d'Afranio, by which the instrument was known during its short fabulous existence, with its pretended Greek etymology, presupposes the pre-exist- ence in Italy of another fagotto with which Afranio was acquainted, perhaps imperfectly. Afranio's was the age of ingenious mechanical devices applied to musical instruments, many of which, like Afranio's, being mere freaks, did not survive the inventor. A document selected from the valuable archives published by Edm. van der Straeten ' suggests a satisfactory clue: In 1426 Louis Willay, a musical instrument maker of Bruges, sold to Philippe le Bon a triple set of wood-wind instru-ˆ

ments, i.e. " 4 bombardes, 4 doucaines double curtail (before and 4 flutes," to be sent as a gift to 1688). Nicolas III., marquis of Ferrara. The (Frdni Harl. Ms. 1034 In new instrument, the doucaine, we may Btit ' Mus)

imagine, by its unusual appearance provoked the satirical wit. of some courtier, and was henceforth known as fagotto: Jusf a century later Ravilius of Ferrara made Afranio's first phagotus from the inventor's design.

The bassoon has been a favourite with all the great masters, excepting Handel. Beethoven uses the bassoon largely in his symphonies, writing everywhere for it independent parts of great beauty and originality. Bach, in his mass in B min., has parts for two bassoons. Mozart wrote a concerto in Bb for bassoon, with orchestra (Kochel, No. 191). Weber has also written a concerto for bassoon in F (op. 75), scored for full orchestra.

See also Etienne Ozi, Nouvelle Methode du Bassoon (Paris, 178$ and 1800); J. B. J. Willent-Bordogiiy, Gran Metlwdo complete per %l Fagotto (Milan, 1844), with illustrations of early bassoons (English

edition, London, J. R. Lafleur & Son) ; Joseph Frohlich, Vollstandige Musikschule fiir alle beym Orchester gebrailchliche wichtigere Instrumente (many practical illustrations) (Cologne, Bonn, 181 i); article " Bassoon," by W. H. Stone and D. J. Blaikley in Grove's Dictionary of Music and Musicians (2nd ed.) ; article " Fagott " in Mendel's Musikalisches Conversaticns-Lexikon; for the history of the instrument, and of its prototypes, see Oboe and Bombard.

(K. S.)

BASSO-RELIEVO (Ital. for " low relief "), the term applied to sculpture in which the design projects but'siightly from the plane of the background. The relief may not project at all from the original surface of the material, as in the sunken reliefs of the Egyptians, and may be nearly flat, as in the Panathenaic pro- cession of the Parthenon. In the early 19th century the term basso-relievo, or " low relief," came to be employed loosely for all forms of relief, the term mezzo-relievo having already dropped out of general use owing to the difficulty of accurate application.

BASS ROCK, THE, a small island in the Firth of Forth, about 2 m. from Canty Bay, Haddingtonshire, Scotland. It is circular in shape, measuring a mile in circumference, and is 350 ft. high. Mersenne, op. cit., and Michael Praetorius, Syntagma Musicum (Wolfenbiittel, 1618), both of whom describe and figure these forms of early bassoons. ' Op. cit. vol. vii. p. 38.

On three sides the cliffs are precipitous, but they shelve towards the S.W., where landing is effected. The Bass Rock is an in- trusive mass of phonolitic trachyte or orthophyre. No nepheline has been detected in the rock, but analcite is present in small quantity together with abundant orthoclase and green soda- augite. It bears a close resemblance to the eruptive masses of North Berwick Law and Traprain Law, but is non-porphyritic. It is regarded by Sir A. Geikie as a plug filling art old volcanic vent, from which lava emanated during the Calciferous Sandstone period. It used to be grazed by sheep, of which the mutton was thought to be unusually good, but its principal denizens are sea-birds, chiefly solan geese, which haunt the rock in vast numbers. A lighthouse with a six-flash lantern of 3.9,000 candle power was opened in 1902. For a considerable

distance E. and W. there runs through the rock a tunnel, about 15 ft. high, accessible at low water. St Baldred, whose name has been given to several of the cliffs on the shore of the mainland, occupied a hermitage on the Bass, where he died in 756. In the 14th-century the island became the property of the Lauders, called afterwards Lauders of the Bass, from whom it was purchased in 1671 by government, and a castle with dungeons was erected on it, in which many Covenanters were imprisoned. Among them were Alexander Peden (1626ˆ-1686), for four years, and John Blackadder (1615-1686), who died there after five years' detention. At the Revolution four young Jacobites captured the Rock, and having been reinforced by a few others, held it for King James from June 1691 to April 1694, only surrendering when threatened by starvation. Thus the island was the last place in Great Britain to submit to William III. Dismantled of its fortifications in 1701, the Bass passed into the ownership of Sir Hew Dalrymple, to whose family it belongs. It is let on annual rental for the feathers, eggs, oil and young of the sea-birds and for the fees of visitors, who. reach it usually from Canty Bay and North Berwick.

BASSUS, AUFIDIUS, a Roman historian, who lived in the reign of Tiberius. His work, which probably began with the civil wars or the death of Caesar, was continued by the elder Pliny, who, as he himself tells us, carried it down at least as far as the end of Nero's reign. The Bellum Germanicum of Bassus, which is commended, may have been either a separate work or a section of his general history. The elder Seneca speaks highly of him as an historian, but the fragments preserved in that writer's Suasoriae (vi. 23) relating to the death of Cicero, are characterized by an affected style.

Pliny, Nat. Hist., praefatio, 20; Tacitus, Dialogus de Oratoribus, 23; Quintilian, Instil, x. 1. 103.

BASSUS, CAESIUS, a Roman lyric poet, who lived in the reign of Nero. He was the intimate friend of Persius, who dedicated his sixth satire to him, and whose works he edited (Schol. on Persius, vi. 1). He is said to have lost his life in the eruption of Vesuvius (79). He had a great reputation as a poet; Quintilian (Jnstit. x. 1. 96) goes so far as to say that, with the exception of Horace, he was the only lyric poet worth reading. He is also identified with the author of a treatise De Metris, of which con- siderable fragments, probably of an abbreviated edition, are ex- tant (ed. Keil, 1885). The work was probably originally in verse, and afterwards recast or epitomized in prose form to be used as an instruction book. A worthless and scanty account of some of the metres of Horace (in Keil, Grammalici Latini,

vi. 305), bearing the title Ars Caesii Bassi de Metris is not by him, but chiefly borrowed by its unknown author from the treatise mentioned above.

BASSUS, CASSIANUS, called Scholasticus (lawyer), one of the geoponici or writers on agricultural subjects.- He lived at the end of the 6th or the beginning of the 7th century a.d. He compiled from earlier writers a collection of agricultural literature (Geoponica) which was afterwards revised by an unknown editor and published about the year 950, in the reign of Constantine Porphyrogenitus, to whom the work itself has been ascribed. It contains a full list of the authorities drawn upon, and the subjects treated include agriculture, birds, bees, horses, cattle, sheep, dogs, fishes and the like.

Complete Editions. — Needham (1704), Niclas (1781), Beckh (1895); see also Gemoll in Berliner Studien, i. (1884); Oder in Rheinisches Museum, xlv. (1890), xlviii. (l893),ˆand De Raynal in Annuaire de V Assoc, pour I' Encouragement des Etudes Grecques, – viii.

(1874).

BASSUS, SALEIUS, Roman epic poet, a contemporary of Valerius Flaccus, in the reign of Vespasian. Quintilian credits him with a vigorous and poetical genius (Instit. x. 1. 90) and Julius Secundus, one of the speakers in Tacitus Dialogus de Oratoribus (5; see also 9) styles him a perfect poet and most illustrious bard. He was apparently overtaken by poverty, but was generously treated by Vespasian, who made him a present of 500,000 sesterces. Nothing from his works has been pre- served; the Laus Pisonis, which has been attributed to him, is probably by Titus Calpurnius Siculus (J. Held, De Saleio Basso,

1834).

BASSVILLE, or Basseviixe, NICOLAS JEAN HUGON DE

(d. 1793), French journalist and diplomatist, was born at Abbe- ville on the 7th of February 1753. He was trained for the priesthood, taught theology in a provincial seminary and then went to Paris. Here in 1 784 he published Elements de mythologie and some poems, which brought him into notice. On the recom- mendation of the prince of Conde he became tutor to two young Americans travelling in Europe. With them he visited Berlin, made the acquaintance there of Mirabeau, and became a member of the Berlin Academy Royal. At

the outbreak of the Revolution he turned to journalism, becoming editor of the Mercure- inter- national. Then, through the Girondist minister Lebrun-Tondu, he entered the diplomatic service, went in May, 1792, as secretary of legation to Naples and was shortly afterwards sent, without official status, to Rome. Here his conduct was anything but diplomatic. He at once announced himself as the protector of the extreme Jacobins in Rome, demanded the expulsion of the French SmigrSs who had taken refuge there, including the " demoiselles Capet," and ordered the fleur-de-lys on the escutcheon of the French embassy to be replaced by a picture of Liberty painted by a French art student. He talked at iarge of the "purple geese of the Capitol" and met the remonstrances of Cardinal Zelada, the papal secretary of state, with insults. This enraged the Roman populace; a riot broke out on the 13th of January 1793, and Bassville, who was driving with his family to the Corso, was dragged from his carriage and so roughly handled that he died. The affair was magnified in the Convention into a deliberate murder of the " representative of the Republic " by the pope's orders. In 1797 by an article of the treaty of Tolentino the papal government agreed to pay compensation to Bassville's family. Among his writings we may also mention Memoires historiques, critiques et politiques sur la Revolution it France (Paris 1790; English trans. London, 1790).

See F. Masson, Les Diplomates de la Revolution (Paris, 1882); Silvagni, La Corte e la Societa romana nei secoli XVIII. e XIX. (Florence, 1881).

BASTAR, a feudatory state of British India, in the Chattis- garh division of the Central Provinces; area, 13,062 sq. m. In 1901 the population was 306,501, showing a decrease of 1% compared with an apparent increase of 58% in the preceding decade. Estimated revenue £22,000; tribute £1100. The eastern part of Bastar is a flat elevated plateau, from 1800 to 2000 ft. above the level of the sea, the centre and N.W. portions are very mountainous, and the southern parts consist of hills and plains. On the plateau there are but few hills; the streams run slowly and the country is a mixture of plain and undulating ground covered by dense sal forests. Principal mountains of the district: (1) a lofty range which separates it from the Sironcha district; (2) a range of equal height called the Bela Dila lying in the centre of the district; (3) a range running N. and S. near Narayanpur; (4) Tangri Dongri range, running E- and W.; (5) Tulsi Dongri, bordering on the Sabari river and the Jaipur state. There is also a small range running from the river Ihdra- vati to the Godavari. The Indravati, the Sabari and the Tal or Talper, are the chief rivers of the district; all of them affluents of the Godavari. The

soil throughout the greater portion of Bastar consists of light clay, with an admixture of sand, suited

for raising rice and wet crops. In the jungles the Marias, who are among the aboriginal tribes of Gond origin, raise kosra (Panicum italicum) and other inferior grains. Aboriginal races generally follow the migratory system of tillage, clearing the jungle on selected patches, and after taking crops for two or three years abandoning them for new ground. They do not use the plough; nor do they possess buffaloes, bullocks or cows; their only agricultural implement is a long-handled iron hoe. They are a timid, quiet, docile race, and although addicted to drinking not quarrelsome. They inhabit the densest jungles and are very shy, avoiding contact with strangers, and flying to the hills on the least alarm; but they bear a good character for honesty and truthfulness. They are very scantily dressed, wear a variety of trinkets, with a knife, hatchet, spear, bow and arrows, the only weapons they use. Their hair is generally shaved, excepting a topknot; and when not shaved it gets into a matted, tangled mass, gathered into a knot behind or on the crown. The Marias and the Jhurias are supposed to be a subdivision of the true Gond family. All the aboriginal tribes of Bastar worship the deities of the Hindu pantheon along with their own national goddess Danteswari.

Bastar is divided into two portions— that held by the Raja or chief himself, and that possessed by feudatory chiefs under him. The climate is unhealthy — fever, smallpox, dysentery and rheumatism being the prevailing diseases. Jagdalpur, Bijapur, Madder and Bhupalpatnam ate the only places of any note in the dependency, the first (on the Indravati river) being the residence of the raja and the chief people of the state. The principal products are rice, oil-seeds, lac, tussur silk, horns, hides, wax and a little iron. Teak timber is floated down the rivers to the Madras coast. A good road has brought Jagdalpur into connexion with the railway at Raipur.

BASTARD (G. Fr. bastard, mod. bdtard = fils de bast, "pack- saddle child," from bast, saddle), a person born out of legal wedlock. Amongst the Romans, bastards were classified as nothi, children born in concubinage, and spurii, those not so born. Both classes had a right of succession to their mother, and the nothi were entitled to support from their father, but had no rights of inheritance from him.

Both, however, had in other respects most of the rights of citizenship. The Germanic law was based upon an entirely different principle. It recognized as legitimate only those whose parents were of the same social rank. All others were regarded as bastards, and took the status of the parent of inferior rank. The aim of all the Germanic codes was to preserve purity of race, not to improve morals, for in- cestuous unions are not censured. The influence of the Germanic law lasted throughout the early feudal period, and bastards were debarred rights of inheritance. In the 13th century the influence of Roman law tended again to modify this severity. An excep- tion was probably made in the case of those whose fathers were of royal blood, in which case it even seems that no stigma was attached to the accident of their birth, nor did they suffer from the usual disabilities as to inheritance which attended those of illegitimate birth (Gregory of Tours, v. 25). Among the Franks we find Theodoric I., a natural son of Clovis, sharing the kingdom with the legitimate sons; Zwentibold, natural son of Arnulf, was created king of Lorraine by his father in 895; and even William the Conqueror actually assumed the appellation of bastard.

In English law a bastard still retains certain disabilities. His rights are only such as he can acquire; for civilly he can inherit nothing, being looked upon as the son of nobody, and sometimes called filius nullius, sometimes filius populi. This, however, does not hold as to moral purposes, e.g. he cannot marry his mother or bastard sister. Yet he may gain a surname by reputation though he has none by inheritance, and may even be made legitimate and capable of inheriting by the transcendent power of an act of parliament.

For poor-law purposes, all legitimate children take the settle- ment of their father, but a bastard takes the settlement of its mother. The mother of an illegitimate child is entitled to its custody in preference to the father, and consequently the re- sponsibility 'ji its support falls primarily on her. But the

English law has always recognized the principle that to a certain extent the father must share in that responsibility. This, how- ever, was imposed not with the idea of furnishing the woman with a civil remedy, nor to have a penal effect against the man, but solely to prevent the cost of maintenance of the bastard child from falling upon the parish. Indeed, the legislation upon the subject, which dates back to 1576, was until 1845 an intimate part of the poor law. The act of 1576, the basis of English bastardy law, empowered justices to take order for the punish- ment of the mother and reputed father of every bastard child left to the care of the parish, and to charge the

*motherland reputed father with the payment of a weekly sum or other needful sustenance. Other acts Were passed in 1609 and 1733, enabling the mother of any child chargeable or likely to become chargeable to the parish to secure the apprehension, and even the imprisonment, of the father until he should indemnify the parish, provisions which were made somewhat more stringent by acts passed in 1809 and 18 10. In 1832 a commission *as appointed to inquire into the operation of the poor laws, and the commissioners in their report gave great attention to the subject of bastardy. They reviewed the various acts from 1576 downwards and gave examples of their operation. The con- clusion to which the commissioners came was that the laws " which respect bastardy appear to be pre-eminently unwise," and that they gave rise to many abuses. For example,, the weekly payment recovered by the parish was usually transferred to the mother; even in many cases guaranteed. The com- missioners recommended that the mother alone should be re- sponsible for the maintenance of the child. " This," they said, "is now the position of a widow, and there can be no reason for giving to vice privileges which we deny to misfortune." Acting on the recommendation of the commissioners the Poor Law Amendment Act of 1834 endeavoured to discourage the principle of making the putative father contribute by introducing a some- what cumbersome method of procedure. The trend of public opinion proved against the discouragement of affiliation, and an act of 1839 transferred jurisdiction in affiliation cases from quarter-sessions to petty-sessions. A commission of inquiry on the working of the bastardy acts in 1844 recommended " that affiliation should be facilitated," and, accordingly, by the Bastardy Act of 1845 effect was given to this recommendation by giving the mother an independent civil remedy against the putative father and dissociating the parish altogether from the proceedings. Subsequently, legislation gave the parish the right of attaching, and in some cases suing for, money due from the putative father for the maintenance of the child. The existing law is set out under Affiliation.*

The incapacities attaching to a bastard consist principally in this, that he cannot be heir to any one; for being nullius filius, he is therefore of kin to nobody, and has no ancestor from whom an inheritable blood can be derived. Therefore, if there be ho other claimant upon an inheritance than such illegitimate child, it escheats to the lord. And as bastards cannot be heirs them- selves, so neither can they have any heirs but those of their own bodies; for as all collateral kindred consists in being derived from the same common ancestor, and as a bastard has no legal ancestor, he can have no

collateral kindred, and consequently no legal heirs, except such as claim by a lineal descent from himself. And hence, if a bastard purchase land, and die seised therefor without issue and intestate, the land escheats to the lord of the fee. Originally a bastard was deemed incapable of holy orders, and disqualified by the fact of his birth from holding any dignity in the church; but this doctrine is now obsolete, and in all other respects there is no distinction between a bastard and another man. By the law of Scotland a bastard is not only excluded from his father's succession, because the law knows no father who is not marked out by marriage; and from all heritable succession, whether by the father or mother, because he cannot be pronounced lawful heir by the inquest in terms of the brief; but also from the movable succession of his mother, because he is not her lawful child, and legitimacy is implied in all succession deferred by the law. But a bastard, although he cannot succeed

jure sanguinis, may succeed by destination, where he is specially called to the succession by entail or testament. In Scotland, as in England, a bastard can have no legal heirs except those of his own body; and hence, failing his lawful issue, the king succeeds to him as last heir. Formerly bastards in Scotland without issue of their own could not make a will, but this disability was removed by a statute of 1835. If bastards or other persons without kindTed die intestate without wife or child, their effects go to the king as ultimus haeres; but a grant is usually made of them by letters patent, and the grantee becomes entitled to the administration.

According to the common law, which is the law of England, a bastard cannot be divested of his state of illegitimacy, unless by the supreme power of an act of parliament. But in those countries which have followed the Roman or civil law, a bastard's status may be provisional, and he can be made legitimate by the subsequent marriage of his parents. (See Legitimacy and Legitimation; and, for statistics, Illegitimacy.)

Authorities. — Bacquet, Traite de la bdtardise (1608) ; Du Cange, Gloss. Lot., infra "Bastardus"; L. G. Koenigswater, Hisloire de I' organisation de lafamille en France (1 851), and Essai sur les enfants nes hors manage (1842); E. D. Glasson, Hisloire des droits et des institutions de t'Angleterre (6 vols., 1 882-1 883), Histoire du droit et des institutions de la France (1887); Pollock and Maitland,

History of English Law (1898); Stephen's Commentaries; Nicholls and Mackay, History of the English Poor Law (3 vols., 1898J.

BASTARNAE, the easternmost people of the Germanic race, the first to come into contact with the ancient world and the Slavs. Originally settled in Galicia and the Bukovina, they appeared on the lower Danube about 200 B.C., and were used by Philip V. of Macedon against his Thracian neighbours. Defeated by these the Bastarnae returned north, leaving some of their number (hence called Peucini) settled on Peuce, an island in the Danube. Their main body occupied the country between the eastern Carpathians and the Danube. As allies of Perseus and of Mithradates the Great, and lastly on their own account, they had hostile relations with the Romans who in the time of Augustus defeated them, and made a peace, which was disturbed by a series of incursions. In these the Bastarnae after a time gave place to the Goths, with whom they seem to have amalgamated, and we last hear of them as transferred by the emperor Probus to the right bank of the Danube. Polybius and the authors who copy him regard the Bastarnae as Galatae; Strabo, having learned of the Romans to distinguish Celts and Germans, first allows a German element; Tacitus expressly declares their German origin' but says that the race was degraded by inter- marriage with Sarmatians. The descriptions of their bodily appear- ance, tribal divisions, manner of life and methods of warfare are such as are applied to either race. No doubt they were an outpost of the Germans, and so had absorbed into themselves strong Getic, Celtic and Sarmatian elements. (E. H. M.)*

BASTI, a town and district of British India, in the Gorakhpur division of the United Provinces. The town, a collection of villages, is on the river Kuana, 40 m. from Gorakhpur by railway. The population in 1901 was 14,761. It has no municipality. The district has an area of 2792 sq. m. It stretches out in one vast marshy plain, draining towards the south-east, and traversed by the Rapti, Kuana, Banganga, Masdih, Jamwar, Ami and Katneihia rivers. The tract lying between these streams consists of a rich alluvial deposit, more or less subject to inunda- tions, but producing good crops of rice, wheat and barley. In 1901 the population was 1,846,153, showing an increase of 3 % in the decade. A railway from Gorakhpur to Gonda runs through the district, and the river Gogra is navigable. A large transit trade is conducted with Nepal. The export trade of the district itself is chiefly in rice, sugar and other agricultural produce.

BASTIA, a town and seaport on the eastern coast of the island of Corsica, 98 m. N.N.E. of Ajaccio by rail. Pop. (1906) 24,509.

Bastia, the chief commercial town in Corsica, consists of the densely-populated quarter of the old port with its labyrinth of steep and narrow streets, and of a more modern quarter to the north, which has grown up round the new port. La Traverse, a fine boulevard, intersects the town from north to south. Rising

from the sea-shore like an amphitheatre^ Bastia presents an imposing appearance, which is enhanced by the loftiness of its houses; it has, however, little of architectural interest to offer. Its churches, of which the largest is San Giovanni Battista, are florid in decoration, as are the law-court, the theatre and the hotel-de-ville. The citadel, which dominates the old port, has a keep of the 14th century. As capital of an arrondissement, Bastia is the seat of a tribunal of first instance and a sub-prefect, while it is also the seat of the military governor of Corsica, of a court of appeal for the whole island, of a court of assizes, and of a tribunal and a chamber of commerce, and has a lycee, a branch of the Bank of France, and. a library with between 30,000 and 40,000 volumes. The town has active commerce, especially with Italy. The new port has 1 100 ft. of quayage, served by a railway, and with a depth alongside of 25 ft. The total number of vessels entered in 1907 was 721 with a tonnage of 337,551, of which 203,950 were French. The chief exports are chestnut extract for tanning, cedrates, citrons, oranges, early vegetables, fish, copper ore and antimony ore. Imports include coal, grain, flour and wine. Industry consists chiefly in fishing (sardines, &c, and coral), the manufacture of tobacco, oil-distilling, tanning, and the preparation of preserved citrons and of macaroni and similar provisions.

Bastia dates from the building of the Genoese fortress or " bastille " by Lionello Lomellino in 1383. Under the Genoese it was long the principal stronghold in the north of the island, and the residence of the governor; and in 1553 it was the first town attacked by the French. On the division of the island in 1797 into the two departments of Golo and Liamone, Bastia remained the capital of the former; but when the two were again united Ajaccio obtained the superiority. The city was taken by the English in 1 745 and again in 1 794.

BASTIAN, ADOLF (1826-), German ethnologist, . was born at, Bremen on the 26th of June 1826. He was educated as a physician, but from his early years devoted himself to travel. Proceeding to Australia in 1851 as surgeon on a vessel, he had visited almost every part of the world before his return in 1859. In 1 86 1 he made an expedition to the Far East which lasted five years. Upon his return he

commenced the publication of his great work on The Peoples of Eastern Asia, an immense store- house of facts owing little to arrangement or style. He settled in Berlin, where he was made professor of ethnology at the uni- versity and keeper of the ethnological museum. He succeeded R. Virchow as president of the Berlin Anthropological Society, and to him was largely due the formation in 1878 of the German Africa Society of Berlin, which did much to encourage German colonization in Africa. Later he undertook further scientific travels in Africa, South America and India. The results of these explorations were made public in a long series of separate publications comprising several on Buddhism, and on the psycho- logical problems presented by native superstitions. Bastian also edited the Zeitschrift fur Ethnologie from 1869, in conjunction with Virchow and Robert von Hartmann. On his seventieth birthday, 1896 (during which year he started on an expedition to Malaysia), he was presented with a volume of essays composed by the most distinguished ethnologists in celebration of the event and dedicated to him. Among his more important works may be mentioned: — Der Mensch in der Geschichte (Leipzig, i860); Die V olker des ostlichen Asien (Jena, 1866-1871); Ethnologische Forschungen (Leipzig, 1871-1873); Die Kulturlander des alten Amerika (Berlin, 1878); Der Buddhismus in seiner Psychologie (Berlin, 1881); Indonesian (Leipzig, 1884); Der. Fetisck an der Kiiste Guineas (Berlin, 1885); Die mikronesischen Kolonien (1899-1 900); Die wechselnden Phasen im geschichllichen Sehkreis und ihre Riickwirkung auf die Volkerkunde (1900).

BASTIAT, FREDERIC (1801-1850), French economist, was the son of a merchant of Bayonne, and was born in that town on the 29th of June 1801. Educated at the colleges of Saint-Sever and of Soreze, he entered in 18 18 the counting-house of his uncle at Bayonne. The practical routine of mercantile life being distasteful to him, in 1825 he retired to a property at Mugron, of which he became the owner on the death of his grandfather.

Here Bastiat occupied himself with farming, his leisure being devoted to study and meditation. He welcomed with enthusiasm the Revolution of 1830. In 183 1 he became a juge de paix of his canton, and in 1832 a member of the conseil gSniral of the Landes. In 1834 he published his first pamphlet, and betweem84i and 1844 three others, all on questions of taxation affecting local interests. During

this period an accidental circumstance led him to become a subscriber- to an English newspaper, the Globe and Traveller, through which he was made acquainted with the nature and progress of the crusade of the Anti- Corn-Law League against protection. After studying the movement for two years, he resolved to inaugurate a similar movement in France. To prepare the way, he contributed in 1844 to the Journal des Economist es an article " Sur 1 'influence des tarifs anglais et frangais," which attracted great attention, and was followed by others, including the first series of his brilliant Sophistries Econorrliques.

In 1845 Bastiat came to Paris in order to superintend the publication of his Cobden et la Ligue, ou I 'agitation anglaise pour la liberti des ickanges, and was very cordially received by the economists of the capital. From Paris he went to London and Manchester, and made the personal acquaintance of Cobden, Bright and other leaders of the league. When he returned to France he found that his writings had been exerting a powerful influence; and in 1846 he assisted in organizing at Bordeaux the first French Free-Trade Association (Association pour la Liberte des Echanges). The rapid spread of the movement soon required him to abandon Mugron for Paris.

During the eighteen months which followed this change his labours were prodigious. He acted as secretary of the central committee of the association, organized and corresponded with branch societies, waited on ministers, procured subscriptions', edited a weekly paper, the Libre-Hchange, contributed to the Journal des Hconomisies and to three other periodicals, addressed meetings in Paris and the provinces, and delivered a course of lectures on the principles of political economy to students of the schools of law and of medicine. The cause to which he thus devoted himself at the expense of his health and life appeared for a time as if it would be successful; but the forces in its favour were much weaker and those opposed to it were much stronger in France than in England, and this became more apparent as the struggle proceeded, until it was brought to an abrupt end by the Revolu- tion of February 1848. This event made the socialistic and communistic principles, which had been gathering and spreading during the previous thirty years, temporarily supreme. (See National Workshops.) In this grave crisis Bastiat nobly performed his duty. Although exhausted by the far too heavy labours in which he had been engaged, although robbed of his voice by the malady which was preying upon him, so that he could do but little to defend the truth from the tribune of the Constituent Assembly, he could still suggest wise counsels in the committee of finance of which he was vice-president, and he could still use his pen with a vigour and

dexterity which made him capable of combating single-handed many opponents.

He wrote in rapid succession a series of brilliant and effective pamphlets and essays, showing how socialism was connected with protection, and exposing the delusions on which it rested. Thus within the space of two years there appeared PropriSte et Loi, Justice et Fraternite, Proprieti et Spoliation, L'Lltat, BaccalaurSat et Socialisme, Protectionisme et Communisme, Capital et Rente, M audit Argent, Spoliation et Loi, Gratuiti du Credit, and Ce qu'on wit et ce qu'on ne voit pas. While thus occupied he was meditating the composition of a great constructive work, meant to renovate economical science by basing it on the principle that " interests, left to themselves, tend to harmonious combinations, and to the progressive preponderance of the general good." The first volume of this work Les Harmonies econotniques was published in the beginning of 1 850. In the autumn of that year, when working on the second volume, the increase of his malady compelled him to go to Italy. After lingering at Pisa and Florence he reached Rome, but only to die there on the 24th of December 1850 in the fiftieth year of his age.

The life-work of Bastiat, in order to be fairly appreciated, requires to he considered in three aspects. (1) He was the advocate of free-trade, the opponent of protection. , The general principles of freeˆtrade had, of course, been clearly stated and solidly established before he was born, but he did more than merely restate them. He showed, as no one before him had done, how they were practically applicable to French agriculture, trade and commerce; and in the Sophistries Hconomiques we have the completest and most effective, the wisest and the wittiest exposure of protectionism in its principles, reasonings and consequences which exists in any language. (2) He was the opponent of socialism. In this respect also heˆhad no equal among the economists of France. He alone fought socialism hand to hand, body to body, as it were, not caricaturing it, no t denounc- ing it, not criticizing under its name some merely abstract theory, but taking it as actually presented by its most popular represen- tatives, considering patiently their proposals and arguments, and proving conclusively that they proceeded on false principles, reasoned badly and sought to realize generous aims by foolish and harmful means. Nowhere will reason find a richer armoury of weapons available against socialism than in the pamphlets published by Bastiat between 1848 and 1850. (3) He attempted to expound in an original and independent manner political economy as a science. In combating, first, the Protectionists, and, afterwards, the Socialists, there*

gradually rose on his mind a conception which seemed to him to shed a flood of light over the whole of economical doctrine, and, indeed, over the whole theory of society, viz. the harmony of the essential tendencies of human nature. The radical error, he became always more convinced, both of protectionism and socialism, was the assumption that human interests, if left to themselves would inevitably prove antagonistic and anti-social, capital robbing labour, manufactures ruining agriculture, the foreigner injuring the native, the consumer the producer, &c. ; and the chief weakness of the various schools of political economy, he believed, he had discovered in their imperfect apprehension of the truth that human interests, when left to themselves, when not arbitrarily and forcibly interfered with, tend to harmonious combination, to the general good.

His (Euvres computes are in 7 vols. The first contains at inter- esting M-emoir by M. Paillottet.

BASTIDE, JULES (1800-1879), French publicist, was born at Paris on the 22nd of November 1800. He studied law for a time, and afterwards engaged in business as a timber merchant. In 1 82 1 he became a member of the French Carbonari, and took a prominent part in the Revolution of 1830. After the "July Days " he received an artillery command in the national guard. For his share in the £meute in Paris (5th of June 1832) on the occasion of the funeral of General Maximilien Lamarque, Bastide was sentenced to death but escaped to London. On his return to Paris in, 1834 he was acquitted, and occupied himself with journalism, contributing to the National, a republican journal of which he became editor in 1836. In 1847 he founded the Revue nationale with the collaboration of P.J. Buchez (q.v.), with whose ideas he had become infected. After the Revolution of February 1848 Bastide's intimate knowledge of foreign affairs- gained for him a secretarial post in the provisional government, aHd, after the creation of the executive commission, he was made minister of foreign affairs. At the close of 1848 he threw up his portfolio, and, after the coup d'etat of December 1851, retired into private life. He died bn the 2nd of March 1879. His writings comprise De I'education publique en France (1847); Histoire del' assetnblie Ugislative (1847); La RSpublique franqaise et I'ltalie en 1848 (1858); Histoire des guerres religieuses en France (1859).

BASTIDE (Provencal basiida, building), a word applied to the fortified towns founded in south-western France in< the middle ages, and corresponding to the villes neuves of northern France. They were established by the abbeys, the nobles and the crown, frequently by two of these authorities in co-operation, and were intended to

serve as defensive posts and centres of population for sparsely-inhabited districts. In addition, they formed a source of revenue and power for their founders, who on their part conceded liberal charters to the new towns. They were

built on a rectangular plan, with a large central square and straight thoroughfares running at right angles or parallel to one another, this uniformity of construction being well exemplified in the existing bastide of Monpazier (Dordogne) founded by the English ih 1284. Mont-de-Marsan, the oldest of the bastides, was founded in 1141, and the movement for founding them lasted during the 12th, 13 th and 14th centuries, attaining its height between 1250 and 1350.

See E. Menault, Les Villes Neuves, leur origine el lew influence dans le mowoement communal (Paris, 1868) ; ; Curie-Seimbres, Essai sur les villes fondees dans le sttd-ouesl de la France sous le nom de bastides (Tpulpuse, 1880).

BASTIfiN-LEPAGE, JULES (1848-1884), French painter, was born in the village of Damvillers, Meuse, France, on the ist of November 1848 and spent his childhood there. He first studied at Verdun, and prompted' by a love of art went in 1867 t6 Paris, where he was admitted to the Ecole des Beaux-arts, working Under Cabanel. After exhibiting in the Salons of 1876 and 1872 works which attracted no attention, in 1874 he made his mark with his" Song of Spring," a study of rural life, representing a peasant girl sitting on a knoll looking down on a village. His " Portrait of my Grandfather," exhibited in the same year, was not less remarkable for its artless simplicity and received a third-class medal. This success was confirmed in 1875 by the " First Communion," a picture of a little girl minutely worked up as to colour, and a " Portrait of M. Hayem." In 1875 he took the second Prix de Rome with his " Angels appearing to the Shepherds," exhibited again in 1878. His next endeavour to win the Grand Prix de.Rome in 1876 with " Priam at the Feet of Achilles " wag again unsuccessful (it is in the Lille gallery), and the painter determined to return to country life. To the Salon ; of 1877 he sent a full-length " Portrait of Lady L." and " My Parents "; and in 1878 a "Portrait of M. Theuriet" and "The Hayfield: " The last picture, now in the Luxembourg, is regarded as a typical work from its stamp of realistic truth. Thenceforth Bastien-Lepage was recognized in France as the leader of a School, and his " Portrait of

Mme Sarah Bernhardt " (1879), painted in a light key, won him the cross of the Legion of Honour. In 1880 he exhibited a small portrait of M. Andrieux and "Joan of Arc listening to the Voices"; and in the same year, at the Royal Academy, the little portrait of the " Prince of Wales." In 1881 he painted " The Beggar " and the "Portrait of Albert Wolf"; in 1882 "Le Pere Jacques"; in 1883 "Love in a Village," in which we find some trace of Courbet's influence: His last dated work is " The Forge " (1884). The artist, long ailing, had tried in vain to re-establish his health in Algiers. He died in Paris on the 10th of December 1884, when planning a new series of rural subjects. Among his more important works may also be mentioned the portrait of "Mme J. Drouet "" (1883); " Gambetta on his death-bed," and some landscapes; " The Vintage " (1880), and " The Thames at London ".(1882). " The Little Chimney- Sweep " was never finished. An exhibition of his collected works was opened in March and April 1.885.

See A. Theuriet, Bastien-Lepage (1885 — English edition, 1892) ; L. de Fourcaud, Bastien-Lepage (1885). (H. Fa.)

BASTILLE (from Fr. bastir, now bdtir, to build), originally any fortified building forming part ; of a system of defence or attack; the name was especially applied to several of the principal points in the ancient fortifications of Paris. In the reign of King John, or even earlier, the gate of Saint Antoine was flanked by two towers; and about 1369 Hugues Aubriot, at the command of Charles V., changed it into a regular bastille or fort by the addition of six others of massive structure, the whole united by thick walls and surrounded by a ditch 25 ft. wide. Various extensions and alterations were afterwards effected; but the building remained substantially what it was made by the vigorous provost, a strong and gloomy structure, with eight stern towers. As the ancient fortifications of the city were superseded, the use of the word bastille as a general designa- tion gradually died out, and it became restricted to the castle of Saint Antoine, the political importance of which made it practi- cally, long before it was actually, the only bastille of Paris. The building had originally a military purpose, and it appears j

as a fortress on several occasions in French history. When Charles VII. retook Paris from the English in 1436, his opponents in the city took refuge in the Bastille, which they were prepared to defend with vigour, but the want of provisions obliged them to capitulate. In 1 588 the duke of Guise took possession of the Bastille, gave the command of it to Bussy^Leclerc, and soon afterwards shut up the whole parlement within' its walls, for having refused their adherence

to the League. When Henry IV. became master of Paris he committed the command of the Bastille to Sully, and there he deposited his treasures, which at the time of his death amounted to the sum of 15,870,000 livres. On the nth of January 1649 the Bastille was invested by the forces of the Fronde, and after a short cannonade capitulated on the 13th of that month. The garrison consisted of only twenty-two men. The Frondeurs concluded a peace with the court on the nth of March; but it was stipulated by treaty that they should retain possession of the Bastille, which in fact was not restored to the king till the 21st of October 1651.

At a very early period, however, the Bastille was employed for the custody of state prisoners, and it was ultimately much more of a prison than a fortress. According to the usual account, which one is tempted to ascribe to the popular love of poetical justice, the first who was incarcerated within its walls was the builder himself, Hugues Aubriot. Be this as it may, the duke of Nemours spent thirteen years there in one of those iron cages which Louis XI. called his fillettes; and Jacques d'Armagnac, Poyet and Chabot were successively prisoners. It was not till the reign of Louis XIII. that it became recognized as a regular place of confinement; but from that time till its destruction it was frequently filled to embarrassment with men and women of every age and condition. Prisoners were detained without trial on lettres de cachet for different reasons, to avoid a scandal, either public or private, or to satisfy personal animosities. But the most frequent and most notorious use of the Bastille was to imprison those writers who attacked the government or persons in power. It was this which made it so hated as aft emblem of despotism, and caused its capture and demolition in the Revolution.

Of the treatment of prisoners in the Bastille : very various accounts have been given even by those who speak from personal experience, for the simple reason that it varied greatly in different cases. The prisoners were divided into two main classes, those who were detained on grounds of precaution or by way of admonitory correction, and those who lay under presumption or proof of guilt. The former were subject to no investigation or judgment, and the length of their imprisonment depended on the will of the king; the latter were brought to trial in the ordinary courts or before special tribunals, such as that of the Arsenal— though even in their case the interval between their arrest and their trial was determined solely by the royal decree, and it was quite possible for a man to grow old in the prison without having the opportunity of having his fate decided. Until guilt was established, the prisoner was registered in the king's name, and-ˆ-except in the case of state-prisoners of import- ance,

who were kept with greater strictness and often in absolute isolation — he enjoyed a certain degree of comfort and freedom. Visitors were admitted under restrictions; games were allowed; and, for a long time at least, exercise was permitted in open parts of the interior. Food was both abundant and good, at least for the better class of prisoners; and instances were not unknown of people living below their allowance and, by arrangement with the governor, saving the surplus. When the criminality of the prisoner was established, his name was transferred to the register of the ■" commission/' and he became exposed to numerous hardships and even barbarities, which however belonged not so much to the special organization of the Bastille as to the general system of criminal justice then in force.

Among the more distinguished personages who were confined in this fortress during the reigns of Louis XIV., XV. and XVI., were the famous Man of the Iron Mask (see Iron M ask) , Foucquet, the marshal Richelieu, Le Maistre de Sacy, De Renneville, Voltaire, Latude, Le Prev6t de Beaumont, Labourdonnais,

Lally, Cardinal de Rohan, Linguet and La Chalotais. While no detestation iz toˆ jreat for that system of " royal pantheism " which led to the unjust and often protracted imprisonment of even men of great ability and stainless character, it is unnecessary to give implicit credence to all the tales of horror which found currency during the excitement of the Revolution, and which historical evidence, as well as a priori considerations, tends to strip of their more dreadful features, and even in many cases to refute altogether. Much light of an unexpected kind has in modern times been shed on the history of the Bastille from the pages of its own records. These documents had been flung out into the courts of the building by the revolutionary captors, and after suffering grievous diminution and damage were finally stored up and forgotten in the vaults of the library of the (so called) Arsenal. Here they were discovered in 1840 by Francois Ravaisson, who devoted himself to their arrangement, elucida- tion and publication.

At the breaking out of the Revolution the Bastille was attacked by the Parisians; and, after a vigorous resistance, it was taken and razed to the ground on the 14th of July 1789. At the time of its capture only seven prisoners were found in it. A very striking account of the siege will be found in Carlyle's French Revolution, vol. i. The site of the

building is now marked by a lofty column of bronze, dedicated to the memory of the patriots of July 1789 and 1830. It is crowned by a gilded figure of the genius of liberty.

See the Memoirs of Linguet (1783), and Latude (ed. by Thierry, tome iii. l8mo, 1791-1793); also Francois Ravaisson, Les Archives de la Bastille (16 vols. 8vo, 1866-1886); Delort, Histoire de la detention des philosophes a la Bastille (3 vols., 1829) ; F. Bournon, La Bastille (1893) ; Fr. Funck-Brentano, Les Lettres de cachet St Paris, Hude suivied'une lisle des prisonniers de la Bastille (1904) ; G. Lecocq, La Prise de la Bastille (1881).

BASTINADO (Span, baston, Fr. bdton, a stick, cudgel), the European name for a form of punishment common in the east, especially in Turkey, Persia and China. It consists in blows with a light stick or lath of bamboo upon the soles of the feet or on the buttocks. The terror of the punishment lies not in the severity of the blows, which are on the contrary scarcely more than tapping, but in its long continuation. A skilful bastina- doist can kill his victim after hours of torture.

BASTION (through the Fr. from late Lat. bastire, to build), a work forming part of a line of fortifications. The general trace of a bastion is similar to an irregular pentagon formed by a triangle and a narrow rectangle, the base of the triangle coincid- ing with the long side of the rectangle. The two sides of the triangle form the " faces " of the bastion, which join at the " salient " angle, the short sides of the rectangle form the " flanks." Bastions were arranged so that the fire from the flanks of each protected not only the front of the curtain but also the faces of the adjacent bastions. A " tower bastion " is a case- mated tower built in bastion form; a " demi-bastion " is a work formed by half a bastion (bisected through the salient angle) and by a parapet along the line of bisection; a " flat bastion " is a bastion built on a curtain and having a very obtuse salient angle.

BASTWICK, JOHN (1593-1654), English physician and religious zealot, was born at Writtle, in Essex, in 1593, and after a brief education at Cambridge, wandered on the continent and graduated in medicine at Padua. On his return he settled in Colchester. His celebrity rests on his strong opposition to the Roman Catholic ceremonial. About 1633 he printed in Holland two Latin treatises, entitled Elenchus Religionis Papisticae, and Flagellum Pontificis et Episcoporum Latialium; and as Laud and other English prelates thought themselves aimed at, he was fined £1000 in the court of high commission, excommunicated and prohibited from practising physic,

while his books were ordered to be burnt and the author himself consigned to prison. Instead of recanting, however, he wrote A pologeticus ad Praesules Anglicanos, and another hook called The Litany, in which he exclaimed vehemently against the proceedings of the court, and charged the bishops with being the enemies of God and " the tail of the beast." William Prynne and Henry Burton coming under the lash of the star-chamber court at the same time, they were all

censured as turbulent and seditious persons; and condemned to pay a fine of £5000 each, to be set in the pillory, to lose their ears, and to undergo imprisonment for life in remote parts of the kingdom, Bastwick being sent to Scilly. The parliament in 1640 reversed these proceedings, and ordered Bastwick a reparation of £5000 out of the estates of the commissioners and lords who had sentenced him. He joined the parliamentary army, but in later years showed bitter opposition to the Independents. He died in the latter part of 1654.

BASUTOLAND (officially " The Territory of Basutoland"), an inland state and British crown colony of S.E. Africa, situated between 28° 35′ and 30 30′ S. and 27 and 29 25′ E. It has an area of 10,293 S Q- m -> being somewhat smaller than Belgium, and is bounded S., S.E., and N.E. by the Drakensberg, N. and N.W. by the Caledon river, S.W. by a range of low hills extending from the Caledon above Wepener to the Orange river, and south of the Orange by the Telle or Tees river to its source in the Drakensberg. Its greatest length S.W. to N.E. is 145 m.; its greatest breadth N. to S. 1 20 m. On every side it is surrounded by British colonies, north by the Orange River Colony, south-west and south by Cape Colony, and east by Natal.

Basutoland, or Lesuto (Lesotho) as the natives call it, forms the south-eastern edge of the interior tableland of South Africa, and has a rugged and broken surface with a mean elevation of 6000 ft. The Drakensberg: (q.v.) forming the buttress of the plateau seaward, attain their highest elevation on the Basuto- Natal border. The frontier line follows the crest of the mountains, three peaks some 10,000 or more ft. high— Giant's Castle, Champagne Castle or Cathkin Peak and Mont aux Sources—ˆ towering high above the general level. Mount Hamilton, which lies north of the waterparting, is over 9000 ft. high. From Mont aux Sources, table-shaped, and called by the Basutos Potong (Antelope), a second range of mountains, the Maluti, runs S.W. through the entire length of Basutoland. The crest of the Maluti is in few places lower than 7000 ft. whilst Machacha, the culminating point, is about 10,500 ft. From the tableland north of the Maluti several isolated hills rise, the iriost

noted being the almost inaccessible Thaba Bosigo— the rallying place of the Basuto in many of their wars. Shut off from the adjacent Indian Ocean by its mountain barrier, the drainage of the country is westward to the distant Atlantic. As its name implies, the chief rivers rise in Mont aux Sources. From the inner sides of that mountain descend the Caledon and the Senku, whilst from its seaward face the Tugela flows through Natal to the Indian Ocean. The Caledon runs north of the Maluti, the Senku south of that range. From the slopes of the Maluti descend many streams, the largest being the Kornet Spruit, which joins the Senku and other torrents from the Drakensberg to form the upper Orange (q.v.). The Caledon also, sweeping southward, unites with the Orange beyond the frontiers of Basutoland. Ordinarily shallow, the rivers after heavy rain fill with great Tapidity, sweeping away everything in their path. In the richer soil they cut deep channels; the denudation thus caused threatens to diminish seriously the area of arable and pasture land. The river beds contain dangerous quicksands.

The aspect of the country is everywhere grand, and often beautiful, fully justifying the title, " The Switzerland of South Africa," often applied to it. Viewed from a distance the mountains appear as dark perpendicular barriers, quite impene- trable; but narrow paths lead round the precipitous face of the hills, and when the inner side is gained a wonderful panorama opens out. In every direction can be seen luxuriant valleys through which rivers thread their silvery way, wild chasms, magnificent waterfalls — that of Maletsunyane has an unbroken leap of over 600 ft. — and, above all, hill crest after hill crest in seeming endless succession. In winter the effect is heightened by the snow which caps all the higher peaks.

Geology.— Basutoland is entirely occupied by the upper divi- sion (Stormberg series) of the Karroo formation. The highest strata (Volcanic group) form the rugged elevated spurs of the Drakensberg mountains which extend along the eastern terri- torial boundary. It has been suggested that these spurs represent

SQ4-

BASUTOMM)

the sites of vents or fissures of eruption. The upper part of the Maluti range consists of flows of melaphyres and diabases belonging to the volcanic beds. Among these lavas is the "pipe" amygdaloid of which many blocks have been transported great distances down the Vaal river; The amygdales are three or four inches long and about three-

eighths of an inch in diameter. Heulandite, with thomsonite, stilbite, scolecite, calcite and chalcedony, occur as infilling minerals.

Climate. — The climate is excellent, invigorating alike for Europeans and natives. The mean annual temperature is about 6o F. The four seasons are distinctly marked, a rarity in South Africa, where the transition from summer to winter is generally very rapid. . The heat of summer (December-March, which is the rainy season) is tempered by cool breezes; winter (May- September, inclusive) is dry, cold and bracing, and frost prevails for prolonged periods. The average annual rainfall is about 30 in. The gen«ral ! health conditions are good. Malaria is almost unknown and chest complaints are rare. Epidemics of smallpox and typhoid occur; and leprosy, imported from the Orange River and Cape Colonies, has taken firm hold on the Basuto, of whom about -91 per 1000 are sufferers from this disease.*

Flora and Fauna.— A few kloofs are wooded, but of forest land there is hone. Along the upper Gourses of the rivers are willows and wild olive trees; round the chief settlements the eucalyptus and the pine have been planted. Heaths, generally somewhat rare in South Africa outside the Cape peninsula, are abundant in Basutoland. The Alpine flora is very beautiful. There are few wild animals; but the eland, hartebeest and smaller antelopes are found, as well as the leopard and the jackal. M6untain hares, partridges and quails afford good sport; baboons and great hawks live in the mountains. The few fish include the barbel. Swarms of locusts occasionally visit the country; the lucusts are eaten by the Basuto.

Population and Towns. — Considering the extensive area of uninhabitable mountain land it contains, the Territory supports a large population. The inhabitants increased from 128,206 in 1875 to 348,848 in 1904. The females outnumber the males by about 20,000, which is, however, about the number of adult males away from the country at any given period. The majority live in the district between the Maluti mountains and the Caledon river. The great bulk of the people are Basuto, but there are some thousands of Barolong and other Kaffirs. The Basuto proper are a branch of the Bechuana family of Bantu-Negroids. The white inhabitants' in 1904 numbered 895, and there were i22 coloured persons other than natives. The seat of government is Maseru, on the left bank of the Caledon, with a population of about 1000 including some 100 Europeans. Mafeteng, in the N.W. near the Cape frontier, is a thriving agricultural centre, as is Butha Buthe in the N.E. Morija, some 16 m. S.E. of Maseru, is the oldest mission station in the Territory, having been founded by the Paris Society about 1833. Three miles from Morija is Matsieng,

the kraal of the paramount chief Lerothodi (who died in August 1905). There are numerous mission stations throughout Basutoland, to several of which Biblical names have been given, such as Shiloh > Hermon, Cana, Bethesda, Berea.

Agriculture and Trade.— Basutoland is one of the greatest grain-growing countries of South Africa. The richest tract of land is that between the Maluti mountains and the Caledon river. In summer the country appears as one waving field of wheat, millet and mealies; whilst on the mountain slopes and on their flat tops are large flocks of sheep, cattle and goats, and troops of ponies. The Basuto ponies, said to be descended from Shetland ponies which, imported to the Cape in 1840, strayed into the mountains, are short-legged, strong-bodied, sure-footed, and noted for their hardiness. Improvements in the breed have been effected by the introduction of Arab stallions. Nearly every Basuto is an agriculturist; there are no manufactories, and the minerals; in accordance with the desire of the people, are not worked. The land is wholly in the possession of the natives, who hold it on the communal system. Whites and Indians are allowed, to establish trading stations on obtaining special permits from the government, and the Indians absorb

much of the retail trade. The chief exports are wheat, mealies, Kaffir corn, wool, mohair, horses and cattle. The great bulk of the imports are textiles. The value of the trade depends on regular rains, so that in seasons of drought the exports seriously diminish. The average annual value of trade for the five years ending the 30th of June 1905 was:— Exports £215,668, imports £203,026. Trade is almost entirely with Orange River Colony and Cape Colony. The Territory is a member of the South African Customs Union. Some 60,000 Basuto (annual average) find employment outside the Territory, more than half of whom seek farm and domestic service. A small proportion go to the Johannesburg gold mines, and others obtain employment on the railways.

Communication over the greater part of the Territory is by road; none of the rivers is navigable. A state-owned railway, i6£ m. long, starting from Maseru crosses the Caledon river and joins the line connecting Bloemfontein and Ladysmith. This railway follows, N.E. of Maseru, the right bank of the Caledon, and affords a ready means of transport for the cereals raised on the left or Basuto side of the river. Highroads, maintained by the government, traverse every part of the country, and bridges have been built across the Caledon. The usual mode of convey- ance is by ox-waggon or light cart. Several passes through the Drakensberg into Griqualand East and Natal

exist, but are little used. There is a complete postal and telegraphic service and a telephone line connects all government stations.

Government and Finance. — Basutoland is a crown colony, of which the high commissioner for South Africa is governor. In him resides the legislative power, exercised by proclamation. The Territory is administered, under the direction of the governor, by a resident commissioner, who is also the chief judicial officer. He is aided by a government secretary and by assistant commissioners. Under the British officials the country is governed by hereditary native chiefs, over whom is a para- mount chief. The chiefs have jurisdiction in cases affecting natives, but there is a right of appeal to the courts of the com- missioners, who try all cases in which any of the parties are European. A national council (pitso), representative of all the native tribes, meets annually for the free discussion of public affairs. For administrative purposes the Territory is divided into the seven districts of Maseru, Leribe, Mohales Hoek, Berea, Mafeteng, Quthing and Qacha's Nek, each of which is subdivided into wards presided over by Basuto chiefs.

Revenue is obtained from a hut tax of £1 per hut; the sale of licences to trade; customs and post office receipts. Seven-eighths of the revenue comes from the hut' tax and customs. The average annual revenue for the five years 1901- 1905 was £96,880; the average annual expenditure £69,559. Basutoland has no public debt.

Education and Social Condition.— Education is given in schools founded by missionary societies, of which the chief is the Soci6t6 des Missions Fvangeliques de Paris. • A large proportion of the people can read and write Sesuto (as the Basuto language is called) and English, and speak Dutch, whilst a considerable! number also receive higher education. Many Basuto at the public examinations take higher honours than competitors of European descent. There are over 200 schools, with an average attendance exceeding 10,000. Nine-tenths of the scholars are in the schools of the French Protestant Mission, which are conducted by English, or English-speaking, missionaries. A government grant is made towards the cost of upkeep. A government in- dustrial school (opened in 1906) is maintained at Maseru, and the Paris Society has an industrial school at Leloalengl The social condition of the people is higher than that of the majority of South African natives. Many Basuto profess Christianity and have adopted European clothing. Serious crime is rare among them and " deliberate murder is almost unknown." l They are, like mountaineers generally, of a sturdy, independent spirit, and are given to the free expression of their views, gener- ally

stated with good sense and moderation. These views found a new medium of publicity in 1904 when an independent native

1 Report by resident-commissioner H. C. Sloley, for 1902-1903.

newspaper was started, called Naledi ea Lesotha (Star of Basuto-land). The publication of this paper was followed in 1906 by the adoption of a uniform system of Sesuto orthography. A book on national customs, the first work in the vernacular by a South African native, was published in 1893. The brandyˆ drinking habit,, which, when the imperial government assumed control of the administration in 1884, threatened the existence of the nation, has been very largely checked. A strong beer, brewed from Kaffir corn, is a favourite drink.

History.— Until the beginning of the 19th century Basutoland appears to have been uninhabited save by wandering Bushmen, whose rude rock pictures are to be found in several parts of the Drakensberg. About 1800 the country was occupied by various tribes of Bechuana, such as Batau, Basuto, Baputi, who then possessed the greater part of what is now Orange River Colony. They appear to have recognized the paramount authority of a family descended from a chief named Monaheng. By the wars of the Zulu chiefs Chaka, Matiwana and Mosilikatze, these tribes were largely broken up and their power destroyed. One tribe, living in the Maluti mountains, was reduced to cannibalism. Moshesh From their chief Machacha mountain takes its name. forms the At this period a young man named Moshesh (born Basuto about 1790), who was of the family of Monaheng and nation. a l re ady noted as hunter and warrior, gathered round him the remnants of several broken clans, out of which he welded the existing Basuto nation. He established himself in 1824 on the rock-fortress of Thaba Bosigo, where, in 183-1, he successfully defended himself against Mosilikatze; and there- after became second only to that chief among the natives north of the Orange River. In 1833 Moshesh invited the missionaries of the Societe des Missions Evangeliques of Paris to settle in his country, and from that day until his death proved their firm friend. A few years later, in 1836ˆ1837, large parties of emigrant Boers settled north of the Orange, and before long disputes arose between them and Moshesh, who claimed a great part of the land on which the white farmers had settled. The Basuto acquired an unenviable

notoriety as a race of bold cattle lifters and raiders, arid the emigrant Boers found them extremely trouble- some neighbours. At the same time, if the Basuto were eager for cattle, the Boers were eager for land ; and their encroach- ments on the territories of the Basuto led to a proclamation in 1842 from Sir George Napier, the then governor of Cape Colony, forbidding further encroachments on Basutoland. In 1843 a treaty was signed with Moshesh on the lines of that already arranged with Waterboer, the Griqua chief (see Griqualand), creating Basutoland a native state under British protection.

To the quarrels between Basuto and Boers were added inter- minable disputes between the Basuto and other Bechuana tribes, which continued unabated after the proclamation of British sovereignty over the Orange river regions by Sir Harry Smith in 1848. In 1849, however, Moshesh was unwillingly induced by Sir Harry to surrender his claims to part of the territory recognized ds his by the Napier treaty. The British continued to intervene in the inter-tribal disputes, and in 1851 Major H. D. Warden led against the Basuto a commando composed of British soldiers, farmers and a native contingent. This commando was defeated at Viervoet, near Thaba Nchu, by the Basuto, who thereafter raided and plundered the natives opposed to them and the farmers who had helped the British. Attempts were made to come to terms with Moshesh and the justice of many of his complaints was admitted. The efforts at accommodation failed, and in 1852 General Sir George Cathcart, who had succeeded Sir Harry Smith as governor of Cape Colony, decided to take strong measures with the tribe, and proceeded with three small divisions of troops against Moshesh. The expedition was by no means a success, but Moshesh, with that peculiar statecraft for which he was famous, saw that he could not hope permanently to hold out against the British troops, and followed up his successful skir- mishes with General Cathcart by writing him a letter, in which he said: " As the object for which you have come is to have a compensation for Boers, I beg you will be satisfied with what you have taken. You have shown your power, you have chastised;

I will try all I can to keep my people in order in the future." General Cathcart accepted the offer of Moshesh and peace was proclaimed, the Basuto power being unbroken. Fourteen months later (February 1854) Great Britain renounced sovereignty over the farmers settled beyond the Orange, and Moshesh found himself face to face with the newly constituted Free State. Boundary disputes at once arose but were settled (1858) by the mediation of Sir George Grey, governor of Cape Colony. In 1 865 a fresh feud occurred between the Orange

*Free: State Boers and the Basuto. The latter applied to Sir Philip Wodehouse at the Cape for protection, but he declined to interfere. The Boers proved more successful than they had been in the past, and occupied several of the Basuto strongholds. They also annexed a certain fertile portion of Basuto territory, and finally terminated the strife by a treaty at Thaba Bosigo, by which Moshesh gave up the tract of territory taken by the Boers and professed himself 4 subject of the Free State. Seeing that the struggle against the Boers was hopeless, no fewer than 2000 Basuto warriors having been killed, Moshesh again appealed for protection to the British authorities, saying: "Let me and my people rest and live under the large folds of the flag of England before I am no more." In response to this request, the British authorities decided to take over Basutoland, and a proclamation of annexation was issued on the 1 2th of March 1868. At the same time the Boer commandoes were requested to leave the country. The Free State strongly resented the British annexation of Basutoland, but Aaamxm- after much negotiation the treaty of Aliwal North was tionto concluded (1869) between the Free State and the high anat commissioner. This treaty defined the boundary beˆ Brk * 1 "- tween the Free State and Basutoland, whereby the fertile strip of country west of the Caledon river, known as the Conquered Territory, was finally transferred to the Free State, and the remainder of Basutoland was recognized as a portion of the British dominions.*

Moshesh, who for nearly fifty years had led his people so skil- fully and well, died in 1870. He was one of the rare instances among the Kaffirs of a leader endowed with intellectual gifts which placed him on a level with Europeans, and his life-work has left a permanent mark on South African history. In diplomacy he proved fully the equal of all— white or black — -with whom he had to deal, while he ruled with a rare combination of vigour and moderation over the nation which he had created.

In 1871 Basutoland was annexed to Cape Colony, the area at that time being given as 10,300 sq. m. The turbulent Basuto warriors did not remain quiet for any length of time, and in 1879 Moirosi, a chief residing in the southern portion of Basutoland; openly repudiated colonial rule. An expedition was despatched from Cape Colony and severe fighting followed. Moirosi's stronghold was captured and the chief himself was killed. Immediately after the war, strife occurred among the Basuto themselves over the question of the partition of Moirosi's territory, which had been decided on as one of the results of the war. In 1880 the Cape government felt sufficiently strong to extend to Basutoland the Cape Peace Preservation Act of 1878. This

act provided for the disarmament of natives, and had The already been put in force successfully among some "gun" of the Kaffir tribes on the Cape eastern frontier. Its war ' execution in Basutoland, however, proved an extremely difficult task, and was never entirely accomplished. Desultory warfare was carried on between the colonial troops and the Basuto until 1 88 1, when the intervention of the high commissioner, Sir Hercules Robinson (afterward Lord Rosmead), was asked for. Peace in Basutoland was not announced until the end of 1882. In the following year a form of self-government was established, but was once more followed by internal strife among the petty chieftains.

The subjection of Basutoland to the control of the Cape govern- ment had by this time proved unsatisfactory, both to the Basuto and to Cape Colony. The Cape government therefore offered no opposition to the appeal made by the Basuto themselves to the. imperial government to take them over, and, moreover, Cape Colony undertook to pay towards the cost of administration an

annual contribution of £18,000. Consequently, in 1884, Basutoi land ceased to be a portion of the Cape Colony and became a British crown colony. Native laws and customs were interfered with as little as possible and the authority of the chiefs — all members of the Moshesh family — was maintained. Moshesh had been succeeded as paramount chief by his son, Letsie, and he in turn was succeeded in 1891 by Lerothodi (c. 1837-1005). These chieftains acted in concert with the British representative in the country, to whom was given the title of resident commissioner. The first commissioner was Sir Marshall Clarke, to whose tact and ability the country owed much. The period of warfare over, the Basuto turned their attention more and more to agricultural pursuits and also showed themselves very receptive of missionary influence. Trade increased, and in 1891 Basutoland was admitted to the customs union, which already existed between Orange Free State, Cape Colony and British Bechuanaland. When Lord (then Sir Alfred) Milner visited Basutoland in 1898, on his way to Bloemfontein, he was received by 15,000 mounted Basuto. The chiefs also attended a large meeting at Maseru, and gave expression to their gratitude for the beneficent character of Queen Victoria's rule and protection. On the out- break

of the Boer War in 1899, these same chiefs, at a great meeting held in the presence of the resident commissioner, gave a further protestation of their loyalty to Her Majesty. They remained passive throughout the War and the neutrality of the country was respected by both armies. One chief alone sought to take ad- vantage of the situation by disloyal action, and his offence was met by a year's imprisonment. The conversion of Basuto- land into a crown colony contributed alike to the pros- perity of theBasuto,thesecurity of the propertyof neigh- bouring colonists and a peaceful condition among the natives of South Africa generally. In pursuance of the policy of encourag- ing the self-governing powers of the Basuto, a national council was instituted and held its first sitting in July 1903. In August 1905 the paramount chief Lerothodi died. In early life he had distinguished himself in the wars with the Boers, and in 1880 he took an active part in the revolt against the Cape government. Since 1884 he had been a loyal supporter of the imperial authori- ties, being unwavering in his adherence in critical times. Fearless and masterful he also possessed high diplomatic gifts, and though oh occasion arbitrary and passionate he was neither revengeful nor cruel. On the 19th of September following Lerothodi's death, the national council, with the concurrence of the imperial govern- ment, elected his son Letsie as paramount chief. The completion in October 1005 of a railway putting Maseru in connexion with the South African railway system proved a great boon to the community. During the rebellion of the natives in Natal and Zululand in 1906 the Basuto remained perfectly quiet.

Authorities.— The Basutos (2 vols., London, 1909), a 1 standard history, and " Basutoland and the Basutos " in Jnl. Ryl. Col. Inst. 1901, both by Sir, G. Lagden, resident-commissioner, 1893-1901 ;

E. Jacottet, Moeura, coutumes et superstitions des Ba-Souts," in Bull. Soc. neuchdteloise Gedg., vol. ix. pp. 107-151, 1897 ; G. M. Theal, Basutoland Records (Cape Town, 1883); E. Casalis, Les Bassutos (Paris, 1859), a description of exploration, manners and customsi the result of twenty-three years' residence in the country; Minnie Martin, Basutoland: its Legends and Customs (London, 1903) ; Mrs

F. A. Barkly, Among Boers and Basutos (new ed., London, 1897), a record, chiefly, of the Gun War of 1880-1882; C.'W. Mackintosh, Coillard of the Zambesi (London, 1907). For geology consult E. Cohen, " Geognostisch-petrographische Skizzen aus Siid-Afrika," Neues Jakrb. f. Min., 1874, and N. Jahrb. Beil., Bd. v., 1887; D. Draper, " Notes on the Geology of South-eastern Africa," Quart. Jour n. Geol. Soc, vol. 1., 1894; Hatch-Corstorphine. The Geology of

South Africa (London, 1905) . For current information see the annual report on Basutoland (Colonial Office, London). Many books dealing with South Africa generally have chapters relating to Basutoland, e.g. A. P. Hillier, South African Studies (London, 1900) ; James Bryce, Impressions of South Africa (3rd ed., London, 1899). Consult also Theal's History of South Africa (1908-9 ed.).

(F. R. C. ; A. P. H.) BAT, 1 a name for any member of the zoological order Chirop- tera (q.v.). Bats are insectivorous animals modified for flight, 1 M. E. bakke, the change to " bat " having apparently been influenced by Lat. batta, bldtta, moth. The word is thus distinct from the other common term " bat," the implement for striking, which is probably connected with Fr. battre, though a Celtic or simply onomatopoetic origin has been suggested.

with slight powers of progression on the ground; the patagium or "flying-membrane" of some squirrels and of Galeopithecus (q.v.) probably indicates the way in which the modification was effected. They are distributed throughout the world, but are most abundant in the tropics and the warmer parts of the temperate zones; within these limits the largest forms occur. There is great variation in size; the Malay " flying-fox " (Pteropus edulis) measures about a foot in the head and body, and has a wing-spread of 5 ft.; while in the smaller forms the head and body may be only about 2 in., and the wing-spread no more than a foot. The coloration is generally sombre, but to this there are exceptions; the fruit-bats are brownish yellow or russet on the under surface ; two South American species are white; Blainville's chin-leafed bat is bright orange; and the Indian painted bat (Cerivoula picta) with its deep orange dress, spotted with black on the wing-membranes, has reminded observers of a large butterfly. In habits bats are social, noc- turnal and crepuscular; the insect-eating species feed on the wing, in winter in the temperate regions they migrate to a warmer climate, or hibernate, as do the British bats. The sense-organs are highly developed; the wing-membranes are exceedingly sensitive; the nose-leaf is also an organ of percep- tion, and the external ear is specially modified to receive sound- waves. Most bats are insect-eaters, but the tropical " flying foxes " or fox-bats of the Old World live on fruit; some are blood-suckers, and two feed on small fish. Twelve species are British, among which are the pipistrelle (Pipistrellus pygmaeus, or P. pipistrellus), the long-eared bat (Plecotus auritus), the noctule (Pipistrellus [Pterygistes] noctuius) the greater and lesser horseshoe bats (Rhinolophus ferrum-equinum and R. hipposiderus), &c. (See Flying-Fox and Vampire.)

BAT AC, a town of the province of Ilocos Norte,. Luzon, Philippine

Islands, 10 m. S. of Laoag, the capital. Pop. (1903) 19,524; subsequently, in October 1903, the town of Banna (pop. 4015) was annexed. Cacao, tobacco, cotton, rice and indigo are grown in the neighbouring country, and the town has a considerable trade in these and other commodities; it also manufactures sugar, fans and woven fabrics. Batac was founded in 1587. It is the birthplace and home of Archbishop Gregorio Aglipay (b. i860), the founder of an important sect of Filipino Independent Catholics.

BATALA, a town of British India, in the Gurdaspur district of the Punjab, with a station on a branch of the North- Western railway, 24 m. from Amritsar. Pop. (1901) 27,365. It is an important centre of trade, with manufactures of cotton and silk goods, shawls, brass-ware, soap and leather. There are two mission schools.

BATALHA (i.e. battle), a town of Portugal, in the district of Leiria, formerly included in the province of Estremadura; 8 m. S. of Leiria. Pop. (1900) 3858. Batalha, which occupies the site of the medieval Canoeira, is chiefly interesting for its great Dominican monastery of Santa Maria da Victoria (" St Mary of the Victory ") , also known as Batalha. Both town and monastery owe their names to the battle fought on the plain between Canoeira and Aljubarrota, 9 m. S. W., in which John I. of Portugal defeated John I. of Castile in 1385 and secured the independence of his kingdom. The monastery is built of golden-brown lime- stone, resembling marble, and richly sculptured. In size and beauty it excels all the other buildings of Portugal in which Gothic and Moorish architecture are combined. Its ground- ' plan may be roughly described as a parallelogram, measuring about 500 ft. from north to south, and 445 from east to west; with the circular annexe of the royal mausoleum on the east, and the Founder's chapel at the south-western corner. In the centre is the royal cloister, which is flanked by the refectory, now a museum, on the west; and by the chapter-house, on the east. Two smaller cloisters, named respectively after Alphonso V. and John III., form the northern division of the parallelo- gram; its southern division is the Gothic church. The Founder's chapel contains the tomb of John I. (d. 1433) and Philippa of Lancaster (d. 1416), his queen, with the tomb of Prince Henry the Navigator (d. T46o). Like the royal mausoleum, where

several later menarchs are buried, it is remarkable for the intricacy

and exquisite finish of its carved stonework. The monastery was probably founded in 1388. Plans and masons were procured from England by Queen Philippa, and the work was entrusted to A. Domingues, a native architect, and Huetor Houguet, an Irishman. Only the royal cloister, church and Founder's chapel were included in the original design; and all three show signs of English influence. Various additions were made up to 1 5 5 1 , beginning with the royal mausoleum and ending with the cloister of John III. Considerable damage was inflicted by the earthquake of 1755; and in 1810 the monastery was sacked by the French. It was secularized in 1834 and declared a national monument in 1840. Thenceforward it was gradually restored.

8ATANGAS, a town, port of entry, and the capital of the province of Batangas, Luzon, Philippine Islandsˆ near the Batangas river, about 1 m. from its mouth on the E. coast of the Gulf of Batangas, and about 65 m. S. by E. of Manila. Pop. (1903) 33,131. The United States government has established a military post here, and the town has numerous fine public buildings and private residences. It is the most important port of a province noted for the fertility of its soil and the industry of its inhabitants. Its exports, which are large, include rice, coffee of excellent quality, cacao, sugar, Indian corn, horses and cattle. The horses of Batangas are unusually strong and active. Cotton is produced, and is woven into fabrics by the women. The language is Tagalog.

BATARNAY, IMBERT DE (? 1438-1523), French statesman, was botn of an old but obscure family in Dauphine, about the year 1438. In consequence of a chance circumstance he entered into relations with the dauphin Louis, at that time (14SS) m arms against the king his father; he attached himself to the prince, and followed him on his retreat into Burgundy. From the beginning of his reign Louis XI. loaded Batarnay with favours: he married him to a rich heiress, Georgette de Mont- chenu, lady of Le Bouchage; besides making him captain of Mont Saint Michel and giving him valuable estates, with, later, the titles of counsellor and chamberlain to the king. In 1469 Batarnay was sent to keep watch upon the duke of Guienne's intrigues, which began to appear dangerous. As lieutenant- general in Roussillon in 1475 he protected the countryside against the wrath of the king, who wished to repress with cruel severity a rebellion of the inhabitants. He was present at the interview between Louis XI. and Edward IV. of England at Picquigny, and was afterwards employed on negotiations with the duke of Burgundy. In accordance with the recommenda- tions of his father, Charles VIII. kept the lord of Le Bouchage in his confidential service. During the differences that

arose in 1485 between the regent, Anne of Beaujeu, and the dukes of Orleans, Brittany and Alencon, Imbert de Batarnay kept the inhabitants of Orleans faithful to the king. He proved his skill in the negotiations concerning the marquisate of Saluzzo and the town of Genoa. During the Naples expedition he was in charge of the dauphin, Charles Orland, who died in 1495. He treated with Maximilian of Austria to prevent him from entering Picardy during the war with Naples, and then proceeded to Castile to claim promised support. Under Louis XII. he took part in -the expedition against the Genoese republic in 1507. Francis I. employed him to negotiate the proposed marriage of Charles of Austria with Renee of France, daughter of Louis XII., and appointed him governor to the dauphin Francis in 1518. He died on the 1 2th of May 1523.

SeealsoB. de Mandrot's Ymbertde Batarnay (Paris, 1886).

(M.P.)*

BATAVIA, a residency of the island of Java, Dutch East Indies, bounded E., S. and W. by the residencies of Krawana, Preanger and Bantam, and N. by the Java Sea. It also com- prises a number of small islands in the Java Sea, including the Thousand Islands group, with a total area of 24 sq. m. The population in 1898 was 1,313,383, including 12,434 Europeans, 82,510 Chinese, 3426 Arabs and other Asiatic foreigners. The natives belong to a Simdanese group, but in the north contain

a large admixture of Malays. The northern half of the province is flat, and even marshy along the coast, and consists >of a broad band of alluvium formed by the series of parallel rivers descend- ing from the south. The southern half on the other hand is covered by a mountain range whose chief peaks are situated along the southern border, namely Halimun mountain, the volcanoes Salak, Pangerango and Gede, and the Megamendung. The soil is fertile, and whereas rice is mainly grown on the low- lands the highlands are especially suitable for the cultivation of coffee, tea, tobacco, cinchona and vanilla. Extensive cocoamvt plantations are also found in the plains, and market-gardening is practised in the neighbourhood of the towns. Sugar was formerly cultivated. The government of the residency of Batavia differs from that of the other residencies in having no native regencies, the lands being privately owned. The divisions of the residency are Batavia, town and surroundings, Tangerang, Meester Cornelis and Buitenzorg, the first being directly governed by a resident and the remainder by assistant residents. As early as the second half of the 17th century, the Dutch East India

Company began the practice of selling portions of the land to private persons, and of granting other portions as the reward of good services. A -large strip of hill-country, almost correspond- ing to the present southern or Buitenzorg division of the residency, was appropriated by the governor-general in 1745 and attached to that office. In 1808, however, Marshal Daendels disposed of this property to various purchasers, including the Dutch government, and thus the whole of the residency gradually passed into private hands. Hence the administration of the residency is largely confined to police duties. The principal towns are Batavia (q

BATAVIA, a city and seaport on the north coast of the island of Java, and the capital of all the Dutch settlements in the East. The population in 1880 was 96,957; in 1898, 115,567; including 9423 Europeans, 26,433 Chinese, 2828 Arabs and 132 other Asiatic foreigners. It is situated on both sides of the river Jacatra or Jilivong, in a swampy plain at the head of a capacious bay. The streets are for the most part straight and regular, and many of them have a breadth of from 100 to 200 ft. In several cases there is a canal in the centre lined with stone, and protected by low parapets or banks, while almost every street and square is fringed with trees. The old town has greatly changed from its condition in the 18th century. It was then surrounded by strong fortifications, and contained a number of important buildings, such as the town-house (built in 1652 and restored in 1706), the exchange, the infirmary and orphan asylum, and the European churches. But the ramparts were long ago demolished; only natives, Malays, Arabs and Chinese live here, and the great European houses have either fallen into decay or been converted into magazines and warehouses. The European inhabitants live principally in the new town, which was gradually formed by the integration of Weltevreden (Well- content), Molenvliet (MilUstream), Rjjswijk {Rice-town), Noord- wijk (North-town), Koningsplem (King's square), and other suburban villages or stations. The situation of this modern part is higher and healthier. The imitation of Dutch arrangements has been avoided, and the natural advantages of the situation and climate have been turned to account. The houses, generally of a single storey or two at most, are frequently separated from each other by rows of trees. Batavia contains, numerous buildings connected with the civil and military organization of the govern- ment. The governor-general's palace and the government build- ings are the most important of these; in the district of Wel- tevreden are also the barracks, and the artillery school, as well as the military and civil hospital, and not far off is the Frederik-Hendrik citadel built in 1837. Farther inland, at Meester Cornelis,

are barracks and a school for under-officers. The

Koningsplein is a large open square surrounded by mansions of the wealthier classes. Noordwijk is principally inhabited by lesser merchants and subordinate officials. There is an orphan asylum in thfe district of Parapatna. Batavia has various .educa- tional and scientific institutions of note. In 1851 the government founded amedical school for Javanese, and in i860 the " Gym- nasium William III." in which a comprehensive education is bestowed. A society of arts and sciences (which possesses an excellent museum) was established in 1778, a royal physical society in 1850, and a society for the promotion of industry and agriculture in 1853. In addition to the Transactions of these societies — many of which contain valuable contributions to their respective departments in their relation to the East Indies — a considerable number of publications are issued in Batavia. Among miscellaneous buildings of importance may be mentioned the public hall known as the Harmonic, the theatre, club-house and several fine hotels.

The population of Batavia is varied, the Dutch residents being a comparatively small class, and greatly intermixed with Portu- guese and Malays. ' Here are found members of the different Indian nations, originally slaves; Arabs, who are principally engaged in navigation, but also trade in -gold and precious stones; Javanese, who are cultivators; and Malays, chiefly boatmtn and sailors, ; and adherents of Mahommedanism. The Chinese are both numerous and industrious. They were long greatly oppressed by the Dutch government, and in 1740 they were massacred to the number of 12,000.

Batavia Bay is rendered secure by a number of islands at its mouth, but grows very shallow towards the shore. The con- struction of the new harbour at Tanjong Priok, to the east of the old one, Was therefore of the first importance. The works, begun in 1877 and completed in 1886, connect the town with Tanjong (" cape ") Priok by a canal, and include an outer port formed by two breakwaters, 6072 ft. long, with a width at entrance of 408 ft. and a depth of 27 ft. throughout. The inner port has 3282 ft. of quayage; its length is 3609 ft., breadth 573 ft. and depth 24 ft. There is also a coal dock, and the port has railway and roadway connexion with Batavia. The river Jilivong is navigable 2 m. inland for vessels of 30 or 40 tons,

but the entrance is narrow, and requires continual attention to keep it open.

The exports from Batavia to the other islands of the archi- pelago, and to the ports in the Malay Peninsula, are rice, sago, coffee, sugar, salt, oil, tobacco, teak timber and planks, Java cloths, brass wares, &c., and European, Indian and Chinese goods. The produce of the Eastern Islands is also collected at its ports for re-exportation to India, China and Europe — namely, gold-dust, diamonds, camphor, benzoin and other drugs; edible bird-nests, trepang, rattans, beeswax, tortoise- shell, and dyeing woods from Borneo and Sumatra; tin from Banka; spices from the Moluccas; fine cloths from Celebes and Bali; and pepper from Sumatra. From Bengal are imported opium, drugs and cloths; from China, teas, raw silk, silk piece-goods, coarse China wares, paper, and innumerable smaller articles for the Chinese settlers. The tonnage of vessels clearing from Batavia to countries beyond the archipelago had increased from 879,000 tons in 1887 to nearly 1,500,000 tons by the end of the century. The old and new towns are connected by steam tramways. The Batavia-Buitenzorg railway passes the new town, thus connecting it with the main railway which crosses the island from west to east.

Almost the only manufactures of any importance' are the distillation of arrack, which is principally carried on by Chinese, the burning of lime and bricks, and the making of pottery. The principal establishment for monetary transactions is the Java Bank, established in 1828 with a capital of £500,000.

Batavia owes its origin to the Dutch governor-general Pieter Both, who in 1610 established a factory at Jacatra (which had been built on the ruins of the old Javanese town of Sunda Calappa), and to his successor, Jan Pieters Coen, who in 1619 founded in its stead the present oity, which soon acquired a flourishing trade and increased in importance. In 1699 Batavia

was visited by a terrible earthquake, and the streams were choked by the mud from the volcano of Gunong Salak; they overflowed the surrounding country and made it a swamp, by which the climate was so affected that the city became notorious for its unheal thiness, and was in great danger of being altogether abandoned. In the twenty-two years from 1730 to 1752, 1,100,000 deaths are said to have been recorded. General Daendels, who was governor from 1808 to 181 1, caused the ramparts of the town to be demolished, and began to form the nucleus of a new city at Weltevreden. By 1816 nearly all

the Europeans had left the old town. In 1.811 a British armament was sent against the Dutch settlements in Java, which had been incorporated by France, and to this force Batavia surrendered on the 8th of August. It was restored, however, to the Dutch by the treaty of 1814.

BATAVIA, a village and the county-seat of Genesee county, New York, U.S.A., about 36 m. N.E. of Buffalo, on the Tonawanda Creek. Pop. (1890) 7221; (1900) 9180, of whom 1527 were foreign-born; (1910), 11,613. Batavia is served by the New York Central & Hudson River, the Erie, and the Lehigh Valley railways. It is the seat of the New York State School for the Blind, and of St Joseph's Academy (Roman 1 Catholic), and has a historical museum, housed in the Old Holland Land Office (1804), containing a large collection of relics of the early days of New York, and a memorial library erected in 1889 in memory of a son by Mary E. Richmond, the widow of Dean Richmond; the building contained in 1908 more than 14,000 volumes. The public schools are excellent ; in them in 1898 Super- intendent John Kennedy (b. 1846) introduced the method of individual instruction now known as the " Batavia scheme," under which in rooms of more than fifty pupils there is, besides the class teacher, an" individual " teacher who helps backward children in their studies. Among Batavia's manufactures are harvesters, ploughs, threshers and other agricultural implements, firearms rubber tires, shoes, shell goods, paper-boxes and inside wbodwork. In 1905 the city's factory products were valued at $3,589,406, an increase of 39-5 % over their value in 1900. Batavia was laid out in 1801 by Joseph Ellicott (1760-1826), the engineer who had been engaged in surveying the land known as the "Holland Purchase," of which Batavia was a part. The village was incorporated in 1823. Here lived William Morgan, whose supposed murder (1826) by members of the Masonic order led to the organization of the Anti-Masonic party. Batavia was the home during his last years of Dean Richmond (1864-1866), a capitalist, a successful shipper and wholesaler of farm produce, vice-president (1853-1864) and president (1864-1866) of the New York Central railway, and a prominent leader of the Democratic party in New York state.*

See O. Turner, History of the Holland Purchase (Buffalo, 1850).

BATEMAN, HEZlEKIAH LINTHICUM (1812-1875), American actor and manager, was born in Baltimore, Maryland, oft the 6th of December 1812. He was intended for an engineer, but in 1832 became an actor, playing with Ellen Tree (afterwards Mrs Charles Kean) in juvenile leads. In 1855 he was manager of the St Louis

theatre for a few years and in 1859 moved to New York. In 1866 he was manager for his daughter Kate, and in 1871 returned to London, where he took the Lyceum theatre. Here he engaged Henry Irving, presenting him first in The Bells, with great success. He died on the 22nd of March 1875.

His wife, Sidney Frances (1823-1881), daughter of Joseph Cowell; an English actor who had settled in America, was also an actress and the author of several popular plays, in one of which, Self (1857), sh e an d her husband made a great success. After her husband's death Mrs Bateman continued to manage the Lyceum till 1875. She later took the Sadler's Wells theatre, which she managed until her death on the 13th of January 1881. She was the first to bring to England an entire American company with an American play, Joaquin Miller's The Danites.

Mr and Mrs Bateman had eight children, three of the four daughters being educated for the stage. The two oldest, Kate Josephine (b. 1842), and Ellen (b. 1845), known as the " Bateman children," began their theatrical career at an early age. In 1&62

BATEMENT i LIGHTSˆ-BATES, JOHN

Kate played in New York as Juliet and Lady Macbeth, and in 1863 had a great success in London as Leah in Augustin Daly's adaptation of Mosenthal's Deborah. In 1866 she married George Crowe, but returned to the stage in 1868, playing later as Lady Macbeth with Henry Irving, and in 1875 in the title-part of Tennyson's Queen Mary. When her mother opened the Sadler's Wells theatre in 1879 MissBateman appeared as Helen Macgregor in Rob Roy, and in 1881 as Margaret Field in Henry Arthur Jones' His Wife. Her daughter, Sidney Crowe (b. 1871), also became anactress. Virginia Bateman (b. 1854), a younger sister of Kate, born in Cincinnati, Ohio, went on the stage as a child, and first appeared in London in the title-part of her mother's play, Fanchette, in 187 1. She created a number of important parts during several seasons at the Lyceum and elsewhere. She married Edward Compton the actor. Another sister was Isabel (b. 1854), well known on the London stage.

BATEMENT LIGHTS, in architecture the lights in the upper part of a perpendicular window, abated, or only half the width of those below.

BATES, HARRY (1850-1899), British sculptor, was born at Stevenage, Herts, on the 26th of April 1850. He began his career as a carver's assistant, and before beginning the regular study of plastic art he passed through a long apprenticeship in architec- tural decoration. In 1879 he came to London and entered the Lambeth School of Art, studying under Jules Dalou and Rodin, and winning a silver medal in the national competition at South Kensington. In 1881 he was admitted to the Royal Academy schools, where in 1883 he won the gold medal and the travelling scholarship of £200 with his relief of " Socrates teaching the People in the Agora," which showed grace of line and harmony of composition. He then went to Paris and studied under Rodin. A head and three small bronze panels (the " Odyssey,") executed by Bates in Paris, were exhibited at the Royal Academy, and selected for purchase by the Chantrey trustees; but the selec- tion had to be cancelled because they had not been modelled in England. His " Aeneas " (1885), " Homer " (1886), three " Psyche " panels and " Rhodope " (1887) all showed marked advance in form and dignity; and in 1892, after the exhibition of his vigorously designed " Hounds in Leash," Bates was elected A.R.A. • This and his " Pandora," in marble and ivory, which was bought in the same year for the Chantrey Bequest, are now in the Tate Gallery. The portrait-busts of Harry Bates are good pieces of realism — strong, yet delicate in technique, and excellent in character. His statues have a picturesqueness in which the refinement of the sculptor is always felt. Among the chief of these are the fanciful " Maharaja of Mysore," somewhat overladen with ornament, and the colossal equestrian statue of Lord Roberts (1896) upon its important pedestal, girdled with a frieze of figures, now set up in Calcutta, and a statue of Queen Victoria for Dundee. But perhaps his masterpiece, showing the sculptor's delicate fancy and skill in composition, was an allegorical present- ment of " Love and Life " — a winged male figure in bronze, with a female figure in ivory being crowned by the male. Bates died in London on the 30th of January 1899, his premature death robbing English plastic art of its most promising representative at the time. (See Sculpture.)

BATES, HENRY WALTER (1825-1892), English naturalist and explorer, was born. at Leicester on the 8th of February 1825. His father, a manufacturing hosier, intended him for business, and for a time the son yielded to his wishes, escaping as often as he could into the neighbouring country to gratify his love of botany and entomology. In 1844 he met a congenial spirit in Alfred R.ussel Wallace, and the result was discussion and execu- tion of a plan to explore some then little-known region of the globe. The banks of the

Amazons was the district chosen, and in April 1848 the two friends sailed in a trader for Para. They had little or no money, but hoped to meet their expenses by the sale of duplicate specimens. After two years Bates and Wallace agreed to collect independently, Wallace taking the Rio Negro and the upper waters of the Orinoco, while Bates continued his route up the great river for 1400 m. He remained in the country eleven years, during which time he collected no fewer than 8000 species

of insects new to science. His long residence in the tropics, with the privations which it entailed, undermined his health. Nor had the exile from home the compensation of freeing him from financial cares, which hung heavy on him till he had the good fortune to be appointed in 1864 assistant-secretary of the Royal Geographical Society, a post which, to the inestimable gain of the society, and the advantage of a succession of explorers, to whom he was alike Nestor and Mentor, he retained till his death on the 16th of February 1892. Bates is best known as the author of one of the most delightful books of travel in the English language, The Naturalist on the Amazons (1863), the writing of which, as the correspondence between the two has shown, was due to Charles Darwin's persistent urgency. " Bates," wrote Darwin to Sir Charles Lyell, " is second only to Humboldt in describing a tropical forest." But his most memorable contribution to biological science, and more especially to that branch of it which deals with the agencies of modification of organisms, was his paper on the "Insect Fauna of the Amazon Valley," read before the Linnaean Society in 1 86 1 . He therein, as Darwin testified, clearly

stated and solved the problem of " mimicry," or the superficial resemblances between totally different species and the likeness between an animal and its surroundings, whereby it evades its foes or conceals itself from its prey. Bates's other contributions to the literature of science and travel were sparse and fugitive, but he edited for several years a periodical of Illustrated Travels. A man of varied tastes, he devoted the larger part of his leisure to entomology, notably to the classification of coleoptera. Of these he left an extensive and Unique collection, which, fortunately for science, was purchased intact by Ren6 Oberthur of Rennes. ,

BATES, JOHN. A famous case in English constitutional history, tried before the court of exchequer in November 1606, arose out'of the refusal of a merchant of the Levant Company, John Bates, to pay an extra duty of 5s. per Cwt. on imported currants levied by the sole authority of the crown in addition to the 2S. 6d. granted by the Statute of Tonnage and Poundage, on the ground that such an imposition was illegal without the sanction of parliament. The unanimous decision of the four barons of the exchequer in favour of the crown threatened to establish a precedent which, in view of the rapidly increasing foreign trade, would have made the king independent of parlia- ment. The judgments of Chief Baron Fleming and Baron Clark are preserved. The first declares that "the king's power is double, ordinary and absolute, and they have several laws and ends. That of the ordinary is for the profit of particular sub- jects, for the execution of civil justice . . . in the ordinary courts, and by the civilians is nominated 'jus privatum, and with us common law; and these laws cannot be changed without parliament. . . . The absolute power of the king is not that which is converted or executed to private uses to the benefit of particular persons, but is only that which is applied to the' general benefit of the people and is salus populi; and this power is not guided by the rules which direct only at the common law, and is most properly named policy or government; and as the con- stitution of this body varieth with the time, so varieth this absolute law, according to the wisdom of the king, for the common good; and these being general rules, and true as they are, all things done within these rules are lawful. The matter in question is

material matter of state, and ought to be ruled by the rules of policy, and if it be so, the king hath done well to execute his extraordinary power. All customs (i.e. duties levied at the ports), be they old or new, are no other but the effects and issues of trades and commerce with foreign nations; but all commerce and affairs with foreigners, all wars and peace, all acceptance and admitting for foreign current coin, all parties and treaties Whatsoever are made by the absolute power of the king; and he Who hath power of causes hath power also of effects." Baron Clark, in his judgment, concurred, declaring that the seaports were the king's ports, and that, since foreign merchants were admitted to them only by leave of the crown, the crown possessed also the right of fixing the conditions under 'which they should be admitted, including the imposition of a money pay- ment. Incidentally, Baron Clark, in reply to the argument that

the king's right to levy impositions was limited by the statute of 1370-1371, advanced a principle still more dangerous to con- stitutional liberty. " The statute of the 45 Edward III. cap. 4," he said, " which hath been so much urged, that no new imposition shall be imposed upon wool-fells, wool' or leather, but only the custom and subsidy granted to the king — this extends only to the king himself and shall not bind his successors, for it is a principal part of the qrown of England, which the king cannot diminish."

See Stale. Trials (ed. 1779), x! – PP- 3°-32; excerpts in G. W. Prothero, Statutes ana Constitutional Documents (Clarendon Press, 1894) ; G. B. Adams and H. Morse Stephens, Select Documents of Eng. Const. Hist. (New York, 1901); cf. T. P. Taswell-Langmead, Eng. Const. Hist. (London, 1905), p. 393. (W. A. P.) ,. .

BATES, JOSHUA (1788-1864), American financier, was born in Weymouth, Massachusetts, on the 10th of October 1788, of an old Massachusetts family prominent in colonial affairs. After several winters' schooling in his native town, he entered the countingrhouse of William Gray & Son in Boston. In 1809 he began business on his own account, but failed during the War of 1813 and again became associated with the Grays, then the largest shipowners in America, by whom a few years later he was sent to London in charge of their European business. There he came into relations with the Barings, and in 1826 formed a partnership with John, a son of Sir Thomas Baring. Two years later both partners were admitted to the firm of Baring Brothers & Company, of which Bates eventually became senior partner, occupying in consequence an influential position in

the British financial world. In 1853-1854 he acted with rare impartiality and justice as umpire of the international commission appointed to settle claims growing out of the War of 1812., In 1852-1855 he contributed $100,000 in books and in cash for a public library in Boston, the money to be invested and the annual income to be applied to the purchase of books. Upon his death the " upper hall," or main reference-room (opened in 1861) in the building erected in 1858 by the order of the library trustees, was named Bates Hall; and upon the opening of the new hujlding in 1895 this name was transferred to its principal reading-room, one of the finest library halls in the world. During the Civil War, Bates's sympathies were strongly with the Union, and besides aiding the United States government fiscal agents in various ways, he used his influence to prevent the raising of loans for the Confederacy. He died in London on the 24th of September

1864. '

See Memorial of Joshua Bates (Boston, 1865).

BATES, WILLIAM (1625-1699), English nonconformist divine, was born in London in November 1625. He was admitted to Emmanuel College, Cambridge, and removed thence to King's College in 1644. Of Presbyterian belief, he held the rich living of St Dunstah's-in-the-West, London. He was one of the com- missioners at the conference in the Savoy, for reviewing the public liturgy, and was concerned in drawing up the exceptions to the Book of Common Prayer. Notwithstanding this he was appointed chaplain to. .Charles. II., and was offered the deanery of Lichfield and Coventry, but he came out in 1662 as one of the 2000 ejected ministers. Bates was of an amiable character, and enjoyed the friendship of the lord-keeper Bridgeman, the lord- chancellor Finch, the earl of Nottingham and Archbishop Tillotson. With other moderate churchmen he made several efforts towards a comprehensive settlement, but the bishops were uncompromising. He addressed William and Mary on their accession in behalf of the dissenters. After some years of pastoral service at Hackney he died there on the 14th of July 1699. Bates published Select Lives of Illustrious and Pious Persons in Latin; and after his death all his works, except this, were printed in 1 voL fol.; again in 1723; and in 4 vols. 8vo in 181 5. They treat of practical theology and include Con- siderations on the Existence of God and the Immortality of the Soul (1676), Four Last Things (1691), Spiritual Perfection (1699).

BATESON (Batson or Betson), THOMAS, an English writer of

madrigals in the early 17th century. He is said to have been organist of Chester cathedral in 1599, and is believed to have been the first musical graduate of Trinity College, Dublin. He

RATESˆ JOSHUAS-BATH, W. P. ;

is known to have written church music, but his fame rests pn his. madrigals, which give him an important place among Elizabethan composers. He published a set of madrigals in 1.604 and a second, set in 1618, and both collections have been reprinted in recent years. He died in 1630.

BATH, THOMAS THYNNE, ist Marquess of (1734ˆ-1706), English politician, was the elder son' of Thomas Thynne, 2nd Viscount Weymouth (1710-1751), and the great-grandnephew. of Thomas Thynne (c. 1640- 17 14), the , friend of Bishop; Ken, who was created Baron Thynne and Viscount Weymouth in 1682. His mother was Louisa (d. 1736), daughter of John Carteret, ist Earl Granville, and a descendant, of the family of Granville who held the earldom oi Bath from 1661 to 171 1. The Thynnes are descended from Sir John Thynne, the builder, of Longleat, the splendid seat of the family in Wiltshire. Sir John, owed his wealth and position to the favour of his master, the protector Somerset; he was comptroller, of; .the household;-} of the princess Elizabeth, and was a person of some importance after the princess became queen. He died in April 1589J Another famous member of this family was • Thomas Thjtgne (1648-1682), called on account of his wealth " Tpm of Tea Thousand." He is celebrated by Dryden as Issachar in Absalom and. Achitophel,. and was murdered in London by some Sweden in February 1682. ..■■■,.

Born on the 13th of September 1 734, Thomas ThynnesucceedecJ his father as 3rd Viscount Weymouth in, January i75i» and was lord-lieutenant of Ireland for a short time during 1765, although he never visited that countryt Having, however, become prominent in English politics he was appointed, secretary, iqf state for the .northern department in January 1768; he acted with great promptitude during , the unrest caused by, John Wilkes and the Middlesex election of 1 768. He was then attacked and libelled by Wilkes, who was consequently expelled from the House of Commons. Before the close of 1768 he was transferred from the northern to the southern department, but he resigned in December 1770 in the midst of the dispute with Spain oyer the possession of the Falkland Islands. In November 17175 Weymouth; returned to his former office of secretary for the, southern department, undertaking in addition the

duties attached to the northern department for a few months in .1779, but he resigned both positions in the autumn of this year. In 1789 he was created marquess of Bath, and he died on the roti of November 1796, Weymouth was a man of considerable ability especially as a speaker, but according to more modern; standards his habits were very coarse, resembling those of, his friend and frequent companion, Charles James Fox. Horace Walpole refers frequently to his idleness and his drunkenness, and in early life at least " his great fortune he had damaged; by such profuse play, that hjs house was often full of bailiffs." He married Elizabeth (d. 1825),: daughter of William Bentfncˆ 2nd duke of Portland, by whom he had three sons and ten, daughters. His eldest son Thomas (1765-1837) succeededˆ his titles, while the two younger ones, George (1770-1838) and John (1772-1849), succeeded in turn to the barony of Carteret of Hawnes, which came to them from their uncle, Henˆ Frederick Thynne (1735-1826). Weymouth's great-grandson, John Alexander, 4th marquess of Bath (1 831-1896), the author of Observations on Bulgarian affairs (1880), was succeeded, as 5th marquess by his son Thomas Henry (b. 1862). ;; ;

See B. Botfield, Stemmata Botevilliana (1858). . ■"

BATH, WILLIAM PULTENEY, ist Earl of (1684-1764);, generally known by the surname of Pulteney, English politician, descended from an ancient family of Leicestershire, was the sw of William Pulteney by his first wife, Mary Floyd, and was born in April 1684. The boy was sent to Westminster school, and from it proceeded to Christ Church, Oxford, matriculating .'fhfi 31st of October 1700, At these institutions he acquired his deep classical knowledge: On leaving Oxford he made the usual tbiijr on the continent. In 1705 he was brought into parliament by Henry Guy (secretary of the treasury, 1679-1688, and June 1691 to February i'695) for the Yorkshire borough of Hedon, antrM his death on the 23rd of February 1710 inherited an estate oj

BATH

5"

£500 a year and £40,000 in cash. This seat was held by him without a break until 1734. Throughout the reign of Queen Anne William Pulteney played a prominent part in the struggles of the Whigs, and on the prosecution of Sacheverell he exerted himself with great zeal against that violent divine. When the victorious Tories sent his friend Robert Walpole to the Tower in 1 71 2, Pulteney championed his

cause in the House of Commons and with the leading Whigs Visited him in his prison- chamber. He held the post of secretary of war from 17 14 to 1 71 7 in the first ministry of George I., and when the committee of secrecy on the Utrecht treaty was formed in April 171 5 the list included the name of William Pulteney. Two years later (6th of July 1716, he became one of the privy council. When Townshend was dismissed, in April 1717, from his post of lord-lieutenant of Ireland, and Walpole resigned his places, they were followed in their retirement by Pulteney. The crash of the South Sea Company restored Walpole to the highest position, but all that he offered to Pulteney was a peerage. The offer was rejected, but in May 1723 Pulteney stooped to accept the lucrative but insignificant post of cofferer of the household. In this obscure position he was content for some time to await the future; but when he found himself neglected he opposed the proposition of Walpole to discharge the debts of the civil list, and in April 1725 was dismissed from his sinecure. From the day of his dismissal to that of his ultimate triumph Pulteney remained in opposition, and, although Sir Robert Walpole attempted in 1730 to conciliate him by the offer of Townshend's place and of a peerage, all his overtures were spurned.- Pulteney's resent- ment was not confined to his speeches in parliament. With Bolingbroke he set on foot in December 1726 the well-known periodical called the Craftsman, and in its pages the minister was incessantly denounced for many years. Lord Hervey published an attack on the Craftsman, and Pulteney,, either openly or behind the person of Amhurst, its editor, replied to the attack. Whether the question at issue was the civil list, the excise, the incoirie of the prince of Wales, or the state of domestic affairs Pulteney was ready with a pamphlet, and the minister or one of his friends came out with a reply. For his " Proper reply to a late scurrilous libel " (Craftsman, 1731), an answer to " Sedition and defamation displayed," he was challenged to a duel by Lord Heryey; for another, " An answer to one part of an infamous libel entitled remarks on the Craftsman's indication of his two honourable patrons," he was in July 1731 struck off the roll of privy councillors and dismissed from the commission of the peace in several counties. In print Pulteney was inferior to Bolingbroke alone among the antagonists of Walpole, but in parliament, from which St John was excluded, he excelled all his comrades. When the sinking fund was appropriated in 1733 his voice was the foremost in denunciation; when the excise scheme in the same year was stirring popular feeling to its lowest depths the passion of the multitude broke out in his oratory. Through Walpole's prudent withdrawal of the latter measure the fall, of his ministry was averted. Bolingbroke withdrew to France

*on the suggestion, it is said,*of Pulteney, and the opposi- tion was weakened by the dissensions of the leaders.*

Frontrtfce general election of 1734 until his elevation to the peerage Pultehey sat for ˆ Middlesex. For some years after this election the minister's assailants made little progress in their attack, but in 1738 the troubles with Spain supplied them with the opportunity, which they desired. Walpole long argued for peace, but he was feebly supported in his own cabinet, and the frenzy of the people for war knew no bounds. In an evil moment for his own reputation he consented to remain in office and to gratify popular passion with a war against Spain. His downfall was not long deferred. War was declared in 1739,; a new parliament was summoned in the summer of 1741, and over the divisions, on the election petitions the ministry of Wajpole fell to pieces. The task of forming the new administration was after some delay entrusted to Pulteney, who weakly offered the post of first lord of the treasury to that harmless politician the earl' of Wilmington, and contented himself with a seat in the cabinet and a peerage thinking that by this action he would preserve*

his reputation for consistency in disdaining office and yet retain his supremacy in the ministry. At this act popular feeling broke out into open indignation, and from the moment of his elevation to the Upper House Pulteney's influence dwindled to nothing. Horace Walpole asserts that when Pulteney wished to recall his desire for a peerage it was forced upon him through the ex- minister's advice by the king, and another chronicler of the times records that when victor and vanquished met in the House of Lords, the one as Lord Orford, the other as the earl of Bath, the remark was made by the exulting' Orford: " Here we are, my lord, the two most insignificant fellows in England." On the 14th of July 1742 Pulteney was created Baron Pulteney of Hedon, Co. York, Viscount Pulteney of Wrington, Co. Somerset, and earl of Bath. On the 20th of February he had been restored to his rank in the privy council. At Wilmington's death in 1743 he made application to the king for the post of first lord of the treasury, only to find that it had been conferred on Henry Pelham. For two days, ioth-i2th February 1746, he was at the head of a ministry, but in " 48 hours, three quarters, seven minutes, and eleven seconds " it collapsed. An occasional pamphlet and an infrequent speech were afterwards the sole fruits of Lord Bath's talents. His praises whilst in retirement have been sung by two bishops, Zachary Pearce and Thomas Newton. He died on the 7th of July 1764, and was buried on the 17th of July in his own vault in Islip chapel, Westminster Abbey. He married on the 27th of December 1714 Anna Maria, daughter and co-heiress of John Gumley of Isleworth,

commissary- general to the army who was often satirized by the wits of the day (Ifotes and Queries, 3rd S. ii. 402-403, iii. 490). She died on the 14th of September 1758, and their only son William died unmarried at Madrid on the 12th of February 1763. Pulteney's vast fortune came in 176710 William Johnstone of Dumfries (third son of Sir James 'Johnstone), who had married Frances, daughter and co-heiress of his cousin, Daniel Pulteney, a bitter antagonist of Walpole in parliament, and had taken the name of Pulteney.

Pulteney's eloquence was keen and incisive, sparkling with vivacity and with allusions drawn from the literature of his own country and of Rome. Of business he was never fond, and the loss in 1734 of his trusted friend John Merrill, who had supplied the qualities which he lacked, was feelingly lamented by him in a letter to Swift. His chief weakness was a passion for money. Lord Bath has left no trace of the possession of practical statesmanship.

Bibliography. — Wm. Coxe's Memoirs of Sir Robert Walpole (i8l6),andof Henry Pelham (1829) ; John Morley's Walpole (1889] I; Walter Sichel's Bolingbroke (1901-1902); A. Ballantyne's Carteret (1887) ; Eng. Hist. Rev. iv. 749-753. and the general political memoirs of the time. (W. P. C.)

BATH, a city, municipal, county and parliamentary borough, and health resort of Somersetshire, England, on the Great Western, Midland, and Somerset & Dorset railways, 107ˆ m. W, by S. of London. Pop. (1901) 49,839. Its terraces and crescents, built mostly of grey freestone, cover the slopes and heights of the abrupt hills which rise like an amphitheatre above the winding valley of the river Avon. The climate is pleasant, and the city, standing amidst fine scenery, itself possesses a number of beautiful walks and gardens. Jointly with; Wells, it is an episcopal ; see of the Church of England. The abbey church of St Peter and St Paul occupies the site of earlier Saxon and Norman churches, founded in connexion with a 7th-century convent, which was transferred for a time to a body of secular canons, and from about 970 until the Dissolution, to Benedictine monks. The present cruciform building dates from the 15 th century, being a singularly pure and ornate example of late Perpendicular work. From the number of its windows, it has been called " The Lantern of the West," and especially note- worthy is the great west window, with seven lights, and flanking turrets on which are carved figures of the angels ascending and descending on Jacob's Ladder. Within are the tombs of James Quin, the actor, with an epitaph by Garrick; Richard Nash; Thomas Mai thus the economist; William Broome the poet, and many others. Some of the monuments

are the work of Bacon,

5i

BATH

Flaxman and Chantrey. Slight traces of the previous Norman building remain. There are many other churches and chapels in Bath, the oldest being that of St Thomas of Canterbury, and one of the most interesting St Swithin's, which contains the tombs of Christopher Anstey and Madame d'Arblay. Among educa- tional institutions may be mentioned the free grammar school, founded by Edward VI., the Wesleyan College, originally estab- lished at Bristol by John Wesley, and the Roman Catholic College. The hospital ojf St John was founded in the 12th century. The public buildings include a guild hall, assembly rooms, Jubilee hall, art gallery and library, museum, literary and scientific institute, and theatres. In the populous suburb of Twerton (pop. 11,098), there are lias quarries, and bricks and woollen cloths are manufactured. The parliamentary borough returns two members. The city is governed by a mayor, 14 aldermen and 42 councillors. Area, 3382 acres.

The mineral springs supply several distinct establishments. The temperature varies in the different springs from 117 to 120 F., and the specific gravity of the hot baths is 1-002. The principal substances in solution are calcium and sodium sulphates, and sodium and magnesium chlorides. Traces of radium have been revealed, and the gases contain argon and helium. The waters are very beneficial in cases of rheumatism, gout, neuralgia, sciatica, diseases of the liver, and cutaneous and scrofulous affections. The highest archaeological interest, moreover, attaches to the baths in view of the magnificent Roman remains testifying to the early recognition of the value of the waters. It may here be noted that two distinct legends ascribe the foundation of Bath to a British king Bladud. According to Geoffrey of Monmouth this monarch gave its healing power to the water by his spells. According to a later version, he was banished as a leper, and made the discovery leading to his cure, and to the origin of Bath, whilst wandering as a swineherd in 863 B.C. This, at least, is the date inscribed on a statue of Bladud placed in the Pump Room in 1699. There is, however, no real evidence of a British settlement. By the Romans Bath was named Aquae Suits, the name indicating the dedication to a British goddess Sul or Sulis, whom the Romans considered the counterpart of Minerva. There were a temple of the goddess and a few houses for priests, officials and visitors, besides the large baths, and the place was apparently walled; but it did not

contain a large resident population. Many relics have been disinterred, such as altars, inscriptions, fragments of stone carvings and figures, Samian ware, and others. The chief buildings were apparently grouped near the later abbey churchyard, and included, besides two temples, a magnificent bath, discovered when the- duke of Kingston pulled down the old priory in 1755 to form the Kingston Baths. Successive excavations have rendered accessible a remarkable series of remains, including seyeral baths, a sudarium, and conduits. The main bath still receives its water (now for the purpose of cooling) through the original conduit. The fragmentary colonnade surrounding this magnificent relic still supports the street and buildings beneath which it lies, the Roman foundations having been left untouched. The remains of the bath and of the temple are among the most striking Roman antiquities in western Europe.

Bath (variously known as Achemann, Hat Bathun, Bathonea, Batha) was a place of note in Saxon times, King Edgar being crowned there in 973. It was a royal borough governed by a reeve, with a burg mote in 907. Richard I. granted the first charter in 1 189, whicji allowed the same privileges as Winchester to the members of the merchant gild. This was confirmed by Henry III. in 1236, 1247 and 1256, by charters giving the burgesses of Bath the right to elect coroners, with freedom from arrest for the debts of others, and from the interference of sheriffs or kings' bailiffs. Charters were granted by succeeding kings in 1312, 1322, 1341, 1382, 1399, 1414, 1432, 1447, 1466 and 1545. The existence of a corporation being assumed in the earliest royal charter, and a common seal having been used since 1 249, there was no formal incorporation of Bath until the charter of 1590, 1794 and 1835. Parliamentary representation began in 1297. Various fairs were granted to Bath, to be held on the 29th of August, the 9th of

August, the 30th of June to the 8th of July (called Cherry Fair), the 1st of February to the 6th of February, in 1275, 1305, 1325 and 1 545 respectively. P'airs are now held on the 4th of February and on the Monday after the 9th of December. These fairs were flourishing centres of the cloth trade in the middle agss, but this industry has long departed. Bath " beaver," however, was known throughout England, and Chaucer makes his " Wife of Bath " excel the cloth-weavers " of Ypres and of Gaunt." The golden age of Bath began in the 18th century, and is linked with the work of the two architects Wood (both named John), of Ralph Allen, their patron, and of Richard Nash, master of the cere- monies. Previously the baths had been ill-kept, the lodging poor, the streets beset by footpads. All this was changed by the architectural scheme, including Queen Square,

the Royal Crescent and the North and South Parades, which was chiefly designed by the elder Wood, and chiefly executed by his son. Instead of the booth which did duty as a gaming club and chocolate house, Nash provided the assembly rooms which figure largely in the pages of Fielding, Smollett, Burney, Dickens and their contemporaries. Anstey published his New Bath Guide to ridicule the laws of taste which " Beau " Nash dictated; but two royal visits, in 1734 and 1738, established Bath as a centre of English fashion. The weekly markets granted on Wednesday and Saturday in 1305 are still held.

See R. Warner, History and Antiquities of Bath (1801); C. E, Davis, Ancient Landmarks of Bath; Tlie Mineral Baths of Bath (1883); Excavations of Roman Baths (1895), and The Saxon Cross (1898); Sir G. Jackson, Archives of Bath (2 vols.,. 1873) ; R. E. M. Peach, Rambles about Bath (1875), Bath Old and 'New (1888), Collections of Books belonging to the City (1893), &c. ; H. Scarth, Aquae Solis, or Notices of Roman Bath (1864) ; A. Barbeau, Lifeand Letters at Bath in the 18th Century (from the French Une Ville d'eaux anglaise an XVIII' siecle) (London, 1904); A. H. King, Charter of Bath Corporation.

BATH, a city, port of entry, and the county-seat of Sagadahoc county, Maine, U.S.A., on the W. bank of the Kennebec river, 12 m. from its mouth and 36 m. N.E. of Portland. Pop. (1890) 8723; (1900) 10,477, of whom 1759 were foreign-born; (1910, censuO 9396. It is served by the Mdne Central railway, by steamboat lines to Boston, and by inter-urban electric railway. The city covers an area of about 9 sq. m., and extends along the W. bank of the river for about 5 m. ; the business, district is only a few feet above sea-level, but most of the residences are on higher ground. The streets are well shaded, chiefly with elms. At Bath are the state military and naval orphan asylum, two homes for

the aged, and a soldiers' monument. Bath has a good harbour and its principal industry is the building of ships, both of wood and of iron and steel; several vessels of the United States navy

have been built here. In 1905 three-fourths of the city's wage-earners were employed in this industry. Bath also manufactures lumber, iron and brass goods, andhas a considerable trade in ice,

coal, lumber and iron and steel. First settled about 1660, Bath was a part of Georgetown until 1781, when it was incorporated as a separate town; in 1789 it was made a port of entry, and in 1847 was chartered as a city.

BATH-CHAIR, a vehicle with a folding hood, which can be used open or closed, and a glass front, mounted on three or four wheels and drawn or pushed by hand. If required to be drawn by a donkey or small pony it is then mounted on four wheels, with the usual turning arrangement. James Heath, of Bath, who flourished rather before the middle of the 18th century, was the inventor.

BATHGATE, a municipal and police burgh of Linlithgowshire, Scotland, 19 m. W. by S. of Edinburgh by the North British railway. Pop. (1 901) 7549. The district is rich in limestone, coal, ironstone, shale and fireclay, all of which are worked. Silver also was once mined. The manufactures include paraffin, paper, glass, chemicals, flour and whisky, and freestone is quarried. The burgh is a considerable centre for agricultural produce. Bathgate became a burgh of barony in 1824 and a police burgh in 1865. Although it was not until the development of its mineral wealth that it attained to commercial importance, it is a place of some antiquity, and formed the dowry of Marjory, Robert Bruce's daughter, who married Walter, the hereditary steward of Scot- land, in 1315.

BATHOLITE (from Gr. ftodbs, deep, and Xtfljs, a stone), in geology, a term given to certain intrusive rock masses. Especially in districts which are composed principally of rocks belonging to the older geological systems extensive areas of granite frequently occur. By their relations to the strata around them, it is clear that these granites have been forced into their present positions in a liquid state, and under great pressure. The bedding planes of stratified rocks are wedged apart and tongues of granite have been injected into them, while cracks have been opened up and filled with intrusions in the shape of igneous veins. Great masses of the strata which the granite has invaded are often floated off, and are found lying in the heart of the granite much altered by the heat to which they have been exposed, and traversed by the igneous rock in ramifying threads. Such granite intrusions are generally known as bosses from their rounded surfaces, and the frequency with which they form flattish dome-shaped hills, rising above the older rocks sur- rounding them. At one time many geologists held that in certain situations the granite had arisen from the complete fusion and transformation of the stratified rocks over a limited area of intense metamorphism. The chemical no less than the structural relations of

the two sets of rocks, howeyer, preclude the acceptance of this hypothesis. Obviously the granite is an intruder which has welled up from below, and has cooled gradu- ally, and solidified in its present situation.

Regarding the mechanism of this process there are two theories which hold the field, each having a large number of supporters. One school considers that they are mostly " batho- lites " or conical masses rising from great depths and eating up the strata which lie above and around them. The frequency of inclusions of the surrounding rocks, their rounded shapes indicating that they have been partly dissolved by the igneous magma, the intense alteration which they have undergone pointing to a state approaching actual fusion, the extensive changes induced in the rocks which adjoin the granite, the abundance of veins, and the unusual modifications of the granite which occur where it comes in contact with the adjacent strata, are adduced as evidence that there has been absorption and digestion of the country rock by the intrusive mass. These views are in favour especially in France; and instances are cited in which as the margins of the granite are approached diorites and other rocks make their appearance, which are ascribed to the effect which admixture with dissolved sedi- mentary material has had on the composition of the granite magma; at the same time the schists have been permeated

with felspar from the igneous rocks, and are said to have been felspathized.

The opponents of this theory hold these granitic masses to be " laccolites " (Gr.XaKKos, a cistern), or great cake-shaped injections of molten rock, which have been pressed from below into planes of weakness in the upper portions of the earth's crust, taking the lines of least resistance, and owing their shape to the varying flexibility of the strata they penetrated. The modifications of the granite are ascribed to magmatic segregation (chemical and physical processes which occasioned diffusion of certain components towards the cooling surfaces). Absorption of country rock is held to be unimportant in amount, and in- sufficient to account for the great spaces in the schists which are occupied by the granite. Those who support this theory leave the question of the ultimate source of the granite un- answered, but consider that it is of deep-seated origin, and the bosses which now appear at the surface are only comparatively superficial manifestations.

The bulk of the evidence is in favour of the laccolitic theory; in fact it has been clearly demonstrated; in many important cases. Still it is equally clear that many granites are not merely passive injections, but have assimilated much foreign rock. Possibly much depends on the chemical composition of the respective masses, and on the depths and temperatures at which the intrusion took place. Increase of pressure and of temperature, which we know to take place at great depths, would stimulate resorption of sedimentary material, and by retarding cooling would allow time for dissolved foreign substances to diffuse widely through the magma. (J. S. F.)

BATHONIAN SERIES, in geology. The typical Bathonian is the Great Oolite series of England, and the name was derived from the " Bath Oelite," so extensively mined and quarried in the vicinity of that city, where the principal strata were first studied by W. Smith. The term was first Used by J. d'Omalius d'Halloy in 1843 (Precis Geol.) as a synonym for " Dogger "; but it was limited in 1849 by A. d'Orbigny (Pal. Franc. Jur. i. p. 607). In 1864 Mayer-Eymar (Tail. Synchron.) used the word " Bathien " = Bajocian+Bathonian (sen. str.). According to English practice, the Bathonian includes the.following formations in descending order: Cornbrash, Forest Marble with Bradford Clay, Great or Bath Oolite, Stonesfield Slate and Fullers' Earth. (The Fullers' Earth is sometimes regarded as constituting a separate stage, the " Fullonian.") The " Bathonien " of some French geologists differs from the English Bathonian in that it includes at the base the zone of the ammonite Parkinsonia Parkinsoni, which in England is placed at the summit of the Inferior Oolite. The Bathonian is the equivalent of the upper part of the " Dogger " (Middle Jurassic) of Germany, or to the base of the Upper Brown Jura (substage " E " of Quenstedt).

Rocks of Bathonian age are well developed in Europe: in the N.W. and S.W. oolite limestones are characteristically associated with coral-bearing, crinoidal and other varieties, and with certain beds of clay. In the N- and N.E., Russia, &c, clays, sandstones and ferruginous oolites prevail, some of the last being exploited for iron. They occur also in the extreme north of America and in the Arctic regions, Greenland, Franz Josef Land, &c. ; in Africa, Algeria, German East Africa, Madagascar and near the Cape (Enon Beds); in India, Raj- putana and Gulf of Cutch, and in South America.

The well-known Caen stone of Normandy and " Haupt- rogenstein " of Swabia, as well as the "Eisenkalk" of N.W. Germany, and " Klaus-Schichten " of the Austrian Alps, are of Bathonian age.

For a general account, see A. de Lapparent, Traite de gtelogie (5th ed., 1906), vol. ii.; see also the article Jurassic. (J. A. H.)

BATHORY, SIGISMUND (Zsigmond), (1572-1613), prince of Transylvania, was the son of Christopher, prince of Transylvania, and Elizabeth Bocskay, and nephew of the great Stephen Bathory. He was elected prince in his father's lifetime, but being quite young at his father's death (1581), the government was entrusted to a regency. In 1588 he attained his majority, and,

following the advice of his favourite councillor Alfonso Carillo, departed from the traditional policy of Transylvania in its best days (when friendly relations with the Porte were maintained as a matter of course, in order to counterpoise the ever hostile influence of the house of Habsburg), and joined the league of Christian princes against the Turk. The obvious danger of such a course caused no small anxiety in the principality, and the diet of Torda even went so far as to demand a fresh coronation oath from Sigismund, and, on his refusal to render it, threatened him with deposition. Ultimately Bathory got the better of his opponents, and executed all whom he got into his hands (1505). Nevertheless, if anybody could have successfully carried out an anti-Turkish policy, it was certainly Bathory. He had inherited the military genius of his uncle, and his victories astonished contemporary Europe. In 1595 he subdued Walachia and annihilated the army of Sinan Pasha at Giurgevo (October 28th). The turning-point of his career was his separation from his wife, the archduchess Christina of Austria, in 1599, an event followed by his own abdication the same year, in order that he might take orders. It was on this occasion that he offered the throne of Transylvania to the emperor Rudolph II., in exchange for the duchy of Oppeln. In 1600, however, at the head of an army of Poles and Cossacks, he attempted to recover his throne, but was routed by Michael, voivode of Moldavia, at Suceava. In February 1 60 1 the diet of Klausenburg reinstated him, but again he was driven out by Michael, never to return. He died at Prague in 1613. Bathory's indisputable genius must have been warped by a strain of madness. His incalculableness, his savage cruelty (like most of the princes of his house he was a fanatical Catholic and persecutor) and his perpetual restlessness point plainly enough to a disordered mind.

See Ignaz Acsady, History of the Hungariwtt

BATHOS (Gr. /Sa0os), properly depth, the bottom or lowest part of anything. The current usage for an anticlimax, a descent " from the sublime to the ridiculous," from the elevated to the commonplace in literature or speech, is due to Pope's satire on Bathos (Miscellanies, 1727-1728), "the art of sinking in poetry." The title was a- travesty of Longinus's essay, On the Sublime, Ilepl uˆous.

ii BATHS. In the ordinary acceptation of the word a bath is the immersion of the body in a • medium different from the ordinary one of atmospheric air, which medium is usually c»m'mon water in some form. In another sense it includes the different media that may be used, and the various arrangements by Which they are applied.

Ancient Baths. — Bathing, as serving both for cleanliness and for pleasure, has been almost instinctively practised by nearly every people. The most ancient records mention bathing in the rivers Nile and Ganges. From an early period the Jews bathed in running water, used both hot and cold baths, and employed oils and ointments. So also did the Greeks; their earliest and commonest form of bathing was swimming in rivers, and bathing in them was practised by both sexes. Warm baths were, accord- ing >td Homer, used after fatigue or exercise. The Athenians appear for a long time to have had only private baths, but after- wards they had public ones: the latter seem to have originated among the Lacedaemonians, who invented the hot-air bath, at least the form of it called after them the laconicum. Although the baths of the Greeks were not so luxurious as those of some other nations, yet effeminate people were accused among them of using warm baths in excess; and the bath servants appear to have been rogues and thieves, as in later and larger establish- ments. The Persians must have had handsomely equipped baths, for Alexander the Great admired the luxury of the bath of Darius.

But the baths of the Greeks, and probably of all Eastern nations, were on a small scale as compared with those which everitually sprang up among the Romans. In early times the Romans used after exercise to throw themselves into the Tiber. Next, When ample supplies of water were brought into the city, large piscinae, or cold swimming baths, were constructed, the

earliest of which appear to have been the piscina publico- (312 B.C.), near the Circus Maximus, supplied by the Appian aqueduct, the lavacrum of Agrippina, and a bath at the end of the Clivus Capitolinus. Next, small public as well as private baths were built; and with the empire more luxurious forms of bathing were introduced, and warm became far more popular than cold baths.

Public baths (balneae) were first built in Rome after Clodius brought in the supply of water from Praeneste. After that date baths began to be common both in Rome and in other Italian cities; and private baths, which gradually came into use, were attached to the villas of the wealthy citizens. Maecenas was one of the first who built public baths at his own expense. After his time each emperor, as he wished to ingratiate himself with the people, lavished the revenues of the state in the construction of enormous buildings, which not only contained suites of bathing apartments, but included gymnasia, and sometimes even theatres and libraries. Such enormous establishments went by the name of thermae. The principal thermae were those of Agrippa 2 1 B.C., of Nero 65 A.D., of Titus 81, of Domitian 95, of Commodus 185, of Caracalla 217, and still later those of Diocletian 302, and of Constantine. The technical skill displayed by the Romans in rendering their walls and the sides of reservoirs impervious to moisture, in conveying and heating water, and in constructing flues for the conveyance of hot air through the walls, was of the highest order.

The Roman baths contained swimming baths, warm baths, baths of hot air, and vapour baths. The chief rooms (which in the largest baths appear to have been mostly distinct, whereas in smaller baths one chamber was made to do duty for more than a single purpose) were the following: — (1) The apodyterium or spoliatorium, where the bathers undressed; (2) the alipterium or unctuarium, where oils and ointments were kept (although the bathers often brought their own pomades), and where th8 aliptae anointed the bathers; (3) the frigidarium, or cool room', cella frigida, in which usually was the cold bath, the piscina o; baptisterium; (4) the tepidarium, a room moderately heated, in which the bathers rested for a time, but which was not meant for bathing; (5) the calidarium or heating room, over the hypocaustum or furnace; this in its commonest arrangement had at one end a warm bath, the alveus or calida lavatio; at the other end in a sort of alcove was (6) the sudatorium or laconicum, which usually had a labrum or large vessel containing water, with which bathers sprinkled themselves to help in rubbing off the perspiration. In the largest baths the laconicum was prob- ably a separate chamber, a circular domical room with recesses in the sides, and a large openiftg in the top; but there is no well-preserved specimen, unless that at Pisa may be so regarded. In the drawing of baths from the thermae of Titus (fig. 1), the laconicum is represented as a small cupola rising in a corner of the calidarium. It is known that the temperature of the laconi- cum was regulated by drawing up or down a metallic plate

cold water — the water being poured longer over his head than on the rest of the body; next to be scraped with the strigil, and lastly to be rubbed and anointed.

The warmest of the heated rooms, i.e. the calidarium and laconicum, were heated directly from the hypocaustum, over which they were built or suspended (suspensura) ; while from the hypocaustum tubes of brass, or lead, or pottery carried the hot air or vapour to the walls of the other rooms. The walls were ■ usually hollow, so that the hot air could readily circulate.

The water was heated ingeniously. Close to the furnace, about 4 in. off, was placed the calidarium, the copper (ahenum) for boiling water, near which, with the same interval between them, was the copper for warm water, the tepidarium, and at the distance of 2 ft. from this was the receptacle for cold water, or the frigidarium, often a plastered reservoir. A constant com- munication was kept up between these vessels, so that as fast as hot water was drawn off from the calidarium a supply was obtained from the tepidarium, which, being already heated, but slightly reduced the temperature of the hotter boiler. The tepidariunij again, wag supplied from the frigidarium, and that from an aqueduct. In this way the heat which was not taken up by the first boiler passed on to the second, and instead of being wasted, helped to heat the second— a principle which has only lately been introduced into modern furnaces. In the case of the large thermae the water of an aqueduct was brought to the castellum or top of the building and was allowed to descend into chambers over the hypocaustum, where it was heated and transmitted in pipes to the central buildings. Remains of this arrangement are to be seen in the baths of Caracalla. The general plan of such buildings may be more clearly understood by the accompanying illustrations. In the well-known drawing (fig. 1) found in the baths of Titus, the name of each part of the building is inscribed on it. The small dome inscribed laconicum directly over the furnace, and having

Fig. 1. — Roman baths.

the clypeus over it, will be observed in the corner of the chamber named concamerata sudatio. The vessels for water are inscribed, according to their temperature, with the same names as some of the

chambers, frigidarium, tepidarium and calidarium.

The baths of Pompeii (as shown in fig. 2) were a double set, and were surrounded with tabernae or shops, which are marked by a lighter shade. There were streets on four sides; and the reservoir supplying water was across the street in the building on the left hand of the cut. There were three public entrances— 21a, 21b, aic— to the men's baths and one to the women's. The furnaces (9) heated water, which was conveyed on one side to the larger baths of the men, on the other to the women's. Entering from the street at 21c there was a latrina on the left hand (22). From this entrance it was usual to proceed to a court (20) surrounded by pillars, where servants were in attendance. There is some doubt as to the purpose to which the room (10) was devoted. Leaving the hall a passage conducted to the apodyterium or dressing-room (17), at one end of it is the frigidarium, baptisterium or cold plunge bath (18). Entering out of the apodyterium is the tepidarium or warming-room (15), which most probably was also used as the alipterium or anointing-room. From it bathers passed into the hot room or calidarium (12), which had at one end the alveus or calida lavatio (13), at the other end the labrum (14). This end of the calidarium served as the laconicum. The arrange-

ments of the women's baths were similar, but on a smaller scale. The calidarium (5) had the labrum (7) at one end, and the alveus (6) Was in one side of the room. The general arrangements of a

Fig. 2. — Ground plan of the baths of Pofnpeii. calidarium are well illustrated by the accompanying sectio|i J(fig. 3) of a bath discovered at Tusculum. The disposition of the parts is the same as at Pompeii. We here have the' calidariurt supported on the pillars of the fornax, the suspensura. The alvestfs (3) is; at one end, and the labrum (4) at the other. (1) andf{2) are -the vessels for water over the fdrnax; afld the passages in the roof and walls for the escape of heated air will be observed.

A clear idea of the relative position of the different rooms, and some slight indication of their ornamentation, will be obtained from fig. 4. The flues under the calidarium and the labrum (1) may be observed, as also the opening in the roof above. (2), (3) and (4) mark the vessels for water which are placed between the men's baths on the left and the women's on the right.

The arrangements of the thermae were mainly those 'of the balneae on a larger scale. Some idea of their size may be gathered

Fig. 3. — Section of bath dis- covered at Tusculum, showingj.the calidarium (hot room).

FRIGIDARIUM TEPIDARIUM CALIDARIUM

Fig. 4. — Section of baths of Pompeii. ‘

from such facts as these, that in the baths of Diocletian one room has been transmuted into a church of most imposing proportions,

and that the outside walls of the baths of Caracalla extend about a quarter of a mile on each of the four sides. A visit to the remains of the baths of Titus,. of Diocletian, or of Caracalla impresses the mind strongly with a sense of the vast scale on which they were erected, and .Ammian-is’s designation of them as provinces appears scarcely exaggerated. It is said that the baths of Caracalla contained 1600, and those of Diocletian 3200 marble seats for the use of the bathers. In the largest of the thermae there was a stadium for the games of the young men, with raised seats for the spectators. There were open colonnades and seats for philo- sophers and literary men to sit and discourse or read their productions aloud or for others to discuss the latest news. Near the porticoes, in the interior open space, rows of trees were planted. There was a sphaeristerium or place for playing ball, which was often over the apodyterium; but it must be cpnfessed that the purposes of many portions of these large edifices have not been made out in as satisfactory a way as tnose of smaller baths. A more definite idea of the thermae-can be best got by an examina- tion of the accompanying plan of the baths of.Caraealla (fig. 5). A good deal of the plan is conjectural, the restoration? being marked by lighter shading.

At the bottom of the plan is shown a long colonnade, which faces the street, behind which was a series of chambers, supposed to have

H llHIH I H l llHllll ll lll l Il llll lll HIIIHIH’lH g

llllllMMIIIlBAIIIllllBaint

gniBiiBiBSIBOgiaDOl ■

Fig. 5. — Ground plan of the baths of Caracalla.

been separate bathing-rooms. Entering by the opening in its centre, the visitor passes what was probably an inner colonnade round the main building. Passing in by either of the gates (2, 2), he reaches the large chamber (3)., which has been variously called the natatio or large swimming-bath, or the tepidarium. The great central room (4) in all probability was the calidarium, with two labra (6, 6) on opposite sides, and with four alvei, one in each corner, represented by small circular dots. (9) has been regarded by some as the laconi-curr, although it appears very large for that purpose. The rooms (15 15) have been variously described as baptisteria and as laconica. Most authors are agreed in thinking that the large rooms (13) and (16) were the sphaeristeria or places for playing ball.

Returning to the outside, (1) and (18) and the corresponding places on the other side are supposed to have been the exedrae for philosophers, and places corresponding to the Greek xysti. (20) and (19) have been considered to be servants' rooms. (22) was the stadium, with raised seats for the spectators. The space between this and the large central hall (9) was planted with trees, and at (21) the aqueduct brought water into the castellum or reservoir, which was on an upper storey. There were upper storeys in most portions of the building, and in these probably were the libraries and small theatres.

The piscinae were often of immense size — that of Diocletian being 200 ft. long — and were adorned with beautiful marbles. The halls were crowded with magnificent columns and were ornamented with the finest pieces of statuary. The walls, it has been said, were covered with exquisite mosaics that imitated the art of the painter in their elegance of design and variety of colour.

The Egyptian syenite was encrusted with the precious green marbles of Numidia. The rooms contained the works of Phidias and Praxiteles. A perpetual stream of water was poured into capacious basins through the wide mouths of lions of bright and polished silver, water issued from silver, and was received on silver. " To such a pitch of luxury have we reached," says Seneca " that we are dissatisfied if we do not tread on gems in our baths."*

The richer Romans used every variety of oils and pomades (smegmata) ; they scarcely had true soaps. The poorer class had to be content with the flour of lentils, an article used at this day for the same purpose by Orientals. The most important bath utensil was the strigillus, a curved instru- ment made of metal, with which the skin was scraped and all sordes removed.

The bath servants assisted in anointing, fl in using the strigillus and in various other v menial offices. The poorer classes had to use their strigils themselves. The various processes of the aliptae seem to have been carried on very systematically.

*The hot baths appear to have been open from 1 p.m. till dark. It was only one of the later emperors that had them lighted up at night. When the hot baths were ready (for, doubtless, the plunge baths were available at an earlier hour), a bell or wswas rung for the information of the people. Among the Greeks and Romans the eighth hour, or 1 o'clock, before their F 6 ,_ R . dinner, was the commonest hour for bathing, which are suspefded The bath was supposed to promote appetite, some of the articles and some voluptuaries had one or more ' n . use m the Alip- baths after dinner, to enable them to begin termm – eating again; but such excesses, as Juvenal tells us, occasionally proved fatal. Some of the most effeminate of the emperors are said to have bathed seven or eight times in the course of the day. In early times there was delicacy of feeling about the sexes bathing together— even a father could riot bathe with his sons; but latterly, under most of the emperors, men and women often us*ed the same baths. There frequently were separate baths for the women, as we see at Pompeii or at Badenweiler; but although respectable matrons would not go to public baths, promiscuous bathing was common during the Empire.*

The public baths and thermae were under the more immediate superintendence of the aediles. The charge made at a public bath was only a quadrans or quarter of an as, about half a farthing. Yet cheap though this was, the emperors used to ingratiate themselves with the populace, by making the baths at times gratuitous.

Wherever the Romans settled, they built public baths; and wherever they found hot springs or natural stufae, they made use of them, thus saving the expense of heating, as at the myrteta of Baiae or the Aquae Sulis of Bath. In the cities there appear to have been private baths for hire, as well as the public baths; and every rich citizen had a set of baths attached to his villa, the fullest account of which is given in the Letters of Pliny, or in Ausonius's Account of a Villa on the Moselle, or in Statius'S De Balneo Etrusco. Although the Romans never wholly gave up cold bathing, and that practice was revived under Augustus by Antonius Musa, and again under Nero by Charmis (at which later time bathing in the open sea became common), yet they chiefly practised warm bathing (calida lavatio). This is the most luxurious kind of bathing, and when indulged in to excess is enervating. The women were particularly fond of these

baths, and were accused, at all events in some provincial cities, of drunkenness in them.

The unbounded license of the public baths, and their connexion

1 The figure represents four strigils, in which the hollow tor collecting the oil or perspiration from the body may be observed. There is also ? small ampulla or vessel containing oil, meant to keep the strigils smooth, and a small flat patera or drinking vessel, out of which it was customary to drink after the bathing was finished.

with modes of amusement that were condemned, led to their being to a considerable extent proscribed by the early Christians. The early Fathers wrote that bathing might be practised for the sake of cleanliness or of health, but not of pleasure; and Gregory the Great saw no objection to baths being used on Sunday. About the 5th century many of the large thermae in Rome fell into decay. The cutting off of the aqueducts by the Huns, and the gradual decrease of the population, contributed to this. Still it is doubtful whether bathing was ever disused to the extent that is usually represented. It was certainly kept up in the East in full vigour at Alexandria and at Brusa. Hot bathing, and especially hot air and vapour baths, were adopted by the Mahommedans; and the Arabs brought them with them into Spain. The Turks, at a later time, carried them high up the Danube, and the Mahommedans spread or, it may be more correct to say, revived their use in Persia and in Hindustan. The Crusaders also contributed to the spread of baths in Europe, and hot vapour baths were specially recommended for the leprosy so prevalent in those days. After the commencement of the 13th century there were few large cities in Europe without hot vapour baths. We have full accounts of their regulations — how the Jews were only allowed to visit them pnce a week, and how there were separate baths for lepers. In England they were called hothouses. Erasmus, at the date of the Reformation, spoke of them as common in France, Germany and Belgium; he gives a lively account of the mixture of all classes of people to be found in them, and would imply that they were a common adjunct to inns. They seem after a time to have become less common, though Montaigne mentions them as being still in Rome in his day. In England the next revival of baths was at the close of the 17th century, under the Eastern name of Hummums or the Italian name of Bagnios. These were avowedly on the principle of the

Turkish baths described below. But there were several considerable epochs in the history of baths, one in the commence- ment of the 1 8th century, when Floyer and others recalled attention to cold bathing, of which the virtues had long been overlooked. In the middle of the century also, Russell and others revived sea-bathing in England, and were followed by others on the continent, until the value of sea-bathing became fully appreciated. Later in the same century the experiments of James Currie on the action of complete or of partial baths on the system in disease attracted attention; and though for- gotten for a while, they bore abundant fruit in more recent times.

Modern Baths. — It is uncertain how far the Turkish and Egyptian and even the Russian baths are to be regarded merely as successors of the Roman baths, because the principle of vapour baths has been known to many nations in a very early period of civilization. Thus the Mexicans and Indians were found using small vapour baths. The ancient inhabitants of Ireland and of Scotland had some notion of their use, and the large vapour baths of Japan, now so extensively employed, are probably of independent origin.

The following accounts of Turkish and Russian baths illustrate the practices of the ancient Roman and also of modern Turkish baths. In Lane's On the Modern Egyptians we read: " The building consists of several apartments, all of which are paved with marble, chiefly white. The inner apartments are covered with domes, which have a number of small glazed apertures for the admission of light. The bather, on entering, if he has a watch or purse, gives them in charge to the keeper of the bath. The servant of the bath takes off his shoes and supplies him with a pair of wooden clogs. The first apartment has generally three or four leewans (raised parts of the floor used as couches) cased with marble, and a fountain of cold water, which rises from an octagonal basement in the centre. One of the leewans, which is meant for the higher classes, is furnished with cushions or mats. In warm weather bathers usually undress in this room; in winter they undress in an inner room, called the beytowwal or first chamber, between which and the last apart- ment there is a passage often with two or three latrines off it. This is the first of the heated chambers. It generally has two

raised seats. The bather receives a napkin in which to put his clothes and another to put round his waist — this reaches to the knees; a third, if he requires it, is brought him to wind round his head, leaving the top of it bare; a fourth to put over his chest ; and a fifth to cover his back. When the bather has un- dressed, the attendant opens to

him the door of the inner and principal apartment. This in general has four leewans, which gives it the form of a cross, and in the centre a fountain of hot water rises from a small shallow basin. The centre room, with the adjoining ones, forms almost a square. The beytowwal already mentioned is one of them. Two small chambers which adjoin each other, one containing a tank of hot water, the other containing a trough, over which are two taps, one of hot and one of cold water, occupy the two other angles; while the fourth angle of the square is occupied by the chamber which contains the fire, over which is the boiler. The bather haying entered this apartment soon perspires profusely from the humid heat which is produced by the hot water of tanks and fountains, and by the steam of the boiler. The bather sits on one of the marble seats, or lies on the leewan or near one of the tanks, and the operator then commences his work. The operator first cracks aloud every joint in the body. He makes the vertebrae of the back and even of the neck crack. The limbs are twisted with apparent violence, but so skilfully, that no harm is ever done. The operator next kneads the patient's flesh. After this he rubs the soles of the feet with a kind of rasp of baked clay. There are two kinds of rasps, one porous and rough, one, of fine smooth clay. Those used by ladies are usually encased in thin embossed silver. The next operation is rubbing the bather's flesh with a small coarse woollen bag, after which the bather dips himself in one of the tanks. He is next taken to one of the chambers in the corner, and the operator lathers the bather with fibres of the palm tree, soap and water. The soap is then washed off with water, when the bather having finished washing, and enveloped himself in dry towels, returns to the beytowwal and reclines. Here he generally remains an hour to an hour and a half, sipping coffee and smoking, while an attendant rubs the soles of the feet and kneads the body and limbs. The bather then dresses and goes out."

The following description of a Russian bath is from Kohl's Russia (1842): " The passage from the door is divided into two behind the check-taker's post, one. for the male, one for the female guests. We first enter an open space, in which a set of men are sitting in a state of nudity on benches, those who have already bathed dressing, while those who are going to undergo the pro- cess take off their clothes. Round this space or apartment are the doors leading to the vapour-rooms. The bather is ushered into them, and finds himself in a room full of vapour, which is surrounded by a wooden platform rising in steps to near the roof of the room. The bather is made to lie down on one of the lower benches, and gradually to ascend to the higher and hotter ones. The first sensation on entering the room amounts almost

to a feeling of suffocation. After you have been subjected for some time to a temperature which may rise to 145° the transpiration reaches its full activity, an.l the sensation is very pleasant. The bath attendants come and flog you with birchen twigs, cover you with the lather of soap, afterwards rub it off, and then hold you over a jet of ice-cold water. The shock is great, but is followed by a pleasant feeling of great comfort and of alleviation of any rheumatic pains you may have had. In regular establish- ments you go after this and lie down on a bed for a time before issuing forth. But the Russians often dress in the open air, and instead of using the jet of cold water, go and roll themselves at once in the snow."

Turkish baths have, with various modifications, become popular in Europe. The Russian baths were introduced into German towns about 1825. They had a certain limited amount of popularity, but did not take firm root. Another class practi- cally owes its origin to Dr Barter and David Urquhart. It pro- fessed to be founded on the Turkish bath, but in reality it was much more of a hot air bath, i.e. more devoid of vapour than either Roman or Turkish baths ever were, for it is doubtful

whether in any case the air of the laconicum was free from vapour. These baths, with their various modifications, have become extremely popular in Great Britain, in Germany and in northern Europe, but have, curiously enough, never been used extensively in France, notwithstanding the familiarity of the French with Turkish baths in Algiers.

In England hot air baths are now employed very extensively. They are often associated with Turkish and electric baths.

Bathing among the ancients was practised in various forms. It was sometimes a simple bath in cold or in tepid water; but at least, in the case of the higher orders, it usually included a hot air or vapour bath, and was followed by affusion of cold or warm water, and generally by a plunge into the piscina. In like manner the order varies in which the different processes are gone through in Turkish baths in modern Europe. Thus in the baths in Vienna, the process begins by immersion in a large basin of warm water. Sudatipn is repeatedly interrupted by cold douches at the will of the bathers, and after the bath they are satisfied with a short stay in the cooling-

room, where they have only a simple sheet rolled round them. In Copenhagen and in Stock- holm the Oriental baths have been considerably modified by their association with hydropathic practices.

This leads us to notice the introduction of the curiously mis- named system known as hydropathy (q.v.). Although cold baths were in vogue for a time in Rome, warm baths were always more popular. Floyer, as we have seen, did something to revive their use in England; but it was nearly a century and a half afterwards that a Silesian peasant, Priessnitz, introduced, with wonderful success, a variety of operations with cold water, the most important of which was the packing the patient in a wet sheet, a process which after a time is followed by profuse suda- tion. Large establishments for carrying out this mode of bathing and its modifications were erected in many places on the con- tinent and in Great Britain, and enjoyed at one time a large share of popularity. The name " hydropathic " is still retained for these establishments, though hydropathy so-called is no longer practised within them to any extent.

But the greatest and most important development of ordinary baths in modern times was in England, though it has extended gradually to some parts of the continent. The English had long used affusion and swimming-baths freely in India. Cold and hot baths and shower baths have been introduced into private houses to an extent never known before; and, since 1842, public swimming-baths, besides separate baths, have been supplied to the public at very moderate rates, in some cases associated with wash-houses for the poorer classes. Their number has increased rapidly in London and in the principal continental cities. Floating-baths in rivers, always known in some German towns, have become common wherever there are flowing streams. The better supply of most European cities with water has aided in this movement. Ample enclosed swimming-baths have been erected at many seaside places. When required, the water, if not heated in a boiler, is raised to a sufficient temperature by the aid of hot water pipes or of steam. Separate baths used to be of wood, painted; they are new most frequently of metal, painted or lined with procelain enamel. The swimming-baths are lined with cement, tiles or marble and porcelain slabs; and a good deal of ornamentation and painting of the walls and ceiling of the apartments, in imitation of the ancients, has been attempted.

We have thus traced in outline the history of baths through successive ages. The medium of the baths spoken of thus far has been water, vapour or dry hot air. But baths of more complex nature, and

of the greatest variety, have been in use from the earliest ages. The best known media are the various mineral waters and sea-water. Of baths of mineral substances, those of sand are the oldest and best known; the practice of arenation or of burying the body in the sand of the seashore, or in heated sand near some hot spring, is very ancient, as also that of applying heated sand to various parts of the body: Baths of peat earth are of comparatively recent origin. The peat earth is carefully prepared and pulverized, and then worked

up with water into a pasty consistence, of which the temperature can be regulated before the patien t immerses himself in it.

There are various terms that may be termed chemical, in which chlorine or hydrochloric acid is added to the water of the bath, or where fumes of sulphur are made to rise and envelop the body.

Of vegetable baths the number is very large. Lees of wine, in a state of fermentation, have been employed. An immense variety of aromatic herbs have been used to impregnate water with. At one time fuci or sea-weed were added to baths, under the idea of conveying into the system the iodine which they contain; but by far the most popular of all vegetable baths are those made with an extract got by distilling certain varieties of pine leaves.

The strangeness of the baths of animal substances, that have been at various times in use, is such that their employment seems scarcely credible. That baths of milk or of whey might be not unpopular is not surprising, but baths of blood, in some cases even of human blood, have been used; and baths of horse dung were for many ages in high favour, and were even succeeded for a short time by baths of guano.

Electrical baths are now largely used, a current being passed through the water; and electrical massage, by the d'Arsonval or other system, is colloquially termed a "bath."

Baths also of compressed air, in which the patient is subjected to the pressure of two or three atmospheres, were formerly employed in some places.

A sun bath (insolatio or heliosis) , exposing the body tc the sun, the head- being covered, Was a favourite practice among the Greeks and Romans.

Some special devices require a few words of explanation.

Douches were used by the ancients, and have always been an

important mode of applying water to a circumscribed portion of the body. They are, in fact, spouts of water, varying in size and temperature, applied by a hose-pipe with more or less force for a longer or shorter time against particular parts. A douche exercises a certain amount of friction, and a continued impulse on the spot to which it is applied, which stimulate the skin and the parts beneath it, quickening the capillary circulation. The effects of the douche are so powerful that it cannot be applied for more than a few minutes continuously. The alternation of hot and cold douches, which for some unknown reason has got the name of Ecossaise, is a very potent type of bath from the strong action and reaction which it produces. The shower bath may be regarded as a union of an immense number of fine douches projected on the head and shoulders. It produces a strong effect on the nervous system. An ingenious contrivance for giving circular spray baths, by which water is propelled laterally in fine streams against every portion of the surface of the body, is now common.

To all these modes of acting on the cutaneous surface and circulation must be added dry rubbing, as practised by the patient with the flesh glove, but much more thoroughly by the bath attendants, if properly instructed (see also Massage).

Action of Baths on the Human System.— The primary operation of baths is the action of heat and cold on the cutaneous surfaces through the medium of water.

The first purpose of baths is simply that of abstersion and cleanliness, to remove any foreign impurity from the surface, and to prevent the pores from being clogged by their own secretions or by desquamations of cuticle. It need scarcely be said that such objects are greatly promoted by the action of the alkali Of soaps and by friction; that the use of warm water, owing to its im- mediate stimulation of the skin, promotes the separation of sordes, and that the vapour of water is still more efficient than water itself.

It has been supposed that water acts on the system by being absorbed through the skin, but, under ordinary circumstances, no water is absorbed, or, if any, so minute a quantity as not to be worth considering. No dissolved substances, Under the ordinary circumstances of a bath, are actually absorbed into the system; although when a portion of skin has been entirely cleared of its sebaceous secretion, it is possible that a strong solution of salts

may be partially absorbed. In the case of medicated baths we therefore only look (in addition to the action of heat and cold, or more properly to the abstraction or communication and retention of heat) to any stimulant action on the skin that the ingredients of the bath may possess.

The powerful influence of water on the capillaries of the skin, and the mode and extent of that operation, depend primarily on the temperature of the fluid. The human system bears changes of temperature of the air much better than changes of the tempera- ture of water. While the temperature of the air at 75° may be too warm for the feelings of many people, a continued bath at that temperature is felt to be cold and depressing. Again, a bath of 98° to 102 acts far more excitingly than air of the same tempera- ture, both because, being a better conductor, water brings more heat to the body and because it suppresses the perspiration which is greatly augmented by air of that temperature. Further, a temperature a few degrees below blood heat is that of indifferent baths, which can be borne longest without natural disturbance of the system.

Cold baths act by refrigeration, and their effects vary according to the degree of temperature. The effects of a cold bath, the temperature not being below 50 , are these :— there is a diminu- tion of the temperature of the skin and of the subjacent tissues; there is a certain feeling of shock diffused over the whole surface, and if the cold is intense it induces a slight feeling of numbness in the skin. It becomes pale and its capillaries contract. The further action of a cold bath reaches the central nervous system, the heart and the lungs, as manifested by the tremor of the limbs it produces, along with a certain degree of oppression of the chest and a gasping for air, while the pulse becomes small and sinks. After a time reaction takes place, and brings redness to the skin and an increase of temperature.

The colder the water is, and the more powerful and depressing its effects, the quicker and more active is the reaction. Very cold baths, anything below 50°, cannot be borne long. Lowering of the temperature of the skin-may be borne down to 9 , but a further reduction may prove fatal. The diminution of temperature is much more rapid when the water is in motion, or when the bather moves about; because, if the water is still, the layer of it in immediate contact with the body is warmed to a certain degree.

A great deal depends on the form of the cold bath; thus one may have

— (1) Its depressing operation, — with a loss of heat, retardation of the circulation, and feeling of weariness, when the same water remains in contact with the skin, and there is contin- uous withdrawal of heat without fresh stimulation. This occurs with full or sitz baths, with partial or complete wrapping up the body in a wet sheet which remains unchanged, and with frictions practised without removing the wet sheets. (2) Its exciting operation, — with quickening of the action of the heart and lungs, and feeling of glow and of nervous excitement and of increased muscular power. These sensations are produced when the layer of water next the body and heated by it is removed, and fresh cold water causes fresh stimulus. These effects are produced by full baths with the water in motion used only for a short time, by frictions when the wet sheet is removed from the body, by douches, shower baths, bathing in rivers, &c. The depressing operation comes on much earlier in very cold water than in warmer; and in the same way the exciting operation comes on faster with the colder than with the warmer water. The short duration of the bath makes both its depressing and its exciting action less; its longer duration increases them; and if the baths be continued too long, the protracted abstraction of animal heat may prove very depressing.

Tepid baths, 85° to 95°. — The effects of a bath of this tempera- ture are confined to the peripheral extremities of the nerves, and are so slight that they do not reach the central system. There is no reaction, and the body temperature remains unchanged. Baths of this kind can be borne for hours with impunity.

Warm baths from 96 to 104°. — In these the action of the heat on the peripheral surface is propagated to the central system, and causes reaction, which manifests itself in moderately increased

flow of the blood to the surface, and in an increased frequency of pulse.

With a hoi bath from 102° up to no° the central nervous and circulating systems are more affected. The frequency of the pulse increases rapidly, the respiration becomes quickened, and is interrupted by deep inspirations. The skin is congested, and there is profuse perspiration.

Very hot baths. — Everything above uo° feels very hot; any- thing above 120° almost scalding. Baths of from 119 to 126 have caused a rise of 2° to 45° in the temperature of the blood. Such a bath can be borne for only a few minutes. It causes great rapidity of the pulse,

extreme lowering of the blood-pressure, excessive congestion of the skin, and violent perspiration.

In the use of hot baths a certain amount of vapour reaches the parts of the body not covered by the water, and is also inhaled.

Vapour baths produce profuse perspiration and act in cleans- ing the skin, as powerful hot water baths do. Vapour, owing to its smaller specific heat, does not act so fast as water on the body. A vapour bath can be borne for a much longer time when the vapour is not inhaled. Vapour baths can be borne hotter than water baths, but cannot be continued too long, as vapour, being a bad conductor, prevents radiation of heat from the body. A higher heat than 1 2 2° is not borne comfortably. The vapour bath though falling considerably short of the temperature of the hot air bath, raises the temperature much more.

Hot air baths differ from vapour baths in not impeding the respiration as the latter do, by depositing moisture in the bron- chial tubes. The lungs, instead of having to heat the inspired air, are subjected to a temperature above their own. Hot air baths, say of 13 5°, produce more profuse perspiration than vapour baths. If very hot, they raise the temperature of the body by several degrees. Vapour baths, hot air baths, and hot water baths agree in producing violent perspiration. As perspiration eliminates water and effete matter from the system, it is obvious that its regulation must have an important effect on the economy.

In comparing the general effects of cold and hot baths, it may be said that while the former tend to check perspiration, the latter favour it.

The warm bath causes swelling and congestion of the capillaries of the surface in the first instance; when the stimulus of heat is withdrawn their contraction ensues. A cold bath, again, first causes a contraction of the capillaries of the surface, which is followed by their expansion when reaction sets in. A warm bath elevates the temperature of the body, both by bringing a supply of heat to it and by preventing the radiation of heat from it. It can be borne longer than a cold bath. It draws blood to the surface, while a cold bath favours internal congestions.

But baths often produce injurious effects when used injudici- ously. Long continued warm baths are soporific, and have, owing to this action, often caused death by drowning. The effects of very hot baths are swimming in the head, vomiting, fainting, congestion of the

brain, and, in some instances, apoplexy.

The symptoms seem to point to paralysis of the action of the heart. It is therefore very evident how cautious those should be, in the use of hot baths, who have weak hearts or any obstruction to the circulation. Fat men, and those in whom the heart or blood-vessels are unsound, should avoid them. Protracted indulgence in warm baths is relaxing, and has been esteemed a sign of effeminacy in all ages. Sleepiness, though it will not follow the first immersion in a cold bath, is one of the effects of protracted cold baths; depression of the temperature of the surface becomes dangerous. The risk in cold baths is congestion of the internal organs, as often indicated by the lips getting blue. Extremely cold baths are always dangerous.

For the medical use of baths see Balneotherapeutics.

Public Baths. — It was not till 1846 that it was deemed advis- able in England, for the " health, comfort, and welfare" of the inhabitants of towns and populous districts, to encourage the establishment therein of baths by the local authority acting through commissioners. A series of statutes, known collectively as " The Baths and Wash-houses Acts 1846 to 1896," followed. By the Public Health Act 1875, the urban authority was declared

to be the authority having power to adopt and proceed under the previous acts, and in 1878 provision was for the first time expressly made for the establishment of swimming baths, which might be used during the winter as gymnasia, and by an amending act of 1899, for music or dancing, provided a licence is obtained. By the Local Government Act 1 894, it was provided that the parish meeting should be the authority having exclusive power of adopting the Baths and Wash-houses Acts in rural districts, which should, if adopted, be carried into effect by the parish council. Up to 1865 it seems as if only twenty-five boroughs had cared to provide bathing accommodation for their inhabitants. There is no complete information as to the number of authorities who have adopted the acts since 1865, but a return of reproductive undertakings presented to the House of Commons in 1899 shows that no local authorities outside the metropolis applied for power to raise loans to provide baths, of whom 48 applied before 1875 and 62 after 1875. In the year 1907 the loans sanctioned for the purpose amounted to

£53,026. The revenues of parish councils are so limited that it has not been possible for them to take much advantage of the acts. In the metropolis, by the Local Government Act of 1894, the power of working the act was given to vestries, and by the act of 1899 this power was transferred to the borough councils. There are 35 parishes in London in which the acts have been adopted, all of which except n have taken action since 1875. These establishments, according to the return made in 1908, provided 3502 private baths and 104 swimming baths. The maximum charge for a second-class cold bath is id,, for a hot bath 2d. In 1904-1905 the number of bathers was 6,342,158, of whom 3,064,998 were bathers in private baths and 3,277,160 bathers in swimming baths. In 1896-1897 the gross total had been only 2,000,000. In cases where the proportion between the sexes has been worked out, it is found that only 18 % of the users of private baths, and 10 % of the users of swimming baths, are females. In 1898 the School Board was authorized to pay the fees for children using the baths if instruction in swimming were provided, and in 1 907-1 908 the privilege was used by 1,556,542 children. The cost of this public provision in London — water being supplied by measure — is over £80,000 a year. No account can be given of the numbers using the ponds and lakes in the parks and open spaces, but it is computed that on a hot Sunday 25,000 people bathe in Victoria Park, London, some of the bathers starting as early as four o'clock in the morning. These returns show how great is the increase of the habit of bathing, but they also show how even now the habit is limited to a comparatively small part of the population. People require to be tempted to the use of water, at any rate at the beginning. There are still authorities in London responsible for 800,000 persons who have provided no baths, and those who have made provision have not always done so in a sufficiently liberal and tempting way. The comparison between English great towns and those of the continent is not in favour of the former.

For the literature of baths in earlier periods we may refer to the Architecture of Vitruvius, and to Lucian's Hippias; see art. " Bader" in Pauly-Wissowa, Realencyclopddie (1896), by A. Mau ; " Balneum " in Daremberg and Saglio, Did. des antiquites ; J. Marquardt, Das Privaileben der Romer (1886), pp. 269-297; Becker's Gallus, and the article " Balneae " by Rich, in Dr Smith's Dictionary of Greek and Roman Antiquities (rev. ed. 1890); also the bibliography to Hydropathy.

BATHURST, EARLS. Allen Bathtjrst, 1st Earl Bathurst (1684-1775), was the eldest son of Sir Benjamin Bathurst (d. 1704), by his wife, Frances (d. 1727), daughter of Sir Allen Apsley of Apsley, Sussex,

and belonged to a family which is said to have settled in Sussex before the Norman Conquest. He was educated at Trinity College, Oxford, and became member of parliament for Cirencester in May 1705, retaining his seat until December 1 7 1 1 , when he was created Baron Bathurst of Battles- den, Bedfordshire. As a zealous Tory he defended Atterbury, bishop of Rochester, and in the House of Lords was an opponent of Sir Robert Walpole. After Walpole left office in 1742 he was made a privy councillor, and in August 1772 was created Earl

Bathurst, having previously received a pension of £2000 a year chargeable upon the Irish revenues. He died on the 16th of September 1775, and was buried in Cirencester church. In July 1704 Bathurst married his cousin, Catherine (d. 1768), daughter of Sir Peter Apsley, by whom he had four sons and five daughters. The earl associated with the poets and scholars of the time. Pope, Swift, Prior, Sterne, and Congreve were among his friends. He is described in Sterne's Letters to Eliza; was the subject of a graceful reference on the part of Burke speaking in the House of Commons; and the letters which passed between him and Pope are published in Pope's Works, vol. viii. (London, 1872).

Henry, 2nd Earl Bathurst (1714-1794), was the eldest surviving son of the 1st earl. Educated at Balliol College, Oxford, he was called to the bar, and became a K.C. in 1745. In April 1735 he had been elected member of parliament for Cirencester, and was rewarded for his opposition to the govern- ment by being made solicitor-general and then attorney-general to Frederick, prince of Wales. Resigning his seat in parliament in April 1754 he was made a judge of the court of common pleas in the following month, and became lord high chancellor in January 1771, when he was raised to the peerage as Baron Apsley. Having become Earl Bathurst by his father's death in September 1775, he resigned his office somewhat unwillingly in July 1778 to enable Thurlow to join the cabinet of Lord North. In November 1779 he was appointed lord president of the council, and left office with North in March 1782. He died at Oakley Grove near Cirencester on the 6th of August 1794. Bathurst was twice married, and left two sons and four daughters. He was a weak lord chancellor, but appears to have been just and fair in his distribution of patronage.

Henry, 3rd Earl Bathurst (1762-1834), the elder son of the second earl, was born on the 22nd of May 1762. In April 1789 he married Georgiana (d. 1841), daughter of Lord George Henry Lennox, and was member of parliament for Cirencester from 1783 until he

succeeded to the earldom in August 1794. Owing mainly to his friendship with William Pitt, he was a lord of the admiralty from 1783 to 1789; a lord of the treasury from 1789 to 1791; and commissioner of the board of control from 1793 to 1802. Returning to office with Pitt in May 1804 he became master of the mint, and was president of the Board of Trade and master of the mint during the ministries of the duke of Portland and Spencer Perceval, only vacating these posts in June 181 2 to become secretary for war and the colonies under the earl of Liverpool. For two months during the year 1809 he was in charge of the foreign office. He was secretary for war and the colonies until Liverpool resigned in April 1827; and deserves some credit for improving the conduct of the Peninsular War, while it was his duty to defend the government concerning its treatment of Napoleon Bonaparte. Bathurst's official position caused his name to be mentioned frequently during the agitation for the abolition of slavery, and with regard to this traffic he seems to have been animated by a humane spirit. He was lord president of the council in the government of the duke of Wel- lington from 1828 to 1830, and favoured the removal of the dis- abilities of Roman Catholics, but was a sturdy opponent of the reform bill of 1832. The earl, who had four sons and two daughters, died on the 27th of July 1834. Bathurst was made a knight of the Garter in 181 7, and held several lucrative sinecures.

His eldest son, Henry George, 4th Earl Bathurst (1790- 1866), was member of parliament for Cirencester from 181 2 to 1834. He died unmarried on the 25th of May 1866, and was succeeded in the title by his brother, William Lennox, 5th Earl Bathurst (1791-1878), member of parliament for Weobley from 1812 to 1816, and clerk of the privy council from 1827 to i860, who died unmarried on the 24th of February 1878.

Allen Alexander, 6th Earl Bathurst (1832-1892), was the son of Thomas Seymour Bathurst, and grandson of the 3rd earl. He was member of parliament for Cirencester from 1857 until he became Earl Bathurst in February 1878, and died on the 2nd of August 1892, when his eldest son, Seymour Henry (b. 1864), I became 7th Earl Bathurst.

BATHURST, a city of Bathurst county, New South Wales, Australia, 144 m. by rail W.N.W. of Sydney on the Great Western railway.

Pop. (1901) 9223. It is situated on the south bank of the Macquarie river, at an elevation of 2153 ft., in a fertile undulating plain on the west side of the Blue Mountains. Bathurst has broad streets,, crossing one another at right angles, with a handsome park in the centre of the town, while many of the public buildings, specially the town hall, government build- ings, and Anglican and Roman Catholic cathedrals, are note- worthy. Bathurst is the centre of the chief wheat-growing district of New South Wales, while gold, copper and silver are extensively mined in its vicinity. There are railway works, coach factories, tanneries, breweries, flour-mills and manu- factures of boots and shoes and other commodities. The town was founded in 1815 by Governor Macquarie, taking its name from the 3rd Earl Bathurst, then secretary of state for the colonies, and it has been a municipality since 1862.

BATHVILLITE, a naturally occurring organic substance. It is an amorphous, opaque, and very friable material of fawn- brown colour, filling cavities in the torbanite or Boghead coal of Bathville, Scotland. It has a specific gravity of 1.01, and is insoluble in benzene.

BATHYBIUS (j3a0fa, deep, and jStos, life), a slimy substance at one time supposed to exist in great masses in the depths of the ocean and to consist of undifferentiated protoplasm. Regarding it as an organism which represented the simplest form of life, Huxley about 1868 named it Bathybius Haeckelii. But in- vestigations carried out in connexion with the " Challenger " expedition indicated that it was an artificial product, composed of a flocculent precipitate of gypsum thrown down from sea- water by alcohol, and the hypothesis of its organic character was abandoned by most biologists, Huxley included.

BATHYCLES, an Ionian sculptor of Magnesia, was commis- sioned by the Spartans to make a marble throne for the statue of Apollo at Amyclae, about 550 b.c. Pausanias (iii. 18) gives us a detailed description of this monument, which is of the greatest value to us, showing the character of Ionic art at the time. It was adorned with scenes from mythology in relief and supporting figures in the round.

For a reconstruction, see Furtwangler, Meisterwerke der griech. Plastik, p. 706.

BATLEY, a municipal borough in the West Riding of York- shire, England, within the parliamentary borough of Dewsbury, 8 m. S.S.W. of Leeds, on the Great Northern, London & North Western,

and Lancashire & Yorkshire railways. Pop. (1900) 30,321. Area 2039 acres. The church of All Saints is mainly Perpendicular, and contains some fine woodwork, mostly of the 17 th century, and some good memorial tombs. The market square contains an excellent group of modern buildings, including the town hall, public library, post office and others. The town is a centre of the heavy woollen trade, and has extensive manu- factures of army cloths, pilot cloths, druggets, flushings, &c. The working up of old material as " shoddy " is largely carried on. There are also iron foundries, manufactures of machinery, and stone quarries. The town lies on the south-west Yorkshire coalfield, and there are a number of collieries in the district. The borough is governed by a mayor, six aldermen, and eighteen councillors.

BATON (Fr. baton, baston, from Late Lat. basto, a stick or staff), the truncheon carried by a field marshal as a sign of authority, by a police constable, &c; in music, the stick with ' which the conductor of an orchestra beats time; in heraldry, the fourth part of a bend, frequently broken off short at the ends so as to be shaped like a rod; in English coats of arms, only as a mark of illegitimacy, the " baton sinister."

BATONI, POMPEO GIROLAMO (1708-1787), Italian painter, was born at Lucca. He was regarded in Italy as a great painter in the 18th century, and unquestionably did much to rescue the art from the intense mannerism into which it had fallen during the preceding century. His paintings, however, are not of the highest order of merit, though they are generally graceful, well designed, and harmoniously coloured. His best production is

thought to be his group of " Peace and War." Batoni painted an unusual number of pictures, and was also celebrated for his portraits.

BATON ROUGE, the capital of Louisiana, U.S.A., and of East Baton Rouge parish, on the E. bank of the Mississippi river, about 70 m. N.W. of New Orleans. Pop. (1890) 10,478; (1900) 11,269, of whom 6596 were of negro descent; (1910 census) 14,897. It is served by the Yazoo & Mississippi Valley railway and by the Louisiana Railway & Navigation Company; and the Texas & Pacific enters Port Allen, just across the liver. The city lies on the river bluff, secure against the highest floods. Old houses in the Spanish style give quaintness to its appearance. The state capitol was built in 1880-1882, replacing another burned in 1862. At Baton Rouge is the State University and Agricultural and Mechanical College (i860), of

which the Audubon Sugar School, " for the highest scientific training in the growing of sugar cane and in the technology of sugar manufacture," is an important and 'distinctive feature. The university grew out of the Louisiana State Seminary of Learning and Military Academy, founded in 1855 near Alexandria and opened in i860 under the charge of W. T. Sherman. In 1869 the institution was removed to Baton Rouge, and in 1877 it was united with the Agricultural and Mechanical College, established in 1873 and in 1874 opened at New Orleans. The campus of the university is the former barracks of the Baton Rouge garrison, occupied by the college since 1886 and transferred to it by the Federal government in 1902. The enrolment of the university in 1ˆ07-1908 was 636. Other important institutions at Baton Rouge are a State Agricultural Experiment Station, asylums and schools for the deaf and dumb, for the blind, and for orphans, and the state penitentiary. The surrounding bluff and alluvial country is very rich. Sugar and cotton plantations and sub- tropic fruit orchards occupy the front-lands on the river. The manufactures include lumber and cotton seed products, and sugar. The value of the city's factory products increased from $7:17,368 in 1900 to $1,383,061 in 1905 or 92.8%. The city is governed under a charter granted by the legislature in 1898. This charter is peculiar in that it gives to the city council the power to elect various administrative boards — -of police, finance, &c. — from which the legislative council of most cities is separated,

Baton Rouge was one of the earliest French settlements in the state. As a part of West Florida, it passed into the hands of the British in 1763, and in 1779 was captured by Bernardo Galvez, the Spanish governor of Louisiana. The town was incorporated in 1817. In 1849 it was made the state capital, remaining so until 1862, when Shreveport became the Con- federate state capital.' In 1864 the Unionists made New Orleans the seat of government. The Secession Ordinance of Louisiana was passed on the 26th of January 1861 by a convention that met at Baton Rouge. On the 2nd of May 1862 the city was captured by the forces of the United States under Col. Benjamin H. Grierson (b. 1826), who had led raiders thither from Tennessee; on the 12th of May it was formally occupied by troops from New Orleans, and was successfully defended by Brig.-Gen. Thomas Williams (1815-1862) against an attack by Confederate forces under General John C. Breckinridge on the 5th of August 1862; Gen. Williams, however, was killed during the attack. Baton Rouge was soon abandoned for a month, was then reoccupied, and was held throughout the rest of the war. It became the state capital again in 1882, in accord- ance with the state constitution of 1879.

For several years after 1840 Zachary Taylor made his home on a plantation near Baton Rouge.

BATRACHIA. The arguments adduced by T. H. Huxley, in his article on this subject in the ninth edition of the Encyclo- paedia Britannica, for applying the name Amphibia to those lung-breathing, pentadactyle vertebrates which had been first severed from the Linnaean Amphibia by Alexandre Brongniart, under the name of Batrachia, have not met with universal acceptance. Although much used in text-books and anatomical works in Great Britain and in Germany, the former name has been discarded in favour of the latter by the principal authors

on systematic herpetology, such as W. Peters, A. Giinther and E. D. Cope, and their lead is followed in the present article. Bearing in mind that Linnaeus, in his use of the name Amphibia, was not alluding to the gill-breathing and air-breathing periods through which most frogs and newts pa6s in the course of their existence, but only wished to convey the fact that many of the Constituents of the group resort to both land and water (e.g. crocodiles), it seems hard to admit that the term may be thus diverted from its original signification, especially when such a change results in discarding the name expressly proposed by Brongniart to denote' the association which has ever since been universally adopted either as an order, a sub-class or a class. Many authors who have devoted special attention to questions of nomenclature therefore think Reptilia and Batrachia the correct names of the two great classes into which the Linnaean Amphibia have been divided, and consider that the latter term should be reserved for the use of those who, like that great authority, the late Professor Peters, down to the time of his death in 1883, would persist in regarding reptiles and batrachians as mere sub-classes (1). However extraordinary it may appear, especially to those who bring the living forms only into focus, that opposition should still be made to Huxley's primary division of the vertebrates other than mammals into Sauropsida (birds and reptiles) and Ichthyopsida (batrachians and fishes), it is certain that recent discoveries in palaeontology have reduced the gap between batrachians and reptiles to such a minimum as to cause the greatest embarrassment in the attempt to draw a satisfactory line of separation between the two; on the other hand the hiatus between fishes and batrachians remains as wide as it was at the time Huxley's

article Amphibia (Encyclopaedia Britannica, 9th ed.) was written.

The chief character which distinguishes the Batrachians from the reptiles, leaving aside the metamorphoses, lies in the arrangement of the bones of the palate, where a large para- sphenoid extends forwards as far or nearly as far as the vomers and widely separates the pterygoids. The bones which bear the two occipital condyles have given rise to much discussion, and the definition given by Huxley in the previous edition — " two occipital condyles, the basi-occipital region of the skull either very incompletely or not at all ossified " — requires revision. Some authors have held that the bone on which the occipital condyles have been found most developed in some labyrintho- donts (2) represents a large basi-occipital bearing two knobs for the articulation with the first vertebra, whilst the skull of the batrachians of the present day has lost the basi-occipital, and the condyles are furnished by the exoccipitals. On the other hand, some reptiles have the occipital condyle divided into two and produced either by the basi-occipital or by the ex- occipitals. But the recent find of a well preserved skull of a labyrinthodont (Capitosaurns stantonensis) from the Trias of Staffordshire has enabled A. S. Woodward (3) to show that, in that form at any rate, the condyles are really exoccipital, although they are separated by a narrow basi-occipital. It is therefore very probable that the authors quoted in (2) were mistaken in their identification of the elements at the base of the foramen magnum. The fact remains, however, that some if not all of the stegocephalous batrachians have an ossified basi-occipital.

As a result of his researches on the anomodont reptiles and the Stegocephalia (4), as the extinct order that includes the well known labyrinthodonts is now called, we have had the proposal by H. G. Seeley (5) to place the latter with the reptiles instead of with the batrachians, and H. Gadow, in his most recent classification (6), places some of them among the reptiles, others being left with the batrachians; whilst H. Credner, basing his views on the discovery by him of various annectent forms between the Stegocephalia and the Rhynchocephalian reptiles, has proposed a class, Eotetrapoda, to include these forms, ancestors of the batrachians proper on the one hand, of the reptiles proper on the other. Yet, that the Stegocephalia, notwithstanding their great affinity to the reptiles, ought to be included in the batrachians as commonly understood, seems sufficiently obvious from the mere fact of their passing through

a branchiate condition, i.e. undergoing metamorphosis (7). The outcome of our present knowledge points to the Stegoce- phalia, probably themselves derived from the Crossopterygian fishes (8),

having yielded on the one hand the true batrachians (retrogressive series), with which they are to a certain extent connected through the Caudata and the Apoda, on the other hand the reptiles (progressive series), through the Rhyncho- cephalians and the Anomodonts, the latter being believed, on very suggestive evidence, to lead to the mammals (9).

*The division of the class Amphibia or Batrachia into four orders, as carried out by Huxley, is maintained, with, however, a change of names: Stegocephalia, for the assemblage of minor groups that cluster round the Labyrinthodonta of R. Owen, which name is re- stricted to the forms for which it was originally in- tended; Peromela, Urodela, Anura, are changed to Apoda, Caudata, Ecaudata, for the reason that (unless obviously misleading, which is not the case in the present instance) the first proposed name should sup- ersede all others for higher groups as well as for genera and species, and the latter set have the benefit of the law of priority. In the first subdivision of the ba- trachians into two families by C. Dumeril in 1806 (Zool. Anal. pp. 90-94) these are termed " Anoures " and " Urodeles " in French, Ecaudati and Caudati in Latin, When Dumeril's pupil, M. Oppel, in 181 1 *», (Ordn. Rept. p. 72), added ", the Caecilians, he named v the three groups Apoda, j, Ecaudata and Caudata.*

Fig. 1. — Upper view of Archego-

saurus Decheni.

(Outlines after Gredner.)

Praemaxilla. st, Supratem-

n,

Nasal.

Maxilla.

Lachrymal.

Praefrontal.

Frontal.

Jugal.

poral.

sq, Squamosal. pto, Postorbital. qj, Quadrato-

jugal. 0, Occipital. pt, Post-tem- poral. q, Quadrate.

The Ptf< Postfrontal. Latin form being the only ^' Panetal – one entitled to recognition in zoological nomenclature, it follows that the last-mentioned names should be adopted for the three orders into which recent batrachians are divided,

I. Stegocephalia (1Q). — Tailed, lacertiform or serpentiform batrachians, with the temporal region of the skull roofed over by postorbital, squamosal, and supratemporal plates similar to the same bones in Crossopterygian fishes, and likewise with paired dermal bones (occipitals and post-temporals) behind the parietals and supratemporals. A parietal foramen; scales or bony scutes frequently present, especially on the ventral region, which is further protected by three large bony plates— interclavicle and clavicles, the latter in addition to cleithra.

Extinct, ranging from the Upper Devonian to the Trias. Our knowledge of Devonian forms is still extremely meagre, the only certain proof of the existence of pentadactyle vertebrates at that period resting on the footprints discovered in Pennsylvania and described by 0. C. Marsh (11) as Tinopus antiquus. Sundry remains from Belgium, as to the identification of which doubts are still Entertained, have been regarded by M. Lohest (12) as evidence of these batrachians in the Devonian. Over 200 species are now distinguished, from the Carboniferous of Europe and North America, the Permian of Spitsbergen, Europe, North America and South Africa, and the Trias of Europe, America, South Africa, India and Australia. The forms of batrachians with which we are acquainted show the vertebral column to have been evolved in the course of time from a notochordal condition with segmented centra similar to that of early bony ganoid fishes (e.g. Caturus, Eurycormus) , to biconcave centra, and finally to the socket-and-ball condition that prevails at the present day. However, owing to the evolution of the vertebral column in various directions, and to the inconstant state of things in certain annectent groups, it is not possible, it seems, to apply the vertebral characters to taxonomy with that rigidity which E. D. Cope and some other recent authors have attempted ti> enforce.

BATRAGHIA

This is particularly evident in the case of the Stegocephalians ; and recent batraehians, tailed and tailless, show the mode of articulation of the vertebrae, whether amphicoelous, opisthocoelous or procoelous, to be of but secondary systematic importance in dealing with these lowly vertebrates. The following division of the Stegocephalians into five sub-orders is therefore open to serious criticism; but it seems on the whole the most natural to adopt in the light of our present knowledge.

A. Rhachitomi, (figs. 1, 2), in which the spinal cord rests on the notochord, which persists uninterrupted and is surrounded by three bony elements in addition to the neural arch: a so-called pleurocentrum on each side, which appears to represent the centrum proper of reptiles and mammals, and an intercentrum or hypecentrum below, which may extend to the neural arch, and probably answers to the hypapophysis, as it is produced into chevrons in the caudal region. Mostly large forms, of Carboniferous and Permian age, with a more or less complex infolding of the wajls of the teeth. Families: Archegosauridae, Eryopidae, Trimerorbachidae, DissorhopHidae. The last is remarkable for an extraordinary endo- and exo-skeletal carapace, Dissorhophus being described by Cope (13) as a " batrachian armadillo."

B. Embolomeri, with the centra and intercentra equally de- veloped disks, of which there are thus two to each neural arch ; these disks perforated in the middle for the passage of the notochord. This type may be directly derived from the preceding, with which it. appears to be connected by the genus Diplospandylus. Fam.: Cricotidae, Permian.

C. Labyrinthodonta, with simple biconcave vertebral disks, very slightly pierced by a remnant of the notochord and supporting the loosely articulated neural arch. . This condition is derived from

nos.

Pl ch

Fig. 2. — A, Dorsal vertebrae. B, Caudal vertebra of Archegosaurus. na, Neural arch; ch, chorda; pi, pleurocentrum; ic, intercentrum.

(Outline after Jaekel.)

that of the Rhachitomi, as shown by the structure of the vertebral column in young specimens. Mostly large forms from the Trias (a few Permian), with true labyrinthic dentition. Families: Labyrinthodontidae, Anthracosauridae, Dendrerpetidae, Nyraniipae.

D. Microsauria, nearest the reptiles, with persistent notochord completely surrounded by constricted cylinders on which the neural arch rests. Teeth hollow, with simple or only slightly folded walls. Mostly of small size and abundant in the Carboniferous and Lower Permian. Families: Urocordylidae, LiMnerpetidae, Hylono- midae (fig. 3), Microbrachidae, Dolichosomatidae ; the latter serpentiform, apodal.

E. Branchiosauria, nearest to the true batraehians; with persistent non-constricted notochord, surrounded by barrel-shaped, bony cylinders formed by the neural arch above and a pair of intercentra below, both these elements taking an equal share in the formation of a transverse process on each side for the support of the rib. This plan of structure, apparently evolved out of the rhachitomous type by suppression of the pleurocentra and the downward extension of the neural arch, leads to that characteristic of frogs in which, as development shows, the vertebra is formed wholly or for the greater part by the neural arch (14). Small forms from the Upper Carboni- ferous and Permian formations. A single family: Branchio- sauridae.

II. Apoda (15). — No limbs. Tail vestigial or absent. Frontal bones distinct from parietals; palatines fused with maxillaries. Male with an intromittent copulatory organ. Degraded, worm-like batraehians of still obscure affinities, inhabiting tropical Africa, south-eastern Asia and tropical America. Thirty-three species are known. No fossils have yet been discovered. It has been attempted of late to do away . with this order altogether and to make the Caecilians merely a family of the Urodeles. This view has originated

out of the very remarkable superficial resemblance between the IchthyophisA&rva and the Amphiuma. Cope (16) regarded the Apoda as the extremes of a line of degeneration from the Salamanders, with Amphiuma as one of the annectent forms. In the opinion of P. and

F. Sarasin (17), whose great work on the development of Ichthyophis is one of the most im- portant recent contribu- tions to our knowledge of the batraehians, Am- phiuma is a sort of neo- tenic Caecilian, a larval form become sexually mature while retaining the branchial respiration. If the absence of limbs and the reduction of the tail were

the only characteristic of the group, there would be, of course, no objection to unite the Caecilians with the Urodeles; but, to say nothing of . the scales, present in many genera of Apodals and absent in all Caudates, which have been shown by H. Credner to be

identical in structure with „ . _ , , , „ ,

*those of Stegocephalians, ¥l(f: }~ A > Dor J s a 1 vertebra of Hylono- the Caecilian skull pre . ™«f (side yiew and front view . B, Dorsal sents features which are vertebra of Bfa»eA**

G. M. Winslow (18), who has made a study of the

chondrocranium of Ichthyophis, concludes that its condition could not have been derived from a Urodele form, but points to some more primitive ancestor. That this ancestor was nearly related to, if not one of, the Stegocephalians, future discovery will in all probability show.

III. Caudata (19). — Tailed batraehians, with the frontals distinct from the parietals and the palatines from the maxillary. Some of the forms breathe by gills throughout their existence, and were formerly regarded as establishing a passage from the fishes to the air-breathing batraehians. They are now considered as arrested larvae descended from the latter. One of the most startling dis- coveries of the decade 1890-1900 was the fact that a number of forms are devoid of both gills and lungs, and breathe merely by the skin and the buccal mucose membrane (20). Three blind cave-forms are known: one terrestrial — Typhlotriton, from North America, and two perennibranchiate — Proteus in Europe and Typhlomolge in North America.

This order contains about 150 species, referred to five families: Hylaeobatrachidae, Salamandridae, Amphiumidae, Protei- dae, Sirenidae.

Fossil remains are few in the Upper Eocene and Miocene of Europe and the Upper Cretaceous of North America. The oldest Urodele known is Hylaeobdtrachus Dollo (21) from the Lower Wealden of Belgium. At present this order is confined to the northern hemi-sphere, with the exception of two Spelerpes from the Andes of Ecuador and Peru, and a Plethodon from Argentina.

IV. Ecaudata (22). — Frogs and toads. Four limbs and no tail. Radius confluent with ulna, and tibia with fibula; tarsus (astragalus and calcaneum) elongate, forming an additional segment in the hind

limb. Caudal vertebrae fused into a urostyle or coccyx. Frontal bones confluent with parietals.

This order embraces about 1300 species, of which some 40 are fossil, divided into two sub-orders and sixteen families: —

A. Aglossa, — Eustachian tubes united into a single ostium pharyngeum ; no tongue. Dactylethridae, Pipidae.

B. Phaneroglossa, — Eustachian tubes separated; tongue present. Discoglossidae.Pelobatidae, Hemiphractidae, Amphi-gnathodontidae, hylidae, bufonidae, dendrophryniscidae, Cystignathidae, Dyscophidae, Genyophrynidae, ENgystoma- fiDAE, Ceratobatrachidae, Ranidae, Dendrobatidae.

The Phaneroglossa are divided into two groups; Arcifera and Firmisternia, representing two stages of evolution. The family characters are mainly derived from the dilatation or non-dilatation of the sacral diapophyses. and the presence of teeth in one or both jaws, or their absence. The Discoglossidae are noteworthy for the presence of short ribs to some of the vertebrae, and in some other points also they approach the tailed batraehians ; they may be safely regarded as, on the whole, the most generalized of known Ecaudata. Distinct ribs are present at an early age in the Aglossa, as discovered by W. G. Ridewood (23). The recent addition of a third genus of Aglossa, Hymenochirus (24) from tropical Africa, combining char-acters of Pipa arid Xenopus, has removed every doubt as to the real affinity which connects these genera. Hymenochirus is further re-markable for the presence of only six distinct pieces in the vertebral

column, which is thus the most abbreviated among all the vertebrata.

Frogs and toads occur wherever insect food is procurable, and their distribution is a world-wide one, with the exception of many islands. Thus New Caledonia, which has a rich and quite special lizard-fauna, has no batrachians of its own, although the Australian Hyla aurea has been introduced with success. New Zealand possesses only one species (Liopelma hochstetteri) , which appears to be rare and restricted to the North Island. The forest regions of southern Asia, Africa and South America are particularly rich in species.

According to our present knowledge, the Ecaudata can be traced

about as far back in time as the Caudata. An unmistakable batrachian of this Order, refe-red by its describer to Palaeobatrachus, a determination which is only provisional, has been discovered in the Kimmeridgian of the Sierra del Montsech, Catalonia (25), in a therefore somewhat older formation than the Wealden Caudata Hylaeobatrachus.

Apart from a few unsatisfactory remains from the Eocene of Wyoming, fossil tailless batrachians are otherwise only known from the Oligocene, Miocene and Pliocene of Europe and India. These forms differ very little from those that live at the present day in the same part of the world, and some of the genera (Discoglossus, Bufo, Oxyglossus, Rana) are even identical. Palaeobatrachus (26), of which a number of species represented by skeletons of the perfect form and of the tadpole have been described from Miocene beds in Ger- many, Bohemia and France, seems to be referable to the Pelo-batidae ; this genus has been considered as possibly one of the Aglossa, but the absence of ribs in the larvae speaks against such an association.

Numerous additions have been made to our knowledge of the development and nursing habits, which are extremely varied, some forms dispensing with or hurrying through the metamorphoses and hopping out of the egg in the perfect condition (27).

Skeleton. — In the earliest forms of this order, the Stegocephalia, we meet with considerable variety in the constitution of the verte- brae, and these modifications have been used for their classification. All agree, however, in having each vertebra formed of at least two pieces, the suture between which persists throughout life. In this they differ from the three orders which have living representatives. Even the inferior arches or chevrons of the tail of salamanders are continuously ossified with the centra. As a matter of fact, these vertebrae have no centra proper, that part which should correspond with the centrum being formed, as a study of the development has shown (H. Gadow, 14), by the meeting and subsequent complete co-ossification of the two chief dorsal and ventral pairs of elements (tail- vertebrae of Caudata), or entirely by the pair of dorsal elements. In the Ecaudata, the vertebrae of the trunk are formed on two different plans. In some the notochord remains for a long time exposed along the ventral surface, and, owing to the absence of cartilaginous formation around it, disappears without ever becom-ing invested otherwise than by a thin elastic membrane; it can be easily stripped off below the vertebrae in larval specimens on the point of metamorphosing. This has been termed the epichordal type.

In others, which represent the perichordal type, the greater share of the formation of the whole vertebra falls to the (paired) dorsal cartilage, but there is in addition a narrow ventral or hypo- chordal cartilage which fuses with the dorsal or becomes connected with it by calcified tissue; the notochord is thus completely sur- rounded by a thick sheath in tadpoles with imperfectly developed limbs. This mode of formation of both the arch and the greater part or whole of the so-called centrum from the same cartilage explains why there is never a neuro-central suture in these ba- trachians.

During segmentation of the dorsal cartilages mentioned above, which send out the transverse processes of diapophyses, there appears between each two centra an intervertebral cartilage, out of which the articulating condyle of the centrum is formed, and becomes attached

Fig. 4. — The first two vertebrae of Necturus. Vl 1 , Atlas ; Vfi, second vertebrae; o, intercondyloid process of the atlas; b, the articular surfaces for the occipital condyles. The ribs of the second vertebra are not represented. A, Dorsal ; B , ventral ; C, lateral view.

either to the vertebra anterior (procoelous type) or posterior (opis- thocoelous type) to it, if not remaining as an independent, inter- vertebral, ossified sphere, as we sometimes find in specimens of Pelobatidae.

In the Caudata and Apoda, cartilage often persists between the vertebrae; this cartilage may become imperfectly separated into a cup-and-ball portion, the cup belonging to the posterior end of the vertebra. In such cases the distinction between amphicoelous and opisthocoelous vertebrae rests merely on a question of ossi-

sy..

Fig. 5. — Necturus. Posterior (A) and ventral (B) views of the sacral vertebrae (S. V.) ; S.R.\ S.R. 1 , sac- ral ribs; //, ilium; Is, ischium.

Fig. 6. — Vertebra! column of Hymeno- chirus (ventral view).

fication, and has occasionally given rise to misunderstandings in the use of these terms.

Amphicoelous (bi-concave) vertebrae are found in the Apoda and in some of the Caudata; opisthocoelous (convexo-concave) verte- brae in the higher Caudata and in the lower Ecaudata ; whilst the great

majority of the Ecaudata have procoelous (concavo-convex) vertebrae.

All living batrachians, and some of the Stegocephalia, have trans- verse processes on the vertebrae that succeed the atlas (fig. 4), some of which, in the Cau- data, are divided into »■>—». ˆ g}

*a dorsal and a ventral -p. n i -0£ii>Z”’ **

portion. Ribs are

present in the lower Ecaudata (Discoglos- sidae and larval Aglossa), but they are never connected with a sternum. It is in fact doubtful whether the so-called sternum of batrachians, in most cases a mere plate of cartilage, has been cor- rectly identified as such. When limbs are present, one vertebra, rarely two (fig- 5) or three, are distinguished as sacral, giving attachment to the ilia. In the Ecau- data, the form of the transverse processes of the sacral vertebra varies very consider- ably, and has afforded important characters to the systematist. In accordance with the saltatorial habits of the members of this order, the vertebrae, which number from 40 to 60 in the Caudata, to up- wards of 200 in the Apoda, have become reduced to 10 as the

Fig. 7. — Chondrocranium of Rana escu- lenta — ventral aspect. The rhinal process. The praenasal processes. The alinasal processes, shown by the removal of part of the floor of the left nasal chamber. AO., The antorbital process. pd, The pedicle of the suspensorium continued into cv, the ventral crus of the suspensorium. Its dorsal crus. The tegmen tympani. The sphen-ethmoid. EO., The exoccipitals. Qu.J., The quadratbjugal. //. V. VI. Foramina by which the optic, trigeminal and portio dura, and ab- normal number, viz., ducens nerves leave the skull, eight praecaudal, one sacral and an elongate coccyx or urostyle, formed by coalescence of at least two vertebrae. In some genera this coccyx is fused with the ninth vertebra, and contributes to the

rp,

pnl, an,

cd,

it,

SE,

sacrum, whilst in a few others the number of segments is still further reduced by the co-ossification of one or two vertebrae preceding that corresponding to the normal sacral and by the fusion of the two first vertebrae, the extreme of reduction being found in

? >» n-n*

Fig. 8. — The skull of Ichthyophis glutinosus. A, Dorsal; B, ventral; C, lateral view. The letters have the same signification as below.

the genus Hymenochirus, the vertebral column of which is figured here (fig. 6.)

As stated above in the definition of the order, the Stenocephalia have retained most of the cranial bones which are to be found in the Crossopterygian fishes, and it is worthy of note that the bones termed

Cost -temporals may give attachment to a further bone so prolonged ackwards as to suggest the probability of the skull being connected with the shoulder-girdle, as in most teleostome fishes. This supposition is supported by a specimen from the Lower Permian of Autun, determined as Actinodon frossardi, acquired in 1902 by the British Museum, which shows a bone, similar to the so-called "epiotic cornu " of the microsaurians, Ceraterpeton and Scincosaurus, to have the relations of the supra-cleithrum of fishes, thus confirming a suggestion made by C. W. Andrews (28). As in fishes also, the sensory canal system must have been highly developed on the skulls of many labynnthodonts, and the impressions left by these canals have been utilized by morphologists for homologizirig the various elements of the cranial roof with those of Crossopterygians. The pineal foramen, in the parietal bones, is as constantly present as it is absent in the other orders. Although not strictly forming part of the skull, allusion should be made here to the ring of sclerotic plates which has been found in many of the Stegocephalia, and which is only found elsewhere in a few Crossopterygian fishes as well as in many reptiles and birds.

In the orders which are still represented at the present day, the bones of the skull are reduced in number and the " primordial skull," or chondrocranium (fig. 7), remains to a greater or less extent unossified, even in the adult. Huxley's figures of the skull of a caecilian (Ichthyophis glutinosus), fig. 8, of a perertnibranchiate

urodele (Necturus maculosus = Menobranchus lateralis), fig. 9, and of a frog (Rana esculenta), fig. 10, are here given for comparison.

The skull, in the Apoda, is remarkably solid and compact, and it possesses a postorbital or postfrontal bone (marked I in the figure) which does not exist in any of the other living batrachians. The squamosal bone is large and either in contact with the frontals and parietals or separated from them by a vacuity; the orbit is sometimes roofed over by bone. The presence, in soma genera, of a second row of mandibular teeth seems to indicate the former existence of a splenial element, such as exists in Siren among the Caudata and apparently in the labyrinthodonts.

In the Caudata, the frontals remain likewise distinct from the parietals, whilst in the Ecaudata the two elements are fused into one, and in a few forms (Aglossa, some Pelobaiidae) the paired condition of these bones has disappeared in the adult. Prefrontal bones are present in the Salamandridae and Amphiumidae, but absent (or fused with the nasals) in the other Caudata and in the Ecaudata. In most of the former the palatines fuse with the vomers, whilst they remain distinct, unless entirely lost, in the latter. The vomer is single, or absent, in the Aglossa. In the lower jaw of most of the Ecaudata the svmphysial cartilages ossify separately from the dentary bones, forming the so-called mento-meckelian bones ; but these svmphysial bones, so distinct in the frog, are less so in the Hylidae and Bufonidae, almost indistinguishable in the Pelobatidae and Discoglossidae, whilst in the Aglossa they do not exist any more than in the other orders of batrachians.

No batrachian is known to possess an ossified azygous supra-occipital.

Although there are four branchial arches in all the larval forms of the three orders, and throughout life in the Sirenidae, the perenni-

Eh-o.

C

Fig. 9. — Lateral, dorsal and ventral views of the cranium of Necturus maculosus. In the dorsal view, the bones are removed from the left half of the skall; in the ventral view, the parasphenoid, palato-pterygoid, and vomers are given in outline. The letters have, for the most part, the same signification as before.

Vll.p, Posterior -division of the a, seventh nerve.

VII. Chorda tympani.

V'yV'.V, First, second and third divisions of the trigeminal.*

s.s.l, Stapedio-suspensorial liga- ment.

h.s.l, Hyo-suspensorial ligament.

m.h.l, Mandibulo-hyoid ligament.

Ascending process of the

suspensorium. Pterygo-palatine process. Quadrate process. Otic process. Posterior nares. Mck, Meckel's cartilage. Gl. (fig. 10), The position of the glottis.

3- 0,

Na

BP, Bb 2 , Basilbranchials.

branchiate Proteidae have only three (see fig. 11). In the adult Apoda these arches and the hyoid fuse into three transverse, curved or angular bones (see fig. 13), the two posterior disconnected from the hyoid. In the Ecaudata, as shown by E. Gaupp (29) and by W. G. Ridewood (30), the whole hyobranchial. apparatus forms a cartilaginous continuum, and during metamorphosis the branchialia disappear without a trace. The hyoid of the adult frog (fig. 12)

consists of a plate of cartilage with two slender cornua, three processes on each side, and two long bony rods behind, termed

the thyro-hyals, which embrace the larynx. In the Aglossa, which are remarkable for the large size and com- plexity of the larynx, the thyro-hyal bones are incorporated into the laryngeal appara- tus, whilst the recently discovered Hymeno- chirus is further re- markable for the large size and ossification of the hyoidean cornua (ceratohyals) , a feature which, though not un- common among the salamanders, is unique among the Ecaudata

(31).

The pectoral girdle of the Stegocephalia is, of course, only known from the ossified ele- ments, the identifica- tion of which has given rise to some diversity of opinion. But C. Gegenbaur's (32) interpretation may be re- garded as final. He has shown that, as in the Crossopterygian and Chondrostean ganp.id fishes, there are two clavicular ele- ments on each side ; the lower corresponds to the clavicle of rep- tiles and higher verte- brates, whilst the up- per corresponds to the clavicle of teleos- tean fishes, and has been named by him "cleithrum." As stated above, there is strong evidence in favour of the view that some forms at least pos- sessed in addition a "supracleithrum," cor- responding to the supra-clavicle of bony

fishes. The element often termed " cora- coid " in these fossils Would be the scapula. ,The clavicles rest on a large discoidal, rhom- boidal, or T-shaped median bone, which clearly corresponds to the interclavicle of reptiles.

The pectoral girdle of the living types of batrachians is dis- tinguishable into a scapular, a coracoidal, and a praecoracoidai region. In most of the Caudata the scapular region alone ossifies, but in the Ecaudata the coracoid is bony and a clavicle is fre- quently developed over the praecoracoid car- tilage. In these ba- the fifth passes trachians the pectoral to the nasal aren f a n s ; nto two dis- cavity. tinet types— the arci-

ferous, in which the

Fig. io. — Dorsal, ventral, lateral ?nd pos- terior views of the skull of Rana esculenta. The letters have the same signification throughout.

Pmx, Premaxilla. Mx, Maxilla.

Vomer.

Nasal.

Sphen-ethmoid.

Frontal.

Parietal. E.O, Exoccipital. Ep, Epiotic process. Pr.O, Pro-otic. t.t, Tegmentympani.

Squamosal.

Quadrato-jugal.

Pterygoid, an- terior process.

Internal process.

Posterior or exter- nal process.

Columella auris.

Stapes.

Vo, Na, S.e, Fr, Pa,

Sq,

% J :

PC,

p 3 ,*

Ca, St,

Hy, Hyoidean cornu

J'.S, Parasphenoid.

An, Angulare.

D, Dentale.

V, Foramen of exit of the trige- minal. Of the optic. Of the pneumo-gastric and glosso-pharyn- geal nerves. Foramen by which the or-bito-nasal or first division of

H,

X,

VK

precoracoid (-fclavicle) and coracoid are widely separated from each other distaily and connected by an arched' cartilage (the epi coracoid). the right usually overlapping the left; and the firmi

Fig. ii. — Hyoid and branchial

apparatus of Necturus maculosus.

Hh, Hypo-hyal. Ep.b],Ep.b,Ep.b',*

Ch, Cerato-hyal. First, second

Bb l , First basi- and third epi-

branchial. branchials.

Bb 2 , Ossified second Gl, Glottis, basibranchial.

sternal, in which both precorac6id and coracoid nearly abut on the median line, and are only narrowly separated by the more or less

fused epicoracoids. The former type is exemplified by the toads and the lower Ecaudata, whilst the latter is characteristic of the true frogs (Ranidae), although when quite young these batrachians present a condition similar to that which persists throughout life in their lower relatives. A cartilage in the median line in front of

the precoracoids, sometimes . ,

supported by a bony style, S?Z?.' Ji "-.

is the so-called Omosternum ; a large one behind the eora- coids, also sometimes pro- vided with a bony style, has been called the sternum. But these names will prob- ably have to be changed when the homologies of these parts are better under- stood.

The pelvic arch of some of the Stegocephalia con- tained a well ossified pubic element, whilst in all other batrachians only the ilium, or the ilium and the ischium are ossified. In the Ecau- data the ilium is greatly elongated and the pubis and ischium are flattened, dis- coidal, and closely applied totheirfellows by their inner surfaces ; the pelvic girdle looks like a pair of tongs.

The long bones of the limbs consist of an axis of cartilage ; the extremities of the cartilages frequently undergo calcification and are thus converted into epiphyses. In the Ecaudata the radius and ulna coalesce into one bone. The carpus, which remains cartilagin- ous in many of the Stegocephalia and Caudata, contains six to eight elements when the manus is fully developed, whilst the number is reduced in those forms which have only two or three digits. Except in some of the Stegocephalia, there are only four functional digits in the manus, but the Ecaudata have a more or less distinct rudi- ment of pollex ; in the Caudata it seems to be the outer digit which has been suppressed, as atavistic reappearance of a fifth digit takes place on the outer side of the manus, as it does on the pes in those forms in which the toes are reduced to four. The usual number of phalanges is 2, 2, 3, 2 in the Stegocephalia and Caudata, 2, 2, 3, 3 in the Ecaudata. In the foot thedigitsusually numberfive.andthephalanges 2, 2, 3, 3, 2 in the Caudata, 2, 2, 3, 4, 3 in the Stegocephalia and Ecaudata. There are occasionally intercalary ossifications between the two distal phalanges (33). There are usually nine tarsal elements in the Caudata; this number is reduced in the Ecaudata, in which the two bones of the proximal row (sometimes coalesced) are much elongated and form an additional segment to the greatly lengthened hind-limb, a sort of crus secundarium. In the Ecaudata also, the tibia and fibula coalesce into one bone, and two or three small bones on

the inner side of the tarsus form what has been regarded as a rudimentary digit or " prehallux."

Integument. — In all recent batrachians, the skin is naked, or if small scales are present, as in many of the Apoda, they are concealed in the skin. The extinct Stegocephalia, on the other hand, were mostly protected, on the ventral sur- face at least, by an armour of overlapping round, oval, or rhomboidal scales, often very similar to those of Crossopterygian or ganoid fishes, and likewise disposed in trans- verse oblique lines converging forwards on the middle line of the belly. Sometimes these scales assumed the importance of scutes and formed a carapace, as in the " batrachian armadillo " discovered by E. D. Cope. A few frogs have the skin of the back studded with stellate bony deposits Phyllomedusa, Nototrema), whilst two genera are remarkable for possessing a bony dorsal shield, free from the vertebrae (Ceratorphrys) or ankylosed to them (Brachycephalus). None of the Stegocephalia appears to have been provided with claws, but some living batrachians (Onychodactylus , Xenopus, Hymenochirus) have the tips of some or all of the digits protected by a claw-like horny sheath.

The integument of tailed and tailless batrachians is remarkable for the gjreat abundance of follicular glands, of which there may be two kinds, each having a special secretion, which is always more or less acrid and irritating, and affords a means of defence against the attacks of many carnivorous animals. A great deal has been

Fig. 12.— Ventral view of the hyoid of Rana esculenta. a, An- terior; 6, lateral; c, posterior processes ; d, thyrohyals.

m

*P.A-**

Ta-

Aui

I'Ao

published on the poisonous secretion of batrachians (34), which is utilized by the Indians of South America for poisoning their arrows.

Some of the poison-secreting glands attain a greater complication of structure and are remarkable for their large size, such as the so-called ” parotoid ” glands on the back of the head in toads and salamanders.

In all larval forms, in the Caudata, and in a few of the Ecaudata (Xenopus, for instance), the epidermis becomes modified in relation with the termination of sensory nerves, and gives rise to organs of the same nature as those of the lateral line of fishes. In addition to diffuse pigment (mostly in the epidermis), the skin contains granular pigment stored up ■ r ‘ in cells, the chromatophores, restricted to the cutis, which are highly mobile and send out MBBSMT 1 ˆ.”* branches which, by contraction and expan- sion, may rapidly alter the coloration, most batrachians being in this respect quite com- parable to the famous chameleons. Besides white (guanine) cells, the pigment includes black, brown, yellow and red. The green and blue, so frequent in frogs and newts, are merely subjective colours, due to inter- ference. On the mechanism of the change of colour, cf. W. Biedermann (35).*

One of the interesting recent discoveries is that of the ” hairy ” frog (Trichobatrachus) , in which the sides of the body and limbs are covered with long villosities, the function of which is still unknown (36).

The nuptial horny asperities with which

the males of many batrachians are provided,

- *for the purpose of clinging- to the females, will*

be noticed below, under the heading Pairing

and Oviposition.

Dentition. — In the Microsauria and Branch- iosauria among the Stegocephalia, as in the other orders, the hollow, conical or slightly curved teeth exhibit simple or only slightly folded walls. But in the Labyrinthodonta, grooves are more or less marked along the teeth and give rise to folds of the wall which, extending inwards and ramifying, produce the complicated structure, exhibited by trans- verse sections, whence these batrachians de- rive their name; a somewhat similar com- plexity of structure is known in some holcp- tychian (dendrodont) Crossopterygian fishes. In the remarkable

*salamander Autodax, the teeth in the jaws are compressed, sharp-edged, lancet shaped. The teeth are not implanted "V in sockets, but become ankylosed with the * v ' c fB$£^S bones that bear them, and are replaced by*

_ others developed at their bases. Teeth are

Fig. 13.— Ventral present in the jaws of all known Stegocephalia view of the head an

Hy' Hyoid. ' they are nearly always absent in the lower

g r i jj r 2 g' r 3 Bran-J aw °f the Ecaudata (exceptions in Hemi-ch'ial arches, phractus, Amphignathodon, Amphodus, Cerato-Glottis. ' batrachus, the male of Dimorphognathus), many

Trachea. °f which (toads, for instance) are entirely

Inferior' vena edentulous.

There is great variety in the distribution

of the teeth on the palate. They may occur

simultaneously on the vomers, the palatines,

~—k right the pterygoids and the parasphenoid in

and reft supe- some of the Stegocephalia (Dawsonia, Seeleya,

rior cavae. Acanthostoma), on the vomers, palatines and

Ta Truncus ar- parasphenoid in many salamandrids {Pletho-

teriosus. dontinae and Desmognathinae) , on the vomers,

Ao, Left aortic pterygoids and parasphenoid (some Pelobates),

arch. on the vomers and parasphenoid (Triprion,

P. A. Right pulmon- Amphodus), whilst in the majority of other

ary artery. The batrachians they are confined to the vomers

pericardium an d palatines or to the vomers alone (37).

(lightly shaded) As regards the alimentary organs, it will

extends as far suffice to state, in this very brief sketch, that

as the bif urea- all batrachians being carnivorous in their

tion of the perfect condition, the intestine is never very

synangium. long and its convolutions are few and simple.

But the larvae of the Ecaudata are mainly

herbivorous and the digestive tract is accordingly extremely elongate

and coiled up like the spring of a watch. The gullet is short, except

in the Apoda. The tongue is rudimentary in the perennibranchiate

Caudata, well developed, and often protrusile, in the Salamandridae

and most of the Ecaudata, totally absent in the Aglossa.

Gl, Tr, Ivc,

cava. V, Ventricle. Au, Auricles. Rsve, Lsvc,

The organs of circulation cannot be dealt with here ; the most important addition made to our knowledge in recent years being found in the contributions of F. Hochstetter (38) and of G. B.. Howes (39), dealing with the azygous (posterior) cardinal veins in salamanders and some of the Ecaudata. The heart is situated quite forward, in the gular or pectoral region, even in those tailed batrachians which have a serpentiform body, whilst in the Apoda (fig. 13) it is moved back to a distance which is comparable to that it occupies in most of the snakes.

The Respiratory Organs. — The larynx, which is rudimentary itt most of the Caudata and in the Apoda, is highly developed in the Ecaudata, and becomes the instrument of the powerful voice with which many of the frogs and toads are provided. The lungs are long simple tubes in some of the perennibranchiate Caudata ; they generally shorten or become cellular in the salamandrids, and attain their highest development in the Ecaudata, especially in such forms as the burrowing Pelobates. Although the lungs are present in such forms as preserve the gills throughout life, it is highly remarkable that quite a number of abranchiate salamanders, belonging mostly to the subfamilies Desmognathinae and Plethodontinae, are devoid of lungs and breathe entirely by the skin and by the bucco-pharyngeal mucose

membrane (20). Some of the Salamandrinae show the inter- mediate conditions which have led to the suppression of the trachea and lungs. In the Apoda, as in many serpentiform reptiles, one of the lungs, either the right or the left, is much less developed than the other, often very short.

Urino-genital Organs.- — The genital glands, ovaries and testes, are: attached to the dorsal wall of the body-cavity, in the immediate vicinity of the kidneys, with which the male glands are intimately connected. The oviducts are long, usually more or less convoluted tubes which open posteriorly into the cloaca, while their anterior aperture is situated far forward, sometimes close to the root of the lung; their walls secrete a gelatinous substance which invests the ova as they descend. In most male batrachians the testes are drained by transverse canals which open into a longitudinal duct, which also receives the canals of the kidneys, so that this common duct conveys both sperma and urine. In some of the discogloesid frogs, however, the seminal duct is quite independent of the kidney; which has its own canal, or true ureter. Many of the Ecaudata have remnants of oviducts, or Miillerian ducts, most developed in Bufo,. which genus is also remarkable as possessing a problematic organ, Bidder's organ, situated between the testis and the adipose or fat-bodies that surmount it. This has been regarded by some • anatomists as a rudimentary ovary. Female salamandrids are provided with a receptaculum seminis. Copulatory organs are absent, except in the Apoda, in which a portion of the cloaca can be everted and acts as a penis. The urinary bladder is always large-

The spermatozoa have received a great share of attention, on the part not only of anatomists and physiologists, but even of sys- tematic workers (40), This is due to the great amount of difference in structure and size between these elements in the various genera; and also to the fact that otherwise closely allied species may, differ very considerably in this respect. The failure to- obtain hybrids between certain species of Rana has been attributed principally to these differences. The spermatozoa of Discoglossus arc remarkable for their great size, measuring three millimetres in length.

Pairing and Oviposition. — Batrachians may be divided into four categories under this head: — (1) no amplexation; (2) amplexation without internal fecundation; (3) amplexation with internal fecun dation; (4) copulation proper. The first category embraces. many aquatic newts, the second nearly all the Ecaudata, the third the rest of the Caudata, and the fourth the Apoda.

In the typical newts {Molge) of Europe, the males are adorned during the breeding season with bright colours and crests or other ornamental dermal appendages, and, resorting to the water, they engage in a lengthy courtship accompanied by lively evolutions around the females, near which they deposit their spermatozoa in bundles on a gelatinous mass, the spermatophore, probably secreted by the cloacal gland. This arrangement facilitates ,the internal fecundation of the female without copulation, the, female absorbs the spermatozoa by squeezing them out of the spermatophore between the cloacal lips. Other newts, and many salamanders, whether terrestrial or aquatic, pair, the male embracing the female about the fore limbs or in the pelvic region, and the males of such forms are invariably devoid of ornamental secondary sexual characters; but in spite of this amplexation the same mode of fecundation by means of a spermatophore is resorted to, although' it may happen that the contents of the spermatophore are absorbed direct from the cloaca of the male. The spermatozoa thus reach the eggs in the oviducts, where they may develop entirely, some of the salamanders being viviparous.

In all the tailless batrachians (with the exception of a single known viviparous toad), the male clings to the fefnale round' the breast, at the arm-pits, or round the waist, and awaits, often for hours or days, the deposition of the ova, which are immediately fecundated by several seminal emissions.

The fourth category is represented by the Apoda or Caecilians in which, as we have stated above, the male is provided with an intromittent organ. Some of these batrachians are viviparous.

In those species in which the embrace is of long duration the limbs

of the male, usually the fore limbs (pleurodele newt, Ecaudata), rarely the hind limbs (a few American and European newts), according to the mode of amplexation, acquire a greater development, and are often armed with temporary horny excrescences which drop off after the pairing season. These asperities usually form brush-like patches on the inner side of one or more of the digits, but may extend over, the inner surface of the limbs and on the breast and chin ; the use of them on these parts is sufficiently obvious, but they are sometimes also present, without apparent function, on various parts

of the foot, as in Discoglossus , Bombinator, and Pelodytes. In some species of the South American frogs of the genus Leptodactylus the breast and hands are armed with very large spines, which inflict deep wounds on the female held in embrace.

In most of the Caudata, the eggs are deposited singly in the axils of water plants or on leaves which the female folds over the egg with her hind limbs. The eggs are also deposited singly in some of the lower Ecaudata. In many of the Ecaudata, and in a few of the Caudata and Apoda, the eggs are laid in strings or bands which are twined round aquatic plants or carried by the parent; whilst in other Ecaudata they form large masses which either float on the surface of the water or sink to the bottom.

A few batrachians retain the ova within the oviducts until the young have undergone part or the whole of the meta morphosis. Viviparous parturition is known among the Caudata (Salamandra, Speierpes fuscus), and the Apoda (Dermophis thomensis, Typhlonectes compressicauda) ; also in a little toad (Pseudophryne vivipara) re- cently discovered in German East Africa (41).

Development and Metamorphosis. — In a great number of batrachians, including most of the European species, the egg is small and the food-yolk is in insufficient quantity to form an external appendage of the embryo. But in a few European and North American species, and in a great many inhabitants of the tropics, the egg is large and a considerable portion of it persists for a long time as a yolk-sac. Although the segmentation is always complete, it is very irregular in these types, some of which make a distinct approach to the meroblastic egg.

With the exception of a number of forms in which the whole development takes place within the egg or in the body of the mother, batrachians undergo metamorphoses, the young passing through a free-swimming, gill- breathing period of considerable duration, during which their appearance, structure, and often their regime, are essentially different from those of the mature fornu Even the fossil Stegocephalia underwent metamorphosis, as we know from various larval remains first described as Branchiosaurus. They are less marked or more gradual in the Apoda and Caudata than in Ecaudata, in which the stage known as tadpole is very unlike the frog or toad into which it rather suddenly passes (see Tadpole). In the Caudata, external gills (three on each side) persist until the close of the metamorphosis, whilst in the Apoda and Ecaudata they exist only during the earlier periods, being afterwards replaced by internal

gills.

Many cases are known in which the young batrachian enters the world in the perfect condition, as in the black salarrtander of the Alps (Salamandra atra) , the cave salamander (Speierpes fuscus) , the caeci;.an Typhlonectes, and a number of frogs, s«ch as Pipa, Rhino- derma, Hylodes, some Nototrema, Rana opisthodon, &c. A fairly complete bibliographical index to these cases and the most remark- able instances of parental care in tailless batrachians will be found in the interesting articles by Lilian V. Sampson (42), and by G. Brandes and W. Schoenichen (43). It will suffice to indicate here in a synoptic form, as was done by the present writer many years ago, when our knowledge of these wonders of batrachian life was far less advanced than it is now, the principal modes of protection which are resorted to : —

I. Protection by means of nests or nurseries.

A. In enclosures in the water. — Hylafaber.

B. In nests in holes near the water.—- Rhacophorus, Lepto-

dactylus.

C. In nests overhanging the water. — Rhacophorus, Chiro-

mantis, Phyllomedusa. • D. On trees or in moss away from the water.' — Rana opistho- don, Hylodes, Hylella platycephala. E. In a gelatinous bag in the water. — Phrynixalus, Salaman- drella.

2 Direct nursing by the parents.

A Tadpoles transported from one place to another. — Dendrebates, Phyllobates, Sooglossus.

B. Eggs protected by the parents who coil themselves round

or " sit " on them. — Manlophryne, Desmognathus , Autodax, Plethodon, Cryptobranchus, Amphiuma, Ichthyophis, Hypogeophis, Siphonops.

C. Eggs carried by the parents.

(a) Round the legs, by the male. — Alytes.

(b) On the back, by the female.

(i) Exposed. — Hyla goeldii, H. evansii, Ceratp- hyla.

(2) In cell-like pouches.— Pi£a.

(3) In a common pouch.- — Nototrema, Amphi- gnathodon.

(c) On the belly.

(1) Exposed, by the female. — Rhacophorus re-

ticulatus,

(2) In a pouch (the produced vocal sac), by the

male. — Rhinoderma.

(d) In the mouth, by the female. — Hylambates brevi-

rostris.

Geographical Distribution. — If a division of the world according to its batrachian faunae were to be attempted, it would differ very considerably from that which would answer for the principal groups of reptiles, the lizards especially. We should have four great realms: — (1) Europe and Northern and Temperate Asia, Africa north of the Sahara (palaearctic region) and North and Central America (nearctic region) ; (2) Africa and South-Eastern Asia (Ethiopian and Indian region) ; (3) South America (neotropical region); and (4) Australia (Australian region). The first would be characterized by the Caudata, which are almost confined to it (although a few species penetrate into the Indian and neotropical regions), the Discoglossidae, mostly Europaeo- Asia tic, but one genus in California, and the numerous Pelobatidae; the second by the presence of Apoda, the prevalence of firmisternal Ecaudata and the absence of Hylidae; the third by the presence of Apoda, the pre-valence of arciferous Ecaudata and the scarcity of Ranidae, the fourth by the prevalence of arciferous Ecaudata and the absence of Ranidae, as well as by the absence of either Caudata or Apoda. Madagascar might almost stand as a fifth division of the world, characterized by the total absence of Caudata, Apoda, and arciferous Ecaudata. But the close relation of its very rich frog-fauna to that of the Ethiopian and Indian regions speaks against attaching too great importance to these negative features. It may be noted here that no two parts of the world differ so considerably in their Ecau-data as do Madagascar and Australia, the former having only Firmisternia, the latter only Arcifera. Although there is much

similarity between the Apoda of Africa and of South America, one genus being even common to both parts of the world, the frogs are extremely different, apart from the numerous representatives of the widely distributed genus BHifo. It may be said that, on the whole, the distribution of the batrachians agrees to some extent with that of fresh-water fishes, except for the much less marked affinity between South America and Africa, although even among the former we have the striking example of the distribution of the very natural group of the aglossal batrachians, represented by Pipa in South America and by Xenopus and Hymenochirus in Africa.

Bibliography. — (i) On the use of the names Batrachia and Amphibia, cf. E. D. Cope, Geol Mag. (3) ii., 1885, p. 575; G. Baur, Science (2), vi., 1897, pp. 170, 372; B. G. Wilder, t.c. p. 295; T Gill, t.c. p. 446; O. P. Hay, t.c. p. 773; T. Gill, Science (2), xx., 1900, p. 730; L. Steineger, op. cil. xx., 1904, p. 924. (2) E. Fraas, " Die Labyrinthodonten der schwabischen Trias," Palaeonlogr. xxxvi., 1889, p. 1. (3) Proc. Zool. Soc.,. 1904, ii. p. 170. (4) E, D. Cope, " Synopsis of the Extinct Batrachia of North America," Proc. Ac. Philad., 1868, p. 208. (5) " Researches on the Structure, Organization and Classification of the Fossil Reptilia, vii " Phil. Trans. clxxxiii. (B), 1892, p. 311. (6) Cambridge Natural History, viii. (1901). (7) "Die Urvierfiissler (Eotetrapoda) des sachsischen Rotliegenden," Allgem. verstdndl. naturh. Abh., Berlin, 1891, No. 15; " Die Entwicklungsgeschichte von Branchiosaurus amblystomus," Zeitschr. deutsch. geol. Ges., 1886, p. 576. (8) C. Emery, " t)ber die Beziehungen des Chiropterygium zum Ichthyopterygium," Zool. Anz. x., 1887, p. I85; E. D.' Cope, "On the Phylogeny of the Vertebrata," Proc. Amcr. Philos. Soc. xxx., 1892, p. 280; H. B. Pollard, " On the Anatomy and Phylogenetic Position of Polypterus," Zool. Jahrb. Anat. v., 1892, p. 414; G. Baur, "The Stegocephali : a Phylogenetic Study," Anat. Anz. xi., 1896, p. 657; L. Dollo, " Sur le phylogenie des dipneustes," Mem. soc. beige geol. ix., 1895, p. 79 ; T. Gill, " On the Derivation of the Pectoral Member in Terrestrial Vertebrates," Rep. Brit. Ass., 1897, p. 697. (9) E. P. Cope, " The Origin of the Mammalia," Proc. Amer. Philos. Soc. xxii., 1884, p. 43; cf. Discussion on Origin of Mammals, Proc. Intern. Congr. Zool., Cambridge, 1898; also H. Gadow, " The Origin of the Mammalia," Z. f. Morphol. iv., 1902, p. 345; and R. Broom, Rep. Brit. Ass., 1905, p. 437. (10) A. Fritsch, Fauna der Gaskohle und der Kalksteine der Permformation Bohmens, vols. i. and ii (Prague, 1879-1885, 4to); H. Credner, " Die Stegocephalen aus dem Rotliegenden des Plauenschen Grundes bei Dresden," Zeitschr. deutsch. geol. Ges., 1881-1894; J. W. Dawson, "On the Results of Recent

Explorations of Erect Trees containing Animal Remains in the Coal Formation of Nova Scotia," Phil. Trans, clxxiii., 1882, p. 621; H. B. Geinitz and J. V. Deichmiiller, " Die Saurier der unteren Dyas von Sachsen," Palaeonlogr. xxix., 1882, p.'i; A. Gaudry, Les Enchainements du monde animal dans les temps geologiques, fossiles primaires (Paris, 1883, 8vo), p. 251; E. D. Cope, " The Batrachia of the Permian Period of North America," Amer. Nat. xviii., 1884, p. 26; E. Fraas, "Die Labyrinthodonten der schwabischen Trias," Palaeontogr. xxxvi., 1889, p. 1; L. v. Ammon, Die permischen Amphibien der Rheinpfalz (Munich, 1889-1891, 4to); R. Lydekker, Catalogue of the Fossil Reptilia and Amphibia in the British Museum, part iv. (London, 1890, 8vo); E. Fraas, Die schwabischen Trias-Saurier nach dem Material der k. Naturalien-Sammlung in Stuttgart zusammengestellt (Stuttgart, 1896, 4to) ; O. Jaekel, " Die Organization

von Archegosaurus," Zeitschr. deutsch. geol. Ges. xlviii., 1896, p. 505; F. Broili, "Ein Beitrag zur Kenntnis von Eryops mega-cephalus," Palaeontogr. xlvi., 1899, p. 61. (11) " Amphibian Foot-prints from the Devonian," Amer. Journ. Sci. ii., 1896, p. 374. (12) " Decouverte du plus ancien amphibien connu . . . dans le famennten superjeur de Modave," Bull. soc. beige geol. xv., 1888, p. cxx, (13) " A Batrachian Armadillo," Amer. Nat. xxix., 1895, p. 998. (14) C. Gegenbaur, Unlersuchungen zur vergleichenden Anatomie der Wirbelsaule bet Amphibien und Reptilien (Leipzig, 1862, 4to); H. Gadow, " On the Evolution of the Vertebral Column of Amphibia and Amniota," Phil. Trans, clxxxvii. (B), 1896, p. I. (IS) R. Wiedersheim, T}ie Anatomie der Cymnophionen (Jena, 1879, 4to); W. Peters, ' Uber die Einteilung der Caecilien," Mon. Berl. Ac, 1879, p. 924; G. A. Boulenger, Catalogue of Batrachia Grddientia s. Catidata and Batrachia Apoda in tlie Collection of the British Museum (London, 1882, 8vo), and " A Synopsis of the Genera and Species of Apodal Batrachians," P.Z.S., 1895, p. 401. (16) " On the Structure and Affinities of the Amphiumidae" Proc. Amer. Philos. Soc. xxiii., 1886, p. 442. (17) Ergebnisse- naturwissenschaft- Ikher Forschungen auf Ceylon, ii. (Wiesbaden, 1887-1890, 4to). (18) " The Chondrocranium of the Ichthyopsida," Stud. Biol. Lab. Tufts Coll. No. 5, 1898, p- 147. (19) G. A. Boulenger, Catalogue, &c, 1882. (20) H. H. Wilder, "Lungenlose Salamandriden," Anat. Anz. ix., 1894, P- 216; L. Camerano, " Ricerche anatomofisiologiche intorno ai Saiamandridi normalmente apneumoni," AUi 'Ace. Torin.

xxix., 1894, p. 705, and xxxi., 1896, p. 512; H. H. Wilder, " Lungless Salamanders," Anat. Anz. xii., 1896, p. 182; E. Loennberg, " Notes on Tailed Batrachians without Lungs," Zool. Anz. xix., 1896, p. 33. (21) " Note sur le batracien de Bernissart," Bull. mus. belg. lii., 1884, p. 85. (22) G. A. Boulenger, Catalogue of Batrachia Salientia s. Ecaudata in the Collection of the British Museum (London, 1882, 8vo). (23) " On the Development of the Vertebral Column in Pipa and Xenopus," Anat. Anz. xiii., 1898, p. 359. (24) G. A. Boulenger, " On Hymenochirus , a New Type of Aglossal Batrachians," Ann. and Mag. N.H. (7), iv., 1899, p. 122. (25) L. M. Vidal, Mem. Ac. Barcelona (3), iv., 1902, No. 18, pi. iv. (26) W. Wolterstorff, "Ober fossile Frosche, insbesondere Palacobatrachus," Jahresb. Nat. Ver. Magdeb., 1885 and 1886. (27) W. Peters, "fiber die Entwickelung eincs Batrachiers. Hylodes martinicensis, ohne Metamorphose," Mon. Berl. Ac, 1876, p. 709; A. Kappler, " Die Tierwelt im hollandischen Guiana," Das Ausland, 1885, p. 358; G. A. Boulenger, " Reptiles and Batrachians of the Solomon Islands," Trans. Zool. Soc. xii., 1886, p. 51 ; H. v. Ihering, " On the Oviposition of Phyllomedusa iheringii," Ann. and Mag. N.H. (5), xvii., 1886, p. 461; H. H. Smith, "On Oviposition and Nursing in the Batrachian genus Dendrobates," Amer. Nat. xxi., 1887, p. 307; G. B. Howes, " Notes on the Gular Brood-pouch of Rhinoderma darwini," P.Z.S., 1888, p. 231; W. J. Holland, "Arboreal Tadpoles," Amer. Nat. xxiii., 1889, p. 383; E. A. Goeldi, " Contribution to the Knowledge of the Breeding Habits of some Tree-frogs of the Serra dos Orgaos, Rio de Janeiro, Brazil," P.Z.S., 1895. p. 89; G. A. Boulenger, . " On the Nursing Habits of two South American Frogs," P.Z.S., 1895, p. 209; A. Brauer, " Ein neuer Fall von Brutpflege bei Froschen," Zool. Jahrb. Syst. xi., 1898, p. 89; S. Ikeda, " Notes on the Breeding Habit and Development of Rhacophorus schlegelii," Annot. Zool. Japan, i., 1898, p. 1 13 ; G. Brandes, " Larven zweier Nototrema-Arten," Verli. deutsch. zool. Ges., 1899, p. 288; L. v. Mehely, " Beitrage zur Kenntnis der Engystomatiden von Neu-Guinea, ' Termes. Fuzetek, Budapest, xxiv., 1901, p. 216; G. A. Boulenger, " Ceratohyla bubalus carrying eggs on its back," P.Z.S., 1903, ii. p. 115; Idem. " Description of a new, Tree-frog of the genus Hyla, from British Guiana, carrying eggs on the back," op. cit., 1904, ii. p. 106; H. S. Ferguson, " Travancore Batrachians," J. Bombay N.H. Soc. xv., 1904, p. 499. (28) Geol. Mag. iv., ii., 1895, p. 83. (29) "Das Hyobranchial-Skelett der Anura," Morph. Arb. iii., I894, p. 399. (30) " On the Structure and Development of the Hyobranchial Skeleton of the Parsley Frog," P.Z.S., 1897, P- 577- (31) W. G. Ridewood, " On the Hyobranchial Skeleton and Larynx of Hymenochirus," J. Linn. Soc. xxviii., 1899, p. 454. (32) Morphol.

Jahrb. xxiii., 1895, p. I. (33) G. B. Howes and A. M. Davies, P.Z.S., 1888, p. 495. (34) G. A. Boulenger, " The Poisonous Secretion of Batrachians," Nat. Science, i., 1892, p. 185; F. Gidon, Venins multiples et toxicite humorale chez les batraciens (Paris, 1897, 8vo). (35) Arch. Ges. Physiol. Ii., 1892, p. 455. (36) G. A. Boulenger, P.Z.S., 1900, p. 433, and 1901, ii. p. 709; H. Gadow, Anat. Anz. xviii., 1900, p. 588. (37) G. A. Boulenger, " On the Presence of Pterygoid Teeth in a Tailless Batrachian, with remarks on the Localization of Teeth on the Palate," P.Z.S., 1890, p. 664. (38) Morphol. Jahrb. xiii., 1887, p. 119. (39) P.Z.S., 1888, p. 122.

(40) G. A. Boulenger, Tailless Batrachians of Europe (1897), p. 75.

(41) G. Tornier, " Pseudophryne vivipara, ein lebendig gebarender Frosch," Sitzb. Ah. Ber. xxxix., 1905, p. 855. (42) " Unusual Modes of Breeding and Development among Anura," Amer. Nat. xxxiv., 1900, p. 405. (43) " Brutpflege der schwanzlosen Batrachier," Abh. Nat. Ges.. Halle, xxii., 1901, p. 395. (G. A. B.)

BATRACHOMYOMACHIA (Gr. j3aTpa X os, " frog," juDs, " mouse," and fiaxy, " battle "), the " Battle of Frogs and Mice," a comic epic or parody on the Iliad, definitely attri- buted to Homer by the Romans, but according to Plutarch (De

Herodoti Malignitate, 43) the work of Pigres of Halicarnassus, the brother (or son) of Artemisia, queen of Carta and ally of Xerxes. Some modern scholars, however, assign it to an anony- mous poet of the time of Alexander the Great.

Edition by A. Ludwich (1896).

BATTA, an Anglo-Indian military term, probably derived from the Canarese bhatta (rice in the husk), meaning a special allowance made to officers, soldiers, or other public servants in the field.

BATTAGLIA, a town of Venetia, Italy, in the province of Padua, 11 m. S.S.W. by rail from Padua. Pop. (1901) 4456. It lies at the edge of the volcanic Euganean Hills, and is noted for its warm saline springs and natural vapour grotto. A fine palace was erected in the Palladian style in the 17th century by Marchese Benedetto Selvatico-Estense, then owner of the springs.

BATTAKHIN, African "Arabs" of Semitic stock. They occupy the banks of the Blue Nile near Khartum, and it was against them that General Gordon fought most of his battles near the town. Their sheikh, El Obeid, routed Gordon's troops on the 4th of September

1884, a defeat which led to the close investment of Khartum. In the 18th century James Bruce described them as " a thieving, pilfering lot."

BATTALION, a unit of military organization consisting of four or more companies of infantry. The term is used in nearly every army, and is derived through Fr. from It. baltaglionc, Med. Lat. battalia (see Battle). " Battalion " in the 16th and 17th centuries implied a unit of infantry forming part of the line. of battle, but at first meant an unusually large battalia or a single large body of men formed of several battalias. In the British regular service the infantry battalion is commanded by a lieut.-colonel, who is assisted by an adjutant, and consists at war strength of about 1000 bayonets in eight companies. Engineers, train, certain kinds of artillery, and more rarely cavalry are also organized in battalions in some countries.

BATTAMBANG, or Battambong (locally Phralabong), the chief town of the north-western division of Cambodia, formerly capital of Monton Kmer, i.e. " The Cambodian Division," one of the eastern provinces of Siam, now included in the French protectorate of Cambodia. It is situated in 103 6′ E., 13 6′ N., in the midst of a fertile plain and on the river Sang Ke, which flows eastwards and falls into the Tonle or Tale Sap, the great lake of Cambodia. The town is a collection of bamboo houses of no importance, but there is a walled enceinte of some historical interest. Trade is small and is carried on by Chinese settlers, chiefly overland with Bangkok, but to a small extent also by water with Saigon. The population is about 5000, two-thirds Cambodian and the remainder Chinese and Siamese. The language is Cambodian.

Battambang was taken by the Siamese when they overran the kingdom of Cambodia towards the end of the 18th century, and was recognized by the French as belonging to Siam when the frontier of Cambodia was adjusted by treaty in 1867-1872. In another treaty in 1893, Siam bound herself to maintain no armed forces there other than police, but this arrangement was annulled by the treaty of 1904, by which Battambang was definitely admitted to lie within the French sphere of influence. Under a further treaty in March 1907 (see Siam), the district of Battambang was finally ceded to the French.

BATTANNI, or Bhitani, a small tribe on the Waziri border of the North-West Frontier Province of India. The Battannis hold the hills on the borders of Tank and Banttu in the Dera Ismail Khan district, from the Gabar mountain on the north to the Gomal valley on the

south. They are only 3000 fighting men strong, and are generally regarded as the jackals of the Waziris. Their chief importance arises from the fact that no raids can be carried into British districts by the Mahsud Waziris without passing through Battanni territory. A small British expedition against the Battannis was led by Lt.-Col. Rynd in 1880. Under the excitement caused by the preaching of a fanatical mullah the Mahsud Waziris had attacked the town of Gomal. The Battannis failed to supply information as to their

movements, and gave them a passage through their lands. The British troops accordingly stormed the Hinis Tangi defile in face of opposition, and burned the village of Jandola.

BATTAS (Dutch Battaks), the inhabitants of- the formerly independent Batta country, in the central highlands of Sumatra, now for the most part subjugated to the Dutch government. The still independent area extends from o8°-ao° 35′ E., and 2 "-3° 25′ S. North-east of Toba Lake dwell the Timor Battas, and west of it the Pakpak, but on its north (in the mountains which border on the east coast residency) the Karo Battas form a special group, which, by its dialects and ethnological character, appears to be allied to the Gajus and Alias occupying the interior of Achin. The origin of the Battas is doubtful. It is not known whether they were settled in Sumatra before the Hindu period. Their language contains words of Sanskrit origin and others referable to Javanese, Malay and Tagal influence. Their domain has been doubtless much curtailed, and their absorption into the Achin and Malay population seems to have been long going on. The Battas are undoubtedly of Malayan stock, and by most authorities are affiliated to that Indonesian pre-Malayan race which peopled the Indian Archipelago, expelling the aboriginal negritos, and in turn themselves submitting to the civilized Malays. In many points the Battas are physically quite different from the Malay type. The average height of the men is 5 ft. 4 in. ; of the women 4 ft. 8 in. In general build they are rather thickset, with broad shoulders and fairly muscular limbs. The colour of the skin ranges from dark brown to a yellowish tint, the darkness apparently quite independent of climatic influences or distinction of race. The skull is rather oval than round. In marked contrast to the Malay type are the large, black, long- shaped eyes, beneath heavy, black or dark brown eyebrows. The cheek-bones are somewhat prominent, but less so than among the Malays. The Battas. are dirty in their dress and dwellings

*and eat any kind of food, though they live chiefly on rice. They are remarkable as a people who in many ways are cultured and possess a written language of their own, and yet are cannibals. The more civilized of them around Lake Toba are good agri- culturists and stock-breeders, and understand iron-smelting. They weave and dye cotton, make jewellery and krisses which are often of exquisite workmanship, bake pottery, and build pic- turesque chalet-like houses of two storeys. They have an organ- ized government, hereditary chiefs, popular assemblies, and a written civil and penal code. There is even an antiquated postal system, the letter-boxes being the hollow tree trunks at cross- roads. Yet in spite of this comparative culture the Battas have long been notorious for the most revolting forms of cannibalism. (See Memoirs of the Life, 6*c, of Sir T. S. Raffles, 1830.)*

The Battas are the only lettered people of the Indian Archi- pelago who are not Mahommedans. Their religion is mainly confined to a belief in evil spirits; but they recognize three gods, a Creator, a Preserver and a Destroyer, a trinity suggestive of Hindu influence.

Up to the publication of Dr H. N. van der Tuuk's essay, Over schrift en uitspraak der Tobasche taal (1855), our knowledge of the Batta language was confined to lists of words more or less com- plete, chiefly to be found in W. Marsden's Miscellaneous Works,. in :F. W. Junghuhn's Battalander, and in the Tijdschrifb van het Bataviaasch Genootschap, vol. hi. (1855). By his exhaustive works (Bataksch Leesboek, in 4 vols., 1861-1862; Bataksch- nederduitsch Woordenboek, 1861; Tobasche Spraakkunst, 1864- 1867) van der Tuuk made the Batta language the most accessible of the various tongues spoken in Sumatra. According to him, it is nearest akin to the old Javanese and Tagal, but A. Schreiber {Die Battas in ihrem Verhaltnis zu den Malaien von Sumatra, 1874) endeavoured to prove its closer affinity with the Malay proper. Like most languages spoken by less civilized tribes, Batta is poor in general terms, but abounds in terms for special objects. The number of dialects is three, viz. the Toba, the Mandailing and the Dairi dialects; the first and second have again two subdivisions each. The Battas further possess six peculiar or recondite modes of speech, such as the hata andung, or language of the wakes, and the hata poda or the soothsayer's

language. A fair acquaintance with reading and writing is very general among them. Their alphabet is said, with the Rejang and Lampong alphabets, to be of Indian origin. The language is written on bark or bamboo staves from bottom to top, the lines being arranged from left to right. The literature consists Chiefly in books

on witchcraft, in stories, riddles, incantations, &c, and is mostly in prose, occasionally varied by verse. 1

See also " Reisen nach dem Toba See," Petermanns Mitteil. (1883) ; Modigliani, Fra i Batacchi indipendenti (Rome, 1892) ; Neumann, " Het Pane- en Bilastroomgebied," Tydschr. Aardr. Gen., 1885-1887; Van Dijk in the same periodical (1890-1895); Wing Easton in the Jaarboek voor het Mynwezen, 1 894; Niemann in the Encyclopaedia van Nederlandsch-Indie, under the heading Bataks, with very detailed bibliography; Baron J, v. Brenner, Besuch bei den Kannibalen Sumatras (Wurzburg, 1893) ; H. Breitenstein, 21 Jahre in Indien, r Java, Sumatra (Leipzig, 1899-1900) ; G. P. Rouffaer, Die Balik- Kunst in niederldndisch-Indien und ihre Geschichte (Haarlem, 1899).

BATTEL, or Battels (of uncertain origin, possibly connected with " battle," a northern English word meaning to feed, or "batten"), a word used at Oxford University for the food ordered by members of the college as distinct from the usual " commons "; and hence college accounts for board and provi- sions supplied from kitchen and buttery, and, generally, the whole of a man's college accounts. " Batteler," now a resident in a college, was originally a rank of students between commoners, and servitors who, as the name implies, were not supplied with " commons," but only such provisions as they ordered for themselves.

BATTEN, SIR WILLIAM (floruit 1626-1667), British sailor, son of Andrew Batten, master in the royal navy, first appears as taking out letters of marque in 1626, and in 1638 he obtained the post of surveyor to the navy, probably by purchase. In March 1642 he was appointed second-in-command under the earl of Warwick, the parliamentary admiral who took the fleet out of the king's hands. It was Vice-Admiral Batten's squadron which bombarded Scarborough when Henrietta Maria landed there. He was accused (it appears unjustly) by the Royalists of directing his fire particularly en the house occupied by the queen, and up to the end of the First Civil War showed himself a steady partisan of the parliament. To the end of the First Civil War, Batten continued to patrol the English seas, and his action in 1647 in bringing into Portsmouth a number of Swedish ships of war and merchantmen, which had refused the customary salute to the flag, was approved by parliament. When the Second Civil War began he was distrusted by the Independents and removed from his command, though he confessed his continued willingness to serve the state. When part of the fleet revolted against the parliament, and joined the prince of Wales in Holland, May 1648,

Batten went with them. He was knighted by the prince, but being suspected by the Royalists, was put ashore mutinously in Holland and returned to England. He lived in retirement during the Commonwealth period. At the Restoration Sir William Batten became once more surveyor of the navy. In this office he was in constant intercourse with Pepys, whose diary frequently mentions him; but the insinuations of Pepys against him must not be taken too seriously, as there is no, evidence to show that Batten in making a profit from his office fell below the standards of the time. In 1661 he became M.P. for Rochester, and in 1663 he was made master of the Trinity House. He died in 1667.

There is no separate life of Batten, but many notices of him will be found in Penn's Life of Sir W. Penn, and in Pepys' Diary.

BATTEN. (1) A term (a form of " baton ") used in joinery {q.v.) for a board not more than 4 to 7 in. broad or 3 in. thick, used for various purposes, such as for strengthening or holding together laths and other wood- work; and specially, on board ship, a strip of wood nailed to a mast to prevent rubbing, or fixing down a tarpaulin over a hatchway, in. rough weather, to keep out water. (2) A verb (the root is found in words of several Teutonic languages meaning profit or improvement, and also in the English "better"

1 Mr C. A. van Ophuijsen has published (in Bijd. tot Land-, Taal- en Volken-Kunde, 1886) an interesting collection of Battak poetry. He describes a curious leaf language used by Battak lovers, in which the name of some leaf or plant is substituted for the word with which it has greatest phonetic similarity.

and "boot") meaning to improve in condition, especially in the case of animals by feeding; so, to feed gluttonously; the word is used figuratively of prospering at the expense of another.

BATTENBERG, the name of a family of German counts which died out about 13 14, whose seat was the castle of Kellerburg, near Battenberg, a small place now in the Prussian province of Hesse-Nassau. The title was revived in 185.1, when Alexander (1823ˆ 1888), a younger son of Louis II., grand-duke of Hesse, contracted a morganatic marriage with a Polish lady, Countess Julia Theresa von Haucke (1825-1895), who was then created countess of Battenberg.

Raised to the rank of a princess in 1858, the countess and her children were allowed to style themselves princes and princesses of Battenberg, with the addition of Durchlaucht or Serene Highness. The eldest son of this union, Louis Alexander (b. 1854), married in 1884 Victoria, daughter of Louis IV., grand- duke of Hesse, and became an admiral in the British navy. The second son, Alexander Joseph (q.v.), was prince of Bulgaria from 1879 to 1886. The third son, Henry Maurice, was born in 1858, and married op the 23rd of July 1885 Beatrice, youngest daughter of Victoria, queen of England. He died at sea on the 20th of January 1896 when returning from active service with the British troops during the Ashanti War, and left three sons and a daughter, Victoria Eugenie, who was married 011906 to Alphonso XIII. , king of Spain. The fourth son, Francis Joseph, born in 1861, married in 1897 Anna, daughter of Nicholas I., prince of Montenegro, and is the author of Die volkswirtschaftliche Entwickelung Bulgariens von j8yp bis zur Gegenwart (Leipzig, i8f)i). The only daughter of the princess of Battenberg, Marie Caroline, born in 1852, was married in 1871 to Gustavus Ernest, prince and count of Erbach-Schonberg.

BATTER, an architectural term of unknown origin, used of the face of a wall which is slightly inclined to the perpendicular. It is most commonly employed in retaining walls, the lower courses of which are laid at right angles to the batter, so as to resist the thrust of the earth inside. For aesthetic reasons it is often adopted in the lowest or basement porticos of a great building. From a historical point of view it is the most ancient system employed, as throughout Egypt and Chaldaea all the temples built in unburnt brick were perforce obliged to be thicker at the bottom, and this gave rise to the batter or raking side which was afterwards in Egypt copied in stone. For defensive purposes the walls of the lower portions of a fortress were built with a batter as in the case of the tower of David and some of the walls built by Herod at Jerusalem. The Crusaders also largely adopted the principle, which was followed in some of the castles of the middle ages throughout Europe.

BATTERING RAM (Lat. aries, ram), a military engine used before the invention of cannon, for beating down the walls of besieged fortresses. It consisted of a long heavy beam of timber, armed at the extremity with iron fashioned something like the head of a ram. In its simplest form the beam was carried in the hands of the soldiers, who assailed the walls with it by main force. The improved ram was composed of a longer beam, in some cases extending to 120 ft., shod with iron at one end, and suspended, either by the middle or from two points, from another beam laid across two posts. This is the kind

described by Josephus as having been used at the siege of Jerusalem (B.J. iii. 7. 19). The ram was shielded from the missiles of the besieged by a penthouse (vinea) or other overhead protection. It was often mounted on wheels, which greatly facilitated its operations. A hundred soldiers at a time, and sometimes even a greater number, were employed to work it, and the parties were relieved in constant succession. No wall could resist the continued application of the ram, and the greatest efforts were always made to destroy it by various means, such as dropping heavy stones on the head of the ram and on the roof of the penthouse; another method being to seize the ram head with grapnels and then haul it up to. a vertical position by suitable windlasses on the wall of the fortress. Sometimes the besieged ran countermines under the ram pent- house; this if successful would cause the whole engine to fall into the excavation. In medieval warfare the low penthouse, called tat, was generally employed with some form of ram.

BATTERSEA, a south-western metropolitan borough of London, England, bounded N. by the Thames, N.E. by Lambeth, and S.E., S., and W. by Wandsworth. Pop. (1901) 168,907. The principal thoroughfares are Wandsworth Road and Battersea Park and York Roads from east to west, connected north and south with the Victoria or Chelsea, Albert and Battersea bridges over the Thames. The two first of these three are handsome suspension bridges; the third, an iron structure, replaced a wooden bridge of many arches which was closed in 1881, after standing a little over a century. Battersea is a district mainly consisting of artisans' houses, and there are several large factories by the river. The parish church of St Mary, Church Road (1776), preserves from an earlier building stained glass and monuments, including one to Henry St John, Viscount Bolingbroke (d. 1751), and his second wife, who had a mansion close by. Of this a portion remains on the riverside, containing a room associated with Pope, who is said to have worked here upon the " Essay on Man." Wandsworth Common and Clapham Common (220 acres) lie partly within the borough, but the principal public recreation ground is Battersea Park, bordering the Thames between Albert and Victoria Bridges, beautifully laid out, containing a lake and subtropical garden, and having an area of nearly 200 acres. It was constructed with difficulty by embanking the river and raising the level of the formerly marshy ground, and was opened in 1858. Among institutions are the Battersea Polytechnic, the Royal Masonic Institution for girls, founded in 1788, and Church of England and Wesleyan Training Colleges. Battersea is in the parliamentary borough of Battersea and Clapham, including the ; whole of the

Battersea division and part of the Clapham division. , The borough council consists of a mayor, 9 aldermen and 54 councillors. Area, 2160-3 acres.

An early form of the name is Patricsey or Peter's Island; the manor at the time of the Domesday survey, and until the sup- pression of the monasteries, belonging to the abbey of St Peter, Westminster. It next passed to the crown, and subsequently to the family of St John and to the earls Spencer. York Road recalls the existence of a palace of the archbishops of York, occasionally occupied by them between the reigns of Edward IV. and Mary. Battersea Fields, bordering the river, were formerly a favourite resort, so that the park also perpetuates a memory, The art of enamelling was introduced, c. 1750, at works in Batter- sea, examples from which are highly valued.

BATTERY (Fr. batterie, from battre, to beat), the action of beating, especially in law the unlawful wounding of another (see Assault). The term is applied to the apparatus used in batter- ing, hence its use in military organization for the unit of mobile artillery of all kinds. This consists of from four to eight guns with their personnel, wagons and train. In the British service the term is applied to field, horse, field-howitzer, heavy and mountain artillery units. " Battery " is also used to imply a mass of guns in action, especially in connexion with the military history of the 18th and early 19th centuries. In siegecraft, a battery is simply an emplacement for guns, howitzers or mortars, constructed for the purposes of the siege, and protected as a rule by a parapet. In fortification the term is applied similarly to permanent or semi-permanent emplacements for the artillery of the defence. In all these senses the presence of artillery is implied in the use of the word (see Artillery, and Fortification and Siegecraft). The word is also used for the " pitcher " and " catcher " in baseball; for a collection of utensils, primarily of hammered copper or brass, especially in the French term batterie de cuisine; and for the instruments of percussion in an orchestra.

Electric Battery. — This term was applied by the old electricians to a collection of Leyden jars, but is now used of, a device for generating electricity by chemical action, or more exactly, of a number of such devices joined up together. There are two main classes of electric battery, In primary batteries, composed of a number of galvanic or voltaic " cells," " couples ". or " elements," on the completion of the interactions between the substances on which the production of electricity depends, the activity of the cells comes to an end, and can only be restored with the aid of

a fresh supply of those substances; in secondary batteries, also called storage batteries or accumulators (g.v.), the substances after the exhaustion of the cells can be brought back to a condi- tion in which they will again yield an electric current, by means of an electric current passed through them in the reverse direc- tion. The first primary battery was constructed about 1799 by Alessandro Volta. In one form, the "voltaic pile," he placed a series of pairs of copper and zinc disks one above the other, separating each pair from the one above it by a piece of cloth moistened with a solution of common salt. In another form, the " couronne de tasses," he took a number of vessels or cells con- taining brine or dilute acid, and placed in each a zinc plate and a copper plate; these plates were not allowed to touch each other within the vessels, but each zinc plate was connected to the copper plate of the adjoining vessel. In both these arrangements an electric current passes through a wire which is connected to the terminal plates at the two ends of the series. The direction of this current is from copper to zinc; within each cell itself it is from zinc to copper. The plate to which the current flows within the cell is the negative plate, and that from which it flows the positive plate; but the point on the negative plate at which the current enters the external wire h the positive pole, and the point on the positive plate at which it leaves the external circuit the negative pole. During the time that the external connexion is maintained between the two poles and the current passes in the wire, the zinc or positive plates are gradually dissolved, and hydrogen gas is liberated at the surface of the copper or negative plates; but when the external connexion is broken this action ceases. If the materials used in the cells were perfectly pure, probably the cessation would be complete. In practice, however, only impure commercial zinc is available, and with this corrosion continues to some extent, even though the external circuit is not closed, thus entailing waste of material. This " local action" is explained as due to the fact that the impurities in the zinc plate form miniature voltaic couples with the zinc itself, thus causing its corrosion by voltaic action; and an early improve- ment in the voltaic cell was the discovery, applied by W. Sturgeon in 1830, that the evil was greatly reduced if the surface of the zinc plates was amalgamated, by being rubbed with mercury under dilute sulphuric acid. Another disadvantage of the simple cell composed of copper and zinc in dilute acid is that the current it yields rapidly falls off. The hydrogen formed by the operation of the cell does not all escape, but some adheres as a film to the negative plate, and the result is the

establishment of a counter or reverse electromotive force which opposes the main current flowing from the zinc plate and diminishes its force. This pheno- menon is known as "polarization," and various remedies have been tried for the evils it introduces in the practical use of primary batteries. Alfred Smee in 1839 modified the simple copper-zinc couple excited by dilute sulphuric acid by sub- stituting for the copper thin leaves of platinum or platinized silver, whereby the elimination of the hydrogen is facilitated; and attempts have also been made to keep the plates free from the gas by mechanical agitation. The plan usually adopted, however, is either to prevent the formation of the film, or to introduce into the cell some " depolarizer " which will destroy it as it is formed by oxidizing the hydrogen to water (see also Electrolysis).

The former method is exemplified in the cell invented by J. F. Daniell in 1836. Here the zinc stands in dilute sulphuric acid (or in a solution of zinc sulphate), and the copper in a saturated solution of copper sulphate, the two liquids being separated by a porous partition. The hydrogen formed by the action of the cell replaces copper in the copper sulphate, and the displaced copper, instead of the hydrogen, being deposited on the copper plate polarization is avoided. The electromotive force is about one volt. This cell has been constructed in a variety of forms to suit different purposes.' In a portable form, designed by Lord Kelvin in 1858, the copper plate, soldered to a gutta- percha covered wire, is placed at the bottom of a glass vessel and covered with crystals of copper sulphate; over these wet sawdust is sprinkled, and then mere sawdust, moistened with

solution of zinc sulphate, upon which is placed the zinc plate. The Minotto cell is similar, except that sand is substituted for sawdust. In these batteries the sawdust or sand takes the place of the porous diaphragm. In another class of batteries the diaphragm is dispensed with altogether, and the action of gravity alone is relied upon to retard the interdiffusion of the liquids. The cell of J. H. Meidinger, invented in 1859, may be taken as a type of this class. The zinc is formed into a ring which fits the upper part of a glass beaker filled with zinc sulphate solution. At the bottom of the beaker is placed a smaller beaker, in which stands a ring of copper with an insulated connecting wire. The mouth of the beaker is closed by a lid with a hole in the centre, through which passes the long tapering neck of a glass balloon filled with crystals of copper sulphate; the narrow end of this neck dips into the smaller beaker, the copper sulphate slowly runs out, and being specifically heavier than the zinc sulphate it collects at the bottom about the copper ring. In Lord Kelvin's tray-cell a large wooden tray is lined with lead, and is covered at the

*bottom with copper by electrotyping. The zinc plate is enveloped in a piece of parchment paper bent into a tray shape, the whole resting on little pieces of wood placed on the bottom of the leaden tray. Copper sulphate is feci in at the edge of the tray and zinc s*ulphate is poured upon the parchment. A battery is formed by arranging the trays in a stack one above the other.*

Various combinations have been devised in which the hydrogen is got rid of more or less completely by oxidation. Sir W. R. Grove in 1839 employed nitric acid as the oxidizing agent, his cell consisting of a zinc positive plate in dilute sulphuric acid', separated by a porous diaphragm of unglazed earthenware from a platinum negative immersed in concentrated nitric acid. Its electromotive force is nearly two volts, but it has the objection of giving off disagreeable nitrous fumes. R. W. von Bunsen modi- fied Grove's cell by replacing the platinum with the much cheaper material, gas carbon. Chromic acid is much used as a de- polarizer, and cells in which it is employed are about as powerful as, and more convenient than, either of the preceding. In its two-fluid form the chromic acid cell consists of a porous pot containing amalgamated zinc in dilute sulphuric acid, and a carbon plate surrounded with sulphuric acid and a solution of potassium or sodium bichromate or of chromic acid. But it is commonly used in a one-fluid form, the porous pot being dis- pensed with, and both zinc and carbon immersed in the chromic acid solution. Since the zinc is dissolved even when the circuit is not closed, arrangements are frequently provided by which cither the zinc plate alone or both plates can be lifted out of the solution when the cell is not in use. In preparing the solution the sodium salt is preferable to the potassium, and chromic acid to either. In the cell devised by Georges Leclanche in 1868 a solid depolarizer is employed, in the shape of manganese dioxide packed with fragments of carbon into a porous pot round a carbon plate. A zinc rod constitutes the positive plate, and the exciting fluid is a solution of sal-ammoniac. Sometimes no porous pot is employed, and the manganese dioxide and granu- lated carbon are agglomerated into a solid block round the carbon plate. The electromotive force is about one and a half volt. The cell is widely used for such purposes as ringing electric bells, where current is required intermittently, and for such service it will remain effective for months or years, only needing water to be added to the outer jar occasionally to replace loss by evaporation. On a closed circuit the current rapidly falls off, because the manganese dioxide is unable to oxidize all the hydrogen formed, but the cell quickly recovers after polarization. The so-called " dry cells," which came into considerable use towards the end of the

19th century, are essentially Leclanche' cells in which the solution is present, not as a liquid, but as a paste formed with some absorbent material or gelatinized. Black oxide of copper is another solid depolarizer, employed in the Lalande cell. In the Edison-Lalande form the copper oxide is suspended in a light copper frame. The exciting solution consists of one part of caustic soda dissolved in three parts by weight of water, and to prevent it from being acted on by the

carbonic acid of the air it is covered with a layer of petroleum oil. Sodium zincate, which is soluble, is formed by the action of the cell, and the hydrogen produced is oxidized by oxygen from the copper oxide. The electromotive force may be about one volt initially, but in practice only about three-quarters of a volt can be relied on.

Primary cells form a convenient means of obtaining electricity for laboratory experiments, and for such light services as working telegraphs, bells, &c; but as a source of the heavy currents required for electric lighting and traction they are far too expensive in operation, apart from other considerations, to compete with dynamoelectric machinery driven by steam or water power. Certain forms, known as " standard cells," are also used in electrical measurements as standards of electromotive force (see Potentiometer).

See W R Cooper, Primary Batteries (London, 1901) ; Park Benjamin, The Voltaic Cell (New York, 1893) ; W. E. Ayrton, Prac- tical Electricity (London, 1896).

BATTEUX, CHARLES (17 13-1780), French philosopher and writer on aesthetics, was born near Vouziers (Ardennes), and studied theology at Reims. In 1739 he came to Paris, and after teaching in the colleges of Lisieux and Navarre, was appointed to the chair of Greek and Roman philosophy in the College de France. In 1746 he published his treatise Les Beaux- Arts riduits a un mime principe, an attempt to find a unity among the various theories of beauty and taste, and his views were widely accepted. The reputation thus gained, confirmed by his translation of Horace (1750), led to his becoming a member of the Academie des Inscriptions (1754) and of the French Academy (1761). His Cours de belles lettres (1765) was afterwards included with some minor writings in the large treatise, Principes de la litterature (1774). The rules for composition there laid down are, perhaps, somewhat pedantic. His philosophical

writings were La Morale d' Epicure tirie de ses propres ecrits (1758), and the Histoire des causes premieres (1769). In consequence of the freedom with which in this work he attacked the abuse of authority in philo- sophy, he lost his professorial chair. His last and most extensive work was a Cours d'itudes d I'usage des Sieves de I'ecole militaire (45 vols.). In the Beaux- Arts, Batteux developed a theory which is derived from Locke through Voltaire's sceptical sensualism. He held that Art consists in the faithful imitation of the beautiful in nature. Applying this principle to the art of poetry, and analysing, line by line and even word by word, the works of great poets, he deduced the law that the beauty of poetry con- sists in the accuracy, beauty and harmony of individual expres- sion. This narrow and pedantic theory had at least the merit of insisting on propriety of expression. His Histoire des causes premieres was among the first attempts at a history of philosophy, and in his work on Epicurus, following on Gassendi, he defended Epicureanism against the general attacks made against it.

See Dacier et Dupuy, " Eloges," in Memoires de V Academie des Inscriptions.

BATTHYANY, LOUIS (Lajos), Count (1 806-1 849), Hungarian statesman, was born at Pressburg in 1806. He supplied the defects of an indifferent education while serving in garrison in Italy as a lieutenant of hussars, and thenceforward adopted all the new ideas, economical and political. According to Sz6chenyi, he learnt much from a German tutor of the radical school, but it was not till after his marriage with the noble- minded and highly-gifted countess Antonia Zichy that he began working earnestly for the national cause. When Szechenyi drew nearer to the court in 1839-1840, Batthyany became the leader of the opposition in the Upper House, where his social rank and resolute character won for him great influence. Despite his " sardanapalian inclinations," he associated himself un- reservedly with the extremists, and spent large sums for the development of trade and industry. In 1847 he fiercely opposed the government, procured the election of Kossuth as the repre- sentative of Pest, took part in the Great Deputation of the 15th of March, and on the 31st of March 1848 became the first constitutional prime-minister of Hungary. His position became extremely difficult when Jellachich and the Croats took up arms. Convinced that the rigid maintenance of the constitution

was the sole panacea, he did his utmost, in his frequent journeys to

Innsbruck, to persuade the court to condemn Jellachich and establish a strong national government at Pest. Unfortunately, however, he was persuaded to consent to the despatch of Magyar troops to quell the Italian rising, before the Croat difficulty had been adjusted, and thenceforth, despite his perfect loyalty, and his admirable services as Honved minister in organizing the national forces, his authority in Hungary declined before the rising star of Kossuth. When Jellachich invaded Hungary, Batthyany resigned with the intention of forming a new ministry excluding Kossuth, but this had now become impossible. Then Batthyany attempted to mediate between the two extreme parties, and subsequently raised a regiment from among his peasantry and led them against the Croats. On the nth of October he was incapacitated for active service by a fall from his horse which broke his arm On his recovery he returned to Pest, laboured hard to bring about peace, and was a member of the deputation from the Hungarian diet to Prince Windischgratz, whom the Austrian commander refused to receive. A few days later (8th of January 1849) he was arrested at Pest. As a magnate he was only indictable by the grand justiciary, as a minister he was responsible to the diet alone. At Laibach, whither he was taken, he asked that Deak might be his advocate, but this being refused he wrote his own defence. Sentence of hanging was finally pronounced upon him at Olmtitz for violating the Pragmatic Sanction, overthrowing the constitution, and aiding and abetting the rebellion. To escape this fate he Stabbed himself with a small concealed dagger, and bled to death in the night of the 5th of October 1849.

See Bertalan Szemere, Batthyany, Kossuth, Gorget (Ger.) , (Hamburg, 1853). (R. N- B.)

BATTICALOA, the provincial capital of the eastern province of Ceylon, on the E. coast, 69 m. S.S.E. of Trincomalee, situated on an island in lat. 7 44′ N. and long. 8i° 52′ E. It is of import- ance for its haven and the adjacent salt lagoons. The population of the town in 1901 was 9969; of the district (2872 sq. m.) 143,161. The old Dutch fort dates from 1682. Batticaloa.is the seat of a government agent and district judge; criminal sessions of the supreme court are also held. Rice and cocoanuts are the two staples of the district, and steamers trading round the island call regularly at the port. The lagoon is famous for its ” singing fish,” supposed to be shell-fish which give forth musical notes. The district has a remnant of Veddahs or wild men of the wood. The average annual rainfall is 555 in. ; the average temperature 80-4° F.

BATTISHILL, JONATHAN (1738-180!), one of the best 18th century

English composers of church music. Until 1764 he wrote chiefly for the theatre (incidental songs, pantomime music, and an opera in collaboration with Michael Arne, the son of Thomas Arne), but his later compositions are chiefly glees, part-songs and church music. In 1763 he had married a singer at Covent Garden theatre where he was harpsichordist. She retired from her profession when she married; and her death in 1777 so crushed him that he composed no more.

BATTLE, a market-town in the Rye parliamentary division of Sussex, England, 545 m. S.E. by S. from London by the South Eastern & Chatham railway. Pop. of urban district (1901) 2996. It is pleasantly situated in an undulating well- wooded district, 7 m. from the sea at Hastings. Its name is derived from the conflict in 1066, which insured to William the Norman the crown of England (see also Battle Abbey Roll); Before the battle, in which King Harold fell, William vow«d to build an abbey on the spot if he should prove victorious, and in 1094 the consecration took place with great pomp. The gate- house, forming a picturesque termination to the main street of the town, is Decorated; and there also remain parts of the foundations of the Norman church, of the Perpendicular cloisters, and of the Early English refectory. A mansion occupies part of the site, and incorporates some of the ancient building. The church of St Mary is of various dates, the earliest portions being transitional Norman.

See Chronicles of Battle Abbey. 1066-1176. translated, &c, by M. A. Lower (London, 185 1).

BATTLE, a general engagement between the armed forces, naval or military, of enemies. The word is derived from the Fr. bataille, and this, like the Ital. ballaglia, and Span. batalla, eomes from the popular Lat. battalia for battualia. Cassiodorus Senator (48o-?57s) says: Battualia quae vulgo Batalia dicuntur .... exercitationes militum vel gladiatorum significant (see Du Cange, Glossarium, s.v. Batalia). The verb battuere, cognate with " beat," is a rare word, found in Pliny, used of beating in a mortar or of meat before cooking, Suetonius (Caligula, 54. 32) uses it of fencing, battuebat pugnatoriis armis, i.e. not with blunted weapons or foils. Battalia or batalia was used for the array of troops for battle, and hence was applied to the body of troops so arranged, or to a division of an

army, whence the use of the word " battalion " (q.v.).

A "pitched battle," loosely used as meaning almost a decisive engagement, is strictly, as the words imply, cne that is fought on ground previously selected (" pitched " meaning arranged in a fixed order) and in accordance with the intentions of the com- manders of both sides ; the French equivalent is bataille arrangteˆ opposed to bataille manceuvree, which is prearranged but may come off on any ground. With " battle," in its usual meaning of a general engagement of hostile forces, are contrasted " skir- mish,", 1 a fight between small bodies ("skirmishing" technically means fighting by troops in extended or irregular order), and " action," a more or less similar engagement between large bodies of troops. (See also Tactics and Strategy.)

BATTLE ABBEY ROLL. This is popularly supposed to have been a list of William the Conqueror's companions preserved at Battle Abbey, on the site of his great victory over Harold. It is known to us only from 16th century versions of it published by Leland, Holinshed and Duchesne, all more or less imperfect and corrupt. Holinshed's is much the fullest, but of its 629 names several are duplicates. The versions of Leland and Duchesne, though much shorter, each contain many names found in neither of the other lists. It was so obvious that several of the names had no right to figure on the roll, that Camden, as did Dugdale after him, held them to have been interpolated at various times' by the monks, "not without their own advantage." Modern writers have gone further, Sir Egerton Brydges denouncing the roll as " a disgusting forgery," and E. A. Freeman dismissing it as " a transparent fiction." An attempt to vindicate the roll was made by the last duchess of Cleveland, whose Battle Abbey Roll (3 vols., 1880) is the best guide to its contents.

It is probable that the character of the roll has been quite misunderstood. It is not a list of individuals, but only of family surnames, and it seems to have been intended to show which families had "come over with the Conqueror," and to have been compiled about the 14th century. The compiler appears to have been influenced by the French sound of names, and to have included many families of later settlement, such as that of Grandson, which did not come to England from Savoy till two centuries after the Conquest. The roll itself appears to be unheard-of before and after the 16th century, but other lists were current at least as early as the 15th century, as the duchess of Cleveland has shown. In 1866 a list of the Conqueror's followers, compiled from Domesday and other authentic records, was set up in Dives church by M. Leopold Delisle, and is

printed in the duchess' work. Its contents are naturally sufficient to show that the Battle Roll is worthless.

See Leland, Collectanea; Holinshed, Chronicles of England; Duchesne, Hisloria Norm. Scriptores; Brydges, Censura Literaria; Thierry, Conquite de V Angleterre , vol. ii. (1839); Burke, The Roll of Battle Abbey (annotated, 1848); Planche, The Conqueror and His Companions (1874) ; duchess of Cleveland, The Battle Abbey Roll (1889); Round, The Companions of the Conqueror" {Monthly Review, 1901, iii. pp. 91-111). (J. H. R.)

BATTLE CREEK, a city of Calhoun county, Michigan, U.S.A., at the confluence of the Kalamazoo river with Battle Creek, about 48 m. S. of Grand Rapids. Pop. (1890) 13,197; (1900) 18,563,

1 This is the same word as " scrimmage," and is derived from the Anglo-French eskrimir, modern escrimer, properly to fight behind cover, now to fence. The origin of tjhis is the Old High German seirman, to fight behind a shield, scirn\, Modern German Schirm.

of whom 1844 were foreign-born 5(1910, census) 25,267. It is served by the Michigan Central and the Grand Trunk railways, and by interurban electric lines. Here are the hospital and laboratories of the American Medical Missionary College (of Chicago) and the Battle Creek Sanitarium, established in 1866, which was a pioneer in dietetic reform, and did much to make Battle Creek important in the manufacture of health foods, and in the publication of diet-reform literature. Among the principal buildings, besides the hospital and the sanitarium, are several fine churches, the central high school, the Post tavern and the Post theatre. The city is a trading centre for the rich agricul- tural and fruit-growing district by which it is surrounded, has good water-power, and is an important manufacturing centre, its chief manufactured products being cereal health foods, for which it has a wide reputation, and the manufacture of which grew out of the dietetic experiments made in the laboratories of the sanitarium; and threshing machines and other agricultural implements, paper cartons and boxes, flour, boilers, engines and pumps. Extensive locomotive and car shops of the Grand Trunk railway are here. In 1904 the total factory product of Battle Creek was valued at $12,298,244, an increase of 95% over that for 1900; and of the total in 1904 $5,191,655 was the value of food preparations, which was 8-5% of the value of food preparations manufactured in the United States, Battle Creek thus ranking first among American cities in this industry. The water-works are owned and operated by the municipality, the water being obtained from

Lake Goguac, a summer pleasure resort about 2 m. from the city. Battle Creek, said to have been named from hostilities here between some surveyors and Indians, was settled in 1831, incorporated as a village in 1850; and chartered as a city in 1-859, the charter of that year being revised in 1900.

BATTLEDORE AND SHUTTLECOCK, a game played by two persons with small rackets, called battledores, made of parchment or rows of gut stretched across wooden frames, and shuttlecocks, made of a base of some light material, like cork, with trimmed feathers fixed round the top. The object of the players is to bat the shuttlecock from one to the other as many times as possible without allowing it to fall to the ground. There are Greek drawings extant representing a game almost identical with battledore and shuttlecock, and it has been popular in China, Japan, India and Siam for at least 2000 years. In Europe it has been 'played by children for centuries. A further development is Badminton.

BATTLEMENT (probably from a lost Fr. form bastillement, cf. mod. Fr. bastille, from Med. Lat. bastilia, towers, which is derived from Ital. bastire, to build, cf. Fr. b&tir; the English word was, however, early connected with " battle "), a term given to a parapet of a wall, in which portions have been cut out at intervals to allow the discharge of arrows or other missiles; these cut-out portions are known as " crenels "; the solid widths between the " crenels " are, called " merlons." The earliest example in the palace at Medinet-Abu at Thebes in Egypt is of the inverted form, and is said to have been derived from Syrian fortresses. Through Assyria they formed the termination of all the walls surrounding the towns, as shown on bas reliefs from Nimrud and elsewhere. Traces of them have been found at Mycenae, and they are suggested on Greek vases. In the battlements of Pompeii, additional protection was given by small internal buttresses or spur walls against which the defender might place himself so as to be protected completely on one side. In the battlements of the middle ages the crenel was about one-third of the width of the merlon, and the latter was in addition pierced with a small slit. The same is also found in Italian battlements, where the merlon is of much greater height and is capped in a peculiar fashion. The battlements of the Mahommedans had a more decorative and varied character, and were retained from the 13th century onwards not so much for defensive purposes as for a crowning feature to their walls. They may be regarded therefore in the same light as the cresting found in the Spanish renaissance. The same retention of the battlement as a purely decorative feature is found throughout the Decorated and

Perpendicular periods, and not only occurs on parapets but on the transoms of windows and on the tie-beams of roofs and on screens. A further decorative treatment was given in the elaborate panelling of the merlons and that portion of the parapet walls rising above the cornice, by the introduction of quatrefoils and other conventional forms filled with foliage and shields.

BATTUE (from Fr. battre, to beat), the beating of game from cover under the sportsmen's fire; by analogy the word is used to describe any slaughter of defenceless crowds.

BATTUS, the legendary founder of the Greek colony of Cyrene in Libya (about 630 B.C.). The Greeks who accompanied him were, like himself, natives of Thera, and descended partly from the race of the Minyae. Various accounts are given both of the founding of Cyrene and of the origin of the founder's name. According to the Cyrenaeans (Herod, iv. 150-156), Battus, having an impediment in his speech, consulted the oracle at Delphi, and was told to found a colony in Libya; according to the Theraeans, Battus was entrusted with this mission by their aged king Grinus. In another version, there was civil war in Thera; Battus, leader of one party, was banished, and, on applying to the oracle, was recommended to take out a colony to " the continent " (Schol. Pindar, Pyth. iv. 10). In any case the foundation is attributed to the direct instructions of Apollo. The name was connected by some with (5a,TTa.pi$w, ("stammer"), but Herodotus (iv. 155) says that it was the Libyan word for " king," that Battus was not called by the name until after his arrival at Libya, and that the oracle addressed him as " Battus " by anticipation. This, however, would imply on the part of the oracle a knowledge of Libya, which was not shared by the rest of Greece (Herod. I.e.), and it is noteworthy that the name occurs in Arcadian and Messenian legends. Herodotus does not know his real name, but Pindar {Pyth. v. 1 16) , no doubt rightly, calls the founder of the colony Aristoteles, while Justin (xiii. 7) gives his name as Aristaeus who was worshipped at Cyrene. Four kings named Battus, alternating with four named Arcesilaus, ruled in Cyrene (q.v .) till the fall of the dynasty about 450 B.C.

SeeR.W. Macan's Herodotus IV. VI. (1895), v °l l – pp.104.seq. and notes.

BATU, or Rock Islands (Dutch Batoe), a group of three greater and forty-eight lesser islands in the Dutch East Indies, W. of Sumatra, between o° 10′ N. to 0° 45′ S. and 97 50'- 98 35′ E., belonging to the Ayerbangi district of the lowlands of Padang (Sumatra). They are separated by the strait of Sibirut from the Mentawi group. The three chief islands, from N. to S., are Pini or Mintao, Masa, and Bala. The total land area of the group is 445 sq. m. The islands are generally low, and covered with forest, in which the cocoanut palm is conspicuous. There is trade in cocoanuts, oil, and other forest produce. The natives, about 3000 in number, are of Malayan or pre-Malayan stock, akin to those of the island of Nias to the north-west. Only about twenty of the smaller islands are inhabited.

BATUM, a seaport of Russian Transcaucasia, in the govern- ment of and 90 m. by rail S.W. of the city of Kutais, on the S.E. shore of the Black Sea, in 41 39′ N. and 41 38′ E. Pop. (1875) 2000; (1900) 28,512, very mixed. The bay is being filled up by the sand carried into it by several small rivers. The town is protected by strong forts, and the anchorage has been greatly improved by artificial works. Batum possesses' a cathedral, finished in 1903, and the Alexander Park, with sub-tropical vegetation. The climate is very warm, lemon and orange trees, magnolias and palms growing in the open air; but it is at the same time extremely wet and changeable. The annual rainfall (90 in.) is higher than anywhere in Caucasia, but it is very un- equally distributed (23 in. in August and September, sometimes 16 in. in a couple of days), and the place is still most unhealthy. The town is connected by rail with the main Transcaucasian railway to Tiflis, and is the chief port for the export of naphtha and paraffin oil, carried hither in great part through pipes laid down from Baku, but partly also in tank railway-cars; other exports are wheat, manganese, wool, silkworm-cocoons,

liquorice, maize and timber (total value of exports nearly 5! millions sterling annually). The imports, chiefly tin plates and machinery, amount to less than half that total. Known as Bathys in antiquity, as Vati in the middle ages, and as Bathumi since the beginning of the 17 th century, Batum belonged to the Turks, who strongly fortified it, down to 1878, when it was transferred to Russia. In the winter of 1905-1906 Batum was in the hands of the revolutionists, and -a "reign of terror" lasted for several weeks.

BATWA, a tribe of African pygmies living in the mountainous country around Wissmann Falls in the Kasai district of the Belgian Congo. They were discovered in 1880 by Paul Pogge and Hermann von Wissmann, and have been identified with Sir H. M. Stanley's

Vouatouas. They are typical of the negrito family south of the Congo. They are well made, with limbs perfectly proportioned, and are seldom more than 4 ft. high. Their complexion is a yellow-brown, much lighter than their Bantu-Negroid neighbours. They have short woolly hair and no beard. They are feared rather than despised by the Baluba and Bakuba tribes, among whom they live. They are nomads, cultivating nothing, and keeping no animals but a small type of hunting-dog. Their weapon is a tiny bow, the arrows for which are usually poisoned. They build themselves temporary huts of a bee-hive shape. As hunters they are famous, bounding through the jungle growth " like grasshoppers " and fearlessly attacking elephants and buffalo with their tiny weapons. Their only occupation apart from hunting is the preparation of palm- wine which they barter for grain with the Baluba. They are monogamous and display much family affection. See further Pygmy; Akka; Wochua; Bambute.

See A. de Quatrefages, The Pygmies (Eng. ed., 1895); Sir H. H. Johnston, Uganda Protectorate (1902); Hermann von Wissmann, My Second Journey through Equatorial Africa (London, 1891).

BATYPHONE (Ger. and Fr. Batyphon), a contrabass clarinet which was the outcome of F. W. Wieprecht's endeavour to obtain a contrabass for the reed instruments. . The batyphone was made to a scale twice the size of the clarinet in C, the divisions of the chromatic scale being arranged according to acoustic principles. For convenience in stopping holes too far apart to be covered by the fingers, crank or swivel keys were used. The instrument was constructed of maple-wood, had a clarinet mouthpiece of suitable size connected by means of a cylindrical brass crook with the upper part of the tube, and a brass bell. The pitch was two octaves below the clarinet in C, the compass being the same, and thus corresponding to the modern bass tuba. The tone was pleasant and full, but not powerful enough for the contrabass register in a military band. The batyphone had besides one serious disadvantage: it could be played with facility only in its nearly related keys, G and F major. The baty- phone was invented and patented in 1839 by F. W. Wieprecht, director general of all the Prussian military bands, and E. Skorra, the court instrument manufacturer of Berlin. In practice the instrument was found to be of little use, and was superseded by the bass tuba. A similar attempt was made in 1843 by Adolphe Sax, and met with a similar fate.

A batyphone bearing the name of its inventors formed part of the Snoeck collection which was acquired for Berlin's collection of ancient musical instruments at the Technische Hochschule fiir Musik.

The description of the batyphone given above is mainly derived from a MS. treatise on instrumentation by Wieprecht, in 1909 in the possession of Herr Otto Lessmann (Berlin), and reproduced by Capt. C. R. Day, in Descriptive Catalogue of the Musical Instruments of the Royal Military Exhibition, London, 1890 (London, 1891), p. 124. (K. S.)

BAUAN (or Batjn), a town of the province of Batangas, Luzon, Philippine Islands, at the head of Batangas Bay, about 54 m. S. of Manila. Pop. (1903) 39,094. A railway to connect the town with Manila was under construction in 1908. Bauan hats a fine church and is known as a market for " sinamay " or hemp cloth, the hemp and cotton being imported and dyed and woven by the women in their homes. Palm-fibre mats and hats, fans, bamboo baskets and cotton fish-nets are woven here. There is

excellent fishing in the bay. Hogs and horses are raised for the Manila market. The surrounding country is fertile and grows cacao, indigo, oranges, sugar-cane, corn and rice. The language is Tagalog.

BAUBLE (probably a blend of two different words, an old French baubcl, a child's plaything, and an old English bdbyll, something swinging to and fro), a word applied to a stick with a weight attached, used in weighing, to a child's toy, and especi- ally to the mock symbol of office carried by a court jdster, a baton terminating in a figure of Folly with cap and bells, and some- times having a bladder fastened to the other end; hence a term for any triviality or childish folly.

BAUCHI, a province in the highlands of the British pro- tectorate of Northern Nigeria. It lies approximately between 1 1° 1 5′ and 9 1 5′ N. and 1 1° 1 5′ and 8° 30′ E. Bauchi is bounded N. by the provinces of Kano, Katagum and Bornu; E. by Bornu, S. by Yola and Muri, and W. by the provinces of Zaria and Nassarawa. The province has an area of about 2i,ooosq. m. The altitude rises from 1000 ft. above the sea in its north-eastern corner to 4000 ft. and 6000 ft. in the south-west. The province is traversed diagonally from N.E. to S.W. by a belt of mountain ranges alternating with fertile plateaus. Towards the south the country is very rugged and a series of extinct volcanic craters occur.

Amongst the more important plateaus are the Assab or Kibyen country, having a general level of upwards of 4000 ft., and the Sura country, also reaching to elevations of from 3000 to 5000 ft. Both these extensive plateaus are situated in the south-west portion of the province. Their soil is fertile, they possess an abundance of pure water, the air is keen and bracing, and the climate is described as resembling in many respects that of the Transvaal. They form the principal watershed not only of the province of Bauchi, but of the protectorate of Northern Nigeria. The Gongola, flowing east and south to the Benue, lis s in the Sura district, and from the Kibyen plateau streams ilow north to Lake Chad, west to the Kaduna, and south to the IJenue. The soil is generally fertile between the hills, and in the volcanic districts the slopes are cultivated half-way up the extinct craters. The climate in the western parts is temperate and healthy. In the winter months of November and December the thermometer frequently falls to freezing-point, and in the hottest months the maximum on the Kibyen plateau has been found to be rarely over 85°.

The population of Bauchi is estimated at about 1,000,000 and is of a very various description. The upper classes are Fula, and there are some Hausa and Kanuri (Bornuese), but. the bulk of the people are pagan tribes in a very low state of civilization. Sixty-four tribes sufficiently differentiated from each other to speak different languages have been reported upon. Hausa is the lingua franca of the whole. The pagan population has been classified for practical purposes as Hill pagans and Plains pagans, Mounted pagans and Foot pagans. The- Foot pagans of the plains were brought under the Fula yoke in the beginning of the 19th century and have never cast it off. The Hill pagans were partly conquered, but many remained independent or have since succeeded in asserting their freedom . The Mounted pagans are confined to the healthy plateaus of the south-west corner of the province. They are independent and there is considerable variety in the characteristics of the different tribes. The better types are hardy, orderly and agriculturally industrious. They are intelligent and have shown themselves peaceful and friendly to Europeans. Others are, on the contrary, disposed to be turbulent and warlike. Amongst the different tribes many are cannibals. They all go practically naked. They are essentially horsemen, and have a cruel habit of gashing the backs of their ponies that they may get a good seat in the blood. They are armed with bows and arrows, but depend almost entirely in battle on the charges of their mounted spearmen.

The native name " Bauchi," which is of great antiquity, Signifies the " Land of Slaves," and from the earliest times the uplands which now

form the principal portion of the province havt; been the hunting ground of the slave-raider, while the hill

fastnesses have offered defensible refuge to the population. So entirely was slavery a habit of the people, that as late as 1905, after the slave-trade had been abolished for three years, it was found that, in consequence of a famine which rendered food difficult to obtain, a whole tribe (the Tangali) were selling themselves as slaves to their neighbours. Children are readily sold by their parents at a price varying from the equivalent of one shilling to one and sixpence.

The province of Bauchi was conquered by the Fula at the beginning of the 19th century, and furnished them with a valu- able slave preserve. But the more civilized portion had already, under enlightened native rulers, attained to a certain degree of prosperity and order. Mahommedanism was partly adopted by the upper classes in the. 1 8th century, if not earlier, and the son of a Mahommedan native ruler, educated at Sokoto, accepted the flag of Dan Fodio and conquered the country for the Fula. The name of this remarkable soldier and leader was Yakoba (Jacob) . His father's name was Daouad (David) , and his grand- father was Abdullah, all names which indicate Arab or Mahom- medan influence. The town of Bauchi and capital of the province was founded by Yakoba in the year 1809, and the emirate remained under Fula rule until the year 1902. In that year, in consequence of determined slave-raiding and the defiant misrule of the emir, a British expedition was sent against the capital, which submitted without fighting. The emir was deposed, and the country was brought under British control. A new emir was appointed, but he died within a few months. The slave-trade was immediately abolished, and the slave-market which was held at Bauchi, as in all Fula centres, was closed. The Kano-Sokoto campaign in 1903 rendered necessary a temporary withdrawal of the British resident from Bauchi, and comparatively little pro- gress was made until the following year. In 1904 the province was organized for administration on the same system as the rest of Northern Nigeria, and the reigning emir took the oath of allegiance to the British crown. The province has been sub- divided into thirteen administrative districts, which again have been grouped into their principal divisions, with their respective British headquarters at Bauchi, Kanan and Bukuru. The Fula portion of this province, held like the other Hausa states under a feudal system of large landowners or fief-holders, has been organized and assessed for taxation on the system accepted by the emirs throughout the protectorate, and the populations are working harmoniously under British rule. Roads and telegraphs are in process of construction, and

the province is being gradually opened to trade. Valuable indications of tin. have been found to the north of the Kibyen plateau, and have attracted the attention ef the Niger Company.

Bauchi is a province of special importance from the European point of view because, with free communication from the Benue assured, it is probable that on the Kibyen and Sura plateaus, which are the healthiest known in the protectorate, a sanatorium and station for a large civil population might'be established under conditions in which Europeans could live free from the evil effects of a West African climate.

The emirate of Gombe, which is included in the first division of the Bauchi province, is a Fula emirate independent of the emirs of Bauchi. It forms a rich and important district, and its chiefs held themselves in a somewhat sullen attitude of hostility to the British. It was at Burmi in this district that the last stand was made by the religious following of the defeated sultan of Sokoto, and here the sultan was finally overthrown and killed in July 1903. Gombe has now frankly accepted British rule.

(F. L. L.)

BAUDELAIRE, CHARLES PIERRE (1821-1867), French poet, was born in Paris on the 9th of April 182 1. His father, who was a civil servant in good position and an amateur artist, died in 1827, and in the following year his mother married a lieutenant- colonel named Aupick, who was afterwards ambassador of France at various courts. Baudelaire was educated at Lyons and at the College Louis-le-Grand in Paris. On taking his degree in 1839 he determined to enter on a literary career, and during the next two years pursued a very irregular way of life, which led his

guardians, in 1841, to send him on a voyage to India. When he returned to Paris, after less than a year's absence, he was of age; but in a year or two his extravagance threatened to exhaust his small patrimony, and his family obtained a decree to place his property in trust. His salons of 1845 and 1846 attracted immediate attention by the boldness with which he propounded many views then novel, but since generally accepted. He took part with the revolutionaries in 1848, and for some years in- terested himself in republican politi but

his permanent con- victions were aristocratic and Catholic. Baudelaire was a slow and fastidious worker, and it was not until 1857 that he produced his first and famous volume of poems, Fleurs du mal. Some of these had already appeared in the Revue des deux mondes when they were published by Baudelaire's friend Auguste Poulet Malassis, who had inherited a printing business at Alencon. The consummate art displayed in these verses was appreciated by a limited public, but general attention was caught by the perverse selection of morbid subjects, and the book became a by-word for unwholesomeness among conventional critics. Victor Hugo, writing to the poet, said, " Vous dotez le del de l'art d'un rayon macabre, vous creez un frisson nouveau." Baudelaire, the publisher, and the printer were successfully prosecuted for offending against public morals. The obnoxious pieces were suppressed, but printed later as Les Epaves (Brussels, 1866). Another edition of the Fleurs du mal, without these poems, but with considerable additions, appeared in 1861.

Baudelaire had learnt English in his childhood, and had found some of his favourite reading in the English " Satanic " romances, such as Lewis's Monk. In 1846-1847 he became acquainted with the works of Edgar Allan Poe, in which he discovered romances and poems which had, he said, long existed in his own brain, but had never taken shape. From this time till 1865 he was largely occupied with his version of Poe's works, producing masterpieces of the art of translation in Histoires exiraordinaires (1852), Nouvelles Histoires exiraordinaires (1857), Adventures d' Arthur Gordon Pym, Eureka, and Histoires grotesques et sinenses (1865). Two essays on Poe are to be found in his GEuvres completes (vols. v. and vi.). Meanwhile his financial difficulties grew upon him. He was involved in the failure of Poulet Malassis in 1861, and in 1864 he left Paris for Belgium, partly in the vain hope of disposing of his copyrights. He had for many years a liaison with a coloured woman, whom he helped to the end of his life in spite of her gross conduct. He had recourse to opium, and in Brussels he began to drink to excess. Paralysis followed, and the last two years of his life were spent in maisons de santi in Brussels and in Paris, where he died on the 31st of August 1867.

His other works include: — Petit s Poemes en prose; a series of art criticisms published in the Pays, Exposition universelle; studies on Gustave Flaubert (in L' artiste, 18th of October 1857); on Th6ophile Gauticr {Revue contemporainc, September 1858); valuable notices contributed to Eugene Crepet's Poetes francais; Les Paradis artificials opium et haschisch (i860) ; Richard Wagner et Tannhauser a Paris

(1861) ; Un Dernier Chapitre de I' histoire des ozuvres de Balzac (1880), originally an article entitled " Comment on paye ses dettes quand on a du genie," in which his criticism is turned against his friends H. de Balzac, Theophile Gauticr, and Gerard de Nerval.

Bibliography. — An edition of his Lettres (1841-1866) was issued by the Spc. du Mercure de'France in 1906. His CEuvres completes were edited (1868-1870) by his friend Charles Assclineau, with a preface by Theophile Gautier. Assclineau also undertook a vin- dication of his character from the attacks made upon it in his Charles Baudelaire, sa vie, son ceuvre (1869). He left some material of more private interest in a MS. entitled Baudelaire. See Charles Baudelaire, souvenirs, correspondance, bibliographic (1872), by Charles Cousin and Spoelberch de Lovenjoul; Charles Baudelaire, ozuvres pos- thumes et correspondances incdites (1887), containing a journal entitled Mon cceur mis d. nu, and a biographical study by Eugene Crepet; also Le Tombeau de Charles Baudelaire (1896), a collection of pieces unpublished or prohibited during the author's lifetime, edited by S. Mallarme and others, with a study of the text of the Fleurs du mal by Prince A. Ourousof ; Feli Gautier, Charles Baudelaire (Brussels, 1904), with facsimiles of drawings by Baudelaire himself; A. de la Fitzeliere and G. Decaux, Charles Baudelaire (1868) in the series of

Essais de bibliographic contemparaine ; essays by Paul Bourget, Essais de psychologie conlemporaine (1883), and Maurice Spronck, Les Artistes litteraires (1889). Among English translations from Baudelaire are Poems in Prose, by A. Symons (1905), and a selection for the Canterbury Poets (1904), by F. P. Sturm.

BAUDIER, MICHEL (c. 1589-1645), French historian, was born in Lahguedoc. During the reign of Louis XIII. he was historiographer to the court of France. He contributed to French history by writing Histoire de la guerre de Flandre 1559- i6op (Paris, 161 5); Histoire de V administration du cardinal d'Amboise, grand ministre d'itat en France (Paris, 1634), a defence of the cardinal; and Histoire de I' administration de I' abbd Suger (Paris, 1645). Taking an especial interest in the Turks he wrote lnventaire general de I' histoire des Turcs (Paris, 1 61 9); Histoire ginirale de la religion des Turcs avec la vie de leur prophete Mahomet (Paris, 1626); and Histoire generate di{ sirail et de la cour du grand Turc (Paris, 1626; English trans, by E. Grimeston, London, 1635). Having heard the narrative of a Jesuit who had returned from China, Baudier wrote Histoire de Id cour du roi de Chine (Paris, 1626; English trans, in vol. viii. of the Collection of Voyages and Travels of A. and J. Churchill, London, 1707-1747).

He also wrote Vie du cardinal Ximines (Paris, 1635), which was again published with a notice of the author by E. Baudier (Paris, 1851), and a curious romance entitled Histoire de V incomparable administration deRomieu, grand ministre d'itat de Raymond Berenger, comle de Provence(P&tis, 1 63 5) .

See J. Lelong, Bibliotheque historique de la France (Paris, 1768-1778); L. Moreri, Le Grand Dictionnaire historique (Amsterdam,

1740).

BAUDRILLART, HENRI JOSEPH LEON (1821-1892), French economist, was born in Paris on the 28th of November 182 1. His father, Jacques Joseph (1774-1832), was a distinguished writer on forestry, and was for many years in the service of the French government, eventually becoming the head of that branch of the department of agriculture which had charge of the state forests. Henri was educated at the College Bourbon, where he had a distinguished career, and in 1852 he was appointed assistant lecturer in political economy to M. Chevalier at the College de France. In 1866, on the creation of a new chair of economic history, Baudrillart was appointed to fill it. His first work was an Eloge de Turgot (1846), which at once won him notice among the economists. In 1853 he published an erudite work on Jean Bodin et son temps; then in 1857 a Manuel d' economic politique; in i860, Des rapports de la morale et de I 'economic politique; in 1865, La Liberie du travail; and from 1878 to 1880, L'Histoire du luxe . . . depuis I'antiquite jusqu'A nos jours, in four volumes. At the instance of the Academie des Sciences Morales et Politiques he investigated the condition of the farming classes of France, and published the results in four volumes (1885, et seq.). From 1855 to 1864 he directed the Journal des economistes, and contributed many articles to the Journal des dibats and to the Revue des deux mondes. . His writings are distinguished by their style, as well as by their profound erudition. In 1863 he was elected member of the Academie des Sciences Morales et Politiques; in 1870 he was appointed inspector-general of public libraries, and in 1881 he succeeded J. Garnier as professor of political economy at the Ecole des Ponts et Chaussees. Baudrillart was made an officer of the Legion of Honour in 1889. He died in Paris on the 24th of January 1892.

BAUDRY, or Baldeeich, OF BOURGUEIL (1046 or 1047- 1130), archbishop of Dol, historian and poet, was born at Meung- sur-Loire, where he passed his early days. Educated at Meung and at Angers, he entered the Benedictine abbey of Bourgueil, and in 1079 became

abbot of this place, but his time was devoted to literary pursuits rather than to his official duties. Having failed to secure the bishopric of Orleans in 1097, he became archbishop of Dol in 1107, and went to Rome for his pallium in 1 108. The bishopric of Dol had been raised to the rank of an archbishopric during the 10th century by Nomenoe, king of Brittany, but this step had been objected to by the archbishops of Tours. Consequently the position of the see was somewhat ambiguous, and Baudry is referred to both as archbishop and as

bishop of Dol. He appears to have striven earnestly to do something for the education of the ignorant inhabitants of Brittany but his efforts were not very successful, and he soon abandoned the task. In 1116 he attended the Lateran council, and in n 19 the council of Reims, after which he paid a visit of two years' duration to England. Returning to France he neglected the affairs of his diocese, and passed his time mainly at St Samson-sur-Risle in Normandy. He died on the 5th or 7th of January 1130.

Baudry wrote a number of Latin poems of very indifferent quality. The most important of these, from the historical point of view, havebeenpublished in the Historiae FrancorumScriptores ■,. tome iv., edited by A. Duchesne (Paris 1639-1649). Baudry's prose works are more important. The best known of these is his Historiae Hierosolymitanae, a history of the first crusade from 1095 to 1099. This is a history in four books, the material for which was mainly drawn from the anonymous Gesta Francorum, but some valuable information has been added by Baudry. It was very popular during the middle ages, and was used by Ordericus Vi talis for his Historiae ecclesiasticae; by William, archbishop of Tyre, for his Belli sacri historia; and by Vincent of Beauvais for his Speculum historiale. The best edition is that by C. Thurot, which appears in the Recueil des historiens des croisades, tome iv. (Paris, 1841-1887) , Other works probably by Baudry are Epistola ad Fiscannenses monachos, a description of the monastery of Fecamp; Vita Roberti de Arbrissello; Vita S. Hugonis archiepiscopi Rothomagensis; Translatio capitis Gemeticum et miracula S. Valentini martyris; Relatio de scuto et gladio, a history of the arms of St. Michael; and Vita S. Samsonis Dolensis episcopi. Other writings which on very doubtful authority have been attributed to Baudry are Acta S. Valeriani martyris Trenorchii; De visitatione infirmorum; Vita S. Maglorii Dolensis

episcopi et Vita S. Maclovii, Alec- tensis episcopi; De revelatione abbatum Fiscannensium; and Confirmatio bonorum monasterii S. Florentii. Many of these are published by J. P. Migne in the Patrologia Latina, tomes 160, 162 and 166 (Paris 1844).

See Histoire littSraire de la France, tome xi. (Paris, 1865-1869) ; H. von Sybel,, Geschichte des ersten Kreuzzuges (Leipzig, 1881); A. Thurot, " Etudes critiques sur les historiens de la premiere croisade; Baudri de Bourgueil " in the Revue historique (Paris,

1876).

BAUDRY, PAUL JACQUES AIME" (1828-1886), French painterj was born at La Roche-sur-Yonne (Vendee) . He studied under Drolling, a sound but second-rate artist, and carried off the Prix de Rome in 1850 by his picture of " Zenobia found on the banks of the Araxes." His talent from the first revealed itself as strictly academical, full of elegance and grace, but somewhat lacking originality. In the course of his residence in Italy Baudry derived strong inspiration from Italian art with che mannerism of Coreggio, as was very evident in the two works he exhibited in the Salon of 1857, which were purchased for the Luxembourg: " The Martyrdom of a Vestal Virgin " and "The Child." His " Leda," "St John the Baptist," and a " Portrait of Beule," exhibited at the same time, took a first prize that year. Throughout this early period Baudry com- monly selected mythological or fanciful subjects, one of the most noteworthy being " The Pearl and the Wave." Once only did he attempt an historical picture, " Charlotte Corday after the murder of Marat "(1861); and returned by preference to the former class of subjects or to painting portraits of illustrious men of his day — Guizot, Charles Garnier, Edmond About. The works that crowned Baudry's reputation were his mural decora- tions, which show much imagination and a high artistic gift for colour, as may be seen in the frescoes in the Paris Cour de Cassation, at the chateau of Chantilly, and some private resid- ences—the hotel Fould and hotel Paiva— but, above all, in the decorations of the foyer of the Paris opera house. These, more than thirty paintings in all, and among them compositions figurative of dancing and music, occupied the painter, for ten years. Baudry died in Paris in 1886. He was a member of the Institut de France, succeeding Jean Victor Schnetz. Two of

his colleagues, Dubois and Marius Jean Mercie, co-operating with his brother, Baudry the architect, erected a monument to him in Paris (1890). The statue of Baudry at La Roche-sur- Yonne (1897) is by G6rome.

See H. Delaborde, Notice sur la vie et les ouvrages de Baudry (1886) ; Ch. Ephrussi, Baudry, sa vie et son auvre (1887). (H. Fr.)

BAUER, BRUNO (1809-1882), German theologian and historian, was born on the 6th of September 1809, the son of a painter in a porcelain factory, at Eisenberg in Saxe-Altenburg. He studied at Berlin, where he attached himself to the " Right " of the Hegelian school under P. Marheineke. In 1834 he began to teach in Berlin as a licentiate of theology, and in 1839 was transferred to Bonn. In 1838 he published his Kritische Darstellung der Religion des Alien Testaments (2 vols.), which shows that at that date he was still faithful to the Hegelian Right. Soon afterwards his opinions underwent a change, and in two works, one on the Fourth Gospel, Kritik der evangelischen Geschichte des Johannes (1840), and the other on the Synoptics, Kritik der evangelischen Geschichte der Synoptiker (1841), as well as in his Herr Hengsten- berg, kritische Briefe iiber den Gegensatz des Gesetzes und des Evangeliums, he announced his complete rejection of his earlier orthodoxy. In 1842 the government revoked his license and he retired for the rest of his life to Rixdorf, near Berlin. Hencefor- ward he took a deep interest in modern history and politics, as well as in theology, and published Geschichte der Politih, Kultur und Aufklarung des i8ten Jahrhunderts (4 vols. 1843-1845), Geschichte der franzosischen Revolution (3 vols. 1847), and Disraelis romantischer und Bismarcks socialistischer Imperialisms (1882). Other critical works are: a criticism of the gospels and a history of their origin, Kritik der Evangelien und Geschichte ihres Ursprungs (1850-1852), a book on the Acts of the Apostles, Apostelgeschichte (1850), and a criticism of the Pauline epistles; Kritik der paulinischen Briefe (1850-1852). He died at Rixdorf on the 13th of April 1882. His criticism of the New Testament was of a highly destructive type. David Strauss in his Life of Jesus had accounted for the Gospel narratives as half-conscious products of the mythic instinct in the early Christian com- munities. Bauer ridiculed Strauss's notion that a community could produce a connected narrative. His own contention, embodying a theory of C. G. Wilke {Der Urevangelist, 1838), was that the original narrative was the Gospel of Mark; that this was composed in the reign of Hadrian; and that after this the other narratives were modelled by other writers. He, however, " regarded Mark not only as the first narrator, but even as the creator of the gospel history, thus making the latter a fiction and Christianity the invention of a single original evangelist " (Pfieiderer). On the same principle the four principal Pauline epistles were regarded as forgeries of the 2nd century. He argued further for the preponderance of the Graeco-Roman element,

as opposed to the Jewish, in the Christian writings. The writer of Mark's gospel was " an Italian, at home both in Rome and Alexandria " ; that of Matthew's gospel " a Roman, nourished by the spirit of Seneca " ; the Pauline epistles were written in the West in antagonism to the Paul of the Acts, and so on. Christianity is essentially " Stoicism triumphant in a Jewish garb." This line of criticism has found few supporters, mostly in the Netherlands. It certainly had its value in emphasizing the importance of studying the influence of environment in the formation of the Christian Scriptures. Bauer was a man of rest- less, impetuous activity and independent, if ill-balanced, judg- ment, one who, as he himself perceived, was more in place as a free-lance of criticism than as an official teacher. He came in the end to be regarded kindly even by opponents, and he was not afraid of taking a line displeasing to his liberal friends on the Jewish question {Die Judenfrage, 1843).

His attitude towards the Jews is dealt with in the article in the Jewish Encyclopedia. See generally Herzog-Hauck, Realencyklo- pddie; and cf. Otto Pfieiderer, Development of Theology, p. 226; Carl Schwarz, Zur Geschichte der neueslen Theologie, pp. 142 ff. ; and F. Lichtenberger, History of German Theology in the 19/A Century (1889), pp. 374-378.

BAUERNFELD, EDUARD VON (1802-1890), Austrian drama- tist, was born at Vienna on the 13th of January 1802. Having

studied jurisprudence at the university of Vienna, he entered the government service in a legal capacity, and after holding various minor offices was transferred in 1843 to a responsible post on the Lottery Commission. He had already embarked upon politics, and severely criticized the government in a pamphlet, Pia Desideria eines osterreichischen Schriftstellers (1842); and in 1845 he made a journey to England, after which his political opinions became more pronounced. After the Revolution, in 1848, he quitted the government service in order to devote himself entirely to letters. He lived in Vienna until his death on the 9th of August 1890, and was ennobled for his work. As a writer of comedies and farces, Bauernfeld takes high rank among the German playwrights of the century; his plots are clever, the situations witty and natural and the diction elegant. His earliest essays, the comedies Leichtsinn aus Liebe (1831); Das Liebes-Protokoll (1831) and Die ewige Liebe (1834); Bilrgerlich uttd Romantisch, (1S35) enjoyed great popularity. Later he turned his attention to so-called Salonstiicke (drawing-room

pieces), notably Aus der Gesellschaft (1866); Moderne Jugend (1869), and Der Landfrieden (1869), in which he portrays in fresh, bright and happy sallies the social conditions of the capital in which he lived.

A complete edition of Bauernfeld's works, Gesammelte Schriften, appeared in 12 vols. (Vienna, 1871-1873) ; Dramatischer Nachlass, ed. by F. von Saar (1893) ; selected works, ed. by E. Horner (4 vols., 1905). See A. Stern, Bauernfeld, Ein Dichterportrat (1890), R. von Gottschall, " E. von Bauernfeld " (in Unsere Zeit, 1890), and E. Horner, Bauernfeld (1900).

BAUFFREMONT, a French family which derives its name from a village in the Vosges, spelt nowadays Beaufremont. In consequence of an alliance with the house of Vergy the Baiiffre- monts established themselves in Burgundy and Franche-Comt6. In 1448 Pierre de Bauffremont, lord of Charny, married Marie, a legitimatized daughter of Philip the Good, duke of Burgundy. Nicolas de Bauffremont, his son Claude, and his grandson Henri, all played important parts in the states-general of 1576, 1588 and 1614, and their speeches have been published. Alexandre Emmanuel Louis de Bauffremont (1773-1833), a prince of the Holy Roman Empire, was created a peer of France in 1817, and duke in 1818. After having served in the army of the princes he returned to France under the Empire, and had been made a count by Napoleon. (M. P.)*

BAUHIN, GASPARD (1560-1624), Swiss botanist and anato- mist, was the son of a French physician, Jean Bauhin (1511- 1582), who had to leave his native country on becoming a convert to Protestantism. He was born at Basel on the 17th of January 1560, and devoting himself to medicine, he pursued his studies at Padua, Montpellier, and some of the celebrated schools in Germany. Returning to Basel in 1580, he was admitted to the degree of doctor, and gave private lectures in botany and anatomy. In 1582 he was appointed to the Greek professorship in that university, and in 1588 to the chair of anatomy and botany. He was afterwards made city physician, professor of the practice of medicine, rector of the university, and dean of his faculty. He died at Basel on the 5th of December 1624. He published several works relative to botany, of which the most valuable was his Pinax Theatri Bolanici, seu Index in Theo- phrasti, Dioscoridis, Plinii, et botanicorum qui a seculo scripserunt opera (1596). Another great work which he planned was a Theatrum Botanicum, meant to be comprised in twelve parts folio, of which he finished three; only one, however, was pub- lished (1658). He also gave a copious catalogue of the plants growing in

the environs of Basel, and edited the works of P. A. Mattioli (1 500-1 577) with considerable additions. He likewise wrote on anatomy, his principal work on this subject being Theatrum Anatomicum infinitis locis auctum (1592).

His son, Jean Gaspard Bauhin (1606-1685), was professor of botany at Basel for thirty years. His elder brother, Jean Bauhin (1541-1613), after studying botany at Tubingen under Leonard Fuchs (1 501-1566), and travelling with Conrad Gesner, began to practise medicine at Basel, where he was elected pro- fessor of rhetoric in 1766. Four years later he was invited to become physician to the duke of Wurttemberg at Montbeliard, where he remained till his death in 161 3. He devoted himself

chiefly to botany. His great work, Historia plantarum nova et absolutissima, a compilation of all that was then known about botany, was not complete at his death, but was published at Yverdon in 1650-1651, the Prodromus having appeared at the same place in 1619. He also wrote a book De aquis medicaiis

(1605).

BAULK, or Baek (a word common to Teutonic languages, meaning a ridge, partition, or beam), the ridge left unploughed between furrows or ploughed fields; also the uncultivated strip of land used as a boundary in the " open-field " system of agriculture. From the meaning of something left untouched comes that of a hindrance Or check, so of a horse stopping short of an obstacle, of the " baulk-line " in billiards, or of the decep- tive motion of the pitcher in baseball. From the other original meaning, i.e. " beam," comes the use of the word for the cross, or tie-beam of a roof, or for a large log of timber sawn to a one or one and a half foot square section (see Joinery).

BAUMBACH, RUDOLF (1840-1905), German poet, was born at Kranichfeld on the Ilm in Thuringia, on the 28th of September 1840, the son of a local medical practitioner, and received his early schooling at the gymnasium of Meihingen, to which place his father had removed. After studying natural science in various universities, he engaged in private tuition, both inde- pendently and in families, in the Austrian towns of Graz, Briinn, Gorz and Triest respectively. In Triest he caught the popular taste with an Alpine legend, Zlatorog (1877), and songs of a journeyman apprentice, Lieder eines fahrenden Gesellen (1878), both of which have run into many editions. Their success decided him to embark upon a literary career. In 1885 he returned to Meiningen, where he received the title of Hofraf, and was appointed ducal librarian. His death occurred on the 14th of September 1905.

Baumbach was a poet of the breezy, vagabond school, and wrote, in imitation of his greater compatriot, Victor Scheffel, many excellent drinking songs, among which Die Lindenwirtin has endeared him to the German student world. But his real strength lay in narrative verse, especially when he had the opportunity of describing the scenery and life of his native Thuringia. Special mention may be made of Frau Ltolde (1881), S pielmannslieder (1882), Von der Landstrasse (1882), ThUringer Lieder (1891), and his prose,

Sommermdrchen (1881).

BAUME, ANTOINE (1728-1804), French chemist, was born at Senlis on the 26th of February 1728. He was apprenticed to the chemist Claude Joseph Geoffroy, and in 1752 was admitted a member of the Ecole de Pharmacie, where in the same year he was appointed professor of chemistry. The money he made in a business he carried on in Paris for dealing in chemical products enabled him to retire in 1780 in order to devote himself to applied chemistry, but, ruined in the Revolution, he was obliged to return to a commercial career. He devised many improve- ments in technical processes, e.g. for bleaching silk, dyeing, gilding, purifying saltpetre, &c, but he is best known as the inventor of the hydrometer associated with his name (often in this connexion improperly spelt Beaume). Of the numerous books and papers he wrote the most important is his El&mens de pharmacie thiorique et pratique (9 editions, 1762-1818). He became a member of the Academy of Sciences in 1772, and an associate of the Institute in 1796. He died in Paris on the 15th of October 1804.

BAUMGARTEN, ALEXANDER GOTTLIEB (1714-1762), German philosopher, born at Berlin. He studied at Halle, and became professor of philosophy at Halle and at Frankfort on the Oder, where he died in 1762. He was a disciple of Leibnitz and Wolff, and was particularly distinguished as having been the first to establish the Theory of the Beautiful as an independent science. Baumgarten did good service in severing aesthetics (q.v.) from the other philosophic disciplines, and in marking out a definite object for its researches. The very name (Aesthetics), which Baumgarten was the first to use, indicates the imperfect and partial nature of his analysis, pointing as it does to an element so variable as feeling or sensation as the ultimate ground of judgment in questions pertaining to beauty. It is important

to notice that Baumgarten's first work preceded those of Burke, Diderot, and P. Andre, and that Kant had a great admiration for him. The principal works of Baumgarten are the following: Disputationes de nonnullis ad poema pertinentibus (1735); Aesthetica; Mctaphysica (1739; 7th ed. 1779); Ethica philo- sophica (1751, 2nd ed. 1763); Initia philosophiae practicae primae (1760). After his death, his pupils published a Philo- sophic! Generalis (1770) and a Jus Naturae (1765), which he had left in manuscript.

See Mc«“er, Baumgarten’s Leben (1763); Abbt, Baumgarten’s Leben und Charakler (1765) ; H. G. Meyer, Leibnitz und Baumgarten (1874) ; J. Schmidt, Leibnitz und Baumgarten (Halle, 1875); and article Aesthetics.

His brother, Siegmund Jacob Baumgarten (1706-1757), was professor of theology at Halle, and applied the methods of Wolff to theology. His chief pupil, Johann Salomo Semler (q.v.), is sometimes called, the father of German rationalism. Baum- garten, though he did not renounce the Pietistic doctrine, began the process which Semler completed. His works include Evan- gelische Glaubenslehre (1759); Auszug der Kirchengeschichte (1 743-1 762); Primae lineae breviarii antiquitalum Christianarum (1747); Geschichte der Religionsparteien • (1760) ; Nachricht von merkwiirdigen Biichern (1752-1757); Nachrichten von einer hal- lischen Bibliothek (1748-17 51).

See life by Semler (Halle, 1758).

BAUMGARTEN, MICHAEL (181 2-1889), German Protestant theologian, was born at Haseldorf in Schleswig-Holstein on the 25th of March 1812. He studied at Kiel University (1832), and became professor ordinarius of theology at Rostock (1850). A liberal scholar, he became widely known in 1854 through a work, Die N achtgesichte Sacharjas. Eine Prophetenstimme aus der Gegenwart, in which, starting from texts in the Old Testament and assuming the tone of a prophet, he discussed topics of every kind. At a pastoral conference in 1856 he boldly defended evangelical freedom as regards the legal sanctity of Sunday. This, with other attempts to liberalize religion, brought him into conflict with the ecclesiastical authorities of Mecklenburg, and in 1858 he was deprived of his professorship. He then travelled throughout Germany, demanding justice, telling the story of his life {Christliche Selbstgesprache, 1861), and lecturing on the life of Jesus {Die Geschichte Jesu. Fiir das Verstdndniss der Gegen- wart, 1859). In 1865 he helped to found the Deutsche Proles- lanlenverein, but withdrew from it in 1877. On several occasions (1874, 1877 and 1878) he sat in the Reichstag as a member of the progressive party. He died on the 21st of July 1889. Other works: Apostelgeschichte oder Entwicklungsgang der Kirche von Jerusalem bis Rom (2 vols. 2nd ed., 1859), and Doktor Martin Luther, ein Volksbuch (1883).

H. H. Studt published his autobiography in 1891 (2 vols.); see also C. Schwartz, Neueste Theologie (1869); Lichtenberger, Hist. Germ. Theol., 1889; Calwer-Zeller, Kirchen-Lexikon.

BAUMGARTEN-CRUSIUS, LUDWIG FRIEDRICH OTTO (1788-1842), German Protestant divine, was born at Merseburg. In 1805 he entered the university of Leipzig and studied theology and philology. After acting as Privatdocent at Leipzig, he was, in 1812, appointed professor extraordinarius of theology at Jena, where he remained to the end of his life, rising gradually to the head of the theological faculty. He died on the 31st of May 1842. With the exception of Church history, he lectured on all branches of so-called theoretical theology, especially on New Testament exegesis, biblical theology, dogmatic ethics, and the history of dogma, and his comprehensive knowledge, accurate scholarship and wide sympathies gave peculiar value to his lectures and treatises, especially those on the development of church doctrine. His published works are many, the most important being: — Lehrbuch der christlichen \Sittenlehre (1826); Grundzuge der biblischen Theologie (1828); Lehrbuch der Dogmen- geschichte (1832); Compendium der Dogmengeschichte (1840). The last, perhaps his best work, was left unfinished, but was completed from his notes in 1846 by Karl Hase.

BAUR, FERDINAND CHRISTIAN (1792-1860), leader of the Tubingen school of theology, was born at Schmiden, near Canstatt, on the 21st of June 1792. After receiving an early

training in the theological seminary at Blaubeuren, he went in 1809 to the university of Tubingen. Here he studied for a time under Ernst Bengel, grandson of the eminent New Testament critic, Johann Albrecht Bengel, and at this early stage in his career he seems to have been under the influence of the old Tubingen school; But at the same time the philosophers Immanuel Fichte and Friedrich Schelling were creating a wide and deep impression. In 181 7 Baur returned to the theological seminary at Blaubeuren as professor. This move marked a turning-point in his life, for he was now able to set to work upon those investigations on which his reputation rests. He had already, in 1817, written a review of G. Kaiser's Biblischc Theologie for Bengel's Archiv fiir Theologie (ii. 656); its tone was moderate and conservative. When, a few years after his appointment at Blaubeuren, he published his first important, work, Symbolik und Mythologie oder die N aturreligion des Alter- tums (1824-1825), it became evident that he had made a deeper study of philosophy, and had come under the influence of Schelling and more particularly of Friedrich Schleiermacher. The learning of the work was fully recognized, and in 1826 the author was called to Tubingen as professor of theology. It is with Tubingen that his greatest literary achievements are associated. His earlier publications here treated of mythology and the history of dogma. Das manichaische

Religionssystem appeared in 1831, Apollonius von Tyana in 1832, Die christliche Gnosis in 1835, and Uber das Christliche im Platonismus oder Socrates und Christus in 1837. As Otto Pfleiderer {Development of Theology, p. 285) observes, " the choice not less than the treat- ment of these subjects is indicative of the large breadth of view and the insight of the historian into the comparative history of religion." Meantime Baur had exchanged one master in philo- sophy for another, Schleiermacher for Hegel. In doing so, he had adopted completely the Hegelian philosophy of history. " Without philosophy," he has said, " history is always for me dead and dumb." The change of view is illustrated clearly in the essay, published in the Tilbinger Zeitschrift for 1 831, on the Christ-party in the Corinthian Church, Die Christuspartei in der korinthischen Gemeinde, der Gegensatz des paulinischen und petrinischen in der altesten Kirche, der Apostel Petrus in Rom, the trend of which is suggested by the title. Baur contends that St Paul was opposed in Corinth by a Jewish-Christian party which wished to set up its own form of Christian religion instead of his universal Christianity. He finds traces of a keen conflict of parties in the post-apostolic age. The theory is further developed in a later work (1835, the year in which David Strauss' Leben Jesu was published), Uber die sogenannten Pastor albriefe. In this Baur attempts to prove that the false teachers mentioned in the Epistles to Timothy and Titus are the Gnostics, particu- larly the Marcionites, of the second century, and consequently that the Epistles were produced in the middle of this century in opposition to Gnosticism. He next proceeded to investigate the Pauline Epistles and the Acts of the Apostles in the same manner, publishing his results in 1845 under the title Paulus, der Apostel Jesu Christi, sein Leben und Wirken, seine Brief e und seine Lehre. In this he contends that only the Epistles to the Galatians, Corinthians and Romans are genuinely Pauline, and that the Paul of Acts is a different person from the Paul of these genuine Epistles, the author being a Paulinist who, with an eye to the different parties in the Church, is at pains to represent Peter as far as possible as a Paulinist and Paul as far as possible as a Petrinist. Thus it becomes clear that Baur is prepared to apply his theory to the whole of the New Testament; in the words of H. S. Nash, " he carried a sweeping hypothesis into the examination of the New Testament." Those writings alone he considers genuine in which the conflict between Jewish- Christians and Gentile-Christians is clearly marked. In his Kritische Untersuchungen uber die hanonischen Evangelien, ihr Verhaltniss zu einander, ihren Charakter und Ursprung (1847) he turns his attention to the Gospels, and here again finds that the authors were conscious of the conflict of parties; the Gospels reveal a

mediating or conciliatory tendency {Tendenz) on the part of the writers or redactors. The Gospels, in fact, are adaptations

or redactions of an older Gospel, such as the Gospel of the Hebrews, of Peter, of the Egyptians, or of the Ebionites, The Petrine Matthew bears the closest relationship to this original Gospel (Urevangelium); the Pauline Luke is later and arose independently; Mark represents a still later development; the account in John is idealistic: it " does not possess historical truth, and cannot and does not really lay claim to it." Baur's whole theory indeed starts with the supposition that Christianity was gradually developed out of Judaism. Before it could become a universal religion, it had to struggle with Jewish limitations and to overcome them. The early Christians were Jewish-Christians, to whom Jesus was the Messiah. Paul, on the other hand, represented a breach with Judaism, the Temple, and the Law. Thus there was some antagonism between the Jewish apostles, Peter, James and John and the Gentile apostle Paul, and this struggle continued down to the middle of the 2nd century. In short, the conflict between Petrinism and Paulinism is, as Carl Schwarz puts it, the key to the literature of the 1st and 2nd century. –

But Baur was a theologian and historian as well as a Biblical critic, As early as 1834 he published a strictly theological work, Gegensalz des Katholicismus und Protestantismus nach den Prinzipien mid Hauptdogmen der beiden LehrbegriJJe, a strong defence of Protestantism on the lines of Schleiermacher's Glaubenslchre, and a vigorous reply to J. Mohler's Symbolik (1833). This was followed by his larger histories of dogma, Die christliche Lehre von der Versohnung in Hirer geschichtlichen Entvricklung bis auf die neuesle Zeit (1838), Die christliche Lehre von der Dreieinigkeit mid M enschwerdung Goltes in ihrer geschichtlichen Entwicklung (3 vols., 1841-1843), and the Lehrbuch der ; christlichen Dogmengeschichte (1847). The value of these works is impaired somewhat by Baur's habit of making the history of dogma conform to the formulae of Hegel's philo- sophy, a procedure " which only served to obscure the truth and profundity of his conception of history as a true development of the human mind " (Pfleiderer). Baur, however, soon came to attach more importance to personality, and to distinguish more carefully between religion and philosophy. The change is marked in his Epochcn der kirchlichen Geschichtschreibung (1852), Das Christenthum und die christliche Kirche der drei ersten Jahrhunderte

(1853), and Die christliche Kirche von Anfang des vierten bis zum Ende des sechsten J ahrhunderts (1859), works preparatory to his Kirckengeschichte, in which the change of view is specially pronounced. The Kirchengeschichte was published in five volumes during the years 1853-1863, partly by Baur himself, partly by his son, Ferdinand Baur, and his son-in-law, Eduard Zeller, from notes and lectures which the author left behind him. Pfleiderer describes this work, especially the first volume, as " a classic for all time." " Taken as a whole, it is the first thorough and satisfactory attempt to explain the rise of Chris- tianity and the Church on strictly historical lines, i.e. as a natural development of the religious spirit of our race under the com- bined operation of various human causes" {Development of Theology, p. 288). Baur's lectures on the history of dogma, Ausfuhrlichere Vorlesungen fiber die christliche Dogmengeschichte, were published later by his son (1865-1868).

Baur's views were revolutionary and often extreme; but, whatever may be thought of them, it is admitted that as a critic he rendered a great service to theological science. " One thing is certain: New Testament study, since his time, has had a different colour " (H. S. Nash). He has had a number of dis- ciples or followers, who have in many cases modified his positions.

A full account of F. C. Baur's labours, and a complete list of his writings will be found in the article in Herzog-Hauck, Realencyklo- padie, in which his work is divided into three periods: (1) " Philo- sophy of Religion," (2) " Biblical criticism," (3) " Church History." See also H. S. Nash, The History of the Higher Criticism of the New Testament (New York, 1901) ; Otto Pfleiderer, The Development of Theology in Germany since Kant (trans., 1890) ; Carl Schwarz, Zur Geschichtc der neuesten Tlieologie (Leipzig, 1869); R. W. Mackay, The Tubingen School and its Antecedents (1863); A. S. Farrar, A Critical History of Tree Thought in reference to the Christian Religion (Bampton Lectures, 1862); and cf. the aracle on " The Tubingen Historical School," in Bibliotheca Sacra, vol. xix. No. 73, 1862.

(M. A. C.)

BAUTAIN, LOUIS EUGENE MARIE (1796-1867), French philosopher and theologian, was born at Paris. At the Ecole Normale he came under the influence of Cousin. In 1816 he adopted the profession of higher teaching, and was soon after called to the chair of philosophy in the university of Strassburg. He held this position for many years, and gave a parallel course of lectures as professor of

the literary faculty in the same city. The reaction against speculative philosophy, which carried away De Maistre and Lamennais, influenced him also. In 1828 he took orders, and resigned his chair at the university. For several years he remained at Strassburg, lecturing at the Faculty and at the college of Juilly, but in 1849 he set out for Paris as vicar of the diocese. At Paris he obtained considerable reputa- tion as an orator, and in 1853 was made professor of moral theology at the theological faculty. This post he held till his death. Like the Scholastics, he distinguished reason and faith, and held that revelation supplies facts, otherwise unattainable, which philosophy is able to group by scientific methods. The- ology and philosophy thus form one comprehensive science. Yet Bautain was no rationalist; like Pascal and Newman he exalted faith above reason. He pointed out, following chiefly the Kantian criticism, that reason can never yield knowledge of things in themselves. But there exists in addition to reason another faculty which may be called intelligence, through which we are put in connexion with spiritual and invisible truth. This intelligence does not of itself yield a body of truth; it merely contains the germs of the higher ideas, and these are made productive by being brought into contact with revealed facts. This fundamental conception Bautain worked out in the depart-: ments of psychology and morals. The details of this theology are highly imaginative. He says, for instance, that there is a spirit of the world and a spirit of nature; the latter gives birth to a physical and psychical spirit, and the physical spirit to the animal and vegetable spirits. His theories may well be compared with the arbitrary mysticism of van Helmont and the Gnostics, The most important of his works are : — Philosophic du Christia- nisme (1835); Psychologie experimentale (1839), new edition entitled Esprit humain el ses facultes (1859); Philosophic morale (1840); Religion et liberie (1848); La Morale de I'evan- gile compar&e aux divers systemes de morale (Strassburg, 1827; Paris, 1855); De I'lducation publique en France au XIX e siecle (Paris, 1876).

BAUTZEN (Wendish Budissin, " town "), a town of Germany, in the kingdom of Saxony and the capital of Saxon Upper Lusatia. Pop. (1890) 21,515; (1905) 29,412. It occupies an eminence on the right bank of the Spree, 680 ft. above the level of the sea, 32 m. E.N.E. from Dresden, on the Dresden-Gorlitz- Breslau main line of railway, and at the junction of lines from Schandau and Konigswartha. The town is surrounded by walls, and outside these again by ramparts, now in great measure turned into promenades, and has extensive suburbs partly lying on the left bank of the river. Among its churches the most remarkable is the cathedral of St Peter, dating from the

15th century, with a tower 300 ft. in height. It is used by both Protestants and Roman Catholics, an iron screen separating the parts assigned to each. There are five other churches, a handsome town hall, an orphan- asylum, several hospitals, a mechanics' institute, a famous grammar school (gymnasium) , a normal and several other schools, and two public libraries. The general trade and manufactures are considerable, including woollen (stockings and cloth), linen and cotton goods, leather, paper, saltpetre, and dyeing. It has also iron foundries, potteries, distilleries, breweries, cigar factories, &c.

Bautzen was already in existence when Henry L, the Fowler, conquered Lusatia in 928. It became a town and fortress under Otto I., his successor, and speedily attained considerable wealth and importance, for a good share of which it was indebted to the pilgrimages which were made to the " arm of St Peter," preserved in one of the churches. It suffered greatly during the Hussite war, and still more during the Thirty Years' War, in the course of which it was besieged and captured by the elector of Brandenburg, John George (1620) , fell into the hands of Wallenstein (1633) , and,

in the following year was burned by its commander before being surrendered to the elector of Saxony. At the peace of Prague in 1635 it passed with Lusatia to Saxony as a war indemnity.

The town gives its name to a great battle in which, on the 20th and 21st of May 1813, Napoleon I. defeated an allied army of

Russians and Prussians (see Napoleonic Campaigns). Bautzen The position chosen by the allies as that in which to 1813. receive the attack of Napoleon ran S.W. to N.E. from

Bautzen on the left to the village of Gleina on the right. Bautzen itself was held as an advanced post of the left wing (Russians), the main body of which lay 2 m. to the rear (E.) near Jenkwitz. On the heights of Burk, 25 m. N.E. of Bautzen, was Kleist's Prussian corps, with Yorck's in support. On Kleist's right at Pliskowitz (3 m. N.E. of Burk) lay Bliicher's corps, and on Blucher's right, formed at an angle to him, and refused towards Gleina (7 m. N.E. by E. of Bautzen), were the Russians of Barclay de Tolly. The country on which the battle was fought abounded in strong defensive positions, some of

which were famous as battlegrounds of the Seven Years' War. The whole line was covered by the river Spree, which served as an immediate defence for the left and centre, and an obstacle to any force moving to attack the right; moreover the interval between the river and the position on this side was covered with a network of ponds and watercourses. Napoleon's right and centre approached (on a broad front owing to the want of cavalry) from Dresden by Bischofswerda and Kamenz; the left under Ney, which was separated by nearly 40 m. from the left of the main body at Luckau, was ordered to march via Hoyerswerda, Weissig and KHx to strike the allies' right. At noon on the 20th, Napoleon, after a prolonged reconnaissance, advanced the main army against Bautzen and Burk, leaving the enemy's right to be dealt with by Ney on the morrow. He equally neglected the extreme left of the allies in the mountains, judging it impossible to move his artillery and cavalry in the broken ground there. Oudinot's (XII.) corps, the extreme right wing, was to work round by the hilly country to Jenkwitz in rear of Bautzen, Macdonald's (XI.) corps was to assault Bautzen, and Marmont, with the VI. corps, to cross the Spree and attack the Prussians posted about Burk. These three corps were directed bySoult. Farther to the left, Bertrand's (IV.) corps was held back to connect with Ney, who had then reached Weissig with the head of his column. The Guard and other general reserves were in rear of Macdonald and Marmont. Bautzen was taken without difficulty; Oudinot and Marmont easily passed the Spree on either side, and were formed up on the other bank of the river by about 4 p.m. A heavy and indecisive combat took place in the evening between Oudinot and the Russian left, directed by the tsar in person, in which Oudinot's men made a little progress towards Jenkwitz. Marmont's battle was more serious. The Prussians were not experienced troops, but were full of ardour and hatred of the French. Kleist made a most stubborn resistance on the Burk ridge, and Bertrand's corps was called up by Napoleon to join in the battle; but part of Blucher's corps fiercely engaged Bertrand, and Burk was not taken till 7 p.m. The French attack was much impeded by the ground and by want of room to deploy between the river and the enemy. But Napoleon's object in thus forcing the fighting in the centre was achieved. The allies, feeling there the weight of the French attack, gradually drew upon the reserves of their left and right to sustain the shock. At nightfall Bautzen and Burk were in possession of the French, and the allied line now stretched from Jenkwitz northward to Pliskowitz, Bliicher and Barclay main- taining their original positions at Pliskowitz and Gleina. The night of the 2oth-2ist was spent by both armies on the battlefield. Napoleon cared little that the French centre was almost

fought out; it had fulfilled its mission, and on the 21st the decisive point was to be Barclay's position. Soon after daybreak fighting was renewed along the whole line; but Napoleon lay down to sleep until the time appointed for Ney's attack. To a heavy counter- stroke against Oudinot, which completely drove that marshal from the ground won on the ; 2oth, the emperor paid no more heed than to order Macdonald to support the XII corps. For in this second position of the allies, which was far more formidable than

the original line, the decisive result could be brought about only by Ney. That commander had his own (III) corps, the corps of Victor and of Lauriston and the Saxons under Reynier, a total force of 60,000 men. Lauriston, at the head of the column, had been sharply engaged on the 19th, but had spent the 20th in calculated inaction. Early on the 21st the flank attack opened; Ney and Lauriston moving direct upon Gleina, while Reynier and Victor operated by a wide turning movement against Barclay's right rear. The advance was carried out; with precision; the Russians were quickly dislodged, and Ney was now closing upon the rear of Blucher's corps at the village of Preititz. Napoleon at once ordered Soult's four corps to renew their attacks in order to prevent the allies from reinforcing their right. But at the critical moment Ney halted; his orders were to be in Preititz at n a.m. and he reached that place an hour earlier. The respite of an hour enabled the allies to organize a fierce counter-attack; Ney was checked until the flanking columns of Victor and Reynier could come upon the scene. At 1 p.m., when Ney resumed his advance, it was too late to cut off the retreat of the allies. Napoleon now made his final stroke. The Imperial Guard and all other troops in the centre, 80,000 strong and covered by a great mass of artillery, moved forward to the attack; and shortly the allied centre, depleted of its reserves, which had been sent to oppose Ney, was broken through and driven off the field. Bliicher, now almost surrounded, called back the troops opposing Ney to make head against Soult, and Ney's four corps then carried all before them. Preparations had been made by the allies, ever since Ney's appearance,to break off the engagement, and now the tsar ordered a general retreat eastwards, himself with the utmost skill and bravery directing the rearguard. Thus the allies drew' off unharmed, leaving no 'rophies in the hands of Napoleon, whose success, tactically unquestionable, was, for a variety of reasons, and above all owing to the want of cavalry, a coup manipt6 strategically. The troops engaged were, on the French side 163,000 men, on that of the allies about 100,000; and the losses respectively about 20,000 and 13,500 killed and wounded.

BAUXITE, a substance which has been considered to be a mineral

species, having the composition A1 2 0(0H) 4 (correspond- ing with alumina 73-9, water 26-1%), and thus to be distinct from the crystallized aluminium hydroxides, diaspore (AIO) and gibbsite (= hydrargillite, Al(OH) 3) . It was first described by P. Berthier in 1821 as " alumine hydratee de Beaux," and was named beauxite by P. A. Dufrenoy in 1847 an< i bauxite by E. H. Sainte-Claire Deville in 1861; this name being derived from the original locality, the village of Les Baux (or Beaux), near Aries, dep. Bouches-du-Rh6ne in the south of France, where the material has been for many years extensively mined as an ore of aluminium. It is never found in a crystallized state, but always as earthy, clay-like or concretionary masses, often with a pisolitic structure. In colour it varies from white through yellow and brown to red, depending on the amount and the degree of hydration of the iron present. The specific gravity also varies with the amount of iron; that of the variety known as wocheinite (from near Lake Wochein, near Radmannsdorf , in northern Carniola) is given as 2-55. The numerous chemical analyses, which have mostly been made for technical purposes, show that material known as bauxite varies very widely in composition, the maximum and minimum percentages of each constituent being as follows: alumina (Al 2 3) 33-2-76-9; water (H 2 0) 8-6-31-4; iron oxide (Fe 2 Os) 0-1-48-8; silica (Si0 2) 0-3-37-8; titanic acid (Ti0 2) up to 4. The material is thus usually very impure, being mixed with clay, quartz-sand and hydroxides of iron in variable amounts, the presence of which may be seen by a microscopical examination. Analyses of purer material often approximate to diaspore or gibbsite in composition, and minute crystalline scales gf these minerals have been detected under the microscope.

Bauxite can therefore scarcely be regarded as a simple mineral, but rather as a mixture of gibbsite and diaspore with various impurities; it is in fact strikingly like laterite, both in chemical composition and in microscopical structure. Laterite is ad- mittedly a decomposition-product of igneous or other crystalline

rocks, and the same is no doubt also true of bauxite. The deposits in Co. Antrim occur with pisolitic iron ore inter- bedded with the Tertiary basalts, and similar deposits are met with in connexion with the basaltic rocks of the Westerwald in Germany. On the other hand, the more extensive deposits in the south of France (departments Bouches-du-Rhone, Ariege, Herault, Var) and the southern United

States (Georgia, Alabama, Arkansas) are often associated with limestones; in this case the origin of the bauxite has been ascribed to the chemical action of solutions of aluminium sulphate on the limestones.

Bauxite is of value chiefly as a source of metallic aluminium (q.v.); the material is first purified by chemical processes, after which the aluminium hydroxide is reduced in the electric furnace. Bauxite is also largely used in the manufacture of alum and other aluminium salts used in dyeing. Its refractory qualities render it available for the manufacture of fire-bricks and crucibles. (L. J. S.)

BAVAI, a town of northern France in the department of Nord, IS m. E.S.E. of Valenciennes by rail. Pop. (1906) 1622. The town carries on the manufacture of iron goods and of fertil- izers. Under the name of Bagacum or Bavacum it was the capital of the Nervii and, under the Romans, an important centre of roads, the meeting-place of which was marked by a milestone, destroyed in the 17 th century and replaced in the 19th century by a column. Bavai was destroyed during the barbarian invasions and never recovered its old importance. It suffered much during the wars of the 15th, 16th and 17th centuries.

BAVARIA (Ger. Bayern), a kingdom of southern Germany, next to Prussia the largest state of the German empire in area and population. It consists of two distinct and unequal portions, Bavaria proper, and the Palatinate of the Rhine, which lie from 25 to 40 m. W. apart and are separated by the grand-duchies of Baden and Hesse.

Physical Features.— Bavaria proper is bounded on the S. by the Alps, on the N.E., towards Bohemia, by a long range of mountains known as the Bohmerwald, on the N. by the Fichtel- gebirge and the Frankenwald, which separate it from the kingdom of Saxony, the principality of Reuss, the duchies of Saxe-Coburg- Gotha and Meiningen and the Prussian province of Hesse-Cassel. The ranges seldom exceed the height of 3000 or 4000 ft.; but the ridges in the south, towards Tirol, frequently attain an elevation of 9000 or 10,000 ft. On the W. Bavaria is bounded by Wurttemberg, Baden and Hesse-Darmstadt. The country mainly belongs to the basins of the Danube and the Main; by far the greater portion being drained by the former river, which, entering from Swabia as a navigable stream, traverses the entire breadth of the kingdom, with a winding course of 200 m., and receives in its passage the Iller, the Lech, the Isar and the Inn from the south, and the Naab, the Altmuhl and the Wornitz

from the north. The Inn is navigable before it enters Bavarian territory, and afterwards receives the Salzach, a large river flowing from Upper Austria. The Isar does not become navigable till it has passed Munich; and the Lech is a stream of a similar size. The Main traverses the northern regions, or Upper and Lower Franconia, with a very winding course and greatly facilitates the trade of the provinces. The district watered by the southern tributaries of the Danube consists for the most part of an extensive plateau, with a mean elevation of 2390 ft. In the mountainous parts of the country there are numerous lakes and in the lower portions considerable stretches of marshy ground. The smaller or western portion, the Palatinate, is bounded on the E. by the Rhine, which divides it from the grand- duchy of Baden, on the S. by Alsace, and on the W. and N. by a lofty range of hills, the Haardtgebirge, which separate it from Lorraine and the Prussian Rhine province.

The climate of Bavaria differs greatly according to the character of the region, being cold in the vicinity of Tirol but warm in the plains adjoining the Danube and the Main. On the whole, the temperature is in the winter months considerably colder than that of England, and a good deal hotter during summer arid autumn.

Area and Population.— Bavaria proper, or the eastern portion,

contains an area of 26,998 sq. m., and the Palatinate or western, 2288 sq. m., making the whole extent of the kingdom about 29,286 sq. m. The total population, according to the census of 1905, was 6,512,824. Almost a quarter of the inhabitants live in towns, of which Munich and Nuremberg have populations exceeding 100,000, Augsburg, Wurzburg, Furth and Ludwigs- hafen between 50,000 and 100,000, while twenty-six other towns number from 10,000 to 50,000 inhabitants.

Ethnographically, the Bavarians belong to various ancient tribes; Germanized Slavs in the north-east, Swabians and Franks in the centre, Franks towards the west, and, in the Palatinate, Walloons. Politically, the country is divided into eight provinces, as follows: —

Provinces.

Capital.

Pop. of Province in 1905.

Area in sq. m. 1

Upper Bavaria Lower Bavaria. Upper Palatinate . Upper Franconia . Middle Franconia Lower Franconia . Swabia The Palatinate

Munich .

Landshut

Regensburg

Bayreuth

Ansbach .

Wurzburg

Augsburg

Spires

1,410,763 706,345 573.476 637,239 868,072 680,769 750,880 885,280

6,456 4.152 3,728 2,702 2,925 3,243 3.792 2,288

Total.

6,512,824

29,286

Religion. — The majority of the inhabitants (about 70%) are Roman Catholics. The Protestant-Evangelical Church claims about 29 %, while Jews, and a very small number of other sects, account for the remainder.

The districts of Lower Bavaria, Upper Bavaria and the Upper Palatinate are almost wholly Roman Catholic, while in the Rhine Palatinate, Upper Franconia, and especially Middle Franconia, the preponderance is on the side of the Protestants. The exercise of religious worship in Bavaria is altogether free. The Protestants have the same civil rights as the Roman Catholics, and the sovereign may be either Roman Catholic or Protestant. Of the Roman Catholic Church the heads are the two archbishops of Munich-Freising and Bamberg, and the six bishops of Eichstatt, Spires, Wurzburg, Augsburg, Regensburg and Passau, of whom the first three are suffragans of Bamberg. The " Old Catholic " party, under the bishop of Bonn, has failed, despite its early successes, to take deep root in

the country. Among the Protestants the highest authority is the general consistory of Munich. The numbers of the different religions in 1900 were as follows: — Roman Catholics, 4,357,133; Protestants, 1,749,206; Jews, 54,928.

Education. — Bavaria, formerly backward in education, has recently done much in this connexion. The state has two Roman Catholic universities, Munich and Wurzburg, and a Lutheran, Erlangen; in Munich there are a polytechnic, an academy of sciences and an academy of art.

Agriculture. — Of the total surface of Bavaria about one-half is under cultivation, one-third forest, and the remaining sixth mostly pasture. The level country, including both Lower Bavaria (extending northwards to the Danube) and the western and middle parts of Franconia, is productive of rye, oats, wheat, barley and millet, and also of hemp, flax, madder and fruit and vines. The last are grown chiefly in the vicinity of the Lake of Constance, on the banks of the Main, in the lower part of its course, and in the Palatinate of the Rhine. Hops are extensively grown in central Franconia; tobacco (the best in Germany) round Nuremberg and in the Palatinate, which also largely produces the sugar-beet. Potatoes are cultivated in all the provinces, but especially in the Palatinate and in the Spessart district, which lies in the north-west within a curve of the Main. The southern divisions of Swabia and Upper Bavaria, where pasture-land predominates, form a cattle-breeding district and the dairy produce is extensive. Here also horses are bred in large numbers.

The extent of forest forms nearly a third of the total area of Bavaria. This is owing to various causes: the amount of hilly and mountainous country, the thinness of the population and

the necessity of keeping a given extent of ground under wood for the supply of fuel. More than a third of the forests are public property and furnish a considerable addition to the revenue. They are principally situated in the provinces of Upper Bavaria, Lower Bavaria and the Palatinate of the Rhine. The forests are well stocked with game, deer, chamois (in the Alps), wild boars, capercailzie, grouse, pheasants, &c. being plentiful. The greater proportion of the land throughout the kingdom is in the hands of peasant proprietors, the extent of the separate holdings differing very much in different

districts. The largest peasant property may be about 170 acres, and the smallest, except in the Palatinate, about 50.

Minerals. — The chief mineral deposits in Bavaria are coal, iron ore, graphite and salt. The coal mines lie principally in the districts of Amberg, Kissingen, Steben, Munich and the Rhine Palatinate. Salt is obtained on a large scale partly from brine springs and partly from mines, the principal centres being Halle, Berchtesgaden, Traunstein and Rosenheim. The govern- ment monopoly which had long existed was abolished in 1867 and free trade was established in salt between the members of the customs-union. Of quicksilver there are several mines, chiefly in the Palatinate of the Rhine; and small quantities of copper, manganese and cobalt arc obtained. There are numerous quarries of excellent marble, alabaster, gypsum and building stone; and the porcelain-clay is among the finest in Europe. To these may be added emery, steatite, barytes, felspar and ochre, in considerable quantities; excellent lithographic stone is obtained at Solenhofen; and gold and silver are still worked, but to an insignificant extent.

Manufactures and Trade. — A great stimulus was given to manufacturing industry in Bavaria by the law of 1868, which abolished the last remains of the old restrictions of the gilds, and gave the whole country the liberty which had been enjoyed by the Rhine Palatinate alone. The chief centres of industry are Munich, Nuremberg, Augsburg, Fiirth, Erlangen, Aschaffen- burg, Regensburg, Wiirzburg, Bayreuth, Ansbach, Bamberg and Hof in Bavaria proper, and in the Palatinate Spires and the Rhine port of Ludwigshafen. The main centres of the hardware industry are Munich, Nuremberg, Augsburg and Fiirth; the two first especially for locomotives and automobiles, the last for tin- foil and metal toys. Aschaffenburg manufactures fancy goods, Augsburg and Hof produce excellent cloth, and Munich has a great reputation for scientific instruments. In Franconia are numerous paper-mills, and the manufacture of wooden toys is largely carried on in the forest districts of Upper Bavaria. A considerable quantity of glass is made, particularly in the Bohmer- wald. Brewing forms an important industry, the best-known breweries being those of Munich, Nuremberg, Erlangen and Kulmbach. Other articles of manufacture are leather, tobacco, porcelain, cement, spirits, lead pencils (Nuremberg), plate-glass, sugar, matches, aniline dyes, straw hats and baskets. The commerce of Bavaria is very considerable. The exports consist chiefly of corn, potatoes, hops, beer, wine, cloth, cotton goods, glass, fancy wares, toys, cattle, pigs and vegetables. The seat of the hop-trade is Nuremberg; of wool, Augsburg. The imports comprise sugar, tobacco, cocoa, coffee, oils, silk and pig iron.

Communications. — Trade is served by an excellent railway system and there are steamboat services on the navigable rivers, to the east by way of Passau on the Danube, and to the west by Ludwigshafen. The high roads of Bavaria, many of which are military roads laid out at the beginning of the 19th century, extend in all over about 10,000 m. There were 4377 m. of railways in operation in 1904, of which about 3800 were in the hands of the state, and about 440 m. belonged to trie private system of the Palatinate. The principal canal is the Ludwigs- ‘«nal, which connects the Rhine with the Danube, extending from Bamberg on the Regnitz to Dietfurt on the Altmiihl. There is an extensive network of telegraph and telephone lines. All belong to the government post office, which forms an admini- strative system independent of the imperial German post office.

Constitution and Administration. — By the treaty of Versailles (23rd November 1870) and the imperial constitution of the 16th

of April 1871, Bavaria was incorporated with the German empire, reserving, however, certain separate privileges (Sonder- rechtc) in respect of the administration of the army, the railways and the posts, the excise duties on beer, the rights of domicile and the insurance of real estate. The king is the supreme chief of the army, and matters requiring adjudication in the adjutant- general’s court are referred to a special Bavarian court attached to the supreme imperial military tribunal in Berlin. Bavaria is represented in the Bundesrat by six votes and sends forty-eight deputies to the imperial diet. The Bavarian constitution is mainly founded on the constitutional act of the 26th of May 1818, modified by subsequent acts — that of the 9th of March 1828 as affecting the upper house, and those of the 4th of June 1848 and of the 21st of March 1881 as affecting the lower— and is a limited monarchy, with a legislative body of two houses. The crown is hereditary in the house of Wittelsbach, according to the rights of primogeniture, females being excluded from succession so long as male agnates of equal birth exist. The title of the sovereign is king of Bavaria, that of his presumptive heir is crown-prince of Bavaria, and during the minority or incapacity of the sovereign a regency is declared, which is vested in the nearest male agnate capable of ascending the throne. Such a regency began on the 10th of June 1886, at first for King Louis II., and after the 14th of the same month for King Otto I., in the person of the prince regent Luitpold. The executive power resides in the king and the responsibility for the govern- ment of the kingdom in his ministers. The royal family is Roman Catholic, and the seat of government is Munich, the capital.

The upper house of the Bavarian parliament {Kammer der

Reichsrate) is composed of (1) the princes of the blood royal (being of full age), (2) the ministers of the crown, (3) the arch- bishops of Munich, Freising and Bamberg, (4) the heads of such noble families as were formerly " immediate " so long as they retain their ancient possessions in Bavaria, (5) of a Roman Catholic bishop appointed by the king for life, and of the presi- dent for the time being of the Protestant consistory, (6) of hereditary counsellors {Reichsrate) appointed by the king, and (7) of other counsellors appointed by the king for life. The lower house {Kammer dcr Abgeordneten) or chamber of repre- sentatives, consists, since 1881, of 159 deputies, in proportion of one-ˆreckoned on the census of 1875 — to every 31,500 inhabit- ants. A general election takes place every six years, and, under the electoral law of 1906, is direct. Qualifications for the general body of electors are full age of twenty-five years, Bavarian citizenship of one year at least, and discharge of all rates and taxes. Parliament must be assembled every three years, but as the budget is taken every two years, it is regularly called together within that period. No laws affecting the liberty or property of the subject can be passed without the sanction of parliament.

Revenue. — The following is a fairly typical statement of the budget estimates (1902-1903), in marks (= 1 shilling sterling): —

Receipts.

Mks.

Direct taxes . 38,199,000

Customs and indirect

taxes . 50,900,990

State railways . 184,551,000

Posts and tele- graphs . 41,665,100

Forests and agri- cultural dues 37.395.°°°

Imperial assign- ments . . 62,571,605

415,282,695

= £20,764,135

Disbursements.

Civil list

State debt

Ministry of the Royal house and of Foreign dept. .

Ministry of justice .

Ministry of interior .

Public worship and education

Minister of finance

Contribution to im- perial exchequer.

Mks.

402,475 .323.200

688,398 ,615,-299 .055.338

,667,673 ,696,780

72,647,090 222,296,253

= £11,114,813

The public debt amounts to about £95,000,000, of which over 75% was incurred for railways.

Army. — The Bavarian army forms a separate portion of the army of the German empire, with a separate administration, but in time of war is under the supreme command of the German

emperor. The regulations applicable to other sections of the whole imperial army are, however, observed. It consists, on a peace footing, of three army corps, ist, 2nd and 3rd Royal Bavarian (each of two divisions), the headquarters of which are in Munich, Nuremberg and Wurzburg respectively. The Bavarian army comprises sixty-seven battalions of infantry, two battalions of rifles, ten regiments of cavalry (two heavy, two Ulan and six Chevauxlegers) , a squadron of mounted infantry (Jager-zu-pfcrde),

twelve field- and two foot-artillery regiments, three battalions of engineers, three of army service, and a balloon section; in all 60,000 men with 10,000 horses. In time of war the total force is trebled. (P. A. A.)

History

The earliest known inhabitants of the district afterwards called Bavaria were a people, probably of Celtic extraction, who were subdued by the Romans just before the opening of the Christian era, when colonies were founded among them and their land was included in the province of Raetia. During the 5th century it was ravaged by the troops of Odoacer and, after being almost denuded of inhabitants, was occupied by tribes who, pushing along the valley of the Danube, settled there between a.d. 488 and 520. Many conjectures have been formed concerning the race and origin of these people, who were certainly a new and cpmposite social aggregate. Most likely they were descendants of the Marcomanni, Quadi and Narisci, tribes of the Suevic or Swabian race, with possibly a small intermixture- of Gothic or Celtic elements. They were called Baioarii, Baiowarii, Bawarii or Baiuwarii, words derived most probably from Baja or Baya, corruptions of Bojer, and given to them because they came from Bojcrland or Bohemia. Another but less probable explanation derives the name from a combination of the old high German Word uudra, meaning league, and bai, a Gothic word for both. The Bavarians are first mentioned in a Frankish document of 520, and twenty years later Jordanes refers to them as lying east of the Swabians. Their country bore some traces of Roman influence, and its main boundaries were the Enns, the Danube, the Lech and the Alps; but its complete settlement was a work of time.

The Bavarians soon came under the dominion of the Franks, probably without a serious struggle; and were ruled from 555 to 788 by dukes of the Agilolfing family, who were Influence, possibly of Frankish descent. For a century and a half a succession of dukes resisted the inroads of the Slavs on their eastern frontier, and by the time of Duke Theodo I., who died in 717, were completely independent of the feeble Frankish kings. When Charles Martel became the virtual ruler of the Frankish realm he brought the Bavarians into strict dependence, and deposed two dukes successively for contumacy. Pippin the Short was equally successful in maintaining his authority, and several marriages took place between the family to which he belonged and the Agilolfings, who were united in a similar manner with the kings of the Lombards. The ease with which various risings were suppressed by the Franks gives

colour to the supposition that they were rather the outcome of family quarrels than the revolt of an oppressed people. Between the years 739 and 748 the Bavarian law was committed to writing and supplementary clauses were afterwards added, all of which bear evident traces of Frankish influence. Thus, while the dukedom belongs to the Agilolfing family, the duke must be chosen by the people and his election confirmed by the Frankish king, to whom he owes fealty. He has a fivefold wergild, summons the nobles and clergy for purposes of deliberation, calls out the host, administers justice and regulates finance. There are five noble families, possibly representing a former division of the people, after whom come the freeborn, and then the freedmen. The country is divided into gaus or counties, under their counts, who are assisted by judges responsible for declaring the law.

Christianity had lingered in Bavaria from Roman times; but a new era set in when Rupert, bishop of Worms, came to the countv at the invitation of Duke Theodo I. in 696. He

-a. xs

founded several monasteries, and a similar work was also per- formed by St Emmeran, bishop of Poitiers; with the result that before long the bulk of the people professed Christianity and relations were established between lt Bavaria and Rome. The 8th century witnessed in- deed a heathen reaction; but it was checked by the arrival in Bavaria about 734 of St Boniface, who organized the Bavarian church and founded or restored bishoprics at Salzburg, Freising, Regensburg and Passau.

Tassilo III., who became duke of the Bavarians in 749, recognized the supremacy of the Frankish king Pippin the Short in 757, but soon afterwards refused to furnish a con- tribution to the war in Aquitaine. Moreover, during con „ ues t the early years of the reign of Charlemagne, Tassilo gave decisions in ecclesiastical and civil causes in his own name, refused to appear in the assemblies of the Franks, and in general acted as an independent ruler. His position as possessor of the Alpine passes, as an ally of the Avars, and as son-in-law of the Lombard king Desiderius, was so serious a menace to the Frank- ish kingdom that Charlemagne determined to crush him. The details of this contest are obscure. Tassilo appears to have done homage in 781, and again in 787, probably owing to the presence of Frankish armies. But further trouble soon arose, and in 788 the duke was summoned to Ingelheim, where on a charge of treachery he was sentenced to death. He was, however, par- doned by the king; and he

then entered a monastery and formally renounced his duchy at Frankfort in 794. The country was ruled by Gerold, a brother-in-law of Charlemagne, till his death in a battle with the Avars in 799, when its administra- tion was entrusted to Frankish counts and assimilated with that of the rest of the Carolingian empire, while its condition was improved by the measures taken by Charlemagne for the intellectual progress and material welfare of his realm. The Bavarians offered no resistance to the change which thus abol- ished their dukedom; and their incorporation with the Frankish dominions, due mainly to the unifying influence of the church, was already so complete that Charlemagne did not find it necessary to issue more than two capitularies dealing especially with Bavarian affairs.

The history of Bavaria for the ensuing century is bound up with that of the Carolingian empire. Given at the partition of 817 to the king of the East Franks, Louis the German, (j D i 0O wU i, it formed part of the larger territories which were Cam- confirmed to him in 843 by the treaty of Verdun. Marfan Louis made Regensburg the centre of his government, em P lre – and was active in improving the condition of Bavaria, and pro- viding for its security by numerous campaigns against the Slavs. When he divided his possessions in 865 it passed to his eldest son, Carloman, who had already undertaken its government, and after his death in 880 it formed part of the extensive territories of the emperor Charles the Fat. Its defence was left by this incompetent emperor to Arnulf, an illegitimate son of Carloman, and it was mainly owing to the support of the Bavarians that Arnulf was able to take the field against Charles in 887, and to secure his own election as German king in the following year. Bavaria, which was the centre of the East Frankish kingdom, passed in 809 to Louis the Child, during whose reign it was constantly ravaged by the Hungarians. The resistance to these inroads became gradually feebler, and it is said that on the 5th of Jmy 907 almost the whole of the Bavarian race perished in battle with these formidable enemies. For the defence of Bavaria the mark of Carinthia had been erected on the south- eastern frontier, and during the reign of Louis the Child this was ruled by Liutpold, count of Scheyern, who possessed large domains in Bavaria. He was among those who fell in the great fight of 907; but his son Arnulf, surnamed the Bad, rallied the remnants of the race, drove back the Hungarians, and was chosen duke of the Bavarians in 911, when Bavaria and Carinthia were united under his rule. Refusing to acknowledge the supremacy of the German king Conrad I., he was unsuccessfully attacked by the latter, and in 920 was recognized as duke by Conrad's successor, Henry I., the Fowler, who admitted his

right to appoint the bishops, to coin money and to issue laws. A similar conflict took place between Arnulf's son and successor

Eberhard and Otto the Great; but Eberhard was Part of the j ess succe ssful than his father, for in 938 he was driven kingdom. f rom Bavaria, which was given by Otto with reduced

privileges to the late duke's uncle, Bertold; and a count palatine in the person of Eberhard's brother Arnulf was appointed to Watch the royal interests. When Bertold died in 947 Otto conferred the duchy upon his own brother Henry, who had married Judith, a daughter of Duke Arnulf. Henry was disliked by the Bavarians and his short reign was spent mainly in disputes with his people. The ravages of the Hungarians ceased after their defeat on the Lechfeld in 955, and the area of the duchy was temporarily increased by the addition of certain adjacent districts in Italy. In 955 Henry was succeeded by his young son Henry, surnamed the Quarrelsome, who in 974 was implicated in a conspiracy against King Otto II. The reason for this rising was that the king had granted the duchy of Swabia to Henry's enemy, Otto, a grandson of the emperor Otto the Great, and had given the new Bavarian East Mark, afterwards known as Austria, to Leopold I., count of Babenberg. The revolt was, however, soon suppressed; but Henry, who on his escape from prison renewed his plots, was formally deposed in 976 when Bavaria was given to Otto, duke of Swabia. At the same time Carinthia was made into a separate duchy, the office of count palatine was restored, and the church was made dependent on the king instead of on the duke. Restored in 985, Henry proved himself a capable ruler by establishing internal order, issuing important laws and taking measures to reform the monasteries. His son and successor, who was chosen German king as Henry II. in 1002, gave Bavaria to his brother- in-law Henry of Luxemburg; after whose death in 1026 it passed successively to Henry, afterwards the emperor Henry III., and to another member of the family of Luxemburg, as Duke Henry VII. In 1061 the empress Agnes, mother of and regent for the German king Henry IV., entrusted the duchy to Otto of

Nordheim, who was deposed by the king in 1070, The duchy wnen fjjg (j uc hy was granted to Count Welf, a member the Welts. °f an influential Bavarian family. In consequence of

his support of Pope Greegory VII. in his quarrel with Henry, Welf lost but subsequently regained Bavaria; and was followed successively by his sons, Welf II. in 1101, and Henry IX. in 1 1 20, both of whom exercised considerable influence among the German princes. Henry was succeeded in n 26 by his son Henry X., called the Proud, who obtained the duchy of Saxony in 1137. Alarmed at this prince's power, King Conrad III. refused to allow two duchies to remain in the same hands; and, having declared Henry deposed, he bestowed Bavaria upon Leopold IV., margrave of Austria. When Leopold died in 1141, the king retained the duchy himself; but it continued to be the scene of considerable disorder, and in 11 43 he entrusted it to Henry II., surnamed Jasomirgott, margrave of Austria. The struggle for its possession continued until 1156, when King Frederick I. in his desire to restore peace to Germany persuaded Henry to give up Bavaria to Henry the Lion, a son of Duke Henry the Proud.

A new era of government set in when, in consequence of Henry being placed under the imperial ban in 1 180, the duchy was given

by Frederick I. to Otto, a member of the old Bavarian w'tteu- the i amu V oi Wittelsbach (q.v.), and a descendant of the bachs. counts of Scheyern. During the years following the

destruction of the Carolingian empire the borders of Bavaria were continually changing, and for a lengthened period after 955 this process was one of expansion. To the west the

Lech still divided Bavaria from Swabia, but on three Bavaria other sides the opportunities for extension had been

taken advantage of, and the duchy embraced an area of considerable dimensions north of the Danube. , During the later years of the rule of the Welfs, however, a contrary tendency had operated, and the extent of Bavaria had been reduced. The immense energies of Duke Henry the Lion had been devoted to his northern rather than his southern duchv. and when the

of the duchy.

dispute over the Bavarian succession was settled in 1 1 56 the district between the Enns and the Inn had been transferred to Austria. The increasing importance of the mark of Styria, erected into a duchy in 1180; and the county of Tirol, had diminished both the actual and the relative strength of Bavaria, which was now deprived on almost all sides of opportunities for expansion. The

neighbouring duchy of Carinthia, the great temporal possessions of the archbishop of Salzburg, as well as a general tendency to independence on the part of both clerical and lay nobles, were additional forces of similar influence.

When Otto of Wittelsbach was invested with Bavaria at Altenburg in September 1180 the duchy was bounded by the Bohmerwald, the Inn, the Alps and the Lech; and the power of the duke was practically confined to his ?" !e of the extensive private domains aroundWittelsbach,Kelheim tiachs. ' and StraUbing. Otto only enjoyed his new dignity for three years, and was succeeded in 1183 by his son Louis I., who took a leading part in German affairs during the earlier years of the reign of the emperor Frederick II., and was assassinated at Kelheim in September 1231. His son Otto II., called the Illustrious, was the next duke, and his loyalty to the Hohen-staufen caused him to be placed under the papal ban, and Bavaria to be laid under an interdict. Like his father, Otto increased the area of his lands by purchases; and he had con- siderably strengthened his hold upon the duchy before he died in November 1253. The efforts of the dukes to increase their power and to give unity to the duchy had met with a fair measure of success; but they were soon vitiated by partitions among different members of the family which for 250 years made the history of Bavaria little more than a jejune chronicle of territorial divisions bringing war and weakness in ^"Z' 10 " their train. The first of these divisions was made in 1255 between Louis II. and Henry I., the sons of Duke Otto II., who for two years after their father's death had ruled Bavaria jointly; and by it Louis obtained the western part of the duchy, afterwards called Upper Bavaria, and Henry secured eastern or Lower Bavaria. In the B fpp " ', course of a long reign Louis, who was called the Stern, became the most powerful prince in southern Germany. He was the uncle and guardian of Conradin of Hohenstaufen, and when this prince was put to death in Italy in 1 268, Louis and his brother Henry inherited the domains of the Hohenstaufen in Swabia and elsewhere. He supported Rudolph, count of Habsburg, in his efforts to secure the German throne in 1273, married the new king's daughter Mechtild, and aided him in campaigns in Bohemia and elsewhere. For some years after Louis' death in 1294 his sons Rudolph I. and Louis, afterwards the emperor Louis IV., ruled their duchy in common; but as their relations were never harmonious a division of Upper Bavaria was made in 1 3 10, by which Rudolph received the land east of the Isar together with the town of Munich, and Louis the district between the Isar and the Lech. It was not long, however, before this arrangement led to war between the brothers, the outcome of which was that in 13 17, three years*

after he had been chosen German king, Louis compelled Rudolph to abdicate, and for twelve years ruled alone over the W'hole of Upper Bavaria. But in 1329 a series of events induced him to conclude the treaty of Pa via with Rudolph's sons, Rudolph and Rupert, to whom he transferred the Palatinate of the Rhine, which had been in the possession of the Wittelsbach family since 1214, and also a por- tion of Upper Bavaria north of the Danube, which was afterwards called the Upper Palatinate. At the same time it was decided that the electoral vote should be exercised by the two lines alter- nately, and that in the event of either branch of the family be- coming extinct the surviving branch should inherit its possessions.

Henry I. of Lower Bavaria spent most of his time in quarrels with his brother, with Ottakar II. of Bohemia and with various ecclesiastics. When he died in February 1 290 Lower Bavaria was ruled by his three sons, Otto III., Louis Bavaria. III. and Stephen I. Louis died childless in 1296; Stephen left two sons at his death in 13 10, namely, Henry II. and Otto IV., and Otto, who was king of Hungary from 1305 to

1308, died in 1312, leaving a son, Henry III. Lower Bavaria was governed by these three princes until 1333, when Henry III. died, followed in 1334 by his cousin Otto; and as both died without sons the whole of Lower Bavaria then passed to Henry II. Dying in 1339, Henry left an only son, John I., who died childless

in the following year, when the emperor Louis IV., by oftb"""" securM 8 Lower Bavaria for himself, united the whole ducby. of the duchy under his sway. The consolidation of

Bavaria under Louis lasted for seven years, during which the emperor was able to improve the condition of the country. When he died in 1347 he left six sons to share his possessions, who agreed upon a division of Bavaria in 1349. Its history, however, was complicated by its connexion with Branden- burg, Holland and Tirol, all of which had also been left by the emperor to his sons. All the six brothers exercised some authority in Bavaria; but three alone left issue, and of these the eldest, Louis, margrave of Brandenburg, died in 1361; and two years later was followed to the grave by his only son Meinhard, who was childless. The two remaining brothers, Stephen II. and Albert I., ruled over Bavaria-Landshut and Bavaria-

Straubing respectively, and when Stephen died in 1375 his portion of Bavaria was governed jointly by his three sons. In 1392, when all the lines except those of Stephen and Albert had died out, an important partition took place, by which the greater part of the duchy was divided among Stephen's three sons, Stephen III., Frederick and John II., who founded respec- tively the lines of Ingolstadt, Landshut and Munich. Albert's duchy of Bavaria-Straubing passed on his death in 1404 to his son William II., and in 141 7 to his younger son John, who resigned the bishopric of Liege to take up his new position. When John died in 1425 this family became extinct, and after a contest between various claimants Bavaria-Straubing was divided between the three remaining branches of the family.

The main result of the threefold division of 1392 was a suc- cession of civil wars which led to the temporary eclipse of Bavaria

as a force in German politics. Neighbouring states

internal encroached upon its borders, and the nobles ignored condition, ,.,-,,, \ ,

1392. the authority of the dukes, who, deprived of the elec-

toral vote, were mainly occupied for fifty years with intestine strife. This condition of affairs, however, was not wholly harmful. The government of the country and the control of the finances passed mainly into the hands of an assembly called the Landtag or Landschaft, which had been organized in 1392. The towns, assuming a certain independence, became strong and wealthy as trade increased, and the citizens of Munich and Regensburg were often formidable antagonists to the dukes. Thus a period of disorder saw the growth of repre- sentative institutions and the establishment of a strong civic spirit. Stephen III., duke of Bavaria-Ingolstadt, was distin- guished rather as a soldier than as a statesman; and his rule was marked by struggles with various towns, and with his brother, John of Bavaria-Munich. Dying in 1413 he tola was f°U° w ed by his son, Louis, called the Bearded, a restless and quarrelsome prince, who before his accession had played an important part in the affairs of France, where his sister Isabella was the queen of King Charles VI. About 1417 he became involved in a violent quarrel with his cousin, Henry of Bavaria-Landshut, fell under both the papal and the imperial ban, and in 1439 was attacked by his son Louis the Lame. This prince, who had married a daughter of Frederick I. of Hohenzollern, margrave of Brandenburg, was incensed at the favour shown by his father to an illegitimate son. Aided by Albert Achilles,

afterwards margrave of Brandenburg, he took the elder Louis prisoner and compelled him to abdicate in 1443. When Louis the Lame died in 1445 his father came into the power of his implacable enemy, Henry of Bavaria-Landshut, and died in prison in 1447. The duchy of Bavaria-Ingolstadt passed to Henry, who had succeeded his father Frederick as duke of Bavaria-Landshut in 1393, and whose long reign was almost entirely occupied with family feuds. He died in July 1450, and was followed by his son, Louis IX. (called the Rich), and about this time Bavaria began to recover some of its former importance.

Louis IX. expelled the Jews from his duchy, did something for the security of traders, and improved both the administration of justice and the condition of the finances. In 1472 he founded the university of Ingolstadt, attempted to reform the monasteries, and was successful in a struggle with Albert Achilles of Branden- burg. On his death in January 1479 he was succeeded by his son George, also called the Rich; and when George, a faithful adherent of the German king Maximilian I., died without sons in December 1503, a war broke out for the possession of his duchy.

Bavaria- Munich passed on the death of John II. in 1397 to his sons Ernest and William III., but they only obtained possession of their lands after a struggle with Stephen of Bavaria-Ingolstadt. Both brothers were then engaged in warfare with the other branches of the family and with the citizens of Munich. William, a loyal servant of the emperor Sigismund, died in 1435, leaving ar> only son, Adolf, who died five years later; and Ernest, distin- guished for his bodily strength, died in 1438. In 1440 the whole of Bavaria-Munich came to Ernest's son Albert, who had been estranged from his father owing to his union with the unfortunatf Agnes Bernauer (q.v.). Albert, whose attempts to reform the monasteries earned for him the surname of Pious, was almost elected king of Bohemia in 1440. He died in 1460, leaving five sons, the two elder of whom, John IV. and Sigismund, reigned in common until the death of John in 1463. The third brother, Albert, who had been educated for the church, joined his brother in 1465, and when Sigismund abdicated two years later became sole ruler in spite of the claims of his two younger brothers. Albert, who was called the Wise, added the district of Abensberg to his possessions, and in 1504 became involved in the war which broke out for the possession of Bavaria-Landshut on the w death of George the Rich. Albert's rival was George's tne suc . son-in-law, Rupert, formerly bishop of Freising, and son cession to of Philip, count palatine of the Rhine; and the emperor f 9V ˆ?'. Maximilian I., interested as archduke of Austria and count of Tirol, interfered in

the dispute. Rupert died in 1504, and the following year an arrangement was made at the diet of Cologne by which the emperor and Philip's grandson, Otto Henry, obtained certain outlying districts, while Albert by securing the bulk of George's possessions united Bavaria under his rule. In 1506 Albert decreed that the duchy should pass un- _ . . divided according to the rules of primogeniture, and Albert the endeavoured in other ways also to consolidate Bavaria. Wise and He was partially successful in improving the condition w ˆ Uam of the country; and in 1500 Bavaria formed one of the six circles into which Germany was divided for the maintenance of peace. He died in March 1508, and was succeeded by his son, William IV., whose mother, Kunigunde, was a daughter of the emperor Frederick III. In spite of the decree of 1 506 William was compelled in 1516, after a violent quarrel, to grant a share in the government to his brother Louis, an arrangement which lasted until the death of Louis in 1545.

*William followed the traditional Wittelsbach policy, opposition to the Habsburgs, until in 1534 he made a treaty at Linz'with Ferdinand, king of Hungary and Bohemia. This was strengthened in 1 546, when the emperor Charles V. obtained the help of the duke during the war of the league of Schmalkalden by promising him in certain eventualities the succession to the Bohemian throne, and the electoral dignity enjoyed by the count palatine of the Rhine. William also did much at a critical period to secure Bavaria for Catholicism. The reformed doctrines had Roman made considerable progress in the duchy when the duke Catboii- obtained from the pope extensive rights over the ****" '" bishoprics and monasteries, and took measures to re- press the reformers, many of whom were banished; while the Jesuits, whom he invited into the duchy in 1541, made the uni- versity of Ingolstadt their headquarters for Germany. William, whose death occurred in March 155°, was succeeded by his son Albert I V. , who had married a daughter of Ferdinand of Habsburg, afterwards the emperor Ferdinand I. Early in his reign Albert made some concessions to the reformers, who were still strong in Bavaria; but about 1563 he changed his attitude, favoured the decrees of the council of Trent, and pressed forward the work of*

the Counter-Reformation. As education passed by degrees into the hands of the Jesuits the progress of Protestantism was effectually arrested in Bavaria. Albert IV. was a great patron of art. His court at

Munich was the resort of artists of all kinds, and the city was enriched with splendid buildings; while artistic works were collected from Italy and elsewhere. The expenses of a magnificent court led the duke to quarrel with the Landschaft, to oppress his subjects, and to leave a great burden of debt when he died in October 1579. The succeeding duke was Albert's son, William V. (called the Pious), who was educated by the Jesuits and was keenly attached to their tenets. He secured the archbishopric of Cologne for his brother Ernest in 1583, and this dignity remained in the possession of the family for nearly 200 years. In

1597 he abdicated in favour of his son Maximilian I., Maxi- ° an ˆ ret i re d into a monastery, where he died in 1626. mlllan I. Maximilian found the duchy encumbered with debt and and the filled with disorder, but ten years of his vigorous rule Thirtyˆ effected a remarkable change. The finances and the War. judicial system were reorganized, a classof civil servants

anda national militiafounded.and several smalldistricts were brought under the duke's authority. The result was a unity and order in the duchy which enabled Maximilian to play an im- portant part in the Thirty Years' War; during the earlier years of which he was so successful as to acquire the Upper Palatinate and the electoral dignity which had been enjoyed since 1356 by the elder branch of the Wittelsbach family. In spite of subsequent reverses these gains were retained by Maximilian at the peace of Westphalia in 1648. During the later years of this war Bavaria, especially the northern part, suffered severely. In 1632 it was invaded by the Swedes, and, when Maximilian violated the treaty of Ulm in 1647, was ravaged by the French and the Swedes. After repairing this damage to some extent, the elector died at Ingolstadt in September 1651, leaving his duchy much stronger than he had found it. The recovery of the Upper Palatinate made Bavaria compact; the acquisition of the electoral vote made it influential; and the duchy was able to play a part in European politics which intestine strife had rendered impossible for the past four hundred years. (A. W. H.)*

Whatever lustre the international position won by Maximilian I. might add to the ducal house, on Bavaria itself its effect during

the next two centuries was more dubious. Maxi- otmodtrn mman ' s son > Ferdinand Maria (1651-1679), who was a period. minor when he succeeded, did much indeed to repair

the wounds caused by the Thirty Years' War, en- couraging

agriculture and industries, and building or restoring numerous churches and monasteries. In 1669, moreover, he again called a meeting of the diet, which had been suspended since 161 2. His good work, however, was largely undone by his son Maximilian II. Emmanuel (1679-1726), whose far-reaching ambition set him warring against the Turks and, on the side of France, in the great struggle of the Spanish succession. He shared in the defeat at Hochstadt on the 13th of August 1704; his dominions were temporarily partitioned between Austria and the elector palatine, and only restored to him, harried and exhausted, at the peace of Baden in 1714. Untaught by Maxi- milian Emmanuel's experience, his son, Charles Albert (1726- 1745), devoted all his energies to increasing the European prestige and power of his house. The death of the emperor Charles VI. was his opportunity; he disputed the validity of the Pragmatic Sanction which secured the Habsburg succession to Maria Theresa, allied himself with France, conquered Upper Austria, was crowned king of Bohemia at Prague and, in 1742, emperor at Frankfort. The price he had to pay, however, was the occupation of Bavaria itself by Austrian troops; and, though the invasion of Bohemia in 1744 by Frederick II. of Prussia enabled him to return to Munich, at his death on the 20th of January 1745 it was left to his successor to make what terms he. could for the recovery of his dominions. Maximilian III. Joseph (1745-1777), by the peace of Fiissen signed on the 22nd of April 174s, obtained the restitution of his dominions in return for a formal acknowledgment of the Pragmatic Sanction. He was a man of enlightenment, did much to encourage agri-

culture, industries and the exploitation of the mineral wealth of the country, founded the Academy of Scierices at Munich, and abolished the Jesuit censorship of the press. At his death, without issue, on the 30th of December 1777, the Bavarian line of the Wittelsbachs became extinct, and the succession passed to Charles Theodore, the elector palatine. After a separation of four and a half centuries, the Palatinate, to which the duchies of Julich and Berg had been added, was thus of '" he pˆ reunited with Bavaria. So great an accession of atinate. strength to a neighbouring state, whose ambition she had so recently had just reason to fear, was intolerable to Austria, which laid claim to a number of lordships — forming one-third of the whole Bavarian inheritance — as lapsed fiefs of the Bohemian, Austrian, and imperial crowns. These were at once occupied by Austrian troops, with the secret consent of Charles Theodore himself, who was without legitimate heirs, and wished to obtain from the emperor the elevation of his natural children to the status of princes of the

Empire. The protests of the next heir, Charles, duke of Zweibrucken (Deux-Ponts), supported by the king of Prussia, led to the war of Bavarian succession. By the peace of Teschen (May 13th, 1779) the Inn quarter was ceded to Austria, and the succession secured to Charles of Zweibriicken, For Bavaria itself Charles Theodore did less than nothing. He felt himself a foreigner among foreigners, and his favourite scheme, the subject of endless intrigues with the Austrian cabinet and the immediate cause of Frederick II. 's League of Princes {Furstenbund) of 1785, was to exchange Bavaria for the Austrian Netherlands and the title of king of Burgundy. For the rest, the enlightened internal policy of his predecessor was abandoned. The funds of the suppressed order of Jesus, which Maximilian Joseph had destined for the reform of the educational system of the country, were used to endow a province of the knights of St John of Jerusalem, for the purpose of combating the enemies of the faith. The government was inspired by the narrowest clericalism, which culminated in the attempt to withdraw the Bavarian bishops from the jurisdiction of the great German metropolitans and place them directly under that of the pope. On the eve of the Revolution the intellectual and social condition of Bavaria remained that of the middle ages.

In 1792 the revolutionary armies overran the Palatinate; in 1795 the French, under Moreau, invaded Bavaria itself, advanced to Munich — where they were received with joy by the long-suppressed Liberals — and laid siege to Ingolstadt. at j onar y ' Charles Theodore, who had done nothing to prevent wars. or to resist the invasion, fled to Saxony, leaving a regency, the members of which signed a convention with Moreau, by which he granted an armistice in return for a heavy contribu- tion (September 7th, 1796). Immediately afterwards he was forced to retire.

Between the French and the Austrians, Bavaria was now in an evil case. Before the death of Charles Theodore (February 16th, 1799) the Austrians had again occupied the country, preparatory to renewing the war with France. Maximilian IV. Joseph (of Zweibrucken), the new elector, succeeded to a difficult inheritance. Though his own sympathies, and those of his all- powerful minister, Max Josef von Montgelae (?.».), were, if anything, French rather than Austrian, the state of the Bavarian finances, and the fact that the Bavarian troops were scattered and disorganized, placed him helpless in the hands of Austria; on the 2nd of December 1800 the Bavarian arms were involved in the Austrian defeat at Hohenlinden, and Moreau once more occupied Munich. By the treaty of LunSville (February 9th, 1801) Bavaria lost the Palatinate and the duchies of

Zweibrucken and Julich.

In view of the scarcely disguised ambitions and intrigues of the Austrian court, Montgelas now believed that the interests of Bavaria lay in a frank alliance with the French re- public; he succeeded in overcoming the reluctance of tnthiance. Maximilian Joseph; and, on the 24th of August, a separate treaty of peace and alliance with France was signed at Paris. By the third article of this the First Consul undertook to see that the compensation promised under the 7th article

of the treaty of Luneville for the territory ceded on the left bank of the Rhine, should be carried out at the expense of the Empire in the manner most agreeable to Bavaria (de Martens, Recueil, vol. vii. p. 365). In 1803, accordingly, in the territorial re- arrangements consequent on Napoleon's suppression of the ecclesiastical states, and of many free cities of the Empire, Bavaria received the bishoprics of Wiirzburg, Bamberg, Augs- burg and Freisingen, part of that of Passau, the territories of twelve abbeys, and seventeen cities and villages, the whole forming a compact territory which more than compensated for the loss of her outlying provinces on the Rhine. 1 Montgelas' ambition was now to raise Bavaria to the rank of a first-rate power, and he pursued this object during the Napoleonic epoch with consummate skill, allowing fully for the preponderance of France — so long as it lasted — but never permitting Bavaria to sink, like so many of the states of the confederation of the Rhine, into a mere French dependency. In the war of 1805, in accordance with a treaty of alliance signed at Wiirzburg on the 23rd of September, Bavarian troops, for the first time since Charles VII., fought side by side with the French, and by the treaty of Pressburg, signed on the 26th of December, the princi- pality of Eichst&dt, the margraviate of Burgau, the lordship of Vorarlberg, the countships of Hohenems and Konigsegg-Rothen- fels, the lordships of Argen and Tetnang, and the city of Lindau with its territory were to be added to Bavaria. On the other hand WUrzburg, obtained in 1803, was to be ceded by Bavaria to the elector of Salzburg in exchange for Tirol. By the 1st article Of the treaty the emperor acknowledged the assumption by the elector of the title of king, as Maximilian I. 2 The price which Maximilian had reluctantly to pay for this accession of dignity was the marriage of his daughter Augusta with Eugene Beauharnais.

For the internal constitution of Bavaria also the French alliance had noteworthy consequences. Maximilian himself was an " enlightened " prince of the 18th-century type, whose tolerant principles- had already grievously offended his clerical subjects; Montgelas was a firm believer in drastic reform " from above," and, in 1803, had discussed with the rump of the old estates the question of reforms. But the revolutionary changes introduced by the constitution proclaimed on the 1st of May 1808 were due to the direct influence of Napoleon. ' A clean sweep was made of the medieval polity surviving in the somnolent local diets and corporations. In place of the old system of privileges and exemptions were set equality before the law, universal liability to taxation, abolition of serfdom, security of person and property, liberty of conscience and of the press. A representative assembly was created on paper, based on a narrow franchise and with very limited powers, but was never summoned.

*In 1809 Bavaria was again engaged in war with Austria on the side of France, and by the treaty signed at Paris on the 28th of February 1810 ceded southern Tirol to Italy and some small districts to Wurttemberg, receiving as compensation parts of Salzburg, the quarters of the Inn and.Hausruck and the principalities of Bayreuth and Regensburg. So far the policy of Montgelas had been brilliantly successful; but the star of Napoleon had now reached its zenith, and already the astute opportunist had noted the signs of the coming change. The events of 181 2 followed; in 18 13 Bavaria was summoned to join the alliance against Napoleon, the demand being passionately backed by the crown prince Louis and by Marshal Wrede; on Treaty ot l ˆ e 8t ˆ ° * October wa s signed the treaty of Ried, by Wed. which Bavaria threw in her lot with the Allies. Mont-*

gelas announced to the French ambassador that he had been compelled temporarily to bow before the storm, adding " Bavaria has need of France." (For Bavaria's share in the war see Napoleonic Campaigns.)

Immediately after the first peace of Paris (1814), Bavaria ceded to Austria Tirol and Vorarlberg; by the congress of

1 See Reds de la deputation de I' empire . , . du 25 fevr, 1803, &c, { II. vol. vii. p. 453 of G. F. de Martens, Recueil des Traites, &c. (Gottingue, 1831).

- *Text in de Martens' Recueil, viii. p. 388.*

Vienna it was decided that she was to add to these the greater part of

Salzburg and the quarters of the Inn and Hausriick, receiving as compensation, besides Wiirzburg and Aschaffenburg, the Palatinate on the left bank of the ^”° os Rhine and certain districts of Hesse and of the former Austria. abbacy of Fulda. But with the collapse of France the old fear and jealousy of Austria had revived in full force, and Bavaria only agreed to these cessions (treaty of Munich, April 16th, 1816) on Austria promising that, in the event of the powers ignor- ing her claim to the Baden succession in favour of that of the line of the counts of Hochberg, she should receive also the Palatinate on the right bank of the Rhine. The question was thus left open, the tension between the two powers remained extreme, and war was only averted by the authority of the Grand Alliance. At the congress of Aix (1818) the question of the Baden succession was settled in favour of the Hochberg line, without the compensation stipulated for in the treaty of Munich; and by the treaty of Frankfort, signed on behalf of the four great powers on the 20th of July 1810, the territorial questions at issue between Bavaria and Austria were settled, in spite of the protests of the former, in the general sense of the arrangement made at Vienna. A small strip of territory was added, to connect Bavaria with the Palatinate, and Bavarian troops were to garrison the federal fortress of Mainz.

*Meanwhile, on the 1st of February 181 7, Montgelas had been dismissed ; and Bavaria had entered on a new era of constitutional reform. This implied no breach with the European policy of the fallen minister. In the new German < * > “”” confederation Bavaria had assumed the role of de- jgjs. fender of the smaller states against the ambitions of Austria and Prussia, and Montgelas had dreamed of a Bavarian hegemony in South Germany similar to that of Prussia in the north. It was to obtain popular support for this policy and for the Bavarian claims on Baden that the crown prince pressed for a liberal constitution, the reluctance of Montgelas to concede it being the cause of his dismissal. On the 26th of May 1818 the constitution was proclaimed. The parliament was to consist of two houses; the first comprising the great hereditary land- owners, government officials and nominees of the crown; the second, elected on a very narrow franchise, representatives of the small land-owners, the towns and the peasants. By additional articles the equality of religions was guaranteed and the rights of Protestants safeguarded, concessions which were denounced at Rome as a breach of the Concordat, which had been signed immediately before. The result of the con- stitutional experiment hardly justified the royal expectations; the parliament was hardly opened (February 5th, 1819) before the doctrinaire radicalism of some of its members, culminating in the demand that*

the army should swear allegiance to the constitution, so alarmed the king, that he appealed to Austria and Germany, undertaking to carry out any repressive measures they might recommend. Prussia, however, refused to approve of any coup d'etat; the parliament, chastened by the conscious- ness that its life depended on the goodwill of the king, moderated its tone; and Maximilian ruled till his death as a model con- stitutional monarch. On the 13th of October 1825, he was succeeded by his son, Louis I., an enlightened patron of the arts and sciences, who transferred the university of Landshut to Munich, which, by his magnificent taste in building, he trans- formed into one of the most beautiful cities of the continent. The earlier years of his reign were marked by a liberal spirit and the reform, especially, of the financial administration; but the revolutions of 1831 frightened him into reaction, which was accentuated by the opposition of the parliament to his ex- penditure on building and works of art. In 1837 the Ul tra- montanes came into power with Karl von Abel (1788-1859) as prime minister. The Jesuits now gained the upper hand; one by one the liberal provisions of the constitution were modified or annulled; the Protestants were harried and oppressed; and a rigorous censorship forbade any free discussion .of internal politics. The collapse of this regime was due, not to popular agitation, but to the resentment of Louis at the clerical

opposition to the influence of his mistress, Lola Montez. On the 17th of February 1847, Abel was dismissed, for publishing his

memorandum against the proposal to naturalize Lola, Montez. wno was an Irishwoman; and the Protestant Georg

Ludwig von Maurer (q.v.) took his place. The new ministry granted the certificate of naturalization; but riots, in which ultramontane professors of the university took part, were the result. The professors were deprived, the parliament dissolved, and, on the 27th of November, the ministry dismissed. Lola Montez, created Countess Landsfeld, was supreme in the state; and the new minister, Prince Ludwig von Oettingen- Wallerstein (1791-1870), in spite of his efforts to enlist Liberal sympathy by appeals to pan-German patriotism, was powerless to form a stable government. His cabinet was known as the " Lolaministerium "; in February 1848, stimulated by the news from Paris, riots broke out against the countess; on the nth of March the king dismissed Oettingen, and on the 20th,

realizing the force of public opinion against him, abdicated in favour of his son, Maximilian II.

Before his abdication Louis had issued, on the 6th of March, a proclamation promising the zealous co-operation of the Bavarian

government in the work of German freedom and Prussian un ity- To the spirit of this Maximilian was faithful, policy. accepting the authority of the central government

at Frankfort, and (19th of December) sanctioning the official promulgation of the laws passed by the German parlia- ment. But Prussia was henceforth the enemy, not Austria. In refusing to agree to the offer of the imperial crown to Frederick William IV., Maximilian had the support of his parliament. In withholding his assent to the new German constitution, by which Austria was excluded from the Confederation, he ran indeed counter to the sentiment of his people; but by this time the back of the revolution was broken, and in the events which led to the humiliation of Prussia at Olmiitz in 1851, and the restoration of the old diet of the Confederation, Bavaria was safe in casting in her lot with Austria (see Germany: History). The guiding spirit in this anti-Prussian policy, which characterized Bavarian statesmanship up to the war of 1866, was Ludwig Karl Heinrich von der Pfordten (1811-1880), who became minister for foreign affairs on the 10th of April 1849. His idea for the ultimate solution of the question of the balance of power in Germany was the so-called Trias, i.e. a league of the Rhenish states as a counterpoise to the preponderance of Austria and Prussia. In internal affairs his ministry was characterized by a reactionary policy less severe than elsewhere in Germany, which led none the less from 1854 onward to a struggle with the parliament, which ended in the dismissal of Pfordten's ministry on the 27th of March 1859. He was succeeded by Karl Freiherr von Schrenk auf Notzing (1806-1884), an official of Liberal tendencies who had been Bavarian representative in the diet of the Confederation. Important reforms were now introduced, including the separation of the judicial and executive powers and the drawing up of a new criminal code. In foreign affairs Schrenk, like his predecessor, aimed at safeguarding the in- dependence of Bavaria, and supported the idea of superseding the actual constitution of the Confederation by a supreme directory, in which Bavaria, as leader of the purely German states, would hold the balance between Prussia and Austria. Bavaria accordingly opposed the Prussian proposals for the reorganiza- tion of the Confederation, and one of the last acts of King Maximilian was to take a conspicuous part in the assembly of princes summoned to

Frankfort in 1863 by the emperor Francis Joseph (see Germany).

Maximilian was succeeded on the 10th of March 1864 by his son Louis II., a youth of eighteen. The government was at first carried on by Schrenk and Pfordten in concert. Schrenk soon retired, when the Bavarian government found it necessary, in order to maintain its position in the Prussian Zollverein, to become a party to the Prussian commercial treaty with France, signed in 1862. In the complicated Schleswig-Holstein question (q.v.) Bavaria, under Pfordten's guidance, consistently opposed Prussia, and headed the lesser states in their support of Frederick

of Augustenburg against the policy of the two great German powers. Finally, in the war of 1866, in spite of Bismarck's efforts to secure her neutrality, Bavaria sided actively with Austria.

The rapid victory of the Prussians and the wise moderation of Bismarck paved the way for a complete revolution in Bavaria's relation: to Prussia and the German question. The Union South German Confederation, contemplated by the with 6th article of the treaty of Prague, never came into ^"Z"" being; and, though Prussia, in order not prematurely to excite the alarm of France, opposed the suggestion that the southern states should join the North German Confederation, the bonds of Bavaria, as of the other southern states, with the north, were strengthened by an offensive and defensive alliance with Prussia, as the result of Napoleon's demand for " compensa- tion " in the Palatinate. This was signed at Berlin on the 22nd of August 1866, on the same day as the signature of the formal treaty of peace between the two countries. The separatist ambitions of Bavaria were thus formally given up; she had no longer "need of France"; and in the war of 1870-71, the Bavarian army marched, under the command of the Prussian crown prince, against the common enemy of Germany. It was on the proposal of King Louis II. that the imperial crown was offered to King William.

This was preceded, on the 23rd of November 1870, by the signature of a treaty between Bavaria and the North German Confederation. By this instrument, though Bavaria became an integral part of the new German empire, she reserved a larger measure of sovereign independence than any of the other con- stituent states. Thus she retained a separate diplomatic service, military administration, and postal, telegraph and railway systems. The treaty was ratified by the Bavarian chambers on the 21st of January 1871, though not without considerable opposition on the part of the so-called " patriot " party. Their hostility was increased by the Kulturkampf, due to the

promulga- tion in 1870 of the dogma of papal infallibility. Munich Uni- versity, where Doilinger (q.v-) was professor, became the centre of the opposition to the new dogma, and the " old Catholics " (q.v.) were protected by the king and the government. The federal law expelling the Jesuits was proclaimed in Bavaria on the 6th of September 187 1 and was extended to the Redemp- torists in 1873. On the 31st of March 1871, moreover, the bonds with the rest of the empire had been drawn closer by the acceptance of a number of laws of the North German Confedera- tion, of which the most important was the new criminal code, which was finally put into force in Bavaria in 1879. The opposition of the " patriot " party, however, reinforced by the strong Catholic sentiment of the country, continued powerful, and it was only the steady support given by the king to suc- cessive Liberal ministries that prevented its finding disastrous expression in the parliament, where it remained in a greater or less majprity till 1887, and has since, as the " centre," continued to form the most compact party in an assembly made up of " groups."

Meanwhile the royal dreamer, whose passion for building palaces was becoming a serious drain on the treasury, had been declared insane, and, on the 7th of June 1886, the heir-presumptive, Prince Luitpold, was proclaimed regent. Six days later, on the 13th of June, Louis committed suicide. His brother, Otto I., being also insane, the regency was confirmed to Prince Luitpold.

Since 1871 Bavaria has shared to the full in the marvellous development of Germany; but her " particularism," founded on traditional racial and religious antagonism to the Prussians, was by no means dead, though it exhibited itself in no more dangerous form than the prohibition, reissued in 1900, to display any but the Bavarian flag on public buildings on the emperor's birthday; a provision which has been since so far modified as to allow the Bavarian and imperial flags to be hung side by side.

Authorities. — Monumenla Boica (44 vols., Munich, 1763-1900); G. T. Rudhart, Aelteste Geschichte Bayerns (Hamburg, 1 841); A. Quitzmann, Abstammung, Vrsitz, und dlteste Geschichte der Bairwaren (Munich, 1857), and Die dlteste Geschichte der Baiern bis 911

(Brunswick, 1873) ; S. Riezler, GeschichteBayerns (Gotha,

1878-1899) ; Ad. Brecher, Darstettung der geschichtlichen Entwickelung des bay- rischen Staatsgebiets, map (Berlin, 1890); E. Rosenthal, Geschichte des Gerichtswesens und der Verwaltungsorganisation Bayerns (Wiirz- burg, 1889); A. Buchner, Geschichte von Baiern (Munich, 1820- 1853); Forschungen zur Geschichte Bayerns, edited by K. von Reinhardstottner (Berlin, 1897 fol.). Much valuable detail will be found in the lives of Bavarian princes and statesmen in the Allgemeine deutsche Biographie (Leipzig, 1875-1906 in progr.) (W. A. P.)

BAVENO, a town of Piedmont, Italy, in the province of Novara, on the west shore of Lago Maggiore, 13 m. N.N. W. of Arona by rail. Pop. (1901) 2502. It is much frequented as a resort in spring, summer and autumn, and has many beautiful villas. To the north-west are the famous red granite quarries, which have supplied the columns for the cathedral of Milan, the church of S. Paolo fuori le Mura at Rome, the Galleria Vittorio Emanuele at Milan, and other important buildings.

BAWBEE (of very doubtful origin, the most plausible con- jecture being that the word is a corruption from the name of the mint master Sillebawby, by whom they were first issued, c. 1541), the Scottish name for a halfpenny or other small coin, and hence used of money generally. A writer in 1573, quoted in Tytler's History of Scotland, speaks of " a coin called a bawbee, . . . which is in value English one penny and a quarter." The word was sometimes written " babie," and has therefore been identified merely with a " baby coin," but this etymology is less probable.

BAXTER, ANDREW (1686-17 50), Scottish metaphysician, was born in Aberdeen and educated at King's College. He maintained himself by acting as tutor to noblemen's sons. From 1 741 to 1747 he lived with Lord Blantyre and Mr Hay of Drummelzier at Utrecht, and made excursions in Flanders, France and Germany. Returning to Scotland, he lived at Whittingehame, near Edinburgh, till his death in 1750. At Spa he had met John Wilkes, then twenty years of age, and formed a lasting friendship with him. His chief work, An Inquiry into the Nature of the Human Soul (editions 1733, 1737 and 1745; with appendix added in 1750 in answer to an attack in Mac- laurin's Account of Sir I. Newton's Philosophical Discoveries, and dedication to John Wilkes), examines the properties of matter. The- one essential property of matter is its inactivity, vis inertiae (accepted later by Monboddo). All movement in matter is, therefore, caused by some immaterial force, namely, God. But the movements of the body are not analogous to the movements of matter; they are caused by a

special immaterial force, the soul. The soul, as being immaterial, is immortal, and its con- sciousness does not depend upon its connexion with the body. The argument is supported by an analysis of the phenomena of dreams, which are ascribed to direct spiritual influences. Lastly Baxter attempted to prove that matter is finite. His work is an attack on Toland's Letters to Serena (1704), which argued that motion is essential to matter, and on Locke and Berkeley. His criticism of Berkeley (in the second volume) is, however, based on the common misinterpretation of his theory (see Berkeley). Sir Lesiie Stephen speaks of him as a curious example of " the effects of an exploded metaphysics on a feeble though ingenious intellect."

Beside the Inquiry, Baxter wrote Mathq sive Cosmotheoria Puerilis (an exposition in Latin of the elements of astronomy written for his pupils — editions in English 1740, 1745 and 1765, with one dialogue re- written); Evidence of Reason in Proof of the Immortality of the Soul (published posthumously from MSS. by Dr Duncan in 1779).

See life in Biographia Britannica ; McCosh's Scottish Philosophy, pp. 42-49.

BAXTER, RICHARD (1615-1691), English puritan divine, called by Dean Stanley " the chief of English Protestant School- men," was born at Rowton, in Shropshire, at the house of his maternal grandfather, in November (probably the 12th) 161 5. His ancestors had been gentlefolk, but his father had reduced himself to hard straits by loose living. About the time of Richard's birth, however, he changed decisively for the better. The boy's early education was poor, being mainly in the hands of the illiterate and dissolute clergy and readers who held the

neighbouring livings at that time. He was better served by John Owen, master of the free school at Wroxeter, where he studied from about 1629 to 1632, and made fair progress in Latin. On Owen's advice he did not proceed to Oxford (a step which he afterwards regretted), but went to Ludlow Castle to read with Richard Wickstead, the council's chaplain there. Wickstead neglected his pupil entirely, but Baxter's eager mind found abundant nourishment in the great library at the castle. He was persuaded- — against his will — to turn his attention to a court life, and he went to London under the patronage of Sir Henry Herbert, master of the revels, to follow that course; but he very soon returned home with a fixed resolve — confirmed by the death of his mother — to study divinity.

After three months' schoolmastering for Owen at Wroxeter he read theology, and especially the schoolmen, with Francis Garbet, the local clergy- man. About this time (1634) he met Joseph Symonds and Walter Cradock, two famous Nonconformists, whose piety and fervour influenced him considerably. In 1638 he was nominated to the mastership of the free grammar school, Dudley, in which place he commenced his ministry, having been ordained and licensed by John Thornborough, bishop of Worcester. His success as a preacher was, at this early period, not very great; but he was soon transferred to Bridgnorth (Shropshire), where, as assistant to a Mr Madstard, he established a reputation for the vigorous discharge of the duties of his office.

He remained at Bridgnorth nearly two years, during which time he took a special interest in the controversy relating to Nonconformity and the Church of England. He soon, on some points, especially matters of discipline, became alienated from the Church; and after the requirement of what is called " the et cetera oath," he rejected episcopacy in its English form. He could not, however, be called more than a moderate Noncon- formist; and such he continued to be throughout his life. Though commonly denominated a Presbyterian, he had no exclusive attachment to Presbyterianism, and often manifested a willingness to accept a modified Episcopalianism. All forms of church government were regarded by him as subservient to the true purposes of religion.

One of the first measures of the Long Parliament was to effect the reformation of the clergy; and, with this view, a committee was appointed to receive complaints against them. Among the complainants were the inhabitants of Kidderminster, a town which had become famous for its ignorance and depravity. This state of matters was so clearly proved that an arrangement was agreed to on the part of the vicar (Dance), by which he allowed £60 a year, out of his income £200, to a preacher who should be chosen by certain trustees. Baxter was invited to deliver a sermon before the people, and was unanimously elected as the minister of the place. This happened in April 1641, when he was twenty-six years of age.

His ministry continued, with very considerable interruptions, for about nineteen years; and during that time he accomplished a work of reformation in Kidderminster and the neighbourhood which is as notable as anything of the kind upon record. Civilized behaviour succeeded to brutality of manners; and, whereas the professors of religion had been but small exceptions to the mass, the unreligious people became the exceptions in their turn. He formed the ministers

in the country around him into an association for the better fulfilment of the duties of their calling, uniting them together irrespective of their differences as Presby- terians, Episcopalians and Independents. The spirit in which he acted may be judged of from The Reformed Pastor, a book published in relation to the general ministerial efforts he pro- moted. It drives home the sense of clerical responsibility with extraordinary power. The result of his action is that, to this day his memory is cherished as that of the true apostle of the district where he laboured.

The interruptions to which his Kidderminster life was subjected arose from the condition of things occasioned by the civil war. Baxter blamed both parties, but Worcestershire was a cavalier county, and a man in his position was, while the war continued, exposed to annoyance and danger in a place like Kidderminster.

He therefore removed to Gloucester, and afterwards (1643- 1645) settled in Coventry, where he preached regularly both to the garrison and the citizens. After the battle of Naseby he took the situation of chaplain to Colonel Whalley's regiment, and continued to hold it till February 1647. During these stormy years he wrote his Aphorisms of Justification, which on its appearance in 1649 excited great controversy.

Baxter's connexion with the Parliamentary army was a very characteristic one. He joined it that he might, if possible, counteract the growth of the sectaries in that field, and maintain the cause of constitutional government in opposition to the republican tendencies of the time. He regretted that he had not previously accepted an offer of Cromwell to become chaplain to the Ironsides, being confident in his power of persuasion under the most difficult circumstances. His success in converting the soldiery to his views does not seem to have been very great, but he preserved his own consistency and fidelity in a remarkable degree. By public disputation and private conference, as well as by preaching, he enforced his doctrines, both ecclesiastical and political, and shrank no more from urging what he conceived to be the truth upon the most powerful officers than he did from instructing the meanest followers of the camp. Cromwell dis- liked his loquacity and shunned his society; but Baxter having to preach before him after he had assumed the Protectorship, chose for his subject the old topic of the divisions and distractions of the church,

and in subsequent interviews not oniy opposed him about liberty of conscience, but spoke in favour of the monarchy he had subverted. There is a striking proof of Baxter's insight into character in his account of what happened under these circumstances. Of Cromwell he says, " I saw that what he learned must be from himself." It is worthy of notice that this intercourse with Cromwell occurred when Baxter was summoned to London to assist in settling " the fundamentals of religion," and made the memorable declaration, in answer to the objection that what he had proposed as fundamental " might be subscribed by a Papist or Socinian," — " So much the better, and so much the fitter it is to be the matter of concord." In 1647 he was staying at the home of Lady Rouse of Rouse-Lench, and there, in much physical weakness, wrote a great part of his famous work, The Saints' Everlasting Rest (1650). On his recovery he returned to his charge at Kidderminster, where he also became a prominent political leader, his sensitive conscience leading him into conflict with almost every one of the contending parties in state and church. His conduct now, as at all times, did " credit to his conscientiousness rather than to his wisdom."

After the Restoration in 1660 Baxter, who had helped to bring about that event, settled in London. He preached there till the Act of Uniformity took effect in 1662, and was employed in seek- ing for such terms of comprehension as would have permitted the moderate dissenters with whom he acted to have remained in the Church of England. In this hope he was sadly disappointed. There was at that time on the part of the rulers of the church no wish for such comprehension, and their object in the negotiations that took place was to excuse the breach of faith which their rejection of all reasonable methods of concession involved. The chief good that resulted from the Savoy conference was the production of Baxter's Reformed Liturgy, a work of remarkable excellence, though it was cast aside without consideration. The same kind of reputation which Baxter had obtained in the country he secured in the larger and more important circle of the metro- polis. The power of his preaching was universally felt, and his capacity for business placed him at the head of his party. He had been made a king's chaplain, and was offered the bishopric of Hereford, but he could not accept the offer without virtually assenting to things as they were. This he could not do, and after his refusal he was not allowed, even before the passing of the Act of Uniformity, to be a curate in Kidderminster, though he was willing to serve that office gratuitously. Bishop Morley even prohibited him from preaching in the diocese of Worcester. Baxter, however, found much consolation in his marriage on the 24th of

September 1662 with Margaret Charlton, a woman like- minded with himself. She died in 1S81.

From the ejectment of 1662 to the indulgence of 1687, Baxter's life was constantly disturbed by persecution of one kind or another. He retired to Acton in Middlesex, for the purpose of quiet study, and was dragged thence to prison for keeping a conventicle. The mittimus was pronounced illegal and irregular, and Baxter procured a habeas corpus in the court of common pleas. He was taken up for preaching in London after the licences granted in 1 6 7 2 were recalled by the king. The meeting- house which he had built for himself in Oxendon Street was closed against him after he had preached there but once. He was, in 1680, seized in his house, and conveyed away at the risk of his life; and though he was released that he might die at home, his books and goods were distrained. He was, in 1684, carried three times to the sessions house, being scarcely able to stand, and without any apparent cause was made to enter into a bond for £400 in security for his good behaviour.

But his worst encounter was with the chief justice, Sir George Jeffreys, in May 1685. He had been committed to the king's bench prison on the ridiculous charge of libelling the Church in his Paraphrase on the New Testament, and was tried before Jeffreys on this accusation. The trial is well known as among the most brutal perversions of justice which have occurred in England, though it must be remembered that no authoritative report of the trial exists. If the partisan account on which tradition is based is to be accepted, it would appear that Jeffreys himself acted like an infuriated madman. (See Jeffreys, Sir George.) Baxter was sentenced to pay 500 marks, to lie in prison till the money was paid, and to be bound to his good behaviour for seven years. It was even asserted at the time that Jeffreys proposed he should be whipped at the cart's tail through London. The old man, for he was now seventy, remained in prison for eighteen months, when the government, vainly hoping to win his influence to their side, remitted the fine and released him.

During the long time of oppression and injury which followed the ejectment, Baxter was sadly afflicted in body. His whole life was indeed one continued illness, but in this part of it his pain and languor had greatly increased. Yet this was the period of his greatest activity as a writer. He was a most voluminous author, his separate works, it is said, amounting to 168. They are as learned as they are elaborate, and as varied in their subjects as they are faithfully composed. Such treatises as the Christian Directory, the Methodus Theologiae Christianae, and the Catholic Theology, might each have

occupied the principal part of the life of an ordinary man. His Breviate of the Life of Mrs Margaret Baxter records the virtues of his wife, and reveals on the part of Baxter a tenderness of nature which might otherwise have been unknown. His editors have contented themselves with re- publishing his " Practical Works," and his ethical, philosophical, historical and political writings still await a competent editor.

The remainder of Baxter's life, from 1687 onwards, was passed in peace and honour. He continued to preach and to publish almost to the end. He was surrounded by attached friends, and reverenced by the religious world. His saintly behaviour, his great talents, and his wide influence, added to his extended age, raised him to a position of unequalled reputation: He helped to bring about the downfall of James II. and complied with the Toleration Act under William and Mary. He died in London on the 8th of December 1691, and his funeral was attended by churchmen as well as dissenters. A similar tribute of general esteem was paid to him nearly two centuries later, when a statue was erected to his memory at Kidderminster in July 1875.

Baxter was possessed by an unconquerable belief in the power of persuasive argument. He thought every one was amenable to reason — bishops and levellers included. And yet he was as far as possible from being a quarrelsome man. He was at once a man of fixed belief and large appreciation, so that his dogmatism and his liberality sometimes came into collision. His popularity as a preacher was deservedly pre-eminent; but no more diligent student ever shut himself up with his books. He was singularly fitted for intellectual debate, but his devotional tendency was equally strong witb bis logical aptitude. Some of his writings, from their metaphysical subtilty, will always puzzle the learned;

but he could write to the level of the common heart without loss of dignity or pointedness. His Reasons for the Christian Religion is still, for its evidential purpose, better than most works of its kind. His Poor Man's Family Book is a manual that continues to be worthy of its title. His Saints' Everlasting Rest will always command the grateful admiration of pious readers. It is also charged with a robust and manly eloquence and a rare and unsought felicity of language that make it a masterpiece of style. Perhaps no thinker has exerted

so great an influence upon nonconformity as Baxter has done, and that not in one direction only, but in every form of development, doctrinal, ecclesiastical and practical. He is the type of a distinct class of the Christian ministry — that class which aspires after scholarly training, prefers a broad to a sectarian theology, and adheres to rational methods of religious investigation and appeal. The rational element in him was very strong. He had a settled hatred of fanaticism. Even Quakerism he could scarcely endure. Religion was with him all and in all — that by which all besides was measured, and to whose interests all else was subordinated. Isaac Barrow said that " his practical writings were never minded, and his controversial ones seldom confuted," and John Wilkins, bishop of Chester, asserted that " if he had lived in the primitive time he had been one of the fathers of the church."

Bibliography.— Our most valuable source is Baxter's auto-biography, called Reliquiae Baxterianae or Mr Richard Baxter's Narrative of the most memorable Passages of his Life and Times (published by Matthew Sylvester in '1696). Edmund Calamy abridged this work (1702). The abridgment forms the first volume of the account of the ejected ministers, but whoever refers to it should also acquaint himself with the reply to the accusations which had been brought against Baxter, and which will be found in the second volume of Calamy's Continuation. William Orme's Life and Times of Richard Baxter appeared in 2 vols, in 1830; it also forms the first volume of " Practical Works " (1830, reprinted 1868). Sir James Stephen's interesting paper on Baxter, contributed originally to the Edinburgh Review, is reprinted in the second volume of his Essays. More recent estimates of Baxter are those given by John Tulloch in his English Puritanism and its Leaders, and by Dean Stanley in his address at the inauguration of the statue to Baxter at Kidderminster (see Macmillan's Magazine, xxxii. 385).

There is a good portrait of Baxter in the Williams library, Gordon Square, London.

BAXTER, ROBERT DUDLEY (1827-1875), English economist and statistician, was born at Doncaster in 1 8 2 7 . He was educated privately and at Trinity College, Cambridge. He studied law and entered his father's firm of Baxter & Co., solicitors, with which he was connected till his death. Though studiously attentive to business, he was enabled, as a member of the Statistical and other learned societies, to accomplish much useful economic work. His principal economic writings were The Budget and the Income Tax (i860), Railway Extension and its Restdls (1866), The National Income

(1868), The Taxation of the United Kingdom (1869), National Debts of tlie World (1871), Local Government and Taxation (1874), and his purely political writings included The Volunteer Movement (i860), The Redistribution of Seats and the Counties (1866), History of English Parties and Con- servatism (1870), and The Political Progress of the Working Classes (1871).

BAXTER, WILLIAM (1650-1723), British antiquarian, critic and grammarian, nephew of Richard Baxter, the divine, was born at Llanllugan, Montgomeryshire. When he went to Harrow school, at the age of eighteen, he was unable to read, and could speak no language except Welsh. His progress must have been remarkable, since he published his Latin grammar about ten years afterwards. During the greater part of his life Baxter was a schoolmaster, and was finally headmaster of the Mercers' school, where he remained till shortly before his death on the 31st of May 1723. He was an accomplished linguist, and his learning was undoubtedly very great. His published works are: De Analogia (1679), an advanced Latin grammar; Anacreontis Teii Carmina, including two odes of Sappho (1695; reprinted in 1710, "with improvements," which he was accused of having borrowed from the edition of Joshua Barnes); Horace (1701 and subsequent editions, regarded as remarkable for its abuse of Bentley) ; Glossarium Antiquitatum Britannicarum (1 719); and Glossarium

Anliquitatum Romanarum (1826). The last two works were published by the Rev. Moses Williams, the second (which goes no farther than the letter A) under the title of Reliquiae Baxterianae, including an autobiographical fragment. Baxter also contributed to a joint translation of Plutarch's Moralia, and left notes on Juvenal and Persius.

BAY, a homonymous term of which the principal branches are as follows. (1) The name of the sweet laurel (Laurus nobilis) or bay tree (see Laurel) ; this word is derived through the O. Fr. baie, from Lat. baca, berry, the bay bearing a heavy crop of dark purple berries. The leaves of the bay were woven in garlands to crown poets, and hence the word is often used figuratively in the sense of fame and reward. (2) A wide opening or indentation in a coast line. This may be of the same origin as " bay," in the architectural sense, or from a Latin word which is seen in the place name Baiae. (3) The name of a colour, of a reddish brown, principally used of the colour in horses; there are various shades, light bay, bright bay, &c. This word is derived from the Latin badius, which is given by Varro (in Nonnius, pp. 80-82) as one of the colours of horses. The word is also seen in

baize (q.v.). (4) The deep bark of dogs. This word is also seen in the expression " at bay," properly of a hunted animal who at the last turns on the " baying " hounds and defends itself. The origin of the word is the O.Fr. bayer, abayer, Lat. badare, properly to gape, open wide the mouth. (5) An architectural term (Fr. travee, Ital. compartimento, Ger. Abteilung) for any division or compartment of an arcade, roof, &c. Each space from pillar to pillar in a cathedral, church or other building is called a " bay " or " severy." This word is also to be referred to bayer,-to gape.

A " bay-window " or " bow-window " is a window projecting outwards and forming a recess in the apartment. Bay-windows may be rectangular, polygonal or semicircular in plan, in the last case being better known as bow-windows. The bay-window would seem to have been introduced in the 1 5th century, but the earliest examples of importance are those which were built during the reign of Edward IV.(i46i-i483),whenit was largely employed in the colleges of Oxford and Cambridge and in the feudal castles of the period. Examples are found in the palace at Eltham, Cowdray Castle in Sussex, Thornbury Castle in Gloucestershire, and in the George Inn at Glastonbury; one of the finest of a later date is that of the Banqueting Hall at Hampton Court, some 50 ft. high. In the great entrance halls of ancient mansions the floor of the last bay of the hall was generally raised two or three steps, and this portion was reserved for the lord of the manor and his guests, and was known as the dais. The usual position of the bay- window is at one end of this dais, and occasionally but rarely at both ends. The sills of the windows are at a lower level than those in the hall, and, raised on one or two steps, are seats in the recess. The recess of the bay-window was generally covered with a ribbed vault of elaborate design, and the window itself subdivided by mullions and transoms. In some of the larger windows such as those at Cowdray and Hampton Court there are no fewer than five transoms, and this sub-division gave great scale to the design. The same feature when employed in an upper storey and supported by corbels or brackets is known as an oriel window. (See also Dais and Hall.)

BAYAMO, an old inland city on the N. slope of the Sierra Maestra in Santiago province, Cuba. Pop. (1907) 4102. It lies on a plain by the Bayamo river, in a fertile country, but isolated from sea and from railway. Its older parts are extraordinarily irregular. The streets are of all widths, and of all degrees of crookedness, and run in all directions. Bayamo was the third of the seven cities founded by Diego Velazquez, and was established in 1513. During much of the 16th century it was one of the most important agricultural and

commercial settlements of the island. Its inland situation gave it relative security against the pirates who then infested West Indian seas, and the misfortunes of Santiago were the fortunes of Bayamo. Down the river Cauto, then open to the sea for vessels of 200 tons, and through Manza- nillo, Bayamo drove a thriving contraband trade that made it at the opening of the 17th century the leading town of Cuba. A tremendous flood, in 161 6, choking the Cauto with trees and

wrecked vessels, cut it off from direct access to the sea; but through Manzanillo it continued a great clandestine traffic with Curacao, Jamaica, and other foreign islands all through the 17th and 1 8th centuries. Bayamo was then surrounded by fine plantations. It was a rich and turbulent city. In the war of 1868-78 it was an insurgent stronghold; near it was fought one of the most desperate conflicts of the war, and it was nearly destroyed by the opposing parties. Bayamo was the birthplace and the home of Carlos Manuel de Cespedes (1819-1874), first president of the " first " Cuban republic, and was also the birthplace and home of Tomas Estrada Palma (1835-1908), first president of the present Cuban republic. ■ BAYARD, PIERRE TERRAIL, Seigneur de (1473-1524), French soldier, the descendant of a noble family, nearly every head of which for two centuries past had fallen in battle, was born [it the chateau Bayard, Dauphine (near Pontcharra, Isere), about 1473. He served as a page to Charles I., duke of Savoy, until Charles VIII. of France, attracted by his graceful bearing, placed him among the royal followers under the seigneur (count) de Ligr y (1487). As a youth he was distinguished for comeliness, affability of manner, and skill in the tilt-yard. In 1494 he accompanied Charles VIII. into Italy, and was knighted after the battle of Fornova (1495), where he had captured a standard. Shortly afterwards, entering Milan alone in ardent pursuit of the enemy, he was taken prisoner, but was set free without a ransom by Lodovico Sforza. In 1502 he was wounded at the assault of Canossa. Bayard was the hero of a celebrated combat of thirteen French knights against an equal number of Germans, and his restless energy and valour were conspicuous throughout the Italian wars of this period. On one occasion it is said that, single-handed, he made good the defence of the bridge of the Garigliano against about 200 Spaniards, an exploit that brought him such renown that Pope Julius II. sought to entice him into the papal service, but unsuccessfully. In 1508 he distinguished himself again at

the siege of Genoa by Louis XII., and early in 1509 the king made him captain of a company of horse and foot. At the siege of Padua he won further distinction, not only by his valour, but also by his consummate skill. He continued to serve in the Italian wars up to the siege of Brescia in 1512. Here his intre- pidity in first mounting the rampart cost him a severe wound, which obliged his soldiers to carry him into a neighbouring house, the residence of a nobleman, whose wife and daughters he pro- tected from threatened insult. Before his wound was healed, he hurried to join Gaston de Foix, under whom he served in the terrible battle of Ravenna (1512). In 1 513, when Henry VIII. of England routed the French at the battle of the Spurs (Guinegate, where Bayard's father had received a lifelong injury in a battle of 1479), Bayard in trying to rally his countrymen found his escape cut off. Unwilling to surrender, he rode suddenly up to an English officer who was resting unarmed, and summoned him to yield; the knight complying, Bayard in turn gave himself up to his prisoner. He was taken into the English camp, but his gallantry impressed Henry as it had impressed Lodovico, and the king released him without ransom, merely exacting his parole not to serve for six weeks. On the accession of Francis I. in 151s Bayard was made lieutenant-general of Dauphine; and after the victory of Marignan, to which his valour largely contributed, he had the honour of conferring knighthood on his youthful sovereign. When war again broke out between Francis I. and Charles V., Bayard, with 1000 men, held Mezieres, which had been declared untenable, against an army of 35,000, and after six weeks compelled the imperial generals to raise the siege. This stubborn resistance saved central France from invasion, as the king had not then sufficient forces to withstand the imperialists. All France rang with the achievement, and Francis gained time to collect the royal army which drove out the invaders (1521). The parlement thanked Bayard as the saviour of his country; the king made him a knight of the order of St Michael, and commander in his own name of 100 gens d'armes, an honour till then reserved for princes of the blood. After allaying a revolt at Genoa, and striving with the greatest assiduity to check a pestilence in Dauphine, Bayard was sent, in 1523, into Italy with

Admiral Bonnivet, who, being defeated at Robecco and wounded in a combat during his retreat, implored Bayard to assume the command and save the army. He repulsed the foremost pursuers, but in guarding the rear at the passage of the Sesia was mortally wounded by an arquebus ball (April 30th, 1 524). He died in the midst of the enemy, attended by Pescara, the Spanish com- mander, and by his old comrade the constable de Bourbon. His body was restored to his

friends and interred at Grenoble. Chivalry, free of fantastic extravagance, is perfectly mirrored in the character of Bayard. As a soldier he was one of the most skilful commanders of the age. He was particularly noted for the exactitude and completeness of his information of the enemy's movements; this he obtained both by careful reconnaissance and by a well-arranged system of espionage. In the midst of mercenary armies Bayard remained absolutely disinterested, and to his contemporaries and his successors he was, with his romantic heroism, piety and magnanimity, the fearless and faultless knight, le chevalier sans peur el sans reproche. His gaiety and kindness won him, even more frequently, another name bestowed by his contemporaries, le bon chevalier.

Contemporary lives of Bayard are the following: — " Le loyal serviteur " (? Jacques de Maille) ; La tres joyeuse, plaisante, et recreative histoire . . . des faiz, gestes, triumph.es el prouesses du bon chevalier sans paour et sans reproche, le gentil seigneur de Bayart (original edition printed at Paris, 1527 ; the modern editions are very numerous, those of M. J. Roman and of L. Larchey appeared in 1878 and 1882); Symphorien Champier, Les Gestes, ensemble la vie du preulx chevalier Bayard (Lyons, 1525) ; Aymar du Rivail, Histoire des Allobroges (edition of de Terrebasse, 1844); see Bayard in Repertoire des sources historiques, by Ulysse Chevalier, and in particular A. de Terrebasse, Hist, de Pierre Terrail, seigneur de Bayart (1st ed., Paris, 1828; 5th ed., Vienna, 1870).

BAYARD, THOMAS FRANCIS (1828-1898), American diplo- matist, was born in Wilmington, Delaware, on the 29th of October 1828. His great-grandfather, Richard Bassett (1745- 1815), governor of Delaware; his grandfather, James Asheton Bayard (1767-1815), a prominent Federalist, and one of the United States commissioners who negotiated the treaty of Ghent with Great Britain after the War of 181 2; his uncle, Richard Henry Bayard (1 796-1 868); and his father, James Asheton Bayard (1 799-1 880), a well-known constitutional lawyer, all represented Delaware in the United States Senate. Intending to go into business, he did not receive a college education; but in 1848 he began the study of law in the office of his father, and was admitted to the bar in 185L Except from 1855 to 1857, when he was a partner of William Shippen in Philadelphia, he practised chiefly in Wilmington. He was a United States senator from Delaware from 1869 to 1885, and in 1881 was (October 10th to 13 th) president pro tempore of the Senate. His abilities made him a leader of the Democrats in the Senate, and his views on financial and legal questions gave him a high reputation for statesmanship. He was a member of the electoral commission of 1877. In the Democratic

national conventions of 1872, 1876, 1880 and 1884 he received votes for nomination as the party candidate for the presidency. He was secretary of state, 1885- 1889, during the first administration of President Cleveland, and pursued a conservative policy in foreign affairs, the most important matter with which he was called upon to deal being the Bering Sea controversy. As ambassador to Great Britain, 1893-1897, his tall dignified person, unfailing courtesy, and polished, if somewhat deliberate, eloquence made him a man of mark in all the best circles. He was considered indeed by many Americans to have become too partial to English ways; and, for the expression of some criticisms regarded as unfavourable to his own countrymen, the House of Representatives went so far as to pass, on the 7th of November 1895, a vote of censure on him. The value of Mr Bayard's diplomacy was, however, fully recognized in the United Kingdom, where he worthily upheld the traditions of a famous line of American ministers. He was the first representative of the United States in Great Britain to hold the diplomatic rank of an ambassador. He died in Dedham, Massachusetts, on the 28th of September 1898.

See Edward Spencer, Public Life and Services of T. F. Bayard (New York, 1880).

BAYAZID, or Bajazet, a border fortress of Asiatic Turkey, chief town of a sanjak of the Erzerum vilayet, situated close to the frontiers of Russia and Persia, and looking across a marshy plain to the great cone of Ararat, at a general altitude of 6000 ft. It occupies a site of great antiquity, as the cuneiform inscriptions on the neighbouring rocks testify; it stands on the site of the old Armenian town of Pakovan. It is picturesquely situated in an amphitheatre of sharp, rocky hills. The great trade route from Trebizond by Erzerum into N.W. Persia crosses the frontier at Kizil Dize a few miles to the south and does not enter the town. A knoll above the town is occupied by the half -ruined fort or palace of former governors, built for Mahmud Pasha by a Persian architect and considered one of the most beautiful buildings in Turkey. It contains two churches and a monastery, the Rasa Kilissa, famous for its antiquity and architectural grandeur. The cuneiform inscriptions are on the rock pinnacles above the town, with some rock chambers, indicating a town or fortress of the Vannic period. The population has lately decreased and now numbers about 4000. A Russian consul resides here and the town is a military station. It was captured during the

Russian campaigns of 1828 and 1854, also in 1878, but was then recaptured by the Turks, who subjected the Russian garrison to a long siege; the place was ultimately relieved, but a massacre of Christians then took place in the streets. Bayazid was restored to Turkey by the treaty of Berlin.

BAYBAY, a town of the province of Leyte, island of Leyte, Philippine Islands, on the W. coast. Pop. (1903) 22,990. The town proper is situated at the mouth of the Pagbaflganan river, 45 m. S.S.W. of Tacloban, the provincial capital. A superior grade of hemp is exported. Other products are rice, corn, copra, cacao, sugar, cattle and horses. The Cebu dialect of the Visayan language is spoken.

BAY CITY, a city and the county seat of Bay county, Michigan, U.S.A., on the Saginaw river, about 2 m. from its entrance into Saginaw Bay and about 108 m. N.N.W. of Detroit. Pop. (1890) 27,839; (1900) 27,628, of whom 8485 were foreign- born, including 2413 English-Canadians, 1743 Germans, 1822 Poles — the city has a Polish weekly newspaper — and 1075 French- lanadians; (.1910, census) 45,166. Bay City is served by the Michigan Central, the Pere Marquette, the Grand Trunk and the Detroit & Mackinac railways, and by lake steamers. The city extends for several miles along both sides of the river, and is in a good farming district, with which it is connected by stone roads. Among the public buildings are the Federal building, the city hall and the public library. The city has lumber and fishing interests (perch, whitefish, sturgeon, pickerel, bass, &c. being caught in Saginaw Bay), large machine shops and foundries (value of products in 1905, $1,743,155, or 31 % of the total of the city's factory products), and. various manu- factures, including ships (wooden and steel), wooden ware, wood- pipe, veneer, railroad machinery, cement, alkali and chicory. A salt basin underlies the city, and, next to the lumber industry, the salt industry was the first to be developed, but its importance has dwindled, the product value in 1905 being $20,098 out of $5,620,866 for all factory products. Near the city are valuable coal mines, and there is one within the city limits. At Essexville (pop. in 1910, 1477), N.E., at Banks, N.W., and at Salzbury, S. W. of Bay City, are beet-sugar factories — sugar beets are extensively grown in the vicinity. Alcohol is made from the refuse molasses obtained from these beet-sugar factories. The municipality owns and operates the water-works and electric-lighting plant. The settlements of Lower Saginaw and Ports- mouth were made in 1837, and were later united to form Bay City, which was incorporated as a village in 1859, and chartered as a city in 1865. In 1905 West Bay City (pop. 1900, 13,119) and Bay City were consolidated.

BAYEUX, a town of north-western France, capital of an arrondissement in the department of Calvados, 18 m. N.W. of Caen on the Western railway. Pop. (1906) 6930. Bayeux is situated on the Aure, 5 m. from the English Channel. Its majestic cathedral was built in the 13th century on the site of a Romanesque church, to which the lateral arcades of the nave

and the two western towers with their high stone spires belonged. A third and still loftier tower, the upper part of which, in the florid Gothic style, is modern, surmounts the crossing. The chancel, surrounded with radiating chapels, is a fine example of early Gothic. Underneath it there is a crypt of the nth century restored in the 15th century. The oak stalls in the choir are fine examples of late 16th-century carving. The former bishop's palace, parts of which are of great age though the main building is of the 18th century, serves as law-court arid hotel de ville. Bayeux possesses many quaint, timbered houses and stone mansions in its quiet streets. The museum contains the celebrated Bayeux tapestry (see below) . The town is the seat of a bishop and of a sub-prefect; it has tribunals of first instance and of commerce, an ecclesiastical seminary, a communal college and a chamber of arts and manufactures. Dyeing, leather- dressing, lace-making and the manufacture of porcelain for household and laboratory purposes are carried on.

Till the 4th century Bayeux bore the name of Augustodurum, but afterwards, when it became the capital of the two tribes oi the Baiocasses and Viducasses, took the name of Civitas Baio- cassium. Its bishopric dates from the latter half of the 4th century. Before the Norman invasion it was governed by counts. Taken in 890 by the Scandinavian chief, Rollo, it was soon after peopled by the Normans and became a residence of the dukes of Normandy, one of whom, Richard I., built about 960 a castle which survived till the 18th century. During the quarrels between the sons of William the Conqueror it was pillaged and sacked by Henry I. in 1 106, and in later times it underwent siege and capture on several occasions during the Hundred Years' War and the religious wars of the 16th century. Till 1790 it was the capital of the Bessin, a district of lower Normandy.

BAYEU X TAPESTRY, THE. This venerable relic consists of a band of linen, 231 ft, long and 20 in. wide, now light brown with age, on which have been worked with a needle, in worsteds of eight colours, scenes representing the conquest of England by the Normans. Of these scenes there are seventy-two, beginning with Harold's visit to Bosham on his way to Normandy, and ending with the flight of the

English from the battle of Hastings, though the actual end of the strip has perished. Along the top and the bottom run decorative borders with figures of animals, scenes from fables of Aesop and of Phaedrus, from husbandry and the chase, and occasionally from the story of the Conquest itself (see Embroidery; Plate I. fig. 7). Formerly known as the Toile de St Jean, it was used on certain feast days to decorate the nave of Bayeux cathedral. Narrowly escaping the perils of the Revolution, it was exhibited in Paris, by Napoleon's desire, in 1803-1804, and has since been in civil custody at Bayeux, where it is now exhibited under glass. In the Franco- German War (1871) it was hastily taken down and concealed.

" The noblest monument in the world relating to our old English history," as William Stukeley described it in 1746, it has been repeatedly described, discussed and reproduced, both in France and in England since 1730. The best coloured re- production is that by C. A. Stothard in 1818, published in the sixth volume of Vetusta Monumenta; but in 1871-1872 the " tapestry " was photographed for the English education authorities by E. Dossetter.

Local tradition assigned the work to the Conqueror's wife. F. Pluquet, in his Essai historique sur la ville de Bayeux (Caen, 1829), was the first to reject this belief, and to connect it with the Conqueror's half-brother Odo, bishop of Bayeux, and this view, which is now accepted, is confirmed by the fact that three of the bishop's followers mentioned in Domesday Book are among the very few named figures on the tapestry. That Odo had it executed for his cathedral seems tolerably certain, but whether it was worked by English fingers or not has been disputed, though some of the words upon it have been held to favour that view. Freeman emphatically pronounced it to be " a con- temporary work," and historically " a primary authority . . . in fact the highest authority on the Norman side." As some of its evidence is unique, the question of its authority is im- portant, and Freeman's conclusions have been practically

confirmed by recent discussion. In 1902 M. Marignan questioned, on archaeological grounds, the date assigned to the tapestry, as the Abbe de la Rue had questioned it ninety years before; but his arguments were refuted by Gaston Paris and M. Lanore, and the authority of the tapestry was vindicated. The famous relic appears to be the solitary survivor of a class, for Abbot Baudri described in

Latin verse a similar work executed for Adela, daughter of the Conqueror, and in earlier days the widow of Brihtnoth had wrought a similar record of her husband's exploits and death at the hard-fought battle of Maldon (991).

See E. A. Freeman, Norman Conquest, vol. iii. (ed. 1875), with summary of the discussion to date; Archaeologia, vols, xvii.xix. ; Dawson Turner, Tour in Normandy (1820); C. A. Stothard's illus trations in Vetusta Monumenta, vol. vi. ; Gentleman's Magazine, 1837; Bolton Corney, Researches and Conjectures on the Bayeux Tapestry (1836-1838); A. de Caumont, " Un mot sur . . . la tapis-serie de Bayeux," in Bulletin monumental de Vinstitut des provinces, vol. viii. (1841); J. Laffetay, Notice historique et descriptive sur la lapisserie . . . (1874); J. Comte, Tapisserie de Bayeux; F. R. Fowke, The Bayeux Tapestry (ed. 1898); Marignan, Tapisserie de Bayeux (1902); G. Pans, "Tapisserie de Bayeux," in Romania, vol. xxxi. ; Lanore, "La Tapisserie de Bayeux," in Bibliotheque de Vecole des chartes, vol. lxiv. (1903); and 1. H. Round, "The Bayeux Tapestry," in Monthly Review, xvii. (1904). (J. H. R.)

BAYEZID I. (1347-1403), Ottoman sultan, surnamed Yil- derim or " Lightning," from the great rapidity of hismovements, succeeded his father Murad I. on the latter's assassination on the field of Kossovo, 1389, and signalized his accession by ordering at once the execution of his brother Yakub, who had distinguished himself in the battle. His arms were successful both in Europe and Asia, and he was the first Ottoman sovereign to be styled " sultan," which title he induced the titular Abbasid caliph to confer on him. After routing the chivalry of Christendom at the battle of Nikopoli in 1396, he pursued his victorious career in Greece, and Constantinople would doubtless have fallen before his attack, had not the emperor Manuel Palaeologus bought him off by timely concessions which reduced him practically to the position of Bayezid's vassal. But his conquests met with a sudden and overpowering check at the hands of Timur (Tamer- lane). Utterly defeated at Angora by the Mongol invader, Bayezid became his prisoner, and died in captivity some months later, in March 1403.

Bayezid first married Devlet Shah Khatun, daughter of the prince of Kermian, who brought him in dowry Kutaiah and its dependencies. Two years before his accession he also married a daughter of the emperor John Palaeologus.

BAYEZID II. (1447-15 1 2), sultan of Turkey, was the son of Mahommed II., whom he succeeded in 1481, but only after gaining

over the janissaries by a large donative, which hence- forth became for centuries the invariable prerogative of that undisciplined body on the accession of a new sultan. Before he could establish himself on the throne a long struggle ensued with his brother Prince Jem. Being routed, Jem fled for refuge to the knights of St John at Rhodes, who, in spite of a safe-conduct granted to him, accepted a pension from Bayezid as the price for keeping him a close prisoner. (See Aubusson, Pierre d'.)

So long as Jem lived he was a perpetual menace to the sultan's peace, and there was considerable rivalry among the sovereigns of Europe for the possession of so valuable an instrument for bringing pressure to bear upon the Porte for the purpose of extracting money or concessions. By common consent the prince was ultimately entrusted to Pope Innocent VIII., who used him not only to extract an annual tribute out of the sultan, but to prevent the execution of Bayezid's ambitious designs in the Mediterranean. His successor, Alexander VI., used him for a more questionable purpose, namely, not only to extract the arrears of the pension due for Jem's safe-keeping, but, by enlarg- ing on Charles V.'s intention of setting him up as sultan, to persuade Bayezid to aid him against the emperor. There appears, however, to be no truth in the report that Bayezid succeeded in bribing the pope to have Jem poisoned. The prince, who had lived on excellent terms with Alexander, died at Naples in February 1495, possibly as the result of excesses in which he had been deliberately encouraged by the pope.

Whether as a result of his fear of the rivalry of Jem, or of his personal character, Bayezid showed little of the aggressive spirit of his warlike predecessors; and Machiavelli said that another such sultan would cause Turkey to cease being a menace to Europe. He abandoned the attack on Rhodes at the first check, made concessions, for the sake of peace, to Venice and reduced the tribute due from Ragusa. His wars were of the nature of raids, on the Dalmatian coast and into Croatia, Hungary, Moldavia and Poland. The threat of the growing power in the Aegean of Venice, which had acquired Cyprus in 1489, at last roused him to a more serious effort; and in 1499 the war broke out with the republic, which ended in 1 502 by the annexa- tion to Turkey of Lepanto and Modon, Coron and Navarino in the Morea. Bayezid himself conducted the siegeof Modonin 1500.

The comparative inactivity of Bayezid in the direction of Europe was partly due to preoccupation elsewhere. In the south he was threatened by the dangerous rivalry of Kait Bey, the Mameluke

sultan of Egypt, who had extended his power northwards as far as Tarsus and Adana. In 1488 he gained a great victory over the Ottomans, and in 149 1 a peace was made which was not again broken till after Bayezid's death. On the side of Persia too, where the decisive battle of Shurur (1502) had raised to power Ismail, the first of the modern line of shahs, danger threatened the sultan, and the latter years of his reign were troubled by the spread, under the influence of the new Persian power, of the Shi'ite doctrine in Kurdistan and Asia Minor. The forces destined to maintain his authority in Asia had been entrusted by Bayezid to his three sons, Ahmed, Corcud and Selim; and the sultan's declining years were embittered by their revolts and rivalry. Soon after the great earthquake of 1509, which laid Constantinople in ruins, Selim, the ungovern- able pasha of Trebizond, whose vigorous rule in Asia had given Europe an earnest of his future career as sultan, appeared before Adrianople, where Bayezid had sought refuge. The sultan had designated Ahmed as his successor, but Selim, though tem- porarily defeated, succeeded in winning over the janissaries. On the 25th of April 1512 Bayezid was forced to abdicate in his favour, and died a few days later.

See J. B. Bury in the Cambridge Modern History, vol. i. chap. iii. and bibliography p. 700.

BAY ISLANDS (Islas de la Bahia), a small archipelago in the Caribbean Sea, off the coast of Honduras, of which country it forms an administrative district. Pop. (1905) about 3000, including 500 Indians. The archipelago consists of Roatan or Ruatan, Guanaja or Bonacca, Utilla, Barbareta, Helena, Morat, the Puercos or Hog Islands, and many cays or islets. The Bay Islands have a good soil, a fine climate and an advantageous position. Roatan, the largest, is about 30 m. long by, 9 m. broad, with mountains rising to the height of 900 ft., covered with valuable woods and abounding with deer and wild hogs. Its chief towns are Coxen Hole and Puerto Real. Its trade is chiefly with New Orleans in plantains, cocoa-nuts, pineapples and other fruit. Guanaja is 9 m. long by 5 m. broad; it lies 15 m. E.N.E. of Roatan. Wild hogs abound in its thickly- wooded limestone hills. The other islands are comparatively small, and may, in some cases, be regarded as detached parts of Roatan, with which they are connected by reefs. Guanaja was discovered in 1502 by Columbus, but the islands were not colonized until the 17 th century, when they were occupied by British logwood cutters from Belize, and pearlers from the Mosquito Coast. Forts were built on Roatan in 1742, but abandoned in 1749. In 1852 the islands were annexed by Great Britain. In 1859 they were ceded to Honduras.

BAYLE, PIERRE (1647-1706), French philosopher and man of letters, was born on the 18th of November 1647, at le Carla- le-Comte, near Pamiers (Ariege). Educated by his father, a Calvinist minister, and at an academy at Puylaurens, he after- wards entered a Jesuit college at Toulouse, and became a Roman Catholic a month later (1669). After seventeen months he resumed his former religion, and, to avoid persecution, fled to Geneva, where he became acquainted with Cartesianism. For some years he acted under the name of Bele as tutor in various

BAYEUX TAPESTRY

Plate I.

Vk I'M I Jf tUF-*

*^/**/X**

I. SIEGE OF DINANT. Note the wooden castle on a mound, and the knight handing over the keys on his lance tip.

5. THE NORMANS CARRY THEIR ARMS TO THE SHIPS. (By permission of G. Bell & Sons.)

m. 556.

Plate II.

BAYEUX TAPESTRY

musst

6. THE NORMANS CROSS TO PEVENSEY.

7. BUILDING OF HASTINGS CASTLE.

8. HAROLD'S ADVANCE ANNOUNCED TO WILLIAM. THE BURNING OF HASTINGS.

**§s£l V^^^^^^^M*

9. THE NORMAN CAVALRY ATTACKS THE ENGLISH SHIELD WALL.

10. WILLIAM RAISES HIS HELMET TO RALLY HIS MEN. 11. ODO, BISHOP OF BAYEUX, WIELDING HIS MACE.

(By permission of G. Bell & Sons.)

Parisian families, but in 1675 he was appointed to the chair of philosophy at the Protestant university of Sedan. In 168 1 the university at Sedan was suppressed, but almost immediately afterwards Bayle was appointed professor of philosophy and history at Rotterdam. Here in 1682 he published his famous Pensies diverses sur la comete de 1680 and his critique of Maim- bourg's work on the history of Calvinism. The great reputation achieved by this critique stirred the envy of Bayle's colleague, P. Jurieu, who had written a book on the same subject. In 1684 Bayle began the publication of his Nouvelles de la ripublique des lettres, a kind of journal of literary criticism. In 1690 appeared a work entitled Avis important aux refugiis, which Jurieu attributed to Bayle, whom he attacked with animosity. After a long quarrel Bayle was deprived of his chair in 1693. He was not depressed by this misfortune, especially as he was at the time closely engaged in the preparation of the Historical and Critical Dictionary (Dictionnaire historique et critique). The remaining years of Bayle's life were devoted to miscellaneous writings, arising in many instances out of criticisms made upon his Dictionary. He died in exile at Rotterdam on the 28th of December 1706. In 1906 a statue in his honour was erected at Pamiers, " la reparation d'un long oubli." Bayle's erudition, despite the low estimate placed upon it by Leclerc, seems to have been very considerable. As a constructive thinker, he did little. As a critic he was second to none in his own time, and even yet one can admire the delicacy and the skill with which he handles his subject. The Nouvelles de la rSpublique des lettres (see Louis P. Betz, P. Bayle und die Nouvelles de la rSpublique des lettres, Zurich, 1896) was the first thorough-going attempt to popularize literature, and it was eminently successful. The Dictionary, however, is Bayle's masterpiece.

Editions. — Historical and Critical Dictionary (169 5-1 697; 1702, enlarged; best that of P. des Maizeaux, 4 vols., 1740); Les (Euvres de Bayle (3 vols., The Hague); see des Maizeaux, Vie de Bayle; L. A. Feuerbach, Pierre Bayle (1838); Damiron, La Philosophie en France au XVII' siecle (1858-1864); Sainte-Beuve, " Du genie critique et de Bayle " (Revue des deux mondes, 1st Dec. 1835) ; A. Des- champs, La CSnese du scepticisme erudit chez Bayle (Liege, 1878); J. Denis, Bayle et Jurieu (Paris, 1886) ; F. Brunetiere, La Critique litleraire

au XVIII' siicle (vol. i., 1890), and La Critique de Bayle (1893) ; Emile Gigas, Choix de la correspondance inedite de Pierre Bayle (Paris, 1890, reviewed in Revue critique, 22nd Dec. 1890) ; de Bude, Lettres inedites adressees a J. A. Turretini (Paris,i887); J. F. Stephen, Horae Sabbaticae (London, 1892, 3rd ser. pp. 174- 192) ; A. tazes, P. Bayle, sa vie, ses idees, &c. (1905).

BAYLO (Lat. bajulus or baillivus; cf. Ital. balio, Fr. bailli, Eng. bailiff), in diplomacy, the title borne by the Venetian representative at Constantinople. His functions were originally in the nature of those of a consul-general, but from the 16th century onwards he had also the rank and functions of a diplo- matic agent of the first class. " Under the name of bayle," says A. de Wicquefort, " he performs also the functions of consul and judge; not only between members of his own nation, but also between all the other merchants who trade in the Levant under the flag of St Mark." (See Diplomacy.)

BAYLY, THOMAS HAYNES (1797-1839), English song- writer and dramatist, was born at Bath on the 13th of October 1797. He was educated at Winchester and at St Mary Hall, Oxford, with a view to entering the church. While on a visit to Dublin, however, he discovered his ability to write ballads, and on his return to England in 1824 he quickly gained a wide reputation with " I'd be a butterfly," following this up with " We met — 'twas in a crowd," " She wore a wreath of roses," " Oh, no, we never mention her," and other light and graceful songs for which his name is still remembered. He set some of his songs to music himself; a well-known example is " Gaily the troubadour." Bayly also wrote two novels, The Aylmers and A Legend of Killarney, and numerous plays. His most successful dramatic piece was Perfection, which was produced by Madame Vestris and received high praise from Lord Chester- field. Bayly had married in 1826 an Irish heiress, but her estates were mismanaged and the anxiety caused by financial difficulties undermined his health. He died on the 22nd of April 1839.

His Collected Works (1844) contain a memoir by his wife.

BAYNES, THOMAS SPENCER (1823-1887), English editor and man of letters, the son of a Baptist minister, was born at Wellington, Somerset, on the 24th of March 1823. He studied at Edinburgh University, where he was a pupil of Sir William Hamilton, whose assistant he became and of whose views on logic he became the authorized exponent. This teaching was embodied in his Essay on the New Analytic of Logical Forms, published in 1850, the same year in which he took his London University degree. This was followed in the

next year by a translation of Arnauld's Port Royal Logic. In 1850 he had become editor of the Edinburgh Guardian, but after four years' work his health gave way. He spent two years in Somerset and then went to London, becoming, in 1858, assistant editor of the Daily News. In 1864 he was appointed professor of logic metaphysics and English literature at the university of St Andrews, and in 1873 the editorship of the ninth edition of the Encyclopaedia Britannica was entrusted to him. He conducted it singly until 1881, when the decline of his health rendered it necessary to provide him with a coadjutor in the person of Prof. W. Robertson Smith. Baynes, however, continued to be engaged upon the work until his death on the 31st May 1887, shortly before its completion. His article on Shakespeare (Encyclopaedia Britannica, 9th ed.) was republished in 1894, along with other essays on Shakespearian topics and a memoir by Prof. Lewis Campbell.

BAYONET, a short thrusting weapon, fixed to the muzzle or fore-end of a rifle or musket and carried by troops armed "with the latter weapons. The origin of the word is disputed, but there is some authority for the supposition that the name is derived from the town of Bayonne, where the short dagger called bayonnette was first made towards the end of the 15 th century. The elder Puysegur, a native of Bayonne, says (in his Memoirs, published posthumously in Paris, 1747) that when he was commanding the troops at Ypres in 1647 his musketeers used bayonets consisting of a steel dagger fixed in a wooden haft, which fitted into the muzzle of the musket — in fact plug-bayonets. Courts-martial were held on some English soldiers at Tangier in 1663-1664 for using their daggers on their comrades. As bayonets were at first called daggers, and as there were few or no pikemen in Tangier until 1675, the probable conclusion is that the troops in Tangier used plug-bayonets. In 167 1 plug- bayonets were issued to the French regiment of fusiliers then raised. They were issued to part of an English dragoon regiment raised in 1672 and disbanded in 1674, and to the Royal Fusiliers when raised in 1685. The danger incurred by the use of this bayonet (which put a stop to all fire) was felt so early that the younger Puysegur saw a ring-bayonet in 1678 which could be fixed without stopping the fire. The English defeat at Killie crankie in 1689 was due (among other things) to the use of thv plug-bayonet; and shortly afterwards the defeated leadei. General Mackay, introduced a ring-bayonet of his own invention. A trial with badly-fitting socket or zigzag bayonets was made after the battle of Fleurus, 1690, in the presence of Louis XIV., who refused to adopt them. Shortly after the peace of Ryswick (1697) the English and Germans abolished the pike and intro- duced

these bayonets, and plates of them are given in Surirey de St Remy's Memoir es d' Artillerie, published in Paris in that year; but owing to a military cabal they were not issued to the French infantry until 1703. Henceforward the bayonet became, with the musket or other firearm, the typical weapon of infantry. This bayonet remained in the British service until 1805, when Sir John Moore introduced a bayonet fastened to the musket by a spring clip. The triangular bayonet (so called from the cross-section of its blade) was used in the British army until the introduction of the magazine rifle, when it was replaced by the sword-bayonet or dagger-bayonet. Sword-bayonets — weapons which could be used as sword or dagger apart from the rifle — had long been in use by special troops such as engineers and rifles, and many ingenious attempts have been made to produce a bayonet fitted for several uses. A long curved sword-bayonet with a saw-edged back was formerly used by the Royal Engineers, but all troops are now supplied with the plain sword-

bayonet. The bayonet is usually hung in a scabbard on the belt of the soldier and only fixed during the final stages of a battle; the reason for this is that the " jump " of the rifle due to the shock of explosion is materially altered by the extra weight at the muzzle, which thus deranges the sighting. In the short Lee-Enfield rifle of 1903, the bayonet, not being directly attached to the barrel, does not influence accuracy, but with the long rifles, when the bayonet is fixed, the sight must be raised by two or three graduations to ensure correct elevation. In the Russian army troops almost invariably carry the bayonet (triangular) fixed; the model (1891) of Italian carbine has an inseparable bayonet; the United States rifle (the new short model of 1903) has a knife bayonet, the model of 1905, which is 20-5875 in. long, with the lower edge of the blade sharpened along its entire length and the upper edge sharpened 5 in. from the point; this bayonet is carried in a wooden and leather scabbard attached to the cartridge belt. The British bayonet (pattern 1903) has a blade 1 ft. in length. The length of the rifle and bayonet together, considered as an arme blanche, varies consider- ably, that of the French Lebel pattern of 1886 being 6 ft., as against the 4 ft. 8f in. of the British short Lee-Enfield of 1903. The German rifles (1 898)have a length with bayonet of 5 ft. 9! in. ; the Russian (1894) 5 ft. 9 in.; and the Japanese 5 ft. 55 in. In 1908 a new British bayonet was approved, 5 in. longer than its predecessor of 1903, the shape of the point being modified to obtain the thrusting effect of a spear or lance head.

BAYONNE, a town of south-western France, capital of an arrondissement in the department of Basses-Pyrenees, : 66 m. W.N.W. of Pau on the Southern railway. Pop. (1906) 21,779. Bayonne, a first-class fortified place, is situated at the confluence of the Adour and its left-hand tributary, the Nive, about 3 m. from the sea. The two rivers divide the town into three nearly equal parts, communicating with each other by bridges. Grand Bayonne lies on the left bank of the Nive; the two squares which lie close together at the mouth of that river constitute the most animated quarter of the town. Petit Bayonne lies between the right bank of the Nive and the Adour; Saint Esprit, dominated by a citadel which is one of the finest works of Vauban, occupies the right bank of the Adour. The last is inhabited partly by a colony of Jews dating at least from the early 16th century. To- the north-west of the town are the Allees Marines, fine promenades which border the Adour for a mile and a quarter, and the Allees Paulmy, skirting the fortifications. The cathedral of Ste Marie in Grand Bayonne is an imposing Gothic structure of the 13th, 14th and 15th centuries. It consists of a choir with deambulatory and apsidal chapels (the oldest part of the church), a transept, nave and aisles. The towers at the west end were only completed during the general restoration which took place in the latter half of the 19th century. A fine cloister of the 13th century adjoins the south side of the church. Ste Marie contains glass windows of the 15th and 16th centuries and other rich decoration. The Vieux-Chateau, also in Grand Bayonne, dates from the 1 2th and 1 5th centuries and is built upon a portion of the old Roman fortifications; it is used for military purposes. The Chateau Neuf (15th and 16th centuries) serves as barracks and prison. Bayonne is the seat of a bishopric and of a sub- prefect; it has tribunals of first instance and of commerce, a chamber of commerce, a lycee, a school of music, a library, an art museum with a large collection of the works of the painter Leon Bonnat, and a branch of the Bank of France. There are consulates of the chief nations of Europe, of the United States of America and of several Central and South American republics. The town also possesses an important military arsenal and military hospital. The commerce of Bayonne is much more important than its industries, which include the manufacture of leather and of chocolate. The port consists of an outer harbour, the so-called " rade " (roadstead) and the port proper, and occupies the course of the Adour from its mouth, which is obstructed by a shifting bar, to the Pont St Esprit, and the course of the Nive as far as the Pont Mayou. Above these two bridges the rivers are accessible only to river navigation. Vessels drawing from 16 to 22 ft. can make the port in normal weather.

In the five years 1 901-1905 the average value of the imports was £502,000, of the exports £572,000; for the five years 1896- 1900 the average value of imports was £637,000, of exports £634,000. Exports include timber, mine-props, turpentine, resinous material from the Pyrenees and Landes and zinc ore; leading imports are the coal and Spanish minerals which supply the large metallurgical works of Le Boucau at the mouth of the river, the raw material necessary for the chemical works of the same town, wine, and the cereals destined for the flour mills of Pau, Peyrehorade and Grthez. During the early years of the 20th century the shipping of the port increased considerably in tonnage. In 1900 there entered 741 Vessels, tonnage 277,959; and cleared 743, tonnage 276,992. In 1907 there entered 661 vessels, tonnage, 336,773; cleared 650, tonnage 335,849.

In the 3rd century Bayonne (Lapurdum) was a Roman military post and the principal port of Novempopulana. In the middle ages it belonged to the dukes of Aquitaine and then to the kings of England, one of whom, John, granted it full communal rights in 1 2 16. In 145 1 it offered a strenuous opposition to the French, by whom it was eventually occupied. By this time its maritime commerce had suffered disaster owing to the silting up of its port and the deflection of the Adour. New fortifications were constructed under Louis XII. and Francis I., and in 1523 the town was able to hold out against a Spanish army. In 1565 it was the scene of an interview between Charles IX. and Catherine de' Medici on the one hand and Elizabeth, queen of Spain, and the duke of Alva on the other. It is thought that on this occasion the plans were formed for the massacres of St Bartholomew, a crime in which Bayonne took no part, in 1572. In 1 808 Napoleon met Charles IV., king of Spain, and his son Ferdinand at the Chateau de Marrac, near the town, and induced them to renounce their rights to the crown of Spain, which fell to Napoleon's brother Joseph. In 18 14, after a severe siege, Bayonne was occupied by the English (see Peninsular War).

See J. Balasque and E. Dulaurens, Etudes historiques sur la ville de Bayonne (3 vols., Bayonne, 1862-1875) ; E. Ducere, Bayonne historique et pittoresque (Bayonne, 1893), Histoire topographique et anecdotique des rues de Bayonne (Bayonne, 1894) ; H. Leon, Histoire des juifs de Bayonne (Paris, 1893).

BAYONNE, a city of Hudson county, New Jersey, U.S.A., occupying the peninsula (about 5! m. long and about £ m. wide) between New York harbour and Newark Bay, and immediately adjoining the south boundary of Jersey City, from which it is partly separated by the

Morris Canal. It is separated from Staten Island only by the narrow strip of water known as the Kill van Kull, and it has a total water frontage of about 10 m. Pop. (1890) 19,033; (1900) 32,722, of whom 10,786 were foreign- born (3168 Irish, 1868 Russian, 1656 German); (1910) 55,545. Land area about 4 sq. m. Bayonne is served by the Central of New Jersey and by the Lehigh Valley railways (the latter for freight only), and by electric railway lines to Newark and Jersey City. The principal public buildings are the city hall, the public library, the post-office and the city hospital. Besides having a considerable share in the commerce of the port of New York, Bayonne is an important manufacturing centre; among its manufactures are refined petroleum, refined copper arid nickel (not from the ore), refined borax, foundry and machine-shop products, tubular boilers, electric launches and electric motors, chemicals (including ammonia and sulphuric and nitric acids), iron and brass products, wire cables and silk goods. In 1905 the value of its factory product was $60,633,761, an increase of 57-1 % over that of 1900, Bayonne ranking third in 1905 among the manufacturing cities of the state. It is the principal petroleum-distributing centre on the Atlantic seaboard, the enormous refineries and storehouses of the Standard Oil Company, among the largest in the world, being located here; there are connecting pipe lines with the Ohio and Pennsylvania oil fields, and with New York, Baltimore, Philadelphia and Washington. Much coal is shipped from the city. Bayonne, which comprises several former villages (Bayonne, Bergen Point, Pamrapo and Centerville), was settled about 1665-1670 by the Dutch. Originally a part of Bergen, it was set off as a town- ship in 1861. It was chartered as a city in 1869.

BAYOU (pronounced bai-yoo, probably a corruption of Fr. boyau, gut), an ” ox-bow ” lake left behind by a river that has abandoned its old channel in the lower stages of its course. Good examples are found in Palmyra Lake, in the Mississippi valley below Vicksburg, and in Osage river, Missouri. As a river swings from side to side in a series of curves which widen laterally where the current is slow and the country more or less level, there is a tendency in flood times for the water to impinge more strongly upon the convex bank where the curve leaves the main channel. This bank will be eaten away, and the process will be repeated until th»base of the ” isthmus ” is cut through, and the descending channel meets the returning curve, which is thus left stranded and filled with dead water, while the

stream runs directly past it in the shorter course cut by the flood waters that deepen the new channel, and leave an isolated ox-bow lake in the old curve.

BAYREUTH, or Baireuth, a town of Bavaria, Germany, district of Upper Franconia, 58 m. by rail N.N.E. from Nurem- berg. Pop. (1900) 29,384. In Richard-Wagner-strasse is Wagner's house, with his grave in the garden. Franz Liszt (1811-1886) is buried here, as well as Jean Paul Friedrich Richter, who is commemorated by a monument (1841). His house was in Friedrichstrasse. Most of the buildings are of comparatively modern date, the city having suffered severely from the Hussites in 1430 and from a conflagration in 1621. There should be mentioned the palace of Duke Alexander of Wiirttemberg, the administrative offices, the statue of King Maximilian II. (i860) and the collections of the historical society Among the ecclesiastical buildings, the Stadt-Pfarrkirche, dating from 1439, and containing the monuments of the mar- graves of Bayreuth, is the most important. Bayreuth is a railway junction and has an active trade, chiefly in grain and horses. It manufactures woollen, linen and cotton goods, leather, delft and other earthenware, and tobacco, and has also several breweries and distilleries. The village of St Georgen is a suburb to the north-east noted for its marble works; and about 2 m. to the east is the Hermitage, a fanciful building, erected in 1715 by the margrave George William (d. 1726), with gardens containing terraces, statues and fountains. Bayreuth was formerly the capital of a principality of the same name, which was annexed in 1791 to the kingdom of Prussia. In 1807 it was ceded by Prussia to France, which kept possession of it till 1810, when it was transferred to Bavaria.

The Wagner Theatre. — Among the many advantages which Wagner gained from his intimacy with Ludwig II., king of Bavaria, not the least was the practical support given to his plan of erecting a theatre for the ideal performance of his own music-dramas. The first plan of building a new theatre for the purpose in Munich itself was rejected, because Wagner rightly felt that the appeal of his advanced works, like the Nibelungen trilogy, would be far stronger if the comparatively small number of people who wished to hear them were removed from the dis- tractions of a large capital; Bayreuth possessed the desired seclusion, being on a line of railway that could not be approached from any quarter without changing. The municipality furthered Wagner's scheme in every way, and in May 1872 the founda- tion stone of the Festspielhaus was laid, the event being com- memorated by a notable performance of Beethoven's Choral Symphony in the old opera-house. The funds for the erection of the theatre were raised in part by the issue of 1000 certificates of patronage (Patronatsscheine), but the bulk of the sum was raised by founding " Wagner Societies " from St Petersburg to Cairo, from

London to New York; these societies sprang up with such success that the theatre was opened in the summer of 1876 with the first complete performance of Der Ring des Nibelungen. The theatre, which stands on a height a little under a mile from the town, is built from the plans of Gustav Semper, the idea of the design being Wagner's own, an experi- ment indeed, but one which succeeded beyond all expectation. The seats are arranged on a kind of sloping wedge, in such a manner that every one has an almost equally good view of the stage, for there are no boxes, and the only galleries are quite

at the back, one, the Furstenloge, being reserved for distinguished guests, the other, above it, for the townspeople. Immediately in front of the foremost row of seats a hood or sloping screen of wood covers a part of the orchestra, and another hood of similar shape starts from the front of the stage at a slightly lower level. Thus there is left a space between the two hoods through which the sound of the orchestra ascends with wonder- fully blended effect; the conductor, sitting at the highest point of the orchestra, though under the screen, has a complete view of the stage as well as of his instrumentalists, and the sound of the orchestra is sent most forcibly in the direction of the stage, so that the voices are always well supported.

As an important addition to the work of the theatre, a permanent school has been established at Bayreuth for the sake of training young musicians to take part in the festival performances, which were at first exclusively, and then partially, undertaken by artists from other German and foreign theatres. The special feature upon which most stress has been laid, ever since Wagner's death in 1883, has been not so much the musical as the dramatic significance of the works; it is contended by the inmost circle of Wagnerian adherents that none but they can fully realize the master's intentions or hand down his traditions. What is called the " Bayreuth Idea " is set forth in much detail from this point of view by Houston Stewart Chamberlain, in his Richard Wagner (1897 and 1900).

BAZA, a town of southern Spain, in the province of Granada; in the Hoya de Baza, a fruitful valley of the Sierra Nevada, not far from the small river Gallego, and at the terminus of a railway from Lorca. Pop. (1900) 12,770. The dome-shaped mountain of Javaleon (4715 ft.) overlooks the town from the north-west. The ancient collegiate church of San Maximo occupies the tradi- tional site of a cathedral founded by the Visigothic king Reccared about 600, and afterwards converted into a mosque. There is a brisk local trade in farm produce, and in the linen, hempen goods and pottery manufactured in Baza. The town nearly doubled its population in the last quarter

of the 19th century. Sulphurous springs exist in the vicinity.

Baza is the Roman Basti, the medieval Basta or Bastiana; and numerous relics of antiquity, both Roman and medieval, have been found in the neighbourhood. Its bishopric was founded in 306. Under Moorish rule (c. 713-1489) it was one of the three most important cities in the kingdom of Granada, with an extensive trade, and a population estimated at 50,000. In 1489, after a stubborn defence lasting seven months, it was captured by the Spaniards under Isabella of Castile, whose cannon still adorn the Alameda or public promenade. On the 10th of August 1 810 the French under Marshal Soult defeated a large Spanish force close to the town.

BAZAAR (Pers. bazar, market), a permanent market or street of shops, or a group of short narrow streets of stalls under one roof. The word has spread westward into Arabic, Turkish and, in special senses, into European languages, and eastward it has invaded India, where it has been generally adopted. In southern India and Ceylon bazaar means a single shop or stall. The word seems to have early reached South Europe (probably through Turkish), for F. Balducci Pegolotti in his mercantile handbook (c. 1340) gives " bazarra " as a Genoese word for market-place. The Malayan peoples have adopted the word as pazar. The meaning of the word has been much extended in English, where it is now equivalent to any sale, for charitable or mere commercial purposes, of mixed goods and fancy work.

BAZAINE, ACHILLE FRANCOIS (1811-1888), marshal of France, was born at Versailles on the 13th of February 181 1. He entered the army as a private soldier in 1831, with a view to service in Algeria, and received a commission as sub-lieutenant in 1833. By his gallantry in action he won the cross of the Legion of Honour, and he was promoted lieutenant in 1835. He served two campaigns with the Foreign Legion against the Carlists in Spain in 1837-38, returning to Africa as captain in 1839. During the succeeding decade he saw continual active service in Africa, and rose to be a brigadier-general with the charge of the district of Tlemgen. In the Crimean War he com- manded a brigade, and maintained his reputation in the trenches before Sevastopol. On the capture of the south side he was appointed governor of the place, and was promoted general of

division. He also commanded the French forces in the expedi- tion to

Kinburn. In Lombardy in 1859 he was wounded when in command of a division at Melegnano, and took a conspicuous part in the battle of Solferino. For his services in the campaign he received the grand cross of the Legion of Honour, of which he was already (1855) a commander. He commanded with great distinction the first division under General (afterwards marshal) Forey in the Mexican expedition in 1862, succeeded him in supreme command in 1863, and became marshal and senator of France in the following year. He at first pursued the war with great vigour and success, entering Mexico in 1863 and driving President Juarez to the frontier. The marshal's African experience as a soldier and as an administrator stood him in good stead in dealing with the guerrilleros of the Juarez party, but he was less successful in his relations with Maximilian, with whose court the French headquarters was in constant strife. Here, as later in his own country, Bazaine's policy seems to have been directed, at least in part, to his own establishment in the role of a mayor of the palace. His own army thought that he aspired to play the part of a Bernadotte. His marriage to a rich Mexican lady, whose family were supporters of Juarez, still further complicated his relations with the unfortunate emperor, and when at the close of the American Civil War the United States sent a powerful war-trained army to the Mexican frontier, the French forces were withdrawn (see Mexico, History). Bazaine skilfully conducted the retreat and embarkation at Vera Cruz (1867). On his return to Paris he was but coldly received by his sovereign; public opinion was, however, in his favour, and he was held to have been made a scapegoat for the faults of others.

At the outbreak of the Franco-German War (q.v.) Marshal Bazaine was placed in command of the III. corps of the Army of the Rhine. He took no part in the earlier battles, but Napoleon III. soon handed over the chief command of the army to him. How far his inaction was the cause of the disaster of Spicheren is a matter of dispute. The best that can be said of his conduct is that the evil traditions of warfare on a small scale and the mania for taking up " strong positions," common to the French generals of 1870, were in Bazaine's own case emphasized by his personal dislike for the " schoolmaster " Frossard, lately the Prince Imperial's tutor and now commander of the army corps posted at Spicheren. Frossard himself, the leader of the " strong positions " school, could only blame his own theories for the paralysis of the rest of the army, which left the corps at Spicheren to fight unsupported. Bazaine, indeed, when called upon for help, moved part of his corps forward, but only to " take up strong positions," not to strike a blow on the battlefield. A few days later he took up the chief command, and his tenure of it is

the central act in the tragedy of 1870. He found the army in retreat, ill-equipped and numerically at a great disadvantage, and the generals and staffs discouraged and distrustful of one another. There was practically no chance of success. The question was one of extricating the army and the government from a disastrous adventure, and Bazaine's solution of it was to bring back his army to Metz. For the events which led up to the battles before Metz and the investment of Bazaine's whole army in the fortress, see Franco-German War and Metz, Battles.

It seems to be clearly established that the charges of treason to which later events gave so strong a colour had, as yet, no foundation in fact. Nor, indeed, can his unwillingness to leave the Moselle region, while there was yet time to slip past the advancing enemy, be considered even as proof of special incom- petence. The resolution to stay in the neighbourhood of Metz was based on the knowledge that if the slow-moving French army ventured far out it would infallibly be headed off and brought to battle in the open by superior numbers. In " strong positions " close to his stronghold, however, Bazaine hoped that he could inflict damaging repulses and heavy slaughter on the ardent Germans,' and in the main the result justified the ex- pectation. The scheme was creditable, and even heroic, but the execution throughout all ranks, from the marshal to the battalion

commanders, fell far short of the idea. The minutely cautious methods of movement, which Algerian experience had evolved suitable enough for small African desert columns, which were liable to surprise rushes and ambushes, reduced the mobility of a large army, which had favourable marching conditions, to 5 m. a day as against the enemy's rate of 15. When, before he had finally decided to stay in Metz, Bazaine attempted half- heartedly to begin a retreat on Verdun, the staff work and organization of the movement over the Moselle was so ineffective that when the German staff calculated that Bazaine was nearing Verdun, the French had in reality barely got their artillery and baggage trains through the town of Metz. Even on the battlefield the marshal forbade the general staff to appear, and conducted the fighting by means of his personal orderly officers. After the cumbrous army had passed through Metz it encountered an isolated corps of the enemy, which was commanded by the brilliant leader Constantin von Alvensleben, and promptly attacked the French. At almost every moment of the day victory was in Bazaine's hands. Two corps of the Germans fought all day for bare existence. But Bazaine had no con- fidence in his generals or his troops, and contented himself with inflicting severe losses on the most aggressive portions of the German army. Two days later, while the French

actually retreated on Metz — taking seven hours to cover 5 to 6 m. — the masses of the Germans gathered in front of him, intercepting his communication with the interior of France. This Bazaine expected, and feeling certain that the Germans would sooner or later attack him in his chosen position, he made no attempt to interfere with their concentration. The great battle was fought, and having inflicted severe punishment on his assailants, Bazaine fell back within the entrenched camp of Metz. But although he made no appeals for help, public opinion, alarmed and excited, condemned the only remaining army of France, Marshal Mac- Mahon's " Army of Chalons," to rescue Bazaine at all costs. The adventure ended at Sedan, and with Sedan the Third Empire collapsed.

Up to this point Bazaine had served his country perhaps as well as circumstances allowed, and certainly with enough skill and a sufficient measure of success to justify his appointment. His exDerience, wide as it was, had not fitted him for the com- mand of a large army in a delicate position. Since his Mexican expedition, moreover, he had himself fallen into a state of moral and physical lethargy, which, imperceptible on the field of battle, because his reputation for impassive bearing under fire was beyond question, was only too obvious in the staff offices, where the work of manoeuvring the army and framing plans and orders was chiefly done. But, in spite of these defects, it cannot be asserted that any one of Bazaine's subordinates would have done better, with the possible exception of Ladmirault, and Ladmirault was one of the junior corps commanders.

Bazaine, therefore, in the main justified his reputation for ability. He was now to justify his reputation for intriguing and underhand diplomacy. If in Mexico he aspired to the role of mayor of the palace, it was far more so in Metz, where, as com- mander of the only organized army of France, he conceived himself to be the ruler of the country's destiny. Accordingly he engaged in a series of diplomatic intrigues, some of which to this day have never been properly cleared up. Negotiations passed between the outer world and the besieged commander, the purport of which remains still to some extent obscure, but it is beyond question that he proposed with the permission of the Germans to employ his army in "saving France from herself." The scheme, however, collapsed, and the army of the Rhine became prisoners of war to the number of 140,000. At the moment of the surrender a week's further resistance would have enabled the levies of the National Defence government to crush the weak forces of the Germans on the Loire and to relieve Paris. But the army of Prince Frederick Charles, set free by the sur- render, hurried

up in time to check and to defeat the great effort at Orleans (q.v.). The responsibility for this crushing blow was naturally enough, and justly enough, placed on Bazaine's shoulders, and although, when he returned from captivity, the

marshal enjoyed a brief immunity, he was in 1873 brought to trial before a military court. He was found guilty of negotiating with and capitulating to the enemy before doing all that was prescribed by duty and honour, and sentenced to degradation and death, but very strongly recommended to mercy. His sentence was commuted to twenty years' seclusion, and the humiliating ceremonies attending degradation were dispensed with. He was incarcerated in the lie Sainte-Marguerite and treated rather as an exile than as a convict; thence he escaped in 1874 to Italy. He finally took up his abode in Madrid, where he was treated with marked respect by the government of Alfonso XII. He died there on the 23rd of September 1888. He published episodes de la guerre de i&jo (Madrid, 1883). He also wrote L'Armte du Rhin (Paris, 1872).

See the bibliography appended to the article Franco-German War; also memoir by C. Pelletan in La Grande Encyclopedic; for Bazaine's conduct see Bazaine et Varmee du Rhin (1873) ; J. Valfrey, Le Marshal et Varmee du Rhin (1873) ; Count A. de la Guerroniere, L'Homme de Metz (1871) ; Rossel, Les Derniers Jours de Metz (1871). See also the article Bourbaki for the curious Regnier episode con- nected with the surrender of Metz.

BAZALGETTE, SIR JOSEPH WILLIAM (1819-1891), English engineer, was born at Enfield on the 28th of March 1819. At the age of seventeen he was articled to an engineer, and a few years later he began to practise successfully on his own account. His name is best known for the engineering works he carried out in London, especially for the construction of the main drainage system and the Thames embankment. In 1848 the control of London drainage, which had hitherto been divided among eight distinct municipal bodies, was consolidated under twelve com- missioners, who were in 1849 superseded by a second commission. Under the latter Bazalgette accepted an appointment which he continued to hold under the three successive commissions which in the course of a year or two followed the second one, and when finally in 1855 these bodies were replaced by the Metropolitan Board of Works, he was at once appointed its

chief engineer. His plans were ready, but the work was delayed by official obstruction and formality until 1858. Once begun, however, it was vigorously pushed on, and in 1865 the system was formally opened. It consisted of 83 m. of large intercepting sewers, draining more than 100 sq. m. of buildings, and calculated to deal with 420 million gallons a day. The cost was £4,600,000. Almost simultaneously Bazalgette was engaged on the plans for the Thames embankment. The section between Westminster and Vauxhall on the Surrey side was built between i860 and 1869, and the length between Westminster and Blackfriars was declared open by the prince of Wales in 1870. The Chelsea embankment followed in 1 8 7 1- 1 8 7 4, and in 1 8 7 6 Northumberland Avenue was formed. The total outlay on the scheme exceeded £2,000,000. Bazalgette was also responsible for various other engineering works in the metropolitan area, designing, for example, new bridges at Putney and Battersea, and the steam ferry between north and south Woolwich. He also prepared plans for a bridge over the river near the Tower and for a tunnel under it at Blackwall, but did not live to see either of these projects carried out. He died on the 15th of March 1891 at Wimbledon.'

BAZARD, AMAND (1791-1832), French socialist, the founder of a secret society in France corresponding to the Carbonari of Italy, was born at Paris. He took part in the defence of Paris in 1815, and afterwards occupied a subordinate situa- tion in the prefecture of the Seine. About 1820 he united some patriotic friends into a society, called Amis de la verite. From this was developed a complete system of Carbonarism, the peculiar principles of which were introduced from Italy by two of Bazard's friends. Bazard himself was at the head of the central body, and, while taking a general lead, contributed extensively to the Carbonarist journal, L' Aristarque. An unsuccessful outbreak at Belfort ruined the society, and the leaders were compelled to conceal themselves. Bazard, after remaining for some time in obscurity in Paris, came to the con- clusion that the ends of those who wished well to the people would be most easily attained, not through political agitation,

but by effecting a radical change in their social condition. This train of thinking naturally drew him towards the socialist philosophers of the school of Saint-Simon, whom he joined. He contributed to their journal, Le Producleur; and in 1828 began to give public lectures on the principles of the school (see Saint- Simon) . His opposition to the emancipation of women brought about a quarrel with Enfantin (q.v.) in 1831, and Bazard found himself almost deserted by the members of the society. He attacked Enfantin violently, and in a warm

discussion between them he was struck down by apoplexy. After lingering for a few months he died on the 29th of July 1832.

BAZAS, a town of south-western France, in the department of Gironde, 38ˆ m. S.S.E. of Bordeaux by rail. Pop. (1906) town, 2505; commune, 4684. The town, which was the seat of a bishop from at least the beginning of the 6th century till 1790, has a Gothic church (formerly the cathedral) dating from the 13th to the 16th centuries. There are remains of ramparts (15th and 16th centuries) and several old houses of the 16th century. The vineyards of the vicinity produce white wine. The town is capital of an arrondissement, and carries on tanning, &c, and trade in the well-known Bazadais cattle.

Bazas (Cossio) was capital of the ancient tribe of the Vasates, and under the Romans one of the twelve cities of Novempopu- lana. In later times it was capital of the district of Bazadais. It was the scene of much bloodshed during the religious wars of the 16th century.

BAZIGARS, a nomad gipsy-folk of India, found throughout the peninsula, and variously known as Bazigars, Panchpiri, Nats, Bediyas, &c. They live a life apart from the surround- ing Hindu population, and still preserve a certain ethnical identity, scarcely justified by any indications given by their physique. They make a living as jugglers, dancers, basket- weavers and fortune-tellers; and in true European gipsy fashion each clan has its king.

BAZIN, RENE (1853-), French novelist and man of letters, was born at Angers on the 26th of December 1853. He studied law in Paris, and on his return to Angers became pro- fessor of law in the Catholic university there. He contributed to Parisian journals a series of sketches of provincial life and descriptions of travel, but he made his reputation by Une Tache d'encre (1888), which received a prize from the Academy. Other novels of great charm and delicacy followed: La Sarcelle bleue (1892); Madame Corenline (1893); Humble Amour (1894); De toute son dme (1897); La Terre qui meurt (1899); Les OberU (1901), an Alsatian story which was dramatized and acted in the following year; L'Ame alsacienne (1903); Donatienne (1903); L'IsoUe (1905); Le Bli qui leve (1907); Mimoires d'une vieille fille (1908). La Terre qui meurt, a picture of the decay of peasant farming and a story of La Vendee, is an indirect plea for the development of provincial France. A volume of Questions HtlSrairesetsociaiesa.ppea.Tedm 1906. Ren6Bazin was admitted to the Academy on the 28th of April 1904.

BAZIRE, CLAUDE (1 764-1 794), French revolutionist, was deputy

for the Cote d'Or in the Legislative Assembly, and made himself prominent by denouncing the court and the " Austrian committee " of the Tuileries. On the 20th of June 1 792 he spoke in favour of the deposition of the king. In thˆe Convention he sat with the Mountain, opposed adjourning the trial of Louis XVI., and voted for his death. He joined in the attack upon the Girondists, but, as member of the committee of general security, he condemned the system of the Terror. He was implicated by Francois Chabot in the falsification of a decree relative to the East India Company, and though his share seems to have been simply that he did not reveal the plot, of which he knew but part, he was accused before the Revolutionary Tribunal at the same time as Danton and Camille Desmoulins, and was executed on the 5th of April 1794.

BDELLIUM (fiSkXhwv, used by Pliny and Dioscorides as the name of a plant which exuded a fragrant gum) , a name applied to several gums or gum-resins that simulate and are sometimes found as adulterants of true myrrh (q.v.).

BEACH, a word of unknown origin; probably an old dialect word meaning shingle, hence, by transference, the place covered by shingle. Beach sometimes denotes the material thrown up by the waves, sometimes the long resulting ridge, but more frequently .the area between high and low water, or even the area between land and sea covered with material thrown up by exceptional storms.

The actual character of beach material depends upon the nature and structure of the rocks inshore, the strength and direction of currents, and the force of the waves. The southern shore of the Isle of Wight furnishes a good example. The island ends westward in the well-known " Needles," consisting of chalk with flints. The disintegration of this rock by wave action separates the finer chalk, which is carried seawards in suspension, from the hard flint, which is piled in rough shingle upon the shore. The currents sweep constantly eastward up channel, and the rough flint shingle is rolled along by wave action toward the Ventnor rampart, and ground finer and finer until it arrives as a very fine flinty gravel at Ventnor pier. The sweep of Sandown Bay follows, where the cliffs are composed for the most part of greensand, and here the beach at low water is sandy and smooth. The eastern end of the island is again composed of chalk with flints, and here the beach material as at the western end

consists of very coarse flint shingle. In this, as in similar cases, the material has been dragged seawards from the land by constant action of the undertow that accompanies each retreating tide and each returning wave. The resulting accumulated ridge is battered by every storm, and thrown above ordinary high-water mark in a ridge such as the Chesil Bank or the long grass-grown mound that has blocked the old channel of the Yar and diverted its waters into Yaverland Bay. Sandown furnishes an instructive example of the power of the eastward currents carrying high-storm waves. The groins built to preserve the foreshore are piled to the top with coarse shingle on the western side, while there is, a drop of over 8 ft. on to the sands east of the wall, many thousands of tons of shingle having been moved bodily by the waves and' deposited against each groin. The force of the waves has been measured on the west coast of Scotland and found to be as much as 3 tons per square foot. Against these forces the preservation of the shore from the advance of the sea becomes an extremely difficult and often a hopeless undertaking, since blocks of rock over 100 tons in weight have been moved by the waves. The beach is therefore unstable in its position. It advances in front of the encroaching sea, burying former beaches under the sand and mud of the now deeper water, or it retreats when the sea is withdrawn from the land or the land rises locally, leaving the old shingle stranded in a " raised beach," but its formation is in all cases due to the form and structure of the shore, the sapping action of the waves, the backward drag of the undertow plastering the shore with material, which is in turn bombarded by waves and swept by currents that cover the finer debris of the undertow with a layer of coarse fragments that are re-sorted by the daily action of currents and tides.

BEACHY HEAD, a promontory on the coast of Sussex, England, S.W. of Eastbourne, about 3 m. from the centre of the town. It consists of a perpendicular chalk cliff 532 ft. high, and forms the eastern termination of the hill-range known as the South Downs. Th%old Bell Tout lighthouse, 285 ft. above high- water mark, erected in 183 1 on the second cliff to the westward, in o° 10′ 18″ E., 50 43′ 30″ N., has been superseded by a new lighthouse built in the sea at the foot of the head itself.

Battle of Bcacky Head. — This naval battle, known to the French as Bevisier (a corruption of Pevensey), was fought on the 30th of June 1690. An allied force of 37 British sail of the line, under command of the earl of Torrington (Arthur Herbert) , and of 2 2 Dutch under C. Evertsen, was at anchor under the headland, while a French fleet of over 70 sail, commanded by the comte de Tourville, was anchored some miles off to the south-west. The French fleet had orders to co-

operate with an expected Jacobite rising in England. Torrington, to whom the general direction of the allied fleet belonged, was much disturbed by the enemy's superiority in number, and on the 26th had written to

the Council of Regency suggesting that he ought to retire to the Gunfleet at the mouth of the Thames, and observe the enemy from a distance till he could be reinforced. The council, which had the support of Admiral Russell, afterwards earl of Orford, considered that a retreat to the Gunfleet would have fatal consequences, by which they no doubt meant that it would leave the French free to land troops for the support of the Jacobites. They therefore ordered Herbert not to lose sight of the enemy, but rather to fight if he could secure an advantage of position. The admiral, who was on very bad terms with the council, elected to treat this as a peremptory order to fight. At daybreak on the 30th he got under way and bore down on the enemy. The wind was at north-east and gave him the weather-gage. As his fleet was only 57 sail in all he was not able to en- gage the enemy from end to end, but as the French were arranged in a line from east to west he could have fallen on the end nearest him, and could have guarded himself by telling off a part of his ships to watch the remainder. Torrington preferred to bring his fleet down in such a way that his van, consisting of the Dutch ships, should be opposite the enemy's van, his centre opposite their centre, and his rear should engage their rear. The inferiority of the allies in numbers made it therefore inevitable that there should be gaps between the different divisions. As the fleets actually did come to action, the Dutch with a few English ships pressed on the French van, their leading ship being abreast of the ninth or tenth Frenchman. Torrington took his station opposite the rear of the French centre, leaving a great gap between himself and the ships in the van. Being appre- hensive that the French centre would tack and pass this gap so as to put him between two fires, he kept a long way off so as to be free to manoeuvre against them if they made the attempt. The English rear division, consisting of the English blue squadron under Sir Ralph Delaval, fought a close action with the French opposite to them. In the meantime the French ships, ahead of the leading Dutchman, succeeded in turning to windward and putting part of Evertsen's squadron between two fires. The Dutch ships suffered heavily, and one of them which was dismasted drifted among the French and was taken. More severe loss would have followed if the better average seamanship of the English and Dutch had not stood them in good stead. The tide turned from flood to ebb during the action, and the surface current which in the Channel sets to the west with the ebb began to carry the fleets with it.

The Dutch and English dropped anchor. The French, who were not equally alert, did not and were carried westward. When the tide turned the allies retreated to the Thames, abandoning several of the most damaged ships in Pevensey Bay. The pursuit of the French was ineffective, for Tourville persisted in keeping his ships in line of battle, which forced them to regulate their speed by the slowest among them. Torrington was tried for his conduct but acquitted.

A full account of the battle of Beachy Head, written with ample quotation of documents, and for the purpose of vindicating Herbert, will be found in AdmiralColomb's Naval Warfare (London, !899)- (D. H.)

BEACON (from the O. Eng. beam, a sign, cf. "beckon," another form of the same word), a signal, especially a fire lit on a high hill, structure or building for the purpose of sending a message of alarm or of important news over long distances. Such was the courier-fire (a77apos irvp) that brought the news of the fall of Troy to Argos (Aeschylus, Agamemnon), or the chain of signals that told of the approach of the Spanish Armada, or which circled the British Isles in the jubilee years of 1887 and 1897. The word occurs in many names for lofty and conspicuous hills, such as Dunkery Beacon in Somerset, the highest point on Exmoor. On many such hills the remains of old beacon towers and cressets are still found. The word is used generally of a lighthouse, but technically it means either a small unattended light, a superstructure on a floating buoy, such as a staff and cage, or staff and globe, or an unlighted structure, forming a conspicuous object at sea, used in each case to guide or warn sailors. (See Lighthouse and Buoy.)

BEACONSFIELD, BENJAMIN DISRAELI, Earl of (1804- 1881), British statesman, second child and eldest son of Isaac D'Israeli (q.v.) and Maria Basevi, who were married in 1802, was born at No. 6 John Street, Bedford Row, on the 21st of December 1804. Of Isaac D'Israeli's other children, Sarah was born in 1802, Naphtali in 1807, Ralph (Raphael) in 1809, and James (Jacob) in 1813. None of the family was akin to Benjamin for genius and character, except Sarah, to whom he was deeply indebted for a wise, unswerving and sympathetic devotion, when, in his earlier days, he needed it most. All Isaac D'Israeli's children were born into the Jewish communion, in which, how- ever, they were not to grow up. It is a reasonable

inference from Isaac's character that he was never at ease in the ritual of Judaism. His father died in the winter of 1816, and soon afterwards Isaac formally withdrew with all his household from the Jewish church. His son Benjamin, who had been admitted to it with the usual rites eight days after his birth, was baptized at St Andrew's church in Holborn on the 31st of July 1817. One of Isaac D'Israeli's reasons for quitting the tents of his people was that rabbinical Judaism, with its unyielding laws and fettering ceremonies, " cuts off the Jews from the great family of mankind." Little did he know, when therefore he cut off the D'Israeli family from Judaism, what great things he was doing for one small member of it. The future prime minister was then short of thirteen years old, and there was yet time to provide the utmost freedom which his birth allowed for the faculties and ambitions he was born with. Taking the worldly view alone, of course, most fortunate for his aspirations in youth was his withdrawal from Judaism in childhood. That it was fully sanctioned by his intellect at maturity is evident; but the vindication of unbiased choice would not have been readily accepted had Disraeli abandoned Judaism of his own will at the pushing Vivian Grey period or after. And though a mind like Disraeli's might work to satisfaction with Christianity as " com- pleted Judaism," it could but dwell on a breach of continuity which means so much to Jews and which he was never allowed to forget amongst Christians. With all, he was proud of his race as truly, if not as vehemently, as his paternal grandmother detested it. Family pride contributed to the feeling in his case; for in his more speculative moods he could look back upon an ancestry which was of those, perhaps, who colonized the shores of the Mediterranean from before the time of the Captivity. More definite is the history of descent from an ennobled Spanish family which escaped from the Torquemada persecutions to Venice, there found a new home, took a new name, and prospered for six generations. The Benjamin D'Israeli, Lord Beacons- field's grandfather, who came to England in 1748, was a younger son sent at eighteen to try his fortune in London. " A man of ardent character, sanguine, courageous, speculative, fortunate, with a temper which no disappointment could disturb " (so Lord Beaconsfield described him), he soon made the beginnings of a handsome fortune and turned country gentleman. That his grandson exaggerated his prosperity is highly probable; but that he became a man of wealth and consideration is certain. He married twice. His second wife was Sarah Siprout de Gabay, " a beautiful woman of strong intellect " and importunate ambitions, who hated the race she belonged to because it was despised by others. She felt so keenly the social disabilities it brought upon her, and her husband's indifference

to them, that " she never pardoned him his name." Her literary son Isaac suffered equally or even more; for though he had ambitions he had none that she could recognize as such. She could ridicule him for the aspirations which he had not and for those which he had; on the other hand, he never-heard from her a tender word " though she lived to be eighty." Nor did any other member of her family, according to her grandson.

Isaac D'Israeli was devoted to the reading and writing of books in domestic quiet; and his son Benjamin suffered appreciably from his father's gentle preoccupations. As a child — unruly and disturbing no doubt — he was sent to a school of small account at Blackheath, and was there " for years " before he was recalled at the age of twelve on the death of his grandfather.

Isaac D'Israeli was his father's sole heritor, but change of fortune seems to have awakened in him no ambitions for the most hopeful of his sons. At fifteen, not before, Benjamin was sent to a Unitarian school at Walthamstow — a well-known school, populous enough to be a little world of emulation and conflict but otherwise unfit. Not there, nor in any similar institution at that illiberal time, perhaps, was a Jewish boy likely to make a fortunate entry into " the great family of mankind." His name, the foreign look of him, and some pronounced incom- patibilities not all chargeable to young Disraeli (as afterwards the name came to be spelt) , soon raised a crop of troubles. His stay at Walthamstow was brief, his departure abrupt, and he went to school no more. With the run of his father's library, and the benefits of that born bookman's guidance, he now set out to educate himself. This he did with an industry stiffened by matchless self-confidence and by ambitions fully mature before he was eighteen. Yet he yielded to an attempt to make a man of business of him. He was barely seventeen when (in November 1821) he was taken into the office of Messrs Swain, Stevens and Co., solicitors, in Frederick's Place, Old Jewry. Here he remained for three years — " most assiduous in his attention to business," said one of the partners, " and showing great ability in the transaction of it." It was then determined that he should go to the bar; and accordingly he was entered at Lincoln's Inn in 1824. But Disraeli had found other studies and an alien use for his pen. Though " assiduous in his attention to business " in Frederick's Place, he found time to write for the printer. Dr Smiles, in his Memoirs of John Murray, tells of certain pamphlets on the brightening prospects of the Spanish South American colonies, then in the first enjoyment of emancipa- tion — pamphlets seemingly written for a Mr Powles, head of a great financial firm, whose acquaintance Disraeli had made. In the same

year, apparently, he wrote a novel — his first, and never published. Aylmer Papillon was the title of it, Dr Smiles informs us; and he prints a letter from Disraeli to the John Murray of that day, which indicates its character pretty clearly. The last chapter, its author says, is taken up with " Mr Papillon's banishment under the Alien Act, from a ministerial misconcep- tion of a metaphysical sonnet." About the same time he edited a History of Paul Jones, originally published in America, the preface of the English edition being Disraeli's first appearance as an author. Murray could not publish Aylmer Papillon, but he had great hopes of its boyish writer (Isaac D'Israeli was an old friend of his), " took him into his confidence, and related to him his experiences of men and affairs." Disraeli had not completed his twenty-first year when (in 1825) Murray was possessed by the idea of bringing out a great daily newspaper; and if his young friend did not inspire that idea he keenly urged its execution, and was entrusted by R eD r e . Murray with the negotiation of all manner of pre- seatative." liminaries, including the attempt to bring Lockhart in as editor. The title of the paper, The Representative, was Disraeli's suggestion. He chose reporters, looked to the setting- up of a printing-office, busied himself in all ways to Murray's great satisfaction, and, as fully appears from Dr Smiles's account of the matter, with extraordinary address. But when these arrangements were brought to the point of completion, Disraeli dropped out of the scheme and had nothing more to do with it. He was to have had a fourth share of the proprietorship, bringing in a corresponding amount of capital. His friend Mr Powles, whom he had enlisted for the enterprise, was to have had a similar share on the same conditions. Neither seems to have paid up, and that, perhaps, had to do with the quarrel which parted Benjamin Disraeli and John Murray before a sheet of the luckless Representative was printed. Many years afterwards (1853) Disraeli took an active interest in The Press, a weekly journal of considerable merit but meagre fortunes.

At the death of the elder Benjamin (1817), his son Isaac had moved from the King's Road, Gray's Inn (now Theobald's Road), to No. 6 Bloomsbury Square. Here he entertained the many distinguished friends, literary and political, who had been . drawn to him by his " Curiosities " and other ingenious works,

and here his son Benjamin also had their acquaintance and

conversation. In Bloomsbury Square lived the Austens, and to their house, a great resort of similar persons, Mrs Austen cordially welcomed him. Murray's friendship and associations helped him in like manner, no doubt; and thus was opened to Disraeli the younger a world in which he was to make a considerable stir. The very much smaller society of that day was, of course, more comprehensible to sight and hearing, when once you were within its borders, than the society of this. Re- verberations of the gossip of St James's and Mayfair extended to Bloomsbury in those days. Yet Disraeli's range of observation

must have been not only brief but limited when he drey." sat down at twenty or twenty-one to write Vivian Grey.

It is therefore a probable conjecture that Mrs Austen, a clever woman of the world, helped him from her knowledge. His own strongly perceptive imagination (the gift in which he was to excel every other politician of his time) and the bent of political reading and aspiration from boyhood completed his equipment; and so the wonder that so young a man in Disraeli's social position should write a book like Vivian Grey is accounted for. It was published in 1826. The success of this insolently clever novel, the immediate introduction of its author to the great world, and the daring eccentricities of dress, demeanour, and opinion by which he fixed attention on himself there, have always been among the most favourite morsels of Disraeli's history. With them it began, and successive generations of inquirers into a strange career and a character still shrouded and baffling refer to them as settled starting-points of investiga- tion. What was the man who, in such a society and with political aspirations to serve, could thrive by such vagaries as these, or in spite of them? If unaffected, what is to be thought of them as keys to character? If affected, what then? Inquiry still takes this shape, and when any part of Disraeli's career is studied, the laces and essences, the rings over gloves, the jewelled satin shirt-fronts, the guitareries and chibouqueries of his earty days are never remote from memory. The report of them can hardly be doubted; and as the last relation was made (to the writer of this article) not with intent to ridicule Mr Disraeli's taste but to illustrate his conquering abilities, the story is repeated here. One of Disraeli's first friends in the world of fashion and genius was Sir Edward Lytton Bulwer. " And," said Sir Henry Bulwer (" Pelham's " brother), "we heard so much at the time of Edward's amazingly brilliant new friend that we were the less inclined to make his acquaintance." At length, however, Sir Edward got up a little dinner-party to con- vince the doubters. It was to meet at the early hour of those days at one of the Piccadilly

hotels. " There was my brother, Alexander Cockburn, myself and (I think) Milnes; but for a considerable time no Mr Disraeli. Waiting for Mr Disraeli did not enhance the pleasure of meeting him, nor when he did arrive did his appearance predispose us in his favour. He wore green velvet trousers, a canary-coloured waistcoat, low shoes, silver buckles, lace at his wrists, and his hair in ringlets." The descrip- tion of the coat is forgotten. " We sat down. Not one of us was more than five-and-twenty years old. We were all — if you will allow me to include myself — on the road to distinction, all clever, all ambitious, and all with a perfect conceit of ourselves. Yet if on leaving the table we had been severally taken aside and asked which was the cleverest of the party, we should have been obliged to say ' the man in 'the green velvet trousers.' " This story is a little lamp that throws much light. Here we see at their sharpest the social prejudices that Disraeli had to fight against, provocation of. them carried to its utmost in every way open to him, and complete conquest in a company of young men less likely to admit superiority in a wit of their own years, probably, than any other that could have been brought together at that time.

Soon after the publication of Vivian Grey, Disraeli, who is said by Froude to have been " overtaken by a singular disorder," marked by fits of giddiness (" once he fell into a trance, and did not recover for a week ") , went with the Austens on a long summer tour in France, Switzerland and Italy. Returning to a quiet life

at Bradenham — an old manor-house near High Wycombe, which his father had taken — Disraeli put law in abeyance and resumed novel-writing. His weakest book, and two or three other pro- ductions, brief, but in every literary sense the finest of his works, were written in the next two or three years. But for Ixion in Heaven, The Infernal Marriage, and Popanilla, Disraeli could not be placed among the greater writers of his kind ; yet none of his imaginative books have been so little read as these. The mysterious malady continued, and Disraeli set out with William Meredith, who was to have married Sarah Disraeli, for Travel a tour in southern Europe and the nearer East. He saw Cadiz, Seville, Granada, Athens, Constantinople, Jerusalem, Cairo, Thebes; played the corsair with James Clay on a yacht voyage from Malta to Corfu; visited the terrible Reschid, then with a Turkish army in the Albanian capital; landed in Cyprus, and left it with an expectation in his singularly prescient mind that the island would one day be English. These travels must have profited him greatly, and we have our share of the advan- tage; not so much, however, in The Wondrous Tale of Alroy or Tancred, or the " Revolutionary Epic " which he was inspired to write on " the windy

plains of Troy," but in the letters he sent home to his sister. These letters, written with the utmost freedom and fullness to the one whose affection and intellect he trusted more than any, are of the greatest value for interpreting the writer. Together with other letters also published some time after Disraeli's death, they tell more of him than anything that can be found in print elsewhere. They show, for example, that his extraordinary exuberances were unforced, leaping by natural impulse from an overcharged source. They also show that his Oriental fopperies were not so much " purposed affectation " as Froude and others have surmised. That they were so in great part is confessed again and again in these letters, but confessed in such a way as to reveal that they were permitted for his own enjoyment of them as much as planned. The " purposed affectation" sprang from an unaffected delight in gauds of attire, gauds of fancy and expression. It was not only to startle and impress the world that he paraded his eccentricities of splendour. His family also had to be impressed by them. It was to his sober father that he wrote, at the age of twenty-six: " I like a sailor's life much, though it spoils the toilette." It is in a letter from Gibraltar to the same hand that we read of his two canes — " a morning and an evening cane " — changed as the gun fires. And the same correspondent must be told that " Ralph's handkerchief which he brought me from Paris is the most successful thing I ever wore."

When Disraeli returned to England in 1831, all thought of the law was abandoned. The pen of romance was again taken up — the poet's also and the politician's. In the next five years he wrote Contarini Fleming, the Revolutionary P nda^- Epick, Alroy, Henrietta Temple, What is He? (a tioa. pamphlet expository of his opinions), the Runnymede Letters, a Vindication of the British Constitution, and other matter of less note. The epic, begun in great hope and confidence, was ended in less, though its author was to the last unwilling that it should be forgotten. The novels revived the success he had with Vivian Grey, and restored him to his place among the brilliancies and powers of the time. The political writing, too, much of it in a garish, extravagant style, exercised his deeper ambitions, and standsas witness to the working of original thought and foresight. Both qualities are conspicuous in What is He ? and the Vindica- tion, of which it has been truly said that in these pages he " struck the keynote to the explanations he afterwards consistently offered of all his apparent inconsistencies." Here an interpretation of Tory principles as capable of running with the democratic idea, and as called upon to do so, is ingeniously attempted. The aristocratic principle of government having been destroyed by the Reform Bill,

and the House of Lords being practically " abrogated " by that measure, it became necessary that Toryism should start from the democratic basis, from which it had never been alien. The filched liberties of the crown and the people should be restored, and the nation redeemed from the oligarchies which had stolen from both. When at the beginning of all this

writing Disraeli entered the political arena as candidate for High Wycombe (1832), he was nominated by a Tory and seconded by a Radical — in vain; and vain were two subsequent attempts in the autumn of 1832 and in 1834. In the first he was recommended to the electors by Daniel O'Connell and the Radical Hume. In his last candidature at Wycombe he stood on more independent ground, commending himself by a series of speeches which fully displayed his quality, though the prescience which gemmed them with more than one prophetic passage was veiled from his contemporaries. Among Disraeli's great acquaintances were many — Lyndhurst at their head — whose expectations of his future were confirmed by the Wycombe speeches. He was " thought of " for various boroughs, Marylebone among the number, but his democratic Toryism seems to have stood in his way in some places and his inborn dislike of Radicalism in others. It was an impracticable situation — no getting on from it; and so, at Lyndhurst's persuasion, as he afterwards acknowledged, he determined to side with the Tories. Accordingly, when in the spring of 1835 a vacancy occurred at Taunton, Disraeli contested the seat in the Tory interest with Carlton Club support. Here again he failed, but with enhanced reputation as a fighting politician and with other consequences good for notoriety. It was at Taunton that Disraeli fell upon O'Connell, rather ungrate- fully; whereupon the Liberator was roused to retort on his assailant vehemently as " a liar," and humorously as a probable descendant of the impenitent thief. And then followed the challenge which, when O'Connell declined it, was fastened on his son Morgan, and the interruption of the duel by seizure of Mr Disraeli in his bed, and his famous appearance in the Marylebone police court. He declared himself very well satisfied with this episode, but nothing in it can really have pleased him, not even the noise it made.

Here the first period of Disraeli's public life came to an end, a period of preliminaries and flourishes, and of what he himself called sowing his political wild oats. It was a more mature Disraeli who in the

general election of 1837 was returned for Maidstone as the colleague of his provi- dential friend Mr Wyndham Lewis. Though the fortunes of the Tory party were fast reviving under Peel's guidance, the victory was denied him on this occasion; but, for once, the return of the Whigs to power was no great disappoint- ment for the junior member for Maidstone. To gain a footing in the House of Commons was all that his confident spirit ever asked, and Froude vouches for it that he succeeded only just in time to avert financial ruin. His electioneering ventures, the friendly backing of bills, and his own expense in keeping up appearances, had loaded him with debt. Yet (mark his worldly wisdom) " he had never entangled his friends in his financial dealings. He had gone frankly to the professional money-lenders, who made advances to him in a speculation on his success " : they were to get their money back with large interest or lose it altogether. Such conditions were themselves incitement enough to a prompt redemption of the promise of parliamentary distinction, even without the restless spurring of ambition. And Disraeli had another promise to redeem : that which he uttered when he told O'Connell that they would meet again at Philippi. Therefore when, three weeks after the session began, a debate on Irish election petitions gave him opportunity, Disraeli attempted that first House of Commons speech which imagination still dwells upon as something wondrous strange. That he should not have known better, even by hearsay, than to address the House of ■Commons in fantastic phrase from the mouth of a fantastic figure is indeed remarkable, but not that he retained self-confidence enough to tell the unwitting crew who laughed him down that a time would come when they would hear him. It was one of the least memorable of his prophecies. The speech was a humiliating but not an oppressive failure. In about a week afterwards he spoke again, which shows how little damage he felt, while the good sense, brevity, and blameless manner of the speech (on a copy- right bill) announced that he could learn. And for some time thereafter he affected no importance in the House, though not as withdrawing from attention.

Enters Parlia- ment.

Meanwhile, consciously and unconsciously, as is the way with men of genius, his mind was working upon problems of government, the magnitude, the relations and the natural developments of which he was more sensible of than any known politician of his time. " Sensible of," we say, to mark the differ- ence between one sort ' of understanding and another which comes of labour and pains alone. Disraeli studied too, no doubt, reading and inquiring and applying set thought, but such means were insufficient to put into his mind all

that he found there. It seems that opinions may be formed of inquiry and study alone, which are then constructive; but where intuitive perception or the perceptive imagination is a robust possession, the fruits of research become assimilative — the food of a divining faculty which needs more or less of it according to the power of divina- tion. The better judgment in all affairs derives from this quality, which has some very covetable advantages for its possessor. His judgments may be held with greater confidence, which is an intellectual advantage; and, standing in his mind not so much an edifice as a natural growth, they cannot be so readily abandoned at the call of ease or self-interest, character- They may be denied assertion or even outraged for a istics. purpose, but they cannot be got rid of, — which is a moral advantage. Disraeli's mind and its judgments were of this character. Its greatest gift was not the romantic imagina- tion which he possessed abundantly and employed overmuch, but the perceptive, interpretative, judicial or divining imagination, without which there can be no great man of affairs. Breadth of view, insight, foresight, are more familiar but less adequate descriptions of a faculty which Disraeli had in such force that it took command of him from first to last. Although he knew and acted on the principle that " a statesman is a practical character," whose business is to " serve the country according to its present necessities," he was unable to confine his vision to the nearer consequences of whatever policy, or course of action, or group of conditions it rested on. Without effort, and even without intention probably, it looked beyond first con- sequences to the farther or the final outcome; and to complete the operation, the faculty which detected the remoter conse- quences did not allow them to remain in obscurity, but brought them out as actualities no less than the first and perhaps far more important than the first. Moreover, it did not allow him to keep silence where the remoter consequences were of that character, and ought to be provided for betimes. Of course silence was always possible. These renderings to foresight might be denied assertion either for the sake of present ease (and Disraeli's prescience of much of his country's later troubles only made him laughed at) or in deference to hopes of personal advancement. But the same divining imagination which showed him these things also showed him the near time when it would be too late to speak of them, and when not to have spoken would leave him irredeemably in the common herd of hand-to- mouth politicians. Therefore he spoke.

Remembrance of these characteristics — remembrance, too, that his mind, which was neither English nor European, worked in absolute detachment — should accompany the traveller through all the turns

and incidents of Disraeli's long career. They are sometimes puzzling, often speculative; yet nearly all that is obscure in them becomes clear, much . apparent contra- diction disappears, when read by these persistent unvarying lights. The command which»his idiosyncrasies had upon him is shown, for example, by reproachful speeches on the treatment of Ireland, and by a startling harangue on behalf of the Chartists, at a time when such irregularities could but damage him, a new man, where he hoped for influence and office. At about the same time his political genius directed him to open a resolute critical campaign against the Conservatism of the party he proposed to thrive in, and he could but obey. This he did in writing Coningsby, a novel of the day and for i' a ^' , < the day, but commended to us of a later generation "Sybil." not only by the undimmed truth of its character- portraits, but by qualities of insight and foresight which we who have seen the proof of them can measure as his contemporaries

could not. Sybil, which was written in the following year (1845), is still more remarkable for the faculties celebrated in the pre- ceding paragraph. When Sybil was written a long historic day was ending in England, a new era beginning; and no eyes saw so clearly as Disraeli's the death of the old day, the birth of the new, or what and how great their differences would be. In Coningsby the political conditions of the country were illustrated and discussed from the constitutional point of view, and by light of the theory that for generations before the passing of the Reform Bill the authority of the crown and the liberties of the people had been absorbed and extinguished in an oligarchic system of government, itself become fossilized and soulless. In Sybil were exhibited the social relations of rich and poor (the " two nations") under this regime, and under changes in which, while the peasantry were neglected by a shoddy aristocracy ignorant of its duties, factory life and a purblind gospel of political economy imbruted the rest of the population. These views were enforced by a startling yet strictly accurate repre- sentation of the state of things in the factory districts at that time. Taken from the life by Disraeli himself, accompanied by one or two members of the Young England party of which he was the head, it was the first of its kind; and the facts as there displayed, and Disraeli's interpretation of them — a marvel of perceptive and prophetic criticism — opened eyes, roused con- sciences, and led direct to many reforms.

These two books, the Vindication, published in 1835, and his speeches up to this time and a little beyond, are quite enough to show what Disraeli's Tory democracy meant, how truly national was its aim, and how exclusive of partisanship for the "landed interest"; though he did believe the stability and prosperity of the agricultural class a national interest of the first order, not on economic grounds alone or even chiefly. And if Disraeli, possessed by these views, became aggressively insubordinate some time be"fore Peel's proclaimed conversion to Free Trade, we can account for it on reasonable and even creditable grounds. Spite, resentment at being passed over when Peel formed the 1841 government, is one explanation of these outbreaks, and a letter to Peel, lately published, is proof to many minds that Disraeli's denial to Peel's face in 1846 that he had ever solicited office was daringly mendacious. The letter certainly reads like solicitation in the customary half- veiled form. All that can be said in doubt is that since the '41 government came into existence on the 6th of September, and the letter was written on the 5th, its interpretation as complaint of being publicly neglected, as a craving for some mark of recogni- tion, is possible. More than possible it is if Disraeli knew on the 5th (as he very well might from his friend Lyndhurst, Peel's lord chancellor) that the appointments were then complete. The pecuniary need of office, if that comes into the question, had been lightened, if not extinguished, two years before by his marriage with Mrs Wyndham Lewis. Mrs Lewis — a lady fifteen years his senior — brought him a considerable fortune which, however, was but for her life. She lived to a great age, and would gladly have lived longer, in any of the afflictions that time brings on, to continue her mere money-worth to her " Dizzy." Her devotion to him, and his devotion to her, is the whole known story of their private life; and we may believe that nothing ever gratified him more than offering her a coronet from Mr Disraeli.

Disraeli made Peel's acquaintance early in his career and showed that he was proud of it. In his Life of Lord George Bentinck he writes of Peel fairly and even generously. But they were essentially antipathetic persons; and it is clear that the great minister and complete Briton took no pains to understand the dazzling young Jew of whom Lyndhurst thought so much, and wished to have little to do with him. Such men make such feelings evident; and there is no reason for thinking that when, after 1841, Disraeli charged at Peel in obedience to his principles, he gave himself pain. It was not long after it had settled in office that Peel's government, the creature of an anxious Con- servative reaction, began to be suspected of drifting toward Manchester. That it was forced in that direction we should

say rather, looking back, for it was a time of dire distress, especially in the manufacturing districts of the north; so that in his second session Peel had to provide some relief by revising the corn laws and reducing import i84i-67. dues generally. His measures were supported by Disraeli, who understood that Protection must bend to the menacing poverty of the time, though unprepared for total abolition of the corn tax and strongly of opinion that it was not for Peel to abolish it. In the next session (1843) he and his Young England party took up a definitely independent r61e, which became more sharply critical to the end. Disraeli's first strong vote of hostility was on a coercion bill for perishing and rebellious Ireland. It was repeated with greater emphasis in the session of 1844, also in a condition-of -Ireland debate; and from that time forth, as if foreseeing Peel's course and its effect on the country party, Disraeli kept up the attack. Meanwhile bad harvests deepened the country's distress, Ireland was approached by famine, the Anti-Corn-Law League became menacingly powerful, and Peel showed signs of yielding to free trade. Disraeli's opportunity was soon to come now; and in 1845, seeing it on the way, he launched the brilliantly destructive series of speeches which, though they could not prevent the abolition of the corn-laws, abolished the minister who ended them. These speeches appeal more to admiration than to sympathy, even where the limitations of Disraeli's protectionist beliefs are understood and where his perception of the later consequences of free trade is most cordially acknowledged. That he remained satisfied with them himself is doubtful, unless for their foresight, their tremendous effect as instruments of punish- ment, and as they swept him to so much distinction. Within three years, on the death of Lord George Bentinck, there was none to dispute with him the leadership of the Conservative party in the House of Commons.

In the parliament of 1841 he was member for Shrewsbury. In 1847 he was returned for Buckinghamshire, and never again had occasion to change his constituency. Up to this time his old debts still embarrassed him, but now his private and political fortunes changed together. Froude reports that he " received a large sum from a private hand for his Life of Lord George Bentinck " (published in 1852), " while a Conservative millionaire took upon himself the debts to the usurers; the 3 % with which he was content being exchanged for the 10 % under which Disraeli had been staggering." In 1848 his father Isaac DTsraeli died, leaving to his son Benjamin nearly the whole of his estate. This went to the purchase of Hughenden Manor — not, of course, a great property, but with so much of the pleasant and pictur- esque, of the dignified also, as quite

to explain what it was to the affectionate fancy of its lord. About this time, too (1851), his acquaintance was sought by an old Mrs Brydges Willyams — born a Spanish Jewess and then the widow of a long-deceased Cornish squire — who in her distant home at Torquay had conceived a restless admiration for Benjamin Disraeli. She wrote to him again and again, pressing for an appointment to consult on an important matter of business: would meet him at the fountain of the Crystal Palace in Hyde Park. Her impor- tunity succeeded, and the very small, oddly-dressed, strange- mannered old lady whom Disraeli met at the fountain became his adoring friend to the end of her life. Gratitude for her devotion brought him and his wife in constant intimacy with her. There were many visits to Torquay; he gratified her with gossiping letters about the great people with whom and the great affairs with which the man who did so much honour to her race was connected, that being the inspira- tion of her regard for him. She died in 1863, leaving him all her fortune, which was considerable; and, as she wished, was buried at Hughenden, close to the grave where Disraeli was to lie.

It is agreed that the first three years of Disraeli's leadership in Opposition were skilfully employed in reconstructing the shattered Tory party. In doing this he made it sufficiently clear that there could be no sudden return to Protectionist principles. At the same time, however, he insisted (as he did

from first to last) on the enormous importance to the country, to the character of its people no less than to its material welfare, of agricultural contentment and prosperity; and he also obtained As leader a more general recognition of the fact that " the land " in the had borne fiscal burdens under the old regime which House of we re unfair and unendurable under the new. So far he did well; and when in 1852 he took office as chancellor of the exchequer in Lord Derby's first administration, the prospect was a smiling one for a man who, striving against difficulties and prejudices almost too formidable for imagination in these days, had attained to a place where he could fancy them all giving way. That, however, they were not. New difficulties were to arise and old prejudices to revive in full force. His first budget was a quaint failure, and was thrown out by a coalition of Liberals and Peelites which he believed was formed against Mr Disraeli more than against the chancellor of the exchequer. It was on this occasion that he exclaimed, " England does not love coalitions."

After a reign of ten months he was again in Opposition, and remained so for seven years. Of the Crimean War he had a better judgment than those whose weak- ness led them into it, and he could tell them the whole truth of the affair in twenty words: " You are going to war with an opponent who does not want to fight, and whom you are un- willing to encounter." Neither were they prepared; and the scandals and political disturbances that ensued revealed him as a party leader who could act on such occasions with a dignity, moderation and sagacity that served his country well, maintained the honour of party government and cost his friends nothing. The mismanagement of the war broke down the Aberdeen government in 1855, and then Disraeli had the mortification of seeing a fortunate chance of return to office lost by the timidity and distrust of his chief, Lord Derby — the distrust too clearly including the under-valuation of Disraeli himself. Lord Derby wanted Lord Palmerston's help, Mr Gladstone's, Mr Sidney Herbert's. This arrangement could not be made; Lord Derby therefore gave up the attempt to form a ministry and Lord Palmerston came in. The next chance was taken in less favour- ing times. The government in which Disraeli was again financial minister lasted for less than eighteen months (1858-1859), and then ensued another seven years in the cold and yet colder shade of Opposition. Both of these seven-year outings were bad, but the second by far the worse. Parliamentary reform had become a burning question and an embarrassing one for the Tory party. An enormous increase of business, consequent upon the use of steam machinery and free-trade openings to commerce, filled the land with prosperity, and discredited all statesmanship but that which steered by the star over Manchester. Mr Gladstone's budgets, made possible by this prosperity, were so many triumphs for Liberalism. Foreign questions arose which strongly excited English feeling — the arrangements of peace with Russia, Italian struggles for freedom, an American quarrel, the " Arrow " affair and the Chinese war, the affair of the French colonels and the Conspiracy Bill; and as they arose Palmerston gathered into his own sails (except on the last occasion) every wind of popular favour. Amid all this the Tory fortunes sank rapidly, becoming nearly hopeless when Lord Palmerston, without appreciable loss of confidence on his own side, persuaded many Tories in and out of parliament that Conservatism would suffer little while he was in power. Yet there was great despondency, of course, in the Conservative ranks; with despondency discontent; with discontent rancour. The prejudice against Disraeli as Jew, the revolt at his theatricalisms, the distrust of him as " mystery man," which up to this time had never died out even among men who were his nearest colleagues, were now more openly indulged. Out of doors he had a "

bad press," in parliament he had some steady, enthusiastic friends, but more that were cold. Sometimes he was seen on the front Opposition bench for hours quite alone. Little conspiracies were got up to displace him, and might have succeeded but for an unconquerable dread . of the weapon that destroyed Peel. In this state of things he patiently held his ground, working for his party more carefully than it knew, and never seizing, uoon false or discrediting I

advantages. But it was an extremely bad time for Benjamir Disraeli.

Though Lord Palmerston stumbled over his Foreign Conspiracy Bill in 1858, his popularity was little damaged, and it was in no hopeful spirit that the Tories took office again in that year. They were perilously weak in the House of Commons, and affairs abroad, in which they had small practice and no prestige, were alarming. Yet the new administration did very well till, after resettling the government of India, and recovering from a blunder committed by their Indian secretary, Lord Ellenborough, they must needs launch a Reform Bill to put that dangerous question out of controversial politics. The well-intended but fantastic measure brought in for the purpose was rejected. The country was appealed to, with good but insufficient results; and at the first meeting of the new parliament the Tories were turned out on a no-confidence vote moved by Lord Hartington. Foreign affairs supplied the motive: failure to preserve the peace of Europe at the time of the Italian war of independence. It is said that the foreign office had then in print a series of despatches which would have answered its accusers had they been presented when the debate began, as for some unexplained reason they were not. Lord Palmerston now returned to Downing Street, and while he lived Disraeli and his colleagues had to satisfy themselves with what was meant for useful criticism, though with small hope that it was so for their own service. A Polish insurrection, the Schleswig-Holstein question, a commercial treaty with France, the Civil War in America, gave Disraeli occasions for speech that was always forcible and often wiser than all could see at the time. He never doubted that England should be strictly neutral in the American quarrel when there was a strong feeling in favour of the South. All the while he would have gladly welcomed any just means of taking an animated course, for these were dull, dark days for the Conservatives as a parliamentary party. Yet, unperceived, Conservatism was advancing. It was much more than a joke that Palmerston sheltered Conservative principles under the Liberal flag. The warmth of his popularity, to which Radical applause contributed nothing in his later days, created an atmosphere entirely favourable to the quiet growth of Conservat-

ism. He died in 1865. Earl Russell succeeded him as prime minister, Mr Gladstone as leader of the House of Commons. The party most pleased with the change was the Radical; the party best served was Disraeli's. Another Reform Bill, memorable for driving certain good Liberals into a Cave of Aduilam, broke up the new government in a few months; Disraeli contributing to the result by the delivery of opinions not new to him and of lasting worth, though presently to be subordinated to arguments of an inferior order and much less characteristic. " At this rate," he said in 1866," you will have a parliament that will entirely lose its command over the executive, and it will meet with less consideration and possess less influence." Look for declining statesmanship, inferior aptitude, genius dying off. " Instead of these you will have a horde of selfish and obscure mediocrities, incapable of anything but mischief, and that mischief devised and regulated by the raging demagogue of the hour." The Reform legislation which promised these results in 1866 was thrown out. Lord Derby's third administration was then formed in the summer of the same year, and for the third time there was a Tory government on sufferance. Its followers were still a minority in the House of Commons; an angry Reform agitation was going on; an ingenious resolution founded on the demand for an enlarged franchise serviceable to Liberals might extinguish the new government almost immediately; and it is pretty evident that the Tory leaders took office meaning to seek a cure for this desperate weakness by wholesale extension of the suffrage. Their excuses and calculations are well Billot known, but when all is said , Lord Derby's statement of 186T. its character," a leap in the dark," and of its intention. " dishing the Whigs," cannot be bettered. Whether Lord Derby or Mr Disraeli originated this resolve has been much discussed, and it remains an unsettled question. It is known that Disraeli's private secretary, Mr Ralph Earle, quarrelled with him violently at about this time; and Sir William Fraser relates that, meeting

Mr Earle, that gentleman said: " I know what your feelings must be about this Reform Bill, and I think it right to tell you that it was not Disraeli's bill, but Lord Derby's. I know everything that occurred." Mr Earle gave the same assurances to the writer of these lines, and did so with hints and half -confidences (quite intelligible, however) as to the persuasions that wrought upon his chief. Mr Earle 's listener on these occasions confesses that he heard with a doubting mind, and that belief in what he heard still keeps company with Mahomet's

coffin. One thing, however, is clear. To suppose Disraeli satisfied with the excuses made for his adoption of the "dishing " process is forbidden by the whole tenor of his teaching and conduct . He could not have become suddenly blind to the fallacy of the expectations derived from such a course; and all his life it had been his distinction to look above the transient and trafficking expedients of the professional politician. However, the thing was done. After various remodellings, and amid much perturbation, secession, violent reproach, the Household Suffrage Bill passed in August 1867. Another memorable piece of work, the confederation of Canada, had already been accomplished. A few days after parliament met

in the next year Lord Derby's failing health compelled 1868. r ' h' m t0 resign an d Mr Disraeli became prime minister.

Irish disaffection had long been astir; the Fenian menace looked formidable not only in Ireland but in England also. The reconstructed government announced its intention of dealing with Irish grievances. Mr Gladstone approved, proposing the abolition of the Irish Church to begin with. A resolution to that effect was immediately carried against the strong opposition of the government. Disraeli insisted that the question should be settled in the new parliament which the franchise act called for, and he seems to have had little doubt that the country would declare against Mr Gladstone's proposal. He was mistaken. It was the great question at the polls; and the first elections by the new constituencies went violently against the authors of their being.

The history of the next five years is Mr Gladstone's. The Irish Church abolished, he set to work with passionate good intention on the Irish land laws. The while he did so sedition took courage and flourished exceedingly, so that to pacify Ireland the constable went hand in hand with the legislator. The abolition of the Irish Church was followed by a coercion act, and the land act by suspension of Habeas Corpus. Disraeli, who at first preferred retirement and the writing of Lothair, came forward from time to time to point the moral and predict the end of Mr Gladstone's impulsive courses, which soon began to fret the confidence of his friends. Some unpleasant errors of conduct- — the case of Sir R. Collier (afterwards Lord Monkswell, q.v.), the Ewelme rectory case, 1 the significant Odo Russell (Lord Ampthill) episode (to help the government out of a scrape the ambassador was accused of exceeding his instructions) — told yet more. Above all, many humiliating proofs that England was losing her place among the nations came out in these days, the discovery being then new and unendurable . To be brief, in less than four years

the government had well-nigh worn out its own patience with its own errors, failures and distractions, and would gladly have gone to pieces when it was defeated on an Irish university bill. But Disraeli, having good constitutional reasons for declining office at the moment, could not allow this. Still gathering unpopularity, still offending, alarming, alienating, the government went on till 1874, suddenly dissolved parliament, and was signally beaten, the Liberal party breaking up. Like most of his political friends, Disraeli had no expectation of such a victory — little hope, indeed, of any distinct success. Yet when he went to Manchester on a brief political outing two years before, he was received with such acclaim as he had never known in his life. He was then sixty- eight years old, and this was his first full banquet of popularity. The elation and confidence drawn from the Manchester meetings 1 The crown had in 1871 appointed the Rev. W. W. Harvey (1810- 1883), a Cambridge man, to the living of Ewelme, near Oxford, for which members of the Oxford house of convocation were alone eligible. Gladstone was charged with evading this limitation in allowing Harvey to qualify for the appointment by being formally admitted M.A. by incorporation.

were confirmed by every circumstance of the i874elections. But he was well aware of how much he owed to his opponents' errors, seeing at the same time how safely he could lay his future course by them. He had always rejected the political economy of his time, and it was breaking down. He had always refused to accept the economist's dictum without reference to other considerations than the turnover of trade; and even Manchester could pardon the refusal now. The national spirit, vaporized into a cosmo- politan mist, was fast condensing again under mortification and insult from abroad uncompensated by any appreciable percentage of cash profit. This was a changing England, and one that Disraeli could govern on terms of mutual satisfaction; but not if the reviving " spirit of the country " ran to extremes of self- assertion. At one of the great Manchester meetings he said, " Do not suppose, because I counsel firmness and decision at the right moment, that I am of that school of statesmen who are favourable to a turbulent and aggressive diplomacy. I have resisted it during a large part of my life."

But for the hubbub occasioned by the Public Worship Regula- tion Act, the first two years of the 1874 administration had no remarkable excitements till near the end of them. The Public Worship Act, introduced by the archbishop of Canterbury, was meant to restrain ritualism. Disraeli, who from first to last held to the Reformed Church as capable of dispensing social good as no other organization might, supported the Bill as " putting down ritualism ";

spoke very vehemently; gave so much offence that at one time neither the bill nor the government seemed quite safe. For some time afterwards there was so little legislation of the kind called " enterprising " that even some friends of the government began to think it too tame; but at the end of the second year an announcement was made which put that fear to rest. The news that the khedive's Suez Canal shares had been bought by the government was received with boundless applause. It was a courageous sliares , thing to do; but it was not a Disraeli conception, nor did it originate in any government department. It was suggested from without at a moment when the possibility of ever acquiring the shares was passing away. On the morning of the 15th of November 1875, Mr Frederick Greenwood, then editor of the Pall Mall Gazette, went to Lord Derby at the foreign office, informed him that the khedive's shares were passing into the hands of a French syndicate, and urged arrest of the transaction by purchase for England. (The shares being private property their sale could not, of course, be forbidden.) Lord Derby thought there must be a mistake. He could not believe that bargaining of that kind could go on in Cairo without coming to the knowledge of the British consul there. He was answered that nevertheless it was going on. The difficulties of purchase by England were then arrayed by Lord Derby. They were more than one or two, and of course they had a formidable look, but so also had the alternative and the lost opportunity. One difficulty had already come into existence, and had to be met at once. Lord Derby had either to make direct inquiry of the khedive or to let the matter go. If he inquired, and there was no such negotiation, his question might be interpreted in a very troublesome way; moreover, we should put the idea of selling the shares into the khedive's head, which would be unfortunate. " There's my position, and now what do you say? " The answer given, Lord Derby drafted a telegram to the British consul-general at Cairo, and read it out. It instructed Colonel Stanton to go immediately to the khedive and put the question point blank. Meanwhile the prime minister would be seen, and Lord Derby's visitor might call next day to hear the reply from Cairo. It is enough to add here that on receipt of the answer the purchase for England was taken up and went to a speedy conclusion. 2

As if upon the impulse of this transaction, Disraeli opened the next session of parliament with a bill to confer upon the queen the title of empress of India — a measure which offended

- *For a detailed, if somewhat controversial, account of this affair, see Lucien Wolf's article in The Times of December 26, 1905, and Mr Greenwood's letters on the subject.*

the instincts of many Englishmen, and, for the time, revived the prejudices against its author. More important was the revival of disturbances in European Turkey, which, in their outcome, were to fill the last chapter of Disraeli's career. But for this interruption it is likely that he would have given much of his attention to Ireland, not because it was an attractive employment for his few remaining years, but because he saw with alarm the gathering troubles in that country. And his mind was strongly drawn in another direction. In a remarkable speech delivered in 1872, he spoke with great warmth of the slighting of the colonies, saying that " no minister in this country will do his duty who neglects any opportunity of reconstructing as much as possible our colonial empire, and of responding to those distant sympathies which may become the source of incalculable strength and happiness to this island." However, nothing was done in fulfilment of this duty in the first two years

from 1874, and early in the third the famous Andrassy onestfbD note » l ˆ e Berlin memorandum, the Bashi-Bazouk

atrocities, and the accumulative excitement thereby created in England, reopened the Eastern question with a vengeance. The policy which Disraeli's government now took up may be truly called the national policy. Springing from the natural suggestions of sel-f-defence against the march of a danger- ous rivalry, it had the sanction of all British statesmanship for generations, backed by the consenting instinct of the people. It was quite unsentimental, being pro-Turkish or anti-Russian only as it became so in being pro-British. The statesmen by whom it was established and continued saw in Russia a power which, unless firmly kept within bounds, would dominate Europe ; more particularly that it would undermine and supersede British authority in the East. And without nicely considering the desire of Russia to expand to the Mediterranean, the Pacific or in any other direction, they thought it one of their first duties to maintain their own Eastern empire; or, to put it another way, to contrive that Great Britain should be subject to Russian ascendancy (if ever), at the remotest period allowed by destiny. Such were the ideas on which England's Russian policy was founded. In 1876 this policy revived as a matter of course in the cabinet, and as spontaneously, though not upon a first provocation, became popular almost to fury. And furiously popular it remained. But a strong opposing current of feeling, equally passionate, set in against the

Turks; war began and lasted long ; and as the agitation at home and the conflict abroad went on, certain of Disraeli's colleagues, who were staunch enough at the beginning, gradually weakened. It is certainly true that Disraeli was prepared, in all senses of the word, to take strong measures against such an end to the war as the San Stefano treaty threatened. Rather than suffer that, he would have fought the Russians in alliance with the Turks, and had gone much farther in maturing a scheme of attack and defence than was known at the time or is commonly known now. That there was a master motive for this resolution may be taken for granted; and it is to be found in a belief that not to throw back the Russian advance then was to lose England's last chance of postponing to a far future the predominance of a great rival power in the East. How much or how little judgment shows in that calculation, when viewed in the light of later days, we do not discuss. What countenance it had from his colleagues dropped away. At the end their voices were strong enough to insist upon the diplomatic action which at no point falls back on the sword; Lord Derby (foreign minister) being among the first to make a stand on that resolution, though he was not the first seceder from the government. Such diplomacy in such conditions is paralytic. It cannot speak thrice, with whatever affectation of boldness, without discovering its true character to trained ears; which should be remembered when Disraeli's successes at Berlin are measured. It should be remembered that what with the known timidity of his colleagues, and what with the strength and violence of the Russian party in England, his achievement at Berlin was like the reclamation of butter from a dog's mouth; as Prince Bismarck understood in acknow- ledging Disraeli's gifts of statesmanship. It should also be

remembered, when his Eastern policy in 1876-1878 is denounced as malign and a failure, that it was never carried out. Good or bad, ill or well' calculated, effective existence was denied to it; and a man cannot be said to have failed in what he was never permitted to attempt. The nondescript course of action which began at the Constantinople conference and ended at Berlin .was not of his direction until its few last days. It only marked at various stages the thwarting and suppression of his policy by colleagues who were haunted night and day by memories of the Crimean War, and not least, probably, by the fate of the states- men who suffered for its blunders and their own. Disraeli also looked back to those blunders, and he was by no means insensible to the fate of fallen ministers. But just as he maintained at the time of the conflict, and after, that there would have been no Crimean War had not the British government convinced the tsar that it was in the hands of the peace party, so now

he believed that a bold policy would prevent or limit war, and at the worst put off grave consequences which otherwise would make a rapid advance.

As if aware of much of this, the country was well content with Disraeli's successes at Berlin, though sore on some points, he himself sharing the soreness. Yet there were great days for him after his return. At the Berlin conference he had established a formidable reputation; the popularity he enjoyed at home was affectionately enthusiastic; no minister had ever stood in more cordial relations with his sovereign; and his honours in every kind were his own achievement against unending disadvantage. But he was soon to suffer irretrievable defeat. A confused and unsatisfactory war in Afghanistan, troubles yet more unsatis- factory in South Africa, conspired with two or three years of commercial distress to invigorate " the swing of the pendulum " when he dissolved parliament in 1880. Dissolution the year before would have been wiser, but a certain pride forbade. The elections went heavily against him. He took the blow with composure, and sank easily into a comparative retirement. Yet he still watched affairs as a great party leader should, and from time to time figured vigorously in debate. Meanwhile he had another novel to sit down to — the poor though highly character- istic Endymion; which, to his great surprise and equal pleasure, was replaced on his table by a cheque for ten thousand pounds. Yet even this satisfaction had its tang of disappointment; for though Endymion was not wholly written in his last days, it was in no respect the success that Lothair was. This also he could bear. His description of his grandfather recurs to us: "A man of ardent character, sanguine, courageous and fortunate, with a temper which no disappointment could disturb."*

As earl of Beaconsfield (failing health had compelled him to take refuge in the House of Lords in 1876) Benjamin Disraeli died in his house in Curzon Street on the 19th of April 1881. The likelihood of his death was publicly known for some days before the event, and then the greatness of his popularity and its warmth were declared for the first time. No such demonstration of grief was expected even by those who grieved the most. He lies in Hughenden churchyard, in a rail-enclosed grave, with liberty for the turf to grow between him and the sky. Within the church is a marble tablet, placed there by his queen, with a generous inscription to his memory. The anniversary of his death has since been honoured in an unprecedented manner, the 19th of April being celebrated as " Primrose Day " — the primrose, for reasons impossible accurately to define, being popularly supposed to have been Disraeli's favourite flower. Even among his friends in

youth (Sir Edward Ly tton B ulwer, for example) , and not improbably among the city men who wagered their i n fl ueace . money in irrecoverable loans to him on the chance of his success, there may have been some who compassed the thought of Benjamin Disraeli as prime minister and peer; but at no time could any fancy have imagined him remembered so enduringly as Lord Beaconsfield has been. It is possible that Sarah Disraeli (the Myra of Endymion) , or that " the most severe of critics but a perfect wife," may have had such dreams — hardly that they could have occurred to any mind but a devoted woman's. Disraeli's life was a succession of surprises, but none

was so great as that he should be remembered after death more widely, lastingly, respectfully, affectionately, than any other statesman in the long reign of Queen Victoria. While he lived he did not seem at all cut out for that distinction even as an Im- perialist. Significant as was the common grief when he died, no such consequence could be inferred from it, and certainly not from the elections of 1880. It stands, however, this high distinc- tion, and with it the thought that it would have been denied to him altogether had the " adventurer " and " mystery man " of the 'sixties died at the age of threescore years and ten. We have said that never till 1872 did he look upon the full cup of popu- larity. It might have been said that even at that time intrigue to get rid of him had yet to cease in his own party; and but a few ' years before, a man growing old, he was still in the lowest deeps of his disappointments and humiliations. How, then, could it be imagined that with six years of power from his seventieth year, the Jew " adventurer," mysterious and theatrical to the last, should fill a greater space in the mind of England twenty years after death than Peel or Palmerston after five? Of course it can be explained; and when explained, we see that Disraeli's good fortune in this respect is not due entirely to his own merits. His last years of power might have been followed by as long a period of more acceptable government than his own, to the effacement of his own from memory; but that did not happen. What did follow was a time of universal turbulence and suspicion, in which the pride of the nation was wounded again and again. To say " Majuba " and " Gordon " recalls its deepest hurts, but not all of them; and it may be that a pained and angry people, looking back, saw in the man whom they lately displaced more than they had ever seen before. From that time, at any rate, Disraeli has been acknowledged as the regenerator

and representative of the Imperial idea in England. He has also been accused on the same grounds ; and if the giver of good wine may be blamed for the guest who gets drunk on it, there is justice in the accusation. It is but a statement of fact, however, that Disraeli retains his hold upon the popular mind on this account mainly. The rekindling of the" Imperial idea is understood as a timely act of revolt and redemption: of revolt against continuous humiliations deeply felt, redemption from the fate of nations obviously weak and suspected of timidity. It has been called rescue-work — deliver- ance from the dangers of invited aggression and a philosophical neglect of the means of defence. And its first achievement for the country (this is again a mere statement of fact) was the restoration of a much-damaged self-respect and the creation of a great defensive fleet not a day too soon for safety. So much for " the great heart of the people." Meanwhile political students find to their satisfaction that he never courted popularity, and never practised the art of working for " quick returns " of sympathy or applause. As " adventurer," he should have done so; yet he neglected the cultivation of that paying art for the wisdom that looks to the long future, and bears its fruit, per-chance, when no one cares to remember who sowed the seed. So it is that to read some of his books and many of his speeches is to draw more respect and admiration from their pages than could have been found there originally. The student of his life under- stands that Disraeli's claim to remembrance rests not only on the breadth of his views, his deep insight, his long foresight, but even more on the courage which allowed him to declare opinions supplied from those qualities when there was no visible likelihood of their justification by experience, and therefore when their natural fate was to be slighted. His judgments had to wait the event before they were absolved from ridicule or delivered from neglect. The event arrives; he is in his grave; but his reputa- tion loses nothing by that. It gains by regret that death was beforehand with him.

"Adventurer," as applied to Disraeli, was a mere term of abuse. " Mystery-man " had much of the same intention, but in a blameless though not in a happy sense it was true of him to the end of his days. Even to his friends, and to many near him, he remained mysterious to the last. It is impossible to doubt that some two or three, four or five perchance, were at home in his mind, being freely admitted there; but of partial admissions

to its inner places there seem to have been few or none. Men who were long associated with him in affairs, and had much of his stinted companionship, have confessed that with every wish to understand his character they never succeeded. Sometimes they fancied they had

got within the topping walls of the maze, and might hope to gain the point whence survey could be made of the whole; but as often they found themselves, in a moment, where they stood at last and at first — outside. His speeches carry us but a little way beyond the mental range; his novels rather baffle than instruct. It is commonly believed that Disraeli looked in the glass while describing Sidonia in Coningshy. We group the following sentences from this description for a purpose that will be presently seen: — (1) " He was admired by women, idolized by artists, received in all circles with great distinction, and appreciated for his intellect by the very few to whom he at all opened himself." (2) " For, though affable and generous, it was impossible to penetrate him: though unreserved in his manners his frankness was limited to the surface. He observed everything, thought ever, but avoided serious discussion. If you pressed him for an opinion he took refuge in raillery, and threw out some paradox with which it was not easy to cope. The secret history of the world was Sidonia's pastime. His great pleasure was to contrast the hidden motive with the public pretext of transactions." (3) " He might have discovered a spring of happiness in suscepti- bilities of the heart; but this was a sealed fountain for Sidonia. In his organization there was a peculiar, perhaps a great defici- ency; he was a man without affection. It would be hard to say that he had no heart, for he was susceptible of deep emotions; but not for individuals. Woman was to him a toy, man a machine." These sentences are separately grouped here for the sake of suggesting that they will more truly illustrate Disraeli's character if taken as follows : — The first as representing his most cherished social ambitions — in whatever degree achieved. The second group as faithfully and closely descriptive of himself; descriptive too of a character purposely cloaked. The third as much less simple; in part a mixture of truth with Byronic affectation, and for the rest (and more significantly), as intimat- ing the resolute exercise of extraordinary powers of control over the promptings and passions by which so many capable ambitions have come to grief. So read, Sidonia and Benjamin Disraeli are brought into close resemblance by Disraeli himself; for what in this description is untrue to the suspected fundamentals of his character is true to his known foibles. But for a general inter- pretation of Lord Beaconsfield and his career none serves so well as that which Froude insists on most. He was thoroughly and unchangeably a Jew. At but one" remove by birth from southern Europe and the East, he was an Englishman in nothing but his devotion to England and his solicitude for her honour and prosperity. It was not wholly by volition and design that his mind was strange to others and worked in absolute detach- ment. He had " none of the hereditary prepossessions of the native

Englishman." No such prepossessions disturbed his vision when it was bent upon the rising problems of the time, or rested on the machinery of government and the kind of men who worked it and their ways of working. The advantages of Sidonia's intellect and temperament were largely his, in affairs, but not without their drawbacks. His pride in his knowledge of the English character was the pride of a student ; and we may doubt if it ever occurred to him that there would have been less pride but more knowledge had he been an Englishman. It is certain that in shrouding his own character he checked the communication of others to himself, and so could continue to the end of his career the costly mistake of being theatrical in England. There was a great deal too (though little to his blame) in Lord Malmesbury's observation that he was not only disliked in the House of Commons for his mysterious manner, but prejudiced „ by a pronounced foreign air and aspect. Lord Malmesbury does not put it quite as strongly as that, but he might have done so with truth. No Englishman could approach Disraeli without some immediate consciousness that he was in the presence of a foreigner.

Lord Beaconsfield has been praised for his integrity in money matters; the praise could have been spared — it does not rise high enough. It is also said to his honour that he " never struck at a little man," and that was well; but it is explained as readily by pride and calculation as by magnanimity. A man of extraordinary coolness and self-control, his faults in every kind were faults of excess: it is the mark of them all. But whatever offence they gave, whatever mischief they did, was soon exhausted, and has long since been pardoned.

Authorities. — The writer's personal knowledge is largely represented in the above article. Among the biographical literature available prior to the authoritative Life the following may be cited: — Lord Beaconsfield's Preface to 1849 edition of Isaac D'Israeli's works; Correspondence with his Sister, and Home Letters, edited by Ralph Disraeli; Samuel Smiles, Memoirs and Correspond- ence of John Murray; Life of the Earl of Beaconsfield, by F. Hitch- man; Memoir by T. E. Kebbel; Memoir by J. A. Froude; Memoir by Harold Gorst; Sir William Fraser's Disraeli and his Day; The Speeches of Lord Beaconsfield, edited by T. E. Kebbel. In 1904, however, the large collection of material for Lord Beaconsfield's life, in the hands

of his executors Lord Rowton and Lord Rothschild, was acquired by The Times, and the task of preparing the biography was assigned to Mr W. F. Monypenny, an assistant editor of The Times (1894-1899), who was best known to the public as editor of the Johannesburg Star during the crisis of 1899-1903. (F. G.)

BEACONSFIELD, a town of Devon county, Tasmania, on the river Tamar, 28 m. direct N.W. of Launceston. Pop. (1901) 2658. From its port at Beauty Point, 3J m. distant, with which it is connected by a steam tramway, communication is main- tained with Georgetown and Launceston. It is the centre of the most important gold-field in the island.

BEACONSFIELD, a town of South Africa in Giiqualand West, about 3 m. S.W. of Kimberley, of which it is practically a suburb, though possessing a separate municipality. Pop. (1904) 9378, of whom 2780 were whites. Beaconsfield was founded in 1870 near the famous Dutoitspan diamond mine. The land on which the town is built belongs to the De Beers Company. (See Kimberley.)

BEACONSFIELD, a town in the Wycombe parliamentary division of Buckinghamshire, England, 23 m. W. by N. of London, on the main road to Oxford, and on the Great Central & Great Western joint railway. Pop. of urban district (1901) 1570. It lies in a hilly well-wooded district above the valley of the small river Wye, a tributary of the Thames. The broad Oxford road forms its picturesque main street. It was formerly a posting station of importance, and had a considerable manufacture of ribbons. The Perpendicular church of St Mary and All Saints is the burial place of Edmund Burke (d. 1797), who lived at Gregories, or as he named it Butler's Court, near the town. He would have taken his title from Beaconsfield had he survived to enter the peerage. A monument to his memory was erected in 1898. Edmund Waller the poet owned the property of Hall Barn, and died here in 1687. His tomb is in the churchyard. Benjamin Disraeli chose the title of earl of Beaconsfield in 1876, his wife having in 1868 received the title of Viscountess Beaconsfield. The opening of railway communication with London in 1906 resulted in a considerable accretion of residential population.

BEAD, a small globule or ball used in necklaces, and made of different materials, as metal, coral, diamond, amber, ivory, stone, pottery, glass, rock-crystal and seeds. The word is derived from the Middle Eng. bede, from the common Teutonic word for " to pray," cf. German beten and English bedesman, the meaning being transferred from " prayer " to the spherical bodies strung on a rosary and used

in counting prayers. Beads have been made from remote antiquity, and are found in early Egyptian tombs; variegated glass beads, found in the ground in certain parts of Africa, as Ashantiland, and highly prized by the natives as aggry- beads, are supposed to be of Egyptian or Phoenician origin. Beads of the more expensive materials are strung in necklaces and worn as articles of personal adornment, while the cheaper kinds are employed for the decoration of women's dress. Glass beads have long been used for purposes of barter with savage tribes, and are made in enormous numbers and varieties, especially in Venice, where the manufacture has existed from at least the 14th century. Glass, either transparent, or of opaque

coloured enamel (smalli), or having complex patterns produced by the twisting of threads of coloured glass through a transparent body, is drawn out into long tubes, from which the beads are pinched off, and finished by being rotated with sand and ashes in heated cylinders.

In architecture, the term " bead " is given to a small cylindrical moulding, in classic work often cut into bead and reel.

BEADLE, also Bedel or Bedell (from A.S. bydel, from beodan, to bid), originally a subordinate officer of a court or deliberative assembly, who summoned persons to appear and answer charges against them (see Du Cange, supra tit. Bedelli). As such, the beadle goes back to early Teutonic times; he was probably attached to the moot as its messenger or summoner, being under the direction of the reeve or constable of the leet. After the Norman Conquest, the beadle seems to have diminished in importance, becoming merely the crier in the manor and forest courts, and sometimes executing processes. He was also em- ployed as the messenger of the parish, and thus became, to a cer- tain extent, an ecclesiastical officer, but in reality acted more as a constable by keeping order in the church and churchyard during service. He also attended upon the clergy, the churchwardens and the vestry. He was appointed by the parishioners in vestry, and his wages were payable out of the church rate. From the Poor Law Act of 1601 till the act of 1834 by which poor-law administration was transferred to guardians, the beadle in England was an officer of much importance in his capacity of agent for the overseers. In all medieval universities the bedel was an officer who exercised various executive and spectacular functions (H. Rashdall, Hist, of Universities in the Middle Ages, i. 193). He still survives in many universities on the con- tinent of Europe and in those of Oxford and Cambridge, but he is now shorn of much of his importance. At Oxford there are four bedels, representing the

faculties of law, medicine, arts and divinity. Their duties are chiefly processional, the junior or sub-bedel being the official attendant on the vice-chancellor, before whom he bears a silver mace. At Cambridge there are two, termed esquire-bedels, who both walk before the vice- chancellor, bearing maces.

BEAK (early forms beke and becke, from Fr. bee, late Lat. beccus, supposed to be a Gaulish word; the Celtic bee and beg, however, are taken from the English), the horny bill of a bird, and so used of the horny ends of the mandibles of the octopus, the duck-billed platypus and other animals; hence the rostrum (q.v.) or orna- mented prow of ancient war vessels. The term is also applied, in classic architecture, to the pendent fillet on the edge of the corona of a cornice, which serves as a drip, and prevents the rain from flowing inwards.

The slang use of " beak "for a magistrate or justice of the peace has not been satisfactorily explained. The earlier meaning, which lasted down to the beginning of the 19th century, was " watchman " or " constable." According to Slang ami its Analogues (J. S. Farmer and W. E. Henley, 1890), the first example of its later use is in the name of " the Blind Beak," which was given to Henry Fielding's half-brother, Sir John Fielding (about 1750). Thomas Harman, in his book on vagrants, Caveat or Warening for commen cursitors, Vulgar ely called Vaga- bones, 1573, explains harmans beck as " couns table," harman being the word for the stocks. Attempts have been made to connect " beak " in this connexion with the Old English beag, a gold torque or collar, worn as a symbol of authority, but this could only be plausible on the assumption that " magistrate " was the earlier significance of the word.

BEAKER (Scottish bicker, Lat. bicarium, Ger. Becker, a drinking-bowl) , a large wide-mouthed drinking-cup or laboratory vessel. See Drinking- Vessels.

BEALE, DOROTHEA (1831-1906), English schoolmistress, was born on the 21st of March 1831 in London, her father being a physician of good family and cultivated tastes. She had already shown a strong intellectual bent and considerable force of character when in 1848 she was one of the first to attend lectures at the newly opened Queen's College for Ladies, London, and from 1849 to 1856 she herself took classes there. In 1857

for a few months she became head teacher of the Clergy Daughters' school at Casterton, Westmoreland, but narrow religious prejudices on the part of the governors led to her retirement. In 1858 she was appointed principal of the Ladies College at Cheltenham (opened 1854), then in very low water. Her tact and strenuousness, backed by able financial manage- ment, led to its success being thoroughly established by 1864, and as the college increased in numbers new buildings were erected from 1873 onwards. Under Miss Beale's headship it grew into one of the great girls' schools of the country, and its development and example played an important part in the revolution effected in regard to the higher education of women. Miss Beale retained her post till her death on the 9th of November 1906. Strongly religious by nature, broad-minded and keenly interested in all branches of culture, she exercised a far-reaching influence on her pupils.

Her Life was written by Elizabeth Raikes (1908).

BEAM (from the O. Eng. beam, cf. Ger. Baum, a tree, to which sense may be referred the use of " beam " as meaning the rood or crucifix, and the survival in certain names of trees, as horn- beam), a solid piece of timber, as a beam of a house, of a plough, a loom, or a balance. In the last case, from meaning simply the cross-bar of the balance, " beam " has come to be used of the whole, as in the expression " the king's beam," or " common beam," which refers to the old English standard balance for wholesale goods, for several hundred years in the custody of the Grocers' Company, London. As a nautical term, " beam " was transferred from the main cross- timbers to the side of the ship; thus " on the weather-beam " means " to windward," and a ship is said to be " wide in the beam " when she is wide horizon- tally. The phrase " to be on one's beam-ends," denoting a position of extreme peril or helplessness, is borrowed from the position of a ship which has heeled over so far as to stand on the ends of her horizontal beams. The meaning of " beam" for shafts or rays of light comes apparently from the use of the word to translate the Latin columna lucis, a pillar of light.

BEAN (a common Teutonic word, cf. Ger. Bohne), the seed of certain leguminous plants cultivated for food all over the world, and furnished chiefly by the genera Vicia, Phaseolus, Dolichos and others. The common bean, in all its varieties, as cultivated in Britain and on the continents of Europe and America, is the produce of Vicia Faba. The French bean, kidney bean, or haricot, is the seed of Phaseolus vulgaris; but in India several other species of this genus of plants are raised, and form no small portion of the diet of the

inhabitants. Besides these there are numerous other pulses cultivated for the food both of man and domestic animals, to which the name bean is frequently given. The common bean is even more nutritious than wheat; and it contains a very high proportion of nitrogenous matter under the form of legumin, which amounts on an average to 24%. It is, however, a rather coarse food, and difficult of digestion, and is chiefly used to feed horses, for which it is admirably adapted. In England French beans are chiefly, almost exclusively, used in the green state; the whole pod being eaten as a table vegetable or prepared as a pickle. It is wholesome and nutritious; and in Holland and Germany the pods are preserved in salt by almost every family for winter and spring use. The green pods are cut across obliquely, most generally by a machine invented for the purpose, and salted in barrels. When wanted for use they are steeped in fresh water to remove the salt, and broiled or stewed they form an agreeable addition to the diet at a time when no other vegetable may be had.

The broad bean — Vicia Faba, or Faba vulgaris, as it is known by those botanists who regard the slight differences which distinguish it from the great majority of the species of the vetch genus (Vicia) as of generic importance — is an annual which has been cultivated from prehistoric times for its nutritious seeds.

The lake-dwellers of Switzerland, and northern Italy in the bronze age cultivated a small-fruited variety, and it was grown in ancient Egypt, though, according to Herodotus, regarded by the priests as unclean. The ancient Greeks called it Kva/ux, the Latins faba, but there is no suggestion that the plant is a

native of Europe. Alphonse de Candolle (Origin of Cultivated Plants, p. 320) concludes that the bean was introduced into Europe probably by the western Aryans at the time of their earliest migrations. He suggests that its wild habitat was two- fold some thousands of years ago, one of the centres being to the south of the Caspian, the other in the north of Africa, and that its area has long been in process of diminution and extinction. The nature of the plant favours this hypothesis, for its seed has no means of dispersing itself, and rodents or other animals can easily make prey of it; the struggle for existence which was going against this plant as against maize would have gradually isolated it and caused it to disappear, if man had not saved it by cultivation. It was introduced into China a little before the Christian era, later into Japan and more recently into India, though it has been suggested that in parts of the higher Hima- layas its cultivation has survived from very ancient times. It is a plant which will flourish in all ordinary good garden soil. The seeds are

sown about 4 in. apart, in drills 2\ ft. asunder for the smaller and 3 ft. for the larger sorts. The soil should, preferably, be a rather heavy loam, deeply worked and well enriched. For an early crop, seeds may be sown in November, and protected during winter in the same manner as early peas. An early crop may also be obtained by dibbling in the seeds in November, sheltering by a frame, and in February transplanting them to a warm border. Successional crops are obtained by sowing suitable varieties from January to the end of June. All the culture necessary is that the earth be drawn up about the stems. The plants are usually topped when the pods have set, as this not only removes the black aphides which often settle there, but is also found to promote the filling of the pods.

The following are some of the best sorts: — for early use, Early Mazagan, Long-pod, Marshall's Early Prolific and Seville Long-pod; for late use, Carter's Mammoth Long-pod and Broad Windsor.

The horse-bean is a variety— var. equina.

Cultivation of Field-bean. — Several varieties of Vicia Faba (e.g. the horse bean, the mazagan, the tick bean, the winter bean) are cultivated in the field for the sake both of the grain, which is used as food for live-stock, and of the haulm, which serves for either fodder or litter. They are best adapted for heavy soils such as clays or clayey loams. The time for sowing is from the end of January to the beginning of March, or in the case of winter beans from the end of September to the middle of November. The bean-crop is usually interposed between two crops of wheat or some other cereal. If spring beans are to be sown, the land after harvest is dressed with farmyard manure, which is then ploughed in. In January the soil is levelled with the harrows, and the seed, which should be hard and light brown in colour, is drilled in rows from 15 to 24 in. apart at the rate of from 2 to 25 bushels to the acre and then harrowed in. The alternative is to " dibble " the seed in the furrow left by the autumn ploughing and cover it in with the harrows; or the land may be ridged with the double-breasted plough, manure deposited in the furrows and the seed sown broadcast, the ridges being then split back so as to cover both manure and seed. After the plant shows, horse-hoeing and hand-hoeing between the rows is carried on so long as the plant is small enough to suffer no injury therefrom. The routine of cultivation for winter beans hardly differs from that described except as regards the time of sowing.

Beans are cut when the leaf is fallen and the haulm is almost black either with the fagging hook or the reaping machine, though the

stoutness of the stalks causes a severe strain on the latter implement. They are tied and stooked, and are so left for a considerable time before stacking. There is less fear of injury to the crop through damp than in the case of other cereals. Their value for feeding purposes increases in the stack, where they may remain for a year or more before threshing. Pea and bean weevils, both striped (Sitones lineatus) and spotted (Sitones crinitus), and the bean aphis (Aphis rumicis), are noted pests of the crop. Winter beans come to maturity earlier than the spring-sown varieties, and are therefore strong enough to resist

the attacks of the aphis by the end of June, when it begins its ravages. Field-beans yield from 25 to 35 bushels to the acre.

Phaseolus vulgaris, the kidney, French or haricot bean, an annual; dwarf and bushy in grow th,is widely cultivated in temper- ate, sub-tropical and tropical regions, but is nowhere known as a wild plant. It was long supposed to be of Indian origin, an idea which was disproved by Alphonse de Candolle, who sums up the facts bearing on its origin as follows: — Phaseolus vulgaris has not been long cultivated in India, the south-west of Asia and Egypt, and it is not certain that it was known in Europe before the dis- covery of America. At the latter epoch the number of varieties in European gardens suddenly increased, and all authors began to mention them. The majority of the species of the genus exist in South America, and seeds apparently belonging to the species in question have been found in Peruvian tombs of an uncertain date, intermixed with many species, all American. Hence it is probable that the plant is of South American origin.,

It is a tender annual, and should be grown in a rich light loamy soil and a warm sheltered situation. The soil should be well enriched with hot-bed dung. The earliest crop may be sown by the end of March or beginning of April. If, however, the tem- perature of the soil is below 45°, the beans make but little pro- gress. The main crops should be got in early in May; and a later sowing may be made early in July. The earlier plantings may be sown in small pots, and put in frames or houses, until they can be safely planted out-of-doors. A light covering of straw or some other simple shelter suffices to protect from late frosts. The seeds should be covered i§ or 2 in. deep, the distance between the rows being about 2 ft., or for the dwarfest sorts 18 in.,

and that between plants from 4 to 6 in. The pods may be used as a green vegetable, in which case they should be gathered whilst they are so crisp as to be readily snapped in two when bent; but when the dry seeds are to be used the pods should be allowed to ripen. As the green pods are gathered others will continue to be formed in abundance, but if old seed-forming pods are allowed to remain the formation of young ones will be greatly checked. There are numerous varieties; among the best are Canadian Wonder, Canterbury and Black Negro.

Phaseolus multiflorus, scarlet runner-, is nearly allied to P. vulgaris, of which it is sometimes regarded as a variety, but differs in its climbing habit. It is naturally perennial and has a thick fleshy root, but is grown in Great Britain as a tender annual. Its bright, generally scarlet flowers, arranged in long racemes, and the fact that it will flourish in any ordinary good garden soil, combine to make it a favourite garden plant. It is also of interest as being one of the few plants that twine in a direction contrary to the apparent motion of the sun. The seeds of the runner beans should be sown in an open plot, — the first sowing in May, another at the beginning of June, and a third about the middle of June. In the London market-gardens they are sown 8 to 12 in. apart, in 4 ft. rows if the soil is good. The twining tops are pinched or cut off when the plants are from 2 to 2§ ft. high, to save the expense of staking. It is better, however, in private gardens to have the rows standing separately, and to support the plants by stakes 6 or 7 ft. high and about a foot apart, the tops of the stakes being crossed about one-third down. If the weather is dry when the pods are forming abundantly, plenty of tepid water should be supplied to the plants. In training the shoots to their supports, they should be twined from right to left, contrary to the course of the sun, or they will not lay hold. By frequently picking the pods the plants are encouraged to form fresh blooms from which pods may be picked until the approach of frost.

The ordinary scarlet runner is most commonly grown, but there is a white-flowered variety which has also white seeds; this is very prolific and of excellent quality. Another variety called Painted Lady, with the flowers red and white, is very ornamental, but not so productive. Carter's Champion is a large-podded productive variety.

Another species P. lunalus, the Lima bean, a tall biennial with a scimitar-shaped pod (whence the specific name) 2 to 3 in. long containing a few large seeds, is widely cultivated in the warmer-parts of the world.

The young pods of another leguminous climbing herb, Dolichos Lablab, as well as the seeds, are widely used in the tropics, as we use the kidney bean. The plant is probably a native of tropical Africa, but is now generally cultivated in the tropics. The word Dolichos is of Greek origin, and was used by Theophrastus for the scarlet runner.

Another species, D. biflorus, is the horse gram, the seed of which is eaten by the poorer class of natives in India, and is also, as are the pods, a food for horses and cattle.

The Soy bean, Glycine hispida, was included by Linnaeus in the genus Dolichos. It is extensively cultivated in China and Japan, chiefly for the pleasant-flavoured seed from which is prepared a piquant sauce. It is also widely grown in India, where the bean is eaten, while the plant forms a valuable fodder; it is cultivated for the latter purpose in the United States.

Other references to beans will be found under special headings, such as Calabar Bean, Locust-Tree. There are also several non-leguminous seeds to which the popular name bean is attached. Among these may be mentioned the sacred Egyptian or Pytha- gorean bean (Nelumbium speciosum) , and the Ignatius bean (probably Strychnos multiflora) , a source of strychnine.

The ancient Greeks and Romans madeuseof beans in gathering the votes of the people, and for the election of magistrates. A white bean signified absolution, and a black one condemnation. Beans had a mysterious use in the lemuralia and parentalia, where the master of the family, after washing his hands three times, threw black beans over his head nine times, reiterating the words " I redeem myself and my family by these beans."

BEAN-FEAST, primarily an annual dinner given by an em- ployer to his workpeople, and then colloquially any jollification. The phrase is variously derived. The most probable theory is that which connects it with the custom in France, and afterwards in Germany and England, of a feast on Twelfth Night, at which a cake with a bean buried in it was a great feature. The bean- king was he who had the good fortune to have the slice of cake in which was the bean. This choosing of a king or queen by a bean was formerly a common Christmas diversion at the English and Scottish courts, and in both English universities. This monarch was master of the revels like his congener the lord of misrule. A clue to his original functions is possibly found in the old popular belief that the weather for the ensuing twelve months was determined by the weather of the twelve days from Christmas to

Twelfth Night, the weather of each particular month being prognosticated from each day. Thus the king of the bean of Twelfth Night may have originally reigned for the twelve days, his chief duty being the performance of magical ceremonies for ensuring good weather during the ensuing twelve months. Probably in him and the lord of misrule it is correct to find the lineal descend- ant of the old king of the Saturnalia, the real man who personated Saturn and, when the revels ceased, suffered a real death in his assumed character. Another but most improbable derivation for bean-feast connects it with M.E. bene " prayer," "request," the allusion being to the soliciting of alms towards the cost of theii Twelfth Night dinner by the workpeople.

See Wayzgoose; Misrule, Lord of; also J. Boemus, Mores, leges et ritus omnivm gentium (Lyons, 1541), p. 222; Laisnel de la Salle, Croyances et legendes du centre de la France, i. 19-29; Lecoeur, Esquisses du Bocage normand, ii. 125; Schmitz, Sitten und Sagen des Eifler Volh.es, i. 6; Brand, Popular Antiquities of Great Britain (Hazlitt's edit.. 1905), under "Twelfth Night"; Cortet, Fetes religieuses, p. 29 sqq.

BEAR, properly the name of the European brown bear (Ursui arctus) , but extended to include all the members of the Ursidae, the typical family of Arctoid carnivora, distinguished by theif massive bodies, short limbs, and almost rudimentary tails, With the single exception of the Indian sloth-bear, all the specie? have forty-two teeth, of which the incisors and canines closely resemble those of purely carnivorous mammals; while the molars, and especially the one known as the " sectorial " or " carnassial," have their surfaces tuberculated so as to adapt them for grinding vegetable substances. As might have been supposed from their dentition, the bears are omnivorous; but most prefer vegetable food, including honey, when a sufficient

supply of this can be had. The grizzly bear, however, is chiefly carnivorous; while the polar bear is almost wholly so.

Bears are five-toed, and provided with formidable claws, which are not retractile, and thus better fitted for digging and climbing than for tearing. Most climb trees in a slow, lumbering fashion, and, in descending, always come hind-quarters first. The grizzly bear is said

to lose this power of climbing in the adult stage. In northern countries bears retire during the winter into caves and the hollows of trees, or allow the falling snow to cover them, and there remain dormant till the advent of spring, about which time the female usually produces her young. These are born naked and blind, and it is commonly five weeks before they see, or become covered with hair. Before hibernating the adults grow very fat, and it is by the gradual consumption of this fat — known in commerce as bear's grease — that such vital action as is necessary to the continuance of life is sustained.

The bear family is widely distributed, being found in every quarter of the globe except Australia, and in all climates, from the highest northern latitudes yet reached by man to the warm regions of India and Malaya. In the north-west corner of Africa the single representative of the family found on that continent occurs.

The polar or white bear (Ursus maritimus), common to the Arctic regions of both hemispheres, is distinguished from the other species by having the soles of the feet covered with close-set hairs, — in adaptation to the wants of the creature, the bear being thereby enabled to walk securely on slippery ice. In the whiteness of its fur also, it shows such an assimilation in colour to that of surrounding nature as must be of considerable service in concealing it from its prey. The food of the white bear consists chiefly of seals and fish, in pursuit of which it shows great power of swimming and diving, and a considerable degree of sagacity; but its food also includes the carcases of whales, birds and their eggs, and grass and berries when these can be had. That it can sustain life on a purely vegetable diet is proved by instances on record of its being fed for years on bread only, in confinement. These bears are strong swimmers, Sir Edward Sabine having found one " swimming powerfully 40 m. from the nearest shore, and with no ice in sight to afford it rest." They are often carried on floating ice to great distances, and to more southern latitudes than their own, no fewer than twelve Polar bears having been known to reach Iceland in this way during one winter. The female always hibernates, but the male may be seen abroad at all seasons. In bulk the white bear exceeds most other members of the family, measuring nearly 9 ft. in length, and often weighing 1600 lb.

Land bears have the soles of the feet destitute of hair, and their fur more or less shaggy. On these the brown bear (Ursus arctus, — apKTOs of Aristotle) is found in one or other of its varieties all over the temperate and north temperate regions of the eastern hemisphere, from Spain to Japan. The fur is usually brownish, but there are

black, blackish-grey and yellowish varieties. It is a solitary animal, frequenting the wooded parts of the regions it inhabits, and living on a mixed diet of fruits, vegetable, honey, fish and the smaller animals. In winter it hibernates, concealing itself in some hollow or cavern. It does not seek to attack man; but when baited, or in defence of its young, shows great courage and strength, rising on its hind legs and endeavouring to grasp its antagonist in an embrace. Bear- baiting, till within comparatively recent times, was a favourite sport throughout Europe, but, along with cock-fighting and badger-baiting, has gradually disappeared before a more humane civilization. It was a favourite pastime among the Romans, who imported their bears from Britain, a proof that the animal was then comparatively abundant in that country; indeed, from reference made to it in early Scottish history, the bear does not appear to have been extirpated in Britain before the end of the nth century. It is now found in greatest abundance in Norway, Russia and Siberia, where hunting the bear is a favourite sport, and where, when dead, its remains are highly valued. Among the Kamchadales " the skin of the bear," says a traveller,

" forms their beds and their coverlets, bonnets for their heads, gloves for their hands and collars for their dogs. The flesh and fat are their dainties. Of the intestines they make masks or covers for their faces, to protect them from the glare of the sun in the spring, and use them as a substitute for glass, by extending them over their windows. Even the shoulder-blades are said to be put in requisition for cutting grass." In confinement the brown bear is readily tamed; and advantage has been taken of the facility with which it can sustain itself on the hind feet to teach it to dance to the sound of music. It measures 4 ft. in length, and is about 2§ ft. high. Of this species Crowther's bear from the Atlas Mountains, the Syrian bear (Ursus arctus pyriacus) and the snow or isabelline bear (Ursus arctus isabcllinus) of the Himalaya are local races, or at most subspecies. 1 American naturalists regard the big brown bears of Alaska as a distinct group. They range from Sitka to the extremity of the Alaskan Peninsula, over Kodiak Island, and inland. Their distinctive external features are their large size, light-brown colour, high shoulders, massive heads of great breadth and shaggy coat.

The grizzly bear (Ursus arctus horribilis, formerly known as U. ferox) is regarded by some naturalists as a distinct species and by others as a variety of the brown bear, to which it is closely allied. It was said to exceed all other American mammals in ferocity of disposition and muscular strength. Stories were told of its attacking the bison, and it has been reported to carry off the carcase of a

wapiti, weighing nearly 1000 ib, for a considerable distance to its den, there to devour it at leisure. It also eats fruit and vegetables. Its fur is usually of a yellowish-brown colour, coarse and grizzled, and of little value commercially, while its flesh, unlike that of other bears, is uneatable even by the Indians. The grizzly bear is now rare in the United States, save in the Yellowstone Park and the Clearwater Mountains of Idaho, though more common in British Columbia. Several geographical races are recognized. The Tibet bear (U. pruinosus) is a light- coloured small species.

The American black bear (Ursus americanus) occurs throughout the wooded parts of the North American continent, whence it is being gradually driven to make room for man. It is similar in size to the brown bear, but its fur is of a soft even texture, and of a shining black colour, to which it owes its commercial value. At the beginning of the 19th century black bears were killed in enormous numbers for their furs, which at that time were highly valued. In 1803 the skins imported into England numbered 25,000, but the imports have since decreased to one-half of that number. They are chiefly used for military accoutrements. This is a timid animal, feeding almost solely on fruits, and lying dormant during winter, at which period it is most frequently killed. It is an object of superstitious reverence to the Indians, who never kill it without apologizing and deploring the necessity which impels them to do so.

The Himalayan black bear (U. torquatus) is found in the forest regions ranging from the Persian frontier eastward to Assam. The average length is about 5 ft. ; there is no under-fur, and the coat is smooth, black in colour, with the exception of a white horseshoe-mark on the chest. It feeds chiefly on fruit and roots, but kills sheep, goats, deer, ponies and cattle, and sometimes devours carrion.

The small bruang or Malayan bear (Ursus malayanus) is of a jet-black colour, with a white semilunar mark on the chest, and attains a length of 4 J ft. Its food consists almost solely of vegetables and honey, but the latter is its favourite food, — the extreme length and pliability of the tongue enabling it to scoop out the honeycombs from the hollows of trees. It is found in the Malay Peninsula and Islands, and is readily tamed.

Not much larger than the Malay bear is the South American spectacled bear of the Andes (U. ornatus) , distinguished from all the rest by the presence of a perforation in the lower end of the humerus, and hence sometimes separated as Tremarctus. It is black, with tawny rings round the eyes, and white cheeks, throat and chest.

A second race or species exists.

The sloth-bear (Melursus labiatus or ur sinus) is distinguished 1 Lydekker, in Proc. Zool. Soc, 1897, p. 412.

by the absence of one pair of upper incisors, the small size of the cheek-teeth and the very extensile character of the lips. It is also known as the aswail and the honey-bear, the last name being also given to the Malay bear and the kinkajou. It is about the size of the brown bear, is covered with long, black hair, and of extremely uncouth aspect. It inhabits the mountainous regions of India, is readily tamed and is the bear usually exhibited by the Hindu jugglers. The food consists of fruits, honey and white ants.

Fossil remains of extinct bears first occur in strata of the Pliocene age. Those of the great cave bear (Ursus spelaeus), found abundantly in certain caverns of central "Europe and Asia, show that it must have exceeded in size the polar bear of the present day. Its remains are also found in similar situations in Britain associated with those of an allied species [Ursus priscus).

BEAR-BAITING and BULL T BAITING, sports formerly very popular in England but now suppressed on account of their cruelty. They took place in arenas built in the form of theatres which were the common resort even of cultivated people. In the bear-gardens, which are known to have existed since the time of Henry II., the bear was chained to a stake by one hind leg or by the neck and worried by dogs. Erasmus, writing (about 1500) from the house of Sir Thomas More, spoke of " many herds of bears maintained in the country for the purpose of baiting." Sunday was the favourite day for these sports. Hentzner, writing in 1598, describes the bear-garden at Bankside as " another place, built in the form of a theatre, which serves for the baiting of Bulls and Bears. They are fastened behind, and then worried by great English bull-dogs, but not without great risk to the dogs from the horns of the one and the teeth of the other, and it sometimes happens they are killed upon the spot; fresh ones are immediately supplied in the places of those that are wounded or tired." He also describes the whipping of a blinded bear, a favourite variation of bear-baiting. For a famous baiting which took place before Queen Elizabeth in 1575 thirteen bears were provided. Of it Robert Laneham (11.1575) wrote, " it was a sport very pleasant to

see, to see the bear, with his pink eyes, tearing after his enemies' approach; the nimbleness and wait of the dog to take his advantage and the force and experience of the bear again to avoid his assaults: if he were bitten in one place how he would pinch in another to get free; that if he were taken once, then by what shift with biting, with clawing, with roaring, with tossing and tumbling he would work and wind himself from them; and when he was loose to shake his ears twice or thrice with the blood and the slaver hanging about his physiognomy." The famous " Paris Garden " in Southwark was the chief bear-garden in London. A Spanish nobleman of the time, who was taken to see a pony baited that had an ape tied to its back, expressed himself to the effect that " to see the animal kicking, amongst the dogs, with the screaming of the ape, behold- ing the curs hanging from the ears and neck of the pony, is very laughable." Butler describes a bear-baiting at length in the first canto of his Hudibras.

The Puritans endeavoured to put an end to animal-baiting, although Mapaulay sarcastically suggested that this was " not because it gave pain to the bear, but because it gave pleasure to the spectators." The efforts of the Puritans seem, however, to have had little effect, for we find the sport flourishing at the Restoration; but the conscience of cultivated people seems to have been touched, for Evelyn wrote in his Diary, under the date of June 16th, 1670: " I went with some friends to the bear-garden, where was cock-fighting, dog-fighting, bear and bull baiting, it being a famous day for all these butcherly sports, or rather barbarous cruelties. The bulls did exceedingly well, but the Irish wolf-dog exceeded, which was a tall greyhound, a stately creature indeed, who beat a cruel mastiff. One of the bulls tossed a dog full into a lady's lap, as she sat in one of the boxes at a considerable height from the arena. Two poor dogs were killed, and so all ended with the ape on horseback, and I most heartily weary of the rude and dirty pastime, which I had not seen, I think, in twenty years before." Steele also attacked these cruel sports in the Taller. Nevertheless, when the tsar

Nicholas I. visited England as cesarevich, he was taken to see a prize-fight and a bull-baiting. In this latter form of the sport the bull's nose was usually blown full of. pepper to render him the more furious. The bull was often allowed a hole in the ground, into which to thrust his nose and lips, his most vulner- able parts. Sometimes the bull was tethered, and dogs, trained for the purpose, set upon him one by one, a successful attack resulting in the dog fastening his teeth firmly in the bull's snout. This was called "pinning the bull." A sport called bull-running wa's popular in several towns of England,

particularly at Tutbury and Stamford. Its establishment at Tutbury was due to John of Gaunt, to whose minstrels, on the occasion of their annual festival on August 16th the prior of Tutbury, for his tenure, delivered a bull, which had his horns sawn off, his ears and tail cut off, his nostrils filled with pepper and his whole body smeared with soap. The minstrels gave chase to the bull, which became the property of any minstrel of the coxmty of Stafford who succeeded in holding him long enough to cut off a lock of his hair. Otherwise he was returned to the prior. At the dissolution of the monasteries this tenure devolved upon the dukes of Devon- shire, who suppressed it in 1788. At Stamford the running took place annually on November 13 th, the bull being provided by the butchers of the town, the townspeople taking part in the chase, which was carried on until both people and beast were exhausted, and ended in the killing of the bull. Certain rules were strictly observed, such as the prohibition of carrying sticks or staves that were shod with iron. The Stamford bull- running survived well into the 19th century. Bear-baiting and bull-baiting were prohibited by act of parliament in 1835.

BEARD, WILLIAM HOLBROOK (1825-1900), American painter, was born on the 13th of April 1825 at Painesville, Ohio. He studied abroad, and in 1861 removed to New York City, where in 1862 he became a member of the National Academy of Design. He was a prolific worker and a man of much inven- tiveness and originality, though of modest artistic endowment. His humorous treatment of cats, dogs, horses and monkeys, generally with some human occupation and expression, usually satirical, gave him a great vogue at one time, and his pictures were largely reproduced. His brother, James Henry Beard (1814-1893), was also a painter.

BEARD (A.S. beard, O. H. and Mod. Ger. Bart, Dan. baard, Icel. bar, rim, edge, beak of a ship, &c, O. Slav, barda, Russ. barodd. Cf. Welsh barf, Lat. barba, though, according to the New English Dictionary, the connexion is for phonetic reasons doubtful). Modern usage applies this word to the hair grown upon a man's chin and cheek. When the chin is shaven, what remains upon the cheeks is called whiskers. " Moustache " or " moustaches " describes the hair upon the upper lip. But the words have in the past had less exact meaning. Beard has stood alone for all these things, and whisker has in its time signified what we now call moustache, as in the case of Robinson Crusoe's great pair of " Turkish whiskers."

The bearded races of mankind have ever held the beard in high honour. It is the sign of full manhood; the lad or the eunuch is

beardless, and the bearded woman is reckoned a witch, a loathsome thing to all ages. Also the beard shrinks from the profane hand; a tug at the beard is sudden pain and dishonour. The Roman senator sat like a carven thing until the wondering Goth touched his long beard; but then he struck, although he died for the blow. The future King John gave deadly offence to the native chieftains, when visiting Ireland in 1185, by pluck- ing at their flowing beards.

David's ambassadors had their beards despitefully shaven by a bold heathen. Their own king mercifully covered their shame — " Tarry ye at Jericho until your beards be grown " — but war answered the insult. The oath on the beard is as old as history, and we have an echo of it in the first English political ballad when Sir Simon de Montfort swears " by his chin " revenge on Wa-renne.

Adam, our first father, was by tradition created with a beard: Zeus Allfather is bearded, and the old painters and carvers who hardily pictured the first person of the Trinity gave Him the

long beard of his fatherhood. The race-fathers have it and the ancient heroes. Abraham and Agamemnon, Woden and King Arthur and Charlemagne, must all be bearded in our pictures. With the Mahommedan peoples the beard as worn by an un- shaven prophet has ever been in high renown, the more so that amongst most of the conquering tribes who first acknowledged the unity of God and prophethood of Mahomet it grows freely. But before Mahomet's day, kings of Persia had plaited their sacred beards with golden thread, and the lords of Nineveh had curiously curled and oiled beards such as their winged bull wears. Bohadin tells us that Saladin's little son wept for terror when he saw the crusaders' envoys " with their clean-shaven chins." Selim I. (1512-1521) comes down as a Turkish sultan who broke into holy custom and cut off his beard, telling a remonstrating Mufti that his vizier should now have nothing to lead him by. But such tampering with tradition has its dangers, and the absolute rule of Peter the Great is made clear when we know that he taxed Russian beards and shaved his own, and yet died in his bed. Alexander the Great did as much and more with his well-drilled Macedonians, and was obeyed when he bade them shave off the handle by which an enemy could seize them.

With other traditions of their feudal age, the Japanese nation has

broken with its ancient custom of the razor, and their emperor has beard and moustache ; a short moustache is common amongst Japanese officers and statesmen, and generals and admirals of Nippon follow the imperial example. The Nearer East also is abandoning the full beard, even in Mahommedan lands. Earlier shahs of the Kajar house have glorious beards below their girdles, but Nasiru'd-Din and his successor have shaved their chins. In later years the sultan of Turkey has added a beard to his moustache; the khedive of Egypt, son of a bearded father, has a soldier's moustache only. In Europe the great Russian people is faithful to the beard, Peter's law being forgotten. The tsar Alexander III.'s beard might have satisfied Ivan the Terrible, whose hands played delightedly with the five-foot beard of Queen Elizabeth's agent George Killingworth. Indeed the royal houses of Europe are for the most part bearded or whiskered. It may be that the race of Olivier le Dain, of the man who can be trusted with a sharp razor near a crowned king's throat, is extinct. Leopold II., king of the Belgians, however, was in 1909 the only sovereign with the full beard undipped. The Austrian emperor, Francis Joseph, retained the moustache and whiskers of the 'sixties, and the German emperor, William II., for a short period, commemorated by a few very rare photographs, had a beard, although it was never suffered to reach the length of that beard , which gave his father an air of Charlemagne or Barbarossa. In France bearded presidents have followed each other, but it may be noted that the waxed moustache and " imperial " beard of the Second Empire is now all but abandoned to the Frenchman of English comedy. The modern English fashion of shaving clean is rare in France save among actors, and during 1907 many Parisian waiters struck against the rule which forbade them to grow the moustache.

For the most part the clergy of the Roman obedience shave clean; as have done the popes for two centuries and more. But missionary bishops cultivate the long beard with some pride, and the orders have varying customs, the Dominican shaving and the Franciscan allowing the hair to grow. The Roman Catholic clergy of Dalmatia, secular and regular, are allowed to wear the moustache without beard or whiskers, as a concession to national prejudices.

Amongst English people, always ready to be swayed by fashion, the hair of the face has been, age by age, cherished or shaved away, curled or clipped into a hundred devices. Before the immigration from Sleswick the Briton knew the use of the razor, sometimes shaving his chin, but leaving the moustaches long. The old English also wore moustaches and forked beards, but, save for aged men, the beard had passed out of fashion before the Norman Conquest. Thus,

in the Bayeux needlework, Edward the king is venerable with a long beard, but Harold and his younger fighting men have their chins reaped. " The English,"

says William of Malmesbury, " leave the upper lip unshaven, suffering the hair continually to increase," and to Harold's spies the Conqueror's knights, who had " the whole face with both lips shaven," were strange and priest-like. Matthew Paris had a strange idea that the beard was distinctive of Englishmen; he asserts that those who remained in England were compelled to shave their beards, while the native nobles who went into exile kept their beards and flowing locks " like the Easterns and especially the Trojans." He even believed that " William with the beard," who headed a rising in London under Richard I., came of a stock which had scorned to shave, out of hatred for the Normans, a statement which Thierry developed.

The Chanson de Roland shows us "the pride of France" as " that good bearded folk," with their beards hanging over coats of mail, and it makes the great emperor swear to Naimes by his beard. It was only about the year 1000, according to Rodolf Glaber, that men began in the north of France to wear short hair and shave " like actors "; and even in the Bayeux tapestry the old Norman shipwrights wear the beard. But so rare was hair on the face amongst the Norman invaders that William, the fore- father of the Percys, was known in his lifetime and remembered after his death as William " Asgernuns " or " Oht les gernuns," i.e. " William with the moustaches," the epithet revived by one of his descendants making our modern name of Algernon. Count Eustace of Boulogne was similarly distinguished. Fashion swung about after the Conquest, and, in the day of Henry I., Serle the bishop could compare bearded men of the Norman-English court with " filthy goats and bristly Saracens." The crusades, perhaps, were accountable for the beards which were oddly denounced as effeminate in the young courtiers of William Rufus. Not only the Greeks but the Latins in the East sometimes adopted the Saracen fashion, and the siege of Antioch (1098) was as unfavour- able to the use of the razor as that of Sevastopol. When the Latins stormed the town by night, bearded knights owed their death to the assumption that every Christian would be a shaven man. But for more than four centuries diversity is allowed, beards, moustaches and shaven faces being found side by side, although now and again one fashion or another comes uppermost to be followed by those nice in such matters. Henry II. is a close- shaven king, and Richard II. 's effigy shows but a little tuft on each side of the chin, tufts which are two curled locks on the chin of

Henry IV. But Henry III. is long-bearded, Edward II. curls his beard in three great ringlets, and the third Edward's long forked beard flows down his breast in patriarchal style. The mid-i3th century, as seen in the drawings attributed to Matthew Paris, is an age of many full and curled beards, although the region about the lips is sometimes clipped or shaved. The beard is common in the 14th century, the forked pattern being favoured and the long drooping moustache. Amongst those who ride with him to Canterbury, Chaucer, a bearded poet, notes the merchant's "forked beard," the white beard of the franklin and the red beard of the miller, but the reeve's beard is " shave as ny as ever he can." Henry of Monmouth and his son are shaven, and there- after beards are rare save with a few old folk until they come slowly back with the 16th century. In Ireland the statute enacted by a parliament at Trim in 1447 recited that no manner of man who will be taken for an Englishman should have beard above his mouth — the upper lip must be shaven at least every fortnight or be of equal growth with the nether lip, — and this statute remained unrepealed for nigh upon two hundred years. Henry VIII. , always a law to himself, brought back the beard to favour, Stowe's annals giving 1535 as the year in which he caused his beard " to be knotted and no more shaven," his hair being polled at the same time. Many portraits give his fashion of wearing a thin moustache, whose ends met a short and squarely trimmed beard parted at the chin, a fashion in which he was followed by his brother-in-law Charles Brandon. But it is remarkable that those about him rarely imitated their most dread sovereign. While Cromwell and Howard the Admiral go clean shaven, the Seymour brothers, Denny and Russell, have the beard long and flowing. Even the forty shilling a year man, says Hooper in 1548, will waste his morning time while he sets his

beard in order. About this time the clergy began to break with the long tradition of smooth faces. A priest in 1531 is com- manded to abstain from wearing a beard, and Cardinal Pole, coming from the court of a bearded pope, appears bearded like a Greek patriarch. The law too, the church's kinswoman, begins to forbid, a sign of the change, and from 1542 the society of Lincoln's Inn makes rules for fining and expelling those who appear bearded at their mess, rules which the example of exalted lawyers caused to be withdrawn in 1 560.

The age of Elizabeth saw lawyers, soldiers, courtiers and merchants all bearded. Her Cecils, Greshams, Raleighs, Drakes, Dudleys and Walsinghams have the beard. A shaven chin such as that seen in the portrait of Philip Howard, earl of Arundel, is rare, but the beards take a hundred fashions, and satirists and Puritan pamphleteers were busy with them and with the men who wasted hours in perfuming or starching them, in dusting them with orris powder, in curling them with irons and quills. Stubbs gives them a place amongst his abuses. " It is a world to consider how their mowchatowes must be preserved or laid out from one cheek to another and turned up like two horns towards the forehead." Of the English variety of beards Harrison has a good word: " beards of which some are shaven from the chin like those of Turks, not a few cut short like to the beard of Marquess Otto, some made round like a rubbing brush, others with a pique de vant (O ! fine fashion) or now and then suffered to grow long, the Tjarbers being grown to be so cunning in this behalf as the tailors. And therefore if a man have a lean and straight face, a Marquess Otto's cut will make it broad and large; if it be platter-like, a long slender beard will make it seem the narrower; if he be weasel-becked, then much hair left on the cheeks will make the owner look big like a bowdled hen, and as grim as a goose, if Cornelis of Chelmersford say true." Neverthe- less he adds that " many old men do wear no beards at all." The Elizabethan fashions continued under King James, the beard trimmed to a point being common wear; but under King Charles there is a certain reaction, and the royal style of shaving the cheeks and leaving the moustache whose points sweep upward and the chin beard like a downward flame is followed by most of the gentry. With some the beard disappears altogether or remains a mere fleck below the lip. Archbishop Laud has a cavalier-like chin tuft and upturned moustache, but Abbot his predecessor wore the spade beard, the " cathedral beard " of Randle Holme, seen in all its dignity on the Chigwell brass of Samuel Harsnett, archbishop of York (died 1631), a grim figure with his angry moustache and a long and broad beard, cut square at the bottom.

From the Restoration year the razor comes more into use. Young men shave clean. The restored king curls a few dark hairs of a moustache over each cheek, but his brother James is shaven. With the reign of Queen Anne the country enters the beardless age, and beards, moustaches and whiskers are no more seen. In the 1 8th century the moustache indicated a soldier from beyond sea. A Jew or a Turk was known by the beard, an appendage loathsome as comic. Matthew Robinson, the second Lord Rokeby, was indeed wearing a beard in 1798, but he was reckoned a mad- man therefor, and Phillips's

Public Character pictures him as " the only peer and perhaps the only gentleman of either Great Britain or Ireland who is thus distinguished." That George III. in his madness should have been left unshaved was a circumstance of his misery that wrung the hearts of all loyal folk. But in the very year of 1798, when Lord Rokeby's image was engraved for the curious, the Worcestershire militia officers quartered near Brighton were copying the Austrian moustache of the foreign troops, and we may note that the hair of the face, which dis- appeared when wigs came in, began to reappear as wigs went out. Early in the 19th century the bucks began to show a patch of whisker beside the ear, and the soldier's moustache became a common sight. Before Waterloo, guardsmen were complaining that officers of humbler regiments imitated their fashion of the moustache, and by the Waterloo year most young cavalry officers were moustached. The Horse Artillery were the next moustached corps, the rest of the army, already whiskered, in. 19

following their example in the 'fifties. But for a civilian to grow a moustache was long reckoned a piece of unseemly swagger- Clive Newcome, it will be remembered, wore one until th taunting question whether he was " going in the Guards " shamed him into shaving clean. When in 1840 Mr George Frederick Muntz appeared in parliament with a full beard there were those who felt that this tall Radical had taken his own strange method of insulting English parliamentary institutions. James Ward, R.A. (d. 1859), painter of animals, was another breaker of the unwritten law, defending his beard in a pamphlet of eighteen arguments as a thing pleasing at once to the artist and to his Creator. Freedom in these matters only came when the troops were home from the Crimea, when officers who had grown beards and acquired the taste for tobacco during the long months in the trenches showed their beards and their cigars in Piccadilly. Then came the Volunteer movement, and every man was a soldier, taking a soldier's licence. The dominant fashion was the moustache, worn with long and drooping whiskers. But the " Piccadilly weepers " of the 'sixties were out of the mode for the younger men when the 'eighties began, and by the end of the century whiskers were seen in the army only upon a few veteran officers. The fashion of clean shaving had made some way, the popularity of the shaven actor having a part in this. In 1969 air modes of dealing with the hair of the face might be recognized, but the full beard had become somewhat rare in England and the full whiskers rarer still. The upper class showed an inclination to shave clean, although the army grudgingly recognized a rule which ordered the moustache to be worn. Naval men, by regulation, shaved or wore both beard and*

moustache, but their beards were always trimmed. Most barristers shaved the lips, although the last judge unable to hear an advocate whose voice a moustache interrupted had left the bench. Clergymen followed the lay fashions as they did under the first Stuart kings, although there was still some prejudice against the moustache as an ornament military and inappropriate. A newspaper of 1857, describing the appearance of Livingstone the missionary at a Mansion House meeting, records that he came wearing a moustache, " braving the prejudices of his countrymen and thus evincing a courage only inferior to that exhibited by him amongst the savages of Central Africa." Even as late as 1884 the Pall Mall Gazette has some surprised comments on the beard of Bishop Ryle, newly consecrated to the see of Liverpool.

The footman, whose full-dress livery is the court dress of a hundred years ago, must show no more than the rudimentary whisker of the early eighteen-hundreds, and butler, coachman and groom come under the same rule. The jockey and the hunt whip are shaven likewise, but the courier has the whiskers and moustache that once marked him as a foreigner in the English milor's service, and the chauffeur, a servant with no tradition behind him, is often moustached.

Lastly, we may speak of the practice of the royal house since England came out of the beardless century. The regent took the new fashion, and sat " in whiskered state," but his brother and successor shaved clean and disliked even the hussar's moustache. The prince consort wore the moustache as a young man, adding whiskers in later years. King Edward VII. wore moustache and trimmed beard, and his heir apparent also followed the fashion of many fellow admirals. (O. Ba)

BEARDSLEY, AUBREY VINCENT (1872-1898), English artist in black and white, was born at Brighton on the 24th of August 1872. In 1883 his family settled in London, and in the following year he appeared in public as an " infant musical phenomenon," playing at several concerts with his sister. In 1888 he obtained a post in an architect's office, and afterwards one in the Guardian Life and Fire Insurance Company (1889). In 1891, under the advice of Sir Edward Burne-Jones and Puvis de Chavannes, he took up art as a profession. In 1892 he attended the classes at the Westminster School of Art, then under Professor Brown; and from 1893 until his death, at Mentone, on the 16th of March 1898, his work came continually before the public, arousing a storm of criticism and much hostile feeling. Beardsley had an unswerving tendency towards > the fantastic of

the gloomier and " unwholesome " sort. His treatment of most subjects was revolutionary; he deliberately ignored proportion and perspective, and the " freedom from convention " which he displayed caused his work to be judged with harshness. In certain phases of technique he especially excelled; and his earlier methods of dealing with the single line in conjunction with masses of black are in their way unsurpassed, except in the art of Japan, the country which probably gave his ideas some assistance. He was always an ornamentist, rather than an illustrator; and his work must be judged from that point of view. His frontispiece to Volpone is held by some to be, from this purely technical standpoint, one of the best pen-drawings of the age. His posters for the Avenue theatre and for Mr Fisher Unwin were among the first of the modern cult of that art.

The following are the chief works which are illustrated with drawings by Beardsley: the Bon Mot Library, The Pall Mall Budget, and The Studio (1893), Sir Thomas Malory's Morte d' Arthur (1893-1894), Salome (1894), The Yellow Book (1894-1895), The Savoy Magazine (1896), The Rape of the Lock (1896).

See also J. Pennell, The Studio (1893); Symons, Aubrey Beardsley (1898); R. Ross, Volpone (1898); H. C. Marillier, The Early Work of Aubrey Beardsley (1899); Smithers, Reproductions of Drawings by Aubrey Beardsley; John Lane, The Later Works of Aubrey Beardsley (1901); R. Ross, Aubrey Beardsley (1908). (E. F. S.)

BEARDSTOWN, a city of Cass county, Illinois, U.S.A., in the W. part of the state, on the E. bank of the Illinois river, about 111 m. N. of St Louis, Missouri. It is served by the Baltimore & Ohio South-Western, and the Burlington (Chicago, Burlington & Quincy) railways, and by steamboats plying between it and St. Louis. Pop. (iSgo) 4226; (1900) 4827 (444 foreign-born); (191c) 6107. The industrial establishments of the city include flour, planing and saw mills, the machine shops (of the St Louis division) of the Chicago, Burlington & Quincy railway, ice factories, pearl button factories and a shoe factory. The fishing interests are also important. Beardstown was laid out in 1827 and was incorporated as a city in 1896. It was named in honour of Thomas Beard, who settled in the vicinity in 1820. During the Black Hawk War (1832) it was a base of supplies for the Illinois troops. The old court house in which Abraham Lincoln, in 1854, won his famous" Armstrong murder case," is now

used for a city hall.

BEARER, strictly " one who carries," a term used in India for a palanquin-bearer, and now especially for a body-servant. The term is also used in connexion with military ambulances, and " bearer " companies formed part of the Royal Army Medical Corps until amalgamated with the field-hospitals to form field-ambulances (1905). In banking and commerce the word is applied to the holder or presenter of a cheque or draft not made payable to a specific person; it has also a technical use, as in printing, of anything that supports pressure in machinery, &c.

BEARINGS. In engineering a " bearing " is that particular kind of support which, besides carrying the load imposed upon it by the shaft associated with it, allows the shaft freedom to revolve. Or, put in another way, a bearing forms with the shaft a pair of elements having one degree of freedom to turn relatively to one another about their common axis. The part of the shaft in the bearing is commonly called the journal. The component parts of a small bearing, pillow block, plummer block or pedestal, as it is variously styled, are illustrated in fig. 1, and these parts, put together, are further illustrated in fig. 2 with the shaft added. Corresponding parts are similarly lett ered in the two illustrations. The shaft (S) is encircled by the brasses (Bi and B 2) made of gun metal, phosphor bronze or other suitable material. The lower brass fits into the main casting (A) in the semicircular seat provided for it, and is prevented from moving endways by the flanges (F, F) and from turning with the shaft by the projections (P, P), which fit into corresponding recesses in the casting (A), one of which is shown at p. After the shaft has been placed in position, the upper brass (B 2) and the cap © are put on and both are held in place by the bolts (Qi, Q 2). The brasses are bedded into the main casting (A) and the cap © respectively at the surfaces D, D, D, D. The complete bearing is held to the framework of the machine by bolts (R 1(R 2) passing

through holes (H, H) which are slotted to allow endwise adjust- ment of the whole bearing in order to facilitate the alignment of the shaft. Oil or other lubricant is introduced through the hole (G), and it passes through the top brass to grooves or oilways cut into the surface of the brass for the pur- pose of distributing the oil uniformly to the journal.

Some form of lubricator is usually fitted at G in order to supply oil to the bearing continu- ously. A form of lubricator used for this purpose is shown in place, fig. 2, and an enlarged section is shown in fig. 3. It

will be seen that the lubri-

Fig. 1.

cator consists essentially of a cup the base of which is pierced centrally by a tube which reaches to within a small distance of the lid of the cup inside, and projects into the oilway leading to the journal outside. The annular space round the tube inside is filled with oil which is transferred to the central tube and thence to the bearing by the capillary action of a cotton wick thrust down on a piece of wire. It is only necessary to with- draw the wick from the central tube to stop the supply of oil. The lubricator is fitted through a hole in the lid which is usually plugged with a piece of cane or closed by more elaborate means. A line of shafting would be supported by several bearings of the

Fig. 2.

kind illustrated, themselves supported by brackets projecting from or rigidly fixed to the walls of the workshop, or on frames resting on the floor, or on hangers attached to the roof girders or principals.

In bearings of modern design for supporting a line shaft the general arrangement shown in fig. 1 is modified so that the alignments of the shaft can be made both vertically or horizont- ally by means of adjusting screws, and the brass is jointed with the supporting main body so that it is free to follow the small deflections of the shaft which take place when the shaft is work- ing. Another modern improvement is the forma- tion of an oil reservoir or well in the base of the bearing itself, and the transference of the oil from this well to the shaft by means of one or two rings riding loosely on the shaft. The bottom part of the ring dips into the oil contained in the well of the bearing and, as the shaft rotates, the ring rolls on the shaft and thus carries oil up to the shaft con- tinuously, from which it finds its way to the surfaces of the shaft and bearing in contact. It should be understood that the upper brass is slotted crossways to allow the ring to rest on the shaft. When the direction of the load carried by the bearing is constant it is unnecessary to provide

Fig. 3.

more than one brass, and the construction is modified accordingly. Figs. 4 and 5 show an axle box used for goods wagons on the Great Eastern railway, and they also illustrate the method of

Fig. 4.

pad lubrication in general use for this kind of bearing. The main casting, A, is now uppermost, and is designed so that the upper part supports and constrains the spring buckle through which the load W is transmitted to the bearing, and the lower part inside is arranged to support the brass, B. The brass is jointed freely with the main casting by means of a hemispherical hump resting in a corresponding recess in the casting. What may be called the cap, C, forms the lower part of the axle box,

brush, shaped to fit the underside of the journal, whilst the lower part consists of streamers of wick resting in the oil. The oil is fed to the brush by the capillary action of the streamers. The reservoirs are filled with oil through the apertures P and O. The bottom cap is held in position by the T-headed bolts Qj and Q 2 (fig. 5). By slackening the nuts and turning the T- heads fair with the slots in the cap, the cap comes right away and the axle may be examined. A leather ring L is fitted as shown to prevent dust from entering the axle box.

Footsteps. — A bearing arranged to support the lower end of a vertical shaft is called a footstep, sometimes a pivot bearing.

I_A simple form of footstep is shown in fig. 6. A casting A, designed so that it can be conveniently bolted to a foundation block, cross beam, or bracket is bored out and fitted with a brass B, which is turned inside to carry the end of the shaft S. The whole vertical load on the shaft is carried by the footstep, so that it is important to arrange efficient lubricating apparatus. Results of experiments made on a footstep, reported in Proc.

~ Inst. Mech. Eng., 1891, show that if a diametral groove be cut in the brass, as indicated at g (fig, 6), and if the oil is led to the centre of this groove by a channel c communicating with the exterior, the rotation of the shaft draws in a plentiful supply of oil which radiates from the centre and makes its way vertically between the shaft and the brass and finally overflows at the top of the brass. The overflowing oil may be led away and may be re-introduced into the footsteps at c. The rota- tion of the shaft thus causes a continuous

circulation of oil through the footstep. One experiment from the report mentioned above may be quoted. A 3-in. shaft, revolving 128 times per minute and supported on a manganese bronze bearing lubricated in the way explained above sus- tained increasing loads until, at a load of 300 pounds per square inch of the area of the end of the shaft, it seized. The

J=.

Fig. 6.

Fig. 5.

but instead of supporting a second brass it is formed into an oil ‘ reservoir in which is arranged a pad of cotton wick woven on a tin frame. The upper part of the pad is formed into a kind of I

mechanical details of a footstep may be varied for purposes of adjustment in a variety of ways similarly to the variations of a common bearing already explained.

Thrust Block Bearing. — In cases where a bearing is required to resist a longitudinal movement of the shaft through it, as for example in the case of the propeller shaft of a marine engine or a vertical shaft supporting a heavy load not carried on a footstep, the shaft is provided with one or more collars which are grooved with corresponding recesses in the brasses of the bearing. A general sketch of a thrust block for a propeller shaft is shown in fig. 7. There are seven collars turned on the shaft and into the

circumferential grooves between them fit corresponding circum- ferential projections on the brasses, these projections being formed in the case illustrated by means of half rings which are

fitted into grooves turned in the brasses. This method of construction allows an individual ring to be replaced or adjusted if it should get hot. The total area of the rubbing surfaces should be proportioned so that the average load is not more than from 50 to 70 ft per sq. in. Arrangements are usually made for cooling a thrust block with water in case of heating. The spindles of drilling machines, boring machine spindles, turbine shafts may be cited as examples of vertical shafts supported on one collar. Experiments on the friction of a collar

bearing have been made by the Research Committee of the Institution of Mechanical Engineers (Proc. Inst. Mech. Eng., 1888).

Roller and Ball Bearings. — If rollers are placed between two surfaces having relative tangential motion the f rictional resistance to be overcome is the small resistance to rolling. The rollers move along with a velocity equal to one half the relative velocity of the surfaces. This way of reducing frictional resistance has been applied to all kinds of mechanical contrivances, including bearings for shafts, railway axle boxes, and axle boxes for tramcars. An example of a roller bearing for a line shaft is illustrated in figs. 8 and 9. The main casting, A, and cap, C, bolted together, form a spherical seating for the part of the bearing E corresponding to the brasses in a bearing of the usual type. Between the inside of the casting E and the journal are placed rollers held in posi- tion relatively to one another by a " squirrel cage " casting, the section of the bars of which are clearly shown in the half sectional elevation, fig. 9. This squirrel cage ensures that the several axes of the rollers keep parallel to the axis of the journal during the rolling motion. The rollers are made of hard tool steel, and the

Fig. 8.

Fig. 9.

surfaces of the journal and bearing between which they roll are hardened.

Two rings of balls may be used instead of a single ring of rollers, and the kind of ball bearing thus obtained is in general use principally in connexion with bicycles and motor cars (see Bicycle). In ball bearings the load is concentrated at a few points, the points where the balls touch the race, and in the roller bearing at a few lines, the lines of contact between the rollers and the surfaces of the journal and bearing; consequently the load which bearings of this kind carry must not be great enough to cause any indentation at the points or lines of contact. Both rollers and balls, and the paths on which they roll, therefore, are made of hard material; further, balls and rollers must all be exactly the same size in an individual bearing in order to dis- tribute the load between the points or lines of contact as uni- formly as possible. The finest workmanship is required therefore to make good roller or good ball bearings.

Bearings for High Speeds and Forced Lubrication. — When the shaft turns the metallic surfaces of the brass and the journal are prevented

from actual contact by a film of oil which is formed and maintained by the motion of the shaft and which sustains the pressure between the journal and the brass provided the surfaces are accurately formed and the supply of oil is unlimited. This film changes what would otherwise be the friction between metallic surfaces into a viscous resistance within the film itself. When through a limited supply of oil or imperfect lubrication this film is imperfect or fails altogether and allows, the journal to make metallic contact with the brass, the friction increases; and it may increase so much that the bearing rapidly becomes hot and may ultimately seize, that is to say the rubbing surfaces may become stuck together. With the object of reducing the friction at the points of metallic contact and of confining the damage of a hot bearing to the easily renewable brass, the latter is partially,

sometimes wholly, lined with a soft fusible metal, technically known as white metal, which melts away before actual seizure takes place, and thus saves the journal v/bich is more expensive because it is generally formed on a large and expensive shaft. However perfectly the film fulfils its function, the work required to overcome the viscous resistance of the film during the con- tinuous rotation of the shaft appears as heat, and in consequence the temperature of the bearing gradually rises until the rate at which heat is produced is equal to the rate at which it is radiated from the bearing. Hence in order that a journal may revolve with a minimum resistance and without undue heating two precautions must be taken: (1) means must be taken to ensure that the film of oil is complete and never fails; and (2) arrange- ments must be made for controlling the temperature should it rise too high. The various lubricating devices already explained supply sufficient oil to form a partial film, since experiments have shown that the friction of bearings lubricated in this way is akin to solid friction, thus indicating at least partial metallic contact. In order to supply enough oil to form and maintain a film with certainty the journal should be run in an oil bath, or oil should be supplied to the bearing under pressure sufficient to force it in between the surfaces against the load. A bearing to which forced lubrication and water cooling are applied is illustrated in fig. 10, which represents one of the bearings of a Westinghouse turbo-alternator installed at the power station of the Underground Electric Railways Company of London at Lots Road, Chelsea. Oil flows under pressure from a tank on the top of a tower along a supply pipe to the oil inlet O, and after passing through the bearing and performing its duty as a film it falls away from each end of the journal into the bottom of the main casting, from which a pipe, E, conveys the oil

back to the base of the tank tower where it is cooled and finally pumped back into the tank. There is thus a continuous circulation of oil through the bearing. The space C is for cooi- ing water; in fact the bearing is water jacketed and the jacket is connected to a supply pipe and a drain pipe so Fig. 10.

that a continuous circulation may be

maintained if desired. This bearing is 12 in. in diameter and 48 in. long, and it carries a load of about 12-8 tons. The rise in temperature of the bearing under normal conditions of working without water circulating in the jacket is approximately 38 F. The speed of rotation is such that the surface velocity is about 50 ft. per second.

Forced lubrication in connexion with the bearings of high- speed engines was introduced in 1890 by Messrs Belliss & Morcom, Ltd., under patents taken out in the name of A. C. Pain. It should be understood that providing the film of oil in the bearing of an engine can be properly maintained a double-acting engine can be driven at a high speed without any knocking, and without perceptible wear of the rubbing surfaces. Fig. 1 1 shows that the general arrangement of the bearings of a Belliss & Morcom engine arranged for forced lubrication. A small force-pump F, driven from the eccentric strap X, delivers oil into the pipe P, along which it passes to A, the centre of the right-hand main bearing. There is a groove turned on the inside of the brass from which a slanting hole leads to B. The oil when it arrives at A thus has two paths open to it, one to the right and left of the groove through the bearing, the other along the slanting hole to B. At B it divides again into two streams, one stream going upwards to the eccentric sheave, and a part continuing up the pipe Q to the eccentric pin. The second stream from B follows the slanting hole in the crank shaft to C, where it is led to the big end journal through the pipe R to the crosshead pin, and through the slanting hole to D, where it finds its way into the left main bearing. The oL forced through each bearing falls away to the right and to tLe left of the journal and drops into

the bottom of the engine framing, whence it is again fed to the pump through a strainer. The parts of an engine lubricated in this way must be entirely enclosed. Load on bearings. — The distribution

r~

Fig. 11.

of pressure over the film of lubricant separating the rub- bing surfaces of a bearing is variable, being greatest at a point near but not at the crown of the brass, and falling away to zero in all directions towards the boundaries of the film. It is usual in practice to ignore this variation of pressure through the film, and to in- dicate the severity with which the bearing is loaded by stating the load per square inch of the rubbing sur- faces projected on to the diametral plane of the jour- nal. Thus the pro- jected area of the surfaces of a journal 6 in. in diameter on Relief and 8 in. long is 48 sq. in., and if the total load carried by the bearing is 20,000 pounds, the bearing would be said to carry a load of 417 pounds per square inch. When a shaft rotates in a bearing continuously in one direction the load per square inch with which it is safe to load the bearing in order to avoid undue heating is much less than if the motion is intermittent. A table of a few values of the bearing loads used in practice is given in the article Lubricants.

Bearing Friction. — If W is the total load on a bearing, and if m is the coefficient of friction between the rubbing surfaces, the tangential resistance to turning is expressed by the product aiW. If v is the relative velocity of the rubbing surfaces, the work done per second against friction is ixWv foot pounds. This quantity of work is con- verted into heat, and the heat produced per second is therefore / iWzj/778 British Thermal Units. The coefficient y. is a variable quantity, and bearing in mind that a properly lubricated journal is separated from its supporting brass by a film of lubricant it might be expected that p. would have values characteristic of the co- efficient of friction between two metallic surfaces, merging into the characteristics properly belonging to fluid friction, according as the oil film varied from an imperfect to a perfect condition, that is, according as the lubrication is partial or complete, completeness being attained by the use of an oil bath or by some method of forced lubrication. This expectation is entirely borne out by experimental researches. Beauchamp Tower (‘ ‘ Report on Friction Experiments, ‘ ‘ Proc. Inst. Mech. Eng., November 1883) found that when oil was supplied to a bearing by means of a pad the coefficient of friction was approximately constant with the value of 1/100, thus following the law of solid friction ; but when the journal was lubricated by means of an oil bath the coefficient of friction varied nearly inversely as the load on the bearing, thus making mW = constant. The tangential resistance in this case is characteristic of fluid friction

since it is independent of the pressure. Tower's experiments were carried out at a nearly constant temperature. The later experiments of O. Lasche (Zeitsch. Verein deutsche Ingenieure, 1902, 46, pp. 1881 et seq.) show how ix depends upon the temperature. Lasche's main results with regard to the variation of ju are briefly: — jiW is a con- stant quantity, thus confirming Tower's earlier experiments; m is practically independent of the relative velocity of the rubbing surfaces within the limits of 3 to 50 ft. per second; and the product yt is constant, t being the temperature of the bearing. Writing p for the load per unit of projected area of the bearing, Lasche found that the result of the experiments could be expressed

by the simple formula pnt = constant = 2, where p = the pressure in kilograms per square centimetre, and / = the temperature in degrees centigrade. If p ischanged to pounds per square inch the constant in the expression is approximately 30. The expression is valid between limits of pressure 14 to 213 pounds per square inch, limits of temperature 30 to 100 C, and between limits of velocity 3 to 50 ft. per second.

Theory of Lubrication. — After the publication of Tower's experi- ments on journal friction Professor Osborne Reynolds showed {Phil. Trans., 1886, p. 157) that the facts observed in connexion with a journal lubricated by means of an oil bath could be explained by a theory based upon the general principles of the motion of a viscous fluid. It is first established as an essential part of the theory that the radius of the brass must be slightly greater than the radius of the journal as indicated in fig. 12, where J is the centre of the journal and I the centre of the brass. Given this difference of curva- ture and a sufficient supply of oil, the rotation of the journal produces and maintains an oil film between the rubbing sur- faces, the circumferential ex- tent of which depends upon the rate of the oil supply and the external load. With an un- limited supply of oil, that is with oil-bath lubrication, the film extends continuously to the extremities of the brass, unless such extension would lead to negative pressures and therefore to a discontinuity, in which case the film ends where the pressures in the film become negative. The minimum distance between the journal and the brass occurs at the point H (fig. 12), on the off side of the point O where the line of action of the load cuts the surface of the journal. To the right and left of H the thickness of the film gradually increases, this being the condition that the oil-flow to and from the film may be auto- matically maintained. With an unlimited supply of oil the point H moves farther from O as the load increases until it reaches a maxi- mum distance, and then it moves back again towards O as the load is

further increased until a limiting load is reached at which the pressure in the film becomes negative at the boundaries of the film, when the boundaries recede from the edges of the brass as though the supply of oil were limited.

*In the mathematical development of the theory it is first necessary to define the coefficient of viscosity. .This is done as follows: — If two parallel surfaces AB, CD are separated by a viscous film, and if whilst CD is fixed AB moves in a tangential direction with velocity U, the surface of the film in contact with CD clings to it and remains at rest, whilst the lower surface of the film clings to and moves with the surface AB. At intermediate points in the film the tangential motion of the fluid will vary uniformly from zero to U, and the tangential resistance will be F = nU/h, where ju is the coefficient of viscosity and h is the thickness of the film. With this definition of viscosity and from the general equations representing the stress in a viscous fluid, the following equation is established, giving the relations between p, the pressure at any point in the film, h the thick- ness of the film at a point * measured round the circumference of the journal in the direction of relative motion, and U the relative tan- gential velocity of the surfaces,*

,dj>\ = f Trdh

Fig. 12.

ax \ ax] ax

(1)

In this equation all the quantities are independent of the co-ordinate parallel to the axis of the journal, and U is constant. The thickness of the film h is some function of x, and for a journal Professor Reynolds takes the form,

h = a\ +c sin(6 —)} , in which the various quantities have the significance indicated in fig. 12. Reducing and integrating equation (1) with this value of h it becomes

dp _ 6R/j.XJc\sin(6 — (ftp) — sin(4>i — fa) } . .

de a?{i+c sin (8- fa)} 3 ^

fa being the value of 9 for which the pressure is a maximum. In order to integrate this the right-hand side is expanded into a trigono- metrical series, the values of the coefficients are computed, and the

integration is effected term by term. If, as suggested by Professor J. Perry, the value of h is taken to be h = ho + ax 2 , where ho is the minimum thickness of the film, the equation reduces to the form dp 6 M U , C (3)

+ 7

dx (ho + ax 2) 2 ‘ (h + ax 2) 3

and this can be integrated. The process of reduction from the form (1) to the form (3) with the latter value of h, is shown in full in The Calculus for Engineers by Professor Perry (p. 331), and also the final solution of equation (3), giving the pressure in terms of x.

Professor Reynolds, applying the results of his investigation to one of Tower’s experiments, plotted the pressures through the film both circumferentially and longitudinally, and the agreement with the observed pressure of the experiment was exceedingly close. The whole investigation of Professor Reynolds is a remarkable one, and is in fact the first real explanation of the fact that oil is able to insinuate itself between the journal and the brass of a bearing carrying a heavy load. (See also Lubrication.) (W. E. D.)

BEAR-LEADER, formerly a man who led bears about the country. In the middle ages and Tudor times these animals were chiefly used in the brutal sport of bear-baiting and were led from village to village. Performing bears were also common, and are even still sometimes seen perambulating the country with their keepers, generally Frenchmen or Italians. The phrase ” bear-leader ” has now come colloquially to mean a tutor or guardian, who escorts any lad of rank or wealth on his travels.

BEARN, formerly a small frontier province in the south of France, now included within the department of Basses- Pyrenees. It was bounded on the W. by Soule and Lower Navarre, on the N. by Chalosse, Tursan and Astarac, E. by Bigorre and S. by the Pyrenees. Its name can be traced back to the town of Bene- harnum (Lescar). The civitas Benehamensium was included in the N ovempopulania. It was conquered by the Vascones in the 6th century, and in 819 became a viscounty dependent on the dukes of Aquitaine — a feudal link which was broken in the nth century, when the viscounts ceased to acknowledge any suzerain. They then reigned over the two

dioceses of Lescar and Oloron; but their capital was Morlaas, where they had a mint which was famous throughout the middle ages. In the 13th century Gaston VII., of the Catalonian house of Moncade, made Orthez his seat of government. His long reign (1 2 29-1 290) was a perpetual struggle with the kings of France and England, each anxious to assert his suzerainty over Beam. As Gaston left only daughters, the viscounty passed at his death to the family of Foix, from whom it was transmitted through the houses of Grailly and Albret to the Bourbons, and they, in the person of Henry IV., king of Navarre, made it an apanage of the crown of France. It was not formally incorporated in the royal domains, however, until 1620. None of these political changes weakened the independent spirit of the Bearnais. From the nth century onward, they were governed by their own special customs or fors. These were drawn up in the language of the country, a Romance dialect (1288 being the date of the most ancient written code) , and are remarkable for the manner in which they define the rights of the sovereign, determining the reciprocal obligations of the viscount and his subjects or vassals. Moreover, from the 12th century Beam enjoyed a kind of representative government, with cours plenieres composed of deputies from the three estates. From 1220 onward, the judiciary powers of these assemblies were exercised by a cour majour of twelve barons jurats charged with the duty of main- taining the integrity of the fors. When Gaston-Phoebus wished to establish a regular annual hearth-tax (jouage) in the viscounty, he convoked the deputies of the three estates in assemblies called Mats. These soon acquired extensive political and financial powers, which continued in operation till 1789. Although, when Beam was annexed to the domains of the crown, it was granted a conseil d'etat and a parlement, which sat at Pau, the province also retained its fors until the Revolution.

See also Olhagaray, Histoire de Foix, Beam et Navarre (1609) ; Pierre de Marca, Histoire de Beam (1640). This work does not go beyond the end of the 13th century; it contains a large number of documents. Paget de Baure, Essais historiques sur le Beam (1818) ; Les Fors de Beam, by Mazure and Hatoulet (1839), completed by J. Brissaud and P. Roge in Texles_ additionnels aux anciens Fors de Beam (1905)" Leon Cadier, Les Etats de Beam depuis leur origine jusqu'au commencement du XVI" siecle (1888). (C. B.')*

BEAS or Bias, a river of India. The Beas, which was the Hyphasis of the Greeks, is one of the Five Rivers of the Punjab. It issues in the snowy mountains of Kulu at an altitude of 13,326 ft. above sea-level, flows through the Kangra valley and the plains of the Punjab,

and finally joins the Sutlej after a course of 290 m. It is crossed by a railway bridge near Jullundur.

BEAT (a word common in various forms to the Teutonic languages; it is connected with the similar Romanic words derived from the Late Lat. battere), a blow or stroke; from the many applications of the verb " to beat " come various meanings of the substantive, in some of which the primary sense has become obscure. It is applied to th,e throbbing of the pulse or heart, to the beating of a drum, either for retreat, or charge, or to quarters; in music to the alternating sound produced by the striking together of two notes not exactly of the same pitch (see Sound), and also to the movement of the baton by which a conductor of an orchestra or chorus indicates the time, and to the divisions of a bar. As a nautical term, a " beat " is the zigzag course taken by a ship in sailing against the wind. The application of the word to a policeman's or sentry's round comes either from beating a covert for game and hence the term means an exhaustive search of a district, or from the repeated strokes of the foot in constantly walking up and down. In this sense the word is used in America, particularly in Alabama and Mississippi, of a voting precinct.

BEATIFICATION (from the Lat. beatus, happy, blessed, and facet -c, to make), the act of making blessed; in the Roman Catholic Church, a stage in the process of canonization (q.v.).

BEATON (or Bethune), DAVID, (c. 1494-1546), Scottish cardinal and archbishop of St Andrews, was a younger son of John Beaton of Balfour in the county of Fife, and is said to have been born in the year 1494. He was educated at the universities of St Andrews and Glasgow, and in his sixteenth year was sent to Paris, where he studied civil and canon law. About this time he was presented to the rectory of Campsie by his uncle James Beaton, then archbishop of Glasgow. When James Beaton was translated to St Andrews in 1522 he resigned the rich abbacy of Arbroath in his nephew's favour, under reservation of one half of the revenues to himself during his lifetime. The great ability of Beaton and the patronage of his uncle ensured his rapid promo- tion to high offices in the church and kingdom. He was sent by King James V. on various missions to France, and in 1528 was appointed keeper of the privy seal. He took a leading part in the negotiations connected with the king's marriages, first with Madeleine of France, and afterwards with Mary of Guise. At the French court he was held in high estimation by King Francis I., and was consecrated bishop of Mirepoix in Languedoc in December 1537. On the 20th of December 1 538 he was appointed a

cardinal priest by Pope Paul III., under the title of St Stephen in the Coelian Hill. He was the only Scotsman who had been named. to that high office by an undisputed right, Cardinal Wardlaw, bishop of Glasgow, having received his appointment from the anti-pope Clement VII. On the death of Archbishop James Beaton in 1539, the cardinal was raised to the primatial see of Scotland.

Beaton was one of King James's most trusted advisers, and it was mainly due to his influence that the king drew closer the French alliance and refused Henry VIII. 's overtures to follow him in his religious policy. On the death of James in December 1542 he attempted to assume office as one of the regents for the infant sovereign Mary, founding his pretensions on an alleged will of the late king; but his claims were disregarded, and the earl of Arran, head of the great house of Hamilton, and next heir to the throne, was declared regent by the estates. The cardinal was, by order of the regent, committed to the custody of Lord Seaton; but his imprisonment was merely nominal, and he was soon again at liberty and at the head of the party opposed to the English alliance. Arran too was soon won over to his views, dismissed the preachers by whom he had been surrounded, and joined the cardinal at Stirling, where in September 1543 Beaton crowned the young queen. In the same year he was raised to the office of chancellor of Scotland, and was appointed protonotary apostolic and legate a latere by the pope. Had Beaton confined himself to secular politics, his strenuous opposition to the plans of Henry VIII. for the subjugation of Scotland would have earned him the lasting gratitude of his countrymen. Unfortunately politics were inextricably interwoven with the religious controversies of the time, and resistance to English influence involved resistance to

the activities of the reformers in the church, whose ultimate victory has obscured the cardinal's genuine merits as a statesman. During the lifetime of his uncle, Beaton had shared in the efforts of the hierarchy to suppress the reformed doctrines, and pursued the same line of conduct still more systematically after his elevation to the primacy. The popular accounts of the persecu- tion for which he was responsible are no doubt exaggerated, and it sometimes ceased for considerable periods so far as capital punishments were concerned. When the sufferers were of humble rank not much notice was taken of them. It was otherwise when a more distinguished victim was

selected in the person of George Wishart. Wishart had returned to Scotland, after an absence of several years, about the end of 1 544. His sermons produced a great effect, and he was protected by several barons of the English faction. These barons, with the knowledge and approba- tion of King Henry, were engaged in a plot to assassinate the cardinal, and in this plot Wishart is now proved to have been a willing agent. The cardinal, though ignorant of the details of the plot, perhaps suspected Wishart's knowledge of it, and in any case was not sorry to have an excuse for seizing one of the most eloquent supporters of the new opinions. For some time he was unsuccessful; but at last, with the aid of the regent, he arrested the preacher, and carried him to his castle of St Andrews. On the 28th of February 1546 Wishart was brought to trial in the cathedral before the cardinal and other judges, the regent declining to take any active part, and, being found guilty of heresy, was condemned to death and burnt.

The death of Wishart produced a deep effect on the Scottish people, and the cardinal became an object of general dislike, which encouraged his enemies to proceed with the design they had formed against him. Naturally resolute and fearless, he seems to have under-estimated his danger, the more so since his power had never seemed more secure. He crossed over to Angus, and took part in the wedding of his illegitimate daughter with the heir of the earl of Crawford. On his return to St Andrews he took up his residence in the castle. The conspirators, the chief of whom were Norman Leslie, master of Rothes, and William Kirkaldy of Grange, contrived to obtain admission at daybreak of the 29th of May 1546, 'and murdered the cardinal under circumstances of horrible mockery and atrocity.

The character of Beaton has already been indicated. As a statesman he was able, resolute, and in his general policy patriotic. As an ecclesiastic he maintained the privileges of the hierarchy and the dominant system of belief conscientiously, but always with harshness and sometimes with cruelty. His immoralities, like his acts of persecution, were exaggerated by his opponents; but his private life was undoubtedly a scandal to religion, and has only the excuse that it was not worse than that of most of his order at the time. The authorship of the writings ascribed to him in several biographical notices rests on no better authority than the apocryphal statements of Thomas Dempster.

Beaton's uncle, James Beaton, or Bethune (d. 1539), arch- bishop of Glasgow and St Andrews, was lord treasurer of Scotland before he became archbishop of Glasgow in 1 509, was chancellor from 1513

to 1526, and was appointed archbishop of St Andrews and primate of Scotland in 1522. He was one of the regents during the minority of James V., and was chiefly responsible for this king's action in allying himself with France and not with England. He burned Patrick Hamilton and other heretics, and died at St Andrews in September 1539.

This prelate must not be confused with another, James Beaton, or Bethune (1517-1603), the last Roman Catholic archbishop of Glasgow. A son of John Bethune of Auchmuty and a nephew of Cardinal Beaton, James was a trusted adviser of the Scottish regent, Mary of Lorraine, widow of James V., and a determined foe of the reformers. In 1552 he was consecrated archbishop of Glasgow, but from 1560 until his death in 1603 he lived in Paris, acting as ambassador for Scotland at the French court.

See John Knox, Hist, of the Reformation in Scotland, ed. D. Laing (1846-1864); John Spottiswoode, archbishop of St Andrews, Hist: of the Church of Scotland (Spottiswoode Soc, 1847-1851); Art. in Diet, of Nat. Biog. and works there quoted ; and A. Lang, Hist, of Scotland, vols. i. and ii. (1900-1902).

BEATRICE, a city and the county-seat of Gage county, in S.E. Nebraska, U.S.A., about 40 m. S. of Lincoln. Pop. (1900) 7875 (852 foreign-born); (1910) 9356- It is served by the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, and the Union Pacific railways. Beatrice is the seat of the state institute for feeble-minded youth, and has a Carnegie library. The city is very prettily situated in the valley of the Big Blue river, in the midst of a fine agricultural region. Among its manufactures are dairy products (there is a large creamery), canned goods, flour and grist mill products, gasoline engines, well-machinery, barbed wire, tiles, ploughs, windmills, corn-huskers, and hay-balers. Beatrice was founded in 1857, becoming the county-seat in the same year. It was reached by its first railway and was incorporated as a town in 1 871, was chartered as a city in 1873, and in 1901 became a city of the first class.

BEATTIE, JAMES (1735-1803), Scottish poet and writer on philosophy, was born at Laurencekirk, Kincardine, Scotland, on the 25th of October 1735. His father, a small farmer and shopkeeper, died when he was very young; but an elder brother sent him to Marischal College, Aberdeen, where he gained a bursary. In 1753 he was appointed schoolmaster of Fordoun in his native county. Here he had as neighbours the eccentric Francis Garden (afterwards Lord Gardenstone, judge of the supreme court of Scotland), and Lord

Monboddo. In 1758 he became an usher in the grammar school of Aberdeen, and two years later he was made professor of moral philosophy at Marischal College. Here he became closely acquainted with Dr Thomas Reid, Dr George Campbell, Dr Alexander Gerard and others, who formed a kind of literary or philosophic society known as the " Wise Club." They met once a fortnight to discuss speculative questions, David Hume's philosophy being an especial object of criticism. In 1761 Beattie published a small volume of Original Poems and Translations, which con- tained little work of any value. Its author in later days destroyed all the copies he found. In 1770 Beattie published his Essay on the Nature and Immutability of Truth in opposition to sophistry and scepticism, the object of which, as explained by its author, was to " prove the universality and immutability of moral sentiment" (letter to Sir W. Forbes, 17th January 1765). It was in fact a direct attack on Hume, and part of its great popu- larity was due to the fact. Hume is said to have justly com- plained that Beattie " had not' used him like a gentleman," but made no answer to the book, which has no philosophical value. Beattie's portrait, by Sir Joshua Reynolds, hangs at Marischal College, Aberdeen. The philosopher is painted with the Essay on Truth in his hand, while a figure of Truth thrusts down three figures representing, according to Sir W. Forbes, sophistry, scepticism and infidelity. Reynolds in a letter to Beattie (February 1774) intimates that he is well enough pleased that one of the figures is identified with Hume, and that he intended Voltaire to be one of the group. Beattie visited London in 1773, and was received with the greatest honour by George III., who conferred on him a pension of £200 a year. In 1771 and 1774 he published the first and second parts of The Minstrel, a poem which met with great and immediate success. The Spenserian stanza in which it is written is managed with smoothness and skill, and there are many fine descriptions of natural scenery. It is entirely on his poetry that Beattie's reputation rests. The best known of his minor poems are " The Hermit " and " Retire- ment."

In 1773 he was offered the chair of moral philosophy at Edin- burgh University, but did not accept it. Beattie made many friends, and lost none. " We all love Beattie," said Dr Johnson. " Mrs Thrale says, if ever she has another husband she will have him." He was in high favour too with Mrs Montagu and the other has Mens. Beattie was unfortunate in his domestic life. Mary Dunn, whom he married in 1767, became insane, and his two sons died just as they were attaining manhood. The elder, James Hay Beattie, a young man of great promise, who at the age of nineteen had been associated with

his father in his pro- fessorship, died in 1790. In 1794 the father published Essays and Fragments in Prose and Verse by James Hay Beattie with a.

touching memoir. The younger brother died in 1796. Beattie never recovered from this second bereavement. His mind was seriously affected, and, although he continued to lecture occa- sionally, he neither wrote nor studied. In April 1799 he had a stroke of paralysis, and died on the 18th of August 1803.

Beattie's other poetical works include The Judgment of Paris (1765), and "Verses on the death of [Charles] Churchill," a bitter attack which the poet afterwards suppressed. The best edition is the Poetical Works (1831, new ed. 1866) in the Aldine Edition of the British Poets, with an admirable memoir by Alexander Dyce.

See also An Account of the Life of James Beattie (1804), by A. Bower; and An Account of the Life and Writings of James Beattie (1807), by Sir William Forbes; a quantity of new material is to be found in Beattie and his Friends{i<)o£) , by the poet's great-grand-niece, Margaret Forbes; and James Beattie, the Minstrel. Some Unpub- lished Letters, edited by A. Mackie (Aberdeen, 1908).

BEATUS, of Liebana and Valcavado, Spanish priest and monk, theologian and geographer, was born about 730, and died in 798. About 776 he published his Commentaria in Apocalypsin, con- taining one of the oldest Christian world-maps. He took a prominent part in the Adoptionist controversy, and wrote against the views of Felix of Urgel, especially as upheld by Elipandus of Toledo. As confessor to Queen Adosinda, wife of King Silo of Oviedo (774-783), and as the master of Alcuin and Etherius of Osma, Beatus exercised wide influence. His original map, which was probably intended to illustrate, above all, the distribution of the Apostolic missions throughout the world — ■ depicting the head of Peter at Rome, of Andrew in Achaia, of Thomas in India, of James in Spain, and so forth — has survived in ten more or less modified copies. One only of these — the "Osma" of 1203 — preserves the Apostolic pictures; among the remaining examples, that of " St Sever," now at Paris, and dating from about 1030, is the most valuable; that of " Valca- vado," recently in the Ashburnham Library, executed in 970, is the earliest; that of "Turin," dating from about 1100, is perhaps the

most curious. Three others — " Valladolid " of about 1035, "Madrid" of 1047, and "London" of 1109 — are derivatives of the " Valcavado-Ashburnham" of 970; the eighth, " Paris II," is connected, though not very intimately, with " St Sever," otherwise " Paris I "; the ninth and tenth, " Gerona " and " Paris III," belong to the Turin group of Beatus maps. All these works aire emphatically of " dark-age " character; very seldom do they suggest the true forms of countries, seas, rivers or mountains, but they embody some useful information as to early medieval conditions and history. St Isidore appears to be their principal authority, they also draw, directly or indirectly, from Orosius, St Jerome, St Augustine, and probably from a lost map of classical antiquity, represented in a measure by the Peutinger Table of the 13th century.

The chief MSS. of the Commentaria in Apocalypsin are (1-3) Paris, National Library, Lat. 8878; Lat. nouv. acq. 1366 and 2290; (4) Ashburnham MSS. xv. ; (5) London, B. Mus., Addit. MSS. 11695; (6) Turin, National Library 1, ii. (1); (7) Valladolid, Uni- versity Library, 229; (8) the MS. in the Episcopal Library at Osma, in Old Castile.

There is only one complete edition of the text, that by Florez (Madrid, 1770). See also Konrad Miller, Die Weltkarte des Beatus, Heft I. of Mappaemundi: die dltesten Weltkarten (Stuttgart, 1895); d'Avezac in Annates de . . . geographie (June 1870); Beazley, Dawn of Modern Geography, i. 387-388 (1897); ii. 549-559; 591- 605 (1901). (C. R. B.)

BEAUCAIRE, a town of south-eastern France, in the depart- ment of Gard, 17 m. E. by S. of Nimes on the Paris-Lyon railway. Pop. (1906) 7284. Beaucaire is situated on the right bank of the Rhone, opposite Tarascon, with which it is connected by two handsome bridges, a suspension-bridge of four spans and 1476 ft. in length, and a railway bridge. A triangular keep, a chapel, and other remains of a chateau (13th and 14th centuries) of the counts of Toulouse stand on the rocky pine-clad hill which rises to the north of the town; the chapel, dedicated to St Louis, belongs to the latest period of Romanesque architecture, and contains fine sculptures. The town derives celebrity from the great July fair, which has been held here annually since the 12th century, but has now lost its former importance (see Fair).

Beaucaire gives its name to the canal which communicates with the sea (near Aigues-Mortes) and connects it with the Canal du Midi, forming part of the line of communication between the Rhone and

the Garonne. The town is an important port on the Rhone, and its commerce, the chief articles of which are wine, and freestone from quarries in the vicinity, is largely water-borne. Among its industries are distilling and the manufacture of furniture, and the preparation of vermicelli, sausages and other provisions.

Beaucaire occupies the site of the ancient Ugernum, and several remains of the Roman city have been discovered, as well as (in 1734) the road that led from Nimes. The present name is derived from Bellum Quadrum, a descriptive appellation applied in the middle ages either to the chateau or to the rock on which it stands. In 1125 Beaucaire came into the possession of the counts of Toulouse, one of whom, Raymund VI., estab- lished the importance of its fairs by the grant of privileges. In the Wars of the League it suffered severely, and in 1632 its castle was destroyed by Richelieu.

BEAUCE (Lat. Belsia), a physical region of north-central France, comprising large portions of the departments of Eure-et- Loir and Loir-et-Cher, and also extending into those of Loiret and Seine-et-Oise. It has an area of over 2800 sq. m. , its limits being roughly defined by the course of the Essonne on the E., of the Loire on the S., and of the Brenne, the Loir and the Eure towards the W., though in the latter direction it extends some- what beyond these boundaries. The Beauce is a treeless, arid and monotonous plain of limestone formation; windmills and church spires are the only prominent features of the landscape. Apart from the rivers on its borders, it is watered by insigni- ficant streams, of which the Conie in the west need alone be mentioned. The inhabitants live in large villages, and are occupied in agriculture, particularly in the cultivation of wheat, for which the Beauce is celebrated. Clover and lucerne are the other leading crops, and large flocks of sheep are kept in the region. Chartres is its chief commercial centre.

BEAUCHAMP, the name of several important English families. The baronial house of Beauchamp of Bedford was founded at the Conquest by Hugh de Beauchamp, who received a barony in Bedfordshire. His eldest son Simon left a daughter, whose husband Hugh (brother of the count of Meulan) was created earl of Bedford by Stephen. But the heir-male, Miles de Beau- champ, nephew of Simon, held Bedford Castle against the king in 1137-1138. From his brother Payn descended the barons of Bedford, of whom William held Bedford Castle against the royal forces in the struggle for the Great Charter, and was afterwards made prisoner at the battle of Lincoln, while John, who sided with the barons under Simon de Montfort, fell at Evesham. With him the line ended, but a younger

branch was seated at Eaton Socon, Beds., where the earthworks of their castle remain, and held their barony there into the 14th century.

The Beauchamps of Elmley, Worcestershire, the greatest house of the name, were founded by the marriage of Walter de Beauchamp with the daughter of Urise d'Abetot, a Domesday baron, which brought him the shrievalty of Worcestershire, the office of a royal steward, and large estates. His descendant William, of Elmley, married Isabel, sister and eventually heiress to William Mauduit, earl of Warwick, and their son succeeded in 1268 to Warwick Castle and that earldom, which remained with his descendants in the male line till 1445. The earls of the Beauchamp line played a great part in English history. Guy, the 2nd, distinguished himself in the Scottish campaigns of Edward I., who warned him at his death against Piers Gaveston. Under Edward II. he was one of the foremost foes of Piers, who had styled him " the black cur of Arden," and with whose death he was closely connected. As one of the " lords ordainers " he was a recognized leader of the opposition to Edward II. By the heiress of the Tonis he left at his death in 131 5 a son Earl Thomas, who distinguished himself at Crecy and Poitiers, was marshal of the English host, and, with his brother John, one of the founders of the order of the Garter. In 1369 his son Earl Thomas succeeded; from 1376 to 1379 he was among the lords

striving for reform, and in the latter year he was appointed governor to the king. Under Richard II. he joined the lords appellant in their opposition to the king and his ministers, and was in power with them 1388-1389; treacherously arrested by Richard in 1397, he was imprisoned in the Tower of London (the Beauchamp Tower being called after him), but liberated by Henry IV. on his triumph (1399). In 1401 he was succeeded by his son Earl Richard, a brave and chivalrous warrior, who defeated Owen Glendower, fought the Percys at Shrewsbury, and, after travelling in state through Europe and the Holy Land, was employed against the Lollards and afterwards as lay ambassador from England to the council of Constance (1414). He held command for a time at Calais, and took an active part in the French campaigns of Henry V., who created him earl and count of Aumale in Normandy. He had charge of the education of Henry VI., and in 1437 was appointed lieutenant of France and of Normandy. Dying at Rouen in 1439, he left by Isabel,

widow of Richard Beauchamp, earl of Worcester, a son, Earl Henry, who was created duke of Warwick, 1445, and is alleged, but without authority, to have been crowned king of the Isle of Wight by Henry VI. He died, the last of his line, "in June 1445. On the death of Anne, his only child, in 1449, his vast inheritance passed to Anne, his sister of the whole blood, wife of Richard Neville, earl of Salisbury (" the Kingmaker "), who thereupon became earl of Warwick.

Of the cadet branches of the house, the oldest was that of Powyke and Alcester, which obtained a barony in 1447 and became extinct in 1496; from it sprang the Beauchamps, Lords St Amand from 1448, of whom was Richard, bishop of Salisbury, first chancellor of the order of the Garter, and who became extinct in 1508, being the last known male heirs of the race. Another cadet was Sir John Beauchamp of Holt, minister of Richard II., who was created Lord Beauchamp of Kidderminster (the first baron created by patent) 1387, but beheaded 1388; the barony became extinct with his son in 1400. Roger, Lord Beauchamp of Bletsoe, summoned in 1363, is said to have been descended from the Powyke branch; his line ended early in the 15th century. Later cadets were John, brother of the 3rd earl, who carried the standard at Crecy, became captain of Calais, and was summoned as a peer in 1350, but died unmarried; and William, brother of the 4th earl, who was distinguished in the French wars, and succeeding to the lands of the Lords Aber- gavenny was summoned in that barony 1392; his son was created earl of Worcester in 1420, but died without male issue in 1422; from his daughter, who married Sir Edward Neville, descended the Lords Abergavenny.

The Lords Beauchamp of " Hache " (1 299-1361) were so named from their seat of Hatch Beauchamp, Somerset, and were of a wholly distinct family. Their title, " Beauchamp of Hache," was revived for the Seymours in 1536 and 1559. The title of " Beauchamp of Powyke " was revived as a barony in 1 806 for Richard Lygon (descended through females from the Beau- champs of Powyke), who was created Earl Beauchamp in 1815.

See Sir W. Dugdale, Baronage (1675-1676) and Warwickshire (2nd ed., 1730); G. E. C[okayne], Complete Peerage (1887-1898) ; W. Courthope, Rows Roll (1859); and J. H. Round, Geoffrey \de Mandeville (1892). (J. H. R.)

BEAUCHAMP, ALPHONSE DE, French historian and man of letters, was born at Monaco in 1767, and died in 1832. In 1784 he entered a Sardinian regiment of marines, but on the outbreak of war with the French Republic, he refused to fight in what he considered an unjust cause, and was imprisoned for several months. After being liberated he took up his residence in Paris, where he obtained a post in one of the government offices. On the fall of Robespierre, Beauchamp was transferred to the bureau of the minister of police, and charged with the superintendence of the press. This situation opened up to him materials of which he made use in his first and most popular historical work, Histoire de la Vendee et des Chouans, 3 vols. , 1 806. The book, received with great favour by the people, was displeasing to the authorities. The third edition was confiscated; its writer was deprived of his Dost, and in 1809 was compelled to leave Paris and take ˆup his

abode in Reims. In 181 1 he obtained permission to return, and again received a government appointment. This he had to resign on the Restoration, but was rewarded with a small pension, which was continued to his widow after his death.

Beauchamp wrote extensively for the public journals and for the magazines. His biographical and historical works are numerous, and those dealing with contemporary events are valuable, owing to the sources at his disposal. They must, however, be used with great caution. The following are worth mention: — Vie politique, militaire et privee du general Moreau (1814) ; Catastrophe de Mural, ou RScit de la dernier e revolution de Naples (18 1 5); Histoire de la guerre d'Espagne et du Portugal, 1807-1813 (2 vols., 1819); Collection de tnimoires relatifs aux revolutions d'Espagne (2 vols., 1824); Histoire de la revolution de Piemont (2 vols., 1821, 1823); Memoires secrets

et inedits pour servir a V histoire contemporaine (2 vols., 1825). The Memoires de Fouche have also been ascribed to him, but it seems certain that he only revised and completed a work really composed by Fouch6 himself.

See an article by Louis Madelin in La Revolution francaise (1900).

BEAUFORT, the name of the family descended from the union of John of Gaunt, duke of Lancaster, with Catherine, wife of Sir Hugh Swynford, taken from a castle in Anjou which belonged to John of Gaunt. There were four children of this union — John, created earl of Somerset and marquess of Dorset; Henry, after- wards bishop of Winchester and cardinal (see Beaufort, Henry); Thomas, made duke of Exeter and chancellor; and Joan, who married Ralph Neville, first earl of Westmorland, and died in 1440. In 1396, some years after the birth of these children, John of Gaunt and Catherine were married, and in 1397 the Beauforts were declared legitimate by King Richard II. In 1407 this action was confirmed by their half-brother, King Henry IV., but on this occasion they were expressly excluded from the succession to the English throne.

John Beaufort, earl of Somerset (c. 1373-1410), assisted Richard II. in 1397 when the king attacked the lords appellants, and made himself an absolute ruler. For these services he was made marquess of Dorset, but after the deposition of Richard in 1399, he was degraded to his former rank as earl. In 1401, however, he was declared loyal, and appeared later in command of the English fleet. He married Margaret, daughter of Thomas Holland, second earl of Kent, and died in March 1410, leaving three sons, Henry, John, and Edmund, and two daughters, Jane or Joan, who married James I., king of Scotland, and Margaret, who married Thomas Courtenay, earl of Devon.

Thomas Beaufort (d. 1426) held various high offices under . Henry IV., and took a leading part in suppressing the rising in the north in 1405. He became chancellor in 1410, but resigned this office in January 141 2 and took part in the expedition to France in the same year. He was then created earl of Dorset, and when Henry V. became king in 1413, he was made lieutenant of Aquitaine and took charge of Harfleur when this town passed into the possession of the English. In 1416 he became lieutenant of Normandy, and was created duke of Exeter; and returning to England he compelled the Scots to raise the siege of Roxburgh. Crossing to France in 141 8 with reinforcements for Henry V., he took an active part in the subsequent campaign, was made captain of Rouen, and went to the court of France to treat for

peace. He was then captured by the French at Bauge, but was soon released and returned to England when he heard of the death of Henry V. in August 1422. He was one of Henry's executors, and it is probable that the king entrusted his young son, King Henry VI., to his care. However this may be, Exeter did not take a very prominent part in the government, although he was a member of the council of regency. Having again shared in the French war, the duke died at Greenwich about the end of the year 1426. He was buried at Bury St Edmunds, where his remains were found in good condition 350 years later. He married Margaret, daughter of Sir Thomas Neville of Nornby, but left no issue. The Beaufort family was continued by Henry Beaufort (1401-1419), the eldest son of John Beaufort, earl of Somerset, who was succeeded as earl of Somerset bv his brother

John Beaufort (1403-1444). The latter fought under Henry V. in the French wars, and having been taken prisoner remained in France as a captive until 1437. Soon after his release he returned to the war, and after the death of Richard Beauchamp, earl of Warwick, in 1439, acted as commander of the English forces, and, with his brother Edmund, was successful in recapturing Harfleur. Although chagrined when Richard, duke of York, was made regent of France, Beaufort led an expedition to France in 1442, and in 1443 was made duke of Somerset. He died, probably by his own hand, in May 1444. He married Margaret, daughter of Sir John Beauchamp, and left a daughter, Margaret Beaufort, afterwards countess of Richmond and Derby, who married, for her first husband, Edmund Tudor, earl of Richmond, by whom she became the mother of King Henry VII. In this way the blood of the Beauforts was mingled with that of the Tudors, and of all the subsequent occupants of the English throne.

The title of earl of Somerset descended on the death of John Beaufort in 1444 to his brother Edmund Beaufort, duke of Somerset (

Henry Beaufort (1436-1464) became duke of Somerset in 1455, and soon began to take part in the struggle against Richard, duke of York, but failed to dislodge Richard's ally, Richard Neville, earl of Warwick, from Calais. He took part in the victory of the Lancastrians at Wakefield in 1460, escaped from the carnage at Towton in 1461, and shared the attainder of Henry VI. in the same year. In May 1464 he was captured at Hexham and was beheaded immediately after the battle. The title of duke of Somerset was

assumed by his brother, Edmund Beaufort (c. 1438-1471), who fled from the country after the disasters to the Lancastrian arms, but returned to England in 147 1, in which year he fought at Tewkesbury, and in spite of a promise of pardon was beheaded after the battle on the 6th of May 147 1 . His younger brother John Beaufort had been killed probably at this battle, and so on the execution of Edmund the family became extinct.

Margaret Beaufort married Humphrey, earl of Stafford, and was the mother of Henry Stafford, duke of Buckingham. Henry Beaufort, third duke of Somerset (d. 1464), left an illegitimate son, Charles Somerset, who was created earl of Worcester by Henry VIII. in 1514. His direct descendant, Henry Somerset, fifth earl of Worcester, was a loyal partisan of Charles I. and in 1642 was created marquess of Worcester. His grandson, Henry, the third marquess, was made duke of Beaufort in 1682, and the present duke of Beaufort is his direct descendant.

See Thomas Walsingham, Historia Anglicana, edited by H. T. Riley (London, 1863-1864); W. Stubbs, Constitutional History of England, vols. ii. and iii. (Oxford, 1895); The Paston Letters, edited by James Gairdner (London, 1904).

BEAUFORT, FRANCOIS DE VEND6ME, Due de (1616- 1669), a picturesque figure in French history of the 17th century, was the second son of Cesar de Vendome, and grandson of Henry IV., by Gabrielle d'Estrees. He began his career in the army and served in the first campaigns of the Thirty Years' War, but his ambitions and unscrupulous character soon found a more congenial field in the intrigues of the court. In 1642 he joined in the conspiracy of Cinq Mars against Richelieu, and upon its failure was obliged to live in exile in England until Richelieu's death. Returning to France, he became the centre of a group, known as the " Importants," in which court ladies predominated, especially the duchess ol Che vreuse and the duchess of Montbazon. For an instant after the king's death, this group seemed likely to prevail, and Beaufort to be the head of the new government. But Mazarin gained the office, and Beaufort, accused of a plot to murder Mazarin, was imprisoned in Vincennes, in September 1643. He escaped on the 31st of May 1648, just in time to join the Fronde, which began in August 1648. He was then with the parlement and the princes, against Mazarin. His personal appearance, his affectation of popular manners, his quality of grandson (legitimized), of Henry IV., rendered him a favourite

of the Parisians, who acclaimed him everywhere. He was known as

the Roi des Halles (" king of the markets "), and popular subscriptions were opened to pay his debts. He had hopes of becoming prime minister. But among the members of the parlement and the other leaders of the Fronde, he was regarded as merely a tool. His intelligence was but mediocre, and he showed no talent during the war. Mazarin, on his return to Paris, exiled him in October 1652; and he was only allowed to return in 1654, when the cardinal had no longer any reason to fear him. Henceforth Beaufort no longer intrigued. In 1658 he was named general superintendent of navigation, or chief of the naval army, and faithfully served the king in naval wars from that on. In 1664 he directed the expedition against the pirates of Algiers. In 1669 he led the French troops defending Candia against the Turks, and was killed in a night sortie, on the 15th of June 1669. His body was brought back to France with great pomp, and official honours rendered it.

See the memoirs of the time, notably those of La Rochefoucauld, the Cardinal de Retz, and Madame de Motteville. Also DAvenel, Richelieu et la monarchic ■ absolue (1884); Cheruel, La France sous le ministere de Mazarin (1879) ; and La France sous la minorite de Louis XIV (1882).

BEAUFORT, HENRY (c. 1377-1447), English cardinal and bishop of Winchester, was the second son of John of Gaunt, duke of Lancaster, by Catherine, wife of Sir Hugh Swynford. His parents were not married until 1396, and in 1397 King Richard II. declared the four children of this union to be legitimate. Henry spent some of his youth at Aix-la-Chapelle, and having entered the church received various appointments, and was consecrated bishop of Lincoln in July 1398. When his half-brother became king as Henry IV. in 1399, Beaufort began to take a prominent place in public life; he was made chancellor in 1403, but he resigned this office in 1404, when he was translated from Lincoln to Winchester as the successor of William of Wykeham. He exercised considerable influence over the prince of Wales, after- wards King Henry V., and although he steadily supported the house of Lancaster he opposed the party led by Thomas Arundel, archbishop of Canterbury. A dispute over money left by John Beaufort, marquess of Dorset, caused or widened a breach in the royal family which reached a climax in 141 1. The details are not quite clear, but it seems tolerably certain that the prince and the bishop, anxious to retain their power, sought to induce Henry IV. to abdicate in favour of his son. Angry at this request, the king dismissed his son from the council, and Beaufort appears to have shared his disgrace. When Henry V. ascended the throne in 1413 the bishop again became chancellor and took a leading part in the

government until 141 7, when he resigned his office, and proceeded to the council which was then sitting at Constance. His arrival had an important effect on the deliberations of this council, and the compromise which was subsequently made between the rival parties was largely his work. Grateful for Beaufort's services, the new pope Martin V. offered him a cardinal's hat which Henry V. refused to allow him to accept. Returning to England, he remained loyal to Henry; and after the king's death in 1422 be- came a member of the council and was the chief opponent of the wild and selfish schemes of Humphrey, duke of Gloucester. In 1424 he became chancellor for the third time, and was mainly responsible for the conduct of affairs during Gloucester's expedi- tion to Hainaut. He was disliked by the citizens of London; and this ill-feeling was heightened when Gloucester, who was a favourite of the Londoners, returned to England and was doubtless reproached by Beaufort for the folly of his undertaking. A riot took place in London, and at the bishop's entreaty, the protector, John, duke of Bedford, came back to England. As this dispute was still unsettled when the parliament met at Leicester in February 1426, Bedford and the lords undertook to arbitrate. Charged by Gloucester with treason against Henry IV. and his successors, Beaufort denied the accusations. But although a reconciliation was effected, the bishop evidently regarded this as a defeat; and having resigned the chancellorship his energies were diverted into another channel.

Anxious to secure his aid for the crusade against the Hussites, Pope Martin again offered him a cardinal's hat, which Beaufort

accepted. He went to France in 1427, and was then appointed papal legate for Germany, Hungary and Bohemia; and pro- ceeding eastwards, he made a bold but futile effort to rally the crusaders at Tachau. Returning to England to raise money for a fresh crusade, he was received with great state in London; but his acceptance of the cardinalate had weakened his position and Gloucester refused to recognize his legatine commission. Beau- fort gave way on this question, but an unsuccessful attempt was made in 1429 to deprive him of his see. Having raised some troops he set out for Bohemia; but owing to the disasters which had just attended the English arms in France, he was induced to allow these soldiers to serve in the French war; and in February 143 1 the death of Martin V. ended his commission as legate. Meanwhile an attempt on the part of

Gloucester to exclude the cardinal from the council had failed, and it was decided that his attendance was required except during the discussion of questions between the king and the papacy. He accompanied King Henry VI. to Normandy in April 1430, and in December 143 1 crowned him king of France. About this time Gloucester made another attempt to deprive Beaufort of his see, and it was argued in the council that as a cardinal he could not hold an English bishopric. The general council was not inclined to press the case against him; but the privy council, more clerical and more hostile, sealed writs of praemunire and attachment against him, and some of his jewels were seized. On his return to England he attended the parliament jn May 1432, and asked to hear the charges against him. The king declared him loyal, and a statute was passed freeing him from any penalties which he might have incurred under the Statute of Provisors or in other ways. He supported Bedford in his attempts to restore order to the finances. In August 1435 he attended the congress at Arras, but was unable to make peace with France; and after Bedford's death his renewed efforts to this end were again opposed by Gloucester, who favoured a continuance of the war. On two occasions the council advised the king to refuse him permission to leave England, but in 1437 he obtained a full pardon for all his offences. In 1439 and 1440 he went to France on missions of peace, and apparently at his instigation the English council decided to release Charles, duke of Orleans. This step further irritated Gloucester, who drew up and presented to the king a long and serious list of charges against Beaufort; but the council defended the policy of the cardinal and ignored the personal accusations against him. Beaufort, however, gradually retired from public life, and after ' witnessing the conclusion of the treaty of Troy es died at Wolvesey palace, Winchester, on the 10th of April 1447. The " black despair " which Shakespeare has cast round his dying hours appears to be without historical foundation. He was buried in Winchester cathedral, the building of which he finished. He also refounded and enlarged the hospital of St Cross near Winchester.

Beaufort was a man of considerable wealth, and on several occasions he lent large sums of money to the king. He was the lover of Lady Alice Fitzalan, daughter of Richard, earl of Arundel, by whom he had a daughter, Joan, who married Sir Edward Stradling of St Donat's in Glamorganshire. His interests were secular and he was certainly proud and ambitious; but Stubbs has pictured the fairer side of his character when he observes that Beaufort " was merciful in his political enmities, enlightened in his foreign policy; that he was devotedly faithful, and ready to sacrifice his wealth and labour for

the king; that from the moment of his death everything began to go wrong, and went worse and worse until all was lost."

See Historiae Croylandensis continuatio, translated by H. T. Riley (London, 1854); Proceedings and Ordinances of the Privy Council, edited by N. H. Nicolas (London, 1834-1837); Aeneas Sylvius Piccolomini, Historica Bohemica (Frankfort and Leipzig, 1707); W. Stubbs, Constitutional History, vol. iii. (Oxford, 1895) ; M. Creighton, A History of the Papacy during the Period of the Reformation (London, 1897) ; and L. B. Radford, Henry Beaufort (1908).

BEAUFORT, LOUIS DE (d. 1795), French historian, of whose life little is known. In 1738 he published at Utrecht a Disserta- tion sur I 'incertitude des cinq premiers siecles de I'histoire romaine, in which he showed what untrustworthy guides even the his-

torians of highest repute, such as Livy and Dionysius of Halicarnassus, were for that period, and pointed out by what methods and by the aid of what documents truly scientific bases might be given to its history. This was an ingenious plea, bold for its time, against traditional history such as Rollin was writing at that very moment. A German, Christopher Saxius, endeavoured to refute it in a series of articles published in vols, i.iii. of the Miscellanea Liviensia. Beaufort replied by some brief and ironical Remarques in the appendix to the second edition of his Dissertation (1750). Beaufort also wrote an Histoire de Cesar Germanicus (Leyden, 1761), and La Republique romaine, ou plan giniral de I'ancien gouvernement de Rome (The Hague, 1766,2 vols, quarto) . Though not a scholar of the first rank, Beaufort has at least the merit of having been a pioneer in raising the question, afterwards elabor ated by Niebuhr, as to the credibility of early Roman history.

BEAUFORT SCALE, a series of numbers from o to 12 arranged by Admiral Sir Francis Beaufort (1774-1857) in 1805, to indicate the strength of the wind from a calm, force o, to a hurricane, force 12, with sailing directions such as " 5, smacks shorten sails " for coast purposes, and " royals, &c, ' full and by ' " for the open sea. An exhaustive report was made in 1906 by the Meteorological Office on the relation between the estimates of wind-force according to Beaufort's scale and the velocities recorded by anemometers belonging to the office, from which the following table is taken : —

Beaufort scale.

Corresponding wind.

Limits of hourly velocity.

Numbers.

Miles per hour.

Calm

Under 2

!-3

Light breeze

2-12

4-5

Moderate wind

13-23

6-7

Strong wind

24-37

8-9

Gale

38-55

IO-II

Storm

56-75

12

Hurricane

Above 75

BEAUFORT WEST, in Cape province, South Africa, the capital of a division of this name, 339 m. by rail N.E. of Cape Town. Pop.

(1904) 5481. The largest town in the western part of the Great Karroo, it lies, at an elevation of 2792 ft., at the foot of the southern slopes of the Nieuwveld mountains. It has several fine public buildings and the streets are lined with avenues of pear trees, while an abundant supply of water, luxuriant orchards, fields and gardens give it the appearance of an oasis in the desert. It is a favourite resort of invalids. The town was founded in 1819, and in its early days was largely resorted to by Griquas and Bechuana for the sale of ivory, skins and cattle. The Beaufort West division has an area of 6374 sq. m. and a pop. (1904) of 10,762, 45 % being whites. Sheep-farming is the principal industry.

BEAUGENCY, a town of central France, in the department of Loiret, 16 m. S.W. of Orleans on the Orleans railway, between that city and Blois. Pop. (1906) 2993. It is situated at the foot of vine-clad hills on the right bank of the Loire, to the left bank of which it is united by a bridge of twenty-six arches, many of them dating from the 13th century. The chief buildings are the chateau, mainly of the 1 5th century, of which the massive donjon of the nth century known as the Tour de Cesar is the oldest portion; and the abbey-church of Notre-Dame, a building in the Romanesque style of architecture, frequently restored. Some of the buildings of the Benedictine abbey, to which this church belonged, remain. The hotel de ville, the facade of which .is decorated with armorial bearings of Renaissance carving, and the church of St Etienne, an unblemished example of Romanesque architecture, are of interest. Several old houses, some remains of the medieval ramparts and the Tour de l'Horloge, an ancient gateway, are also preserved. The town carries on trade in grain, and has flour mills.

The lords of Beaugency attained considerable importance in the nth, 12th and 13th centuries; at the end of the 13th century the fief was sold to the crown, and afterwards passed to the house of Orleans, then to those of Dunois and Longueville and

ultimately again to that of Orleans. Joan of Arc defeated the English here in 1429. In 1567 the town was sacked and burned by the Protestants. On the 8th, 9th and 10th of December 1870 the German army, commanded by the grand-duke of Mecklenburg, defeated the French army of the Loire, under General Chanzy , in the battle of Beaugency (or Villorceau-Josnes) , which was fought on the left bank

of the Loire to the N.W. of Beaugency.

BEAUHARNAIS, the name of a French family, well known from the 15th century onward in Orleanais, where its members occupied honourable positions. One of them, Jean Jacques de Beauharnais, seigneur de Miramion, had for wife Marie Bonneau, who in 1 66 1 founded a female charitable order, called after her the Miramiones. Frangois de Beauharnais, marquis de la Ferte- Beauharnais, was a deputy in the states-general of 1789, and a devoted defender of the monarchy. He emigrated and served in Conde's army. Later he gave his adherence to Napoleon, and became ambassador in Etruria and Spain; he died in 1823. His brother Alexandre, vicomte de Beauharnais, married Josephine Tascher de la Pagerie (afterwards the wife of Napoleon Bonaparte) and had two children by her — Eugene de Beauharnais (q.v.) and Hortense, who married Louis Bonaparte, king of Holland, and became mother of Napoleon III. Claude de Beauharnais, comte des Roches-Baritaud, uncle of the marquis and of the vicomte de Beauharnais, served in the navy and became a vice-admiral. He married Marie Anne Francoise (called Fanny) Mouchard, a woman of letters who had a celebrated salon. His son, also named Claude (d. 1819), was created a peer of France in 18 14, and was the father of Stephanie de Beau- harnais, who married the grand-duke of Baden. The house of Beauharnais is still represented in Russia by the dukes of Leuchtenberg, descendants of Prince Eugene. (M. P.)*

BEAUHARNAIS, EUGENE DE (1781-1824), step-son of Napoleon I., was born at Paris on the 3rd of September 1781. He was the son of- the general Viscount Alexandre de Beau- harnais (1760-1794) and Josephine Tascher de la Pagerie. The father, who was born in Martinique, and served in the American War of Independence, took part in the politics of the French Revolution, and in June- August 1793 commanded the army of the Rhine. His failure to fulfil the tasks imposed on him (especially that of the relief of Mainz) led to his being arrested, and he was guillotined (23rd June 1794) not long before the fall of Robespierre. The marriage of his widow Josephine to Napoleon Bonaparte in March 1796 was at first resented by Eugene and his sister Hortense; but their step-father proved to be no less kind than watchful over their interests. In the Italian campaigns of 1796-1797 Eugene served as aide-de-camp to Bonaparte, and accompanied him to Egypt in the same capacity. There he distinguished himself by his activity and bravery, and was wounded during the siege of Acre. Bonaparte brought him back to France in the autumn of 1799, and it is known that the intervention of Eugene and Hortense helped to bring about the reconciliation which then

took place between Bonaparte and Josephine. The services rendered by Eugene at the time of the coup d'etat of Brumaire (1799) and during the Consulate (1799-1804) served to establish his fortunes, despite the efforts of some of the Bonapartes to destroy the influence of the Beauharnais and bring about the divorce of Josephine.

After the proclamation of the Empire, Eugene received the title of prince, with a yearly stipend of 200,000 francs, and became general of the chasseurs & cheval of the Guard. A year later, when the Italian republic became the kingdom of Italy, with Napoleon as king, Eugene received the title of viceroy, with large administrative powers. (See Italy.) Not long after the battle of Austerlitz (2nd December 1805) Napoleon dignified the elector of Bavaria with the title of king and arranged a marriage between Eugene and the princess Augusta Amelia of Bavaria. On the whole the government of Eugene gave general satisfaction in the kingdom of Italy; it comprised the districts between the Simplon Pass and Rimini, and also after the peace of Presburg (December 1805), Istria and Dalmatia. In 1808 (on the further partition of the papal states) the frontier of the

kingdom was extended southwards to the borders of the kingdom of Naples, in the part known as the Abruzzi. In the campaign of 1809 Eugene commanded the army of Italy, with General (afterwards Marshal) Macdonald as his adlatus. The battle of Sacile, where he fought against the Austrian army of the Arch- duke John, did not yield proofs of military talent on the part of Eugene or of Macdonald; but on the retreat of the enemy into Austrian territory (owing to the disasters of their main army on the Danube) Eugene's forces pressed them vigorously and finally won an important victory at Raab in the heart of the Austrian empire. Then, joining the main army under Napoleon, in the island of Lobau in the Danube, near Vienna, Eugene and Macdonald acquitted themselves most creditably in the great battle of Wagram (6th July 1809). In 1810 Eugene received the title of grand-duke of Frankfort. Equally meritorious were his services and those of the large Italian contingent in the campaign of 181 2 in Russia. He and they distinguished them- selves especially at the battles of Borodino and Malojaroslavitz; and on several occasions during the disastrous retreat which ensued, Eugene's soldierly constancy and devotion to Napoleon shone out conspicuously in 1813-1814, especially by contrast with the tergiversations of Murat. On the downfall of the Napoleonic regime Eugene retired to Munich, where he continued to reside, with the title duke of Leuchtenberg and prince of Eichstadt. He died in 1824, leaving two surviving sons and three daughters.

For further details concerning Eugene see Memoires et correspondence politique et militaire du Prince Eugene, edited by Baron A. Ducasse (10 vols., Paris, 1858-1860); F. J. A. Schneidewind, Prinz Eugen, Herzog von Leuchtenberg in den Feldzilgen seiner Zeit (Stockholm, 1857); A. Purlitzer, Une Idylle sous Napoleon I er : le roman du Prince Eugene (Paris, 1895) ; F. Masson, Napoleon et sa famille (Paris, 1897-1900). (J. Hl. R.)

BEAUJEU. The French province of Beaujolais was formed by the development of the ancient seigniory of Beaujeu (depart- ment of Rhone, arrondissement of Villefranche). The lords of Beaujeu held from the 10th century onwards a high rank in feudal society. In 1210 Guichard of Beaujeu was sent by Philip Augustus on an embassy to Pope Innocent III.; he was present at the French attack on Dover, where he died in 12 16. His son Humbert took part in the wars against the Albigenses and became constable of France. Isabeau, daughter of this Humbert, married Renaud, count of Forez; and their second son, Louis, assumed the name and arms of Beaujeu. His son Guichard, called the Great, had a very warlike life, fighting for the king of France, for the count of Savoy and for his own hand. He was taken prisoner by the Dauphinois in 1325, thereby losing important estates. Guichard's son, Edward of Beaujeu, marshal of France, fought at Crecy, and perished in the battle of Ardres in 1351. His son died without issue in 1374, and was succeeded by his cousin, Edward of Beaujeu, lord of Perreux, who gave his estates of Beaujolais and Dombes to Louis II., duke of Bourbon, in 1400. Pierre de Bourbon was lord of Beaujeu in 1474, when he married Anne of France, daughter of Louis XL, and this is why that princess retained the name of lady of Beaujeu. Louise of Savoy, mother of Francis I., got Beaujolais assigned to herself despite the claims of the constable de Bourbon. In 1 53 1 the province was reunited to the crown; but Francis II. gave it back to the Montpensier branch of the Bourbons in 1 560, from which house it passed to that of Orleans. The title of comte de Beaujolais was borne by a son of Philippe "Egalite," duke of Orleans, born in 1779, died in 1808. (M. P.)*

BEAULIEU, a village in the French department of Alpes- Maritimes. Pop. (1906) 1460. It is about 4 m. by rail E. of Nice (ij m. from Villefranche), and on the main line between Marseilles and Mentone; it is also connected with Nice and Mentone by an electric tramway. Of late years it has become a much frequented winter resort, and many handsome villas (among them that built by the 3rd marquess of Salisbury) have been constructed in the neighbourhood. The harbour has been extended and adapted for the reception of yachts. (W. A. B. C.)

BEAULY (pronounced Bewley; a corruption of Beaulieu), a town of Inverness-shire, Scotland, on the Beauly, 10 in. W. of

Inverness by the Highland railway. Pop. (1901) 855. Its chief interest is the beautiful remains of the Priory of St John, founded in 1 230 by John Bisset of the Aird, for Cistercian monks. At the Reformation the buildings (except the church, now a ruin) passed into the possession of Lord Lovat. On the right bank of the river is the site of Lovat Castle, which once belonged to the Bissets, but was presented by James VI. to Hugh Fraser and afterwards demolished. To the south-east is the church of Kirkhill containing the vault of the Lovats. Three miles south of Beauly is Beaufort Castle, the chief seat of the Lovats, a fine modern mansion in the Scottish baronial style. It occupies the site of a fortress erected in the time of Alexander II., which was besieged in 1303 by Edward I. This was replaced by several castles in succession, of which one — Castle Dounie — was taken by Cromwell and burned by the duke of Cumberland in 1746, the conflagration being witnessed from a neighbouring hill by Simon, Lord Lovat, before his capture on Loch Morar. The land around Beauly is fertile and the town drives a brisk trade in coal, timber, lime, grain and fish.

BEAUMANOIR, a seigniory in what is now the department of C6tes-du-Nord, France, which gave its name to an illustrious family. Jean de Beaumanoir, marshal of Brittany for Charles of Blois, and captain of Josselin, is remembered for his share in the famous battle of the Thirty. This battle, sung by an unknown trouvere and retold with variations by Froissart, was an episode in the struggle for the succession to the duchy of Brittany between Charles of Blois, supported by the king of France, and John of Montfort, supported by the king of England. John Bramborough, the English captain of Ploermel, having continued his ravages, in spite of a truce, in the district commanded by the captain of Josselin, Jean de Beaumanoir sent him a challenge, which resulted in a fight between thirty picked champions, knights and squires, on either side, which took place on the 25th of March 1351, near Ploermel. Beaumanoir commanded thirty Bretons, Bramborough a mixed force of twenty Englishmen, six German mercenaries and four Breton partisans of Montfort. The battle, fought with swords, daggers and axes, was of the most desperate character, in its details very reminiscent of the last fight of the Burgundians in the Nibelungenlied, especially in the celebrated

advice of Geoffroy du Bois to his wounded leader, who was asking for water: "Drink your blood, Beaumanoir; that will quench your thirst!" In the end the victory was decided by Guillaume de Montauban, who mounted his horse and overthrew seven of the English champions, the rest being forced to surrender. All the combatants on either side were either dead or seriously wounded, Bramborough being among the slain. The prisoners were well treated and released on payment of a small ransom. (See Le Poeme du combat des Trente, in the Pantheon litteraire; Froissart, Chroniques, ed. S. Luce, c. iv. pp. 45 and no ff., and pp.

338-340).

Jean de Beaumanoir (1551-1614), seigneur and afterwards marquis de Lavardin, count of Negrepelisse by marriage, served first in the Protestant army, but turned Catholic after the massacre of St Bartholomew, in which his father had been killed, and then fought against Henry of Navarre. When that prince became king of France, Lavardin changed over to his side, and was made a marshal of France. He was governor of Maine, commanded an army in Burgundy in 1602, was ambassador extraordinary to England in 1612, and died in 1614. One of his descendants, Henry Charles, marquis de Lavardin (1643-1701), was sent as ambassador to Rome in 1689, on the occasion of a difference between Loms XIV. and Innocent XL

BEAUMANOIR, PHILIPPE DE REMI, Sire de (c. 1250- 1296), French jurist, was born in the early part of the 13th century and died in 1296. The few facts known regarding his life are to be gathered from legal documents in which his name occurs. From these it appears that in 1273 he filled the post of bailli at Senlis, and in 1280 held a similar office at Clermont. He is also occasionally referred to as presiding at the assizes held at various towns. His great work is entitled Coutumes de Beauvoisis and first appeared in 1690, a second edition with introduction by A. A. Beugnot being published in 1842. It is regarded as one of

the best works bearing on old French law, and was frequently referred to with high admiration by Montesquieu. Beaumanoir also obtained fame, as a poet, and left over 20,000 verses, the best known of his poems being La Manekine, Jehan et Blonde and Salut d'amour.

BEAUMARCHAIS, PIERRE AUGUSTIN CARON DE (1732- 1799), French dramatist, was born in Paris on the 24th of January 1732.

His father, a watchmaker named Caron, brought him up to the same trade. He was an unusually precocious and lively boy, shrewd, sagacious, passionately fond of music and imbued with a strong desire for rising in the world. At the age of twenty-one he invented a new escapement for watches, which was pirated by a rival maker. Young Caron at once published his grievance in the Mercure, and had the matter referred to the Academy of Sciences, which decided in his favour. This affair brought him into notice at court; he was appointed, or at least called himself, watchmaker to the king, who ordered from him a watch similar to one he had made for Mme de Pompadour. His handsome figure and cool assurance enabled him to make his way at court. Mme Franquet, the wife of an old court official, persuaded her husband to make over his office to young Caron, and, on her husband's death, a few months later, married the handsome watchmaker. Caron at the same time assumed the name Beaumarchais ; and four years later, by purchasing the office of secretary to the king obtained a patent of nobility.

At court his musical talents brought him under the notice of the king's sisters, who.engaged him to teach them the harp. This position enabled him to confer a slight favour on the great banker Joseph Duverney, who testified his gratitude by giving Beau- marchais a share in his speculations. The latter turned the opportunity to good account, and soon realized a handsome fortune. In 1764 he took a journey to Spain, partly with commercial objects in view, but principally on account of the Clavijo affair. Jose Clavijo y Fajardo had twice promised to marry the sister of Beaumarchais, and had failed to keep his word. The adventure had not the tragic ending of Goethe's Clavigo, for Beaumarchais did not pursue his vengeance beyond words. Beaumarchais made his first essay as a writer for the stage with the sentimental drama Eugenie (1767), in which he drew largely on the Clavijo incident. This was followed after an interval of two years by Les Deux Amis, but neither play had more than moderate success. His first wife had died within a year of the marriage and in 1768 Beaumarchais married Mme Leveque. Her death in 1771 was the signal for unfounded rumours of poisoning. Duverney died in 1770; but some time before his death a duplicate settlement of the affairs between him and Beaumarchais had been drawn up, in which the banker acknow- ledged himself 1 debtor to Beaumarchais for 15,000 francs. Duverney's heir, the comte de La Blache, denied the validity of the document though without directly stigmatizing it as a forgery. The matter was put to trial. Beaumarchais gained his cause, but his adversary at once carried the case before the parlement. In the meantime the due de Chaulnes

forced Beaumarchais into a quarrel over Mdlle Menard, an actress at the Comedie Italienne, which resulted in the imprisonment of both parties. This moment was chosen by La Blache to demand judgment from the parlement in the matter of the Duverney agreement. Beaumarchais was released from prison for three or four days to see his judges. He was, however, unable to obtain an interview with Goezman, the member of the parlement appointed to report on his case. At last, just before the day on which the report was to be given in, he was informed privately that, by presenting 200 louis to Mme Goezman and 15 to her secretary, the desired interview might take place, if the result should prove unfavourable the money would be refunded. The money was sent and the interview obtained; but the decision was adverse, and 200 louis were returned, the 15 going as business expenses to the secretary. Beaumarchais, who had learned that •there was no secretary save Mme Goezman herself, insisted on restitution of the 15 louis, but the lady denied all knowledge of the affair. Her husband, who was probably not cognisant of the details of the transaction at first, doubtless thought the defeated

litigant would be easily put down, and at once brought an accusation against him for an attempt to corrupt justice. The battle was fought chiefly through the Memoires, or reports published by the adverse parties, and in it Beaumarchais's success was complete. For vivacity of style, fine satire and broad humour, his famous Memoires have never been surpassed. Even Voltaire was constrained to envy them. Beaumarchais was skilful enough to make his particular case of universal application. He was attacking the parlement through one of its members, and the parlement was the universally detested body formed by the chancellor Maupeou. The Memoires were, therefore, hailed with general delight; and the author, from being perhaps the most unpopular man in France, became at once the idol of the people. The decision went against Beaumarchais. The parlement condemned both him and Mme Goezman au blame, i.e. to civic degradation, while the husband was obliged to abandon his position. Beaumarchais was reduced to great straits, but he obtained restitution of his rights within two years, and finally triumphed over his adversary La Blache.

During the next few years he was engaged in the king's secret service. One of his missions was to England to destroy the MSmoires secrets d'une femme publique in which Charles Theveneau de Morande made

an attack on Mme Du Barry. Beaumarchais secured this pamphlet, and burnt the whole impression in London. Another expedition to England and Holland to seize a pamphlet attacking Marie Antoinette led to a series of incidents more amazing than the intrigues in Beaumarchais's own plays, but his own account must be received with caution. Beaumarchais pursued the libeller to Germany and overtook him in a wood near Neustadt. After a struggle he had gained possession of the document when he was attacked by brigands. Unfortunately the wound alleged to have been received in this fight was proved to be self-inflicted. The Austrian government regarded Beaumarchais with a suspicion justified by the circumstances. He was imprisoned for some time in Vienna, and only released on the receipt of explanations from Paris.

His various visits to England led him to take a deep interest in the impending struggle between the American colonies and the mother-country. His sympathies were entirely with the former; and by his unwearied exertions he succeeded in inducing the French government to give ample, though private, assistance in money and arms to the Americans. He himself, partly on his own account, but chiefly as the agent of the French and Spanish governments, carried on an enormous traffic with America. Under the name of Rodrigue Hortalez et Cie, he employed a fleet of forty vessels to provide help for the insurgents.

During the same period he produced his two famous comedies. The earlier, Le Barbier de Seville, after a prohibition of two years, was put on the stage in 1775. The first representation was a complete failure. Beaumarchais had overloaded the last scene with allusions to the facts of his own case and the whole action of the piece was laboured and heavy. But he cut down and remodelled the piece in time for the second representation, when it achieved a complete success. The intrigues which were necessary in order to obtain a licence for the second and more famous comedy, Le Mariage de Figaro, are highly amusing, and throw much light on the unsettled state of public sentiment at the time. The play was completed in 1778, but the opposition of Louis XVI., who alone saw its dangerous tendencies, was not overcome till 1784. The comedy had an unprecedented success. The principal character in both plays, Figaro, is a completely original conception; in fact Beaumarchais drew a portrait of himself in the resourceful adventurer, who, for mingled wit, shrewdness, gaiety and philosophic reflection, may not unjustly be ranked with Tartuffe. To English readers the Figaro plays are generally known through the adaptations of them in the grand opera of Mozart and Rossini; but in France they long retained popularity as

acting pieces. The success of Le Mariage de Figaro was helped on by the methods of self-advertisement so well understood by Beaumarchais. The proceeds of the

fiftieth performance were devoted to a charity, the choice of which provoked numerous epigrams. Beaumarchais had the imprudence to retaliate by personalities that were reported by his enemies to be dedicated against the king and queen. Beau- marchais was imprisoned for a short time by royal order in the prison of St Lazare. Brilliant pamphleteer as he was, Beau- marchais was at last to meet more than his match. He undertook to defend the company of the " Eaux de Paris," in which he had a large interest, against Mirabeau, and brought down on himself an invective to which he could offer no reply. His real influence was gone from that date (1 785-1 786). Shortly afterwards he was violently attacked by Nicolas Bergasse, whom he sued for defamation of character. He gained his case, but his reputation had suffered in the pamphlet war. Beaumarchais's later pro- ductions, the bombastic opera Tar are (1787) and the drama La Mere coupable (1792), which was very popular, are in no way worthy of his genius.

By his writings Beaumarchais contributed greatly, though quite unconsciously, to hurry on the events that led to the Revolution. At heart he hardly seems to have been a republican, and the new state of affairs did not benefit him. The astonishing thing is that the society travestied in Le Mariage de Figaro was the most vehement in its applause. The court looked on at a play justly characterized by Napoleon as the " revolution already in action " apparently without a suspicion of its real character. His popularity had been destroyed by the Mirabeau and Bergasse affairs, and his great wealth exposed him to the enmity of the envious. A speculation into which he entered, to supply the Convention with muskets from Holland, proved a ruinous failure. He was accused of concealing arms and corn in his house, but when his house was searched nothing was discovered but some thousands of copies of the edition (1783- 1790) of the works of Voltaire which he had had printed at his private press at Kehl, in Baden. He was charged with treason to the republic and was imprisoned in the Abbaye on the 20th of August 1792. A week later he was released at the intercession of Mme Houret de la Mariniere, who had been his mistress. He took refuge in Holland and England. His memoirs entitled, Mes six epoques, detailing his sufferings under the republic, are not unworthy of the Goezman period. His courage and happy disposition never deserted him, although he was hunted as an agent of the Convention in Holland and England, while in Paris he was proscribed as an Emigre. He returned to Paris in 1796, and

died there, suddenly, on the 18th of May 1799.

Gudin de la Brenellerie's Histoire de Beaumarchais (1809) was edited by M. Maurice Tourneux in 1888. See also L. de Lomenie, Beaumarchais et son temps (1855), Eng. trans, by H. S. Edwards, (4 vols., 1856); A. Hallay's Beaumarchais (1897); M. de Lescure, Eloge de Beaumarchais (1886); and Sainte-Beuve, Causeries du lundi, vol. vi. Beaumarchais's works have been edited by Gudin (7 vols., 1809) ; by Furne (6 vols., 1827) ; and by £. Fournier (1876). A variorum edition of his Theatre complet was published by MM. d'Heylli and de Marescot (4 vols., 1869-1875); and a Bibliographie des ceuvres de Beaumarchais, by H. Cordier in 1883.

BEAUMARIS, a market town and municipal borough, and the county town of Anglesey, N. Wales, situated on the Bay of Beaumaris, not far from Penmon, the northern entrance of the Menai Strait. Pop. (1901) 2326. It has but one considerable street. The large castle chapel, dedicated to the Virgin, has some fine monuments. David Hughes, of Jesus College, Oxford, founded the free grammar school in 1603. Buildings include town-hall and county-hall, with St Mary's church of the 13th century, with chancel of the 16th. Practically without trade and with no manufactures, Beaumaris is principally noted as a bathing-place. Its earliest charter dates from 1283 and was revised under Elizabeth. The town was formerly called Barnover and, still earlier, Rhosfair, and bears its present name of French origin since Edward I. built its castle in 1293. This extensive building was erected on low ground, so that the fosse might communicate with the sea, and vessels might unload under its walls. The castle capitulated, after siege, to General Mytton

(1646).

BEAUMONT, Belmont, or Bellomont, the name of a Norman and English family, taken from Beaumont-k-Roger in.

Normandy. Early in the nth century Roger de Beaumont, a kinsman of the dukes of Normandy, married a daughter of Waleran, count of Meulan, and their son, Robert de Beaumont (d. 1 118), became count of Meulan or Mellent about 1080. Before this date, however, he had fought at Hastings, and had added large estates in Warwickshire to the Norman fiefs of Beaumont and Pont Audemer,

which he received when his father entered the abbey of St Peter at Preaux. It was during the reigns of William II. and Henry I. that the count rose to eminence, and under the latter monarch he became " the first among the counsellors of the king." A " strenuous and sagacious man " he rendered valuable service to both kings in their Norman wars, and Henry I. was largely indebted to him for the English crown. He obtained lands in Leicestershire, and it has been said he was created earl of Leicester; this statement, however, is an error, although he exercised some of the privileges of an earl. His abilities as a counsellor, statesman and diplo- matist gained him the admiration of his contemporaries, and Henry of Huntingdon describes him as " the wisest man between this and Jerusalem." He seems to have been a man of inde- pendent character, for he assisted Anselm against William Rufus, although he supported Henry I. in his quarrel with Pope Paschal II. When Robert died on the 5th of June n 18 his lands appear to have been divided between his twin sons, Robert and Waleran, while a third son, Hugh, became earl of Bedford in 1138.

Robert de Beaumont (1104-1168), justiciar of England, married a granddaughter of Ralph Guader, earl of Norfolk, and receiving his father's English fiefs in n 18 became earl of Leicester. He and his brother, Waleran, were the chief advisers of Stephen, and helped this king to seize the bishops of Salisbury and Lincoln in 1139; later, however, Robert made his peace with Henry II., and became chief justiciar of England. First among the lay nobles he signed the Constitutions of Clarendon, he sought to reconcile Henry and Archbishop Becket, and was twice in charge of the kingdom during the king's absences in France. The earl founded the abbey of St Mary d,e Pre at Leicester and other religious houses, and by a charter confirmed the burgesses of Leicester in the possession of their merchant-gild and customs. His son,: Robert, succeeded to the earldom of Leicester, and with other English barons assisted prince Henry in his revolt against his father the king in n 73. For this participation, and also on a later occasion, he was imprisoned; but he enjoyed the favour of Richard I., and died in Greece when returning from a pilgrimage in 1190. His son and heir, Robert, died childless in 1204.

Waleran de Beaumont (1104-1166) obtained his father's French fiefs and the title of count of Meulan in n 18. After being imprisoned for five years by Henry I. he spent some time in England, and during the civil war between Stephen and the empress Matilda he fought for the former until about 1150, when he deserted the king and assisted the empress. His later history appears to have been uneventful. The

county of Meulan remained in possession of the Beaumont family until 1 204, when it was united with the royal domain.

Another member of the Beaumont family, possibly a relative of the earlier Beaumonts, was Louis de Beaumont (d. 1333), bishop of Durham from 13 17 until his death. This prelate was related to the English king, Edward II., and after a life spent in strife and ostentation, he died on the 24th of September 1333. John Beaumont, master of the rolls under Edward VI., was probably a member of the same family. A dishonest and corrupt judge, he was deprived of his office and imprisoned in 1552.

The barony of Beaumont dates from 1309, when Henry Beaumont (d. 1340), who was constable of England in 1322, was summoned to parliament under this title. It was retained by his descendants until the death of William, the 7th baron and the 2nd viscount, 1 in 1507, when it fell into abeyance. In 1840 the barony was revived in favour of Miles Thomas Stapleton (1805-1854), a descendant of Joan, Baroness Lovel, a daughter

1 His father John (d. 1460), the 6th baron, great chamberlain and constable of England, was the first person advanced to the dignity of a viscount in England.

of the 6th baron, and it has since been retained by his descendants.

In 1906 Wentworth Blackett Beaumont (1829-1907), the head of a family well known in the north of England, was created Baron Allendale.

BEAUMONT, CHRISTOPHE DE (1703-1781), French ecclesi- astic and archbishop of Paris, was a cadet of the Les Adrets and Saint-Quentin branch of the illustrious Dauphine family of Beaumont. He became bishop of Bayonne in 1741, then arch- bishop of Vienne in 1743, and in 1746, at the age of forty-three, archbishop of Paris. Beaumont is noted for his struggle with the Jansenists. To force them to accept the bull Unigenilus which condemned their doctrines, he ordered the priests of his diocese to refuse absolution to those who would not recognize the bull, and to deny funeral rites to those who had confessed to a Jansenist priest. While other bishops sent Beaumont their adhesion to his crusade, the parlement of Paris threatened to confiscate his temporalities. The king forbade the parlement to interfere in these spiritual questions, and upon its proving obdurate it was exiled (September 18, 1753). The " royal chamber," which was substituted, having failed to carry on the

administration of justice properly, the king was obliged to recall the parlement, and the archbishop was sent into honourable exile (August 1754). An effort was made to induce him to resign the active duties of his see to a coadjutor, but in spite of the most tempting offers — including a cardinal's hat — he refused. On the contrary, to his polemic against the Jansenists he added an attack on the philosophes, and issued a formal mandatory letter condemning Rousseau's £mile. Rousseau replied in his masterly Lettre a M. de Beaumont (1762), in which he insists that freedom of discussion in religious matters is essentially more religious than the attempt to impose belief by force.

De Beaumont's Mandements, lettres et instructions pastorales were published in two volumes in 1780, the year before his death.

BEAUMONT, SIR JOHN (1583-1627), English poet, second son of the judge, Sir Francis Beaumont, was born at Grace-Dieu in Leicestershire in 1583. The deaths of his father (in 1598) and of Iris elder brother, Sir Henry Beaumont (in 1605), made the poet early the head of this brilliant family; the dramatist, Francis Beaumont, being a younger brother. John went to Oxford in February 1597, and entered as a gentleman commoner in Broadgates Hall, the present Pembroke College. He was admitted to the Inner Temple in 1600, but on the death of Henry he no doubt went down to Grace-Dieu to manage the family estates. He began to write verse early, and in 1602, at the age of nineteen, he published anonymously his Metamorphosis of Tabacco, written in very smooth couplets, in which he addressed Drayton as his " loving friend." He lived in Leicestershire for many years as a bachelor, being one " who never felt Love's dreadful arrow." But in process of time he became a tardy victim, and married a lady of the Fortescue family, who bore him four stout sons, the eldest of whom, another John, was accounted one of the most athletic men of his time. " He could leap 16 ft. at one leap, and would commonly, at a stand-leap, jump over a high long table in the hall, light on a settle beyond the table, and raise himself straight up." This magnificent young man was not without literary taste; he edited his father's posthumous poems, and wrote an enthusiastic elegy on him; he was killed in 1644 at the siege of Gloucester. Another of Sir John Beaumont's sons, Gervaise, died in childhood, and the incidents of his death are recorded in one of his father's most touching poems. Sir John Beaumont concentrated his powers on a poem in eight books, entitled The Crown of Thorns, which was greatly admired in MS. by the earl of Southampton and others, but which is lost. After long retirement, Beaumont was persuaded by the duke of Buckingham to move in larger circles; he

attended court and in 1626 was made a baronet. This honour he did not long survive, for he died on the 19th of April 1627, and was buried in Westminster Abbey ten days later. The new Sir John, the strong man, published in i62g a volume entitled Bosworth Field; with a taste of the variety of other Poems

left by Sir John Beaumont. No more "tastes" were ever vouchsafed, so that it is by this volume and by the juvenile Metamorphosis of Tobacco that Beaumont's reputation has to stand. Of late years, the peculiarities of John Beaumont's prosody have drawn attention to his work. He wrote the heroic couplet, which was his favourite measure, with almost un- precedented evenness. Bosworth Field, the scene of the battle of which Beaumont's principal poem gives a vaguely epical narrative, lay close to the poet's house of Grace-Dieu. He writes on all occasions with a smoothness which was very remark- able in the first quarter of the 17 th century, and which marks him, with Edmund Waller and George Sandys, as one of the pioneers of the classic reformation of English verse.

The poems of Sir John Beaumont were included in A. Chalmers's English Poets, vol. vi. (18 10). An edition, with " memorial intro- duction" and notes, was included (1869) in Dr A. B. Grosart's Fuller Worthies' Library; and the Metamorphosis of Tobacco was included in J. P. Collier's Illustrations of Early English Popular Literature, vol. i. (1863). (E. G.)

BEAUMONT and FLETCHER, English dramatists. 1 The names of Francis Beaumont (1 584-1616) and John Fletcher (1570-1625) are inseparably connected in the history of the English drama. John Fletcher was born in December 1579 at Rye in Sussex, and baptized on the 20th of the same month. Richard Fletcher, his father, afterwards queen's chaplain, dean of Peterborough, and bishop successively of Bristol, Worcester and London, was then minister of the parish in which the son was born who was to make their name immortal. That son was just turned of seven when the dean distinguished and disgraced himself as the spiritual tormentor of the last moments on earth of Mary Stuart. When not quite twelve he was admitted pensioner of Bene't College, Cambridge, and two years later was made one of the Bible-clerks: of this college Bishop Fletcher had been president twenty years earlier, and six months before his son's admission had received from its authorities a first letter of thanks for

various benefactions, to be followed next year by a second. Four years later than this, when John Fletcher wanted five or six months of his seventeenth year, the bishop died suddenly of over much tobacco and the displeasure of Queen Elizabeth at his second marriage — this time, it appears, with a lady of such character as figures something too frequently on the stage of his illustrious son. He left eight children by his first marriage in such distress that their uncle, Dr Giles Fletcher, author of a treatise on the Russian commonwealth which is still held in some repute, was obliged to draw up a petition to the queen on their behalf, which was supported by the intercession of Essex, but with what result is uncertain.

From this date we know nothing of the fortunes of John Fletcher, till the needy orphan boy of seventeen reappears as the brilliant and triumphant poet whose name is linked for all time with the yet more glorious name of Francis Beaumont, third and youngest son of Sir Francis Beaumont of Grace-Dieu, one of the justices of the common pleas — born, according to general report, in 1 586, but, according to more than one apparently irrefragable document, actually born two years earlier. The first record of his existence is the entry of his name, together with those of his elder brothers Henry and John, as a gentleman-commoner of Broadgates Hall, Oxford, now supplanted by Pembroke College. But most lovers of his fame will care rather to remember the admirable lines of Wordsworth on the " eager child " who played among the rocks and woodlands of Grace-Dieu; though it may be doubted whether even the boy's first verses were of the peaceful and pastoral character attributed to them by the great laureate of the lakes. That passionate and fiery genius which was so soon and for so short a time to " shake the buskined stage " with heroic and tragic notes of passion and of sorrow, of scorn and rage, and

1 Recent research has resulted in some variation of opinion as to the precise authorship of some of the plays commonly attributed to them; but this article, contributed to the ninth edition of the Encyclopaedia Britannica, remains the classical modern criticism of. Beaumont and Fletcher, and its value is substantially unaffected. As representing to the end the views of its distinguished author, it is therefore retained as written, the results of later research being epi- tomized in the Bibliographical Appendix at the end. (Ed.)

slighted love and jealousy, must surely have sought vent from the first in fancies of a more ardent and ambitious kind; and it would be a likelier conjecture that when Frank Beaumont (as we know on more authorities than one that he was always called by his

contemporaries, even in the full flush of his adult fame— " never more than Frank," says Heywood) went to college at the ripe age of twelve, he had already committed a tragedy or two in emulation of Tamburlaine, Andronicus or Jeronymo. The date of his admission was the 4th of February 1597; on the 22nd of April of the following year his father died; and on the 3rd of November 1600, having left Oxford without taking his degree, the boy of fifteen was entered a member of the Inner Temple, his two brothers standing sponsors on the grave occasion. But the son of Judge Beaumont was no fitter for success at the bar than the son of Bishop Fletcher for distinction in the church: it is equally difficult to imagine either poet invested with either gown. Two years later appeared the poem of Salmacis and Hermaphroditus , generally attributed to Beaumont, a voluptuous and voluminous expansion of the Ovidian legend, not on the whole discreditable to a lad of eighteen, fresh from the popular love-poems of Marlowe and Shakespeare, which it naturally exceeds in long-winded and fantastic diffusion of episodes and conceits. At twenty-three Beaumont prefixed to the magnificent masterpiece of Ben Jonson some noticeable verses in honour of his " dear friend " the author; and in the same year (1607) appeared the anonymous comedy of The Woman-Hater, usually assigned to Fletcher alone; but being as it is in the main a crude and puerile imitation of Jonson's manner, and certainly more like a man's work at twenty-two than at twenty-eight, internal evidence would seem to justify, or at least to excuse those critics who in the teeth of high authority and tradition would transfer from Fletcher to Beaumont the principal responsibility for this first play that can be traced to the hand of either. As Fletcher also prefixed to the first edition of Volpone a copy of commendatory verses, we may presume that their common admiration for a common friend was among the earliest and strongest influences which drew together the two great poets whose names were thenceforward to be for ever indivisible. During the dim eleven years between the death of his father and the dawn of his fame, we cannot but imagine that the career of Fletcher had been unprosperous as well as obscure. From seventeen to twenty- eight his youth may presumably have been spent in such painful struggles for success, if not for sustenance, as were never known to his younger colleague, who, as we have seen, was entered at Oxford a few months after Fletcher must in all likelihood have left Cambridge to try his luck in London: a venture most probably resolved on as soon as the youth had found his family reduced by the father's death to such ruinous straits that any smoother course can hardly have been open to him. Entering college at the same age as Fletcher had entered six years earlier, Beaumont had before him a brighter and briefer line of life than his elder. But

whatever may have been their respective situations when, either by happy chance or, as Dyce suggests, by the good offices of Jonson, they were first brought together, their intimacy soon became so much closer than that of ordinary brothers that the household which they shared as bachelors was conducted on such thoroughly communistic principles as might have satisfied the most trenchant theorist who ever proclaimed as the cardinal point of his doctrine, a complete and absolute community of bed and board, with all goods thereto appertaining. But in the year following that in which the two younger poets had united in homage to Jonson, they had entered into a partnership of more importance than this in " the same clothes and cloak, &c," with other necessaries of life specified by Aubrey.

In 1608, if we may trust the reckoning which seems trust- worthiest, the twin stars of our stage rose visibly together for the first time. The loveliest, though not the loftiest, of tragic plays that we owe to the comrades or the successors of Shakespeare, Philaster, has generally been regarded as the first-born issue of their common genius. The noble tragedy of Thierry and Theo- doret has sometimes been dated earlier and assigned to Fletcher alone; but we can be sure neither of the early date nor the single

authorship. The main body of the play, comprising both the great scenes which throw out into full and final relief the character of either heroine for perfect good or evil, bears throughout the unmistakable image and superscription of Fletcher; yet there are parts which for gravity and steady strength of style, for reserve and temperance of effect, would seem to suggest the collaboration of a calmer and more patient hand; and these more equable and less passionate parts of the poem recall rather the touch of Massinger than of Beaumont. In the second act, for example, the regular structure of the verse, the even scheme of the action, the exaggerated braggardism which makes of the hero a mere puppet or mouthpiece of his own self-will, are all qualities which, for better or for worse, remind us of the strength or the weakness of a poet with whom we know that Fletcher, before or after his alliance with Beaumont, did now and then work in common. Even the Arbaces of Beaumont, though somewhat too highly coloured, does not " write himself down an ass," like Thierry on his first entrance, after the too frequent fashion of Massinger's braggarts and tyrants; does not proclaim at starting or display with mere wantonness of exposure his more

unlovely qualities in the naked nature of their deformity. Compare also the second with the first scene of the fourth act. In style and metre this second scene is as good an example of Massinger as the first is of Fletcher at his best. Observe especially in the elaborate narrative of the pretended self-immolation of Ordella these distinctive notes of the peculiar style of Massinger; the excess of parenthetic sentences, no less than five in a space of twenty lines; the classical common-place of allusion to Athens, Rome and Sparta in one superfluous breath; the pure and vigorous but somewhat level and prosaic order of language, with the use of certain cheap and easy phrases familiar to Massinger as catch- words; the flat and feeble terminations by means of which the final syllable of one verse runs on into the next without more pause or rhythm than in a passage of prose; the general dignity and gravity of sustained and measured expression. These are the very points in which the style of Massinger differs from that of Fletcher; whose lightest and loosest verses do not overlap each other without sensible distinction between the end of one line and the beginning of the next; who is often too fluent and facile to be choice or forcible in his diction, but seldom if ever prosaic or conventional in phrase or allusion, and by no means habitually given to weave thoughts within thoughts, knit sentence into sentence, and hang whole paragraphs together by the help of loops and brackets. From these indications we might infer that this poem belongs altogether to a period later than the death of Beaumont; though even during his friend's life it appears that Fletcher was once at least allied with Massinger and two lesser dramatists in the composition of a play, probably the Honest Man's Fortune, of which the accounts are to be found in Hen- slowe's papers.

Hardly eight years of toil and triumph of joyous and glorious life were spared by destiny to the younger poet between the date assigned to the first radiant revelation of his genius in Philaster and the date which marks the end of all his labours. On the 6th of March 1616 Francis Beaumont died — according to Jonson and tradition, " ere he was thirty years of age," but this we have seen to be inconsistent with the registry of his entrance at Oxford. If we may trust the elegiac evidence of friends, he died of his own genius and fiery overwork of brain; yet from the magnificent and masculine beauty of his portrait one should certainly never have guessed that any strain of spirit or stress of invention could have worn out so long before its time so fair and royal a temple for so bright and affluent a soul. A student of physiognomy will not fail to mark the points of likeness and of difference between the faces of the two friends; both models

of noble manhood, hand- some and significant in feature and expression alike ; — Beaumont's the statelier and serener of the two, with clear thoughtful eyes, full arched brows, and strong aquiline nose, with a little cleft at the tip; a grave and beautiful mouth, with full and finely curved- lips; the form of face a long pure oval, and the imperial head with its " fair large front " and clustering hair set firm and carried high with an aspect at once of quiet command and kingly observation:

Fletcher's a more keen and fervid face, sharper in outline every way, with an air of bright ardour and glad fiery impatience; sanguine and nervous, suiting the complexion and colour of hair; the expression of the eager eyes and lips almost recalling that of a noble hound in act to break the leash it strains at; — two heads as lordly of feature and as expressive of aspect as any gallery of great men can show. That spring of 1616, we may note in passing, was the darkest that ever dawned upon England or the world; for, just forty-eight days afterwards, it witnessed, on the 23rd of April, the removal from earth of the mightiest genius that ever dwelt among men. Scarcely more than a month and a half divided the death-days of Beaumont and of Shakespeare. Some three years earlier by Dyce's estimate, when about the age of twenty- nine, Beaumont had married Ursula, daughter and co-heiress to Henry Isley of Sundridge in Kent, by whom he'lef t two daughters, one of them posthumous. Fletcher survived his friend just nine years and five months; he died " in the great plague, 1625," and was buried on the 29th of August in St Saviour's, Southwark; not, as we might have wished, beside his younger fellow in fame, who but three days after his untimely death had added another deathless memory to the graves of our great men in Westminster Abbey, which he had sung in such noble verse. Dying when just four months short of forty-six, Fletcher had thus, as well as we can now calculate, altogether some fourteen years and six months more of life than the poet who divides with him the imperial inheritance of their common glory.

The perfect union in genius and in friendship which has made one name of the two names of these great twin brothers in song is a thing so admirable and so delightful to remember, that it would seem ungracious and unkindly to claim for either a precedence which we may be sure he would have been eager to disclaim. But if a distinction must be made between the Dioscuri of English poetry, we must admit that Beaumont was the twin of heavenlier birth. Only as Pollux was on one side a demigod of diviner blood than Castor can it be said that on any side Beaumont was a poet of higher and purer genius than Fletcher; but so much must be allowed by all who have

eyes and ears to discern in the fabric of their common work a distinction without a difference. Few things are stranger than the avowal of so great and exquisite a critic as Coleridge, that he could trace no faintest line of demarcation between the plays which we owe mainly to Beaumont and the plays which we owe solely to Fletcher. To others this line has always appeared in almost every case unmistakable. Were it as hard and broad as the line which marks off, for example, Shakespeare's part from Fletcher's in The Two Noble Kinsmen, the harmony would of course be lost which now informs every work of their common genius, and each play of their writing would be such another piece of magnificent patchwork as that last gigantic heir of Shakespeare's invention, the posthumous birth of his parting Muse which was suckled at the breast of Fletcher's as a child of godlike blood might be reared on the milk of a mortal mother— or in this case, we might sometimes be tempted to say, of a she- goat who left in the veins of the heaven-born suckling some- what too much of his nurse Amalthaea. That question however belongs in any case more properly to the study of Shakespeare than to the present subject in hand. It may suffice here to observe that the contributions of Fletcher to the majestic temple of tragedy left incomplete by Shakespeare show the lesser workman almost equally at his best and at his worst, at his weakest and at his strongest. In the plays which we know by evidence surer than the most trustworthy tradition to be the common work of Beaumont and Fletcher, there is indeed no trace of such incongruous and incompatible admixture as leaves the greatest example of romantic tragedy — for Cymbeline and the Winter's Tale, though not guiltless of blood, are in tfieir issues no more tragic than Pericles or the Tempest — a unique instance of glorious imperfection, a hybrid of heavenly aid other than heavenly breed, disproportioned and divine. But through- out these noblest of the works inscribed generally with the names of both dramatists we trace on every other page the touch of a surer hand, we hear at every other turn the note of a deeper

voice, than we can ever recognize in the work of Fletcher alone. Although the beloved friend of Jonson, and in the field of comedy his loving and studious disciple, yet in that tragic field where his freshest bays were gathered Beaumont was the worthiest and the closest follower of Shakespeare. In the external but essential matter of expression by rhythm and metre he approves himself always a student of Shakespeare's second manner, of the style in which the

graver or tragic part of his historical or romantic plays is mostly written; doubtless, the most perfect model that can be studied by any poet who, like Beaumont, is great enough to be in no danger of sinking to the rank of a mere copyist, but while studious of the perfection set before him is yet conscious of his own personal and proper quality of genius, and enters the presence of the master not as a servant but as a son. The general style of his tragic or romantic verse is as simple and severe in its purity of note and regularity of outline as that of Fletcher's is by comparison lax, effusive, exuberant. The matchless fluency and rapidity with which the elder brother pours forth the stream of his smooth swift verse gave probably the first occasion for that foolish rumour which has not yet fallen duly silent, but still murmurs here and there its suggestion that the main office of Beaumont was to correct and contain within bounds the overflowing invention of his colleague. The poet who while yet a youth had earned by his unaided mastery of hand such a crown as was bestowed by the noble love and the loving " envy " of Ben Jonson was, according to this tradition, a mere precocious pedagogue, fit only to revise and restrain the too liberal effusions of his elder in genius as in years. Now, in every one of the plays common to both, the real difficulty for a critic is not to trace the hand of Beaumont, but to detect the touch of Fletcher. Throughout the better part of every such play, and above all of their two masterpieces, Philaster and The Maid's Tragedy, it should be clear to the most sluggish or cursory of readers that he has not to do with the author of Valentinian and The Double Marriage. In those admirable tragedies the style is looser, more fluid, more feminine. From the first scene to the last we are swept as it were along the race of a running river, always at full flow of light and buoyant melody, with no dark reaches or perilous eddies, no stagnant pools or sterile sandbanks; its bright course only varied by sudden rapids or a stronger ripple here and there, but in rough places or smooth still stirred and sparkling with summer wind and sun. But in those tragic poems of which the dominant note is the note of Beaumont's genius a subtler chord of thought is sounded, a deeper key of emotion is touched, than ever was struck by Fletcher. The lighter genius is palpably subordinate to the stronger, and loyally submits itself to the impression of a loftier spirit. It is true that this distinction is never grave enough to produce a discord: it is also true that the plays in which the predominance of Beaumont's mind and style is generally per- ceptible make up altogether but a small section of the work that bears their names conjointly; but it is no less true that within this section the most precious part of that work is comprised. Outside it we shall find no figures so firmly drawn, no such clearness of outline, no such

cunning of hands as we recognize in the. three great studies of Bellario, Evadne and Aspatia. In his male characters, as for instance in the parts of Philaster and Arbaces, Beaumont also is apt to show something of that exaggeration or inconsistency for which his colleague is perhaps more frequently and more heavily to blame; but in these there is not a jarring note, not a touch misplaced; unless, indeed, a rigid criticism may condemn as unfeminine and incongruous with the gentle beauty of her pathetic patience the device by which Aspatia procures herself the death desired at the hand of Amintor. This is noted as a fault by Dyce; but may well be forgiven for the sake of the magnificent scene which follows, and the highest tragic effect ever attained on the stage of either poet. That this as well as the greater part of those other scenes which are the glory of the poem is due to Beaumont might readily be shown at length by the process of comparison. The noble scene of regicide, which it was found expedient to cancel during the earlier years of the Restoration, may indeed be the work of

Fletcher; but the part of Evadne must undoubtedly be in the main assigned to the more potent hand of his fellow. There is a fine harmony of character between her naked audacity in the second act and her fierce repentance in the fourth, which is not unworthy a disciple of the tragic school of Shakespeare; Fletcher is less observant of the due balance, less heedful of the nice proportions of good and evil in a faulty and fiery nature, compounded of perverse instinct and passionate reaction. From him we might have had a figure as admirable for vigour of handling, but hardly in such perfect keeping as this of Beau- mont's Evadne, the murderess-Magdalen, whose penitence is of one crimson colour with her sin. Nor even in Fletcher's Ordella, worthy as the part is throughout even of the precious and exquisite praise of Lamb, is there any such cunning touch of tenderness or delicate perfume of pathos as in the parts of Bellario and Aspatia. These have in them a bitter sweetness, a subtle pungency of mortal sorrow and tears of divine delight, beyond the reach of Fletcher. His highest studies of female character have dignity, energy, devotion of the heroic type; but they never touch us to the quick, never waken in us any finer and more profound sense than that of applause and admira- tion. There is a modest pathos now and then in his pictures of feminine submission and slighted or outraged love; but this submission he is apt to make too servile, this love too dog-like in its abject devotion to retain that tender reverence which so many generations of readers have paid to the sweet memories of Aspatia and Bellario. To excite compassion was enough for Fletcher as in the masculine parts of his work it was enough for

him to excite wonder, to sustain curiosity, to goad and stimulate by any vivid and violent means the interest of readers or spec- tators. The single instance of noble pathos, the one scene he has left us which appeals to the higher and purer kind of pity, is the death of the child Hengo in Bonduca — a scene which of itself would have sufficed to enrol his name for ever on the list of our great tragic poets. To him we may probably assign the whole merit of that fiery and high-toned tragedy, with all its spirit and splendour of national and martial passion; the conscious and demonstrative exchange of courtesy between Roman and Briton, which is one of the leading notes of the poem, has in it a touch of overstrained and artificial chivalry characteristic of Fletcher; yet the parts of Caratach and Poenius may be counted among the loftiest and most equal of his creations. But no surer test or better example can be taken of the distinctive quality which denotes the graver genius of either poet than that supplied by a comparison of Beaumont's Triumph of Love with Fletcher's Triumph of Death. Each little play, in the brief course of its single act, gives proof of the peculiar touch and special trick of its author's hand: the deeper and more delicate passion of Beaumont, the rapid and ardent activity of Fletcher, have nowhere found a more noticeable vent for the expression respec- tively of the most tender and profound simplicity of quiet sweet- ness, the most buoyant and impatient energy of tragic emotion. In the wider field of their comic or romantic drama it is yet easier to distinguish the respective work of either hand. The bias of Fletcher was towards mixed comedy; his lightest and wildest humour is usually crossed or tempered by an infusion of romance; like Shakespeare in this one point at least, he has left no single play without some touch on it of serious interest, of poetic eloquence or fancy, however slight and fugitive. Beaumont, evidently under the imperious influence of Ben Jonson's more rigid theories, seems rather to have bent his genius with the whole force of a resolute will into the form or mould prescribed for comedy by the elder and greater comic poet. The admirable study of the worthy citizen and his wife, who introduce to the stage and escort with their applause The Knight of .the Burning Pestle through his adventurous career to its untimely end, has all the force and fulness of Jonson's humour at its best, with more of freshness and freedom. In pure comedy, varied with broad farce and mock-heroic parody, Beaumont was the earliest as well as the ablest disciple of the master whose mantle was afterwards to be shared among the academic poets of a younger generation, the Randolphs and Cartwrights who

sought shelter under the shadow of its voluminous folds. The best example of the school of Jonson to be found dutside the ample range of his own work is The Scornful Lady, a comedy whose exceptional success and prolonged popularity must have been due rather to the broad effect of its forcible situations, its wealth and variety of ludicrous incidents, and the strong gross humour of its dialogue, than to any finer quality of style, inven- tion or character. It is the only work of Beaumont and Fletcher which a critic who weighs the meaning of his words can admit to be as coarse as the coarsest work of Ben Jonson. They are prone, indeed, to indulge elsewhere in a wanton and exuberant licence of talk; and Fletcher, at least, is liable to confuse the shades of right and wrong, to deface or efface the boundary lines of good and evil, to stain the ermine of virtue and palliate the nakedness of vice with the same indecorous and incongruous laxity of handling. Often in mere haste to despatch the business of a play, to huddle up a catastrophe or throw out some particular scene into sharp and immediate relief, he will sacrifice all seemli- ness and consistency of character to the present aim of stage effect, and the instant impression of strong incident or audacious eloquence. His heroines are too apt to utter sentiments worthy of Diana in language unworthy of Doll Tearsheet. But in this play both style and sentiment are throughout on a lower level, the action and emotion are of a baser kind than usual; the precept of Aristotle and the practice of Jonson have been so carefully observed and exaggerated that it might almost be said to offer us in one or two places an imitation not merely of the sorrier but of the sorriest qualities of human nature; and full as it is of spontaneous power and humorous invention, the comedy extolled by the moral Steele (with just so much of reservation as permits him to deprecate the ridicule cast upon the clerical character) is certainly more offensive to artistic law and aesthetic judgment by the general and ingrained coarseness of its tone, than the tragi-comedy denounced by the immoral Dryden as exceeding in licence his own worst work and that of his fellow playwrights; an imputation, be it said in passing, as groundless as the protest pleaded on their behalf is impudent; for though we may hardly agree with the uncompromising panegyrist who commends that play in particular to the approval of "the austere scarlet" (remembering, perhaps, that Aristo- phanes was the chosen bedfellow of Chrysostom), there is at least no such offence against art or taste in the eccentricity of its situations or the daring of its dialogue. The buoyant and facile grace of Fletcher's style carries him lightly across quag- mires in which a heavier-footed poet, or one of slower tread, would have stuck fast, and come forth bemired to the knees. To Beaumont his stars had given as birthright the gifts of

tragic pathos and passion, of tender power and broad strong humour; to Fletcher had been allotted a more fiery and fruitful force of invention, a more aerial ease and swiftness of action, a more various readiness and fulness of bright exuberant speech. The genius of Beaumont was deeper, sweeter, nobler than his elder's; the genius of Fletcher more brilliant, more supple, more prodigal, and more voluble than his friend's. Without a taint or a shadow on his fame of such imitative servility as marks and degrades the mere henchman or satellite of a stronger poet, Beaumont may fairly be said to hold of Shakespeare in his tragedy, in his comedy of Jonson; in each case rather as a kinsman than as a client, as an ally than as a follower: but the more special province of Fletcher was a land of his own discovering, where no later colonist has ever had power to settle or to share his reign. With the mixed or romantic comedy of Shakespeare it has nothing in common except the admixture or alternation of graver with lighter interest, of serious with humorous action. Nothing is here of his magic exaltation or charm of fairy empire. The rare and rash adventures of Fletcher on that forbidden track are too sure to end in pitiful and shameful failure. His crown of praise is to have created a wholly new and wholly delightful form of mixed comedy or dramatic romance, dealing merely with the humours and sentiments of men, their passions and their chances; to have woven of all these a web of emotion and event with such gay dexterity, to have blended his colours

and combined his effects with such exquisite facility and swift light sureness of touch, that we may return once and again from those heights and depths of poetry to which access was forbidden him, ready as ever to enjoy as of old the fresh incomparable charm, the force and ease and grace of life, which fill and animate the radiant world of his romantic invention. Neither before him nor after do we find, in this his special field of fancy and of work, more than shadows or echoes of his coming or departing genius. Admirable as are his tragedies already mentioned, rich in splendid eloquence and strong in large grasp of character as is the Roman history of The False One, full of interest and vigour as is the better part of Rollo Duke of Normandy, and sublime in the loveliness of passion as is the one scene of perfect beauty and terror which crowns this latter tragedy, Fletcher may claim a yet higher and more special station among his great dramatic peers by right of his comic and romantic than by right of his tragic and historic plays. Even in these he is. more a romantic than a tragic poet. The quality of his genius, never sombre or subtle or profound, bears him always towards fresh air and sunshine. His natural work is in a midday -world of fearless

boyish laughter and hardly bitter tears. There is always more of rainbow than of storm in his skies; their darkest shadow is but a tragic twilight. What with him is the noon of night would seem as sunshine on the stage of Ford or Webster. There is but one passage in all these noble plays which lifts us beyond a sense of the stage, which raises our admiration out of speech into silence, tempers and transfigures our emotion with a touch of awe. And this we owe to the genius of Beaumont, exalted for an instant to the very tone and manner of Shakespeare's tragedy, when Amintor stands between the dead and the dying woman whom he has unwittingly slain with hand and tongue. The first few lines that drop from his stricken lips are probably the only verses of Beaumont or Fletcher which might pass for Shakespeare's even with a good judge of style —

" This earth of mine doth tremble," &c.

But in Fletcher's tragedy, however we may be thrilled and kindled with high contagious excitement, we are never awed into dumb delight or dread, never pierced with any sense of terror or pity too deep or even deep enough for tears. Even his Brunhalts and Martias can hardly persuade us to forget for the moment that " they do but jest, poison in jest." A critic bitten with the love of classification might divide those plays of Fletcher usually ranked together as comedies into three kinds: the first he would class under the head of pure comedy, the next of heroic or romantic drama, the third of mixed comedy and romance; in this, the last and most delightful division of the poet's work the special qualities of the two former kinds being equally blended and delicately harmonized. The most perfect and triumphant examples of this class are The Spanish Curate, Monsieur Thomas, The Custom of the Country, and The Elder Brother. Next to these and not too far below them, we may put The Little French Lawyer (a play which in its broad conception of a single eccentric humour suggests the collaboration of Beaumont and the influence of Jonson, but in style and execution throughout is perfect Fletcher), The Humorous Lieutenant (on which an almost identical verdict might be passed), Women Pleased, Beggars' Bush, and perhaps we might add The Fair Maid of the Inn; in most if not in all of which the balance of exultant and living humour with serious poetic interest of a noble and various kind is held with even hand and the skill of a natural master. In pure comedy Rule a Wife and have a Wife is the acknowledged and consummate master- piece of Fletcher. Next to it we might class, for comic spirit and force of character, Wit without Money, The Wildgoose Chase, The Chances, and The Noble Gentleman, — a broad poetic farce to whose overflowing fun and masterdom of extravagance no critic has ever

done justice but Leigh Hunt, who has ventured, not without reason, to match its joyous and preposterous audacities of superlative and sovereign foolery with the more sharp-edged satire and practical merriment of King and No King, where the keen prosaic humour of Bessus and his swordsmen is as typical of the comic style in which Beaumont had been trained up under Ben Jonson as the high interest and graduated action of the

serious part of the play are characteristic of his more earnest genius. Among the purely romantic plays of Fletcher, or those in which the comic effect is throughout subordinate to the romantic, The Knight of Malta seems most worthy of the highest place for the noble beauty and exaltation of spirit which informs it with a lofty life, for its chivalrous union of heroic passion and Catholic devotion. This poem is the fairest and the first example of those sweet fantastic paintings in rose-colour and azure of visionary chivalry and ideal holiness, by dint of which the romance of more recent days has sought to cast the glamour of a mirage over the darkest and deadliest " ages of faith." The pure and fervent eloquence of the style is in perfect keeping with the high romantic interest of character and story. In the same class we may rank among the best samples of Fletcher's workmanship The Pilgrim, The Loyal Subject, A Wife for a Month, Love's Pilgrimage, and The Lover's Progress, — rich all of them in exquisite writing, in varied incident, in brilliant effects and graceful and passionate interludes. In The Coxcomb, and The Honest Man's Fortune — two plays which, on the whole, can hardly be counted among the best of their class — there are tones of homelier emotion, touches of a simpler arid more pathetic interest than usual; and here, as in the two admirable first scenes between Leucippus and Bacha, which relieve and redeem from contempt the tragic burlesque of Cupid's Revenge, the note of Beaumont's manner is at once discernible.

Even the most rapid revision of the work done by these great twin poets must impress every capable student with a sense of the homage due to this living witness of their large and liberal genius. The loss of their names from the roll of English poetry would be only less than the loss of the few greatest inscribed on it. Nothing could supply the want of their tragic, their comic or romantic drama; no larger or more fiery planet can ever arise to supplant or to eclipse the twin lights of our zodiac. Whatever their faults of shortcoming or excess, there is in their very names or the mere thought of their common

work a kind of special and personal attraction for all true lovers of high dramatic poetry. There is the glory and grace of youth in all they have left us ; if there be also somewhat too much of its graceless as well as its gracious qualities, yet there hangs about their memory as it were a music of the morning, a breath and savour of bright early manhood, a joyous and vigorous air of free life and fruitful labour, which might charm asleep for ever all thought or blame of all mortal infirmity or folly, or any stain of earth that may have soiled in passing the feet of creatures half human and half divine while yet they dwelt among men. For good or for evil, they are above all things poets of youth; we cannot conceive of them grown grey in the dignity of years, venerable with the authority of long life, and weighted with the wisdom of experience. In the Olympian circle of the gods and giants of our race who on earth were their contemporaries and corrivals, they seem to move among the graver presences and figures of sedater fame like the two spoilt boys of heaven, lightest of foot and heart and head of all the brood of deity. Shakespeare may have smiled as Jonson may have nodded approval of their bright swift work, neither of these great elders grudging his praise to the special charm which won for it a preference during one generation at least even over their own loftier and weightier verse; and indeed the advance in natural ease, in truth and grace of dialogue, is alike manifest whether we turn to such of their comic characters as Valentine and Don John, Rutilio and Monsieur Thomas, from the Truewit of Jonson or even from the Mercutio of Shakespeare; the one too stiff with classic starch, the other too full of mere verbal catches and forced conceits, to persuade us that either can in any age have fairly represented the light free talk and facile humour of its youth. In another field than this Beaumont and Fletcher hold as high and secure a station of their own as any poet of their race. In perfect workmanship of lyrical jewellery, in perfect bloom and flower of song-writing, they equal all compeers whom they do not excel; the blossoms of their growth in this kind may be matched . for colour and fragrance against Shakespeare's, and for morning freshness and natural purity of form exceed the finest grafts of Jonson. The Faithful Shepherdess alone might speak for Fletcher

on this score, being as it is simply a lyric poem in semi-dramatic shape, to be judged only as such, and as such almost faultless; but in no wise to be classed for praise or blame among the acting plays of its author, whose one serious error in the matter was the submission of his Dryad to the critical verdict of an audience too probably in great part composed of clowns and satyrs far unlike the loving and sweet-tongued sylvan of his lovely fancy. And whether we assign to

him or to Beaumont the divine song of melancholy (moestius lacrymis Simonideis), perfect in form as Catullus and profound in sentiment as Shelley, which Milton himself could but echo and expand, could not heighten or deepen its exquisite intensity of thought and word alike, there will remain witness enough for the younger brother of a lyric power as pure and rare as his elder's.

The excess of influence and popularity over that of other poets usually ascribed to the work of Beaumont and Fletcher for some half century or so after their own time has perhaps been somewhat overstated by tradition. Whatever may have been for a season the fashion of the stage, it is certain that Shakespeare can show two editions for one against them in folio ; four in all from 1623 to 1685, while they have but their two of 1647 and 1679. Nor does one see how it can accurately or even plausibly be said that they were in any exact sense the founders of a school either in comedy or in tragedy. Massinger, for some years their survivor, and in some points akin to them as a workman, cannot properly be counted as their disciple; and no leading poet of the time had so much in common with them as he. At first sight, indeed, his choice of romantic subject and treatment of foreign stories, gathered from the fertile tale-tellers of the south, and ranging in date from Boccaccio to Cervantes, may seem to mark him out as a member of the same school; but the deepest and most distinctive qualities of his genius set it far apart from theirs; though undoubtedly not so far that any discrepancy or discord should impair the excellence or injure the keeping of works in which he took part with Fletcher. Yet, placed beside theirs, the tone of his thought and speech seems by comparison severe as well as sober, and sad as well as severe. Their extra- vagant and boyish insanity of prostrate royalism is not more alien from his half pensive and half angry undertone of political protest than his usually careful and complete structure of story from their frequently lax and slovenly incoherence of character or plot, than his well composed and proportioned metre from their lighter and looser melodies, than the bitter insistence and elaborate acrimony of his judicial satire on hypocrisy or oppres- sion from the gaiety or facility of mood which suffers them in the shifting of a scene to redeem their worst characters by some juggler's trick of conversion at the last moment allowed them to wind up a play with universal reconciliation and an act of oblivion on all hands. They could hardly have drawn with such steady skill and explicit finish an Overreach or a Luke; but the strenuous and able work of Massinger at its highest point of success has no breath in it of their brighter and more immediate inspiration. Shirley, on the other hand, may certainly be classed as a pupil who

copied their style in water-colour; his best tragedy and his best comedy, The Traitor and The Lady of Pleasure, might pass muster undetected among the plays of Fletcher, and might fairly claim to take rank above the lowest class of these. In the finest work of Middleton we recognize an almost exact reproduction of Fletcher's metrical effects, — a reverberation of that flowing music, a reiteration of those feminine final notes. In his later tragi-comedies, throughout his masterpiece of Women beware Women, and in the noble scenes which make up the tragic or serious parts of The Change- ling or The Spanish Gipsy, — wherever, in a word, we find the admirable but unequal genius of this poet at its best — we find a likeness wholly wanting in his earlier and ruder work, which undoubtedly suggests the influence of Fletcher. Other instances of imitation, other examples of discipleship, might perhaps be found among lesser men of the next generation; but the mass of succeeding playwrights began in a very short time to lower the style and debase the scheme of dramatic poetry; and especially to loosen the last ties of harmony, to deface the very

form and feature of tragic verse. In Shirley, the last and least of those in whom the lineal blood of the old masters was yet discernible, we find side by side with the fine ancestral indications of legitimate descent exactly such marks of decadence rather than degeneracy as we might have anticipated in the latest heir of a long line which began with the rise of Marlowe, " sun of the morning," in the highest heaven of our song, to prepare a path- way for the sun. After Shakespeare there was yet room for Beaumont and Fletcher; but after these and the other con- stellations had set, whose lights filled up the measure of that diviner zodiac through which he moved, there was but room in heaven for the pallid moonrise of Shirley; and before this last reflex from a sunken sun was itself eclipsed, the glory had passed away from English drama, to alight upon that summit of epic song, whence Milton held communion with darkness and the stars. (A. C. S.)

Bibliographical Appendix

The chief collected editions of the plays of Beaumont and Fletcher are: Comedies and Tragedies written by Francis Beau- mont and John Fletcher Gentlemen, printed by Humphrey Moseley in folio in 1647 as containing plays " never printed before"; Fifty Comedies and

Tragedies written, &c. (fol. 1679); Works … (11 vols. 1843-1846), edited by Alexander Dyce, which superseded earlier editions by L. Theobald, G. Colman and H. Weber, and presented a modernized text; a second two-volume edition by Dyce in 1852; The Works of Francis Beaumont and John Fletcher (15 vols. 1905, &c.)edited by Arnold Glover and A. R. Waller in the " Cambridge English Classics " from the text of the 2nd folio, and giving variant readings from all separate issues of the plays previous to that edition; and Works … (12 vols. 1904, &c), under the general editorship of A. H. Bullen, the text of which is founded on Dyce but with many variant readings, the last volume containing memoirs and excursuses by the editor.

The foundation of all critical work on Beaumont and Fletcher is to be found in Dyce. Discrimination between the work of the two dramatists and their collaborators has been the object of a series of studies for the establishment of metrical and other tests. Fletcher's verse is recognizable by the frequency of an extra syllable, often an accented one, at the end of a line, the use of stopped lines, and the frequency of trisyllabic feet. He thus obtained an adaptable instrument enabling him to dispense with prose even in comic scenes. The pioneer work in these matters was done by F. G. Fleay in a paper read before the New Shakspere Society in 1874 on " Metrical Tests as applied to Fletcher, Beaumont and Massinger." His theories were further developed in the article " Fletcher " in his Biog. Chron. of the Eng. Drama. Further investigations were published by R. Boyle in Englische Studien (vols, v.-x., Heilbronn, 1882-1887), and in the New Shakspere Society Transactions (1880-1886), by Benno Leonhardt in Anglia (Halle, vols. xix. seq.), and by E.H.Oliphant in Englische Studien (vols. xiv. seq.). Mr Oliphant restores to Beaumont much which other critics had been inclined to deny him. On the sources of the plays see E. Koppel in Munchener Beitrage zur roman. u. eng. Phil. (Erlangen and Leipzig, 1895). Consult further articles by A. H. Bullen and R. Boyle respectively on Fletcher and Massinger in the Diet, of Nat. Biog.; G. C. Macaulay, Francis Beaumont, a Critical Study (1883); and Dr A. W. Ward's chapter on " Beaumont and Fletcher " in vol. ii. of his Hist, of Eng. Dram. Lit. (new ed. 1899).

A list of the plays attributed to Beaumont and Fletcher, with some details, is added, with the premiss that beyond the main lines of criticism laid "down in Mr Swinburne's article above it is often difficult to dogmatize on authorship. Even in cases where the play was produced long after Beaumont had ceased to write for the stage there can be no certainty that we are not dealing with a piece which is an adaptation of an earlier play by a later hand.

The Joint Works of Beaumont and Fletcher. — The Scornful^ Lady (acted c. 1609, pr. 1616) is a farcical comedy of domestic life, in which Oliphant finds traces of alteration by a third and perhaps a

fourth hand. Philaster or Love Lies a-Bleeding is assigned by Macaulay to Beaumont practically in its entirety, while Fleay attributes only three scenes to Fletcher. It was probably acted c. 1609, and was printed 1620; it was revised (1695) by Elkanah Settle and (1763) by the younger Colman, probably owing its long popu- larity to the touching character of Bellario. Beaumont's share also predominated in The Maid's Tragedy (acted c. 1609, pr. 1619), in A King and No King (acted at court December 26, 161 1, and perhaps earlier, pr. 1619), while The Knight of the Burning Pestle (c. 1610, pr. 1613), burlesquing the heroic and romantic play of which Heywood's Four Prentices is an example, might perhaps be transferred entire to Beaumont's account. In Cupid's Revenge (acted at court January 1612, and perhaps at Whitefriars in 1610, pr. 1615), founded on Sidney's Arcadia, the two dramatists appear to have had a third collaborator in Massinger and perhaps a fourth in Nathaniel Field.

The Coxcomb (acted c. 1610, and by the Children of the Queen's Revels in 1612, pr. 1647) seems to have undergone later revision by Massinger. Fletcher's collaboration with other dramatists had begun during his connexion with Beaumont, who apparently ceased to write for the stage two or three years before his death.

Works Assigned to Beaumont's Sole Authorship. — The Woman Hater (pr. 1607, as " lately acted by the children of Paul's ") was assigned formerly to Fletcher. The Masque of the Inner Temple and Gray's Inn was presented at Whitehall on the 26th of February 1612, on the marriage of the Prince and Princess Palatine. Of Four Plays, or Moral Representations, in One (acted 1608, pr. 1647), the Induction, with The Triumph of Honour and The Triumph of Love, both founded on tales from the Decameron, are by Beaumont.

Works Assigned to Fletcher's Sole Authorship. — The Faithful Shepherdess (pr. c. 1609) was ill received on its original production, but was revived in 1634. That Fletcher was the sole author is practically unquestioned, though Ben Jonson in Drummond's Conversations is made to assert that " Beaumont and Fletcher ten years since hath written The Faithful Shepherdess." It was trans- lated into Latin verse by Sir R. Fanshawe in 1658, and Milton's Comus owes not a little to it. In Four Plays in One, the two last, The Triumph of Death and The Triumph of Time, are Fletcher's. In the

indifferent comedy of The Captain (acted 1612-1613, revived 1626, pr. 1647) there is no definite evidence of any other hand than Fletcher's, though the collaboration of Beaumont, Massinger and Rowley has been advanced. Other Fletcher plays are : Wit without Money (acted 1614, pr. 1639) ; the two romantic tragedies of Bonduca (in which Caradach or Caractacus is the chief figure rather than Bonduca or Boadicea) and Valentinian, both dating from c. 1616 and printed in the first folio; The Loyal Subject (acted 1618, revived at court 1633, pr. 1647) ; The Mad Lover (acted before March 1619, pr. 1647), which borrows something from the story of Mundus and Paulina in Josephus (bk. xviii.) ; The Humorous Lieutenant (1619, pr. 1647); Woman Pleased (c. 1620, pr. 1647); The Woman's Prize or The Tamer Tam'd (produced probably between 1610 and 1 613, acted 1633 at Blackfriars and at court, pr. 1647), a kind of sequel to The Taming of the Shrew; The Chances (uncertain date, pr. 1647), taken from La Sennora Cornelia of Cervantes, and repeatedly revived after the Restoration and in the 18th century; Monsieur Thomas (acted perhaps as early as 1609, pr. 1639) ; The Island Princess (c. 1621, pr. 1647) ; The Pilgrim and The Wild Goose-Chase (pr. 1652), the second of which was adapted in prose by Farquhar, both acted at court in 1 62 1, and possibly then not new pieces; A Wife for a Month (acted 1624, pr. 1647); Rule a Wife and Have a Wife (lie. 1624, pr. 1640). The Pilgrim received additions from Dryden. and was adapted by Vanbrugh.

Fletcher in Collaboration with other Dramatists. — External evidence of Fletcher's connexion with Massinger is given by Sir Aston Cokaine, who in an epitaph on Fletcher and Massinger wrote: " Playes they did write together, were great friends," and elsewhere claimed for Massinger a share in the plays printed in the 1647 folio. James Shirley and William Rowley have their part in the works that used to be included in the Beaumont and Fletcher canon; and to a letter from Field, Daborne and Massinger, asking for £5 for their joint necessities from Henslowe about the end of 1615, there isa postscript suggesting the deduction of the sum from the " mony remaynes for the play of Mr Fletcher and ours." The problem is complicated when the existing versions of the play are posterior to Fletcher's lifetime, that is, revisions by Massinger or another of pieces which were even originally of double authorship. In this way Beaumont's work may be concealed under successive revisions, and it would be rash to assert that none of the late plays contains anything of his. Mr R. Boyle joins the name of Cyril Tourneur to those of Fletcher and Massinger in connexion with The Honest Man's Fortune (acted 1613, pr. 1647), which Fleay identifies with " the

play of Mr Fletcher's and ours." The Knight of Malta (acted 1618-1619, pr. 1647) is in its existing form a revision by Fletcher, Massinger, and possibly Field, of an earlier play which Oliphant thinks was probably written by Beaumont about 1608. The same remarks (with the exclusion of Field's name) apply to Thierry and Theodoret (acted c. 1617, pr. 1621), perhaps a satire on contemporary manners at the French court, though Beaumont's share in either must be regarded as problematical. Fletcher and Massinger's great tragedy of Sir John van Olden Barnaveldt (acted 1619) was first printed in Bullen's Old Plays (vol. ii., 1883). They followed it up with The Custom of

the Country (acted 1619, pr. 1647), based on an English translation (1619) of Los Trabajos de Pcrsiles y Sigismunda; The Double Marriage (c. 1620, pr. 1647) ; The Little French Lawyer (c. 1620, pr. 1647), the plot of which can be traced indirectly to a novellino by Massuccio Salernitano; The Laws of Candy (c. 1618, pr. 1647), of disputed authorship; The False One (c. 1620, pr. 1647), dealing with the sub- ject of Caesar and Cleopatra; The Spanish Curate (acted 1622, pr. 1647), repeatedly revived after the Restoration, was derived from Leonard Digges's translation (1622) of a Spanish novel, Gerardo, the Unfortunate Spaniard; The Prophetess (1622, pr. 1647), afterwards made into an opera by Bettertcn to Purcell's music; The Sea-Voyage (1622, pr. 1647); The Elder Brother (perhaps originally written by Fletcher c. 1614; revised and acted 1635, pr. 1647); Beggar's Bush (acted at court 1622, probably then not new, pr. 1647) ; and The Noble Gentleman (1625-1626, pr. 1647). Fletcher only had a small share in Wit at Several Weapons — " if he but writ an act or two," says an epilogue on its revival (1623 or 1626), — and the play is probably a revision by Rowley and Middleton of an early Beaumont and Fletcher play. A Very Woman (1634, pr, 1655) is a revision by Massinger of The Woman's Plot ascribed to Fletcher and acted at court in 1621. Field worked with Fletcher and Massinger on the lost play of the Jeweller of Amsterdam (1619), as on the Faithful Friends (1613-1614) and The Queen of Corinth (c. 1618, pr. 1647). The Lover's Progress (acted 1634, pr. 1647) is probably a revision by Massinger of the Fletcher play licensed in 1623 as The Wandering Lovers, and is perhaps identical with Cleander, licensed in 1634. Love's Cure or The Martial Maid (1623 or 1625) is thought by Mr Fleay to be a revision by Massinger of a Beaumont and Fletcher play produced as early as 1607-1608.

W. Rowley joined Fletcher in The Maid in the Mill (1623, pr. 1647), and had a share with Massinger in the revision of The Fair Maid of the Inn (licensed 1626, pr. 1647), based on La illustre Fregona of Cervantes. Nice Valour (acted 1625-1626, pr. 1647) seems to have been altered by Middleton from an earlier play; The Widow, printed in 1652 as by Jonson, Fletcher and Middleton, must be ascribed almost exclusively to Middleton. The Night Walker (1633) is a revision by Shirley of a Fletcher play.

Fletcher and Jonson in Collaboration. — The history of The Bloody Brother or Rollo, Duke of Normandy, printed in 1637 as by " B. J. F.," is matter of varied speculation. Mr Oliphant thinks the basis of the play to be an early work (c. 1604) of Beaumont, on which is super- imposed a revision (1616) by Fletcher, Jonson and Middleton, and a subsequent revision (1636-1637) by Massinger. The general view is that the main portion of the play is referable to Jonson and Fletcher. Jonson apparently had a share in Fletcher's Love's Pilgrimage (pr. 1647), which seems to have been revised by Massinger

in l6 35-

Fletcher and Shakespeare. — The Two Noble Kinsmen was printed in 1634 as by Mr John Fletcher and Mr William Shakespeare. If its first representation was in 1625 it was in the year of Fletcher's death. It was included in the second folio of Beaumont and Fletcher's comedies and tragedies. If Shakespeare and Fletcher worked in concert it was probably in 1612-1613, and the existing play probably represents a revision by Massinger in 1625. Henry VIII. (played at the Globe in 1613) is usually ascribed mainly to Fletcher and Massinger, and the conditions of its production were prob- ably similar. Fletcher and Shakespeare are together credited at Stationers' Hall with the lost pity of Cardenio, destroyed by Warburton's cook. (M. Br.)

BEAUMONT, a city and the county-seat of Jefferson county, Texas, U.S.A., situated on the Neches river, in the E. part of the state, about 28 m. from the Gulf of Mexico and 72 m. N.E. of Galveston. Pop. (1890) 3296; (1900) 9427, of whom 2953 were negroes; (1910, census) 20,640. It is served by the Gulf & Interstate, the Gulf, Colorado & Santa Fe, the Kansas City Southern, the Texas & New Orleans, the Colorado Southern, New Orleans & Pacific, the Beaumont, Sour Lake & Western (from Beaumont, to Sour Lake, Tex.), and the (short) Galveston, Beaumont & North-Eastern railways. The Neches river from Beaumont to its mouth has a depth

of not less than 19 ft.; from its mouth extends a canal (9 ft. deep, 100 ft. wide, and 12 m. long), which connects with the Port Arthur Canal (180 ft. wide and 25 ft. deep) extending to the sea. Situated in the midst of a region covered with dense forests of pine and cypress, Beau- mont is one of the largest lumber centres of the southern states; it is also the centre of a large rice-growing region. The manu- factories include rice mills, saw mills, sash, door and blind factories, shingle mills, iron works, oil refineries, broom factories and a dynamite factory. In 1905 the cleaning and polishing of rice was the most important industry, its output being valued at $1,203,123, being nearly twice the value of the product of the rice mills of the city in 1900, 25-9 % of the total value of the state's product of polished and cleaned rice, 46.1 % of the value

($2,609,829) of all of Beaumont's factory products, and about 7-4% of the value of the product of polished and cleaned rice for the whole United States in 1905. After the sinking of oil wells in 1901, Beaumont became one of the principal oil-produc- ing places in the United States; its oil refineries are connected by pipe lines with the surrounding oil fields, and two 6-in. pipe lines extend from Beaumont to Oklahoma. Beaumont was first settled in 1828, and was first chartered as a city in 1899.

BEAUNE, a town of eastern France, capital of an arrondisse- ment in the department of Cote-d'Or, on the Bouzoise, 23 m. S.S.W. of Dijon on the main line of the Paris-Lyon railway. Pop. (1906) 11,668. Beaune lies at the foot of the hills of Cote- d'Or. Portions of its ancient fortifications are still to be seen, but they have been for the most part replaced by a shady promenade which separates the town from its suburbs. The most interesting feature of Beaune is the old hospital of St Esprit, founded in 1443 by Nicolas Rolin, chancellor of Burgundy. Though it is built largely of wood, the fabric is in good preserva- tion. The exterior is simple, but the buildings which surround the main courtyard have high-pitched roofs surmounted by numerous dormer windows with decorated gables, recalling the Flemish style of architecture. In the interior there are several interesting apartments; the chief of these is the ample council chamber with its fine tapestries, where an. import- ant wine sale is held annually. The hospital possesses many artistic treasures, among them the mural paintings of the 17 th century in the Salle St Hugues and an altar-piece, the Last Judgment, attributed to Roger van der Weyden. The principal church of the town, Notre-Dame, dating mainly from the 12th and 13 th centuries, has a fine central tower and a triple portal with handsome wooden doors. In the interior there is some valuable tapestry of the 15th century, and other works

of art. Two round towers (15th century) are a survival of the castle of Beaune, dismantled by Henry IV. A belfry of 1403 and several houses of the Renaissance period, some of which are built over ancient wine-cellars, are architecturally notable. There is a statue to the mathematician, G. Monge, born in the town (1746), and a monument to Pierre Joigneaux the politician (d. 1892). Beaune has tribunals of first instance and of commerce, a chamber of commerce, a school of agriculture and viticulture and colleges for girls and boys. It carries on con- siderable trade in live-stock and cereals and in the vegetables of its market-gardens, and manufactures of casks, corks, white metal, oil, vinegar and machinery for the wine-trade are included among the industries; it is chiefly important for its vineyards and as the centre of the wine-trade of Burgundy.

Beaune was a fortified Roman camp and a stronghold during the middle ages. It was the capital of a separate county which in 1227 was united to the duchy of Burgundy; it then became the first seat of the Burgundian parlement or jours generaux and a ducal residence. On the death of Charles the Bold, it sided with his daughter, Mary of Burgundy, but was besieged and taken by the forces of Louis XL in 1478. Its rank as commune, conceded to it in 1203, was confirmed by Francis I. in 1521. In the Wars of Religion it at first sided with the League, but afterwards opened its gates to the troops of Henry IV., from whom it received the confirmation of its communal privileges and permission to demolish its fortifications. The revocation of the edict of Nantes struck a severe blow at the cloth and iron industries, which had previously been a source of prosperity to the town. In the 18th century there were no fewer than seven monastic buildings in Beaune, besides a Ber- nardine abbey, a Carthusian convent and an ecclesiastical college.

BEAUREGARD, MARQUIS DE (c. 1772-?), French adven- turer, the son of a poor vinegrower named Leuthraud, was born about 1772. He received the name Beauregard from a nobleman in whose service he was engaged as valet. On the outbreak of the revolution, this nobleman converted all his fortune into gold, and entrusting the bag containing the cash to his valet, fled to the frontier. For security's sake master and man took different roads, but Beauregard turned back with the money to Paris. By speculations in provisions and military equipments under

the Directorate he amassed a considerable fortune, and styling himself the marquis de Beauregard, purchased a splendid mansion and began giving magnificent entertainments. De- tected at the height of his success, the impostor was arrested and condemned to four years in irons and to be branded. He soon escaped from prison, and had the audacity to reappear in Paris and start his old life afresh. After a short time, however, he disappeared again, and is supposed to have committed suicide. It is probable that most of the information available about him is a blend of fact and fiction.

BEAUREGARD, PIERRE GUSTAVE TOUTANT (1818-1893), American soldier, was born near New Orleans, Louisiana, on the 28th of May 1818. At the United States military academy he graduated second in his class in July 1838, and was appointed lieutenant of engineers. In the Mexican War he distinguished himself in siege operations at Vera Cruz, and took part in all the battles around Mexico, being wounded at Chapultepec, and receiving the brevets of captain and major. In 1853 he became captain and was in charge of fortification and other engineer works of various points, on the Gulf coast from 1853 to i860. He had just been appointed superintendent of West Point when the secession of his state brought about his resignation (20th February 1861). As a brigadier-general of the new Confederate army he directed the bombardment of Fort Sumter, S.C. As the commander of the Southern " Army of the Potomac " he opposed McDowell's advance to Bull Run, and during the battle was second in command under Joseph E. Johnston, who had joined him on the previous evening, He was one of the five full generals appointed in August 1861, and in 1862 was second in command under Sidney Johnston on the Tennessee. After Johnston's death he directed the battle of Shiloh, subsequent to which he retired to Corinth. This place he defended against the united armies under Halleck, until the end of May 1862, when he retreated in good order to the southward. His health now failing, he was employed in less active work. He defended Charleston against the Union forces from September 1862 to April 1864. In May 1864 he fought a severe and eventually successful battle at Drury's Bluff against General Butler and the Army of the James. Later in the year he endeavoured to gather troops wherewith to oppose Sherman's advance from Atlanta, and eventually surrendered with Johnston's forces in April 1865. After the war he engaged in railway management, became adjutant-general of his state and managed the Louisiana lottery. He declined high commands which were offered to him in the Rumanian and later in the Egyptian armies. General Beauregard died in New Orleans on the 20th of February 1893. He was the author of Principles and

Maxims of the Art of War (Charleston, 1863); Report on the Defence of Charleston (Rich- mond, 1864).

See Alfred Roman, Military Operations of General Beauregard (New York, 1883).

BEAUSOBRE, ISAAC DE (1650-1738), French Protestant divine, was born at Niort on the 8th of March 1659. After studying theology at the Protestant academy of Saumur, he was ordained at the age of twenty-two, becoming pastor at Chatillon- sur-Indre. After the revocation of the edict of Nantes he fled to Rotterdam (November 1685), and in 1686 was appointed chaplain to the princess of Dessau, Henrietta Catherine of Orange. In 1693, on the death of the prince of Dessau, he went to Berlin and became chaplain to the court at Oranienbaum, and in 1695 pastor of the French church at Berlin. He became court preacher, counsellor of the Consistory, director of the Maison francaise, a hospice for French people, inspector of the French gymnasium and superintendent of all the French churches in Brandenburg. He died on the 5th of June 1738. He had strong sense with profound erudition, was one of the best writers of his time and an excellent preacher.

BEAUVAIS, a town of northern France, capital of the depart- ment of Oise, 49 m. N. by W. of Paris, on the Northern railway. Pop. (1906) 17,045. Beauvais lies at the foot of wooded hills on the left bank of the Therain at its confluence with the Avelon. Its ancient ramparts have been destroyed, and it is now surrounded

by boulevards, outside which run branches of the Therain. In addition, there are spacious promenades in the north-east of the town. Its cathedral of St Pierre, in some respects the most daring achievement of Gothic architecture, consists only of a transept and choir with apse and seven apse-chapels. The vaulting in the interior exceeds 150 ft. in height. The small Romanesque church of the 10th century known as the Basse- (Euvre occupies the site destined for the nave. Begun in 1247, the work was interrupted in 1284 by the collapse of the vaulting of the choir, in 1573 by the fall of a too ambitious central tower, after which little addition was made. The transept was built from 1500 to 1548. Its facades, especially that on the south, exhibit all the richness of the late Gothic style. The carved wooden doors of both the north and the south portals are master-pieces respectively of Gothic and Renaissance workmanship. The church possesses an elaborate astronomical clock (1866) and tapestries of the 15th and 17th centuries; but its chief artistic treasures are stained glass windows of the 13th, 14th and 16th

centuries, the most beautiful of them from the hand of the Renaissance artist, Engrand Le Prince, a native of Beauvais. To him also is due some of the stained glass in St. Etienne, the second church of the town, and an interesting example of the transition stage between the Romanesque and Gothic styles.

In the Place de l'Hotel de Ville and in the old streets near the cathedral there are several houses dating from the 12th to the 16th centuries. The hotel de ville, close to which stands the statue of Jeanne Hachette (see below), was built in 1752. The episcopal palace, now used as a court-house, was built in the 16th century, partly upon the Gallo-Roman fortifications. The industry of Beauvais comprises, besides the state manufacture of tapestry, which dates from 1664, the manufacture of various kinds of cotton and woollen goods, brushes, toys, boots and shoes, and bricks and tiles. Market-gardening flourishes in the vicinity and an extensive trade is carried on in grain and wine.

The town is the seat of a bishop, a prefect and a court of assizes; it has tribunals of first instance and of commerce, together with a chamber of commerce, a branch of the Bank of France, a higher ecclesiastical seminary, a lycee and training colleges.

Beauvais was known to the Romans as Caesaromagus, and took its present name from the Gallic tribe of the Bellovaci, whose capital it was. In the 9th century it became a countship, which about 1013 passed to the bishops of Beauvais, who ultimately became peers of France. In 1346 the town had to defend itself against the English, who again besieged it in 1433. The siege which it suffered in 1472 at the hands of the duke of Burgundy was rendered famous by the heroism of the women, under the leadership of Jeanne Hachette, whose memory is still celebrated by a procession on the 14th of October (the feast of Ste Anga- dreme), in which the women take precedence of the men.

See V. Lhuillier, Choses du vieux Beauvais et du Beauvaisis (1896).

BEAUVILLIER, the name of a very ancient French family belonging to the country around Chartre-s, members of which are found filling court offices from the 15th century onward. For Charles de Beauvillier, gentleman of the chamber to the king, governor and bailli of Blois, the estate of Saint Aignan was created a countship in 1537. Francois de Beauvillier. comte de Saint Aignan, after having been through the campaigns in Germany (1634-1635), Franche-Comte (1636), and Flanders (1637), was sent to the Bastille in

consequence of his having lost the battle of Thionville in 1640. In reward for his devotion to the court party during the Fronde he obtained many signal favours, and Saint Aignan was raised to a duchy in the peerage of France (duche- pairie) in 1663. His son Paul, called the due de Beauvillier, was several times ambassador to England; he became chief of the council of finance in 1685, governor of the dukes of Burgundy, Anjou and Berri from 1689 to 1693, minister of state in 1691, and grandee of Spain in 1701. He married a daughter of Colbert. Paul Hippolyte de Beauvillier, comte de Montresor, afterwards due de Saint Aignan, was ambassador at Madrid from 171 5 to 1 7 18 and at Rome in 1731, and a member of the council of regency in 1719. (M. P.)*

BEAUVOIR, ROGER DE, the now. de plume of Eugene Auguste Roger de Bully (i 806-1 866), French writer, who was born on the 8th of November 1806 in Paris. He was the son and nephew of public officials who did not approve his literary inclinations, and it was at their request that he wrote over the signature of Roger de Beauvoir. A good-looking young fellow, of independent means, an indefatigable viveur, he astonished all Paris with his ostentatious luxury and his adventures, while his romantic novels gave him a more serious if not durable reputation. Among the best of them are L'Ecolier de Cluny ou le Sophisme (1832), which is said to have furnished Alexandre Dumas and Theodore Gaillardet (1808-1882) with the idea of the Tour de Nesle, and Le Chevalier de Saint Georges (1840). He had married in 1847 an actress, Eleonore Leocadie Doze (1822-1859), from whom he obtained a judicial separation a year or two later after a long and notorious trial, following which his mother-in-law got him imprisoned for three months and fined 500 francs for a satirical poem, Mori Proces (1849). Ruined by extravagance and tied to his chair by gout, he spent the last years of his life in retirement, and died in Paris on the 27th of August 1866.

BEAUX, CECILIA (1863-), American portrait-painter, was born in Philadelphia, Pennsylvania, where she became a pupil of William Sartain. But her real art training was obtained in Paris, where she started in the atelier Julian and had the coach- ing of painters like Robert-Fleury, Bouguereau and Dagnan Bouveret. In 1890 she exhibited at the Paris Exposition. Returning to Philadelphia, Miss Beaux obtained in 1893 the gold medal of the Philadelphia Art Club, and also the Dodge prize at the New York National Academy, and

later various other distinctions. She became a member of the National Academy of Design, New York, in 1902. Among her portraits are those of Bishop-Coadjutor Greer (exhibited at the Salon in 1896); Mrs Roosevelt and her daughter; and Mrs Larz Anderson. Her " Dorothea and Francesca," and " Ernesta and her Little Brother," are good examples of her skill in painting children.

BEAVER, 1 the largest European aquatic representative of the mammalian order Rodentia (q.v.), easily recognized by its large trowel-like, scaly tail, which is expanded in the horizontal direction. The true beaver (Castor fiber) is a native of Europe and northern Asia, but it is represented in North America by a closely-allied species (C. canadensis), chiefly distinguished by the form of the nasal bones of the skull. Beavers are nearly allied to the squirrels (Sciuridae), agreeing in certain structural peculiarities of the lower jaw and skull. In the Sciuridae the two main bones (tibia and fibula) of the lower half of the leg are quite separate, the tail is round and hairy, and the habits are arboreal and terrestrial. In the beavers or Castoridae these bones are in close contact at their lower ends, the tail is depressed, expanded and scaly, and the habits are aquatic. Beavers have webbed hind-feet, and the claw of the second hind-toe double. In length beavers — European and American — measure about 2 ft. exclusive of the tail, which is about 10 in. long. They are covered with a fur to which they owe their chief commercial value; this consists of two kinds of hair — the one close-set, silky and of a greyish colour, the other much coarser and longer, and of a reddish brown. Beavers are essentially aquatic in their habits, never travelling by land unless driven by necessity. Formerly common in England, the European beaver has not only been exterminated there, but likewise in most of the countries of the continent, although a few remain on the Elbe, the Rhone and in parts of Scandinavia. The American species is also greatly diminished in numbers from incessant pursuit for the sake of its valuable fur. Beavers are sociable anhrals, living in streams, where, so as to render the water of sufficient depth, they build dams of mud and of the stems and boughs of trees felled by their powerful incisor teeth. In the neighbourhood they make their " lodges," which are roomy chambers, with the entrance beneath the water. The mud is

1 The word is descended from the Aryan name of the animal, cf. Sanskrit babhriis, brown, the great ichneumon, Lat. fiber, Ger. Biber, Swed. bdfver, Russ. bobr' ; the root bhru has given " brown," and, through Romanic, " bronze " and " burnish."

plastered down by the fore-feet, and not, as often supposed, by the

tail, which is employed solely as a rudder. They are mainly nocturnal, and subsist chiefly on bark and twigs or the roots of water plants. The dam differs in shape according to the nature of particular localities. Where the water has little motion it is almost straight; where the current is considerable it is curved, with its convexity towards the stream. The materials made use of are driftwood, green willows, birch and poplars; also mud and stones intermixed in such a manner as contributes to the strength of the dam; but there is no particular method observed, except that the work is carried on with a regular sweep, and that all the parts are made of equal strength. " In places," writes Hearne, " which have been long frequented by beavers undis- turbed, their dams, by frequent repairing, become a solid bank, capable of resisting a great force both of .ice and water; and as the willow, poplar and birch generally take root and shoot up, they by degrees form a kind of regular planted hedge, which I have seen in some places so tall that birds have built their nests among the branches." Their houses are formed of the same materials as the dams, with little order or regularity of structure, and seldom contain more than four old, and six or eight young beavers. It not unfrequently happens that some of the larger houses have one or more partitions, but these are only posts of the main building left by the builders to support the roof, for the apartments have usually no communication with each other except by water. The beavers carry the mud and stones with their fore-paws and the timber between their teeth. They always work in the night and with great expedition. They coyer their houses late every autumn with fresh mud, which, freezing when the frost sets in, becomes almost as hard as stone, so that neither wolves nor wolverines can disturb their repose.

The favourite food of the American beaver is the water-lily (Nuphar luteum), which bears a resemblance to a cabbage-stalk, and grows at the bottom of lakes and rivers. Beavers also gnaw the bark of birch, poplar and willow trees; but during the summer a more varied herbage, with the addition of berries, is consumed. When the ice breaks up in spring they always leave their embankments, and rove about until a little before the fall of the leaf, when they return to their old habitations, and lay in their winter stock of wood. They seldom begin to repair the houses till the frost sets in, and never finish the outer coating till the cold becomes severe. When they erect a new habitation they fell the wood early in summer, but seldom begin building till towards the end of August.

The flesh of the American beaver is eaten by the Indians, and when roasted in the skin is esteemed a delicacy and is said to taste like pork. Castoreum is a substance contained in two pear-shaped

pouches situated near the organs of reproduction, of a bitter taste and slightly foetid odour, at one time largely employed as a medicine, but now used only in perfumery.

Fossil remains of beavers are found in the peat and other superficial deposits of England and the continent of Europe; while in the Pleistocene formations of England and Siberia occur remains of a giant extinct beaver, Trogontherium cuvieri, repre- senting a genus by itself.

For an account of beavers in Norway see R. Collett, in the Bergens Museum Aarbog for 1897. See also R. T. Martin, Castorologia, a History and Traditions of the Canadian Beaver (London, 1892).

(R. L.)*

BEAVER (from Fr. bavicre, a child's bib, from bave, saliva), the lower part of the helmet, fixed to the neck-armour to protect the face and cheeks; properly it moved upwards, as the visor moved down, but the word is sometimes used to include the visor. The right form of the word, " baver," has been altered from a confusion with " beaver," a hat made of beaver-fur or a silk imitation, also, in slang, called a "castor," from the zoological name of the beaver family.

BEAVER DAM, a city of Dodge county, Wisconsin, U.S.A., situated in the S.E. part of the state, 63 m. N.W. of Milwaukee, on Beaver Lake, which is 9 m. long and 3 m. wide. Pop. (1890) 4222; (1900) 5128, of whom 1023 were foreign-born; (1905) 5615; (1910) 6758. Most of the population is of German

descent. Beaver Dam is served by the Chicago, Milwaukee & St Paul railway. The city is a summer resort, has a public library, and is the seat of Wayland Academy (1855, Baptist), a co-educational preparatory school affiliated with the university of Chicago. Beaver Dam is situated in the midst of a fine farm- ing country; it has a good water-power derived from Beaver Lake, and among its manufactures are woollen and cotton goods, malleable iron, foundry products, gasolene engines, agricultural implements, stoves and beer. The city was first settled about 1 84 1, and was incorporated in 1856.

BEAVER FALLS, a borough of Beaver county, Pennsylvania, U.S.A., on Beaver river, about 35 m. from its confluence with the Ohio,

opposite New Brighton, and about 32 m. N.W. of Pittsburg. Pop. (1890) 9735; (1900) 10,054, of whom 1554 were foreign-born; (1910, census, l2.i()i. The borough is served by the Pennsylvania and the Pittsburg & Lake Erie railways. It is built for the most part on a plateau about 50 ft. above the river, hemmed in on either side by hills that rise abruptly, especially on the W., to a height of more than 200 ft. Bituminous coal, natural gas and oil abound in the vicinity; the river provides excellent water-power; the borough is a manufacturing centre of considerable importance, its products including iron and steel bridges, boilers, steam drills, carriages, saws, files, axes, shovels, wire netting, stoves, glass-ware, scales, chemicals, pottery, cork, decorative tile, bricks and typewriters. In 1905 the city's factory products were valued at $4,907,536. Geneva College (Reformed Presbyterian, co-educational), established in 1849 at Northwood, Logan county, Ohio, was removed in 1880 to the borough of College Hill (pop. in 1900, 899) , 1 m. N. of Beaver Falls; it has a preparatory and a collegiate department, departments of music, oratory and art, and a physical department, and in 1907-1908 had 13 instructors and 235 students. Beaver Falls was first settled in 1801; was laid out as a town and named Brighton in 1806; received its present name a few years later; and in 1868 was incorporated as a borough.

BEAWAR, or Nayanagar, a town of British India, the administrative headquarters of Merwara district in Ajmere- Merwara. It is 33 m. from Ajmere. Pop. (1901) 21,928. It is an important centre of trade, especially in raw cotton, and has cotton presses and the Krishna cotton mills. It was founded by Colonel Dixon in 1835.

BEBEL, FERDINAND AUGUST (1840-), German socialist, was born at Cologne on the 22nd of February 1840; he became a turner and worked at Leipzig. Here he took a prominent part in the workmen's movement and in the association of working men which had been founded under the influence of Schultz- Delitzsch; at first an opponent of socialism, he came under the influence of Liebknecht, and after 1865 he was a confirmed advocate of socialism. With Liebknecht he belonged to the branch of the socialists which was in close correspondence with Karl Marx and the International, and refused to accept the leadership of Schweitzer, who had attempted to carry on the work after Lassalle's death. He was one of those who supported a vote of want of confidence in Schweitzer at the Eisenach conference in 1867, from which his party was generally known as " the Eisenacher." In this year he was elected a member of the North German Reichstag for a Saxon constituency, and, with an interval from 1881 to 1883, remained a member of the German parliament.

His great organizing talent and- oratorical power quickly made him one of the leaders of the socialists and their chief spokesman in parliament. In 1870 he and Liebknecht were the only members who did not vote the extraordinary subsidy required for the war with France; the followers of Lassalle, on the other hand, voted for the government proposals. He was the only Socialist who was elected to the Reichstag in 187 1, but he used his position to protest against the annexation of Alsace-Lorraine and to express his full sympathy with the Paris Commune. Bismarck afterwards said that this speech of Bebel's was a " ray of light," showing him that Socialism was an enemy to be fought against and crushed; and in 1872 Bebel was accused in Brunswick of preparation for high treason, and condemned to two years' imprisonment in a fortress, and, for

insulting the German emperor, to nine months' ordinary imprison- ment. After his release he helped to organize, at the con- gress of Gotha, the united party of Social Democrats, which had been formed during his imprisonment. After the passing of the Socialist Law he continued to show great activity in the debates of the Reichstag, and was also elected a member of the Saxon parliament; when the state of siege was proclaimed in Leipzig he was expelled from the city, and in 1886 condemned to nine months' imprisonment for taking part in a secret society. Although the rules of the Social Democratic party do not recog- nize a leader or president, Bebel subsequently became by far the most influential member of the party. In the party meetings of 1890 and 1891 his policy was severely attacked, first by the extremists, the " young " Socialists from Berlin, who wished to abandon parliamentary action; against these Bebel won a complete victory. On the other side he was involved in a quarrel with Volrnar and his school, who desired to put aside from immediate consideration the complete attainment of the Socialist ideal, and proposed that the party should aim at bring- ing about, not a complete overthrow of society, but a gradual amelioration. This conflict of tendencies continued, and Bebel came to be regarded as the chief exponent of the traditional views of the orthodox Marxist party. He was exposed to some natural ridicule on the ground that the " Kladderadatsch," which he often spoke of as imminent, failed to make its appearance. On the other hand, though a strong opponent of militarism, he publicly stated that foreign nations attacking Germany must not expect the help or the neutrality of the Social Democrats. His book, Die Frau und der Socialismus (1893), which went through many editions and contained an attack on the institution of mar- riage, identified him with the most extreme forms of Socialism.

See also Mehring, Geschichte der deutschen Social-Demokratie (Stuttgart, 1898); Reports of the Annual Meetings of the Social Democratic Party, Berlin Vorwarts Publishing Company (from 1890) ; B. Russell, German Social-Democracy (London, 1897). (J. W. He.)

BECCAFICO (Ital. for " fig-pecker "), a small migratory bird of the warbler (Syhiidae) family, which frequents fig-trees and vineyards, and, when fattened, is considered a great delicacy.

BECCAFUMI, DOMENICO DI PACE (1486-1551), Italian painter, of the school of Siena. In the early days of the Tuscan republics Siena had been in artistic genius, and almost in political importance, the rival of Florence. But after the great plague in 1348 the city declined; and though her population always com- prised an immense number of skilled artists and artificers, yec her school did not share in the general progress of Italy in the 15th century. About the year 1500, indeed, Siena had no native artists of the first importance; and her public and private commissions were often given to natives of other cities. But after the uncovering of the works of Raphael and Michelangelo at Rome in 1508, all the schools of Italy were stirred with the desire of imitating them. Among these accomplished men who now, without the mind and inspiration of Raphael or Michel- angelo, mastered a great deal of their manner, and initiated the decadence of Italian art, several of the most accomplished arose in the school of Siena. Among these was Domenico, the son of a peasant, one Giacomo di Pace, who worked on the estate of a well- to-do citizen named Lorenzo Beccafumi. Seeing some signs of a talent for drawing in his labourer's son, Lorenzo Beccafumi took the boy into his service and presently adopted him, causing him to learn painting from masters of the city. Known after- wards as Domenico Beccafumi, or earlier as II Mecarino (from the name of a poor artist with whom he studied), the peasant's son soon gave proof of extraordinary industry and talent. In 1509 he went to Rome and steeped himself in the manner of the great men who had just done their first work in the Vatican. Returning to his native town, Beccafumi quickly gained employ- ment and a reputation second only to Sodoma. He painted a vast number both of religious pieces for churches and of mytho- logical decorations for private patrons. But the work by which he will longest be remembered is that which he did for the celebrated pavement of the cathedral of Siena. For a hundred and fifty years the best artists of the state had been engaged

laying down this pavement with vast designs in commesso work, — white marble, that is, engraved with the outlines of the subject in black, and having borders inlaid with rich patterns in many- colours. From the year 151 7 to 1544 Beccafumi was engaged in continuing this pavement. He made very ingenious improve- ments in the technical processes employed, and laid down multitudinous scenes from the stories of Ahab and Elijah, of Melchisedec, of Abraham and of Moses. These are not so inter- esting as the simpler work of the earlier schools, but are much more celebrated and more jealously guarded. Such was their fame that the agents of Charles I. of England, at the time when he was collecting for Whitehall, went to Siena expressly to try and purchase the original cartoons. But their owner would not part with them, and they are now in the Siena Academy and elsewhere. The subjects have been engraved on wood, by the hand, as it seems, of Beccafumi himself, who at one time or another essayed almost every branch of fine art. He made a triumphal arch and an immense mechanical horse for the pro- cession of the emperor Charles V. on his entry into Siena. In his later days, being a solitary liver and continually at work, he is said to have accelerated his death by over-exertion upon the processes of bronze-casting.

BECCARIA, GIOVANNI BATTISTA (1716-1781), Italian physicist, was born at Mondovi on the 3rd of October 17 16, and entered the religious order of the Pious Schools in 1732. He became professor of experimental physics, first at Palermo and then at Rome, and was appointed to a similar situation at Turin in 1748. He was afterwards made tutor to the young princes de Chablais and de Carignan, and continued to reside principally at Turin during the remainder of his life. In May 1755 he was elected a fellow of the Royal Society of London, and published several papers on electrical subjects in the Phil. Trans. He died at Turin on the 27th of May 1781. Beccaria did much, in the way both of experiment and exposition, to spread a knowledge of the electrical researches of Franklin and others. His principal work was the treatise DeW Eleltricismo Naturale ed Artificiale (1753), which was translated into English in 1776.

BECCARIA-BONESANA, CESARE, Marchese de (1735- 1794), Italian publicist, was born at Milan on the 15th of March 1735. He was educated in the Jesuit college at Parma, and snowed at first a great aptitude for mathematics. The study of Montesquieu seems to have directed his attention towards economic questions; and his first publication (1762) was a tract on the derangement of the currency in the Milanese states, with a proposal for its remedy. Shortly after, in conjunction with his friends the Verris, he formed a literary

society, and began to publish a small journal, in imitation of the Spectator, called II Cafe. In 1764 he published his brief but justly celebrated treatise Dei Delitti e delle Pene (" On Crimes and Punishments ")• The weighty reasonings of this work were expounded with all the additional force of a clear and animated style. It pointed out distinctly and temperately the grounds of the right of punishment, and from these principles deduced certain propositions as to the nature and amount of punishment which should be inflicted for any crime. The book had a surprising success. Within eighteen months it passed through six editions. It was translated into French by Morellet in 1766, and published with an anonymous commentary by Voltaire. An English translation appeared in 1768 and it was translated into several other languages. Many of the reforms in the penal codes of the principal European nations are traceable to Beccaria's treatise. In November 1768 he was appointed to the chair of law and economy, which had been founded expressly for him at the Palatine college of Milan. His lectures on political economy, which are based on strict utilitarian principles, are in marked accordance with the theories of the English school of economists. They are published in the collection of Italian writers on political economy {Scrittori Classici Italiani di Economia politica, vols. xi. and xii.). In 1771 Beccaria was made a member of the supreme economic council; and in 1791 he was appointed one of the board for the reform of the judicial code. In this post his labours were of very great value. He died at Milan on the 28th of November 1794.

BECCLES, a market town and municipal borough, in the Lowestoft parliamentary division of Suffolk, England; on the right bank of the river Waveney, 109 m. N.E. from London by the Great Eastern railway. Pop. (1901) 6898. It has a pleasant, well-wooded site overlooking the flat lands bordering the Waveney. The church of St Michael, wholly Perpendicular, is a fine example of the style, having an ornate south porch of two storeys and a detached bell tower. There are a grammar school (1712), and boys' school and free school on the foundation of Sir John Leman (1631). Rose Hall, in the vicinity, is a moated manor of brick, of the 16th century. Printing works, malting, brick and tile, and agricultural implement works are the chief industries. Beccles was incorporated in 1 584. It is governed by a mayor, 4 aldermen and 12 councillors. Area, 2017 acres.

BECERRA, GASPAR (1520-1570), Spanish painter and sculptor, was born at Baeza in Andalusia. He studied at Rome, it is said under Michelangelo, and assisted Vasari in painting the hall of the Concelleria. He also contributed to the anatomical plates of

Valverde. After his return to Spain he was extensively employed by Philip II., and decorated many of the rooms in the palace at Madrid with frescoes. He also painted altar-pieces for several of the churches, most of which have been destroyed. His fame as a sculptor almost surpassed that as a painter. His best work was a magnificent figure of the Virgin, which was destroyed during the French war. He became court painter at Madrid in 1 563, and played a prominent part in the establishment of the fine arts in Spain.

BECHE-DE-MER (sometimes explained as " sea-spade," from the shape of the prepared article, but more probably from the Port, bicho, a worm or grub), or Trepang (Malay, tripang), an important food luxury among the Chinese and other Eastern peoples, connected with the production of which considerable trade exists in the Eastern Archipelago and the coasts of New Guinea, and also in California. It consists of several – species of echinoderms, generally referred to the genus Holothuria, especially H. edulis. The creatures, which exist on coral reefs, have bodies from 6 to 1 5 in. long, shaped like a cucumber, hence their name of "sea-cucumbers." The skin is sometimes covered with spicules or prickles, and sometimes quite smooth, and with or without " teats " or ambulacral feet disposed in rows. Five varieties are recognized in the commerce of the Pacific Islands, the finest of which is the " brown with teats." The large black come next in value, followed by the small black, the red-bellied and the white. They are used in the gelatinous soups which form an important article of food in China. They are prepared for use by being boiled for about twenty minutes, and then dried first in the sun and afterwards over a fire, so that they are slightly smoked.

BECHER, JOHANN JOACHIM (1635-1682), German chemist, physician, scholar and adventurer, was born at Spires in 1635. His father, a Lutheran minister, died while he was yet a child, leaving a widow and three children. The mother married again; the stepfather spent the tiny patrimony of the children; and at the age of thirteen Becher found himself responsible not only for his own support but also for that of his mother and brothers. He learned and practised several small handicrafts, and devoting his nights to study of the most miscellaneous description earned a pittance by teaching. In 1654, at the age of nineteen, he published an • edition of Salzthal's Tractatus de lapide tris- megisto; his Metallurgia followed in 1660; and the next year appeared his Character pro notitia linguarum universali, in which he gives 10,000 words for use as a universal language. In 1663 he published his Oedipum Chemicum and a book on animals, plants and minerals (Thier- Krduter- mid Bergbuch). At the same time he was full of schemes, practical and unpractical. He

negotiated with the elector palatine for the establishment of factories at Mannheim; suggested to the elector of Bavaria the creation of German colonies in Guiana and the West Indies; and brought down upon himself the wrath of the Munich merchants by planning a government monopoly of cloth manu- facture and of trade. He fled from Munich, but found a ready welcome elsewhere. In 1666 he was appointed teacher of

medicine at Mainz and body-physician to the archbishop-elector; and the same year he was made councillor of commerce (Commer- zienrat) at Vienna, where he had gained the powerful support of Albrecht, Count Zinzendorf, prime minister and grand chamber- lain of the emperor Leopold I. Sent by the emperor on a mission to Holland, he there wrote in ten days his Methodus Didactica, which was followed by the Regeln der Christlichen Bundesgenossen- schaft and the Politischer Discurs vom Auj- und Abbluhen der Stddte. In 1669 he published his Physica sublet ranea, and the same year was engaged with the count of Hanau in a scheme for settling a large territory between the Orinoco and the Amazon. Meanwhile he had been appointed physician to the elector of Bavaria; but in 1670 he was again in Vienna advising on the establishment of a silk factory and propounding schemes for a great company to trade with the Low Countries and for a canal to unite the Rhine and Danube. He then returned to Bavaria, and his absence bringing him into ill odour at Vienna, he complained of the incompetence of the council of commerce and dedicated a tract on trade (Commercien-Tractat) to the emperor Leopold. His Psychosophia followed, and " An in- vitation to a psychological community " {Einladung zu einer psychologischen Societdt), for the realization of which Duke Gustavus Adolphus of Mecklenburg-Gustrow (d. i6qs) offered him in 1674 a site in his duchy. The plan came to nothing, and next year Becher was again busy at Vienna, trying to transmute Danube sand into gold, and writing his Theses chemicae veritalem Iransmutationis metallorum evincentes. For some reason he incurred the disfavour of Zinzendorf and fled to Holland, where with the aid of the government he continued his experi- ments. Pursued even there by the resentment of his former patron, he crossed to England, whence he. visited the mines of Scotland at the request of Prince Rupert. He afterwards went for the same purpose to Cornwall, where he spent a year. At the beginning of 1680 he presented a paper to the Royal Society, De nova temporis dimetiendi ratione et accurala

horologiorum conslructione, in which he attempted to deprive Huygens of the honour of applying the pendulum to the measurement of time. The views of Becher on the composition of substances mark little essential advance on those of the two preceding centuries, and the three elements or principles of salt, mercury and sulphur reappear as the vitrifiable, the mercurial and the combustible earths. When a substance was burnt he supposed that the last of these, the terra pinguis, was liberated, and this conception is the basis on which G. E. Stahl founded his doctrine of " phlogiston." His ideas and experiments on the nature of minerals and other substances are voluminously set forth in his Physica Subterranea (Frankfort, 1669); an edition of this, published at Leipzig in 1703, contains two supplements (Experi- mentum chymicum novum and Demonstrate Philosophica), proving the truth and possibility of transmuting metals, Experi- mentum novum ac curiosum de minera arenaria perpetua, the paper on timepieces already mentioned and also Specimen Becherianum, a summary of his doctrines by Stahl, who in the preface acknowledges indebtedness to him in the words Bechе- riana sunt quae profero. At Falmouth he wrote his Laboratorium por labile and at Truro the Alphabetum miner ale. In 1682 he returned to London, where he wrote the Chemischer Gliickshafen oder grosse Concordanz und Collection von 1500 Processen and died in October of the same year.

BECHUANA, a South African people, forming a branch of the great Bantu-Negroid family. They occupy not only Bechuana- land, to which they have given their name, and Basutoland, but are the most numerous native race in the Orange River Colony and in the western and northern districts of the Transvaal. It seems certain that they reached their present home later than the Zulu-Xosa [Kaffir] peoples who came down the east coast of the continent, but it is probable that they started on their southward journey before the latter. It would appear that the forerunners of the movement were the Bakalahari and Balala, who were subsequently reduced to the condition of serfs by the' later arrivals, and who by intermingling to a certain extent with the aborigines gave rise to the " Kalahari Bushmen " (see

Kalahari Desert) . The Bechuana family may be classed in two great divisions, the western or Bechuana proper, and the eastern or Basuto. The Bechuana proper consist of a large number of tribes, whose early history is extremely confused and involved owing to continual inter-tribal wars and migrations, during which many tribes were practically annihilated. Further con- fusion was produced by subsequent marauding expeditions by the coast " Kaffirs." An

ingenious attempt to disentangle the highly complicated tribal movements which took place in the early 19th century may be found in Stow's Native Races of South Africa. One migration of particular interest calls for mention. In the early part of the 19th century a number of Basuto, led by the chief Sebituane, crossed the Zambezi near the Victoria Falls, and, under the name Makololo, established a supremacy over the Barotse and neighbouring tribes on the upper portion of the river, imposing their language on the conquered peoples. After the death of Sekeletu, Sebituane's successor, the vassal tribes arose and exterminated their conquerors. Only a few escaped, whom Sekeletu had sent with David Livingstone to the coast. These established themselves to the south of Lake Nyasa, where they are still to be found. Sesuto speech, however, still prevails in Barotseland. The chief Bechuana tribes were the Batlapin and Barolong (the last including the Baratlou, Bataung, Barapulana and Baseleka), together with the great Bakuena or Bakone people (including the Bahurutsi, Batlaru, Bamangwato, Batauana, Bangwaketse and Bakuena). The clans representing the southern Bakuena were in comparatively recent times welded together to form the Basuto nation, of which the founder was the chief Moshesh (see Basutoland). The Basuto have been not only influenced in certain cultural details (e.g. the form of their huts) by the neighbouring Zulu-Xosa [Kaffir] peoples, but have moreover received an infusion of their blood which has improved their physique. They are good riders and make considerable use of their horses in war and the chase.

The Bechuana, though not so tail as Kaffirs, average 5 ft. 6 in. in stature; they are of slender build and their musculature is but moderately developed except where a Kaffir strain is found. Their skin is of a reddish-brown or bronze colour, and their features are fairly regular, though in all cases coarser than those of Europeans. One of their chief peculiarities lies in the fact that each tribe respects (usually) a particular animal, which the members of the tribe may not eat, and the killing of which, if necessary, must be accompanied by profuse apologies and followed by subsequent purification. Many of the tribes take their name from their siboko, as the animal in question is called; e.g. the Batlapin, " they of the fish "; Bakuena, " they of the crocodile." The siboko of the Barolong, who as a tribe are accomplished smiths, is not an animal but the metal iron ; other tribes have adopted as their particular emblem respectively the sun, rain, dew, &c. Certain ceremonies are performed in honour of the tribal emblem, hence an inquiry as to the tribe of an individual is put in the form " What do you dance?" In certain tribes the old and

feeble and the sickly children were killed, and albinos and the deaf and dumb exposed; those born blind were strangled, and if a mother died in childbirth the infant was buried alive in the same grave. With the extension of British authority these practices were prohibited. Circum- cision is universally practised, though there is no fixed age for it. It is performed at puberty, when the boys are secluded for a period in the bush. The operation is accompanied by whipping and even tortures. Girls at puberty must undergo trials of endurance, e.g. the holding of a bar of heated iron without crying out. The Bechuana inhabit, for the most part, towns of con- siderable size, containing from 5000 to 40,000. Politically they live under a tribal despotism limited by a council of elders, the chief seldom exercising his individual authority independently, though the extent of his power naturally depends on his person- ality. They have their public assemblies, but only when cir- cumstances, chiefly in reference to war, require. These are generally characterized by great freedom of speech, and there is no interruption of the speaker. The chief generally closes the meeting with a long speech, referring to the subjects which each

speaker has either supported or condemned, not forgetting to clear his own character of any imputation. These public assemblies are now, except in Basutoland, of very rare occur- rence. The clothing of the men consists of a leather bandage; the women wear a skin apron, reaching to the knee, under which is a fringed girdle. Skin cloaks (kaross) are worn by both sexes, with the difference that the male garment is distinguished by a collar. The hair is kept short for the most part; women shave the head, leaving a tuft on the crown which is plastered with fat and earth, and adorned with beads. Beads are worn, and various bracelets of iron, copper and brass.

The Bechuana are mainly an agricultural people, the Bang- waketse and .Bakuena excelling as cultivators. Cattle they possess, but these are used chiefly for the purpose of purchasing wives, especially among the Basuto. At the same time they are excellent craftsmen, and show no little skill in smelting and working iron and copper and the preparation of hides and pottery vessels. The most efficient smiths are the Barolong and Bamangwato (the latter were spared by the Matabele chief Umsilikazi on this account); the Bangwaketse excel as potters; the Barolong as wood carvers, and the Bakuena as hut builders. The huts, with the exception of those of the Basuto who

have adopted the Kaffir model, are cylindrical, with clay-plastered walls and a conical roof of thatch. In spite of the constant tribal feuds dating from the beginning of the 19th century, the Bechuana cannot be classed as a warlike people, especially when they are compared with the Zulu. Their weapons consist of the throwing assegai, usually barbed, axes, daggers in carved sheaths, and, occasionally, bows and arrows, the last sometimes poisoned. Hide shields of a peculiar shape, resembling a depressed hour-glass, are found except among the Basuto, who use a somewhat different pattern. Hunting usually takes the form of great drives organized in concert, and the game is driven by means of converging fences to a large pitfall or series of pits. Their religious beliefs are very vague; they appear to recognize a somewhat indeterminate spirit of, mainly, evil tendencies, called Morimo. The plural form of this word, Barimo, is used of the manes of dead ancestors, to whom a varying amount of reverence is paid. There is universal belief in charms and witchcraft, and divination by means of dice is common. Witch-doctors, who are supposed to counteract evil magic, play a not insignificant part, and the magician who claims the power of making rain occupies a very important position, as might be expected among an agricultural people inhabiting a country where droughts are not infrequent. They have a great dread of anything connected with death; when an old man is on the point of expiring, a net is thrown over him, and he is dragged from his hut by a hole in the wall, if possible before life is extinct. The dead are buried in a sitting position with their faces to the north, in which direction lies their ancestral home. Under the influence of missionaries, however, large numbers of the Bechuana have become Christianized, and many of the customs mentioned are no longer practised.

Polygamy is the rule, but, except in the case of chiefs, is not found to the same extent as among the Zulu-Xosa [Kaffirs]. The woman is purchased from her father, chiefly by means of cattle, though among the western Bechuana other articles are included, many of which become the property of the girl herself. The wives live in separate huts, and the first is given priority over those purchased subsequently. Chastity after marriage is the rule, and adultery and rape are severely punished, as offences against property. Cannibalism is found, but is rare and confined to certain tribes.

The Bechuana language, which belongs to the Bantu lin- guistic family, is copious, with but few slight dialectic differences, and is free from the Hottentot elements found in the Kaffir and Zulu tongues. The richness of the language may be judged from the fact that, though only oral until reduced to writing by the missionaries, it

has sufficed for the translation of the whole Bible.

Bibliography. — G. W. Stow, The Native Races of South Africa (London, 1905) ; Gustav Fritsch, Vie Eingeborenen Sud-Afrikas

(Breslau, 1872) ; Robert Moffat, Missionary Labours and Scenes in Southern Africa (1842); David Livingstone, Missionary Travels and Researches in South Africa (London, 1857) ; J. C. MacGregor, Basuto Traditions (Cape Town, 1905). (T. A.].)

BECHUANALAND (a name given from its inhabitants, the Bechuana, q.v.), a country of British South Africa occupying the central part of the vast tableland which stretches north to the Zambezi. It is bounded S. by the Orange river, N.E. and E. by Matabeleland, the Transvaal and Orange River Colony, and W. and N. by German South- West Africa. Bechuanaland geo- graphically and ethnically enjoys almost complete unity, but politically it is divided as follows: —

I. British Bechuanaland, since 1895 an integral part of Cape Colony. Area, 51,424 sq. m. Pop. (1904) 84,210, of whom 9276 were whites.

II. The Bechuanaland Protectorate, the northern part of the country, governed on the lines of a British crown colony. Area (estimated), 225,000 sq. m. Pop. (1904) 120,776, of whom Europeans numbered 1004. The natives, in addition to the Bechuana tribes, include some thousands of Bushmen (Masarwa). Administratively attached to the protectorate is the Tati con- cession, which covers 2500 sq. m. and forms geographically the south-west corner of Matabeleland.

The Griqualand West province of Cape Colony belongs also geographically to Bechuanaland, and except in the Kimberley diamond mines region is still largely inhabited by Bechuana. (See Griqualand.)

Physical Features. — The average height of the tableland of which Bechuanaland consists is nearly 4000 ft. The surface is hilly and undulating with a general slope to the west, where the level falls in considerable areas to little over 2000 ft. A large part of the country is covered with grass or shrub, chiefly acacia. There is very little forest land. The western region, the Kalahari Desert (q.v.), is mainly arid, with a sandy soil, and is covered in' part by dense bush. In the northern region are large marshy depressions, in which the water is often salt. The best known of these depressions, Ngami (q.v.), lies to

the north-west and is the central point of an inland water system apparently in process of drying up. To the north-east and connected with Ngami by the Botletle river, is the great Makari-Kari salt pan, which also drains a vast extent of territory, receiving in the rainy season a large volume of water. The marsh then becomes a great lake, the water surface stretching beyond the horizon, while in the dry season a mirage is often seen. The permanent marsh land covers a region 60 m. from south to north and from 30 to 60 m. east to west. In the south the rivers, such as the Molopo and the Kuruman, drain towards the Orange. Other streams are tributaries of the Limpopo, which for some distance is the frontier between Bechuanaland and the Transvaal.

The rivers of Bechuanaland are, with few exceptions, inter- mittent or lose themselves in the desert. It is evident, however, from the extent of the beds of these streams and of others now permanently dry, and from remains of ancient forests, that at a former period the country must have been abundantly watered. From the many cattle-folds and walls of defence scattered over the country, and ruins of ancient settlements, it is also evident that at that period stone-dykes were very common. The in- creasing dryness of the land is partly, perhaps largely, attribut- able to the cutting down of timber trees both by natives and by whites, and to the custom of annually burning the grass, which is destructive to young wood.

Climate. — The climate is healthy and bracing, except in the lower valleys along the river banks and in the marsh land, where malarial fever is prevalent. Though in great part within the tropics, the heat is counteracted by the dryness of the air. Throughout the year the nights are cool and refreshing; in winter the cold at night is intense. In the western regions the rainfall does not exceed 10 in. in the year; in the east the average rainfall is 26 in. and in places as much as 30 in. The rainy season is the summer months, November to April, but the rains are irregular, and, from the causes already indicated, the rainfall is steadily declining. From December to February violent

thunder and hail storms are experienced. In the winter or dry season there are occasional heavy dust storms.

Geology. — The greater part of Bechuanaland is covered with superficial deposits consisting of the sands of the desert regions of

the Kalahari and the alluvium and saliferous marls of the Okavango basin. The oldest rocks, granites, gneisses and schistose sandstones, the Ngami series, rise to the surface in the east and south-east and doubtless immediately underlie much of the sand areas. A sandstone found in the neighbourhood of Palapye is considered to be the equivalent of the Waterberg formation of the Transvaal. The Karroo formation and associate dolerites (Loalemandelstein) occur in the same region. A deposit of sinter and a calcareous sandstone, known as the Kalahari Kalk, considered by Dr Passarge to be of Miocene age, overlies a sandstone and curious breccia (Botletle Schnichten). These deposits are held by Passarge to indicate Tertiary desert conditions, to which the basin of the Zambezi is slowly reverting.

Fauna. — Until towards the close of the 19th century Bechuanaland abounded in big game, and the Kalahari is still the home of the lion, leopard, hyena, jackal, elephant, hippopotamus, rhinoceros, buffalo, antelope of many species, ostrich and even the giraffe. Venomous reptiles, e.g. puff-adders and cobras, are met with, enormous frogs are common, and walking and flying locusts, mosquitoes, white ants, flying beetles, scorpions, spiders and tarantulas are very numerous. The crocodile is found in some of the rivers. Many of the rivers are well stocked with fish. In those containing water in the rainy season only, the fish preserve life when the bed is dry by burrowing deeply in the ooze before it hardens. The principal fish are the baba or cat-fish (clarias sp.) and the yellow-fish, both of which attain considerable size. Bustards (the great kori and the koorhaan) are common.

Flora. — In the eastern district are stretches of grass land, both sweet and sour veld. In the " bush " are found tufts of tall coarse grass with the space between bare or covered with herb- aceous creepers or water-bearing tubers. A common creeper is one bearing a small scarlet cucumber, and a species of water- melon called tsoma is also abundant. Of the melon and cucumber there are both bitter and sweet varieties. Besides the grass and the creepers the bush is made up of berry-yielding bushes (some of the bushes being rich in aromatic resinous matter) , the wait-a- bit thorn and white thorned mimosa. The indigo and cotton plants grow wild. Among the rare big trees — found chiefly in the north-east — are baobab and palmyra and certain fruit trees, one bearing a pink plum. There are remains of ancient forests consisting of wild olive trees and the camel thorn, near which grows the ngotuane, a plant with a profusion of fine, strongly scented yellow flowers.

Chief Towns. — The chief town in southern Bechuanaland, i.e. the

part incorporated in Cape Colony, is Mafeking (q.v.), near the headwaters of the Molopo river. It is the headquarters of the Barolong tribe, and although within the Cape border is the seat of the administration of the protectorate. Vryburg (pop., 1904, 2985), founded by Boer filibusters in 1882, and Taungs, are towns on the railway between Kimberley and Mafeking. Taungs has some 22,000 inhabitants, being the chief kraal of the Batlapin tribe. About 7 m. south of Vryburg, at Tiger Kloof, is an Industrial Training Institute for natives founded in 1904 by the London Missionary Society. Upington (2508) on the north bank of the Orange, an agricultural centre, is the chief town in Gordonia, the western division of southern Bechuanaland. Kuruman (q.v.) is a native town near the source of the Kuruman river, 85 m. south-west of Vryburg. It has been the scene of missionary labours since the early years of the 19th century. North of Mafeking on the railway to Bulawayo are the small towns of Gaberones and Francistown. The last named is the chief township in the Tati concession, the centre of a gold-mining region, and the most important white settlement in the pro- tectorate. Besides these places there are five or six large native towns, each the headquarters of a distinct tribe. The most important is Serowe, with over 20,000 inhabitants, the capital of the Bamangwato, founded by the chief Khama in 1903. It is about 250 m. north-north-east of Mafeking, and took the place of

the abandoned capital Palapye, which m its turn had succeeded Shoshong. The chief centre in the western Kalahari is Lehututu. Agriculture and Trade. — The soil is very fertile, and if properly irrigated would yield abundant harvests. Unirrigated land laid under wheat by the natives is said to yield twelve bushels an acre. Cereals are grown in many of the river valleys. Maize and millet are the chief crops. The wealth of the Bechuana consists principally in their cattle, which they tend with great care, showing a shrewd discrimination in the choice of pasture suited to oxen, sheep and goats. Water can usually be obtained all the year round by sinking wells from 20 to 30 ft. deep. The " sweet veld "is specially suitable to cattle, and the finer shorter grass which succeeds it affords pasturage for sheep.

Gold mines are worked in the Tati district, the first discoveries having been made there in 1864. There are gold-bearing quartz reefs at Madibi, near Mafeking, where mining began in 1906. Diamonds have been found near Vryburg. The existence of coal near Palapye about 60 ft. below the surface has been proved. The coal, however, is not mined, and much of the destruction of timber in southern Bechuanaland was caused by the demand for fuel for KimberL y. Copper ore has been found near Francistown.

Formerly there – 'as a trade in ostrich feathers and ivory; but this has ceased, and the chief trade has since consisted in supply- ing the natives with European goods in exchange for cattle, hides, the skins and horns of game, firewood and fencing poles, and in forwarding goods north and south. The protectorate is a member of the South African Customs Union. The value of the goods imported into the protectorate in 1906 was £118,322; the value of the exports was £77,736. The sale of spirits to natives is forbidden. '-,

Communications. — As the gfeat highway from Cape Colony to the north, Bechuanaland has been described as the " Suez canal of South Africa." The trunk railway from Cape Town to the Victoria Falls traverses the eastern edge of Bechuanaland throughout its length. The railway enters the country at Fourteen Streams, 695 m. from Cape Town, and at Ramaquabane, 584 m. farther north, crosses into Rhodesia. The old trade route to Bulawayo, which skirts the eastern edge of the Kalahari, is now rarely used. Wagon tracks lead to Ngami, 320 m. N.W. from Palapye Road Station, and to all the settlements. From the scarcity of water on the main routes through the Kalahari these roads are known as " the thirsts "; along some of them wells have been sunk by the administration.

Government. — The protectorate is administered by a resident commissioner, responsible to the high commissioner for South Africa. Legislation is enacted by proclamations in the name of the high commissioner. Order is maintained by a small force of semi-military police recruited in Basutoland and officered by Europeans. Revenue is obtained mostly from customs and a hut tax, while the chief items of expenditure have been the police force and a subsidy of £20,000 per annum towards the cost of the railway, a liability which terminated in the year 1908. The average annual revenue for the five years ending the 3 1st of March 1906 was £30,074; the average annual expenditure during the same period was£8o,ii4. There is no public debt, the annual deficiency being made good by a grant-in-aid from the imperial exchequer. The tribal organization of the Bechuana is maintained, and native laws and customs, with certain modifications, are upheld.

History. — Bechuanaland was visited by Europeans towards the close of the 18th century. The generally peaceful disposition of the tribes rendered the opening up of the country comparatively easy. The first regular expedition to arJˆJi. penetrate far inland was in 1801-1802, when John (afterwards Sir John) Truter, of the Cape judicial bench, and William Somerville — an army physician and afterwards husband of Mary Somerville — were sent to the Bechuana

tribes to buy cattle. The London Missionary Society established stations in what is now Griqualand West in 1803, and in 18 18 the station of Kuruman, in Bechuanaland proper, was tounded. In the mean- time"M.H.K.Lichtenstein(i8o4)andW.J.Burchell(i8ii-i8i2), both distinguished naturalists, and other explorers, had made familiar the general characteristics of the southern part of the

encroach' meat.

country. The Rev. John Campbell, one of the founders of the Bible Society, also travelled in southern Bechuanaland and the adjoining districts in 1812-1814 and 1819-1821, adding con- siderably to the knowledge of the river systems. About 181 7 Mosilikatze, the founder of the Matabele nation, fleeing from the wrath of Chaka, the Zulu king, began his career of conquest, during which he ravaged a great part of Bechuanaland and enrolled large numbers of Bechuana in his armies. Eventually the Matabele settled to the north-east in the country which afterwards bore their name. In 182 1 Robert Moffat arrived at Kuruman as agent of the London Missionary Society, and made it his headquarters for fifty years. Largely as the result of the work of Moffat (who reduced the Bechuana tongue to writing), and of other missionaries, the Bechuana advanced notably in civilization. The arrival of David Livingstone in 1841 marked the beginning of the systematic exploration of the northern regions. His travels, and those of C. J. Andersson (1853-1858) and others, covered almost every part of the country hitherto un- known. In 1864 Karl Mauch discovered gold in the Tati district. At the time of the first contact of the Bechuana with white men the Cape government was the only civilized authority in South Africa; and from this cause, and the circumstance Boer (nat thg missionaries who lived among and exercised

great influence over them were of British nationality, the connexion between Bechuanaland and the Cape became close. As early as 1836 an act was passed extending the jurisdiction of the Cape courts in certain cases as far north as 25° S. — a limit which included the southern part of Bechuanaland. Although under strong British influence the country was never- theless ruled by its own chiefs, among whom the best-known in the middle of the 19th century "were Montsioa, chief of the Barolong, and Sechele, chief of the Bakwena and the friend of Livingstone. At this period the Transvaal Boers

were in a very unsettled state, and those living in the western districts showed a marked inclination to encroach upon the lands of the Bechuana. In 1852 Great Britain by the Sand river convention acknowledged the independence of the Transvaal. Save the Vaal river no frontier was indicated, and " boasting," writes Livingstone in his Missionary Travels, " that the English had given up all the blacks into their power . . . they (the Boers) assaulted the Bakwains " (Bakwena).

With this event the political history of Bechuanaland may be said to have begun. Not only was Sechele attacked at his capital Kolobeng, and the European stores and Livingstone's house there looted, but the Boers stopped a trader named M'Cabe from going northward. Again to quote Livingstone, " The Boers resolved to shut up the interior and I determined to open the country." In 1858 the Boers told the missionaries that they must not go north without their (the Boers') consent. Moffat complained to Sir George Grey, the governor of Cape Colony, through whose intervention the molestation by Transvaal Boers of British subjects in their passage through Bechuanaland was stopped. At a later date (1865) the Boers tried to raise taxes from the Barolong, but without success, a commando sent against them in 1868 being driven off by Montsioa's brother Molema. This led to a protest (in 1870) from Montsioa, which he lodged with a landdrost at Potchefstroom in the Transvaal, threatening to submit the matter to the British high commis- sioner if any further attempt at taxation were made on the part of the Boers. The Boers then resorted to cajolery, and at a meeting held in August 1870, at which President Pretorius and Paul Kruger represented the Transvaal, invited the Barolong to join their territories with that of the republic, in order to save them from becoming British. Montsioa's reply was short: " No one ever spanned-in an ass with an ox in one yoke." In the following year the claims of the Boers, the Barolong, and other tribes were submitted to the arbitration of R. W. Keate, lieu- tenant-governor of Natal, and his award placed Montsioa's territory outside the limits of the Transvaal. This attempt of the Boers to gain possession of Bechuanaland having failed, T. F. Burgers, the president of the Transvaal in 1872, endeavoured to replace Montsioa as chief of the Barolong by Moshette, whom

he declared to be the rightful ruler and paramount chief of that people. The attacks of the Boers at length became so unbearable that Montsioa in 1874 made a request to the British authorities to be taken under their protection. In formulating this appeal he declared that when the Boers were at war with Mosilikatze, chief of the Matabele, he had aided them on the solemn under- standing that they

were to respect his boundaries. This promise they had broken. Khama, chief of the Bamangwato in northern Bechuanaland, wrote in August 1876 to Sir Henry Barkly making an appeal similar to that sent by the Barolong. The letter contained the following significant passages :

" I write to you, Sir Henry, in order that your queen may preserve for me my country, it being in her hands. The Boers are coming into it, and I do not like them." " Their actions are cruel among us black people. We are like money, they sell us and our children." " I ask Her Majesty to defend me, as she defends all her people. There are three things which distress me very much — war, selling people, and drink. All these things I shall find in the Boers, and it is these things which destroy people to make an end of them in the country. The custom of the Boers has always been to cause people to be sold, and to-day they are still selling people."

The statements of Khama in this letter do not appear to have been exaggerated. The testimony of Livingstone confirms them, and even a Dutch clergyman, writing in 1869, described the system of apprenticeship of natives which obtained among the Boers " as slavery in the fullest sense of the word." These representations on the part of the Barolong, and the Bamang- wato under Khama, supported by the representations of Cape politicians, led in 1878 to the military occupation of southern Bechuanaland by a British force under Colonel (afterwards General Sir Charles) Warren. A small police force continued to occupy the district until April 1881, but, ignoring the wishes of the Bechuana and the recommendations of Sir Bartle Frere (then high commissioner), the home government refused to take the country under British protection. On the withdrawal of the police, southern Bechuanaland fell into a state of anarchy, nor did the fixing (on paper) of the frontier between it and the Transvaal by the Pretoria convention of August 1881 have any beneficial effect. There was fighting between Montsioa and Moshette, while Massow, a Batlapin chief, invited the aid of the Boers against Mankoroane, who claimed to be paramount chief of the Batlapin. The Transvaal War of that date offered oppor- tunities to the freebooting Boers of the west which were not to be lost. At this time the British, wearied of South African troubles, were disinclined to respond to native appeals for help. Consequently the Boers proceeded without let or hindrance with their conquest and annexation of steiialaad territory. In 1882 they set up the republic of Stella- oshen. land, with Vryburg as its capital, and forthwith proceeded to set up the republic of Goshen, farther north, in spite of the protests of Montsioa, and established a small town called Rooi Grond as

capital. They then summoned Montsioa to quit the territory. The efforts of the British authorities at this period (1882-1883) to bring about a satisfactory settlement were feeble and futile, and fighting continued until peace was made entirely on Boer lines. The Transvaal government was to have supreme power, and to be the final arbiter in case of future quarrels arising among the native chiefs. This agreement, arrived at without any reference to the British government, was a breach of the Pretoria convention, and led to an intimation on the part of Great Britain that she could not recognize the new republics. In South Africa, as well as in England, strong feeling was aroused by this act of aggression. Unless steps were taken at once, the whole of Bechuanaland might be permanently lost, while German territory on the west might readily be extended to join with that of the Boers. In the London convention of February 1884, conceded by Lord Derby in response to the overtures of Boer delegates, the Transvaal boundaries were again defined, part of eastern Bechuanaland being included in Boer territory. In spite of the convention the Boers remained in Stellaland and Goshen — which were west of the new Transvaal frontier, and in April 1884 the Rev. John Mackenzie, who had succeeded Livingstone, was sent to the country to arrange

matters. He found very little difficulty in negotiating with the various Bechuana chiefs, but with the Boers he was not so successful. In Goshen the Boers defied his authority, while in Stellaland only a half-hearted acceptance of it was given. At the instance of the new Cape government, formed in May and under control of the Afrikander Bond, Mackenzie, who was accused of being too " pro-Bechuana " and who had been refused the help of any armed force, was recalled on the 30th of July by the high commissioner, Sir Hercules Robinson. In his place Cecil Rhodes, then leader of the Opposition in the Cape parlia- ment, was sent to Bechuanaland.

Rhodes's mission was attended with great difficulty. British prestige after the disastrous Boer War of 1881 was at a very low

ebb, and he realized that he could not count on any mission? active help from the imperial or colonial authorities.

He adopted a tone of conciliation, and decided that the Stellaland republic should remain under a sort of British suzerainty. But in

Goshen the Boers would let him do nothing. Commandant P. J. Joubert, after meeting him at Rooi Grond, entered the country and attacked Montsioa. Rhodes then left under protest, declaring that the Boers were making war against Great Britain. The Boers now (10th of September) proclaimed the country under Transvaal protection. This was a breach of the London convention, and President Kruger explained that the steps had been taken in the " interests of humanity."

Indignant protest in Cape Town and throughout expedition. South Africa, as well as England, led to the despatch

in October 1884 of the Warren expedition, which was sent out by the British government to remove the filibusters, to bring about peace in the country, and to hold it until further measures were decided upon. Before Sir Charles Warren reached Africa, Sir Thomas Upington, the Cape premier, and Sir Gordon Sprigg, the treasurer-general, went to Bechuanaland and arranged a " settlement " which would have left the Boer filibusters in possession, but the imperial government refused to take notice of this " settlement." Public opinion throughout Great Britain was too strong to be ignored. The limit of con- cessions to the Boers had been reached, and Sir Charles Warren's force — 4000 strong — had reached the Vaal river in January 1885. On the 22nd of January Kruger met Warren at the Modder river, and endeavoured to stop him from proceeding farther, saying that he would be responsible for keeping order in the country. Warren, however, continued his march, and without firing a shot broke up the republics of Stellaland and Goshen. Bechuanaland was formally taken under British protection (30th of September 1885), and the sphere of British influence was declared to extend N. to 22° S. and W. to 20° E. (which last- mentioned line marks the eastern limit of German South- West Africa).

The natives cheerfully accepted this new departure in British policy, and from this time forward Khama's country was known as the British protectorate of Bechuanaland. That portion lying to the south of the Molopo river was described as British Bechuanaland, and was constituted a crown colony. In 1891

the northern frontier of the protectorate was extended protector- to i ts P resent boundaries, and the whole of it placed ate. under the administration of a resident commissioner,

a protest being made at the time by the British South Africa Company on the ground that the protectorate was included in the

sphere of their charter. Under the able adminis- tration (1885-1895) of Sir Sidney Shippard (q.v.) peace was maintained among the natives, who have shown great loyalty to British rule.

The history of the country shows how much has been due to the efforts of men like Livingstone, Mackenzie and Rhodes. It is quite clear that had they not represented the true state of affairs to the authorities the whole of this territory would have gradually been absorbed by the Boers, until they had effected a union with the Germans on the west. The great road to the north would thus have been effectually shut against trade and British colonization. With regard to the precise effect of missionary influence upon the natives, opinion will always

remain divided. But Livingstone, who was not only a mis- sionary but also an enlightened traveller, stated that a consider- able amount of benefit had been conferred upon the native races by missionary teaching. Livingstone was a great advocate of the prohibition of alcohol among the natives, and that policy was always adhered to by Khama.

In 1891 the South African Customs Union was extended to British Bechuanaland, and in 1895 the country was annexed to Cape Colony. At the same time it was provisionally arranged that the Bechuanaland protectorate should pass under the administration of the British South Africa Company (see Rho- desia). Khama and two other Bechuana chiefs came to England and protested against this arrangement. The result was that their territories and those of other petty chiefs lying to the north of the Molopo were made native reserves, into which the importation of alcohol was forbidden. A British resident officer was to be appointed to each of the reserves. A stipulation, however, was made with these chiefs that a strip of country sufficient for the purposes of a railway to Matabeleland should be conceded to the Chartered Company. In December 1895 the occurrence of the Jameson Raid, which started from these territories, prevented the completion of negotiations, and the administration of the protectorate remained in the hands of the imperial government. The administration, besides fostering the scanty material resources of the country, aids the missionaries in their endeavours to raise the Bechuanas in the scale of civilization. The results are full of encouragement. The natives proved staunch to the British connexion during the war of 1899-1902, and Khama and other chiefs gave help by providing transport. Anxiety was caused on the western frontier during the German campaigns against the Hottentots and Herero (1903-1908), many natives seeking refuge in

the protectorate. A dispute concerning the chieftainship of the Batawana in the Ngami district threatened trouble in 1906, but was brought to a peaceful issue. The Bechuana were entirely unaffected by the Kaffir rebellion in Natal.

Bibliography. — Of early works the most valuable are David Livingstone, Missionary Travels in South Africa (London, 1857); Robert Moffat, Missionary Labours and Scenes in Southern Africa (London, 1842); J. Campbell, Travels in South Africa (London, 1815), Travels . . . a Second Journey . . . (2 vols., London, 1822); and A. A. Anderson, Twenty-five Years in a Waggon in the Gold Regions of Africa, vol. i. (London, 1887). See also J. D. Hepburn, Twenty Years in Khama's Country (London, 1895); S. Passarge's Die Kalahari (Berlin, 1904) deals chiefly with geological and allied questions; John Mackenzie's Austral Africa, Losing it or Ruling it (London, 1887); John Mackenzie, a biography by W. D. Mackenzie (London, 1902) ; and the article " Bechuanaland " by Sir S. Shippard in British Africa (London, 1899), give the story of the beginnings of British rule in the protectorate. Of larger works dealing incidentally with Bechuanaland consult G. M. Theal's History of South Africa; E. A. Pratt's Leading Points in South African History (London, 1900) ; and Cecil Rhodes, His Political Life and Speeches, by Vindex (London, 1900). See also the Statistical Register, Cape of Good Hope, issued yearly at Cape Town, and the Annual Report, Bechuanaland Protectorate, issued by the Colonial Office, London.

(F. R. C; A. P. H.)

BECK, CHRISTIAN DANIEL (17 57-1832), German philologist, historian, theologian and antiquarian, one of the most learned men of his time, was born at Leipzig on the 22nd of January 1757. Hestudiedat Leipzig University, where he wa s appointed (1785) professor of Greek and Latin literature. This post he resigned in 1819 in order to take up the professorship of history, but resumed it in 1825. He also had the management of the university library, was director of the institute for the deaf and dumb, and filled many educational and municipal offices. In 1784 he founded a philological society, which grew into a philo- logical seminary, superintended by him until his death. In 1808 he was made a Hofrath by the king of Saxony, and in 1820 a knight of the civil order of merit. His philological lectures, in which grammar and criticism were subordinated to history, were largely attended by hearers from all parts of Germany. He died at Leipzig on the 13th of December 1832. He edited a number of classical authors: Pedo Albinovanus (1783), Pindar and the Scholia (1792-1795), Aristophanes (with others,

1794, &c),

Euripides (1778-1788), Apollonius Rhodius (1797), Demosthenes De Pace (1799), Plato (1813-1819), Cicero (1795-1807), Titus Calpurnius Siculus (1803). He translated Ferguson's Fall of the Roman Republic and Goldsmith's History of Greece, and added two volumes to Bauer's Thucydides. He also wrote on theo- logical and historical subjects, and edited philological and bibliographical journals. He possessed a large and valuable library of 24,000 volumes.

See Nobbe, Vita C. D. Seckii (1837) ; and G. Hermann, Opuscula, v. 312.

BECK (or Beek), DAVID (1621-1656), Dutch portrait-painter, was born at Arnheim in Guelderland. He was trained by Van Dyck, from whom he acquired the fine manner of pencilling and sweet style of colouring peculiar to that great master. He possessed likewise that freedom of hand and readiness, or rather rapidity of execution, for which Van Dyck was so remarkable, insomuch that when King Charles I. observed the expeditious manner of Beck's painting, he exclaimed, " Faith! Beck, I believe you could paint riding post." He was appointed portrait- painter and chamberlain to Queen Christina of Sweden, and he executed portraits of most of the sovereigns of Europe to adorn her gallery. His death at the Hague was suspected of being due to poisoning.

BECK, JAKOB SIGISMUND (1761-1840), German philosopher, was born at Danzig in 1761. Educated at Konigsberg, he be- came professor of philosophy first at Halle (1791-1799) and then at Rostock. He devoted himself to criticism and explanation of the doctrine of Kant, and in 1793 published the Erlauternder Auszug aus Kants krilischen Schriften, which has been widely used as a compendium of Kantian doctrine. He endeavoured to explain away certain of the contradictions which are found in Kant's system by saying that much of the language is used in a popular sense for the sake of intelligibility, e.g. where Kant attributes to things – in – themselves an existence under the conditions of time, space and causality, and yet holds that they furnish the material of our apprehensions. Beck maintains that the real meaning of Kant's theory is idealism; that of objects outside the domain of

consciousness, knowledge is impossible, and hence that nothing positive remains when we have removed the subjective element. Matter is deduced by the " original synthesis." Similarly, the idea of God is a symbolical representa- tion of the voice of conscience guiding from within. The value of Beck's exegesis has been to a great extent overlooked owing to the greater attention given to the work of Fichte. Beside the three volumes of the Erlauternder Auszug, he published the Grundriss der krit. Philosophie (1796), containing an interpreta- tion of the Kantian Kritik in the manner of Salomon Maimon.

See Ueberweg, Grundriss der Gesch. der Philos. der Neuzeit; Dilthey in the Archiv fur Geschichte der Pkilos., vol. ii. (1889), pp. 592-650. For Beck's letters to Kant, see R. Reicke, Aus Kants Briefwechsel (Konigsberg, 1885).

BECKENHAM, an urban district in the Sevenoaks parlia- mentary division of Kent, England, 10 m. S.S.E. of London by the South Eastern & Chatham railway. Pop. (1881) 13,045; (1901) 26,331. It is a long straggling parish extending from the western tower of the Crystal Palace almost to the south end of Bromley, and contains the residential suburb of Short- lands. Its rapid increase in size in the last decade of the 19th century was owing to the popularity which it attained as a place of residence for London business men. It retains, however, some of its rural character, and has wide thoroughfares and many handsome residences standing in extensive grounds. King William IV. 's Naval Asylum was endowed by Queen Adelaide for 12 widows of naval officers. The church of St George was built in 1866 on the site of an ancient Perpendicular church. Some 16th-century brasses, an altar tomb and a piscina were removed hither from the old church. The tower of the church was completed in 1903, and furnished with two bells in memory of Cecil Rhodes, in addition to the old bells, one of which dates from 1624.

BECKER, HEINRICH (1770-1822), German actor, whose real name was Bltjmenthal, was born at Berlin. He obtained, while quite a young man, an appointment in the court theatre

at Weimar, at that time under Goethe's auspices. The poet recognized his talent, appointed him stage-manager, entrusted him with several of the leading roles in his dramas and consulted him in all matters connected with the staging of his plays. For many years Becker was the favourite of the Weimar stage, and although he was at his best in comedy, he played, to Goethe's great satisfaction, Vansen in Egmont, and was also seen to great advantage in the leading parts of several

of Schiller's plays; notably Burleigh in Maria Stuart, Karl Moor in Die Rauber, and Antonio in Torquato Tasso. Becker left Weimar in the spring of 1809, played for a short time at Hamburg (under Schroder) and at Breslau, and then began a wandering life, now joining travelling companies, now playing at provincial theatres. Broken in health and ruined in fortune he returned in 1820 to Weimar, where he was again cordially received by Goethe, who reinstated him at the theatre. After playing for two short years with indifferent success, he died at Weimar in 1822.

Becker was twice married. His first wife, Christiane Luise Amalie Becker (1 778-1 797), was the daughter of a theatrical manager and dramatic poet, Johann Christian Neumann, and made her first stage appearance in 1787 at Weimar. Here she received some training from Goethe and from Corona Schroter, the singer, and her beauty and charm made her the favourite both of court and public. She married Heinrich Becker in 1 793. She died on the 22nd of September 1797. Her last part was that of Euphrosyne in the opera Das Petermannchen, and it is under this name that Goethe immortalized her in a poem which first appeared in Schiller's Musen Almanack of 1799.

BECKER, WILHELM ADOLF (1796-1846), German classical archaeologist, was born at Dresden. At first destined for a commercial life, he was in 181 2 sent to the celebrated school at Pforta. In 1816 he entered the university of Leipzig, where he studied under Beck and Hermann. After holding subordinate posts at Zerbst and Meissen, he was in 1842 appointed professor of archaeology at Leipzig. He died at Meissen on the 30th of September 1846. The works by which Becker is most widely known are the Gallus or Romische Scenen aus der Zeit Augusts (1838, new ed. by Goll, 1880-1882), and the Charicles or Bilder altgriechischer Sitte. (1840, new ed. by Goll, 1877-1878). These two books, which have been translated into English by Frederick Metcalfe, contain a very interesting description of the everyday life of the ancient Greeks and Romans, in the form of a romance. The notes and appendixes are valuable. More important is the great Handbuch der rom. Alterthiimer (1843-1868), completed after Becker's death by Marquardt and Mommsen. Becker's treatises De Comicis Romanorum Fabulis (1837), De Romae Veteris Muris atque Portis (1842), Die romische Topographie in Rom (1844), and Zur romischen Topographie (1845) ma y also be mentioned.

BECKET, THOMAS (c. 1118-1170), by his contemporaries more commonly called Thomas of London, English chancellor and

archbishop of Canterbury under Henry II., was born about the year n 18 in London. His mother was a native of Caen; his father, who came of a family of small Norman landowners, had been a citizen of Rouen, but migrated to London before the birth of Thomas, and held at one time the dignified office of port- reeve, although he ended his life in straitened circumstances. The young Thomas received an excellent education. At the age of ten he was put to school with the canons of Merton priory in Surrey. Later he spent some time in the schools of London, which enjoyed at that time a high reputation, and finally studied theology at Paris. Returning at the age of twenty-two he was compelled, through the misfortunes of his parents, to become a notary in the service of a wealthy kinsman, Osbert Huit Deniers, who was of some importance in London politics. About 1142 a family friend brought Thomas under the notice of Archbishop Theobald, of whose household he at once became an inmate. He accompanied the primate to Rome in 1143, and also to the council of Reims (1148), which Theobald attended in defiance of a prohibition from the king. It appears to have been at some time between the dates of these two journeys that he visited

Bologna and Auxerre, and began those studies in the canon law to which he was in no small degree indebted for his subsequent advancement and misfortunes. Although the bent of his mind was legal, he never made himself an expert jurist; but he had the art of turning his knowledge, such as it was, to excellent account. In n 51 he was sent to Rome by the archbishop with instructions to dissuade the Curia from sanctioning the coronation of Stephen's eldest son Eustace. It is said that Thomas distin- guished himself by the ability with which he executed his commission; in any case it gave him a claim on the gratitude of the Angevin party which was not forgotten. In n 54 he was promoted to be archdeacon of Canterbury, after first taking deacon's orders. In the following year Henry II., at the primate's recommendation, bestowed on him the important office of chancellor. In this capacity Thomas controlled the issue of royal writs and the distribution of ecclesiastical patronage; but it was more important for his future that he had ample opportunities of exercising his personal fascination upon a prince who was comparatively inexperienced, and thirteen or fourteen years his junior. He became Henry's bosom friend and was con- sulted in all affairs of state. It had been the hope of Theobald that Becket's influence would be exercised to support the ex- tensive privileges

which the Church had wrested from Stephen. But the chancellor, although preserving friendly relations with his old patron, subordinated the interests of the Church to those of his new master. Under his administration the Church was severely taxed for the prosecution of Henry's foreign wars; and the chancellor incurred the reproach " of plunging his sword into the bowels of his mother." Like Wolsey he identified him- self with the military aspirations of his sovereign. It was Thomas who organized the Toulouse campaign of n 59; even in the field he made himself conspicuous by commanding a company of knights, directing the work of devastation, and superintending the conduct of the war after the king had with- drawn his presence from the camp. When there was war with France upon the Norman border, the chancellor acted as Henry's representative; and on one occasion engaged in single combat and unhorsed a French knight of reputation. Later it fell to his part to arrange the terms of peace with France. He dis- charged the duties of an envoy with equal magnificence and dexterity; the treaty of May n 60, which put an end to the war, was of his making.*

In 1 162 he was transferred to a new sphere of action. Henry bestowed on him the see of Canterbury, left vacant by the death of Theobald. The appointment caused some murmurs; since Becket, at the time when it was made, was still a simple deacon. But it had been desired by Theobald as the one means of averting an attack on clerical privileges which had been impending almost since the accession of Henry II.; and the bishops accepted it in silence. Henry on his side looked to find in Becket the archbishop a coadjutor as loyal as Becket the archdeacon; and anticipated that the Church would once more be reduced to that state of dependence in which she had stood during the latter years of Henry I. Becket, however, disappointed all the conflicting expectations excited by his appointment. He did not allow himself to be made the king's tool; nor on the other hand did he attempt to protect the Church by humouring the king in ordinary matters. He devoted himself to ascetic practices, confined himself to the society of churchmen, and resigned the chancellorship in spite of a papal dispensation (procured by the king) which authorized him to hold that office concurrently with the primacy. By nature a violent par- tisan, the archbishop now showed himself the uncompromising champion of his order and his see. Hence he was on the worst of terms with the king before a year had elapsed. They came into open conflict at the council of Woodstock (July 1163), when Becket successfully opposed the king's proposal that a land-tax, known as the sheriff's aid, which formed part of that official's salary, should be henceforth paid into the Exchequer. But

there were more serious differences in the background. Becket had not shrunk from excommunicating a tenant in chief who had encroached upon the lands of Canterbury, and had protected m. 20

against the royal courts a clerk named Philip de Brois who was charged with an assault upon a royal officer. These disputes involved questions of principle which had long occupied Henry's attention, and Becket's defiant attitude was answered by the famous Constitutions of Clarendon (g.v.), in which the king defined, professedly according to ancient use and custqm, the relations of Church and State. Becket and the bishops were required to give these constitutions their approval. Henry's demands were more defensible in substance than might be supposed from the manner in which he pressed them on the bishops. On the most burning question, that of criminous clerks, he offered a compromise. He was willing that the accused should be tried in the courts Christian provided that the punish- ment of the guilty were left to the lay power. Becket's opposi- tion rested upon a casuistic interpretation of the canon law, and an extravagant conception of the dignity attaching to the priesthood; he showed, moreover, a disposition to quibble, to equivocate, and to make promises which he had no intention of fulfilling. His conduct may be" excused on the ground that the bishops were subjected to unwarrantable intimidation. But when he renounced his promise to observe the constitutions his conduct was reprobated by the other bishops, although approved by the pope. It was fortunate for Becket's reputation that Henry punished him for his change of front by a systematic persecution in the forms of law. The archbishop was thus enabled to invoke the pope's assistance, and to quit the country with some show of dignity.

Becket fled to France in November 1164. He at once suc- ceeded in obtaining from Alexander III. a formal condemnation of the constitutions. But Alexander, a fugitive from Italy and menaced by an alliance of the emperor with an antipope, was indisposed to take extreme measures against Henry; and six years elapsed before the king found himself definitely confronted with the choice between an interdict and a surrender. For the greater part of this time the archbishop resided at the Burgundian monastery of Pontigny, constantly engaged in negotiations with Alexander, whose hand he desired to force, and with Henry, from whom he hoped to extract an unconditional submission. In ir66 Becket received from the pope a commission to publish what censures he thought fit; of which he at once availed himself to excommunicate the king's principal counsellors. In 1169 he took the same step against two of the royalist bishops. In more sweeping measures, however, the pope refused to

support him, until in n 70 Henry infringed the rights of Canterbury by causing Archbishop Roger of York to crown the young king. In that year the threats of the pope forced Henry to a recon- ciliation which took place later at Freteval on the 22nd of July. It was a hollow truce, since the subject of the constitutions was not mentioned; and Thomas returned to England with the determination of riding roughshod over the king's supporters. If he had not given a definite pledge to forgive the bishops who had taken part in the young king's coronation, he had at least raised expectations' that he would overlook all past offences. But the archbishop prevailed upon the pope to suspend the bishops, and before his return published papal letters which, in announcing these sentences, spoke of the constitutions as null and void. It was only to be expected that such a step, which was virtually a declaration of war against the king, should arouse in him the strongest feelings of resentment. The archbishop's murder, perpetrated within a month of his return to England (29th December n 70), was, however, the work of over zealous courtiers and regretted by no one more than Henry.

Becket was canonized in 1172. Within a short time his shrine at Canterbury became the resort of innumerable pilgrims. Plenary indulgences were given for a visit to the shrine, and an official register was kept to record the miracles wrought by the relics of the saint. The shrine was magnificently adorned with the gold and silver and jewels offered by the pious. It was plundered by Henry VIII. , to whom the memory of Becket was specially obnoxious; but the reformers were powerless to expunge the name of the saint from the Roman calendar, on which it still remains. Even to those who are in sympathy with

the principles for which he fought, the posthumous reputation of Becket must appear strangely exaggerated. It is evident that in the course of his long struggle with the state he fell more and more under the dominion of personal motives. At the last he fought not so much for an idea as for the humiliation of an opponent by whom he had been ungenerously treated. William of Newburgh appears to express the verdict of the most impartial contemporaries when he says that the bishop was zelo justiliae fervidus, utrum autem plene secundum scientiam novit Deus: " burning with zeal for justice, but whether altogether according to wisdom God knows."

Authorities. — Original: — The correspondence of Becket and most of the contemporary biographies are collected by J. C. Robert- son in Materials for the History of Thomas Becket (7 vols., Rolls Series, 1875-1885). See also the Vie de Saint Thomas, by Gamier de Pont Sainte Maxence (ed. Hippeau, Paris, 1859). For the chronology of the controversy see Eyton's Itinerary of Henry II.

Modern: — Morris, Life and Martyrdom of St Thomas Becket (London, 1885); Lhuillier, Saint Thomas de Cantorbery (2 vols., Paris, 1891-1892); J. C. Robertson, Becket (London, 1859); F. W. Maitland, Roman Canon Law in the Church of England, c. iv. ; J. A. Froude in his Short Studies, vol. iv., and Freeman in his Historical Essays (1871), give noteworthy but conflicting appreciations.

(H. W. C. D.)

BECKFORD, WILLIAM (1760-1844), English author, son of Alderman William Beckford (1709-1770), was born on the 1st of October 1760. His father was lord mayor of London in 1762 and again in 1769; he was a famous supporter of John Wilkes, and on his monument in the Guildhall were afterwards inscribed the words of his manly and outspoken reproof to George III. on the occasion of the City of London address to the king in 1770. At the age of eleven young Beckford inherited a princely fortune from his father. He married Lady Margaret Gordon in 1783, and spent his brief married life in Switzerland. After his wife's death (1786) he travelled in Spain and Portugal, and wrote his Portuguese Letters (published 1834, 1835), which rank with his best work. He afterwards returned to England, and after selling his old house, Fonthill Abbey, Wiltshire, began to build a magnificent residence there, on which he expended in about eighteen years the sum of £273,000. His eccentricities, together with the strict seclusion in which he lived, gave rise tc scandal, probably unjustified. In 1822 he sold his house, together with its splendid library and pictures, to John Farquhar, and soon after one of the towers, 260 ft. high, fell, destroying part of the villa in the ruins. Beckford erected another lofty structure on Lansdowne Hill, near Bath, where he continued to reside till his death in 1844. His first work, Biographical Memoirs of Extraordinary Painters (1780) was a slight, sarcastic,/e« d'esprit. In 1782 he wrote in French his oriental romance, The History of the Caliph Valhck, which appeared in English, translated by the Rev. Samuel Henley, in 1786 and has taken its place as one of the finest productions of luxuriant imagination.

Beckford's wealth and large expenditure, his position as a collector and patron of letters (he bought Gibbon's library at Lausanne), his literary industry, and his reputation as author of Vathek, make him an interesting figure in literary history. He had a seat in parliament from 1784 to 1793, and again from 1806 to 1820. He left two daughters, the eldest of whom was married to the 10th duke of Hamilton.

Cyrus Redding's Memoir (1859) is the only full biography, but prolix; see Dr R. Garnett's introduction to his edition of Vathek

(1893).

BECKINGTON (or Bekynton), THOMAS (c. 1390-1465), English statesman and prelate, was born at Beckington in Somerset, and was educated at Winchester and New College, Oxford. Having entered the

church he held many ecclesiastical appointments, and became dean of the Arches in 1423; then devoting his time to secular affairs he was sent on an embassy to Calais in 1439, and to John IV., count of Armagnac, in 1442. At this time Beckington was acting as secretary to Henry VI., and soon after his return in 1443 he was appointed lord privy seal and bishop of Bath and Wells. The bishop erected many buildings in Wells, and died there on the 14th of January 1465. The most important results of Beckington's missions to France

were one Latin journal, written by himself, referring to the embassy to Calais; and another, written by one of his attendants, relating to the journey to Armagnac.

Beckington's own journal is published in the Proceedings of the Privy Council, vol. v., edited by N. H. Nicolas (1835) ; and the other journal in the Official Correspondence of Thomas Bekynton, edited by G. Williams for the Rolls Series (1872), which contains many inter- esting letters. This latter journal has been translated into English by N. H. Nicolas (1828). See G. G. Perry, " Bishop Beckington and Henry VI.," in the English Historical Review (1894).

BECKMANN, JOHANN (1739-1811), German scientific author, was born on the 4th of June 1739 at Hoya in Hanover, where his father was postmaster and receiver of taxes. He was educated at Stade and the university of Gottingen. The death of his mother in 1762 having deprived him of his means of support, he went in 1763 on the invitation of the pastor of the Lutheran community, Anton Friedrich Busching, the founder of the modern historic statistical method of geography, to teach natural history in the Lutheran academy, St Petersburg. This office he relinquished in 1765, and travelled in Denmark and Sweden, where he studied the methods of working the mines, and made the acquaintance of Linnaeus at Upsala. In 1766 he was appointed extraordinary professor of philosophy at Gottingen. There he lectured on political and domestic economy with such success that in 1770 he was appointed ordinary professor. He was in the habit of taking his students into the workshops, that they might acquire a practical as well as a theoretical knowledge of different processes and handicrafts. While thus engaged he determined to trace the history and describe the existing condition of each of the arts and sciences on which he was lecturing, being perhaps incited by the Bibliolhecae of Albrecht von Haller. But even Beckmann's industry and ardour were unable to overtake the amount of study necessary for this task. He therefore confined his attention to several practical arts and trades; and to these labours we owe his Beitrage zur Geschichte der Erfindungen (1780-1805), translated

into English as the History of Inventions — a work in which he relates the origin, history and recent condition of the various machines, utensils, &c, employed in trade and for domestic purposes. This work entitles Beckmann to be regarded as the founder of scientific technology, a term which he was the first to use in 1772. In 1772 Beckmann was elected a member of the Royal Society of Gottingen, and he contributed valuable scientific dissertations to its proceedings until 1783, when he withdrew from all further share in its work. He died on the 3rd of February 1811. Other important works of Beckmann are Entwurf einer allgemeinen Technologic (1806)'; Anleitung zur Handelswisscn- schaft (1789); Vorbereitung zur Warenkunde (1 795-1800); Beitrage zur Okonomie, Technologic, Polizei- und Kameral- wissenschaft (1777-1791).

BECKWITH, JAMES CARROLL (1852-), American por- trait-painter, was born at Hannibal, Missouri, on the 23rd of September 1852. He studied in the National Academy of Design, New York City, of which he afterwards became a member, and in Paris (1873-1878) under Carolus Duran. Returning to the United States in 1878, he gradually became a prominent figure in American art. He took an active part in the formation of the Fine Arts Society, and was president of the National Free Art League, which attempted to secure the repeal of the American duty on works of art. Among his portraits are those of W. M. Chase (1882), of Miss Jordan (1883), of Mark Twain, T. A. Janvier, General Schofield and William Walton. He decorated one of the domes of the Manufactures Building at the Columbian Exposition, Chicago, 1893.

BECKWITH, SIR THOMAS SYDNEY (1772-1831), British general, was the son of Major-General John Beckwith, who was colonel of the 20th regiment (Lancashire Fusiliers) in the charge at Minden. In 1791 he entered the 71st regiment (then com- manded by Colonel David Baird), in which he served in India and elsewhere until 1800, when he obtained a. company in Colonel Coote Manningham's experimental regiment of riflemen, shortly afterwards numbered as the 95th Rifles and now called the Rifle Brigade. In 1802 he was promoted major, and in the following

year lieutenant-colonel. Beckwith was one of the favourite officers of Sir John Moore in the famous camp of Shorncliffe, and aided that general in the training of the troops which afterwards became the

Light Division. In 1806 he served in the expedition to Hanover, and in 1807 in that which captured Copenhagen. In 1806 the Rifles were present at Vimeira, and in the campaign of Sir John Moore they bore the brunt of the rearguard fighting. Beckwith took part in the great march of Craufurd to the field of Talavera, in the advanced guard fights on the Coa in 1810 and in the campaign in Portugal. On the formation of the Light Division he was given a brigade command in it. After the brilliant action of Sabugal, Beckwith had to retire for a time from active service, but the Rifles and the brigade he had trained and commanded added to their fame on every subsequent battlefield. In 181 2 he went to Canada as assistant quarter- master-general, and he took part in the war against the United States. In 1814 he became major-general, and in 1815 was created K.C.B. In 1827 he was made colonel commandant of the Rifle Brigade. He went to India as commander-in-chief at Bombay in 1829, and was promoted lieutenant-general in the following year. He died on the 15th of January 183 1 at Mahableshwar.

His elder brother, Sir George Beckwith (1753-1823), dis- tinguished himself as a regimental officer in the American War of Independence, and served subsequently in high administrative posts and in numerous successful military operations in the West Indies during the French Revolutionary and Napoleonic wars. He was made a K.B. for his capture of Martinique in 1809, and attained the full rank of general in 1814. Sir George Beckwith commanded the forces in Ireland, 1816-1820. He died in London on the 20th of March 1823.

Their nephew, Major-General John Charles Beckwith (1789-1862), joined the 50th regiment in 1803, exchanging in 1804 into the 95th Rifles, with which regiment he served in the Peninsular campaigns of 1808-10. He was subsequently employed on the staff of the Light Division, and he was re- peatedly mentioned in despatches, becoming in 1814 a brevet- major, and after the battle of Waterloo (in which he lost a leg) lieutenant-colonel and C.B. In 1820 he left active service. Seven years later an accident drew his attention to the Waldenses, whose past history and present condition influenced him so strongly that he settled in the valleys of Piedmont. The rest of his life was spent in the self-imposed task of educating the Waldenses, for whom he established and maintained a large number of schools, and in reviving the earlier faith of the people. In 1848 King Charles Albert made him a knight of the order of St Maurice and St Lazarus. He was promoted colonel in the British army in 1837 and major-general in 1846. He died on the 19th of July 1862 at La Torre, Piedmont.

BECKX, PIERRE JEAN (1795-1887), general of the Society of Jesus, was born at Sichem in Belgium on the 8th of February 1795, and entered the novitiate of the order at Hildesheim in 1 8 1 9 . His first important post was as procurator for the province of Austria, 1847; next year he became rector of the Jesuit college at Louvain, and, after serving as secretary to the pro- vincials of Belgium and Austria, was elected head of the order in 1853. His tenure of office was marked by an increased zeal for missions in Protestant lands, and by the removal of the society's headquarters from Rome to Fiesole near Florence in 1870. His chief literary work was the often-translated Month oj Mary (Vienna, 1843). He retired in September 1883, being succeeded by Anthony M. Anderledy, a Swiss, who had seen service in the United States. He died at Rome on the 4th of March 1887.

BECQUE, HENRY FRANCOIS (1837-1899), French dramatist, was born on the 9th of April 1837 in Paris. He wrote the book of an opera Sardanapale in imitation of Lord Byron for the music of M. Victorin Joncieres in 1867, but his first important work, Michel Pauper, appeared in 1870. The importance of this sombre drama was first realized when it was revived at the Odeon in 1886. Les Corbeaux (1882) established Becque's posi- tion as an innovator, and in 1885 he produced his most successful

play, La Parisienne. Becque produced little during the last years of his life, but his disciples carried on the tradition he had created. He died in May 1899.

See his Quercttes litteraires (1890), and Souvenirs d'un auteur dramatique (1895), consisting chiefly of reprinted articles in which he does not spare his opponents. His Theatre complet (3 vols., 1899) includes L' Enfant prodigue (Vaudeville Theatre, 6th of Nov. 1868); Michel Pauper (Theatre de la Porte-Saint-Martin, 17th of June 1870); L'Enlevement (Vaudeville, 18th of Nov. 1871); La Navette (Gymnase, 15th of Nov. 1878) ; Les Honnites Femmes (Gymnase, 1st of Jan. 1880) ; Les Corbeaux (Comedie Francaise, 14th of Sept. 1882) ; La Parisienne (Theatre de la Renaissance, 7th of Feb. 1885).

BlCQUER, GUSTAVO ADOLFO (1836-1870), Spanish poet and romance-writer, was born at Seville on the 17th of February 1836. Left an orphan at an early age, he was educated by his godmother, refused to adopt any profession, and drifted to Madrid, where he obtained a small post in the civil service. He was dismissed for carelessness, became an incorrigible Bohemian, and earned a precarious living by translating foreign novels; he died in great poverty at Madrid on the 22nd of December 1870. His works were

published posthumously in 1873. In such prose tales as El Rayo de Luna and La Mujer de piedra, Becquer is manifestly influenced by Hoffmann, and as a poet he has analogies with Heine. He dwells in a fairyland of his own, crooning a weird elfin music which has no parallel in Spanish; his work is unfinished and unequal, but it is singularly free from the rhetoric characteristic of his native Andalusia, and its lyrical ardour is of a beautiful sweetness and sincerity.

BECQUEREL, the name of a French family, several members of which have been distinguished in chemical and physical research.

Antoine Cesar Becquerel (1788-1878), was born at Chatillon sur Loing on the 8th of March 1788. After passing through the Ecole Polytechnique he became ingenieur-ojjicier in 1808, and saw active service with the imperial troops in Spain from 1810 to 1812, and again in France in 1814. He then resigned from the army and devoted the rest of his life to scientific investigation. His earliest work was mineralogical in character, but he soon turned his attention to the study of electricity and especially of electrochemistry. In 1837 he received the Copley medal from the Royal Society " for his various memoirs on electricity, and particularly for those on the production of metallic sulphurets and sulphur by the long-continued action of electricity of very low tension," which it was hoped would lead to increased know- ledge of the " recomposition of crystallized bodies, and the processes which may have been employed by nature in the production of such bodies in the mineral kingdom." In bio- logical chemistry he worked at the problems of animal heat and at the phenomena accompanying the growth of plants, and he also devoted much time to meteorological questions and obser- vations. He was a prolific writer, his books including Traiti d'electriciti et du magnetisme (1 834-1 840), Traiti de physique dans ses rapports avec la chimie (1842), Elements de I'electro-chimie (1843), Traite complet du magnetisme (1845), EMments de physique terrestre et de mUeorologie (1847), and Des climats et de V influence qu'exercent les sols boises et deboises (1853). He died on the 18th of January 1878 in Paris, where from 1837 he had been professor of physics at the Musee d'Histoire Naturelle.

His son, Alexandre Edmond Becquerel (1820-1891), was born in Paris on the 24th of March 1820, and was in turn his pupil, assistant and successor at the Musee d'Histoire Naturelle; • he was also appointed professor at the short-lived Agronomic Institute at Versailles in 1849, an d m 1 ˆ5i received the chair of physics at the

Conservatoire des Arts et Metiers. Edmond Becquerel was associated with his father in much of his work, but he himself paid special attention to the study of light, investigating the photochemical effects and spectroscopic characters of solar radiation and the electric light, and the phenomena of phosphorescence, particularly as displayed by the sulphides and by compounds of uranium. It was in con- nexion with these latter inquiries that he devised his phosphoro- scope, an apparatus which enabled the interval between exposure to the source of light and observation of the resulting effects to

be varied at will and accurately measured. He published in 1867-1868 a treatise in two volumes on La Lumiere, ses causes et ses ejfets. He also investigated the diamagnetic and para- magnetic properties of substances; and was keenly interested in the phenomena of electrochemical decomposition, accumu- lating much evidence in favour of Faraday's law and proposing a modified statement of it which was intended to cover certain apparent exceptions. He died in Paris on the nth of May 1891. Antoine Henri Becquerel (1852-1908), son of the last- named, who succeeded to his chair at the Musee d'Histoire Naturelle in 1892, was born in Paris on the 15th of December 1852, studied at the Ecole Polytechnique, where he was appointed a professor in 1895, and in 1875 entered the department des ponts et chaussees, of which in 1894 he became ingenieur en chef. He was distinguished as the discoverer of radioactivity, having found in 1896 that uranium at ordinary temperatures emits an invisible radiation which in many respects resembles Rontgen rays, and can affect a photographic plate after passing through thin plates of metal. For his researches in this department he was in 1903 awarded a Nobel prize jointly with Pierre Curie. He also engaged in work on magnetism, the polarization of light, phosphorescence and the absorption of light in crystals. He died at Croisic in Brittany on the 25th of August 1908.

BED (a common Teutonic word, cf. German Bett, probably connected with the Indo-European root bhodh, seen in the Lat. fodere, to dig; so " a dug-out place " for safe resting, or in the same sense as a garden " bed "), a general term for a resting or sleeping place for men and animals, and in particular for the article of household furniture for that object, and so used by analogy in other senses, involving a supporting surface or layer. The accompaniments of a domestic bed (bedding, cover- lets, &c.) have naturally varied considerably in

different times, and its form and decoration and social associations have con- siderable historical interest. The Egyptians had high bedsteads which were ascended by steps, with bolsters or pillows, and curtains to hang round. Often there was a head-rest as well, semi-cylindrical and made of stone, wood or metal. Assyrians, Medes and Persians had beds of a similar kind, and frequently decorated their furniture with inlays or appliques of metal, mother-of-pearl and ivory. The oldest account of a bedstead is probably that of Ulysses which Homer describes him as making in his own house, but he also mentions the inlaying of the wood- work of beds with gold, silver and ivory. The Greek bed had a wooden frame, with a board at the head and bands of hide laced across, upon which skins were placed. At a later period the bedstead was often veneered with expensive woods; some- times it was of solid ivory veneered with tortoise-shell and with silver feet; often it was of bronze. The pillows and coverings also became more costly and beautiful; the most celebrated places for their manufacture were Miletus, Corinth and Carthage. Folding beds, too, appear in the vase paintings. The Roman mattresses were stuffed with reeds, hay, wool or feathers; the last was used towards the end of the Republic, when custom demanded luxury. Small cushions were placed at the head and sometimes at the back. The bedsteads were high and could only be ascended by the help of steps. They were often arranged for two persons, and had a board or railing at the back as well as the raised portion at the head. The counterpanes were some- times very costly, generally purple embroidered with figures • in gold; and rich hangings fell to the ground masking the front. The bedsteads themselves were often of bronze inlaid with silver, and Elagabalus, like some modern Indian princes, had one of solid silver. In the walls of some of the houses at Pompeii bed niches are found which were probably closed by curtains or sliding partitions. The marriage bed, lectus genialis, was much decorated, and was placed in the atrium opposite the door. A low pallet-bed used for sick persons was known as scimpodium. Other forms of couch were called lectus, but were not beds in the modern sense of the word except the lectus funebris, on which the body of a dead person lay in state for seven days, clad in a toga and rich garments, and surrounded by flowers and foliage. This bed rested on ivory legs, over which purple blankets

embroidered with gold were spread, and was placed in the atrium with the foot to the door and with a pan of incense by its side. The ancient Germans lay on the floor on beds of leaves covered with skins, or in a kind of shallow chest filled with leaves and moss. In the early middle ages they laid carpets on the floor or on a bench against

the wall, placed upon them mattresses stuffed with feathers, wool or hair, and used skins as a covering. They appear to have generally lain naked in bed, wrapping them- selves in the large linen sheets which were stretched over the cushions. In the 13 th century luxury increased, and bedsteads were made of wood much decorated with inlaid, carved and painted ornament. They also used folding beds, which served as couches by day and had cushions covered with silk laid upon leather. At night a linen sheet was spread and pillows placed, while silk-covered skins served as coverlets. Curtains were hung from the ceiling or from an iron arm projecting from the wall. The Carolingian MSS. show metal bedsteads much higher at the head than at the feet, and this shape continued in use till the 13th century in France, many cushions being added to raise the body to a sloping position. In the 12th-century MSS. the bedsteads appear rmich richer, with inlays, carving and painting, and with embroidered coverlets and mattresses in harmony. Curtains were hung above the bed, and a small hanging lamp is often shown. In the 14th century the woodwork became of less importance, being generally entirely covered by hangings of rich materials. Silk, velvet and even cloth of gold were much used. Inventories from the beginning of the 14th century give details of these hangings lined with fur and richly embroidered. Then it was that the tester bed made its first appearance, the tester being slung from the ceiling or fastened to the walls, a form which developed later into a room within a room, shut in by double curtains, sometimes even so as to exclude all draughts. The space between bed and wall was called the ruelle, and very intimate friends were received there. In the 15th century beds became very large, reaching to 7 or 8 ft. by 6 or 7 ft. Viollet-le-Duc says that the mattresses were filled with pea-shucks or straw — neither wool nor horsehair is mentioned — but feathers also were used. At this time great personages were in the habit of carrying most of their property about with therri, including beds and bed-hangings, and for this reason the bedsteads were for the most part mere frameworks to be covered up; but about the beginning of the 16th century bedsteads were made lighter and more decorative, since the lords remained in the same place for longer periods. In the museum at Nancy is a fine bedstead of this period which belonged to Antoine de Lorraine. It has a carved head and foot as well as the uprights which support the tester. Another is in the Musee Cluny ascribed to Pierre de Gondi, very architectural in design, with a bracketed cornice, and turned and carved posts; at the head figures of warriors watch the sleeper. Louis XIV. had an enormous number of sumptuous beds, as many as 413 being described in the inventories of his palaces. Some of them had embroideries enriched with pearls, and

figures on a silver or golden ground. The carving was the work of Proux or Caffieri, and the gilding by La Baronniere. The great bed at Versailles had crimson velvet curtains on which " The Triumph of Venus " was embroidered. So much gold was used that the velvet scarcely showed. Under the influence of Madame de Maintenon " The Sacrifice of Abraham," which is now on the tester, replaced " The Triumph of Venus." In the 17th century, which has been called " the century of magnificent beds," the style a la duchesse, with tester and curtains only at the head, replaced the more enclosed beds in France, though they lasted much longer in England. In the 18th century feather pillows were first used as coverings in Germany, which in the fashions of the bed and the curious etiquette connected with the bedchamber followed France for the most part. The beds were a la duchesse, but in France itself there was great variety both of name and shape — the lit a alcove, lit d'ange, which had no columns, but a suspended tester with curtains drawn back, lit d I'Anglaise, which' looked like a high sofa by day, lit en baldaquin, with the tester fixed against trie wall,

Kt a couronne with a tester shaped like a crown, a style which appeared under Louis XVI., and was fashionable under the Restoration and Louis Philippe, and lit a I'impiriale, which had a curved tester, are a few of their varieties. The lit en baldaquin of Napoleon I. is still at Fontainebleau, and the Garde Meuble contains several richly carved beds of a more modern date. The custom of the " bed of justice " upon which the king of France reclined when he was present in parliament, the princes being seated, the great officials standing, and the lesser officials kneeling, was held to denote the royal power even more than the throne. Louis XL is credited with its first use, and the custom lasted till the end of the monarchy. From the habit of using this bed to hear petitions, &c, came the usage of the grand lit, which was provided wherever the king stayed, called also lit de parement or lit de parade, rather later. Upon this bed the dead king lay in state. The beds of the king and queen were saluted by the courtiers as if they were altars, and none approached them even when there was no railing to prevent it. These railings were apparently placed for other than ceremonial reasons originally, and in the accounts of several castles in the 15th century mention is made of a railing to keep dogs from the bed. In the chambre de parade, where the ceremonial bed was placed, certain persons, such as ambassadors or great lords, whom it was desired to

honour, were received in a more intimate fashion than the crowd of courtiers. The petit lever was held in the bedroom itself, the grand lever in the chambre de parade. At Versailles women received their friends in their beds, both before and after childbirth, during periods of mourning, and even directly after marriage — in fact in any circumstances which were thought deserving of congratulation or condolence. During the 17th century this curious custom became general, perhaps to avoid the tiresome details of etiquette. Portable beds were used in high society in France till the end of the ancicn regime. The earliest of which mention has been found belonged to Charles the Bold (see Memoirs of Philippe de Comines). They had curtains over a light framework, and were in their way as fine as the stationary beds. Iron beds appear in the 18th century; the advertisements recommend them as free from the insects which sometimes infested wooden bedsteads, but one is mentioned in the inventory of the furniture of the castle of Nerac in 1 569, " un lit de fer et de cuivre, avec quatre petites colonnes de laiton, ensemble quatre satyres de laiton, quatre petits vases de laiton pour mettre sur les colonnes; dedans le dit lit il y a la figure d'Olopherne ensemble de Judith, qui sont d'albatre." In Scotland, Brittany and Holland the closed bed with sliding or folding shutters has persisted till our own day, and in England — where beds were commonly quite simple in form — the four- poster, with tester and curtains all round, was the usual citizen's bed till the middle of the 19th century. Many fine examples exist of 17th-century carved oak bedsteads, some of which have found their way into museums. The later forms, in which mahogany was usually the wood employed, are much less architectural in design. Some exceedingly elegant mahogany bed- steads were designed by Chippendale, Hepplewhite and Sheraton, and there are signs that English taste is returning to the wooden bedstead in a lighter and less monumental form. (J. P.-B.)

BED, in geology, a term for certain kinds of rock usually found to be arranged in more or less distinct layers; these are the beds of rock or strata. Normally, the bedding of rocks is horizontal or very nearly so; when the upper and lower surfaces of a bed are parallel, the bedding is said to be regular; if it is thickest at one point and thins away thence in every direction, the bedding is lenticular. Beds may be thick (50 ft. or more) or so thin as to be like sheets of paper, e.g. paper shales, such thin beds being often termed layers or laminae; intermediate regular varieties may be called flags, flagstones or tilestones. In fine-grained rocks the bedding is usually thinner and more regular than in coarser rocks, such as sandstones and grits. Bedding is confined to rocks which have been formed under water or

by the agency of wind; these are the " stratified " rocks. The deposition . of roclt material by moving water is not as

a rule uniform, slight changes in the velocity produce an im- mediate change in the size of the particles deposited upon a given area; thus a coarse sand layer may be succeeded by a finer sand or a mud, or two sandy layers may be separated by a thin layer of muddy shale. Bedding is most often induced by a change in the nature of the contiguous strata; thus a sandstone is followed by a shale or vice versa — changes which may be due to the varying volume or velocity of a current. Or the nature of the deposit may be influenced by chemical actiohs, whereby we get beds of rock-salt or gypsum between beds of marl. Or again, organic activities may influence the deposit, beds of coal may succeed layers of shale, iron-stone may lie between lime- stones or clays, a layer of large fossils or of flints may determine a bedding plane in massive limestones. Flaky minerals like mica frequently assist in the formation of bedding planes; and the pressure of superincumbent strata upon earlier formed deposits has no doubt often produced a tendency in the par- ticles to arrange themselves normal to the direction of pressure, thus causing the rock to split more readily along the same direction.

Where rapidly-moving currents of water (or air) are trans- porting or depositing sand, &c, the bedding is generally not horizontal, but inclined more or less steeply; this brings about the formation of what is variously called " cross-bedding," " diagonal bedding", " current bedding " or improperly " false- bedding." Igneous materials, when deposited through the agency of water or air, exhibit bedding, but no true stratifica- tion is seen in igneous rocks that have solidified after cooling, although in granites and similar rocks the process of weather- ing frequently produces an appearance resembling this structure. Miners not infrequently describe a bed of rock as a " vein," if it is one that has some economic value, e.g. a " vein of coal or ironstone." (J. A. H.)

BEDARESI, YEDAIAH (1270-1340), Jewish poet, physician and philosopher of Provence. His most successful work was an ethical treatise, Behinath 'Olam (Examination of the World), a didactic poem in thirty-seven short sections. The work is still very popular. It was translated into English by Tobias Goodman.

BEDARIEUX, a town of southern France, in the department of Herault, on the Orb, 27 m. N.N.W. of Beziers by rail. Pop. (1906) SS94- The town has a 16th-century church, a board of trade arbitration, a chamber of arts and manufactures, a com- munal

college and a school of drawing. Bcdarieux was at one time a notable manufacturing centre. Its cloth-weaving industry, carried on under a special royal privilege from the end of the 17 th century to the Revolution, employed in 1789 as many as 5000 workmen, w T hile some thousand more were occupied in wool and cotton spinning, &c. In spite of the introduction of modern machinery from England, the industries of the place declined, mainly owing to the loss of the trade with the Levant; but of late years they have somewhat revived, owing partly to the opening up of coal mines in the neighbourhood. Besides cloth factories and wool-spinning mills, there are now numerous tanneries and leather-dressing works. There is some trade in timber, wool and agricultural produce.

BEDDGELERT (" Gelert's grave "), a village in Carnarvon- shire, North Wales, at the foot of Snowdon. The tradition of Gelert, Llewelyn's hound, being buried there is old in Wales; and common to it and India is the legend of a dog (or ichneumon) saving a child from a beast of prey (or reptile) , and being killed by the child's father under the delusion that the animal had slain the infant. The English poet, W. R. Spencer, has versified the tale of Llewelyn, king of Wales, leaving Gelert and the baby prince at home, returning to find Gelert stained with the blood of a wolf, and killing the hound because he thought his child was slain. Sir W. Jones, the Welsh philologist and linguist, gives the Indian equivalent (Lord Teignmouth's Life of Jones, ed. Rev. S. C. Wilkes, editor's supplement). A Brahmin, leaving home, left his daughter in charge of an ichneumon, which he had long cherished. A black snake came up and was killed by the ichneumon, mistakenly killed, in its turn, by the Brahmin on

his coming back. Another version is the medieval romance in The Seven Wise Masters of Rome. In the edition printed by Wynkyn de Worde it is told by " the first master " — a knight had one son, a greyhound and a falcon; the knight went to a tourney, a snake attacked the son, the falcon roused the hound, which killed the serpent, lay down by the cradle, and was killed by the knight, who discovered his error, like Llewelyn, and similarly repented (Villon Society, British Museum reprint, by Gomme and Wheatley).

On the west of Beddgelert is Moel Hebog (Bare-hill of the falcon), a hiding-place of Owen Glendower. Here, in 1784, was found a brass

Roman shield. Near is the famous Aberglaslyn Pass, dividing Carnarvon and Merioneth. In the centre is Cadair Rhys Goch o'r Eryri, a rock named as the chair of Rhys Goch, a bard contemporary with Glendower (died traditionally, 1420). Not far hence passed the Roman road from Uriconium to Segontium (see Carnarvon).

BEDDOES, THOMAS (1760-1808), English physician and scientific writer, was born at Shiffnall in Shropshire on the 13 th of April 1760. After being educated at Bridgnorth grammar school and at Pembroke College, Oxford, he studied medicine in London under John Sheldon (1752-1808). In 1784 he published a translation of L. Spallanzani's Dissertations on Natural History, and in 1785 produced a translation, with original notes, of T. O. Bergman's Essays on Elective Attractions. He took his degree of doctor of medicine at Oxford in 1786, and, after visiting Paris, where he became acquainted with Lavoisier, was appointed reader in chemistry at Oxford University in 1788. His lectures attracted large and appreciative audiences; but his sympathy with the French Revolution exciting a clamour against him, he resigned his readership in 1792. In the following year he pub- lished Observations on the Nature of Demonstrative Evidence, and the History of Isaac Jenkins, a story which powerfully exhibits the evils of drunkenness, and of which 40,000 copies are reported to have been sold. About the same time he began to work at his project for the establishment of a " Pneumatic Institution " for treating disease by the inhalation of different gases. In this he was assisted by Richard Lovell Edgeworth, whose daughter, Anna, became his wife in 1794. In 1798 the institution was established at Clifton, its first superintendent being Humphry Davy, who investigated the properties of nitrous oxide in its laboratory. The original aim of the institution was gradually abandoned; it became an ordinary sick-hospital, and was relinquished by its projector in the year before his death, which occurred on the 24th of December 1808. Beddoes was a man of great powers and wide acquirements, which he directed to noble and philanthropic purposes. He strove to effect social good by popularizing medical knowledge, a work for which his vivid imagination and glowing eloquence eminently fitted him. Be- sides the writings mentioned above, he was the author of Political Pamphlets (1 795-1 797), a popular Essay on Consumption (1799), which won the admiration of Kant, an Essay on Fever (1 807) , and Hygeia, or Essays Moral and Medical (1 807) . He also edited John Brown's Elements of Medicine (1795), and Contribu- tions to Physical and Medical Knowledge, principally from the

West of England (1799).

A life of Beddoes by Dr John E. Stock was published in 1810.

BEDDOES, THOMAS LOVELL (1803-1849), English dramatist and poet, son of the physician, Thomas Beddoes, was born at Clifton on the 20th of July 1803. His mother was a sister of Maria Edgeworth, the novelist. He was sent to Bath grammar school and then to the Charterhouse. At school he wrote a good deal of verse and a novel in imitation of Fielding. In 1820 he was entered at Pembroke College, Oxford, and in his first year published The Improvisatore, afterwards carefully suppressed, and in 1822 The Bride's Tragedy, which showed him as the disciple of the later Elizabethan and Jacobean dramatists. The play found a small circle of admirers, and procured for Beddoes the friendship of Bryan Waller Procter (Barry Cornwall). Beddoes retired to Southampton to read for his degree, and there Procter introduced him to a young lawyer, Thomas Forbes Kelsall, with whom he became very intimate, and who became

his biographer and editor. At this time he composed the dramatic fragments of The Second Brother and Torrismond. Unfortunately he lacked the power of constructing a plot, and seemed to suffer from a constitutional inability to finish any- thing. Beddoes was one of the first outside the limited circle of Shelley's own friends to recognize Shelley's genius, and he was certainly one of the earliest imitators of his lyrical method. In the summer of 1824 he was summoned to Florence by the illness of his mother, but she died before he arrived. He remained some time in Italy, and met Mrs Shelley and Walter Savage Landor before he returned to England. In 1825 he took his degree at Oxford, and in that year he began what he calls {Letters, p. 68) " a very Gothic styled tragedy " with " a jewel of a name." This work was completed in 1829 as the fantastic and incoherent drama, Death's Jest Book or The Fool's Tragedy; but he continued to revise it until his death, and it was only published posthumously. On leaving Oxford he decided to study anatomy and physiology, not, however, without some hope that his studies might, by increasing his knowledge of the human mechanism, further his efforts as a dramatist. In the autumn of 1825 he entered on his studies at Gottingen, where he remained for four years. In 1829 he removed to Wiirzburg, and in 1832 obtained his doctorate in medicine, but his intimate association with democratic and republican leaders in Germany and Switzer- land forced him to leave Bavaria without receiving his diploma. He settled in Zurich, where he practised for some time as a physician, and was even elected to be professor of comparative anatomy at the university, but the authorities refused to ratify his appointment because of his revolutionary views. He fre- quently contributed political poems and articles to German and Swiss

papers, but none of his German work has been identified. The years at Zurich seem to have > been the happiest of his life, but in 1839 the anti-liberal riots in the town rendered it unsafe for him, and early in the next year he had to escape secretly. From this time he had no settled home, though he stored his books at Baden in Aargau. His long residence in Germany was only broken by visits to England in 1828 to take his master of arts degree, in 1835, in 1842 and for some months in 1846. He had adopted German thought and manners to such an extent that he hardly felt at home in England; and his study of the German language, which he had begun in 1825, had almost weaned him from his mother- tongue; he was, as he says in a letter, " a non-conductor of friendship "; and it is not surprising that his old friends found him much changed and eccentric. In 1847 he returned to Frankfort, where he lived with a baker called Degen, to whom he became much attached, and whom he persuaded to become an actor. He took Degen with him to Zurich, where he chartered the theatre for one night to give his friend a chance of playing Hotspur. The two separated at Basel, and in a fit of dejection (May 1848) Beddoes tried to bleed himself to death. He was taken to the hospital, and wrote to his friends in England that he had had a fall from horseback. His leg was amputated, and he was in a fair way to recovery when, on the first day he was allowed to leave the hospital, he took curare, from the effects of which he died on the 26th of January 1849. His MSS. he left in the charge of his friend Kelsall.

In one of his letters to Kelsall Beddoes wrote: — " I am convinced the man who is to awaken the drama must be a bold, trampling fellow — no creeper into worm-holes — no reviser even — however good. These reanimations are vampire cold. Such ghosts as Marloe, Webster, &c, are better dramatists, better poets, I dare say, than any contemporaries of ours — but they are ghosts — the worm is in their pages " {Letters, p. 50). In spite of this wise judgment, Beddoes was himself a " creeper into worm-holes," a close imitator of Marston and of Cyril Tourneur, especially in their familiar handling of the phenomena of death, and in the remoteness from ordinary life of the passions por- trayed. In his blank verse he caught to a certain degree the manner of his Jacobean models, and his verse abounds in beautiful imagery, but his Death's Jest Book is only finished in the sense of having five acts completed; it remains a bizarre

production which appeals to few minds, and to them rather for the

occasional excellence of the poetry than as an entire com- position. His lyrics show the influence of Shelley as well as the study of 1 7th-century models, but they are by no means mere imitations, and some of them, like the " Dirge for Wolfram " (" If thou wilt ease thy heart "), and " Dream Pedlary " (" If there were dreams to sell "), are among the most exquisite of 10th-century lyrics.

Kelsall published Beddoes' great work, Death's Jest Book: or, The Fool's Tragedy, in 1 850. The drama is based on the story that a certain Duke Boleslaus of Munsterberg was stabbed by his court-fool, the " Isbrand " of the play (see C. F. Floegel, Geschichte der Hofnarren, Leipzig, 1789, pp. 297 et seq.). He followed this in 1851 with Poems of the late Thomas Lovell Beddoes, to which a memoir was prefixed. The two volumes were printed together (1851) with the title of Poems, Posthumous and Collected. All these volumes are very rare. Kelsall bequeathed the Beddoes MSS. to Robert Brown- ing, with a note stating the real history of Beddoes' illness and death, which was kept back out of consideration for his relatives. Browning is reported to have said that if he were ever Professor of Poetry his first lecture would be on Beddoes, " a forgotten Oxford poet." Mr Edmund Gosse obtained permission to use the documents from Browning, and edited a fuller selection of the Poetical Works (2 vols., 1890) for the " Temple Library," supplying a full account of his life. He also edited the Letters of Thomas Lovell Beddoes (1894), containing a selection from his correspondence, which is full of gaiety and contains much amusing literary criticism. See also the edition of Beddoes by Ramsay Colles in the " Muses' Library " (1906).

BEDE, Beda, or Bˆeda (672 or 673-735), English historian and theologian. Of Baeda, commonly called " the Venerable Bede," almost all that we know is contained in the short auto- biographical notice which he has appended to his Ecclesiastical History: — " Thus much concerning the ecclesiastical history of Britain, and especially of the race of the English, I, Ba:da, a servant of Christ and priest of the monastery of the blessed apostles St Peter and St Paul, which is at Wearmouth and at Jarrow, have with the Lord's help composed, so far as I could gather it, either from ancient documents, or from the tradition of the elders, or from my own knowledge. I was born in the territory of the said monastery, and at the age of seven I was, by the care of my relations, given to the reverend Abbot Benedict (Biscop), and afterwards to Ceolfrid, to be educated. From that time I have spent the whole of my life within that monastery devoting all my pains to the study of the scriptures; and amid the observance of monastic discipline, and the daily charge of singing in the church, it

has ever been my delight to learn or teach or write. In my nineteenth year I was admitted to the diaconate, in my thirtieth to the priesthood, both by the hands of the most reverend Bishop John (of Hexham), and at the bidding of Abbot Ceolfrid. From the time of my admission to the priesthood to my (present) fifty-ninth year, I have en- deavoured, for my own use and that of my brethren, to make brief notes upon the Holy Scripture, either out of the works of the venerable fathers, or in conformity with their meaning and interpretation." Then follows a list of his works, so far as, at that date, they had been composed. As the Ecclesiastical History was written in 731, we obtain the following dates for the principal events in Bede's uneventful life: — birth, 672-673; entrance into the monastery, 679-680; ordination as deacon, 691-692; as priest, 702-703.

The monastery of Wearmouth was founded by Benedict Biscop in 674, and that of Jarrow in 681-682. Though some 5 or 6 m. apart, they were intended to form a single monastery under a single abbot, and so Bede speaks of them in the passage given above. It is with Jarrow that Bede is chiefly associated, though no doubt from the close connexion of the two localities he would often be at Wearmouth . The preface to the prose life of Cuthbert proves that he had stayed at Lindisfarne prior to 721, while the Epistle to Egbert shows that he had visited him at York in 733. The tradition that he went to Rome in obedience to a summons from Pope Sergius is contradicted by his own words above, and by his total silence as to any such visit. In the passage cited above, " monastic discipline, the daily charge of singing in the church, learning, teaching, writing," in other words devotion and study make up the even tenor of Bede's tranquil life. Anec- dotes have been preserved which illustrate his piety both in

early and in later years ; of his studies the best monument is to be found in his writings. As a little boy he would take his place among the pupils of the monastic school, though he would soon pass to the ranks of the teachers, and the fact that he was ordained deacon at nineteen, below the canonical age, shows that he was regarded as remarkable both for learning and goodness.

For the rest, it is in his works that we must chiefly seek to know him. They fall into three main classes: (1) scientific; (2) historical; (3) theological. The first class comprises works on grammar, one on natural phenomena, and two on chronology and the calendar. These last were inspired largely by the Paschal Question, which was the subject of such bitter contro- versy between the Roman and Celtic

Churches in the 7 th century. They form a natural transition to the second class. In this the chief place is held by the Ecclesiastical History of the English Nation. By this Bede has justly earned the title of the Father of English History. By this almost exclusively he is known to others than professed students. It is indeed one of the most valuable and one of the most beautiful of historical works. Bede has the artist's instinct of proportion, the artist's sense for the picturesque and the pathetic. His style too, modelled largely, in the present writer's opinion, on that of Gregory in the Dialogues, is limpid and unaffected. And though it would be wrong to call Bede a critical historian in the modern sense of the words, he shows a very unusual conscientiousness in collecting his information from the best available sources, and in dis- tinguishing between what he believed to be fact, and what he regarded only as rumour or tradition. Other historical works of Bede are the History of the Abbots (of Wearmouth and Jarrow), and the lives of Cuthbert in verse and prose. The History of the A blots and the prose life of Cuthbert were based on earlier works which still survive. In the case of the latter it cannot honestly be said that Bede has improved on his original. In the History of the A bbots he was much nearer to the facts, and could make additions out of his own personal knowledge. The Epistle to Egbert, though not historical in form, may be mentioned here, because of the valuable information which it contains as to the state of the Northumbrian _Church, on which the disorders and revolutions of the Northumbrian kingdom had told with disastrous effect. It is probably the latest of Bede's extant works, as it was written in November 734, only six months before his death. The third or theological class of writings consists mainly of commentaries, or of works which, if not commentaries in name, are so in fact. They are based largely on the works of the four great Latin Fathers, SS. Augustine, Jerome, Ambrose and Gregory; though Bede's reading is very far from being limited to these. His method is largely allegorical. For the text of scripture he uses both the Latin versions, the Itala and the Vulgate, often comparing them together. But he certainly knew Greek, and possibly some Hebrew. Indeed it may be said that his works, scientific, historical and theological, practically sum up all the learning of western Europe in his time, which he thus made available for his countrymen. And not for them only; for in the school of York, founded by his pupil Archbishop Ecgberht, was trained Alcuin (Ealhwine) the initiator under Charles the Great of the Frankish schools, which did so much for learning on the continent. And though Bede makes no pretensions to originality, least of all in his theological works, freely taking what he needed, and (what is very rare in medieval writers) acknowledging what he

took, " out of the works of the venerable Fathers," still everything he wrote is informed and impressed with his own special character and temper. His earnest yet sober piety, his humility, his gentleness, appear in almost every line. " In history and in science, as well as in theology, he is before all things the Christian thinker and student." (Plummer's Bede, i. 2.) Yet it should not be forgotten that Bede could hardly have done what he did without the noble library of books collected by Benedict Biscop.

Several quaint and beautiful legends have been handed down as to the origin of the epithet of " venerable " generally attached to his name. Probably it is a mere survival of a title commonly given to priests in his day. It has given rise to a false idea that

he lived to a great age; some medieval authorities making him ninety when he died. But he was not born before 672 (see above) ; and though the date of his death has been disputed, the tradi- tional year, 735, is most probably correct. This would make him at most sixty-three. Of his death a most touching and beautiful account has been preserved in a contemporary letter. His last hours were spent, like the rest of his life, in devotion and teaching, his latest work being to dictate, amid ever-increasing bodily weakness, a translation into the vernacular of the Gospel of St John, a work which unhappily has not survived. It was a fitting close to such a life as his.

Bibliography. — The above sketch is largely based on the present writer's essay on Bede's Life and Works, prefixed tohis edition of Bede's Historia Ecclesiastica, &c. (2 vols., Clarendon Press, 1896). Beda der Ehrwiirdige und seine Zeit, by Dr Karl Werner (Vienna, 1875), is excellent. Gehle, Disputatio . . . de Bedae vita et Scriptis (Leiden, 1838), is still useful. • Dr William Bright's Chapters of Early English Church History (3rd ed., Clarendon Press, 1897) is indispensable. See also Ker, Dark Ages, pp. 141 ff. Of the collected works of Bede the most convenient edition is that by Dr Giles in twelve volumes (8vo., 1843-1844), which includes translations of the Historical Works. The Continental folio editions (Basel, 1563 ; Cologne, 1612 and 1688) contain many works which cannot by any possibility be Bede's. The edition of Migne, Patrologia Latina (1862 ff.) is based on a com- parison of the Cologne edition with Giles and Smith (see below), and is open to the same criticism. On the chronology and genuineness of the works commonly ascribed to

Bede, see Plummer's ed., i., cxlv-clix.

On the MSS. early editions and translations of the Historia Ecclesiastica, see Plummer, u.s., i., lxxx-cxxxii. The edition of Whelock (Cambridge, fol. 1643-1644) is noteworthy as the first English edition of the Latin text, and as the editio princeps of the Anglo-Saxon version ascribed to King Alfred (see Alfred the Great). Smith's edition (Cambridge, fol. 1722) contained not only these, but also the other historical works of Bede, with notes and appendices, it is a monument of learning and scholarship. The most recent edition is that with notes and introduction by the present writer, u.s. It includes also the History of the Abbots, and the Epistle to Egbert. Of books iii. and iv. only, there is a learned edition by Professors Mayor and Lumby of Cambridge (3rd ed., 188 1)■ A cheap and handy edition of the text alone is that by A. Holder (Freiburg im Breisgau, 1882, &c). The best-known modern English translation is that by the Rev. L. Gidley (1870). Of the minor historical works a good edition was edited by Rev. J. Stevenson for the Eng. Hist. Soc. in 1841 ; and a translation by the same hand was included in Church Historians of England, vol. i., part ii. (1853). See also Plummer's edition, pp. cxxxii-cxlii. (C. Pl.)

BEDE, CUTHBERT, the pen-name of Edward Bradley (1827- 1889), English author, who was born at Kidderminster on the 25th of March 1827. He entered University College, Durham, in 1845, and later studied at Oxford, where he made the acquaint- ance of J. G. Wood, the naturalist. He took holy orders, and eventually became rector of Stretton in Rutlandshire. Here he gained a reputation as a humorist and numbered among his friends Cruikshank, Frank Smedley, Mark Lemon and Albert Smith. He wrote for various magazines and, in the pages of the Illustrated London News, introduced the double acrostic. He is chiefly known as the author of The Adventures of Mr Verdant Green, an Oxford Freshman (1853), which he also illustrated and of which a third part appeared in 1856. Several well-known Oxford characters of the time are depicted in its pages, such as Dr Plumptre the vice-chancellor, Dr Bliss the registrar, and the waiter at the Mitre. The book abounds in innocent fun. In 1883 hewas given the living of Lenton, or Lavington, Lincoln- shire, where he died on the 12th of December 1889.

BEDELL, WILLIAM (1 571-1642), Anglican divine, was born at Black Notley in Essex, in 1571- He was educated at Cam- bridge, became fellow of Emmanuel in 1593, and took orders. In 1607 he was appointed chaplain to Sir H. Wotton, then English ambassador at Venice, where he remained for four years, acquiring a great

reputation as a scholar and theologian. He translated the Book of Common Prayer into Italian, and was on terms of closest friendship with the reformer, Sarpi (Fra Paolo). In 1616 he was appointed to the rectory of Horningsheath (near to Bury St Edmunds, where he had previously laboured), which he held for twelve years. In 1627 he became provost of Trinity College, Dublin, and, in 1629, bishop of Kilmore and Ardagh. He set himself to reform the abuses of his diocese, encouraged the use of the Irish language, and personally undertook the duties generally dischaiged by the bishop's lay chancellor. In 1633

he resigned his see. In 1641, when the Protestants were being massacred, Bedell's house was not only left untouched, but be- came the place of refuge for many fugitives. In the end, however, the rebels insisted upon the dismissal of all who had taken shelter in his house, and on the bishop's refusal he was seized and imprisoned with some others in the ruined castle of Lough- boughter. Here he was detained for several weeks, and when released, rapidly sank from the effects of exposure, and died on the 7 th of February 1642.

His life was written by Bishop Gilbert Burnet in 1685, and also by his elder son (ed. T. W. Jones, for the Camden Society, 1872).

BEDESMAN, or Beadsman (Med. Eng. bede, prayer, from O. Eng. biddan, to pray; literally " a man of prayer "), generally a pensioner or almsman whose duty it was to pray for his bene- factor. In Scotland there were public almsmen supported by the king and expected in return to pray for his welfare and that of the state. These men wore long blue gowns with a pewter badge on the right arm, and were nicknamed Blue Gowns. Their number corresponded to the king's years, an extra one being added each royal birthday. They were privileged to ask alms throughout Scotland. On the king's birthday each bedesman received a new blue gown, a loaf, a bottle of ale, and a leathern purse containing a penny for every year of the king's life. On the pewter badge which they wore were their name and the words ""pass and repass," which authorized them to ask alms. In 1833 the appointment of bedesmen was stopped. In 1863 the last payment was paid to a bedesman. In consequence of its use in this general sense of pensioner, "bedesman" was long used in English as equivalent to "servant." The word had a special sense as the name for those almsmen attached to cathedral and other churches, whose duty it was to pray for the souls of deceased benefactors. A relic of pre-Reformation times, these old men still figure in the accounts of English cathedrals.

BEDFORD, EARLS AND DUKES OF. The present English title of duke of Bedford comes from a line of earls and dukes in the Russell family. In January 1550 John, Baron Russell, was created earl of Bedford, and in May 1694 his descendant, William, the 5th earl, became duke of Bedford. The Russell line is dealt with in the later part of this article. The title of duke of Bedford had, however, been previously held, notably by the third son of Henry IV. ; and the earlier creations may first be considered here.

John Plantagenet, duke of Bedford (1389-1435), third son of Henry IV., king of England, was born on the 20th of June 1389. He received various dignities after his father became king in 1399, and gained his early experiences in warfare when' he undertook the office of warden of the east marches of Scotland in 1404; he was fairly successful in this command, which he held until September 1414. In the previous May his brother, the new king Henry V., had created him duke of Bedford, and after resigning the wardenship he began to take a leading part in the royal councils. He acted as lieutenant of the kingdom during Henry's expedition to France in 1415, and in August 1416 com- manded the ships which defeated the French fleet at the mouth of the Seine, and was instrumental in relieving Harfleur. Again appointed lieutenant in July 141 7, he marched against the Scots, who abandoned the siege of Berwick at his approach; and on his return to London he brought Sir John Oldcastle to trial and was present at his execution. He appears to have governed the country with considerable success until December 1419, when he resigned his office as lieutenant and joined the king in France. Returning to England, he undertook the lieutenancy for the third time in June 1421, and in the following May con- ducted the queen to join Henry in Normandy. He then took his brother's place and led the English troops to the relief of Cosne, but on hearing of the king's serious illness he left the army and hurried to his side. Henry's last wish was that Bedford should be guardian of the kingdom and of the young king, and that Philip the Good, duke of Burgundy, should act as regent in France. But when Philip declined to undertake this office, it too was assumed by Bedford, who, after the death of the French king Charles VI. in October 1422, presided at a session of the

parlement of Paris, and compelled all present to take an oath of fidelity to King Henry VI . Meanwhile the English parliament had

decided that Bedford should be " protector and defender " of the kingdom, and that in his absence the office should devolve upon his brother Humphrey, duke of Gloucester. Confining himself to the conduct of affairs in France the protector took up Henry V.'s work of conquest, captured Meulan and other places, and sought to strengthen his position by an alliance with Philip of Burgundy. This task was rendered more difficult as Gloucester had just married Jacqueline, countess of Holland and Hainaut, a union which gave the English duke a claim on lands which Philip hoped to secure for himself. Bedford, however, having allayed Philip's irritation, formed an alliance with him and with John VI., duke of Brittany, at Amiens in April 1423, and himself arranged to marry Anne, a sister of the Burgundian duke. This marriage was celebrated at Troyes in the following June, and the war against Charles, the dauphin of France, was prosecuted with vigour and success. Bedford sought to restore prosperity to the districts under his rule by reforming the debased coinage, granting privileges to merchants and manufacturers, and removing various abuses. He then granted some counties to Philip to check the growing hostility between him and Gloucester, and on the 17th of August 1424 gained a great victory over a combined army of French and Scots at Verneuil. But in spite of the efforts of the protector the good understanding between England and Burgundy was partially destroyed when Gloucester invaded Hainaut in October 1424. The ambition oi his brother gave Bedford trouble in another direction also; for on his return from Hainaut Gloucester quarrelled with the chancellor, Henry Beaufort, bishop of Winchester, and the council implored Bedford to come to England to settle this dispute. He reached London in January 1426, and after concluding a bond of alliance with Gloucester effected a reconciliation between the duke and the chancellor; and knighted the young king, Henry VI. Bedford then promised to act in accordance with the will of the council, and in harmony with the decision of this body raised a body of troops and re- turned to France in March 1427. Having ordered Gloucester to desist from a further attack on Hainaut, he threatened Brittany and compelled Duke John to return to the English alliance; and the success of his troops continued until the siege of Orleans, to which he consented with reluctance, was undertaken in October 1428. Having assured himself that Philip was prepared to desert him, Bedford sent orders to his army to raise the siege in April 1429. He then acted with great energy and judgment in attempting to stem the tide of disasters which followed this failure, strengthened his hold upon Paris, and sent to England for reinforcements; but before any engagement took place he visited Rouen, where he sought to bind the Normans closer to England, and after his return to Paris resigned the

French regency to Philip of Burgundy in accordance with the wish of the Parisians. Retaining the government of Normandy Bedford established himself at Rouen and directed the movements of the English forces with some success. He did not interfere to save the life of Joan of Arc. He was joined by Henry VI. in April 1430, when the regency was temporarily suspended, and he secured Henry's coronation at Paris in December 143 1. In November 1432 his wife Anne died, and in April 1433 he was married at Therouanne to Jacqueline, daughter of Pierre I., count of St Pol. But notwithstanding Bedford's vigour the English lost ground steadily; and the death of Anne and this marriage destroyed the friendly relations between England and Burgundy. Negotiations for peace had no result, and when the duke returned to England in June 1433 he told parlia- ment that he had come home to defend himself against the charge that the losses in France were caused by his neglect, and de- manded that his detractors should make their accusations public. The chancellor replied that no such charges were known to the king or the council, and the duke was thanked for his great services. His next act was to secure an inquiry into the national finances; and when asked by the parliament to stay in England he declared that his services were at the king's disposal. As

chief councillor he offered to take a smaller salary than had been previously paid to Gloucester, and undertook this office in December 1433, when his demands with regard to a continual council were conceded. Bedford, who was anxious to prosecute the war in France, left England again in 1434, but early in 1435 was obliged to consent to the attendance of English repre- sentatives at a congress held to arrange terms of peace at Arras. Unable to consent to the French terms the English envoys left Arras in September, and Philip of Burgundy made a separate treaty with France. Bedford only lived to see the ruin of the cause for which he struggled so loyally. He died at Rouen on the 14th of September 1435, and was buried in the cathedral of that city. He left a natural son, Richard, but no legitimate issue. Bedford was a man of considerable administrative ability, brave and humane in war, wise and unselfish in peace. He was not responsible for the misfortunes of the English in France, and his courage in the face of failure was as admirable as his continued endeavour to make the people under his rule contented and prosperous.

The chief contemporary authorities for Bedford's life are : Vita et gesta Henrici Quinti, edited by T. Hearne (Oxford, 1727); E. de Monstrelet, Chronique, edited by L. D. d'Arcq. (Paris, 1857-1862) ; William of Worcester, Annates rerum Anglicarum, edited by J.

Stevenson (London, 1864). See also Proceedings and Ordinances of the Privy Council of England, edited by J. R. Dasent (London, 1890-1899); W. Stubbs, Constitutional History, vol. iii. (Oxford, 1895); P. A. Barante, Histoire des dues de Bourgogne (Paris, 1824).

In 1470 George Nevill (c. 1457-1483), son of John, earl of Northumberland, was created duke of Bedford; but after his father's attainder and death at the battle of Barnet in 1471 he was degraded from the peerage.

The next duke of Becfford was Jasper Tudor (c. 1430-1495), half-brother of King Henry VI. and uncle of Henry VII. He was made earl of Pembroke in 1453. Having survived the vicissitudes of the Wars of the Roses he was restored to his earldom and created duke of Bedford in 1485. The duke, who was lord-lieutenant of Ireland from i486 to 1494, died without legitimate issue on the 21st of December 1495.

John Russell, 1st earl of Bedford (c. 1486-1555), was a son of James Russell (d. 1 509) . Having travelled widely, he attained some position at the court of Henry VII., and was subsequently in great favour with Henry VIII. In 15 13 he took part in the war with France, and, having been knighted about the same time, was afterwards employed on several diplomatic errands. He was with Henry at the Field of the Cloth of Gold in 1520, and, returning to military service when the Fiench war was renewed, lost his right eye at the siege of Morlaix in 1522. He was soon made knight marshal of the royal household, and in 1523 went secretly to France, where he negotiated a treaty between Henry and Charles, duke of Bourbon, who was anxious to betray the French king Francis I. After a short visit to England Russell was sent with money to Bourbon, joining the constable at the siege of Marseilles. In 1524 he visited Pope Clement VII. at Rome, and, having eluded the French, who endeavoured to capture him, was present at the battle of Pavia in February 1525, returning to England about the close of the year. In January 1527 he was sent as ambassador to Clement, who employed him to treat on his behalf with Charles de Lannoy, the general of Charles V. The next few years of Russell's life were mainly spent in England. He was member of parliament for Buckingham in the parliament of 1529, and although an opponent of the party of Anne Boleyn, retained the favour of Henry VIII. He took an active part in suppressing the Pilgrimage of Grace in 1536, and was one of the commissioners appointed to try the Lincolnshire prisoners. Honours now crowded upon him. His appointment as comptroller of the king's household in 1537 was followed by that of a privy coun- cillor in 1538; then he

was made lord high admiral, high steward of the duchy of Cornwall and a knight of the garter. In March 1539 he was created Baron Russell of Chenies, and in 1542 became high steward of the university of Oxford, and keeper of the privy seal. In 1539, when Charles V. and Francis I. were threatening to invade England, he was sent into the west, and

crossed to France when Henry attacked Francis in 1544. He was in command of an army in the west of England in 1545, and when Henry died in January 1547 was one of the executors of his will. Under Edward VI. Russell was lord high steward and keeper of the privy seal, and the defeat which he inflicted on the rebels at Clyst St Mary near Exeter in August 1549, was largely instrumental in suppressing the rising in Devonshire. In January 1550 he was created earl of Bedford, and was one of the commissioners appointed to make peace with France in this year. He opposed the proposal to seat Lady Jane Grey on the throne; supported Queen Mary, who reappointed him lord privy seal; and assisted to prevent Sir Thomas Wyat's rising from spreading to Devonshire. In 1554 he went to Spain to conclude the marriage treaty between Mary and Philip II., and soon after his return died in London on the 14th of March 1555. By extensive acquisitions of land Bedford was the founder of the wealth and greatness of the house of Russell. Through his wife, Anne (d. 1559), daughter of Sir Guy Sapcote, whom he married in 1526, he obtained Chenies, and in 1539 was granted the forest of Exmoor, and also Tavistock, and a number of manors in Devon, Cornwall and Somerset, which had formerly belonged to the abbey of Tavistock. In 1549 he received Thorney, the abbey of Woburn, and extensive lands in the eastern counties; and in 1552 Covent Garden and seven acres of land in London, formerly the property of the protector Somer- set. He left an only son, Francis, who succeeded him in the title.

See Letters and Papers of Henry VIII. (London, 1862-1901); State Papers during the Reign of Henry VIII. (London, 1831-1852) ; Calendar of State Papers, Edward VI. and Mary (London, 1861); J. H. Wiffen, Historical Memoirs of the House of Russell (London, 18 S3); J- A. Froude, History of England, passim (London, 1881 fol.).

Francis Russell, 2nd earl of Bedford (c. 1527-1585), was educated at King's Hall, Cambridge. He accompanied his father to the French war in 1544, and from 1547 to 1552 was member of parliament for

Buckinghamshire, being probably the first heir to a peerage to sit in the House of Commons. He assisted to quell the rising in Devonshire in 1549, and after his father had been created earl of Bedford in January 1550, was known as Lord Russell, taking his seat in the House of Lords under this title in 1552. Russell was in sympathy with the reformers, whose opinions he shared, and was in communication with Sir Thomas Wyat; and in consequence of his religious attitude was imprisoned during the earlier part of Mary's reign. Being released he went into exile; visited Italy; came into touch with foreign reformers; and fought at the battle of St Quentin in 1557. Afterwards he seems to have enjoyed some measure of the royal favour, and was made lord-lieutenant of the counties of Devon, Cornwall and Dorset early in 1558. When Elizabeth ascended the throne in November 1558 the earl of Bedford, as Russell had been since 1555, became an active figure in public life. He was made a privy councillor, and was sent on diplomatic errands to Charles IX. of France and Mary queen of Scots. From February 1564 to October 1567 he was governor of Berwick and warden of the east marches of Scotland, in which capacity he conducted various negotiations between Elizabeth and Mary. He appears to have been an efficient warden, but was irritated by the vacillating and tortuous conduct of the English queen. When the northern insurrection broke out in 1569, Bedford was sent into Wales, and he sat in judgment upon the duke of Norfolk in 1572. In 1576 he was president of the council of Wales, and in 1581 was one of the commissioners deputed to arrange a marriage between Elizabeth and Francis, duke of Anjou. Bedford, who was made a knight of the garter in 1564, was lord warden of the Stannaries from 1553 to 1580. He appears to have been a generous and popular man, and died in London on the 28th of July 1585. He was buried at Chenies. His first wife was Margaret (d. 1562), daughter of Sir John St John, by whom he had four sons and three daughters. His three eldest sons predeceased their father. His second wife was Bridget (d. 1601), daughter of John, Lord Hussey. He was succeeded as 3rd earl by his grandson, Edward (1572-1627), only son of Francis, Lord Russell ic. 1550-1585).

The 3rd earl left no children when he died on the 3rd of May 1627, and was succeeded by his cousin.

Francis Russell, 4th earl of Bedford (1593-1641), was the only son of William, Lord Russell of Thornhaugh, to which barony he succeeded in August 1613. For a short time previ- ously he had been member of parliament for the borough of Lyme Regis; in 1623 he was made lord-lieutenant of Devonshire; and in May 1627 became earl of Bedford by the death of his cousin, Edward, the 3rd earl. When the

quarrel broke out between Charles I. and the parliament, Bedford supported the demands of the House of Commons as embodied in the Petition of Right, and in 1629 was arrested for his share in the circulation of Sir Robert Dudley's pamphlet, " Proposition for His Majesty's service," but was quickly released. The Short parliament meet- ing in April 1640 found the earl as one of the king's leading opponents. He was greatly trusted by John Pym and Oliver St John, and is mentioned by Clarendon as among the " great contrivers and designers " in the House of Lords. In July 1640 he was among the peers who wrote to the Scottish leaders refusing to invite a Scottish army into England, but promising to stand by the Scots in all legal and honourable ways; and his signature was afterwards forged by Thomas, Viscount Savile, in order to encourage the Scots to invade England. In the follow- ing September he was among those peers who urged Charles to call a parliament, to make peace with the Scots, and to dismiss his obnoxious ministers; and was one of the English commis- sioners appointed to conclude the treaty of Ripon. When the Long parliament met in November 1640, Bedford was generally regarded as the leader of the parliamentarians. In February 1 64 1 he was made a privy councillor, and during the course of some negotiations was promised the office of lord high treasurer. He was essentially a moderate man, and seemed anxious to settle the question of the royal revenue in a satisfactory manner. He did not wish to alter the government of the Church, was on good terms with Archbishop Laud, and, although convinced of Strafford's guilt, was anxious to save his life. In the midst of the parliamentary struggle Bedford died of smallpox on the 9th of May 1641. Clarendon described him as " a wise man, and of too great and plentiful a fortune to wish the subversion of the government," and again referring to his death said that " many who knew him well thought his death not unseasonable as well to his fame as his fortune, and that it rescued him as well from some possible guilt as from those visible misfortunes which men of all conditions have since undergone." Bedford was the head of those who undertook to drain the great level of the fens, called after him the " Bedford level." He spent a large sum of money over this work. and received 43,000 acres of land, but owing to various jealousies and difficulties the king took the work into his own hands in 1638, making a further grant of land to the earl. Bedford married Catherine (d. 1657), daughter of Giles, 3rd Lord Chandos, by whom he had four sons and four daughters. His eldest son, William (1613-1700), succeeded him as 5th earl, fought first on the side of the parliament and then on that of the king during the Civil War, and in 1694 was created marquess of Tavistock and duke of Bedford.

See Clarendon, History of the Rebellion, passim (Oxford, 1888); J.H. Wiffen, Historical Memoirs of 'the House of Russell (London, 1833) ; J. L. Sanford, Studies and Illustrations of the Great Rebellion (London, 1858).

The first duke, who married Anne (d. 1684), daughter of Robert Carr, earl of Somerset, was succeeded in the title by his grandson Wriothesley (1680-1711), who was a son of Lord William Russell (q.v .) by his marriage with Rachel, daughter of Thomas Wriothesley, 4th earl of Southampton, and who became second duke in 1 700. Eleven years later the second duke was suc- ceeded by his eldest son Wriothesley (1 708- 1732), who died without issue in October 1732, when the title passed to his brother John.

John Russell, 4th duke of Bedford (1710-1771), second son of Wriothesley Russell, 2nd duke of Bedford, by his wife, Elizabeth, daughter and heiress of John Howland of Streatham, Surrey, was born on the 30th of September 17 10. Known as Lord John Russell, he married in October 1731 Lady Diana Spencer, daughter of Charles, 3rd earl of Sunderland; became duke of

Bedford on his brother's death a year later; and having lost his first wife in 1735, married in April 1737 Lady Gertrude Leveson- Gower (d. 1794), daughter of John, Earl Gower, In the House of Lords he joined the party hostile to Sir Robert Walpole, took a fairly prominent part in public business, and earned the dislike of George II. When Carteret, now Earl Granville, resigned office in November 1744, Bedford became first lord of the admiralty in the administration of Henry Pelham, and was made ■ a privy councillor. He was' very successful at the admiralty, but was not equally fortunate after he became secretary of state for the southern department in February 1748. Pelham accused him of idleness; he was constantly at variance with the duke of New- castle, and resigned office in June 1 7 5 1 . Instigated by his friends he was active in opposition to the government, and after New- castle's resignation in November 1756, became lord-lieutenant of Ireland in the ministry of William Pitt and the duke of Devon- shire, retaining this office after Newcastle, in alliance with Pitt, returned to power in June 1757. In Ireland he favoured a relaxation of the penal laws against Roman Catholics, but did not keep his promises to observe neutrality between the rival parties, and to abstain from securing

pensions for his friends. His own courtly manners and generosity, and his wife's good qualities, however, seem to have gained for him some popularity, although Horace Walpole says he disgusted everybody. In March 1761 he resigned this office. Having allied himself with the earl of Bute and the party anxious to bring the Seven Years' War to a close, Bedford was noticed as the strongest opponent of Pitt, and became lord privy seal under Bute after Pitt resigned in October 1761. The cabinet of Bute was divided over the policy to be pursued with regard to the war, but pacific counsels prevailed, and in September 1762 Bedford went to France to treat for peace. He was considerably annoyed because some of the peace negotiations were conducted through other channels, but he signed the peace of Paris in February 1763. Resigning his office as lord privy seal soon afterwards, various causes of estrangement arose between Bute and Bedford, and the subse- quent relations of the two men were somewhat virulent. The duke refused to take office under George Grenville on Bute's resignation in April 1763, and sought to induce Pitt to return to power. A report, however, that Pitt would only take office on condition that Bedford was excluded, incensed him and, smarting under this rebuff, he joined the cabinet of Grenville as lord president of the council in September 1 763. His haughty manner, his somewhat insulting language, and his attitude with regard to the regency bill in 1765 offended George III., who sought in vain to supplant him, and after this failure was obliged to make humiliating concessions to the ministry. In July 1765, however, he was able to dispense with the services of Bedford and his colleagues, and the duke became the leader of a political party, distinguished for rapacity, and known as the " Bedford party," or the " Bloomsbury gang." During his term of office he had opposed a bill to place high import duties on Italian silks. He was consequently assaulted and his London residence attacked by a mob. He took some part in subsequent political intrigues, and although he did not return to office, his friends, with his consent, joined the ministry of the duke of Grafton in December 1767. This proceeding led "Junius" to write his " letter to the duke of Bedford," one of especial violence. Bed- ford was hostile to John Wilkes, and narrowly escaped from a mob favourable to the agitator at Honiton in July 1769. His health had been declining for some years, and in 1770 he became partially paralysed. He died at Woburn on the 1 5th of January 1 77 1, and was buried in the family burying-place at Chenies. His three sons all predeceased him, and he was succeeded in the title by his grandson, Francis. The duke held many public offices: lord-lieutenant of Bedfordshire and Devonshire, and chancellor of Dublin University among others, and was a knight of the garter. Bedford was a proud

and conceited man, but possessed both ability and common-sense. The important part which he took in public life, however, was due rather to his wealth and position than to his personal taste or ambition. He was neither above nor below the standard of political morality

of the time, and was influenced by his duchess, who was very ambitious, and by followers who were singularly unscrupulous.

See Correspondence of John, 4th Duke of Bedford, edited by Lord John Russell (London, 1842-1846) ; J. H. Wiffen, Historical Memoirs of the House of Russell (London, 1833) ; W. E. H. Lecky, History of England, vol. iii. (London, 1892); Horace Walpole, Memoirs of the Reign of George II. (London, 1847), and Memoirs of the Reign of George III., edited by G. F. R. Barker (London, 1894.)

Francis Russell, 5th duke of Bedford (1765-1802), eldest son of Francis Russell, marquess of Tavistock (d. 1767), by his wife, Elizabeth (d. 1768), daughter of William Keppel, 2nd earl of Albemarle, was baptized on the 23rd of July 1765. In January 1 771 he succeeded his grandfather as duke of Bedford, and was educated at Westminster school and Trinity College, Cambridge, afterwards spending nearly two years in foreign travel. Regard- ing Charles James Fox as his political leader, he joined the Whigs in the House of Lords, and became a member of the circle of the prince of Wales, afterwards George IV. Having overcome some nervousness and educational defects, he began to speak in the House, and soon became one of the leading debaters in that assembly. He opposed most of the measures brought for- ward by the ministry of William Pitt, and objected to the grant of a pension to Edmund Burke, an action which drew down upon him a scathing attack from Burke's pen. Bedford was greatly interested in agriculture. He established a model farm at Woburn, and made experiments with regard to the breeding of sheep. He was a member of the original board of agriculture, and was the first president of the Smithfield club. He died at Woburn on the 2nd of March 1802, and was buried in the family burying-place at Chenies. The duke was never married, and was succeeded in the title by his brother, John.

See Lord Holland, Memoirs of the Whig Party (London, 1854); J. H. Wiffen, Historical Memoirs of the House of Russell (London, 1833); E. Burke, Letter to a Noble Lord (Edinburgh, 1837; and Earl Stanhope, Life of Pitt (London, 1861-1862).

John Russell, 6th duke of Bedford (1 766-1839) ,was succeeded as

seventh duke by his eldest son, Francis (1788-1861), who had an only son, William (1809-1872), who became duke on his father's death in 1861. When the eighth duke died in 1872, he was succeeded by his cousin, Francis Charles Hastings (1819- 1891), who was member of parliament for Bedfordshire from 1847 until he succeeded to the title. The ninth duke was the eldest son of Major-General Lord George William Russell (1790- 1846), who was a son of the sixth duke. He married Elizabeth, daughter of George John, 5th Earl de la Warr, and both his sons, George William Francis Sackville (1852-1893), and Herbrand Arthur (b. 1858), succeeded in turn to the title.

BEDFORD, a municipal and parliamentary borough, and the county town of Bedfordshire, England, 50 m. north-north-west of London by the Midland railway; served also by a branch of the London & North-Western. Pop. (1901) 35,144. It lies in the fertile valley of the Ouse, on both banks, but mainly on the north, on which stands the mound which marks the site of the ancient castle. The church of St Paul is Decorated and Perpendicular, but its central tower and spire are modern; it contains the tomb of Sir William Harper or Harpur (c. 1496-1573), lord mayor of London, a notable benefactor of his native town of Bedford. St Peter's church has in its central tower masonry probably of pre-Conquest date; that of St Mary's is in part Norman, and that of St John's Decorated; but the bodies of these churches are largely restored. There are some remains of a Franciscan friary of the 14th century. The Congregational chapel called Bunyan's or the " Old Meeting " stands on the site of the building in which John Bunyan preached from 1656 onward. His chair is preserved here, and a tablet records his life in the town, where he underwent a long but in part nominal imprisonment. He was born at Elstow, ij m. from Bedford, where, while playing on the green, he believed himself to have received the divine summons to renounce sin. In the panels of a fine pair of bronze doors in the chapel are scenes illustrative of Bunyan's Pilgrim's Progress. Bedford is noted for its grammar school, founded by Edward VI. in 1552, and endowed by Sir William Harper. The existing buildings date from 1891, and have been increased since

that date, and the school is one of the important public schools of England. Harper's endowment includes land in London, and is now of great value, and the Harper Trust supports in addition modern

and elementary schools for boys and girls, a girls' high school, and almshouses. The grammar school annually awards both entrance exhibitions and two exhibitions to a university or other higher educational institution. The old grammar school buildings are used as a town hall; and among other modern buildings may be mentioned the shire hall and county hospital. There are statues of John Bunyan (1874) and John Howard (1894) the philanthropist (1726-1790), who founded the Con- gregational chapel which bears his name, and resided at Card- ington in the vicinity. There are two parks. Bedford has a large trade as a market town for agricultural produce, and extensive engineering works and manufactures of agricultural implements. The parliamentary borough returns one member. The municipal borough is under a mayor, 6 aldermen and 18 councillors. Area, 2223 acres.

Bedford (Bedcanforda, Bedanforda, Bedeford) is first men- tioned in 571, when Cuthwulf defeated the Britons here. It subsequently became a Danish borough, which in 914 was cap- tured by Edward the Elder. In Domesday, as the county town, it was entered apart from the rest of the shire, and was assessed at half a hundred for the host and for ship service. The pre- scriptive borough received its first charter from Henry II., who gave the town to the burgesses to hold at a fee-farm rent of £40 in lieu of all service. The privileges included a gild-merchant, all tolls, and liberties and laws in common with the citizens of Oxford. This charter was confirmed by successive sovereigns down to Charles II. During the 15th century, owing to the rise of other market towns, Bedford became less prosperous, and the fee-farm rent was finally reduced to £20 by charter of Henry VII. Henry VIII. granted a November fair to St Leonard's hospital, which was still held in the 19th century at St Leonard's farm, the site of the hospital. Mary granted two fairs, one in Lent and one on the Feast of the Conception, and also a weekly market. A 17th century pamphlet on river navigation in Bedfordshire mentions the trade which Bedford carried on in coal, brought by the Ouse from Lynn and Yarmouth. The town was also one of the earliest centres of the lace trade, to the success of which French refugees in the 1 7th and 18th centuries largely contributed. Bedford was represented in the parliament of 1295, and after that date two members were returned regularly, until by the Redistribution of Seats Act in 1885 Bedford lost one of its members. The unlimited power of creating freemen, an inherent right of the borough, led to great abuse, noticeably in 1769 when 500 freemen 1 were created to support the political interest of Sir Robert Barnard, afterwards recorder of the borough.

Bedford castle, of which mention is first heard during Stephen's reign

(1136), was destroyed by order of Henry III. in 1224. The mound marking its site is famous as a bowling-green.

BEDFORD, a city and the county-seat of Lawrence county, Indiana, U.S.A., in the south-central part of the state, about 60 m. north-west of Louisville, Kentucky. Pop. (1890) 3351; (1910) 8716. It is served by the Baltimore & Ohio Southwestern, the Chicago, Indianapolis & Louisville, the Southern Indiana, and (for freight from the Wallner quarries about 5 m. distant) the Bedford & Wallner railways. It is the shipping point of the Bedford Indiana (oolitic) limestone, which is found in the vicinity and is one of the most valuable and best known building stones in the United States — of this stone were built the capitols of Indiana, Georgia, Mississippi and Kentucky; the state historical library at Madison, Wisconsin; the art building at St Louis, Missouri; and many other important public buildings. The city has large cement works, foundries and machine shops (stone- working machinery being'manufactured), and the repair shops of the Southern Indiana railway. Bedford was settled in 1826 and received a city charter in 1889.

BEDFORD, a borough and the county-seat of Bedford county, Pennsylvania, U.S.A., on the Raystown branch of the Juniata river, about 35 m. south by west of Altoona. Pop. (1890) 2242; 1 Called " guinea-pigs."

(1910) 2235. Bedford is served by the Bedford branch of the Pennsylvania railway. It lies in a beautiful valley. In the borough are some interesting old houses, erected in the latter part of the 18th century, an art gallery and a soldiers' monument. There are deposits of hematite and limestone near the borough, and less than 2 m. south of it are the widely-known Bedford Mineral Springs — a magnesia spring, a limestone spring, a sulphur spring, and a " sweet-water " spring — which attract many visitors during the summer season. There' are also chalybeate and other less important springs about the same distance east of the borough, and a white sulphur spring 10 m. south-west of it. Bedford has a large wholesale grocery trade, manufactures flour, dressed lumber, kegs and handles, and is situated in a fine fruit- growing district, especially known for its apples and plums. The borough owns and operates the water works. A temporary settlement was made on or near the site of the present borough about 1750 by an Indian trader named Ray, and for a few years the place was known as Raystown; the present name was adopted not later than 1759. In July 1758 Fort Bedford, for many years an important military post on the frontier, was constructed, and here, later in the year, General John Forbes brought together his

troops preparatory to advancing against Fort Duquesne. The town of Bedford was laid out in 1 769, and in 1771 it was made the county-seat of Bedford county which was organized in that year. The borough was incorporated in 1795, and received a new charter in 1817. Washington came here in 1794 to review the army sent to quell the Whisky Insurrection, and the Espy house, which he then occupied, is still standing.*

BEDFORDSHIRE [abbreviated Beds], a south midland county of England, bounded N. E. by Huntingdonshire, E. by Cambridge- shire, S.E. by Hertfordshire, W. by Buckinghamshire and N.W. by Northamptonshire. It is the fourth smallest English county, having an area of 466-4 sq. m. It lies principally in the middle part of the basin of the river Ouse, which, entering in the north- west, traverses the rich and beautiful Vale of Bedford with a serpentine course past the county town of Bedford to the north- eastern corner near St Neots. North of it the land is undulating, but low; to the south, a well-wooded spur of the Chiltern Hills separates the Vale of Bedford from the flat open tributary valley of the Ivel. A small part of the main line of the Chilterns is included in the south of the county, the hills rising sharply from the lowland to bare heights exceeding 600 ft. above Dunstable. In this neighbourhood the county includes the headwaters of the Lea, and thus a small portion of it falls within the Thames basin. In the north a few streams are tributary to the Nene.

Geology. — The general trend of the outcrops of the various formations is from south-west to north-east; the dip is south-easterly. In the northern portion of the county, the Middle Oolites are the most important, and of these, the Oxford Clay predominates over most of the low ground upon which Bedford is situated. At Ampt- hill a development of clay, the Ampthill clay, represents the Corallian limestones of neighbouring counties. The Cornbrash is represented by no more than about 2 ft. of limestone; but the Kellaways Rock is well exposed near Bedford ; the sandy parts of this rock are frequently cemented to form hard masses called " doggers." The Great Ouse, from the point where it enters the county on the west, has carved through the Middle Oolites and exposed the Great Oolite as far as Bedford ; their alternating limestones and clays may be seen in the quarries not far from the town. From Woburn through Ampthill to Potton a more elevated tract is formed by the Lower Greensand. These rocks are sandy throughout. At Leighton Buzzard they are dug on a large scale for various purposes. Beds of fuller's earth occur in this formation at Woburn. At Potton, phos- phatized nodules may be obtained, and here a hard bed, the " Car- stone," lies at the top of the formation. Above the Lower Greensand comes the Gault Clay,

which lies in the broad vale south-east of the former and north-west of the Chalk hills. The Chalk rises up above the Gault and forms the high ground of Dunshill Moors and the Chiltern Hills. At the base of the Chalk is the Chalk Marl, above this is the Totternhoe Stone, which, on account of its great hardness, usually stands out as a well-marked feature. The Lower Chalk, which comes next in the upward succession, is capped in a similar manner by the hard Chalk Rock, as at Royston and elsewhere. The upper Chalk-with-Flints occurs near the south-eastern boundary. Patches of glacial boulder clay and gravel lie upon the older rocks over most of the area. Many interesting mammalian fossils, rhino- ceros, mammoth, &c, with palaeolithic implements, have been found in the valley gravels of the river Ouse and its tributaries.

Industries. — Agriculture is important, nearly nine-tenths of the total area being under cultivation. The chief crop is wheat, for which the soil in the Vale of Bedford is specially suited; while on the sandy loam of the Ivel valley, in the neighbourhood of Biggleswade, market-gardening is extensively carried on, the produce going principally to London, whither a considerable quantity of butter and other dairy-produce is also sent. The manufacture of agricultural machinery and implements employs a large number of hands at Bedford and Luton. Luton, however, is specially noted for the manufacture of straw hats. Straw- plaiting was once extensively carried on in this neighbour-hood by women and girls in their cottage homes, but has now almost entirely disappeared owing to the importation of Chinese and Japanese plaited straw. Another local industry in the county is the manufacture of pillow-lace. Many of the lace designs are French, as a number of French refugees settled in and near Cranfield. Mechlin and Maltese patterns are also copied.

Communications are provided in the east by the Great Northern main line, passing Biggleswade, and in the centre by that of the Midland railway, serving Ampthill and Bedford. The Bletchley and Cambridge branch of the London & North- Western railway crosses these main lines at Bedford and Sandy respectively. The main line of the same company serves Leighton Buzzard in the south-west, and there is a branch thence to Dunstable, which, with Luton, is also served by a branch of the Great Northern line. A branch of the Midland railway south from Bedford connects with the Great Northern line at Hitchin, and formerly afforded the Midland access to London over Great

Northern metals.

Population and Administration. — The area of the ancient county is 298,494 acres, with a population in 1891 of 161,704 and in 1901 of 171,240. The area of the administrative county is 302,947 acres. The municipal boroughs are Bedford (pop. 35,144), Dunstable (5157) andLuton (36,404). The other urban districts are — Ampthill (2177), Biggleswade (5120), Kempston, connected with Bedford to the south-west (4729), and Leighton Buzzard (6331). Potton (2033), Shefford (874), and Woburn (11 29) are lesser towns, and local centres of the agricultural trade. The county is the midland circuit, and assizes are held at Bedford. It has one court of quarter-sessions, and is divided into eight petty sessional divisions. The boroughs of Bedford, Dunstable and Luton have separate commissions of the peace, and Bedford has a separate court of quarter-sessions. There are 133 civil parishes. Bedfordshire forms an archdeaconry in the diocese of Ely, with 125 ecclesiastical parishes and parts of 6 others. The county has two parliamentary divisions, Northern (or Biggleswade), and Southern (or Luton), each returning one member; and Bedford is a parliamentary borough, returning one member. The principal institution, apart from those in the towns, is the great Three Counties asylum (for Bedfordshire, Hertfordshire and Huntingdonshire), in the south-east of the county near Arlesey.

History. — Although the Saxon invaders were naturally attracted to Bedfordshire by its abundant water supply and facilities for agriculture, the remains of their settlements are few and scattered. They occur, with one exception, south of the Ouse, the most important being a cemetery at Kempston, where two systems — cremation and earth-burial — are found side by side. Early reference to Bedfordshire political history is scanty. In 57 1 Cuthwulf inflicted a severe defeat on the Britons at Bedford and took, four towns. During the Heptarchy what is now the shire formed part of Mercia; by the treaty of Wedmore, how- ever, it became Danish territory, but was recovered by King Edward (919-921). The first actual mention of the county comes in 1016 when King Canute laid waste to the whole shire. There was no organized resistance to the conqueror within Bedfordshire, though the Domesday survey reveals an almost complete substitution of Norman for English holders. In the civil war of Stephen's reign the county suffered severely; the great Roll of the Exchequer of 1165 proves the shire receipts had depreciated in value to two-thirds of the assessment for the

Danegeld. Again the county was thrown into the barons' war when Bedford Castle, seized from the Beaucharnps by Falkes de Breaute,

one of the royal partisans, was the scene of three sieges before it was demolished by the king's orders in 1224. The peasants' revolt (1377-1381) was marked by less violence here than in neighbouring counties; the Annals of Dunstable make brief mention of a rising in that town and the demand for and granting of a charter. In 1638 ship-money was levied on Bed- fordshire, and in the Civil War that followed, the county was one of the foremost in opposing the king. Clarendon observes that here Charles had no visible party or fixed quarter.

Bedfordshire is divided into nine hundreds, Barford, Biggles- wade, Clifton, Flitt, Manshead, Redbornestoke, Stodden, Willey and Wiscamtree, and the liberty, half hundred or borough of Bedford. From the Domesday survey it appears that in the nth century there were three additional half hundreds, viz. Stanburge, Buchelai and Weneslai, which had by the 14th century become parts of the hundreds of Manshead, Willey and Biggleswade respectively. Until 1574 one sheriff did duty for Bedfordshire and Buckinghamshire, the shire court of the former being held at Bedford. The jurisdiction of the hundred courts, excepting Flitt, remained in the king's possession. Flitt was parcel of the manor of Luton, and formed part of the marriage portion of Eleanor, sister of Henry III. and wife of William Marshall. The burgesses of Bedford and the prior of Dunstable claimed juris- dictional freedom in those two boroughs. The Hundred Rolls and the Placita de quo warranto show that important jurisdiction had accrued to the great over-lordships, such as those of Beauchamp, Wahull and Caynho, and to several religious, houses, the prior of St John of Jerusalem claiming rights in more than fifty places in the county.

With regard to parliamentary representation, the first original writ which has been discovered was issued in 1290 when two members were returned for the county. In 1295 in addition to the county members, writs are found for two members to represent Bedford borough. Subsequently until modern times two county and two borough members were returned regularly.

Owing to its favourable situation Bedfordshire has always been a prominent agricultural rather than manufacturing county. From the 13 th to the 15 th century sheep farming flourished, Bedfordshire wool being in request and plentiful. Surviving records show that in assessments of wool to the king, Bedfordshire always provided its full quota. Tradition says that the straw-plait industry owes its introduction to James I., who transferred to Luton the colony of Lorraine plaiters whom Mary queen of Scots had settled in Scotland.

Similarly the lace industry is associated with Catherine of Aragon, who, when trade was dull, burnt her lace and ordered new to be made. As late as the 19th century the lace makers kept " Cattern's Day " as the holiday of their craft. The Flemings, expelled by Alva's persecutions (1569), brought the manufacture of Flemish lace to Cranfield, whence it spread to surrounding districts. The revocation of the edict of Nantes, and conse- quent French immigration, gave further impetus to the industry. Defoe writing in 17 24-1 727 mentions the recent improvements in the Bedfordshire bone-lace manufacture. In 1794 further French refugees joined the Bedfordshire lace makers.

Woburn Abbey, belonging to the Russells since 1547, is the seat of the duke of Bedford, the greatest landowner in the county. The Burgoynes of Sutton, whose baronetcy dates from 1641, have been in Bedfordshire since the 15th century, whilst the Osborn family have owned Chicksands Priory since its purchase by Peter Osborn in 1576. Sir Phillip Monoux Payne represents the ancient Monoux family of Wootton. Other county families are the Crawleys of Stockwood near Luton, the Brandreths of Houghton Regis, and the Orlebars of Hinwick.

With the division of the Mercian diocese in 679 Bedfordshire fell naturally to the new see of Dorchester. It formed part of Lincoln diocese from 1075 until 1837, when it was finally trans- ferred to Ely. In 1 291 Bedfordshire was an archdeaconry

including six rural deaneries, which remained practically un- altered until 1 880, when they were increased to eleven with a new schedule of parishes.

Antiquities. — The monastic remains in Bedfordshire include the fine fragment of the church of the Augustinian priory at Dunstable, serving as the parish church; the church (also imperfect) of Elstow near Bedford, which belonged to a Benedictine nunnery founded by Judith, niece of William the Conqueror; and portions of the Gilbertine Chicksands Priory and of a Cistercian foundation at Old Warden. In the parish churches, many of which are of great interest, the predominant styles are Decorated and Perpendicular. Work of pre-Conquest date, however, is found in the massive tower of Clapham church, near Bedford on the north, and in a door of

Stevington church. Fine Norman and Early English work is seen at Dunstable and Elstow, and the later style is illustrated by the large cruciform churches at Leighton Buzzard and at Felmersham on the Ouse above Bedford. Among the Perpendicular additions to the church last named may be noted a very beautiful oaken rood- screen. To illustrate Decorated and Perpendicular the churches of Clifton and of Marston Moretaine, with its massive detached campanile, may be mentioned; and Cople church is a good specimen of fine Perpendicular work. The church of Cockayne Hatley, near Potton, is fitted with rich Flemish carved wood, mostly from the abbey of Alne near Charleroi, and dating from 1689, but brought here by a former rector early in the 19th century. In medieval domestic architecture the county is not rich. The mansion of Woburn Abbey dates from the middle of the 1 8th century.

Authorities. — Victoria County History (London, 1904, &c.) ; Fishe, Collections, Historical, Genealogical and Topographical, for Bedfordshire (London, 1812-1816, and also 1812-1836); J. D. Parrv, Select Illustrations of Bedfordshire (London, 1827); Bedfordshire Domesday Book (Bedford, 1881); Visitation of Bedford, 1566, 1582, and 1634, in Harleian Society's Publications, vol. xiv. (London, 1884) ; Genealogica Bedfordiensis, 1538, 1800 (London, 1 890) ; and Illustrated Bedfordshire (Nottingham, 1895). See also Bedfordshire Notes and Queries, ed. F. A. Blades, and Transactions of the Bedfordshire Natural History and Field Club.

BEDLAM, or Bethlehem Hospital, the first English lunatic asylum, originally founded by Simon FitzMary, sheriff of London, in 1247, as a priory for the sisters and brethren of the order of the Star of Bethlehem. It had as one of its special objects the housing and entertainment of the bishop and canons of St Mary of Bethlehem, the mother-church, on their visits to England. Its first site was in Bishopsgate Street. It is not certain when lunatics were first received in Bedlam, but it is mentioned as a hospital in 1330 and some were there in 1403. In 1547 it was handed over by Henry VIII. with all its revenues to the city of London as a hospital for lunatics. With the exception of one such asylum in Granada, Spain, the Bethlehem Hospital was the first in Europe. It became famous and after- wards infamous for the brutal ill-treatment meted out to the insane (see Insanity: Hospital Treatment). In 1675 it was removed to new buildings in Moorfields and finally to its present site in St George's Fields, Lambeth. The word " Bedlam " has long been used generically for all lunatic asylums.

BEDLINGTON, an urban district of Northumberland, England, within

the parliamentary borough of Morpeth, 5 m. S.E. of that town on a branch of the North Eastern railway. Pop. (1901) 18,766. It lies on high ground above the river Blyth, 25 m. above its mouth. The church of St Cuthbert shows good transitional Norman details. Its dedication recalls the trans- portation of the body of the saintly bishop of Lindisfarne from its shrine at Durham by the monks of that foundation to Lindis- farne, when in fear of attack from William the Conqueror. They rested here with the coffin. The modern growth of the town is attributable to the valuable collieries of the neighbour- hood, and to manufactures of nails and chains. It is one of the most populous mining centres in the county. On the south bank of the river is the township and urban district of Cowpen (pop. 17,879), with collieries and glass works; coal is shipped from this point by river.

Bedlington (Betlingtun) and the hamlets belonging to it were bought by Cutheard, bishop of Durham, between 900 and 915, and although locally situated in the county of Northumberland became part of the county palatine of Durham over which Bishop Walcher was granted royal rights by William the Conqueror. When these rights were taken from Cuthbert Tunstall, bishop of Durham, in 1536, Bedlington among his other property lost its special privileges, but was confirmed to him in 1541 with the other property of his predecessors. To- gether with the other lands of the see of Durham, Bedlington was made over to the ecclesiastical commissioners in 1866. Bedlingtonshire was made part of Northumberland for civil purposes by acts of parliament in 1832 and 1844.

BEDLOE, WILLIAM (1650-1680), English informer, was born at Chepstow on the 20th of April 1650. He appears to have been well educated; he was certainly clever, and after coming to London in 1670 he became acquainted with some Jesuits and was occasionally employed by them. Calling himself now Captain Williams, now Lord Gerard or Lord Newport or Lord Cornwallis, he travelled from one part of Europe to another; he underwent imprisonments for crime, and became an expert in all kinds of duplicity. Then in 1678, following the lead of Titus Oates, he gave an account of a supposed popish plot to the English government, and his version of the details of the murder of Sir E. B. Godfrey was rewarded with £500. Em- boldened by his success he denounced various Roman Catholics, married an Irish lady, and having become very popular lived in luxurious fashion. Afterwards his fortunes waned, and he died at Bristol on the 20th of August 1680. His dying deposi- tions, which were taken by Sir Francis North, chief justice of the common pleas, revealed nothing of importance. Bedloe wrote a Narrative and impartial discovery of the horrid Popish Plot (1679), but all his

statements are extremely untrustworthy. See J. Pollock, The Popish Plot (1903).

BEDMAR, ALPHONSO DELLA CUEVA, Marquis or (1572- 1655), Spanish diplomatist, became ambassador to the republic of Venice in 1667. This was a very important position owing to the amount of information concerning European affairs which passed through the hands of the representative of Spain. When Bedmar took up this appointment, Venice had just con- cluded an alliance with France, Switzerland and the Netherlands, to counterbalance the power of Spain, and the ambassador was instructed to destroy this league. Assisted by the duke of Ossuna, viceroy of Naples, he formed a plan to bring the city into the power of Spain, and the scheme was to be carried out on Ascension Day 1618. The plot was, however, discovered; and Bedmar, pro- tected by his position from arrest, left Venice and went to Flanders as president of the council. In 1622 he was made a cardinal, and soon afterwards became bishop of Oviedo, a position which he retained until his death, which occurred at Oviedo on the 2nd of August 1655. The authorship of an anonymous work, Squitinio delta liberta Veneta, published at Mirandola in 1612, has been attributed to him.

Some controversy has arisen over the Spanish plot of 1618, and some historians have suggested that it only existed in the minds of the Venetian senators, and was a ruse for forcing Bedmar to leave Venice. From what is known, however, of the policy of Spain at this time, it is by no means unlikely that such a scheme was planned.

See C. V. de Saint-Real, CEuvres, tome iv. (Paris, 1745); P.J. Grosley, Discussion historique et critique sur la conjuration de Venise (Paris, 1756); P. A. N. B. Daru, Histoire de la republique de Venise (Paris, 1853); A. Baschet, Histoire de la chancellerie secrete a Venise (Paris, 1870).

BED-MOULD, in architecture, the congeries of mouldings which is under the projecting part of almost every cornice, of which, indeed, it is a part.

BEDOUINS (Ahl Bedu, "dwellers in the open land," or AM el beit, " people of the tent," as they call themselves), the name given to the most important, as it is the best known, division of the Arab race. The Bedouins are the descendants of the Arabs of North Arabia whose traditions claim Ishmael as

their ancestor (see Arabs). The deserts of North Arabia seem to have been their earliest home, but even in ancient times they had migrated to the lowlands of Egypt and Syria. The Arab conquest of northern Africa in the 7th century a.d. caused a wide dispersion, so that to-day the Arab element is strongly represented in the Nile Valley, Saharan, and Nubian peoples. Among the Hamitic-Negroid races the Bedouins have largely lost their nomadic character; but in the deserts of the Nile lands they remain much what their ancestors were. Thus the name has suffered much ethnic confusion, and is often incorrectly reserved to describe such pastoral peoples as the Bisharin, the Hadendoa and the Ababda. This article treats solely of the Arabian Bedouin, as affording the purest type of the people. They are shepherds and herdsmen, reduced to an open-air, roving life, partly by the nature of their occupations, partly by the special characteristics of the countries in which they dwell. For, while land, unsuited to all purposes except pasture, forms an unusually large proportion of the surface in the Arabian territory, the prolonged droughts of summer render considerable portions of it unfit even for that, and thus continually oblige the herdsmen to migrate from one spot to another in search of sufficient herbage and water for their beasts. The same causes also involve the Bedouins in frequent quarrels with each other regarding the use of some particular well or pasture-ground, besides reducing them not unfrequently to extreme want, and thus making them plunderers of others in self-support. Professionally, the Bedouins are shepherds and herdsmen; their raids on each other or their robbery of travellers and caravans are but occasional exceptions to the common routine. Their intertribal wars (they very rarely venture on a conflict with the better-armed and better- organized sedentary population) are rarely bloody; cattle-lifting being the usual object. Private feuds exist, but are usually limited to two or three individuals at most, one of whom has perhaps been ridiculed in satirical verse, to which they are" very sensitive, or had a relation killed in some previous fray. But bloodshed is expensive, as it must be paid for either by more bloodshed or by blood-money — the diya, which varies, according to the importance of the person killed, from ten to fifty camels, or even more. Previous to Mahomet's time it was optional for the injured tribe either to accept this compensation or to insist on blood for blood; but the Prophet, though by his own account despairing of ever reducing the nomad portion of his countrymen to law and order, succeeded in establishing among them the rule, that a fair diya if offered must be accepted. Instances are, however, not wanting in Arab history of

fiercer and more general Bedouin conflicts, in which the destruction, or at least the complete subjugation, of one tribe has been aimed at by another, and when great slaughter has taken place. Such were the wars of Pekr and Thagleb in the 6th century, of Kelb and Howazin in the 8th, of Harb and Ateba in the 18th.

The Bedouins regard the plundering of caravans or travellers as in lieu of the custom dues exacted elsewhere. The land is theirs, they argue, and trespassers on it must pay the forfeit. Hence whoever can show anything equivalent to a permission of entrance into their territory has, in the regular course of things, nothing to fear. This permission is obtained by securing the protection of the nearest Bedouin sheik, who, for a politely- worded request and a small sum of money, will readily grant the pass, in the shape of one or two or more men of his tribe, who accompany the wayfarers as far as the next encampment on their road, where they hand their charge over to fresh guides, equally bound to afford the desired safeguard. In the interior of Arabia the passport is given in writing by one of the town governors, and is respected by the Bedouins of the district; for, however impudent and unamenable to law these nomads may be on the frontiers of the impotent Ottoman government in Syria or the Hejaz, they are submissive enough in other and Arab-governed regions. But the traveller who ventures on the desert strip without such precautions will be robbed and perhaps killed.

Ignorant of writing and unacquainted with books, the Bedouins trust to their memory for everything; where memory fails,

they readily eke it out with imagination. Hence their own assertions regarding the antiquity, numbers, strength, &c, of their clans are of little worth; even their genealogies, in which they pretend to be eminently versed, are not to be much depended on; the more so that their own family names hardly ever exceed the limits of a patronymic, whilst the constantly renewed sub- divisions of a tribe, and the temporary increase of one branch and decrease of another, tend to efface the original name of the clan. Few tribes now preserve their ancient, or at least their historical titles; and the mass of the Bedouin multitude re- sembles in this respect a troubled sea, of which the substance is indeed always the same, but the surface is continually shifting and changing. As, however, no social basis or ties are acknow- ledged among them except those of blood and race, certain broad divisions are tolerably accurately kept up, the wider and more important of which may here be noted. First, the Aneza clan, who extend from Syria southward to the limits of Jebel Shammar. It is numerous, and, for a Bedouin tribe, well armed. Two-

thirds of the Arab horse trade, besides a large traffic in sheep, camels, wool, and similar articles, are in their hands. Their principal subdivisions are the Sebaa on the north, the Walid Ali on the west, and the Ruala on the south; these are generally on bad terms with each other. If united, they could muster, it is supposed, about 30,000 lances. They claim descent from Rabi'a. Second, the Shammar Bedouins, whose pasturages lie conterminous to those of the Aneza on the east. Their numbers are about the same. Thirdly, in the northern desert, the Huwetat and Sherarat, comparatively small and savage tribes. There is also the Solibi clan, which, however, is disowned by the Arabs, and seems to be of gipsy origin. Next follow, in the western desert, the Beni-Harb, a powerful tribe, supposed to muster about 20,000 fighting men. They are often troublesome to the Meccan pilgrims. In the eastern desert are the Muter, the Beni-Khalid, and the Ajmans, all numerous clans, often at war with each other. To the south, in Nejd itself or on its frontiers, are the Hodeil, Ateba, and others. These all belong to the " Mustareb," or northern Arabs.

The Bedouins of southern or " pure Arab " origin are com- paratively few in number, and are, with few exceptions, even poorer and more savage than their northern brethren. Al- Morrah, on the confines of Oman, Al-Yam and Kahtan, near Yemen, and Beni-Yas, between Harik and the Persian Gulf, are the best known. The total number of the Bedouin or pastoral population throughout Arabia, including men, women, and children, appears not to exceed a million and a half, or about one fifth of the total population. The only tribal authority is the " elder," or " sheik," a title not necessarily implying ad- vanced age, but given to any one who, on account of birth, courage, wealth, liberality or some other quality, has been chosen to the leadership. Descent has something to do with rank, but not much, as every individual of the tribe considers himself equal to the others; nor are the distinctions of relative riches and poverty greatly taken into account. To the " sheik " all disputes are referred; he is consulted, though not necessarily obeyed, on every question which regards the general affairs of the tribe, whether in peace or war; there is no other magis- trate, and no law except what he and the other chief men may consider proper. But in fact, for most personal and private affairs, every man does pretty much what is right in his own eyes.

All the Bedouins, with the exception of certain tribes in Syria, are nominally Mahommedans, but most pay but slight attention to the ceremonial precepts of the Koran; the five daily prayers and the annual fast of Ramadan are not much in favour among them; and

however near a tribe may be to Mecca; few of them visit it as pilgrims. The militant Wahhabi have, however, from time to time enforced some degree of Island tic observance among the Bedouins of Nejd and the adjoining districts: elsewhere Mahommedanism is practically confined to the profession of the Divine Unity; among the remoter and wilder tribes sun- worship, tree-worship, and no worship at all, are not uncommon. Some clans even omit the rite of circumcision altogether; others,

like the tribe of Hodeil, south of Mecca, perform it after a fashion peculiar to themselves.

Though polygamy is not common among Bedouins, marriages are contracted without any legal intervention or guarantee; the consent of the parties, and the oral testimony of a couple of witnesses, should such be at hand, are all that are required; and divorce is equally easy. Nor is mutual constancy much expected or observed either by men or women ; and the husband is rarely strict in exacting from the wife a fidelity that he himself has no idea of observing. Jealousy may indeed occasionally bring about tragic results, but this rarely occurs except where publicity, to which the Bedouins, like all other Arabs, are very sensitive, is involved. Burckhardt writes: " The Bedouins are jealous of their women, but do not prevent them from laughing and talking with strangers. It seldom happens that a Bedouin strikes his wife; if he does so she calls loudly on her wasy or protector, who pacifies the husband and makes him listen to reason. . . . The wife and daughters perform all domestic business. They grind the wheat in the handmill or pound it in the mortar; they prepare the breakfast and dinner; knead and bake the bread; make butter, fetch water, work at the loom, mend the tent-covering . . . while the husband or brother sits before the tent smoking his pipe." A maiden's honour is, on the other hand, severely guarded; and even too openly avowed a courtship, though with the most honourable intentions, is ill looked on. But marriage, if indeed so slight and temporary a connexion as it is among Bedouins deserves the name, is often merely a passport for mutual licence. In other respects Bedouin morality, like that of most half-savage races, depends on custom and public feeling rather than on any fixed code or trained conscience, and hence admits of the strangest contradictions. Not only are lying and exaggeration no reproach in ordinary discourse, but even deliberate perjury and violation of the most solemn engage- ments are frequent occurrences.

Not less frequent, however, are instances of prolonged fidelity and observance of promise carried to the limits of romance. " The wind," " the wood," and " the honour of the Arabs " are the most ordinary oaths in serious matters; but even these do not give absolute security, while a simple verbal engagement will at other times prove an inviolable guarantee. Thus, too, the extreme abstemiousness of a Bedouin alternates with excessive gorgings; and, while the name and deeds of " robber " are hardly a reproach, those of " thief " are marked by abhorrence and contempt. In patience, or rather endurance, both physical and moral, few Bedouins are deficient; wariness is another quality universally developed by their mode of life. And in spite of an excessive coarseness of language, and often of action, gross vice, at'least of the more debasing sorts that dishonour the East, is rare.

Most Bedouins, men and women, are rather undersized; their complexion, especially in the south, is dark; their hair coarse, thick and black; their eyes dark and oval; the nose is generally aquiline, and the features well formed; the beard and moustache are usually scanty. The men are active, but not strong; the women are generally plain. The dress of the men consists of a long cotton shirt, open at the breast, often girt with a leathern girdle; a black or striped cloak of hair is sometimes thrown over the shoulders; a handkerchief, folded once, black, or striped yellow and red, covers the head, round which it is kept in its place by a piece of twine or a twisted hairband. To this costume a pair of open sandals is sometimes added. Under the shirt, round the naked waist, a thin strip of leather plait is wound several times, not for any special object, but merely out of custom. In his hand a Bedouin almost always carries a slight crooked wand, commonly of almond- wood. Among the Bedouins of the south a light wrapper takes the place of the handkerchief on the head, and a loin-cloth that of the shirt. The women usually wear wide loose drawers, a long shirt, and over it a wide piece of dark blue cloth enveloping the whole figure and head, and trailing on the ground behind. Very rarely does a Bedouin woman wear a veil, or even cover her face with her overcloak, contenting herself with narrowing the folds of the latter over her head on the approach of a stranger. Her wrists and ankles are

generally adorned with bracelets and rings of blue glass or copper or iron, very rarely of silver; her neck with glass beads; ear-rings are rare, and nose-rings rarer. Boys, till near puberty, usually go stark naked; girls also wear no clothes up to the age of six or seven.

On a journey a Bedouin invariably carries with him a light, sharp-

pointed lance, the stem of which is made of Persian or African cane; the manner in which this is carried or trailed often indicates the tribe of the owner. The lance is the favourite and characteristic weapon of the Arab nomad, and the one in the use of which he shows the greatest skill. An antiquated sword, an out-of-date musket, an ornamented dagger or knife, a coat of mail, the manufacture of Yemen or Bagdad, and a helmet, a mere iron head-piece, without visor or crest, complete his military outfit.

A Bedouin's tent consists of a few coverings of the coarsest goat-hair, dyed black, and spread over two or more small poles, in height from 8 to 9 ft., gipsy fashion. If it be the tent of a sheik, its total length may be from 30 to 40 ft. ; if of an ordinary person, less than 20 ft. Sometimes a partition separates the quarters of the women and children; sometimes they are housed under a lower and narrower covering. A rough carpet or mat is spread on the ground; while camel-saddles, ropes, halters, two or three cooking pots, one or two platters, a wooden drinking bowl, the master's arms at one side of the tent, and his spear stuck in the ground at the door, complete the list of house- hold valuables. On striking camp all these are fastened on the backs of camels; the men mount their saddles, the women their litters; and in an hour the blackened stones that served for a cooking hearth are the only sign of the encampment. For food the Bedouin relies on his herds, but rice, vegetables, honey, locusts and even lizards are at times eaten.

Bibliography. — Johann Ludwig Burckhardt, Notes on the ■Bedouins and Wahabis (183 1); Karstens Niebuhr, Travels through Arabia (orig. Germ. edit. 1772), translated into English by Robert Heron (2 vols., Edinburgh, 1792); H. H. Tessup, Women of the Arabs (New York, 1874); W. S. Blunt, Bedouin Tribes of the Euphrates (1879); Lady Anne Blunt, Pilgrimage to Nejd (1881); Desmoulins, Les Francois d'aujourd'hui (Paris, 1898) ; C. M. Doughty, Arabia Deserta (2 vols., 1888); E. Rectus, Les Arabes (Brussels, 1898); Rev. S. M. Zwemer, Arabia, the Cradle of Islam (1900) ; W. Robertson Smith, Kinship and Marriage in Early Arabia (Cambridge, 1885); H. C. Trumbull, The Blood Covenant (Phil- adelphia, 1891).

BEDSORE, a form of ulceration or sloughing, occasioned in people who, through sickness or old age, are confined to bed, resulting from pressure or the irritation of sweat and dirt. Bedsores usually occur when there is a low condition of nutrition of the tissues. The more helpless the patient the more liable he is to bedsores, and especially when he is paralysed, delirious or insane, or when suffering from one of the acute specific fevers. They may occur wherever there is a

pressure, more especially when any moisture is allowed to remain on the bedding; and thus lack of cleanliness is an important factor in the production of this condition. In large hospitals a bedsore is now a great rarity, and this, considering the helplessness of many of the patients treated, shows what good nursing can do. The bed must be made with a firm smooth mattress; the undersheet and blanket must be changed whenever they become soiled; the drawsheet is spread without creases, and changed the moment it becomes soiled. Preventive treatment must be followed from the first day of the illness. This consists in the most minute attention to cleanliness, and constant variation in the position of the patient. All parts subjected to pressure or friction must be frequently washed with soap and hot water, then thoroughly dried with a warm soft towel. The part should next be bathed in a solution of corrosive sublimate in spirits of wine, and finally dusted with an oxide of zinc. and starch powder. This routine should be gone through not less than four times in the twenty-four hours in any case of prolonged illness. The pressure may be relieved over bony prominences by a water-pillow or by a piece of thick felt cut into a ring. Signs of impending bedsores must constantly be watched for. Where one threatens, the skin loses • its proper colour, becoming either a deadly white or a dusky red,

and the redness does not disappear on pressure. The surrounding tissues become oedematous, and pain is often severe, except in a case of paralysis. ‘ As the condition progresses further the pain ceases. The epidermis now becomes raised as in a blister, and finally becomes detached, forming an excoriation and exposing the papillae. Even at this late stage an actual ulceration can still be prevented if proper care is taken; but failing this, the skin sloughs and an ulcer forms. In treating this, the position of the patient must be such that no pressure is ever allowed on the sloughing tissue. A hot boracic pad under oil-silk should be applied, the affected part being first dusted with iodoform. If, however, the slough is very large, it is safer to avoid wet applications, and the parts should be dusted with animal charcoal and iodoform, and protected with a dry dressing. When the slough has separated and the sore is clean, friar’s balsam will hasten the healing process. In any serious illness the formation of a bedsore makes the prognosis far more grave, and may even bring about a fatal issue, either directly or indirectly.

BEDWORTH, a manufacturing town in the Nuneaton parlia- mentary

division of Warwickshire, England; on the Nuneaton- Coventry branch of the London & North Western railway, 100 m. north-west from London. Pop. (1900) 7169. Atramway connects with Coventry, and the Coventry canal passes through. Coal and ironstone are mined; there are iron- works, and bricks, hats, ribbons and tape and silk are made. Similar industries' are pursued in the populous district (including the villages of Exhall and Foleshill) which extends southward towards Coventry.

BEE (Sanskrit bha, A.S. bed, Lat. apis), a large and natural family of the zoological order Hymenoptera, characterized by the plumose form of many of their hairs, by the large size of

the basal segment of the foot, which is always elongate and in the hindmost limb sometimes as broad as the shin, and by the development of a " tongue " for suck- ing liquid food; this organ has been vari- ously interpreted as the true insectan tongue (hypo-

pharynx) or as a ligula formed by fused portions of the second maxillae (probably the latter). Bees are specialized in correspondence with the flowers from which they draw the bulk of their food supply, the flexible tongue being used for sucking nectar, the plumed hairs and the modified legs (fig. 7) for gathering pol- len. These floral pro- ducts which form the food of bees and of their larvae, are in most cases collected and stored by the industrious insects; but some genera of

(After Benton, Bull, x („. s.) D,. Ent., U.S. Dept. Agr.). bees act as ˆ nquiHnes*

or " cuckoo-parasites," laying their eggs in the nests of other bees, so that their larvae may feed at the expense of the rightful owners of the nest. In a few cases, the parasitic bee-

Fig. I. — Honey-bee {Apis mellifica). a, male (drone) ; b, queen ; c, worker.

grub devours not only the food-supply, but also the larva ol its host.

Solitary and Social Bees. — Many genera of bees are represented, like most other insects, by ordinary males and females, each female constructing a nest formed of several chambers (" cells ") and storing in each chamber a supply of food for the grub to be hatched from the egg that she lays therein. Such bees, although a number of individuals often make their nests close together, are termed " solitary," their communities differing in nature from those of the "

social " bees, among which there are two kinds of females — the normal fertile females or " queens," and those specially modified females with undeveloped ovaries (see fig. 6) that are called " workers " (fig. 1). The workers

Fig. 2. — Head and Appendages of Honey-bee {Apis),

a,

Antenna or feeler.

mx, 1st maxilla.

g,

Epipharynx.

lp, Labial palp.

mxp,

Maxillary palp.

/, Ligula or " tongue."

Pg>

Opposite to galeae of 2nd

b, Bouton or spoon of

maxillae (labium).

ligula.

the

(From Frank R. Cheshire's Bee and Bee-keeping.)

are the earliest developed offspring of the queen, and it is their associated work which renders possible the rise of an insect state — a state which evidently has its origin in the family. It is interesting to trace various stages in the elaboration of the bee-society. Among the humble-bees (Bombus) the workers help the queen, who takes her share in the duties of the nest; the distinction between queen and workers is therefore less absolute than in the hive-bees (Apis), whose queen, relieved of all nursing and building cares by the workers,

devotes her whole energies

to egg-laying. The division of labour among the two castes of female becomes therefore most complete in the most highly organized society.

Structure. — Details of the structure of bees are given in the article Hymenoptera. The feelers (fig. 2, a) are divided into ” scape ” and ” flagellum ” as in the ants, and the mandibles vary greatly in size and sharpness in different genera. The proboscis or ” tongue ” (fig. 2, /) is a hollow organ enclosing an outgrowth of the body-cavity which is filled with fluid, and with its flexible under-surface capable of invagination or protrusion. Along this surface stretches a groove which is sur- rounded by thickened cuticle and practically formed into a tube by numerous fine hairs. Along this channel the nectar is drawn into the pharynx and passes, mixed with saliva, into the crop or ” honey-bag “; the action of the saliva changes the saccharose into dextrose and levulose, and the nectar becomes honey, which the bee regurgitates for storage in the cells or for the feeding of the grubs. The sting (fig. 6, pg, st.) of female bees is usually highly specialized, but in a few genera it is reduced and useless.

Many modifications in details of structure may be observed within the family. The tongue is bifid at the tip in a few genera ; usually it is pointed and varies greatly in length, being com- paratively short in Andrena, long in the humble-bees(Sow&Mˆ), and longest in Euglossa, a tropical American genus of solitary bees. The legs, which are so highly modified as pollen-carriers in the higher bees, are comparatively simple in certain primitive genera. The hairy covering, so notable in the hive-bee and especially in humble-bees, is greatly reduced among bees that follow a parasitic mode of life.

Early stages. — As is usual where an abundant food supply is provided for the young insects, the larvae of bees (fig. 3, SL.)

an e

w, Wing.

ce, Compound Eye.

e, Excrement.

ex, Exuvium.

Fig. 3. — Larva and Pupa of Apis. SL, Spinning larva. sp, Spiracles. N, Pupa. t, " Tongue."

FL, Feeding larva. m, Mandible.

co, Cocoon. an, Antenna.

(From Cheshire's Bees and Bee-keeping.)

are degraded maggots; they have no legs, but possess fairly well-developed heads. The successive cuticles that are cast as growth proceeds are delicate in texture and sometimes separate from the underlying cuticle without being stripped off. The maggots may pass no excrement from the intestine until they have eaten all their store of food. When fu-lly grown the final larval cuticle is shed, and the " free " pupa (fig. 3, N) revealed. The larvae of some bees spin cocoons (fig. 3, co) before pupation.

Nests 0} Solitary' Bees. — Bees of different genera vary considerably in the site and arrangement of their nests. Many — like the common " solitary " bees Halictus and A ndrena— burrow in the ground; the holes of species of Andrena are commonly seen in springtime opening on sandy banks, grassy lawns or gravel paths. Our knowledge of such bees is due to the observa- tions of F. Smith, H. Friese, C. Verhoeff and others. The nest may be simple, or, more frequently, a complex excavation, cells opening off from the entrance or from a main passage. Some- times the passage is the conjoint work of many bees whose cells are grouped along it at convenient distances apart. Other bees, the species of Osmia for example, choose the hollow stem of a bramble or other shrub, the female forming a linear series of cells

in each of which an egg is laid and a supply of food stored up. J. H. Fabre has found that in the nests of some species of Osmia the young bee developed in the first-formed cell, if (as often happens) she emerges from her cocoon before the inmates of the later cells, will try to work her way round these or to bite a lateral hole through the bramble shoot; should she fail to do this, she will wait for the emergence of her sisters and not make her escape at the price of injury to them. But when Fabre substituted dead individuals of her own species or live larvae of another genus, the Osmia had no scruple in destroying them, so as to bite her way out to air and liberty.

The leaf-cutter bees (Megackile) — which differ from Andrena and Halictus and agree with Osmia, Apis and Bombus in having elongate tongues — cut neat circular disks from leaves, using them for lining the cells of their underground nests. The carpenter-bees (Xylocopa and allied genera), unrepresented in the British Islands, though widely distributed in warmer countries, make their nests in dry wood. The habits of X. violacea, the commonest European species, were minutely described in the 18th century in one of R. A. F. de Reaumur's memoirs. This bee excavates several parallel galleries to which access is .gained by a cylindrical hole. In the galleries are situated the cells, separated from one another by transverse partitions, which are formed of chips of wood, cemented by the saliva of the bee.

Among the solitary bees none has more remarkable nesting habits than the mason bee (Ckalicodoma) represented in the south of France and described at length by Fabre. The female constructs on a stone a series of cells, built of cement, which she compounds of particles of earth, minute stones and her own saliva. Each cell is provided with a store of honey and pollen beside which an egg is laid; and after eight or nine cells have been successively built and stored, the whole is covered by a dome-like mass of cement . Fabre found that a Chalicodoma removed to a distance of 4 kilometres from the nest that she was building, found her way back without difficulty to the exact spot. But if the nest were removed but a few yards from its former position, the bee seemed no longer able to recognize it, sometimes passing over it, or even into the unfinished cell, and then leaving it to visit again uselessly the place whence it had been moved. She would accept willingly, however, another nest placed in the exact spot where her own had been. If the unfinished cell in the old nest had been only just begun, while that in the substituted nest were nearly completed, the bee would add so much material as to make the cell much larger than the normal size, her instinct evidently being to do a certain amount of building work before filling the cell with food. The food, too, is always placed in the cell after a fixed routine — first honey disgorged from the mouth, then pollen brushed off the hairs beneath the body (fig. 7, c) after which the two substances are mixed into a paste.

Inquilines and Parasites. — The working bees, such as have been mentioned, are victimized by bees of other genera, which throw upon the industrious the task of providing for the young of the idle. The nests of Andrena, for example, are haunted by the black and yellow species of Nomada, whose females lay their eggs in the food provided for the larva of the A ndrena. According to H. Friese, the relations

between the host and the inquiline are quite friendly, and the insects if they meet in the nest- galleries courteously get out of each other's way. D. Sharp, in commenting on this strange behaviour, points out that the host can have no idea why the inquiline haunts her nest. " W T hy then should the Andrena feel alarm? If the species of Nomada attack the species of Andrena too much, it brings about the destruction of its own species more certainly than that of the Andrena."

More violent in its methods is the larva of a Stelis, whose operations in the nest of Osmia leucomelana have been studied by Verhoeff. The female Stelis lays her eggs earlier than the Osmia, and towards the bottom of the food-mass; the egg of the Osmia is laid later, and on the surface of the food. Hence the two eggs are at opposite ends of the food, and both larvae

feed for a time without conflict, but the Slelis, being the older, is the larger of the two. Finally the parasitic larva attacks the Osmia, and digging its mandibles into its victim's head kills and eats it, taking from one to two days for the completion of the repast.

Social Bees. — The bees hitherto described are " solitary, " all the individuals being either males or unmodified females. The most highly developed of the long-tongued bees are " social "

species, in which the females are differentiated into egg – laying queens and

(usually) infer- tile " workers " (fig. 6). Verhoeff has discussed the rise of the " social " from the " solitary " condition, and points out that for the forma- tion of an insect community three conditions are necessary — a nest large enough for a number of individuals, a close grouping of the cells, and an associa- tion between mother and daughters in the winged state. For the fulfilment of this last condition, the older insects of the new generation must emerge from the cells while the mother is still occupied with the younger eggs or larvae. One species of Halictus nearly reaches the desired stage; but the first young bees to appear in the perfect state are males, and when the females emerge the mother dies.

Among the social bees the mother and daughter-insects co-operate, and they differ from the " solitary " groups in the nature of their

nest, the cells (fig. 25) of which are formed of wax secreted by special glands (fig. 5) in the bee's abdomen, the wax being pressed out between the segmental sclerites in the form of plates (fig. 4), which are worked by the legs (fig. 7) and jaws into the requisite shape. In our well-known hive-bee {Apis) and humble-bees {Bombus) the wax glands are ventral

Fig. 4. — Under Side of Worker, carrying Wax

Scales.

(From Cheshire's Bees and Bee-keeping.)

Fig. 5. — Abdominal Plate (worker of Apis), under side, third segment. W, wax-yielding surface, covering true gland; s, septem, or carina ; wh, webbed hairs.

(From Cheshire's Bees and Bee-keeping.)

in position, but in the " stingless " bees of the tropics {Trigona and Melipona) they are dorsal. A colony of humble-bees is started in spring by a female " queen " which has survived the winter. She starts her nest underground or in a surface depres- sion, forming a number of waxen cells, roughly globular in shape and arranged irregularly. The young females (" workers ") that develop from the eggs laid in these early cells assist the queen by building fresh cells and gathering food for storage therein. The queen may be altogether relieved of the work of the nest as the season advances, so that she can devote all her energies to egg-laying, and the colony grows rapidly. The

distinction between queen and worker is not always clear among humble-bees, the female insects varying in size and in the develop- ment of their ovaries. If any mishap befall the queen, the workers can sometimes keep the community from dying out. In autumn males are produced, as well as young queens. The community is broken up on the approach of winter, the males and workers perish, and the young queens after hibernation start fresh nests in the succeeding year.

The appearance of the heavy-bodied hairy Bombi is well known. They are closely " mimicked " by bees of the genus Psithyrus, which often share their nests. These Psithyri have no pollen-carrying structures on the legs and their grubs are dependent for their food – supply on the labours of the Bombi, though, according to E. Hoffer's observa- tions, it seems that the female Psithyrus

builds her own cells. |l|iHHi , ˆSHiBˆMi!S//Wl/ sf> ˆ R The colonies of Bombus illustrate the rise of the inquiline habit. Many of the species are very variable and have been differentiated into races or varieties. F. W. L. Sladen states that a queen

belonging to the $$ˆ\ VˆSBF7 // oA J$$F C virginalis form of 1 Bombus terrestris often invades a nest belonging to the ˆ IG – 6- — Ovaries of Queen and Workers (Apis).

lucorum form, kills the rightful queen, andtakespossession of the nest, getting the lucorum workers to rear her young. In the nests of Bombi are found various beetle larvae that live as inquilines or parasites, and also mag- gots of drone-flies (Volucella) , which act as scavengers; the Volucella-fly is usually a ” mimic

A,

Abdomen of queen, under side.

P, Petiole.

o, o, Ovaries.

hs, Position filled by honey-sack.

ds, Position through which digestive system passes.

od, Oviduct.

co.d, Vagina.

E, Egg-passing ovi- duct.

5, Spermatheca.

i, Intestine.

pb, Poison bag. pg, Poison gland. st, Sting. p, ” Palps ” or

” feelers ” of

sting.

B, Rudimentary ova-

ries of ordinary worker. sp, Rudimentary spermatheca.

C, Partiallydeveloped

ovaries of fer- tile worker. sp, Rudimentary spermatheca.

(From Cheshire's Bees and Bee-keeping.)

of the Bombus, whose nest she in- vades.

The " stingless " bees (Trigona) of the tropics have the parts of the sting reduced and useless for piercing. As though to compensate for the loss of this means of defence, the mandibles are very powerful, and some of the bees construct tubular entrances to the nest with a series of constrictions easy to hold against an enemy. The habits of the Brazilian species of these bees have been described in detail by H. von Jhering, who points out that their wax glands are dorsal in position, not ventral as in Bombus and Apis.

With Apis, the genus of the hive-bee, we come to the most highly-specialized members of the family — better known, perhaps, than any other insects, on account of the long domestication of many of the species or races. In Apis the workers differ structur- ally from the queen, who neither builds cells, gathers food, nor tends brood, and is therefore without the special organs adapted

for those functions which are possessed in perfection by the workers. The differentiation of queen and workers is correlated with the habit of storing food supplies, and the consequent permanence of the community, which finds relief for its surplus population by sending off a swarm, consisting of a queen and a number of workers, so that the new community is already specialized both for reproduction and for labour.

The workers of Apis may be capable (fig. 6, C) of laying eggs — necessarily unfertilized — which always give rise to males ("drones"), and, since the researches of J. Dzierzon (1811- 1906) in 1848, it has been believed that the queen bee lays fertilized eggs in cells appropriate for the rearing of queens or

Fig. 7. — Modifications in the Legs of Bees.

A. a-d,

B. /-•,

C. h-i, a,f, h, b, g, 1, d,

Hive-bee (Apis). Stingless bee (Melipona). Humble-bee (Bombus). Outer view of hind-leg. Inner view. Fore-leg of Apis showing

notch in tarsal segment for

cleaning feeler. Tip of intermediate shin with

spur. Feathered hairs with

grains, magnified. •

pollen

(After Riley, Insect Life (U.S. Dept. Agr.), vol. 6.)

workers, and unfertilized eggs in " drone-cells," virgin reproduc- tion or parthenogenesis being therefore a normal factor in the life of these insects. F. Dickel and others have lately claimed that fertilized eggs can give rise to either queens, workers or males, according to the food supplied to the larvae and the influence of supposed " sex-producing glands " possessed by the nurse-workers. Dickel states that a German male bee mated with a female of the Italian race transmits distinct paternal characters to hybrid male offspring. A. Weismann, however, doubts these conclusions, and having found a sperm- aster in every one of the eggs that he examined from worker- cells, and in only one out of 272 eggs taken from drone-cells, he supports Dzierzon's view, explaining the single exception mentioned above as a mistake of the queen, she having laid

inadvertently this single fertilized egg in a drone instead of in a worker cell.

The cells of the honeycomb of Apis are usually hexagonal in form, and arranged in two series back to back (figs. 3, 25). Some of these cells are used for storage, others for the rearing of brood. The cells in which workers are reared are smaller than those appropriate for the rearing of drones, while the " royal cells," in which the young queens are developed, are large in size and of an irregular oval in form (fig. 25) . It is believed that from the nature of the cell in which she is ovipositing, the queen derives a reflex impulse to lay the appropriate egg — fertilized in the queen or worker cell, unfertilized in the drone cell, as previously mentioned. Whether the fertilized egg shall

develop into a queen or a worker depends upon the nature of the food. All young grubs are at first fed with a specially nutritious food, discharged from the worker's stomach, to which is added a diges- tive secretion derived from special salivary glands in the worker's head. If this " royal jelly " continue to be given to the grub throughout its life, it will grow into a queen; if the ordinary mixture of honey and digested pollen be substituted, as is usually the case from the fourth day, the grub will become a worker. The workers, who control the polity of the hive (the " queen " being exceedingly " limited " in her monarchy), arrange if possible that young queens shall develop only when the population of the hive has become so congested that it is desirable to send off a swarm. When a young queen has emerged, she stings her royal sisters (still in the pupal stage) to death. Previous to the emergence of the young queen, the old queen, prevented by the workers from attacking her daughters, has led off a swarm to find a new home elsewhere. The young queen, left in the old home, mounts high into the air for her nuptial flight, and then returns to the hive and her duties of egg-laying. The number of workers increases largely during the summer, and so hard do the insects work that the life of an individual may last only a few weeks. On the approach of winter the males, having no further function to perform for the community, are refused food-supplies by the workers, and are either excluded or banished from the hive to perish. Such ruthless habits of the bee-commonwealth, no less than the altruistic labours of the workers, are adapted for the survival and dominance of the species. The struggle for life may deal hardly with the indi- vidual, but it results — to quote Darwin's well-known title — in " the preservation of favoured races."

Bibliography. — More has been written on bees, and especially on the genus Apis, than on any other group of insects. The classical observations of Reaumur Mernoires pour servir d Vhistoire des insectes, vols, v., vi. (Paris, 1740-1742) and F. Huber's Nouvelles observations sur les abeilles (Geneve, 1792) will never be forgotten; they have been matched in recent times by J. H. Fabre's Souvenirs entomologiques (Paris, 1879-1891): and M. Maeterlinck's poetic yet scientific La vie des abeilles (Paris, 1901). Among writers on the solitary and parasitic species may be specially mentioned F. Smith, Hymenoptera in the British Museum (London, 1853-1859) ; H. Friese, Zool. Jahrb. Syst., iv. (1891) J. Perez, Actes Soc. Bordeaux, xlviii. (1895); and C. Verhoeff, Zool. Jahrb. Syst., vi. (1892). For the social species we have valuable papers by E. Hoffer, Milt. Natur-wissen. Ver. Steiermark, xxxi. (1881); H. von Jhering, Zool. Jahrb. Syst., xix. (1903); and others. For recent controversy on partheno-

genesis in the hive bee, see J. Perez, Ann. Sci. Nat. Zool. (6), vii. (1878); F. Dickel, Zool. Anz., xxv. (1901), and Anatom. Anzeiger, xix. (1902); A. Petrunkevich, Zoolog. Jahrb. Anal., xiv. (1901); and A. Weismann, Anatom. Anzeiger, xviii. (1001). F. R. Cheshire's Bees and Bee-keeping (London, 1 885-1 888), and T. W. Cowan's Honey Bee (2nd ed., 1904), are invaluable to the naturalist, and contain extensive bibliographies olApis. D. Sharp's summary in the Cambridge Natural History, vol. vi., should be consulted for further information on bees generally. British bees are described in the catalogues of Smith, mentioned above, and by E. Saunders, The Hymenoptera of the British Islands (London, 1896). (G. H. C.)

Bee-Keeping Bee-keeping, or the cultivation of the honey-bee as a source of income to those who practise it, is known to have existed from the most ancient times. Poets, philosophers, historians and naturalists (among whom may be mentioned Virgil, Aristotle, Cicero and Pliny) have eulogized the bee as unique among insects, endowed by nature with wondrous gifts beneficial to

Fig. 8. — Sign of the king of Lower Egypt ; from the coffin of Mykcrinos, 3633 B.C. (British Museum).

Queen- rearing.

mankind in a greater degree than any other creature of the insect world. We are told that some of these ancient scientists passed years of their lives studying the wonders of bee-life, and left accurate records of their observations, which on many points agree with the investigations of later observers. As a forcible illustration of the manner in which a colony of bees was recog- nized as the embodiment of government by a chief or ruler, in the earliest times of which there is any existing record, it may be mentioned that on the sarcophagus containing the mummified remains of Mykerinos (now in the British Museum and dating back 3633 years B.C.) will be found a hieroglyphic bee, (fig. 8) representing the king of Lower Egypt.

In dealing with the practical side of bee- keeping as now understood, it may be said that, compared with the methods in vogue during the first decade of the 19th century, or even within the memory of men still living at the beginning of the 20th, it is as the modern locomotive

to the stage- coach of a previous generation. Almost everything connected with bee-craft has been revolution- ized, and apiculture, instead of being classed with such homely rural occupations as that of the country housewife who carries a few eggs weekly to the market-town in her basket, is to-day regarded in many countries as a pursuit of considerable import- ance. Remarkable progress has also been made in the art of queen-rearing, and in improving the common or native bee by judicious crossing with the best foreign races, selected mainly for hardiness, working qualities and the prolific capacity of their queens. American bee-breeders are conspicuous in this respect, extensive apiaries being exclu- sively devoted to the business of rearing queens by the thousand for sale and export.

On the European continent queen-rearing apiaries are plentiful, but less attention is paid there to hybridizing than to keeping the respective races pure. In England also, some bee-keepers include queen-rearing as part of their business, while one large apiary on the south coast is exclusively devoted to the rearing of queen bees on the latest scientific system, and to breeding by selection from such races as are most suited to the exceptional climatic conditions of the country.

Extensive apiaries have been established on the American continent, some containing from 2000 to 3500 colonies of bees, and in these honey is harvested in hundreds of tons yearly. The magnitude of the bee industry in the United States may be judged from the fact of a single bee-farmer located in California having harvested from 150,000 lb of honey in one year from 2000 stocks of bees, and, as an instance of the enormous weight of honey obtainable from good hives in that favoured region, the same farmer secured 60,000 lb of comb-honey in one season from his best 300 colonies. This is probably the maximum, and the hives were necessarily located in separate apiaries some few miles apart in order to avoid the evils of overstocking, but all in the midst of thousands of acres of honey-yielding flowers. Results like the above compared with those of the skeppist bee- keeper of former days, who was well pleased with an average of 20 to 25 lb per hive, may be regarded as wonderful, but they are matters of fact. The consumption of honey f °°/ y as as an article of food has also largely increased of late years; a recent computation shows that from 100 to 125 million lb of honey, representing a money value of from eight to ten million dollars, is consumed annually in the United States alone. Many of the larger bee-farmers of the United States of America and Canada harvest from 50,000 to 60,000 ft) of honey in a single season, and some of them sell the whole crop direct to consumers.

It is a notable fact that in the United States, Canada, Australia, New Zealand, and indeed all English-speaking countries outside the United Kingdom, honey is far more extensively used than it is there as an article of daily food. The natural result of this is that the trade in honey is conducted, in those countries, on

entirely different lines from those followed in the British Isles, where honey production as an occupation has, until quite recent years, been regarded as too insignificant for official notice in any form. The value of the bee industry is now recognized, however, by the British government as worthy of state ˆ tat ? al f aid, in the promotion of technical instruction connected keeping. with agriculture. On the American continent apiculture is officially recognized by the respective states' governments; and by the federal government at Washington it is taken into account as a section of the Agricultural Department, with fully equipped experimental apiaries and qualified professors engaged therein for educational work. In several Canadian provinces also, the public funds are used in promoting the bee industry in various ways, mainly in combating the bee-disease known as " foul brood." In New Zealand the government of the colony has displayed the most praiseworthy earnestness and vigour in promoting apiculture. State-aided apiaries have been established under the supervision of a skilled bee-keeper, who travels over the colony giving instruction in practical bee-work at the public schools, and forming classes at various centres where pupils are taught bee-keeping in all its branches.

In Europe similar progress is observable; technical schools, with well-equipped apiaries attached, are supported by the state, and in them the science and practice of modern bee-keeping is taught free by scientists and practical experts. Institutions of this kind have been established in Germany, Russia, Switzerland and elsewhere, all tending in the same direction, viz. the cultivation of the honey-bee as an appreciable source of income to the farmer, the peasant cultivator, and dwellers in districts where bee-forage is abundant and, if unvisited by the bee, lies wasting its sweetness on the desert air. It may be safely said that the value of the bee to the fruit-grower and the market-gardener has been proved beyond dispute; and the technical instruction now afforded by county councils in the rural districts of England has an appreciable effect. In proof thereof, we may quote the case of an extensive grower ˆaiue of in the midland counties — sending fruit to the London fertilizers. market in tons — whose crop of gooseberries increased nearly fourfold after establishing a number of stocks of bees in close proximity to the gooseberry bushes. The fruit orchards and raspberry fields of Kent

are also known to be greatly bene- fited by the numerous colonies of bees owned by more than 3000 bee-keepers in the county. The important part played by the bee in the economy of nature as a fertilizer is shown in fig. 9.

In the United Kingdom the prevailing conditions, climatic

Fig. 9. — A, Raspberry (Rubus idaeus, order Rosaceae), being fertilized. B, Cross section.

A, Flower. p, p, Petals.

B, Section'through core, or torus (C) and drupels (D). ud, Unfertilized drupel. ws, Withered stigma.

a, a, Anthers.

s, Stigma.

no, Nectary openings.

nc, Nectar cells.

D, Drupels.

(From Cheshire's Bees and Bee-keeping, Scientific and Practical.)

and otherwise, with regard to apiculture — as well as the lack of sufficient natural bee-forage for large apiaries — are such as to preclude the possibility of establishing apiaries on a scale com- parable with those located in less confined lands. On the other

assocla tions.

hand, even in England the value of bee-keeping is worthy of recognition as a minor industry connected with such items of agriculture as fruit-growing, market-gardening or poultry- raising. The fact that British honey is second to none for quality, and that the British market is eagerly sought by the bee-keepers of other nationalities, has of late impressed itself on the minds of thinking men. Moreover, their views are con- firmed by the constant references to bees and the profits obtain- able from bee-keeping in the leading papers on all sides. This newly-aroused interest in the

subject is no doubt to a large extent fostered by the grants in aid of technical instruction afforded by Bee . county councils in rural districts. The British Bee-

keepers' keepers' Association (instituted in 1874) has been

untiring in its efforts to raise the standard of efficiency

among those who are desirous of qualifying as experts and teachers of bee-keeping on modern methods. This body had for its first president the distinguished naturalist Sir John Lubbock (Lord Avebury). Subsequently the baroness Burdett- Coutts accepted the office in the year 1878, and was re-elected annually until her death in 1906. During this time she nresided at its meetings and took an active part in its work, until advanc- ing years prevented her attendance, but her interest in the welfare of the association was maintained to the last. Branch societies of bee-keepers were established throughout the English counties, mainly by the efforts of the parent body in London, with the object of securing co-operation in promoting the sale

of honey, and showing the most modern methods of Aone" rf producing it in its most attractive form at exhibitions shows. held for the purpose. Nearly the whole of these county

societies affiliated with the central association, paying an affiliation fee yearly, and receiving in return the silver medal, bronze medal and certificate of the association, to be offered as prizes for competition at the annual county shows. Other ad- vantages are given in connexion with the qualifying of experts, &c, while nearly all the county associations in the United Kingdom employ qualified men who visit members in spring and autumn for the purpose of examining hives and giving advice on bee management to those needing it. Another

*advantage of membership is the use of a " county labels. label " * or amxm 8 t0 each section of honey in comb,*

or jar of extracted honey, offered for sale by members. These labels are numbered consecutively, and thus afford a guarantee of the genuineness and quality of the honey, the label enabling purchasers to trace the producer if needed. The British Bee-keepers' Association is an entirely philanthropic body, the only object of its members being to promote all that is good in British bee-keeping, and to " teach humanity to that industrious little labourer, the honey-bee." Bee-appliance manufacturers are not eligible for membership of its council, nor are those who make bee-keeping their main business; thus no professional jealousies can possibly arise. In this respect the association appears to stand alone among the bee-keepers' societies of the world. There are many equally beneficial societies, framed on different lines, existing in Germany, France, Russia and Switzerland, but they are mainly co-operative bodies instituted for the general benefit of members, who are without exception either bee-keepers on a more or less extensive scale, or scientists interested in the study of insect life.

The bee-keepers' associations of the United States, Canada and most of the British colonies, are — like those last mentioned above — formed for the sole and laudable purpose of promoting the business interests of their members, the latter being either bee-farmers or bee-appliance manufacturers. Thus they make no pretension of any but business discussions at their confer- ences, and much benefit to all concerned follows as a matter of course. In fact, we find enthusiastic bee-men and women travelling several hundreds of miles and devoting time, money and labour in attending conferences of bee-

keepers in America, while the proceedings usually last for several days and are largely attended. The extent of the industry compared with that of Great Britain is so great that it fully accounts for the difference in procedure of the respective associations.

*As a natural consequence of this activity, the trade in bee- appliance making has assumed enormous proportions in the United States, where extensive factories have been established; one firm— employing over 500 hands, T * e * ee – and using electric-power machinery of the most modern trade.”” type — being devoted entirely to the manufacture of bee-goods and apiarian requisites. From this establishment alone the yearly output is about 25,000 bee-hives, and upwards of 100 millions of the small wooden boxes used for holding comb- honey. The most generally approved form of»this box is known as the “i-lb section,” made from a strip of wood ˆ in. thick, 2 in. wide, and of such length that when folded by joining the morticed and tenoned ends A B (fig. 10) it forms the section or box C, measuring 4i”X 4 i”X2″ when complete, and holds about 1 lb of comb-honey when filled by the bees and ready for table use. The V-shaped groove D (cut across and partly through the wood) shows the joint when in the flat, and E the same joint when closed for use. All the section boxes used in the United Kingdom are made in the U.S.A. or in Canada from the timber known as basswood, no native wood being suitable for the purpose.*

Development of the Movable-frame Hive. — The dome-shaped straw skep of our forefathers may be regarded as the typical bee-hive of all time and of all civilized countries; indeed, it may with truth be said that as a healthy lˆ straw and convenient home for the honey-bee it has nc equal. A swarm of bees hived in a straw skep, the picturesque little domicile known the world over as the personification of industry, will furnish their home with waxen combs in form and shape so admirably adapted to their requirements as to need no improve- ment by man. Why the circular form was chosen for the skep need not be inquired into, beyond saying that its shape conforms to that of a swarm, as the bees usually hang clustered on the branch of a neighbouring tree or bush after issuing from the parent hive. Fig. 1 1 shows a straw skep in section, and explains

Fig. 10. — ” i-lb section ” wooden box for

holding Comb-honey. (Redrawn from the A B C of Bee-Culture, published by the A. I. Root Co., Medina, Ohio, U. S. A.)

Fig. 11. — Straw skep in section, showing arrangement of Combs

A, Vertical section. fb, Floor board, e, Entrance. br, Brood.

p, Pollen. B, Horizontal section.

h, Honey. sk, Skep-side.

fh, Feeding hole. c, c, Combs. bs, i.y,Bee spaces. sc, sc, Store combs.

bs, bs, Bee spaces.

(From Cheshire's Bees and Bee-keeping, Scientific and Practical.)

itself as illustrating the admirable way in which the bees furnish their dwelling. The vertical section (A) shows the lower portion of the combs devoted to brood-rearing, the higher and thicker combs being reserved for honey, and midway between the brood and food is stored the pollen required for mixing with honey in feeding the larvae. It will be seen how well the upper part of the combs are fitted for bearing the weight of stores they contain,

and how the lower portion allows the bees to cluster around the tender larvae and thus maintain the warmth necessary during its metamorphosis from the egg to the perfect insect. The hori- zontal section (B) with equal clearness demonstrates the bee's ingenuity in economizing space, showing how the outer combs are used exclusively for stores, and, as such, may be built of varying thickness as more or less storage room is required. The straw skep has, however, the irredeemable fault of fixed combs,

and the gradual development of the movable-frame T bf° V " k' ve of to-day may be said to have first appeared in hive. ~L1%9 with the leaf -hive of Huber, so called from its

opening like the leaves of a book. Prior to that date wooden box-hives of various shapes had been adopted by advanced bee-masters anxious to increase their output of honey, and by enthusiastic naturalists desirous of studying and in- vestigating the wonders of bee-life apart from the utilitarian standpoint. Foremost among the latter was the distinguished Swiss naturalist and bee-keeper, Francois Huber, who was led to construct the leaf-hive bearing his name after experimenting with a single comb observatory hive recommended by Reaumur. Huber found that although he could induce swarms to

occupy the glass-sided single frame advised by Reaumur, if the frame was fitted with ready-built pieces of comb patched together before hiving the swarm, the experiment was successful, while if left to themselves the bees built small combs across the space between the sheets of glass, and the desired inspection from the outside was thus rendered impossible. He also gathered that the abnormal conditions forced upon the bees by a ready-built single comb might so turn aside their natural instincts as to render his investigations less trustworthy than if conducted under perfectly natural conditions; so, in order to remove all doubt, he decided to have a series of wooden frames made, measuring 12 in. sq., each of rather more than the ordinary width allowed for brood- combs. These frames were numbered consecutively 1 to 12, and hinged together as shown in fig. 12 (h, A). In this way the

tb

B

jil i^^SSS,^ – v^sfeir

s = ?l

I

C

*1”. Issw;. *^ i*

1 tb

A p

1

1

i jfe

1

iii)&p

1

\

1 3

1

mmi

1

A,

Fig. 12. — Huber's book or leaf hive. Book hive. B, Side view of frame

e, e, Entrances. or leaf. C,

s, s, Side leaves. tb, Top-bar.

h, Hinges. c, Comb.

p, p, Pegs. (From Cheshire's Bees and Bee-keeping, Scientific and Practical.)

frames of comb could be opened for inspection like a book, while when closed the bees clustered together as in an ordinary hive.

Part of bin, cross section, lettering as before.

Ten of these frames had a small piece of comb fixed to the top- bar in each, supported (temporarily) by a thin lath wedged up with pegs at side, the latter being removed when the comb had been made secure by the bees. When closed, the ten frames, together with the two outside ones (fitted with squares of glass for inspection) , which represent the covers of the book, were tied together with, a couple of stout strings. In a subsequent form of the same hive Huber was enabled — with the help of very long thumb-screws at each side (fig. 13) — to raise up any frame between two sheets of glass which confined the bees and allowed him to study the process of comb-building H " ber ' s better than any hive we know of to-day. By means tory hive. of the leaf-hive and using the entrances (fig. 1 2, e,e, A) Huber made artificial swarms by dividing and the use of division- boards, though not in quite the same fashion as is practised at the present day. On the other hand, it must be admitted that

JBBld

Fig. 13. — Huber's bar-hive, showing how comb is built, cb, Comb bar; g, g, glass sheets; s,.s, screws; e, entrance.

(From Cheshire's Bees and Bee-keeping, Scientific and Practical.)

Huber's hive was defective' in many respects; the parting of each frame, thus letting loose the whole colony, caused much trouble at times, but it remained the only movable-comb hive till 1838, when Dr Dzierzon— whose theory of parthenogenesis has made his name famous — devised a box-hive with a loose top-bar on which the bees built their combs and a movable side or door, by means of which the frames could be lifted out for inspection. This improvement was at once appreciated, and in the year 1852 Baron Berlepsch added side-bars and a bottom-bar, thus completing the movable frame.

About the same time the Rev. L. L. Langstroth was experi- menting on the same lines in America, and in 1852 his important invention was made known, giving to the world of Laag- bee-keepers a movable frame which in its most im- strath's portant details will never be excelled. We refer to the hlve ' respective distances left between the side-bars and hive walls on each side, and between the lower edge of the bottom-bars and the floor-board. Langstroth, in his measurements, hit upon the happy mean which keeps bees from propolizing or fastening the frames to the hive body, as they assuredly would do if sufficient space had not been allowed for free passage round the side-bars; it is equally certain that if too much space had been provided, they would fill it with comb and thus render the frame immovable. In addition to these benefits, Langstroth's frame and hive possessed the enormous advantage over Dzierzon's of being manipulated from above, so that any single frame could be raised for inspection without disturbing the others. Lang- stroth's space-measurements have remained practically unaltered notwithstanding the many improvements in hive-making, and in the various sizes of movable frames, since introduced and used in different parts of the world.

In the United States of America Langstroth's frame and hive are the acknowledged " standards " among the great body of bee-keepers, although about a dozen different frames, varying more or less in size, have their adherents. j^j°/ /n Among these may be named the American, Adair, ihe u.s.a. Danzenbaker, Gallup, Heddon, Langstroth and Quinby. Three of these, the American, Adair and Gallup, may

be termed square frames, the others being oblong, but the latter shape appears to possess the most all-round advantages to the modern bee-keeper. Amid the different climatic conditions of so vast a continent as America, variation in size, and in the capacity of frames used, is in some measure accounted for.

In the British Isles, though the conditions are variable enough, they are less extreme, and, fortunately for those engaged in British tne pursuit, only one size of frame is acknowledged by •'Stand- the great majority of bee-keepers, viz. the British ard" Bee-keepers' Association " Standard " (fig. 14). This

frame. f ra me, the outside measurement of which is 14 by 85 in., was the outcome of deliberations extending over a consider- able time on the part of a committee of well-known bee-keepers, specially appointed in 1882 to consider the matter. In this way,

whatever type or form of hive is used, the frames are interchangeable. Differences in view may, and do, exist regarding the thickness of the wood used in frame-making, but the outside measurement never varies. Notwith- standing this fact, the ad- vancement of apiculture

Fig

14

14. — Standard Frame, and the continuous development of the modern frame-hive and methods of working have proceeded with such rapidity, both in England and in America, that hives and appliances used prior to 1885 are now obsolete.

It may, therefore, be useful to compare the progress made in the United States of America and in Great Britain in order to show that, while the industry is incomparably larger and of more importance in America and Canada than in Great Britain, British bee-keepers have been abreast of the times in all things apicultural. The original Langstroth hive was single-walled, held ten frames (size 17! by 9 in.), and had a deep roof, made to cover a case of small honey boxes like the sections now in use; but the cumbersome projecting porch and sides, made to support the roof, are now dispensed with, and the number of frames reduced to eight. Although various modifications have since been made in minor details — all tending to improvement — its main features are unaltered. The typical hive of America is the improved Langstroth (fig. 15), which has no other cover- ing for the

frame tops but a flat roof-board allowing j in. space between the roof and |A top-bars for bees to pass from frame to frame. Consequently, on the roof being raised B the bees can take wing if not prevented from doing so. This feature C finds no favour with British bee-keepers, nevertheless the " im- proved Langstroth " is a useful and simple hive, moderate in price, and no doubt efficient, but not suitable for bees wintered on their summer stands, as nearly all hives are in Great Britain. American bee-keepers, therefore, find it necessary to provide oe'ujrsfor under g round cellars, into which the bees are carried bees. i n tne f a H °f eacn year, remaining there till work

begins in the following spring. Those among them who cannot, for various reasons, adopt the cellar-wintering plan are obliged to provide what are termed " chaff-covers " for pro- tecting their bees in winter. Of late years they have also introduced, as an improvement, the plan long followed in England of using double-walled chaff-packed hives. The differ- ence here is that packing is now dispensed with, it being found

Fig. 15. — Langstroth Hive.

(Redrawn'from the A BC of Bee-Culture, published by the A. I. Root Co., Medina, Ohio, U. S. A.)

that bees winter equally well with an outer case giving i| in. of free space on all sides of the hive proper, but with no packing in between. Thus no change is needed in winter or summer, the air-space protecting the bees from cold in winter and heat in summer. Another point of difference between the English and American hive is the roof, which being gable-shaped in the former allows warm packing to be placed directly on the frame tops, so that the bees are covered in when the roof is removed and may be examined or fed with very little disturbance. Again, the American hive is, as a general rule, set close down on the ground, while stands or short legs are invariably used in Great Britain. One of the best-known hives in England is that known as the W.B.C. hive, devised in 1890 by W. Broughton Carr.

Figs. 16 and 17 explain its construction and, as will be seen, it is equally suit- able when work- ing for comb or for extracted honey.

Various causes have contributed to the develop- ment of the modern hive, the most important of which are the improvements in methods of ex- tracting honey from combs, and in the manufac- ture of comb-foundation. Re- garding the first of these, it can- not be said that the

honey ex- tractor, even in its latest form, differs very much from the original machine (fig. 18) invented by Major Hruschka, an officer in the Italian army, who in later life became an enthusiastic apicul- turist. _ Hruschka's extractor, first brought to public Zactors"" notice in 1865, may be said to have revolutionized the bee-industry as a business. It enabled the honev producer to in- crease his output considerably by extracting honey from the cells in most cleanly fashion without damaging the combs, and in a fraction of the time previously occupied in the draining, heating and squeez- ing process. At the same time the combs were pre- served for refilling by the bees, in lieu of melting them down for wax. The principle of the honey extractor (throwing the liquid honey out of the cells by cen- trifugal force) was discovered quite by

accident. Major Fig- j 7- — Interior, W.B.C. Hive.

Hruschka's little son chanced to have in his hand a bit of unsealed comb-honey in a basket to which was attached a piece of string, and, as the boy playfully whirled the basket round in the air, his father noticed a few drops of honey,

Fig. 16.— Exterior, W.B.C. Hive.

Fig. 18. — Hruschka Extractor.

(Redrawn from the A B C oj Bee-Culture, published bv the A. I. Root Co., Medina, Ohio, U.S.A.)

thrown out of the comb by the centrifugal force employed to keep the basket suspended. The value of the idea at once struck him; he set to work on utilizing the principle involved, and ere long had constructed a machine admirably adapted to serve its purpose. Since that time changes, of more or less value, have

been introduced to meet present-day requirements. One of the first to take ad- vantage of Hruschka's in- vention was Mr A. I. Root, who in 1869 perfected a machine on similar lines to the Hruschka one but em- bodying various improve- ments. This appliance, known as the " Novice Honey Extractor," became very popular in the United States of America, but it had the fault of wasting tine in removing the combs for reversing after one side had been emptied of its contents. A simple form of machine for extracting honey by centrifugal force was

brought to notice in England in 1875, and was soon improved upon, as will be seen in fig. 19, which shows a section of one of the best English machines at that time. Various plans were tried in America to improve on the " Novice " machine, and Mr T. W. Cowan, who was experimenting in the same direction in England, invented in the year 1875 a machine called the " Rapid," in which the combs were reversed without removal of the cages (fig. 20) . The frame- cases — wired on both sides — are hung at the angles of a revolving ring of iron, and the reversing process is so simple and effective that the " Cowan " reversible frame has been adopted in all the best machines both in Great Britain and in America

The latest form of honey extractor used in America is that known as the " Four-frame Cowan." Fig. 21 shows the working part or inside of the appliance. In this, and indeed in all extractors used in large apiaries, the " Cowan " or re- versible frame principle is used. Each of the four cages in which the combs are placed is swung Fig. 19.— Diagram of the Raynor on a pivot attached to the side, Extractor. and whcn the outer fac£S of tne

A, Section of extractor.

00

combs are emptied the cages are reversed without removal from the machine for emptying the opposite sides of combs. The further development of the honey extractor has of late been limited to an increase in the size of machine used, in , e order to save time and manual

C, Perpendicular section of side labour, and thus meet the re-

wb, wn,

CO,

10,

P, c, cb,

Fixing rail.

Frame for cage.

Metal webbing.

Wire netting.

Comb.

Wire bottom.

Pivot.

Stiffening cone.

Coned bottom.

Gutter.

of cage enlarged. oc, Outer casing. wb, Metal webbing. wn, Wire netting.

(From Cheshire's Bees and Bee-keeping, Scientific and Practical.)

quirements of the largest honey producers, who extract honey by the car load. Some of the largest machines — propelled by motor power — are capable of taking eight or more frames at one time. It may also be claimed for the honey extractor that it does away with the objection entertained by many persons to the use of honey, by enabling the apiarist to remove his produce from the honey-combs in its purest form untainted by crushed brood and untouched by hand.

founds' Von.

Next in importance, to bee-keepers, is the enormous advance made in late years through the invention of a machine for manufacturing the impressed wax sheets known as " comb foundation," aptly so named, because upon Comb it the bees build the cells wherein they store their food. We need not dwell upon the evolution from the crude idea, which first took form in the endeavour to compel beesto build straight combs in a given direction by offering them a guiding line of wax along the under side of each top-bar of the frame in which the combs were built; but we may glance at the more important improvements which gradually developed as time went on. In 1843 a German bee-keeper, Krechner by name, con- ceived the idea of first dipping fine linen into molten wax, then pressing the sheets so made be- tween rollers, and thus forming a waxen midrib on which the bees would build their combs. This experiment was partially successful, but the in- stinctive dislike of bees

to anything of a fibrous __ _

nature caused them com- ˆ

pletely to spoil their work Fig. 20.-Cowan s rapid Extractor, of comb-building in the endeavour to tear or gnaw away the linen threads whenever they got in touch with them. In 1857 Mehring (also a German) made a further advance by the use of wooden moulds for casting sheets of wax im- pressed with the hexagonal form of the bee-cell. These sheets were readily accepted by the bees, and afterwards plates cast from metal were employed, with so good a result as to give to the bees as perfect a midrib as that of natural comb with the deep cell walls cut away. Fig. 22 shows a portion of one of these metal plates with worker-cells of natural size, i.e. five cells to the inch. Thus Mehring is justly claimed as the originator of comb-foundation, though the value of his invention was less eagerly taken advantage of even in Germany than its merits deserved. Probably it was ahead of the times, for not until nearly twenty years later was any prominence given to it, when Sanuel Wagner, founder and editor of the American Bee Journal, became impressed with Mehring's invention and warmly advocated it in his paper. Mr Wagner first con- ceived the idea of adding slightly raised side walls to the hexagonal outlines of the cells, by means of which the bees are supplied with the material for building out one-half or more of the complete cell walls or sides. The manifest advan- tage of this was at once realized by practical Ameri- can apiarists as saving labour to the bees and money to the bee-keeper. One of the first

Fig. 21. — Cowan's four-frame Extractor; interior.

(Redrawn from the A B C oj Bee-Culture, to recognize its value Was Mr published by the A. I. Root Co., Medina,

A. I. Root, of Medina, Ohio, ohio ' VSA ->

who suggested the substitution of embossed rollers in lieu of flat plates, in order to increase the output of foundation and lessen its cost to the bee-keeper. He lost no time in giving practical shape to his views, and mainly through the inventive genius of a skilled machinist (Mr A. Washburn) the A. I. Root Co. constructed a roller press (fig. 23) for producing foundation in sheets. This form of machine came

into extensive use in the United States of America and after- wards in Great Britain. The first roller press was made by the A. I. Root Co.

and imported by Mr William Raitt, a Scottish bee-keeper of repute in Perthshire, N.B. In all roller machines used at that time the plain sheets of wax were first made by the " dipping " process, i.e. by repeated dippings of

damped boards in

WP 1

•a .1 ˆiiˆlˆrt

p

molten wax (kept in liquid condition in tanks immersed in hot water) until the sheet was of suitable thickness for the pur- pose. The prepared sheets were then passed through the rollers, and after being cut out and trimmed were ready for use.

Owing to the enor- mous demand for comb-foundation at that time various devices were tried with the view of securing (i) more rapid production, and (2) a foundation thin enough to be used in surplus chambers when working for comb-honey intended for table use. Foremost among the able men who experimented in this latter direction was Mr F. B. Weed, a skilful American machinist, who, after some years of strenuous effort, succeeded in devising and perfecting special rollers and dies, by the use of which foundation was produced with a midrib so thin as to compare favourably with natural comb built by the bees. " Dipping," however, proved not only a stumbling-block to speed but to the production of continuous sheets of wax; and in the end Mr Weed, acting in concert with Mr A. I. Root (who

Fig. 22. — Portion of a type-metal plate — i.e. form of Comb Midrib (five cells to the inch).

(From Cheshire's Bees and Bee-keeping, Scientific and Practical)

Fig. 23. — Foundation Machine.

(From Cheshire's Bees and Bee-keeping, Scientific and Practical)

placed the resources of his enormous factory at his disposal), devised and perfected machinery — driven by motor power — for manufacturing foundation by what is known as the " Weed " process. By this process " dipping " is abolished, and in its latest form sheets of wax of any length are produced, passed between engraved rollers

6 in. in diameter, cut to given lengths, trimmed, counted and paper-tissued ready for packing, at a rate of speed previously undreamt of.

Practical Management of Bees. — Among the world of insects

the honey-bee stands pre-eminent as the most serviceable to mankind; from the day on which the little labourer leaves its home for the first time in search of food, its mission is un- doubtedly useful. Launched upon an unknown world, and guided by unerring instinct to the very flowers it seeks, the bee fertilizes fruit and flowers while winging its happy flight among the blossoms, gathering pollen for the nurslings of its own home and honey for the use of man. Nothing seems to be lost, nor can any part of the bee's work be accounted labour in vain; the very wax from which the insect builds the store-combs for its food and the cells in which its young are hatched and reared is valuable to mankind in many ways, and is regarded to-day no less than in the past ages as an important commercial product. The hive bee is, moreover, the only insect known to be capable of domestication, so far as labouring under the direct control of the bee-master is concerned, its habits being admirably adapted for embodying human methods of working for profit in our present-day life.

In dealing with the practical side of apiculture it will not be necessary to do more than mention the salient points to be considered by those desirous of acquiring more complete know- ledge of the subject. Authoritative text-books specially written for the guidance of bee-keepers are numerous and cheap, and on no account should any one engage in an attempt to manage bees on modern lines without a careful perusal of one or more of these. Bearing this in mind the reader will understand that so much of the natural history of the honey-bee as is necessary for eluci- dating the practical part of our subject may be comprised in (1) the life of the insect, (2) its mission in life, and (3) utilizing to the utmost the brief period during which it can labour before being worn out with toil.

A prosperous bee-colony managed on modern lines will in the height of summer consist of three kinds of bees: a queen or mother-bee, a certain number of drones, and from 80,000 to 100,000 workers. With regard to sex, the queen is a fully-developed female, the drones are males and the workers may be termed neuters or partially developed females. These last possess ovaries like the queen, but shrunken and aborted so as to render the insect normally incapable of egg- production. The relative import- ance of the three kinds of bees differs greatly in degree and in somewhat curious fashion. For

in- stance, the queen (or ‘ by our forefathers) is

Sex of

bees.

Loss 0/ queens.

a Dc

Fig. 24. — Hive bee (Apis mellifica). a, Worker; b, queen; c, drone. (From Cheshire’s Bees and Bee-keeping, Scientific and Practical)

king ” of the hives as it was termed of paramount importance at certain seasons, her death or disablement during the period when the male element is absent meaning extinction of the whole colony. Fecundation would under such conditions be impossible, and without this the eggs of a resultant queen will produce nothing but drones. During the summer season, however (from May to July), when drones are abundant, the loss of a queen is of comparatively little moment, as the workers can transform eggs (or young larvae not more than three days old), which would in the ordinary course produce worker bees, into fully-developed queens, capable of fulfilling all the maternal duties of a mother-bee. The value of this wonderful provision of nature to the bee-keeper of to-day may be estimated from the fact that bees managed according to modern methods are necessarily subject to so much manipulating or handling, that fatal accidents are as likely to happen in bee-life as among human beings.

Authorities differ with regard to the age during which the queen-bee is useful to the bee-keeper who works for profit. Under normal conditions the insect will live for three, four or sometimes five years, but the stimulation given, together with

the high-pressure system followed in modern bee-management, exhausts the period of her greatest fecundity in two years, so that queens are usually superseded after their second season has expired and egg-production gradually decreases. This can hardly cause wonder if it is borne in mind that for many weeks during the height of the season a prolific queen will deposit eggs at the rate of from two to three thousand every twenty-four hours.

Drones (or male bees) are more or less numerous in hives according to the skill of the bee-keeper in limiting their pro- duction. It is admitted by those best able to judge droae tnat tne proportion of about a hundred drones in each hive is conducive to the prosperity of the colony, but beyond that number they are worse than useless, being non- producers and heavy consumers. Thus in times of scarcity, which are not infrequent during the early part of the season, they become a heavy tax upon the food-supply of the colony at the critical period when brood-rearing is accelerated by an abundance of stores, while shortness of food means a falling- off in egg-production. The modern bee-keeper, therefore, allows just so much drone comb in the hive as will produce a sufficient number of drones to ensure queen-mating, while affording to the bees the satisfaction of dwelling in a home equipped according to natural conditions, and containing all the elements necessary to bee-life. The action of the bees themselves makes this point clear, for when the season of mating is past the drone is no longer needed, the providing of winter stores taking first place in the economy of the hive. So long as honey is being gathered in plenty drones are tolerated, but no sooner does the honey harvest show signs of being over than they are mercilessly killed and cast out of the hive by the workers, after a brief idle life of about four months' duration. Thus the " lazy yawning drone," as Shakespeare puts it, has a short shrift when his usefulness to the community is ended.

*Finally we have the aptly named worker-bee, on whom devolves the entire labour of the colony. The worker-bee is incapable of egg-production and can therefore take no part in Th * the perpetuation of its species, so that individually its*

value to the community is infinitesimal. Yet it forms an item in a commonwealth, the members of which are in all respects equally well endowed. They are in turn skilled scientists, architects, builders, artisans, labourers and even scavengers; but collectively they are the rulers on whom the colony depends for the wonderful condition of law and order which has made the bee-community a model of good government for all mankind. Then so far as regards longevity, the period of a worker-bee's existence is not measured by number- fabees ' n S ' ts ^ a y s ^ ut s i m Ply by wear and tear, the marvellous intricacy and wonderful perfection of its framework being so delicate in construction that after six or seven weeks of strenuous toil, such as the bee undergoes in summer time, the little creature's labour is ended by a natural death. On the other hand, worker-bees hatched in the autumn will seven months later be strong with the vigour of lusty youth; able to take their full share in the labour of the hive for six

weeks or more in the early spring, which is the most critical period in the colony's existence; hence the value to the apiarist of bees hatched in the autumn.

The mission of the worker-bee is work ; not so much for itself as for the younger members of the community to which it belongs. We cannot claim for it the virtue of strict honesty with regard to the stranger, but for its own " kith and kin " it is a model of socialism in an ideal form, possessing nothing of its own yet toiling unceasingly for the good of all. The increasing warmth of each recurring spring finds the bee awake, and full of eagerness to be up and doing; its sole mission being apparently to accom- plish as much work as possible while life lasts. The earliest pollen is sought out from far and near, and has its immediate effect upon the mother bee of the colony. If healthy and young she begins egg-laying at once, and brood-rearing proceeds at an ever-increasing rate as each week passes, until the hive is brimming over with bees in time for the first honey flow. Then

worker- bee.

comes the almost human foresight with which the bee prevents the inevitable chaos created by an overcrowded home. There is no cell-room either for storing the abundant supply of food constantly being brought in, or for the thousands of eggs which a prolific queen will produce daily as a consequence of general prosperity; therefore unless help comes from without an exodus is prepared for, and what is known as " swarming " takes place.

It would be difficult to imagine anything more exhilarating to a beginner in bee-keeping than the sight of his first hive in the act of swarming. The little creatures are seen rushing in frantic haste from the hive like a living t „ stream, filling the air with ever-increasing thousands of bees on the wing. The incoming workers returning pollen-laden from the fields, carried away by the prevailing excitement, do not stop to unload their burdens in the old home, but join the enthusiastic emigrants, tumbling over each other pell-mell in the outrush; among them the queen of the colony will in due course have taken her place, bound like her children for a new home. It soon becomes apparent to the onlooker when the queen has joined the flying multitude of bees in the air, for they are seen to be closing up their ranks, and in a few moments begin to form a solid cluster, usually on the branch of a small tree or bush close to the ground. When this stage of swarming is reached the bee-keeper has but to take his hiving skep, hold it under the swarm, and shake the bees into it, preparatory to trans- ferring them into a frame-hive already

*prepared for their re- ception. The process of hiving a swarm is very simple and need not occupy many moments of time under *Zanns. ordinary conditions, but so many unlooked-for con- tingencies may arise that the apiarist would do well to prepare himself beforehand by carefully reading the directions in his text-book.*

The illustration given in fig. 25 will serve more readily than words to enlighten the would-be bee-keeper. It shows a portion of honeycomb (natural size) not precisely as it appears when the frame containing it is lifted out of the hive, but as would be seen on two or more combs in the same hive, namely, the various cells built for — and occupied by — queens, drones and workers; also the larvae or grubs in the various stages of transformation

P

■ymwm

1 ^»' !Aii*

Fig. 25. — Honeycomb, Metamorphoses of the Honey Bee.

(From Cheshire's Bees and Bee-keeping, Scientific and Practical)

from egg to perfect insect, with the latter biting their way out of sealed cells. It also shows sealed honey and pollen in cells, &c. To familiarize himself with the various objects depicted, all of which are drawn from nature, will not only help the reader to understand the different phases of bee-life during the swarm- ing season, but tend to increase the interest of beginners in the pursuit. "Early drones, early swarms" was the ancient bee-man's favourite adage, and the skilled apiarist of to-day

experiences the same pleasurable thrill as did the skeppist of old at the sight of the first drone of the year, which betokens an early swarm. As the drones increase in number queen-cells are formed, unless steps be taken to turn aside the swarming impulse by affording additional room beforehand in the hive. The above brief outline of the guiding principles of natural swarming is merely intended as introductory to the fuller information given in a good text-book.

Management of^an Apiary. — The main consideration in estab-

lishing an apiary is to secure a favourable location, which means a place where honey of good marketable quality may be gathered from the bee-forage growing around without any planting on the part of the bee-keeper himself. It is impossible to deal here with the varying conditions under which apiculture is carried on in all parts of the world, but, as a rule, the same principle applies everywhere. The bee industry prospers greatly

in America, where amid the vast stretches of mountain f e ” eia anc ˆ can y° n m California the bee-forage extends for the U.S.A. miles without a break, and the climatic conditions*

are so generally favourable as to reduce to a minimum the cnances of the honey crop failing through adverse weather.

The bee-keeper’s object is to utilize to the utmost the brief space of a worker-bee’s life in summer, by adopting the best methods in vogue for building up stocks to full strength before the honey-gathering time begins, and preparing for it by the exercise of skill and intelligence in carrying out this work.

In the United Kingdom there is a difference of several weeks in the honey season between north and south. Swarming usually begins in May in the south of England, and in mid- July in the north of Scotland, the issue of swarms coinciding with the early part of the main honey flow. The weather is naturally more precarious in autumn than earlier in the year, and chances of success proportionately smaller for northern bee-men, but the disadvantage to the latter is more than compensated for by the heather season, which extends well into September. With regard to the British bee-keeper located in the south,

the early fruit crop is what concerns him most, and Va tf”n ° f wnere pollen (the fertilizing dust of flowers) is plentiful P ° “”’ his bees will make steady progress. If pollen is scarce, a substitute in the form of either pea-meal or wheaten flour must be supplied to the bees, as brood-rearing cannot make headway without the nitrogenous element indispensable in the food on which the young are reared. But the main honey-crop of both north and south is gathered from the various trifoliums,

among which the white Dutch or common clover lfbel- ee ” (Trifolium repens) is acknowledged to be the most plants. important honey-producing plant wherever it grows.

In the United States, Canada, Australia, New Zealand and in many other parts of the world honey of the finest quality is obtained from this " queen of bee-plants," and in lesser degree from other clovers such as sainfoin, alsike (a hybrid clover), trefoil, &c.

Before undertaking the management of a modern apiary, the bee-keeper should possess a certain amount of aptitude for the pursuit, without which it is hardly possible to succeed. He must also acquire the ability to handle bees judiciously and well under all imaginable conditions. In doing this it is needful to remember that bees resent outside interference with either their work or their hives, and will resolutely defend themselves when aroused even at the cost of life itself. Experience has also proved that, when alarmed, bees instinctively begin to fill their honey-sacs with food from the nearest store-cells as a safeguard against contingencies, and when so provided they are more amenable to interference. The bee-keeper, therefore, by the judicious application of a little smoke from smouldering fuel, blown into the hive by means of an appliance known as a bee- smoker, alarms the bees and is thus able to manipulate the frames of comb with ease and almost no disturbance. The smoker (fig. 26) devised by T. F. Bingham of Farwell, Michigan, U.S.A., is the one most used in America and in the United Kingdom. No other protection is needed beyond a bee-veil of fine black net, which slipped over a wide-brimmed straw hat protects the

face from stings when working among bees; as experience is gained the veil is not always used. The man who is hasty and nervous in temperament, who fears an occasional sting, and resents the same by viciously killing the bee that inflicts it will rarely make a good apiarist. The methods of handling bees vary in different countries, this being in a great measure accounted for by the number of hives kept. Very few apiaries in the United Kingdom contain more than a hundred hives; consequently the British bee-keeper has no need for employing the forceful or " hustling " methods found necessary in America, where the honey-crop is gathered in car-loads and the British hives numbered by thousands. It naturally follows and that bee-life is there regarded very slightly by com- Am eˆ a parison, and the " bee-garden " in England becomes the " bee-yard " in America, where the apiarist when at work must thoroughly protect himself from being stung, and, safe in his immunity from damage, cares little for bee-life in getting through his task, the loss of a few hundred bees being considered of no account. There are, however, other reasons, apart from humanity, to account for the difference in handling bees as advocated in the United Kingdom. The great majority of apiaries owned by British bee-keepers are located in close proximity to

neighbours; consequently a serious upset among the bees would in many cases in- volve an amount of trouble which should if possible be avoided; therefore quietness and the exer- cise of care when manipulating are always recommended by teachers, and practised by those who wisely take their lessons to heart.

Having made himself proficient in practical bee-work and chosen a suitable location for his apiary, the bee-keeper should carefully select the par- ticular type of hive most suited to his means and requirements. This point settled, uniformity is a ° °ation. secured, and all loose parts of the hives being interchangeable time will be saved during the busy season when time means money. Beginning with not too many stocks he can test the capabilities of his location before investing much capital in the undertaking, so that by utilizing the information already given and adopting the wise adage " make haste slowly " he will realize in good time whether it will pay best to work for honey in comb or extracted honey in bulk; not only so, but the knowledge gained will enable him to select such appliances as are suited to his needs. As a rule, it may be said that the man content to start with an apiary of moderate size — say fifty stocks — may jgg"f e r ep ~ realize a fair profit from comb-honey only; but so profit. limited a venture would need to be supplemented by some other means before an adequate income could be secured. On the other hand, the owner of one or two hundred colonies would find it more lucrative to work for extracted honey and send it out to wholesale buyers in that form. By 30 doing a far greater weight of surplus per hive may be secured, and extracted honey will keep in good condition for years, while comb-honey must be sold before granulation sets in. At the same time it is but fair to say that bee-culture in the United Kingdom, if limited to honey-production alone, is not sufficiently safe for entire reliance to be placed on it for obtaining a livelihood. The uncertain climate renders it necessary to include either other branches of the craft less dependent on warmth and sunshine, or to combine it with fruit-growing, poultry-rearing, &c. Under such conditions the bees will usually occupy a good position in the balance-sheet.

Another indispensable feature of good bee-management is "forethought," coupled with order and neatness; the rule of

Fig. 26. — Bee-Smoker.

(Redrawn from the A B C of Bee- Culture, published by (he A. I. Root Co., Medina, Ohio, U.S.A.)

” a place for everything and everything in its place ” prepares the bee-keeper for any emergency; constant watchfulness is

also necessary, not only to guard against disease in Need of ˆis hives, but to overlook nothing that tends to be of ‘thought. advantage to the bees at all seasons. Among the many

ways of saving time nothing is more useful than a carefully-kept note-book, wherein are recorded brief memoranda regarding such items as condition of each stock when packed for winter, amount of stores, age and prolific capacity of queen, strength of colony, healthiness or otherwise, &c, all of which particulars should be noted and the hives to which they refer plainly numbered. It also enables the bee-keeper to arrange his day’s work indoors while avoiding disturbance to such colonies as do not need interference. In the early spring stores must be seen to and replenished where required; breeding stimulated when pollen begins to be gathered; and appliances cleaned and prepared for use during the busy season.

The main honey-gathering time (lasting about six or seven weeks) is so brief that in no pursuit is it more important to

” make hay while the sun shines,” and if the bee-keeper Length of needs a rerrnn der of this truism he surely has it in the bee season. example get by nis bces _ As t he season advances and

the flowers yield nectar more freely, visible signs of comb- building will be observed in the whitened edges of empty cells in the brood-chambers; the thoughtful workers are lengthening out the cells for honey-storing, and the bee-master takes the hint by giving room in advance, thus lessening the chance of undesired swarms. In other words, order and method, combined with the habit of taking time by the forelock, are absolutely necessary to the bee-keeper, seeing that the enormous army of ‘workers under his control is multiplying daily by scores of thousands. As spring merges into summer, sunny days become more frequent; the ever-increasing breadth of bee- forage yields still more abundantly, and the excitement among the labourers crowding the hives increases, rendering room in advance, shade and ventilation, a sine qua non. It requires a level head to keep cool amongst a couple of hundred strong stocks of bees on a hot summer’s day in a good honey season.

Moreover, it will be too late to think of giving ventila- Swarm tion at noo ntide, when the temperature has risen to Ooa e ”’ 8o ° F – in the shade ; the necessary precautions for

swarm prevention must therefore be taken in advance, for when what is known as the ” swarming fever ” once starts it is most difficult to overcome.

The well-read and intelligent bee-keeper, content to work on orthodox lines, will be able to manage an apiary— large or small— by guiding and controlling the countless army he commands in a way that will yield him both pleasure and profit. All he needs is good bee weather and an apiary free from disease to make him appreciate bee-craft as one of the most remunerative of rural industries; affording a wholesome open-air life conducive to good health and yielding an abundance of contentment.

Diseases of Bees.— It is quite natural that bees living in colonies should be subject to diseases, and only since the intro- duction of movable-comb hives has it been possible to learn something about these ailments. The most serious disease with which the bee-keeper has to contend is that commonly known as ” bee-pest ” or ” foul brood,” so called because of the young brood dying and rotting in the cells. This disease has been known from the earliest ages, and is probably the same as that designated by Pliny as blapsigonia (Natural Histc-y, bk. xi. ch. xx.). Coming to later times, Delia Rocca minutely describes a disease to which bees were subject in the island of Syra, between the years 1777 and 1780, and through which nearly every colony in the island perished. From the description given it was undoubtedly foul brood, and the bee-keepers of the island became convinced, after bitter experience, that it was extremely contagious. Schirach also mentioned and described the disease in 1769, and was the first to give it the name of ” foul brood.” Still later, in 1874, Dr Cohn, after the most exhaustive experi- ments and bacteriological research, realized that the disease was caused by a bacillus, and— nine years later— the name Bacillus

alvei was given to it by Cheyne and Cheshire, whose views were in agreement with those of Dr Cohn.

The illustration (fig. 27) shows a portion of comb affected with foul brood in its worst form. The sealed cells are dark-coloured and sunken, pierced with irregular holes, and the larvae in all stages from the crescent-shaped healthy condition to that in which the dead larvae are seen lying at the bottom of the cells, flaccid and shapeless.

The remains then change to buff colour, afterwards turning brown, when decomposition sets in, and as the bacilli present in the dead larvae increase and the nutrient matter is consumed, the mass in some cases becomes sticky and ropy in character, making its removal impossible by the bees. In course of time it dries up, leaving nothing but a brown scale adhering to the bottom or side of the cell. In the worst cases the larvae even die after the cells are sealed over; a strong characteristic and offensive odour being developed in some phases of the disease, noticeable at times some distance away from the hive.

Two forms of foul brood have been long known, one foul smelling, the other odourless; and investigations made during 1906 and 1907 showed that the etiology of the disease is not by

SM&MS&S&F&

Fig. 27. — Foul Brood (Bacillus alvei). (From Cheshire's Bees and Bee-keeping, Scientific and Practical.)

any means simple, but that it is produced by different microbes, two others in addition to Bacillus alvei playing an important part. These are Bacillus brandenburgiensis, Maassen (syn. B. burri, Burri: B. larvae, white), and Streptococcus apis, Maassen (syn. B. Guntheri, Burri). The first two are found in both forms of foul brood, whereas the last is only present with B. alvei in the strong-smelling form of the disease, in which the larvae are attacked prior to the cells being sealed over.

The brood of bees, when healthy, lies in the combs in compact masses, the larvae being plump and of a pearly whiteness, and when quite young curled up on their sides at the base of the cells. When attacked by the disease, the larva moves uneasily, stretches itself out lengthwise in the cell, and finally becomes loose and flabby, an appearance which plainly indicates death.

When the disease attacks the larvae before they are sealed over Bacillus alvei is present, usually associated with Strepto- coccus apis, which latter imparts a sour smell to the dead brood. In cases where the disease is odourless the larvae are attacked after the cells are sealed over, and just before they change to pupae, when they become slimy, sputum-like masses, difficult to remove from the cells. Under these conditions Bacillus brandenburgiensis is found, although Bacillus alvei may also be present. The two bacilli are antagonistic, each striving for supremacy, first one then the other predominating.

Various other microbes are also present in large numbers, but are not believed to be pathogenic or disease-producing in character.

It is, therefore, seen that at least three different microbes play an important part in the same disease. The danger of contagion lies in the wonderful vitality of the spores, and their great resistance to heat and cold. Dr Maassen records a case where he had no difficulty in obtaining cultures from spores removed from comb's after being kept dry for twenty years. It should be

borne in mind that the disease is much easier to cure in the earlier stages while the bacilli are still rod-shaped than when the rods have turned to spores.

Since the bacterial origin of foul brood has been established, the efforts of some bacteriologists have been employed in finding a simple remedy by means of which the disease may be checked in its earliest stages, and in this an appreciable amount of success has been attained. Nor has foul brood in its more advanced forms been neglected, all directions for treatment being found in text-books written by distinguished writers on apiculture in the United Kingdom, America and throughout the European continent.

The only other disease to which reference need be made here is dysentery, which sometimes breaks out after the long confine- ment bees are compelled to undergo during severe winters. This trouble may be guarded against by feeding the bees in the early autumn with good food made from cane sugar, and housing them in well-ventilated hives kept warm and dry by suitable coverings. When bees are wintered on thin, watery food not sealed over, and are unable for months to take cleansing flights, they become weak and involuntarily discharge their excrement over the combs and hive, a state of things never seen in a healthy colony under normal conditions. The stocks of bee-keepers who attend t<5 the instructions given in text-books are rarely visited by this disease.

The above embraces all that is necessary to be said in relation to diseases, though bees have been subject to other ailments such as paralysis, constipation, &c.

In the Isle of Wight a serious epidemic broke out in 1906 which caused great destruction to bee-life in the following year. The malady

was of an obscure character, but its cause has been under investigation by the British Board of Agriculture and Fisheries, and by European bacteriologists in 1908.

Authorities. — Though in modern times a great deal has appeared in the daily newspapers on the subject, it is a notable fact that not a tithe of the wonderful things published in such articles about bees and bee-keeping is worthy of credence or possesses any real value. Indeed, a pressman possessing any technical knowledge of the subject — beyond that obtainable from books — would be a rara avis. The account given above is the result of forty years' practical experience with bees in England, the writer having for a great portion of the time been connected editorially with the only two papers in that country entirely devoted to bees and bee-keeping, The British Bee Journal (weekly, founded 1873), and Bee-keepers' Record (monthly, founded 1882), the former being the only weekly journal in the world. The following books on the subject may be consulted for further details: — Francois Huber, New Observations on the Natural History of Bees; T. W. Cowan, British Bee-keepers' Guide-Book, The Honey Bee, its Natural History, Anatomy and Physiology; Langstroth on the Honey Bee, revised by C. Dadant & Son; A. I. Root, A B C and X Y Z of Bee-culture; F. R. Cheshire, Bees and Bee-keeping; Dr Dzierzon, Rational Bee-keeping; E. Bertrand, Conduite du rucher; A. J. Cook, Manual of the Apiary; Dr C. C. Miller, Forty Years among the Bees; F. W. L. Sladen, Queen-rearing in England; S. Simmins, A Modern Bee Farm.

(W. B. Ca.)

BEECH, a well-known tree, Fagus sylvatica, a member of the order Fagaceae to which belong the sweet-chestnut (Castanea) and oak. The name beech is from the Anglo-Saxon hoc, bece or beoce (Ger. Buche, Swedish, bok), words meaning at once a book and a beech-tree. The connexion of the beech with the graphic arts is supposed to have originated in the fact that the ancient Runic tablets were formed of thin boards of beech- wood. " The origin of the word," says Prior {Popular Names of British Plants), " is identical with that of the Sanskrit boko, letter, bokos, writings; and this correspondence of the Indian and our own is interesting as evidence of two things, viz. that the Brahmins had the art of writing before they detached themselves from the common stock of the Indo-European race in Upper Asia, and that we and other Germans have received alphabetic signs from the East by a northern route and not by the Mediterranean." Beech-mast, the fruit of the beech-tree, was formerly known in England as buck; and the county of Buckingham

is so named from its fame as a beech-growing country. Buckwheat (Bucheweizen) derives its name from the similarity of its angular seeds to beech-mast. The generic name Fagus is derived from ayeiv, to eat; but the

4rrjy6s of Theophrastus was probably the sweet chestnut (Aesculus) of the Romans. Beech-mast has been used as food in times of distress and famine; and in autumn it yields an abundant supply of food to park-deer and other game, and to pigs, which are turned into beech-woods in order to utilize the fallen mast. In France it is used for feeding pheasants and domestic poultry. Well-ripened beech-mast yields from 17 to 20% of non-drying oil, suitable for illumination, and said to be used in some parts of France and other European countries in cooking, and as a substitute for butter.

The beech is one of the largest British trees, particularly on chalky or sandy soils, native in England from Yorkshire south- wards, and planted in Scotland and Ireland. It is one of the common forest trees of temperate Europe, spreading from southern Norway and Sweden to the Mediterranean. It is found on the Swiss Alps to about 5000 ft. above sea-level, and in southern Europe is usually confined to high mountain slopes; it is plentiful in southern Russia, and is widely distributed in Asia Minor and the northern provinces of Persia.

It is characterized by its sturdy pillar-like stem, often from 15 to 20 ft. in girth, and smooth olive-grey bark. The main branches rise vertically, while the subsidiary branches spread outwards and give the whole tree a rounded outline. The slender brown pointed buds give place in April to clear green leaves fringed with delicate silky hairs. The flowers which appear in May are inconspicuous and, as usual with our forest trees, of two kinds; the male, in long-stalked globular clusters, hang from the axils of the lower leaves of a shoot, while the female, each of two or three flowers in a tiny cup (cupule of bracts), stand erect nearer the top of the shoot. In the ripe fruit or mast the four-sided cupule, which has become much enlarged, brown and tough, encloses two or three three-sided rich chestnut- brown fruits, each containing a single seed. It is readily propa- gated by its seeds. It is a handsome tree in every stage of its growth, but is more injurious to plants under its drip than other trees, so that shade-bearing trees, as holly, yew and thuja, suffer. Its leaves, however, enrich the soil. The beech has a remarkable power of holding the ground where the soil is con- genial, and the deep shade prevents the growth of other trees. It is often and most usefully mixed with oak and Scotch fir. The timber is not remarkable for either strength or durability. It was formerly much used in mill-work and turnery; but

its principal use at present is in the manufacture of chairs, bedsteads and a variety of minor articles. It makes excellent fuel and charcoal. The copper-beech is a variety with copper-coloured leaves, due to the presence of a red colouring-matter in the sap. There is also a weeping or pendulous-branched variety; and several varieties with more or less cut leaves, are known in cultivation.

The genus Fagus is widely spread in temperate regions, and contains in addition to our native beech, about 1 5 other species. A variety (F. sylvatica var. Sieboldi) is a native of Japan, where it is one of the finest and most abundant of the deciduous-leaved forest trees. Fagus americana is one of the most beautiful and widely-distributed trees of the forests of eastern North America. It was confounded by early European travellers with F. sylvatica, from which it is distinguished by its paler bark and lighter green, more sharply-toothed leaves. Several species are found in Australia and New Zealand, and in the forests of southern Chile and Patagonia. The dense forests which cover the shore of the Straits of Magellan and the mountain-slopes of Tierra del Fuego consist largely of two beeches — one evergreen, Fagus bctuloides, and one with deciduous leaves, F. antarclica.

BEECHER, CHARLES EMERSON (1856-1904), American palaeontologist, was born at Dunkirk, New York, on the 9th of October 1856. He graduated at the university of Michigan in 1878, and then became assistant to James Hall in the state museum at Albany. Ten years later he was appointed to the charge of the invertebrate fossils in the Peabody Museum, New Haven, under O. C. Marsh, whom he succeeded in 1 899 as curator. Meanwhile in 1889 he received the degree of Ph.D. from Yale University for his memoir on the Brachiospongidae, a remarkable

group of Silurian sponges; later on he did good work among the fossil corals, and other groups, being ultimately regarded as a leading authority on fossil Crustacea and brachiopoda; his researches on the development of the brachiopoda, and on the Trilobites Triarthrus and Trinucleus, were especially note- worthy. In 1892 he was appointed professor of palaeontology in Yale University. He died on the 14th of February 1904.

Memoir by C. Schuchert in Amer. Joum. Science, vol. xvii., June 1904 (with portrait and bibliography).

BEECHER, HENRY WARD (1813-1887), American preacher and reformer, was born in Litchfield, Connecticut, on the 24th of June 181 3. He was the eighth child of Lyman and Roxana Foote Beecher, and brother of Harriet Beecher Stowe. Entering Amherst College in 1830, and graduating four years later, he gave more attention to his own courses of reading than to college studies, and was more popular with his fellows than with the faculty. With a patience foreign to his impulsive nature, he submitted to minute drill in elocution, and became a fluent extemporaneous speaker. Reared in a Puritan atmo- sphere, he has graphically described the mystical experience which, coming to him in his early youth, changed his whole conception of theology and determined his choice of the ministry. " I think," he says, " that when I stand in Zion and before God, the highest thing that I shall look back upon will be that blessed morning of May when it pleased God to reveal to my wondering soul the idea that it was His nature to love a man in bis sins for the sake of helping him out of them." In 1837 he graduated from Lane Theological Seminary in Ohio, of which his father was president, and entered upon his work as pastor of a missionary Presbyterian church at Lawrenceburg, Indiana, a village on the Ohio, about 20 m. below Cincinnati. The membership numbered nineteen women and one man. Beecher was sexton as well as preacher. Two years later he accepted a call to Indianapolis. His unconventional preaching shocked the more staid members of the flock, but filled the church to overflowing with people unaccustomed to churchgoing. He studied men rather than books; became acquainted with the vices in what was then a pioneer town; and in his Seven Lectures to Young Men (1844) treated these with genuine power of realistic description and with youthful and exuberant rhetoric. Eight years later (1847) he accepted a call to the pastorate of Plymouth Church (Con- gregational), then newly organized in Brooklyn, New York. The situation of the church, within five minutes' walk of the chief ferry to New York, the stalwart character of the man who had organized it, and the peculiar eloquence of Beecher, combined to make the pulpit a national platform. The audience-room of the church, capable of seating 2000 or 2500 people, frequently contained 300 or 1000 more.

Beecher at once became a recognized leader. On the all-absorb- ing question of slavery he took a middle ground between the pro-slavery or peace party, and abolitionists like William Lloyd Garrison and Wendell Phillips, believing, with such statesmen as W. H. Seward, Salmon P. Chase, and Abraham Lincoln, that slavery was to be overthrown under the constitution and in the Union, by forbidding its

growth and trusting to an awakened conscience, enforced by an enlightened self-interest. He was always an anti-slavery man, but never technically an abolitionist, and he joined the Republican party soon after its organization. In the earlier days of the agitation, he challenged the hostility which often mobbed the anti-slavery gatherings; in the later days he consulted with the political leaders, inspiring the patriotism of the North, and sedulously setting himself to create a public opinion which should confirm and ratify the emancipation proclamation whenever the president should issue it. When danger of foreign intervention cast its threatening shadow across the national path, he went to England, and by his famous addresses did what probably no other American could have done to strengthen the spirit in England favourable to the United States, and to convert that which was doubtful and hostile. In 1861-1863 he was the editor-in-chief of the Independent, then a Congregational journal; and in his editorials, copied far and wide, produced a profound impression on the

public mind by clarifying and defining the issue. Later (in 1870) , he founded and became editor-in-chief of the Christian Union, afterwards the Outlook, a religious undenominational weekly. His lectures and addresses had the spirit if not the form of his sermons, just as his sermons were singularly free from the homiletical tone. Yet his work as a reformer was subsidiary to his work as a preacher. He was not indeed a parish pastor; he inspired church activities which grew to large proportions, but trusted the organization of them to laymen of organizing abilities in the church; and for acquaintance with his people he depended on such social occasions as were furnished in the free atmosphere of this essentially New England church at the close of every service. But during his pastorate the church grew to be probably the largest in membership in the United States.

It was in the pulpit that Beecher was seen at his best. His mastery of the English tongue, his dramatic power, his instinctive art of impersonation, which had become a second nature, his vivid imagination, his breadth of intellectual view, the catholicity of his sympathies, his passionate enthusiasm, which made for the moment his immediate theme seem to him the one theme of transcendent importance, his quaint humour alternating with genuine pathos, and above all his simple and singularly un- affected devotional nature, made him as a preacher without a peer in his own time and country. His favourite theme was love: love to man was to him the fulfilment of all law; love of God was the essence of all Christianity. Retaining to the day of his death the forms and phrases of the New England

theology in which he had been reared, he poured into them a new meaning and gave to them a new significance. He probably did more than any other man in America to lead the Puritan churches from a faith which regarded God as a moral governor, the Bible as a book of laws, and religion as obedience to a conscience to a faith which regards God as a father, the Bible as a book of counsels, and religion as a life of liberty in love. The later years of his life were darkened by a scandal which Beecher's personal, political and theological enemies used for a time effectively to shadow a reputation previously above reproach, he being charged by Theodore Tilton, whom he had befriended, with having had improper relations with his (Til ton's) wife. But in the midst of these accusations (February 1876), the largest and most representative Congregational council ever held in the United States gave expression to a vote of confidence in him, which time has absolutely justified. Not a student of books nor a technical scholar in any department, Beecher's knowledge was as wide as his interests were varied. He was early familiar with the works of Matthew Arnold, Charles Darwin and Herbert Spencer; he preached his Bible Studies sermons in 1878, when the higher criticism was wholly unknown to most evangelical ministers or known only to be dreaded; and his sermons on Evolution and-Religion in 1885, when many of the ministry were denouncing evolution as atheistic. He was stricken with apoplexy while still active in the ministry, and died at Brooklyn on the 8th of March 1887, in the seventy-fourth year of hi? age.

The principal books by Beecher, besides his published sermons, are: Seven Lectures to Young Men (1844); Plymouth Collection of Hymns and Tunes (1855); Star Papers, Experiences of Art and Nature (1855); Life Thoughts (1858); New Star Papers; or Views and Experiences of Religious Subjects (1 859) ; Plain and Pleasant Talks about Fruits, Flowers and Farming (1859) ; American Re- bellion, Report of Speeches delivered in England at Public Meetings in Manchester, Glasgow, Edinburgh, Liverpool, and London (1864) ; Prayers from Plymouth Pulpit (1867); Norwood: A Tale of Village Life in New England (1867); The Life of Jesus the Christ (1871), completed in 2 vols., by his sons (1891); and Yale Lectures on Preaching (3 vols., 1872-1874).

The principal lives are: Noyes L. Thompson, The History of Plymouth Church (1 847-1 872); Thomas W. Knox, The Life and Work of Henry Ward Beecher (Hartford, Conn., 1887); Frank S. Child, The Boyhood of Henry Ward Beecher (Pamphlet, New Creston, Conn., 1887); Joseph Howard, Jr., Life of Henry Ward Beecher (Philadelphia, 1887); T. W. Hanford, Beecher: Christian Philo-

sopher, Pulpit Orator, Patriot and Philanthropist (Chicago, 1887); Lyman Abbott and S. B. Halliday, Henry Ward Beecher: A Sketch of His Career (New York, 1887); William C. Beecher, Rev. Samuel Scoville and Mrs H. W. Beecher, .4 Biography of Henry Ward Beecher (New York, 1888) ; John R. Howard, Henry Ward Beecher:

A Study (1891); John Henry Barrows, Henry Ward Beecher (New York, 1893); and Lyman Abbott, Henry Ward Beecher (Boston, 1903). ‘ (L- A.)

BEECHER, LYMAN (1775-1863), American clergyman, was born at New Haven, Connecticut, on the 12th of October 1775. He was a descendant of one of the founders of the New Haven colony, worked as a boy in an uncle’s blacksmith shop and on his farm, and in 1797 graduated from Yale, having studied theology under Timothy Dwight. He preached in the Presby- terian church at East Hampton, Long Island (1 798-1810, being ordained in 1799); in the Congregational church at Litchfield, Connecticut (1810-1826),, in the Hanover Street church of Boston (1826-1832), and in the Second Presbyterian church of Cincinnati, Ohio (1833-1843); was president of the newly established Lane Theological Seminary at Walnut Hills, Cincin- nati, and was professor of didactic and polemic theology there (183 2- 1 8 50), being professor emeritus until his death. At Litchfield and in Boston he was a prominent opponent of the growing ” heresy ” of Unitarianism, though as early as 1836 he was accused of being a ” moderate Calvinist ” and was tried for heresy, but was acquitted. Upon his resignation from Lane Theological Seminary he lived in Boston for a short time, devoting himself to literature; but he broke down, and the last ten years of his life were spent at the home of his son, Henry Ward Beecher, in Brooklyn, New York, where he died on the 10th of January 1863. Magnetic in personality, incisive and powerful in manner of expression, he was in his prime one of the most eloquent of American pulpit orators. In 1806 he preached a widely circulated sermon on duelling, and about 1814 a series of six sermons on intemperance, which were reprinted frequently and greatly aided temperance reform. Thrice married, he had a large family, his seven sons becoming Congregational clergymen, and his daughters, Harriet Beecher Stowe (q.v.) and Catherine Esther Beecher, attaining literary distinction.

Lyman Beecher’s published works include: A Plea for the West

(1835), Views in Theology (1836), and various sermons; his Collected Works were published at Boston in 1852 in 3 vols. Consult his Autobiography and Correspondence (2 vols., New York, 1863-1864), edited by his son Charles ; D. H. Alien, Life and Services of Lyman Beecher (Cincinnati, 1863); and James C. White, Personal Reminis- cences of Lyman Beecher (New York, 1882).

His daughter, Catherine Esther (1800-1878), was born at East Hampton, Long Island, on the 6th of September 1800. She was educated at Litchfield Seminary, and from 1822 to 1832 conducted a school for girls at Hartford, Connecticut, with her sister Harriet's assistance, and from 1832 to 1834 conducted a similar school in Cincinnati. She wrote and lectured on women's education and in behalf of better primary schools, and radically opposed woman suffrage and college education for women, holding woman's sphere to be domestic. The National Board of Popular Education, a charitable society which she founded, sent hundreds of women as teachers into the South and West. She died on the 12th of May 1878 in Elmira, New York. She published An Essay on Slavery and Abolition with Reference to the Duty of American Females (1837), A Treatise on Domestic Economy (1842), The True Remedy for the Wrongs of Women (1851), Letters to the People on Health and Happiness (1855), The Religious Training of Children (1864), and Woman's Profession as Mother and Educator (1871).

His son, Edward Beecher (1803-1895), was born at East Hampton, Long Island, on the 27th of August 1803, graduated at Yale in 1822, studied theology at Andover, and in 1826 became pastor of the Park Street church in Boston. From 1830 to 1844 he was president of Illinois College, Jacksonville, Illinois, and subsequently filled pastorates at the Salem Street church, Boston (1844-1855), and the Congregational church at Galesburg, Illinois (1855-1871). He was senior editor of the Congrega- tionalist (1849-1855), and an associate editor of the Christian Union from 1870. In 1872 he settled in Brooklyn, New York, where in 1S85-1889 he was pastor of the Parkville church and where he died on the 28th of July 1895. He wrote Addresses on the Kingdom of God (1827), History of the Alton Riots (1837), .it'itement of Anti-Slavery Principles (1837), Baptism, its Import

and Modes (1850), The Conflict of Ages (1853), The Papal Con- spiracy Exposed (1855), The Concord of Ages (i860), and History of Opinions on the Scriptural Doctrine of Future Retribution{i&i%) .

Charles Beecher (1815-1900), another of Lyman's sons, was born at

Litchfield, Connecticut, on the 7th of October 181 5. He graduated at Bowdoin College in 1834, and subsequently held pastorates at Newark, New Jersey (1851-1857), and Georgetown, Massachusetts; and from 1870 to 1877 lived in Florida, where he was state superintendent of public instruction in 1871-1873. He died at Georgetown, Massachusetts, on the 21st of April 1900. He was an accomplished musician, and assisted in the selection and arrangement of music in the Plymouth Collection of Hymns and Tunes. He wrote David and His Throne (1855), Pen Pictures of the Bible (1855), Redeemer and Redeemed (1864), and Spiritual Manifestations (1879).

Thomas Kinnictjtt Beecher (1824-1900), another son, bora at Litchfield, Connecticut, on the 10th of February 1824, was pastor of the Independent Congregational church (now the Park church), at Elmira, New York, one of the first institutional churches in the country, from 1854 until his death at Elmira on the 14th of March 1900. He wrote Our Seven Churches (1870).

BEECHEY, FREDERICK WILLIAM (1796-1856), English naval officer and geographer, son of Sir William Beechey, R.A., was born in London on the 17th of February 1796. In 1806 he entered the navy, and saw active service during the wars with France and America. In 18 18 he served under Lieutenant (afterwards Sir) John Franklin in Buchan's Arctic expedition, of which at a later period he published a narrative; and in the following year he accompanied Lieutenant W. E. Parry in the " Hecla." In 182 1 he took part in the survey of the Mediter- ranean coast of Africa under the direction of Captain, afterwards Admiral, William Henry Smyth. He and his brother Henry William Beechey, made an overland survey of this coast, and published a full account of their work in 1828 under the title of Proceedings of the Expedition to Explore the Northern Coast of Africa from Tripoly Eastward in 1821-1822. In 1825 Beechey was appointed to command the " Blossom," which was intended to explore Bering Strait, in concert with Franklin and Parry operating from the east. He passed the strait and penetrated as far as 71° 23′ 31″ N., and 156 21′ 30″ W., reaching a point only 146 m. west of that reached by Franklin's expedition from the Mackenzie river. The whole voyage lasted more than three years; and in the course of it Beechey discovered several islands in the Pacific, and an excellent harbour near Cape Prince of Wales. In 1831 there appeared his Narrative of a Voyage to the Pacific and Bering's Strait to Co-operate with the Polar Expedi- tions, 182 5-1828. In 1835 and the following year Captain Beechey was employed on the coast survey of South America, and from 1837 to 1847 carried on the same work

along the Irish coasts. He was appointed in 1850 to preside over the Marine Depart- ment of the Board of Trade. In 1854 he was made rear-admiral, and in the following year was elected president of the Royal Geographical Society. He died on the 29th of November 1856.

BEECHEY, SIR WILLIAM (1753-183°), English portrait- painter, was born at Burford. He was originally meant for a conveyancer, but a strong love for painting induced him to become a pupil at the Royal Academy in 1772. Some of his smaller portraits gained him considerable reputation; he began to be employed by the nobility, and in 1703 became associate of the Academy. In the same year he was made portrait-painter to Queen Charlotte. He painted the portraits of the members of the royal family, and of nearly all the most famous or fashion- able persons of the time. What is considered his finest produc- tion is a. review of cavalry, a large composition, in the foreground of which he introduced portraits of George III., the prince of Wales and the duke of York, surrounded by a brilliant staff on horseback. It was painted in 1798, and obtained for the artist the honour of knighthood, and his election as R.A.

BEECHING, HENRY CHARLES (1859-), English clergy- man and author, was born on the 15th of May 1859, and educated at the City of London school and at Balliol College, Oxford. He took holy orders in 1882, and after three years in a Liverpool

curacy he was for fifteen years rector of Yattendon, Berkshire. From 1900 to 1903 he lectured on pastoral and liturgical theology at King's College, London, and was chaplain of Lincoln's Inn, where he became preacher in 1903. He became a canon of Westminster in 1902, and examining chaplain to the bishop of Carlisle in 1905. As a poet he is best known by his share in two volumes — Love in Idleness (1883) and Love's Looking Glass (1891) — which contained also poems by J. W. Mackail and J. Bowyer Nichols. He was a sympathetic editor and critic of the works of many 16th and 17th century poets, of Richard Crashaw (1905), of Herrick (1907), of John Milton (19°°)) of Henry Vaughan (1896). Under the pseudonym of "Urbanus Sylvan " he published two successful volumes of essays, Pages from a Private Diary (1898) and Provincial Letters and other Papers (1906). His works also include numerous volumes of sermons and essays on theological subjects.

BEECHWORTH, a town of Bogong county, Victoria, Australia, 172 m. by rail N.E. of Melbourne. Pop. (1901) 7359. The town is the centre of the Ovens goldfields, and the district is mainly devoted to mining with both alluvial and reef working, but much of the land is under cultivation, yielding grain and fruit. The water supply is derived from Lake Kerferd in the vicinity, which is a favourite resort of visitors; the scenery near the town, which lies at an elevation of 1805 ft. among the May Day Hills, being singularly beautiful. The industries of Beech- worth include tanning, ironfounding and coach-building.

BEEF (through O. Fr. boef, mod. boeuf, from Lat. bos, bovis, ox, Gr. /3oDs, which show the ultimate connexion with the Sanskrit go, gdus, ox, and thus with " cow"), the flesh of the ox, cow or bull, as used for food. The use of the French word for the meat, while the Saxon name was retained for the animal, has been often noticed, and paralleled with the use of veal, mutton andpork. "Beef" is also used, especially in the plural "beeves," for the ox itself, but usually in an archaic way. " Corned " or "corn" beef is the flesh cured by salting, i.e. sprinkling with " corns " or granulated particles of salt. " Collared " beef is so called from the roll or collar into which the meat is pressed, after extracting the bones. "Jerked" beef, i.e. meat cut into long thin slices and dried in the sun, like "biltong" (q.v.), comes through the Spanish- American charque, from ccharqui, the Peruvian word for this species of preserved meat. For " Beef- eater" see Yeomen or the Guard.

BEEFSTEAK CLUB, the name of several clubs formed in London during the 18th and 19th centuries. The first seems to have been that founded in 1709 with Richard Estcourt, the actor, as steward. Of this the chief wits and great men of the nation were members and its badge was a. gridiron. Its fame was, however, entirely eclipsed in 1735 when " The Sublime Society of Steaks " was established by John Rich at Covent Garden theatre, of which he was then manager. It is said that Lord Peterborough supping one night with Rich in his private room, was so delighted with the steak the latter grilled him that he suggested a repetition of the meal the next week. From this started the Club, the members of which delighted to call themselves "The Steaks." Among them were Hogarth, Garrick, Wilkes, Bubb Doddington and many other celebrities. The rendezvous was the theatre till the fire in 1808, when the club moved first to the Bedford Coffee House, and the next year to the Old Lyceum. In 1785 the prince of Wales joined, and later his brothers the dukes of Clarence and Sussex became members. On the burning of the Lyceum, " The Steaks " met again in the Bedford Coffee House till 1838, when the

New Lyceum was opened, and a large room there was allotted the club. These meetings were held till the club ceased to exist in 1867. Thomas Sheridan founded a Beefsteak Club in Dublin at the Theatre Royal in 1749, and of this Peg Woffington was president. The modern Beefsteak Club was founded by J. L. Toole, the actor, in 1876.

See J. Timbs Clubs and Club Life in London (1873); Walter Arnold, Life and Death of the Sublime Society of Steaks (1871).

BEELZEBUB, Beelzebul, Baalzebub. In 2 Kings i. we read that Ahaziah ben Ahab, king of Israel, fell sick, and sent to inquire of Baalzebub, the god of the Philistine city Ekron, in. 21

whether he should recover. There is no other mention of this god in the Old Testament. Baal, "lord," is the ordinary title or word for a deity, especially a local deity, cf. such place names as Baal Hazor (2 Sam. xiii. 23), Baal Hermon (Judges iii. 3), which are probably contractions of fuller forms, like Beth Baal Meon (Josh. xiii. 17), the House or Temple of the Baal of Meon.. According to these analogies we should expect Zebub to be a place. No place Zebub, however, is known; and it has been objected that the Baal of some other place would hardly be the god of Ekron. These objections are hardly conclusive.

Usually Zebub is identified with a Hebrew common noun zebub — flies, 1 occurring twice in the Old Testament, 2 so that Baalzebub "is the Baal to whom flies belong or are holy. As children of the summer they are symbols of the warmth of the sun, to which . . . Baal stands in close relation. Divination by means of flies was known at Babylon." 3 There are other cases of names compounded of Baal and an element equivalent to a descriptive epithet, e.g. Baalgad, the Baal of Fortune. 4 For the "Fly-god," sometimes interpreted as the "averter of insects," cf. Zevs airoixvtos, fiviaypos, and the Hercules fiviaypos. Clemens Alexander speaks of a Hercules avbfwux as worshipped at Rome. It has been suggested that Baalzebub was the dung-beetle, Scarabaeus pillularius, worshipped in Egypt.

A name of a deity on an Assyrian inscription of the 12th century B.C. has been read as Baal-zabubi, but this reading has now been abandoned in favour of Baal-sapunu (Baal-Zephon). 6 Cheyne considers that Baalzebub is a " contemptuous uneuphonic Jewish modification of the true name Baalzcbul." 6

In the New Testament we meet with Beelzebul, 7 which some of the

versions, especially the Vulgate and Syriac, followed by the Authorized Version, have changed to Beelzebub, under the influence of 2 Kings. In Matt. x. 25, Christ speaks of men calling the master of the house, i.e. Himself, Beelzebul. 8 In Mark iii. 22-27, 9 the scribes explain that Jesus is possessed by Beelzebul 10 and is thus enabled to cast out devils. The passage speaks of Beelzebul as Satan and as the prince of the demons.

The origin of the name Beelzebul is variously explained. (a) It is "a phonetic corruption, perhaps a softening of the original word'; as Bab-el-mandel is a corruption of Bab-el- mandeb. (b) Zebul is from zebel, a word found in the Targums in the sense of "dung," so that Beelzebul would mean "Lord of Dung," a term of contempt. The further suggestion has been made that zebul itself in the sense of " dung " is a term for a heathen deity, cf. the Old Testament use of "abomination" &c, for heathen deities, so that Beelzebul would mean " Chief of false gods," and so arch-fiend, (c) Zebul is found in 1 Kings viii. 13 in the sense of " height," beth-zebul — lofty house, and in Rabbinical writings in the sense of "house" or "temple," or "the fourth heaven"; 11 and Beelzebul may equal "Lord of the High House" or "Lord of Heaven." This view is per- haps favoured by Matt. x. 25, "if they have called the lord of the house Beelzebul." It appears, however, that Rabbinical writings use yom (day-of) zebul for the festival of a heathen deity; and Jastrow connects this usage with the meaning "house" or "temple," so that the meaning "Lord of the False Gods" might be arrived at in a different way.*

The names Zebulun, 'Izebel (Jezebel), suggest that Zebul may be an ancient name of a deity; cf. the names Sim bva (B'L 'ZBL), hime (ShMZBL) in Punic and Phoenician

1 So Clarendon Press, Hebrew Lexicon, p. 127, with LXX. 2 'Eccl. x. 1; Isaiah vii. 18.

3 Baethgen, Beitrage zi:r semitischen Religionsgeschichte, p. 25, cf. pp. 65, 261.

I Josh. xii. 7.

5 Art. " Baalzebub," Black and Cheyne's Ency. Bibl. 5 With various spellings (e.g. Belzebul, and in XB, Beezebul), all variants of Beelzebul. Cf. Deissmann, Bible Studies, 332.

7 There is a variation of reading, which has been held to support the view that the passage means that men reproached Jesus with His

supposed connexion with Beelzebul ; cf. A. B. Bruce, in loco.

8 And in the parallel passages, Matt. xii. 22-29 ; Luke xi. 14-22.

9 Cf. John vii. 20, viii. 48, 52, x. 20.

10 Swete, in loco.

II Jastrow, Diet, of the Targumim, fife.,, sub voce.

inscriptions. 1 The substitution of Beelzebub for Beelzebul by the Syriac, Vulgate and other versions implies the identifica- tion of the New Testament arch-fiend with the god of Ekron; this substitution, however, may be due to the influence of the Aramaic B'el-debaba, " adversary," sometimes held to be the original of these names.

There is no trace of Beelzebul or Beelzebub outside of the Biblical passages mentioned, and the literature dependent on them. If we assume a connexion between the two names, there is nothing to show how the god became in later times the devil.

In Paradise Lost, Book ii., Beelzebub appears as second only to Satan himself.

Bibliog raphy. — Lightf oot, Horac Hebraicae et Talmudicae, Works, vol. ii. pp. 188 f., 429, ed. Strype (1684); Baethgen, Beitrage zur semitischen Religions geschichte, pp. 25, 65, 261. Commentaries on the Biblical passages especially Burney and Skinner on Kings, Meyer and A. B. Bruce on the Synoptic Gospels, and Swete on Mark. Articles on " Baal, " " Baalzebub, " " Beelzebub, " " Beel- zebul," in Hastings' Bible Diet., Black and Cheyne's Encycl. BibL, and Hauck's Realencyklopadie; on am hvi in Clarendon Press Hebr. Lex. : and on ˆ>at and Inn in Jastrow's Diet, of the Targumim, dfc. (W. H. Be.)

BEER, a beverage obtained by a process of alcoholic fer- mentation mainly from cereals (chiefly malted barley) , hops and water. The history of beer extends over several thousand years. According to Dr Bush, a beer made from malt or red barley is mentioned in Egyptian writings as early as the fourth dynasty.

It was called

or heqa. Papyri of the time of Seti I.

(1300 B.C.) allude to a person inebriated from over-indulgence in beer. In the second book (c. 77) of Herodotus (450 B.C.) we are told that the Egyptians, being without vines, made wine from barley (cf. Aesch. Suppl. 954) ; but as the grape is mentioned so frequently in Scripture and elsewhere as being most abundant there, and no record exists of the vine being destroyed, we must conclude that the historian was only partially acquainted with the productions of that most fertile country. Pliny {Natural History, xxii. 82) informs us that the Egyptians made wine from corn, and gives it the name of zythum, which', in the Greek, means drink from barley. The Greeks obtained their knowledge of the art of preparing beer from the Egyptians. The writings of Archilochus, the Parian poet and satirist who flourished about 650 B.C., contain evidence that the Greeks of his day were acquainted with the process of brewing. There is, in fact, little doubt that the discovery of beer and its use as an exhilarating beverage were nearly as early as those of the grape itself, though both the Greeks and the Romans despised it as a barbarian drink. Dioscorides mentions two kinds of beer, namely fD0os and Kovpfii, but he does not describe them sufficiently to enable us to distinguish them. Sophocles and other Greek writers, again, styled it fipvrov. In the time of Tacitus (1st century after Christ), according to him, beer was the usual drink of the Germans, and there can be little doubt that the method of malting barley was then known to them. Pliny (Nat. Hist. xxii. 82) mentions the use of beer in Spain under the name of cclia and ceria and in Gaul under that of cerevisia; and elsewhere (xiv. 29) he says: — " The natives who inhabit the west of Europe have a liquid with which they intoxicate themselves, made from corn and water. The manner of making this liquid is somewhat different in Gaul, Spain and other countries, and it is called by different names, but its nature and properties are everywhere the same. The people in Spain in particular brew this liquid so well that it will keep good a long time. So exquisite is the cunning of mankind in gratifying their vicious appetites that they have thus invented a method to make water itself produce intoxication."

The knowledge of the preparation of a fermented beverage from cereals in early times was not confined to Europe. Thus, according to Dr H. H. Mann, the Kaffir races of South Africa have made for ages — and still make — a kind of beer from millet, and

1 Lidzbarski, Handbuch der nordsemitischen Epigraphik, i. po. 240,

similarly the natives of Nubia, Abyssinia and other parts of Africa prepare an intoxicating beverage, generally called bousa, from a variety of cereal grains. The Russian quass, made from barley and rye, the Chinese samshu, made from rice, and the Japanese saM (q.v.) are all of ancient origin. Roman historians mention the fact that the Britons in the south of England at the time of the Roman invasion brewed a species of ale from barley and wheat. The Romans much improved the methods of brewing in vogue among the Britons, and the Saxons — among whom ale had long been a common beverage— in their turn profited much by the instruction given to the original inhabitants of Great Britain by the Romans. We are informed by William of Malmes- bury that in the reign of Henry II. the English were greatly addicted to drinking, and by that, time the monasteries were already famous, both in England and on the continent, for the excellence of their ales. The waters of Burton-on-Trent began to be famous in the 13th century. The secret of their being so especially adapted for brewing was first discovered by some monks, who held land in the adjacent neighbourhood of Wetmore. There is a document dated 1 295 in which it is stated that Matilda, daughter of Nicholas de Shoben, had re-leased to the abbot and convent of Burton-on-Trent certain tenements within and without the town; for which re-lease they granted her, daily for life, two white loaves from the monastery, two gallons of con- ventual beer, and one penny, besides seven gallons of beer for the men. The abbots of Burton apparently made their own malt, for it was a commoh covenant in leases of mills belonging to the abbey that the malt of the lords of the manor, both spiritual and temporal, should be ground free of charge. Robert Plot, in his Natural History of Staffordshire (1686), refers to the peculiar properties of the Burton waters, from which, he says, " by an art well known in this country good ale is made, in the management of which they have a knack of fining it in three days to that degree that it shall not only be potable, but is clear and palatable as we could desire any drink of this kind to be." In 1630 Burton beer began to be known in London, being sold at " Ye Peacocke " in Gray's Inn Lane, and according to the Spectator was in great demand amongst the visitors in Vauxhall. Until tea and coffee were introduced, beer and ale (see Ale) were, practically speak- ing, the only popular beverages accessible to the general body of consumers. Since the advent of tea, coffee, cocoa and mineral waters, the character of British beers has undergone a gradual modification, the strongly alcoholic, heavily hopped liquids consumed by the previous generation slowly giving place to the

lighter beverages in vogue at the present time. The old " stock bitter " has given way to the " light dinner ale," and " porter " (so called from the fact that it was the popular drink amongst the market porters of the 18th century) has been largely replaced by " mild ale." A certain quantity of strong beer — such as heavy stouts and "stock " and " Scotch " ales — is still brewed nowadays, but it is not an increasing one. The demand is almost entirely for medium beers such as mild ale, light stout, and the better class of " bitter " beers, and light beers such as the light " family ales," " dinner ales " and lager.

The general run of beers contain from 3 to 6 % of alcohol and 4 to 7 % of solids, the remainder being water and certain flavour- ing and preservative matters derived from the malt, hops and other materials employed in their manufacture. The solid, i.e. non-volatile, matter contained in solution in beer consists mainly of maltose or malt sugar, of several varieties of dextrin (see Brewing), of substances which stand in an intermediate position between the sugars and the dextrins proper, and of a number of bodies containing nitrogen, such as the non-coagulable proteids, peptones, &c. In addition there is an appreciable quantity of mineral matter, chiefly phosphates and potash. Dietetically regarded, therefore, beer possesses considerable food value, and, moreover, the nutritious matter in beer is present in a readily assimilable form.

It is probable that the average adult member of the British working classes consumes not less than two pints of beer daily, A reasonable calculation places the total proteids and carbo- hydrates consumed by the average worker at 140 and 400

grammes respectively. Taking the proteid content of the average beer at 0-4 % and the carbohydrate content at 4 %, a simple calculation shows that about 3 % of the total proteid and 11% of the total carbohydrate food of the average worker will be consumed in the shape of beer.

The chemical composition of beers of different types will be gathered from the following tables.

A. English Beers.

(Analyses by J. L. Baker, Hulton & P. Schidrowitz.)

I. Mild Ales.

Number.

Original Gravity.

Alcohol %.

Extractives(Solids) %.

I. 1

2.'

.V 2

1055-13 1055-64 1071-78

4-17

4-47 5-57

6-1

5-7 7-3

II. Light Bitters and Ales.

N umber.

Original Gravity.

Alcohol %.

Extractives(Solids) %.

1. 2.

3- 4- 5-

1046-81 1047-69 1047-79 1050-30 1038-31

4-15 4-23 4-61

4-53

3-8i

4-0 4-1 3-2 4-2

3-5

III. Pale and Stock Ales.

Number.

Original Gravity.

Alcohol %.

Extractives(Solids)%.

i. 3

2. 4

3- 4

1059-01

1068-58 1076-80

4-77 5-48 6-68

5-8

7-i

5-9

IV. Stouts and Porter.

Number.

Original Gravity.

Alcohol %.

Extractives(Solids) %.

1. 5

2. 6

3- 6 4- 7

1072-92 1054-26 1081-62 1054-11

6-14 4-73

6-02

3-90

6-3 4-5 8-8

6-5

The figures in the above tables are very fairly representative of different classes of British and Irish beers. It will be noticed that the Mild Ales are of medium original gravity 8 and alcoholic strength, but contain a relatively large proportion of solid matter. The Light Bitters and Ales are of a low original gravity, but compared with the Mild Ales the proportion of alcohol to solids is higher. The Pale and Stock Ales, which represent the more expensive bottle beers, are analytically of much the same character as the Light Bitters, except that the figures all round are much higher. The Stouts, as a rule, are characterized by a high gravity, and contain relatively more solids (as compared with alcohol) than do the heavy beers of light colour. With

1 London Ales. ! Strong Burton Mild Ale.

3 Fairly representative of " Pale Ales."

4 Heavy Stock Ales. 5 Irish Stout.

6 Nos. 2 and 3 are respectively " single " and " double " London Stouts from the same brewery. 7 London Porter or Cooper.

8 The specific gravity, or " gravity " as it is always termed in the industry, of the brewer is 1000 times the specific gravity of the physicist. This is purely a matter of convention and convenience. Thus when a brewer speaks of a wort of a " gravity " of 1045 (ten-forty-five) he means a wort having a specific gravity of 1-045. Each unit in the brewer's scale of specific gravity is termed a " degree of gravity." The wort referred .to above, therefore, possesses forty- five degrees of gravity. The " original gravity," it may here be mentioned, represents the specific gravity of the wort (see Brewing) before fermentation. The solids in the original wort may be ascer- tained by dividing the excess of the gravity over 1000 by 3-86. Thus in the case of Mild Ale No. 1 the excess of the original gravity over 1000 is

1055-13 — 1000 = 55-13. Dividing this by 3-86 we get 14-28, which indicates that the wort from which the beer was manu- factured contained 14-28 % of solids. In the trade the gravity of a beer (or rather of the wort from which it is derived) is generally expressed in pounds per barrel. This means the excess in weight of a barrel of the wort over the weight of a barrel of water. The weight of a barrel (36 gallons) of water is 360 lb ; in the above ex- ample the weight of a barrel of the beer wort is 360X1-05513=379-8. The gravity of the wort in lb is therefore 379-8 — 360=19-8. The beer which is made from this wort would also be called a 19-8 lb beer, the reference in all cases being to the original wort.

regard to the proportions of the various matters constituting the extractives (solids) in English beers, roughly 20-30 % consists of maltose and 20-50 % of dextrinous matter. In mild ales the proportion of maltose to dextrin is high (roughly 1:1), thus accounting for the full sweet taste of these beers. Pale and stock ales, on the other hand, which are of a " dry " character, con- tain relatively more dextrin, the general ratio being about i:i| or 1 : 2. The mineral matter (" ash ") of beers is generally in the neighbourhood of 0-2 to 03%, of which about one-fourth is phosphoric acid. The proteid (" nitrogenous matters ") content of beers varies very widely according to character and strength, the usual limits being 0-3 to o-8%, with an average of roughly

o-4%-

B. Continental Beers. (Analyses by A. Doemens.)

Description.

Original Gravity.

Alcohol %.

Extractives

(Solids) %.

Munich Draught Dark

1056-4

3-76

6-58

>. .. ..

1052-6

3-38

6-45

„ L lg ht

1048-0

3-18

5-55

< > .. 11

1048-1

4-05

3 92

,, Export .

1054-3

3-68

632

.. .. ■

1059-5

4-15

7-48

Bock Beer 9 .

1076-6

4-53

10-05

Pilsener Bottle

1047-7

3-47

490

,, Draught

1044-3

3-25

4-58

Berlin Dark

i°55-2

3-82

6-17

„ Light

1056-5

4-36

5-46

„ Weissbier .

1033-1

2-64

3-oi

It will be seen that, broadly speaking, the original gravity of German and Austrian beers is lower than that of English beers, and this also applies to the alcohol. On the other hand, the foreign beers are relatively very rich in solids, and the extractives: alcohol ratio is high. (See Brewing.) C. American Beers and Ales. (Analyses by M. Wallerstein.)

Description.

Original Gravity.

Alcohol %.

Extractives

(Solids) %.

] 1

Bottom Fermenta- 2

tion Beers V 3

(Lager Type). 4

I 5

Top Fermenta-] 1

tion Ales > 2

(British Type). J 3

1046-7 1055-6 1063-4 1046-0 1051-7 1084-2

1073-5 1068-0

3-48 3-56 4-12 2-68 3-42 5-89 6-46

5-50

5 6

7 5 5 8

5 5

08

5°

43 96 86 60 69 53

It will be noted that the American beers (i.e. bottom fermenta- tion products of the lager type) are very similar in composition to the German beers, but that the ales are very much heavier than the general run of the corresponding British products.

Production and Consumption. — (For manufacture of beer, see Brewing.) Germany is the greatest beer-producing nation, if liquid bulk be taken as a criterion; the United States comes next, and the United Kingdom occupies the third place in this regard. The consumption per head, however, is slightly greater in the United Kingdom than in Germany, and very much greater than is the case in the United States. The 1905 figures with regard to the total production and consumption of the three great beer-producing countries, together with those for 1885, are as under: —

Country.

Total Production (Gallons).

Consumption per Head of Popu- lation (Gallons).

German Empire . United States United Kingdom

1905.

1885.

1905.

1885.

1,538,240,000 1,434,114,180

1,227,933,468[9]

932,228,000 494.854.000

993.759.ooo

26-3

19-9

27-90 w

19-8

8-8

27-1

9 A particularly heavy beer, only brewed at certain times in the year.

10 The maxima of production and consumption were reached in 1899/1900, when the production amounted to 1,337,509,116 gallons (at the standard gravity) and consumption to 32-28 gallons per head.

The chief point of interest in the preceding table is the enormous increase in the United' States. In considering the figures, the character of the beer produced must be taken into consideration. Thus, although Germany produces roughly 25 % more beer in liquid measurement than the United Kingdom, the latter actually uses about 50% more malt than is the case in the German breweries. According to a Viennese technical journal, the quantities of malt employed for the production of one hectolitre (22 gallons) of beer in the respective countries is 0-40 cwt. in the German empire, 0-72 cwt. in the United States, and o-8i cwt. in the United Kingdom. In a sense, therefore, England may still claim pre-eminence as a beer-producing nation. Large as the per capita consumption in the United Kingdom may seem, it is considerably less than is the case in Bavaria, which stands at the head of the list with over 50 gallons, and in Belgium, which comes second with 47-7 gallons. In the city of Munich the consumption is actually over 70 gallons, that is to say, about 1 \ pints a day for every man, woman and child. It is curious to note that in Germany, which is usually regarded as a beer- drinking country par excellence, the consumption per head of this article is slightly less than in England, and that inversely the average German consumes more alcohol in the shape of spirits than does the inhabitant of the British Islands (consumption of spirits per head: Germany, 1-76 gallons; United Kingdom, 0-99 gallons). This is accounted for by the fact that the peasantry of the northern and eastern portions of the German empire consume spirits almost exclusively. In the British colonies beer is generally one of the staple drinks, but if we except Western Australia, where about 25 gallons per head of population are consumed, the demand is much smaller than in the United Kingdom. In Australia generally, the per capita consumption amounts to about 12 gallons, in New Zealand to 10 gallons, and in Canada to 5 gallons. (P. S.)

BEERSHEBA, a place midway between Gaza and Hebron (28 m. from each), frequently referred to in the Bible as the southern limit of Palestine ("Dan to Beersheba," Judg. xx. 1, &c.) Its foundation is variously ascribed to Abraham and Isaac, and different etymologies

for its name are suggested, in the funda- mental documents of Genesis (xxi. 22, xxvi. 26). It was an important holy place, where Abraham planted a sacred tree (Gen. xxi. 23), and where divine manifestations were vouchsafed to Hagar (Gen. xxi. 17), Isaac (xxvi. 24), Jacob (xlvi. 2) and Elijah (1 Kings xix. 5). Amos mentions it in connexion with the shrines of Bethel and Gilgal (Amos v. 5) and denounces oaths by its numen (viii. 14) . The most probable meaning of the name is " seven wells," despite the non-Semitic construction involved in this interpretation. Seven ancient wells still exist here, though two are stopped up. Eusebius and Jerome mention the place in the 4th century as a large village and the seat of a Roman garrison. Extensive remains of this village exist, though they are being rapidly quarried away for building; some inscriptions of great importance have been found here. Later it appears to have been the site of a bishopric; remains of its churches were still standing in the 14th century. Some fine mosaics have been here unearthed and immediately destroyed, in sheer wantonness, by the natives quarrying building-stone. The Biblical Beersheba probably exists at Bir es-Seba', 2 m. distant.

BEESLY, EDWARD SPENCER (1831-), English historian and positivist, son of the Rev. James Beesly, was born at Fecken- ham, Worcestershire, on the 23rd of January 1831. He was educated at Wadham College, Oxford, which may be regarded as the original centre of the English positivist movement. Richard Congreve (q.v.) was tutor at Wadham from 1849 to 1854, and three men of that time, Frederic Harrison (q.v.), Beesly and John Henry Bridges (1832-1906), became the leaders of Comtism in England. Beesly left Oxford in 1854 to become assistant- master at Marlborough College. In 1859 he was appointed professor of history at University College, London, and of Latin at Bedford College, London, in i860. He resigned these appoint- ments in 1893 and 1889, and in 1893 became the editor of the newly-established Positivist Review. He collaborated in the translation of Comte's system of Positive Polity (4 vols., 1875-

1879), translated his Discourse on the Positive Spirit (1903), and wrote a biography of Comte for a translation of the first two chapters of his Cours de philosophic positive, entitled Fundamental Principles of Positive Philosophy (1905). Professor Beesly stood unsuccessfully as Liberal candidate for Westminster in 1885 and for Marylebone in 1886, and is the author of numerous review articles on social and political topics, treated from the positivist standpoint, especially on the Irish question. His works also include a series of lectures on Roman history, entitled Catiline, Clodius, Tiberius (1878), in which

he rehabilitates in some degree the character of each of his subjects, and Queen Elisabeth (1892), in the " Twelve English Statesmen " series.

BEET, a cultivated form of the plant Beta vulgaris (natural order Chenopodiaceae), which grows wild on the coasts of Europe, North Africa and Asia as far as India. It is a biennial, producing, like the carrot, a thick, fleshy tap-root during the first year and a branched, leafy, flowering stem in the following season. The small, green flowers are borne in clusters. A considerable number of varieties are cultivated for use on account of their large fleshy roots, under the names of mangel-wurzel or mangold, field-beet and garden-beet. The cultivation of beet in relation to the production of sugar, for which purpose certain varieties of beet stand next in importance to the sugar cane, is dealt with under Sugar. The garden-beet has been cultivated from very remote times as a salad plant, and for general use as a table vegetable. The variety most generally grown has long, tapering, carrot-shaped roots, the " flesh " of which is of a uniform deep red colour throughout, and the leaves brownish red. It is boiled and cut into slices for being eaten cold; and it is also prepared as a pickle, as well as in various other forms. Beet is in much more common use on the continent of Europe as a culinary vegetable than in Great Britain, where it has, however, been cultivated for upwards of two centuries. The white beet, Beta cicla, is cultivated for the leaves, which are used as spinach. The midribs and stalks of the leaves are also stewed and eaten as sea-kale, under the name of Swiss chard. B. cicla is also largely used as a decorative plant for its large, handsome leaves, blood red or variegated in colour.

The beet prospers in a rich deep soil, well pulverized by the spade. If manure is required, it should be deposited at the bottom of the trench in preparing the ground. The seeds should be sown in drills 1 5 ins. asunder, in April or early in May, and the plants are afterwards to be thinned to about 8 in. apart in the lines, but not more, as moderate-sized roots are preferable. The plants should grow on till the end of October or later, when a portion should be taken up for use, and the rest laid in in a sheltered corner, and covered up from frost. The roots must not be bruised and the leaves must be twisted off — not closely cut, as they are then liable to bleed. In the north the crop may be wholly taken up in autumn, and stored in a pit or cellar, beyond reach of frost. If it is desired to have fresh roots early, the seeds should be sown at the end of February or beginning of March; and if a succession is required, a few more may be sown by the end of March.

BEETHOVEN, LUDWIG VAN (1770-1827), German musical composer, was baptized (probably, as was usual, the day after birth) on the 17th of December 1770 at Bonn. His family is traceable to a village near Louvain, in Belgium, in the 17th century. In 1650 a lineal ancestor of the composer settled in Antwerp. Beethoven's grandfather, Louis, quarrelled with his family, came to Bonn in 1732, and became one of the court musicians of the archbishop-elector of Cologne. He was a genial man of estimable character, and though Ludwig van Beethoven was only four years old when his grandfather died, he never forgot him, but cherished his portrait to the end of his life. Beethoven's father, a tenor singer at the archbishop-elector's court, was of a rough and violent temper, not improved by his passion for drink, nor by the dire poverty under which the family laboured. He married Magdelina Leim or Laym, the widow of a vdlet-de-chambre of the elector of Trier and daughter of the chief cook at Ehrenbreitstein. Beethoven's father wished to profit as early as possible by his son's talent, and accordingly

began to give him a severe musical training, especially on the violin, when he was only five years old, at about which time they left the house in which he was born (515 Bonngasse, now pre- served as a Beethoven museum, with a magnificent collection of manuscripts and relics). By the time Beethoven was nine his father had no more to teach him, and he entered upon a perhaps healthier course of clavier lessons under a singer named Pfeiffer. A little general education was also edged in by a certain Zambona. Van den Eeden, the court organist, and an old friend of his grandfather, taught him the organ and the pianoforte, and so rapid was Beethoven's progress that when C. G. Neefe succeeded to Van den Eeden's post in 1781, he was soon able to allow the boy to act as his deputy. With his permission Beethoven pub- lished in 1783 his earliest extant composition, a set of variations on a march by Dressier. The title-page states that they were written in 1780 " par un jeune amateur Louis van Beethoven age de dix ans." Beethoven's father was very clumsy in his unnecessary attempts to make an infant prodigy of his son; for the ante-dating of this composition, implying the correct date of birth, contradicts the post-dating of the date of birth by which he tried to make out that the three sonatas Beethoven wrote in the same year were by a boy of eleven. (Beethoven for a lcng time believed that he was born in 1772, and the certificate of his baptism hardly convinced him, because he knew that he had an elder brother named

Ludwig who died in infancy.) In the same year, 1783, Beethoven was given the post of cembalist in the Bonn theatre, and in 1784 his position of assistant to Neefe became official. In a catalogue raisonni of the new archbishop Max Franz's court musicians we find " No. 14, Ludwig Beethoven " described " as of good capacity, still young, of good, quiet behaviour and poor," while his father (No. 8) " has a completely worn-out voice, has long been in service, is very poor, of fairly good behaviour, and married."

In the spring of 1787 Beethoven paid a short visit to Vienna, where he astonished Mozart by his extemporizations and had a few lessons from him. How he was enabled to afford this visit is not clear. After three months the illness of his mother, to whom he was devoted, brought him back. She died in July, leaving a baby girl, one year old, who died in November. For five more years Beethoven remained at Bonn supporting his family, of which he had been since the age of fifteen practically the head, as his father's bad habits steadily increased until in 1789 Ludwig was officially entrusted with his father's salary. He had already made several lifelong friends at Bonn, of whom the chief were Count Waldstein and Stephan Breuning; and his prospects brightened as the archbishop-elector, in imitation of his brother the emperor Joseph II., enlarged the scale of his artistic munificence. By 1792 the archbishop-elector's attention was thoroughly aroused to Beethoven's power, and he provided for Beethoven's second visit to Vienna. The introductions he and Count Waldstein gave to Beethoven, the prefix " van " in Beethoven's name (which looked well though it was not really a title of nobility), and above all the unequalled impressiveness of his playing and extemporization, quickly secured his footing with the exceptionally intelligent and musical aristocracy of Vienna, who to the end of his life treated him with genuine affection and respect, bearing with all the roughness of his manners and temper, not as with the eccentricities of a fashion- able genius, but as with signs of the sufferings of a passionate and noble nature.

Beethoven's life, though outwardly uneventful, was one of the most pathetic of tragedies. His character has had the same fascination for his biographers as it had for his friends, and there is probably hardly any great man in history of whom more is known and of whom so much of what is known is interesting. Yet it is all too much a matter of detail and anecdote to admit of chronological summarizing here, and for the disentangling of its actual incidents we must refer the reader to Sir George Grove's long and graphic article, " Beethoven," in the Dictionary of Music and Musicians, and to the monumental biography of Thayer, who devoted his whole life to collecting

materials. These two biographical works, read in the spirit in which their

authors conceived them, will reveal, beneath a mass of distress- ing, grotesque and sometimes sordid detail, a nobility of character and unswerving devotion to the highest moral ideas throughout every distress and temptation to which a passionate and totally unpractical temper and the growing shadow of a terrible mis- fortune could expose a man.

The man is surpassed only by his works, for in them he had that mastery which was denied to him in what he himself calls his attempt to " grapple with fate." Such of his difficulties as lay in his own character already showed themselves in his studies with Haydn. Haydn, who seems to have heard of him on his first visit to Vienna in 1787, passed through Bonn in July 1792, and was so much struck by Beethoven that it was very likely at his instigation that the archbishop sent Beethoven to Vienna to study under him. But Beethoven did not get on well with him, and found him perfunctory in correcting his exercises. Haydn appreciated neither his manners nor the audacity of his free compositions, and abandoned whatever intentions he may have had of taking Beethoven with him to England in 1794. Beet- hoven could do without sympathy, but a grounding in strict counterpoint he felt to be a dire necessity, so he continued his studies with Albrechtsberger, a mere grammarian who had the poorest opinion of him, but who could, at all events, be depended on to attend to his work. Almost every comment has been made upon the relations between Haydn and Beethoven, except the perfectly obvious one that Mozart died at the age of thirty-six, just at the time Beethoven came to Vienna, and that Haydn, as is perfectly well known, was profoundly shocked by the untimely loss of the greatest musician he had ever known. At such a time the undeniable clumsiness of Beethoven's efforts at academic exercises would combine with his general tactlessness to confirm Haydn in the belief that the sun had set for ever in the musical world, and would incline him to view with disfavour those bold features of style and form which the whole of his own artistic development should naturally have predisposed him to welcome. It is at least significant that those early works of Beethoven in which Mozart's influence is most evident, such as the Septet, aroused Haydn's open admiration, whereas he hardly approved of the compositions like the sonatas, op. 2 (dedicated to him), in which his own influence is stronger. Neither he nor Beethoven was skilful in expressing himself except in music, and it is impossible to tell what Haydn meant, or what Beethoven thought he meant, in advising him not to publish the last and finest

of the three trios, op. 1. But even if he did not mean that it was too daring for the public, it can hardly be expected that he never contrasted the meteoric career of Mozart, who after a miraculous boyhood had produced at the age of twenty-five some of the greatest music Haydn had ever seen, with the slow and painful development of his uncouth pupil, who at the same age had hardly a dozen presentable works to his credit. It is not clear that Haydn ever came to understand Beethoven, and many years passed before Beethoven realized the greatness of the master whose teaching had so disappointed him.

From the time Beethoven settled permanently in Vienna, which he was soon induced to do by the kindness of his aristo- cratic friends, the only noteworthy external features of his career are the productions of his compositions. In spite of the usual hostile criticism for obscurity, exaggeration and unpopu- larity, his reputation became world-wide and by degrees actually popular; nor did it ever decline, for as his later works became notorious for their extravagance and unintelligibility his earlier works became better understood. He was no man of business, but, in a thoroughly unpractical way, he was suspicious and exacting in money matters, which in his later years frequently turned up in his conversation as a grievance, and at times, especially during the depreciation of the Austrian currency between 1 808 and 1 8 1 5 , were a real anxiety to him. Nevertheless, with a little more skill his external prosperity would have been great. He was always a personage of importance, as is testified by more than one amusing anecdote, like those of his walks with Goethe and his half-ironical comments on the hats which flew off more for him than for Goethe; and in 1815 it seemed as if the

summit of his fame was reached when his 7 th symphony was performed, together with a hastily-written cantata, Der glorreiche Augenblick and the blazing piece of descriptive fireworks entitled Wellingtons Sieg oder die Schlacht bei Vittoria, once popular in England as the Battle Symphony. The occasion for this performance was the congress of Vienna; and the government placed the two halls of the Redouten-Saal at his disposal for two nights, while he himself was allowed to invite all the sovereigns of Europe. In the same year he received the freedom of the city, an honour much valued by him. After that time his immediate popularity, as far as new works were

concerned, be- came less eminent, as that of his more easy-going contemporaries began to increase. Yet there was, not only in the emotional power of his earlier works, but also in the known cause of his increasing inability to appear in public, something that awakened the best popular sensibilities; and when his two greatest and most difficult works, the oth symphony and parts of the Missa Solemnis, were produced at a memorable concert in 1824, the storm of applause was overwhelming, and the composer, who was on the platform in order to give the time to the conductor, had to be turned round by one of the singers in order to see it.

Signs of deafness had given him grave anxiety as early as 1798. For a long time he successfully concealed it from all but his most intimate friends, while he consulted physicians and quacks with eagerness; but neither quackery nor the best skill of his time availed him, and it has been pointed out that the root of the evil lay deeper than could have been supposed during his lifetime. Although his constitution was magnificently strong and his health was preserved by his passion for outdoor life, a post-mortem examination revealed a very complicated state of disorder, evidently dating almost from childhood (if not inherited) and aggravated by lack of care and good food. The touching document addressed to his brothers in 1802, and known as his " will," should be read in its entirety, as given by Thayer (iv. 4). No verbal quotation short of the whole will do justice to the overpowering outburst which runs almost in one long unpunctuated sentence through the whole tragedy of Beethoven's life, as he knew it then and foresaw it. He reproaches men for their injustice in thinking and calling him pugnacious, stubborn and misanthropical when they do not know that for six years he has suffered from an incurable condition, aggravated by incompetent doctors. He dwells upon his delight in human society, from which he has had so early to isolate himself, but the thought of which now fills him with dread as it makes him realize his loss, not only in music but in all .finer interchange of ideas, and terrifies him lest the cause of his distress should appear. He declares that, when those near him had heard a flute or a singing shepherd while he heard nothing, he was only prevented from taking his life by the thought of his art, but it seemed im- possible for him to leave the world until he had brought out all that he felt to be in his power. He requests that after his death his present doctor, if surviving, shall be asked to describe his illness and to append it to this document in order that at least then the world may be as far as possible reconciled with him. He leaves his brothers his property, such as it is, and in terms not less touching, if more conventional than the rest of the document, he declares that his

experience shows that only virtue has preserved his life and his courage through all his misery.

And, indeed, his art and his courage rose far above any level attainable by those artists who are slaves to the " personal note," for his chisf occupation at the time of this document was his 2nd symphony, the most brilliant and triumphant piece that had ever been written up to that time. On a smaller scale, in which mastery was the more easily attainable as experiment was more readily tested, Beethoven was sooner able to strike a tragic note, and hence the process of growth in his style is more readily traceable in the pianoforte works than in the larger compositions which naturally represent a series of crowning results. Only in his last period does the pianoforte cease to be Beethoven's normal means of expression. Accordingly, if in the discussion of Beethoven's works, with which we close this

article, we dwell rather more on the pianoforte sonatas than on his greater works, it is not only because they are more easily referred to by the general reader, but because they are actually a key to his intellectual development, such as is afforded neither by his life nor by the great works which are themselves the crown- ing mystery and wonder of musical art.

Deafness causes inconvenience in conversation long before it is noticeable in music, and in 1806 Beethoven could still conduct his opera Fidelio and be much annoyed at the inattention to his nuances; and his last appearance as a player was not until 1814, when he made a great impression with his B flat trio, op. 97. At the end of November 1822 an attempt to conduct proved disastrous. The touching incident in 1824 has been described, but up to the last Beethoven seems to have found or imagined that ear-trumpets (of which a collection is now preserved at Bonn) were of use to him in playing to himself, though his friends were often pained when the pianoforte was badly out of tune, and were overcome when Beethoven in soft passages did not make the notes sound at all. The instrument sent him by Broadwood in 1817-1818 gave him great pleasure and he answered it with a characteristically cordial and quaint letter in the best of bad French. His fame in England was often a source of great comfort to him, especially in his last illness, when the London Philharmonic Society, for which the 9th symphony was written and a 10th symphony projected, sent him £100 in advance of the proceeds of a benefit concert which he had begged them to give, being in very straitened circumstances, as he would make no use of the money he had deposited in the bank for his

nephew. This nephew was the cause of most of his anxiety and distress in the last twelve years of his life. His brother, Kaspar Karl, had often given him trouble; for example, by obtaining and publishing some of Beethoven's early indiscretions, such as the trio-variations, op. 44, the sonatas, op. 49, and other trifles, of which the late opus number is thus explained. In 1815, after Beethoven had quarrelled with his oldest friend, Stephan Breuning, for warning him against trusting his brother in money matters, Kaspar died, leaving a. widow of whom Beethoven strongly disapproved, and a son, nine years old, for the guardian- ship of whom Beethoven fought the widow through all the law courts. The boy turned out utterly unworthy of his uncle's persistent devotion, and gave him every cause for anxiety. He failed in all his examinations, including an attempt to learn some trade in the polytechnic school, whereupon he fell into the hands of the police for attempting suicide, and, after being expelled from Vienna, joined the army. Beethoven's utterly simple nature could neither educate nor understand a human being who was not possessed by the wish to do his best. His nature was passionately affectionate, and he had suffered all his life from the want of a natural outlet for it. He had often been deeply in love and made no secret of it; but Robert Browning had not a more intense dislike of " the artistic tempera- ment " in morals, and though Beethoven's attachments were almost all hopelessly above him in rank, there is not one that was not honourable and respected by society as showing the truthfulness and self-control of a great man. Beethoven's orthodoxy in such matters has provoked the smiles of Philistines, especially when it showed itself in his objections to Mozart's Don Giovanni, and his grounds for selecting the subject of Fidelio for his own opera. The last thing that Philistines will ever understand is that genius is far too independent of con- vention to abuse it; and Beethoven's life, with all its mistakes, its grotesqueness and its pathos, is as far beyond the shafts of Philistine wit as his art.

At the beginning of 1827 Beethoven had projects for a 10th symphony, music to Goethe's Faust, and (under the stimulus of his newly acquired collection of Handel's works) any amount of choral music, compared to which all his previous compositions would have seemed but a prelude. But he was in bad health; his brother Johann, with whom he had been staying, had not allowed him a fire in his bedroom, and had sent him back to Vienna in an open chaise in vile weather; and the chill which resulted ended in a fatal illness. Within a week of his death

Beethoven was still full of his projects. Three days before the end he added a codicil to his will, and saw Schubert, whose music had aroused his keen interest, but was not able to speak to him, though he afterwards spoke of the Philharmonic Society and the English, almost his last words being " God bless them." On the 26th of March 1827, during a fierce thunderstorm, he died.

Beethoven's Music. — The division of Beethoven's work into three styles has become proverbial, and is based on obvious facts. The styles, however, are not rigidly separated, either in them- selves or in chronology. Nor can the popular description of Beethoven's first manner as " Mozartesque " be accepted as doing justice to a style which differs more radically from Mozart's than Mozart's differs from Haydn's. The style of Beethoven's third period is no longer regarded as " showing an obscurity traceable to his deafness," but we have, perhaps, only recently outgrown the belief that his later treatment of form is revolu- tionary. The peculiar interest and difficulty in tracing Beet- hoven's artistic development is that the changes in the materials and range of his art were as great as those in the form, so that he appears in the light of a pioneer, while the art with which he started was nevertheless already a perfectly mature and highly organized thing. And he is perhaps unique among artists in this, that his power of constructing perfect works of art never deserted him while he revolutionized his means of expression. No doubt this is in a measure true of all the greatest artists, but it is seldom obvious. In mature art vital differences in works of similar form are generally more likely to be overlooked than to force themselves on the critic's attention. And when they become so great as to make a new epoch it is generally at the cost of a period of experiment too heterogeneous and insecure for works of art to attain great permanent value. But in Beethoven's case, as we have said, the process of develop- ment is so smooth that it is impossible to separate the periods clearly, although the ground covered is, as regards emotional range, at least as great as that between Bach and Mozart. No artist has ever left more authoritative documentary evidence as to the steps of his development than Beethoven. In boyhood he seems to have acquired the habit of noting down all his musical ideas exactly as they first struck him. It is easy to see why in later years he referred to this as a. " bad habit," for it must often take longer to jot down a crude idea than to reject it; and by the time the habit was formed Beethoven's powers of self-criticism were unparalleled, and he must often have felt hampered by the habit of writing down what he knew to be too crude to be even an aid to memory. Such first

intuitions, if not written down, would no doubt be forgotten; but the poetic mood, the Stimmung, they attempt to indicate, would remain until a better expression was forthcoming. Beethoven had acquired the habit of recording them, and thereby he has, perhaps, misled some critics into over-emphasizing the contrast between his " tentative " self-critical methods and the quasi- extempore outpourings of Mozart. This contrast is probably not very radical; indeed, we may doubt whether in every thoughtful mind any apparently sudden inspiration is not pre- ceded by some anticipatory mood in which the idea was sought and its first faint indications tested and rejected so instantane- ously as to leave no impression on the memory.

The number and triviality of Beethoven's preliminary sketches should not, then, be taken as evidence of a timid or vacillating spirit. But if we regard his sketches as his diary their significance becomes inestimable. They cover every period of Beethoven's career, and represent every stage of nearly all his important works, as well as of innumerable trifles, including ideas that did not survive to be worked out. And the type of self-criticism is the same from beginning to end. There is no tendency in the middle or last period, any more than in the first, to " sub- ordinate form to expression," nor do the sketches of the first period show any lack of attention to elements that seem more characteristic of the third. The difference between Beethoven's three styles appears first in its full proportions when we realize this complete continuity of his method and art. We have ven- tured to cast doubts upon the Mozartesque character of his early

style, because that is chiefly a question of perspective- While he was handling a range of ideas not, in a modern view, glaringly different from Mozart's, he had no reason to use a glaringly different language. His contemporaries, however, found it more difficult to see the resemblance; and, though their criticism was often violently hostile, they saw with prejudice a daring origin- ality which we may as well learn to appreciate with study. Beethoven himself in later years partly affected and partly felt a lack of sympathy with his own early style. But he had other things to do than to criticize it. Modern prejudice has not his excuse, and the neglect of Beethoven's early works is no less than the neglect of the key to the understanding of his later. It is also the neglect of a mass of mature art that already places Beethoven on the same plane as Mozart, and contains perhaps the only traces in all his work of a real struggle between the forces of progress and those of construction. We will therefore give special attention to this subject here.

The truth is that there are several styles in Beethoven's first period, in the centre of which, " proving all things," is the true and mature Beethoven, however wider may be the scope of his later maturity. And he did not, as is often alleged, fail to show early promise. The pianoforte quartets he wrote at the age of fifteen are, no doubt, clumsy and childish in execution to a degree that contrasts remarkably with the works of Mozart's, Mendelssohn's or Schubert's boyhood; yet they contain material actually used in the sonatas, op. 2, No. 1, and op. 2, No. 3. And the passage in op. 2, No. 3, is that immediately after the first subject, where, as Beethoven then states it, it embodies one of his most epoch-making discoveries, namely, the art of organizing a long series of apparently free modulations by means of a systematic progression in the bass. In the childish quartet the principle is only dimly felt, but it is nevertheless there as a subconscious source of inspiration; and it afterwards gives inevitable dramatic truth to such passages as the climax of the development in the sonata, op. 57 (commonly called Appas- sionato), and throughout the chaos of the mysterious introduction to the C major string-quartet, op. 59, No. 3, prepares us for the world of loveliness that arises from it.

Although with Beethoven the desire to express new thoughts was thus invariably both stimulated and satisfied by the dis- covery of the necessary new means of expression, he felt deeply the danger of spoiling great ideas by inadequate execution; and his first work in a new form or medium is, even if as late as the Mass in C, op. 89, almost always unambitious. His teachers had found him sceptical of authority, and never con- vinced of the practical convenience of a rule until he had too successfully courted disaster. But he appreciated the experience, though he may have found it expensive, and traces of crudeness in Such early works as he did not disown are as rare as plagiar- isms. The first three pianoforte sonatas, op. 2, show the different elements in Beethoven's early style as clearly as possible. Sir Hubert Parry has aptly compared the opening of the sonata, op. 2, No; 1, with that of the finale of Mozart's G minor sym- phony, to show how much closer Beethoven's texture is. The slow movement well illustrates the rare cases in which Beethoven imitates Mozart to the detriment of his own proper richness of tone and thought, while the finale in its central episode brings a misapplied and somewhat diffuse structure in Mozart's style into direct conflict with themes as " Beethovenish" in their terseness as in their sombre passion. The second sonata is flawless in execution, and entirely beyond the range of Haydn and Mozart in harmonic and dramatic thought, except in the finale. And it is just in the adoption

of the luxurious Mozart- esque rondo form as the crown of this work that Beethoven shows his true independence. He adopts the form, not because it is Mozart's, but because it is right and because he can master it. The opening of the second subject in the first movement is a wonderful application of the harmonic principle already mentioned in connexion with the early piano quartets. In all music nothing equally dramatic can be found before the D minor sonata, op. 31, No. 2, which is rightly regarded as marking the beginning of Beethoven's second period. The slow movement,

like those of op. 7 and a few other early works, shows a thrilling solemnity that immediately proves the identity of the pupil of Haydn with the creator of the 9th symphony. The little scherzo no less clearly foreshadows the new era in music by the fact that in so small and light a movement a modulation from A to G sharp minor can occur too naturally to excite surprise. If the later work of Beethoven were unknown there would be very little evidence that this sonata was by a young man, except, perhaps, in the remarkable abruptness of style in the first movement, an abruptness which is characteristic, not of im- maturity, but of art in which problems are successfully solved for the first time. This abruptness is, however, in a few of Beethoven's early works carried appreciably too far. In the sonata in C minor, op. 10, No. 1, for example, the more vigorous parts of the first movement lose in breadth from it, while the finale is almost stunted.

But Beethoven was not content to express his individuality only in an abrupt epigrammatic style. From the outset breadth was also his aim, and while he occasionally attempted to attain a greater breadth than his resources would properly allow (as in the first movement of the sonata, op. 2, No. 3, and that of the violoncello sonata, op. 5, No. 1, in both of which cases a kind of extempore outburst in the coda conceals the collapse of his peroration), there are many early works in which he shows neither abruptness of style nor any tendency to confine himself within the limits of previous art. The C minor trio, op. 1, No. 3, is not more remarkable for the boldness of thought that made Haydn doubtful as to the advisability of publishing it, than for the perfect smoothness and spaciousness of its style. These qualities Beethoven at first naturally found easier to retain with less dramatic material, as in the other trios in the same opus, but the C minor trio does not stand alone. It represents, per- haps, the most numerous, as

certainly the noblest, class of Beethoven's early works. Certainly the smallest class is that in which there is unmistakable imitation of Mozart, and it is significant that almost all examples of this class are works for wind instruments, where the technical limitations narrowly determine the style and discourage the composer from taking things seriously. Such works are the beautiful and popular septet, the quintet for pianoforte and wind instruments (modelled superficially, yet closely and with a kind of modest ambition, on Mozart's wonderful work for the same combination) and, on a somewhat higher level, the trio for pianoforte, clarinet and violoncello, op. n.

It is futile to discuss the point at which Beethoven's second manner may be said to begin, but he has himself given us ex- cellent evidence as to when and how his first manner (as far as that is a single thing) became impossible to him. Through quite a large number of works, beginning perhaps with the great string quintet, op. 29, new types of harmonic and emotional expression had been assimilated into a style at least intelligible from Mozart's point of view. Indeed, Beethoven's favourite way of enlarging his range of expression often seems to consist in allowing the Titanic force of his new inventions and the formal beauty of the old art to indicate by their contrast a new world grander and lovelier than either. Sometimes, as in the C major quintet, the new elements are too perfectly assimilated for the contrast to appear. The range of key and depth of thought is beyond that of Beethoven's first manner, but the smoothness is that of Mozart. In the three pianoforte sonatas, op. 31, the struggle of the transition is as manifest as its accomplishment is triumphant. The first movement of the first sonata (in G major) deals with widely separated keys on new principles. These are embodied in a style which for abruptness and jocular paradox is hardly surpassed by Beethoven's most nervous early works. The exceptionally ornate and dilatory slow movement reads almost like a protest; while the finale begins as if to show that humour should be beautiful, and ends by making fun of the beauty. The second sonata (in D minor) is the greatest work Beethoven had as yet written. Its first movement, already cited above in connexion with the dramatic sequences in op. 2, No. 2, is, like that of the Sonata Appassionata, a locus classicus for such

powerful means of expression. And it is worth noting that the only sketch known of this movement is a sketch in which nothing but its sequential plan is indicated. In the third sonata Beet- hoven enjoys on a higher plane an experience he had often indulged in before, the attainment of smoothness and breadth by means of a delicately humorous calm which gives scope to the finer subtleties of his new

thoughts.

Beethoven himself wrote to his publisher that these three sonatas represented a new phase in his style; but when we realize his artistic conscientiousness it is not surprising that they should be contemporary with larger works like the 2nd sym- phony, which are far more characteristic of his first manner. His whole development is entirely ruled by his determination to let nothing pass until it has been completely mastered, and long before this his sketch-books show that he had many ambitious ideas for a 1st symphony, and that it was a deliberate process that made his ambitions dwindle into something that could be safely realized in the masterly little comedy with which he began his orchestral career. The easy breadth and power of the 2nd symphony represents an amply sufficient advance, and leaves his forces free to develop in less expensive forms those vast energies for which afterwards the orchestra and the string-quartet were to become the natural field.

In the " Waldstein " sonata, op. 53, we see Beethoven's second manner literally displacing his first; that is to say, we reach a state of things at which the two can no longer form an artistic contrast. The work, as we know it, is not only perfect, but has all the qualities of art in which the newest elements have long been familiar. The opening is on the same harmonic train of thought as that of the sonata, op. 31, No. 1, but there is no longer the slightest need for a paradoxical or jocular manner. On the contrary, the harmonies are held together by an orderly sequence in the bass, and the onrush is that of some calm diurnal energy of nature. The short introduction to the finale is har- monically and emotionally the most profound thing in the sonata, while the finale itself uses every new resource in the triumphant attainment of a leisure more splendid than any conceivable in the most spacious of Mozart's rondos. Yet it is well known that Beethoven originally intended the beautiful andante in F, afterwards published separately, to be the slow movement of this sonata. That andante is, like the finale, a spacious and gorgeous rondo, which probably Beethoven himself could not have written at an earlier period. The modulation to D flat in its principal theme, and that to G flat near the end, are its chief harmonic effects and stand out in beautiful relief within its limits. After the first movement of the Waldstein sonata they would be fiat and colourless. The sketch-books show that Beethoven, when he first planned the sonata, was by no means inattentive to the balance of harmonic colour in the whole scheme, but that at first he did not realize how far that scheme was going to carry hirn. He originally thought of the slow movement as in E major, a remote key to which, however, he soon assigned the

more intimate position of complementary key in the first movement. He then worked at the slow movement in F with such zest that he did not discover until the whole sonata was finished that he had raised the. first and last movements to an altogether higher plane of thought, though the redundancy of the two rondos in juxtaposition and the unusual length of the sonata were so obvious that his friends ventured to point them out. Beethoven's revision of his earliest works is now known to have been extensive and drastic; but this is the first instance, and Fidelio and the quartet in B flat, op. 131, are the only other instances, of any later work needing important alteration after it was completely executed. From this point up to op. 101 we may study Beethoven's second manner entirely free from any survivals of his first, even as a legitimate contrast; though it is as impossible to fix a point before which his third manner cannot be traced as it is to ignore the premonitions of his second manner in his early works. The distinguishing features in Beethoven's second style are the result of a condition of art in which enormous new possibilities have become so well known that there is no need for stating them abruptly, paradoxically 01

emphatically, but also no need for working them out to remote conclusions. Hence these works have become for most people the best-known and best-loved type of classical music. In their perfect fusion of untranslatable dramatic emotion with every beauty of musical design and tone they have never been equalled, nor is it probable that any other art can show a wider range of thought embodied in a more perfect form. In music itself there is nothing else of so wide a range without grave artistic defects from which Beethoven is entirely free. Wagnerian opera aims at an ideal as truly artistic, and in so far of wider range than Beethoven's that it passes beyond the bounds of pure music altogether. Within those bounds Beethoven remained, and even the apparent exceptions (such as Fidelio and his two great ' examples of " programme music," the Pastoral Symphony and the sonata, Les Adieux) only show how universal his conception of pure music is. Extraneous ideas had here struck him as magnificent material for instrumental music, and he never troubled to argue whether instrumental music is the better or worse for expressing extraneous ideas. To describe the works of Beethoven's second period here would be to describe a library of well-known classics, and we must refer the reader for further details to the articles on Sonata Forms, Contrapuntal Forms, Harmony and

Instrumentation. It remains for us to attempt to indicate the essential features of his third style, and to conclude with a survey of his influence on the history of music.

Beethoven's third style arose imperceptibly from his second. His deafness had very little to do with it, for all his epoch-making discoveries in orchestral effect date from the time when he was already far too much inconvenienced to test them in a way which would satisfy any one who depended more upon his ear than upon his imagination. It is indeed highly probable that there are no important features in Beethoven's latest style that may not be paralleled by the tendencies of all great artists who have handled their material until it contains nothing that has not been long familiar with them. Such tendencies lead to an extreme simplicity of form, underlying an elaboration of detail which may at first seem bewildering until we realize that it is purely the working out to its logical conclusions of some idea as simple and natural as the form itself. The form, however, will be not merely simple, but individual. Different works will show such striking external differences of form that a criticism which applies merely a priori or historic standards will be tempted by the fallacy that there is less form in a number of such markedly different works than in a number of works that have one scheme in common. All this is eminently the case with Beethoven's last works. The extreme simplicity of the themes of the first two movements of the quartet in B flat, op. 131, and the tremendous complexity of the texture into which they are woven, at first impress us as some- thing mysterious and intangible rather than astonishing. The boldness with which the slow introduction is blended in broad statement and counter-statement with the allegro, is directly impressive, as is also the entry of the second subject with its dark harmony and tone, but the work needs long familiarity before its vast mass of thought reveals itself to us in its true lucidity. Such works are "dark with excessive bright." When we enter into them they are transparent as far as our vision extends, and their darkness is that of a depth that shines as we penetrate it. In all probability only a veil of familiarity prevents our finding the same kind of difficulty in Beethoven's earlier works. What is undoubtedly newest in the last works is the enormous development of those polyphonic elements which are always essential to the life of a composition, but which have very different functions and degrees of prominence in different forms and stages of the art. Polyphony inevitably draws attention to detail, and thus Beethoven in his middle period found its more obvious manifestations but little conducive to the breadth of designs which were not as yet sufficiently familiar to take any but

the foremost place. Hence, among other interesting features of that second period, his marked preference for themes founded on rhythmic figures of one note, e.g. the famous " four taps " in the C minor symphony; an identical rhythm in a melodious theme of very different character in the

G major concerto;, a similar figure in the Sonata Appassionala; the first theme of the scherzo of the F major quartet, op. 59, No. 1, and the drum-beats in the violin concerto. Such rhythms give thematic life to an inner part without causing it to assume such melodic interest as might distract the attention from the flow of the surface. But in proportion as polyphony loses its danger so does the prominence of such rhythmic figures decrease, until in Beethoven's last works they are no mere noticeable than other kinds of simplici ty . The impression of crowded detail is naturally more prominent the smaller the means with which Beethoven works and the less outwardly dramatic his thought. Thus those most gigantic of all musical designs, the 9th symphony, and the Mass in D, are, but for the mechanical difficulties of the choral writing, almost like works of the second period as far as direct impressiveness is concerned; and in the same way the enormous pianoforte sonata, op. 106, is in its first three move- ments easier to follow than the extremely terse and subtle works on a smaller scale that preceded it (sonata in A major, 101, and the two sonatas for violoncello, op. 102).

His enormous development of polyphonic interest soon led Beethoven to employ the fugue, not only, as in previous works, by way of episodic contrast to passages and designs in which the form and not the texture is the main object of interest, but as the culminating expression of a condition or art in which the unity of form and texture is so perfect that the mind is free to concentrate itself on the texture alone. This union was not effected without a struggle, the traces of which present a close parallel to that abrupt emphasis which we noticed in some of Beethoven's early works. In his fugue-writing the notion that the chief interest lies in the texture is as yet so difficult to hold together with the perception that these fugues are based on a modern firmness and range of form, that the texture is forced upon the listener's attention by a continual series of ruthlessly logical bold strokes of harmony. From this and from the notorious violence of Beethoven's choral writing, and also from his well-known technical struggles in his years of pupilage, the easy inference has been drawn that Beethoven never was a great master of counterpoint, an inference that is absolutely irreconcil- able with such plain facts as, to take but one early example, the brilliant piece of triple counterpoint in the andante of the string quartet in C minor, op. iS,

No. 4, and the complete absence of anything like crudeness in his handling of harmonies, basses or inner parts at any period of his career. Beethoven may have mastered some things with difficulty, but he mastered nothing incompletely; and where he is not orthodox it is safest to conclude that orthodoxy is wrong. Had he lived for another ten years he would certainly have produced an immense amount of choral work, and with it many other great instrumental works in which this last remaining element of conflict between texture and form would have dwindled away. But while this would doubtless result in such work being easier to follow and might even have given us a version of the great fugue, op. 133 (discarded from the string-quartet, op. 131), that did not surpass the bounds of practical performance, it would yet be no sound criterion by which to stigmatize as an immaturity the roughness of the polyphonic works that we know. That roughness is, like the abrupt epigrammatic manner of some of his early works, the necessary condition in which such material realizes mature expression. Without it that material could receive but the academic handling of a dead language. And by it was created that permanent reconciliation of polyphony and form from which has arisen almost all that is true in " Romantic " music, all that is peculiar to the thematic technique of Wagnerian opera, and all the perfect smoothness of Brahms's polyphony.

The incalculable depth of thought and closeness of texture in Beethoven's later works are, of course, the embodiment of a no less incalculable emotional power. If we at times feel that the last quartets are more introspective than dramatic, that is only because Beethoven's dramatic sense is higher than we can realize. The subject is too large and too subtle for dogmatism to be profitable; and we cannot in Beethoven's case, as we can in Bach's, cite a complete series of illustrations of his musical

ideas from his treatment in choral music of words which them- selves interpret the intention of the composer. There is so little but the music itself by which one can express Beethoven's thought, that the utmost we can do here is to refer the reader, as before, to the articles on Sonata Forms, Harmony, Instru- mentation, Opera and Music, where he will find further attempts to indicate in what sense pure music can be described as dramatic and expressive of emotion.

As our range of investigation widens, and thoroughness of analysis

and study increases, so we shall surely find in ourselves an ever-deepening conviction that Beethoven, whether in range, depth and truth of thought, perfect sense of beauty, or absolute conscientiousness of execution, is the greatest musician, per- haps the greatest artist, that ever lived. There is no means of measuring Beethoven's influence upon subsequent music. Every composer of every school claims it. The immense changes he brought about in the range of music have their most obvious effect in the possibilities of emotional expression; and so any outbreak of vulgarity or sentimentality can with impunity claim descent from Beethoven, though its ancestry may be no higher than Meyerbeer. Again, we have already referred to that confusion of thought which regards a series of works markedly different in form as containing less form than any number of works cast in one mould. Hence the works of Beethoven's third period have been cited in defence of more than one " revolution," attempted in a form which never existed in any true classic, for the purpose of setting up something the revolutionist has not yet succeeded in inventing. To measure Beethoven's influence is like measuring Shakespeare's. It is an influence either too vaguely universal to name or too profoundly artistic to analyse. Perhaps the truest account of it would be that which ignored its presence in the works of ill-balanced artists, or even in the works of those who profited merely by an increase of technical and harmonic resource which, though effected by Beethoven, would, after the French Revolution and the Napoleonic wars, almost certainly have to some extent arisen from sheer necessity of finding expression for the new experience of humanity, if Beethoven had never existed. Setting aside, then, all instances of mere domina- tion, and of a permanently established new world of musical thought, and omitting Schubert and Weber as contemporaries, the one attracted and the other partly repelled, we may, perhaps, take three later composers, Schumann, Wagner and Brahms, as the leading examples of the way in which Beethoven's influence is definitely traceable as a creative force. The depth and solemnity of Beethoven's melody and later polyphonic richness is a leading source of Schumann's inspiration, though Schumann's artistic schemes exclude any high degree of formal organization on a large scale. Beethoven's late polyphony is carried on by Brahms to the point at which perfect smoothness of style is once more possible, and there is no aspect of his form which Brahms neglects or fails to realize with that complete originality which has nothing to fear from its ancestry. Wagner does not handle the same art-forms; his task is different, but Beethoven was the inspiring source, not only of his purely musical sense, but also of his whole sense of dramatic contrast and fitness. When he had shaken off the

influence of Meyerbeer, which has so often been confused with that of Beethoven, there remained to him, pre- eminently in his music and more imperfectly realized in his drama, a power of combining contrasted emotions such as is the privilege of only the very greatest dramatic artists. Bach and Beethoven are the sources of the polyphonic means of expression by which he attains this. Beethoven alone is the extraneous source of his knowledge that it was possible. And it is as certain as anything in the history of art that there will never be a time when Beet- hoven's work does not occupy the central place in a sound musical mind.

Annotated List of Beethoven's Works

Up to 1823 we give in most cases the dates of publication, the date of composition being generally from one to three years earlier. Beethoven seldom had less than a dozen projects in hand at once, and their immediate chronology is inextricable ; whereas publication generally means final revision. This list is purposely incomplete

in order that unimportant works may not distract attention, even when they are late and on a large scale.

Sonata = Pianoforte sonata.

Violin or violoncello sonata = for pianoforte, V. or Vc.

Pianoforte trio = Pfte., V., Vc.

Pianoforte quartet = Pfte., V., viola and Vc.

String trio = V., Va., Vc.

String quartet = VV, Va. and Vc.

Pianoforte or violin concerto = Concerto with orchestra. 1 785. 3 pfte. quartets, of which the third contains important material for the sonatas, op. 2, Nos. 1 and 3.

(Thayer's attribution of the masterly bagatelles, op. 33,

Cublished 1803, to this period can only be rationalized y some similar rough first idea.) 1790. 24 variations on an air by Righini (published 1801). A very remarkable work, anticipating Schumann's Papillons in its humorous close. It was Beethoven's chief early tour-de-force in pianoforte playing. J 795- 3 pfte. trios, op. 1 (Et>, G, C minor). I796- 3 pfte- sonatas, op. 2 (F minor, A and C, dedicated to

Haydn).

1797. String trio, op. 3, 2 violoncello sonatas, op. 5, F and G mi.,

sonata, op. 7, Eb.

1798. 3 string trios, op. 9; G, D, C mi., 3 sonatas, op. 10 (C mi.

F, D). Trio for pfte., clarinet and violoncello in Bb,op. II. J 799- 3 violin sonatas (D, A, Eb), op. 12. Pfte. sonata (Pathetique not Beethoven's title) C mi., op. 13, 2 pfte. sonatas, op. 14, E, G (the first arranged by the composer as a string quartet inF).

1801. Pianoforte concertos, op. 15 in C, op. 19 in Bb (the latter

composed first). Quintet for pianoforte and wind instru- ments, op. 16 (also arranged, with new details, as quartet for pianoforte and strings), composed 1797. 6 string quartets, op. 18 (F, G, D, C mi., A, Bb). 1st symphony ©, op. 21. 2 violin sonatas, A mi., op. 23; F ma., op. 24 (made into two opus-numbers by an accident in the format of the volumes).

1802. Pianoforte score of the Prometheus ballet, op. 24 (ousted by

the F ma. violin sonata, and reissued as op. 43). Sonata in Bt>, op. 22. Sonata in Ab, op. 26 (with the funeral march). 2 sonatas (" quasi fantasia "), op. 27, Eb, C#mi. Sonata in D, op. 28 (Pastorale not Beethoven's title) . String quintet in C, . 29.

1803. 3 violin sonatas, op. 30 (A, C mi., G). 3 sonatas, op. 31, G,

D mi., Eb (the last appearing in 1804).

Variations, op. 34. 1 5 variations and fugue on theme from Prometheus, op. 35.

1804. 2nd symphony (D), op. 36 (1802). 3rd pfte. concerto (C mi.),

op- 37 (1800).

1805. The " Kreutzer " sonata, op. 47, for pfte. and violin (A)

(finale at first intended for op. 30, No. 1).

" Waldstein " sonata for pfte., op. 53 ©. First version of opera Leonore in three acts (with overture " No. 2 ").

1806. Sonata in F, op. 54. Eroica Symphony, No. 3. op. 55 (Eb),

written in 1804 in honour of Napoleon Bonaparte. It was just finished when news arrived that Napoleon had made himself emperor, and Beethoven was with dimculty restrained from destroying the score. It is still the longest extant perfect design in instrumental music. The finale glorifies the material (and much of the form) of the varia- tions, op. 35. The scherzo is the first full-sized example of Beethoven's special type.

Leonore reproduced in two acts with overture No._ 3. 32 variations in C mi. (no oˆKS-number, but a very im- portant work on the lines of a modernized chaconne).

1807. Triple concerto (pfte., V. and Vc), op. 56, chiefly interesting

as a study for the true concerto-form which had given Beethoven difficulty. Sonata, op. 57 (F mi., Appassionata not Beethoven's title). New overture, Leonore, " No. 1," composed for projected performance of the opera at Prague (posthumously published as op. 138).

1808. 4th pfte. concerto, op. 58 (G). 3 string quartets, op. 59, F,

E mi., C (dedicated to Count Rasoumovsky, in compliment to whom Russian tunes appear in the finale of No. I and the scherzo of No. 2). Overture to Coriolanus, op. 62.

1809. 4th symphony, e£. 60 (Bb). Violin concerto (D), op. 61 (also

arranged by the composer for pianoforte). 5th symphony, op. 67 (C mi.) (1806), the first in which trombones appear. 6th symphony [Pastorale), op. 68; violoncello sonata, op. 69 (A). 2 pianoforte trios, op. 70 (D, Eb).

1810. Pianoforte score oi Leonore (2nd version) published. String

quartet, op. 74 (Eb, called " Harp " because of pizzicato passages in first movement). Fantasia, op : 77, interesting as consisting of a long and capricious series of dramatic beginnings and breakings off of themes, as if in search for a firm idea, which is at last found and developed as a set of variations. This scheme thus foreshadows the choral finale of the 9th symphony even more significantly than the Choral Fantasia.

Sonata, op. 78, F# (extremely terse and subtle, and a great favourite

with Beethoven, who preferred it to the C#mi.).

1811.

5th pfte. concerto, op. 73, Eb (The Emperor not Beethoven's title). Fantasia for pfte., orchestra and chorus, op. 80. Sonata, op. 81a (Les Adieux, I'absence, et le retour), first movement written when the archduke Rudolph had to leave Vienna (4th May 1809), and the rest on his return on the 30th of January 18 10. It was an anxious time both for Beethoven and his excellent royal friend, for whom he had great affection. (Battle of Wagram, 6th July 1809.) (We may here note that op. 81b is an unimportant and very early sextet.) The overture to Egmont, op. 84; Christus am Oelberge (the Mount of Olives), op. 85, oratorio (prob- ably composed between 1800 and its first performance in

1803).

The rest of the Egmont music, op. .84. 1st mass, op. 87 © (first performance, 1807).

Final version of Leonore, performed as Fidelio with great alterations, skilful revision of the libretto, very important new material in the music and a new overture. „ Sonata, op. 90 (E mi.). 1816. 7th symphony, op. 92 (A); 8th symphony, op. 93 (F) (Beet- hoven was planning a group of three of which the last was to be in D mi., which we shall find significant). String quartet, op. 95 (F mi.). Violin sonata, op. 96 (G). Piano- forte trio, op. 97 (Bb); Liederkreis, op. 98.

Sonata, op. 101 (the first indisputably in Beethoven's " third manner "). 2 violoncello sonatas, op. 102 (C, D, the second containing Beethoven's first modern instrumental strict fugue).

Arrangement for string quintet, op. 104, of C mi. trio, op. I, No. 3 (a wonderful study in translation, comparable only to Bach's arrangements and very unlike Beethoven's former essays of the kind). Sonata, op. 106 (Bb), the largest and most symphonic pianoforte work extant, surpassed in length only by Bach's Goldberg variations and Beethoven's 33 variations on Diabelli's waltz.

25 Scotch songs accompanied by pfte., V. and Vc, op. 108 (the first

set of a large and much neglected collection, mostly posthumous, many of great interest and beauty and very Beethovenish, which has shocked persons who expect sympathetic insight into folk-music to prevail over Beethoven's artistic impulse). Sonata, op. 109 (E).

Sonata, op. 1 10 (A\>). Overture, Die Weihe des Houses, op. 124 ©, a magnificent essay in orchestral free fugue, published 1825.

Sonata, op. 1.11 (C mi., the last pianoforte sonata). 33 varia- tions on a waltz by Diabelli, who sent his waltz round to fifty-one musicians in Austria asking each to contribute a variation; the whole to be published for the benefit of the widows .and orphans left by the war. Beethoven answered with the greatest set ever written, and it was published in a separate volume. Among the other fifty composers were Schubert and an infant prodigy of eleven, Franz Liszt!

The mass in D (Missa Solemnis), op. 123, begun in 1818 for the installation of the archduke Rudolph as arch- bishop of Olmutz, was not finished until 1826, two years after the installation.

The 9th symphony, op. 125 D mi. (see note on 7th and 8th symphonies); sketches begun 1817; project of setting Schiller's Freude already in Beethoven's mind before he left Bonn.

6 bagatelles, op. 126, Beethoven's last pianoforte work a very remarkable and unaccountably neglected group of carefully contrasted lyric pieces.

String quartet, op. 127 (Eb, published 1826).

String quartet, op. 130 (Bb), with finale, op. 133 (grand fugue) ; string quartet, op. 132 (A mi., with slow movement in Lydian mode, a Heiliger Dankgesang on recovery from illness. Theme of finale first thought of as for instrumental finale to 9th symphony).

String quartet, op. 131 (C#, mi.). String quartet, o£. 135 (F). New finale to op. 1 %o, Beethoven's last composition.

(D. F. T.)

Authorities. — A. W. Thayer, Beethovens Leben (1866-1879); L. Nohl, Life of Beethoven (Eng. trans., 1884), and Letters (Eng. trans., 1866); Sir G. Grove, Beethoven and his Symphonies (1896), and in Grove's Dictionary of Music.

BEETLE (0. Eng. bityl; connected with " bite "), a name commonly

applied to those insects which possess horny wing- cases; it is used to denote the cockroaches (q.v.) (black beetles), as well as the true beetles or Coleoptera (q.v.), the two belonging to different orders of Insecta.

The adjective " beetle-browed," and similarly " beetling " (of a cliff), are derived from the name of the insect. From another word (O. Eng. betel, connected with " beat ") comes " beetle " in the sense of a mallet, and the " beetling-machine," which subjects fabrics to a hammering process.

1814.

1815.

1817.

1819.

1821.

1822.

1823.

1824. 1825.

1826.

BEETS, NIKOLAAS (1814-1903), Dutch poet, was born at Haarlem on the 13th of September 1814; constant references in his poems and sketches show how deeply the beauty of that town and its neighbourhood impressed his imagination. He studied theology in Leiden, but gave himself early to the cultiva- tion of poetry. In his youth Beets was entirely carried away on the tide of Byronism which was then sweeping over Europe, and his early works — Jose (1834), Kuser (1835) and Guy de Vlaming (1837) — are gloomy romances of the most impassioned type. But at the very same time he was beginning in prose the composite work of humour and observation which has made him famous, and which certainly had nothing that was in the least Byronic about it. This was the celebrated Camera Obscura (1839), the most successful imaginative work which any Dutch- man of the 19th century produced. This work, published under the pseudonym of " Hildebrand," goes back in its earliest inception to the year 1835, when Beets was only twenty-one. It consists of complete short stories, descriptive sketches, studies of

peasant life — all instinct with humour and pathos, and written in a style of great charm; it has been reprinted in countless editions. Beets became a professor at the university of Leiden, and the pastor of a congregation in that city. In middle life he published further collections of verse — Cornflowers (1853) and New Poems (1857) — in which the romantic melancholy was found to have disappeared, and to have left in its place a gentle sentiment and a depth of religious feeling. In 1873-1875 Beets collected his works in three volumes. In April 1883 the honorary degree of LL.D. Edin. was conferred upon him. He died at Utrecht on the 13 th "of March 1903.

BEFANA (Ital., corrupted from Epifania, Epiphany), the Italian female counterpart of Santa Claus, the Christmas bene- factor (St Nicholas). On Epiphany, or Twelfth Night, she plays the fairy godmother to the children, filling their stockings with presents. Tradition relates that she was too busy with house duties to come to the window to see the Three Wise Men of the East pass on their journey to pay adoration to the Saviour, excusing herself on the ground that she could see them on their return. They went back another way, and Befana is alleged to have been punished by being obliged to look for them for ever. Her legends seem to be rather mixed, for in spite of her Santa Claus character, her name is used by Italian mothers as a bogey to frighten the babies. It was the custom to carry her effigy through Italian towns on the eve of the Epiphany.

BEFFROY DE REIGNY, LOUIS ABEL (1757-1811), French dramatist and man of letters, was born at Laon on the 6th of November 1757. Under the name of "Cousin Jacques" he founded a periodical called Les Lunes (1785-1 787). The Courrier des planetes ou Correspondance du Cousin Jacques avec le firma- ment (1 788-1 792) followed. Nicodeme dans la lune, ou la revolu- tion pacifique (1790) a three-act farce, is said to have had more than four hundred representations. In spite of his protests against the evils of the Revolution he escaped interference through the influence of his brother, Louis Etienne Beffroy, who was a member of the Convention. Of La Petite Nanette (1795) and several other operas he wrote both the words and the music. His Dictionnaire neologique (3 vols., 1795-1800) of the chief actors and events in the Revolution was interdicted by the police and remained incomplete. Beffroy spent his last years in retirement, dying in Paris on the 17th of December 1811.

BEGAS, KARL (1794-1854), German historical painter, was born at Heinsberg near Aix-la-Chapeile. His father, a retired judge, destined

him for the legal profession, but the boy's tastes pointed definitely in another direction. Even at school he was remarked for his wonderful skill in drawing and painting, and in 181 2 he was permitted to visit Paris in order to perfect himself in his art. He studied for eighteen months in the atelier of Gros and then began to work independently. In 18 14 his copy of the Madonna della Sedia was bought by the king of Prussia, who was attracted by the young artist and did much to advance him. He was engaged to paint several large Biblical pictures, and in 1825, after his return from Italy, continued to produce paintings which were placed in the churches of Berlin and

Potsdam. Some of these were historical pieces, but the majority were representations of Scriptural incidents. Begas was also celebrated as a portrait-painter, and supplied to the royal gallery a long series of portraits of eminent Prussian men of letters. At his death he held the post of court painter at Berlin. His son Oskar (1 828-1883) was also a painter and professor of painting at Berlin. Reinhold, the sculptor, is noticed below.

BEGAS, REINHOLD (183 1-), German sculptor, younger son of Karl Begas, the painter, was born at Berlin on the 15th of July 1831. He received his early education (1846-1851) in the ateliers of C. D. Rauch and L. Wichmann. During a period of study in Italy, from 1856 to 1858, he was influenced by Bocklin and Lenbach in the direction of a naturalistic style in sculpture. This tendency was marked in the group " Borussia," executed for the facade of the exchange in Berlin, which first brought him into general notice. In 1861 he was appointed professor at the art school at Weimar, but retained the appointment only a few months. That he was chosen, after competition, to execute the statue of Schiller for the Gendarmen Markt in Berlin, was a high tribute to the fame he had already acquired; and the result, one of the finest statues in the German metropolis, entirely justified his selection. Since the year 1870, Begas has entirely dominated the plastic art in Prussia, but especially in Berlin. Among his chief works during this period are the colossal statue of Borussia for the Hall of Glory; the Neptune fountain in bronze on the Schlossplatz; the statue of Alexander von Hum- boldt, all in Berlin; the sarcophagus of the emperor Frederick III. in the mausoleum of the Friedenskirche at Potsdam; and, lastly, the national monument to' the emperor William (see Berlin), the statue of Bismarck before the Reichstag building, and several of the

statues in the Siegesallee. He was also entrusted with the execution of the sarcophagus of the empress Frederick.

See A. G. Meyer, " Reinhold Begas " in Kiinstler-Monographien, ed. H. Knackfuss, Heft xx. (Bielefeld, 1897; new ed., 1901).

BEGGAR, one who begs, particularly one who gains his living by asking the charitable contributions of others. The word, with the verbal form " to beg," in Middle English beggen, is of obscure history. The words appear first in English in the 13th century, and were early connected with " bag," with reference to the receptacle for alms carried by the beggars. The most probable derivation of the word, and that now generally accepted, is that it is a corruption of the name of the lay communities known as Beguines and Beghards, which, shortly after their establishment, followed the friars in the practice of mendicancy (see Beguines). It has been suggested, however, that the origin of " beg " and " beggars " is to be found in a rare Old English word, bedecian, of the same meaning, which is apparently connected with the Gothic bidjan, cf. German betteln; but between the occurrence of bedecian at the end of the 9th century and the appearance of " beggar " and " beg " in the 13th, there is a blank, and no explanation can be given of the great change in form. For the English law relating to begging and its history, see Charity, Poor Law and Vagrancy.

BEGGAR-MY-NEIGHBOUR, a simple card-game. An ordinary pack is divided equally between two players, and the cards are held with the backs upwards. The first player lays down his top card face up, and the opponent plays his top card on it, and this goes on alternately as long as no court-card appears; but if either player turns up a court-card, his opponent has to play four ordinary cards to an ace, three to a king, two to a queen, one to a knave, and when he has done so the other player takes all the cards on the table and places them under his pack; if, however, in the course of this playing to a court-card, another court-card turns up, the adversary has in turn to play to this, and as long as neither has played a full number of ordinary cards to any court-card the trick continues. The player who gets all the cards into his hand is the winner.

BEGONIA (named from M. Begon, a French patron of botany), a large genus (natural order, Begoniaceae) of succulent herbs or undershrubs, with about three hundred and fifty species in tropical moist climates, especially South America and India. About one hundred and fifty species are known in cultivation,

and innumerable varieties and hybrid forms. Many are tuberous. The flowers are usually showy and large, white, rose, scarlet or yellow in colour; they are unisexual, the male containing numerous stamens, the female having a large inferior ovary and two to four branched or twisted stigmas. The fruit is a winged capsule containing numerous minute seeds. The leaves, which are often large and variegated, are unequal-sided.

Cuttings from flowering begonias root freely in sandy soil, if placed in heat at any season when moderately firm; as soon as rooted, they should be potted singly into 3-in. pots, in sandy loam mixed with leaf -mould and sand. They should be stopped to keep them bushy, placed in a light situation, and thinly shaded in the middle of very bright days. In a few weeks they will require another shift. They should not be overpotted, but instead assisted by manure water. The pots should be placed in a light pit near the roof glass. The summer-flowering kinds will soon begin blooming, but the autumn and winter flowering sorts should be kept growing on in a temperature of from 55° to 60° by night, with a few degrees more in the day. The tuberous- rooted sorts require to be kept at rest in winter, in a medium temperature, almost but not quite dry. In February they should be potted in a compost of sandy loam and leaf-mould, and placed in a temperate pit until May or June, when they may be moved to the greenhouse for flowering. If they afterwards get at all pot-bound, weak manure should be applied. After blooming, the supply of water must be again slackened; in winter the plants should be stored in a dry place secure from frost; they are increased by late summer and autumn cuttings, after being partially cut down.

BEGUINES (Fr. beguine, Med. Lat. beguina, begina, beghina), at the present time the name of the members of certain lay sisterhoods established in the Netherlands and Germany, the enclosed district within which they live being known as a be- guinage (Lat. beginagium). The equivalent male communities, called also Beguines (Fr. beguins, Lat. beguini), but more usually Beghards (Lat. baghardi, beggardi, begehardi, &c, O. Fr. begard-t, Flem. beggaert), have long ceased to exist. The origin of the names Beguine and Beghard has been the subject of much controversy. In the 15th century a legend arose that both name and organization were traceable to St Begga, daughter of Pippin of Landen, who consequently in 1630 was chosen by the Beguines as the patron saint of their association. In 1630 a professor of Louvain, Erycius Puteanus (van Putte), published a treatise, De Begginarum apud Belgas instituto et nomine sujfragutm, in which he produced three documents purporting to date from the nth and 12th centuries, which

seemed conclusively to prove that the Beguines existed long before Lambert le Begue. For two centuries these were accepted as genuine and are admitted as such even in the monumental work of Mosheim. In 1843, however, they were conclusively proved by the German scholar Kallmann, from internal evidence, to be forgeries of the 14th and 15th centuries. It is now universally admitted that both the institution and the name of the Beguines are derived from Lambert le Begue, who died about the year 1 187. The confusion caused by the spurious documents of Puteanus, however, led, even when the legend of St Begga was rejected, to other sugges- tions for the derivation of the name, e.g. from an imaginary old Saxon word beggen, " to beg " or " pray," an explanation adopted even by Mosheim, or from begue, " stammering," a French word of unknown origin, which only brings us back to Lambert again, whose name of Le Begue, as the chronicler Aegidius, a. monk of Orval (Aureae Vallis), tells us, simply means " the stammerer," quia balbus erat (Gesta pontificum Leodiensium, c. a.d. 1251). Doubtless this coincidence gave a ready handle to the scoffing wits of the time, and among the numerous popular names given to the Beghards — bans garcons, boni pueri, boni valeti and the like — we find also that of Lollards (from Flemish lollen, " to stammer ").

About the year n 70 Lambert le Begue, a priest of Liege, who had devoted his fortune to founding the hospital and church of St Christopher for the widows and children of crusaders, conceived the idea of establishing an association of women, who,

without taking the monastic vows, should devote themselves to a life of religion. The effect of his preaching was immense, and large numbers of women, many of them left desolate by the loss of their husbands on crusade, came under the influence of a movement which was attended with all the manifestations of what is now called a " revival." About the year 1180 Lambert gathered some of these women, who had been ironically styled " Beguines " by his opponents, into a semi-conventual com- munity, which he established in a quarter of the city belonging to him around his church of St Christopher. The district was surrounded by a wall within which the Beguines lived in separate small houses, subject to no rule save the obligation of good works, and of chastity so long as they remained members of the community. After Lambert's death (c. 11 87?) the movement rapidly spread, first in the Netherlands and afterwards in

France —where it was encouraged by the saintly Louis IX. — Germany, Switzerland and the countries beyond. Everywhere the com- munity was modelled on the type established at Liege. It constituted a little city within the city, with separate houses, and usually a church, hospital and guest-house, the whole being under the government of a mistress (magistra). Women of all classes were admitted; and, though there was no rule of poverty, many wealthy women devoted their riches to the common cause. The Beguines did not beg; and, when the endowments of the community were not sufficient, the poorer members had to support themselves by manual work, sick-nursing and the like.

The Beguine communities were fruitful soil for the missionary enterprise of the friars, and in the course of the 13th century the communities in France, Germany and upper Italy had fallen under the influence of the Dominicans and Franciscans to such an extent that in the Latin-speaking countries the tertiaries of these orders were commonly called beguini and beguinae. The very looseness of their organization, indeed, made it inevitable that the Beguine associations should follow very diverse develop- ments. Some of them retained their original character; others fell completely under the dominion of the friars, and were ulti- mately converted into houses of Dominican, Franciscan or Augustinian tertiaries; others again fell under the influence of the mystic movements of the 13th century, turned in increasing numbers from work to mendicancy (as being neararthe Christ-life), practised the most cruel self-tortures, and lapsed into extravagant heresies that called down upon them the condemnation of popes and councils. 1 All this tended to lower the reputation of the Beguines. During the 14th century, indeed, numerous new beguinages were established; but ladies of rank and wealth ceased to enter them, and they tended to become more and more mere almshouses for poor women. By the 1 5th century in many cases they had utterly sunk in reputation, their obligation to nurse the sick was quite neglected, and they had, rightly or wrongly, acquired the reputation of being mere nests of beggars and women of ill fame. At the Reformation the communities were suppressed in Protestant countries, but in some Catholic countries they still survive. The beguinages found here and there in Germany are now simply almshouses for poor spinsters, those in Holland (e.g. at Amsterdam and Breda) and Belgium preserve more faithfully the characteristics of earlier days. The beguinage of St Elizabeth at Ghent has some thousand sisters, and occupies quite a distinct quarter of the city, being surrounded by a wall and moat. The Beguines wear the old Flemish head-dress and a dark costume, and are conspicuous for their kindness among the poor and their sick nursing.

It is uncertain whether the parallel communities of men originated also with Lambert le Begue. The first records are of communities at Louvain in 1220 and at Antwerp in 1228. The history of the male communities is to a certain extent parallel with the female, but they were never so numerous and their degeneration was far more rapid. The earliest Flemish Beghard communities were associations mainly of artisans who earned

1 In the year 1287 the council of Liege decreed that " all Beguinae

desiring to enjoy the Beguine privileges shall enter a Beguinage, and we order that all who remain outside the Beguinage shall wear a dress to distinguish them from the Beguinae."

their living by weaving and the like, and appear to have been in intimate connexion with the craft-gilds; but under the influence of the mendicant movement of the 13th century these tended to break up, and, though certain of the male beguinages survived or were incorporated as tertiaries in the orders of friars, the name of Beghard became associated with groups of wandering mendi- cants who made religion a cloak for living on charity; Mguigner becoming in the French language of the time synonymous with " to beg," and beghard with " beggar," a word which, according to the latest authorities, was probably imported into England in the 13th century from this source (see Beggar). More serious still, from the point of view of the Church, was the association of these wandering mendicants with the mystic heresies of the Fraticelli, the Apostolici and the pantheistic Brethren of the Free Spirit. The situation was embittered by the hatred of the secular clergy for the friars, with whom the Beguines were associated. Restrictions were placed upon them by the synod of Fritzlar (1269), by that of Mainz (1281) and Eichstatt (1281). and by the synod of Beziers (1299) they were absolutely for- bidden. They were again condemned by a synod held at Cologne in 1306; and at the synod of Trier in 13 10 a decree was passed against those " who under a pretext of feigned religion call themselves Beghards . . . and, hating manual labour, go about begging, holding conventicles and posing among simple people as interpreters of the Scriptures." Matters came to a climax at the council of Vienne in 131 1 under Pope Clement V., where the " sect of Beguines and Beghards " were accused of being the main instruments of the spread of heresy, and decrees were passed suppressing their organization and demanding their severe punishment. The decrees were put into execution by Pope John XXII., and a persecution raged in which, though the pope expressly protected the female Beguine communities of the Netherlands, there was little discrimination between the orthodox and unorthodox Beguines. This led to the utmost confusion, the laity in many cases taking the part of the Beguine com- munities, and the Church being thus brought into conflict with the secular authorities. In these circumstances the persecution died down; it was, however, again resumed between 1366 and 1378 by Popes Urban V. and Gregory XL, and the Beguines were not formally reinstated until the pontificate of Eugenius IV. (1431-1447). The male communities did not survive the 14th century, even in the Netherlands, where they had maintained their original character least impaired.

See J. L. von Mosheirn, De beghardis et beguinabus commentarius (Leipzig, 1790); E. Hallmann, Die Geschichte des Ursprungs der bclgischen Beghinen (Berlin, 1843); J. C. L. Gieseler, Eccles. Hist. (vol. iii., Fng. trans., Edinburgh, 1853), with useful excerpts from documents; Du Cange, Glossarium; Herzog-Hauck, Realencyklo-piidie (3rd ed., 1807) s. " Beginen," by Herman Haupt, where numerous further authorities are cited. (W. A. P.)

BEHAIM (or Beitem), MARTIN (1436?! 507), a navigator and geographer of great pretensions, was born at Nuremberg, according to one tradition, about 1436; according to Ghillany, as late as 1459. He was drawn to Portugal by participation in Flanders trade, and acquired a scientific reputation at the court of John II. As a pupil, real or supposed, of the astronomer " Regiomontanus " (i.e. Johann Muller of Konigsberg in Fran conia) he became (c. 1480) a member of a council appointed by King John for the furtherance of navigation. His alleged intro- duction of the cross-staff into Portugal (an invention described by the Spanish Jew, Levi ben Gerson, in the 14th century) is a matter of controversy; his improvements in the astrolabe were perhaps limited to the introduction of handy brass instru- ments in place of cumbrous wooden ones; it seems likely that he helped to prepare better navigation tables than had yet been known in the Peninsula. In 1484-1485 he claimed to have accompanied Diogo Cao in his second expedition to West Africa, really undertaken in 1485-86, reaching Cabo Negro in i5°4o' S. and Cabo Ledo still farther on. It is now disputed whether Behaim's pretensions, here deserve any belief; and it is'suggested that instead of sharing in this great voyage of discovery, the Nuremberger only sailed to the nearer coasts of Guinea, perhaps as far as the Bight of Benin, and possibly with Jose Visinho the

astronomer and with Joao Affonso d' Aveiro, in 1484-86. Martin's later history, as traditionally recorded, was as follows. On his return from his West African exploration to Lisbon he was knighted by King John, who afterwards employed him in various capacities; but, from the time of his marriage in i486, he usually resided at Fayal in the Azores, where his father-in-law, Jobst van Huerter, was governor of a Flemish colony. On a visit to his native city in 1492, he constructed his famous terrestrial globe, still preserved in Nuremberg, and often reproduced, in which the influence of Ptolemy is strongly apparent, but wherein some attempt is also made to

incorporate the discoveries of the later middle ages (Marco Polo, &c.) . The antiquity of this globe and the year of its execution, on the eve of the discovery of America, are noteworthy; but as a scientific work it is unim- portant, ranking far below the portolani charts of the 14th cen- tury. Its West Africa is marvellously incorrect; the Cape Verde archipelago lies hundreds of miles out of its proper place; and the Atlantic is filled with fabulous islands. Blunders of 16° are found in the localization of places the author claims to have visited: contemporary maps, at least in regard to continental features, seldom went wrong beyond 1°. It is generally agreed that Behaim had no share in Transatlantic discovery; and though Columbus and he were apparently in Portugal at the same time, no connexion between the two has been established. He died at Lisbon in 1507.

See C. G. von Murr, Diplomatische Geschichte des beruhmten Ritters Behaim (1778) ; A. von Humboldt, Kritische Untersuchungen (1836) ; F. W. Ghillany, Geschichte des Seefahrers Martin Behaim (1853); O. Peschel, Geschichte der Erdkunde, 214-215, 226, 251, and Zeitalter der Entdeckungen, esp. p. 90 ; Breusing, Zur Geschichte der Geographic (1869); Eugen Gelcich in the Mittheilungen of the Vienna Geo- graphical Society, vol. xxxvi. pp. 100, &c; E. G. Ravenstein, Martin de Bohemia (Lisbon, 1900), Martin Behaim, His Life and His Globe (London, 1909), and Voyages of Diogo Cao and Bartholomeu Dias, 1 482-1488, in Geographical Journal, Dec. 1900; see also Geog. Journal, Aug. 1893, p. 175, Nov. 1901, p. 509; Jules Mees in Bull. Soc. Geog., Antwerp, 1902, pp. 182-204; A. Ferreira de Serpa in Bull. Soc. Geog., Lisbon, 1904, pp. 297-307. (C. R. B.)

BEHAR, or Bihar, a town of British India, in the Patna district of Bengal, which gives its name to an old province, situated on the right bank of the river Panchana. Pop. (1901) 4S>°63- There are still some manufactures of silk and muslin, but trade has deserted Behar in favour of Patna and other places more favourably situated on the river Ganges and the railway, while the indigo industry has been ruined by the synthetic products of the German chemist, and the English colony of indigo planters has been scattered abroad.

The old province, stretching widely across the valley of the Ganges from the frontier of Nepal to the hills of Chota Nagpur, corresponds to the two administrative divisions of Patna and Bhagalpur, with a total area of 44, 197 sq.m. and a population of 24,241,305. It is the most densely populated tract in India, and therefore always liable to famine; but it is now well pro- tected almost everywhere by railways. It is a country of large landholders and formerly of indigo planters. The vernacular language is not Bengali, but a dialect of Hindu; and

the people likewise resemble those of Upper India. The general aspect of the country is flat, except in the district of Monghyr, where detached hills occur, and in the south-east of the province, where the Rajmahal and Santal ranges abut upon the plains.

Behar abounds in great rivers, such as the Ganges, with its tributaries, the Ghagra, Gandak, Kusi, Mahananda and Sone. The Ganges enters the province near the town of Buxar, flows eastward and, passing the towns of Dinajpur, Patna, Monghyr and Colgong, leaves the province at Rajmahal. It divides the province into two almost equal portions; north of the river lie the districts of Saran, Champaran, Tirhoot, Purnea, and part of Monghyr and Bhagalpur, and south of it are Shahabad, Patna, Gaya, the Santal parganas, and the rest of Monghyr and Bhagal- pur. The Ganges and its northern tributaries are navigable by country boats of large burden all the year round. The cultivation of opium is a government monopoly, and no person is allowed to grow the poppy except on account of government. The Behar Opium Agency has its headquarters at the town of Patna.

Annual engagements are entered into by the cultivators, under a system of pecuniary advances, to sow a certain quantity of land with poppy, and the whole produce in the form of opium is delivered to government at a fixed rate.

Saltpetre is largely refined in Tirhoot, Saran and Champaran, and is exported both by rail and river to Calcutta. The manu- factures of less importance are tussore-silk, paper, blankets, brass utensils, firearms, carpets, coarse cutlery and hardware, leather, ornaments of gold and silver, &c. Of minerals — lead, silver and copper exist in the Bhagalpur division, but the mines are not worked. One coal-mine is worked in the parganas. Before the construction of railways in India, the Ganges and the Grand Trunk road afforded the sole means of communication from Calcutta to the North-Western Provinces. But now the railroad is the great highway which connects Upper India with Lower Bengal. The East Indian railway runs throughout the length of the province. The climate of Behar is very hot from the middle of March to the end of June, when the rains set in, which continue till the end of September. The cold season, from October to the first half of March, is the pleasantest time of the year.

History. — The province of Behar corresponds to the ancient kingdom of Magadha, which comprised the country now included in the districts of Patna, Gaya and Shahabad, south of the Ganges. The origin of this kingdom, famous alike in the political and religious

history of India, is lost in the mists of antiquity; and though the Brahmanica) Puranas give lists of its rulers extending back to remote ages before the Christian era, the first authentic dynasty is that of the Saisunaga, founded by Sisunaga (c. 600 B.C.), whose capital was at Rajagaha (Rajgir) in the hills near Gaya; and the first king of this dynasty of whom anything is known was Bimbisara (c. 528 B.C.), who by conquests and matrimonial alliances laid the foundations of the greatness of the kingdom. It was in the reign of Bimbisara that Vardhamana Mahavira, the founder of Jainism. and Gautama, the founder of Buddhism, preached in Magadha, and Buddhist missionaries issued thence to the conversion of China, Ceylon, Tibet and Tatary. Even to this day Behar, where there are extensive remains of Buddhist buildings, remains a sacred spot in the eyes of the Chinese and other Buddhist nations.

Bimbisara was murdered by his son Ajatasatru, who succeeded him, and whose bloodthirsty policy reduced the whole country between the Himalayas and the Ganges under the suzerainty of Magadha. According to tradition, it was his grandson, Udaya, who founded the city of Pataliputra (Patna) on the Ganges, which under the Maurya dynasty became the capital not only of Magadha but of India, The remaining history of the dynasty is obscure; according to Mr Vincent Smith, its last representative was Mahanandin (417 B.C.), after whose death the throne was usurped, under obscure circumstances, by Mahapadma Nanda, a man of low caste (Early Hist, of India, p. 36) . It was a son of this usurper who was reigning at the time of the invasion of Alexander the Great; and the conqueror, when his advance was arrested at the Hyphasis (326 B.C.), meditating an attack on Pataliputra (the Palimbothra of the Greeks), was informed that the king of Magadha could oppose him with a force of 20,000 cavalry, 200,000 infantry, 2000 chariots, and 3000 or 4000 elephants. The Nanda dynasty seems to have survived only for two generations, when (321 B.C.) Chandragupta Maurya, the founder of the great Maurya dynasty, seized the throne. This dynasty, of which the history belongs to that of India (q.v.), occupied the throne for 137 years. After the death of the great Buddhist king, Asoka (c. 231), the Maurya empire began to break up, and it was finally destroyed- about fifty years later when Pushyamitra Sunga murdered the Maurya king Brihadratha and founded the Sunga dynasty. Descendants of Asoka con- tinued, however, to subsist in Magadha as subordinate rajas for many centuries; and as late as the 8th century a.d. petty Maurya dynasties are mentioned as ruling 'n Konkan. The reign of Pushyamitra, who held his own against Menander and succeeded in establishing his claim to be lord

paramount of northern India, is mainly remarkable as marking the beginning

BEHA UD-DINˆBEHEADING

**>Si*

of the Brahmanical reaction and the decline of Buddhism; according to certain Buddhist writers the king, besides reviving Hindu rites, indulged in a savage persecution of the monks. The Sunga dynasty, which lasted 112 years, was succeeded by the Kanva dynasty, which after 45 years was overthrown (c. 27 B.C.) by the Andhras or . Satavahanas. In a.d. 236 the Andhras were overthrown, and, after a confused and obscure period of about a century, Chandragupta I. established his power at Pataliputra (a.d. 320) and founded the famous Gupta empire (see Gupta), which survived till it was overthrown by the Ephthalitas (q.v.), or White Huns, at the close of the 5th century. In Magadha itself the Guptas continued to rule as tributary princes for some centuries longer. About the middle of the 8th century Magadha was conquered by Gopala, who had made himself master in Bengal, and founded the imperial dynasty known as the Palas of Bengal. They were zealous Buddhists, and under their rule Magadha became once more an active centre of Buddhist influence. Gopala himself built a great monastery at Udandapura, or Otantapuri, which has been identified by Sir Alexander Cunningham with the city of Behar, where the later Pala kings established their capital. Under Mahipala (c. 1026), the ninth of his line, and his successor Nayapala, missionaries from Magadha succeeded in firmly re-establishing Buddhism in Tibet.

In the nth century the Pala empire, which, according to the Tibetan historian Taranath, extended in the 9th century from the Bay of Bengal to Delhi and Jalandhar (Jullundur) in the north and the Vindhyan range in the south, was partly dis- membered by the rise of the " Sena " dynasty in Bengal; and at the close of the 12th century both Palas and Senas were swept away by the Mahommedan conquerors, the city of Behar itself being captured by the Turki free-lance Mahommed-i-Bakhtyar Khilji in 1193, by surprise, with a party of 200 horsemen. " It was discovered," says a contemporary Arab historian, "that the whole of that fortress and city was a college, and in the Hindi tongue they call a college Bihar." Most of the monks were massacred in the first heat of the assault; those who survived fled to Tibet, Nepal and the south. Buddhism in Magadha never recovered from this blow; it lingered in obscurity for a while and then vanished.

Behar now came under the rule of the Mahommedan governors of Bengal. About 1330 the southern part was annexed to Delhi, while north Behar remained for some time longer subject to Bengal. In 1397 the whole of Behar became part of the kingdom of Jaunpur; but a hundred years later it was annexed by the Delhi emperors, by whom — save for a short period — it continued to be held. The capital of the province was established under the Moguls at the city of Behar, which gave its name to the province. From the middle of the 14th to the middle of the 16th century a large part of Behar was ruled by a line of Brahman tributary kings; and in the 15th century another Hindu dynasty ruled in Champaran and Gorakhpur. Behar came into the possession of the East India Company with the acquisition of the Diwani in 1765, when the province was united with Bengal. In 1857 two zemindars, Umar Singh and Kumar Singh, rebelled against the British government, and for some months held the ruinous fort of Rohtas against the British.

See Imperial Gazetteer of India (Oxford, 1908), s.v. " Bihar " and " Bengal "; V. A. Smith, Early History of India (2nd ed., Oxford,

1908).

BEHA UD-DIN [Abu-l-Mahasin Yusuf ibn Rafi' ibn Shaddad Beha ud Din] (1145-1234), Arabian writer and states- man, wasborn in Mosul and early became famous for his knowledge of the Koran and of jurisprudence. Before the age of thirty he became teacher in the great college at Bagdad known as the Nizamiyya, and soonafterbecameprofessorat Mosul. In 1 187, after making the pilgrimage to Mecca, he visited Damascus. Saladin, who was at the time besieging Kaukab (a few miles south of Tiberias), sent for him and became his friend. Beha ud-Dln observed that the whole soul of the monarch was engrossed by the war which he was then engaged in waging against the enemies of the faith, and saw that the only mode of acquiring his favour

was by urging him to its vigorous prosecution. With this view he composed a treatise on The Laws and Discipline of Sacred War, which he presented to Saladin, who received it with peculiar favour. From this time he remained constantly attached to the person of the sultan, and was employed on various embassies and in departments of the civii government. He was appointed judge of the army and judge of Jerusalem. After Saladin's death Beha-ud-Din remained the friend of his son Malik uz-Zahir, who appointed him judge of Aleppo. Here he employed some of his wealth in the foundation of colleges. When Malik uz-Zahir died, his son Malik ul-'Aziz was a minor, and

Beha ud-Dln had the chief power in the regency. This power he used largely for the patronage of learning. After the abdication of Malik ul-'Aziz, he fell from favour and lived in retirement until his death in 1 234. Beha ud-Dln's chief work is his Life of Saladin (published at Leiden with Latin translation by A. Schultens in 1732 and X 7S5)- An English translation was published by the Palestine Pilgrims' Text Society, London, 1897.

For list of other extant works see C. Brockelmann, Geschichte der arabiscken Litter atur (Weimar, 1898), vol. i. pp. 316 f.

(G. W. T.)

BEHA UD-DlN ZUHAIR (Abu-l Fadl Ztjhair ibn Mahom- med al-Muhallabi) (1186-1258), Arabian poet, was born at or near Mecca, and became celebrated as the best writer of prose and verse and the best calligfaphist of his time. He entered the service of Malik us-Salih Najm ud-Dln in Mesopotamia, and was with him at Damascus until he was betrayed and imprisoned. Beha ud-Dln then retired to Nablus (Shechem) where he re- mained until Najm ud-Dln escaped and obtained possession of Egypt, whither he accompanied him in 1240. There he re- mained as the sultan's confidential secretary until his death, due to an epidemic, in 1258. His poetry consists mostly of panegyric and brilliant occasional verse distinguished for its elegance. It has been published with English metrical transla- tion by E. H. Palmer (2 vols., Cambridge, 1877).

His life was written by his contemporary Ibn Khallikan (see M'G. de Slane's trans, of his Biographical Dictionary, vol. i. pp. 542-545). (G. W. T.)

BEHBAHAN, a walled town of Persia in the province of Fars, pleasantly situated in the midst of a highly cultivated plain, 128 m. W.N.W. of Shiraz and 3 m. from the left bank of the river Tab, here called Kurdistan river. It is the capital of the Kuhgilu- Behbahan sub-province of Fars and has a population of about 10,000. The walls are about 3 m. in circumference and a Narinj Kalah (citadel) stands in the south-east corner. At a short distance north-west of the city are the ruins of Arrajan, the old capital of the province.

BEHEADING, a mode of executing capital punishment (q.v.). It was in use among the Greeks and Romans, and the former, as Xenophon says at the end of the second book of the Anabasis, regarded it as a most honourable form of death. So did the Romans, by whom it was known as decollatio or capitis amputatio. The head was laid on a

block placed in a pit dug for the purpose, — in the case of a military offender, outside the intrenchments, in civil cases outside the city walls, near the porta decumana. Before execution the criminal was tied to a stake and whipped with rods. In earlier years an axe was used; afterwards a sword, which was considered a more honourable instrument of death, and was used in the case of citizens (Dig. 48, 19, 28). It was with a sword that Cicero's head was struck off by a common soldier. The beheading of John the Baptist proves that the tetrarch Herod had adopted from his suzerain th£ Roman mode of execution. Suetonius {Calig. c. 32) states that Caligula kept a soldier, an artist in beheading, who in his presence decapitated prisoners fetched indiscriminately for that purpose from the gaols.

Beheading is said to have been introduced into England from Normandy by William the Conqueror. The first person to suffer was Waltheof, earl of Northumberland, in 1076. An ancient MS. relating to the earls of Chester states that the Serjeants or bailiffs of the earls had power to behead any malefactor or thief, and gives an account of the presenting of several heads of felons

at the castle of Chester by the earl's Serjeant. It appears that the custom also attached to the barony of Malpas. In a roll of 3 Edward II., beheading is called the " custom of Cheshire " (Lysons' Cheshire, p. 299, from Harl. MS. 2009 fol. 346). The liberty of Hardwick, in Yorkshire, was granted the privilege of beheading thieves. (See Guillotine.)

But with the exceptions above stated beheading was usually reserved as the mode of executing offenders of high rank. From the 15th century onward the victims of the axe include some of the highest personages in the kingdom: Archbishop Scrope (1405); duke of Buckingham (1483); Catherine Howard (1542); earl of Surrey (1547); duke of Somerset (1552); duke of Northumberland (1553) ; Lady Jane Grey (1554) ; Lord Guildford Dudley (1554); Mary queen of Scots (1587); earl of Essex (1601); Sir Walter Raleigh (1618); earl of Strafford (1641); Charles I. (1649); Lord William Russell (1683); duke of Monmouth (1685); earl of Derwentwater (17 16); earl of Kenmure (17 16); earl of Kilmarnock and Lord Balmerino (1746); and the list closes with Simon, Lord Lovat, who (9th of April 1747) was the last person beheaded in England. The execution of Anne Boleyn was carried out not with the axe, but with a sword, and

by a French headsman specially brought over from Calais. In 1644 Archbishop Laud was condemned to be hanged, and the only favour granted him, and that re- luctantly, was that his sentence should be changed to beheading. In the case of the 4th Earl Ferrers (1760) his petition to be beheaded was refused and he was hanged.

Executions by beheading usually took place on Tower Hill, London, where the scaffold stood permanently during the 15th and 1 6th centuries. In the case of certain state prisoners, e.g. Anne Boleyn and Lady Jane Grey, the sentence was carried out within the Tower on the green by St Peter's chapel.

Beheading was only a part of the common-law method of punishing male traitors, which was ferocious in the extreme. According to Walcot's case (1696), 1 Eng. Rep. 89, the proper sentence was " quod . . . ibidem super bigam (herdillum) ponatur et abinde usque ad furcas de [Tyburn] trahatur, et ibidem per collum suspendatur et vivus ad terram prosternatur et quod secreta membra ejus amputentur, et interiora sua intra ventrem suum capiantur et in ignem ponantur et ibidem ipso vivente comburantur, et quod caput ejus amputetur, quodque corpus ejus in quatuor partes dividatur et illo ponantur ubi dominus rex eas assignare voluit." There is a tradition that Harrison the regicide after being disembowelled rose and boxed the ears of the executioner.

In Townley's case (18 Howell, Slate Trials, 350, 351) there is a ghastly account of the mode of executing the sentence; and in that case the executioner cut the traitor's throat. In the case of the Cato Street conspiracy(i82o, 33 Howell, State Trials, 1566), after the traitors had been hanged as directed by the act of 18 14, their heads were cut off by a man in a mask whose dexterity led to the belief that he was a surgeon.

Female traitors were until 1 790 liable to be drawn to execution and burnt alive. In that year hanging was substituted for burning.

In 18 14 so much of the sentence as related to disembowelling and burning the bowels was abolished and the king was empowered by royal warrant to substitute decapitation for hanging, which was made by that act the ordinary mode of executing traitors. But it was not till 1870 that the portions of the sentence as to drawing and quartering were abolished (Forfeiture Act 1870).

The more barbarous features of the execution were remitted in the case of traitors of high rank, and the offender was simply

decapitated.

The block usually employed is believed to have been a low one such as would be used for beheading a corpse. C. H. Firth and S. R. Gardiner incline to the view that such a block was the one used at Charles I.'s execution. The more general custom, however, seems to have been to have a high block over which the victim knelt. Such is the form of that preserved in the armoury of the Tower of London. This is undoubtedly the block upon which Lord Lovat suffered, but, in spite of several

axe-cuts on it, probably not one in early use. The axe which stands beside it was used to behead him and the other Jacobite lords, but no certainty exists as to its having been previously employed. On the ground floor of the King's House, at the Tower, is preserved the processional axe which figured in the journeys of state prisoners to and from their trials, the edge turned from them as they went, but almost invariably turned towards them as they returned to the Tower. The axe's head is peculiar in form, 1 ft. 8 in. high by 10 in. wide, and is fastened into a wooden handle 5 ft. 4 in. long. The handle is ornamented by four rows of burnished brass nails.

In Scotland they did not behead with the axe, nor with the sword, as under the Roman law, and formerly in Holland and France, but with the maiden (q.v.).

Capital punishment is executed by beheading in France, and in Belgium by means of the guillotine.

In Germany the instrument used varies in different states: in the old provinces of Prussia the axe, in Saxony and Rhenish Prussia the guillotine. Until 1851 executions were public. They now take place within a prison in the presence of certain specified officials.

Beheading is also the mode of executing capital punishment in Denmark and Sweden. The axe is used. In Sweden the execution takes place on the order of the king within a prison in the presence of certain specified officials and, if desired, of twelve representatives of the commune within which the prison is situate (Code 1864, s. 2, Royal Ordinance 1877).

In the Chinese empire decapitation is the usual mode of execution. By an imperial edict (24th of April 1905) certain attendant barbarities have been suppressed: viz. slicing, cut- ting up the body, and exhibiting the head to public view (32 Clunet, 1175).

BEHEMOTH (the intensive plural of the Hebrew b'hemah, a beast), the animal mentioned in the book of Job (ch. xl. 15), probably the hippopotamus, which in ancient times was found in Egypt below the cataracts of Syene. The word may be used in Job as typical of the primeval king of land animals, as leviathan of the water animals. The modern use expresses the idea of a very large and strong animal.

BEHISTUN, or Bisitun, now pronounced Bisntun, a little village at the foot of a precipitous rock, 1700 ft. high, in the centre of the Zagros range in Persia on the right bank of the Samas-Ab, the principal tributary of the Kerkha (Choaspes). The original form of the name, Bagistana, " place of the gods " or " of God " has been preserved by the Greek authors Stephanus of Byzantium, and Diodorus (ii. 13), the latter of whom says that the place was sacred to Zeus, i.e. Ahuramazda (Ormuzd). At its foot passes the great road which leads from Babylonia (Bagdad) to the highlands of Media (Ecbatana, Hamadan). On the steep face of the rock, some 500 ft. above the plain, Darius I., king of Persia, had engraved a great cuneiform inscription (n or 12 ft. high), which recounts the way in which, after the death of Cambyses, he killed the usurper Gaumata (in Justin Gometes, the pseudo-Smerdis) , defeated the numerous rebels, and restored the kingdom of the Achaemenidae. Above the inscription the picture of the king himself is graven, with a bow in his hand, putting his left foot on the body of Gaumata. Nine rebel chiefs are led before him, their hands bound behind them, and a rope round their necks; the ninth is Skunka, the chief of the Scythians (Sacae) whom he defeated. Behind the king stand his bow-bearer and his lance-bearer; in the air appears the figure of the great god Ahuramazda, whose protection led him to victory. 1 The inscriptions are composed in the three languages which are written with cuneiform signs, and were used in all official inscriptions of the Achaemenian kings: the chief place

1 A passage in the inscription runs: — "Thus saith Darius the king: That which I have done I have done altogether by the grace of Ahuramazda. Ahuramazda, and the other gods that be, brought aid to me. For this reason did Ahuramazda, and the other gods that be, bring aid to me, because I was not hostile, nor a liar, nor a wrongdoer, neither I nor my family, but according to Rectitude (arstam) have I ruled." (A. V. Williams Jackson, Persia, 1'asi and Present.)

is of course given to the Persian language (in four columns); the three Susian (Elamitic) columns lie to the left, and the Babylonian text is on a slanting boulder above them; a part of the Babylonian has been destroyed by a torrent, which has made its way over it. In former times the second language has often been called Scythian, Turanian or Median; but we now know from numerous inscriptions of Susa that it is the language of Elam which was spoken in Susa, the capital of the Persian empire.

In 1835 the difficult and almost inaccessible cliff was first climbed by Sir Henry Rawlinson, who copied and deciphered the inscriptions (1835-1845), and thus completed the reading of the old cuneiform text and laid the foundation of the science of Assyriology. Diodorus ii. 13 (cf . xvii. 1 10) , probably following a later author who wrote the history of Alexander's campaigns, mentions the sculptures and inscriptions, but attributes them to Semiramis. At the foot of the rock are the remainders of some other sculptures (quite destroyed), the fragments of a Greek inscription of the Parthian prince Gotarzes (a.d. 40; text in Dittenberger, Orientis graeci inscr. selectae, no. 431), and of an Arabic inscription.

See Sir Henry Rawlinson in the Journ. R. Geog. Soc. ix., 1839; J. R. Asiatic Soc. x. 1866, xiv., 1853, xv., 1855; Archaeologia, xxxiv., 1852; Sir R. Ker Porter, Travels, ii. 149 ff . ; Flandin and Coste, Voyage en Perse, i. pi. 16; and the modern editions of the inscriptions, the best of which, up to the end of the 19th century, were: Weissbach and Bang, Die altpersischen Keilinschriften (1893); Weissbach, Die Achaemenideninschriften zweiter Art (1890); Bezold, Die (babylonischen) Achaemenideninschriften (1882). A description of the locality, with comments on the present state of the inscrip- tions and doubtful passages of the Persian text, was given by Dr A. V. Williams Jackson in the Journal of the American Oriental Society, xxiv., 1903, and in his Persia, Past and Present (1906). Dr Jackson in 1903 climbed to the ledge of the rock and was able to collate the lower part of the four large Persian columns; he thus convinced himself that Foy's conjecture of arslam (" righteous- ness ") for Rawlinson's abistam or abastam was correct. A later investigation was carried out in 1904 on the instructions of the British Museum Trustees by Messrs. L. W. King and R. C. Thompson, who published their results in 1907 under the title, The Inscription of Darius the Great at Behistun, including a full illustrated account of the sculptures and the inscription, and a complete collation of the text. (Ed. M.)

BEHN, APHRA (otherwise Afra, Aphara or Ayfara) (1640- 1689),

British dramatist and novelist, was baptized at Wye, Kent, in 1640. Her father, John Johnson, was a barber. While still a child she was taken out to Surinam, then an English possession, from which she returned to England in 1658, when it was handed over to the Dutch. In Surinam Aphra learned the history, and acquired a personal knowledge of the African prince Oroonoko and his beloved Irnoinda, whose adventures she has related in her novel, Oroonoko. On her return she married Mr Behn, a London merchant of Dutch extraction. The wit and abilities of Mrs Behn brought her into high estimation at court, and — her husband having died by this time — Charles II. em- ployed her on secret service in the Netherlands during the Dutch war. At Antwerp she successfully accomplished the objects of her mission; and in the latter end of 1666 she wormed out of one Van der Aalbert the design formed by De Ruyter, in con- junction with the DeWitts, of sailing up the Thames and burning the English ships in their harbours. This she communicated to the English court, but although the event proved her intelligence to have been well founded, it was at the time disregarded. Disgusted with political service, she returned to England, and from this period she appears to have supported herself by her writings. Among her numerous plays are The Forced Marriage, or the Jealous Bridegroom (167 1); The Amorous Prince (167 1); The Town Fop (1677); and The Rover, or the Banished Cavalier (in two parts, 1677 and 1681); and The Roundheads (1682). The coarseness that disfigures her plays was the fault of her time; she possessed great ingenuity, and showed an admirable compre- hension of stage business, while her wit and vivacity were un- failing. Of her short tales, or novelettes, the best is the story of Oroonoko, which was made the basis of Thomas Southerne's popular tragedy. Mrs Behn died on the 16th of April 1689, and was buried in the cloisters of Westminster Abbey.

See Plays written by the Late Ingenious Mrs Behn (1702; re-

Crinted, 1871); also "Aphra Behn's Gedichte und Prosawerke," y P. Siegel in Anglia (Halle, vol. xxv., 1902, pp. 86-128,329-385); and A. C. Swinburne's essay on " Social Verse " in Studies in Prose and Poetry (1894).

BEHR, WILLIAM JOSEPH (1775-1851), German publicist and writer, was born at Salzheim on the 26th of August 1775. He studied law at Wiirzburg and Gottingen, became professor of public law in the university of Wurzburg in 1799, and in 1819 was sent as a deputy to the Landtag of Bavaria. Having asso- ciated himself with the party of reform, he was regarded with suspicion by the Bavarian king Maximilian I. and the court party, although favoured for a time

by Maximilian's son, the future King Louis I. In 1821 he was compelled to give up his professorship, but he continued to agitate for reform, and in 1 83 1 the king refused to recognize his election to the Landtag. A speech delivered by Behr in 1832 was regarded as seditious, and he was arrested. In spite of his assertion of loyalty to the principle of monarchy he was detained in custody, and in 1836 was found guilty of seeking to injure the king. He then admitted his offence; but he was not released from prison until 1839, and the next nine years of his life were passed under police super- vision at Passau and Regensburg. In 1848 he obtained a free pardon and a sum of money as compensation, and was sent to the German national assembly which met at Frankfort in May of that year. He passed his remaining days at Bamberg, where he died on the 1st of August 1851. Behr's chief writings are: Darstellung der Bediirfnisse, Wiinsche und Hojfnungen deutscher Nation (Aschaffenburg, 1816); Die Verfassung und Verwaltung des Staates (Nuremberg, 1811-1812); Von den rechtlichen Grenzen der Einwirkung des Deutschen Bundes auf die Verfassung, Gesetz- gebung, und Rechtspjlege seiner Gliederstaaten (Stuttgart, 1820). BEIRA, a seaport of Portuguese East Africa, at the mouth of the Pungwe river, in 19° 50′ S., 34 50′ E., 488 m. N. of Delagoa Bay, in communication by railway with Cape Town via Umtali, Salisbury and Bulawayo. Pop. about 4000, of whom a third are Europeans, and some 300 Indians. The town is built on a tongue of sand extending into the river, and is comparatively healthy. The sea front is protected by a masonry wall, and there are over 13,000 ft. of wharfage. Vessels drawing 24 ft. can enter the port at high tide. Between the customs house and the railway terminus is the mouth of a small river, the Chiveve, crossed by a steel bridge, the centre span revolving and giving two passages each of 40 ft. The town is without any architectural pretensions, but possesses fine public gardens. It is the head- quarters of the Companhai de Mozambique, which administers the Bcira district under charter from the Portuguese crown. The business community is largely British.

Beira occupies the site of a forgotten Arab settlement. The present port sprang into being as the result of a clause in the Anglo-Portuguese agreement of 189.1 providing for the construc- tion of a railway between Rhodesia and the navigable waters of the Pungwe. The railway at first began at Fontesvilla, about 50 m. by river above Beira, but was subsequently brought down to Beira. The completion in 1902 of the line connecting Salisbury with Cape Town adversely affected the port of Beira, the long railway route from the Cape being increasingly employed by travellers to and from Mashonaland.

Moreover, the high freights on goods by the Beira route enabled Port Elizabeth to compete successfully for the trade of Rhodesia. In October 1905 a considerable reduction was made in railway rates and in port dues and customs, with the object of re-attracting to the port the transit trade of the interior, and in 1907 a branch of the Rhodesian customs was opened in the town. In that year goods valued at £647,000 passed through the port to Rhodesia. Efforts were also made to develop the agricultural and mineral resources of the Beira district itself. The principal exports are rubber, sugar, ground-nuts and oil seeds, beeswax, chromitc (from Rhodesia), and gold (from Manica). The imports are chiefly rice (from India) and cotton goods for local use, and food stuffs, machinery, hardware and manufactured goods for Rhodesia. For the three years, 1 905-1907, the average annual value of the

imports and exports, excluding the transit trade with Rhodesia, was, imports £200,000, exports £90,000. Direct steamship communication with Europe is maintained by German and British lines.

See Portuguese East Africa; also the reports issued yearly by the British Foreign Office on the trade of Beira.

BEIRA, an ancient principality and province of northern and central Portugal; bounded on the N. by Entre Minho e Douro and by Traz os Montes, E. by the Spanish provinces of Leon and Estremadura, S. by Alemtejo and Portuguese Estremadura, and W. by the Atlantic Ocean. Pop. (1900) 1,515,834; area, 9208 sq. m. Beira is administratively divided into the districts of Aveiro, Coimbra, Vizeu, Guarda and Castello Branco, while it is popularly regarded as consisting of the three sections — Beira Alta or Upper Beira (Vizeu), north and west of the Serra da Estrella; Beira Baixa or Lower Beira (Guarda and Castello Branco), south and east of that range; and Beira Mar or Mari- time Beira (Aveiro and Coimbra), coinciding with the former coastal province of Douro. The coast line, about 72 m. long, is uniformly flat, with long stretches of sandy pine forest, heath or marshland bordered by a wide and fertile plain. Its most conspicuous features are the lagoon of Aveiro (q.v.) and the bold headland of Cape Mondego; in the south Aveiro, Murtosa, Ovar and Figueira da Foz are small seaports. Except along the coast, the surface is for the most part mountainous, — the highest point in the Serra da Estrella, which extends from north-east to south-west

through the centre of the province, being 6532 ft. The northern and south-eastern frontiers are respectively marked by the two great rivers Douro and Tagus, which rise in Spain and flow to the Atlantic. The Agueda and C6a, tributaries of the Douro, drain the eastern plateaus of Beira; the Vouga rises in the Serra da Lapa, and forms the lagoon of Aveiro. at its mouth; the Mondego springs from the Serra da Estrella, passes through Coimbra, and enters the sea at Figueira da Foz; and the Zezere, a tributary of the Tagus, rises north-north-east of Covilha and flows south-west and south.

Beira has a warm and equable climate, except in the mountains, where the snowfall is often heavy. The soil, except in the valleys, is dry and rocky, and large stretches are covered with heath. The principal agricultural products are maize, wheat, garden vegetables and fruit. The olive is largely cultivated, the oil forming one of the chief articles of export; good wine is also produced. In the flat country between Coimbra and Aveiro the marshy land is laid out in rice-fields or in pastures for herds of cattle and horses. Sheep farming is an important industry in the highlands of Upper Beira; while near Lamego swine are reared in considerable numbers, and furnish the well-known Lisbon hams. Iron, lead, copper, coal and marble are worked to a small extent, and millstones are quarried in some places. Salt is obtained in considerable quantities from the lagoons along the coast. There are few manufactures except the production of woollen cloth, which occupies a large part of the population in the district of Castello Branco. Three important lines of railway, the Salamanca-Oporto, Salamanca-Lisbon and Lisbon-Oporto, traverse parts of Beira; the two last named are also connected by the Guarda-Figueira da Foz railway, which has a short branch line going northwards to Vizeu. The chief towns, Aveiro (pop. 1900, 9979), Castello Branco (7288), Coimbra (18,144), Covilha (15,469), Figueira da Foz (6221), Guarda (61 24), Ilhavo (12,617), Lamego (9471), Murtosa (9737), Ovar (10,462) and Vizeu (8057), with the frontier fortress of Almeida (2330), are described in separate articles. There is a striking difference of character between the inhabitants of the highlands, who are grave and reserved, hardy and industrious, and those of the lowlands, who are more sociable and courteous, but less energetic. The heir-apparent to the throne of Portugal has the title of prince of Beira.

BEIRUT or Beyrout. (i) A vilayet of Syria, constituted as recently as 1888, which stretches along the sea-coast from Jebel el-Akra, south of the Orontes, to the Nahr Zerka, south of Mount Carmel, and towards the south extends from the Mediter- ranean to the Jordan. It includes five sanjaks, Latakia,

Tripoli, Beirut, Acre and Buka'a. (2) The chief town of the vilayet (anc. Berytus), the most important seaport town in Syria, situated on the south side of St George's Bay, on rising ground at the foot of Lebanon. Pop. 120,000 (Moslems, 36,000; Christians, 77,000; Jews, 2500; Druses, 400; foreigners, 4100). Berytus, whether it is to be identified with Hebrew Berothai or not (2 Sam. viii. 8; Ezek. xlvii. 16), was one of the most ancient settlements on the Phoenician coast; but nothing more than the name is known of. it till B.C. 140, when the town was taken and destroyed by Tryphon in his contest with Antiochus VII. for the throne of the Seleucids. It duly passed under Rome, was much favoured by the Herods and became a colonia. It was famous for its schools, especially that of law, from the 4th century a.d. onwards. Justinian recognized it as one of the three official law schools of the empire (a.d. 533), but within a few years, as the result of a disastrous earthquake (551), the students were transferred to Sidon. In the following century it passed to the Arabs (63 5) , and was not again a Christian city till mi, when Baldwin captured it. Saladin retook it in 1 187, and thenceforward, for six centuries and a half, whoever its nominal lords may have been, Saracen, Crusader, Mameluke or (from the 16th century) Turk, the Druse emirs of Lebanon dominated it (see Druses) . One of these, Fakr ed-Din Maan II., fortified it early in the 17th century; but the Turks asserted themselves in 1763 and occupied the place. During the succeed- ing epoch of rebellion at Acre under Jezzar and Abdullah pashas, Beirut declined to a small town of about 10,000 souls, in dispute between the Druses, the Turks and the pashas, — a state of things which lasted till Ibrahim Pasha captured Acre in 1832. When the powers moved against the Egyptians in 1840, Beirut had recently been occupied in force by Ibrahim as a menace to the Druses; but he was easily driven out after a destructive bombard- ment by Admiral Sir Robert Stopford (1768-1847). Since the pacification of the Lebanon after the massacre of the Christians in i860 (for later history, see Lebanon), Beirut has greatly increased in extent, and has become the centre of the transit trade for all southern Syria. In 1894 a harbour, constructed by a French company, was opened, but the insecurity of the outer roadstead militates against its success. Nevertheless trade is on the increase. In 1895 a French company completed a railway across the Lebanon to Damascus, and connected it with Mezerib in the Hauran, whence now starts the line to the Hejaz. Since 1907 it has also had railway communication with Aleppo; and a narrow-gauge line runs up the coast to Tripoli. The steepness of the Lebanon railway, and the break of gauge at Rayak, the junction for Aleppo, have prevented the diversion of much of the trade of North Syria to Beirut. The town has

been supplied with water, since 1875, by an English company, and with gas, since 1888, by a French company. There are many American and European institutions in the city: the American Presbyterian mission, with a girls' school and a printing office, which published the Arabic translation of the Bible, and now issues a weekly paper and standard works in Arabic; the Syrian Protestant college with its theological seminary, medical faculty, training college and astronomical observatory; the Scottish mission, and St George's institute for Moslem and Druse girls; the British Syrian mission schools; the German hospital, orphanage and boarding school; the French hospital and schools, and the Jesuit " Universite de St Joseph " with a printing office. In summer most of the richer residents reside on the Lebanon, and in winter the governor of the Lebanon and many Lebanon notables inhabit houses in Beirut. The town has many fine houses, but the streets are unpaved and the bazaars mean. The Moslem inhabitants, being in a minority, have often shown themselves fanatical and turbulent. There are several fairly good hotels for tourists. (C.W. W. ; D. G. H.)

BEIT, ALFRED (1853-1906), British South African financier, was the son of a well-to-do merchant of Hamburg, Germany, and in 1875, after a commercial education at home, was sent out to Kimberley, South Africa, to investigate the diamond prospects. He had relatives, the Lipperts, out there in business, and in conjunction with Mr (afterwards Sir) Julius Wernher

(b. 1850) he rapidly acquired a leading position on the diamond fields, and became closely allied with the ideals of Cecil Rhodes (

BEJA (or Bija), the name under which is comprised a wide- spread family of tribes, usually classed as Hamitic. They may, however, represent very early Semitic immigrants (see Hamitic Races). When first recorded the Beja occupied the whole region between the Nile and the Red Sea from the border of Upper Egypt to the foot of the Abyssinian plateau. They were known to the ancient Egyptians, upon whose monu- ments they are represented. They are the Blemmyes of Strabo (xvii. 53), an(i have also been identified with the Macrobii of Herodotus, " tallest and finest of men " (iii. 17). It has been suggested, though on insufficient grounds, that the Beja, rather than the Abyssinians, are the " Ethiopians " of Herodotus, the civilized people who built the city of Meroe' and its pyramids. During the

Roman period the Beja were much what they are to-day, nomadic and aggressive, and were constantly at war. In 216 a.h. (a.d. 832) the Moslem governor of Assuan made a treaty with the Beja chief, by which the latter undertook to guard the road to Aidhab and pay an annual tribute of one hundred camels. This is the earliest record of a government engagement with the northern section of the Beja, now the Ababda. Ibn Batuta, early in the 14th century, mentions a king of Beja, El Hadrabi, who received two-thirds of the revenue of Aidhab, the other third going to the king of Egypt. The Beja territory contained gold and emerald mines. The tribesmen were-the usual escort for pilgrims to Mecca from Kus to Aidhab. According to Leo Africanus, at the close of the 14th or very early in the 15th century their rich town of Zibid (Aidhab?) on the Red Sea was destroyed. This seems to have broken up the tribal cohesion. Leo Africanus describes the Beja as " most base, miserable and living only on milk and camels' flesh." In the middle ages the Beja, partially at any rate, were Christians. The kingdom of Meroe was succeeded by that of " Aloa," the capital of which, Soba, was on the Blue Nile, about 13 m. above Khartum. The country was conquered by the Funj (g.v.), a negroid people who subsequently became Mahommedan and compelled the Beja to adopt that religion. Until the invasion of the Egyptians, under Ismail, son of Mehemet Ali (1820), the Funj remained in possession.

All the Beja are now Mahommedans, but generally only so in name, though some of the tribes enthusiastically fought for Mahdiism (1883-99). As a race the Beja are remarkable for

physical beauty, with a colour more red than black, and of a distinctly Caucasic type of face. The chiefs are, as a rule, of much fairer complexion than the tribesmen. In spite of their claim to Arab origin, the tribes have preserved many negro customs in the matter of costume and scarring the body. Their hair-dressing is very characteristic. The hair, worn thick as a protection against the sun, is parted in a circle round the head on a level with the eyes, above which the hair, saturated with mutton fat or butter, is trained straight up like a mop, with separate tufts at sides and back. Most of the tribes are nomadic shepherds, driving their cattle from pasture to pasture; some few are occupied in agriculture.

They are polygynous, but, unlike the Arabs, great independ- ence is granted their women. Among most of the Beja peoples the wife can return to her mother's tent whenever she likes, and after a birth of a child she can repudiate the husband, who must make a present to be re-accepted. Cases are said to have occurred where the woman has

thus obtained all her husband's possessions. The whole social position of the Beja women points, indeed, to an earlier matriarchal system. Among some of the tribes the custom of the " fourth day free " is observed, by which the women are only considered married for so many days a week, forming what liaisons they please on the odd day. The chief Beja tribes are the Ababda, Bisharin, Hadendoa, Beni-Amer, Amarar, Shukuria, Hallenga and Hamran.

BEJA (probably the ancient Pax Julia), the capital of an administrative district formerly included in the province of Alemtejo, Portugal; situated 95 m. S.S.E. of Lisbon by the Lisbon-Faro railway, and at the head of a branch line to Pias e Orada (3855), 26 m. E. Pop. (1900) 8885. Beja is an episcopal city, built on an isolated hill, and partly enclosed by walls of Roman origin; on the south it has a fine Roman gateway. Its cathedral is modern, but the citadel, with its beautiful Gothic tower of white marble, was founded by King Diniz (1279-1325). The city is surrounded by far-reaching plains, known as the Campo de Beja, and devoted partly to the cultivation of grain and fruit, partly to the breeding of cattle and pigs; copper, iron and manganese are also mined to a small extent, and Beja is the central market for all these products. Cloth, pottery and olive oil are manufactured in the city.

The administrative district of Beja, the largest and most thinly-populated district in Portugal, coincides with the southern part of Alemtejo (q.v.); pop. (1900) 163,612; area, 3958 sq. m.; 41-3 inhabitants per sq. m.

BEJAN (Fr. bejaune, from becjaune, " yellow beak," in allusion to unfledged birds; the equivalent to Ger. Gelbschnabel, Fr. blanc-bec, a greenhorn), a term for freshmen, or undergraduates of the first year, in the Scottish universities. The phrase was introduced from the French universities, where the levying of bejaunium " footing-money " had been prohibited by the statutes of the university of Orleans in 1365 and by those of Toulouse in 1 40 1. In 1493 the election of an Abbas Bejanorum (Abbot of the Freshmen) was forbidden in the university of Paris. In the German and Austrian universities the freshman was called beanus. In Germany the freshman was anciently called a Pennal (from Med. Lat. pennale, a box for pens), in allusion to the fact that the newly-arrived student had to carry such for the older pupils. Afterwards Fuchs (fox) was substituted for Pennal, and then Goldjuchs, because he is supposed still to have a few gold coins from home.

BEJART, the name of several French actors, children of Marie Herv6

and Joseph Bejart (d. 1643), the holder of a small government post. The family — there were eleven children — was very poor and lived in the Marais, then the theatrical quarter of Paris. One of the sons, Joseph Bejart (c. 1617-1659), was a strolling player and later a member of Moliere's first company (l'lllustre Theatre), accompanied him in his theatrical wanderings, and was with him when he returned permanently to Paris, dying soon after. He created the parts of Lelie in L' Etourdie, and Eraste in Le Depit amoureux. His brother Louis Bejart (c. 1630-1678) was also in Moliere's company during the last years of its travels. He created many parts in his

brother-in-law's plays — Valere in Le Depil amoureux, Dubois in Le Misanthrope, Alcantor in Le Mariage force, and Don Luis in Le Festin de Pierre — and was an actor of varied talents. In consequence of a wound received when interfering in a street brawl, he became lame and retired with a pension — the first ever granted by the company to a comedian — in 1670.

The more famous members of the family were two sisters.

Madeleine Bejart (1618-1672) was at the head of the travelling company to which her sister Genevieve (1631-1675) — who played as Mile Herve — and her brothers belonged, before they joined Moliere in forming lTUustre Theatre (1643). With Moliere she remained until her death on the 17th of February 1672. She had had an illegitimate daughter (1638) by an Italian count, and her conduct on her early travels had not been exemplary, but whatever her private relations with Moliere may have been, however acrimonious and violent her- temper, she and her family remained faithful to his fortunes. She was a tall, handsome blonde, and an excellent actress, particularly in soubrette parts, a number of which Moliere wrote for her. Among her creations were Marotte in Les Pricieuses ridicules, Lisette in IJEcole des maris, Dorine in Tartuffe.

Her sister, Armande Gresinde Claire Elizabeth Bejart (1 645-1 700), seems first to have joined the company at Lyons in 1653. Moliere directed her education and she grew up under his eye. In 1662, he being then forty and she seventeen, they were married. Neither was happy; the wife was a flirt, the husband jealous. On the strength of a scurrilous anonymous pamphlet, La Famea.se Comedienne, ou histoire de la Gutrin (1688), her character has been

held perhaps unduly low. She was certainly guilty of indifference and ingratitude, possibly of infidelity; they separated after the birth of a daughter in 1665 and met only at the theatre until 1671. But the charm and grace which fascinated others, Moliere too could not resist, and they were reconciled. Her portrait is given in a well-known scene (Act iii., sc. 9) in Le Bourgeois gentilhomme. Mme Moliere's first appear- ance on the stage was in 1663, as filise in the Critique de Vicole des femmes. She was out of the cast for a short time in 1664, when she bore Moliere a son — Louis XIV. and Henrietta of England standing sponsors. But in the spring, beginning with the fetes given at Versailles by the king to Anne of Austria and Maria Theresa, she started her long list of important roles. She was at her best as Celimene — really her own highly-finished portrait — ■ in Le Misanthrope, and hardly less admirable as Angelique in Le Malade imaginaire. She was the Elmire at the first performance of Tartuffe, and the Lucile of Le Bourgeois gentilhomme. All these parts were written by her husband to display her talents to the best advantage and she made the most of her opportunities. The death of Moliere, the secession of Baron and several other actors, the rivalry of the H6tel de Bourgogne and the develop- ment of the Palais Royal, by royal patent, into the home of French opera, brought matters to a crisis with the comldiens du roi. Well advised by La Grange (Charles Varlet, 1639-1692), Armande leased the Theatre Guenegaud, and by royal ordinance the residue of her company were combined with the players from the Theatre du Marais, the fortunes of which were at low ebb. The combination, known as the troupe du roi, at first was un- fortunate, but in 1679 they secured Mile du Champmcsle, later absorbed the company of the Hotel de Bourgogne, and in 1680 the Comedie Francaise was born. Mme Moliere in 1677 had married Eustache Francois Guerin (1636-17 28), an actor, and by him she had one son (1678-1708). She continued her successes at the theatre until she retired in 1694, and she died on the 30th of November 1700.

BEK, ANTONY (d. 131 1), bishop of Durham, belonged to a Lincolnshire family, and, having entered the church, received several benefices and soon attracted the attention of Edward I., who secured his election as bishop of Durham in 1283. When, after the death of King Alexander III. in 1285, Edward interfered in the affairs of Scotland, he employed Bek on this business, and in 1 294 he sent him on a diplomatic errand to the German king, Adolph of Nassau. Taking part in Edward's campaigns in Scotland, the bishop received the surrender of John de Baliol at

Brechin in 1296, and led one division of the English army at the

battle of Falkirk in 1298. Soon after his return to England he became involved in a quarrel with Richard de Hoton, prior of Durham. Deposed and excommunicated by Bek, the prior secured the king's support; but the bishop, against whom other complaints were preferred, refused to give way, and by his obstinacy incurred the lasting enmity of Edward. In 1302, in obedience to the command of Pope Boniface VIII., he visited Rome on this matter, and during his absence the king seized and administered his lands, which, however, he recovered when he returned and submitted to Edward. He continued, however, to pursue Richard with unrelenting hostility, and was in his turn seriously harassed by the king. Having been restored to the royal favour by Edward II. who made him lord of the Isle of Man, the bishop died at Eltham on the 3rd of March 131 1. A man of great courage and energy, chaste and generous, Bek was remark- able for his haughtiness and ostentation. Both as a bishop and as a private individual he was very wealthy, and his household and retinue were among the most magnificent in the land. He was a soldier and a hunter rather than a bishop, and built castles at Eltham and elsewhere.

Bek's elder brother, Thomas Bek (d. 1293), bishop of St David's, was a trusted servant of Edward I. He obtained many important and wealthy ecclesiastical positions, was made treasurer of England in 1279, and became bishop of St David's in 1280. He was a benefactor to his diocese and died on the 1 2th of May 1293.

Another Thomas Bek (1282-1347), who was bishop of Lincoln from 1341 until his death on the 2nd of February 1347, was a member of the same family.

Antony Bek must not be confused with his kinsman and name- sake, Antony Bek (1279-1343), who was chancellor and dean of Lincoln cathedral, and became bishop of Norwich after a disputed election in 1337. He was a quarrelsome man, and after a stormy episcopate, died on the 19th of December 1343.

See Robert of Graystanes, Historia de statu ecclesiae Dunelmensis, edited by J. Raine in his Historiae Dunelmensis scriptores (London, 1839); W. Hutchinson, History of Durham (Newcastle, 1785-1794); J. L. Low, Diocesan History of Durham (London, 188 1); and M. Creighton in the Dictionary of National Biography, vol. iv. (London,

1885).

BEKE, CHARLES TILSTONE (1800-1874), English traveller,

geographer and Biblical critic, was born in Stepney, Middlesex, on the 10th of October 1800. His father was a merchant in London, and Beke engaged for a few years in mercantile pursuits. He afterwards studied law at Lincoln's Inn, and for a time practised at the bar, but finally devoted himself to the study of historical, geographical and ethnographical subjects. The first-fruits of his researches appeared in his work entitled Origines Biblicae, or Researches in Primeval History, published in 1834. An attempt to reconstruct the early history of the human race from geological data, it raised a storm of opposition on the part of defenders of the traditional readings of the book of Genesis; but in recognition of the value of the work the university of Tubingen conferred upon him the degree of Ph.D. For about two years (1837-1838) Beke held the post of acting British consul in Saxony. From that time till his death his attention was largely given to geographical studies, chiefly of the Nile valley. Aided by private friends, he visited Abyssinia in connexion with the mission to Shoa sent by the Indian government under the leadership of Major (afterwards Sir) William Cornwallis Harris, and explored Gojam and more southern regions up to that time unknown to Europeans. Among other achievements, Beke was the first to determine, with any approach to scientific accuracy, the course of the Abai (Blue Nile). The valuable results of this journey, which occupied him from 1840 to. 1843, he gave to the world in a number of papers in scientific publica- tions, chiefly in the Journal of the Royal Geographical Society. On his return to London, Beke re-engaged in commerce, but devoted all his leisure to geographical and kindred studies. In 1848 he planned an expedition from the mainland opposite Zanzibar to discover the sources of the Nile. A start was made, but the expedition accomplished little. Beke's belief that the

White Nile was the main stream was, however, shown to be accurate by subsequent exploration. In 1856 he endeavoured; unsuccessfully, to establish commercial relations with Abyssinia through Massawa. In 1861-1862 he and his wife travelled in Syria and Palestine, and went to Egypt with the object of pro- moting trade with Central Africa and the growth of cotton in the Sudan. In 1865 he again went to Abyssinia, for the purpose of obtaining from King Theodore the release of the British captives. On learning that the captives had been released, Beke turned back, but Theodore afterwards re-arrested the party. To the military expedition sent to effect their release Beke furnished much valuable information, and his various services to the

government and to geographical research were acknowledged by the award of £500 in 1868 by the secretary for India, and by the grant of a civil list pension of £100 in 1870. In his seventy- fourth year he undertook a journey to Egypt for the purpose of determining the real position of Mount Sinai. He conceived that it was on the eastern side of the Gulf of Akaba, and his journey convinced him that his view was right. It has not, however, commended itself to general acceptance. Beke died at Bromley, in Kent, on the 31st of July 1874.

Beke's writings are very numerous. Among the more im- portant, besides those already named, are: An Essay on the Nile and Us Tributaries (1847), The Sources of the Nile (i860), and The British Captives in Abyssinia (1865). He was a fellow of the Royal Geographical Society, and for his contributions to the knowledge of Abyssinia received its gold medal, and also that of the Geographical Society of France. As a result of a controversy over the statements of another Abyssinian explorer, Antoine Abbadie, Beke returned the medal awarded him by the French Society.

See Summary of the late Dr Beke's published works and . . . public services, by his widow (Tunbridge Wells, 1876).

BˆKlSCSABA, a market-town of Hungary, 123 m. S.E. of Budapest by rail. Pop. (1900) 37,108, mostly Slovaks and Lutherans, who form the largest Lutheran community in Hungary. The town is situated near the White Koros, with which it is connected by a canal, and is an important railway- junction in central Hungary. Bekescsaba possesses several large milling establishments, while the weaving of hemp and the production of hemp-linen is largely pursued as a home industry. The town carries on an active trade in cereals, wines and cattle.

BEKKER, AUGUST IMMANUEL (1785-1871), German philologist and critic, was born on the 21st of May 1785. He completed his classical education at the university of Halle under F. A. Wolf, who considered him as his most promising pupil. In 18 10 he was appointed professor of philosophy in the university of Berlin. For several years, between 1810 and 182 1, he travelled in France, Italy, England and parts of Germany, examining classical manuscripts and gathering materials for his great editorial labours. He died at Berlin on the 7th of June 1871. Some detached fruits of his researches were given in the Anecdota Graeca, 1814-1821; but the full result of his unwearied industry and ability is to be found in the enormous array of classical authors edited by him. Anything like a complete list of his works would occupy too much space, but it may be said that his

industry extended to nearly the whole of Greek literature with the exception of the tragedians and lyric poets. His best known editions are: Plato (1816-1823), Oratores Attici (1823- 1824), Aristotle (1831-1836), Aristophanes (1829), and twenty- five volumes of the Corpus Scriptorum Historiae Byzantinae. The only Latin authors edited by him were Livy (1829-1830) and Tacitus (183 1). Bekker confined himself entirely to textual recension and criticism, in which he relied solely upon the MSS., and contributed little to the extension of general scholarship.

See Sauppe, Zur Erinnerung an Meineke und Bekker (1872); Haupt, " Gedachtnisrede auf Meineke und Bekker," in his Opuscula, iii. ; E. I. Bekker, " Zur Erinnerung an meinen Vater," in the Preussisches Jahrbuch, xxix.

BEKKER, BALTHASAR (1634-1698), Dutch divine, was born in Friesland in 1634, and educated at Groningen, under Jacob Alting, and at Franeker. He was pastor at Franeker, and from

1679, at Amsterdam. An enthusiastic disciple of Descartes, he wrote several works in philosophy and theology, which by their freedom of thought aroused considerable hostility. His best known work was Die Betooverde Wereld (1691), or The World Bewitched (1695; one volume of an English translation from a French copy), in which he examined critically the phenomena generally ascribed to spiritual agency, and attacked the belief in sorcery and " possession " by the devil, whose very existence he questioned. The book is interesting as an early study in comparative religion, but its publication in 1692 led to Bekker's deposition from the ministry. He died at Amsterdam.

BEKKER (or Wolff), ELIZABETH (1738-1804), Dutch novelist, was married to Adrian Wolff, a Reformed clergyman, but is always known under her maiden name. After the death of her husband in 1777, she resided for some time in France, with her close friend, Agatha Deken. She was exposed to some of the dangers of the French Revolution, and, it is said, escaped the guillotine only by her great presence of mind. In 1795 she returned to Holland, and resided at the Hague till her death. Her novels were written in conjunction with Agatha Deken, and it is somewhat difficult to determine the exact qualities contributed by each. The Hislorie van William Lcvend (1785), Historic van Sara Burgerhart (1790), Abraham Blankaart (1787), Cornelie Wildschut (1 793-1 796), were extremely popular.

BEL, the name of a chief deity in Babylonian religion, the counterpart of the Phoenician Baal (q.v.) ideographically written as

En-lil. Since Bel signifies the " lord " or " master " par excellence, it is, therefore, a title rather than a genuine name, and must have been given to a deity who had acquired a position at the head of a pantheon. The real name is accordingly to be sought in En-lil, of which the first element again has the force of " lord " and the second presumably " might," " power," and the like, though this cannot be regarded as certain. En-lil is associated with the ancient city of Nippur, and since En-lil with the determinative for " land " or " district " is a common method of writing the name of the city, it follows, apart from other evidence, that En-lil was originally the patron deity of Nippur. At a very early period — prior to 3000 B.C. — Nippur had become the centre of a political district of considerable extent, and it is to this early period that the designation of En-lil as Bel or " the lord " reverts. Inscriptions found at Nippur, where extensive excavations were carried on during 1888- 1900 by Messrs Peters and Hayncs, under the auspices of the University of Pennsylvania, show that Bel of Nippur was in fact regarded as the head of an extensive pantheon. Among the titles accorded to him are " king of lands," " king of heaven and earth " and " father of the gods." His chief temple at Nippur was known as E-Kur, signifying " mountain house," and such was the sanctity acquired by this edifice that Babylonian and Assyrian rulers, down to the latest days, vied with one another in em- bellishing and restoring Bel's seat of worship, and the name itself became the designation of a temple in general. Grouped around the main sanctuary there arose temples and chapels to the gods and goddesses who formed his court, so that E-Kur became the name for an entire sacred precinct in the city of Nippur. The name " mountain house " suggests a lofty structure and was perhaps the designation originally of the staged tower at Nippur, built in imitation of a mountain, with the sacred shrine of the god on the top. The tower, however, also had its special designation of " Im-Khar-sag," the elements of which, signifying " storm " and " mountain," confirm the conclusion drawn from other evidence that En-lil was originally a storm-god having his seat on the top of a mountain. Since the Euphrates valley has no mountains, En-lil would appear to be a god whose worship was carried into Babylonia by a wave of migration from a mountainous country — in all probability from Elam to the east.

When, with the political rise of Babylon as the centre of a great empire, Nippur yielded its prerogatives to the city over which Marduk presided, the attributes and the titles of En-lil were transferred to Marduk, who becomes the " lord " or Bel of later days. The older Bel did not, however, entirely lose his standing. Nippur

continued to be a sacred city after it ceased

to have any considerable political importance, while in addition the rise of the doctrine of a triad of gods symbolizing the three divisions — heavens, earth and water — assured to Bel, to whom the earth was assigned as his province, his place in the religious system. The disassociation from his local origin involved in this doctrine of the triad gave to Bel a rank independent of political changes, and we, accordingly, find Bel as a factor in the religion of Babylonia and Assyria to the latest days. It was no doubt owing to his position as the second figure of the triad that enabled him to survive the political eclipse of Nippur and made his sanctuary a place of pilgrimage to which Assyrian kings down to the days of Assur-bani-pal paid their homage equally with Babylonian rulers.

See also Belit and Baal. For the apocryphal book of the Bible, Bel and the Dragon, see Daniel: Additions to Daniel. (M. J A.)

BELA III. (d. 1196), king of Hungary, was the second son of King Geza II. Educated at the Byzantine court, where he had been compelled to seek refuge, he was fortunate enough to win the friendship of the brilliant emperor Manuel who, before the birth of his own son Alexius, intended to make Bela his successor and betrothed him to his daughter. Subsequently, however, he married the handsome and promising youth to Agnes of Chatilion, duchess of Antioch, and in n 73 placed him, by force of arms, on the Hungarian throne, first expelling Bela's younger brother Geza, who was supported by the Catholic party. Initiated from childhood in all the arts of diplomacy at what was then the focus of civilization, and as much a warrior by nature as his imperial kinsman Manuel, Bela showed himself from the first fully equal to all the difficulties of his peculiar position. He began by adopting Catholicism and boldly seeking the assistance of Rome. He then made what had hitherto been an elective a hereditary throne by crowning his infant son Emerich his successor. In the beginning of his reign he adopted a prudent policy of amity with his two most powerful neighbours, the emperors of the East and West, but the death of Manuel in 1180 gave Hungary once more a free hand in the affairs of the Balkan Peninsula, her natural sphere of influence. The attempt to recover Dalmatia, which involved Bela in two bloody wars with Venice (1181-88 and 1190-91), was only partially successful. But he

assisted the Rascians or Serbs (see Hungary: History) to throw off the Greek yoke and establish a native dynasty, and attempted to made Galicia an appanage of his younger son Andrew. It was in Bela's reign that the emperor Frederick I., in the spring of 1189, traversed Hungary with 100,000 crusaders, on which occasion the country was so well policed that no harm was done to it and the inhabitants profited largely from their commerce with the German host. In his last years Bela assisted the Greek emperor Isaac II. Angelus against the Bulgarians. His first wife bore Bela two sons, Emerichand Andrew. On her death he married Margaret of France, sister of King Philip Augustus. Bela was in every sense of the word a great statesman, and his court was accounted one of the most brilliant in Europe.

For an account of his internal reforms see Hungary. Though the poet Ede Szigligeti has immortalized his memory in the play Bela III., we have no historical monograph of him, but in Ignacz Acsady, History of the Hungarian Realm (Hung.), i. 2 (Budapest, 1903), there is an excellent account of his reign. (R. N. B.)

BELA IV. (1206-1270), king of Hungary, was the son of Andrew II., whom he succeeded in 1235. During his father's lifetime he had greatly distinguished himself by his administra- tion of Transylvania, then a wilderness, which, with incredible patience and energy, he colonized and christianized. He repaired as far as possible the ruinous effects of his father's wastefulness, but on his accession found everything in the utmost confusion, " the great lords," to cite the old chronicler Rogerius (c. 1223- 1266), "having so greatly enriched themselves that the king was brought to naught." The whole land was full of violence, the very bishops storming rich monasteries at the head of armed retainers. Bela resolutely put down all disorder. He increased the dignity of the crown by introducing a stricter court etiquette, and its wealth by recovering those of the royal domains which the magnates had appropriated during the troubles of the last reign. The pope, naturally on the side of order, staunchly

*supported this regenerator of the realm, and in his own brother Coloman, who administered the district of the Drave, Bela also found a loyal and intelligent co-operator. He also largely employed Jews and Ishmaelites, 1 the financial specialists of the day, whom he rewarded with lands and titles. The salient event of Bela's reign was the terrible Tatar invasion which reduced three-quarters of Hungary to ashes. The terror of their name had long*preceded them, and Bela, in 1235 or 1236, sent the Dominican monk Julian, by way of Constantinople, to Russia, to collect information about them from*

the " ancient Magyars " settled there, possibly the Volgan Bulgarians. He returned to Hungary with the tidings that the Tatars contemplated the immediate conquest of Europe. Bela did his utmost to place his kingdom in a state of defence, and appealed betimes to the pope, the duke of Austria and the emperor for assistance; but in February and March 1241 the Tatars burst through the Carpathian passes; in April Bela himself, after a gallant stand, was routed on the banks of the Sajo and fled to the islands of Dalmatia; and for the next twelve months the kingdom of Hungary was merely a geographical expression. The last twenty- eight years of Bela's reign were mainly devoted to the recon- struction of his realm, which he accomplished with a single- minded thoroughness which has covered his name with glory. (See Hungary: History.)

Perhaps the most difficult part of his task was the recovery of the western portions of the kingdom (which had suffered least) from the hands of Frederick of Austria, who had seized them as the price of assistance which had been promised but never given. First Bela solicited the aid of the pope, but was compelled finally to resort to arms, and crossing the Leitha on the 15th of June 1246, routed Frederick, who was seriously wounded and trampled to death by his own horsemen. With him was extinguished the male line of the house of Babenberg. In the south Bela was less successful. In 1243 he was obliged to cede to Venice, Zara, a perpetual apple of discord between the two states; but he kept his hold upon Spalato and his other Dalmatian possessions, and his wise policy of religious tolerance in Bosnia enabled Hungary to rule that province peaceably for many years. The new Servian kingdom of the Nemanides, on the other hand, gave him much trouble and was the occasion of many bloody wars. In 1 261 the Tatars under Nogai Khan invaded Hungary for the second time, but were defeated by Bela and lost 50,000 men. Bela reached the apogee of his political greatness in 1264 when, shortly after his crushing defeat of the Servian king, Stephen Urosh, he entertained at his court, at Kalocsa, the ambassadors of the newly restored Greek emperor, of the kings of France, Bulgaria and Bohemia and three Tatar mirzas. For a time Bela was equally fortunate in the north-west, where the ambitious and enterprising Premyslidae had erected a new Bohemian empire which absorbed the territories of the old Babenbergers and was very menacing to Hungary. With Ottakar II. in particular, Bela was almost constantly at war for the possession of Styria, which ultimately fell to the Bohemians. The last years of Bela's life were embittered by the ingratitude of his son Stephen, who rebelled continuously against his father and ultimately compelled him to divide the kingdom with him,

the younger prince setting up a capital of his own at Sarospatak, and following a foreign policy directly contrary to that of his father. Bela died on the 3rd of May 1 270 in his sixty-fourth year. With the people at large he was popular to the last; his services to his country had been inestimable. He married, while still crown-prince, Maria, daughter of the Nicaean emperor, Theodore Lascaris, whom his own father brought home with him from his crusade. She bore him, besides his two sons Stephen and Bela, seven daughters, of whom St Margaret was the most famous.

No special monograph for the whole reign exists. For the Tatar invasion see the contemporary Rogerius, Epistolae super destructione Regni Hungariae per Tartaros facta (Budapest, 1885). A vivid but somewhat chauvinistic history of Bela's reign will be found in Acsady 's History of the Hungarian Realm (Hung.), i. 2 (Budapest, 1903). (R. N. B.)

1 Mahommedan itinerant chapmen, from the Volga.

BELA, Las Bela, or Lus Beyla, situated in 26 27′ 30″ N. lat. and 66° 45′ o" E. long., 350 ft. above sea level, capital of the small independent state of Las Bela to the south of Kalat (Baluchistan), ruled by the Jam (or Cham), who occupies the position of a protected chief under the British Raj. To the east lies Sind, and to the west Makran, and from time immemorial the great trading route between Sind and Persia has passed through Las Bela. The area of Las Bela is 6357 sq. m., and its population in 1901 was 56,109, of which 54,04° were Mussulmans. The low-lying, alluvial, hot and malarial plains of Las Bela, occupying about 6000 sq. m. on the north-east corner of the Arabian Sea, are highly irrigated and fertile — two rivers from the north, the Purali and the Kud, uniting to provide a plentiful water supply. The bay of Sonmiani once extended over most of these plains, where the Purali delta is now growing with measurable strides. The hill ranges to the east, parting the plains from Sind (generally known locally as the MOr and the Kirthar), between which lies the long narrow line of the Hab valley,' strike nearly north and south, diminishing in height as they approach the sea and allowing of a route skirting the coast between Karachi and Bela. To the west they are broken into an infinity of minor ridges massing themselves in parallel forma- tion with a strike which curves from south to west till they form the coast barrier of Makran. The

Persian route from India, curving somewhat to the north, traverses this waste of barren ridges almost at right angles, but on dropping into the Kolwah valley its difficulty ceases. It then becomes an open road to Kej and Persia, with an .easy gradient. This was un- doubtedly one of the greatest trade routes of the medieval days of Arab ascendancy in Sind, and it is to this route that Bela owes a place in history which its modern appearance and dimen- sions hardly seem to justify. Bela is itself rather prettily situated on a rocky site above the banks of the Purali. About four miles to the south are the well-kept gardens which surround the tomb of Sir Robert Sandeman; which is probably destined to become a " ziarat," or place of pilgrimage, of even greater sanctity than that of General Jacob at Jacobabad. The population of the town numbers about 5000. The Jam's retinue consists of about 300 infantry, 50 cavalry, and 4 guns. Liability to assist on active service is the only acknowledgment of the suzerainty which is paid by the Jam to the Khan of Kalat. The Jam, Mir Kamal Khan, succeeded his father, Sir Mir Khan, in 1895, and was formally invested with powers in 1902.

From Very early times this remote corner of Baluchistan has held a distinct place in history. There are traces of ancient Arab (possibly Himyaritic) occupation to be found in certain stone ruins at Gondakeha on the Kud river, 10 m. to the north-west of Bela, whilst the Greek name " Arabis " for the Purali is itself indicative of an early prehistoric connexion with races of Asiatic Ethiopians referred to by Herodotus. On the coast, near the village of Sonmiani (a station of the Indo-Persian telegraph line) may be traced the indentation which once formed the bay of Moron tobara, noted in the voyage of Nearchus; and it was on the borders of Makran that the Turanian town of Rhambakia was situated, which was once the centre of the trade in " bdellium." In the 7th century a.d. Las Bela was governed by a Buddhist priest, at which time all the province of Gandava was Buddhist, and Sind was ruled by the Brahman, Chach. Buddhist caves are to be found excavated in the conglomerate cliffs near Gondakeha, at a place called Gondrani, or Shahr-i-Rogan. With the influx of Arabs into Makran, Bela, under the name of Armel (or Armabel), rose to importance as a link in the great chain of trading towns between Persia and Sind; and then there existed in the delta such places as Yusli (near the modern Uthal) and Kambali (which may possibly be recognized in the ruins at Khairokot), and many smaller towns, each of which possessed its citadel, its caravanserai and bazaar, which are not only recorded but actually mapped by one of the medieval Arab geographers, Ibn Haukal. It is prob- able that Karia Pir, if m, to the east of the modern city, repre- sents the site of

the Armabel which was destroyed by Mahommed Kasim in his victorious march to Sind in 710. There is another

The ruins at

Karia Pir, like those of Tijarra Pir and Khairokot, contain Arab pottery, seals, and other medieval relics. The Lumris, or Lasis, who originate the name Las as a prefix to that of Bela, are the dominant tribe in the province. They are comparatively recent arrivals who displaced the earlier Tajik and Brahui occupants. It is probable that this influx of Rajput population was coincident with the displacement of the Arab dynasties in Sind by the Mahommedan Rajputs in the 1 1 th century a.d. Some authorities connect the Lumris with the Sumras.

There are no published accounts of Bela, excepting those of the Indian government reports and gazetteers. This article is compiled from unpublished notes by the author and by Mr Wainwright, of the Indian Survey department. (T. H. H.)*

BELA, a town of British India, administrative headquarters of the Partabgarh district of the United Provinces, with a railway station 80 m. from Benares. Pop. (1901) 8041. It adjoins the village of Partabgarh proper, and the civil station sometimes known as Andrewganj. Bela, which was founded in 1802 as a cantonment, became a district headquarters after the mutiny. It has trade in agricultural produce. There is a well-known hospital for women here.

BELAY (from the same O. Eng. origin as " lay "; cf. Dutch beleggen), a nautical term for making ropes fast round a pin. In earlier days the word was synonymous with " waylay " or " surround."

BELCHER, SIR EDWARD (1799-1877), British naval officer, entered the navy in 1812. In 1825 he accompanied Frederick William Beechey's expedition to the Pacific and Bering Strait, as a surveyor. He subsequently commanded a surveying ship on the north and west coasts of Africa and in the British seas, and in 1836 took up the work which Beechey left unfinished on the Pacific coast of South America. This was on board the " Sulphur," which was ordered to return to England in 1839 by the Trans-Pacific route. Belcher made various observations at a number of islands which he visited, was delayed by being despatched to take part in the war in China in 1840-1841, and reached home only in 1842. In 1843 he was knighted, and was now engaged in the " Samarang," in surveying work in the East Indies, the Philippines, &c, until 1847. In 1852 he

was given command of the government Arctic expedition in search of Sir John Franklin. This was unsuccessful; Belcher's inability to render himself popular with his subordinates was peculiarly unfortunate in an Arctic voyage, and he was not wholly suited to command vessels among ice. This was his last active service, but he became K.C.B. in 1867 and an admiral in 1872. He published a Treatise on Nautical Surveying (1835), Narrative of a Voyage round the World performed in H.M.S. " Sulphur," 1836-1842 (1843), Narrative of the Voyage of H.M.S. "Samarang' : during 1843-1846 (1848; the Zoology of the Voyage was separately dealt with by some of his colleagues, 1850), and The Last of the. Arctic Voyages (1855); besides minor works, including a novel, Horatio Howard Brenton (1856), a story of the navy. He died in London on the 1 8th of March 1877.

BELDAM (like " belsire," grandfather, from the Fr. bel, good, expressing relationship; cf. the Fr. belle-mere, mother-in-law, and dame, in Eng. form " dam," mother), strictly a grandmother or remote ancestress, and so an old woman; generally used contemptuously as meaning an old hag.

BELESME, ROBERT OF (fl. 11 00), earl of Shrewsbury. From his mother Mabel Talvas he inherited the fief of Belesme, and from his father, the Conqueror's companion, that of Shrews- bury. Both were march-fiefs, the one guarding Normandy from Maine, and the other England from the Welsh; consequently their lord was peculiarly powerful and independent. Robert is the typical feudal noble of the time, circumspect and politic, persuasive and eloquent, impetuous and daring in battle, and an able military engineer; in person, tall and strong; greedy for land, an oppressor of the weak, a systematic rebel and traitor, and savagely cruel. He first appears as a supporter of Robert's rebellion against the Conqueror (1077); then as an accomplice in the English conspiracy of 1088 against Rufus. Later he served Ruf us in Normandy, and was allowed to succeed his brother Hugh

in the earldom of Shrewsbury (1098). But at the height of his power, he revolted against Henry I. (1102). He was banished and deprived of his English estate; for sometime after he remained at large in Normandy, defying the authority of Robert and Henry alike. He betrayed Robert's cause at Tinchebrai; but in in 2 was imprisoned for

life by Henry I.

See E. A. Freeman's William Rufus and his Norman Conquest, vol. iv. ; and J. M. Lappenberg's History of England under the Norman Kings, trans. B. Thorpe (1857).

BELFAST, a city, county and parliamentary borough, the capital of the province of Ulster, and county town of county Antrim, Ireland. Pop. (1901) 349,180. It is a seaport of the first rank, situated at the entrance of the river Lagan into Belfast Lough, ii2f m. north of Dublin by rail, on the north-east coast of the island. It is an important railway centre, with terminal stations of the Great Northern, Northern Counties (Midland of England), and Belfast & County Down railways, and has regular passenger communication by sea with Liverpool, Fleetwood, Heysham, Glasgow, and other ports of Great Britain. It is built on alluvial deposit and reclaimed land, mostly not exceeding 6 ft. above high water mark, and was thus for a long period subject to inundation and epidemics, and only careful drainage rendered the site healthy. The appearance of the city plainly demonstrates the modern growth of its importance, and evidence is not wanting that for a considerable period architec- tural improvement was unable to keep pace with commercial development. Many squalid districts, however, have been im- proved away to make room for new thoroughfares and handsome buildings. One thoroughfare thus constructed at the close of the 19th century is the finest in Belfast — Royal Avenue. It contains, among several notable buildings, the post office, and the free public library, opened in 1888 and comprising a collection of over 40,000 volumes, as well as an art gallery and a museum of antiquities especially rich in remains of the Neolithic period. The architect was Mr W. H. Lynn. The magnificent city hall, from designs of Mr (afterwards Sir) Brumwell Thomas, was opened in 1906. The principal streets, such as York Street, Donegall Street, North Street, High Street, are traversed by tramways. Four bridges cross the Lagan; the Queen's Bridge (1844, widened in 1886) is the finest, while the Albert Bridge (1889) replaces a former one which collapsed. Other principal public buildings, nearly all to be included in modern schemes of development, are the city hall, occupying the site of the old Linen Hall, in Donegall Square, estimated to cost £300,000; the commercial buildings (1820) in Waring Street, the custom- house and inland revenue office on Donegall Quay, the architect of which, as of the court house, was Sir Charles Lanyon, and some of the numerous banks, especially the Ulster Bank. The Campbell College in the suburb of Belmont was founded in 1892 in accordance with the will of Mr W. J. Campbell, a Belfast merchant, who left £200,000

for the building and endowment of a public school. Other educational establishments are Queen's University, replacing the old Queen's College (1849) under the Irish Universities Act 1908; the Presbyterian and the Methodist Colleges, occupying neighbouring sites close to the extensive botanical gardens, the Royal Academical Institution, and the Municipal Technical Institute. In 1897 the sum 0I £100,000 was subscribed by citizens to found a hospital (1903) to commemorate the Diamond Jubilee of Queen Victoria, and named after her. It took the place of an institution which, under various names, had existed since 1797. Public monuments are few, but include a statue of Queen Victoria (1903) and a South African War memorial (1905) in front of the city hall; the Albert Memorial (1870), in the form of a clock-tower, in Queen Street; a monument to the same prince in High Street; and a statue in Wellington Place to Dr Henry Cooke, a prominent Presbyterian minister who died in 1868. The corporation controls the gas and electric and similar undertakings. The water supply, under the control of the City and District Water Commissioners (in- corporated 1840), has its sources in the Mourne Mountains, Co. Down, 40 m. distant, with a service reservoir at Knockbreckan; also in the hilly district near Carrickfergus. There are several

public parks, of which the principal are the Ormeau Park (1870), the Victoria, Alexandra, and Falls Road parks. There is a Theatre Royal in Arthur Square. There are also several ex- cellent clubs and societies, social, political, scientific, and sport- ing; including among the last the famous Royal Ulster Yacht Club.

In 1899 was laid the foundation stone of the Protestant cathedral in Donegall Street, designed by Sir Thomas Drew and Mr W. H. Lynn to seat 3000 worshippers, occupying the site of the old St Anne's parish church, part of the fabric of which the new building incorporates. The diocese is that of Down, Connor, and Dromore. The first portion (the nave) was conse- crated on the 2nd of June 1904. . The plan is a Latin cross, the west front rising to a height of 105 ft., while the central tower is 1 7 S f t. The pulpit was formerly used in the nave of Westminster Abbey, being presented to Belfast cathedral' by the dean and chapter of that foundation.

Most of the older churches are classical in design, and the most notable are St George's, in High Street, and the Memorial church of Dr Cooke in May Street. For the more modern churches the Gothic style has frequently been used. Amongst these are St James, Antrim Road; St Peter's Roman Catholic chapel, with its Florentine spire; Presbyterian churches in Fitzroy Avenue, and Elmwood Avenue, and

the Methodist chapel, Carlisle Circus. The Presbyterians and Protestant Episcopalians each outnumber the Roman Catholics in Belfast, and these three are the chief religious divisions.

Environs. — The country surrounding Belfast is agreeable and picturesque, whether along the shores of the Lough or towards the girdle of hills to the west; and is well wooded and studded with country seats and villas. In the immediate vicinity of the city are several points of historic interest and natural beauty. The Cave Hill, though exceeded in height by Mount Divis, Squire's Hill, and other summits, is of greatest interest for its caves, in the chalk, from which early weapons and other objects have been recovered. The battle in 1408, which was fought along the base of the cliffs here between the Savages of the Ards and the Irish, is described in Sir Samuel Ferguson's "Hibernian Nights Entertainment." Here also are McArt's Fort and other earthworks, and from here the importance of the physical position of Belfast may be appreciated to the full. At Newtonbreda, overlooking the Lagan, was the palace of Con O'Neill, whose sept was exterminated by Deputy Mountjoy in the reign of Queen Elizabeth. Belfast Lough is of great though quiet beauty; and the city itself is seen at its best from its seaward approach, with its girdle of hills in the background: On the shores of the lough several villages have grown into residential towns for the wealthier classes, whose work lies in the city. Of these White- house and White Abbey are the principal on the western shore, and on the eastern, Holywood, which ranks practically as a suburb of Belfast, and, at the entrance to the lough, Bangor.

Harbour and Trade. — The harbour and docks of Belfast are managed by a board of harbour commissioners, elected by the ratepayers and the shipowners. The outer harbour is one of the safest in the kingdom. By the Belfast Harbour Acts the com- missioners were empowered to borrow more than £2,500,000 in order to carry out several new works and improvements in the port. Under the powers of these acts a new channel, called the Victoria Channel, several miles in length, was cut about 1840 leading in a direct line from the quays to the sea. This channel affords 20 ft. of water at low tide, and 28 ft. at full tide, the width of the channel being 300 ft. The Alexandra Dock, which is 852 ft. long and 31 ft. deep, was opened in 1889, and the extensive improvements (including the York Dock, where vessels carrying 10,000 tons can discharge in four to six days) have been effected from time to time, making the harbour one of the most commodious in the United Kingdom. The provision of a new graving dock adjoining the Alexandra was delayed in October 1905 by a subsidence of the ground during its construction.

Parliamentary powers were obtained to construct a graving dock capable of accommodating the largest class of warships. The growth and development of the shipbuilding industry has been

immense, the firm of Harland & Wolff being amongst the first in the trade, and some of the largest vessels in the world come from their yards. The vast increase of the foreign trade of Belfast marks its development, like Liverpool, as a great distri- buting port. The chief exports are linen, whisky, aerated waters, iron ore and cattle.

Belfast is the centre of the Irish linen industry, machinery for which was introduced by T. & A. Mulholland in 1830, a rapid extension of the industry at once resulting. It is also the head- quarters and business centre for the entire flax-spinning and weaving industry of the country. Distilling is extensively carried on. Several firms are engaged in the manufacture of mineral waters, for which the water of the Cromac Springs is peculiarly adapted. Belfast also has some of the largest tobacco works and rope works in the world.

Administration. — In conformity with the passing of the Municipal Corporations Act of 1840 the constitution of the cor- poration was made to consist of ten aldermen and thirty coun- cillors, under the style and title of " The Mayor, Aldermen, and Burgesses of the Borough of Belfast." In 1888 the rank of a city was conferred by royal charter upon Belfast, with the incidental rank, liberties, privileges, and immunities. In 1892 Queen Victoria conferred upon the mayor of the city the title of lord mayor, and upon the corporation the name and description of "The Lord Mayor, Aldermen, and Citizens of the city of Belfast." By the passing of the Belfast Corporation Act of 1896, the boundary of the city was extended, and the corporation made to consist of fifteen aldermen and forty five councillors, and the number of wards was increased from five to fifteen. By virtue of the Local Government (Ireland) Act 1898, Belfast became a county borough on the 1st of April 1899. By the Local Govern ment (Ireland) Act 1898, Belfast became for assize purposes " the county of the city of Belfast," with a high sheriff. It is divided into four parliamentary divisions north, south, east and west, each returning one member. The total area is 16,594 acres.

History. — The etymology of the name (for which several derivations have been proposed) and the origin of the town are equally

uncertain, and there is not a single monument of anti- quarian interest upon which to found a conjecture. About n 77 a castle is said to have been built by John de Courcy, to be destroyed by Edward Bruce in 1316. It may be noted here that Belfast Castle was finally burnt in 1708; but a modern mansion, on Cave Hill, outside the city, bears that name. About the beginning of the 16th century, Belfast is described as a town and fortress, but it was in reality a mere fishing village in the hands of the house of O'Neill. In the course of the wars of Gerald Fitzgerald, 8th earl of Kildare, Belfast was twice attacked by him, in 1503 and 1512. The O'Neills, always opposed to the English, had forfeited every baronial right; but in 1552 Hugh O'Neill of Clandeboye promised allegiance to the reigning monarch, and obtained the castle of Carrickfergus, the town and fortress of Belfast, and all the surrounding lands. Belfast was then restored from the half ruined state into which it had fallen, and the castle was garrisoned. The turbulent successors of O'Neill having been routed by the English, the town and fortress were obtained by grant dated the 16th of November 1571 by Sir Thomas Smith, a favourite of Queen Elizabeth, but were afterwards forfeited by him to the lord deputy Sir Arthur Chichester, who, in 161 2, was created Baron Chichester of Belfast. At this time the town consisted of about 120 houses, mostly built of mud and covered with thatch, while the castle, a two- storeyed building, was roofed with shingles. A charter was now granted to the town by James I. (April 27, 1613) constituting it a corporation with a chief magistrate and 12 burgesses and commonalty, with the right of sending two members to parliament. In 163 2 Thomas Wentworth, Earl Strafford, was appointed first lord deputy of Ireland, and Belfast soon shared largely in the benefits of his enlightened policy, receiving, among other favours, certain fiscal rights which his lordship had purchased from the corporation of Carrickfergus. Two years after the rebellion of 1641 a rampart was raised round the town, pierced by four gates on the land side. In 1662, as appears by a map

still extant, there were 150 houses within the wall, forming five streets and as many lanes; and the upland districts around were one de.nse forest of giant oaks and sycamores, yielding an unfailing supply of timber to the woodmen of Carrickfergus.

Throughout the succeeding fifty years the progress of Belfast surpassed that of most other towns in Ireland. Its merchants in 1686 owned forty ships, of a total carrying power of 3300 tons, and the customs collected were close upon £20,000. The old charter was annulled by James II. and a new one issued in 1688, but the old was restored in 1690 by William III. When the king arrived at Belfast in

that year there were only two places of worship in the town, the old corporation church in the High Street, and the Presbyterian meeting-house in Rosemary Lane, the Roman Catholics not being permitted to build their chapels within the walls of corporate towns.

At the beginning of the 18th century Belfast had become known as a place of considerable trade, and was then thought a handsome, thriving and well-peopled town, with many new houses and good shops. During the civil commotions which so long afflicted the country, it suffered less than most other places; and it soon afterwards attained the rank of the richest commercial town in the north of Ireland. James Blow and Co. introduced letterpress printing in 1696, and in 1704 issued the first copy of the Bible produced in the island. In September 1737, Henry and Robert Joy started the Belfast News Letter. Twenty years afterwards the town contained 1800 houses and 8549 inhabitants, 556 of whom were members of the Church of Rome. It was not, however, till 1789 that Belfast obtained the regular communication, which towns of less importance already enjoyed, with Dublin by stage coach, a fact which is to be explained by the badness of the roads and the steepness of the hills between Newry and Belfast.

The increased freedom of trade with which Ireland was favoured, the introduction of the cotton manufacture by Robert Joy and Thomas M'Cabe in 1777, the establishment in 1791 of shipbuilding on an extensive scale by William Ritchie, an energetic Scotsman, combined with the rope and canvas manufacture already existing, supplied the inhabitants with employments and increased the demand for skilled labour. The population now made rapid strides as well by ordinary extension as by immigration from the rural districts. Owing to the close proximity of powerful opposed religious sects, the modern history of the city is not without its record of riot and bloodshed, as in 1880 and 1886, and in August 1907 serious rioting followed upon a strike of carters; but the prosperity of the city has been happily unaffected.

See George Benn, History of Belfast (Belfast, 1877) ; Robert M. Young, Historical Notices of Old Belfast (Belfast, 1896).

BELFAST, a city, port of entry, and the county-seat of Waldo county, Maine, U.S.A., on Belfast Bay (an arm of the Penobscot), and about 32 m. south-south-west of Bangor. Pop. (1890) 5294; (1910) 4618. It is served by the Belfast branch of the Maine Central railway (connecting with the main line at Burnham Junction, 33 m. distant), and by the coasting steamers (from Boston) of the Eastern Steamship

Co. The city, a summer resort, lies on an undulating hillside, which rises from the water's edge to a height of more than 150 ft., and commands extensive views of the picturesque islands, headlands, and mountains of the Maine coast. It has a public library. Among the industries of Belfast are trade with the surrounding country, the manufacture of shoes, leather boards, axes, and sashes, doors and blinds, and the building and repairing of boats. Its exports in 1908 were valued at $285,913 and its imports at $10,313. Belfast was first settled (by Scottish-Irish) in 1769, and in 1773 was incorporated as a town under its present name (from Belfast, Ireland). The town was almost completely destroyed by the British in 1779, but its rebuilding was begun in the next year. It was held by a British force for five days in September 1814. Belfast was chartered as a city in 1850.

BELFORT, Territory or, administrative division of eastern France, formed from the southern portion of the department of Haut-Rhin, the rest of which was ceded to Germany by the

treaty of Frankfort (1871). It is bounded on the N.E. and E. by German Alsace, on the S.E. and S. by Switzerland, on the S.W. by the department of Doubs, on the W. by that of Haute-Saone, on the N. by that of Vosges. Pop. (1906), 95,421.

With an area cf only 235 sq. m., it is, next to that of Seine, the smallest department of France. The northern part is' occupied by the southern offshoots of the Vosges, the southern part by the northern outposts of the Jura. Between these two highlands stretches the Trouee (depression) de Belfort, 185 m. broad, joining the basins of the Rhine and the Rhone, traversed by the canal from the Rhone to the Rhine and by several railways. A part of the natural highway open from Frankfort to the Mediterranean, the Trouee has from earliest times provided the route for the migration from north to south, and is still of great commercial and strategical value. The northern part, occupied by the Vosges, rises to 4126 ft. in the Ballon d' Alsace, the northern termination and the culminating point of the department; to 3773 ft. in the Planche des Belles-Filles; to 3579 ft. in the Signal des Plaines; to 3534 ft. in the Barenkopf; and to numerous other lesser heights. South of the Trouee de Belfort, there rise near Delle limestone hills, in part wooded, on the frontiers of France, Alsace, and Switzerland, attaining 1680 ft. in the Foret de

Florimont. The territory between Lachapelle-sous-Rougemont (in the north-east), Belfort and Delle does not rise above 1300 ft. The line of lowest altitude follows the river St Nicolas and the Rhone-Rhine canal. The chief rivers are the Savoureuse, 24 m. long, running straight south from the Ballon d' Alsace, and emptying into the Allaine; the Allaine, from Switzerland, entering the territory a little to the south of Delle, and leaving it a little to the west of Morvillars; the St Nicolas, 24 m. long, from the Barenkopf, running south- wards and then south-west into the Allaine. The climate to the north of the town of Belfort is marked by long and rigorous winters, sudden changes of temperature, and an annual rainfall of 31 in. to 39 in. retained by an impervious subsoil; farther south it is milder and more equable with a rainfall of 23 in. to 31 in., quickly absorbed by the soil or evaporated by the sun. About one-third of the total area is arable land; wheat, oats and rye are the chief cereals; potatoes come next in importance. Forest covers another third of the surface; the chief trees are firs, pines, oak and beech; cherries are largely grown for the distillation of kirsch. Pasture and forage crops cover the re-maining third of the Territory; only horned cattle are raised to any extent. There is an unworked concession of copper, silver and lead at Giromagny; and there are also quarries of stone. The Territory is an active industrial region. The two main branches of manufacture are the spinning and weaving of cotton and wool, and the production of iron and iron-goods (wire, railings, nails, files, &c.) and machinery. Belfort has important locomotive and engineermg works. Hoisery is manufactured at Delle, watches, clocks, agricultural machinery, petrol motors, ironware and electrical apparatus at the flourishing centre of Beaucourt, and there are numerous saw-mills, tile and brick works and breweries. Imports consist of raw materials for the industries, dyestuffs, coal, wine, &c, and the exports of manufactured goods.

Belfort is the capital of the Territory, which comprises one arrondissement, 6 cantons and 106 communes, and falls within the circumscriptions of the archbishopric, the court of appeal and the academie (educational division) of Besancon. It forms the 7th subdivision of the VII. army corps. Both the Eastern and the Paris-Lyon-Mediterranee railways traverse the Territory, and the canal from the Rhone to the Rhine accompanies the river St Nicolas for about 6 m.

BELFORT, a town of eastern France, capital of the Territory of Belfort, 275 m. E.S.E. of Paris, on the main line of the Eastern railway. Pop. (1906), town, 27,805; commune, 34,649. It is situated among wooded hills on the Savoureuse at the intersec- tion

of the roads and railway lines from Paris to Basel and from Lyons to Miilhausen and Strassburg, by which it maintains considerable trade with Germany and Switzerland. The town is divided by the Savoureuse into a new quarter, in which is the

railway station on the right bank, and the old fortified quarter, with the castle, the public buildings and monuments, on the left bank. The church of St Denis, a building in the classical style, erected from 1727 to 1750, and the hotel de ville (1721- 1724) both stand in the Place d'Armes opposite the castle. The two chief monuments commemorate the defence of Belfort in the war of 1870-1871. " The Lion of Belfort," a colossal figure 78 ft. long and 52 ft. high, the work of F. A. Bartholdi, stands in front of the castle; and in the Place d'Armes is the bronze group " Quand Meme " by Antonin Mercie, in memory of Thiers and of Colonel Pierre Marie Aristide Denfert-Rochereau (1823- 1878), commandant of the place during the siege. Other objects of interest are the Tour de la Miotte, of unknown origin and date, which stands on the hill of La Miotte to the N.E. of Belfort, and the Port de Brisach, a gateway built by Vauban in 1687. Belfort is the seat of a prefect; its public institutions include tribunals of first instance and of commerce, a chamber of commerce, a lycee, a training-college and a branch of the Bank of France. The construction of locomotives and machinery, carried on by the Socifite Alsacienne, wire-drawing, and the spinning and weaving of cotton are included among its industries, which together with the population increased greatly owing to the Alsacian immigration after 187 1. Its trade is in the wines of Alsace, brandy and cereals. The town derives its chief importance from its value as a military position.

After the war of 1870-1871, Belfort, which after a diplomatic struggle remained in French hands, became a frontier fortress of the greatest value, and the old works which underwent the siege of 1870-1871 (see below) were promptly increased and re-modelled. In front of the Perches redoubts, the Bosmont, whence the Prussian engineers began their attack, is now heavily fortified with continuous lines called the Organisation defensive de Bosmont. The old Bellevue redoubt (now Fort Denfert- Rochereau) is covered by a new work situated likewise on the ground occupied by the siege trenches in the war. Perouse, hastily entrenched in 1870, now possesses a permanent fort. The old entrenched camp enclosed by the castle, Fort La Miotte, and Fort Justice, is still maintained, and part even of the enceinte built by Vauban is used for defensive purposes. Outside this improved inner line, which includes the whole area of the attack and defence of 1870, lies a complete circle of detached forts and

batteries of modern construction. To the north, Forts Salbert and Roppe form the salients of a long defensive line on high ground, at the centre of which, where the Savoureuse river divides it, a new work was added later. Two works near Giromagny, about 8 m. from Belfort itself, connect the fortress with the right of the defensive line of the Moselle (Fort Ballon d' Alsace). Ir> the eastern sector of the defences (from Roppe to the Savoureuse below Belfort) the forts are about 3 m. from the centre, the works near the Belfort-Mulhausen railway being somewhat more advanced, and in the western (from Salbert to Fort Bois d'Oye on the lower Savoureuse) they are advanced to about the same distance. The fort of Mont Vaudois, the western- most, overlooks Hericourt and the battlefield of the Lisaine: farther to the south Montbeliard is also fortified. The perimeter of the Belfort defences is nearly 25 m.

History. — Gallo-Roman remains have been discovered in the vicinity of Belfort, but the place is first heard of in the early part of the 13th century, when it was in the possession of the counts of Montbeliard. From them it passed by marriage to the counts of Ferrette and afterwards to the archdukes of Austria. By the treaty of Westphalia (1648) the town was ceded to Louis XIV. who gave it to Cardinal Mazarin.

In the Thirty Years' War Belfort was twice besieged, 1633 and 1634, and in 1635 there was a battle here between the duke of Lorraine and the allied French and Swedes under Marshal de la Force. The fortifications of Vauban were begun in 1686. Belfort was besieged in 1814 by the troops of the allies and in 181 5 by the Austrians.

The most famous episode of the town's history is its gallant and successful defence in the war of 1870-1871.

The events which led up to the siege are described under

BELFRY

667

Franco-German War. Even before the investment Belfort was cut off from the interior of France, and the German corps of von Werder was, throughout the siege, between the fortress and the forces which might attempt its relief. The siege corps was commanded by General von Tresckow and numbered at first 10,000 men with twenty-four field guns — a force which appeared adequate for the reduction of the antiquated works of Vauban. Colonel Denfert-Rochereau was,

however, a scientific engineer of advanced ideas as well as a veteran soldier of the Crimea and Algeria, and he had been stationed at Belfort for six years. He was therefore eminently fitted for the command of the fortress. He had as a nucleus but few regular troops, but the energy of the military and civil authorities enabled his force to be augmented by national guards, &c, to 17,600 men. The artillery was very numerous, but skilled gunners were not available in any great strength and ammunition was scarce. Perhaps the most favourable circumstance from a technical point of view was the bomb-proof accommodation of the enceinte.

The old fortress consisted of the town enceinte, the castle (situated on high ground and fortified by several concentric envelopes), and the entrenched camp, a hollow enclosed by continuous lines, the salients of which were the castle, Fort La Justice and Fort La Miotte. These were planned in the days of short-range guns, and were therefore in 1870 open to an overwhelming bombardment by the rifled cannon of the attack. Denfert-Rochereau, however, understood better than other engineers of the day the power of modern artillery, and his plan was to utilize the old works as a keep and an artillery position. The Perches ridge, whence the town and suburbs could be bombarded, he fortified with all possible speed. On the right bank of the Savoureuse he constructed two new forts, Bellevue in the south-west and Des Barres to the west, and, further, he prepared the suburb on this side for a hand-to-hand defence. His general plan was to maintain as advanced a line as possible, to manoeuvre against the investing troops, and to support his own by the long range fire of his rifled guns. With this object he fortified the outlying villages, and when the Germans (chiefly Landwehr) began the investment on the 3rd of November 1870, they encountered everywhere a most strenuous resistance. Throughout the month the garrison made repeated sorties, and the Germans were on several occasions forced by the long range fire of the fortress to evacuate villages which they had taken. Under these circumstances, and also because of their numerical weakness and the rigour of the weather, the Germans advanced but slowly. On the 2nd of December, when at last von Tresckow broke ground for the construction of his batteries, the French still held Danjoutin, Bosmont, Perouse and the adjacent woods, and, to the northward (on this side the siege was not pressed) La Forge. Thus the first attack of the siege artillery was con- fined to the western side of the river between Essert and Bavillers. From this position the bombardment opened on the 3rd of December. Some damage was done to the houses of Belfort, but the garrison was not intimidated, and their artillery replied with such spirit that after

some days the German commander gave up the bombardment. On this occasion the distant forts La Miotte and La Justice fired with effect at a range of 4700 yds., affording a conspicuous illustration of the changed conditions of siege-craft. The German batteries, as more guns arrived, were extended from left to right, and on the 13th of December the Bosmont was captured, ground being also gained in front of Bellevue. The difficulties under which the siege corps laboured were very great, and it was not until the 7th of January 1871 that the rightmost battery opened fire. The formal siege of the Perches redoubts had now been decided upon, and as an essential preliminary to further operations, Danjoutin, now isolated, was stormed by the Landwehr on the night of the 7th-8th January. In the meanwhile typhus and smallpox had broken out amongst the French, many of the national guards were impatient of control, and the German trenches, in spite of difficulties of ground and weather, made steady progress towards the Perches. A week after the fall of Danjoutin the victory of von Werder and

the XIV. army corps at the Lisaine, in which a part of the siege corps bore a share, put an end to the attempt to relieve Belfort, and the siege corps was promptly increased to a strength of 17,600 infantry, 4700 artillery and 1100 engineers, with thirty- four field-guns besides the guns and howitzers of the siege train. The investment was now more strictly maintained even on the north side. On the night of the 20th of January the French lines about Perouse were carried by assault, and, both flanks

being now cleared, the formal siege of the Perches forts was opened, the first parallel extending from Danjoutin to Haut Taillis. In the early morning of the 27 th a determined but premature attempt was made to storm the Perches redoubts, which cost the besiegers nearly 500 men. After this failure Tresckow once more resorted to the regular method of siege approaches, and on the 2nd of February the second parallel was thrown up. La Justice was now bombarded by two new batteries near Perouse, the Perches were of course subjected to an "artillery attack," and henceforward the besiegers fired 1500 shells a day into the works of the French. But the besiegers were still weak in numbers and their labours were very exhausting. Bellevue and Des Barres became very active in hindering the advance of the

siege works, and the German battalions were so far depleted by losses and sickness that they could often muster but 300 men for duty. Still, the guns of the attack were now steadily gaining the upper hand, and at last on the 8th of February the Germans entered the two Perches redoubts. This success, and the arrival of German reinforcements, decided the siege. The Perches ridge was crowned with a parallel and numerous batteries, which in the end mounted ninety-seven guns. The attack on the castle now opened, but operations were soon afterwards suspended by the news that Belfort was now included in the general armis- tice (February 15th). A little later Denfert-Rochereau received a direct order from his own government to surrender the fortress, and the garrison, being granted free withdrawal, marched out with its arms and trains. " The town had suffered terribly . . . nearly all the buildings were damaged . . . the guns in the upper batteries could only be reached by ladders. The garrison, of its original strength of 17,700 officers and men, had lost 4750, besides 336 citizens. The place was no longer tenable " (Moltke, Franco-German War). Nevertheless, " the defence was by no means at its last stage " at the time of the formal surrender (British 'Text-Book of Fortification, 1893). The total loss of the besiegers was about 2000 men.

See J. Liblin, Belfort el son territoire (Miilhausen, 1887).

BELFRY (Mid. Eng. berfrey, through Med. Lat. berefredus, from Teut. bergjrid or berevrit, which, according to the New Eng. Diet., is a combination of bergen, to protect, and frida, safety or peace; the word thus meaning a shelter; the change from r to I, — cf. almery for armarium, — wrongly associated the origin of the word with " bell," and aided the restriction in meaning), a word in medieval siege-craft for a movable

wooden tower of several stages, protected with raw hides, used for purposes of attack; also a watch-tower, particularly one with an alarm bell; hence any detached tower or campanile containing bells, as at Evesham, but more generally the ringing room or loft of the tower of a church (see Tower) .

BELGAE, a Celtic people first mentioned by Caesar, who states that they formed the third part of Gaul, and were separated from the Celtae by the Sequana (Seine) and Matrona (Marne). On the east

and north their boundary was the lower Rhine, on the west the ocean. Whether Caesar means to include the Leuci, Treviri and Mediomatrici among the Belgian tribes is uncertain. According to the statement of the deputation from the Remi to Caesar (Bell. Gall. ii. 4),, the Belgae were a people of German origin, who had crossed the Rhine in early times and driven out the Galli. But Caesar's own statement (B.G. i. 1) that the Belgae differed from the Celtae in language, institutions and laws, is too sweeping (see Strabo iv. p. 176), at least as regards language, for many words and names are common to both. In any case, only the eastern districts would have been affected by invaders from over the Rhine, the chief seat of the Belgae proper being in the west, the country occupied by the Bellovaci, Ambiani and Atrebates, to which it is probable (although the reading is uncertain) that Caesar gives the distinctive name Belgium (corresponding to the old provinces of Picardy and Artois). The question is fully discussed by T. R. Holmes (Caesars Conquest of Gaul, 1899), who comes to the conclusion that " when the Reman delegates told Caesar that the Belgae were descended from the Germans, they probably only meant that the ancestors of the Belgic conquerors had formerly dwelt in Germany, and this is equally true of the ancestors of the Gauls who gave their name to the Celtae; but, on the other hand, it is quite possible that in the veins of some of the Belgae flowed the blood of genuine German forefathers." W. Ridgeway {Early Age 0} Greece, 1901) considers that the Belgic tribes were Cimbri, " who had moved directly across the Rhine into north-eastern Gaul." No definite number of Belgian tribes is given by Caesar; according to Strabo (iv. p. 196) they were fifteen in all. The Belgae had also made their way over to Britain in Caesar's time (B.G. ii. 4, v. 12), and settled in some of the southern counties (Wilts, Hants and Somerset). Among their towns were Magnus Portus (Portsmouth) and Vettta Belgarum (Winchester).

In 57 B.C., after the defeat of Ariovistus, the Belgae formed a coalition against Caesar, and in 52 took part in the general rising under Vercingetorix. After their final subjugation, Caesar combined the territory of the Belgae, Celtae and Aquitani into a single province (Gallia Comata). Augustus, however, finding it too unwieldy, again divided it into three provinces, one of which was Belgica, bounded on the west by the Seine and the Arar (Saone); on the north by the North Sea; on the east by the Rhine from its mouth to the Lacus Brigantinus (Lake Constance). Its southernmost district embraced the west of Switzerland. The capital and residence of the governor of the province was Durocortorum Remorum (Reims). Under Dio- cletian, Belgica Prima (capital, Augusta Trevirorum, Trier) and Secunda

(capital, Reims) formed part of the " diocese " of Gaul.

See A. G. B. Schayes, La Belgique el les Pays-Bas avant et pendant la domination romaine (2nd ed., Brussels, 1877) ; H. G. Moke, La Belgique ancienne (Ghent, 1855) ; A. Desjardins, Geographic historique de la Gaule, ii. (1878); T. R. Holmes, Caesar's Conquest of Gaul (1899); M. Ihm in Pauly-Wissowa's Realencyclopadie, iii. pt. 1 (1897) ; J. Jung, " Geographie von Italien und dem Orbis romanus " (2nd ed., 1897), in I. Miiller's Handbuch der klassischen Altertums- wissenschaft.

BELGARD, a town of Germany, in the Prussian province of Pomerania, at the junction of the rivers Leitznitz and Persante, 22 m. S.E. of Kolberg by rail. Pop. (1900) 8047. Its industries consist of iron founding and cloth weaving, and there are considerable horse and cattle markets.

BELGAUM, a town and district of British India, in the southern division of Bombay. The town is situated nearly 2500 ft. above sea-level; it has a station on the Southern Mahratta railway, 245 m. S. of Poona. It has an ancient fortress, dating apparently from 1519, covering about 100 acres, and surrounded

by a ditch; within it are two interesting Jain temples. Belgaum contains a cantonment which is the headquarters of a brigade in the 6th division of the western army corps. It is also a considerable centre of trade and of cotton weaving. There are cotton mills. Pop. (1901) 36,878.

The district of Belgaum has an area of 4649 sq. m. To the north and east the country is open and well cultivated, but to the south it is intersected by spurs of the Sahyadri range, thickly covered in some places with forest. In 1901 the population was 993)976, showing a decrease of 2 % compared with an increase of 17% in the preceding decade. The principal crops are millet, rice, wheat, other food-grains, pulse, oil-seeds, cotton, sugar- cane, spices and tobacco. There are considerable manufactures of cotton-cloth. The town of Gokak is known for its dyes, its paper and its wooden and earthenware toys. The West Deccan line of the Southern Mahratta railway runs through the district from north to south. Two high schools at Belgaum town are maintained by government and by the London Mission. The Kurirs, a wandering and thieving tribe, the Kamais, professional burglars, and the Baruds, cattle-stealers and highwaymen, are notorious among the criminal classes.

History. — The ancient name of the town of Belgaum was Venugrama, which is said to be derived from the bamboos that arc characteristic of its neighbourhood. The most ancient place in the district is Halsi; and this, according to inscriptions on copper plates discovered in its neighbourhood, was once the capital of a dynasty of nine Kadamba kings. It appears that from the middle of the 6th century a.d. to about 760 the country was held by the Chalukyas, who were succeeded by the Rashtra- kutas. After the break-up of the Rashtrakuta power a portion of it survived in the Rattas (875-1250), who from 1210 onward made Venugrama their capital. Inscriptions give evidence of a long struggle between the Rattas and the Kadambas of Goa, who succeeded in the latter years of the 12th century in acquiring and holding part of the district. By 1208, however, the Kadambas had been overthrown by the Rattas, who in their turn succumbed to the Yadavas of Devagiri in 1250. After the overthrow of the Yadavas by the Delhi emperor (1320), Belgaum was for a short time under the rule of the latter; but only a few years later the part south of the Ghatprabha was subject to the Hindu rajas of Vijayanagar. In 1347 the northern part was conquered by the Bahmani dynasty, which in 1473 took the town of Belgaum and conquered the southern part also. When Aurungzeb overthrew the Bijapur sultans in 1686, Belgaum passed to the Moguls. In 1776 the country was overrun by Hyder Ali, but was retaken by the Peshwa with British assistance. In 1818 it was handed over to the East India Company and was made part of the district of Dharwar. In 1836 this was divided into two parts, the southern district continuing to be known as Dharwar, the northern as Belgaum.

See Imp. Gazetteer of India (Oxford, ed. 1908), s.v.

BELGIAN CONGO, a Belgian colony in Equatorial Africa occupying the greater part of the basin of the Congo river. Formerly the Independent State of the Congo, it was annexed to Belgium in 1908. (See Congo Free State.)

BELGIUM (Fr. Belgique; Flem. Belgic), an independent, constitutional and neutral state occupying an important position in north-west Europe. It was formerly part of the Low Countries or Netherlands (q.v.). Although the name Belgium only came into general use with the foundation of the modern kingdom in 1830, its derivation from ancient times is clear and incontro- vertible. Beginning with the Belgae and the Gallia Belgica of the Romans, the use of the adjective to distinguish the inhabit- ants of the south Netherlands can be traced through all stages of subsequent history. During the Crusades, and in the middle ages, the term Belgicae

principes is of frequent occurrence, and when in 1790 the Walloons rose against Austria during what was called the Brabant revolution, their leaders proposed to give the country the name of Belgique. Again in 1814, on the expulsion of the French, when there was much talk of founding an inde- pendent state, the same name was suggested for it. It was not till sixteen years later, on the collapse of the united kingdom of

the Netherlands, that the occasion presented itself for giving effect to this proposal. For the explanation of the English form of the name it may be mentioned that Belgium was a canton of what had been the Nervian country in the time of the Roman occupation.

Topography, &°c. — Belgium lies between 49 30′ and 51° 30′ N., and 2 32′ and 6 s 7′ E., and on the land side is bounded by Holland on the N. and N.E., by Prussia and the grand duchy of Luxemburg on the E. and S.E., and by France on the S. Its land frontiers measure 793 m., divided as follows: — with Holland 269 m., with Prussia 60 m., with the grand duchy 80 m. and with France 384 m. In addition it has a sea-coast of 42 m. The western portion of Belgium, consisting of the two Flanders, Antwerp and parts of Brabant and Hainaut, is flat, being little above the level of the sea; and indeed at one point near Furnes it is 7 ft. below it. The same description applies more or less to the north-east, but in the south of Hainaut and the greater part of Brabant the general level of the country is about 300 ft. above the sea, with altitudes rising to more than 600 ft. South of the Meuse, and in the district distinguished by the appellation " Between Sambre and Meuse," the level is still greater, and the whole of the province of Luxemburg is above 500 ft., with alti- tudes up to 1650 ft. In the south-eastern part of the province of Liege there are several points exceeding 2000 ft. The highest of these is the Baraque de Michel close to the Prussian frontier, with an altitude of 2190 ft. The Baraque de Fraiture, north-east of La Roche, is over 2000 ft. While the greater part of western and northern Belgium is devoid of the picturesque, the Ardennes and the Fagnes districts of " Between Sambre and Meuse " and Liege contain much pleasant and some romantic scenery. The principal charm of this region is derived from its fine and exten- sive woods, of which that called St Hubert is the best known. There are no lakes in Belgium,

but otherwise it is exceedingly well watered, being traversed by the Meuse for the greater part of its course, as well as by the Scheldt and the Sambre. The numerous affluents of these rivers, such as the Lys, Dyle, Dender, Ourthe, Ambleve, Vesdre, Lesse and Semois, provide a system of waterways almost unique in Europe. The canals of Belgium are scarcely less numerous or important than those of Holland, especially in Flanders, where they give a distinctive character to the country. But the most striking feature in Belgium, where so much is modern, utilitarian and ugly, is found in the older cities with their relics of medieval greatness, and their record of ancient fame. These, in their order of interest, are Bruges, Antwerp, Louvain, Brussels, Ghent, Ypres, Courtrai, Tournai, Furnes, Oudenarde and Liege. It is to them rather than to the sylvan scenes of the Ardennes that travellers and tourists flock.

The climate may be described as temperate and approximating to that of southern England, but it is somewhat hotter in summer and a little colder in winter. In the Ardennes, owing to the greater elevation, the winters are more severe.

Geology. — Belgium lies upon the northern side of an ancient mountain chain which has long been worn down to a low level and the remnants of which rise to the surface in the Ardennes, and extend eastward into Germany, forming the Eifel and Westerwald, the Hunsriick and the Taunus. Westward the chain lies buried beneath the Mesozoic and' Tertiary beds of Belgium and the north of France, but it reappears in the west of England and Ireland. It is the " Hercynian chain " of Marcel Bertrand, and is composed entirely of Palaeozoic rocks. Upon its northern margin lie the nearly undisturbed Cretaceous and Tertiary beds which cover the greater part of Belgium. The latest beds which are involved in the folds of this mountain range belong to the Coal Measures, and the final elevation must have taken place towards the close of the Carboniferous period. The fact that in Belgium Jurassic beds are found upon the southern and not uˆpon the northern margin indicates that in this region the chain was still a ridge in Jurassic times. In the Ardennes the rocks which constitute the ancient mountain chain belong chiefly to the Devonian System, but Cambrian beds rise through the Devonian strata, forming the masses of Rocroi,

Stavelot, &c, which appear to have been islands in the Devonian sea. The Ordovician and Silurian are absent here, and the Devonian rests unconformably upon the Cambrian; but along the northern margin of the Palaeozoic area, Ordovician and Silurian rocks appear, and beds of similar age are also exposed farther north where the rivers have

cut through the overlying Tertiary deposits. Carboniferous beds occur in the north of the Palaeozoic area. Near Dinant they are folded amongst the Devonian beds, but the most important band runs along the northern border of the Ardennes. In this band lie the coalfields of Liege, and of Mons and Charleroi. It is a long and narrow trough, which is separated from the older rocks of the Ardennes by a great reversed fault, the faille du midi. In the southern half of the trough the folding of the Coal Measures is intense; in the northern half it is much less violent. The structure is complicated by a thrust-plane which brings a mass of older beds upon the Coal Measures in the middle of the trough. Except along the southern border of the Ardennes, and at one or two points in the middle of the Palaeozoic massif, Triassic and Jurassic beds are unknown in Belgium, and the Palaeozoic rocks are directly and unconformably overlaid by Cretaceous and Tertiary deposits. The Cretaceous beds are not extensive, but the Wealden deposits of Bernissart, with their numerous remains of Iguanodon, and the chalk of the district about the Dutch frontier near Maastricht, with its very late Cretaceous fauna, are of special interest.

Exclusive of the Ardennes the greater part of Belgium is covered by Tertiary deposits. The Eocene, consisting chiefly of sands and marls, occupies the whole of the west of the country. The Oligocene forms a band stretching from Antwerp to Maas- tricht, and this is followed towards the north by a discontinuous strip of Miocene and a fairly extensive area of Pliocene. The Tertiary deposits are similar in general character to those of the north of France and the south of England. Coal and iron are by far the most important mineral productions of Belgium. Zinc, lead and copper are also extensively worked in the Palaeozoic rocks of the Ardennes.

Area and Population. — The area comprises 2,945,503 hectares, or about 11,373 English sq. m., and the total population in December 1904 was 7,074,910, giving an average of 600 per sq. m.

The Nine

Area in

Population at

Population per

Provinces.

English sq. m.

end of 1904.

sq. m. 1904.

Antwerp .

1093

888,980

813-3

Brabant .

1268

1,366,389

1077-59

Flanders E.

1 158

1,078,507

931-35

Flanders W.

1249

845,732

677-8

Hainaut .

1437

1,192,967

830-18

Liege

1117

863,254

772-8

Limburg .

931

255,359

274-28

Luxemburg

1706

225,963

132-45

Namur Total

1414

357,759

253

11,373

7,074,910

622

The population was made up of 3,514,491 males and 3,560,419 females. The rate at which the population has increased is shown as follows: — From 1880 to 1890 the increase was at the rate annually of 54,931, from 1890 to 1900 at the rate of 62,421, and for the five years from 1900 to 1904 at the rate of 66,200. In 1831 the population of Belgium was 3,785,814, so that in 75 years it had not quite doubled. The following table gives the total births and deaths in certain years since 1880: —

Year.

Total births.

Total deaths.

Excess of births.

1880 . 1895 . . 1900 1904 .

171,864 183,015 193,789 191,721

123,323 125,148 129,046 119,506

48,541 57,867 64-743 72,215

These figures show that the births were 23,674 more in 1904 than in 1880, while the deaths were nearly 4000 fewer, with a population that had increased from 5ˆ to 7 millions. Of 191,721 births in 1904, 12,887 or 6-7 % were illegitimate. Statistics of

recent years show a slight increase in legitimate and a slight decrease in illegitimate births.

The emigration of Belgians from their country is small and reveals little variation. In 1900, 13,492 emigrated, and in 1904 the total rose only to 14,752. Of Belgians living abroad it is estimated that 400,000 reside in France, 15,000 in Holland, 12,000 in Germany and 4600 in Great Britain. The number of Belgians in the Congo State in 1904 was 1505. The number of foreigners resident in Belgium in 1900 with their nationalities were Germans, 42,079; English, 5096; French, 85,735; Dutch, 54,491; Luxemburgers, 9762; and all other nationalities,

14,411.

With regard to the languages spoken by the people of Belgium the following comparative table gives the return for the three censuses of 1880, 1890 and 1900:—

!

1880.

1890.

1900.

French only

2,230,316

2,485,072

2,574.805

Flemish only

2,485,384

2.744.271

2,822,005

German only

39.550

32,206

28,314

French and Flemish .

423.752

700,997

801,587

French and German .

35.250

58,590

66,447

Flemish and German .

2.956

7,028

7,238

The three languages .

13.331

13,185

42,889

Constitution and Government. — The Belgian constitution, drafted by the national assembly in 1 830-1 831 after the' pro- visional government had announced that " the Belgian provinces detached by force from Holland shall form an independent state," was published on the 7 th of February 1831, and the modifications introduced into it subsequently, apart from the composition of the electorate, have been few and unimportant. The constitu- tion originally contained one hundred and thirty-nine articles, and decreed in the first place that the government was to be " a constitutional, representative and hereditary monarchy." Having decided in favour of a monarchy, the provisional govern- ment first offered the throne to the due de Nemours, son of Louis-Philippe, but this offer was promptly withdrawn on the discovery that Europe would not endorse it. It was then offered to Prince Leopold of Saxe-Coburg, widower of the princess Charlotte of England, and accepted by him. The prince was proclaimed on the 4th of June 1831 as Leopold I., king of the Belgians, and on the 21st of July 1831 he was solemnly in- augurated in Brussels. The succession is vested in the heirs male of Leopold I., and should they ever make complete default the throne will be declared vacant, and a national assembly composed of the two chambers elected in double strength will make a fresh nomination. In 1894 a new article numbered 61 was inserted in the constitution providing that " in default of male heirs the king can nominate his successor with the assent of the two chambers, and if no such nomination has been made the throne shall be vacant," when the original procedure of the constitution would be followed. The Belgian national assembly assumed that its constitution would

extend over the whole of the Belgic or south Netherlands, but the powers decreed otherwise. The limits of Belgium are fixed by the London protocol of the 15th of October 183 1 — also called the twenty-four articles — which cut off what is now termed the grand duchy of Luxemburg, and also a good portion of the duchy of Limburg. These losses of territory held by a brother people are still felt as a grievance by many Belgians. The Belgian constitution stipulates for " freedom of conscience, of education, of the press and also of the right of meeting," but the sovereign must be a member of the Church of Rome. The government was to consist of the king, the senate and the chamber of representatives. The functions of the king are those that appertain everywhere to the sovereign of a constitutional state. He is the head of the army and has the exclusive right of dissolving the chambers as preliminary to an appeal to the country.

The senate is composed of seventy-six elected members and twenty-six members nominated by the provincial councils. A senator sits for eight years unless a dissolution is ordered, and no one is eligible until he is forty years of age. Half the

seventy-six elected senators retire for re-election every four years. There is no payment or other privilege, except a pass on the state railways, attached to the rank of senator. The chamber of representatives contained one hundred and fifty-two members until 1899, when the number was increased to one hundred and sixty-six. Deputies are elected for four years, but half the house is re-elected every two years. A deputy must be twenty-five years of age, and the members of both houses must be of Belgian nationality, born or naturalized. A deputy receives an annual honorarium of 4000 francs and a railway pass. Down to 1893 the electorate was exceedingly small. Property and other qualifications kept the voting power in the hands of a limited class. This may be judged from the fact that in the year named there were only 137,772 voters out of a population of 65 millions. In April 1894 the new electoral law altered the whole system. The property qualification was removed and every Belgian was given one vote on attaining twenty-five years of age and after one year's residence in his commune. At the same time the principle of multiple votes for certain qualifications was introduced. The Belgian citizen on reaching the age of thirty-five, providing he is married or is a widower with legitimate offspring and pays five francs of direct taxes, gets a second vote. Two extra votes are given for qualifica- tions of property, official status or university diplomas. The maximum voting power of any individual is three votes. In 1904 there were 1,581,649 voters, possessing 2,467,966 votes. This

system of plural voting has proved a success. It does not, however, satisfy the Socialists, whose formula is one man, one vote. The final change in the system of parliamentary elections was made in 1899-1900, when proportional representation was introduced. Proportional representation aims at the protection of minorities, and its working out is a little intricate, or at all events difficult to describe. The following has been accepted as a clear definition of what proportional representation is: — ■ " Each electoral district has the number of its members appor- tioned in accordance with the total strength of each party or political programme in that district. As a rule there are only the three chief parties, viz. Catholic, Liberal and Socialist, but the presence of Catholic-Democrats or some other new faction may increase the total to four or even five. The number of seats to be filled is divided by the number of parties or candidates, and then they are distributed in the proportion of the total followers or voters of each. The smallest minority is thus sure of one seat." An illustration may make this clearer. In an electoral district with 32,000 votes which returns eight deputies, four parties send up candidates, let us say, eight Catholics, eight Liberals, eight Socialists and one Catholic-Democrat. The result of the voting is, 16,000 Catholic votes, 9000 Liberal, 4500 Socialist, and 2500 Catholic-Democrat. The seats would, there- fore, be apportioned as follows: four Catholic, two Liberal, one Socialist and one Catholic-Democrat.

The king has one right which other constitutional rulers do not possess. He can initiate proposals for new laws (projets de lot). He is also charged with the executive power which he delegates to a cabinet composed of ministers tratioa. ' chosen from the party representing the majority in the chamber. Down to 1884 the Liberal party had held power with very few intervals since 1840. The Catholic party succeeded to office in 1884. The ministers represent depart- ments for finance, foreign affairs, colonies, justice, the interior, science and arts, war, railways, posts and telegraphs, agri- culture, public works, and industry and labour. The minister for war is generally a soldier, the others are civilians. Ministers may be members of either chamber and enjoy the privilege of being allowed to speak in both. Sometimes one minister will hold several portfolios at the same time, but such cases are rare.

The kingdom is divided into nine provinces which are sub- divided into 342 cantons and 2623 communes. The provinces are governed by a governor nominated by the king, the canton is a judicial division for marking the limit of the jurisdiction of each juge de paix, and the commune is the administrative unit,

and com- munes.

possessing self-government in all local matters. For each com- mune of 5000 inhabitants or over, a burgomaster is appointed by the communal council which is chosen by the electors Provinces f tne commune. As three years' residence is re- quired these electors are fewer in number than those for the legislature. In 1902 there were 1,146,482 voters with 2,007,704 votes, the principles of multiple votes, with, however, a maximum of four votes and proportional representation, being in force for communal as for legislative elections.

Religion.— -The constitution provides for absolute liberty of conscience and there is no state religion, but the people are almost to a man Roman Catholics. It is computed that there are 10,000 Protestants (half English) and 5000 Jews, and that all the rest are Catholics. The government in 1904 voted nearly 7,000,000 francs in aid of the religious establishments of, and the benevolent institutions kept up by, the Roman Church. The grant to other cults amounted to 118,000 francs, but small as this sum may appear it is in due proportion to the relative numbers of each creed. The hierarchy of the Church of Rome in Belgium is composed of the archbishop of Malines, and the bishops of Liege, Ghent, Bruges, Tournai and Namur. The archbishop receives £800, and the bishops £600 apiece from the state yearly. The pay of the village cure averages £80 a year and a house. Besides the regular clergy there are the members of the numerous monastic and conventual houses established in Belgium. They are engaged principally in educational and eleemosynary work, and the development in such institutions is considerable.

Education. — Education, though not obligatory, is free for those who cannot pay for it. In the primary schools instruction in reading, writing, arithmetic, history and geography is obliga- tory. In 1904 there were 7092 primary schools with 859,436 pupils of both sexes. Of these 807,383 did not pay. Primary education is supposed to continue till the age of fourteen, but in practice it stops at twelve for all who do not intend to pass through the middle schools, which is essential for all persons seeking state employment of any kind. The

middle schools have one privilege. They can give a certificate qualifying scholars for a mastership in the primary schools, which are under the full control of the communes. These appointments are always bestowed on local favourites. The pay of a school- master in a small commune is only £48, and in a large town £96, with a maximum ranging from £80 to £152 after twenty-four years' service. It is therefore clear that no very high qualifica- tions could be expected from such a staff. The control of the state comes in to the extent of providing district inspectors who visit the schools once a year, and hold a meeting of the teachers in their district once a quarter. In each province there is a chief inspector who is bound to visit each school once in two years, and reports direct to the minister of public instruction. With regard to the middle schools, the government has reserved the right to appoint the teaching staff, and to prescribe the books that are to be used The results of the middle schools are fairly satisfactory. Still better are the Athenees Royaux, twenty in number, which are quite independent of the commune and subject to official control under the superior direction of the king. Mathematics and classics are taught in them and the masters are allowed to take boarders. The expenditure of the state on education amounts to about a million sterling. In i860 the grants were only for little over one-eighth of the total in 1903. In 1900 31-94% of the toal population was illiterate. Considerable progress in the education of the people is made visibleby a comparison of the figures of three decennial censuses. In 1880 the illiterate were 42-25 % and in 1890 37-63, so that there was a further marked improvement by 1900. Among the provinces Walloon Belgium is better instructed than Flemish, Luxemburg coming first, followed by Namur, Liege and Brabant in their order.

Higher instruction is given at the universities and in the schools attached thereto. Those at Ghent and Liege are state universities; the two others at Brussels and Louvain are free.

At Louvain alone is there a faculty of theology. The number of students inscribed for the academical year 1 904-1 905 at each university was Ghent 899, Liege 1983, Brussels 1082, and Louvain 2134, or a grand total of 6098. Liege is specially famed for the technical schools attached to it. There are also a large number of state-aided schools for special purposes; (1) for military instruction, there are the Ecole Militaire at Brussels, the school of cadets at Namur, and army schools at different stations, e.g. Bouillon, &c. For officers in the army, there are the £cole de Guerre or staff college at Brussels with an average attendance of twenty, a riding school at Ypres where a course is obligatory for the cavalry and horse

artillery, and for soldiers in the army there are regimental schools and evening classes for illiterate soldiers. (2) For education in the arts, there is the Royal Academy of Fine Arts at Antwerp, and besides this famous school of painting there are eighty-four academies for teaching drawing throughout the kingdom. In music, there are royal conservatoires at Brussels, Antwerp, Ghent, and Liege. Besides these there are sixty-nine minor conservatoires. (3) For commercial and professional education, there are 181 schools. The Commercial Institute of Antwerp deserves special notice as an excellent rchool for clerks. (4) Among special schools may be named the three schools of navigation at Antwerp, Ostend and Nieuport. Since the wreck of the training-ship " Comte de Smet de Naeyer " in 1906, it has been decided that a stationary training-ship shall be placed in the Scheldt like the " Worcester " on the Thames. Among the numerous learned societies may be mentioned the Belgian Royal Academy founded in 1769 and revived in 1818. For the encouragement of research and literary style the government awards periodical prizes which are very keenly contested.

Justice. — The administration of justice is very fully organized, and in the Code Beige, which was carefully compiled between 183 1 and 1836 from the old laws of the nine provinces leavened by the Code Napoleon and modern exigencies, the Belgians claim that they possess an almost perfect statute-book. The courts of law in their order are Cow de Cassation, Cour d'Appel, Cour de Premiere Instance, and the Juge de Paix courts, one for each of the 342 cantons. The Cour de Cassation has a peculiar judicial sphere. It works automatically, examining every judgment to see if it is in strict accord with the code, and where it is not the decision or verdict is simply annulled. There is only one judge in this court, but he has the assistance of a large staff of revisers. The Cour de Cassation never tries a case itself except when a minister of state is the accused. The president of this tribunal is the highest legal functionary in Belgium. There are three courts of appeal, viz. at Brussels, Ghent and Liege. At Brussels there are four separate chambers or tribunals in the appeal court. Judges of appeal are appointed by the king for life from lists of eligible barristers prepared by the senate and the courts. Judges can only be removed by the unanimous vote of their brother judges. There are twenty-six courts of first instance distributed among the principal towns of the kingdom, and in Antwerp, Ghent and Liege there are besides special tribunals for the settlement of commercial cases. Of course there is the right of appeal from the decisions of these tribunals as well as of the regular courts. Finally the 342 Juge de Paix courts resemble British county courts. Criminal

cases are tried by (1) the Tribunaux de Police, (2) Tribunaux Correclionnels, (3) and the Cours d' Assises. The last are held as the length of the calendar requires. Capital punishment is retained on the statute, but is never enforced, the prisoner on whom sentence of death is passed in due form in open court being relegated to imprisonment for life in solitary confinement and perpetual silence. The chief prisons are at Louvain, Ghent and St Gilles (Brussels), and the last named serves as a house of detention. At Merxplas, near the Dutch frontier, is the agricultural criminal colony at which an average number of two thousand prisoners are kept employed in comparative liberty within the radius of the convict settlement.

Pauperism. — For the relief of pauperism there are a limited number of houses of mendicity, in which inmates are received,

and houses of refuge for night shelter. At the beguinages of Ghent and Bruges women and girls able to contribute a specified sum towards their support are given a home.

National Finance. — The budget is submitted to the chambers by the minister of finance and passed by them. The revenue and expenditure were in the years stated as follows : —

Year.	*Revenue.*	*Expenditure.*
1880 .	*394,215,932 francs*	*395.730,445 .. 632,416,810 ,,*
1895 •		
1903 .	*382,908,429 francs*	

410,383,402

627,975.568 „

The revenue is made up from taxes, including customs, tolls, including returns from railway traffic, &c, and the balance comes from various revenues, return of capital, loans, &c. The following are the principal items of expenditure (1903) : —

Service of debt . .

Sovereign, senate, chamber, &c.

Departments, foreign office ,, agriculture

,, railways .

,, finance

„ industry .

,, war

,, public instruction

justice

Minor items .

143.065,352 francs

5,289,087 ,,

3.751.636 „

12,253,957

165,086,019 „

34,479,674 „

19,905,589 ,.

63,972,473 ,.

31,799.105 ..

27,168,032 ,, 4,179,046

Total

510,949,970

The difference is made up of "special expenditure." The total debt in English money may be put at 126 millions sterling, which requires for interest, sinking fund and service about 5 j millions sterling annually. The rate of interest on all the loans extant is 3%, except on one loan of 219,959,632 francs, which pays only 2 i%.

Army and National Defence. — The army is divided into the regular army, the gendarmerie, and the garde civique. The Belgian regular army is thus composed: infantry, one regiment of carabiniers, one of grenadiers, three of chasseurs a pied, and fourteen of the line, all these regiments having 3 or 4 active and 3 or 4 reserve battalions apiece; cavalry, two regi- ments of guides, two of chasseurs a cheval, and four of lancers, all light cavalry; artillery, four horse, thirty field, and seventy siege batteries on active service; engineers, 140 officers and 2000 men. The train or commissariat has only 30 officers and 600 men on the permanent establishment. Belgium retains the older form of conscription, and has not adopted the system of " universal service." The annual levy is small and substitution is permitted. In 1904 the number inscribed for service was 64,042. Of these only 12,525 were enrolled in the army, and of that number 1421 were volunteers, who took an engagement on receipt of a premium. The effective strength of the army in 1904 with the colours was 3406 officers and 40,382 men. To this total has to be added the men on the active list, but either absent on leave or allowed to return to civil life, numbering 70,043. It is assumed, that on mobilization these men are immediately available. The reserve consists of 181 officers and 58,014 men, so that the total strength of the Belgian army is 3587 officers and 168,439 men. The field force in war is organized in four infantry and two cavalry divisions, the total strength being about 100,000. The peace effective has not varied much since 1870, but the total paper strength is 75,000 more than in that year. In the years 1 900-1 904 it increased by 8000 men. The gendarmerie is a mounted force composed of men picked for their physique and divided into three divisions. It numbers 67 officers and 3079 men, but has no reserve. It is in every sense a corps d'elile, and may be classed as first-rate heavy cavalry. The total strength of the garde civique in 1905 was 35,102, to which have to be added 8532 volunteers belonging to the corps of older formation, service in which counts on a par with the garde civique. Some of the latter regiments, especially the artillery, would rank with British volunteers, but the mass of the garde civique does not pretend

to possess military value. It is a defence against sedition and socialism. The defence of

Belgium depends on five fortified positions. The fortified position and camp of Antwerp represents the true base of the national defence. Its detached forts shelter the city from bombardment, and so long as sea communication is open with England, Antwerp would be practically impregnable. Liege with twelve forts and Namur with nine forts are the fortified teles de pont protecting the two most important passages of the Meuse. The forts are constructed in concrete with armoured cupolas. Termonde on the Scheldt and Diest on the Dender are retained as nominally fortified positions, but neither, could resist a regular bombard- ment for more than a few hours, as their casemates are not bomb-proof.

The training camp of the Belgian army is at Beverloo in the province of Limburg, and at Braschaet not far from Antwerp are ranges for artillery as well as rifle practice. The Belgian officer is technically as well trained and educated as any in Europe, but he lacks practical experience in military service.

Mines and Industry. — The principal mineral produced in Belgium is coal. This is found in the Borinage district near Mons and in the neighbourhood of Liege, but the working of an entirely new coal-field, which promises to attain vast dimensions, was commenced in 1906 in the Campine district of the province of Limburg. The coal mines of Belgium give employment to nearly 150,000 persons, and for some years the average output has exceeded 2 2,000,000 tons. Other minerals are iron, manganese, lead and zinc. The iron mines produce much less than formerly, and the want of iron is a grave defect in Belgian prosperity, as about £5,000,000 sterling worth of ironhas to beimported annually, chiefly from French Lorraine. The chief metal industry of the country is represented by the iron and steel works of Charleroi and Liege. Belgium is particularly rich in quarries of marble, granite and slate. Ghent is the capital of the textile industry, and all the towns of Flanders are actively engaged in producing woollen and cotton materials and in lace manufacture. The bulk of the population is, however, engaged in agriculture, and the extent of land under cultivation of all kinds is about

Commerce. — The trade returns for 1904 were as follows:

Imports — General Commerce Special Commerce

Commerce)

(included in General

4,426,400,000 francs 2,782,200,000 „

Exports — General Commerce . Special Commerce

Commerce)

(included in General

3,849,100,000 2,183,300,000

The general commerce includes goods in transit across Belgium, the special commerce takes into account only the produce and the consumption of Belgium itself. The trade of Belgium has more than trebled as regards both imports and exports since 1870. The following table shows the amount of exports and im- ports between Belgium and the more important foreign states: —

Imports.

Exports.

France

465,684,000 francs

346,670,000 francs

Germany .

351,025,000

505,473.000 „

England .

335,404,000 ,,

392,324,000

,

Holland .

240,873,000 ,,

268,781,000

United States .

222,301,000 ,,

86,324,000

Russia

212,119,000 ,,

26,671,000

Argentina .

198,913,000 ,,

41,508,000

British India

141,669,000 ,,

25,860,000

Rumania .

102,174,000 ,,

3,949,000

t

Australia .

58,190,000

12,087,000

Congo State

53,100,000 „

14,049,000

China

8,770,000

25,546,000

. .

In the relative magnitude of the annual value of its commerce, excluding that in transit, Belgium stands sixth among the nations of the world, following Great Britain, the United States, Germany, France and Holland. The principal imports are food supplies and raw material such as cotton, wool, silk, flax, hemp and jute. Among minerals, iron ore, sulphur, copper, coal, tin, lead and diamonds are the most imported. The exports of greatest value

are textiles, lace, coal, coke, briquettes, glass, machinery, railway material and fire arms.

Shipping and Navigation. — Belgium has no state navy, although various proposals have been made from time to time to establish an armed flotilla in connexion with the defence of Antwerp. The state, however, possesses a certain number of steamers. In 1 904 they numbered sixty-five of 99,893 tons. These steamers are chiefly employed on the passenger route between Ostend and Dover. The total number of vessels entering the only two ports of Belgium which carry on ocean commerce, namely Antwerp and Ostend, in 1904 was 7650 of a tonnage of 10,330,1 27. Among inland ports that of Ghent is the most important, 11 27 ships of a tonnage of 786,362 having entered the port in 1904. The corresponding figures for ships sailing from the two ports first named were in the same year 7642 and tonnage 10,298,405. The figures from Ghent were n 28 and 787,173 tons. Whereas the lines of steamers from Ostend are chiefly with Dover and London, those from Antwerp proceed to all parts of the world. A steam service was established in 1906 from Hull to Bruges by Zeebrugge and the ship canal.

Internal Communications. — The internal communications of Belgium of every kind are excellent. The roads outside the province of Luxemburg and Namur are generally paved. In the provinces named, or in other words, in the region south of the Meuse, the roads are macadamized. The total length of roads is about 6000 m. When Belgium became a separate state in 1830 they were less than one-third of this total. There are about 2900 m. of railways, of which

upwards of 2500 m. are state railways. It is of interest to note that the state railways derived a revenue of 249,355 francs (or nearly £10,000) from the penny tickets for the admission of non-travellers to railway stations. Besides the main railways there are numerous light railways (chemins de fer vicinaux) , of a total length approaching 2500 m. There are also electric and steam tramways in all the principal cities. The total of navigable waterways is given as 1360 m. Posts, telegraphs and telephones are exclusively under state management and form a government department.

Banks and Money. — The principal banking institution is the Banque Nationale which issues the bank-notes in current use. In 1 904the average value of no tesin circulation was645, 989, 100 francs. The rate of discount was 3 % throughout the whole of the year.

The mintage of Belgian money is carried out by a directeur de la fabrication who is nominated by and responsible to the government. The gold coins are for 10 and 20 francs, silver for half francs, francs, 2 francs and 5 francs. Nickel money is for 5, 10 and 20 centimes, and the copper coinage has been withdrawn from circulation.

Authorities. — Annuaire statistique de la Belgique (1905); Belt- jens and Godennf , La Constitution beige (Brussels, 1880) ; La Belgique illustree (Bruss..s, 1878-1882); Les Pandectes beiges (Brussels, 1898); Annates du parlement beige for each year; Belgian Life in Town and Country, " Our Neighbours " Series (London, 1904). For geology see C. Dewalque, Prodrome d'tme description geologique de la Belgique (Brussels, 1880); M. Mourlon, Geologic de la Belgique (Brussels, 1880-1881); F. L. Cornet and A. Briart, " Sur le relief du sol en Belgique apres les temps paleozo ques," Ann. Soc. Geol. Belg. vol. iv., 1877, pp. 71-115, p!s. v.-xi. (see also other papers by the same authors in the same journal); J. Gosselet, L'Ardenne (Paris, 1888); M. Bertrand, " Etudes sur le bassin houiller du nord et sur le Boulonnais," Ann. des mines, ser. ix. vol. vi. (Mem.), pp. 569-635, 1894; C. Malaise, " Etat actuel de nos connaissances sur le silurien de la Belgique," Ann. Soc. Geol. Belg. vol. xxv., 1900— 1901, pp. 179- 221; H. Forir, " Bibliographie des etages laekenien, ledien, wem- melien, asschien, tongrien, rupelien et bolderien et des depfits tertiaires de la haute et moyenne Belgique," ibid. pp. 223 seq.*

(D. C. B.)

History '

The political severance of the northern and southern Nether- lands may be conveniently dated from the opening of the year 1579. By the signing of the league of Arras (5th of January) the Walloon " Malcontents " declared their adherence to the cause of Catholicism and their loyalty to the Spanish king, and broke away definitely from the northern provinces, who bound

'See for earlier history Netherlands, Flanders, Brabant, Liege, &c.

in. 22

themselves by the union of Utrecht (29th of January) to defend their rights and liberties, political and religious, against all foreign potentates. Brabant and Flanders were still indeed under the control of the prince of Orange, and through his Final influence accepted in 1582 the duke of Anjou as their separa- sovereign. The French prince was actually inaugurated t "°"° ftl > e duke of Brabant at Antwerp (February i582)and count a nd of Flanders at Bruges (July), but his misconduct southern speedily led to his withdrawal from the Netherlands, Nether- and even before the assassination of Orange (July

1584) the authority of Philip had been practically restored throughout the two provinces. This had been achieved by the military skill and statesmanlike abilities of Alexander , . Farnese, prince of Parma, appointed governor- p a rnese, general on the death of Don John of Austria, on the prince of 1st of October 1578. Farnese first won by promises Perma, and blandishments the confidence of the Walloons, ^^/raiT always jealous of the predominance of the " Flemish " provinces, and then proceeded to make himself master of Brabant and Flanders by force of arms. In succession Ypres, Mechlin, Ghent, Brussels, and finally Antwerp (17th of August _

1585) fell into his hands. Philip had in the southern f Parma. Netherlands attained his object, and Belgium was henceforth Catholic and Spanish, but at the expense of its progress and prosperity. Thousands of its inhabitants, and those the most enterprising and intelligent, fled from the Inquisi- tion, and made their homes in the Dutch republic or in England. Ail commerce and industry was at a standstill; grass grew in the streets of Bruges and Ghent; and the trade of Antwerp was transferred to Amsterdam. On Parma's death (3rd of December 1592) the archduke Ernest of Austria was appointed governor- general, but he died after a short tenure of office (20th of February 1595) and was at the beginning of 1:596 succeeded by his younger brother the cardinal archduke

Albert. Philip was now nearing his end, and in 1598 he gave his eldest daughter Isabel

*in marriage to her cousin the archduke Albert, and i ss t e i, erected the Netherlands into a sovereign state under sovereigns their joint rule. The advent of the new sovereigns, ottl >e officially known as " the archdukes," though greeted laBds _ ' with enthusiasm in the Belgic provinces, was looked upon with suspicion by the Dutch, who were as firmly resolved as ever to uphold their independence. The chief military event of the early years of their reign was the battle of Nieuport (2nd of July 1 600) , in which Maurice of Nassau defeated the archduke Albert, and the siege of Ostend, which rhe tv ˆ eiv « after a three years' heroic defence was surrendered truce . (20th of September 1604) to the archduke's general, Spinola. The Dutch, however, being masters of the sea, kept the coast closely blockaded, and through sheer exhaustion the king of Spain and the archdukes were compelled to agree to a truce for twelve years (9th of April 1609) J*f ru, f. ' with the United Provinces " in the capacity of free d „i es . states over which Albert and Isabel made no preten- sions." During the period of the truce the archdukes, who were wise and statesmanlike rulers, did their utmost to restore pros- perity to their country and to improve its internal condition. Unfortunately they were childless, and f˜ he the instrument of cession of ' 1598 provided that in southern case they should die without issue, the Netherlands Nether' should revert to the crown of Spain. This reversion g" ln ° actually took place. Albert died in 1621, just before the 1633 renewal of the war with the Dutch, and Isabel in 1633. The Belgic provinces therefore passed under the rule of Philip IV., and were henceforth known as the Spanish Netherlands.*

This connexion with the declining fortunes of Spain was disastrous to the well-being of the Belgian people, for during many years a close alliance bound together France and the United Provinces, and the Southern Netherlands were exposed to attack from both sides, and constantly suffered from the ravages of hostile armies. The cardinal arch- funster duke Ferdinand, governor-general from 1634-1641, was a capable ruler, and by his military skill prevented in a succession

ii

of campaigns the forces of the enemy from overrunning the country. On the 30th of January 1648, Spain concluded a separate peace at Munster with the Dutch, by which Philip IV.

finally renounced all his claims and rights over the coase" S United Provinces, and made many concessions to them. queaces Among these was the closing of the Scheldt to all ships, utthedos- a clause which was ruinous to the commerce of the Scheldt 6 Belgic provinces, by cutting them off from their only

access to the ocean. Thus they remained for a long course of years without a sea-port, and in the many wars that broke out. between Spain and France were constantly exposed, as an outlying Spanish dependency, to the first attack, and peace when it came was usually purchased at the cost of some part of Belgian territory. By the treaty of the Pyrenees (1659) Artois . , (except St Omer and Aire) and a number of towns in cession ot Flanders, Hainaut, and Luxemburg were ceded to Belgian France. Subsequent French conquests, confirmed by territory to the peace of Aix-la-Chapelle (1668), took away Lille, ■ranee. Tj oua j j Charleroi, Oudenarde, Coutrai and Tournai. These were, indeed, partly restored to Belgium by the peace of Nijmwegen (1679); but on the other hand it lost Valenciennes, Nieuport, St Omer, Ypres and Charlemont, which were only in part recovered by the peace of Ryswick (1697).

The internal history of the Belgic provinces has little to record during this long period in which the ambition of Louis XIV. to possess himself of the Netherlands, in right of his wife the infanta Maria Theresa (see Spanish Succession), led to a series of invasions and desolating wars. The French king managed to incorporate a large slice of territory upon his northern frontier, but his main object was baffled by the steady resistance and able statesmanship of William III. of England and Holland. Mean- while from 1692 onwards brighter prospects were opened out to the unfortunate Belgians by the nomination by the Spanish king "of Maximilian Emanuel, elector of Bavaria, to be governor- general with well-nigh sovereign powers. The elector had himself a claim to the inheritance as the husband of an Austrian arch- duchess, whose mother, the infanta Margaret, was the younger sister of the French queen. Maximilian Emanuel was an able man, who did his utmost to improve the condition of the country.

He attempted to promote trade and restore prosperity the elector to

the impoverished land by the introduction of new ot Bavaria customs laws and other measures, and particularly by to promote t jj e construction of canals to counteract the damage tra ”’ done to Belgian commerce by the closing of the Scheldt.

The position of the elector was greatly strengthened by the partition treaty of the 19th of August 1698. Under this instru- ment the signatory powers — England, France and Holland — agreed that on the demise of Charles II. the crown prince of Bavaria under his father’s guardianship should be sovereign of Spain, Belgium and Spanish America. Charles II. himself

shortly afterwards by will appointed the Bavarian The Span- p r ; nc e heir to all his dominions. The death of the

infant heir a few months later’ (6th of February 1699)

unfortunately destroyed any prospects of a peaceable settlement of the Spanish Succession. Charles II. was persuaded to name as his sole successor, Philip duke of Anjou, the second son of the dauphin, and on his death (on the 1st November 1700) Louis XIV. took immediate steps to support his grandson’s claims, in spite of his formal renunciation of such claims under

the treaty of the Pyrenees. England and Holland Alliance”’ were determined to prevent, however, at all costs the

acquisition of Belgium by a French prince, and a coalition, known as the Grand Alliance, was formed between these two powers and the empire to uphold the claims of the archduke Charles, second son of the emperor.

One of the first steps of Louis was to take possession of the Netherlands. The hereditary feud between the houses of

Austria and Bavaria induced the elector to take the War/ ” t side of France, and he was nominated by Philip V. successes, vicar-general of the Netherlands. The unhappy Belgic

provinces were again doomed for a number of years to be the battle-ground of the contending forces, and it was on

Ish succes sioa.

Belgic soil that Marlborough won the great victories of Ramillies (1 706) and of Oudenarde (1 708), by which he was enabled to drive

*the French armies out of the Netherlands and to carry the war into French territory. At the general peace concluded at Utrecht (nth of April 1713) the long connexion between Belgium and Spain was severed, and this portion of the Bur- gundian inheritance of Charles V. placed under the utrecht sovereignty of the Habsburg claimant, who had, by the death of his brother, become the emperor Charles VI. The Belgic provinces now came for a full century to be known as the Austrian Netherlands. Yet such was the dread of The France and the enfeebled state of the country that Austrian Holland retained the privilege, which had been con- Nether- ceded to her during the war, of garrisoning the principal lal " ls – fortresses or Barrier towns, on the French frontier, and her right to close the navigation on the Scheldt was again ratified by a European treaty. The beginnings of Austrian sovereignty were marked by many collisions between the representatives of the new rulers and the States General, and provincial " states." Despite their troubled history and long subjection, the Belgic provinces still retained to an unusual l j a ˆ- s ln degree their local liberties and privileges, and more Belgium. especially the right of not being taxed, except by the *

express consent of the states. The marquis de Pri6, who (as deputy for Prince Eugene) was the imperial governor from 17 19 to 1726, encountered on the part of local authorities and town gilds vigorous resistance to his attempt to rule the Netherlands as an Austrian dependency, and he was driven to take strong measures to assert his authority. He selected as his victim a powerful popular leader at Brussels, Francis Execution Anneesens, syndic of the gild of St Nicholas, who was Anneˆsens. beheaded on the 19th of September 1719. His name is remembered in Belgian annals as a patriot martyr to the cause of liberty. The administration of de Prie was not, however, without its redeeming features. He endeavoured to create at Ostend a seaport, capable in some measure to take the place of Antwerp, and in 1722 a Chartered Company of Ostend was erected for the purpose of trading in the East and Chartered West Indies (see Ostend). The determined hostility /osteiirf. of the Dutch rendered the promising scheme futile, and after a precarious struggle for existence, Charles VI., in order to gain the assent of the United Provinces and Great Britain to the Pragmatic Sanction (q.v.), suppressed the Company in 1731. For sixteen years (1725-1741) the archduchess Mary Elizabeth, sister of the emperor, filled the post of governor-general. Her rule was marked by the restoration of the old form Arch . of administration under the three councils, and was duchess a period of general tranquillity. She died (1741) in Mary the Netherlands, and the empress-queen, Maria e '

Theresa, who had succeeded under the Pragmatic Sanction to the Burgundian domains of her father about a year before, appointed her brother-in-law, Charles of Lorraine, to be governor- general in her aunt's place, and he retained that post, to the great

advantage of Belgium, for nearly forty years. He „ ,

j ji 1 4-1- •< n j n » Charles 0/

was deservedly known as the Good Governor. Lorraine.

The first years of his administration were stormy.

During the Austrian War of Succession the country was conquered

by the French, and for two years Marshal Saxe bore the title of

governor-general, but it was restored to Austria by the peace of

Aix-la-Chapelle (1748). Belgium was undisturbed by the Seven

Years' War (1756-1 763), and during the long peace which followed

enjoyed considerable prosperity. Charles of Lorraine thoroughly

identified himself with the best interests of the country, and was

the champion of its liberties, and though he had at times to make

a stand against the imperialistic tendencies of the chancellor

Kaunitz, he was able to rely on the steady support of the empress,

who appreciated the wise and liberal policy of her brother-in-law.

Although the Scheldt was still closed, Charles endeavoured by

a large extension of the canal system to facilitate commercial

intercourse, he encouraged agriculture, and was successful in

restoring the prosperity of the country. He also did much for

the advancement of learning, founding, among other institutions,

HISTORY]

BELGIUM

the Academy of Science, and he consistently restrained the undue intervention of the church in secular affairs, and placed re- strictions upon the accumulation of property in the hands of religious bodies.

The death of Charles of Lorraine preceded only by a few months that of Mafia Theresa, whose son Joseph II. not only

appointed his sister, the archduchess Maria Christine, 2*a°™'" y governor-general, but visited Belgium in person and Joseph il. showed a great and active interest in its affairs.

Here as elsewhere in his dominions his intentions were excellent, but his reforming zeal outran discretion, and his hasty and self-opinionated interferences with treaty rights and traditional privileges ended in provoking opposition and disaster. Finding the United Provinces hampered by a war with England, he seized the opportunity to try to get rid of the impediments placed upon Belgian development by the Barrier and other treaties with Holland. He was able to compel the Dutch to withdraw their garrisons from the Barrier towns, but was wholly unsuccessful in his high-handed attempt to free the navigation of the Scheldt. These efforts to coerce the Dutch, though marred by partial failure, were, however, calculated to win for Joseph II. popularity with his Belgian subjects; but it was far otherwise with his policy of internal reform. He offended the states by seeking to sweep away many of their inherited privileges and to change the time-honoured, if somewhat obsolete, system of civil government. He further excited the religious feelings of the people against him, by his edict of Tolerance (1780), and his later attempts at the reform of clerical abuses, which were pronounced to be an infraction of the Joyous Entry (see Joyeuse Entree). Fierce opposition was aroused. Numbers of mal- contents left the country and organized themselves as a military force in Holland. As the discontent became more general, the

insurgents returned, took several forts, defeated the Bwbancon Austrians at Turnhout, and overran the country. revolt. On the nth of December 1789, the people of Brussels

rose against the Austrian garrison, and compelled it to capitulate, and, on the 27th, the states of Brabant declared their independence. The other provinces followed and, on the nth of January 1790, the whole formed themselves into an independent state, under the name of the " Belgian United States." A few weeks later, on the 20th of

February, Joseph II. died, his end hastened by chagrin at the utter failure of his well- meant efforts, and was succeeded by Leopold II.

The new emperor at once took steps to re-assert, if possible, his authority in Belgium without having recourse to armed Leopold 11. force. He offered the states, if the people would return pacifies to their allegiance, the restoration of their ancient tbe constitution and a general amnesty. This, however,

coun ry. · not su j t ˆ e v j ews £ ˆ popular party, who, under

the leadership of an advocate named Van der Noot, had posses- sion of the reins of power, and were uplifted by their success. The terms offered in an imperial proclamation were rejected, and preparations were made to resist coercion by the levee en masse of a national army. When, however, in November 1790, a powerful Austrian force entered the country, there was prac- tically little opposition to its advance. The popular leaders fled, the form of government, as it existed at the end of the reign of Maria Theresa, and an amnesty for past offences was proclaimed; a superficial pacification of the revolted provinces was effected, and Austrian rule re-established. It was destined to be short-lived. In 1792 the armies of revolutionary France assailed Austria at her weakest point by an invasion of Belgium. The battle of Jemappes (7th of November) made the French Conquest masters of the southern portion of the Austrian of Bel- Netherlands; the battle of Fleurus (26th of June 1794) g'um by put al] enc [t0 t jj e ru j e f t jj e jj aDS burgs over the Belgic

*the French. * . ,_, . „ _° . , , .*

provinces, lhe treaty of Campo .torrmo (1797) and

the subsequent treaty of Luneville (1801) confirmed the con- querors in the possession of the country, and Belgium became an integral part of France, being governed on the same footing, receiving the Code Napoleon, and sharing in the fortunes of the Republic and the Empire. After the fall of Napoleon and the

1814- 1830.

conclusion of the first peace of Paris (30th of May 1814) Belgium was indeed for some months placed under the ad- ministration of an Austrian governor-general, but it was shortly afterwards united with Holland to form Holland the kingdom of the Netherlands. The sovereignty and of the newly formed state was given to the prince of Be, g ,um Orange, who mounted the throne (23rd of March 1815)

William I. under the title of William I. The congress of Vienna (31st of May 1815) determined the relations and fixed the boundaries of the kingdom; and the new constitution was pro- mulgated on the 24th of August following, the king taking the oath at Brussels on the 27th of September.

From this date until the Belgian revolt of 1830, the history of Holland and Belgium is that of two portions of one political entity, but in the relations of those two portions were to be found from the very outset fundamental causes tending to disagreement and separation. The Dutch and Belgian provinces of the Netherlands had for one hundred and thirty years passed through totally different experiences, and had drifted farther and farther apart from one another in character, in habits, in ideas and above all in religion. In the south the policy of Alva and Philip II. had been wholly successful, and the Belgian people, Flemings and Walloons alike, were perhaps more devoted to the Catholic faith than any other in Europe. On the other hand the incorporation of the country for two decades in the French republic and empire had left deep traces on a considerable section of the population, the French language was commonly spoken and was exclusively used in the law courts and in all public proceedings, and French political theories had made many converts. The Fundamental Law promulgated by William I. aroused strong opposition among both the Catholic and Liberal parties in Belgium. The large powers granted to the king under the new constitution displeased the Liberals, who saw in its provision only a disguised form of personal government. The principle of liberty of worship and of the press, which it laid down, was so offensive to the Catholics that the bishops condemned it publicly, and in the Doctrinal Judgment actually forbade their flocks to take the oath. The " close and complete union," which was stipulated under the treaty of 1814, began under unfavourable auspices. Nevertheless the difficulties might have been smoothed away in the course of time, had the Belgians felt that the Dutch were treating them in a fair and conciliatory spirit. This, despite the un- doubtedly good intentions of the king, was far from being the case. Belgium was regarded too much in the light of an annexed territory, handed over to Holland as compensation for the losses sustained by the Dutch in the revolutionary d f" g s ˆ r s ee °. and Napoleonic wars. The idea that Holland was the ment predominant partner in the kingdom of the Netherlands between was firmly rooted in the north and naturally provoked tlo, ' a '" 1 in the south the feeling that Belgium was being ex- Belgium. ploited for the benefit of the Dutch. The grievances of the Belgians were indeed very substantial. The seat of govern- ment

was in Holland, the king was a Dutchman by birth and training, and a Calvinistic protestant by religion. Though the population of Belgium, was 3,400,000 and that of Holland only a little more than 2,000,000 the two countries had equal repre- sentation in the second chamber of the states-general. Prac- tically in all important legislative measures affecting the interests of the two countries the Dutch government were able to com- mand a small but permanent majority. The use of the term " the Dutch Government " is strictly accurate, for the great majority of the public offices were filled by northerners. In 1830, of the seven members of the ministry only one was a Belgian; in the home department out of 117 officials 11 only were Belgians; in the ministry of war 3 were Belgians out of 102; of the officers of the army 288 out of 1967. All the public establishments, the Bank, the military schools, were Dutch. That such was the case must not be entirely tne klB „ charged to partiality, still less to deliberate unfair- ness on the part of William I. The conduct of the king proves that he had a most sincere regard for the welfare of his

Belgian subjects, and in his choice of measures and men his aim was to secure the prosperity of his new kingdom by a policy of unification. This was the object he had in view in his attempt to make Dutch, except in the Walloon districts, the official language for all public and judicial acts, and a knowledge of Dutch a necessary qualification for every person entering the public service. That the fierce opposition which this attempt

aroused in the Flemish-speaking provinces was ill- question considered and unwise, is shown by the fact that in*

recent years there has been a patriotic movement in these same provinces which has been successful in forcing the Belgian government to adopt Flemish (i.e. Dutch) as well as French for official usage. This Flemish movement is all in favour of establishing close relations with the sister people of the north. Moreover it cannot be gainsaid that Belgium during her union Beleian with Holland enjoyed a degree of prosperity that prosperity was quite remarkable. The mineral wealth of the during the country was largely developed, the iron manufactures union. { Lieg e made rapid advance, the

woollen manu- factures of Verviers received a similar impulse, and many large establishments were formed at Ghent and other places, where cotton goods were produced which rivalled those of England and surpassed those of France. The extensive colonial and foreign trade of the Dutch furnished them with markets, while the opening of the navigation of the Scheldt raised Antwerp once more to a place of high commercial importance. The govern- ment also did much in the way of improving the internal com- munications of the country, in repairing the roads and canals, in forming new ones, in deepening and widening rivers, and the like. Nor was the social and intellectual improvement of the people by any means neglected. A new university was formed at Liege, normal schools for the instruction of teachers were in- stituted, and numerous elementary schools and schools for higher instruction were established over the country. These measures for the furthering of education among the people on the part of a government mainly composed of Protestants were received with suspicion and disfavour by the priests, and still more the attempts subsequently made to regulate the education of the priests themselves. The establishment under the auspices of the king in 1825 of the Philosophical College at Louvain, and the requirement that every priest before ordination should spend two years in study there, gave great offence to the clerical party, and some of the bishops were prosecuted for the violence of their denunciations at this intrusion of the secular arm into the religious domain. With the view of terminating these differences the king in 1827 entered into a concordat with the pope, and an agreement was reached with regard to nominations to bishoprics, clerical education and other questions, which should have satisfied all reasonable men. But in 1828 the two extreme parties, the Catholic Ultramontanes and the revolu- tionary Liberals, in their common hatred to the Dutch regime, formed an alliance, the union, for the overthrow of the govern- ment. Petitions were sent in setting forth the Belgian grievances, demanding a separate administration for Belgium and a full concession of the liberties guaranteed by the constitution.

Matters were in this state when the news of the success of the July revolution of 1830 at Paris reached Brussels, at this time

a city of refuge for the intriguing and discontented Brussels f a l m0 st every country of Europe. The first outbreak "of 1830. t0 °k Pl ace on the 25th of August, the anniversary

of the king's accession. An opera called La Mttette, which abounds in appeals to liberty, was played, and the audience were so excited that they rushed out into the street crying, " Imitons les Parisiens!" A mob

speedily gathered together, who proceeded to destroy or damage a number of public buildings and the private residences of unpopular officials. The troops were few in number and offered no opposition to the mob, but a burgher guard was enrolled among the influential and middle- class citizens for the protection of life and property. The intelligence of these events in the capital soon spread through the provinces; and in most of the large towns similar scenes were enacted, beginning with plunderings and outrages, followed

by the institution of burgher guards for the maintenance of peace. The leading men of Brussels were most anxious not to push matters to extremities. They demanded the dismissal of the specially obnoxious minister, Van Maanen, and a separate ad- ministration for Belgium. The government, however, could not make up their minds what course to pursue, and by allowing things to drift ended by converting a popular riot into a national revolt. " The heir apparent, the prince of Orange (see William II. of the Netherlands), was sent on a peaceful mission to Brussels, but furnished with such limited powers, as under the circum- stances were utterly inadequate. He did his best to get at the real facts, and after a number of conferences with the leaders became so convinced that nothing but a separate administration of the two countries would restore tranquillity that he promised to use his influence with his father to bring about that object — on receiving assurances that the personal union under the house of Orange would be maintained. The king summoned an extra- ordinary session of the states-general, which met at the Hague on the 13th of September and was opened by a speech from the throne, which was firm and temperate, but by no means definite. The proceedings were dilatory, and the attitude of the Dutch deputies exceedingly exasperating. The result was that the moderate party in Belgium quickly lost their influence, and those in favour of violent measures prevailed. Meanwhile although the states were still sitting at the Hague, an army of 14,000 troops under the command of Prince Frederick, second son of the king, was gradually approaching Brussels. It was hoped that the inhabitants would welcome the prince and that a display of armed force would speedily restore order. After much unnecessary delay, at a time when prompt action was required, the prince on the 23rd of September entered Brussels and, with little opposition, occupied the upper or court portion of it, but when they attempted to advance into the lower town the troops found the streets barricaded and defended by citizens in arms. Desultory fighting between the soldiers and the insurgents continued for three days until, finding that he was making no headway, the prince ordered a retreat. The news spread like

wildfire through the country, and the principal towns declared for separation. A provisional government was formed at Brussels, which declared Belgium to be an independent state, and summoned a national congress to establish a system of government. King William now did his utmost to avoid a rupture, and sent the prince of Orange to Antwerp to promise that Belgium should have a separate administration; but it was too late. Antwerp was the only important place that re- mained in the hands of the Dutch, and the army ..n retreating from Brussels had fallen back on this town. At the end of October an insurgent army had arrived before the gates, which were opened by the populace to receive them, and the troops, under General Chasse, retired within the citadel. The general ordered a bombardment of the town for two days, destroying a number of houses and large quantities of merchandize. This act served still further to inflame the minds of the Belgians against the Dutch.

A convention of the representatives of the five great powers met in London in the beginning of November, at the request of the king of the Netherlands, and both sides were Meet'mr brought to consent to a cessation of hostilities. On the of the 10th of November the National Congress, consisting National of 200 deputies, met at Brussels and came to three Congress. important decisions: (1) the independence of the country — carried unanimously; (2) a constitutional hereditary monarchy — 174 votes against 13; (3) the perpetual exclusion of the Orange-Nassau family— 161 votes against 28. On the 20th of December the conference of London proclaimed the dissolution of the kingdom of the Netherlands, but claimed the right of regulating the conditions under which it should take place. On the 28th of January 1831, the congress proceeded to the election of a king, and out of a number of candidates the choice fell on the duke of Nemours, second son of Louis Philippe, but he declined the office. The congress then elected Baron Surlet de Chokier to the temporary post of regent, and proceeded to

draw up a constitution on the British parliamentary pattern. The constitution expressly declared that the king has no powers except those formally assigned to him. Ministers were to be appointed by him, but be responsible to the cham- constitu- bers. The legislature was composed of two chambers — ■ tioa. the senate and the

chamber of deputies. Both cham-

bers were elected by the same voters, but senators required a property qualification, — the payment of at least 2000 florins in taxes. Senators and deputies received salaries. The franchise was for that time a low one — every one who paid at least 20 florins in taxes had a vote. The choice of a king was more difficult than that of drawing up a constitution. It was desirable that the new sovereign should be able to count upon the friendly support of the great powers, and yet not be actually a member of their reigning dynasties. It was from fear of arousing the susceptibilities of neighbouring states, especially Great Britain, that Louis Philippe had refused to sanction the election of his son. It was for this reason that the name of Leopold of Saxe-Coburg, the widower of Princess Charlotte of England, had not been placed among the candidates in January. Overtures were, however, made to him, as soon as it was understood that, as the result of private negotiations at the London conference, the selection of this prince would be favourably received both by Great Britain and France. Leopold kine°ot the signified his readiness to accept the crown after having Belgians, first ascertained that he would have the support of the great powers in bringing about a satisfactory settlement with Holland on those points which he considered essential to the security and welfare of the new kingdom. The election took place on the 4th of June, when 152 votes out of 196, four being absent, determined that Leopold should be proclaimed king of the Belgians, under the express condition that he "would accept the constitution and swear to maintain the national independence and territorial integrity." Leopold made his public entry into Brussels, on the 21st, and subsequently visited other parts of the kingdom, and was everywhere received with demonstrations of loyalty and respect.

At this juncture news suddenly arrived that the Dutch were preparing to invade the country with a large army. It com- prised 45,000 infantry and 6000 cavalry with 7 2 pieces of artillery, while Leopold could scarcely bring forward 25,000 men to oppose it. On the 2nd of August the whole of the Dutch army had crossed the frontier; Leopold collected his forces, such as they were, near Louvain in order to cover his capital. The two armies met on the 9th of August. The undisciplined Belgians, despite the personal efforts of their king , were speedily routed, and Leopold and his staff narrowly escaped capture. He, however, made good his retreat to the capital, and, on the advance of a French army, the prince of Orange did not deem it prudent to push on farther. A convention was concluded between him and the French general, in consequence of which he returned to

Holland and the French likewise recrossed the frontier. Leopold now proceeded with vigour to strengthen his position and to restore order and confidence. French officers were selected for the training and disciplining of the army, the civil list was arranged with economy and order, and reforms were introduced into the public service and system of administration. He kept on the best of terms, though a Protestant, with the Roman Catholic clergy and nobility, and his subsequent marriage with the daughter of the French king (9th of August 1832), and the contract that the children of the marriage should be brought up in the Roman Catholic faith, did much to inspire confidence in his good intentions.

Meanwhile the conference in London had drawn up the project of a treaty for the separation of Holland and Belgium, which was declared " to be final and irrevocable." otsepara The conditions were far less favourable to Belgium tion. than had been hoped, and it was not without much

heart-burning and considerable opposition, that the senate and chamber of deputies gave their assent to them. The treaty, which contained 24 articles, was signed on the 15th of November 1831. By these articles the grand-duchy

of Luxemburg was divided, but the king of Holland retained possession of the fortress of Luxemburg, and also received a portion of Limburg to compensate him for the part of Luxemburg assigned to Belgium. The district of Maestricht was likewise partitioned, but the fortress remained Dutch. The Scheldt w T as declared open to the commerce of both countries. The national debt was divided. The powers recognized the inde- pendence of Belgium, " as a neutral state."

This agreement was ratified by the Belgian and French sovereigns on the 20th and 24th of November, by the British on the 6th of December, but the Austrian and Prussian and Russian governments, whose sympathies were with the " legitimate " King William rather than with a prince who owed his crown to a revolution, did not give their ratification till some five months later. Even then King William remained obdurate, refused to sign and continued to keep possession of Antwerp. After fruitless efforts on the part of the great powers to obtain his acquiescence, France and Great Britain resolved to have recourse to force. On the 5th of November their com- bined fleets sailed for the coast of Holland, and, on the 18th, a French army of 60,000 men, under the command of The Marshal Gerard, crossed the Belgian frontier to besiege French Antwerp. The Dutch garrison

capitulated on the besiege 23rd of December, and on the 31st the town was handed over to the Belgians, and the French troops withdrew across the frontier. The Dutch, however, still held two forts, which enabled them to command the navigation of the Scheldt, and these they stubbornly refused to yield. Belgium therefore kept possession of Limburg and Luxemburg, except the fortress of Luxemburg, which as a fortress of the German confederation was, under the terms of the treaty of Vienna, garrisoned by Prussian troops. These territories were treated in every way as a part of Belgium, and sent representatives to the chambers. Great indignation was therefore felt at the idea of giving them up, when Holland (14th of March 1838) signified e/n6s/ ~ " its readiness to accept the conditions of the treaty, question. The chambers argued that Belgium had been induced to agree to the twenty-four articles in 1832 in the hope of thereby at once terminating all harassing disputes, but as Holland refused then to accept them, the conditions were no longer binding and the circumstances were now quite changed. They urged that Luxemburg in fact formed an integral part of Belgium and that the people "w ere totally opposed to a union with Holland. They offered to pay for the territory in dispute, but the treaty gave them no right of purchase, and the proposal was not enter- tained. Addresses were unanimously voted urging the king to resist separation, great excitement was settlement aroused throughout the country and preparations between were made for war. But the firmness of. the allied Holland powers and their determination to uphold the condi- Beigj am , tions of the treaty compelled the king most reluctantly to submit to the inevitable. The treaty was signed in London on the 19th of April 1839. It saddled Belgium with a portion of Holland's debt, and a severe financial crisis followed.

The Belgian revolution owed its success to the union of the

Catholic and Liberal parties; and the king had been very careful

to maintain the alliance between them. This continued „. ,

Struggle to be the character of the government till 1840, but by between

*degrees it had been growing more and more conserva- *he*

tive, and was giving rise to dissatisfaction. A ministry Catholics

was formed on more liberal principles, but it clashed Liberals.

with the Catholic aristocracy, who had the majority in

the senate. A neutral ministry under M. Charles Nothomb was then formed. In 1 842 it carried a new law of primary instruction, which aroused the dislike of the anti-clerical Liberals. The Nothomb ministry retired in 1845. In March 1846 the king formed a purely Catholic ministry, but it was fiercely attacked by the. Liberals, who had for several years been steadily organizing. A congress was summoned to meet at Brussels (14th of June 1846) composed of delegates from the different Liberal associations throughout the country. Three hundred and twenty delegates met arid drew up an Act of Federation and a programme of

reforms. The election of 1847 gave a majority to the Liberals and a purely Liberal ministry was formed, and from this date onwards it has been the constitutional practice in Belgium to choose a homogeneous ministry from the party which possesses a working majority in the chamber. In 1848 a new electoral law was passed, which lowered the franchise to 20 reform. florins' worth of property and doubled the number of electors. Hence it came to pass that Belgium passed safely through the crisis of the French revolution of 1848. The extreme democratic and socialistic party made with French aid some spasmodic efforts to stir up a revolutionary movement, but they met with no popular sympathy; the throne of Leopold stood firmly based upon the trust and respect of the Belgian nation for the wisdom and moderation of their king.

The attention of the government was now largely directed to the stimulating of private industry and the carrying out of public works of great practical utility, such as the extension of railways and the opening up of other internal means of com- munication. Commercial treaties were also entered into with various countries with the view of providing additional outlets for industrial products. The king also sought as much as possible to remove from the domain of politics

every irritating question, believing that a union of the different parties was most for the advantage of the state. In 1850 the question of middle- class education was settled. In 1852 the Liberal cabinet was overthrown and a ministry of conciliation was formed. A bill was passed authorizing the army to be raised to 100,000 men including reserve. The elections of 1854 modified the parlia- mentary situation by increasing the strength of the Conserva- tives; the ministry resigned and a new one was formed, under Pierre de Decker, of moderate Catholics and Progressives. In 1857 the government of M. de Decker brought in a bill to establish " the liberty of charity," but in reality to place the administration of charities in the hands of the priesthood. This led to a violent agitation throughout the kingdom and the military had to be called out. Eventually the bill was withdrawn, the ministers resigned and a Liberal ministry was formed under M. Charles Rogier. In i860 the communal octrois or duties on articles of food brought into the towns was abolished; in 1863 the naviga- tion of the Scheldt was made free, and a treaty of commerce established with England. The elections of July 1864 gave a majority to the Liberals, and M. Rogier continued in office.

On the 10th of December 1865, King Leopold died, after a reign of thirty-four years. He was greatly beloved by his people, and to him Belgium owed much, for in difficult circum- stances and critical times he had managed its affairs with great tact and judgment. He was succeeded by his eldest son Leopold II., who was immediately proclaimed king and took the oath to the constitution on the 17th of December. On the outbreak of war between France and Germany in 1870, Belgium saw the difficulty and danger of her position, and lost no time in providing for contingencies. A large war credit was voted, the strength of the army was raised and strong bodies of troops were moved to the frontier. The feeling of danger to Belgium also caused great excitement in England. The British government declared its intention to maintain the integrity of Belgium in accordance with the treaty of 1839, and it induced the two belligerent powers to agree not to violate the neutrality of Belgian territory. A considerable portion of the French army routed at Sedan did indeed seek refuge across the frontier; but they laid down their arms according to convention, and were duly " interned."

In 1870 the Liberal party, which had been in power for thirteen years, was overthrown by a union of the Catholics with a number of Liberal dissentients to whom the policy of the government had given offence, and a Catholic cabinet, at the head of which was Baron Jules Joseph d'Anethan, took office. At the election of August 1870,

the Catholics obtained a majority in both chambers. They increased their power considerably by reducing the voting qualification for electors to provincial councils to 20 frs., and to communal councils to 10 frs., and also by recognizing the importance of what was styled " the

Accession of Leopold

11.

Flemish Movement." Hitherto French had been the official language of the states. The use of Flemish in public documents, in judicial procedure and in official correspondence was hereafter required in the Flemish provinces, and Belgium xhe became officially bi-lingual, It was, as has been Flemish already pointed out, a reversion to the policy of the Move- Dutch king, which in 1830 had been so strongly denounced by the leaders of the Belgian revolution, and its object was the same, i.e. to prevent frenchification of a population that was Teutonic by race and speech. In 187 1 M. Malou had become the head of a cabinet of moderate Catholics, and he retained office till 1878. This was the period of the struggle between the pope and the Italian government, and the German Kulturkampf . The Belgian Ultramontanes agitated strongly in favour of the re-establishment of the temporal power and against the policy of Bismarck. Though discountenanced by the ministry, the violence of the Ultra-clericals compassed its downfall. They passed a law adopting the ballot in 1877, but at the election of the following year a Liberal majority was returned.

The new cabinet, under M. Frere-Orban, devoted itself solely to the settlement of the educational system. Hitherto since 1842 in all primary schools instruction by the clergy in the Catholic faith was obligatory, children belonging iaw°ot to other persuasions being dispensed from attendance. 1879. In 1879 a bill was passed for the secularization of primar)' education; but an attempt was made to conciliate the clergy by Art. 4, which enacted — r" religious instruction is rele- gated to the care of families and the clergy of the various creeds. A place in the school may be put at their disposal where the children may receive religious instruction," at hours other than those set apart for regular education. The bill likewise provided for a rigorous inspection of the communal schools. The passing of this law was met by the clergy by uncompromising resistance. The bishops ordered that absolution be refused to teachers in the schools " sans Dieu," and to the parents who sent their children to them, and urged the establishment of private Catholic schools. All over Belgium

the agitation spread, and the clergy, who were practically independent of state control, gained the victory. In November 1879 it was calculated that there were but 240,000 scholars in the secularized schools against 370,000 in the Catholic schools. In Flanders over 80 % of the children attended the Catholic schools. The government appealed to the pope, but the Holy See declined to take any action, and so great was the embitterment that the Belgian minister at the Vatican and the papal nuncio at Brussels were recalled, and in 1880 the clergy refused to associate themselves with the fetes of the national jubilee. In order to emerge victorious in such a struggle the Liberal party had need of all their strength, but a split took place between the sections known as the doctrinaires and the progressists, on the question of an extension of the franchise, and at the election of 1884 the Catholics carried all before them at the' polls. From 1884 up to the present time the clerical party have maintained their supremacy.

A Catholic administration under M. Malou at once took in hand the schools question. A law was passed, despite violent protests from the Liberals, which enacted that the communes might maintain the private Catholic schools established since 1879 and suppress unsectarian schools at their pleasure. They might retain at least one unsectarian or adopt one Catholic school, where 25 heads of families demanded it. The state subsidized all the communal schools, Catholic and unsectarian alike. Under this law in all districts under clerical control the unsectarian schools were abolished. In October 1884, M. Beernaert replaced M. Malou as prime minister, and retained that post for the following ten years. He had in 1886 a troublous and dangerous situation to deal with. Socialism had become a political force in the land. Socialism of a German type had taken deep root among the working men of the Flemish o'utbre'ak towns, especially at Ghent and Brussels; socialism of ini8S6. a French revolutionary type among the Walloon miners and factory hands. On the 18th of March 1886, a socialist rising suddenly burst out at Liege, on the occasion of the

sens com promise.

anniversary of the Paris Commune, and rapidly spread in other

industrial centres of the Walloon districts. Thousands of work- men went on strike, demanding better wages and the suffrage. The ministry acted promptly and with vigour, the outbreak was suppressed by the employment of the military and order was restored. But as soon as this was accomplished the government opened a comprehensive enquiry into the causes of dissatisfaction, which served as the basis of numerous social laws, and for a re- led eventually to the establishment of universal vision of suffrage and the substitution in Belgium of a demo- te con- cr atic for a middle-class regime. It was not effected sti u mo. ^.jj severa j y ears had been spent in long parliamentary discussions, by demonstrations on the part of the supporters of franchise revision and by strikes of a political tendency. At last the senate and chamber declared, May 1892, that the time for a revision of certain articles of the constitution had come., As prescribed by the constitution, a dissolution took place and two new chambers were elected. The Catholics had a majority in both, but not enough to enable them to dispense with the assistance of the Liberals, the constitution requiring for every revision a two-thirds majority. The bills proposed for extending the franchise were all rejected (April nth and 1 2th) . Thereupon the council of the Labour party proclaimed a general strike. Fifty thousand workmen struck, in Brussels there were violent demonstrations, and the agitation assumed generally a dangerous aspect. Both the government and the opposition in the chambers saw that delay was impossible, and that revision must be carried out. Agreement was reached by the acceptance of a com- promise proposed by M. Albert Nyssens, Catholic TheSys- deputy and professor of penal procedure and com- mercial law at the university of Louvain, and on the 18th of April the chamber adopted an electoral system until then unknown — le suffrage univcrsel plural. The citizen in order to possess a vote for the election of representatives to the chambers was to be of a minimum age of twenty-five years, and of thirty years for the election of senators and provincial and communal councillors. For the four categories of elections a supplementary vote was given to (a) citizens who having attained the age of thirty-five years, and being married or widowers with children, paid at least 5 f. income tax, and (b) to citizens of the age of twenty-five years possessing real estate to the value of 2000 f. or Belgian state securities yielding an income of at least 100 f. Two supplementary votes were bestowed upon citizens having certain educational certificates, or discharging functions or following professions implying their possession. This elaborate system was only carried into law after considerable and violent opposition in the sessions of 1894 and 1895. It was chiefly the work of the ministry of

M. de Burlet, who succeeded to the place of M. Beernaert in March 1894.

The composition of the elected bodies for the years 1894-1895 was: — for the chamber of representatives 1,354,891 electors with 2,085,605 votes, for the senate and provincial Catholic councils 1,148,433 electors with 1,856,838 votes. The result of the first election in October 1894 was to give the Catholic party an overwhelming majority. The old Liberal party almost disappeared, while the Walloon provinces returned a number of Socialists. In February 1896 M. de Burlet, being in bad health, transferred the direction of the government to M. Smet de Naeyer. The election of 1894 had given the Liberals a much smaller number of seats than they ought to have had according to the number of votes they polled, and a cry arose for the establishment of proportional representa- tion. Both sides felt that reform was again necessary, but the Catholic majority disagreed among them-selves as to the form it should take. In 1899 M. Smet de Naeyer gave place as head of the ministry to M. van den Peereboom. But the proposals _. of the latter met with organized obstruction on the

tional part of the Socialist deputies, and after a few months'

represent- tenure of office he gave way to M. Smet de Naeyer atlon. once more. The new cabinet at once (August 1899)

introduced a bill giving complete proportional representation in parliamentary elections to all the arrondissements, and it

majority ot!894.

was passed despite the defection of a number of Catholic deputies led by M. Woeste. The election in May 1900 resulted in the return of a substantial (though reduced) Catholic majority in both chambers.

During this period of Catholic ascendancy social legislation was not neglected. Among the enactments the following are the most important: — the institution of industrial and labour councils, composed of employers and Social employes, and of a superior council, formed of officials, f a " workmen and employers (1887); laws assisting the erection of workmen's dwellings and supervising the labour of women and children (1889); laws for ameliorating the system of Friendly Societies (1890); laws regulating workshops (1896); conferring corporate rights on trades' unions (1898); guarantee- ing the security and health of working men during hours

of labour (1899). In 1900 laws were passed regulating the contract of labour, placing the workman on a footing of perfect equality with his employer, assuring the married woman free control of her savings, and organizing a system of old-age- pensions. Primary education was dealt with in 1895 by a law, which made religious instruction obligatory, and extended state support to all schools that satisfied certain conditions. In 1899 there were in Belgium 6674 subsidized schools, having 775,000 scholars out of a total of 950,000 children of school age. Only 68,000 did not receive religious instruction. The Catholic party also strove to mitigate the principle of obligatory military service by encouraging the system of volunteering and by a reduction of the time of active service and of the number with the colours.

In 1905 the 75th anniversary of Belgian independence was celebrated, and there was a great manifestation of loyalty to King Leopold II. for the wisdom and prudence shown by him during his long reign. Owing to dis- igos.° S sensions among the Catholic and Conservative party on the subject of military service and the fortification of Antwerp, their majority in the chamber in 1904 fell from 26 to 20, that in the senate from 16 to 12. The partial election in 1906 reduced the majority in the chamber to 12, while the partial election in 1908 brought the majority down to 8. The Smet de Naeyer ministry which had held office since 1900 was defeated in April 1907 in a debate on the mining law over the proposal concerning the length of the working day. A new cabinet was formed on the 2nd of May following under the presidency of M. de Trooz, who had been minister of the interior under M. Smet de Naeyer, and who retained that portfolio in conjunction with the premiership. M. de Trooz died on the 31st of December 1907, and was succeeded by M. Schollaert, president of the chamber. The count of Flanders, brother of the king, died on the 17th of November 1905, leaving his son Albert heir to the throne.

The Congo question had meanwhile become an acute one in Belgium. The personal interest taken by Leopold II. in the exploration and commercial development of the equatorial regions of Africa had led, in the creation of Belgium the Congo Free State, to results which had originally conzo. not been anticipated. The Comite des Etudes du Haul Congo, formed in 1878 at the instance of the king and mainly, financed by him had developed into the International Association of the Congo, of which a Belgian officer, Colonel M. Strauch, was president. Through the efforts in Africa of H. M. Stanley a rudimentary state was created, and through the efforts of King Leopold in Europe the International Association was recognized

during 1884-1885 by the powers as an independent state. Declarations to this effect were exchanged between the Belgian government and the Association on the 23rd of February 1885. In April of the same year the Belgian chambers authorized the king to be the chief of the state founded by the Association, which had already taken the name of Etat Independant du Congo. The union between Belgium and the new state was declared to be purely personal, but its European headquarters were in Brussels, its officials, in the course of time, became almost ex- clusively Belgian, and financially and commercially the con- nexion between the two countries became increasingly close.

[LITERATURE

In 1889 King Leopold announced that he had by his will be- queathed the Congo state to Belgium, and in 1890 the Belgian government, in return for financial help, acquired the right of annexing the country under certain conditions. At later dates definite proposals for immediate annexation were considered but not adopted, the king showing a strong disinclination to cede the state, while among the mass of the Belgians the dis- inclination to annex was equally strong. It was not until terrible reports as to the misgovernment of the Congo created a strong agitation for reform in Great Britain, America and other countries responsible for having aided in the creation of the state, that public opinion in Belgium seriously concerned itself with the subject. The result was that in November 1907 a new treaty of cession was presented to the Belgian chambers, while in March 1908 an additional act modified one of the most objec- tionable features of the treaty — a clause by which the king retained control of the revenue of a vast territory within the Congo which he had declared to be his private property. A colonial law, also submitted to the chambers, secured for Belgium in case of annexation complete parliamentary control over the Congo state, and the bill for annexation was finally passed in September 1908.

Bibliography. — Th. Juste, Histoire de la Belgique (2 vols., 1853) ; La Revolution beige de 1830 (2 vols., 1872); Congres national de Belgique (2 vols., 1880); Memoirs of Leopold I. (2 vols., 1868); De Gerlache, Histoire du royaume des Pays-Bas (3 vols., 1859); D. C. Boulger, The History of Belgium, part i. (1900) ; C. White, The Belgic Revolution of 1830 (2 vols., 1835) ; Moke and Hubert,

Histoire de Belgique (jusque 1885) (1892); L. Hymans, Histoire parlementaire de la Belgique (1830-1899) ; Cinquante ans de liberte (4 vols., 1881) ; J.J. Thonissen, La Belgique sous le regne de Leopold I" (4 vols., 1855- 1858); De Laveleye, Le Parti clerical en Belgique (1874); Vander- velde and Destree, Le Socialisme beige (1898); C. Woeste, Vingt ans de polemique (1890); Hamelius, Le Mouvement fiamand (1894).

(G. E.)

Literature

Belgian literature, taken in the widest sense of the term, falls into three groups, consisting of works written respectively in Flemish, Walloon and French. The earlier Flemish authors are treated under Dutch Literature; the revival of Flemish Literature (q.v .) since the separation of Belgium from the Nether- lands in 1830, and Walloon Literature {q.v.), are each separately noticed. The earlier French writers born on what is now Belgian territory — e.g. Adenes le Rois, Jean Froissart, Jean Lemaire des Beiges and others — are included in the general history of French Literature (q.v.). It remains to consider the literature written by Belgians in French during the 19th century, and its rapid development since the revolution of 1831.

Belgian writers were commonly charged with provincialism, but the prejudice against them has been destroyed by the brilliant writers of 1870-1880. It was also asserted that Belgian French literature lacked a national basis, and was merely a reflection of Parisian models. The most important section of it, however, has a distinctive quality of its own. Many of its most distinguished exponents are Flemings by birth, and their writings reflect the characteristic Flemish scenery; they have the sensuousness, the colour and the realism of Flemish art; and on the other hand the tendency to mysticism, to abstraction, is far removed from the lucidity and definiteness associated with French literature properly so-called. This profoundly national character disengaged itself gradually, and has been more strik- ingly evident since 1870. The earlier writers of the century were content to follow French tradition.

The events of 1830-1831 gave a great stimulus to Belgian letters, but the country possessed writers of considerable merit before that date. Adolphe Mathieu (1802-1876) belongs to the earlier half of the century, although the tenth and last volume of his (Euvres en vers was only printed in 1870. His later works show the influence of the Romantic revival. Auguste Clavareau (1787-1864), a mediocre poet,

an imitator of the French and Dutch, produced some successful comedies, but he ceased to write plays before 1830. Edouard Smits (1789-1852) showed romantic tendencies in his tragedies of Marie de Bonrgogne (1823), Eljrida (1825), and Jeanne de Flandre (1828). The first of these

had a great success, partly no doubt because of its patriotic subject. For four years before 1830 Andre van Hasselt (q.v.) had been publishing his verses in the Sentinelle des Pays-Bas, and from 1829 onwards he was an ardent romanticist. A burst of literary and artistic activity followed the Revolution; and van Hasselt's house became a centre of poets, artists and musicians of the romantic school. The best work of the Belgian romanticists is in the rich and picturesque prose of the 16th century romance of Charles de Coster (see De Coster), and in the melancholy and semi-philosophical writings of the moralist Octave Pirmez (q.v.). The Poisies (1841) and the Chansons (1866) of Antoine Clesse (1816-1889), have been compared with the work of Beranger; and the Catholic party found a champion against the liberals and revolutionists in the satirical poet, Benoit Quinet (b. 1819). Among the famous dramatic pieces of this epoch was the Andre Chenier (1843) of Edouard Wacken (1819-1861), who was a lyric rather than a dramatic poet; also the comedies of Louis Labarre (1810-1892) and of Henri Delmotte (182 2-1884). Charles Potvin(i8i8-i902), a poet and a dramatist, is best known by a patriotic Histoire des lettres en Belgique, forming vol. iv. of the Belgian compilation, Cinquante ans de liberti (1882), and by his essays in literary history. Eugene van Bemmel (1824-1880) established an excellent historical tradition in his Histoire de la Belgique (1880), reproducing textually the original authorities, and also edited a Belgian Encyclopaedia (1873-187 5), the Patria Belgica. Baron E. C.de Gerlache (1785- 187 1) wrote the history of the Netherlands from the ultramontane standpoint. The romanticists were attacked in an amusing satire, Les Voyages et aventures de M. Alfred Nicolas (1835), by Francois Grandgagnage (1797-1877), who was a nationalist in the narrowest sense, and regarded the movement as an inde- fensible invasion of foreign ideas. The best of the novelists of this period, excluding Charles de Coster, was perhaps Estelle Ruelens (n£e Crevecceur; 1821-1878); she wrote under the pseudonym of " Caroline Graviere." Her tales were collected by the bibliophile " P. L. Jacob " (Paris, 1873-1874).

The whole of this literature derived more or less from foreign sources, and, with the exception of Charles de Coster and Octave Pirmez, produced no striking figures. De Coster died in 1879, and Pirmez in 1883, and the new movement in Belgian literature dates

from the banquet given in the latter year to Camille Lemonnier (q.v.) whose powerful personality did much to turn " Young Belgium " into a national channel. Lemonnier himself cannot be exclusively claimed by any of the conflicting schools of young writers. He was by turns naturalist, lyrist and symbolist; and it has been claimed that the germs of all the later develop- ments in Belgian letters may be traced in his work. The quin- quennial prize of literature had been refused to his Un male, and the younger generation of artists and men of letters gave him a banquet which was recognized as a protest against the official literature, represented by Louis Hymans (1829-1884), Gustave Frederix (b. 1834), the literary critic of L'Independance beige, and others. The centres around which the young writers were grouped were two reviews, L' Art moderne and La Jeune Belgique. V Art moderne was founded in 1882 by Edmond Picard, who had as his chief supporters Victor Arnould and Octave Maus. The first editor of La Jeune Belgique was M. Warlomont (1860-1889), known under the pen-name of " Max Waller." This review, which owed much of its success to Waller's energy, defended the intense preoccupation of the new writers with questions of style, arid became the depository of the Parnassian tradition in Belgium. It had among its early contributors Georges Eekhoud, Albert Giraud, Iwan Gilkin and Georges Rodenbach. Edmond Picard (b. 1836) was one of the foremost in the battle. He was well known as an advocate in Brussels, and made a considerable contribution to jurisprudence as the chief writer of the Pandectes beiges (1886-1890). His Pro arte (1886) was a kind of literary code for the young Belgian writers. His novels, of which La Forge Roussel (1881) is a good example, were succeeded in 1902-1903 by two plays, Jericho and Fatigue de wore.

Georges Eekhoud, born at Antwerp on the 27th of May 1854, was in some ways the most passionately Flemish of the whole

group. He described the life of the peasants of his native Flanders with a bold realism, making himself the apologist of the vagabond and the outcast in a series of tragic stories: — Kees Doorik (1883), Kermesses (1883), Nouvelles Kermesses (1887), Le Cycle patibulaire (1892), Mes Communions (1895), Escal Vigor (1899) and La Faneuse d'amour (1900), &c. Nouvelle Carthage (1888) deals with modern Antwerp. In 1892 he produced a striking book on English literature entitled An siecle de Shake- speare, and has written French versions of Beaumont and Fletcher's Philaster (1895) and of

Marlow's Edward II.

(1896).

The earlier work of " Young Belgium " in poetry was experi- mental in character, and was marked by extravagances of style and a general exuberance which provoked much hostile criticism. The young writers of 1870 to 1880 had not long to wait, however, for recognition both at home and in Paris, where many of them found hospitality in the pages of the Mercure de France from 1890 onwards. They divided their allegiance between the leaders of the French Parnassus and the Symbolists.

The most powerful of the Belgian poets, Emile Verhaeren (q.v.), is the most daring in his technical methods of expressing bizarre sensation, and has been called the " poet of paroxysm." His reputation extends far beyond the limits of his own country.

Many of the Belgian poets adhere to the classical form. Albert Giraud (born at Louvain in i860) was faithful to the Parnassian tradition in his Pierrot lunaire (1884), Pierrot narcisse (1891) and Hors du siecle (1886). In the earlier works of Iwan Gilkin (born at Brussels in 1858) the influence of Charles Baude- laire is predominant. He wrote Damnation de I' artiste (1890), Tenebres (1892), Stances dories (1893), La Nuit (1897) and Promethee (1899). The poems of Valere Gille (born at Brussels in 1867), whose Cithare was crowned by the French Academy in 1898, belong to the same group. Emile van Arenberghe (born at Louvain in 1854) is the author of some exquisite sonnets. Fernand Severin (b. 1867) in his Poemes ingenus (1000) aims at simplicity of form, and seems to have learnt the art of his musical verse direct from Racine. With Severin_ is closely associated Georges Marlow (b. 1872), author of L'Ame en exil

(1895).

Georges Rodenbach (1855-1898) spent most of his life in Paris and was an intimate of Edmond de Goncourt. He produced some Parisian and purely imitative work; but the best part of his production is the outcome of a passionate idealism of the quiet Flemish towns in which he had passed his childhood and early youth. In his best known work, Bruges la Morte (1892), he explains that his aim is to evoke the town as a living being, associated with the moods of the spirit, counselling, dissuading from and prompting action.

The most famous of all modern Belgian writers, Maurice Maeterlinck (q.v.), made his debut in a Parisian journal, the Pleiade, in 1886. He succeeded more nearly than any of his predecessors in expressing or suggesting ideas and emotions which might have been supposed to be capable of translation only in terms of music. " The unconscious self, or rather the sub-conscious self," says Emile Verhaeren, " recognized in the verse and prose of Maeterlinck its language or rather its stammer- ing attempt at language." Maeterlinck was a native of Ghent, and the first poems of two of his fellow-townsmen also appeared in the Pleiade. These were Gregoire le Roy (b. 1862), author of La Chanson d'un soir (1886), and Mon Cceur pleure d'autrefois (1889); and Charles van Lerberghe (b. 1861), author of a play, Les Flaireurs (1890) and a collection of Poemes (1897).

Max Elskamp (born at Antwerp in 1862) is the author of some volumes of religious poetry — Dominical (1892), Salutations, dont d'angeliques (1893), En symbole vers l'apostolat(i&Q$) — for which he has devised as background an imaginary city. Eugene Demolder (b.1862) also created a mythical city as a setting for his prose contcs in the Lggende d'Yperdamme (1897).

Belgian literary activity extends also to historical research. Baron Kervyn de Lettenhove (1817-1891) wrote a Histoire de Flandre (7 vols., 1847-1855), and a number of monographs on separate points in Flemish and English history. Though an

accurate historian, he allowed himself to be prejudiced by his extreme Catholic views. He was a vehement defender of Mary Stuart. Louis Gachard (1800-1885) wrote many valuable works on 16th century history; Mgr. Nameche (1810-1893) completed the 29th volume of his Cours d'histoire nationale before his death; Charles Piot (b. 181 2) edited the correspond- ence of Cardinal de Granvelle; Alphonse Wauters (181S-1898), archivist of Brussels, published many archaeological works; and Charles Rahlenbeck (1823-1903) wrote enthusiastically of the history of Protestantism in Belgium. One of the most ˆmasterly writers of French in Belgium was the economist Emile de Laveleye (q.v.). In aesthetics should be noted the historian of music, Francois Joseph Fetis (1784-1871); F. A. Gevaert (1828-1908), author of Histoire el theorie de la musique d'antiquile" (2 vols., 1875-1881); and Victor Mahillon (b. 1841) for his work in acoustics and his descriptive catalogue (1893-1900) of the museum of musical instruments belonging to the Brussels conservatoire. In psychology Joseph Delbceuf (1831-1896) enjoyed a great reputation outside Belgium; Elisee Reclus (b. 1830), though a Frenchman by birth, completed his Gtographie universelle (1875-1894) in exile at Brussels; and Ernest Nys has written many standard works on international law. In the history of literature an important work is compiled by Ferdinand van derHaeghen and others in the Bibliotheca Belgica (1880, &c), comprising a description of all the books printed in the Nether- lands in the 1 5th and 1 6th centuries. The vicomte de Spoelberch de Lovenjoul (1836-1907) was well known in France as the author of Sainte-Beuve inconnu (1901), La Gencse d'un roman de Balzac (1901), Une Page perdue de H. de Balzac (1903), and of numerous bibliographical works.

See F. V. Goethals, Histoire des lettres, des sciences et des arts en Belgique (4 vols., 1840-1844); Fr. Masoin, Histoire de la litterature frangaise en Belgique de 1815 a 1830 (1903) ; F. Nautet, Histoire des lettres beiges d' expression franˆaise (3 vols., 1892 et seq.), written from the point of view of young Belgium, and by no means impartial; A. de Koninck, Bibliographie nationale brought down to 1880; Biographie nationale de Belgique (1866, &c.) in progress; see also articles by Emile Verhaeren in the Revue des revues (15th June 1896), by Albert Mockel in the Revue encyclopidique (24th July 1897); a collection of criticisms chiefly on Belgian writers by Eugene Gilbert, France et Belgique; etudes litteraires (1905); Frederic Faber, Histoire du thedtre frangais en Belgique (5 vols., 1878-1880). An excellent anthology of Belgian poets was published by K. Pol de Mont with the title of Modernites (1898). (E. G.)

BELGRADE (Servian, Biograd or Beograd, i.e. " White Castle"), the capital of Servia. Pop. (1900) 69,097. Belgrade occupies a triangular ridge or foreland, washed on the north-west by the Save, and on the north-east by the Danube; these rivers flowing respect- ively from the south-west and north-west. The sides of the triangle slope down abruptly towards the west, more gradually towards the east; at the base stands the cone of Avala Hill, the last outpost of the Rudnik Mountains, which extend far away to the south; and, at the apex, a cliff of Tertiary chalk, 200 ft. high, overlooks the confluence of the two rivers, the large, flat island of Veliki Voyn and several smaller islets. This cliff is crowned by the walls and towers of the citadel, once white, but now maroon with age, and, though useful as a prison and barracks, no longer of any military value. Behind the citadel, and along its glacis on the southern side, are the gardens of Kalemegdan, commanding a famous view across the river; behind Kalemegdan comes Belgrade itself, a city of white houses, among which a few great public buildings, like the high school, national bank, national theatre and the so-called New Palace, stand forth prominently. The town was formerly divided into three parts, namely, the Old town, the Russian town (Sava-Makhala or Save district) , and the Turkish town (Dor col, or Cross-road) . A great change, however, took place in the course ol the 19th century, and the old divisions are only partially applic- able, while there has to be added the Tirazia, animportant suburban extension along the line of the aqueduct or Tirazi. A few old Turkish houses, built of plaster, with red-tiled roofs, are left among the ill-paved and insanitary districts bordering upon the rivers, but as the royal residence, the seat of government, and the centre of the import trade, Belgrade was, after 1869,

rapidly transformed into a modern European town, with wide streets, electric tramways and electric lighting. Only the multitude of small gardens, planted with limes, acacias and lilacs, and the bright costumes of the Servian or Hungarian peasants, remain to distinguish it from a western capital. For a town of such importance, which is also the seat of the metropolitan of Servia, Belgrade has very few churches, and these are of a somewhat modest type. There were, in 1900, four Servian Orthodox churches, including the cathedral, one Roman Catholic chapel, one Evangelical chapel (German), two synagogues and one mosque. This last is kept up entirely at the expense of the Servian government.

The highest educational establishments are to be found in Belgrade: the Velika Shkola (a small university with three faculties), the military academy, the theological seminary, the high school for girls, a commercial academy, and several schools for secondary education on German models. A commercial tribunal, a court of appeal and the court of cassation are also in Belgrade. There is a fine monument to Prince Michael (1860- 1868) who succeeded in removing the Turkish garrison from the Belgrade citadel and obtaining other Turkish fortresses in Servia by skilful diplomacy. There are also an interesting national museum, with Roman antiquities and numismatic collections, a national library with a wealth of old Servian MSS. among its 40,000 volumes, and a botanical garden, rich in specimens of the Balkan flora. To promote commerce there are a stock and produce exchange (Berza), a national bank, privileged to issue notes, and several other banking establishments. The insurance work is done by foreign companies.

The bulk of the foreign trade of Servia passes through Belgrade, but the industrial output of the city itself is not large, owing to the scarcity both of labour and capital. The principal industries are brewing, iron-founding and the manufacture of cloth, boots, leather, cigarettes, matches, pottery, preserved meat and confectionery. The railway from Budapest to Constantinople crosses the Save by a fine bridge on the south-west, above the landing-place for steamers. Farther south is the park Of Top- chider, with an old Turkish kiosk built for Prince Milosh (1818- 1839) in the beautifully laid-out grounds. In the adjoining forest of lime-trees, called Koshutnyak or the " deer-park," Prince Michael was assassinated in 1868. Just opposite the citadel, in a north-westerly direction, half-an-hour by steamer across the Danube, lies the Hungarian town of Semlin. For administrative purposes, Belgrade forms a separate department of the kingdom.

The first fortification of the rock, at the confluence of the Save and the Danube, was made by the Celts in the 3rd century B.C. They gave it the name of Singidunum, by which Belgrade was known until the 7th century a.d. The Romans took it from the Celts, and replaced their fort by a regular Roman castmm, placing in it a strong garrison. Roman bricks, dug up in the fortress, bear the inscription, Legio IV. Flavia Felix. From the 4th to the beginning of the 6th century A.D. it often changed its masters (Huns, Sarmatians, Goths, Gepids); then the emperor Justinian brought it once more under Roman rule and fortified and embellished it. Towards the end of the 8th century it was taken by the Franks of Charlemagne. In the 9th century it was captured by the Bulgarians, and held by them until the beginning of

the nth century, when the Byzantine emperor Basil II. reconquered it for the Greek empire. The Hungarians, under king Stephen, took it from the Greeks in 1 1 24. From that time it was constantly changing hands — Greeks, Bulgarians, Hungarians, replacing each other in turn. The city was considered to be the key of Hungary, and its possession was believed to secure possession of Servia, besides giving command of the traffic between the Upper and the Lower Danube. It has, in consequence, seen more battles under its walls than most fortresses in Europe. The Turks used to call it Darol-i- Jehad, " the home of wars for faith." During the 14th century it was in the hands of the Servian kings. The Servian prince George Brankovich ceded it to the Hungarians in 1427. The Turkish forces unsuccessfully besieged the city

in 1444 and 1456, on which last occasion a glorious victory was obtained by the Christian garrison, led by the famous John Hunyady and the enthusiastic monk John Capistran. In 1521 Sultan Suleiman took it from the Hungarians, and from that year it remained in Turkish possession until 1688, when the Austrians captured it, only to lose it again in 1690. In 171 7 Prince Eugene of Savoy conquered it for Austria, which kept it until 1739, improving the fortifications and giving great impulse to the commercial development of the town. From 1739 to 1789 the Turks were again its masters, when, in that last year, the Austrians under General Laudon carried it by assault, only to lose it again in 1792. In 1807 the Servians, having risen for their independence, forced the Turkish garrison to capitulate, and became masters of Belgrade, which they kept until the end of September 1813, when they abandoned it to the Turks. Up to the year 1862 not only was the fortress of Belgrade garrisoned by Turkish troops,, but the Danubian slope of the town was inhabited by Turks, living under a special Turkish ad- ministration, while the modern part of the town (the plateau of the ridge and the western slope) was inhabited by Servians living under their own authorities. This dual government was a constant cause of friction between the Servians and the Turks, and on the occasion of one conflict between the two parties the Turkish commander of the fortress bombarded the Servian part of the town (June 1862). The indirect consequence of this incident was that in 1866, on the categoric demand of Prince Michael of Servia, and under the diplomatic pressure of the great powers, the sultan withdrew the Turkish garrison from the citadel and delivered it to the Servians. (C. Mi.)

BELHAVEN AND STENTON, JOHN HAMILTON, 2ND Baron (1656-1708), was the eldest son of Robert Hamilton, Lord Presmennan (d. 1696), and was born on the 5th of July 1656.

Having married Margaret, granddaughter of John Hamilton, 1st Baron Belhaven and Stenton, who had been made a peer by Charles I. in 1647, he succeeded to this title in 1679. I n J 68i he was imprisoned for opposing the government and for speaking slightingly of James, duke of York, afterwards James II., in parliament, and in 1689 he was among those who asked William of Orange to undertake the government of Scotland. Belhaven was at the battle of Killiecrankie; he was a member of the Scottish privy council, and he was a director of the Scottish Trading Company, which was formed in 1695 and was respons- ible for the Darien expedition. He favoured the agitation for securing greater liberty for his country, an agitation which culminated in the passing of the Act of Security in 1705, and he greatly disliked the union of the parliaments, a speech which he delivered against this proposal in November 1706 attracting much notice and a certain amount of ridicule. Later he was imprisoned, ostensibly for favouring a projected French invasion, and he died in London on the 21st of June 1708. Belhaven is chiefly iamous as an orator, and two of his speeches, one of them the famous one of November 1706, were printed by D. Defoe in an appendix to his History of the Union (1786).

Belhaven's son, John, who fought on the English side at Sheriffmuir, became the 3rd baron on his father's death. He was drowned in November 1721, whilst proceeding to take up his duties as governor of Barbados, and was succeeded by his son John (d. 1764). After the death of John's brother James in 1777 the title was for a time dormant; then in 1799 the House of Lords declared that William Hamilton (1765-1814), a de- scendant of John Hamilton, the paternal great-grandfather of the 2nd baron, was entitled to the dignity. William, who became the 7th baron, was succeeded by his son Robert (1793- 1868), who was created a peer of the United Kingdom as Baron Hamilton of Wishaw in 1 83 1 . He died without issue in December 1868, when the barony of Hamilton became extinct; in 1875 the House of Lords declared that his cousin, James Hamilton (1822-1893) was rightfully Baron Belhaven and Stenton, and the title descended to his kinsman, Alexander Charles (b. 1840), the 10th baron.

BELISARIUS (c. 505-565), one of the most famous generals of the later Roman empire, was born about a.d. 505, in "Germania,"

a district on the borders of Thrace and Macedonia. His name is supposed to be Slavonic. As a youth he served in the body- guard of Justinian, who appointed him commander of the Eastern army. He won a signal victory over the Persians in 530, and successfully conducted a campaign against them, until forced, by the rashness of his soldiers, to join battle and suffer defeat in the following year. Recalled to Constantinople, he married Antonina, a clever, intriguing woman, and a favourite of the empress Theodora. During the sedition of the " green " and "blue" parties of the circus (known as the Nika sedition, 532) he did Justinian good service, effectually crushing the rebels who had proclaimed Hypatius emperor. In 533 the command of the expedition against the Vandal kingdom in Africa, a perilous office, which the rest of the imperial generals shunned, was conferred on Belisarius. With 15,000 mercenaries, whom he had to train into Roman discipline, he took Carthage, defeated Gelimer the Vandal king, and carried him captive, in 534, to grace the first triumph witnessed in Constantinople. In reward for these services Belisarius was invested with the consular dignity, and medals were struck in his honour. At this time the Ostrogothic kingdom, founded in Italy by Theodoric the Great, was shaken by internal dissensions, of which Justinian resolved to avail himself. Accordingly, Belisarius invaded Sicily; and, after storming Naples and defending Rome for a year against almost the entire strength of the Goths in Italy, he concluded the war by the capture of Ravenna, and with it of the Gothic king Vitiges. So conspicuous were Belisarius's heroism and military skill that the Ostrogoths offered to acknowledge him emperor of the West. But his loyalty did not waver; he rejected the proposal and returned to Constantinople in 540. Next year he was sent to check the Persian king Chosroes (Anu- shirvan); but, thwarted by the turbulence of his troops, he achieved no decisive result. On his return to Constantinople he lived under a cloud for some time, but was pardoned through the influence of Antonina with the empress. The Goths having meanwhile reconquered Italy, Belisarius was despatched with utterly inadequate forces to oppose them. Nevertheless, during five campaigns he held his enemies at bay, until he was removed from the command, and the conclusion of the war was entrusted to the eunuch Narses. Belisarius remained at Constantinople in tranquil retirement until 559, when an incursion of Bulgarian savages spread a panic through the metropolis, and men's eyes were once more turned towards the neglected veteran, who placed himself at the head of a mixed multitude of peasants and soldiers, and repelled the barbarians with his wonted courage and adroitness. But this, like his former victories, stimulated Justinian's envy. The saviour of his country was coldly received and left

unrewarded by his suspicious sovereign. Shortly after- wards Belisarius was accused of complicity in a conspiracy against the emperor (562); his fortune was confiscated, and he was confined as a prisoner in his palace. He was liberated and restored to favour in 563, and died in 565.

The fiction of Belisarius wandering as a blind beggar through the streets of Constantinople, which has been adopted by Marmontel in his BSlisaire, and by various painters and poets, is first heard of in the 10th century. Gibbon justly calls Beli- sarius the Africanus of New Rome. He was merciful as a conqueror, stern as a disciplinarian, enterprising and wary as a general; while his courage, loyalty and forbearance seem to have been almost unsullied. He was the idol of his soldiers, a good tactician, but not a great strategist.

Authorities. — Procopius, De Bellis and Historia Arcana (best edition by J. Haury, 1905, 1907) ; see Gibbon, Decline and Fall (ed. Bury, vol. 4) ; T. Hodgkin, Italy and her Invaders (vol. 4) ; J. B. Bury, Later Roman Empire, vol. i. ; Diehl, Justinien (Paris, 1901).

(J. B. B.)

BELIT (signifying the " lady," par excellence), in the Baby- lonian religion the designation of the consort of Bel (g.fl.). Her real name was Nin-lil, i.e. the " lady of power," if the explanation suggested in Bel for the second element is correct. She is also designated as Nin-Khar-sag, " Lady of the mountain," which name stands in some relationship to Im-Khar-sag, " storm mountain " — the name of the staged tower or sacred edifice to

Bel at Nippur. As the consort of En-lil, the goddess Nin-lil or Belit belongs to Nippur and her titles as " ruler of heaven and earth," and " mother of the gods " are all due to her position as the wife of Bel. While recognized by a temple of her own in Nippur and honoured by rulers at various times by having votive offerings made in her honour and fortresses dedicated in her name, she, as all other goddesses in Babylonia and Assyria with the single exception of Ishtar, is overshadowed by her male consort. The title Belit was naturally transferred to the great mother-goddess Ishtar after the decline of the cult at Nippur, and we also find the consort of Marduk, known as Sarpanit, designated as Belit, for the sufficient reason that Marduk, after the rise of the city of Babylon as the seat of his cult, becomes the Bel or " lord " of later days. (M. Ja.)

BELIZE, or Baijze, the capital and principal seaport of British

Honduras, on the Caribbean Sea, in 17° 29′ N. and 88° 11′ W. Pop. (1904) 9969. Belize occupies both banks of the river Belize, at its mouth. Its houses are generally built of wood, with high roofs and wide verandahs shaded by cocoanut or cabbage palms. The principal buildings are the court house, in the centre of the town, government house, at the southern end, Fort George, towards the north, the British bank of Honduras, the hospital, the Roman Catholic convent, and the Wesleyan church, which is the largest and handsomest of all. Mangrove swamps surround the town and epidemics of cholera, yellow fever and other tropical diseases have been frequent; but the unhealthiness of the climate is mitigated to some extent by the high tides which cover the marshes, and the invigorating breezes which blow in from the sea. Belize is connected by telegraph and telephone with the other chief towns of British Honduras, but there is no railway, and communication even by road is defective. The exports are mahogany, rosewood, cedar, logwood and other cabinet- woods and dye-woods, with cocoanuts, sugar, sarsaparilla, tortoiseshell, deerskins, turtles and fruit, especially bananas. Breadstuffs, cotton fabrics and hardware are imported.

Belize probably derives its name from the French balise, " a beacon," as no doubt some signal or light was raised here for the guidance of the buccaneers who once infested this region. Local tradition connects the name with that of Wallis or Wallace, a Scottish buccaneer, who, in 1638, settled, with a party of logwood cutters, on St George's Cay, a small island off the town. In the 18th century the names Wallis and Belize were used interchangeably for the town, the river and the whole country. The history of Belize is inextricably bound up with that of the rest of British Honduras (q. v.).

BELJAME, ALEXANDRE (1842-1906), French writer,.was born at Villiers-le-Bel, Seine-et-Oise, on the 26th of November 1842. He spent part of his childhood in England and was a frequent visitor in London. His lectures on English literature at the Sorbonne, where a chair was created expressly for him, did much to promote the study of English in France. In 1905-1906 he was Clark lecturer on English literature at Trinity College, Cambridge. He died at Domont (Seine-et-Oise) on the 19th of September 1906. His best known book was a masterly study of the conditions of literary life in England in the 18th century illustrated by the lives of Dryden, Addison and Pope. This book, Le Public et les hommes de lettres en Angleterre au XVIII" siecle (1 88 1) , was crowned by the French Academy on the appear- anceof the second edition in 1897. Hewasagood Shakespearian scholar, and his editions of Macbeth, Othello and Julius Caesar also received an academic prize in 1902.

BELKNAP, JEREMY (1744-1798), American author and clergyman, was born at Boston on the 4th of June 1744, and was educated at Harvard College, where he graduated in 1762. In 1767 he became minister of a Congregational church at Dover, New Hampshire, remaining there until 1787, when he removed to Federal Street church, Boston. He is recognized as the founder of the Massachusetts Historical Society, and in 1792 became an overseer of Harvard. He died at Boston on the 20th of June 1798. Belknap's chief works are: History of New Hampshire (1784-1792); An Historical Account of those

persons who have been distinguished in America, generally known as American Biography (1792-1794); The Foresters (1792), &c.

BELKNAP, WILLIAM WORTH (1829-1890), American soldier and politician, was born at Newburgh, N.Y., on the 22nd of September 1829. Entering the Union army in 1861, he took part in the battles of Shiloh, Corinth and Vicksburg, as major of the 15th Iowa volunteers. In the Atlanta campaign under Sherman he gained considerable distinction, rising successively to the rank of brigadier-general in 1864 and major-general in 1865. During the four years that followed he was collector of internal revenue for Iowa, leaving that post in 1869 to become secretary of war. In 1876, in consequence of unproved accusations of corruption, he resigned. He died at Washington, D.C., on the 13th of October 1890.

BELL, ALEXANDER GRAHAM (1847-), American inventor and physicist, son of Alexander Melville Bell, was born in Edinburgh, Scotland, on the 3rd of March 1847. He was educated at the university of Edinburgh and the university of London, and removed with his father to Canada in 1870. In 1872 he became professor of vocal physiology in Boston Univer- sity. In 1876 he exhibited an apparatus embodying the results of his studies in the transmission of sound by electricity, and this invention, with improvements and modifications, constitutes the modern commercial telephone. He was the inventor also of the photophone, an instrument for transmitting sound by variations in a beam of light, and of phonographic apparatus. Later, he interested himself in the problem of mechanical flight. He published many scientific monographs, including a memoir on the formation of a deaf variety in the human race.

BELL, ALEXANDER MELVILLE (1819-1905), American educationalist, was born at Edinburgh, Scotland, on the 1st of March 1819. He studied under and became the principal assist- ant of his father, Alexander Bell, an authority on phonetics and defective speech. From 1843 to 1865 be lectured on elocution at the university of Edinburgh, and from 1865 to 1870 at the university of London. In 1868, and again in 1870 and 187 1, he lectured in the Lowell Institute course in Boston. In 1870 he became a lecturer on philology at Queen's College, Kingston, Ontario; and in 1881 he removed to Washington, D.C., where he devoted himself to the education of deaf mutes by the " visible speech " method of orthoepy, in which the alphabetical characters of his own invention were graphic diagrams of positions and motions of the organs of speech. He held high rank as an authority on physiological phonetics (q.v.) and was the author of numerous works on orthoepy, elocution and education, including Steno- Phonography (1852); Letters and Sounds (1858); The Standard, Elocutionist (i860); Principles 0} Speech and Dictionary of Sounds (1863); Visible Speech: The Science of Universal Alphabetics (1867); Sounds and their Relations (1881); Lectures on Phonetics (1885); A Popular Manual of Visible Speech and Vocal Physiology (1889); World English: the Universal Language (1888); The Science of Speech (1897); The Fundamentals of Elocution (1899).

See John Hitz, Alexander Melville Bell (Washington, 1906).

BELL, ANDREW (1753-1832), British divine and educational- ist, was born at St Andrews on the 27th of March 1753- He graduated at the university there, and afterwards spent some years as a tutor in Virginia, U.S.A. On his return he took orders, and in 1787 sailed for India, where he held eight army chap- laincies at the same time. In 1789 he became superintendent of the male orphan asylum at Madras, and having been obliged from scarcity of teachers to introduce the system of mutual tuition by the pupils, found the scheme answer so well that ne 'became convinced of its universal applicability. In 1797, after his return to London, he published a small pamphlet explaining his views on education. Little public attention was drawn towards the " monitorial " pian tiil Joseph Lancaster (q.v.), the Quaker, opened a school in Southwark, conducting it in accord- ance with Bell's principles, and improving on his system. The success of the method, and the strong support given to Lancaster by the whole body of Nonconformists gave immense impetus to the movement. Similar schools were established in great

numbers; and the members of the Church of England, becoming

alarmed at the patronage of such schools resting entirely in the hands of dissenters, resolved to set up similar institutions in which their own principles should be inculcated. In 1807 Bell was called from his rectory of Swanage in Dorset to organize a system of schools in accordance with these views, and in 181 1 became superintendent of the newly formed " National Society for Promoting the Education of the Poor in the Principles of the Established Church." For his valuable services he was in some degree recompensed by his preferment to a prebend of West- minster, and to the mastership of Sherburn hospital, Durham. He tried, but without success, to plant his system in Scotland and on the continent. He died on the 27th of January 1832, at Cheltenham, and was buried in Westminster Abbey. His great fortune was bequeathed almost entirely for educational purposes. Of the £120,000 given in trust to the provost of St Andrews, two city ministers and the professor of Greek in the university, half was devoted to the founding of the important school, called the Madras College, at St Andrews; £10,000 was left to each of the large cities, Edinburgh, Glasgow, Leith, Inverness and Aberdeen, for school purposes; and £10,000 was also given to the Royal Naval School.

Southey's Life of Dr Bell (3 vols.) is very tedious; J. D. Meikle- john's An Old Educational Reformer is concise and accurate.

BELL, SIR CHARLES (1774-1842), Scottish anatomist, was born at Edinburgh in November 1774, the youngest son of the Rev. William Bell, a clergyman of the Episcopal Church of Scotland; among his brothers were the anatomist, John Bell, and the jurist, G. J. Bell. After attending the high school and the university of Edinburgh, he embraced the profession of medicine, and devoted himself chiefly to the study of anatomy, under the direction of his brother John. His first "work, entitled A System of Dissections, explaining the anatomy of the human body, the manner of displaying the parts, and their varieties in disease, was published in Edinburgh in 1798, while he was still a pupil, and for many years was considered to be a valuable guide to the student of practical anatomy. In 1802 he published a series of engravings of original drawings, showing the anatomy of the brain and nervous system. These drawings, which are remarkable for artistic skill and finish, were taken from dis- sections made by Bell for the lectures or demonstrations he gave on the nervous system as part of the course of anatomical instruction of his brother. In 1804 he wrote the third volume, containing the anatomy of the nervous system and of the organs of special sense, of The Anatomy of the Human Body, by John and Charles Bell. In November of the same year he migrated to London, and from that date, for nearly forty

years, he kept up a regular correspondence with his brother George, much of which was published in the Letters of Sir Charles Bell, &c, 1870. The earlier letters of this correspondence show how rapidly he rose to distinction in a field where success was difficult, as it was already occupied by such men as John Abernethy, Sir Astley Cooper and Henry Cline. Before leaving Edinburgh, he had written his work on the Anatomy of Expression, which was published in London soon after his arrival and at once attracted attention. His practical knowledge of anatomy and his skill as an artist qualified him in an exceptional manner for such a work. The object of this treatise was to describe the arrangements by which the influence of the mind is propagated to the muscular frame, and to give a rational explanation of the muscular move- ments which usually accompany the various emotions and passions. One special feature was the imoortance attributed to the respiratory arrangements as a source of expression, and it was shown how the physician and surgeon might derive informa- tion regarding the nature and extent of important diseases by observing the expression of bodily suffering. This work, apart from its value to artists and psychologists, is of interest histori- cally, as there is no doubt the investigations of the author into the nervous supply of the muscles of expression induced him to prosecute inquiries which led to his great discoveries in the physiology of the nervous system.

In 1 8 1 1 Bell published his New Idea of the A natamy of the Brain,

in which he announced the discovery of the different functions of the nerves corresponding with their relations to different parts of the brain; his latest researches were described in The Nervous System of the Human Body (1830), a collection of papers read by him before the Royal Society. He discovered that in the nervous trunks there are special sensory filaments, the office of which is to transmit impressions from the periphery of the body to the sensorium, and special motor filaments which convey motor impressions from the brain or other nerve centre to the muscles. He also showed that some nerves consist entirely of sensory filaments and are therefore sensory nerves, that others are composed of motor filaments and are therefore motor nerves, whilst a third variety contains both kinds of filaments and are therefore to be regarded as sensory-motor. Furthermore, he indicated that the brain and spinal cord may be divided into separate parts, each part having a special function —

one part ministering to motion, the other to sensation, and that the origin of the nerves from one or other or both of those sources endows them with the peculiar property of the division whence they spring. He also demonstrated that no motor nerve ever passes through a ganglion. Lastly, he showed, both from theoretical considerations and from the result of actual experiment on the living animal, that the anterior roots of the spinal nerves are motor, while the posterior are sensory. These discoveries as a whole must be regarded as the greatest in physiology since that of the circulation of the blood by William Harvey. They were not only a distinct and definite advance in scientific knowledge, but from them flowed many practical results of much importance in the diagnosis and treatment of disease. It is not surprising that Bell should have viewed his results with exultation. On the 26th of November 1807, he wrote to his brother George: — " I have done a more interesting nova anatomia cerebri humani than it is possible to conceive. I lectured it yesterday. I prosecuted it last night till one o'clock; and I am sure it will be well received." On the 31st of the same month he wrote: — " I really think this new anatomy of the brain will strike more than the discovery of the lymphatics being absorbents."

In 1807 he produced a System of Comparative Surgery, in which surgery is regarded almost wholly from an anatomical and operative point of view, and there is little or no mention of the use of medicinal substances. It placed him, however, in the highest rank of English writers on surgery. In 1809 he re- linquished his professional work in London, and rendered meritorious services to the wounded from Corufia, who were brought to the Haslar hospital at Portsmouth. In 181c he pub- lished a series of Letters concerning the Diseases of the Urethra, in which he treated of stricture from an anatomical and patho- logical point of view. In 1812 he was appointed surgeor to the Middlesex hospital, a post he retained for twenty-four years. He was also professor of anatomy, plrysiology and surgery to the College of Surgeons of London, and for many years teacher of anatomy in the school which used to exist in Great Windmill Street. In i8r5 he went to Brussels to treat the wounded of the battle of Waterloo. In 1816, 1817 and 1818, he published a series of Quarterly Reports of Cases in Surgery ; in 1 8 2 1 a volume of coloured plates with descriptive letterpress, entitled Illustra- tions of the great operations of Surgery, Trepan, Hernia, Amputa- tion and Lithotomy, and in 1824 Observations on Injuries of the Spine and of the Thigh Bone. On the formation of University College, Gower Street, he was for a short time head of the medical department. In 1832 he wrote a paper for the Royal Society of London on the " Organs of the Human Voice,"

in which he gave many illustrations of the physiological action of these parts, and in 1833 a Bridgewater treatise, The Hand: its Mechan- ism and Vital Endowments as evincing Design. Along with Lord Brougham he annotated and illustrated an edition of Paley's Natural Theology, published in 1836. The Royal Society of London awarded to him in 1829 the first annual medal of that year given by George IV. for discoveries in science; and when William IV. ascended the throne, Charles Bell received the honour of knighthood along with a few other men distinguished in science and literature.

In 1836 the chair of surgery in the university of Edinburgh was offered to him. He was then one of the foremost scientific men in London, and he had a large surgical practice. But his opinion was " London is a place to live in, but. not to die in "; and he accepted the appointment. In Edinburgh he did not earn great local professional success; and, it must be confessed, he was not appreciated as he deserved. But honours came thick upon him. On the continent of Europe he was spoken of as greater than Harvey. It is narrated that one day P. J. Roux, a celebrated French physiologist, dismissed his class without a lecture, saying " C'est assez, messieurs, vous avez vu Charles Bell." During his professorship he published the Institutes of Surgery, arranged in the order of the lectures delivered in the university of Edinburgh (1838); and in 1841 he wrote a volume of Practical Essays, two of which, " On Squinting," and " On the action of purgatives," are of great value. He died at Hallow Park near Worcester on the 28th of April 1842.

BELL, GEORGE JOSEPH (1770-1843), Scottish jurist, was born at Edinburgh on the 20th of March 1770. He was an elder brother of Sir Charles Bell. At the age of eight he entered the high school, but he received no university education further than attending the lectures of A. F. Tytler, Dugald Stewart and Hume. He became a member of the Faculty of Advocates in 1 791, and was one of the earliest and most attached friends of Francis Jeffrey. In 1804 he published a Treatise on the Law of Bankruptcy in Scotland, which he subsequently enlarged and published in 1826 under the title of Commentaries on the Law of Scotland and on the principles of Mercantile Jurisprudence — an institutional work of the very highest excellence, which has had its value acknowledged by such eminent jurists as Joseph Story and James Kent. In 182 1 Bell was elected professor of the law of Scotland in the university of Edinburgh; and in 1 83 1 he was appointed to one of the principal clerkships in the supreme court. He was placed at the head of a com- mission in 1833 to inquire into the Scottish bankruptcy law; and in consequence of the reports of the commissioners, chiefly drawn up by himself, many

beneficial alterations were made. He died on the 23rd of September 1843. Bell's smaller treatise, Principles of the Law of Scotland, became a standard text-book for law students. The Illustrations of the Principles is also a work of high value.

BELL, HENRY (1767-1830), Scottish engineer, was born at Torphichen, Linlithgowshire, in 1767. Having received the ordinary education of a parish school, he was apprenticed to his uncle, a millwright, and, after qualifying himself as a ship-modeller at Bo'ness, went to London, where he found employment under John Rennie, the celebrated engineer. Re- turning to Scotland in 1790, he first settled as a carpenter at Glasgow and afterwards removed to Helensburgh, on the Firth of Clyde where he pursued his mechanical projects, and also found occasional employment as an engineer. In January 181 2 he placed on the Clyde a steamboat (which he named the " Comet ") of about 25 tons, propelled by an engine of three horse power, at a speed of 7 m. an hour. Although the honour of priority is admitted to belong to the American engineer Robert Fulton, there appears to be no doubt that Fulton had received very material assistance in the construction of his vessel from Bell and others in Great Britain. A handsome sum was raised for Bell by subscription among the citizens of Glasgow; and he also received from the trustees of the river Clyde a pension of £100 a year. He died at Helensburgh on the 14th of November 1830. A monument to his memory stands on the banks of the Clyde,,at Dunglass, near Bowling.

BELL, HENRY GLASSFORD (1803-1874), a Scottish lawyer and man of letters, was born at Glasgow on the 8th of November 1803. He received his education at the Glasgow high school and at Edinburgh University. He became intimate with " Delta" Moir, James Hogg, John Wilson (Christopher North), and others of the brilliant staff of Blackwood's Magazine, to which he was drawn by his political sympathies. In 1828 he became editor of the Edinburgh Literary Journal, which was eventually incor- porated in the Edinburgh Weekly Chronicle. He was admitted

to the bar in 1832. In 1839 he was appointed sheriff-substitute of Lanarkshire, and in 1867 he succeeded Sir Archibald Alison in the post of sheriff-principal of the county, an office which he filled with distinguished success. In 1831 he published Summer and Winter

Hours, a volume of poems, of which the best known is that on Mary, queen of Scots. He further defended the cause of the unfortunate queen in a prose Life (2 vols., 1828-1831). Among his other works may be mentioned a preface which he wrote to Bell and Bains's edition (1865) of the works of Shake- speare, and Romances and Minor Poems (1866). He figures in the society of the Nodes Ambrosianae as " Tallboys." He died on the 7 th of January 1874.

BELL, JACOB (1810-1859), British pharmaceutical chemist, was born in London on the 5 th of March 1810. On the com- pletion of his education, he joined his father in business as a chemist in Oxford Street, and at the same time attended the chemistry lectures at the Royal Institution, and those on medicine at King's College. Always keenly alive to the interests of chemists in general, Bell conceived the idea of a society which should at once protect the interests of the trade, and improve its status, and at a public meeting held on the 15th of April 1841, it was resolved to found the Pharmaceutical Society of Great Britain. Bell carried his scheme through in the face of many difficulties, and further advanced the cause of pharmacy by establishing the Pharmaceutical Journal, and superintending its publication for eighteen years. The Pharmaceutical Society was incorporated by royal charter in 1 843. One of the first abuses to engage the attention of the new body was the practice of pharmacy by unqualified persons, and in 1845 Bell drew up the draft of a bill to deal with the matter, one of the provisions of which was the recognition of the Pharmaceutical Society as the governing body in all questions connected with pharmacy. For some time after this the question of pharmaceutical legisla- tion was widely discussed. In 1850 Bell successfully contested the borough of St Albans in order that he might be able to advo- cate his proposals for reform more effectually in parliament. In 1851 he brought forward a bill embodying these proposals. It passed its second reading, but was considerably whittled down in committee, and when eventually it became law it only partially represented its sponsor's intentions. Bell was the author of an Historical Sketch of the Progress of Pharmacy in Great Britain. He died on the 12th of June 1859.

BELL, JOHN (1691-1780), Scottish traveller, was born at Antermony in Scotland in 1691, and educated for the medical profession, in which he took the degree of M.D. In 17 14 he set out for St Petersburg, where, through the introduction of a countryman, he was nominated medical attendant to Valensky, recently appointed to the Persian embassy, with whom he travelled from 1715 to 171 8. The next four years he spent in an embassy to China, passing through Siberia and the great Tatar deserts. He had scarcely rested from this

last journey when he was summoned to attend Peter the Great in his perilous expedition to Derbend and the Caspian Gates. The narrative of this journey he enriched with interesting particulars of the public and private life of that remarkable prince. In 1738 he was sent by the Russian government on a mission to Constanti- nople, to which, accompanied by a single attendant who spoke Turkish, he proceeded in the midst of winter and all the horrors of war, returning in May to St Petersburg. It appears that after this he was for several years established as a merchant at Constantinople, where he married in 1746. In the following year he retired to his estate of Antermony, where he spent the remainder of his life. He died in 1780. His travels, published at Glasgow in 1763, were speedily translated into French, and widely circulated in Europe.

BELL, JOHN (1763-1820), Scottish anatomist and surgeon, an elder brother of Sir Charles Bell, was born at Edinburgh on the 1 2th of May 1 763. After completing his professional educa- tion at Edinburgh, he carried on from 1790 in Surgeons' Square an anatomical lecture-theatre, where, in spite of much opposition, due partly to the unconservative character of his teaching, he attracted large audiences by his lectures, in which he was for a

time assisted by his younger brother Charles. In 1 793-1 795 he published Discourses on the Nature and Cure of Wounds, and in 1800 he became involved in an unfortunate controversy with James Gregory (1753-1821), the professor of medicine at Edin- burgh. Gregory in 1800 attacked the system whereby the fellows of the Royal College of Surgeons of Edinburgh acted in rotation as surgeons at the Royal Infirmary, with the result that the younger fellows were excluded. Bell, who was among the number, composed an Answer for the Junior Members (1800), and ten years later published a collection of Letters on Professional Character and Manners, which he had addressed to Gregory. After his exclusion from the infirmary he ceased to lecture and devoted himself to study and practice. In 1816 he was injured by a fall from his horse and in the following year went to Italy for the benefit of his health. He died at Rome on the 15th of April 1820. His works also included Principles of Surgery (1801), Anatomy of the Human Body, which went through several editions and was translated into German, and Observations on Italy, published by his widow in 1825.

BELL, JOHN (1797-1869), American political leader, was born near Nashville, Tennessee, on the 15th of February 1797. He graduated at the university of Nashville in 1814, and in 1817 was elected to the state senate, but retiring after one term, he devoted himself for ten

years to the study and the practice of the law. From 1827 until 1841 he was a member of the national House of Representatives, of which from June 1834 to March 1835 he was the speaker, and in which he was conspicuous as a debater and a conservative leader. Though he entered political life as a Democrat, he became estranged from his party's leader, President Jackson, also a Tennessean, and after 1835 was one of the leaders of the Whig party in the South. In March 1841 he became the secretary of war in President Harrison's cabinet, but in September, after the death of Harrison and the rupture between the Whig leaders and President Tyler, he resigned this position. From 1847 until 1859 he was a member of the United States Senate, and attracted attention by his ability in debate and his political independence, being one of two Southern senators to vote against the Kansas-Nebraska Bill of 1854 and against the admission of Kansas with the Lecompton or pro- slavery constitution in 1858. Strongly conservative by tempera- ment and devoted to the Union, he ardently desired to prevent the threatened secession of the Southern states in i860, and was the candidate, for the presidency, of the Constitutional Union Party, often called from the names of its candidates for the presidency and the vice-presidency (Edward Everett) the " Bell and Everett Party," which was made up largely of former Whigs and Southern " Know-Nothings," opposed sectionalism, and strove to prevent the disruption of the union. The party adopted no platform, and discarding all other issues, resolved that " it is both the part of patriotism and of duty to recognize no political principle other than the constitution of the country, the union of the states, and the enforcement of the laws." Bell was defeated, but received a popular vote of 587,830 (mostly cast in the Southern states), and obtained the electoral votes of Virginia, Kentucky and Tennessee — 39 altogether, out of a total of 303. Bell tried earnestly to prevent the secession of his own state, but after the issue of President Lincoln's proclamation of the 15th of April 1861 calling on the various states for volun- teers, his efforts were unavailing, and when Tennessee joined the Confederacy Bell " went with his state." He took no part in the Civil War, and died on the 10th of September 1869.

BELL, ROBERT (1800-1867), Irish man of letters, was born at Cork en the 16th of January 1800. He was educated at Trinity College, Dublin, where he was one of the founders of the Dublin Historical Society. In 1828 he 'settled in London, where he edited a weekly paper, the Atlas, and until 1841 was engaged in journalisnij and afterwards in miscellaneous literary work. He died on the 12th of April 1867. His most important work is his annotated edition of the

English Poets (24 vols., 1854-1857; new ed., 29 vols., 1866), the works of each poet being prefaced by a memoir. For Lardner's,CaW»e/ Cyclopaedia he wrote: History of Russia (3 vols., 1836-1838); Lives of English Poets (2 vols.,

1839); a continuation, with W. Wallace, of Sir James Mackin- tosh's History of England (vols, iv.-x., 1830-1840); and the fifth volume (1840) of the Lives of the British Admirals, begun by R. Southey. He was a director of the Royal Literary Fund, and well known for his open-hearted generosity to fellow men of letters.

BELL, a hollow metallic vessel used for making a more or less loud noise (A.S. bellan, to bellow; Mid. Eng. "to bell"; cf. "As loud as belleth ,winde in helle," in Chaucer, House of Fame, iii. 713). Bells are usually cup-like in shape, and are constructed so as to give one fundamental note when struck. The term does not strictly include gongs, cymbals, metal plates, resonant bars of metal or wood, or tinkling ornaments, such as e.g. the " bells " upon the Jewish high priest's dress (Exodus xxviii. 32); nor is it necessary here to deal with the common useful varieties of sheep or cow bells, or bells on sledges or harness. For house bells see the end of this article. A "diving-bell" (see Divers) is only so called from the analogy of its shape.

The main interest of bells and bell-ringing has reference to church or tower bells, their history, construction and uses.

Early Bells. — Of bells before the Christian era there is no trustworthy evidence. The instruments which summoned the Romans to public baths or processions, or that which Lucian (a.d. 180) describes as set in motion by a water-clock (clepsydra) to measure time, were probably cymbals or resonant plates of metal, like the timbrels (corybantia aera, Virg. Aen. iii. in) used in the worship of Cybele, or the Egyptian sistrum, which seems to have been a sort of rattle. The earliest Latin word for a bell (campana) is late Latin Of the 4th or 5th century a.d.; and the first application of bells to churches has been ascribed to Paulinus, bishop of Nola in Campania about a.d. 400. There is, however, no confirmation of this story, which may have arisen frcm the words campana and nola (a small bell) ; and in a letter from Paulinus to the emperor Severus, describing very fully the decoration of his church, the bishop makes

no mention of bells. It has been maintained with somewhat more reason that Pope Sabinianus (604) first used church bells; but it seems clear that they were introduced into France as early as 550. In the 7 th century Bede mentions a bell brought from Italy by Benedict Biscop for his abbey at Wearmouth, and speaks of the sound of a bell being well known at Whitby Abbey at the time of St Hilda's death (680). St Dunstan hung many in the 10th century; and in the nth they were not uncommon in Switzerland and Germany. It is said that the Greek Christians were unacquainted with bells till the 9th century; but it is known that for political reasons, after the taking of Constanti- nople by the Turks in 1453, their use was forbidden lest they should provide a popular signal for revolt.

Several old bells are extant in Scotland, Ireland and Wales; the oldest are often quadrangular, made of thin iron plates hammered and riveted together. A well-known specimen is St Patrick's bell preserved at Belfast, called Clog an eadhachta Phatraic, " the bell of St Patrick's will." It is 6 in. high, 5 broad, 4 deep, adorned with gems and gold and silver filigree- work; it is inscribed 1091 and no;, but it is probably alluded to in Ulster annals in 552. (For Scottish bells, see Illustrated Cata- logue of Archaeological Museum, Edinburgh, for 1856.)

TW four-sided bell of the Irish missionary St Gall (646) is preserved at the monastery of St Gall, Switzerland. In these early times bells were usually small; even in the nth century a bell presented to the church at Orleans weighing 2600 lb was thought large. In the 13th century larger bells were cast. The bell Jacqueline of Paris, cast in 1400, weighed 15,000 lb; another Paris bell of 1472, 25,000 lb; and the famous Amboise bell at Rouen (1501) 36,364 lb.

To these scanty records of the early history of bells may be added the enumeration of different kinds of bells by Hieronymus Magius, in his work De Tintinnabulis: — 1. Tintinnabulum, a little bell, otherwise called linniolum,ior refectory or dormitory, accord- ing to Joannes Belethus, but Guillaume Durand names squilla for the refectory; 2. Petasius, or larger " broad-brimmed hat " bell; 3. Codon, orifice of trumpet, a Greek hand-bell; 4. Nola, a very

small bell, used in the choir, according to Durand; 5. Campana, a large bell, first used in the Latin churches in the steeple (Durand), in the tower (Belethus) ; 6. Squilla, a shrill little bell. We read of cymbalum for the cloister (Durand) or campanella for the cloister (Belethus); nolula or dupla in the clock; signum in the tower (e.g. in the Excerptions of St Egbert, 750); the Portu- guese still call a bell

sino.

Bell-founding. — The earliest bells were probably not cast, but made of plates riveted together, like the bells of St Gall or Belfast above mentioned. The bell-founder's art, originally practised in the monasteries, passed gradually into the hands of a professional class, by whom, in England and the Low Countries especially, were gradually worked out the principles of construction, mixture of metals, lines and proportions, now generally accepted as necessary for a good bell. In England some of the early founders were peripatetic artificers, who travelled about the country, setting up a temporary foundry to cast bells wherever they were wanted. Miles Graye (c. 1650), a celebrated East Anglian founder, carried on his work in this fashion, and in old churchwardens' accounts are sometimes found notices of payment for the casting of bells at places where no regular foundry is known to have existed. The chief centres of the art in medieval times were London, York, Gloucester and Nottingham; and bells by e.g. " John of York " (14th century), Samuel Smith, father and son, of York (1 680-1 730), Abraham Rudhall and his descendants of Gloucester (1684- 1774), Mot (16th century), Lester and Pack (1750), Christopher Hodson of London (who cast " Great Tom " of Oxford, 1681) and Richard Phelps (17 16) are still in high repute. The White- chapel Bell Foundry (now Mears and Stainbank), established by Robert Mot in 1 5 70, incorporated the business of the Rudhalls, Lester and Pack, Phelps, Briant and others, and is now one of the leading firms of bell-founders; others being Warner and Sons of Spitalfields and Taylor & Co., Loughborough, the founders of " Great Paul " for St Paul's cathedral (1881). Of Dutch and Flemish founders the firms of van den Gheyn (1550), Hemony (1650), Aerschodt & Wagheven at Louvain and others have a great reputation in the Low Countries, especially for " carillons," such as those at Antwerp or Bruges, a form of bell-music which has not taken much root in England, despite the advocacy of the Rev. H. R. Haweis, who proclaimed its superiority to English- change-ringing.

Bell-metal is a mixture of copper and tin in the proportion of 4 to 1. In Henry III.'s reign it was 2 to 1. In Layard's Nineveh bronze bells, it was 10 to 1. Zinc and lead are used in small bells. The thickness of the bell's edge is about one-tenth of its diameter, and its height is twelve times its thickness.

Bells, like viols, have been made of every conceivable shape within certain limits. The long narrow bell, the quadrangular, and the mitre-shaped in Europe at least indicate antiquity, and the graceful

curved-inwardly-midway and full trumpet- mouthed bell indicates an age not earlier than the 16th century.

The bell is first designed on paper according to the scale of measurement. Then the crook is made, which is a kind of double wooden compass, the legs of which are respectively curved to the shape of the inner and outer sides of the bell, a space of the exact form and thickness of the bell being left betwixt them. The compass is pivoted on a stake driven into the bottom of the casting-pit. A stuffing of brickwork is built round the stake, leaving room for a fire to be lighted inside it. The outside of this stuffing is then padded with fine soft clay, well mixed and bound together with calves' hair, and the inner leg of the compass run round it, bringing it to the exact shape of the inside of the bell. Upon this core, well smeared with grease, is fashioned the false clay bell, the outside of which is defined by the outer leg of the compass. Inscriptions are now moulded in wax on the outside of the clay-bell; these are carefully smeared with grease, then lightly covered with the finest clay, and then with coarser clay, until a solid mantle is thickened over the outside of the clay bell. A fire is now lighted, and the whole baked hard ; the grease and wax inscriptions steam out through holes at the top, leaving the sham clay bell baked hard and tolerably loose, between the

core and the cope or mantle. The cope is then lifted, the clay bell broken up, the cope let down again, enclosing now between itself and the core the exact shape of the bell. The metal is then boiled and run molten into the mould. A large bell will take several weeks to cool. When extricated it ought to be scarcely touched and should hardly require tuning. This is called its maiden state, and it used to be so sought after that many bells were left rough and out of tune in order to claim it.

Bell Tones and Tuning. — A good bell, fairly struck, should give out three distinct notes — a " fundamental " note or " tonic " ; the octave above, or "nominal"; and the octave below, or " hum-ncte." (It also gives out the " third " and " fifth " above the fundamental; but of these it is less necessary to take notice.) Very few bells, however, have any two of these notes, and hardly any all three, in unison — the " hum-notes " being generally a little sharper, and the " fundamentals " a little flatter, than their respective " nominals." In

tuning a ” ring ” or series of bells, the practice of founders has hitherto been to take one set of notes (in England usually the nominals, on the continent the fundamentals) and put these into tune, leaving the other tones to take care of themselves. But in different circumstances different tones assert themselves. Thus, when bells are struck at considerable intervals, the fundamental notes being fuller and more persistent are more prominent; but when struck in rapid succession (as in English change-ringing or with the higher bells of a Belgian ” carillon,” which take the ” air “) the higher tone of the ” nominal ” is more perceptible. The inharmonious character of many Belgian carillons, and of certain Belgian and French rings in England, is ascribed by Canon A. B. Simpson (in his pamphlet, Why Bells sound out of Tune, 1897) to neglect of the ” nominals,” the fundamentals only being tuned to each other. To tune a series of bells properly, the fundamental tone of each bell must be brought into true octave with its nominal, and the whole series of bells, thus rectified, put into tune with each other. The ” hum-note ” of each, which is the tone of the whole mass of metal, should also be in tune with the others. If flatter than the nominr.1, it cannot be sharpened: but if sharper (as is more usual), it may be flattened by thinning the metal near the crown of the bell. The great bell (” Great Paul “) cast by Messrs Taylor for St Paul’s cathedral, London, has all its tones in true harmony, except that the tone next above the fundamental (El?) is a “fourth ” (At.) instead of a ” third ” (G or Gt>). The great bell cast by the same founders for Beverley Minster is in perfect tune; and with the improved machinery now in use, there is no reason why this should not henceforth be the case with all church bells.

The quality of a bell depends not only on the casting and the fineness and mixture of metals, but upon the due proportion of metal to the calibre of the bell. The larger the bell the lower the tone; but if we try to make a large E bell with metal only enough for a smaller F bell, the E bell will be puny and poor. It has been calculated that for a peal of bells to give the pure chord of the ground tone or key-note, third, fifth and octave, the diameters are required to be as thirty, twenty-four, twenty, fifteen, and the weights as eighty, forty-one, twenty-four and ten.

History and Uses of Bells.— The history of bells is full of romantic interest. In civilized times they have been intimately associated, not only with all kinds of religious and social uses, but with almost every important historical event. Their influence upon architecture is not less remarkable, for to them indirectly we probably owe most of the famous towers in the world. Church towers at first, perhaps, scarcely rose above the roof, being intended as lanterns for the admission of

light, and addition to their height was in all likelihood suggested by the more common use of bells.

Bells early summoned soldiers to arms, as well as Christians to church. They sounded the alarm in fire or tumult; and the rights of the burghers in their bells were jealously guarded. Thus the chief bell in the cathedral often belonged to the town, not to the cathedral chapter. The curfew, the Carolus and St Mary's bejl in the Antwerp tower all belong to the town; the

rest are the property of the chapter. He who commanded the bell commanded the town; for by that sound, at a moment's notice, he could rally and concentrate his adherents. Hence a conqueror commonly acknowledged the political importance of bells by melting them down; and the cannon of the conquered was in turn melted up to supply the garrison with bells to be used in the suppression of revolts. Many a bloody chapter in history has been rung in and out by bells.

On the third day of Easter 1282, at the ringing of the Sicilian vespers (which have given their name to the affair) , 8000 French were massacred in cold blood by John of Procida, who had thus planned to free Sicily from Charles of Anjou. On the 24th of August, St Bartholomew's day, 1571, bells ushered in the massacre of the Huguenots in France, to the number, it is said, of 100,000. Bells have rung alike over slaughtered and ransomed cities; and far and wide throughout ■ Europe in the hour of victory or irreparable loss. At the news of Nelson's triumph and death at Trafalgar, the bells of Chester rang a merry peal alternated with one deep toll, and similar incidents could be multiplied.

There are many old customs connected with the use of church bells, some of which have died out, while others remain here and there. The best known and perhaps oldest of these is the " Curfew " {couvre-feti) , first enforced (though not perhaps introduced) by William the Conqueror in England as a signal for all lights and fires to be extinguished at 8 p.m. — probably to prevent nocturnal gatherings of disaffected subjects. In many towns it survived into the 19th century as a signal for closing shops at 8 or 9 ; and it is still kept up in various places as an old custom; thus at Oxford the familiar boom of " Tom's " 101 strokes is still the signal fcr closing college gates at 9. The largest and heaviest bells were used for the Curfew, to carry the sound as far as possible, as it did to Milton's ear, suggesting the descriptive lines in II Penseroso (74-75) : —

" Oft, on a plot of rising ground, I hear the far-off curfew sound Over some wide-watered shore, Swinging slew with sullen roar."

Gray's allusion in the Elegy is well known; as also are those of Shakespeare to the elves " that rejoice to hear the solemn curfew" {Tempest), or the fiend that "begins at curfew and walks till the first cock " {King Lear); or Milton's in Comus to the ghost " that breaks his magic chains at curfew time."

Among secular uses connected with church bells are the " Mote "or " Common " bell, summoning to municipal cr other meetings, as e.g. the 7th at St Mary's, Stamford, tolled for quarter sessions, or the bell at St Mary's, Oxford, for meetings of Convocation. In some places one of the bells is known as the " Vestry Bell." The " Pancake Bell," still rung here and there on Shrove Tuesday, was originally a summons to confession before Lent; the " Harvest Bell " and " Seeding Bell " called labourers to their work; while the " Gleaning Bell " fixed the hours for beginning or leaving off gleaning, so that everyone might start fair and have an even chance. The " Oven Bell " gave notice when the lord of the manor's oven was ready for his tenants to bake their bread; the " Market Bell " was a signal for selling to begin; and in some country districts a church bell is still rung at dinner time. The general diffusion of clocks and watches has rendered bells less necessary for marking the events of daily life; and most of these old customs have either dis- appeared or are fast disappearing. At Strassburg a Large bell of eight tons weight, known as the " Holy Ghost Bell," is only rung when two fires are seen in the town at once; a " storm- bell " warns travellers in the plain of storms approaching from the mountains, and the " Thor Glocke " (gate bell) gives the signal for opening or shutting the city gates. On the European continent, especially in countries which, like Belgium and Holland, were distracted by constant war, bells acquired great public importance. They were formally baptized with religious ceremonies (as also in England in pre-Reformation days), the notabilities of a town or church standing as sponsors; and they

were very generally supposed to have the power of scaring away evil spirits.

Other old customs are naturally connected with the ecclesi- astical uses of bells. The " Passing Bell," rung for the dying, is now generally

rung after death; the ancient mode of indicating the sex of the deceased, viz. two pulls for a woman and three for a man being still very common, with many varying customs as regards the interval after death or the bell to be used, e.g. smaller bells for children and females, and larger ones for aged men; the tenor bell being sometimes reserved for the death of the incumbent, or of a bishop or member of the royal family. " Burial Peals," once common at or after funerals to scare away the evil spirits from the soul of the departed, though discouraged by bishops as early as the 14th century, were kept alive by popular superstition, and only finally checked in Puritan times; but they have been revived, since the spread of change-ringing, in the "muffled peals" now frequently rung as a mark of respect to deceased persons of public or local importance, or the short " touches " on hand-bells sometimes rung at the grave by the comrades of a deceased ringer. The " Sermon-Bell," rung in pre-Reformation times to give notice that a sermon was to be preached (cf. Shakespeare, Henry IV., Pt. II. iv. 2. 4-7), survives in some places in a custom of ringing the tenor bell before a service with a sermon; and a similar custom before a celebration of the Holy Communion preserves the memory of the "' Sacrament Bell." The ancient " Sanctus " or " Sance " bell, hung on the rood-screen or in a small bell cot on the chancel gable, and sounded three times when the priest said the Ter- sanctus (Holy, Holy, Holy) in the office of mass, was specially obnoxious to Puritan zeal, and few of them survived the Refor- mation. An early morning bell, rung in many places for no apparent reason, is probably a relic of the Ave Maria or Angelus bell. The inscription on some old bells, Ledum fuge, discute somnum (" Away from bed, shake off sleep "), points to this use, as also does the name " Gabriel " applied to the bell used for ringing the Angelus. In old times bells were generally named at their baptism, after the Virgin Mary or saints, or their donors; thus the bells at Oseney Abbey in the 13th century were called Hautclere, Doucement, Austyn, Marie, Gabriel and John; sometimes they were known by mere nicknames, such as " Great (or " Mighty ") Tom " at Oxford, or " Big Ben," " Great Paul," &c, in recent times.

Bell Inscriptions. — The names of bells were often stamped upon them in the casting; whence arose inscriptions upon church bells, giving in monkish Latin the name of some saint, a prayer to the Virgin, or for the soul of the donor, or a distich upon the function of the bell itself; e.g. —

" Funera plango, fulgura frango, Sabbata pango, Excito lentos, dissipo ventos, paco cruentos. ' (I mourn for death, I break the lightning, I fix the Sabbath, I rouse the lazy, I scatter the winds, I

appease the cruel.)

The character of the lettering and the foundry marks upon old bells, are of great assistance in determining their date. Sometimes a set of bells has each a separate verse, e.g. on a ring of five in Bedfordshire: —

1st. " Hoc signum Petri pulsatum nomine Christi."

(This emblem of Peter is struck in the name of Christ.) 2nd. " Nomen Magdalene campana sonat melode."

(This bell named Magdalen sounds melodiously.) 3rd. " Sit nomen Domini benedictum semper in eum." (May the name of the Lord always be blessed upon him, i.e. on the bell when struck.) 4th. " Musa Raphaelis sonat auribus Immanuelis."

(The music of Raphael sounds in the ear of Immanuel.) 5th. " Sum Rosa pulsata mundique Maria vocata."

(I, Maria, am struck and called the Rose of the world.)

The names of these five bells were thus: — Peter, Magdalen, (?) Jesus, Raphael and Mary.

Other inscriptions take the form of an invocation or prayer for the bell itself, its donor or those who hear it, e.g. — " Augustine tuam campanam protege sanam." (Augustine, protect thy bell and keep it sound.)

" Sancte Johannes, ora pro animabus Johannis Pudsey, militis, et Mariae, consortae suae."

(St John, pray for the souls of John Pudsey, knight, and Mary his wife.)

" Protege pura via quos convoco virgo Maria." (Guard in the way those whom I pure Virgin Mary call.)

The " Mittags Glocke " (mid-day bell) at Strassburg, taken down at the time of the French Revolution, bore the legend: "Vox ego sum vitae; voco vos; orate venite." (I am the voice of life: I call you: come and pray.)

A bell in Rouen cathedral, melted down in 1793, was inscribed: " Je suis George dAmbois, Qui trente cinque mille pois; Mais lui qui me

pesera Trente six mille me trouvera." (I am George dAmbois, weighing 35,000 lb; but he who weighs me will find me 36,000.)

A similar inscription is said to have been cast on the largest of the bells placed by Edward III. in a " clocher " or bell hut in the Little Cloisters at Westminster:

" King Edward made mee thirty thousand weight and three, Take mee down and wey mee and more you shall find mee."

On the "Thor Glocke " at Strassburg above mentioned are the words: —

" Dieses Thor Glocke das erst mal schallt Als man 1618 sahlt Dass Mgte jahr regnet man Nach doctor Luther Jubal jahr Das Bos hinaus das Gut hinein Zu lauten soil igr arbeit seyn."

The reference is to the year 1517, when Luther began his crusade, and the verse may be Englished as follows: — When first ringeth this Gate Bell 1618 years we tell. We reckon this a year to be From Dr Luther's jubilee. To ring out ill, the good ring in, Its daily task shall now begin.

Large Bells. — There are a few bells of world-wide renown, and several others more or less celebrated. The great bell at Moscow, " Tsar Kolokol," which, according to the inscription, was cast in 1733, was in the earth 103 years and was raised by the emperor Nicholas in 1836. The present bell seems never to have been actually hung or rung, having been cracked in the furnace; and it now stands on a raised platform in the middle of a square. It is used as a chapel. It weighs about 180 tons, height 19 ft. 3 in., circumference 60 ft. 9 in., thickness 2 ft., weight of broken piece n tons. The second Moscow bell, the largest in the world in actual use, weighs 128 tons. In a pagoda in Upper Burma hangs a bell 16 ft. in diameter, weighing about 80 tons. The great bell at Peking weighs 53 tons; Nan- king, 22 tons; Olmutz, 17 tons; Vienna (1711), 17 tons; Notre Dame (1680), 17 tons; Erfurt, 13 tons; Great Peter, York Minster, recast in 1845, i2§ tons; Great Paul, at St Paul's cathedral, 16J tons; Great Tom at Oxford, 7J tons; Great Tom at Lincoln, 55 tons. Big Ben of the Westminster Clock Tower weighs 135 tons; it was cast by George Mears under the direction of the first Lord Grimthorpe (E. Beckett Denison) in 1858. Its four quarters were cast by Warner in 1856. The " Kaiserglocke " of Cologne cathedral, recast in 1875, with metal from French cannon captured in 1870ˆ1871, weighs 275 tons.

These large bells are either not moved at all, or only slightly swung to enable the clapper to touch their side; in some cases they are struck by a hammer or beam from outside. The heaviest ringing peals in England are those at Exeter and St Paul's cathedrals, tenors 72 cwt. and 62 cwt. respectively.

Bell-ringing. — The science and art of bell-ringing, as practised upon church and tower bells, falls under two main heads: — (1) Mechanical ringing, in connexion with the machinery of a clock or " carillon "; (2) Ringing by hand, by means of ropes attached to the fittings of the bells, whereby the bell itself is either moved as it hangs mouth downwards sufficiently for the clapper just to touch its side (called technically " chiming ") ; or is swung round nearly full circle with its mouth uppermost (technically

" ringing "), in which case the impact of the clapper is much heavier, and the sound produced is consequently louder and more far-reaching. Mechanical ringing is more common on the con- tinent of Europe, especially in Belgium and Flanders; ringing by hand is more common in England, where the development of change-ringing (see below) has brought it into prominence.

(i) Mechanical ringing is effected by a system of wires con- nected with small hammers striking the bells, usually on their outside, and worked either by connexion with the machinery of a clock, so as to play tunes or artificially arranged chimes at definite intervals; or with a key-board resembling that of an organ. The first of these methods is familiar in the chimes (Cambridge, Westminster, &c.) heard from many towers at the striking of the hours and quarters; or in hymn tunes played at intervals (e.g. of three hours) upon the church bells. The second method is peculiar to the " carillon " (q.v.), as found everywhere in Belgium, where with a set of from 20 or 30 to 60 or 70 bells a much wider scope for tunes and harmonies is provided than in English belfries, few of which have more than one octave of bells in one key only and none more than 1 2 bells. The carillons at Louvain and Bruges contain 40 bells, and that of Mechlin 44, while in the tower of Antwerp cathedral there are upwards of 90 bells, for the largest of which, cast in 1507, Charles V. stood sponsor at its consecration.

(2) Ringing by Hand. — Church bells may be " chimed " or " rung " (see above). One man can, as a rule, chime three bells, with a rope in each hand and one foot in the loop of another; but by the use of an "

Ellacombe " or other chiming apparatus one man can work six, eight or ten bells. Some prefer the quieter sound of chiming as an introduction to divine service, but where a band of ringers is available and change-ringing is practised the bells as a rule are rung. The practice of " clocking " a bell, in which the clapper, by means of a cord attached to it and pulled from below, is allowed to swing against the bell at rest, is often employed to save trouble; but the jar is very likely to crack the bell. In ringing, or in true chiming, the bell is in motion when struck.

For ringing, a bell is pulled up and " set " mouth uppermost. She (to ringers a bell is feminine) is then pulled off, first at " handstroke " (i.e. with the hands on the " sally " or tufted portion of the rope, a few feet from its lower end) and then at " back-stroke " in the reverse direction (with the hands nearer the lower end, the rope having at the previous pull coiled round three-quarters of the wheel's circumference), describing at each pull almost a full circle till she comes back to the upright position. At each revolution the swing is chiefly done by the weight of the bell, the ringer giving a pull of just sufficient strength to bring the bell back into the upright position; otherwise its swing would become gradually shorter till it remained at rest mouth downwards.

Change-ringing. — When a given number of bells are rung over and over again in the same order, from the highest note, or " treble," to the lowest, or " tenor " — 1, 2, 3, 4, 5, 6, 7 — they are said to be rung in " rounds." " Changes " are variations of this order — e.g. 2135476,2314567; and " change-ringing " is the art of ringing bells in " changes," so that a different " change " or rearrangement of order is produced at each pull of the bell-ropes, until, without any repetition of the same change, the bells come back into " rounds." The general prin- ciple of all methods of change-ringing is that each bell, after striking in the first place or " lead," works gradually " up " to the last place or " behind," and " down " again to the first, and that no bell ever shifts more than one place in each change. Thus the ringer of any bell knows that whatever his position in one change, his place in the next will be cither the same, or the place before or the place after. He does not have to learn by heart the different changes or variations of order; nor need he, unless he is the " conductor," know the exact order of any one change. He has to bear in mind, first, which way his bell is working, viz. whether " up " from first to last place, or " down " from last to first; secondly, in what place his bell is striking; thirdly, what bell or bells are striking immediately before or

after him — this being ascertained chiefly by " rope-sight," ij.,, the knack, acquired by practice, of seeing which rope is being pulled immediately before and after his own. He must also remember and apply the rules of the particular "method" which is being rung. The following table representing the first twenty changes of a " plain course " of " Grandsire Triples " (for these terms, see below) illustrates the subject-matter of this section : —

1234567″ Rounds."

2 1 3 5 4 7 6 (1st change.)

2314567

3241657

3426175

4362715 (5th change.)

463725 1

6473 52 1

67453 12

7654132

7561423 (10th change.)

5716243

5172634

1527364

1253746

2157364 (15th change.)

25 13746

5231476

5324167

3542617

3456271 (20th change.)

It will be observed that at the 1st change the third bell and at the 15th the fifth bell, according to the rule of this " method," strikes a second blow in the third place (" makes third's place "). This stops the regular work of the bells which at the previous change were in the 4th, 5th, 6th and 7th places (" in 4, 5, 6, 7 "), causing them to take a step backwards in their course " up " or " down," or as it is technically called, to " dodge." Were it not for this, the bells would come back into "rounds" at the 14th change. It is by the use of " place-making " and " dodging," according to the rules of various " methods," that the required number of changes, upon any number of bells, can be produced. But in order that this may be done, without the bells coming back into " rounds " (as, e.g. in the " plain course " of Grandsire Triples, above given, they will do in seventy changes), further modifications of the " coursing order," called technically " Bobs " and " Singles," must be introduced. In ringing, notice of these alterations as they occur is given by one of the ringers, who acts as " conductor," calling out " Bob " or " Single " at the right moment to warn the ringers of certain bells to make the requisite alteration in the regular work of their bells. (Hence, in ringing language, to " call " a peal or touch = to conduct it.) Particulars of these, as of other details of change-ringing, may be gathered from books dealing with the technique of the art; but they are best mastered in actual practice. The term " single," applied to five-bell ringing meant that, as the first three bells remained unchanged, only a single pair of bells changed places, e.g. I543 2 , I5423- On larger numbers of bells it loses this meaning; but the effect of this " call " is that the " coursing order " of a single pair of bells is inverted. The origin of " Bob " is unknown. As a " call " it was perhaps adopted as a short, sharp sound, easily uttered and easily heard by the ringers. As applied to a " method " or system of ringing it may refer to the evolution of " dodging," e.g. in " Treble Bob " to the zigzag " dodging " path of the treble bell; but none of the old writers attempts to explain it.

The number of possible " changes " on any given series of bells may be ascertained, according to the mathematical formula of "permutations," by multiplying the number of the bells together. Thus on three bells, only 6 changes or variations of order (1 X 2 X3) can be produced; on four bells, 1X2X3X4 = 24; on five, 24X5 = 120; on six, 120X6 = 720; on seven, 720X7 = 5040. A " peal " on any such number of bells is in ordinary language the ringing of all the possible changes. But technically, only the full extent of changes upon seven bells, usually rung with a " tenor behind," is called a " peal "; a shorter performance upon seven or more bells, or the full

extent upon less than seven, being, in ringing parlance, a ” touch.” On six bells the full extent of changes must be repeated continuously seven times (720X7 = 5040), and on five bells forty-two times (120X42 = 5040) to rank as a ” peal.” On eight or more bells 5000 changes in round numbers is accepted as the minimum standard for a peal; and on such numbers of bells up to twelve (the largest number used in change-ringing), peals are so arranged that the bells come into rounds at, or at some point beyond,

5000 changes. As many as 16,000 changes, occupying from nine to ten hours, have been rung upon church bells. But the great physical strain upon the ringers — to say nothing of the effect upon those who are within hearing — makes such performances exceptional. The word “peal” is often, though incorrectly, used (1) for a set of church bells (” a peal of six,” ” a peal of eight “), for which the correct term is “a ring” of bells; (2) for any shorter performance than a full peal (e.g. ” wedding-peal,” ” muffled peal,” &c), called in ringing language a ” touch.” Its use as equivalent for ” method,” found in old campano- logical works, is now obsolete.

Change-ringing upon five bells is called ” Doubles,” upon seven bells ” Triples,” upon nine ” Caters ” (Fr. quatre), and upon eleven ” Cinques,” from the fact that at each change two, three, four or five pairs of bells change places with each other. ” Doubles ” can be and are rung when there are only five bells; but as a rule these “odd-bell” systems are rung with a ” tenor behind,” i.e. struck at the end of each change; the number of bells in a tower being usually an even number — six, eight, ten or twelve. In ” even-bell ” systems the tenor is ” rung in ” or ” turned in,” i.e. changes with the other bells, and a different terminology is employed; change-ringing on six bells being called “Minor”; on eight bells, “Major”; on ten bells, “Royal”; and on twelve, ” Maximus.” The principal ” methods ” of change-ringing, each of which has its special rules, are — (1) ” Grandsire “; (2) “Plain Bob”; (3) “Treble Bob “; (4) ” Stedman,” from the name of its inventor, Fabian Stedman, about 1670. In ” Grandsire ” the treble and one other bell, in ” Plain Bob ” the treble alone, has a ” plain hunt,” i.e. works from the first place, or ” lead,” to the last place, or ” behind,” and back again, without any dodging; in ” Treble Bob ” the treble has a uniform but zigzag course, dodging in each place on its way up and down. This is called a ” Treble Bob hunt “; and under these two heads, according to the work of the treble, are classified a

variety of " plain methods " and " Treble Bob methods," among the latter being the so-called " Surprise " methods, the most complicated and difficult of all. " Stedman's principle," which is sui generis, consists in the three front bells ringing their six possible changes, while the remaining pair or pairs of bells dodge. It is thus an " odd-bell " method adapted to five, seven, nine or eleven bells; as also is " Grand- sire," though occasionally rung on even numbers of bells. " Treble Bob " is always, and " Plain Bob " generally, rung on even numbers — six, eight, ten or twelve. In ringing, whenever the treble has a uniform course, unaffected by " Bobs " or " Singles," it serves as a guide to the other changing bells, according to the place in which they meet and cross its path from " behind " to the " lead." The order in which the different dodges occur, and the " course bell," i.e. the bell which he follows from behind to lead, are also useful, and on large numbers of bells indispensable, guides to the ringer.

Quite distinct from the art of change-ringing is the science of " composing," i.e. arranging and uniting by the proper " calls," subject to certain fixed laws and conditions, a number of groups of changes, so that no one change, or series of changes represented in those groups, shall be repeated. A composition, long or short, is said to be " true " if it is free from, " false " if it involves, such repetition; and the body of ascertained laws and conditions governing true composition in any method constitutes the test or " proof " to be applied to a composition in that method to demonstrate its truth or falseness. Many practi- cal ringers know little or nothing of the principles of composition, and are content with performing compositions received from composers, or published in ringing books and periodicals. An elaborate statement of the principles of composition in the " Grandsire " method may be found in an appendix to Snowdon's Grandsire (1888), by the Rev. C. D. P. Davies. Those which apply to " Treble Bob " are explained in Snowdon's Treatise on Treble Bob, Part I. But, so far as can be ascertained, there is no treatise dealing with the science of composition as a whole; nor is it possible here to attempt a popular exposition of its principles.

One of the objects kept in view by composers is musical

effect. Certain sequences or contrasts of notes strike the ear as more musical than others; and an arrangement which brings up the more musical changes in quicker succession improves the musical effect of the " peal " or " touch." On seven bells all the possible changes must be inserted in a true peal; but on larger numbers of bells, where the choice is from an immense number of possible changes, the composer

is free to select those which are most musical. Unless, however, the bells of any given " ring " are in perfect tune and harmony with each other, their musical effect must be impaired, however well they are rung. This gives importance to the science and art of bell-tuning, in which great progress has been made (see above).

The art of scientific change-ringing, peculiar to England, does not seem to have been evolved before the middle of the 17th century. Societies or gilds of ringers, however, existed much earlier. A patent ro!l of 39 Henry III. (1255) confirms the " Brethren of the Guild of Westminster, who are appointed to ring the great bells there," in the enjoyment of the " privileges and free customs which they have enjoyed from the time of Edward the Confessor." In 1602 (as appears from a MS. in the library of All Souls' College, Oxford) was founded a society called the" Scholars of Cheapside." In 1637 began the " Ancient Society "of College Youths," so called from their meeting to practise on the six bells at St Martin's, College Hill, a church destroyed in the Great Fire of London, 1666. At first only " rounds " and "call-changes" were rung, till about 1642, when 120 " Bob Doubles " were achieved; but slow progress was made till 1677, when Fabian Stedman of Cambridge published his Campanologia, dedicating it to this society, his method being first rung about this time by some of its members. Before the end of the 17th century was founded the " Society of London Scholars," the name of which was changed in 1746 to " Cumber- land Youths " in compliment to the victor of Culloden. These two metropolitan societies still exist, and include in their member- ship most of the leading change-ringers of England: one of the oldest provincial societies being that of Saffron Walden in Essex, founded in 1623, and still holding an annual ringing festival. In the latter half of the 18th and first half of the 19th century change-ringing, which at first seems to have been an aristocratic pastime, degenerated in social repute. Church bells and their ringers, neglected by church authorities, became associated with the lower and least reputable phases of parochial life; and belfries were too often an adjunct to the pothouse. In the last half of the 19th century there was a great revival of change-ringing, leading to improvements in belfries and in ringers, and to their gradual recognition as church workers. Diocesan or county associations for the promotion of change- ringing and of belfry reform spread knowledge of the art and aroused church officials to greater interest in and care for their bells. A Central Council of Church Bell Ringers, consisting of delegates from these various societies, meets annually in London or at some provincial centre to discuss ringing matters, and to collect and formulate useful knowledge upon practical

questions — e.g. the proper care of bells and the means of preventing annoyance from their use in the neighbourhood of houses, rules for the conduct of belfries, &c. It is now less likely than ever that the Belgian carillons will be preferred in England to the peculiarly English system of ringing bells in peal; by which, whatever its difficulties, the musical sound of bells is most fully brought out, and their scientific construction best stimulated.

Authorities. — The literature of bell-lore (or campanology) consists chiefly of scattered treatises or pamphlets upon the tech- nique of different methods of change-ringing, or upon the bells of particular counties or districts. The earliest that deal with the science and art of change-ringing are Campanologia or the Art of Ringing Improved (1677), and a chapter of " Advice to a Ringer " in the School of Recreations, or Gentleman' s Tutor (1684), showing that in its early days bell-ringing was a fashionable pastime. Then follow Campanologia, or the Art of Ringing made Easy (1766), Clavis Campanologia, a Key to Ringing (1788), and Shipway's Campanologia (1816). The revival of change-ringing in recent years has produced many manuals: e.g. Snowdon's Rope-Sight (explaining the " Plain Bob " method), Grandsire, Treatise on Treble Bob, Double Norwich Court Bob Major, and Standard Methods (with a book of diagrams) ;

Troyte on Change-Ringing; The Duffield Method, by Sir A. P. Heywood, Bart., its inventor. Somewhat prior to these are various works by the Rev. H. T. Ellacombe, inventor of a chiming apparatus which bears his name, and a pioneer in belfry reform. Among these are accounts of the church bells of Devon, Somerset and Gloucester, and pamphlets on Belfries and Ringers, Chiming, &c. ; much of their contents being summarized in The Ringer's Guide to the Church Bells of Devon, by C. Pearson (1888). A Glossary of Technical Terms used in connexion with church bells and change-ringing was published (1901) under the auspices of the Central Council of Church Bell Ringers. On the history of church bells and customs connected with them much curious information is given in North's English Bells and Bell Lore (1888). By the same author are monographs on the church bells of Leicestershire, Northamptonshire, Lincolnshire and Hertfordshire. There are similar works on the church bells of Suffolk and Cambridgeshire, by Dr Raven; of Huntingdonshire, by the Rev. T. M. N. Owen; and on the church bells of Essex, by the Rev. C.

Deedes. A compilation and summary of many data of bell- lore will be found in A Book about Bells, by the Rev. G. S. Tyack; and in a volume by Dr Raven in the " Antiquary's Books " series (Methuen, 1906), entitled The Bells of England, which deals with the antiquarian side of bell-lore. See also Quarterly Review, No. cxc. (September 1854); Windsor Magazine (December 1896); Lord Rayleigh's paper " On the Tones cf Bells " in the Phil. Mag_. for January 1890; and a series of articles from the Guardian, reprinted as a pamphlet under the title, Church Bells and Bell-ringing.

(T. L. P.)

House Bells. — Buildings are commonly provided with bells, conveniently arranged so as to enable attendants to be summoned to the different rooms. In the old system, which has been largely superseded by pneumatic and still more by electric bells, the bells themselves are of the ordinary conical shape and are provided! with clappers hung loosely inside them. Being sup- ported on springs they continue to swing, and therefore to give out sound as the clapper knocks against the sides, for some time after they have been set in motion by means of the strings or wires by which each is. connected to a bell-pull in the rooms. These wires are generally placed out of sight inside the walls, and bell-cranks are employed to take them round corners and to change the direction of motion as required. A lightly poised pendulum is often attached to each bell, to show by its motion when it has been rung. In pneumatic bells the wires are replaced by pipes of narrow bore, and the current of air which is caused to flow along these by the pressing of a push-button actuates a small hammer which impinges rapidly against a bell or gong. An electric bell consists of a small electro-magnet acting on a soft iron armature which is supported in such a way that normally it stands away from the magnet. When the latter is energized by the passage of an electric current, the armature is attracted towards it, and a small hammer attached to it strikes a blow on the bell or gong. This " single stroke " type of bell is largely used in railway signalling instruments. For domestic purposes, however, the bells are arranged so that the hammer strikes a series of strokes, continuing so long as the push-button which closes the electric circuit is pressed. A light spring is provided against which the armature rests when it is not attracted by the electro- magnet, and the current is arranged to pass through this spring and the armature on its way to the magnet. When the armature is attracted by the magnet it breaks contact with this spring, the current is interrupted, and the magnet being no longer energized allows the armature to fall back on the spring and thus restore the circuit. In this way a rapid to and fro motion is imparted

to the hammer. The electric current is supplied by a battery, usually either of Leclanche or of dry cells. One bell will serve for all the rooms of a house, an "indicator" being provided to show from which it has been rung. Such indicators are of two main types: the current either sets in motion a pendulum, or causes a disk bearing the name or number of the room concerned to come into view. Each push must have one wire appropriated to itself leading from the battery through the indicator to the bell, but the return wire from the bell to the battery may be common to all the pushes. Bells of this kind cease to ring whenever the electrical continuity of any of these wires is interrupted, but in some cases, as in connexion with burglar-alarms, it is desirable that the bell, once set in action, shall continue to ring even though the wires are cut. For this purpose, in " continuous ringing " bells, the current,

started by the push or alarm apparatus, instead of working the bell, is made to operate a relay-switch and thus to bring into circuit a second battery which continues to ring the bell, no matter what happens to the first circuit. (H. M. R.)

BELLABELLA, the common name (popularized from the Indian corruption of Milbank) for a tribe of Kwakiutl Indians at Milbank, British Columbia, including the subtribes Kokaitk, Oetlitk and Oealitk. They were converted to Christianity by Protestant missionaries, and number about 300.

BELLACOOLA or Bilqula, a tribe of North American Indians of Salishan stock, inhabiting the coast of British Columbia. They number some 300.

BELLADONNA (from the Ital. bella donna, " beautiful lady," the berries having been used as a cosmetic), the roots and leaves of Atropa belladonna, or deadly nightshade (q.v.), widely used in medicine on account of the alkaloids which they contain. Of these the more important are atropine (or atropia), hyoscyamine, hyoscine and belladonine; atropine is the most important, occurring as the malate to the extent of about 0-47 % in the leaves, and from o-6 to 0-25 % in the roots.

Atropine, $C_{17}H_{23}NO_3$, was discovered in 1833 by P. L. Geiger and Hesse and by Mein in the tissues of Atropa belladonna, from which it may be extracted by means of chloroform. By crystal- lization from alcohol it is obtained as colourless needles, melting at 115°. Hydrolysis with hydrochloric acid or baryta water gives tropic acid and tropine; on the other hand, by boiling equimolecular quantities

of these substances with dilute hydro- chloric acid, atropine is reformed. Since both these substances have been synthesized (see Tropine), the artificial formation of atropine is accomplished. Atropine is optically inactive; hyoscyamine, possibly a physical isomer, which yields atropine when heated to 108 -6°, is laevorotatory.

Medicine. — The official doses of atropine are from -jˆ-jf to tJtt grain, and the sulphate, which is in general use in medicine, has a similar dose. It is highly important to observe that the official doses of the various pharmacopoeias may with safety be greatly exceeded in practice. They are based on the ex- perimental toxic, as distinguished from lethal dose. A toxic dose causes unpleasant symptoms, but in certain cases, such as this, it may require very many times a toxic dose to produce the lethal effect. In other words, whilst one-fiftieth of a grain may cause unpleasant symptoms, it may need more than a grain to kill. So valuable are certain of the properties of atropine that it is often desirable to give doses of one-twentieth or one- tenth of a grain; but these will never be ventured upon by the practitioner who is ignorant of the great interval between the minimum toxic and the minimum lethal dose. It actually needs twenty to thirty grains of atropine to kill a rabbit: the animal is, however, somewhat exceptional in this regard. The most valuable preparations of this potent drug are the liquor atropinae sulphatis, which is a 1 % solution, and the lamella — for insertion within the conjunctival sac — which contains one five-thousandth part of a grain of the alkaloid.

Pharmacology. — When rubbed into the skin with such sub- stances as alcohol or glycerine, which are absorbed, atropine is carried through the epidermis with them, and in this manner — or when simply applied to a raw surface — it paralyses the terminals of the pain-conducting sensory nerves. It acts similarly, though less markedly, upon the nerves which determine the secretion of the perspiration, and is therefore a local anaes- thetic or anodyne and an anhidrotic. Being rapidly absorbed into the blood, it exercises a long and highly important series of actions on nearly every part and function of the nervous system. Perhaps its most remarkable action is that upon the terminals of nearly all the secretory nerves in the body. This causes the entire skin to become dry — as in the case of the local action above mentioned; and it arrests the secretion of saliva and mucus in the mouth and throat, causing these parts to become very dry and to feel very uncomfortable. This latter result is due to paralysis of the chorda tympani nerve, which is mainly responsible for the salivary secretion. Certain nerve fibres from the sym- pathetic

nervous system, which can also cause the secretion of a

(specially viscous) saliva, are entirely unaffected by atropine. A curious parallel to this occurs in its action on the eye. There is much uncertainty as to the influence of atropine on the secre- tions of the stomach, intestines, liver, pancreas and kidneys, and it is not possible to make any definite statement, save that in all probability the activities of the nerves innervating the gland- cells in these organs are reduced, though they are certainly not arrested, as in the other cases. The secretion of mucus by the bronchi and trachea is greatly reduced and their muscular tissue is paralysed — a fact of which much use is made in practical medicine. The secretion of milk, if occurring in the mammary gland, is much diminished or entirely arrested. Given internally, atropine does not exert any appreciable sedative action upon the nerves of pain.

The action of atropine on the motor nerves is equally important. Those that go to the voluntary muscles are depressed only by very large and dangerous doses. The drug appears to have no influence upon the contractile cells that constitute muscle-fibre, any more than it has directly upon the secretory cells that constitute any gland. But moderate doses of atropine markedly paralyse the terminals of the nerves that go to involuntary muscles, whether the action of those nerves be motor or inhibitory. In the intestine, for instance, are layers of muscle-fibre which are constantly being inhibited or kept under check by the splanchnic nerves. These are paralysed by atropine, and intestinal peri- stalsis is consequently made more active, the muscles being released from nervous control. The motor nerves of the arteries, of the bladder and rectal sphincters, and also of the bronchi, are paralysed by atropine, but the nervous arrangements of those organs are highly complex and until they are further unravelled by physiologists, pharmacology will be unable to give much information which might be of great value in the employment of atropine. The action upon the vaso-motor system is, however, fairly clear. Whether effected entirely by action on the nerve terminals, or by an additional influence upon the vaso-motor centre in the medulla oblongata, atropine certainly causes extreme dilatation of the blood-vessels, so much so that the skin becomes flushed and there may appear, after large doses, an erythematous rash, which must be carefully distinguished, in cases of supposed belladonna poisoning, from that of scarlet fever : more especially as

the temperature may be elevated and the pulse is very rapid in both conditions. But whilst the character- istic action of atropine is to dilate the blood-vessels, its first action is to stimulate the vaso-motor centre — thereby causing temporary contraction of the vessels — and to increase the rapidity of the heart's action, so that the blood-pressure rapidly rises. Though transient, this action is so certain, marked and rapid, as to make the subcutaneous injection of atropine invaluable in certain conditions. The respiratory centre is similarly stimulated, so that atropine must be regarded as a temporary but efficient respiratory and cardiac stimulant.

Toxic doses of atropine — and therefore of belladonna — raise the temperature several degrees. The action is probably nervous, but in the present state of our knowledge regarding the control of the temperature by the nervous system, it cannot be further defined. In small therapeutic and in small toxic doses atropine stimulates the motor apparatus of the spinal cord, just as it stimulates the centres in the medulla oblongata. This is indeed, as Sir Thomas Fraser has pointed out, " a strychnine action." In large toxic and in lethal doses the activity of the spinal cord is lowered.

No less important than any of the above is the action of atropine on the cerebrum. This has long been a debated matter, but it may now be stated, with considerable certainty, that the higher centres are incoordinately stimulated, a state closely resembling that of delirium tremens being induced. In cases of poisoning the delirium may last for many hours or even days. Thereafter a more or less sleepy state supervenes, but it is not the case that atropine ever causes genuine coma. The stuporose condition is the result of exhaustion after the long period of cerebral excitement. It is to be noted that children, who are particularly susceptible to the influence of certain of the other

potent alkaloids, such as morphine and strychnine, will take relatively large doses of atropine without ill-effect.

The action of atropine on the eye is of high theoretical and practical importance. The drug affects only the involuntary muscles of the eye, just as it affects only the involuntary or non-striated portion of the oesophagus. The result of its in- stillation into the eye — and the same occurs when the atropine has been absorbed elsewhere — is rapidly to cause wide dilatation of the pupil. This can be experimentally shown — by the method of exclusion — to be caused by a paralysis of the terminals of the third cranial nerve in the sphincter pupillae of the iris. The action of atropine in dilating the

pupil is also aided by a stimula- tion of the fibres from the sympathetic nervous system, which innervate the remaining muscle of the iris — the dilator pupillae. As a result of the extreme pupillary dilatation, the tension of the eyeball is greatly raised. The sight of many an eye has been destroyed by the use of atropine — in ignorance of this action on the intra-ocular tension — in cases of incipient glaucoma. The use of atropine is absolutely contra-indicated in any case where the intra-ocular tension already is, or threatens to become, unduly high. This warning applies notably to those — usually women — who are accustomed indiscriminately to use belladonna or atropine in order to give greater brilliancy to their eyes. The fourth ocular result of administering atropine is the production of a slight but definite degree of local anaesthesia of the eyeball. It follows from the above that a patient who is definitely under the influence of atropine will display rapid pulse, dilated pupils, a dry skin and a sense of discomfort, due to dryness of the mouth and throat.

Therapeutics. — The external uses of the drug are mainly analgesic. The liniment or plaster of belladonna will relieve many forms of local pain. Generally speaking, it may be laid down that atropine is more likely than .iodine to relieve a. pain of quite superficial origin; and conversely. Totally to be reprobated is the use, in order to relieve pain, of belladonna or any other application which affects the skin, in cases where the surgeon may later be required to operate. In such cases, it is necessary to use such anodyne measures as will not interfere with the subsequent demands that may be made of the skin, i.e. that it be aseptic and in a condition so sound that it is able to undertake the process of healing itself after the operation has been performed. Atropine is universally and constantly used in ophthalmic practice in order to dilate the pupil for examination of the retina by the ophthalmoscope, or in cases where the inflamed iris threatens to form adhesions to neigh- bouring parts. The drug is often replaced in ophthalmology by homatropine — an alkaloid prepared from tropine — which acts similarly to atropine but has the advantage of allowing the ocular changes to pass away in a much shorter time. The anhidrotic action of atropine is largely employed in controlling the night-sweats so characteristic of pulmonary tuberculosis, small doses of the solution of the sulphate being given at night.

The uses of atropine in cardiac affections are still obscure and dubious. It can only be laid down that the drug is a valuable though temporary stimulant in emergencies, and that its use as a plaster or internally often relieves cardiac pain. Recollection of the extraordinary complexity of the problems which are involved in the

whole question of pain of cardiac origin will emphasize the extreme vagueness of the above assertion. Pro- fessor Schafer recommended the use of atropine prior to the administration of a general anaesthetic, in cases where the action of the vagus nerve upon the heart is to be dreaded; and there is little doubt of the value of this precaution, which has no attendant disadvantages, in all such cases. Atropine is often of value as an antidote, as in poisoning by pilocarpine, muscarine (mushroom poisoning), prussic acid, &c.

Omitting numerous minor applications of this drug, we may pass to two therapeutic uses which are of unquestionable utility. In cases of whooping-cough or any other condition in which there is spasmodic action of the muscular fibre in the bronchi — a definition which includes nearly every form of abthma and many cases of bronchitis — atropine is an almost invaluable

drug. Not only does it relieve the spasm, but it lessens the amount of secretion — often dangerously excessive — which is often associated with it. The relief of symptoms in whooping- cough is sharply to be distinguished from any influence on the course of the disease, since the drug does not abbreviate its duration by a single day. In treating an actual and present attack of asthma, it is advisable to give the standardized tincture of belladonna — unless expense is no consideration, in which case atropine may itself be used — in doses of twenty minims every quarter of an hour as long as no evil effects appear. Relief is thereby constantly obtained. Smaller doses of the drug should be given three times a day between the attacks.

The nocturnal enuresis or urinary incontinence of children and of adults is frequently relieved by this drug. The excellent toleration of atropine displayed by children must be remem- bered, and if its use is " pushed " a cure may almost always be expected.

Toxicology. — The symptoms of poisoning by belladonna or atropine are dealt with above. The essential point here to be added is that death takes place from combined cardiac and respiratory failure. This fact is, of course, the key to treatment. This consists in the use of emetics or the stomach-pump, with lime-water, which decomposes the alkaloid. These measures are, however, usually rendered nugatory by the very rapid absorption of the alkaloid. Death is to be averted by such measures as will keep the heart and lungs in action

until the drug has been excreted by the kidneys. Inject stimulants subcutaneously; give coffee — hot and strong — by the mouth and rectum, or use large doses of caffeine citrate; and employ artificial respiration. Do not employ such physiological antagonists as pilocarpine or morphine, for the lethal actions of all these drugs exhibit not mutual antagonism but coincidence.

BELLAGIO, a town of Lombardy, Italy, in the province of Como, about 15 m. N.N.E. by steamer from the town of Como, situated on the promontory which divides the two southern arms of the Lake of Como. Pop. (1901) 3536. It is chiefly remarkable for the beauty of its scenery, and is a very favourite resort in the spring and autumn. Some of the gardens of its villas are remarkably fine. The manufacture of silks and carving in olive wood are carried on.

BELLAIRE, a city of Belmont county, Ohio, U.S.A., on the Ohio river, 5 m. S. of Wheeling, West Virginia. Pop. (1890) 9934; (1900) 9912 (1159 foreign-born); (1910) 12,946. It is served by the Baltimore & Ohio, the Pennsylvania, and the Ohio River & Western railways. Bellaire is the shipping centre of the Belmont county coalfield which in 1907 produced 19-3 % of the total output of coal for the state. Iron, limestone and fire- clay are found in the vicinity; among the manufactures are iron and steel, glass, galvanized and enamelled ware, agricultural implements and stoves. The value of the city's factory products increased from $8,837,646 in 1900 to $10,712,438 in 1905, or 21-2 %. Bellaire was settled about 1795, was laid out in 1836, was incorporated as a village in 1858, and was chartered as a city in 1874.

BELLAMY, EDWARD (1850-1898), American author and social reformer, was born at Chicopee Falls, Massachusetts, on the 25th of March 1850. He studied for a time at Union College, Schenectady, New York, and in Germany; was admitted to the bar in 1871; but soon engaged in newspaper work, first as an associate editor of the Springfield Union, Mass., and then as an editorial writer for the New York Evening Post. After publishing three novelettes (Six to One, Dr Heidenhojf's Process and Miss Ludington's Sister), pleasantly written and showing some in- ventiveness in situation, but attracting no special notice, in 1888 he caught the public attention with Looking Backward, 2000- 1887. in which he set forth ideas of co-operative or semi-social- istic life in village or city communities. The book was widely circulated in America and Europe, and was translated into several foreign languages. It was at first judged merely as a romance, but was soon accepted as a statement of the deliberate wishes and methods of its author, who devoted the remainder of his life as

editor, author, lecturer and politician, to the pro-

motion of the communistic theories of Looking Backward, which he called " nationalism "; a Nationalist party (the main points of whose immediate programme, according to Bellamy, were embodied in the platform of the People's party of 1892) was organized, but obtained no political hold. In 1897 Bellamy published Equality, a sequel to Looking Backward. He died at Chicopee Falls on the 22nd of May 1898.

BELLAMY, GEORGE ANNE (1727-1788), English actress, born at Fingal, Ireland, by her own account, on the 23rd of April 1733, but more probably in 1727, was the illegitimate daughter of Lord Tyrawley, British ambassador at Lisbon. Her mother married there a Captain Bellamy, and the child received the name George Anne, by mistake for Georgiana. Lord Tyrawley acknowledged the child, had her educated in a convent in Boulogne, and through him she came to know a number of notable people in London. On his appointment as ambassador to Russia, she went to live with her mother in London, made the acquaintance of Mrs Woffington and Garrick, and adopted the theatrical profession. Her first engagement was at Covent Garden as Monimia in the Orphan in 1 744. Owing to her personal charms and the social patronage extended to her, her success was immediate, and till 1770 she acted in London, Edinburgh and Dublin, in all the principal tragic roles. She played Juliet to Garrick's Romeo at Drury Lane at the time that Spranger Barry (q.v.) was giving the rival performances at Covent Garden, and was considered the better of the Juliets. Her last years were unhappy, and passed ; n poverty and ill-health. She died on the 16th of February 1788.'

Her Apology (6 vols., 1785) gives an account of her long career and of her private life, the extravagance and licence of which were notorious.

BELLAMY, JOSEPH (17 19-1790), American theologian, was born in Cheshire, Connecticut, on the 20th of February 1719. He graduated from Yale in 1735, studied theology for a time under Jonathan Edwards, was licensed to preach when scarcely eighteen years old, and from 1740 until his death, on the 6th of March 1790, was pastor of the Congregational church at Be thlehem, Connecticut. The publication of his best-known work, True Religion Delineated (1750), won for him a high reputation as a theologian, and the book was several times reprinted both in England and in America. Despite the fact that with the excep- tion of the period of the " Great Awakening " (1740-1742), when he preached as an itinerant in

several neighbouring colonies, his active labours were confined to his own parish, his influence on the religious thought of his time in America was probably surpassed only by that of his old friend and teacher Jonathan Edwards. This influence was due not only to his publications, but also to the " school " or classes for the training of clergymen which he conducted for many years at his home and from which went forth scores of preachers to every part of New England and the middle colonies (states). Bellamy's " system " of divinity was in general similar to that of Edwards. During the War of Independence he was loyal to the American cause. The univer- sity of Aberdeen conferred upon him the honorary degree of D.D. in 1768. He was a powerful and dramatic preacher. His published works, in addition to that above mentioned, include The Wisdom of God in the Permission of Sin (1758), his most characteristic work; T heron, Paulinus and Aspasio; or Letters and Dialogues upon the Nature of Love to God, Faith in Christ, and Assurance of a Title to Eternal Life (1759) ; The Nature and Glory of the Gospel (1762); A Blow at the Root of Antinomian- ism (1763); There is but One Covenant (1769); Four Dialogues on the Half-Way Covenant (1769) ; and A Careful and Strict Examina- tion of the External Covenant (1769).

His collected Works were published in 3 vols. (New York, 1811-1812), and were republished with a Memoir by Rev. Tryon Edwards (2 vols., Boston, 1850).

BELLARMINE (Ital. Bellarmino), ROBERTO FRANCESCO

ROMOLO (1 542-1621), Italian cardinal and theologian, was born at Monte Pulciano, in Tuscany, on the 4th of October 1542. He was destined by his father to a political career, but feeling a call to the priesthood he entered the Society of Jesus in 1 560.

After spending three years at Rome, he was sent to the Jesuit settlement at Mondovi in Piedmont, where he studied and at the same time taught Greek, and, though not yet in orders, gained some reputation as a preacher. In 1567 and 1568 he was at Padua, studying theology under a master who belonged to the school of St Thomas Aquinas. In 1 569 he was sent by the general of his order to Louvain, and in 1570, after being ordained priest, began to lecture on theology at the university. His seven years' residence in the Low Countries brought him into close relations with modes of thought

differing essentially from his own; and, though he was neither by temperament nor training inclined to be affected by the prevailing Augustinian doctrines of grace and free-will, the controversy into which he fell on these questions compelled him to define his theological principles more clearly. On his return to Rome in 1576 he was chosen by Gregory XIII. to lecture on controversial theology in the newly-founded Roman College. The result of these labours appeared some years afterwards in the far-famed Disputationes de Conlrovcrsiis Christianae Fidei adversus hujus temporis Haereticos (3 vols., 1581, 1582, 1593). These volumes, which called forth a multitude of answers on the Protestant side, exhaust the controversy as it was carried on in those days, and contain a lucid and uncompromising statement of Roman Catholic doctrine. For many years afterwards, Bellarmine was held by Protestant advocates as the champion of the papacy, and a vindication of Protestantism generally took the form of an answer to his works. In 1 589 he was selected by Sixtus V. to accompany, in the capacity of theologian, the papal legation sent to France soon after the murder of Henry III. He was created cardinal in 1599 by Clement VIII., and two years later was made archbishop of Capua. His efforts on behalf of the clergy were untiring, and his ideal of the bishop's office may be read in his address to his nephew, Angelo della Ciaia, who had ,been raised to the episcopate (Admonitio ad episcopum Theanensem, nepotem suum, Rome, 1612). Being detained in Rome by the desire of the newly-elected pope, Paul V., he resigned his archbishopric in 1605. He supported the church in its conflicts with the civil powers in Venice, France and England, and sharply criticized James I. for the severe legislation against the Roman Catholics that followed the discovery of the Gunpowder Plot. When health failed him, he retired to Monte Pulciano, where from 1607 to 161 1 he acted as bishop. In 1610 he published his De Potestate summiPontificis in rebus temporalibus directed against the posthumous work of William Barclay of Aberdeen, which denied the temporal power of the pope. Bellarmine trod here on difficult ground, for, although maintain- ing that the pope had the indirect right to depose unworthy rulers, he gave offence to Paul V. in not asserting more strongly the direct papal claim, whilst many French theologians, and especially Bossuet, condemned him for his defence of ultra- montanism. As a consultor of the Sacred Office, Bellarmine took a prominent part in the first examination of Galileo's writings. His conduct in this matter has been constantly mis- represented. He had followed with interest Galileo's scientific discoveries and a respectful admiration grew up between them. Bellarmine did not proscribe the Copernican system, as has been maintained by Reusch (Der Process Galilei's und die

Jesuiten, Bonn, 1879, p. 125) ; all he claimed was that it should be presented as an hypothesis until it should receive scientific demonstration. When Galileo visited Rome in December 161 5 he was warmly received by Bellarmine, and the high regard in which he was held is clearly testified in Bellarmine's letters and in Galileo's dedication to the cardinal of his discourse on " flying bodies." The last years of Bellarmine's life were mainly devoted to the composition of devotional works and to securing the papal approbation of the new order of the Visitation, founded by his friend St Francis de Sales, and the beatification of St Philip Neri. He died in Rome on the 17th of September 1621. Bellarmine, whose life was a model of Christian virtue, is the greatest of modern Roman Catholic controversialists, but the value of his theological works is seriously impaired by a very defective exegesis and a too frequent use of " forced " conclusions,

His devotional treatises were very popular among English Roman Catholics in the penal days.

Bibliography. — Of the older editions of Bellarmine's complete works the best is that in 7 vols, published at Cologne (1617-1620); modern editions appeared in 8 vols, at Naples (1856-1862, reprinted 1872), and in 12 vols, at Paris (1870-1874). For complete biblio- graphy of all works of Bellarmine, of translations and controversial writings against him, see C.Sommervogel, Bibliotheque de laCompagnie de Jesus (Brussels and Paris, 1890 et seq), vol. i. cols. 1151-1254; id., Addenda, pp. x.-xi. vol. viii., cols. 1797-1807. The main source for the life of Bellarmine is his Latin Autobiography (Rome, 1675; Louvain, 1753), which was reprinted with original text and German translation in the work of Dollinger and Reusch entitled Die Selbst-biographie des Cardinals Bellarmin (Bonn, 1887). The Epistolae Fainiliares, a very incomplete collection of letters, was published by J. Fuligatti (Rome, 1650), who is also the author of Vita del cardinale Bellarmino della Compagnia di Giesu (Rome, 1624). Cf. D. Bartoli, Dellavita di Roberto cardinal Bellarmino (Rome, 1678), and M. Cervin, Imago virtutum Roberti card. Bellarmini Politiani (Siena, 1622), All these are panegyrics of small historical value. The best modern studies are J. B. Couderc's Le Venerable Cardinal Bellarmin (2 vols., Paris, 1893), and X. le Bachelet's article in A. Vacant's Diet, de theol. cat. cols. 560-599, with exhaustive bibliography.

BELLARY, or Ballari, a city and district of British India, in the Madras presidency. The city is 305 m. by rail from Madras. Pop. (1901) 58,247. The fort rises from a huge mass of granite rock, which with a circumference of nearly 2 m., juts up abruptly to a

height of 450 ft. above the plain. The length of this rock from north-east to south-v/est is about n 50 ft. To the E. and S. lies an irregular heap of boulders, but to the W. is an unbroken precipice, and the N. is walled by bare rugged ridges. It is defended by two distinct lines of works. The upper fort is a quadrangular building on the summit, with only one approach, and was deemed impregnable by the Mysore princes. But as it has no accommodation for a garrison, it is now only occupied by a small guard of British troops in charge of prisoners. The ex- nawab of Kurnool was confined in it for forty years for the murder of his wife. It contains several cisterns, excavated in the rock. Outside the turreted rampart are a ditch and covered way. The lower fort lies at the eastern base of the rock and measures about half a mile in diameter. It contains the barracks and the commissariat stores, the Protestant church, orphan- age, Masonic lodge, post-office and numerous private dwellings. The fort of Bellary was originally built by Hanumapa, in the 16th century. It was first dependent on the kingdom of Vijayanagar, afterwards on Bijapur, and subsequently subject to the nizam and Hyder Ali. The latter erected the present fortifications according to tradition with the assistance of a French engineer in his service, whom he afterwards hanged for not building the fort on a higher rock adjacent to it. Bellary is an important cantonment and the headquarters of a military division. There is a considerable trade in cotton, in connexion with which there are large steam presses, and some manufacture of cotton cloth. There is a cotton spinning mill. In 1901 Bellary was chosen as one of the places of detention in India for Boer prisoners of war.

The district of Bellary has an area of 5714 sq. m. It consists chiefly of an extensive plateau between the Eastern and Western Ghats, of a height varying from 800 to 1000 ft. above the sea. The most elevated tracts are on the west, where the surface rises towards the culminating range of hills, and on the south, where it rises to the elevated tableland of Mysore. Towards the centre the almost treeless plain presents a mono- tonous aspect, broken only by a few rocky elevations that rise abruptly from the black soil. The hill ranges in Bellary are those of Sandur and Kampli to the west, the Lanka Malla to the east and the Copper Mountain (3148 ft.) to the south-west. The district is watered by five rivers: the Tungabhadra, formed by the junction of two streams, Tunga and Bhadra, the Haggari, Hindri, Chitravati and Pennar, the last considered sacred by the natives. None of the rivers is navigable and all are fordable during the dry season. The climate of Bellary is characterized by extreme dryness, due to the passing of the air over a great extent of heated plains, and

it has a smaller rainfall than any other district in south India. The average daily variation of the thermometer is from 67° to 83 F. The

prevailing diseases are cholera, fever, small-pox, ophthalmia, dysentery and those of the skin among the lower classes. Bellary is subject to disastrous storms and hurricanes, and to famines arising from a series of bad seasons. There were memorable famines in 1751, 1793, 1803, 1833, 1854, 1866, 1877 and 1896.

In 1901 the population was 947,214, showing an increase of 8 % in the decade. The principal crops are millet, other food-grains, pulse, oil-seeds and cotton. There are considerable manu- factures of cotton and woollen goods, and cotton is largely exported. The district is traversed by the Madras and Southern Mahratta railways, meeting on the eastern border at Guntakal junction, where another line branches off to Bezwada.

Little is known of the early history of the district. It contains the ruined capital of the ancient Hindu kingdom of Vijayanagar, and on the overthrow of that state by the Mahommedans, in 1564, the tract now forming the district of Bellary was split up into a number of military holdings, held by chiefs called poligars. In 1635 the Carnatic was annexed to the Bijapur dominions, from which again it was wrested in 1680 by Sivaji, the founder of the Mahratta power. It was then included in the dominions of Nizam-ul-mulk, the nominal viceroy of the great Mogul in the Deccan, from whom again it was subsequently conquered by Hyder Ali of Mysore. At the close of the war with Tippoo Sultan in 1792, these territories fell to the share of the nizam of Hyderabad, by whom they were ceded to the British in 1800, in return for protection by a force of British troops to be stationed at his capital. In 1808 the " Ceded Districts," as they were called, were split into two districts, Cuddapah and Bellary. In 1882 the district of Anantapur, which had hitherto formed part of Bellary, was formed into a separate collectorate.

See Bellary Gazetteer, 1904.

BELL-COT, Bell-gable, or Bell-turret, the place where one or more bells are hung in chapels or small churches which have no towers. Bell-cots are sometimes double, as at Northborough and Coxwell; a very common form in France and Switzerland admits of three bells.

In these countries also they are frequently of wood and attached to the ridge. In later times bell-turrets were much ornamented; on the continent of Europe they run up into a sort of small, slender spire, called fleche in France, and guglio in Italy. A bell-cot, gable or turret often holds the " Sanctus-bell," rung at the saying of the " Sanctus " at the beginning of the canon of the Mass, and at the consecration and elevation of the Elements in the Roman Church. This differs but little from the common bell-cot, except that it is generally on the top of the arch dividing the nave from the chancel. At Cleeve, however, the bell seems to have been placed in a cot outside the wall. Sanctus-bells have also been placed over the gables of porches.

BELLEAU, REMY (c. 1527-1577), French poet, and member of the Pleiade (see Daurat), was born at Nogent-le-Rotrou about 1527. He studied with Ronsard and others under Jean Daurat at the College de Coqueret. He was attached to Ren6 de Lorraine, marquis d'Elboeuf, in the expedition against Naples in 1557, where he did good military service. On his return he was made tutor to the young Charles, marquis d'Elboeuf, who, under Belleau's training became a great patron of the muses. Belleau was an enthusiast for the new learning and joined the group of young poets with ardour. In 1556 he published the first translation of Anacreon which had appeared in French. In the next year he published his first collection of poems, the Petiles inventions, in which he describes stones, insects and flowers. The Amours et nouveaux echanges des pierres precieuses .... (1576) contains perhaps his most characteristic work. Its title is quoted in the lines of Ronsard's epitaph on his tomb: — " Luy mesme a basti son tombeau Dedans ses Pierres Precieuses."

He wrote commentaries to Ronsard's Amours in 1560, notes which evinced delicate taste and prodigious learning. Like Ronsard and Joachim Du Bellay, he was extremely deaf. His days passed peacefully in the midst of his books and friends, and he died on the 6th of March 1577. He was buried in the nave d the Grands Augustins at Paris, and was borne to the tomb on I

the pious shoulders of four poets, Ronsard, J. A. de Baif, Philippe Desportes and Amadis Jamyn. His most considerable work is La Bergerie (1565-1572), a pastoral in prose and verse, written in imitation of Sannazaro. The lines on April in the Bergerie are well known to all readers of French poetry. Belleau was the French Herrick, full of picturesqueness, warmth and colour. His skies drop flowers and all his air is perfumed, and this volup- tuous sweetness degenerates sometimes into licence. Extremely popular in his own age, he shared the fate of his friends, and was undeservedly forgotten

in the next. Regniersaid: “Belleau ne parle pas comme on parle a. la ville ” ; and his lyrical beauty was lost on the trim 17th century. His complete works were collected in 1578, and contain, besides the works already mentioned, a comedy entitled La Reconnue, in short rhymed lines, which is not without humour and life, and a comic masterpiece, a macaronic poem on the religious wars, Dictamen metrificum de hello huguenotico et reistrorum 1 piglamine ad sodales (Paris, no date) .

The CEuvres completes (3 vols., 1867) of Remy Belleau were edited by A. Gouverneur; and his CEuvres poetiques (2 vols., 1879) by M. Ch. Marty-Laveaux in his Pleiade francaise; see also C. A. Sainte-Beuve, Tableau historique et critique de la poesie francaise au XVP siecle (ed. 1876), i. pp. 155-160, and ii. pp. 296 seq.

BELLECOUR (1725-1778), French actor, whose real name was Jean Claude Gilles Colson, was born on the 16th of January 1725, the son of a portrait-painter. He showed decided artistic talent, but soon deserted the brush for the stage under the name of Bellecour. After playing in the provinces he was called to the Comedie Francaise, but his debut, on the 21st of December 1750, as Achilles in IphigSnie was not a great success. He soon turned to more congenial comedy roles, which for thirty years he filled with great credit. He was a very natural player, and his willingness to give others on the stage an opportunity to show their talents made him extremely popular. He wrote a successful play, Fausses apparences (1761), and was very useful to the Comedie Francaise in editing and adapting the plays of others. He died on the 19th of November 1778.

His wife, Rose Perrine le Roy de la Corbinaye, was born at Lamballe on the 20th of December 1730, the daughter of an artillery officer. Under the stage name of Beaumenard she made her first Paris appearance in 1743 as Gogo in Favart’s Le Coq du village. After a year at the Opera Comique she played in several companies, including that of Marshal Saxe, who is said to have been not insensible to her charms. In 1749 she made her d&bul at the Comedie Francaise as Dorine in Tartuffe, and her success was immediate. She retired in 1756, but after an absence of five years, during which she married, she reappeared as Madame Bellecour, and continued her successes in soubrette parts in the plays of Moliere and de Regnard. She retired finally at the age of sixty, but troublous times had put an end to the pension which she received from Louis XVI. and from the theatre, and she died in abject poverty on the 5th of August 1799. There is a charming portrait of her owned by the Theatre Francais.

BELLEFONTAINE, a city and the county-seat of Logan county, Ohio, U.S.A., about 45 m. N.W. of Columbus. Pop. (1890) 4245; (1900) 6649 (267 foreign-born); (1910) 8238. It is served by the Cleveland, Cincinnati, Chicago & St Louis (which has large shops here) and the Ohio Central railways; also by the Dayton, Springfield & Urbana electric railway. It is built on the south-west slope of a hill having an elevation of about 1500 ft. above sea-level and at the foot of which are several springs of clear water which suggested the city's name. Among the city's manufactures are iron bridges, carriage-bodies, flour and cement. The municipality owns and operates its water-works system and its gas and electric-lighting plants. Bellefontaine was first settled about 181 8, was laid out as a town and made the county-seat in 1820 and was incorporated in 1835.

BELLEGARDE, the name of an important French family. Roger de Saint-Lary, baron of Bellegarde, served with distinction in the wars against the French Protestants. He showed much devotion to Henry III., who loaded him with favours and made him marshal of France. He eventually fell into disgrace, 1 Retires, German soldiers of fortune!.

however, and died by poisoning in 1579. His nephew, Roger de Saint-Lary de Termes, a favourite with Henry III., Henry IV. and Louis XIII., was royal master of the horse and governor of Burgundy. His estate of Seurre in Burgundy was created a duchy in the peerage of France (duche-pairie) in his favour under the name of Bellegarde, in 1619. In 1645 the title of this duchy was transferred to the estate of Choisy-aux-Loges in Gatinais, and was borne later by the family of Pardaillan de Gondrin, heirs of the house of Saint-Lary-Bellegarde. When Seurre passed into the possession of the princes of Conde they in the same way acquired the title of dukes of Bellegarde. (M. P.)*

BELLEGARDE, HEINRICH JOSEPH JOHANNES, Count von (1756-1845), Austrian soldier and statesman, was born at Dresden on the 29th of August 1756, and for a short time served in the Saxon army. Transferring his services to Austria in 1771 he distinguished himself greatly as colonel of dragoons in the Turkish War of 1788-1789, and served as a major-general in the Netherlands campaigns of 1793-1794. In the campaign of 1796 in Germany, as a lieutenant field marshal, he served on the staff of the archduke

Charles, whom he accompanied to Italy in the following year. He was also employed in the congress of Rastatt. In 1799 he commanded a corps in eastern Switzerland, connecting the armies of the archduke and Suvarov, and finally joined the latter in north Italy. He conducted the siege of the citadel of Alessandria, and was present at the decisive battle of Novi. He served again in the latter part of the Marengo campaign of 1800 in the rank of general of cavalry. In 1805, when the archduke Charles left to take command in Italy, Bellegarde became president ad interim of the council of war. He was, however, soon employed in the field, and at the sanguin- ary battle of Caldiero he commanded the Austrian right. In the war of 1809 he commanded the extreme right wing of the main army (see Napoleonic Campaigns). Cut off from Charles as the result of the battle of Eckmiihl, he retreated into Bohemia, but managed to rejoin before the great battles near Vienna (Aspern and Wagram). From 1809 to 1813 Belle- garde, now field marshal, was governor-general of Galicia, but was often called to preside over the meetings of the Aulic Council, especially in 1810 in connexion with the reorganization of the Austrian army. In 1813, 1814 and 181 5 he led the Austrian armies in Italy. His successes in these campaigns were diplomatic as well as military, and he ended them by crushing the last attempt of Murat in 1815. From 1816 to 1825 (when he had to retire owing to failing eyesight) he held various distinguished civil and military posts. He died in 1845.

See Smola, Das Leben des F. M. von Bellegarde (Vienna, 1847).

BELLE-ILE-EN-MER, an island off the W. coast of France, forming a canton of the department of Morbihan, 8 m. S. by W. of the peninsula of Quiberon, Pop. (1906) 9703. Area, 33 sq. m. The island is divided into the four communes of Le Palais, Bangor, Sauzon and Locmaria. It forms a treeless plateau with an average height of 130 ft. above sea-level, largely covered with moors and bordered by a rugged and broken coast. The climate is mild, the fig-tree and myrtle growing in sheltered spots and the soil, where cultivated, is productive. The inhabitants are principally engaged in agriculture and the fisheries, and in the preservation of sardines, anchovies, &c. The breed of draught horses in the island is highly prized. The chief town, Le Palais (pop. 2637), has an old citadel and fortifications, and possesses a port which is accessible to vessels drawing 13 ft. of water. Belle-lie must have been inhabited from a very early period, as it possesses several stone monuments of the class usually called Druidic.

The Roman name of the island seems to have been Vindilis, which in

the middle ages became corrupted to Guedel. In 1572 the monks of the abbey of Ste Croix at Quimperle ceded the island to the Retz family, in whose favour it was raised to a marquisate in the following year. It subsequently came into the hands of the family of Fouquet, and was ceded by the latter to the crown in 1718. It was held by English troops from 1761 to 1763 when the French got it in exchange for Nova Scotia. A few of the inhabitants of the latter territory migrated to

Belle-lie, which is partly peopled by their descendants. In the state prison of Nouvelle Force at Le Palais political prisoners have at various times been confined.

BELLE-ISLE, CHARLES LOUIS AUGUSTE FOUQUET, Comte, and later Due, de (1684-1761), French soldier and statesman, was the grandson of Nicholas Fouquet, superin tendent of finances under Louis XIV., and was born at Villefranche de Rouergue. Although his family was in disgrace, he entered the army at an early age and was made proprietary colonel of a dragoon regiment in 1 708. He rose during the War of the Spanish Succession to the rank of brigadier, and in March 17 18 to that of marechal de camp. In the Spanish War of 17 18-17 19 he was present at the capture of Fontarabia in 17 18 and at that of St Sebastian in 1719. When the duke of Bourbon became prime minister, Belle-Isle was imprisoned in the Bastille, and then relegated to his estates, but with the advent of Cardinal Fleury to power he regained some measure of favour and was made a lieutenant-general. In the War of the Polish Succession he commanded a corps under the orders of Marshal Berwick, captured Trier and Trarbach and took part in the siege of Philipps- burg (1734). When peace was made in 1 736 the king, in recogni- tion both of his military services and of the part he had taken in the negotiations for the cession of Lorraine, gave him the government of the three important fortresses of Metz, Toul and Verdun — an office which he kept till his death. His military' and political reputation was now at its height, and he was one of the principal advisers of the government in military and diplomatic affairs. In 1741 he was sent to Germany as French plenipotentiary to carry out, in the interests of France, a grand scheme of political reorganization in the moribund empire, and especially to obtain the election of Charles, elector of Bavaria, as emperor. His diplomacy was thus the mainspring of the War of the Austrian Succession (VII. During the' campaign of 1746 he was in command of the " Army of Piedmont " on the Alpine frontier, and although he began his work with a demoralized and inferior army, he managed not only to repel the invasion of the Spanish and Italian forces but also to carry the war back into the

plain of Lombardy. At the peace, having thus retrieved his military reputation, he was created duke and peer of France (1748). In 1757 his credit at court was considerable, and the king named him secretary for war. During his three years' ministry he under- took many reforms, such as the development of the military school for officers, and the suppression of the proprietary colonelcies of nobles who were too young to command; and he instituted the Order of Merit. But the Seven Years' War was by that time in progress and his efforts had no immediate effect. He died at Versailles on the 26th of January 1761. Belle-Isle interested himself in literature; was elected a member of the French Academy in 1740, and founded the Academy of Metz in 1760. The dukedom ended with his death, his only son having been killed in 1758 at the battle of Crefeld.

His brother, Louis Charles Armand Fouquet, known as the Chevalier de Belle-Isle (i 693-1 746), was also a soldier and a diplomatist. He served as a junior officer in the War of the Spanish Succession and as brigadier in the campaign of 1734 on the Rhine and Moselle, where he won the grade of martchal de camp. He was employed under his brother in political missions in Bavaria and in Swabia in 1 741-1742, became a lieutenant-general, fought in Bohemia, Bavaria and the Rhine countries in 1742-1743, and was arrested and sent to England with the marshal in 1 744. On his release he was given a command in the Army of Piedmont. He fell a victim to his romantic bravery at the action of Exilles (Col de l'Assiette) on the 19th of July 1746.

See Jean de Maugre, Oraison funebre du marechal de Belleisle (Montmedy, 1762); R. P. de Neuville, Memoires du marechal due de Belleisle (Paris, 1761) ; D. C. (Chevrier), La Vie politique et mili- laire du marechal due de Belleisle (London, 1760), and Testament politique du marechal due de Belleisle (Hague, 1762); Le Codicille et Vesprit ou commentaire des maximes du marechal due de Belleisle (Amsterdam, 1761); F. M. Chayert, Notice sur le marechal de Belle- isle (Metz, 1856); L. Leclerc, Eloge du marechaLde Belleisle (Metz, 1862); E. Michel, Eloge du marechal de Belleisle (Paris, 1862); and Jobez, La France sous Louis XV (6 vols., Paris, i868-i8 < 74).

BELLE ISLE, STRAIT OF, the more northern of the two channels connecting the Gulf of St Lawrence with the Atlantic Ocean. It separates northern Newfoundland from Labrador, and extends N.E.

and S.W. for 35 m., with a breadth of 10 to 15 m. It derives its name from a precipitous granite island, 700 ft. in height, at its Atlantic entrance. On this light- houses are maintained by the government of Canada and constant communication with the mainland is kept up by wireless tele- graphy. The strait is in the most direct route from Europe to the St Lawrence, but is open only from June till the end of November, and even during this period navigation is often rendered dangerous by floating ice and fogs. Through it Jacques Cartier sailed in 1534. The southern or Cabot Strait, between Cape Ray in Newfoundland and Cape North in Cape Breton, was discovered later, and the expansion below Belle Isle was long known as La Grande Bate. Cabot Strait is open all the year, save for occasional inconvenience from drift ice.

BELLENDEN (Ballantyne or Bannatyne), JOHN (fl. 1533-1587), Scottish writer, was born about the end of the 15th century, in the south-east of Scotland, perhaps in East Lothian. He appears to have been educated, first at the univer- sity of St Andrews and then at that of Paris, where he took, the degree of doctor. From his own statement, in one of his poems, we learn that he had been in the service of James V. from the king's earliest years, and that the post he held was clerk of accounts. At the request of James he undertook translations of Boece's Historia Scotorum, which had appeared at Paris in 1527, and the first five books of Livy. As a reward for his versions, which he finished in 1533, he was appointed archdeacon of Moray and a canon of Ross. He was a strenuous opponent of the Reformation and was compelled to go into exile. He is said by some authorities to have died at Rome in 1550; by others to have been still living in 1587. His translation of Boece, entitled The History and Chronicles of Scotland, is a remarkable specimen of Scottish prose, distinguished by its freedom and vigour of expression. It was published in 1536; and was reprinted in 2 vols., edited by Mai tland, in 182 1. The translation of Livy was not printed till 1822 (also in 2 vols.). Two MSS. of the latter are extant, one, the older, in the Advocates' library, Edinburgh (which was the basis of the normalized text of 1822), the other (c. 1550) in the possession of Mr Ogilvie Forbes of Boyndlie. An edition of the work was edited for the Scottish Text Society by Mr W. A. Craigie (2 vols. 1901, 1903). The second volume of this edition contains also a complete reprint of the portions of the holograph first draft which were discovered in the British Museum in 1902. Two poems by Bellendcn — The Proheme to the Cosmographe and the Proheme of the History — appeared in the 1536 edition of the History of Scotland. Others, bearing his name in the well-known Bannatyne MS. collection, made by his namesake

George Bannatyne (q.v.), may or may not

be his. Sir David Lyndsay, in his prologue to the Papyngo, speaks vaguely of:

" Ane cunnyng Clark quhilk wrythith craftelie Ane plant of poetis callit Ballendyne, Quhose ornat workis my wit can nocht defyne."

The chief sources of information regarding Bellenden's life are the Accounts of the Lord High Treasurer of Scotland, his" own works and the ecclesiastical records.

BELLENDEN, WILLIAM, Scottish classical scholar. Hardly anything is known of him. He lived in the reign of James I. (VI. of Scotland) , who appointed him magister libellorum supplicum or master of requests. King James is also said to have provided Bellenden with the means of living independently at Paris, where he became professor at the university, and advocate in the parliament. The date of his birth cannot be fixed, and it can only be said that he died later than 1625. The first of the works by which he is known was published anonymously in 1608, with the title Ciceronis Princeps, a laborious compilation of all Cicero's remarks on the origin and principles of regal government, digested and systematically arranged. In 161 2 there appeared a similar work, devoted to the consideration of consular authority and the Roman senate, Ciceronis Consul, Senator, Senatusque Romanus. His third work, De Statu Prisci Orbis, 161 5, is a good outline of general history. All three works were combined in a single large volume, entitled De Statu Libri Tres, 161 5, which was first brought into due notice by Dr Samuel Parr, who, in 1787, published an edition with a preface, famous for the elegance of its Latinity, in which he eulogized Burke, Fox and Lord North as the " three English luminaries." The greatest of Bellenden's works is the extensive treatise De Tribus Luminibus Romanorum, printed and published posthumously at Paris in 1633. The book is unfinished, and treats only of the first luminary, Cicero; the others intended were apparently Seneca and Pliny. It contains a most elaborate history of Rome and its institutions, drawn from Cicero, and thus forms a storehouse of all the historical notices contained in that voluminous author. It is said that nearly all the copies were lost on the passage to England. One of the few that survived was placed in the univer- sity library at Cambridge, and freely drawn upon by Conyers Middieton, the librarian, in his History of the Life of Cicero. Both Joseph Warton and Dr Parr accused Middieton of deliberate plagiarism, which was the more likely to have escaped detection owing to the small number of existing copies of Bellenden's work.

BELLEROPHON, or Bellerophontes, in Greek legend, son of Glaucus or Poseidon, grandson of Sisyphus and local hero of Corinth. Having slain by accident the Corinthian hero Bellerus (or, according to others, his own brother) he fled to Tiryns, where his kinsman Proetus, king of Argos, received him hospitably ano> purged him of his guilt. But Anteia (or Sthene- boea), wife of Proetus, became enamoured of Bellerophon, and, when he refused her advances, charged him with an attempt upon her virtue. Proetus thereupon sent him to Iobates, his wife's father, king of Lycia, with a letter or sealed tablet, in which were instructions, apparently given by means of signs, to take the life of the bearer. Arriving in Lycia, he was received as a guest and entertained for nine days. On the tenth, being asked the object of his visit, he handed the letter to the king, whose first plan for complying with it was to send him to slay the Chimaera, a monster which was devastating the country. Bellerophon,mounted on Pegasus(

the sea near the island of Melos (Schol. Aristoph., Pax, 140). His ambitious attempt to ascend to the heavens on Pegasus brought upon him the wrath of the gods. His son was smitten by Ares in battle; his daughter Laodameia was slain by Artemis; he himself, flung from his horse, lamed or blinded, became a wanderer over the face of the earth until his death (Pindar, Isthmia, vi. [vii.], 44; Horace, Odes, iv. n, 26). Bellerophon was honoured as a hero at Corinth and in Lycia. His story formed the subject of the Iobates of Sophocles, and of the Bellero- phontes and Stheneboea of Euripides. It has been suggested that Perseus, the local hero of Argos, and Bellerophon were originally one and the same, the difference in their exploits being the result of the rivalry of Argos and Corinth. Both are connected with the sun-god Helios and with the sea-god Poseidon, the symbol of the union being the winged horse Pegasus. Bellerophon has been explained as a hero of the storm, of which his conflict with the Chimaera is symbolical. The most frequent representa- tions of Bellerophon in ancient art are (1) slaying the Chimaera, (2) departing from Argos with the letter, (3) leading Pegasus to drink. Among the first is to be noted a terra-cotta relief from Melos in the British Museum, where also, on a vase of black ware, is what seems to be a representation of his escape from Stheneboea.

See H. A. Fischer, Bellerophon (1851); R. Engelmann, Annali of the Archaeological Institute at Rome (1874); O. Treuber, Ge- schichte

der Lykier (1887) ; articles in Pauly-Wissowa's Real-Encyclo- pddie, W. H. Roscher's Lexikon der Mythologie, Daremberg and Saglio's Dictionnaire des antiquites; L. Preller, Griechische Mythologie.

BELLES-LETTRES (Fr. for " fine literature "), a term used to designate the more artistic and imaginative forms of literature, as poetry or romance, as opposed to more pedestrian and exact studies. The term appears to have been first used in English by Swift (17 10).

BELLEVILLE, a city and port of entry of Ontario, Canada, and capital of Hastings county, 106 m. E.N.E. of Toronto, on Bay of Quinte and the Grand Trunk railway. Pop. (1001) 01 1 7. Communication is maintained with Lake Ontario and St Lawrence ports by several lines of steamers. It is the com- mercial centre of a fine agricultural district, and has a large export trade in cheese and farm produce. The principal industries are planing mills and cement works, cheese factories and dis- tilleries. There are several educational institutions, including a business college, a convent, and a government institute for the deaf and dumb. Albert College, under the control of the Methodist church, was formerly a university, but now confines itself to secondary education.*

BELLEVILLE, a city and the county-seat of St Clair county, Illinois, U.S.A., in the S.W. part of the state 14 m. S.E. of St Louis, Missouri. Pop. (1890) 15,361; (1900) 17,484, of whom 27S0 were foreign-born; (1910) 21,122. Belleville is served by the Illinois Central, the Louisville & Nashville, and the Southern railways, also by extensive interurban electric systems; and a belt line to O'Fallon, Illinois, connects Belleville with the Baltimore & Ohio South Western railway. A large element of the population is of German descent or German birth, and two newspapers are published in German, besides three dailies, three weeklies and a semi-weekly in English. Among the industrial establishments of the city are stove and range lactones, flour mills, rolling mills, distilleries, breweries, shoe factories, copper refining works, nail and tack factories, glass works and agricultural implement factories. The value of the city's factory products increased from $2,873,334 in i9°° to $4,356,615 in 1905 or 51-6%. Belleville is in a rich agri- cultural region, and in the vicinity there are valuable coal mines, the first of which was sunk in 1852; from this dates the industrial development of the city. Belleville was first settled in 1813, was incorporated as a city in 1850, and was re-incorporated in 1876.

BELLEY, a town of eastern France, capital of an arrondisse- ment in the department of Ain, 52 m. S.E. of Bourg by the Paris-Lyon

railway. Pop. (1906), town, 3709; commune, 5707. It is situated on vine-covered hills at the southern

extremity of the Jura, 3 m. from the right bank of the Rhone. Apart from the cathedral of St Jean, which, with the exception of the choir of 1413, is a modern building, there is little of architectural interest in the town. Belley is the seat of a bishopric and a prefect, and has a tribunal of first instance. The manu- facture of morocco leather goods and the quarrying of the lithographic stone of the vicinity are carried on, and there is trade in cattle, grain, wine, truffles and dressed pork. Belley is of Roman origin, and in the 5th century became an episcopal see. It was the capital of the province of Bugey, which was a dependency of Savoy till 1601, when it was ceded to France. In 1385 the town was almost entirely destroyed by an act of incendiarism, but was subsequently rebuilt by the dukes of Savoy, who surrounded it with ramparts of which little is left.

BELLI, GIUSEPPE GIOACHINO (1791-1863), Italian poet, was born at Rome, and after a period of literary employment in poor circumstances was enabled by marriage with a lady of means to follow his own special bent. He is remembered for his vivid popular poetry in the Roman dialect, a number of satirical sonnets which in their own way are unique.

See Morandi's edition, / sonetti romaneschi (1886-18

BELLIGERENCY, the state of carrying on war (Lat. helium, war, and gerere, to wage) in accordance with the law of nations. Insurgents are not as such excluded from recognition as belli- gerents, and, even where not recognized as belligerents by the government against which they have rebelled, they may be so recognized by a neutral state, as in the case of the American Civil War, when the Southern states were recognized as belli- gerents by Great Britain, though regarded as rebels by the Northern states. The recognition by a neutral state of belli- gerency does not, however, imply recognition of independent political existence. The regulations annexed to the Hague Convention, relating to the laws and customs of war (29th of July 1899), contain a section entitled " Belligerents " which is divided into three chapters, dealing respectively with (i.) The Qualifications of Belligerents; (ii.) Prisoners of War; (iii.) The Sick and Wounded. To entitle troops to the special privileges attaching to belligerency, chapter i. provides that all regular, militia or volunteer forces shall alike be commanded by persons responsible for the acts of their men, that all such shall carry distinctive emblems, recognizable at a distance, that arms shall be carried openly and operations conducted

in accordance with the usages of war observed among civilized mankind. It provides, nevertheless, for the emergency of the population of a territory, which has not already been occupied by the invader, spontane- ously taking up arms to resist the invading forces, without having had time to comply with the above requirements; they, too, are to be treated as belligerents " if they respect the laws and customs of war." In naval war, privateering having been, finally abolished as among the parties to it by the declaration of Paris, a privateer is not entitled, as between such parties, to the rights of belligerency. As between states, one of whom is not a party to the Declaration, the right to grant letters of marque would remain intact for both parties, and the privateer, as between them, would be a belligerent; as regards neutrals, the situation would be complicated (see Privateer). On prisoners of war and sick and wounded, see War. (T. Ba)

BELLINGHAM, SIR EDWARD (d. 1549), lord deputy of Ireland, was a son of Edward Bellingham of Erringham, Sussex, his mother being a member of the Shelley family. As a soldier he fought in France and elsewhere, then became an English member of parliament and a member of the privy council, and in 1547 took part in some military operations in Ireland. In May 1 548 he was sent to that country as lord deputy. Ireland was then in a very disturbed condition, but the new governor crushed a rebellion of the O'Connors in Leinster, freed the Pale from rebels, built forts, and made the English power respected in Munster and Connaught. Bellingham, however, was a headstrong man and was constantly quarrelling with his council; but one of his opponents admitted that he was " the best man of

war that ever he had seen in Ireland." His short but successful term of office was ended by his recall in 1549.

See R. Bagwell, Ireland Under the Tudors, vol. i. (1885).

BELLINGHAM, a city of Whatcom county, Washington, U.S.A., on the E. side of Bellingham Bay, 96 m. N. of Seattle. Pop. (1900) 11,062; (1905, state est.) 26,000; (1910, U.S. census) 24,298. Area about 23 sq. m. It is served by the Great Northern, the Northern Pacific, the Canadian Pacific, and the Bellingham Bay & British Columbia railways — being a terminus of the last named, which operates only 62 m. of line and connects with the Mt. Baker

goldfields and the Nooksack valley farm and orchard region. A suburban electric line was projected in 1907. About 25 m. south-east of the city is the main body of Lake Whatcom, 13 m. long, ij m. wide, and 318 ft. higher than the city and the source of its water-supply, a gravity system which cost $ 1,000,000, being owned by the city. Belling- ham has two Carnegie libraries. Among the principal buildings are the county court-house, the city hall, the Young Men's Christian Association building, and Beck's theatre, with a seating capacity of 2200. The largest of the state's normal colleges is situated here; in 1907 it had a faculty of 25 and 350 students; there are two high schools, two business colleges, and one industrial school also in the city. The excellent harbour, and the fact that Bellingham is nearer to the great markets of Alaska than any other city in the states, make the port an im- portant shipping centre. In the value of manufactured product the city was fourth in the state in 1905 (being passed only by Tacoma, Seattle and Spokane), with a value of $3,293,988; according to a census taken by the local chamber of commerce the value of the product in 1906 was $7,751,464. The principal industrial establishments are shingle (especially cedar) and saw-mills, salmon canneries and factories for the manufacture of tin cans, and machinery used in the canning of salmon. Motive and electric lighting power is brought 52 m. from the falls of the north fork of the Nooksack river, where there is a power plant which furnishes 3500 horsepower. There are deposits of clay and limestone in the surrounding country, and cement is manufactured in the vicinity of the city. The blue-grey Chuckanut sandstone is quarried on the shore of Chuckanut Bay, south of Bellingham; and a coarse, dark-brown sandstone is quarried on Sucia Island, west of the city. There are quarries also on Waldron Island. Bellingham was formed in 1903 by the consolidation of the cities of New Whatcom (pop. in 1900, 6834) and Fairhaven (pop. in 1900, 4228), and was chartered as a city of the first class in 1904; it is named from Bellingham Bay, which Vancouver is supposed to have named, in 1792, in honour of Sir Henry Bellingham.

BELLINI, the name of a family of craftsmen in Venice, three members of which fill a great place in the history of the Venetian school of painting in the 15th century and the first years of the 16th.

I. Jacopo Bellini (c. 1400-1470-71) was the son of a tin- smith or pewterer, Nicoletto Bellini, by his wife Franceschina. When the accomplished Umbrian master Gentile da Fabriano came to practise at Venice, where art was backward, several young men of the city took service under him as pupils. Among these were Giovanni and Antonio of Murano and Jacopo Bellini. Gentile da Fabriano left

Venice for Florence in 1422, and the two brothers of Murano stayed at home and presently founded a school of their own (see Vivarini) . But Jacopo Bellini followed his teacher to Florence, where the vast progress lately made, alike in truth to natural fact and in sense of classic grace and style, by masters like Donatello and Ghiberti, Masaccio and Paolo Uccello, offered him better instruction than he could obtain even from his Umbrian teacher. But his position as assistant to Gentile brought him into trouble. As a stranger coming to practise in Florence, Gentile was jealously looked on. One day some young Florentines threw stones into his shop, and the Venetian pupil ran out and drove them off with his fists. Think- ing this might be turned against him, he went and took service on board the galleys of the Florentine state; but returning after a year, found he had in his absence been condemned and fined for

assault. He was arrested and imprisoned, but the matter was soon compromised, Jacopo submitting to a public act of penance and his adversary renouncing further proceedings. Whether Jacopo accompanied his master to Rome in 1426 we cannot tell; but by 1429 we find him settled at Venice and married to a wife from Pesaro named Anna (family name uncertain), who in that year made a will in favour of her first child then expected. She survived, however, and bore her husband two sons, Gentile and Giovanni (though some evidences have been thought to point rather to Giovanni having been his son by another mother), and a daughter Nicolosia. In 1436 Jacopo was at Verona, painting a Crucifixion in fresco for the chapel of S. Nicholas in the cathedral (destroyed by order of the archbishop in 1750, but the composition, a vast one of many figures, has been preserved in an old engraving). Documents ranging from 1437 to 1465 show him to have been a member of the Scuola or mutual aid society of St John the Evangelist at Venice, for which he painted at an uncertain date a series of eighteen subjects of the Life of the Virgin, fully described by Ridolfi but now destroyed or dispersed. In 1439 we find him buying a panel of tarsia work at the sale of the effects of the deceased painter Jacobello del Fiore, and in 1440 entering into a business partnership with another painter of the city called Donate About this time he must have paid a visit to the court of Ferrara, where there prevailed a spirit of free culture and humanism most congenial to his tastes. Pisanello, the first great naturalist artist of north Italy, whose influence on Jacopo at the outset of his career had been only second to that of Gentile da Fabriano, had been some time engaged on a portrait of Leonello d'Este, the elder son of the reigning marquis Niccolo III. Jacopo (according to an almost contemporary sonneteer) competed with a

rival portrait, which was declared by the father to be the better of the two. In the next year, the last of the marquis Niccolo's life, we find him making the successful painter a present of two bushels of wheat. The relations thus begun with the house of Este seem to have been kept up, and among Jacopo's extant drawings are several that seem to belong to the scheme of a monument erected to the memory of the marquis Niccolo ten years later. He was also esteemed and employed by Sigismondo Malatesta at the court of Rimini. In 1443 Jacopo took as an articled pupil a nephew whom he had brought up from charity; in 1452 he painted a banner for the Scuola of St Mary of Charity at Venice, and the next year received a grant from the confraternity for the marriage of his daughter Nicolosia with Andrea Mantegna, a marriage which had the effect of transferring the gifted young Paduan master definitively from the following of Squarcione to that of Bellini. In 1456 he painted a figure of Lorenzo Giustiniani, first patriarch of Venice, for his monument in San Pietro de Castello, and in 1457, with a son for salaried assistant, three figures of saints in the great hall of the patriarch. For. some time about these years Jacopo and his family would seem to have resided at, or at least to have paid frequent visits to Padua, where he is reported to have carried out works now lost, including an altar-piece painted with the assistance of his sons in 1459-1460 for the Gattamelata chapel in the Santo, and several portraits which are described by 16th-century witnesses but have dis- appeared. At Venice he painted a Calvary for the Scuola of St Mark (1466). His activity can be traced in documents down to August 1470, but in November 1471 his wife Anna describes herself as his relict, so that he must have died some time in the interval.

The above are all the facts concerning the life of Jacopo Bellini which can be gathered from printed and documentary records. The materials which have reached posterity for a critical judgment on his work consist of four or five pictures only, together with two important and invaluable books of drawings. These prove him to have been a worthy third, following the Umbrian Gentile da Fabriano and the Veronese Pisanello, in that trio of remarkable artists who in the first half of the 15 th century carried towards maturity the art of painting in Venice and the neighbouring cities. Of his pictures, an important signed example is a life-size Christ Crucified in the archbishop's

palace at Verona. The rest are almost all Madonnas: two signed, one in the Tadini gallery at Lovere, another in the Venice academy; a third, unsigned and long ascribed in error to Gentile da Fabriano, in the Louvre, with the portrait of Sigis- mondo Mala testa as donor; a fourth, richest of all in colour and ornamental detail, recently acquired from private hands for the Uffizi at Florence. Plausibly, though less certainly, ascribed to him are a fifth Madonna at Bergamo, a warrior-saint on horseback (San Crisogono) in the church of San Trovaso at Venice, a Cruci- fixion in the Museo Correr, and an Adoration of the Magi in private possession at Ferrara. Against this scanty tale of paintings we have to set an abundance of drawings and studies preserved in two precious albums in the British Museum and the Louvre. The former, which is the earlier in date, belonged to the painter's elder son Gentile and was by him bequeathed to his brother Giovanni. It consists of ninety-nine paper pages, all drawn on both back and front with a lead point, an instrument unusual at this date. Two or three of the drawings have been worked over in pen; of the remainder many have become dim from time and rubbing. The album at the Louvre, discovered in 1883 in the loft of a country-house in Guienne, is equally rich and better preserved, the drawings being all highly finished in pen, probably over effaced preliminary sketches in chalk or lead. The range of subjects is much the same in both collections, and in both extremely varied, proving Jacopo to have been a crafts- man of many-sided curiosity and invention. He passes indis- criminately from such usual Scripture scenes as the Adoration of the Magi, the Agony in the Garden, and the Crucifixion, to designs from classic fable, copies from ancient bas-reliefs, stories of the saints, especially St Christopher and St George, the latter many times repeated (he was the patron saint of the house of Este), fanciful allegories of which the meaning has now become obscure, scenes of daily life, studies for monuments, and studies of animals, especially of eagles (the emblem of the house of Este), horses and lions. He loves to marshal his figures in vast open spaces, whether of architecture or mountainous landscape. In designing such spaces and in peopling them with figures of relatively small scale, we see him eagerly and continually putting to the test the principles of the new science of perspective. His castellated and pinnacled architecture, in a mixed medieval and classical spirit, is elaborately thought out, and scarcely less so his groups and ranges of barren hills, broken in clefts or ascending in spiral terraces. With a predilection for tall and slender proportions, he draws the human figure with a flowing generalized grace and no small freedom of movement; but he does not approach either in mastery of line or in vehemence of action a Florentine draughtsman

such as Antonio Pollaiuolo. Jacopo's influence on the development of Venetian art was very great, not only directly through his two sons and his son-in-law Mant- egna, but through other and independent contemporary work- shops of the city, in none of which did it remain unfelt.

II. Gentile Bellini (1429-1430-1507), the elder son of Jacopo, first appears independently as the painter of a Madonna, much in his father's manner, dated 1460, and now in the Berlin museum. We have seen how in the previous year he and his brother assisted their father in the execution of an altar-piece for the Santo at Padua. In July 1466 we find him contracting with the officers of the Scuola of St Mark as an independent artist to decorate the doors of their organ. These paintings still exist in a blackened condition. They represent four saints, colossal in size, and designed with much of the harsh and searching austerity which characterized the Paduan school under Squar- cione. In December of the same year Gentile bound himself to execute for the great hall of the same company two subjects of the Exodus, to be done better than, or at least as well as, his father's work in the same place. These paintings have perished. For the next eight years the history of Gentile's life and work remains obscure. But he must have risen steadily in the esteem of his fellow-citizens, since in 1474 we find him commissioned by the senate to restore, renew, and when necessary replace, the series of paintings, the work of an earlier generation of artists, which were perishing from damp on the walls of the Hall of the

Great Council in the ducal palace. This was evidently intended to be a permanent employment, and in payment the painter was to receive the reversion of a broker's stall in the Fondaco dei Tedeschi; a lucrative form of sinecure frequently allotted to artists engaged for tasks of long duration. In continuation of this work Gentile undertook a series of independent paintings on subjects of Venetian history for the same hall, but had apparently only finished one, representing the delivery of the consecrated candle by the pope to the doge, when his labours were interrupted by a mission to the East. The sultan Mahommed II. had despatched a friendly embassy to Venice, inviting the doge to visit him at Constantinople and at the same time requesting the despatch of an excellent painter to work at his court. The former part of the sultan's proposal the senate declined, with the latter they complied; and Gentile Bellini with two assistants was selected for the mission, his brother Giovanni; being at the same time appointed to fill his place on the works! for the Hall of the Great Council. Gentile gave great satisfaction' to the sultan, and returned after about a year with a knighthood, some fine clothes, a gold chain

and a pension. The surviving fruits of his labours at Constantinople consist of a large painting representing the reception of an ambassador in that city, now in the Louvre; a highly finished portrait of the sultan himself, now one of the treasures, despite its damaged condition, of the collection of the late Sir Henry Layard; an exquisitely wrought small portrait in water-colour of a scribe, found in 1905 by a private collector in the bazaar at Constantinople and now in the collection of Mrs Gardner at Boston; and two pen-and-ink drawings of Turkish types, now in the British Museum. Early copies of two or three other similar drawings are preserved in the Stadel Institute at Frankfurt; such copies may have been made for the use of Gentile's Umbrian contemporary, Pin- turicchio, who introduced figures borrowed from them into some of his decorative frescoes in the Appartamento Borgia at Rome.

A place had been left open for Gentile to continue working beside his brother Giovanni (with whom he lived always on terms of the closest amity) in the ducal palace; and soon after 1480 he began to carry out his share in the great series of frescoes, unfortunately destroyed by fire in 1577, illustrating the part played by Venice in the struggles between the papacy and the emperor Barbarossa. These works were executed not on the wall itself but on canvas (the climate of Venice having so many times proved fatal to wall paintings), and probably in oil, a method which all the artists of Venice, following the example set by Antonello da Messina, had by this time learnt or were learning to practise. The subjects allotted to Gentile, in addition to the above-mentioned presentation of the consecrated candle, were as follows: the departure of the Venetian ambassadors to the court of Barbarossa, Barbarossa receiving the ambassadors, the pope inciting the doge and senate to war, the pope bestowing a sword and his blessing on the doge and his army (a drawing in the British Museum purports to be the artist's original sketch for this composition), and according to some authorities also the gift of the symbolic ring by the pope to the victorious doge on his return. These works received the highest praise both from contemporary and from later Venetian critics, but no fragment of them survived the fire of 1577. Their character can to some extent be judged by a certain number of kindred historical and processional works by the same hand which have been preserved. Of such the Academy at Venice has three which were painted between 1490 and 1500 for the Scuola of St John the Evangelist, and represent certain events connected with a famous relic belonging to the Scuola, namely, a supposed fragment of the true cross. All have been much injured and re-painted; never- theless one at least, showing the procession of the relic through St Mark's

Place and the thanksgiving of a father who owed to it the miraculous cure of his son, still gives a good idea of the painter's powers and style. Great accuracy and firmness of individual portraiture, a strong gift, derived no doubt from his father's example, for grouping and marshalling a crowd of personages in spaces of fine architectural perspective, the

severity and dryness of the Paduan manner much mitigated by the dawning splendour of true Venetian colour — these are the qualities that no injury has been able to deface. They are again manifest in an interesting Adoration of the Magi in the Layard collection; and reappear still more forcibly in the last work undertaken by the artist, the great picture now at the Brera in Milan of St Mark preaching at Alexandria ; this was commissioned by the Scuola of St Mark in March 1 505, and left by the artist in his will, dated 18th of February 1507, to be finished by his brother Giovanni. Of single portraits by this artist, who was almost as famous for them as for processional groups, there survive one of a doge at the Museo Correr in Venice, one of Catarina Cornaro at Budapest, one of a mathematician at the National Gallery, another of a monk in the same gallery, signed wrongly to all appearance with the name of Giovanni Beliini, besides one or two others in private hands. The features of Gentile himself are known from a portrait medallion by Camelio, and can be recognized in two extant drawings, one at Berlin supposed to be by the painter's own hand, and another, much larger and more finished, at Christ Church, Oxford, which is variously attributed to Bonsignori and A. Vivarini.

III. Giovanni Bellini (1430-1431-1516) is generally assumed to have been the second son of Jacopo by his wife Anna; though the fact that she does not mention him in her will with her other sons has thrown some slight doubt upon the matter. At any rate he was brought up in his father's house, and always lived and worked in the closest fraternal relation with Gentile. Up till the age of nearly thirty we find documentary evidence of the two sons having served as their father's assistants in works both at Venice and Padua. In Giovanni's earliest inde- pendent works we find him more strongly influenced by the harsh and searching manner of the Paduan school, and especially of his own brother-in-law Mantegna, than by the more graceful and facile style of Jacopo. This influence seems to have lasted at full strength until after the departure of his brother-in-law Mantegna for

the court of Mantua in 1460. The earliest of Giovanni's independent works no doubt date from before this period. Three of these exist at the Correr museum in Venice: a Crucifixion, a Transfiguration, and a Dead Christ supported by Angels. Two Madonnas of the same or even earlier date are in private collections in America, a third in that of Signor Frizzoni at Milan; while two beautiful works in the National Gallery of London seem to bring the period to a close. One of these is of a rare subject, the Blood of the Redeemer; the other is the fine picture of Christ's Agony in the Garden, formerly in the Northbrook collection. The last-named piece was evidently executed in friendly rivalry with Mantegna, whose version of the subject hangs near by; the main idea of the composition in both cases being taken from a drawing by Jacopo Bellini in the British Museum sketch-book. In all these pictures Giovanni combines with the Paduan severity of drawing and complex rigidity of drapery a depth of religious feeling and human pathos which is his own. They are all executed in the old tempera method; and in the last named the tragedy of the scene is softened by a new and beautiful effect of romantic sunrise colour. In a somewhat changed and more personal manner, with less harshness of contour and a broader treatment of forms and draperies, but not less force of religious feeling, are the two pictures of the Dead Christ supported by Angels, in these days one of the master's most frequent themes, at Rimini and at Berlin. Chronologically to be placed with these are two Madonnas, one at the church of the Madonna del Orto at Venice and one in the Lochis collection at Bergamo; devout intensity of feeling and rich solemnity of colour being in the case of all these early Madonnas combined with a singularly direct rendering of the natural movements and attitudes of children.

The above-named works, all still executed in tempera, are no doubt earlier than the date of Giovanni's first appointment to work along with his brother and other artists in the Scuola di San Marco, where among other subjects he was commissioned in 1470 to paint a Deluge with Noah's Ark. None of the master's works of this kind, whether painted for the various schools or I

confraternities or for the ducal palace, have survived. To the decade following 1470 must probably be assigned a Transfigura- tion now in the Naples museum, repeating with greatly ripened powers and in a much serener spirit the subject of his early effort at Venice; and also the great altar-piece of the Coronation of the Virgin at Pesaro, which would seem to be his earliest effort in ajorm of art previously almost monopolized in Venice by the rival school of the Vivarini. Probably not much later was the still more famous altar-piece painted in tempera for a chapel in the church of S. Giovanni e Paolo, where it

perished along with Titian's Peter Martyr and Tintoretto's Crucifixion in the disastrous fire of 1867. After 1479-1480 very much of Giovanni's time and energy must have been taken up by his duties as conservator of the paintings in the great hall of the ducal palace, in payment for which he was awarded, first the reversion of a broker's place in the Fondaco dei Tedeschi, and afterwards, as a substitute, a fixed annual pension of eighty ducats. Besides repairing and renewing the works of his predecessors he was commissioned to paint a number of new subjects, six or seven in all, in further illustration of the part played by Venice in the wars of Barbarossa and the pope. These works, executed with much interruption and delay, were the object of universal admira- tion while they lasted, but not a trace of them survived the fire of 1577; neither have any other examples of his historical and processional compositions come down, enabling us to compare his manner in such subjects with that of his brother Gentile. Of the other, the religious class of his work, including both altar-pieces with many figures and simple Madonnas, a consider- able number have fortunately been preserved. They show him gradually throwing off the last restraints of the r5th-century manner; gradually acquiring a complete mastery of the new oil medium introduced in Venice by Antonello da Messina about 1473, and mastering with its help all, or nearly all, the secrets of the perfect fusion of colours and atmospheric gradation of tones. The old intensity of pathetic and devout feeling gradually fades away and gives place to a noble, if more worldly, serenity and charm. The enthroned Virgin and Child become tranquil and commanding in their sweetness; the personages of the attendant saints gain in power, presence and individuality; enchanting groups of singing and viol-playing angels symbolize and complete the harmony of the scene. The full splendour of Venetian colour invests alike the figures, their architectural framework, the landscape and the sky. The altar-piece of the Frari at Venice, the altar-piece of San Giobbe, now at the academy, the Virgin between SS. Paul and George, also at the academy, and the altar- piece with the kneeling doge Barbarigo at Murano, are among the most conspicuous examples. Simple Madonnas of the same period (about 1485-1490) are in the Venice academy, in the National Gallery, at Turin and at Bergamo. An interval of some years, no doubt chiefly occupied with work in the Hall of the Great Council, seems to separate the last-named altar-pieces from that of the church of San Zaccaria at Venice, which is perhaps the most beautiful and imposing of all, and is dated 1505, the year following that of Giorgione's Madonna at Castelfranco. Another great altar-piece with saints, that of the church of San Francesco de la Vigna at Venice, belongs to 1507; that of La Corona

at Vicenza, a Baptism of Christ in a landscape, to 1510; to 1513 that of San Giovanni Crisostomo at Venice, where the aged saint Jerome, seated on a hill, is raised high against a resplendent sunset background, with SS. Christopher and Augustine standing facing each other below him, in front. Of Giovanni's activity in the interval between the altar-pieces of San Giobbe and of Murano and that of San Zaccaria, there are a few minor evidences left, though the great mass of its results perished with the fire of the ducal palace in 1577. The examples that remain consist of one very interesting and beautiful allegorical picture in the Uffizi at Florence, the subject of which had remained a riddle until it was recently identified as an illustration of a French medieval allegory, the Pelerinage de I'dme by Guillaume de Guilleville; with a set of five other allegories or moral emblems, on a smaller scale and very romantically treated, in the academy at Venice. To these should probably be added, as painted

towards the year 1505, the portrait of the doge Loredano in the National Gallery, the only portrait by the master which has been preserved, and in its own manner one of the most masterly in the whole range of painting.

The last ten or twelve years of the master's life saw him besieged with more commissions than he could well complete. Already in the years 1 501-1504 the marchioness Isabella Gonzaga of Mantua had had great difficulty in obtaining delivery from him of a picture of the " Madonna and Saints " (now lost) for which part payment had been made in advance. In 1505 she en- deavoured through Cardinal Bembo to obtain from him another picture, this time of a secular or mythological character. What the subject of this piece was, or whether it was actually delivered, we do not know. Albrecht Diirer, visiting Venice for a second time in 1 506, reports of Giovanni Bellini as still the best painter in the city, and as full of all courtesy and generosity towards foreign brethren of the brush. In 1507 Gentile Bellini died, and Giovanni completed the picture of the " Preaching of St Mark " w'hich he had left unfinished; a task on the fulfilment of which the bequest by the elder brother to the younger of their father's sketch-book had been made conditional. In 1513 Giovanni's position as sole master (since the death of his brother and of Alvise Vivarini) in charge of the paintings in the Hall of the Great Council was threatened by an application on the part of his own former pupil, Titian, for a joint-share in the same undertaking, to be

paid for on the same terms. Titian's application was first granted, then after a year rescinded, and then after another year or two granted again; and the aged master must no doubt have undergone some annoyance from his sometime pupil's proceedings. In 1514 Giovanni undertook to paint a Bacchanal for the duke Alfonso of Ferrara, but died in 1516, leaving it to be finished by his pupils; this picture is now at Alnwick.

Both in the artistic and in the worldly sense, the career of Giovanni Bellini was upon the whole the most serenely and unbrokenly prosperous, from youth to extreme old age, which fell to the lot of any artist of the early Renaissance. He lived to see his own school far outshine that of his rivals, the Vivarini of Murano; he embodied, with ever growing and maturing power, all the devotional gravity and much also of the worldly splendour of the Venice of his time; and he saw his influence propagated by a host of pupils, two of whom at least, Giorgione and Titian, surpassed their mister. Giorgione he outlived by five years; Titian, as we have seen, challenged an equal place beside his teacher. Among the best known of his other pupils were, in his earlier time, Andrea Previtali, Cima da Conegliano, Marco Basaiti, Niccolo Rondine'lli, Piermaria Pcnnacchi, Martino da Udine, Girolamo Mocetto; in later time, Pierfrancesco Bissolo, Vincenzo Catena, Lorenzo Lotto and Sebastian del Piombo.

Bibliography. — Vasari, ed. Milanesi, vol. iii. ; Ridolfi, Le Maraviglie, &c., vol. i. ; Francesco Sansovino, Venezia Descritta; Morelli, Notizia, &c, di un Anonimo; Zanetti, Pittura Veneziana; F. Aglietti, Elogio Storico di Jacopo e Giovanni Bellini; G. Berna- sconi, Cenni intorno la vita e le opere di Jacopo Bellini; Moschini, Giovanni Bellini e pittori contemporanei;K. Galichon in Gazette des beaux-arts (1866); Crowe and Cavalcaselle, History of Painting in North Italy, vol. i. ; Hubert Janitschek, "Giovanni Bellini" in Dohme's Kunst und Kilnstlcr; Julius Meyer in Meyer's Allge- meines Kiinstler-Lexikon, vol. iii. (1885); Pompeo Molmenti, " I pittori Bellini " in Studi e ricerche di Storia d' Arte; P. Paoletti, Raccolta di documenti inediti, fasc. i. ; Vasari, Vite di Gentile da Fabriano e Vittor Pisanello, ed. Venturi ; Corrado Ricci in Rassegna a" Arte (1901, 1903), and Rivista d' Arte (1906) ; Roger Fry, Giovanni Bellini in "The Artist's Library"; Everard Meyncll, Giovanni Bellini in Newnes's " Art Library " (useful for a nearly complete set of reproductions of the known paintings) ; Corrado Ricci, Jacopo Bellini e i suoi Libri di Disegni; Victor Goloubeff, Les Dessins de Jacopo Bellini (the two works last cited reproduce in full, that of M. Goloubeff by far the most skilfully, the contents of both the Paris and the London sketch-

books). (S. C.)

BELLINI, LORENZO (1 643-1 704), Italian physician and anatomist, was born at Florence on the 3rd of September 1643. At the age of twenty, when he had already begun his researches on the structure of the kidneys and had described the ducts known by his name (Exercitatio anatomica de structura el usu

renum, 1662), he was chosen professor of theoretical medicine at Pisa, but soon after was transferred to the chair of anatomy. After spending thirty years at Pisa, he was invited to Florence and appointed physician to the grand duke Cosimo III., and was also made senior consulting physician to Pope Clement XL He died at Florence on the 8th of January 1704. His works were published in a collected form at Venice in 1708.

BELLINI, VINCENZO (1801-1835), operatic composer of the Italian school, was born at Catania in Sicily, on the 1st of November 1801. He was descended from a family of musicians, both his father and grandfather having been composers of some reputation. After having received his preparatory musical education at home, he entered the conservatoire of Naples, where he studied singing and composition under Tritto and Zingarelli. He soon began to write pieces for various instruments, as w'ell as a cantata and several masses and other sacred com- positions. His first opera, Adelson e Savina, w r as performed in 1825 at a small theatre in Naples; his second dramatic work, Bianca e Fernando, was produced next year at the San Carlo theatre of the same city, and made his name known in Italy. His next work, II Pirata (1827), was written for the Scala in Milan, to words by Felice Romano, with whom Bellini formed a union of friendship to be severed only by his death. The splendid rendering of the music by Tamburini, Rubini and other great Italian singers contributed greatly to the success of the work, which at once established the European reputation of its composer. In almo't every year of the short remainder of his life he produced a new operatic work, which was received with rapture by the audiences of France, Italy, Germany and England. The names and dates of four of Bellini's operas familiar to most lovers of Italian music are: / Montecchi e Capuleti (1830), in which the part of Romeo became a favourite with all the great contraltos; La Sonnambula (1831); Norma, Bellini's best and most popular creation (1831); and 1 Puritani (1835), written for the Italian opera in Paris, and to some extent under the influence of French music. In 1833 Bellini had left his country to accom- pany to England the singer Pasta, who had created the part of his Sonnambula. In 1834 he accepted an invitation to write an opera for

the national grand opera in Paris. While he was carefully studying the French language and the cadence of French verse for the purpose, he was seized with a sudden illness and died at his villa in Puteaux near Paris on the 24th of September 1835. His operatic creations are throughout replete with a spirit of gentle melancholy, frequently monotonous and almost always undramatic, but at the same time irresistibly sweet. To this spirit, combined with a rich flow of cantilena, Bellini's operas owe their popularity. " I shall never forget," wrote Wagner, " the impression made upon me by an opera of Bellini at a period when I was completely exhausted with the ever-lastingly abstract complication used in our orchestras, when a simple and noble melody was revealed anew to me."

See also G. Labat, Bellini (Bordeaux, 1865) ; A. Pougin, Bellini, sa vie et ses ceuvres (Paris, 1868).

BELLINZONA (Ger. Bellenz), the political capital of the Swiss canton of Tessin or Ticino. It. is 105 m. from Lucerne by the St Gotthard railway, 19 m. from Lugano and 14 m. from Locarno at the head of the Lago Maggiore, these two towns having been till 1881 capitals of the canton jointly with Bcllin- zona. The old town is built on some hills, on the left bank of the Tessin or Ticino river, and a little below the junction of the main Ticino valley (the Val Leventina) with that of Mesocco. It thus blocked the road from Germany to Italy, while a great wall was built from the town to the river bank. Bellinzona still possesses three picturesque castles (restored in modern times), dating in their present form from the 15th century. They belonged for several centuries to the three Swiss cantons which were masters of the town. The most westerly, Castello Grande or of San Michele, belonged to Uri; the central castle, that of Montebello, was the property of Schwyz; while the most easterly castle, that of Sasso Corbaro, was in the hands of Unter- walden. The 13th-century church of San Biagio (Blaise) has a remarkable 14th-century fresco, while the collegiate church of

San Stefano dates from the 16th century. In 1900 the population of Bellinzona was 4949, practically all Romanists and Italian-speaking.

Possibly Bellinzona is of Roman origin, but it is first mentioned in 590. It played a considerable part in the early history of Lombardy,

being a key to several Alpine passes. In the 8th century it belonged to the bishop of Como, while in the 13th and 14th centuries it was tossed to and fro between the cities of Milan and Como. In 1402 it was taken from Milan by Albert von Sax, lord of the Val Mesocco, who in 1419 sold it to Uri and Obwalden, which, however, lost it to Milan in 1422 after the battle of Arbedo. In 1499 (like the rest of the Milanese) it was occupied by the French, but in 1 500 it was taken by Uri. In 1 503 the French king ceded it to Uri, Schwyz and Unterwalden, which henceforth ruled it very harshly through their bailiffs till 1798. At that date it became the capital of the canton Bellinzona of the Helvetic republic, but in 1803 it was united to the newly-formed canton of Tessin. (W. A. B. C.)

BELLMAN, KARL MIKAEL (1740-1795), Swedish poet, son of a civil servant, was born at Stockholm on the 4th of February 1740. When quite a child he developed an extraordinary gift of improvising verse, during the' delirium of a severe illness, weaving wild thoughts together lyrically and singing airs of his own composition. When he was nineteen he became clerk in a bank and afterwards in the customs, but his habits were irregular and he was frequently in great distress, particularly after the death of his patron, Gustavus III. As early as 1757 he published Evangeliska Dodstankar, meditations on the Passion from the German of David von Schweidnitz, and during the next few years wrote, besides other translations, a great quantity of poems, imitative for the most part of Dalin. In 1760 appeared his first characteristic work, Manan (The Moon), a satirical poem, which was revised and edited by Dalin. But the great work of his life occupied him from 1765 to 1780, and consists of the collections of dithyrambic odes known as Fred- mans Epistlar (1790) and Fredmans Sanger (1791). Fredman and his friends were well-known characters in the Stockholm pot-houses, where Bellman had studied them from the life. No poetry can possibly smell less of the lamp than Bellman's. He was accustomed, when in the presence of none but con- fidential friends, to announce that the god was about to visit him. He would shut his eyes, take his zither, and begin appar- ently to improvise the music and the words of a long Bacchic ode in praise of love or wine. Most of his melodies are taken direct, or with slight adaptations, from old Swedish ballads, and still retain their popularity. Fredman's Epistles bear the clear impress of individual genius; his torrents of rhymes are not without their method; wild as they seem, they all conform to the rules of style, and among those that have been preserved there are few that are not perfect in form. A great Swedish critic has remarked that the voluptuous joviality and the humour of Bellman is, after all, only " sorrow clad in rose-

colour," and this underlying pathos gives his poems their undying charm. His later works, Bacchi Tempel (The Temple of Bacchus) (1783), eight numbers of a journal called FIvad behagas? (What you Will) (1781), in 1780 a religious anthology entitled in a later edition (1787) Zions Hogtid (Zion's Holiday), and a translation of Gellert's Fables, are comparatively unimportant. He died on the nth of February 1795. Much of Bellman's work was only printed after his death, Bihang till Fredmans Epistlar (Nykoping, 1809), Fredmans Handskrifter (Upsala, 1813), Skaldestycken (" Poems," Stockholm, 1814) being among the most important of these posthumous works. A colossal bronze bust of the poet by Bystrom (erected by the Swedish Academy in 1829) adorns the public gardens of Stockholm, and a statue by Alfred Nystrom is in the Hasselbacken, Stockholm. Bellman had a grand manner, a fine voice and great gifts of mimicry, and was a favourite companion of King Gustavus III.

The best edition of his works was published at Stockholm, edited by J. G. Carlen, with biographical notes, illustrations and music (5 vols., 1856-1861); see also monographs on Bellman by Nils Erdmann {Stockholm, 1895) and by F. Niedner (Berlin, 1905).

BELLO, ANDRES (1781-1865), South American poet and scholar, was born at Caracas (Venezuela) on the 29th of November 1 78 1 , and in early youth held a minor post in the civil administra- tion. He joined the colonial revolutionary party, and in 18 10 was sent on a political mission to London, where he resided for nineteen years, acting as secretary to the legations of Chile, Colombia and Venezuela, studying in the British Museum, supplementing his small salary by giving private lessons in Spanish, by journalistic work and by copying Jeremy Bentham's almost indecipherable manuscripts. In 1829 he accepted a post in the Chilean treasury, settled at Santiago and took a prominent part in founding the national university (1843), of which he became rector. He was nominated senator, and died at Santiago de Chile on the 15th of October 1865. Bello was mainly responsible for the civil code promulgated on the 14th of December 1855. His prose works deal with such various subjects as law, philosophy, literary criticism and philology; of these the most important is his Gramdlica castellana (1847), the leading authority on the subject.. But his position in litera- ture proper is secured by his Silvas Americanas, a poem written during his residence in England, which conveys with extra- ordinary force the majestic impression of the South American landscape.

Bello's complete works were issued in fifteen 'volumes by the Chilean government (Santiago de Chile, 1881-1893); he is the sub- ject of an

excellent biography (Santiago de Chile, 1882) by Miguel Luis Amunategui. (J. F.-K.)

BELLO-HORIZONTE, or Minas, a city of Brazil, capital of the state of Minas Geraes since 1898, about 50 m. N.W. of Ouro Preto, connected with the Central of Brazil railway by a branch line 9 m. in length. Pop. (estimated) in 1906, 25,000 to 30,000. The city was built by the state on an open plateau, and provided with all necessary public buildings, gas, water and tramway services before the seat of government was transferred from Ouro Preto. The cost of transfer was about £1,000,000. The city has grown rapidly, and is considered one of the most attractive state capitals of Brazil.

BELLONA (originally Duellona), in Roman mythology, the goddess of war {bellum, i.e. duellum), corresponding to the Greek Enyo. By later mythologists she is called sometimes the sister, daughter or wife of Mars, sometimes his charioteer or nurse. Her worship appears to have been promoted in Rome chiefly by the family of the Claudii, whose Sabine origin, together with their use of the name of " Nero," has suggested an identifi- cation of Bellona with the Sabine war goddess Nerio, herself identified, like Bellona, with Virtus. Her temple at Rome, dedicated by Appius Claudius Caecus (296 B.C.) during a battle wi-th the Samnites and Etruscans (Ovid, Fasti vi. 201), stood in the Campus Martius, near the Flaminian Circus, and outside the gates of the city. ˆ It was there that the senate met to discuss a general's claim to a triumph, and to receive ambassadors from foreign states. In front of it was the columna bellica, where the ceremony of declaring war by the f etialis was performed. From this native Italian goddess is to be distinguished the Asiatic Bellona, whose worship was introduced into Rome from Comana, in Cappadocia, apparently by Sulla, to whom she had appeared, urging him to march to Rome and bathe in the blood of his enemies (Plutarch, Sulla, 9). For her a new temple was built, and a college of priests (Bellonarii) instituted to conduct her fanatical rites, the prominent feature of which was to lacerate themselves and sprinkle the blood on the spectators (TibuUus i. 6. 45-50). To make the scene more grim they wore black dresses (Tertullian, De Pallid) from head to foot. The festival of Bellona, which originally took place on the 3rd of June, was altered to the 24th of March, after the confusion of the Roman Bellona with her Asiatic namesake.

See Tiesler, De Bellonae Cultu (1842).

BELLOT, JOSEPH RENE (1826-1853), French Arctic explorer, was born at Rochefort on the 18th of March 1826, the son of a farrier.

With the aid of the authorities of his native town he was enabled at the age of fifteen to enter the naval school, in which he studied two years and earned a high reputation. Ha

then took part in the Anglo-French expedition of 1845 to Madagascar, and received the cross of the Legion of Honour for distinguished conduct. He afterwards took part in another Anglo-French expedition, that of Parana, which opened the river La Plata to commerce. In 1851 he joined the Arctic expedition under the command of Captain Kennedy in search of Sir John Franklin, and discovered the strait between Boothia Felix and Somerset Land which bears his name. Early in 1852 he was promoted lieutenant, and in the same year accompanied the Franklin search expedition under Captain Inglefield. As on the previous occasion, his intelligence, devotion to duty and courage won him the esteem and admiration of all with whom he was associated. While making a perilous journey with two comrades for the purpose of communicating with Sir Edward Belcher, he suddenly disappeared in an opening between the broken masses of ice (August 1853). A pension was granted to his family by the emperor Napoleon III., and an obelisk was erected to his memory in front of Greenwich hospital.

BELLOWS, ALBERT F. (1829-1883), American landscape- painter, was born at Milford, Massachusetts, on the 20th of November 1829. He first studied architecture, then turned to painting, and worked in Paris and in the Royal Academy at Antwerp. He painted much in England; was a member of the National Academy of Design, and of the American Water Color Society, New York; and an honorary member of the Royal Belgian Society of Water-Colourists. His earlier work was genre, in oils; after 1865 he used water-colours more and more ex- clusively and painted landscapes. Among his water-colours are " Afternoon in Surrey " (1868); " Sunday in Devonshire " (1876), exhibited at the Philadelphia Exposition; " New Eng- land Village School " (1878) ; and " The Parsonage " (1879). He died in Auburndale, Massachusetts, on the 24th of November 1883.

BELLOWS, HENRY WHITNEY (1814-1882), American clergyman, was born in Boston, Massachusetts, on the nth of June 1814. He graduated at Harvard College in 1832, and at the Harvard Divinity School in 1837, held a brief pastorate (1837-1838) at Mobile, Alabama, and in 1839 became pastor of the First Congregational (Unitarian) church in New York City (afterwards All Souls church), in charge of which he remained until his death. Here Bellows

acquired a high reputation as a pulpit orator and lyceum lecturer, and was a recognized leader in the Unitarian Church in America. For many years after 1846 he edited The Christian Inquirer, a Unitarian weekly paper, and he was also for some time an editor of The Christian Examiner. In 1857 he delivered a series of lectures in the Lowell Institute course, on " The Treatment of Social Diseases." At the outbreak of the Civil War he planned the United States Sanitary Commis- sion, of which he was the first and only president (1861 to 1878). He was the first president of the first Civil Service Reform Association ' organized in the United States (1877), was an organizer of the Union League Club and of the Century Associa- tion in New York City, and planned with his parishioner and friend, Peter Cooper, the establishment of Cooper Union. In 1865 he proposed and organized the national conference of Unitarian and other Christian churches, and from 1865 to 1880 was chairman of its council. He died in New York City on the 30th of January 1882. A bronze memorial tablet by Augustus Saint Gaudens was unveiled in All Souls church in 1886. His published writings include Restatements of Christian Doctrine in Twenty-Five Sermons (i860); Unconditioned Loyalty (1863), a strong pro-Union sermon, which was widely circulated during the Civil War; The Old World in its New Face: Impressions of Europe in 1867-1868 (2 vols., 1868-1869) ; Historical Sketch of the Union League Club (1879) ; and Twenty-Four Sermons in All Souls Church, New York, 1865-1881 (1886).

See Russell N. Bellows, Henry Whitney Bellows (Keene, N.H., 1897), a biographical sketch reprinted from T. B. Peck's Bellows Family Genealogy; John White Chadwick, Henry W. Bellows: His Life and Character (New York, 1882), a memorial address; and Charles J. Stille, History of the United States Sanitary Commission (Philadelphia, 1866).

BELLOWS and BLOWING MACHINES, appliances used for producing currents of air, or for moving volumes of air from one in.

place to another. Formerly all such artificially-produced currents of air were used to assist the combustion of fires and furnaces, but now this purpose only forms a part of the uses to which they are put. Blowing appliances, among which are included bellows, rotary fans, blowing engines, rotary blowers and steam-jet blowers, are now also employed for forcing pure air into buildings and mines for purposes of ventilation, for withdrawing vitiated air for the same reason, and for supplying the air or other gas which is required in some chemical processes. Appliances of this kind differ from air compressors in that

they are primarily intended for the transfer of quantities of air at low pressures, very little above that of the atmosphere, whereas the latter are used for supplying air which has previously been raised to a pressure which may be many times that of the atmo- sphere (see Power Transmission: Pneumatic).

Among the earliest contrivances employed for producing the movement of air under a small pressure were those used in Egypt during the Greek occupation. These depended upon the heating of the air, which, being raised in pressure and bulk, was made to force water out of closed vessels, the water being afterwards employed for moving some kind of mechanism. In the process of iron smelting there is still used in some parts of India an artificial blast, produced by a simple form of bellows made from the skins of goats; bellows of this kind probably represent one of the earliest contrivances used for producing currents of air.

The bellows 1 now in use consists, in its simplest form, of two flat boards, of rectangular, circular or pear shape, connected round their edges by a wide band of leather so as to include an air chamber, which can be increased or diminished in volume by separating the boards or bringing them nearer together. The leather is kept from collapsing, on the separation of the boards, by several rings of wire which act like the ribs of animals. The lower board has a hole in the centre, covered inside by a leather flap or valve which can only open inwards; there is also an open outlet, generally in the form of a pipe or nozzle, whose aperture is much smaller than that of the valve. When the upper board is raised air rushes into the cavity through the valve to fill up the partial vacuum produced; on again depressing the upper board the valve is closed by the air attempting to rush out again, and this air is discharged through the open nozzle with a velocity depending on the pressure exerted.

The current of air produced is evidently not continuous but intermittent or in puffs, because an interval is needed to refill the cavity after each discharge. In order to remedy this draw- back the double bellows are used. To understand their action it is only necessary to conceive an additional board with valve, like the lower board of the single bellows, attached in the same way by leather below this lower board. Thus there are three boards, forming two cavities, the two lower boards being fitted with air-valves. The lowest board is held down by a weight and another weight rests on the top board. In working these double bellows the lowest board is raised, and drives the air from the lower cavity into the upper. On lowering the bottom board again a fresh supply of air is drawn in through the bottom valve, to be again discharged when the board is raised. As the air passes from the lower to the upper cavity it is prevented from returning by the valve in the middle board, and in this way a quantity of air is sent into the upper cavity each time the lowest board is raised. The weight on the top board provides the necessary

pressure for the blast, and at the same time causes the current of air delivered to be fairly continuous. When the air is being forced into the upper cavity the weight is being

1 The Old English word for this appliance was bldstbaelig, i.e. " blow-bag," cf. German Blasebalg. By the nth century the first part of the word apparently dropped out of use, and baelig, bylig, bag, is found in early glossaries as the equivalent of the Latin follis. Baelig became in Middle English bely, i.e. " belly," a sack or bag, and so the general word for the lower part of the trunk in man and animals, the stomach, and another form, probably northern in origin, belu, belw, became the regular word for the appliance, the plural" bellies " being still used till the 16th century, when "bellows " appears, and the word in the singular ceases to be used. The verb " to bellow " of the roar of a bull, or the low of a cow, is from Old English bellan, to bell, roar.

raised, and, during the interval when the lowest board is descending, the weight is slowly forcing the top board down and thus keeping up the flow of air.

Hand-bellows for domestic use are generally shaped like a pear, with the hinge at the narrow end. The same shape was adopted for the older forms of smiths' bellows, with the difference that two bellows were used superposed, in a manner similar to that just described, so as to provide for a continuous blast. In the later form of smiths' bellows the same principle is employed, but the boards are made circular in shape and are always main- tained roughly parallel to one another. These are shown on figs, i and 2. Here A is the blast pipe, B the movable lowest board,

C the fixed middle board, close to which the pipe A is inserted, and D is the movable uppermost board pressed upon by the weight shown. The board B is raised by means of a hand lever L, through either a chain or a con- necting rod, and

t- j ˆ c •., , ™ ,, lowered by a

Figs, i and 2.— Common Smiths Bellows. we ight. The size

of the weight on D depends on the air pressure required. For instance, if a blast pressure of half a pound per square inch is wanted and the boards are 18 in. in diameter, and therefore have an area of 254 sq. in., on each of the 254 sq. in. there is to be a pressure of half a pound, so that the weight to balance this must be half multiplied by 254, or 127 lb. The diameter of the air-pipe can be varied to suit the required conditions. Instead of bellows with flexible sides, a sliding arrangement is sometimes used; this consists of what are really two boxes fitting into one another with the open sides both facing inwards, as if one were acting as a lid to the other. By having a valve and outlet pipe fitted as in the bellows and sliding them alternately apart and together, an intermittent blast is produced. The chief defect of this arrange- ment is the leakage of air caused by the difficulty in making the joint a sufficiently good fit to be air-tight.

Blowing Engines. — Where larger quantities of air at higher pressures than can conveniently be supplied by bellows are required, as for blast furnaces and the Bessemer process of steel-making, what are termed " blowing engines " are used. The mode of action of a blowing engine is simple. When a piston, accurately fitting a cylinder which has one end closed, is forcibly moved towards the other end, a partial vacuum is formed between the piston and the blank end, and if this space be allowed to communicate with the outer atmosphere air will flow in to fill the vacuum. When the piston has completed its movement or " stroke," the cylinder will have been filled with air. On the return of the piston, if the valve through which the air entered is now closed and a second one communicating with a chamber or pipe is opened, the air in the cylinder is expelled through this second valve. The action is similar to that of the bellows, but is carried out in a machine which is much better able to resist higher pressures and which is more convenient for dealing with large quantities of air. The valves through which the atmosphere or " free " air is admitted are called " admission " or " suction " valves, and those through which the air is driven from the cylinder are the " discharge " or " delivery " valves. Formerly one side only of the blowing piston was used, the engine working " single-acting "; but now both sides of the piston are utilized, so that when it is moving in either direction suction will be taking place on one side and delivery on the other. All processes in connexion with which

blowing engines are used require the air to be above the pressure of the outer atmosphere. This means that the discharge valves do not open quite at the beginning of the delivery stroke, but remain closed until the air in the cylinder has been reduced in volume and so increased in pressure to that of the air in the discharge chamber.

The power used to actuate these blowing-engines is in most cases steam, the steam cylinder being placed in line or " tandem " with the air cylinder, so that the steam piston rod is continuous with or directly joined to the piston rod of the air cylinder. This plan is always adopted where the cylinders are placed horizontally, and often in the case of vertical engines. The engines are generally built in pairs, with two blowing cylinders and one high-pressure and one low-pressure steam cylinder, the piston rods terminating in connecting rods which are attached to the pins of the two cranks on the shaft. In the centre of this shaft, midway between the two engines, there is usually placed a heavy flywheel which helps to maintain a uniform speed of turning. Some of the largest blowing engines built in. Great Britain are arranged as beam engines; that is to say, there is a heavy rocking beam of cast iron which in its middle position is horizontal. One end of this beam is linked by a short connecting rod to the end of the piston rod of the blowing cylinder, while the other end is similarly linked to the top of the steam piston rod, so that as the steam piston comes up the air piston goes down and vice versa. At the steam end of the beam a third connecting rod works the crank of a flywheel shaft.

About the end of the 19th century an important development took place which consisted in using the waste gas from blast furnaces to form with air an explosive mixture, and employing this mixture to drive the piston of the actuating cylinder in precisely the same manner as the explosive mixture of coal gas and air is used in a gas engine. Since the majority of blowing engines are used for providing the air required in iron blast furnaces, considerable saving should be effected in this way, because the gas which escapes from the top of the furnace is a waste product and costs nothing to produce.

The general action of a blowing engine may be illustrated by the sectional view shown' on fig. 3, which represents the

Fig. 3. — Section of Cylinder of Early Blowing Engine (1851).

internal view of one of the blowing cylinders of the engines erected at the Dowlais Ironworks as far back as 185 1. Many of the details are now obsolete, but the general scheme is the same as in all blowing engines. Here A is the air cylinder; in this is a piston whose rod is marked R; this piston is usually made air-tight by some form of packing fitted into the groove which runs round its edge. In this particular case the cylinder is placed vertically and its piston rod is actuated from the end of a rocking beam. The top and bottom ends are closed by covers and in these

are a number of openings controlled by valves opening inwards so that air can flow freely in but cannot return. The piston is shown moving downwards. Air is now being drawn into the space above the piston through the valves v at the top, and the air in the space A below the piston, drawn in during the previous up-stroke, is being expelled through the valve 1/ into the discharge chamber B, thence passing to the outlet pipe O. The action is reversed on the up-stroke. Thus it will be seen that air is being delivered both during the up-stroke and the down-stroke, and therefore flows almost continuously to the furnaces. There must, however, be momentary pauses at the ends of the strokes when the direction of movement is changed, and as the piston, though worked from an evenly rotating crank shaft, moves more quickly at the middle and slows down to no speed at the ends of its travel, there must be a considerable variation in the speed of

Fig. 4. — Vertical Section of Lackenby Blowing Engines (1871).

delivery of the air. The air is therefore led from O into a large storage chamber or reservoir, whence it is again taken to the furnace; if this reservoir is made sufficiently large the elasticity of the air in it will serve to compensate for the irregularities, and a nearly uniform stream of air will flow from it. The valves used in this case and in most of the older blowing engines consist of rectangular metal plates hinged at one of the longer edges; these plates are faced with leather or indiarubber so as to allow them to come to rest quietly and without clatter and at the same time to make them air-tight. It will be seen that some of these valves hang vertically and others lie flat on the bottom of the cover. The Dowlais cylinder is very large, having a diameter of 12 ft. and a piston stroke of 12 ft., giving a discharge of 44,000 cub. ft. of air per minute, at a pressure of 41 lb to the square inch. A later design of blowing engine, built in 1871 for the Lackenby iron-works, Middlesbrough, is shown in section in fig. 4, and is of a type which is still the most common, especially in the north of England. Here A, the high-pressure steam cylinder,

and C, the low-pressure one, are placed in tandem with the air cylinders B, B, whose pistons they actuate. In these blowing cylinders

the inlet valves in the bottom are circular disk valves of leather, eighteen in number; the inlet valves T on the top of the cylinder are arranged in ten rectangular boxes, having openings in their vertical sides, inside which are hung leather flap valves. The outlet valves O are ten in number at each end of the cylinders, and are hung against flat gratings which are arranged round the circumference. The blast is delivered into a wrought iron casing M which surrounds the cylinder. The combined area of the inlet valves is 860 sq. in., or one-sixth the area of the piston. The speed is twenty-four revolutions per minute and the air delivered at this speed is 15,072 cubic ft. per minute, the horse-power in the air cylinders being 258. The circulating pump E, air pump F, and feed pumps G, G, are worked off the cross-head on the low-pressure side.

A more modern form of blowing engine erected at the Dowlais works about the end of the 19th century, may be taken as typical of the present design of vertical blowing engine in use in Great Britain. The two air cylinders are placed below and in tandem with the steam cylinders as in the last case. The piston rods also terminate in connecting rods working on to the crank shaft. The air cylinders are each 88 in. in diameter, and the high and low pressure cylinders of the compound steam engine are 30 in. and 64 in. respectively, while the common stroke of all four is 60 in. The pressure of the air delivered varies from 45 to 10 lb per sq. in. and the quantity per minute is 25,000 cub. ft. Each engine develops about 1200 horse-power. It is to be noted that flap valves such as those used in the 1851 Dowlais engine have in most cases given place to a larger number of circular steel disk valves, held to their seats by springs.

In a large blowing engine built in 1905 by Messrs Davy Bros, of Sheffield for the North-Eastern Steel Company at Middles- brough (see Engineering, January 6, 1905) the same arrangement was adopted as in that just described. The two air cylinders are each 90 in. diameter and have a stroke of' 72 in. The capacity of this engine is 52,000 cub. ft. of air per minute, delivered at a pressure of from 12! to 15 lb per sq. in. when running at a speed of thirty-three revolutions per minute. The air valves consist of a large number of steel disks resting on circular seatings and held down by springs, which for the delivery valves are so adjusted in strength that they lift and release the air when the desired working pressure has been reached. It is worthy of note that in this engine no attempt is made to make the air pistons air-tight in the usual way by having packing rings set in grooves round the edge, but the piston is made deeper than usual and turned so as to be a very good fit in the cylinder and one or two small grooves are cut round the edge to hold the

lubricant.

To illustrate a blowing engine driven by a gas engine supplied with blast furnace gas, fig. 5 gives a diagram- matic view of the blowing cylinder of an engine built by Messrs Richardsons, Westgarth & Co. of Mid- dlesbrough about 1905. The gas cylinder is not shown. It will be seen that the air cylinder is horizontal, and it is arranged to work in tandem with the gas motor cylinder. The chief point of interest is to be found in the arrangement of the details of the air cylinder. Its diameter is 86J in. and the length of piston stroke 55 in. As to the arrangement of the valves, if the piston be moving in the direction shown, on the left side of the piston at A air is being discharged, and follows the course indicated by the arrows, so as first to pass into the annular chamber which forms a continuation of the

Fig. 5. — Richardsons, Westgarth & Co.'s Blowing Engine.

space A, and thence, through the spring-controlled steel disk valves v', into the discharge chamber C, which ultimately leads to the blast pipe. It will be seen that the valves v on the other side of the annular chamber are closed. At the same time a partial vacuum is being formed in the space B, to be filled by the inflow of air through the valves v which are now open, the corresponding discharge valves v' being closed. These valves on the inside and outside of the annular spaces referred to are arranged so as to form a circle round the ends of the barrel of the cylinder. The free air, instead of being drawn into the valves v direct from the air of the engine house, is taken from an enclosed annular chamber E, which may be in communication with the clean, cool air outside. It will be seen that the piston is made deep so as to allow for a long bearing surface in the cylinder. Two metal packing rings are provided to render the piston air- tight. The horse-power of this engine, which is designed on the Cockerell system, is 750.

Air valves of other types than those which have been mentioned have been tried, such as sliding grid valves, rotatory slide valves and piston valves, but it has been found that either flap or disk lift valves are more satisfactory for air on account of the grit which is liable to get between slide valves and their seatings. In some of the blowing engines made by Messrs Fraser & Chalmers (see Engineer, June 15, 1906), sheets of flexible bronze act as flap valves both for admission

and delivery, the part which actually closes the opening being thickened for strength. The pressure of the air supplied by blowing engines depends upon the purposes for which it is to be used. In charcoal furnaces the pressure is very low, being less than 1 lb per sq. in. ; for blast furnaces using coal an average value of 4 lb is common; for American blast furnaces using coke or anthracite coal the pressure is as high as 10 lb; while for the air required in the Bessemer process of steel-making pressures up to 25 or 30 lb per sq. in. are not uncommon. According to British practice one large blowing engine is used to supply several blast furnaces, while in America a number of smaller ones is used, one for each furnace.

Rotary blowers occupy a position midway between blowing engines and fan blowers, being used for purposes requiring the delivery of large volumes of air at pressures lower than those of blowing engines, but higher than those of fan blowers. The blowing engine draws in, compresses and delivers its air by the direct action of air-tight pistons; the same effect is aimed at in a

rotary blower with the difference that the piston revolves instead of moving up and down a cylinder. Two of the best- known machines of this kind are Roots' and Baker's, both American devices. The mode of action of Roots' blower, as made by Messrs Thwaites Bros, of Bradford, will be clear from the sec- tion shown on fig. 6. The moving parts work in a closed casing B, which con- sists of half-cylin-

Fig. 6.— Thwaites' Improved Roots' Blower, drical curved plates

placed a little more than their own radius apart, the ends being enclosed by two plates. Within the casing, and barely touching the curved part of the casing and each other, revolve two parts C, D, called " revolvers," the speed of rotation of which is the same, but the direction opposite. They are compelled to keep their proper relative positions by a pair of equal spur wheels

fixed on the ends of the shafts on which they run. The free air enters the casing through a wire screen at A and passes into the space E.

As the space E increases in volume owing to the movement of the revolvers, air is drawn in; it is then imprisoned between D and the casing, as shown at G, and is carried round until it is free to enter F, from which it is in turn expelled by the lessening of this space as the lower ends of the revolvers come together. In this way a series of volumes of air is drawn in through A, to be afterwards expelled from

H in an almost perfectly continuous stream, this result being brought about by the relative variation in volume of the spaces E, F and G. In their most improved form the revolvers are made hollow, of cast iron, and accurately machined to a form such that they always keep close to one another and to the end casing without actually touching, there being never more space for the escape of air than -gˆnd of an inch. Machines after this design are made from the smallest size, delivering 25 cub. ft., to the largest, with a capacity of 25,000 cub. ft. per minute working up to a pressure of 3 lb per sq. in. It is not found economical to attempt to work at higher pressures, as the leakage between the revolvers and the casing becomes too great; where a higher pressure is desired two or more blowers can be worked in series, the air being raised in pressure by steps. A blower using 1 H.P. will deliver 350 cub. ft. of air per minute and one using 2J H.P. will deliver 800 cub. ft., at a pressure suitable for smiths' fires. At the higher pressure required for cupola work — somewhere about f lb per sq. in. — 6| H.P. will deliver 1300, and 123 H.P. 25,000 cub. ft. per minute. In the Baker blower three revolvers are used — a large one which acts as the rotating piston and two smaller ones forming air locks or valves.

Rotary Fans. — Now that power for driving them is so generally available, rotary blowing fans have for many purposes taken the place of bellows. They are used for blowing smiths' fires, for supplying the blast for iron melting cupolas and furnaces and the forced draught for boiler fires, and for any other purpose requiring a strong blast ef air. Their construction will be clear from the two views (figs. 7 and 8) of the form made by Messrs Gunther of Oldham, Lancashire. The fan consists of a circular casing A having the general appearance of a snail shell. Within this casing revolves a series of vanes B — in this case five — curved as shown, and attached together so as to form a wheel whose centre is a boss or hub. This boss is fixed to a shaft or spindle which revolves in bearings supported on brackets outside the casing. As the shaft is rotated, the vanes B are compelled to revolve in the direction indicated by the arrow on fig. 7, and their rotation causes the air within the casing to rotate also. Thus a centri- fugal action is set up by which there is a diminution d pressure at the centre of the fan and an increase against the outer casing. In consequence air is sucked in, as shown by the arrows on fig. 8, through the openings C, C, at the centre of the casing around the spindle. At the same time the air which has been forced towards the outside of the casing and given a rotary motion is expelled from the opening at D (fig. 8). All blowing fans work on the same principle, though differences in detail are

adopted by different makers to meet the variety of conditions under which they are to be used. Where the fan is to be employed for producing a delivery or blast of air the opening D is connected to an air pipe which serves to transmit the current of air, and C is left open to the atmosphere; when, however, the main object is suction, as in the case where the fan is used for ventilation, the aperture C is connected through a suction pipe with the space to be exhausted, D being usually left open. Gunther fans range in size from those which have a diameter of fan disk of 8 in. and make 5500 revolutions per minute, to those which have a dia- meter of 50 in. and run at from 950 to 1200 revolutions per minute. For exhausting the fans are run less quickly than for blowing, the speed for a fan of 10 in. diameter being 4800 revolutions for blowing and 3300-4000 for exhausting, while the 50-in. fan only runs at 550-700 when exhausting. These two exhausting fans remove 400-500 and 12,000-15,000 cub. ft. of air per minute respectively.

The useful effect of rotary fans, that is to say the proportion of the total power used to drive the fan which is actually utilized in producing the current of air, is very low for the smaller sizes, but may rise to 30-70% in sizes above 5 ft. in diameter. It has its maximum value for any .given fan at a certain definite speed. Fans are most suitable in cases where it is required to move or

Fig. 7. — Giinther's Blowing Fan.

deliver comparatively large volumes of air at pressures which are little above that of the atmosphere. Where the pressure of the current produced exceeds a quarter of a pound on the square inch the waste of work becomes so great as to preclude their use. The fan is not the most economical form of blower, but it is simple and inexpensive, both in first cost and in maintenance. The largest fans are used for ventilating purposes, chiefly in mines, their diameters rising to 40 or even 50 ft. The useful effect of some of these larger fans, as obtained from experiments, is as

m

Fig. 8. — Giinther's Blowing Fan.

high as 75%- In the case of the Capell fan, which differs from other forms in that it has two series of blades, inner and outer, separated

by a curved blank piece between the inner wings, dipping into the fan inlet, and the outer wings, very high efficien- cies have been obtained, being as great as 90% in some cases. Capell fans are used for ventilating mines, buildings, and ships, and for providing induced currents for use in boiler furnaces. In the larger fans the casing, instead of having a curved section, is more often built of sheet steel and is given a rectangular section at right angles to the periphery. The Sirocco blowing fan, of Messrs Davidson of Belfast, has a larger number of blades,

which are relatively narrow as measured radially, but wide axially. It can be made much smaller in diameter than fans of the older designs for the same output of air — a great advantage for use in ships or in buildings where space is limited — and its useful effect is also said to be superior. (See also Hydraulics, § 213.)

Helical or screw blowers, often called " air propellers," are used where relatively large volumes of air have to be moved against hardly any perceptible difference in pressure, chiefly for purposes of ventilation and drying. Most often the propeller is used to move air from one room or chamber to another adjoining, and is placed in a light circular iron frame which is fixed in a hole in the wall through which the air is to be passed. The propeller itself consists of a series of vanes or wings arranged helically on a revolving shaft which is fixed in the centre of the opening. The centre line of the shaft is perpendicular to the plane of the opening so that when the vanes revolve the air is drawn towards and through the opening and is propelled away from it as it passes through. The action is similar to that of a steamship screw propeller, air taking the place of water. Such blowers are often driven by small electric motors working directly on the end of the shaft. For moving large volumes of air against little pressure and suction they are very suitable, being simpler than fans, cheaper both in first cost and maintenance for the same volume of air delivered, and less likely to fail or get out of order. To obtain the best effect for the power used a certain maximum speed of rotation must not be exceeded; at higher speeds a great deal of the power is wasted. For example, a propeller with a vane diameter of 2§ ft. was found to deliver a volume of air approximately proportional to the speed up to about 700 revolu- tions per minute, when 8000 cub. ft. per minute were passed through the machine; but doubling this speed to 1400 revolutions per minute only increased delivery by 1000 cub. ft. to 9000. At the lower of these speeds the horse-power absorbed was o-6 and at the higher one i-6.

Other Appliances for producing Currents of Air. — In its primitive form the " trompe " or water-blowing engine adopted in Savoy, Carniola, and some parts of America, consists of a long vertical wooden pipe terminating at its lower end in an air chest. Water is allowed to enter the top of the pipe through a conical plug and, falling down in streamlets, carries with it air which is drawn in through sloping holes near the top of the pipe. In this way a quantity of air is delivered into the chamber, its pressure depend- ing on the height through which the water falls. This simple arrangement has been developed for use in compressing large volumes of air at high pressures to be used for driving compressed air machinery. It is chiefly used in America, and provides a simple and cheap means of obtaining compressed air where there is an abundant natural supply of water falling through a consider- able height. The pressure obtained in the air vessel is somewhat less than half a pound per square inch for every foot of fall.

Natural sources of water are also used for compressing and discharging air by letting the water under its natural pressure enter and leave closed vessels, so alternately discharging and drawing in new supplies of air. Here the action is the same as in a blowing engine, the water taking the place of the piston. This method was first thoroughly developed in connexion with the Mt. Cenis tunnel works, and its use has since been extended.

In the jet blower (fig. 9) a jet of steam is used to induce a

gts

Fig. 9. — Steam-jet Blower.

current of air. Into one end of a trumpet-shaped pipe B projects a steam pipe A. This steam pipe terminates in a small opening, say, one-eighth of an inch, through which the steam is allowed to

flow freely. The effect is to cause a movement of the air in the pipe, with the result that a fresh supply is drawn in through the annular opening at C, C, and a continuous stream of air passes along the pipe. This is the form of blower made by Messrs Meldrum Bros, of Manchester, and is largely used for delivering air under the fire bars of boiler and other furnaces. In some cases the jets of steam arc allowed to enter a boiler furnace above the fire, thus inducing a

current of air which helps the chimney draught and is often used to do away with the production of smoke; they are also used for producing currents of air for purposes other than those of boiler fires, and are very convenient where considerable quantities of air are wanted at very low pressures and where the presence of the moisture of the steam does not matter.

Sometimes jets of high-pressure air flowing at great velocities are used to induce more slowly-moving currents of larger volumes of air at low pressures. (W. C. P.)

BELLOY, DORMONT DE, the name assumed by Pierre Laurent Buirette ('1727-1775), French dramatist, was born at Saint-Flour, in Auvergnc, on the 17th of November 1727. He was educated by his uncle, a distinguished advocate in Paris, for the bar. To escape from a profession he disliked he joined a troupe of comedians playing in the courts of the northern sovereigns. In 1758 the performance of his Titus, which had already been produced in St Petersburg, was postponed through his uncle's exertions; and when it did appear, a hostile cabal procured its failure, and it was not until after his guardian's death that de Belloy returned to Paris with Zelmire (1762), a fantastic drama which met with great success. This was followed in 1765 by the patriotic play, Le Siege de Calais. The moment was opportune. The humiliations undergone by France in the Seven Years' War assured a good reception for a play in which the devotion of Frenchmen redeemed disaster. The popular enthusiasm was unaffected by the judgment of calmer critics such as Diderot and Voltaire, who pointed out that the glorification of France was not best effected by a picture of defeat. De Belloy was admitted to the Academy in 1772. His attempt to introduce national subjects into French drama deserves honour, but it must be confessed that his resources proved unequal to the task. The Siege de Calais was followed by Gaston et Bayard (1771), Pedro le cruel (1772) and Gabrielle de Vcrgy (1777). None of these attained the success of the earlier play, and de Belloy's death, which took place on the 5th of March 1775, is said to have been hastened by disappointment.

BELL or INCHCAPE ROCK, a sandstone reef in the North Sea, 11 m. S.E. of Arbroath, belonging to Forfarshire, Scotland. It measures 2000 ft. in length, is under water at high tide, but at low tide is exposed for a few feet, the sea for a distance of 100 yds. around being then only three fathoms deep. Lying in the fair- way of vessels making or leaving the Tay and Forth, besides ports farther north, it was a constant menace to navigation. In the great gale of 1799 seventy sail, including the " York," 74 guns, were wrecked off the

reef, and this disaster compelled the authorities to take steps to protect shipping. Next year Robert Stevenson modelled a tower and reported that its erection was feasible, but it was only in 1806 that parliamentary powers were obtained, and operations began in August 1807. Though John Rennie had meanwhile been associated with Stevenson as consulting engineer, the structure in design and details is wholly Stevenson's work. The tower is 100 ft. high; its diameter at the base is 42 ft., decreasing to 15 ft. at the top. It is solid for 30 ft. at which height the doorway is placed. The interior is divided into six storeys. After five years the building was finished at a cost of £61,300. Since the lighting no wrecks have occurred on the reef. A bust of Stevenson by Samuel Joseph (d. 1850) was placed in the tower.

According to tradition an abbot of Aberbrothock (Arbroath) had ordered a bell — whence the name of the rock — to be fastened to the reef in such a way that it should respond to the movements of the waves, and thus always ring out a warning to mariners. This signal was wantonly destroyed by a pirate, whose ship was afterwards wrecked at this very spot, the rover and his men

being drowned. Southey made the incident the subject of his ballad of "The Inchcape Rock."

BELLUNO (anc. Bellunum), a city and episcopal see of Venetia, Italy, the capital of the province of Belluno, N. of Treviso, 54 m. by rail and 28 m. direct. Pop. (1901) town, 6898; com- mune, .19,050. It is situated in the valley of the Piave, at its confluence with the Ardo, 1285 ft. above sea level, among the lower Venetian Alps. It was a Roman municipium. In the middle ages it went through various vicissitudes; it fell under the dominion of Venice in 1511, and remained Venetian until 1797. Its buildings present Venetian characteristics; it has some good palaces, notably the fine early Lombard Renaissance Palazzo dei Rettori, now the seat of the prefecture. The cathe dral, erected after 1517 by Tullio Lombardo, was much damaged by the earthquake of 1873, which destroyed a considerable portion of the town, though the campanile, 217 ft. high, erected in 1732-1743, stood firm. The facade was never finished. Important remains of prehistoric settlements have been found in the vicinity; cf. G. Ghirardini in Notizie degli Scavi, 1883, 27, on the necropolis of Caverzano. (T. As.)

BELMONT, AUGUST (1816-1890), American banker and financier, was born at Alzei, Rhenish Prussia, on the 8th of December 1816. He entered the banking house of the Roth- schilds at Frankfort at the age

of fourteen, acted as their agent for a time at Naples, and in 1837 settled in New York as their American representative. He became an American citizen, and married a daughter of Commodore Matthew C. Perry. He was the consul-general of Austria at New York from 1844 to 1850, when he resigned in protest against Austria's treatment of Hungary. In 1853-1855 he was charge d'affaires for the United States at the Hague, and from 1855 to 1858 was the American minister resident there. In i860 he was a delegate to the Democratic National Convention at Charleston, South Carolina, actively supporting Stephen A. Douglas for the presidential nomination, and afterwards joining those who withdrew to the convention at Baltimore, Maryland, where he was chosen chair- man of the National Democratic Committee. He energetically supported the Union cause during the Civil War, and exerted a strong influence in favour of the North upon the merchants and financiers of England and France. He remained at the head of the Democratic organization until 1872. Fie died in New York on the 24th of November 1890.

His son, Perry Belmont (1851-), was born in New York on the 28th of December 1851, graduated at Harvard in 1872 and at the Columbia Law School in 1876, and practised law in New York for five years. He was a Democratic member of Congress from 1881 to 1889, serving in 1885-1887 as chairman of the committee on foreign affairs. In 1889 he was United States minister to Spain.

Another son, August Belmont (1853-), was born in New York on the 18th of February 1853 and graduated at Harvard in 1873. He succeeded his father as head of the banking house and was prominent in railway finance, and in financing and building the New York subway. In 1904 he was one of the principal supporters of Alton B. Parker for the Democratic presidential nomination, and served as chairman of the finance committee of the Democratic National Committee.

A volume entitled Letters, Speeches and Addresses of August Belmont (the elder) was published at New York in 1890.

BELOIT, a city of Rock county, Wisconsin, U.S.A., situated on the S. boundary of the state, on Rock river, about 91 m. N.W. of Chicago and about 85 m. S.W. of Milwaukee. Pop. (1890) 6315; (1900) 10,436, of whom 1468 were foreign-born; (1910) 15,125. It is served by the Chicago & North- Western, and the Chicago, Milwaukee & St Paul railways, and by an inter-urban electric railway to Janesville, Wisconsin and Rock- ford, Illinois. Beloit is attractively situated on high bluffs on both sides of the river. The city

is the scat of Beloit College, a co-educational, non-sectarian institution, founded under the auspices of the Congregational and Presbyterian churches in 1847, and having, in 1907-1908, 36 instructors and 430 students. It has classical, philosophical (1874) and scientific (1892) courses;

women were first admitted in 1895. The Greek department of the college has supervised since 1895 the public presentation nearly every year of an English version of a Greek play. The river furnishes good water-power, and among the manufactures are wood-working machinery, ploughs, steam pumps, windmills, gas engines, paper-mill machinery, cutlery, flour, ladies' shoes, cyclometers and paper; the total value of the factory product in 1 905 was $4,485,224, 6o – 2% more than in 190c. Beloit, founded by New Englanders in 1838, was chartered as a city in 1856.

BELOMANCY (from Gr. /JeAos, a dart, and navrela, prophecy or divination), a form of divination (q.v.) by means of arrows, practised by the Babylonians, Scythians and other ancient peoples. Nebuchadrezzar (Ezek. xxi. 21) resorted to this practice " when he stood in the parting of the way … to use divination: he made his arrows bright."

BELON, PIERRE (1517-1564), French naturalist, was born about 1517 near Le Mans (Sarthe). He studied medicine at Paris, where he took the degree of doctor, and then became a pupil of the botanist Valerius Cordus (151 5-1 544) at Wittenberg, with whom he travelled in Germany. On his return to France he was taken under the patronage of Cardinal de Tournon, who furnished him with means for undertaking an extensive scientific journey. Starting in 1546, he travelled through Greece, Asia Minor, Egypt, Arabia and Palestine, and returned in 1549. A full account of his travels, with illustrations, was published in 1553. Belon, who was highly favoured both by Henry II. and by Charles IX., was assassinated at Paris one evening in April 1564, when coming through the Bois de Boulogne. Besides the narrative of his travels he wrote several scientific works of considerable value, particularly the Histoire naturelle des estranges poissons (1551), De aquatilibiis (1553), and L'Histoire de la nature des oyseaux (1555), which entitle him to be regarded as one of the first workers in the science of comparative anatomy.

BELFER, a market-town in the mid-parliamentary division of Derbyshire, England, on the river Derwent, 7 m. N. of Derby on the Midland railway. Pop. of urban district (1901), 10,934. The chapel of St John is said to have been founded by Edmund Crouchback, second son of Henry III., about the middle of the 13 th century. There is an Anglican convent of the Sisters of St Lawrence, with orphanage and school. For a considerable period one of the most flourishing towns in the county, Belper owed its prosperity to the establishment of cotton works in 1776 by Messrs Strutt, the title of Baron Belper (cr. 1856), in the Strutt family, being taken from the town. Belper also manu- factures linen, hosiery, silk and earthenware; and after the decline of nail-making, once an important industry, engineering works and iron foundries were opened. The Derwent provides water-power for the cotton-mills. John of Gaunt is said to have been a great benefactor to Belper, and the foundations of a massive building have been believed to mark the site of his residence. A chapel which he founded is incorporated with a modern schoolhouse. The scenery in the neighbourhood of Belper, especially to the west, is beautiful; but there are collieries, lead-mines and quarries in the vicinity of the town.

Belper (Beaurepaire) until 1846 formed part of the parish of Duffield, granted by William I. to Henry de Ferrers, earl of Derby. There is no distinct mention of Belper till 1296, when the manor was held by Edmund Crouchback, earl of Lancaster, who is said to have enclosed a park and built a hunting seat, to which, from its situation, he gave the name Beaurepaire. The manor thus became parcel of the duchy of Lancaster and is said to have been the residence of John of Gaunt. It afterwards passed with Duffield to the Jodrell family. In a great storm in r545, 40 houses were destroyed, and the place was scourged by the plague in 1609.

See C. Willott, Historical Records of Belper.

BELSHAM, THOMAS (1750-1829), English Unitarian minister, was born at Bedford on the 26th of April 1 750. He was educated at the dissenting academy at Daventry, where for seven years he acted as assistant tutor. After three years spent in a charge at Worcester, he returned as head of the Daventry academy, a post which he continued to hold till 1789, when, having adopted

Unitarian principles, he resigned. With Joseph Priestly for colleague, he superintended during its brief existence a new college at Hackney, and was, on Priestly's departure in 1794, also called to the charge of the Gravel Pit congregation. In 1805 he accepted a call to the Essex

Street chapel, where in gradually failing health he remained till his death in 1829. Belsham's first work of importance, Review 0] Mr Wilberforce's Treatise entitled Practical View (1798), was written after his conversion to Unitarianism. His most popular work was the Evidences of Christianity; the most important was his transla- tion and exposition of the Epistles of St Paul (1822). He was also the author of a work on philosophy, Elements of the Philosophy of the Human Mind (1801), which is entirely based on Hartley's psychology. Belsham is one of the most vigorous and able writers of his church, and the Quarterly Review and Gentleman's Magazine of the early years of the 19th century abound in evidences that his abilities were recognized by his opponents.

BELSHAZZAR (6th century B.C.), Babylonian general. Until the decipherment of the cuneiform inscriptions, he was known only from the book of Daniel (v. 2, n, 13, 18) and its reproduction in Josephus, where he is represented as the son of Nebuchad- rezzar and the last king of Babylon. As his name did not appear in the list of the successors of Nebuchadrezzar handed down by the Greek writers, various suggestions were put forward as to his identity. Niebuhr identified him with Evil-Merodach, Ewald with Nabonidos, others again with Neriglissor. The identifica- tion with Nabonidos, the last Babylonian king according to the native historian Berossus, goes back to Josephus. The decipher- ment of the cuneiform texts put an end to all such speculations. In 1854 Sir H. C. Rawlinson discovered the name of Bel-sarra- uzur — " O Bel, defend the king " — in an inscription belonging to the first year of Nabonidos which had been discovered in the ruins of the temple of the Moon-god at Muqayyar or Ur. Here Nabonidos calls him his " first-born son," and prays that " he may not give way to sin," but that " the fear of the great divinity " of the Moon-god may " dwell in his heart." In the contracts and similar documents there are frequent references to Belshazzar, who is sometimes entitled simply " the son of the king."

He was never king himself, nor was he son of Nebuchadrezzar Indeed his father Nabonidos (Nabunaid), the son of Nabu— baladsu-iqbi, was not related to the family of Nebucha.drezzar and owed his accession to the throne to a palace revolution. Belshazzar, however, seems to have had more political and military energy than his father, whose tastes were antiquarian and religious; he took command of the army, living with it in the camp near Sippara, and whatever measures of defence were organized against the invasion of Cyrus appear to have been due to him. Hence Jewish tradition substituted him for his less-known father, and rightly concluded that his death marked the fall of the Babylonian monarchy. We learn from the

Babylonian Chronicle that from the 7th year of Nabonidos (548 B.C.) onwards " the son of the king " was with the army in Akkad, that is in the close neighbourhood of Sippara. This, as Dr Th. G. Pinches has pointed out, doubtless accounts for the numerous gifts bestowed by him on the temple of the Sun-god at Sippara. So late as the 5th of Ab in the 1 7th year of Nabonidos — that is to say, about three weeks after the forces of Cyrus had entered Babylonia and only three months before his death — • we find him paying 47 shekels of silver to the temple on behalf of his sister, this being the amount of " tithe " due from her at the time. At an earlier period there is frequent mention of his trading transactions which were carried out through his house- steward or agent. Thus in 545 B.C. he lent 20 manehs of silver to a private individual, a Persian by race, on the security of the property of the latter, and a year later his house-steward negotiated a loan of 16 shekels, taking as security the produce of a field of corn.

The legends of Belshazzar's feast and of the siege and capture of Babylon by Cyrus which have come down to us from the book of Daniel and the Cyropaedia of Xenophon have been shown by the contemporaneous inscriptions to have been a projection

backwards of the re-conquest of the city by Darius Hystaspis. The actual facts were very different. Cyrus had invaded Babylonia from two directions, he himself marching towards the confluence of the Tigris and Diyaleh, while Gobryas, the satrap of Kurdistan, led another body of troops along the course of the Adhem. The portion of the Babylonian army to which the protection of the eastern frontier had been entrusted was de- feated at Opis on the banks of the Nizallat, and the invaders poured across the Tigris into Babylonia. On the 14th of Tammuz (June), 538 B.C., Nabonidos fled from Sippara, where he had taken his son's place in the camp, and the city surrendered at once to the enemy. Meanwhile Gobryas had been despatched to Babylon, which opened its gates to the invader on the 16th of the month " without combat or battle," and a few days later Nabonidos was dragged from his hiding-place and made a prisoner. According to Berossus he was subsequently appointed governor of Karmania by his conqueror. Belshazzar, however, still held out, and it was probably on this account that Cyrus himself did not arrive at Babylon until nearly four months later, on the 3rd of Marchesvan. On the nth of that month Gobryas was despatched to put an end to

the last semblance of resistance in the country " and the son (?) of the king died." In accordance with the conciliatory policy of Cyrus, a general mourning was proclaimed on account of his death, and this lasted for six days, from the 27th of Ada- to the 3rd of Nisan. Unfortunately the character representing the word " son " is indistinct on the tablet which contains the annals of Nabonidos, so that the reading is not absolutely certain. The only other reading possible, ho vvever, is " and the king died," and this reading is excluded partly by the fact that Nabonidos afterwards became a Persian satrap, partly by the silence which would otherwise be maintained by the " Annals " in regard to the fate of Belshazzar. Considering how important Belshazzar was politically, and what a prominent place he occupied in the history of the period, such a silence would be hard to explain. His death subsequently to the surrender of Babylon and the capture of Nabonidos, and with it the last native effort to resist the invader, would account for the position he assumed in later tradition and the substitution of his name for that of the actual king.

See Th. G. Pinches, ,_ P.S.B .A., May 1884; H. Winckler, Zeit-schriftfur Assyriologie, ii. 2, 3 (1887) ; Records of the Past, new series, i. pp. 22-31 (1888); A. H. Sayce, The Higher Criticism, pp. 497-537 (1893)- (A- H. S.)

BELT, THOMAS (1832-1878), English geologist and naturalist, was born at Newcastle-on-Tyne in 1832, and educated in that city. As a youth he became actively interested in natural history through the Tyneside Naturalists' Field Club. In 1852 he went to Australia and for about eight years worked at the gold-diggings, where he acquired a practical knowledge of ore- deposits. In i860 he proceeded to Nova Scotia to take charge of some gold-mines, and there met with a serious injury, which led to his return to England. In 1861 he issued a separate work entitled Mineral Veins: an Enquiry into their Origin, founded on a Study of the Auriferous Quartz Veins of A ustralia. Later on he was engaged for about three years at Dolgelly, another though small gold-mining region, and here he carefully investigated the rocks and fossils of the Lingula Flags, his observations being published in an important and now classic memoir in the Geological Maga- zine for 1867. In the following year he was appointed to take charge of some mines in Nicaragua, where he passed four active and adventurous years — the results being given in his Naturalist in Nicaragua (1874), a work of high merit. In this volume the author expressed his views on the former presence of glaciers in that country. In subsequent papers he dealt boldly and sug- gestively with the phenomena of the Glacial period in Britain and in various parts

of the world. After many further expedi- tions to Russia, Siberia and Colorado, he died at Denver on the 21st of September 1878.

BELT (a word common to Teutonic languages, the Old Ger. form being bak, from which the Lat. balteus probably derived), a flat strap of leather or other material used as a girdle (q.v.), especially the cinctura gladii or sword-belt, the chief " ornament

of investiture " of an earl or knight; in machinery, a flexible strap passing round from one drum, pulley or wheel to another, for the purpose of power-transmission(j.i<.). The word is applied to any broad stripe, to the belts of the planet Jupiter, to the armour-belt at the water-line of a warship, or to a tract of country, narrow in proportion to its length, with special dis- tinguishing characteristics, such as the earthquake-belt across a continent.

BELTANE, Beltene, Beltine, or Beal-Tene (Scottish Gaelic, bcalltain), the Celtic name for May-day, on which also was held a festival called by the same name, originally common to all the Celtic peoples, of which traces still linger in Ireland, the Highlands of Scotland and Brittany. This festival, the most important ceremony of which in later centuries was the lighting of the bonfires known as "beltane fires," is believed to represent the Druidical worship of the sun-god. The fuel was piled on a hill-top, and at the fire the beltane cake was cooked. This was divided into pieces corresponding to the number of those present, and one piece was blackened with charcoal. For these pieces lots were drawn, and he who had the misfortune to get the black bit became cailleach bealtine (the beltane carline) — a term of great reproach. He was pelted with egg-shells, and afterwards for some weeks was spoken of as dead. In the north-east of Scotland beltane fires were still kindled in the latter half of the 1 8th century. There were many superstitions connecting them with the belief in witchcraft. According to Cormac, archbishop of Cashel about the year 908, who furnishes in his glossary the earliest notice of beltane, it was customary to light two fires close together, and between these both men and cattle were driven, under the belief that health was thereby promoted and disease warded off. (See Transactions of the Irish Academy, xiv. pp. 100, 122, 123.) The Highlanders have a proverb, " he is between two beltane fires." The Strathspey Highlanders used to make a hoop of rowan wood through which on beltane day they drove the sheep and lambs both at dawn and sunset.

As to the derivation of the word beltane there is considerable obscurity. Following Cormac, it has been usual to regard it as representing a combination of the name of the god Bel or Baal or Bil

with the Celtic teine, fire. And on this etymology theories have been erected of the connexion of the Semitic Baal with Celtic mythology, and the identification of the beltane fires with the worship of this deity. This etymology is now repudiated by scientific philologists, and the New English Dictionary accepts Dr Whitley Stokes's view that beltane in its Gaelic form can have no connexion with teine, fire. Beltane, as the 1st of May, was in ancient Scotland one of the four quarter days, the others being Hallowmas, Candlemas, and Lammas.

For a full description of the beltane celebration in the Highlands of Scotland during the 18th century, see John Ramsay, Scotland and Scotsmen in the 18th Century, from MSS. edited by A. Allardyce (1888) ; and see further J. Robertson in Sinclair's Statistical Account of Scotland, xi. 620; Thomas Pennant, Tour in Scotland (1769-1770) ; W. Gregor, " Notes on Beltane Cakes," Folklore, vi. (1895), p. 2; and " Notes on the Folklore of the North-East of Scotland," p. 167 (Folklore Soc. vii. 1881) ; A. Bertrand, La Religion des Gaulois (1897) ; Jamieson, Scottish Dictionary (1808). Cormac's Glossary has been edited by O'Donovan and Stokes (1862).

BELUGA (Delphinapterus leucas), also called the " white whale," a cetacean of the family Delphinidae, characterized by its rounded head and uniformly light colour. A native of the Arctic seas, it extends in the western Atlantic as far south as the river St Lawrence, which it ascends for a considerable distance. In colour it is almost pure white; the maximum length is about twelve feet; and the back-fin is replaced by a low ridge. Examples have been taken on the British coasts; and individuals have been kept for some time in captivity in America and in London. See Cetacea.

BELVEDERE, or Belvidere (Ital. for " fair- view "), an architectural structure built in the upper part of a building or in any elevated position so as to command a fine view. The belvedere assumes various forms, such as an angle turret, a cupola, a loggia or open gallery. The name is also applied to the whole building, as the Belvedere gallery in the Vatican at Rome. For Apollo Belvidere see Greek Art, Plate II. fig. 55.

BELVIDERE, a city and the county-seat of Boone county, Illinois,

U.S.A., in the N. part of the state, on the Kishwaukee river, about 78 m. N.W. of Chicago. Pop. (1890) 3867; (1900) 6937 (1018 foreign-born); (1910) 7253. It is served by the Chicago & North- Western railway, and by an extensive inter- urban electric system. Among its manufactures are sewing machines, boilers, automobiles, bicycles, roller-skates, pianos, gloves and mittens, corsets, flour and dairy products, Borden's condensed milk factory being located there. Belvidere was settled in 1836, was incorporated in 1852 and was re-incorporated in 1881.

BELZONI, GIOVANNI BATTISTA (1778-1823), Italian explorer of Egyptian antiquities, was born at Padua in 1778. His family was from Rome, and in that city he spent his youth. He intended taking monastic orders, but in 1798 the occupation of the city by the French troops drove him from Rome and lhanged his proposed career. He went back to Padua, where he studied hydraulics, removed in 1800 to Holland, and in 1803 went to England, where he married an Englishwoman. He was 6 ft. 7 in. in height, broad in proportion, and his wife was of equally generous build. They were for some time compelled to find subsistence by exhibitions of feats of strength and agility at fairs and on the streets of London. Through the kindness of Henry Salt, the traveller and antiquarian, who was ever afterwards his patron, he was engaged at Astley's amphitheatre, and his circumstances soon began to improve. In 181 2 he left England, and after travelling in Spain and Portugal reached Egypt in 181 5, where Salt was then British consul-general. Belzoni was desirous of laying before Mehemet Ali a hydraulic machine of his own invention for raising the waters of the Nile. Though the experiment with this engine was successful, the design was abandoned by the pasha, and Belzoni resolved to continue his travels. On the recommendation of the orientalist, J. L. Burckhardt, he was sent at Salt's charges to Thebes, whence he removed with great skill the colossal bust of Rameses II., commonly called Young Memnon, which he shipped for England, where it is in the British Museum. He also pushed his investiga- tions into the great temple of Edfu, visited Elephantine and Philae, cleared the great temple at Abu Simbel of sand (1817), made excavations at Karnak, and opened up the sepulchre of Seti I. (" Belzoni's Tomb "). He was the first to penetrate into the second pyramid of Giza, and the first European in modern times to visit the oasis of Baharia, which he supposed to be that of Siwa. He also identified the ruins of Berenice on the Red Sea. In 1819 he returned to England, and published in the following year an account of his travels and discoveries entitled Narrative of the Operations and Recent Discoveries within the Pyramids, Temples, Tombs and

Excavations in Egypt and Nubia, b”c. He also exhibited during 1820-1821 facsimiles of the tomb of Seti I. The exhibition was held at the Egyptian Hall, Piccadilly, London. In 1822 Belzoni showed his model in Paris. In 1823 he set out for West Africa, intending to penetrate to Timbuktu. Having been refused permission to pass through Morocco, he chose the Guinea Coast route. He reached Benin, but was seized with dysentery at a village called Gwato, and died there on the 3rd of December 1823. In 1829 his widow published his drawings of the royal tombs at Thebes.

BEM, JOSEF (1795-1850), Polish soldier, was born at Tarnow in Galicia, and was educated at the military school at Warsaw, where he especially distinguished himself in mathematics. Joining a Polish artillery regiment in the French service, he took part in the Russian campaign of 181 2, and subsequently so brilliantly distinguished himself in the defence of Danzig (January-November 1813) that he won the cross of the Legion of Honour. On returning to Poland he was for a time in the Russian service, but lost his post, and his liberty as well for some time, for his outspokenness. In 1825 he migrated to Lemberg, where he taught the physical sciences. He was about to write a treatise on the steam-engine, when the Polish War of Independ- ence summoned him back to Warsaw in November 1830. It was his skill as an artillery officer which won for the Polish general Skrynecki the battle of Igany (March 8, 1831), and he distin-

guished himself at the indecisive battle of Ostrolenka (May 26). He took part in the desperate defence of Warsaw against Prince Paskievich (September 6-7,1831). Then Bern escaped to Paris, where he supported himself by teaching mathematics. In 1833 he went to Portugal to assist the liberal Dom Pedro against the reactionary Dom Miguel, but abandoned the idea when it was found that a Polish legion could not be formed. A wider field for his activity presented itself in 1848. First he attempted to hold Vienna against the imperial troops, and, after the capitulation, hastened to Pressburg to offer his services to Kossuth, first defending himself, in a long memorial, from the accusations of treachery to the Polish cause and of aristocratic tendencies which the more fanatical section of the Polish emigrant Radicals repeatedly brought against him. He was entrusted with the defence of Transylvania at the end of 1848, and in 1849, as the general of the Szeklers (q.v.), he performed miracles with his little army, notably at the bridge of Piski (February 9), where, after fighting all day, he drove back an immense force of pursuers. After recovering Transylvania he was sent to drive the Austrian general Puchner out of the Banat of Temesvar. Bern defeated him at Orsova

(May 16), but the Russian invasion recalled him to Transylvania. From the 1 2th to 22nd of July he was fighting continually, but finally, on the 31st of July, his army was annihilated by overwhelming numbers near Segesvar (Schass- burg), Bern only escaping by feigning death. Yet he fought a fresh action at Gross-Scheueren on the 6th of August, and contrived to bring off the fragments of his host to Temesvar, to aid the hardly-pressed Dembinski. Bern was in command and was seriously wounded in the last pitched battle of the war, fought there on the 9th of August. On the collapse of the rebellion he fled to Turkey, adopted Mahommedanism, and under the name of Murad Pasha served as governor of Aleppo, at which place, at the risk of his life, he saved the Christian population from being massacred by the Moslems. Here he died on the 16th of September 1850. The tiny, withered, sickly body of Bern was animated by an heroic temper. Few men have been so courageous, and his influence was magnetic. Even the rough Szeklers, though they did not understand the language of their " little father," regarded him with superstitious reverence. A statue to his honour has been erected at Maros-Vasarhely, but he lives still more enduringly in the immortal verses of the patriot poet Sandor Petofi, who fell in the fatal action of the 31st of July at Segesvar. As a soldier Bern was remarkable for his excellent handling of artillery and the rapidity of his marches.

See Johann Czetz, Memoiren ilber Bems Feldzug (Hamburg, 1850) ; Kalman Deresenyi, General Bern's Winter Campaign in Transylvania, 1848-1849 (Hung.), (Budapest, 1896). (R. N. B.)

BEMA (Gr.pfj/xa,), in ecclesiastical architecture, the semi- circular recess or exedra, in the basilica, where the judges sat, and where in after times the altar was placed. It generally is roofed with a half dome. The seats, Bpovoi, of the priests were against the wall, looking into the body of the church, that of the bishop being in the centre. The bema is generally ascended by steps, and railed off. In Greece the bema was the general name of any raised platform. Thus the word was applied to the tribunal from which orators addressed assemblies of the citizens at Athens. That in the Pnyx, where the Ecclesia often met, was a stone platform from 10 to 11 ft. in height. Again in the Athenian law court counsel addressed the court from such a platform: it is not known whether each had a separate bema or whether there was only one to which each counsel (? and the witnesses) in turn ascended (cf. W. Wyse in his edition of Isaeus, p. 440). Another bema was the platform on which stood the urns for the reception of the bronze disks (iprjcjjoi.) by means of which at the end of the 4th century the judges recorded their decisions.

BEMBERG, HERMAN (1861-), French musical composer, was born of French parents at Buenos Aires, and studied at the Paris Conservatoire, under Massenet, whose influence, with that of Gounod, is strongly marked in his music. As a composer he is known by numerous songs and pieces for the piano, as well as by his cantata La Mort de Jeanne d 'A re (1 886) , comic opera Le Baiser

de Suzon (1888) and grand opera Elaine (produced at Covent Garden in 1892). Among his songs the dramatic recitative Ballade du Desespere is well known.

BEMBO, PIETRO (1470-1547), Italian cardinal and scholar, was born at Venice on the 20th of May 1470. While still a boy he accompanied his father to Florence, and there acquired a love for that Tuscan form of speech which he afterwards cultivated in preference to the dialect of his native city. Having completed his studies, which included two years' devotion to Greek under Lascaris at Messina, he chose the ecclesiastical profession. After a considerable time spent in various cities and courts of Italy, where his learning already made him welcome, he accompanied Giulio de' Medici to Rome, where he was soon after appointed secretary to Leo X. On the pontiff's death he retired, with impaired health, to Padua, and there lived for a number of years engaged in literary labours and amusements. In 1 5 29 he accepted the office of historiographer to his native city, and shortly afterwards was appointed librarian of St Mark's. The offer of a cardinal's hat by Pope Paul III. took him in 1539 again to Rome, where he renounced the study of classical literature and devoted himself to theology and classical history, receiving before long the reward of his conversion in the shape of the bishoprics of Gubbio and Bergamo. He died on the 18th of January 1547. Bembo, as a writer, is the beau ideal of a purist. The exact imitation of the style of the genuine classics was the highest perfection at which he aimed. This at once prevented the graces of spontaneity and secured the beauties of artistic elaboration. One cannot fail to be struck with the Ciceronian cadence that guides the movement even of his Italian writings.

His works (collected edition, Venice, 1729) include a History of Venice (1551) from 1487 to 1513, dialogues, poems, and what we would now call essays. Perhaps the most famous are a little treatise on Italian prose, and a dialogue entitled Gli Asolani, in which

Platonic affection is explained and recommended in a rather long-winded fashion, to the amusement of the reader who remembers the relations of the beautiful Morosina with the author. The edition of Petrarch's Italian Poems, published by Aldus in 1501, and the Terzerime, which issued from the same press in 1502, were edited by Bembo, who was on intimate terms with the great typographer. See Opere de P. Bembo (Venice, 1729); Casa, Vita di Bembo, in 2nd vol. of his works.

BEMBRIDGE BEDS, in geology, strata forming part of the fluvio-marine series of deposits of Oligocene age, in the Isle of Wight and Hampshire, England. They lie between the Ham- stead beds above and the Osborne beds below. The Bembridge marls, freshwater, estuarine and marine clays and marls (70-120 ft.) rest upon the Bembridge limestone, a freshwater pool deposit (15-25 ft.), with large land snails (Amphidromus and Helices), freshwater snails (Planorbis, Limnaea), and the fruits of Chara. The marls contain, besides the freshwater Limnaea and Unio, such forms as Meretrix, Ostrea and Melanopsis. A thin calcareous sandy layer in this division has yielded the remains of many insects and fossil leaves.

See " Geology of the Isle of Wight," Mem. Geol. Survey, 2nd ed. 1S89.

BEMIS, EDWARD WEBSTER (i860-.), American econo- mist, was born at Springfield, Massachusetts, on the 7th of April i860. He was educated at Amherst and Johns Hopkins University. He held the professorship of history and political economy in Vanderbilt University from 1887 to 1892, was associate professor of political economy in the university of Chicago from 1892 to 1895, and assistant statistician to the Illinois bureau of labour statistics, 1896. In 1901 he became superintendent of the Cleveland water works. He wrote much on municipal government, his more important works being some chapters in History of Co-operation in the United States (1888); Municipal Ownership of Gas in the U.S. (1891); Municipal Monopolies (1899).

BEMONT, CHARLES (1848-), French scholar, was born at Paris on the 16th of November 1848. In 1884 he graduated with two theses, Simon de Montfort and La Condamnation de Jean Sansterre (Revue historique, 1886). His Les Charles des liberies anglaises (1892) has an introduction upon the history of Magna Carta, &c, and his History of Europe from 395 to 127°, in

collaboration with G. Monod, was translated into English. He was

also responsible for the continuation of the Gascon Rolls, the publication of which had been begun by Francisquc Michel in 1885 (supplement to vol. L, 1896; vol. ii., for the years 1273-1290, 1900; vol. iii., for the years 1290-1307, 1906). He received the honorary degree of Litt. Doc. at Oxford in 1909.

BEN (from Old Eng. bennan, within), in the Scottish phrase " a but and a ben," the inner room of a house in which there is only one outer door, so that the entrance to the inner room is through the outer, the but (Old Eng. butan, without). Hence " a but and a ben " meant originally a living room and sleeping room, and so a dwelling or a cottage.

BENARES, the Holy City of the Hindus, which gives its name to a district and division in the United Provinces of India. It is one of the most ancient cities in the world. The derivation of its ancient name Varanasi is not known, nor is that of its alter- native name Kasi, which is still in common use among Hindus, and is popularly explained to mean " bright." The original site of the city is supposed to have been at Sarnath, 3! m. north of the present city, where ruins of brick and stone buildings, with three lofty stupas still standing, cover an area about half a mile long by a quarter broad. Sakya Muni, the Buddha, came here from Gaya in the 6th century B.C. (from which time some of the remains may date), in order to establish his religion, which shows that the place was even then a great centre. Hsiian Tsang, the celebrated Chinese pilgrim, visited Benares in the 7th century a.d. and described it as containing 30 Buddhist monasteries, with about 3000 monks, and about 100 temples of Hindu gods. Hinduism has now supplanted Buddhism, and the Brahman fills the place of the monk. The modern temples number upwards of 1 500. Even after the lapse of so great a time the city is still in its glory, and as seen from the river it presents a scene of great picturesqueness and grandeur. The Ganges here forms a fine sweep of about 4 m. in length, the city being situated on the outside of the curve, on the northern bank of the river, which is higher than the other. Being thus elevated, and extending along the river for some 4 m., the city forms a magnificent panorama of buildings in many varieties of oriental architecture. The minarets of the mosque of Aurangzeb rise above all. The bank of the river is entirely lined with stone, and there are many very fine ghats or landing-places built by pious devotees, and highly ornamented. These are generally crowded with bathers and worshippers, who come to wash away their sins in the sacred river Ganges. Near the Manikarnika ghat is the well held to have been dug by Vishnu and filled with his sweat; great numbers of pilgrims bathe in its venerated water. Shrines and

temples line the bank of the river. But in spite of its fine appearance from the river, the architecture of Benares is not distinguished, nor are its buildings of high antiquity. Among the most conspicuous of these are the mosque of Aurangzeb, built as an intentional insult in the middle of the Hindu quarter; the Bisheshwar or Golden Temple, important less through architectural beauty than through its rank as the holiest spot in the holy city; and the Durga temple, which, like most of the other principal temples, is a Mahratta building of the 17th century. The temples are mostly small and are placed in the angles of the streets, under the shadow of the lofty houses. Their forms are not ungraceful, and many of them are covered over with beautiful and elaborate carvings of flowers, animals and palm branches. The observatory of Raja Jai Singh is a notable building of the year 1693. The internal streets of the town are so winding and narrow that there is not room for a carriage to pass, and it is difficult to penetrate them even on horseback. The level of the roadway is considerably lower than the ground-floors of the houses, which have generally arched rooms in front, with little shops behind them; and above these they are richly embellished with verandahs, galleries, projecting oriel windows, and very broad overhanging eaves supported by carved brackets. The houses are built of chanar stone, and are lofty, none being less than two storeys high, most of them three, and several of five or six storeys. The Hindus are fond of paint- ing the outside of their houses a deep red colour, and of covering

the most conspicuous parts with pictures of flowers, men, women, bulls, elephants and gods and goddesses in all the many forms known in Hindu mythology.

Benares is bounded by a road which, though 50 m. in circuit, is never distant from the city more than five kos (7-3- m.); hence its name, Panch-kos road. All who die within this boundary, be they Brahman or low caste, Moslem or Christian, are sure of admittance into Siva's heaven. To tread the Panch-kos road is one of the great ambitions of a Hindu's life. Even if he be an inhabitant of the sacred city he must traverse it once in the year to free himself from the impurities and sins contracted within the holy precincts. Thousands from all parts of India make the pilgrimage every year. Benares, having from time immemorial been a holy city, contains a vast number of Brah- mans, who either subsist by charitable

contributions, or are supported by endowments in the numerous religious institutions of the city. Hindu religious mendicants, with every conceivable bodily deformity, line the principal streets on both sides. Some have their legs or arms distorted by long continuance in one position; others have kept their hands clenched until the finger nails have pierced entirely through their hands. But besides an immense resort to Benares of poor pilgrims from every part of India, as well as from Tibet and Burma, numbers of rich Hindus in the decline of life go there for religious salvation. These devotees lavish large sums in indiscriminate charity, and it is the hope of sharing in such pious distributions that brings together the concourse of religious mendicants from all quarters of the country.

The city of Benares had a population in 1901 of 209,3.31. The European quarter lies to the west of the native town, on both sides of the river Barna. Here is the cantonment of Sikraul, no longer of much military importance, and the suburb of Sigra, the seat of the chief missionary institutions. The principal modern buildings are the Mint, the Prince of Wales' hospital (commemorating the visit of King Edward VII. to the city in 1876) and the town hall. The Benares college, including a first- grade and a Sanskrit college, was opened in 1791, but its fine buildings date from 1852. The Central Hindu College was opened in 1898. Benares conducts a flourishing trade by rail and river with the surrounding country. It is the junction between the Oudh & Rohilkhand and East Indian railways, the Ganges being crossed by a steel girder bridge of seven spans, each 350 ft. long. The chief manufactures are silk brocades, gold and silver thread, gold filigree work, German-silver work, embossed brass vessels and lacquered toys; but the brasswork for which Benares used to be famous has greatly degenerated.

The Hindu kingdom of Benares is said to have been founded by one Kas Raja about 1200 B.C. Subsequently it became part of the kingdom of Kanauj, which in a.d. 1193 was conquered by Mahommed of Ghor. On the downfall of the Pathan dynasty of Delhi, about a.d. 1599, it was incorporated with the Mogul empire. On the dismemberment of the Delhi empire, it was seized by Safdar Jang, the nawab wazir of Oudh, by whose grandson it was ceded to the East India Company by the treaty of 1775. The subsequent history of Benares contains two important events, the rebellion of Chait Singh in 1781, occa- sioned by the demands of Warren Hastings for money and troops to carry on the Mahratta War, and the Mutiny of 1857, when the energy and coolness of the European officials, chiefly of General Neill, carried the district successfully through the storm.

The District of Benares extends over both sides of the Ganges and has an area of 1008 sq. m. The surface of the country is remarkably level, with numerous deep ravines in the calcareous conglomerate. The soil is a clayey or a sandy loam, and very fertile except in the Usar tracts, where there is a saline efflorescence. The principal rivers are the Ganges, Karamnasa, Gumti and Barna. The principal crops are barley, rice, wheat, other food-grains, pulse, sugar-cane and opium. The main line of the East Indian railway runs through the southern portion of the district, with a branch to Benares city; the Oudh & Rohilkhand railway through the northern portion, starting from the city; and a branch of the Bengal & North- Western railway

also terminates at Benares. The climate of Benares is cool in winter but very warm in the hot season. The population in 1901 was 882,084, showing a decrease of 4% in the decade due to the effects of famine.

The Division of Benares has an area of 10,431 sq. m., and comprises the districts of Benares, Mirzapur, Jaunpur, Ghazipur and Ballia. In 1901 the population was 5,069,020, showing a decrease of 6 % in the decade.

See E. B. Havell, Benares (1906) ; M. A. Sherring, The Sacred City of the Hindus (1868).

BENBOW, JOHN (1653-1702), English admiral, the son of a tanner in Shrewsbury, was born in 1653. He went to sea when very young, and served in the navy as master's mate and master, from 1678 to 1681. When trading to the Mediterranean in 1686 in a ship of his own he beat off a Salli pirate. On the accession of William III. he re-entered the navy as a lieutenant and was rapidly promoted. It is probable that he enjoyed the protection of Arthur Herbert, earl of Torrington, under whom he had already served in the Mediterranean. After taking part in the bombardment of St Malo (1693), and superintending the blockade of Dunkirk (1696), he sailed in 1698 for the West Indies, where he compelled the Spaniards to restore two vessels belonging to the Scottish colonists at Darien (see Pater son, William) which they had seized. On his return he was appointed vice-admiral, and was frequently consulted by the king. In 1 701 he was sent again to the West Indies as commander-in-chief. On the 19th of August 1702, when cruising with a squadron of seven ships, he sighted, and chased, four French vessels commanded by M. du Casse near Santa Marta. The engagement is the most disgraceful episode in English naval history. Benbow's captains were mutinous, and he was left unsupported in his flagship the " Breda." His right leg

was shattered by a chain-shot, despite which he remained on the quarter-deck till morning, when the flagrant disobedience of the captains under him, and the disabled condition of his ship, forced him reluctantly to abandon the chase. After his return to Jamaica, where his subordinates were tried by court-martial, he died of his wounds on the 4th of November 1702. A great deal of legendary matter has collected round his name, and his life is really obscure.

See Yonge's Hist, of the British Navy, vol. i.; Campbell's British Admirals, vol. iii. ; also Owen and Blakeway's History of Shrewsbury.

BENCE-JONES, HENRY (1814-1873), English physician and chemist, was born at Thorington Hall, Suffolk, in 1814, the son of an officer in the dragoon guards. He was educated at Harrow and Trinity College, Cambridge, Subsequently he studied medicine at St George's hospital, and chemistry at University College, London. In 1841 he went to Giessen in Germany to work at chemistry with Liebig. Besides becoming a fellow, and after- wards senior censor, of the Royal College of Physicians, and a fellow of the Royal Society, he held the post of secretary to the Royal Institution for many years. In 1846 he was elected physician to St George's hospital. He died in London on the 20th of April 1873. Dr Bence-Jones was a recognized authority on diseases of the stomach and kidneys. He wrote, in addition to several scientific books and a number of papers in scientific periodicals, The Life and Letters of Faraday (1870).

BENCH (an O.E. and Eng. form of a word common to Teutonic languages, cf. Ger. Bank, Dan. baenk and the Eng. doublet " bank "), a long narrow wooden seat for several persons, with or without a back. While the chair was yet a seat of state or dignity the bench was ordinarily used by the commonalty. It is still extensively employed for other than domestic purposes, as in schools, churches and places of amusement. Bench or Banc, in law, originally was the seat occupied by judges in court; hence the term is used of a tribunal of justice itself, as the King's Bench, the Common Bench, and is now applied to judges or magistrates collectively as the "judicial bench," "bench of magistrates." The word is also applied to any scat where a number of people sit in an official capacity, or as equivalent to the dignity itself, as " the civic bench," the " bench of aldermen," the " episcopal bench," the " front bench," i.e. that reserved for the leaders of either party in the British House of Commons. King's Bench

(g.v.) was one of the three superior courts of common law at Westminster, the others being the common pleas and the ex- chequer. Under the Judicature Act 1873, the court of king's bench became the king's bench division of the High Court of Justice. The court of common pleas was sometimes called the common bench.

Sittings in banc were formerly the sittings of one of the superior courts of Westminster for the hearing of motions, special cases, &c, as opposed to the nisi prius sittings for trial of facts, where usually only a single judge presided. By the Judicature Act 1873 the business of courts sitting in banc was transferred to divisional courts.

BENCH-MARK, a surveyor's mark cut in stone or some durable material, to indicate a point in a line of levels for the determination of altitudes over a given district. The name is taken from the " angle-iron " which is inserted in the horizontal incision as a " bench " or support for the levelling staff. The mark of the " broad-arrow " is generally incised with the bench-mark so that the horizontal bar passes through its apex.

BENCH TABLE (Fr. banc; Ital. sedile; Ger. Bank), the stone seat which runs round the walls of large churches, and sometimes round the piers; it very generally is placed in the porches.

BEND. (1) (From Old Eng. bendan), a bending or curvature, as in " the bend of a river," or technically the ribs or " wales " of a ship. (2) (From Old Eng. bindan, to bind), a nautical term for a knot, the " cable bend," the " fisherman's bend." (3) (From the Old Fr. bende, a ribbon), a term of heraldry, signifying a diagonal band or stripe across a shield from the dexter chief to the sinister base; also in tanning, the half of a hide from which the thinner parts have been trimmed away, " bend- leather " being the thickest and best sole-leather.

BENDA, the name of a family of German musicians, of whom the most important is Georg (d. 1795), who was a pupil of his eldei brother Franz (1709-1786), C oncer tmeister in Berlin. Georg Benda was a famous clavier player and oboist, but his chief interest for modern musical history lies in his melodramas. Being a far more solid musician than Rousseau he earns the title of the musical pioneer of that art-form {i.e. the accompani- ment of spoken words by illustrative music) in a sense which cannot be claimed for Rousseau's earlier Pygmalion. Benda's first melodrama, Ariadne auf*

Naxos, was written in 1774 after his return from a visit to Italy. He was a voluminous composer, whose works (instrumental and dramatic) were enthusiastically taken up by the aristocracy in the time of Mozart. Mozart's imagination was much fired by Benda's new vehicle for dramatic expression, and in 1778 he wrote to his father with the greatest enthusiasm about a project for composing a duodrama on the model of Benda's Ariadne auf Naxos and Medea, both of which he considered excellent and always carried about with him. He concluded at the time that that was the way the problems of operatic recitative should be solved, or rather shelved, but the only specimen he has himself produced is the wonderful melo- drama in his unfinished operetta, Zaide, written in 1780.

BENDER (more correctly Bendery), a town of Russia, in the government of Bessarabia, on the right bank of the Dniester, 37 m. by rail S.E. of Kishinev. It possesses a tobacco factory, candle-works and brick-kilns, and is an important river port, vessels discharging here their cargoes of corn, wine, wool, cattle, flour and tallow, to be conveyed by land to Odessa and to Yassy in Rumania. Timber also is floated down the Dniester. The citadel was dismantled in 1897. The town had in 1867 a popu- lation of 24,443, an d in 1900 of 33,741, the greater proportion being Jews. As early as the 12th century the Genoese had a settlement on the site of Bender. In 1709 Charles XII., after the defeat of Poltava, collected his forces here in a camp which they called New Stockholm, and continued there till 1713. Bender was taken by the Russians in 1770, in 1789 and in 1806, but it was not held permanently by Russia till 181 2.

BENDIGO (formerly Sandhurst), a city of Bendigo county, Victoria, Australia, 101 m. by rail N.N.W. of Melbourne. Pop. (1901) 31,020. It is the centre of a large gold-field consisting

of quartz ranges, with some alluvial deposits, and many of the mines are deep-level workings. The discovery of alluvial gold in 185 1 brought many immigrants to the district; but the opening up of the quartz reefs in 1872 was the principal factor in the importance of Bendigo. It became a municipality in 1855 and a city in 187 1. It is the seat of Anglican and Roman Catholic bishops. Besides mining, the local industries are the manufacture of Epsom pottery, bricks and tiles, iron-founding, stone-cutting, brewing, tanning and coach-building. The sur- rounding district produces quantities of wheat and fruits for export, and much excellent wine is made.

BENDL, KAREL or Karl (1838-1897), Bohemian composer, was born on the 16th of April 1838 at Prague. He studied at the organ school,

and in 1858 had already composed a number of small choral works. In 1861 his Poletuje holubice won a prize and at once became a favourite with the local choral societies. In 1864 Bendl went to Brussels, where for a short time he held the post of second conductor of the opera. After visiting Amsterdam and Paris he returned to Prague. Here in 1865 he was appointed conductor of the choral society known as Hlakoe, and he held the post until 1879, when Baron Dervies engaged his services for his private band. Bendl's first opera Lejla was successfully produced in 1868. It was followed by Bretislav a Jitka (1870), Stary Zenich, a comic opera (1883), Karel Skreta (1883), Bite Tabora, a prize opera (1892), and Matki Mila (1891). Other operas by Bendl are Indicka prin- cezna, Cernohorci, a prize opera, and the two operas Carovny Kvel and Gina. His ballad Svanda dudak acquired much popularity; he published a mass in D minor for male voices and another mass for a mixed choir; two songs to Ave Maria; a violin sonata and a string quartet in F; and a quantity of songs and choruses, many of which have come to be regarded as national possessions of Bohemia. Bendl died on the 20th of September 1897 at Prague.

BENEDEK, LUDWIG, Ritter von (1804-1881), Austrian general, was born at Odenburg in Hungary on the 14th of July 1804, his father being a doctor. He received his commission in the Austrian army as ensign in 1822, becoming lieutenant in 1825, first lieutenant in 1831 and captain in 1835. He was employed for a considerable time in the general staff, and had risen to the rank of colonel, when he won his first laurels in the suppression of the rising of 1846 in Galicia (see Austria: History). In this campaign his bold leadership in the field and his capacity for organization were so far conspicuous that he was made a Ritter (knight) of the Leopold order by his sovereign, and a freeman {Ehrenburger) by the city of Lemberg. In 1847 he commanded a regiment in Italy, and on the outbreak of war with Sardinia he was placed in command of a mixed brigade, at the head of which he displayed against regular troops the same qualities of un- hesitating bravery and resolution which had given him the victory in many actions with the Galician rebels. His conduct at Curtatone won for him the commandership of the Leopold order, and shortly afterwards the knighthood of the Maria Theresa order. At' the action of Mortara his tactical skill and bravery were again conspicuous, and Radetzky particularly distinguished him in despatches. The archduke Albert, with whom he served, is said to have given him the sword of his father, the great archduke Charles. He was promoted major-general soon after- wards over the heads of several colonels senior to him, and was sent as a brigade commander

to Hungary. Again he was distinguished as a fighting general at Raab, Komorn, Szegedin and many other actions, and was three times wounded. Benedek then received the cross for military merit, and soon afterwards was posted to the staff of the army in Italy. In 1852 he was made lieutenant field marshal, and in 1857 commander successively of the II. , the IV. and the VIII. corps, and also a Geheimrath. In the political crisis of 1854 he had command of a corps in the army of observation under Hess on the Turkish frontier. In the war of 1859 in Italy, Benedek commanded the VIII. corps, and at the battle of Solferino was in command of the right of the Austrian position. That portion of the struggle which was fought out between Benedek and the Piedmontese army is sometimes called

the battle of San Martino. Benedek, with magnificent gallantry, held his own all day, and in the end covered the retreat of the rest of the. Austrian army to the Mincio. His reward was the com- mandership of the order of Maria Theresa, and Vienna and many 'other cities followed the example of Lemberg in 1846. His reputation was now at its highest, and his great popularity was enhanced, in the prevailing discontent with the reactionary and clerical government of previous years, by the fact that he was a Protestant and not of noble birth. He was promoted Feldzeug- meister and in i860 appointed quartermaster-general to the army, and soon afterwards governor-general and commander-in-chief in Hungary, in succession to the archduke Albert. In 1861 he was made commander-in-chief in Venetia and the • adjoining provinces of the empire, and in the following year he received the grand cross of the Leopold order. In 1864 he resigned the quartermaster-generalship and devoted himself exclusively to the command of the army in Italy. In 1861 he had been made a life-member of the house of peers. In 1866 war with Prussia and with Italy became imminent. Benedek was appointed to com- mand the Army of the North against the Prussians, the control of affairs in Italy being taken over by the archduke Albert. For the story of the campaign of Koniggratz, in which the Austrians under Benedek's command were decisively defeated, see Seven Weeks' War. Benedek took over his new command as a stranger to the country and to the troops. Only the personal command of the emperor and the requests of the archduke Albert prevailed upon him to ""sacrifice his honour," as he himself said, in a task for which he felt himself ill prepared. When he took the field his despondency was increased by the passive obstruction which he met with amongst his own officers,

many of whom resented being placed under a man of the middle class instead of the archduke Albert, and by the general state of unpreparedness which he found existing at the front. Further, his own staff was self-willed to the verge of disloyalty, and his assistants, Lieutenant Field Marshal von Henikstein, and Major-General Krismanic in particular, endeavoured to controlBenedek's operations in the spirit of the 18th-century strategists. Under these circumstances, and against the superior numbers, moral and armament of the Prussians, the Austrians were foredoomed to defeat. A series of partial actions convinced Benedek that success was unattainable, and' he telegraphed to the emperor advising him to make peace; the emperor refused on the ground that no decisive battle had been fought; Benedek, thereupon, instead of retreating across the Elbe, determined to bring on a decisive engagement, and took up a position with the whole of his forces near Koniggratz with the Elbe in his rear. Here he was completely defeated by the Prussians on the 3rd of July, but they could not prevent him from making good his retreat over the river in magnificent order on the evening of the battle. He con- ducted the operations of his army in retreat up to the great concentration at Vienna under the archduke Albert, and was then suspended from his command and a court-martial ordered; the emperor, however, in December determined that the inquiry should be stopped. Benedek from this time lived in absolute retirement, and having given his word of honour to the archduke Albert that he would not attempt to rehabilitate himself before the world, he published no defence of his conduct, and even destroyed his papers relating to the campaign of 1866. This attitude of self-sacrificing loyalty he maintained even when on the 8th of November 1866 the official Wiener Zeitung published an article in which he was made responsible for all the disasters of the war. The history of the campaign from the Austrian point of view as at present known leaves much unexplained, and the published material is primarily of a controversial character. The official Osterreichs Kampfe speaks of the unfortunate general in the following terms: " A career full of achievements, distinction and fame deserved a less tragic close. A dispassionate judgment will not forget the ever fortunate and successful deeds which he accomplished earlier in the service of the emperor, and will ensure for him, in spite of his last heavy misfortune (Last) , an honourable memory." Praise of his earlier career could not well be denied, and the officiaj history is careful not to extend its eulogy to cover

the events of 1866; the recognition in these words cannot therefore be set against the general opinion of subsequent critics that Benedek

was the victim of political necessities, perhaps of court intrigues. For the rest of his life Benedek lived at Graz, where he died on the 27 th of April 1881.

See H. Friedjung, Benedeks nachgelassene Papiere (Leipzig, 1901, 3rd and enlarged ed., 1904), and Der Kampf um die Vorherrschafl in Deutschland 1850-1866 (Stuttgart, 1897, 6th ed., 1904) ; v. Schlichtling, Moltke und Benedek (Berlin, 1900), also therewith A. Krauss, Moltke, Benedek und Napoleon (Vienna, 1901); and a roman d. de by Grafin Salburg, entitled Kbnigsglaube (Dresden, 1906). The brief memoir in Allgemeine deutsche Biographie represents the court view of Benedek's case.

BENEDETTI, VINCENT, Count (1817-1900), French diplo- matist, was born at Bastia, in the island of Corsica, on the 29th of April 1817. In the year 1840 he entered the service of the French foreign office, and was appointed to a post under the marquis de la Valette, who was consul-general at Cairo. He spent eight years in Egypt, being appointed consul in 1845; in 1848 he was made consul at Palermo, and in 1851 he accompanied the marquis, who had been appointed ambassador at Constantin- ople, as first secretary. For fifteen months during the progress of the Crimean War he acted as charge d'affaires. In the second volume of his essays he gives some recollections of his experiences in the East, including an account of Mehemet Ali, and a (not very friendly) sketch of Lord Stratford de Redcliffe. In 1855, after refusing the post of minister at Teheran, he was employed in the foreign office at Paris, and acted as secretary to the congress at Paris (1855-1856). During the next few years he was chiefly occupied with Italian affairs, in which he was much interested, and Cavour said of him he was an Italian at heart. He was chosen in 1861 to be the first envoy of France to the king of Italy, but he resigned his post next year on the retirement of E. A. Thouvenel, who had been his patron, when the anti-Italian party began to gain the ascendancy at Paris. In 1864 he was appointed ambassador at the court of Prussia.

Benedetti remained in Berlin till the outbreak of war in 1870, and during these years he played an important part in the diplomatic history of Europe. His position was a difficult one, for Napoleon did not keep him fully informed as to the course of French policy. In 1866, during the critical weeks which followed the attempt of Napoleon to intervene between Prussia and Austria', he accompanied the Prussian headquarters in the advance on Vienna, and during a visit to Vienna he helped to arrange the preliminaries of the armistice signed at Nikolsburg. It was after this that he was instructed to

present to Bismarck French demands for " compensation," and in August, after his return to Berlin, as a result of his discussions with Bismarck a draft treaty was drawn up, in which Prussia promised France her support in the annexation of Belgium. This treaty was never concluded, but the draft, which was in Benedetti's handwriting, was kept by Bismarck and, in 1870, a few days after the outbreak of the war, was published by him in The Times. During 1867 Benedetti was much occupied with the affair of Luxemburg. In July 1870, when the candidature of the prince of Hohenzollern for the throne of Spain became known, Benedetti was instructed by the due de Gramont to present to the king of Prussia, who was then at Ems, the French demands, that the king should order the prince to withdraw, and afterwards that the king should promise that the candidature would never be renewed. This last demand Benedetti submitted to the king in an informal meeting on the promenade at Ems, and the misleading reports of the conversa- tion which were circulated were the immediate cause of the war which followed, for the Germans were led to believe that Benedetti had insulted the king, and the French that the king had insulted the ambassador. Benedetti was severely attacked in his own country for his conduct as ambassador, and the due de Gramont attempted to throw upon him the blame for the failures of French diplomacy. He answered the charges brought against him in a book, Ma Mission en Prusse (Paris, 1871), which still remains one of the most valuable authorities for the study of Bismarck's diplomacy. In this Benedetti successfully defends himself, and shows that he had kept his government well informed; he had

even warned them a year before as to the proposed Hohenzollern candidature. Even if he had been outwitted by Bismarck in the matter of the treaty of 1866, the policy of the treaty was not his, but was that of E. Drouyn de Lluys. The idea of the annexation of part of Belgium to France had been suggested to him first by Bismarck; and the use to which Bismarck put the draft was not one which he could be expected to anticipate, for he had carried on the negotiations in good faith. After the fall of the Empire he retired to Corsica. He lived to see his defence confirmed by later publications, which threw more light on the secret history of the times. He published in 1895 a volume of Essais diplomatiques , containing a full account of his mission to Ems, written in 1873; and in 1897 a second series dealing with the Eastern question. He died on the 28th of March 1900, while on a visit to Paris. He received the title of count from Napoleon.

See Rothan, La Politique Francaise en 1866 (Paris, 1879) > an d L' Affaire de Luxemburg (Paris, 1881); Sorel, Histoire diplomatique (Paris, 1875) ; Sybel, Die Begriindung des deutschen Reiches (Munich, 1889), &c. (J. W. HE.)

BENEDICT (Benedicttjs), the name taken by fourteen of the popes.

Benedict I. was pope from 573 to 578. He succeeded John III., and occupied the papal chair during the incursions of the Lombards, and during the series of plagues and famines which followed these invasions.

Benedict II. was pope from 684 to 685. He succeeded Leo II., but although chosen in 683 he was not ordained till 684, because the leave of the emperor Constantine was not obtained until some months after the election.

Benedict III. was pope from 855 to 858. He was chosen by the clergy and people of Rome, but the election was not confirmed by the emperor, Louis II., who appointed an anti-pope, Anastasius (the librarian). But the candidature of this person, who had been deposed from the presbyterate under Leo IV., was in- defensible. The imperial government at length recognized Benedict and discontinued its opposition, with the result that he was at last successful. The mythical pope Joan is usually placed between Benedict and his predecessor, Leo IV.

Benedict IV. was pope from 900 to 903.

Benedict V. was pope from 964 to 965. He was elected by the Romans on the death of John XII. The emperor Otto I. did not approve of the choice, and carried off the pope to Hamburg, where he died.

Benedict VI. was pope from 972 to 974. He was chosen with great ceremony and installed pope under the protection of the emperor, Otto the Great. On the death of the emperor the turbulent citizens of Rome renewed their outrages, and the pope himself was strangled by order of Crescentius, the son of the notorious Theodora, who replaced him by a deacon called Franco. This Franco took the name of Boniface VII.

Benedict VII. was pope from 974 to 983. He was elected through the intervention of a representative of the emperor, Count Sicco, who drove out the intruded Franco (afterwards Pope Boniface VII.). Benedict governed Rome quietly for nearly nine years, a somewhat

rare thing in those days.

Benedict VIII., pope from 1012 to 1024, was called originally Theophylactus. He was a member of the family of the count of Tusculum, and was opposed by an anti-pope, Gregory, but defeated him with the aid of King Henry II. of Saxony, whom he crowned emperor in 1014. In his pontificate the Saracens began to attack the southern coasts of Europe, and effected a settlement in Sardinia.- The Normans also then began to settle in Italy. In Italy Benedict supported the policy of the emperor, Henry II., and at the council of Pavia (1022) exerted himself in favour of ecclesiastical discipline, then in a state of great decadence.

Benedict IX., pope from 1033 to 1056, son of Alberic, count of Tusculum, and nephew of Benedict VIII., was also called Theophylactus. He was installed pope at the age of twelve through the influence of his father. The disorders of his conduct, though tolerated by the emperors, Conrad II. and Henry III., who were then morally responsible for the pontificate, at length disgusted the Romans, who drove him out in 1044 and appointed

Silvester III. his successor. Silvester remained in the papal chair but a few weeks, as the people of Tusculum quickly recovered their influence and reinstated their pope. Benedict, however, was obliged to bow before the execration of the Romans. He sold his rights, to his godfather, the priest Johannes Gratianus, who' was installed under the name of Gregory VI. (1045). The following year Henry III. obtained at the council of Sutri the deposition of the three competing popes, and replaced them by Suidger, bishop of Bamberg, who took the name of Clement II. But before the close of 1047 Clement II. died, probably from poison administered by Benedict, who was reinstalled for the third time. At last, on the 17th of July 1048, the marquis of Tuscany drove him from Rome, where he was never seen again. He lived several years after his expulsion and appears to have died impenitent.

Benedict X. (Johannes " Mincius," i.e. the lout or dolt, bishop of Velletri) was pope from 1058 to 1059. He was elected on the death of Stephen IX. through the influence of the Roman barons, who, however, had pledged themselves to take no action without Hildebrand, who was then absent from Rome. Hilde- brand did not recognize him, and put forward an opposition pope in the person of Gerard, bishop of Florence (pope as Nicholas II.), whom he supported against the Roman aristocracy. With the help of the Normans, Hildebrand seized the castle of Galeria, where Benedict

had taken refuge, and degraded him to the rank of a simple priest. (L. D.)*

Benedict XL (Niccolo Boccasini), pope from 1303 to 1304, the son of a notary, was born in 1240 at Treviso. Entering the Dominican order in 1254, he became lector, prior of the convent, provincial of his order in Lombardy, and in 1296 its general. In 1298 he was created cardinal priest of Santa Sabina, and in 1300 cardinal bishop of Ostia and Velletri. In 1302 he was papal legate in Hungary. On the 22nd of October 1303 he was unanimously elected pope. He did much to conciliate the enemies made by his predecessor Boniface VIII. , notably France, the Colonnas and King Frederick II. of Sicily; never- theless on the 7th of June 1304 he excommunicated William of Nogaret and all the Italians who had captured Boniface in Anagni. Benedict died at Perugia on the 7th of July 1304; if he was really poisoned, as report had it, suspicion would fall primarily on Nogaret. His successor Clement V. transferred the papal residence to Avignon. Among Benedict's works! are commentaries on part of the Psalms and on the Gospel of 1 Matthew. His beatification took place in 1733.

See C. Grandjean, " Registres de Benoit XI." (Paris, 1883 ff.), Bibliotheque des Ecoles francaises d'Athenes et de Rome.

Benedict XII. (Jacques Fournier), pope from 1334 to 1342, the son of a miller, was born at Saverdun on the Arriege. Enter- ing the Cistercian cloister Bolbonne, and graduating doctor of theology at Paris, he became in 13 n abbot of Fontfroide, in 13 1 7 bishop of Pamiers and in 1326 of Mirepoix. Created cardinal priest of Santa Prisca in 1327 by his uncle John XXII. he was elected his successor on the 20th of December 1334. Benedict made appointments carefully, reformed monastic orders and consistently opposed nepotism. Unable to remove his capital to Rome or to Bologna, he began to erect a great palace at Avignon. In 1336 he decided against a pet notion of John XXII. by saying that souls of saints may attain the fulness of the beatific vision before the last judgment. In 1339 he entered upon fruitless negotiations looking toward the reunion of the Greek and Roman churches. French influence made futile his attempt to come to an understanding with the emperor Louis the Bavarian. He died on the 25th of April 1342.

See the source publications of G. Daumet (Lettres closes, patentes etcuriales, . . . Paris, 1899 ff.), and J. -M.V\&aA{Lettres communes, . . . Paris, 1903 ff.). (W. W. R.)*

Benedict XIII. (Pedro de Luna), (c. 1328-1422 or 1423), anti-pope, belonged to one of the most noble families in Aragon. His high birth, his legal learning— he was for a long time pro fessor of canon law at Montpellier — and the irreproachable purity of his life, recommended him to Pope Gregory XL, who created him cardinal in 1375. Hewas almost the only one who succeeded

in making a firm stand in the tumultuous conclave of 1378; but the deliberation with which he made up his mind as to the validity of the election of Urban VI. was equalled, when he took the side of Clement VII., by the ardour and resourcefulness which he displayed in defending the cause of the pope of Avignon; it was mainly to him that the latter owed his recognition by Castile, Aragon and Navarre. When elected pope, or rather anti pope, by the cardinals of Avignon, on the 28th of September 1394, it was he who by his astuteness, his resolution, and, it may be added, by his unswerving faith in the justice of his cause, was to succeed in prolonging the lamentable schism of the West for thirty years. The hopes he had aroused that, by a voluntary abdication, he would restore unity to the church, were vain: though called upon by the princes of France to carry out his plan, abandoned by his cardinals, besieged and finally kept under close observation in the palace of the popes (1398-1403), he stood firm, and tired out the fury of his opponents. Escaping from Avignon, he again won obedience in France, and his one thought was how to triumph over his Italian rival, if neces- sary, by force. He yielded, however, to the instances of the government of Charles VI., and pretending that he wished to have an interview with Gregory XII., with a view to their simultaneous abdication, he advanced to Savona, and then to Porto Venere. The failure of these negotiations, for which he was only in part responsible, led to the universal movement of indignation and impatience, which ended, in France, in the declaration of neutrality (1408), and at Pisa, in the decree of deposition against the two pontiffs (1409). Benedict XIII., who had on his part tried to call together a council at Perpignan, was by this time recognized hardly anywhere but in his native land, in Scotland, and in the estates of the countship of Armagnac. He remained none the less full of energy and of illusions, repulsed the overtures of Sigismund, king of the Romans, who had come to Perpignan to persuade him to abdicate, and, abandoned by nearly all his adherents, he took refuge in the impregnable castle of Pefliscola, on a rock dominating the Mediterranean (1415). The council of

Constance then deposed him, as a per- jurer, an incurable schismatic and a heretic (26th July 141 7), After struggling with the popes of Rome, Urban VI., Boniface IX., Innocent VII. and Gregory XII., and against the popes of Pisa, Alexander V. and John XXIII., Pedro de Luna, clinging more than ever to that apostolic seat which he still professed not to desire, again took up the struggle against Martin V., although the latter was recognized throughout almost all Christendom, and, before his death (29th November 1422, or 23rd May 1423), he nominated four new cardinals in order to carry the schism on even after him.

See Fr. Ehrle, Archiv fur Lit und Kirchengesch. vols, v., vi., vii. ; N. Valois, La France el le grand schisme d'occident (4 vols., Paris, 1896-1902) ; Fr. Ehrle, " Martin de Alpartils chronica actitatorum temporibus domini Benedicti XIII. "' (Quellen und Forschungen aus dem Geb. der Gesch., Gorres-Gesellschaft, Paderborn, 1906). (N. V.)

Benedict XIII. (Piero Francesco Orsini), pope from 1724 to 1730, at first styled Benedict XIV., was born on the 2nd of February 1649, of the ducal family of Orsini- Gravina. In 1667 he became a Dominican (as Vincentius Maria), studied theology and philosophy, was made a cardinal in 1672 and arch- bishop of Benevento in 1686. Elected pope on the 29th of May 1724, he attempted to reform clerical morals; but neither the decrees of the Latin council (1725) nor his personal precepts had much effect. He confirmed the bull Unigenitus; but, despite the Jesuits, allowed the Dominicans to preach the Augustinian doctrine of grace. State affairs he left entirely to the unpopular Cardinal Nicolo Coscia. He died on the 21st of February 1730. His works were published in 3 vols, at Ravenna in 1728.

Benedict XIV. (Prospero Lorenzo Lambertini), pope from 1740 to 1758, was born at Bologna on the 31st of March 1675. At the age of thirteen he entered the Collegium Clementinum at Rome. He served the Curia in many and important capacities, yet devoted his leisure time to theological and canonistic study. Benedict XIII. made him archbishop of Theodosia in partibus, then of Ancona (1727), and the next year created him cardinal priest. In 1731 Clement XII. translated him to his native city

of Bologna, where as archbishop he was both efficient and popular. He published valuable works, notably De servorum Dei bealificatione et canonizatione, De sacrificio missae, as well as a treatise on the feasts of Christ and the Virgin and of some saints honoured in Bologna. In a conclave which had lasted for months he was elected on the 17th of August 1740 the successor of Clement Xll. Benedict

XIV. was not merely earnest and conscientious, but of incisive intellect, and unfailingly cheerful and witty. In several respects he bettered the economic conditions of the paual states, but was disinclined to undertake the needed thorough- going reform of its administration. In foreign politics he made important concessions to Portugal, Naples, Sardinia, Spain, and was the first pope expressly to recognize the king of Prussia as such. In 1 741 he issued the bull Immensa pastorum principis, demanding more humane treatment for the Indians of Brazil and Paraguay, and in the bulls Ex quo singulari (1742) and Omnium sollicitudinum (1 744) he rebuked the missionary methods of the Jesuits in accommodating their message to the heathen usages of the Chinese and of the natives of Malabar. In accord with the spirit of the age he reduced the number of holy days in several Catholic countries. To the end of his life he kept up his studies and his intercourse with other scholars, and founded several learned societies. His masterpiece, Libri oclo.de synods diocesana, begun in Bologna, appeared during his pontificate. He died on the 3rd of May 1758.

• His works, published in twelve quarto volumes at Rome (1747-1751), appeared in more nearly complete editions at Venice in 1767 and at Pra to, 1839-1846; also Brief e Benedicts XIV., ed. F. X. Kraus (2nd ed., Freiburg, 1888); Benedicti XIV. Papae opera inedita, ed. F. Heiner (Freiburg, 1904). See Herzog-Hauck, Real-encyklopadie, ii. 572 ff. ; Wetzer and Welter, Kirchenlexikon, ii. 317 ff. (W. W. R.)*

BENEDICT OF ALIGNAN (d. 1268), Benedictine abbot of Notre Dame de la Grasse (1224) and bishop of Marseilles (1229), twice visited the Holy Land (1239 and 1260), where he helped the Templars build the great castle of Safet. He founded a short-lived order, the Brothers of the Virgin, suppressed by the touncil of Lyons (1274), and died a Franciscan. His writings include a letter to Innocent IV. and De construclione Castri Saphet (Baluze, Miscellanea, ii.).

BENEDICT OF NURSIA, SAINT (c. 480-c. 544), the patriarch of Western monks. Our only authority for the facts of St Benedict's life is bk. ii of St Gregory's Dialogues. St Gregory declares that he obtained his information from four of St Benedict's disciples, whom he names; and there can be no serious reason for doubting that it is possible to reconstruct the outlines of St Benedict's career (see Hodgkin, Italy and her Invaders, iv. 412). A precise chronology and a pedigree have been supplied for Benedict, according to which he was born in 480, of the great family of the Anicii; but all we know is

what St Gregory tells us, that he was born of good family in Nursia, near Spoleto in Umbria. His birth must have occurred within a few years of the date assigned; the only fixed chronological point is a visit of the Gothic king Totila to him in 543, when Benedict was already established at Monte Cassino and advanced in years {Dial. ii. 14, 15). He was sent by his parents to frequent the Roman schools, but shocked by the prevailing licentiousness he fled away. It has been usual to represent him as a mere boy at this time, but of late years various considerations have been pointed out which make it more likely that he was a young man. He went to the mountainous districts of the Abruzzi, and at last came to the ruins of Nero's palace and the artificial lake at Subiaco, 40 m. from Rome. Among the rocks on the side of the valley opposite the palace he found a cave in which he took up his abode, un- known to all except one friend, Romanus, a monk of a neighbour- ing monastery, who clothed him in the monastic habit and secretly supplied him with food. No one who has seen the spot will doubt that the Sacro Speco is indeed the cave wherein Benedict spent the three years of opening manhood in solitary prayer, contemplation and austerity. After this period of formation his fame began to spread abroad, and the monks of a neighbouring monastery induced him to become their abbot; but their lives were irregular and dissolute, and on his trying to

put down abuses they attempted to poison him. He returned to his cave, but disciples flocked to him, and in time he formed twelve monasteries in the neighbourhood, placing twelve monks in each, and himself retaining a general control over all. In time patricians and senators from Rome entrusted their young sons to his care, to be brought up as monks; in this manner came to him his two best-known disciples, Maurus and Placidus. Driven from Subiaco by the jealousy and molestations of a neighbouring priest, but leaving behind him communities in his twelve monas- teries, he himself, accompanied by a small band of disciples, journeyed south until he came to Cassino, a town halfway between Rome and Naples. Climbing the high mountain that overhangs the town, he established on the summit the monastery with which his name has ever since been associated, and which for centuries was a chief centre of religious life for western Europe. He destroyed the remnants of paganism that lingered on here, and by his preaching gained the rustic population to Christianity. Few other facts of his career are known : there is record of his founding a monastery at Terracina; his death must have occurred soon after Totila's visit in 543.

Rule of St Benedict. — In order to understand St Benedict's character and spirit, and to discover the secret of the success of his institute, it is necessary, as St Gregory says, to turn to his Rule. St Gregory's characterization of the Rule as " conspicuous for its discretion" touches the most essential quality. The re- lation of St Benedict's Rule to earlier monastic rules, and of his institute to the prevailing monachism of his day, is explained in the article Monasticism. Here it is enough to say that no wadays it is commonly recognized by students that the manner of life instituted by St Benedict was not intended to be, and as a matter of fact was not, one of any great austerity, when judged by the standard of his own day (see E. C. Butler, Lausiac History of Palladius, part i. pp. 251-256). His monks were allowed proper clothes, sufficient food, ample sleep. The only bodily austerities were the abstinence from flesh meat and the unbroken fast till mid-day or even 3 p.m., but neither would appear so onerous in Italy even now, as to us in northern climes. Midnight office was no part of St Benedict's Rule: the time for rising for the night office varied from 1.30 to 3.0, according to the season, and the monks had had unbroken sleep for 75 or even 8 hours, except in the hot weather, when in compensation they were allowed the traditional Italian summer siesta after the mid-day meal. The canonical office was chanted throughout, but the directly religious duties of the day can hardly have taken more than 4 or 5 hours — perhaps 8 on Sundays. The remaining hours of the day were divided between work and reading, in the proportion (on the average of the whole year) of about 6 and 4 hours respectively. The " reading " in St Benedict's time was probably confined to the Bible and the Fathers. The " work " contemplated by St Benedict was ordinarily field work, as was natural in view of the conditions of the time and best suited to the majority of the monks ; but the principle laid down is that the monks should do whatever work is most useful. There were from the beginning young boys in the monastery, who were educated by the monks according to the ideas of the time. We have seen St Benedict evangelizing the pagan population round Monte Cassino; and a considerable time each day is assigned to the read- ing of the Fathers. Thus the germs of all the chief works carried on by his monks in later ages were to be found in his own monastery.*

The Rule consists of a prologue and 73 chapters. Though it has resisted all attempts to reduce it to an ordered scheme, and probably was not written on any set plan, still it is possible roughly to indicate its contents: after the prologue and intro- ductory chapter setting forth St Benedict's intention, follow instructions to the abbot on the manner in which he should govern his monastery (2, 3) ; next comes

the ascetical portion of the Rule, on the chief monastic virtues (4-7) ; then the regulations for the celebration of the canonical office, which St Benedict calls " the Work of God " or " the divine work," his monks' first duty, "of which nothing is to take precedence " (8-20); faults and punish- ments (23-30); the cellarer and property of the monastery

BENEDICT, SIR J.

(3 1 ! 3 2) ; community of goods (3$, 34) ; various officials and daily life (21, 22, 35-57); reception of monks (58-61); miscellaneous

(62-73).

The most remarkable chapters, in which St Benedict's wisdom stands out most conspicuously, are those on the abbot (2, 3, 27,64). The abbot is to govern the monastery with full and unquestioned patriarchal authority; on important matters he must consult the whole community and hear what each one, even the youngest, thinks; on matters of less weight he should consult a few of the elder monks; but in either case the decision rests entirely with him, and all are to acquiesce. He must, however, bear in mind that he will have to render an account of all his decisions and to answer for the souls of all his monks before the judgment seat of God. Moreover, he has to govern in accordance with the Rule, and must endeavour, while enforcing discipline and implanting virtues, not to sadden or " overdrive " his monks, or give them cause for " just murmuring." In these chapters pre-eminently appears that element of " discretion," as St Gregory calls it, or humanism as it would now be termed, which without doubt has been a chief cause of the success of the Rule. There is as yet no satisfactory text of the Rule, either critical or manual; the best manual text is Schmidt's editio minor (Regensburg, 1892). Of the many commentaries the most valuable are those of Paulus Diaconus (the earliest, c. 800), of Calmet and of Martene (Migne, Patrol. Lat. lxvi.).

Authorities. — An old English translation of St Gregory's Dialogues is reprinted in the Quarterly Series (Burns & Oates). On St Benedict's life and Rule see Montalembert, Monks of the West, bk. iv. ; Abbate L. Tosti, S. Benedetto (translated 1896); also Indexes to standard general histories of the period; Thomas Hodg- kin's Italy and Her Invaders and Gregorovius' History of the City of Rome may be specially mentioned. But by far the best sum- maries in English are those contained in the relevant portions of F. H. Dudden's Gregory

the Great (1905), i. 107-115, ii. 160-169; on the recent criticism of the text and contents of the Rule, see Otto Zockler, Askese und Monchtum (1897), 355-371 ; and E. C. Butler, articles in Downside Review, December 1899, and Journal of Theo- logical Studies, April 1902. (E. C. B.)

BENEDICT, SIR JULIUS (1804-1885), musical composer, was born in Stuttgart on the 27th of November 1804. He was the son of a Jewish banker, and learnt composition from Hummel at Weimar and Weber at Dresden; with the latter he enjoyed for three years an intimacy like that of a son, and it was Weber who introduced him in Vienna to Beethoven on the 5th of October 1823. In the same year he was appointed Kapellmeister of the Karnthnerthor theatre at Vienna, and two years later (in 1825) he became Kapellmeister of the San Carlo theatre at Naples. Here his first opera, Giacinta ed Ernesto, was brought out in 1829, and another, written for his native city, / Portoghesi in Goa, was given there in 1830; neither of these was a great success, and in 1834 he went to Paris, leaving it in 1835 at the suggestion of Malibran for London, where he spent the remainder of his life. In 1836 he was given the conductorship of an operatic enterprise at the Lyceum Theatre, and brought out a short opera, Un anno ed un giorno, previously given in Naples. In 1838 he became conductor of the English opera at Drury Lane during the period of Balfe's great popularity; his own operas produced there were The Gipsy's Warning (1838), The Bride of Venice (1843), and The Crusaders (1846). In 1848 he conducted Mendelssohn's Elijah at Exeter Hall, for the first appearance of Jenny Lind in oratorio, and in 1850 he went to America as the accompanist on that singer's tour. On his return in 1852 he became musical conductor under Mapleson's management at Her Majesty's theatre (and afterwards at Drury Lane), and in the same year conductor of the Harmonic Union. Benedict wrote recitatives for the production of an Italian version of Weber's Oberon in i860. In the same year was produced his beautiful cantata Undine at the Norwich festival, in which Clara Novello appeared in public for the last time, His best-known opera, The Lily of Killarney, written on the subject of Dion Boucicault's play Colleen Bawn to a libretto by Oxenford, was produced at Covent Garden in 1862. His operetta, The Bride of Song, was brought out there in 1864. St Cecilia, an oratorio, was performed at the Norwich festival in 1886; St Peter at the Birmingham

festival of 1870; Graziella, a cantata, was given at the Birmingham festival of 1882, and in August 1883 was produced in operatic form at the Crystal Palace. Here also a symphony by him was given in 1873. Benedict conducted every Norwich festival from 1845 to 1878 inclusive, and the Liverpool Phil- harmonic Society's concerts from 1876 to 1880. He was the regular accompanist at the Monday Popular Concerts in London from their start, and with few exceptions acted as conductor of these concerts. He contributed an interesting life of Weber to the series of biographies of " Great Musicians." In 1871 he was knighted, and in 1874 was made knight commander of the orders of Franz Joseph (Austria) and Frederick (Wiirttemberg) . He died in London on the 5th of June 1885.

BENEDICT BISCOP (628?-6oo), also known as Biscop Baducing, English churchman, was born of a good Northumbrian family and was for a time a thegn of King Oswiu. He then went abroad and after a second journey to Rome (he made five altogether) lived as a monk at Lerins (665-667). It was under his conduct that Theodore of Tarsus came from Rome to Canter- bury in 669, and in the same year Benedict was appointed abbot of St Peter's, Canterbury. Five years later he built the monastery of St Peter at Wearmouth, on land granted him by Ecgfrith of Northumbria, and endowed it with an excellent library. A papal letter in 678 exempted the monastery from external control, and in 682 Benedict erected a sister foundation (St Paul) at Jarrow. He died on the 12th of January 690, leaving a high reputation for piety and culture. Saxon archi- tecture owes nearly everything to his initiative, and Bede was one of his pupils.

BENEDICTINE, a liqueur manufactured at Fecamp, France. The composition is a trade secret, but, according to Konig, the following are among the substances used in the manufacture of imitations of the genuine article: fresh lemon peel, cardamoms, hyssop tops, angelica, peppermint, thyme, cinnamon, nutmegs, cloves and arnica flowers. (See Fecamp.)

BENEDICTINES, or Black Monks, monks living according to the Rule of St Benedict (q.v.) of Nursia. Subiaco in the Abruzzi was the cradle of the Benedictines, and in that neigh- bourhood St Benedict established twelve monasteries. After- wards giving up the direction of these, he migrated to Monte Cassino and there established the monastery which became the centre whence his Rule and institute spread. From Monte Cassino he founded a monastery at Terracina. These fourteen are the only monasteries of which we have any knowledge as being" founded before St Benedict's death; for the mission of St Placidus to Sicily must certainly be regarded as mere

romance, nor does there seem to be any solid reason for viewing more favourably the mission of St Maurus to Gaul. There is some ground for believing that it was the third abbot of Monte Cassino who began to spread a knowledge of the Rule beyond the circle of St Benedict's own foundations. About 580-590 Monte Cassino was sacked by the Lombards, and the community came to Rome and was established in a monastery attached to the Lateran Basilica, in the centre of the ecclesiastical world. It is now commonly recognized by scholars that when Gregory the Great became a monk and turned his palace on the Caelian Hill into a monastery, the monastic life there carried out was funda- mentally based on the Benedictine Rule (see F. H. Dudden, Gregory the Great, i. 108). From this monastery went forth St Augustine and his companions on their mission to England in 596, carrying their monachism with them; thus England was the first country out of Italy in which Benedictine life was firmly planted. In the course of the 7th century Benedictine life was gradually introduced in Gaul, and in the 8th it was carried into the Germanic lands from England. It is doubtful whether in Spain there were Benedictine monasteries, properly so called, until a later period. In many parts the Benedictine Rule met the much stricter Irish Rule of Columbanus, introduced by the Irish missionaries on the continent, and after brief periods, first of conflict and then of fusion, it gradually absorbed and sup- planted it; thus during the 8th century it became, out of Ireland and other purely Celtic lands, the only rule and form of monastic

life throughout western Europe, — so completely that Charle- magne once asked if there ever had been any other monastic rule.

What may be called the inner side of Benedictine life and history is treated in the article Monasticism; here it is possible to deal only with the broad facts of the external history. The chief external works achieved for western Europe by the Bene- dictines during the early middle ages may be summed up under the following heads.

1. The Conversion of the Teutonic Races. — The tendency of modern historical scholarship justifies the maintenance of the tradition that St Augustine and his forty companions were the first great Benedictine apostles and missioners. Through their efforts Christianity was firmly planted in various parts of England; and after the conversion of the country it was English Benedictines — Wilfrid, Willibrord, Swithbert, Willehad — who evangelized Friesland and Holland; and another, Winfrid or Boniface, who, with his fellow-monks Willibald and others, evangelized the greater part of central Germany and founded and organized the German church.

It was Anschar, a monk of Corbie, who first preached to the Scandinavians, and other Benedictines were apostles to Poles, Prussians and other Slavonic peoples. The conversion of the Teutonic races may properly be called the work of the Benedictines.

2. The Civilization of north-western Europe. — As the result of their missionary enterprises the Benedictines penetrated into all these lands and established monasteries, so that by the 10th or nth century Benedictine houses existed in great numbers throughout the whole of Latin Christendom except Ireland. These monasteries became centres of civilizing influences by the method of presenting object-lessons in organized work, in agriculture, in farming, in the arts and trades, and also in well-ordered life. The unconscious method by which such great results were brought about has been well described by J. S. Brewer (Preface to Works of Giraldus Cambrensis, Rolls Series, iv.) and F. A. Gasquet.

3. Education. — Boys were educated in Benedictine houses from the beginning, but at first they were destined to be monks. The monasteries, however, played a great part in the educational side of the Carolingian revival; and certainly from that date schools for boys destined to live and work in the world were commonly attached to Benedictine monasteries. From that day to this education has been among the recognized and principal works of Benedictines.

4. Letters and Learning. — This side of Benedictine life is most t3ˆpically represented by the Venerable Bede, the gentle and learned scholar of the early middle ages. In those times the monasteries were the only places of security and rest in western Europe, the only places where letters could in any measure be cultivated. It was in the monasteries that the writings of Latin antiquity, both classical and ecclesiastical, were transcribed and preserved.

In a gigantic system embracing hundreds of monasteries and thousands of monks, and spread over all the countries of western Europe, without any organic bond between the different houses, and exposed to all the vicissitudes of the wars and conquests of those wild times, to say that the monks often fell short of the ideal of their state, and sometimes short of the Christian, and even the moral standard, is but to say that monks are men. Failures there have been many, and scandals not a few in Benedictine history; but it may be said with truth that there does not appear to have been ever a period of widespread or universal corruption, however much at times and in places primitive love may have waxed cold. And when such declensions occurred, they soon called forth efforts at reform and

revival; indeed these constantly recurring reform- movements are one of the most striking features of Benedictine history, and the great proof of the vitality of the institute through- out the ages.

The first of these movements arose during the Carolingian revival (c. 800), and is associated with the name of Benedict of Aniane. Under the auspices of Charlemagne and Louis the Pious he initiated a scheme for federating into one great order, with

himself as abbot general, all the monasteries of Charles's empire, and for enforcing throughout a rigid uniformity in observance. For this purpose a synod of abbots was assembled at Aix-la- Chapelle in 817, and a series of 80 Capitula passed, regulating the life of the monasteries. The scheme as a whole was shortlived and did not survive its originator; but the Capitula were com- monly recognized as supplying a useful and much-needed supple- ment to St Benedict's Rule on points not sufficiently provided for therein. Accordingly these Capitula exercised a wide influence among Benedictines even outside the empire. And Benedict of Aniane's ideas of organization found embodiment a century later in the order of Cluny (910), which for a time overshadowed the great body of mere Benedictines (see Cluny) . Here it will suffice to say that the most distinctive features of the Cluny system were (1) a notable increase and prolongation of the church services, which came to take up the greater part of the working day; (2) a strongly centralized government, whereby the houses of the order in their hundreds were strictly subject to the abbot of Cluny.

Though forming a distinct and separate organism Cluny claimed to be, and was recognized as, a body of Benedictine houses; but from that time onwards arose a number of independent bodies, or " orders," which took the Benedictine Rule as the basis of their life. The more important of these were : in the 1 1 th and 1 2th cen- turies, the orders of Camaldulians, Vallombrosians, Fontevrault and the Cistercians, and in the 13th and 14th the Silvestrines, Celestines and Olive tans (see separate articles). The general tendency of these Benedictine offshoots was in the direction of greater austerity of life than was practised by the Black Monks or contemplated by St Benedict's Rule — some of them were semi-eremitical; the most important by far were the Cistercians, whose ground-idea was to reproduce exactly the life of St Benedict's own monastery. These

various orders were also organized and governed according to the system of centralized authority devised by St Pachomius (see Monasticism) and brought into vogue by Cluny in the West. What has here to be traced is the history of the great body of Benedictine monasteries that held aloof from these separatist movements.

For the first four or five centuries of Benedictine history there was no organic bond between any of the monasteries; each house formed an independent autonomous family, managing its own affairs and subject to no external authority or control except that of the bishop of the diocese. But the influence of Cluny, even on monasteries that did not enter into its organism, was enormous; many adopted Cluny customs and practices and moulded their life and spirit after the model it set; and many such monasteries became in turn centres of revival and reform in many lands, so that during the 10th and nth centuries arose free unions of monasteries based on a common observance derived from a central abbey. Fleury and Hirsau are well-known examples. Basing themselves on St Gregory's counsel to St Augustine, Dunstan, yEthelwold and Oswald adopted from the observance of foreign monasteries, and notably Fleury and Ghent, what was suitable for the restoration of English monachism, and so produced the Concordia Regularis, interesting as the first serious attempt to bring about uniformity of observance among the monasteries of an entire nation. In the course of the 1 2th century sporadic and limited unions of Black Monk monasteries arose in different parts. But notwithstanding all these movements, the majority of the great Black Monk abbeys continued to the end of the 1 2th century in their primeval isolation. But in the year 1215, at the fourth Lateran council, were made regulations destined profoundly to modify Benedictine polity and history. It was decreed that the Benedictine houses of each ecclesiastical province should hence-forth be federated for the purposes of mutual help and the maintenance of discipline, and that for these ends the abbots should every third year meet in a provincial chapter (or synod), in order to pass laws binding on all and to appoint visitors who, in addition to the bishops, should canonically visit the monasteries and report on their condition in spirituals and temporals to the ensuing chapter. The English monks took the lead in carrying out this legislation, and in 1 2 18 the first chapter of the province of Canterbury was held at Oxford,, and up to the dissolution under

Henry VIII. the triennial chapters took place with wonderful regularity. Fitful attempts were made elsewhere to carry out the decrees, and in 1336 Benedict XII. by the bull Benediclina tried to give further development to the system and to secure its general

observance. The organization of the Benedictine houses into provinces or chapters under this legislation interfered in the least possible degree with the Benedictine tradition of mutual independence of the houses; the provinces were loose federations of autonomous houses, the legislative power of the chapter and the canonical visitations being the only forms of external interfer- ence. The English Benedictines never advanced farther along the path of centralization; up to their destruction this polity remained in operation among them, and proved itself by its results to be well adapted to the conditions of the Benedictine Rule and life.

In other lands things did not on the whole go so well, and many causes at work during the later middle ages tended to bring about relaxation in the Benedictine houses; above all the vicious system of commendatory abbots, rife everywhere except in England. And so in the period of the reforming councils of Constance and Basel the state of the religious orders was seriously taken in hand, and in response to the public demand for reforming the Church " in head and members," reform movements were set on foot, as among others, so among the Benedictines of various parts of Europe. These movements issued in the congregational system which is the present polity among Benedictines. In the German lands, where the most typical congregation was the Bursfeld Union (1446), which finally embraced over 100 monasteries throughout Germany, the system was kept on the lines of the Lateran decree and the bull Benedictina, and received only some further develop- ments in the direction of greater organization; but in Italy the congregation of S. Justina at Padua (1421), afterwards called the Cassinese, departed altogether from the old lines, setting up a highly centralized government, after the model of the Italian republics, whereby the autonomy of the monas- teries was destroyed, and they were subjected to the authority of a central governing board. With various modifications or restrictions this latter system was imported into all the Latin lands, into Spain and Portugal, and thence into Brazil, and into Lorraine and France, where the celebrated congregation of St Maur (see Maurists) was formed early in the 17th century. During this century the Benedictine houses in many parts of Catholic Europe united themselves into congregations, usually characterized by an austerity that was due to the Tridentine reform movement.

In England the Benedictines had, from every point of view, flourished exceedingly. At the time of the Dissolution there were nearly 300 Black Benedictine houses, great and small, men and women, including most of the chief religious houses of the land (for lists see tables and maps in Gasquet's English Monastic Life, and Catholic

Dictionary, art. " Benedictines "). It is now hardly necessary to say that the grave charges brought against the monks are no longer credited by serious historians (Gasquet, Henry VIII. and the Monasteries; J. Gairdner, Prefaces to the relevant volumes of Calendars of State Papers of Henry VIII.). In Mary's reign some of the surviving monks were brought together, and Westminster Abbey was restored. Of the monks professed there during this momentary revival, one, Sigebert Buckley, lived on into the reign of James I. ; and being the only survivor of the Benedictines of England, he in 1607 invested with the English habit and affiliated to West- minster Abbey and to the English congregation two English priests, already Benedictines in the Italian congregation. By this act the old English Benedictine line was perpetuated; and in 16 19 a number of English monks professed in Spain were aggregated by pontifical act to these representatives of the old English Benedictines, and thus was constituted the present English Benedictine congregation. Three or four monasteries of the revived English Benedictines were established on the continent at the beginning of the 17th century, and remained there till driven back to England by the French Revolution.

The Reformation and the religious wars spread havoc among the Benedictines in many parts of northern Europe; and as a consequence, in part of the rule of Joseph II. of Austria, in part of the French Revolution, nearly every Benedictine monastery in Europe was suppressed — it is said that in the early years of the 19th century scarcely thirty in all survived. But the latter half of the century witnessed a series of remark- able revivals, and first in Bavaria, under the influence of Louis I. The French congregation (which does not enjoy continuity with the Maurists) was inaugurated by Dom Gueranger in 1833, and the German congregation of Beuron in 1863. Two vigorous congregations have arisen in the United States. These are all new creations since 1830. In Italy, Spain, Portugal and Brazil only a few monasteries survive the various revolutions, and in a crippled state; but signs are not wanting of renewed life: St Benedict's own monasteries of Subiaco and Monte Cassino are relatively flourishing. In Austria, Hungary and Switzerland there are some thirty great abbeys, most of which have had a continued existence since the middle ages. The English congregation is composed of three large abbeys (Down- side, Ampleforth and Woolhampton) , a cathedral priory (Here- ford) and a nunnery (Stanbrook Abbey, Worcester): there are besides in

England three or four abbeys belonging to foreign congregations, and several nunneries subject to the bishops. Each congregation has its president, who is merely a president, with limited powers, and not a general superior like the Provincials of other orders; so that the primitive Benedictine principle of each monastery being self-contained and autono- mous is preserved. Similarly each congregation is independent and self-governing, there being no superior-general or central authority, as in other orders. Leo XIII. established an inter- national Benedictine College in Rome for theological studies, and conferred on its abbot the title of " Abbot Primate," with precedence among Black Monk abbots. He is only primus inter pares, and exercises no kind of superiority over the other abbots or congregations. Thus the Benedictine polity may be described as a number of autonomous federations of autonomous monasteries. The individual monks, too, belong not to the order or the congregation, but each to the monastery in which he became a monk. The chief external work of the Benedictines at the present day is secondary education; there are 114 secondary schools or gymnasia attached to the abbeys, wherein the monks teach over 12,000 boys; and many of the nunneries have girls' schools. In certain countries (among them England) where there is a dearth of secular priests, Bene- dictines undertake parochial work.

The statistics of the order (1905) show that of Black Bene- dictines there are over 4000 choir-monks and nearly 2000 lay brothers — figures that have more than doubled since 1880. If the Cistercians and lesser offshoots of the order be added, the sum total of choir-monks and lay brothers exceeds 11,000.

In conclusion a word must be said on the Benedictine nuns. From the beginning the number of women living the Bene- dictine life has not fallen far short of that of the men. St Gregory describes St Benedict's sister Scholastica as a nun (sanctimonialis) , and she is looked upon as the foundress of Benedictine nuns. As the institute spread to other lands nunneries arose on all sides, and nowhere were the Benedictine nuns more numerous or more remarkable than in England, from Saxon times to the Reformation. A strong type of womanhood is revealed in the correspondence of St Boniface with various Saxon Benedictine nuns, some in England and some who accompanied him to the continent and there established great convents. In the early times the Benedictine nuns were not strictly enclosed, and could, when occasion called for it, freely go out of their convent walls to perform any special work: on the other hand, they did not resemble the modern active congregations of women, whose ordinary work lies outside the convent. It has to be said that in the course of the middle

ages, especially the later middle ages, grave disorders arose in many convents; and this doubtless led, in the reform movements initiated by the councils of Constance and Basel, and later of Trent, to the

introduction of strict enclosure in Benedictine convents, which now is the almost universal practice. At the present day there are of Black Benedictine nuns 262 convents with 7000 nuns, the large majority being directly subject to the diocesan bishops; if the Cistercians and others be included, there are 387 convents with nearly 11,000 nuns. In England there are a dozen Benedictine nunneries.

Authorities — The chief general authority for Benedictine history up to the middle of the 12th century is Mabillon's Annales, in 6 vols, folio ; for the later period no such general work exists, but the various countries, congregations or even abbeys have to be taken separately. Montalembert's Monks of the West gives the early history very fully; the later history, to the beginning of the 18th century, may be found in Helyot, Hist, des ordres religieux, v. and vi. (1792). A useful sketch, with references to the best literature, is in Max Heimbucher, Or den und Kongregationen (1896), i. §§ 17- 28; see also the article " Benedictinerorden " in Wetzer u. Welter, Kirchenlexicon (2nd ed.), and " Benedikt von Nursia und der Benediktinerorden," in Herzog-Hauck, Realencyklopddie (3rd ed.). For England see Ethelred Taunton, English Black Monks (1897); and for the modern history (19th century) the series entitled " Succisa Virescit " in the Downside Review, 1880 onwards, by J. G. Dolan. On the inner spirit and working of the institute see F. A. Gasquet, Sketch of Monastic Constitutional History (being the preface to the 2nd ed., 1895, of the trans, of Montalembert) and English Monastic Life (1904) ; and Newman's two essays on the Benedictines, among the Historical Sketches. On Benedictine nuns much will be found in the above-mentioned authorities, and also in Lina Eckenstein, Woman in Monasticism (1896). On Bene- dictines and the Arts see F. H. Kraus, Geschichte der christlichen Kunst (Freiburg-i-B., 1896-1897). (E. C. B.)

BENEDICTION (Lat. benedictio, from benedicere, to bless), generally, the utterance of a blessing or of a devout wish for the prosperity and happiness of a person or enterprise. In the usage of the Catholic Church, both East and West, though the bene- diction as defined above has its place as between one Christian and another, it has also a special place in the sacramental system in virtue of the special powers of blessing vested in the priesthood. Sacerdotal benedictions are not indeed sacraments — means of grace ordained by Christ himself, — but sacramentals (sacra- menta minora)

ordained by the authority of the Church and exercised by the priests, as the plenipotentiaries of God, in virtue of the powers conferred on them at their ordination; " that whatever they bless may be blessed, and whatever they con- secrate may be consecrated." The power to bless in this ecclesiastical sense is reserved to priests alone; the blessing of the paschal candle on Holy Saturday by the deacon being the one exception that proves the rule, for he uses for the purpose grains of incense previously blessed by the priest at the altar. But though by some the benediction has thus been brought into connexion with the supreme means of grace, the sacrifice of the Mass, the blessing does not in itself confer grace and does not act on its recipients ex opere operato. It must not be supposed, however, that the Catholic idea of a sacerdotal blessing has any- thing of the vague character associated with a benediction by Protestants. Both by Catholics and by Protestants blessings may be applied to things inanimate as well as animate; but while in the reformed Churches this involves no more than an appeal to God for a special blessing, or a solemn " setting apart " of persons or objects for sacred purposes, in the Catholic idea it implies a special power, conferred by God, of the priests over the invisible forces of evil. It thus stands in the closest relation to the rite of exorcism, of which it is the complement.

According to Catholic doctrine, the Fall involved the subjec- tion, not only of man, but of all things animate and inanimate, to the influence of evil spirits; in support of which St Paul's epistles to the Romans (viii.) and to Timothy (1 Tim. iv. 4-5) are quoted. This belief is, of course, not specifically Christian; it has been held at all times and everywhere by men of the most various races and creeds; and, if there be any validity in the contention that that is true which has been held semper, ubique, et ab omnibus, no fact is better established. In general it may be said, then, that whereas exorcism is practised in order to cast out devils already in possession, benediction is the formula by which they are prevented from entering in. Protestants have condemned these formulae as so much magic, and in this

modern science tends to agree with them; but to orthodox Protestants at least Catholics have a perfect right to reply that, in taking this line, they are but repeating the accusation brought by the Pharisees against Christ, viz. that he cast out devils "by Beelzebub, prince of the devils."

Though, however, the discomfiture of malignant spirits still plays an important part in the Catholic doctrine of benedictions, this has on the whole tended to become subordinated to other benefits. This is but natural; for, though the progress of knowledge has not disproved the existence of devils, it has greatly limited the supposed range of their activities. According to Father Patrick Morrisroe, dean and professor of liturgy at Maynooth, the efficacy of benedictions is fourfold: (i) the excitation of pious emotions and affections of the heart, and by their means the remission of venial sins and of the temporal punish- ments due for these; (2) freedom from the power of evil spirits; (3) preservation and restoration of bodily health; (4) various other benefits, temporal and spiritual. Benedictions, moreover, are twofold: (a) in vocative, i.e. those invoking the divine benignity for persons and things without changing their con- dition, e.g. children or food; (b) constitutive, i.e. those which give to persons or things an indelible religious character, i.e. monks and nuns, or the furniture of the altar. The second of these brings the act of benediction into contact with the principle of consecration (q.v.); for'by the formal blessing by the duly constituted authority persons, places and things are consecrated, i.e. reserved to sacred uses and preserved from the contaminating influence of evil spirits. Thus graveyards are consecrated, i.e. solemnly blessed in order that the powers of evil may not disturb the bodies of the faithful departed; thus, too, the blessing of bells gives them a special power against evil demons.

Though the giving of blessings as a sacerdotal function is proper to the whole order of priests, particular benedictions have, by ecclesiastical authority, been reserved for the bishops, who may, however, delegate some of them; i.e. the benediction of abbots, of priests at their ordination, of virgins taking the veil, of churches, cemeteries, oratories, and of all articles for use in connexion with the altar (chalices, patens, vestments, &c), of military colours, of soldiers and of their arms. The holy oil is also blessed by bishops in the Roman Catholic Church; in the Greek Church, on the other hand, the oil for the chrism at baptism is blessed by the priest. To the pope alone is reserved the blessing of the pallium, the golden rose, the " Agnus-Dei " and royal swords ; he alone, too, can issue blessings that involve some days' indul- gence. The ceremonies prescribed for the various benedictions are set forth in the Rituale Romanum (tit. viii.). In general it is laid down (cap. i.) that the priest, in benedictions outside the Mass, shall be vested in surplice and stole, and shall give the blessing standing and bare-headed. Certain prayers are said before each benediction, after which he sprinkles the person or thing

to be blessed with holy water and, where prescribed, censes them. He is attended by a minister with a vase of holy water, an aspergillum and a copy of the Rituale or missal. In all bene- dictions the sign of the cross is made. In the blessing of the holy water (cap. ii.), the essential instrument of all benedictions, the object is clearly to establish its potency against evil spirits. First the " creature of salt " is exorcized, " that . . . thou mayest be to all who take thee health of body and soul; that wherever thou art sprinkled every phantasy and wickedness and wile of diabolic deceit may flee and leave that place, and every unclean spirit "; a prayer to God for the blessing of the salt follows; then the " creature of water " is exorcized, " that thou mayest become exorcized water for the purpose of putting to flight every power of the enemy, that thou mayest avail to uproot and expel this enemy with all his apostate angels, by the virtue of the same our Lord Jesus Christ, &c"; and again a prayer to God follows that the water may " become a creature in the service of His mysteries, for the driving out of demons, &c." In the formulae of blessings that follow, the special efficacy against devils is implied by the aspersion with holy water; the benedictions themselves are usually merely invocative of the divine protection or assistance, though, e.g., in the form for

blessing sick animals the priest prays that " all diabolic power in them may be destroyed, and that they may be ill no longer." It is to be remarked that the " laying on of hands," which in the Old and the New Testament alike is the usual ' ' form "of blessing, is not used in liturgical benedictions, the priest being directed merely to extend his right hand towards the person to be blessed. The appendix de Benediclionibus to the Rituale Romanum contains formulae, often of much simple beauty, for blessing all manner of persons and things, from the congregation as a whole and sick men and women, to railways, ships, blast-furnaces, lime-kilns, articles of food, medicine and medical bandages and all manner of domestic animals.

The Benediction of the Blessed Sacrament, commonly called simply " Benediction " (Fr. salut, Ger. Segen), is one of the most popular of the services of the Roman Catholic Church. It is usually held in the afternoon or evening, sometimes at the conclusion of Vespers, Compline or the Stations of the Cross, and consists in the singing of certain hymns and canticles, more particularly the O salutaris hostia and the Tantum ergo, before the host, which is exposed on the altar in a monstrance and surrounded by not less than ten lighted candles. Often litanies and hymns to the Virgin are added. At the conclusion the priest, his shoulders wrapped in the humeral veil, takes the monstrance and with it makes the sign of the cross over the kneeling

con- gregation, whence the name Benediction. The service, the details of which vary in different countries, is of comparatively modern origin. Father Thurston traces it to a combination in the 16th and 17th centuries of customs that had their origin in the 13th, i.e. certain gild services in honour of the Blessed Virgin, and the growing habit, resulting naturally from the doctrine of transubstantiation, of ascribing a supreme virtue to the act of looking on the Holy Sacrament.

In the reformed Churches the word " benediction " is techni- cally confined to the blessing with which the priest or minister dismisses the congregation at the close of the service.

See the article " Benediktionen," by E. C. Achelis in Herzog- Hauck, RealencyMopadie (Leipzig, 1897); The Catholic Encyclo- paedia (Londonand New York, 1908) s. " Blessing," by P. Morrisroe, and "Benediction of the Blessed Sacrament," by Herbert Thurston, S.J. ; in all of which further authorities are cited.

BENEDICTUS, the hymn of Zacharias (Luke i. 68 sqq.), so called from the opening word of the Latin version. The hymn has been used in Christian worship since at least the 9th century, and was adopted into the Anglican Order of Morning Prayer from the Roman service of matin-lauds. In the Praycr-Book of 1549 there was no alternative to the Benedictus; it was to be used " throughout the whole year." In 1552 the Jubilate was inserted without any restriction as to how often it should take the place of the Benedictus. Such restriction is clearly implied in the words " except when that (Benedictus) shall happen to be read in the chapter for the day, or for the Gospel on Saint John Baptist's day," which were inserted in 1662. The rubric of 1532 had this curious wording: " And after the Second Lesson shall be used and said, Benedictus in English, as followeth."

The name is also given to a part of the Roman Catholic mass service beginning Benedictus qui venit.

BENEDICTUS ABBAS (d. n 94), abbot of Peterborough, whose name is accidentally connected with the Gesta Henrici Regis Secundi, one of the most valuable of English 12th-century chronicles. He first makes his appearance in n 74, as the chancellor of Archbishop Richard, the successor of Becket in the primacy. In 1 1 75 Benedictus became prior of Holy Trinity, Canterbury; in 1177 he received from Henry II. the abbacy of Peterborough, which he held until his death. As abbot he distinguished himself by his activity in building, in administering the finances of his house and in collecting a library.

He is described in the Chronicon Petroburgense as "blessed both in name and deed." He belonged to the circle of Becket 's admirers, and wrote two works dealing with the martyrdom and the miracles of his hero. Fragments of the former work have come down to us in the compilation known as the Quadrilogus, which is printed in the fourth volume of J. C. Robertson's Materials for the History

of Thomas Becket (Rolls series) ; the miracles are extant in their entirety, and are printed in the second volume of the same collection. Benedictus has been credited with the authorship of the Gesta Henrici on the ground that his name appears in the title of the oldest manuscript. We have, however, conclusive evidence that Benedictus merely caused this work to be tran- scribed for the Peterborough library. It is only through the force of custom that the work is still occasionally cited under the name of Benedictus. The question of authorship has been discussed by Sir T. D. Hardy, Bishop Stubbs and Professor Liebermann; but the results of the discussion are negative. Stubbs conjectur- ally identified the first part cf the Gesta (1170-1177) with the Liber Tricolumnis, a register of contemporary events kept by Richard Fitz Neal (q.v.), the treasurer of Henry II. and author of the Dialogns de Scaccario; the latter part (1177-1192) was by the same authority ascribed to Roger of Hoveden, who makes large use of the Gesta in his own chronicle, copying them with few alterations beyond the addition of some documents. This theory, so far as concerns the Liber Tricolumnis, is rejected by Liebermann and the most recent, editors of the Dialogus (A. Hughes, C. G. Crump and C. Johnson, Oxford, 1902). We can only say that the Gesta are the work of a well-informed con- temporary who appears to have been closely connected with the court and is inclined on all occasions to take the side of Henry II. The author confines himself to the external history of events, and his tone is strictly impersonal. He incorporates some official documents, and in many places obviously derives his information from others which he does not quote. There is a break in his work at the year 1177, where the earliest manuscript ends; but the reasons which have been given to prove that the authorship changes at this point are inconclusive. The work begins at Christmas 1169, and concludes in 1192; it is thus in form a fragment, covering portions of the reign of Henry II. and Richard I.

See W. Stubbs' Gesta regis Henrici Secundi Benedicti abbatis (2 vols., Rolls series, 1867), and particularly the preface to the first volume;

F. Liebermann in Einleitung in den Dialogus de Scaccario (Gottingen, 1875) ; in Ostenglische Geschichtsauellen (Hanover, 1892) ; and in Pertz's Monumenta Germaniae Historica, Scriptores, vol. xxvii. pp. 82, 83 ; also the introduction to the Dialogus de Scaccario in the Oxford edition of 1902. (H. W. C. D.)

BENEDIX, JULIUS RODERICH (1811-1873), German dramatist and librettist, was born at Leipzig on the 21st of January 181 1, and was educated at the Thomasschule at Leipzig. He joined the stage in 1831, his first engagement being with the travelling company of H. E. Bethmann in Dessau, CSthen, Bernburg and Meiningen. Subsequently he was tenor in several theatres in Westphalia and on the Rhine, and became manager of the theatre at Wesel, where he produced a comedy, Das bemooste Haupl (1841), which met with great success. After an engagement in Cologne, he managed the new theatre at Elberfeld (1844-1845) and in 1849 was appointed teacher on the staff of the Rhenish school of music in Cologne. In 185s he was appointed intendant of the municipal theatre in Frankfort-on- Main, but retired in 1861, and died in Leipzig on the 26th of September 1873. Benedix's comedies, the scenes of which are mostly laid in upper middle-class life, still enjoy some popularity; the best-known are: Dr Wespe; Die Hochzeitsreise; Der Vetter; Das Gef Unguis; Das Lugen; Ein Lusts piel; Der Storenfried; Die Dienstboten; Aschenbrodel; Die zdrtlichen Verwandten. The chief characteristics of his farces are a clear plot and bright, easy and natural dialogue. Among his more serious works are: Bilder aus dem Schauspielerleben (Leipzig, 1847); Der miindliche Vortrag (Leipzig, 1859-1860); Das W esendes deutschen Rhythmus (Leipzig, 1862) and, posthumously, Die Shakes pear omanie (1873), in which he attacks the extreme adoration of the British poet.

Benedix's Gesammeite dramalische Werke appeared in 27 vols. (Leipzig, 1846-1875) ; a selection under the title Volkstheater in 20 vols. (Leipzig, 1882); and a collection of smaller comedies as Haustheater in 2 vols. (loth ed., Leipzig, 1891); see Benedix's autobiography in the Gartenlaube for 1871.

BENEFICE (Lat. beneficium, benefit), a term first applied under the Roman empire to portions of land, the usufruct of which was granted by the emperors to their soldiers or others

for life, as a reward or beneficium for past services, and as a. retainer for future services. A list of all such beneficia was recorded in the Book of Benefices (Liber Beneficiorum) , which was kept by the principal registrar of benefices (Primiscrinius Bene- ficiorum) . In

imitation of the practice observed under the Roman empire, the term came to be applied under the feudal system to portions of land granted by a lord to his vassal for the main- tenance of the latter on condition of his rendering military service; and such grants were originally for life only, and the land reverted to the lord on the death of the vassal. In a similar manner grants of land, or of the profits of land, appear to have been made by the bishops to their clergy for life, on the ground of some extraordinary merit on the part of the grantee. The validity of such grants was first formally recognized by the council of Orleans, a.d. 511, which forbade, however, under any circumstances, the alienation from the bishoprics of any lands so granted. The next following council of Orleans, 533, broke in upon this principle, by declaring that a bishop could not reclaim from his clergy any grants made to them by his predecessor, excepting in cases of misconduct. This innovation on the ancient practice was confirmed by the subsequent council of Lyons, 566, and from this period these grants ceased to be regarded as personal, and their substance became annexed to the churches, — in other words, they were henceforth enjoyed jure tituli, and no longer jure personali. How and when the term beneficia came to be applied to these episcopal grants is uncertain, but they are designated by that term in a canon of the council of Mainz,

813.

The term benefice, according to the canon law, implies always an ecclesiastical office, propter quod beneficium datur, but it does not always imply a cure of souls. It has been defined to be the right which a clerk has to enjoy certain ecclesiastical revenues on condition of discharging certain services prescribed by the canons, or by usage, or by the conditions under which his office has been founded. These services might be those of a secular priest with cure of souls, or they might be those of a regular priest, a member of a religious order, without cure of souls; but in every case a benefice implied three things: (1) An obligation to discharge the duties of an office, which is altogether spiritual; (2) The right to enjoy the fruits attached to that office, which is the benefice itself; (3) The fruits themselves, which are the temporalities. By keeping these distinctions in view, the right of patronage in the case of secular benefices becomes intelligible, being in fact the right, which was originally vested in the donor of the temporalities, to present to the bishop a clerk to be admitted, if found fit by the bishop, to the office to which those temporalities are annexed. Nomination or presenta- tion on the part of the patron of the benefice is thus the first requisite in order that a clerk should become legally entitled to a benefice. The next

requisite is that he should be admitted by the bishop as a fit person for the spiritual office to which the benefice is annexed, and the bishop is the judge of the sufficiency of the clerk to be so admitted. By the early constitutions of the Church of England a bishop was allowed a space of two months to inquire and inform himself of the sufficiency of every pre- sentee, but by the ninety-fifth of the canons of 1604 that interval has been abridged to twenty-eight days, within which the bishop must admit or reject the clerk. If the bishop rejects the clerk within that time he is liable to a duplex querela in the eccle- siastical courts, or to a quare impedit in the common law courts, and the bishop must then certify the reasons of his refusal. In cases where the patron is himself a clerk in orders, and wishes to be admitted to the benefice, he must proceed by way of petition instead of by deed of presentation, reciting that the benefice is in his own patronage, and petitioning the bishop to examine him and admit him. Upon the bishop having satisfied himself of the sufficiency of the clerk, he proceeds to institute him to the spiritual office to which the benefice is annexed, but. before such institution can take place, the clerk is required to make a declara- tion of assent to the Thirty-nine Articles of Religion and to the Book of Common Prayer according to a form prescribed in the Clerical Subscription Act 1865, to make a declaration against

simony in accordance with that act, and to take and subscribe the oath of allegiance according to the form in the Promissory Oaths Act 1868. The bishop, by the act of institution, commits to the clerk the cure of souls attached to the office to which the benefice is annexed. In cases where the bishop himself is patron of the benefice, no presentation or petition is required to be tendered by the clerk, but the bishop having satisfied himself of the sufficiency of the clerk, collates him to the benefice and office. It is not necessary that the bishop himself should person- ally institute or collate a clerk; he may issue a fiat to his vicar- general, or to a special commissary for that purpose. After the bishop or his commissary has instituted the presentee, he issues a mandate under seal, addressed to the archdeacon or some other neighbouring clergyman, authorizing him to induct the clerk into his benefice, — in other words, to put him into legal possession of the temporalities, which is done by some outward form, and for the most part by delivery of the bell-rope to the clerk, who thereupon tolls the bell. This form of induction is required to give the clerk a legal title to his bencficium, although bis

admission to the office by institution is sufficient to vacate any other benefice which he may already possess.

By a decree of the Lateran council of 121 5, which was en- forced in England, no clerk can hold two benefices with cure of souls, and if a beneficed clerk shall take a second benefice with cure of souls, he vacates ipso facto his first benefice. Dispensa- tions, however, could be easily obtained from Rome, before the reformation of the Church of England, to enable a clerk to hold several ecclesiastical dignities or benefices at the same time, and by the Peterpence, Dispensations, &c. Act 1534, the power to grant such dispensations, which had been exercised previously by the court of Rome, was transferred to the archbishop of Canterbury, certain ecclesiastical persons having been declared by a previous statute (1529) to be entitled to such dispensations. The system of pluralities carried with it, as a necessary con- sequence, systematic non-residence on the part of many incum- bents, and delegation of their spiritual duties in respect of their cures of souls to assistant curates. The evils attendant on this system were found to be so great that the Pluralities Act 1838 was passed to abridge the holding of benefices in plurality, and it was enacted that no person should hold under any circumstances more than two benefices, and , this privilege was made subject to the restriction that his benefices were within ten statute miles of each other. By the Pluralities Act 1850, the restriction was further narrowed, so that no spiritual person could hold two benefices except the churches of such benefices were within three miles of each other by the nearest road, and the annual value of one of such benefices did not- exceed £100. By this statute the term benefice is defined to mean benefice with cure of souls and no other, and therein to comprehend all parishes, perpetual curacies, donatives, endowed public chapels, parochial chapelries and chapelries or districts belonging or reputed to belong, or annexed or reputed to be annexed, to any church or chapel. The Pluralities Acts Amend- ment Act 1885, however, enacted that, by dispensation from the archbishop, two benefices could be held together, the churches of which are within four miles of each other, and the annual value of one of which does not exceed £200.

All benefices except those under the clear annual value of £50 pay their first fruits (one year's profits) and tenths (of yearly profits) to Queen Anne's Bounty for the augmentation of the maintenance of the poorer clergy. Their profits during vacation belong to the next incumbent. Tithe rent charge attached to a benefice is relieved from payment of one-half of the agricultural rates assessed thereon. Benefices may be exchanged by agree- ment between incumbents with

the consent of the ordinary, and they may, with the consent of the patron and ordinary, be united or dissolved after being united. They may also be charged with the repayment of money laid out for their permanent advantage, and be augmented wholly by the medium of Queen Anne's Bounty.

A benefice is avoided or vacated — (1) by death; (2) by resigna- tion, if the bishop is willing to accept the resignation: by the In-

cumbents' Resignation Act 1 8 7 1 , Amendment Act 1 88 7 , any clergy- man who has been an incumbent of one benefice continuously for seven years, and is incapacitated by permanent mental or bodily infirmities from fulfilling his duties, may, if the bishop thinks fit, have a commission appointed to consider the fitness of his resigning; and if the commission report in favour of his resign- ing, he may, with the consent of the patron (or, if that is refused, with the consent of the archbishop) resign the cure of souls into the bishop's hands, and have assigned to him, out of the benefice, a retiring-pension not exceeding one-third of its annual value, which is recoverable as a debt from his successor; (3) by cession, upon the clerk being instituted to another benefice or some other preferment incompatible with it; (4) by deprivation and sentence of an ecclesiastical court; under the Clergy Discipline Act 1892, an incumbent who has been convicted of offences against the law of bastardy, or against whom judgment has been given in a divorce or matrimonial cause, is deprived, and on being found guilty in the consistory court of immorality or ecclesiastical offences (not in respect of doctrine or ritual), he may be deprived or suspended or declared incapable of preferment; (5) by act of law in consequence of simony; (6) by default of the clerk in neglecting to read publicly in the church the Book of Common Prayer, and to declare his assent thereto within two months after his induction, pursuant to an act of 1662.

See also Advowson; Glebe; Incumbent; Vicar; also Philli- more, Eccles. Law; Cripps, Law of Church and Clergy.

BENEFICIARY (from Lat. bencficium, a benefit), in law, one who holds a benefice; one who is beneficially entitled to, or interested in, property, i.e. entitled to it for his own benefit, and not merely holding it for others, as does an executor or trustee. In this latter sense it is nearly equivalent to cestui que trust, a term which it is gradually superseding in modern law.

BENEKE, FRIEDRICH EDUARD (1708-1854), German psychologist, was born at Berlin on the 17th of February 1798, studied at the

universities of Halle and Berlin, and served as a volunteer in the war of 181 5. After studying theology under Schleiermacher and De Wette, he turned to pure philosophy, studying particularly English writers and the German modifiers of Kantianism, such as Jacobi, Fries and Schopenhauer. In 1820 he published his Erkcnntnisslehrc, his Erfahrungsseelenlehre als Grundlage allcs Wissens, and his inaugural dissertation De Veris Philosophise Initiis. His marked opposition to the philosophy of Hegel, then dominant in Berlin, was shown more clearly in the short tract, Neue Grundlegung zur Metaphysik (1822), intended to be the programme for his lectures as privat-docent, and in the able treatise, Grundlegung zur Physik der Sittcn (1822), written, in direct antagonism to Kant's Mclaphysic of Ethics, to deduce ethical- principles from a basis of empirical feeling. In 1822 his lectures were prohibited at Berlin, according to his own belief through the influence of Hegel with the Prussian authorities, who also prevented him from obtaining a chair from the Saxon government. He retired to Gottingen, lectured there for some years, and was then allowed to return to Berlin. In 1832 he received an appointment as professor extraordinarius in the university, which he continued to hold till his death. On the 1st of March 1854 he disappeared, and more than two years later his remains were found in the canal near Charlottenburg. There was some suspicion that he had committed suicide in a fit of mental depression.

The distinctive peculiarity of Benekc's system consists, first, in the firmness with which he maintained that in empirical psychology is to be found the basis of all philosophy; and secondly, in his rigid treatment of mental phenomena by the genetic method. According to him, the perfected mind is a development from simple elements, and the first problem of philosophy is the determination of these elements and of the processes by which the development takes place. In his Neue Psychologie (essays iii., viii. and ix.), he defined his position with regard to his predecessors and contemporaries, and both there and in the introduction to his Lehrbuch signalized as the two great stages in the progress of psychology the negation of innate ideas by Locke, and of faculties, in the ordinary acceptation of the

term, by Herbart. ' The next step was his own; he insisted that psychology must be treated as one of the natural sciences. As is the case with them, its content is given by experience alone, and differs from theirs only in being the object of the internal as opposed- to the

external sense. But by this Beneke in no wise meant a psychology founded on physiology. These two sciences, in his opinion, had quite distinct provinces and gave no mutual assistance. Just as little help is to be expected from the science of the body as from mathematics and metaphysics, both of which had been pressed by Herbart into the service of psychology. The true method of study is that applied with so much success in the physical sciences — critical examination of the given experience, and reference of it to ultimate causes, which may not be themselves perceived, but are nevertheless hypotheses necessary to account for the facts. (See on method, Neue Psych., essay i.)

Starting from the two assumptions that there is nothing, or at least no formed product, innate in the mind, and that definite faculties do not originally exist, and from the fact that our minds nevertheless actually have a definite content and definite modes of action, Beneke proceeds to state somewhat dogmatically his scien- tifically verifiable hypotheses as to the primitive condition of the soul and the laws according to which it develops. Originally the soul is possessed of or is an immense variety of powers, faculties or forces (conceptions which Beneke, in opposition to Herbart, holds to be metaphysically justifiable), differing from one another only in tenacity, vivacity, receptivity and grouping. These primitive im- material forces, so closely united as to form but one being (essence), acquire definiteness or form through the action upon them of stimuli or excitants from the outer world. This action of external impres- sions which are appropriated by the internal powers is the first fundamental process in the genesis of the completed mind. If the union of impression and faculty be sufficiently strong, consciousness (not je//-consciousness) arises, and definite sensations and perceptions begin to be formed. These primitive sensations, however, are not to be identified with the sensations of the special senses, for each of these senses is a system of many powers which have grown into a definite unity, have been educated by experience. From ordinary experience it must be concluded that a second fundamental process is incessantly going on, viz. the formation of new powers, which takes place principally during sleep. The third and most important process results from the fact that the combination between stimulus and power may be weak or strong ; if weak, then the two elements are said to be movable, and they may flow over from one to another of the already formed psychical products. Any formed faculty does not cease to exist on the removal of its stimulus; in virtue of its fundamental property, tenacity, it sinks back as a trace (Spur) into unconsciousness, whence it may be recalled by the

application to it of another stimulus, or by the attraction towards it of some of the movable elements or newly-formed original powers. These traces and the flowing over of the movable elements are the most important conceptions in Benekc's psychology; by means of them he gives a rationale of reproduction and association, and strives to show that all the formed faculties are simply developments from traces of earlier processes. Lastly, similar forms, according to the degree of their similarity, attract one ano'ther or tend to form closer combinations.

All psychical phenomena are explicable by the relation of impression and power, and by the flow of movable elements; the whole process of mental development is nothing but the result of the action and interaction of the above simple laws. In general this growth may be said to take the direction of rendering more and more definite by repetition and attraction of like to like the originally indefinite activities of the primary faculties. Thus the sensations of the special senses are gradually formed from the primary sensuous feel- ings [sinnliche Empfindungen) ; concepts are formed from intuitions of individuals by the attraction of the common elements, and the consequent flow towards them of movable forms. Judgment is the springing into consciousness of a concept alongside of an in- tuition, or of a higher concept alongside of a lower. Reasoning is merely a more complex judgment. Nor are there special faculties of judging or reasoning. The understanding is simply the mass of concepts lying in the background of unconsciousness, ready to be called up and to flow with force towards anything closely connected with them. Even memory is not a special faculty ; it is simply the fundamental property of tenacity possessed by the original faculties. The very distinction between the great classes, Knowledge, Feeling and Will, may be referred to elementary differences in the original relations of faculty and impression.

This is the groundwork of Beneke's philosophy. It should be carefully compared with the association psychology of modern British thinkers, most of whose results and processes will be found there worked into a comprehensive system (see Association of Ideas). In logic, metaphysics and ethics Beneke's speculations are naturally dependent on his psychology.

The special value of Beneke's works, as has been already said, consists in the many specimens of acute psychological analysis

scattered throughout them. As a complete explanation of psychicai facts, the theory seems defective. The original hypotheses, peculiar to

Beneke, on which the whole depends, are hastily assumed and rest on a clumsy mechanical metaphor. As is the case with all empirical theories of mental development, the higher categories or notions, which are apparently shown to result from the simple elements, are really presupposed at every step. Particularly un- satisfactory is the account of consciousness, which is said to arise from the union of impression and faculty. The necessity of con- sciousness for any mental action whatsoever is apparently granted, but the conditions involved in it are never discussed or mentioned. The same defect appears in the account of ethical judgment; no amount of empirical fact can ever yield the notion of absolute duty. His results have found acceptance mainly with practical teachers. Undoubtedly his minute analysis of temperament and careful exposition of the means whereby the young, unformed mind may be trained are of infinite value ; but the truth of many of his doctrines on these points lends no support to the fundamental hypotheses, from which, indeed, they might be almost entirely severed.

Beneke was a most prolific writer, and besides the works mentioned above, published large treatises in the several departments of philosophy, both pure and as applied to education and ordinary life. A complete list of his writings will be found in the appendix to Dressler's edition of the Lehrbuch der Psychologie als Naturwissen- schaft (1861). The chief are: — Psychologische Skizzen (1825, 1827); Lehrbuch der Psychologie (1832); Metaphysik und Religionsphilo- sophie (1840); Die neue Psychologie (1845); Pragmatische Psy- chologie oder Seelenlehre in der Anwendung auf das Leben (1832).

Among German writers, who, though not professed followers of Beneke, have been largely influenced by him, may be mentioned Ueberweg and Karl Fortlage (1806-1881). In England, perhaps, the only writer who shows traces of acquaintance with his works is J. D. Morell (Introd. to Mental Philosophy). The most eminent members of the school are J. G. Dressier (whose Beneke oder Seelen- lehre als Naturwissenschaft is an admirable exposition), Fried. Dittes and G. Raue. The compendium by the last-named author passed through four editions in Germany, and has been translated into French, Flemish and English. The English translation, Elements of Psychology (1871), gives a lucid and succinct view of the whole system.

Among more recent works on Beneke are O. E. Hummel, Die Unterrichtslehre Benekes (Leipzig, 1885) ; on his ethical theory, C. H. Th. Kiihn, Die Sittenlehre F. E. Benekes (1892); Joh. Friedrich, F. E. Beneke (Wiesbaden, 1898, with biography and list of works); Otto

Gramzow, F. E. Benekes Leben und Philos. (Bern, 1899, with full bibliography) ; on his theory of knowledge, H. Renner, Benekes Erkenntnistheorie (Halle, 1902) ; on his metaphysics, Die Metaphysik Benekes, by A. Wandschneider (Berlin, 1903) ; Brandt, Beneke, the Man and His Philosophy (New York, 1895); Falckenberg, Hist, of Phil. (Eng. trans., 1895); and H. HSffding, Hist, of Mod. Phil. vol. ii. (Eng. trans., 1900). (R. Ad.)

BENETT, ETHELDRED (1776-1845), one of the earliest of English women geologists, the second daughter of Thomas Benett, of Pyt House near Tisbury, was born in 1776. Later she resided at Norton House, near Warminster, in Wiltshire, and for more than a quarter of a century devoted herself to collecting and studying the fossils of her native county. She contributed " A Catalogue of the Organic Remains of the County of Wilts " to Sir R. C. Hoare's County History, and a limited number of copies of this work were printed as a separate volume (1831) and privately distributed. She died on the nth of January 1845.

BENEVENTO, a town and archiepiscopal see of Campania, Italy, capital of the province of Benevento, 60 m. by rail and 32 m. direct N.E. of Naples, situated on a hill 400 ft. above sea-level at the confluence of the Calore and Sabbato. Pop. (1901) town, 17,227; commune, 24,137. It occupies the site of the ancient Beneventum, originally Maleventum or Maluentum, supposed in the imperial period to have been founded by Dio- medes. It was the chief town of the Samnites, who took refuge here after their defeat by the Romans in 314 B.C. It appears not to have fallen into the hands of the latter until Pyrrhus's absence in Sicily, but served them as a base of operations in the last campaign against him in 275 B.C. A Latin colony was planted there in 268 B.C., and it was then that the name was changed for the sake of the omen, and probably then that the Via Appia was extended from Capua to Beneventum. It remained in the hands of the Romans during both the Punic and the Social Wars, and was a fortress of importance to them. The position is strong, being protected by the two rivers mentioned, and the medieval fortifications, which are nearly 2 m. in length, probably follow the ancient line, which was razed to the ground by Totila in

a.d. 542. After the Social War it became a municipium and under Augustus a colony. Being a meeting point of six main roads, 1 it was

much visited by travellers. Its importance is vouched for by the many remains of antiquity which it possesses, of which the most famous is the triumphal arch erected in honour of Trajan by the senate and people of Rome in a.d. 114, with important reliefs relating to its history (E. Petersen in Romische Mitleilungen, 1892, 241; A. von Domaszewzki in Jahreshejte des Osterreich. archaologischen Inslituts ,i., 1899, 173). There are also considerable remains of the ancient theatre, a large cryptoporticus 197 ft. long known as the ruins of Santi Quaranta, and probably an emporium (according to Meomartini, the portion preserved is only a fraction of the whole, which once measured 1791 ft. in length) and an ancient brick arch (called the Arco del Sacramento), while below the town is the Ponte Lebroso, a bridge of the Via Appia over the Sabbato, and along the road to Avellino are remains of thermae. Many inscriptions and ancient fragments may be seen built into the houses; in front of the Madonna delle Grazie is a bull in red Egyptian granite, and in the Piazza Papiniano the fragments of two Egyptian obelisks erected in a.d. 88 in front of the temple of Isis in honour of Domitian. In 1903 the foundations of this temple were discovered close to the Arch of Trajan, and many fragments of fine sculptures in both the Egyptian and the Greco-Roman style belonging to it were found. They had apparently been used as the foundation of a portion of the city wall, reconstructed in a.d. 663 under the fear of an attack by Constans, the Byzantine emperor, the temple having been destroyed under the influence of the bishop, St Barbatus, to provide the necessary material (A. Meomartini, O. Marucchi and L. Savignoni in Notizie degli Scavi, 1904, 107 sqq.). Not long after it had been sacked by Totila Benevento became the seat of a powerful Lombard duchy and continued to be inde- pendent until 1053, when the emperor Henry III. ceded it to Leo IX. in exchange for the bishopric of Bamberg; and it continued to be a papal possession until 1806, when Napoleon granted it to Talleyrand with the title of prince. In 181 5 it returned to the papacy, but was united to Italy in 1 860. Manfred lost his life in 1266 in battle with Charles of Anjou not far from the town. Much damage has been done by earthquakes from time to time. The church of S. Sofia, a circular edifice of about 760, now modernized, the roof of which is supported by six ancient columns, is a relic of the Lombard period; it has a fine cloister of the 12th century constructed in part of fragments of earlier buildings; while the cathedral with its fine arcaded facade and incomplete square campanile (begun in 1279) dates from the 9th century and was rebuilt in 1 1 14. The bronze doors, adorned with bas-reliefs, are good; they may belong to the beginning of the 13th century. The interior is in the form of a basilica, the double aisles being borne by ancient columns, and

contains ambones and a candelabrum of 13 11, the former resting on columns supported by lions, and decorated with reliefs and coloured marble mosaic. The castle at the highest point of the town was erected in the 14th century.

Benevento is a station on the railway from Naples to Foggia, and has branch lines to Campobasso and to Avellino.

See A. Meomartini, Monumenti e opere A' Arte di Benevento (Benevento, 1899) ; T. Ashby, Melanges de I'ecole francaise, 1903, 416.

(T. As.)

BENEVOLENCE (Lat. bene, well, and volens, wishing), a term for an act of kindness, or a gift of money, or goods, but used in a special sense to indicate sums of money, disguised as gifts, which were extorted by various English kings from their subjects, without consent of parliament. Among the numerous methods which have been adopted by sovereigns everywhere to obtain support from their people, that of demanding gifts has frequently found a place, and consequently it is the word and not the method which is peculiar to English history. Edward II. and Richard II.

1 These were (1) the prolongation of the Via Appia from Capua, (2) its continuation to Tarentum and Brundisium, of which there were two different lines between Beneventum and Aquilonia at different dates (see Appia, Via), (3) the Via Traiana to Brundisium by Herdoniae, (4)' the road to Telesia and Aesernia, (5) the road to Aesernia by Bovianum, (6) the road to Abellinum and Salernum.

had obtained funds by resorting to forced loans, a practice which was probably not unusual in earlier times. Edward I V. , however, discarded even the pretence of repayment, and in 1473 the word benevolence was first used with reference to a royal demand for a gift. Edward was very successful in these efforts, and as they only concerned a limited number of persons he did not incur serious unpopularity. But when Richard III. sought to emulate his brother's example, protests were made which led to the passing of an act of parliament in 1484 abolishing benevolences as " new and unlawful inventions." About the same time the Chronicle of Croyland referred to a benevolence as a " nova et inaudita impositio muneris ut per benevclentiam quilibet daret id quod vellet, immo verius quod nollet." In spite of this act Richard demanded a further benevolence; but it was Henry VII. who made the most extensive use of this system. In 149 1 he sent out commissioners to obtain gifts of money,

and in 1496 an act of parliament enforced payment of the sums promised on this occasion under penalty of imprisonment. Henry's chancellor, Cardinal Morton, archbishop of Canterbury, was the traditional author of a methpd of raising money by benevolences known as " Morton's Fork." If a man lived economically, it was reasoned he was saving money and could afford a present for the king. If, on the contrary, he lived sumptuously, he was evidently wealthy and could likewise afford a gift. Henry VII. obtained consider- able sums of money in this manner; and in 1545 Henry VIII. demanded a " loving contribution " from all who possessed lands worth not less than forty shillings a year, or chattels to the value of £15; and those who refused to make payment were summoned before the privy council and punished. Elizabeth took loans which were often repaid; and in 16 14 James I. ordered the sheriffs and magistrates in each county and borough to collect a general benevolence from all persons of ability, and with some difficulty about £40,000 was collected. Four counties had, how- ever, distinguished themselves by protests against this demand, and the act of Richard III. had been cited by various objectors. Representatives from the four counties were accordingly called before the privy council, where Sir Edward Coke defended the action of the king, quoted the Tudor precedents and urged that the act of 1484 was to prevent exactions, not voluntary gifts such as James had requested. Subsequently Oliver St John was fined and imprisoned for making a violent protest against the bene- volence, and on the occasion of his trial Sir Francis Bacon defended the request for money as voluntary. In 16 1 5 an attempt to exact a benevolence in Ireland failed, and in 1620 it was decided to demand one for the defence of the Palatinate. Circular letters were sent out, punishments were inflicted, but many excuses were made and only about £34,000 was contributed. In i62iafurther attempt was made, judges of assize and others were ordered to press for contributions, and wealthy men were called before the privy council and asked to name a sum at which to be rated. About £88,000 was thus raised, and in 1622 William Fiennes, 1st Viscount Saye and Sele, was imprisoned for six months for protesting. This was the last time benevolences were actually collected, although in 1622 and 1625 it was proposed to raise money in this manner. In 1633 Charles I. consented to collect a benevolence for the recovery of the Palatinate for Charles Louis, the son of his sister Elizabeth, but no further steps were taken to carry out the project.

See W. Stubbs, Constitutional History of England, vol. iii. (Oxford, 1895) ; H. Hallam, Constitutional History of England, vol. i.

(London, ‘855); T. P. Taswell-Langmead, English Constitutional History (London, 1896) ; S. R. Gardiner, History of England, passim (London,

1893).

BENFEY, THEODOR (1809-1881), German philologist, son of a Jewish trader at Norten, near Gottingen, was born on the 28th of January 1809. Although originally designed for the medical profession, his taste for philology was awakened by a careful instruction in Hebrew which he received from his father. After brilliant studies at Gottingen he spent a year at Munich, where he was greatly impressed by the lectures of Schelling and Thiersch, and afterwards settled as a teacher in Frankfort. His pursuits were at first chiefly classical, and his attention was diverted to Sanskrit by an accidental wager that he would learn enough of

the language in a few weeks to be able to review a new book upon it. This feat he accomplished, and rivalled in later years when he learned Russian in order to translate V. P. Vasilev’s work on Buddhism. For the time, however, his labours were chiefly in classical and Semitic philology. At G<5ttingen, whither he had returned as privat-docent, he wrote a little work on the names of the Hebrew months, proving that they were derived from the Persian, prepared the great article on India in Ersch and Griiber's Encyclopaedia, and published from 1839 to 1842 the Lexicon of Greek Roots which gained him the Volney prize of the Institute of France. From this time his attention was principally given to Sanskrit. He published in 1848 his edition of the Sama-veda; in 1852-1854 his Manual of Sanskrit, comprising a grammar and chrestomathy; in 1858 his practical Sanskrit grammar, after- wards translated into English; and in 1859 his edition of the Pantscha Tantra, with an extensive dissertation on the fables and mythologies of primitive nations. All these works had been produced under the pressure of poverty, the government, whether from parsimony or from prejudice against a Jew, refusing to make any substantial addition to his small salary as extra-professor at the university. At length, in 1862, the growing appreciation of foreign scholars shamed it into making him an ordinary professor, and in 1866 Benfey published the laborious work by which he is on the whole best known, his great Sanskrit- English Dictionary. In 1869 he wrote a

history of German philological research, especially Oriental, during the 19th century. In 1878 his jubilee as doctor was celebrated by the publication of a volume of philological essays dedicated to him and written by the first scholars in Germany. He had designed to close his literary labours by a grammar of Vedic Sanskrit, and was actively preparing it when he was interrupted by illness, which terminated in his death at Gottingen on the 26th of June 1881.

A collection of his various writings was published in 1890, prefaced by a memoir by his son.

BENGAL, a province of British India, bounded on the E. by the province of Eastern Bengal and Assam, the boundary line being the Madhumati river and the Ganges; on the S. by the Bay of Bengal and Madras; on the W. by the Central Provinces and United Provinces; and on the N. by Nepal and Sikkim. It has an area of 141,580 sq. m. and a population of 54,096,806. It consists of the provinces of Behar, Orissa and Chota Nagpur, and the western portion of the Ganges valley, but without the provinces of Northern and Eastern Bengal; and is divided into the six British divisions of the presidency, Bhagalpur, Patna, Burdwan, Chota Nagpur and Orissa, and various native states. The province was reconstituted in 1905, when the Chittagong, Dacca and Rajshahi divisions, the district of Malda and the state of Hill Tippera were transferred from Bengal to a new province, Eastern Bengal and Assam; the five Hindi-speaking states of Chota Nagpur, namely Chang Bhakar, Korea, Sirguja, Udaipur and Jashpur, were transferred from Bengal to the Central Provinces; and Sambalpur and the five Oriya states of Bamra, Rairakhol, Sonpur, Patna and Kalahandi were transferred from the Central Provinces to Bengal. The province of Bengal, therefore, now consists of the thirty-three British districts of Burdwan, Birbhum, Bankura, Midnapore, Hugh, Howrah, Twenty-four Parganas, Calcutta, Nadia, Murshidabad, Jessore, Khulna, Patna, Gaya, Shahabad, Saran, Champaran, Muzaf- farpur, Darbhanga, Monghyr, Bhagalpur, Purnea, Santal Parganas, Cuttack, Balasore, Angul and Khondmals, Puri, Hazaribagh, Ranchi, Palamau, Manbhum, Singhbum and Sambalpur, and the native states of Sikkim and, the tributary states of Orissa and Chota Nagpur.

The name Bengal is derived from Sanskrit geography, and applies strictly to the country stretching southwards from Bhagalpur to the sea. The ancient Banga formed one of the five outlying kingdoms of Aryan India, and was practically conter- minous with the delta of Bengal. It derived its name, according to the etymology of the Pundits, from a prince of the Maha- bharata, to whose portion it fell

on the primitive partition of the country among the Lunar race of Delhi. But a city called

Bangala, near Chittagong, which, although now washed away, is supposed to have existed in the Mahommedan period, appears to have given the name to the European world. The word Bangala was first used by the Mussulmans; and under their rule, like the Banga of old Sanskrit times, it applied specifically to the Gangetic delta, although the later conquests to the east of the Brahmaputra were eventually included within it. In their distribution of the country for fiscal purposes, it formed the central province of a governorship, with Behar on the north-west, and Orissa on the south-west, jointly ruled by one deputy of the Delhi emperor. Under the English the name has at different periods borne very different significations. Francis Fernandez applies it to the country from the extreme east of Chittagong to Point Palmyras in Orissa, with a coast line which Purchas estimates at 600 m., running inland for the same distance and watered by the Ganges. This territory would include the Mahommedan province of Bengal, with parts of Behar and Orissa. The loose idea thus derived from old voyagers became stereotyped in the archives of the East India Company. All its north-eastern factories, from Balasore, on the Orissa coast, to Patna, in the heart of Behar, belonged to the " Bengal Estab- lishment," and as British conquests crept higher up the rivers, the term came to be applied to the whole of northern India. The presidency of Bengal, in contradistinction to those of Madras and Bombay, eventually included all the British territories north of the Central Provinces, from the mouths of the Ganges and Brahmaputra to the Himalayas and the Punjab. In 1831 the North-Western Provinces were created, which are now included with Oudh in the United Provinces; and the whole of northern India is now divided into the four lieutenant-governorships of the Punjab, the United Provinces, Bengal, and Eastern Bengal and Assam, and the North-West Frontier Pro- vince under a commissioner.

Physical Geography. — Three sub-provinces of the present lieutenant-governorship of Bengal — namely, Bengal proper, Behar and Orissa — consist of great river valleys; the fourth, Chota Nagpur, is a mountainous region which separates them from the central India plateau. Orissa embraces the rich deltas of the Mahanadi and the neighbouring rivers, bounded by the Bay of Bengal on the S.E., and walled in on the N.W. by tributary hill states. Proceeding west, the sub-province of Bengal proper stretches to the banks of the Ganges and inland from the sea- board to the Himalayas. Its southern portion is formed by the delta of the Ganges;

its northern consists of the Ganges valley. Behar lies on the north-west of Bengal proper, and comprises, the higher valley of the Ganges from the spot where it issues from the United Provinces. Between Behar and Orissa lies the province of Chota Nagpur, of which a portion was given in 1905 to the Central Provinces. The valley of the Ganges, which is now divided between Bengal and Eastern Bengal and Assam, is one of the most fertile and densely-populated tracts of country in the world. It teems with every product of nature. Tea, indigo, turmeric, lac, waving white fields of the opium-poppy, wheat and innumerable grains and pulses, pepper, ginger, betel- nut, quinine and many costly spices and drugs, oil-seeds of sorts, cotton, the silk mulberry, inexhaustible crops of jute and other fibres; timber, from the feathery bamboo and coroneted palm to the iron-hearted sdl tree — in short, every vegetable product which feeds and clothes a people, and enables it to trade with foreign nations, abounds. Nor is the country destitute of mineral wealth. The districts near the sea consist entirely of alluvial formations; and, indeed, it is stated that no substance so coarse as gravel occurs throughout the delta, or in the heart of the provinces within 400 m. of the river mouths.

The climate varies from the snowy regions of the Himalayas to the tropical vapour-bath of the delta and the burning winds of Behar. The ordinary range of the thermometer ,

on the plains is from about 52 F. in the coldest month to 103 in the shade in summer. A temperature below 6o° is considered very cold, while with care the temperature of well-built houses rarely exceeds 95° in the hot weather. The rainfall varies from 37 in. in Behar to about 65 in. in the delta.

73°

BENGAL

Rivers.

Lower Bengal exhibits the two typical stages in the life of a great river. In the northern districts the rivers run along the valleys, receive the drainage from the country on either side, absorb broad tributaries and rush forward with an ever-increasing volume. But near the centre of the provinces the rivers enter upon a new stage cf their career. Their main channels bifurcate, and each new stream so created throws off its own set of distributaries to right and left. The country which they thus enclose and intersect forms the delta of Bengal. Originally conquered by the fluvial deposits from the sea, it now stretches out as a vast dead level, in which the rivers find their velocity checked, and their current no longer able to carry along the silt which they have brought down from northern India. The streams, accordingly, deposit their alluvial burden in their channels and upon their banks, so that by degrees their beds rise above the level of the surrounding country. In this way the rivers in the delta slowly build themselves up into canals, which every autumn break through or overflow their margins, and leave their silt upon the adjacent flats. Thousands of square miles in Lower Bengal annually receive a top-dressing of virgin soil from the Himalayas, — a system of natural manuring . which renders elaborate tillage a waste of labour, and defies the utmost power of over-cropping to exhaust its fertility. As the rivers creep farther down the delta, they become more and more sluggish, and their bifurcations and interlacings more com- plicated. The last scene of all is a vast amphibious wilderness of swamp and forest, amid whose solitudes their network of channels insensibly merges into the sea. The rivers, finally checked by the sea, deposit their remaining silt, which emerges as banks or blunted promontories, or, after a year's battling with the tide, adds a few feet

or it may be a few inches to the foreshore.

The Ganges gives to the country its peculiar character and aspect. About 200 m. from its mouth it spreads out into numerous branches, forming a large delta, composed, where it borders on the sea, of a labyrinth of creeks and rivers, running through the dense forests of the Sundarbans, and exhibiting during the annual inundation the appearance of an immense sea. At this time the rice fields to the extent of many hundreds of square miles are submerged. The scene presents to a European eye a panorama of singular novelty and interest — rice fields covered with water to a great depth; the ears of grain floating on the surface; the stupendous embankments, which restrain without altogether preventing the excesses of the inundations; and peasants going out to their daily work with their cattle in canoes or on rafts. The navigable streams which fall into the Ganges intersect the country in every direction and afford great facilities for internal communication. In many parts boats can approach by means of lakes, rivulets and water-courses to the door of almost every cottage. The lower region of the Ganges is the richest and most productive portion of Bengal, abounding in valuable produce. The other principal rivers in Bengal are the Sone, Gogra, Gandak, Kusi, Tista; the Hugli, formed by the junction of the Bhagirathi and Jalangi, and farther to the west, the Damodar and Rupnarayan; and in the south-west, the Mahanadi or great river of Orissa. In a level country like Bengal, where the soil is composed of yielding and loose materials, the courses of the rivers are continually shifting from the wearing away of their different banks, or from the water being turned off by obstacles in its course into a different channel. As this channel is gradually widened the old bed of the river is left dry. The new channel into which the river flows is of course so much land lost, while the old bed constitutes an accession to the adjacent estates. Thus, one man's property is diminished, while that of another is enlarged or improved; and a distinct branch of jurisprudence has grown up, the particular province of which is the definition and regulation of the alluvial rights alike of private property and of the state.

Geology. — The greater part of Bengal is occupied by the alluvial deposits of the Ganges, but in the south-west rises the plateau of Chota Nagpur composed chiefly of gneissic rocks. The great thickness of the Gangetic alluvium is shown by a

borehole at Calcutta which was carried to a depth of about 460 ft. below the present level of the sea without entering any marine deposit. Over the surface of the gneissic rocks are scattered

numerous basins of Gondwana beds. Some of these are undoubtedly faulted into their present positions, and to this they owe their preservation. In the Rajmahal Hills basaltic lava flows are interbedded with the Gondwana deposits, and in the Karharbari coalfield the Gondwana beds are traversed by dikes of mica-peridotite and basalt, which are supposed to be of the same age as the Rajmahal lavas. The Gondwana series is economically of great importance. It includes numerous seams of coal, many of which are worked on an extensive scale (at Giridih, Raniganj, &c). The quality of the coal is good, but unfortunately it contains a large amount of ash, the average being as high as 17 %.

People. — In the sub-provinces under the lieutenant-governor of Bengal dwell a great congeries of peoples, of widely diverse origin, speaking different languages and representing far separated eras of civilization. The province, in fact, became so unwieldy that this was the chief reason for its partition in 1905. The people exhibit every stage of human progress, and every type of human enlightenment and superstition from the educated classes to primitive hill tribes. On the same bench of a Calcutta college sit youths trained up in the strictest theism, others indoctrinated in the mysteries of the Hindu trinity and pantheon, with representatives of every link in the chain of superstition — ■ from the harmless offering of flowers before the family god to the cruel rites of Kali, whose altars in the most civilized districts of Bengal, as lately as the famine of 1866, were stained with human blood. Indeed, the very word Hindu is one of absolutely indeterminate meaning. . The census officers employ it as a convenient generic to include 42 millions of the population of Bengal, comprising elements of transparently distinct ethnical origin, and separated from each other by their language, customs and religious rites. But Hinduism, understood even in this wide sense, represents only one of many creeds and races found within Bengal. The other great historical cultus, which during the last twelve centuries did for the Semitic peoples what Chris- tianity accomplished among the European Aryans, has won to itself one-fifth of the population of Bengal. The Mahommedans number some 9,000,000 in Bengal, but the great bulk of their numbers was transferred to Eastern Bengal and Assam. They consist largely of the original inhabitants of the country, who were proselytized by the successive Pathan and Mogul invasions. In the face of great natural catastrophes, such as river inunda- tions, famines, tidal waves and cyclones of the lower provinces of Bengal, the religious instinct works with a vitality unknown in European countries. Until the British government stepped in with its police and canals and

railroads, between the people and what they were accustomed to consider the dealings of Providence, scarcely a year passed without some terrible mani- festation of the power and the wrath of God. Mahratta invasions from central India, piratical devastations on the sea-board, banditti who marched about the interior in bodies of 5°, 000 men, floods which drowned the harvests of whole districts, and droughts in which a third of the population starved to death, kept alive a sense of human powerlessness in the presence of an omnipotent fate. Under the Mahommedans a pestilence turned the capital into a silent wilderness, never again to be re-peopled. Under British rule it is estimated that 10 millions perished within the Lower Provinces alone in the famine of 1769-1770; and the first surveyor-general of Bengal entered on his maps a tract of many hundreds of square miles as bare of villages and " depopulated by the Maghs." But since the advent of British administration the history of Bengal has substantially been a record of prosperity; the teeming population of its river valleys is one of the densest in the world, and the purely agricultural districts of Saran and Muzaffarpur in the Patna division support over 900 persons to the square mile, a number hardly surpassed elsewhere except in urban areas.

Language. — Excluding immigrants the languages spoken by the people of Bengal belong to one or other of four linguistic

families — Aryan, Dravidian, Munda and Tibeto-Burman. Of these the languages of the Aryan family are by far the most important, being spoken by no less than 95 % of the population according to the census of 1 90 1 . The Aryan languages are spoken in the plains by almost the whole population; the Munda and Dravidian in the Chota Nagpur plateau and adjoining tracts; and the Tibeto-Burman in Darjeeling, Sikkim and Jalpaiguri. The most important Aryan languages are Bengali (q.v.), Bihari, Eastern Hindi and Oriya. On the average in the province, before partition, out of every 1000 persons 528 spoke Bengali, 341 Hindi and Bihari, and 79 Oriya. As a rule Bengali is the language of Bengal proper, Hindi of Behar and Chota Nagpur, and Oriya of Orissa.

Agriculture. — The staple crop of the province is rice, to which about 66% of the cropped area is devoted. There are three harvests in the year — the boro, or spring rice; dus, or autumn rice; and avian, or winter rice. Of these the last or winter rice is by far the most

extensively cultivated, and forms the great harvest of the year. The dman crop is grown on low land. In May, after the first fall of rain, a nursery ground is ploughed three times, and the seed scattered broadcast. When the seed- lings make their appearance another field is prepared for trans- planting. By this time the rainy season has thoroughly set in, and the field is dammed up so as to retain the water. It is then repeatedly ploughed until the water becomes worked into the soil, and the whole reduced to thick mud. The young rice is then taken from the nursery, and transplanted in rows about 9 in. apart. Aman rice is much more extensively cultivated than dus, and in favourable years is the most valuable crop, but being sown in low lands is liable to be destroyed by excessive rain- fall. Harvest takes place in December or January. Aus rice is generally sown on high ground. The field is ploughed when the early rains set in, ten or twelve times over, till the soil is reduced nearly to dust, the seed being sown broadcast in April or May. As soon as the young plants reach 6 in. in height, the land is harrowed for the purpose of thinning the crop and to clear it of weeds. The crop is harvested in August or September. Boro, or spring rice, is cultivated on low marshy land, being sown in a nursery in October, transplanted a month later, and harvested in March and April. An indigenous description of rice, called uri or jaradhdn, grows in certain marshy tracts. The grain is very small, and is gathered for consumption only by the poorest. Wheat forms an important food staple in Behar, whence there is a considerable export to Calcutta. Oil-seeds are very largely grown, particularly in Behar. The principal oil-seeds are sarisha (mustard), til (sesamum) and tisi or masina (linseed). Jute {pat or kosta) forms a very important commercial staple of Bengal. The cultivation of this crop has rapidly increased of late years. Its principal seat of cultivation, however, is Eastern Bengal, where the superior varieties are grow r n. The crop grows on either high or low lands, is sown in April and cut in August. Apart from the quantity exported and the quantity made up by hand, it supports a prosperous mill industry, chiefly in the neigh- bourhood of Calcutta and Howrah. In 1905 there were thirty-six jute mills in the province and 2J million acres were cropped. The value of jute and of the goods manufactured from it re- presents more than a third of the aggregate value of the trade of Calcutta. Indigo used to be an important crop carried on with European capital in Behar, but of late years the industry has almost been destroyed by the invention of artificial indigo. Tea cultivation is the other great industry carried on by European capital, but that is chiefly confined to Assam, the industry in Darjeeling and the Dwars being on a small scale. Opium is grown in Behar with its head station at Patna. The cultivation of the cinchona plant in Bengal was

introduced as an experiment about 1862, and is grown on government plantations in Darjeeling.

Mineral Products. — The chief mineral product in Bengal is coal, which disputes with the gold of Mysore for the place of premier importance in the mining industries of India. The most import- ant mine in point of area, accessibility and output is Raniganj, with an area of 500 sq. m. Another of rising importance is that of Jherria, with an area of 200 sq. m., which is situated only 16 m. to

the west of Raniganj; while Daltonganj also has an area of 200 sq. m. The small coalfield of Karharbari with an area of only n sq. m. yields the best coal in Bengal. Besides these four coalfields there are twenty-five others of various sizes, which are only in the initial stages of development.

Commerce. — The sea-borne trade of Bengal is almost entirely concentrated at Calcutta (q.v.), which also serves as the chief port for Eastern Bengal and Assam, and for the United Provinces. The principal imports are cotton piece goods, railway materials, metals and machinery, oils, sugar, cotton, twist and salt; and the principal exports are jute, tea, hides, opium, rice, oil-seeds, indigo and lac. The inter-provincial trade is mostly carried on with Eastern Bengal and Assam, the United Provinces and the Central Provinces. From the United Provinces come opium, hides, raw cotton, wheat, shellac and oil-seeds; and from Assam, tea, oil-seeds and jute. The frontier trade of Bengal is registered with Nepal, Sikkim, Tibet and Bhutan, but except with Nepal the amount is insignificant.

Railways. — Bengal is well supplied with railways, which natu- rally have the seaport of Calcutta as the centre of the system. South of the Ganges, the East Indian follows the river from the North- Western Provinces, with its terminus at Howrah on the Hugli, opposite Calcutta. A chord line passes by the coalfield of Raniganj,. which enables this great railway to be worked more economically than any other in India. The Bengal-Nagpur, from the Central Provinces, also has its terminus at Howrah, and the section of this railway through Midnapore carries the East Coast line from Madras. North of the Ganges the Eastern Bengal runs north to Darjeeling, and maintains a service of river steamers on the Brahmaputra. The Bengal Central serves the lower Gangetic delta. Both of these have their termini at Sealdah, an eastern suburb of Calcutta. Northern Behar is traversed by the Bengal & North-Western, with an extension eastwards through Tirhoot to join the Eastern Bengal. In addition there are a few light lines and steam tramways.

Canals and Rivers. — Rivers and other waterways still carry a large part of the traffic of Bengal, especially in the delta. The government maintains two channels through the Sundarbans, known as the Calcutta and Eastern canals, and likewise does its best to keep open the Nadiya rivers, which form the communica- tion between the main stream of the Ganges and the Hugli. There is further a route by water between Calcutta and Midnapore. The most important canals, those in Orissa (see Mahanadi) and on the Sone river in southern Behar, have been constructed primarily for irrigation, though they are also used for navigation. Except as a protection against famine, expenditure on inigation is not remunerative in Bengal, on account of the abundance of rivers, and the general dampness of the climate.

Administration. — The administration of Bengal is conducted by a lieutenant-governor, with a chief secretary, two secretaries and three under-secretaries. There is no executive council, as in Madras and Bombay; but there is a board of revenue, consist- ing of two members. For legislative purposes the lieutenant- governor has a council of twenty members, of whom not more than ten may be officials. Of the remaining members seven are nominated on the recommendation of the Calcutta corporation, groups of municipalities, groups of district boards, selected public associations and the senate of Calcutta university. The number of divisions or commissionerships is 6, of which Chota Nagpur ranks as " non-regulation." The number of districts is 33.

Army. — In Lord Kitchener's reconstitution of the Indian army in 1904 the old Bengal command was abolished and its place taken by the Eastern army corps, which includes all the troops from Meerut to Assam. The boundaries of the 8th division include those of the former Oudh, Allahabad, Assam and Presidency districts; and the troops now quartered in Bengal only consist of the Presidency brigade with its head- quarters at Fort William.

History. — The history of so large a province as Bengal forms an integral part of the general history of India. The northern part, Behar (q.v.), constituted the ancient kingdom of Magadha, the nucleus of the imperial power of the successive great dynasties

See Parliamentary Papers relating to the reconstitution of the provinces of Bengal and Assam (Cd. 2658 and Cd. 2746, 1905);

Colonel E. T. Dal ton, The Ethnology of Bengal (1872) ; Sir W. W. Hunter, Annals of Rural Bengal (1868), and Orissa (1872) ; Sir H. H. Risley, Tribes and Castes of Bengal (1891); C. E. Buckland, Bengal under the Lieutenant-Governors (1901); and Sir James Bourdillon, The Partition of Bengal (Society of Arts, 1905).

BENGAL, BAY OF, a portion of the Indian Ocean, resembling a triangle in shape, lying between India and Burma. A zone 50 m. wide extending from the island of Ceylon arid the Coro- mandel coast to the head of the bay, and thence southwards through a strip embracing the Andaman and Nicobar islands, is bounded by the 100 fathom line of sea bottom; some 50 m. beyond this lies the 500-fathom limit. Opposite the mouth of the Ganges, however, the intervals between these depths are very much extended by deltaic influence. The bay receives many large rivers, of which the most important are the Ganges and Brahmaputra on the north, the Irrawaddy on the east, and the Mahanadi, Godavari, Kistna and Cauvery on the west. On the west coast it has no harbours, Madras having a mere open roadstead, but on the east there are many good ports, such as Akyab, Moulmein, Rangoon and Tavoy river. The islands in the bay are very numerous, including the Andaman, Nicobar and Mergui groups. The group of islands, Cheduba and others, in the north-east, off the Burmese coast, are remarkable for a chain of mud volcanoes, which are occasionally active. Thus in December 1 906 a new island of mud was thrown up, and measured 307 by 217 yds.

BENGALI, with Oeiya and Assamese, three of the four forms of speech which compose the Eastern Group of the Indo-Aryan Languages (q.v.). This group includes all the Aryan languages spoken in India east of the longitude of Benares, and its members are the folio wing :—

Number of speakers in British India, 1901.

Bengali 44,624,048

Oriya 9.687,429

Assamese i.35°.84°

Bihari 34.579.844

Total

90,242,167

Of these Bihari is treated separately. In the present article we shall devote ourselves to the examination of Bengali together with the two other closely connected languages. The reader is throughout assumed to be in possession of the facts described under the heads Indo-Aryan Languages and Prakrit.

Bengali is spoken in the province of Bengal proper, i.e. in, and on both sides of; the delta of the Ganges, and also in the Eastern Bengal portion of the province of Eastern Bengal and aagaag ^' Assam. The name " Bengali " is an English word, derived from the English word " Bengal." Natives call the language Banga-Bhdsa, or the language of Barjga, i.e. " Bengal." " Oriya " is the native name for the language of Odra or Orissa. Assamese, again an English word, is spoken in the Assam Valley. Its native name is Asamiyd, pronounced Ohamiyd. All these languages have alphabets derived from early forms of the well-known Nagari character of northern India. That of Bengali dates from about the nth century a.d. It is a cursive script which admits of ' considerable speed in writing. The Assamese alphabet is the same as that of Bengali, but has one additional character to represent the sound of w, which has to be expressed in the former language in a very awkward fashion. In Orissa, till lately, writing was done on a talipot palm-leaf, on which the letters were scratched with an iron stylus. In such circumstances straight lines would tend to split the leaf, and accordingly the alphabet received a peculiar curved appearance typical of it and of one or two other South Indian methods of writing.

The three languages are all the immediate descendants of MagadhI Prakrit (see Prakrit), the headquarters of which were in south Behar, near the modern city of Patna. From here it spread in three lines — southwards, where it developed into Oriya; south-eastwards into Bengal proper, where it became

Bengali; and eastwards, through Northern Bengal, into Assam, where it became Assamese. It thus appears that the language of Northern Bengal, though usually and conveniently treated as a dialect of Bengali, is not so in reality, but is a connecting link between Assamese and Bihari, the language of Behar. It is noteworthy that Northern Bengali and Assamese often agree in their grammar with Oriya, as against standard Bengali.

Omitting border forms of speech, Bengali, as a vernacular, has two main dialects, a western and an eastern, the former being the standard. The boundary-line between the two may be roughly put at the 89th degree of east longitude. The eastern dialect has many

marked peculiarities, amongst which we may mention a tendency to disaspiration, the pronunciation of c as ts, of ch as s, and of j as z. In the northern part of the tract a medial r is often elided, and in the extreme east there is a broader pronunciation of the vowel a, like that in the English word " ball," k is sounded like the ch in " loch," and both c and ch are pronounced like 5. The letter p is often sounded like w, and 5 like h, which again, when initial, is dropped. The distinction between cerebral and dental letters is lost, so that the words dth and sat are both pronounced 'at. In the south-east, near Chittagong, corruption has gone even further, and the locai dialect, which is practically a new language, is unintelligible to a man from Western Bengal. Throughout the eastern districts there is a strong tendency to epenthesis, e.g. kali is pronounced Mil. A more important dialectic difference in Bengali is that between the literary speech and the vernacular. The literary vocabulary is highly Sanskritized, so much so that it is not understood by any native of Bengal who has not received special instruction in it. Its grammar preserves numerous archaic or pseudo-archaic forms, which are invariably contracted in the colloquial speech of even the most highly educated. For instance, " I do " is expressed in the literary dialect by karitechi, but in the vernacular by kdrcci or kdcci. Oriya and Assamese may be said to have no dialects. There are a few local variations, but the standard form of speech, as a whole, is used everywhere in the respective tracts where the languages are spoken.

The three languages, being all children of a common parent, present many similar features. Oriya on the whole preserves the usual accentuation of the Indo-Aryan Languages (q.v.), seldom having the stress syllable farther back than the ante- penultimate. Bengali, on the other hand, throws the accent as far back as possible, and this produces the contracted forms which we observe in the colloquial language, the first syllable of a word being strongly accented, and the rest being hurried over. Literary Bengali preserves the full form of the word, and in reading aloud this full form is adhered to. Assamese follows Bengali in its accentuation, but the language has never been the toy of euphuism. In its literature colloquial words are employed, and are written as they are pronounced colloquially.

In the following account of the three languages, Bengali, literary and colloquial, will be primarily dealt with, and then the points of difference between it and the other two will be described. Abbreviations used: A. = Assamese, Bg. = Bengali, 0. = Oriya, Pr. = Prakrit, Mg. Pr. = MagadhI Prakrit, Skr. = Sanskrit.

Vocabulary.— As already said, Literary Bengali abounds in

tatsamas, or words borrowed in modern times from Sanskrit (see Indo-Aryan Languages), and these have also intruded themselves into the speech of the educated. So much has the false taste for these lea'rned words obtained the mastery that, in the literary lan- guage, when a genuine Bengali or tadbhava word is used in literature it is frequently not put into writing, but the corresponding learned tatsama is written in its place, although the tadbhava is read. It is as though a French writer wrote sicca when he wished the word siche to be pronounced. Similarly, the Bengali word for the goddess of Fortune is Lakkhi, but in books this is always written in the Skr. form Laksmi, although no Bengali would dream of saying anything but Lakkhi, even when reciting a purple passage ore rotundo. In fact, the vocal organs of most Bengalis are incapable of uttering the sound connoted by the letters Laksmi. The result is that the spelling of a Bengali word rarely represents its pronunciation. Oriya also borrows freely from Sanskrit, but there is no confusion between tatsamas and tadbhavas, as in Bengali. Assamese, on the other hand, is re- markably free from these parasites, its vocabulary being mainly tadbhava. In Eastern Bengal, where Mussulmans predominate, there is a free use of words borrowed from Arabic and Persian.

of the Mauryas, Andhras and Guptas; and its chief town, Patna, is the ancient Pataliputra (the Palimbothra of the Greeks), once the capital of India. The Delta or southern part of Bengal lay beyond the ancient Sanskrit polity, and was governed by a number of local kings belonging to a pre-Aryan stock. The Chinese travellers, Fa Hien in the 5th century, and Hsiian Tsang in the 7th century, found the Buddhist religion prevailing throughout Bengal, but already in a fierce struggle with Hinduism — a struggle which ended about the 9th or 10th century in the general establishment of the latter faith. Until the end of the 1 2th century Hindu princes governed in a number of petty principalities, till, in 1109, Mahommed Bakhtiyar Khilji was appointed to lead the first Mussulman invasion into Bengal. The Mahommedan conquest of Behar dates from 1197 a.d., and the new power speedily spread southwards into the delta. From about this date until 1340 Bengal was ruled by governors appointed by the Mahommedan emperors in the north. From 1340 to 1539 its governors asserted a precarious independence, and arrogated the position of sovereigns on their own account. From 1540 to 1576 Bengal passed under the rule of the Pathan or Afghan dynasty, which commonly bears the name of Sher Shah. On the overthrow of this

house by the powerful arms of Akbar, Bengal was incorporated into the Mogul empire, and administered by governors appointed by the Delhi emperor, until the treaties of 1765, which placed Bengal, Behar and Orissa under the administration of the East India Company. The Company formed its earliest settlements in Bengal in the first half of the 1 7th century. These settlements were of a purely commercial character. In 1620 one of the Company's factors dates from Patna; in 1624-1636 the Company established itself, by the favour of the emperor, on the ruins of the ancient Portu- guese settlement of Pippli, in the north of Oribsa; in 1640-1642 an English surgeon, Gabriel Boughton, obtained establishments at Balasore, also in Orissa, and at Hugli, some miles above Calcutta. The vexations and extortions to which the Company's early agents were subjected more than once almost induced them to abandon the trade, and in 167 7-1678 they threatened to withdraw from Bengal altogether. In 1685, the Bengal factors, driven to extremity by the oppression of the Mogul governors, threw down the gauntlet; and after various successes and hairbreadth escapes, purchased from the grandson of Aurangzeb, in 1696, the villages which have since grown up into Calcutta, the metropolis of India. During the next fifty years the British had a long and hazardous struggle alike with the Mogul governors of the province and the Mahratta armies which invaded it. In 1 7 56 this struggle culminated in the great outrage known as the Black Hole of Calcutta, followed by Clive's battle of Plassey and capture of Calcutta, which avenged it. That battle, and the subsequent years of confused fighting, established British military supremacy in Bengal, and procured the treaties of 1765, by which the provinces of Bengal, Behar and Orissa passed under British administration. To Warren Hastings (1772-1785) belongs the glory of consolidating the British power, and converting a military occupation into a stable civil govern- ment. To another member of the civil service, John Shore, afterwards Lord Teignmouth (1 786-1 793), is due the formation of a regular system of Anglo-Indian legislation. Acting through Lord Cornwallis, then governor- general, he ascertained and defined the rights of the landholders in the soil. These land- holders under the native system had started, for the most part, as collectors of the revenues, and gradually acquired certain prescriptive rights as quasi-proprietors of the estates entrusted to them by the government. In 1793 Lord Cornwallis declared their rights perpetual, and made over the land of Bengal to the previous quasi-proprietors or zaminddrs, on condition of the payment of a fixed land tax. This piece of legislation is known as the Permanent Settlement of the Land Revenue. But the Cornwallis code, while defining the rights of the proprietors, failed to give adequate

recognition to the rights of the under- tenants and the cultivators. His Regulations formally reserved the latter class of rights, but did not legally define them, or enable the husbandmen to enforce them in the courts. After

half a century of rural disquiet, the rights of the cultivators were at length carefully formulated by Act X. of 1859. This measure, now known as the land law of Bengal, effected for the rights of the under-holders and cultivators what the Cornwallis code in 1793 had effected for those of the superior landholders. The status of each class of persons interested in the soil, from the government as suzerain, through the zaminddrs or superior landholders, the intermediate tenure-holders and the under- tenants, down to the actual cultivator, is now clearly defined. The act dates from the first year after the transfer of India from the company to the crown; for the mutiny burst out in 1857. The transactions of that revolt chiefly took place in northern India, and are narrated in the article Indian Mutiny. In Bengal the rising began at Barrackpore, was communicated to Dacca in Eastern Bengal, and for a time raged in Behar, producing the memorable defence of the billiard-room at Arrah by a handful of civilians and Sikhs — one of the most splendid pieces of gallantry in the history of the British arms. Since 1858, when the country passed to the crown, the history of Bengal has been one of steady progress. Five great lines of railway have been constructed. Trade has enormously expanded; new centres of commerce have sprung up in spots which formerly were silent jungles; new staples of trade, such as tea and jute, have rapidly attained importance; and the coalfields and iron ores have opened up prospects of a new and splendid era in the internal development of the country.

During the decade 1891-1901 Bengalwasfortunateinescaping to a great extent the two calamities of famine and plague which afflicted central and western India. The drought of 1896-1897 did indeed extend to Bengal, but not to such an extent as to cause actual famine. The distress was most acute in the densely populated districts of northern Behar, and in the remote hills of Chota Nagpur. Plague first appeared at Calcutta in a sporadic form in April 1898, but. down to April of the following year the total number of deaths ascribed to plague throughout the province was less than 1000, compared with 191,000 for Bombay. At the beginning of 1900, however, there was a serious recrud- escence of plague at Calcutta, and a malignant outbreak in the district of Patna, which caused 1000 deaths a week. In the early months of 1901, plague again appeared in the same regions. The number of deaths in 1904 was

75,436, the highest recorded up to that date.

The earthquake of the 12th of June 1897, which had its centre of disturbance in Assam, was felt throughout eastern and northern Bengal. In all the large towns the masonry buildings were severely damaged or totally wrecked. The permanent way of the railways also suffered. The total number of deaths returned was only 135. Far more destructive to life was the cyclone and storm-wave that broke over Chittagong district on the night of the 24th of October 1897. Apart from damage to shipping and buildings, the low-lying lands along the coast were completely submerged, and in many villages half the inhabitants were drowned. The loss of human lives was reported to be about 14,000, and the number of cattle drowned about 15,000. As usual in such cases, a severe outbreak of cholera followed in the track of the storm-wave. Another natural calamity on a large scale occurred at Darjeeling in October 1899. Torrential rains caused a series of landslips, carrying away houses and breaking up the hill railway.

The most notable event, however, of recent times was the partition of the province, which was decided upon by Lord Curzon, -and carried into execution in October 1905. Serious popular agitation followed this step, on the ground {inter alia) that the Bengali population, the centre of whose interests and prosperity was Calcutta, would now be divided under two governments, instead of being concentrated and numerically dominant under the one; while the bulk would be in the new division. In 1906-1909 the unrest developed to a considerable extent, requiring special attention from the Indian and home governments; but as part of the general history of India the movement may be best discussed under that heading (see India: History) .

Owing to geographical and historical circumstances, Oriya is to some extent infected by Telugu and Marathi idioms,while the Tibeto-Burman dialects and Ahom have left their marks upon Assamese.

Phonetics. — The three forms of speech agree in sounding the vowel a like the 6 in ” hot.” When writing phonetically, this sound is represented in the present article by 6. The pronunciation of this frequently recurring vowel gives a tone to the general sound of the languages which at once strikes a foreigner. In Bg. and A. a final

vowel preceded by a single consonant is generally not pronounced. In Bg. this is only true for nouns, a final a being freely sounded in adjectives and verbs. In O., on the other hand, a final a is always pronounced. The sound of such a final a is in all three languages the same as that of the seccond o in " promote"; thus, the Bg. bara is pronounced boro. In Bg. a medial a sometimes has the sound of the first o in " promote," as, for instance, in the word ban {bon), a forest. In A. and Eastern Bg. a medial a is often sounded like the a in " ball," and is then transliterated a. A has preserved as a rule its proper sound of a in "father." The distinction between i and i and between u and u is everywhere lost in pronunciation, although in tatsama words the Sanskrit spelling is followed in literature. Thus, in Bg., the Skr. vyatlta is pronounced betito, with the accent on the first syllable. In A. the distinction between these long and short vowels is obliterated more than elsewhere, the reason being, as in Bg., the changes of pronunciation due to the shifting back of the accent. In O., the Skr. vowel r is pronounced ru. Elsewhere it is ri. In O. the vowel e is always long, but in Bg. it may be long or short, and in A. it is always short. The syllable ya preceded by a consonant has in Bg. the sound of a short e, so that vyakti is pro- nounced bekti. Moreover, in the same language the letter e is often pronounced like the a in the German Mann, a sound here phonetic- ally represented by a; thus, dekha is sometimes pronounced dekho, and sometimes ddkhb or even ddko. The syllable yd, when following a consonant, also has this d-sound, so that the English word " bank " is written bydnk in Bengali characters. in O. is always long. In Bg., when it has not got the accent it is shortened to the sound of the first o in " promote," a sound which, as we have seen, is also sometimes taken by a medial a. In A. o approaches the sound of u, and it actually becomes u when followed by i in the next syllable. The diphthongs ai (in iatsamas, i.e. the Skr. ai) and ai (in tadbhavas) are sounded like oi in " oil " in Bg. and O., while in A. they have the sound of oi in " going." Similarly, in Bg. and O. the diphthongs au and au are sounded like the au in the German Haus, but in A. like au in the French jaune, or the second o in " promote." In colloquial Bg. the two syllables ai often have the sound of e, as in khdite (khete), to eat.

In Eastern Bengal k has often the sound of ch in " loch." In A. the consonants c and ch are both pronounced like s, and j and jh become zh (i.e. the s in " pleasure ") or (when final) z. The same tendency is observable in Bg., though it is usually considered vulgar. In parts of Eastern Bengal c is pronounced like ts. O. as a rule has the proper sound of these letters, but towards the south c and ch become ts and

tsh when not followed by a palatal letter. The letters d and dh, when medial, are pronounced as a strongly burred r, and are then transliterated r and rh respectively. In A. and Eastern Bg. there is a strong tendency to pronounce both dentals and cerebrals as semi-cerebrals, as is done by the neighbouring Tibeto-Burmans. In A. r and r.h become r and rh respectively. In Bg. and A. n has universally become », but is properly pronounced in 0. Y is usually pronounced as j, unless it is a merely euphonic bridge to avoid a hiatus between two vowels, as in kariyd for kari-d. In A. the re- sultant j has the usual z-sound. When y is the final element of a conjunct consonant, in Bg. (except in the south-east) it is very faintly pronounced. In compensation the preceding member of the conjunct is doubled and the preceding vowel is shortened if possible, thus vakya becomes bdkk y d. In A., while the y is usually preserved, an i is inserted before the conjunct, so that we have baikyo. M and v when similarly situated are altogether elided in Bg., and this is also the case with v in A., in which language m under these circumstances becomes w ; thus, smarana becomes Bg. ssoron, A. swordn, and dvdrd becomes Bg. and A. dddra. R is generally pronounced correctly, except that when a member of a compound it is often not pronounced in colloquial Bg. ; thus karma (kommo). In North-eastern Bengali and in A. a medial r is commonly dropped; thus, Bg. karildm (ka'ilam), A. kari (kai). 1 The vulgar commonly confound n and /. 0. has retained the old cerebral I of Pr., which has disappeared in Bg. and A. The semi-vowel v(w) becomes b in Bg. and O., but retains its proper sound when medial in A. When Bg. wishes to represent a w, it has to write 6yd; thus, for chdwd it writes chdoya. Similarly bard, twelve, + ydri, friendship, when compounded together to mean " a collection of twelve friends," is pronounced bdrwari. Bg. pro- nounces all uncompounded sibilants as if they were s, like the English sh in " shin." This was already the case in Mg. Pr. (see Prakrit). O., on the contrary, pronounces all three like the dental s in " sin," while A. sounds them like a rough h, almost like the ch in " loch." In Eastern Bg. s becomes frankly h, and is then often

1 In Mg. Pr. every r becomes I. For an explanation of the apparent non-observance of this rule in languages of the Eastern Group, see

BlHARI.

dropped. The compound ks is everywhere treated as if it were khy. In colloquial Bg. there is a tendency to disaspiration ; thus dekha is pronounced ddko and the Pr. hattha-, a hand, becomes hat, not hath. In Eastern Bg. there is a cockney tendency to drop h, so that we have 'at, a hand, and ka'ilam for kahilam, I said.

The above remarks show that O. has, on the whole, preserved the original sounds of the various letters better than Bg. or A.

Declension. — The distinction of gender has disappeared from all three languages. Sex is distinguished either by the use of qualify- ing terms, such as ” male” or ” female,” or by the employment of different words,_ as in the case of our ” bull and ” cow.” The plural number is almost always denoted by the addition of some word meaning ” many ” or ” collection ” to the singular, although we sometimes find a true plural used in the case of nouns denoting human beings. Case was originally indicated by postpositions (see Indo-Aryan Languages), but in many instances these have been joined to the noun, so that they form one word with it. The following is the full declension of the singular of the word ghora, a horse, in the three languages : —

Oriya.

Bengali.

Assamese.

Nom. .

ghora

ghora

ghora

Acc.-Dat. .

ghoraku

ghdrdke

ghorak

Instr. .

ghordre

ghorate

ghordre

Abl. . .

ghordru

ghord-haite

ghoraye

Gen.

ghorara

ghordr

ghordr

Loc.

ghordre

ghorate or ghoray

ghordt

In Bg. and A. a noun often takes e (e) in the nominative singular, when it is the subject of a transitive verb ; thus Bg. bide (from bed) bale, the Veda says. In Bg. the nominative plural may, in the case of human beings, be formed by adding a to the genitive singular; thus, santan, a son; gen. sing., santdner; nom. plur., santdnera. The same is the case with the pronouns ; thus amar, of me ; award, we; tahdr, his; tahdra, they. In Bihari (q.v.) the pronouns follow the same rule, and, as is explained under that head, the nominative plural is really an oblique form of the genitive. With this exception, the plural in all our three languages is either the same as the singular, or (when the idea of plurality has to be emphasized) is formed by the addition of nouns of multitude, such as gan in Bg., mana in O., or bilak in A.

We shall see that pronominal suffixes are freely used in all three languages in the conjugation of verbs. In the Outer languages of the north-west of India (for the list of these, see Indo-Aryan Languages) pronominal suffixes are also commonly added to nouns to signify possession. In most of the languages of the Eastern Group such pronominal suffixes added to nouns have fallen into disuse, but in A. they are still commonly employed with nouns of relationship; thus, bap, a father; bopdi, my father; baper, your father; bdpek, his father. Their retention in A. is no doubt due to the example of the neighbouring Tibeto-Burman languages, in which such pronominal prefixes are a common feature.

In all three languages the adjective does not change for gender, for number or for case.

The personal pronouns have at the present day lost their old nominatives, and have new nominatives formed from the oblique base. In the first and second persons the singulars have fallen into disuse in polite conversation, and the plurals are used honorifically for the singular, as in the case of the English " you " for " thou." For the plural, new plurals are formed from the new singular (old plural) bases. In A., however, the old singular of the first person is retained, and the old plural plays its proper function. The Bg. pronouns are, mui (old), I; ami (modern), I; tui (old), thou; tumi (modern), thou; se, Hni, he; e, ini, this; o, uni, that; je, jini, who; ke, who?; hi, what?; kon, what (adjective)?; keha, anyone; kichu, anything; kona, any. Most of the forms in the other lan- guages closely follow these. The words in O. for " I " and " thou " are ambhe and tumbhe respectively. All these pronouns have plurals and oblique forms to which the case suffixes are added. These must be learnt from the grammars.

Conjugation.- — It is in the conjugation of the verb that colloquial Bg. differs most from the literary dialect. There is no distinction in any of the three languages between singular and plural. Most of the old singular forms have survived in a non-honorific sense, but they are rarely employed in polite language except in the third person. The old plural forms are generally employed for the singular also. The usual base for the verb substantive, when employed as an auxiliary, is ach, be, derived from the Skr. rcchati. 0., however, forms its past from the base iha (Skr. sthita-), and in South-western Bengal the base iha, derived from the same original, is used for both present and past time. Only two of the old Skr.-Pr. tenses have survived in the finite verb, the simple present and the imperative. Thus, Bg. kari, I do; kar, do thou. The past is formed by adding pronominal suffixes to the old past participle in il (Skr. ilia, a pleonastic suffix, see Prakrit), and the future by adding them to the old future participle in b (Skr. tavya, Pr. awa). Thus, Bg. karil-am, done + by-me, I did; karib-a, it-is-to-be-done + by-me ; I shall do. In Bg. there are two modern participles, a present (kar-ite)

and a past (kar-iya), and from these there are formed periphrastic tenses by suffixing auxiliary verbs. Thus, karite-chi (colloquial,

korcior kocci), I am doing; karite-childm (coll., korcilum or koccilum), I was doing; kariya-chi (coll., korsi), I have done; kariyd-chilam (coll., korsilum), I had done. A past conditional is formed by adding pro- nominal suffixes to the present participle; thus, karitdm (coll., kortum or kottum), (if) I had done. Similar tenses are formed in O. and A., but the periphrastic tenses are formed with verbal nouns and not with participles. Thus, O. karu-achT, A. kari-cho, I am a-doing, I am doing. O. and A. have each a very complete series of gerunds or verbal nouns which are fully declined. In Bg. only one gerund, that of the genitive, is in common use.

In order to illustrate the conjugation of the verb, we here give that of the root kar, do, in its present, past and future tenses.

Literary

Colloquial

Assam-

Oriya.

Bengali.

Bengali.

ese.

I do .

karri

kari

kori

karo

Thou doest

kara

kara

koro

kara

He (non-honor-

ific) does

kare

kare

kdre

kare

He (honorific)

does

karanti

karen

kdr'en

kare

I did .

karilu

karildm

kdllum, korlum.

kdrilo

Thou didst

harila

karile

kdlle, kdrle

k&rild

He (non-hon.)

did .

karila

karila

kollo, korlo

kdrile

He (hon.) did .

karile

karilen

kollen, korlen

kdrile

I shall do .

karibii

kariba

korbo

k&rim

Thou wilt do

kariba

karibe

korbe

kdriba

He (non-hon.)

will do

kariba

karibe

korbe

kdriba

He (hon.) will do

karibe

kariben

korben

kdriba

All the three languages have negative forms of the verb substan- tive, and A. has a complete negative conjugation for all verbs, made by prefixing the negative syllable na under certain euphonic rules.

Bengali Literature. — The oldest recognized writer in Bengali is the Vaishnava poet Candl Das, who flourished about the

*Literature en(* °^ tne I 4 t ‘ 1 or ˆ e beginning of the 15th cen- tury. His language does not differ much from the Bengali of to-day. He founded a school of poets who wrote hymns in honour of Krishna, many of whom, in later times, became connected with the religious revival instituted by Caitanya in the early part of the 16th century. In the 15th century KasI Ram translated the Mahabhdrata and Krttibas Ojha the Rdmayana into the vernacular. The principal figure of the 17th century was Mukunda Ram who has left us two really admirable poems entitled Candi and Srimanta Sauddgar. Parts of the former have been translated by Professor Cowell into English verse, and both well deserve putting into an English dress. With Bharat Candra, whose much admired but artificial Bidya Sundar appeared in the 18th century, the list of old Bengali authors may be considered as closed. They wrote in genuine nervous Bengali, and the conspicuous success of many of them shows how baseless is the contention of some native writers of the present day that modern literary Bengali needs the help of its huge imported Sanskrit vocabulary to express anything but the simplest ideas. This modern literary Bengali arose early in the 19th century, as a child of the revival of Sanskrit learning in Calcutta, under the influence of the college founded by the English in Fort William. Each decade it has become more and more the slave of Sanskrit. It has had some excellent writers, notably the late Bankim Candra, whose novels have received the honour of being translated into several languages, including English. Even he, however, sometimes laboured under the fetters imposed upon him by a strange vocabulary, and all competent European scholars are agreed that no work of first-class originality*

has much chance of arising in Bengal till some great genius purges the language of its pseudo-classical element.

Oriya Literature does not go back beyond the 16th century, though examples of the language are found in inscriptions of the 13th century. Nearly all the works are connected with the history of Krishna, and the translation of the Bhdgavata Purana into Oriya in the first half of the 16th century still exercises great influence on the masses. Dina Krsna Das (17th century) was the author of another popular work entitled Rasa Kallola,

or " The Waves of Sentiment," which deals with the early life of Krishna. Every verse in it begins with the letter k. It is not always decent, but is immensely popular. Upendra Bhanja, Raja of Gumsur, a petty hill state, is the most famous of Oriya poets, and was the most prolific. His work is insipid to a European taste, and when not unintelligible is often obscene. Oriya poetry, from first to last, has been an artificial production, the work of pandits, who clung to the rules of Sanskrit rhetoric, and loaded their verses with so many ideas and words borrowed from that language that it is rarely understood, except by the learned. The whole literature is, in fact, overshadowed by the great temple of Jagannath (a name of Krishna) at Puri in Orissa.

Assamese Literature. — The Assamese are justly proud of their national literature. It has an independent growth, and its strength lies in history, a branch of letters in which other Indian languages are almost entirely wanting. They have chronicles going back for the past 600 years, and a knowledge of their contents is a necessary part of the education of the upper classes of the country. In poetry, the Vaishnava reformer, Sankar Deb, who flourished some 450 years ago, was a volu- minous writer. His best known work is a translation of the Bhdgavata Purana. About the same time Ananta Kandali translated the Mahabhdrata and the Rdmayana into his native tongue. Medicine was a science much studied, and there are translations of all the principal Sanskrit works on the subject. Forty or fifty dramatic works in the vernacular are known and are still acted. Some of them date back to the time of Sankar Deb.

Authorities. — There is no work dealing with the three languages as a group. Both the Comparative Grammars of Beames and Hoernle (see Indo-Aryan Languages) are silent about Assamese. The fullest details concerning them all will be found in vol. v. of the Linguistic Survey of India, parts i. and ii. (Calcutta, 1903). Jn this each dialect and subdialect is treated with great minuteness and with copious

examples.

The first Bengali grammar and dictionary in a European language was the Vocabulario em Idioma Bengalla e Portuguez of Manoel da Assumpcam (Lisbon, 1743)., N. B. Halhed wrote the first Bengali grammar in the English language (Hooghly, 1778), but the real father of Bengali philology was the great missionary, William Carey (Grammar, Serampore, 1801; Dictionary, ib., 1825). W. Yates's Grammar, as edited and improved by T. Wenger (Calcutta, 1847) and others, is still on sale. It is entirely confined to the literary Bengali of the pandits. Its great rival has been Syama Caran Sarkar's Grammar (Calcutta, 1850), of which there have been numerous reprints. In 1894 J. Beames published his Grammar (Oxford), now the standard work on the subject. It is largely based on Syama Caran's work, but with much new material, especially that dealing with the colloquial side of the language. G. F. Nicholl 's Grammar (London, 1885) is an independent study of the language, in which the vernacular works of the best native grammarians have been freely utilized. There is no good Bengali dictionary. G. C. Haughton's Dictionary (London, 1833) is perhaps still the best, but J. Mendies' (Calcutta, about 1870) is also well known, and is the parent of countless others which have issued from the Calcutta presses. A Small Dictionary of Colloquial Bengali Words, by J. M. C. and G. A. C. (Calcutta, 1904), may also be studied with advantage. Cf . also Syama-caran Ganguli, Bengali Spoken and Written (Calcutta, 1906). For Bengali literature, see R. C. Dutt, The Literature of Bengal (Calcutta and London, 1895), and Hara Prasad Sastri, The Vernacular Literature of Bengal before the Introduction of English Education (Calcutta, n.d.). The most complete work is Bangabhasa Sahitya by Dines Candra Sen (2nd ed., Calcutta, 1901) in the Bengali language.

For Oriya there are E. Hallam's (Calcutta, 1874), T. Maltby's (Calcutta, 1874) and J. Browne's (London, 1882) Grammars. Thf last two are in the Roman character. They are all mere sketches of the language. Sutton's (Cuttack, 1841) is still the only Dictionary which the present writer has found of any practical use. For Oriya literature, see App. IX. of Hunter's Orissa (London, 1872), and Monmohan Chakravarti's " Notes on the Language and Literature of Orissa " in the Journal of the Asiatic Society of Bengal, vol. lxvi. (1897), part i. pp. 317 ff., and vol. lxvii. (1898), part i. pp. 332 ff.

The first Assamese Grammar was Nathan Brown's (Sibsagar, 1848, 3rd ed. 1893), and it is still the one usually studied. G. F. Nicholl gives an Assamese grammar as a supplement to his Bengali Grammar

already quoted. Like that work, it is quite independent, and is not a revised edition of Brown. M. Bronson's Dictionary (Sibsagar, 1867) was for long the only vocabulary available, and a very useful and practical work it was. It is now superseded by Hem Candra Barua's Hema-kosa (Shillong, 1900). For Assamese literature, see Ananda Ram Dhekial Phukan's A Few Remarks on the Assamese

Language (Sibsagar, 1855), partly reprinted in the Indian Antiquary, vol. xxv. (1896), pp. 57 ff. (G. A. Gr.)

BENGAZI (anc. Hesperides- Berenice) , a seaport on the north coast of Africa, capital of the sanjak of Bengazi or Barca, formerly in the vilayet of Tripoli, but, since 1875, dependent directly on the ministry of the interior at Constantinople. It is situated on a narrow strip of land between the Gulf of Sidra and a salt marsh, in 30 7′ N. lat. and 20° 3′ E. long. Though for the most part poorly built, it has one or two buildings of some pretension — an ancient castle, a mosque, a Franciscan monastery, government buildings and barracks. Senussi influence is strong and there is a large zawia (convent). The harbour is half silted up with sand and the ruins of fortifications, and is accessible only to vessels of light draught. A lighthouse has been erected at the entrance, but reefs render approach difficult, and the outer anchorage is fully exposed to west and north and not good holding. The export trade is largely in barley, shipped to British and other maltsters. The Sudan produce (ivory, ostrich feathers, &c.) formerly brought to Bengazi by caravan, has now been almost wholly diverted to Tripoli, the eastern tracks from Wadai and Borku by way of Kufra to Aujila having become so unsafe that their natural difficulties are no longer worth braving. Consular vigilance has also killed the once considerable slave trade. Trade in other commodities, however, is on the increase, exports now amounting to nearly half a million sterling and imports to half that figure. The neighbouring coast is frequented by Greek and Italian sponge-fishers, the industry being a valuable one. The province of Bengazi, being still without telegraphs or roads, is one of the most backward in the Ottoman empire.

Founded by the Greeks of Cyrenaica under the name Hes- perides, the town received from Ptolemy III. the name of Berenice in compliment to his wife. The ruins of the ancient town, which superseded Cyrene and Barca as chief place in the province after the

3rd century a.d., are now nearly buried in the sand. The modern town lies south-west of the original site. Certain large natural pits which are found in the plain behind, and have luxuriant gardens at the bottom, are supposed to have originated the myth of the Gardens of the Hesperides. Ancient tombs are found, which in 1882 yielded fine Greek vases to G. Dennis, then British vice-consul. The present name is derived from that of a Moslem saint whose tomb, near the sea-ccast, is an object of veneration. The population, amounting to about 25,000, is greatly mixed. Levantines, Maltese, Greeks and Jews form the trading community, but since 1895, when a branch of the Agenzia Italiana Commerciale was established at Bengazi, Italians have exercised an increasing influence on Cyrenaic commerce. Turks, Arabs and Berbers are the ruling castes, and negroes act as labourers and domestics. Many of these found their way to Crete, and becoming porters, &c. in Canea and Candia, were notorious for turbulence and fanaticism. In 1897 and 1898 the European admirals forcibly deported consignments of the worst characters back to Bengazi. In 1858 and again in 1874 the town was devastated by plague (see also Tripoli and Cyrenaica). (D. G. H.)

BENGEL, JOHANN ALBRECHT (1687-1752), Lutheran divine and scholar, was born at Winnenden in Wurttemberg, on the 24th of June 1687. His father died in 1693, and Bengel was educated by a friend, who became a master in the gymnasium at Stuttgart. In 1703 Bengel left Stuttgart and entered the university of Tubingen, where, in his spare time, he devoted himself specially to the works of Aristotle and Spinoza, and in theology to those of Philipp Spener, Johann Arndt and August Franke. His knowledge of the metaphysics of Spinoza was such that he was selected by one of the professors to prepare materials for a treatise De Spinosismo, which was afterwards published. After taking his degree, Bengel devoted himself to theology.

■ *Even at this time he had religious doubts; it is interesting in view of his later work that one cause of his perplexities was the difficulty of ascertaining the true reading of certain passages*

In the Greek New Testament. In 1707 Bengel entered the ministry and was appointed to the parochial charge of Metzingen

unter-Urach. In the following year he was recalled to Tubingen to undertake the office of Repetent or theological tutor. Here he remained till 1713, when he was appointed head of a seminary recently established at Denkendorf as a preparatory school of theology. Before entering on his new duties he travelled through the

greater part of Germany, studying the systems of education which were in use, and visiting the seminaries of the Jesuits as well as those of the Lutheran and Reformed churches. Among other places he went to Heidelberg and Halle, and had his attention directed at Heidelberg to the canons of scripture criticism published by Gerhard von Mastricht, and at Halle to C. Vitringa's Anacrisis ad Apocalypsin. The influence exerted by these upon his theological studies is manifest in some of his works. For twenty-eight years — from 1713 to 1741 — he was master (KlosterprSceptor) of the Klosterschule at Denkendorf, a seminary for candidates for the ministry established in a former monastery of the canons of the Holy Sepulchre. To these years, the period of his greatest intellectual activity, belong many of his chief works. In 1741 he was appointed prelate (i.e. General Superintendent) at Herbrechtingen, where he remained till 1749, when he was raised to the dignity of consistorial counsellor and prelate of Alpirspach, with a residence in Stuttgart. He now devoted himself to the discharge of his duties as a member of the consistory. A question of considerable difficulty was at that time occupying the attention of the church courts, viz. the manner in which those who separated themselves from the church were to be dealt with, and the amount of toleration which should be accorded to meetings held in private houses for the purpose of religious edification. The civil power (the duke of Wurttemberg was a Roman Catholic) was disposed to have recourse to measures of repression, while the members of the consistory, recognizing the good effects of such meetings, were inclined to concede considerable liberty. Bengel exerted himself on the side of the members of the consistory. In 1751 the uni- versity of Tubingen conferred upon him the degree of doctor of divinity. He died after a short illness, in 1752.

The works on which Bengel's reputation rests as a Biblical scholar and critic are his edition of the Greek New Testament, and his Gnomon or Exegetical Commentary on the same.

(A.) His edition of the Greek Testament was published at Tubingen in 1734, and at Stuttgart in the same year, but without the critical apparatus. So early as 1725, in an addition to his edition of Chrysostom's De Sacerdotio, he had given an account in his Prodromus Novi Testamenti Graeci recte cauteque adornandi of the principles on which his intended edition was to be based. In preparation for his work Bengel was able to avail himself of the collations of upwards of twenty MSS., none of them, however, of great importance, twelve of which had been collated by himself. In constituting the text, he imposed upon himself the singular restriction of not inserting any various reading which had not already been printed in some preced-

ing edition of the Greek text. From this rule, however, he deviated in the case of the Apocalypse, where, owing to the corrupt state of the text, he felt himself at liberty to introduce certain readings on manuscript authority. In the lower margin of the page he inserted a selection of various readings, the relative importance of which he denoted by the first five letters of the Greek alphabet in the following manner: — a was employed to denote the reading which in his judgment was the true one, although he did not venture to place it in the text; /3, a reading better than that in the text; 7, one equal to the textual reading; S and e, readings inferior to those in the text. R. Etienne's division into verses was retained in the inner margin, but the text was divided into paragraphs. The text was followed by a critical apparatus, the first part of which consisted of an introduction to the criticism of the New Testament, in the thirty-fourth section of which he laid down and explained his celebrated canon, " Proclivi scriptioni praestat ardua " (" The difficult reading is to be preferred to that which is easy "), the soundness of which, as a general principle, has been recognized by succeeding critics. The second part of the critical apparatus was devoted to a consideration of the various readings, and here Bengel adopted the plan of stating the evidence both against and in favour of a particular reading, thus placing before the reader the materials for forming a judgment. Bengel was the first definitely to propound the theory of families or recensions of MSS. His investigations had led him to see that a certain affinity or resemblance existed amongst many of the authorities for the Greek text — MSS., versions, and ecclesiastical writers; that if a peculiar reading, e.g., was found in one of these, it was gener- ally found also in the other members of the same class; and this general relationship seemed to point ultimately to a common origin for all the authorities which presented such peculiarities. Although

Benin river (known also as the Jakri outlet), though linked to the Niger system by a network of creeks, is an independent stream. It is formed by the junction of two rivers, the Ethiope and the Jamieson, which rise (north of 6° N,) on the western side of the hills which slope east to the Niger river. They unite about 50 m. above the sea. The general course of the Benin is westerly. It enters the Atlantic in about 5° 46′ N., 5 3′ E., and at its mouth is 2 m. wide. It is here obstructed by a sand-bar over which there is 1 2-1 4 ft. of water at high tide. The river is navigable by small steamers up to Sapele, a

town on the south bank immediately below the junction of the head streams. The Ologi and Gwato creeks enter the Benin on the right or north bank, and on the same side (8 m. above the mouth of the river) a channel, the Lagos creek, 170 m. long, branches off to the north-west, affording a waterway to Lagos. From the south or left bank of the Benin the Forcados mouth of the Niger can be reached by the Nana creek.

The Beni are a pure negro tribe, speaking a distinct language, but having many characteristics common to those of the Yoruba- and Ewe-speaking tribes. Like the Ashanti and Dahomeyans the Beni had a well-organized and powerful government and possessed a culture rare among negro races (see below, History).

Benin city is situated in a clearing of the forest, about 25 m. from the river-port of Gwato, on Gwato creek. The principal building is the British residency, which is constructed of brick and timber. A primary school, supported by the native chiefs, was opened in 1901, and a meteorological station was established in 1902. In 1904 the town was placed in telegraphic communica- tion with the rest of the protectorate and with Europe. Of the ancient city, whose buildings excited the admiration of travellers in the 17th and 18th centuries, scarcely a trace remains. The houses are neatly built of clay, coloured with red ochre, and frequently ornamented with rudely carved pillars. The port of Gwato, which lies about 30 m. north-north-east of the mouth of the Benin river, has a special interest as the place where Giovanni Belzoni, the explorer of Egyptian antiquities, died in 1823 when starting on an expedition to Timbuktu. No trace of his grave can now be found. Wari (formerly known also as Owari, Oywhere, &c.) is a much-frequented port on a branch of the Niger of the same name reached from the Forcados mouth, and is 55 m. south of Benin city.

Since the abolition of the slave trade the chief export of the country is palm-oil. Other trade products were from time to time — with the desire to preserve the isolation and independence of the country — placed under fetish, i.e. their export was for- bidden, so that in 1897 the only article in which trade was allowed by the king was palm-oil. After the British occupation, an extensive trade developed in oil, kernels, timber, ivory, rubber, &c. In the rubber and timber industries great strides have been made. The chiefs and people have shown considerable aptitude in' adapting themselves to the new order of things. Among the articles prized by the Beni is coral, of which the chiefs wear great quantities as ornaments.

History. — Benin was discovered by the Portuguese about the year 1485, and they carried on a brisk trade in slaves, who were taken to Elmina and sold to the natives of the Gold Coast. At that time and for more than two centuries afterwards, Benin seems to have been one of the most powerful states of West Africa. It was known to Europeans in the 17th century as the Great Benin. The towns of Lagos and Badagry were both founded by Benin colonists. Benin city was the seat of a theocracy of priests, in whose hands the oba or king, nominally supreme, appears to have often been a puppet. He was revered by his subjects as a species of divinity, and seldom left the enclosure surrounding the royal palace. The religion and mythology of the Beni, like those of the Yorubas, are based on spirit- and ancestor- worship (see Negro and Africa: Ethnology) ; the chief spirit or juju was worshipped with human sacrifices to an appalling extent, the Benin fetish being considered the most powerful in all West Africa. The usual form of sacrifice was crucifixion. Many chiefs, in no way politically dependent on Benin, used to send annual presents to the juju. The Benin

people do not appear to have indulged in wanton cruelty, and it is stated that they usually stupefied the victims before putting them to death. The people were skilled in brass work; their carving and design were alike excellent. Carved ivory objects abound, and there are many evidences of the skill attained by native artists, who perhaps owed something to their contact with the Portuguese. The weaving of cloth was also carried on. The Beni remained politically and socially almost unaffected by European influence until the occupation of their country by the British in 1897, their connexion with the white men having previously been almost confined to matters of trade. The Portuguese withdrew from the coast in the 18th century, but one of the most striking proofs of their commercial influence is the fact that a corrupt Lusitanian dialect was spoken by the older natives up to the last quarter of the 19th century. The first English expedition to Benin was in 1553; after that time a considerable trade grew up between England and that country, ivory, palm-oil and pepper being the chief commodities exported from Benin. The Dutch afterwards established factories and maintained them for a considerable time, chiefly with a view to the slave trade. In 1788 Captain Landolphe founded a factory called Barodo, near the native village of Obobi for the French Compagnie d'Oywhere; and it lasted till 1792, when it was destroyed by the English. In 1863 Sir Richard Burton, then British consul at Fernando Po, went to Benin to try and put a stop to human sacrifices, an attempt in which he did not succeed. At that time the decline in power of the kingdom of

Benin was obvious, and the city was in a decaying condition. In 1885 the coast-line of Benin was placed under British protection, and steps were taken to enter into friendly relations with the king. Consul G. F. N. B. Annesley 1 saw the king in 1890, with the hope of making a treaty, but failed in his object. In March 1892 Captain H. L, Gallwey, British vice-consul, succeeded in concluding a treaty with the king Overami. The treaty, however, proved of no avail, and the king kept as aloof as of old from any outside interference. In January 1897 J. R. Phillips, acting consul-general, and eight Europeans were brutally massacred on the road from Gwato to Benin city, whilst on a mission to the king. Phillips had persisted in starting for Benin despite the repeated request of the king that he should delay his visit until he (the king) had finished the celebration of the annual " customs." Two Europeans, Captain Alan Boisragon and R. F. Locke, alone escaped. A punitive expedition was organized under the command of Admiral Sir Harry Rawson, the success of which was a remarkable example of good organization hastily improvised. The news of the massacre of Phillips's party reached Rear-Admiral Rawson, the commander-in-chief on the Cape station, on the 4th of January 1897. The flagship was at Simons Town. The small craft were dispersed. Two ships at Malta had been ordered to join the Cape command. A transport was chartered in the Thames for the purposes of the expedition. In twenty-nine days a force of 1 200 men, coming from three places between 3000 and 4500 m. from the Benin river, was landed, organized, equipped and provided with transport. Five days later the city of Benin was taken, and in twelve days more the men were re-embarked, and the ships coaled and ready for any further service. On the 1 7 th of February Benin was occupied after considerable fighting. The town, which was found to be reeking of human sacrifices, was partly burned, and on the 22nd the expedition started on its return. The king and chiefs responsible for the massacre were placed on their trial by Sir Ralph Moor, high commissioner for Southern Nigeria; the king was deposed and deported to Calabar, and the chiefs, six in all, were executed. The chief offender was not brought to justice until a second punitive expedition in 1899 completed the pacification of the country. After the removal of the king in September 1897 a council of chiefs was appointed. This council carries on the government of the whole Beni country, and is presided over by a British resident.

1 Mr Annesley (b. 1851), after having served in the Prussian army, and in the Turkish army during the war of 1877, was in the British consular service from 1879 to 1892. In 1888 he became consul to the Congo Free State.

disposed at first to divide the various documents into three classes, he finally adopted a classification into two — the African or older family of documents, and the Asiatic, or more recent class, to which he attached only a subordinate value. The theory was afterwards adopted by J. S. Semler and J. J. Griesbach, and worked up into an elaborate system by the latter critic. Bengel's labours on the text of the Greek Testament were received with great disfavour in many quarters. Like Brian Walton and John Mill before him, he had to encounter the opposition of those who believed that the certainty of the word of God was endangered by the importance attached to the various readings. J. J. Wetstein, on the other hand, accused him of excessive caution in not making freer use of his critical materials. In answer to these strictures, Bengel published a Defence of the Greek Text of His New Testament, which he prefixed to his Harmony of the Four Gospels, published in 1736, and which contained a sufficient answer to the complaints, especially of Wetstein, which had been made against him from so many different quarters. The text of Bengel long enjoyed a high reputation among scholars, and was frequently reprinted. An enlarged edition of the critical apparatus was published by Philip David Burk in 1763.

(B.) The other great work of Bengel, and that on which his reputation as an exegete is mainly based, is his Gnomon Novi Testamenti, or Exegetical Annotations on the New Testament, published in 1742. It was the fruit of twenty years' labour, and exhibits with a brevity of expression, which, it has been said, " condenses more matter into a line than can be extracted from pages of other writers," the results of his study. He modestly entitled his work a Gnomon or index, his object being rather to guide the reader to ascertain the meaning for himself, than to save him from the trouble of personal investigation. The principles of interpretation on which he proceeded were, to import nothing into Scripture, but to draw out of it everything that it really contained, in conformity with grammatico-historical rules; not to be hampered by dogmatical considerations; and not to be influenced by the symbolical books. Bengel's hope that the Gnomon would help to rekindle a fresh interest in the study of the New Testament was fully realized. It has passed through many editions, has been translated into German and into English, and is still one of the books most valued by expositors of the New Testament. John Wesley made great use of it in compiling his Expository Notes upon the New Testament (1755).

Besides the two works already described, Bengel was the editor or author of many others, classical, patristic, ecclesiastical and expository. The more important are: Ordo Temporum, a treatise on the chronology of Scripture, in which he enters upon speculations regarding the end of the world, and an Exposition of the Apocalypse which enjoyed for a time great popularity in Germany, and was ■ translated into several languages.

Authorities. — For full details regarding Bengel the reader is referred to Oskar Wachter's /. A. Bengels Lebensabriss and to the Memoir of His Life and Writings (J. A. Bengels Leben und Wirken), by J. C. F. Burk, translated into English by Rev. R. F. Walker (London, 1837); see also Herzog-Hauck, Realencyklopddie, and E. Nestle, Bengel als Gelehrter (1893).

BENGUELLA (Sao Felipe de Benguella), a town of Portuguese West Africa, capital of Benguella district, on a bay of the same name, in 12° 2,ˆ' S., 13 25′ E. Benguella was founded in 1617 by the Portuguese under Manoel Cerveira Pereira. It was long the centre of an important trade, especially in slaves to Brazil and Cuba, but has now greatly declined. The anchorage, about a mile from the town, in 4 to 6 fathoms, is nothing but an open road- stead. Besides the churches of S. Felipe and S. Antonio, the hospital, and the fortress, there are only a few stone-built houses. The white population numbers about 1 500. A short way beyond Benguella is Bahia Tarta, where salt is manufactured and sulphur excavated.

About 20 m. north of Benguella is Lobito Bay, a natural harbour chosen (1903) as the starting-point of a railway to Katanga. At Lobito steamers can come close inshore and discharge cargo direct. Lobito is connected with Benguella by a railway which passes about midway through Katumbella, a town at the mouth of the river of the same name, and the sea terminus of an ancient route from the heart of Central Africa through Bihe. Old Benguella is a small town about 1 20 m. north of Lobito Bay.

BENf, a river of Bolivia, a tributary of the Madeira, rising in the elevated Cordilleras near the city of La Paz and at first known as the Rio de La Paz, and flowing east, and north-east, to a junction with the Mamore at io° 20′ S. lat. to form the Madeira. Fully one-half of its length is through the mountainous districts of central Bolivia, where it is fed by a large number of rivers and streams from the snowclad peaks, and may be described as a raging torrent. Below Reyes its course is through the forest- m. 24

covered hills and open plains of northern Bolivia, where some of the old Indian missions were located. The lower river is navig- able for 217 m. from Reyes to the Esperanza rapids, 18 m. above its confluence with the Mamore, where a fall of 20 ft. in a distance of 330 yds. obstructs free navigation. Its principal affluent is the Madre de Dios, or Mayu-tata, which rises in the eastern Cordilleras about 35 m. east of Cuzco, and flows in an east and north-east direction through northern Bolivia to a junction with the Beni 120 m. above its mouth. The. principal tributaries of the Madre de Dios are the Inambari and Paucartambo, both large rivers, and the Chandless, Marcapata, and Tambopata. In length and size of its tributaries the Madre de Dios is a more important river than the Beni itself, and is navigable during the wet season to the foot of the Andes, 180 m. from Cuzco.

BEN! (El Beni), a department of north-eastern Bolivia, bounded N. and E. by Brazil, S. by the departments of Santa Cruz and Cochabamba, and W. by La Paz and the national territory contiguous to Peru and Brazil. Pop. (est., 1900) 32,180, including 6000 wild Indians; area (est., probably too high) 102,111 sq. m. The " Llanos de Mojos," famous for their flourishing Jesuit mission settlements of the 17 th and 18th centuries, occupy the eastern part of this department and are still inhabited by an industrious peaceful native population, devoted to cattle raising and primitive methods of agriculture. Cattle and forest products, including rubber and coca, are exported to a limited extent. The capital, Trinidad (pop. 2556), is situated on the Mamor6 river in an open fertile country, and was once a flourishing Jesuit mission.

BENI-AMER (Amir), a tribe of African " Arabs " of Hamitic stock, ethnologically intermediate between Abyssinians and Nubians. They are of the Beja family, and occupy the coast of the Red Sea south of Suakin and portions of the adjacent coast-country of Eritrea, north of Abyssinia. They are of very mixed Beja and Abyssinian blood, and speak a dialect half Beja and half Tigr6, locally known as Hassa. They marry the women of the Bogos and other mountain tribes; but are too proud to let their daughters marry Abyssinians.

See Anglo-Egyptian Sudan, ed. Count Gleichen (London, 1905); A. H. Keane, Ethnology of Egyptian Sudan (1884) ; G. Sergi, Africa: Antropologia della Stirpe Camitica (Turin, 1897).

BENI-ISRAEL (" Sons of Israel "), a colony of Jews settled on the Malabar coast in Kolaba district, Bombay presidency, chiefly centring in the native state of Janjira. With the Jews of Cochin, they

represent a very ancient Judaic invasion of India, and are to be entirely distinguished from those Jews who have come to India in modern days for purposes of trade. Some authorities believe that the Beni-Israel settled in Kolaba in the 15 th century, but they themselves have traditions which indicate a far longer connexion with India (see Jews : § 3) .

BENIN, the name of a country, city and river of British West Africa, west of the main channel of the Niger, forming part of the protectorate of Southern Nigeria. The name was formerly applied to the coast from the Volta, in o° 40′ E., to the Rio del Rey, in 8° 40′ E., and included the Slave Coast, the whole delta of the Niger and a small portion of the country to the eastward. Some trace of this earlier application remains in the name " Bight of Benin," still given to that part of the sea which washes the Slave Coast, whilst up to 1894 " Benin " was used to designate the French possessions on the coast now included in Dahomey.

In its restricted sense Benin is the country formerly ruled by the king of Benin city. This area, at one time very extensive, gradually contracted as subject tribes and towns acquired independence. It may be described as bounded W. by Lagos, S. by the territory of the Jakri and other tribes of the Niger delta, E. by the Niger river, and N. by Yorubaland. The coast-line held by Benin had passed out of its sovereignty by the middle of the 19th century. In physical characteristics, climate, flora and fauna, Benin in no way differs from the rest of the southern portion of Nigeria (

Authorities. — H. L. Roth, Great Benin, its Customs, Art and Horrors (Halifax, 1903), a comprehensive and profusely illustrated work, with an annotated bibliography ; C. H. Read and O. M. Dalton, Antiquities from Benin . . . in the British Museum (1899); Pitt Rivers, Works of Art from Benin (1900); R. E. Dennett, At the Back of the Black Man's Mind (London, 1906) ; Sir R. Burton, Wanderings in West Africa (London, 1863); H. L. Gallwey, "Journeys in the Benin Country," Geog. Jnl., vol. i., London, 1893; A. Boisragon, The Benin Massacre (London, 1897); R. H. Bacon, Benin, the City of Blood (London, 1898), by a member of the punitive expedition of 1897; the annual Reports on Southern

Nigeria, issued by the Colonial Office, London.

BENITOITE, a mineral discovered in 1907 near the head- waters of the San Benito river, San Benito Co., California, and described by Prof. G. D. Louderback. It is a titano-silicate of barium (BaTiSi 3 9), crystallizing in the hexagonal system, with a hardness of 6-5, and specific gravity 3-65. It may be colourless or blue, the colour varying sometimes in different parts, and passing to a deep sapphire blue. The blue variety is cut as a gem stone, and often resembles blue spinel, though its softness distinguishes it from spinel and sapphire. It is a brilliant stone, with high refractive index, and is strongly dichroic, being pale when viewed parallel to the principal axis and dark when viewed transversely.

BENJAMIN, a tribe of Israel, named after the youngest son of Jacob and Rachel. As distinct from the others Benjamin was born not beyond the Jordan but in Palestine, between Bethel and Ephrath. His mother, dying in childbed, gave him the name Ben-onI, " Son of my sorrow," which was changed by his father to Ben-jamln, meaning probably " Son of the right hand " {i.e. " of prosperity," or, perhaps, " son of the south "; Gen. xxxv. 16-18). Of his personal history little is recorded. He was the favourite of his father and brothers (with which contrast the spirit of the stories in Judg. xix.-xxi.), and the reputation of fierceness ascribed to him in the blessing of Jacob (" Benjamin is a wolf that teareth," Gen. xlix. 27) agrees with what is told of the tribe's warriors (see Ehud, Saul, Jonathan). It is a curious feature that its noted slingers were said to be left-handed (Judg. xx. 16, cf. iii. 15) and even ambidextrous (1 Chron. xii. 2). The late references to this tribe in the Israelite wanderings in the wilderness are of little value. On entering Palestine it is allotted a portion encompassed by the districts of Ephraim, Dan and Judah. In the time of the " judges " the tribe, of Benjamin was almost exterminated (see Judges, Book or), 600 men alone escaping (Judges xix. sqq.). The tribe was built up again by the rape of the maidens of Shiloh at one of their annual festivals (for which cf. Judges ix. 27), but a later narrative gives currency to a tradition that 400 virgins were also brought to Shiloh, the survivors of a massacre of the inhabitants of Jabesh-Gilead. At all events, Benjamin claimed the honour of providing the great king of Israel whose heroic deliverance of Jabesh-Gilead is referred to elsewhere (see Saul), and it is noteworthy that the tribe only now attain historical importance. If the genealogies associated it with Joseph the father of Ephraim and Manasseh, its fortunes were for a time bound up with the northern kingdom (see David). Although its territory lies open on the west and east, its physical features unite it to Judah, and what is known of its mixed

population 1 makes it difficult to determine how far the youngest of the tribes of Israel enjoyed any independent position previous to the monarchy. Its neutral position between Judah and Ephraim gave it an importance which was religious as well as political. Anathoth the home of Abiathar and Jeremiah, Gibeon the old Canaanite sanctuary, the royal sanctuary at Bethel, its associations with Samuel and the prophetic gilds of the times of Elijah and Elisha, and finally Jerusalem itself, the centre of worship, give " the least of all the tribes " a unique value in the history of Old Testament religion.

See H. W. Hogg, Ency. Bib., col. 534 sqq. (S. A. C.)

BENJAMIN OF TUDELA (in Navarre), a Jewish rabbi of the 12th century. He visited Constantinople, Egypt, Assyria and

1 Jerusalem and its district was Jebusite until its capture by David (so 2 Sam. v.); for Beeroth and Gibeon, see 2 Sam. iv. 2 seq., xxi. 2, and note the Benjamite and Judahite names which find analogies in the Edomite genealogies. See, on these points, S. A. Cook, Jew. Quarterly Review (1906), pp. 528 sqq.

Persia, and penetrated to the frontiers of China. His journeys occupied him for about thirteen years. He was credulous, but his Itinerary, or Massa'oth, contains some curious notices of the countries he visited and of the condition of the Jews. Thus his work is of much value for the Jewish history of the 12 th century. It is from Benjamin that we know that the Jews of Palestine and other parts of the East were noted for the arts of dyeing and glass-making.

His Itinerary was translated from the Hebrew into Latin by Arias Montanus in 1575, and appeared in a French version by Baratier in 1734. There have been various English translations. One was published by Asher in 1840; another (with critical Hebrew text) by M. N. Adler {Jewish Quarterly Review, vols, xvi.xviii. ; also re printed as a. separate volume, 1907).

BENJAMIN, JUDAH PHILIP (1811-1884), Anglo-American lawyer, of Jewish descent, was born a British subject at St Thomas in the West Indies on the nth of August 181 1, and was succes- sively an American lawyer, a leading Confederate politician and a distinguished English barrister. He eventually died in Paris a domiciled Frenchman. After 181 8 his parents lived in Charleston, South Carolina, and he w r ent to Yale in 1825 for his education, but left without taking a degree, and entered an attorney's office in New Orleans. He was admitted to the New Orleans bar in 1832. He

compiled with his friend John Slidell a valuable digest of decisions of the superior courts of New Orleans and Louisiana; and as a partner in the firm, of Slidell, Benjamin & Conrad, he enjoyed a good practice. In 1848 he was admitted a councillor of the supreme court, and in 1852 he was elected a senator for Louisiana, and thereafter he took an active part in politics, declining to accept a judgeship of the supreme court. In 1861 he withdrew from the Senate, left Washington and actively espoused the Confederate cause. He joined Jefferson Davis's provisional government as attorney-general, becoming afterwards his secretary for war (1861-1862), and chief secretary of state (1862-1865). Although at times subject to fierce criticism with regard to matters of administration and finance, he was recog- nized as one of the ablest men on the Confederate side, and he remained with Jefferson Davis to the last, sharing his flight after the surrender at Appomattox, and only leaving him shortly before his capture, because he found himself unable to go farther on horseback. He escaped from the coast of Florida in an open boat, and after many vicissitudes reached England, an exile. In 1866 his remaining property was lost in the banking failure of Overend & Gurney.

In London Benjamin was able to earn a little money by journalism, and on the 13th of January 1866 he entered Lincoln's Inn. He received a hospitable welcome from the legal profession. The influence of English judges who knew his abilities and his circumstances enabled him to be called to the bar on the 6th of June 1866, dispensing with the usual three years as a student, and he acquired his first knowledge of the practice and methods of English courts as the pupil of Mr C. E. (afterwards Baron) Pollock. Pollock fully recognized his abilities and they became and remained firm friends. Benjamin was naturally an apt and useful pupil; for instance, an opinion of Mr Pollock, which for long guided the London police in the exercise of their right to search prisoners, is mentioned by him as having been really composed by Benjamin while he was still his pupil. Benjamin joined the northern circuit, and a large proportion of his early practice came from solicitors at Liverpool who ha d correspondents in New Orleans. His business gradually increased, and having received a patent of precedence, he was on the 2nd of November 1872 called within the bar as a queen's counsel. In addition to his knowledge of law and of commercial matters he had consider- able eloquence, and a power of marshalling facts and arguments that rendered him extremely effective, particularly before judges. He was less successful in addressing juries, and towards the close of his career did not take Nisi prius

work, but in the court of appeal and House of Lords and before the judicial committee of the privy council he enjoyed a very large practice, making for some time fully £15,000 a year. The question of raising him to the bench was seriously considered by Lord Cairns, who, however, seems to have thought that the ungrudging hospitality and

goodwill with which Benjamin had been received by the English legal profession had gone far enough. Towards the close of his career he was in ill health, and he suffered from the results of a fall from a tramcar. He retired in 1882 to a house in Paris which he had built and where he had been in the habit of passing his vaca- tions with his wife, who was a Frenchwoman. He never returned to practice, but came back to London to be entertained by the bench and bar of England at a banquet in the Inner Temple Hall on the 30th of June 1883. He died at Paris on the 6th of May

1884.

Benjamin was thick-set and stout, with an expression of great shrewdness. An early portrait of him is to be found in Jefferson Davis's Rise and Fall of the Confederate Government. His political history may be traced in that work, and in John W. Draper's American Civil War and von Hoist's Constitutional History of the United States. Many allusions to his English career will be found in works describing English lawyers of his period, and there are some interesting reminiscences of him by Baron Pollock in the Fortnightly Review for March 1898. His Treatise on the Law of Sale of Personal Property with References to the American Decisions and to the French Code and Civil Law — a bulky volume known to practitioners as Benjamin on Sales — is the principal text-book on its subject, and a fitting monument of the author's career at the English bar, of his industry and learning. Many of his American speeches have been published.

See Judah P. Benjamin, by Pierce Butler (Philadelphia, 1907, with a good bibliography).

BEN LEDI (Gaelic, "the hill of God"), a mountain of Perthshire, Scotland, 2875 ft. high, 5 m. by road N.W. of Callander. It is situated close to some of the most romantic scenery in the Highlands,

and is particularly well known through Scott's Lady of the Lake. Its name is supposed to point to the time when Beltane rites were observed on its summit. A cairn was built on the top in 1887 to commemorate Queen Victoria's jubilee. On one of the sides of the mountain is a tarn which bears the name of Lochan nan Corp, " the little loch of the dead," from an accident to a funeral party by which 200 lives were lost.

BENLLIURE Y GIL, JOSE (1858-), Spanish painter, was born at Valencia, studied painting under Domingo, and showed from the first such marked talent that he was sent to the Spanish school in Rome. He was one of the select circle pensioned by the Spanish government for residence in Italy and executed several state orders for the decoration of public buildings; but he owes his chief fame to his large historical paintings, notably the " Vision in the Coliseum." He became the leader of the Spanish art colony in Rome, where he practised as painter and sculptor.

BEN LOMOND, a mountain in the north-west of Stirlingshire, Scotland. It is situated near the eastern bank of Loch Lomond, about 9 m. from the head and about 15 from the foot. It is 3192 ft. high, and the prevailing rocks are granite, mica schist, diorite, porphyry and quartzite, the last, where it crops out on the surface, gleaming in the distance like snow. Duchray Water, a head-stream of the Forth, rises in the north-east shoulder. The hill, which is covered with grass to the top, is a favourite climb, being ascended from Rowardennan (the easiest) or Inversnaid on the lake, or Aberfoyle 10 m. inland due east. The view from the summit extends northward as far as the Grampians, with occasional glimpses of Ben Nevis; westward to Jura in the Atlantic; south-westward to Arran in the Firth of Clyde; southward to Tinto Hill, the Lowthers and Cairnsmore; and eastward to Edinburgh Castle and Arthur's Seat.

BENLOWES, EDWARD (1603 ?-i676), English poet, son of Andrew Benlowes of Brent Hall, Essex, was born about 1603. He matriculated at St John's College, Cambridge, in 1620, and on leaving the university he made a prolonged tour on the continent of Europe. He was a Roman Catholic in middle life, but became a convert to Protestantism in his later years. He dissipated his fortune by openhanded generosity to his friends and relations, and possibly by serving in the Civil War; so that he was in great poverty at the time of his death, which occurred on the 1 8th of December 1676. The last eight years of his life

were passed at Oxford. Many of his writings are in Latin. His most

important work is Theophila, or Love's Sacrifice, a Divine Poem (1652). The poem deals with mystical religion, telling how the soul, represented by Theophila, ascends by humility, zeal and contemplation, and triumphs over the sins of the senses. It is written in a curious stanza of three lines of unequal length rhyming together. Until recent times justice has hardly been done to Benlowes' poetical merits and indisputable piety. Samuel Butler, who satirized him in his " Character of a Small Poet," found abundant matter for ridicule in his eccentricities; and Pope and Warburton noted him as a patron of bad poets.

His Theophila was reprinted by S. W. Singer; and in Minor Poets of the Caroline Period, vol. i. (1905) , Mr Saintsbury reprints Theophila and two other poems by Benlowes, " The Summary of Wisedome," and " A Poetic Descant upon a Private Music-Meeting."

BEN MACDHUI, more correctly Ben Mtjichdhtji (Gaelic for " the mountain of the black pig," in allusion to its shape), the second highest mountain (4296 ft.) in Great Britain, one of the Cairngorm group, on the confines of south-western Aberdeenshire and south-western Banffshire, not far from the eastern boundary of Inverness-shire. It is about 1 1 m. from Castleton of Braemar and about 10 from Aviemore. The ascent is usually made from Castleton of Braemar, by way of the Linn of Dee, Glen Lui and Glen Derry. From the head of Glen Derry, with its blasted trees, the picture of desolation, it becomes more toilsome, but is partly repaid by the view of the remarkable columnar cliffs of Corrie Etchachan. The summit is flat and quite bare of vegeta- tion, but the panorama in every direction is extremely grand. At the foot of a vast gully, 2500 ft. above the sea, lies Loch Avon (or A'an), a narrow lake about 15 m. long, with water of the deepest blue and a margin of bright yellow sand. At the western end of the lake is the Shelter Stone, an enormous block of granite resting upon two other blocks, which can accommodate a dozen persons. Beautiful rock crystals occur in veins in the corries. The summit of Cairngorm, 3ˆ m. north of that of Ben Macdhui, may be reached from the latter with scarcely any descent, by following the rugged ridge flanking the western side of Loch Avon. The other great peaks of the group are Braeriach (4248 ft.) and Cairntoul (4241 ft.), and 6 m. to the east are the twin masses of Ben a Bourd, the northern top of which is 3924 ft. and the southern 3860 ft. high. Ben A'an, an adjoining hill, is 3843 ft. high.

BENNETT, CHARLES EDWIN (1858-), American classical scholar, was born on the 6th of April 1858, in Providence, Rhode Island. He graduated from Brown Uni- versity in 1878 and also studied at

Harvard (1881-1882) and in Germany (1882-1884). He taught in secondary schools in Florida (1878-1879), New York (1879-1881), and Nebraska (1885-1889), and became professor of Latin in the University of Wisconsin in 1889, of classical philology at Brown University in 1 89 1, and of Latin at Cornell University in 1892. His syn- tactical studies, notably various papers on the subjunctive, are based on a statistical examination of Latin texts and are marked by a fresh system of nomenclature; he ranks as one of the leaders of the " New American School " of syntacticians, who insist on a preliminary re-examination of all available data. Of great importance are his advocacy of " quantitative " reading of Latin verse and his Critique of Some Recent Subjunctive Theories in vol. ix. (1898) of Cornell Studies in Classical Philology, of which he was an editor. Bennett's Latin Grammar (1895) is the first successful attempt in America to adopt the method of the brief, scholarly Schulgrammatik. Besides the Latin classics commonly read in secondary courses and other text-books in " Bennett's Latin Series," he edited Tacitus's Dialogus de Oratoribus (1894), and Cicero's De Seneclute (1897) and De Amicitia (1897). He wrote, with George P. Bristol, The Teaching of Greek and Latin in Secondary Schools (1900), and The Latin Language (1907), and with William Alexander Hammond translated The Char- acters of Theophrastus (1902).

BENNETT, JAMES GORDON (1794-1872), American journa- list, founder and editor of the New York Herald, was born at Newmills in Banffshire, Scotland, in 1794 (not in 1800, as has been stated). He was educated for the Roman Catholic priesthood

in a seminary at Aberdeen, but in the spring of 1819, giving up the career which had been chosen for him, he emigrated to America. Landing at Halifax, Nova Scotia, he earned a poor living there for a short time by giving lessons in French, Spanish and bookkeeping; he passed next to Boston, where starvation threatened him until he got employment in a printing-office; and in 1822 he went to New York. An engagement as translator of Spanish for the Courier of Charleston, South Carolina, took him there for a few months in 1823. On his return to New York he projected a school, gave lectures on political economy and did subordinate work for the journals. During the next ten years he was employed on various papers, was the Washington corre- spondent first of the New York Enquirer, and

later of the Courier and Enquirer in 1827-1832, his letters attracting much attention; he founded the short-lived Globe in New York in 1832; and in 1833-1834 was the chief editor and one of the proprietors of the Pennsylvanian at Philadelphia. On the 6th of May 1835 he published the first number of a small one-cent paper, bearing the title of New York Herald, and issuing from a cellar, in which the proprietor and editor played also the part of salesman. " He started with a disclaimer of all principle, as it is called, all party, all politics"; and to this he consistently adhered. By his industry, sagacity and unscrupulousness, and by the variety of his news, the " spicy " correspondence, and the supply of personal gossip and scandal, he made the paper a great commercial success. He devoted his attention particularly to the gathering of news, and was the first to introduce many of the methods of the modern American reporter. He published on the 13 th of June 1835, the first Wall Street financial article to appear in any American newspaper; printed a vivid and detailed account of the great fire of December 1835, in New York; was the first, in 1846, to obtain the report in full by telegraph of a long political speech; and during the Civil War maintained a staff of sixty- three war correspondents. Bennett continued to edit the Herald almost till his death, at New York, on the 1st of June 1872.

His son, James Gordon Bennett (1841-), took over the management of the paper during the last year of its founder's life, and succeeded him in its control. It was he who sent Henry M. Stanley on his mission to find Livingstone in Central Africa, and he fitted out the " Jeannette" Polar Expedition, and in 1883 established (with John W. Mackay) the Commercial Cable Company.

BENNETT, JOHN, one of the finest English madrigalists, whose first set of madrigals appeared in 1599. In '1614 Ravens- croft, in a collection including five of his madrigals, writes a eulogy which reads like an obituary notice. The first set of madrigals was reprinted in 1845 by the Musical Antiquarian Society. Bennett's works consist of this set and several con- tributions to such collections as the Triumphs of Oriana, and to various collections of church music.

BENNETT, JOHN HUGHES (1812-1875), English physician and pathologist, was born in London on the 31st of August 181 2. He was educated at Exeter, and being destined for the medical profession was articled to a surgeon in Maidstone. In 1833 he began his studies at Edinburgh, and in 1837 graduated with the highest honours. During the next four years he studied in Paris and Germany, and on his return to Edinburgh in 1841 published a Treatise on Cod-liver Oil

as a Therapeutic Agent. In the same year he began to lecture as an extra-academical teacher on histology, drawing attention to the importance of the microscope in the investigation of disease; and as physician to the Royal Dispensary he instituted courses of " polyclinical medicine." In 1843 he was appointed professor of the institutes of medicine at Edinburgh, and performed the duties of that chair with great energy till incapacitated by failing health. He resigned in 1874. In August 1875 he was able to be present at the meeting of the British Medical Association in Edinburgh, on which occasion he received the degree of LL.D., but the fatigue he then underwent brought on a relapse, and he was compelled to have the operation of lithotomy performed. He sank rapidly and died on the 25th of September at Norwich. His publications were very numerous

including Lectures on Clinical Medicine (1850-1856), which in second and subsequent editions were called Clinical Lectures on the Principles and Practice of Medicine, and were translated into various languages, including Russian and Hindu; Leuco- cythaemia (1852), the first recorded cure of which was published by him in 1845; Outlines of Physiology (1858), reprinted from the 8th edition of the Encyclopaedia Britannica; Pathology and Treatment of Pulmonary Tuberculosis (1853); Textbook of Physiology (1871-1872).

BENNETT, SIR WILLIAM STERNDALE (1816-1875), English musical composer, the son of Robert Bennett, an organist, was born at Sheffield on the 13th of April 1816. Having lost his father at an early age, he was brought up at Cambridge by his grandfather, from whom he received his first musical education. He entered the choir of King's College chapel in 1824. In 1826 he entered the Royal Academy of Music, and remained a pupil of that institution for the next ten years, studying pianoforte under W. H. Holmes and Cipriani Potter, and composition under Lucas and Dr Crotch. It was during this time that he wrote several of his most appreciated works, in which may be traced influences of the contemporary movement of music in Germany, which country he frequently visited during the years 1836-1842. At one of the Rhenish musical festivals in Dusseldorf he made the personal acquaintance of Mendelssohn, and soon afterwards renewed it at Leipzig, where the talented young Englishman was welcomed by the leading musicians of the rising generation. At one of the celebrated Gewandhaus concerts he played his third pianoforte concerto, which was received enthusiastically. An en- thusiastic account of the event was written by Robert Schumann, who pronounced Bennett to be the most " musikalisch " of all Englishmen, and " an angel of a musician " (copying Gregory's pun on Angli and Angeli). But it was Mendelssohn's influence that

dominated Bennett's mode of utterance. A good example of this may be studied in Bennett's Capriccio in D minor. His great success on the continent established his position on his return to England. In 1834 he was elected organist of St Anne's chapel (now church), Wandsworth. In this year he composed his Overture to Parisina, and his Concerto in C minor, modelled on Mozart. An unpublished concerto in F minor, and the overture to the Naiads, impressed the firm of Broadwood so favourably in 1836 that they offered the composer a year in Leipzig, where the Naiads overture was performed at a Gewand- haus concert on the 13th of February 1837. Bennett visited Leipzig a second time in 1 840-1 841, when he composed his Caprice in E for pianoforte and orchestra and his overture The Wood Nymphs. He settled in London, devoting himself chiefly to practical teaching. In 1844 he married Mary Anne, daughter of Captain James Wood, R.N. He was made musical professor at Cambridge in 1856, the year in which he was engaged as permanent conductor of the Philharmonic Society. This latter post he held until 1866, when he became principal of the Royal Academy of Music. Owing to his professional duties his latter years were not fertile, and what he then wrote was scarcely equal to the productions of his youth . The principal charm of Bennett's compositions (not to mention his absolute mastery of the musical form) consists in the tenderness of their conception, rising occasionally to sweetest lyrical intensity. Except the opera, Bennett tried his hand at almost all the different forms of vocal and instrumental writing. As his best works in various branches of art, we may mention, for pianoforte solo, and with accompani- ment of the orchestra, his three sketches, The Lake, The Mill- stream and The Fountain, and his 3rd pianoforte concerto; for the orchestra, his Symphony in G minor, and his overture The Naiads; and for voices, his cantata The May Queen, written for the Leeds Festival in 1858. For the jubilee of the Philharmonic Society he wrote the overture Paradise and the Peri in 1862. He also wrote a sacred cantata, The Woman of Samaria, first per- formed at the Birmingham Musical Festival in 1867. In 1870 the university of Oxford conferred upon him the honorary degree of D.C.L. A year later he was knighted, and in 1872 he received a public testimonial before a large audience at St James's Hall, the money subscribed being devpte d to the foundation of a scholarship

at the Royal Academy of Music. Shortly before his death he produced a sonata called the M aid of Orleans, an elaborate piece of

programme- music based on Schiller's tragedy. He died at his house in St John's Wood, London, on the 15th of February 1875. See the Life, by his son (1908).

BEN NEVIS, the highest mountain in the British Isles, in Inverness shire, Scotland. It is 4406 ft. above the level of the sea, and is situated \ m. E.S.E. of Fort William, the meridian of 5 W. passing through it. As viewed from Banavie on the Caledonian Canal, it has the appearance of two great masses, one higher than the other, and though its bulk is impressive, its outline is much less striking than that of many other Highland hills. Its summit consists of a plateau 100 acres in area, with a slight slope to the south, terminating on its north-eastern side in a sheer fall of more than 1 500 ft. Snow lies in some of the gorges all the year round. The rocks of its lower half are mainly granite and gneiss ; its upper half is composed of porphyritic greenstone, and a variety of minerals occur. Its circumference at the base is about 30 m. It may be described as flanked on the west and south by the Glen and Water of Nevis, on the east by the river and Glen of Treig, and on the north by the river and Glen of Spean. From 1881 till 1904 meteorological observations were taken from the summit of Ben Nevis, the observers at first making the ascent daily for the purpose. In 1883, however, an observatory, equipped at a cost of £4000 (raised by public subscription), was opened by Mrs Cameron Campbell of Monzie, who provided the site. The observatory, which was connected by wire with the post office at Fort William, was provisioned by the Scottish Meteorological Society, to whom it belonged. The burden of maintaining it, however, proving too great for the society's means, appeal was made in vain to government for national support, and the station was closed in 1904. The bridle road up the mountain leaves Glen Nevis at Achintee; it has a gradient nowhere exceeding 1 in 5, and the ascent is commonly effected in two to three hours. There is a small hotel on the summit for the convenience of tourists, especially of those anxious to witness sunrise. From the summit every considerable peak in Scotland is visible. Observations conducted during several months have shown that, whilst the mean temperature at Fort William was 57 F., at the summit of Ben Nevis it was 41 F., and that though the rainfall at the fort amounted to 24 in., it was as much as 43 in. on the top of the Ben.

BENNIGSEN, LEVIN AUGUST, Count von (1745-1826), Russian general, of Hanoverian family, was born on the 10th of February 1745 in Brunswick, and served successively as a page at the Hanoverian court and as an officer of foot-guards. He retired from the Hanoverian army in 1764, and in 1773 entered the Russian

service as a field officer. He fought against the Turks in 1774 and in 1778, becoming lieutenant-colonel in the latter year. In 1787 his conduct at the storming of Oczakov won him promotion to the rank of brigadier, and he distinguished himself repeatedly in the Polish War of 1 793-1 794 and in the Persian War of 1 796. The part played by Bennigsen in the actual assassination of the tsar Paul I. is not fully known, but he took a most active share in the formation and conduct of the conspiracy. Alexander I. made him governor-general of Lithuania in 1801, and in 1802 a general of cavalry. In 1806 he was in command of one of the Russian armies operating against Napoleon, when he fought the battle of Pultusk and met the emperor in person in the sanguinary battle of Eylau (8th of February 1807). Here he could claim to have inflicted the first reverse suffered by Napoleon, but six months later Bennigsen met with the crushing defeat of Friedland (14th of June 1807) the direct consequence of which was the treaty of Tilsit. Bennigsen now retired for some years, but in the campaign of 181 2 he reappeared in the army in various responsible positions. He was present at Borodino, and defeated Murat in the engagement of Tarutino, but on account of a quarrel with Marshal Kutusov, the Russian commander-in-chief, he was compelled to retire from active military employment. After the death of Kutusov he was recalled and placed at the head of an army. Bennigsen led one of the columns which made the decisive attack on the last day of the battle of Leipzig (16t.h-1.9th of

October 1813). On the same evening he was made a count by the emperor Alexander I., and he afterwards commanded the forces which operated against Marshal Davout in North Germany. After the general peace he held a command from 1815 to 1818, when he retired from active service and settled on his Hanoverian estate of Banteln near Hildesheim. Count Bennigsen died on the 3rd of December 1826. His son, Alexander Levin, count von Bennigsen(1 809-1 893), was a distinguishedHanoverian statesman.
BENNIGSEN, RUDOLF VON (1824-1902), German politician, was born at Liineburg on the 10th of July 1824. He was descended from an old Hanoverian family, his father, Karl von Bennigsen, being an officer in the Hanoverian army, who rose to the rank of general and also held diplomatic appointments. Bennigsen, having studied at the university of Gottingen, entered the Hanoverian civil service. In 1855 he was elected a member of the second chamber; and as the government refused to allow him leave of absence from his official duties he resigned his post in the public service. He at once became the recognized leader of the Liberal opposition to the reactionary government, but must be distinguished from Count Bennigsen, a

member of the same family, and son of the distinguished Russian general, who was also one of the parliamentary leaders at the time. What gave Bennigsen his importance not only in Hanover, but throughout the whole of Germany, was the foundation of the National Verein, which was due to him, and of which he was president. This society, which arose out of the public excite- ment created by the war between France and Austria, had for its object the formation of a national party which should strive for the unity and the constitutional liberty of the whole Father- land. It united the moderate Liberals throughout Germany, and at once became a great political power, notwithstanding all the efforts of the governments, and especially of the king of Hanover to suppress it. In 1866 Bennigsen used all his influence to keep Hanover neutral in the conflict between Prussia and Austria, but in vain. He took no part in the war, but his brother, who was an officer in the Prussian army, was killed in Bohemia. In May of this year he had an important interview with Bismarck, who wished to secure his support for the reform of the confederation, and after the war was over at once accepted the position .of a Prussian subject, and took his seat in the diet of the North German Confederation and in the Prussian parliament. He used his influence to procure as much autonomy as possible for the province of Hanover, but was a strong opponent of the Guelph party. He was one of the three Hanoverians, Wind- thorst and Miquel being the other two, who at once won for the representatives of the conquered province the lead in both the Prussian and German parliaments. The National Verein, its work being done, was now dissolved.; but Bennigsen was chiefly instrumental in founding a new political party — the National Liberals, — who, while they supported Bismarck's national policy, hoped to secure the constitutional development of the country. For the next thirty years he was president of the party, and was the most influential of the parliamentary leaders. It was chiefly owing to him that the building up of the internal institutions of the empire was carried on without the open breach between Bismarck and the parliament, which was often imminent. Many amendments suggested by him were introduced in the debates on the constitution; in 1870 he undertook a mission to South Germany to strengthen the national party there, and was con- sulted by Bismarck while at Versailles. It was he who brought about the compromise on the military bill in 1874. In 1877 he was offered the post of vice-chancellor with a seat in the Prussian ministry, but refused it because Bismarck or the king would not agree to his conditions. From this time his relations with the government were less friendly, and in 1878 he brought about the rejection of the first Socialist Bill. In 1883 he resigned his seat in

parliament owing to the reactionary measures of the government, which made it impossible for him to continue his former co-operation with Bismarck, but returned in 1887 to support the coalition of national parties. One of the first acts of the emperor William II. was to appoint him president of the province of Hanover. In 1897 he resigned this post and

retired from public life. He died on the 7th of August

1902.

See biographical notices by A. Kiepert (2nd ed., Hanover, 1902), and E. Schreck (Hanover, 1894).

BENNINGTON, a village and one of the county-seats of Bennington county, Vermont, U.S.A., situated in the S.W. part of the state, about 30 m. E.N.E. of Troy, New York. Pop. (1890) 3971; (1900) 5656 (965 foreign-born); (1910) 62lr. The township of the same name, in which it is situated, had in 1910 a population of 8698, living chiefly in the villages of Bennington, North Bennington and Bennington Centre, the last a summer resort. The village of Bennington is served by the Rutland railway, and is connected by electric railway with North Adams and Pittsfield, Mass., and Hoosick Falls, N.Y. It is picturesquely situated at the foot of the Green Mountains, and the summit of the neighbouring Mt. Anthony (2345 ft.) commands a magnificent view. The village has woollen mills, knitting mills, stereoscope, box, and collar and cuff factories and machine shops. There are white clay and yellow ochre works in different parts of the township. Bennington is the seat of the Vermont state soldiers' home. The Bennington Battle Monument, a shaft 301 ft. high, is said to be the highest battle monument in the world. It commemorates the success gained on the 16th of August 1777 by a force of nearly 2000 " Green Mountain Boys " and New Hampshire and Massachusetts militia under General John Stark over two detachments of General Burgoyne's army, totalling about 1200 men, under Col. Friedrich Baum and Col. Breyman. These came up one after the other in search of provisions and were practically annihilated, Col. Baum being mortally wounded and 700 men taken prisoners. The scene of the battle is about 5 m. from the village. The victory had an important influence on Burgoyne's campaign (see American War of Independence), weakening Burgoyne and encouraging the American

militia to take the field against him. Bennington was settled in 1761 and was named in honour of Governor Benning Wentworth of New Hampshire. The township was organized in 1762. It was one of the " New Hampshire Grant " towns, both New York and New Hampshire claiming jurisdiction over it, and, being the home of Ethan Allen and Seth Warner, it became the centre of activities of the " Green Mountain Boys," of whom they were leaders. During the fifteen years in which Vermont was an independent commonwealth, Bennington was the headquarters of the council of safety. In 1828- 1829 W. L. Garrison edited here a paper called The Journal of the Times. The village of Bennington was incorporated in 1849.

See Merrill and Merrill, Sketches of Historic Bennington (Cambridge, Mass., 1898).

BENNO (1010-1106), bishop of Meissen, was the son of Werner, count of Woldenburg, was educated at Gosslar, and in 1066 was nominated by the emperor Henry IV. to the see of Meissen. In the troubles between empire and papacy that followed Benno took part against the emperor. In 1085 he was deposed by the synod of Mainz, but after the death of Pope Gregory VII. he submitted, and on the recommendation of the imperialist Pope Clement III. was restored to his see, which he held till his death. He did much for his diocese, both by ecclesiastical reforms on the Hildebrandine model and by material developments. He was long reverenced in his own diocese as a saint before, in 1523, he was canonized by Pope Adrian VI. His canonization drew from Luther a violent brochure " against the new false god and old devil, who is to be lifted up at Meissen."

For bibliography, see Ulysse Chevalier, Repertoire des sources hist.: Bio-bibliographie, s.v. " Bennon."

BENOIT, PETER LEONARD LEOPOLD (1834-1901), Flemish composer, was born on the 17th of August 1834 at Harlebeke in Flanders. His father and a local village organist were his first teachers. In i85r Benoit entered the Brussels Conserva- toire, where he remained till 1855, studying chiefly under F. J. Fetis. During this period he composed music to many melo- dramas, and to an opera Le Village dans les montagnes for the Park theatre, of which in 1856 he became conductor. He won

a government prize and a money grant in 1857 by his cantata Le Meurtre d' Abel, and this enabled him to travel through Germany. In course of his journeyings he found time to write a considerable amount of music, as well as an essay L'Ecole de musique flamande ct

son avenir. Fetis loudly praised his Messe solennelle, which Benoit produced at Brussels on his return from Germany. In 1861 he visited Paris for the produc- tion of his opera Le Roi des Aulnes (" Erlk5nig "), which, though accepted by the Theatre Lyrique, was never mounted; while there he conducted at the Bouffes-Parisiens. Again returning home, he astonished a section of the musical world by the pro- duction at Antwerp of a sacred tetralogy, consisting of his Cantate de Noel, the above-mentioned Mass, a Te Deum and a Requiem, in which were embodied to a large extent his theories of Flemish music. It was in consequence of his passion for the founding of an entirely separate Flemish school that Benoit changed his name from Pierre to Peter. By prodigious efforts he succeeded in gathering round him a small band of enthusiasts, who affected to see with him possibilities in the foundation of a school whose music should differ completely from that of the French and German schools. In its main features this school failed, for its faith was pinned to Benoit's music, which is hardly more Flemish than French or German. Benoit's more important compositions include the Flemish oratorios De Schelde and Lucifer, the latter of which met with complete failure on its production in London in 1888; the operas Het Dorp int Gebirgte and Isa, the Drama Christi; an enormous mass of songs, choruses, small cantatas and motets. Benoit also wrote a great number of essays on musical matters. He died at Antwerp on the 8th of March 1901.

BENOIT DE SAINTE-MORE, or Sainte-Maure, 12th century French trouvere, is supposed to have been a native of Sainte- Maure in Touraine. Very little is known of his personal history. The maitre prefixed to his name implies that he had graduated at the university, but there is nothing to show whether he was a simple trouvere by profession or belonged to the clergy. He was a loyal subject of Henry II. of England, to whose court he was attached, and when he speaks of the French, it is as " they." Wace had begun a history of the dukes of Normandy in his Roman du Rou. This he brought down to the reign of Henry I., but here Henry II. seems to have withdrawn his patronage, and at the end of his poem Wace refers to a maistre Beneeit who had received a similar commission. There is no other contemporary poem extant dealing with the subject except the Chronique des dues de Normandie, and it would seem reasonable to assume the identity of Wace's rival with Benoit de Sainte-More, whose authorship of the chronicle has, nevertheless, been often disputed. But a comparison of the Roman de Troie, which is certainly Benoit's work, with the Chronique, confirms the supposition that they are by the same author. The poem contains over forty thousand lines, and relates the history of the Norman dukes from Rollo to

Henry I., with a preliminary sketch of the Danish invasions and the adventures of Hastings and his companions. It has no claims to be considered an original authority. Benoit drew his information from the De moribus et aciis primorum Normanniae ducum of Dudon de Saint Quentin as far as 1002, following his model very closely. From that time he avails himself of the chronicle of William of Jumieges, also of Ordericus Vitalis and others. The Chronique probably dates from about 1172 to 1176. In the Roman de Troie, written about 1160, Benoit expressly asserts his authorship. He mentions " Omers " with great respect as li clers merveillos, but his authority for the story is naturally not Homer, of whom he could have no first- hand knowledge. He follows the apocryphal Historia de excidio Trojae of Dares the Phrygian and the Ephemerides belli Trojani of Dictys of Crete. The poem runs to about 30,000 lines. The personages of the classical story are converted into heroes of romance. They have their castles and their abbeys, and act in accordance with feudal custom. The supernatural machinery of Homer is missing both in Benoit's original and his own narrative. The story begins with the capture of the Golden Fleece and comes down to the return of the Greek princes after

the fall of Troy. Benoit diverges very widely from the classical tradition, and M. Leopold Constans sees reason to suppose that the trouvere founded his poem on an amplified version of the Dares narrative that has not come down to us. In the Roman de Troie first appeared the episode of Troilus and Briseida, that was to be developed later in the Filostrato of Boccaccio, which in its turn formed the basis of Chaucer's Troilus and Creseide. The Shakespearian play of Troilus and Cressida is also indirectly derived from Benoit's story.

On the strength of a certain similarity of treatment Benoit has sometimes been credited with the authorship of the anonymous Roman d'£ngas and of the Roman de Thebes, a romance derived indirectly from the Thebais of Statius. M. Constans is inclined to negative both these attributions. It is not even certain that the Benoit who chronicled the deeds of the Norman dukes for Henry II. between 1172 and n 76 was the Benoit de Sainte-More of the Roman de Troie.

The Chronique des dues de Normandie was edited by Francisque

Michel in 1836-1844; the Roman de Troie by A. Joly in 187C-1871 ; the Eneas, by J. J. Salverda de Grave in H. Suchier's Bibliotheca Normannica in 1891 ; the Roman de Thebes for the Societe des anciens textes francais, by M. L. Constans in 1890. See E. D. Grand in La Grande Encyclopedie ; L. Constans in Petit de Julleville's Hist, de la langue et de la litt. francaise (vol. i. pp. 171-225). where the three romances are analysed at length. The prefaces to the editions just mentioned discuss the authorship of the romances.

BENSERADE, ISAAC DE (1613-1691), French poet, was born in Paris, and baptized on the 5th of November 1613. His family appears to have been connected with Richelieu, who bestowed on him a pension of 600 livres. He began his literary career with the tragedy of Cleopdtre (1635), which was followed by four other in- different pieces. On Richelieu's death Benserade lost his pension, but became more and more a favourite at court, especially with Anne of Austria. He provided the words for the court ballets, and was, in 1674, admitted to the Academy, where he wielded an influence quite out of proportion to the merit of his work. In 1676 the failure of his Metamorphoses d'Ovide in the form of rondeaux gave a blow to his reputation, but by no means destroyed his vogue with his contemporaries. Benserade would probably be forgotten but for his sonnet on Job (165 1). This sonnet, which he sent to a young lady with his paraphrase on Job, having been placed in competition with the Urania of Voiture, a dispute on their relative merits long divided the whole court and the wits into two parties, styled respectively the Jobelins and the Uranists. The partisans of Benserade were headed by the prince de Conti and Mile de Scudery, while Mme de Montausier and J. G. de Balzac took the side of Voiture.

Some years before his death, on the 19th of October 1691, Benserade retired to Chantilly, and devoted himself to a transla- tion of the Psalms, which he nearly completed.

BENSLEY, ROBERT, an 18th-century English actor, of whom Charles Lamb in the Essays of Elia speaks with special praise. His early life is obscure, and he is said to have served in America as a lieutenant of marines; but he appeared at Drury Lane in 1765, and at that house and at Covent Garden, and later at the Haymarket, he played important parts up to 1796, when he retired from the stage. He appears then to have been given a small post under the government, a paymastership, which he resigned in 1798. He is stated in various quarters to have died in 181 7, but Mr Joseph Knight shows in his article in the Diet. Nat. Biog. that this is due to a confusion with another man named William Bensley, who possibly belonged to the

family of printers of whom Thomas Bensley (d. 1833) was the chief representative. On the stage he was simply " Mr Bensley," but though he is named William and even Richard in some accounts, Mr Knight shows that his name was certainly Robert. The actual date of his death is unknown, though it was probably later than 1809, when he is said to have inherited a fortune. His great character was Malvolio, but Charles Lamb's fervent admiration of his acting seems to have outrun the general opinion.

BENSON, EDWARD WHITE (1829-1896), archbishop of Canterbury, was born on the 14th of July 1829, at Birmingham.

He came of a family of Yorkshire dalesmen, his father, whose name was also Edward White Benson, being a manufacturing chemist of some note. He was educated at King Edward VI. 's school, Birmingham, under James Prince Lee, afterwards bishop of Manchester, and amongst his school-fellows were B.F. Westcott and J. B. Lightfoot, both of whom preceded him to Trinity College, Cambridge, where he was elected a sub-sizar in 1848, becoming subsequently sizar and scholar. The death of his widowed mother in 1850 left him almost without resources, with a family of younger brothers and sisters dependent upon him. Relations came to his aid, and presently his anxieties were relieved by Francis Martin, bursar of Trinity, who gave him liberal help. Benson took his degree in 1852 as a senior optime, eighth classic and senior chancellor's medallist, and was elected fellow of Trinity in the following year. He became a master at Rugby, first under E. M. Goulburn, and then (1857) under Frederick Temple, who became his lifelong friend; he was also ordained deacon in 1854 and priest in 1856. From Rugby he went to be first headmaster of Wellington College, which was opened in January 1859; and in the course of the same year he married his cousin, Mary Sidgwick. The school flourished under his management and also developed his administrative abilities, but gradually his thoughts began to turn towards other work. In 1868 he became prebendary of Lincoln and examining chaplain to Bishop Christopher Wordsworth, an office which he also held for a short time in 1870 for Dr Temple, just appointed to the see of Exeter. In 1872 his acceptance of the chancellorship of Lincoln opened a new period of his life. As chancellor, the statutes directed him to study theology, to train others in that study and to oversee the educational work of the diocese. To such work Benson at once devoted himself; and did more perhaps than any other man to reinvigorate cathedral life in England. He started a theological college (the Scholae Cancel- larii), founded night schools, delivered courses of lectures on church history, held Bible classes, and was instrumental in founding a

society of mission preachers for the diocese, the " Novate Novale." Early in 1877 he was consecrated first bishop of Truro, and threw himself with characteristic vigour into the work of organizing the new diocese. His knowledge, his sympathy, his enthusiasm soon made themselves felt everywhere ; the ruridecanal conferences of clergy became a real force, and the church in Cornwall was inspired with a vitality that had never been possible when it was part of the unwieldy diocese of Exeter. A chapter was constituted, the bishop being dean: amongst its members was a canon missioner (the first to be appointed in England), and the Scholae Cancellarii were founded after the Lincoln pattern. Moreover, the bishop at once set to work to build a cathedral. The foundation-stone was laid on the 20th of May 1880, and on the 3rd of November 1887 the building, so far as then completed, was consecrated. On the death of Dr Tait, Benson was nominated to the see of Canterbury and was enthroned on the 29th of March 1883. His primacy was one of almost unprecedented activity.

Frequent communications passed between him and the heads of the Eastern Churches. With their approval a bishop was again consecrated, after six years' interval (1881-1887), for the Anglican congregations in Jerusalem and the East; and the features which had made the plan objectionable to many English churchmen were now abolished. In 1886, after much careful investiga- tion, he founded the " Archbishop's Mission to the Assyrian Chris- tians," having for its object the instruction and the strengthening from within of the " Nestorian " churches of the East (see Nestorians) . An interchange of courtesies with the Metropolitan of Kiev on the occasion of the 900th anniversary of the conversion of Russia (1888), led to further intercourse, which has tended to a friendlier feeling between the English and Russian churches. On the other hand, with the efforts towards a rapprochement with the Church of Rome, to which the visit of the French Abbe Portal in 1894 gave some stimulus, the archbishop would have nothing to do.

With the other churches of the Anglican Communion the archbishop's relations were cordial in the extreme and grew

closer as time went on. Particular questions of importance, the "Jerusalem bishopric, the healing of the Colenso schism in the diocese of Natal, the organization of native ministries and the like,

occupied much of his time; and he did all in his power to foster the growth of local churches. But it was the work at home which occupied most of his energies. That he in no way slighted diocesan work had been shown at Truro. He complained now that the bishops were " bishops of their dioceses but not bishops of England," and did all he could to make the Church a greater religious force in English life. He sat on the ecclesiastical courts commission (1881-1883) and the sweating commission (1888- 1890). He brought bills into parliament to reform Church patronage and Church discipline, and worked unremittingly for years in their behalf. The latter became law in 1892, and the former was merged in the Benefices Bill, which passed in 1898, after his death. He wrote and spoke vigorously against Welsh disestablishment (1893); and in the following year, under his guidance, the existing agencies for Church defence were consoli- dated. He was largely instrumental in the inauguration of the House of Laymen in the province of Canterbury (1886) ; he made diligent inquiries as to the internal order of the sisterhoods of which he was visitor; from 1884 onwards he gave regular Bible readings for ladies in Lambeth Palace chapel. But the most important ecclesiastical event of his primacy was the judgment in the case of the bishop of Lincoln (see Lincoln Judgment), in which the law of the prayer-book is investigated, as it had never been before, from the standpoint of the whole history of the English Church. In 1 896 the archbishop went to Ireland to see the working of the sister Church. He was received with enthusiasm, but the work which his tour entailed over-fatigued him. On Sunday morning the nth of October, just after his return, whilst on a visit to Mr Gladstone, he died in Ha warden parish church of heart failure.

Archbishop Benson left numerous writings, including a valuable essay on The Cathedral (London, 1878), and various charges and volumes of sermons and addresses. But his two chief works, posthumously published, are his Cyprian (London, 1897), a work of great learning, which had occupied him at intervals since early manhood; and The Apocalypse, an Intro- ductory Study (London, 1900), interesting and beautiful, but limited by the fact that the method of study is that of a Greek play, not of a Hebrew apocalypse. The archbishop's knowledge of the past was both wide and minute, but it was that of an antiquary rather than of a historian. " I think," writes his son, "he was more interested in modern movements for their resemblance to ancient than vice versa." His sermons are very noble though written in a style which is over-compressed and often obscure. He wrote some good hymns, including " O Throned, O Crowned " and a beautiful version of Urbs Beata. His "grandeur in

social function" was unequalled and his interests were very wide. But above all else he was a great ecclesiastic. He paid less attention to secular politics than Archbishop Tait; but if a man is to be judged by the effect of his work, it is Benson and not Tait who should be described as a great statesman. His biography, by his son, reveals him as a man of devout and holy life, impulsive indeed and masterful, but one who learned self-restraint by strenuous endeavour.

His eldest son, Arthur Christopher Benson (b. 1862), was educated at Eton and King's College, Cambridge. He became fellow of Magdalene College, Cambridge, and was a master at Eton College from 1885 to 1903. His literary capacity was early shown in the remarkable fiction of his Memoirs of Arthur Hamilton (1886) under the pseudonym of " Christopher Carr," and his Poems (1893) and Lyrics (1895) established his reputation as a writer of verse. Among his works are Fasti Etonenses (1 899) ; his father's Life (1899); The Schoolmaster (1902), a commentary on the aims and methods of an assistant schoolmaster in a public school; a study of Archbishop Laud (1887); mono- graphs on D. G.Rossetti (1904), Edward FitzGerald (1905) and Walter Pater (1906), in the "English Men of Letters" series; Lord Vyet and other Poems (1897), Peace and other Poems (1905); The Upton Letters (1905), From a College Window

(1906), Beside Still Waters (1907). He also collaborated with Lord Esher in editing the Correspondence of Queen Victoria

(1907).

The third son, Edward Frederick Benson (b. 1867), was educated at Marlborough College and King's College, Cambridge. He worked at Athens for the British Archaeological Society from 1892 to 1895, and subsequently in Egypt for the Hellenic Society. In 1893 his society novel, Dodo, brought him to the front among the writers of clever fiction; and this was followed by other novels, notably The Vintage (1898) and The Capsina U890).

The fourth son, Robert Hugh Benson (b. 1871), was educated at Eton and Trinity College, Cambridge. After reading with Dean Vaughan at Llandaff he took orders, and in 1898 became a member of the Community of the Resurrection at Mirfield. In 1903 he became a Roman Catholic, was ordained priest at Rome in the following year, and returned to Cambridge as assistant priest of the Roman Catholic church there. Among his numerous publications are The Light Invisible, By What Authority?, The King's Achievement, Richard

Raynal, Solitary, The Queen's Tragedy, The Sentimentalists, Lord of the World.

See A. C. Benson, Life of Archbishop Benson (2 vols., London, i?99); J- H. Bernard, Archbishop Benson in Ireland (1897); Sir L. T. Dibdin in The Quarterly Review, October 1897.

BENSON, FRANCIS ROBERT (1858-), English actor, son of William Benson of Alresford,. Hants, was born at Tunbridge Wells on the 4th of November 1858. He came of a talented family, his elder brother, W. A. S. Benson (b. 1854), becoming well known in the world of art as one of the pioneers in the revival of English industrial craftsmanship, especially in the field of the metallic arts; and his younger brother, Godfrey Benson, being an active Liberal politician. He was educated at Winchester and New College, Oxford, and at the university was distinguished both as an athlete (winning the Inter-university three miles) and as an amateur actor. In the latter respect he was notable for producing at Oxford the first performance of a Greek play, the Agamemnon, in which many Oxford men who afterwards became famous in other fields took part. Mr Benson, on leaving Oxford, took to the professional stage, and made his first appearance at the Lyceum, under Irving, in Romeo and Juliet, as Paris, in 1882 . In the next year he went into manager- ship with a company of his own, taken over from Walter Bentley, and from this time he became gradually more and more prominent, both as an actor of leading parts himself and as the organizer of practically the Only modern " stock company " touring through the provinces. In 1886 he married Gertrude Constance Cockburn (Featherstonhaugh), who acted in his company and continued to play leading parts with him. Mr Benson's chief successes were gained out of London for some years, but in 1890 he had a season in London at the Globe and in 1900 at the Lyceum, and in later years he was seen with his repertoire at the Coronet. His company included from time to time many actors and actresses who, having been trained under him, became prominent on their own account, and both by his organization of this regular company and by his foundation of a dramatic school of acting in 1901, Mr Benson exercised a most important influence on the contemporary stage. From the first he devoted himself largely to the production of Shakespeare's plays, reviving many which had not been acted for generations, and his services to the cause of Shakespeare can hardly be overestimated. From 1888 onwards he managed the Stratford-on-Avon Shakespearian Festival. His romantic and intellectual powers as an actor, combined with his athletic and picturesque bearing and fine elocution, were conspicuously shown in his own impersonations,

most remarkable among which were his Hamlet (in 1900 he produced this play without cuts in London), his Coriolanus, his Richard II., his Lear and his Petruchio.

BENSON, FRANK WESTON (1862-), American painter, was born in Salem, Massachusetts, on the 24th of March 1862. He was a pupil of Boulanger and of Lefebvre in Paris; won many distinctions in American exhibitions, and a silver medal at the Paris Exhibition of 1900; and became a member of

the " Ten Americans," and of the National Academy of Design, New York. Besides portraits, he painted landscape and still life; and he was one of the decorators of the Congressional library, Washington, D.C.

BENSON, GEORGE (1699-1762), English dissenting minister, was born at Great Salkeld, in Cumberland, on the 1st of Sep- tember 1699, of a family which had distinguished itself in church and state. He studied at a school at Whitehaven and later at the university of Glasgow. In 1722, on Calamy's recommendation, he was chosen pastor of a congregation of dissenters at Abing- don, in Berkshire, where he continued till 1729, when, having em- braced Arminian views, he became the choice of a congregation in Southwark; and in 1740 he was appointed by the congregation of Crutched Friars colleague to the learned Dr Nathaniel Lardner, whom he succeeded in 1749. His Defence of the Reasonableness of Prayer appeared in 1731, and he afterwards published para- phrases and notes on the epistles to the Thessalonians, Timothy, Titus and Philemon, adding dissertations on several important subjects, particularly (as an appendix to 1 Timothy) on inspira- tion. In 1 738 he published his History of the First Planting of the Christian Religion, in 3 vols. 4to, a work of great learning and ability. He also wrote the Reasonableness of the Christian Religion {1743), the History of the Life of Jesus Christ, post- humously published in 1764, a paraphrase and notes on the seven Catholic epistles, and several other works, which gained him great reputation as a scholar 'and theologian even outside his own communion and his own country. Owing to his undoubted Socinianism his works suffered neglect after his death, which occurred on the 6th of April 1762.

BENT, JAMES THEODORE (1852-1897), English traveller, was the son of James Bent of Baildon House, near Leeds, York- shire, where he was born on the 30th of March 1852. He was educated at Repton school and Wadham College, Oxford, where he graduated in 1875.

In 1877 he married Mabel, daughter of R. W. Hall-Dare of Newtownbarry, Co. Wexford, and she became his companion in all his travels. He went abroad every year and became thoroughly acquainted with Italy and Greece. In 1879 he published a book on the republic of San Marino, entitled A Freak of Freedom, and was made a citizen of San Marino; in the following year appeared Genoa: How the Republic Rose and Fell, and in 1881 a Life of Giuseppe Garibaldi. He spent con- siderable time in the Aegean archipelago, of which he wrote in The Cyclades: or Life among the Insular Greeks (1885). From this period Bent devoted himself particularly to archaeological research. The years 1885-1888 were given up to investigations in Asia Minor, his discoveries and conclusions being communi- cated to the Journal of Jlellenic Studies and other magazines and reviews. In 1889 he undertook excavations in the Bahrein Islands of the Persian Gulf, and found evidence that they had been a primitive home of the Phoenician race. After an expedition in 1890 to Cilicia Trachea, where he obtained a valuable collection of inscriptions, Bent spent a year in South Africa, with the object, by investigation of some of the ruins in Mashonaland, of throwing light on the vexed question of their origin and on the early history of East Africa. He made the first detailed examination of the Great Zimbabwe. Bent described his work in The Ruined Cities of Mashonaland (1892). In 1893 he investigated the ruins of Axum and other places in the north of Abyssinia, partially made known before by the researches of Henry Salt and others, and The Sacred City of the Ethiopians (1893) gave an account of this expedition. Bent now visited at considerable risk the almost unknown Hadramut country (1 893-1 894), and during this and later journeys in southern Arabia he studied the ancient history of the country, its physical features and actual condition. On the Dhafar coast in 1894-1895 he visited ruins which he identified with the Abyssapolis of the frankincense merchants. In 1895- 1896 he examined part of the African coast of the Red Sea, finding there the ruins of a very ancient gold-mine and traces of what he considered Sabean influence. While on another journey in South Arabia (1896-1897), Bent was seized with malarial fever, and died in London on the 5th of May 1897, a few days after his return. Mrs Bent, who had contributed by her skill as a photo-

grapher and in other ways to the success of her husband's journeys, published in 1900 Southern Arabia, Soudan and Sakotra, in which were given the results of their last expedition into that region. The conclusions at which Bent arrived as to the Semitic origin of the ruins in Mashonaland have not been accepted by archaeologists, but the value of his pioneer work is undeniable (see Zimbabwe).

BENT. 1. (From " to bend "), primarily the result of bending; hence any inclination from the straight, as in curved objects like a hook or a bow; this survives in the modern phrase " to follow one's own bent," i.e. to pursue a certain course in a direction deviating from the normal, as also in such phrases as Chaucer's " Downward on a hill under a bent," indicating a hollow or declivity in the general configuration of the land. From the bending of a bow comes the idea of tension, as in Hamlet, " they fool me to the top of my bent," i.e. to the utmost of my capacity. 2. (From the O. Eng. beonet, a coarse, rushy grass growing in wet places; cf. the Ger. Binse, a reed), the name (" bent " or ' bennet ") popularly applied to several kinds of grass and surviving in the form " bent-grass."

BENTHAM, GEORGE (1800-1884), English botanist, was born at Stoke near Portsmouth on the 22nd of September 1800. His father, Sir Samuel Bentham (1 757-1831), was the only brother of Jeremy Bentham, the publicist, and of scarcely inferior ability though in a different direction. Devoting himself in early life to the study of naval architecture, Sir Samuel went to Russia to visit the naval establishments in the Baltic and Black Seas. He was induced to enter the service of the empress Catherine II., built a flotilla of gunboats and defeated the Turkish fleet. For this he was made, in addition to other honours, colonel of a cavalry regiment. On the death of the empress he returned to England to be employed by the admiralty, and was sent (1805-1807) again to Russia to superintend the building of some ships for the British navy. He attained the rank, under the admiralty, of inspector-general of naval works. He intro- duced a multitude of improvements in naval organization, and it was largely through his recommendation that M. I. Brunei's block-making machinery was installed at Portsmouth.

George Bentham had neither a school nor a college education, but early acquired the power of giving sustained and concentrated attention to any subject that occupied him — one essential condition of the success he attained as perhaps the greatest systematic botanist of the 19th century. Another was his remarkable linguistic aptitude. At the age of six to seven he could converse in French, German and Russian, and he learnt Swedish during a short residence in Sweden when little older. At the close of the war with France, the Benthams made a long tour through that country, staying two years at Montauban, where Bentham studied Hebrew and mathematics in the Protestant Theological School. They eventually settled in the neighbourhood of Montpellier where Sir Samuel purchased a large estate.

The mode in which George Bentham was attracted to the botanical studies which became the occupation of his life is noteworthy; it was through the applicability to them of the logical methods which he had imbibed from his uncle's writings, and not from any special attraction to natural history pursuits. While studying at Angouleme a copy of A. P. de Candolle's Flore francaise fell into his hands and he was struck with the analytical tables for identifying plants. He immediately pro- ceeded to test their use on the first that presented itself. The result was successful and he continued to apply it to every plant he came across. A visit to London in 1823 brought him into con- tact with the brilliant circle of English botanists. In 1826, at the pressing invitation of his uncle, he agreed to act as his secretary, at the same time entering at Lincoln's Inn and reading for the bar. He was called in due time and in 1832 held his first and last brief. The same year Jeremy Bentham died, leaving his property to his nephew. His father's inheritance had fallen to him the previous year. He was now in a position of modest independence, and able to pursue undistractedly his favourite studies. P"or a time these were divided between botany,

jurisprudence and logic, in addition to editing his father's profes- sional papers. Bentham's first publication was his Catalogue des planles indigenes des Pyrenees et du Bas Languedoc (Paris, 1826), the result of a careful exploration of the Pyrenees in company with G. A. Walker Arnott (1700-1868), afterwards professor of botany in the university of Glasgow. It is interesting to notice that in it Bentham adopted the principle from which he never deviated, of citing nothing at second-hand. This was followed by articles on various legal subjects: on codification, in which he disagreed with his uncle, on the laws affecting larceny and on the law of real property. But the most remarkable production of this period was the Outline of a New System of Logic, with a Critical Examination of Dr Whately's Elements of Logic (1827). In this the principle of the quantification of the predicate was first explicitly stated. This Stanley Jevons declared to be " undoubtedly the most fruitful discovery made in abstract logical science since the time of Aristotle." Before sixty copies had been sold the publisher became bankrupt and the stock went for wastepaper. The book passed into oblivion, and it was not till 1873 that Bentham's claims to priority were finally vindicated against those of Sir William Hamilton by Herbert Spencer. In 1836 he published his Labiatarum genera et species. In preparing this work he visited, between 1 830-1 834, every European herbarium, several more than once. The following winter was passed in Vienna, where

he produced his Commenta- tiones de Leguminosarum generibus, published in the annals of the Vienna Museum. In 1842 he removed to Pontrilas in Here- fordshire. His chief occupation for some succeeding years was his contributions to the Prodromus Systematic Naturalis Regni Vegetabilis, which was being carried on by his friend, A. P. deCandolle. In all these dealt with some 4730 species.

In 1854 he found the maintenance of a herbarium and library too great a tax on his means. He therefore offered them to the government on the understanding that they should form the foundation of such necessary aids to research in the Royal Botanic Gardens at Kew. At the same time he contemplated the abandonment of botanical work. Fortunately, he yielded to the persuasion of Sir William Hooker, John Lindley and other scientific friends. In 1855 he took up his residence in London, and worked at Kew for five days a week, with a brief summer holiday, from this time onwards till the end of his life. As his friend Asa Gray wrote: " With such methodical habits, with freedom from professional or administrative functions, which consume the time of most botanists, with steady devotion to his chosen work, and with nearly all authentic material and needful appliances at hand or within reach, it is not so surprising that he should have undertaken and have so well accomplished such a vast amount of work, and he has the crowning merit and happy fortune of having completed all that he undertook." The government, in 1857, sanctioned a scheme for the preparation of a series of Floras or descriptions in the English language of the indigenous plants of British colonies and possessions. Bentham began with the Flora Hongkongensis in 1861, which was the first comprehensive work on any part of the little-known flora of China. This was followed by the Flora Auslraliensis, in seven volumes (1863-1878), the first flora of any large con- tinental area that had ever been finished. His greatest work was the Genera Plantarum, begun in 1862, and concluded in 1883 in collaboration with Sir Joseph Hooker, " the greater portion being," as Sir Joseph Hooker tells us, " the product of Bentham's indefatigable industry." As age gradually impaired his bodily powers, he seemed at last only to live for the completion of this monumental work.

When the last revise of the last sheet was returned to the printer, the stimulus was withdrawn, and his powers seemed suddenly to fail him. He began a brief autobiography, but the pen with which he had written his two greatest works broke in his hand in the middle of a page. He accepted the omen, laid aside the unfinished manuscript and patiently awaited the not distant end. He died on the 10th of September 1884, within a fortnight of his 84th birthday.

The scientific world received the Genera Plantarum with as

unanimous an assent as was accorded to the Species Plantarum of Linnaeus. Bentham possessed, as Professor Daniel Oliver remarked, " an insight of so special a character as to deserve the name of genius, into the relative value of characters for practical systematic work, and as a consequence of this, a sure sifting of essentials from non-essentials in each respective grade." His preparation for his crowning work had been practically lifelong. There are few parts of the world upon the botany of which he did not touch. In the sequence and arrangement of the great families of flowering plants, different views from those of Bentham may be adopted. But Bentham paved the way by an intimate and exact statement of the structural facts and their accurate relationship, which is not likely to be improved. In method and style, in descriptive work, Bentham was a supreme master. This, to quote Professor Oliver again, is " manifest not only in its terseness, aptness and precision, but especially in the judicious selection of diagnostic marks, and in the instinctive estimate of probable range in variation, which long experience and innate genius for such work could alone inspire." (W. T. T.-D.)

BENTHAM, JEREMY (1748-183 2), English philosopher and jurist, was born on the 1 5th of February 1 748 in Red Lion S treet, Houndsditch, London, in which neighbourhood his grandfather and father successively carried on business as attorneys. His father, who was a wealthy man and possessed at any rate a smattering of Greek, Latin and French, was thought to have demeaned himself by marrying the daughter of an Andover tradesman, who afterwards retired to a country house near Reading, where young Jeremy spent many happy days. The boy's talents justified the ambitious hopes which his parents entertained of his future. When three years old he read eagerly such works as Rapin's History and began the study of Latin. A year or two later he learnt to play the violin and to speak French. At Westminster school he obtained a reputation for Greek and Latin verse writing; and he was only thirteen when he was matriculated at Queen's College, Oxford, where his most important acquisition seems to have been a thorough acquaint- ance with Sanderson's logic. He became a B.A. in 1763, and in the same year entered at Lincoln's Inn, and took his seat as a student in the queen's bench, where he listened with rapture to the judgments of Lord Mansfield. He managed also to hear Blackstone's lectures at Oxford, but says that he immediately detected the fallacies which underlay the rounded periods of the future judge.

Bentham's family connexions would naturally have given him a fair start at the bar, but this was not the career for which he was preparing himself. He spent his time in making chemical experiments and in speculating upon legal abuses, rather than in reading Coke upon Littleton and the Reports. On being called to the bar he " found a cause or two at nurse for him, which he did his best to put to death," to the bitter disappointment of his father, who had confidently looked forward to seeing him upon the woolsack. The first fruits of Bentham's studies, the Fragment on Government, appeared in 1776. This masterly attack upon Blackstone's praises of the English constitution was variously attributed to Lord Mansfield, Lord Camden and Lord Ashburton. One important result of its publication was that, in 1781, Lord Shelburne (afterwards first marquess of Larisdowne) called upon its author in his chambers at Lincoln's Inn. Henceforth Bentham was a frequent guest at Bowood, where he saw the best society and where he met Miss Caroline Fox (daughter of the second Lord Holland), to whom he afterwards made a proposal of marriage. In 1785 Bentham started, by way of Italy and Constantinople, on a visit to his brother, Samuel Bentham, a naval engineer, holding the rank of colonel in the Russian service; and it was in Russia that he wrote his Defence of Usury. Disappointed after his return to England in 1788 in the hope which he had entertained, through a misapprehension of some- thing said by Lord Lansdowne, of taking a personal part in the legislation of his country, he settled down to the yet higher task of discovering and teaching the principles upon which all sound legislation must proceed. The great work, upon which he had

been engaged for many years, the Principles of Morals and Legislation, was published in 1789. His fame spread widely and rapidly. He was made a French citizen in 1792; and his advice was respectfully received in most of the states of Europe and America, with many of the leading men of which he maintained an active correspondence. In 1 8 1 7 he became a bencher of Lincoln's Inn. His ambition was to be allowed to prepare a code of laws for his own or some foreign country. During nearly a quarter of a century he was engaged in negotiations with the govern- ment for the erection of a " Panopticon," for the central inspection of convicts; a plan suggested to him by a building designed by his brother Samuel, for the better supervision of his Russian shipwrights. This scheme, which it was alleged would render transportation unnecessary, was eventually

abandoned, and Bentham received in 1813, in pursuance of an act of parliament, £23,000 by way of compensation. It was at a later period of his life that he propounded schemes for cutting canals through the isthmus of Suez and the isthmus of Panama. In 1823 he estab- lished the Westminster Review. Emboldened perhaps by the windfall of 1813, Bentham in the following year took a lease of Ford Abbey, a fine mansion with a deer-park, in Dorsetshire; but in 1818 returned to the house in Queen's Square Place which he had occupied since the death of his father in 1792. It was there that he died on the 6th of June 1832 in his eighty-fifth year. In accordance with his directions, his body was dissected in the presence of his friends, and the skeleton is still preserved in University College, London.

Bentham's life was a happy one of its kind. His constitution, weakly in childhood, strengthened with advancing years so as to allow him to get through an incredible amount of sedentary labour, while he retained to the last the fresh and cheerful temperament of a boy. An ample inherited fortune permitted him to pursue his studies undistracted by the necessity for earning a livelihood, and to maximize the results of his time and labour by the employment of amanuenses and secretaries. He was able to gather around him a group of congenial friends and pupils, such as the Mills, the Austins and Bowring, with whom he could discuss the problems upon which he was engaged, and by whom several of his books were practically rewritten from the mass of rough though orderly memoranda which the master had himself prepared. Thus, for instance, was the Rationale of Judicial Evidence written out by J. S. Mill and the Book of Fallacies by Bingham. The services which Dumont rendered in recasting as well as translating the works of Bentham were still more important.

The popular notion that Bentham was a morose visionary is far removed from fact. It is true that he looked upon general society as a waste of time and that he disliked poetry as " mis- representation "; but he intensely enjoyed conversation, gave good dinners and delighted in music, in country sights and in making others happy. These features of Bentham's character are illustrated in the graphic account given by the American minister, Richard Rush, of an evening spent at his London house in the summer of the year 1818. " If Mr Bentham's character is peculiar," he says, " so is his place of residence. It was a kind of blind-alley, the end of which widened into a small, neat courtyard. There by itself stands Mr Bentham's house. Shrubbery graced its area and flowers its window-sills. It was like an oasis in the desert. Its name is the Hermitage. Mr Bentham received me with the simplicity of a philosopher. I should have taken him for

seventy or upwards. Everything inside the house was orderly. The furniture seemed to have been unmoved since the days of his fathers, for I learned that it was a patrimony. A parlour, library and dining-room made up the suite of apartments. In each was a piano, the eccentric master of the whole being fond of music as the recreation of his literary hours. It is a unique, romantic-like homestead. Walking with him into the garden, I found it dark with the shade of ancient trees. They formed a barrier against all intrusion. The company was small but choice. Mr Brougham; Sir Samuel Romilly; Mr Mill, author of the well-known work on India; M. Dumont, the learned Genevan, once the associate of

Mirabeau, were all who sat down to table. Mr Bentham did not talk much. He had a benevolence of manner suited to the philanthropy of his mind. He seemed to be thinking only of the convenience and pleasure of his guests, not as a rule of artificial breeding as from Chesterfield or Madame Genlis, but from innate feeling. Bold as are his opinions in his works, here he was wholly unobtrusive of theories that might not have commended the assent of all present. When he did converse it was in simple language, a contrast to his later writings, where an involved style and the use of new or universal words are drawbacks upon the speculations of a genius original and pro- found, but with the faults of solitude. Yet some of his earlier productions are distinguished by classical terseness." — {Residence at the Court of London, p. 286.) Bentham's love of flowers and music, of green foliage and shaded walks, comes clearly out in this pleasant picture of his home life and social surroundings.

Whether or no he can be said to have founded a school, his doctrines have become so far part of the common thought of the time, that there is hardly an educated man who does not accept as too clear for argument truths which were invisible till Bentham pointed them out. His sensitively honourable nature, which in early life had caused him to shrink from asserting his belief in Thirty-nine articles of faith which he had not examined, was shocked by the enormous abuses which confronted him on commencing the study of the law. He rebelled at hearing the system under which they flourished described as the perfection of human reason. But he was no merely destructive critic. He was determined to find a solid foundation for both morality and law, and to raise upon it an edifice, no stone of which should be laid except in accordance with the deductions of the severest logic. This foundation is " the greatest happiness of the greatest number," a formula adopted from Priestly or perhaps first from Beccaria. The phrase may, however, be found in writers of an earlier date than these, e.g. in Hutcheson's Enquiry, published in

1725. The pursuit of such happiness is taught by the " utili- tarian " philosophy, an expression used by Bentham himself in 1802, and therefore not invented by J. S. Mill, as he supposed, in r 8 23. In order to ascertain what modes of action are most conducive to the end in view, and what motives are best fitted to produce them, Bentham was led to construct marvellously exhaustive, though somewhat mechanical, tables of motives. With all their elaboration, these tables are, however, defective, as omitting some of the highest and most influential springs of action. But most of Bentham's conclusions may be accepted without any formal profession of the utilitarian theory of morals. They are, indeed, merely the application of a rigorous common sense to the facts of society. That the proximate ends at which Bentham aimed are desirable hardly any one would deny, though the feasibility of the means by which he proposes to attain them may often be questioned, and much of the new nomenclature in which he thought fit to clothe his doctrines may be rejected as unnecessary. To be judged fairly, Bentham must be judged as a teacher of the principles of legislation. With the principles of private morals he really deals only so far as is necessary to enable the reader to appreciate the impulses which have to be controlled by law.

As a teacher of legislation he inquires of all institutions whether their utility justifies their existence. If not, he is prepared to suggest a new form of institution by which the needful service may be rendered. While thus engaged no topic is too large for his mental grasp, none too small for his notice; and, what is still rarer, every topic is seen in its due relation to the rest. English institutions had never before been thus comprehensively and dispassionately surveyed. Such improvements as had been necessitated were mere makeshifts, often made by stealth. The rude symmetry of the feudal system had been long ago destroyed by partial and unskilful adaptations to modern commercial life, effected at various dates and in accordance with various theories. The time had come for deliberate reconstruction, for inquiring whether the existence t>f many admitted evils was, as it was said to be, unavoidable; for proving that the needs of society may be classified and provided for by contrivances which shall not clash

with one another because all shall be parts of a consistent whole. This task Bentham undertook, and he brought to it a mind abso-

lutely free from professional or class feeling, or any other species of prejudice. He mapped out the whole subject, dividing and subdividing it in accordance with the principle of " dichotomy." Having reached his ultimate subdivisions he subjects each to the most thorough and ingenious discussion. His earlier writings exhibit a lively and easy style, which gives place in his later treatises to sentences which are awkward from their effort after unattainable accuracy, and from the newly-invented technical nomenclature in which they are expressed. Many of Bentham's ■ phrases, such as " international," "utilitarian," " codification," are valuable additions to our language; but the majority of them, especially those of Greek derivation, have taken no root in it. His neology is one among many instances of his contempt for the past and his wish to be clear of all association with it. His was, indeed, a typically logical, as opposed to a historical, mind. For the history of institutions which, thanks largely to the writings of Sir Henry Maine, has become a new and interesting branch of science, Bentham cared nothing. Had he possessed such a knowledge of Roman law as is now not uncommon in England, he must doubtless have taken a different view of many subjects. The logical and historical methods can, however, seldom be combined without confusion; and it is perhaps fortunate that Bentham devoted his long life to showing how much may be done by pursuing the former method exclusively. His writings have been and remain a storehouse of instruction for statesmen, an armoury for legal reformers. " Pille par tout le monde," as Talleyrand said of him, " il est toujours riche." To trace the results of his teaching in England alone would be to write a history of the legislation of half a century. Upon the whole administrative machinery of government, upon criminal law and upon procedure, both criminal and civil, his influence has been most salutary; and the great legal revolution which in 1873 purported to accomplish the fusion of law and equity is not obscurely traceable to the same source. Those of Bentham's suggestions which have hitherto been carried out have affected the matter or contents of the law. The hopes which have been from time to time entertained, that his suggestions for the improvement of its form and expression were about to receive the attention which they deserved, have hitherto been dis- appointed. The services rendered by Bentham to the world would not, however, be exhausted even by the practical adoption of every one of his recommendations. There are no limits to the good results of his introduction of a true method of reasoning into the moral and political sciences.

Bentham's Works, together with an Introduction by J. Hill Burton, selections from his correspondence and a biography, were published

by Dr Bowring, in eleven closely printed volumes (1838- 1843). This edition does not include the Deontology, which, much rewritten, had been published by Bowring in 1834. Translations of the Works or of separate treatises have appeared in most Euro- pean languages. Large masses of Bentham's MSS., mostly un- published, are preserved at University College, London (see T. Whittaker's Report, 1892, on these MSS., as newly catalogued and reclassified by, him in 155 parcels) ; also in the British Museum (see E. Nys, Etudes de droit international et de droit politique, 1901, pp. 291-333). See farther on the life and writings of Bentham: J. H. Burton, Benthamiana (1843) ; R. von Mohl, Geschichte und Literatur der Staatswissenschaften, bk. iii. (1858), pp. 595-635; R. K. Wilson, History of Modern English Law (1875), pp. 133-170; J. S. Mill, Dissertations (1859), vol. i. pp. 330-392; L. Stephen, The English Utilitarians (1900), vol. i. ; A Fragment on Government, edited by F. C. Montague (1891) ; The Law Quarterly Review (1895), two articles on Bentham's influence in Spain; A. V. Dicey, Law and Opinion in England (1905), pp. 125-209; C. M. Atkinson, Jeremy Bentham (1905). (T. E. H.)

BENTINCK, LORD WILLIAM (1 774-1 839), governor-general of India, was the second son of the 3rd duke of Portland and was born on the 14th of September 1774. He entered the army, rose to the rank of lieutenant-colonel and was present at Marengo. In 1803 he was nominated governor of Madras, where he quarrelled with the chief justice, Sir Henry Gwillim, and several members of his council. The sepoy mutiny at Vellore in 1807 led to his recall. His name was considered at this time for the post of governor-general, but Lord Minto was selected instead;

and it was not until twenty years later that he succeeded Lord Amherst in that office. His governor-generalship (1827-1835) was notable for' many reforms, chief among which were the suppression of the Thugs (q.v.), the abolition of suttee, and the making of the English language the basis of education in India. It was on this last subject that Lord Macaulay's famous minute was written. Lord William's administration was essentially peaceful, but progressive and successful. He died at Paris on the 17th of June 1839.

See Demetrius C. Boulger, Lord William Bentinck, in the " Rulers of India " series (1892).

BENTINCK, LORD WILLIAM GEORGE FREDERICK CAVENDISH, better known as Lord George Bentinck (1802- 1848), British politician, was the second surviving son of the fourth duke of

Portland, by Henrietta, sister of Viscountess Canning, and was born on the 27th of February 1802. He was educated at home until he obtained his commission as cornet in the 10th hussars at the age of seventeen. He practically retired from the army in 1822 and acted for some time as private secretary to his uncle George Canning. In 1828 he succeeded his uncle Lord William Bentinck as member for Lynn- Regis, and continued to represent that constituency during the remaining twenty years of his life. His failures as a speaker in parliament seem to have discouraged him from the attempt to acquire reputation as a politician, and till within three years of his death he was little known out of the sporting world. As one of the leaders on " the turf," however, he was distinguished by that integrity, judgment and indomitable determination which, when brought to bear upon weightier matters, quickly gave him a position of first-rate importance in the political world. On his first entrance into parliament he belonged to the moderate Whig party, and voted in favour of Catholic emancipation, as also for the Reform Bill, though he opposed some of its principal details. Soon after, however, he joined the ranks of the opposition, with whom he sided up to the important era of 1846. When, in that year, Sir Robert Peel openly declared in favour of free trade, the advocates of the corn-laws, then without a leader, after several ineffectual attempts at organization, discovered that Lord George Bentinck was the only man of position and family (for Disraeli's time was not yet come) around whom the several sections of the opposition could be brought to rally. His sudden elevation took the public by surprise; but he soon gave convincing evidence of powers so formidable that the Protectionist party under his leadership was at once stiffened into real importance. Towards Peel, in particular, his hostility was uncompromising. Believing, as he himself expressed it, that that statesman and his colleagues had "hounded to the death his illustrious relative" Canning, he combined with his political opposition a degree of personal animosity that gave additional force to his invective. On entering on his new position, he at once abandoned his connexion with the turf, disposed of his magnificent stud and devoted his whole energies to the laborious duties of a parliamentary leader. Apart from the question of the corn-laws, however, his politics were decidedly independent. In opposition to the rest of his party, he supported the bill for removing the Jewish disabilities, and was favourable to the scheme for the payment of the Roman Catholic clergy in Ireland by the landowners. The result was that on December 23rd, 1847, he wrote a letter resigning the Protectionist leadership, though he still remained active in politics. But his positive abilities as a constructive statesman were not to be

tested, for he died suddenly at Welbeck on the 21st of Sep' tember 1848. It was to be left to Disraeli to bring the Conserva- tive party into power, with Protection outside its programme.

See Lord George Bentinck: a Political Biography (1851), by B. Disraeli (Lord Beaconsfield).

BENTIVOGLIO, GIOVANNI (1443-1508), tyrant of Bologna, descended from a powerful family which exercised great influence in Bologna during the 15th century, was born after the murder of his father, then chief magistrate of the commune. In 1462 Giovanni contrived to make himself master of the city, although it was nominally a fief of the church under a papal legate. He ruled with a stern sway for nearly half a century, but the brilliance of his court, his encouragement of the fine arts and his

decoration of the city with sumptuous edifices, to some extent compensated the Bolognese for the loss of their liberty. Cesare Borgia (q.v.) contemplated the subjugation of Bologna in 1500, when he was crushing the various despots of Romagna, but Bentivoglio was saved for the moment by French intervention. In 1 502 he took part in the conspiracy against Cesare, but, when the latter obtained French assistance, he abandoned his fellow- conspirators and helped Borgia to overcome them. During the brief pontificate of Pius III., who succeeded Alexander VI. in 1503, Bentivoglio enjoyed a respite, but the new pope, Julius II., was determined to reduce all the former papal states to obedience. Having won Louis XII. of France to his side, he led an army against Bologna, excommunicated Bentivoglio and forced him to abandon the city (November 1506). The deposed tyrant took refuge with the French, whom he trusted more than the pope, and died at Milan in 1508.

Bibliography. — P. Litta, Le Famiglie celebri Italiane, vol, iii. (Milan, 1834); P. Villari, Machiavelll (Eng. trans., London, 1892); M. Creighton, History of the Papacy (London, 1897); A. von Reu mont, Geschichte der Sladt Rom, vol. iii. (Berlin s 1868). (L. V.)

BENTIVOGLIO, GUIDO (1 579-1644), Italian cardinal, states- man and historian, was born at Ferrara in 1579. After studying at Padua, he went to reside at Rome, and was received with great favour by Pope Clement VIII., who made him his private chamberlain. The next

pope, Paul V., created him archbishop of Rhodes in 1607, and appointed him as nuncio to Flanders and afterwards to France; on his return to Rome in 1621 he was created cardinal and entrusted by Louis XIII. with the manage- ment of French affairs at the papal court. He became the intimate friend of Pope Urban VIII. , who appointed him to the suburban see of Palestrina in 1691. An able writer and skilful diplomatist, Bentivoglio was marked out as Urban's successor, but he died suddenly on the 7th of September 1644 at the opening of the conclave. Bentivoglio's principal works are: — Delia Guerra di Fiandria (best edition, Cologne, 1633-1639), translated into English by Henry, earl of Monmouth (London, 1654); Relazioni di G. Bentivoglio in tempo delle sue Nunziature di Fiandria e di Francia (Cologne, 1630); Letter e diplomatiche di Guido Bentivoglio (Brussels, 1631, frequently reprinted, best edition by L. Scarabelli, 2 vols., Turin, 1852). The complete edition of his works was published at Venice in 1668 in 4to. A selection of his letters has been adopted as a classic in the Italian schools.

BENTLEY, RICHARD (1662-1742), English scholar and critic, was born at Oulton near Wakefield, Yorkshire, on the 27th of January 1662. His grandfather had suffered in person and estate in the royalist cause, and the family were in con- sequence in reduced circumstances. Bentley's mother, the daughter of a stonemason in Oulton, was a woman of excellent understanding and some education, as she was able to give her son his first lessons in Latin. From the grammar school of Wakefield Richard Bentley passed to St John's College, Cam- bridge, being admitted subsizar in 1676. He afterwards obtained a scholarship and took the degree of B.A. in 1680 (M.A. 1683). He never succeeded to a fellowship, being appointed by his college, before he was twenty-one, headmaster of Spalding grammar school. In this post he did not remain long, being selected by Dr Edward Stillingfleet, dean of St Paul's, to be domestic tutor to his son. This appointment introduced Bentley at once to the society of the most eminent men of the day, threw open to him the best private library in England, and brought him into familiar intercourse with Dean Stillingfleet, a man of sound understanding, who had not shrunk from explor- ing some of the more solid and abstruse parts of ancient learning. The six years which he passed in Stillingfleet's family were employed, with the restless energy characteristic of the man, in exhausting the remains of the Greek and Latin writers, and laying up those stores of knowledge upon which he afterwards drew as circumstances required.

In 1689 Stillingfleet became bishop of Worcester, and Bentley's pupil went to reside at Oxford in Wadham College, accompanied by his

tutor. Bentley's introductions and his own merits '

placed him at once on a footing of intimacy with the most distinguished scholars in the university, Dr John Mill, Humphrey Hody, Edward Bernard. Here he revelled in the MS. treasures of the Bodleian, Corpus and other college libraries. He pro- jected and occupied himself with collections for vast literary schemes. Among these are specially mentioned a corpus of the fragments of the Greek poets and an edition of the Greek lexicographers. But his first publication was in connexion with a writer of much inferior note. The Oxford (Sheldonian) press was about to bring out an edition (the editio princeps) from the unique MS. in the Bodleian of the Greek Chronicle (a universal history down to a.d. 560) of John of Antioch (date uncertain, between 600 and 1000), called John Malalas or " John the Rhetor "; and the editor, Dr John Mill, principal of St Edmund Hall, had requested Bentley to look through the sheets and make any remarks on the text. This originated Bentley's Epistola ad Millium, which occupies less than one hundred pages at the end of the Oxford Malalas (1691). This short tractate at once placed Bentley at the head of all living English scholars. The ease with which, by a stroke of the pen, he restores passages which had been left in hopeless corruption by the editors of the Chronicle, the certainty of the emendation and the command over the relevant material, are in a style totally different from the careful and laborious learning of Hody, Mill or E. Chilmead. To the small circle of classical students (lacking the great critical dictionaries of modern times) it was at once apparent that there had arisen in England a critic whose attainments were not to be measured by the ordinary academical standard, but whom these few pages had sufficed to place by the side of the great Grecians of a former age. Unfortunately this mastery over critical science was accompanied by a tone of self-assertion and pre- sumptuous confidence which not only checked admiration, but was calculated to rouse enmity. Dr Monk, indeed, Bentley's biographer, charged him (in his first edition, 1830) with an indecorum of which he was not guilty. " In one place," writes Dr Monk, " he accosts Dr Mill as Si 'Icoavvidiov (Johnny), an indecorum which neither the familiarity of friendship, nor the licence of a dead language, can justify towards the dignified head of a house." But the object of Bentley's apostrophe was not his correspondent Dr Mill, but his author John Malalas, whom in another place he playfully appeals to as " Syrisce." From this publication, however, dates the origin of those mixed feelings of admiration and repugnance which Bentley throughout his career continued to excite among his contemporaries.

In 1690 Bentley had taken deacon's orders in the Church. In 1692 he was nominated first Boyle lecturer, a nomination which was repeated in 1694. He was offered the appointment a third time in 1695 but declined it, being by that time involved in too many other undertakings. In the first series of lectures (" A Confutation of Atheism ") he endeavours to present the New- tonian physics in a popular form, and to frame them (especially in opposition to Hobbes) into a proof of the existence of an intelligent Creator. He had some correspondence with Newton, then living in Trinity College, on the subject. The second series, preached in 1694, has not been published and is believed to be lost. Andrew Kippis, the editor of the Biographia Brilannica, mentions MS. copies of them as in existence. Scarcely was Bentley in priest's orders before he was preferred to a prebendal stall in Worcester cathedral. In 1693 the keepership of the royal library becoming vacant, great efforts were made by his friends to obtain the place for Bentley, but through court interest the post was given to Mr Thynne. An arrangement, however, was made, by which the new librarian resigned in favour of Bentley, on condition that he received an annuity of £130 for life out of the salary, which only amounted to £200. To these preferments were added in 1695 a royal chaplaincy and the living of Hartlebury. In the same year Bentley was elected a fellow of the Royal Society, and in 1696 proceeded to the degree of D.D. The recognition of continental scholars came in the shape of a dedication, by Graevius, prefixed to a disserta- tion of Albert Rubens, De Vita Flavii Mallii Theodori, pub- lished at Utrecht in 1694.

While these distinctions were being accumulated upon Bentley, his energy was making itself felt in many and various directions. He had official apartments in St James's Palace, and his first care was the royal library. He made great efforts to retrieve this collection from the dilapidated condition into which it had been allowed to fall. He employed the mediation of the earl of Marlborough to beg the grant of some additional rooms in the palace for the books. The rooms were granted, but Marlborough characteristically kept them for himself. Bentley enforced the law against the publishers, and thus added to the library nearly iooo volumes which they had neglected to deliver. He was commissioned by the university of Cambridge to obtain Greek arid Latin founts for their classical books, and accordingly he had cast in Holland those beautiful types which appear in the Cambridge books of that date. He assisted Evelyn in his

Numismata. All Bentley's literary appearances at this time were of this accidental character. We do not find him settling down to the steady execution of any of the great projects with which he had started. He designed, indeed, in 1694 an edition of Philostratus, but readily abandoned it to G. Olearius, (Ohlschlager) , " to the joy," says F. A. Wolf, " of Olearius and of no one else." He supplied Graevius with collations of Cicero, and Joshua Barnes with a warning as to the spuriousness of the Epistles of Euripides, which was thrown away upon that blunderer, who printed the epistles and declared that no one could doubt their genuineness but a man perfrietaefr otitis autjudicii imminuti. Bentley supplied to Graevius's Callimachus a masterly collection of the fragments with notes, published at Utrecht in 1697.

The Dissertation on the Epistles of Phalaris, the work on which Bentley's fame in great part rests, originated in the same casual way. William Wotton, being about to bring out in 1697 a second edition of his book on Ancient and Modem Learning, claimed of Bentley the fulfilment of an old promise to write a paper exposing the spuriousness of the Epistles of Phalaris. This paper was resented as an insult by the Christ Church editor of Phalaris, Charles Boyle, afterwards earl of Orrery, who in getting the MS. in the royal library collated for his edition (1695) had had a little quarrel with Bentley. Assisted by his college friends, particularly Atterbury, Boyle wrote a reply, " a tissue," says Dr Alexander Dyce (in his edition of Bentley's Works, 1836-1838), " of super- ficial learning, ingenious sophistry, dexterous malice and happy raillery." The reply was hailed by the public as crushing and went immediately into a second edition. It was incumbent on Bentley to rejoin. This he did (1699) in what Porson styles " that immortal dissertation," to which no answer was or could be given, although the truth of its conclusions was, not immediately recognized. (See Phalaris.)

In the year 1700 Bentley received that main preferment which, says De Quincey, " was at once his reward and his scourge for the rest of his life." The six commissioners of ecclesiastical patronage unanimously recommended Bentley to the crown for the master- ship of Trinity College, Cambridge. This college, the most splendid foundation in the university of Cambridge, and in the scientific and literary reputation of its fellows the most eminent society in cither university, had in 1700 greatly fallen from its high estate. It was not that it was more degraded than the other colleges, but its former lustre made the abuse of endowments in its case more conspicuous. The eclipse had taken place during the reaction which followed 1660, and was owing to causes which were not peculiar to Trinity,

but which influenced the nation at large. The names of John Pearson and Isaac Barrow, and, greater than either, that of Newton, adorn the college annals of this period. But these were quite exceptional men. They had not inspired the rank and file of fellows of Trinity with any of their own love for learning or science. Indolent and easy-going clerics, without duties, without a pursuit or any consciousness of the obligation of endowments, they haunted the college for the pleasant life and the good things they found there, creating sinecure offices in each other's favour, jobbing the scholarships and making the audits mutually pleasant. Any excuse served for a banquet at the cost of " the house," and the celibacy imposed by the statutes was made as tolerable as the decorum

of a respectable position permitted. To such a society Bentley came, obnoxious as a St John's man and an intruder, unwelcome as a man of learning whose interests lay outside the walls of the college. Bentley replied to their concealed dislike with open contempt, and proceeded to ride roughshod over their little arrangements. He inaugurated many beneficial reforms in college usages and discipline, executed extensive improvements in the buildings, and generally used his eminent station for the promotion of the interests of learning both in the college and in the university. But this energy was accompanied by a domineer- ing temper, an overweening contempt for the feelings and even for the rights of others, and an unscrupulous use of means when a good end could be obtained. Bentley, at the summit of classical learning, disdained to associate with men whom he regarded as illiterate priests. He treated them with contumely, while he was diverting their income to public purposes. The continued drain upon their purses — on one occasion the whole dividend of the year was absorbed by the rebuilding of the chapel — was the grievance which at last roused the fellows to make a resolute stand. After ten years of stubborn but ineffectual resistance within the college, they had recourse in 17 10 to the last remedy — an appeal to the visitor, the bishop of Ely (Dr Moore). Their petition is an ill-drawn invective, full of general complaints and not alleging any special delinquency. Bentley's reply {The Present State of Trinity College, b"c, 17 10) is in his most crushing style. The fellows amended their petition and put in a fresh charge, in which they articled fifty-four separate breaches of the statutes as having been committed by the master. Bentley, called upon to answer, demurred to the bishop of Ely's jurisdiction, alleging that the crown was visitor. He backed his application by a dedication of his Horace to the lord treasurer (Harley). The crown lawyers decided the point against him; the case was heard (17 14) and a sentence of

ejection from the mastership ordered to be drawn up, but before it was executed the bishop of Ely died and the process lapsed. The feud, however, still went on in various forms. In 1 7 18 Bentley was deprived by the university of his degrees, as a punishment for failing to appear in the vice-chancellor's court in a civil suit; and it was not till 1724 that the law compelled the university to restore them. In 1733 he was again brought to trial before the bishop of Ely (Dr Greene) by the fellows of Trinity and was sentenced to deprivation, but the college statutes required the sentence to be exercised by the vice-master (Dr Walker), who was Bentley's friend and refused to act. In vain were attempts made to compel the execution of the sentence, and though the feud was kept up till 1738 or 1740 (about thirty years in all) Bentley remained undisturbed.

During the period of his mastership, with the exception of the first two years, Bentley pursued his studies uninterruptedly, although the results in the shape of published works seem incommensurable. In 1709 he contributed a critical appendix to John Davies's edition of Cicero's Tusculan Disputations. In the following year he published his emendations on the Plutus and Nubes of Aristophanes, and on the fragments of Menander and Philemon. The last came out under the name of " Phil- eleutherus Lipsiensis," which he made use of twoyearslater in his Remarks on a late Discourse of Frcethinking, a reply to Anthony Collins the deist. For this he received the thanks of the univer- sity, in recognition of the service thereby rendered to the church and clergy. His Horace, long contemplated and in the end written in very great haste and brought out to propitiate public opinion at a critical period of the Trinity quarrel, appeared in 17 1 1. In the preface he declared his intention of confining his attention to criticism and correction of the text, and ignoring exegesis. Some of his 700 or 800 emendations have been accepted, but the majority of them are now rejected as unnecessary and prosaic, although the learning and ingenuity shown in their support are remarkable. In 17 16, in a letter to Dr Wake, archbishop of Canterbury, he announced his design of preparing a critical edition of the New Testament. During the next four years, assisted by J. J. Wetstein, an eminent biblical critic, who claimed to have been the first to suggest the idea to Bentley, he collected materials for the work, and in 1720 published

Proposals for a New Edition of the Greek Testament, with specimens

of the manner in which he intended to carry it out. He proposed, by comparing the text of the Vulgate with that of the oldest Greek MSS., to restore the Greek text as received by the church at the time of the council of Nice. A large number of subscribers to the work was obtained, but it was never com- pleted. His Terence (1726) is more important than his Horace, and it is upon this, next to the Phalaris, that his reputation mainly rests. Its chief value consists in the novel treatment of the metrical questions and their bearing on the emendation of the text. To the same year belong the Fables of Phaedrus and the Sententiae of Publius Syrus. The Paradise Lost (1732), undertaken at the suggestion of Queen Caroline, is generally regarded as the most unsatisfactory of all his writings. It is marred by the same rashness in emendation and lack of poetical feeling as his Horace; but there is less excuse for him in this case, since the English text could not offer the same field for conjecture. He put forward the idea that Milton employed both an amanuensis and an editor, who were to be held responsible for the clerical errors, alterations and interpolations which Bentley professed to detect. It is uncertain whether this was a device on the part of Bentley to excuse his own numerous corrections, or whether he really believed in the existence of this editor. Of the contemplated edition of Homer nothing was published; all that remains of it consists of some manuscript and marginal notes in the possession of Trinity College. Their chief importance lies in the attempt to restore the metre by the inser- tion of the lost digamma. Among his minor works may be mentioned: the Astronomica of Manilius (1739), for which he had been collecting materials since 1601; a letter on the Sigean inscription on a marble slab found in the Troad, now in the British Museum; notes on the Theriaca of Nicander and on Lucan, published after his death by Cumberland; emendations of Plautus (in his copies of the editions by Pareus, Camerarius and Gronovius, edited by Schroder, 1880, and Sonnenschein, 1883). Bentleii Critica Sacra (1862) , edited by A. A. Ellis, contains the epistle to the Galatians (and excerpts), printed from an inter- leaved folio copy of the Greek and Latin Vulgate in Trinity College. A collection of his Opuscula Philologica was published at Leipzig in 1 781 . The edition of his works by Dyce (1836-1838) is incomplete.

He had married in 1701 Joanna, daughter of Sir John Bernard of Brampton in Huntingdonshire. Their union lasted forty years. Mrs Bentley died in 1740, leaving a son, Richard, and two daughters, one of whom married in 1728 Mr Denison Cumberland, grandson of Richard Cumberland, bishop of Peter- borough. Their son was Richard Cumberland, the dramatist. Surrounded by his

grandchildren, Dr Bentley experienced the joint pressure of age and infirmity as lightly as is consistent with the lot of humanity. He continued to amuse himself with read- ing; and though nearly confined to his arm-chair, was able to enjoy the society of his friends and several rising scholars, J. Markland, John Taylor, his nephews Richard and Thomas Bentley, with whom he discussed classical subjects. He was accustomed to say that he should live to be eighty, adding that a life of that duration was long enough to read everything worth reading. He fulfilled his own prediction, dying of pleurisy on the 14th of July 1742. Though accused by his enemies of being grasping, he left not more than £5000 behind him. A few Greek MSS., brought from Mount Athos, he left to the college library; his books and papers to his nephew, Richard Bentley. Richard, who was a fellow of Trinity, at his death in 1786 left the papers to the college library. The books, containing in many cases valuable manuscript notes, were purchased by the British Museum.

Of his personal habits some anecdotes are related by his grandson, Richard Cumberland, in vol. i. of his Memoirs (1807). The hat of formidable dimensions, which he always wore during reading to shade his eyes, and his preference of port to claret (which he said " would be port if it could ") are traits embodied in Pope's caricature (Dunciad, b. 4), which bears in other respects little resemblance to the original. He did not take up the habit

of smoking till he was seventy. He held the archdeaconry of Ely with two livings, but never obtained higher preference in the church. He was offered the (then poor) bishopric of Bristol but refused it, and being asked what preferment he would con- sider worth his acceptance, replied, " That which would leave him no reason to wish for a removal."

Bentley was the first, perhaps the only, Englishman who can be ranked with the great heroes of classical learning, although perhaps not a great classical scholar. Before him there were only John Selden, and, in a more restricted field, Thomas Gataker and Pearson. But Selden, a man of stupendous learning, wanted the freshness of original genius and confident mastery over the whole region of his knowledge. " Bentley inaugurated a new era of the art of criticism. He opened a new path. With him criticism attained its majority. Where scholars had hitherto offered suggestions and conjectures, Bentley, with unlimited control over the whok material of learning, gave decisions " (Mahly). The modern German school of philology does ungrudging homage to his genius. Bentley, says Bunsen, " was the founder of historical philology." And Jakob

Bernays says of his corrections of the Tristia, " corruptions which had hitherto defied every attempt even of the mightiest, were removed by a touch of the fingers of this British Samson." The English school of Hellenists, by which the 18th century was distinguished, and which contains the names of R. Dawes, J. Markland, J. Taylor, J. Toup, T. Tyrwhitt, Richard Porson, P. P. Dobree, Thomas Kidd and J. H. Monk, was the creation of Bentley. And even the Dutch school of the same period, though the outcome of a native tradition, was in no small degree stimulated and directed by the example of Bentley, whose letters to the young Hemsterhuis on his edition of Julius Pollux produced so powerful an effect on him, that he became one of Bentley's most devoted admirers.

Bentley was a source of inspiration to a following generation of scholars. Himself, he sprang from the earth without forerunners, without antecedents. Self-taught, he created his own science. It was his misfortune that there was no contemporary gild of learning in England by which his power could be measured, and his eccentricities checked. In the Phalaris controversy his academical adversaries had not sufficient knowledge to know how absolute their defeat was. Garth's couplet —

" So diamonds take a lustre from their foil, And to a Bentley 'tis we owe a Boyle " —

expressed the belief of the wits or literary world of the time. The attacks upon him by Pope, John Arbuthnot and others are evidence of their inability to appreciate his work. To them, textual criticism seemed mere pedantry and useless labour. It was not only that he had to live with inferiors, and to waste his energy in a struggle forced upon him by the necessities of his official position, but the wholesome stimulus of competition and the encouragement of a sympathetic circle were wanting. In a university where the instruction of youth or the religious controversy of the day were the only known occupations, Bentley was an isolated phenomenon, and we can hardly wonder that he should have flagged in his literary exertions after his appointment to the mastership of Trinity. All his vast acquisi- tions and all his original views seem to have been obtained before 1700. After this period he acquired little and made only spas- modic efforts — the Horace, the Terence and the Milton. The prolonged mental concentration and mature meditation, which alone can produce a great work, were wanting to him.

F. A. Wolf, Literarische Analekten, i. (18 16); Monk, Life of Bentley (1830); J. Mahly, Richard Bentley, eine Biographie (1868); R. C.

Jebb, Bentley (" English Men of Letters " series, 1882), where a list of authorities bearing on Bentley's life and work is given. For his letters see Bentlei et doctorum'virorum ad eum Epistolae (1807); The Correspondence of Richard Bentley, edited by C. Wordsworth (1842). See also J. E. Sandys, History of Classical Scholarship, ii. 401-410 (1908) ; and the Bibliography of Bentley, by A. T. Bartholo- mew and J. W. Clark (Cambridge, 1908).

BENTLEY, RICHARD (1794-1871), British publisher, was born in London in 1794. His father owned the General Evening Post in conjunction with John Nichols, to whom Richard Bentley, on leaving St Paul's school, was apprenticed to learn the printing

trade. With his brother Samuel (1785-1868), an antiquarian of some repute, he set up a printing establishment, but in 1829 he began business as a publisher in partnership with Henry Colburn in New Burlington Street. Colburn retired in 1832 and Bentley continued business on his own account. In 1837 he began Bentley's Miscellany, edited for the first three years of its exist- ence by Charles Dickens, whose Oliver Twist, with Cruikshank's illustrations, appeared in its pages. Bentley and his son George (1828-1895), as Richard Bentley & Son, published works by R. H. Barham, Theodore Hook, Isaac D'Israeli, Judge Haliburton and others; also the " Library of Standard Novels " and the " Favourite Novel Library." In the latter series Mrs Henry Wood's East Lynne appeared. In 1866 the firm took over the publication of Temple Bar, with which Bentley's Miscellany was afterwards incorporated. Richard Bentley died on the 10th of September 1871. His son, George Bentley, and his grandson, Richard Bentley, junior, continued the business until it was absorbed (1898) by Macmillan & Co.

See also R. Bentley & Son (Edinburgh, 1886), a history of the firm reprinted from Le Livre (October, 1885).

BENTON, THOMAS HART (1782-1858), American statesman, was born at Hillsborough, Orange county, North Carolina, on the 14th of March 1782. His father, an Englishman of refinement and scholarship, died in 1790, leaving the boy under the influence of a very superior mother, from whom he received lessons in book learning, piety and temperance quite unusual in the frontier country. His home studies, facilitated by his father's fine library, were supplemented by a brief stay at the university of North Carolina (Chapel Hill) in 1799. The family removed, probably in this year, to

a large tract of land which had been acquired by the father on the outskirts of the Indian country (at Benton Town, now Leipers Fork) near Franklin, Tennessee. The following years, during which Benton was at various times school teacher, farmer, lawyer and politician, were the distinct- ively formative period of his life. His intense democracy and many features of his boldly cast personality were perfectly representative of the border people among whom he lived; al- though his education, social standing and force of character placed him above his fellows. In 1809 he served a term as state senator. Between 181 5 and 181 7 he transferred his interests to St Louis, Missouri, and in 1820 was elected United States senator from the new state. His senatorial career of thirty years (1821- 1851) was one of extreme prominence. A friendship early formed in Tennessee for Andrew Jackson was broken in 18 13 by an armed fracas between the principals and their friends, but after the presidential election of 1824 Benton became a Jacksonian Democrat and Jackson's close friend, and as such was long the Democratic leader in the Senate, his power being greatest during Jackson's second term. He continued to be the administration's right-hand man under Van Buren, but gradually lost influence under Polk, with whom he finally broke both personally and politically.

The events of Benton's political life are associated primarily with three things: the second United States Bank, westward expansion and slavery. In the long struggles over the bank, the deposits and the "expunging resolution" {i.e. the resolution to expunge from the records of the Senate the vote of censure of President Jackson for his removal of the government deposits from the bank), Benton led the Jackson Democrats. His opposi- tion to a national bank and insistence on the peculiar virtues of " hard money," whence his sobriquet of " Old Bullion," went back to his Tennessee days. In all that concerned the expansion of the country and the fortunes of the West no public man was more consistent or more influential than Benton, and none so clear of vision. Reared on the border, and representing a state long the farthermost outpost across the Mississippi in the Indian country, he held the ultra-American views of his section as regarded foreign relations generally, and the " manifest destiny " of expansion westward especially. It was quite natural that he should advocate the removal westward of the Indian tribes, should urge the encouragement of trade with Sante Fe (New j Mexico), and should oppose the abandonment in the Spanish <

treaty of 1819 of American claims to Texas. He once thought the

Rocky Mountains the proper western limit of the United States (1824), but this view he soon outgrew. He was the originator of the policy of homestead laws by which the public lands were used to promote the settlement of the west by home- seekers. No other man was so early and so long active for transcontinental railways. But Benton was not a land-grabber, whether in the interest of slavery or of mere jingoism. In the case of Oregon, for instance, he was firmly against joint occupa- tion with Great Britain, but he was always for the boundary of 49° and never joined in the campaign- jingo cry of " Fifty-four Forty or Fight." It was he who chiefly aided Polk in with- drawing from that untenable position. He despised pretexts and intrigues. Both in the case of Oregon and in that of Texas, though one of the earliest and most insistent of those who favoured their acquisition, yet in the face of southern and western sentiment he denounced the sordid and devious intrigues and politics connected with their acquisition, and kept clear of these. For the same reason he opposed the Mexican War, though not its prosecution once begun. In the Texas question slavery was prominent. Toward slavery Benton held a peculiarly creditable attitude. A southerner, he was a slaveholder; but he seems to have gradually learned that slavery was a curse to the South, for in 1844 he declared that he would not introduce it into Texas lands " where it was never known," and in 1849 proclaimed that his personal sentiments were " against the institution of slavery." In the long struggle over slavery in the territories, following 1845, he was for the extreme demands of neither section; not because he was timorous or a compromiser, — no man was less of either, — but because he stood unwaveringly for justice to both sections, never adopting exaggerated views that must or even could be compromised. The truth is that he was always a westerner before he was a southerner and a union man before all things else; he was no whit less national than Webster. Hence his distrust and finally hatred of Calhoun, dating from the nullification episode of 1832-1833. As the South under Calhoun's lead became increasingly sectional and aggressive, Benton increasingly lost sympathy with her. Though he despised political inaction Abolitionists, and hated their propaganda as inimical to the Union, he would not therefore close the national mails to Abolition literature, nor abridge the right of petition. No statesman was more prescient of the disunion tendencies of Calhoun's policies, and as early as 1844 he prophetically denounced the treason to the Union toward which the South was drifting. He would not drift with her for the sake of slavery, and this was his political undoing. In 1851 Missouri rejected him in his sixth candidacy for the Senate, after he had been an autocrat in her politics for thirty years. In 1852 he was

elected to the House of Representatives, but his opposi- tion to the repeal of the Missouri Compromise caused his defeat in 1854. An unsuccessful campaign for the governorship of Missouri in 1856 ended his political career. He died at Washington on the 10th of April 1858.

Benton's entire career was eminently creditable, and he is, besides, one of the most picturesque figures in American political history. His political principles — whether as regarded lobbying, congressional jobbing, civil service or great issues of legislation and foreign affairs — were of the highest. He was so independent that he had great dislike for caucuses, and despised party plat- forms — although he never voted any but the Democratic ticket, even when his son-in-law, J. C. Fremont, was the Republican presidential candidate in 1856; nor would he accept instructions from the Missouri legislature. His career shows no truckling to self-interest, and on large issues he outgrew partisanship. Although palpably inferior to each of his great senatorial col- leagues, Webster, Clay and Calhoun, in some gifts, yet if character, qualities and career be taken in the whole his were possibly the most creditable of all. Benton was austere, aggressive and vain; besides, he had a fatal deficiency of humour. Nevertheless he had great influence, which was a deserved tribute to his ability and high character. An indefatigable student, he treated all subjects capably, and especially in questions of his country's

history and the exploration of the West had few equals — in the latter none. He acted always with uncalculating boldness, and defended his acts with extraordinary courage and persistence. Benton wrote a Thirty Years' View . . . oj the American Government (2 vols., 1854-1856), characteristic of the author's personality; it is of great value for the history of his time. He also compiled an Abridgment of the Debates 0} Congress, 1789-1850 (16 vols., 1857-1861), likewise of great usefulness; and published a bitter review of the Dred Scott decision full of extremely valuable historical details — Historical and Legal Examination of . . . the Dred Scott Case (1857). All were written in the last eight years of his life and mostly in the last three.

The best biography is that by W. M. Meigs, Life of Thomas Hart Benton (Philadelphia and London, 1904). See also Theodore Roosevelt's Thomas Hart Benton (Boston, 1887), in the "American

Statesmen " series, which admirably brings out Benton's significance as a western man; and Joseph M. Rogers's Thomas Hart Benton (Philadelphia, 1905) in the " American Crisis " series.

BENTON HARBOR, a. city of Berrien county, Michigan, U.S.A., on the Saint Joseph river, about 1 m. from Lake Michigan (with which it is connected by a ship canal), near the S.W. corner of the state, and 1 m. N.E. of St Joseph. Pop. (1890) 3692; (1900) 6562, of whom 795 were foreign-born; (1904) 6702; (1910) 9185. It is served by the Pere Marquette, the Michigan Central, and the Cleveland, Cincinnati, Chicago & St Louis railways, by electric railways to St Joseph and Niles, Mich., and South Bend, Indiana, and for a part of the year by steamboat lines to Chicago and Milwaukee. One mile south-east of the city are a sanitarium and the Eastman mineral springs; within the city also there are springs and bath-houses. Near the city is a communistic religious community, the Israelite House of David, founded in 1903; the members believe that they are a part of the 144,000 elect (Revelation, vii, xiv) ultimately to be redeemed. Benton Harbor has a large trade in fruit (peaches, grapes, pears, cherries, strawberries, raspberries and apples) and other market garden produce raised in the vicinity The city's manufactures include fruit baskets, preserved fruits, cider, vinegar, pickles, furniture, lumber and stationers' supplies, particularly material for the " loose-leaf ledger " system of accounting. Benton Harbor, which was known as Bronson Harbor until 1865, was incorporated as a village in 1869, was chartered as a city in 1891, and in 1903 received a new charter.

BENUE, a river of West Africa, the largest and most important affluent of the Niger (q.v.), which it joins after a course of over 800 m. in a general east to west direction from its source in the mountains of Adamawa. Through the Tuburi marshes there is a water connexion between theBenue (Niger) and Shari (Lake Chad) systems.

BEN VENUE, a mountain in south-west Perthshire, Scotland, 10 m. W. of Callander. Its principal peaks are 2393 and 2386 ft. high, and, owing to its position near the south-eastern shore of Loch Katrine, its imposing contour is one of the most familiar features in the scenery of the Trossachs, the mountain itself figuring prominently in The Lady of the Lake. On its northern base, close to the lake, Sir Walter Scott placed the Coir-nan- Uriskin, or " Goblin's Cave." Immediately to the south of the cave is the dell called Beal(ach)-nam-Bo, or " Cattle Pass," through which were driven to the refuge of the Trossachs the herds lifted by the Highland marauders in their

excursions to the lands south of Loch Lomond. The pass, though comparatively unvisited, offers the grandest scenery in the district.

BENZALDEHYDE (oil of bitter almonds), C 6 H 6 CHO, the simplest representative of the aromatic aldehydes. It was first isolated in 1803 and was the subject of an important investigation byJ.v.Liebigin i837(/l»»a/e«,i837,22,p.i). It occurs naturally in the form of the glucoside amygdalin (C20H27NO11), which is present in bitter almonds, cherries, peaches and the leaves of the cherry laurel; and is obtained from this substance by hydrolysis with dilute acids:

CmHˆNOu +2H 2 = HCN +2C6H, j0 8 + C 8 H 6 CHO. It occurs free in bitter almonds, being formed by an enzyme decomposition of amygdalin {q.v.). It may also be prepared by oxidizing benzyl alcohol with concentrated nitric acid; by

distilling a mixture of calcium benzoate and calcium formate; by the condensation of chlor-oxalic ester with benzene in the pres- ence of aluminium chloride, the ester of the ketonic acid formed being then hydrolysed and the resulting acid distilled:

C 6 H 6 +Cl-CO-COOC 2 H 6 = C 6 H5CO-COOC 2 H5-rTICl, C 6 H s CO-COOH = C 6 H 6 CHO +C0 2 ;

by the action of anhydrous hydrocyanic acid and hydrochloric acid on benzene, an aldime being formed as an intermediate product:

C 6 H 6 +HCN+HC1= C 6 H 5 CH:NH-HC1,

Bcnzaldine hydrochloride C 6 H6CH:NH-HCH-H 2 = NH4Cl+C 6 H 6 CHO;

and by the action of chromium oxychloride on toluene dissolved in carbon bisulphide (A. Etard, Berichte, 1884, 17, pp. 1462, 1700). Technically it is prepared "from toluene, by converting it into benzyl chloride, which is then heated with lead nitrate:

C 6 H 5 CH 2 Cl + Pb(N03) 2 = 2N0 2 +PbCl-OH+C 6 H5CHO, or, by conversion into benzal chloride, which is heated with milk of lime under pressure:

C 6 H 6 CHCl 2 -i-CaO = CaCl 2 -r-C 6 H ; ,CHO. E. Jacobsen has also obtained benzaldehyde by heating benzal chloride with glacial acetic acid:

C 6 H5CHCI 2 -|-CH3COOH=CH3COCl + HCH-C 6 H 6 CHO.

Benzaldehyde is a colourless liquid smelling of bitter almonds. Its specific gravity is 1-0636 ({J-° C), and it boils at 179-1° C. (75i-3mm). It is only slightly soluble in water, but is readily volatile in steam. It possesses all the characteristic properties of an aldehyde; being readily oxidized to benzoic acid; reducing solutions of silver salts; forming addition products with hydrogen, hydrocyanic acid and sodium bisulphite; and giving an oxime and a hydrazone. On the other hand, it differs from the aliphatic aldehydes in many respects; it does not form an addition product with ammonia but condenses to hydrobenzamide (C 6 H 6 CH) 3 N 2 ; on shaking with alcoholic potash it undergoes simultaneous oxidation and reduction, giving benzoic acid and benzyl alcohol (S. Cannizzaro) ; and on warming with alcoholic potassium cyanide it condenses to benzoin (q.v.).

The oxidation of benzaldehyde to benzoic acid when exposed to air is not one of ordinary oxidation, for it has been observed in the case of many compounds that during such oxidation, as much oxygen is rendered " active " as is used up by the substance undergoing oxidation; thus if benzaldehyde is left for some time in contact with air, water and indigosulphonic acid, just as much oxygen is used up in oxidizing the indigo compound as in oxidiz- ing the aldehyde. A. v. Baeyer and V. Villiger (Berichte, 1900, 33, pp. 858, 2480) have shown that benzoyl hydrogen peroxide C 6 H 5 -CO-0-OH is formed as an intermediate product and that this oxidizes the indigo compound, being itself reduced to benzoic acid; they have also shown that this peroxide is soluble in benzaldehyde with production of benzoic acid, and it must be assumed that the oxidation of benzaldehyde proceeds as shown

in the equations:

C 6 H 5 CHO-r-0 2 = C6H 5 CO-0-OH, C 6 H5CO-0-OH+C 6 H5CHO = 2C 6 H 6 COOH.

Further see G. Bodlander, Ahrens Sammlung, 1899, iii. 470; W. P. Jorissen, Zeit. fiir phys. Chem., 1897, 22, p. 56; C. Engler and W. Wild, Berichte, 1897, 30, p. 1669.

The oxime of benzaldehyde (C 6 H 5 CH:N-OH), formed by the addition of hydroxylamine to the aldehyde, exhibits a character- istic behaviour when hydrochloric acid gas is passed into its ethereal solution, a second modification being produced. The former (known as the a or benz-anti-aldoxime) melts at 34 _ 3S° C.; the latter (/? or benz-syn-aldoxime) melts at 130° C. and is slowly transformed into the a form. The difference between the two forms has been explained

by A. Hantzsch and A. Werner (Berichte, 1890,23ˆ.11) by the assumption of the different spatial arrangement of the atoms (see Stereoisomerism). On account of the readiness with which it condenses with various compounds, benzaldehyde is an important synthetic reagent. With aniline it forms benzylidine aniline CeHsCˆN-CeHs, and with acetone, benzal acetone C 6 H 5 CH : CH- CO- CH 3 . Heated with anhydrous sodium acetate and acetic anhydride it gives cinnamic acid (q.v.); with ethyl bromide and sodium it forms triphenyl-carbinol

(CeH 6)3C-OH; with dimethylaniline and anhydrous zinc chloride it forms leuco-malachite green CeHsCHfCsˆNCCHahlj.; and with dimethylaniline and concentrated hydrochloric acid it gives dimethylaminobenzhydrol, C6H 5 GH(OH)C6H 4 N(CH 3) 2 . Heated with sulphur it forms benzoic acid and stilbene:

2C 7 H 8 0+S = C 6 H 6 COOH+C 6 H 8 CHS, 2QH 6 CHS=2S +CnH 12 .

Its addition compound with hydrocyanic acid gives mandelic acid C 6 H 6 CH(OH)-COOH on hydrolysis; when heated with sodium succinate and acetic anhydride, phenyl-iso-crotonic acid C 6 H 6 CH : CH-CH 2 COOH is produced, which on boiling is converted into a-naphthol C10H7OH. It can also be used for the synthesis of pyridine derivatives, since A. Hantzsch has shown that aldehydes condense with aceto-acetic ester and ammonia to produce the homologues of pyridine, thus :

R R

ROOOCH2 CHO CH 2 COOR ROOCC-CH-C-COOR

I + + I = II II +3H 2 0.

H 3 C-CO NHj CO-CH, H 3 C-C-NH-C-CH 3

On nitration it yields chiefly meta-nitro-benzaldehyde, crystalliz- ing in needles which melt at 58 C. The ortho-compound may be obtained by oxidizing ortho-nitrocinnamic acid with alkaline potassium permanganate in the presence of benzene; or from ortho – nitrobenzyl chloride by condensing it with aniline, oxidizing the product so obtained to ortho-nitrobenzylidine aniline, and then

hydrolysing this compound with an acid (Far ben fabrik d. Meister, Lucius und Brttning). It crystallizes in yellowish needles, which are volatile in steam and melt at 46 C. It is used in the artificial production of indigo (see German Patent 19768).

Para-nitrobenzaldehyde crystallizes in prisms melting at 107 C. and is prepared by the action of chromium oxychloride on para-nitrotoluene, or by oxidizing para-nitrocinnamic acid. By the reduction of ortho-nitrobenzaldehyde with ferrous sulphate and ammonia, ortho-aminobenzaldehyde is obtained. This compound condenses in alkaline solution with compounds containing the grouping— CH 2 — CO — to form quinoline (q.v.) or its derivatives; thus, with acetaldehyde it forms quinoline, and with acetone, a-methyl quinoline. With urea it gives

/CH 5

1 I

quinazolone I , and with mandelic nitrile and its

W…./CO

homologues it forms oxazole derivatives (S. S. Minovici, Berichle, 1896, 29, p. 2097).

BENZENE, C 6 H6, a hydrocarbon discovered in 1825 by Faraday in the liquid produced in the compression of the illuminating gas obtained by distilling certain oils and fats. E. Mitscherlich prepared it in 1834 by distilling benzoic acid with lime; and in 1845 Hofmann discovered it in coal-tar. It was named "benzin" or "benzine" by Mitscherlich in 1833, but in the following year Liebig proposed "benzol" (the ter- mination ol being suggested by the Lat. oleum, oil); the form "benzene" was due to A. W. Hofmann. The word "benzine" is sometimes used in commerce for the coal-tar product, but also for the light petroleum better known as petroleum-benzine; a similar ambiguity is presented by the word " benzoline," which is applied to the same substances as the word "benzine." "Benzene" is the term used by English chemists, "benzol" is used in Germany, and " benzole " in France.

Benzene is manufactured from the low-boiling fractions of the coal-tar distillate (see Coal- Tar). The first successful fractionation of coal-tar naphtha was devised by C. B. Mansfield (1819-1855), who separated a benzol distilling below ioo° from a less volatile naphtha by using a simple dephlegmator. At first, the oil was manufactured

principally for combustion in the Read-Holliday lamp and for dissolving rubber, but the develop- ment of the coal-tar colour industry occasioned a demand for benzols of definite purity. In the earlier stages 30 %, 50 % and 90 % benzols were required, the 30 % being mainly used for the

manufacture of "aniline for red," and tb.p 90 % for "aniline for blue." (The term " 30 % benzol " means that 30 % by volume distils below ioo°.) A purer benzol was subsequently required for the manufacture of aniline black and other dye-stuffs. The process originally suggested by Mansfield is generally followed, the success of the operation being principally conditioned by the efficiency of the dephlegmator, in which various improvements have been made. The light oil fraction of the coal-tar distillate, which comes over below 140 and consists principally of benzene, toluene and the xylenes, yields on fractionation (1) various volatile impurities such as carbon disulphide, (2) the benzene fraction boiling at about 80° C, (3) the toluene fraction boiling at ioo°, (4) the xylene fraction boiling at 140 . The fractions are agitated with strong sulphuric acid, and then washed with a caustic soda solution. The washed products are then refrac- tionated. The toluene fraction requires a more thorough washing with sulphuric acid in order to eliminate the thiotolene, which is sulphonated much less readily than thiophene.

Benzene is a colourless, limpid, highly refracting liquid, having a pleasing and characteristic odour. It may be solidified to rhombic crystals which melt at 5-4° C. (Mansfield obtained perfectly pure benzene by freezing a carefully fractionated sample.) It boils at 80-4°, and the vapour is highly inflammable, the flame being extremely smoky. Its specific gravity is 0-899 at o° C. It is very slightly soluble in water, more soluble in alcohol, and completely miscible with ether, acetic acid and carbon disulphide. It is an excellent solvent for gums, resins, fats, &c; sulphur, phosphorus and iodine also dissolve in it. It sometimes separates with crystals of a solute as " benzene of crystallization," as for example with triphenylmethane, thio-p-tolyl urea, tropine, &c.

Benzene is of exceptional importance commercially on account of the many compounds derivable from it, which are exceedingly valuable in the arts. Chemically it is one of the most interesting substances known, since it is the parent of the enormous number of compounds styled the " aromatic " or " benzenoid " com- pounds. The constitution of the benzene ring, the isomerism of its derivatives, and their syntheses from aliphatic or open- chain compounds, are treated in the article Chemistry. A summary of its chemical transformations

may be given here, and reference should be made to the articles on the separate compounds for further details.

Passed through a red-hot tube, benzene vapour yields hydrogen, di phenyl, diphenylbenzenes and acetylene; the formation of the last compound is an instance of a reversible reaction, since Berthelot found that acetylene passed through a red-hot tube gave some benzene. Benzene is very stable to oxidants, in fact resistance to oxidation is a strong characteristic of the benzene ring. Manganese dioxide and sulphuric acid oxidize it to benzoic and o-phthalic acid; potassium chlorate and sulphuric acid breaks the ring; and ozone oxidizes it to the highly explosive white solid named ozo-benzene, C 6 H60 6 . Hydriodic acid reduces it to hexamethylene (cyclo-hexane or hexa-hydro-benzene) ; chlorine and bromine form substitution and addition products, but the action is slow unless some carrier such as iodine, molyb- denum chloride or ferric chloride for chlorine, and aluminium bromide for bromine, be present. It is readily nitrated to nitro- benzene, two, and even three nitro groups being introduced if some dehydrator such as concentrated sulphuric acid be present. Sulphuric acid gives a benzene sulphonic acid.

BENZIDINE (Dipara-diamino-diphenyl) , NH 2 • C 6 H 4 • C 6 H 4 • NH 2 , a chemical base which may be prepared by the reduction of the corresponding dinitro-diphenyl, or by the reduction of azo-benzene with tin and hydrochloric acid. In this latter case hydrazo-benzene C 6 H 5 NH-NH-C6H5 is first formed and then undergoes a peculiar re-arrangement into benzidine (see H. Schmidt and G. Schultz, Annalen, 1881, 207, p. 320; 0. N. Witt and Hans v. Helmont, Berichle, 1894, 27, p. 2352; P. Jacobson, Berichte, 1892, 25, p. 994). Benzidine crystallizes in plates (from water) which melt at 1 22° C, and boil above 360 C, and is charac- terized by the great insolubility of its sulphate. It is a di-acid base and forms salts with the mineral acids. It is readily

brominated and nitrated; when the nitration is carried out in the presence of sulphuric acid, the nitro-groups take up the meta position with regard to the amino-groups. Benzidine finds commercial application since its tetrazo compound couples readily with amino-sulphonic acids, phenol carboxylic acids, and phenol and naphthol-sulphonic acids to produce substantive cotton dyes (see Dyeing). Among such dyestuffs are chrysa- mine or flavophenine, obtained

from salicylic acid and dia- zotized benzidine, and congo red obtained from sodium naphthionate and diazotized benzidine. On the constitution of benzidine see G. Schultz (Annalen, 1874, 174, p. 227).

The Benzidine and Semidine Change. — Aromatic hydrazo compounds which contain free para positions are readily con- verted by the action of acids, acid chlorides and anhydrides into diphenyl derivatives; thus, as mentioned above, hydrazo- benzene is converted into benzidine, a small quantity of diphenylin being formed at the same time. The two products are separated by the different solubilities of their sulphates. This reaction is known as the benzidine transformation. If, however, one of the para positions in the hydrazo compound is substituted, then either diphenyl derivatives or azo compounds are formed, or what is known as the semidine change takes place (P. Jacobson, Bcrichte, 1892, 25, p. 992; 1893, 26, p. 681; 1896, 29, p. 2680; Annalen, 1895, 287, p. 97; 1898, 303, p. 290). A para mono substituted hydrazo compound in the presence of a hydrochloric acid solution of stannous chloride gives either a para diphenyl derivative (the substituent group being elimi- nated), an ortho-semidine, a para-semidine, or a diphenyl base, whilst a decomposition with the formation of amines may also take place. The nature of the substituent exerts a specific influence on the reaction; thus with chlorine or bromine, ortho-semidines and the diphenyl bases are the chief products; the dimethylamino, -N(CH 3) 2 , and acetamino, -NHCOCH3, groups give the diphenyl base and the para-semidine respectively. With a methyl group, the chief product is an ortho-semidine, whilst with a carboxyl group, the diphenyl derivative is the chief product. The ortho- and para-semidines can be readily distinguished by their behaviour with different reagents; thus with nitrous acid the ortho-semidines give azimido compounds, whilst the para-semidines give complex diazo derivatives; with formic or acetic acids the ortho-semidines give anhydro compounds of a basic character, the para-semidines give acyl products possessing no basic character. The carbon disulphide and salicylic aldehyde products have also been used as means of distinction, as has also the formation of the stilbazonium bases obtained by condensing ortho-semidines with benzil (0. N. Witt, Berichte, 1892, 25, p. 1017).

Structurally we have: —

NH 2 < > -NH-NH – < > — > NH 2 < > – < > NH 2 and NH 2 < > –

Hydrazobenzene.

R<)-NH-NH-

Benzidine.

Ortho-semidine.

Diphenylin.

> or R < > NH

> NH 2

Para-semidine.

NH 2 or<^>-<^>NH 2 . R

BENZOIC ACID, C 7 H 6 2 or C 6 H 6 COOH, the simplest representative of the aromatic acids. It occurs naturally in some resins, especially in gum benzoin (from Styrax benzoin), in dragon's blood, and as a benzyl ester in Peru and Tolu balsams. It can be prepared by the. oxidation of toluene, benzyl alcohol, benzaldehyde and cinnamic acid; by the oxidation of benzene with manganese dioxide and concentrated sulphuric acid in the cold (L. Carius, Ann. 1868, 148, p. 51); by hydrolysis of benzoni- trile or of hippuric acid; by the action of carbon dioxide on benzene in the presence of aluminium chloride (C. Friedel and J. M. Crafts, Ann. chim. phys. 1888 [6], 14, p. 441); by the action of carbon dioxide on monobrombenzene in the presence of sodium; by condensing benzene and carbonyl chloride in presence of aluminium chloride, the benzoyl chloride formed

being subsequently hydrolysed; and similarly from benzene and chlorformamide: —

C 6 H 6 -f-Cl-CONHj = HC1+C 6 H 6 C0NH 2 , the benzamide being then hydrolysed. It may also be prepared by boiling benzyl chloride with dilute nitric acid (G. Lunge, Berichte, 1877, 10, p. 1275) ; by fusing sodium benzene sulphonate with sodium formate: CeH5S03Na+HC0 2 Na = C 6 H 5 COONa-r- NaHSOs; by heating calcium phthalate with calcium hydroxide to 330°-35o° C; by heating benzotrichloride with water in a sealed tube, and from the hippuric acid which is found in the urine of the herbivorae. For this purpose the urine is concen- trated and the hippuric acid precipitated by the addition of hydrochloric acid; it is then filtered and boiled for some time with concentrated hydrochloric acid, when it is hydrolysed into

benzoic and amido-acetic acid. It is made commercially by boiling benzotrichloride (obtained from toluene) with milk of lime, the calcium benzoate so obtained being then decomposed by hydrochloric acid

2C 6 H i ,CCl 3 4Ca(OH) 2 = (C 6 H 6 COO) 2 Ca 3CaCl 2 +4H 2 0. Benzoic acid crystallizes in glistening leaflets (from, water) which melt at 121-4° C. and boil at 249-2° C. (H. Kopp). Its specific heat is 0-1946. It sublimes readily and is volatile in steam. It is readily soluble in hot water and the ordinary organic solvents, but is only slightly soluble in cold water. When heated with lime, it is decomposed, benzene being formed; if its vapours are passed over heated zinc dust, it is converted into benzalde- hyde (A. Baeyer, Ann. 1866, 140, p. 296). Distillation of its calcium salt gives benzophenone (q.v.) with small quantities of other substances, but if the calcium salt be mixed with calcium formate and the mixture distilled, benzaldehyde is produced. By the action of sodium amalgam on an aqueous solution of the acid, benzyl alcohol, tetrahydrobenzoic acid and hexahydro- benzoic acid are formed. The salts of benzoic acid are known as the benzoates and are mostly soluble in water. They are readily decomposed by mineral acids with the production of benzoic acid, and on addition of ferric chloride to their neutral solutions give a reddish-brown precipitate of ferric benzoate. ,

Benzoic anhydride, (C 6 H 5 CO) 2 0, is prepared by the action of benzoyl chloride on sodium benzoate, or by heating benzoyl chloride with anhydrous oxalic acid (R. Anschiitz, Ann. 1884, 226, p. 15). It crystallizes in needles, melting at 42°C, and boiling at 36o°C. It is insoluble in water but readily soluble in alcohol and ether.

Benzoyl chloride, C 6 HsCOCl, is formed by distilling a mixture of phosphorus pentachloride and benzoic acid; by the action of chlorine on benzaldehyde, or by passing a stream of hydrochloric acid gas over a mixture of benzoic acid and phosphorus pentoxide heated to 2oo°C. (C. Friedel, Ber. 1869, 2, p. 80). It is a colourless liquid of very unpleasant smell, which boils at 198° C, and solidifies in a freezing mixture, the crystals obtained melting at -i° C. It shows all the characteristic properties of an acid chloride.

Ethyl benzoate, C6H5COOC2H5, is best prepared by boiling benzoic acid and alcohol with a small quantity of sulphuric acid for some hours (E. Fischer and A. Speier, Berichte, 1896, 28, p. 3252). It is a colourless liquid of boiling point 213° C.

Benzamide, CeH 5 CONH 2 , is prepared by the action of benzoyl chloride on ammonia or ammonium carbonate, or from ethyl benzoate and ammonia. It crystallizes (from water) in glistening leaflets which melt at 130° C. and boil at 288° C. Its silver salt behaves as if it were the salt of an imido benzoic acid, since it yields benzimido ethyl ether C 6 H 5 -C(:NH)-OC 2 H5 with ethyl iodide (J. Tafel and C. Enoch, Berichte, 1890, 23, p. 1550).

Chlor-, brom-, iodo- and fluor-benzoic acids are known and can be obtained by oxidizing the corresponding halogen toluenes, or from the amido acids, or by substitution. Nitration of benzoic acid gives chiefly meta-nitro-benzoic acid. The ortho- and para-nitro-benzoic acids can be obtained by oxidizing ortho- and para-nitro-cinnamic acids. Ortho-amino-benzoic acid, C6l-l4-NH 2 -COOH (anthranilic acid), is closely related to indigs (q.v.).

Gum benzoin, which contains from 12 to 20 % of benzoic acid, is used in medicine as the essential constituent of benzoated lard, Adeps benzoatus, which owes its antiseptic properties to benzoic acid; and in friar's balsam, Tinctura benzoini composite,, which is an ancient and valuable medicament, still largely used for inhalation in cases of laryngitis, bronchitis and other inflamma- tory or actually septic conditions of the respiratory tract. It owes its value to the benzoic acid which it contains. A fluid drachm of friar's balsam may be added to a pint of water at a temperature of about 140 F., and the resultant vapour may be inhaled from the spout of a kettle or from a special inhaler. Benzoic acid itself, ammonium benzoate and sodium benzoate are all administered internally in doses of from five to thirty grains. The ammonium salt is most often employed, owing to the stimulant character of the ammonium base. The acid itself is a powerful antiseptic. When administered internally, it causes the appearance of hippuric acid in the urine. This is due to its combination in the body with glycocoll. The combination probably occurs in the kidney. The hippuric acid in the urine acts as a stimulant and disinfectant to the urinary mucous membrane. Benzoic acid is also excreted by the bronchi and tends to disinfect and stimulate the bronchial mucous membrane. Hence the value of friar's balsam. The acid and its salts are antipyretic and were used in Germany instead of salicylates in rheumatic fever. But the most important fact is that ammonium benzoate is largely used — often in combination with urinary anodynes such as tincture of hyoscyamus

— as a urinary antiseptic in cases of cystitis (inflammation of the bladder) and pyelitis (inflammation of the pelvis of the kidney).

BENZOIN, C 6 H 5 CHOH-CO-C fi H 6 , a ketone-alcohol, which may be prepared by boiling an alcoholic solution of benzaldehyde with potassium cyanide; by reducing benzil (CeHjCO-CO-CoHs) with zinc and acetic acid; or by the oxidation of hydrobenzoin (C 6 H5-CHOH-CHOH'C 6 H 5). It is a colourless, crystalline solid, readily soluble in alcohol and ether, melting at 137 C. and boiling at 343-344°C. On passing the vapour of benzoin over heated lead oxide, it is converted into benzil and benzophenone. Owing to the readiness with which it is oxidized, it acts as a reducing agent, giving a red precipitate of cuprous oxide with Fehling's solution in the cold. Chlorine and nitric acid oxidize it to benzil ; chromic acid mixture and potassium permanganate, to benzoic acid and benzaldehyde. On heating with zinc dust, desoxy- benzoin (CeHsCO-CITi-CeHo) is obtained; sodium amaJgam converts it into hydrobenzoin; and fuming hydriodic acid at I3 o° C. gives dibenzyl (C 6 H E CH 2 -CH 2 C 6 H 6). By fusion with alkali it is converted into benzil; and with an alcoholic solution of benzaldehyde in presence of ammonia it forms amarine (tri phenyl dihydro-glyoxaline) . In the presence of sulphuric acid it condenses with nitriles to oxazoles (g.v.).

BENZOIN, or Gum Benjamin (supposed to be from Arab. luban, frankincense, the first syllable being dropped in Romanic as if it were the article), a balsamic resin obtained from Styrax benzoin, a tree of considerable size, native to Sumatra and Java, and from other species of Styrax. It is obtained by making incisions in the bark of the trees, and appears to be formed as the result of the wound, not to be secreted normally. There are several varieties of benzoin in commerce: (1) Siam benzoin, which apparently does not come from Styrax benzoin, is the finest and most aromatic, and occurs in the form of small " tears, " rarely exceeding 2 in. in length by \ in. in thickness, and of " blocks " made up of these tears agglomerated by a clear reddish-brown resin. The odour of Siam benzoin is partly due to the presence of vanillin, and the substance contains as much as 38 % of benzoic acid but no cinnamic acid. (2) Sumatra benzoin occurs only in masses formed of dull red resin enclosing white tears. It contains about 20 % of cinnamic acid in addition to 1 8 or even more of benzoic. (3) Palembang benzoin, an inferior variety, said to be obtained from Styrax benzoin in Sumatra, consists of greyish translucent resinous masses, containing small white opaque tears. It does not appear to contain cinnamic acid. Large quantities of benzoin are used as incense. Its medicinal uses depend on the contained benzoic acid (q.v.).

BENZOPHENONE (Diphenyl Ketone), CeHs-CO-GHs, the simplest representative of the true aromatic ketones. It may be prepared by distilling calcium benzoate; by condensing benzene with benzoyl chloride in the presence of anhydrous aluminium chloride; by the action of mercury diphenyl on benzoyl chloride, or by oxidizing diphenylmethane with chromic acid. It is a dimorphous substance existing in two enantiotropic forms, one melting at 26 C. and the other at 48 C. (Th. Zincke, Berichte,i8i 1, 4>P-576). It boilsat 306-1° C, under a pressure of 760-32 mm. It is reduced by sodium amalgam to benzhydrol or diphenyl carbinol CeHs-CHOH-CeHs; a stronger reducing agent, such as hydriodic acid in the presence of amorphous phosphorus converts it into diphenylmethane (GHe)2-CH 2 . Potash fusion converts it into benzene and benzoic acid. With phenylhydrazine it forms a hydrazone, and with hydroxylamine an oxime, which exists in one form only; if, however, one of the phenyl groups in the oxime be substituted in any way then two stereo-isomeric oximes are produced (cf. Stereoisomerism) ; thus parachlorbenzophenone oxime exists in two different forms (V. Meyer and K. F. Auwers, Berichte, 1890, 23, p. 2403). Many derivatives are known, thus ortho-amino-benzophenone, melting at 106° C, can be obtained by reduction of the corresponding nitro compound ; it condenses under the influence of heated lead monoxide to an acridine derivative and with acetone in presence of caustic soda it gives a quinoline. Tetramethyl-diamido-benzophenone or Michler's ketone, CO[C6H 4 N-(CH 3) 2] 2 , melting at 173°, is of technical importance, as by condensation with various substances it can be made to yield dye-stuffs. It is prepared by the action of carbonyl chloride on dimethyl aniline in the presence of aluminium chloride: COCl 2 -r-2C 6 H s N(CH3)2 = 2HCl+CO[C 6 H4N 2] 2 .

BENZYL ALCOHOL (Phenyl Carbinol), CACHoOH, occurs as a benzoic ester in Peru balsam, as cinnamic ester in Tolu balsam, as acetic ester in essential oil of jasmine, and also in storax. It may be synthetically prepared by the reduction of benzoyl chloride; by the action of nitrous acid on benzylamine; by boiling benzyl chloride with an aqueous solution of potassium carbonate, or by the so-called " Cannizzaro " reaction, in which benzaldehyde is shaken up with caustic potash, one half of the aldehyde being oxidized to benzoic acid, and the other half reduced to the alcohol. (Berichte, 1881, 14, p. 2394).

2C 6 H5CHO+KOH=C6H 6 COOK+C 6 H5CH 2 OH. It is a colourless liquid, with a faint aromatic smell, and boils at 206° C. On oxidation with nitric acid it is converted into benzaldehyde, whilst chromic acid oxidizes it to benzoic acid. Reduction by means

of hydriodic acid and phosphorus at 140° C. gives toluene, whilst <5n distillation with alcoholic potash, toluene and benzoic acid are formed.

BEOTHUK, a tribe of North American Indians formerly dwelling in the interior of Newfoundland. A certain mystery attaches to them, since investigation of the few words of their language which have survived suggests that they were of distinct stock. The name (of Micmac origin) is said to mean simply " red men." They were bitterly hostile to the French settlers, and were hunted down and killed off until 1820, when a few survivors made their escape into Labrador. The last of them is believed to have died in 1829.

BEOTHY, ODON (1796-1854), Hungarian deputy and orator, was born at Grosswardein, his father being a retired officer and deputy lord-lieutenant of the county of Bihar. At the age of sixteen he served in the war against Napoleon, and was present at the great battle of Leipzig. Like so many others of his com- patriots, he picked up Liberal ideas abroad. He was sent to parliament by his county in 1826 and again in 1830, but did not become generally known till the session of 1832-1836, when along with Deak he, as a liberal Catholic, defended the Protestant point of view in " the mixed marriages question." He was also an energetic advocate of freedom of speech. After parliament rose he carried his principles to their logical conclusion by marrying a Protestant lady and, being denied a blessing on the occasion by an indignant bishop, publicly declared that he could very well dispense with such blessings. In 1841 he was elected deputy lord-lieutenant of his county to counteract the influence of the

lord-lieutenant, Lajos Tisza, and powerfully promoted the popular cause by his eloquence and agitation. After 1843 the conservatives succeeded in excluding him both from parliament and from his official position in the county; but during the famous " March Days " (1848) he regained all his authority, becoming at the same time a commander of militia, a deputy and lord-lieutenant. At the first session of the Upper House (5th of July 1848), he moved that it should be radically reformed, and during the war of Independence he energetically served the Hungarian government as a civil commissioner and lord justice. Towards the end of the war he reappeared as a deputy at the Szeged diet, and on the flight of the

government took refuge first with Richard Cobden in London and subsequently in Jersey, where he made the acquaintance of Victor Hugo. Thence he went to Hamburg, to meet his wife, and died there on the 7 th of December 1854. Beothy was a man of extraordinary ability and character, and an excellent debater. He also exercised as much influence socially over his contemporaries as politically, owing to his unfailing tact and pleasant wit.

See Antal Csengery, Hungarian Orators and Statesmen (Hung., Budapest, 1851). (R. N. B.)

BEOWULF. The epic of Beowulf, the most precious relic of Old English, and, indeed, of all early Germanic literature, has come down to us in a single MS., written about a.d. iooo, which contains also the Old English poem of Judith, and is bound up with other MSS. in a volume in the Cottonian collection now at the British Museum. The subject of the poem is the exploits of Beowulf, son of Ecgtheow and nephew of Hygelac, king of the " Geatas," i.e. the people, called in Scandinavian records Gautar, from whom a part of southern Sweden has received its present name Gotland.

The Story.— The following is a brief outline of the story, which naturally divides itself into five parts.

1. Beowulf, with fourteen companions, sails to Denmark, to offer his help to Hrothgar, king of the Danes, whose hall (called " Heorot ") has for twelve years been rendered uninhabitable by the ravages of a devouring monster (apparently in gigantic human shape) called Grendel, a dweller in the waste, who used nightly to force an entrance and slaughter some of the inmates. Beowulf and his friends are feasted in the long-deserted Heorot. At night the Danes withdraw, leaving the strangers alone. When all but Beowulf are asleep, Grendel enters, the iron-barred doors having yielded in a moment to his hand. One of Beowulf's friends is killed; but Beowulf, unarmed, wrestles with the monster, and tears his arm from the shoulder. Grendel, though mortally wounded, breaks from the conqueror's grasp, and escapes from the hall. On the morrow, his bloodstained track is followed until it ends in a distant mere.

2. All fear being now removed, the Danish king and his followers pass the night in Heorot, Beowulf and his comrades being lodged elsewhere. The hall is invaded by Grendel's mother, who kills and carries off one of the Danish nobles. Beowulf proceeds to the mere, and, armed with sword and corslet, plunges into the water. In a vaulted chamber under the waves, he fights with Grendel's mother,

and kills her. In the vault he finds the corpse of Grendel; he cuts off the head, and brings it back in triumph.

3. Richly rewarded by Hrothgar, Beowulf returns to his native land. He is welcomed by Hygelac, and relates to him the story of his adventures, with some details not contained in the former narrative. The king bestows on him lands and honours, and during the reigns of Hygelac and his son Heardred he is the greatest man in the kingdom. When Heardred is killed in battle with the Swedes, Beowulf becomes king in his stead.

4. After Beowulf has reigned prosperously for fifty years, his country is ravaged by a fiery dragon, which inhabits an ancient burial-mound, full of costly treasure. The royal hall itself is burned to the ground. The aged king resolves to fight, unaided, with the dragon. Accompanied by eleven chosen warriors, he journeys to the barrow. Bidding his companions retire to a distance, he takes up his position near the entrance I to the mound — an arched opening whence issues a boiling stream. I

The dragon hears Beowulf's shout of defiance, and rushes forth, breathing flames. The fight begins; Beowulf is all but over- powered, and the sight is so terrible that his men, all but one, seek safety in flight. The young Wiglaf, son of Weohstan, though yet untried in battle, cannot, even in obedience to his lord's prohibition, refrain from going to his help. With Wiglaf 's aid, Beowulf slays the dragon, but not before he has received his own death-wound. Wiglaf enters the barrow, and returns to show the dying king the treasures that he has found there. With his last breath Beowulf names Wiglaf his successor, and ordains that his ashes shall be enshrined in a great mound, placed on a lofty cliff, so that it may be a mark for sailors far out at sea.

5. The news of Beowulf's dear-bought victory is carried to the army. Amid great lamentation, the hero's body is laid on the funeral pile and consumed. The treasures of the dragon's hoard are buried with his ashes; and when the great mound is finished, twelve of Beowulf's most famous warriors ride around it, celebrating the praises of the bravest, gentlest and most generous of kings.

The Hero. — Those portions of the poem that are summarized above — that is to say, those which relate the career of the hero in progressive order — contain a lucid and well-constructed story, told with a vividness of imagination and a degree of narrative skill that may with little exaggeration be called Homeric. And yet it is

probable that there are few readers of Beowulf who have not felt — and there are many who after repeated perusal continue to feel — that the general impression produced by it is that of a bewildering chaos. This effect is due to the multitude and the character of the episodes. In the first place, a very great part of what the poem tells about Beowulf himself is not presented in regular sequence, but by way of retrospective mention or narration. The extent of the material thus introduced out of course may be seen from the following abstract.

When seven years old the orphaned Beowulf was adopted by his grandfather king Hrethel, the father of Hygelac, and was regarded by him with as much affection as any of his own sons. In youth, although famed for his wonderful strength of grip, he was generally despised as sluggish and unwarlike. Yet even before hfs encounter with Grendel, he had won renown by his swimming contest with another youth named Breca, when after battling for seven days and nights with the waves, and slaying many sea-monsters, he came to land in the country of the Finns. In the disastrous invasion of the land of the Hetware, in which Hygelac was killed, Beowulf killed many of the enemy, amongst them a chieftain of the Hugas, named Dajghrefn, apparently the slayer of Hygelac. In the retreat he once more displayed his powers as a swimmer, carrying to his ship the armour of thirty slain enemies. When he reached his native land, the widowed queen offered him the kingdom, her son Heardred being too young to rule. Beowulf, out of loyalty, refused to be made king, and acted as the guardian of Heardred during his minority, and as his counsellor after he came to man's estate. By giving shelter to the fugitive Eadgils, a rebel against his uncle the king of the " Sweon " (the Swedes, dwelling to the north of the Gautar), Heardred brought on himself an invasion, in which he lost his life. When Beowulf became king, he supported the cause of Eadgils by force of arms; the king of the Swedes was killed, and his nephew placed on the throne.

Historical Value. — Now, with one brilliant exception — the story of the swimming-match, which is felicitously introduced and finely told — these retrospective passages are brought in more or less awkwardly, interrupt inconveniently the course of the narrative, and are too condensed and allusive in style to make any strong poetic impression. Still, they do serve to complete the portraiture of the hero's character. There are, however, many other episodes that have nothing to do with Beowulf himself, but seem to have been inserted with a deliberate intention of making the poem into a sort of cyclopaedia of Germanic tradition. They include many particulars of what purports to be the history of the royal houses, not only of the

Gautar and the Danes, but also of the Swedes, the continental

Angles, the Ostrogoths, the Frisians and the Heathobeards, besides references to matters of unlocalized heroic story such as the exploits of Sigismund. The Saxons are not named, and the Franks appear only as a dreaded hostile power. Of Britain there is no mention; and though there are seme distinctly Christian passages, they are so incongruous in tone with the rest of the poem that they must be regarded as interpolations. In general the extraneous episodes have no great appropriateness to their context, and have the appearance of being abridged versions of stories that had been related at length in poetry. Their confusing effect, for modern readers, is increased by a curiously irrelevant prologue. It begins by celebrating the ancient glories of the Danes, tells in allusive style the story of Scyld, the founder of the " Scylding" dynasty of Denmark, and praises the virtues of his son Beowulf. If this Danish Beowulf had been the hero of the poem, the opening would have been appropriate; but it seems strangely out of place as an introduction to the story of his namesake.

However detrimental these redundancies may be to the poetic beauty of the epic, they add enormously to its interest for students of Germanic history or legend. If the mass of traditions which it purports to contain be genuine, the poem is of unique importance as a source of knowledge respecting the early history of the peoples of northern Germany and Scandinavia. But the value to be assigned to Beowulf in this respect can be determined only by ascertaining its probable date, origin and manner of composition. The criticism of the Old English epic has therefore for nearly a century been justly regarded as indispensable to the investigation of Germanic antiquities.

The starting-point of all Beowulf criticism is the fact (dis- covered by N. F. S. Grundtvig in 1815) that one of the episodes of the poem belongs to authentic history. Gregory of Tours, who died in 594, relates that in the reign of Theodoric of Metz (511-534) the Danes invaded the kingdom, and carried off many captives and much plunder to their ships. Their king, whose name appears in the best MSS. as Chlochilaicus (other copies read Chrochilaicus, Hrodolaicus, &c), remained on shore intend- ing to follow afterwards, but was attacked by the Franks under Theodobert, son of

Theodoric, and killed. The Franks then defeated the Danes in a naval battle, and recovered the booty. The date of these events is ascertained to have been between 512 and 520. An anonymous history written early in the eighth century {Liber Hist. Francorum, cap. 19) gives the name of the Danish king as Chochilaicus, and says that he was killed in the land of the Attoarii. Now it is related in Beowulf that Hygelac met his death in fighting against the Franks and the Hetware (the Old English form of Attoarii). The forms of the Danish king's name given by the Frankish historians are corruptions of the name of which the primitive Germanic form was Hugilaikaz, and which by regular phonetic change became in Old English Hygelac, and in Old Norse Hugleikr. It is true that the invading king is said in the histories to have been a Dane, whereas the Hygelac of Beowulf belonged to the " Geatas" or Gautar. But a work called Liber Monstrorum, 1 preserved in two MSS. of the 10th century, cites as an example of extraordinary stature a certain " Huiglaucus, king of the Getae," who was killed by the Franks, and whose bones were preserved on an island at the mouth of the Rhine, and exhibited as a marvel. It is therefore evident that the personality of Hygelac, and the expedition in which, according to Beowulf, he died, belong not to the region of legend or poetic invention, but to that of historic fact.

This noteworthy result suggests the possibility that what the poem tells of Hygelac's near relatives, and of the events of his reign and that of his successor, is based on historic fact. There is really nothing to forbid the supposition; nor is there any unlikelihood in the view that the persons mentioned as belonging to the royal houses of the Danes and Swedes had a real existence. It can be proved, at any rate, that several of the names are

1 Printed in Berger de Xivrey, Traditions Teratologiques (1836), from a MS. in private hands. Another MS., now at Wolfenbiittel, reads "Hunglacus"forHuiglaucus, and (ungrammatically) "gentes" for Getis.

derived from the native traditions of these two peoples. The Danish king Hrothgar and his brother Halga, the sons of Healf- dene, appear in the Historia Danica of Saxo as Roe (the founder of Roskilde) and Helgo, the sons of Haldanus. The Swedish princes Eadgils, son of Ohthere, and Onela, who are mentioned in Beowulf, are in the Icelandic Heimskringla called Adils son of Ottarr, and Ali; the correspondence of the names, according to the phonetic laws of Old English and Old Norse, being strictly normal. There are other points of contact between Beowulf o» the one hand and the Scandinavian records on the other, confirmˆ ing the conclusion that the Old English

poem contains much of the historical tradition of the Gautar, the Danes and the Swedes, in its purest accessible form.

Of the hero of the poem no mention has been found elsewhere. But the name (the Icelandic form of which is Bjolfr) is genuinely Scandinavian. It was borne by one of the early settlers in Iceland, and a monk named Biuulf is commemorated in the Liber Vilae of the church of Durham. As the historical character of Hygelac has been proved, it is not unreasonable to accept the authority of the poem for the statement that his nephew Beowulf succeeded Heardred on the throne of the Gautar, and interfered in the dynastic quarrels of the Swedes. His swimming exploit among the Hetware, allowance being made for poetic exaggera- tion, fits remarkably well into the circumstances of the story told by Gregory of Tours; and perhaps his contest with Breca may have been an exaggeration of a real incident in his career; and even if it was originally related of some other hero, its attribu- tion to the historical Beowulf may have been occasioned by his renown as a swimmer.

On the other hand, it would be absurd to imagine that the combats with Grendel and his mother and with the fiery dragon can be exaggerated representations of actual occurrences. These exploits belong to the domain of pure mythology. That they have been attributed to Beowulf in particular might seem to be adequately accounted for by the general tendency to connect mythical achievements with the name of any famous hero. There are, however, some facts that seem to point to a more definite explanation. The Danish king " Scyld Scefing," whose story is told in the opening lines of the poem, and his son Beowulf, are plainly identical with Sceldwea, son of Sceaf , and his son Beaw, who appear among the ancestors of Woden in the genealogy of the kings of Wessex given in the Old English Chronicle. The story of Scyld is related, with some details not found in Beowulf, by William of Malmesbury, and, less fully, by the 10th-century English historian Ethclwerd, though it is told not of Scyld himself, but of his father Sceaf. According to William's version, Sceaf was found, as an infant, alone in a boat without oars, which had drifted to the island of " Scandza." The child was asleep with his head on a sheaf, and from this circumstance he obtained his name. When he grew up he reigned over the Angles at " Slaswic." In Beowulf the same story is told of Scyld, with the addition that when he died his body was placed in a ship, laden with rich treasure, which was sent out to sea unguided. It is clear that in the original form of the tradition the name of the foundling was Scyld or Sceldwea, and that his cognomen Scefing (derived from sceaf, a sheaf) was misinterpreted as a patronymic.

Sceaf, therefore, is no genuine personage of tradition, but merely an etymological figment.

The position of Sceldwea and Beaw (in Malmesbury's Latin called Sceldius and Beowius) in the genealogy as anterior to Woden would not of itself prove that they belong to divine mythology and not to heroic legend. But there are independent reasons for believing that they were originally gods or demi-gods. It is a reasonable conjecture that the tales of victories over Grendel and the fiery dragon belong properly to the myth of Beaw. If Beowulf, the champion of the Gautar, had already become a theme of epic song, the resemblance of name might easily suggest the idea of enriching his story by adding to it the achievements of Beaw. At the same time, the tradition that the hero of these adventures was a son of Scyld, who was identified (whether rightly or wrongly) with .the eponymus of the Danish dynasty of the Scyldings, may well have prompted the

supposition that they took place in Denmark. There is, as we shall see afterwards, some ground for believing that there were circulated in England two rival poetic versions of the story of the encounters with supernatural beings: the one referring them to Beowulf the Dane, while the other (represented by the existing poem) attached them to the legend of the son of Ecgtheow, but ingeniously contrived to do some justice to the alternative tradition by laying the scene of the Grendel incident at the court of a Scylding king.

As the name of Beaw appears in the genealogies of English kings, it seems likely that the traditions of his exploits may have been brought over by the Angles from their continental home. This supposition is confirmed by evidence that seems to show that the Grendel legend was popularly current in this country. In the schedules of boundaries appended to two Old English charters there occurs mention of pools called " Grendel's mere," one in Wiltshire and the other in Staffordshire. The charter that mentions the Wiltshire " Grendel's mere " speaks also of a place called Beowan ham (" Beowa's home "), and another Wiltshire charter has a " Scyld's tree " among the landmarks enumerated. The notion that ancient burial mounds were liable to be inhabited by dragons was common in the Germanic world: there is perhaps a trace of it in the Derbyshire place-name Drakelow, which means " dragon's barrow."

While, however, it thus appears that the mythic part of the Beowulf story is a portion of primeval Angle tradition, there is no proof that it was originally peculiar to the Angles; and even if it was so, it may easily have passed from them into the poetic cycles of the related peoples. There are, indeed, some reasons for suspecting that the blending of the stories of the mythic Beaw and the historical Beowulf may have been the work of Scandi- navian and not of English poets. Prof. G. Sarrazin has pointed out the striking resemblance between the Scandinavian legend of Bodvarr Biarki and that of the Beowulf of the poem. In each, a hero from Gautland slays a destructive monster at the court of a Danish king, and afterwards is found fighting on the side of Eadgils (Adils) in Sweden. This coincidence cannot well be due to mere chance; but its exact significance is doubtful. On the one hand, it is possible that the English epic, which unquestion- ably derived its historical elements from Scandinavian song, may be indebted to the same source for its general plan, including the blending of history and myth. On the other hand, considering the late date of the authority for the Scandinavian traditions, we cannot be sure that the latter may not owe some of their material to English minstrels. There are similar alternative possibilities with regard to the explanation of the striking resemblances which certain incidents of the adventures with Grendel and the dragon bear to incidents in the narratives of Saxo and the Icelandic sagas.

Date and Origin. — It is now time to speak of the probable date and origin of the poem. The conjecture that most naturally pre- sents itself to those who have made no special study of the ques- tion, is that an English epic treating of the deeds of a Scandinavian hero on Scandinavian ground must have been composed in the days of Norse or Danish dominion in England. This, however, is impossible. The forms under which Scandinavian names appear in the poem show clearly that these names must have entered Eng- lish tradition not later than the beginning of the 7th century. It does not indeed follow that the extant poem is of so early a date; but its syntax is remarkably archaic in comparision with that of the Old English poetry of the 8th century. The hypothesis that Beowulf is in whole or in part a translation from a Scandinavian original, although still maintained by some scholars, introduces more difficulties than it solves, and must be dismissed as unten- able. The limits of this article do not permit us to state and criticize the many elaborate theories that have been proposed respecting the origin of the poem. All that can be done is to set forth the view that appears to us to be most free from objection. It may be premised that although the existing MS. is

written in the West-Saxon dialect, the phenomena of the language indicate transcription from an Anglian (i.e. a Northumbrian or Mercian) original; and this conclusion is supported by the fact that while

the poem contains one important episode relating to the Angles, the name of the Saxons does not occur in it at all.

In its original form, Beowulf was a product of the time when poetry was composed not to be read, but to be recited in thehalls of kings and nobles. Of course an entire epic could not be recited on a single occasion; nor can we suppose that it would be thought out from beginning to end before any part of it was presented to an audience. A singer who had pleased his hearers with a tale of adventure would be called on to tell them of earlier or later events in the career of the hero; and so the story would grow, until it included all that the poet knew from tradition, or could invent in harmony with it. That Beowulf is concerned with the deeds of a foreign hero is less surprising than it seems at first sight. The minstrel of early Germanic times was required to be learned not only in the traditions of his own people, but also in those of the other peoples with whom they felt their kinship. He had a double task to perform. It was not enough that his songs should give pleasure; his patrons demanded that he should recount faithfully the history and genealogy both of their own line and of those other royal houses who shared with them the same divine ancestry, and who might be connected with them by ties of marriage or warlike alliance. Probably -the singer was always himself an original poet; he might often be content to reproduce the songs that he had learned, but he was doubtless free to improve or expand them as he chose, provided that his inventions did not conflict with what was supposed to be historic truth. For all we know, the intercourse of the Angles with Scandinavia, which enabled their poets to obtain new knowledge of the legends of Danes, Gautar and Swedes, may not have ceased until their conversion to Christianity in the 7th century. And even after this event, whatever may have been the attitude of churchmen towards the old heathen poetry, the kings and warriors would be slow to lose their interest in the heroic tales that had delighted their ancestors. It is probable that down to the end of the 7th century, if not still later, the court poets of Northumbria and Mercia continued to celebrate the deeds of Beowulf and of many another hero of ancient days.

Although the heathen Angles had their own runic alphabet, it is unlikely that any poetry was written down until a generation had grown up trained in the use of the Latin letters learned from

Christian missionaries. We cannot determine the date at which some book-learned man, interested in poetry, took down from the lips of a minstrel one of the stories that he had been accus- tomed to sing. It may have been before 700; much later it can hardly have been, for the old heathen poetry, though its existence might be threatened by the influence of the church, was still in vigorous life. The epic of Beowulf was not the only one that was reduced to writing: a fragment of the song about Finn, king of the Frisians, still survives, and possibly several other heroic poems were written down about the same time. As originally dictated, Beowulf probably contained the story outlined at the beginning of this article, with the addition of one or two of the episodes relating to the hero himself — among them the legend of the swimmiug-match. This story had doubtless been told at greater length in verse, but its insertion in its present place is the work of a poet, not of a mere redactor. The other episodes were introduced by some later writer, who had heard recited, or perhaps had read, a multitude of the old heathen songs, the substance of which he piously sought to preserve from oblivion by weaving it in an abridged form, into the texture of the one great poem which he was transcribing. The Christian passages, which are poetically of no value, are evidently of literary origin, and may be of any date down to that of the extant MS. The curious passage which says that the subjects of Hrothgar sought deliverance from Grendel in prayer at the temple of the Devil, " because they knew not the true God," must surely have been substituted for a passage referring sym- pathetically to the worship of the ancient gods.

An interesting light on the history of the written text seems to be afforded by the phenomena of the existing MS. The poem is divided into numbered sections, the length of which was probably determined by the size of the pieces of parchment of

which an earlier exemplar consisted. Now the first fifty-two lines, which are concerned with Scyld and his son Beowulf, stand outside this numbering. It may reasonably be inferred that there once existed a written text of the poem that did not include these lines. Their substance, however, is clearly ancient. Many difficulties will be obviated if we may suppose that this passage is the beginning of a different poem, the hero of which was not Beowulf the son of Ecgtheow, but his Danish namesake. It is true that Beowulf the Scylding is mentioned at the beginning of the first numbered section;

but probably the opening lines of this section have undergone alteration in order to bring them into connexion with the prefixed matter.

Bibliography. — The volume containing the Beowulf MS. (then, as now, belonging to the Cottonian collection, and numbered " Vitellius A. xv.') was first described by Humphrey Wanley in 1705, in his catalogue of MSS., published as vol. lii. of G. Hickes's Thesaurus Veterum Linguarum Septentrionalium. In 1786 G. J. Thorkelin, an Icelander, made or procured two transcripts of the poem, which are still preserved in the Royal Library at Copenhagen, and are valuable for the criticism of the text, the MS. having subse- quently become in places less legible. Thorkelin's edition (1815) is of merely historic interest. The first edition showing competent knowledge of the language was produced in 1833 by J. M. Kemble. Since then editions have been very numerous. The text of the poem was edited by C. W. M. Grein in his Bibliothek der angelsdchsischen Poesie (1857), and again separately in 1867. Autotypes of the MS. with transliteration by Julius Zupitza, were issued by the Early English Text Society in 1882. The new edition of Grein s Bibliothek, by R. P. Wiilker, vol. i. (1883), contains a revised text with critical notes. The most serviceable separate editions are those of M. Heyne (7th ed., revised by A. Socin, 1903), A. J. Wyatt (with English notes and glossary, 1898), and F. Holthausen (vol. i., 1905).

Eleven English translations of the poem have been published (see C. B. Tinker, The Translations of Beowulf , 1903). Among these may be mentioned those of J. M. Garnett (6th ed., 1900), a literal rendering in a metre imitating that of the original; J. Earle (1892) in prose; W. Morris (1895) in imitative metre, and almost unin- telligibly archaistic in diction; and C. B. Tinker (1902) in prose.

For the bibliography of the earlier literature on Beowulf, and a detailed exposition of the theories therein advocated, see R. P. Wiilker, Grundriss der angelsdchsischen Litteratur (1882). The views of Karl Miillenhoff, which, though no longer tenable as a whole, have formed the basis of most of the subsequent criticism, may be best studied in his posthumous work, Beovulf, Untersuchungen uber das angelsdchsische Epos (1889). Much valuable matter may be found in B. ten Brink, Beowulf, Untersuchungen (1888). The work of G. Sarrazin, Beowulf-studien (1888), which advocates the strange theory that Beowulf is a translation by Cynewulf of a poem by the Danish singer Starkadr, contains, amid much that is fanciful, not a little that deserves careful consideration. The many articles by E. Sievers and S. Bugge, in Beitrdge zur Geschichte der deutschen

Sprache und Litteratur and other periodicals, are of the utmost importance for the textual criticism and interpretation of the poem. (H. Br.)

BEQUEST (from O. Eng. becwethan, to declare or express in words; cf. " quoth "), the disposition of property by will. Strictly, " bequest " is used of personal, and " devise " of real property. (See Legacy; Will or Testament.)

BERAIN, JEAN (1638-17 11), known as " the Elder," Belgian draughtsman and designer, painter and engraver of ornament, was born in 1638 or 1639 at Saint Mihiel (Meuse) and died in Paris on the 24th of Tanuary 17 n. In 1674 he was appointed dessinateur de la cha . el du cabinet de Roi, in succession to Gissey, whose pupil hi. is believed to have been. From 1677 onward he had apartments, near to those of Andre Charles Boulle (q.v.), for whom he made many designs, in the Louvre, where he died. After the death of Le Brun he was commissioned to compose and supervise the whole of the exterior decoration of the king's ships. Without possessing great originality he was inventive and industrious, and knew so well how to assimilate the work of those who had preceded him (especially Raffaelle's arabesques) and to adapt it to the taste of the time that his designs became the rage. He furnished designs for the decorations and costumes used in the opera performances, for court festivals, and for public solemnities such as funeral processions, and inspired the ornamentations of rooms and of furniture to such an extent that a French writer says that nothing was done during his later years which he had not designed, or at least which was not in his manner. He was, in fact, the oracle of taste and the supreme pontiff whose fiat was law in all matters of decora-

tion. His numerous designs were for the most part engraved under his own superintendence, and a collection of them was published in Paris in 171 1 by his son-in-law, Thuret, clockmaker to the king. There are three books, (Euvre de J. Berain, Orne- menls inventus par J. Berain and CEuvres de J. Berain contenant des ornements d' architecture. His earliest known works show him as engraver — twelve plates in the collection of Diverses pieces de serrurerie invenUes par Hughes Brisville el gravies par Jean Berain (Paris, 1663), and in 1667 ten plates of designs for the use of gunsmiths. M. Guilmard in Les Mailres- ornemanistes, gives a complete list of his published works.

His son Jean Berain, " the Younger " (1678-1726), was born in Paris, where he also died. He was his father's pupil, and exercised

the same official functions after his death. Thus he planned the funeral ceremonies at St Denis on the death of the dauphin, and afterwards made the designs for the obsequies of Louis XIV. He is perhaps best known as an engraver. He engraved eleven plates of the collection Ornements de peinture el de sculpture qui sont dans la galerie d'Apollon au chasteau du Louvre, et dans le grand appartement du roy au palais des Tuileries (Paris, 1 7 10), which have been wrongly attributed to his father, the Mausolei du due de Bourgogne, and that of Marie-Louise Gabrielle de Savoie, reine d'Espagne (1714), &c. His work is exceedingly difficult to distinguish from his father's, the similarity of style being remarkable.

Claude Berain, brother of the elder Jean, was still living in 1726. He was engraver to the king, and executed a good number of plates of ornament and arabesque of various kinds, some of which are included in his more distinguished brother's works. (J. P.-B.)

BERANGER, PIERRE JEAN DE (1780-1857), French song- writer, was born in Paris on the 19th of August 1780. The aristocratic de was a piece of groundless vanity on the part of his father, who had assumed the name of Beranger de Mersix. He was descended in truth from a country innkeeper on the one side, and, on the other, from a tailor in the rue Montorgueil. Of education, in the narrower sense, he had but little. From the roof of his first school he beheld the capture of the Bastille, and this stirring memory was all that he acquired. Later on he passed some time in a school at Peronne, founded by one Bellenglise on the principles of Rousseau, where the boys were formed into clubs and regiments, and taught to play solemnly at politics and war. Beranger was president of the club, made speeches before such members of Convention as passed through Peronne, and drew up addresses to Tallien or Robespierre at Paris. In the meanwhile he learned neither Greek nor Latin — not even French, it would appear; for it was after he left school, from the printer Laisney, that he acquired the elements of grammar. His true education was of another sort. In his childhood, shy, sickly and skilful with his hands, as he sat at home alone to carve cherry stones, he was already forming for himself those habits of retirement and patient elaboration which influenced the whole tenor of his life and the character of all that he wrote. At Peronne he learned of his good aunt to be a stout republican; and from the doorstep of her inn, on quiet evenings, he would listen to the thunder of the guns before Valenciennes, and fortify himself in his passionate love of France and distaste for all things foreign. Although he could never read Horace save in a translation, he had been educated on Telemaque, Racine and the dramas of Voltaire, and taught, from a child, in the

tradition of all that is highest and most correct in French.

After serving his aunt for some time in the capacity of waiter, and passing some time also in the printing-office of one Laisney. he was taken to Paris by his father. Here he saw much low speculation, and many low royalist intrigues. In 1802, in consequence of a distressing quarrel, he left his father and began life for himself in the garret of his ever memorable song. For two years he did literary hackwork, when he could get it, and wrote pastorals, epics and all manner of ambitious failures. At the end of that period (1804) he wrote to Lucien Bonaparte, enclosing some of these attempts. He was then in bad health, and in the last state of misery. His watch was pledged. His

wardrobe consisted of one pair of boots, one greatcoat, one pair of trousers with a hole in the knee, and " three bad shirts which a friendly hand wearied itself in endeavouring to mend." The friendly hand was that of Judith Frere, with whom he had been already more or less acquainted since 1796, and who continued to be his faithful companion until her death, three months before his own, in 1857. She must not be confounded with the Lisette of the songs; the pieces addressed to her {La Bonne Vieille, Maudit printemps, &c.) are in a very different vein. Lucien Bonaparte interested himself in the young poet, transferred to him his own pension of 1000 francs from the Institute, and set him to work on a Death of Nero. Five years later, through the same patronage, although indirectly, Beranger became a clerk in the university at a salary of another thousand.

Meanwhile he had written many songs for convivial occasions, and " to console himself under all misfortunes "; some, according to M. Boiteau, had been already published by his father, but he set no great store on them himself; and it was only in 181 2, while watching by the sick-bed of a friend, that it occurred to him to write down the best he could remember. Next year he was elected to the Caveau Moderne, and his reputation as a song-writer began to spread. Manuscript copies of Les Cueux, Le Stnateur, above all, of Le Roi d' Yvetot, a satire against Napoleon, whom he was to magnify so much in the sequel, passed from hand to hand with acclamation. It was thus that all his best works went abroad; one man sang them to another over all the land of France. He was the only poet of modern times who could altogether have dispensed with printing.

His first collection escaped censure. " We must pardon many things to the author of Le Roi d' Yvetol," said Louis XVIII. The second (1821) was more daring. The apathy of the Liberal camp, he says, had convinced him of the need for some bugle call of awakening. This publication lost him his situation in the university, and subjected him to a trial, a fine of 500 francs and an imprisonment of three months. Imprisonment was a small affair for Beranger. At Sainte Pelagie he occupied a room (it had just been quitted by Paul Louis Courier), warm, well furnished, and preferable in every way to his own poor lodging, where the water froze on winter nights. He adds, on the occasion of his second imprisonment, that he found a certain charm in this quiet, claustral existence, with its regular hours and long evenings alone over the fire. This second imprisonment of nine months, together with a fine and expenses amounting to 1100 francs, followed on the appearance of his fourth collection. The government proposed through Laffitte that, if he would sub- mit to judgment without appearing or making defences, he should only be condemned in the smallest penalty. But his public spirit made him refuse the proposal; and he would not even ask permission to pass his term of imprisonment in a Maison de santS, although his health was more than usually feeble at the time. " When you have taken your stand in a contest with govern- ment, it seems to me," he wrote, " ridiculous to complain of the blows it inflicts on you, and impolitic to furnish it with any occasion of generosity." His first thought in La Force was to alleviate the condition of the other prisoners.

In the revolution of July he took no inconsiderable part. Copies of his song, Le Vieux Drapeau, were served out to the insurgent crowd. He had been for long the intimate friend and adviser of the leading men; and during the decisive week his counsels went a good way towards shaping the ultimate result. " As for the republic, that dream of my whole life," he wrote in 1 83 1, "I did not wish it should be given to vft a second time unripe." Louis Philippe, hearing how much the song-writer had done towards his elevation, expressed a wish to see and speak with him; but B6ranger refused to present himself at court, and used his favour only to ask a place for a friend, and a pension for Rouget de ITsle, author of the famous Marseillaise, who was now old and poor, and whom he had been already succouring for five years.

In 1848, in spite of every possible expression of his reluctance, he was elected to the Constituent Assembly, and that by so large a number of votes (204,471) that he felt himself obliged to

accept the seat. Not long afterwards, and with great difficulty, he

obtained leave to resign. This was the last public event of Beranger's life. He continued to polish his songs in retirement, visited by nearly all the famous men of France. He numbered among his friends Chateaubriand, Thiers, Jacques Laffitte, Michelet,. Lamennais, Mignet. Nothing could exceed the amiability of his private character; so poor a man has rarely been so rich in good actions; he was always ready to receive help from his friends when he was in need, and always forward to help others. His correspondence is full of wisdom and kind- ness, with a smack of Montaigne, and now and then a vein of pleasantry that will remind the English reader of Charles Lamb. He occupied some of his leisure in preparing his own memoirs, and a certain treatise on Social and Political Morality, intended for the people, a work he had much at heart, but judged at last to be beyond his strength. He died on the 16th July 1857. It was feared that his funeral would be the signal for some political disturbance; but the government took immediate measures, and all went quietly. The streets of Paris were lined with soldiers and full of townsfolk, silent and uncovered. From time to time cries arose: — " Honneur, honneur a Beranger!"

The songs of Beranger would scarcely be called songs in England. They are elaborate, written in a clear and sparkling style, full of wit and incision. It is not so much for any lyrical flow as for the happy turn of the phrase that they claim superi- ority. Whether the subject be gay or serious, light or passionate, the medium remains untroubled. The special merits of the songs are merits to be looked for rather in English prose than in English verse. He worked deliberately, never wrote more than fifteen songs a year and often less, and was so fastidious that he has not. preserved a quarter of what he finished. " I am a good little bit of a poet," he says himself, " clever in the craft, and a conscientious worker to whom old airs and a modest choice of subjects {le coin ouje me suis confine) have brought some success." Nevertheless, he makes a figure of importance in literary history. When he first began to cultivate the chanson, this minor form lay under some contempt, and was restricted to slight subjects and a humorous guise of treatment. Gradually he filled these little chiselled toys of verbal perfection with ever more and more of sentiment. From a date comparatively early he had determined to sing for the people. It was for this reason that he fled, as far as possible, the houses of his influential friends and came back gladly to the garret and the street corner. Thus it was, also, that he came to acknowledge obligations to Emile Debraux, who had often stood between him and the masses as interpreter, and given him the key-note of the popular humour. Now, he had observed in

the songs of sailors, and all who labour, a prevailing tone of sadness; and so, as he grew more masterful in this sort of expression, he sought more and more after what is deep, serious and constant in the thoughts of common men. The evolution was slow; and we can see in his own works ex- amples of every stage, from that of witty indifference in fifty pieces of the first collection, to that of grave and even tragic feeling in Les Souvenirs du peuple or Le Vieux Vagabond. And this innovation involved another, which was as a sort of prelude to the great romantic movement. For the chanson, as he says himself, opened up to him a path in which his genius could develop itself at ease; he escaped, by this literary postern, from strict academical requirements, and had at his disposal the whole dictionary, four-fifths of which, according to La Harpe, were forbidden to the use of more regular and pretentious poetry. If he still kept some of the old vocabulary, some of the old imagery, he was yet accustoming people to hear moving subjects treated in a manner more free and simple than heretofore; so that his was a sort of conservative reform, preceding the violent revolution of Victor Hugo and his army of uncompromis- ing romantics. He seems himself to have had glimmerings of some such idea; but he withheld his full approval from the new movement on two grounds: — first, because the romantic school misused somewhat brutally the delicate organism of the French language; and second, as he wrote to Sainte-Beuve in 1832, because they adopted the motto of "Art for art," and

set no object of public usefulness before them as they wrote. For himself (and this is the third point of importance) he had a strong sense of political responsibility. Public interest took a far higher place in his estimation than any private passion or favour. He had little toleration for those erotic poets who sing their own loves and not the common sorrows of mankind, " who forget," to quote his own words, " forget beside their mistress those who labour before the Lord." Hence it is that so many of his pieces are political, and so many, in the later times at least, inspired with a socialistic spirit of indignation and revolt. It is by this socialism that he becomes truly modern and touches hands with Burns.

Authorities. — Ma biographie (his own memoirs) (1858); Vie de Beranger, by Paul Boiteau (1861); Correspondance de Beranger, edited by Paul Boiteau (4 vols., i860;; Beranger et Lamennais, by Napoleon Peyrat (1857); Quarante-cinq lettres de Beranger publiees

par Madame Louise Colet (almost worthless) (1857); Beranger, ses amis, ses ennemis et ses critiques, by A. Arnould (2 vols., 1864); J. Janin, Beranger et son temps (2 vols., 1866); also Sainte-Beuve's Portraits contemporains, vol. i. ; J. Garson, Beranger et la legende napoleonienne (1897). A bibliography of B6rangcr's works was published by Jules Brivois in 1876. (R. L. S.)

BERAR, known also as the Hyderabad Assigned Districts, formerly a province administered on behalf cf the nizam of Hyderabad by the British government, but since the 1st of October 1903 under the administration of the commissioner- general for the Central Provinces (q.v.). The origin of the name Berar is not known, but may perhaps be a corruption of Vidarbha, the name of a kingdom in the Deccan of which, in the period of the Mahabharata, Berar probably formed part. The history of Berar belongs generally to that of the Deccan, the country falling in turn under the sway of the various dynasties which successively ruled in southern India, the first authentic records showing it to have been part of the Andhra or Satavahana empire. On the final fall of the Chalukyas in the 12th century, Berar came under the sway of the Yadavas of Deogiri, and remained in their possession till the Mussulman invasions at the end of the 13th century. On the establishment of the Bahmani dynasty in the Deccan (1348) Berar was constituted one of the four provinces into which their kingdom was divided, being governed by great nobles, with a separate army. The perils of this system becoming apparent, the province was divided (1478 or 1479) into two separate governments, named after their capitals Gawil and Mahur. The Bahmani dynasty was, however, already tottering to its fall; and in 1490 Imad-ul-Mulk, governor of Gawil, who had formerly held all Berar, proclaimed his independence and proceeded to annex Mahur to his new kingdom. Imad-ul-Mulk was by birth a Kanarese Hindu, but had been captured as a boy in one of the expeditions against Vijayanagar and reared as a Mussulman. He died in 1504 and his direct descendants held the sultanate of Berar until 1561, when Burhan Imad Shah was deposed by his minister Tufal Khan, who assumed the kingship. This gave a pretext for the intervention of Murtaza Nizam Shah of Ahmednagar, who in 1572 invaded Berar, imprisoned and put to death Tufal Khan, his son Shams-ul-Mulk, and the ex-king Burhan, and annexed Berar to his own dominions. In 1595 Sultan Murad, son of the emperor Akbar, besieged Ahmednagar, and was bought off by the formal cession of Berar.

Murad, founding the city of Shahpur, fixed his seat at Berar, and after his death in 1598, and the conquest of the Deccan by Akbar, the province was united with Ahmednagar and Khandesh under the

emperor's fifth son, Daniyal (d. 1605), as governor. After Akbar's death (1605) Berar once more became independent under the Abyssinian Malik Ambar (d. 1626), but in the first year of Shah Jahan's reign it was again brought under the sway of the Mogul empire. Towards the close of the 17th century the province began to be overrun by the Mahrattas, and in 17 18 the Delhi government formally recognized their right to levy blackmail (chauth) on the unhappy population. In 1724 the Nizam-ul-Mulk Asaf Jah established the independent line cf the nizams of Hyderabad, and thenceforth the latter claimed to be de jure sovereigns of Berar, with exception of certain districts (Mehkar, Umarkhed, &c.) ceded to the peshwa in 1760

and 1795. The claim was contested by the Bhonsla rajas, and for more than half a century the miserable country was ground between the upper and the nether millstone.

This condition of things was ended by Wellesley's victories at Assaye and Argaon (1803), which forced the Bhonsla raja to cede his territories west of the Wardha, Gawilgarh and Narnala. By the partition treatyof Hyderabad (1804) these ceded territories in Berar were transferred to the nizam, together with some tracts about Sindkhed and Jalna which had been held by Sindhia. By a treaty of 1822, which extinguished the Mahratta right to levy chauth, the Wardha river was fixed as the eastern boundary of Berar, the Melghat and adjoining districts in the plains being assigned to the nizam in exchange for the districts cast of the Wardha held by the peshwa.

Though Berar was no longer oppressed by its Mahratta task- masters nor harried by Pindari and Bhil raiders, it remained long a prey to the turbulent elements let loose by the sudden cessation of the wars. From time to time bands of soldiery, whom the government was powerless to control, scoured the country, and rebellion succeeded rebellion till 1859, when the last fight against open rebels took place at Chichamba near Risod. Meanwhile the misery of the country was increased by the reckless raising of loans by the nizam 's government and the pledging of the revenues to a succession of great farmers-general. At last the British government had to intervene effectively, and in 1853 a new treaty was signed with the nizam, under which the Hyderabad contingent was to be maintained by the British government, while for the pay of tins force and in satis- faction of other claims, certain districts were " assigned " to the East India Company. It was these " Hyderabad Assigned Districts " which were popularly supposed to form the province of Berar, though they

coincided in extent neither with the Berar of the nizams nor with the old Mogul province. In i860, by a new treaty which modified in the nizam's favour that of 1853, it was agreed that Berar should be held in trust by the British government for the purposes specified in the treaty of i8S3-

Under British control Berar rapidly recovered its prosperity. Thousands of cultivators who had emigrated across the Wardha to the peshwa's dominions, in order to escape the ruinous fiscal system of the nizam's government, now returned; the American Civil War gave an immense stimulus to the cotton trade; the laying of a line of railway across the province provided yet further employment, and the people rapidly became prosperous and contented.

See Imperial Gazetteer of India (Oxford, 1908), and authorities there quoted.

BERARD, JOSEPH FREDERIC (1780-1828), French physi- cian and philosopher, was born at Montpellier. Educated at the medical school of that town, he afterwards went to Paris, where he was employed in connexion with the Dictionnaire des sciences midicales. He returned in 1816, and published a work, Doctrine midicale de I'&cole de Montpellier (18 19), which is indis- pensable to a proper understanding of the principles of the Vi talis tic school. In 1823 he was called to a chair of medicine at Paris, which he held for three years; he was then nominated professor of hygiene at Montpellier. His health gave way under his labours, and he died in 1828. His most important book is his Doctrines des rapports du physique et du moral (Paris, 1823). He held that consciousness or internal perception reveals to us the existence of an immaterial, thinking, feeling and willing subject, the self or soul. Alongside of this there is the vital force, the nutritive ■ power, which uses the physical frame as its organ. The soul and the principle of life are in constant reciprocal action, and the first owes to the second, not the formation of its faculties, but the conditions under which they are evolved. He showed himself unable to understand the points of view of those whom he criticized, and yet his own theories, midway between vitalism and animism, are entirely destitute of originality.

To the Esprit des doctrines medicates de Montpellier, published posthumously (Paris, 1830), the editor, H. Petiot, prefixed an account cf his life and works; see also Damiron, Phil, en Prance an XIX' siecle (Paris, 1834); C. J. Tisˆot, Anthropologic generate (1843).

BERAT (Slav. Byelgorod; Turk. Arnaut-Beligradi), the capital of a sanjak in the vilayet of Iannina, southern Albania, Turkey; on the river Ergene, Ergeni or Osum, a left-hand tributary of the Semeni. Pop. (1900) about 15,000. Berat is a fortified town, situated in a fertile valley, which produces wine, olive-oil, fruit and grain. It is the see of an Orthodox metropolitan, and the inhabitants, of whom two-thirds are Albanian and the remainder principally Greek, are equally divided in religion between Christianity and Islam.

BERAUN (Czech Beroun), a town of Bohemia, Austria, 27 m. S.W. of Prague by rail. Pop. (1900) 9693, mostly Czech. It is situated at the confluence of the Beraun with the Litawa river, and is the seat of important textile industry, sugar-refining, corn-milling and brewing. Lime-kilns and the manufacture of cement, and smelting and iron works are carried on in the environs. Beraun is a place of immemorial antiquity. It was originally called na Brodi (by the ford), and received the name of Bern, Berun or Verona in the 13th century, when it obtained the privileges of a city from the emperor Charles IV., who was specially attached to the place, calling it " Verona mea." Under his patronage the town rapidly prospered. In 142 1 2izka stormed the town, which later on was retaken and devastated by the troops of Duke Leopold, bishop of Passau. During the Thirty Years' War it was sacked by the Imperialists, the Saxons and the Swedes in turn; and in the first Silesian war the same fate befell it at the hands of the French and Bavarians.

BERBER, a town and mudiria (province) of the Anglo- Egyptian Sudan. The town is on the right bank of the Nile, 1 140 ft. above sea-level, in 18° 1′ N., 33 59′ E., and 214 m. by rail N.W. of Khartum. Pop. about 6000. Berber derived its importance from being the starting-point of the caravan route, 242 m. long, across the Nubian desert to the Red Sea at Suakin, a distance covered in seven to twelve days. It was also one of the principal stopping-places between Cairo and Khartum. The caravan route to the Red Sea was superseded in 1906 by a railway, which leaves the Wadi Haifa-Khartum line at the mouth of the Atbara. Berber thus lost the Red Sea trade. It remains the centre and market-place for the produce of the Nile valley for a considerable distance. East of the town is an immense plain, which, if irrigated, would yield abundant crops.

Berber, or El Mekerif, is a town of considerable antiquity. Before its

conquest by the Egyptians in 1820 its ruler owed allegiance to the kings of Sennar. It was captured by the Mahdists on the 26th of May 1884, and was re-occupied by the Anglo-Egyptian army on the 6th of September 1897. It was the capital of the mudiria until 1905, in which year the head- quarters of the province were transferred to Ed Darner, a town near the confluence of the Nile and Atbara. At the northern end of the mudiria is Abu Hamed (q.v.), important as a railway junction for Dongola mudiria. The best-known of the tribes inhabiting the province are the Hassania, Jaalin, Bisharin and Kimilab. During the Mahdia most of these tribes suffered severely at the hands of the dervishes. In 1904 the total popula- tion of the province was estimated at 83,000. It has since considerably increased. The riverain population is largely engaged in agriculture, the chief crops cultivated being durra, barley, wheat and cotton.

BERBERA, chief town and principal port of the British Somaliland protectorate, North-East Africa, 155 m. S. of Aden, in io° 26′ N., 45° 4′ E. Berbera stands at the head of a deep inlet which forms the only completely sheltered haven on the south side of the Gulf of Aden. It is the residence of the com- missioner of the protectorate and the headquarters of the Somaliland battalion of the King's African Rifles. The harbour is eleven to thirteen fathoms deep at the entrance (indicated by a lighthouse), decreasing to five fathoms near the shore. Ocean- going steamers find ample accommodation. There are two piers and numerous warehouses. The town is built in two divisions — the native town to the east, the new town, laid out by the Egyptians (1875-1877), to the west. The majority of the better-class houses are of rubble, one-storeyed and flat-roofed. The public buildings include the fort, hospital and barracks.

There are a Roman Catholic mission-house and convent and a government school. The affairs of the town are administered by a municipality. The water-supply is brought to the town by an aqueduct from the hills some 8 m. distant. The bulk of the inhabitants are Somali, who have abandoned a nomadic life and adopted largely the ways of the Arab and Indian traders. The permanent population is under 10,000; but from October to April the population rises to 30,000 or more by the arrival of caravans from Ogaden and Dolbahanta. The traders bring with them tents on the backs of camels and these are pitched near the native town. Their merchandise consists of sheep and goats, gum and resin, skins and ostrich feathers. The trade is almost entirely with Aden, of which Berbera may be considered a com- mercial dependency. The value of the goods brought in yearly by caravan exceeds on the average £100,000. The total trade of the port for the five years 1901-1902

to 1905-1906 averaged over £200,000 a year. The chief articles of import are cotton goods (European white longcloth and American grey shirting), rice and jowari, flour, dates, sugar and tobacco (the last from Rotterdam). Berbera is said to have been founded by the Ptolemies among the Barbari of the adjacent coast lands. It fell subsequently into the possession of Arabs and was included in the Mahommedan state of Adel. At the time of the visit to the town of R. F. Burton and J. H. Speke (1854) it was governed by its own sheiks. In 1870 it was claimed by the khedive Ismail, but was not permanently occupied by Egypt until 1875. In 1884 it passed into the possession of Great Britain (see Somaliland, § 2, History).

BERBERINE, C20H17NO4, an alkaloid occurring together with the alkaloids oxyacanthine Ci 8 Hi 9 N0 3 , berbamine Ci 8 H 19 N0 3 , hydrastine C 2 iH 2 iNO«, and canadine C20H21NO4, in Berberis vulgaris; it also occurs in other plants, Berberis aristata, B. aquifolium, Hydrastis canadensis, &c. It is a yellow, crystalline solid, insoluble in ether and chloroform, soluble in 45 parts of water at 2 1°, and moderately soluble in alcohol. It is a monacid base; the hydrochloride, CaoHr/NOˆHCl, is insoluble in cold alcohol, ether and chloroform, and soluble in 500 parts of water; the acid sulphate, CHjHnNOˆrˆSO,,, dissolves in about 100 parts of water. Canadine is a tetrahydroberberine.

Its constitution was worked out by W. H. Perkin (J.C.S., 1889, 55, p. 63; 1890, 57, p. 991). This followed from a study of the decomposition products, there being obtained hemipinic acid (CH30) 2 C 6 H 2 (COOH) 2 , and a substance which proved to be w – amino – ethyl – piperonyl carboxylic acid, CH 2 2 :C 6 H 2 -COOHCH 2 - CH 2 NH 2 . His formula was modified by Gadamer (Abs. J.C.S., 1902, 1, p. 555), who made the free base an aldehyde, but the salts of an wo-quinolinium type. iThis formula, which necessitates the presence of two asymmetric carbon atoms in an alkyl tetrahydroberberine, has been accepted by M. Freund and F. Mayer (Abs. J.C.S., 1907, 1, p. 632), who showed that two racemic propyl tetrahydroberberines are produced when propyl dihydroberberine is reduced.

BERBERS, the name under which are included the various branches of the indigenous " Libyan " race of North Africa. Since the dawn of history the Berbers have occu- EtbaoIozy pied the tract between the Mediterranean and the Sahara from Egypt to the Atlantic. The origin of the name is doubtful. Some believe it to be derived from the word /SapiSapoi (barbarians), employed first by the Greeks and later by the Romans. Others attribute the first use of the term to the Arab

conquerors. However this may be, tribal titles, Barabara and Beraberata, appear in Egyptian inscriptions of 1700 and 1300 B.C., and the Berbers were probably intimately related with the Egyptians in very early times. Thus the true ethnical name may have become confused with Barbari, the designation naturally used by classical conquerors. To the Egyptians they were known as " Lebu," " Mashuasha," " Tamahu," " Tehennu " and " Kahaka "; a long list of names is found in Herodotus, and the Romans called them Numidae, Gaetuli and Mauri, terms which have been derived respectively from the Greek vo/iades (nomads), the name Gued'oula, of a great Berber tribe, and the Hebrew mahur (western). To speak of more modern times

there can be enumerated the Zouaoua and Jebalia (Tripoli and Tunisia) ; the Chauwia, Kabyies and Beni-Mzab (Algeria) ; the Shluh (Chlouah), Amazigh and Berbers (Morocco); the Tuareg, Amoshagh, Sorgu, &c. (Sahara). These tribes have many sub- tribes, each with a distinctive name. Among the Azgar, an important division of the Tuareg, one of the noble or free tribes, styled Aouraghen, is said to descend from a tribe named Avrigha. The Avrigha, or Afrigha, in ancient times occupied the coast lands near Carthage, and some scholars derive the word Africa from their name (see Africa, Roman). In regard to the ethnic relations of the Berbers there has been much dispute. The antiquity of their type is evidenced by the monuments of Egypt, where their ancestors are pictured with the same comparatively blond features which many of them still display. The aborigines of the Canary Islands, the Guanches, would seem almost certainly, from the remains of their language, to have been Berbers. But the problem of the actual origin of the Berber race has not yet been solved. Perhaps the most satisfactory theory is that of Sergi, who includes the Berbers in the " Mediterranean Race." General L. L. C. Faidherbe regards them as indigenous Libyans mingled with a fair-skinned people of European origin. Dr Franz Pruner-Bey, Henri Duveyrier and Prof. Flinders Petrie maintain that they are closely related to the ancient Egyptians. Con- nexion has been traced between the early Libyan race and the Cro-Magnon and other early European races and, later, the Basque peoples, Iberians, Picts, Celts and Gauls. The mega- lithic monuments of Iberia and Celtic Europe have their counter- parts in northern Africa, and it is suggested that these were all erected by the same race, by whatever name they be known, Berbers and Libyans in Africa, Iberians in

Spain, Celts, Gauls and Picts in France and Britain.

In spite of a history of foreign conquest — Phoenician, Greek, Roman, Vandal, Arab and French — the Berber physical type • and the Berber temperament and nationality have istics. ‘ P er sisted since the stone age. The numerous invasions have naturally introduced a certain amount of foreign blood among the tribes fringing the Mediterranean, but those farther inland have preserved their racial purity to a surprising degree. Though considerable individual differences of type may be found in every village, the Berbers are distinctively a ” white ” race, and the majority would, if clad in European costume, pass unchallenged as Europeans. Dark hair and brown or hazel eyes are the rule; blue-eyed blonds are found, but rJieir frequency has been considerably overstated. The invaders who have most affected the Berber race are the Arabs, but the two races, with a common religion, often a common government, with the same tribal groupings, have failed to amalgamate to any great extent. This fact has been emphasized by Dr R. G. Latham, who writes: ” All that is not Arabic in the kingdom of Morocco, all that is not Arabic in the French pro- vinces of Algeria, and all that is not Arabic in _ Tunis, Tripoli and Fezzan, is Berber.” The explanation lies in a profound distinction of character. The Arab is a herdsman and a nomad; the Berber is an agriculturist and a townsman. The Arab has built his social structure on the Koran, which inculcates absolut- ism, aristocracy, theocracy; the Berber, despite his nominal Mahommedanism, is a democrat, with his Jemda or “Witan gemot ” and his Kanum or unwritten code, the Magna Carta of the individual’s liberty as opposed to the community’s good. The Kanum forbids no sort of exercise of individual will, so long as it is not inimical to the right or rights of other individuals. The Arabizing of the Berbers is indeed limited to little beyond the conversion of the latter to Islam. The Arab, transported to a soil which does not always suit him, so far from thriving, tends to disappear, whereas the Berber becomes more and more aggressive, and yearly increases in numbers. At present he forms at least three-fifths of the population in Algeria, and in Morocco the proportion is greater. The difference between the Berber and the Arab of the Barbary States is summed up by Dr Randall-Maclver in the following words: — ” The Berber gives the impression of being, as he is, the descendant of men who have lived in sturdy independence, self-governing and self-reliant.

The Arab is the degenerate offspring of a race which only from its history and past records can claim any title to respect. Cringing, venal, avaricious, dishonest, the Arab combines all the faults of a vicious nature with those which a degraded religion inculcates or

encourages. The Berber, on the other hand, is straightforward, honest, by no means averse to money-making, but not unscrupulous in the methods which he employs to this end, intelligent in a degree to which the ordinary Arab never approaches, and trustworthy as no Arab can be."

The Berber's village is his state, and the government is vested in an assembly, the Jemda, formed of all males old enough to observe the fast of Ramadan. By them are deter- mined all matters of peace or war, legislation, taxation men™' and justice. The executive officer is the Amin, a kind of mayor, elected from some influential family in which the dignity is often in practice hereditary. He owes his position to the good-will of his fellows, receives no remuneration, and resigns as soon as he loses the confidence of the people. By him are appointed certain Tcmman (sing. Tamen) who act as over- seers, though without executive powers, in the various quarters of the village. The poorest Berber has as great a voice in affairs as the richest. The undue power of the Jemda is checked by vendetta and a sort of lynch law, and by the formation of parties (sofs), within or without the assembly, for trade, political and other purposes. The Berbers are a warlike people who have never been completely subjugated. Every boy as soon as he reaches sixteen is brought into the Jemda and given weapons which he carries till he is sixty. Though each village is absol- utely independent as far as its internal affairs are concerned, two or more are often connected by administrative ties to form an Arsh or tribe. A number of these tribes form a Thakebill or confederation, which is an extremely loose organization. An exception to this form of government is constituted by the Tuareg, whose organization, owing to their peculiar circum- stances of life, is monarchical. Wars are declared by special messengers; the exchange of sticks or guns renders an armistice inviolable. In some tribes a tablet, on which is inscribed the name of every man fit to bear arms, is placed in the mosque. The Berbers, though Mahommedans, do not often observe the prescribed ablutions; they break their fast at Ramadan; and eat wild boar's flesh and drink fig brandy. On the other hand, saints, both male and female, are paid more reverence by Berbers than by Arabs. Around their tombs their descendants settle, and thus sacred villages, often of considerable size, spring up. Almost every village, too, has its saint or prophet, and disputes as to their relative sanctity and powers cause fierce feuds. The hereditary caste known as Marabouts are frequently in open opposition to the absolute authority of the Jemda. They are possessed of certain privileges, such as exemption from the chief taxes and the duty of bearing arms. They, however, often take

a foremost part in tribal administration, and ar

The dress of the Berbers was formerly made of home-woven cloth, and the manufacture of woollen stuffs has always been one of the chief occupations of their women. The men wear a tunic reaching to the knees, the women a longer garment. For work the men use a leather apron, and in the cold

Customs.

season and in travelling a burnous, usually a family heirloom, old and ragged; the women, in winter, throw a coloured cloth over their shoulders. The men's hair is cut short but their beards are allowed to grow. In some districts there are peculiar cus- toms, such as the wearing of small silver nose-rings, seen in El-Jofra. The Berbers' weapons are those of the Arab: the long' straight sword, the slightly curved and highly ornamented dagger,- and the long gun. Berbers are not great town-builders. Their villages, however, are often of substantial appearance: with houses of untrimmed stones, occasionally with two storeys, built on hills, and invariably defended by a bank, a stone wall or a hedge. Sometimes their homes are mere huts of turf, or of clay tiles, with mortar made from lime and clay or cow-dung. The sloping roof is covered with reeds, straw or stones. The living room is on the right, the cattle-stall on the left. The dwelling is surrounded by a garden or small field of grain. The second storey is not added till a son marries. In the villages of the western Atlas the greater part of the upper storey consists of a sort of rough verandah. In this mountain district the natives spend the winter in vaults beneath the houses, and, for the sake of warmth, the tenements are built very close. Agriculture, which is carried on even in the mountain districts by means of laboriously constructed terraces, is antiquated in its methods. The plough, often replaced on the steeper slopes by the hoe, is similar to that depicted in ancient Egyptian drawings, and hand irrigation is usual. A sickle, toothed like a saw, is used for reaping. Corn is trodden by oxen, and kept in osier baskets narrowing to the top, or clay granaries. The staple crop is barley, but wheat, lentils, vetches, flax and gourds are also cultivated. Tobacco, maize and potatoes have been introduced; and the aloe and prickly pear, called in Morocco the Christian fig, are also found. The Kabyles understand grafting, have fine orchards and grow vines. The Beni-Abbas tribe in the Algerian Atlas is famed for

its walnuts, and many tribes keep bees, chiefly for the commercial value of the wax. The Berber diet largely consists of cucumbers, gourds, water-melons and onions, and a small artichoke (Cynara kumilis) which grows wild. At the beginning and end of their meal they drink a strongly sweetened liquid made from green tea and mint. Tea- drinking probably became a habit in Morocco about the begin- ning of the 19th century; coffee came by way of Algiers. At feasts the food is served on large earthenware dishes with high basket-work covers, like bee-skeps but twice as high.

The Berbers have many industries. They mine and work iron, lead and copper. They have olive presses and flour mills, and their own millstone quarries, even travelling into Arab districts to build mills for the Arabs. They make lime, tiles, woodwork for the houses, domestic utensils and agricultural implements. They weave and dye several kinds of cloth, tan and dress leather and manufacture oil and soap. Without the assistance of the wheel the women produce a variety of pottery utensils, often of very graceful design, and decorated with patterns in red and black. Whole tribes, such as the Beni-Sliman, are occupied in the iron trade; the Beni-Abbas made firearms before the French conquest, and _ven cannon are said to have been made by boring. Before it was proscribed by the French, the manufacture of gunpowder was general. The native jewellers make excellent ornaments in silver, coral and enamel. In some places wood-carving has been brought to considerable perfection; and native artists know how to engrave on metal both by etching and the burin. In its collective industry the Berber race is far superior to the Arab. The Berbers are keen traders too, and, after the harvest, hawk small goods, travelling great distances.

A Berber woman has in many ways a better position than her Arab sister. True, her birth is regarded as an event of no moment, while that of a boy is celebrated by great rejoicings, and his mother acquires the right to wear on her forehead the tafzint, a mark which only the women who have borne an heir can assume. Her husband buys and can dismiss her at will. She has most of the hard work to do, and is little better than a servant. When she is old and past worky

Indus tries.

especially if she has not been the mother of a male child, she is often abandoned. But she has a voice in public 1 ffairs; she has laws to protect her, manages the household and goes unveiled; she has a right to the money she earns; she can inherit under wills, and

bequeath property, though to avoid the alienation of real property, succession to it is denied her. But most characteristic of her social position is the Berber woman's right to enter into a sacred bond or agreement, repre- sented by the giving of the anaya. This is some symbolic object, stick or what not, which passes between the parties to a contract, the obligations under which, if not fulfilled by the contracting parties during their lives, become hereditary. Female saints, too, are held in high honour; and the Berber pays his wife the compliment of monogamy. The Kabyle women have stood side by side with their husbands in battle. Among many Berber tribes the law of inheritance is such that the eldest daughter's son succeeds. South of Morocco proper, Gerhard Rohlfs, who travelled extensively in the region (c. 1861-1867), states that a Berber religious corporation, the Savia Kartas, was ruled over by a woman, the chief's wife. The Berbers consult their women in many matters, and only one woman is really held in low esteem. She, curiously, is the kuata or " go-between," even though her services are only employed in the respectable task of arranging marriages. Berber women are intelligent and hard-working, and, when young, very pretty and graceful. The Berbers, unlike the Arabs, do not admire fat women. Among the Kabyles the adulteress is put to death, as are those women who have illegitimate children, the latter suffering with their mothers.

Though Arabic has to a considerable extent displaced the Berber language, the latter is still spoken by millions of people from Egypt to the Atlantic and from the Mediterranean to the Sudan. It is spoken nowhere else, though, as has been said, place-names in the Canary Islands and other remains of the aboriginal language there prove it to have been the native tongue. Although the Berber tongue shows a certain affinity with Semitic in the construction both of its words and sentences Berber is quite distinct from the Semitic languages; and a remarkable fact is that in spite of the enormous space over which the dialects are spread and the thousands of years that some of the Berber peoples have been isolated from the rest, these dialects show but slight differences from the long-extinct Hamitic speech from which all are derived. Whatever these dialects be called, the Kabyle, the Shilha, the Zenati, the Tuareg or Tamashek, the Berber language is still essentially one, and the similarity between the forms current in Morocco, Algeria, the Sahara and the far-distant oasis of Siwa is much more marked than between the Norse and English in the sub-Aryan Teutonic group. The Berbers have, moreover, a writing of their own, peculiar and little used or known, the antiquity of which is proved by monuments and inscriptions ranging over the whole of

North Africa-.

The various spoken dialects, though apparently very unlike each other, are not more dissimilar than are Portuguese, Spanish, French and Italian, and their differences are doubtless attribut- able to the lack of a literary standard. Even where different words are used, there is evidence of a common stem from which the various branches have sprung. The great difficulty of satisfactory comparison arises from the fact that few of the Beber dialects possess any writings. The Tawahhid (The Unity of God), said to have been written in Moroccan Berber and be- lieved to be the oldest African work in existence, except Egyptian and Ethiopic, was the work of the Muwahhadi leader, Ibn Tumart the Mahdi, at a time when the officials of the Kairawan mosque were dismissed because they could not speak Berber. Most of the writings found, however, have been in the form of inscriptions, chiefly on ornaments. A collection of the various signs of the alphabet has shown thirty-two letters, four more than Arabic. De Slane, in his notes on the Berber historian Ibn Khaldun, shows the following points of similarity to the Semitic class: — its tri-literal roots, the inflections of the Aerb, the formation of derived verbs the genders of the second and*

third persons, the pronominal affixes, the aoristic style of tense, the whole and broken plurals and the construction of the phrase. Among the peculiar grammatical features of Berber may be mentioned two numbers (no dual), two genders and six cases, and verbs with one, two, three and four radicals, and imperative and aorist tense only. As might be expected the Berber tongue is most common in Morocco and the western Sahara — the regions where Arab dominion was least exercised. When Arabic is mentioned as the language of Morocco it is seldom realized how small a proportion of its inhabitants use it as their mother tongue. Berber is the real language of Morocco, Arabic that of its creed and government.

Bibliography. — General A. Hanoteau and A. Letourneux, La Kabylie et les coutumes kabyles (3 vols., Paris, 1872-1873); D. Randall-Maclver and Antony Wilkin, Libyan Notes (London, 1901) ; Antony Wilkin, Among the Berbers of Algeria (London, 1900); G. Sergi, The Mediterranean Race (London, 1901), and Africa, Anlropologia delta Stirpe Comitica (Turin, 1897); Henri Duveyrier, Exploration du Sahara (1864), Les Pr ogres de la geographie en

Algerie (1867-1871), Bull, de la Soc. Khediviale de Ceog. (1876); E. Renan, " La Societe Berbere," Revue des deux mondes, vol. for 1873 ; M. G. Olivier, " Recherches sur 1'origine des Berberes," Bull, de I Acad. d'Hippone (1867-1868); F. G. Rohlfs, Reise durch Marokko (1869); Quer durch Afrika (1874-1875); General Faidherbe, Collection complete des inscriptions numidiques (lybiques) (1870), and Les Dolmens d'Afrique (1873) ; H. M. Flinders Petrie in The Academy, 20th of April 1895; Jules Lionel, Races berberes (1894); Sir H. H. Johnston, " A Journey through the Tunisian Sahara," Geog. Journal, vol. xi., 1898; De Slane's translation of Ibn Khaldun, Hist, des Berberes (Algiers, 1852); W. Z. Ripley, Races of Europe (London, 1900) ; Dr Malbot, " Les Chaouias " in V Anthropologic, 1897 (p. 14) ; General Faidherbe and Dr Paul Topinard, Instructions sur I'anthro- pologie de V Algerie (Paris, 1874); E. T. Hamy, La Necropole berbire d'Henchir el- Asset (Paris, 1896), and Cites el necropoles berberes del'Enfida (Tunisie moyenne) (ib. 1904).

Berber dictionaries: — Venture de Paradis (Paris, 1844); Brosse- lard (ib. 1844); Delaporte (ib. 1844, by order of minister of war); J. B. Creusat, Essai de dictionnaire francais-kabyle (Algiers, 1873); A. Hanoteau, Essai de grammaire de la langue tamachek, &c. (Paris, i860); Minutoli, Siwah Dialect (Berlin, 1827).

Folklore, &c. : — J. Riviere, Recueil de contes populaires de la Kabylie (1882); R. Basset, Conies populaires berberes (1887); P. le Blanc de Prebois, Essai de conies kabyles, avec traduction en francais (Batna, 1897); H. Stumine, Mdrchen der Berbern von Tamazratt in Sudtunisien (Leipzig, 1900).

BERCEUSE (Fr. for a " lullaby," from berceau, a cradle), a cradle- song, the German Wiegenlicd, a musical composition with a quiet rocking accompaniment.

BERCHEM (or Berghem), NICOLAAS (1620-1683), Dutch painter, was born at Haarlem. He received instruction from his father (Pieter Claasz van Haarlem) and from the painters Van Goyen, Jan Wils and Weenix. It is not known why he called himself Berchem (or Berighem, and other variants). His pictures, of which he produced an immense number, were in great demand, as were also his etchings and drawings. His landscapes are highly esteemed; and many of them have been finely engraved by John Visscher. His finest pictures are at the Amsterdam Museum and at the Hermitage, St Petersburg.

BERCHTA (English Bertha), a fairy in South German mytho- logy. She was at first a benevolent spirit, the counterpart of Hulda in

North German myth. Later her character changed and she came to be regarded as a witch. In Pagan times Berchta had the rank of a minor deity.

BERCHTESGADEN, a town of Germany, beautifully situated on the south-eastern confines of the kingdom of Bavaria, 1700 ft. above the sea on the southern declivity of the Untersberg, 6 m. S.S.E. from Reichenhall by rail. Pop. (1900) 10,046. It is celebrated for its extensive mines of rock-salt, which were worked as early as 1 1 74. The town contains three old churches, of which the early Gothic abbey church with its Romanesque cloister is most notable, and some good houses. Apart from the salt-mines, its industries include toys and other small articles of wood, horn and ivory, for which the place has long been famous. The district of Berchtesgaden was formerly an inde- pendent spiritual principality, founded in 1100 and secularized in 1803. The abbey is now a royal castle, and in the neighbour- hood a hunting-lodge was built by King Maximilian II. in 1852.

BERCK, a bathing resort of northern France, in the depart- ment of Pas-de-Calais, 25 m. S. of Boulogne by rail. Pop. (1906) 7638. It comprises two parts — Berck-Ville, i\ m. from the shore, and Berck-Plage, the latter with a fine sandy beach. There are two children's hospitals, the climate proving peculiarly beneficial in the treatment of scrofulous affections. About 150 boats are employed in the fisheries, and herrings form the staple of an active trade. Boat-building and fish-curing are carried on.

BERDICHEV, a town of W. Russia, in the government of Kiev, 116 m. S.W. of Kiev by rail and not far from the borders of Volhynia. The cathedral of the Assumption, finished in 1832, is the principal place of worship. The fortified Carmelite monastery, founded in 1627, was captured and plundered by Chmielnicki, chief of the Zaporogian Cossacks, in 1647, and disestablished in 1864. An extensive trade is carried on in peltry, silk goods, iron and wooden wares, salt fish, grain, cattle and horses. Four fairs are held yearly, the most important being on the 1 2th of June and the 1 5th of August. The numerous minor industries include the manufacture of tobacco, soap, candles, oil, bricks and leather. Pop. (1867) 52,563; (1897) 5.3,728, Jews forming about 80%. In the treaty of demarcation between the Lithuanians and the Poles in 1546 Berdichev was assigned to the former. In 1768 Pulaski, leader of the con- federacy of Bar, fled, after the capture of that city, to Berdichev, and there maintained himself during a siege of twenty-five days. The town belongs to the Radziwill family.

BERDYANSK, a seaport town of Russia, in the government of Taurida, on the north coast of the Sea of Azov, in 46° 45′ N. lat. and 36 40′ E. long. The principal industries are in bricks and tiles, tallow and macaroni. The roads are protected from every wind except the south, which occasions a heavy surf; but against this a mole was constructed in 1863. The chief articles of export are cereals, flour, wool, hemp, skins and fish; and the imports include hardwares, fruits, oil and petroleum. In the immediate neighbourhood are salt-lagoons. Pop. (1867) 12,223; (1900) 29,168.

BEREA, a town of Madison county, Kentucky, U.S.A., 131m. by rail S. of Cincinnati. Pop. (1900) 762. Berea is served by the Louisville & Nashville railway. It is pleasantly situated on the border between the Blue Grass and the Mountain regions. The town is widely known as the seat of Berea College, which has done an important work among the mountaineers of Kentucky and of Tennessee. The college has about 70 acres of ground (and about 4000 acres of mountain land for forestry study), with a large recitation hall, a library, a chapel (seating 1400 persons), a science hall, an industrial hall, a brick-making plant, a woodwork building, a printing building, a tabernacle for commencement exercises and other buildings. In 1908 Berea had 65 instructors and 11 50 students; and it paid the tuition of 141 negro students in Fisk University (Nashville, Tennessee) and in other institutions. The school out of which Berea College has developed was founded in the anti-slavery interests in 1855. An attempt was made to procure for it a college charter in 1859, but the slavery interests caused it to be closed before the end of that year and it was not reopened until 1865, the charter having then been obtained, as Berea College. Negroes as well as whites were admitted until 1904, when educa- tion of the two races at the same institution was prohibited by an act of the state legislature (upheld by the U.S. Supreme Court in 1908). This act did not, however, prohibit an in-stitution from maintaining separate schools for the two races, provided these schools were at least 25 m. apart, and a separate school for the negroes was at once projected by Berea.

BEREKHIAH NAQDAN, Jewish fabulist, author of a collection of Fox Fables, written in Hebrew. As his title implies (Naqdan = punctuator of the Biblical text), Berekhiah was also a gram- marian. He further wrote an ethical treatise and was the author of various translations. His date is disputed. Most authorities place him in the 13th century, but J. Jacobs has identified him with Benedictus le Puncteur, an English Jew of the 1 2th century.

BERENGARIUS

BERENGARIUS [Berengar] (d. 1088), medieval theologian, was born at Tours early in the nth century; he was educated in the famous school of Fulbert of Chartres, but even in early life seems to have exhibited great independence of judgment. Appointed superintendent of the cathedral school of his native city, he taught with such success as to attract pupils from all parts of France, and powerfully contributed to diffuse an interest in the study of logic and metaphysics, and to introduce that dialectic development of theology which is designated the scholastic. The earliest of his writings of which we have any record is an Exhortatory Discourse to the hermits of his district, written at their own request and for their spiritual edification. It shows a clear discernment of the dangers of the ascetic life, and a deep insight into the significance of the Augustinian doctrine of grace. Sometime before 1040 Berengar was made archdeacon of Angers. It was shortly after this that rumours began to spread of his holding heretical views regarding the sacrament of the eucharist. He had submitted the doctrine of transubstantiation (already generally received both by priests and people, although in the west it had been first unequivocally taught and reduced to a regular theory by Paschasius Radbert in 831) to an independent examination, and had come to the conclusion that it was contrary to reason, unwarranted by Scripture, and inconsistent with the teaching of men like Ambrose, Jerome and Augustine. He did not conceal this conviction from his scholars and friends, and through them the report spread widely that he denied the common doctrine respecting the eucharist. His early friend and school companion, Adelmann, archdeacon of Liege, wrote to him letters of expostu- lation on the subject of this report in 1046 and 1048; and a bishop, Hugo of Langres, wrote (about 1049) a refutation of the views which he had himself heard Berengar express in conversa- tion. Berengar's belief was not shaken by their arguments and exhortations, and hearing that Lanfranc, the most celebrated theologian of that age, strongly approved the doctrine of Paschasius and condemned that of " Scotus " (really Ratramnus), he wrote to him a letter expressing his surprise and urging him to reconsider the question. The letter, arriving at Bee when Lanfranc was absent at Rome (1050), was sent after him, but was opened before it reached him, and Lanfranc, fearing the scandal, brought it under the notice of Pope Leo IX. Because of it Berengar was condemned as a heretic without being heard, by a synod at Rome and another at Vercelli, both held in 1050. His enemies in France cast him into prison; but the bishop of Angers and other powerful friends, of whom he had a considerable number, had

sufficient influence to procure his release. At the council of Tours (1054) he found a protector in the papal legate, the famous Hildebrand, who, satisfied himself with the fact that Berengar did not deny the real presence of Christ in the sacra- mental elements, succeeded in persuading the assembly to be con- tent with a general confession from him that the bread and wine, after consecration, were the body and blood of the Lord, without requiring him to define how. Trusting in Hildebrand's support, and in the justice of his own cause, he presented himself at the synod of Rome in 1059, but found himself surrounded by zealots, who forced him by the fear of. death to signify his acceptance of the doctrine " that the bread and wine, after consecration, are not merely a sacrament, but the true body and the true blood of Christ, and that this body is touched and broken by the hands of the priests, and ground by the teeth of the faithful, not merely in a sacramental but in a real manner." He had no sooner done so than he bitterly repented his weakness; and acting, as he himself says, on the principle that " to take an oath which never ought to have been taken is to estrange one's self from God, but to retract what one has wrongfully sworn to, is to return back to God," when he got safe again into France he attacked the transubstantiation theory more vehemently than ever. He continued for about sixteen years to disseminate his views by writing and teaching, without being directly interfered with by either his civil or ecclesiastical superiors, greatly to the scandal of the multitude and of the zealots, in whose eyes Berengar was " ille apostolus Satanae," and the academy of Tours the " Babylon

nostri temporis." An attempt was made at the council of Poitiers in 1076 to allay the agitation caused by the controversy, but it failed, and Berengar narrowly escaped death in a tumult. Hildebrand, now pope as Gregory VII., next summoned him to Rome, and, in a synod held there in 1078, tried once more to obtain a declaration of his orthodoxy by means of a confession of faith drawn up in general terms; but even this strong-minded and strong-willed pontiff was at length forced to yield to the demands of the multitude and its leaders; and in another synod at Rome (1079), finding that he was only endangering his own position and reputation, he turned unexpectedly upon Berengar and commanded him to confess thafhe had erred in not teaching a change as to substantial reality of the sacramental bread and wine into the body and blood of Christ. " Then," says Berengar, " confounded by the sudden madness of the pope, and because God in punishment for my sins did not give me a steadfast heart, I threw myself on the ground, and confessed with impious voice that I had erred, fearing the pope would instantly pro-

nounce against me the sentence of condemnation, and, as a necessary consequence, that the populace would hurry me to the worst of deaths." He was kindly dismissed by the pope not long after, with a letter recommending him to the protection of the bishops of Tours and Angers, and another pronouncing anathema on all who should do him any injury or call him a heretic. He returned home overwhelmed with shame and bowed down with sorrow for having a second time been guilty of a great impiety. He immediately recalled his forced confession, and besought all Christian men " to pray for him, so that his tears might secure the pity of the Almighty." He now saw, however, that the spirit of the age was against him, and hopelessly given over to the belief of what he had combated as a delusion. He withdrew, therefore, into solitude, and passed the rest of his life in retirement and prayer on the island of St C6me near Tours. He died there in 1088.

Berengar left behind him a considerable number of followers. All those who in the middle ages denied the substantial presence of the body and blood of Christ in the eucharist were commonly designated Berengarians. They differed, of course, in many respects, even in regard to the nature of the supper. Berengar's own views on the subject may be thus summed up: — 1. That bread and wine should become flesh and blood and yet not lose the properties of bread and wine was, he held, contradictory to reason, and therefore irreconcilable with the truthfulness of God. 2. He admitted a change (conversio) of the bread and wine into the body of Christ, in the sense that to those who receive them they are transformed by grace into higher powers and influences — into the true, the intellectual or spiritual body of Christ. The unbelieving receive the external sign or sacr amentum; but the believing receive in addition, although invisibly, the reality re- presented by the sign, the res sacramenti. 3. He rejected the notion that the sacrament of the altar was a constantly renewed sacrifice, and held it to be merely a commemoration of the one sacrifice of Christ. 4. He dwelt strongly on the importance of men looking away from the externals of the sacrament to the spirit of love and piety. The transubstantiation doctrine seemed to him full of evil, from its tendency to lead men to overvalue what was sensuous and transitory. 5. He rejected with indignation the miraculous stories told to confirm the doctrine of transubstantiation. 6. Reason and Scripture seemed to him the only grounds on which a true doctrine of the Lord's supper could be rested. He attached little importance to mere ecclesi- astical tradition or authority, and none to the voice of majorities, even when sanctioned by the decree of a pope. In this, as in other respects, he

was a precursor of Protestantism.

The opinions of Berengar are to be ascertained from the works written in refutation of them by Adelmann, Lanfranc, Guitmund, &c. ; from the fragments of the De sacr. coena adv. Lanfr. liber, edited by Staudlin (1820-1829); and from the Liber posterior, edited by A. F. and F. T. Vischer (1834). See the collection of texts by Sudendorf (1850); the Church Histories of Gieseler, ii. 396-411 (Eng. trans.), and Neander, vi. 221-260 (Eng. trans.) ; A. Harnack's History of Dogma; Haureau's Histoire de la philosophic scolastique, i. 225-238; Hermann Reuter, Geschichte der religibsen Aufklarung des

Mittelallers, vol. i. (Berlin, 1875); L. Schwabe, Studien zur Geschichte. des Zweiten Abendmahlstreits (1887); and W. Broecking, " Bruno von Angers und Berengar von Tours," in Deutsche Zeitschrift fur Geschichtswissenschaft (vol. xii., 1895).

BERENGER, ALPHONSE MARIE MARCELLIN THOMAS

(1785-1866), known as Berenger de la Drome, French lawyer and politician, son of a deputy of the third estate of Dauphine to the Constituent Assembly, was born at Valence on the 31st of May 1785. He entered the magistracy and became procureur gineral at Grenoble, but resigned this office on the restoration of the Bourbons. He now devoted himself mainly to the study of criminal law, and in 1818 published La Justice criminette en France, in which with great courage he attacked the special tribunals, provosts' courts or military commissions which were the main instruments of the Reaction, and advocated a return to the old common law and trial by jury. The book had a considerable effect in discrediting the reactionary policy of the government; but it was not until 1828, when Berenger was elected to the chamber, that he had an opportunity of exercising a personal influence on affairs as a member of the group known as that of constitutional opposition. His courage, as well as his moderation, was again displayed during the revolution of 1830, when, as president of the parliamentary commission for the trial of the ministers of Charles X., he braved the fury of the mob and secured a sentence of imprisonment in place of the death penalty for which they clamoured.

His position in the chamber was now one of much influence, and he

had a large share in the modelling of the new constitution, though his effort to secure a hereditary peerage failed. Above all he was instrumental in framing the new criminal code, based on more humanitarian principles, which was issued in 1835. It was due to him that, in 1832, the right, so important in actual French practice, was given to juries to find " extenuating' circumstances " in cases when guilt involved the death penalty. In 183 1 he had been made a member of the court of appeal (cour de cassation), and the same year was nominated a member of the academy of moral and political sciences. He was raised to the peerage in 1839. This dignity he lost owing to the revolution of 1848; and as a politician his career now ended. As a judge, however, his activity continued. He was president of the high courts of Bourges and Versailles in 1 849. Having been appointed president of one of the chambers of the court of cassation, he devoted himself entirely to judicial work until his retirement, under the age limit, on the 31st of May i860. He now withdrew to his native town, and occupied himself with his favourite work of reform of criminal law. In 1833 he had shared in the founda- tion of a society for the reclamation of young criminals, in which he continued to be actively interested to the end. In 1851 and 1852, on the commission of the academy of moral sciences, he had travelled in France and England for the purpose of examining and comparing the penal systems in the two countries. The result was published in 1855 under the title La Repression ptnale, comparaison du systeme pSnitentiaire en France et en Angleterre. He died on the 15th of May 1866.

His son, Rene Berenger (1830-), continued the work of his father, and at the outbreak of the revolution of 1870 was avocat general of Lyons. He served as a volunteer in the Franco- German War, being wounded at Nuits on the 28th of December. Returned to the National Assembly by the department of Drome, he was for a few days in 1873 minister of public works under Thiers. He then entered the senate, of which he was vice- president from 1894 to 1897. He founded in 1871 a society for the reclamation of discharged prisoners, and presided over various bodies formed to secure improvement of the public morals. He succeeded Charles Lucas in 1890 at the Academy of Moral and Political Science.

BERENICE, or Bernice, the Macedonian forms of the Greek Pherenice, the name of (A) five Egyptian and (B) two Jewish princesses.

(A) 1. Berenice, daughter of Lagus, wife of an obscure

Macedonian soldier and subsequently of Ptolemy Soter, with

whose bride Eurydice she came to Egypt as a lady-in-waiting.

Her son, Ptolemy Philadelphus, was recognized as heir over the

m. 2$

heads of Eurydice's children. So great was her ability and her influence that Pyrrhus of Epirus gave the name Berenicis to a new city. Her son Philadelphus decreed divine honours to her on her death. (See Theocritus, Idylls xv. and xvii.)

2. Berenice, daughter of Ptolemy Philadelphus, wife of Antiochus Theos of Syria, who, according to agreement with Ptolemy (249), had divorced his wife Laodice and transferred the succession to Berenice's children. On Ptolemy's death, Antiochus repudiated Berenice and took back Laodice, who, however, at once poisoned him and murdered Berenice and her son. The prophecy in Daniel xi. 6 seq. refers to these events.

3. Berenice, the daughter of Magas, king of Cyrene, and the wife of Ptolemy III. Euergetes. During her husband's absence on an expedition to Syria, she dedicated her hair to Venus for his safe return, and placed it in the temple of the goddess at Zephyrium. The hair having by some unknown means disappeared, Conon of Samos, the mathematician and astronomer, explained the phenomenon in courtly phrase, by saying that it had been carried to the heavens and placed among the stars. The name Coma Berenices, applied to a constellation, commemorates this incident. Callimachus celebrated the transformation in a poem, of which only a few lines remain, but there is a fine translation of it by Catullus. Soon after her husband's death (221 B.C.) she was murdered at the instigation of her son Ptolemy IV., with whom she was probably associated in the government.

4. Berenice, also called Cleopatra, daughter of Ptolemy X., married as her second husband Alexander II., grandson of Ptolemy VII. He murdered her three weeks afterwards.

5. Berenice, daughter of Ptolemy Auletes, eldest sister of the great Cleopatra. The Alexandrines placed her on the throne in succession to her father (58 B.C.). She married Seleucus Cybiosactes, but soon caused him to be slain, and married Archelaus, who had been made king of Comana in Pontus (or in Cappadocia) by Pompey. Auletes was restored and put both Berenice and Archelaus to death in 55 B.C.

(B) 1. Berenice, daughter of Salome, sister of Herod I., and wife of her cousin Aristobulus, who was assassinated in 6 B.C. Their relations had been unhappy and she was accused of com- plicity in his murder. By Aristobulus she was the mother of Herod Agrippa I. Her second husband, Theudion, uncle on the mother's side of Antipater, son of Herod I., having been put to death for conspiring against Herod, she married Archelaus. Subsequently she went to Rome and enjoyed the favour of the imperial household.

2. Berenice, daughter of Agrippa I., king of Judaea, and born probably about a.d. 28. She was first married to Marcus, son of the alabarch 1 Alexander of Alexandria. On his early death she was married to her father's brother, Herod of Chalcis, after whose death (a.d. 48) she lived for some years with her brother, Agrippa II. Her third husband was Polemon, king of Cilicia, but she soon deserted him, and returned to Agrippa, with whom she was living in 60 when Paul appeared before him at Caesarea (Acts xxvi.). During the devastation of Judaea by the Romans, she fascinated Titus, whom along with Agrippa she followed to Rome as his promised wife (a.d. 75). When he became emperor (a.d. 79) he dismissed her finally, though reluctantly, to her own country. Her influence had been exer- cised vainly on behalf of the Jews in a.d. 66, but the burning of her palace alienated her sympathies. For her influence see Juvenal, Satires, vi., and Tacitus, Hist. ii. 2.

BERENICE, an ancient seaport of Egypt, on the west coast of the Red Sea, in 23 56′ N., 35° 34′ E. Built at the head of a gulf, the Sinus Immundus, or Foul Bay, of Strabo, it was sheltered on the north by Ras Benas (Lepte Extrema). The port is now nearly filled up, has a sand-bar at its entrance and can be reached only by small craft. Most important of the ruins is a temple; the remnants of its sculptures and inscriptions preserve the name of Tiberius and the

figures of many deities, including a goddess 1 Alabarch or Arabarch (Gr. AXaˆApxi?, or bpafHupxris) , the name of the head magistrate of the Jews in Alexandria under the Ptolemaic and Roman rules.*

of the emerald mines. Berenice was founded by Ptolemy II. (285-247 B.C.) in order to shorten the dangerous Red Sea voyages, and was named in honour of his mother. For four or five centuries it became the entrepot of trade between India, Arabia and Upper Egypt. From it a road, provided with watering stations, leads north-west across the desert to the Nile at Coptos. In the neighbourhood of Berenice are the emerald mines of Zabara and Saket.

BERESFORD, LORD CHARLES WILLIAM DE LA POER (1846-), British admiral, second son of the 4th marquess of Waterford, was born in Ireland, and entered the " Britannia " as a naval cadet in 1859. He became lieutenant in 1868, and commander in 1875. In 1874 he was returned to parliament as Conservative M.P. for Waterford, retaining his seat till 1880, and he was already known in this period as a gallant officer, with a special interest in naval administration. In 1875- 1876 he accom- panied the then prince of Wales on his visit to India as naval A.D.C.; from 1878 to 1881 he was commander of the royal yacht " Osborne." He was in command of the gunboat " Condor " in the Mediterranean when the Egyptian crisis of 1882 occurred; and he became a popular hero in England in connexion with the bombardment of Alexandria (July n), when he took his ship close in to the forts and engaged them with such conspicuous gallantry that the admiral ordered a special signal " Well done, Condor! " He was promoted captain for his services, and, after taking an active part in the re-establishment of order in Alex- andria, he served again in Egypt on Lord Wolseley's staff in the expedition of 1884-85, commanding the naval brigade at Abu Klea, Abu Kru and Metemmeh, and, with the river steamer " Safieh," rescuing Sir C. Wilson and his party, who had been wrecked on returning from Khartum (Feb. 4, 1885). In November 1885 he was again returned to parliament as member for East Marylebone (re- elected 1886). and in Lord Salisbury's ministry of 1886 he was appointed a lord of the admiralty. The press agitation in favour of a stronger navy was now in full swing, and it was well known that in Lord Charles Beresford it had an active supporter; but very little impression was made on the government, and in 1888 he resigned his office on this question, a dramatic step which had considerable

effect. In the House of Commons he advocated an expenditure of twenty millions sterling on the fleet, and the passing of the Naval Defence Act in 1889 was largely due to his action. At the end of 1889 he became captain of the cruiser " Undaunted " in the Mediterranean, and when this ship was paid off in 1893 he was appointed in command of the steam reserve at Chatham, a post he held for three years. In 1897 he became rear-admiral, and again entered parliament, winning a by-election at York; he retained his seat till 1900, but was mainly occupied during these years by a mission to China on behalf of the Associated Chambers of Commerce; he published his book The Break-up of China in 1899. In 1902 he was returned to parliament for Woolwich, but resigned on his appointment to command the Channel squadron (1903-1905); in 1905 he was given the command of the Mediterranean fleet, and from 1906 to 1909 was commander-in-chief of the Channel fleet; in 1906 he became a full admiral. At sea he had always shown himself a remarkable disciplinarian, possessed of great influence over his men, and his reputation as one who would, if necessary, prove a great fighting commander was second to none; and, even when serving afloat and therefore unable to speak direct to the public, he was in the forefront of the campaign for increased naval efficiency. During the administration (1903- 1910) of Sir John Fisher (see Fisher, Baron) as first sea lord of the admiralty it was notorious that considerable friction existed between them, and both in the navy and in public a great deal of party-spirit was engendered in the discussion of their opposing views. When Lord Charles Beresford's term expired as commander-in-chief in March 1909 he was finally "unmuzzled," and the attack which for some years his supporters had made against Sir J. Fisher's administration came to a head at a moment coinciding with the new shipbuilding crisis occasioned by the revelations as to the increase of the German fleet. He himself came forward with proposals for a large increase in the navy

and a reorganization of the administrative system, his first step being a demand for an inquiry, to which the government promptly' assented (May) in the shape of a small Committee under the prime minister. Its report (August), however, gave him no satisfaction, and he proceeded with his public campaign, bitterly attacking the ministerial policy. In January 1910, at the general election, he was returned as Conservative M.P. for Portsmouth; but meanwhile Sir John Fisher's term of office came to an end, and in his successor, Admiral Sir Arthur Knyvet Wilson (b. 1842), the navy obtained a first sea lord who com- manded universal confidence.

BERESFORD, JOHN (1738-1805), Irish statesman, was a younger

son of Sir Marcus Beresford, who, having married Catherine, sole heiress of James Power, 3rd earl of Tyrone, was created earl of Tyrone in 1746. After the death of the earl in 1763, Beresford's mother successfully asserted her claim sno jure to the barony of La Poer. John Beresford, born on the 14th of March r738, thus inherited powerful family connexions. He was educated at Trinity College, Dublin, was called to the Irish bar, and entered the Irish parliament as member for Waterford in 1760. His industry, added to the influence of his family, procured his admission to the privy council in 1768, and his appointment as one of the commissioners of revenue two years later. In T780 he became first commissioner of revenue, a position which gave him powerful influence in the Irish adminis- tration. He introduced some useful reforms in the machinery of taxation ; and he was the author of many improvements in the architecture of the public buildings and streets of Dublin. He was first brought into conflict with Grattan and the popular party, in 1784, by his support of the proposal that the Irish parliament in return for the removal of restrictions on Irish trade should be bound to adopt the English navigation laws. In 1786 he was sworn a member of the English privy council, and the power which he wielded in Ireland through his numerous dependants and connexions grew to be so extensive that a few years later he was spoken of as the " king of Ireland." He was a vehement opponent of the increasing demand for relief of the Roman Catholics; and when it became known that Lord Fitz- william was to succeed Lord Westmorland as lord lieutenant in 1795 for the purpose of carrying out a conciliatory policy, Beresford expressed strong hostility to the appointment. One of Fitzwilliam's first acts was to dismiss Beresford from his employment but with permission to retain his entire official salary for life, and with the assurance that no other member of his family would be removed. Beresford immediately exerted all his influence with his friends in England, to whom he described himself as an injured and persecuted man; he appealed to Pitt, and went in person to London to lay his complaint before the English ministers. There is little doubt that the recall of Lord Fitzwilliam {q.v.), which was followed by such momentous consequences in the history of Ireland, was, as the viceroy himself believed, mainly due to Beresford's dismissal. There had been a misunderstanding on the point between Pitt and Fitzwilliam. The latter, whose veracity was unimpeachable, asserted that previous to his coming to Ireland he had informed the prime minister of his intention to dismiss Beresford, and that Pitt had raised no objection. Pitt denied all recollection of any such communication, and on the contrary described the dismissal as " an open breach of the most solemn

promise." 1 In a letter to Lord Carlisle, justifying his action, Fitzwilliam mentioned that malversation had been imputed to Beresford. Beresford sent a challenge to Fitzwilliam, but the combatants were interrupted on the field and Fitzwilliam then made an apology.

When Lord Camden replaced Fitzwilliam in the viceroyalty in March 1795, Beresford resumed his former position. On the eve of the rebellion in 1798 his letters to Lord Auckland gave an alarming description of the condition of Ireland, and he counselled strong measures of repression. When first consulted by Pitt on the question of the union Beresford appears to have disliked the idea; but he soon became reconciled to the policy and warmly supported it. After the union Beresford continued to represent 1 Stanhope, Life of Pitt, ii. 301.

Waterford in the imperial parliament, and he remained in office till 1802, taking an active part in settling the financial relations between Ireland and Great Britain. He died near Londonderry on the 5th of November 1805. John Beresford was twice married: in 1760 to a foreign lady, Constantia Ligondes, who died in 1772; and, secondly, in 1774 to Barbara Montgomery, a celebrated beauty who figures in Sir Joshua Reynolds's picture of " The Graces." He had large families by both marriages. His son, John Claudius, kept a riding school in Dublin, which acquired an evil reputation as the chief scene of the floggings by which evidence was extorted of the conspiracy which came to a head in 1798. He took a prominent part in the Irish House of Commons, where he unsuccessfully moved the reduction of the proposed Irish contribution to the imperial exchequer in the debates on the Act of Union, of which, unlike his father, he was to the last an ardent opponent.

See Correspondence of the Right Hon. John Beresford, edited by W. Beresford (2 vols., London, 1854); Edward Wakefield, An Account of Ireland (2 vols., London, 1812); Earl Stanhope, Life of William Pitt (4 vols., London, 1861); W. E. H. Lecky, History of Ireland in the Eighteenth Century, vols, iii., iv., v. (5 vols., London, 1892). (R. J. M.)

BERESFORD, WILLIAM CARR BERESFORD, Viscount (1768-1854), British general and Portuguese marshal, illegitimate son of the first

marquess of Waterford, was born on the 2nd of October 1768. He entered the British army in 1785, and while in Nova Scotia with his regiment in the following year lost the sight of one eye by a shooting accident. He first distinguished himself at Toulon in 1793, receiving two years later the command of the 88th regiment (Connaught Rangers) . In 1 799 his regiment was ordered to India, and a few months later Beresford left with Sir David Baird's expedition for Egypt, and was placed in command of the first brigade which led the march from Kosseir across the desert. When, on the evacuation of Egypt in 1803, he returned home, his reputation was established. In 1805 he accompanied Sir David Baird to South Africa, and was present at the capture of Cape Town and the surrender of the colony. From South Africa he was despatched to South America. He had little difficulty in capturing Buenos Aires with only a couple of regiments. But this force was wholly insufficient to hold the colony. Under the leadership of a French emigre, the chevalier de Timers, the colonists attacked Beresford, and at the end of three days' hard fighting he was compelled to capitulate. After six months' imprisonment he escaped, and reached England in 1807, and at the end of that year he was sent to Madeira, occupy- ing the island in the name of the king of Portugal. After six months in Madeira as governor and commander-in-chief, during which he learnt Portuguese and obtained an insight into the Portuguese character, he was ordered to join Sir Arthur Wellesley's army in Portugal. He was first employed as com- mandant in Lisbon, but accompanied Sir John Moore on the advance into Spain, and took a conspicuous part in the battle of Corunna (see Peninsular War). In February 1809 Beresford was given the task of reorganizing the Portuguese army. In this task, by systematic weeding-out of inefficient officers and men, he succeeded beyond expectation. By the summer of 1810 he had so far improved the moral and discipline of the force that Wellington brigaded some of the Portuguese regiments with English ones, and at Busaco Portuguese and English fought side by side. Beresford's services in this battle were rewarded by the British government with a knighthood of the Bath and by the Portuguese with a peerage.

In the spring of 181 1 Wellington was compelled to detach Beresford from the Portuguese service. The latter was next in seniority to General (Lord) Hill who had gone home on sick leave, and on him, therefore, the command of Hill's corps now devolved. Unfortunately Beresford never really gained the confidence of his new troops. At Campo Mayor his light cavalry brigade got out of hand, and a regiment of dragoons was practic- ally annihilated. He invested Badajoz with insufficient forces, and on the advance of Soult he was

compelled to raise the siege and offer battle at Albuera. His personal courage was even more than usually conspicuous, but to the initiative of a junior

staff officer, Colonel (afterwards Viscount) Hardinge, rather than to Beresford's own generalship, was the hardly-won victory to be attributed. Beresford then went back to his work of reorganizing the Portuguese army. He was present at the siege of Badajoz and at the battle of .Salamanca, where he was severely wounded (181 2). In 1813 he was present at the battle of Vittoria, and at the battles of the Pyrenees, while at the battle of the Nivelle, the Nive and Orthez he commanded the British centre, and later he led a corps at the battle of Toulouse. At the close of the Peninsular War he was created Baron Beresford of Albuera and Cappoquin, with a pension of £2000 a year, to be continued to his two successors.

In 1819 the revolution in Portugal led to the dismissal of the British officers in the Portuguese service. Beresford therefore left Portugal and placed the question of the arrears of pay of his army before the king at Rio Janeiro. On his return the new Portuguese government refused to allow him to land, and he accordingly left for home. On arriving in England he turned his attention to politics, and strongly supported the duke of Wellington in the House of Lords. In 1823 his barony was made a viscounty, and when the duke of Wellington formed his first cabinet in 1828 he gave Beresford the office of master-general of the ordnance. In 1830 Beresford retired from politics, and for some time subsequently he was occupied in a heated con- troversy with William Napier, the historian of the Peninsular War, who had severely criticised his tactics at Albuera. On this subject Wellington's opinion of Beresford is to the point. The duke had no illusions as to his being a great general, but he thought very highly of his powers of organization, and he went so far as to declare, during the Peninsular War, that, in the event of his own death, he would on this ground recommend Beresford to succeed him. The last years of Beresford's life were spent at Bedgebury, Kent, where he had purchased a country estate. He died on the 8th of January 1854.

BEREZINA, a river of Russia, in the government of Minsk, forming a tributary of the Dnieper. It rises in the marshes of Borizov and flows south, inclining to east, for 350 m. (250 m. navigable) , for the most part through low-lying but well-wooded country. As a navigable river, and forming a portion of the canal system which unites the Black Sea with the Baltic, it is of importance for commerce, but is subject to severe floods. It was just above Borizov that Napoleon's

army forced the passage of the Berezina, with enormous losses, on the 26th-28th of November 181 2, during the retreat from Moscow.

BEREZOV, a town of Asiatic Russia, in the government of Tobolsk, 700 m. N. of the city of that name, situated on three hills on the left bank of the Sosva, 26 m. above its mouth in the Ob, in 63 55′ N. lat. and 65 7′ E. long. It has more than once suffered from conflagrations — for example, in 17 19 and 1808. Prince Menshikov, the favourite of Peter the Great and Catherine I., died here an exile, in 1729. In 1730 his enemy and rival, Prince Dolgoruki, was interned here with his family; and in 1742 General Ostermann was sent to Berezov with his wife and died there in 1747. The yearly mean temperature is 25 Fahr., the maximum cold being 4-7°. It has a cathedral, near which lie buried Mary Menshikov, once betrothed to the tsar Peter II., and some of the Dolgorukis. There is some trade in furs, mammoth bones, dried and salted fish. Pop. (1897) 1073.

BEREZOVSK, a village of east Russia, in the government of Perm, on the eastern slope of the Urals, 8 m. N.E. of Ekaterin- burg. It is the centre of an important gold-mining region (5 m. by 25) of the same name. The mines have been known since 1747. The inhabitants also manufacture boots, cut stone and carry on cabinet-making.

BERG {Ducatus Montensis), a former duchy of Germany, on the right bank of the Rhine, bounded N. by the duchy of Cleves, E. by the countship of La Marck and the duchy of Westphalia, and S. and W. by the bishopric of Cologne. Its area was about 1 1 20 sq. m. The district was raised in 1108 to the rank of a countship, but did not become a duchy till 1380, after it had passed into the possession of the Jiilich family. In 1423 the duchy of Jiilich fell to Adolf of Berg, and in 1437 the countship

of Ravensberg was united to the duchies. The male line of the dukes of Jiilich-Berg-Ravensberg became extinct in 151 1, and the duchy passed by marriage to John III. (d. 1539), duke of Cleves and count of La Marck, whose male line became extinct with the death of John William, bishop of Mtinster, in 1609. Of the latter's four sisters, the eldest (Marie Eleonore) was married to Albert Frederick, duke of Prussia, the second (Anna) to Philip Louis, count palatine of Neuburg, the third (Magdalena) to John, count palatine of

Zweibriicken, and the fourth (Sybille) to Charles of Habsburg, margrave of Burgau. The question of the succession led to a prolonged contest, which was one of the causes of the Thirty Years' War. It was settled in 1614 by a partition, under which Berg, with Jiilich, was assigned to the count palatine of Neuburg, in whose line it remained till 1742, when it passed to the Sultzbach branch of the house of Wittels- bach. On the death of Charles Theodore, the last of this line, in 1799, Jiilich and Berg fell to Maximilian Joseph of Zweibriicken (Maximilian I. of Bavaria), who ceded the duchies in 1806 to Napoleon. Berg was bestowed by Napoleon, along with the duchy of Cleves and other possessions, on Joachim Murat, who bore the title of grand-duke of Berg; and after Murat's elevation to the throne of Naples, it was transferred to Louis, the son of the king of Holland. By the congress of Vienna in 181 5 it was made over to Prussia.

See B. Schonneshofer, Geschichte des Bergischen Landes (Elberfeld, 1895); Stokvis, Manuel d'histoire, &c. vol. iii. (Leiden, 1890-1893); and R. Gocke, Das Grossherzogtum Berg unter Joachim Murat, Napoleon I" und Louis Napoleon, 1806-1813 (Cologne, 1877).

BERGAMASK, or Bergomask (from the town of Bergamo in North Italy) , a clumsy rustic dance (cf . Shakespeare, Midsummer Night's Dream, v. 360) copied from the natives of Bergamo, reputed to be very awkward in their manners.

BERGAMO (anc. Bergomum), a city and episcopal see of Lombardy, Italy, capital of the province of Bergamo, situated at the foot of the Alps, at the junction of the Brembo and Serio, 2i\ m. N.E. of Milan by rail, and 26 m. direct. Pop. (1901) town, 25,425; commune, 46,861. The town consists of two distinct parts, the older Citta. Alta, upon a hill 1200 ft. above sea-level, strongly fortified by the Venetians, and the new town (Citta Bassa) below, the two being connected by a funicular railway. The most interesting building of the former is the fine Romanesque church of S. Maria Maggiore, founded in 1137 and completed in 1355, with a baroque interior and some interesting works of art. Adjoining it to the north is the Cappella Colleoni, with a richly sculptured polychrome facade, and a modernized interior, containing the fine tombs of Bartolommeo Colleoni (c. 1400-1475), a native of Bergamo, and his daughter Medea. The work was executed in 1470-1476 by Giovanni Antonio Amadeo, who was also employed at the Certosa di Pavia. The market-place (now Piazza Garibaldi) contains the Gothic Palazzo Vecchio or Broletto; close by are the cathedral (1614) and a small baptistery of 1340, rebuilt in 1898. The lower town contains an

important picture-gallery, consisting of three collec- tions of works of north Italian masters, one of which was bequeathed in 1891 by the art critic Giovanni Morelli. Bergamo has fine modern buildings and numerous silk and cotton factories. It also has a considerable Cattle market, though its yearly Fiera di S. Alessandro (the patron saint) has lost some of its importance. Railways radiate from it to Lecco, Ponte della Selva, Usmate (for Monza or Seregno) , Treviglio (on the main line from Milan to Verona and Venice) and (via Rovato) to Brescia, and steam tramways to Treviglio, Sarnico and Soncino.

The ancient Bergomum was the centre of the tribe of the Orobii; it became, after their subjection to Rome, a Roman municipality with a considerable territory, and after its destruc- tion by Attila, became the capital of a Lombard duchy. From 1264 to 1428 it was under Milan, but then became Venetian, and remained so until 1797. Remains of the Roman city are not visible above ground, but various discoveries made are recorded by G. Mantovani in Not. Scav., 1890, 25. (T. As.)

BERGAMOT, OIL OF, an essential oil obtained from the rind of the fruit of the Citrus bergamia. The bergamot is a small

tree with leaves and flowers like the bitter orange, and a round fruit nearly 3 in. in diameter, having a thin lemon-yellow smooth rind. The tree is cultivated in southern Calabria, whence the entire supply of bergamot oil is drawn. Machinery is mostly used to express the oil from the fruit, which is gathered in November and December. The oil, which on standing deposits a stearoptene, bergamot camphor or bergaptene, is a limpid greenish-yellow fluid of a specific gravity of 0-882 to o-886, and its powerful but pleasant odour is mainly due to the presence of linalyl acetate, or bergamiol, which can be artificially prepared by heating linalol with acetic anhydride. The chief use of bergamot oil is in perfumery. The word apparently is derived from the Italian town Bergamo. The name Bergamot, for a variety of pear, is an entirely different word, supposed to be a corruption of the Turkish beg-armudi (= prince's pear; cf. Ger. Fiirstenbirn).

BERGEDORF, a town of Germany, in the territory of Hamburg, on the river Bille, 10 m. by rail E. by S. from the city. Pop. (1900) 23,728. It produces vegetables and fruit for the Hamburg markets, and carries on tanning, glass manufacture, brewing and brick-making. It received civic rights in 1275, belonged to Liibeck and Hamburg conjointly from 1420 to 1868, and in the latter year was purchased by Hamburg. The surrounding dis- trict, exceptionally

fertile marshland, is known as Die Vierlande, being divided into four parishes, whence the name is derived.

BERGEN, a city and seaport of Norway, forming a separate county (ami), on the west coast, in lat. 60° 23′ N. (about that of the Shetland Islands) . Pop. (1900) 72,179. It lies at the head of the broad Byf jord, and partly on a rocky promontory (Nord- naes) between the fine harbour (Vaagen) and the Puddefjord. Its situation is very beautiful, the moist climate (mean annual rainfall, 74 in.) fostering on the steep surrounding hills a vegeta- tion unusually luxuriant for the latitude. Behind the town lie the greater and lesser Lungegaard Lakes, so that the site is in effect a peninsula. The harbour is crowded with picturesque timber-ships and fishing-smacks, and is bordered by quays. The principal street is Strandgaden, on the Nordnaes, parallel with the harbour, communicating inland with the ton or market- place, which fronts the harbour and contains the fish and fruit market. The portion of the city on the mainland rises in an amphitheatre. The houses, of wood or stucco, are painted in warm reds and yellows. On the banks of the lesser Lungegaard Lake is the small town park, and above the greater lake the pleasant Nygaards park, with an aquarium adjoining. Among the principal buildings are the cathedral (rebuilt in the 16th century), and several other churches, among which the Mariae Kirke with its Romanesque nave is the earliest; a hospital, diocesan college, naval academy, school of design and a theatre. An observatory and biological station are maintained. The museums are of great interest. The Vestlandske fishery and industrial museum also contains a picture gallery, and exhibition of the Bergen Art Union (Kunstforening) . The Bergen museum contains antiquities and a natural history collection. The Hanseatic museum is housed in a carefully-preserved gaard, or store-house and offices of the Hanseatic League of German merchants, who inhabited the German quarter (Tydskenbryggen) and were established here in great strength from 1445 to 1558 (when the Norwegians began to find their presence irksome), and brought much prosperity to the city in that period. The Bergenhus and Fredriksberg forts defend the north and south entries of the harbour respectively. The first was originally built in the 13th century by King Haakon Haakonsson, and subsequently enlarged; and still bears marks of an English attack when a Dutch fleet was driven to shelter here in 1665. Near it are remains of another old fort, the Sverresborg. Electric trams ply in the principal streets.

Bergen is the birthplace of the poets Ludvig Holberg (1684- 1754) and Johan Welhaven (1807-1873), of Johan Dahl the painter (1

788-1857), of Ole Bull (1810-1880) and Edvard Grieg the musicians. There are statues to Holberg and Bull, and also to Christie, president of the Storthing (parliament) in 18 15 and

Bergen ranks first of the Norwegian ship-owning centres, having risen to this position from fifth in 1879. The trade, however, is exceeded by that of Christiania. The staple export trade is in fish and their products; other exports are butter, copper ore and hides. The principal imports are coal, machinery, salt, grain and provisions. The manufactures are not extensive, but the preparation of fish products, shipbuilding, weaving and distillery, with manufactures of paper, pottery, tobacco and ropes are carried on. Bergen is an important centre of the extensive tourist traffic of Norway. Regular steamers serve the port from Hull and Newcastle (about 40 hours), from Hamburg, and from all the Norwegian coast towns. Many local steamers penetrate the fjords, touching at every village and gaard. Bergen is the nearest port to the famous Hardanger Fjord, and is the starting-point of a remarkable railway which runs through many tunnels and fine scenery towards Vosse- vangen or Voss. In 1896 a beginning was made with the con- tinuation of this line through the mountains to connect with Chrisliania. In the first 50 m. from Voss the line ascends 4080 ft., passing through a tunnel 5796 yds. long.

Bergen (formerly Bjorgvin) was founded by King Olaf Kyrre in 1070-1075, and rapidly grew to importance, the Byfjord becoming the scene of several important engage- ments in the civil wars of subsequent centuries. The famous Hansa merchants maintained a failing position here till 1764. The town suffered frequently from fire, as in 1702 and 1855, and the broad open spaces (Almenninge) which interrupt the streets are intended as a safeguard against the spread of flames.

See Y. Nielsen, Bergen fra die dldste tider indtil nutiden (Christiania, 1877); H. Jager, Bergen og Bergenserne (Bergen, 1889).

BERGEN-OP-ZOOM, a town in the province of North Brabant, Holland, situated on both sides of the small river Zoom, near its confluence with the East Scheldt, ,385 m. by rail E. by N. of Flushing. It is connected by steam tramway with Antwerp (20 m. S.). and with the islands of Tholen and Duiveland to the north-west. Pop. (1900) 13,663. The houses are well built, the market-places and

squares handsome and spacious. It possesses a port and an arsenal, and contains a fine town hall, with portraits of the ancient margraves of Bergen-op-Zoom, a Latin school, and an academy, of design and architecture. The remains of the old castle of the margraves have been converted into barracks. The tower is still standing and is remarkable for its increase in size as it rises, which causes it to rock in a strong wind. The church contains a monument to Lord Edward Bruce, killed in a duel with Sir Edward Sackville, afterwards earl of Dorset, in 1613. There are numerous tile-works and potteries of fine ware; and a considerable trade is carried on in anchovies and oysters caught in the Scheldt. A large sugar-beet industry has also sprung up here in modern times.

Bergen-op-Zoom is a very old town, but little is known of its early history beyond the fact that it was taken by the Normans in 880. In the 13th century it became the seat of Count Gerhard of Wesemael, who surrounded it with walls and built a castle. By the end of the 15th century it had become one of the most prosperous towns of Holland, on account of its fisheries and its cloth-trade. In 1576 the town joined the United Netherlands, and was shortly afterwards fortified. In 1588 it was successfully defended against the duke of Parma by an English and Dutch garrison commanded by Colonel Morgan, and in 1605 it was suddenly attacked by Du Terail. In 1622 the Spaniards, under Spinola, made another attempt to take the town, but were forced to abandon the enterprise after a siege of ten weeks and the loss of 1200 men. Towards the end of the 17th century the fortifications were greatly strengthened by Coehoorn, and in 1725 they were further extended. In 1747, however, the town was taken by the French, under Marshal Lowendahl, who sui prised it by means of a subterranean passage. Restored at the end of the war, it was again taken by the French under Pichegru in 1795. The English, under Sir Thomas Graham, afterwards Lord Lynedoch, in March 1814 made an attempt to take it by a coup de main, but were driven back with great loss

by the French, who surrendered the place, however, by the treaty of peace in the following May.

The lordship of Bergen-op-Zoom appears, after the definite union of the Low Countries with the Empire in 924, as an hereditary fief of the Empire, and the succession of its lords may be traced from Henry (1098-1125), who also held Breda. In 1533 it was raised to a margraviate by the emperor Charles V., and was held by various families until in 1799 it passed, through the Sultzbach branch of the Wittelsbachs, to the royal house of ‘ Bavaria, by whom it was

renounced in favour of the Batavian republic in 1801.

BERGERAC, a town of south-western France, capital of an arrondissement in the department of Dordogne, on the right bank of the Dordogne, 60 m. E. of Bordeaux on the railway to Cahors. Pop. (1906) town, 10,545; commune, 15,623. The river is rendered navigable by a large dam and crossed by a fine bridge which leads to the suburb of La Madeleine. Apart from a few old houses in the older quarter by the river, the town contains no monuments of antiquarian interest. There is a handsome modern church built in the middle of the 19th century. Bergerac is the seat of a sub-prefect and has tribunals of first instance and of commerce and a communal college. Wine of fine quality is grown in the district and is the chief source of the commerce of the town, which is mainly carried on with Libourne and Bordeaux. There is trade in grain, truffles, chestnuts, brandy and in the salmon of the Dordogne. The town has flour-mills, iron-works, tanneries, distilleries and nursery-gardens, and it has manufactures of casks and of vinegar. There are quarries of millstone in the vicinity. In the 16th century Bergerac was a very flourishing and populous place, but most of its inhabitants having embraced Calvinism it suffered greatly during the religious wars and by the revocation of the edict of Nantes (1685). It was in 1577 the scene of the signing of the sixth peace between the Catholics and Protestants. Its fortifications and citadel were demolished by Louis XIII. in i62r.

BERGHAUS, HEINRICH (1797-1884), German geographer, was born at Kleve on the 3rd of May 1797. He was trained as a surveyor, and after volunteering for active service under General Tauerizien in 1813, joined the staff of the Prussian trigono- metrical survey in 1816. He carried on a geographical school at Potsdam in company with Heinrich Lange, August Petermann, and others, and long held the professorship of applied mathe- matics at the Bauakademie. But he is most famous in connexion with his cartographical work. His greatest achievement was the Physikalischer Atlas (Gotha, 1838-1848), in which work, as in others, his nephew Hermann Berghaus (1828-1890) was associated with him. He had also a share in the re-issue of the great Stieler Handatlas (originally produced by Adolf Stieler in 1817-1823), and in the production of other atlases. His written works were numerous and important, including Allgemeine Lander- und Volkerkunde (Stuttgart, 1837-1840), Grundriss der Geographie in fiinf Btickern (Berlin, 1842), Die Volkerdes Erdballs (Leipzig, 1845-1847), Was man von der Erde weiss (Berlin, 1856- 1860), and various large works on Germany. In 1863 he pub- lished Briefwechsel mit Alexander von Humboldt

(Leipzig). He died at Stettin on the 17th of February 1884.

BERGK, THEODOR (1812-1881), German philologist, was born at Leipzig on the 22nd of May 181 2. After studying at the university of his native town, where he profited by the instruc- tion of G. Hermann, he was appointed in 1835 to the lectureship in Latin at the orphan school at Halle. After holding posts at Neustrelitz, Berlin and Cassel, he succeeded (1842) K. F. Hermann as professor of classical literature at Marburg. In 1852 he went to Freiburg, and in 1857 returned to Halle. In 1868 he resigned his professorship, and settled down to study and literary work in Bonn. He died on the 20th of July 1881, at Ragatz in Switzerland, where he had gone for the benefit of his health. Bergk's literary activity was very great, but his reputa- tion mainly rests upon his work in connexion with Greek literature and the Greek lyric poets. His Poetae Lyrici Graeci (1843. 5th ed. 1900, &c), and Griechische Litter ■aturgeschichte (1872-1887, completed by G. Hinrichs and R. Peppmuller) are standard

works. He also edited Anacreon (1834), the fragments of Aristophanes (1840), Aristophanes (3rd ed., 1872), Sophocles (2nd ed., 1868), a lyric anthology (4th ed., 1890). Among his other works may be mentioned: Augusli Rerum a se geslarum Index (1873); Inschriflen romischer Schleudergeschosse (1876); Zur Geschichte und Topographie der Rheinlande in romischer Zeit (1882); Beitrage zur romischen Chronologie (1884).

His Kleine philologische Schriften have been edited by Peppmiiller (1 884-1 886), and contain, in addition to a complete list of his writings, a sketch of his life. See Sandys, Hist, of Class. Schol iii. 146 (1908).

BERGLER, STEPHAN, German classical scholar, was born about 1680 at Kronstadt in Transylvania. The date of his death is uncertain. After studying at Leipzig, he went to Amsterdam, where he edited Homer and the Onomaslicon of Julius Pollux for Wetzstein the publisher. Subsequently, at Hamburg, he assisted the great bibliographer J. A. Fabricius in the production of his Bibliolheca Graeca and his edition of Sextus Empiricus. He finally found a permanent post in Bucharest as secretary to the prince of Walachia, Alexander Mavrocordato, whose work Hept tGiv Ka3r)K.bvT

BERGMAN, TORBERN OLOF (173 5-1 784), Swedish chemist and naturalist, was born at Katrineberg, Vestergotland, Sweden, on the 20th of March 1735. At the age of seventeen he entered the university of Upsala. His father wished him to read either law or divinity, while he himself was anxious to study mathe- matics and natural science; in the effort to please both himself and his father he overworked himself and injured his health. During a period of enforced abstinence from study, he amusDd himself with field botany and entomology, to such good purpose that he was able to send Linnaeus specimens of several new kinds of insects, and in 1756 he succeeded in proving that, contrary to the opinion of that naturalist, Coccus aqualicus was really the ovum of a kind of leech. In 1758, having returned to Upsala, he graduated there, and soon afterwards began to teach mathe- matics and physics at the university, publishing papers on the rainbow, the aurora, the pyroelectric phenomena of tourmaline, &c. In 1767 Johann Gottschalck Wallerius (1 709-1 785) having resigned the chair of chemistry and mineralogy, Bergman deter- mined to become a candidate, though he had paid no particular attention to chemistry. As evidence of his attainments he produced a memoir on the manufacture of alum, but his pre- tensions were strongly opposed, and it was only through the influence of G-ustavus III., then crown prince and chancellor of the university, that he gained the appointment, which he held till the end of his life. He died at Medevi on Lake Vetter on the 8th of July 1784. Bergman's most important chemical paper is his Essay on Elective Attractions (1775), a study of chemical affinity. In methods of chemical analysis, both by the blowpipe and in the wet way, he effected many improvements, and he made considerable contributions to mineralogical and geological chemistry, and to crystallography. He also made observations of the transit of Venus in 1761, and published a Physical Description of the Earth in 1766.

His works were collected and printed in 6 vols, as Opuscula Physica et Chemica in 1779-1790, and were translated into French, German and English.

BERGSCHRUND (Ger. Berg, mountain; Schrund, cleft or crevice), a gaping crack in the upper part of a snowfield or glacier, near the rock wall, caused by the glacier moving bodily away from the mountain-side as the mass settles downwards. The crack is roughly parallel to the rock-face of- the upper edge of the glacier basin, and extends downwards to the solid rock beneath the glacier where at the bottom of this huge crevasse there are blocks of ice, and large pieces of rock torn off by the lower portion of the glacier from the rock wall and floor.

BERGUES, a town of northern France, in the department of Nord, at the junction of the canal of the Colme with canals to Dunkirk and Furnes (in Belgium), 5 m. S.S.E. of Dunkirk by rail. Pop. (1906) 4499. The town has a belfry, the finest in French Flanders, dating from the middle of the 16th century and restored in the 19th century. The church of St Martin is a brick building of the 17th century in the Gothic style with a modern facade. The town hall, dating from the latter half of the 19th century, contains a municipal library and an interesting collection of pictures. The industries of the town include brewing and malting, and the manufacture of brushes and oil.

BERHAMPUR, a town of British India, the headquarters of Murshidabad district, in Bengal, situated on the left bank of the river Bhagirathi, 5 m. below Murshidabad city. Pop. (1901) 24,397. Berhampur was fixed upon after the battle of Plassey as the site of the chief miXtary station for Bengal; and a huge square of brick barracks was erected in 1767, at a cost of £300,000. Here was committed the first overt act of the mutiny, on the 25th of February 1857. No troops are now stationed here, and the barracks have been utilized for a jail, a lunatic asylum and other civic buildings. A college, founded by government in 1853, was made over in 1888 to a local committee, being mainly supported by the munificence of the rani Svarnamayi. In the municipality of Berhampur is included the remnant of the once important, but now utterly decayed city of Cossim- bazar (q.v.).

BERHAMPUR, a town of British India, in the presidency of Madras. Pop. (1901) 25,729. It is the headquarters of Ganjam district, and is situated about 9 m. from the sea. It is a station on the East Coast railway, which connects Calcutta with Madras. Berhampur had a military cantonment, sometimes distinguished as Baupur, containing a wing of a native regiment; but the troops have been transferred elsewhere. There is some weaving of silk cloth, and export trade in sugar. The college, originally founded by government, is now maintained by the raja of Kallikota. Silk-weaving and sugar-manufacture are carried on.

BERI-BERI, a tropical disease of the greatest antiquity, and known to the Chinese from an extremely remote period. It gradually dropped out of sight of European practice, until an epidemic in Brazil in 1863, and the opening up of Japan, where it prevailed extensively, and the investigations into the disease in Borneo, brought it again into notice. The researches of Scheube and Balz in Japan, and of Pekelharing and Winkler in the Dutch Indies, led to its description as

a form of peripheral neuritis (see also Neuropathology). The geographical dis- tribution of beri-beri is between 45° N. and 35° S. It occurs in Japan, Korea and on the Chinese coast south of Shanghai; in Manila, Tongking, Cochin China, Burma, Singapore, Malacca, Java and the neighbouring islands; also in Ceylon, Mauritius, Madagascar and the east coast of Africa. In the Western hemisphere it is found in Cuba, Panama, Venezuela and South America. It has been carried in ships to Australia and to England. Sir P. Manson has " known it originate in the port of London in the crews of ships which had been in harbour for several months," and he suggests that when peripheral neuritis occurs in epidemic form it is probably beri-beric.

The cause is believed by many authorities to be an infective agent of a parasitic nature, but attempts to identify it have not been entirely successful. It is " not obviously communicable from person to person" (Manson), but may be carried from

place to place. It clings to particular localities, buildings and ships, in which it has a great tendency to occur; for instance, it is apt to break out again and again on certain vessels trading to the East. It haunts low-lying districts along the coast, and the banks of rivers. Moisture and high temperature are required to develop its activity, which is further favoured by bad ven- tilation, overcrowding and underfeeding. Another strongly supported hypothesis is that it is caused by unwholesome diet. The experience of the Japanese navy points strongly in this direction. Beri-beri was constantly prevalent among the sailors until 1884, when the dietary was changed. A striking and pro- gressive diminution at once set in, and continued until the disease wholly disappeared. Major Ronald Ross suggested that beri- beri was really arsenical poisoning. A natural surmise is that it is due to some fungoid growth affecting grain, such as rice, maize or some other food stuff commonly used in the localities where beri-beri is prevalent, and among sailors. The conditions under which their food is kept on board certain ships might explain the tendency of the disease to haunt particular vessels. Dr Charles Hose is the principal advocate of this theory. Having had much experience of beri-beri in Sarawak, he associates it with the eating of mouldy rice, a germ in the fungus constitut- ing the poison. But Dr Hose's views as to rice have been strongly opposed by Dr Hamilton Wright and others.

The most susceptible age is from 15 to 4°- Children under 15 and persons over 50 or 60 are rarely attacked. Men are more liable than women. Race has no influence. Previous attacks powerfully predispose.

The symptoms are mainly those of peripheral neuritis with special implication of the phrenic and the pneumogastric nerves. There is usually a premonitory stage, in which the patient is languid, easily tired, depressed, and complains of numbness, stiffness and cramps in the legs; the ankles are oedematous and the face is puffy. After this, pronounced symptoms set in rapidly, the patient suddenly loses power in the legs and is hardly able to walk or stand; this paresis is accompanied by partial anaesthesia, and by burning or tingling sensations in the feet, legs and arms; the finger-tips are numb, the calf muscles tender. These symptoms increase; the oedema becomes general, the paralysis more marked; breathlessness and palpitation come on in paroxysms; the urine is greatly diminished. There is no fever, unless it is of an incidental char- acter, and no brain symptoms arise. The patient may remain in this condition for several days or weeks, when the symptoms begin to subside. On the disappearance of the oedema the muscles of the leg are found to be atrophied. Recovery is very slow, but appears to be certain when once begun. When death occurs it is usually from syncope through over-distension of the heart. The mortality varies greatly, from 2 to 50 % of the cases. The disease is said to be extremely fatal among the Malays. After death there is found to be serious infiltration into all the tissues, and often haemorrhages into the muscles and nerves, but the most important lesion is degeneration of the peripheral nerves. The cerebrospinal centres are not affected, and the degeneration of the nerve-fibres is more marked the farther they are from the point of origin. The implication of the phrenic and pneumogastric nerves, and of the cardiac plexus, accounts for the breathlessness, palpitation and heart failure; that of the vaso-motor system for the oedema and diminution of urine, and that of the spinal nerves for the loss of power, the impair- ment and perversion of sensation. According as these nerves are variously affected the symptoms will be modified, some being more prominent in one case and some in another.

Authorities. — See Sir Patrick Manson, Tropical Diseases (new ed., 1907); for a critical discussion of the subject, see The Times of 28th October 1905; a full bibliography is given by Manson in Allbutt and Rolleston's System of Medicine (1907).

BERING (Behring), VITUS (1680-1741), Danish navigator, was born

in 1680 at Horsens. In 1703 he entered the Russian navy, and served in the Swedish war. A series of explorations of the north coast of Asia, the outcome of a far-reaching plan devised by Peter the Great, led up to Bering's first voyage to

Kamchatka. In 1 7 25, under the auspices of the Russian government, he went overland to Okhotsk, crossed to Kamchatka, and built the ship " Gabriel." In her he pushed northward in 1728, until he could no longer observe any extension of the land to the north, or its appearance to the east. In the following year he made an abortive search for land eastward, and in 1730 returned to St Petersburg. He was subsequently commissioned to a further expedition, and in 1740 established the settlement of Petropavlosk in Kamchatka; and built two vessels, the " St Peter " and " St Paul," in which in 1741 he led an expedition towards America. A storm separated the ships, but Bering sighted the southern coast of Alaska, and a landing was made at Kayak Island or in the vicinity. Bering was forced by adverse conditions to return quickly, and discovered some of the Aleutian Islands on his way back. He was afflicted with scurvy, and became too ill to command his ships, which were at last driven to refuge on an uninhabited island in the south-west of Bering Sea, where Bering himself and many of his company died. This island bears his name. Bering died on the 19th of December 1741. It was long before the value of his work was recognized; but Captain Cook was able to prove his accuracy as an observer.

See G. F. Midler, Sammlung russischer Ceschichten, vol. iii. (St Petersburg, 1758); P. Lauridsen, Bering og de Russiske Opdagelsesrejser (Copenhagen, 1885).

BERING ISLAND, SEA and STRAIT. These take their name from the explorer Vitus Bering. The island (also called Avatcha), which was the scene of his death, lies in the south- western part of the sea, off the coast of Kamchatka, being one of the Commander or Komandor group, belonging to Russia.

English Miles

100 200 300 400

It is 69 m. long and 28 m. in extreme breadth; the area is 615 sq. m. The extreme elevation is about 300 ft. The smaller Copper Island lies near. The islands are treeless, and the climate is severe, but there is a population of about 650. Bering Sea is the northward continuation of the Pacific Ocean, from which it is demarcated by the long chain

of the Aleutian Islands. It is bounded on the east by Alaska, and on the west by the Siberian and Kamchatkan coast. Its area is estimated at 870,000 sq. m. In the north and east it has numerous islands (St Lawrence, St Matthew, Nunivak and the Pribiloff group) and is shallow; in the south-west it reaches depths over 2000 fathoms. The seal-fisheries are important (see Bering Sea Arbitration). The sea is connected with the Arctic Ocean northward by Bering Strait, at the narrowest part of which East Cape (Deshnev) in Asia approaches within about 56 m. of Cape Prince of Wales on the American shore. North and south of these points the coasts on both sides rapidly diverge. They are steep and rocky, and considerably indented. The extreme depth of the strait approaches 50 fathoms, and it contains two small islands known as the Diomede Islands. These granite domes, lacking a harbour, lie about a mile apart, and the boundary line between the possessions of Russia and the United States passes between them. They are occupied by a small tribe of about 80 Eskimo, who have

from early times plied the trade of middlemen between Asia and America. They call the western island Nunarbook and the eastern Ignalook. Haze and fogs greatly prevail in the strait, which is never free of ice.

The earliest names associated with the exploration of Bering Strait are those of Russians seeking to extend their trading facilities. Isai Ignatiev made a voyage eastward from the Kolyma river in 1646, and Simon Dezhnev in 1648 followed his route and prolonged it, rounding the East or Dezhnev Cape, and entering the strait. The post of Anadyrsk was founded on the river Anadyr, and overland communications were gradually opened up. A Russian named Popov first learnt a rumour of the existence of islands east of Cape Dezhnev, and of the proximity of America, and presently there followed the explorations of Vitus Bering. In 1731 the navigator Michael Gvosdev was driven by storm from a point north of Cape Dezhnev to within sight of the Alaskan coast, which he followed for two days. Under Bering on his last voyage (1741) was Commander Chirikov of the " St Paul," and after being separated from his leader during foggy weather this officer reached the Alaskan coast and explored a considerable stretch of it. Lieutenant Waxel and William Steller, a naturalist, left at the head of Bering's party after his death, by their researches laid the foundation of the important fur trade of

these waters. The Aleutian Islands gradually became known in the pursuit of this trade, through Michael Novidiskov (1745) and his successors, and it was not until Captain James Cook, working from the south, explored the sea and strait in 1778 that the tide of discovery set farther northward.

BERING SEA ARBITRATION. The important fishery dispute between Great Britain and the United States, which was closed by this arbitration, arose in the following circum- stances.

In the year 1867 the United States government had purchased from Russia all her territorial rights in Alaska and the adjacent islands. The boundary between the two powers, as laid down by the treaty for purchase, was a line drawn from the middle of Bering Strait south-west to a point midway between the Aleutian and Komandorski Islands dividing Bering Sea into two parts, of which the larger was on the American side of this line. This portion included the Pribiloff Islands, which are the prin- cipal breeding-grounds of the seals frequenting those seas. By certain acts of congress, passed between 1868 and 1873, the killing of seals was prohibited upon the islands of the Pribiloff group and in " the waters adjacent thereto " except upon certain specified conditions. No definition of the meaning of the words " adjacent waters " was given in the act. In 1870 the exclusive rights of killing seals upon these islands was leased by the United States to the Alaska Commercial Company, upon conditions limiting the numbers to be taken annually, and otherwise pro- viding for their protection. As early as 1872 the operations of foreign sealers attracted the attention of the United States government, but any precautions then taken seem to have been directed against the capture of seals on their way through the passages between the Aleutian Islands, and no claim to juris- diction beyond the three-mile limit appears to have been put forward. On the 12th of March 1881, however, the acting secretary of the United States treasury, in answer to a letter asking for an interpretation of the words " waters adjacent thereto " in the acts of 1868 and 1873, stated that all the waters east of the boundary line were considered to be within the waters of Alaska territory. In March 1886 this letter was communi- cated to the San Francisco customs by Mr Daniel Manning, secretary of the treasury, for publication. In the same summer three British sealers, the " Carolena," " Onward " and " Thornton," were captured by an American revenue cutter 60 m. from land. They were condemned by the district judge on the express ground that they had been sealing within the limits of Alaska territory. Diplomatic representations followed, and an order for release was issued, but in 1887 further captures were made and were judicially supported upon

the same grounds. The respective positions taken up by the two govern-

ments in the controversy which ensued may be thus indicated. The United States claimed as a matter of right an exclusive jurisdiction over the sealing industry in Bering Sea; they also contended that the protection of the fur seal was, upon grounds both of morality and interest, an international duty, and should be secured by international arrangement. The British govern- ment repudiated the claim of right, but were willing to negotiate upon the question of international regulation. Between 1887 and 1890 negotiations were carried on between Russia, Great Britain and the United States with a view to a joint convention. Unfortunately the parties were unable to agree as to the prin- ciples upon which regulation should be based. The negotiations were wrecked upon the question of pelagic sealing. The only seal nurseries were upon the Pribiloff Islands, which belonged to the United States, and the Komandorski group, which be- longed to Russia. Consequently to prohibit pelagic sealing would have been to exclude Canada from the industry. The United States, nevertheless, insisted that such prohibition was indispensable on the grounds— (1) that pelagic scaling involved the destruction of breeding stock, because it was practically im- possible to distinguish between the male and female seal when in the water; (2) that it was unnecessarily wasteful, inasmuch as a large proportion of the seals so killed were lost. On the other hand, it was contended by Great Britain that in all known cases the extermination of seals had been the result of operations upon land, and had never been caused by sealing exclusively pelagic. The negotiations came to nothing, and the United States fell back upon their claim of right. In June 1890 it was reported that certain American revenue cutters had been ordered to proceed to Bering Sea. Sir Julian Pauncefote, the British ambassador at Washington, having failed to obtain an assurance that British vessels would not be interfered with, laid a formal protest before the United States government.

Thereupon followed a diplomatic controversy, in the course of which the United States developed the contentions which were afterwards laid before the tribunal of arbitration. The claim that Bering Sea was mare clausum was abandoned, but it was asserted that Russia had formerly exercised therein rights of exclusive jurisdiction which had passed to the United States, and they relied inter alia upon the ukase of 182 1, by which foreign vessels had been forbidden to approach within 100 Italian miles of the coasts of Russian America. It was pointed out by Great Britain that this ukase had been the subject of protest both by Great Britain and the United States, and that by

treaties similar in their terms, made between Russia and each of the protesting powers, Russia had agreed that their subjects should not be troubled or molested in navigating or fishing in any part of the Pacific Ocean. The American answer was that the Pacific Ocean did not include Bering Sea. They also claimed an interest in the fur seals, involving the right to protect them outside the three-mile limit. In August 1890 Lord Salisbury proposed that the question at issue should be submitted to arbitration. This was ultimately assented to by the secretary of state, James Gillespie Blaine, on the understanding that certain specific points, which he indicated, should be laid before the arbitrators. On the 29th of February 1892 a definitive treaty was signed at Washington. Each power was to name two arbitrators, and the president of the French Republic, the king of Italy, the king of Norway and Sweden were each to name one. The points submitted were as follows: — (1) What exclusive jurisdiction in the sea now known as Bering Sea, and what exclusive rights in the seal fisheries therein, did Russia assert and exercise prior to and up to the time of the cession of Alaska to the United States? (2) How far were her claims of jurisdiction as to the seal fisheries recognized and conceded by Great Britain? (3) Was the body of water now known as Bering Sea included in the phrase " Pacific Ocean," as used in the treaty of 1825 between Great Britain and Russia, and what rights, if any, in Bering Sea were held exclusively exercised by Russia after the said treaty? (4) Did not all the rights of Russia as to jurisdiction and as to the seal fisheries in Bering Sea east of the water boundary, in the treaty between the United States and Russia of the 30th o>

March 1867, pass unimpaired to the United States under that treaty? (5) Had the United States any and what right of pro- tection over, or property in, the fur seals frequenting the islands of Bering Sea when such seals are found outside the three-mile limit? In the event of a determination in favour of Great Britain the arbitrators were to determine what concurrent regulations were necessary for the preservation of the seals, and a joint commission was to be appointed by the two powers to assist them in the investigation of the facts of seal life. The question of damages was reserved for further discussion, but either party was to be at liberty to submit any question of fact to the arbitrators, and to ask for a finding thereon. The tribunal was to sit at Paris. The treaty was approved by the Senate on the 29th of March 1892, and ratified by the president on

the 22nd of April.

The United States appointed as arbitrator Mr John M. Harlan, a justice of the Supreme Court, and Mr John T. Morgan, a member of the Senate. The British arbitrators were Lord Hannen and Sir John Thompson. The neutral arbitrators were the baron de Courcel, the marquis Visconti Venosta, and Mr Gregers Gram, appointed respectively by the president of the French Republic, the king of Italy, and the king of Norway and Sweden. The sittings of the tribunal began in February and ended in August 1893. The main interest of the proceedings lies in the second of the two claims put forward on behalf of the United States. This claim cannot easily be stated in language of precision; it is indicated rather than formulated in the last of the five points specially submitted by the treaty. But its general character may be gathered from the arguments addressed to the tribunal. It was suggested that the seals had some of the characteristics of the domestic animals, and could therefore be the subject of something in the nature of a right of property. They were so far amenable to human control that it was possible to take their increase without destroying the stock. Sealing upon land was legitimate. sealing; the United States being the owners of the land, the industry was a trust vested in them for the benefit of mankind. On the other hand, pelagic sealing, being a method of promiscuous slaughter, was illegitimate; it was contra bonos mores and analogous to piracy. Consequently the United States claimed a right to restrain such practices, both as proprietors of the seals and as proprietors and trustees of the legitimate industry. It is obvious that such a right was a novelty hitherto unrecognized by any system of law. Mr J. C. Carter, therefore, as counsel for the United States, submitted a theory of international jurisprudence which was equally novel. He argued that the determination of the tribunal must be grounded upon " the principles of right," that " by the rule or principle of right was meant a moral rule dictated by the general standard of justice upon which civilized nations are agreed, that this international standard of justice is but another name for international law, that the particular recognized rules were but cases of the application of a more general rule, and that where the particular rules were silent the general rule applied." The practical result of giving effect to this contention would be that an international tribunal could make new law and apply it retrospectively. Mr Carter's contention was successfully com bated by Sir Charles Russell, the leading counsel for Great Britain.

The award, which was signed and published on the 15th of August 1893, was in favour of Great Britain on all points. The question of

damages, which had been reserved, was ultimately settled by a mixed commission appointed by the two powers in February 1896, the total amount awarded to the British sealers being $473,151.26. (M. H. C.)

BERIOT, CHARLES AUGUSTE DE (180.2-1870), Belgian violinist and composer. Although not definitely a pupil of Viotti or Baillot he was much influenced by both. He was very successful in his concert tours, and held appointments at the courts of Belgium and France. From 1843 to 1852 he was violin professor at the Brussels conservatoire. Then his eyesight began to fail, and in 1858 he became blind. His compositions are still often played, and are good, clean displays of technique.

BERJA, a town of southern Spain, in the province of Almeria; on the south-eastern slope of the Sierra de Gador\ 10 m. N.E. of Adra by road, Pop. (1900) 13,224. Despite the lack of a rail- way Berja has a considerable trade. Lead is obtained among the mountains, and the more sheltered valleys produce grain, wine, oil, fruit and esparto grass. These, with the paper, linen and cotton goods manufactured locally in small quantities, are exported from Adra.

BERKA, a town and watering-place of Germany, in the grand- duchy of Saxe- Weimar, on the Ilm and the Weimar-Kranichfeld railway, 8 m. S. of Weimar. Pop. 2300. It has sulphur baths, which are largely frequented in the summer. Berka was once celebrated for its Cistercian nunnery, founded in 12 51. Two m. down the Ilm is the curious castle of Burgfarth, partly hewn out of the solid rock.

BERKELEY, the name of an ancient English family remark- able for its long tenure of the feudal castle built by the water of Severn upon the lands from which the family takes its name. It traces an undoubted descent from Robert (d. n 70) son of Harding. Old pedigree-makers from the 14th century onward have made of Harding a younger son of a king of Denmark and a companion of the Conqueror, while modern historians assert his identity with one Harding who, although an English thane, is recorded by Domesday Book in 1086 as a great landowner in Somerset. This Harding the thane was son of Elnod or Alnod, who is recognized as Eadnoth the Staller, slain in beating off the sons of Harold when they attacked his county. But if Hard- ing the Berkeley ancestor be the Harding who, as the queen's butler, witnesses King Edward's Waltham charter of 1062, his dates seem strangely apart from those of Robert his son, dead a hundred and eight years later. Of Robert fitz Harding we know that he was a Bristol man whose wealth and importance were

probably increased by the trade of the port. A partisan of Henry, son of the empress, that prince before his accession to the throne granted him, by his charter at Bristol in the earlier half of 1153, the Gloucestershire manor of Bitton, and a hundred librates of land in the manor of Berkeley, Henry agreeing to strengthen the castle of Berkeley, which was evidently already in Robert's hands. In his rhvmed chronicle Robert of Glou- cester tells how —

" A bourgois at Bristowe — Robert Harding Vor gret tresour and richesse — so wel was mid the king That he gat him and is eirs — the noble baronie That so riche is of Berkele — mid al the seignorie."

Later in the same year the duke of Normandy granted to Robert fitz Harding Berkeley manor and the appurtenant district called " Berkelaihernesse," to hold in fee by the service of one knight or at a rent of 100 s. Being at Berkeley, the duke confirmed to Robert a grant of Bedminster made by Robert, earl of Gloucester, and in the first year of his reign as king of England he confirmed his own earlier grant of the Berkeley manor. About this time Robert, who had founded St Augustine's Priory in Bristol, gave to the Black Canons there the five churches in Berkeley and Berkeley Herness. In their priory church he was buried in n 70, Berkeley descending to his son and heir Maurice. Berkeley had already given a surname to an earlier family sprung from Roger, its Domesday tenant, whose descendants seem to have been ousted by the partisan of the Angevin. But if there had been a feud between the families it was ended by a double alliance, a covenant having been made at Bristol about November n 53 in the presence of Henry, duke of Normandy, whereby Maurice, son of Robert fitz Harding, was to marry the daughter of Roger of Berkeley, Roger's own son Roger marrying the daughter of Robert. In his certificate of 1166 Robert tells the king that, although he owes the service of five knights for Berkeley, Roger of Berkeley still holds certain lands of the honour for which he does no service to Robert. This elder line of Berkeley survived for more than two centuries on their lands of Dursley and Cubberley, but after his father's death Maurice, son of Robert, is styled Maurice of Berkeley. Robert of Berkeley, the eldest son of Maurice, paid in n 90 the vast sum of £1000 for livery of his great inheritance, but, rising with the rebellious

barons against King John, his castle was taken into the king's hands.

Seizin, however, was granted in 1220 to Thomas his brother and heir, but the estate was again forfeit in the next generation for a new defection, although the wind of the royal displeasure was tempered by the fact that Isabel de Creoun, wife of Maurice, lord of Berkeley, was the king's near kins- woman. Thomas, son of Maurice, was allowed to succeed his father in the lands, and, having a writ of summons to parlia- ment in 1295, he is reckoned the first hereditary baron of the line.

Even in the age of chivalry the lords of Berkeley were notable warriors. Thomas, who as a lad had ridden on the barons' side at Evesham, followed the king's wars for half a century of his long life, flying his banner at Falkirk and at Bannockburn, in which fight he was taken by the Scots. His seal of arms is among those attached to the famous letter of remonstrance addressed by the barons of England to Pope Boniface VIII. Maurice, his son, joined the confederation against the two Despensers, and lay in prison at Wallingford until his death in 1326, the queen's party gaining the upper hand too late to release him. But as the queen passed by Berkeley on her way to seize Bristol, she gave back the castle, which had been kept by the younger Despenser, to Thomas, the prisoner's heir, who, with Sir John Mautravers, soon received in his hold the deposed king brought thither secretly. The chroniclers agree that Thomas of Berkeley had no part in the murder of the king, whom he treated kindly. It was when Thomas wasaway from thecastlethat Mautravers and Gournay made an end of their charge. Through the providence of this Thomas the Berkeley estates were saved to the male line of his house, a fine levied in the twenty-third year of Edward III. so settling them. Thomas of Berkeley fought at Crecy and Calais, bringing six knights and thirty-two squires to the siege in his train, with thirty mounted archers and two hundred men on foot. His son and heir-apparent, Maurice of Berkeley, was the hero of a misadventure recorded by Froissart, who tells how a young English knight, displaying his banner for the first time on the day of Poitiers, rode after a flying Picard squire, by whom he was grievously wounded and held to ransom. Froissart errs in describing this knight as Thomas, lord of Berkeley, for the covenant made in 1,360 for the release of Maurice is still among the Berkeley muniments, the ransom being stated at £1080.

Being by his mother a nephew of Roger Mortimer, earl of March, the paramour of Queen Isabel, Maurice Berkeley married Elizabeth, daughter of Hugh Despenser, the younger of Edward II. 's favourites and the intruder in Berkeley Castle. With his son and heir Thomas of Berkeley, one of the com- missioners of parliament for the deposing

of Richard II. and a warden of the Welsh marches who harried Owen of Glendower, the direct male line of Robert fitz Harding failed, and but for the settlement of the estates Berkeley would have passed from the family. On this Thomas's death in 1417 Elizabeth, his daughter and heir, and her husband, Richard Beauchamp, earl of Warwick, the famous traveller, statesman and jouster, seized Berkeley Castle. Earl and countess only withdrew after James Berkeley, the nephew and heir male, had livery of his lands by the purchased aid of Humphrey of Gloucester. But the Beauchamps returned more than once to vain attacks on the stout walls of Berkeley, and a quarrel of two generations ended with the pitched battle of Nibley Green. Fought between the retainers of William, Lord Berkeley, son of James, and those who followed Thomas Talbot, Viscount Lisle, grandson of the illustrious Talbot and great-grandson of the countess of Warwick, this was the last private battle on English ground between two feudal lords. Young Lisle was shot under the beaver by an arrow, and the feud ended with his death, all claims of his widow being settled with an annuity of £100. Bitter as was the long quarrel, it kept the Berkeleys from casting their interest into the Wars of the Roses, in which most of their fellows of the ancient baronage sank and disappeared.

The victorious Lord Berkeley, whose children died young, was on ill terms with his next brother, and made havoc of the great

Berkeley estates by grants to the Crown and the royal house, for which he was rewarded with certain empty titles. Edward IV. gave him a viscount's patent in 1481, and Richard III. created him earl of Nottingham in 1483. His complacence extending to the new dynasty, Henry VII. made him earl marshal in 1485 and marquess of Berkeley in 1487. For this last patent he, by a settlement following a recovery suffered, gave the king and his heirs male Berkeley Castle and all that remained to him of his ancestors' lands, enjoying for his two remaining years a bare life interest. At his death in 1491 the king took possession, bringing his queen with him on a visit to Berkeley.

Here follows a curious chapter of the history of the Berkeley peerage. When Thomas, Lord Berkeley, died in 1417, it might have been presumed that his dignity would descend to his heir, the countess of Warwick. Nevertheless, his nephew and heir male was summoned as a baron from 1421, apparently by reason of his tenure of the castle and its lands. When the marquess of Berkeley was dead without surviving issue, the castle having passed to the crown, Maurice, the brother and heir, had no summons. Yet this Maurice's son, another Maurice, had a summons as a baron, although not " with the room in

the parliament chamber that the lords of Berkeley had of old time." The old precedence was restored when Thomas, brother and heir of this baron, was summoned. This Thomas, who had a com- mand at Flodden, held his ancestors' castle as constable for the king. A final remainder under the marquess's settlement brought back castle and lands on the failure in 1553 of the heirs male of the body of Henry VII., and Henry, Lord Berkeley, had special livery of them in his minority. Yet although seized of the castle he took a lower seat in the parliament house than did his grandfather who was not so seized, being given place after Abergavenny, Audley and Strange.

By these things we may see that peerage law in old time rested upon the pleasure of the sovereign and upon no ascertained and unvarying custom. Of the power behind that pleasure this Henry. Lord Berkeley, had one sharp reminder. He was, like most of his line, a keen sportsman, and, returning to Berkeley to find that a royal visit had made great slaughter among his deer, he showed his resentment by disparking Berkeley Park. Thereat Queen Elizabeth sent him a warning in round Tudor fashion. Let him beware, she wrote, for the earl of Leicester coveted the castle by the Severn.

At the Restoration, George, Lord Berkeley, who had been one of the commissioners to invite Charles II. 's return from the Hague, petitioned for a higher place in parliament, claiming a barony by right of tenure before 1255, but his claim was silenced by his advancement on September n, 1679, to be viscount of Dursley and earl of Berkeley. James, the 3rd earl, an active sea captain who was all but lost in company with Sir Cloudesley Shovel, became knight of the Garter and lord high admiral and commander-in-chief in the Channel, he and his house being loyal supporters of the Hanoverian dynasty.

The last and most curious chapter of the history of the Berkeley honours was opened by Frederick Augustus, the 5th earl of Berkeley (1745-1810). This peer married at Lambeth, on the 16th of May 1796, one Mary Cole, the daughter of a small tradesman at Wotton-under-Edge, with whom he had already lived for several years, several children having been born to them. In order to legitimatize the issue born before the marriage, the earl in 1801 made declaration of an earlier marriage contracted privately at Berkeley in 1785. On his death in 1811 the validity of this alleged marriage was tested by the committee of privileges of the House of Lords, and it was shown without doubt that the evidence for it, a parish register entry, was a forgery.

Under the will of his father, Colonel William Berkeley, the eldest illegitimate son, had the castle and estates, and on the failure of his claim to the earldom he demanded a writ of summons as a baron by reason of his tenure of the castle. No judgment was given in the matter, the king in council having declared in 1669 that baronies by tenure were " not in being and so not fit to be revived." But Colonel Berkeley's political influence afterwards procured him (1831) a peerage as Lord Segrave of

Berkeley, and ten years later an earldom with the title of Fitz-hardinge. He died without issue in 1857. His brother, Sir Maurice Fitzhardinge Berkeley, who succeeded to Berkeley under the terms of the 5th earl's will, revived the claims, and was likewise given a new barony (1861) as Lord Fitzhardinge, a title in which he was succeeded by two of his sons, the 3rd baron (b. 1830) being in 1909 owner of the Berkeley and Cranford estates. The earldom of Berkeley was never assumed by the eldest legitimate son of the 5th earl, and was in 1909 enjoyed by Randal Thomas Mowbray Berkeley, 8th earl, grandson of admiral Sir George Cranfield Berkeley, second &.m of the 4th earl. In 1893 Mrs Milman (d. 1 899) , daughter and heir of Thomas Moreton Fitzhardinge Berkeley, 6th earl de jure, was declared by letters patent under the great seal to have succeeded to the ancient barony of Berkeley created by the writ of 142 1; and she was succeeded by her daughter.

Many branches have been thrown out by this family during its many centuries of existence. Of these the most important descended from Maurice of Berkeley, the baron who died in Wallingford hold in 1326. His second son Maurice was ancestor of the Berkeleys of Stoke Giffard, whose descendant, Norborne Berkeley, claimed the barony of Botetourt and had a summons in 1764, dying without issue in 1770. Sir Maurice Berkeley of Bruton, a cadet of Stoke Giffard, was forefather of the Viscounts Fitzhardinge, the Lords Berkeley of Stratton (1658-1773) and the earls of Falmouth, all extinct, the Berkeleys of Stratton bequeathing their great London estate, including Berkeley Square and Stratton Street, to the main line. Edward Berkeley of Pylle in Somerset, head of a cadet line of the Bruton family, married Philippa Speke, whose mother was Joan, daughter of Sir John Portman of Orchard Portman, baronet. His grandson William, on succeeding to the Orchard Portman and Bryanston estates, took the additional name of Portman, and from

him come the Viscounts Portman of Bryanston (1873). From James, Lord Berkeley, who died in 1463, descended Rowland Berkeley, a clothier of Worcester, who bought the estates of Spetchley. Rowland's second son, Sir Robert Berkeley, the king's bench justice who supported the imposition of ship-money, was ancestor of the Berkeleys of Spetchley, now the only branch of the house among untitled squires.

See John Smyth's Lives of the Berkeleys, compiled c. 1618, edited by Sir John Maclean (1883-1885); J. H. Round's introduction to the Somerset Domesday, V.C.H. series; G. E. C(okayne)'s Complete Peerage; Jeayes's Descriptive Catalogue of the Charters and Muniments at Berkeley Castle (1892); Dictionary of National Biography; Transactions of Bristol and Gloucestershire Archaeological Society, 3 vols., viii., xlv., et passim; The Red Book of the Exchequer, Chronicles of Roger of Wendover, Matthew Paris, Adam of Muri- muth, Robert of Gloucester, Henry of Huntingdon, &c. (Rolls Series) ; British Museum Charters, &c. (O. Ba.)

BERKELEY, GEORGE (1685-1753"), Irish bishop and philo- sopher, the eldest son of William Berkeley (an officer of customs who had, it seems, come to Ireland in the suite of Lord Berkeley of Stratton, lord lieutenant, 1670-1672, to whom he was related), was born on the 12th of March 1685, in a cottage near Dysert Castle, Thomastown, Ireland. He passed from the school at Kilkenny to Trinity College, Dublin (1700), where, owing to the peculiar subtlety of bis mind and his determination to accept no doctrine on the evidence of authority or convention, he left the beaten track of study and was regarded by some as a dunce, by others as a genius. During his career at Dublin the works of Descartes and Newton were superseding the older text-books, and the doctrines of Locke's Essay were eagerly discussed. Thus he " entered on an atmosphere which was beginning to be charged with the elements of reaction against traditional scholasticism in physics and in metaphysics " (A. C. Fraser). He became a fellow in 1707. His interest in philosophy led him to take a prominent share in the foundation of a society for discussing the new doctrines, and is further shown by his Common Place Book, one of the most valuable autobiographical records in existence, which throws much light on the growth of his ideas, and enables us to understand the significance of his early writings. We find here the consciousness of creative thought focused in a mew principle which is to revolutionize speculative science.

There is no sign of any intimate knowledge of ancient or scholastic thought; to the doctrines of Spinoza, Leibnitz, Malebranche, Norris,

the attitude is one of indifference or lack of appreciation, but the influence of Descartes and specially of Locke is evident throughout. The new principle (nowhere in the Common Place Book explicitly stated) may be expressed in the proposition that no existence is conceivable — and therefore possible — which is not either conscious spirit or the ideas (i.e. objects) of which such spirit is conscious. In the language of a later period this principle may be expressed as the absolute synthesis of subject and object; no object exists apart from Mind. Mind is, therefore, prior both in thought and in existence, if for the moment we assume the popular distinction. Berkeley thus diverted philosophy from its beaten track of discussion as to the meaning of matter, substance, cause, and preferred to ask first whether these have any signifi- cance apart from the conscious spirit. In the pursuit of this inquiry he rashly invaded other departments of science, and much of the Common Place Book is occupied with a polemic, as vigorous as it is ignorant, against the fundamental conceptions of the infinitesimal calculus.

In 1707 Berkeley published two short mathematical tracts; in 1709, in his New Theory of Vision, he applied his new prin- ciple for the first time, and in the following year stated it fully in the Principles of Human Knowledge. In these works he attacked the existing theories of externality which to the un- philosophical mind is proved by visual evidence. He maintained that visual consciousness is merely a system of arbitrary signs which symbolize for us certain actual or possible tactual experi- ence — in other words a purely conventional language.

The contents of the visual and the tactual consciousness have no element in common. The visible and visual signs are definitely connected with tactual experiences, and the associa- tion between them, which has grown up in our minds through custom or habit, rests upon, or is guaranteed by, the constant conjunction of the two by the will of the Universal Mind. But this synthesis is not brought forward prominently by Berkeley. It was evident that a similar analysis might have been applied to tactual consciousness which does not give externality in its deepest significance any more than the visual; but with de- liberate purpose Berkeley at first drew out only one side of his argument. In the Principles of Human Knowledge, externality in its ultimate sense as independence of all mind is considered. Matter, as an abstract, unperceived substance or cause, is shown to be impossible, an unreal conception; true substance is affirmed to be conscious spirit, true causality the free activity of such a spirit, while physical substantiality and causality are held to be merely arbitrary, though constant, relations among phenomena

connected subjectively by suggestion or association, objectively in the Universal Mind. In ultimate analysis, then, nature is conscious experience, and forms the sign or symbol of a divine, universal intelligence and will.

In 171 1 Berkeley delivered his Discourse on Passive Obedience, in which he deduces moral rules from the intention of God to promote the general happiness, thus working out a theological utilitarianism, which may be compared with the later exposi- tions of Austin and J. S. Mill. From 1707 he had been engaged as college tutor; in 1712 he paid a short visit to England, and in April 1 713 he was presented by Swift at court. His abilities, his courtesy and his upright character made him a universal favourite. While in London he published his Dialogues (1713), a more popular exposition of his new theory; for exquisite facility of style these are among the finest philosophical writings in the English language. In November he became chaplain to Lord Peterborough, whom he accompanied on the continent, returning in August 17 14. He travelled again in 1 715-1720 as tutor to the only son of Dr St George Ashe (?i658-i7i8, bishop successively of Cloyne, Clogher and Derry). In 172 1, during the disturbed state of social relations consequent on the bursting of the South Sea bubbly he published an Essay towards preventing the Ruin of Great Britain, which shows the intense interest he took in practical affairs. In the same year he returned to Ireland as chaplain to the duke of Grafton, and was made

divinity lecturer and university preacher. In 1722 he was appointed to the deanery of Dromore, a post which seems to have entailed no duties, as we find him holding the offices of Hebrew lecturer and senior proctor at the university. The following year Miss Vanhomrigh, Swift's Vanessa, left him half her property. It would appear that he had only met her once at dinner. In 1724 he was nominated to the rich deanery of Derry, but had hardly been appointed before he was using every effort to resign it in order to devote himself to his scheme of founding a college in the Bermudas, and extending its benefits to the Americans. With infinite exertion he succeeded in obtain- ing from government a promise of £ 20,000, and after four years spent in preparation, sailed in September 1728, accompanied by some friends and by his wife, daughter of Judge Forster, whom he had married in the preceding month. Three years of quiet retirement and study were spent in Rhode Island, but it

gradu- ally became apparent that government would never hand over the promised grant, and Berkeley was compelled to give up his cherished plan. Soon after his return he published the fruits of his studies in Alciphron, or the Minute Philosopher (1733), a finely written work in the form of dialogue, critically examining the various forms of free-thinking in the age, and bringing forward in antithesis to them his own. theory, which shows all nature to be the language of God. In 1734 he was raised to the bishopric of Cloyne. The same year, in his A nalyst, he attacked the higher mathematics as leading to freethinking; this involved him in a hot controversy. The Querist, a practical work in the form of questions on what would now be called social or economical philosophy, appeared in three parts, 1735, 1736, 1737. In 1744 was published the Siris, partly occasioned by the controversy as to the efficacy of tar-water in cases of small-pox, but rising far above the circumstance from which it took its rise, and revealing hidden depths in the Berkeleian metaphysics. In 1 75 1 his eldest son died, and in 1752 he removed with his family to Oxford for the sake of his son George, who was studying there. He died suddenly in the midst of his family on the 14th of January 1753, and was buried in Christ Church, Oxford.

In the philosophies of Descartes and Locke a large share of atten- tion had been directed to the idea of matter, which was held to be the abstract, unperceived background of real experience, and was supposed to give rise to our ideas of external things through its action on the sentient mind. Knowledge being limited to the ideas produced could never extend to the unperceived matter, or substance, or cause which produced them, and it became a problem for specu- lative science to determine the grounds for the very belief in its existence. Philosophy seemed about to end in scepticism or in materialism. Now Berkeley put this whole problem in a new light by pointing out a preliminary question. Before we deduce results from such abstract ideas as cause, substance, matter, we must ask what in reality do these mean — what is the actual content of con- sciousness which corresponds to these words? Do not all these ideas, when held to represent something which exists absolutely apart from all knowledge of it, involve a contradiction? In putting this question, not less than in answering it, consists Berkeley's originality as a philosopher. The essence of the answer is that the universe is inconceivable apart from mind — that existence, as such, denotes conscious spirits and the objects of consciousness. Matter and external things, in so far as they are thought to have an exist- ence beyond the circle of consciousness, are impossible, inconceiv- able. External things are things known to us in immediate per- ception. To

this conclusion Berkeley seems, in the first place, to have been led by the train of reflection that naturally conducts to subjective or egoistic idealism. It is impossible to overstep the limits of self-consciousness; whatever words I use, whatever notions I have, must refer to and find their meaning in facts of con- sciousness. But this is by no means the whole or even the principal part of Berkeley's philosophy; it is essentially a theory of causality, and this is brought out gradually under the pressure of difficulties in the first solution of the early problem. To merely subjective idealism, sense percepts differ from ideas of imagination in degree, not in kind; both belong to the individual mind. To Berkeley, however, the difference is fundamental ; sense ideas are not due to our own activity; they must therefore be produced by some other will — by the divine intelligence. Sense experience is thus the con- stant action upon our minds of supreme active intellect, and is not the consequence of dead inert matter. It might appear, therefore, that sensible things had an objective existence in the mind of God ; that an idea so soon as it passes out of our consciousness passes into that of God. This is an interpretation, frequently and not without some justice, put upon Berkeley's own expression. But it is not a

satisfactory account of his theory. Berkeley is compelled to see that an immediate perception is not a thing, and that what we consider permanent or substantial is not a sensation but a group of qualities, which in ultimate analysis means sensations either immediately felt or such as our experience has taught us would be felt in conjunction with these. Our belief in the reality of a thing may therefore be said to mean assurance that this association in our minds between actual and possible sensations is somehow guaranteed. Further, Berkeley's own theory would never permit him to speak of possible sensations, meaning by that the ideas of sensations called up to our minds by present experience. He could never have held that these afforded any explanation of the permanent existence of real objects. His theory is quite distinct from this, which really amounts to nothing more than subjective idealism. External things are produced by the will of the divine intelligence; they are caused, and caused in a regular order; there exists in the divine mind archetypes, of which sense experience may be said to be the realization in our finite minds. Our belief in the permanence of something which corresponds to the association in our minds of actual and possible sensations means belief in the orderliness of nature ; and that is merely assurance that the universe is pervaded and regulated by mind. Physical science is occupied in endeavouring to decipher the divine ideas which find realization in our limited experience, in trying to interpret the divine language of

which natural things are the words and letters, and in striving to bring human conceptions into harmony with the divine thoughts. Instead, therefore, of fate or necessity, or matter, or the unknown, a living, active mind is looked upon as the centre and spring of the universe, and this is the essence of the Berkeleian metaphysics.

The deeper aspects of Berkeley's new thought have been almost universally neglected or misunderstood. Of his spiritual empiri- cism one side only has been accepted by later thinkers, and looked upon as the whole. The subjective mechanism of association which with Berkeley is but part of the true explanation, and is dependent on the objective realization in the divine mind, has been received as in itself a satisfactory theory. Sunt Cogitationes has been regarded by thinkers who profess themselves Berkeleians as the one proposition warranted by consciousness; the empiricism of his philo- sophy has been eagerly welcomed, while the spiritual intuition, without which the whole is to Berkeley meaningless, has been cast aside. For this he is himself in no small measure to blame. The deeper spiritual intuition, present from the first, was only brought into clear relief in order to meet difficulties in the earlier statements, and the extension of the intuition itself beyond the limits of our own consciousness, which completely removes his position from mere subjectivism, rests on foundations uncritically assumed, and at first sight irreconcilable with certain positions of his system. The necessity and universality of the judgments of causality and substantiality are taken for granted ; and there is no investigation of the place held by these notions in the mental constitution. The relation between the divine mind and finite intelligence, at first thought as that of agent and recipient, is complicated and obscure when the necessity for explaining the permanence of real things comes forward. The divine archetypes, according to which sensible experience is regulated and in which it finds its real objectivity, are different in kind from mere sense ideas, and the question then arises whether in these we have not again the " things as they are," which Berkeley at first so contemptuously dismissed. He leaves it un- determined whether or not our knowledge of sense things, which is never entirely presentative, involves some reference to this objective course of nature or thought of the divine mind. And if so, what is the nature of the notions necessarily implied in the simplest know- ledge of a thing, as distinct from mere sense feeling? That in know- ing objects certain thoughts are implied which are not presentations or their copies is at times dimly seen by Berkeley himself; but he was content to propound a question with regard to those notions, and to look upon them as merely Locke's ideas of relation. Such ideas of relation are in truth the stumbling-

block in Locke's philo- sophy, and Berkeley's empiricism is equally far from accounting for them.

With all these defects, however, Berkeley's new conception marks a distinct stage of progress in human thought. His true place in the history of speculation may be seen from the simple observation that the difficulties or obscurities in his scheme are really the points on which later philosophy has turned. He once for all lifted the problem of metaphysics to a higher level, and, in conjunction with his successor, Hume, determined the form into which later meta- physical questions have been thrown.

Bibliography. — The standard edition of Berkeley's works is that of A. Campbell Fraser in 4 vols, (i.-iii. Works; iv. Life, Letters and Dissertation) published by the Clarendon Press (1871); this edition, revised throughout and largely re-written, was re-published by the same author (1 901) . Another complete edition edited by G. Sampson, with a biographical sketch by A. J. Balfour, and a useful biblio- graphical summary, appeared in 1897-1898. Prof. Fraser also pub- lished an excellent volume of selections (5th ed., 1899), and a short general account in a volume on Berkeley in the Blackwood Philos. Class. For Berkeley's theory of vision see manuals of psychology {e.g. G. F. Stout, Wm. James) ; for his ethical views H. Sidgwick, Hist, of Ethics (5th ed., 1902); A. Bain, Mental and

Moral Science (1872). See also Sir L. Stephen, English Thought in the 18th Century (3 r d ed., 1902); J. S. Mill's Dissertations, vols. ii. and iv. ; T. Huxley, Critiques and Addresses, pp. 320 seq.; G. S. Fullerton, System of Metaphysics (New York, 1904) ; John Watson, Outline of Philos. (New York, 1898) ; J. McCosh, Locke's Theory of Knowledge (1884); T. Lorenz, Ein Beitrag zur Lebens- geschichte G. Berkeleys (1900) and Weitere Beitrdge i. Leb. G. B.'s (1901): histories of modern philosophy generally. V (R. Ad.; J. M. M.)

BERKELEY, MILES JOSEPH (1803-1889), English botanist, was born on the 1st of April 1803, at Biggin Hall, Northampton- shire, and educated at Rugby and Christ's College, Cambridge, of which he became an honorary fellow. Taking holy orders, he became incumbent of Apethorpe in 1837, and vicar of Sibber- toft, near Market Harborough, in 1868. He acquired an enthusiastic love of cryptogamic botany in his early years, and soon was recognized as

the leading British authority on fungi and plant pathology. He was especially famous as a systematist in mycology, some 6000 species of fungi being credited to him, but his Introduction to Cryptogamic Botany, published in 1857, and his papers on " Vegetable Pathology " in the Gardener's Chronicle in 1854 and onwards, show that he had a very broad grasp of the whole domain of physiology and morphology as understood in those days. Moreover, it should be pointed out that Berkeley began his work as a field naturalist and collector, his earliest objects of study having been the mollusca and other branches of zoology, as testified by his papers in the Zoological Journal and the Magazine of Natural History, between 1828 and 1836. As a microscopist he was an assiduous and accurate worker, as is shown by his numerous drawings of the smaller algae and fungi, and his admirable dissections of mosses and hepaticae. His investigations on the potato murrain, caused by Phytophthora infestans, on the grape mildew, to which he gave the name Oidium Tuckeri, and on the pathogenic fungi of wheat rust, hop mildew, and various diseases of cabbage, pears, coffee, onions, tomatoes, &c, were important in results bearing on the life-history of these pests, at a time when very little was known of such matters, and must always be considered in any his- torical account of the remarkable advances in the biology of these organisms which were made between 1850 and 1880; and when it is remembered that this work was done without any of the modern appliances or training of a properly equipped laboratory, the real significance of Berkeley's pioneer work becomes apparent. It is as the founder of British mycology, however, that his name will live in the history of botany, and his most important work is contained in the account of native British fungi in Sir W. Hooker's British Flora (1836), in his Introduction to Cryptogamic Botany (1857), and in his Outlines of British Fungology (i860). His magnificent herbarium at Kew, which contains over 9000 specimens, and is enriched by numerous notes and sketches, forms one of the most important type series in the world. Berkeley died at Sibbertoft on the 30th of July 1889. He was a man of refined and courteous bearing, an accomplished classical student, with the simple and modest habits that befit a man of true learning.

A list of his publications will be found in the Catalogue of Scien- tific Papers of the Royal Society, and sketches of his life In Proc. Roy. Soc, 1890, 47, 9, by Sir Joseph Hooker, and Annals of Botany, 1897, 11/ by Sir W. T. Thiselton-Dyer. (H. M. W.)

BERKELEY, SIR WILLIAM (c. 1608-1677), British colonial governor in America, was born in or near London, England, about 1608, the youngest son of Sir Maurice Berkeley, an original member of the

London Company of 1606, and brother of John, first Lord Berkeley of Stratton, one of the proprietors of the Carolinas. He graduated at Oxford in 1629, and in 1632 was appointed one of the royal commissioners for Canada, in which office he won the personal favour of Charles I., who appointed him a gentleman of the privy chamber. During this period he tried his hand at literary work, producing among other things a tragi-comedy entitled The Lost Lady (1638). In August 1641 he was appointed governor of Virginia, but did not take up his duties until the following year. His first term as governor, during which he seems to have been extremely popular with the majority of the colonists, was notable principally for his

religious intolerance and his expulson of the Puritans, who were in a great minority. During the Civil War in England he remained loyal to the king, and offered an asylum in Virginia to Charles II. and the loyalists. On the arrival of a parliamen- tary fleet in 1652, however, he retired from office and spent the following years quietly on his plantation. On the death, in 1660, of Samuel Matthews, the last parliamentary governor, he was chosen governor by the Virginia assembly, and was soon recommissioned by Charles II. His natural arrogance and tyranny seems to have increased with years, and the second period of his governorship was a stormy one. Serious frontier warfare with the Indians was followed (1676) by Bacon's Re- bellion (see Virginia), brought on by Berkeley's misrule, and during its course all his worst traits became evident. His cruelty and barbarity in punishing the rebels did not meet with the approval of Charles II., who is said to have remarked that " the old fool has put to death more people in that naked country than I did here for the murder of my father." Berkeley was called to England in 1677 ostensibly to report on the condition of affairs in the colony, and a lieutenant-governor (Herbert Jeffreys) was put in his place. Berkeley sailed in May, but died soon after his arrival, at Twickenham, and was buried there on the 13th of July 1677. In addition to the play mentioned he wrote A Discourse and View of Virginia (London,

1663).

BERKELEY, a city of Alameda county, California, U.S.A., on the E. shore of San Francisco Bay, named after Bishop Berkeley on account of his line " Westward the course of empire takes its way." Pop. (1890) 5101; (1900) 13,214, of whom 3216 were foreign-born; (1910) 40,434. It is served by the Southern Pacific and the Santa Fe railway systems, both transcontinental; and is connected by electric lines (and ferry) with San Francisco, and by five electric lines with Oakland. Its attractive situation and pleasant outlooks have made it

a favourite residential suburb of San Francisco, which lies at a distance of 7 m. across the bay. Berkeley is the seat of the California state university (see California, University or), opened in 1873; the inter-related Berkeley Bible Seminary (1896, Disciples of Christ); Pacific Theological Seminary (established in 1866 at Oakland, in 1901 at Berkeley, Con- gregational); Seminary of the Pacific Coast Baptist Theo- logical Union, and Unitarian Theological School — all associated with the University of California; and the state institution for the deaf, dumb and blind. The site of Berkeley was a farming region until its selection for the home of the university. Berke- ley was incorporated as a town in 1878.

BERKELEY, a market town of Gloucestershire, England, near the river Severn, in that portion of its valley known as the Vale of Berkeley, on a branch from the Midland railway. Pop. (1901) 774. It is pleasantly situated on a gentle eminence, in a rich pastoral vale to which it gives name, celebrated for its dairies, producing the famous cheese known as " double Gloucester." The town has a handsome church (Early English and Decorated), a grammar school, and some trade in coal, timber, malt and cheese. Berkeley was the birthplace of Dr Edward Jenner (1749), who is buried in the church. Berkeley Castle, on an eminence south-east of the town, is one of the noblest baronial castles existing in England, and one of the few inhabited. The Berkeley Ship Canal connects Gloucester with docks at Sharpness, avoiding the difficult navigation of the upper part of the Severn estuary.

The manor of Berkeley gives its name to the noble family of Berkeley (?.».). According to tradition, a nunnery to which the manor belonged existed here before the Conquest, and Earl Godwin, by bringing about its dissolution, obtained the manor. All that is certainly known, however, is that in Domesday the manor is assigned to one Roger, who took his surname from it. His descendants seem to have been ousted from their possessions during the 12th century by Robert fitz Harding, an Angevin partisan, who already held the castle when, in 11 53, Henry, duke of Normandy (who became King Henry II. in the following year), granted him the manor. Under an agreement made in the same year, Maurice, son of Robert fitz Harding, married a daughter

of Roger of Berkeley. Their descendants styled themselves of

Berkeley, and in 1200 the town was confirmed to Robert of Berkeley with toll, soc, sac, &c, and a market on whatever day of the week he chose to hold it. This charter was con- firmed to Thomas, Lord Berkeley, in 1330, and in 1395-1396 Lord Berkeley received a grant of another fair on the vigil and day of Holyrood. The descendants of the Berkeley family still hold the manor and town. Berkeley Castle was the scene of the death of Edward II. The king was at first entrusted to the care of Lord Berkeley, who, being considered too lenient, was obliged to give up his prisoner and castle to Sir John Mautravers and Thomas Gournay. The town has no charter, but is mentioned as a borough in 1284-1285. It was governed by a mayor and twelve aldermen, but by 1864 their privileges had become merely nominal, and the corporation was dissolved in 1885 under the Municipal Corporations Act. Berkeley was formerly noted for the manufacture of clothing, but the trade had decreased by the 16th century, for Leland, writing about 1520, says " the town of Berkeley is no great thing. ... It hath very much occupied and yet somewhat doth clothing." See John Fisher, History of Berkeley (1864).

BERKHAMPSTEAD (Great Berkhampstead), a market town in the Watford parliamentary division of Hertfordshire, England, 28 m. N.W. from London by the London & North- Western railway. Pop. of urban district (1901) 5140. It lies pleasantly in the narrow well-wooded valley of the Bulbourne, and is close to the Grand Junction canal. The church of St Peter, a large cruciform structure, exhibits all the Gothic styles, and earlier fragments are traceable. There are several brasses of interest. The poet William Cowper was born in the rectory in 1731. The large grammar school is a foundation of 1541. Straw-plaiting and the manufacture of small wooden wares are the principal industries, and there are large chemical works. Of the castle earthworks and fragments of walls remain. The name of the town is Great Berkhampstead(or Berkhamsted) , in distinction from Little Berkhampstead near Hatfield in this county.

Berkhampstead (Beorhhamstede, Berchehamstede) was un-doubtedly of some importance in Saxon times since there were fifty-two burgesses there at the time of the Conquest. In 1 1 56 Henry II. granted the men and merchants of the town the same laws and customs as they had in the time of Edward the Con- fessor, and that they should be quit of toll throughout England, Normandy, Aquitaine and Anjou. Berkhampstead rose to importance with its castle, which is said to have been built by Robert, count of Mortain, and when the castle fell into ruin after 1496 the town also began to decay. In 1618, however, the burgesses received an incorporation charter; but after the civil wars the corporate body began to fail through poverty,

and in the 18th century had ceased to exist. The burgesses returned two members to parliament in 1320 and again in 1338 and 1341, but were never represented again. Before the 13th century the burgesses held a weekly market on Sunday and a yearly fair on St James's day, but in 1218 Henry III. altered the market day to Monday. Roofing tiles were manufactured in Berkhampstead as early as the 13th century, and in Elizabeth's reign the making of malt was the chief industry.

BERKSHIRE, THOMAS HOWARD, ist Eakl or (1587-1669), 2nd son of Thomas Howard, ist earl of Suffolk and of Catherine, daughter of Sir Henry Knevet, Kt., widow of Richard Rich, was baptized on the 8th of October 1587. He succeeded to his mother's estate of Charlton in Wiltshire, was created K.B. in 1605, became master of the horse to Prince Charles, and was created Lord Howard of Charlton and Viscount Andover in 1622, K.G. in 1625, and earl of Berkshire in 1626. In 1634 he was chosen high steward of the university of Oxford. He was a commissioner for negotiating the treaty of Ripon in 1640, and accompanied the king to York in 1642. While attempting to execute the king's commission of array in Oxfordshire in August he was taken prisoner by Hampden at Watlington and imprisoned in the Tower, but after being censured by the Lords was liberated in September. In 1643 he was made governor of the prince of Wales, a post for which he was in no way fitted, and in which

he showed himself factious and obstructive. He accompanied the prince to Scilly and to Jersey, but on the latter's departure for France went to Holland. At the Restoration he was made a privy councillor and received rewards. He died on the 16th of July 1669, and was buried in Westminster Abbey. According to Clarendon " his affection for the crown was good; his interest and reputation less than anything but his understanding." He married Elizabeth, daughter and co-heir of William, earl of Exeter, by whom he had nine sons and four daughters. Of these Charles succeeded him as 2nd earl of Berkshire; Thomas suc- ceeded the latter: and Philip was ancestor of John, 15th earl of Suffolk and 8th earl of Berkshire, and so of the later earls of Suffolk and Berkshire.

BERKSHIRE [abbreviated Berks, pronounced Barkshire], a southern county of England, bounded N. by Oxfordshire and Buckinghamshire, E. by Surrey, S. by Hampshire, W. by Wilt- shire, and N.W. for a short distance by Gloucestershire. Its area is 721-9 sq. m. Its entire northern boundary is formed by the river Thames, in the basin of which practically the whole county is included. In the north-west a narrow and broken line of hills, pierced in the west by

the Cole stream, which here forms the county boundary, extends past Faringdon and culminates in a height over 500 ft. at Cumnor Hurst, which, with Wytham Hill, fills a deep northward bend of the Thames, and overlooks the city of Oxford from the west. The range separates the Thames valley from the Vale of White Horse which is traversed by the small river Ock, and bounded on the south by a line of hills known as the White Horse Hills or Berkshire Downs, richly wooded along their base, and rising sharply to bare rounded summits. In White Horse Hill on the western confines of the county a height of 856. ft. is reached. The line of these hills is continued north-eastward by the Chiltern Hills in Oxfordshire, but a division between the two is made by the Thames in a narrow valley or gap at Goring. Southward the Downs are scored with deep narrow valleys, the chief of which are those of the Lambourn and the Pang. The last stream runs eastward directly to the Thames; but the Lambourn and others join the Kennet, which drains a beautiful sylvan valley to the Thames at Reading. Another line of downs closely confines the vale of Kennet on the south from Newbury upwards, and although the greater part of these does not fall within the county, their highest point, Inkpen Beacon (ion ft.), does so. The Enborne stream, rising here, and flowing parallel to the Kennet until turning north to join it, is for a considerable distance the county boundary. Between Reading and Windsor the Thames makes a northward bend, past Henley and Marlow, in the form of three sides of a square. Within the bend slight hills border the river, but south of these, and in the Loddon valley south of Reading, the county is low and flat. In the south-east of the county, however, there is a high sandy plateau, forming part of Bagshot Heath, over 400 ft. in elevation, and extending into Surrey. Fir- woods are characteristic of this district, and northward towards the Thames extends the royal park of Windsor, which is magnificently timbered. The proportion to the total area of the county which is under woods is, however, by no means so great as in the adjacent counties of Surrey and Hampshire. There is fine trout-fishing in the Kennet and some of its feeders.

Geology. — The dominant feature of the county, the Chiltern and White Horse Hills, owes its form to the Chalk, which spreads from Ashbury and Hungerford on the west to Henley and Maidenhead on the east. In the northern face of the escarpment we find the Lower Chalk with a hard bed, the Totternhoe Stone; on the southern slope lies the Chalk-with-Flints. At Kintbury it is quarried for the manufacture of whiting. At the foot of the Chalk escarpment is the Upper Greensand with a narrow crop towards the west which is broken up into patches eastwards. Looking northward from the Chalk

hills, the low-lying ground is occupied successively by the Gault Clay, the Kimmeridge Clay, and finally by the Oxford Clay, which extends beyond the Thames into Oxfordshire. This low-lying tract is relieved by an elevated ridge of Corallian beds, between the Kimmeridge Clay and the Gault. It extends from near Faringdon past Abingdon

to Cumnor and Wytham Hill. At Faringdon there are some interesting gravels of Lower Greensand age, full of the fossil remains of sponges. South of the Chalk, the county is occupied by Eocene rocks, mottled clays, well exposed in the brickfields about Reading, and hence called the Reading beds. At Finch- ampstead, Sunninghill and Ascot, these deposits are overlaid by the more sandy beds of the Bagshot series. Between the two last named formations is a broad outcrop of London Clay. Numerous outliers of Eocene rest on the Chalk beyond the main line of boundary. The Chalk of Inkpen Beacon is brought up to the south side of the Tertiary rocks by a synclinal fold; similarly, an anticline has brought up the small patch of Chalk in Windsor Park. Clay-with-Flints lies in patches and holes on the chalk, and flint gravels occur high up on either side of the Thames. Fairly thick beds of peat are found in the alluvium of the Kennet at Newbury.

Industries. — About seven-ninths of the total area is under cultivation; a large proportion of this being in permanent pasture, as much attention is paid to dairy-farming. Butter and cheese are largely produced, and the making of condensed milk is a branch of the industry. Many sheep are pastured on the Downs, important sheep-markets being held at the small town of East or Market Ilsley; and an excellent breed of pigs is named after the county. The parts about Faringdon are specially noted for them. Oats are the principal grain crop; although a considerable acreage is under wheat. Turnips and swedes are largely cultivated, and apples and cherries are grown. Besides the royal castle of Windsor, fine county seats are especially numerous.

The only manufacturing centre of first importance is Reading, which is principally famous for its biscuit factories. The manu- facture of clothing and carpets is carried on at Abingdon; but a woollen industry introduced into the county as early as the Tudor period is long extinct. Engineering works and paper mills are established at various places; and boat-building is carried on at Reading and other riverside stations. There are extensive seed warehouses and testing

grounds near Reading; and the Kennet and Windsor ales are in high repute. Whiting is manu- factured from chalk at Kintbury on the Kennet.

Communications. — Communications are provided principally by the Great Western railway, the main line of which crosses the county from east to west by Maidenhead, Reading and Didcot. A branch line serves the Kennet valley from Reading; and the northern line of the company leaves the main line at Didcot, a branch from it serving Abingdon. The Basingstoke branch runs south from Reading, and lines serve Wallingford from Cholsey, and Faringdon from Uffington. Communication with the south of England is maintained by a joint line of the South Western and South Eastern & Chatham companies terminating at Reading, and there are branches of the Great Western and South Western systems to Windsor. The Lambourn valley light railway runs north-west to Lambourn from Newbury. Wide water-communications are afforded by the Thames, and the Kennet is in part canalized, to form the eastern portion of the Kennet and Avon canal system, connecting with the Bristol Avon above Bath.

Population and Administration. — The area of the ancient county is 462,208" acres; with a population in 1891 of 239,138, and in 1901 of 256,509. The area of the administrative county is 462,367 acres. The county contains twenty hundreds. The municipal boroughs are Abingdon (pop. 6480), Maidenhead (12,980), Newbury (11,061), Reading, the county town and a county borough (72,217), Wallingford (2808), Windsor or New Windsor (14,130), Wokingham (3551). Wantage (3766) is an urban district. Among lesser towns may be mentioned Faring- don in the north-west (2900), Hungerford on the Kennet (2906), and Lambourn in the valley of that name (2071), the villages of Bray (2978), Cookham (3874) and Tilehurst (2545), which, like others on the banks of the Thames, have grown into resi- dential towns; and Sandhurst (2386). The county is in the Oxford circuit, and assizes are held at Reading. It has one court of quarter sessions, and is divided into twelve petty

sessional divisions. The boroughs of Abingdon, Newbury, Maidenhead, Reading, Wallingford and Windsor have separate commissions of the peace, and Abingdon, Newbury, Reading and Windsor have separate courts of quarter sessions. There are 198 civil parishes. Berkshire forms an archdeaconry in the diocese of Oxford; a small portion, however, falls within the diocese of Salisbury. There are 202 ecclesiastical parishes or districts, wholly or in part within the county. There are three parliamentary divisions, Northern or Abingdon, Southern or Newbury, and Eastern or Wokingham, each

returning one member; while the parliamentary borough of Reading returns one member, and parts of the borough of Oxford and Windsor are included in the county. There are several important educational establishments in the county. Radley College near Abingdon, Wellington College near Sandhurst, and Bradfield College, at the village of that name, 8 m. west of Reading, are among the more important modern public schools for boys. Bradfield College was founded in 1850, and is well known for the realistic performances of classical Greek plays presented by the scholars in an open theatre designed for the purpose. Abingdon and Reading schools rank among the lesser public schools. At Reading is a university extension college, and in the south-east of the county is the Sandhurst Royal Military College.

History. — During the Heptarchy Berkshire formed part of the kingdom of Wessex, and interesting relics of Saxon occupa- tion have been discovered in various parts of the county. Of these the most remarkable are the burial grounds at Long Wittenham and Frilford, and there is evidence that the Lam- bourn valley was occupied in early Saxon times. The cinerary urns found in Berkshire undoubtedly contain the ashes of the Anglians who came south under Penda in the 7th century. The fortification called Cherbury Castle, not far from Dench- worth, is said to have been first made up by Canute.

At the time of the Norman invasion Berkshire formed part of the earldom of Harold, and supported him stanchly at the battle of Hastings. This loyalty was punished by very sweep- ing confiscations, and at the time of the Domesday survey no estates of any importance were in the hands of Englishmen. When Alfred divided the country into shires, this county re- ceived the name of Berrocscir, as Asser says, " from the wood of Berroc, where the box-tree grows most plentifully." 1 At the time of the survey it comprised twenty- two hundreds; at the present day there are only twenty, of which eleven retain their ancient names. Many parishes have been transferred from one hundred to another, but the actual boundary of the county is practically unchanged. Part of the parishes of Shilton and Langford formed detached portions of the shire, until included in Oxfordshire in the reign of William IV. Portions of Combe and Shalbourne parishes have also been restored to Hampshire and Wiltshire respectively, while the Wiltshire portion of Hungerford has been transferred to Berkshire. The county was originally included in the see of Winchester, but in a.d. 909 it was removed to the newly-formed see of " Wiltshire," afterwards united with Sherborne. In 1075 the seat of the bishopric was removed to Salisbury, and in 1836 by an order in council Berkshire was transferred to the diocese

of Oxford. The archdeaconry is of very early origin and is co-extensive with the county. Formerly it comprised four rural deaneries, but the number has lately been increased to nine. Much of the early history of the county is recorded in the Chronicles of the abbey of Abingdon, which at the time of the survey was second only to the crown in the extent and number of its possessions. The abbot also exercised considerable judicial and administrative powers, and his court was endowed with the privileges of the hundred court and was freed from liability to interference by the sheriff. Berkshire and Oxfordshire had a common sheriff until the reign of Elizabeth, and the shire court was held at Grauntpont. The assizes were formerly held at Reading,

1 The derivation from Bibroci, a British tribe in the time of Caesar, which probably inhabited Surrey or Middlesex, seems philologically impossible.

Abingdon and Newbury, but are now held entirely at Reading.

At the time of the Domesday survey the chief lay-proprietor was Henry de Ferrers, ancestor of the earls of Derby, but it is remarkable that none of the great Berkshire estates has remained with the same family long. Thomas Fuller quaintly observes that " the lands of Berkshire are very skittish and apt to cast their owners." The De la Poles succeeded to large estates by a marriage with the heiress of Thomas Chaucer, son of the poet, but the family became extinct in the male line, and the estates were alienated. The same fate befell the estates of the Achards, the Fitzwarrens and later the families of Norris and Befils.

The natural advantages of this county have always encouraged agricultural rather than commercial pursuits. The soil is especially adapted for sheep-farming, and numerous documents testify to the importance and prosperity of the wool-trade in the 1 2 th century. At first this trade was confined to the export of the raw material, but the reign of Edward III. saw the intro- duction of the clothing industry, for which the county afterwards became famous. This trade began to decline in the 17 th century, and in 1641 the Berkshire clothiers complained of the deadness of their trade and the difficulty of getting ready money, attri- buting the same to delay in the execution of justice. The malt- ing industry and the timber trade also

flourished in the county until the 19th century. Agriculturally considered, the Vale of the White Horse is especially productive, and Camden speaks of the great crops of barley grown in the district.

Owing to its proximity to London, Berkshire has from early times been the scene of frequent military operations. The earliest recorded historical fact relating to the county is the occupation of the district between Wallingford and Ashbury by Offa in 758. In the 9th and 10th centuries the county was greatly impoverished by the ravages of the Danes, and in 871 the invaders were defeated by ˆEthelwulf at Englefield and again at Reading. During the disorders of Stephen's reign Walling- ford was garrisoned for Matilda and was the scene of the final treaty in n 53. Meetings took place between John and his barons in 1213 at Wallingford and at Reading, and in 1216 Windsor was besieged by the barons. At the opening of the civil war of the 17th century, the sheriff, on behalf of the in- habitants of Berkshire, petitioned that the county might be put in a posture of defence, and here the royalists had some of their strongest garrisons. Reading endured a ten days' siege by the parliamentary forces in 1643, and Wallingford did not surrender until 1646. Newbury was the site of two battles in 1643 and

1644.

In 1295, Berkshire returned two members to parliament for the county and two for the borough of Reading. Later the boroughs of Newbury, Wallingford, Windsor and Abingdon secured representation, and from 1557 until the Reform Act of 1832 the county was represented by a total of ten members. By this act Abingdon and Wallingford were each deprived of a member, but the county returned three members instead of two. Since the Redistribution of Seats Act 1885 the county has returned three members for three divisions, and Windsor and Reading return one member each, the remaining boroughs having lost representation.

Antiquities. — The remains of two great Benedictine monas- teries at Abingdon and Reading are scanty. The ecclesiastical architecture of the county is not remarkable, excepting a few individual churches. Thus for Norman work the churches of Shellingford and Cholsey may be noted, together with the very small chapel, of early date, at Upton near Didcot. The church of Blewbury in the same locality is in the main transitional Norman, and retains some of its original vaulting. Of Early English churches there are several good examples, notably at Uffington, with its unusual angular-headed windows, Buckland near Faringdon, and Wantage. The tower of St Helen's, Abingdon,

well illustrates this period. The cruciform church of Shottesbrooke, with its central spire, is a beautiful and almost unaltered Decorated building; and St George's chapel in Windsor Castle is a superb specimen of Perpendicular work.

Apart from Windsor, Berkshire retains no remarkable medieval castles or mansions.

Authorities. — Chief of the older works are: Elias Ashmole, Antiquities of Berkshire (3 vols., 1719, 2nd ed., London, 1723; 3rd ed., Reading, 1736); D. and S. Lysons, Magna Britannia, vol. i. Other works are: Marshall, Topographical and Statistical Details of the County of Berkshire (London, 1830) ; Earl of Carnarvon, Archaeology of Berkshire (London, 1859) ; C. King, History of Berkshire (London, 1887); Lowsley, Glossary of Berkshire Words (London, 1888), and Index to Wills in the Court of the Archdeacon of Berkshire, 1508-1652 (Oxford, 1893) ; Victoria County History, Berkshire. See also The Berks Archaeological Society's Quarterly journal, and Berkshire Notes and Queries.

BERLAD, the capital of the department of Tutova, Rumania, on the river Berlad, which waters the high plains of Eastern Moldavia. Pop. (1900) 24,484, about one-fourth of whom are Jews. At BSrlad the railway from Jassy diverges, one branch skirting the river Sereth, the other skirting the Pruth; both reunite at Galatz. Among a maze of narrow and winding streets Berlad possesses a few good modern buildings, including a fine hospital, administered by the St Spiridion Foundation of Jassy. BSrlad has manufactures of soap and candles, and some trade in timber and farm-produce, while the annual horse-fairs are visited by dealers from all parts of the country. In the vicinity are traces of a Roman camp.

BERLICHINGEN, GOETZ or Gottfried VON (1480-1562), German knight, was born at the castle of Jagsthausen now in Wiirttemberg. In 1497 he entered the service of Frederick IV., margrave of Brandenburg-Ansbach, and in 1498 fought for the emperor Maximilian I. in Burgundy, Lorraine and Brabant, and next year in Switzerland. About 1500 he raised a company of freelances, and at their head took part in various private wars. In 1505, whilst assisting Albert IV., duke of Bavaria, at the siege of Landshut, his right hand was shot away, and an iron one was substituted which is still shown at Jagsthausen. In spite of this " Goetz with the iron hand " continued his feuds, their motive being mainly booty and ransom. In 151 2 an attack near Forchheim on some merchants returning from the great fair at Leipzig, caused him to be put under the ban of the

empire by Maximilian, and he was only released from this in 15 14 upon a promise to pay 14,000 gulden. In 1516 he made a raid into Hesse and captured Philip IV., count of Waldeck, whom he compelled to pay a ransom of 8400 gold gulden, and in 15 18 was again placed under the ban. He fought for Ulrich I., duke of Wiirttemberg, when he was attacked by the Swabian League in 1519, and after a spirited resistance was compelled, through want of ammunition and provisions, to surrender the town of Mockmiihl. In violation of the terms of the capitulation he was held prisoner, and handed over to the citizens of Heilbronn, but owing to the efforts of Sickingen and Georg von Frundsberg was released in 1522, upon paying 2000 gulden, and swearing not to take vengeance on the League. When the Peasants' War broke out in 1525 Goetz was compelled by the rebels of the Odenwald district to act as their leader. He accepted the position, accord- ing to his own account, partly because he had no choice, partly in the hope of curbing the excesses of the insurgents; but, finding himself in this respect powerless, after a month of nominal leadership, he took the first opportunity of escaping to his castle. For his part in the rebellion he was called to account before the diet of Speier, and on the 17th of October 1526 was acquitted by the imperial chamber. In spite of this the Swabian League seized the opportunity of paying off old scores against him. Lured to Augsburg, under promise of safe conduct, to clear himself of the charges made against him on behalf of the League, he was there treacherously seized on the 28th of November 1528, and kept a close prisoner for two years. In 1 530 he was liberated on repeating his oath of 1522, and undertaking not to leave the neighbourhood of his castle of Hornberg on the Neckar. He appears to have remained there quietly until 1540 when the emperor Charles V. released him from his oath. In 1542 he fought against the Turks in Hungary, and in 1 544 accompanied Charles when he invaded France. He returned to Hornberg, where he passed his time until his death on the 23rd of July 1562. He was twice married and left three daughters and seven

sons. The counts von Berlichingen-Rossach, of Helmstadt near Heidelberg, one of the two surviving branches of the family, are his descendants. The other branch, that of the Freiherrn von Berlichingen-Jagsthausen, is descended from Goetz's brother Hans. " Goetz von Berlichingen " is the title of Goethe's play, which, published in 1773, marked an epoch in the history of German drama

(see Goethe).

See R. Pallmann, Der historische Goetz von Berlichingen (Berlin, 1894) ; F. W. G. Graf von Berlichingen-Rossach, Geschichie des Ritters Goetz von Berlichingen und seiner Familie (Leipzig, 1861). Goetz's Autobiography, valuable as a record of his times, was first published by Pistorius at Nuremberg (1731), and again at Halle

(1886).

BERLIN, ISAIAH (1725-1799), an eminent rabbi of Breslau; he was the author of acute notes on the Talmud which had their influence in advancing the critical study of that work.

BERLIN, the largest city of the German empire, the capital of the kingdom of Prussia. It is the principal residence of the German emperor and king of Prussia, the seat of the imperial parliament {Reichstag) and the Prussian diet {Landtag) and of the state offices of the empire, except of the supreme court of justice {Reichsgericht), which is fixed at Leipzig. It lies in a flat, sandy plain, no ft. above sea-level, on both banks of the navig- able Spree, which intersects it from S.E. to N.W. The highest elevation in the immediate neighbourhood is the Kreuzberg (200 ft.), a hill in the southern suburb of Schoneberg, which commands a fine view of the city. The situation of Berlin, midway between the Elbe and the Oder, with which rivers it is connected by a web of waterways, at the crossing of the main roads from Silesia and Poland to the North Sea ports and from Saxony, Bohemia and Thuringia to the Baltic, made it in medieval days a place of considerable commercial importance. In modern times the great network of railways, of which it is the centre and which mainly follow the lines of the old roads, further established its position. Almost equidistant from the remotest frontiers of Prussia, from north to south, and from east to west, 180 m. from Hamburg and 84 from Stettin, its situation, so far from being prejudicial to its growth and pros- perity, as was formerly often asserted, has been, in fact, the principal determining factor in its rapid rise to the position of the greatest industrial and commercial city on the continent of Europe. In point of wealth and population it ranks im- mediately after London and Paris.

The boundaries of the city have not been essentially extended since i860, and though large and important suburbs have crept up and practically merged with it, its administrative area remains unchanged. It occupies about 29 sq. m., and has a length from E. to W. of 6 and a breadth from N. to S. of 5! m., contains nearly 1000

streets, has 87 squares and open spaces, 73 bridges and a population (1905) of 2,033,900 (including a garrison of about 22,000). If, however, the outer police district, known as " Greater Berlin," embracing an area of about 10 m. radius from the centre, be included, the population amounts to about 3 1 millions.

Berlin is essentially a modern city, the quaint two-storied houses, which formerly characterized it, having given place to palatial business blocks, which somewhat dwarf the streets and squares, which once had an air of stately spaciousness. The bustle of the modern commercial city has superseded the austere dignity of the old Prussian capital. Thus the stranger entering it for the first time will find little to remind him of its past history. The oldest part of Berlin, the city and Alt-Kblln, built along the arms of the Spree, is, together with that portion of the town lying immediately west, the centre of business activity. The west end and the south-west are the residential quarters, the north-west is largely occupied by academic, scientific and military institutions, the north is the seat of machinery works, the north-east of the woollen manufactures, the east and south-east of the dyeing, furniture and metal in- dustries, while in the south are great barracks and railway works.

In 1870 Berlin was practically bounded on the south by the Landwehr Canal, but it has since extended far beyond, and the Tempelhofer Feld, where military reviews are held, then

practically in the country, is now surrounded by a dense belt of houses. The Landwehr Canal, leaving the Spree near the Schlesische Tor (gate), and rejoining it at Charlotten- burg, after a course of 6 m., adds not a little to the charm of the southern and western districts, being flanked by fine boule- vards and crossed by many handsome bridges. The object of this canal was to relieve the congestion of the water traffic in the heart of Berlin. It was superseded, however, in its turn by a new broad and deep canal opened in 1906, lying from 3 to 4 m. farther south. This, the Teltow Canal, leaves the Spree above Berlin at Kopenick, and running south of Rixdorf, Sudende and Gross-Lichterfelde, enters the Havel at Teltow. This important engineering work was planned not only to afford a more convenient waterway between the upper Spree and the Havel (and thus to the Elbe), but was to remove from the city to its banks and vicinity those factories of which the noxious gases and other poisonous emanations were regarded as dan- gerous to the health of the community. A dislocation of the manufacturing factors has therefore been in progress, which with the creation of a " trans Tiberim " (as in ancient Rome) is, in many respects, altering the

character and aspect of the metropolis.

The effect upon Berlin of the successful issue of the Franco- Prussian War of 1870-71 was electrical. The old Prussian capital girded itself at once to fulfil its new role. The concen- tration upon the city of a large garrison flushed with victory, and eager to emulate the vanquished foe in works of peace, and vie with them in luxury, was an incentive to Berliners to put forth all their energy. Besides the military, a tremendous immigration of civilian officials took place as the result of the new conditions, and, as accommodation was not readily avail- able, rents rose to an enormous figure. Doubts were often expressed whether the capital would be able to bear the burden of empire, so enormous was the influx of new citizens. It is due to the magnificent services of the municipal council that the city was enabled to assimilate the hosts of newcomers, and it is to its indefatigable exertions that Berlin has in point of organiza- tion become the model city of Europe. In no other has public money been expended with such enlightened discretion, and in no other has the municipal system kept pace with such rapid growth and displayed greater resource in emergencies. In 1870 the sanitary conditions of Berlin were the worst of any city of Europe. It needed a Virchow to open the eyes of the municipality to the terrible waste of life such a state of things entailed. But open sewers, public pumps, cobble-paved roads, open market-places and overcrowded subterranean dwellings are now abolished. The city is excellently drained, well-paved, well-lighted and furnished with an abundant supply of filtered water, while the cellar dwellings have given place to light and airy tenements, and Berlin justly claims to rank among the cleanest and healthiest capitals in Europe. The year 1878 marks a fresh starting-point in the development of the city. In that year Berlin was the meeting-place of the congress which bears its name. The recognition of Germany as a leading factor in the world's counsels had been given, and the people of Berlin could indulge in the task of embellishing the capital in a manner befitting its position. From this time forward, state, municipal and private enterprise have worked hand in hand to make the capital cosmopolitan. The position it has at length attained is due not alone to the enterprise of its citizens and the munici- pality. The brilliancy of the court and the triumph of the sense of unity in the German nation over the particularism of the smaller German states have conduced more than all else to bring about this result. It has become the chief pleasure town of Germany; and though the standard of morality, owing to the enormous influx of people bent on amusement, has become lower, yet there is so much healthy, strenuous activity in in- tellectual life and commercial

rivalry as to entitle it, despite many moral deficiencies, to be regarded as the centre of life and learning in Germany. Dr A. Shadwell {Industrial Efficiency, London, 1906) describes it as representing " the most complete application of science, order and method of public life," adding

" it is a marvel of civic administration, the most modern and most perfectly organized city that there is."

Streets. — The social and official life of the capital centres round Unter den Linden, which runs from the royal palace to the Brandenburger Tor. This street, one of the finest and most spacious in Europe, nearly a mile in length, its double avenue divided by a favourite promenade, . planted with lime trees, presents Berlin life in all its varying aspects. Many historical events have taken place in this famous boulevard, notably the entry of the troops in 1871, and the funeral pageant of the emperor Willaim I. South of Unter den Linden lies the Friedrichstadt, with its parallel lines of straight streets, includ- ing the Behren-strasse — (the seat of finance) — the Wilhelm- strasse, with the palace of the imperial chancellor, the British embassy, and many government offices — the official quarter of the capital — and the busy Leipziger-strasse, running from the Potsdamer-platz to the Donhoff-platz. This great artery and Unter den Linden are crossed at right angles by the Friedrich- strasse, 2 m. long, flanked by attractive shops and restaur- ants, among them the beer palaces of the great breweries. In the city proper, the Konig-strasse and the Kaiser-Wilhelm- strasse, the latter a continuation of Unter den Linden, are the chief streets; while in the fashionable south-west quarter Viktoria – strasse, Bellevue – strasse, Potsdamer – strasse and Kurfiirsten-strasse and the Kurfurstendamm are the most imposing. Among the most important public squares are the Opern-platz, around or near which stand the opera house, the royal library, the university and the armoury; the Gendarmen- markt, with the royal theatre in its centre, the Schloss-platz; the Lustgarten, between the north side of the royal palace, the cathedral and the old and new museums; the Pariser-platz with the French embassy, at the Brandenburg Gate; the Konigs-platz, with the column of Victory, theReichstagsgebaude and the Bismarck and Moltke monuments; the Wilhelms-platz ; the circular Belle-Alliance-platz, with a column commemorating the battle of Waterloo; and, in the western district, the spacious Liitzow-platz.

Bridges. — Of the numerous bridges, the most remarkable are the Schloss-briicke, built after designs by Schinkel in 1822-1824, with eight colossal figures of white marble, representing ideal stages in a warrior's life, the work of Drake, Albert Wolff and other eminent sculptors; the Kurfursten- or Lange-brucke, built 1692-1695, and restored in 1895, with an equestrian statue of the great elector, and the Kaiser-Wilhelm-briicke (1 886-1 889) connecting the Lustgarten with the Kaiser- Wilhelm-strasse in the inner town. In the modern residential quarter are the Potsdamer- Viktoria-brucke, which carries the traffic from two converging streets into the outer rotsdamer-strasse, and the Herkules-brucke connecting the Liitzow-platz with the Tier- garten. The first three cross the Spree and the last two the Landwehr Canal.

Churches. — Berlin, until the last half of the 19th century, was in respect of its churches probably the poorest of the capitals of Christendom, and the number of worshippers on an average Sunday was then less than 2 % of the population. The city now contains over a hundred places of worship, of which ten are Roman Catholic, and nine Jewish synagogues. Of the older Evangelical churches but four date from medieval days, and of them only the Marien-kirche, with a tomb of Field marshal O. C. von Sparr (1605-1665), and the Nikolai-kirche are particu- larly noteworthy. Of a later date, though of no great pretensions to architectural merit, are the Petri-kirche with a lofty spire, the Franzosische-kirche and the Neue-kirche with dome-capped towers, on the Gendarmen-markt, and the round, Roman Catholic St Hedwigs – kirche behind the Opera-house. The Garrison church in the centre of the city, which was erected in 1722 and contained numerous historical trophies, was destroyed by fire in 1908. Of modern erections the new cathedral {Bom), on the Spree, which replaces the old building pulled down in 1893, stands first. It is a clumsy, though somewhat imposing edifice of sandstone in Italian Renaissance style, and has a dome rising, with the lantern, to a height of 380 ft. The Kaiser- Wilhelm-

Gedachtnis-kirche (in the suburb Charlottenburg) with a lofty spire, the Dankes-kirche (in commemoration of the emperor William I.'s escape from the hand of the assassin, Nobiling, in 1878) in Wedding, and the Kaiser-Friedrich-Gedachtnis-kirche on a grassy knoll in the north of the Tiergarten are also worthy of notice. In the Monbijou Park, on the north bank of the Spree, is the pretty English church of St George. The main Jewish synagogue, a fine building in oriental style, erected in 1866, stands in a commanding position in the Oranienburger-strasse and is remarkable for its stained glass. Berlin was a walled city until 1867-1868. Of the former nineteen city gates

only one remains, the Brandenburg Gate (1 789-1 793), an imitation of the Propylaea at Athens. It is 201 ft. broad and nearly 65 ft. high, and is supported by twelve Doric columns, each 44 ft. in height, and surmounted by a car of victory (Auriga), which, taken by Napoleon to Paris in 1807, was brought back by the Prussians in 1814. The gate has been enlarged by two lateral colonnades, each supported by sixteen columns.

Public Buildings. — In secular buildings Berlin is very rich. Entering the city at the Potsdam Gate, traversing a few hundred yards of the Leipziger-strasse, turning into Wilhelm-strasse, and following it to Unter den Linden, then beginning at the Branden- burg Gate and proceeding down Unter den Linden to its end, one passes, among other buildings, the following, many of them of great architectural merit — the admiralty, the ministry of commerce, the ministry of war, the ministry of public works, the palace of Prince Frederick Leopold, the palace of the imperial chancellor, the foreign office, the ministry of justice, the residences of the ministers of the interior and of public worship, the French and the Russian embassies, the arcade, the palace of the emperor William I., the university, the royal library, the opera, the armoury, the palace of the emperor Frederick III., the Schloss-briicke, the royal palace, the old and new museums and the national gallery. At a short distance from this line are the new town-hall, the mint, the imperial bank and the royal theatre. Berlin differs from all other great capitals in this respect that with the exception of the royal palace, which dates from the 16th century, all its public buildings are modern. This palace, standing in the very heart of the city, is a huge quadrangular building, with four courts, and is surmounted by a dome 2 20 ft. high. It contains more than 600 rooms and halls; amonˆ the latter the Weisse-saal used for great court pageants, the halls of the chapters of the Black and the Red Eagle orders, a picture gallery and a chapel. The first floor overlooking the Schloss- platz is the Berlin residence of the emperor, and that square is embellished by a huge fountain (Neptuns-brunnen) by R. Begas. Facing the west portal is the monument to the emperor William I., and before the north gate, opening upon the Lustgarten, are the famous bronze groups, the " horse-tamers " by Clodt, the gift of the emperor Nicholas I. of Russia. The establishment of the imperial government in Berlin naturally brought with it the erection of a large number of public buildings, and the great prosperity of the country, as well as the enhanced national feeling, has enabled them to be built on a scale of splendour befitting the capital of an empire. First in importance is the Reichstagsgebaude (see Architecture, plate ix. fig. 47), in which the federal council (Bundesrai) and the

imperial parliament (Reichstag) hold their sittings. A special feature is the library, which is exceedingly rich in works on con- stitutional law. A new house has also been built for the Prussian parliament (Landtag) in the Albrecht-strasse. Other new official buildings are the patent office on the site of the old ministry of the interior; the new ministry of posts (with post museum) at the corner of the Mauer-strasse and Leipziger-strasse; the central criminal court in Moabit; the courts of first instance on the Alexander-platz; the ministry of police, and the Reichsversicherungsamt, the centre for the great system of state insurance. In addition to these, many buildings have been restored and enlarged, chief among them being the armoury (Zeughaus), the war office and the ministry of public works, while the royal mews (Marstall) has been entirely rebuilt with an imposing facade.

BERLIN

787

Among the public monuments comes first, in excellence, Rauch's celebrated statue of Frederick the Great, which stands in Unter den Linden opposite the palace of the emperor William I.; and in size the monument to the emperor William I. (by R. Begas), erected opposite the west portal of the royal palace. The space for the site was gained by pulling down the old houses composing the Schlossfreiheit and damming the Spree. The monument, which cost £200,000, is surmounted by an equestrian statue of the emperor in a martial cloak, his right hand resting on a field marshal's baton, reining in his charger, which is led by a female genius of peace. The high pedestal on which these figures stand is surrounded by an Ionic colonnade. The equestrian statue of the great elector on the Lange-briicke has been already mentioned. In the Lustgarten is a statue of Frederick William III., by Wolff; in the Tiergarten, Drake's marble monument to the same ruler; and in the mausoleum in the park in Charlottenburg he and his queen, Louisa, are sculptured in marble by Rauch. Here also lie the emperor William I. and the empress Augusta under marble effigies by Encke. A second group of monuments on the Wilhelms-platz commemorates the generals of the Seven Years' War; and a third in the neighbourhood of the opera-house the generals who fought against Napoleon I. On the Kreuzberg a Gothic monu- ment in bronze was erected by Frederick William III. to com- memorate the victories of 1813-1815; and in the centre of the Konigs-platz stands a lofty column in honour of the triumphs of 1864, 1866 and 1870-1871, surmounted by a gilded figure of Victory. Literature, science and art are represented in different parts

of the city by statues and busts of Rauch, Schinkel, Thaer, Beuth, Schadow, Winckelmann, Schiller, Hegel and Jahn. On the Konigs-platz between the column of Victory and the Reichstagsgebaude, and immediately facing the western facade of the latter, is the bronze statue of Bismarck, unveiled in 1901, a figure 20 ft. in height standing on a granite base. From the south side of the Konigs-platz crossing the Tiergarten and intersecting the avenue from the Brandenburg Gate to Charlot- tenburg runs the broad Sieges-allee adorned by thirty-two groups of marble statuary representing famous rulers of the house of Hohenzollern, the gift of the emperor William II. to the city. The Tiergarten, the beautiful west-end park with its thickets of dense undergrowth and winding lanes and lakes has lost somewhat of its sylvan character owing to building encroach- ments on the north side and the laying out of new rides and drives. It has, in addition to those above enumerated, statues of Queen Louisa, Goethe and Lessing.

Communications. — Berlin is the centre of the North German network of railways. No fewer than twelve main lines concen- trate upon it. Internal communication is provided for by the Ringbahn, or outer circle, which was opened in 1871, and by a well-devised system connects the termini of the various main lines. The through traffic coming from east and west is carried by the Stadtbahn, or city railway, which also connects with and forms an integral part of the outer circle. This line runs through the heart of the city, and was originally a private enterprise. Owing, however, to the failure of the company, the work was taken in hand by the state, and the line opened in 1878. It has four tracks — two for the main-line through traffic, and two for local and suburban service, and is carried at a height of about 20 ft. above the streets. Its length is 12 m., the total cost 3f millions sterling. The chief stations are Zoologischer Garten, Friedrich-strasse, Alexander-platz and Schlesischer Bahnhof. Lying apart from the system are the Lehrter Bahnhof for Hamburg and Bremen, the Stettiner for Baltic ports, and the Gorlitzer, Anhalter and Potsdamer termini for traffic to the south, of which the last two are fine specimens of railway archi- tecture. Internal communication is also provided for by an excellent system of electric tram-lines, by an overhead electric railway running from the Zoologischer Garten to the Schlesische Tor with a branch to the Potsdam railway station, and by an underground railway laid at a shallow depth under the Leipziger- strasse. Most of the cabs (victorias and broughams) have fare- indicatorsi Steamboats ply above and below the city.

Industry, Trade and Commerce. — It is in respect of its manu- facture and trade that Berlin has attained its present high pitch of

economic prosperity. More than 50 % of its working popu- lation are engaged in industry, which embraces almost all branches, of which new ones have lately sprung into existence, whilst most of the older have taken a new lease of life. The old wool industry, for example, has become much extended, and now embraces products such as shawls, carpets, hosiery, &c. Its silk manufactures, formerly so important, have, however, gradually gone back. It is particularly in the working of iron, steel and cloth, and in the by-products of these, that Berlin excels. The manufacture of machinery and steam-engines shows an enormous development. No fewer than 100 large firms, many of them of world-wide reputation, are engaged in this branch alone. Among the chief articles of manufacture and production are railway plant, sewing machines, bicycles, steel pens, chronometers, electric and electric-telegraph plant, bronze, chemicals, soap, lamps, linoleum, china, pianofortes, furniture, gloves, buttons, artificial flowers and ladies' mantles, the last of an annual value exceeding £5,000,000. It has exten- sive breweries and vies in the amount of the output of this pro- duction with Munich. Berlin is also the great centre and the chief market for speculation in corn and other cereals which reach it by water from Poland, Austria and Scuth Russia, while in com- merce in spirits it rivals Hamburg. It is also a large publishing centre, and has become a serious rival to Leipzig in this regard.

The Borse, where 4000 persons daily do business, is the chief market in Germany for stocks and shares, and its dealings are of great influence upon the gold market of the world. Numerous barks of world-wide reputation, doing an extensive international business, have their seats in Berlin, chief among them, in addition to the Reichs-bank,beingtheBerlinerKassen-Verein,theDiskonto-Gesellschaft, the Deutsche Bank, and the Boden-Kredit Bank.

Learning and Art. — Berlin is becoming the centre of the in- tellectual life of the nation. The Friedrich Wilhelm University, although young in point of foundation, has long outstripped its great rival Leipzig in numbers, and can point with pride to the fact that its teaching staff has yielded to none in the number of illustrious names. It was founded in 1810, when Prussia had lost her celebrated university of Halle, which Napoleon had included in his newly created kingdom of Westphalia. It was as a weapon of war, as well as a nursery of learning, that Frederick William III. and the great men who are associated with its origin, called it into existence. Wilhelm von Humboldt was at that time at the head of the educational department of the kingdom, and men like Fichte and Schleiermacher worked on the popular mind. Within the first ten

years of its existence it counted among its professors such names as Neander, Savigny, Eichhorn, Bockh, Bekker, Hegel, Raumer, Niebuhr and Butt- mann. Later followed men like Hengstenberg, Homeyer, Bethmann-Hollweg, Puchta, Stahl and Heffter; Schelling, Trendelenburg, Bopp, the brothers Grimm, Zumpt, Carl Richter; later still, Twesten and Dorner, Gneist and Hinschius; Langen- beck, Bardeleben, Virchow, Du-Bois Reymond; von Ranke, Curtius, Lipsius, Hofmann the chemist, Kiepert the geographer; Helmholtz, van't Hoff, Koch, E. Fischer, Waldeyer and von Bergmann among scientists and surgeons; Mommsen, Treitschke and Sybel among historians, Harnack among theologians, Brunner among jurists. Taking ordinary, honorary, extra- ordinary professors and licensed lecturers (Privat-docenten) together, its professorial strength consisted, in 1904-1905, of 23 teachers in the faculty of theology, 32 in that of law, 175 in that of medicine and 227 in that of philosophy — altogether 457. The number of matriculated students during the same period was 7154, as against 5488 in the preceding summer term. The number of matriculated students is usually greater in winter than in summer; the reason of the disproportion being that in the summer university towns having pleasant surroundings, such as Bonn, Heidelberg, Kiel and Jena, are more frequented. Berlin is essentially a Prussian university — of students from non-German states, Russia sends most, then the United States of America while Greiat Britain is credited with comparatively*

few. It is, however, in the ugly palace of Prince Henry of Prussia, which was given for the purpose in the days of Prussian poverty and distress, that the university is still housed, and although some internal rearrangement has been effected, no substantial alterations have been made to meet the ever-increas- ing demand for lecture-room accommodation. The garden towards Unter den Linden is adorned by a bronze statue of Helmholtz; the marble statues of Wilhelm and Alexander von Humboldt, which were formerly placed on either side of the gate, have been removed to the adjacent garden. Technical education is provided in the magnificent buildings erected at a cost of £100,000 in Charlottenburg, which are equipped with all the apparatus for the teaching of science. Among other institutions of university rank and affiliated to it are the school of mines, the agricultural college, the veterinary college, the new seminary for oriental languages, and the high school for music. The geodetic institute has been removed to Potsdam. The univer- sity is, moreover,

rich in institutions for the promotion of medical and chemical science, for the most part housed in build- ings belonging to the governing body. There should also be mentioned the Royal Academy of Sciences, founded in 1700. The name of Leibnitz is associated with its foundation, and it was raised to the rank of a royal academy by Frederick the Great in 1743. The Royal Academy of Arts is under the imme- diate protection of the king, and is governed by a director and senate. There is also an academy of vocal music.

Schools. — Berlin possesses fifteen Gymnasia (classical schools, for the highest branches of the learned professions), of which four are under the direct supervision of the provincial authori- ties and have the prefix koniglich (royal), while the remain- ing eleven are municipal and under the control of the civic authorities. They arc attended by about 7000 scholars, of whom a fourth are Jews. There are also eight Real- gymnasia (or " modern " schools), numerous Real-schulen (commercial schools), public high schools for girls, and commodious and excellently organized elementary schools.

Museums. — The buildings of the royal museum are divided into the old and new museums. The former is an imposing edifice situated on the north-east side of the Lustgarten, facing the royal palace. It was built in the reign of Frederick William III. from designs by Schinkel. Its portico supported by eighteen colossal Ionic columns is reached by a wide flight of steps. The back and side walls of the portico are covered with frescoes, from designs by Schinkel, representing the world's progress from chaos to organic and developed life. The sides of the flight of steps support equestrian bronze groups of the Amazon by Kiss, and the Lion-slayer by Albert Wolff. Under the portico are monuments of the sculptors Rauch and Schadow, the architect Schinkel, and the art critic Winckelmann. The interior consists of a souterrain, and of a first floor, entered from the portico through bronze doors, after designs by Stiller, weighing 75 tons, and executed at a cost of £3600. This floor consists of a rotunda, and of halls and cabinets of sculpture. The second floor, which formerly contained the national gallery of paintings, is occupied by a collection of northern antiquities and by the Schliemann treasures.

The new museum, connected with the old museum by a covered corridor, is, in its internal arrangements and decorations, one of the finest structures in the capital. The lowest of its three floors contains the Egyptian museum; on the first floor plaster casts of ancient, medieval and modern sculpture are found, while the second contains a cabinet of engravings. On the walls of the grand marble staircase, which rises to the full height of the building, Kaulbach's cyclus of

stereochromic pictures is painted, representing the six great epochs of human progress, from the confusion of tongues at the Tower of Babel and the dispersion of the nations to the Reformation.

The national gallery, a fine building surrounded by a Cor- inthian colonnade and lying between the royal museums and the Spree> contains a number of modern German paintings. Behind these buildings, again, is the Pergamum museum, which houses a unique collection, the result of the excavations at

Pergamum. Still farther away, on a triangular plot of land enclosed by the two arms of the Spree and the metropolitan railway, stands the Kaiser Friedrich museum (1904). This edifice, in the Italian baroque style, surmounted by a dome, possesses but little architectural merit, and its position is so confined that great ingenuity had to be employed in its internal arrangements to meet the demands of space, but its collection of pictures is one of the finest in Europe. Hither were removed, from the old and new museums, the national gallery of pictures, the statuary of the Christian epoch and the numismatic collec- tion. The gallery of paintings, on the first floor, is distributed into the separate schools of Germany, Italy, Flanders and Holland, while another of the central rooms embraces those of Spain, France and England. The collection, which in 1874 contained 1300 paintings, was then enriched by the purchase by the Prussian government for £51,000 of the Suermondt col- lection which, rich in pictures of the Dutch and Flemish schools, contained also a few by Spanish, Italian and French masters. The gallery as a whole has been happily arranged, and there are few great painters of whom it does not contain one or more examples. The Kunst-gewerbe museum, at the corner of the Koniggratzer-strasse and Albrecht-strasse, contains valuable specimens of applied art.

Theatres. — In nothing has the importance of Berlin become more conspicuous than in theatrical affairs. In addition to the old-established Opernhaus and Schauspielhaus, which are sup- ported by the state, numerous private playhouses have been erected, notably the Lessing and the Deutsches theatres, and it is in these that the modern works by Wildenbruch, Sudermann, and Hauptmann have been produced, and it may be said that it is in Berlin that the modern school of German drama has its home. In music Berlin is not able to vie with Leipzig, Dresden or Munich, yet it is well represented by the Conservatorium, with which the name of Joachim is connected, while the more modern school is represented by Xaver Scharwenka.

Government, Administration and Politics. — On the 1st of April

1881 Berlin was divided off from the province of Brandenburg and since forms a separate administrative district. But the chief presidency (Oberprasidium) , the Consistory, the provincial school-board, and the board of health of the province of Brandenburg remain tribunals of last instance to which appeals lie from Berlin. The government is partly semi-military (police) and partly municipal. The ministry of police (a branch of the home office) consists of six departments: (1) general; (2) trade; (3) building; (4) criminal; (5) passports; (6) markets. It controls the fire brigade, has the general inspection over all strangers, and is responsible for public order. The civil authority {Magistrat) consists of a chief mayor (Oberbiir germeister), a mayor (Bilrger- meister), and a city council (Stadtral). The Obe bur germeister, who is ex officio a member of the Prussian Upper House, and the Biir germeister are elected by the common council (Stadtver- ordnetenversammlung) of 144 members, i.e. three delegates chosen by manhood suffrage for each ward of the city; but the election is subject to the veto of the king without reason given. The Sladtrat consists of 32 members, of whom 15 are paid officials (including 2 syndics, 2 councillors for building, and 2 for education), while 17 serve gratuitously. For general work the Magistrat and the Stadlverordnelenversammlung coalesce, and committees are appointed for various purposes out of the whole body, these being usually presided over by members of the Magistrat. Their jurisdiction extends to water- supply, the drainage, lighting and cleaning of the streets, the care of the poor, hospitals and schools. Politically the city is divided into six Reichstag and four Landtag constituencies, returning six and nine members respectively, and it must be noted that in the case of the Landtag the allocation of seats dated from i860, so that the city, in proportion to its population, was in 1908 much under-represented. It should have had twenty-five members instead of nine.

Population. — The stupendous growth of the population of Berlin during the last century is best illustrated by the following figures. In 1816 it contained 197,717 inhabitants; in 1849,

431,566; in 1871, 826,341; in 1880, 1,122,330; 1890, 1,578,794, and in 1905, 2,033,900. The birth-rate is about 30, and the death-rate 20 per 1000 inhabitants a year. Illegitimate births amount to about 15 % of the whole. According to religion, about 84 % are Protestants, 10 % Roman Catholics and 5 % Jews, but owing to the

great number of Jews who for social and other reasons ostensibly embrace the Christian faith, these last figures do not actually represent the number of Jews by descent riving in the city.

Environs. — Marvellous as has been the transformation in the city itself, no less surprising results have been effected since 1875 in the surroundings of Berlin. On the east, north and west, the city is surrounded at a distance of some 5 m. from its centre by a thick belt of pine woods, the Jungfernheide, the Spandauer Forst, and the Grunewald, the last named stretching away in a south-westerly direction as far as Potsdam, and fringing the beautiful chain of Havel lakes. These forests enjoyed until quite recent times an unenviable notoriety as the camping- ground and lurking-place of footpads and other disorderly characters. After the opening of the circular railway in 1871, private enterprise set to work to develop these districts, and a " villa colony " was built at the edge of the Grunewald between the station West-end and the Spandauer Bock. From these beginnings, owing mainly to the expansion of the important suburb of Charlottenburg, has resulted a complete transformation of the eastern part of the Grunewald into a picturesque and delightful villa suburb, which is connected by railway, steam- tra/nway and a magnificent boulevard — the Kurfiirstendamm — with the city. Nowadays the little fishing villages on the shores of the lakes, notably the Wannsee, cater for the recreation of the Berliners, while palatial summer residences of wealthy merchants occupy the most prominent sites. Suburban Berlin may be said to extend practically to Potsdam.

Traffic. — The public streets have a total length of about 350 m., and a large staff of workmen is regularly employed in maintaining and cleaning the public roads and parks. The force is well controlled, and the work of cleaning and removing snow after a heavy fall is thoroughly and efficiently carried out. The less important thoroughfares are mostly paved with the so-called Vienna paving, granite bricks of medium size, while the principal streets, and especially those upon which the traffic is heavy, have either asphalt or wood paving.

Water-Supply and Drainage. — The water-supply is mainly derived from works on the Miiggel and Tegeler lakes, the river water being carefully filtered through sand. The drainage system is elaborate, and has stood the test of time. The city is divided into twelve radial systems, each with a pumping station, and the drainage is forced through five mains to eighteen sewage farms, each of which is under careful sanitary supervision, in respect both of the persons employed

thereon, and the products, mainly milk, passing thence to the city for human consumption. Only in a few isoiated cases has any contamination been traced to fever or other zymotic germs. In this connexion it is worth noting that the infectious diseases hospital has a separate system of drainage which is carefully disinfected, and not allowed to be employed for the purposes of manure.

Hospitals. — In no other city of the world is the hospital organization so well appointed as in Berlin, or are the sick poor tended with greater solicitude. State, municipal and private charity here again join hands in the prompt relief of sickness and cases of urgency. The municipal hospitals are six in number, the largest of which is the Virchow hospital, situate in Moabit and opened in 1906. It is arranged on the pavilion system, contains 2000 beds, and is one of the most splendidly equipped hospitals in the world. The cost amounted to £900,000. Next comes that of Friedrichshain, also built on the pavilion system, while the state controls six (not including the prison infirmaries) of which the world-renowned Charite in the Luisen-strasse is the principal. The hospitals of the nursing sisters (Diakonissen Anstalten) number 8, while there are 60 registered private hospitals under the superintendence of responsible doctors and under the inspection of government.

Charities. — Berlin is also very richly endowed with charitable institutions for the relief of pauperism and distress. In addition to the municipal support of the poor-houses there are large funds derived from bequests for the relief of the necessitous and deserv- ing poor; while night shelters and people's kitchens have been organized on an extensive scale for the temporary relief of the indigent unemployed. For the former several of the arches of the city railway have been utilized, and correspond in internal arrangement to like shelters instituted by the Salvation Army in London and various other cities.

Markets. — Open market-places in Berlin are things of the past, and their place has been taken by airy and commodious market halls. Of-these, 14 in number, the central market, close to the Alexander-platz station of the city railway with which it is connected by an admirable service of lifts for the rapid unloading of goods, is the finest. It has a ground area of about 17,000 sq. yds., and is fitted with more than 2000 stalls. The other markets are conveniently situated at various accessible places within the city, and the careful police supervision to which they are subjected, both in the matter of general cleanliness, and in the careful examination of all articles of food exposed for sale, has tended to the general health and cqrnfort of the population.

The central cattle market and slaughter-houses for the inspec- tion and supply of the fresh meat consumed in the metropolis occupy an extensive area in the north-east of the city on the Ringbahn, upon which a station has been erected for the accom- modation of meat trains and passengers attending the market. The inspection is rigorously carried out, and only carcases which have been stamped as having been certified good are permitted to be taken away for human consumption.

History. — The etymology of the word " Berlin " is doubtful. Some derive it from Celtic roots — her, small, short, and lyn, a lake; others regard it as a Wend word, meaning a free, open place; others, again, refer it to the word werl, a river island. Another authority derives it from the German word Bruhl, a marshy district, and the Slavonic termination in; thus Bruhl, by the regular transmutation Biihrl (compare Ger. bren-nen and Eng. burn), Burhlin. More recent research, however, seems to have established the derivation from Wehr, dam.

Similar obscurity rests on the origin of the city. The hypo- theses which carried it back to the early years of the Christian era have been wholly abandoned. Even the margrave Albert the Bear (d. n 70) is no longer unquestionably regarded as its founder, and the tendency of opinion now is to date its origin from the time of his great-grandsons, Otto III. and John I. When first alluded to, what is now Berlin was spoken of as two towns, Kolln and Berlin. The first authentic document con- cerning the former is from the year 1237, concerning the latter from the year 1244, and it is with these dates that the trustworthy history of the city begins. In 1307 the first attempt was made to combine the councils of Kolln and Berlin, but the experiment was abandoned four years later, and the two towns continued their separate existence till 1432, when the establishment of a common council for both led to disturbances of which the out- come was that Frederick II. the Iron in 1442 abolished this arrangement, seriously curtailed the privileges of both towns, and began the building of a castle at Kolln. A feud between the elector and the Berliners ended in the defeat of the latter, who in 1448 were forced to accept the constitution of 1442. From this time Berlin became and continued to be the residence of the Hohenzollerns, the elector John Cicero (1486-1499) being the first to establish a permanent court inside the walls. It was not, however, until the time of King Frederick William I. that the sovereigns ceased to date their official acts from Kolln. In 1539, under the elector Joachim II., Berlin embraced the Lutheran religion. Henceforth the history of Berlin was intimately bound up with the house of Hohenzollern. The

conversion of the elector John Sigismund in 16 13 to the Reformed (Calvinist) faith was hotly resented by the Berliners and led to bloody riots in the city. The Thirty Years' War all but ruined the city, the population of which sank from some 14,000 in 1600 to less than 8000 in 1650. It was restored and the foundations of its modern

splendour were laid by the Great Elector, by the time of whose death (1688) the population had risen to some 20,000. During this period several suburbs had begun to grow up, Friedrichs- werder in 1667 and the Dorotheenstadt, so named in 1676 after the electress Dorothea its founder. In 1688 Frederick III. (afterwards King Frederick I.) began the Friedrichstadt, com- pleted by Frederick William I. Under Frederick I., who did much to embellish the city as the royal Residenzsiadt, the separate administrations of the quarters of Berlin, Kolln, Friedrichstadt, Friedrichswerder and Dorotheenstadt were com- bined, and the separate names were absorbed in that of Berlin. The fortifications begun in 1658 were finally demolished under Frederick the Great in 1745. and the Neue Friedrichstrasse, the Alexander-strasse and the Wall-strasse were laid out on their site.

Twice during the Seven Years' War Berlin was attacked by the enemy: in 1757 by the Austrians, who penetrated into the suburbs and levied a heavy contribution, and in 1760 by the Russians, who bombarded the city, penetrated into it, and only retired on payment of a ransom of 1,500,000 thalers (£225,000). After the disastrous campaign of Jena, Berlin suffered much during the French occupation (24th October 1806 to 1st December In spite of thes'e misfortunes, however, the progress of

the city was steady. In 1809 the present municipal government was instituted. In 1810 the university was founded. After the alliance of Prussia and Russia in r8r2 Berlin was again occupied by the French, but in March 18 13 they were finally driven out. The period following the close of the war saw great activity in building, especially in the erection cf many noble monuments and public buildings, e.g. those by the architect Karl Friedrich Schinkel. The most notable event in the history of Berlin during the 19th century, prior to the Franco-German War, was the March revolution of 1848 (see Germany: History, and Frederick William IV., king of Prussia). The effect of the war of 1870-71 on the growth of Berlin has been

sufficiently indicated already.

Authorities. — For the history cf Berlin see the publications of the " VcreinfiirdieGeschichte Berlins " ; the Berlinische Chroniknebst Urkundenbuch, and the periodicals Der Bar (1875, & c) an d Mit teilungen (1884, &c). Of histories may be mentioned A. Streckfuss, $00 Jahre Berliner Geschichte (new ed. by Fernbach, 1900) ; Berlin im igten Jahrhundert (4 vols., 1867-1869), and Statistisches Jahrbuch der Stadt Berlin (1904-1905); Fidicin, Ilistorisch-diplo- tnatische Beitrdge zur Geschichte der Stadt Berlin (5 vols., 1837-1842) ; Brockhaus, Konversalions-Lexikon (1904); Meyer, Konversations- Lexikon (1904); Baedeker, Fuhrer durch Berlin; Woerl, Fiihrer durch Berlin; J. Pollard, The Corporation of Berlin (Edinburgh, 1893); A. Shadwell, Industrial Efficiency (London, 1906) ; Berliner Jahrbuch fur Handel und Industrie (1905); and O. Schwebel, Ge- schichte der Stadt Berlin (Berlin, 1888). (P. A. A.)

Berlin, Congress and Treaty or. The events that led up to the assembling of the congress of Berlin, the outcome of which was the treaty of the 13th of July 1878, are described else- where (see Europe: History; Turkey: History; Russo-Turkish War). Here it must suffice to say that the terms of the treaty of SanStefano (3rd March 18 78), by which the Russo-Turkish War had been brought to a conclusion, seemed to those of the other powers who were most interested scarcely less fatal to the Ottoman dominion than that Russian occupation of Constantinople which Great Britain had risked a war to prevent. By this instrument Bulgaria was to become a practically independent state, under the nominal suzerainty of the sultan, bounded by the Danube, the Black Sea, the Aegean and Albania, and cutting off the latter from the remnant of Rumelia which, with Constantinople, ; vas to be left to the Turks. At the same time the other Christian principalities, Servia and Montenegro, were largely increased in size and their independence definitively recognized; and the proposals of the powers with regard to Bosnia and Herzegovina, communicated to the Ottoman plenipotentiaries at the first sitting of the conference of Constantinople (23rd December 1876), were to be immediately executed. These provisions seemed to make Russia permanently arbiter of the fate of the Balkan peninsula, the more so since the vast war indemnity of 1400,000,000 roubles exacted in the treaty promised to cripple

the resources of the Ottoman government for years to come.

The two powers whose interests were most immediately threatened by the terms of the peace were Austria and Great Britain. The former

especially, refusing to be bribed by the Russian offer of Bosnia and Herzegovina, saw herself cut off from all chance of expansion in the Balkan peninsula and threatened with the establishment there of the paramount power of Russia, a peril it had been her traditional policy to avert. On the 5th of February, accordingly, Count Andrassy issued a circular note, addressed to the signatory powers of the treaty of Paris of 1856 and the London protocol of 1871, suggesting a congress for the purpose of establishing " the agreement of Europe on the modifications which it may become necessary to introduce into the above-mentioned treaties " in view of the preliminaries of peace signed by Russia and Turkey. This appeal to the sanctity of international engagements, traditional in the diplomatic armoury of Austria, and strengthened by so recent a precedent as that of 1871, met with an immediate response. On the 1st of April Lord Salisbury had already addressed a circular note to the British embassies refusing on behalf of the British government to recognize any arrangements made in the peace preliminaries, calculated to modify European treaties, " unless they were made the subject of a formal agree- ment among the parties to the treaty of Paris," and quoting the " essentia] principle of the law of nations " promulgated in the London protocol. By Great Britain therefore the Austrian proposal was at once accepted. Germany was very willing to fall in with the views of her Austrian ally and share in a council in which, having no immediate interests of her own, Bismarck could win new laurels in his role of " honest broker." In these circumstances Russia could not but accept the principle of a congress. She tried, however, to limit the scope of its powers by suggesting the exclusion of certain clauses of the treaty from its reference, and pointed out (circular of Prince Gorchakov, April 9th) that Russia had not been the first nor the only Power to violate the treaties in question. The answer of Lord Beacons- field was to mobilize the militia and bring Indian troops to the Mediterranean; and finally Russia, finding that the diplomatic support which she had expected from Bismarck failed her, consented to submit the whole treaty without reserve to the congress.

On the 3rd of June Count Minister, in the name of the German government, issued the formal invitation to the congress. The congress met, under the presidency of Prince Bismarck, at Berlin on the 13th of June. Great Britain was represented by Lord Beaconsfield, Lord Salisbury and Lord Odo Russell, am- bassador at Berlin; Germany by Prince Bismarck, Baron Ernst von Biilow and Prince Chlodwig von Hohenlohe-Schillingsfiirst, ambassador at Paris; Austria by Count Andrassy, Count Louis Karolyi and Baron Heinrich Karl von Haymerle, ambassador at Rome; France by

William H. Waddington, the Comte de Saint- Vallier, ambassador at Berlin, and Felix Hippolyte Desprez, director of political affairs in the department for foreign affairs; Russia by the chancellor, Prince Gorchakov, Count Peter Shuvalov, ambassador to the court of St James's, and Paul d'Oubril, ambassador at Berlin; Turkey by Alexander Catheodory Pasha, minister of public works, Ali Pasha, muskir of the Ottoman armies, and Sadullah Bey, ambassador at Berlin. The bases of the conferences had, of course, been settled before- hand, and the final act of the congress was signed by the pleni- potentiaries mentioned above exactly a month after the opening of the congress, on the 13th of July.

The treaty of Berlin consists in all of sixty-four articles, of which it will be sufficient to note those which have had a special bearing on subsequent international developments. So far as they affect the territorial boundaries fixed by the treaties of Paris and San Stefano it will be sufficient to refer to the sketch map in the article Europe: History. By Art. I. Bulgaria was " constituted an autonomous and tributary principality under the suzerainty of H.I.M. the Sultan"; it was to have "a Christian government and a national militia." Art. II. fixed

the boundaries of the new state and provided for their delimita- tion by a European commission, which was " to take into con- sideration the necessity for H.I.M. the Sultan to be able to defend the Balkan frontiers of Eastern Rumelia." Arts. III. to XII. provide for the election of a prince for Bulgaria, the machinery for settling the new constitution, the adjustment of the relations of the new Bulgarian government to the Ottoman empire and its subjects (including the question of tribute, the amount of which was, according to Art. XII., to be settled by agreement of the signatory powers " at the close of the first year of the working of the new organization ")• By Art. X. Bulgaria, so far as it was concerned, was to. take the place of the Sublime Porte in the engagements which the latter had contracted, as well towards Austria-Hungary as towards the Rustchuck- Varna Railway Company, for working the railway of European Turkey in respect to the completion and connexion, as well as the working of the railways situated in its territory.

By Art. XIII. a province was formed south of the Balkans which was to take the name of " Eastern Rumelia," and was to remain " under

the direct military and political control of H.I.M. the Sultan,under conditions of administrative autonomy." It was to have a Christian governor-general. Arts. XIV. to XXIII. define the frontiers and organization of the new pro- vince, questions arising out of the Russian occupation, and the rights of the sultan. Of the latter it is to be noted that the sultan retained the right of fortifying and occupying the Balkan passes (Art. XV.) and all his rights and obligations over the railways (Art. XXL).

Art. XXV., which the events of 1908 afterwards brought into special prominence, runs as follows: " The provinces of Bosnia and Herzegovina shall be occupied and administered by Austria-Hungary. The government of Austria-Hungary, not desiring to undertake the administration of the sarijak of Novi-Bazar, ... the Ottoman administration will continue to exercise its functions there. Nevertheless, in order to assure the mainten- ance of the new political state of affairs, as well as freedom and security of communications, Austria-Hungary reserves the right of keeping garrisons and having military and commercial roads in the whole of this part of the ancient vilayet of Bosnia."

By Art. XXVI. the independence of Montenegro was defini- tively recognized, and by Art. XVIII. she received certain accessions of territory, inch", ling a strip of coast on the Adriatic, but under conditions which tended to place her under the tute- lage of Austria-Hungary. Thus, by Art. XXIX. she was to have neither ships of war nor a war flag, the port of Antivari and all Montenegrin waters were to be closed to the war-ships of all nations; the fortifications between the lake and the coast were to be razed; the administration of the maritime and sanitary police at Antivari and along the Montenegrin littoral was to be carried on by Austria-Hungary "by means of light coast-guard boats "; Montenegro was to adopt the maritime code in force in Dalmatia, while the Montenegrin merchant flag was to be under Austro-Hungariar. consular protection. Finally, Montenegro was to " come to an understanding with Austria-Hungary on the right to construct and keep up across the new Montenegrin territory a road and a railway."

By Art. XXXIV. the independence of Servia was recognized, subject to conditions (as to religious liberty, &c.) set forth in Art. XXXV. Art. XXXVI. defined the new boundaries.

By Art. XLIII. the independence of Rumania, already pro- claimed by the prince (nTmT§ l8 7?) > wa s recognized. Subse- quent articles define the conditions and the boundaries.

Arts. LII. to LVII. deal with the question of the free navi- gation of the Danube. All fortifications between the mouths and the Iron Gates were to be razed, and no vessels of war, save those of light tonnage in the service of the river police and the customs, were to navigate the river below the Iron Gates (Art. I.IL). The Danube commission, on which Rumania was to be represented, was maintained in its functions (Art. LIII.) and provision made for the further prolongation of its powers (Art. LI V.).

Art. LVIII. cedes to Russia the territories of Ardahan, Kars and Batoum, in Asiatic Turkey. By Art. LIX. " H.M. the emperor of Russia declares that it is his intention to constitute Batoum a free port, essentially commercial."

By Art. LXI. " the Sublime Porte undertakes to carry out, without further delay, the improvements and reforms de- manded by local requirements in the provinces inhabited by the Armenians, and to guarantee their security against the Cir- cassians and Kurds." It was to keep the powers informed periodically of " the steps taken to this effect"

Art. LXII. made provision for the securing religious liberty in the Ottoman dominions.

Finally, Art. LXIII. declares that " the treaty of Paris of 30th March 1856, as well as the treaty of London of 13th March 1 87 1, are maintained in all such of their provisions as are not abrogated or modified by the preceding stipulations."

For the full text of the treaty in the English translation see E. Hertslet, Map of Europe by Treaty, vol. iv. p. 2759 (No. 530) ; for the French original see State Papers, vol. lxix. p. 749. (W. A. P.)

BERLIN, a city of Coos county, New Hampshire, U.S.A., on the AndroScoggin river, in the N. part of the state, about 98 m. N.W. of Portland, Maine. Pop. (1890) 3729; (1900) 8886, of whom 4643 were foreign-born; (1910 census) 11,780. The area of the city in 1906 was 57-81 sq. m. Berlin is served by the Grand Trunk and Boston & Maine railways. It is situated in the heart of the White Mountains and 16 m. from the base of Mt. Washington. Berlin Falls, on the picturesque Androscoggin river, furnishes an immense water-power, the development of which for manufacturing purposes accounts for the rapid growth of the city. The forests of northern New England and of the province of Quebec supply the raw material for the extensive saw-mills and planing-miils, the pulp- and paper-

mills, and the sulphite fibre mills, said to be the largest in existence. In 1905 the city's factory products were valued at $5,989,119, of which 78-5 % was the value of the paper and wood pulp manufactured. Berlin was first settled in 1821, was incorporated as a township in 1829, and was chartered as a. city in 1897.

BERLIN, a city and port of entry, Ontario, Canada, and capital of Waterloo county, 58 m. W. of Toronto, on the Grand Trunk railway. It is the centre of a prosperous farming and manu- facturing district, inhabited chiefly by German immigrants and their descendants. An electric railway connects it with the town of Waterloo (pop. 4100) 2 m. to the north, which has important flour and woollen mills and distilleries. Berlin is a flourishing manufacturing town, and contains a beet sugar refinery, automobile, leather, furniture, shirt and collar, felt, glove, button and rubber factories. Pop. (1881) 4054; (1901)

9747-

BERLIN, a four-wheeled carriage with a separate hooded seat behind, detached from the body of the vehicle; so called from having been first used in Berlin. It was designed about 1670, by a Piedmontese architect in the service of the elector of Brandenburg. It was used as a travelling carriage, and Swift refers to it in his advice to authors " who scribble in a berlin." As an adjective, the word is used to indicate a special kind of goods, originally made in Berlin, of which the best known is Berlin wool. A Berlin warehouse is a shop for the sale of wools and fancy goods (cf. Italian warehouse). The spelling " berlin " is also used by Sir Walter Scott for the " birlinn," a large Gaelic rowing-boat.

BERLIOZ, HECTOR (1803-1869), French musical composer, was born on the nth of December 1803 at Cote-Saint-Andre, a small town near Grenoble, in the department of Isere. His father, Louis Berlioz, was a physician of repute, and by his desire Hector for some time devoted himself to the study of medicine. At the same time he had music lessons, and, in secret, perused numerous theoretical works on counterpoint and harmony, with little profit it seems, till the hearing and subsequent careful analysis of one of Haydn's quartets opened a new vista to his unguided aspirations. A similar work written by Berlioz in imitation of Haydn's masterpiece was favorably received by his friends. From Paris, where he had been sent to complete his

medical studies, he at last made known to his father the unalter- able decision of devoting himself entirely to art, the answer to which confession was the withdrawal of all further pecuniary- assistance. In order to support life Berlioz had to accept the humble engagement of a singer in the chorus of the Gymnase theatre. Soon, however, he became reconciled to his father and entered the Conservatoire, where he studied composition under Reicha and Lesueur. His first important composition was an opera called Les Francs-Juges, of which, however, only the overture remains extant. In 1825 he left the Conservatoire, and began a course of self-education, founded chiefly on the works of Beethoven, Gluck, Weber and other German masters. About this period Berlioz saw for the first time the talented Irish actress Henrietta Smithson, who was then charming Paris by her impersonations of Ophelia, Juliet and other Shakespearean characters. The enthusiastic young composer became deeply enamoured of her at first sight, and tried, for a long time in vain, to gain the love or even the attention of his idol. To an incident of this wild and persevering courtship Berlioz's first symphonic work, Hpisode de la vie d'un artiste, owes its origin. By the advice of his friends Berlioz once more entered the Conservatoire, where, after several unsuccessful attempts, his cantata Sardana- palus gained him the first prize for foreign travel (1830), in spite of the strong personal antagonism of one of the umpires. During a stay in Italy Berlioz composed an overture to King Lear, and Le Retour a la vie — a sort of symphony, with intervening poetical declamation between the single movements, called by the composer a melologue, and written in continuation of the Episode de la vie d'un artiste, along with which work it was performed at the Paris Conservatoire in 1832. Paganini on that occasion spoke to Berlioz the memorable words: " Vous com- mencez par ou les autres ont fini." Miss Smithson, who also was present on the occasion, consented to become the wife of her ardent lover in 1833. The marriage was a tempestuous mistake. In 1840 he separated fiom his wife, who died in 1854. Six months later Berlioz married Mademoiselle Recio. His second wife did not live very long, nor was there much that was edifying in this marriage. Between the date of his first marriage and 1840 came out his dramatic symphonies Harold en Italie, Funebre et triompkale, and Romeo el Juliette; his opera Benvenuto Cellini (1837); his Requiem, and other works. In the course of time Berlioz won his due share of the distinctions generally awarded to artistic merit, such as the ribbon of the Legion of Honour and the membership of the Institute. But these distinctions he owed, perhaps, less to a genuine admiration of his compositions than to his successes abroad and his influential position as the musical critic of the

Journal des Debats (a position which he held from 1838 to 1864, and which he never used or abused to push his own works). In 1842 Berlioz went for the first time to Germany, where he was hailed with welcome by the leading musicians of the younger generation, Robert Schumann foremost amongst them. The latter paved the way for the French composer's success by a comprehensive analysis of the Episode in his musical journal, the Neue Zeitschrift fur Musik. In 1846 he produced his magnificent cantata La Damnation de Faust. Berlioz gave successful concerts at Leipzig and other German cities, and repeated his visit on various later occasions — in 1852 by invitation of Liszt, to conduct his opera, Benvenuto Cellini (hissed off the stage in Paris), at Weimar; and in 1855 to produce his oratorio-trilogy, L'Enfance dti Christ, in the same city. This latter work had been previously performed at Paris, where Berlioz mystified the critics by pretending to have found the last chorus amongst the manuscript scores of a composer of the 17th century, Pierre Ducre by name. In 1855 his Te Deum was written for the opening of the Paris exhibition. Berlioz also made journeys to Vienna (1866) and St Petersburg (1867), where his works were received with great enthusiasm. In 1861 he produced >iis work Beatrice et Benedict, and in 1863 Les Troyens. He died in Paris on the 8th of March 1869.

It is not only as a composer that the life of Berlioz is full of interest, although in this respect his achievement is singularly significant for the comprehension of the modern spirit in music.

But it is as the symbol of French romanticism in the whole domain of aesthetic perception that his pre-eminence has come to be recognized. His MSmoires (begun in London in 1848 and finished in 1865) illustrate this romantic spirit at its highest elevation as well as at its lowest depths. Victor Hugo was a romantic, Musset was a romantic, but Berlioz was romanticism itself. As a boy he is in despair over the despair of Dido, and his breath is taken away at Virgil's " Quaesivit coelo lucem ingemuitque reperta." At the age of twelve he is in love with " Estelle," whom he meets fifty years afterwards. The scene is described by himself (1865) with minute fidelity — a scene which Flaubert must have known by heart when he wrote its parallel in the novel L' Education sentimentale. The romance of this meeting between the man — old, isolated, unspeakably sad, with the halo of public fame burning round him — and the woman — old also, a mother, a widow, whose beauty he had worshipped when she was eighteen — is striking. In a frame of chastened melancholy and joy at the sight of Estelle, Berlioz goes to dine with Patti and her family. Patti, on the threshold of her career, pets Berlioz with such

uncontrollable affection, that as the composer wrote a description of his feelings he was overwhelmed at the bitterness of fate. What would he not have given for Estelle to show him such affection ! Patti seemed to him like a marvellous bird with diamond wings flitting round his head, resting on his shoulder, plucking his hair and singing her most joyous songs to the accompaniment of beating wings. " I was enchanted but not moved. The fact is that the young, beautiful, dazzling, famous virtuoso who at the age of twenty-two has already seen musical Europe and America at her feet, does not win the power of love in me; and the aged woman, sad, obscure, ignorant of art, possesses my soul as she did in the days gone by, as she will do until my last day." If this episode touches the sublime, it may be urged with almost equal truth that his description of the exhumation of his two wives and their reburial in a single tomb touches the ridiculous. And yet the scene is described with a perception of all the detail which would call for the highest praise in a novelist. Perhaps some parallel between the splendid and the ridiculous in this singular figure may be seen in the comparison of Nadar's caricature with Charpentier's portrait of the composer.

The profound admiration of Berlioz for Shakespeare, which rose at moments to such a pitch of folly that he set Shakespeare in the place of God and worshipped him, cannot be explained simply on the ground that Henrietta Smithson was a great Shakespearean actress. Unquestionably the great figures in English literature had a profound attraction for him, and while the romantic spirit is obvious in his selections from Byron and Scott, it can also be traced in the quality of his enthusiasm for Shakespeare. It is in his music more than in his literary attitude, however, that is disclosed something in addition to the pure romance of Schumann. — something that places him nearer in kind to Wagner, who recognized in him a composer from whose works he might learn something useful for the cultivation of his «wn ideals. As a youth the power of Beethoven's symphonies made a deep impression on Berlioz, and what has been described as the " poetical idea " in Beethoven's creations ran riot in the young medical student's mind. He thus became one of the most ardent and enlightened originators of what is now known as " programme music." Technically he was a brilliant musical colourist, often extravagant, but with the extravagant emotional- ism of genius. He was a master of the orchestra; indeed, his treatment of the orchestra and his invention of unprecedented effects of timbre give him a solitary position in musical history; he had an extraordinary gift for the use of the various instru- ments, and himself propounded a new ideal for the force to be employed, on an enormous scale.

His literary works include the Traite d' instrumentation (1844); Voyage musical en Allemagne et en Italie (1S45); Les SoirSes d'orchestre (1853); Les Grotesques de la musique (1859); ˆ4 travers chant (1862); Memoires (1870); Lettres intimes (1882),, For a full list of his musical works, Grove's Dictionary should be consulted.

The new critical edition of the complete musical works (published by Breitkopf and Hartel) is in ten series. I. Symphonies: Fanlas- tique, Op. 14; Funebre et triomphale, Op. 15, for military band and chorus; Harold en Italie, Op. 16, with viola solo' Romeo et Juliette, with chorus and soli. II. Overtures (ten, including the five belong- ing to larger works). III. Smaller instrumental works, of which only the Funeral March for Hamlet is important. IV. Sacred music: the Grande Messe des marts, Op. 5; the Te Deum, Op. 22; L'Enfance du Christ, Op. 25, and four smaller pieces. V. Secular cantatas, including Huit scenes de Faust, Op. I ; Lelio, ou le retour a la vie, Op. 146 (sequel to Symphonie fantastique) , and La Damnation de Faust, Op. 24. VI. Songs and lyric choruses with orchestra, two vols. VII. Songs and lyric choruses with pianoforte, 2 vols, in- cluding arrangements of the orchestral songs. VIII. Operas: Benvenuto Cellini; Les Troyens (five acts in two parts, La Prise de Troie and Les Troyens <5 Carthage) ; Recitatives for the dialogue in Weber's Freischiitz. IX. Arrangements, including the well-known orchestral version of Weber's Invitation a la danse. X. Fragments and new discoveries.

Adolphe Julien's biography of Berlioz (1888) first gave a careful account of the details of his life. See also the books by R. Pohl (1884), P. Galibert (1890), E. Hippeau (1890), G. Noufflard (1885), L. Mesnard (1888), Louise Pohl (1900), and D. Bernard (trans, by H. M. Dunstan, 1882). An illuminating essay on Berlioz is in Filson Young's Mastersingers (1902). See also the essay in W. H. Hadow's Studies in Modern Music (1st series, 1908). Berlioz's Traite d 'instrumentation has been translated into German and brought up to date by Richard Strauss (Peters' edition [1906]).

BERM (probably a variant of " brim "), a narrow ledge of ground, generally the level banks of a river. In parts of Egypt the whole area reached by the Nile is included in the berm. Thus of the lands near Berber, Mr C. Dupuis writes (in Sir William Garstin's Report on the Upper Nile, 1904), " In most places there is a well-defined alluvial

berm of recent formation and varying width, up to perhaps a couple of kilometres." In military- phraseology the berm is the space of ground between the base of a rampart and the ditch.

BERMONDSEY, a south-eastern metropolitan borough of London, England, bounded N. and E. by the Thames, S.E. by Deptford, S.W. by Camberwell, and W. by Southwark. Pop. (1901) 130,760. It is a district of poor streets, inhabited by a labouring population employed in leather and other factories, and in the Surrey Commercial Docks and the wharves bordering the river. The parish of Rotherhithe or Redriff has long been associated with a seafaring population. A tunnel connecting it with the opposite shore of the river was opened in June 1908. The neighbouring Thames Tunnel was opened in 1843, but, as the tolls were insufficient to maintain it, was sold to the East London Railway Company in 1865. The Herold Institute, a branch of the Borough Polytechnic, Southwark, is devoted to instruction in connexion with the leather trade. Southwark Park in the centre of the borough is 63 acres in extent. Ber- mondsey is in the parliamentary borough of Southwark, including the whole of Rotherhithe and part of the Bermondsey division. The borough council consists of a mayor, 9 aldermen, and 54 councillors. Area 1499-6 acres.

The name appears in Domesday, the suffix designating the former insular, marshy character of the district; while the prefix is generally taken to indicate the name of a Saxon over- lord, Beormund. Bermondsey was in favour with the Norman kings as a place of residence, and there was a palace here, perhaps from pre-Norman times. A Cluniac monastery was founded in 1082, and Bermondsey Cross became a favoured place of pilgrim- age. The foundation was erected into an abbey in 1399, and Abbey Road recalls its site. Similarly, Spa Road points to the existence of a popular spring and pleasure grounds, maintained for some years at the close of the 18th century. Jacob Street marks Jacob's Island, the scene of the death of Bill Sikes in Dickens's Oliver Twist. Tooley Street, leading east from South- wark by London Bridge railway station, is well known in con- nexion with the story of three tailors of Tooley Street, who addressed a petition to parliament opening with the compre- hensive expression " We, the people of England." The name is a corruption of St Olave, or Olaf , the Christian king of Norway, who in 994 attacked London by way of the river, and broke down London Bridge.

See E. T. Clarke, Bermondsey, its Historic Memories (1901)

BERMUDAS, a group of islands in the Atlantic Ocean, forming a

British colony, in 32 15′ N. and 64 50′ W., about 580 m. E. by S. from Cape Hatteras on the American coast. The group, consisting of small islands and reefs (which mark the extreme northern range of the coral-building polyps), is of oval form, measuring 22 m. from N.E. to S.W., the area being 20 sq. m. The largest of the islands is Great Bermuda, or the Main Island, 14 m. long and about a mile in average width, enclosing on the east Harrington or Little Sound, and on the west the Great Sound, which is thickly studded with islets, and protected on the north by the islands of Watford, Boaz, Ireland and Somerset. The remaining members of the group, St George, Paget, Smith, St David, Cooper, Nonsuch, &c, lie N.E. of the Main Island, and form a semicircle round Castle Harbour. The fringing islands which encircle the islands, especially on the north and west, leave a few deep passages wide enough to admit the largest vessels.

Geology. — The Bermudas consist of aeolian limestones (cf. Bahamas) which in some of the larger islands form irregular hills attaining a height of some 200-250 ft. These limestones are composed chiefly of comminuted shells drifted and deposited by the wind, and they are very irregularly stratified, as is usually the case with wind-blown deposits. Where fresh the rock is soft, but where it has been exposed to the action of the sea it is covered by a hard crust and often loses all trace of stratification. The surface is frequently irregularly honeycombed. Even the reefs are not wholly formed of coral. They are ridges of aeolian lime- stone plastered over by a thin layer of corals and other calcareous organisms. The very remarkable " serpuline atolls " are covered by a solid crust made of the convoluted tubes of serpulae and Vermetus, together with barnacles, mussels, nullipores, corallines and some true incrusting corals. They probably rest upon a foundation of aeolian rock. The Bermudas were formerly much more extensive than at present, and they may possibly stand upon the summit of a hidden volcano. There are evidences of small oscillations of levels, but no proofs of great elevation or depression.

Soil, Climate, &c. — The surface soil is a curious kind of red earth, which is also found in ochre-like strata throughout the limestone. It is generally mixed with vegetable matter and coral sand. There is a total want of streams and wells of fresh water, and the inhabitants are dependent on the rain, which they collect and preserve in tanks. The climate is mild and healthy, although serious epidemics of yellow fever and typhus have occurred. The maximum reading of the thermometer is about 87 F. and its minimum 49°, the mean annual temperature being 70 . The islands attract a large number of visitors annually from America. Vegetation is very rapid, and the soil is clad

in a mantle of almost perpetual green. The principal kind of tree is the so-called " Bermudas cedar," really a species of juniper, which furnishes timber for small vessels. The shores are fringed with the mangrove; the prickly pear grows luxuriantly in the most barren districts; and wherever the ground is left to itself the sage bush springs up profusely. The citron, sour orange, lemon and lime grow wild; but the apple and peach do not come to perfection. The loquat, an introduction from China, thrives admirably. The mild climate assists the growth of esculent plants and roots; and a considerable trade is carried on with New York, principally in onions, early potatoes, tomatoes, and beetroot, together with lily bulbs, cut flowers and some arrowroot. Medicinal plants, as the castor-oil plant and aloe, come to perfection without culture; and coffee, indigo, cotton and tobacco are also of spontaneous growth. Few oxen or sheep are reared in the colony, meat, as well as bread and most vege- tables, being imported from America. The indigenous mammals are very few, and the only reptiles are a small lizard and the green turtle. Birds, however, especially aquatic species, are very numerous. Insects are comparatively few, but ants swarm destructively in the heat of the year. Fish are plentiful round the coasts, and the whale-fishery was once an important industry, but the fisheries as a whole have not been developed.

Towns, and Administration. — There are two towns in the Bermudas: St George, on the island of that name, founded in

1 794 and incorporated in 1 797 ; and Hamilton, on the Main Island, founded in 1790 and incorporated in 1793. St George was the capital till the senate and courts of justice were removed by Sir James Cockburn to Hamilton, which being centrally situated, is more convenient. Hamilton, which is situated on the inner part of the Great Sound, had a population in 1901 of 2246, that of St George being 985. In Ireland Island is situated the royal dockyard and naval establishment. The harbour of St George's has space enough to accommodate a vast fleet; yet, till deepened by blasting, the entrance was so narrow as to render it almost useless. The Bermudas became an important naval and coaling station in 1869, when a large iron dry dock was towed across the Atlantic and placed in a secure position in St George, while, owing to their important strategic position in mid-Atlantic, the British government maintains a strong garrison. The Bermudas are a British crown colony, with a governor

resident at Hamilton, who is assisted by an executive council of 6 members appointed by the crown, a legislative council of 9 similarly appointed, and a representative assembly of 36 members, of whom four are returned by each of nine parishes. The currency of the colony, which had formerly twelve shillings to the pound sterling, was assimilated to that of England in 1842. The English language is universal. The colony is ecclesiastically attached to- the bishopric of Newfoundland. In 1847 an educational board was established, and there are numerous schools; attend- ance is compulsory, but none of the schools is free. Government scholarships enable youths to be educated for competition in the Rhodes scholarships to Oxford University. The revenue of the islands shows a fairly regular increase during the last years of the 19th century and the first of the 20th, as from £37,830 in 1895 to £63,457 in 1904; expenditure is normally rather less than revenue. In the year last named imports were valued at £589,979 and exports at £130,305, the annual averages since 1895 being about £426,300 and £112,500 respectively. The population shows a steady increase, as from 13,948 in 1881 to 17,535 in 1901; 6383 were whites and 11,152 coloured in the latter year.

History. — The discovery of the Bermudas resulted from the shipwreck of Juan Bermudez, a Spaniard (whose name they now bear), when on a voyage from Spain to Cuba with a cargo of hogs, early in the 16th century. Henry May, an Englishman, suffered the same fate in 1 593 ; and lastly, Sir George Somers shared the destiny of the two preceding navigators in 1609. Sir George, from whom the islands took the alternative name of Somers, was the first who established a settlement upon them, but he died before he had fully accomplished his design. In 161 2 the Bermudas were granted to an offshoot of the Virginia Company, which consisted of 120 persons, 60 of whom, under the command of Henry More, proceeded to the islands. The first source of colonial wealth was the growing of tobacco, but the curing industry -ceased early in the 18th century. In 1726 Bishop George Berkeley chose the Bermudas as the scat of his projected missionary establishment. The first newspaper, the Bermuda Gazette, was published in 1784.

See Godet, Bermuda, its History, Geology, Climate, &c. (London, i860); Lefroy, Discovery and Settlement of the Bermudas (London, 1877-1879); A. Heilprin, Bermuda Islands (Philadelphia, 1889); Stark, Bermuda Guide (London, 189S); Cole, Bermuda . . . Bibliography (Boston, 1907); and for geology see also A. Agassiz, " Visit to the Bermudas in March 1894," Bull. AIus. Comp. Zool. Harvard, vol. xxvi. No. 2, 1895; A. E. Verrill, " Notes on the Geology of the

Bermudas," Amer. Journ. Sci. scr. 4, vol. ix. (1900), pp. 313-34°; " The Bermuda Islands; Their Scenery, &c.," Trans. Conn. Acad. Arts and Sci. vol. xi. pt. 2 (1901-1902). '

BERMUDEZ, a N.E. state of Venezuela, between the Carib- bean Sea and the Orinoco river, bounded E. by the gulf of Paria and the Delta-Amacuro territory, and W. by the states of Guarico and Miranda. Pop. (est. 1905) 364,158. It was created in 1881 by the union of the states of Barcelona, Cumana and Maturin, dissolved in 1901 into its three original states, and reorganized in 1904 with a slight modification of territory. The state includes the oldest settlements in Venezuela, and was once very prosperous, producing cattle and exporting hides, but wars and political disorders have partly destroyed its industries and

impeded their development. Its principal productions are coffee, sugar, and cacao, and — less important — cotton, tobacco, cocoanuts, timber, indigo and dyewoods. Its more important towns are the capital, Barcelona, Maturin (pop. 14,473), capital of a district of the same name, and Cumana (10,000), on the gulf of Cariaco, founded in 1520 and one of the oldest towns of the continent.

BERN (Fr. Berne), after the Grisons, the largest of the Swiss cantons, but by far the most populous, though politically Bern ranks after that of Zurich. It extends right across Switzerland from beyond the Jura to the snow-clad ranges that separate Bern from the Valais. Its total area is 2641-9 sq. m., of which 2081 sq. m. are classed as " productive " (including 591 sq. m. of forests, and 2-1 m. of vineyards), while of the remainder 1 n 3 sq. m. are occupied by glaciers (the Valais and the Grisons alone surpass it in this respect). It is mainly watered by the river Aar (q.v.), with its affluents, the Kander (left), the Saane or Sarin e (left) and the Emme (right); the Aar forms the two lakes of Brienz and Thun (q.v.). The great extent of this canton accounts for the different character of the regions therein 'com prised. Three are usually distinguished: — (1) The Oberland or Highlands, which is that best known to travellers, for it includes the snowy Alps of the Bernese Oberland (culminating in the Finsteraarhorn, 14,026 ft., and the Jungfrau, 13,669 ft.), as well as the famous summer resorts of Grindelwald, Miirren, Lauter-brunnen, Interlaken, Meiringen, Kandersteg, Adelboden, Thun and the fine pastoral valley of the Simme. (2) The Miltelland or Midlands, comprising the valley of the Aar below Thun, and that of the Emme, thus taking in the outliers of the high Alps and the open country on every side of the town of Bern. (3) The Seeland

(Lakeland) and the Jura, extending from Bienne and its lake across the Jura to Porrentruy in the plains and to the upper course of the Birs. The Oberland and Mittelland form the " old " canton, the Jura having only been acquired in 1815, and differing from the rest of the canton by reason of its French- speaking and Romanist inhabitants.

In 1900 the total population of the canton was 589,433, of whom 483,388 were German-speaking, 97,789 French-speaking, and 7167 Italian-speaking; while there were 506,699 Protestants, 80,489 Romanists (including the Old Catholics), and 1543 Jews. The capital is Bern (q.v.), while the other important towns are Bienne (q.v.), Burgdorf (q.v.), Delemont or Delsberg (5053 inhabitants), Porrentruy or Pruntrut (6959 inhabitants), Thun (q.v.), and Langenthal (4799 inhabitants). There is a university (founded in 1834) in the town of Bern, as well as institutions for higher education in the principal towns. The canton is divided into 30 administrative districts, and contains 507 communes (the highest number in Switzerland). From 1803 to 1814 the canton was one of the six " Directorial " cantons of the Confederation. The existing cantonal constitution dates from 1893, but in 1906 the direct popular election of the executive cf 9 members (hitherto named by the legislature) was introduced. The legislature or Grossrath is elected for four years (like the executive), in the proportion of 1 member to every 2500 (or fraction over 1250) of the resident population. The obligatory Referendum obtains in the case of all laws, and of decrees relating to an expenditure of over half a million francs, while 12,000 citizens have the right of initiative in the case of legislative projects, and 15,000 may demand the revision of the cantonal constitution. The 2 members sent by the canton to the federal Stdnderath are elected by the Grossrath, while the 29 members sent to the federal Nationalrath are chosen by a popular vote. In the Alpine portions cf the canton the breeding of cattle (those of the Simme valley are particularly famous) is the chief industry; next come the elaborate arrangements for summer travellers (the Fremdeninduslrie). It is reckoned that there are 2430 " Alps " or mountain pastures in the canton, of which 1474 are in the Oberland, 627 in the Jura, and 280 in the Emme valley; they can maintain 95,478 cows and are of the estimated value of 46 1 million francs. The cheese of the Emme valley is locally much esteemed. Other industries in the Alpine region are wood-carving (at Brienz) and wine manufacture (on the shores

of the lakes of Bienne and of Thun). The Mittelland is the agricultural portion of the canton. Watchmaking is the principal industry of the Jura, Bienne and St Imier being the chief centres of this industry. Iron mines are also worked in the Jura, while the Heimberg potteries, near Thun, produce a locally famous ware, and there are both quarries of building stone and tile factories. The canton is well supplied with railway lines, the broad gauge lines being 228 m. in length, and the narrow gauge lines 157I m. — in all 3855 m. Among these are many funicular cog-wheel lines, climbing up to considerable heights, so up to Miirren (5368 ft.), over the Wengern Alp (6772 ft.), up to the Schynige Platte (6463 ft.), and many others still in the state of projects. All these are in the Oberland where, too, is the so-called Jungfrau railway, which in 1906 attained a point (the Eismeer station) in the south wall of the Eiger (13,042 ft.) that was 10,371 ft. in height, the loftiest railway station in Switzerland.

The canton of Bern is composed of the various districts which the town of Bern acquired by conquest or by purchase in the course of time. The more important, with dates of acquisition, are the following: — Laupen (1324), Hasli and Meiringen (1334), Thun and Burgdorf (1384), Unterseen and the Upper Simme valley (1386), Frutigen, &c. (1400), Lower Simme valley (1430- 1449), Interlaken, with Grindelwald, Lauterbrunnen and Brienz (1528, on the suppression of the Austin Canons of Interlaken), Saanen or Gessenay (1555), Koniz (1729), and the Bernese Jura with Bienne (1815, from the bishopric of Basel). But certain regions previously won were lost in 1798 — Aargau (1415), Aigle and Grandson (1475), Vaud (1536), and the Pays d'En-Haut or Chateau d'Oex (1555). From 1798 to 1802 the Oberland formed a separate canton (capital, Thun) of the Helvetic Republic. (W. A. B. C.)

BERN (Fr. Berne), the capital of the Swiss canton of the same name, and, by a Federal law of 1848, the political capital of the Swiss confederation. It is most picturesquely situated on a high bluff or peninsula, round the base of which flows the river Aar, thus completely cutting off the old town, save to the west. Five lofty bridges have been thrown over the Aar, the two most modern being the Kirchfeld and Kornhaus bridges which have greatly contributed to create new residential quarters near the old town. Within the town the arcades (or Lauben) on either side of the main street, and the numerous elaborately ornamented fountains attract the eye, as well as the two remaining towers that formerly stood on the old walls but are now in the centre of the town; the Zeitglockenthurm (famous for its singular 16th- century clock, with its mechanical contrivances, set

in motion when the hour strikes) and the Kafichlhurm. The principal medieval building in Bern is the (now Protestant) Minister, begun in 1421 though not completed till 1573. The tower, rising conspicuously above the town, has recently been well restored, but the church was never a cathedral church (as is often stated), for there has never yet been a bishop of Bern. The federal Houses of Parliament (Bundeshaus) were much enlarged in 1888-1892, the older portions dating from 1852-1857, and also contain the offices of the federal executive and administration. The town-hall dates from 1406, while some of the houses belonging to the old gilds contain much of interest. The town library (with which that of the university was incorporated in 1905) contains a vast store of MSS. and rare printed books, but should be carefully distinguished from the national Swiss library, which, with the building for the federal archives, is built in the new Kirchfeld quarter. There are a number of museums; the historical (archaeological and medieval), the natural history (in which the skin of Barry, the famous St Bernard dog, is preserved) , the art (mainly modern Swiss pictures), and the Alpine (in which are collections of all kinds relating to the Swiss Alps). Bern possesses a university (founded in 1834) and two admirably organized hospitals. The old fortifications {Schanzen) have been converted into promenades, which command wonderful views of the snowy Alps of the Bernese Oberland. Just across the Nydeck bridge is the famous bear pit in which live bears are kept, as they are supposed to have given the name to the town;

certainly a bear is shown on the earliest known town seal (1224), while live bears have been maintained at the charges of the town since 1513. There is comparatively little industrial activity in the town, the importance of which is mainly political, though of late years it has been selected as the seat of various inter- national associations (postal, telegraph, railway, copyright, &c). The climate is severe, as the town is much exposed to cold winds blowing from the snowy Alps. In point of population it is exceeded in Switzerland by Zurich, Basel and Geneva, though the number of inhabitants has risen from 27,558 in 1850 and 43,197 in 1880 to 64,227 in 1900. In 1900, 59,698 inhabitants were German-speaking; while 57,144 were Protestants, 6087 Romanists (including Old Catholics) and 655 Jews. The height of the town above the sea-level is 1788 ft.

The ancient castle of Nydeck, at the eastern end of the penin- sula, guarded the passage over the Aar, and it was probably its existence that induced Berchtold V., duke of Zaringen, to found Bern in 1191 as a military post on the frontier between the Alamannians (German-speaking) and the Burgundians (French-speaking). Thrice the walls

which protected the town were moved westwards, about 1250, in 1346 and in 1622, though even at the.last-named date the town only stretched a little way to the west of (or beyond) the present railway station. After the extinction of the Zaringen dynasty (1218) Bern became a free imperial city, but it had to fight hard for its independence, which was finally secured by the victories of Dornbuhl (1298) over Fribourg and the Habsburgs, and of Laupen (1339) over the neighbouring Burgundian nobles. In the second battle Bern received help from the three forest cantons with which it had become allied in 1323, while in 1353 it entered the Swiss confedera- tion as its eighth member. It soon took the lead in the confedera- tion, though always aiming at enlarging its own borders, even at great risks (see the article on the canton). In 1528 Bern accepted the religious reformation, and henceforth became one of its chief champions in Switzerland. In the 1 7 th century the number of families by which high offices of state could be held was diminished, so that in 1605 there were 152 thus qualified, but in 1691 only 104, while towards the end of the 18th century there were only 69 such families. Meanwhile the rule of the town was extending over more and more territory, so that finally it governed 52 bailiwicks (acquired between 1324 and 1729), the Bernese patricians being thus extremely powerful and forming an oligarchy that administered affairs like a benevolent and well-ordered despotism. In 1 7 23 Major Davel, at Lausanne, and in 1 749 Henzi, in Bern itself, tried to break down this monopoly, but in each case paid the penalty of failure on the scaffold. The whole system was swept away by the French in 1798, and though partially revived in 1815, came to an end in 1831, since which time Bern has been in the van of political progress. From 181 5 to 1848 it shared with Zurich and Lucerne the supreme rule (which shifted from one to the other every two years) in the Swiss confederation, while in 1848 a federal law made Bern the sole political capital, where the federal government is permanently fixed and where the ministers of foreign powers reside.

Authorities. — Die Alp- und Weidewirthschaft im Kant. Bern (Bern, 1903): Archiv d. hist. Vereins d. Kant. Bern, from 1848, and Blatter fur bernische Geschichte, from 1905 : Bernische Biographic?! (Bern, 1898-1906); E. Friedli, Barndiitsch als Spiegel bernischen Volkstums, vol. i. (Liitzelniih, Bern, 1905), and vol. ii. (Grindelwald, Bern, 1908); Festschrift zur Jten Saktdarfeier d. Crundung Berns, 1 191 (Bern, 1891); Fontes Rerum Bernensium (to 1378), (9 vols., Bern, 1883-1908); K. Geiser, Geschichte d. bernischen Verfassung, 1191-1471 (Bern, 1888); B. Hallcr, Bern in seinen Rathsmanualen , 1465-1565 (3 vols., Bern, 1900-1902) ; E.

F. and W. F. von Miilinen, Beitrage zur Htimathskunde d. Ka?itons Bern, deulschen Theils (3 vols., Bern, 1879-1894) ; W. F. von Miilinen, Berns Geschichte, 1 191—1891 (Bern, 1891); E. ven Rodt, Bernische Stadtgeschichte (Bern, 1888), and 6 finely illustrated vols, on Bern in the 13th to 19th centuries (Bern, 1 898-1907); L. S. von Tscharner, Rechts- geschichte des Obersimmenthales bis zum Jahre 171)8 (Bern, 1908) ; E. von Wattenwyl, Geschichte d. Stadt u. Landschaft Bern (to 1400), (2 vols.) ; Schaffhausen and Bern (1867-1872) ; F. E. Welti, Die Rechts- quellen d. Kant. Bern, vol. i. (Aarau, 1902) ; Gertrud Ziiricher, Kinder spiel u. Kinderlied im Kant. Bern (Zurich, 1902). (W. A. B. C.)

79 6

BERNARD, SAINT

BERNARD, SAINT (1090-1153), abbot of Clairvaux one of the most illustrious preachers and monks of the middle ages, was born at Fontaines, near Dijon, in France. His father, a knight named Tecelin, perished on crusade; and his mother Aleth, a daughter of the noble house of Mon-Bar, and a woman distin- guished for her piety, died while Bernard was yet a boy. The lad was constitutionally unfitted for the career of arms, and his own disposition, as well as his mother's early influence, directed him to the church. His desire to enter a monastery was opposed by his relations, who sent him to study at Chalons in order to qualify for high ecclesiastical preferment. Bernard's resolution to become a monk was not, however, shaken, and when he at last definitely decided to join the community which Robert of Molesmes had founded at Citeaux in 1198, he carried with him his brothers and many of his relations and friends. The little community of reformed Benedictines, which was to produce so profound an influence on Western monachism (see Cistercians and Monasticism) and had seemed on the point of extinction for lack of novices, gained a sudden new life through this accession of some thirty young men of the best families of the neighbour- hood. Others followed their example; and the community grew so rapidly that it was soon able to send off offshoots. One of these daughter monasteries, Clairvaux, was founded in 1115, in a wild valley branching from that of the Aube, on land given by Count Hugh of Troyes, and of this Bernard was appointed abbot.

By the new constitution of the Cistercians Clairvaux became the chief monastery of the five branches into which the orc\er was divided under the supreme direction of the abbot of Citeaux. Though nominally subject to Citeaux, however, Clairvaux soon became the

most important Cistercian house, owing to the fame and influence of Bernard. 1 His saintly character, his self- mortification — of so severe a character that his friend, William of Champeaux, bishop of Chalons, thought it right to remonstrate with him — and above all, his marvellous power as a preacher, soon made him famous, and drew crowds of pilgrims to Clairvaux. His miracles were noised abroad, and sick folk were brought from near and far to be healed by his touch. Before long the abbot, who had intended to devote his life to the work of his monastery, was drawn into the affairs of the great world. When in 1 1 24 Pope Honorius II. mounted the chair of St Peter, Bernard was already reckoned among the greatest of French churchmen ; he now shared in the most important ecclesiastical discussions, and papal legates sought his counsel. Thus in n 28 he was invited by Cardinal Matthew of Albano to the synod of Troyes, where he was instrumental in obtaining the recognition of the new order of Knights Templars, the rules of which he is said to have drawn up ; and in the following year, at the synod of Chalons- sur-Marne, he ended the crisis arising out of certain charges brought against Henry, bishop of Verdun, by persuading the bishop to resign. The European importance of Bernard, however, began with the death of Pope Honorius II. (1130) and the disputed election that followed. In the synod convoked by Louis the Fat at Etampes in April 1130 Bernard successfully asserted the claims of Innocent II. against those of Anacletus II., and from this moment became the most influential supporter of his cause. He threw himself into the contest with character- istic ardour. While Rome itself was held by Anacletus, France, England, Spain and Germany declared for Innocent, who, though banished from Rome, was — in Bernard's phrase — "accepted by the world." The pope travelled from place to place, with the powerful abbot of Clairvaux at his side; he stayed at Clairvaux itself, humble still, so far as its buildings were concerned; and he went with Bernard to parley with the emperor Lothair III. at Liege.

In 1 133, the year of the emperor's first expedition to Rome, Bernard was in Italy persuading the Genoese to make peace with the men of Pisa, since the pope had need of both. He accom- panied Innocent to Rome, successfully resisting the proposal to reopen negotiations with Anacletus, who held the castle of Sant' Angelo and, with the support of Roger of Sicily, was too strong

1 The Cistercians of this branch of the order were commonly known as Bernardines.

to be subdued by force. Lothair, though crowned by Innocent in St Peter's, could do nothing to establish him in the Holy See so long as

his own power was sapped by his quarrel with the house of Hohenstaufen. Again Bernard came to the rescue; in the spring of 1135 he was at Bamberg successfully persuading Frederick of Hohenstaufen to submit to the emperor. In June he was back in Italy, taking a leading part in the council of Pisa, by which Anacletus was excommunicated. In northern Italy the effect of his personality and of his preaching was immense; Milan itself, of all the Lombard cities most jealous of the imperial claims, surrendered to his eloquence, submitted to Lothair and to Innocent, and tried to force Bernard against his will into the vacant see of St Ambrose. In 113 7, the year of Lothair's last journey to Rome, Bernard was back in Italy again; at Monte Cassino, setting the affairs of the monastery in order, at Salerno, trying in vain to induce Roger of Sicily to declare against Anacletus, in Rome itself, agitating with success against the antipope. Anacletus died on the 25th of January 1138; on the 13th of March the cardinal Gregory was elected his successor, assuming the name of Victor. Bernard's crowning triumph in the long contest was the abdication of the new antipope, the result of his personal influence. The schism of the church was healed, and the abbot of Clairvaux was free to return to the peace of his monastery.

Clairvaux itself had meanwhile (1135-1136) been transformed outwardly — in spite of the reluctance of Bernard, who preferred the rough simplicity of the original buildings — into a more suitable seat for an influence that overshadowed that of Rome itself. How great this influence was is shown by the outcome of Bernard's contest with Abelard (g.v.). In intellectual and dialectical power the abbot was no match for the great schoolman; yet at Sens in 1141 Abelard feared to face him, and when he appealed to Rome Bernard's word was enough to secure his condemnation.

One result of Bernard's fame was the marvellous growth of the Cistercian order. Between 1130 and 1145 no less than ninety- three monasteries in connexion with Clairvaux were either founded or affiliated from other rules, three being established in England and one in Ireland. In 1145 a Cistercian monk, once a member of the community of Clairvaux — another Bernard, abbot of Aquae Silviae near Rome, was elected pope as Eugenius III. This was a triumph for the order; to the world it was a triumph for Bernard, who complained that all who had suits to press at Rome applied to him, as though he himself had mounted the chair of St Peter (Ep. 239).

Having healed the schism within the church, Bernard was next called upon to attack the enemy without. Languedoc especially had become a hotbed of heresy, and at this time the preaching of Henry of Lausanne (q.v.) was drawing thousands from the orthodox faith. In June 1145, at the invitation of Cardinal Alberic of Ostia, Bernard travelled in the south, and by his preaching did something to stem the flood of heresy for a while. Far more important, however, was his activity in the following year, when, in obedience to the pope's command, he preached a crusade. The effect of his eloquence was extra- ordinary. At the great meeting at Vezelay, on the 2 1st of March, as the result of his sermon, King Louis VII. of France and his queen, Eleanor of Guienne, took the cross, together with a host of all classes, so numerous that the stock of crosses was soon exhausted; Bernard next travelled through northern France, Flanders and the Rhine provinces, everywhere rousing the wildest enthusiasm; and at Spires on Christmas day he succeeded in persuading Conrad, king of the Romans, to join the crusade.

The lamentable outcome of the movement (see Crusades) was a hard blow to Bernard, who found it difficult to understand this manifestation of the hidden counsels of God, but ascribed it to the sins of the crusaders (Ep. 288; de Consid. ii. 1). The news of the disasters to the crusading host first reached Bernard at Clairvaux,

where Pope Eugenius, driven from Rome by the revolution associated with the name of Arnold of Brescia, was his guest. Bernard had in March and April 1148 accompanied the pope to the council of Reims, where he led the attack on

certain propositions of the scholastic theologian Gilbert de la Porr6e (q.v.). From whatever cause — whether the growing jealousy of the cardinals, or the loss of prestige owing to the rumoured failure of the crusade, the success of which he had so confidently predicted— Bernard's influence, hitherto so ruinous to those suspected of heterodoxy, on this occasion failed of its full effect. On the news of the full extent of the disaster that had overtaken the crusaders, an effort was made to retrieve it by organizing another expedition. At the invitation of Suger, abbot of St Denis, now the virtual ruler of France, Bernard attended the meeting of Chartres convened for this purpose, where he himself was elected to conduct the new crusade, the choice being confirmed by the pope. He was saved from this task, for which he was physically and constitutionally unfit, by the intervention of the Cistercian abbots, who forbade him to undertake it.

Bernard was now ageing, broken by his austerities and by ceaseless work, and saddened by the loss of several of his early friends. But his intellectual energy remained undimmed. He continued to take an active interest in ecclesiastical affairs, and his last work, the De Consider atione, shows no sign of failing power. He died on the 20th of August 1153.

The greatness of St Bernard lay not in the qualities of his intellect, but of his character. Intellectually he was the child of his age, inferior to those subtle minds whom the world, fired by his contagious zeal, conspired to crush. Morally he was their superior; and in this moral superiority lay the secret of his power. The age recognized in him the embodiment of its ideal: that of medieval monasticism at its highest development. The world had no meaning for him save as a place of banishment and trial, in which men are but " strangers and pilgrims " (Serm. i., Epiph. n. 1; Serm. vii., Lent. n. 1); the way of grace, back to the lost inheritance, had been marked out once for all, and the function of theology was but to maintain the landmarks inherited from the past. With the subtleties of the schools he had no sympathy, .and the dialectics of the

schoolmen quavered into silence before his terrible invective. Yet, within the limits of his mental horizon, Bernard's vision was clear enough. His very life proves with what merciless logic he followed out the principles of the Christian faith as he conceived it ; and it is impossible to say that he conceived it amiss. For all his overmastering zeal he was by nature neither a bigot nor a persecutor. Even when he was preaching the crusade he interfered at Mainz to stop the persecution of the Jews, stirred up by the monk Radulf. As for heretics, " the little foxes that spoil the vines," these " should be taken, not by force of arms, but by force of argument," though, if any heretic refused to be thus taken, he considered " that he should be driven away, or even a restraint put upon his liberty, rather than that he should be allowed to spoil the vines " (Serm. lxiv.). He was evidently troubled by the mob violence which made the heretics "martyrs to their unbelief." He approved the zeal of the people, but could not advise the imitation of then- action, " because faith is to be produced by persuasion, not imposed by force "; adding, however, in the true spirit of his age and of his church, " it would without doubt be better that they should be coerced by the sword than that they should be allowed to draw away many other persons into their error." Finally, oblivious of the precedent of the Pharisees, he ascribes the steadfastness of these " dogs " in facing death to the power of the devil (Serm. lxvi. on Canticles ii. 15).

This is Bernard at his worst. At his best — and, fortunately, this is what is mainly characteristic of the man and his writings — he displays a nobility of nature, a wise charity and tenderness in his dealings with others, and a genuine humility, with no touch of servility, that make him one of the most complete exponents of the Christian life. His broadly Christian character is, indeed, witnessed to by the enduring quality of his influence. The author of the Imitatio drew inspiration from his writings; the reformers saw in him a medieval champion of their favourite doctrine of the supremacy of the divine grace; his works, down to the present day, have been reprinted in countless editions. This is perhaps due to the fact that the chief fountain of his own

inspiration was the Bible. He was saturated in its language and in its spirit; and though he read it, as might be expected, uncritically, and interpreted its plain meanings allegorically — as the fashion of the day was — it saved him from the grosser aberrations of medieval Catholicism. He accepted the teaching of the church as to the reverence due to our Lady and the saints, and on feast-days and festivals these receive their due meed in his sermons; but in his letters and sermons their names are at other times seldom invoked. They

were overshadowed com- pletely in his mind by his idea of the grace of God and the moral splendour of Christ; " from Him do the Saints derive the odour of sanctity; from Him also do they shine as lights " (Ep. 464).

The cause of Bernard's extraordinary popular success as a preacher can only imperfectly be judged by the sermons that survive. These were all delivered in Latin, evidently to congrega- tions more or less on his own intellectual level. ' Like his letters, they are full of quotations from and reference to the Bible, and they have all the qualities likely to appeal to men of culture at all times. " Bernard," wrote Erasmus in his Art of Preaching, "is an eloquent preacher, much more by nature than by art; he is full of charm and vivacity and knows how to reach and move the affections." The same is true of the letters and to an even more striking degree. They are written on a large variety of subjects, great and small, to people of the most diverse stations and types; and they help us to understand the adaptable nature of the man, which enabled him to appeal as successfully to the unlearned as to the learned.

Bernard's works fall into three categories: — (1) Letters, of which over five hundred have been preserved, of great interest and value for the history of the period. (2) Treatises: (a) dogmatic and polemical, De gratia el libero arbilrio, written about 1 1 27, and following closely the lines laid down by St Augustine; De baptismo aliisque quaestionibus ad mag. Hugonem de S. Victore; Contra quaedam capitala errorum Abaelardi ad Innocentem II. (in justification of the action of the synod of Sens); (b) ascetic and mystical, De gradibus humilitatis et superbiae, his first work, written perhaps about n 21; De diligendo Deo (about n 26); De conversione ad clericos, an address to candidates for the priest- hood; De Consider atione, Bernard's last work, written about 1 148 at the pope's request for the edification and guidance of Eugenius III.; (c) about monasticism, Apologia ad Guilelmum, written about 1127 to William, abbot of St Thierry; De lande novae militiae ad milites templi (c. 1132A136); De precepto et dispensatione, an answer to various questions on monastic conduct and discipline addressed to him by the monks of St Peter at Chartres (some time before 1143); (d) on ecclesiastical government, De moribus et officio episcoporum, written about 1 1 26 for Henry, bishop of Sens; the De Consider atione mentioned above; (e) a biography, De vita et rebus gestis S. Malachiae, Hiberniae episcopi, written at the request of the Irish abbot Congan and with the aid of materials supplied by him; it is of importance for the ecclesiastical history of Ireland in the 12th century; (/) sermons — divided into Sermones de tempore; de

Sanctis; de diver sis; and eighty-six sermons, in Cantica Canticorum, an allegorical and mystical exposition of the Song of Solomon; (g) hymns. Many hymns ascribed to Bernard survive, e.g. Jesu dulcis memoria, Jesus rex admirabilis, Jesu decus angelicum, Salve caput cruentatum. Of these the three first are included in the Roman breviary. Many have been translated and are used in Protestant churches.

*St Bernard's works were first published in anything like a complete edition at Paris in 1508, under the title Seraphica melliflui devotique doctoris S. Bernardi scripia, edited by Andre Bocard; the first really critical and complete edition is that of Dom J. Mabillon Sancti Bernardi opp. &*c. (Paris, 1667, improved and enlarged in 1690, and again, by Massuet and Texier, in i7ig), reprinted by J. P. Migne, Patrolog. lat. (Paris, 1859). There is an English translation of Mabillon's edition, including, how- ever, only the letters and the sermons on the Song of Songs, with the biographical and other prefaces, by Samuel J. Eales (4 vols., London, 1889-1895). See further Leopold Janauschek,*

Bibliographia Bernardino. (Vienna, i8gi), which includes 2761 entries, including 120 works wrongly ascribed to Bernard.

Authorities. — The principal source for the life of St Bernard is the Vita Prima, compiled, in six books, by various contemporary writers: book i. by William, abbot of St Thierry near Reims; book ii. by Ernald, or Arnald, abbot of Bonnevalle; books iii., iv. and v. by Geoffrey (Gaufrid), monk of Clairvaux and Bernard's secretary ; book vi., on Bernard's miracles, by Geoffrey and Philip, another monk of Clairvaux, &c. A MS. is preserved, int. al., in the library of Lambeth Palace (§ xiv. No. 163). The Vita was first published in Bernardi op. omn. by Mabillon (Paris, 1690), ii. pp. 1061 ff . ; it was included in Migne, Patrolog. tat. clxxxv. pp. 225-416, which also contains the abridgments or amplifications, by later hands, of the Vita Prima, known as the Vita Secunda, Tertia and Quarta. For a critical study of these sources see G. Hiiffer, Der heilige Bernhard von Clairvaux (2 vols., Miinster, 1886), and E. Vacandard, Vie de Saint Bernard (2 vols., Paris, 1895).

Among the numerous modern works on St Bernard may be mentioned, besides the above, J. C. Morison, The Life and Times of St

Bernard (London, 1863) ; G. Chevallier, Histoire de Saint Bernard (2 vols., Lille, 1888); S. J. Eales, St Bernard, abbot of Clairvaux (London, 1890, "Fathers for English Readers" series); ib. Life and Works of St Bernard (London, 1889); R. S. Storrs, Bernard of Clairvaux: the Times, the Man and His Work (New York, 1893); Comte d'Haussonville, Saint Bernard (Paris, 1906). See also the article by Vacandart in A. Vacant's Dictionnaire de thcologie (with full bibliography), and that by S. M. Deutsch in Herzog-Hauck, Realencyklopddie (3rd ed.), vol. ii. (bibliography). Further works, monographs, &c, are given s. "Vita S. Bernardi" in Potthast. Bibliotheca Historica Medii Aevi (Berlin, 1896). (W. A. P.)

BERNARD OF CHARTRES (1080 ?n67), surnamed Sylvestris, scholastic philosopher, described by John of Salisbury as perfectissimus inter Platonicos nostri saeculi. He and his brother Theodore were among the chief members of the school of Chartres (France), founded in the early part of the nth century by Fulbert, the great disciple of Gerbert. This school flourished at a time when medieval thought was directed to the ancient philosophy of Plato and Aristotle, and had per versely come to regard Aristotle as merely the founder of abstract logic and formal intellectualism, as opposed to Plato whose doctrine of Ideas seemed to tend in a naturalistic direction. Thus Bernard is a Platonist and yet the representative of a " return to Nature " which curiously anticipates the humanism of the early Renaissance. John of Salisbury {Metalogicus, iv. 35) attributes to him two treatises, of which one contrasts the eternity of ideas with the finite nature of things, and the other is an attempt to reconcile Plato and Aristotle. The only extant fragments of Bernard's writings are from a treatise Megacosmus and Microcosmus (edited by C. S. Barach at Innsbruck, 1876). The source of Bernard's inspiration was Plato's Timaeus. He maintained that ideas are really existent and are laid up for ever in the mind of God. He further attempted to build up a sym- bolism of numbers with the view of elaborating the doctrine of the Trinity, and explaining the meaning of unity, plurality and likeness.

See Scholasticism; also V. Cousin, CEuvres inedites of Abelard (Paris, 1836); Haureau, Philosophie scolastique, i. 396 foil.

BERNARD, CHARLES DE, whose full name was Pierre Marie Charles de Bernard du Grail de la Villette (1804- 1850), French writer, was born at Bcsa.ncon on the 25th of February 1804. After studying for the law, and then taking to journalism, he was encouraged by Balzac (whose Peau de chagrin he had reviewed) to settle in Paris and devote himself to authorship; and the result was a series of volumes

of fiction, remarkable for their picture of provincial society and the Parisian bourgeoisie. The best of these are Le Nasud gordien (1838), containing among other short stories Une Aventure de magistral, from which Sardou drew his comedy of the Pommes du voisin; Gerfaut (1838), considered his masterpiece; Les Ailes d'Icare (1840), La Peau du lion (1841) and Le Gentilkomme campagnard

(1847)-

His CEuvres computes (12 vols.), which appeared after his death on the 6th of March 1850, include also his poetry and two comedies written in collaboration with " Leonce " (C. H. L. Laurengot, 1805-1862). A flattering appreciation by Armand de Pontmartin is prefixed to Un Beau-pere in this collection. In W. M. Thackeray's Paris Sketch-book (" On some fashionable French novels ") there is an admirable criticism of Bernard. See also an essay by Henry James in French Poets and Novelists (1884).

BERNARD, CLAUDE (1813-1878), French physiologist, was born on the 12th of July 1813 in the village of Saint-Julien near Villefranche. He received his early education in the Jesuit school of that town, and then proceeded to the college at Lyons, which, however, he soon left to become aSsistant in a druggist's shop. His leisure hours were devoted to the composition of a vaudeville comedy, La Rose du Rhone, and the success it achieved moved him to attempt a prose drama in five acts, Arthur de Bretagne. At the age of twenty-one he went to Paris, armed with this play and an introduction to Saint-Marc Girardin, but the critic dissuaded him from adopting literature as a profession, and urged him rather to take up the study of medicine. This advice he followed, and in due course became interne at the Hotel Dieu. In this way he was brought into contact with the great physiologist, F. Magendie, who was physician to the hospital, and whose official preparateur at the College de France he became in 1841. Six years afterwards he was appointed his deputy-professor at the college, and in 1855 he succeeded him as full professor. Some time previously he had been chosen the first occupant of the newly-instituted chair of physiology at the Sorbonne. There no laboratory was provided for his use, but Louis Napoleon, after an interview with him in 1864, supplied the deficiency, at the same time building a laboratory at the natural history museum in the Jardin des Plantes, and estab- lishing a professorship, which Bernard left the Sorbonne to accept in 1868 — the year in which he was admitted a member of the Institute. He died in Paris on the 10th of February 1878 and was accorded a public funeral — an honour which had never before been bestowed by

France on a man of science.

Claude Bernard's first important work was on the functions of the pancreas gland, the juice of which he proved to be of great significance in the process of digestion; this achievement won him the prize for experimental physiology from the Academy of Sciences. A second investigation — perhaps his most famous — was on the glycogenic function of the liver; in the course of this he was led to the conclusion, which throws light on the causation of diabetes, that the liver, in addition to secreting bile, is the seat of an " internal secretion, " by which it prepares sugar at the expense of the elements of the blood passing through it. A third research resulted in the discovery of the vaso-motor system. While engaged, about 1851, in examining the effects produced in the temperature of various parts of the body by section of the nerve or nerves belonging to them, he noticed that division of the cervical sympathetic gave rise to more active circulation and more forcible pulsation of the arteries in certain parts of the head, and a few months afterwards he observed that electrical excitation of the upper portion of the divided nerve had the contrary effect. In this way he established the existence of vaso-motor nerves — both vasodilatator and vaso-constrictor. The study of the physiological action of poisons was also a favourite one with him, his attention being devoted in particular to curare and carbon monoxide gas. The earliest announcements of his results, the most striking of which were obtained in the ten years from about 1850 to i860, were generally made in the recognized scientific publications; but the full exposition of his views, and even the statement of some of the original facts, can only be found in his published lectures. The various series of these Lecons fill seventeen octavo volumes. He also published Introduction a la medecine experimental (1865), and Physiologie ghierale (1872).

An English Life of Bernard, by Sir Michael Foster, was published in London in 1899.

BERNARD, JACQUES (1658-1718), French theologian and publicist, was born at Nions in Dauphine on the 1st of September 1658. Having studied at Geneva, he returned to France in 1679, and was chosen minister of Venterol in Dauphine, whence he afterwards removed to the church of Vinsobres. As he continued to preach the reformed doctrines in opposition to the royal ordinance, he was obliged to leave the country and retired to Holland, where he was well received and appointed one of the pensionary ministers of Gouda. In July 1686 he commenced his Histoire abregee de P Europe, which he continued monthly till

December 1688. In 1692 he began Tiis Lettres historiques, containing an account of the most important transactions in Europe; he carried on this work til! the end of 1698, after which it was continued by others. When Le Clerc discontinued his Biblio- Iheque universelle in 1691, Bernard wrote the greater part of the twentieth volume and the five following volumes. In 1698 he collected and published Acleset negotiations de la paix de Ryswic, in four volumes nmo. In 1699 he began a continuation of Bayle's Nouvelles de la republique des letlrcs, which continued till December 17 10. In 1705 he was unanimously elected one of the ministers of the Walloon church at Leiden; and about the same time he succeeded M. de Valder in the chair of philosophy and mathematics at Leiden. In 17 16 he published a supplement to Moreri's dictionary, in two volumes folio. The same year he resumed his Nouvelles de la ripublique des lettres, and continued it till his death, on the 27th of April 1718. Besides the works above mentioned, he was the author of two practical treatises, one on late repentance (17 12), the other on the excellence of religion (1714).

BERNARD, MOUNTAGUE (1S20-1882), English international lawyer, the third son of Charles Bernard of Jamaica, the descendant of a Huguenot family, was born at Tibberton Court, Gloucestershire, on the 28th of January 1820. He was educated at Sherborne school, and Trinity College, Oxford. Graduating B.A. in 1842, he took his B.C.L., was elected Vinerian scholar and fellow, and having read in chambers with Roundell Palmer (afterwards Lord Selborne), was called to the bar at Lincoln's Inn in 1846. He was specially interested in legal history and in church questions, and was one of the founders of the Guardian. In 1852 he was elected to the new professorship of international law and diplomacy at Oxford, attached to All Souls' College, of which he afterwards was made a fellow. But besides his duties at Oxford he undertook a good deal of non-collegiate work; he was a member of several royal commissions; in 187 1 he went as one of the high commissioners to the United States, and signed the treaty of Washington, and in 1872 he assisted Sir Roundell Palmer before the tribunal of arbitration at Geneva. In 1874 he resigned his professorship at Oxford, but as member of the university of Oxford commission of 1876 he was mainly responsible for bringing about the compromise ultimately adopted between the university and the colleges. Bernard's reputation as an international lawyer was widespread, and he was an original member of the

In.stitut de Droit International (1873). His published works include An Historical Account of the Neutrality of Great Britain during Ike American Civil War (London, 1870), and many lectures on international law and diplomacy.

BERNARD, SIMON (1779-1839), French general of engineers, was born at Dole, educated at the Ecole Polytechnique, and entered the army in the corps of engineers. He, rose rapidly, and served (1805-1812) as aide-de-camp to Napoleon. He was wounded in the retreat after Leipzig, and distinguished himself the same year (1813) in the gallant defence of Torgau against the allies. After the emperor's fall he emigrated to the United States, where, being made a brigadier-general of engineers, he executed a number of extensive military works for the govern- ment, notably at Fortress Monroe, Va., and around New York, and did a large amount of the civil engineering connected with the Chesapeake and Ohio Canal and the Delaware Breakwater. He returned to France after the revolution of 1830, was made a lieulenant-gcneral by Louis Philippe, and in 1836 served as minister of war.

BERNARD, SIR THOMAS, Bart. (1750-1818), English social reformer, was born at Lincoln on the 27th of April 1750, the younger son of Sir Francis Bernard, 1st bart. (1711-1779), who as governor of Massachusetts Bay (1760-1770) played a re- sponsible part in directing the British policy which led to the revolt of the American colonics. On the death of his elder brother in 1810, Bernard succeeded to the baronetcy conferred on his father in 1769. His early education was obtained in America, partly at Harvard, in which college his father took a great interest. He then acted as confidential secretary to his

father during the troubles which led (1769) to the governor's recall, and accompanied Sir Francis to England, where he was called to the bar, and practised as a conveyancer. He married a rich wife, and acquired a considerable fortune, and then devoted most of his time to social work for the benefit of the poor. He was treasurer of the Foundling Hospital, in the con- cerns of which he took an important part. He helped to establish in 1796 the " Society for Bettering the Condition and Increasing the Comforts of the Poor," in 1800 a school for indigent blind, and in 1801 a fever institution. He was active in promoting vaccination, improving the conditions of child labour, advocating rural allotments, and agitating against the salt duties. He took great interest in education, and with Count Rumford he was an originator of the Royal Institution in London. He died without issue on the 1st of Julv 1818.

BERNARDIN OF SIENA, ST (1380-1444), Franciscan friar and preacher, was born of a noble family in 1380. His parents died in his childhood, and on the completion of his education he spent some years in the service of the sick in the hospitals, and thus caught the plague, of which he nearly died. In 1402 he entered the Franciscan order in the strict branch called Observant, of which he became one of the chief promoters (see Franciscans) . Shortly after his profession the work of preaching was laid upon him, and for more than thirty years he preached with wonderful effect all over Italy, and played a great part in the religious revival of the beginning of the 15th century. In 1437 he became vicar-general of the Observant branch of the Franciscans. He refused three bishoprics. He died in 1444 at Aquila in the Abruzzi, and was canonized in 1450.

The first edition of his works, for the most part elaborate sermons, was printed at Lyons in 1501; later ones in 1636, 1650 and 1745. His Life will be found in the Bollandists and in Lives of the Saints on the 20th of May : a good modern biography has been written by Paul Thureau-Dangin (1896), and translated into English by Gertrude von Hiigel (1906). (E. C. B.)

BERNAUER, AGNES _(d. 1435), daughter of an Augsburg baker, was secretly married about 1432 to Albert (1401-1460), .son of Ernest, duke of Bavaria-Munich. Ignorant of the fact that this union was a lawful one, Ernest urged his son to marry, and reproached him with his connexion with Agnes. Albert then declared she was his lawful wife; and subsequently, during his absence, she was seized by order of Duke Ernest and con- demned to death for witchcraft. On the 12th of October 1435 she was drowned in the Danube near Straubing, in which town her remains were afterwards buried by Albert. This story lived long in the memory of the people, and its chief interest lies in its literary associations. It has afforded material for several dramas, and Adolf Bottger, Friedrich Hcbbel and Otto Ludwig have each written one entitled Agnes Bernauer.

BERNAY, a town of north-western France, capital of an arrondissement in the department of Eure, on the left bank of the Charen tonne, 31 m. W.N.W. of Evreux, on the Western railway between that town and Lisieux. Pop. (1906) 5973. It is beautifully situated in the midst of green wooded hills, and still justifies Madame de Stael's description of it as " a basket of flowers." Of great antiquity, it possesses numerous quaint wooden houses and ancient ecclesiastical buildings of considerable interest. The abbey church is now used as a market, and the abbey, which was founded by Judith of Brittany early in the nth century, and underwent a restoration in

the 17th century, ssrves for municipal and legal purposes. The church of Ste Croix, which has a remarkable marble figure of the infant Jesus, dates from the 14th and 15th centuries, that of Notre-Dame de la Couture, which preserves some good stained glass, from the 14th, 15th and 16th centuries. Bernay has a sub-prefecture, a communal college, tribunals of commerce and of first instance, and a board of trade-arbitrators. Among the industrial estab- lishments of the place are manufactories of cotton and woollen goods, bleacheries and dye-works. Large numbers of Norman horses are sold in Lent, at the fair known as the Foire fleurie, and there is also a trade in grain. Bernay grew up round the Benedictine abbey mentioned above, and early in the 13th century was the seat of a viscount. The town, formerly fortified .

was besieged by Bertrand du Guesclin, constable of France, in 1378; it was taken several times by the English during the first half of the 15th century, and by Admiral de Coligny in 1563. The fortress was razed in 1589.

BERNAYS, JAKOB (1824-1881), German philologist and philosophical writer, was born at Hamburg of Jewish parents on the nth of September 1824. His father, Isaac Bernays (1792-1849), a man of wide culture, was the first orthodox German rabbi to preach in the vernacular. Jakob studied from 1844 to 1848 at the university of Bonn, the philological school of which, under Welcker and Ritschl (whose favourite pupil B ernays became) , was the best in Germany. In 1 8 53 he accepted the chair of classical philology at the newly founded Jewish theological college (the Frankel seminary) at Breslau, where he formed a close friendship with Mommsen. In 1866, when Ritschl left Bonn for Leipzig, Bernays returned to his old uni- versity as extraordinary professor and chief librarian. He remained at Bonn until his death on the 26th of May 1881. His chief woiks, which deal mainly with the Greek philosophers, are:— Die Lebensbeschreibung des J. J. Scaliger (1855); fiber das Phokylidiscke Gedicht (1856); Die Chronik des Sulpicius Severus (1861); Die Dialoge des Aristoteles im Verhaltniss zu seinen ilbrigen Werken (1863); Theophrastos' Schrift iiber Frommigkeit (1866); Die Heraklitischen Briefe (1869); Lucian und die Cyniker (1879); Zwei Abhandlungen iiber die Aristole- lische Theorie des Dramas (1880). The last of these was a republication of his Grundzilge der verlorenen Abhandlungen des Aristoteles iiber die Wirkung der Tragodie (1857),

which aroused considerable controversy.

See notices in Biographisches Jahrbuch fur Alterthumskunde (1881), and Allgemeine deutsche Biographie, xlvi.- (1902) ; art. in Jewish Encyclopaedia; also Sandys, Hist, of Class. Schol. iii. 176 (1908).

His brother, Michael Bernays (1834-1897), was born in Hamburg on the 27th of November 1834. He studied first law and then literature at Bonn and Heidelberg, and obtained a considerable reputation by his lectures on Shakespeare at Leipzig and an explanatory text to Beethoven's music to Egmont. Having refused an invitation to take part in the editor- ship of the Preussiche Jahrbucher, in the same year (1866) he published his celebrated Zur Kritik und Geschichte des Goethe- schen- Textes. He confirmed his reputation by his lectures at the university of Leipzig, and in 1873 accepted the post of extra- ordinary prof essorof German literature atMunich specially created for him by Louis II. of Bavaria. In 1874 he became an ordinary professor, a position which he only resigned in 1889 when he settled at Carlsruhe. He died at Carlsruhe on the 25th of February 1897. At an early age he had embraced Christianity, whereas his brother Jakob remained a Jew. Among his other publications were: Briefe Goethes an F. A. Wolf (1868); Zur Enstehungs geschichte des Schlegelschen Shakespeare (1872) ; an introduction to Hirzel's collection entitled Der junge Goethe (1875); an d he edited a revised edition of Voss's trans- lation of the Odyssey. From his literary remains were published Schriften zur Kritik und Litter atur geschichte (1895-

1899).

BERNBURG, a town in the duchy of Anhalt, Germany, on the Saale, 29 m. N. by W. from Halle by rail, formerly the capital of the now incorporated duchy of Anhalt-Bernburg. Pop. (1900) 34,427; (1905) 34,929. It consists of four parts, the Altstadt or old town, the Bergstadt or hill town, the Neustadt or new town, and the suburb of Waldau — the Bergstadt on the right and the other three on the left of the river Saale, which is crossed by a massive stone bridge. It is a well-built city, the principal public buildings being the government house, the church of St Mary, the gymnasium and the house of correction. The castle, formerly the ducal residence, is in the Bergstadt, defended by moats, and surrounded by beautiful gardens. Bernburg is the seat of considerable industry, manufacturing machinery and boilers, sugar, pottery and chemicals, and has lead and zinc smelting. Market-gardening is also extensively carried on, and there is a large river traffic in grain and agricultural produce.

Bernburg is of great antiquity. The Bergstadt was fortified by Otto III. in the 10th century, and the new town was founded in the 13th. For a long period the different parts were under separate municipalities, the new town uniting with the old in 1560, and the Bergstadt with both in 1824. Prince Frederick removed the ducal residence to Ballenstedt in 1765.

BERNERS, JOHN BOURCHIER, 2ND Baron (1469-1533), English translator, was born probably at Tharfield, Hertford- shire, about 1469. His father was killed at Barnet in 1471, and he inherited his title in 1474 from his grandfather, John Bourchier, who was a descendant of Edward III. It is supposed that he was educated at Oxford, perhaps at Balliol. His political life began early, for in 1484 he was implicated in a premature attempt to place Henry, duke of Richmond (afterwards Henry VII.), on the throne, and fled in consequence to Brittany. In 1497 he helped to put down an insurrection in Cornwall and Devonshire, raised by Michael Joseph, a blacksmith, and from this time was in high favour at court. He accompanied Henry VIII. to Calais in 15 13, and was a captain of pioneers at the siege of Therouanne. In the next year he was again sent to France as chamberlain to the king's sister Mary on her marriage with Louis XII., but he soon returned to England. He had been given the reversion of the office of lord chancellor, and in 1516 he received the actual appointment. In 1518 he was sent to Madrid to negotiate an alliance with Charles of Spain. He sent letters to Henry chronicling the bull-fights and other doings of the Spanish court, and to Wolsey complaining of the expense to which he was put in his position as ambassador. In the next year he returned to England, and with his wife Catherine Howard, daughter of the duke of Norfolk, was present in 1520 at the Field of the Cloth of Gold. But his affairs were greatly embarrassed. He was harassed by lawsuits about his Hertfordshire property and owed the king sums he was unable to repay. Perhaps in the hope of repairing his fortune, he accepted the office of deputy of Calais, where he spent the rest of his life in comparative leisure, though still harassed by his debts, and died on the 16th of March 1533.

His translation of Syr Johan Froyssart of the Cronycles of England, France, Spayne, Portyngale, Scotland, Bretayne, Flaunders: and other places adjoynynge, was undertaken at the request of Henry VIII., and was printed by Richard Pynson in two volumes dated 1523 and 1525. It was the most considerable historical work that had yet appeared in English, and exercised great influence on 16th-century chroniclers. Berners tells us in his prefaces of his own love of histories of all kinds, and in the introduction to his story of Arthur of

Little Britain he excuses its " fayned mater " and " many unpossybylytees " on the ground that other well reputed histories are equally incredible. He goes on to excuse his deficiencies by saying that he knew himself to be unskilled in the " facundyous arte of retoryke," and that he was but a " lerner of the language of Frensshe." The want of rhetoric is not to be deplored. The style of his translation is clear and simple, and he rarely introduces French words or idioms. Two romances from the French followed: The Boke of Duke Huon of Burdeux (printed 1534? by Wynkyn de Worde), and The Hy story of the Moost noble and valyaunt knight Arthur of lytell brytayne. His other two translations, The Castell of Love (printed 1540), from the Carcel de Amor of Diego de San Pedro, and The Golden Boke of Marcus Aurelius (completed six days before his death, printed 1534), from a French version of Antonio Guevara's book, are in a different manner. The Golden Boke gives Berners a claim to be a pioneer of Euphuism, although Lyly was probably acquainted with Guevara not through his version, but through Sir Thomas North's Dial of Princes. Berners is also credited with a book on the duties of the inhabitants of Calais, which Mr Sidney Lee thinks may be identical with the ordinance for watch and ward of Calais preserved in the Cotton MSS. and with a lost comedy, Ite in vineam meam, which used to be acted at Calais after vespers.

A biographical account of Berners is to be found in Mr Sidney Lee's introduction to Huon of Bourdeaux (Early English Text Society

1882-1883). Among the many editions of his translation of Froissart may be mentioned that in the " Tudor Translations " (1901), with an introductory critical note by Professor W. P. Ker.

BERNERS, Barnes or Bernes, JULIANA (b. 1388 ?), English writer on hawking and hunting, is said to have been prioress of Sopwell nunnery near St Albans, and daughter of Sir James Berners, who was beheaded in 138S. She was probably brought up at court, and when she adopted the religious life, she still retained her love of hawking, hunting and fishing, and her passion for field sports. The only documentary evidence regarding her, however, is the statement at the end of her treatise on hunting in the Boke of St Albans, " Explicit Dam Julyans Barnes in her boke of huntyng " (edition of i486), and the name is changed by Wynkyn de Worde to " dame Julyans Bernes." There is no such person to be found in the pedigree of the

Berners family, and there is a gap in the records of the priory of Sopwell between 1430 and 1480. Juliana Berners is the supposed author of the work generally known as the Boke of St Albans. The first and rarest edition was printed in i486 by an unknown schoolmaster at St Albans. It has no title-page. Wynkyn de Worde's edition (fol. 1496), also without a title-page, begins: — " This present boke shewyth the manere of hawkynge and huntynge: and also of diuysynge of Cote armours. It shewyth also a good matere belongynge to horses: wyth other comendable trcatyses. And ferdermore of the blasynge of armys: as hereafter it maye appere." This edition was adorned by three woodcuts, and included a " Treatyse of fysshynge wyth an Angle," not contained in the St Albans edition. J. Haslewood, who published a facsimile of that of Wynkyn de Worde (London, 1811, folio), with a biographical and bibliographical notice, examined with the greatest care the author's claims to figure as the earliest woman author in the English language. He assigned to her little else in the Boke except part of the treatise on hawking and the section on hunting. It is expressly stated at the end of the " Blasynge of Armys " that the section was " translatyd and compylyt," and it is likely that the other treatises are translations, probably from the French. An older form of the treatise on fishing was edited in 1883 by Mr T. Satchell from a MS. in possession of Mr A. Denison. This treatise probably dates from about 1450, and formed the foundation of that section in the book of 1496. Only three perfect copies of the first edition are known to exist. A facsimile, entitled The Book of St Albans, with an introduction by William Blades, appeared in 1881. During the 16th century the work was very popular, and was many times reprinted. It was edited by Gervase Markham in 1595 as The Gentleman's Academie.

BERNHARD OF SAXE-WEIMAR, Duke (1604-1630), a celebrated general in the Thirty Years' War, was the eleventh son of John, duke of Saxe- Weimar. He received an unusually good education, and studied at Jena, but soon went to the court of the Saxon elector to engage in knightly exercises. At the outbreak of the Thirty Years' War he took the field on the Protestant side, and served under Mansfeld at Wiesloch (1622), under the margrave of Baden at Wimpfen (1622), and with his brother William at Stadtlohn (1623). Undismayed by these defeats, he took part in the campaigns of the king of Denmark; and when Christian withdrew from the struggle Bernhard went to Holland and was present at the famous siege of Hertogenbosch (Bois-le-Duc) in 1629. When Gustavus Adolphus landed in Germany Bernhard quickly joined him, and for a short

time he was colonel of the Swedish life guards. After the battle of Breitenfeld he accompanied Gustavus in his march to the Rhine and, between this event and the battle of the Alte Veste, Bern- hard commanded numerous expeditions in almost every district from the Moselle to Tirol. At the Alte Veste he displayed the greatest courage, and at Liitzen, when Gustavus was killed, Bernhard immediately assumed the command, killed a colonel who refused to lead his men to the charge, and finally by his furious energy won the victory at sundown. At first as a sub- ordinate to his brother William, who as a Swedish lieutenant- general succeeded to the command, but later as an independent commander, Bernhard continued to push his forays over southern

m. 26

Germany; and with the Swedish General Horn he made in 1633 a successful invasion into Bavaria, which was defended by the imperialist general Arldinger. In this year he acquired the duchy of Wiirzburg, installing one of his brothers as Stadthalter, and returning to the wars. A stern Protestant, he exacted heavy contributions from the Catholic cities which he took, and his repeated victories caused him to be regarded by German Pro- testants as the saviour of their religion. But in 1634 Bernhard suffered the great defeat of Nordlingen, in which the flower of the Swedish army perished. In 1635 he entered the service of France, which had now intervened in the war. He was now at the same time general-in-chief of the forces maintained by the Heilbronn union of Protestant princes, and a general officer in the pay of France. This double position was very difficult; in the following campaigns, ably and resolutely conducted as they were, Bernhard sometimes pursued a purely French policy, whilst at other times he used the French mercenaries to forward the cause of the princes. From a military point of view his most notable achievements were on the common ground of the upper Rhine, in the Breisgau. In his great campaign of 1638 he won the battles of Rheinfelden, Wittenweiher and Thann, and captured successively Rheinfelden, Freiburg and Breisach, the last reputed one of the strongest fortresses in Europe. Bernhard had in the first instance received definite assurances from France that he should be given Alsace and Hagenau, Wiirzburg having been lost in the debacle of 1634; he now hoped to make Breisach the capital of his new duchy. But his health was now broken. He died on the 8/i8th of July 1639 at the beginning of the cam- paign, and the governor of Breisach was bribed to transfer the fortress to France. The duke was buried at Breisach, his remains being subsequently removed to Weimar.

See J. A. C. Hellfeld, Ceschichte Bernhards des Crossen, Herzogs v. Saxe-Weimar (Jena, 1747); B. Rose, Herzog Bernhard d. Grosse von Saxe-Weimar (Weimar, 1828-1829); Droysen, Bernhard v. Weimar (Leipzig, 1885).

BERNHARDT, SARAH (Rosine Bernard) (1845-), French actress, was born in Paris on the 22nd of October 1845, of mixed French and Dutch parentage, and of Jewish descent. She was, however, baptized at the age of twelve and brought up in a convent. At thirteen she entered the Conservatoire, where she gained the second prize for tragedy in 1861 and for comedy in 1862. Her debut was made at the Comedie Francaise on the nth of August 1862, in a minor part in Racine's Iphiginie en Aulide, without any marked success, nor did she do much better in burlesque at the Porte St-Martin and Gymnase. In 1867 she became a member of the company at the Odeon, where she made her first definite successes as Cordelia in a French translation of King Lear, as the queen in Victor Hugo's Ruy Bias, and, above all, as Zanetto in Francois Coppee's Le Passant (1869). When peace was restored after the Franco- German War she left the Odeon for the Comedie Francaise, thereby incurring a con- siderable monetary forfeit. From that time she steadily increased her reputation, two of the most definite steps in her progress being her performances of Phedre in Racine's play (1874) and of Dona Sol in Victor Hugo's Hernani (1877). In 1879 she had a famous season at the Gaiety in London. By this time her position as the greatest actress of her day was securely established. Her amazing power of emotional acting, the extraordinary realism and pathos of her death-scenes, the magnetism of her personality, and the beauty of her " voix d'or," made the public tolerant of her occasional caprices. She had developed some skill as a sculptor, and exhibited at the Salon at various times between 1876 (honourable mention) and 1881. She also exhibited a painting there in 1880. In 1878 she pub- lished a prose sketch, Dans les nuages; les impressions d'une chaise. Her comedy L'Aveu was produced in 1888 at the Odeon without much success. Her relations with the other societaires of the Comedie Francaise having become somewhat strained, a crisis arrived in 1880, when, enraged by an unfavourable criticism of her acting, she threw up her position on the day following the first performance of Emile Augier's L' Aventuriere. This obliged her to pay a forfeit of £4000 for breach of contract.

'i

Immediately after the rupture she gave a series of performances in London, relying 'chiefly upon Scribe and Legouve's Adrienne Lecouvreur and Meilhac and Halevy's Frou Frou. These were followed by tours in Denmark, America and Russia, during 1880 and 1 88 1, with La Dame aux camelias as the principal attraction. In 1882 she married Jacques Damala, a Greek, in London, but separated from him at the end of the following year. After a fresh triumph in Paris with Sardou's Fedora at the Vaudeville she became proprietress of the Porte St-Martin. Jean Richepin's Nana Sahib (1883), Sardou's Theodora (1884) and La Tosca (1887), Jules Barbier's Jeanne d' Arc (1890) and Sardou and Moreau's Cleopdtre (1890) were among her most conspicuous successes here, where she remained till she became proprietress of the Renaissance theatre in 1893. During those ten years she made several extended tours, including visits to America in 1886-1887 and 1888-1889. Between 1891 and 1893 she again visited America (North and South), Australia, and the chief European capitals. In November 1893 she opened the Renais- sance with Lcs Rois by Jules Lemaitre, which was followed by Sylvesire and Morand's Izeyl (1894), Sardou's Gismonda (1894) and Edmond Rostand's La Princesse lointaine (1895). In 1895 she also appeared with conspicuous success as Magda in a French translation of Sudermann's Heimat. For the next few years she visited London almost annually, and America in 1896. In that year she made a success with an adaptation of Alfred de Musset's Lorenzaccio- In Easter week of 1897 she played in a religious drama, La Samarilaine, by Rostand. In December 1896 an elaborate fete was organized in Paris in her honour; and the value of this public recognition of her position at the head of her profession was enhanced by cordial greetings from all parts of the world. By this time she had played one hundred and twelve parts, thirty-eight of which she had created. Early in 1899 she removed from the Renaissance to the Theatre des Nations, a larger house, which she opened with a revival of La Tosca. In the same year she made the bold experiment of a French production of Hamlet, in which she played the title part. She repeated the impersonation in London not long afterwards, where she also appeared (1901) as the fate-ridden son of Napoleon I., in Rostand's L'Aiglon, which had been produced in Paris the year before. Of the successful productions of her later years perhaps none was more remarkable than her impersonation of La Tisbe in Victor Hugo's romantic drama Angelo (1905).

See Jules Huret, Sarah Bernhardt (1889) ; and her own volume of autobiography (1907).

BERNHARDY, GOTTFRIED (1800-1875), German philologist and literary historian, was born on the 20th of March 1800, at Landsberg on the Wartia, in Brandenburg. He was the son of Jewish parents in reduced circumstances. Two well-to-do uncles provided the means for his education, and in 181 1 he entered the Joachimsthal gymnasium at Berlin. In 181 7 he went to Berlin University to study philology, where he had the advantage of hearing F. A Wolf (then advanced in years), August Bockh and P. Buttmann. In 1822 he took the degree of doctor of philosophy at Berlin, and in 1825 became extra- ordinary professor. In 1829 he succeeded C. Reisig as ordinary professor and director of the philological seminary at Halle, and in 1844 was appointed chief librarian of the university. He died suddenly on the 14th of May 1875. The most important of Bernhardy's works were his histories (or sketches) of Greek and Roman literature; Grundriss der rbmischen Litteratur (5th ed., 1872); Grundriss der griechischen Litteratur (pt. i., Introduction and General View, 1836; pt. ii., Greek Poetry, 1845; P 1 – i»-> Greek Prose Literature, was never published). A fifth edition of pts. i. and ii., by R. Volkmann, began in 1892. Other works by Bernhardy are: Eratosthenica (1822); Wisscnschaftliche Syntax der griechischen Sprache (1829, suppts. 1854, 1862); Grundlinien zur Encyclopadie der Philologie (1832); the monu- mental edition of the Lexicon of Suidas (1834-1853); and an edition of F. A. Wolf's Kleine Schriften (1869).

See Volkmann, G. Bernhardy (1887).

BERNI, FRANCESCO (1497-1536), Italian poet, was born about 1497 at Lamporecchio, in Bibbiena, a district lying along

the Upper Arno. His family was of good descent, but excessively poor. At an early age he was sent to Florence, where he remained till his 19th year. He then set out for Rome, trusting to obtain some assistance from his uncle, the Cardinal Bibbiena. The cardinal, however, did nothing for him, and he was obliged to accept a situation as clerk or secretary to Ghiberti, datary to Clement VII. The duties of his office, for which Berni was in every way unfit, were exceedingly irksome to the poet, who, however, made himself celebrated at Rome as the most witty and inventive of a certain club of literary men, who devoted them- selves to light and sparkling effusions. So strong was the admiration for Berni's verses, that mocking or burlesque poems have since been called poesie berncsca. About the year 1530 he was relieved from his servitude by obtaining a canonry in the cathedral of Florence. In that city he died in 1536, according to tradition poisoned by Duke Alessandro de' Medici, for

having refused to poison the duke's cousin, Ippolito de' Medici; but considerable obscurity rests over this story. Berni stands at the head of Italian comic or burlesque poets. For lightness, sparkling wit, variety of form and fluent diction, his verses are unsur- passed. Perhaps, however, he owes his greatest fame to the recasting (Rifacimento) of Boiardo's Orlando Innamoralo. The enormous success of Ariosto's Orlando Furioso had directed fresh attention to the older poem, from which it took its characters, and of which it is the continuation. But Boiardo's work, though good in plan, could never have achieved wide popularity on account of the extreme ruggedness of its style. Berni undertook the revision of the whole poem, avowedly altering no sentiment, removing or adding no incident, but simply giving to each line and stanza due gracefulness and polish. His task he completed with marvellous success; scarcely a line remains as it was, and the general opinion has pronounced decisively in favour of the revision over the original. To each canto he prefixed a few stanzas of reflective verse in the manner of Ariosto, and in one of these introductions he gives us the only certain information we have concerning his own life. Berni appears to have been favour- ably disposed towards the Reformation principles at that time introduced into Italy, and this may explain the bitterness of some remarks of his upon the church. The first edition of the Rifaci- mento was printed posthumously in 1 34 1 , and it has been supposed that a few passages either did not receive the author's final revision, or have been retouched by another hand.

A partial translation of Berni's Orlando was published by W. S. Rose (1823).

BERNICIA, the northern of the two English kingdoms which were eventually united in the kingdom of Northumbria. Its territory is said to have stretched from the Tyne northwards, ultimately reaching the Forth, while its western frontier was gradually extended at the expense of the Welsh. The chief royal residence was Bamburgli, and near it was the island of Lindisfarne, afterwards the see of a bishop. The first king of whom we have any record is Ida, who is said to have obtained the throne about 547. ˆEthelfrith, king of Bernicia, united Deira to his own kingdom, probably about 605, and the union continued under his successor Edwin, son of Ella or /Elle, king of Deira. Bernicia was again separate from Deira under Eanfrith, son of ˆEthelfrith (633-634), after which date the kings of Bernicia were supreme in Northumbria, though for a short time under Oswio Deira had a king of its own.

See Bede, Hist. Eccles. ii. 14, iii. I, 14; Nennius, § 63; Simeon of

Durham, i. 339. (F. G. M. B.)

BERNICIAN SERIES, in geology, a term proposed by S. P. Woodward in 1856 {Manual of Mollusca, p. 409) for the lower portion of the Carboniferous System, below the Millstone Grit. The name was suggested by that of the ancient province of Bernicia on the Anglo-Scottish borderland. It is practically equivalent to the " Dinantien " of A. de Lapparent and Munier-Chalmas (1893). In 1875 G. Tate's " Calcareous and Carbonaceous " groups of the Carboniferous Limestone series of Northumberland were united by Professor Lebour into a single series, to which he applied the name "Bernician"; but later he speaks of the whole of the Carboniferous rocks of Northumberland and its

borders as of the " Bernician type," which is the most satisfactory way in which the term may now be used {Report of the Brit. Sub-committee on Classification and Nomenclature, 2nd ed., Cambridge, 1888). " Demetian " was the corresponding designa- tion proposed by Woodward for the Upper Carboniferous rocks.

BERNINI, GIOVANNI LORENZO (1 598-1680), Italian artist, was born at Naples. He was more celebrated as an architect and a sculptor than as a painter. At a very early age his great skill in modelling introduced him to court favour at Rome, and he was specially patronized by Maffeo Barberini, afterwards Pope Urban VIII., whose palace he designed. None of his sculptured groups at all come up to the promised excellence of his first effort, the Apollo and Daphne, nor are any of his paintings of particular merit. His busts were in so much request that Charles I. of England, being unable to have a personal interview with Bernini, sent him three portraits by Vandyck, from which the artist was enabled to complete his model. His architectural designs, including the great colonnade of St Peter's, brought him perhaps his greatest celebrity. Louis XIV., when he contemplated the restoration of the Louvre, sent for Bernini, but did not adopt his designs. The artist's progress through France was a triumphal procession, and he was most liberally rewarded by the great monarch. He left a fortune of over £100,000.

BERNIS, FRANgOIS JOACHIM DE PIERRE DE (1715-1794), French cardinal and statesman, was born at St Marcel-d'Ardeche on the 22nd of May 171 5. He was of a noble but impoverished family, and,

being a younger son, was intended for the church. He was educated at the Louis-le-Grand college and the seminary of Saint-Sulpice, Paris, but did not take orders till 1755. He became known as one of the most expert epigrammatists in the gay society of Louis XV. 's court, and by his verses won the friendship of Madame de Pompadour, the royal mistress, who obtained for him an apartment, furnished at her expense, in the Tuileries, and a yearly pension of 1500 livres (about £60). In 1751 he was appointed to the French embassy at Venice, where he acted, to the satisfaction of both parties, as mediator between the republic and Pope Benedict XIV. During his stay in Venice he received subdeacon's orders, and on his return to France in 1755 was made a papal councillor of state. He took an important part in the delicate negotiations between France and Austria which preceded the Seven Years' War. He regarded the alliance purely as a temporary expedient, and did not propose to employ the whole forces of France in a general war. But he was over-ruled by his colleagues. He became secretary for foreign affairs on the 27th of June 1757, but owing to his attempts to counteract the spendthrift policy of the marquise de Pompadour and her creatures, he fell into disgrace and wasin December 1 758 banished to Soissons by Louis XV., where he remained in retirement for six years. In the previous November he had been created cardinal by Clement XIII. On the death of the royal mistress in 1764, Bernis was recalled and once more offered the seals of office, but declined them, and was appointed archbishop of Albi. His occupancy of the see was not of long duration. In 1769 he went to Rome to assist at the conclave which resulted in the election of Clement XIV., and the talent which he displayed on that occasion procured him the appointment of ambassador in Rome, where he spent the remainder of his life. He was partly instrumental in bringing about the suppression of the Jesuits, and acted with greater moderation than is generally allowed. He lost his influence under Pius VI., who was friendly to the Jesuits, and the French Revolution, to which he was hostile, reduced him almost to penury; the court of Spain, however, mindful of the support he had given to their ambassador in obtaining the condemnation of the Jesuits, came to his relief with a handsome pension. He died at Rome on the 3rd of November 1704, and was buried in the church of S. Luigi de' Francesi. In 1803 his remains were transferred to the cathedral at Nimes. His poems, the longest of which is La Religion vengee (Parma, 1794), have no merit; they were collected and published after his death (Paris, 1797, &c); his Memoires et lettres 1J15-58 (2 vols., Paris, 1S78) are still interesting to the historian.

See Frederic Masson's prefaces to the MSmoires et lettres, and Le

Cardinal de Bernis depuis son ministere (Paris, 1884); E. et J. de Goncourt, Mme de Pompadour (Paris, 1888), and Sainte-Beuve, Causeries du lundi, t. viii.

BERNKASTEL, a town of Germany, in the Prussian Rhine province, on the Mosel, in a deep and romantic valley, connected by a branch to Wengerohr with the main Trier-Coblenz railway. Pop. 2300. It has some unimportant manufactures; the chief industry is in wine, of which Berncastler Doctor enjoys great repute. Above the town lie the ruins of the castle Landshut. Bernkastel originally belonged to the chapter of Trier, and received its name from one of the provosts of the cathedral, Adalbero of Luxemburg (hence Adalberonis castellum).

BERNOULLI, or Bernouilli, the name of an illustrious family in the annals of science, who came originally from Antwerp. Driven from their country during the oppressive government of Spain for their attachment to the Reformed religion, the Bernoullis sought first an asylum at Frankfort (1583), and afterwards at Basel, where they ultimately obtained the highest distinctions. In the course of a century eight of its members successfully cultivated various branches of mathe- matics, and contributed powerfully to the advance of science. The most celebrated were Jacques (James), Jean (John) and Daniel, the first, second and fourth as dealt with below; but, for the sake of perspicuity they may be considered as nearly as possible in the order of family succession. A complete summary of the great developments of mathematical learning, which the members of this family effected, lies outside the scope of this notice. More detailed accounts are to be found in the various mathematical articles.

I. Jacques Bernoulli (1654-1705), mathematician, was born at Basel on the 27th of December 1654. He was educated at the public school of Basel, and also received private instruction from the learned Hoffmann, then professor of Greek. At the conclusion of his philosophical studies at the university, some geometrical figures, which fell in his way, excited in him a passion for mathematical pursuits, and in spite of the opposition of his father, who wished him to be a clergyman, he applied himself in secret to his favourite science. In 1676 he visited Geneva on his way to France, and subsequently travelled to England and Holland. While at Geneva he taught a blind girl several branches of science, and also how to write; and this led him to publish A Method of Teaching Mathematics to the Blind. At Bordeaux his Universal Tables on Dialling were constructed; and in London he was admitted to the meetings of Robert Boyle, Robert Hooke and other learned and scientific men.

On his final return to Basel in 1682, he devoted himself to physical and mathematical investigations, and opened a public seminary for experimental physics. In the same year he published his essay on comets, Conamen Novi Systematis Cometarum, which was occasioned by the appearance of the comet of 1680. This essay, and his next publication, entitled De Gravitate Aetheris, were deeply tinged with the philosophy of Rene Descartes, but they contain truths not unworthy of the philosophy of Sir Isaac Newton's Principia.

Jacques Bernoulli cannot be strictly called an independent discoverer; but, from his extensive and successful application of the calculus and other mathematical methods, he is deserving of a place by the side of Newton and Leibnitz. As an additional claim to remembrance, he was the first to solve Leibnitz's problem of the isochronous curve (Acta Eruditorum, 1690). He proposed the problem of the catenary (q.v.) or curve formed by a chain suspended by its two extremities, accepted Leibnitz's construction of the curve and solved more complicated problems relating to it. He determined the " elastic curve," which is formed by an elastic plate or rod fixed at one end and bent by a weight applied to the other, and which he showed to be the same as the curvature of an impervious sail filled with a liquid (Hn- tearia). In his investigations respecting cycloidal lines and various spiral curves, his attention was directed to the loxo- dromic and logarithmic spirals, in the last of which he took particular interest from its remarkable property of reproducing itself under a variety of conditions.

In 1696 he proposed the famous problem of isoperimetrical figures, and offered a reward for its solution. This problem engaged the attention of British as well as continental mathe- maticians; and its proposal gave rise to a painful quarrel with his brother Jean. Jean offered a solution of the problem; his brother pronounced it to be wrong. Jean then amended his solution, and again offered it, and claimed the reward. Jacques still declared it to be no solution, and soon after published his own. In 1 701 he published also the demonstration of his solu- tion, which was 1 accepted by the marquis de l'Hopital and Leibnitz. Jean, however, held his peace for several years, and then dishonestly published, after the death of Jacques, another incorrect solution; and not until 17 18 did he admit that he had been in error. Even then he set forth as his own his brother's solution purposely disguised.

In 1687 the mathematical chair of the university of Basel was conferred upon Jacques. He was once made rector of his university, and had other distinctions bestowed on him. He and his brother Jean were the first two foreign associates of the Academy of Sciences of Paris; and, at the request of Leibnitz, they were both received as members of the academy of Berlin. In 1684 he had been offered a professorship at Heidelberg; but his marriage with a lady of his native city led him to decline the invitation. Intense application brought on infirmities and a slow fever, of which he died on the 16th of August 1705. Like another Archimedes, he requested that the logarithmic spiral should be engraven on his tombstone, with these words, Eadem mutata resurgo.

Jacques Bernoulli wrote elegant verses in Latin, German and French ; but although these were held in high estimation in his own time, it is on his mathematical works that his fame now rests. These are: — Jacobi Bernoulli Basiliensis Opera (Genevae, 1744), 2 torn. 4to; Ars Conjectandi, opus posthumum: accedunt traclatus de Serie- bus Infinilis, el epistola {Gallice scripta) de Ludo Pilae Reticularis (Basiliae, 1713), 1 torn. 4to.

II. Jean Bernoulli (1667-1748), brother of the preceding, was born at Basel on the 27th of July 1667. After finishing his literary studies he was sent to Neuchatel to learn commerce and acquire the French language. But at the end of a year he renounced the pursuits of commerce, returned to the university of Basel, and was admitted to the degree of bachelor in philosophy, and a year later, at the age of 18, to that of master of arts. In his studies he was aided by his elder brother Jacques. Chemistry, as well as mathematics, seems to have been the object of his early attention; and in the year 1690 he published a dissertation on effervescence and fermentation. The same year he went to Geneva, where he gave instruction in the differential calculus to Nicolas Fatio de Duillier, and afterwards proceeded to Paris, where he enjoyed the society of N. Malebranche, J. D. Cassini, Philip de Lahire and Pierre Varignon. With the marquis de l'Hopital he spent four months studying higher geometry and the resources of the new calculus. His independent discoveries in mathematics are numerous and important. Among these were the exponential calculus, and the curve called by him the linea brachistochrona, or line of swiftest descent, which he was the first to determine, pointing out at the same time the relation which this curve bears to the path described by a ray of light passing through strata of variable density. On his return to his native city he studied medicine, and in 1694 took the degree of M.D. Although he had declined a professorship in Germany, he now accepted an invitation

to the chair of mathematics at Groningen {Commercium Philosophicum, epist. xi. and xii.). There, in addition to the learned lectures by which he endeavoured to revive mathematical science in the university, he gave a public course of experimental physics. During a residence of ten years in Groningen, his controversies were almost as numerous as his discoveries. His dissertation on the " barometric light," first observed by Jean Picard, and discussed by Jean Bernoulli under the name of mercurial phosphorus, or mercury shining in vacuo (Diss, physica de mercurio lucenle in vacuo), procured him the notice of royalty, and engaged him in controversy. Through the influence of Leibnitz he received from the king of Prussia a gold medal for his supposed discoveries; but Nicolaus Hartsoeker

and some of the French academicians disputed the fact. The family quarrel about the problem of isoperimetrical figures above mentioned began about this time. In his dispute with his brother, in his controversies with the English and Scottish mathe- maticians, and in his harsh and jealous bearing to his son Daniel, he showed a mean, unfair and violent temper. He had declined, during his residence at Groningen, an invitation to Utrecht, but accepted in 1705 the mathematical chair in the university of his native city, vacant by the death of his brother Jacques; and here he remained till his death. His inaugural discourse was on the " new analysis," which he so successfully applied in investigating various problems both in pure and applied mathematics.

He was several times a successful competitor for the prizes given by the Academy of Sciences of Paris; the subjects of his essays being: — the laws of motion (Discours stir les lots de la communication du mouvement, 1727), the elliptical orbits of the planets, and the inclinations of the planetary orbits (Essai d'une nouvelle physique cileste, 1735). In the last case his son Daniel divided the prize with him. Some years after his return to Basel he published an essay, entitled Nouvelle Theorie de la manoeuvre des vaisseaux. It is, however, his works in pure mathematics that are the permanent monuments of his fame. Jean le Rond d'Alembert acknowledges with gratitude, that' "whatever he knew of mathematics he owed to the works of Jean Bernoulli." He was a member of almost every learned society in Europe, and one of the first mathematicians of a mathematical age. He was as keen in his resentments as he was ardent in his friendships; fondly attached to his family, he yet disliked a deserving son; he gave full praise to Leibnitz and Leonhard Euler, yet was blind to the excellence of Sir Isaac Newton. Such was the vigour of his constitution that he continued to pursue his usual

mathematical studies till the age of eighty. He was then attacked by a com- plaint at first apparently trifling; but his strength daily and rapidly declined till the 1st of January 1748, when he died peacefully in his sleep.

His writings were collected under his own eye by Gabriel Cramer, professor of mathematics at Geneva, and published under the title of Jokannis Bernoulli Operi Omnia (Lausan. et Genev.), 4 torn. 4to; his interesting correspondence with Leibnitz appeared under the title of Gul. Leibnitii et Johannis Bernoulli Commercium Philoso- phicum et Mathematicum (Lausan. et Genev. 1745), 2 torn. 4to.

III. Nicolas Bernoulli (1695-1726), the eldest of the three sons of Jean Bernoulli, was born on the 27th of January 1695. At the age of eight he could speak German, Dutch, French and Latin. When his father returned to Basel he went to the univer- sity of that city, where, at the age of sixteen, he took the degree of doctor in philosophy, and four years later the highest degree in law. Meanwhile the study of mathematics was not neglected, as appears not only from his giving instruction in geometry to his younger brother Daniel, but from his writings on the differ- ential, integral, and exponential calculus, and from his father considering him, at the age of twenty-one, worthy of receiving the torch of science from his own hands. (" Lampada nunc tradam filio meo natu maximo, juveni xxi. annorum, ingenio mathematico aliisque dotibus satis instructo," Com. Phil. ep. 223.) With his father's permission he visited Italy and France, and during his travels formed friendship with Pierre Varignon and Count Riccati. The invitation of a Venetian nobleman induced him again to visit Italy, where he resided two years, till his return to be a candidate for the chair of jurisprudence at Basel. He. was unsuccessful, but was soon afterwards appointed to a similar office in the university of Bern. Here he resided three years, his happiness only marred by regret on account of his separation from his brother Daniel. Both were appointed at the same time professors of mathematics in the academy of St Petersburg; but this office Nicolas enjoyed for little more then eight months. He died on the 26th of July 1726 of a lingering fever. Sensible of the loss which the nation had sustained by his death, the empress Catherine ordered him a funeral at the public expense.

Some of his papers are published in his father's works, and others in the Acta Eruditorum and the Comment. Acad. Petropol.

BERNSTEIN

IV. Daniel Bernoulli (1700-1782), the second son of Jean Bernoulli, was born on the 29th of January 1700, at Groningen. He studied medicine and became a physician, but his attention was early directed also to geometrical studies. The severity of his father's manner was ill-calculated to encourage the first efforts of one so sensitive; but fortunately, at the age of eleven, he became the pupil of his brother Nicolas. "He afterwards studied in Italy under Francesco Domenico Michelotti and Giambattista Morgagni. After his return, though only twenty-four years of age, he was invited to become president of an academy then projected at Genoa; but, declining this honour, he was, in the following year, appointed professor of mathematics at St Petersburg. In consequence of the state of his health, however, he returned to Basel in 1733, where he was appointed professor of anatomy and botany, and afterwards of experimental and speculative philosophy. In the labours of this office he spent the remaining years of his life. He had previously published some medical and botanical dissertations, besides his Exercita- tiones quaedam Mathemalicae, containing a solution of the differ- ential equation proposed by Riccati and now known by his name. In 1738 appeared his Hydrodynamica, in which the equilibrium, the pressure, the reaction and varied velocities of fluids are considered both theoretically and practically. One of these problems, illustrated by experiment, deals with an ingenious mode of propelling vessels by the reaction of water ejected from the stern. Some of his experiments on this subject were per- formed before Pierre Louis M. de Maupertuis and Alexis Claude Clairaut, whom the fame of the Bernoullis had attracted to Basel. With a success equalled only by Leonhard Euler, Daniel Bernoulli gained or shared no less than ten prizes of the Academy of Sciences of Paris. The first, for a memoir on the construction of a clepsydra for measuring time exactly at sea, he gained at the age of twenty-four; the second, for one on the physical cause of the inclination of the planetary orbits, he divided with his father; and the third, for a communication on the tides, he shared with Euler, Colin Maclaurin and another competitor. The problem of vibrating cords, which had been some time before resolved by Brook Taylor (1685-1731) and d'Alembert, became the subject of a long discussion conducted in a generous spirit between Bernoulli and his friend Euler. In one of his early investigations he gave an ingenious though indirect demonstra- tion of the problem of the parallelogram of forces. His labours in the decline of life were chiefly directed to the doctrine of probabilities in reference to practical purposes, and in particular to economical subjects, as, for example, to inoculation,

and to the duration of married life in the two sexes, as well as to the relative proportion of male and female births. He retained his usual vigour of understanding till near the age of eighty, when his nephew Jacques relieved him of his public duties. He was afflicted with asthma, and his retirement was relieved only by the society of a few chosen friends. He died on the 1 7 th of March 1782 at Basel. Excluded by his professional character from the councils of the republic, he nevertheless received all the deference and honour due to a first magistrate. He was wont to mention the following as the two incidents in his life which had afforded him the greatest pleasure, — that a stranger, whom he had met as a travelling companion in his youth, made to his declaration " I am Daniel Bernoulli " the incredulous and mocking reply, "And I am Isaac Newton"; and that, while entertaining Konig and other guests, he solved without rising from table a problem which that mathematician had submitted as difficult and lengthy. Like his father, he was a member of almost every learned society of Europe, and he succeeded him as foreign associate of the Academy of Paris.

Several of his investigations are contained in the earlier volumes of the Comment. Acad. Petropnl. ; and his separately published works are: — Dissertatio Inaugur. Phys. Med. de Respiratione (Basil. 1721), 4to; Positiones Anatomico-Botanicae (Basil. 1721), 4to; Exercita- tiones quaedam Mathemalicae (Venetiis, 1724), 4to; Hydrodynamica (Argentorati, 1738), 4to.

V. Jean Bernoulli (1710-1790), the youngest of the three sons of Jean Bernoulli, was born at Basel on the 18th of May 1710. He studied law and mathematics, and, after travelling in

France,was for five years professor of eloquence in the university of his native city. On the death of his father he succeeded him as professor of mathematics. He was thrice a successful com- petitor for the prizes of the Academy of Sciences of Paris. His prize subjects were, the capstan, the propagation of light, and the magnet. He enjoyed the friendship of P. L. M. de Maupertuis, who died under his roof while on his way to Berlin. He himself died in 1790. His two sons, Jean and Jacques, are the last noted mathematicians of the family.

VI. Nicolas Bernoulli (1687-1759), cousin of the three preceding, and son of Nicolas Bernoulli, one of the senators of Basel, was born in that city on the 10th of October 1687. He visited England, where he was kindly received by Sir Isaac Newton and Edmund Halley {Com. Phil. ep. 199), held for a time the mathematical chair at

Padua, and was successively professor of logic and of law at Basel, where he died on the 29th of November 1759. He was editor of the Ars Conjectandi of his uncle Jacques. His own works are contained in the Acta Eruditorum, the Giornale de' letterati d' Italia, and the Com- mercium Philosophicum.

VII. Jean Bernoulli (1 744-1 807), grandson of the first Jean Bernoulli, and son of the second of that name, was born at Basel on the 4th of November 1744. He studied at Basel and at Neuchatel, and when thirteen years of age took the degree of doctor in philosophy. At nineteen he was appointed astronomer royal of Berlin. Some years after, he visited Germany, France and England, and subsequently Italy, Russia and Poland. On his return to Berlin he was appointed director of the mathematical department of the academy. Here he died on the 13th of July 1807. His writings consist of travels and astronomical, geographical and mathematical works. In 1774 he published a French translation of Leonhard Euler's Elements of Algebra. He contributed several papers to the Academy of Berlin.

VIII. Jacques Bernoulli (1759-1789), younger brother of the preceding, and the second of this name, was born at Basel on the 17th of October 1759. Having finished his literary studies, he was, according to custom, sent to Neuchatel to learn French. On his return he graduated in law. This study, however, did not check his hereditary taste for geometry. The early lessons which he had received from his father were con- tinued by his uncle Daniel, and such was his progress that at the age of twenty-one he was called to undertake the duties of the chair of experimental physics, which his uncle's advanced years rendered him unable to discharge. He afterwards accepted the situation of secretary to count de Brenner, which afforded him an opportunity of seeing Germany and Italy. In Italy he formed a friendship with Lorgna, professor of mathematics at Verona, and one of the founders of the Societd Italiana for the encouragement of the sciences. He was also made correspond- ing member of the royal society of Turin; and, while residing at Venice, he was, through the friendly representation of Nicolaus von Fuss, admitted into the academy of St Petersburg. In 1788 he was named one of its mathematical professors.

He was tragically drowned while bathing in the Neva in July 1789, a few months after his marriage with a daughter of Albert Euler, son of Leonhard Euler.

Several of his papers are contained in the first six volumes of Nova

Acta Acad. Scien. Imper. Petropol., in the Acta Helvetica, in the Memoirs of the Academies of Berlin and Turin, and in his brother John's publications. He also published separately some juridical and physical theses, and a German translation of Memolres du philosophe de Merian. See generally M. Cantor, Geschichte der Mathematik; J. C. Poggendorff, Biographisch-lilerarisches Hand-worterbuch (1 863-1 904).

BERNSTEIN, AARON (181 2-1884), Jewish scientist, author and reformer. In the middle of the 19th century Bernstein took an active share in the movement for synagogue reform in Ger- many. He was the author of two delightful Ghetto stories, Vogele der Maggid and Mendel Gibbor, being one of the originators of this genre of modern fiction. He was also a publicist, and his History of Revolution and Reaction in Germany (3 vols., 1883- 1884) was a collection of important political essays.

BERNSTORFF, ANDREAS PETER, Count von (1735-1797), Danish statesman, was born at Hanover on the 28th of August 1735. His career was determined by his uncle, Johann Hartwig Ernst Bernstorff, who early discerned the talents of his nephew and induced him to study in the German and Swiss universities and travel for some years in Italy, France, England and Holland, to prepare himself for a statesman's career. During these Wanderjahre he made the acquaintance of the poets Gellert and Jacobi, the learned Jean-Jacques Barthelemy, the due de Choiseul, and Gottfried Achenwall, the statistician. At his uncle's desire he rejected the Hanoverian for the Danish service, and in 1759 took his seat in the German chancery at Copenhagen. In 1767, at the same time as his uncle, he was created a count, and in 1769 was made a privy-councillor. He is described at this period as intellectual, upright and absolutely trustworthy, but obstinate and self-opinionated to the highest degree, arguing with antiquaries about coins, with equerries about horses, and with foreigners about their own countries, always certain that he was right and they wrong, whatever the discussion might be. He shared the disgrace of his uncle when Struensee came into power, but re-entered the Danish service after Struen- see's fall at the end of 1772, working at first in the financial and economical departments, and taking an especial interest in agriculture. The improvements he introduced in the tenures of his peasantry anticipated in some respects the agricultural reforms of the next generation.

In April 1773 Bernstorff was transferred to the position for which he was especially fitted, the ministry of foreign affairs, with which he combined the presidency of the German chancery (for Schleswig-Holstein) . His predecessor, Adolf Siegfried Osten, had been dismissed because he was not persona grata at St Petersburg, and Bernstorff's first official act was to conclude the negotiations which had long been pending with the grand-duke Paul as duke of Holstein-Gottorp. The result was the exchange- treaty of the 1st of June (May 21 O.S.) 1773, confirming the previous treaty of 1767 (see Bernstorff, J. H. E.). This was followed by the treaty of alliance between Denmark and Russia of the 12th of August 1773, which was partly a mutually defensive league, and partly an engagement between the two states to upset the new constitution recently established in Sweden by Gustavus III., when the right moment for doing so should arrive. For this mischievous and immoral alliance, which bound Denmark to the wheels of the Russian empress's chariot and sought to interfere in the internal affairs of a neighbouring state, Bernstorff was scarcely responsible, for the preliminaries had been definitely settled in his uncle's time and he merely concluded them. But there can be no doubt that he regarded this anti- Swedish policy as the correct one for Denmark, especially with a monarch like Gustavus III. on the Swedish throne. It is also pretty certain that the anti-Swedish alliance was Russia's price for compounding the Gottorp difficulty.

Starting from the hypothesis that Sweden was " Denmark- Norway's most active and irreconcilable enemy," Bernstorff logically included France, the secular ally of Sweden, among the hostile powers with whom an alliance was to be avoided, and drew near to Great Britain as the natural foe of France, especially during the American War of Independence, and this too despite the irritation occasioned in Denmark-Norway by Great Britain's masterful interpretation of the expression " contraband." Bernstorff's sympathy with England grew stronger still when in 1779 Spain joined her enemies; and he was much inclined, the same winter, to join a triple alliance between Great Britain, Russia and Denmark-Norway, proposed by England for the purpose of compelling the Bourbon powers to accept reasonable terms of peace. But he was overruled by the crown prince Frederick, who thought such a policy too hazardous, when Russia declined to have anything to do with it. Instead of this the Russian chancellor Nikita Panin proposed an armed league to embrace all the neutral powers, for the purpose of protecting neutral shipping in time of war. This league was very similar to one proposed by Bernstorff himself in September 1778 for enforcing the principle "a free ship

makes the cargo free";

-BERNSTORFF, C. G.

but as now presented by Russia, he rightly regarded it as directed exclusively against England. He acceded to it indeed (gth of July 1780) because he could not help doing so; but he had previously, by a separate treaty with England, on the 4th of July, come to an understanding with that power as to the meaning of the expression " contraband of war. " This independence caused great wrath at St Petersburg, where Bernstorff was accused of disloyalty, and ultimately sacrificed to the resentment of the Russian government (13 th of November 1780), the more readily as he already disagreed on many important points of domestic administration with the prime minister Hoegh Guldberg. He retired to his Mecklenburg estates, but on the fall of Guldberg four years later, was recalled to office (April 1784). The ensuing thirteen years were perhaps the best days of the old Danish absolutism. The government, under the direction of such enlightened ministers as Bernstorff, Reventlow and others, held the mean between Struensee's extravagant cosmopolitanism and Guldberg's stiff conservatism. In such noble projects of reform as the emancipation of the serfs (see Reventlow) Bernstorff took a leading part, and so closely did he associate himself with everything Danish, so popular did he become in the Danish capital, that a Swedish diplomatist expressed the opinion that henceforth Bernstorff could not be removed without danger. Liberal-minded as he was, he held that " the will of the nation should be a law to the king," and he boldly upheld the freedom of the press as the surest of safety-valves.

Meanwhile foreign complications were again endangering the position of Denmark-Norway. As Bernstorff had predicted, Panin's neutrality project had resulted in a breach between Great Britain and Russia. Then came Gustavus III.'s sudden war with Russia in 1788. Bernstorff was bound by treaty to assist Russia in such a contingency, but he took care that the assistance so rendered should be as trifling as possible, to avoid offending Great Britain and Prussia. Still more menacing became the political situation on the outbreak of the French Revolution. Ill-disposed as Bernstorff was towards the Jacobins, he now condemned on principle any interference in the domestic affairs of France, and he was persuaded that Denmark's safest policy was to keep clear of every anti-French coalition. From this unassailable standpoint he never swerved, despite the promises and even the menaces both of the eastern and the western powers. He was rewarded with complete success and the respect of all the diplomatists in Europe. His neutrality treaty with

Sweden (17th of March 1794), for protecting their merchantmen by combined squadrons, was also extremely beneficial to the Scandinavian powers, both commercially and politically. Taught by the lesson of Poland, he had, in fact, long since abandoned his former policy of weakening Sweden. Bernstorff's great faculties appeared, indeed, to mature and increase with age, and his death, on the 21st of June 1797, was regarded in Denmark as a national calamity.

Count Bernstorff was twice married, his wives being the two sisters of the writers Counts Christian and Friedrich Leopold zu Stolberg. He left seven sons and three daughters. Of his sons the best known is Christian Gunther, count von Bernstorff. Another, Count Joachim, was attached to his brother's fortunes so long as he remained in the Danish service, was associated with him in representing Denmark at the congress of Vienna, and in 181 5 was appointed ambassador at that court.

See Rasmus Nyerup, Bernstorffs Eftermaele (Kjobenhavn, 1799); Peter Edward Holm, Danmark-Norges udenrigske Historie (Copenhagen, 1875); Danmarks Riges Historie V. (Copenhagen, 1897-1905); Christian Ulrich Detlev von Eggers, Denkwiirdigsksiten aus dem Leben des Grafen A. P. Bernstorff (Copenhagen, 1800); Aage Friis, A. P. Bernstorff og 0. Hoegh-Guldberg (Copenhagen, 1899); and Bernstorffeme og Danmark (Copenhagen, 1903). (R. N. B.)

BERNSTORFF, CHRISTIAN GUNTHER, Count von (1769- 1835), Danish and Prussian statesman and diplomatist, son of Count Andreas Peter von Bernstorff, was born at Copenhagen on the 3rd of April 1769. Educated for the diplomatic service under his father's direction, he began his career in 1787, as attache to the representative of Denmark at the opening of the Swedish diet. In 1 789 he went as secretary of legation to Berlin,

where his maternal uncle, Count Leopold Friedrich zu Stolberg, was Danish ambassador. His uncle's influence, as well as his own social qualities, obtained him rapid promotion; he was soon charge d'affaires, and in 1791 minister plenipotentiary. In 1 794 he exchanged this post for the important one of ambas- sador at Stockholm, where he remained until May 1797, when he was summoned to Copenhagen to act as substitute for his father during

his illness. On the death of the latter (21st June), he succeeded him as secretary of state for foreign affairs and privy councillor. In 1800 he became head of the ministry. He remained responsible for the foreign policy of Denmark until May 1810, a fateful period which saw the battle of Copen- hagen (2nd of April 1801), the bombardment of Copenhagen and capture of the Danish fleet in 1807. After his retirement he remained without office until his appointment in 181 1 as Danish ambassador at Vienna. He remained here, in spite of the fact that for a while Denmark was nominally at war with Austria, until, in January 1814, on the accession of Denmark to the coalition against Napoleon, he publicly resumed his functions as ambassador. He accompanied the emperor Francis to Paris, and was present at the signature of the first peace of Paris. With his brother Joachim, he represented Denmark at the congress of Vienna and, as a member for the commission for the regulation of the affairs of Germany, was responsible for some of that confusion of Danish and German interests which was to bear bitter fruit later in the Schleswig-Holstein question (q.v.). He again accompanied the allied sovereigns to Paris in 1815, returning to Copenhagen the same year. In 1817 he was appointed Danish ambassador at Berlin, his brother Joachim going at the same time to Vienna. In the following year Prince Hardenberg made him the formal proposition that he should transfer his services to Prussia, which, with the consent of his sovereign, he did.

It was, therefore, as a Prussian diplomat that Bernstorff attended the congress of Aix-la-Chapelle (October 1818), at the close of which he returned to Berlin as minister of state and head of the department for foreign affairs. Bernstorff's manage- ment of Prussian policy during the many years that he remained in office has been variously judged. He was by training and temperament opposed to the Revolution, and he was initiated into his new duties as a Prussian minister by the reactionary Ancillon. He is accused of having subordinated the particular interests of Prussia to the European policy of Metternich and the " Holy Alliance." Whether any other policy would in the long run have served Prussia better is a matter for speculation. It is true that Bernstorff supported the Carlsbad decrees, and the Vienna Final Act; he was also the faithful henchman of Metternich at the congresses of Laibach, Troppau and Verona. On the other hand, he took a considerable share in laying the foundations of the customs union (Zollvcrcin), which was destined to be the foundation of the Prussian hegemony in Germany. In his support of Russia's action against Turkey in 1828 also he showed that he was no blind follower of Mctternich's views. In the crisis of 1830 his moderation in face of

the warlike clamour of the military party at Berlin did much to prevent the troubles in Belgium and Poland from ending in a universal European conflagration.

From 1824 onward Bernstorff had been a constant sufferer from hereditary gout, intensified and complicated by the results of overwork. In the spring of 1832 the state of his health compelled him to resign the ministry of foreign affairs to Ancillon, who had already -acted as his deputy for a year. He died on the 18th of March 1835.

See J. Caro in Allgem. Deutsch. Biog. s. v.; also H. von Treitschke, Deutsche Geschichte (Leipzig, 1874-1894). (R. N. B.)

BERNSTORFF, JOHANN HARTWIG ERNST, Count von (17 1 2-1 7 7 2), Danish statesman, who came of a very ancient Mecklenburg family, was the son of Joachim Engelke, Freiherr von Bernstorff, chamberlain to the elector of Hanover, and was born on the 13th of May 171 2. His maternal grandfather, Andreas Gottlieb Bernstorff (1640-1726), had been one of the ablest ministers of George I., and under his guidance Johann

was very carefully educated, acquiring amongst other things that intimate knowledge of the leading European languages, especially French, which ever afterwards distinguished him. He was introduced into the Danish service by his relations, the brothers Plessen, who were ministers of state under Christian VI. In 1732 he was sent on a diplomatic mission to the court of Dresden; and from 1738 he represented Holstein at the diet of Regensburg, from 1744 to 1750 he represented Denmark at Paris, whence he returned in 1754 to Denmark as minister of foreign affairs. Supported by the powerful favourite A. G. Moltke, and highly respected by Frederick V., he occupied for twenty-one years the highest positionin thegovernment,andin the council of state his opinion was decisive. But his chief concern was with foreign affairs. Ever since the conclusion of the Great Northern War, Danish statesmen had been occupied in harvesting its fruits, namely, the Gottorp portions of Schleswig definitely annexed to Denmark in 17 21 by the treaty of Nystad, and endeavouring to bring about a definitive general under- standing with the house of Gottorp as to their remaining pos- sessions in Holstein. With the head of the Swedish branch of the Gottorps, the crown prince Adolphus Frederick, things had been arranged by the exchange of 1750; but an attempt to make a similar arrangement with the chief of the elder Gottorp line, the cesarevitch Peter Feodorovich, had failed. In intimate connexion with the Gottorp affair stood the question of the poli- tical equilibrium of the north.

Ever since Russia had become the dominant Baltic power, as well as the state to which the Gottorpers looked primarily for help, the necessity for a better understanding between the two Scandinavian kingdoms had clearly been recognized by the best statesmen of both, especially in Denmark from Christian VI. 's time; but unfortunately this sound and sensible policy was seriously impeded by the survival of the old national hatred on both sides of the Sound, still further complicated by Gottorp's hatred of Denmark. Moreover, it was a diplomatic axiom in Denmark, founded on experience, that an absolute monarchy in Sweden was incom- parablymore dangerous to herneighbourthan a limited monarchy, and after the collapse of Swedish absolutism with Charles XII., the upholding of the comparatively feeble, and ultimately anarchical, parliamentary government of Sweden became a question of principle with Danish statesmen throughout the 18th century. A friendly alliance with a relatively weak Sweden was the cardinal point of Bernstorff's policy. But his plans were traversed again and again by unforeseen complica- tions, the failure of the most promising presumptions, the per- petual shifting of apparently stable alliances; and again and again he had to modify his means to attain his ends. Amidst all these perplexities Bernstorff approved himself a consummate statesman. It seemed almost as if his wits were sharpened into a keener edge by his very difficulties; but since he con- demned on principle every war which was not strictly defensive, and it had fallen to his lot to guide a comparatively small power, he always preferred the way of negotiation, even sometimes where the diplomatic tangle would perhaps best have been severed boldly by the sword. The first difficult problem he had to face was the Seven Years' War. He was determined to preserve the neutrality of Denmark at any cost, and this he succeeded in doing, despite the existence of a subsidy-treaty with the king of Prussia, and the suspicions of England and Sweden. It was through his initiative, too, that the convention of Kloster-Seven was signed (10th of September 1757), and on the 4th of May 1 758 he concluded a still more promising treaty with France, whereby, in consideration of Denmark's holding an army-corps of 24,000 men in Holstein till the end of the war, to secure Hamburg, Liibeck and the Gottorp part of Holstein from invasion, France, and ultimately Austria also, engaged to bring about an exchange between the king of Denmark and the cesarevitch, as regards Holstein. But the course of the war made this compact inoperative. Austria hastened to repudiate, her guarantee to Denmark in order not to offend the new emperor of Russia, Peter III., and one of Peter's first acts on ascending the throne was to declare war against Denmark. The coolness

and firmness of Bernstorff saved the situation. He protested that the king of Denmark was bound to defend Schleswig " so long as there was a sword in Denmark and a drop of blood in the veins of the Danish people." He rejected the insulting ultimatum of the Russian emperor. He placed the best French general of the day at the head of the well-equipped Danish army. But just as the Russian and Danish armies had come within striking distance, the tidings reached Copenhagen that Peter III. had been overthrown by his consort. Bernstorff was one of the first to recognize the impotence of the French monarchy after the Seven Years' War, and in 1763 he considered it expedient to exchange the French for the Russian alliance, which was cemented by the treaty of the 28th of April (March n) 1765. This compact engaged Denmark to join with Russia in upholding the existing Swedish constitution, in return for which Catherine II. undertook to adjust the Gottorp diffi- culty by the cession of the Gottorp portion of Holstein in ex- change for the counties of Oldenburg and Delmenhorst. For his part in this treaty Bernstorff was created count. On the accession of Christian VII., in 1766, Bernstorff 's position became very precarious, and he was exposed to all manner of attacks, being accused, without a shadow of truth, of exploiting Denmark, and of unduly promoting foreigners. It is remarkable, however, that though Bernstorff ruled Denmark for twenty years he never learnt Danish. His last political achievement was to draw still closer to Russia by the treaty of the 13th of December 1769, the most important paragraph of which stipulated that any change in the Swedish constitution should be regarded by Denmark and Russia as a casus belli against Sweden, and that in the event of such a war Denmark should retain all the territory conquered from Sweden. This treaty proved to be a great mistake on Denmark's part, but circumstances seemed at the time to warrant it. Nine months later, on the 13th of September 1770, Bernstorff was dismissed as the result of Struensee's intrigues, and, rejecting the brilliant offers of Catherine II. if he would enter the Russian service, retired to his German estates, where he died on the 18th of February 1772. Bernstorff was not only one of the ablest but one of the noblest and most conscientious statesmen of his day. The motto he chose on receiving the order of the Daneborg was " Integritas et rectum custodiunt me," and throughout a long life he was never false to it.

See Poul Vedel, Den aeldre Crev Bernstorffs ministerium (Copen- hagen, 1882) ; Correspondance ministerielle du Comte J. H. E.

Bernstorff, ed. Vedel (Copenhagen, 1882) ; Aage Friis, Bernstorfferne og Danmark (Copenhagen, 1899). (R. N. B.)

BEROSSUS, a priest of Bel at Babylon, who translated into Greek the standard Babylonian work on astrology and astronomy, and compiled (in three books) the history of his country from native documents, which he published in Greek in the reign of Antiochus II. (250 B.C.). His works have perished, but extracts from the history have been preserved by Josephus and Euse- bius, the latter of whom probably derived them not directly from Berossus, but through the medium of Alexander Polyhistor and Apollodorus. The extracts containing the Babylonian cosmology, the list of the antediluvian kings of Babylonia, and the Chaldaean story of the Deluge, have been shown by the decipherment of the cuneiform texts to have faithfully reproduced the native legends; we may, therefore, conclude that the rest of the History was equally trustworthy. On the other hand, a list of post-diluvian dynasties, which is quoted by Eusebius and Georgius Syncellus as having been given by Berossus, cannot, in its present form, be reconciled with the monumental facts, though a substratum of historical truth is discoverable in it. As it stands, it is as follows: —

1. 86 Chaldaean kings 34,080 or 33,091 years

2. 8 Median „ 224 ,,

3. II other kings ,, no number.

4. 49 Chaldaean ,, 458 „

5. 9 Arabian ,, 245 „

6. 45 Assyrian ,, 526 „

After these, according to Eusebius, came the reign of Pul. By means of an ingenious chronological combination, the several items of which, however, are very questionable, J. A. Brandis

assigned 258 years to the 3rd dynasty; other summations have been proposed with equally little assurance of certainty. If Eusebius can be trusted, the 6th dynasty ended in 729 B.C., the year in which Pul or Tiglath-pileser III. was crowned king of Babylonia. But all attempts to harmonize the scheme of dynasties thus ascribed to Berossus with the list given us in the so-called dynastic Tablets discovered by Dr Pinches have been failures. The numbers, whether of kings or of years, cannot have been handed down to us correctly

by the Greek writers. All that seems certain is that Berossus arranged his history so that it should fill the astronomical period of 36,000 years, beginning with the first man and ending with the con- quest of Babylon by Alexander the Great.

See J. P. Cory, Ancient Fragments (1826, ed. by E. R. Hodges, 1876); Fr. Lenormant, Essai de commentaire des fragments cosmo- goniques de Berose (1872); A. von Gutschmid in the Rheinisches Museum (1853); George Smith in T.S.B.A. iii., 1874, pp. 361-379; Th. G. Pinches in P.S.B.A., 1880-1881. (A. H. S.)

BERRY, CHARLES ALBERT (1852-1899), English non- conformist divine, was born on the 14th of December 1852 at Bradshawgate, Leigh, Lancashire. At the age of seventeen he entered Airedale College, Bradford, to train for the Congrega- tional ministry, and in 1875 became pastor of St George's Road Congregational church, Bolton. He became widely known as a man of administrative ability, a vigorous platform speaker and an eloquent preacher. In July 1883 he undertook the pastorate of the church at Queen Street, Wolverhampton, with the supervision of nine dependent churches in the neigh- bourhood. Here again he exercised a wide influence, due in part to his evangelical conviction, eloquence, broad views and powers of organization, but also to the magnetic force of his personality. In 1887 he went to America in fulfilment of a promise to. Henry Ward Beecher of Brooklyn, and received a unanimous invitation to succeed Beecher in what was then the best-known pulpit in the United States. Berry, however, felt that his work lay in England and declined the invitation. In 1892 he took part in a conference at Grindelwald on the question of Christian Reunion, and subsequently, with Hugh Price Hughes and Alexander Mackennal of Bowdon, conducted a campaign throughout England, introducing the ideas and principles of Free Church federation. He was the first president of the Free Church congress. He played an effective part in expressing the popular desire for peace between England and America in reply to President Cleveland's message on the Venezuelan boundary dispute, and was invited to Washington to preach in connexion with the endeavour to establish an international arbitration treaty. In 1896 he was elected chair- man of the Congregational Union of England and Wales. In 1898 his health began to fail, and he died suddenly on the 31st of January 1899. His published works consist chiefly of addresses, and two volumes of sermons, Vision and Duty, and Mischievous Goodness. (D. Mn.)

BERRY, CHARLES FERDINAND, Duke of (1778-1820), younger son of Charles X. of France, was born at Versailles. At the Revolution he

left France with his father, then comte d'Artois, and served in the army of Conde from 1792 to 1797. He afterwards joined the Russian army, and in 1801 took up his residence in England, where he remained for thirteen years. During that time he married an Englishwoman, Anna Brown, by whom he had two daughters, afterwards the baronne de Charette and the comtesse de Lucinge-Faucigny. The marriage was cancelled for political reasons in 18 14, when the duke set out for France. His frank, open manners gained him some favour with his countrymen, and Louis XVIII. named him com- mander-in-chief of the army at Paris on the return of Napoleon from Elba. He was, however, unable to retain the loyalty of his troops, and retired to Ghent during the Hundred Days. In 1816 he married the princess Caroline Ferdinande Louise (1798- 1870), eldest daughter of King Francis I. of Naples. On the 13th of February 1820 he was mortally wounded, when leaving the opera-house at Paris with his wife, by a saddler named Louis Pierre Louvel. Seven months after his death the duchess gave birth to a son, who received the title of duke of Bordeaux,

but who is known in history as the comte de Chambord. A daughter, afterwards duchess of Parma, was born in 1819.

The duchess of Berry was compelled to follow Charles X. to Holyrood after July 1830, but it was with the resolution of returning speedily and making an attempt to secure the throne for her son. From England she went to Italy, and in April 1832 she landed near Marseilles, but, receiving no support, was com- pelled to make her way towards the loyal districts of Vendee and Brittany. Her followers, however, were defeated, and, after remaining concealed for five months in a house in Nantes, she was betrayed to the government and imprisoned in the castle of Blaye. Here she gave birth to a daughter, the fruit of a secret marriage contracted with an Italian nobleman, Count Ettore Lucchesi-Palli (1805-1864). The announcement of this marriage at once deprived the duchess of the sympathies of her supporters. She was no longer an object of fear to the French government, who released her in June 1833. She set sail for Sicily, and, joining her husband, lived in retirement from that time till her death, at Brunnensee in Switzerland, in April 1870.

BERRY, JOHN, Duke of (1340-1416), third son of John II., king of France and Bonne of Luxemburg, was born on the 30th of November

1340 at Vincennes. He was created count of Poitiers in 1356, and was made the king's lieutenant in southern France, though the real power rested chiefly with John of Armagnac, whose daughter Jeanne he married in 1360. The loss of his southern possessions by the treaty of Bretigny was compensated by the fiefs of Auvergne and Berry, with the rank of peer of France. The duke went to England in 1360 as a hostage for the fulfilment of the treaty of Bretigny, returning to France in 1367 on the pretext of collecting his ransom. He took no leading part in the war against the English, his energies being largely occupied with the satisfaction of his artistic and luxurious tastes. For this reason perhaps his brother Charles V. assigned him no share in the government during the minority of Charles VI. He received, however, the province of Languedoc. The peasant revolt of the Tuchins and Coquins, as the insurgents were called, was suppressed with great harshness, and the duke exacted from the states of Languedoc assembled at Lyons a fine of £15,000. He fought at Rosebeke in 1382 against the Flemings and helped to suppress the Parisian revolts. By a series of delays he caused the failure of the naval expedition prepared at Sluys against England in 1386, and a second accusation of military negligence led to disgrace of the royal princes and the temporary triumph of the marmousels, as the advisers of the late king were nicknamed. Charles VI. visited Languedoc in 1389- 1390, and enquired into his uncle's government. The duke was deprived of the government of Languedoc, and his agent, Betizac, was burnt. When in 1401 he was restored, he delegated his authority in the province, where he was still hated, to Bernard d'Armagnac. In 1396 he negotiated a truce with Richard II. of England, and his marriage with the princess Isabella of France. He tried to mediate between his brother Philip the Bold of Burgundy and his nephew Louis, duke of Orleans, and later between John " sans Peur " of Burgundy and Orleans. He broke with John after the murder of Orleans, though he tried to prevent civil war, and only finally joined the Armagnac party in 1410. In 1413 he resumed his role of mediator, and was for a short time tutor to the dauphin. He died in Paris on the 15th of June 1416, leaving vast treasures of jewelry, objects of art, and especially of illuminated MSS., many of which have been preserved. He decorated the Sainte Chapelle at Bourges; he built the Hotel de Nesle in Paris, and palaces at Poitiers, Bourges, Mehun-sur-Yevre and elsewhere.

See also L. Raynal, Histoire du Berry (Bourges, 1845); "Jean, due de Berry," in S. Luce, La France pendant la guerre de Cent Ans (1890), vol. i. ; Toulgoet-Treanna, in Mem. de la Soc. des antiquaires du centre, vol. xvii. (1890). His beautiful illuminated Livre d heures

was reproduced (Paris, fol. 1904) by P. Durrieu.

BERRY, or Berei, a former province of France, absorbed in 1790 in the departments of Cher, corresponding roughly with Haut-Berry, and Indre, representing Bas-Berry. George Sand, the most famous of " berrichon " writers, has described the quiet scenery and rural life of the province in the rustic novels of her

later life. Berry is the civitas or pagus Bituricensis of Gregory of Tours. The Bituriges were said by Livy (v. 34) to have been the dominating tribe in Gaul in the 7 th century, one of their kings, Ambigat, having ruled over all Gaul. In Caesar's time they were dependent on the Aedui. The tribes inhabiting the districts of Berry and Bourbonnais were distinguished as Bituriges Cubi. The numerous menhirs and dolmens to be found in the district, to which local superstitions still cling, are probably monuments of still earlier inhabitants. In 52 B.C. the Bituriges, at the order of Vercingetorix, set fire to their towns, but spared Bourges (Avaricum) their capital, which was taken and sacked by the Romans. The province was amalga- mated under Augustus with Aquitaine, and Bourges became the capital of Aquitania Prima. In 475 Berry came into the possession of the west Goths, from whom it was taken (c. 507) by Clovis. The first count of Berry, Chunibert (d. 763), was created by Waifer, duke of Aquitaine, from whom the county was wrested by Pippin the Short, who made it his residence and left it to his son Carloman, on whose death it fell to his brother Charlemagne. The countship of Berry was suppressed (926) by Rudolph, king of the Franks (fl. 923-936). Berry was for some time a group of lordships dependent directly on the crown, but the chief authority eventually passed to the viscounts of Bourges, who, while owning the royal suzerainty, preserved a certain independence until 1101, when the viscount Odo Arpin de Dun sold his fief to the crown. Berry was part of the dowry of Eleanor, wife of Louis VII., and on her divorce and remarriage with Henry II. of England it passed to the English king. Its posses- sion remained, however, a matter of dispute until 1200, when Berry reverted by treaty with John of England to Philip Augustus, and the various fiefs of Berry were given as a dowry to John's niece, Blanche of Castile, on her marriage with Philip's son Louis (afterwards Louis VIII.). Philip Augustus established an effective control over the administration of the province by the appointment of a royal bailli. Berry suffered during the Hundred Years' War, and more severely during the wars of religion in the 16th century. It had been made a duchy in 1360, and its first duke, John [Jean] (1340-1416), son of the French king John II., encouraged the arts and beautified the province with money wrung

from his government of Languedoc. Thence- forward it was held as an apanage of the French crown, usually by a member of the royal family closely related to the king. Charles of France (1447-1472), brother of Louis XL, was duke of Berry, but was deprived of this province, as subsequently of the duchies of Normandy and Guienne, for intrigues against his brother. The duchy was also governed by Jeanne de Valois (d. 1505), the repudiated wife of Louis XII. 1 ; by Marguerite d'Angouleme, afterwards queen of Navarre; by Marguerite de Valois, afterwards duchess of Savoy; and by Louise of Lorraine, widow of Henry III., after whose death (1601) the province was finally reabsorbed in the royal domain. The title of duke of Berry, divested of territorial significance, was held by princes of the royal house. Charles (1686-1 714), duke of Berry, grandson of Louis XIV., and third son of the dauphin Louis (d. 1711), married Marie Louise Elisabeth (1686-1714), eldest daughter of the duke of Orleans, whose intrigues made her notorious. The last to bear the title of duke of Berry was the ill-fated Charles Ferdinand, grandson and heir of Charles X.

BERRYER, ANTOINE PIERRE (1 790-1 868), French advocate and parliamentary orator, was the son of an eminent advocate and counsellor to the parlement. He was educated at the College de Juilly, on leaving which he adopted the profession of the law; he was admitted advocate in 1811, and in the same year he married. In the great conflict of the period between Napoleon I. and the Bourbons, Berryer, like his father, was an ardent Legitimist; and in the spring of 181 5, at the opening of the campaign of the Hundred Days, he followed Louis XVIII. to Ghent as a volunteer. After the second restoration he dis- tinguished himself as a courageous advocate of moderation in the treatment of the military adherents of the emperor. He

1 See R. le Maulde, Jeanne de France, duchesse d 'Orleans et de Berry (Paris, 1883).

assisted his father and Dupin in the unsuccessful defence of Marshal Ney before the chamber of peers; and he undertook alone the defence of General Cambronrifc and General Debelle, procuring the acquittal of the former and the pardon of the latter. By this time he had a very large business as advocate, and was engaged on behalf of journalists in many press prosecutions. He stood forward with a noble resolution

to maintain the freedom of the press, and severely censured the rigorous measures of the police department. In 1830, not long before the fall of Charles X., Berryer was elected a member of the chamber of deputies. He appeared there as the champion of the king and encouraged him in his reactionary policy. After the revolution of July, when the Legitimists withdrew in a body, Berryer alone retained his seat as deputy. He resisted, but unsuccessfully, the abolition of the hereditary peerage. He advocated trial by jury in press prosecutions, the extension of municipal fran- chises and other liberal measures. In May 1832 he hastened from Paris to see the duchess of Berry on her landing in the south of France for the purpose of organizing an insurrection in favour of her son, the duke of Bordeaux, since known as the Comte de Chambord. Berryer attempted to turn her from her purpose; and failing in this he set out for Switzerland. He was, however, arrested, imprisoned and brought to trial as one of the insurgents. He was immediately acquitted. In the following year he pleaded for the liberation of the duchess, made a memorable speech in defence of Chateaubriand, who was pro- secuted for his violent attacks on the government of Louis Philippe, and undertook the defence of several Legitimist journalists. Among the more noteworthy events of his subse- quent career were his defence of Louis Napoleon after the ridiculous affair of Boulogne, in 1840, and a visit to England in December 1843, for the purpose of formally acknowledging the pretender, the duke of Bordeaux, then living in London, as Henry V. and lawful king of France. Berryer was an active member of the National Assembly convoked after the revolution of February 1848, again visited the pretender, then at Wiesbaden, and still fought in the old cause. This long parliamentary career was closed by a courageous protest against the coup d'Slat of December 2, 1851. After a lapse of twelve years, however, he appeared once more in his forsaken field as a deputy to the Corps Legislatif. Berryer was elected member of the French Academy in 1854. A visit paid by this famous orator to Lord Brougham in 1865 was made the occasion of a banquet given in his honour by the benchers of the Temple and of Lincoln's Inn. In November 1868 he was removed by his own desire from Paris to his country seat at Augerville, and there he died on the 29th of the same month:

BERSERKER (from the " sark " or shirt of the " bear," or other animal-skins worn by them), in Scandinavian mythology, the name of the twelve sons of the hero Berserk, grandson of the eight-handed Starkadder and Alfhilde. Berserk was famed for the reckless fury with which he fought, always going into battle without armour. By the daughter of King Swafurlam, whom he had killed, he had the

twelve sons who were his equals in bravery. In Old Norse the term berserker thus became synonymous with reckless courage, and was later applied to the bodyguards of several of the Scandinavian heroes.

BERT, PAUL (1 833-1 886), French physiologist and politician, was born at Auxerre (Yonne) on the 17th of October 1833. He entered the Ecole Polytechnique at Paris with the intention of becoming an engineer; then changing his mind, he studied law; and finally, under the influence of the zoologist, L. P. Gratiolet (1815-1865), he took up physiology, becoming one of Claude Bernard's most brilliant pupils. After graduating at Paris as doctor of medicine in 1863, and doctor of science in 1866, he was appointed professor of physiology successively at Bordeaux (1866) and the Sorbonne (1869). After the revolu- tion of 1870 he began to take part in politics as a supporterof Gambetta. In 1874 he was elected to the Assembly, where he sat on the extreme left, and in 1876 to the chamber of deputies. He was one of the most determined enemies of clericalism, and an ardent advocate of " liberating national education from

religious sects, while rendering it accessible to every citizen." In 188 1 he was minister of education and worship in Gambetta's short-lived cabinet, and in the same year he created a great sensation by a lecture on modern Catholicism, delivered in a Paris theatre, in which he poured ridicule on the fables and follies of the chief religious tracts and handbooks that circulated especially in the south of France. Early in 1886 he was appointed resident-general in Annam and Tonkin, and died of dysentery at Hanoi on the nth of November of that year. But he was more distinguished as a man of science than as a politician or administrator. His classical work, La Pression barometrique (1878), embodies researches that gained him the biennial prize of 20,000 francs from the Academy of Sciences in 1875, and is a comprehensive investigation on the physiological effects of air-pressure, both above and below the normal. His earliest researches, which provided him with material for his two doctoral theses, were devoted to animal grafting and the vitality of animal tissues, and they were followed by studies on the physiolo- gical action of various poisons, on anaesthetics, on respiration and asphyxia, on the causes of the change of colour in the chameleon, &c. He was also interested in vegetable physiology, and in particular investigated the movements of the sensitive plant, and the influence of light of different colours on the life of vegetation. After about 1880 he produced several elementary text-books of scientific instruction, and also various publications on educational and allied subjects.

BERTANI, AGOSTINO (1812-1886), Italian revolutionist, was born at Milan on the 19th of October 181 2. He took part in the insurrection of 1848, though opposed to the fusion of Lombardy with Piedmont. During the Roman republic of 1849, he, as medical officer, organized the ambulance service, and, after the fall of Rome, withdrew to Genoa, where he worked with Sir James Hudson for the liberation of the political prisoners of Naples, but held aloof from the Mazzinian conspiracies. In 1859 he founded a revolutionary journal at Genoa, but, shortly afterwards, joined as surgeon the Garibaldian corps in the war of 1859. After Villafranca he became the organizer-in- chief of the expeditions to Sicily, remaining at Genoa after Garibaldi's departure for Marsala, and organizing four separate volunteer corps, two of which were intended for Sicily and two for the papal states. Cavour, however, obliged all to sail for Sicily. Upon the arrival of Garibaldi at Naples, Bertani was appointed secretary-general of the dictator, in which capacity he reorganized the police, abolished the secret service fund, founded twelve infant asylums, suppressed the duties upon Sicilian products, prepared for the suppression of the religious orders, and planned the sanitary reconstruction of the city. Entering parliament in 1861, he opposed the Garibaldian expedition, which ended at Aspromonte, but nevertheless tended Garibaldi's wound with affectionate devotion. In 1866 he organized the medical service for the 40,000 Garibaldians, and in 1867 fought at Mentana. His parliamentary career, though marked by zeal, was less brilliant than his revolutionary activity. Up to 1870 he remained an agitator, but, after the liberation of Rome, seceded from the historic left, and became leader of the extreme left, a position held until his death on the 30th of April 1886. His chief work as deputy was an inquiry into the sanitary conditions of the peasantry, and the preparation of the sanitary code adopted by the Crispi administration. (H. W. S.)

BERTAT (Arab. Jebalain), negroes of the Shangalla group of tribes, mainly agriculturists. They occupy the valleys of the Yabus and Tuma t, tributaries of the Blue Nile. They are shortish and very black, with projecting jaws, broad noses and thick lips. By both sexes the hair is worn short or the head shaved; on cheeks and temple are tribal marks in the form of scars. The huts of the Bertat are circular, the floor raised on short poles. Their weapons are the spear, throwing-club, sword and dagger, and also the kulbeda or thro wing-knife. Blocks of salt are the favourite form of currency. Gold washing is practised. Nature worship still struggles against the spread of Mahommedanism. The Bertat, estimated to number some 80,000, c. 1880, were

nearly exterminated during the period of Dervish ascendancy (1884-1898) in the eastern Sudan. Settled among them are Arab communities governed by their own sheiks, while the meks or rulers of the Bertat speak Arabic, and show traces of foreign blood. (See Fazogli.)

See Koeltlitz, " The Bertat," Journal 0} the Anthropological Institute, xxxiii. 51 ; Anglo-Egyptian Sudan, edited by Count Gleichen (London, I9°5)-

BERTAUT, JEAN (1552-1611), French poet, was born at Caen in 1552. He figures with Desportes in the disdainful couplet of Boileau on Ronsard: —

" Ce poete orgueilleux, trebuche de si haut, Rendit plus retenus Desportes et Bertaut." He wrote light verse to celebrate the incidents of court life in the manner of Desportes, but his verse is more fantastic and fuller of conceits than his master's. He early entered the church, and had a share in the conversion of Henry IV., a circumstance which assured his career. He was successively councillor of the parlement of Grenoble, secretary to the king, almoner to Marie de' Medici, abbot of Aulnay and finally, in 1606, bishop of Sees. After his elevation to the bishopric he ceased to produce the light verse in which he excelled, though his scruples did not prevent him. from preparing a new edition of his Recueil de quelqu.es vers amoureux (1602) in 1606. The serious poems in which he celebrated the public events of his later years are dull and lifeless. Bertaut died at Sees on the 8th of June 1611. His works were edited by M. Ad. Chenevieres in 1891.

BERTH, originally a nautical term, probably connected with the verb " to bear," first found in literature at the end of the 16th century, with the alternative spelling " birth." Its primary meaning is " sea-room," whether on the high seas or at anchor. Hence the phrase " to give a wide berth to," meaning " to keep at a safe distance from," both in its literal and its metaphorical use. From meaning sea-room for a ship at anchor, " berth " comes to mean also the position of a ship at her moor- ings (" to berth a ship "). The word further means any place on a ship allotted for a special purpose, where the men mess or sleep, or an office or appointment on board, whence the word has passed into colloquial use with the meaning of a situation

or employment. From the Icelandic byrdi, a board, is also derived the ship-building term " berth," meaning to board, put up bulk-heads, etc.

BERTHELOT, MARCELLIN PIERRE EUGENE (1827-1907), French chemist and politician, was born at Paris on the 29th of October 1S27, being the son of a doctor. After distinguishing himself at school in history and philosophy, he turned to the study of science. In 1851 he became a member of the staff of the College de France as assistant to A. J. Balard, his former master, and about the same time he began his life-long friendship with Ernest Renan. In 1854 he made his reputation by his doctoral thesis, Sur les combinaisons de la glycerine avec les acides, which described a series of beautiful researches in continuation and amplification of M. E. Chevreul's classical work. In 1859 he was appointed professor of organic chemistry at the Ecole Superieure de Pharmacie, and in 1865 he accepted the new chair of organic chemistry, which was specially created for his benefit at the College de France. He became a member of the Academy of Medicine in 1863, and ten years afterwards entered the Academy of Sciences, of which he became perpetual secretary in 1889 in succession to Louis Pasteur. He was appointed inspector general of higher education in 1876, and after his election as life senator in 1881 he continued to take an active interest in educational questions, especially as affected by compulsory military service. In the Goblet ministry of 1886-1887 he was minister of public instruction, and in the Bourgeois cabinet of 1895-1896 he held the portfolio for foreign affairs. His scientific jubilee was celebrated in Paris in 1 901. He died suddenly, immediately after the death of his wife, on thei8th of March 1907, at Paris, and with her was buried in the Pantheon.

The fundamental conception that underlay all Berthelot's chemical work was that all chemical phenomena depend on the action of physical forces which can be determined and measured. When he began his active career it was generally believed

that, although some instances of the synthetical production of organic substances had been observed, on the whole organic chemistry must remain an analytical science and could not become a constructive one, because the formation of the sub- stances with which it deals required the intervention of vital activity in some shape. To this attitude he offered uncompro- mising opposition, and by the synthetical production of numerous hydrocarbons, natural fats, sugars and other bodies he proved that organic compounds can be formed by ordinary methods of chemical manipulation and obey

the same laws as inorganic substances, thus exhibiting the " creative character in virtue of which chemistry actually realizes the abstract conceptions of its theories and classifications — a prerogative so far possessed neither by the natural nor by the historical sciences." His investigations on the synthesis of organic compounds were published in numerous papers and books, including Chimie organique fondee sur la synthese (1S60) and Les Carbures d'hydro- gene (1901). Again he held that chemical phenomena are not governed by any peculiar laws special to themselves, but are explicable in terms of the general laws of mechanics that are in operation throughout the universe; and this view he developed, with the aid of thousands of experiments, in his Mecanique chimique (1878) and his Thermochimie (1897). This branch of study naturally conducted him to the investigation of explo- sives, and on the theoretical side led to the results published in his work Sur la force de la poudre et des matieres explosives (1872), while on the practical side it enabled him to render important services to his country as president of the scientific defence committee during the siege of Paris in 1870-71 and subse- quently as chief of the French explosives committee. In the later years of his life he turned to the study of the earlier phases of the science which he did so much to advance, and students of chemical history are greatly indebted to him for his book on Les Origines de Valchimie (1885) and his Introduction a I'etude de la chimie des anciens et du moyen dge (1889), as well as for publishing translations of various old Greek, Syriac and Arabic treatises on alchemy and chemistry {Collection des anciens alchimistes grccs, 1887-1888, and La Chimie au moyen dge, 1893). He was also the author of Science et phi.losoph.ie (1886), which contains a well-known letter to Renan on "La Science ideale et la science positive," of La involution chimique, Lavoisier (1890), of Science et morale (1897), and of numerous articles in La Grande Encyclopedic, which he helped to establish.

BERTHIER, LOUIS ALEXANDRE, prince of Neuchatel (I 7S3 _1 8i5), marshal of France and chief of the staff under Napoleon I., was born at Versailles on the 20th of February 1753. As a boy he was instructed in the military art by his father, an officer of the Corps de genie, and at the age of seventeen he entered the army, serving successively in the staff, the engineers and the prince de Lambesq's dragoons. In 1780 he went to North America with Rochambeau, and on his return, having attained the rank of colonel, he was employed in various staff posts and in a military mission to Prussia. During the Revolution, as chief of staff of the Versailles national guard, he protected the aunts of Louis XVI. from popular violence, and aided

their escape (1791). In the war of 1792 he was at once made chief of staff to Marshal Liickner, and he bore a distinguished part in the Argonne campaign of Dumouriez and Kellermann. He served with great credit in the Vendean War of i793~9S) and was in the next year made a general of division and' chief of staff {Major-General) to the army of Italy, which Bonaparte had recently been appointed to command. His power of work, accuracy and quick comprehension, combined with his long and varied experience and his complete mastery of detail, made him the ideal chief of staff to a great soldier; and in this capacity he was Napoleon's most valued assistant for the rest of his career. He accompanied Napoleon throughout the brilliant campaign of 1796, and was left in charge of the army after the peace of Campo Formic In this post he organized the Roman republic (1798), after which he joined his chief in Egypt, serving there until Napoleon's return. He assisted in the coup d'Stat of 18th Brumaire, afterwards becoming minister of war for

a time. In the campaign of Marengo he was the nominal head of the Army of Reserve, but the first consul accompanied the army and Berthier acted in reality, as always, as chief of staff to Napoleon. At the close of the campaign he was employed in civil and diplomatic business. When Napoleon became emperor, Berthier was" at once made a marshal of the empire. He took part in the campaigns of Austerlitz, Jena and Friedland, and was created duke of Valengin in 1806, sovereign prince of Neuchatel in the same year and vice-constable of the empire in 1807. In 1808 he served in the Peninsula, and in 1809 in the Austrian War, after which he was given the title of prince of Wagram. Berthier married a niece of the king of Bavaria. He was with Napoleon in Russia in 1 8 1 2 , Germany in 1 8 1 3 , and France in 1 8 1 4, fulfilling, till the fall of the empire, the functions of " major-general " of the Grande Annie. He abandoned Napoleon to make his peace with Louis XVIII. in 1814, and accompanied the king in his solemn entry into Paris. During Napoleon's captivity in Elba, Berthier, whom he informed of his projects, was much perplexed as to his future course, and, being unwilling to commit himself, fell under the suspicion both of his old leader and of Louis XVIII. On Napoleon's return he withdrew to Bamberg, where he died on the 1st of June 1815. The manner of his death is uncertain; according to some accounts he was assassinated by members of a secret society, others say that, maddened by the sight of Russian troops marching to invade France, he threw himself

from his window and was killed. Berthier was not a great commander. When he was in temporary command in 1809 the French army in Bavaria underwent a series of reverses. Whatever merit as a general he may have possessed was completely overshadowed by the genius of his master. But his title to fame is that he understood and carried out that master's directions to the minutest detail.

' . BERTHOLLET, CLAUDE LOUIS (1748-1822), French chemist, was born at Talloire, near Annecy in Savoy, on the 9th of December 1748. He studied first at Chambery and afterwards at Turin, where he graduated in medicine. Settling in Paris in 1772, he became the private physician of Philip, duke of Orleans, and by his chemical work soon gained so high a reputation that in 1780 he was admitted into the Academy of Sciences. In 1785 he declared himself an adherent of the Lavoisierian school, though he did not accept Lavoisier's view of oxygen as the only and universal acidifying principle, and he took part in the reform in chemical nomenclature carried out by Lavoisier and his associates in 1787. Among the substances cf which he investigated the composition were ammonia, sulphuretted hydrogen and prussic acid, and his experiments on chlorine, which he regarded, not as an element, but as oxygenated muriatic (oxymuriatic) acid, led him to propose it as a bleaching agent in 1785. He also prepared potassium chlorate and attempted to use it in the manufacture of gunpowder as a substitute for saltpetre. When, at the beginning of the French Revolution, the deficiency in the supply of saltpetre became a serious matter, he was placed at the head of the commission entrusted with the development of its production in French territory, and another commission on which he served had for its object the improve- ment of the methods of iron manufacture. He was also a member in 1794 of the committee on agriculture and the arts, and technical science was further indebted to him for a systematic exposition of the principles of dyeing — Elimens de Part de la leinture, 1791, of which he published a second edition in 1809, in association with his son, A. B. Berthollet (1783-1811). After 1794 he was teacher of chemistry in the polytechnic and normal schools of Paris, and in 1795 he took an active part in remodelling the Academy as the Institut National. In the following year he and Gaspard Monge were chosen chiefs of a commission charged with the task of selecting in Italy the choicest specimens of ancient and modern art for the national galleries of Paris; and in 1798 he was one of the band of scientific men who accompanied Napoleon to Egypt, there forming themselves into the Institute of Egypt on the plan of the Institut National. On the fall of

the Directory he was made a senator and grand officer of the Legion of Honour; under the empire he became a count; and after the

restoration of the Bourbons he took his seat as a peer. In the later years of his life he had at Arcueil, where he died on the 6th of November 1822, a well-equipped laboratory, which became a centre frequented by some of the most distinguished scientific men of the time, their proceedings being published in three volumes, between 1807 and 1817, as the Mimoires de la societi d' Arcueil. Berthollet 's most remarkable contribution to chemistry was his Essai de slalique chimique (1803), the first systematic attempt to grapple with the problems of chemical physics. His doctrines did not meet with general approval among his contemporaries, partly perhaps because he pushed them too far, as for instance in holding that two elements might combine in constantly varying proportions, a view which gave rise to a long dispute with L. J. Proust; but his speculations, in particular his insistence on the influence of the relative masses of the acting substances in chemical reactions, have exercised a dominating influence on the modern developments of the theory of chemical affinity, of which, far more than T. O. Bergman, whom he controverted, he must be regarded as the founder.

BERTHON, EDWARD LYON (1813-1899), English inventor, was born in London, on the 20th of February 1813, the son of an army contractor and descendant of an old Huguenot family. He studied for the medical profession in Liverpool and at Dublin, but after his marriage in 1834 he gave up his intention of becoming a doctor, and travelled for about six years on the con- tinent. Keenly interested from boyhood in mechanical science, he made experiments in the application of the screw propeller for boats. But his model, with a two-bladed propeller, was only ridiculed when it was placed before the British admiralty. Berthon therefore did not complete the patent and the idea was left for Francis Smith to bring out more successfully in 1838. In 1 84 1 he entered Magdalene College, Cambridge, in order to study for the Church, There he produced what is usually known as " Berthon's log," in which the suction produced by the water streaming past the end of a pipe projected below a ship is registered on a mercury column above. In 1845 he was ordained, and after holding a curacy at Lymington was given a living at Fareham. Here he was able to carry on experiments with his log, which was tested on the Southampton to Jersey steamboats; but the British admiralty gave him no encouragement, and it remained uncom- pleted. He next designed some instruments to indicate the trim and rolling of boats at sea; but the idea for which he is chiefly remembered was that of the " Berthon Folding Boat " in 1849. This

invention was again adversely reported on by the admiralty. Berthon resigned his living at Fareham, and subsequently accepted the living of Romsey. In 1873, encouraged by Samuel Plimsoll, he again applied himself to perfecting his collapsible boat. Success was at last achieved, and in less than a year he had received orders from the admiralty for boats to the amount of £15,000. Some were taken by Sir George Nares to the Arctic, others were sent to General Gordon at Khartum, and others again were taken to the Zambezi by F. C. Selous. Berthon died on the 27th of October 1899.

BERTHOUD, FERDINAND (1727-1807), Swiss chronometer- maker, was born at Plancemont, Neuchatel, in 1727, and settling in Paris in 1745 gained a great reputation for the excellence and accuracy of his chronometers. He was a member of the Institute and a fellow of the Royal Society of London, and among other works wrote Essais sur I'horlogerie (1763). He died in 1807 at Montmorency, Seine et Oise. He was succeeded in business by his nephew, Louis Berthoud (1759-1813).

BERTILLON, LOUIS ADOLPHE (1821-1883), French statis- tician, was born in Paris on the 1st of April 182 1. Entering the medical profession, he practised as a doctor for a number of years. After the revolution of 1870, he was appointed in- spector-general of benevolent institutions. He was one of the founders of the school of anthropology of Paris, and was appointed a professor there in 1876. His Dimographie figuree de la France (1874) is an able statistical study of the population of France. He died at Neuilly on the 28th of February 1883.

His son Alphonse Bertillon, the anthropometrist, was born in Paris in 1853. He published in 1883 a work Ethnographic

moderne des races sauvages, but his chief claim to distinction lies in the system invented by him for the identification of criminals, which is described by him in his Photographie judiciaire, Paris, 1890 (see Anthropometry). He was officially appointed in 1894 to report on the handwriting of the bordereau in the Dreyfus case, and was a witness for the prosecution before the cour de cassation on the 18th of January 1899.

BERTIN, a family of distinction in the history of French journalism.

The most important member of the family, generally regarded as the father of modern French journalism, Louis Francois Bertin (1766-1841), known as Bertin atni, was born in Paris on the 14th of December 1766. He began his journalistic career by writing for the Journal Francois and other papers during the French Revolution. After the 18th Brumaire he founded the paper, with which the name of his family has chiefly been connected, the Journal des Debats. He was suspected of royalist tendencies by the consulate and was exiled in 1801. He returned to Paris in 1804 and resumed the management of the paper, the title of which had been changed by order of Napoleon to that of Journal de I' Empire. Bertin had to submit to a rigorous censorship, and in 1811 the conduct, together with the profits, was taken over entirely by the government. In 1814 he regained possession and restored the old title and continued his support of the royalist cause — during the Hundred Days; he directed the Monileur de Cand — till 1823, when the Journal des Debats became the recognized organ of the constitutional opposition. Berlin's support was, however, given to the July monarchy after 1830. He died on the 13th of September 1841. Louis Francois Bertin de.Vaux (1771-1842), the younger brother of Bertin aine, took a leading part in the conduct of the Journal des Debats, to the success of which his powers of writing greatly contributed. He entered the chamber of deputies in 1815, was made councillor of state in 1827, and a peer of France in 1830. The two sons of Bertin aine, Edouard Francois (1797-1871) and Louis Marie Francois (1801-1854), were directors in succession of the Journal des Dibats. Edouard Bertin was also a painter of some distinction.

BERTINORO, OBADIAH, Jewish commentator of the Mishnah, died in Jerusalem about 1500. Bertinoro much improved the status of the Jews in the Holy Land; before his migration thither the Jews of Palestine were in a miserable condition of poverty and persecution. His commentary on the Mishnah is the most useful of all helps to the understanding of that work. It is printed in most Hebrew editions of the Mishnah. Surenhusius, in his Latin edition of the last-named code (Am- sterdam 1698-1703), translated Bertinoro's commentary.

BERTINORO, a town and episcopal see of Emilia, Italy, in the province of Forli, 8 m. S.E. direct of Forli and 5! m. N. of the station of Forlimpopoli, and 800 ft. above sea-level. Pop. (1901) town, 3753; commune, 7786. The town commands a fine view to the north over the plain of Emilia and the lower course of the Po, itself lying on the foothills of the Apennines. It appears to have been first fortified by Frederick Barbarossa, and its castle stood frequent sieges in the middle ages. Polenta, i\ m. to the south of it, was the

birthplace of Francesca da Rimini. The castle is almost entirely ruined, but the church of S. Donato, of the Lombard period, with Byzantine capitals, is interesting; Giosue Carducci has written a fine ode on the subject {La Chiesa di Polenta, Bologna, 1897).

SeeC. Ricci, " Delia Chiesa ecastellodi Polenta " in A tti e Memorie ■iella Deputazione di Storia patria per le prooniae di Romagna, ser. iii. vol. ix. (Bologna, 1891), I seq. (T. As.)

BERTOLD (1442-1504), elector and archbishop of Mainz, son of George, count of Henneberg, entered the ecclesiastical profession, and after passing through its lower stages, was made archbishop of Mainz in 1484. He appears to have been a firm supporter of law and order, an enemy of clerical abuses and a careful administrator of his diocese. Immediately after his elec- tion as archbishop he began to take a leading part in the business of the Empire, and in i486 was very active in securing the election of Maximilian as Roman king. His chief work, however, was done as an advocate of administrative reform in Germany.

During the reign of the emperor Frederick III. he had brought this question before the diet, and after Frederick's death, when he had become imperial chancellor, he was the leader of the party which pressed the necessity for reform upon Maximilian at the diet of Worms in 1495. His" proposals came to nothing, but he continued the struggle at a series of diets, and urged the Germans to emulate the courage and union of the Swiss cantons. He gained a temporary victory when the diet of Augsburg in 1500 established a council of regency {Reichsregiment) , and in 1502 persuaded the electors to form a union to uphold the reforms of 1495 and 1500. The elector died on the 21st of December 1504. Bertold was a man of great ability and resourcefulness, and as a statesman who strove for an ordered and united Germany was far in advance of his age.

See J. Weiss, Berthold von Henneberg, Erzbischof von Mainz (Freiburg, 1889).

BERTOLD VON REGENSBURG (c. 1220-1272), the greatest German preacher of the later middle ages, was a native of Regensburg, and entered the Franciscan monastery there. From about 1250 onwards his fame as a preacher spread over all the German-speaking parts of the continent of Europe. He wandered from village to village and town to town, preaching to enormous audiences, always in the open air; the earnestness and straight- forward eloquence with which he insisted that true repentance came from the heart, that pious

pilgrimages and the absolution of the Church were mere outward symbols, appealed to all classes. He died in Regensburg on the 13th of December 1272. His German sermons, of which seventy-one have been preserved, are among the most powerful in the language, and form the chief monuments of Middle High German prose. His style is clear, direct and remarkably free from cumbrous Latin constructions; he employed, whenever he could, the pithy and homely sayings of the peasants, and is not reluctant to point his moral with a rough humour. As a thinker, he shows little sympathy with that strain of medieval mysticism which is to be observed in all the poetry of his contemporaries.

The best edition of Bertold's German sermons is that by F. Pfeiffer and J. Strobl (2 vols., 1862-1880; reprinted, 1906); there is also a modern German version by F. Gobel (4th ed., 1906). The Latin sermons were edited by G Jakob (1 880) . See C. W. Stromberger, Bertold von Regensburg, der grosste Volksredner des deutschen Mitlelalters (1877), K. Unkel, Bertold von Regensburg (1882), and E. Bernhardt, Bruder Bertold von Regensburg (1905) ; A. E. Schonbach, Studien zur Geschickte der altdeutschen Predigt {Publications of the Vienna Academy, 1906).

BERTRAM, CHARLES (1723-1765), English literary impostor, was born in London, the son of a silk dyer. In 1747, being then teacher of English at the school for Danish naval cadets at Copen- hagen, he wrote to Dr William Stukeley, the English antiquarian, that he had discovered a manuscript written by a monk named Richard of Westminster, which corrected and supplemented the Itinerary of Antoninus in Britain. He subsequently sent to Stukeley a copy of various parts of the work and a facsimile of a few lines of the manuscript. These were so cleverly executed that they quite deceived the English palaeographers of the period. Stukeley, finding that a chronicler of the fourteenth century, Richard of Cirencester, had also been an inmate of Westminster Abbey, identified him with Bertram's Richard of Westminster, and, in 1756, read an analysis of the "discovery" before the Society of Antiquaries, which was published with a copy of Richard's map. In 1757 Bertram published at Copenhagen a volume entitled Britannicarum Gentium Historiae Antiquae Scriptores Tres. This contained the works of Gildas and Nennius and the full text of Bertram's forgery, and though Bertram's map did not correspond with that of Richard, Stukeley discarded the latter and adopted Bertram's concoction in his Itinerarium Curiosum published in 1776. Although Thomas Reynolds in his Iter Britanniarum (1799), an edition of the British portion of Antoninus' Itinerary, was distinctly sceptical as to the value of Bertram's

manuscript, its authenticity was generally accepted until the middle of the 19th century. No original of the manu- script could then be found at Copenhagen, and B. B. Woodward, librarian of Windsor Castle, proved conclusively, by a series of articles in the Gentleman's Magazine in 1866 and 1867, that

the supposed facsimile of calligraphy produced by Bertram was a blend of the style of various periods, while the greater portion of the idiomatic Latin in the book was a mere translation of i8th century English phraseology. Nevertheless, as late as 1872, a translation of Bertram's forgery was included in Bohn's Antiquarian Library as one of the Six English Chronicles, and there is no doubt that the work had a wide and mislead- ing influence upon many antiquarian writers. Bertram died in 1765.

BERTRAND, HENRI GRATIEN, Comte (1773-1S44), French general, was born at Chateauroux. At the outbreak of the Revolution, he had just finished his studies, and he entered the army as a volunteer. During the expedition to Egypt, Napoleon named him colonel (1798), then brigadier-general, and after Austerlitz his aide-de-camp. His life was henceforth closely bound up with that of Napoleon, who had the fullest confidence in him, honouring him in 18 13 with the title of grand marshal of the court. It was Bertrand who in 1809 directed the building of the bridges by which the French army crossed the Danube at Wagram. In 1813, after the battle of Leipzig, it was due to his initiative that the French army was not totally destroyed. He accompanied Napoleon to Elba in 1814, returned with him in 181 5, held a command in the Waterloo campaign, and then, after the defeat, accompanied Napoleon to St Helena. He did not return to France until after Napoleon's death, and then Louis XVIII. allowed him to retain his rank, and he was elected deputy in 1830. In 1840 he was chosen to go to bring Napoleon's remains to France. He died at Chateauroux on the 31st of January 1844. His touching fidelity has made his name very popular in France.

BERTRICH, a village and watering place of Germany, in the Prussian Rhine province, in a narrow valley running down to the Mosel near Cochem. Its waters are efficacious in cases of gout, rheumatism and biliary affections. Pop. 500.

BiRULLE, PIERRE DE (1575-1629), French cardinal and statesman,

was born at Serilly, near Troves, on the 4th of February 1575. He was educated by the Jesuits and at the university of Paris. Soon after his ordination in 1599, he assisted Cardinal Duperron in his controversy with the Protestant Philippe de Mornay, and made numerous converts. He founded the Congregation of the French Oratory in 161 1 and introduced the Carmelite nuns into France, notwithstanding the opposition of the friars of that order, who were jealous of his ascendancy. Berulle also played an important part as a statesman. He obtained the necessary dispensations from Rome for Henrietta Maria's marriage to Charles L, and acted as her chaplain during the first year of her stay in England. In 1626, as French ambassador to Spain, he concluded the treaty of Monzon. After the reconciliation of Louis XIII. with his mother, Marie de' Medici, through his agency, he was appointed a councillor of state, but had to resign this office, owing to his Austrian policy, which was opposed by Richelieu. Berulle encouraged Descartes' philosophical studies, and it was through him that the Samaritan Pentateuch, recently brought over from Con- stantinople, was inserted in Lejay's Polyglot Bible. His treatise, Des Grandeurs de Jesus, was a favourite book with the Jansenists. He died on the 2nd of October 1629. His works, edited by P. Bourgoing (2 vols., 1644) were reprinted, by Migne in 1857.

See M. de Berulle el les Carmelites; Le Pere de Berulle et Voratoire de Jesus; Le Cardinal de Berulle et Richelieu (3 vols., 1872-1876), by the Abbe M. Houssaye; and H. Sidney Lear's Priestly Life in France in the Seventeenth Century (London, 1873).

BERVIE, or Inverbervie, a royal and police burgh of Kin-cardineshire, Scotland. Pop. (1901) 1207. It is situated at the mouth of Bervie Water and is the terminus of the North British railway's branch line from Montrose, which lies 14 m. S.W. The leading industries include manufactures of woollens, flax and chemicals, and there is also a brisk trade in live-stock. Bervie unites with Arbroath, Brechin, Forfar and Montrose in returning one member (for the " Montrose burghs ") to parlia- ment. David II., driven by stress of weather, landed here with his queen Joanna in 1341, and, out of gratitude for the hospitality

of the townsfolk, granted them a charter, which James VI. con-firmed. Hallgreen Castle, a stronghold of the 14th century, is maintained in repair. About one m. south is the fishing village of Gourdon (pop. 1197), where boat-building is carried "on. There is a small but steady export business from the harbour, which has a pier and breakwater. St Ternan's, the Romanesque parish church of

Arbuthnott, 25 m. north-west, stands on the banks of the Bervie. In the chapel dedicated to St Mary, which was afterwards added to it, is the burial-place of the Arbuthnotts, who took their title from the estate in 1644. John Arbuthnot, Queen Anne's physician and the friend of Swift and Pope, was a native of the parish. Kinneff, 2 m. north, on the coast, is of interest as the place where the Scottish regalia were concealed during the siege of Dunottar Castle.

BERWICK, JAMES FITZJAMES, Duke of (i 670-1 734), marshal of France, was the natural son of James, duke of York, afterwards James II. of England, by Arabella Churchill (1648- 1730), sister of the great duke of Marlborough. He was born at Moulins (Bourbonnais) on the 21st of August 1670. He received his education in France at the hands of the Jesuits, and at the age of fifteen, his father having succeeded to the throne, he was sent to learn the business of a soldier under the famous general of the empire, Charles of Lorraine. He served his first campaign in Hungary, and was present at the siege of Buda. He then returned to England, was made a colonel of the 8th Foot, and in 1687 created duke of Berwick, earl of Teignmouth and Baron Bosworth. He then went out afresh to Hungary and was present at the battle of Mohacz. On his return to England he was made K.G., colonel of the 3rd troop of horse guards (Royal Horse Guards Blue) and governor of Portsmouth, but soon afterwards the revolution forced him to flee to France. He served under James II. in the campaign in Ireland, and was present at the battle of the Boyne. For a short time he was left in Ireland as commander-in-chief, but his youth and inexperience unfitted him for the post, and he was a mere puppet in stronger hands. He then took service in the French army, fought under Marshal Luxembourg in Flanders, and took part in the battles of Steinkirk and Neerwinden, at the latter of which he was taken prisoner. He was, however, immediately exchanged for the duke of Ormond, and afterwards he served under Villeroi. In 1695 he married the widow of Patrick Sarsfield, who died in 1698. His second marriage, with Anne Bulkeley, took place in 1700. As a lieutenant-general he served in the campaign of 1702, after which he became naturalized as a French subject in order to be eligible for the marshalate. In 1704, he first took command of the French army in Spain. So highly was he now esteemed for his courage, abilities and integrity, that all parties were anxious to have him on their side {Eloge, by Montesquieu). His tenure of the command was, however, very short, and after one campaign he was replaced by the Marshal de Tesse. In 1 705 he commanded against the Camisards in Languedoc, and when on this expedition he is said to have carried out his orders with remorseless

*rigour. His successful expedition against Nice in 1 706 caused him to be made marshal of France, and in the same year he returned to Spain as com- mander-in-chief of the Franco-Spanish armies. On the 25th of April 1707, the duke won the great and decisive victory of Almanza, where an Englishman at the head of a French army defeated Ruvigny, earl of Galway, a Frenchman at the head of an English army. The victory established Philip V. on the throne of Spain. Berwick was made a peer of France by Louis * XIV., and duke of Liria and of Xereca and lieutenant of Aragon by Philip. Thenceforward Berwick was recognized as one of the greatest generals of his time, and successively commanded in nearly all the theatres of war. From 1709 to 171 2 he defended the south-east frontier of France in a series of campaigns which, unmarked by any decisive battle, were yet models of the art of war as practised at the time. The last great event of the War of the Spanish Succession was the storming of Barcelona by Berwick, after a long siege, on the nth of September 17 14. Three years later he was appointed military governor of the province of Guienne, in which post he became intimate with*

Montesquieu. In 17 18 he found himself under the necessity of once more entering Spain with an army; and this time he had to fight against Philip V., the king who owed chiefly to Berwick's courage and skill the safety of his throne. One of the marshal's sons, known as the duke of Liria, was settled in Spain, and was counselled by his father not to shrink from doing his duty and fighting for his sovereign. Many years of peace followed this campaign, and Marshal Berwick was not again called to serve in the field till 1733. He advised and con- ducted the siege of Philipsburg, and while the siege was going on was killed by a cannon-shot on the 12th of June 1734. Cool, self-possessed and cautious as a general, Marshal Berwick was at the same time not wanting in audacity and swiftness of action. He was a true general of the 18th century, not less in his care for the lives of his men than in his punctiliousness and rigidity in matters of discipline.

The Mcmoires of Marshal Berwick, revised, annotated and con- tinued by the Abbe Hooke, were published by the marshal's grand- son in 1778. Montesquieu made many contributions to this.

BERWICKSHIRE, a county of Scotland, forming its south- eastern

extremity, bounded N. by Haddingtonshire and the North Sea; E. by the North Sea; S.E. by the county of the borough and town of Berwick; S. by the Tweed and Roxburgh- shire, and W. by Mid-Lothian. Its area is 292,577 acres or 457 sq. m., and it has a coast-line of 21m. The county is naturally divided into three districts: Lauderdale, or the valley of the Leader, in the W.; Lammermuir, the upland district occupied by the hills of that name in the N.; and the Merse (the March or Borderland, giving a title to the earls of Wemyss), the largest district, occupying the S.E. The Lammermuirs are a range of round-backed hills, whose average height is about 1000 ft., while the highest summit, Says Law, reaches 1749 ft. From these hills the Merse stretches to the S. and E., and is a comparatively level tract of country. The coast is lofty, rocky and precipitous, broken by ravines and not accessible, except at Eyemouth Harbour, for small vessels, and at Coldingham and Burnmouth for fishing boats. St Abb's Head, a promontory with a lighthouse upon it, rises to 310 ft. The Eye is the only river of any size which falls directly into the sea. The others — the Leader, the Eden, the Leet and the Whiteadder with its tributaries, the Blackadder and the Dye — all flow into the Tweed. Of these the largest and most important is the Whiteadder, which has its source in the parish of Whittingehame on the East Lothian side of the Lammermuirs, and, following a sinuous course of 35 m., joins the Tweed within the bounds or liberties of Berwick. There are small lochs at Coldingham, Legerwood, Spottiswoode, the Hirsel, near Coldstream, Hule Moss on Greenlaw Moor, and tiny sheets of water near Duns and Mersington.

Geology. — The north portion of the county embraces that part of the Silurian tableland of the south of Scotland which stretches from the Lammermuir Hills east to St Abb's Head. The strata consist mainly of grits, greywackes, flags and shales, repeated by innumerable folds, trending north-east and south-west, which are laid bare in the great cliff section between Fast Castle and St Abb's Head. This section of the tableland includes sediments, chiefly of Tarannon age, which form a belt 10 m. across from the crest of the Lammermuir Hills to a point near Wcstruther and Longformacus. In the Earnscleuch Burn north-east of Lauder representatives of Llandovery, Caradoc and Llandeilo rocks, together with the Arenig cherts, appear along an anticlinal fold in the midst of the younger strata. Again in the extreme north- west of the county near Channelkirk and to the north of the Tarannon belt radiolarian cherts and black shales with graptolites of Upper Llandeilo and Caradoc age are met with. The Lower Old Red Sandstone rocks, which rest

unconformably on the folded and denuded Silurian strata, appear at Eyemouth and Reston Junction, and at St Abb's Head are associated with contemporaneous volcanic rocks which are evidently on the same horizon as the interbedded lavas of Lower Old Red age in the Cheviots. The intrusive igneous materials of this period are represented by the granitic mass of Cockburn Law and the porphyrites of the Dirrington Laws. The Upper Old Red Sand-

stone, consisting of conglomerates and sandstones, rest unconformably alike on .the Silurian platform as at Siccar Point and on the lower division of that system. The age of these beds has been determined by the occurrence of remains of H oloptychius nobilissimus in the sandstones at Earlston and in the Whiteadder north of Duns. On the Black Hill of Earlston these strata are traversed by a sheet of trachyte resembling the type of reck capping the Eildon Hills (see Roxburghshire: Geology). Overlying the strata just described there is a succession of volcanic rocks extending from Greenlaw southwards by Stichil and Kelso to Carham, which, at several localities, are followed by a band of cornstone resembling that near the top of the Upper Old Red Sandstone in the midland valley of Scotland. Next in order comes a great development of the Cementstone group of the Carboniferous system which spreads over nearly the whole of the low ground of the Merse and attains a great thickness. At Marshall Meadows north of Berwick-on-Tweed, thin bands of marine limestone occur, which probably represent some of the calcareous beds above the Fell sandstones south of Spittal.

Climate and Agriculture.— Owing to the maritime position, the winter is seldom severe in the lowland districts, but spring is a trying season on account of the east winds, which often last into summer. The mean annual rainfall is 30! in. and the average temperature for the year is 47° F., for January 37° F., and for July 58-5° F. The climate is excellent as regards both the health of the inhabitants and the growth of vegetation. The soils vary, sometimes even on the same farm. Along the rivers is a deep rich loam, resting on gravel or clay, chiefly the former. The less valuable clay soil of the Merse has been much improved by drainage. The more sandy and gravelly soils are suitable for turnips, of which great quantities are grown. Oats and barley are the principal grain crops, but wheat also is raised. The flocks of sheep are heavy, and cattle are pastured in considerable numbers. Large holdings predominate — indeed, the average size is the highest in Scotland — and scientific farming is the rule. The labourers, who are physically well developed, are as a whole frugal,. industrious and intelligent, but somewhat migratory in their habits. This feature in their character, which they may have by inheritance

as Borderers, has admirably fitted them for colonial life, to which the scarcity of industrial occupation has largely driven the surplus population.

Other Industries. — Next to agriculture the fisheries are the most important industry. The Tweed salmon fisheries are famous, and the lesser rivers of the Merse are held in high esteem by anglers. Eyemouth, Burnmouth, Coldingham and Cove are engaged in the sea fisheries. Cod, haddock, herring, ling, lobsters and crabs are principally taken. The season for herring is from May to the middle of September and for white fish from October to the end of May. Coal, copper ore and ironstone exist in too small quantities to work, and the limestone is so far from a coal district as to be of little economic value. Earlston sends out ginghams and woollen cloths. At Cumledge on the Whiteadder, blankets and plaids are manufactured, and paper is made at Chirnside. The other manufactures are all connected with agri- culture, such as distilleries, breweries, tanneries, &c. The trade is also mainly agricultural. Fairs are held at Duns, Lauder, Coldstream and Greenlaw; but the sales of cattle and sheep mostly take place at the auction marts at Reston, Duns and Earlston. There are grain markets at Duns and Earlston. Berwick, from which the county derives its name, is stiil its chief market. There is, however, no legal or fiscal connexion between the county and the borough.

The North British railway monopolizes the communications of the county. The system serves the coast districts from Berwick to Cockburnspath, and there is a branch from Reston to St Boswells.

Population and Government. — The population of Berwickshire was 32,290 in 1891 and 30,824 in 1001, in which year the number of persons speaking Gaelic and English was 74, and one person spoke Gaelic only. The only considerable towns are Eyemouth (pop. in 1901. 2436) and Duns (2206). The county returns one

member to parliament. Lauder is the only royal burgh, and Duns the county town, a status, however, which was held by Greenlaw from 1696 to 1853, after which date it was shared by both towns until conferred on Duns alone. Berwickshire forms a sheriffdom with Roxburgh and Selkirk shires, and there is a resident sheriff-substitute at Duns, who sits also at Greenlaw, Coldstream, Ayton and Lauder.

In addition to board and voluntary schools throughout the county, there is a high school, which is also a technical school, at Duns, and Coldstream and Lauder public schools have secondary departments. Duns school is subsidized by the county council, which pays the expenses of students attending it from a distance.

History. — Traces of Roman occupation and of ancient British settlement exist in various parts of the Merse. Edin's or Etin's Hall, on Cockburn Law, 4 m. north of Duns, is still called the Pech's or Pict's House, and is one of the very few brochs found in the Lowlands. After the Romans withdrew (409) the country formed part of the Saxon kingdom of Northumbria, and the inhabitants were converted to Christianity through the missionary efforts of Modan in the 6th, and Oswald, Aidan and Cuthbert (traditionally believed to have been born in the vale of the Leader) in the 7 th centuries. The Northmen invaded the sea- board, but the rugged coast proved an effectual barrier. The Danes, however, landed in 886, and destroyed the nunnery at Coldingham, founded about 650 by Ebba, daughter of ˆEthel- frith, king of Northumbria, after whom the adjoining promontory of St Abb's Head was named. After the battle of Carham (1018) the district, which then constituted part of the division of Lothian, was annexed to Scotland. Birgham (pron. Birjam), 35 m. west of Coldstream, was the scene of the conference in 1188 between William the Lion and the bishop of Durham, which discussed the attempt of the English church to assert supremacy over the Scottish. Here also met in 1 289 a convention of the Scots estates to consider the projected marriage of Prince Edward of England to the Maid of Norway, and here was signed in 1290 the treaty of Birgham, assuring the independence of Scotland. During the long period of international strife the shire was repeatedly Overrun by armies of the English and Scots kings, who were constantly fighting for the ancient frontier town of Berwick. It was finally ceded to England in 1482, and the people afterwards gradually settled down to peaceful pursuits. The ford at the confluence of the Leet and Tweed near Coldstream gave access to south-eastern Scotland. Edward I. crossed it with his army in 1296, encamping at Hutton the day before the siege of Berwick, and it was similarly employed as late as 1640, when the marquess of Montrose led the Covenanters on their march to Newcastle, although James VI. had already caused a bridge to be constructed from Berwick to Tweedmouth. There are several places of historic interest in the county. Upon the site of the nunnery at Coldingham King Edgar in 1098 founded a Benedictine priory, which was one of the oldest monastic institutions in Scotland and grew so wealthy that James III. annexed its revenues to defray his

extravagance, a step that precipitated the revolt of the nobles (1488). The priory was seriously damaged in the earl of Hertford's inroad in 1545, and Cromwell blew up part of the church in 1650. The chancel (without aisles) was repaired and used as the parish church. The remains contain some fine architectural features, such as, on the outside, the Romanesque arcades surmounted by lancet windows at the east end, and, in the interior, the Early Pointed triforium. On the coast, about 4 m. north-west of Coldingham, are the ruins of Fast Castle — the " Wolf's Crag " of Scott's Bride of Lammermoor — situated on a precipitous headland. From Sir Patrick Hume it passed to Sir Robert Logan of Restalrig, who is alleged to have been one of the Gowrie conspirators, and to have intended to imprison James VI. within its walls (1600). Four miles west is the Pease or Peaths bridge, built by Thomas Telford in 1786 across the deep pass which was of old one of the strongest natural defences of Scotland. The bridge is 123 ft. high, 300 ft. long and 16 ft. wide. Near it are the ruins of Cockburnspath Tower, once a strong fortress and supposed to be the " Ravens wood " of the Bride of Lammermoor. In the

south-west of the shire besides Dryburgh Abbey (q.v.) there are, at Earlston, the remains of the castle that was traditionally the residence of Thomas the Rhymer. Hume Castle, the ancient seat of the Home family, a picturesque ruin about 3 m. south of Green- law, is so conspicuously situated as to be visible from nearly every part of the county. Coldstreanrand Lamberton, being close to the Border, were both resorted to (like Gretna Green in the west) by eloping couples for clandestine marriage. In Lamberton church was signed in 1502 the contract for the marriage of James IV. and Margaret Tudor, which led, a century later, to the union of the crowns of Scotland and England.

See W. S. Crockett, Minstrelsy of the Merse (Paisley, 1893) ; In Praise of Tweed (Selkirk, 1889); The Scott Country (London, 1902); J. Robson, The Churches and Churchyards of Berwickshire (Kelso, 1893); F. H. Groome, A Short Border History (Kelso, 1887); J. Tait, Two Centuries of Border Church Life (Kelso, 1889); Margaret Warrender, Marchmont and the Humes of Polwarth (Edinburgh, 1894); W. K. Hunter, History of the Priory of Coldingham (Edin- burgh, 1858).

BERWICK-UPON-TWEED, a market town, seaport, municipal borough and county in itself, of England, at the mouth of the Tweed on the north bank, 339 m. N. by W. from London. Pop. (1901) 13,437. For parliamentary purposes it is in the Berwick- upon-Tweed

division of Northumberland. It is the junction on the East Coast route from London to Scotland between the North Eastern and North British railways, a branch of the company first named running up the Tweed valley by Coldstream and Kelso. The town lies in a bare district on the slope and flat summit of an abrupt elevation, higher ground rising to the north and south across the river. It has the rare feature of a complete series of ramparts surrounding it. Those to the north and east are formed of earth faced with stone, with bastions at intervals and a ditch now dry. They are of Elizabethan date, but there are also lines of much earlier date, the fortifications of Edward I. Much of these last has been destroyed, and threatened encroachment upon the remaining relics so far aroused public feeling that in 1905 it was decided that the Board of Works should take over these ruins, including the Bell Tower, from the town council,, and enclose them as national relics. The Bell Tower, from which alarms were given when border raiders were observed, is in fair preservation. There are slight remains of the castle, which fell into disrepair after the union of the crowns of England and Scotland. There are no traces of the churches, monasteries or other principal buildings of the ancient town. The church of Holy Trinity is a plain building without steeple, of the time of Cromwell. Of modern places of worship, the most noteworthy is Wallace Green United Presbyterian church (1859). The chief public building is the town hall (1760), a stately classic building surmounted by a lofty spire. Educational institutions include an Elizabethan grammar school and a blue-coat school; and there is a local museum. Two bridges connect the town with the south side of the Tweed. The older, which is very substantial, was finished in 1634, having taken twenty-four years in building. It has fifteen arches, and is 924 ft. long, but only 17 ft. wide. A unique provision for its upkeep out of Imperial funds dates from the reign of Charles II. The other, the Royal Border Bridge, situated a quarter of a mile up the river, is a magnificent railway viaduct, 126 ft. high, with twenty-eight arches, which extends from the railway station, a castellated building on part of the site of the old castle, to a considerable distance beyond the river. This bridge was designed by Robert Stephenson and opened by Queen Victoria in 1850.

The reach of the river from the old bridge to the mouth forms the harbour. The entrance to the harbour is protected by a stone pier, which stretches half a mile south-east from the north bank of the river mouth. The depth of water at the bar is 17 ft. at ordinary tides, 22 ft. at spring tides, but the channel is narrow, a large rocky portion of the harbour on the north side being dry at low water. There is a wet dock of 3! acres. Principal exports are grain, coal and

fish; imports are bones and bone-ash, manure stuffs, linseed, salt, timber and iron. The herring and other sea fisheries are of some value, and the salmon fishery, in the hands of a company, has long been famous. A fair is held

annually at the end of May. There are iron-works and boat- building yards.

The custom of specially mentioning Berwick-upon-Tweed after Wales, though abandoned in acts of parliament, is retained in certain proclamations. The title of " county in itself " also helps to recall its ancient history. The liberties of the borough, commonly called Berwick Bounds, include the towns of Spittal, at the mouth, and Tweedmouth immediately above it, on the south bank of the river. The first is a watering-place (pop. 2074), with pleasant sands and a chalybeate spa; the second (pop. 3086) has iron foundries, engineering works and fish-curing establishments. Berwick-upon-Tweed is governed by a mayor, 6 aldermen and 18 councillors. Area, 6396 acres.

Very little is known of the history of Berwick before the Conquest. It was not until the Tweed became the boundary between England and Scotland in the 12th century that Berwick as the chief town on that boundary became really important. Until the beginning of the 14th century Berwick was one of the four royal boroughs of Scotland, and although it possesses no charter granted before that time, an inquisition taken in Edward III.'s reign shows that it was governed by a mayor and bailiffs in the reign of Alexander III., who granted the town to the said mayor and the commonalty for an annual rent. After Edward I. had conquered Berwick in 1302 he gave the burgesses another charter, no longer existing but quoted in several confirmations, by which the town was made a free borough with a gild merchant. The burgesses were given the right to elect annually their mayor, who with the commonalty should elect four bailiffs. They were also to have freedom from toll, pontage, &c, two markets every week on Monday and Friday, and a fair lasting from the feast of Holyrood to that of the Nativity of St John the Baptist- Five years later, in 1307, the mayor and burgesses received another charter, granting them their town with all things that belonged to it in the time of Alexander III., for a fee-farm rent of 500 marks, which was granted back to them in 1313 to help towards enclosing their town

with a wall. While the war with Scotland dragged on through the early years of the reign of Edward II., the fortification of Berwick was a matter of importance, and in 1317 the mayor and bailiffs undertook to defend it for the yearly sum of 6000 marks; but in the following year, " owing to their default," the Scots entered and occupied it in spite of a truce between the two kingdoms. After Edward III. had recovered Berwick the inhabitants petitioned for the recovery of their prison called the Beffroi or Bell-tower, the symbol of their independence, which their prede- cessors had built before the time of Alexander III., and which had been granted to William de Keythorpe when Edward I. took the town. Edward III. in 1326 and 1356 confirmed the charter of Edward I., and in 1357, evidently to encourage the growth of the borough, granted that all who were willing to reside there and desirous of becoming burgesses should be admitted as such on payment of a fine. These early charters were confirmed by most of the succeeding kings, until James I. granted the incorporation charter in 1604; but on his accession to the English throne, Berwick of course lost its importance as a frontier town. Berwick was at first represented in the court of the four boroughs and in 1326 in Robert Bruce's parliament. After being taken by the English it remained unrepresented until it was re-taken by the Scots, when it sent two members to the parliament at Edinburgh from 1476 to 1479. In 1482 the burgesses were allowed to send two members to the English parliament, and were represented there until 1885, when the town was included in the Berwick-upon-Tweed division of the county of Northumberland. No manufactures are mentioned as having been carried on in Berwick, but its trade, chiefly in the produce of the surrounding country, was important in the 12th century. It has been noted for salmon fishery in the Tweed from very early times. There was a bridge over the Tweed at Berwick in the time of Alex- ander and John, kings of Scotland, but it was broken down in the time of the latter and not rebuilt until the end of the 14th century.

See Victoria County History, Northumberland; John Fuller, History of Berwick-upon-Tweed, &c. (1799); John Scott, Berwick upon-Tweed: History of the Town and Guild (1

BERYL, a mineral containing beryllium and aluminium in the form of a silicate; its formula is Be 3 Al 2 Si 6 Oi 8 . The species in- cludes the emerald (q.v.), the aquamarine (q.v.) and other trans- parent varieties known as " precious beryl," with certain coarse varieties unfit for use as gem-stones. The name comes from the Gr. PypvWos, a word of uncertain etymology applied to the beryl and probably several other gems. It is notable that the relation of the emerald to

the beryl, though proved only by chemical analysis, was conjectured at least as far back as the time of Pliny.

Beryl crystallizes in the hexagonal system, usually taking the form of long six-sided prisms, striated vertically and terminated

Crystal of beryl.

with the basal plane, sometimes associated with various pyra- midal faces (see fig.). It cleaves rather imperfectly parallel to the base. The colour of beryl may be blue, green, yellow, brown or rarely pink; while in some cases the mineral is colourless. The specific gravity is about 2-7, and the hardness 7-5 to 8, so that for a gem-stone beryl is comparatively soft. Whilst the gem- varieties are transparent, the coarse beryl may be opaque. The transparent crystals are pleochroic — a character well marked in emerald.

Beryl was much prized as a gem-stone by the ancients, and Greek intaglios of very fine workmanship are extant. The Roman jewellers, taking advantage of the columnar form of the natural crystal, worked it into long cylinders for ear-pendants. It was a favourite stone with the artists of the Renaissance, but in modern times has lost popularity, except in the form of emerald, which remains one of the most valued gem-stones. It is notable that English lapidaries of the 18th century often included the sard under the term beryl — a practice which has led to some confusion in the nomenclature of engraved gems.

Beryl occurs as an accessory constituent of many granitic rocks, especially in veins of pegmatite, whilst it is found also in gneiss and in mica-schist. Rolled pebbles of beryl occur, with topaz, in Brazil, especially in the province of Minas Geraes. Crystals are found in drusy cavities in granite in the Urals, not- ably near Mursinka; in the Altai Mountains, which have yielded very long prismatic crystals; and in the mining district of Nerchinsk in Siberia, principally in the Adun-Chalon range, where beryl occurs in veins of topaz-rock piercing granite. Among European localities may be mentioned Elba, good crystals being occasionally found in the tourmaline-granite of San Piero. In Ireland excellent crystals of beryl occur in druses of the granite of the Mourne Mountains in Co. Down, and others less fine are found in the highlands of Donegal, whilst the mineral is also known from the Leinster granite. It occurs likewise in the granite of the Grampians in Scotland, and is not unknown in Cornwall, specimens having been found, with topaz, apatite, &c, in joints of the granite of St Michael's Mount.

Many localities in the United States yield beryl, sometimes sufficiently fine to be cut as a gem. It is found, for example, at Hiddenite and elsewhere in Alexander county, N.C.; at Haddam and Monroe, Conn.; at Stoneham and at Albany, in Oxford county, Maine; at Royalston, Mass.; and at Mt. Antero, Colorado, where it occurs with phenacite. Beryl of beautiful pink colour occurs in San Diego county, California. Coarse beryl, much rifted, is found in crystals of very large size at Grafton and Acworth, N.H.; a crystal from Grafton weigh- ing more than 25 tons. A colourless beryl from Goshen, Mass., has been called Goshenite; whilst crystals of coarse yellow beryl from Rubislaw quarry in Aberdeenshire, Scotland, have been termed Davidsonite.

Beryl suffers alteration by weathering, and may thus pass into kaolin and mica. (F. W. R.)*

BERYLLIUM, or Gluctntjm (symbol Be, atomic weight 9-1), one of the metallic chemical elements, included in the same sub-group of the periodic classification as magnesium. It was prepared in the form of its oxide in 1798 by L. N. Vauquelin (Ann. de chimie, 1798, xxvi. p. 155) from the mineral beryl, and though somewhat rare, is found in many minerals. It was first obtained, in an impure condition, in 1828 by A. A. B. Bussy (1794-1882) and F. Wobler by the reduction of the chloride with potassium, and in 1855 H. J. Debray prepared it, in a compact state, by reducing the volatilized chloride with melted sodium, in an atmosphere of hydrogen. L. F. Nilson and O. Pettersson (Wied. Ann. 1878, iv. p. 554) have also prepared the metal by heating beryllium potassium fluoride with sodium; P. M. Lebeau (Comptes rendus, 1895-1898, vols. 120-127) has obtained it in lustrous hexagonal crystals by electrolysing the double fluoride of beryllium and sodium or potassium with an excess of

beryllium fluoride. It is a malleable metal, of specific gravity 1-64 (Nilson and Pettersson) and a specific heat of 0-4079. Its melting-point is below that of silver. In a fine state of division it takes fire on heating in air, but is permanent at ordinary temperatures in oxygen or air; it is readily attacked by hydro- chloric and sulphuric acids, but scarcely acted on by nitric acid. It is also soluble in solutions of the caustic alkalis, with evolution of hydrbgen a behaviour similar to that shown by aluminium. It combines readily with fluorine, chlorine and bromine, and also with sulphur, selenium, phosphorus, &c.

Considerable discussion has taken place at different times as to the position which beryllium should occupy in the periodic classification of the elements, and as to whether its atomic weight should be 9-1 or 13-65, but the weight of evidence undoubtedly favours its position in Group II., with an atomic weight 9-1 (0=i6) (see Nilson and Pettersson, Berichte, 1880, 13, p. 1451; 1884, 17, p. 987; B. Brauner, Berichte, 1881, 14, p. 53; T. Car- nelley, Journ. of C hem. Soc, 1879, xxxv. p. 563; 1880, xxxvii., p. 125, and W. N. Hartley, Journ. of C hem. Soc., 1883, xliii. p. 316). The specific heat of beryllium has been calculated by L. Meyer (Berichte, 1880, 13, p. 1780) from the data of L. F. Nilson and O. Pettersson, and appears to increase rapidly with increasing temperature, the values obtained being 0-3973 at 20-2° C, 0-4481 at 73-2° C. and 0-5819 at 256-8° C.

Beryllium compounds are almost wholly prepared from beryl. The mineral is fused with potassium carbonate, and, on cooling, the product is treated with sulphuric acid, the excess of which is removed by evaporation; water is then added and the silica is filtered off. On concentration of the solution, the major portion of the aluminium present separates as alum, and the mother liquor remaining contains beryllium and iron sulphates together with a little alum. This is now treated for some days with a hot con- centrated solution of ammonium carbonate, which precipitates the iron and aluminium but keeps the beryllium in solution. The iron and aluminium precipitates are filtered off, and the filtrate boiled, when a basic beryllium hydroxide containing a little ferric oxide is precipitated. To remove the iron, the precipitate is again dis- solved in ammonium carbonate and steam is blown through the liquid, when beryllium oxide is precipitated. This process is re- peated several times, and the final precipitate is dissolved in hydro- chloric acid and precipitated by ammonia, washed and dried. It has also been obtained by J. Gibson (Journ. of Chem. Soc, 1893, lxiii. p. 909) from beryl by conversion of the beryllium into its fluoride.

Beryllium oxide, beryllia or glucina, BeO, is a very hard white powder which can be melted and distilled in the electric furnace, when it condenses in the form of minute hexagonal crystals. After ignition it dissolves with difficulty in acids. The hydroxide Be(0H)2 separates as a white bulky precipitate on adding a solution of an alkaline hydroxide to a soluble beryllium salt; and like those of aluminium and zinc, this hydroxide is soluble in excess of the alkaline hydroxide, but is reprecipitated on prolonged boiling. Beryllium chloride BeCl 2 , like aluminium chloride, may be prepared by heating a mixture of the oxide and sugar charcoal in a

current of dry chlorine. It is deliquescent, and readily soluble in water, from which it separates on concentration in crystals of composition BeCl 2 —tH 2 0. Its vapour density has been determined by Nilson and Pettersson, and corresponds to the molecular formula BeCl 2 . The sulphate is obtained by dissolving the oxide in sulphuric acid; if the solution be not acid, it separates in pyramidal crystals of composition BeS04-4H 2 0, whiL from an acid solution of this salt, crystals of composition BeS0 4 -7H 2 are. obtained. Double sulphates of beryllium and the alkali metals are known, e.g. BeS04-K 2 S04-3H 2 as are also many basic sulphates. The nitrate Be(NOs) 2 -3H 2 is prepared by adding barium nitrate to beryllium sulphate solution; it crystallizes with difficulty and is very deliquescent. It readily yields basic salts.

The carbide BeC 2 is formed when beryllia and sugar charcoal are heated together in the electric furnace. Like aluminium carbide it is slowly decomposed by water with the production of methane. Several basic carbonates are known, being formed by the addition of beryllium salts to solutions of the alkaline carbonates; the normal carbonate is prepared by passing a current of carbon dioxide through water containing the basic carbonate in suspension, the solution being filtered and concentrated over sulphuric acid in an atmosphere of carbon dioxide. The crystals so obtained, are very unstable and decompose rapidly with evolution of carbon dioxide.

Beryllium salts are easily soluble and mostly have a sweetish taste (hence the name Glucinum (g.v.), from yXvidis, sweet) ; they are readily precipitated by alkaline sulphides with formation of the white hydroxide, and may be distinguished from salts of all other metals by the solubility of the oxide in ammonium carbonate. . Beryllium is estimated quantitatively by precipitation with ammonia, and ignition to oxide. Its atomic weight has been determined by L. F.

Nilson and O. Pettersson (Berichte, j88o, 13, p. 1451) by analysis of the sulphate, from which they found the value 9-08, and by G. Kriiss and H. Moraht (Berichte, 1890, 23, p. 2556) from the con- version of the sulphate BeS04-4H 2 into the oxide, from which they obtained the value 9-05. C. L. Parsons (Journ. Amer. Chem. Soc, 1904, xxvi. p. 721) obtained the values 9-1 13 from analyses of beryl- lium acetonyl-acetate and beryllium basic acetate.

For a bibliography see C. L. Parsons, The Chemistry and Literature of Beryllium (1909).

BERYLLONITE, a mineral phosphate of beryllium and sodium,

NaBePQi, found as highly complex orthorhombic crystals and as broken fragments in the disintegrated material of a granitic vein at Stoneham, Maine, where it is associated with felspar, smoky quartz, beryl and columbite. It was dis- covered by Prof. E. S. Dana in 1888, and named beryllonite because it contains beryllium in large amount. The crystals vary from colourless to white or pale yellowish, and are trans- parent with a vitreous lustre; there is a perfect cleavage in one direction. Hardness 5J-6; specific gravity 2-845. A few crystals have been cut and faceted, but, as the refractive index is no higher than that of quartz, they do not make very brilliant gem-stones.

BERZELIUS, JONS JAKOB (1779-1848), Swedish chemist, was born at Vafversunda Sorgard, near Linkoping, Sweden, on the 20th (or 29th) of August 1779. After attending the gym- nasium school at Linkoping he went to Upsala University, where he studied chemistry and medicine, and graduated as M.D. in 1802. Appointed assistant professor of botany and pharmacy at Stockholm in the same year, he became full professsor in 1807, and from 1815 to 1832 was professor of chemistry in the Caroline medico-chirurgical institution of that city. The Stockholm Academy of Sciences elected him a member in 1808, and in 1818 he became its perpetual secretary. The same year he was ennobled by Charles XIV., who in 1835 further made him a baron. His death occurred at Stockholm on the 7th of August 1848. During the first few years of his scientific career Berzelius was mainly engaged on questions of physiological chemistry, but about 1807 he began to devote himself to what he made the chief object of his life — the elucidation of the composition of chemical compounds through study of the law of multiple proportions and the atomic theory. Perceiving the exact determination of atomic and molecular weights to be of fundamental importance, he spent ten years in ascertaining that constant for some two thousand simple and compound bodies, and the results he published in 18 18 attained a remarkable standard of accuracy, which was still further improved in a second table that appeared in 1826. He used oxygen — in his view the pivot round which the whole of chemistry revolves — as the basis of reference for the atomic weights of other substances, and the data on which he chiefly relied were the proportions of oxygen in oxygen compounds, the doctrines of isomorphism, and Gay Lussac's law of volumes. When Volta's discovery of the electric cell became known, Berzelius, with W. Hisinger (1766-1852), began experi- ments on the electrolysis of salt solutions, ammonia, sulphuric acid, &c, and later this work led him to his electrochemical theory, a full exposition of which he gave in his memoir on the Theory of Chemical Proportions and the Chemical

Action of Electricity (18 14). This theory was founded on the supposition that the atoms of the elements are electrically polarized, the positive charge predominating in some and the negative in others, and from it followed his dualistjc hypothesis, according to which compounds are made up of two electrically different components. At first this hypothesis was confined to inorganic chemistry, but subsequently he extended it to organic compounds, which he saw might similarly be regarded as containing a group or groups of atoms — a compound radicle — in place of simple elements. Although his conception of the nature of compound radicles did not long retain general favour — indeed he himself changed it more than once — he is entitled to rank as one of the chief founders of the radicle theory. Another service of the utmost importance which he rendered to the study of chemistry was in continuing and extending the efforts of Lavoisier and his associates to establish a convenient system of chemical nomenclature. By using the initial letters of the Latin

(occasionally Greek) names of the elements as symbols for them, and adding a small numeral subscript, to show the number of atoms of each present in a compound, he introduced the present system of chemical formulation (see Chemistry). Mention should also be made of the numerous improvements he effected in analytical methods and the technique of the blowpipe (Uber die Anwendung des Lothrohrs, 1820), of his classification of minerals on a chemical basis, and of many individual researches such as those on tellurium, selenium, silicon, thorium, titanium, zirconium and molybdenum, most of which he isolated for the first time. Apart from his original memoirs, of which he published over 250, mostly in Swedish in the Transactions of the Stock- holm Academy, his remarkable literary activity is attested by his Lehrbuch der Chemie, which went through five editions (first 1803-1818, fifth 1843-1848) and by his J ahresbericht or annual report on the progress of physics and chemistry, prepared at the instance of the Stockholm Academy, of which he published 27 vols. (1821-1848).

BES, or Besas (Egyp. Bes or Besa), the Egyptian god of re- creation, represented as a dwarf with large head, goggle eyes, protruding tongue, shaggy beard, a bushy tail seen between his bow legs hanging down behind (sometimes clearly as part of a skin girdle) and usually a large crown of feathers on his head. A Bes-like mask was found by Petrie amongst remains of the twelfth dynasty, but the earliest

occurrence of the god is in the temple of the queen Hatshepsut at Deir el Bahri (c. 1500 B.C.), where he is figured along with the hippopotamus goddess as present at the queen's birth. His figure is that of a grotesque mountebank, intended to inspire joy or drive away pain and sorrow, his hideousness being perhaps supposed actually to scare away the evil spirits. In his joyous aspect Bes plays the harp or flute, dances, &c. He is figured on mirrors, ointment vases and other articles of the toilet. Amulets and ornaments in the form of the figure or mask of Bes are common after the New Kingdom; he is often associated with children and with child- birth and is figured in the " birth-houses " devoted to the cult of the child-god. Perhaps the earliest known instance of his prominent appearance of large size in the sculptures of the temples is under Tahraka, at Jebel Barkal, Nubia, at the begin- ning of the 7th century B.C. As the protector of children and others he is the enemy of noxious beasts, such as lions, crocodiles, serpents and scorpions. Large wooden figures of Bes are gener- ally found Jo contain the remains of a human foetus. In the first centuries of our era an oracle of Besas was consulted at Abydos, where A. H. Sayce has found graffiti concerning him, and prescriptions exist for consulting Besas in dreams. It has been held that Bes was of non-Egyptian origin, African, as Wiedemann, or Arabian or even Babylonian, as W. Max Miiller contends; he is sometimes entitled "coming from the Divine Land " ■ {i.e. the East or Arabia), or " Lord of Puoni " (Punt), i.e. the African coast of the Red Sea; his effigy occurs also on Greek coins of Arabia. It is remarkable also that, contrary to the usual rule, he is commonly represented in Egyptian sculptures and paintings full faced instead of in profile. But the connexion of the god with Puoni may have grown out of the fact that dwarf dancers were especially brought to Egypt from Ethiopia and Puoni.

See K. Sethe in Pauly-Wissowa, Realencyclopadie, s.v.; A. Wiedemann, Religion of the Ancient Egyptians (London, 1897), p. 159; E. A. W. Budge, Gods of the Egyptians, ii. p. 284 (London) ; W. Max Miiller, Asien u. Europa (Leipzig, 1893), p. 310.

(F. Ll. G.)

BESANQON, a city of eastern France, capital of the depart- ment of Doubs, 76 m. E. of Dijon by the Paris-Lyon railway. Pop. (1906) town, 41,760; commune, 56,168. It is situated on the left bank of the river Doubs, 820 ft. above sea-level at the foot of the western Jura, and is enclosed by hills in every direction. The Doubs almost surrounds the city proper forming a peninsula, the neck of which is occupied by a height crowned by the citadel; on the right bank lie

populous industrial suburbs. The river is bordered by fine quays, and in places by the shady promenades which are a feature of Besancon. On the right

I bank there is a fine bathing establishment in the Mouillere quarter, supplied by the saline springs of Miserey. The cathedral of St Jean, the chief of the numerous churches of the town, was founded in the 4th century but has often undergone reconstruc- tion and restoration; it resembles the Rhenish churches of Germany in the possession of apses at each of its extremities. Several styles are represented in its architecture which for the most part is the work of the nth, 12th and 13th centuries; the eastern apse and the tower date from the reign of Louis XV. In the interior there are a " Madonna and Child " of Fra Bartol- ommeo and a number of other paintings and works of art. The archiepiscopal palace adjoining the cathedral is a building of the 1 8th century. The church of Ste. Madeleine belongs to the 18th and 19th centuries. The Palais de Granvelle, in the heart of the town, was built from 1534 to 1540 by Nicolas Perrenot de Granvella, chancellor of Charles V., and is the most interesting of the secular buildings. It is built round a square interior court surrounded by arcades, and is occupied by learned societies. The hotel de ville dates from the 16th century, to which period many of the old mansions of Besancon also belong. The law- court, rebuilt in recent times, preserves a Renaissance facade and a fine audience-hall of the 18th century. Some relics of old military architecture survive, among them a cylindrical tower of the 15th century near the Porte Notre-Dame, the southern gate of the city, and the Porte Rivotte, a gate of the 16th century, flanked by two round towers. The Roman remains at Besancon are of great archaeological value. Close to the cathedral there is a , triumphal arch decorated with bas-reliefs known as the Porte Noire, which is generally considered to have been built in commemoration of the victories of Marcus Aurelius over the Germans in 167. It is in poor preservation and was partly re- built in 1820. Remains of a Roman theatre, of an amphitheatre, of an aqueduct which entered the town by the Porte Taillee, a gate cut in the rock below the citadel, and an arch of a former Roman bridge, forming part of the modern bridge, are also to be seen. Besancon has statues of Victor Hugo and of the Marquis de Jouffroy d'Abbans (b. 175 1), inventor of steam- navigation.

Besancon is important as the seat of an archbishopric, a court of appeal and a court of assizes, as centre of an acadtmie (edu- cational division), as seat of a prefect and as headquarters of the VHth army corps. It also has tribunals of first instance and of commerce, a chamber of commerce, a board of trade-arbitrators, an

exchange and a branch of the Bank of France. Its educa- tional establishments include the university with its faculties of science and letters and a preparatory school of medicine and pharmacy, an artillery school, the lycee Victor Hugo for boys, a lycee for girls, an ecclesiastical seminary, training colleges for teachers, and schools of watch-making, art, music and dairy- work. The library contains over 130,000 volumes, and the city has good collections of pictures, antiquities and natural history. The chief industry of Besancon is watch- and clock-making, introduced from the district of Neuchatel at the end of the 18th century. It employs about 12,000 workpeople, and produces about three-fourths of. the watches sold in France. Subsidiary industries, such as enamelling, are also important. The metal- lurgical works of the SociitS de la Franche-Comte are established in the city and there are saw-mills, printing-works, paper-factories, distilleries, and manufactories of boots and shoes, machinery, hosiery, leather, elastic fabric, confectionery and arti- ficial silk. There is trade in agricultural produce, wine, metals, &c. The canal from the Rhone to the Rhine passes under the citadel by way of a tunnel, and the port of Besancon has con- siderable trade in coal, sand, &c.

As a fortress Besancon forms one of a group which includes Dijon, Langres and Belfort; these are designed to secure Franche Comte and to cover a field army operating on the left flank of a German army of invasion. The citadel occupies the neck of the peninsula upon which the town stands; along the river bank in a semicircle is the town enceinte, and the suburb of Battant on the right bank of the Doubs is also "regularly" fortified as a bridge-head. These works, and Forts Chaudanne and Bregille

overlooking the Doubs at the bend, were constructed prior to 1870. The newer works enclose an area more suited to the needs of modern warfare: the chain of detached forts along the ridges of the left bank has a total length of 75 m., and the centre of this chain is supported by numerous forts and batteries lying between it and the citadel. On the other bank Fort Chaudanne is now the innermost of several forts facing towards the south- west, and the foremost of these works connects the fortifications of the left bank with another chain of detached forts on the right bank. The latter completely encloses a large area of ground in a semicircle of which Besancon itself is the centre, and the whole of the newer works taken together form an

irregular ellipse of which the major axis, lying north-east by south-west, is formed by the Doubs.

Besancon is a place of great antiquity. Under the name of Vesontio it was, in the time of Julius Caesar, the chief town of the Sequani, and in 58 B.C. was occupied by that general. It was a rich and prosperous place under the Roman emperors, and Marcus Autelius promoted it to the rank of a colonia as Colonia Victrix Sequanorutn. During the succeeding centuries it was several times destroyed and rebuilt. The archbishopric dates from the close of the 2nd century, and the archbishops gradually acquired considerable temporal power. As the capital of the free county of Burgundy, or Franche-Comte, it was united with the German kingdom when Frederick I. married Beatrix, daughter of Renaud III., count of Upper Burgundy. In 1184 Frederick made it a free imperial city, and about the same time the archbishop obtained the dignity of a prince of the Empire. It afterwards became detached from the German kingdom, and during the 14th century came into the possession of the dukes of Burgundy, from whom it passed to the emperor Maximilian I., and his grandson Charles V. Cardinal Granvella, who was a native of the city, became archbishop in 1584, and founded a university which existed until the French Revolution. After the abdication of Charles V. it came into the possession of Spain, although it remained formally a portion of the Empire until its cession at the peace of Westphalia in 1648. During the 17 th century it was attacked several times by the French, to whom it was definitely ceded by the peace of Nijmwegen in 1678. It was then fortified by the engineer Vauban. Until 1789 it was the seat of a parlement. In 18 14 it was invested and bom- barded by the Austrians, and was an important position during the Franco-German War of 1870-71.

See A. Castan, Besancon et ses environs (Besancon, 1887) ; A. Guenard, Besancon, description historique (Besancon, i860).

BESANT, SIR WALTER (1836-1901), English author, was born at Portsmouth, on the 14th of August 1836, third son of William Besant of that town. He was educated at King's College, London, and Christ's College, Cambridge, of which he was a scholar. He graduated in 1859 as 18th wrangler, and from 1861 to 1867 was senior professor of the Royal College, Mauritius. From 1868 to 1885 he acted as secretary to the Pales- tine Exploration Fund. In 1884 he was mainly instrumental in establishing the Society of Authors, a trade-union of writers designed for the protection of literary property, which has ren- dered great assistance to inexperienced authors by explaining the principles of literary profit. Of this society

he was chairman from its foundation in 1884 till 1892. He married Mary, daughter of Mr Eustace Foster-Barham of Bridgwater, and was knighted in 1895. He died at Hampstead, on the 9th of June 1901. Sir Walter Besant practised many branches of literary art with success, but he is most widely known for his long succession of novels, many of which have enjoyed remarkable popularity. His first stories were written in collaboration with James Rice (q.v.). Two ˆit least of these, The Golden Butterfly (1876) and Ready-Money Moriiboy (1872), are among the most vigorous and most characteristic of his works. Though not without exaggeration and eccentricity, attributable to the influence of Dickens, they are full of rich humour, shrewd observation and sound common-sense, and contain characters which have taken their place in the long gallery of British fiction. After Rice's death, Sir Walter Besant wrote alone, and in All Sorts

and Conditions of Men (1882) produced a stirring story of East End life in London, which set on foot the movement that cul- minated in the establishment of the People's Palace in the Mile End Road. Though not himself a pioneer in the effort made by Canon Barnett and others to alleviate the social evils of the East End by the personal contact of educated men and women of a superior social class, his books rendered immense service to the movement by popularizing it. His sympathy with the poor was shown in another attempt to stir public opinion, this time against the evils of the sweating system, in The Children of Gibeon (1886).

Other popular novels by him were Dorothy Forsler (1884), Armor el of Lyonesse (1890), and Beyond the Dreams of Avarice (1895). He also wrote critical and biographical works, including The French Humorists (1873), Rabelais (1879), and lives of Coligny, Whittington, Captain Cook and Richard Jefferies. Besant undertook a series of important historical and archaeo- logical volumes, dealing with the associations and development of the various districts of London — of which the most important was A Survey of London, unfortunately left unfinished, which was intended to do for modern London what Stow did for the Elizabethan city. Other books on London (1892), West- minster (1895) and South London (1899) showed that his mind was full of his subject. No man of his time evinced a keener interest in the professional side of literary work, and the improved conditions of the literary career in England were largely due to his energetic and capable exposition of the commercial value of authorship and to the unselfish efforts which Sir Walter constantly made on behalf of his fellow-workers in the field of letters.

See also Autobiography of Sir Walter Besant (1902), with a prefatory note by S. S. Sprigge; the preface to the library edition (1887) of Ready- Money Moriiboy contains a history of the literary partnership of Besant and Rice.

BESENVAL DE BRONSTATT, PIERRE VICTOR, Baron de (172 2-1 794), French soldier, was born at Soleure. He was the son of Jean Victor Besenval, colonel of the regiment of Swiss guards in the pay of France, who was charged in 1707 by Louis XIV. with a mission to Sweden, to reconcile Charles XII. with the tsar Peter the Great, and to unite them in alliance with France against England. Pierre Victor served at first as aide- de-camp to Marshal Broglie during the campaign of 1748 in Bohemia, then as aide-de-camp to the duke of Orleans during the Seven Years' War. He then became commander of the Swiss Guards. When the Revolution began Besenval remained firmly attached to the court, and he was given command of the troops which the king had concentrated on Paris in July 1789 — a movement which led to the taking of the Bastille on the 14th of July. Besenval showed incompetence in the crisis, anu attempted to flee. He was arrested, tried by the tribunal of the Chatelet, but acquitted. He then fell into obscurity and died in Paris in 1794 Besenval de Bronstatt is principally known as the author of MSmoires, which were published in 1805-1807 by the vicomte T. A. de Segur, in which are reported many scandalous tales, true or false, of the court of Louis XVI. and Marie Antoinette. The authenticity of these memoirs is not absolutely established.

BESKOW, BERNHARD VON, Baron (1796-1868), Swedish dramatist and historian, son of a Stockholm merchant, was born on the 19th of April 1796. His vocation for literature was assisted by his tutor, the poet Johan Magnus Stjernstolpe (1777-1&31), whose works he edited. He entered the civil service in 1814, was ennobled in 1826 and received the title of baron in 1843. He held high appointments at court, and was, from 1834 onwards, perpetual secretary of the Swedish academy, using his great influence with tact and generosity. His poetry is over-decorated, and his plays are grandiose historical poems in dramatic form. Among them are " Erik XIV." (2 parts, 1826); and four pieces collected (1836-1838) as Dramatiska Studier, the most famous of which is the tragedy of " Thorkel Knutsson." His works include many academical memoirs, volumes of poems, philosophy and a valuable historical study,

Om Gustav den Tredje s&som konung och menniska (5 vols. 1860-1869, " Gustavus III. as king and man "), printed in the transactions of the Swedish Academy (vols. 32, 34, 37, 42, 44). He died on the 17th of October 1868.

See also a notice by C. D. af Wirsen in his Lefnadsteckningar (Stockholm, 1901).

BESNARD, PAUL ALBERT (1849-), French painter, was born in Paris and studied at the Ecole des Beaux-Arts, winning the Prix de Rome in 1874. Until about 1880 he followed the academic tradition, but then broke away completely, and devoted himself to the study of colour and light as conceived by the impressionists. The realism of this group never appealed to his bold imagination, but he applied their technical method to ideological and decorative works on a large scale, such as his frescoes at the Sorbonne, the Ecole de Pharmacie, the Salle des Sciences at the h6tel de ville, the mairie of the first arrondisse- ment, and the chapel of Berck hospital, for which he painted twelve " Stations of the Cross " in an entirely modern spirit. A great virtuoso, he achieved brilliant successes alike in water-colour, pastel, oil and etching, both in portraiture, in landscape and in decoration. A good example of his daring unconvention- ality is his portrait of Madame Rejane; and his close analysis of light can be studied in his picture " Femme qui se chauffe " at the Luxembourg in Paris.

BESOM (Old Eng. besema, a rod), originally a bundle of rods or twigs, used for sweeping, &c. ; a stiff broom.

BESSARABIA, a government of south-west Russia, separated on the W. and S. from Moldavia and Walachia by the Pruth, and on the E. and N. from the Russian governments of Podolia and Kherson by the Dniester; on the S.E. it is washed by the Black Sea. Area, 17,614 sq. m. The northern districts are invaded by offshoots of the Carpathians, which reach altitudes of 800 to 1 1 50 ft., and are cut up by numerous ravines and river valleys. Here, however, agriculture is the prevailing occupation, the soil being the fertile black earth. The crops principally raised are wheat and maize, though here, as well as in other parts of the government, barley, flax, tobacco, water-melons, gourds, fruit, wine, saffron and madder are grown. The middle of the government is also hilly (S50-1000 ft.), and is heavily timbered, chiefly with beech, oak and mountain-ash, and, though to a smaller extent, with birch. The districts south of the old Roman earthworks which link the Dniester with the Pruth along the line of the Botna, just south of Bender, consist of level pasture- land known

as the Budjak steppes. Here stock-breeding is the predominant calling, the people owning large numbers of sheep, cattle and horses, also goats, pigs and buffaloes. Lagoons fringe the lower course of the Pruth and the coast of the Black Sea, and marshy ground exists beside the Reuth and other tributaries of the Dniester. The climate is rather subject to extremes, the mean temperature for the year, at Kishinev, being 50 Fahr., of January 27 , and of July 72 . The rainfall amounts to over 25 in. annually. Salt, saltpetre and marble are the principal mineral products. Manufacturing industry is only just beginning, wine-making (17,000,000 gallons annually), cloth-mills, iron-works, soap-works and tanneries being the principal branches. Both the Dniester and the Pruth are important waterways commercially, the former being navigable up to Mogilev and the latter to Leovo (46 30′ N. lat.). Down the Dniester come timber and wooden wares from Galicia, and grain and wool from Bessarabia itself. Three branches of the railway from Odessa to Poland penetrate the government and proceed towards the Carpathians. The population numbered 988,431 in i860 and 1,938,326 in 1897, of whom only 302,852 were urban, while 942,179 were women. In 1906 it was estimated at 2,262,400. It consists of various races, nearly one-half (920,919 in 1897) being Moldavians, the others Little Russians, Jews (37 % in the towns and 12% in the rural districts), Bulgarians (103,225), Germans (60, 206) , with some Gypsies(Zigani) , Greeks, Armenians, Tatars and Albanians. The Germans, who form some thirty prosperous colonies in the Budjak steppes west from Akkerman, have been settled there since about 1814. The government is divided into eight districts, the chief towns of which are Akker- I

man (pop. 32,470 in 1900), Bender (33,741 in 1900), Byeltsi (18,526 in 1897), Izmail (33,607 in 1900), Khotin (18,126), Kishinev (125,787 in 1900), Orgeyev (13,356), and Soroki (25,523 in 1900). The capital is Kishinev. Kagul, on the Pruth, and Reni on the Danube (the place to which Alexander of Bulgaria was carried when kidnapped by the Russians in 1886), are small, but lively, river-ports.

The original inhabitants were Cimmerians, and after them came Scythians. During the early centuries of the Christian era Bessarabia, being the key to one of the approaches towards the Byzantine empire, was invaded by many successive races. In the 2nd century it was occupied by the Getae, a Thracian tribe, whom the Roman emperor Trajan conquered in 106; he then incorporated the region in the province of Dacia. In the following century the Goths poured into this quarter of the empire, and in the 5th century it was overrun one

after the other by the Huns, the Avars and the Bulgarians. Then followed in the 7 th century the Bessi, a Thracian tribe, who gave their name to the region, and in the 9th the Ugrians, that is to say the ancestors of the present Magyars of Hungary, the country being then known as Atel-kuzu. The Ugrians were forced farther west by the Turkish tribe of the Petchenegs in the 10th century, and these were succeeded in the nth century by the Kumans (Comani) or Polovtsians, a kindred Turkish stock or federation. In the 13th century Bessarabia was overrun by the irresistible Mongols under the leadership of Batu, grandson of Jenghiz Khan. In this century also the Genoese founded trading factories on the banks of the Dniester. In 1367 Bessarabia was subdued and annexed by the ruling prince of Moldavia. During the 16th century it was in the possession alternately of the Turks and the Nogais or .Crimean Tatars. From early in the 18th century it was a bone of contention between the Ottoman Turks and the Russians, the latter capturing it five times between 1711 and 1812. In the latter year it was definitely annexed to Russia, and in 1829 its frontier was pushed southwards so as to include the delta of the Danube. After the Crimean War, however, Russia ceded to Moldavia not only this later addition, but also certain districts in the south of the existing government, amounting altogether to an area of 4250 sq. m. and a population of 180,000. By the treaty of Berlin (1878) Russia recovered of this 3580 sq. m., with a population of 127,000.

See Nakko, History of Bessarabia, in Russian (1873).

(P. A. K.; J. T. Be.)

BESSARION, JOHANNES, or Basilius (c. 1395-1472), titular patriarch of Constantinople, and one of the illustrious Greek scholars who contributed to the great revival of letters in the 15th century, was born at Trebizond, the year of his birth being variously given as 1389, 1395 or 1403. He was educated at Constantinople, and in 1423 went to the Peloponnesc to hear Gemistus Pletho expound the philosophy of Plato. On entering the order of St Basil, he adopted the name of an old Egyptian anchorite Bessarion, whose story he has related. In 1437 he was made archbishop of Nicaea by John VII. Palaeologus, whom he accompanied to Italy in order to bring about a union between the Greek and Latin churches with the object of obtaining help from the West against the Turks. The Greeks had bitterly resented his attachment to the party which saw no difficulty in a reconciliation of the two churches. At the councils held in Ferrara and Florence Bessarion supported the Roman church, and gained the favour of Pope Eugenius IV., who invested him with the

rank of cardinal. From that time he resided permanently in Italy, doing much, by his patronage of learned men, by his collection of books and manuscripts, and by his own writings, to spread abroad the new learning. He held in succession the archbishopric of Siponto and the bishoprics of Sabina and Frascati. In 1463 he received the title of Latin patriarch of Constantinople; and it was only on account of his Greek birth that he was not elevated to the papal chair. For five years (1450-1455) he was legate at Bologna, and he was engaged on embassies to many foreign princes, among others to Louis XL of France in 147 1. Vexation at an insult offered him by Louis is said to have hastened his death, which took place on the 19th

of November 1A72, at Ravenna. Bessarion was one of the most learned scholars of his time. Besides his translations of Aristotle's Metaphysics and Xenophon's Memorabilia, his most important work is a treatise directed against George of Trebizond, a violent Aristotelian, entitled In Calumniator em Platonis. Bessarion, though a Platonist, is not so thoroughgoing in his admiration as Gemistus Pletho, and rather strives after a reconciliation of the two philosophies. His work, by opening up the relations of Platonism to the main questions of religion, contributed greatly to the extension of speculative thought in the department of theology. His library, which contained a very extensive col- lection of Greek MSS.. was presented by him to the senate of Venice, and formed the nucleus of the famous library of

St Mark.

See A. M. Bandini, De Vita et Rebus Gestis Bessanonis (i777); H. Vast, Le Cardinal Bessarion (1878); E. Legrand, Bibliographic Hellenique (1885); G. Voigt, Die Wiederbelebung des klassischen Altertums, ii. (1893); on Bessarion at the councils of Ferrara and Florence, A. Sadov, Bessarion de Nicee (1883); on his philosophy, monograph by A. Kandelos (in Greek: Athens, 1888); most of his works are in Migne, Patrologia Graeca, clxi.

BESSBOROUGH, EARLS OF. The Ponsonby family, who have contributed many conspicuous men to Irish and English public life, trace their descent to Sir John Ponsonby (d. 1678), of Cumberland, a Commonwealth soldier who obtained land grants in Ireland. His son William (1657-1724) was created Baron Bessborough (1721)

and Viscount Duncannon (1723), and the latter's son Brabazon was raised to the earldom of Bessborough in 1 739. He was the father not only of the 2nd earl (1 704-1 793), but of John Ponsonby (q.v.), speaker of the Irish House of Commons. The 2nd earl was a well-known Whig politician, who held various offices of state; and his son the 3rd earl (1758-1844) was father of the 4th earl (1781-1847), first commissioner of works in 1831-1834, lord privy seal from 1835 to 1839 and lord-lieutenant of Ireland in 1846. He was succeeded by his three sons, the 5th earl (d. 1880), 6th earl (1815-1895), a famous cricketer and chairman of the Bessborough commission (1881) to inquire into the Irish land system, and 7th earl (d.1906), and the last named by his son the 8th earl.

BESS EG ES, a town of south-eastern France, in the depart- ment of Gard, on the Ceze, 20 m. north of Alais by rail. Pop. (1906) 7662. The town is important for its coal-mines, blast- furnaces and iron-works.

BESSEL, FRIEDRICH WILHELM (1 784-1846), German astronomer, was born at Minden on the 22nd of July 1784. Placed at the age of fifteen in a counting-house at Bremen, he was impelled by his desire to obtain a situation as supercargo on a foreign voyage to study navigation, mathematics and finally astronomy. In 1804 he calculated the orbit of Halley's comet from observations made in 1607 by Thomas Harriot, and communicated his results to H. W. M. Olbers, who procured their publication (Monatliche Correspondenz, x. 425), and re- commended the young aspirant in 1805 for the post of assistant in J. H. Schroter's observatory at Lilienthal. A, masterly investigation of the comet of 1807 (Konigsberg, 1810) enhanced his reputation, and the king of Prussia summoned him, in 1810, to superintend the erection of a new observatory at Konigsberg, of which he acted as director from its completion in 18 13 until his death. In this capacity he inaugurated the modern era of practical astronomy. For the purpose of improving knowledge of star-places he reduced James Bradley's Greenwich observa- tions, and derived from them an invaluable catalogue of 3222 stars, published in the volume rightly named Fundamenta Astronomiae (1818). In Tabulae Regiomontanae (1830), he definitively established the uniform system of reduction still in use. During the years 1821-1833, he observed all stars to the ninth magnitude in zones extending from-15 to +45° dec -i and thus raised the number of those accurately determined to about 50,000. He corrected the length of the seconds' pendulum in 1826, in a discussion re-published by H. Bruns in 1889; measured an arc of the meridian in East Prussia in 1831-1832; and deduced for the earth in 1841 an ellipticity of T ˆ ¥ . His

ascertainment in 1838 (Astr. Nach., Nos. 365-366) of a parallax

of o”-3i for 61 Cygni was the first authentic result of the kind published. He announced in 1844 the binary character of Sirius and Procyon from their disturbed proper motions; and was preparing to attack the problem solved later by the discovery of Neptune, when fatal illness intervened. He died at Konigsberg on the 17th of March 1846. Modern astronomy of precision is essentially Bessel’s creation. Apart from the large scope of his activity, he introduced such important novelties as the effective use of the heliometer, the correction for personal equation (in 1823), and the systematic investigation of instrumental errors. He issued 21 volumes of Astronomische Bcobachtungen auf der Sternwarte zu Konigsberg (1815-1844), and a list of his writings drawn up by A. L. Busch appeared in vol. 24 of the same series. Especial attention should be directed to bis Astronomische Untersuchungen (2 vols. 1841-1842), Populare Vorlesungen (1848), edited by H. C. Schumacher, and to the important collection entitled Abhandlungen (4 vols. 1875-1882), issued by R. Engelmann at Leipzig. His minor treatises num- bered over 350. In pure mathematics he enlarged the resources of analysis by the invention of Bessel’s Functions. He made some preliminary use of these expressions in 1817, in a paper on Kepler’s Problem {Transactions Berlin Academy, 1816-1817, p. 49), and fully developed them seven years later, for the purposes of a research into planetary perturbations {Ibid. 1824, PP- 1-S2).

See also H. Durege, Bessels Leben und Wirken (Zurich, 1861); J. F. Encke, Geddchtnissrede auf Bessel (Berlin, 1846); C. T. Anger, Erinnerung an Bessels Leben und Wirken (Danzig, 1845); Astronomische Nachrichten, xxiv. 49, 331 (1846); Monthly Notices Roy. Astr. Society, -vii. 199 (1847); Allgemeine deutsche Biographic, ii.

558-567.

BESSEL FUNCTION, a certain mathematical relation between two variables. The Bessel junction of order m satisfies the differ- ential equation ~{ + ~p + (I- ˆ) u = ‘ and may be expressed

as the series

:+-

:.\,

the

.ml { 2.2OT + 2 ‘ 2-4.2OT+2.2OT+4

function of zero order is deduced by making m = o, and is

equivalent to the series 1 -|j + jrp &c. O. Schlomilch

defines these functions as the coefficients of the power of t in the expansion of exp §p(2-r l). The symbol generally adopted to represent these functions is J m (p) where m denotes the order of the function. These functions are named after Friedrich Wilhelm Bessel, who in 1817 introduced them in an investigation on Kepler’s Problem. He discussed their pro- perties and constructed tables for their evaluation Although Bessel was the first to systematically treat of these functions, it is to be noted that in 1732 Daniel Bernoulli obtained the function of zero order as a solution to the problem of the oscillations of a chain suspended at one end. This problem has been more fully discussed by Sir A. G. Greenhill. In 1764 Lconhard Euler employed the functions of both zero and integral orders in an analysis into the vibrations of a stretched membrane; an investigation which has been considerably developed by Lord Rayleigh, who has also shown (1878) that Bessel’s functions are particular cases of Laplace’s functions. There is hardly a branch of mathematical physics which is independent of these functions. Of the many applications we may notice: — Joseph Fourier’s(1824) investigation of the motion of heat in a solid cylinder, a. problem

which, with the related one of the flow of electricity, has been developed by W. E. Weber, G. F. Riemann and S.D. Poisson; the flow of electromagnetic waves along wires (Sir J. J. Thom- son, H. Hertz, O. Heaviside) ; the diffraction of light (E. Ldmmel, Lord Rayleigh, Georg Wilhelm Struve) ; the theory of elasticity (A. E. Love, H. Lamb, C. Chree, Lord Rayleigh); and to hydrodynamics (Lord Kelvin, Sir G. Stokes).

The remarkable connexion between Bessel's functions and spherical harmonics was established in 1868 by F. G. Mehler, who proved that a simple relation existed between the function of zero order and the zonal harmonic of order n. Ileinrich Eduard Heine has shown that the functions of higher orders may be considered as limiting values of the associated functions;

this relation was discussed independently, in 1878, by Lord Rayleigh.

For the mathematical investigation see Spherical Harmonics and for tables see Table, Mathematical.

See A. Gray and G. B. Matthews, Treatise on Bessel's Functions (1895); Encyclopadie der math. Wissenschaften ; F '. W. Bessel, Unter- suchung des Teils der planetarischen Stbrungen (1824).

BESSEMER, SIR HENRY (1813-1898), English engineer, was born on the 19th of January 1813, at Charlton, in Hert- fordshire. Throughout his life he was a prolific inventor, but his name is chiefly known in connexion with the Bessemer process for the manufacture of steel, by which it has been rendered famous throughout the civilized world. Though this process is now largely supplemented, and even displaced, by various rivals, at the time it was brought out it was of enormous industrial importance, since it effected a great cheapening in the price of steel, and led to that material being widely substituted for others which were inferior in almost every respect but that of cost. Bessemer's attention was drawn to the problem of steel manu- facture in the course of an attempt to improve the construction of guns. Coming to the conclusion that if any advance was to be made in artillery better metal must be available, he estab- lished a small ironworks in St Pancras, and began a series of experiments. These he carried on for two years before he evolved the

essential idea of his process, which is the decarbon- ization of cast iron by forcing a blast of air through the mass of metal when in the molten condition. The first public announce- ment of the process was made at the Cheltenham meeting of the British Association in 1856, and immediately attracted considerable notice. Many metallurgists were sceptical on theoretical grounds about his results, and only became convinced when they saw that his process was really able to convert melted cast iron into malleable iron in a perfectly fluid state. But though five firms applied without delay for licences to work under his patents, success did not at once attend his efforts; indeed, after several ironmasters had put the process to practical trial and failed to get good results, it was in danger of being thrust aside and entirely forgotten. Its author, however, instead of being discouraged by this lack of success, continued his experi- ments, and in two years was able to turn out a product, the quality of which was not inferior to that yielded by the older methods. But when he now tried to induce makers to take up his improved system, he met with general rebuffs, and finally was driven to undertake the exploitation of the process himself. To this end he erected steelworks in Sheffield, on ground pur- chased with the help of friends, and began to manufacture steel. At first the output was insignificant, but gradually the mag- nitude of the operations was enlarged until the competition became effective, and steel traders generally became aware that the firm of Henry Bessemer & Co. was underselling them to the extent of £20 a ton. This argument to the pocket quickly had its effect, and licences were applied for in such numbers that, in royalties for the use of his process, Bessemer received a sum in all considerably exceeding a million sterling.

Of course, patents of such obvious value did not escape criticism, and invalidity was freely urged against them on various grounds. But Bessemer was fortunate enough to maintain them intact without litigation, though he found it advisable to buy up the rights of one patentee, while in another case he was freed from anxiety by the patent being allowed to lapse in 1859 through non-payment of fees. At the outset he had found great difficulty in making steel by his process — in his first licences to the trade iron alone was mentioned. Experi- ments he made with South Wales iron were failures because the product was devoid of malleability; Mr Goransson, a Swedish ironmaster, using the purer charcoal pig iron of that country, was the first to make good steel by the process, and even he was successful only after many attempts. His results prompted Bessemer to try the purer iron obtained from Cumberland haematite, but even with this he did not meet with much success, until Robert Mushet showed that

the addition of a certain quantity of spiegeleisen had the effect of removing the difficulties.

Whether or not Mushet's patents could have been sustained, the value of his procedure was shown by its general adoption in conjunction with the Bessemer method of conversion. At the same time it is only fair to say that whatever may have been the conveniences of Mushet's plan, it was not absolutely essential; this Bessemer proved in 1865, by exhibiting a series of samples of steel made by his own process alone. The pecuniary rewards of Bessemer's great invention came to him with comparative quickness; but it was not till 1879 that the Royal Society admitted him as a fellow and the government honoured him with a knighthood. Bessemer died at Denmark Hill, London, on the 15th of March 1898.

Among Bessemer's numerous other inventions, not one of which attained a tithe of the success or importance of the steel process, were movable dies for embossed stamps, a gold paint, sugar machinery, and a ship which was to save her passengers from the miseries of mal de mer. This last had her saloon mounted in such a way as to be free to swing relatively to the boat herself, and the idea was that this saloon should always be maintained steady and level, no matter how rough the sea. For this purpose hydraulic mechanism of Bessemer's design was arranged under the control of an attendant, whose duty it was to keep watch on a spirit-level, and counteract by proper manipu- lation of the apparatus any deviation from the horizontal that might manifest itself on the floor of the saloon owing to the rolling of the vessel. A boat, called the " Bessemer," was built on this plan in 1875 and put on the cross-Channel service to Calais, but the mechanism of the swinging saloon was not found effective in practice and was ultimately removed.

An Autobiography was published in 1905.

BESSEMER, a town of Jefferson county, Alabama, U.S.A., about 12 m. S.W. of Birmingham, a little N. of the centre of the state. Pop. (1890) 4544; (1900) 6538, including 3695 ne- groes; (1910) 10,864. The town is served by the Alabama Great Southern (Queen & Crescent route), the Louisville & Nash— ville, the Kansas City, Memphis & Birmingham (St Louis & San Francisco system), the Birmingham Southern, and the Atlanta, Birmingham & Atlantic railways. Bessemer is situated in the midst of the iron ore and limestone district of Alabama, in the south part of Jones' Valley (about 3 m. wide.) ; to the east is the Red Ore mountain range, rich in red haematite; to the north-west are the Warrior coalfields; to the

south-west, south and south-east are immense fossiliferous iron ore seams and the Cahaba coalfields; in the immediate vicinity of the city are limestone quarries, and about 18 m. north-east are the limestone kilns of Gate City. Mining, iron smelting and the manu- facture of iron and coke are the chief industries of Bessemer; truck farming is also an important industry. In 1900 Bessemer was the eighth city of the state in population, second in amount of capital invested in manufacturing, and fourth in the value of its manufactured product for the year. Bessemer was laid out in 1887, and was incorporated in 1889.

BESSIERES, JEAN BAPTISTE, duke of Istria (1768-1813), French marshal, was born near Cahors in 1768. He served for a short time in the " Constitutional Guard " of Louis XVI. and as a non-commissioned officer took part in the war against Spain. In the Army of the Eastern Pyrenees and in the Army of the Moselle he repeatedly distinguished himself for valour, and in 1796, as captain, he served in Bonaparte's Italian cam- paign. At Roveredo his conduct brought him to his chief's notice, and after Rivoli he was sent to France to deliver the captured colours to the Directory. Hastening back to the front, he accompanied Napoleon in the invasion of Styria in command of the " Guides," who formed the nucleus of the later Consular and Imperial Guard. As chef de brigade he next served in the Egyptian expedition, and won further distinction at Acre and Aboukir. Returning to Europe with Napoleon, he was present at Marengo (1800) as second-in-command of the Consular Guard, and led a brilliant and successful cavalry charge at the close of the day, though its effect on the battle was not as decisive as Napoleon pretended. Promoted general of division in 1802 and marshal of France in 1804, he made the most famous

campaigns of the Grande Armie as colonel-general of the Guard Cavalry (1805, 1806, 1807). In 1805 he had received the Grand Eagle of the Legion of Honour, and in 1809 was created duke of Istria. With the outbreak of the Peninsular War, Marshal Bessieres had his first opportunity of an independent command, and his crushing victory over the Spaniards at Medina del Rio Seco (1808) justified Napoleon's choice. When disaster in other parts of the theatre of war called Napoleon himself to the Penin- sula, Bessieres continued to give the emperor the very greatest assistance in his campaign. In 1809 he was again with the Grande Armie in the

Danube valley. At Essling his repeated and desperate charges checked the Austrians in the full tide of their success. At Wagram he had a horse killed under him. Replacing Bernadotte in the command of the Army of the North, a little later in the same year, the newly-created duke of Istria successfully opposed the British Walcheren expedition, and in 1811 he was back again, in a still more important command, in Spain. As Massena's second-in-command he was present at the battle of Fuentes d'Onoro, but Napoleon never detached him for very long, and in 1812 he commanded the Guard Cavalry at Borodino and in the retreat from Moscow. Wherever engaged he won further distinction, and at the beginning of the 1813 campaign he was appointed to the command of the whole of Napoleon's cavalry. Three days after the opening of the cam- paign, while reconnoitring the defile of Poserna-Rippach, Bessieres was killed by a musket-ball. Napoleon, who deeply felt the loss of one of his truest friends and ablest commanders, protected his children, and his eldest son was made a member of the Chamber of Peers by Louis XVIII. As a commander, especially of cavalry, Bessieres left a reputation excelled by very few of Napoleon's marshals, and his dauntless courage and cool judgment made him a safe leader in independent com- mand. He was personally beloved to an extraordinary extent amongst his soldiers, and (unlike most of the French generals of the time) amongst his opponents. It is said that masses were performed for his soul by the priests of insurgent Spain, and the king of Saxony raised a monument to his memory.

His younger brother, Bertrand, Baron Bessieres (1773- 1855), was a distinguished divisional leader under Napoleon. After serving with a good record in Italy, in Egypt and at Hohenlinden, he had a command in the Grande Armie, and in 1808 was sent to Spain. He commanded a division in Catalonia and played a notable part at the action of Molins de Rey near Barcelona. Disagreements with his superior, General Duhesme, led to his resignation, but he subsequently served with Napoleon in all the later campaigns of the empire. Placed on the retired list by the Bourbons, his last public act was his defence of the unfortunate Ney. The rest of his long life was spent in retirement.

BESSUS, satrap of Bactria and Sogdiana under Darius III. In the battle of Gaugamela (1st of October 331) he commanded the troops of his satrapy. When Alexander pursued the Persian king on his flight to the East (summer 330), Bessus with some of the other conspirators deposed Darius and shortly afterwards killed him. He then tried to organize a national resistance against the Macedonian conqueror in the eastern provinces, proclaimed himself king and

adopted the name Artaxerxes. But he was taken prisoner by treachery in the summer of 329. Alexander sent him to Ecbatana, where he was condemned to death. Before his execution his nose and ears were cut off, according to the Persian custom; we learn from the Behistun inscription that Darius I. punished the usurpers in the same way.

BEST, WILLIAM THOMAS (1826-1897), English organist, the son of a solicitor, was born at Carlisle on the 13 th of August 1826. Having decided upon a musical career, he received his first instruction from the cathedral organist. He applied himself especially to Bach's music, and became a player of great skill. His successive appointments were to Pembroke chapel, Liver- pool, 1840; to a church for the blind, 1847, and the Liverpool Philharmonic Society, 1848. For a short time (1854-1855) he was in London at the Panopticon in Leicester Square, the church of St Martin-in-the-Fields, and Lincoln's Inn chapel. In 1855

he returned to Liverpool as organist of St George's Hall, where his performances rapidly became famous throughout England. Ill-health compelled him at last to retire in 1894. He was engaged as solo organist at all the Handel festivals at the Crystal Palace, and also as organist at the Albert Hall, where he in- augurated the great organ in 187 1. He had been in the receipt of a civil list pension of £100 a year since 1880, and in 1890 went to Australia to give organ recitals in the town hall of Sydney. Best died at Liverpool on the 10th of May 1897.

His command over all the resources of his own instrument was masterly; his series of Saturday recitals at St George's Hall, carried on for many years, included the whole field of organ music, and of music that could be arranged for the organ, ancient and modern; and his performances of Bach's organ works were particularly fine. His own compositions for the organ, chiefly comprised in the publication entitled Organ Pieces for Church Use, have a strong and marked individuality. Best, unlike many soloists, was an all-round musician, and fully acquainted with every branch of the art. His bust, by Conrad Dressier, has been placed on the platform in front of the Liver- pool organ, as a memorial of his long series of performances there.

BESTIA, the name of a family in ancient Rome, of which the following were the most distinguished.

1. Lucius Calpurnius Bestia, Roman tribune of the people in 121

B.C., consul in 111. Having been appointed to the command of the operations against Jugurtha, he at first carried on the campaign energetically, but soon, having been heavily bribed, concluded a disgraceful peace. On his return to Rome he was brought to trial for his conduct and con- demned, in spite of the efforts of Marcus Scaurus who, though formerly his legate and equally guilty, was one of the judges. He is probably identical with the Bestia who encouraged the Italians in their revolt, and went into exile (90) to avoid punish- ment under the law of Q. Varius, whereby those who had secretly or openly aided the Italian allies against Rome were to be brought to trial (Appian, Bell. Civ. i. 37; Val. Max. viii. 6. 4). Both Cicero and Sallust express a high opinion of Bestia's abilities, but his love of money demoralized him. He is mentioned in a Carthaginian inscription as one of a board of three, perhaps an agricultural commission.

See Sallust, Jugurtha; Cicero, Brutus, xxxiv. 128; for the general history, A. H. J. Greenidge, Hist, of Rome, vol. i. (1904), pp. 346 foil.

2. Lucius Calpurnius Bestia, one of the Catilinarian con- spirators, possibly a grandson of the above. He was tribune elect in 63, and it had been arranged that, after entering upon his office, he should publicly accuse Cicero of responsibility for the impending war. This was to be the signal for the outbreak of revolution. The conspiracy, however, was put down and Bestia had to content himself with delivering a violent attack upon the consul on the expiration of his office. This Bestia is probably not the Lucius Calpurnius Bestia, aedile, and a candidate for the praetorship in 57. He was accused of bribery during his candi- dature, and, in spite of Cicero's defence, was condemned. In 43 he attached himself to the party of Antony, apparently in the hope of obtaining the consulship.

Sallust, Catiline, xvii. 43; Appian, Bell. Civ. ii. 3; Cicero, Ad Q. Fr. ii. 3, 6.

BESTUZHEV-RYUMIN, ALEXIUS PETROVICH, Count (1693-1768), grand chancellor of Russia, the second son of Count Peter Bestuzhev, the early favourite of the empress Anne, was born at Moscow on the 1st of June 1693. Educated abroad, with his elder brother Mikhail, at Copenhagen and Berlin, he especially distinguished himself in languages and the applied sciences. Peter the Great, in 1712, attached him to Prince Kurakin at the Utrecht Congress that he might learn diplomacy, and for the same reason permitted him in 17 13 to enter the service of the elector of Hanover. George I. took him to

London in 17 14, and sent him to St Petersburg as his accredited minister with a notification of his accession. Bestuzhev then returned to England, where he remained four years. It was the necessary apprenticeship to his brilliant diplomatic career. His passion for intrigue is curiously illustrated by his letter to the tsarevich

BESTUZHEV-RYUMIN, A. P.

Alexius at Vienna, assuring his " future sovereign " of his devotion, and representing his sojourn in England as a deliberate seclusion of a zealous but powerless well-wisher. This extra- ordinary indiscretion might well have cost him his life, but the tsarevich fortunately destroyed the letter. 1 On his return to Russia he served for two years without any salary as chief gentleman of the Bedchamber at the court of Anne of Courland, and in 17 21 succeeded Vasily Dolgoruki as Russian minister at Copenhagen. Copenhagen was then a whirlpool of diplomatic intrigue, for George I. was endeavouring to arm the northern powers against Peter the Great, and this it was Bestuzhev's mission to counteract. On the occasion of the peace of Nystad, which terminated the 21 years' war between Russia and Sweden, Bestuzhev designed and struck a commemorative medal with a panegyrical Latin inscription, which so delighted Peter (then at Derbent) that he sent a letter of thanks written with his own hand and his portrait set in brilliants. It was at this time too that the many-sided Alexius invented his famous " drops," or tinclura toniconervina Bestuscheffi, the recipe of which was stolen by the French brigadier Lamotte, who made his fortune by introducing it at the French court, where it was known as Elixir d'Or.

The sudden death of Peter the Great seriously injured Bestu- zhev's prospects. For more than ten years he remained at Copen- hagen, looking vainly towards Russia as a sort of promised land from which he was excluded by enemies or rivals. He rendered some importa.it services, however, to the empress Anne, for which he was decorated and made a privy councillor. He also won the favour of Biren, and on the tragic fall of Artemy Volu- insky in 1739 was summoned home to take his place in the council. He assisted Biren to obtain the regency in the last days of the empress Anne, but when his patron fell three weeks later, his own position became extremely precarious. His chance came when the empress Elizabeth, immediately after her acces- sion, summoned him back to court, and appointed him vice-chancellor. For the next twenty years, during a period of exceptional difficulty, he practically controlled the foreign policy of Russia. Bestuzhev rightly recognized that, at this time, France was the natural enemy of Russia. The interests of the two states in Turkey,

Poland and Sweden were diametrically opposed, and Russia could never hope to be safe from the intrigues of France in these three borderlands. All the enemies of France were thus necessarily the friends of Russia, and her friends Russia's enemies. Consequently Great Britain, and still more Austria, were Russia's natural allies, while the aggressive and energetic king of Prussia was a danger to be guarded against. It was, therefore, the policy of Bestuzhev to bring about a quad- ruple alliance between Russia, Austria, Great Britain and Saxony, to counterpoise the Franco-Prussian league. But he was on dangerous ground. The empress herself was averse from an alliance with Great Britain and Austria, whose representatives had striven to prevent her accession; and many of her personal friends, in the pay of France and Prussia, took part in innumer- able conspiracies to overthrow Bestuzhev. Nevertheless, step by step, Bestuzhev, aided by his elder brother Mikhail, carried out his policy. On the nth of December 1742, a defensive alliance was concluded between Great Britain and Russia. Bestuzhev had previously rejected with scorn the proposals of the French government to mediate between Russia and Sweden on the basis of a territorial surrender on the part of the former; and he conducted the war so vigorously that by the end of 1742 Sweden lay at the mercy of the empress. At the peace congress of Abo (January- August 1743) he insisted that the whole of Finland should be ceded to Russia, by way of completing the testament of Peter the Great. But the French party contrived to get better terms for Sweden, by artfully appealing to the empress's fondness for the house of Holstein. The Swedes, at the desire of Elizabeth, accepted Adolphus Frederick, duke of Holstein, as their future king, and, in return, received back Finland, with the exception of a small strip of land up to the river Kymmene. Nor could

1 A copy of the letter was taken by way of precaution, beforehand, by the Austrian ministers, and this copy is still in the Vienna archives.

Bestuzhev prevent the signing of a Russo-Prussian defensive alliance (March 1743); but he deprived it of all political signifi- cance by excluding from it the proposed guarantee of Frederick's Silesian conquests. Moreover, through Bestuzhev's efforts, the credit of the Prussian king (whom he rightly regarded as more dangerous than France) at the Russian court fell steadily, and the vice-chancellor prepared the way for an alliance with Austria by acceding to the treaty of Breslau (1st of November 1743). A bogus conspiracy, however, got up by the Holstein faction, aided by France and

Prussia, who persuaded Elizabeth that the Austrian ambassador was intriguing to replace Ivan VI. on the throne, alienated the empress from Austria for a time; and Bestuzhev's ruin was regarded as certain when, in 1743, the French agent, the marquis de La Chetardie, arrived to reinforce his other enemies. But he found a friend in need in M. L. Vorontsov, the empress's confidant, who shared his political views." Still his position was most delicate, especially when the betrothal between the grand-duke Peter and Sophia of Anhalt- Zerbst (afterwards Catharine II.) was carried through against his will, and Elizabeth of Holstein, the mother of the bride, arrived in the Prussian interests to spy upon him. Frederick II., conscious of the instability of his French ally, was now eager to contract an offensive alliance with Russia; and the first step to its realization was the overthrow of Bestuzhev, " upon whom," he wrote to his minister Axel von Mardefeld, " the fate of Prussia and my own house depends." But Bestuzhev succeeded, at last, in convincing the empress that Chetardie was an impudent intriguer, and on the 6th of June 1744, that diplomatist was ordered to quit Russia within twenty-four hours. Five weeks later Bestuzhev was made grand chancellor (July 15th). Before the end of the year Elizabeth of Holstein was also expelled from Russia, and Bestuzhev was supreme.

The attention of European diplomacy at this time was con- centrated upon the king of Prussia, whose insatiable acquisitive- ness disturbed all his neighbours. Bestuzhev's offer, communi- cated to the British government at the end of 1745, to attack Prussia if Great Britain would guarantee subsidies to the amount of some £6,000,000, was rejected as useless now that Austria and Prussia were coming to terms. Then he turned to Austria, and on the 22nd of May 1746, an offensive and defensive alliance was concluded between the two powers manifestly directed against Prussia. In 1747, alliances were also concluded with Denmark and the Porte. At the same time Bestuzhev resisted any rapprochement with France, and severely rebuked the court of Saxony for its intrigues with that of Versailles. About this time he was hampered by the persistent opposition of the vice- chancellor Mikhail Vorontsov, formerly his friend, now his jealous rival, who was secretly supported by Frederick the Great. In 1748, however, he got rid of him by proving to the empress that Vorontsov was in the pay of Prussia. The hour of Bestuzhev's triumph coincided with the peace congress of Aix- la-Chapelle, which altered the whole situation of European politics and introduced fresh combinations, the breaking away of Prussia from France and a rapprochement between England and Prussia, with the inevitable corollary of an alliance between P'rance and the enemies of Prussia.

Bestuzhev's violent political prejudices at first prevented him from properly recognizing this change. Passion had always been too large an ingredient in his diplomacy. His Anglomania also misled him. His enemies, headed by his elder brother Mikhail and the vice- chancellor Vorontsov, powerless while his diplomacy was faultless, quickly took advantage of his mistakes. When, on the 16th of January 1756, the Anglo-Prussian, and on the 2nd of May the Franco-Austrian alliances were concluded, Vorontsov advocated the accession of Russia to the latter league, whereas Bestuzhev insisted on a subsidy treaty with Great Britain. But his in- fluence was now on the wane. The totally unexpected Anglo- Prussian alliance had justified the arguments of his enemies that England was impossible, while his hatred of France prevented him from adopting the only alternative of an alliance with her. To prevent undergound intrigues, Bestuzhev now proposed the erection of a council of ministers, to settle all important

affairs, and at its first session (i4th~3oth of March) an alliance with Austria, France and Poland against Frederick II. was proposed, though Bestuzhev opposed any composition with France. He endeavoured to support his failing credit by a secret alliance with the grand-duchess Catherine, whom he proposed to raise to the throne instead of her Holstein hus- band, Peter, from whom Bestuzhev expected nothing good either for himself or for Russia. The negotiations were conducted through the Pole Stanislaus Poniatowski. The accession of Russia to the anti-Prussian coalition (1756) was made over his head, and the cowardice and incapacity of Bestuzhev's friend, the Russian commander-in-chief, Stephen Apraksin, after the battle of Gross-Jagersdorf (1757), was made the pretext for overthrowing the chancellor. His unwillingness to agree to the coalition was magnified into a determination to defeat it, though it is quite obvious that he could only gain by the humilia- tion of Frederick, and nothing was ever proved against him. Nevertheless he was deprived of the chancellorship and banished to his estate at Goretovo (April 1759), where he remained till the accession of Catharine II., who recalled him to court and created him a field marshal. But he took no leading part in affairs and died on the 21st of April 1768, the last of his race.

See The Sbornik of the Russian Historical Society, vols. 1, 3, 5, 7, 12, 22, 26, 66, 79, 80, 81, 85-86, 91-92, 96, 99, 100, 103 (St Petersburg, 1870, &c.) ; Politische Correspondenz Friedrichs des Grossen, vols. 1-21 (Berlin, 1879-1904.); R. Nisbet Bain, The

Daughter of Peter the Great (London, 1899). (R. N. B.)

BESTUZHEV-RYUMIN, MIKHAIL PETROVICH, Count (1688-1760), Russian diplomatist, elder brother of the foregoing, was educated at Berlin, and was sent by Peter the Great to represent Russia at Copenhagen in 1705. In 1720 he was appointed resident at London at a time when the English court was greatly inflamed against Peter, who was regarded as a dangerous rival in the Baltic; and Bestuzhev was summarily dismissed for protesting against the lately-formed Anglo-Swedish alliance. On the conclusion of the peace of Nystad in 1721 he was sent as ambassador to the court of Stockholm. His first official act was the signing of a defensive alliance between Russia and Sweden for twelve years, in 1724. He was success- ively transferred to Warsaw (1726) and to Berlin (1730), but returned to Stockholm in 1732. How far Bestuzhev was con- cerned in the murder (June 28th, 1739) of the Swedish diplomatic agent Sinclair in Silesia on his journey home from Constantinople, it is difficult to say. It is certain that Bestuzhev sent informa- tion to his court of Sinclair's mission, which was supposed to be hostile to Russia, and even supplied the portrait of the envoy for recognition. The Swedish authorities are unanimous in describing Bestuzhev as the arch-plotter in this miserable affair; yet, while the active agents were banished to Siberia, Bestuzhev was not even censured. The Sinclair murder led ultimately to the Swedish-Russian War of 1741, when Bestuzhev was transferred first to Hamburg and subsequently to Hanover, where he endeavoured to conclude an alliance between Great Britain and Russia. On his return to Russia in 1743, he was made grand marshal, and married Anna, the widow of Paul Yaguzhinsky, Peter the Great's famous pupil. A few months later his wife was implicated in a bogus conspiracy got up by the French ambassador, the marquis de La Chetardie, to ruin the Bestuzhevs (see Bestuziiev-Ryumin, Alexius), and after a public whipping, had her tongue cut out and was banished to Siberia. Thither Bestuzhev had not the manhood to follow her, but went abroad, and subsequently resumed his diplomatic career. His last and most brilliant mission was to Versailles, shortly after the conclusion of the coalition against Frederick the Great, where he cut a great figure. He died at Paris on the 26th of February 1760.

See Robert Nisbet Bain, The Daughter of Peter the Great (London, 1899) ! Mikhail Sergyievich, History of Russia (Rus.), vols, xv.-xxii. (2nd ed., St Petersburg, 1897). (R. N. B.)

BET and BETTING (probably from 0. Fr. abeter, to instigate, Eng. " abet," i.e. with money). To " bet " is to stake money or something

valuable on some future contingency. Betting in some form or other has been in vogue from the earliest days,

commencing in the East with royal and noble gamblers, and gradually extending itself westwards and throughout all classes. In all countries where the English tongue is spoken betting is now largely indulged in; and in the United Kingdom it spread to such an extent amongst all grades of society, during the 19th century, that the interference of the legislature was necessary (see Gaming and Wagering). Bets can, of course, be made on any subject, and are a common method of backing one's opinion or skill, whether at games of cards or in any other connexion; but the Commonest form of betting is associated with the turf. In the early days of horse-racing persons who wished to bet often failed to gratify their inclination because of the difficulty of finding any one ready to wager. To obviate this difficulty the professional bookmaker arose. It was perceived that if a man laid money against a number of horses, conducting his business on discreet principles, he would in all probability receive enough to pay the bettor who was successful and to leave a sur- plus for himself; for the " bookmaker," as the professional betting man came to be called, had enormous advantages in his favour. He was presumably shrewd and wary, whereas many of those with whom he dealt were precisely the opposite, and benefit arose to him from the mistakes and miscalculations of owners and trainers of horses, and from the innumerable acci- dents which occur to prevent anticipated success; moreover, if he carried out the theory of his calling he would so arrange his book, by what is called " betting to figures," that the money he received would be more than he could possibly be called upon to pay. In practice, of course, this often does not happen, because " backers " will sometimes support two or three horses in a race only, and the success of one may result in loss to the bookmaker; but in the long run it has been almost invariably found that the bookmaker grows rich and that the backer of horses loses money. It is the bookmaker who regulates the odds, and this he does, sometimes by anticipating, sometimes by noting, the desire of backers to support certain animals. Such things as stable secrets can scarcely be said to exist at the present time; the bookmaker is usually as well able as any one else to estimate the chances of the various horses engaged in races. Notwithstanding that the reports of a trial gallop are of comparatively little value to any except the few persons who know what weights the animals carried when tried, the bookmaker is extraordinarily keen, and frequently successful, in his search for information; and on this the odds depend.

Betting in connexion with horse-racing is of two kinds: " post," when wagering does not begin until the numbers of the runners are hoisted on the board; and " ante-post," when wagering opens weeks or months before the event; though of this latter there is far less than was formerly the case, doubtless for the reason that before the introduction of so many new and valuable stakes attention was generally concentrated on a comparatively small number of races. Bets on the Derby, the Oaks and the St Leger were formerly common nearly a year before the running of the races, and a few handicaps, such as the Chester Cup, used to occupy attention months beforehand; the weights, of course, being published at a much longer interval prior to the contest than is at present the rule. As regards ante- post betting, bookmakers have their own ideas as to the relative prospects of the horses entered. A person who wishes to back a horse asks the price, and accepts or declines, as the case may be. If the bet is laid it will probably be quoted in the newspapers, and other persons who propose to wager on the race are so likely to follow suit that it is shrewdly suspected that in not a few cases bets are quoted which never have been laid, in order to induce the backers to speculate. According to the public demand for a horse the price shortens. If there is little or no demand the odds increase, the market being almost entirely regulated by the money; so that if a great many people bet on a certain animal the odds become shorter and shorter, till in many cases instead of laying odds against a horse, the bookmaker comes to take odds, that is, to agree to pay a smaller sum than he would receive from the backer if the animal lost. Post betting is conducted l on very much the same principles. . When the numbers ate

hoisted bookmakers proclaim their readiness to lay or take certain odds, which vary according to the demand for the differ- ent animals. Backers are influenced by many considerations: by gossip, by the opinions of writers on racing, and in many cases, unfortunately, by the advice of " tipsters," who by advertisements and circulars profess their ability to indicate winners, a pretence which is obviously absurd, as if these men possessed the knowledge they claim, they would assuredly keep it to themselves and utilize it for their own private purposes.

The specious promises of such men do infinite mischief, as they so often appeal with success to the folly and gullibility of the ignorant,

and in recent years the extent to which betting has grown has resulted in attempts to check it by organized means. A society for the purpose was formed in England called the Anti-Gambling League. A bookmaker named Dunn was summoned in 1897 for betting in Tattersall's enclosure, which it was contended contravened the Betting House Act of 1853. This act had been aimed against what were known as " list houses," establishments then kept by bookmakers for betting pur- poses, and associated with many disgraceful scandals. In the preamble to his bill Lord Cockburn began by remarking that " Whereas a new form of betting has of late sprung up," and the Anti-Gambling League sought to argue that this included a form of betting which had not sprung up of late but had on the con- trary been carried on without interference for many generations. The divisional court of the queen's bench (Hawke v. Dunn, 13 T.L.R. 281) held that such betting was an infringement of the act, and that the enclosure was a " place " within the meaning of the act, and had been used by the respondent for the purpose of betting with persons resorting thereto, and that he was liable to be convicted. The case was remitted to the justices, who convicted the defendant. A somewhat similar case was decided on the same day (M'Inany v. Hildreth, 1897, 13 T.L.R. 285), in which it was held that a professional book- maker who went to a place known as the ". pit heap " at Jarrow, to which the public had access at all times, and made bets with persons assembled there, was properly convicted, and that the " pit heap " itself and the place where he stood were " places " within the meaning of the act. It was afterwards held by the court of appeal (Powell v. Kempton Park Racecourse Co., Ltd., 1897, 2 Q.B. 242), in an action brought to restrain a racecourse company from opening or keeping an enclosure on a racecourse by allowing it to be used by bookmakers, that the words " other place " must be construed as meaning a defined place, that the user of such a place implied some exclusive right in the user against others, and that the racecourse owners had not been guilty of permitting the enclosure to be used in the manner prohibited by the act of 1853. The decision in Hawke v. Dunn was disapproved of; and the House of Lords afterwards affirmed the decision of the court of appeal.

The Street Betting Act 1906 enacted that any person frequent- ing or loitering in streets or public places for the purpose of book- making, or betting, or wagering, should be liable on summary conviction, in the case of a first offence, to a fine not exceeding ten pounds, in the case of a second offence, to a fine not exceeding twenty pounds, and in the case of a third or subsequent offence, or in any case where he is proved to have committed the offence of having a betting

transaction with a person under the age of sixteen years, to a fine, on conviction on indictment, not ex- ceeding fifty pounds or to imprisonment with or without hard labour for a term not exceeding six months. On summary conviction the fine is a sum not exceeding thirty pounds or imprisonment with or without hard labour for a term not ex- ceeding three months. A wide definition is given to the words " street " and " public place," and racecourses are expressly exempted from the operation of the act.

On all French racecourses (since 1866), as on others nearly everywhere else on the continent, and likewise in the British colonies, a system of betting known as the Pari-Mutuel or Totalizator, is carried on. Rows of offices are established behind or near the stands, on each of which lists are exhibited containing the numbers of the horses that are to run in the

coming race. At some of these the minimum wager is five francs, at others ten, twenty, fifty, one hundred, five hundred and in some cases a thousand. The person who proposes to bet goes to the clerk at one of these offices, mentions the number, as indicated on the card, of the horse he wishes to back, and states whether he desires to bet on it to win or for a place only. He receives a voucher for his money. After the race the whole amount collected at the various offices is put together and divided after a percentage has been deducted for the administration and for the poor. As soon as this has been done, the money is divided and the prices to be paid to winners are exhibited on boards. These prices are calculated on a unit of ten francs. Thus, for instance, if the winner is notified as bringing in twenty- five francs, the meaning is that the backer receives his original stake of ten and fifteen in addition, the money being paid immediately by another clerk attached to the office at which the bet was made. The great French municipalities derive considerable revenue in relief of rates from the Paris Mutuels. In Japan this system was made illegal in 1908.

BETAKNE (Oxyneurine, Lycine), C5H13NO3, a substance discovered in the sugar beet (Beta vulgaris) in 1869 by C. Scheibler (Bet., 1869, 2, p. 292). It is also found in cotton seed, in the vetch and in wheat sprouts (E. Schulz and S. Frankfurt, Ber., 1893, 26, p. 21 51). It may be synthetically prepared by oxidizing choline with chromic acid (0. Liebreich, Ber., 1869, 2, 13), (CH3)3N(OH)-CH 2 CH 2 OHˆC 6 H 18 N03-|-H 2 0; by heating trimethylamine with monochloracetic acid (Liebreich), (CH 3) 3 N+CH 2 C1-C00H= (CH 3) 3 N(Cl)-CH 2 -COOH (betaine hydrochloride); and by heating amino-acetic acid (glycocoll) with methyl iodide in the

presence of an alkali (P. Griess, Ber., 1875, 8, p. 1406). It crystallizes from alcohol in large deliquescent crystals; and is readily soluble in water, but insoluble in ether. It is a weak base. As is shown by the various syntheses of the base, it is the methyl hydroxide of dimethyl glycocoll. This free base readily loses water on heating and gives an internal

anhydride of constitution (CH 3)3N<ˆ v 'q 2 ˆ>C0, which is the

type of the so-called " betaines." These organic betaines are internal anhydrides of carboxylic acids, which contain an ammonium hydroxide group in the a-position. A. Hantzsch (Ber., 1886, 19, p. 31) prepared the betaines of nicotinic, picolinic and collidine carboxylic acids from the potassium salts of the acids, by treatment with methyl iodide, followed by moist silver oxide. The reaction may be shown as follows: —

*S HacVˆI H 3 C*tf—0*

The methyl betaine of nicotinic acid is identical with the alkaloid trigonelline, which was discovered in 1885 by E. Jahns in the seeds of Trigonellafaenum-graecum (Ber., 1885, 18, p. 2518). It has also been obtained from nicotine by A. Pictet by oxidizing the methyl hydroxide of nicotine with potassium permanganate (Ber., 1897, 30, p. 2117).

Substances closely related to betaine are choline, neurine and muscarine. Choline (bilineurine, sincaline), (Gr. xoXit, bile), C 6 H 1S N0 2 or HO-CH 2 -CH 2 -N(CH 3) 3 -OH, first isolated by A. Strecker in 1862 (Ann. 123, p. 353; 148, p. 76), is found in the bile, in brain substance, and in yolk of egg in the form of lecithin, a complex ester of glycerin with phosphoric acid and the fatty acids. It is also found in combination with sinapic acid in sinapin, the glucoside obtained from white mustard, and can be obtained from this glucoside by hydrolysis with baryta water,

C, 6 H 23 N0 5 +2H 2 = C,H 15 N0 2 + C u H 12 6 . Sinapin. Choline. Sinapic acid.

It can be synthetically prepared by the action of trimethylamine on an aqueous solution of ethylene oxide (A. Wurtz, Ann. Suppl., 1868, 6, p. 201). If forms deliquescent crystals of strongly alkaline reaction, and absorbs carbon dioxide from the air. It is not poisonous. By continued boiling of its aqueous solution, it is resolved into glycol and trimethylamine.

Neurine, trimethyl vinyl ammonium hydroxide (Gr. vevpov,

nerve), CH 2 :CH-N(CH 3)3-OH, is a product of the putrefaction of

albumen. It may be prepared by the action of moist silver oxide on

ethylene dibromide and trimethylamine,

CH 2 Br-CH 2 Br- > CH 2 BrCH 2 N(CH 3) 3 Br-ˆCH 2 :CH-N(CH 8) 8 -OH.

It is a crystalline solid, very soluble in water, and is strongly basic and very poisonous. Muscarine, C5H15NO3, is an exceedingly poison- ous substance found in many fungi. It may be obtained synthetic- ally by oxidizing choline with dilute nitric acid (0. Schmiedeberg, Jahresb., 1876, p. 804). The exact constitution has not yet been definitely determined.

BETEL NUT. The name betel is applied to two different plants, which in the East are very closely associated in the purposes to which they are applied. The betel nut is the fruit of the Areca or betel palm, Areca Catechu, and the betel leaf is the produce of the betel vine or pan, Chavica Betel, a plant allied to that which yields black pepper. The Areca palm is a native of the Malay Peninsula and Islands and is extensively cultivated over a wide area in the East, including southern India, Ceylon, Siam, the Malay Archipelago and the Philippine Islands. It is a graceful tree with a straight, slender, unbranched stem reach- ing 40 or 50 ft. in height and about i\ ft. in circumference, and bearing a crown of 6-9 very large spreading pinnate fronds. The fruit is about the size of a small hen's egg, and within its fibrous rind is the seed or so-called nut, the albumen of which is very hard and has a prettily mettled grey and brown appearance. The chief purpose for which betel nuts are cultivated and col- lected is for use as a masticatory, — their use in this form being so widespread among Oriental nations that it is estimated that one- tenth of the whole human family indulge in betel chewing. For this use the fruits are annually gathered between the months of August and November, before they are quite ripe, and deprived of their husks. They are prepared by boiling in water, cutting up into slices, and drying in the sun, by which treatment the slices assume a dark brown or black colour. When chewed a small piece is wrapped up in a leaf of the betel vine or pan, with a pellet of shell lime or

chunam; and in some cases a little card- amom, turmeric or other aromatic is added. The mastication causes a copious flow of saliva of a brick-red colour, which dyes the mouth, lips and gums. The habit blackens the teeth, but it is asserted by those addicted to it that it strengthens the gums, sweetens the breath and stimulates the digestive organs. Among the Orientals betel is offered on ceremonial visits in the same manner as wine is produced on similar occasions by Europeans. Betel nuts are further used as a source of catechu, which is procured by boiling the nuts in water. The water of the first boiling becomes red and thick, and when this is inspissated after the removal of the nuts it forms a catechu of high astringency and dark colour called in Bombay " Kossa." The nuts are again boiled, and the inspissated juice of the second decoction yields a weaker catechu of a brown or reddish colour. Betel nuts have been used by turners for ornamental purposes, and for coat buttons on account of the beauty of their structure. At one time they were supposed to be useful as a vermifuge. The nuts of other species of Areca are used by the poorer classes in the East as substitutes for the genuine betel nut.

The alkaloid arecaidine, C7H11NO2, occurs in areca or betel nuts, together with three other alkaloids: arecoline, C 8 Hi 3 N0 2 , guvacine, C 6 H 9 N02, and arecaine, CyHuNO. Arecaidine forms white crystals easily soluble in water, and difficultly soluble in alcohol. Chemically it is methyl-tetrahydro-nicotinic acid. Dehydration results in the formation of a " betai'ne," which is a tetrahydro-trigonelline (see Betaine). Arecoline is an oil, and the physiological action of the betel nut is alone due to this substance. Chemically it is the methyl ester of arecaidine. Guvacine, named from " guvaca," an Indian designation of the betel palm, forms white crystals. It is a secondary base, but its constitution is uncertain. Arecaine is ra-methyl- guvacine.*

BETHANY (mod. el-' Azariyeh) , a village nearly 2 m. E.S.E. from Jerusalem, on the eastern slope of the Mount of Olives, 2208 ft. above the sea. It is interesting as the residence of Lazarus and his sisters, and a favourite retreat of Jesus (see especially John xi., which describes the miracle of the resurrection of Lazarus at this place). From the 4th century down to the time of the Mahommedan invasion several ecclesiastical buildings were erected on the spot, but of these no distinct traces remain. El-'Azariyeh is a poor village of about thirty families, with few marks of antiquity; there is no reason to believe that the houses of Mary and Martha and of Simon the Leper, or the sepulchre of Lazarus, still shown by the monks, have any claim to the

names they bear. Another Bethany (with the alternative reading Bethabara) is mentioned in John i. 28, as " beyond Jordan "; it has not been identified.*

BETHEL (Heb. " House of God "), originally called Luz, an ancient city of Palestine, on the N.W. border of the tribe of Benjamin, n m. N. of Jerusalem and nearly 2900 ft. above sea-level. From very early times it was a holy place, a circum- stance probably due primarily to a very extraordinary group of boulders and rock-outcrops north of the town. Abraham recognized its sanctity (Gen. xii. 8); Jacob, in ignorance, slept in the sacred enclosure and was granted a vision (" Jacob's ladder," Gen. xxviii). For a while the ark seems to have been deposited here (Judg. xx. 27), and it was a place for consulting the oracle (Judg. xx. 18). At the ■ secession of the northern kingdom under Jeroboam, Bethel became a royal residence and a national shrine (1 Kings xii. 29-31, Amos vii. 13), for which its position at the junction of main roads from N. to S. and E. to W. well fitted it. It was taken from Jeroboam by Abijah, king of Judah (2 Chr. xiii. r9). It seems to have con- tinued to flourish down into the Christian era; remains of its ecclesiastical buildings still exist. The present village, which bears the name of Beitin, occupies about three or four acres, and has a population of 2000.

BETHENCOURT, JEAN DE (c. 1360-1422), French explorer, belonged to a noble family of Normandy, and held important offices at the court of Charles VI., king of France. His spirit was fired by hearing of the deeds of explorers and adventurers, and having formed a plan to conquer the Canary Islands he raised some money by pledging his Norman estates, and sailed from La Rochelle on the 1st of May 1402 with two ships, com- manded by himself and Gadifer de la Salle. He was delayed by a mutiny off the coast of Spain, but reached the island of Lanzarote in July. Unable to carry out his project of con- quest, he left his men at the Canaries and went to seek help at the court of Castile. He obtained men and provisions from Henry III. king of Castile, through the good offices of his uncle, Robert de Braquemont, who had considerable influence with Henry; he also received the title of king, and did homage to Henry for his future conquests. Returning to the Canaries in 1404 he found that Gadifer de la Salle had conquered Lanzarote and Fuerteventura, and explored other islands. La Salle, un- willing to accept a position of inferiority, left the Canaries and appealed unsuccessfully for redress at the court of Castile. Bethencourt was unable to complete his work of conquest and exploration. In 1405 he visited Normandy, and returned with fresh colonists who occupied Hierro. In December 1406 he left the islands to the government of his

nephew, Maciot de Bethen- court, reserving for himself the royal title and a share in any profits obtained. He returned to Normandy, where he appears to have spent the remainder of his days. He died in 1422, and was buried in the church of Grainville-la-Teinturiere. Bethen- court wrote a very untrustworthy account of his " conquest of the Canary Islands," Le Canarien, livre dc la conquete et conversion ses Canaries. This has been published with introduction and notes by G. Gravier (Rouen, 1874), and an English translation was edited by R. H. Major for the Hakluyt Society (London,

1872).

See also Canary Islands, for the controversy as to the relations between Bethencourt and La Salle.

BETHESDA (i.e. " House of Mercy," John v. 2), better perhaps Bethzatha or Bethsaida, a pool or public bath in Jerusalem, where miraculous cures were believed to be performed. The following identifications have been suggested: Birket Isra'il, near St Stephen's gate; a large cistern, near St Anne's church; the " Twin Pools," north of the Haram (the ancient Temple area); the Hammam esh-ShiJa', or pool of healing, west of the Haram; the Virgin's fountain, south of the Haram; and the " Pool of Siloam." Which, if any, of these identifications is correct, it is impossible to say.

BETHESDA, an urban district of Carnarvonshire, N. Wales, 5 m. from Bangor, by a branch of the London & North-Western railway. Pop. (1901) 5281. It lies near the lower end of the

fine Nant Ffrancon (valley of the Ogwen stream). The scriptural name is due, as often in Wales, to the village or hamlet taking its title from the Nonconformist church. Here are extensive slate quarries belonging to Lord Penrhyn. A narrow-gauge railway connects these with Port Penrhyn, at the mouth of the stream Cegid (hemlock, " cicuta "), which admits the entry of vessels of 300 tons to the quay at low water.

BETH-HORON (" the place of the hollow way "), the name of two neighbouring villages, upper and lower Beth-horon, on the ascent from the coast plain of Palestine to the high tableland of Benjamin, which was until the 16th century the high road from Jerusalem to the sea. The two towns thus played a con- spicuous part in Israeli tish

military history (see Josh. x. 10; 1 Sam. xiii. 18; 1 Kings ix. 17; 1 Mace. iii. 13-24, vii. 39 ff., ix. 50). Josephus (Bell. Jud. ii. 19) tells of the rout of a Roman army under Cestius Gallus in a.d. 66. The Talmud states that many rabbis were born in the place. It is now represented by Beit 'Ur-el-foka and Beit 'Ur-et-tahta.

BETHLEHEM (Heb. " House of Bread," or, according to a more questionable etymology, " of [the god] Lakhmu "), a small town in Palestine, situated on a limestone ridge (2550 ft. above sea-level), 5 m. S. of Jerusalem. The neighbourhood produces wheat, barley, olives and vines in abundance. It was occupied in very early times, though the references in Judges xvii., xix., and Ruth 1 are of doubtful date. It was the early home of David and of Joab (2 Sam. ii. 32). It was fortified by Rehoboam, and in the neighbouring inn of Chimham the murderers of Gedaliah took refuge (Jer. xli. 17). Micah (v. 2) and other writers speak of it as Bethlehem-Ephrathah: perhaps Ephrathah was the name of the district. Almost complete obscurity, however, was gathering round it when it became (according to Matt. ii. and Luke ii.) the birthplace of Jesus. The traditional scene of the Nativity, a grotto on the eastern part of the ridge, is alleged to have been desecrated during the reign of Hadrian by a temple of Adonis. In 330 it was enclosed by a basilica built by the orders of the emperor Constantine. This basilica (S. Maria a Praesepio) , which is still standing, was restored and added to by Justinian, and was later surrounded by the three convents successively erected by the Greek, Latin and Armenian Churches (see de Vogiie, Les £glises de la Terre Sainte). Captured by the Crusaders in the nth century, Bethlehem was made an episcopal see; but the bishopric soon sank to a titular dignity. Beside the grotto of the Nativity other traditional sites are shown within the church, such as the Altar of the Magi, the Tomb of Eusebius, the cave wherein Jerome made his translation of the Bible, &c.

There are several monasteries and convents, and British, French and German schools. The village is well built and comparatively clean. The population (8000) has contained few Moslems since the Moslem quarter was destroyed by Ibrahim Pasha, in revenge for the murder of one of his favourites, after the insurrection of 1834. The carving of crucifixes and other sacred mementoes gives employment to a large proportion of the population. In 1850 a dispute arose between France and Russia, in the name of the Latin and Greek Churches respectively, concerning the possession of the key of the chief door of the basilica, and concerning the right to place a silver star, with the arms of France, in the g'lotto of the Nativity. The Porte, after much futile temporizing, yielded to France. The dis- appointment thus

inflicted on Russia was a determining cause of the outbreak of the Crimean War (see Kinglake, Invasion of the Crimea, chap. iii.). [There is a tiny village of the same name in Zebulun, 7 m. N.W. of Nazareth (Josh. xv. 19).]

See 'bibliography under Palestine. For the modern town see Palmer, "Das jetzige Bethlehem," in the Zeitschrift of the Deutsche Palastina-Vtrein, xvii. p. 89. (R. A. S. M.)

BETHLEHEM, a borough of Northampton and Lehigh counties, Pennsylvania, U.S.A., on the N. bank of the Lehigh river, opposite South Bethlehem and 55 m. N. by W. of Phila- delphia. Pop. (1890) 6762; (190c 1 7293 (350 foreign-born); (1910) 12,837. It is served by the Central of New Jersey, the Lehigh & New England, the Lehigh Valley and the Phila-

1 The country of Moab is clearly visible from around Bethlehem.

delphia & Reading railways, and is connected by two long bridges with South Bethlehem. The borough lies on a ridge of ground commanding delightful landscape scenery extending north up the course of the river to the Blue Mountains 20 m. away. In Church Street and its vicinity still stand several specimens of the 17th-century style of architecture of eastern Germany. The same sect that erected these buildings, the Moravians, or United Brethren, maintain here the Moravian College and Theological Seminary, and a well-known school for girls (the Moravian Seminary), founded as a church boarding school in 1749 and reorganized in 1785, for girk of all denominations. During the War of Independence, from December 1776 to April 1777, and from September 1777 to April 1778, the old Colonial Hall in this seminary (built 1748) was used as a general hospital of the continental army. From its roof the famous Moravian trombones were long played on festal or funeral occasions, and later summoned the people to musical festivals. The Moravians have given Bethlehem a national reputation as a musical centre. Only a few years after the city was founded, Benjamin Franklin was strongly impressed with the fine music in its church, and towards the close of the 19th century a choir under the direction of the organist, J. Frederick Wolle, became widely known by rendering for the first time in America Bach's St John Passion (in 1888), followed after short intervals by the St Matthew Passion, the Christmas Oratorio, the Mass in B Minor, and finally by an annual Bach festival continuing for three days, which was discontinued after Wolle's removal to the university of California in 1905. Bethlehem has often been called the American Bayreuth. Among the borough's industrial establishments,

the manufactories of iron and steel are the most important, but it also manufactures brass, zinc, and silk and knit goods. The municipality owns and operates its water- works. Bethlehem was foundec by the Moravians, led by Count Nikolaus Ludwig Zinzendorf, shortly before Christmas in 1741, and the season of the year suggested its name; for the first century of its existence it was almost exclusively a settle- ment of that sect, and it is still their American headquarters. Bethlehem was incorporated as a borough in 1845. In 1904 the borough of West Bethlehem (pop. in 1900, 3465) was consolidated with Bethlehem.

See J. M. Levering, A History of Bethlehem, Pennsylvania (Bethlehem, 1903).

BETHLEHEMITES, a name borne at different times by three orders in the Roman Catholic Church. (1) A community of friars at Cambridge, in 1257, whose habit was distinguished from that of the ordinary Dominicans by a five-rayed red star (in reference to Matt. ii. 9 f). (2) An order of knighthood similar to the Knights of St John, established by Pius II. in 1459 to resist the inroads of the Turks. (3) The Bethlehemite Order of Guate- mala, a nursing community founded in i6so by Pedro Betan- court (d. 1667), extended by the brothers Rodrigo and Antonio of the Cross, and raised to an order by Innocent XL in 1687. They wore a dress like that of the Capuchins, and Clement XI. in 1707 gave them the privileges of the mendicant orders. They spread throughout Central America and Mexico and as far south as Lima, and with the order of sisters, founded in 1668 by Anna Maria del Galdo, were conspicuous for their devotion during times of plague and other contagious diseases. This order became extinct about 1850. The name Bethlehemites has also sometimes been given to the Hussites of Bohemia because their leader preached in the Bethlehem church at Prague.

BETHLEN, GABRIEL (Gabor) (i 580-1 629), prince of Transylvania, the most famous representative of the Iktari branch of a very ancient Hungarian family, was born at Illye, and educated at Szarhegy, at the castle of his uncle Andras Lazar. Thence he was sent to the court of Prince Zsigmond Bathory, whom he accompanied on his famous Wallachian campaign in 1600. Subsequently he assisted Stephen Bocskay to mount the throne of Transylvania (1605), and remained his chief counsellor. Bethlen also supported Bocskay's successor Gabriel Bathory (1608-1613), but the prince became jealous of Bethlen's superior abilities, and he was obliged to take refuge with the Turks.

In 1613 he led a large army against his persecutor, on whose murder by two of his officers that year Bethlen was placed on the throne by the Porte, in opposition to the wishes of the emperor, who preferred a prince who would incline more towards Vienna than towards Constantinople. On the 13th of October 1613, the diet of Klausenburg confirmed the choice of the sultan. In 1 615 Gabor was also officially recognized by the emperor Matthias. Bethlen no sooner felt firmly seated on his throne than he seized the opportunity presented to him by the outbreak of the Thirty Years' War to take up arms in defence of the liberties and the constitution of the extra-Transylvanian Hun- garian provinces, with the view of more effectually assuring his own position. While Ferdinand was occupied with the Bohemian rebels, Bethlen led his armies into Hungary (16 19), and soon won over the whole of the northern counties, even securing Pressburg and the Holy Crown. Nevertheless he was not averse to a peace, nor to a preliminary suspension of hostilities, and negotia- tions were opened at Pressburg, Kassa and Beszterczebanya successively, but came to nothing because Bethlen insisted on including the Bohemians in the peace, whereupon (20th of August 1620) the estates of North Hungary elected him king. Bethlen accepted the title but refused to be crowned, and war was re- sumed, till the defeat of the Czechs at the battle of the White Hill gave a new turn to affairs. In Bohemia, Ferdinand II. took a fearful revenge upon the vanquished; and Bethlen, regarding a continuation of the war as unprofitable, concluded the peace of Nikolsburg (31st of December 162 1), renouncing the royal title on condition that Ferdinand confirmed the peace of Vienna (which had granted full liberty of worship to the Protestants) and engaged to summon a general diet within six months. For himself Bethlen secured the title of prince of the Empire, the seven counties of the Upper Theiss, and the fortresses of Tokaj, Munkacs and Ecsed. Subsequently Bethlen twice (1623 and 1626) took up arms against Ferdinand as the ally of the anti-Habsburg Protestant powers. The first war was concluded by the peace of Vienna, the second by the peace of Pressburg, both confirmatory of the peace of Nikolsburg. After the second of these insurrections, Bethlen attempted a rapprochement with the court of Vienna on the basis of an alliance against the Turks and his own marriage with one of the Austrian archduchesses; but Ferdinand had no con- fidence in him and rejected his overtures. Bethlen was obliged to renounce his anti-Turkish projects, which he had hitherto cherished as the great aim and object of his life, and continue in the

old beaten paths. Accordingly, on his return from Vienna he wedded Catherine, the daughter of the elector of Brandenburg, and still more closely allied himself with the Protestant powers, especially with Gustavus Adolphus of Sweden, who, he hoped, would assist him to obtain the Polish crown. He died before he could accomplish any of his great designs (15th of November 1629), having previously secured the election of his wife Catherine as princess. His first wife, Susannah Karolyi, died in 1622.

Gabriel Bethlen was certainly one of the most striking and original personages of his century. A zealous Calvinist, whose boast it was that he had read the Bible twenty-five tinies, he was nevertheless no persecutor, and even helped the Jesuit Kaldy to translate and print his version of the Scriptures. He was in communication all his life with the leading contemporary statesmen, so that his correspondence is one of the most interest- ing and important of historical documents. He also composed hymns.

The best editions of his correspondence are those by Sandor Sziligyi, both published at Buda (1866 and 1879). The best life of him is that by the Bohemian historian Anton Gindely, Acta et docu- menta historiam Gabrielis Bethleni illustrantia (Budapest, 1890). This work has been largely utilized by Ignae-Acsady in his excellent Gabriel Bethlen and his Court (Hung., Budapest, 1890). (R. N. B.)

BETHNAL GREEN, an eastern metropolitan borough of London, England, bounded N. by Hackney, E. by Poplar, S. by Stepney and W. by Shoreditch. Pop. (1901) 129,680. It is a district of poor houses, forming part of the area commonly known as the " East End." The working population is employed in the making of match-boxes, boot-making, cabinet-making

and other industries; but was formerly largely devoted to silk-weaving, which spread over the district from its centre in Spitalfields (see Stepney). This industry is still maintained. The Bethnal Green museum was opened in 1872. It contains ex- hibits of food and animal products, formerly at South Kensington, entomological collections, &c; and various loan exhibitions are held from time to time. The Museum also housed the Wallace collection until the opening of Hertford House, and the pictures now in the National Portrait Gallery. It stands in public gar- dens; there are several other small open spaces; and some 70 out of the 217 acres of Victoria Park are within the borough. Close by the park there stood, until the 19th century, a house believed to have belonged to the notorious Bishop Bonner, the persecutor of Protestants in the reign of Mary; his name

is still attached to a street here. Among institutions are the missionary settlement of the Oxford House, founded in 1884, with its women's branch, St Margaret's House; the North- Eastern hospital for children, the Craft school und the Leather Trade school. The parliamentary borough of, Bethnal Green has two divisions, each returning one member. The borough council consists of a mayor, 5 aldermen and 30 councillors. Area, 759-3 acres.

BETHUNE (Family). The seigneurs of Bethune, avoues (advocati) of the great abbey of Saint- Vaast at Arras from the nth century, were the ancestors of a great French house whence sprang the dukes of Sully, Charost, Orval, and Ancenis; the marquises of Rosny, Courville and Chabris; the counts of Selles and the princes of Boisbelle and Henrichemont. Conon de Bethune (q.v.), the crusader and poet, was an early forebear. The most illustrious member of the Bethune family was Maxi- milien, baron of Rosny, and afterwards duke of Sully {q.v.), minister of Henry IV. His brother Philip, count of Selles and of Charost, was ambassador to Scotland, Rome, Savoy and Germany, and died in 1649. Hippolyte de Bethune, count of Selles and marquis of Chabris, who died in 1665, bequeathed to the king a magnificent collection of historical documents and works of art. The Charost branch of the family gave France a number of generals during the 17th and 18th centuries.

The last duke of Charost, Armand Joseph de Bethune (1738- 1800), French economist and philanthropist, served in the army during the Seven Years' War, after which he retired to his estates in Berry, where, and also in Brittany and Picardy, he sought to ameliorate the lot of his peasants by abolishing feudal dues, and introducing reforms in agriculture. During the Terror he was arrested, but was liberated after the 9th Thermidor. He was mayor of the 10th arrondissement of Paris under the Consulate, and died at Paris on the 27th of October 1800, of small-pox, contracted during a visit to a workshop for the blind which he had founded. He published essays on the way to destroy mendicancy and to improve the condition of the labourers, and also on the establishment of a fund for rural relief and the organization of rural education. His life throws light on some phases of the ancien regime which are often over- looked by historians. Louis XV. said of Charost, " Look at this man, his appearance is insignificant, but he has put new life into three of my provinces." His only son, Armand Louis de Bethune, marquis de Charost, was beheaded on the 28th of April 1794.

BETHUNE, CONON or Quesnes, DE (c. 1150-1224), French trouvere of Arras, was born about the middle of the 12 th century. He came

about 1 180 to the court of France, where he met Marie de France, countess of Champagne. To this princess his love poems are dedicated, and much of his time was passed at her court where the trouveres were held in high honour. At the French court he met with some criticisms from Queen Alix, the widow of Louis VII., on the roughness of his verse and on his Picard dialect. To these criticisms, interesting as proof of the already preponderant influence of the dialect of the lie de France, the poet replied by some verses in the satirical vein that best suited his temperament. Some of his best songs were inspired by anger at the delays before the crusade of 1188-1192. His plain-speaking made him many enemies, and when he returned

with the rest after the fruitless capture of Acre, these were not slow to take advantage of the opportunity for retaliation. Conon took part with Baldwin of Flanders in the crusade which resulted in 1204 in the capture of Constantinople, and he is said to have been the first to plant the crusaders' standard on the walls of the city. He held high office in the new empire and died about 1224. His verses, of which the crusading song Ah! amors com dure departie is well known, are marked by a vigour and martial spirit which distinguish them from the work of other trouveres.

The completest edition of his works is in the Trouveres beiges of Aug. Scheler (1876).

BETHUNE, a town of northern France, capital of an arron- dissement in the department of Pas-de-Calais, 24 m. N.N.W. of Arras, on the Northern railway between that town and St Omer. Pop. (1906) 12,601. Bethune is situated on a low hill at the confluence of the Lawe with the canal from Aire to Bauvin. Once strongly fortified, it is now surrounded by wide boulevards, and new quarters have grown up on its out- skirts. The old town is composed of winding streets and culs-de-sac bordered by old houses in the Flemish style. In the central square stands one of the finest belfries of northern France, a square structure surmounted by a wooden campanile, dating from the 14th century. St Vaast, the principal church of Bethune, belongs to the 16th century. The town is the seat of a sub-prefect, and has a tribunal of first instance, a chamber of commerce and a communal college among its public institu- tions. Bethune lies in the midst of the richest coal mines in France. Its industries include

the distillation of oil, tanning, salt-refining, brewing, and the manufacture of earthenware and casks. Trade is carried on in flax, cloth, cereals, oil- seeds, &c.

The town, which dates from the nth century, was governed by its own lords till 1 248, after which date it passed through the ownership of the counts of Flanders, the dukes of Burgundy, and the sovereigns of Austria and Spain. Ceded to France by the peace of Nijmwegen (1678), it was taken by the allied forces in 1 7 10, and restored to France by the treaty of Utrecht.

BETROTHAL (A.S. treowth, "truth"), the giving "one's truth," or pledging one's faith to marry. Although left optional by the church and not necessary in law, betrothal was anciently a formal ceremony which in most cases preceded the actual marriage service, usually by a period of some weeks, but the marriage might for various reasons be delayed for years. The canon law distinguished two types of betrothal: — (1) Spon- salia de praesenti, (2) Sponsalia de juturo. The first was a true though irregular marriage, and was abolished by the council of Trent as leading to clandestine unions and therefore being inimical to morality. The second, or betrothal properly so called, was a promise to marry at a future date, which promise without further ceremony became a valid marriage upon con- summation. The church never precisely determined the form of the ceremony, but demanded for its validity that it should have been entered into freely and at a legal age, i.e. after the seventh birthday. The church further declared that females between the ages of seven and twelve, and males between seven and fourteen, could be betrothed, but not married, and that all such betrothals were to be public. The ill-defined laws as to betrothals tended to encourage abuses; and the people, especially in the rural districts, inclined to hold betrothal sufficient justification for cohabitation. Such pre- contract is known to have existed in the case of Shakespeare (q.v.). Francis Douce (Illustrations of Shakespeare and of Antient Manners, 1807) says that betrothal consisted of the " interchange of rings — the kiss — the joining of hands, to which is to be added the testimony of witnesses." In France the presence of a priest seems to have been considered essential, and though this was not so elsewhere it was customary for the couple to get their parish priest to wit- ness their promise. In England solemn betrothal was almost universally practised. Among the peasantry the place of rings was taken by a coin which was broken between the pair, each taking a part. But almost any gift sufficed. A case in 1582

is recorded where the lover gave the girl a pair of gloves, two

oranges, two handkerchiefs and a red silk girdle. Sometimes the bride-elect received a bent or crooked sixpence. At the conclusion of the ceremony, which by no means always took place in a church, it seems to have been usual for the couple to pledge each other in a cup of wine, as do the Jews and Russians to-day. This drinking together was ever the universal custom of parties in ratification of a bargain. Joseph Strutt (1749- 1802) states that by the civil law gifts given at betrothal could be recovered by the parties, if the marriage did not take place. But only conditionally, for if the man " had had a kiss for his money, he should lose one half of that which he gave. Yet with the woman it is otherwise, for, kissing or not kissing, whatever she gave, she may ask and have it again. However, this extends only to gloves, rings, bracelets and such-like small wares." Though the church abstained from prescribing the form of the ceremony, it jealously watched over the fulfilment of such, contracts and punished their violation. Betrothal, validly contracted, could be dissolved either by mutual consent, or by the supervening of some radical physical or social change in the parties, or by the omission to fulfil one of the conditions of the contract. But here the church stepped in, and endeavoured to override such law as existed in the matter by decreeing that whoever, after betrothal, refused to marry in facie ecclesiae i was liable to excommunication till relieved by public penance. In England the law was settled by an act of 1753, which enacted that an aggrieved party could obtain redress only by an action at common law for breach of promise of marriage (see Marriage) .

Formal betrothal is no longer customary in England, but on the European continent it retains much of its former importance. There it is either solemn (publicly in church) or private (simply before witnesses). Such betrothals are legal contracts. They are only valid between persons of legal age, both of whom consent ; and: they are rendered void by fraud, intimidation and duress. In Germany if the parties are under age the consent of the parents is needed; but if this be unreasonably withheld the couple may appeal to a magistrate, who can sanction the betrothal. If the parents disagree, the father's wish prevails. Public betrothal carries with it an obligation to marry, and in case of refusal an action " lies " for the injured party. In Germany the betrothal is generally celebrated before the relatives, and the couple are called bride and bridegroom from that day until marriage. In Russia, where it was once as binding as marriage, it is now a mere formal part of the marriage ceremony.

Among the ancient Jews betrothal was formal and as binding as marriage. After the ceremony, which consisted of the handing of a

ring or some object of value to the bride and formal words of contract, and the mutual pledging of the couple in consecrated wine, a period of twelve months elapsed before the marriage was completed by the formal home-taking; unless the bride was a widow or the groom a widower, when this interval was reduced to thirty days. Latterly the ceremony of betrothal has become a part of the marriage ceremony, and the engagement has become the informal affair it is in England.

For betrothal customs in China, the East and elsewhere, consult L. J. Miln, Wooings and Weddings in Many Climes (London, 1900), and H. N. Hutchinson, Marriage Customs in Many Lands (London, 1897). On early English law as to betrothals see Sir F. Pollock and Maitland, History of English. Law before the time of Edward- 1. (2nd ed., 1898). See also J. O. Halliwell-Phillipps, Outlines of the Life of Shakespeare (London, 1848, 1883).

BETTERMENT {i.e. " making better," as opposed to " worse- ment "), a general term, used particularly in connexion with the increased value given to real property by causes for which a tenant or the public, but not the owner, is responsible; it is thus of the nature of " unearned increment," When, for instance, some public improvement results in raising the value of a piece of private land, and the owner is thereby " bettered " through no merit of his own, he gains by the betterment, and many econo- mists and politicians have sought to arrange, by taxation or otherwise, that the increased value shall come into the pocket of the public rather than into his. A betterment tax would be so assessed as to divert from the owner of the property the profit

thus accruing " unearned " to him. (See also Compensation.) The whole problem is one of the incidence of taxation and the question of land values, and various applications of the principle of betterment have been tried in America and in England, raising considerable controversy from time to time.

See A. A. Baumann, Betterment, Worsement and Recoupment

(1894).

BETTERTON, THOMAS (c. 1635-1710), English actor, son of an under-cook to King Charles I., was born in London. He was

apprenticed to John Holden. Sir William Davenant's publisher, and possibly later to a bookseller named Rhodes, who had been wardrobe-keeper to the theatre in Blackfriars. The latter obtained in 1659 a licence to set up a company of players at the Cockpit in Drury Lane; and on the reopening of this theatre in 1660, Betterton made his first appearance on the stage. His talents at once brought him into prominence, and he was given leading parts. On the opening of the new theatre in Lincoln's Inn Fields in 1661, Sir William Davenant, the patentee, engaged Betterton and all Rhodes's company to play in his Siege of Rhodes. Betterton, besides being a public favourite, was held in high esteem by Charles II., who sent him to Paris to examine stage improvements there. According to Cibber it was after his return that shifting scenes instead of tapestry were first used in an English theatre. In 1692, in an unfortunate speculation, Betterton and his friend Sir Francis Watson were ruined; but Betterton 's affection for Sir Francis was so strong that he adopted the latter's daughter and educated her for the stage. In .1693, with the aid of friends, he erected the New Playhouse in the tennis court in Lincoln's Inn Fields. It was opened in 1695 with Congreve's Love for Love. But in a few years the profits fell off; and Betterton, labouring under the infirmities of age and gout, determined to quit the stage. At Iris benefit perform- ance, when the profits are said to have been over £500, he played Valentine in Love for Love. In 17 10 he made his last appearance as Melantius in The Maid's Tragedy; he died on the 28th of April, and was buried in Westminster Abbey.

In appearance he was athletic, slightly above middle height, with a tendency to stoutness; his voice was strong rather than melodious, but in recitation it was used with the greatest dex- terity. Pepys, Pope, Steele and Cibber all bestow lavish praise on his acting. His repertory included a large number of Shake- spearian roles, and although many of these were presented in the tasteless versions of Davenant, Dryden, Shadwell and Nahum Tate, yet they could not hide the great histrionic gifts which Betterton possessed, nor does his reputation rest on these performances alone. The blamelessness of his life was con- spicuous in an age and a profession notorious for dissolute habits. Betterton was author of several adaptations which were popular in their day. In 1662 he had married Mary Saun- derson (d. 171 2), an admirable actress, whose Ophelia shared the honours with his Hamlet.

See Howe, Thomas Betterton (1891) ; The Life and Times of Thomas Betterton (1886).

BETTIA, a town of British India, in the Champaran district of

Bengal; situated on a former branch of the Harha river, with a station on the Tirhoot section of the Bengal & North- western railway. Bettia is the residence of one of the leading noblemen of northern Behar, who enjoys a rent-roll of £66,000. In 1901, owing to a disputed succession, the estate was under the management of the court of wards. It comprises land in no fewer than ten districts, much of which is let on permanent leases to indigo-planters. Besides the palace of the maharaja, the town contains a middle English school and a female dis- pensary, entirely supported out of the estate. There is a Roman Catholic mission, with about 1000 converts, which was founded by an Italian priest in 1 746.

BETTINELLI, SAVERIO (1 718-1808), Italian Jesuit and man of letters, was born at Mantua on the 18th of July 17 18. After studying under the Jesuits in his native city and at Bologna he entered the society in 1736. He taught the belles-lettres from 1739 to 1744 at Brescia, where Cardinal Quirini, Count Mazzuchelli, Count Duranti and other scholars, formed an illus-

trious academy. He next went to Bologna, to pursue the study of divinity, and there he enjoyed the society of many learned and literary men. At the age of thirty he went to Venice, where he became professor of rhetoric, and was on friendly terms with the most illustrious persons of that city and state. The superintendence of the college of nobles at Parma was entrusted to him in 1751; and he had principal charge of the studies of poetry and history, and the entertainments of the theatre. He remained there eight years, visiting, at intervals, other cities of Italy, either on the affairs of his order, for pleasure or for health. In 1755 he traversed part of Germany, proceeded as far as Strassburg and Nancy, and returned by way of Germany into Italy, taking with him two young sons or nephews of the prince of Hohcnlohe, who had requested him to take charge of their education. He made, the year following, another journey into France, along with the eldest of his pupils; and during this excursion he wrote his famous Letlere died di Virgilio agli Arcadi, which were published at Venice with his sciolti verses, and those of Frugoni and Algarotti. The opinions maintained in these letters against the two great Italian poets and particularly against Dante, created him many enemies, and embroiled him with Algarotti. In 1758 he went into Lorraine, to the court of King Stanislaus, who sent him on a matter of business to visit Voltaire. Voltaire presented him with a copy of his works, with a flattering inscription in allusion to Bettinelli's Letters of Virgil. From Geneva he returned to Parma, where he arrived in 1759. He afterwards lived for some years at Verona and Modena, and he had just been appointed professor of

rhetoric there, when, in 1773, the order of Jesuits was abolished in Italy. Bettinelli then returned into his own country, and resumed his literary labours with new ardour. The siege of Mantua by the French compelled him to leave the city, and. he retired to Verona, where he formed an intimate friendship with the chevalier Hippolito Pindemonti. In 1797 he returned to Mantua. Though nearly eighty years old, he resumed his labours and his customary manner of life. He undertook in 1799 a complete edition of his works, which was published at Venice in 24 vols. i2mo. Arrived at the age of ninety years, he still retained his gaiety and vivacity of mind, and died on the 13th of September 1808. The works of Bettinelli are now of little value. The only one still deserving remembrance, perhaps, is the Risorgimento negli studj, nelleArli e tie' Costumi dopo il Mille (1775-1786), a sketch of the progress of literature, science, the fine arts, industry, &c, in Italy.

BETTWS Y COED, an urban district of Carnarvonshire, North Wales, 4 m. from Llanrwst and 16 m. from Llandudno, on a branch of the London & North-Western railway. Pop. (1901) 1070. The name means " warm place of the wood," according to Llyn's definition of bettws. The other derivation of the word from Abbatis (domus) agrees with its vicinity to Yspytty 1 Ifan (Jeuan), Hospitium loannis, near Pentre'r Eoelas. The words " y coed " are added to distinguish this Bettws from several others in Wales, especially that near Llandeilo Fawr, Carmarthenshire, not far from the Bettws hills. Bettws y coed is a favourite village for artists and tourists. It is a centre for excursions towards Capel Curig and Snowdon, or towards Blaenau Festiniog, via Roman Bridge. There is excellent fishing for salmon and trout, and in summer coaches leave their daily loads of tourists here. The best-known streams and waterfalls are Llugwy, Lledr, with Rhaiadr y wenol (Swallow falls) , Conwy and Machno tails. In the neighbourhood are Dolwyddelan castle and the hill of Moel Siabod.

BETTY, WILLIAM HENRY WEST (1791-1874), English actor, known as " the young Roscius," was born on the 13th of September 1791 at Shrewsbury. He first appeared on the stage at Belfast before he was twelve years old, as Osman in Aaron Hill's Zara, an English version of Voltaire's Zaire. His success was immediate, and he shortly afterwards appeared in Dublin, where it is said that in three hours of study he committed the

1 Other places named " Yspytty " are Y. Cynfyn and Y. Ystwyth. For the name Yspytty, cf. Bale's' King John, 2125: "So many masendeens (maisons Dieu), hospytals and spyttle howses."

part of Hamlet to memory. His precocious talents aroused great enthusiasm in Glasgow and Edinburgh, and he was favourably compared with some of the greatest tragedians. In 1804 he first appeared at Covent Garden, when the troops had to be called out to preserve order, so great was the crush to obtain admittance. At Drury Lane the house was similarly packed, and he played for the then unprecedented salary of over 75 guineas a night. He was a great success socially, George III. himself presenting him to the queen, and Pitt upon one occasion adjourning the House of Commons that members might be in time for his performance. But this enthusiasm gradually subsided, and in 1808 he made his final appearance as a boy actor, and entered Christ's College, Cambridge. He re-appeared four years later, but the public would have none of him, and he retired to the enjoyment of the large fortune which he had amassed as a prodigy. He died on the 24th of August 1874. His son Henry Betty (1819-1897) was also an actor.

BETUL, a town and district of British India, in the Nerbudda division of the Central Provinces. In 1901 the population of the town was 4739. The administrative headquarters of the district have been transferred to the town of Badnur (q.v.), 3 m. north.

The district of Betul has an area of 3826 sq. m. In 1901 the population was 285,363, showing a decrease of 1 2 % in the decade, due to the results of famine. The mean elevation above the sea is about 2000 ft. The country is essentially a highland tract, divided naturally into three distinct portions, differing in their superficial aspects, the character of their soil and their geological formation. The northern part of the district forms an irregular plain of the sandstone formation. It is a well-wooded tract, in many places stretching out in charming glades like an English park, but it has a very sparse population and little cultivated land. In the extreme north a line of hills rises abruptly out of the great plain of the Nerbudda valley. The central tract alone possesses a rich soil, well watered by the Machna and Sampna rivers, almost entirely cultivated and studded with villages. To the south lies a rolling plateau of basaltic formation (with the sacred town of Multai, and the springs of the river Tapti at its highest point), extending over the whole of the southern face of the district, and finally merging into the wild and broken line of the Ghats, which lead down to the plains. This tract consists of a succession of stony ridges of trap rock,

enclosing valleys or basins of fertile soil, to which cultivation is for the most part confined, except where the shallow soil on the tops of the hills has been turned to account. The principal crops are wheat, millet, other food-grains, pulse, oil-seeds, and a little sugar-cane and cotton. A large part of the area is covered with forests, which yield teak and other timber. The only manufacture is cotton cloth. A railway is projected from Itarsi through the district to Berar. Good roads are few; and none of the rivers is navigable. This district suffered very severely from the famine of 1896-1897, in 1897 the death-rate being as high as 73 per 1000. It suffered again in 1900, when in May the number of persons relieved jse to one-third of the total population.

Little is known of the early history of the district except that it must have been the centre of the first of the four ancient Gond kingdoms of Kherla, Deogarh, Mandla and Chanda. According to Ferishta, the Persian historian, these kingdoms engrossed in 1398 all the hills of Gondwana and adjacent countries, and were of great wealth and power. About the year 1418 Sultan Husain Shah of Malwa invaded Kherla, and reduced it to a dependency. Nine years later the raja rebelled, but although with the help of the Bahmani kings of the Deccan he managed for a time to assert his independence, he was finally subdued and deprived of his territories. In 1467 Kherla was seized by the Bahmani king, but was afterwards restored to Malwa . A century later the kingdom of Malwa became incorporated into the dominions of the emperor of Delhi. In 1703 a Mussulman convert of the Gond tribe held the country, and in 1743 Raghoji Bhonsla, the Mahratta ruler of Berar, annexed it to his dominions. The Mahrattas in the year 1818 ceded this district to the East India Company as payment for a contingent, and by the treaty of 1826 it was formally incorporated with the British possessions.

HI, 27

Detachments of British troops were stationed at Multai, Betu] and Shahpur to cut off the retreat of Apa Sahib, the Mahratta general, and a military force was quartered at Betul until June 1862. The ruined city of Kherla formed the seat of government under the Gonds and preceding rulers, and hence the district was, until the time of its annexation to the British dominions, known as the " Kherla Sarkar." The town of Multai contains an artificial tank, from the centre of which the Tapti is said to take its rise: hence the reputed sanctity of the spot, and the accumula- tion of temples in its honour.

The climate of Betul is fairly healthy. Its height above the plains and

the neighbourhood of extensive forests moderate the heat, and render the temperature pleasant throughout the greater part of the year. During the cold season the thermometer at night falls below the freezing point; little or no hot wind is felt before the end of April, and even then it ceases after sunset. The nights in the hot season are comparatively cool and pleasant. During the monsoon the climate is very damp, and at times even cold and raw, thick clouds and mist enveloping the sky for many days together. The average annual rainfall is 40 in. In the denser jungles malaria prevails for months after the cessation of the rains, but the Gonds do not appear to suffer much from its effects. Travellers and strangers who venture into these jungles run the risk of fever of a severe type at almost all seasons of the year.

BETWA, a river of India, which rises in the native state of Bhopal in Malwa, and after a course of 360 m., for the most part in a north-easterly direction, falls into the Jumna at Hamirpur. A weir is thrown across the Betwa about 15 m. from Jhansi town, whence a canal 168 m. long takes off, irrigating 106,000 acres of the Jalaun district; similar works have been carried out elsewhere on the river.

BEUDANT, FRANCOIS STJLPICE (1787-1850), French mineralogist and geologist, was born at Paris on the 5th of September 1787. He was educated at the Ecole Polytechnique and Ecole Normale, and in 181 1 was appointed professor of mathematics at the lycee of Avignon. Thence he was called, in 1813, to the lycee of Marseilles to fill the post of professor of physics. In the following year the royal mineralogical cabinet was com- mitted to his charge to be conveyed into England, and from that time his attention was directed principally towards geology and cognate sciences. In 181 7 he published a paper on the phenomena of crystallization, treating especially of the variety of forms' assumed by the same mineral substance. In 1818 he undertook, at the expense of the French government, a geological journey through Hungary, and the results of his researches, Voyage mineralogique et geologique en Hongrie, 3 vols. 4to, with atlas, published in 1822, established for him a European reputation. In 1820 he was appointed to the professorship of mineralogy in the Paris faculty of sciences, and afterwards became inspector-general of the university. He subsequently published treatises on physics and on mineralogy and geology, and died on the 10th of December

1850.

BEUGNOT, JACQUES CLAUDE, Count (1761-1835), French

politician, was born at Bar-sur-Aube. A magistrate under the old regime, he was elected deputy to the Legislative Assembly (1791), then to the Convention. He was involved in the proscription of the Girondists and imprisoned until the 9th Thermidor. He next entered into relations with the family of Bonaparte, and in 1799, after the 18th Brumaire, again entered politics, becoming successively prefect of the lower Seine, councillor of state, and finance minister to Jerome Bona- parte, king of Westphalia. In 1808 Beugnot, who had mean- while been appointed administrator of the duchy of Berg-Cleves, received the cross of officer of the Legion of Honour with the title of count. He returned to France in 1813, after the battle of Leipzig, and was made prefect of the department of Nord. In 1814 tie was a member of the provisional government as minister of the interior; and by Louis XVIII. he was named director-general of police and afterwards minister of marine. He followed Louis to Ghent during the Hundred Days, and became

one of his confidants. He contributed to draw up Louis's charter, and in his memoirs boasted of having furnished the text of the proclamation addressed by the king to the French people before his return to France; but it is known now that it was another text that was adopted. Lacking the support of the ultra-royalists, he was given the title of minister of state without portfolio, which was equivalent to a retirement. Elected deputy, he attached himself to the moderate party, and defended the liberty of the press. In 183 1 Louis Philippe made him a peer of France and director-general of manufactures and commerce. He died on the 24th of June 1835.

His son, Auguste Arthur Beugnot (1707-1865), was an historian and scholar, who published an Essai sur les institutions de Saint Louis (1821), Histoire de la destruction du paganisme en Occident (2 vols., 1885), and edited the Olim of the parlement of Paris, the Assizes of Jerusalem, and the Coutumes de Beau- voisis of Philippe de Beaumanoir. He was a member of the chamber of peers under Louis Philippe, and opposed Villemain's plan for freedom of education. After 1848 he maintained the same role, acting as reporter of the lot Falloux. He retired from public life after the coup d'Stat of Napoleon III., and died on the 15th of March 1865.

The Memoires of J. C. Beugnot were published by his grandson, Count Albert Beugnot (2nd ed., Paris, 1868) ; see H. Wallon, Eloges

academiques (1882); and E. Dejean, Un Prefet du Consulat: J. C. Beugnot (Paris, 1907).

BEUlJ, CHARLES ERNEST (1826-1874), French archaeo- logist and politician, was born at Saumur on the 29th of June 1826. He was educated at the Ecole Normale, and after having held the professorship of rhetoric at Moulins for a year, was sent to Athens in 1851 as one of the professors in the Ecole Francaise there. He had the good fortune to discover the propylaea of the Acropolis, and his work, L'Acropoled' Athenes (2nded., 1863), was published by order of the minister of public instruction. On his return to France, promotion and distinctions followed rapidly upon his first successes. He was made doctor of letters, chevalier of the Legion of Honour, professor of archaeology at the Bibliotheque Imperiale, member of the Academie des Inscriptions et Belles-Lettres and perpetual secretary of the Academie des Beaux-Arts. He took great interest in political affairs, with which the last few years of his life were entirely occupied. Elected a member of the National Assembly in 187 1, he zealously supported the Orleanist party. In May-November 1873 he was minister of the interior in the Broglie ministry. He died by his own hand on the 4th of April 1874. His other important works are: Etudes sur le Ptloponne.se (2nd ed., 1875); Les Monnaies d' Athenes (1858); L' Architecture au siecle de Pisistrate (i860); Fouilles a Carthage (1861). Beule was also the author of high-class popular works on artistic and historical subjects: Histoire de I'art grec avant PSricles (2nd ed., 1870}; Le Proces des Cesars (1867-1870, in four parts; Auguste, sa famille et ses amis; Tib'ere et I'Mritage a" Auguste; Le Sang de Germanicus; Titus etsa dynastic).

See Ideville, Monsieur Beule, Souvenirs personnels (1874).

BEURNONVILLE, PIERRE DE RUEL, Marquis de (1752- 182 1), French general. After service in the colonies, he married a wealthy Creole, and returning to France purchased the post of lieutenant of the Swiss guard of the count of Provence. During the Revolution he was named lieutenant-general, and took an active part in the battles of Valmy and Jemmapes. Minister of war in February 1793, he denounced his old com- mander, C. F. Dumouriez, to the Convention, and was one of the four deputies sent to watch him. Given over by him to the Austrians on the 3rd of April 1793, Beurnonville was not ex- changed until November 1795. He entered the service again, commanded the armies of the Sambre-et-Meuse and of the North, and was appointed inspector of infantry of the army of England in 1798. In 1800 he was sent as ambassador to Berlin, iu 1802 to Madrid. Napoleon made him a senator and count of the empire. In

18 14 he was a member of the pro- visional government organized after the abdication of Napoleon, and was created a peer of France. During the Hundred Days

he followed Louis XVIII. to Ghent, and after the second restora- tion was made marquis and marshal of France.

See A. Chaquet, Les Guerres de la Revolution (Paris, 1886).

BEUST, FRIEDRICH FERDINAND VON (1809-1886), Austrian statesman, was descended from a noble family which had originally sprung from the Mark of Brandenburg, and of which one branch had been for over 300 years settled in Saxony. He was born on the 13 th of January 1809 in Dresden, where his father held office at the Saxon court. After studying at Leipzig and Gottingen he entered the Saxon public service; in 1836 he was made secretary of legation at Berlin, and afterwards held appointments at Paris, Munich and London. In March 1848 he was summoned to Dresden to take the office of foreign minister, but in consequence of the outbreak of the revolution was not appointed. In May he was appointed Saxon envoy at Berlin, and in February 1849 was again summoned to Dresden, and this time appointed minister of foreign affairs, an office which he continued to hold till 1866. In addition to this he held the ministry of education and public worship from 1849 to 1853; that of internal affairs in 1853, and in the same year was appointed minister-president. From the time that he entered the ministry he was, however, the leading member of it, and he was chiefly responsible for the events of 1849. By his advice the king refused to accept the constitution proclaimed by the Frankfort parliament, a policy which led to the outbreak of revolution in Dresden, which was suppressed after four days' fighting by Prussian troops, for whose assistance Beust had asked. On Beust fell also the chief responsibility for governing the country after order was restored, and he was the author of the so-called coup d'Uai of June 1850 by which the new constitu- tion was overthrown. The vigour he showed in repressing all resistance to the government, especially that of the university, and in reorganizing the police, made him one of the most unpopular men among the Liberals, and his name became synonymous with the worst form of reaction, but it is not clear that the attacks on him were justified. After this he was chiefly occupied with foreign affairs, and he soon became one of the most conspicuous figures in German politics. He was the leader of that party which hoped to maintain the independence of the smaller states, and was the opponent of all attempts on the part of Prussia to attract them into a separate union; in 1849-1850 he had been obliged to join the " three kings' union "

of Prussia, Hanover and Saxony, but he was careful to keep open a loop- hole for withdrawal, of which he speedily availed himself. In the crisis of 1851 Saxony was on the side of Austria, and he supported the restoration of the diet of the confederation. In 1854 he took part in the Bamberg conferences, in which the smaller German states claimed the right to direct their own policy independent of that of Austria or of Prussia, and he was the leading supporter of the idea of the Trias, i.e. that the Smaller states should form a closer union among themselves against the preponderance of the great monarchies. In 1863 he came forward as a warm supporter of the claims of the prince of Augustenburg to Schleswig-Holstein (see Schleswig- Holstein Question); he was the leader of the party in the German diet which refused to recognize the settlement of the Danish question effected in 1852 by the treaty of London, and in 1864 he was appointed representative of the diet at the con- gress of London. He was thus thrown into opposition to the policy of Bismarck, and he was exposed to violent attacks in the Prussian press as a " particularist," i.e. a supporter of the independence of the smaller states. The expulsion of the Saxon troops from Rendsburg nearly led to a conflict with Prussia. Beust was accused of having brought about the war of 1866, but the responsibility for this must rest with Bismarck. On the outbreak of war Beust accompanied the king to Prague, and thence to Vienna, where they were received by the emperor with the news of Koniggratz. Beust undertook a mission to Paris to procure the help of Napoleon. When the terms of peace were discussed he resigned, for Bismarck refused to negotiate with him.

After the victory of Prussia there was no place for Beust in

Germany, and his public career seemed to be closed, but he quite unexpectedly received an invitation from the emperor of Austria to become his foreign minister. It was a bold decision, for Beust was not only a stranger to Austria, but also a Pro- testant; but the choice of the emperor justified itself. Beust threw himself into his new position with great energy; it was owing to him that the negotiations with Hungary were brought to a successful issue. When difficulties came he went himself to Budapest, and acted directly with the Hungarian leaders. In 1867 he also held the position of Austrian minister-president, and he carried through the measures by which parliamentary government was restored. He also carried on the negotiations with the pope concerning the repeal of the concordat,

and in this matter also did much by a liberal policy to relieve Austria from the pressure of institutions which had checked the development of the country. In 1868, after giving up his post as minister-president, he was appointed chancellor of the empire, and received the title of count. His conduct of foreign affairs, especi- ally in the matter of the Balkan States and Crete, successfully maintained the position of the empire. In 1869 he accompanied the emperor on his expedition to the East. He was still to some extent influenced by the anti-Prussian feeling he had brought from Saxony. He maintained a close understanding with France, and there can be little doubt that he would have welcomed an opportunity in his new position of another struggle with his old rival Bismarck. In 1867, however, he helped to bring the affair of Luxemburg to a peaceful termination. In 1870 he did not disguise his sympathy for France, and the failure of all attempts to bring about an intervention of the powers, joined to the action of Russia in denouncing the treaty of Paris, was the occasion of his celebrated saying that he was nowhere able to find Europe. After the war was over he completely accepted the new organization of Germany.

As early as December r87o he had opened a correspondence with Bismarck with a view to establishing a good understanding with Germany. Bismarck accepted his advances with alacrity, and the new entente, which Beust announced to the Austro- Hungarian delegations in July 187 1, was sealed in August by a friendly meeting of the two old rivals and enemies at Gastein.

In 187 1 Beust interfered at the last moment, together with Andrassy, to prevent the emperor accepting the federalist plans of Hohenwart. He was successful, but at the same time he was dismissed from office. The precise cause for this is not known, and no reason was given him. At his own request he was appointed Austrian ambassador at London; in 1878 he was transferred to Paris; in 1882 he retired from public life. He died at his villa at Altenberg, near Vienna, on the 24th of October 1886, leaving two sons, both of whom entered the Austrian diplomatic service. His wife, a Bavarian lady, sur- vived him only a few weeks. His elder brother Friedrich Konstantin (1806-1891), who was at the head of the Saxon department for mines, was the author of several works on mining and geology, a subject in which other members of the family had distinguished themselves.

Beust was in many ways a diplomatist of the old school. He had great social gifts and personal graces; he was proud of his proficiency in the lighter arts of composing waltzes and vers de

societe. His chief fault was vanity, but it was an amiable weakness. It was more vanity than rancour which made him glad to appear even in later years as the great opponent of Bismarck; and if he cared too much for popularity, and was very sensitive to neglect, the saying attributed to Bismarck, that if his vanity were taken away there would be nothing left, is very unjust. He was apt to look more to the form than the substance, and attached too much importance to the verbal victory of a well-written despatch; but when the opportunity was given him he showed higher qualities. In the crisis of 1849 he displayed considerable courage, and never lost his judgment even in personal danger. If he was defeated in his German policy, it must be remembered that Bismarck held all the good cards, and in 1866 Saxony was the only one of the smaller states

which entered on the war with an army properly equipped and ready at the moment. That he was no mere reactionary the whole course of his government in Saxony, and still more in Austria, shows. His Austrian policy has been much criticized, on the ground that in establishing the system of dualism he gave too much to Hungary, and did not really understand Austrian affairs; and the Austro-Hungarian crisis during the early years of the present century has given point to this view. Yet it remains the fact that in a crisis of extraordinary difficulty he carried to a successful conclusion a policy which, even if it was not the best imaginable, was probably the best attainable in the circumstances.

Beust was the author of reminiscences: Aus drei Viertel-Jahr-hunderten (2 vols., Stuttgart, 1887; English trans, edited by Baron H. de Worms) ; and he also wrote a shorter work, Erinnerungen zu Erinnerungen (Leipzig, 1881), in answer to attacks made on him by his former colleague, Herr v. Frieseri, in his reminiscences. See also Ebeling, F. F. Graf v. Beust (Leipzig, 1876), a full and care- ful account of his political career, especially up to 1866; Diplomatic Sketches: No. 1, Count Beust, by Outsider (Baron Carl v. Malortie) ; Flathe, Geschichte von Sachsen, vol. iii. (Gotha, 1877) '< Friesen, Erinnerungen aus meinem Leben (Dresden, 1880). (J. W. He.)

BEUTHEN, or Niederbeuthen, a town of Germany, in the north of Prussian Silesia, on the Oder, the capital of the media- tized principality of Carolath-Beuthen. Pop. (1900) 3164. The chief industries of the place are straw-plaiting, boat- building, and the manufacture of pottery; and a considerable traffic is carried on by means of the river.

BEUTHEN, or Oberbeuthen, a town of Germany, in the extreme

south-east of Prussian Silesia, on the railway between Breslau and Cracow, 121 m. S.E. of the former. Pop. (1905) 60,078. It is the centre of the mining district of Upper Silesia,' and its population is mainly engaged in such operations and in iron and zinc smelting. Beuthen is an old town, and was formerly the capital of the Bohemian duchy of Beuthen, which in 1620 was ultimately granted, as a free lordship of the Empire, to Lazarus, Baron Henckel von Donnersmarck, by the emperor Ferdinand II., and parts of which, now mediatized, are held by two branches of the counts Henckel von Donnersmarck.

BEVEL (from an O. Fr. word, cf. mod. biveau, a joiner's instrument), the inclination of one surface of a solid body to another; also, any angle other than a right angle, and parti- cularly, in joinery, the angle to which a piece of timber has to be cut. The mechanic's instrument known as a bevel consists of a rule with two arms so jointed as to be adjustable to any angle. In heraldry, a bevel is an angular break in a line. Bevelment, as a term of crystallography, means the replacement of an edge of a crystal by two planes equally inclined to the adjacent planes. As an architectural term " bevel " is a sloped or canted edge given to a sill or horizontal course of stone, but is more frequently applied to the canted edges worked round the pro- jecting bands of masonry which for decorative purposes are employed on the quoins of walls or windows and in some cases, with vertical joints, cover the whole wall. When the outer face of the stone band is left rough so that it forms what is known as rusticated masonry, the description would be bevelled and rusticated. The term is sometimes applied to the splay- ing of the edges of a window on the outside, but the wide expansion made inside in order to admit more light is known as a splay.

BEVERLEY, WILLIAM ROXBY (i8i 4 ?-i889), English artist and scene-painter, was born at Richmond, Surrey, about 1 8 14, the son of William Roxby, an actor-manager who had assumed the name of Beverley. His four brothers and his sister all entered the theatrical profession, and Beverley soon became both actor and scene-painter. In 1831 his father and his brothers took over the old Durham circuit, and he joined them to play heavy comedy for several seasons, besides painting scenery. His work was first seen in 183 1 in London, for the pantomime Baron Munchausen at the Victoria theatre, which was being managed by his brother Henry. He was appointed scenic director for the Covent Garden operas in 1853. In 1854 he entered the service of the Drury Lane theatre under the management of E. T. Smith, and for thirty years continued to produce

wonderful scenes for the pantomimes, besides working for Co vent Garden and a number of other theatres. In 1851 he executed part of a great diorama of Jerusalem and the Holy Land, and produced dioramic views of the ascent of Mont Blanc, exhibited at the Egyptian Hall, Piccadilly, and in 1884 a panorama of the Lakes of Killarney. He was a frequent exhibitor of sea pictures at the Royal Academy from 1865 to 1880. In 1884 failing eyesight put an end to his painting. He died in com- parative poverty at Hampstead on the 17th of May 1889. He was the last of the old school of one surface painters, and famed for the wonderful atmospheric effects he was able to produce. Although he was skilled in all the mechanical devices of the stage, and painted in 1881 scenery for Michael Strogojf at the Adelphi, in which for the first time in England the still life of the stage was placed in harmony with the background, he was strongly opposed to the new school of scene-builders.

BEVERLEY, a market town and municipal borough in the Holderness parliamentary division of the East Riding of York- shire, England, 8 m. N.N.W. of Hull by a branch of the North- Eastern railway. Pop. (1901) 13,183. It lies in a level country east of the line of slight elevations known as the Wolds, near the river Hull, and has communication by canal with Hull. The church of St John the Evangelist, commonly called Beverley Minster, is a magnificent building, exceeding in size and splen- dour some of the English cathedrals. A monastery was founded here by John of Beverley (c. 640-721), a native of the East Riding, who was bishop successively of Hexham and of York, and was canonized in 1037. A college of secular canons followed in the 10th century, the provostship of which subsequently became an office of high dignity, and was held by Thomas Becket, afterwards archbishop of Canterbury. Of the existing building, the easternmost bay of the nave, the transepts with east and west aisles, the choir with aisles and short transepts, and the Lady chapel, are Early English, a superb example of the finest development of that style. The remainder of the nave is Decorated, excepting the westernmost bay which is Perpendicular, as is the ornate west front with its graceful flanking towers. The north porch is also a beautiful example of this style. The most noteworthy details within the church are the exquisite Early English staircase which led to the chapter house (no longer remaining), and the Percy tomb, a remarkable example of Decorated work, commemorating Eleanor, wife of Henry Percy (d. 1328). The church of St Mary is a cruciform

building with central tower, almost entirely of Decorated and Perpendicular work. Though overshadowed by the presence of the minster, it is yet a very fine example of its styles, its most noteworthy features being the tower and the west front. Bever- ley was walled, and one gate of the 1 5th century remains ; there, are also some picturesque old houses. The industries are tanning, iron-founding, brewing and the manufacture of chemicals; and there is a large agricultural trade. Beverley is the seat of a suffragan bishop in the diocese of York. The municipal borough is under a mayor, 6 aldermen and 18 councillors, and has an area of 2404 acres, including a large extent of common pasture land.

Beverley (Beverlac) is said to be on the site of a British settlement. Evidently a church had existed there before 704, since in that year it was restored by St John of Beverley, who also founded a monastery there and was himself buried in the church. In the devastation of the north of England which followed the Conquest, Beverley is said to have escaped by a miracle attributed to St John; the Norman leader, while about to enter and pillage the church, fell from his horse dead, and the king, thinking this a sign that the town was under the protection of heaven, exempted it from pillage. From the time of St John of Beverley until the dissolution of the monasteries, the manor and town of Beverley belonged to the archbishopric of York, and is said to have been held under a charter of liberties supposed to have been granted by King /Ethelstan in 925. This charter, besides other privileges, is said to have granted sanctuary in Beverley, and the " leuga " over which this privilege extended was afterwards shown to include the whole town. Confirmations of jfithelstan's charter were granted by Edward the Confessor and other succeeding kings. In the reign of Henry I., Thurstan, arch- bishop of York, gave the burgesses their first charter, which is one of the earliest granted to any town in England. In it he granted them the same privileges as the citizens of York, among these being

a gild merchant and freedom from toll throughout the whole of Yorkshire, with right to take it at all the markets and fairs in their town except at the three principal fairs, the toll of which belonged to the archbishop. In 1200 King John granted the town a new charter, for which the burgesses had to pay 500 marks. Other charters generally confirming the first were granted to the town by most of the early kings. The incorporation charter granted by Queen Elizabeth in 1573 was confirmed by Charles I. in 1629 and Charles II. in 1663, and renewed by James II. on his accession. Parliamentary representation by two members began in the reign ol Edward I., but lapsed, until the corporation charter of 1573, from which date it

continued until the Reform Act of 1867. In I 554 -I 555 Queen Mary granted the three fairs on the feasts of St John the Confessor, the Translation of St John and the Nativity of St John the Baptist, together with the weekly markets on Wednesday and Saturday, which had been held by the archbishops of York by traditional grant of Edward the Confessor to the burgesses of the town. Cloth-weaving was one of the chief industries of Beverley; it is mentioned and appears to have been important as early as I3I5-

See Victoria County History — Yorkshire; G. Poulson, Beverlac; Antiquities and History of Beverley and of the Provostry, fife, of St John's (2 vols., 1829); G. Oliver, D. D., History and Antiquities of Beverley, eVc. (1829).

BEVERLY, a seaboard city of Essex county, Massachusetts, U.S.A., situated on the N. shore of Massachusetts Bay, opposite Salem. It is 18 m. from Boston on the Boston & Maine railway. Pop. (1890) 10,821; (1900) 13,884, of whom 2814 were foreign- born; (1910, census) 18,650. The land area of the city is about 15 sq. m. The surface is the typical glacial topography, with a few low, rocky hills, less than 100 ft. in height. There are beautiful drives through well-wooded districts, studded with handsome summer houses. In the city are a public library, the Beverly hospital, the New England industrial school for deaf mutes (organized, 1876; incorporated, 1870), and the Beverly historical society (1891), which owns a large colonial house, in which there is a valuable historical collection. The city has an excellent public school system. There are a number of manu-facturing establishments; in 1905 the total factory product of the city was valued at $4,101,168, boots and shoes accounting for more than one-half of the total. Leather and shoe machinery also are important manufactures; and the main plant of the United Shoe Machinery Corporation is located here. Market gardening is a considerable industry, and large quantities of vegetables are raised under glass for the Boston markets. Fishing is an industry no longer of much importance. Beverly is con- nected by a regular line of oil-steamers with Port Arthur, Texas, and is the main distributing point for the Texas oil fields. The first settlement within the limits of Beverly was made by Roger Conant in 1626. The town was a part of Salem until 1668, when it was incorporated as a separate township; in 1894 it was chartered as a city. In 1788 there was established here the first cotton mill to be successfully operated in the United States. The manufacture of Britannia ware was begun in 181 2. George Cabot lived for many years in Beverly, which he represented in the provincial congress (1779); Nathan Dane (1752-1835) was also a resident; and it was the birthplace of Wilson Flagg

(1805-1884), the author of Studies in the Field and Forest (1857), The Woods and By-Ways of New England (1872), The Birds and Seasons of New England (1875), and A Year with the Birds (1881). It was also the birthplace and early home of Lucy Larcom (1826-1893), and the scene of much of her Story of a New England Girlhood (Boston, 1889).

BEVIS OF HAMPTON, the name of an English metrical romance. Bevis is the son of Guy, count of Hampton (Southampton) and his young wife, a daughter of the king of Scotland. The countess asks a former suitor, Doon or Devoun, emperor of Almaine (Germany), to send an army to murder Guy in the forest. The plot is successful, and she marries Doon. When threatened with future vengeance by her ten-year-old son, she determines to make away with him also, but he is saved from death by a faithful tutor, is sold to heathen pirates, and reaches the court of King Hermin, whose realm is variously placed in Egypt and Armenia (Armorica). The exploits of Bevis, his love for the king s daughter Josiane, his mission to KingBradmond of Damascus with a sealed letter demanding his own death, his

imprisonment, his final vengeance on his stepfather are related in detail. After succeeding to his inheritance he is, however, driven into exile and separated from Josiane, to whom he is reunited only after each of them has contracted, in form only, a second union. The story also relates the hero's death and the fortunes of his two sons.

The oldest extant version appears to be Boeve de Haumtone, an Anglo-Norman text which dates from the first half of the 13 th century. The English metrical romance, Sir Bcues of Hamtoun, is founded on some French original varying slightly from those which have been preserved. The oldest MS. dates from the beginning of the 14th century. The French chanson de geste, Beuve d'Hanstonc, was followed by numerous prose versions. The printed editions of the story were most numerous in Italy, where Bovo d'Antona was the subject of more than one poem, and the tale was interpolated in the Reali di Francia, the Italian compilation of Carol ingian legend. Although the English version that we possess is based on a French original, it seems probable that the legend took shape on English soil in the 10th century, and that it originated with the Danish invaders. Doon may be identified with the emperor Otto the Great, who was the contemporary of the English king Edgar of the story. R. Zenker

(Boeve-Amlelhus, Berlin and Leipzig, 1904) establishes a close parallel between Bevis and the Hamlet legend as related by Saxo Grammaticus in the Historia Danica. Among the more obvious coincidences which point to a common source are the vengeance taken on a stepfather for a father's death, the letter bearing his own death-warrant which is entrusted to the hero, and his double marriage. 1 The motive of the feigned madness is, however, lacking in Bevis. The princess who is Josiane's rival is less ferocious than the Hermuthruda of the Hamlet legend, but she threatens Bevis with death if he refuses her. Both seem to be modelled on the type of Thyrdo of the Beowulf legend. A fanciful etymology connecting Bevis (Boeve) with Beowa (Beowulf), on the ground that both were dragon slayers, is inadmissible.

Bmi.iOGRAPiiY. — TheRomance. of Sir Beuesof Hamtoun, edited from six MSS. and the edition (without date) of Richard Pynson, by E. Kolbing (Early Eng. Text Soc, 1885-1886-1894) ; A. Stimming, " Der anglonormannische Boeve de Haumtone," in H. Suchier s Bibl. Norm. vol. vii. (Halle, 1899); the Welsh version, with a trans- lation, is given by R. Williams, Selections of the Hengwrt MSS. (vol. ii., London, 1892); the old Norse version by G. Cederschiold, Forn- sbgur Sudhrlanda (Lund, 1884); A. Wesselofsky, " Zum russischen Bovo d' Antona" (in Archiv fur slav. Phil. vol. viii., 1885); for the early printed editions of the romance in English, French and Italian see G. Brunet, Manuel du libraire, s.w. Bevis, Beufues and Buovo.

BEWDLEY, a market town and municipal borough in the Bewdley parliamentary division of Worcestershire, England; 137 m. N.JV. by W. from London and 17J N. by W. from Worcester by rail. Pop. (1901) 2866. The Worcester-Shrews- bury line of the Great Western is here joined by lines east from Birmingham and west from Tenbury. Bewdley is pleasantly situated on the sloping right bank of the Severn, on the eastern border of the forest of Wyre. A bridge by Telford (1797) crosses the river. A free grammar school, founded in 1591, was re- founded by James I. in 1606, and possesses a large library bequeathed in 181 2. The town manufactures combs and horn goods, brass and iron wares, leather, malt, bricks and ropes. The town is governed by a mayor, 4 aldermen and 1 2 councillors. Area, 2105 acres.

Bewdley {i.e. Beaulieu) is probably referred to in the Domesday- survey as " another Ribbesford," and was held by the king. The manor, then called Bellus Locus or Beaulieu on account of its beautiful situation, was afterwards granted to the Mortimers, in whose family it continued until it was merged in the crown on the

accession of Edward IV. It is from this time that Bewdley dates its importance. Through its situation on the Severn it was connected with the sea, and in 1250 a bridge, the only one between it and Worcester, was built across the river and added greatly to the commerce of the town. From Edward IV. Bewdley received its charter in 1472, and there

1 On double marriage in early romance see G. Paris, " La Legende du mari aux deux femmes," in La Poesie du moyen age (2nd series, Paris, 1895) ; and A. Nutt, " The Lai of Eliduc," &c , in Folk-Lore, vol. iii. (1892).

appears to be no evidence that it was a borough before this time. Other charters were granted in 1605, 1685 and 1708. By James I.'s charter the burgesses sent one member to parliament, and continued to do so until 1885. A fair and a market on Wednesday were granted by Edward III. in 1373 to his grand-daughter Philippa, wife of Edmund Mortimer, and confirmed to Richard, duke of York, by Henry VI. Edward IV. also granted the burgesses a market on Saturdays, and three fairs, which were confirmed to them by Henry VII. Coal-mines were worked in Bewdley as early as 1669, and the town was formerly noted for making caps.

BEWICK, THOMAS (1753-1828), English wood-engraver, was born at Cherryburn, near Newcastle-on-Tyne, in August 1753. His father rented a small colliery at Mickleybank, and sent his son to school at Mickley. He proved a poor scholar., but showed, at a very early age, a remarkable talent for drawing. He had no tuition in the art, and no models save natural objects. At the age of fourteen he was apprenticed to Mr Beilby, an engraver in Newcastle. In his office Bewick engraved on wood for Dr Hutton a series of diagrams illustrating a treatise on mensuration. He seems thereafter to have devoted himself entirely to engraving on wood, and in 1 775 he received a premium from the Society for the Encouragement of Arts and Manufactures for a woodcut of the " Huntsman and the Old Hound." In 1784 appeared his Select Fables, the engravings in which, though far surpassed by his later productions, were incomparably superior to anything that had yet been done in that line. The Quadrupeds appeared in 1790, and his great achievement, that with which his name is inseparably associated, the British Birds, was published from 1 797-1804. Bewick, from his intimate knowledge of the habits of animals acquired during his constant excursions into the country, was thoroughly qualified to do justice to his great task. Of his other productions the engravings for Goldsmith's Traveller and Deserted Village, for Parnell's Hermit, for

Somerville's Chase, and for the collection of Fables of Aesop and Others, may be specially mentioned. Bewick was for many years in partnership with his former master, and in later life had numerous pupils, several of whom gained distinction as engravers. He died on the 8th of November

1828.

His autobiography, Memoirs of Thomas Bewick, by Himself, appeared in 1862.

BEXHILL, a municipal borough and watering-place in the Rye parliamentary division of Sussex, England, 62 m. S.E. by S. from London, on the London, Brighton & South Coast, and the South-Eastern & Chatham railways. Pop. (1891) 5206; (1901) 12,213. The ancient village, with the Norman and Early English church of St Peter, lies inland on the slope of the low hills fringing the coast, but the watering- place on the shore has developed very rapidly since about 1884, owing to the exertions of Earl De la Warr, who owns most of the property. It has a marine parade, pier, golf links, and the usual appointments of a seaside resort, while the climate is bracing and the neighbouring country pleasant. Bexhill was incorporated in 1902, the corporation consisting of a mayor, 6 aldermen and 18 councillors. Area, 8013 acres.

BEXLEY, NICHOLAS VANSITTART, Baron (1766-1851), English politician, was the fifth son of Henry Vansittart (d. 1 770), governor of Bengal, and was born in London on the 29th of April 1766. Educated at Christ Church, Oxford, he took his degree in 1787, and was called to the bar at Lincoln's Inn in 1791. He began his public career by writing pamphlets in defence of the administration of William Pitt, especially on its financial side, and in May 1796 became member of parliament for Hastings, retaining his seat until July 1802, when he was returned for Old Sarum. In February 1801 he was sent on a diplomatic errand to Copenhagen, and shortly after his return was appointed joint secretary to the treasury, a position which he retained until the resignation of Addington's ministry in April 1804. Owing to the influence of his friend, Ernest, duke of Cumberland, he became secretary for Ireland under Pitt in January 1805, resigning his office in the following September. With Addington, now Viscount Sid mouth, he joined the government of Fox and Gren- ville as secretary to the treasury in February 1806, leaving office with Sidmouth just before the fall of the ministry in March

1807. During these and the next few years Vansittart's reputa- tion as a financier was gradually rising. In 1809 he proposed and carried without opposition in the House of Commons thirty-eight resolutions on financial questions, and only hisloyalty to Sidmouth prevented him from joining the cabinet of Spencer Perceval as chancellor of the exchequer in October 1809. He opposed an early resumption of cash paymentsin 181 i,and became chancellor of the exchequer when the earl of Liverpool succeeded Perceval in May 181 2. Having forsaken Old Sarum, he had represented Helston from November 1806 to June 181 2; and after being member for East Grinstead for a few weeks, was returned for Harwich in October 1812.

When Vansittart became chancellor of the exchequer the country was burdened with heavy taxation and an enormous debt. Nevertheless, the continuance of the war compelled him to increase the custom duties and other taxes, and in 1813 he introduced a complicated scheme for dealing with the sinking fund. In 1 8 16, after the conclusion of peace, a large decrease in taxation was generally desired, and there was a loud outcry when the chancellor proposed only to reduce, not to abolish, the property or income tax. The abolition of this tax, however, was carried in parliament, and Vansittart -was also obliged to remit the extra tax on malt, meeting a large deficiency principally by borrowing. He devoted considerable attention to effecting real or supposed economies with regard to the national debt. He carried an elaborate scheme for handing over the payment of naval and military pensions to contractors, who would be paid a fixed annual sum for forty-five years; but no one was found willing to undertake this contract, although a modified plan on the same lines was afterwards adopted. Vansittart. became very unpopular in the country, and he resigned his office in December 1822. His system of finance was severely criticized by Huskisson, Tierney, Brougham, Hume and Ricardo. On his resignation Liverpool offered Vansittart the post of chancellor of the duchy of Lancaster. Accepting this offer in February

1823, he was created Baron Bexley in March, and granted a pension of £3000 a year. He resigned in January 1828. In the House of Lords Bexley took very little part in public business, although he introduced the Spitalfields weavers bill in 1823, and voted for the removal of Roman Catholic disabilities in

1824. He took a good deal of interest in the British and Foreign Bible Mission, the Church Missionary Society and kindred bodies, and assisted to found King's College, London. He died at Foot's Cray, Kent, on the 8th of February 1851. His wife, whom he married in July 1806, was Isabella (d. 1810), daughter of William Eden, 1st Baron Auckland, and as he had no issue the title became extinct on his death. There are nine volumes of Vansittart's papers in the British Museum.

See Spencer Walpole, History of England (London, 1890); S. C. Buxton, Finance and Politics (London, 1888).

BEXLEY, an urban district in the Dartford parliamentary division of Kent, England, 12 m. S.E. by E. of London by the South-Eastern & Chatham railway. Pop. (1901) 12,918. Bexley, which is mentioned in Domesday Book, has had a church since the 9th century. The present church of St Mary is Early English and later. With the rental of the manor of Bexley, William Camden, the antiquary, founded the ancient history professorship at Oxford. Hall Place, which contains a fine Jacobean staircase and oak-panelled hall, is said to occupy the site of the dwelling-place of the Black Prince. The course of Watling Street may be traced over Bexley Heath, where, too, there exist deep pits, widening into vaults below, and probably of British origin.

BEY (a modern Turk, word, the older form being beg, cf. Pers. baig), the administrator of a district, now generally an honorific title throughout the Turkish empire; the granting of this in Egypt is made by the sultan of Turkey through the khedive. In Tunis "bey" has become the hereditary title of the reigning sovereigns (see Tunisia).

BEYBAZAR, the chief town of a kaza of the Angora vilayet in Asiatic Turkey, situated on an affluent of the Sakaria (anc. Sangarius) , about 52 m. W. of Angora. It corresponds to the

anc. Lagania, renamed Anastasiopolis under the emperor Anastasius (491-518), a bishopric by the 5th century. Its well- built wooden houses cover the slopes of three hills at the mouth of a gorge filled with fruit gardens and vineyards. The chief products are rice, cotton and fruits. From Beybazar come the fine pears sold in Constantinople as " Angora pears "; its musk- melons are equally esteemed; its grapes are used only for a sweetmeat called jevizli-sujuk (" nutty fruit sausage "). There are few remains of antiquity apart from numerous rock-cut chambers lining the banks of the stream. Pop. about 4000 to

5000.

BEYLE, MARIE HENRI (1783-1842), better known by his nom de plume of Stendhal, French author, was born at Grenoble on the 23rd of January 1783. With his father, who was an avocat in the parlement of Grenoble, he was never on good terms, but his intractable disposition sufficiently explains his unhappy childhood and youth. Until he was twelve years old he was educated by a priest, who succeeded in inspiring him with a lasting hatred of clericalism. He was then sent to the newly established Ecole Centrale at Grenoble, and in 1799 to Paris with a letter of introduction to the Daru family, with which the Beyles were connected. Pierre Daru offered him a place in the ministry for war, and with the brothers Daru he followed Napoleon to Italy. Most of his time in Italy was spent at Milan, a city for which he conceived a lasting attachment. Much of his Chartreuse de Parme seems to be autobiographical of this part of his life.

He was a spectator of the battle of Marengo, and afterwards enlisted in a dragoon regiment. With rapid promotion he became adjutant to General Michaud; but after the peace of Amiens in 1802 he returned to study in Paris. There he met an actress, Melanie Guilbert, whom he followed to Marseilles. His father cut off his supplies on hearing of this escapade, and Beyle was reduced to serving as clerk to a grocer. Melanie Guilbert, however, soon abandoned him to marry a Russian, and Beyle returned to Paris. Through the influence of Daru he obtained a place in the commissariat, which he filled with some distinction from 1806 to 1814. Charged with raising a levy in Brunswick of five million francs, he extracted seven; and during the retreat from Moscow he discharged his duties with efficiency. On the fall of Napoleon he refused to accept a place under the new regime, and retired to Milan, where he met Silvio Pellico, Manzoni, Lord Byron and other men of note. At Milan he contracted a liaison with a certain Angelina P.ˆwhom he had admired fruit- lessly during his earlier residence in that city. In 1814 he published, under the pseudonym of Alexandre Cesar Bombet, his Lettres ecrites de Vienne en Autriche sur le celebre compositeur, Joseph Haydn, suivies d'une vie de Mozart, et de considerations sur Metastase et I' Stat present de la musique en Italic His letters on Haydn were borrowed from the Haydini (1812) of Joseph Carpani, and the section on Mozart had no greater claim to originality. The book was reprinted (1817) as Vies de Haydn, Mozart et MStastase. His Histoire de la peinture en Italie (2 vols., 1817) was originally dedicated to Napoleon.

His friendship with some Italian patriots brought him in 1821 under

the notice of the Austrian authorities, and he was exiled from Milan. In Paris he felt himself a stranger, as he had never recognized French contemporary art in literature, music or painting. He frequented, however, many literary salons in Paris, and found some friends in the " ideologues " who gathered round Destutt de Tracy. He was the most closely allied with Prosper Merimee, a dilettante and an ironist like himself. He published at this time his Essai sur V amour (1822), of which only seventeen copies were sold in eleven years, though it afterwards became famous, Racine et Shakespeare (1823-1825), Vie de Rossini (1824), D'un nouveau complot contre les industriels (1825), Promenades dans Rome (1829), and his first novel, Armance, ou quelques scenes de Paris en 1827 (1827). After the Revolution of 1830 he was appointed consul at Trieste, but the Austrian government refused to accept him, and he was sent to Civita Vecchia instead. Le Rouge et le noir, chronique du XIX' siecle (2 vols., 1830) appeared in Paris after his departure, but attracted

small notice. He had published in 1838 Mimoires d'un touriste, and in 1839 La Chartreuse de Parme (2 vols.), which was the last of his publications, and the first to secure any popular success, though his earlier writings had been regarded as significant by a limited public. It was enthusiastically reviewed by Balzac in his Revue Parisienne (1840). Beyle remained at Civita Vecchia, discharging his duties as consul perfunctorily and with frequent intervals of absence until his death, which took place in Paris on the 23rd of March 1842. He wrote his own epitaph, 1 describing himself as a Milanese.

His posthumous works include a fragmentary Vie de Napoleon (1875); Melanges d'art et de littirature (1867); Chroniques tia'iennes (1885), including " L'Abbesse de Castro," " Les Cenci," " Vittoria Accoramboni," " Vanina Vanini," " La Duchesse de Palliano" some of which has appeared separately; Romans et nouvelles and Nouvettes inedites (1855); Correspondance (2 vols., 1855); Lamiel (ed. C. Stryienski, 1889); his Journal 1801-1814 (ed. Stryienski and F. de Nion, 1888), of which the section dealing with the Russian and German campaigns is unfortunately lost; Vie de Henri Brulard (1890), a disguised autobiography, chiefly the history of his numerous love affairs; Lettres intimes (1892); Lucien Leuwen (ed. J. de Mitty, 1894); Souvenirs d'igotisme (ed. C. Stryienski, 1892), autobiography and unpublished letters.

Stendhal's reputation practically rests on the two novels Le Rouge et le noir and La Chartreuse de Parme. In the former of these he borrowed his plot from events which had actually happened some years previously. Julien Sorel in the novel is tutor in a noble family and seduces his pupil's mother. He eventually kills her to avenge a letter accusing him to the family of his betrothed, Mile de la Mole. Julien is a picture of Beyle as he imagined himself to be. The Chartreuse de Parme has less unity of purpose than Le Rouge et le noir. For its setting the author drew largely on his own experiences. Fabrice's ex- periences at Waterloo are his own in the Italian campaign, and the countess Pietranera is his Milanese Angelina. But of the two novels it is more picturesque and has been more popular. Stend- hal's real vogue dates from the early sixties, but his importance is essentially literary. In spite of his egotism and the limitations of his ideas, his acute analysis of the motives of his personages has appealed to successive generations of writers, and a great part of the development of the French novel must be traced to him. Brunetiere has pointed out {Manual of French Lit., Eng. trans., 1898) that Stendhal supplied the Romanticists with the notion of the interchange of the methods and effects of poetry, painting and music, and that in his worship of Napoleon he agreed with their glorification of individual energy. Stendhal, however, thoroughly disliked the Romanticists, though Sainte- Beuve acknowledged (Causeries du lundi, voL ix.) that his books gave ideas. Taine (Essais de critique et d'kistoire, 1857) found in him a great psychologist; Zola (Romanciers naturalistes, 1 881) actually claimed him as the father of the naturalist school; and Paul Bourget (Essais de psychologie contemporaine, 1883) cited Le Rouge et le noir as one of the classic novels of analysis.

The 1846 edition of La Chartreuse de Parme contains a prefatory notice by R. Colomb, and a reprint of Balzac's article. In addition to the authorities already mentioned see the essay on Beyle (1850) by Prosper Merimee; A. A. Paton, Henry Beyle, a Critical and Biographical Study (1874) ; Adolphe Paupe, Histoire des ceuvres de Stendhal (1903) ; A. Chuquet, Stendhal-Beyle (1902) ; a review by R. Doumic (Revue des deux mondes, February 1902), deprecating the excessive attention paid to Beyle's writings; and Edouard Rod, Stendhal (1892) in the " Grands ecrivains frangais " series. See also Correspondance de Stendhal, 1800-1842, with preface by M. Barres (Paris, 1908).

BEYRICH, HEINRICH ERNST VON (1815-1896), German geologist, was born at Berlin on the 31st of August 1815, and educated at the university in that city, and afterwards at Bonn, where he studied

under Goldfuss and Noggerath. He obtained his degree of Ph. D. in 1837 at Berlin, and was subsequently employed in the mineralogical museum of the university, becoming director of the palaeontological collection in 1857, and director of the museum in 1875. He was one of the founders 1 Qui giace Arrigo Beyle Milanese; visse, scrisse, amo.

of the German Geological Society in 1848. He early recognized the value of palaeontology in stratigraphical work; and he made important researches in the Rhenish mountains, in the Harz and Alpine districts. In later years he gave special attention to the Tertiary strata, including the Brown Coal of North Germany. In 1854 he proposed the term Oligocene for certain Tertiary strata intermediate between the Eocene and Miocene; and the term is now generally adopted. In 1865 he was appointed professor of geology and palaeontology in the Berlin University, where he was eminently successful as a teacher; and when the Prussian Geological Survey was instituted in 1873 he was appointed co-director with Wilhelm Hauchecorne (1828-1900). He published Beilrdgezur Kenntniss der Versteine- rungen des rheinischen Ubergangs-gebirges (1837); fiber einige b'dhmische Trilobiten (1845); Die Conchylien des norddeutschen Tertiargebirges (1853-1857). He died on the 9th of July

1896.

BEYSCHLAG, WILLIBALD (1823-1900), German Protestant divine, was born at Frankfort-on-Main on the 5th of September 1823. He studied theology at Bonn and Berlin (1840-1844), and in 1856 was appointed court-preacher at Karlsruhe. In i860, he moved to Halle as professor ordinarius of practical theology. A theologian of the mediating school, he became leader of the Millelpartei, and with Albrecht Wolters founded as its organ the Deutschevangeliscke Blatter. As a representative of this party, he took a prominent part in the general synods of 1875 and 1879. His championship of the rights of the laity and his belief in the autonomy of the church led him to advocate the separation of church and state. He died at Halle on the 25th of November 1900. Among his numerous works are Die Christologie des Neuen Testaments (1866), Der Altkatholicismus (three editions, 1882-1883), Leben Jesu (2 vols., 1885; 3rd ed., 1893), Neutesta- mentliche Theologie (2 vols., 1891-1892; 2nd ed., 1896), Christen- lehre auf Grund dss kleinen luth. Katechismus (1900), and an autobiography Ausmeinem Leben (2 parts, 1896-1898).

See P. Schaff, Living Divines (1887) ; Lichtenberger, Hist. Germ. Theol. (1889); Calwer-Zeller, Kirchenlexikon.

BEZA (de Besze), THEODORE (1519-1605), French theo- logian, son of bailli Pierre de Besze, was born at Vezelai,Burgundy, on the 24th of June 1519. Of good descent, his parents were known for generous piety. He owed his education to an uncle, Nicolas de Besze, counsellor of the Paris parlement, who placed him (1529) under Melchior Wolmar at Orleans, and later at Bourges. Wolmar, who had taught Greek to Calvin, grounded Beza in Scripture from a Protestant standpoint; after his return to Germany (1534) Beza studied law at Orleans (May 1535 to August 1539), beginning practice in Paris (1539) as law licen- tiate. To this period belong his exercises in Latin verse, in the loose taste of the day, foolishly published by him as Juvenilia in 1548. Though not in orders, he held two benefices. A severe illness wrought a change; he married his mistress, Claude Desnoz, and joined the church of Calvin at Geneva (October 1548). In November 1549 he was appointed Greek professor at Lausanne, where he acted as Calvin's adjutant in various publications, including his defence of the burning of Servetus, De Haereticis a civili magistratu puniendis (1554). In 1558 he became professor in the Geneva academy, where his career was brilliant. His conspicuous ability was shown in the abortive Colloquy of Poissy (1561). On Calvin's death (1564) he became his biographer and administrative successor. As a historian, Beza, by his chronological inexactitude, has been the source of serious mistakes; as an administrator, he softened the rigour of Calvin. His editions and Latin versions of the New Testament had a marked influence on the English versions of Geneva (1557 and 1560) and London (161 1). The famous codex D. was pre- sented by him (1581) to Cambridge University, with a character- istically dubious account of the history of the manuscript. His works are very numerous, but of little moment, except those already mentioned. He resigned his offices in 1600, and died on the 13th of October 1605. He had taken a second wife (1588), Catherine del Piano, a widow, but left no issue. He was not the author of the Histoire ecclesiastique (1580), sometimes ascribed

to him; nor, probably, of the vulgar skit published under the name of Benedict Panavantius (1551).

See Laingaeus, De Vila et Moribus (1585, calumnious) ; Antoine la Faye, De Vita et Obitu (1606, eulogistic); Schlosser, Lebeh (1806); Baum, Th. Beza, portrait (1843-1851); Heppe, Leben (1861). (A. Go.)*

BEZANT or Byzant (from Byzantium, the modern Constanti- nople), originally a Byzantine gold coin which had a wide circula- tion throughout Europe up to about 1250. Its average value was about nine shillings. Bezants were also issued in Flanders and Spain. Silver bezants, in value from one to two shillings, were in circulation in England in the 13th and 14th centuries. In Wycliffe's translation of the Bible he uses the word for a " talent " (e.g. in Luke xv. 8). In heraldry, bezants are repre- sented by gold circles on the shield, and were introduced by the crusaders.

BEZANTlSE, in architecture, a name given to an ornamented moulding much used in the Norman period, resembling the coins (bezants) struck in Byzantium.

BEZBORODKO, ALEKSANDER ANDREEVICH, Prince (1747-1799), grand chancellor of Russia, was born at Gluchova on the 14th of March 1747, and educated at home and in the clerical academy at Kiev. He entered the public service as a clerk in the office of Count P. A. Rumyantsev. then governor- general of Little Russia, whom he accompanied to the Turkish War in 1768. He was present at the engagements of Larga and Kaluga, and at the storming of Silistria. On the conclusion of the peace of Kuchuk-Kainarji (1774) the field marshal recommended him to Catharine II., and she appointed him in 1775 her petition-secretary. He thus had the opportunity of impressing the empress with his brilliant gifts, the most remarkable of which were exquisite manners, a marvellous memory and a clear and pregnant style. At the same time he set to work to acquire the principal European languages, especially French, of which he became a master. It was at this time that he wrote his historical sketches of the Tatar wars and of Little Russia.

His activity was prodigious, and Catharine called him her factotum. In 1780 he accompanied her on her journey through White Russia, meeting the emperor Joseph, who urged him to study diplomacy. On his return from a delicate mission to Copen- hagen, he presented to the empress " a memorial on political affairs " which comprised the first plan of a partition of Turkey between Russia and Austria. This document was transmitted almost word for word to Vienna as the Russian proposals. He followed this up by Epitomised Historical Information con- cerning Moldavia. For these two state papers he

was rewarded with the posts of " plenipotentiary for all negotiations " in the foreign office and postmaster-general. From 'this time he was inseparably associated with Catharine in all important dip- lomatic affairs, though officially he was the subordinate of the vice-chancellor, Count Alexander Osterman. He wrote all the most important despatches to the Russian ministers abroad, concluded and subscribed all treaties, and performed all the functions of a secretary of state. He identified himself entirely with Catharine's political ideas, even with that of re-establishing the Greek empire under her grandson Constantine. The empress, as usual, richly rewarded her comes with pensions and principalities. In 1786 he was promoted to the senate, and it was through him that the empress communicated her will to that august state-decoration. In 1787 he accompanied Catharine on her triumphal progress through South Russia in the capacity of minister of foreign affairs. At Kaniev he conducted the negotiations with the Polish king, Stanislaus II., and at Novuiya Kaidaniya he was in the empress's carriage when she received Joseph II.

The second Turkish War (1787-92) and the war with Gustavus III. (1788-90) heaped fresh burdens on his already heavily laden shoulders, and he suffered from the intrigues of his numerous jealous rivals, including the empress's latest favourite, A. M. Mamonov. All his efforts were directed towards the conclusion of the two oppressive wars by an honourable peace. The pause of Verela. with Gustavus III. (14th of August 1790)

was on the terms dictated by him. On the sudden death oi Potemkin he was despatched to Jassy to prevent the peace con- gress there from breaking up, and succeeded, in the face of all but insuperable difficulties, in concluding a treaty exceedingly advantageous to Russia (9th of January 1792). For this service he received the thanks of the empress, the ribbon of St Andrew and 50,000 roubles. On his return from Jassy, however, he found his confidential post of secretary of petitions occupied by the empress's last favourite, P. A. Zubov. He complained of this " diminution of his dignity " to the empress in a private memorial in the course of 1793. The empress reassured him by fresh honours and distinctions on the occasion of the solemn celebration of the peace of Jassy (2nd of September 1793), when she publicly presented him with a golden olive-branch encrusted with brilliants. Subsequently Catharine reconciled him with Zubov, and he resumed the conduct of foreign affairs. He contributed more than any other man to bring about the downfall and the third partition of Poland, for which he was magnificently recompensed. But diplomacy by no means ex- hausted

■*Bezborodko's capacity for work. He had a large share in the internal administration also. He reformed the post-office, improved the banking system of Russia, regulated the finances, constructed roads, and united the Uniate and Orthodox churches. On the death of Catharine, the emperor Paul entrusted Bez- borodko with the examination of the late empress's private papers, and shortly afterwards made him a prince of the Russian empire, with a correspondingly splendid apanage. On the retirement of Osterman he received the highest dignity in the Russian empire — that of imperial chancellor. Bezborodko was the only Russian minister who retained the favour of Paul to the last. During the last two years of his life the control of Russia's diplomacy was entirely in his hands. His programme at this period was peace with all the European powers, revolu- tionary France included. But the emperor's growing aversion from this pacific policy induced the astute old minister to attempt to " seek safety in moral and physical repose." Paul, however, refused to accept his resignation and would have sent him abroad for the benefit of his health, had not a sudden stroke of paralysis prevented Bezborodko from taking advantage of his master's kindness. He died at St Petersburg on the 6th of April 1799. In private life Bezborodko was a typical Catharinian, corrupt, licentious, conscienceless and self-seeking. But he was infinitely generous and affectionate, and spent his enormous fortune liberally. His banquets were magnificent, his collections of pictures and statues unique in Europe. He was the best friend of his innumerable poor relatives, and the Maecenas of all the struggling authors of his day. Sycophantic he might have been, but he was neither ungrateful nor vindictive. His patriotism is as indisputable as his genius.*

See Sbornik (Collections) of the Imperial Russian Historical Society (Fr. and Russ.), vols. 60-100 (St Petersburg, 1870-1904); Nikolai Ivanovich Grigorovich, The Chancellor A. A. Bezborodko in Connexion with the Events of His Time (Rus., St Petersburg, 1879-1881). (R. N. B.)

BEZEL (from an O. Fr. word, cf. Mod. Fr. biseau, basile, possibly connected with Lat. bis, twice), a sloping edge, as of a cutting tool, also known as basil. In jewelry, the term is used for the oblique sides or faces of a gem; the rim which secures the crystal of a watch in position or a jewel in its setting, and particularly the enlarged part of a ring on which the device is engraved (see Ring).

BEZIERS, a town of southern France, capital of an arron- dissement in the department of Herault, 47 m. S.W. of Mont- pellier by rail. Pop. (1906) 46,262. Beziers is situated in a wine-growing district on

a hill on the left bank of the river Orb, which is joined at this point by the Canal du Midi. The Allees Paul Riquet, named after the creator of the canal, occupy the centre of Beziers and divide the old town with its maze of narrow and irregular streets from the new quarter to the east. They form a long and shady promenade, terminating a1 one end in the Place de la Republique and the theatre, the front of which is decorated with bas-reliefs by David d' Angers,

and at the other in a beautiful park, the Plateau des Poetes. The most interesting portion of the town is the extreme west where the old ramparts overlook the Orb. Above them towers St Nazaire, the finest of the churches of Beziers; it dates from the 1 2th to the 14th centuries and is a good specimen of the ecclesiastical fortification common in southern France. Its chief artistic features are the rose window in the western facade, and the stained glass and curious iron grilles of the choir- windows, which belong to the 14th century. Adjoining the south transept there are Gothic cloisters of the 14th century. The Orb is crossed by four bridges, the railway bridge, an ancient bridge of the 13th or 14th century, a modern bridge and the fine aqueduct by which the Canal du Midi is carried over the river. About half a mile to the south-west of the town are the locks of Fonserannes, in which in 330 yds. the water of the canal descends 80 ft. to reach the level of the Orb. There are remains of a Roman arena which have been built into the houses of the rue St Jacques. Beziers is seat of a sub-prefect and has tribunals of first instance and of commerce, communal colleges and several learned societies. It is an agricultural market and carries on an active trade in wine, brandy, fruit, leather and sulphur. Its industries are chiefly connected with the wine trade (cask and cork making, &c.) and there are important distilleries. It also has iron-works and tanneries.

The Romans established a colony at Beziers, and it was the headquarters of the seventh legion, under the title of Baeterrae Scptimanorum. The present name occurs in the form Besara as early as Festus Avienus (later 4th century). The town was completely destroyed in 1 209 by the forces of Simon de Montfort in the crusade against the Albigenses, on which occasion 20,000 persons were massacred. The walls were rebuilt in 1289; but the town again suffered severely in the civil and religious wars of the 16th century, and all its fortifications were destroyed in 1632.

BEZIQUE (probably from Span, besico, little kiss, in allusion to the meeting of the queen and knave, an important feature in the game), a game at cards played with two similar packs from which the twos, threes, fours, fives and sixes have been rejected, shuffled together and used as one. It is modelled on a group of card games which possess many features in common ; the oldest of these is mariage, then follow brusquembille, I'homme de broil., briscan or brisque, and cinq-cents. Bezique (also called besi and besigue) is, in fact, brisque played with a double pack, and with certain modifications rendered necessary by the intro- duction of additional cards. The cards rank as follows: — Ace, ten, king, queen, knave, nine, eight, seven.

The usual game is for two players. The players cut for deal, and the higher bezique card deals. The objects of the play are: (1) to promote in the hand various combinations of cards, which, when declared, entitle the holder to certain scores; (2) to win aces and tens, known as " brisques "; (3) to win the so-called last trick. The dealer deals eight cards to each, first three, then two, and again three. The top card of those remaining (called the " stock ") is turned up for trumps. As sometimes played, the first marriage, or the first sequence, decides the trump suit; there is then no score for the seven of trumps (see below). The stock is placed face downwards between the players and slightly spread. The non-dealer leads any card, and the dealer plays to it, but need not follow suit, nor win the trick. If he wins the trick by playing a higher card of the same suit led, or a trump, the lead falls to him. In case of ties the leader wins. Whoever wins the trick leads to the next; but before playing again each player takes a card from the stock and adds it to his hand, the winner of the trick taking the top card. This alternate playing and drawing a card continues until the stock (including the trump card or card exchanged for it, which is taken up last) is exhausted. The tricks remain face upwards on the table, but must not be searched during the play of the hand.

The scores are shown as follows: —

Table of Bezique Scores. Seven of trumps, turned up, dealer marks .... 10 Seven of trumps, declared (see below) or exchanged, player marks . . . . . • • • .10

Marriage (king and queen of any suit) declared ... 20

Royal marriage (king and queen of trumps) declared . . 40

Bezique (queen of spades and knave of diamonds) declared . 40

Double bezique (all the four bezique cards) declared . . 500

Four aces (any four, whether duplicates or not) declared . 100

Four kings (any four) declared 80

Four queens (any four) declared 60

Four knaves (any four) declared 40

Sequence (ace, ten, king, queen, knave of trumps) declared . 250

Aces and tens, in tricks, the winner for each one marks . . 10 Last trick of all (as sometimes played, the last trick before the

stock is exhausted) the winner marks 10

A " declaration " can only be made by the winner of a trick immediately after he has won it, and before he draws from the stock. It is effected by placing the declared cards (one of which at least must not have been declared before) face upwards on the table, where they are left, unless they are played, as they may be. A player is not bound to declare. A card led or played cannot be declared. More than one declaration may be made at a time, provided no card of one combination forms part of another that is declared with it. Thus four knaves and a mar- riage may be declared at the same time; but a player cannot declare king and queen of spades and knave of diamonds to- gether to score marriage and bezique. He must first declare one combination, say bezique; and when he wins another trick he can score marriage by declaring the king. A declaration cannot be made of cards that have already all been declared. Thus, if four knaves (one being a bezique knave) and four queens (one being a bezique queen) have been declared, the knave and queen already declared cannot be declared again as bezique. To score all the combinations with these cards, after the knaves are declared and another trick won, bezique must next be made, after which, on winning another trick, the three queens can be added and four queens scored. Lastly, a card once declared can only be used again in declaring in combinations of a different class. For example: the bezique queen can be declared in bezique, marriage and four queens; but having once been de- clared in single bezique, she cannot form part of another single bezique. Two declarations may, in a sense, be made to a trick, but only one can be scored at the time. Thus with four kings declared, including the king of spades, bezique can be declared and scored, but the spade marriage cannot be scored till the holder wins another trick. The correct formula is " Forty, and 20 to

score." The seven of trumps may be either declared or exchanged for the turn-up after winning a trick, and before drawing. When exchanged, the turn-up is taken into the player's hand, and the seven put in its place. The second seven can, of course, be declared. A seven when declared is not left on the table, but is simply shown.

The winner of the last trick can declare anything hitherto undeclared in his hand. After this all declarations cease. The winner of the last trick takes the last card of the stock, and the loser the turn-up card (or seven exchanged for it) . All cards on the table, that have been declared and not played, are taken up by their owners. The last eight tricks are then played, but the second player must follow suit if able, and must win the trick if able. Finally, each player counts his tricks for the aces and tens they may contain, unless (as is often done) they are scored at the time. If a player revokes in the last eight tricks, or does not win the card led, if able, the last eight tricks belong to his adversary. The deal then passes on alternately until the game (1000) is won. If the loser does not make 500, his oppo- nent counts a double game, or double points, according as they have agreed. The score is best kept by means of a special bezique-marker.

Three- and Four-Handed Bezique. — When three play, three packs are used together. All play against each other. The player on the left of the dealer is first dealt to and has the first lead. The rotation of dealing goes to the left. If double bezique has been scored, and one pair has been played, a second double bezique may be made with the third pair and the pair on the table. Triple bezique scores 1500. All the cards of the triple bezique must be on the table at the same time and unplayed to a trick. All may be declared together, or a double bezique may be added to a single one, or a third bezique may be added to a double bezique already declared. The game is 2000

up. Sometimes the three players cut, the one who cuts the highest card plays against the other two in consultation, and continues to do so till the allies win a game, when the two cut as before to see who shall be the single player. Only two packs are then used.

When four play four packs are used. The players may then score independently or may play as partners. A second double bezique or triple bezique may be scored as before; to form them the beziques may be declared from the hand of either partner. A player may

declare, when he or his partner takes a trick. In playing the last eight tricks, the winner of the last trick and the adversary to his left play their cards against each other, and then the other two similarly play theirs. Four people may also play in pairs by con- sultation, only two packs being then required.

Polish Bezique (also called " Open Bezique " and " Fildniski ") differs from ordinary bezique in the following particulars. The game is not less than 2000 up. Whenever a scoring card is played, the winner of the trick places it face upwards in front of him (the same with both cards if two scoring cards are played to a trick), forming rows of aces, kings, queens, knaves and trump tens (called open cards). Cards of the same denomination are placed overlapping one another lengthwise from the player towards his adversary to economise space. When a scoring card is placed among the open cards, all the sevens, eights, nines, and plain suit tens in the tricks are turned down and put on one side. Open cards cannot be played a second time, and can only be used in declaring. Whether so used or not they remain face upwards on the table until the end of the hand, including the last eight tricks. A player can declare after winning a trick and before drawing again, when the trick won con- tains a card or cards, which added to his open cards complete any combination that scores. Every declaration must include a card played to the trick last won. Aces and tens must be scored as soon as won, and not at the end of the hand. The seven of trumps can be exchanged by the winner of the trick containing it ; and if the turn- up card is one that can be used in declaring, it becomes an open card when exchanged. The seven of trumps when not exchanged is scored for by the player winning the trick containing it.

Compound declarations are allowed, i.e. cards added to the open cards can at once be used, without waiting to win another trick, in as many combinations of different classes as they will form with the winner's open cards. For.example: A has three open kings, and he wins a trick containing a king. Before drawing again he places the fourth king with the other three, and scores 80 for kings. This is a simple declaration. But suppose the card led was the queen of trumps, and A wins it with the king, and he has the following open cards — three kings, three queens, and ace, ten, knave of trumps. He at once declares royal marriage (40) ; four kings (80) ; four queens (60) ; and sequence (250) ; and scores in all, 430. Again : ace of spades is turned up, and ace of hearts is led. The second player has two open aces, and wins the ace of hearts with the seven of trumps and exchanges. He scores for the exchange, 10; for the ace of hearts, 10; for the ace of spades, 10; and adds the aces to his open cards,

and scores 100 for aces; in all, 130. If a declaration or part of a compound declaration is omitted, and the winner of the trick draws again, he cannot amend his score.

The ordinary rule holds that a second declaration cannot be made of a card already declared in the same class. Thus: a queen once married, cannot be married again ; a fifth king added to four already declared does not entitle to another score for kings. The fundamental point to be borne in mind is, that no declaration can be effected by means of cards held in the hand. Thus: A having three open queens and a queen in hand cannot add it to his open cards. He must win another trick containing a queen, when ho can declare queens. Declarations continue during the play of the last eight tricks just the same as during the play of the other cards.

Rubicon Bezique. — Four packs are used. Nine cards are dealt by three to each player. The rules of Polish bezique hold good in regard to dealing, leading, playing to lead, drawing and declaring; but a player who receives a hand containing no picture-card (king, queen, or knave) scores 50 for carte blanche, which he shows. If he does not draw a picture-card, he can again score for carte blanche. The trump suit is decided by the first sequence or marriage declared. As four packs are used, triple and quadruple bezique may be made. Triple bezique counts 1500, quadruple 4500. Tricks are left face upwards till a brisque (ace or ten) is played, when the winner takes all the played cards and puts them in a heap ; their only value is the value of the brisques, which are only counted when the scores are very close ; then they are used to decide the game. They may be counted during the play, provided there are not more than twelve cards in the stock. Declarations can only be made after winning a trick and before drawing. In addition to the ordinary bezique declarations, sequence, counting 150, can be made in plain suits. Declared cards, except carte blanche, remain on the table. If the holder of carte blanche hold four aces and wins the first trick, he can declare his aces. With the exceptions already made, the scores for declarations are the same as at ordinary bezique. Declaration is not compulsory. Cards led or played cannot be declared. There are three classes of declarations, their order being (1) marriage and sequence, (2) bezique, (3) fours. _ A card once declared can be used for a second declaration, but only in an equal or superior class. If a card of a declared com-

bination be played to a trick, another card of the same rank may be used to form a second similar combination; e.g. if aces be declared and one of them be played by the playing of a fifth ace, aces can be

declared again. If a player has a chance of a double declaration he can declare both, but can only score one at the time. As in other variations of bezique he announces, say, " forty, and twenty to score." He should repeat, " Twenty to score," after every trick, until he can legally score it, but if he plays a card of the combination he cannot score the points. To the last nine tricks, after the stock is exhausted, the second player must follow suit and win the trick by trumping or over-playing, if he can. The winner of the odd trick scores 50. The game consists of one deal. In reckoning the score all fractions of 100 are neglected; the winner scores goo for game in addition to the difference between his own points and his opponent's. The loser is " rubiconed " if he does not score 1000 points, in which case the winner adds the loser's points to his own, takes 300 for brisques and 1000 for game, but the loser may claim his brisques to save a rubicon, though they are not reckoned among his points. If a rubiconed player has scored less than 100 the opponent counts the score as 100.

BEZWADA, a town of British India, in the Kistna district of Madras, on the left bank of the river Kistna, at the head of its delta. Pop. (1901) 24,224. Here are the headquarters of the Kistna canal system, which irrigates more than 500,000 acres, and also provides navigation throughout the delta. The anicut or dam at Bezwada, begun in 1852, consists of a mass of rubble, fronted with masonry, 1240 yds. long. Here also is the central junction of the East Coast railway from Madras to Calcutta, 267 m. from Madras, where one branch line comes down from the Warangal coalfield in the Nizam's Dominions, and another from Bellary on the Southern Mahratta line. Ancient cuttings on the hills west of Bezwada have been held by some to mark the site of a Buddhist monastery; by others they are considered to have been quarries. At Undavalle to the south are some noted cave-shrines.

BHAGALPUR, a city of British India, in the Behar province of Bengal, which gives its name to a district and to a division; situated on the right bank of the Ganges, 265 m'. from Calcutta. It is a station on the East Indian railway. Pop. (1901) 75,760, showing an increase of 9% in the decade. The chief educational institution is' the Tejnarayan Jubilee college (1887), supported almost entirely by fees. Adjacent to the town are the two Augustus Cleveland monuments, one erected by government, and the other by the Hindus, to the memory of the civilian, who, as collector of Bhagalpur at the end of the 18th century, " by conciliation, confidence and benevolence, attempted and accomplished the entire subjection of the lawless and savage inhabitants of the Jungleterry of Rajmahal."

The District or Bhagalpur stretches across both banks of the Ganges. It has an area of 4226 sq. m. In 1901 the population was 2,088,953, showing an increase of 3 % in the decade. Bhagalpur is a long and narrow district, divided into two unequal parts by the river Ganges. In the southern portion of the district the scenery in parts of the hill-ranges and the highlands which connect them is very beautiful. The hills are of primary formation, with fine masses of contorted gneiss. The ground is broken up into picturesque gorges and deep ravines, and the whole is covered with fine forest trees and a rich under- growth. Within this portion also lie the lowlands of Bhagalpur, fertile, well planted, well watered, and highly cultivated. The country north of the Ganges is level, but beautifully diversified with trees and verdure. Three fine rivers flow through the district — the Ganges, Kusi and Ghagri. The Ganges runs a course of 60 m, through Bhagalpur, is navigable all the year round, and has an average width of 3 m. The Kusi rises in the Himalayas and falls into the Ganges near Colgong within Bhagalpur. It is a fine stream, navigable up to the foot of the hills, and receives the Ghagri 8 m. above its debouchure.

In the early days of British administration the hill people,, the Nats and Santals, gave much trouble. They were the original inhabitants of the country whom the Aryan conquerors had driven back into the barren hills and unhealthy forests. This they avenged from generation to generation by plundering and ravaging the plains. The efforts to subdue or restrain these marauders proved fruitless, till Augustus Cleveland won them by mild measures, and successfully made over the piotection of the

district to the very hill people who a few years before had been its scourge. Rice, wheat, barley, oats, Indian corn, various kinds of millet, pulses, oil-seeds, tobacco, cotton, indigo, opium, flax and hemp and sugar-cane, are the principal agricultural products of Bhagalpur district. The jungles afford good pasturage in the hot weather, and abound in lac, silk cocoons, catechu, resin and the mahud fruit, which is both used as fruit and for the manu- facture of spirits. Lead ores (chiefly argentiferous galena) and building stone are found, and iron ore is distributed over the hilly country. Attempts made to work the galena in 1878-70 and 1900 were abandoned, and the iron ore is little worked. Gold is washed from the river sand in small particles.

The climate of Bhagalpur partakes of the character both of the deltaic districts of Bengal and of the districts of Behar, between which it is situated. The hot season sets in about the end of March, and continues till the beginning of June, the temperature at this time rising as high as 1 1 o° Fahr. The rains usually begin at the end of June and last till the middle of September; average annual rainfall, 55 in. The cold season commences at the begin- ning of November and lasts till March. During December and January the temperature falls as low as 41 9 Fahr. The average annual temperature is 78°. Bhagalpur formed a part of the ancient Sanskrit kingdom of Anga. In later times it was included in the powerful Hindu kingdom of Magadha or Behar, and in the 7th century a.d. it was an independent state, with the city of Champa for its capital. It afterwards formed a part of the Mahommedan kingdom of Gaur, and was subsequently subjugated by Akbar, who declared it to be a part of the Delhi empire. Bhagalpur passed to the East India Company by the grant of the emperor Shah Alam in 1765.

There are indigo factories, and other industries include the weaving of tussur silk and the making of coarse glass. A large trade is carried on by rail and river with Lower Bengal. The tract south of the Ganges is traversed by the loop-line of the East Indian railway, and there is also a railway across the northern tract.

The Division of Bhagalpur stretches across the Ganges from the Nepal frontier to the hills of Chota Nagpur. It com- prises the five districts of Monghyr, Bhagalpur, Purnea, Dar- jeeling, and the Santal Parganas. The total area is 19,776 sq. m.; and in 1901 the population was 8,091,405.

BHAMO, a town and district of Burma. The town was in ancient times the capital of the Shan state of Manmaw, later the seat of a Burmese governor. It is now the headquarters of a district in the Mandalay division of Upper Burma (Chinese frontier) . It is situated about 300 m. up the river from Mandalay. It is the highest station on the Irrawaddy held by British troops, and the nearest point on the river to the Chinese frontier. In 1901 it contained 10,734 inhabitants, of whom a considerable number were Chinamen, natives of India and Shan-Chinese. It stretches for a distance of nearly 4 m. along the Irrawaddy bank in a series of small villages, transformed into quarters of the town, but the town proper is confined mainly to the one high ridge of land running at right angles to the river. The surface of the ground is much cut up by ravines which fill and dry up according to the rise and fall of the river. When the Irrawaddy is at its height the lower portion of the town is flooded, and the country

all round is a sheet of water, but usually for no very long time. Here or hereabouts has long been the terminus of a great deal of the land commerce from China. For years after its annexation by Great Britain in 1885 the trade routes were unsafe owing to attacks from Kachins. These have now ceased, and the roads, which were mere bridle-tracks, have been greatly improved. The two chief are the so-called Santa and Ponlaing route, through Manyiin (Manwaing) and Nantien to Momein, and the southern or Sawadi route by way of Namh- kam. Cart roads are now being constructed on both routes, and that south of the Taiping river could easily be continued through Manyiin to Momein if the Chinese should be induced to co-operate. There is a fairly large military garrison in Bhamo distributed between two forts to the north and east of the town. There are in general stationed here a native regiment, two sections of

a battery and the wing of a European regiment. Besides the barracks there are a circuit house, dak bungalow, courthouse, and post and telegraph offices. There is a branch railway from Myitkyina to Katha, whence there is daily communication by river to Bhamo.

The District of Bhamo lies wholly in the basin of the Irra- waddy, which, as well as its tributaries, runs through the heart of it. On the east of the river is the Shan plateau, running almost due north and south. West of the Irrawaddy there is a regular series of ranges, enclosing the basins of the Kaukkwe, Mosit, Indaw and other streams, down which much timber is floated. Beyond the Kaukkwe there is a ridge of hills, which starts at Leka, near Mogaung, and diverges to the south, the eastern ridge dividing the Kaukkwe from the Mosit, and the western forming the eastern watershed of the Nam Yin and running south into Katha. It is an offshoot from the latter of these ridges that forms the third defile of the Irrawaddy between Bhamo and Sinbo. The district covers an area of 4146 sq. m., and the population in 1901 was 79,515- It is mainly composed of Shan-Burmese and Kachins. The Shan-Burmese inhabit the valleys and alluvial plains on each side of the river. The Kachins, who probably came from the sub-regions of the Himalayas, occupy the hills throughout the district. There are also settle- ments of Shans, Shan-Chinese, Chinese and Assamese. There are extensive fisheries in the Shwegu and Mo-hnyin circles, and in the Indaw, a chain of lakes just behind the Mosit, opposite Shwegu. The district abounds in rich teak forests, and there are reserves representing 60,000 acres of teak plantation. The whole of the country along the banks of the Irrawaddy, the Mole, Taiping and Kaukkwe, is generally in a water-logged condition during the rains. The climate in the district is therefore decidedly malarious, especially at the beginning and end of

the rains. From November to March there is very bracing cold weather. The highest temperatures range a few degrees over ioo° F. up to 106 , and the lowest a few degrees under 40°. The average maximum for the year is about 87°, the average minimum about 62 . The rainfall averages 72 in. a year. (J. G. Sc.)

BHANDARA, a town and district of British India, in the Nagpur division of the Central Provinces. The town (pop. in 1901, 14,023) is situated on the left bank of the river Wainganga, 7 m. from a station on the Bengal-Nagpur railway. It has considerable manufactures of cotton cloth and brass- ware, and a first-grade middle school, with a library.

The District of Bhandara has an area of 3965 sq. m. In 1901 the population was 663,062, showing a decrease of n % since 1891 compared with an increase of 8 % in the preceding decade. The district is bounded on the N., N.E. and E. by lofty hills, inhabited by Gonds and other aboriginal tribes, while the W. and N.W. are comparatively open. Small branches of the Satpura range make their way into the interior of the district. The Ambagarh or Sendurjhari hills, which skirt the south of the Chandpur pargana, have an average height of between 300 and 400 ft. above the level of the plain. The other elevated tracts are the Balahi hills, the Kanheri hills and the Nawegaon hills. The Wainganga is the principal river in the district, and the only stream that does not dry up in the hot weather, — its affluents within the district being the Bawanthari, Bagh, Kanhan and Chulban. There are 3648 small lakes and tanks in Bhandara district, whence it is called the " lake region of Nagpur"; they afford ample means of irrigation. More than one-third of the district lies under jungle, which yields gum, medicinal fruit and nuts, edible fruits, lac, honey and the blossoms of the makud tree (Bassia latijolia), which are eaten by the poorer classes, and used for the manufacture of a kind of spirit. Tigers, panthers, deer, wild hogs and other wild animals abound in the forests, and during the rainy season many deaths occur from snake-bites. Iron is the chief mineral product. Gold is also »ound in the bed of the Sone river. Laterite, shale and sandstone occur all over the disi.net. Native cloth, brass wares, pot-stone wares, cartwheels, straw and reed baskets, and a small quantity of silk, form the only manufactures. The principal crops are rice, wheat, millet, other food-grains,

pulse, linseed, and a little sugar-cane. The district is traversed by the main road from Nagpur to the east, and also by the Bengal-Nagpur railway. It suffered in the famine of 1896-1897, and yet more severely in 1900.

Bhandara district contains 25 semi-independent chief ships. These little states are exempted from the revenue system, and only pay a light tribute. Their territory, however, is included within the returns of area and population above given. The climate of Bhandara is unhealthy, — the prevailing diseases being fever, small-pox and cholera. Nothing is known of the early history of the district. Tradition says that at a remote period a tribe of men, called the Gaulis or Gaulars, overran and conquered it. At the end of the 17th century it belonged to the Gond raja of Deogarh. In 1743 it was conquered by the Mahrattas, who governed it till 1853, when it lapsed to the British government, the raja of Nagpur having died without an heir.

BHANG, an East Indian name for the hemp plant, Cannabis saliva (see Hemp), but applied specially to the leaves dried and prepared for use as a narcotic drug. In India the products of the plant for use as a narcotic and intoxicant are recognized under the three names and forms of Bhang, Gunja or Ganja, and Churrus or Charas. Bhang consists of the larger leaves and capsules of the plant on which an efflorescence of resinous matter has occurred. The leaves are in broken and partly agglutinated pieces, having a dark-green colour and a heavy but not unpleasant smell. Bhang is used in India for smoking, with or without tobacco; it is prepared in the form of a cake or manjan, and it is made into an intoxicating beverage by infusing in cold water and straining. Gunja is the flowering or fruit-bearing tops of the female plants. It is gathered in stalks of several inches in length, the tops of which form a matted mass, from the agglutination of flowers, seeds and leaflets by the abundant resinous exudation which coats them. Churrus is the crude resinous substance separated from the plant. The use of preparations of hemp among the Mussulman and Hindu population of India is very general; and the habit also obtains among the population of central Asia, the Arabs and Egyptians, extending even to the negroes of the valley of the Zambezi and the Hottentots of South Africa. The habit appears to date from very remote times, for Herodotus says of the Scythians, that they creep inside huts and throw hemp seeds on hot stones.

BHARAHAT, or Barhut, a village in the small state of Nagod in India, lying about 24° 15′ N. by 8o° 45′ E., about 120 m. S.W. of Allahabad. General A. Cunningham discovered there in 1873 the

remains of a stupa (i.e. a burial mound over the ashes of some distinguished person) which were excavated, in 1874, by his assistant, J. D. Beglar. The results showed that it must have been one of the most imposing and handsome in India; and it is especially important now from the large number of inscriptions found upon it. The ancient name of the place has not been yet traced, but it must have been a considerable city and its site lay on the high road between the ancient capitals of UjjenI and Kosambl. The stupa was circular, 70 ft. in diameter and 42 ft. high. It was surrounded by a stone railing 100 ft. in diameter, so that between railing and stupa there was an open circle round which visitors could walk; and the whole stood towards the east side of a paved quadrangle about 300 ft. by 320 ft., surrounded by a stone wall. On the top of the stupa was an ornament shaped like the letter T, and as the base of the stupa was above the quadrangle, the total height of the monument was between 50 and 60 ft. But its main interest, to us, lies in the railing. This consisted of eighty square pillars, 7 ft. 1 in. in height, connected by cross-bars about 1 ft. broad. Both pillars and cross-bars were elaborately carved in bas-relief, and most of them bore inscriptions giving either the name of the donor, or the subject of the bas-relief, or both. There were four entrances through the railing, facing the cardinal points, and each one protected by the railing coming out at right angles, and then turning back across it in the shape of the letter L. This gave the whole ground plan of the monument, and no doubt designedly so, the shape of a gigantic swastika

(i.e. a symbol of good fortune) . By the forms of the letters of the inscriptions, and by the architectural details, the age of the monument has been approximately fixed in the 3rd century B.C. The bas-reliefs give us invaluable evidence of the literature, and also of the clothing, buildings and other details of the social conditions of the peoples of Buddhist India at that period. The subjects are taken from the Buddhist sacred books, more especially from the accounts given in them of the life of the Buddha in his last or in his previous births. Unfortunately, only about half the pillars, and about one-third of the cross- bars have been recovered. When the stupa was discovered the villagers had already carried off the greater part of the monument to build their cottages with the stones and bricks of it. The process has gone on till now nothing is left except what General Cunningham found and rescued and carried off to Calcutta. Even the mere money value of the lost pieces must be immense, and among them is the central relic box, which would have told us in whose honour the monument was put up.

See A. Cunningham, The Stupa of Bharhut (London, 1879) ; T. W. Rhys Davids, Buddhist India (London, 1903). (T. W. R. D.)

BHARAL, the Tatar name for the " blue sheep " Ovis (Pseu- dois) nahura, of Ladak and Tibet. The general colour is blue- grey with black " points " and white markings and belly; and the horns of the rams are olive-brown and nearly smooth, with a characteristic backward curvature. In the absence of face- glands, as well as in certain other features, the bharal serves to connect more typical sheep (q.v.) with goats.

BHARATPUR, or Bhurtpore, a native state of India, in the Rajputana agency. Its area covers 1982 sq. m. The country is generally level, about 700 ft. above the sea. Small detached hills, rising to 200 ft. in height, occur, especially in the northern part. These hills contain good building stone for orna- mental architecture, and in some of them iron ore is abundant. The Banganga is the only river which flows through the state. It takes its rise at Manoharpur in the territory of Jaipur, and flowing eastward passes through the heart of the Bharatpur state, and joins the Jamna below Agra.

Bharatpur rose into importance under Suraj Mall, who bore a conspicuous part in the destruction of the Delhi empire. Having built the forts of Dig and Kumbher in 1730, he received in 1756 the title of raja, and subsequently joined the great Mahratta army with 30,000 troops. But the misconduct of the Mahratta leader induced him to abandon the confederacy, just in time to escape the murderous defeat at Panipat. Suraj Mall raised the Jat power to its highest point; and Colonel Dow, in 1770, esti- mated the raja's revenue (perhaps extravagantly) at £2,000,000 and his military force at 60,000 or 70,000 men. In 1803 the East India Company concluded a treaty, offensive and defensive, with Bharatpur. In 1804, however, the raja assisted the Mahrattas against the British. The English under Lord Lake captured the fort of Dig and besieged Bharatpur, but were compelled to raise the siege after four attempts at storming. A treaty, concluded on the 17th of April 1805, guaranteed the raja's territory; but he became bound to pay £200,000 as indemnity to the East India Company. A dispute as to the right of the succession again led to a war in 1825, and Lord Combermere captured Bharatpur with a besieging force of 20,000 men, after a desperate resistance, on the 18th of January 1826. The fortifications were dismantled, the hostile chief being deported to Benares, and an infant son of the former raja installed under a treaty favourable to the company. In 1853 the Bharatpur ruler died, leaving a minor heir. The state came under British management, and the administration was improved, the revenue increased, a system of irrigation developed, new tanks and wells constructed and an excellent system of roads and public buildings organized. Owing to the hot winds blowing from Rajputana, the climate of Bharatpur is extremely sultry till the setting in of the periodical rains.

In 1901 the population was 626,665, a decrease of 2%. The estimated revenue is £180,000. The maharaja Ram Singh, who succeeded his father in 1893, was deprived of power of government

in 18155 on the ground of intemperate conduct; and in 1900 was finally deposed for the murder of one of his personal attend- ants. He was succeeded by his infant son Kishen Singh. During his minority the administration was undertaken by a native minister, together with a state council, under the general superintendence of the political agent. Imperial service cavalry are maintained. The state is traversed for about 40 m. by the Rajputana railway.

The City of Bharatpur is 34 m. W. of Agra by rail. The population in 1901 was 43,601, showing a decrease of over 23,000 in the decade. The immense mud ramparts still stand. It has a handsome palace, a new hospital and a high school. There are special manufactures of chauris, or flappers, with handles of sandalwood, ivory or silver, and tails also made of strips of ivory or sandalwood as fine as horse-hair.

BHATGAON, a town of Nepal, 8 m. from Khatmandu. It is a celebrated place of Hindu superstition, the favourite residence of the Brahmans of Nepal, and contains more families of that order than either Khatmandu or Patan. It has a population of about 30,000, and its palace and buildings generally are of a more striking appearance than in other Nepalese towns. The town is said to possess many Sanskrit libraries.

BHATTIANA, a tract of country in the Punjab province of India, covering the Ghaggar valley from Fatehabad in the district of Hissar to Bhatnair in Bikanir. It derives its name from the Bhattis, a wild Rajput clan, who held the country lying between Hariana, Bikanir and Bahawalpur. It skirts the borders of the great sandy desert, and only contains a small and scattered population. This tract was ravaged by Timur in his invasion of India; and in 1795 paid a nominal allegiance to George Thomas, the adventurer of Hariana. After the victories of Lord Lake in 1803 it passed with the rest of the Delhi territory under British rule, but was not settled until 1810. A district of Bhattiana was formed in 1837, but in 1858 it was merged in the Sirsa district, which was divided up in 1884. The Bhattis number some 350,000, and are a fine tall race, making capital soldiers.

BHAU DAJI (Ramkrishna Vithal) (1822-1874), Hindu physician of Bombay, Sanskrit scholar and antiquary, was born in 1822 at the village of Manjare, in the native state of Sawant- wari, of humble

parents dealing in clay dolls. Dr Bhau's career is a striking instance of great results arising from small accidents. An Englishman noticing his cleverness at chess induced his father to give the boy an English education. Accordingly Bhau was brought to Bombay and was educated at the Elphinstone Institution. He relieved his father of the cost of his education by winning many prizes and scholarships, and on his father's death two years later he cheerfully undertook the burden of supporting his mother and a brother (Narayen), who also in after-life became a distinguished physician and surgeon. About this time he gained a prize for an essay on infanticide, and was appointed a teacher in the Elphinstone Institution. He began to devote his time to the study of Indian antiquities, deciphering inscriptions and ascertaining the dates and history of ancient Sanskrit authors. He then studied at the Grant Medical College, and was one of the first batch who graduated there in 1850. In 185 1 he set up as a medical practitioner in Bombay, where his success was so great that he soon made a fortune. He studied the Sanskrit literature of medicine, and also tested the value of drugs to which the ancient Hindus ascribed marvellous powers, among other pathological subjects of historical interest investigating that of leprosy. Being an ardent promoter of education, he was appointed a member of the board of education, and was one of the original fellows of the university of Bombay. As the first native president of the students' literary and scientific society, and the champion of the cause of female education, a girls' school was founded in his name, for which an endowment was provided by his friends and admirers. In the political progress of India he took a great and active interest, and the Bombay Association and the Bombay branch of the East Indian Association owe their existence to his ability and exertions. He was twice chosen sheriff of Bombay, in 1869 and 1871.

Various scientific societies in England, France, Germany and America conferred on him their membership. He contributed numerous papers to the journal of the Bombay branch of the Royal Asiatic Society. He found time to make a large collec- tion of rare ancient Sanskrit manuscripts at great cost and trouble. He died in May 1874. His brother, Dr Narayen Daji (who helped him to set up the charitable dispensary in Bombay), did not long survive him. Dr Bhau was a man of the most simple and amiable character and manners; his kindness and sympathy towards the poor and distressed were unbounded, and endeared his memory among the Hindus of Bombay. (N. B. W.)

BHAUNAGAR, or Bhavnagar, a native state of India in the Kathiawar agency, Bombay. Its area covers 2860 sq. m. In 1 901 the

population was 412,664, showing a decrease of 12% in the decade; the estimated revenue is £255,800, and the tribute £10,300. The chief, whose title is thakor sahib, is head of the famous clan of the Gohel Rajputs of Kathiawar. The enlightened system of administration formed during the rule of the thakor sahib maharaja Sir Takhtsinghji Jaswatsinghji, G.C.S.I., was continued with admirable results under the personal supervision of his son, the maharaja Bhausinghji, K.C.S.I. (b. 1875), and forms a model for other native states. The Gohel Rajputs are said to have settled in the district about 1260. Bhaunagar suffered terribly from the famine of 1899-1900. About 60 m. of the Bhaunagar-Gondal railway run through the state, with its terminus at the town of Bhaunagar, which is the principal port. The town of Bhaunagar is situated on the west coast of the gulf of Cambay. The population in 1901 was 56,442. It is the chief port in Kathiawar, though only admitting vessels of small burden. It was founded in 1723 by the thakor sahib Bhausinghji, after whom it is named, in place of his former capital, Sihor, which was considered too exposed to the Mahratta power.

BHEESTY (from the Persian bihisti, paradise), the Hindustani name for a water carrier, the native who supplies water from a pigskin or goat-skin bag.

BHERA, a town of British-India, in the Shahpur district of the Punjab, situated on the river Jhelum. Pop. (1901) 18,680. It is the terminus of a branch of the North- Western railway. It is an important centre of trade, with manufactures of cotton goods, metal-work, carving, &c. Bhera was founded about 1540 on its present site, but it took the place of a city on the opposite bank of the river, of far greater antiquity, which was destroyed at this period.

BHILS, or Bheels (" bowmen," from Dra vidian bil, a bow), a Dra vidian people of central India, probably aborigines of Marwar. They live scattered over a great part of India. They are found as far north as the Aravalli Hills, in Sind and Rajputana, as well as Khandesh and Ahmedabad. They are mentioned in Sanskrit works, and it is thought that Ptolemy (vii. 1. 66) refers to them as $u\XIt(u ("leaf wearers"), though this word might equally apply to the Gonds. Expelled by the Aryans from the richer lowlands, they are found to-day in greatest numbers on the hills of central India. In many Rajput states the princes on succes- sion have their foreheads marked with blood from the thumb or toe of a Bhil. The Rajputs declare this a mark of Bhil allegiance, but it is more probably a relic of days when the Bhils were a power in India. The Bhils eagerly keep the practice alive, and the right of giving the blood is hereditary in certain

families. The popular legend of the Bhil origin assigns them a semi-divine birth, Mahadeva (Siva) having wedded an earth maiden who bore him children, the ugliest of whom killed his father's bull and was banished to the mountains. The Bhils of to-day claim to be his descendants. Under the Moguls the Bhils were submissive, but they rebelled against the Mahrattas, who, being unable to subdue them, treated them with the utmost cruelty. The race became outlaws, and they have lived their present wild life ever since. Their nomad habits and skill with their bows helped them to maintain successfully the fight with their oppressors. An unsuccessful attempt was made in 1818 by the British to conquer them. Milder measures were then tried, and the Bhil Agency was formed in 1825. The Bhil corps was then organized

with a view to utilizing the excellent fighting qualities of the tribesmen. This corps has done good service in gradually reducing their more lawless countrymen to habits of order, and many Bhils are now settled in regular industries.

The pure Bhil is to-day much what he has always been, a savage forest dweller. The Bhils are a stunted race, but well built, active and strong, of a black colour, with high cheek-bones, wide nostrils, broad noses and coarse features. Like all Dravidians the hair is long and wavy. The lowland Bhils are not now easily distinguished from the low-caste Hindus. Surgeon-major T. H. Hendley writes: — " The Bhil is an excellent woodman, knows the shortest cuts over the hills; can walk the roughest paths and climb the steepest crags without slipping or feeling distressed. Though robbers, and timorous owing to ages of ill- treatment, the men are brave when trusted, and very faithful. History proves them always to have been faithful to their nominal Rajput sovereigns, especially in their adversity. The Bhil is a merry soul, loving a jest." The hill Bhils wear nothing but a loin-cloth, their women a coarse robe; lowland Bhils wear turban, coat and waist-cloth. The Bhils have oaths none of them will break. The most sacred is that sworn by a dog, the Bhil praying that the curse of a dog may fall on him if he breaks his word. Their chief divinity is Hanuman, the monkey-god. Offerings are made to the much-feared goddess of smallpox. Stone worship is found among them, and some lowland Bhils are Moslems, while many have adopted Hinduism.

The Bhils of pure blood number upwards of a million, and there are

some 200,000 Bhils of mixed descent.

See Gustav Oppert, The Original Inhabitants of India (1893) ; T. H. Hendley, " Account of Marwar Bhils," in Bengal Asiatic Journal, vol. 44; W. I. Sinclair in Indian Antiquary, vol. iv. pp. 336- 338; Col. W. Kincaid, "On the Bheel Tribes of the Vindhyan Range," Jour. Anthrop. Institute, vol. ix.

BHIMA (Sanskrit, " The Terrible "), in Hindu mythology, a hero, one of the Pandava princes who figure in the Mahabharata. He was distinguished by his huge body, strength and voracity.

BHIWANI, a town of British India, in the Hissar district of the Punjab, 38 m. S.E. of Hissar town by rail. Pop. (1001) 35,917. It is an important centre of trade with Rajputana, and has factories for ginning and pressing cotton, and metal manufactures. Its rise dates from 181 7, when it was made a free market.

BHOPAL, a native state of India, in the central India agency. Its area is 6902 sq. m., and its population in 1901 was 665,961, showing a decrease of 30 % in the decade. This seems to be in part due to a difference in numeration, but the state suffered heavily from famine in 1896-1897 and 1899-1900. Bhopal is the principal Mussulman state in central India, ranking next to Hyderabad among the Mahommedan states of India. The surface of the country is uneven, being traversed by the Vindhya ranges, a peak of which near Raysen is upwards of 2500 ft. above sea-level. The general inclination of the country is towards the north, in which direction most of the streams of the state flow, while others, passing through the Vindhya ranges, flow to the Nerbudda.

Bhopal state was founded in 1723 by Dost Mahommed Khan, an Afghan adventurer. In 1778, when General Thomas Goddard made his bold march across India, the state of Bhopal was the only Indian power that showed itself friendly; and in 1809 when another British expedition under General Close appeared in the same parts, the nawab of Bhopal petitioned earnestly but in vain to be received under British protection. But in 1817, at the outbreak of the Pindari War, a treaty of dependence was con- cluded between the chief and the British government. Since then Bhopal has been steadily loyal to the British government, and during the Mutiny it rendered good services. The throne has descended in the female line since 1844, when Sikandar Begum became ruler. Succeeding begums have taken a great interest in the work of governing the state, which they carried on with marked success. The sultan Jahan Begum, succeeded on the

death of her mother, Shah Jahan Begum, in June 1901, being the only female ruler in India.

The estimated revenue of the state is £250,000, and the state

pays a subsidy of £13,000 for the Bhopal battalion. Besides the Bhopal battalion, a regiment of imperial service cavalry is maintained, under the name of the Victoria Lancers. There is a branch railway from Itarsi to Bhopal city, continued to Jhansi. The British currency has been introduced, and in 1897-1898, Rs. 71,00,000 of Bhopali coins were converted. The residence of the political agent and the headquarters of the Bhopal battalion are at Sehore, 20 m. west of Bhopal city. The city of Bhopal, a railway station, had a population in 1901 of 76,561. The palace, with its rock fortress, is called Fatehgarh. An excellent water-supply has been provided from two large artificial lakes. There are two hospitals. There is an export trade in opium.

Bhopal Agency, an administrative section of central India, takes its name from the state of Bhopal, which is included in it. The Bhopal agency is administered by the agent to the governor- general in central India. Its area is 11,653 sq. m > an d its population in 1901 was 1,157,697. It was created in 1818. In 1900 this district suffered severely from famine owing to the com plete failure of the monsoon, and the cultivated area decreased by 50 or 60 %; but, on the whole, trade has improved of late years owing to the new railways, which have stimulated commerce and created fresh centres of industry.

BHOPAWAR, an agency in central India. It consists of the Dhar and Barwani states, three minor states, Ali Rajpur, Jhabua and Jobat, and a number of districts and estates. Its total area is 7684 sq. m., and its population on this area in 1901 was 547,546. But in 1901 and 1904 certain districts were transferred from this agency to the Indore residency, created in 1899, and the area of Bhopawar was thus reduced by 3283 sq. m. The chief towns are Dhar (pop. 17,792), Barwani (6277) and Kukshi

(5402).

BHOR, a native state of India, in the Poona political agency, Bombay, forming one of the Satara Jagirs; situated among the higher peaks of the Western Ghats. Its area covers 925 sq. m. The population in 1901 was 137,268, showing a decrease of 12 % in the decade; the estimated gross revenue is £21,437; the tribute, £310. The chief, whose title is pant sachiv, is a Brahman by caste. The

town of Bhok is 25 m. south of Poona. In 1901 the population was 4178. The Bhor Ghat, on the northern border of the state, has always been the main pass over the Western Ghats, or means of communication between the sea- coast and the Deccan. Since 1861 it has been traversed by the main line of the Great Indian Peninsula railway.

BHUJ, a town of India, the capital of the native state of Kach, in the Gujarat division of Bombay, situated at the base of a fortified hill. Pop. (1901) 26,362. It contains some interesting examples of architecture of the middle of the 16th century and later; it was a place sacred to the snake-god Bhujanga.

BHUTAN, an independent kingdom in the Eastern Himalayas, lying between the Brahmaputra and the southern face of the mountains. It is under various commercial and other arrange- ments with the government of India, from whom it receives an annual subsidy of £3333. It is bounded on the N. by Tibet; on the E. by a tract inhabited by various uncivilized inde- pendent mountain tribes; on the S. by the British province of Assam, and the district of Jalpaiguri; and on the W. by the independent native state of Sikkim. The whole of Bhutan presents a succession of lofty and rugged mountains abounding in picturesque and sublime scenery. This alpine region sends out numerous rivers in a southerly direction, which, forcing their passage through narrow defiles, and precipitated in cataracts over the precipices, eventually pour themselves into the Brah- maputra. Of the rivers traversing Bhutan, the most considerable is the Manas, flowing in its progress to the Brahmaputra under the walls of Tasgaon, below which it is unfordable. At the foot of Tasgaon Hill it is crossed by a suspension bridge. The other principal rivers are the Machu, Tchinchu, Torsha, Manchi and Dharla. Information respecting the country accumulates but slowly. In 1863 Captain Godwin Austen accompanied Sir Ashley Eden's mission to the court of the Deb raja, and made a survey of the route to Punakha. There has also been a certain amount of geographical sketching combined with trigonometrical

observations ; and there are the route surveys of native explorers. In 1887-1888 two native Indian explorers " R. N." and " P. A." traversed a part of Western Bhutan, but were forced to retire owing to the disturbed state of the districts. They re-entered the country on

the east from Dewangiri. Here they explored the Kuru, or Lhobrak Chu, which proves to be the largest river in Bhutan. It drains the tract between the Yamdok Tso and Tigu Lakes, and is fed by the glaciers of the Kulha Kangri and other great ranges. The Lhobrak was finally identified with the Manas river, a geographical discovery of some importance. A previously unknown tribe, the Chingmis, were discovered in Eastern Bhutan, who are socially on a higher level than the Bhutias, and differ from them chiefly in the matter of wearing pigtails. Some excellen.t survey work was done in Bhutan by a native surveyor during the progress of the Tibetan Expedition in 1904. The Monla Kachung pass (17,500 ft.), by which " R. N." crossed into Tibet, is nearly on the meridian of Gualpara, and is one of the most important passes between Bhutan and Tibet. East of Bhutan, amongst the semi-independent hill states which sometimes own allegiance to Tibet and sometimes assert complete freedom from all authority, the geographical puzzle of the course of the Tsanpo, the great river of Tibet, has been solved by the researches of Captain Harman, and the explorations of the native surveyor " K. P." The Tsanpo has been definitely ascertained to be the same river as the Brahmaputra. The tracts inhabited by the aboriginal tribes entitled Lo Nakpo, Lo Karpo and Lo Tawa (" Lo " signifies " barbarous " in Tibetan), are described as a pleasant country; the lands on either side of the Tsanpo being well cultivated and planted with mangoes, plantains and oranges.

Nothing is known certainly about the area and population of Bhutan, the former being estimated at 16,800 sq. m. At the head of the Bhutan government there are nominally two supreme authorities, the Dharm raja, the spiritual head, and the Deb raja, the temporal ruler. Recently official correspondence has been written in the name of the Dharm raja, but it is not known whether this change really signifies anything. To aid these rajas in administering the country, there is a council of permanent ministers, called the Lenehen. Practically, however, there is no government at all. Subordinate officers and rapacious governors of forts wield all the power of the state, and tyranny, oppression and anarchy reign over the whole country. The Dharm raja succeeds as an incarnation of the deity. On the death of a Dharm raja a year or two elapses, and the new incarnation then reappears in the shape of a child who generally happens to be born in the family of a principal officer. The child establishes his identity by recognizing the cooking utensils, &c, of the late Dharm raja; he is then trained in a monastery, and on attaining his majority is recognized as raja, though he exercises no more real authority in his majority than he did in his infancy. The Deb raja is in theory elected

by the council. In practice he is merely the nominee of whichever of the two governors of East and West Bhutan happens for the time to be the more powerful. The people are industrious, and devote themselves to agriculture, but from the geological structure of the country, and from the insecurity of property, regular hus- bandry is limited to comparatively few spots. The people are oppressed and poor. " Nothing that a Bhutia possesses is his own," wrote the British envoy in 1864; " he is at all times liable to lose it if it attracts the cupidity of any one more power- ful than himself. The lower classes, whether villagers or public servants, are little better than the slaves of higher officials. In regard to them no rights of property are observed, and they have at once to surrender anything that is demanded of them. There never was, I fancy, a country in which the doctrine of 'might is right' formed more completely the whole and sole law and custom of the land than it does in Bhutan. No official receives a salary; he has certain districts made over to him, and he may get what he can out of them; a certain portion of his gains he is compelled to send to the durbar; and the more he extorts and the more he sends to his superior, the longer his tenure of office is likely to be."

Physically the Bhutias are a fine race, although dirty in their habits and persons. Their food consists of meat, chiefly pork, turnips, rice, barley-meal and tea made from the brick-tea of China. Their favourite drink is chong, distilled from rice or barley and millet, and Marwd, beer made from fermented millet. A loose woollen coat reaching to the knees, and bound round the waist by a thick fold of cotton cloth, forms the dress of the men ; the women's dress is a long cloak with loose sleeves. The houses of the Bhutias are of three and four storeys; all the floors are neatly boarded with deal; and on two sides of the house is a verandah ornamented with carved work generally painted. The Bhutias are neat joiners, and their doors, windows and panelling are perfect in their way. No iron- work is used; the doors open on ingenious wooden hinges. The appearance of the houses is precisely that of Swiss chalets, picturesque and com- fortable — the only drawback being a want of chimneys, which the Bhutias do not know how to construct. The people nomin- ally profess the Buddhist religion, but in reality their religious exercises are confined to the propitiation of evil spirits, and the mechanical recital of a few sacred sentences. Around the cottages in the mountains the land is cleared for cultivation, and produces thriving crops of barley, wheat, buckwheat, millet, mustard, chillies, etc. Turnips of excellent quality are exten- sively grown; they are free from fibre and remarkably sweet. The wheat and barley have a full

round grain, and the climate is well adapted to the production of both European and Asiatic vegetables. Potatoes have been introduced. The Bhutias lay out their fields in a series of terraces cut out of the sides of the hills; each terrace is riveted and supported by stone embankments, sometimes 20 ft. high. Every field is care- fully fenced with pine branches, or protected by a stone wall. A complete system of irrigation permeates the whole culti- vated part of a village, the water being often brought from a long distance by stone aqueducts. Bhutias do not care to extend their cultivation, as an increased revenue is exacted in proportion to the land cultivated, but devote their whole energies to make the land yield twice what it is estimated to produce. The forests of Bhutan abound in many varieties of stately trees. Among them are the beech, ash, birch, maple, cypress and yew. Firs and pines cover the mountain heights; and below these, but still at an elevation of eight or nine thousand feet, is a zone of vegetation, consisting principally of oaks and rhodo- dendrons. The cinnamon tree is also found. Some of the roots and branches were examined by Captain Samuel Turner during his journey to Tibet; but the plant being neither in blossom nor bearing fruit, it was impossible to decide whether it was the true cinnamon or an inferior kind of cassia. The leaf, how- ever, corresponded with the description given of the true cinnamon by Linnaeus. The lower ranges of the hills abound in animal life. Elephants are so numerous as to be dangerous to travellers; but tigers are not common, except near the river Tista, and in the dense reed jungle and forests of the Dwars. Leopards abound in the Hah valley; deer every- where, some of them of a very large species. The musk deer is found in the snows, and the barking deer on every hill side. Wild hogs are met with even at great eleva- tions. Large squirrels are common. Bears and rhinoceros are also found. Pheasants, jungle fowls, pigeons and other small game abound. The Bhutias are no sportsmen. They have a superstitious objection to firing a gun, thinking that it offends the deities of the woods and valleys, and brings down rain. A species of horse, which seems indigenous to Bhutan, and is used as a domestic animal, is called tdngan, from Tangastan, the general appellation of that assemblage of mountains which constitutes the territory of Bhutan. It is peculiar to this tract, not being found in any of the neighbouring countries of Assam, Nepal, Tibet or Bengal, and unites in an eminent degree the two qualities of strength and beauty. The tdngan horse usually stands about thirteen hands high, is short-bodied, clean-limbed, deep in the chest and extremely active, his colour usually inclining to piebald. In so barren and rude a country the manufacturing industry of its people is, as might be expected,

in a low stage, the few articles produced being all destined for home consumption. These consist of coarse blankets and cotton cloths made by the villagers inhabiting the southern tract. Leather, from the hide of the buffalo, imperfectly tanned, furnishes the soles of snow boots. Circular bowls are neatly turned from various woods. A small quantity of paper is made from a plant described as the Daphne papyrifera. Swords, iron spears and arrow-heads, and a few copper caldrons, fabricated from the metal obtained in the country, complete the list of manufactures.

Trade connections are rather with Tibet than with India. In 1901-1902 the value of the import and export trade with British India amounted only to £57,000. The military resources of the country are on an insignificant scale. Beyond the guards for the defence of the various castles, there is nothing like a standing army. The total military force was estimated by the British envoy in 1864 at 6000. The climate of Bhutan varies according to the difference of elevation. At the time when the inhabitants of Punakha (the winter residence of the rajas) are afraid of exposing themselves to the blazing sun, those of Ghasa experience all the rigour of winter, and are chilled by perpetual snows. Yet these places are within sight of each other. The rains descend in floods upon the heights; but in the vicinity of Tasisudon, the capital, they are moderate; there are frequent showers, but nothing that can be compared to the tropical rains of Bengal. Owing to the great elevation and steepness of the mountains, dreadful storms arise among the hollows, often attended with fatal results.

History. — Bhutan formerly belonged to a tribe called by the Bhutias Tephu, generally believed to have been the people of Kuch Behar. About a.d. 1670 some Tibetan soldiers subjugated the Tephus, took possession of the country and settled down in it. The relations of the British with Bhutan commenced in 1772, when the Bhutias invaded the principality of Kuch Behar, a dependency of Bengal. The Kuch Behar Raja applied for aid, and a force under Captain James was despatched to his assistance; the invaders were expelled and pursued into their own territories. Upon the intercession of Teshu Lama, then regent of Tibet, a treaty of peace was concluded in 1774 between the East India Company and the ruler of Bhutan. In 1783 Captain S. Turner was deputed to Bhutan, with a view of promoting commercial intercourse, but his mission proved unsuccessful. From this period

little intercourse took place with Bhutan, until the occupation of Assam by the British in 1826. It was then discovered that the Bhutias had usurped several tracts of low land lying at the foot of the mountains, called the Dwars or passes, and for these they agreed to pay a small tribute. They failed to pay, however, and availed themselves of the command of the passes to commit depredations within the British territory. Captain R. B. Pemberton was accordingly deputed to Bhutan to adjust the points of difference. But his negotiations yielded no definite result; and every other means of obtaining redress and security proving unsuccessful, the Assam Dwars were wrested from the Bhutias, and the British government consented to pay to Bhutan a sum of £1000 per annum as compensation for the resumption of their tenure, during the good behaviour of the Bhutias. Continued outrages and aggressions were, however, committed by the Bhutias on British subjects in the Dwars. Nothwithstanding repeated remonstrances and threats, scarcely a year passed without the occurrence of several raids in British territory headed by Bhutia officials, in which they plundered the inhabitants, massacred them, or carried them away as slaves. In 1863 Sir Ashley Eden was sent as an envoy to Bhutan to demand reparation for these outrages. He did not succeed in his mission; he was subjected to the grossest insults; and under compulsion signed a treaty giving over the disputed territory to Bhutan, and making other concessions which the Bhutan government demanded. On Sir A. Eden's return the viceroy at once disavowed his treaty, sternly stopped the former allowance for the Assam Dwars, and demanded the immediate restoration of all British subjects kidnapped during the last five years. The Bhutias not complying with this demand, the governor-general

issued a proclamation, dated the 1 2th of November 1864, by which the eleven Western or Bengal Dwars were forthwith incorporated with the queen's Indian dominions. No resistance was at first offered to the annexation; but, suddenly, in January 1865, the Bhutias surprised the English garrison at Dewangiri, and the post was abandoned with the loss of two mountain guns. This disaster was soon retrieved by General Sir Henry Tombs, and the Bhutias were compelled to sue for peace, which was concluded on the nth of November 1865. The Bhutan government formally ceded all the eighteen Dwars of Bengal and Assam, with the rest of the territory taken from them, and agreed to liberate all kidnapped British subjects. As the revenues of Bhutan mainly depended on these Dwars, the British government, in return for these concessions, undertook to pay the Deb and Dharm rajas annually, subject to the condition of

their continued good behaviour, an allowance beginning at £2500 and rising gradually to the present figure. Since that time the annexed territories have settled down into peaceful and prosperous British districts. The recent relations between the Indian government and Bhutan have been satisfactory; and during the troubles with Tibet in 1904 the attitude of the Bhutias was perfectly correct and friendly.

See Report on Explorations in Sikkim, Bhutan and Tibet (Deva Dun, 1889); Tanner, " Our present Knowledge of the Himalayas," R.G.S. Proceedings, vol. xiii. (T. H. H.)*

BIANCHINI, FRANCESCO (1662-1729), Italian astronomer and antiquary, was born of a noble family at Verona on the 13th of December 1662. In 1684 he went to Rome, and became librarian to Cardinal Ottoboni, who, as Pope Alexander VIII. (1689), raised him to the offices of papal chamberlain and canon of Santa Maria Maggiore. Clement XI. sent him on a mission to Paris in 171 2, and employed him to form a museum of Christian antiquities. He died at Rome on the 2nd of March 1729. A paper by him on G. D. Cassini's new method of parallaxes was inserted in the Acta Eruditorum of Leipzig in 1685. He pub- lished separately: — Istoria Universale (Roma, 1697), only one volume of which appeared; De Calendario et Cyclo Caesaris (1703); Hesperi et Phosphori nova Phaenomena (1729), in which he asserted Venus to rotate in 24ˆ days; and (posthumously) Astronomicae et Geographicae Observaliones Selectae (1737) and Opuscula Varia (1754).

See Fontenelle's " Eloge " (Memoires de I' Acad, de I'Histoire, p. 102, Paris, 1729); Mazzoleni, Vita di Francesco Bianchini (Verona, 1735); Tipaldo, Biografia degli Italiani Illustri, vii. 288 (Venezia, 1840); Mazzuchelli, Scrittori a" Italia; Maffei, Verona IUuslrata, p. 254, &c.

BIARRITZ, a watering-place of south-western France, in the department of Basses-Pyrenees, on the sea-coast about 5 m. W.S.W. of Bayonne. Pop. (1906) 13,629. From a mere fishing village, with a few hundred inhabitants in the beginning of the 19th century, Biarritz rose rapidly into a place of importance under the patronage of the emperor Napoleon III. and the empress Eugenie, with whom it was a favourite resort. The town is situated on a promontory jutting north-west into the Bay of Biscay and on the coast which extends on each side of it. The beach to the north-east is known as the Grande Plage, that to the south-west as the Cote des Basques. The Grande Plage is more than half a mile long and stretches to the Cap St

Martin, on which stands a lighthouse. It is divided into two parts by a small headland once the site of the villa of the empress Eugenie, between which and the main promontory are the two casinos, the principal baths and many luxurious villas and fine hotels. Towards the north-east the promontory of Biarritz ends in a pro- jection known as che Atalaye, crowned by the ruins of a castle and surrounded by rocky islets. Some of these are united to the mainland and to each other by jetties which curve round so as to form the Port de Refuge, a haven available only in fair weather. South-west of the Atalaye lies the Port-Vieux, a sheltered cove now used only as a bathing-place. The Port des Pecheurs, the principal of the three harbours, is on the south-east side of the Atalaye and is that most used by the fishermen of the town. Apart from unimportant manufactures of pottery, chocolate, &c, fishing is the only industry; Biarritz depends for its prosperity on the visitors who are attracted by its mild climate and the

bathing. The season is almost continuous; in the winter the English, in the summer Russians, Spaniards and French fill the hotels of the town. Among its attractions is a golf club, estab- lished in 1888, with a course of 18 holes.

BIAS of Priene in Ionia, one of the so-called Seven Sages of Greece, son of Teutamus, flourished about 570 B.C. He was famous for his patriotism, the nobility of his character and his eloquence. A number of gnomes or aphorisms are attributed to him, which may be found collected in F. W. A. Mullach, Frag- mented PhUosophorum Graccorum (i860). He is said to have written a poem on the best means of making Ionia prosperous. His advice to its inhabitants, at the time of the Persian invasion, to migrate to Sardinia and there found a single pan-Ionic city (Herodotus i. 170), has generally been regarded as historical. One much-quoted saying of his may be mentioned. When his native town was besieged by the enemy, the inhabitants resolved to escape with their most valuable belongings. One of them seeing Bias without anything, advised him to follow the example of the rest. " I am doing so," said lie, " for I carry all my belong- ings with me " {omnia mea mecum porto). He was honoured with a splendid funeral, and a sanctuary called Teutamium was dedicated to him.

See Bohren, De Septem Sapientibus (i860).

BIAS (from the Fr. biais, of unknown origin; the derivation from Lat. bifax, two-faced, is wrong), something oblique or slanting. The term is used especially of a piece of cloth cut obliquely across the texture, or of a seam of two such pieces brought together; and in the game of bowls (q.v.) it is applied alike to the one-sided construction of the bowl, flattened on one side and protruding on the other, and to the slanting line the bowl takes when thrown. The figurative sense of the word, prejudice or undue leaning to one side of a subject, is derived from this bowling term.

BIBACULUS, MARCUS FURIUS, Roman poet, flourished during the last century of the republic. According to Jerome, he was born at Cremona in 103 B.C., and probably lived to a great age. He wrote satirical poems after the manner of Catullus, whose bitterness he rivalled, according to Quintilian (Instit. x. 1. 196), in his iambics. He even attacked Augustus (and perhaps Caesar), who treated the matter with indifference. He was also author of prose Lucubrationes and perhaps of an epic poem on Caesar's Gallic wars (Pragmatia Belli Gallici). Otto Ribbeck attributes to him one of the shorter poems usually assigned to Virgil. It is doubtful whether he is the person ridiculed by Horace (Satires, ii. 5. 40) and whether he is identical with the turgidus Alpinus (Satires, i. 10. 36), the author of an Aethiopis dealing with the life and death of Memnon and of a poem on the Rhine. Some critics, on the ground that Horace would not have ventured to attack so dangerous an adversary, assume the existence of a poet whose real name was Furius (or Cornelius) Alpinus. Bibaculus was ridiculed for his high-flown and exaggerated style and manner of expression.

See Weichert, " De M. Furio Bibaculo," in his Poetarum Latinorum Reliquiae (1830); fragments in L. Miiiler's edition of Catullus in the Teubner Series (1870).

BIBER, HEINRICH JOHANN FRANZ VON (1644-1704), German violinist and composer, was for isome time musical conductor at Salzburg, and was ennobled by the emperor Leo- pold in 1681. He is regarded as the earliest important German composer for the violin, his works including sonatas and church music.

BIBERACH, a town of Germany, in the kingdom of Wiirttem- berg, on the Riss, a small affluent of the Danube, 22 m. S.S.W. from Ulm. Pop. (1900) 8390. It is still surrounded by medieval walls and towers, and is strikingly picturesque. Its principal church dates from the 12th century, and it possesses a hospital with rich endowments. Its main industries are cloth, bell- casting, toys and zinc wares, and

its fruit markets are famous.

Biberach appears as a village in the 8th century, and in 13 12 it became a free imperial city. During the Thirty Years' War it underwent various vicissitudes, and was for a while held by the Swedes. In 1707 it was captured and put to ransom by the

French, who afterwards, in 1796 and 1800, defeated the Austrians in the neighbourhood. In 1803 the city was deprived of its imperial freedom and assigned to Baden, and in 1806 was trans- ferred to Wiirttemberg. Biberach is the birthplace of the sculptor Johann Lorenz Natter (1 705-1 763) and the painter Bernhard Neher (1806-1886); Christoph Martin Wieland, born in 1733 at the neighbouring village of Oberholzheim, spent several years in the town.

BIBIRINE, or Bebeeeine, Ci 9 H 2 iN0 3 , an alkaloid obtained from the bark and fruit of the greenheart (q.v.) tree, Nectandra rodiaei, called bibiru or sipiri in Guiana, where the tree grows. The substance was discovered about the year 1835 by Hugh Rodie, a surgeon in Demerara, who used it as a febrifuge in substitution for quinine.

BIBLE. The word " Bible," which in English, as in medieval Latin, is treated as a singular noun, is in its original Greek form a plural, to. /3i/3Xta, the (sacred) books — correctly expressing the fact that the sacred writings of Christendom (collectively de- scribed by this title) are made up of a number of independent records, which set before us the successive stages in the history of revelation. The origin of each of these records forms a distinct critical problem, and for the discussion of these questions of detail the reader is referred to the separate articles on the Biblical books. An account of the Bible as a whole involves so many aspects of interest, that, apart from the separate articles on its component books, the general questions of importance arising out of its present shape require to be discussed in separate sections of this article. They are here divided accordingly, into two main divisions: — (A) Old Testament, and (B) New Testament; and under each of these are treated (1) the Canon, (2) the texts and versions, (3) textual criticism, (4) the " higher criticism," i.e. a general historical account (more particularly considered for separate books in the articles on them) of the criticism and views based on the substance and matter, as apart from criticism devoted to the correction and elucidation of the text, and (5) chronology. For the literary history of the trans- lated English Bible, see the separate article under Bible, English.

(A) Old Testament • 1. Canon.

We shall begin by giving a general account of the historical and literary conditions under which the unique literature of the Old Testament sprang up, of the stages by which it gradually reached its present form, and (so far as this is possible) of the way in which the Biblical books were brought together in a canonical collection. There exists no formal historical account of the formation of the Old Testament canon. The popular idea that this canon was closed by Ezra has no foundation in antiquity. Certainly in the apocryphal book of 2 Esdras, written towards the end of the 1st century a.d., we read (xiv. 20-26, 38-48), that, the law being burnt, Ezra, at his own request, was miraculously inspired to rewrite it; he procured accordingly five skilled scribes, and dictated to them for forty days, during which time they wrote 94 books, i.e. not only (according to the Jewish reckoning) the 24 books of the Old Testament, but 70 apocryphal books as well, which, being filled, it is said, with a superior, or esoteric wisdom, are placed upon even a higher level (vv. 46, 47) than the Old Testament itself. No argument is needed to show that this legend is unworthy of credit; even if it did deserve to be taken seriously, it still contains nothing respecting either a completion of the canon, or even a collection, or redaction, of sacred books by Ezra. Yet it is frequently referred to by patristic writers; and Ezra, on the strength of it, is regarded by them as the genuine restorer of the lost books of the Old Testament (see Ezra).

In 2 Mace. ii. 13 it is said that Nehemiah, " founding a library, gathered together the things concerning the kings and prophets, and the (writings) of David, and letters of kings about sacred gifts." These statements are found in a part of 2 Mace, which is admitted to be both late and full of untrustworthy matter; still, the passage may preserve an indistinct reminiscence of an early stage in the formation of the canon, the writings referred

to being possibly the books of Samuel and Kings and some of the Prophets, a part of the Psalter, and documents such as those excerpted in the book of Ezra, respecting edicts issued by Persian kings in favour of the Temple. But obviously nothing definite can be built upon a passage of this character.

The first traces of the idea current in modern times that the canon of the Old Testament was closed by Ezra are found in the f3th century a.d. From this time, as is clearly shown by the series of quotations in Ryle's Canon of the Old Testament, p. 257 ff . (2Tid ed., p. 269 ff.), the legend — for it is nothing better — grew, until finally, in the hands of Elias Levita (1538), and especially of Johannes Buxtorf (1665), it assumed the form that the " men of the Great Synagogue," — a body the real existence of which is itself very doubtful, but which is affirmed in the Talmud to have " written " (!) the books of Ezekiel, the Minor Prophets, Daniel and Esther — with Ezra as president, first collected the books of the Old Testament into a single volume, restored the text, where necessary, from the best MSS., and divided the collection into three parts, the Law, the Prophets and the " Writings " (the Hagiographa). The reputation of Elias Levita and Buxtorf led to this view of Ezra's activity being adopted by other scholars, and so it acquired general currency. But it rests upon no authority in antiquity whatever.

The statement just quoted, however, that in the Jewish canon the books of the Old Testament are divided into three parts, though the arrangement is wrongly referred to Ezra, is in itself both correct and important. " The Law, the Prophets and the Writings (i.e. the Hagiographa) " is the standing Jewish ex- pression for the Old Testament; and in every ordinary Hebrew Bible the books are arranged accordingly in the following three divisions : —

1. The Torah (or "Law"), corresponding to our "Penta- teuch " (5 books).

2. The " Prophets," consisting of eight books, divided into two groups: —

(a) The " Former Prophets "; Joshua, Judges, Samuel; Kings. 1

(b) The "Latter Prophets"; Isaiah, Jeremiah, Ezekiel, the Minor Prophets (called by the Jews " the Twelve," and counted by them as one book).

3. The "Writings," also sometimes .the "Sacred Writings," i.e., as we call them, the " Hagiographa," consisting of three groups, containing in all eleven books: —

(a) The poetical books, Psalms, Proverbs, Job.

(b) The five Megilloth (or " Rolls ") — grouped thus together in later times, on account of the custom which arose of reading them in the

synagogues at five sacred seasons — Song of Songs, Ruth, Lamentations, Ecclesiastes, Esther.

(c) The remaining books, Daniel, Ezra and Nehemiah (forming one book), Chronicles. 1

There are thus, according to the Jewish computation, twenty- four " books " in the Hebrew canon. The threefold division of the canon just given is recognized in the Talmud, and followed in all Hebrew MSS., the only difference being that the books included in the Latter Prophets and in the Hagiographa are not always arranged in the same order. No book, however, belong- ing to one of these three divisions is ever, by the Jews, trans- ferred to another. The expansion of the Talmudic twenty-four to the thirty-nine Old Testament books of the English Bible is effected by reckoning the Minor Prophets one by one, by separ- ating Ezra from Nehemiah, and by subdividing the long books of Samuel, Kings and Chronicles. The different order of the books in the English Bible is due to the fact that when the Hebrew Bible was translated into Greek between the 3rd and 1st centuries B.C., the Hebrew tripartite division was disregarded, and the books (including those now known as the " Apocrypha ") were grouped mostly by subjects, the historical books being placed first (Genesis — Esther), the poetical books next (Job — Song of Songs), and the prophetical books last (Isaiah — Malachi).

1 The books of Samuel, Kings, Ezra and Nehemiah, and Chronicles, were by the Jews each treated (and written) as one book, and were not divided by them into two till the 16th century, through Christian influence.

Substantially the same order was followed in the Vulgate. The Reformers separated the books which had no Hebrew original (i.e. the Apocrypha) from the rest, and placed them at the end; the remaining books, as they stood in the Vulgate, were then in the order which they still retain in the English Bible.

The tripartite division of the Hebrew canon thus recognized by Jewish tradition can, however, be traced back far beyond the Talmud. The Proverbs of Jesus, the son of Sirach (c. 200 B.C.), which form now the apocryphal book Ecclesiasticus, were translated into Greek by the grandson of the author at about 130 B.C.; and in the preface prefixed by him to his translation he speaks of " the law, and the prophets, and the other books of our fathers," and again of " the law, and the prophets, and the rest of the books," expressions which point naturally to the same threefold division which was

afterwards universally recognized by the Jews. The terms used, however, do not show that the Hagiographa was already completed, as we now have it; it would be entirely consistent with them, if, for instance, particular books, as Esther, or Daniel, or Ecclesi- astes, were only added to the collection subsequently. Another allusion to the tripartite division is also no doubt to be found in the expression " the law, the prophets, and the psalms," in Luke xxiv. 44. A collection of sacred books, including in parti- cular the prophets, is also referred to in Dan. ix. 2 (R.V.), written about 166 B.C.

This threefold division of the Old Testament, it cannot reason- ably be doubted, rests upon an historical basis. It represents three successive stages in the history of the collection. The Law was the first part to be definitely recognized as authoritative, or canonized; the " Prophets " (as defined above) were next accepted as canonical; the more miscellaneous collection of books comprised in the Hagiographa was recognized last. In the absence of all external evidence respecting the formation of the canon, we are driven to internal evidence in our endeavour to fix the dates at which these three collections were thus canon ized. And internal evidence points to the conclusion that the Law could scarcely have been completed, and accepted formally, as a whole, as canonical before 444 B.C. (cf. Neh. viii.-x.); that the " Prophets " were completed and so recognized about 250 B.C., and the Hagiographa between about 150 and 100 B.C. (See further Ryle's Canon of the Old Testament.)

Having thus fixed approximately the terminus ad quern at which the Old Testament was completed, we must now begin at the other end, and endeavour to sketch in outline the process by which it gradually reached its completed form. And here it will be found to be characteristic of nearly all the longer books of the Old Testament, and in some cases even of the shorter ones as well, that they were not completed by a single hand, but that they were gradually expanded, and reached their present form by a succession of stages.

Among the Hebrews, as among many other nations, the earliest beginnings of literature were in all probability poetical. At least the opening phrases of the song of Moses in Exodus xv. ; the song of Deborah in Judges v. ; the fragment from the " Book of the Wars of Yahweh," in Numbers xxi. 14, 15; the war-ballad, celebrating an Israelitish victory, in Numbers xxi. 27-30; the extracts from the " Book of Jashar " (or " of the Upright," no doubt a title of Israel) quoted in Joshua x. 12, 13 (" Sun, stand thou still upon Gibeon," &c.) ; in 2 Sam. i. (David's elegy over Saul and Jonathan) ; and, very probably, in the Septuagint of 1 Kings viii. 13 [Sept. 53], as the

source of the poetical frag- ment in vv. 12, 13, describing Solomon's building of the Temple, show how great national occurrences and the deeds of ancient Israelitish heroes stimulated the national genius for poetry, and evoked lyric songs, suffused with religious feeling, by which their memory was perpetuated. The poetical descriptions of the character, or geographical position, of the various tribes, now grouped together as the Blessings of Jacob (Gen. xlix.) and Moses (Deut. xxxiii.), may be mentioned at the same time. These poems, which are older, and in most cases considerably older, than the narratives in which they are now embedded, if they were collected into books, must have been fairly numerous,

and we could wish that more examples of them had been preserved.

The historical books of the Old Testament form two series: one, consisting of the books from Genesis to 2 Kings (exclusive of Ruth, which, as we have seen, forms in the Hebrew canon part of the Hagiographa), embracing the period from the Creation to the destruction of Jerusalem by the Chaldaeans in 586 B.C.; the other, comprising the books of Chronicles, Ezra and Nehe- miah, beginning with Adam and ending with the second visit of Nehemiah to Jerusalem in 432 B.C. These two series differ from one another materially in scope and point of view, but in one respect they are both constructed upon a similar plan; no entire book in either series consists of a single, original work; but older writings, or sources, have been combined by a com- piler — or sometimes, in stages, by a succession of compilers — – in such a manner that the points of juncture are often clearly discernible, and the sources are in consequence capable of being separated from one another. The authors of the Hebrew historical books, as we now have them, do not, as a rule, as a modern author would do, rewrite the matter in their own language ; they excerpt from pre-existing documents such passages as are suitable to their purpose, and incorporate them in their work, sometimes adding at the same time matter of their own. Hebrew writers, however, exhibit usually such strongly marked individu- alities of style that the documents or sources, thus combined, can generally be distinguished from each other, and from the com- ments or other additions of the compiler, without difficulty. The literary differences are, moreover, often accompanied by-

differences of treatment, or representation of the history, which, where they exist, confirm independently the conclusions of the literary analysis. Although, however, the historical books generally are constructed upon similar principles, the method on which these principles have been applied is not quite the same in all cases. Sometimes, for instance, the excerpts from the older documents form long and complete narratives; in other cases (as in the account of the Flood) they consist of a number of short passages, taken alternately from two older narratives, and dovetailed together to make a continuous story; in the books of Judges and Kings the compiler has fitted together a series of older narratives in a framework supplied by himself; the Pentateuch and book of Joshua (which form a literary whole, and are now often spoken of together as the Hexateuch) have passed through more stages than the books just mentioned, and their literary structure is more complex.

The Hexateuch (Gen.-Josh.). — The traditions current among the Israelites respecting the origins and early history of their nation— the patriarchal period, and the times of Moses and Joshua — were probably first cast into a written form in the 10th or 9th century B.C. by a prophet living in Judah, who, from the almost exclusive use in his narrative of the sacred name " Jahveh " (" Jehovah "), — or, as we now commonly write it, Yahweh, — is referred to among scholars by the abbreviation " J." This writer, who is characterized by a singularly bright and picturesque style, and also by deep religious feeling and insight, begins his narrative with the account of the creation of man from the dust, and tells of the first sin and its consequences (Gen. ii. 4 6 -iii. 24) ; then he gives an account of the early growth of civilization (Gen. iv.), of the Flood (parts of Gen. vi.-viii.), and the origin of different languages (xi. 1-9); afterwards in a series of vivid pictures he gives the story, as tradition told it, of the patriarchs, of Moses and the Exodus, of the journey through the wilderness, and the conquest of Canaan. It would occupy too much space to give here a complete list of the passages belonging to "J"; but examples of his narrative (with the exception here and there of a verse or two belonging to one of the other sources described below) are to be found, for instance, in Gen. xii., xiii., xviii.-xix. (the visit of the three angels to Abraham, and the judgment on Sodom and Gomorrah), xxiv. (Abraham's servant sent to find a wife for Isaac), xxvii. 1-45 (Jacob obtaining his father's blessing), xxxii., xliii., xliv. (parts of the history ol Joseph); Ex. iv.v. (mostly), viii. 20 ix. 7, 1. i-n, xxxiii. 12-xxxiv. 26 (including, in xxxiv. 17-26,

a group of regulations, of a simple, undeveloped character, on various religious observances); Num. x. 29-36, and most of Num. xi.

Somewhat later than " J," another writer, commonly referred to as " E," from his preference for the name Elohim (" God ") rather than " Jehovah," living apparently in the northern king- dom, wrote down the traditions of the past as they were current in northern Israel, in a style resembling generally that of " J," but not quite as bright and vivid, and marked by small differences of expression and representation. The first traces of " E " are found in the life of Abraham, in parts of Gen. xv. ; examples of other passages belonging to this source are: — Gen. xx. 1-17, xxi. 8-32, xxii. 1-14, xl.-xlii. and xlv. (except a few isolated passages); Ex. xviii., xx.-xxiii. (including the decalogue — in its original, terser form, without the explanatory additions now attached to several of the commandments — and the collection of laws, known as the " Book of the Covenant," in xxi.-xxiii.), xxxii., xxxiii. 7-1 1; Num. xii., most of Num. xxii.-xxiv. (the history of Balaam); Josh. xxiv. "E" thus covers substantially the same ground as "J," and gives often a parallel, though somewhat divergent, version of the same events. The laws contained in Ex. xx. 23-xxiii. 19 were no doubt taken by " E " from a pre-existing source; with the regulations referred to above as incorporated in "J " (Ex. xxxiv. 17-26), they form the oldest legislation of the Hebrews that we possess; they consist principally of civil ordinances, suited to regulate the life of a community living under simple conditions of society, and chiefly occupied in agriculture, but partly also of elementary regulations respecting religious observances (altars, sacrifices, festivals, &c).

Not long, probably, after the fall of the northern kingdom in 722 B.C., a prophet of Judah conceived the plan of compiling a comprehensive history of the traditions of his people. For this purpose he selected extracts from the two narratives, " J " and " E," and combined them together into a single narrative, introducing in some places additions of his own. This combined narrative is commonly known as " JE." As distinguished from the Priestly Narrative (to be mentioned presently), it has a distinctly prophetical character; it treats the history from the standpoint of the prophets, and the religious ideas characteristic of the prophets often find expression in it. Most of the best- known narratives of the patriarchal and Mosaic ages belong to " JE." His style, especially in the parts belonging to " J," is graphic and picturesque, the descriptions are vivid and abound in detail and colloquy, and both emotion and religious feeling are warmly and sympathetically expressed in it.

Deuteronomy. — In the 7th century B.C., during the reign of either Manasseh or Josiah, the narrative of " JE " was enlarged by the

addition of the discourses of Deuteronomy. These dis- courses purport to be addresses delivered by Moses to the assembled people, shortly before his death, in the land of Moab, opposite to Jericho. There was probably some tradition of a farewell address delivered by Moses, and the writer of Deutero- nomy gave this tradition form and substance. In impressive and persuasive oratory he sets before Israel, in a form adapted to the needs of the age in which he lived, the fundamental principles which Moses had taught. Yahweh was Israel's only god, who tolerated no other god beside Himself, and who claimed to be the sole object of the Israelite's reverence. This is the fundamental thought which is insisted on and developed in Deuteronomy with great eloquence and power. The truths on which the writer loves to dwell are the sole godhead of Yahweh, His spirituality (ch. iv.), His choice of Israel, and the love and faithfulness which He had shown towards it, by redeeming it from slavery in Egypt, and planting it in a free and fertile land; from which are deduced the great practical duties of loyal and loving devotion to Him, an uncompromising repudiation of all false gods, the rejection of all heathen practices, a cheerful and ready obedience to His will, and a warm-hearted and generous attitude towards man. Love of God is the primary spring of human duty (vi. 5). In the course of his argument (especially in chs. xii.-xxvi.), the writer takes up most of the laws, both civil

and ceremonial, which (see above) had been incorporated before in " J " and " E," together with many besides which were current in Israel; these, as a rule, he expands, applies or enforces with motives; for obedience to them is not to be rendered merely in deference to external authority, it is to be prompted by right moral and religious motives. The ideal of Deuteronomy is a community of which every member is full of love and reverence towards his God, and of sympathy and regard for his fellow-men. The " Song " (Deut. xxxii.) and " Blessing " (Deut. xxxiii.) of Moses are not by the author of the discourses; and the latter, though not Mosaic, is of considerably earlier date.

The influence of Deuteronomy upon subsequent books of the Old Testament is very perceptible. Upon its promulgation it speedily became the book which both gave the religious ideals of the age, and

moulded the phraseology in which these ideals were expressed. The style of Deuteronomy, when once it had been formed, lent itself readily to imitation; and thus a school of writers, imbued with its spirit, and using its expressions, quickly arose, who have left their mark upon many parts of the Old Testament. In particular, the parts of the combined narrative " JE," which are now included in the book of Joshua, passed through the hands of a Deuteronomic editor, who made considerable additions to them — chiefly in the form of speeches placed, for instance, in the mouth of Joshua, or expansions of the history, all emphasizing principles inculcated in Deuteronomy and expressed in its characteristic phraseology (e.g. most of Josh, i., ii. io-ii, iii. 2-4, 6-0, x. 28-43, »• IO " 2 3» xb-; xn i- 2 ~6, 8-12, xxiii.). From an historical point of view it is characteristic of these additions that they generalize Joshua's successes, and represent the conquest of Canaan, effected under his leadership, as far more complete than the earlier narratives allow us to suppose was the case. The compilers of Judges and Kings are also (see below) strongly influenced by Deuteronomy.

The Priestly sections of the Hexateuch (known as " P ") remain still to be considered. That these are later than " JE," and even than Deut., is apparent — to mention but one feature — from the more complex v ritual and hierarchical organization which they exhibit. They are to all appearance the work of a school of priests, who, after the destruction of the Temple in 586 B.C., began to write down and codify the ceremonial regula- tions of the pre-exilic times, combining them with an historical narrative extending from the Creation to the establishment of Israel in Canaan; and who completed their work during the century following the restoration in 537 B.C. The chief object of these sections is to describe in detail the leading institutions of the theocracy (Tabernacle, sacrifices, purifications, &c), and to refer them to their traditional origin in the Mosaic age. The history as such is subordinate; and except at important epochs is given only in brief summaries (e.g. Gen. xix. 29, xli. 46). Statistical data (lists of names, genealogies, and precise chrono- logical notes) are a conspicuous feature in it. The legislation of " P," though written down in or after the exile, must not, however, be supposed to be the creation of that period; many elements in it can be shown from the older literature to have been of great antiquity in Israel; it is, in fact, based upon pre- exilic Temple usage, though in some respects it is a development of it, and exhibits the form which the older and simpler ceremonial institutions of Israel ultimately assumed. In " P's " picture of the Mosaic age there are many ideal elements; it represents the priestly ideal of the past rather than the past as it actually was.

The following examples of passages from " P " will illustrate what has been said: — Gen. i. i-ii. 4°, xvii. (institution of circumcision), xxiii. (purchase of the cave of Machpelah), xxv. 7-17, xlvi. 6-27; Ex. vi. 2-vii. 13, xxv.-xxxi. (directions for making the Tabernacle, its vessels, dress of the priests, &c), xxxv.-xl. (execution of these directions); Lev. (the whole); Num. i. i-x. 28 (census of people, arrangement of camp, and duties of Levites, law of the Nazirite, &c), xv., xviii.,xix., xxvi.- xxxi., xxxiii.-xxxvi. ; Josh. v. 10-12, the greater part of xv.-xix. (distribution of the land among the different tribes), xxi. 1-42. The style of " P " is strongly marked — as strongly marked, in

fact, as (in a different way) that of Deuteronomy is; numerous expressions not found elsewhere in the Hexateuch occur in it repeatedly. The section Lev. xvii.-xxvi. has a character of its own; for it consists of a substratum of older laws, partly moral (chs. xviii.-xx. mostly), partly ceremonial, with a hortatory conclusion (ch. xxvi.), with certain very marked characteristics (from one of which it has received the name of the " Law of Holiness "), which have been combined with elements belonging to, or conceived in the spirit of, the main body of " P. "

Not long after " P " was completed, probably in the 5th century B.C., the whole, consisting of " JE " and Deuteronomy, was com- bined with it; and the existing Hexateuch was thus produced.

Judges, Samuel and Kings. — The structure of these books is simpler than that of the Hexateuch. The book of Judges consists substantially of a series of older narratives, arranged together by a compiler, and provided by him, where he deemed it necessary, with introductory and concluding comments (e.g. ii. n-iii. 6, iii. i2-is a , 30, iv. 1-3, 23, 24, v. 31 6). The compiler is strongly imbued with the spirit of Deuteronomy; and the object of his comments is partly to exhibit the chronology of the period as he conceived it, partly to state his theory of the religious history of the time. The compiler will not have written before c. 600 B.C.; the narratives incorporated by him will in most cases have been considerably earlier. The books of Samuel centre round the names of Samuel, Saul and David. They consist of a series of narratives, or groups of narratives, dealing with the lives of these three men, arranged by a compiler, who, however, unlike the compilers of Judges and Kings, rarely allows his own hand to appear. Some of these narratives are to all appearance nearly contemporary with the events that they describe (e.g. 1 Sam. ix. i-x. 16, xi. 1-11, 15, xiii.xiv., xxv. xxxi.; 2 Sam. ix.-xx.); others are later. Ini Sam. the double (and discrepant) accounts of the appointment of Saul as

king (ix. i-x. 16, xi. i-n, 15, and viii., x. 17-27, xii.), and of the introduction of David to the history (xvi. 14-23 and xvii. 1- xviii. 5) are noticeable; in ix. i-x.16, xi. 1-11, 15, the monarchy is viewed as God's gracious gift to His people; in viii., x. 17-27, xii., which reflect the feeling of a much later date, the monarchy is viewed unfavourably, and represented as granted by God unwillingly. The structure of the book of Kings resembles that of Judges. A number of narratives, evidently written by prophets, and in many of which also (as those relating to Elijah, Elisha and Isaiah) prophets play a prominent part, and a series of short statistical notices, relating to political events, and derived probably from the official annals of the two kingdoms (which are usually cited at the end of a king's reign), have been arranged together, and sometimes expanded at the same time, in a framework supplied by the compiler. The framework is generally recognizable without difficulty. It comprises the chronological details, references to authorities, and judgments on the character of the various kings, especially as regards their attitude to the worship at the high places, all cast in the same literary mould, and marked by the same characteristic phrase- ology. Both in point of view and in phraseology the compiler shows himself to be strongly influenced by Deuteronomy. The two books appear to have been substantially completed before the exile; but short passages were probably introduced into them afterwards. Examples of passages due to the compiler: 1 Kings ii. 3-4, viii. 14-61 (the prayer of dedication put into Solomon's mouth), ix. 1-9, xi. 32 6 -39, xiv. 7-11, 19-20, 21-24, 29-31, xv. 1-15, xxi. 2o 6 -26; 2 Kings ix. 7-10", xvii. 7-23.

The Latter Prophets. — Isaiah, Jeremiah, Ezekiel, the Twelve. The writings of the canonical prophets form another important element in the Old Testament, also, like the historical books, of gradual growth. Beginning with Amos and Hosea, they form a series which was not completed till more than three centuries had passed away. The activity of the prophets was largely called forth by crises in the national history. They were partly moral reformers, partly religious teachers, partly political advisers. They held up before a backsliding people the ideals of human duty, of religious truth and of national policy. They expanded and developed, and applied to new situations and

circumstances of the national life, the truths which in a more germinal form they had inherited from their ancestors. The nature and attributes of God; His gracious purposes towards man; the relation of man to God, with the practical conse- quences that follow from it; the true nature of religious service; the call to repentance as the condition of God's favour; the ideal of character and action which each man should set before himself; human duty under its various aspects; the responsibilities of office and position; the claims of mercy and philanthropy, justice and integrity; indignation against the oppression of the weak and the unprotected; ideals of a blissful future, when the troubles of the present will be over, and men will bask in the enjoyment of righteousness and felicity, — these, and such as these, are the themes which are ever in the prophets' mouths, and on which they enlarge with unwearying eloquence and power.

For the more special characteristics of the individual prophets, reference must be made to the separate articles devoted to each; it is impossible to do more here than summarize briefly the literary structure of their various books.

Isaiah. — The book of Isaiah falls into two clearly distinguished parts, viz. chs. i.-xxxix., and xl.-lxvi. Chs. xl.lxvi., how ever, are not by Isaiah, but are the work of a prophet who wrote about 540 B.C., shortly before the conquest of Babylon by Cyrus, and whose aim was to encourage the Israelites in exile, and assure them of the certainty of their approaching restoration to Canaan. (According to many recent critics, this prophet wrote only chs. xl.-lv., chs. lvi.-lxvi. being added subsequently, some time after the return.) The genuine prophecies of Isaiah are contained in chs. i.-xii., xiv. 24-xxiii., xxviii.-xxxiii., xxxvii. 22-32, — -all written between 740 and 700 B.C. (or a little later), and all (except ch. vi.) having reference to the condition of Judah and Israel, and the movements of the Assyrians during the reigns of Ahaz and Hezekiah. The opinion has, however, latterly gained ground that parts even of these chapters are of later origin than Isaiah's own time. Of the rest of chs. i.xxxix. this is generally admitted. Thus chs. xiii. 1 xiv. 23, xxi. 1-10, xxxiv.-xxxv. belong to the same age as chs. xl.-lxvi., xiii. i-xiv. 23, and xxi. 1-10, looking forward similarly to the approaching fall of Babylon; chs. xxiv.-xxvii. have a character of their own, and form an apocalypse written not earlier than the 5th century B.C.; chs. xxxvi.-xxxix., describing incidents in which Isaiah took a part, consist of narratives excerpted from 2 Kings xviii. 13-xx. with the addition of Hezekiah's song (xxxviii. 9-20). It is evident from these facts that the book of Isaiah did not assume its present form till considerably after the return of the Jews from exile in 537, when a compiler, or series of

compilers, arranged the genuine prophecies of Isaiah which had come to his hands, together with others which at the time were attributed to Isaiah, and gave the book its present form.

Jeremiah. — Jeremiah's first public appearance as a prophet was in the 13th year of Josiah (Jer. i. 2, xxv. 3), i.e. 626 B.C., and his latest prophecy (ch. xliv.) was delivered by him in Egypt, whither he was carried, against his will, by some of the Jews who had been left in Judah, shortly after the fall of Jeru- salem in 586. Jeremiah was keenly conscious of his people's sin; and the aim of most of his earlier prophecies is to bring his countrymen, if possible, to a better mind, in the hope that thereby the doom which he sees impending may be averted — an end which eventually he saw clearly to be unattainable. Jeremiah's was a sensitive, tender nature; and he laments, with great pathos and emotion, his people's sins, the ruin to which he saw his country hastening, and the trials and persecutions which his predictions of disaster frequently brought upon him. A large part of his book is biographical, describing various in- cidents of his ministry. Prophecies of restoration are contained in chs. xxx.-xxxiii. The prophecies of the first twenty-three years of his ministry, as we are expressly told in ch. xxxvi., were first written down in 604 B.C. by his friend and amanuensis Baruch, and the roll thus formed must have formed the nucleus of the present book. Some of the reports of Jeremiah's pro-

phecies, and especially the biographical narratives, also probably; have Baruch for their author. But the chronological disorder of the book, and other indications, show that Baruch could not have been the compiler of the book, but that the prophecies and narratives contained in it were collected together gradually, and that it reached its present form by a succession of stages, which were not finally completed till long after Israel's return from Babylon. The long prophecy (1. i-li. 58), announcing the approaching fall of Babylon, is not by Jeremiah, and cannot have been written till shortly before 538 B.C.

Ezekiel. — Ezekiel was one of the captives who were carried with Jehoiachin in 507 B.C. to Babylonia, and was settled with many other exiles at a place called Tel-abib (iii. 15). His pro- phecies (which are. regularly dated) are assigned to various years from 592 to 570 B.C. The theme of the first twenty-four chapters of his book is the impending fall of Jerusalem, which took place actually in 586, and which Ezekiel foretells in a series of prophecies, distinguished by great variety of symbolism and imagery. Chs. xxv.-xxxii. are on various foreign nations, Edom, Tyre, Egypt, &c. Prophecies of

Israel's future restoration follow in chs. xxxiii.-xlviii., chs. xl.xlviii. being remarkable for the minuteness with which Ezekiel describes the organization of the restored community, as he would fain see it realized, including even such details as the measurements and other arrangements of the Temple, the sacrifices to be offered in it, the duties and revenues of the priests, and the redistribu tion of the country among the twelve tribes. The book of Ezekiel bears throughout the stamp of a single mind; the pro- phecies contained in it are arranged methodically; and to all appearance— in striking contrast to the books of Isaiah and Jeremiah — it received the form in which we still have it from the prophet himself.

The Twelve Minor Prophets. — These, as was stated above, were reckoned by the Jews as forming a single " book." The two earliest of the Minor Prophets, Amos and Hosea, prophesied in the northern kingdom, at about 760 and 740 B.C. respectively; both foresaw the approaching ruin of northern Israel at the hands of the Assyrians, which took place in fact when Sargon took Samaria in 722 B.C.; and both did their best to stir their people to better things. The dates of the other Minor Prophets (in some cases approximate) are: Micah, c. 725-c. 680 B.C. (some passages perhaps later); Zephaniah, c. 625; Nahum, shortly before the destruction of Nineveh by the Manda in 607 ; Habakkuk (on the rise and destiny of the Chaldaean empire) 605-600; Obadiah, after the destruction of Jerusalem by the Chaldaeans in 586; Haggai, 520; Zechariah, i.viii. (as in Haggai, promises and encouragements connected with the re building of the Temple) 520 and 518; Malachi, c. 460-450; Joel, 5th century B.C.; Jonah, 4th century B.C. The latest prophecies in the book are, probably, those contained in Zech. ix.-xiv. which reflect entirely different historical conditions from Zech. i.-viii. (520 and 518 B.C.), and may be plausibly assigned to the period beginning with the conquests of Alexander the Great, between 332 and c. 300 B.C. Why these prophecies were attached to Zech. i.-viii. must remain matter of conjecture; but there are reasons for supposing that, together with the prophecy of Malachi, they came to the compiler of the "book" of the Twelve Prophets anonymously, and he simply attached them at the point which his collection had reached (i.e. at the end of Zech. viii.).

The Psalms. — The Psalter is that part of the Old Testament in which the devotional aspect of the religious character finds its completest expression; and in lyrics of exquisite tenderness and beauty the most varied emotions are poured forth by the psalmists to their God — despondency and distress, penitence and resignation, hope and confidence, jubilation and thankful^ ness, adoration and praise. The

Psalter, it is clear from many indications, is not the work of a single compiler, but was formed) gradually. A single compiler is not likely to have introduced double recensions of one and the same psalm fas Ps. liii. = Ps. xiv., Ps. lxx. = Ps. x£. 13-17, Ps. cviii. = Ps. lvii. 7-1 1 + lx. 5-12); in the Hebrew canon the Psalter is composed of five

books (i.-xli., xlii.-lxxii., lxxiii.-lxxxix., xc.-cvi., cvii.-cL); and in many parts it is manifestly based upon independent smaller collections; for it contains groups of psalms headed " David," the " sons of Korah," " Asaph," " Songs of Ascents." Each of the five books of which it is composed contains psalms which show that its compilation cannot have been completed till after the return from the Captivity; and indeed, when the individual psalms are studied carefully it becomes apparent that in the great majority of cases they presuppose the historical conditions, or the religious experiences, of the ages that followed Jeremiah. Thus, though it is going too far to say that there are no pre-exilic psalms, the Psalter, as a whole, is the expression of the deeper spiritual feeling which marked the later stages of Israel's history. It has been not inaptly termed the Hymn-book of the second Temple. Its compilation can hardly have been finally completed before the 3rd century B.C.; if it is true, as many scholars think, that there are psalms dating from the time of the Maccabee struggle (Ps. xliv., Ixxiv., lxxix., lxxxiiL, and perhaps others), it cannot have been completed till after 165 B.C.

The Book of Proverbs. — This is the first of the three books belonging to the " Wisdom-literature " of the Hebrews, the other two books being Job and Ecclesiastes. The Wisdom- literature of the Hebrews concerned itself with what we should call the philosophy of human nature, and sometimes also of physical nature as well; its writers observed human character, studied action in its consequences, laid down maxims for edu- cation and conduct, and reflected on the moral problems which human society presents. The book of Proverbs consists essen- tially of generalizations on human character and conduct, with (especially in chs. i.-ix.) moral exhortations addressed to an imagined " son " or pupil. The book consists of eight distinct portions, chs. i.-ix. being introductory, the proverbs, properly so called, beginning at x. 1 (with the title " The Proverbs of Solomon "), and other, shorter collections, beginning at xxii. 17, xxiv. 23, xxv.

1, xxx. 1, xxxi. 1, xxxL 10 respectively. The book, it is evident, was formed gradually. A small nucleus of the proverbs may be Solomon's; but the great majority represent no doubt the generalizations of a long succession of " wise men." The introduction, or " Praise of Wisdom," as it has been called (chs. i.-ix), commending the maxims of Wisdom as a guide to the young, will have been added after most of the rest of the book was already complete. The book will not have finally reached its present form before the 4th century B.C. Some scholars believe that it dates entirely from the Greek period (which began 332 B.C.) ; but it may be doubted whether there are sufficient grounds for this conclusion.

Job. — The book of Job deals with a problem of human life; in modern phraseology it is a work of religious philosophy. Job is a righteous man, overwhelmed with undeserved misfortune; and thus the question is raised, Why do the righteous suffer? Is their suffering consistent with the justice of God? The dominant theory at the time when Job was written was that all suffering was a punishment of sin; and the aim of the book is to controvert this theory. Job's friends argue that he must have been guilty of some grave sin; Job himself passionately main- tains his innocence; and on the issue thus raised the dialogue of the book turns. The outline of Job's story was no doubt supplied by tradition; and a later poet has developed this out- line, and made it a vehicle for expressing his new thoughts respecting a great moral problem which perplexed his contem- poraries. A variety of indications (see Job) combine to show that the book of Job was not written till after the time of Jere- miah — probably, indeed, not till after the return from exile. The speeches of Elihu (chs. xxxii.-xxxvii.) are not part of the original poem, but were inserted in it afterwards.

There follow (in the Hebrew Bible) the five short books, which, as explained above, are now known by the Jews as the Megilloth, or " Rolls," viz. Song of Songs, Ruth, Lamentations, Ecclesiastes and Esther. Of these, the Song of Songs, in exquisite poetry, extols the power and sweetness of pure and faithful human love. The date at which it was written is uncertain; there are features in it which point to its having been the work of a poet living

in north Israel, and writing at an early date; but most recent scholars, on account chiefly of certain late expressions occurring in it, think that it cannot have been written earlier than the 4th or 3rd century B.C. In the graceful and tender idyll of Ruth, it is told how Ruth, the Moabitess, and a native consequently of a country hostile theocratically to Israel, adopted Israel's faith (i. 16), and was

counted worthy to become an ancestress of David. The date of Ruth is disputed: Driver has defended a pre-exilic date for it, but the general opinion of modern scholars is that it belongs to the 5th century B.C. The Lamentations consist of five elegies on the fall of Jerusalem, and the sufferings which its people experienced in consequence; they must all have been composed not long after 586 B.C. Ecclesiastes, the third book belonging (see above) to the Wisdom-literature, consists of moralizings, prompted by the dark times in which the author's lot in life was cast, on the disappointments which seemed to him to be the reward of all human endeavour, and the inability of man to remedy the injustices and anomalies of society. If only upon linguistic grounds — for the Hebrew of the book resembles often that of the Mishnah more than the ordinary Hebrew of the Old Testament — Ecclesiastes must be one of the latest books in the Hebrew canon. It was most probably written during the Greek period towards the end of the 3rd century B.C. The book of Esther, which describes, with many legendary traits, how the beautiful Jewess succeeded in rescuing her people from the destruction which Haman had prepared for them, will not be earlier than the closing years of the 4th century B.C., and is thought by many scholars to be even later.

The Book of Daniel. — The aim of this book is to strengthen and encourage the pious Jews in their sufferings under the persecution of Antiochus Epiphanes, 168-165 B C Chs. i.vi. consist of narratives, constructed no doubt upon a tradi tional basis, of the experiences of Daniel at the Babylonian court, between 605 and 538 B.C., with the design of illustrating how God, in times of trouble, defends and succours His faithful servants. Chs. vii.xii. contain a series of visions, purport ing to have been seen by Daniel, and describing, sometimes (especially in ch. xi.) with considerable minuteness, the course of events from Alexander the Great, through the two royal lines of the Ptolemies and the Seleucidae, to Antiochus Epiphanes, dwelling in particular on the persecuting measures adopted by Antiochus against the Jews, and promising the tyrant's speedy fall (see e.g. viii. 9-14, 23-25, xi. 21-45). Internal evidence shows clearly that the book cannot have been written by Daniel himself; and that it must in fact be a product of the period in which its interest culminates, and the circumstances of which it so accurately reflects, i.e. of i68-r6s B.C.

Chronicles, Ezra and Nehemiah. — These books form the second series of historical books referred to above, Ezra and Nehemiah carrying on the narrative of Chronicles, and forming its direct sequel. 1 Chr. i.ix. consists mostly of tribal gene alogies, partly based

upon data contained in the older books (Gen.-Kings), partly including materials found by the compiler elsewhere. 1 Chr. x.2 Chr. xxxvi. consists of a series of excerpts from the books of Samuel and Kings — sometimes transcribed without substantial change, at other times materially altered in the process— combined with matter, in some cases limited to a verse or two, in others extending to several chapters, con tributed by the compiler himself, and differing markedly from the excerpts from the older books both in phraseology and in point of view. The books of Ezra and Nehemiah are of similar structure; here the sources excerpted are the Memoirs of Ezra and Nehemiah, written by themselves in the first person; viz. Ezra vii. 12-ix. (including the decree of Artaxerxes, vii. 12-26); Neh. i. i-vii. 73 a , xii. 31-41, xiii. ; and a narrative written in Aramaic (Ezra iv. 8-vi. 18); Ezra x. and Neh. viii.-x. also are in all probability based pretty directly upon the Memoirs of Ezra; the remaining parts of the books are the composition of the compiler. # The additions of the compiler, especially in the Chronicles, place the old history in a new light; he invests it with the associations of his own day; and pictures pre-exilic Judah as already possessing the fully developed ceremonial

system, under which he lived himself, and as ruled by the ideas and principles current among his contemporaries. There is much in his representation of the past which cannot be historical. For examples of narratives which are his composition see i Chr. xv. 1-24, xvi. 4-42, xxii. 2-xxix.; 2 Chr. xiii. 3-22, xiv. 6-xv. 15, xvi. 7-11, xvii., xix. i-xx. 30, xxvi. 16-20, xxix. 3- xxxi. 21. On account of the interest shown by the compiler in the ecclesiastical aspects of the history, his work has been not inaptly called the " Ecclesiastical Chronicle of Jerusalem." From historical allusions in the book of Nehemiah, it may be inferred that the compiler wrote at about 300 B.C. (S. R. D.)

2. Texts and Versions.

Text. — The form in which the Hebrew text of the Old Testa- ment is presented to us in all MSS. and printed editions is that of the Massoretic text, the date of which is usually placed somewhere between the 6th and 8th centuries of the Christian era. It is probable that the present text became fixed as early as the 2nd century a.d.,

but even this earlier date leaves a long interval between the original autographs of the Old Testa- ment writers and our present text. Since the fixing of the Massoretic text the task of preserving and transmitting the sacred books has been carried out with the greatest care and fidelity, with the result that the text has undergone practically no change of any real importance; but before that date, owing to various causes, it is beyond dispute that a large number of corruptions were introduced into the Hebrew text. In dealing, therefore, with the textual criticism of the Old Testament it is necessary to determine the period at which the text assumed its present fixed form before considering the means at our disposal for controlling the text when it was, so to speak, in a less settled condition.

An examination of the extant MSS. of the Hebrew Old Testa- ment reveals two facts which at first sight are somewhat remark-

able. The first is that the oldest dated MS., the Codex te'T"" Babylonicus Petropolitanus, only goes back to the year

a.d. 916, though it is probable that one or two MSS. belong to the 9th century. The second fact is that all our Hebrew MSS. represent one and the same text, viz. the Massoretic. This text was the work of a special gild of trained scholars called Massoretes (moan ˆw) or "masters of tradition" (m.'iDD or less correctly m v ba), 1 whose aim was not only to preserve and transmit the consonantal text which had been handed down to them, but also to ensure its proper pronunciation. To this end they provided the text with a complete system of vowel points and accents. 2 Their labours further included the compilation of a number of notes, to which the term Massorah is now usually applied. These notes for the most part constitute a sort of index of the peculiarities of the text, and possess but little general interest. More important are those, passages in which the Massoretes have definitely adopted a variation from the consonantal text. In these cases the vowel points attached to the written word {K(thibh) belong to the word which is to be substituted for it, the latter being placed in the margin with the initial letter of QSre (= to be read) prefixed to it. Many even of these readings merely relate to variations of spelling, pronuncia- tion or grammatical forms; others substitute a more decent expression for the coarser phrase of the text, but in some instances the suggested reading really affects the sense of the passage. These last are to be regarded either as old textual

1 For a discussion of this word see W. Bacher (J.Q.R. vol. iii. pp.

785 f.), who maintains that the original pronunciation of these words was jvviod and n-jciD.

2 The actual date of the introduction of vowel points is not known, but it must in any case have been later than the time of Jerome, and is probably to be assigned to the 7th century. Of the systems of punctuation which are known to us, the more familiar is the Tiberian, or sublinear, which is found in all printed editions of the Hebrew Bible. The other system, the Babylonian or superlinear, is chiefly found in certain Yemen MSS. For j'et a third system of vocalization see M. Friedlander, J.Q.R., 1895, pp. 564 f., and P. KMeinZ.A.T.W. xxi. (1901), pp. 273 f. Probably the idea of providing vowel points was borrowed from the Syrians.

variants, or, more probably, as emendations corresponding to the errata or corrigenda of a modern printed book, They do not point to any critical editing of the text; for the aim of the Massoretes was essentially conservative. Their object was not to create a new text, but rather to ensure the accurate trans- mission of the traditional text which they themselves had received. Their work may be said to culminate in the vocalized text which resulted from the labours of Rabbi Aaron ben Asher in the 10th century. 3 But the writings of Jerome in the 4th, and of Origen in the 3rd century both testify to a Hebrew text practically identical with that of the Massoretes. Similar evidence is furnishedby theMishna and the Gemara, the Targums, and lastly by the Greek version of Aquila, 4 which dates from the first half of the 2nd century a.d. Hence it is hardly doubtful that the form in which we now possess the Hebrew text was already fixed by the beginning of the and century. On the other hand, evidence such as that of the Book of Jubilees shows that the form of the text still fluctuated considerably as late as the 1st century a.d., so that we are forced to place the fixing of the text some time between the fall of Jerusalem and the produc- tion of Aquila's version. Nor is the occasion far to seek. After the fall of Jerusalem the new system of biblical exegesis founded by Rabbi Hillel reached its climax at Jamnia under the famous Rabbi Aqiba (d. c. 132). The latter's system of interpretation was based upon an extremely literal treatment of the text, according to which the smallest words or particles, and some- times even the letters of scripture, were invested with divine authority. The inevitable result of such a system must have been the fixing of an officially recognized text, which could scarcely have differed materially from that which was finally adopted by the Massoretes. That the standard edition was not the result of the critical investigation of existing materials may be assumed with some certainty. 6 Indeed, it is probable, as has been

suggested, 6 that the manuscript which was adopted as the standard text was an old and well-written copy, possibly one of those which were preserved in the Court of the Temple.

But if the evidence available points to the time of Hadrian as the period at which the Hebrew text assumed its present form, it is even more certain that prior to that date the various MSS. of the Old Testament differed very materially from one another. Sufficient proof of this statement is furnished by the Samaritan Pentateuch and the versions, more especially the Septuagint. Indications also are not wanting in the Hebrew text itself to show that in earlier times the text was treated with considerable freedom. Thus, according to Jewish tradition, there are eighteen 7 passages in which the older scribes deliberately altered the text on the ground that the language employed was either irreverent or liable to misconception. Of a similar nature are the changes introduced into proper names, e.g. the substitution of bosheth (= shame) for ba'al in Ishbosheth (2 Sam. ii. 8) and Mephibosheth (2 Sam. ix. 6; cf. the older forms Eshbaaland Meribaal, 1 Chron. viii. 34, 35); the use of the verb "to bless" (t») in the sense of cursing (1 Kings xxi. 10, 13; Job i. 5, n, ii. 5, 9; Ps. x. 3); and the insertion of " the enemies of " in 1 Sam. xxv. 22, 2 Sam. xii. 14. These intentional alterations, however, only affect a very limited portion of the text, and, though it is possible that other changes were introduced at different times, it is very

3 This represents the Western tradition as opposed to the Eastern text of ben Naphtali. For the standard copies such as the Codex Hillelis referred to by later writers see H. L. Strack, Proleg. Critica, pp. 14 f.

4 Cf. F. C. Burkitt, Fragments of the Books of Kings according to the Translation of Aquila.

6 The Talmudic story of the three MSS. preserved in the court of the temple (Sopherim, vi. 4) sufficiently illustrates the tentative efforts of the rabbis in this direction.

6 W. Robertson Smith, Old Testament and the Jewish Church pp. 69 f. • »

7 For these Tiqqune Sopherim or " corrections of the scribes " see Geiger, Urschrift, pp. 308 f . ; Strack, Prolegomena Critica, p. 87 ; Buhl, Canon and Text of the Old Testament, pp. 103 f. In the Mekilta (Exod. xv. 7) only eleven passages are mentioned. Less important are the Itture Sopherim, or five passages in which the scribes have omitted a waw from the text.

unlikely that they were either more extensive in range or more important in character. At the same time it is clear both from internal and external evidence that the archetype from which our MSS. are descended was far from being a perfect representative of the original text. For a comparison of the different parallel passages which occur in the Old Testament (e.g. i and 2 Samuel, 1 and 2 Kings, and 1 and 2 Chronicles; 2 Kings xviii. 13-xx. 19 and Isaiah xxxvi.xxxix; 2 Sam. xxii. and Ps. xviii.; Ps. xiv. and liii., &c.) reveals many variations which are obviously due to textual corruption, while there are many passages which in their present form are either ungrammatical, or inconsistent with the context or with other passages. Externally also the ancient versions, especially the Septuagint, frequently exhibit variations from the Hebrew which are not only intrinsically more probable, but often explain the difficulties presented by the Massoretic text. Our estimate of the value of these variant readings, moreover, is considerably heightened when we consider that the MSS. on which the versions are based are older by several centuries than those from which the Massoretic text was derived; hence the text which they presuppose has no slight claim to be regarded as an important witness for the original Hebrew. " But the use of the ancient versions " (to quote Prof. Driver 1) " is not always such a simple matter as might be inferred. . . . In the use of the ancient versions for the purposes of textual criticism there are three precautions which must always be observed; we must reasonably assure ourselves that we possess the version itself in its original integrity; we must eliminate such variants as have the appearance of originating merely with the translator; the remainder, which will be those that are due to a difference of text in the MS. (or MSS.). used by the trans lator, we must then compare carefully, in the light of the consid- erations just stated, with the existing Hebrew text, in order to determine on which side the superiority lies."

Versions. — In point of age the Samaritan Pentateuch furnishes the earliest external witness to the Hebrew text. It is not a version, but merely that text of the Pentateuch which has been Samari- preserved by the Samaritan community since the time ia "' of Nehemiah (Neh. xiii. 23-31), i.e. about 432 B.C. 2

It is written in the Samaritan script, which is closely allied to the old

Hebrew as opposed to the later " square " character. We further possess a Samaritan Targum of the Pentateuch written in the Samaritan dialect, a variety of western Aramaic, and also an Arabic translation of the five books of the law; the latter dating perhaps from the nth century A.D. or earlier. The Samaritan Pentateuch agrees with the Septuagint version in many passages, but its chief importance lies in the proof which it affords as to the substantial agreement of our present text of the Pentateuch, apart from certain intentional changes, 3 with that which was promulgated by Ezra. Its value for critical purposes is considerably discounted by the late date of the MSS., upon which the printed text is based.

The Targums, or Aramaic paraphrases of the books of the Old Testament (see Targum), date from the time when Hebrew had . become superseded by Aramaic as the language spoken Aramaic ˆy the Jews, i.e. during the period immediately preceding the Christian era. In their written form, however, the earlier Targums, viz. those on the Pentateuch and the prophetical books, cannot be earlier than the 4th or 5th century A.D. Since they were designed to meet the needs of the people and had a directly edifica- tory aim, they are naturally characterized by expansion and para- phrase, and thus afford invaluable illustrations of the methods of Jewish interpretation and of the development of Jewish thought. The text which they exhibit is virtually identical with the Masso- retic text.

The earliest among the versions as well as the most important for the textual criticism of the Old Testament is the Septuagint. This version probably arose out of the needs of the Greek- Septua- speaking Jews of Alexandria in the 3rd century B.C. 8 According to tradition the law was translated into Greek

during the reign of Ptolemy Philadelph us (284-247 B.C.), and, though the form (viz. the Letter of Aristeas) in which this tradition

1 Text of the Books of Samuel, pp. xxxix. f.

2 According to Josephus (Ant. xi. 7. 8) the temple on Mt. Gerizim was set up by Manasseh in the reign of Darius Codomannus, i.e. about 332 B.C. It is possible that he is correct in placing the building of the temple at the later date, but probably he errs in connecting it with the secession of Manasseh, which, according to Nehemiah, occurred a century earlier; it has been suggested that he has confused Darius Codomannus with his predecessor, Darius Nothus.

- e.g. Ex. xx. 17. 19 ff. ; Num. xx. f. : Deut. xxvii. 4.

has come down to us cannot be regarded as historical, yet it seems to have preserved correctly both the date and the locality of the version. The name Septuagint, strictly speaking, only applies to the translation of the Pentateuch, but it was afterwards extended to include the other books of the Old Testament as they were translated. That the interval which elapsed before the Prophets and the Hagiographa were also translated was no great one is shown by the prologue to Sirach which speaks of " the Law, the Prophets and the rest of the books," as already current in a translation by 132 B.C. The date at which the various books were combined into a single work is not known, but the existence of the Septuagint as a whole may be assumed for the 1st century a.d., at which period the Greek version was universally accepted by the Jews of the Dispersion as Scripture, and from them passed on to the Christian Church.

*The position of the Septuagint, however, as the official Greek representative of the Old Testament did not long remain unchallenged. The opposition, as might be expected, came from the side of the Jews, and was due partly to the * T ' ".? controversial use which was made of the version by the ° *" a ' Christians, but chiefly to the fact that it was not suffi- mˆihus ciently in agreement with the standard Hebrew text estab- xheo- ' lished by Rabbi Aqiba and his school. Hence arose in Motion. the 2nd century A.D. the three new versions of Aquiia, Symmachus and Theodotion. Aquiia was a Jewish proselyte of Pontus, and since he was a disciple of Rabbi Aqiba (d. A.D. 135), and (according to another Talmudic account) also of Rabbi Eliezer and Rabbi Joshua, the immediate predecessors of Aqiba, his version may be assigned to the first half of the 2nd century. It is characterized by extreme literalness, and clearly reflects the peculiar system of exegesis which was then in vogue among the Jewish rabbis. Its slavish adherence to the original caused the new translation to be received with favour by the Hellenistic Jews, among whom it quickly superseded the older Septuagint. For what remains of this version, which owing to its character is of the greatest value to the textual critic, we have until recently been indebted to Origen's Hexapla (see below) ; for, though Jerome mentions a secunda editio, no MS. of Aquila's translation has survived. Fragments, 4 however, of two codices were discovered (1897) in the genizah at Cairo, which illustrate more fully the peculiar features of this version.*

The accounts given of Theodotion are somewhat conflicting. Both Irenaeus and Epiphanius describe him as a Jewish proselyte, but while the former calls him an Ephesian and mentions his translation before that of Aquiia, the latter states that he was a native of

Pontus and a follower of Marcion, and further assigns his work to the reign of Commodus (a.d. 180-192) ; others, according to Jerome, describe him as an Ebionite. On the whole it is probable that Irenaeus has preserved the most trustworthy account. 6 Theo- dotion's version differs from those of Aquiia and Symmachus in that it was not an independent translation, but rather a revision of the Septuagint on the basis of the current Hebrew text. He retained, however, those passages of which there was no Hebrew equivalent, and added translations of the Hebrew where the latter was not represented in the Septuagint. A peculiar feature of his translation :s his excessive use of transliteration, but, apart from this, his work has many points of contact with the Septuagint. which it closely resembles in style; hence it is not surprising to find that later MSS. of the Septuagint have been largely influenced by Theodotion' s translation. In the case of the book of Daniel, as we learn from Jerome (praefatio in Dan.), the translation of Theodotion was definitely adopted by the Church, and is accordingly found in the place of the original Septuagint in all MSS. and editions. 6 It is interesting to note in this connexion that renderings which agree in the most remarkable manner with Theodotion's version of Daniel are found not only in writers of the 2nd century but also in the New Testament. The most probable explanation of this phenomenon is that these renderings are derived from an early Greek translation, differing from the Septuagint proper, but closely allied to that which Theodotion used as the basis of his revision.

Symmachus, according to Eusebius and Jerome, was an Ebionite ; Epiphanius represents him (very improbably) as a Samaritan who became a Jewish proselyte. He is not mentioned by Irenaeus and his date is uncertain, but probably his work is to be assigned to the

4 I Kings xx. 7-17:2 Kings xxiii. 12-17, e d- by Mr (now Professor) F. C. Burkitt in Fragments of the Books of Kings according to the Translation of Aquiia (Cambridge, 1897), and Ps. xc. 6-13; xci. 4-10, and parts of Ps. xxiii. by Dr C. Taylor in Sayings of the Jewish Fathers (2nd ed., 1897).

5 On the question of Theodotion's date, Schiirer (Geschichte des jiidischen Volkes, Bd. iii. p. 324) argues very plausibly for his priority to Aquiia on the grounds, (1) that Irenaeus mentions him before Aquiia, and (2) that, after Aquila's version had been adopted by the Greek Jews, a work such as that of Theodotion would have been somewhat superfluous. Theodotion's work, he suggests, formed the first stage towards the establishment of a Greek version which should correspond more closely with the Hebrew. Moreover, this

theory affords the simplest explanation of its disappearance from Jewish tradition.

6 Only one MS. of the Septuagint version of Daniel has survived, the Codex Chisianus.

end of the 2nd century. His version was commended by Jerome as giving the sense of the original, and in that respect it forms a direct contrast with that of Aquila. Indeed Dr Swete 1 thinks it probable that " he wrote with Aquila's version before him, (and that) in his efforts to recast it he made free use both of the Septuagint and of Theodotion."

As in the case of Aquila, our knowledge of the works of Theodotion and Symmachus is practically limited to the fragments that have . l been preserved through the labours of Origen. This writer Origen s ˆ (gee Qrigen) conceived the idea of collecting all the 'Hexapla. ex i st ; n g Greek versions of the Old Testament with a view to recovering the original text of the Septuagint, partly by their aid and partly by means of the current Hebrew text. He accordingly arranged the texts to be compared in six 2 parallel columns in the following order: — (l) the Hebrew text ; (2) the Hebrew transliterated into Greek letters; (3) Aquila; (4) Symmachus; (5) the Septuagint; and (6) Theodotion. In the Septuagint column he drew attention to those passages for which there was no Hebrew equivalent by prefixing an obelus; but where the Septuagint had nothing corre- sponding to the Hebrew text he supplied the omissions, chiefly but not entirely from the translation of Theodotion, placing an asterisk at the beginning of the interpolation; the .close of the passage to which the obelus or the asterisk was prefixed was denoted by the metobelus. That Origen did not succeed in his object of recovering the original Septuagint is due to the fact that he started with the false conception that the original text of the Septuagint must be that which coincided most nearly with the current Hebrew text. Indeed, the result of his monumental labours has been to impede rather than to promote the restoration of the genuine Septuagint. For the Hexaplar text which he thus produced not only effaced many of the most characteristic features of the old version, but also exercised a prejudicial influence on the MSS. of that version.

The Hexapla as a whole was far too large to be copied, but the revised Septuagint text was published separately by Eusebius and Pamphilus, and was extensively used in Palestine during Hesychius, tne ˆ tn centur y During the same period two other Lucian. recensions made their appearance, that of Hesychius which was current in Egypt, and that of Lucian which became the accepted text of the Antiochene Church. Of Hesychius little is known. Traces of his revision are to be found in the Egyptian MSS., especially the Codex Marchalianus, and in the quotations of Cyril of Alexandria. Lucian was a priest of Antioch who was martyred at Nicomedia in a.d. 311 or 312. His revision (to quote Dr Swete) " was doubtless an attempt to revise the noivi) (or

common text ' of the Septuagint) in accordance with the prin- ciples of criticism which were accepted at Antioch." To Ceriani is due the discovery that the text preserved by codices 19, 82, 93, 10S, really represents Lucian's recension; the same conclusion was reached independently by Lagarde, who combined codex 118 with the four mentioned above. 3 As Field {Hexapla, p. 87) has shown, this discovery is confirmed by the marginal readings of the Syro-Hexapla. The recension (see Driver, Notes on the Hebrew Text of the Books of Samuel, p. 52) is characterized by the substitution of synonyms for the words originally used by the Septuagint, and by the frequent occurrence of double renderings, but its chief claim to critical importance rests on the fact that " it embodies renderings not found in other MSS. of the Septuagint which presuppose a Hebrew original self-evidently superior in the passages concerned to the existing Massoretic text."

Latin Versions. — Of even greater importance in this respect is the Old Latin version, which undoubtedly represents a Greek original prior to the Hexapla. " The earliest form of the version " (to quote Dr Kennedy 4) " to which we can assign a definite date, namely, that used by Cyprian, plainly circulated in Africa." In the view of many authorities this version was first produced at Carthage, but recent writers are inclined to regard Antioch as its birthplace, a view which is supported by the remarkable agreement of its readings with the Lucianic recension and with the early Syriac MSS. Unfortunately the version is only extant in a fragmentary form, being preserved partly in MSS., partly in quotations of the „ . . Fathers. The non-canonical books of the Vulgate, how-

uga ' ever, which do not appear to have been revised by Jerome, still represent the older version. It was not until after the 6th century that the Old Latin was finally superseded by the Vulgate or Latin

translation of the Old Testament made by Jerome during the last quarter of the 4th century. This new version was translated

1 Introduction to the Old Testament in Creek, p. 51.

2 Hence the name Hexapla. I n some books, especially the poetical, the columns were increased to eight by the addition of the Quinta and Sexta, but the Octapla, as the enlarged work was called, was not apparently a distinct work. The Tetrapla, on the other hand, was a separate edition which did not contain the first two columns of the Hexapla.

3 Lagarde's projected edition of the Lucianic recension was un- fortunately never completed ; the existing volume contains Genesis -2 Esdras, Esther. It may be noted here that the Complutensian Polyglott represents a Lucianic text.

4 Hastings's Diet, of the Bible, iii. pp. 54 ff.

from the Hebrew, but Jerome also made use of the Greek versions, more especially of Symmachus. His original intention was to revise the Old Latin, and his two revisions of the Psalter, the Roman and the Gallican, the latter modelled on the Hexapla, still survive. Of the other books which he revised according to the Hexaplar text, that of Job has alone come down to us. For textual purposes the Vulgate possesses but little value, since it presupposes a Hebrew original practically identical with the text stereotyped by the Massoretes.

Syriac Versions. — The Peshito (P'shitta) or " simple " revision of the Old Testament is a translation from the Hebrew, though certain books appear to have been influenced by the Septuagint. Its date is unknown, but it is usually assigned to the 2nd century a.d. Its value for textual purposes is not great, partly because the under- lying text is the same as the Massoretic, partly because the Syriac text has at different times been harmonized with that of the Septuagint.

The Syro-Hexaplar version, on the other hand, is extremely valuable for critical purposes. This Syriac translation of the Septua- gint column of the Hexapla was made by Paul, bishop of Telia, at Alexandria in A.D. 616-617. Its value consists „™" in the extreme literalness of the translation, which renders " exa P' ar – it possible to recover the Greek original with considerable certainty. It has further preserved the critical signs employed by Origen as well as many readings from the other Greek versions; hence it forms our chief authority for reconstructing the Hexapla. The greater part of

this work is still extant ; the poetical and prophetical books have been preserved in the Codex Ambrosianus at Milan (published in photolithography by Ceriani, Mon. Sacr. et Prof.), and the remaining portions of the other books have been collected by Lagarde in his Biblidthecae Syriacae, &c.

Of the remaining versions of the Old Testament the most im- portant are the Egyptian, Ethiopic, Arabic, Gothic and Armenian, all of which, except a part of the Arabic, appear to have been made through the medium of the Septuagint.

Authorities. — Wellhausen-Bleek, Einleitung in das alte Testa- ment (4th ed., Berlin, 1878, pp. 571 ff ., or 5th ed., Berlin, 1886, pp. 523 ff.); S. R. Driver, Notes on Samuel (Oxford, 1890), Introd. §§ 3 f . ; W. Robertson Smith, Old Testament in the Jewish Church (2nd ed., 1895); F. G. Kenyon, Our Bible and the Ancient MSS. (London, 1896); T. H. Weir, A Short History of the Hebrew Text (London, 1896) ; H B. Swete, Introduction to the Old Testament in Creek (Cambridge, 1900) ; F. Buhl, Kanon u. Text des A.T. (English trans., Edinburgh, 1892); E. Schurer, Geschichte des judischen Volkes (3rd ed., 1902), vol. iii. § 33 ; C. H. Cornill, Einleitung in das alte Testament (4th ed., 1896), and Prolegomena to Ezechiel (Leipzig), 1886) ; H. L. Strack, Einleitung in das alte Testament, Prolegomena Critica in Vet. Test. (Leipzig, 1873) ; A. Loisy, Histoire critique du texte et des versions de la bible (Amiens, 1892) ; E. Nestle, Urtext und Vbersetzungen der Bibel (Leipzig, 1897); Ed. Konig, Einleitung in das alte Testament (Bonn, 1893) ; F. Field, Origenis Hexaplorum quae supersunt, &c. ; A. Dillmann and F. Buhl, article on " Bibel-text des A.T." in P.R.E. Z vol. ii. ; Ch. D. Ginsburg, Introduction to the Massoretico-critical edition of the Bible (London, 1897) and The Massorah (London, 1 880-1 885). (J. F. St.)

3. Textual Criticism. The aim of scientific Old Testament criticism is to obtain, through discrimination between truth and error, a full apprecia- tion of the literature which constitutes the Old Testa- ment, of the life out of which it grew, and the secret of ti „ ‘ the influence which these have exerted and still exert, between For such an appreciation many things are needed ; and Textual the branches of Old Testament criticism are corre- f? d spondingly numerous. It is necessary in the first criticism. instance to detect the errors which have crept into the text in the course of its transmission, and to recover, so far as possible, the text in its original form ; this is the task of Textual, or as it is sometimes called in contradistinction to another branch, Lower Criticism. It then becomes the task of critical exegesis to interpret the text thus recovered so as to bring out the

meaning intended by the original authors. This Higher Criticism partakes of two characters, literary and historical. One branch seeks to determine the scope, purpose and character of the various books of the Old Testament, the times in and conditions under which they were written, whether they are severally the work of a single author or of several, whether they embody earlier sources and, if so, the character of these, and the conditions under which they have reached us, whether altered and, if altered, how; this is Literary Criticism. A further task is to estimate the value of this literature as evidence for the history of Israel, to determine, as far as possible, whether such parts of the literature as are contemporary with the time described present correct, or whether

in any respect one-sided or biased or otherwise incorrect, descriptions; and again, how far the literature that relates the story of long past periods has drawn upon trustworthy records, and how far it is possible to extract historical truth from tradi- tions (such as those of the Pentateuch) that present, owing to the gradual accretions and modifications of intervening generations, a composite picture of the period described, or from a work such as Chronicles, which narrates the past under the influence of the conception that the institutions and ideas of the present must have been established and current in the past; all this falls under Historical Criticism, which, on its constructive side, must avail itself of all available and well-sifted evidence, whether derived from the Old Testament or elsewhere, for its presentation of the history of Israel — its ultimate purpose. Finally, by comparing the results of this criticism as a whole, we have to determine, by observing its growth and comparing it with others, the essential character of the religion of Israel.

In brief, then, the criticism of the Old Testament seeks to discover what the words written actually meant to the writers, what the events in Hebrew history actually were, what the religion actually was; and hence its aim differs from the dog- matic or homiletic treatments of the Old Testament, which have sought to discover in Scripture a given body of dogma or incen- tives to a particular type of life or the like.

Biblical criticism, and in some respects more especially Old

Testament criticism, is, in all its branches, very largely of modern growth. This has been due in part to the removal of conditions unfavourable to the critical study of the evidence that existed, in part to the discovery in recent times of fresh evidence. The unfavourable conditions and the critical efforts which were made in spite of them can only be briefly indicated.

For a long time Biblical study lacked the first essential of sound critical method, viz. a critical text of the literature. Jewish study was exclusively based on the official Hebrew critklsau text > wm ch was fixed, probably in the 2nd century a.d., and thereafter scrupulously preserved. This text, however, had suffered certain now obvious corruptions, and, probably enough, more corruption than can now, or perhaps ever will be, detected with certainty. The position of Christian (and Jewish Alexandrian) scholars was considerably worse; for, with rare exceptions, down to the 5th century, and practically without exception between the 5th and 15th centuries, their study was exclusively based on translations. Beneath the ancient Greek version, the Septuagint, there certainly underlay an earlier form of the Hebrew text than that perpetuated by Jewish tradition, and if Christian scholars could have worked through the version to the underlying Hebrew text, they would often have come nearer to the original meaning than their Jewish contemporaries. But this they could not do; and since the version, owing to the limitations of the translators, departs widely from the sense of the original, Christian scholars were on the whole kept much farther from the original meaning than their Jewish contemporaries, who used the Hebrew text; and later, after Jewish grammatical and philological study had been stimulated by intercourse with the Arabs, the relative disad- vantages under which Christian scholarship laboured increased. Still there are not lacking in the early centuries a.d. important, if limited and imperfect, efforts in textual criticism. Origen, in his Hexapla, placed side by side the Hebrew text, the Septuagint, and certain later Greek versions, and drew attention to the variations: he thus brought together for comparison, an indispensable preliminary to criticism, the chief existing evidence to the text of the Old Testament. Unfortunately this great work proved too voluminous to be preserved entire; and in the form in which it was fragmentarily preserved, it even largely enhanced the critical task of later centuries. Jerome, perceiving the unsatisfactory position of Latin-speaking Christian scholars who studied the Old Testament at a double remove from the original — in Latin versions of the Greek — made a fresh Latin translation direct from the Hebrew text then received among the Jews. It is only in accord- ance with what

constantly recurs in the history of Biblical criticism that this effort to approximate to the truth met at first

with considerable opposition, and was for a time regarded even by Augustine as dangerous. Subsequently, however, this version of Jerome (the Vulgate) became the basis of Western Biblical scholarship. Henceforward the Western Church suffered both from the corruptions in the official Hebrew text and also from the fact that it worked from a version and not from the original, for a knowledge of Hebrew was rare indeed among Christian scholars between the time of Jerome and the 16th century.

But if the use of versions, or of an uncritical text of the original, was one condition unfavourable to criticism, another that was not less serious was the dominance over both Jews and Christians of unsound methods of interpretation — legal or dogmatic or allegorical. The influence of these can be traced as early as the Greek version (3rd century B.C. and later); alle- gorical interpretation is conspicuous in the Alexandrian Jewish scholar Philo (q.v.); it may be seen in many New Testament interpretations of the Old Testament (e.g. Gal. iii. 16, iv. 21-31), found a classical exponent in Origen, and, in spite of the opposi- tion of the school of Antioch, pre-eminently of Theodore (d. a.d. 428), maintained its power virtually unbroken down to the Reformation. It is true that even by the most thorough-going allegorists the literal sense of Scripture was not openly and entirely disregarded; but the very fact that the study of Hebrew was never more than exceptional, and so early ceased to be cultivated at all, is eloquent of indifference to the original literal sense, and the very principle of the many meanings inherent in the sacred writings was hostile to sound interpretation; greater importance was attached to the " deeper " or " hidden " senses, i.e. to the various unreal interpretations, and when the literal sense conflicted with the dogmas or tradition of the Church its validity was wholly denied.. The extraordinary ambiguity and uncertainty which allegorical interpretation tacitly ascribed to Scripture, and the ease with which heretical as well as orthodox teaching could be represented as "bidden" under the literal sense, was early perceived, but instead of this leading to any real check on even wild subjectivity in interpretation and insistence on reaching the literal sense, it created an ominous principle that maintained much of its influence long after the supremacy of allegorism was overthrown. This is the principle that all interpretation of Scripture must be according to the Regula fidei — that all interpretation which makes Scripture contradict or offend the traditions of the Church is wrong.

The spirit and the age of humanism and the Reformation effected and witnessed important developments in the study of the Old Testament. It was still long before any considerable results were achieved; but in various ways the dogmatic and traditional treatment of Scripture was undermined; the way was opened for a more real and historical method. It must suffice to refer briefly to two points. .

1. Ignorance gave place to knowledge of the languages in which the Old Testament was written. In 1506 the distinguished humanist, Johann Reuchlin, who had begun the study of Hebrew under a Jewish teacher about 1492, published a work entitled De Rudimentis Hebraicis containing a Hebrew lexicon and a Hebrew grammar. In 1504 Konrad Pellikan (Pellicanus), whose study of Hebrew had profited from intercourse with Reuchlin, had published a brief introduction to the language. In 1514 the Complutensian Polyglott began to be printed and in 1522 was published. Various Jewish, editions of the Hebrew Bible had already been printed — in part since 1477, entire since 1488; but this work contained the first Christian edition of the text. Certainly the editors did not intend hereby to exalt the original above the versions ; for they placed the Vulgate in the centre of the page with the Hebrew on one side, the Greek on the other, i.e. as they themselves explained it, the Roman Church between the synagogue and the Greek Church, as Christ crucified between two thieves. Yet even so the publication of the Hebrew text by Christian scholars marks an important stage ; henceforth the study of the original enters increasingly into Christian Biblical scholarship; it already underlay the translations which form so striking a feature of the 16th century. Luther's German version (Pentateuch, 1523) and Tyndale's English version (Penta- teuch, 1530) were both made from the Hebrew. At first, and indeed down to the middle of the 17th century, Jewish traditions and methods in the study of Hebrew dominated Christian scholars; but in the 17th and 18th centuries the study of other Semitic lan- guages opened up that comparative linguistic study which was systematized and brought nearer to perfection in the 19th century

(which also witnessed the opening up of the new study of Assyrian) by scholars such as Gesenius, Ewald, Olshausen, Renan, Noldeke, Stade and Driver. This has done much to render possible a more

critical interpretation of the Old Testament.

2. An increasing stress was laid on the literal sense of Scripture. The leading Reformers — Luther, Zwingli, Melancthon — frequently expressed themselves against the prevailing view of the manifold sense of Scripture, and in particular questioned the legitimacy of allegorical interpretation — except for purposes of popular and practical exposition. The effort to get at and abide by the literal sense is characteristic of Calvin's extensive exegetical works. True, practice did not always keep pace with theory, and the literal sense had to yield if it came into conflict with the " Faith ": the allegorical method for long obscured the meaning of the Song of Songs, and any departure from it was severely condemned ; just as Theodore of Mopsuestia drew down on himself for maintaining the literal sense of the Song the condemnation of the Second Council of Con- stantinople (a.d. 553), so Sebastian Castellio owed (in part) to the same indiscretion his expulsion from Geneva in 1544. Even in the 1 6th and 17th centuries scholars like Grotius and Michaelis met with violent opposition for the same cause.

But, however slowly and irregularly, the new conditions and the new spirit affected the study of the Old Testament. It became subject to the same critical methods which since the Renaissance have been applied to other ancient literatures. Biblical criticism is part of a wider critical movement, but it is noticeable how, from stage to stage, Biblical scholars adopted the various critical methods which as applied to other literatures have been proved valid, rather than themselves initiated them. The textual criticism of the classical literatures made way before the textual criticism of the Old Testament: Bentley's Phalaris (1699) preceded any thorough or systematic application of Higher Criticism to any part of the Old Testament; Niebuhr's History of Rome (181 1) preceded Ewald's History of Israel (1843- 1859).

The fundamental principles of the Textual Criticism of the Old Testament are the same as those which apply to any other Conditions ancient text and need not be described here (see the of Textual article Textual Criticism) . There are also, however, criticism certain conditions peculiar to the text of the Old Rib/ " Testament. The significance of these and the extent to which they must govern the application of the general principles have even yet scarcely obtained full and general recognition. These, then, must be briefly described.

The earliest Hebrew MSS. of the Old Testament date from not earlier than the 9th century a.d., or nearly one thousand years after the

latest parts of the Old Testament were written. These MSS., and the Hebrew Bibles as usually printed, contain in reality two perfectly distinct texts— the work of two different ages separated from one another by centuries: the one is a text of the Old Testament itself, the other a text of a later Jewish interpretation of the Old Testament. The text of the Old Testament consists of consonants only, for the alphabet of the ancient Hebrews, like that of their Moabite, Aramaean and Phoenician neighbours, contained no vowels; the text of the interpretation consists of vowels and accents only — for vowel signs and accents had been invented by Jewish scholars between the 5th and 9th centuries a.d.; the text of the Old Testament is complete in itself and intelligible, though ambiguous; but the text of the interpretation read by itself is unintelligible, and only becomes intelligible when read with the consonants (under, over, or in which they are inserted) of the text of the Old Testa- ment. But the fact that the later text makes use of the earlier to make itself intelligible in no way destroys the fact that it is as entirely distinct a work from the earlier as is any commentary distinct from the work on which it comments. The first task of Old Testament textual criticism after the Reformation was to prove the independence of these two texts, to gain general recognition of the fact that vowels and accents formed no part of the original Hebrew text of the Old Testament. The conflict that arose over this question in the Christian Church was pro- longed and bitter— in part because it unfortunately became inflamed by the contending interests of Roman Catholic and Protestant. The coeval origin of consonants and vowels had indeed been questioned or denied by the earliest reformers (Luther, Zwingli, Calvin), but later, in the period of Protestant scholasticism and under the influence of one school of Jewish Rabbis, Protestant scholars in particular, and especially those of the Swiss school, notably the Buxtorfs, had committed

themselves to the view that the vowels formed an integral and original part of the text of the Old Testament; and this they maintained with all the more fervency because the ambiguity of the consonants without the vowels was a troublesome fact in the way of the extreme Protestant doctrine of the inspiration, verbal infallibility and sufficiency of Scripture, while it was by no means unwelcome to Catholic theologians with their doctrine of the need for an authoritative interpretation. Still in the end it was due in large measure to the learning and argu- mentative power devoted to this subject by the French Protestant scholar, Louis Capell, and, amongst others, by the English Protestant scholar, Brian Walton, that by the end of the 17th century this particular controversy was practically at

an end; criticism had triumphed, and the later origin of the vowels was admitted. Yet, as often happens, the influence of tradition lingered long after it had been proved to be false; thus the R.V., instead of being an independent translation of the Hebrew text, is intended (with rare exceptions, as e.g. in Is. lix. 19, where R.V. translates the Hebrew text and R.V. margin the Jewish interpretation) to be merely a translation of the Jewish interpretation; and to the present day it is usual, though obviously uncritical and wrong, to describe perfectly legitimate translations of the received consonantal text, if they happen to presuppose other vowels than those provided by Jewish tradition, as based on emendation; even in the English edition of Haupt's Sacred Books of the Old Testament (see below) the possi- bility of this unfortunate misunderstanding is not altogether removed.

But the original text of the Old Testament long before it was combined with the text of the Jewish or Massoretic interpretation had already undergone a somewhat similar change, the extent of which was indeed far less, but also less clearly discoverable. This change consisted in the insertion into the original text of certain consonants which had come to be also used to express vowel sounds : e.g. the Hebrew consonant corresponding to w also expressed the vowel or u, the consonant h the vowel a, and so forth. For reasons suggested partly by the study of Semitic inscriptions, partly by comparison of passages occurring twice within the Old Testament, and partly by a comparison of the Hebrew text with the Septuagint, it is clear that the authors of the Old Testament (or at least most of them) themselves made some use of these vowel consonants, but that in a great number of cases the vowel consonants that stand in our present text were inserted by transcribers and editors of the texts. Again, and for similar reasons, it is probable that in many cases, if not in all, the original texts were written without any clear division of the consonants into words. In view of all this, the first requisite for a critical treatment of the text of the Old Testament is to consider the consonants by themselves, to treat every vowel-consonant as possibly not original, and the existing divisions of the text into words as original only in those cases where they yield a sense better than any other possible division (or, at least, as good). Certainly all this brings us face to face with much ambiguity and demands increased skill in interpreta- tion, but anything short of it falls short also of strict critical method. A perception of this has only been gradually reached, and is even now none too general.

Apart from these changes in the history of the text, it has, like all ancient texts, suffered from accidents of transmission, from the

unintentional mistakes of copyists. This fact was, naturally enough and under the same dogmatic stress, denied by those scholars who maintained that the vowels were an integral part of the text. Here again we may single out Capellus as a pioneer in criticism, in his Critica sacra sive de variis quae in sacris V. T. libris occurrunt lectionibus, written in 1634, much studied in MS. by scholars before its publication in 1650, and unavailingly criticized by Buxtorf the younger in his Anticritica seu vindiciae veritatis hebraicae (1653). Capellus drew conclusions from such important facts as the occurrence of variations in the two Hebrew texts of passages found twice in the Old Testa- ment itself, and the variations brought to light by a comparison of the Jewish and Samaritan texts of the Pentateuch, the Hebrew

text and the Septuagint, the Hebrew text and New Testament quotations from the Old Testament.

In order that the principles already perceived by Capellus might be satisfactorily applied in establishing a critical text, many things were needed; for example, a complete collation of existing MSS. of the Jewish text and of the Samaritan text of the Pentateuch, the establishing of a critical text of the Septua- gint, a careful study of the several versions directed to determin- ing when real variants are implied and what they are. Some of this work has been accomplished: much of it remains to be done.

The Hebrew MSS. were collated by Kennicott and de Rossi at the close of the 18th century, with sufficient thoroughness to justify the important conclusion that all existing MSS. reproduce a single recension. The Samaritan MSS. are still very imperfectly collated; the same is true of the Syriac and other versions except the Septuagint. In regard to the Septua- gint, though the work is by no means complete, much has been done. For collection of material the edition of Holmes and Parsons (Oxford, 1 798-1827), with its magnificent critical apparatus, is pre-eminent; the preparation of a similar edition, on a rather smaller scale but embodying the results of fresh and more careful collation, was subsequently undertaken by Cam- bridge scholars. 1 These editions furnish the material, but neither attempts the actual construction of a critical text of the

version. Some important contributions towards a right critical method of using the material collected have been made — in particular by Lagarde, who has also opened up a valuable line of critical work, along which much remains to be done, by his restoration of the Lucianic recension, one of the three great recensions of the Greek text of the Old Testament which obtained currency at the close of the 3rd and beginning of the 4th centuries a.d.

More especially since the time of Capellus the value of the Septuagint for correcting the Hebrew text has been recognized; but it has often been used uncritically, and the correctness of the Hebrew text underlying it in comparison with the text of the Hebrew MSS., though still perhaps most generally under- estimated, has certainly at times been exaggerated.

It has only been possible here to indicate in the briefest way what is involved in the collection and critical sifting of the extant evidence for the text of the Old Testament, Criticism. now mucn of the work has been done and how much remains; and with equal brevity it must suffice to indicate the position which faces the textual critic when all that can be done in this way has been done. In so far as it is possible to recover the Hebrew text from which the Greek version was made, it is possible to recover a form of the Hebrew text current about 280 B.C. in the case of the Pentateuch, some time before 100 B.C. in the case of most of the rest of the Old Testament. By comparison of the Hebrew MSS. it is not difficult to recover the recension which with few and unimportant variants they have perpetuated, and which may safely be regarded as differing but slightly from the text current and offici- ally established before the end of the 2nd century a.d. By a comparison of these two lines of evidence we can approximate to a text current about 300 B.C. or later; but for any errors which had entered into the common source of these two forms of the text we possess no documentary means of detection whatsoever. The case then stands thus. Except by the obviously absurd assumption of the infallibility of copyists for the centuries before c. 300 B.C., we cannot escape the conclusion that errors lurk even where no variants now exist, and that such errors can be corrected, if at all, only by conjectural emendation. The dangers of conjectural emendation are well known and apparent; large numbers of such emendations have been ill-advised; but in the case of many passages the only alternative for the textual critic who is at once competent and honest is to offer such emendations or to indicate that such passages are corrupt and the means of restoring them lacking.

Conjectural emendations were offered by Capellus in the 17 th, and by scholars such as C. F. Houbigant, Archbishop

1 The Old Testament in Greek, by A. E. Brooke and N. McLean, vol. i. pt. 1 (1906).

Seeker, Bishop Lowth and J. D. Michaelis in the 18th century. Some of these have approved themselves to successive genera- tions of scholars, who have also added largely to the store of such suggestions; conjectural emendation has been carried furthest by upholders of particular metrical theories (such as Bickell and Duhm) which do not accommodate themselves well to the existing text, and by T. K. Cheyne (in Critica Biblica, 1903), whose restorations resting on a dubious theory of Hebrew history have met with little approval, though his negative criticism of the text is often keen and suggestive.

A model of the application of the various resources of Old Testament textual criticism to the restoration of the text is C. H. Cornill's Das Buck des Propheten Ezechiel (1886) : outstand- ing examples of important systematic critical notes are J. Well- hausen's Der Text der Bilcher Samuelis (1871) and S. R. Driver's Notes on the Hebrew Text of the Books of Samuel (1890). Haupt's Sacred Books of the Old Testament, edited by various scholars, was designed to present, when complete, a critical text of the entire Old Testament with critical notes. The results of textual criticism, including a considerable number of conjectural emend- ations, are succinctly presented in Kittel's Biblia Hebraica (1906); but the text here printed is the ordinary Massoretic (vocalized) text. The valuable editions of the Old Testament by Baer and Delitzsch, and by Ginsburg, contain critical texts of the Jewish interpretation of Scripture, and therefore neces- sarily uncritical texts of the Hebrew Old Testament itself: it lies entirely outside their scope to give or even to consider the evidence which exists for correcting the obvious errors in the text of the Old Testament as received and perpetuated by the Jewish interpreters. See also the authorities mentioned in the following section. (G. B. G.)*

4. Higher Criticism.

We now pass on to consider the growth of literary and his- toric criticism, which constitute the Higher Criticism as already explained. Down to the Reformation conditions were un- favourable to such criticism; the prevailing dogmatic use of Scripture gave no occasion for inquiry into the human origins or into the real purport and

character of the several books. Nevertheless we find some sporadic and tentative critical efforts or questions. The most remarkable of these was made outside the Church — a significant indication of the adverse effect of the conditions within; the Neo-platonist philosopher Porphyry 2 in the 3rd century a.d., untrammelled by church tradition and methods, anticipated one of the clearest and most important conclusions of modern criticism: he detected the incorrectness of the traditional ascription of Daniel to the Jewish captivity in Babylon and discerned that the real period of its composition was that of Antiochus Epiphanes, four centuries later. In the mind even of Augustine (Locutio in Jos. vi. 25) questions were raised by the occurrence of the formula " until this day " in Jos. iv. 9, but were stilled by a rather clever though wrong use of Jos. vi. 25; Abelard (Heloissae Problema, xli.) considers the problem whether the narrative of Moses's death in Deut. contains a prophecy by Moses or is the work of another and later writer, while the Jewish scholar Ibn Ezra (Abenezra), in a cryptic note on Deut. i. 1, which has been often quoted of late years, gathers together several indications that point, as he appears to perceive, to the post-Mosaic origin of the Pentateuch. Even rarer than these rare perceptions of the evidence of the quasi-historical books to their origin are such half-perceptions of the literary origin of the prophetical books as is betrayed by Ibn Ezra, who appears to question the Isaianic authorship of Is. xl.lxvi., and by Photius, patriarch of Constantinople in the 9th century, who, according to Diestel (Gesch. des A. T., 169), raises the ques tion why the sixth chapter of Isaiah, containing the inaugural vision, does not stand at the beginning of the book.

Even after the Renaissance and the Reformation tradition continued influential. For though the Reformers were critical of the authority of ecclesiastical tradition in the matter of

2 His arguments are stated briefly (and in order to be refuted) by Jerome in his commentary on Daniel.

the interpretation and use of Scripture, they were not im- mediately interested in literary and historical criticism, nor con- cerned to challenge the whole body of traditional lore Reformers. on these matters. At the same time we can see from Luther's attitude how the

doctrine of the Reformers (unlike that of the Protestant scholastics who came later) admitted considerable freedom, in particular with reference to the extent of the canon, but also to several questions of higher criticism. Thus it is to Luther a matter of indifference whether or not Moses wrote the Pentateuch; the books of Chronicles he definitely pronounces less credible than those of Kings, and he considers that the books of Isaiah, Jeremiah and Hosea probably owe their present form to later hands. Carlstadt again definitely denied the Mosaic authorship of the Pentateuch on the ground that Moses could not have written the account of his own death and yet that Deut. xxxiv. cannot be separated from the rest of the Pentateuch. The later scholastic Protestant doctrine of verbal infallibility necessarily encouraged critical reaction and proved a widely extended retarding force far down into the 19th century. Nevertheless criticism advanced by slow degrees among individuals, now in the Roman Church, now in the number of those who sat loosely to the restrictions of either Roman or Protestant authority, and now among Protestant scholars and theologians.

It would be impossible to refer here even briefly to all these, and it may be more useful to select for somewhat full description,

u •.„ as showing what could be achieved by, and what Hoboes. ,. . . ° , ..,..-“., ,*

limitations beset, even a critical spirit in the 17th

century, the survey of the origin of the Old Testament given

by one such individual — Thomas Hobbes in his Leviathan 1

(published 1651) c. xxxiii. As far as possible this survey shall

be cited verbatim: — •

” Who were the original writers of the several books of Holy Scripture has not been made evident by any sufficient testimony of other history, which is the only proof of matter of fact; nor can be, by any argument of natural reason: for reason serves only to convince the truth, not of fact, but of consequence. The light therefore that must guide us in this question, must be that which is held out unto us from the books themselves: and this light, though it shew us not the author of every book, yet it is not unuseful to give us knowledge of the time wherein they were written.”

” And first, for the Pentateuch. . . . We read (Deut. xxxiv. 6)

concerning the sepulchre of Moses ‘ that no man knoweth of his sepulchre to this day ‘ ; that is, to the day wherein those words were written. It is therefore manifest that these words were written after his interment. For it were a strange interpretation to say Moses spake of his own sepulchre, though by prophecy, that it was not found to that day wherein he was yet living.” The suggestion that the last chapter only, not the whole Pentateuch, was written later, is met by Hobbes by reference to Gen. xii. 6 (” the Canaanite was then in the land “) and Num. xxi. 14 (citation from a book relating the acts of Moses at the Red Sea and in Moab) and the con- clusion reached that ” the five books of Moses were written after his time, though how long after is not so manifest.”

” But though Moses did not compile those books entirely, and in the form we have them, yet he wrote all that which he is there said to have written: as, for example, the volume of the Law ” contained ” as it seemeth ” in Deut. xi.-xxvii, ” and this is that Law which . . . having been lost, was long time after found again by Hilkiah and sent to King Josias (2 Kings xxii. 8).”

The books of Joshua, Judges, Ruth, Samuel are proved much later than the times recorded in them by the numerous passages which speak of customs, conditions, &c, remaining ” unto this day,” and Judges in particular by xviii. 30, ” where it said that ‘ Jonathan and his sons were priests to the tribe of Dan, until the day of the captivity of the land.’ ”

As for Kings and Chronicles, ” besides the places which mention such monuments as, the writer saith, remained till his own days ” (Hobbes here cites thirteen from Kings, two from Chron.), ” it is argument sufficient that they were written after the captivity in Babylon, that the history of them is continued till that time. For the facts registered are always more ancient than the register; and much more ancient than such books as make mention of and quote the register, as these books do in divers places.”

Ezra and Nehemiah were written after, Esther during, or after, the captivity : Job, which is not a history but a philosophical poem, at an uncertain date. The Psalms were written mostly by David, but ” some ol them after the return from the captivity, as the 137th

1 In what follows the actual quotations are from his English work; some of the summaries take account of the brief expansions in his later Latin version.

and 126th, whereby it is manifest that the psalter was compiled and put into the form it now hath, after the return of the Jews from Babylon." The compilation of Proverbs is later than any of those whose proverbs are therein contained ; but Ecclesiastes and Canticles are wholly Solomon's except the titles. There is little noticeable in Hobbes' dating of the prophets, though he considers it " not apparent " whether Amos wrote, as well as composed, his prophecy, or whether Jeremiah and the other prophets of the time of Josiah and Ezekiel, Daniel, Haggai and Zechariah, who lived in the cap- tivity, edited the prophecies ascribed to them. He concludes: "But considering the inscriptions, or titles of their books, it is manifest enough that the whole Scripture of the Old Testament was set forth in the form we have it after the return of the Jews from their cap- tivity in Babylon and before the time of Ptolemaeus Philadelphus."

Except in strangely making Zephaniah contemporary with Isaiah, Hobbes' conclusions, in so far as they differ from the traditional views, have been confirmed by the more thorough criticism of subsequent scholars. But apart from the special conclusions, the opening and closing considerations contain clear and important statements which still hold good. No fresh discoveries since the time of Hobbes have furnished any " testi- mony of other history " to the origin of the books of the Old Testament: this must still be determined by the statements and internal evidence of the Old Testament itself, and a deeper criticism has given to the final consideration that the Old Testament received its present form after the Exile a far greater significance than Hobbes perhaps guessed.

But the limitations of Hobbes' literary criticism judged from our present standpoint are great. The considerations from which he acutely and accurately draws far-reaching and im- portant conclusions might be suggested by a very superficial examination of the literature; they involve, for example, no special philological knowledge. The effect of a deeper criticism has been (a) to give a more powerful support to some of Hobbes' conclusions; (b) to show that works {e.g. Ecclesiastes) whose traditional antiquity is left unquestioned by him are in reality of far more recent origin; (e) to eliminate the earlier sources or elements in the writings which Hobbes was content to date mainly or as a whole by their latest elements (e.g. Pentateuch, Judges, Kings), and thus to give to these earlier sources an historical value higher than that which would be safely attri- buted to them as indistinguishable parts of a late compilation.

Hobbes argues in the case of the Pentateuch that two authors are

distinguishable — Moses and a much later compiler and editor. Spinoza, whose conclusions in his Tractatus theologico- poliiicus (1671), c. viii. ix., had in general much in common with Hobbes, drew attention in particular to the confused mixture of law and narrative in the Pentateuch, the occurrence of duplicate narratives and chronological incongruities. Father Simon in his Histoire critique du Vieux Testament (1682) also argues that the Pentateuch is the work of more than one author, and makes an important advance towards a systematic analysis of the separate elements by observing that the style varies, being sometimes very curt and sometimes very copious " al- though the variety of the matter does not require it." But none of these makes any attempt to carry through a continuous analysis.

The first attempt of this kind is that of a French Catholic physician, Jean Astruc. In a work published anonymously in 1753 under the title of Conjectures sur les memoir es . originaux dont il paroit que Moyse s'est servi pour composer le livre de la Genese, he argued that in Genesis and Ex. i. ii. Moses had used different documents, and that of these the two chief were distinguished by their use of different divine names — Elohim and Yahweh; by the use of this clue he gave a detailed analysis of the passages belonging to the several documents. Astruc's criteria were too slight to give to all the details of his analysis anything approaching a final analysis; but later criticism has shown that his criteria, so far as they went, were valid, and his results, broadly speaking, sound though incomplete: and, moreover, they have abundantly justified his really important fundamental theory that the documents used by the compiler of the Pentateuch have been incorporated so much as they lay before him that we can get

behind the compiler to the earlier sources and thus push back the evidence of much of the Pentateuch beyond the date of its compilation to the earlier date of the sources. In identifying the compiler with Moses, Astruc failed to profit from some of his predecessors: and the fact that he held to the traditional (Mosaic) origin of the Pentateuch may have prevented him from seeing the similar facts which would have led him to continue his analysis into the remaining books of the Pentateuch.

For subsequent developments, and the fruitful results of documentary analysis as applied to the Pentateuch and other composite books, which cannot be dealt with in any detail here, reference must be made to the special articles on the books of the Old Testament.

The year of the publication of Astruc's book saw also the publication of Bishop Lowth's De sacra poesi Hebraeorum : later Lowth Lowth published a new translation of Isaiah with notes (1778). Lowth's contribution to a more critical appreciation of the Old Testament lies in his perception of the nature and significance of parallelism in Hebrew poetry, in his discernment of the extent to which the prophetical books are poetical in form, and in his treatment of the Old Testament as the expression of the thought and emotions of a people — in a word, as literature. Both Lowth's works were translated and became influential in Germany.

In spite of these earlier achievements, it is J. G. Eichhorn who has, not without reason, been termed the " founder of modern Eichhorn. Old Testament criticism." Certainly the publication of his Einleitung {Introduction to the Old Testament), in 1 780-1 783, is a landmark in the history of Old Testament criticism. An intimate friend of Herder, himself keenly interested in literature, he naturally enough treats the Old Testament as literature — like Lowth, but more thoroughly: and, as an Oriental scholar, he treats it as an Oriental literature. In both respects he was to be widely followed. His Introduction, con- sisting of three closely packed volumes dealing with textual as well as literary criticism, is the first comprehensive treatment of the entire Old Testament as literature. Much of the voluminous detailed work in this and other works is naturally enough provisional, but in the Introduction there emerge most of the broad conclusions of literary criticism (sometimes incomplete) which, after more than a century of keen examination by scholars unwilling to admit them, have passed by more or less general consent into the number of historical certainties or high proba- bilities. With his wide linguistic knowledge Eichhorn perceived that the language alone (though he also adduces other considera- tions) betrays the late origin of Ecclesiastes, which he places in the Persian Period (538-332 B.C.): Canticles, too, preserves linguistic features which are not of the Solomonic age. He analyses significant stylistic peculiarities such as occur, e.g., in Isaiah xxiv.-xxvii. For various reasons (here following Koppe, who just previously in additions to his translation of Lowth's Isaiah had shown himself the pioneer of the higher criticism of the book of Isaiah) he argues that " in our Isaiah are many oracles not the work of this prophet." In other directions the still powerful influence of tradition affects Eichhorn.

He maintains the exilic origin of parts of Daniel, though he is convinced (here again in part by language) of the later origin of other parts. His Pentateuchal criticism is limited by the tradition of Mosaic authorship: but even within these limits he achieves much. He carries through, as Astruc had done, the analysis of Genesis into (primarily) two documents; he draws the distinction between the Priests' Code, of the middle books of the Pentateuch, and Deuteronomy, the people's law book; and admits that even the books that follow Genesis consist of different documents, many incomplete and fragmentary (whence the theory became known as the " Fragment-hypothesis "), but all the work of Moses and some of his contemporaries.

Other literary critics of the same period or a little later are Alex. Geddes, a Scottish Catholic priest, who projected, and in part carried out (1792-1800), a critically annotated new transla- tion of the Old Testament, and argued therein that the Pentateuch ultimately rests on a variety of sources partly written, partly

oral, but was compiled in Canaan probably in the reign of Solomon; K. D. Ilgen, the discoverer (1798) that there were two distinct documents in Genesis using the divine name Elohim, and consequently that there were three main sources in the books, not two, as Astruc and Eichhorn had conjectured; and J. S. Vater, the elaborator of the " Fragment-hypothesis."

But the next distinct stage is reached when we come to De Wette, whose contributions to Biblical learning were many and varied, but who was pre-eminent in historical criticism. _ w e tte He carried criticism beyond literary analysis and literary appreciation to the task of determining the worth of the documents as records, the validity of the evidence. His peculiar qualities were conspicuous in his early and exceedingly influential work — the Beitrage zur Einleitung in das Alte Testament (1806- 1807). In the introduction to vol. ii. he carefully analyses the principles of sound historical method and the essentials of a trustworthy historical record. These principles he applied to the Old Testament, firstly to the Books of Chronicles, and then to the Pentateuch. The untrustworthiness of Chronicles — briefly admitted by Luther — he proved in detail, and so cleared the way for that truer view of the history and religion of Israel which the treatment of Chronicles as a trustworthy record of the past hopelessly obscured. In the criticism of the Pentateuch his most influential and enduring contributions to criticism are his proof that Deuteronomy is a work of the 7th century B.C., and his insistence that the theory of the Mosaic origin of all the institutions

described in the Pentateuch is incompatible with the history of Israel as described in the historical books, Judges, Samuel and Kings.

Strong in historical criticism, De Wette was weak in historical construction. But what he failed to give, Ewald supplied, and if more of De Wette's than of Ewald's work still stands Bwaid to-day, that is but an illustration of the melancholy fact that in history negative criticism is surer than positive construction. But Ewald's History of the People of Israel (1843- 1859) was the first great attempt to synthesize the results of criticism and to present the history of Israel as a great reality of the past. By the force of his wide learning and even more of his personality, Ewald exercised for long an all-pervading and almost irresistible influence. He closes one epoch of Old Testa- ment criticism; by his influence he retards the development of the next. Before passing to the new epoch it must suffice to make a simple reference to the philological work of Gesenius and Ewald, which assisted a sounder exegesis and so secured for later criticism a more stable basis.

The next stage brings us to the critical theories or conclusions which at first gradually and then rapidly, in spite of the keenest criticisms directed against them both by those who clung more or less completely to tradition and by the geuss. representatives of the earlier critical school, gained increasing acceptance, until to-day they dominate Old Testament study. The historico-critical starting-point of the movement was really furnished by De Wette: but it was Vatke who, in his Biblische Theologie wissenschaftlich dargestellt (1835), first brought out its essential character. The fundamental peculiarity of the movement lies in the fact that it is a criticism of what is supreme in Israel — its religion, and that it has rendered possible a true appreciation of this by showing that, like all living and life-giving systems of thought, belief and practice, the religion of Israel was subject to development. It seized on the prophetic element, and not the ceremonial, as containing what is essential and unique in the religion of Israel. In literary criticism its fundamental thesis, stated independently of Vatke and in the same year by George in Die dlteren jildischen Fesle, and in a measure anticipated by Reuss, who in 1832 was maintaining in his academical lectures that the prophets were older than the Law and the Psalms more recent than both, is that the chronor logical order of the three main sources of the Hexateuch is (1) the prophetic narratives (JE), (2) Deuteronomy, (3) the Priestly Code (P), the last being post-exilic. This entirely reversed the prevailing view that P with its exact details and developed ceremonial and sacerdotal system was at once the earliest portion

of the Pentateuch and the Grundschrift or foundation of the whole — a view that was maintained by Ewald and, though with very important modifications, to the last by A. Dillmann (d. 1804). Inherent in this view of religious development and the new critical position were far-reaching changes in the literary, historical and religious criticism of the Old Testament: these have been gradually rendered clear as the fundamental positions on which they rest have been secured by the manifold work of two generations of scholars.

Nearly a generation passed before Vatke's point of view gained any considerable number of adherents. This is significant. In part it may fairly be attributed to the retarding influence of the school of Ewald, but in large part also to the fact that Vatke, a pupil of Hegel, had developed his theory on a priori grounds in accordance with the principles of Hegel's philosophy of history. It was only after a fresh and keener observation of facts that the new theory made rapid progress. For that, when it came, much was due to the work of Graf (a pupil of Reuss, whose Geschichtliche Bttcher des Alten Testaments appeared in 1866); to the Dutch scholar Kuenen, who, starting from the earlier criticism, came over to the new, made it the basis of his Religion of Israel (1869- 1870), a masterly work and a model of sound method, and continued to support it by a long series of critical essays in the Theologisch Tijdschrift; and to Wellhausen, who displayed an unrivalled combination of grasp of details and power of historical construction: his Prolegomena zur Geschichte Israels was published in 1878 and translated into English in 1885; the history itself, I sraelitische u. jiidische Geschichte, followed twenty years later, after much further critical work had been done in the meantime. Not a little also was due to Colenso {The Penta- teuch . . . critically examined, pt. i., 1862), who, though he never entirely accepted the new position, contributed by his searching analysis of the unreality of P's narrative to the forma- tion (for example, in the mind of Kuenen) or ratification of the judgment on that work which is fundamental to the general theory.

This sketch of the critical movement has now been brought down to the point at which the comprehensive conclusions which still

dominate Old Testament study gained clear ex- pression and were shown to be drawn from the observation of a large body of facts. It does not fall within the scope of this article to examine the validity of these conclusions, nor even to notice the various subsidiary or consequential con- clusions. Nor again is it possible to survey the more special developments of literary criticism which have later emerged, amongst which one of the most important has been the radical examination of the prophetic writings introduced and developed by (amongst others) Stade, Wellhausen, Duhm, Cheyne, Marti. 1 The starting-point of this newer criticism of the prophets is the clearer practical recognition of the fact that all pre-exilic prophecy has come down to us in the works of post-exilic editors, and that for the old statement of the problem of the prophetic books — What prophecies or elements in Isaiah, Jeremiah and the rest are later than these prophets? — is to be substituted the new critical question — From these post-exilic collections how are the pre-exilic elements to be extracted ? Bound up with this question of literary criticism is the very important question of the origin and development of the Messianic idea.

But two things, the extent of the influence of criticism and the relation of archaeology and criticism, yet remain for con- sideration, in the course of which it will be possible just to in- dicate some other problems awaiting solution.

It is one thing for scholars to reach conclusions: it is another for these conclusions to exercise a wide influence in the Churches and over general culture. In the 16th century we find obiter

1 See particularly B. Stade, Geschichte des Volkes Israel (1887-1888); J. Wellhausen, Die Kleinen Propheten (1892); B. I. Duhm, Jesaia (1892); T. K. Cheyne, Introduction to the Book of Isaiah (1895); K. Marti, Jesaja (1900), and Das Dodehapropheton

(1904).

dicta of the Reformers challenging traditional opinions on the origin and character of the Old Testament; in the 17th century, among certain isolated scholars, elementary critical surveys of the whole field, which exercised, however, no f Q.ˆ, e extensive influence. Nor was it till late in the 18th cen- cism. tury that criticism seriously challenged the dominance of the Protestant scholastic treatment of the Old Testament on the one hand, and the rough and ready, uncritical explanations or depreciations of the Rationalists on the other. But Eichhorn's Introduction appealed to more than technical

scholars: its in- fluence was great, and from that time forward criticism gradually or even rapidly extended its sway in Germany. Very different was the case in England; after Geddes and Lowth, at the close of the 18th, till far down into the 19th century, the attitude even of scholars (with rare exceptions) was hostile to critical developments, and no independent critical work was done. Pusey indeed studied under Eichhorn, and in his Historical Enquiry into the probable causes of the Rationalist Character lately predominant in German Theology (1828-1830) speaks sympathetically of the attitude of the Reformers on the question of Scripture and in condemna- tion of the later Protestant scholastic doctrine; but even in this book he shows no receptivity for any of the actual critical con- clusions of Eichhorn and his successors, and subsequently threw the weight of his learning against critical conclusions — notably in his Commentary on Daniel (1864). Dean Stanley owed some- thing to Ewald and spoke warmly of him, but the Preface to the History of the Jewish Church in which he does so bears eloquent testimony to the general attitude towards Old Testa- ment criticism in 1862, of which we have further proof in the almost unanimous disapprobation and far-spread horror with which Colenso 's Pentateuch, pt. i., was met on its publication in the same year.

From 1869 T. K. Cheyne worked indefatigably as a resource- ful pioneer, but for many years, in view of the prevailing temper, with " extreme self-suppression " and " willingness to concede to tradition all that could with any plausibility be conceded " (Cheyne, Origin of the Psalter, p. 15); more especially is his influence observable after 1890, when he published his Bampton Lectures, the Origin of the Psalter, a work of vast learning and keen penetration, without restraint on the freedom of his judg- ment — always stimulating to students and fellow-workers, though by no means always carrying large numbers with him. From about 1880 the prevailing temper had changed; within a decade of this date the change had become great; since then the influence of Old Testament criticism has grown with increased acceleration. The change in the former period with regard to a single point, which is however typical of many, is briefly summed up by Dr Cheyne: " In 1880 it was still a heresy to accept with all its consequences the plurality of authorship of the Book of Isaiah; in 1890 to a growing school of church- students this has become an indubitable fact " (Origin of the Psalter, xv.). By 1906 this plurality of authorship had become almost a commonplace of the market. Many, particularly of late, have contributed to the wide distribution, if not of the critical spirit itself, yet at least of a knowledge of its conclusions. To two only of the most influential is it

possible to make more definite reference — to W. Robertson Smith and S. R. Driver. From 1875 onwards Smith contributed to the 9th edition of the Encyclopaedia Britannica a long series of important articles, which, together with the articles of Cheyne, Wellhausen and others, made that work an important factor in the change which was to pass over English thought in regard to the Bible; in 1878, by his pleadings in the trial for heresy brought against him on the ground of these articles, he turned a personal defeat in the immediate issue into a notable victory for the cause which led to his condemnation; and subsequently (in 1880), in two series of lectures, afterwards published 2 and widely read, he gave a brilliant, and, as it proved, to a rapidly increasing number a convincing exposition of the criticism of the literature, history and religion of Israel, which was already represented in Germany

2 The Old Testament in the Jewish Church (1881); The Prophets of Israel (1882).

by Wellhausen and in Holland by Kuenen. In 189 1 Dr Driver published his Introduction to the Literature of the Old Testament (6th ed., 1897); less popular in form than Smith's lectures, it was a more systematic and comprehensive survey of the whole field of the literary criticism of the Old Testament. The position of the author as regius professor of Hebrew at Oxford and canon of Christ Church in succession to Pusey, and his well- established reputation as a profound Hebrew scholar, com- manded wide attention; the qualities of the book itself — its marked sobriety, its careful discrimination between the differing degrees of probability attaching to various conclusions and suggestions, and in general its soundness of method — rapidly extended the understanding of what Old Testament criticism is and commanded acceptance of the well-established conclusions.

No less rapid has been the change in America during the same period, nor less numerous the scholars well equipped to pursue the detailed investigation involved in critical study or those who have shown ability in popular presentations of the critical standpoint. 1 Pre-eminent amongst these is C. A. Briggs, whose influence has been due in part to a large and varied body of work (Biblical Study, 1883,

and many articles and volumes since) and in part to his organization of united critical, inter- national and interconfessional labour, the chief fruits of which have been the Hebrew Lexicon (based on Gesenius, and edited by F. Brown, one of the most eminent of American scholars, S. R. Driver and himself), and the International Critical Com- mentary. Other important works in which English and American scholars have co-operated are the Encyclopaedia Biblica (1899- 1903) and Hastings' Bible Dictionary (1898-1904) — the latter less radical, but yet on the whole based on acceptance of the funda- mental positions of Vatke, Graf, Wellhausen. Between either of these and Smith's Dictionary of the Bible (1863) yawns a great gulf. Space forbids any attempt to sketch here the special growth of criticism in other countries, such as France, where the brilliant genius of Renan was in part devoted to the Old Testament, or within the Roman Catholic Church, which pos- sesses in Pere Lagrange, for example, a deservedly influential critical scholar, and in the Revue Biblique an organ which devotes much attention to the critical study of the Old Testament.

Rapid and extensive as has been the spread of critical methods, there have not been lacking anticrilica. Many of these have been not only apologetic, but unscholarly; that is, however, not the case with all. In Dr James Orr's learned work, The Problem of the Old Testament considered with reference to Recent Criticism (1906), the author's chief aim is to prove insecure the fundamental positions of the now dominant school of criticism.

In view of extensive misconception occasioned by many of these anticrilica, it.needs to be pointed out that terms like " criticism," " higher criticism," " critics " are often loosely used: criticism is a method, its results are many. Again, many of the results or conclusions of criticism are mutually independent, while others are interrelated and depend for their validity on the validity of others. For example, among the generally or largely accepted critical conclusions are these: (1) Moses is not the author of the whole Pentateuch; (2) Isaiah is not the author of Is. xl.-lxvi.; (3) the book of Daniel was written in the 2nd century B.C.; (4) the Priestly Code is post-exilic; (5) most of the Psalms are post-exilic. Now 1, 2, 3 are absolutely independent — if 1 were proved false, 2 and 3 would still stand; and so with 2 and 3; so also 2 and 3 could be proved false without in any way affecting the validity of 4. On the other hand, if 1 were disproved, 4 would immediately fall through, and the strength of 5 would be weakened (as it would also by the disproof of 2), because the argument for the date of many Psalms is derived from religious ideas and the significance of these varies greatly according

as the Priestly Code is held to be early or late. In view of the number of critical conclusions and the mutual independence of many of them, " higher criticism "

1 For details see an article in the Zeitschr. fitr d. alttest. Wissenschaft for 1889, pp. 246-302, on " Alttestamentliche Studien in Amerika," by G. F. Moore, who has himself since done much distinguished and influential critical work.

can only be overthrown by proving the application of criticism to the Old Testament to be in itself unlawful, or else by proving the falseness or inconclusiveness of all its mutually independent judgments one by one. On examination, the authors of anti- crilica are generally found to disown, tacitly or openly, the first of these alternatives; for example, Prof. Sayce, who frequently takes the field against the " higher criticism," and denies, without, however, disproving, the validity of the literary analysis of the Hexateuch, nevertheless himself asserts that " no one can study the Pentateuch . . . without perceiving that it is a com- pilation, and that its author, or authors, has made use of a large variety of older materials," and that " it has probably received its final shape at the hands of Ezra " (Early History of the Hebrews, 129 and 134). This is significant enough; Prof. Sayce, the most brilliant and distinguished of the " anti-critics," does not really reoccupy the position of the " able and pious men " of the mid-i9th century, to whom "even to speak of any portion of the Bible as a history " was " an outrage upon religion " (Stanley, Jewish Church, Preface); these may still have pious, but they have no longer scholarly successors. Prof. Sayce travels farther back, it is true, but on critical lines: he abandons the Pentateuchal criticism of the 20th century, to reoccupy the critical position of Hobbes, Spinoza and Simon in the 1 7th century — whether reasonably or not must here be left an open question.

Briefly, in conclusion, it remains to consider the relation of Archaeology to Criticism, partly because it is frequently asserted in the loose language just discussed that Archae- Archaeology has overthrown Criticism, or in par- criffc&m. ticular the " higher criticism," and partly because Archaeology has stimulated and forced to the front certain important critical questions.

More especially since the middle of the 19th century the decipherment of Egyptian and Assyrian inscriptions and systematic excavation in Palestine and other parts of the East have supplied a multitude of new facts bearing more or less directly on the Old Testament. What has been the general effect of these new facts on

traditional theories or critical conclusions ?

(1) Literary Criticism. — No discovery has yielded any direct testimony as to the authorship of any book of the Bible, or as to the mode or date of its composition. Any documentary analysis of the Pentateuch may be right or wrong; but archae- ology contributes nothing either one way or another as to the answer. On the other hand, archaeology has in some cases greatly strengthened the critical judgment that certain writings (e.g. Daniel, the story of Joseph in Genesis) are not contem- porary with the events described.

(2) Historical Criticism. — Here the gain has been more direct; e.g. the Assyrian inscriptions have furnished independent evidence of the relations of certain Hebrew kings (Ahab, Jehu, Ahaz) with the Assyrians, and thus supported more or less com- pletely the evidence of the Old Testament on these points: they have also served to clear up in part the confused chronology of the Hebrews as given in the books of Kings. But above all archaeology has immensely increased our knowledge of the nations among which Israel was placed, and of the political powers which from time to time held Palestine in subjection. In this way archaeology has greatly helped to bring the history of Israel into relation with the history of the ancient East, and in so doing has raised important questions as to the origin of Hebrew culture. For example, the recent discovery of the Code of Khammurabi, which contains some remarkable re- semblances to the Pentateuchal codes, raises the question of the relation of Hebrew to Babylonian law. On the other hand, there are certain great historical questions which have been greatly affected by criticism, but on which archaeology has hitherto shed no light. For example, much as archaeology has increased our knowledge of the conditions obtaining in Palestine before the Hebrew invasion, it has so far contributed nothing to our knowledge of the Hebrew nation before that time beyond the statement in the now famous stele of Merenptah (Mineptah)(c. 1270B.C.), discovered in 1896, "Ysirael is desolated, its seed is not," and a few possible but vague and uncertain

allusions to particular tribes. It has contributed nothing whatsoever to our knowledge of any Hebrew individual of this period, 1 and consequently what elements of history underlie the stories in Genesis,

in so far as they relate to the Hebrew patriarchs, must still be determined, if at all, by a critical study of the Old Testament. The story in Gen. xiv. is no exception to this statement: archaeology has made probable the historic reality of Chedorlaomer, which some critics had previously divined; it has not proved the historical reality of the patriarch Abraham or the part played by him in the story, which some critics, whether rightly or wrongly, had questioned. The Dutch scholar Kosters called in question the return of the Jews in the days of Cyrus; his view, adopted by many, has hardly obtained, as yet at all events, the weight of critical judgment: here again, unfortunately, archaeology at present is silent.

(3) Criticism of Religion. — Here, perhaps, archaeology has contributed most new material, with the result that religious terms, ideas, institutions, once supposed to be peculiar to Israel, are now seen to be common to them and other nations; in some cases, moreover, priority clearly does not lie with the Hebrews, as, for example, in the case of the materials (as distinct from the spirit in which they are worked up) of the stories of Creation and the Flood. Of late, too, it has been much argued, and often somewhat confidently maintained, that Hebrew monotheism is derivative from Babylonian monotheism.

This and similar questions, leading up to the ultimate and supreme question — Wherein docs lie the uniqueness of Israel's religion? — are among those which will require in the future renewed examination in the light of a critical study alike of the Old Testament and of all the relevant material furnished by archaeology. Archaeology has not yet found the key to every unopened door; but it has already done enough to justify the surmise that if criticism had not already disintegrated the traditional theories of the Old Testament, archaeology in the latter half of the 19th century would itself have initiated the process.

Literature. — Much of the details and results of criticism and the special literature will be found in the articles in the present work on the several books of the Old Testament. To the works already mentioned we may add L. Diestel, Geschichte des Alten Testaments in derChrlstlichen Kirche (1869); C. A. Briggs, General Introduction to the Study of Holy Scripture (1889) ; G. A. Smi);h, Modern Criticism and the Preaching of the Old Testament (1901) — these for the history of Criticism (or more generally of Old Testament study) ; T. K. Cheyne, Founders of Old Testament Criticism (pp. 1-247, biographical sketches of critical scholars since the middle of the 18th century; pp. 248-372, criticism of Driver's Introduction) . As already

indi- cated, the exposition of Literary Criticism in English is Driver's Intro- duction to the Literature of the Old Testament. For the general prin- ciples of Historical Criticism see Ch. V. Langlois and Ch. Seignobos, Introduction to the Study of History (Eng. trans., 1898), with which it is interesting to compare De Wette's brief discussion referred to in the article. (G. B. G.)*

5. Old Testament Chronology.

A sense of the importance of a fixed standard of chronology was only acquired gradually in the history of the world. Nations in a primitive state of civilization were not, and are not, conscious of the need. When the need began to be felt events were prob- ably at first dated by the regnal years of kings; the reigns of successive kings were then arranged in order, and grouped, if necessary, in dynasties, and thus a fixed standard was gradually constructed. Particular states also not unfrequently introduced fixed eras, which obtained a more or less extensive currency, as the era of the first Olympiad (776 B.C.), of the foundation of Rome (753 B.C.), and of the Seleucidae at Antioch (312 B.C.), which is followed by the Jewish author of the first book of Maccabees. Some of the earliest documents which we possess are dated by the year in which some noticeable event took place, as in contract-tablets of the age of Sargon of Agade

1 To avoid any possibility of overstating the case, it is necessary to refer here to the fact that Tethmosis (Thothmes) III. in the 16th century B.C. mentions two Palestinian places named respectively Jacobel and Joscphel, and Sheshonk in the 10th century B.C. mentions another called " The field of Abram." From these names alone it is impossible to determine whether the places derived their names from individuals or tribes.

m. a?

(Akkad) (3800 B.C., or, according to other authorities, 2800 B.C.), " In the year in which Sargon conquered the land of Amurru [the Amorites]"; or, "In the year in which Samsu-ditana [c. 1950 B.C.] made the statue of Marduk": Is. vi. 1 (" In the year of King Uzziah's death "), xiv. 28, xx. 1, are examples of this method of dating found even in the Old Testament. In process of time, however, the custom of dating by the regnal year of the king became general. The Babylonians and Assyrians were probably the first to construct and employ a fixed chronological standard; arid the numerous contract-tablets, and list of kings and yearly officials, discovered within recent years, afford striking evidence of the precision with which they noted chronological details. Biblical chronology is, unfortunately, in many respects uncertain. Prior to the establishment of the monarchy the conditions for securing an exact and consecutive chronology did not exist; the dates in the earlier period of the history, though apparently in many cases precise, being in fact added long after the events described, and often (as will appear below)

resting upon an artificial basis, so that the precision is in reality illusory. And after the establishment of the monarchy, though the con- ditions for an accurate chronology now existed, errors by some means or other found their way into the figures; so that the dates, as we now have them, are in many cases at fault by as much as two to three decades of years. The exact dates of events in Hebrew history can be determined only when the figures given in the Old Testament, can be checked and, if necessary, corrected by the contemporary monuments of Assyria and Babylonia, or (as in the post-exilic period) by the knowledge which we independently possess of the chronology of the Persian kings. In the following parts of this article the chronological character of each successive period of the Old Testament history will be considered and explained as far as the limits of space at the writer's disposal permit.

1. From the Creation of Man to the Exodus. — In the whole of this period the chronology, in so far as it consists of definite figures, depends upon that part of the Pentateuch which is called by critics the " Priestly Narrative." The figures are in most, if not in all cases artificial, though the means now fail us of determining upon what principles they were calculated. It is also to be noted that in the Samaritan text of the Pentateuch, and in the LXX., the figures, especially in the period from the Creation to the birth of Abraham, differ considerably from those given in the Hebrew, yielding in Sam. a lower, but in the LXX. a much higher total. The following tables will make the details clear: —

(1) From the Creation of Man to the Flood (Gen. v. and vii. 11).

Age of each at birth of next.

Heb.

Sam.

LXX.

Adam (930) ....

130

130

230

Seth (912)

105

105

205

Enosh (905)

90

90

190

Kenan (910)

70

70

170

Mahalalel (895)

65

65

165

Tared (962) Enoch (365)

162

62

162

65

65

165

Methuselah (969)

187

67

*187**

Lamech (777) .

182

53

188

Noah (950) ; age at Flood

600

600

600

Total from the Creation of

1656

1307

2262

Man to the Flood

1

The figures in parentheses indicate the entire ages assigned to the several patriarchs; these are generally the same in the three texts. The Sam., however, it will be noticed, makes in three cases the father's age at the birth of his eldest son less than it is in the Heb. text, while the LXX. makes it in several cases as much as 100 years higher, the general result of these differences being that the total in the Sam. is 349 years less than in the Heb., while in the LXX. it is 606 years more. The names, it need hardly be remarked, belong to the prehistoric period, and equally with the figures are destitute of historical value. 2 Or, according to some MSS., 167.

{O.T. CHRONOLOGY

(2) From the Flood to the Call of Abraham (Gen.

xi.).

Age of each at birth of next.

Heb.

Sam.

LXX.

Arphaxad (438) ‘ . . .

35 2

135

135

Cainan (460) [cf. Luke iii. 27]

130

Shelah (433) .

30

130

130

Eber (464) . . . .

34

134

134

Peleg (239) ....

3°

, 130

130

Reu (239) ....

32

132

132

Serug (230) ....

30

130

130

Nahor (148) ....

29

79

79

Terah (205) ....

70

70

70

Abraham (175); age at Call

(Gen. xii. 4) . . Total from the Flood to

75 .

. 75

75

365

1015

the Call of Abraham

The variations are analogous to those under (1), except that here the birth-years of the patriarchs in both Sam. and LXX. differ more consistently in one direction, being, viz., almost uniformly higher by 100 years. It has been much debated, in both cases, which of the three texts preserves the original figures. In (2) it is generally agreed that the Heb. does this, the figures in Sam. and LXX. having been arbitrarily increased for the purpose of lengthening the entire period. The majority of scholars hold the same view in regard also to (1) ; but Dillmann gives here the preference to the figures of the Sam. The figures, of course, in no case possess historical value: accepting even Ussher’s date of the Exodus, 1491 B.C., which is earlier than is probable, we should obtain from them for the creation of man 4157 B.C., or (LXX.) 53 28, 3 and for the confusion of tongues, which, according to Gen. xi. 1-9, immediately followed the Flood, 2501 B.C., or (LXX.) 3066 B.C. But the monuments of Egypt and Babylonia make it certain that man must have appeared upon the earth long before either 4157 B.C. or 5328 B.C.; and numerous inscriptions, written in three distinct languages — Egyptian, Sumerian and Babylonian — are preserved dating from an age considerably earlier than either 2501 B.C. or 3066 B.C. 4 The figures of Gen. v. and xi. thus merely indicate the manner in which the author of the Priestly Narrative — and probably to some extent tradition before him — pictured the course of these early ages of the world’s history. The ages assigned to the several patriarchs (except Enoch) in Gen. v. are much greater than those assigned to the patriarchs mentioned in Gen. xi., and similarly the ages in Gen. xi. 10-18 are higher than those in Gen. xi. 19-26; it is thus a collateral aim of the author to exemplify the supposed gradual diminution in the normal years of human life.

The Babylonians, according to Berossus, supposed that there were ten antediluvian kings, who they declared had reigned for the portentous period of 432,000 years: 432,000 years, however, it has been ingeniously pointed out by Oppert (Gott. Gel. Nachrichten, 1877, p. 205 ff.) =86,400 lustra, while 1656 years (the Heb. date of the Flood) =86,400 weeks (1656 = 72X23; and 23 years being.= 8395 days+5 intercalary days = 8400 days = 1200 weeks); and hence the inference has been drawn that the two periods have in some way been developed from a common basis, the Hebrews taking as their unit a week, where the Babylonians took a lustrum of 5 years.

(3) From the Call of A braham to the Exodus. From the Call of Abraham to the birth of Isaac

(Abraham being then aged 100, Gen. xxi. 5) . 25 years Age of Isaac at the birth of Esau and Jacob

(Gen. xxv. 26) . 60 ,,

Age of Jacob when he went down into Egypt

(Gen. xlvii. 9) 130 „

The period of the Patriarchs' sojourn in Canaan

was thus 215 ,,

But the period of the Israelites' sojourn in Egypt,

according to Ex. xii. 40, 41, was . 430 ,,

1 Shem, the father of Arphaxad, is aged 100 at the time of the Flood, and lives for 600 years.

s Disregarding the " two years " of Gen. xi. 10: see v. 32, vii. 11.

3 Taking account of the reading of LXX. in Ex. xii. 40.

4 See further Driver's essay in Hogarth's Authority and Archaeology (1899), pp. 32-34; or his Bock of Genesis (1904, 7th ed., 1909), p. xxxi. if.

We thus get—' From the Call of Abraham to the Exodus (Heb.

text) 2 15 +430 ==645 years

From the Flood to the Call of Abraham (Heb.

text), ".'.;, 365 ,.

From the Creation of Man to the Flood (Heb.

text). 1656 ,,

From the Creation of Man to the Exodus (Heb.

text). . . . . 2666 ,,

On these figures the following remarks may be made: — (i.) In

Genesis the chronology of the Priestly Narrative (" P ") is not consistent with the chronology of the other parts of the book (" JE "). Three or four illustrations will suffice: (a) The author of Gen. xii. 10-20 evidently pictures Sarai as a comparatively young woman, yet according to P (xii. 4, xvii. 17) she was 65 years old. (b) In Gen. xxi. 15 it is clearly implied that Ishmael has been carried by his mother, yet according to xvi. 16, xxi. 5, 8, he must have been at least 15 years old. (c) In Gen. xxvii. Isaac is to all appearance on his deathbed (cf. ver. 2), yet according to P (xxv. 26, xxvi. 34, xxxv. 28) he sur- vived for eighty years, dying at the age of 180. Ussher and others, arguing back from the dates in xlvii. 9, xlv. 6, xii. 46, xxxi. 41, infer that Jacob's flight to Haran took place in his 77th year. This reduces the 80 years to 43 years, though that is scarcely less incredible. It involves, moreover, the incongruity of suppos- ing that thirty-seven years elapsed between Esau's marrying his Hittite wives (xxvi. 34) and Rebekah's expressing her apprehensions (xxvii. 46) lest Jacob, then aged seventy-seven, should follow his brother's example, (d) In Gen. xliv. 20 Ben- jamin is described as a " little one "; in P, almost immediately afterwards (xlvi. 21), he appears as the father of ten sons; for a similar anomaly in xlvi. 12, see the Oxford Hexateuch, i. p. 2$n. (ii.) The ages to which the various patriarchs lived (Abraham, 175; Isaac, 180; Jacob, 147), though not so extravagant as those of the antediluvian patriarchs, or (with one exception) as those of the patriarchs between Noah and Abraham, are much greater than is at all probable in view of the structure and constitution of the human body, (iii.) The plain intention of Ex. xii. 40, 41 is to describe the Israelites as having dwelt in Egypt for 430 years, which is also in substantial agreement with the earlier passage, Gen. xv. 13 (" shall sojourn in a land that is not theirs, . . . and they shall afflict them 400 years "). It does not, however, accord with other passages, which assign only four generations from Jacob's children to Moses (Ex. vi. 16-20; Num. xxvi. 5-9; cf. Gen. xy. 16), or five to Joshua (Josh. vii. 1); and for this reason, no doubt, the Sam. and LXX. read in Ex. xii. 40, " The sojourning of the children of Israel in the land of Egypt, and in the land of Canaan, was 430 years," reducing the period of the sojourn in Egypt to half of that stated in the Hebrew text, viz. 215 years. This computation attained cur- rency among the later Jews (Josephus and others; cf. the " 400 years " of Gal. iii. 17). The forced and unnatural render- ing of Ex. xii. 40 in the A.V. (contrast R.V.), which was followed by Ussher, is intended for the purpose of making it possible. From the facts that have been here briefly noted it must be evident how precarious and, in parts, how impossible the Biblical chronology of this period is. (iv.) It has been observed as re- markable that 2666, the number of

years (in the Hebrew text) from the Creation of Man to the Exodus, is, in round numbers, just two-thirds of 4000; and the fact has suggested the infer- ence that the figure was reached by artificial computation.

The Date oj the Exodus. — Is it possible to determine this, even approximately, upon the basis of external data? (i.) The correspondence between the Egyptian governors established in different parts of Palestine and the Egyptian kings Amen- hotep (Amenophis) III. and IV. of the 18th dynasty, which was discovered in 1887 at Tel el-Amarna, makes it evident that Palestine could not yet have been in the occupation of the Israelites. – It was still an Egyptian province, and the Baby- lonian language, in which the correspondence is written, shows that the country must have been for a considerable time past, before it came into the possession of Egypt, under Babylonian

influence. Now one of the kings, who corresponds with Amen- hotep IV., is Burnaburiash (Burna-buryas), king of Babylon, and Egyptologists and Assyriologists are agreed that the date of these monarchs was c. 1400 B.C. The conquest of Canaan, consequently, could not have taken place till after 1400 B.C. (ii.) It is stated in Ex. i. n that the Israelites built in Egypt for the Pharaoh two store-cities, Pithom and Rameses. The excavations of M. Naville have, however, shown that Ramses II. of the 19th dynasty was the builder of Pithom; and though the other city has not at present been certainly identified, its name is sufficient to show that he was its builder likewise. Hence the Pharaoh of the Exodus is commonly supposed to have been Ramses (Rameses) II. 's successor, Merenptah (Mineptah). Egyptian chronology is unfortunately imperfect; but Professor Petrie, who has paid particular attention to the subject, and who assigns the reign of Ameh-hotep IV. to 1383-1365 B.C., assigns Ramses II. to 1300-1234 B.C. 1 In Merenptah's fifth year the Delta was invaded by a formidable body of Libyans and other foes ; 2 and it has been conjectured that the Israelites took the opportunity of escaping during the unsettlement that was thus occasioned.

Alternative dates for Ramses II.: Maspero, The Struggle of the Nations (1897), p. 449, c. 1320-1255; Breasted (1906), 1292-

1225; Meyer (1909), 1310-1244. Attempts have been made to identify the Khabiri, who are mentioned often in the Tel el-Amarna letters as foes, threatening to invade Palestine and bring the Egyptian supremacy over it to an end, with the Hebrews. The Exodus, it has been pointed out, might then be placed under Amen-hotep II. (1448-1420 B.C., Breasted; 1449-1423, Petrie), the successor of Thothmes, and more time would be allowed for the events between the Exodus and the time of David (c. 1000), which, if the date given above be correct, have been thought to be unduly compressed (see Orr in the Expositor^ March 1897, p. 161 ff.) ; but there are difficulties attaching to this view, and it has not been adopted generally by scholars. There may be some ultimate connexion between the Khabiri and the Hebrews; but the Khabiri of the Tel el-Amarna letters cannot be the Hebrews who invaded Canaan under Joshua. '

The mention of Israel on the stele of Merenptah, discovered by Petrie in 1896 (" Israel [Ysirael] is desolated; its seed [or fruit] is not "), is too vague and indefinite in its terms to throw any light on the question of the Exodus. The context speaks of places in or near Canaan; and it is possible that the reference is to Israelite clans who either had not gone down into Egypt at all, or had already found their way back to Palestine. See Hogarth's Authority and Archaeology, pp. 62-65.

*2. From the Exodus to the Foundation of the Temple {in the fourth year of Solomon, 1 Kings vi. 1). — In the chronological note, 1 Kings vi. 1, this period is stated to have consisted of 480 (LXX. 440) years. Is this figure correct? If the years of the several periods of oppression and independence mentioned in the Book of Judges (Judges iii. 8, 11, 14, 30, iv. 3, v. 31, vi. 1, viii. 28, ix. 22, x. 2, 3, 8, xii. 7, 9, 11, 14, xiii. 1, xv. 20, xvi. 31) be added up, they will be found to amount to 410 years; to these must be added further, in order to gain the entire period from the Exodus to the foundation of the Temple, the 40 years in the wilderness, * years under Joshua and the elders (Judges ii. 7), the 40 (LXX. 20) years' judgeship of Eli (1 Sam. iv. 18), the 20 or more years of Samuel (1 Sam. vii. 2, 15), the y years of Saul (the two years of 1 Sam. xiii. 1 [R.V.] seem too few), the 40 years of David (1 Kings ii.- 11), and the first four years of Solomon, i.e. 144+x+y years, in all 554 years, + two unknown periods denoted by x and y — in any case con- siderably more than the 480 years of 1 Kings vi. 1. This period might no doubt be reduced to 480 years by the supposition, in itself not improbable, that some of the judges were local and contemporaneous; the suggestion has also been made that, as is usual in Oriental chronologies, the years of foreign domina-*

*tion were not counted, the beginning of each judge's rule being reckoned, not from the victory which brought him into power,but from the death of his predecessor; we should in this case obtain for the period from the Exodus to the foundation of the Temple 440 + * + ˆ years, 3 which if 30 years be assigned co'n-*

1 Petrie, Hist, of Egypt, i. (ed. 5, 1903), p. 251 ; iii. (1905), p. 2.

2 See Merenptah's account of the defeat of these invaders in Maspero, op. cit. pp. 432-437; or in BreaJted's Ancient Records of Egypt (Chicago, 1906), iii. 240-252.

*jecturally to Joshua and the elders, and 10 years to Saul, would amount exactly to 480 years. The terms used, however (" and the land had rest forty years," iii. n, similarly, iii. 30, v. 31, viii. 28), seem hardly to admit of the latter supposition; and even if they did, it wotfid still be scarcely possible to maintain the correctness of the 480 years : it is difficult to harmonize with what, as we have seen, appears to be the most probable date of the Exodus; it isˆmoreover, open itself to the suspicion of having been formed artificially, upon the assumption that the period in question consisted of twelve generations * of 40 years each. In the years assigned to the different judges, also, the frequency of the number 40 (which certainly appears to have been regarded by the Hebrews as a round number) is suspicious. On the whole no certain chronology of this period is at present attainable. 5*

3. From the Fourth Year of Sol.omon to the Captivity of Judah. — During this period the dates are both more abundant, and also, approximately, far more nearly correct, than in any of the earlier periods; nevertheless in details there is still much uncertainty and difficulty. The Books of Kings are a compilation made at about the beginning of the Exile, and one object of the compiler was to give a consecutive and complete chronology of the period embraced in his work. With this purpose in view, he not only notes carefully the length of the reign of each king in both kingdoms, but also (as long as the northern kingdom existed) brings the history of the two kingdoms into relation with one another by equating the commencement of each reign in either kingdom with the year of the reign of the contemporary king in the other kingdom.

The following are examples .of the standing formulae used by the compiler for the purpose: — " In the twentieth year of Jeroboam king of Israel began Asa to reign over Judah. And forty and one years reigned he in Jerusalem " (1 Kings xv. 9, 10). " In the third year of

Asa king of Judah began Baasha the son of Ahijah to reign over all Israel in Tirzah (and reigned) twenty and four years " (ibid. ver. 33).

In these chronological notices the lengths of the .reigns were derived, there is every reason to suppose, either from tradition or from the state annals — the " book of the chronicles of Israel " (or " Judah "), so constantly referred to by the compiler as his authority (e.g. 1 Kings xv. 23, 31, xvi. 5); but the "syn- chronisms " — i.e. the corresponding dates in the contemporary reigns in the other kingdom were derived, it is practically certain, by computation from the lengths of the successive reigns. Now in some cases, perhaps, in the lengths of the reigns themselves, in other cases in the computations based upon them, errors have crept in, which have vitiated more or less the entire chronology, of the period. The existence of these errors can be demonstrated in two ways: (1) The chronology of the two kingdoms is not consistent with itself; (2) the dates of various events in the history, which are mentioned also in the Assyrian inscriptions, are in serious disagreement with the dates as fixed by the contemporary Assyrian chronology.

(1) That the chronology of the two kingdoms is inconsistent with itself is readily shown. After the division of the kingdom the first year of Jeroboam in Israel coincides, of course, with the first year of Rehoboam in Judah; and after the death of Jehoram of Israel and Ahaziah of Judah in battle with Jehu (2 Kings ix. 24, 27), the first year of Jehu in Israel coincides similarly with the first year of Athaliah in Judah: there are thus in the history of the two kingdoms two fixed and certain synchronisms. Now,

'Namely, 40 years in the wilderness; Joshua and the elders (Judges ii. 7), x years; Othniel (iii. 11), 40 years; Ehud (iii.. 30), 80 years; Barak (v. 31), 40 years; Gideon (viii. 28), 40 years; Jephthah and five minor judges (x. 2, 3, xii. 7, 9, 11, 14), 76 years; Samson (xvi. 31), 20 years; Eli (1, Sam. iv. 18), 40 years; Samuel (vii. 2), 20 years; Saul, y years; David, 40 years; and Solomon's first four years — in all 440-j-x+y years.

4 Namely, Moses (in the wilderness), Joshua, Othniel, Ehud, Deborah, Gideon, Jephthah, Samson, Eli, Samuel, Saul and David.

6 The' " 300 years " of Judges xi. 26 agrees very nearly with the sum of the years (namely, 319) given in the preceding chapters for the successive periods of oppression and independence. The verse occurs in a long insertion (xi. 12-28) in the original narrative; and the

figure was mpst probably arrived at by computation upon the basis of the present chronology of the book.

Chronological Table.

The dales printed in heavy type are certain, at least within a unit.

Events in Contemporary Historv.

Chronology of Ussher.

Probable Real Dates.

RiHlipal T“vf*nt^*

±JlUll\^Cll ijYCHIO,

Babylonia.

Assyria.

Egypt. 3

4004

[4157’]

I ndeterminable,

Creation of Man

but much before

•

7000 B.C.

7-6000. 2 Temple of Bel

at Nippur founded

4777. Menes, the first king of the First

Egyptian Dynasty

c. 4000. 2 Lugal-zaggisi,

king of Uruk (Erech,

3998-3721. Fourth Dyn-

Gen. x. 10)

asty 3969-3908 Cheops. The Great Pyramid built

3800. 4 Sargon of Agade,

who carries his arms

as far as the Mediter- .

ranean Sea

2348

The Deluge

c. 2800.' Ur-bau and

[2501 B]

Dungi, kings of Uru (Ur, Gen. xi. 28, 31)

c. 2300. Ushpia, priest of Ashur, builder of temple in the city of Ashur

c. 2225. Ilu-shuma,

1996-1821

c. 2100 (if, as is

Abraham

c. B.C. 2130-2088. 7

first king of Assyria

[221 1-2036 6]

probable, the

Khammurabi unifies

at present (1909)

Amraphel of

Babylonia and con-

known s

Gen. xiv. 1 is

structs in it many

•

Khammurabi)

great works (see art. Babylonia)

c. 1400. Burnaburiash. Tel el-Amarna cor- respondence

2098-1587. Rule of the Hyksos

1587-1328. Eighteenth

Dynasty 1 503-1449. Thothmes

(Tetnmosis) 1 1 I. (leads

victorious expeditions

into Asia) 1414-1383. Amen-hotep

(Anienophis) 111. 1383-1365. Amen-hotep

IV. 1328-1202. Nineteenth

c. 1300. Shalmaneser I.

Dynasty

(builder of Calah,

Gen. x. 11)

1 300-1 234. Ramses II.

1491

c. 1230

The Exodus

••

*1234-1214. Merenptar II. **

1099-1058

c. 1025-1010 9

Saul (2) «>

1058-1017

c. 1010-970

David (40)

1017-977

c. 970-933

Solomon (40)

■

952~749 (al- 945-745)-

A

Twenty-secondDynasty 952-930 11 (Breasted,

Judah.

Israel.

977

933. Rehoboam(l7)

933- Jeroboam I.

(22)

, .

945-924). Sheshonq

959

916. Abijah (3)

(Shishak). Shishak in-

956

913. Asa (41)

vades Judah in the

956

912. Nadab (2)

fifth yearof Rehoboam

954

911. Baasha (24)

(1 Ki. xiv. 25 f.) '

I The real Biblical date, Ussher in Gen. xi. 26 interpolating 60 years, because it is said in Acts vii. 4 that Abraham left Haran after his father Terah's death (Gen. xi. 32), and also (as explained above) interpreting wrongly Ex. xii. 40.

- *Hilprecht's dates {The Bab. Expedition of the University of Pennsylvania, vol. i. pt. i. 1893, pp. 11, 12 ; pt. ii. 1896, pp. 23, 24, 43, 44). "Petrie's dates, Hist, of Egypt, vol. i. (ed. 5, 1903), pp. 20, 30, 233, 251, 252; vol. iii. (1905), pp. 2, 235, 281-7, 296-360. Other*

authorities, however, assign considerably lower dates for the dynasties prior to the 18th. Thus Breasted (Hist, of Egypt, 1906, pp. 22 ft'., 22I i 597) agrees with Ed. Meyer in giving, for reasons which cannot be here explained, for the beginning of the 1st dynasty c. b c. 3400, for the 4th dynasty c. B.C. 2900-2750, and for the rule of the Hyksos c. B.C. 1680-1580; and in his Researches in Sinai, 1906, p. 175, Petrie proposes for Menes B.C. 5510, and for the 4th dynasty B.C. 4731-4454. See Egypt (Chronology).

4 So Sayce, Rogers (Hist, of Bab. and Ass., 1900, i. 318 f.) and others. The date rests upon a statement of Nabu-na'id's, that Sargon's 6on, Naram-Sin, reigned 3200 years before himself. Lehmann holds that, there are reasons for believing that the engraver, by error, put a stroke too many, and that 2200 should be read instead of 3200. _ 6 The real Biblical date.

6 Rogers, i. 373-375. Many monuments and inscriptions of other kings in Babylonia, between 4000 and 2000 B.C., are also known.

7 The lists of the Babylonian and Assyrian kings are not continuous; and before 1907, from the data then available (see the discussion in Rogers, op. cit. i. 312-348), Khammurabi, the sixth king of the first Babylonian dynasty, was commonly referred to such dates as 2376-2333 B.C. (Sayce) or 2285-2242 B.C. (Johns). But inscriptions recently discovered, by showing that the second dynasty was partly contemporaneous with the first and the third, have proved that these dates are too high : see L. W. King, Chronicles Concerning Early Bab. Kings (1907), i. 93-110; and the article Babylonia, Chronology. The date B.C. 2130-2088 is that adopted by Thureau-Dangin, after a discussion of the subject, in the Journal des Savants, 1908, p. 199; and by Ungnad in the Orient. Litt.-Zeitung, 1908, p. 13, and in

• Gressmann's Altorientalische Texte und Bilder zum A.T. (1909), p. 103. 8 King, op. cit. i. 116, ii. 14.

• The dates of the kings are, in most cases, those given by Kautzsch in the table in his Outline of the Hist, of the Literature of the O.T. (tr. by Taylor, 1898), pp. 167 ff. ; see also A. R. S. Kennedy, "Samuel" in the Century Bible (1905), p. 31. The dates given by other recent authorities seldom differ by more than three or four years.

10 The figures after a king's name indicate the number of years assigned to his reign in the O.T. For Saul, see 1 Sam. xiii. 1, R.V

II The date of Sheshonq depends on that fixed for Rehoboam. Petrie places the accession of Rehoboam in 937 b.c

Chronological Table — Continued.

Chronology of Ussher.

Probable Real Dates.

Biblical Events.

Events in Contemporary History.

Babylonia.

Assyria.

Egypt.

93°

929 929 918 914 898 896

892

885 884

878 856 841

839 823

810

773

772

772 758

761

759 742

73°

726

721

698

Judah.

873-Jehoshaphat (25)

849. Jehoram (8) 842. Ahaziah (1) 842. Athaliah (6)

836. Jehoash (40)

797. Amaziah (29)

779. Uzziah (52) c. 750. Jotham (16),

as regent (2 Ki.

xv. 5)

740. Jotham, ruler

sole

736. 1 Ahaz (16)

728.' Hezekiah (29)

698. Manasseh (55)

Israel. 888. Elah (2) S87. Zimri (7 days) 887. Omri (12) 876. Ahab (22)

854. Ahaziah (2) 853. Jehoram (12)

842. Jehu (28)

814. Jehoahaz (17) 798. Jehoash (16)

783. Jeroboam II.

(40

743. Zechariah (6

mo.) 743. Shallum (1 mo.) 743. Menahem (10)

738. Pekahiah (2) 737. Pekah (20)

733 (or 732). Hoshea

(9)

747-733. Nabonassar

722. Fall of Samaria and end of the northern king- dom

729-724. Tiglath-pile- ser, under the name of Pulu (cf. 2 Ki. xv. 19), king of Babylon

721-710. The Chaldaean prince, Merodach-bal- adan, king of Babylon (cf. 2 Kings xx. 12 = Is. xxxix. 1)

885-860. Asshur-nazir-

abal 860-825, Shalmaneser

II.

854. Ahab mentioned at the battle of Karkar

842. Jehu pays tribute to Shalmaneser II.

825-812. Shamshi-Adad

(Hadad) 812-783. Adad-Nirari

IV.

745-727.

ser IV.

Tiglath-pile-

738. Menahem pays tribute to Tiglath- pileser IV. (cf. 2 Ki. xv. 19)

733 (or 732). Assassina- tion of Pekah, and succession of Hoshea, mentioned by Tig- lath-pileser III.

732. Capture of Dam- ascus by Tiglath- pileser IV. (2 Ki. xvi. 9; cf. Is. viii. 4, xvii. 1)

727-722. Shalmaneser IV.

722-705. Sargon

722. Capture of Sam- aria in Sargon's ac- cession-year

711. Siege and capture of Ashdod (cf. Is. xx.

1)

705-681. Sennacherib

701. Campaign against Phoenicia, Philistia and Judah (2 Kings xviii. 13-xix. 35)

681-368. Esarhaddon

7157663

Twenty-fifth (Ethio- pian) Dynasty

7I5- 2 Sabako (Shabaka)

707. 2 Shabataka

693. Taharqa (Tirha- kah, Is. xxxvii. 9)*

1 If these dates are correct, there must be some error in the ages assigned to Ahaz and Hezekiah at their accession, viz. 20 and 25 respectively, for it would otherwise follow from them that Ahaz, dying at the age of [20+8=] 28. left a son aged 25! The date 728 for Hezekiah's accession rests upon the assumption that of the two inconsistent dates in 2 Kings xviii. 10, 13, the one in ver. 10 (which places the fall of Samaria in Hezekiah's 6th year) is correct; but some scholars (as Wellhausen, Kamphausen, and Stade) suppose that the date in ver. 10 (which places Sennacherib's invasion in Hezekiah's 14th year) is correct, and assign accordingly Hezekiah's accession to 715. _ This removes, or at least mitigates, the difficulty referred to, and leaves more room for the reigns of Jotham and Ahaz; but it requires, of course, a corresponding reduction in the reigns of the kings succeeding Ahaz.

"Breasted's dates for these three kings (Hist, of Egypt, 1906, p. 601) are: Shabaka 712-700; Shabataka 700-688; Taharqa 688-663.

3 7©

BIBLE

Chronological Table — Continued.

[O. T. CHRONOLOGY

Chronology of Ussher.

Biblical Events.

Events in Contemporary History.

Babylonia.

Assyria.

Egypt.

°43

641 629

624

610 610

599

599

588

562

536

515

457 445

641. Anion (2) 639. Josiah (31)

626. Call of the prophet Jeremiah in Josiah's 13th year (Jer. i. 2, xxv. 3)

621. Discovery of the Book of the Law (Deuteronomy) in Josiah's 18th year (2 Kings xxiii. 3 ff-)

608. Jehoahaz (3 mo.) 608. Jehoiakim (11)

597. Jehoiachin (3 mo.) First deportation of captives (including Jehoiachin) to Babylonia, in the 8th year of Nebuchad- nezzar (2 Kings xxiv. 12-16) ■

597. Zedekiah (11)

586. Destruction of Jerusalem by the Chal- daeans in the 19th year of Nebuchad- nezzar (2 Kings xxv. 8). Second deporta- tion of

captives to Babylonia (2 Kings xxv. 4-21)

561. Jehoiachin released from prison by Evil-merodach in the 37th year of his captivity (2 Kings xxv. 27-30)

670. Esarhaddon con- quers Egypt

668-626. Asshur-banipal (Assur-bani-pal)

663. Asshur-banipal in- vades Egypt, and sacks Thebes (Nah. iii. 8-10)

664-525. Twenty-sixth

Dynasty 664. Psammetichus I.

Chaldaean Dynasty 625. Nabopolassar

605. Defeat of Egyp- tians by Nebuchad- rezzar (as his father's general) at Carchem- ish (Jer. xlvi. 2)

604. Nebuchadrezzar

Judah a province of the Persian Empire 538. Edict of Cyrus, permitting the Jews to return to Palestine. Many return under the leadership of Zerubbabel (Ezra i.-ii.)

516. Completion of the second Temple in the 6th year of Darius (Ezra vi; 15)

458. Return of exiles with Ezra, in the 7th year of Artaxerxes (Ezra vii. 7)

445. Nehemiah's first visit to Jerusalem (Neh. i. I, ii. 1)

568. Nebuchadrezzar in- vades Egypt (cf. Jer. xliii. 8-13)

561. Amel – marduk

(Evil-merodach, 2 Ki.

xxv. 27) 559. Nergal-sharuzur

(Neriglissar) 555. (9 months) Labashi-

marduk (Laboriso-

archod) 555. Nabu-na'id (Nabon-

nedus, Nabonidus) 539. Capture of Babylon

by Cyrus

Persian Kings 538. Cyrus

529. Cambyses

522. (7 mo.) Gaumata

(Pseudo-Smerdis) 522. Darius Hystaspis

490. Battle of Marathon 485. Xerxes

480. Battles of Thermo- pylae and Salamis 465. Artaxerxes

607. Destruction of Nine- veh by the Medes, and end of the empire of Assyria

610. Necho

608. Battle of Megiddo, and death of Josiah (2 Kings xxiii. 29)

594. Psammetichus II.

(Psammis) 589. Apries (Hophra,

Jer. xliv. 30)

570. Amasis II. (jointly with Apries)

564. Amasis alone

526. Psammetichus III. 525. Conquest of Egypt by Cambyses

0. T. CHRONOLOGY]

BIBLE

871

Chronological Table — Continued.

Chronology of Ussher.

Biblical Events.

Events in Contemporary History.

Babylonia.

Assyria.

Egypt.

434

432. Nehemiah's second visit to Jerusalem (Neh. xiii. 6)

c. 350. Many Jews carried away captive to Hyrcania and Babylonia, probably on account of a revolt against the Persians

423. Darius II. (Nothus) 404. Artaxerxes II.

(Mnemon) 359. Artaxerxes III.

(Ochus)

338. Arses

336. Darius III. (Codo- mannus)

333. Persian Empire overthrown by Alex- ander the Great

i

312.

305. 198.

Palestine now becomes a province, first of the empire of Alexander, and afterwards of that of one or other of Alexander's successors,

332. The Jews submit to Alexander the Great.

323. Death of Alexander in Babylon.

322, Alexander's general, Ptolemy Lagi, becomes Satrap of Egypt.

320. Ptolemy Lagi gains possession of Palestine, which, with short interruptions, continues in the hands of the Ptolemies till

198. _

Beginning of the era of the Seleucidae (reckoned from the time when Seleucus Nicator, Alexander's former heavy cavalry officer, finally established himself in the satrapy of Baby- lonia. He founded

Antioch as his capital, 300 B.C.). Ptolemy Lagi assumes the ti-tle of king.

Antiochus the Great, king of Syria (223-187), defeats Ptolemy Epiphanes at Panias (Baniyas, near the sources of the Jordan), and obtains possession of Palestine.

175-164. Antiochus Epiphanes, king of Syria (Dan. xi. 21-45).

168. Antiochus's attempt to suppress the religion of the Jews (1 Mace. i. 41-63; cf. Dan. vii. 8, 21, 24-26, viii. 9-14, xii. 10-12). Public worship suspended in the Temple for three years.

167. Rise of the Maccabees (1 Mace. ii.).

166-165. Victories of Judas Maccabaeus over the generals of Anti-ochus (1 Mace, iii.-iv.).

165. Re-dedication of the Temple on 25th Chisleu (December), I Mace. iv. 52-61.

160. 'Death of Judas Maccabaeus (1 Mace. ix. 1-22).

160-142. Jonathan, younger brother of Judas, leader of the loyal Jews (1 Mace. ix. 23-xii. 53).

142-135. Simon, elder brother of Judas (1 Mace, xiii.-xvi.).

135-105. John Hyrcanus, son of Simon.

105-104. Aristobulus I. (son of Hyrcanus), king.

104-78. Alexander Jannaeus (brother of Aristobulus), king.

78-69. Salome (Alexandra), widow of Alexander Jannaeus.

69. Aristobulus II. (son of Alexandra).

65. Capture of Jerusalem by Pompey. Palestine becomes a part of the Roman province of Syria.

if the regnal years of the kings of Israel from Jeroboam tojehoram be added together, they will be found to amount to 98, while if those of the kings of Judah for the same period (viz. from Rehoboam to Ahaziah) be added together, they amount only to 95. This discrepancy, if it stood alone, would not, however, be serious. But when we proceed to add up similarly the regnal years in the two

kingdoms from the division after Solomon's death to the fall of Samaria in the sixth year of Hezekiah (2 Kings xviii. 10), we find in the southern kingdom 260 years, and in the northern kingdom only 241 years 7 months. This is a for- midable discrepancy. Ussher, in order to remove it, has re- course to the doubtful expedient of artificially lengthening the northern series of years, by assuming (without any authority in the text) an "interregnum of 11 years" after the death of Jeroboam II., and an "anarchy for some years" between Pekah and Hoshea (see the margin of A.V. at 2 Kings xiv. 29; | xv. 8, 29). j

(2) As we now know, the methods of chronological computa- | tion adopted by the Assyrians were particularly exact. Every j year a special officer was appointed, who held office for that year, and gave his name to the year; and " canons," or lists, 1 of these officers have been discovered, extending from 893 to !

666 b.c. 1 The accuracy of these canons can in many cases be checked by the full annals which we now possess of the reigns of many of the kings — as of Asshur-nazir-abal or Assur-nasir-pal (885-860 B.C.), Shalmancser II. (860-825), Tiglath-pileser IV. (745-727), Sargon (722-705), Sennacherib (704-781), Esarhaddon (681-668), and Assburbanipal or Assur-bani-pal (668-626). Thus from 893 B.C. the Assyrian chronology is certain and precise. Reducing now both the Assyrian and Biblical dates to a common standard, 2 and adopting for the latter the computations of Ussher, we obtain the following singular series of discrepancies: —

Reign of Ahab . . . . Ahab mentioned at the battle of

Karkar

Reign of Jehu ..... Jehu pays tribute to Shal- mancser II

Reign of Menahem .... Menahem mentioned by Tiglath- pileser IV

Reign of Pekah

Reign of Hoshea

Assassination of Pekah and suc- cession of Hoshea, mentioned by Tiglath-pileser IV. Capture of Samaria by Sargon in Hezekiah's sixth year (2 Kings xviii. to) .... Invasion of Judah by Sennacherib in Hezekiah's fourteenth year {ibid. ver. 13)

Manifestly all the Biblical dates earlier than 733-732 B.C. are too

high, and must be considerably reduced: the two events, also, in Hezekiah's reign — the fall of Samaria and the invasion of Sennacherib — -which the compiler of the book of Kings treats as separated by an interval of eight years, were separated in reality by an interval of twenty-one years. 4

1 See George Smith, The Assyrian Eponym Canon (1875), pp. 29 ff., 57 ff . ; Schrader, Keilinschriftliche Bibliothek (transcriptions and trans- lations of Assyrian and Babylonian inscriptions), i. (1889), pp. 204 ff.

2 It may be explained here that the dates of the Assyrian and Babylonian kings can be reduced to years B.C. by means of the so-called " Canon of Ptolemy," which is a list of the Babylonian and Persian kings, with the lengths of their reigns, extending from Nabonassar, 747 B.C., to Alexander the Great, drawn up in the 2nd century A.D. by the celebrated Egyptian mathematician and geographer Ptolemy : as the dates B.C. of the Persian kings are known independently, from Greek sources, the dates B.C. of the preceding Babylonian kings can, of course, be at once calculated by means of the Canon. ' The recently-discovered contemporary monuments have fully established the accuracy of the Canon.

3 Or, in any case, between 734 and 732 ; see Rost, Die Keilschrift-texte Tiglat-pilesers III., 1893, pp. xii., 39, 81, with the discussion, pp. xxxii.-xxxiv., xxxv.-xxxvi.

4 This interval does not depend upon a mere list of Eponym years; we have in the annals of Sargon and Sennacherib full particulars of the events in all the intervening years.

Dates accord- ing to Ussher's Chronology. B.C.

Dates accord- ing to Assyrian Inscription.

B.C.

918-897

884-856

854

772-761

842

759-739 730-721

738

733(°r 732) ‘

721

722

713

701

Much has been written on the chronology of the kings and many endeavours have been made to readjust the Biblical figures so as to bring them into consistency with themselves and at the same time into conformity with the Assyrian dates. But, though the fact of there being errors in the Biblical figures is patent, it is not equally clear at what points the error lies, or how the available years ought to be redistributed between the various reigns. It is in any case evident that the accession of Jehu and Athaliah must be brought down from 884 to 842 B.C.; and this will involve, naturally, a corresponding reduction of the dates of the previous kings of both kingdoms, and of course, at the same time, of those of Solomon, David and Saul. The difficulty is, however, greatest in the 8th century. Here, in Judah, from the accession of Athaliah to the accession of Ahaz, tradition gives 143 years, whereas, in fact, there were but 106 years (842-736); and in Israel, from the death of Menahem to the fall of Samaria, it gives 31 years, whereas from 738 (assuming that Menahem died in that year) to 722 there are actually only 16 years. The years assigned by tradition to the reigns in both kingdoms in the middle part of the 8th century B.C. have thus to be materially reduced. But in the following period, from the fall of Samaria in 722 to the capture of Jerusalem by the Chaldaeans in 586, the Biblical dates, so far as we can judge, are substantially correct. (See further the table above.)

4. From the Destruction of Jerusalem in 586 to the close of the Old Testament History. — Here, though it is true that there are events in

the Biblical history which are not fully or unambigu- ously dated, there is otherwise no difficulty. The lengths of the reigns of Nebuchadrezzar and his successors on the throne of Babylon, and also, after the conquest of Babylon, of Cyrus and the following Persian kings, are known from the " Canon of Ptolemy," referred to above, the particulars in which, for the earlier part of this period, are also confirmed by the testimony of the monuments.

See, for further information on the subject, the article Ch ronolog y, and the same heading in the Encyclopedia Biblica, cols. 773-799, with the literature referred to on col. 819 (especially the writings of Noldeke, Wellhausen, and Kamphausen there mentioned).

(S. R. D.)

(B) New Testament 1. Canon.

The New Testament is the collection of the Sacred Books of Christians. It forms in the Bible the distinctive possession of Christians, just as the Old Testament is the collection of Sacred Books which Christians share with Jews. Every term in the definition is significant and has a history. There are, first, the Books; then, the Collection; then, the Sacred Volume, complete as such in idea, though not as yet complete in its actual con- tents; and, lastly, the Sacred Volume in its full dimensions, as it has come down to us.

There is a double development, of quality and of quantity; of quality, as to the estimate formed of the books, their increasing recognition as sacred; and of quantity, by which the books so recognized were gradually brought up to their present number. Our duty will be to describe this double process, and we shall do so under the four heads: (a) The Growth of a specifically Christian Literature; (/3) The Collection of the Books into a single volume, made up of ordered groups; (7) The investing of this volume with the character of a Sacred Book; and (8) The gradual settlement by which the volume assumed its present dimensions, neither less nor more.

The model throughout was the Old Testament. The result was attained when there was a definite volume called the New Testament by the side of the earlier volume called the Old Testament, complete like it, and like it endowed with the attributes of a Sacred Book. This is the consummation towards which events had been steadily moving — not at first consciously, for it was some time before the tendencies at work were con- sciously realized — but ending at last in the complete equation of Old Testament and New, and in the bracketing

together of both as the first and second volumes of a single Bible. This is the process that we shall have to describe. And because the process

before us is the gradual assimilation of New Testament and Old Testament, we shall have to include at each step all that bears upon this. For instance, at starting, it will not be enough for us simply to tell the story how the Books of the New Testament came to be written, but we shall have to point out what there was about them which fitted them to be what they afterwards became, what inherent qualities they possessed which suggested the estimate ultimately put upon them; in others words, how they came to be not only a collection of Christian books, but a collection of Christian sacred books, or part of a Bible.

(a) The Growth of a Christian Literature. 1. The Pauline Epistles. — The Bible of Jesus and His disciples was the Old Testament. And both Jesus and His disciples were to all appearance content with this. It was probably two full decades after the death of Christ before there were any specifically Christian writings at all. The first generation of Christians was not given to writing. There was not only no obvious reason why it should write, but there was a positive reason why it should not write. This reason lay in the dominant attitude of Christians, which was what we call " eschatological." The first genera- tion of Christians lived in the daily expectation that Christ would return from heaven. The truth is, that not only were Christians expecting (as we say) the Second Coming of the Messiah, but what they expected was the Coming. The Messiah, as all Jews conceived of Him, was a superhuman being; and His First Coming as a man among men did not count as really Messianic. The whole first generation of Christians looked intently for His Coming in power and great glory, which they believed to be near at hand. In such a state of mind as this there was no motive for seeking permanence by writing. Men who imagined that they might at any moment be caught up to meet the Lord in the air were not likely to take steps for the instruction of the generations that might come after them.

Hence the first Christian writings were no deliberate product of theologians who supposed themselves to be laying the founda- tion of a sacred volume. They were not an outcome of the dominant tendencies of the time, but they arose rather in spite of them, in the simplest way, just from the practical needs of the moment.

It was thus that St Paul came to write his two epistles to the Thessalonians, the oldest Christian documents that we possess. By

this time he was launched on his missionary labours; he had founded a number of churches, and he was going on to found others. And these earliest epistles are just the substitute for his personal presence, advice which he took occasion to send to his converts after he had left them. There are a few indications that he had sent similar communications to other churches – before, but these have not been preserved. Indeed the wonder is — and it is a testimony to the strength of the impression which St Paul left upon all with whom he came into contact — that these missionary letters of his should have begun to be preserved so soon.

Both Epistles to the Thessalonians have for their object to calm somewhat the excited expectations of which we have spoken.

The first Epistle hits exactly the prominent features in the situation, when it reminds the Thessalonians how they had " turned unto God from idols, to serve a living and true God, and to wait for his Son from heaven," who would deliver them from the wrath to come (1 Thess. i. 9, 10). The turning from idols was of course peculiar to the Gentile communities, but the waiting for the Messiah from heaven was common to all Christians, whatever their origin. In this we may take the epistle as typical of the state of the whole Church at the time. And there is another important passage which shows why, in spite of its natural and occasional character, the epistle exhibits the germs of that essential quality which caused all the books of the New Testament to be so highly estimated. The apostle again reminds his readers how they had received his preaching " not as the word of men, but as it is in truth, the word of God," which showed its power by the way in which it took hold of those who believed in it (1 Thess. ii. ix) The reference is of

course primarily to the spoken word, but the written word had the same qualities as the spoken. It was the deep impression made by these which prepared Christians generally to accept the apostolic writings as inspired, and therefore sacred. There is no greater mistake than to suppose that the estimate formed by the early Church of its Bible was a merely arbitrary verdict imposed by an external authority; it was the expression, and the natural expression (though following certain prescribed lines), of its real sense of the value and

fundamentally divine origin of the writings which it treasured.

Nearest in character to the Thessalonian Epistles are the two to Corinth, which have perhaps an interval of a year and a half between them. When 1 Corinthians was written, the attitude of the Church was still strongly eschatological (1 Cor. i. 7, 8, hi. 13-15, vii. 26, 29-31, xv. 25, 26, 51-54, xvi. 23). The thoughts of men were still set upon the near approach of the end, the troublous times that would issue in the break-up of the existing order and the return of Christ to introduce a new era. There was no idea of constructing a systematic theology; Christ was still the Jewish Messiah, and His Coming was con- ceived of as the Jews conceived of the coming of the Messiah, as a great supernatural event transforming the face of things and inaugurating the reign of God. In view of this approaching revolution, both the Church and the world were regarded as living from hand to mouth. It was useless to attempt to found permanent institutions; everything was provisional and for the moment. And yet, even under these conditions, some practical arrangements had to be made. The epistle is taken up with matters of this kind ; either the apostle, is reproving disorders and abuses actually existing in the Church, and almost sure to exist in a young community that had just adopted a novel method of life and had as yet no settled understanding of the principles involved in it; or else he is replying to definite questions put to him by his converts. In all this the epistle is still a genuine letter, and not a treatise. It only rises from time to time above the level of a letter, through the extraordinary penetration, force, enthusiasm and elevation of feeling that the apostle throws into his treatment of more or less ordinary topics. He can never rest until he has carried up the question of the moment to some higher ground of faith or conduct. It is in this incidental and digressive way that we get the description of the Gospel in i. 18— ii. 16; of the Christian ministry in chs. iii., iv. ; of the principle of consideration for others in ch. ix. ; of the Sacrament of the Lord's Supper in chs. x., xi.; of Christian love in ch. xiii. ; of the Resurrection and its consequences in ch. xv.

2 Corinthians is even more a product of the situation: it is even more taken up with personal relations. No epistle sheds more light on St Paul's character as a man — so mobile, so tactful, so tender and affectionate, and yet so statesmanlike and so commanding. If doctrinal utterances occur from time to time, they are in every case incidental and unpremeditated.

The development of doctrine in St Paul's epistles is due in part to the gradual subsiding of the eschatological temper, but even more to the

growth of controversy. A crisis had arisen in Galatia owing to the invasion of the churches, which St Paul had founded there, by reactionary Jews. This called forth a letter 1 from St Paul, who felt himself compelled to grapple at close quarters with teaching which he saw cut at the very root of his own. He was thus led both to clear up for himself and to state for the sake of others his whole conception of soteriology • — his answer to the question how was man to be set right before God. That was a large part, and at the moment the most crucial part, of the whole problem of religion.

Two or three years later (c. a.d. 55-56) St Paul was bent on paying a visit to Rome. He was not going there straight, but to Jerusalem first. He knew that he could only do this at the

1 The date of this epistle is rather uncertain. Something depends upon the vexed question as to the identity of the Galatian churches. The epistle may be placed conjecturally early in the stay at Ephesus (c. a.d. 52-53). It is to be noted that the chronological grouping of the epistles by minute comparison of style is apt to be deceptive; resemblances of this kind are due more to similarity of subject than to proximity in date.

imminent peril of his life. It seemed very doubtful whether he would accomplish his desire. And therefore he took the oppor- tunity to send to the Romans what is really a summing up, not of the whole of Christianity, but of that side of Christianity which the preceding controversy had brought into special relief. He states his case as part of a larger question still — a question that inevitably became pressing at that particular time — as to the entire religious relation of Jew and Gentile.

These years of shock and conflict could not fail to have marked effect upon the shaping of definite Christian doctrine. They drew attention away from the future to the present, and to the past as leading up to the present. They compelled a man like St Paul to theorize: thought was driven inward; it was made to search for foundations, to organize itself and knit together part with part. And the impulse thus given continued. It showed itself strongly in the epistles of the next group, especially Ephesians and Colossians. These epistles took their form at once from a natural progression of thought and from a new phase of controversy, a sort of Gnosticizing theory, or theories, which perverted Christian practice and impaired the supremacy of Christ by placing other beings or entities by His side. The apostle meets this by renewed emphasis on the central position of Christ; and he at the same time carries a step farther his conception

*of the unity of the Church, as embracing both Jew *nd Gentile. The predominance of this somewhat recondite teaching gave to these epistles even more the character of treatises, which in the case of Ephesians is further enhanced by the fact that it is probably a circular letter addressed not to a single church but to a group of churches. Philemon is of course a pure letter, and Philippians mainly so, the Pastorals, as their name implies, contain advice and instructions to the apostle's lieutenants, Timothy and Titus, in the temporary charge com- mitted to them of churches that the apostle could not visit himself.*

The Epistle to the Hebrews is an epistolary treatise of uncertain date, on the Pauline model, and by a disciple of St Paul or at least a writer strongly influenced by him, though influenced also in no small degree by the Jewish school of Alexandria re- presented by Philo. Of the many theories as to the address, the most plausible are perhaps those which would apply to a single congregation of Hebrew Christians in Rome, or to a local church or group of local churches in Palestine, perhaps like that of which the centre would be at Caesarea. It is not probable that the epistle was addressed to the mother church at Jerusalem.

The above sketch of the growth and general character of the Pauline Epistles is based upon the hypothesis that all thirteen are genuine. But some discrimination should be made in detail. The scepticism which challenges the whole collection may be set aside as radically perverse and unreasonable. Apart from this, the keen criticism of modern times has fastened especially upon two groups: — 2 Thessalonians; Colossians with Philemon, Ephesians and the Pastorals. The present writer would accept without any real hesitation the first of these classes; and the second he would also himself accept, though in regard to this class he would think it right to speak with rather more reserve. This may be said to be the position generally taken up by the leading English scholars; it differs slightly in a conservative direction, but not widely, from that of Harnack, a little more from that of Julicher, and again a little more from that of von Soden.

2 Thessalonians is still questioned by scholars of some note; but when Julicher can say that no question could be raised if it were not for the existence of I Thessalonians (assumed to be genuine), this is practically giving up the whole case, because the objections drawn from 1 Thessalonians are, at least to the present writer, only an example of faulty criticism. Still less is there any valid argument against Philemon. It is a mark of the improved methods now current

in Germany that, whereas in 1886 this epistle was rejected by a scholar as able and sober as Weizsacker, Julicher now pronounces it " among the most assured possessions of the apostle " {EM. 5th ed., p. 112).

But there is an arguable case of some real weight against Colossians, Ephesians, Pastorals — least against Colossians and perhaps most against the Pastorals. Colossians is strongly vouched for by its connexion with Philemon. And the objections to Ephesians are considerably reduced when it is taken as a circular letter. But it should be admitted that, especially in regard to Ephesians and Pastorals, there is a perceptible difference, (a) in style, and (b) in characteristic subject matter, from the standard epistles. If these

later epistles are really the work of St Paul, the difference must be accounted for (a) by a somewhat unusual range of variation in style and thought on his part, and (b) by different environment and different purpose. The question is whether these explanations are adequate. The writer of this is inclined to think that they are. St Paul was in any case an unusual writer, by no means facile or with ready command of expression ; still, he could by an effort express what he wanted, and new situations called up new words and new minor ideas. He was also a writer in whom the physical wear and tear must have been enormous. It might well be believed that the change in the so-called Epistles of the Imprisonment from the earlier epistles was due in part to the physical effects of prolonged confinement, as compared with the free, varied and open life and exciting controversies of earlier years. There is also the uncertain element that may possibly be due to the use of different amanuenses. An argument in favour of the genuineness of the epistles may be ' derived from the fact that each of the doubtful epistles is connected with others that are not doubtful by subtle links both of style and thought. If the reasons suggested above are not adequate, then we must set down the questioned epistles to some disciple of St Paul, who has carried the ideas and principles of his master a step farther or has applied them to a different set of problems and conditions.

2. The Gospels and Acts. — The Gospels and Acts arose in a way very similar to the Pauline Epistles. Here too there was no deliberate

intention of writing a Series of books that should be at once accepted as sacred and authoritative. Here too the expectation of the near return of Christ doubtless delayed for a number of years the desire and need for written compositions. Here too the first steps were taken as the exigencies of the moment dictated. We are again driven to fill up the gaps in our knowledge by conjectures; but some such outline as the following has much to commend it.

When the enterprise of Christian missionaries had gone on for some little time, especially in the regions outside Palestine where there was little or no previous knowledge of Christ and of Christian ideals, the wandering prophets and apostles by whom the missions were mainly conducted must have soon begun to feel the need for some sort of written manual to supplement their own personal teaching. It was one of the characteristics of the early Christian teachers that they rarely stayed for any length of time in a place; they moved on, and the little con- gregation was left to wait for another visitor, who might be some time in coming. How was this interval to be filled ? There would be every degree of preparation, or want of prepara- tion, for the reception of Christian teaching. Some Jews, like those who are described in the Gospel as " waiting for the kingdom of God," would be pious men and women carefully trained in the Old Testament, who would be almost fit for the kingdom even before they had heard of Christ. Other Gentile converts would require instruction in the very rudiments of ethical and monotheistic religion. Between these extremes there would be many shades and degrees of ignorance and knowledge. How could these various cases be met at once most simply and most effectually? We remember that the Christian preachers were preaching before all things a Person, but a Person whose interest for these new converts lay chiefly in the fact that He was about to come and establish a supernatural kingdom for which they had to fit themselves. The best way therefore of helping them to do this was to provide them with an outline of the characteristic teaching of Christ, which should be at the same time a clear statement of His moral demands. It is probable that these requirements suggested the form of the first Christian Gospel, which the writer believes to be rightly identified with the so-called Logia of St Matthew, now often designated by the symbol Q. It did not aim at being a history, and still less a complete history, but it was mainly a collection of sayings or discourses suited to supply a rule of life.*

It would be somewhat later than this, and not until the eschatological outlook became weaker, and men began to turn their regard to the past rather than to the future, that there would gradually arise a more strictly historical interest. There is reason to think that in the

Christian Church this interest did not begin to be active much before the decade a.d. 60-70. Its first conspicuous product was our present Gospel of St Mark, which was probably composed at Rome within the years 64-70. We say advisedly " our present Gospel of St Mark," because

there does not seem to us to be any sufficient reason for pre-supposing an Ur-Marcus, or older form of this Gospel.

These two works, the Logia (or, as some prefer to call it, the Non-Marcan document common to Matthew and Luke) and the Mark-Gospel, were the prime factors in all the subsequent composition of Gospels. Our Matthew and our Luke are just combinations, differently constructed, of these two documents, with a certain amount of additional matter which the editors had collected for themselves. And it is probable that other Gospels of which only fragments have come down to us, like the Gospel according to the Hebrews and the Gospel of Peter, have been built up out of the same materials.

St Luke was the first to write, as we may see from his preface, definitely in the spirit of a historian. He addresses his work to Theophilus, apparently an official person, who had already been taught the main outlines of Christianity. He had planned his work on a large scale; and in Acts we have its second volume. It is an event of no small importance for criticism that so eminent a scholar as Prof. Harnack should have come round to the view, almost universally prevalent in England, that St Luke himself was the final editor and author of both the Third Gospel and the Acts. It is a very secondary question what is their exact date.

The reasons which converge upon the conclusion just ex- pressed as to the origin and nature of the fundamental documents worked up in our present Synoptic Gospels are as follows:—, (i.) The literary analysis of the Synoptic Gospels brings out a number of sections common to Matthew and Luke which probably at one time existed as an independent document, (ii.) This document consisted, in the main though not entirely, of a collection of Sayings of the Lord, which set in strong relief at once His character and the moral and religious ideal that He desired to commend, (iii.) We have an express statement, which must have been originally made before the end of the first century, that the apostle Matthew composed in Hebrew a work described as Logia. This word need not mean, but may quite well and pointedly mean, a collection specially of Sayings, and would still more aptly denote a collection of divine or authoritative

sayings (Xo7ta=prop. ” oracles “). (iv.) We know further that the conditions of early Christian missionary teaching were such as have been described. We learn this especially from the Didache; and the first part of that work, the so-called ” Two- Ways,” is commonly thought to have been in the first instance a Jewish manual put into the hands of proselytes. On our hypothesis the Logia would have been a sort of Christian manual used with a similar object, (v.) We are confirmed in this opinion by the fact that the epistles of St Paul furnish many indications that Christians in general, including those who had not been much in contact with the original Twelve, were well acquainted with the leading features in the character of Christ and in the Christian ideal, although there is little corresponding evidence for their knowledge of details in the life of Christ.

There is a similar statement to the one mentioned above, that like it must have been originally made before the end of the first century, as to a Gospel composed by St Mark on the basis mainly of the preaching of St Peter, though this need not exclude personal experience (as, e.g., perhaps in Mark xiv. 51-52) or information derived from other sources. Only raw materials came from St Peter, and those probably not checked or revised by him; the arrangement is due to Mark himself, and is more successful than might have been expected in the circumstances — indeed so successful as to suggest advice from some good quarter. According to Irenaeus (c. a.d. 185), who is more precise than Clement of Alexandria, the Gospel was not published until after the death of Peter, which would place its composition between the limits a.d. 65 and 70. The phenomena which are sometimes supposed to require the hypothesis of an Ur-Marcus are more simply and satisfactorily explained as incidents in the transmission of the Marcan text.

The matter peculiar to Matthew and Luke raises a number of interesting questions which are still too much sub judice to

be answered decidedly or dogmatically, though approximate and provisional answers may before long be forthcoming. All parts of the problem have been greatly forwarded by the recent publication of important works by Wellhausen and Harnack (see below). The date of the completed Luke depends (a) on whether or not we believe Luke

himself or a later disciple to be the author, and (b) whether or not we believe that the author of Acts had seen Josephus' Antiquities, published in a.d. 93 or 94. Professor Burkitt takes an original line in maintaining that Luke was the author of both works, and yet that he had seen Antiq. The present writer is inclined to think the latter hypo- thesis not proven. The date of Matthew cannot be fixed more nearly than 70-100.

3. The Catholic Epistles.— -The Catholic Epistles were so called in the first instance from their wider and more indefinite address; they were intended for Christians generally, or over some wide area, rather than for a particular church or individual. 2 and 3 John are exceptions, but probably came in under the wing of the larger epistle, which is strictly " catholic." As applied to a class of epistles, the title dates from Eusebius, early in the 4th century; the epithet is given to single epistles by Origen, and is found as far back as the end of the 2nd century. In later Latin usage " catholic " came to mean much the same as " canonical," another name that was also given.

This group of epistles practically continues and supplements the work of the epistles of St Paul. 1 Peter, if genuine, must date from the end of the apostle's career (for the early composition claimed for it by B. Weiss is a paradox that may be disregarded). It was written to instruct and encourage the Christians of Asia Minor at a time of persecution, which on the hypothesis of genuineness, would be the Neronian, i.e. a secondary outbreak perhaps loosely connected with the onslaught in Rome. The Epistle of James (also, if genuine) must be placed late in the life- time of the brother of the Lord. In that case it was probably not written with any direct polemic against writings of St Paul, but against hearsay versions of his teaching that had reached Jerusalem. Controversy of this kind is not always conducted with complete understanding of that which is being opposed. The Epistle of Jude cannot be either dated or localized with any certainty. It seems on the whole most probable that 2 Peter is not a genuine work, but that it came from the same factory of pseudonymous Pe trine writings as the Apocalypse which bears the same name, though the one has, and the other has not, obtained a place within the Canon. This epistle was questioned from the first, and only gained its place with much hesitation, and rather through slackness of opposition than any conclusive- ness of proof. The three Johannine epistles may be more conveniently treated under the next head.

Even in the case of the two more important epistles, r Peter and James, we have to add the qualification " if genuine," but rather

perhaps because of the persistence with which they are challenged than because of inherent defect of attestation. The evidence for 1 Peter is both early in date and wide in range, and the book was one of those that passed as " acknowledged " in antiquity. The evidence for James is not so widely diffused but is found in early writings. Perhaps the position of these two epistles might be described as not unlike that of Colossians and Ephesians. Instead of casting doubt upon them, we should prefer to say that they are both probably genuine, but that there are features about them that are not as yet fully explained. The chief of these features is their relation to the writings of St Paul. There is indeed so much that is Pauline in 1 Peter as to give distinct attractiveness to the hypothesis, which is most elaborately maintained by Zahn, that a larger share than usual in the composition of the letter was left to Silvanus (1 Peter v. 12). Nor does it appear to us that the objections to this theory brought by Dr Chase in his excellent article on the epistle in Hastings' Dictionary are really so fatal as he supposes. The epistle is more the work of a companion of St Paul of- long standing than of one who, with quite different and independent antecedents, had only been influenced by the perusal of one or

two of St Paul's letters. In the Epistle of James we have a really distinct type; and it seems to us that the degree to which the epistle misses its mark as a polemic may be easily and naturally accounted for in more ways than one.

4. The Johannine Writings. — The Gospel and Epistles that bear the name of John, and the Apocalypse, form a group of writings that stand very much by themselves and are still the subject of active discussion. The points in regard to them that would unite the greatest number of suffrages would seem to be these: — (i.) That, except 2 Peter, they are probably the latest of the New Testament writings, and that they form a group closely connected among themselves, though it is not clear how many hands have been at work in them, (ii.) That they arose not far from each other towards the end of the 1st century. The Apocalypse is plausibly dated by Reinach and Harnack near to the precise year 93, and the other writings may be referred to the reign of Domitian (81-96), though many critics would extend the limit to some two decades later, (iii.) The writings are to be connected, either more or less closely, with John of Ephesus, who was a prominent figure towards the end of the 1st century. On the other hand, the greatest differences would be:— (i.) As to the personal identity of this John — is he himself " the beloved disciple " ? Is he the apostle, the son of Zebedee or another? Can the writer of the Apocalypse be the same as the writer of the Gospel and Epistles?

(ii.) What is the exact relation of John of Ephesus to the Gospel ? Is he its author or only the authority behind it? (iii.) How far is the Gospel intended to be, and how far is it, in the strict sense historical? This last question is beginning to overshadow all the rest.

Whatever may be the ultimate decision on these intricate questions, the Fourth Gospel in any case played a very important part in the history of the Church and of Christian theology. It drew together and gathered up into itself the forces at work in the apostolic age; and, by reaching out a hand as it were (through the preface) towards Greek philosophy, it succeeded in so formulating the leading doctrines of Christianity as to make it more acceptable than it had as yet been to the Gentile world, and in securing for the Gospel a place in the main stream of European thought. It is probably true to say that no other primitive Christian writing has had so marked an effect on all later attempts to systematize the Christian creed.

The situation as to the Fourth Gospel has been altered in recent years by the statement attributed to Papias that the two sons of Zebedee (and not only one) were slain by the Jews— a statement which becomes more difficult to put aside as the evidence for it increases (full details in Burkitt, Gosp. Hist. pp. 252-255; E. Schwartz, Uber d. Tod d. Sohne Zebedaei, Berlin, 1904). But this statement does not affect the historical character of John of Ephesus, who is also expressly described by Papias as "a disciple of the Lord " (Eus. H.E. iii. 39. 4). On the other hand, the theory that the Gospel is a thorough-going allegory must be hard to maintain in view of the frequent appeals to " witness " which is several times defined as eye-witness (John i. 15, 32, iii. n, xix. 35, xxi. 24; i John i. 1-3; cf. John v. 36, x. 25). This is borne out by Ignatius with his strong emphasis on the reality of the Gospel history (Eph. xx. 2; Trail, x. ; Smyrn. i. 1, 2, ii., iii. 1-3, v. 2). If the writer of the Gospel were simply inventing his facts, they would be no proof of his thesis (John xx. 31). It is a paradox that he should be invoked " to prove the reality of Jesus Christ " (as against Docetism), and yet that it should be. contended at the same time that for him " ideas, and not events, were the true realities."

5. Other Literat-ure not included in the New Testament. — It must not be thought that the primitive Christian literature came abruptly to an end with the writings that are included in our present New Testament. On the contrary, all round these there was a broad fringe of writings more or less approximating to them in character. Most nearly on the lines of the New Testament are the so-called Apostolic (really Sub-Apostolic) Fathers (Clement of Rome to the Corinthians,

Didache, Barnabas, the letters of Ignatius and the single letter of Polycarp, the Shepherd of Hermas, the homily commonly known as the Second Epistle of Clement). These are in most cases the writings of leading persons in the Church who took up and continued the tradition of the apostles. Barnabas and 2 Clement are more

*eccentric, but the writers must have been persons of some note. Outside this group would come what are called the Apocryphal Gospels and Acts (Gospel according to Hebrews, according to Egyptians, of Peter, of Truth, of the Twelve [or Ebionite Gospel], the recently recovered so-called Logia; the Gospel of Nicodemus, the Protevangelium of James, the Gospel of Thomas, the Acts of Pilate, Acts of Paul, Peter, John, Andrew, Thomas; the Preaching of Peter, the Apocalypse of Peter). As the 2nd century wears on, we come to controversial or philosophical works by Agrippa, Castor, Quadratus, Aristides. With the middle of the century we reach a considerable writer in Justin Martyr. With him *he twilight period which succeeds to the apostolic age is over, and we enter upon the main course of ecclesiastical history. At this point, therefore, our survey may end.*

(/?) The Process of Discrimination and Collection. 1. Dis- crimination. — Throughout the apostolic age Christians were conscious of being carried forward in a great movement, the origin and motive-power of which they regarded as supernatural. It began on the Day of Pentecost, but continued in full tide almost to the end of the 1st century, and, even when it began to subside, it did so quite gradually. The moment of transition is clearly marked in the Didache, where the charismatic ministry of " apostles and prophets " is beginning to give place to per- manent local officials of the Church, bishops, presbyters and deacons. The literature that we now call the New Testament held its place because it was regarded as a product of the palmy days of that great movement. It was considered to be the work of inspired men, of men whom the Holy Spirit, at that time specially active in the Church, had chosen as its organs. We have seen how St Paul, for instance, fully believed that his own preaching had a force behind it which vindicated for it the claim to be " the word of God " (1 Thess. ii. 13); and it was inevitable that the other preachers and teachers should have had in different degrees something of the same consciousness. This conscious- ness receives

perhaps its strongest expression in the Apocalypse.

There is really no contradiction between this sense of a high calling and mission, with a special endowment corresponding to it, and the other fact that the writings from this age that have come down to us are all (except perhaps the Apocalypse, and even the Apocalypse, in seme degree, as we see by the letters to the Seven Churches) strictly occasional and natural in their origin. The Jives and actions of apostles and prophets were in their general tenor like those of other men; it was only that, for the particular purpose of their mission, they found them- selves carried beyond and above themselves. St Paul himself knew when he was speaking by the Spirit, and when he was not; and we too can recognize to some extent when the afflatus comes upon him. It is fortunate that this should be so clearly marked in his epistles, because it enables us to argue by analogy to the other writers. When we come to historical books like the third Gospel and the Acts, we find the writer just pursuing the ordinary methods of history, and not claiming to do anything more (Luke i. 1-4). With the methods of history, these writers were naturally exposed to the risks and chances of error attendant upon those methods. There was hot at first among the writers any idea that they were composing an infallible narrative. The freedom with which they used each other's work, and with which the early texts were transmitted, excludes this. But there was the idea that the whole movement of the Church to which they gave expression was in a special sense divine. And this belief was the fundamental principle that determined the marking off of the writings of the first, or apos- tolic, age from the rest.

At the same time it must not be supposed that a hard and fast line can be drawn beyond which the spiritual stimulus of this first age ceased. The writings of Clement of Rome (a.d. 97) and of Ignatius (c. a.d. no) mark the transition. Ignatius, for in- stance, clearly distinguishes between his own position and that of the apostles: " I do not enjoin you, as Peter and Paul did. They were Apostles, I am a convict; they were free, but I am a slave to this very hour " (Rom. iv. 3). And yet, none the less, Ignatius is conscious of acting and speaking at times from a

kind of inspiration. " Even though certain persons desired to deceive me after the flesh, yet the spirit is not deceived, being from God; for it knoweth whence it cometh and where it goeth, and it searcheth out the hidden things. I cried out, when I was among you; I spake with a loud voice, with God's own voice, give ye heed to the bishops, and the presbyters and deacons " (Philadelph. vii. 1). In like manner Clement, in two places (lix. 1, lxiii. 2), writes as though God were

speaking through him.

2. Collection. — Concurrently with the tendency to discriminate between the higher authority of certain writings and the lower authority of others, there was also a tendency to collect and group together writings of the first class. The earliest example of this tendency is in the case of the Pauline Epistles. Marcion, we know (c. a.d. 140), had a collection of ten out of thirteen, in the order, Gal., 1 and 2 Cor., Rom., 1 and 2 Thess., Laodic. (=Eph.), Col., Phil., Philem. We observe that the Pastorals are omitted. But it is highly probable that the collection went back a full generation before Marcion. The short Epistle of Polycarp contains references or allusions to no less than nine out of the thirteen epistles, including 2 Thess., Eph., 1 and 2 Tim. Ignatius, writing just before, gives clear indications of six, including 1 Tim. and Titus. The inference lies near at hand that both writers had access to the full collection of thirteen, not omitting the Pastorals. Polycarp (ad Phil. xiii. 2) shows how strong was the interest in collecting the writings of eminent men.

It of course did not follow that, because the letters of St Paul were collected, they were therefore regarded as sacred. The feeling towards them at first would be simply an instinct of respect and deference; but we have seen above that the essential conditions of the higher estimate were present all along, and were only waiting to be recognized as soon as reflective thought was turned upon them. This process appears to have been going on throughout the middle years of the 2nd century.

The famous passage of Irenaeus (Adv. Haer. iii. 15. 8) assumes the possession by the Church of four authoritative Gospels and no more. This is the general view of the Church of his time, except the little clique known as the Alogi who rejected the Fourth Gospel, and Marcion. who only recognized St Luke. But here again, we may go back some way farther. Irenaeus writes (c. a.d. 185) as though the Four Gospels had held the field as far back as he can remember. About a.d. 170 Tatian, the disciple of Justin, composed out of these Gospels his Diates- saron. If Justin used any other Gospel, his use of it was very subordinate. Practically we may say that the estimate of the Four to which Tatian and Irenaeus testify must have been well established by the middle of the century, though sporadic instances may be found of the use of other Gospels that did not become canonical. The sifting out of these was proceeding steadily and gradually, and by the end of the century it may be regarded as complete.

We must make allowance for the existence of this margin, and for the blurring of the boundary-line that goes along with it. We cannot claim for the Church absolute sureness of judg- ment as to what falls on one side of the line and what on the other. It is possible, e.g., that a mistake has been made in the case of 2 Peter, which, however, is edifying enough. It is not less possible that writings like 1 Clem, and Epp. Ignat. are not inferior in real religious value to the Epistle of Jude. But, broadly speaking, the judgment of the early Church has been endorsed by that of after ages

Harnack raises an interesting question (Reden u. Aufsatze. ii. 239 ff.), how it came about that Four Gospels were recognized, and not only one. There are many indications early in the 2nd century of a tendency towards the recognition of a single Gospel; for in- stance, there are the local Gospels according to Hebrews, according to Egyptians; Marcion had but one Gospel, St Luke, the Valen- tinians preferred St John and so on; Tatian reduced the Four Gospels to one by means of a Harmony, and it is possible that something of the kind may have existed before he did this. There is probably some truth in the view that the Church clung to its Four Gospels as a weapon against Gnosticism; it could not afford to reduce the number of its documents. But, over and above this, there was probably something in the circumstances in which the

canonical Gospels were composed, and in their early history, which gave them a special prestige in the eyes of the faithful. The story which Eusebius quotes from Clement of Alexandria {H.E. vi. 14) seems to point to something of the kind.

3. Influences at work. — The whole process of the formation of the New Testament was steady and gradual. The critical period, during which the conception grew up of the New Covenant with its sacred book by the side of the Old Covenant, which in its written embodiment we call the Old Testament, extends roughly over the 2nd century. By the last decades of that century a preliminary list of these new Sacred Books had been formed and placed by the side of the Old with substantially the same attributes. We must briefly sketch the process by which this came about, tracing the causes which led to the result and indicating the manner in which they operated.

We have seen that the ultimate cause was the consciousness on the part of the Church that the first age of its own history was characterized by spiritual workings more intense than other times. This feeling had been instinctive, and it found expression in several ways, each one of them partial, when taken alone, but obtaining their full effect in combination. It should be understood that the goal towards which events were moving all the time was the equalizing of the New Testament with the Old Testament.

(a) Public Reading. — From the first the way in which the Epistles of Paul were brought to the knowledge of the churches to which they were addressed was by reading in the public assemblies for worship. This was done by the direction of the apostle himself (1 Thess. v. 27; Col. iv. 16). At first any writing that was felt to be useful for edification was read in this way, especially if it had local associations (cf. Dionysius of Corinth, ap. Eus. H.E. iv. 23. 11). But, as worship became more thoroughly organized, it was invested with increasing solemnity; the freedom of choice was gradually restricted; and inasmuch as lections were regularly taken from the Old Testament, it was only natural that other lections read alongside of them should gradually be placed upon the same footing.

(b) Authority of Christ and the Apostles. — As the words of prophets and lawgivers had from the first carried their own authority with them under the Old Covenant, so from the first the words of Christ needed no commendation from without under the New. And what applied to words of Christ soon came also to apply in their degree to words of the apostles. The only difference was that an authority at first instinctively assumed came to be consciously recognized and formally defined. There was also a natural tendency towards levelling up the different parts of books and groups of books. In other words, the somewhat vague sense of spiritual power and impressiveness hardened into the conception of sacred books united in a sacred volume.

(c) Controversy. — The process was accelerated by the demand for a standard or rule of faith and practice. At an early date in the 2nd century this demand was met by the composition of the oldest form of what we call the Apostles' Creed. But the Creed was but the condensed essence of the New Testament scriptures, and behind it there lay an appeal to these scriptures, which was especially necessary where (as in the case of the Valentinian Gnostics) the dissident bodies professed to accept the common belief of Christians. "^ its conflict with Gnostics, Marcionites and Montanists the Church was led to insist more and more upon its Bible, its own Bible, just as

in its older controversy with the Jews it had to insist on the Bible which it inherited from them. This was a yet further cause of the equating of the two parts of the sacred volume, which went on with an imperceptible crescendo through the first three quarters of the 2nd century, and by the last quarter was fairly complete.

(7) Provisional Canon of New Testament (end of 2nd century). — By the last quarter of the 2nd century the conception of a Christian Bible in two parts, Old Testament and New Testament, may be said to be definitely established. Already at the beginning of this period JVIelito had drawn up a fist of the twenty-two Books of the Old Covenant, i.e. of the documents to which the Old Covenant made its appeal. It was a very short step to the compiling of a similar list for the New Covenant, which by another very short step becomes the New Testament, by the side of the Old Testament. It is therefore not surprising, though a piece of great good fortune, that there should be still extant a list of the New Testament books that may be roughly dated from the end of the century. This list published by Muratori in 1740, and called after him " the Muratorian Fragment on the Canon," is commonly believed to be of Roman origin and to be a trans- lation from the Greek, though there are a few dissentients on

both heads. The list recognized four Gospels, Acts, thirteen epistles of Paul, two epistles of John, Jude, Apocalypse of John and (as the text stands) of Peter; there is no mention of Hebrews or (apparently) of 3 John or Epistles of Peter, where it is possible — we cannot say more — that the silence as to 1 Peter is accidental; the Shepherd of Hermas on account of its date is admitted to private, but not public, reading; various writ- ings associated with Marcion, Valentinus, Basilides and Mon- tanus are condemned.

There are many interesting points about this list, which still shows considerable freshness of judgment, (i.) There are traces of earlier discussions about the Gospels, both in disparagement cf the Synoptics as compared with St John, and in criticism of the latter as differing from the former, (ii.) There is a healthy tendency to lay stress on the historical value of narratives which proceed from eye-witnesses, (iii.) An over-ruling and uniting influence is ascribed to the Holy Spirit, (iv.) The writer is concerned to point out that letters ad- dressed to a single church and even to an individual may yet have a wider use for the Church as a whole, (v.) The sense is not yet lost that the appeal of the Old Testament is as coming from men of pro- phetic gifts, and that of the New Testament as coming from apostles, (vi.) It is in accordance with this that a time limit is placed upon the books included in the New Testament, (vii.) Christians are to be on their

guard against writings put forth in the interest of heretical sects.

When the data of Fragm. Murat. are compared with those supplied by the writers of the last quarter of the 2nd and first of the 3rd centuries (Tatian, Theoph. Ant., Iren., Clem. Alex., Tert., Hippol.), it is seen that there is a fixed nucleus of writings that is acknowledged, with one exception, over all parts'of the Christian world. The exception is the Syriac-speaking Church of Edessa and Mesopotamia. This Church at first acknowledged only the Gospel (in the form of Tatian's Diatessaron) , Acts and the Epistles of Paul. These seem to have been the only books translated immediately upon the foundation of the Edessan Church, though an edition of the separate Gospels must have followed either before or very soon afterwards. In all other churches the four Gospels, Acts and Epistles of Paul are fixed, with the addition in nearly all of 1 Peter, 1 John. The Apocalypse was generally accepted in the West. Hebrews and James were largely accepted in the East.

In the 3rd century the conspicuous figure is Origen (ob. 253), whose principal service was, through the vast range of his know ledge, his travels and his respect for tradition wherever he found it, to keep open the wider limits of the Canon. There is not one of our present books that he does not show himself inclined to accept, though he notes the doubts in "regard to 2 Peter and 2 and 3 John. Later in the century Dionysius of Alexandria applies some acute criticism to justify the Alexandrian dislike of the Apocalypse.

(8) The Final Canon (4th century). — Early in the 4th century Eusebius, as a historian reviews the situation (H.E. iii. 25. 1). He makes three classes; the first, including the Gospels, Acts, Epistles of Paul, 1 Peter, 1 John, is acknowledged; to these, if one likes, one may add the Apocalypse. The second class is questioned, but accepted by the majority; viz. James, Jude, 2 Peter, 2 and 3 John. The third class, of works to be decidedly rejected, contains the Acts of Paul, Hermas, Apocalypse of Peter, Barnabas, Didache ; to these some would add Apoc. of John, and others Ev. sec. Hebr. About the same time another line of tradition is represented by Lucian and the school of Antioch. The vernacular Church of Syria represented yet a third. In Egypt the uncertainty and laxity of usage was still greater. This state of things the great Athanasius set himself to correct, and he did so by laying down a list identical with our New Testament as we have it now. It was very largely the influence of Athanasius that finally turned the scale. He was peculiarly qualified for exercising this influence, as his long exile in the West made him familiar with Western usage, while he was also able to bring to the West the usage

that he was trying to establish in the East. His efforts would be helped by Westerns, like Hilary and Lucifer, who were exiled to the East. The triumph of the Athanasian Canon, indeed, went along with the triumph of Nicene Christianity. And while the movement

received its impulse from Athanasius, the power by which it was carried through and established was largely that of his powerful ally, the Church of Rome.

The final victory was no doubt a little delayed. Asia Minor and Syria were for most of the 4th century divided between the following of Eusebius (Cyril of Jerusalem in a.d. 348, Gregory of Nazianzus, the list of Apost. Can. 85, that attached to Can. 59 of the Council of Laodicea, c. a.d. 363) and the school of Antioeh. The leading members of that school adopted 3 Epp. Cath. (James, 1 Peter, 1 John), Theod. Mops, omitting this group altogether, and the whole school omitting Apoc. Amphilochius of Iconium (c. 380) gives the two lists, Eusebian and Antiochene, as alternatives. The Eusebian list only wanted the complete admission of the Apocalypse to be identical with the Athanasian; and Athanasius had one stalwart supporter in Epiphanius (ob. 403).

The original Syriac list, as we have seen, had neither Epp. Cath. nor Apoc. The Peshito version, in regard to which Professor Burkitt's view is now pretty generally accepted, that it was the work of Rabbula, bishop of Edessa, 411-433, added the 3 Epp. Cath. The remaining 4 Epp. Cath. and Apoc. were sup- plied in the Philoxenian version of 508, and retained in the Harklean revision of 616. But both these were Monophysite and of limited use, and the Nestorians still went on using the Peshito.

Meantime, in the West, an important Synod was held by Damasus at Rome in 382 which, under the dominant influence of Jerome and the Athanasian tradition,drew up a list correspond- ing to the present Canon. This was ratified by Pope Gelasius (492-496), and independently confirmed for the province of Africa by a series of Synods held at Hippo Regius in 393, and at Carthage in 397 and 419, under the lead of Augustine. The formal completion of the whole process in East and West was reserved for the Quinisextine Council (Council in Trullo) of 692. But even after that date irregularities occur from time to time, especially in the East.

In the fixing of the Canon, as in the fixing of doctrine, the decisive influence proceeded from the bishops and the theologians of the period 325-450. But behind these was the practice of the greater churches; and behind that again was. not only the lead of a few distinguished individuals, but the instinctive judgment of the main body of the faithful. It was really this instinct that told in the end more than any process of quasi-scientific criticism. And it was well

that it should be so, because the methods of criticism are apt to be, and certainly would have been when the Canon was formed, both faulty and inadequate, whereas instinct brings into play the religious sense as a whole; with spirit speaking to spirit rests the last word. Even this is not infallible; and it cannot be claimed that the Canon of the Christian Sacred Books is infallible. But experience has shown that the mis- takes, so far as there have been mistakes; are unimportant; and in practice even these are rectified by the natural gravita- tion of the mind of man to that which it finds most nourishing and most elevating.

Bibliography. — The separate articles on the various books of the New Testament may be consulted for detailed bibliographies. The object of the above sketch has been to embrace in constructive outline the ground usually covered analytically and on a far larger scale by Introductions to the New Testament, and by Histories of the New Testament Canon. In English there is a standard work of the latter class in Westcott's General Survey of the History of the ! Canon of the New Testament (first published in 1855, important revision ' and additions in 4th ed. 1874, 7th ed. 1896), with valuable ap- pendix of documents at the end. There was also a useful collection of texts by Prof. Charteris of Edinburgh, Canonicity (1880) , based on Kirchhofer, Quellensamm- lung (1844), but with im- provements. The leading documents are to be had in the handyand reliable Klein e Texte (ed. Lietzmann, from 1902). On Introduction the ablest older English work was Salmon, Historical Introduc- tion to the Study of N.T. (1st ed. 1885, 5th ed. 1891); but,

although still possessing value as argument, this has been more dis- tinctly left behind by the progress of recent years. England has made many weighty contributions both to Introduction and Canoa, especially Lightfoot, Essays on Supernatural Religion (collected in 1889) ; editions of Books of the New Testament and Apostolic Fathers; Westcdtt, editions; Hort, especially Romans and Ephesians (posthumous, 1895); Swete, editions; Knowling and others. The Oxford Society of Historical Theology put out a useful New Testament in the Apostolic Fathers in 1905, and Prof. Stanton of Cambridge,_ The Gospels as Historical Documents (part i. in 1903). Prof. Burkitt's Gospel History and its Transmission appeared in 1906. For introductory matter the student will do well to consult the Dictionary of the Bible (ed. Hastings, 5 vols., 1898-1904) and Encyclopaedia Biblica (ed. Cheyne and Black, 4 vols., 1899-1903). Dr Hastings and his contributors belong more to the right wing of criticism, and Dr Cheyne and his to the left. The systematic Intro- duction is a characteristic production of Germany and has done

excellent service in its day, though there are signs that the analytic method hitherto mainly practised is beginning to give place to something more synthetic or constructive. The pioneer work in this latter direction is Weizsacker's skilful and artistic Apostotisches Zeitalter (1st ed. 1886, 3rd ed. 1901 ; Eng. trans. 1894-1895); somewhat similar on a smaller scale is von Soden, History of Early Christian Literature (trans., 1906). Special mention should be made of Wellhausen on the Synoptic Gospels (1903-1905), and Harnack, Beitrage z. Einleitung in d. N.T. (part i. 1906, part ii. 1907). The most important recent works on Introduction and Canon have been those of H. J. Holtzmann (1st ed. 1885, 3rd ed. 1902); B. Weiss (1st ed. 1886, 3rd ed. 1897); a series of works by Th. Zahn, almost colossal in scale and exhaustive in detail, embracing Gesch. d. njsut. Kandns (2 vols., 1888-1892, third to follow), Forschungen z. Gesch. d. neut. Kan. (7 parts, 1881-1907), Einleitung (2 vols., 1897-1899), Grundriss d. Gesch. d. neut. Kan. (1st ed. 1901, 2nd ed. 1904) ; A. Jiilicher, Einleitung (1st and 2nd ed. 1894, 5th and 6th ed. 1906; Eng._ trans, by Miss Janet Ward, 1904). Zahn and Jiilicher may be said to supplement and correct each other, as they write from very different points of view, and on Julicher's side there is no lackof criticism of his great opponent. Zahn's series is monu-mental in its way, and his Grundriss is very handy and full of closely packed and (in statements of facts) trustworthy matter. Julicher's work is also highly practical, very complete and well proportioned in scale, and up to a certain point its matter is also excellent. The History of the Canon, by the Egyptologist Joh. Leipoldt (Leipzig, 1907), may also be warmly recommended; it is clear and methodical, and does not make the common mistake of assigning too much to secondary causes; the author does not forget that he is dealing with a sacred book, and that he has to show why it was held sacred. (W. Sa.)

2. Texts and Versions.

The apparatus crilicus of the New Testament consists, from one point of view, entirely of MSS. ; but these MSS. may be divided into three groups: (A) Greek MSS., which in practice are known as " The MSS," (B) MSS. of versions in other languages repre- senting translations from the Greek, (C) MSS. of other writings whether in Greek or other languages which contain quotations from the New Testament.

(A) Greek MSS. — These may be divided into classes accord- ing to style of writing, material, or contents. The first method distinguishes between uncial or majuscule, and cursive or minuscule; the second between papyrus, vellum or parchment, and paper (for further

details see Manuscript and Palaeo- graphy) ; and the third distinguishes mainly between Gospels, Acts and Epistles (with or without the Apocalypse), New Testaments (the word in this connexion being somewhat broadly interpreted), lectionaries and commentaries.

Quite accurate statistics on this subject are scarcely attainable. Von Soden's analysis of numbers, contents and date may be tabulated as follows, but it must be remembered that it reckons many small fragments as separate MSS., especially in the earlier centuries. It is also necessary to add that there is one small scrap of papyrus of the 3rd century containing a few verses of the 4th Gospel.

Century

IV.

V.

VI.

VII.

VIII.

IX.

X.

XI.

XII.

XIII.

XIV.

XV.

XVIf.

Total.

New Testaments

2 .

2

1

1

2

2

16

24

44

47

19

7

167

Gospels

3

10

26

10

19

26

82

188

282

260

218

107

46

1277

. Acts and Epistles.

1

1

1

1

4

iq

55

. 49

52

56

31

8

278

Acts- and Catho-

lic Epp. .

1

4

2

3

2

5

25

Pauline Epp..

4

7

1

5

4

1

4

3

3

32

Apocalypse

1

2

3

.5

5

21

6

43

BIBLE

Plate I.

won .r.‘n HNˆMHex ..*

*h k y m R *. k o m AJˆAA *.’ zo M < *Ti e an e%u>ri itt«t>HTn K n k i. 1 1 € t A < iW K M7CTH*

r j c7» c 1 NKinex’i’njki

TM N 1 1 ICTIwdlCTfOfM

*M 5 e ic -taIw *. 1 i#K nvm A.e m HˆScu>.6y«e m«tim»’ v k-akj -J-uj m »‘c*ti»n *!mtˆ*

*Y ri A r V O M T”a’mO y K Kt*M*

L , nA.rJLAd)-roca>MiCMOY

Fig. 1. — Codex Valicanus. {From facsimile ed. by J. Cozza-Luzi, 1889-1890.)

MHI1XMTCCXIVX.010J.OI T

I KJtIIIXN’I’CCAkYKiXMO.IO Ml MINN

‘|TGCXK] , IOM>;|‘W;XOYlllNl’>>U>’|iii : WtlllKNI-COrMDOCWOVVKOYi:! f Mill IXNTCCXICP W IIMCYOYOIM •

g ZnXGYIˆlXC‘1’SXA.flCUKivrvwi

I: ZOHXKMe’nKXOYllOrBOMlH

- *OXOMYU INMVMYM I*

|737-0 XM ””” atI, ” ,, * 1> C«XtClXJl>MVK4U)Kl I &X \U>1NAl’*hii*

XeMHOClDrer’ONVXKXKOClIlX””” HI.VXZU)N*

*K**»tsxu>n ptxh>» nv i vm kxi iX«.n*

*tXU YOTl I fl.VII.VM’l MOM I |XC»1I**~*

rmucrm

niC’i’lHlDCTCOfMUCOICivHM’ W-xiitiNxcu 1 iox«>0”Yt>oncud>i-

*“XOYˆ**-! K.vm4ˆ<.IIWIICU>IIXK|-|V •|”>ˆY< AU> I TOCWlMXMOYiNXKXYXtlOUJUM*

!•■ XTXTI1 I M\CM1 IQX < -l > OY«CM«”

Fig. 3. — Codex Alexandrinus. {British Museum.)

I XCXJYTON RACING

*AMONONmi-KH**

KKKKKAJ 1 1 A NTX r

*‘roycH royM-6N 07**

*v ■T9”Y&HG»‘KGiX > GK*i e n»* Ai HfHCA; »r»qr TO I CTXfH M ATXI H- fcˆrˆM CCHOK’W U**

Fig. 2. — Codex Sinaiticus. {From facsimile published by Palaeo graphical Soc, 1873.)

CRANT \U’I\:a > dUO I’AN’l tKl > inacro

\C > pR.\clx:NˆeNsq > .\!n\pAlXiuaK > suucoNouucn qu» > cooperc 1 us c-ji-vr sciDrriN&cioOecKiˆpAjnus

CTAir \L > l > icRoiio.\i.xvroLXc’riBi dccearscisSfciRAe

I \cce.Niv.r > J > icfrC»4sC > siˆ)tAbel,

*eCCCCCO SClND.VU > RfiC*NtKl >*

GTtXXBOT 1BI L > CCCU > UBUS pORRO UN -V llll Bv 1U” ilWNeB J TC I

Fig. 4. — From a probable Northumbrian Copy of the Codex Amiatinus. (British Museum.)

tmwyvmtttur? x vi n nurtiwntw wctm cMimm$\tU)

& dtigˆi camarem aft ri

Fig. 5. — Pentateuch in Hebrew, 9th Century. (British Museum.) III. 878. v ‘ ‘

Fig. 6. — Vulgate. (From MS. written for the monastery of Ste Marie de Parco, Louvain, a.d. i 148, British Museum.)

Plate II.

BIBLE

utqiKtni;

*t wmwibis &monftu > *0tttt$r*

ibann/fi? lixm tutor tf ftmattf Atrcntv- i tmnutifrtoft bfojp&wmmont, t intfis Mtnuat MttHntlfiint'ifthii' ximfcnn tBttto w w ng gd & fe u an r«ntfltfnnrni&in.&ftdifiR

qugrqutf

ftxlrlttt£ < tour WW

(tttCS'Q(S*

tad Man

,...,. „ˆ.ˆf . w ._.. f ,- yi .ˆ.. „.->,.3$MsP4b

| «tf etotaignaftoteontffi CHatem gmenteijj*

y f qam tquefttfl fttmtyw mwawEfl a!.- {t«t(qtu! flnˆjnaton.fijBUtttffnwiuBaiKwi' tenaftMi

$«ptet$ iriidtfiam

Fig. 7.— 13th Century Latin Bible. (From copy belonging to Robert de Bella, abbot of St 'Augustine's, Canterbury. British Museum.)

uHi m fanae our nmbaiu tmniras.

ftftljabimojpjaiaˆnoutamiamˆ

mn orani

no!

tra 1 tto pauprai antes fatultateo

*tntaa • *fi ffa&iDrto rorpˆtwu tta w*

arora:tantatfautndˆburco:ni4il

*midjiiffif&Xaritae panes eft: betri**

Fig. 9.— The 42-Line Bible. (Printed at Mainz, 1452-6. British Museum.)

35 £bo»g& pK > pbecteitcte& fˆfc , eittmge cedfle, 0: fcn*wleg«*

*perifˆe, yet lone falletb iteuer awaye . $& cure tnorclege ie »np«r-fecte,«n& cure piopbect'enge 19 vnporfecte, 25utnrˆ»tˆatwˆtd)fe perfecw.commetb, then fˆ*l tfce vrtparfecte be Owe «wAˆe. SX>b«n 3 was <* djilfte , 3 (pate #» « d)itoe,*

*- 3»nbcr/Iot>e<»6<»d)jtee,n|'ˆii«gineb<»a<» d)«lce.25»c *s fcoite <*e 3 w*« 4 nM<3 put: rtwaˆe d)iU>tfl?»e8. ETow we ft tboioro « gkfle tn « %"re e (pe<*Jtyige,bBe tbj ft?«l we)c face co f«ce.CTow 3 fcnowe imperfectly: buetbe fl>*l 3r , WW«M»e'<*Oflml?B©wne. tnon?«bˆetˆ faitb, bope,l*ue,t&eje tfcw:*

Fig. ii.— First printed English Bible, 1535. (British Museum.)

cfjmtc fttttt|» twttouAvTwjgty mto (dnilnbc twtfr c£ lauˆis Ctfwiii atfcscifCaeuv Otfjal ve

4jaii luwib avt rt$tyc Wc wbc

I uro almidjittc 1CpaUca$a tmtcˆttid. j traMtoera*iJmift«l& 1 rouitt as a.Utrt dmto.tfHtiwfc*

Fig. 8. — Early Wycliffite Version. (From copy belonging to Thomas of Woodstock, duke of Gloucester, written towards the end of \l,th century. British Museumˆ)

*ifcmftefametite people/ It**

*oxtit v>p into « moimtainc/Ant»tKii be wa*fctt/; kyu t)ifcip[» cam vnto b»" / «"> &« otwieb bj6 niwitb/aift raii0l)ttb«»>fay"'£(t: £ – l # *" *<*

pox?:ciitfp:crc:f<>uf)crai$tb«l : r»0>« > »» c f9 cv,t "', I *» t& : arc they tl;at mournc:fo«bcyf b*lb< comfojteb . Wcflebftre tbc mcFc:fo: rbeyft*" •»b«>'« * tbc««bc.23lcfl«ˆ«y«ˆ c y, ivF)ii>bri0cr«i»t>tbtirfrfoiriˆttˆTc(iKe:fc>«bf>fbalbfull:foJtbcy | b«8' obttync mercy;. Blcflcbarc tbc pure in bm:for tbty ft>«» f« SJˆ • «ˆ feb aretbt iitavntcyricie of peace: fos t&cyfl>» ibt «tt«» rbcd;vˆsciioffjˆ.BItfTci>arttb«)!wb'ˆf«ff«' f P«f« u « cn fo:ri£(b r «vrefiic6faFe; , ro:tb ct ! ;n 3 ! > | 5» t *fs'« , ' ciˆbefllftbbe/fM£! rcateiayou«KW«r**

Fig. 10.— Tyndale's Quarto Edition of New Testament. (Printed by P. Quenlel, Cologne, 1525, from the only remaining fragment, in British Museum.)

CHAP. XIII,

*AHeiftc5 J *- 3h° wexce ” ent ˆ >cue,: ” 3rcno ” thingwcmhwichoutchariDe. 4-Thepraifes*

therofcincl 13 prdation before hope & faith.

tongues of men $ of &n gelsˆnoDauenotdjatttp, ‘ 3lamibecontea £(lbanDftis bˆOeoˆatinklinscvnibal tDonsD? DauetDegtftof p;opi)eGtˆno tmoerOano ail tnptttaes ano all lmott)leose: ano fljousl) 31 I>aaeaufaitt),(ajt6at3 couio remooue • . niotmta*

Fig. 12.

-First Edition of the Authorized Version, 161 1. (British Museum.)

NT. TEXTS]

BIBLE

879

This table says nothing about style of writing or material, but it may be taken as a general rule that MSS: earlier than the 13th century are on vellum and later than the 14th century are on paper, and that MSS. earlier than the 9th century are uncial and later than the 10th are minuscule. There are said to be 129 uncial MSS. of the New Testament (Kenyon, Textual Criticism of the New Testament, p. 45), but it is not easy to be quite accurate on the point.

Besides the MSS. mentioned in the table above, there are 281 MSS. containing commentaries on the Gospels, 169 on Acts and Epistles, 66 on the Apocalypse, 1072 lectionaries of the Gospels and 287 of Acts and Epistles, making a grand total of 3698 MSS. It must be remembered that the dating of the MSS., especially of minuscules, is by no means certain : Greek Palaeo- graphy is a difficult subject, and not all the MSS. have been investigated by competent palaeographers.

The notation of this mass of MSS. is very complicated. There are at present two main systems: (1) Since the time of Wetstein it has been customary to employ capital letters, at first of the Latin and latterly also of the Greek and Hebrew alphabets, to designate the uncials, and Arabic figures to designate the minus- cules. Of this system there are two chief representatives, Gregory and Scrivener. These agree in the main, but differ for the more recently discovered minuscules. Gregory’s notation is more generally used, and Scrivener’s, though still followed by a few English scholars, is likely to become obsolete.

This method of notation has various disadvantages. There are not enough letters to cover the uncials, the same letter has to serve for various fragments which are quite unconnected except by the accident of simultaneous discovery, and no information is given about the MS. referred to. (2) To remedy these drawbacks an entirely new system was introduced in 1902 by von Soden in his Die Schrijten des neuen Testaments, Bd. 1, Abt. 1, pp. 33-40. He abandons the practice of making a distinction between uncial and minuscule, on the ground that for textual criticism the style of writing is less important than the date and contents of a MS. To indicate these he divided MSS. into three classes. (1) New Testaments (the Apocalypse being not regarded as a necessary' part), (2) Gospels, and (3) Acts, Epistles and Apocalypse (the latter again being loosely regarded). These three classes he dis- tinguished as 5(=Sici0)7joj) , e (= evayy eXioe) anda {— aroaroXos) . To these letters he attaches numbers arranged on a principle showing the century to which the MS. belongs, and denning its contents more precisely. The number is determined thus: — MSS. of the 5 and a classes from the earliest period to the 9th century inclusive are numbered 1 to 49; those of the 10th century 50 to 99; for the later centuries numbers of three figures are used, and the choice is made so that the figure in the hundreds' place indicates the century, 1 meaning nth century, 2 meaning 12th century, and so on; to all these numbers the appropriate letter, if it be 5 or a, must be always prefixed, but if it be «, only when there is any chance of ambiguity. In 8 MSS. a distinction is made for those of the nth and subsequent centuries by reserving 1 to 49 in each hundred for MSS. containing the Apocalypse, 50 to 99 for those which omit it. Similarly, in a MSS. a distinction is made according to their contents; the three-figure numbers are reserved for MSS. which contain Acts, Catholic Epistles and Pauline Epistles with or without the Apocalypse, the presence Or absence of which is indicated as in the 5 MSS.; but when a MS. consists of only one part a " 1 " is prefixed, thus making a four-figure number, and the precise part is indicated by the two last of the four figures; 00-19 means Acts and Catholic Epistles, 20-69 means Pauline Epistles and 70-99 means Apocalypse. In the case of e MSS. 1-99 is used for the earliest MSS. up to the 9th century, and as this is insufficient, the available numbers are increased by prefixing a o, and reckoning a second hundred from 01 to 099; 1000 to 1099 are MSS. of the 10th century; 100 to 199 are MSS. of the nth century, 200-299 ot the 12th century, and so on; as this is insufficient, the range of numbers is increased by prefixing a 1, and so obtaining another hundred, e.g. 1100 to 1199, and in the 1 2th and subsequent centuries, where even this is not enough,

by passing on to the thousands and using 2000-2999 for the 1 2th century, 3000-3999 for the 13th and so on. In each case e is prefixed whenever there is any chance of ambiguity. It is claimed that this system gives the maximum of information about a MS., and that it leaves room for the addition of any number of MSS. which are likely to be discovered. At present it has not seriously threatened the hold of Gregory's notation on the critical world, but it will probably have to be adopted, at least to a large extent, when von Soden's text is published.

[The full details of this subject can be found in E. Miller's edition of Scrivener's Introduction to the Criticism of the New Testament (George Bell, 1894); C. R. Gregory's Prolegomena to Teschendorf's Novum Testamenlum Graece, Ed. VIII. critica major (Leipzig, 1894); C, R. Gregory's Textkritik (Leipzig, 1900) ; H. von Soden's Die Schriften des neuen Testaments (Berlin, Band i., 1902-1907) ; F. G. Kenyon's Handbook to the Textual Criticism of the New Testament (London, 1901), especially valuable for a clear account of the Papyri fragments.]

It is neither possible nor desirable to give any description of most of these MSS., but the following are, critically, the most important.

Uncials. — Codex Vaticanus (Vat. Gr, 1209), Greg. B, v. Soden S I ; an uncial MS. of the 4th century. It is written in three columns and has forty-two lines to the column. It originally contained the whole Bible, but in the New Testament £r x Heb. ix. 14, xiii. 25, I and 2 Tim., Tit., Philemon, Apoc,, Vatlcanas – are now missing. It was written by three scribes of whom the writer of the New Testament was identified by Tischendorf as the scribe D of x (cod. Sinaiticus). The text has been corrected by two scribes, one (the 5(op9uT7;s) contemporary with the original writer, the other belonging to the 10th or nth century. The latter probably also re-inked the whole of the MS. and introduced a few changes in the text, though some critics think that this was done by a monk of the 15th century who supplied the text of the lacuna in Heb. and of the Apocalypse from a MS. belonging to Bessarion. The text is the best example of the so-called Neutral Text, except in the Pauline epistles, where it has a strong " Western " element. How this MS. came to be in the Vatican is not known. It first appears in the catalogue of 1481 (Bibj. Vat. MS. Lat. 3952 f. 50), and is not in the catalogue of 1475, as is often erroneously stated on the authority of Vercellone. It was , therefore, probably acquired between the years 1475 and 1481'. The problem of its earlier history is so en tangled with the similar questions raised by x that the two cannot well be discussed separately. [Phototypic*

editions have been issued in Rome in 1889-1890 and in 1905.]

Codex Sinaiticus (St Petersburg, Imperial library), Greg, x, von Soden &2; an uncial MS. of the 4th century. It was found in 1844 by C. Tischendorf (q.v.) in the monastery of St Catherine on Mt. Sinai, and finally acquired by the Slnaitl- tsar in 1869. It is written on thin vellum in four columns cus ‘ of forty-eight lines each to a page. It contained originally the whole Bible, and the New Testament is still complete. At the end it also contains the Ep. of Barnabas and the Shepherd of Hermas, unfortunately incomplete, and there was probably originally some other document between these two. The text was written, accord- ing to Tischendorf, by four scribes, of whom he identified one as also the scribe of cod. Vaticanus. It was corrected many times, especi- ally in the 6th century, by a scribe known as «° and in the 7th by x°. It has, in the main, a Neutral text, less mixed in the Epistles than that of B, but not so pure in the Gospels. The cor- rections of x° are important, as they are based (according to a note by that scribe, at the end of Esther) on an early copy which had been corrected by Pamphilus, the disciple of Origen, friend of Eusebius and founder of a library at Caesarea.

[The text of x was published in Tischendorf ‘s Bibliorum codex Sinaiticus Petropolitanus (vol. iv.,1862), and separately in his Novum Testamenlum Sinaiticum (1863) ; in 1909 it was published in collo- type by the Clarendon Press, Oxford. The relations of k c to Pamphilus are studied by Bousset in ” Textkritische Studien zum N.T.” (in Texte u. XJntersuchungen, xi. 4).]

If Tischendorf was right in identifying the scribe of B with that of part of x, it is obvious that these MSS. probably come from the same place. He was probably wrong, but there are some indications of relationship to justify the same view. The two most probable places seem to be Caesarea and Alexandria. The case for Caesarea is that the colophon written by x° at the end of Esther, and also of Ezra, shows that x was then in the library of Caesarea, and that a chapter division in Acts found both in x and B can also be traced to the same library. This is a fairly strong case, but it falls short of demonstration because it cannot be shown that the MS. corrected by Pamphilus was still at Caesarea when it was used by x, and because it is not certain either that the chapter divisions in Acts were added by the original scribes, or that x and B were at that time in their original home, or that the chapter divisions were necessarily only to be found at Caesarea. The case for Alexandria depends partly on the orthography of B, which resembles

Graeco-Coptic papyri, partly on the order of the Pauline epistles. At present, both in « and B, Hebrews is placed after 2 Thess., but in B there is also a continuous numeration of sections throughout the epistles, according to which I to 58 cover Romans to Galauans, but Ephesians, the next epistle, begins with 70 instead of 59, and the omitted section numbers are found in Hebrews. Obviously, the archetype placed Hebrews between Galatians and Ephesians, but the scribe altered the order and put it between 2 Thess. and 1 Tim., though without changing the section numbers. This older order of the epistles is only found elsewhere in the Sahidic version of the New Testament, and it was probably therefore the old Egyp- tian or Alexandrian order. Moreover, we know from the Festal letter of a.d. 367 (according to the Greek and Syriac texts, but not the Sahidic), that Athanasius then introduced the onier of the epistles which is now given in x B. This is strong evidence for the view that the archetype of B came from Alexandria or the neighbourhood, and was older than the time of Athanasius, but it scarcely proves that B itself is Alexandrian, for the order of epistles which it gives is also that adopted by the council of Laodicea in a.d. 363, and may have been introduced elsewhere, perhaps in Caesarea. A further argument, sometimes based upon and some- times in turn used to support the foregoing, is that the text of K B represents that of Hesychius; but this is extremely doubtful (see the section Textual Criticism below).

[The question of the provenance of x and B may best be studied in J. Rendel Harris, Stichometry (Cambridge, 1893), pp. 71-89; J. Armitage Robinson, " Euthaliana," Texts and Studies, iii. 3 (Cambridge, 1895), esp. pp. 34-43 (these more especially for the connexion with Caesarea) ; A. Rahfls, " Alter und Heimat der vatikanischer Bibelhandschrift," in the Nachrichten der Gesell. der Wiss. zu Gottingen (1899), vol. i. pp. 72-79; and O. von Gebhardt in a review of the last named in the Theologische Literaturzeitung (1899), col. 556.]

Codex Bezae (Cambridge Univ. Nu. 2, 41), Greg. D, von Soden S 5 ; an uncial Graeco-Latin MS. not later than the 6th century and prob- Bezae a ' 3 ' y considerably earlier. The text is written in one

column to a page, the Greek on the left hand page and the Latin on

the right. It was given to the university of Cambridge in 1 58 1, but its early history is doubtful. Beza stated that it came from Lyons and had been always preserved in the monastery of St Irenaeus there. There is no reason to question Beza's bona fides, or that the MS. was obtained by him after the sack of Lyons in 1562 by des Adrets, but there is room for doubt as to the accuracy of his belief that it had been for a long time in the same monastery. His information on this point would necessarily be derived from Protestant sources, which would not be of the highest value, and there are two pieces of evidence which show that just previously the MS. was in Italy. In the first place it is certainly identical with the MS. called ij which is quoted in the margin of the 1550 edition of Robert Stephanus' Greek Testament; this MS. according to Stephanus' preface was collated for him by friends in Italy. In the second place it was probably used at the council of Trent in 1546 by Gul. a Prato, bishop of Clermont in Auvergne, and in the last edition of the Annotationes Beza quotes his MS. as Claromontanus , and not as Lugdunensis. These points suggest that the MS. had only been a short time at Lyons when Beza obtained it. The still earlier history of the MS. is equally doubtful. H. Quentin has pro- duced some interesting but not convincing evidence to show that the MS. was used in Lyons in the 12th century, and Rendel Harris at one time thought that there were traces of Gallicism in the Latin, but the latter's more recent researches go to show that the correc- tions and annotations varying in date between the 7th and 12th centuries point to a district which was at first predominantly Greek and afterwards became Latin. This would suit South Italy, but not Lyons. The text of this MS. is important as the oldest and best witness in a Greek MS. to the so-called " Western " text. (See the section Textual Criticism below.)

[The following books and articles are important for the history, as apart from the text of the MS. Codex Bezae . . . phototypice repraesentatus (Cambridge, 1899); Scrivener, Codex Bezae (Cambridge, 1864); J. Rendel Harris, "A Study of Cod. Bezae," Texts and Studies, i. 1 (Cambridge, 1891); J. Rendel Harris, The Anno- tators of Cod. Bezae (London, 1901); F. E. Brightman and K. Lake, " The Italian Origin of Codex Bezae," in Journal of Theol. Studies, April 1900, pp. 441 ff.; F. C. Burkitt, " The Date of Codex Bezae," in the Journal of Theol. Studies, July 1902, pp. 501 ff. ; D. H. Quentin, " Le Codex Bezae a Lyon, &c," Revue Benidictine, xxxiii. 1, 1906.]

Codex Alexandrinus (G. M. reg. ID v.viii.), Greg. A, von Soden 84; an uncial MS. of the 5th century. It was given by Cyril Lucar, patriarch of Constantinople, to Charles I. in 1621. It appears probable that Cyril Lucar had brought it with him from Alexandria,

of which he had formerly been patriarch. A note by Cyril Lucar states that it was written by Thecla, a noble lady of Egypt, but this is probably merely his inter pretation of an Arabic note of the 14th century which states that the MS. was written by Thecla, the martyr, an obviously absurd legend ; another Arabic note by Athanasius (probably Athanasius III., patriarch c. 1308) states that it was given to the patriarchate of Alexandria, and a Latin note of a later period dates the presenta-

Alexaa- drlnus.

tion in 1098. So far back as it can be traced it is, therefore, ar Alexandrian MS., and palaeographical arguments point in the same direction. Originally, the MS. contained the whole of the Old and New Testaments, including the Psalms of Solomon in the former and 1 and 2 Clement in the latter. It has, however, suffered mutila- tion in a few places. Its text in the Old Testament is thought by some scholars to show signs of representing the Hesychian recension, but this view seems latterly to have lost favour with students of the Septuagint. If it be true, it falls in with the palaeographic indications and suggests an Alexandrian provenance. In the New Testament it has in the gospels a late text of Westcott and Hort's " Syrian " type, but in the epistles there is a strongly marked " Alex- andrian " element. [Cod. A was published in photographic fac- simile in 1879-1880.]

Codex Ephraemi Syri Rescriptus (Paris Nat. Gr. 9), Greg. C, von Soden J 3; an uncial palimpsest (the top writing being that of Ephraem) of the 5th century. It was formerly the pro- Eohraeml perty of Catherine de' Medici, and was probably brought £ , from the east to Italy in the 16th century. Hort (Intro- '

duction, p. 268) has shown from a consideration of displacements in the text of the Apocalypse that it was copied from a very small MS., but this, of course, only holds good of the Apocalypse. It is usually said that this MS., like A, came originally from Egypt, but this is merely a palaeographical guess, for which there is no real evidence. Originally, it contained the whole Bible, but only sixty-four leaves of the Old Testament remain, and 145 (giving about two-thirds of the whole) of the New Testament. The character of the text is mixed with a strong " Alexandrian " element. [Published in fac- simile by Tischendorf (1843). Discussed by Lagarde in his Ges. Abhandlungen, p. 94.]

Codex Claromontanus (Paris Nat. Gr. 107), Greg. D 1 " 1 , von

Soden a 1026; an uncial Graeco-Latin MS. of the 6th century. This MS. also belonged to Beza, who " acquired " it from the monastery of Clermont, near Beauvais. After his death c } aromaam it passed through various private hands and was finally "" u& bought for the French royal library before 1656. It contains the whole of the Pauline epistles with a few lacunae, and has a famous stichometric list of books prefixed in another hand to Hebrews. It is probably the best extant witness to the type of Greek text which was in use in Italy at an early time. It is closely connected with cod. Sangermanensis (a direct copy) at St Petersburg, Greg. E'"" 1 , von Soden a 1027; cod. Augiensis (Cambridge, Trin. Coll. B xvii. 1)', Greg. F 1 "" 11 , von Soden a 1029; and cod. Boernerianus (Dresden K Bibl.), Greg. G"""" 1 , von Soden o 1028. [The text is published in Teschendorf's Codex Claromontanus (1852). Its relations to EFG are best discussed in Westcott and Hort's Introduction, §§ 335"337\l

There are no other uncials equal in importance to the above. The next most valuable are probably cod. Regius of the 8th century at Paris, Greg. L, von Soden e 56, containing the Gospels; cod. Laudianus of the 7th century at Oxford, Greg. E, von Soden a 1001,, a Latino-Greek MS. containing the Acts; cod. Coislinianus of the 6th century in Paris, Turin, Kiev, Moscow and Mt. Athos, Greg. H wul , von Soden a 1022, containing fragments of the Pauline epistles; and cod. Augiensis of the 9th century in Trinity College, Cambridge, Greg. F"""" 1 , von Soden o 1029, a Graeco-Latin MS. closely related to cod. Claromontanus. [Further details as to these MSS. with bibliographies can be found in Gregory's Prolegomena to Tischendorf 's N.T. ed. maj. viii.]

Minuscules. — Very few of these are of real importance. The most valuable are the following : —

*1. The Ferrar Group; a group of eight MSS. known in Gregory's notation as 13, 69, 124, 346, 543, 788, 826, 828, or in von Soden's as t 368, S 505, « 1211, « 226, e 257, e 1033, e 218, e 219, all which, except 69, in spite of the dating implied by von Soden's notation were probably written in the 12th century in Calabria. They have a most peculiar text of a mainly " Western " type, with some special affinities to the Old Syriac and perhaps to the Diatessaron. They are known as the Ferrar group in memory of the scholar who first published their text, and are sometimes quoted as * (which, however, properly is the symbol for Codex Beratinus of the Gospels), and sometimes as fam. 13 .*

2. Cod. I and its Allies; a group of four MSS. known in Gregory's

notation as I, 118, 131, 209, and in von Soden's as 5 50, e 346, S 467 and S 457. The dating implied by the latter notation is wrong, as I certainly belongs to the 12th, not to the loth century, and 118 is probably later than 209. It is sometimes quoted as fam. 1 Fam. 1 and /am. 13 probably have a common archetype in Mark which is also represented by codd. 28 (t 168), 565 (e 93, quoted by Tischendorf and others as 2) and 700 (<■ 133, quoted by Scrivener and others as 604). It seems to have had many points of agreement with the Old Syriac, but it is impossible to identify the locality to which it belonged. Other minuscules of importance are cod. 33 (S 48) at Paris, which often agrees with k BL and is the best minuscule repre- sentative of the " Neutral " and " Alexandrian " types of text in the gospels; cod. 137 (a 364) at Milan, a valuable "Western" text of the Acts ; a 78 (not in Gregory) in the Laura on Mt. Athos, a MS. of the Acts and epistles, with an early (mixed) type of text and textual comments and notes from Origen.*

[The text of the Ferrar group was published after Ferrar's death

N.T. VERSIONS]

BIBLE

881

by T. K. Abbott, A Collation of Four Important MSS. of the Gospels (Dublin, 1877). It is best discussed by Rendel Harris's books, The Origin of the Leicester Codex (1887), The Origin of the Ferrar Group (1893), and The Ferrar Group (1900), all published at Cam- bridge ; the text of /am. 1 with a discussion of its textual relations is given in K. Lake's " Codex I and its Allies " {Texts and Studies, vii. 3, 1902) ; 565 was edited by J. Belsheim in Das Evang. des Marcus nach d. griech. Cod. Theodorae, &c. (Christiania, 1885), many corrections to which are published in the appendix to H. S. Cronin's " Codex Purpureus," Texts and Studies, v. 4; 700 was published by H. C. Hoskier in his collation of cod. Evan. 604, London, 1890; o 78 is edited by E. von der Goltz in Texte und Untersuchungen, N.F. ii. 4.]

(B) The Versions. — These are generally divided into (a) primary and (fi) secondary; the former being those which represent translation made at an early period directly from Greek originals, and the latter being those which were made either from other versions or from late and unimportant Greek texts.

(a) The primary versions are three — Latin, Syriac and Egyptian.

Latin Versions. — 1. The Old Latin. According to Jerome's letter to Pope Damasus in a.d. 384, there was in the 4th century Old Latin a £ reat val "iety of text in the Latin version, " Tot enint exemplaria pene quot codices." This verdict is confirmed by examination of the MSS. which have pre-Hieroriymian texts. It is customary to quote these by small letters of the Latin alphabet, but there is a regrettable absence of unanimity in the details of the notation. We can distinguish two main types, African and European. The African version is best represented in the gospels by cod. Bobiensis (k) of the 5th (some say 6th) century at Turin, and cod. Palatinus (e) of the 5th century at Vienna, both of which are imperfect, especially k, which, however, is far the superior in quality; in the Acts and Catholic epistles by cod. Floriacensis (f , h. or reg.) of the 6th century, a palimpsest which once belonged to the monks of Fleury, and by the so-called speculum (m) or collection of quotations formerly attributed to Augustine but probably connected with Spain. This scanty evidence is dated and localized as African by the quotations of Cyprian, of Augustine (not from the gospels), and of Primasius, bishop of Hadrumetum (d. c. 560), from the Apocalypse. It is still a disputed point whether Tertullian's quotations may be regarded as evidence for a Latin version or as independent translations from the Greek, nor is it certain that this version is African in an exclusive sense; it was undoubtedly used in Africa and there is no evidence that it was known elsewhere originally, but on the other hand there is no proof that it was not. The European version is best represented in the gospels by cod. Vercellensis (a) of the 5th century and cod. Vero- nensis (b) of the same date (the latter being the better), and by others of less importance. It is possible that a later variety of it is found in cod. Monacensis (q) of the 7th century, and cod. Brixianus (f) of the 6th century, and this used to be called the Italic version, owing (as F. C. Burkitt has shown) to a misunderstanding of a remark of Augustine about the " Itala " which really refers to the Vulgate. In the Acts the European text is found in cod. Gigas (g or gig) of the 13th century at Stockholm, in a Perpignan MS. of the 12th century (p), published by S. Berger, and probably in cod. Laudianus (e) of the 7th century at Oxford. In the Catholic epistles it is found in cod. Corbeiensis (f or ff) of the 10th century at St Petersburg. In the Pauline epistles it is doubtful whether it is extant at all, though some have found it in the cod. Claro-montanus (d) and its allies. In the Apocalypse it is found in cod. Gigas.

The main problem in connexion with the history of the African and European versions is whether they were originally one or two. As

they stand at present they are undoubtedly two, and can be distinguished both by the readings which they imply in the under- lying Greek, and by the renderings which they have adopted. But there is also a greater degree of similarity between them than can be explained by accidental coincidence, and there is thus an a priori case for the theory that one of the two is a revision of the other, or that there was an older version, now lost, which was the original of both. If one of the two is the original it is probably the African, for which there is older evidence, and of which the style both in reading and rendering seems purer. The chief argument against this is that it seems paradoxical to think of Africa rather than Rome as the home of the first Latin version; but it must be remembered that Roman Christianity was originally Greek, and that the beginnings of a Latin church in Rome seem to be surpris- ingly late.

[Editions of Old Latin MSS. are to be found in Old Latin Biblical Texts, i.-'w. (Oxford) ; in Migne's Patrologia Latina, torn. xii. ; and their history is treated especially in F. C. Burkitt's " Old Latin and the Itala " (Texts and Studies, iv. 3), as well as in all books dealing with Textual Criticism generally; other important books are Ronsch's Itala und Vulgaia (1875); Corssen's Der cyprianische Text der Acta Apostolorum (Berlin, 1892); Wordsworth and Sanday on the " Corbey S. James " in Studia Biblica, i. (1885) ; the article

on the " Old Latin Version," in Hastings' Dictionary of the Bible. For the textual character and importance of these versions see the section Textual Criticism below.]

2. The Vulgate or Hieronymian version. To remedy the con- fusion produced by the variations of the Latin text Pope Damasus asked Jerome to undertake a revision, and the latter published a new text of the New Testament in A.D. 384 Vulgate. and the rest of the Bible probably within two years. This version gradually became accepted as the standard text, and after a time was called the " Vulgata," the first to use this name as a title being, it is said, Roger Bacon. In the Old Testament Jerome made a new translation directly from the Hebrew, as the Old Latin was based on the LXX., but in the New Testament he revised the existing version. He did this fully and carefully in the gospels, but some- what superficially in the epistles. He seems to have taken as the basis of his wort the European version as it existed in his time, perhaps best represented by cod. Monacensis (q) of the 7th century, and by the quotations in Ambrosiaster, to which cod. Brixianus (f) of the 6th century would be added if it were not probable that it is merely a Vulgate MS. with intrusive elements. This type of text he revised with the help of Greek MSS. of a type

which does not seem to correspond exactly to any now extant, but to resemble B more closely than any others.

Of Jerome's revision we possess at least 8000 MSS., of which the earliest may be divided (in the gospels at all events) into groups connected with various countries; the most important are the Northumbrian, Irish, Anglo-Irish and Spanish, but the first named might also be called the Italian, as it represents the text of good MSS. brought from Italy in the 7th century and copied in the great schools of Wearmouth and Jarrow. One of the most important, cod. Amiatinus, was copied in this way in the time of Ceolfrid, Benedict Biscop's successor, as a present for Pope Gregory in 716. From these MSS. the original Hieronymian text may be recon- structed with considerable certainty. The later history of the version is complicated, but fairly well known. The text soon began to deteriorate by admixture with the Old Latin, as well from the process of transcription, and several attempts at a revision were made before the invention of printing. Of these the earliest of note were under- taken in France in the 9th century by Alcuin in 801, and almost at the same time by_ Theodulf , bishop of Orleans (787-821). In the nth century a similar task was undertaken by Lanfranc, arch- bishop of Canterbury (1069-1089) ; in the 12th century by Stephen Harding (1 109), third abbot of Citeaux, and by Cardinal Nicolaus Maniacoria (1150), whose corrected Bible is preserved in the public library at Dijon. But these were not successful, and in the 13th century, instead of revisions, attempts were made to fix the text by providing correctoria, or lists of correct readings, which were the equivalent of critical editions; of these the chief are the Parisian, the Dominican (prepared under Hugo de S. Caro about 1240), and the Vatican. In the 15th century the history of the printed Vulgates begins. The earliest is the Mentz edition of 1452-1456 (the Mazarin or " 42-line" Bible), but the earliest of a critical nature were those of Robert Etienne in 1528 and 1538-1540. In 1546 the council of Trent decided that the Vulgate should be held as authentica, and in 1590 Pope Sixtus V. published a new and authoritative edition, which was, probably at the instigation of the Jesuits, recalled by Pope Clement VIII. in 1592. In the same year, however, the same pope published another edition under the name of Sixtus. This is, according to the Bull of 1592, the authoritative edition, and has since then been accepted as such in the Latin Church. The critical edition by J. Wordsworth (bishop of Salisbury) and H. J. White probably restores the text almost to the state in which Jerome left it.

[The text of the Vulgate may be studied in Wordsworth and White, Novum Testamentum Latine; Corssen, Epistula ad Galatas. Its

history is best given in S. Berger's Histoire de la Vulgate (Paris, 1893), in which a good bibliography is given on pp. xxxii.-xxxiv. The section in Kenyon's handbook to the Textual Criticism of the New Testament is particularly clear and full.]

Syriac Versions. — 1. The Old Syriac. This is only known to us at present through two MSS. of the gospels, containing the Evan- gelion da-Mepharreshe, or separated gospel, probably so called in distinction to Tatian's Diatessaron. These old MSS. are known as the Curetonian and Sinaitic. The ' Syriac. Curetonian is a MS. of the 5th century. The fragments of it which we possess are MS. Brit. Mus. addit. 14,451, which was brought in 1842 from the monastery of St Mary in the Nitrian desert, and was edited by Cureton in 1858; and three leaves in Berlin (MS. Orient. Quart. 528) which were bought in Egypt by H. Brugsch and published by A. Roediger in 1872. It was given to the monas- tery of St Mary in the loth century, but its earlier history is unknown. It contained originally the four gospels in the order Mt., Mk.,Jo.,Lc. It is generally quoted as Syr our or Syr C. The Sinaitic was discovered in 1892 by Mrs Lewis and Mrs Gibson in the library of St Catherine's monastery on Mt. Sinai, where it still remains, and was published in 1894 by R. L. Bensly, J. Rendel Harris and F. C. Burkitt, with an introduction by Mrs Lewis. It is a palimpsest MS., and the upper writing (lives of saints), dated a.d. 778. is the work of " John, the anchorite of Beth Mari Qanon, a monastery of Ma'arrath Mesren city in the district of Antioch." This town is

between Antioch and Aleppo; though the monastery is otherwise unknown, it seems probable that it was the source of many of the MSS, now at Sinai. The under writing seems to be a little earlier than that of the Curetonian; it contains the gospels in the order Mt., Ma, La, Jo. with a few lacunae. There is no evidence that this version was ever used in the Church services: the Diatessaron was always the normal Syriac text of the gospels until the introduction of the Peshito. But the quotations and references in Aphraates, Ephraem and the Acts of Judas Thomas show that it was known, even if not often used. It seems certain that the Old Syriac version also contained the Acts and Pauline epistles, as Aphraates and Ephraem agree in quoting a text which differs from the Peshito, but no MSS.

containing this text are at present known to exist. – [The text of this version is best given, with a literal English translation, in F.C. Burkitt's Evangelion da Mepharreshe (Cambridge, 1904).]

2. The Peshito (Simple) Version. This is represented by many MSS. dating from the 5th century. It has been proved almost to peshito. demonstration by F. C. Burkitt that the portion contain- ing the gospels was made by Rabbula, bishop of Edessa

(411), to take the place of the Diatessaron, and was based on the Greek text which was at that time in current use at Antioch. The Old Testament Peshifo is a much older and quite separate version. The exact limits of Rabbula's work are difficult to define. It seems probable that the Old Syriac version did not contain the Catholic epistles, and as these are found in the Peshito they were presumably added by Rabbula. But he never added 2 Peter, Jude, 2 and 3 John, or the Apocalypse, and the text of these books, which is sometimes bound up with the Peshito, really is that of the Philoxenian or of the Harklean version. A comparison of the Peshito with quotations in Aphraates and Ephraem shows that Rabbula revised the text of the Acts and Pauline epistles, but in the absence of MSS. of the Old Syriac for these books, it is difficult to define the extent or character of his work. The Peshito is quoted as Syr P, Pesh., and Syrsch (because Tischendorf followed the edition of Schaaf).

[The best text of the Peshito is by G. H. Gwilliam, Tetraevan- gelium Sanctum (Oxford, 1901); its relations to Rabbula's revision are shown by F. C. Burkitt, " S. Ephraim's quotations from the Gospel " (Texts and Studies, vii. 2, Cambridge, 1901), which renders out of date F. H. Woods's article on the same subject in Studia Biblica, iii. pp. 105-138.]

3. The Philoxenian Version. This is known, from a note extant in MSS. of the Harklean version, to have been made in a.d. 508 Phllox- ˆ or Philoxenus, bishop of Hierapolis, by Polycarpus, a eniaa. chorepiscopus. No MSS. of it have survived except in

2 Peter, Jude, 2 and 3 John and the Apocalypse. The four former are found in some MSS. of the Peshito, as the Philoxenian was used to supply these epistles which were not in the older version, and the Apocalypse was published in 1892 by Dr Gwynn from a MS. belonging to Lord Crawford.

[This version may be studied in Isaac H. Hall's Williams MS. (Baltimore, 1886); in the European editions of the Syriac Bible so

far as the minor Catholic epistles are concerned; in Hermathena, vol. vii. (1890), pp. 281-314 (article by Gwynn) ; in Zeitschrifi fur Assyriologie, xii. and xiii. (series of articles by Merx) ; in Gwynn's The Apocalypse of St John in a Syriac Version (Dublin, 1897).]

4. The Harklean Version. This is a revision of the Philoxenian made in 616 by Thomas of Harkel (Heraclea), bishop of Hierapolis. Harklean. ˆ was apparently an attempt to replace the literary free-dom of the Philoxenian by an extreme literalness. It

represents in the main the text of the later Greek MSS., but it has important textual notes, and has adopted a system of asterisks and obeli from the Hexaplar LXX. The source of these notes seems to have been old MSS. from the library of the Enaton near Alex- andria. The marginal readings are therefore valuable evidence for the Old Alexandrian text. This version is quoted as Syr H (and when necessary Syr He or Syr H me) and by Tischendorf as Syr B (= Syra posterior). It should be noted that when Tischendorf speaks of Syr utr he means the Peshito and the Harklean.*

[There is no satisfactory critical edition of this version, nor have the Philoxenian and the Harklean been disentangled from each other. The printed text is that published in 1778-1803 by J. White at Oxford under the title Versio Philoxenia; for the marginal notes see esp. Westcott and Hort, Introduction, and for Acts, Pott's Abendldndischc Text der Apostelgesch. (Leipzig, 1900).]

5. The Palestinian or Jerusalem Version. This is a lectionary which was once thought to have come from the neighbourhood of

Jerusalem, but has been shown by Burkitt to come from that of Antioch. It was probably made in the 6th century in connexion with the attempts of Justinian to abolish

Judaism. Usually quoted as SyrPa and by Tischendorf as Syr 1 ””. [The text may be found in Lewis and Gibson's The Palestinian

Syriac Lectionary (London, 1899), (Gospels), and in Studia Sinaitica,

part vi. (Acts and Epistles) ; its origin is discussed best by F. C.

Burkitt in the Journal of Theological Studies, vol. ii. (1901), pp.

174-183.]

6. The Karkaphensian. This is not a version, but a Syriac " Massorah " of the New Testament, i.e. a collection of notes on the texts. Probably emanates from the monastery of the Skull. Little is known of it and it is unimportant.

Pales- tinian,

[See Gwilliam's "Materials for the Criticism of the Peshito N.T." in Studia Biblica, iii. esp. pp. 60-63.]

7. Tatian's Diatessaron. This is something more than a version. It was originally a harmony of the four gospels made by Tatian, the pupil of Justin Martyr, towards the end of the 2nd cen- _. .. , tury. In its original form it is no longer extant, but it • "n'tes- exists in Arabic (published by Ciasca) and Latin (cod. sar 'g n •> ' Fuldensis) translations, in both of which the text has un- fortunately been almost entirely conformed to the ordinary type. These authorities are, therefore, only available for the reconstruction of the order of the selections from the gospels, not for textual criticism properly so called. For the latter purpose, however, we can use an Armenian translation of a commentary on the Diatessaron by Ephraem, and the quotations in Aphraates. The Diatessaron appears to have been the usual form in which the gospels were read until the beginning of the 5th century, when the Peshito was put in its place, and a systematic destruction of copies of the Diatessaron was undertaken.

[The Diatessaron may be studied in Zahn, " Evangelien- harmonie," article in the Protestantische Realencyklopadie (1898); J. H. Hill, The Earliest Life of Christ (Edinburgh, 1893); J. Rendel Harris, Fragments of the Commentary of Ephraim the Syrian (London, ! 895); F. C. Burkitt, Evangelion da Mepharreshe (Cambridge, 1904, vol. ii.).]

Inter-relation of Syriac Versions. — The relations which subsist between the various Syriac versions remain to be discussed. There is little room for doubt that the Harklean was based on the Phil- oxenian, and the Philoxenian was based on the Peshito, the revision being made in each case by the help of the Greek MSS. of the day, but the relations which subsist between the Old Syriac, the Diates- saron and the Peshito are a more difficult question. There are now but few, if any, scholars who think that the Peshito is an entirely separate version, and the majority have been convinced by Burkitt and recognize (1) that the Peshito is based on a knowledge of the Old Syriac and the Diatessaron; (2) that it was made by Rabbula with the help of the contemporary Greek text of the Antiochene Church. _

But there is not yet the same degree of consensus as to the relations between the Old Syriac and the Diatessaron. Here it is necessary to distinguish between the original text of the Old Syriac and the existing MSS. of it — Cur. and Sin. There is no question that many passages in these show signs of Diatessaron influence, but this is only to be expected if we consider that from the end of the 2nd to the beginning of the 5th century the Dia- tessaron was the popular form of the gospels. A large discount has therefore to be made from the agreements between Diatessaron and Syr. S and C. Still, it is improbable that this will explain everything, and it is generally conceded that the original Dia- tessaron and the original Old Syriac were in some way connected. The connexion is variously explained, and efforts have been made to show on which side the dependence is to be found. The most probable theory is that of Burkitt. He thinks that the first Syriac translation was that of Tatian (c. A.D. 175), who brought the Dia- tessaron from Rome and translated it into Syriac. There, in the last days of the 2nd century, when Serapion was bishop of Antioch (a.d. 190-203), a new start was made, and a translation of the " separated Gospels " (Evangelion da Mepharreshe) was made from the MSS. which was in use at Antioch. Probably the maker of this version was partly guided, especially in his choice of renderings, by his knowledge of the Diatessaron. Nevertheless, the Diatessaron remained the more popular and was only driven out by Theodoret and Rabbula in the 5th century, when it was replaced by the Peshito. If this theory be correct the Syriac versions represent three distinct Greek texts: — (1) the 2nd-century Greek text from Rome, used by Tatian ; (2) the 2nd-century Greek text from Antioch, used for the Old Syriac; (3) the 2nd-century Greek text from Antioch, used by Rabbula for the Peshito.

[The best discussion of this point is in vol. ii. of Burkitt's Evan- gelion da Mepharreshe.]

Egyptian Versions. — Much less is known at present about the history of the Egyptian versions. They are found in various dialects of Coptic, the mutual relations of which are not Coptic. yet certain, but the only ones which are preserved with any completeness are the Bohairic, or Lower Egyptian, and Sahidic, or Upper Egyptian, though it is certain that fragments of inter- mediate dialects such as Middle Egyptian, Fayumic, Akhmimic and Memphitic also exist. The Bohairic has been edited by G. Horner. It is well represented, as it became the official version of the Coptic Church; its history is unknown, but from internal evid- ence it seems to have been made from good Greek MSS. of the type of XBL, but the date to which this points depends largely on the general view taken of the history of the

text of the New Testament. It need not, but may, be earlier than the 4th century. The Sahidic is not so well preserved. G. Horner's researches tend to show that the Greek text on which it was based was different from that repre- sented by the Bohairic, and probably was akin to the " Western " text, perhaps of the type used by Clement of Alexandria. Un- fortunately none of the MSS. seems to be good, and at present it is impossible to make very definite use of the version. It is possible that this is the oldest Coptic version, and this view is supported by the general probabilities of the spread of Christianity in Egypt.

which suggest that the native church and native literature had their strength at first chiefly in the southern parts of the country. It must be noted that Westcott and Hort called the Bohairic Mem- phitic, and the Sahidic Thebaic, and Tischendorf called the Bohairic Coptic.

[See G. Horner's The Coptic Version of the New Testament in the Northern Dialect (Oxford); Scrivener's Introduction (ed. Miller), vol. ii. pp. 91-144; and especially an article on " Egyptian Ver- sions " in Hastings' Dictionary of the Bible, vol. i. by Forbes Robinson.]

(ff) Among the secondary versions the only one of real importance is the Armenian.

The Armenian Version. — The early history of this version is obscure, but it seems probable that there were two translations Armenian. ma -de in the 4th century: (1) by Mesrop with the help of Hrofanos (Rufinus?) based on a Greek text; (2) by Sahak, based on Syriac. After the council of Ephesus (a. d. 430) Mesrop and Sahak compared and revised their work with the help of MSS. from Constantinople. The general character of the version is late, but there are many places in which the Old Syriac basis can be recognized, and in the Acts and Epistles, where the Old Syriac is no longer extant, this is sometimes very valuable evidence.

[See Scrivener (ed. Miller) vol. ii. pp. 148-154; Hastings' Dictionary of the Bible, article on " The Armenian Versions of the New Testa- ment," by F. C. Conybeare; J. A. Robinson, " Euthaliana " {Texts and Studies, iii. 3), cap. 5; on the supposed connexion of Mark xvi. 8 ff. with Aristion mentioned in this version, see esp. Swete's The

Gospel according to St Mark (London, 1902), p. cxi.]

Other secondary versions which are sometimes quoted are the Gothic, Ethiopic, Georgian, Arabic, Anglo-Saxon, Frankish and Persic. None has any real critical importance; details are given in Gregory's Prolegomena and in Scrivener's Introduction.

(C) Quotations in Patristic Writings. — The value of this source of evidence lies in the power which it gives us to date and localize texts. Its limitations are found in the inaccuracy of quotation of the writers, and often in the corrupt condition of their text. This latter point especially affects quotations which later scribes frequently forced into accord with the text they preferred.

All writers earlier than the 5th century are valuable, but particularly important are the following groups: — (1) Greek writers in the West, especially Justin Martyr, Tatian, Marcion, Irenaeus and Hippolytus; (2) Latin writers in Italy, especially Novatian, the author of the de Rebaptismate and Ambrosiaster; (3) Latin writers in Africa, especially Tertullian and Cyprian; (4) Greek writers in Alexandria, especially Clement of Alexandria, Origen, Athanasius and Cyril; (5) Greek writers in the East, especially Methodius of Lycia and Eusebius of Caesarea; (6) Syriac writers, especially Aphraates and Ephraem; it is doubtful whether the Diatessaron of Tatian ought to be reckoned in this group or in (1). None of these groups bears witness to quite the same text, nor can all of them be identified with the texts found in existing MSS. or versions, but it may be said with some truth that group 2 used the European Latin version, group 3 the African Latin, and group 6 the Diatessaron in the gospels and the Old Syriac elsewhere, while group 1 has much in common with cod. Bezae, though the difference is here somewhat greater. In group 4 the situation is more complex; Clement used a text which has most in common with cod. Bezae, but is clearly far from identical; Origen in the main has the text of X B ; Athan- asius a somewhat later variety of the same type, while Cyril has the so-called Alexandrian text found especially in L. Group 4 has a peculiar text which cannot be identified with any definite group of MSS. For further treatment of the importance of this evidence see the section Textual Criticism below.

[There is as yet but little satisfactory literature on this subject. Outstanding work is P. M. Barnard's " Clement of Alexandria's Biblical Text " (Texts and Studies, v. 5), 1899; Harnack's " Eine Schrift Novatians," in Texte mid Untersuchungen, xiii. 4; Souter's "Ambrosiaster " in Texts and Studies, vii. 4; the Society of His-

torical Theology's New Testament in the Apostolic Fathers; an article by Kostschau, " Bibelcitate bei Origenes," in the Zeitschrift f. wissenschaftliche Theologie (1900), pp. 321-378; and on the general subject especially Ncstle's Einfiihrung in das griechische Neue Testament (Gottingen, 1909), pp. 159-167.] (K. L.)

3. Textual Criticism.

The problem which faces the textual critic of the New Testa- ment is to reconstruct the original text from the materials supplied by the MSS., versions, and quotations in early writers, which have been described in the preceding section on the apparatus criticus. His object, therefore, is to discover and remove the various corruptions which have crept into the text, by the usual methods of the textual critic — the collection of material, the grouping of MSS. and other authorities, the re- construction of archetypes, and the consideration of tran-

scriptional and intrinsic probability. No book, however, presents such a complicated problem or such a wealth of material for the textual critic.

In a certain wide sense the textual criticism of the New Testa- ment began as soon as men consciously made recensions and versions, and in this sense Origen, Jerome, Augustine and many other ecclesiastical writers might be regarded as textual critics. But in practice it is general, and certainly convenient, to regard their work rather as material for criticism, and to begin the history of textual criticism with the earliest printed editions which sought to establish a standard Greek Text. It is, of course, impossible here to give an account of all these, but the following may fairly be regarded as the epoch-making books from the beginning to the present time.

The Complutensian. — The first printed text of the Greek Testa- ment is known as the Complutensian, because it was made under the direction of Cardinal Ximenes of Alcala (Lat. Complutum). It was printed in 1514, and is thus the first printed text, but is not the first published, as it was not issued until 1522. It is not known what MSS. Ximenes used, but it is plain from the character of the text that they were not of great value. His text was reprinted in 1569 by Chr. Plantin at Antwerp.

Erasmus. — The first published text was that of Erasmus. It was undertaken at the request of Joannes Froben (Frobenius), the printer of Basel, who had heard of Cardinal Ximenes' project and wished to

forestall it. In this he was successful, as it was issued in 1516. It was based chiefly on MSS. at Basel, of which the only really good one (cod. Evan. 1) was seldom followed. Erasmus issued new editions in 1519, 1522, 1527 and 1535, and the Aldine Greek Testament, printed at Venice in 1518, is a reproduction of the first edition.

Stephanus. — Perhaps the most important of all early editions were those of Robert fitienne, or Stephanus, of Paris and afterwards of Geneva. His two first editions (1546, 1549) were based on Erasmus, the Complutensian, and collations of fifteen Greek MSS. These are i6mo volumes, but the third and most important edition (1550) was a folio with a revised text. It is this edition which is usually referred to as the text of Stephanus. A fourth edition (in l6mo) published at Geneva in 1551 is remarkable for giving the divi- sion of the text into verses which has since been generally adopted.

Beza. — Stephanus' work was continued by Theodore Beza, who published ten editions between 1565 and 161 1. They did not greatly differ from the 1550 edition of Stephanus, but historically are important for the great part they played in spreading a know- ledge of the Greek text, and as supplying the text which the Elzevirs made the standard on the continent.

Elzevir. — The two brothers, Bonaventura and Abraham Elzevir, published two editions at Leiden in 1624 and 1633, based chiefly on Beza's text. In the preface to the second edition the first is referred to as " textum . . . nunc ab omnibus receptum," and this is the origin of the name " Textus Receptus " (or T.R.) often given to the ordinary Greek Text. The Elzevir text has formed the basis of all non-critical editions on the continent, but in England the 1550 edition of Stephanus has been more generally followed. The importance of both the Stephanus and Elzevir editions is that they formed a definite text for the purposes of comparison, and so pre- pared the way for the next stage, in which scholars busied them- selves with the investigation and collation of other MSS.

Walton's Polyglot. — The first to begin this work was Brian Waltcn, bishop of Chester, who published in 1657 in the 5th and 6th volumes of his " polyglot " Bible the text of Stephanus (1550) with the readings of fifteen new MSS. besides those employed by Stephanus himself. The collations were made for him by Archbishop Ussher.

John Fell. — In 1675 John Fell, dean of Christ Church, published the Elzevir text with an enlarged apparatus, but even more im- portant was the help and advice which he gave to the next important editor—

Mill.

John Mill, of Queen's College, Oxford, influenced by the advice, and supported by the purse of John Fell until the latter's death, published in 1707 a critical edition of the New Testament which has still a considerable value for the scholar. It gives the text of Stephanus (1550) with collations of 78 MSS., besides those of Ste- phanus, the readings of the Old Latin, so far as was then known, the Vulgate and Peshito, together with full and valuable prolegomena.

Bentley. — A little later Richard Bentley conceived the idea that it would be possible to reconstruct the original text of the New Testament by a comparison of the earliest Greek and Latin sources; he began to collect material for this purpose, and issued a scheme entitled " Proposals for Printing " in 1720, but though he amassed many notes nothing was ever printed.

W. Mace. — Fairness forbids us to omit the name of William (or Daniel?) Mace, a Presbyterian minister who published The New Testament in Greek and English, in 2 vols, in 1729, and really antici- pated many of the verdicts of later critics. He was, however, not in a position to obtain recognition, and his work has been generally overlooked.

/. J. Wetstein, one of Bentley's assistants, when living in Basel in 1730, published " Prolegomena " to the Text, and in 1751-1752 (at Amsterdam) the text of Stephanus with enlarged Prolegomena and apparatus criticus. His textual views were peculiar; he preferred to follow late MSS. on the ground that all the earlier copies had been contaminated by the Latin — almost reversing the teaching of Bentley. His edition is historically very important as it intro- duced the system of notation which, in the amplified form given to it by Gregory, is still in general use.

J. A. Bengel, abbot of Alpirspach (a Lutheran community), pub- lished in 1734, at Tubingen, an edition of the New Testament which marks the beginning of a new era. For the first time an attempt was made to group the MSS., which were divided into African and Asiatic. The former group contained the few old MSS., the latter the many late MSS., and preference was given to the African. This

innovation has been followed by almost all critics since Bengel's time, and it was developed by Griesbach.

/. /. Griesbach, a pupil at Halle of J. S. Semler (who in 1764 reprinted Wetstein's Prolegomena, and in comments of his own took over and expounded Bengel's views), collated many MSS., and distinguished three main groups : — the Alexandrian or Origenian (which roughly corresponded to Bengel's African), found in ABCL, the Egyptian version and Origen; the Western, found in D and Latin authorities; and the Constantinopolitan (Bengel's Asiatic), found in the later MSS. and in Byzantine writers. His view was that the last group was the least valuable; but, except when in- ternal evidence forbade (and he thought that it frequently did so), he followed the text found in any two groups against the third. His first edition was published in 1774-1775, his second and improved edition in 1796 (vol. i.) and 1806. For the second edition he had the advantage not merely of his own collection of material (pub- lished, chiefly in his Symbolae Criticae, 1785-1793), but also of many collations by Birch, Matthaei and Adler, and an edition with new collations by F. K. Alter.

/. L. Hug, Roman Catholic professor of theology at Freiburg, published (Stuttgart and Tubingen) his Einleitung in die Schriften des_N. T. (1808); he is chiefly remarkable for the curious way in which he introduced many critical ideas which were not appreciated at the time but have since been revived. He accepted Griesbach's views as a whole, but starting from the known recensions of the LXX. he identified Griesbach's Alexandrian text with the work of Hesychius, and the Constantinopolitan with that of Lucian, while he described Griesbach's Western text as the Koivq 2k6o

/. M. A. Scholz, a pupil of Hug, inspected and partially collated nearly a thousand MSS. and assigned numbers to them which have since been generally adopted. His work is for this reason important, but is unfortunately inaccurate.

K. Lachmann, the famous classical scholar, opened a new era in textual criticism in 1842-1850, in his N.T. Graece et Latine. In this great book a break was made for the first time with the traditional text and the evidence of the late MSS., and an attempt was made to reconstruct the text according to the oldest authorities. This was a great step forward, but unfortunately it was accompanied by a retrogression to the pre-Griesbachian (or rather pre-Bengelian) days; for Lachmann rejected the idea of grouping MSS., and having selected a small number of the oldest authorities undertook always to

follow the reading of the majority.

C. Tischendorf, the most famous follower of Lachmann, besides editions of many MSS. and the collation of many more, published between 1841 and 1869-1872 eight editions of the New Testament with full critical notes. The eighth edition, which for the first time contained the readings of N, has not yet been equalled, and together with the Prolegomena, supplied by C. R. Gregory after Tischendorf 's death, is the standard critical edition which is used by scholars all over the world. At the same time it must be admitted that it gradually became antiquated. Fresh collations of MSS., and especially fresh discoveries and investigations into the text of the versions and Fathers, have given much new information which entirely changed the character of the evidence for many readings, and rendered a new edition necessary (see Soden, H. von). As a collector and publisher of evidence Tischendorf was marvellous, but as an editor of the text he added little to the principles of Lach- mann, and like Lachmann does not seem to have appreciated the value of the Griesbachian system of grouping MSS.

_ 5. P. Tregelks, an English scholar, like Tischendorf, spent almost his whole life in the collection of material, and published a critical edition, based on the earliest authorities, at intervals between 1857 and 1872. His work was eclipsed by Tischendorf's, and his critical principles were almost the same as the German scholar's, so that his work has obtained less recognition than would otherwise have been the case. Tischendorf and Tregelles finished the work which Lachmann began. They finally exploded the pretensions of the Textus Receptus to be the original text; but neither of them gave any explanation of the relations of the later text to the earlier, nor developed Griesbach's system of dealing with groups of MSS. rather than with single copies.

B. F. Westcott and F. J. A. Hort (commonly quoted as WH), the Cambridge scholars, supplied the deficiencies of Lachmann, and without giving up the advantages of his system, and its develop- ment by Tischendorf, brought back the study of the text of the

New Testament to the methods of Griesbach. Their great work was published in 1881 under the title of The New Testament in the Original Greek. Their view of the history of the text is that a comparison of the evidence shows that, while we can distinguish more than one type of text, the most clearly discernible of all the varieties is first recognizable in the quotations of Chrysostom, and is preserved in almost all the later MSS. Though found in so great a

number of witnesses, this type of text is shown not to be the earliest or best by the evidence of all the oldest MS. versions and Fathers, as well as by internal evidence. Moreover, a comparison with the earlier sources of evidence shows that it was built up out of previously existing texts. This is proved by the " conflations " which are found in it. For instance in Mark ix. 38 the later MSS. read 6s ovk aKoKovdel rtfuv, nal e/aoXucra/xe' avrov otl ovk dnoXovOei ytnv, a clumsy sentence which is clearly made up out of two earlier readings, /cat kKoiXOofiev abrov otl ovk rjKoXovdti. 7hui>, found in X BCL boh., and os ovk a/coAou0et /ze0* itfi&v, ko.1 iKcoXuojuep avrbv, found in DX fam. 1 , jam. 11 28 latt. It is impossible, in face of the fact that the evidence of the oldest witnesses of all sorts is con- stantly opposed to the longer readings, to doubt that WH were right in arguing that these phenomena prove that the later text was made up by a process of revision and conflation of the earlier forms. Influenced by the use of the later text by Chrysostom, WH called it the Syrian or Antiochene text, and refer to the revision which produced it as the Syrian revision. They suggested that it might perhaps be attributed to Lucian, who is known to have made a revision of the text of the LXX. The earlier texts which were used for the Syrian revision may, according to WH, be divided into three: — (1) the Western text, used especially by Latin writers, and found also in cod. Bezae and in Syr C ; (2) the Alexandrine text used by Cyril of Alexandria and found especially in CL S 33 ; and (3) a text which differs from both the above mentioned and is therefore called by WH the Neutral text, found especially in K B and the quotations of Origen. Of these three types WH thought that the Neutral was decidedly the best. The Alexandrian was clearly a literary recension of it, and WH strove to show that the Western was merely due to the non-literary efforts of scribes in other parts to improve the narrative. The only exception which they allowed to this general rule was in the case of certain passages, especially in the last chapters of Luke, where the " Western " authorities omit words which are found in the Neutral and Alex- andrian texts. Their reason was that omission seems to be contrary to the genius of the Western text, and that it is therefore probable that these passages represent interpolations made in the text on the Neutral side after the division between it and the Western. They might be called Neutral interpolations, but WH preferred the rather clumsy expression " Western non-interpolations." Having thus decided that the Neutral text was almost always right, it only remained for WH to choose between the various authorities which preserved this type. They decided that the two best authorities were N and B, and that when these differed the reading of B, except when obviously an accidental*

blunder, was probably right. The great importance of this work of WH lies in the facts that it not merely condemns but explains the late Antiochene text, and that it attempts to consider in an objective manner all the existing evidence and to explain it historically and genealogically. Opinions differ as to the correctness of the results reached by WH, but there is scarcely room for doubt that as an example of method their work is quite unrivalled at present and is the necessary starting-point for all modern investigations.

Since Westcott and Hort no work of the same importance appeared up till 1909. Various useful texts have been issued, among which those of Nestle {Novum Testamentum Graece, Stuttgart, 1904), based on a comparison of the texts of Tischendorf, WH and Weiss, and of Baljon (Novum Testamentum Graece, Groningen, 1898), are the best. The only serious attempt as yet published to print a complete text independently of other editors is that of B. Weiss (Das Neue Testament, Leipzig, 1894-1900), but the method followed in this is so subjective and pays so little attention to the evidence of the versions that it is not likely to be permanently important. The text reached is not widely different from that of WH. The new work in course of preparation by von Soden at Berlin, which pro- mises to take the place of Tischendorf's edition, must certainly do this so far as Greek MSS. are concerned, for the whole field has been reinvestigated by a band of assistants who have grouped and collated specimens of all known MSS.

Besides these works the chief efforts of textual critics since WH have been directed towards the elucidation of minor problems, and the promulgation of certain hypotheses to explain the character- istics either of individual MSS. or of groups of MSS. Among these the works of Sanday, Corssen, Wordsworth, White, Burkitt and Harris on the history of the Old Latin and Vulgate, and especially the work of Burkitt on the Old Syriac, have given most light on the subject. These lines of research have been described in the preceding section on the apparatus criticus. Other noteworthy and inter- esting, though in the end probably less important, work has been done by Blass, Bousset, Schmidtke, Rendel Harris and Chase. The outline of the chief works is as follows : —

F. Blass. — In his various books on the Acts and third gospel Blass has propounded a new theory as to the " Western " text. He was

struck by the fact that neither the Western can be shown to be derived from the Neutral, nor the Neutral from the Western. He therefore conceived the idea that perhaps both texts were Lucan, and represented two recensions by the original writer, and he reconstructed the history as follows. Luke wrote the first edition of the Gospel for Theophilus from Caesarea; this is the Neutral text of the Gospel. Afterwards he went to Rome and there revised the text of the Gospel and reissued it for the Church in that city; this is the Western (or, as Blass calls it, Roman) text of the Gospel. At the same time he continued his narrative for the benefit of the Roman Church, and published the Western text of the Acts. Finally he revised the Acts and sent a copy to Theophilus; this is the Neutral text of the Acts. This ingenious theory met with consider- able approval when it was first advanced, but it has gradually been seen that " Western " text does not possess the unity which Blass's theory requires it to have. Still, Blass's textual notes are very important, and there is a mass of material in his books.

Bousset and Schmidtke. — These two scholars have done much work in trying to identify smaller groups of MSS. with local texts. Bousset has argued that the readings in the Pauline epistles found in n c H and a few minuscules represent the text used by Pamphilus, and on the whole this view seems to be highly probable. Another group which Bousset has tried to identify is that headed by B, which he connects with the recension of Hesychius, but this theory, though widely accepted in Germany, does not seem to rest on a very solid basis. To some extent influenced by and using Bousset's results, Schmidtke has tried to show that certain small lines in the margin of B point to a connexion between that MS. and a Gospel harmony, which, by assuming that the text of B is Hesychian, he identifies with that of Ammonius. If true, this is exceedingly im- portant. Nestle, however, and other scholars think that the lines in B are merely indications of a division of the text into sense- paragraphs and have nothing to do with any harmony.

Rendel Harris and Chase. — Two investigations, which attracted much notice when they were published, tried to explain the phenomena of the Western text as due to retranslation from early versions into Greek. Rendel Harris argued for the influence of Latin, and Chase for that of Syriac. While both threw valuable light on obscure points, it seems probable that they exaggerated the extent to which retranslation can be traced ; that they ranked Codex Bezae somewhat too highly as the best witness to the " Western " text ; and that

some of their work was rendered defective by their failure to recognize quite clearly that the " Western " text is not a unity. At the same time, however little of Rendel Harris's results may ultimately be accepted by the textual critics of the future, his work will always remain historically of the first importance as having done more than anything else to stimulate thought and open new lipes of research in textual criticism in the last decade of the 19th century.

The time has not yet come when any final attempt can be made to bring all these separate studies together and estimate exactly how far they necessitate serious modification of the views of West- cott and Hort; but a tentative and provisional judgment would probably have to be on somewhat the following lines. The work of WH may be summed up into two theorems: — (1) The text pre- served in the later MSS. is not primitive, but built up out of earlier texts;. (2) these earlier texts may be classified as Western, Alex- andrian and Neutral, of which the Neutral is the primitive form. The former of these theorems has been generally accepted and may be taken as proved, but the second has been closely criticized and probably must be modified. It has been approached from two sides, according as critics have considered the Western or the Neutral and Alexandrian texts.

The Western Text. — This was regarded by WH as a definite text, found in D, the Old Latin and the Old Syriac ; and it is an essential part of their theory that in the main these three witnesses represent one text. On the evidence which they had WH were undoubtedly justified, but discoveries and investigation have gone far to make it impossible to hold this view any longer. We now know more about the Old Latin, and, thanks to Mrs Lewis' discovery, much more about the Old Syriac. The result is that the authorities on which WH relied for their Western text are seen to bear witness to two texts, not to one. The Old Latin, if we take the African form as the oldest, as compared with the Neutral text has a series of inter- polations and a series of omissions. The Old Syriac, if we take the Sinaitic MS. as the purest form, compared in the same way, has a similar double series of interpolations and omissions, but neither the omissions nor the interpolations are the same in the Old Latin as in the Old Syriac. Such a line of research suggests that instead of being able, as WH thought, to set the Western against the Neutral text (the Alexandrian being merely a develop- ment of the latter), we must consider the problem as the comparison of at least three texts, a Western (geographically), an Eastern and the Neutral. This makes the matter much more difficult ; and an answer is demanded to the problem afforded by the agreement of two of these texts against the third. The

obvious solution would be to say that where two agree their reading is probably correct, but the followers of WH maintain that the agreement of the Western and Eastern is often an agreement in error. It is difficult to see how texts, geographically so wide apart as the Old Latin and Old Syriac would seem to be, are likely to agree in error, but it is certainly

true that some readings found in both texts seem to have little probability. Sanday, followed by Chase and a few other English scholars, has suggested that the Old Latin may have been made originally in Antioch, but this paradoxical view has met with little support. A more probable suggestion is Burkitt's, who thinks that many readings in our present Old Syriac MSS. are due to the Dia- tessaron, which was a geographically Western text. It may be that this suggestion will solve the difficulty, but at present it is impossible to say.

The Neutral and Alexandrian Texts. — WH made it plain that the Alexandrian text was a literary development of the Neutral, but they always maintained that the latter text was not confined to, though chiefly used in Alexandria. More recent investigations have confirmed their view as to the relation of the Alexandrian to the Neutral text, but have thrown doubt on the age and wide- spread use of the latter. Whatever view be taken of the provenance of Codex Vaticanus it is plain that its archetype had the Pauline epistles in a peculiar order which is only found in Egypt, and so far no one has been able to discover any non-Alexandrian writer who used the Neutral text. Moreover, Barnard's researches into the Biblical text of Clement of Alexandria show that there is reason to doubt whether even in Alexandria the Neutral text was used in the earliest times. We have no evidence earlier than Clement, and the text of the New Testament which he quotes has more in common with the Old Latin or "geographically Western " text than with the Neutral, though it definitely agrees with no known type preserved in MSS. or versions. This discovery has put the Neutral text in a different light. It would seem as though we could roughly divide the history of the text in Alexandria into three periods. The earliest is that which is represented by the quotations in Clement, and must have been in use in Alexandria at the end of the 2nd and beginning of the 3rd century. It is unfortunately not found in any extant MS. The second stage is that found in the quotations of Origen which is fairly well represented in n B, though Origen seems at times to have used MSS. of the earlier type. The third stage is WH's Alexandrian, found in the quotations of Cyril of Alexandria and a few MSS. (esp. CL EA). It is clearly a re- vision of the second stage, as WH saw, but we can now add that it was not merely a literary revision but was influenced by*

the tendency to revive readings which are found in the first stage but rejected in the second.

It thus seems probable that WH's theory must be modified, both as regards the " Western " text, which is seen not to be a single text at all, and as regards the " Neutral " text, which seems to be nothing more than the second stage of the development of the text in Alexandria. But the importance of these modifications is something more than the doubt which they have thrown on WH's theories: they have really shifted the centre of gravity of the textual problem.

Formerly the Greek uncials, which go back to the 4th century, were regarded as the most important source of evidence, and were supposed to have the decisive vote; but now it is becoming plain that still more important, though unfortunately much less complete, is the evidence of the versions and of quotations by early writers. Both of these point to the existence in the 3rd and even 2nd century of types of text which differ in very many points from anything preserved in Greek MSS. Yet there is no doubt that both of them ultimately represent Greek MSS. which are no longer extant. The question, therefore, is whether we ought not to base our text on the versions and ecclesiastical quotations rather than on the extant Greek MSS. Two positions are possible: (1) We may defend a text based on the best existing Greek MSS. by the argument that these represent the text which was approved by competent judges in the 4th century, and would be found to exist in earlier MSS. if. we possessed them. The weak point of this argument is the lack of evidence in support of the second part. The only possible sources of evidence, apart from the discovery of fresh MSS., are the versions, and they do not point to existence in the 2nd or 3rd century of texts agreeing with the great uncials. It is also possible to argue, as WH did, on the same side, that the purest form of text was pre- served in Alexandria, from which the oldest uncials are directly or indirectly derived, but this argument has been weakened if not finally disposed of by the evidence of Clement of Alexandria. It is, of course, conceivable that Clement merely used bad MSS., and that there were other MSS. which he might have used, agreeing with the great uncials, but there is no evidence for this view. (2) If we reject this position we must accept the evidence as giving the great uncials much the same secondary importance as Westcott and Hort" gave to the later MSS., and make an attempt to reconstruct a text on the basis of versions and Fathers. The adoption of this view sets textual critics a peculiarly difficult task. The first stage in their work must be the establishment of the earliest form of each version, and the collection and examination of the quotations in all the early writers. This has not yet been done,

but enough has been accomplished to point to the probability that the result will be the establishment of at least three main types of texts, repre- sented by the Old Syriac, the Old Latin and Clement's quotations, while it is doubtful how far Tatian's Diatessaron, the quotations in Justin and a few other sources may be used to reconstruct the type of Greek text used in Rome in the 2nd century when Rome was still

primarily a Greek ehurch. The second stage must be the com- parison of these results and the- attempt to reconstruct from them a Greek text from which they all arose.

Bibliography. — The literature of textual criticism of the New Testament is so great that only a few of the more important modern books can be mentioned here: H. von Soden, Die Schriften des Neuen Testaments (i. 1902-1907) ; E. Nestle, Einfuhrung in das griechische Neue Testament (Gottingen, 1909) ; F. G. Kenyon, Handbook to the Textual Criticism of th-e New Testament (London, 1901); C. R. Gregory, Texthritik des Neuen Testament (Leipzig, 1900-1902), and Die griech. Handschr. des N.T. (Leipzig, 1908); Westcott and Hort, Introduction (vol. ii. of their New Testament in Greek, Cambridge, 1882). The history of criticism is dealt with in all the above- mentioned books, and also in F. H. Scrivener, Introduction . to the Criticism of the New Testament (London, 1894). For other points especially important (besides books men- tioned in the preceding section) see F. Blass, Acta Apostolorum (Gottingen, 1895 ; and an editio minor, with a valuable preface, Leipzig, 1896) ; Rendel Harris, Four Lectures on the Western Text (Cambridge, 1894); F. Chase, The Syro-Latin Text (London, 1895); W. Bousset, Textkritische Studien (Leipzig, 1894); B. Weiss, Der Codex D in der Apostelgeschichte (Leipzig, 1897); A. Pott, Der abendldndische Text d. Apostelgeschichte (Leipzig, 1900) ; G. Salmon, Some Thoughts on Textual Criticism of the New Testament (London, 1897) ; Schmidtke, Die Evangelien eines alien Unzialcodex (Leipzig, 1903). (K. L.)

4. Higher Criticism.

The New Testament is a series of early Christian 'writings which the Church came to regard as canonical, i.e. they were placed in the

same category as the Old Testament, the writings which the Christian had inherited from the Jewish Church. Just as the ancient Scriptures were considered to be the Word of God, so that what they contained was necessarily the true and inspired doctrine, so also the New Testament was available for proving the Church's dogma. The assured canonicity of the whole New Testament resulted in its use by the medieval theo- logians, the Schoolmen, as a storehouse of proof-texts. Thus the New Testament seemed to exist in order to prove the Church's conclusions, not to tell its own tale.

The Nouum Instrumentum published by Erasmus in 15 16 (see above, Textual Criticism) contained more than the mere Erasmus Editio Princeps of the Greek text: Erasmus accom- panied it with a Latin rendering of his own, in which he aimed at giving the meaning of the Greek without blindly following the conventional phraseology of the Latin Vulgate, which was the only form in which the New Testament had been current in western Europe for centuries. This rendering of Erasmus, together with his annotations and prefaces to the several books, make his editions the first great monument of modern Biblical study. Medieval Bibles contain short prefaces by St Jerome and others. The stereotyped information supplied in these prefaces was drawn from various sources: Erasmus distinguishes, e.g., between the direct statements in the Acts and the inferences which may be drawn from incidental allusions in the Pauline Epistles, or from the statements of ancient non- canonical writers . This discrimination of sources is the starting- point of scientific criticism.*

The early champions of Church reform in the beginning of the 16th century found in the Bible their most trustworthy weapon. The picture of Apostolical Christianity Reformers. lou nd m the New Testament offered indeed a glaring contrast to the papal system of the later middle ages. Moreover, some of the " authorities " used by the Schoolmen had been discovered by the New Learning of the Renaissance to be no authorities at all, such as the writings falsely attributed to Dionysius the Areopagite. When, therefore, the breach came, and the struggle between reformers and conservatives within the undivided Church was transformed into a struggle between Protestants and Romanists, it was inevitable that the authority which in the previous centuries had been ascribed to the Church

1 E.g. from the preface to the Acts: " Dionysius, bishop of the Corinthians, a very ancient writer, quoted by Eusebius, writes that Peter and Paul obtained the crown of martyrdom by the com- mand of Nero on the same day." And again: " Some industrious critics have added (to the narrative of Acts) that Paul was acquitted at his

first trial by Nero. . . . This conjecture they make from the 2nd Ep. to Timothy. . . .”

should be transferred by the Reformed Churches to the Bible. ” The Bible, the Bible alone, is the religion of Protestants ” 2 did really express the watchword of the anti-Romanist parties, especially towards the close of the acuter struggle. At the beginning of the movement the New Testament itself had been freely criticized. Luther, like his countrymen of to-day, judged the contents of the New Testament by the light of his leading convictions; and in his German translation, which occupies the same place in Germany as the Authorized Version of 16 n does in English-speaking lands, he even placed four of the books (Hebrews, James, Jude, Apocalypse) in an appendix at the end, with prefaces explanatory of this drastic act of criticism. But though we may trace a real affiliation between the principles of Luther and modern German critical study — notably in the doctrines of the Gospel within the Gospel and of the residual Essence of Christianity — Luther’s discriminations were in the 17 th century ignored in practice.

From cover to cover the whole New Testament was regarded at the beginning of the 18th century by almost all Protestants as the infallible revelation of the true religion. The doctrines of Christianity, and in many communities ,aS ‘ iem:e the customs of the Church, were held to be inferences criticism. from the inspired text of the Scriptures. The first serious blow to this view came from the study of textual criticism. The editions of Mill (1707) and of Wetstein (1751) proved once for all that variations in the text, many of them serious, had existed from the earliest times. It was evident, therefore, that the true authority of the New Testament could not be that of a legal code which is definite in all its parts. More important still was the growing perception of the general uniformity of nature, which had forced itself with increasing insistence upon men’s minds as the study of the natural sciences progressed in the 17th and 18th centuries. The miracles of the New Testament, which had formerly been received as bulwarks of Christianity, now appeared as difficulties needing explanation. Furthermore, the prevailing philosophies of the 18th century tended to demand that a real divine revelation should be one which expressed itself in a form convincing to the reason of the average plain man, whatever his predispositions might be; it was obvious that the New Testament did not wholly conform to this standard.

But if the New Testament be not itself the direct divine revelation in the sense of the 18th century, the question still remains, how we are

to picture the true history of the rise of Christianity, and what its true meaning i$. if ts °" a ' This is the question which has occupied the theologians of the 19th and 20th centuries. Perhaps the most significant event from which to date the modern period is the publication by Lessing in 1774— 1777 of the " Wolfenbuttel Fragments," i.e. H. S. Reimarus' posthumous attack on Christianity, a work which showed that the mere study of the New Testament is not enough to compel belief in an unwilling reader. Lessing's publication also helped to demonstrate the weakness of the older rationalist position, a position which really belongs to the 18th century, though its best-remembered exponent, Dr H. E. G. Paulus, only died in 1851. The characteristic of the rationalists was the attempt to explain away the New Testament miracles as coincidences or naturally occurring events, while at the same time they held as tenaciously as possible to the accuracy of the letter of the New Testament narratives. The opposite swing of the pendulum appears in D. F. Strauss: in his strauss Leben Jesu (1833) he abandons the shifts and ex- pedients by which the rationalists eliminated the miraculous from the Gospel stories, but he abandons also their historical character. According to Strauss the fulfilments of prophecy in the New Testament arise from the Christians' belief that the Christian Messiah must have fulfilled the predictions of the prophets, and the miracles of Jesus in the New Testament either originate in the same way or are purely mythical embodiments of Christian doctrines.

2 The phrase is Chillingworth's (1637), who may be described as a Broad High-churchman.

The main objection to this presentation, as also to that of the rationalists, is that it is very largely based not upon the

historical data, but upon a pre-determined theory. school?" Granted the philosophical basis, the criticism practised

upon the New Testament by Paulus and Strauss follows almost automatically. Herein lies the permanent im- portance of the work of Ferdinand Christian Baur, professor of theology at Tubingen from 1826 to i860. The corner-stone of his reconstruction of early Christian history is derived not so much from philosophical

principles as from a fresh study of the documents. Starting from Galatians and 1 Corinthians, which are obviously the genuine letters of a Christian leader called Paul to his converts, Baur accepted 2 Corinthians and Romans as the work of the same hand. From the study of these contemporary and genuine documents, he elaborated the theory that the earliest Christianity, the Christianity of Jesus and the original apostles, was wholly Judaistic in tone and practice. Paul, converted to belief in Jesus as Messiah after the Crucifixion, was the first to perceive that for Christians Judaism had ceased to be binding. Between him and the older apostles arose a long and fierce controversy, which was healed only when at last his disciples and the Judaizing disciples of the apostles coalesced into the Catholic Church. This only occurred, according to Baur, early in the 2nd century, when the strife was finally allayed and forgotten. The various documents which make up the New Testament were to be dated mainly by their relation to the great dispute. The Apocalypse was a genuine work of John the son of Zebedee, one of the leaders of the Judaistic party, but most of the books were late, at least in their present form. The Acts, Baur thought, were written about a.d. 140, after the memory of the great controversy had almost passed away. All four Gospels also were to be placed in the 2nd century, though that according to Matthew retained many features unaltered from the Judaistic original upon which it was based.

The Tubingen school founded by Baur dominated the theo- logical criticism of the New Testament during a great part of

the 19th century and it still finds some support. The views. main position was not so much erroneous as one-sided.

The quarrel between St Paul and his opponents did not last so long as Baur supposed, and the great catastrophe of the fall of Jerusalem effectually reduced thorough-going Judaistic Christianity into insignificance from a.d. 70 onwards. Moreover, St Paul's converts do not seem to have adopted consistent " Paulinism " as a religious philosophy. St Paul was an emancipated Jew, but his converts were mostly Greeks, and the permanent significance of St Paul's theories of law and faith only began to be perceived after his letters had been collected together and had been received into the Church's canon. All these considerations tend to make the late dates proposed by Baur for the greater part of the New Testament books unnecessary; the latest investigators, notably Professor A. Harnack of Berlin, accept dates that are not far removed from the ancient Christian literary tradition.

Literary criticism of the Gospels points to a similar conclusion. A hundred years' study of the synoptic problem, i.e. the causes which make the Gospels according to Matthew, Mark and Luke at once so much alike and so different, has resulted in the demon- stration of the priority of Mark, which " was known to Matthew arid Luke in the same state and with the same contents as we have it now." ' This Gospel may be dated a very few years after a.d. 70. Luke and Matthew appear to have been published between 80 and ioo. 2 Besides the Gospel of Mark these Evange- lists made use of another document, now lost, which contained many sayings of Jesus and some narratives not found in Mark. This document is by many scholars identified with the " Logia," mentioned by Papias (Eusebius, Ch. Hist. iii. 39) as being the work of Matthew the Apostle, but the identification is not certain.

1 J. Wellhausen, Einl. in die drei erslen Evangelien (1905), p. 57.

2 If Luke used Josephus, as F. C. Burkitt and others believe, the later date must be taken; otherwise the earlier date is more prob- able, as in any case it must fall within the lifetime of a companion of St Paul.

The Johannine writings, i.e. the Fourth Gospel and the three Epistles of John, represent the view of Christ and Christianity taken by a Christian teacher, who seems to have lived and written in Asia Minor at the close of the 1st century a.d. The value of the Fourth Gospel as a narrative of events is a matter of dispute, but the view of the personality of Jesus Christ set forth in it is unquestionably that which the Church has accepted.

The discoveries of papyri in Upper Egypt during recent years, containing original letters written by persons of various classes and in some cases contemporary with the Epistles of the New Testament, have immensely increased our knowledge of the Greek of the period, and have cleared up not a few difficulties of language and expression. More important still is the applica- tion of Semitic study to elucidate the Gospels. It is idle indeed to rewrite the Gospel narratives in the Aramaic dialect spoken by Christ and the apostles, but the main watchwords of the Gospel theology — phrases like " the Kingdom of God," " the World to come," the " Father in Heaven," " the Son of Man," — can be more or less surely reconstructed from Jewish writings, and their meaning gauged apart from the special significance which they received in Christian hands. This line of investigation has been specially followed by Professor G. Dalman in his Worte Jesu. The study of the Semitic elements in early Christianity is less advanced than the study of the Greek elements, so

that it is doubtless from the Semitic side that further progress in the criticism of the New Testament may be expected.

Bibliography. — See the separate bibliographies to the separate articles on the books of the New Testament. The selection here given of the vast literature of the subject has been drawn up with the idea of setting the student on his way. 1. General and Historical. — Jerome's Prefaces (to be found in any R. C. edition of the Vulgate) ; Luther's Prefaces (to be found in German-printed editions of Luther's Bible) ; F. Seebohm, The Oxford Reformers (3rd ed., London, 1887) — for Erasmus; M. Creighton, " Chillingworth " in the Diet, of Nat. Biogr.; Chr. Schrempf, Lessing als Philosoph (Stuttgart, 1906); J. Estlin Carpenter, The Bible in the'igth Century (London, 1903); A. Schweitzer, Von Reimaruszu Wrede (Tubingen, 1906). 2. For the Synoptic Gospels. — W. G. Rushbrooke, Synopticon (London, 1880), (trans, in The Common Tradition of the Synoptic Gospels by E. A. Abbott and W. G. Rushbrooke, London, 1884), Sir J. C. Hawkins, Horae Synopticae (Oxford, 1899); Prof. Julius Wellhausen, Einleitung in die drei ersten Evangelien (Berlin, 1905), Das Evangelium Marci (1903), Das Ev. Matthaei (1904), Das Ev. Lucae (1904) — these four books make one work; Prof. A. Harnack, Lukas der Arzt (Berlin, 1905). 3. For the Fourth Gospel. — K. G. Bretschneider, Probabilia (Leipzig, 1820) ; Matthew Arnold's God and the Bible, chaps, v., vi. (still the best defence in English of a Johannine kernel, new ed., 1884); W. Sanday, Criticism of the Fourth Gospel (Oxford, 1905) ; A. Loisy, Le Quatrieme Evangile (Paris, 1903) ; Prof. P. W. Schmiedel, Das vierte Evangelium gegenuber den drei ersten (Halle, 1906). 4. For the Semitic Elements in the N.T. — Prof. G. Dalman, Die Worte Jesu (Leipzig, 1898), (Eng. trans., The Words of Jesus, 1905) ; Prof. Johannes Weiss, Die Predigt Jesu vom Reiche Goites (1st ed. 1892, 2nd ed. 1900). The Protestant view of the New Testament in Prof. A. Harnack, Das Wesen des Christentums (Berlin, 1900), (Eng. trans., What is Christianity?, London, 1901) may be compared with the Liberal Catholic view in A. Loisy, L'&angile et I'E'glise (2nd ed., 1903). (F. C. B.)

5. New Testament Chronology.

The subject of the chronology of the New Testament falls naturally into two distinct sections — the chronology of the Gospels, that is, of the life of Christ; and the chronology of the Acts, that is, of the apostolic age.

The Chronology of the Gospels.

The data group themselves round three definite points and the intervals between them : the definite points are the Nativity, the Baptism and the Crucifixion; the age of Christ at the time of the Baptism connects the first two points, and the duration of his public ministry connects the second and third. The results obtained under the different heads serve mutually to test, and thereby to correct or confirm, one another.

1. The date of the Nativity as fixed according to our common computation of Anni Domini (first put forward by Dionysius Exiguus at Rome early in the 6th century) has long been recog- nized to be too late. The fathers of the primitive church had been

nearer the truth with the years 3 or 2 B.C. (see Irenaeus, Haer. in. xxi. 3 [xxiv. 2]; Clement of Alexandria, Strom, i. 21, p. 147; Hippolytus, in Danielem, iv. ed. Bonwetsch, p. 242; [Tertullian], adv. Judaeos, 8). What may be called the received chronology during the last two centuries has pushed the date farther back to 4 B.C. But the considerations now to be adduced make it probable that the true date is earlier still.

(a) Evidence of St Matthew's Gospel (i. 18-ii. 22). — The birth of Christ took place before the death of Herod, and the evidence of Josephus fixes the death of Herod, with some approach to certainty, in the early spring of 4 b.c. Josephus, indeed, while he tells us that Herod died not long before Passover., nowhere names the exact year; but he gives four calculations which serve to connect Herod's death with more or less known points, namely, the length of Herod's own reign, both from his de jure and from his de facto accession, and the length of the reigns of two of his successors, Archelaus and Herod Philip, to the date of their deposition and death respectively. The various calculations are not quite easy to harmonize, but the extent of choice for the year of Herod's death is limited to the years 4 and 3 B.C., with a very great preponderance of probability in favour of the former. How long before this the Nativity should be placed the Gospel does not enable us to say precisely, but as Herod's decree of extermination included all infants up to two years of age, and as a sojourn of the Holy Family in Egypt of unknown length intervened between the massacre and Herod's death, it is clear that it is at least

possible, so far as the evidence of this Gospel goes, that the birth of Christ preceded Herod's death by as much as two or three years. What is thus shown to be possible would, of course, be necessary if we went on, with the astronomer Kepler, to identify the star of the Magi with the conjunction of the planets Jupiter and Saturn which occurred, in the constella- tion Pisces, in May, October and December of 7 B.C. 1

(b) Evidence of St Luke's Gospel (ii. 1-8).— The birth of Christ took place at the time of a general census of the empire ordered by Augustus: " it was the first census, and was made at the time when Quirinius was governor of Syria." Against this account it has been urged that we know that the governorship of Syria from 10 or 9 B.C. down to and after Herod's death was held successively by M. Titius, C. Sentius Saturninus, and P. Quintilius Varus; and further, that when Judaea became a Roman province on the deposition of Archelaus in a.d. 6, Quirinius was governor of Syria, and did carry out an elaborate census. The notice in the Gospel, it is suggested, grew out of a confused recollection of the later (and only historical) census, and is devoid of any value whatever. At the other extreme Sir W. M. Ramsay (Was Christ Born at Bethlehem?, 1898, pp. 149 ff.) defends the exact accuracy of St Luke's " first census " as wit- nessing to the (otherwise of course unknown) introduction into Syria of the periodic fourteen years' census which the evidence of papyri has lately established for Egypt, at least from a.d. 20 onwards. Reckoning back from a.d. 20, the periodic census should fall in 9 B.C., but Ramsay alleges various causes for delay, which would have postponed the actual execution of the census till 7 B.C., and supposes that Quirinius was an imperial commissioner specially appointed to carry it out. The truth seems to rest midway between these extremes. St Luke's statement of a general census is in all probability erroneous, and the introduction of the name Quirinius appears to be due to confusion with the census of a.d. 6. But the confusion in question would only be possible, or at any rate likely, if there really was a census at the time of the Nativity; and it is no more improbable that Herod should have held, or permitted to be held, a local census than that Archelaus of Cappadocia in the reign of Tiberius (Tacitus, Ann. vi. 41) should have taken a census of his own native state "after the Roman manner."

1 It is a curious coincidence that a medieval Jew, R. Abarbanel (Abrabanel) , records that the conjunction of these particular planets in this particular constellation was to be a sign of Messiah's coining. It is just conceivable that his statement may ultimately depend on some such ancient tradition as may have been known to Chaldaean

magi.

But St Luke's account, when the name of Quirinius is subtracted from it, ceases to contain any chronological evidence.

(c) Evidence of Tertullian. — Strangely enough, however, the missing name of the governor under whom the census of the Nativity was carried out appears to be supplied by an author who wrote more than a century after St Luke, and has by no means a good reputation for historical trustworthiness. Tertullian, in fact {adv. Marcionem, iv. 19), employs against Marcion's denial of the true humanity of Christ the argument that it was well known that Sentius Saturninus carried out a census under Augustus in Judaea, by consulting which the family and relationships of Christ could have been discovered. This Saturninus was the middle one of the three governors of Syria named above, and as his successor Varus must have arrived by the middle of 6 b.c. at latest (for coins of Varus are extant of the twenty -fifth year of the era of Actium), his own tenure must have fallen about 8 and 7 b.c, and his census cannot be placed later than 7 or 7-6 B.C. The independence of Tertullian's information about this census is guaranteed by the mere fact of his knowledge of the governor's name; and if there was a census about that date, it would be unreasonable not to identify it with St Luke's census of the Nativity.

The traditional Western day for the Christmas festival, 25th December, goes back as far as Hippolytus, loc. cit.; the tradi- tional Eastern day, 6th January, as far as the Basilidian Gnostics (but in their case only as a celebration of the Baptism), mentioned by Clement of Alexandria, loc. cit.

2. The interval between the Nativity and the Baptism. Evidence of St Luke's Gospel (iii. 23).— At the time of his

baptism Jesus was apxofievos uael erw TpiaKovra, of which words two opposite misinterpretations must be avoided: (i.) apxbp.evos does not mean (as Valentinian interpreters thought, Iren. n. xxii. 5 [xxxiii. 3]; so also Epiphanius, Haer. Ii. 16) " beginning to be thirty years " in the sense of " not yet quite thirty," but " at the beginning of His ministry," as in Luke xxiii. 5; Acts i. 22, x. 37; (ii.) uael kruv rpianovTa does not mean " on attaining the full age of thirty, before which he could not have publicly taught," for if there was by Jewish custom or tradition any minimum age for a teacher, it was not thirty, but forty (Bab. Taint, ed. 1715, fol. 19 b; Iren. loc cit.). St Luke's phrase is a general one, " about thirty years old," and cannot be so pressed as to exclude some latitude in either direction.

3. The date of the Baptism.

(a) Evidence of St Luke's Gospel (iii. 1). — A terminus a quo for the Baptism is the synchronism of the commencement of the Baptist's public ministry with the fifteenth year of the rule (riye/tovLa) of Tiberius. Augustus died on 19th August a.d. 14, and, reckoned from that point, Tiberius's fifteenth year might be, according to different methods of calculation, either a.d. 28, or 28-29, or 29. But any such result would be difficult to reconcile with the results yielded by other lines of investigation in this article; among alter- native views the choice seems to lie between the following: — (i.) The years of Tiberius are here reckoned from some earlier starting-point than the death of his predecessor — probably from the grant to him of co-ordinate authority with Augustus over the provinces made in a.d. ii (see, for the parallel with the case of Vespasian and Titus, Ramsay, St Paul the Roman Traveller, p. 387), so that the fifteenth year would be roughly a.d. 25; or (ii.) St Luke has made here a second error in chronology, caused perhaps in this case by reckoning back from the Crucifixion, and only allowing one year to the ministry of Christ.

(b) Evidence of St John's Gospel (ii. 13, 20). — A terminus ad quern for the Baptism is the synchronism of the first Passover mentioned after it with the forty-sixth year of the building of Herod's Temple. Herod began the Temple in the eighteenth year of his reign, probably 20-19 b.c, and the Passover of the forty-sixth year is probably that of a.d. 27. While too much stress must not be laid on a chain of reasoning open to some uncertainty^ several points, it is difficult to suppose with Loisy, Quatrieme Evangile, 1903, p. 293, that the number was intended

by the evangelist as purely figurative, and is therefore destitute of all historical meaning.

On the whole, the Baptism of -Christ should probably be placed in a.d. 26-27; and as the Nativity was placed in 7-6 B.C. (at latest), this would make the age of Christ at his Baptism to be about thirty-two, which tallies well enough with St Luke's general estimate.

4. The interval between the Baptism and the Crucifixion, or, in other

words, the duration of the public ministry of Christ.

(a) Evidence of the Synoptic Tradition and of St Mark's Gospel (ii. 23, vi. 39, xiv. 1). — The order of events in the primitive synoptic tradition appears to be faithfully reproduced in St Mark; and if this order is chronological, Christ's ministry lasted at least two years, since the plucking of the ears of corn (April- June) marks a first spring; the feeding of the five thousand when the grass was fresh green (xXwpos: about March), a second; and the Passover of the Crucifixion a third: and these three points are so far removed from one another in the narrative that the conclusion would hold, even if the general arrangement in St Mark were only roughly, and not minutely, chronological. On the other hand, it may be true that an impression of a briefer period of ministry naturally results, and in early generations did actually result, from the synoptic account considered as a whole.

(b) Evidence of St Luke's Gospel (ix. 51-xix. 28 compared with iv. 14-ix. 50; iv. 19). — Still stronger is the impression of brevity suggested by St Luke. The second and larger half of the narrative of the ministry is introduced at ix. 51 with the words, " It came to pass as the days of His assumption were coming to the full, He set His face firmly to go to Jerusalem," under which phrase the evangelist cannot have meant to include more than a few months, perhaps not more than a few weeks; so that even if the earlier and shorter half of the account, which describes a purely Galilean ministry (" Judaea " in iv. 44, if it is the true reading, means Judaea in the sense of Palestine), is to be spread over a longer period of time, the combined narrative can hardly have been planned on the scale of more than a single year. St Luke himself may have understood literally, like so many of his readers in ancient times, the reference which he records to the " acceptable year of the Lord " (iv. 19 = Isaiah lxi. 2): see, too, above, 3 (a) ad fin.

(c) Evidence of St John's Gospel (ii. 13, " the Passover of the Jews was near," and 23, " He was in Jerusalem at the Passover at the feast "; v. 1, " after these things was a feast [or ' the feast '] of the Jews "; vi. 4, " and the Passover, the feast of the Jews, was near "; vii. 2, " and the feast of the Jews, the Tabernacles, was near"; x. 22, "at that time the feast of dedication took place at Jerusalem "; xi. 55, " and the Passover of the Jews was near ": besides iv. 35, " say ye not that there is yet a period of four months and harvest cometh? behold, I telJ you, lift up your eyes and see the fields that they are white to harvest "). This catena of time-references is of course unique in the Gospels as a basis for a chronology of the ministry; and

it is not reason- able to doubt (with Loisy, loc. cil., who suggests that the aim was to produce an artificial correspondence of a three and a half years' ministry with the half- week of Daniel ; but many and diverse as are the early interpretations of Daniel's seventy weeksˆ no one before Eusebius thought of connecting the half-week with the ministry), that the evangelist intended these notices as definite historical data, possibly for the correction of the looser synoptic narratives and of the erroneous impressions to which they had given rise. Unfortunately, difficulties, either (i.) of reading, or (ii.) of interpretation, or (iii.) of arrangement, have been raised with regard to nearly all of them; and these difficulties must be briefly noticed here.

(i.) Readings (a) v. I , koprri A B D, Origen, Epiphanius, Chrysostom, Paschal Chronicle; 17 fop-nj XCLA 1-118, 33, the Egyptian versions, Eusebius, Cyril-Alex. (Irenaeus ?). The balance of internal evidence — copyists being more likely to accentuate than to diminish the precision of a note of time — inclines, like the balance of external evidence, against the article. (/S) vi. 4, rb iraaxa. is read by all known MSS. and versions; but it has been argued by Hort (in Westcott's and Hort's New Testament in Greek, appendix, pp. 77-81) that four ancient authorities omitted the words, and that their omission

simplifies the whole chronology, since " the feast " which was " near " in vi. 4 would then be identical with the feast of Tabernacles mentioned in vii. 2, and all the time-notices of the Gospel could be arranged to fall within the space of a single year, between the Pass-over of ii. 13 and the Passover of xi. 55. But of the four authorities alleged, Irenaeus (11. xxii. 3 [xxxiii. l])andtheAlogi (ap. Epiphanius, Haer. Ii. 22) were giving catalogues of Passovers " observed " by Christ (at Jerusalem), and therefore naturally omitted a mere chronological reference like vi. 4: Cyril of Alexandria, in so far as his evidence is adverse to the words, appears to be incorporating a passage from the Commentary of Origen, not extant in loc. ; and the only writer who perhaps really did omit the words — with the view, no doubt, of reconciling the witness of the fourth Gospel with the then widely spread tradition of the single-year ministry — is Origen himself.

(ii.) Interpretation (a) iv. 35: which is to be taken literally, the " four months to harvest " (about January), or the " fields white to harvest " (about May)? It does not seem possible to rule out either interpretation; the choice between them will follow from the view taken of the general chronological arrangement of the Gospel. (/3) v.

i.: if " the feast "is read, a choice remains between Passover and Tabernacles (the definite article would not be very definite after all) ; if the more probable " a feast," the greater feasts are presum- ably excluded, but a choice remains between, at any rate, Pentecost (May), Trumpets (September), Dedication (December) and Purim (February). Here again the decision will follow on the general chronological arrangement which may be adopted.

(iii.) Arrangement. — So far the amount of possible latitude left is not so great as to obscure the main outline of the chronology. For a first (ii. 13, 20), second (vi. 4), and third (xi. 55) Passover are established, with two indeterminate notices (iv. 35, v. 1) between the first and second, and two determinate notices (vii. 2 Tabernacles in October, x. 22 Dedication in December) between the second and third. But of late years an increasing desire has been manifested, especially in Germany and America, to manipulate the fourth Gospel on grounds of internal evidence, at first only in the way of particular transpositions of more or less attractiveness, but latterly also by schemes of thorough-going rearrangement. The former class of proposals will as a rule hardly affect the chronology of the Gospel ; the latter will affect it vitally. The distinction here drawn may be illustrated from the earliest instance of the former and one of the latest of the latter. In 1871 Archdeacon J. P. Norris {Journal of Philology) wished to transpose chapters v. and vi. — ch. vi. was, like ch. xxi., a Galilean appendix, and was inserted by mistake at some- what too late a point in the body of the Gospel — and to read "the feast " in v. I, identifying it with the Passover which was near in vi. 4: in any case, whether " the feast "=Passover, or " a feast " = Pentecost, were read in v. I, the transposition would not affect the two years' ministry. In 1900 Professor B. W. Bacon {American Journal of Theology, p. 770) proposed a rearrangement of the whole Gospel, according to which the time-notices would occur in the following order: vi. 4, Passover is near; iv. 35, the fields white to harvest = May; v. I, "a feast "=Pentecost; vii. 2, Tabernacles; x. 22, Dedication; xi. 55, Passover is near; xii. 1, Jesus at Bethany six days before Passover; ii. 13, Passover is near and Jesus goes up to Jerusalem (ii. 23, an interpolation) for the Passover of the Cruci- fixion; and the ministry would thus be reduced to a single year. Such a scheme does not lend itself to discussion here; but as far as evidence is at present obtainable, the conclusion that the fourth evangelist drew up his narrative on the basis of 3 two years' rather than a one year's ministry appears to be irrefragable.

Not only do the fourth and second Gospels thus agree in indications of a two years' ministry, but the notes of the middle spring of the

three (John vi. 4; Mark vi. 39) both belong to the feeding of the 5000, one of the few points of actual contact between the two Gospels.

The question, however, may still be raised, whether these time-indications of the two Gospels are exhaustive, whether (that is) two years, and two years only, are to be allotted to the ministry. Irenaeus (n. xxii. 3-6 [xxxiii. 1-4]), in favour of a ministry of not less than ten years, appeals (i.) to the tradition of Asia Minor; (ii.) to the record in St John that Christ, who was thirty years old at the time of his baptism, was addressed by the Jews as " not yet [i.e. nearly] fifty years old ": but both his arguments are probably derived from a single source, Papias's interpretation of John viii. 57. With this exception, however, all ancient writers, whether they enumerated two or three or four Passovers in the Gospel history, believed that the enumera- tion was exhaustive; and their belief appears correctly to repre- sent the mind of the author of the Fourth Gospel, seeing that his various notes of time were probably in intentional contrast to the looser synoptic accounts. Moreover, the wide currency in early times of the tradition of the single-year ministry (Ptolemaeus.

ap. Iren, loc. tit.; Clementine Homilies, xvii. 19; Clem. Alex. Strom, i. 145, vi. 279; Julius Africanus, ap. Routh, Rett. Sacr. ii. 240, 306; Hippolytus, Paschal Cycle and Chronicle; Origen, in Levit. Horn. ix. 5, de Principiis, iv. 5) becomes more difficult to account for the farther it is removed from the actual facts.

5. The date of the Crucifixion.

(a) The Roman Governor. — Pontius Pilate was on his way back to Rome, after ten years of office, when Tiberius died on the 16th March a.d. 37 (Josephus, Ant. xvni. ii. 2, iv. 2). Luke xiii. 1, xxiii. 12, show that he was not a newcomer at the time of the Crucifixion. For the Crucifixion " under Pontius Pilate " the Passover of a.d. 28 is therefore the earliest possible and the Passover of a.d. 36 the latest.

(b) The Jewish High-Priest. — Caiaphas was appointed before Pilate's arrival, and was deposed at a Passover apparently not later than that of the year of Herod Philip's death, a.d. 34 (Josephus, Ant.

xvin. ii. 2, iv. 3-v. 3. The Crucifixion at some previous Passover would then fall not later than a.d. 33.

(c) The Day of the Week. — The Resurrection on " the first day of the week " (Sunday) was " on the third day " after the Crucifixion; and that "the third day" implies an interval of only two days hardly needed to be shown, but has been shown to demonstration in Field's Notes on the Translation of the New Testament (on Matt. xvi. 21). The Crucifixion was therefore on a Friday in some year between a.d. 28 and 33 inclusive.

(d) The Day of the Jewish Month Nisan. — The Passover was kept at the full moon of the lunar month Nisan, the first of the Jewish ecclesiastical year; the Paschal lambs were slain on the afternoon of the 14th Nisan, and the Passover was eaten after sunset the same day — which, however, as the Jewish day began at sunset, was by their reckoning the early hours of the 15th Nisan; the first fruits (of the barley harvest) were solemnly offered on the 16th. The synoptic Gospels appear to place the Crucifixion on the 15 th, since they speak of the Last Supper as a Passover; 1 St John's Gospel, on the other hand (xiii. 1, 29, xviii. 28), distinctly implies that the feast had not yet taken place, and thus makes the Crucifixion fall on the 14th. Early Christian tradition is unanimous on this side; either the 14th is mentioned, or the Crucifixion is made the antitype of the slaughter of the Paschal Lamb (and the Resurrection of the first fruits), in the following authorities anterior to a.d. 235: St Paul, 1 Cor. v. 7, xv. 20; Quartodecimans of Asia Minor, who observed the Christian Pascha on the " 14th," no matter on what day of the week it fell; Claudius Apollinaris, Clement of Alexandria, Hippolytus, all three quoted in the Paschal Chronicle; Irenaeus (apparently) iv. x. 1 [xx. 1]; [Tertullian] adv. Judaeos, 8; Africanus, in Routh, Rett. Sacr. ii. 297. The Crucifixion, then, should be placed rather on the 14th than on the 15th of Nisan.

These four lines of inquiry have shown that the Crucifixion fell on Friday, Nisan 14 (rather than 15), in one of the six years 28-33 A – D – ; an d therefore, if it is possible to discover (i.) exactly which moon or month was reckoned each year as the moon or month of Nisan, and (ii.) exactly on what day that particular moon or month was reckoned as beginning, it will, of course, be possible to tell in which of these years Nisan 14 fell on a Friday. To neither question can an answer be given in terms so precise as to exclude some latitude, but to both with sufficient exactness to rule out at once three of the six years, (i.) The difficulty with regard to the month is to know how the commencement of the Jewish year was fixed — in

what years an extra month was inter- calated before Nisan. If the Paschal full moon was, as in later Christian times, the first after the spring equinox, the difficulty would be reduced to the question on what day the equinox was reckoned. If, on the other hand, it was, as in ancient Jewish times, the first after the earliest ears of the barley harvest would be ripe, it would have varied with the forwardness or backward-

1 If the Passover celebration could be anticipated by one day in a private Jewish family (and we know perhaps too little of Jewish rules in the time of Christ to be able to exclude this possibility), the evidence of the synoptic Gospels would no longer conflict with that of St John.

ness of the season from year to year, (ii.) The difficulty with regard to the day is, quite similarly, to know what precise relation the first day of the Jewish month bore to the astronomical new moon. In later Christian times the Paschal month was calculated from the astronomical new moon; in earlier Jewish times all months were reckoned to begin at the first sunset when the new moon was visible, which in the most favourable circumstances would be some hours, and in the most unfavourable three days, later than the astronomical new moon.

Direct material for answering the question when and how far astronomical calculations replaced simple observations as the basis of the Jewish calendar is not forthcoming. Jewish tradi- tions represented the Sanhedrin as retaining to the end its plenary power over, the calendar, and as still fixing the first day of every month and the first month of every year. But as it is quite inconceivable that the Jews of the Dispersion should not have known beforehand at what full moon they were to present themselves at Jerusalem for the Passover, it must be assumed as true in fact, whether or no it was true in theory, that the old empirical methods must have been qualified, at least partially, by permanent, that is in effect by astronomical rules. Exactly what modifications were first made in the system under which each month began by simple observation of the new moon we do not know, and opinions are not agreed as to the historical value of the rabbinical traditions; but probably the first step in the direction of astronomical precision would be the rule that no month could consist of less than twenty-nine or more than thirty days — to which appears to have been added, but at what date is uncertain, the further rule that Adar, the month preceding Nisan, was always to be limited to twenty- nine. In the same way the beginning of the Jewish year accord- ing to the state of the harvest

was supplanted by some more fixed relation to the solar year. But this relation was not, it would seem, regulated by the date, real or supposed, of the equinox. Christian controversialists from Anatolius of Laodicea (a.d. 277) onwards accused the Jews of disregarding the (Christian) equi- noctial limit, and of sometimes placing the Paschal full moon before it; and it is possible that in the time of Christ the 14th of Nisan might have fallen as far back as the 17th of March. In the following table the first column gives the terminus paschalis, or 14th of the Paschal moon, according to the Christian calendar; the second gives the 14th, reckoned from the time of the astronomical new moon of Nisan; the third the 14th, reckoned from the probable first appearance of the new moon at sunset. Alternative moons are given for a.d. 29, according as the full moon falling about the 18th of March is or is not reckoned the proper Paschal moon.

a.d. 28 Sat. Mar. 27 Mar. 28 Mar. 30 „ 29 Th. Mar. 17 Mar. 17 Mar. 19

F. Ap. 15 Ap. 16 Ap. 18

„ 30 Tu. Ap. 4 Ap. 5 Ap. 7

„ 31 Sat. Mar. 24 Mar. 25 Mar. 27 „ 32 Sat. Ap. 12 Ap. 12 Ap. 14

„ 33 W. Ap. 1 Ap. 1-2 Ap. 3 or 4.

It will be seen at once that Friday cannot have fallen on Nisan 14th in any of the three years a.d. 28, 31 and 32. The choice is narrowed down to a.d. 29, Friday, 18th March (Friday, 15th April, would no doubt be too early even for the 14th of Nisan); a.d. 30, Friday 7th April; and a.d. ˆ3, Friday, 3rd April.

(e) The Civil Year (consuls, or regnal years of Tiberius) in early Christian tradition. It is not a priori improbable that the year of the central event from which the Christian Church dated her own existence should have been noted in the apostolic age and handed down to the memory of succeeding generations; and the evidence does go some way to suggest that we have in favour of a.d. 29, the consulate of the two Gemini (15th or 16th year of Tiberius), a body of tradition independent of the Gospels and ancient, if not primitive, in origin.

The earliest witness, indeed, who can be cited for a definite date for the crucifixion gave not 29, but ˆ3 a.d. The pagan chronicler, Phlegon, writing in the reign of Hadrian, noted under Olympiad 202-4 (= a.d. 32-33), besides a great earthquake in Bithynia, an

eclipse so remarkable that it became night

" at the sixth hour of the day." The eclipse meant is, presum- ably, that of the Crucifixion (so Origen, contra Celsum, ii. 33 [but see in Matt. 134, Delarue iii. 922], Eusebius's Chronicle Tib. 19 [=a.d. 33], Anon, in Cramer's Catena in Matt. p. 237), but as the notice of it was clearly derived by Phlegon, pagan as he was, directly or indirectly from the Gospel narrative, there is no reason at all to ascribe any independent value to the date. Phlegon may have had grounds for dating the Bithynian earth- quake in that year, and have brought the dateless portent into connexion with the dated one. Eusebius adopted and popular- ized this date, which fell in with his own system of Gospel chronology, but of the year 33 as the date of the Passion there is no vestige in Christian tradition before the 4th century.

The only date, in fact, which has any real claim to represent Christian tradition independent of the Gospels, is the year 29. Tiberius 15 is given by Clem. Alex. Strom, i. 147; Origen, Horn, in Jerem. xiv. 13; cf. c. Cels. iv. 22. Tiberius 16 by Julius Africanus (Routh, Rell. Sacr. ii. 301-304), and pseudo- Cyprian de pascha computus (a.d. 243), § 20. The consulship of the two Gemini by Lactantius, Div. Inst. iv. x. 18, and (Lactantius?)"

(/) The Civil Month and Day. — The earliest known calculations, by Basilidian Gnostics, quoted in Clem. Alex. Strom, i. 147, gave alternative dates, Phamenoth 25, Pharmuthi 25, Pharmuthi 19; that is, according to the fixed Alexandrine calendar of B.C. 26, 21st March, 20th April, 14th April; in the older, not wholly superseded, Egyptian calendar the equivalents with Roman days varied from year to year. But in all probability these dates were only one development of those speculations in the region of numbers to which Gnosticism was so prone; and in any case to look for genuine traditions among Egyptian Gnostics, or even in the church of Alexandria, would be to misread the history of Christianity in the 2nd century. Such traditions must be found, if anywhere, in Palestine and Syria, in Asia Minor, in Rome, not in Egypt; within the Church, not among the Gnostics. The date which makes the most obvious claim to satisfy these conditions would be the 25th of March, as given by Hippolytus,

[Tert.] adv. Judaeos, and the Acts of Pilate (according to all extant MSS. and versions, but see below), locc. citt.— the same three authorities who bear the earliest witness for the consuls of the year of the Crucifixion — and by many later writers. It cannot be correct, since no full moon occurs near it in any of the possible years; yet it must be

very early, too early to be explained with Dr Salmon (Dictionary of Christian Biography, iii. 926), as originated by Hippolytus's Paschal cycle of a.d. 221. Now Epiphanius (Haer. 1. 1) had. seen copies of the Acts of Pilate in which the day given was not 25th March, but a.d. xv. kal. Apr. (= i8th March); and if this was the primitive form of the tradition, it is easy to see how 25th March could have grown out of it, since the 18th would from comparatively early times, in the East at any rate, have been thought impossible as falling before the equinox, and no substitution would be so natural as that of the day week, Friday, 25th March. But Friday, 18th March, a.d. 29, was one of the three alternative dates for the Crucifixion which on astronomical and calendar grounds were found (see above, s

Thus a.d. 29 is the year, the 18th of March is the day, to which Christian tradition (whatever value, whether much or little, be ascribed to it) appears to point. Further, the Baptism was tentatively placed in a.d. 26-27; the length of the ministry was fixed, with some approach to certainty, at between two and three years, and here too the resultant date for the Crucifixion would be the Passover of a.d. 29.

To sum up: the various dates and intervals, to the approxi- mate determination of which this article has been devoted, do not claim separately more than a tentative and probable value. But it is submitted that their harmony and convergence give them some additional claim to acceptance, and at any rate do something to secure each one of them singly — the Nativity in 7-6 B.C., the Baptism in a.d. 26-27, the Crucifixion in a.d. 29 — from being to any wide extent in error.

The Chronology of the Apostolic Age.

The chronology of the New Testament outside the Gospels may be defined for the purposes of this article as that of the period between the Crucifixion in a.d. 29 (30) on the one hand, and on the other the persecution of Nero in a.d. 64 and the fall of Jerusa- lem in a.d. 70. Of the events in Christian history which fall between these limits it must be admitted that there are many which with our present

information we cannot date with exact- ness. But the book of Acts, our only continuous authority for the period, contains two synchronisms with secular history which can be dated with some pretence to exactness and con- stitute fixed points by help of which a more or less complete chronology can be constructed for at least the latter half of the apostolic age. These are the death of Herod Agrippa I. (xii. 23) and the replacement of Felix by Festus (xxiv. 27).

1. The death of Herod Agrippa I. This prince, son of Aris- tobulus and grandson of Herod the Great, was made (i.) king over the tetrarchy which had been Herod Philip's, " not many days " after the accession of Gaius, 16th of March a.d. 37; (ii.) ruler of the tetrarchy of Antipas, in a.d. 30-40; (iii.) ruler of the whole of Palestine (with Abilene), on the accession of Claudius at the beginning of a.d. 41. Josephus's Jewish Wars and Anti- quities differ by one in the number of years they allot to his reign over the tetrarchies (the former work says three years, the latter four), but agree in the more important datum that he reigned three years more after the grant from Claudius, which would make the latest limit of his death the spring of a.d. 44. The Antiquities also place his death in the seventh year of his reign, which would be a.d. 43-44. On the other hand, coins whose genuineness there is no apparent reason to doubt are extant of Agrippa's ninth year; and this can only be reconciled even with a.d. 44 by supposing that he commenced reckoning a second year of his reign on Nisan 1, a.d. 37, so that his ninth would run from Nisan 1, a.d. 44. On the balance of evidence the only year which can possibly reconcile all the data appears to be a.d. 44 after Nisan, so that it will have been at the Passover of that year that St Peter's arrest and deliverance took place.

After Agrippa's death Judaea was once more governed by procurators, of whom Cuspius Fadus and Tiberius Alexander ruled from a.d. 44 to 48; the third, Cumanus, was appointed in a.d. 48; and the fourth, Felix, in a.d. 52. Under Tiberius

Alexander, i.e. in a.d. 46 or 47, occurred the great famine which Agabus had foretold, and in which the Antiochene church sent help to that of Jerusalem by the ministry of Barnabas and Saul (Acts xi. 30, xii. 25). Thus the earliest date at which the com- mencement of

the first missionary journey (Acts xiii. 4) can be placed is the spring of a.d. 47. The journey extended from Salamis " throughout the whole island " of Cyprus as far as Paphos, and on the mainland from Pamphylia to Pisidian Antioch, Iconium, Lystra and Derbe, at each of which places indications are given of a prolonged visit (xiii. 49, xiv. 3, 6, 7, 21). The same places were visited in reverse order on the return journey, as far as Perga on the Pamphylian coast; but instead of revisiting Cyprus the voyage to Syria was this time made direct. In estimating the length of time occupied by this first missionary journey, it must be remembered that a sea voyage could never have been undertaken, and land travel only rarely, during the winter months, say November to March; and as the amount of the work accomplished is obviously more than could fall within the travelling season of a single year, the winter of 47-48 must have been spent in the interior, and return to the coast and to Syria made only some time before the end of autumn a.d. 48. The succeeding winter, at least, was spent again at Antioch of Syria (xiv. 28). The council at Jerusalem of Acts xv. will fall at earliest in the spring of a.d. 49, and as only " certain days " were spent at Antioch after it (xv. 36) the start on the second missionary journey might have been made in the (late) summer of the same year. The " confirmation " of the existing churches of Syria and Cilicia, and of those of the first journey beginning with Derbe (xv. 41, xvi. 5), cannot have been completed under several months, nor would the Apostle have commenced the strictly missionary part of the journey in districts not previously visited, before the opening of the travel- ling season of a.d. 50. No delay was then made on the Asiatic side : it may still have been in spring when St Paul crossed to Europe and began the course of preaching at Philippi, Thessa- lonica, Beroea and Athens which finally brought him to Corinth. The stay of eighteen months at the last-named place (xviii. 11) will naturally begin at the end of one travelling season and end at the beginning of another, i.e. from the autumn of a.d. 50 to the spring of a.d. 52. From Corinth the Apostle went to Jerusalem to " salute the church," and then again to Antioch in Syria, where he stayed only for " a time " (xviii. 22), and soon left — on the third missionary journey, as conventionally reckoned — proceeding " in order " through the churches of the interior of Asia Minor. These journeys and the intervening halts must have occupied seven or eight months, and it must have been about the end of the year when St Paul established his new headquarters at Ephesus. The stay there lasted between two and three years (xix. 8, 10, xx. 31), and cannot have terminated before the spring of a.d. 55. From Ephesus he went into Europe, and after " much teaching " given to the churches of Macedonia (xx. 2), spent the three winter

months at Corinth, returning to Philippi in time for the Passover (xx. 3, 6) of a.d. 56. Pente- cost of the same year was spent at Jerusalem, and there St Paul was arrested, and kept in prison at Caesarea for two full years, until Festus succeeded Felix as governor (xx. 16, xxiv. 27), an event which, on this arrangement of the chronology of the missionary journeys, would therefore fall in a.d. 58.

Care, however, must be taken to remember exactly what this line of argument amounts to — what it can fairly be said to have proved, and what it still leaves open. It has been shown, firstly, that the missionary journeys cannot have commenced before the spring of a.d. 47, and, secondly, that between their com- mencement and the end of the two years' imprisonment at Caesarea not less than eleven full years must have elapsed. Consequently a.d. 58 appears to be the earliest date possible for the arrival of Festus. On the other hand, a later date for Festus is not absolutely excluded. It is possible that the first missionary journey should be placed in a.d. 48 instead of a.d. 47; and it is possible, though not probable, that the missionary journeys should be spread over one year more than has been suggested above. At any rate, then, the alternative is open that every

date given above, from a.d. 47 to a.d. 58, should be moved on one year, with the result of placing Festus's arrival in a.d. 59.

It is now time to run to the direct evidence for the date of Festus's arrival as procurator, in order to test by it the result already tentatively obtained.

2. The repla cement of Felix by Festus. This is the pivot date of St Paul's later life, but unfortunately two schools of critics date it as differently as a.d. 55 and a.d. 60 (or 61). The former are represented by Harnack, the latter by Wieseler, whom Lightfoot follows. It can be said confidently that the truth is between these two extremes (though in what exact year it is not easy to say), as will be evident from a consideration of the argu- ments urged, which in each case appear less to prove one extreme than to disprove its opposite. 1

_ Arguments for the Later Date, A.D. 60 or 61. — (o) St Paul, at the time of his arrest, two years before Felix's recall, addresses him as " for many years past a judge for this nation " (Acts xxiv. 10, 27). It is certain that Felix succeeded Cumanus in a.d. 52, for Tacitus mentions Cumanus's recall under that year, Josephus immediately before the notice of the completion of Claudius's twelfth year [January, a.d. 53], Eusebius probably under Claudius II, that is, between September 51 and September 52 (for the meaning of the

regnal years in the Chronicle of Eusebius see the present writer's article in Journal of Theological Studies, January 1900, pp. 188-192). It is argued that " many years " cannot mean less than six or seven, so that St Paul must have been speaking at. earliest in 58 or 59, and Felix will have left Judaea at earliest in 60 or 61. But this argument overlooks the fact that Felix had been in some position which might properly be described as that of " judge for this nation " before he became governor of all Palestine in a.d. 52. In the words of Tacitus, Felix was at the time of that appointment iampridem Iudaeae im- positus {Annals, xii. 54) ; he certainly supposes Felix to have been already governor of Samaria, and apparently of Judaea too, and only recognizes Cumanus as governor of Galilee; and Josephus, though he says nothing of this, and treats Cumanus as the sole procurator down to A.D. 52, implies that Felix had been in some position where the Jewish authorities could judge of his fitness when he tells us that the high priest Jonathan used to press on Felix, as a reason for urging him to govern well, the fact he that had asked for his appointment to the procuratorship (Ant. xx. viii. 5). If Felix had acted in some position of responsibility in Palestine before 52 (perhaps for some time before), St Paul could well have spoken of "many years" at least as early as 56 or 57.

(0) Josephus enumerates after the accession of Nero (October 54) a long catalogue of events which all took place under the procurator-ship of Felix, including the revolt of " the Egyptian " which was already " before these days " at the time of St Paul's arrest, two years from the end of Felix's tenure. This suggests, no doubt, that the Egyptian rebelled at earliest in 54-55, and makes it probable that St Paul's arrest did not take place before (the Pentecost of) A.D. 56; and it implies certainly that the main or most important part of Felix's governorship fell, in Josephus's view, under Nero. But as two years only of Felix's rule (52-54) fell under Claudius, this procedure would be quite natural on Josephus's part if his recall were dated in 58 or 59, so that four or five years fell under Nero. And there is no need at all to suppose that all the incidents which the historian masses under his account of Felix were successive: events in Emesa, Chalcis, Caesarea and Jerusalem may easily have been synchronous.

The arguments, then, brought forward in favour of a.d. 60 or 61 do not do more than bring the rule of Felix down to 58 or 59.

Arguments for an Early Date, A.D. 55 or 56.— (a) Eusebius's Chronicle places the arrival of Festus in Nero 2, October 55-56, and Eusebius's chronology of the procurators goes back probablv through Julius Africanus (himself a Palestinian) to contemporary authorities

like the Jewish kings of Justus of Tiberias. But (i.) Nero 2 is really September 56-September 57; (ii.) it is doubtful whether Eusebius had any authority to depend on here other than Josephus, who gives no precise year for Festus — Julius Africanus is hardly probable, since we know that his chronicle was very jejune for the Christian period — and if so, Eusebius had to find a year as best he could. '

(/S) Felix, on his return to Rome, was prosecuted by the Jews for misgovernment, but was acquitted through the influence of his brother Pallas. Pallas had been minister and favourite of Claudius,

1 Dr C. Erbes (Texte und Untersuchungen, new series, iv. 1) attempts to interpret the evidence of Eusebius in favour of the later date for Festus as follows: Eusebius's date for Festus is to be found in Nero r, by striking a mean between the Armenian, Claudius 12, and the Latin, Nero 2; it is really to be understood as reckoned, not by years of Nero, but by years of Agrippa ; and as Eusebius erroneously antedated Agrippa's reign by five years, commencing it with A.D. 45 instead of a.d. 50, his date for Festus is five years too early also, and should be moved to Nero 6, a.d. 59-60. The whole of this theory appears to the present writer to be a gigantic mare's nest: see Journal of Theological Studies (October 1901), pp. 120-123.

but was removed from office in the winter following Nero's accession, 54-55. Felix must therefore have been tried at the very beginning of Nero's reign. But this argument would make Felix's recall — if Festus came in summer, as Acts xxv. I, xxvii. 1, 9, seem to prove — fall actually under Claudius. And, in fact, it would be a mistake to look upon Pallas's retirement as a disgrace. He stipulated that no inquiry should be made into his conduct in office, and was left for another seven years unmolested in the enjoyment of the fortune he had amassed. There is, therefore, every likelihood that he retained for some years enough influence to shield his brother.

Of these arguments, then, the first, so far as it is valid, is an argument for the summer, not of a.d. 55 or 56, but of A.D. 57 as that of the recall, while the second will apply to any of the earlier years ®f Nero's reign.

In the result, then, the arguments brought forward in favour of each

extreme fail to prove their case, but at the same time prove something against the opposite view. Thus the point that Josephus catalogues the events of Felix's procuratorship under Nero cannot be pressed to bring down Felix's tenure as far as 60 or 61, but it does seem to exclude as early a termination as 56, or even 57. Conversely, the influence of Pallas at court need not be terminated by his ceasing to be minister early in 55; but it would have been overshadowed not later than the year 60 by the influence of Poppaea, who in the summer of that year 1 enabled the Jews to win their cause in the matter of the Temple wall, and would certainly have supported them against Felix. Thus the choice again appears to lie between the years 58 and 59 for the recall of Felix and arrival of Festus.

If St Paul was arrested in 56 or 57, and appealed to Caesar on the arrival of Festus in 58 or 59, then, as he reached Rome in the early part of the year following, and remained there a prisoner for two full years, we are brought down to the early spring of either 61 or 62 for the close of the period recorded in the Acts. That after these two years he was released and visited Spain in the west, and in the east Ephcsus, Macedonia, Crete, Troas, Miletus, and perhaps Achaea and Epirus, is probable, in the one case, from the evidence of Romans xv. 28, Clem, ad Cor. v. and the Muratorian canon, and, in the other, from the Pastoral Epistles. These journeys certainly cannot have occupied less than two years, and it is more natural to allow three for them, which takes us down to 64-65.

Early evidence is unanimous in pointing to St Peter and St Paul as victims of the persecution of Nero (Clem, ad Cor. v. vi., Dionysius of Corinth ap. Eus. H.E. ii. 25, &c, combined with what we know from Tacitus of the course of the persecution, and from Gaius of Rome, ap. Eus. ii. 25, of the burial-places of the two apostles); and tradition clearly distinguished the fierce outbreak at Rome that followed on the fire of the city in July 64 from any permanent disabilities of the Christians in the eye of the law which the persecution may have initiated. There is, therefore, no reason at all to doubt that both apostles were martyred in 64-65, and the date serves as a confirmation of the chronology adopted above of the imprisonment, release and . subsequent journeys of St Paul.

Investigation, then, of that part of the book of Acts which follows the death of Agrippa, recorded in chap. xii. — i.e. of that part of the apostolic age which follows the year 44 — has shown that apparent difficulties can be to a large extent set aside, and that there is nowhere room between a.d. 44 and 64 for doubt extending to more

than a single year. The first missionary journey may have begun in 47 or 48; the arrival of Festus may have taken place in the summer of 58 or of 59; the two years of the Roman imprisonment recorded in the last chapter of Acts may have ended in the spring of 61 or 62; and the dates which fall in between these extremes are liable to the same variation. The present writer leans to the earlier alternative in each case, 47, 58, 61; but he willingly concedes that the evidence, as he understands it, is not inconsistent with the later alternative.

But if the events of a.d. 44-64 can thus be fixed with a fair approximation to certainty, it is unfortunately otherwise with the events of a.d. 29-44. Here we are dependent (i.) on general

1 This date appears to be satisfactorily established by Ramsay, " A Second Fixed Point in the Pauline Chronology," Expositor, August 1900.

indications given in the Acts; (ii.) on the evidence of the Epistle to the Galatians, which, though in appearance more precise, can be and is interpreted in very different ways.

(i.) The book of Acts is divided, by general summaries from time to time inserted in the narrative, into six periods: i. i-vi. 7, vi. 8-ix. 31, ix. 32-xii. 24, xii. 25-xvi. 5, xvi. 6-xix. 20, xix. 21- xxviii. 31. Of these the three last extend respectively from the death of Herod to the start for Europe in the second missionary journey (a.d. 44 to the spring of 50 [51]), from the start for Europe to the end of the long stay at Ephesus (a.d. 50 [51] to the spring of a.d. 55 [56]), and from the departure from Ephesus to the end of the two years' captivity at Rome (a.d. 55 [56] to the beginning of a.d. 61 [62]). It will be seen that these periods are of more or less the same length, namely, six (or seven) years, five years, six years. There is, therefore, some slight presumption that the three earlier periods, which together cover about fifteen years, were intended by so artistic a writer as St Luke to mark each some similar lapse of time. If that were so, the preaching of the apostles at Jerusalem and organization of the Church at the capital — the preaching of the seven and the extension of the Church all over Palestine — the extension of the Church to Antioch, and the commencement of St Paul's work — might each occupy five years more or less, that is to say, roughly, a.d. 29-34, 34-39, 39-44- The conversion of St Paul, which falls within the second period, would on this arrangement fall somewhere between five and ten years after the Crucifixion. Such con- clusions are, however, of course general in the extreme.

(ii.) A nearer attempt to date at least the chronology of St Paul's earlier years as a Christian could be made by the help of the Galatian Epistle if we could be sure from what point and to what point its reckonings are made. The apostle tells us that on his conversion he retired from Damascus into Arabia, and thence returned to Damascus; then after three years (from his con- version) he went up to Jerusalem, but stayed only a fortnight, and went to the regions of Syria and Cilicia. Then after fourteen years (from his conversion ? or from his last visit ?) he went up to Jerusalem again to confer with the elder apostles. Now, if either of these visits to Jerusalem could be identified with any of the visits whose dates have been approximately settled in the chronology of a.d. 44-64, we should have a fixed point from which to argue back. Unfortunately, even less agreement exists on this head than on the question whether the fourteen years of the last-mentioned visit are to be reckoned from the conversion or from the previous visit. Most critics, indeed, are now agreed that the fourteen years are to be calculated from the conversion; and most of them still hold that the visit of Galatians ii. is the same as the council of Acts xv., partly, no doubt, on the ground that the latter visit was too important and decisive for St Paul to have omitted in giving even the most summary description of his relations with the twelve. This ground would, however, be cut away from their feet if it were possible to hold (with J. V. Bartlet, Apostolic Age, 1900, and V. Weber, Die Abjassung des Galaterbrisfs vor dent Aposlelkonzil, Ravensburg, 1900) that the epistle was actually written just before the council, i.e. in the winter of 48-49 [49-50]. In that case, of course, the two visits of Galatians i. and ii. would be those of Acts ix. 26 and xi. 30. The fourteen years reckoned back from the latter (c. a.d. 46) would bring us to a.d. 32-33 as the latest possible date for the conversion. With the older view, on the other hand, the fourteen years reckoned from the council in a.d. 49 [50] would allow us to bring down the conversion to a.d. 36. The new view clears away some manifest difficulties in the reconciliation of the Epistle and the Acts, and the early date for Galatians in relation to the other Pauline epistles is not so improbable as it may seem; but the chronology still appears more satisfactory on the older view, which enables the conversion to be placed at least three years later than on the alternative theory. But it is clear that the last word has not been said, and that definite results for this period cannot yet be looked for.

To sum up: an attempt has been made, it is hoped with some success, to provide a framework of history equipped with dates from the time of St Peter's arrest by Herod Agrippa I. at the

Passover of a.d. 44 down to the martyrdom of St Peter and St Paul in the persecution of Nero, a.d. 64-65. For the previous period, on the other hand, from a.d. 29 to a.d. 44, it appeared impossible in our present state of knowledge to state conclusions other than in the most general form.

Authorities. — The views stated in this article are in general (though with some modifications) the same as those which the present writer worked out with more fulness of detail in Hastings' Dictionary of the Bible, i. (1898) 403-424. Of older books should be mentioned : — Ideler, Handbuch der mathematiscken und tech- nischen Chronologie (2 vols., 1825); Wieseler, Chronologie des apostolischen Zeitalters (1848); Lewin's Fasti Sacri (1865). Im- portant modern contributions are to be found in Prof. (Sir) W. M. Ramsay's various works, and in Harnack's Chronologie der altchrist- lichen Litteratur bis Eusebius, i. 233-244. Mention should also be made of an article, containing much useful astronomical and Tal- mudical information, by Mr J. K. Fotheringham, " The Date of the Crucifixion," in the Journal of Philology, xxix. 100-118 (1904). Mr Fotheringham is of opinion that the evidence from Christian sources is too uncertain, and that the statements of the Mishnah must be the starting-point of the inquiry: taking then the phasis of the new moon as the true beginning of Nisan, he concludes that Friday cannot have coincided with Nisan 14 in any year, within the period A. D. 28-35, other than A. D. 33 (April 3rd). But in one of the two empirical tests of the value of these calculations that he was able to obtain {loc. cit. p. 106, n. 2), the new moon was seen a day earlier than his rules allowed. This being so, it would be premature to disregard the convergent lines of historical evidence which tell against A.D. 33. Among the latest German works may be cited the chapter on New Testament chronology in the Neutestamentliche Zeitgeschichte of Dr Oscar Holtzmann (2nd ed., 1906), pp. 1 17-147: regarded as a collection of historical material this deserves every praise, but the mass is undigested and the treatment of the evidence arbitrary. As might be expected, Dr Holtzmann's conclusions are clear-cut, and alternatives are rigidly excluded: the Crucifixion is dated on the 7th of April A.D. 30, and St Paul's arrest (with the older writers) at Pentecost A.D. 58. (C. H. T.)

BIBLE, ENGLISH. The history of the vernacular Bible of the English race resolves itself into two distinctly marked periods — the one

being that of Manuscript Bibles, which were direct translations from the Latin Vulgate, the other that of Printed Bibles, which were, more or less completely, transla- tions from the original Hebrew and Greek of the Old and New Testaments.

1. The Manuscript Bible. — The first essays in Biblical trans- lation, or rather paraphrasing, assumed in English, as in many Ceedmoa °ther languages, a poetical form. Even in the 7th century, according to the testimony of Bede (Hist. Eccl. iv. 24), Caedmon sang " de creatione mundi et origine humani generis, et tota Genesis historia, de egressu Israel ex Aegypto et ingressu in terram repromissionis, de aliis plurimis sacrae Scripturae historiis, de incarnatione Dominica, passione, resurrectione et ascensione in coelum, de Spiritus Sancti adventu, et apostolorum doctrina." It is, however, doubtful whether any of the poetry which has been ascribed to him can claim to be regarded as his genuine work.

The first prose rendering of any part of the Bible — and with these we are mainly concerned in the present inquiry — originated in all probability in the 8th century, when Bede, the eminent scholar and churchman, translated the first portion (chs. i.-vi. 9) of the Gospel of St John into the vernacular, but no part of this rendering is extant. His pupil Cuthberht recorded this fact in a letter to a fellow-studentj Cuthwine: " a capite sancti evangelii Johannis usque ad eum locum in quo dicitur, ' sed haec quid sunt inter tantos ?' in nostram linguam ad utilitatem ecclesiae Dei convertit " (Mayor and Lumby, Bedae Hist. Eccl. p. 178).

The 9th century is characterized by interlinear glosses on the Book of Psalms, and towards its close by a few attempts at 9th and independent translation. Of these " glossed Psalters " 10th cen- twelve MSS. are known to exist, and they may be t»ry ranged into two groups according to the Latin text

glosses. they represent. The Roman Psalter is glossed in the following MSS.: (1) Cotton Vesp. A. 1 (Vespasian Psalter); (2) Bodl. Junius 27; (3) Univ. Libr. Camb. Ff. 1. 23; (4) Brit. Mus. Reg. 2. B. 5; (5) Trin. Coll. Camb. R. 17. 1 (Eadwine's Psalter) ; (6) Brit. Mus. Add. 37517. The Galilean Psalter in the following: (1) Brit. Mus. Stowe 2 (Spelman's text); (2) Cotton

Bede.

Vitell. E. 18; (3) Cotton Tib. C. 16; (4) Lambeth 48; (5) Arundel 60; (6) Salisbury Cath. 150. 1

The oldest arid most important of these MSS. is the so-called Vespasian Psalter, which was written in Mercia in the first half of the 9th century. It was in all probability the original from which all the above-mentioned Old English glosses were derived, though in several instances changes and modifications were introduced by successive scribes. The first verse of Psalm c. (Vulg. xcix. 2) may serve as a specimen of these glosses. Roman Text. Callican Text.

MS. Vespasian. A. I. MS. Stowe. 2,

WynsumiaS gode, all eorSe DrymaS drihtne, eall eorSe;

SiowiacT Dryhtne in blisse ; SeowiaS drihtne on blisse ;

ingaS in gesihSe his in infaraS on gesyhSe hys

wynsumnisse. on bliSnysse.

Jubilate Deo, otnnis terra; Jubilate Domino, omnis terra;

servile Domino in laetitia; Semite Domino in laetitia;

intrate in conspectu eius in introite in conspectu eius

exultatione. in exultatione.

To the late 9th or early 10th century a work may be assigned which is in so far an advance upon preceding efforts as to be a real translation, not a mer" gloss corresponding word for word with the Latin original. This is the famous Paris Psalter, 2 a rendering of the first fifty Psalms (Vulg. i.l. 10), contained in the unique MS. lat. 8824 in the Bibliotheque Nationale, Paris. The authorship of this version is doubtful, being by some scholars attributed to King Alfred (d. 901), of whom William of Malmes bury writes (Gesta Regum Anglorum, ii. 123), " Psalterium transferre aggressus vix prima parte explicata vivendi finem fecit." This view is, however, denied by others.

In the course of the 10th century the Gospels were glossed and translated. The earliest in date is a Northumbrian Gloss on the Gospels, contained in a beautiful and highly interesting MS. variously known as the Durham Hindis- Book, the Lindisfarne Gospels, or the Book of St a 0S peis Cuthbert (MS. Cotton, Nero. D. 4). The Latin text dates from the close of the 7th century, and is the work of Eadfrith, bishop of Lindisfarne (698-721). The English gloss was added about a century and a half later (e. 950) by one Aldred,

whom Dr Charles O'Conor (Bibl. Stowensis, 1818-1819, ii. 180) supposes to have been the bishop of Durham of that name. The Lord's Prayer is glossed in the following way: — •

Lindisfarne Gospels. Matthew vi. 9. Suae Sonne iuih gie bidde fader urer Su arff sic ergo uos orabitis + Pater noster qui is Su bist in heofnum i in heofnas ; sie gehalgad noma Sin ; in caelis; _ sanctificetur nomen tuum;

(10) to-cymeS ric Sin. sie willo Sin suae is in heofne adueniat regnum tuum fiat uoluntas tua sicut in caelo

"J in eorSo. et in terra. (il)hlaf userne oferwistlic sel lis to daeg.

panem nostrum super-substantiale[m] da nobis hodie.

(12) 3 forgef us scylda usra suae uoe forgefon scyldgum et demitte nobis debita nostra' sicut nos dimittimus debitoribus

usum. nostris.

(13) 1 ne inlaed usih in costunge ah gefrig usich from yfle et ne inducas nos in temtationem sed libera nos a malo. 3

1 See A. S. Cook, Biblical Quotations in Old English Prose Writers, with an introduction on Old English Biblical Versions (London, 1898- 1903), vol.i.pp.xxvi. ff. ; H. Sweet, The Vespasian Psalter in " Oldest English Texts" (E.E.T.S., No. 83, London, 1885); F. Harsley, Eadwine's Canterbury Psalter (E.E.T.S., No. 92, London, 1892); John Spelman, Psalterium Davidis Latino-Saxonicum Vetus (London, 1640) ; Fr. Roeder, Der altengl. Regius Psalter (Reg. II. B. 5), Halle,

1904)-

2 Benjamin Thorpe, Libri Psalmorum versio Antiqua Latina cum paraphrasi Anglo-Saxonica (Oxford, 1835); cf. J. D. Bruce, The Anglo-Saxon Version of the Book of Psalms . . . known as the Paris Psalter (Baltimore, 1894).

3 K. W. Bouterwek, Die vier Evangelien in alt-nordh. Sprache (Giitersloh, 1857), id. Screadunga (Elberfeld, 1858, prefaces to the Gospels) ; J. Stevenson and E. Waring, The Lindisfarne and Rush-worth Gospels (Surtees Soc, 1854-1865); W. W. Skeat, The Holy Gospels in Anglo-Saxon, Northumbrian and Old Mercian Versions (Cambridge, 1871-1887).

citric.

Of a somewhat later date is the celebrated Rushworth Version of the Gospels (MS. Bodl. Auct. D. ii. 9), which contains an independent translation of the Gospel of St Matthew, Version. an< ˆ a gl° ss on those of St Mark, St Luke and St John, founded upon the Lindisfarne glosses. From a note in the manuscript we learn that two men, Fasrman and Owun, made the version. Fserman was a priest at Harewood, or Harwood, in the West Riding of Yorkshire, and to him the best part of the work is due. He translated the whole of St Matthew, and wrote the gloss of St Mark i.-ii, 15, and St John xviii. 1-3. The remaining part, a mere transcript, is Owun's work. The dialect of the translation of St Matthew is Mercian. 1

A further testimony to the activity which prevailed in the field of Biblical lore is the fact that at the close of the century — probably about the year 1000 — the Gospels were Saxon rendered anew for the first time in the south of Eng- Qospels. land. Of this version — the so-called West-Saxon Gospels — not less than seven manuscripts have come down to us. A note in one of these, MS. Corpus Christi College, Cambridge, 140, states, ego JElfricus scripsi hunc librum in Monasterio Ba$\>onio et dedi Brihtwoldo preposito, but of this ˆfilfric and his superior nothing further is known. 2

The Lord’s Prayer is rendered in the following way in these gospels : —

West-Saxon Gospels. — MS Corpus 140.

Matthew vi. 9. Eornustlice gebiddaS eow Sus; Faeder lire Jpu J>e. eart on heofonum; si jpin naraa gehalgod (10) to-becume |>in rice; gewurfie 3in willa on eorSan swa swa on heofonum. (11) lirne gedaeghwamlican hiaf syie us to dasg, (12) J forgyf us lire gyltas swa swa we forgyfaS urum gyltendum. (13)] ne gelaed f)U us on costnunge ac alys us of yfele so|)lice.

Towards the close of the century the Old Testament found a translator in ˆElfric (q.v.), the most eminent scholar in the close of the 10th and the opening decades of the nth century. According to his own statement in De vetere testamento, written about 1010, he had at that period translated the Penta- teuch, Joshua, Judges, Kings, Job, Esther, Judith and the Maccabees. 3 His rendering is

clear and idiomatic, and though he frequently abridges, the omissions never obscure the meaning or hinder the easy flow of the narrative.

Dietrich, ˆElfric's most competent biographer (Niedner's, Zeilschrifl filr hislorische Theologie, 1855-1856), looks upon the Pentateuch, Joshua and Judges as a continuation of his Lives of Saints, including as they do in a series of narratives the Old Testament saints. Genesis is but slightly abridged, but Job, Kings, Judges, Esther and Judith as well as the Maccabees are mere homilies epitomized from the corresponding Old Testa- ment books. Judith is metrical in form.

The nth century, with its political convulsions, resulting in the establishment of an alien rule and the partial suppression of the language of the conquered race, was unfavourable to literary efforts of any kind in the vernacular. With the excep- tion of .(Elfric's late works at the very dawn of the century, we can only record two transcripts of the West-Saxon Gospels as coming at all within the scope of our inquiry.

In the 12 th century the same gospels were again copied by pious hands into the Kentish dialect of the period.

The 13th century, from the point of view of Biblical renderings into the vernacular, is an absolute blank. French — or rather the Anglo-Norman dialect of the period — reigned Norman supreme amongst the upper classes, in schools, in Period. parliament, in the courts of law and in the palace of the king. English lurked in farms and hovels, amongst villeins and serfs, in the outlying country-districts, in the distant

1 See Stevenson, Waring and Skeat, op. cit.

2 W. W. Skeat, The Holy Gospels in Anglo-Saxon, &c. (Cambridge, 1871-1887) ; J. W. Bright, The Gospel of Saint Luke in Anglo-Saxon (Oxford, 1893); for earlier editions see Cook, op. cit, p. lx.

3 C. W. M. Grein, JElfrik de vetero et novo Testamento, &c. — Bibl. d. Angels. Prosa (Cassel and Gottingen, 1872), p. 6; E. Thwaites, Heptateuchus. Liber Job, et Evangelium Nicodemi; Anglo- Saxonice (Oxon., 1698).

monasteries, amongst the lower clergy, amongst the humble and lowly and ignorant. There were certainly renderings of the Bible during the 12th, 13th and early 14th centuries, but they were all in French. Some of these translations were made in England, some were

brought over to England and copied and recopied. Amongst the latter was the magnificently illumin- ated Norman Commentary on the Apocalypse, some of the earliest copies of which were written in an English hand. In fact before the middle of the 14th century the entire Old Testa- ment and the greater part of the New Testament had been translated into the Anglo-Norman dialect of the period. (MSS. Bibl. Nat. fr. 1, 9562, Brit. Mus. Reg. I.C. iii. Cf. S. Berger, La Bible franqaise au moyen dge, Paris, 1884, pp. 78 ff.)

When English finally emerged victorious, towards the middle and latter half of the 14th century, it was for all practical pur- poses a new language, largely intermixed with French, differing from the language of the older period in sound, flexion and structure. It is evident that any Old English versions which might have survived the ravages of time would now be unin- telligible, it was equally natural that as soon as French came to be looked upon as an alien tongue, the French versions hitherto in use would fail to fulfil their purpose, and that attempts should again be made to render the Bible into the only language intelligible to the greater part of the nation — into English. It was also natural that these attempts tary'jva'- should be made where the need was most pressing, derlags. where French had gained least footing, where parlia- ment and court were remote, where intercourse with France was difficult. In fact in the Northern Midlands, and in the North even before the middle of the 14th century, the book of Psalms had been twice rendered into English, and before the end of the same century, probably before the great Wycliffite versions had spread over the country, the whole of the New Testament had been translated by different hands into one or other of the dialects of this part of the country.

At the same time we can record only a single rendering during the whole century which originated in the south of England, namely the text of James, Peter, 1 John and the Pauline Epistles (edited by A. C. Paues, Cambridge, 1904).

Of these pre-Wycliffite versions possibly the earliest is the West Midland Psalter, once erroneously ascribed to William of Shoreham. 4 It occurs in three MSS., the earliest of which, Brit. Mus. Add. 17376, was probably written between 1340 and 1350. It contains a complete version of the book of Psalms, followed by the usual eleven canticles and the Athanasian Creed. The Latin original is a glossed version of the Vulgate, and in the English translation the words of the gloss are often substituted for the strong and picturesque expressions of the Biblical text; in other respects the rendering is faithful and idiomatic. The following two verses of the first psalm

may exemplify this: —

MS. British Mus. Add. 17376.

(i. 1.) Beatus uir, qui non abijt in consilio impiorum, & in uia peccatorum non stetit, et in cathedra i iudicio pestilencie •»'• falsitatis non sedit. Blesced be f>e man j)at 3ede nou3t in f>e counseii of wicked, ne stode nou3t in |)e waie of sin3eres, ne sat noujt in fals iugement. (2)Set in lege dommi uoluntas eius, & in lege eius meditabitur die ac node. Ac hijs wylle was in fpe wylle of oure Lord, and he schal J>enche in hijs lawe bo|>e daye and ny3t.

Before the middle of the century Richard Rolle (q.v.), the hermit of Hampole (+ 1349), turned into English, with certain additions and omissions, the famous Commentary on the Psalms by Peter Lombard. The work was under- nolle. taken, as the metrical prologue of one of the copies tells us (MS. Laud. misc. 286), " At a worthy recluse prayer, cald dame Merget Kyrkby." The Commentary gained immediate and lasting popularity, and spread in numerous copies throughout the country, the peculiarities of the hermit's vigorous northern dialect being either modified or wholly removed in the more

4 K. D. Bulbring, The Earliest Complete English Prose Psalter (E.E.T.S., No. 97), part i. (London, 1891) ; cf. A. C. Paues, A Fourteenth-Century Engl. Bibl. Version (Upsala Diss.) (Cambridge, 1902), p. lvi.

southerly transcripts. The translation, however, is stiff and literal to a fault, violating idiomatic usage and the proper order of words in its strict adherence to the Latin. The following brief extracts may exemplify the hermit's rendering and the change the text underwent in later copies. 1

MS. Univ. Coll. 64. MS. Reg. 18 B. 21.

(i. I.) Blisful man J>e whilk Blessed is jpat man f)at hah oway Jed noght in Je counsaile not gone in f)e counsell of wicked of wicked, and in Jje way of men, and in J>e weye of sinfull synful stode noght, & in J>e men ha|) not stonde, and in f>e chaiere of pestilens he noght chaire of pestilence sat not. sate. (2) Bot in laghe of lord be 2. But in |>e lawe of our lorde will of him ; and in his laghe is |>e wille of him ; and [in] his he sail thynke day & nyght. lawe we shall

J)inke day and

nyght.

Approximately to the same period as these early renderings of the Psalter belongs a version of the Apocalypse with a Com- mentary, the earliest MS. of which (Harleian 874) is written in the dialect of the North Midlands. This Commentary, for a long time attributed to Wycliffe, is really nothing but a verbal rendering of the popular and widely-spread Norman Commentary on the Apocalypse (Paul Meyer and L. Delisle, L' Apocalypse en Francais au XIII' siecle, Paris, 1901), which dates back as far as the first half of the 13th century, and in its general tenor represents the height of orthodoxy. The English apocalypse, to judge from the number of MSS. remaining, must have enjoyed great and lasting popularity. Several revisions of the text exist, the later of which present such striking agreement with the later Wycliffite version that we shall not be far wrong if we assume that they were made use of to a considerable extent by the revisers of this version.

To the North Midlands or the North belongs further a complete version of the Pauline Epistles found in the unique MS. 32, Corpus Christi College, Cambridge, of the 15th century.

Commentaries on the Gospels of St Matthew, St Mark and St Luke, we are told by the heading in one of the MSS. (Univ. Libr. Camb. Ii. 2. 12), were also translated into English by " a man of }>e north cuntre." The translation of these Gospels as well as of the Epistles referred to above is stiff and awkward, the translator being evidently afraid of any departure from the Latin text of his original. The accompanying commentary is based on the Fathers of the Church and entirely devoid of any original matter. The opening lines of the third chapter of Matthew are rendered in the following way : — ^.'

MS. Camb. Univ. Libr. Ii. 2. 12.

(iii. I.) In J)o dayes come Ihone baptist prechand in desert of J>e Iewry, & seyand, (2) Do 3e penaunce; forwhy]>e kyngdome of heuyne sal come negh. (3) pisis he of whome it was seide be Isayjje prophete, sayand. " |>e voice of J>e cryand in f>e desert, redye 3e j>e way of God, right made 3e |>e lityl wayes of him." (4) & Ihone his klefnng of f)e hoerys of camels, & a gyrdyl of a skyn about his lendys ; & his mete was jje locust & hony of |>e wode.

A version of the Acts and the Catholic Epistles completes the number

of the New Testament books translated in the northern parts of England. It is found in several MSS. either separately or in conjunction with a fragmentary Southern Version of the Pauline Epistles, Peter, James and 1 John in a curiously compiled volume, evidently made, as the prologue tells us, by a brother superior for the use and edification of an ignorant " sister," or woman vowed to religion. 2 The translation of this, our only southern text, surpasses all previous efforts from the point of view of clearness of expression and idiomatic use of English, and, though less exact, it may be even said in these respects to rank equal with the later or revised Wycliffite version.

Apart from these more or less complete versions of separate books of the Bible, there existed also numerous renderings of the Lord's Prayer, the Ten Commandments, accounts of the Life, Passion and Resurrection of our Lord, translations of the

1 H. R. Bramley, The Psalter and Certain Canticles . . . by Richard Rolle of Hampole (Oxford, 1884); cf. H. Middcndorff, Studien ilber Richard Rolle von Hampole unter besonderer Beriicksichtigung seiner Psalmen-Commentare (Magdeburg, 1888).

- *A. C. Paues, A Fourteenth-Century English Biblical Version (Cambridge, 1904), pp. xxiv. ff.*

epistles and gospels used in divine service, and other means of familiarizing the people with Holy Scripture. It was the custom of the medieval preachers and writers to give their own English version of any text which they quoted, not resorting as in later times to a commonly received translation. This explains the fact that in collections of medieval homilies that have come down to us, no two renderings of the Biblical text used are ever alike, not even Wycliffe himself making use of the text of the commonly accepted versions that went under his name.

It is noteworthy that these early versions from Anglo-Saxon times onwards were perfectly orthodox, executed by and for good and faithful sons of the church, and, generally speaking, with the object of assisting those whose knowledge of Latin proved too scanty for a proper interpretation and understanding of the holy text. Thus Richard Rolle's version of the Psalms was executed for a. nun; so was in all likelihood the southern version of the epistles referred to above. Again the earliest MS. (Harl. 874) of the Commentary on the Apocalypse gives the owner's name in a coeval hand as " Richard Schepard, presbiter," and the Catholic Epistles of MS. Douce 250 3

were probably glossed for the benefit of men in religious orders, if one may judge from a short Commentary to James ii. 2, " & berfore if eny man come into 3oure si3t, \at is, into 3oure cumpenye \at be\ Codes religiouse men in what degre so $e be." Nor do any of the remaining works contain anything but what is strictly orthodox.

It is first with the appearance of Wycliffe (q.v.) and his followers on the arena of religious controversy that the Bible in English came to be looked upon with suspicion by the orthodox party within the Church. For it is a well-known fact ™y Cluate that Wycliffe proclaimed the Bible, not the Church versions. or Catholic tradition, as a man's supreme spiritual authority, and that he sought in consequence by every means in his power to spread the knowledge of it among the people. It is, therefore, in all likelihood to the zeal of Wycliffe and his followers that we owe the two noble 14th-century translations of the Bible which tradition has always associated with his name, and which are the earliest complete renderings that we possess of the Holy Scriptures into English. 4

The first of these, the so-called Early Version, was probably completed about. 1382, at all events before 1384, the year of Wycliff e's death. The second, or Later Version, being a thorough revision of the first, is ascribed to the year 1388 by Sir Frederic Madden and the Rev. Joshua Forshall in their edition of these two versions. 5 – It is a matter of uncertainty what part, if any, Wycliffe himself took in the work. The editors of the Wycliffite versions say in the Preface, pp. xv. ff. — " The New Testament was naturally the first object. The text of the Gospels was extracted from the Commentary upon them by Wycliffe, and to these were added the Epistles, the Acts and the Apocalypse, all now translated anew. This translation might probably be the work of Wycliffe himself; at least the similarity of style between the Gospels and the other parts favours the supposition." The Wycliffite authorship of the Commentaries on the Gospels, on which the learned editors base their argument, is, however, unsupported by any evidence beyond the fact that the writer of the Prologue to Matthew urges in strong language " the propriety of translating Scripture for the use of the laity." The Biblical text found in these Commentaries is in fact so far removed from the original type of the Early Version as to be transitional to the Late, and, what is' still more convincing, passages from the Early Version, from both the Old Testament and the New Testament, are actually quoted in the Commentary. Under such circumstances it would be folly to look upon them as anything but late productions, at all events later than the Early Version, and equal folly to assign these bulky volumes to the last two years of Wycliffe's

3 See Paues, op. cit. p. 210.

4 For a different view as to the authorship of the Wycliffite versions, see F. A. Gasquet, The Old English Bible and Other Essays (London, 1897), pp. 102 ff.

6 Sir F. Madden and Rev. J. Forshall, The Holy Bible . . . made from the Latin Vulgate by John Wycliffe and His Followers (4 vols., Oxford, 1850), pp. xix., xxiv.

life merely because the text used in them happens to be that of the Early Version. It is therefore at present impossible to say what part of the Early Version of the New Testament was translated by Wycliffe. 1

The Old Testament of the Early Version was, according to the editors (Preface, p. xvii.), taken in hand by one of Wycliffe's coadjutors, Nicholas de Herford. The translator's original copy and a coeval transcript of it are still extant in the Bodleian library (Bodl. 959, Douce 369). Both break off abruptly at Baruch iii. 19, the latter having at this place a note inserted to the following effect: Explicit translacionem Nicholay de herford. There is consequently but little doubt that Nicholas de Herford took part in the translation of the Old Testament, though it is uncertain to what extent. The translator's copy is written in not less than five hands, differing in orthography and dialect. The note may therefore be taken to refer either to the portion translated by the last or fifth hand, or to the whole of the Old Testament up to Baruch iii. 19. Judging from uniformity of style and mode of translation the editors of the Bible are inclined to take the latter view; they add that the remaining part of the Old Testament was completed by a different hand, the one which also translated the New Testament. This state- ment is, however, not supported by sufficient evidence. In view of the magnitude of the undertaking it is on the contrary highly probable that other translators besides Wycliffe and Nicholas de Herford took part in the work, and that already existing versions, with changes when necessary, were incorporated or made use of by the translators.

The Early Version, apart from its completeness, shows but little advance upon preceding efforts. It is true that the transla- tion is more careful and correct than some of the renderings noticed above,

but on the other hand it shares all their faults. The translation of the Old Testament as far as Baruch iii. 19 is stiff and awkward, sometimes unintelligible, even nonsensical, from a too close adherence to the Latin text (e.g. Judges xx. 25). In the remaining parts the translation is somewhat easier and more skilful, though even here Latinisms and un-English render- ings abound.

It is small wonder, therefore, if a revision was soon found necessary and actually taken in hand within a few years of the completion of the Earlier Version. The principles of work adopted by the revisers are laid down in the general prologue to their edition, the so-called " Later Version."

For these resons and othere … a symple creature hath trans- latid the bible out of Latyn into English. First, this symple creature hadde myche trauaile, with diuerse felawis and helperis, to gedere manie elde biblis, and othere doctouris, and comune glosis, and to make 00 Latyn bible sumdel trewe; and thanne to studie it of the newe, the text with the glose, and othere doctouris, as he mi3te gete, and speciali Lire on the elde testament, that helpide ful myche in this work; the thridde tyme to counseile with elde gramariens, and elde dyuynis, of harde wordis, and harde sen- tencis, hou tho mi3ten best be vndurstonden and translatid ; the iiij tyme to translate as cleerli as he coude to the sentence, and to haue manie gode felawis and kunnynge at the correcting of the translacioun.

It is uncertain who the revisers were; John Purvey, the leader of the Lollard party after Wycliffe's death, is generally assumed to have taken a prominent part in the work, but the evidence oi this is extremely slight (cf. Wycl. Bible, Preface, 00. xxv. f.). The exact date of the revision is also doubtful: the editors of the Wycliffe Bible, judging from the internal evidence of the Prologue, assume it to have been finished about 1388. •This Revised or Later Version is in every way a readable, correct rendering of the Scriptures, it is far more idiomatic than the Earlier, having been freed from the greater number of its Latinisms; its vocabulary is less archaic. Its popularity admits of no doubt, for even now in spite of neglect and persecution, in spite of the ravages of fire and time, over 1 50 copies remain to testify to this fact. The following specimens of the Early and Late Versions will afford a comparison with preceding renderings: —

1 Cf. A. C. Paues, The English Bible in the Fourteenth Century. m. 29

Late Version. (i. I.) Blessid is the man, that

Early Version.

(Psalm i. 1.) Blisful the man,

that went not awei in the coun- 3ede not in the councel of wickid

seil of vnpitouse, and in the wei men ; and stood not in the

off sinful stod not; and in the weie of synneris, and sat not in

cha3er of pestilence sat not. the chaier of pestilence. (2)

(2) But in the lawe of the Lord his But his wille is in the lawe of

wil ; and in the lawe of hym he the Lord ; and he schal bithenke

shal sweteli thenke dai and ny3t. in the lawe of hym dai and ny3t.

(Matthew iii. 1.) In thilke (iii. 1.) In tho daies loon

days came loon Baptist, pre- Baptist cam, and prechide in

chynge in the desert of Iude, the desert of Iudee, and seide,

sayinge, (2) Do 3e penaunce, (2) Do 3e penaunce, for the

for the kyngdom of heuens shal kyngdom of heuenes shal nei3e.

nei3, or cume ntie. (3) Forsothe (3) For this is he, of whom it is

this is he of whome it is said by seid bi Ysaie, the prophete,

Ysaye the prophet, A voice of seyinge, A vois of a crier in

a cryinge in desert, Make 3e redy desert, Make 3e redi the weies

the wayes of the Lord ; make 3e of the Lord; make 3e ri3t the

ri3tful the pathes of hym. (4) pathis of hym. (4) And this

Forsothe that ilk loon hadde cloth loon hadde clothing of camels

of the heeris of cameylis, and a heeris, and a girdil of skynne

girdil of skyn aboute his leendis; aboute his leendis ; and his mete

sothely his mete weren locustis, was honysoukis and hony of the

and hony of the wode. wode. ,

The 15 th century may well be described as the via dolorosa of the English Bible as well as of its chief advocates and sup- porters, the Lollards. After the death of Wycliffe violence and anarchy set in, and the Lollards came Lollards. gradually to be looked upon as enemies of order and -.*

disturbers of society. Stern measures of suppression were directed not only against them but against " Goddis Lawe," the book for which they pleaded with such passionate earnestness. The bishops' registers bear sufficient testimony to this fact. 2 It would appear, however, as if at first at all events the persecu- tion was directed not so much against the Biblical text itself as against the Lollard interpretations which accompanied it. In a convocation held at Oxford under Archbishop Arundel in 1408 it was enacted " that no man hereafter by his own authority translate any text of the Scripture into English or any other tongue, by way of a book, booklet, or tract; and that no man read any such book, booklet, or tract, now lately composed in the time of John Wycliffe or since, or hereafter to be set forth in part or in whole, publicly or privately, upon pain of greater excommunication, until the said translation be approved by the ordinary of the place, or, if the case so require, by the council provincial. He that shall do contrary to this shall likewise be punished as a favourer of heresy and error." 3

It must be allowed that an enactment of this kind was not without justification. The Lollards, for instance, did not hesitate to introduce into certain copies of the pious and orthodox Commentary on the Psalms by the hermit of Hampole interpola- tions of their own of the most virulently controversial kind (MSS. Trin. Coll. Camb. B.V. 25, Brit. Mus. Reg. 18. C. 26, &c), and although the text of their Biblical versions was faithful and true, the General Prologue of the Later Version was interlarded with controversial matter. It is small wonder if the prelates and priests sought to repress such trenchant criticism of their lives and doctrines as appeared more especially in the former work, and probably in many others which since have perished in " faggots and burning."

For all this, manuscripts of Purvey's Revision were copied and re-copied during this century, the text itself being evidently approved by the ecclesiastical authorities, when in the hands of the right people and if unaccompanied by controversial matter.

Of the Lollard movement in Scotland but little'is known, but a

curious relic has come down to our times in the shape of a New Testament of Purvey's Revision in the Scottish dialect of the early 16th century. The transcriber was in all probability a certain Murdoch Nisbet, who also showed his reforming tend- encies by adding to it a rendering of Luther's Prologue to the New Testament. 4

2 See Foxe, Acts and Monuments, iv. 135 ff. (ed. Townsend, 1846).

3 Wilkin's Concilia, iii. 317.

4 T. G. Law, The New Testament in Scots, being Purvey's Revision of Wycliffe's version turned into Scots by Murdoch Nisbet, c. 1520 (Scot. T. S., Edinburgh, 1901-1905).

2. The Printed Bible. — It is singular that while France, Spain, Italy, Bohemia and Holland possessed the Bible in the vernacular before the accession of Henry VIII., and in Germany the Scriptures were printed in 1466 and seventeen times re- printed before Luther began his great work, yet no English printer attempted to put the familiar English Bible into type. No part of the English Bible was printed before 1525, no com- plete Bible before 1535, and none in England before 1538.

Versions of the Scriptures so far noticed were all secondary renderings of the Vulgate, translations of a translation. It was only with the advent of the " new learning " in England that a direct rendering from the originals became possible. Erasmus in 1 516 published the New Testament in Greek, with a new Latin version of his own; the Hebrew text of the Old Testament had been published as early as 1488.

The first to take advantage of these altered conditions was William Tyndale iq.v.), " to whom," as Dr Westcott says, 1 " it wim k een a ˆ owe d more than to any other man to give

Tyndale. ˆ s characteristic shape to the English Bible." Of Tyndale's early life but little is known. Be it enough for our purpose to say that he thoroughly saturated his mind with the "new learning," first at Oxford, where in 1515 he was admitted to the degree of M.A., and then in Cambridge, where the fame of Erasmus still lingered. Before

the beginning of 1522 we find Tyndale as chaplain and tutor in the family of Sir John Walsh of Old Sodbury in Gloucestershire. He was there constantly involved in theological controversies with the surrounding clergy, and it was owing to their hostility that he had to leave Gloucestershire. He then resolved to open their eyes to the serious corruptions and decline of the church by translating the New Testament into the vernacular. In order to carry out this purpose he repaired in July or August 1523 to London, and to the famous protector of scholars and scholarship, Bishop Cuthbert Tunstall. His reception was, however, cold, the bishop advising him to seek a livelihood in the town. During a year of anxious waiting, it became clear to him " not only that there was no rowme in my lorde of londons palace to translate the new testament, but also that there was no place to do it in all englonde." 2 In May 1524 he consequently betook himself to Hamburg, his resolution to carry out his great work never for a moment flagging, and it was probably during his stay in this free city and in Wittenberg, where he may have been stimulated by Luther, that his translation of the New Testament was actually made. At all events there is no doubt that in 1525 he was in Cologne, engaged in printing at the press of Peter Quentel a quarto edition of the New Testament. This edition was provided with prefaces and marginal glosses. He had advanced as far as the tenth sheet, bearing the signature K, when his work was discovered by Johann Cochlaeus (q.v.), a famous controversialist and implacable enemy of the Refor- mation, who not only caused the Senate of Cologne to prohibit the continuation of the printing, but also communicated with Henry VIII. and Wolsey, warning them to stop the importation of the work at the English seaports. Tyndale and his assistant, William Roye, managed, however, to escape higher up the Rhine to Worms, and they succeeded in carrying with them some or all of the sheets which had been printed. Instead of completing Quentel's work, Peter Schoeffer, the Worms printer, was em- ployed to print another impression of 3000 in a small octavo size, without prefaces to the books or annotations in the margin, and only having an address " To the Reder " at the end in addition to the New Testament itself. Two impressions, the quarto having possibly been completed by Schoeffer, arrived in England early in the summer of 1526, and were eagerly welcomed and bought. Such strong measures of suppression were, however, at once adopted against these perilous volumes, that of the quarto only a single fragment remains (Matt, i.- xxii. 12), now preserved in the British Museum (Grenville, 12179), 3

1 B. F. Westcott, History of the English Bible (3rd ed.), revised by W. Aldis Wright (London, 1905), p. 25.

2 Pre}, to Genesis, p. 396 (Parker Soc).

3 Photo lithographed by Edw. Arber (London, 1871).

of the octavo only one perfect copy (the title-page missing) in the Baptist College at Bristol, 4 and one imperfect in the library of St Paul's cathedral.

But Tyndale continued his labours undaunted. In 1529 the manuscript translation of Deuteronomy is mentioned as having perished with his other books and papers in a shipwreck which he suffered on the coast of Holland, on his way to Hamburg. In 1530, however, the whole of the Pentateuch was printed in Marburg by Hans Luft; it is provided with prefaces and mar- ginal annotations of a strongly controversial character. The only perfect copy is preserved in the Grenville library of the British Museum. 5 It was reissued in 1534 with a new preface and certain corrections and emendations in Genesis, and again in London in 1551.

In 1 53 1 the Book of Jonah appeared with an important and highly interesting prologue, the only copy known of which is in the British Museum. 6

Meanwhile the demand for New Testaments, for reading or for the flames, steadily increased, and the printers found it to their advantage to issue the Worms edition of the New Testa- ment in not less than three surreptitious reprints before 1534. This is testified by George Joye in his Apology, who himself brought out a fourth edition of Tyndale's New Testament in August 1 S3 4, freed from many of the errors which, through the carelessness of the Flemish printers, had crept into the text, but with such alterations and new renderings as to arouse the indignation of Tyndale. The only remaining copy, a i6mo, is in the Grenville library. To counteract and supersede all these unauthorized editions, Tyndale himself brought out his own revision of the New Testament with translations added of all the Epistles of the Old Testament after the use of Salisbury. It was published in November 1534 at Antwerp by Martin Emperowr. Prologues were added to all books except the Acts and the Apocalypse, and new marginal glosses were introduced. Three copies of this edition are in the British Museum, and it was reprinted in 1841 in Bagster's Hexapla. In the following year Tyndale once more set forth a revised edition, " fynesshed in the yere of oure Lorde God A.M.D. and XXXV.," and printed at Antwerp by Godfried van der Haghen. 7 In this headings were added to the chapters in the Gospels and the Acts, and the marginal notes of the edition of 1534 were

omitted. It is chiefly noted for the peculiarities of its orthography. Of this edition one copy is in the University library, Cambridge, a second in Exeter College, Oxford, and a fragment in the British Museum. It is supposed to have been revised by Tyndale while in prison in the castle of Vilvorde, being the last of his labours in connexion with the English Bible. His execution took place on the 6th of October 1536, and about the same time a small folio reprint of his revised edition of 1534 was brought out in England, the first volume of Scripture printed in this country, probably by T. Berthelet. 8 A perfect copy is found in the Bodleian library. In later years, between 1536 and 1550, numerous editions of Tyndale's New Testament were printed, twenty-one of which have been enumerated and fully described by Francis Fry. 9

" The history of our English Bible begins with the work of Tyndale and not with that of Wy cliff e," says Dr Westcott in his History of the English Bible, p. 316, and it is true that one of the most striking features of the work of Tyndale is its independence. Attempts have been made to show that especially in the Old Testament he based a great deal of his work on the Wycliffite translations, but in face of this we have his own explicit

4 Reprinted by G. Offor (London, 1836) ; reproduced in facsimile by Francis Fry (Bristol, 1862).

5 Reprinted with an introduction by J. T. Mombert (New York,

1884).

6 Reproduced in facsimile by Francis Fry (1863).

7 Cf . H. Bradshaw, Bibliographer (1882-1881), i. 3 ff. (reprinted

1886).

8 See F. Jenkinson, Early English Printed Books in the Univ. Libr. Cambridge, iii. (1730).

9 See Biographical Description of the Editions of the New Testament, Tyndale's Version, in English (1878).

statement, " I had no man to counterfet, nether was holpe with englysshe of eny that had interpreted the same (i.e. the New Testament), or soche lyke thlge I the scripture beforetyme." 1

He translated straight from the Hebrew and Greek originals, although the Vulgate and more especially Erasmus's Latin version were on occasion consulted. For his prefaces and marginal notes he used Luther's Bible freely, even to para- phrasing or verbally translating long passages from it.

Apart from certain blemishes and awkward and even incorrect renderings, Tyndale's translation may be described as a truly noble work, faithful and scholarly, though couched in simple and popular language. Surely no higher praise can be accorded to it than that it should have been taken as a basis by the translators of the Authorized Version, and thus have lived on through the centuries up to the present day.

The following specimens may prove of interest: —

The thryde Chapter.

(Matthew iii. 1-4.) In those dayes Ihon the baptyser cam and

preached in the wyldernes of Iury, saynge, Repent, the kyngedom

of heven ys at hond. Thys ys he of whom it ys spoken be the

prophet Isay, whych sayth : the voice of a cryer in wyldernes, pre-

*faire ye the lordes waye, and make hys pathes strayght. Thys hon had hys garment of camelles heere, and a gyrdyll of a skynne about hys loynes. Hys meate was locustes * and wyldhe ony.*

- *" Locustes are more then oware greshoppers, souche men vse to eate in divres parties of the est " (marginal note).*

(Matthew vi. 9-13.) O oure father which art in heven, halewed be thy name. Let thy kingdom come. Thy wyll be fulfilled, as well in erth, as hit ys in heven. Geve vs this daye oure dayly breade. And forgeve vs oure treaspases, even as we forgeve them whych treaspas vs. Lede vs nott in to temptacion, but delyvre vs from yvell. Amen. (Grenville 12179.)

Meanwhile a complete English Bible was being prepared by Miles Coverdale (q.v.), an Augustinian friar who was afterwards for a few years (1551-1553) bishop of Exeter. As the Coverdale. P rmtm g was finished on the 4th of October 1535 it is evident that Coverdale must have been engaged on the preparation of the work for the press at almost as early a date as Tyndale. Foxe states (op. cit. v. 120) that Coverdale was with Tyndale at Hamburg in 1529, and it is probable that most of his time before 1535 was spent abroad, and that his translation, like that of Tyndale, was done out of England.

In 1877 Henry Stevens, in his catalogue of the Caxton Exhibi- tion, pointed out a statement by a certain Simeon Ruytinck in his life of Emanuel van Meteren, appended to the latter's Neder- landische Historie (1614), that Jacob van Meteren, the father of Emanuel, had manifested great zeal in producing at Antwerp a translation of the Bible into English, and had employed for that purpose a certain learned scholar named Miles Conerdale (sic). In 1884 further evidence was adduced by W. J. C. Moens, who reprinted an affidavit signed by Emanuel van Meteren, 28 May 1609, to the effect that " he was brought to England anno 1550 . . . by his father, a furthcrer of reformed religion, and he that caused the first Bible at his costes to be Englisshed by Mr Myles Coverdal in Andwarp, the w'h his father, with Mr Edward Whytchurch, printed both in Paris and London" (Registers of the Dutch Reformed Church, Austin Friars, 1884, p. xiv.). Apart from the reference to Whytchurch and the place of printing, this statement agrees with that of Simeon Ruytinck, and it is possible that van Meteren showed his zeal in the matter by undertaking the cost of printing the work as well as that of remunerating the translator. Mr W. Aldis Wright, however, judging from the facts that the name of Whytchurch was introduced, that the places of printing were given as London and Paris, not Antwerp, and lastly that Emanuel van Meteren being born in 1535 could only have derived his knowledge from hearsay, is inclined to think that the Bible in which J. van Meteren was interested " was Matthew's of 1537 or the Great Bible of 1539, and not Coverdale's of 1535. " 2

It is highly probable that the printer of Coverdale's Bible was

1 Epistle to the Reader in the New Testament of 1526, reprinted by G. Offor; cf. Parker Soc. (1848), p. 390.

2 Westcott, op. cit. p. 57 note.

Christopher Froschouer of Zurich, 3 who printed the edition of 1550, and that the sheets were sent for binding and distribution to James

Nicolson, the Southwark printer. 4 This first of all printed English Bibles is a small folio in German black letter, bearing the title: " Biblia, The Bible; that is, the Holy Scrip- ture of the Olde and New Testament, faithfully and truly translated out of Douche (German) and Latyn into Englishe, M.D.XXXV." The volume is provided with woodcuts and initials, the title-page and preliminary matter in the only two remaining copies (British Museum and Holkam Hall) being in the same type as the body of the book. A second issue of the same date, 1535, has the title-page and the preliminary matter in English type, and omits the words " out of Douche and Latyn "; a third issue bears the date 1536. A second edition in folio, " newly oversene and corrected," was printed by Nicolson, with English type, in 1537; and also in the same year, a third edition in quarto. On the title-page of the latter were added the significant words, " set forth with the Kynge's moost gracious licence."

Coverdale, however, was! no independent translator. Indeed, he disavows any such claim by stating expressly, in his dedication to the king, " I have with a cleare conscience purely & fayth- fully translated this out of fyue sundry interpreters, hauyng onely the manyfest trueth of the scripture before myne eyes," and in the Prologue he refers to his indebtedness to " The Douche (German) interpreters: whom (because of theyr synguler gyftes and speciall diligence in The Bible) I haue ben the more glad to folowe for the most parte, accordynge as I was requyred." 6 These "fyue interpreters" Dr Westcott (ibid. p. 163) identifies as Luther, the Zurich Bible, the Latin version of Pagninus, the Vulgate, and, in all likelihood, the English translation of Tyndale.

Though not endowed with the strength and originality of mind that characterized Tyndale's work, Coverdale showed great discrimination in the handling and use of his authorities, and moreover a certain delicacy and happy ease in his rendering of the Biblical text, to which we owe not a few of the beautiful expressions of our present Bible.

The following extracts from the edition of 1535 may serve as examples of his rendering: —

The first psalme.

(i. 1-2.) Blessed is be man, he goeth not in the councell of he un- godly: be abydeth not in the waye off synners, & sytteth not in he seate of the scornefull. But delyteth in the lawe of be Lorde, & exercyseth himself in his lawe both daye and night.

The gospell of S. Mathew. (iii. 1-4.) In those dayes Ihon the Baptyst came and preached in the wildernes of Jury, saynge: Amende youre selues, the kyng- dome of heuen is at honde. This is he, of whom it is spoken by the prophet Esay, which sayeth : The voyce of a cryer in be wyldernes, prepare the Lordes waye, and make his pathes straight. This Ihon had his garment of camels heer, and a lethren gerdell aboute his loynes. Hys meate was locustes and wylde hony.

It should be added that Coverdale's Bible was the first in which the non-canonical books were left out of the body of the Old Testament and placed by themselves at the end of it under the title Apocripha.

The large sale of the New Testaments of Tyndale, and the success of Coverdale's Bible, showed the London booksellers that a new and profitable branch of business was opened out to them, and they soon began to avail fl#,/ e- themselves of its advantages. Richard Grafton and Edward Whitchurch were the first in the field, bringing out a fine and full-sized folio in 1537, " truely and purely trans- lated into English by Thomas Matthew." Thomas Matthew, is, however, in all probability, an alias for John Rogers, a friend and fellow-worker of Tyndale, and the volume is in reality no new translation at all, but a compilation from the renderings of Tyndale and Coverdale. Thus the Pentateuch and the New Testament were reprinted from Tyndale's transla- tions of 1530 and 1535 respectively, with very slight variations;

3 See Dr Ginsburg's information to Mr Tedder, D.N.B. xii. 365.

4 Cf. H. Stevens, Catalogue of the Caxton Exhibition (1877X p. 88.
6 Remains, Parker Soc, pp. II f.

Tareraer.

the books from Joshua to the end of Chronicles are traditionally, and lately also by external evidence, 1 assigned to Tyndale and were probably left by him in the hands of Rogers. From Ezra to Malachi the translation is taken from Coverdale, as is also that of the Apocryphal books. John Roger's own work appears in a marginal commentary distributed through the Old and New Testaments and chiefly taken from Olivetan's French Bible of 1535. The volume was printed in black letter in double columns, and three copies are preserved in the British Museum. In 1538 a second edition in folio

appeared; it was reprinted twice in 1549, and again in 1551. It is significant that this Bible, like Coverdale's second edition, was " set forth with the kinges most gracyous lycence," probably with the concurrence of Cranmer, since he, in a letter to Cromwell, begged him to " exhibit the book unto the king's highness, and to obtain of his grace … a licence that the same may be sold and read of every person, without danger of any act, proclamation or ordinance, heretofore granted to the contrary." 2 And thus it came to pass, as Dr Westcott strikingly puts it, that " by Cranmer's petition, by CrumwelJ's influence, and by Henry's authority, without any formal ecclesiastical decision, the book was given to the English people, which is the foundation of the text of our present Bible. From Matthew's Bible — itself a combination of the labours of Tyndale and Coverdale — all later revisions have been successively formed " (op. cit. p. 71).

Meanwhile the successful sale of Matthew's Bible, the private venture of the two printers Grafton and Whitchurch, was threat- ened by a rival edition published in 1539 in folio and quarto by " John Byddell for Thomas Barthlet " with Richard Taverner as editor. This was, in fact, what would now be called " piracy," being Grafton's Matthew Bible revised by Taverner, a learned member of the Inner Temple and famous Greek scholar. He made many alterations in the Matthew Bible, characterized by critical acumen and a happy choice of strong and idiomatic expressions. He is, perhaps, the first purist among the Biblical translators, endeavouring, whenever possible, to substitute a word of native origin for the foreign expression of his predecessors. 3 His revision seems, however, to have had little or no influence on subsequent translators, and was only once, in 1549, reprinted in its entirety. Quarto and octavo editions of the New Testament alone were published in the same year, 1 539, as the original edition, and in the following year, 1 540, the New Testament in duodecimo. The Old Testa- ment was reprinted as part of a Bible in 1551, but no other editions are known than those named.

It will have been observed that the translations of Holy Scripture which had been printed during these years (1525-1539) were all made by private men and printed without any Bible, public authority. Some of them had indeed been set

1539. forth by the king's licence, but the object of this is

shown by the above-quoted letter of Archbishop Cranmer to Cromwell, touching Matthew's Bible. It is " that the same may be sold and read of every person . . . until such time that we, the

bishops, shall set forth a better translation, which I think will not be till a day after doomsday." This letter was written on the 4th of August 1537, and the impatient words at the end refer to an authorized version which had been projected several years before, and which was, in fact, at that very time in preparation, though not proceeding quickly enough to satisfy Cranmer. In the year 1 530, Henry VIII. had issued a commis- sion of inquiry respecting the expediency and necessity of having " in the English tongue both the New Testament and the Old " (Wilkins' Concilia, iii. 737). This commission reported against the expediency of setting forth a vernacular translation until there was a more settled state of religious opinion, but states that the king " intended to provide that the Holy Scripture shall be, by great, learned and Catholic persons, translated into the English tongue if it shall then seem to His Grace convenient to be" (ib. 740). The Convocation of Canterbury refreshed the

1 Westcott, op. cit. p. 172 note.

2 Cranmer's Works, letter 194 (Parker Soc).

3 See examples in Westcott, op. cit. pp. 208 f.

royal memory on the subject by petitioning the king on the 19th of December 1534 " that His Majesty would vouchsafe to decree, that the Scriptures should be translated into the vulgar tongue . . . and . . . delivered to the people according to their learning" (ibid. 770). The subject was again before Convocation in 1536, 4 but the detailed history is lost to us — all that is known being that Cromwell had placed Coverdale at the head of the enterprise, and that the result was an entirely new revision, based on Matthew's Bible. 5 Coverdale consulted in his revision the Latin version of the Old Testament with the Hebrew text by Sebastian Miinster, the Vulgate and Erasmus's editions of the Greek text for the New Testament.

Concerning the printing of this authorized Bible more details are known. Cromwell had planned the work on a large scale, too large evidently- for the resources of the English presses, for it was determined that the printing should be entrusted to Francis Regnault, a famous Paris printer. At the request of Henry VIII., a licence was granted to Regnault for this purpose by Francis I., while Coverdale and Grafton were sent over in 1538 to superintend the work as it passed through the press. The work was pressed forward with all speed, for, as Coverdale writes to Cromwell, they were " dayly threatened " and ever feared "to be spoken withall." Indeed, when

the printing was far advanced, on the 17th of December 1538, its further progress was interdicted by the Inquisitor-general for France, and orders were given to seize the whole of the impression. Coverdale and Grafton left Paris quickly, but soon returned, rescued a great number of the finished sheets, "four great dry- vats " full of them having been sold to a haberdasher instead of being burnt — and conveyed types, printing-presses and workmen to England. Thus the volume which had been begun in Paris in 1538 was completed in London, the colophon stating that it was " Fynisshed in Apryll, Anno M.CCCCC.XXXIX." It is a splendid folio Bible of the largest volume, and was dis- tinguished from its predecessors by the name of The Great Bible. The title-page represents Henry VIII. giving the " Word of God " to Cromwell and Cranmer, who, in their order, distribute it to laymen and clerics, and describes the volume as "truly translated after the veryte of the Hebreue and Greke texts by)>e dylygent studye of dyverse excellent learned men, expert in the for- sayde tongues. Prynted by Rychard Grafton and Edward Whitchurch." " Certain godly annotations," which Coverdale promised in the Prologue, did not, however, appear in the first issue, nor in any of the following. This was the first of seven editions of this noble Bible which issued from the press during the years 1 539-1 541, — the second of them, that of 1540, called Cranmer's Bible from the fact that it contained a long Preface by Archbishop Cranmer, having the important addition " This is the Byble apoynted to the vse of the churches " on the title- page. Seventy years afterwards it assumed the form ever since known as the Authorized Version, but its Psalter is still embedded, without any alteration, in the Book of Common Prayer.

For the sake of comparison the following extracts from St Matthew are given, according to the edition of 1539.

(Matthew iii. 1-4.) In those dayescame'Iohn the Baptyst, preach- ing in the wyldernes of Iewry, saying, Repent of the life that is past, for the kyngdome of heauen is at hande, For thys is he, of whom the prophet Esay spake, which sayeth, the voyce of a cryer in the wylder- nes, prepare ye the waye of the lorde: make hys pathes strayght. Thys Iohn had hys garment of camels heer And a gyrdell of a skynne aboute hys loynes. His meate was locustes and wylde hony.

(Matthew vi. 9-13.) Oure father which art in heauen, halowed be thy name. Let thy kingdome come. Thy will be fulfilled, as well in erth, as it is in heuen. Geue vs this daye oure dayly bred. And forgeue vs oure dettes, as we forgeue oure detters. And leade vs not into temptation: but delyuer vs from euyll. For thyne is the kyngdom and

the power, and the glorye for euer. Amen.

Meanwhile the closing years of Henry VIII. 's reign were characterized by restrictive measures as to the reading and use of the Bible. Tyndale Version was prohibited by an act of

4 Burnet's Ref., ed. Pococke, 1865. 6 Westcott, op. cit. pp. 180 f.

6 Remains (Parker Soc), p. 493; cf. J. A. Kingdon, Incidents in the Lives of Thomas Poyntz and Richard Grafton (1895).

parliament, 1543; at the same time it was enacted that all notes and marginal commentaries in other copies should be obliterated, and that " no woman (unless she be a noble or gentle woman), no artificers, apprentices, journeymen, servingmen, under the degree of yeomen . . . husbandmen or labourers " should read or use any part of the Bible under pain of fines and imprisonment. 1

In 1 546 Coverdale's Bible was included in the proscription, the Great Bible being the only translation not interdicted. During Edward VI. 's reign there was a brief respite, w'h'ttF – b ut w ˆ t ˆ le access i° n °f Mary the persecutions of the ham. English Bible and its friends were renewed. Cranmer

suffered martyrdom at the stake, as John Rogers had done before him. Other prominent reformers, amongst them Coverdale, sought refuge in Geneva, the town of Calvin and Beza, where they employed their enforced leisure in planning and carrying out a new revision of the Bible. The first fruits of these labours was a New Testament issued in June 1557, with an introduction by Calvin, probably the work of William Whitting- ham. 2 The volume, in a convenient quarto size, printed in clear Roman type, and provided with marginal annotations, gained im- mediate popularity in England, where a Bible suited for household demands had long been needed. It was the first Bible which had the text divided into " verses and sections according to the best editions in other languages." 3

Whittingham's enterprise was, however, soon superseded by

an issue of the whole Bible, which appeared in 1560, the so-called

Genevan Bible, popularly also known as the Breeches

Z ne Bible, from its rendering of Gen. iii. 7, ” They sewed

Genevan ‘ ° ” J

Bible. fig leaves together and made themselves breeches.

This edition was mainly due to the combined efforts of William Whittingham, Anthony Gilby and Thomas Sampson, and the expenses towards printing and publication were borne by members of the congregation at Geneva. It represented in the Old Testament a thorough and independent revision of the text of the Great Bible with the help of the Hebrew original, the Latin versions of Leo Juda (1543), Pagninus (1528), Sebastian Miinster (1534-1535), and the French versions of Olivetan. The New Testament consisted of Tyndale’s latest text revised to a great extent in accordance with Beza’s translation and commentary. The changes introduced by the Genevan trans- lators were, as a rule, a great improvement, and the version received a ready welcome and immediate popularity, not only on account of its intrinsic merits, but because of its handy size, usually that of a small quarto, and of its being printed, like Whittingham’s New Testament, in a readable Roman type instead of black letter. Like this earlier publication, it had the division of the chapters into verses, and a marginal commentary which proved a great attraction to the Puritans. The popularity of the Genevan Bible was so great that between 1560 and 1644 at least 140 editions of it were published, 4 and this in spite of its not being allowed for use in the churches.

In 1576 the New Testament of the Genevan Bible was again revised by Lawrence Tomson and provided with a new com- mentary mainly translated from Beza. It soon became popular and even replaced the Genevan New Testament in later editions of this Bible.

Some time after the accession of Queen Elizabeth an attempt was made to improve the authorized Great Bible, and in this way to challenge the ever growing popularity of the liishoDs’ Calvinistic Genevan Bible. The initiative was taken Bible. by Archbishop Parker, about 1563-1 565, who, accord-

ing to Strype (Parker i. 414) ” took upon him the labour to contrive and set the whole work a going … by sorting out the whole Bible into parcels . . . and distributing these

1 Cf. Burnet’s Ref. i. 584.

2 Printed in Bagster’s Hexapla, 1841, reprinted separately in 1842.

3 See " Address to the Reader." The division into verses of the New Testament was first found in R. Stephanus' Greek-Latin New Testament (4th ed., 1551), whereas these divisions already existed in the Hebrew Old Testament.

4 See T. H. Darlow and H. F. Moule, Historical Catal. of the Printed Editions of Holy Scripture in the Libr. of the Brit, and Foreign Bible Soc. (London, 1903).

parcels to able bishops and other learned men, to peruse and collate each the book or books allotted them . . . and they to add some short marginal notes for the illustration or correction of the text."

The rules upon which they proceeded were these : — 1. " To follow the common English translation used in the churches, and not to recede from it, but where it varieth manifestly from the Hebrew or Greek original. 2. To use sections and divisions in the text as Pagnine in his translation useth, and for the verity of the Hebrew to follow the said Pagnine and Miinster specially, and generally others learned in the tongues. 3. To make no bitter notes upon any text, or yet to set down any determination in places of controversy. 4. To note such chapters and places as contain matters of genealogies, or other such places not edifying, with some strike or note, that the reader may eschew them in his public read- ing. 5. That all such words as sound in the old translation to any offence of lightness or obscenity be expressed with more convenient terms and phrases."

The work was pushed forward with energy, and on the 5th of October 1568 the volume was ready for publication. It was a magnificent folio, generally known as the Bishops' Bible, since not less than eight of these dignitaries took part in the revision. But the detached and piecemeal way in which the revision had been carried out naturally caused certain in- equalities in the execution of the work. The different parts of the Bible vary considerably in merit, the alterations in the New Testament, for instance, showing freshness and vigour, whereas most of the changes introduced in the Old Testament have been condemned as " arbitrary and at variance with the exact sense of the Hebrew text " (Westcott,oˆ>. cit. p. 237). Several editions of the Bishops' Bible were afterwards published, but it is doubt- ful whether the ecclesiastical authorities in spite of repeated enactments (Card well, Synodalia, pp. 115, 123, 210, 292) ever succeeded in entirely enforcing its public use in the churches. After 1569 the Great Bible ceased, however, to be reprinted. But in the homes the Genevan version still maintained its supremacy. One thing is certain, that the book of Psalms of the new revision had

fairly soon to give way before the well- known and smooth rendering of the Great Bible. In the second edition of the Bishops' Bible, 1572, the two texts were actually printed side by side; in all later editions except one (1585) the older Psalter alone remained.

*From the time of Tyndale onwards the translation of the Scriptures into English had been more or less an outcome of the great reformatory movements within the church. It was not until Queen Elizabeth's reign that members J*5 oˆJJJJJ of the Romanist party found itexpedientto translate the Version. Bible into the vernacular " for the more speedy abolish- ing of a number of false and impious translations put forth by sundry sectes, and for the better preseruation or reclaime of many good soules endangered thereby " {Preface to the Rhemish Version) .*

According to the title-page the New Testament was " trans- lated faithfvlly into English ovt of the authentical Latin, accord- ing to the best corrected copies of the same, diligently conferred with the Greeke and other editions in diuers languages. ... In the English College of Rhemes, 1582." The Old Testament had been " long since " completed, but " for lacke of good meanes " (Preface to the New Testament), its appearance was delayed till 1609-1610, when it was published at Douai. The complete work, known as the Rhemes and Douay Version, was reprinted in Rouen in 1635, and after a considerable time revised by Dr Challoner (1749-1730). The translation is really anony- mous, but there seems to be little doubt that it was carried out by some of the Romanist refugees connected with the Seminary at Douai and the English college at Reims, the chief .amongst them being Gregory Martin, William Allen, Richard Bristow and J. Reynolds. Like the Wycliffite Versions it is merely a secondary rendering from the Latin Vulgate, and it suffered from many of the defects which characterized these versions, extreme literalness, often stilted, ambiguous renderings, at times un- intelligible except by a reference to the Latin original, as in Luke xxii. 18, " I will not drink of the generation of the vine," or Phil. ii. 7, " But he exinanited himself."

As further examples of this rendering we print the same passages from St Matthew: — '

(Matthew iii. 1-4.) And in those dayes cometh Iohn the Baptist

preaching in the desert of Ievvrie, saying. Doe penance : for the Kingdom of heauen is at hand. For this is he that was spoken of by Esay the Prophet, saying, A voyce of one crying in the desert, prepare ye the way of our Lord, make straight his pathes. And the sayd Iohn had his garment of camels heare, & a girdle of a skinne about his loynes : and his meate was locustes & vvilde honie.

(Matthew vi. 9-13.) Ovr Father which art in heauen, sanctified be thy name. Let thy Kingdom come. Thy wil be done, as in heauen, in earth also. Giue vs to day our supersubstantial bread. And forgiue vs our dettes, as we also forgiue our detters. And leade vs not into tentation. But deliuer vs from evil. Amen.

The strongly Latinized vocabulary of this version was not without its influence on the next great venture in English translations of the Bible, the Authorized Version. 1

The English Bible, which is now recognized as the Authorized Version wherever the English language is spoken, is a revision Tbe of the Bishops' Bible, begun in 1604, and published

Authorized in 161 1. It arose incidentally out of a Conference Version, between the High Church and the Low Church parties convened by James I. at Hampton Court Palace in January 1604, for the purpose of determining " things pretended to be amiss in the church," and was originally proposed by Dr Reynolds, president of Corpus Christi College, Oxford, the leader and spokesman of the Low Church party, and subse- quently on the committee which revised the translation of the Prophets.

No real opposition was offered to the proposal, and the king cleverly sketched out on the moment a plan to be adopted. He " wished that some special pains should be taken in that behalf for one uniform translation — professing that he could never yet see a Bible well translated in English — and this to be done by the best learned in both the Universities; after them to be reviewed by the bishops and the chief learned of the Church; from them to be presented to the privy council; and lastly to be ratified by his royal authority; and so this whole church to be bound unto it and none other." 2 He also particularly desired that no notes should be added by way of comment in the margin, since some of those in the Genevan Bible appeared to him " very partial, untrue, seditious and savouring too much of dangerous and traiterous conceits."

The appointment of the revisers was a work of much responsi- bility

and labour, and five months elapsed before they were selected and their respective portions assigned to them; but the list of those who began the work, and who, with some few changes in consequence of deaths, brought it to a happy con- clusion, shows how large an amount of scholarship was enlisted. It includes Dr Andrewes, afterwards bishop of Winchester, who was familiar with Hebrew, Chaldee, Syriac, Greek, Latin and at least ten other languages, while his knowledge of patristic literature was unrivalled; Dr Overall, regius professor of theology and afterwards bishop of Norwich; Bedwell, the greatest Arabic scholar of Europe; Sir Henry Savile, the most learned layman of his time; and, to say nothing of others well known to later generations, nine who were then or afterwards professors of Hebrew or of Greek at Oxford or Cambridge. It is observable also that they were chosen without reference to party, at least as many of the Puritan clergy as of the opposite party being placed on the committees.

The following list 3 is drawn up in such a way as to show the academical or other position which each of them occupied, and the particular part of the work on which they were engaged.

1 See J. G. Carleton, The Part ofRheims in the Making of the English Bible (Oxford, 1902).

2 Barlow, Sum and Substance of the Conference … in Cardwell's History of Conferences, pp. 187 f.

3 Compiled chiefly from the list found in Cardwell's Synodalia (ed. 1844), ii. 145-146, a reprint from Burnet's Doc. Annals, ii. 106 if., " who himself took his list from a copy belonging originally to Bishop Ravis." The list is correct for the year 1604; cf. Westcott, op. cit. pp. 112 f.

W

W

U

1

X

to

X

n

X

>,

H

V

a

<

m

3

fa

<

a “c5

X

ex

H

a;

Dr Lancelot Andrewes, dean of Westminster.

Dr John Overall, dean of St Paul’s.

Dr Hadrian de Saravia, canon of Canterbury.

Dr Richard Clark, fellow of Christ’s Coll., Camb.

Dr John Lay field, fellow of Trin. Coll., Camb.

Dr Robert Teigh, archdeacon of Middlesex.

Mr Francis Burleigh, Pemb. Hall, Camb., D.D., 1607.

Mr Geoffrey King, fellow of King’s Coll., Camb.

Mr Thompson, Clare Hall, Camb. LMr William Bedwell, St John's Coll., Camb.

Mr Edward Lively, fellow of Trin. Coll.

Mr John Richardson, afterwards master of Trin. Coll.

Mr Laurence Chatterton, master of Emm. Coll.

Mr Francis Dillingham, fellow of Christ's Coll.

Mr Thomas Harrison, vice-master of Trin. Coll.

Mr Roger Andrewes, afterwards master of Jesus Coll.

Mr Robert Spalding, fellow of St John's. .Mr Andrew Byng, fellow of St Peter's Coll. 'Dr John Harding, pres. of Magd. Coll.

Dr John Reynolds, pres. of Corpus Christi Coll.

Dr Thomas Holland, afterwards rector of Ex. Coll.

Mr Richard Kilbye, rector of Lincoln Coll.

Dr Miles Smith, Brasenose Coll.

Dr Richard Brett, fellow of Lincoln Coll.

Mr Richard Fairclough, fellow of New Coll.

Dr John Duport, master of Jesus Coll.

Dr William Branthwait, master of Caius Coll.

Dr Jeremiah Radcliffe, fellow of Trin. Coll.

Dr Samuel Ward, afterwards master of Sid. Coll.

Mr Andrew Downes, fellow of St John's Coll.

Mr John Bois, fellow of St John's Coll. LMr Robert Ward, fellow of King's Coll. 'Dr Thomas Ravis, dean of Christ Church.

Dr George Abbot, dean of Winchester.

Dr Richard Eedes, dean of Worcester.

Dr Giles Thompson, dean of Windsor.

Mr (Sir Henry) Saville, provost of Eton.

Dr John Perin, fellow of St John's Coll.

Dr Ravens [fellow of St John's Coll.]

Dr John Harmer, fellow of New Coll.

Dr William Barlow, dean of Chester.

Dr William Hutchinson, archdeacon of St Albans.

Dr John Spencer, pres. of Corp. Chr. Coll., Ox.

Dr Roger Fenton, fellow of Pemb. Hall, Camb.

Mr Michael Rabbett, Trin. Coll., Camb.

Mr Thomas Sanderson, Balliol Coll., Oxford, D.D., 1605.

Mr William Dakins, fellow of Trin. Coll., Camb.

c

re

be •a

x O

r-3

6

U

When this large body of scholars were set down to their task, an elaborate set of rules was drawn up for their guidance, which contained a scheme of revision as well as general direc- tions for the execution of their work. This is one of the very few records that remain of their undertaking. 4

" (1) The ordinary Bible read in the Church, commonly called ' the Bishops' Bible,' to be followed, and as little altered as the truth of the original will permit. (2) The names of the prophets and the holy writers, with the other names of the text to be retained as nigh as may be, accordingly as they were vulgarly used. (3) The old

ecclesiastical words to be kept, viz. the word Church not to be translated Congregation, &c. (4) When a word hath divers significations, that to be kept which hath been most commonly used by the most of the ancient fathers, being agreeable to the propriety of the place and the analogy of the faith. (5) The division of the chapters to be altered either not at all or as little as may be, if necessity so require. (6) No marginal notes at all to be affixed, but only for the explanation of the Hebrew or Greek words which cannot, without some circumlocution, so briefly and fitly be expressed in the text. (7) Such quotations of places to be marginally set down as shall serve for the fit reference of one Scripture to another. (8) Every particular man of each company to take the same chapter or chapters ; and having translated or amended them severally by himself where he thinketh good, all to meet together, confer what they have done, and agree for their parts what shall stand. (9) As any one company hath dispatched any one book in this manner, they shall send it to the rest to be considered of seriously and judiciously, for his majesty is very careful in this point. (10) If any company, upon the review of the book so sent, doubt or differ upon any place, to send them word thereof, note the place, and withal send the reasons; to which if they consent not, the difference to be compounded at the general meeting, which is to be of the chief persons of each company at the end of the work. (11) When any place of special obscurity is doubted of, letters to be directed by authority to send to any learned man in the land for his judgment of such a place. (12) Letters to be sent from every bishop to the rest of his clergy, admonishing them of his

4 Quoted from G. Burnet's Hist, of Reformation, ii. p. 368 (1861).

translation in hand, and to move and charge as many as being skilful in the tongues and having taken pains in that kind, to send his particular observations to the company either at Westminster, Cambridge or Oxford. (13) The directors in each company to the deans of Westminster and Chester for that place; and the king's professors in the Hebrew or Greek in either university. (14) These translations to be used when they agree better with the text than the Bishops' Bible; viz. Tyndale's, Matthew's, Coverdale's, Whitchurch's, Geneva. (15) Besides the said directors before mentioned, three or four of the most ancient and grave divines in either of the universities, not employed in translating, to be assigned by the vice-chancellor upon conference with [the] rest of the heads to be over-

seers of the translations, as well Hebrew as Greek, for the better observation of the fourth rule above specified."

It is not possible to determine in how far all these rules were adhered to. All we know of the way this noble work was carried out is contained in the Preface, where Dr Miles Smith, in 1612 bishop of Gloucester, in the name of his fellow-workers gives an account of the manner and spirit in which it was done: —

" Neither did we run ouer the worke with that posting haste that the Septuagint did, if that be true which is reported of them, that they finished it in 72 days. . . . The worke hath . . . cost the workemen, as light as it seemeth, the paines of twise seuen times seuentie two dayes and more . . . Truly (good Christian Reader), we neuer thought from the beginning, that we should neede to make a new Translation, nor yet to make of a bad one a good one . . . but to make a good one better, or out of many good ones, one princi- pall good one, not iustly to be excepted against. . . . To that purpose there were many chosen, that were greater in other mens eyes than in their owne, and that sought the truth rather than their own praise. . . . Neither did wee thinke much to consult the Translators or Commentators, Chaldee, Hebrewe, Syrian, Greeke, or Latine, no mor the Spanish, French, Italian or Dutch [German] ; neither did we disdaine to reuise that which we had done, and to bring back to the anuill that which we had hammered: but hauing and vsing as great helpes as were needfull, and fearing no reproch for slownesse, nor coueting praise for expedition, wee haue at the length, through the good hand of the Lord vpon vs, brought the worke to that passe that you see."

From the above it appears that the actual work of revision occupied about two years and nine months, an additional nine months being required for the final preparation for press. The edition appeared at length in 161 1, the full title being as follows: The Holy Bible, conteyning the Old Testament, and the New: Newly Translated out of the Originall tongues, & with the former Translations diligently compared and reuised, by his Maiesties speciall comandement. Appointed to be read in Churches. Imprinted at London by Robert Barker, Printer to the Kings most Excellent Maiestie. Anno Dom. 161 1. 1 Since that time many millions of this revised translation have been printed, and the general acceptance of it by all English-speaking people of whatever denomination is a testimony to its excellence.

Still the work of improving and correcting went on through the centuries, and a modern copy of the Authorized Version shows no inconsiderable departures from the standard edition of 161 1. Dr

Scrivener imputes some of those differences " to oversight and negligence . . . but much the greater part of them " he holds to be " deliberate changes, introduced silently and without authority by men whose very names are often unknown." (A. C. P.)

More ambitious attempts at amending the new version were not lacking, but they all proved fruitless, until in February 1870 the Convocation of Canterbury appointed a committee V" to consider the subject of revision. The report of*

Version. ˆ n ' s committee, presented in May, was adopted, to the effect " that Convocation should nominate a body of its own members to undertake the work of revision, who shall be at liberty to invite the co-operation of any eminent for scholar- ship, to whatever nation or religious body they may belong "; and shortly afterwards two companies were formed for the re- vision of the Authorized Version of the Old and New Testaments.

These companies consisted of the following : — 1 . For the Old Testa- ment: — (a) Appointed by Convocation. — Connop Thirl wall, bishop of St David's (d. 1875); Alfred Ollivant (1798-1882), bishop of Llandaff ; E. Harold Browne (1811-1891), bishop of Ely; Christopher Wordsworth, bishop of Lincoln; and Lord Arthur Hervey (1808-

1 A reprint of this edition has been published by the Clarendon Press (Oxford, 1833).

1894), bishop of Bath and Wells; Archdeacon H. J. Rose (d. 1873); William Selwyn (1806-1875), canon of Ely and Lady Margaret professor at Cambridge; Dr John Jebb (1805-1886), canon of Here- ford; and Dr William Kay (1820-1886). (/S) Invited.— Dr William Lindsay Alexander (1808-1884), congregational minister; Thomas Chenery (1826-1884), professor of Arabic at Oxford, and afterwards (1877) editor of The Times; Frederick Charles Cook (1810-1889), canon of Exeter; Professor A. B. Davidson; Dr Benjamin Davies (1814-1875), professor of oriental and classical languages at Stepney Baptist College; the Rev. A. M. Fairbairn, congregationalist ; the Rev. Frederick Field (1801-1885), fellow of Trinity, Cambridge; Dr C. D. Ginsburg; the Rev. Dr Gotch of Bristol; Archdeacon Benjamin Harrison (1808-1887), Hebraist; the Rev. Stanley Leathes (1830-1900), professor of Hebrew at King's College, London ; Professor M'Gill; Canon Robert Payne Smith (1819-1895), regius professor of divinity at Oxford, dean of Canterbury (1870) ; Professor J. J. S. Perowne, afterwards bishop of Worcester; the Rev.

Edward Hayes Plumtre (1821-1891), professor of exegesis at King's College, London, afterwards dean of Wells; Canon E. Bouverie Pusey; William Wright (1830-1889), the orientalist; W. Aldis Wright, Cambridge. Of these Canons Cook and Pusey declined to serve, and ten members died during the progress of the work. The secre- tary of the company was Mr W. Aldis Wright, fellow of Trinity, Cambridge.

2. For the New Testament: — (a) Appointed by Convocation. — Samuel Wilberforce, bishop of Winchester; Charles J. Ellicott, bishop of Gloucester and Bristol; and George Moberly, bishop of Salisbury; Dr Edward Bickersteth (1814-1892), prolocutor of the lower house of convocation ; Henry Alford, dean of Canterbury, and Arthur Penrhyn Stanley, dean of Westminster; Joseph Williams Blakesley (1808-1885), canon of Canterbury, and (1872) dean of Lincoln. (/3) Invited. — The Rev. Dr Joseph Angus, president of the Stepney Baptist College; Dr David Brown; Richard Chenevix Trench, archbishop of Dublin; the Rev. Dr Tohn Eadie C1810- 1876), Presbyterian; the Rev. F. J. A. Hort; the Rev. W. G. Humphry (1815-1886), vicar of St Martin-in-the-Fields, London; the Rev. Benjamin Hall Kennedy, canon of Ely; William Lee (1815-1883), archdeacon of Dublin, and professor of ecclesiastical history in the university; J. B. Lightfoot, afterwards bishop of Durham; Professor William Milligan; the Rev. William Fieldian Moulton (1835-1898), Wesleyan biblical scholar; Dr J. H. Newman; the Rev. Samuel Newth (1821-1898), congregationalist, professor of ecclesiastical history at, and afterwards president of, New College, London; Dr A. Roberts; the Rev. G. Y an ce Smith; Dr Robert Scott; the Rev. F. H. A. Scrivener (1813-1891), rector of St Gerrans, Cornwall; Charles Wordsworth, bishop of St Andrews; Dr W. H. Thompson; Dr S. P. Tregelles; Dr C. J. Vaughan; Canon Westcott. Of these, Dr Thompson and Dr Newman declined to serve. Dean Alford, Dr Tregelles, Bishop Wilberforce and Dr Eadie were removed by death. Only the first vacancy was filled up. Dean Merivale was co-opted, and on his resignation Professor, afterwards Archdeacon, Edwin Palmer. The Rev. J. Troutbeck, minor canon of West- minster, acted as secretary.

Negotiations were opened with the leading scholars of the Protestant denominations in America, with the result that similar companies were formed in the United States. The work of the English revisers was regularly submitted to their con- sideration; their comments were carefully considered and largely adopted, and their divergences from the version ultimately agreed upon were printed in an appendix to the published work. Thus the Revised Version was the achievement of English-speaking Christendom as a whole; only the Roman Catholic

Church, of the great English-speaking denominations, refused to take part in the undertaking. The Church of England, which had put forth the version of 161 1 , fitly initiated the work, but for its performance most wisely invited the help of the sister churches. The delegates of the Clarendon Press in Oxford, and the syndics of the Pitt Press in Cambridge, entered into a liberal arrangement with the revisers, by which the necessary funds were provided for all their expenses. On the completion of its work the New Testament company divided itself into three committees, working at London, Westminster and Cambridge, for the purpose of revising the Apocrypha.

The work of the Old Testament company was different in some important respects from that which engaged the attention of the New Testament company. The received Hebrew text has undergone but little emendation, and the revisers had before them substantially the same Massoretic text which was in the hands of the translators of 161 1. It was felt that there was no sufficient justification to make any attempt at an entire re- construction of the text on the authority of the versions. The Old Testament revisers were therefore spared much of the

labour of deciding between different readings, which formed one of the most important duties of the New Testament company. But the advance in the study of Hebrew since the early part of the 17th century enabled them to give a more faithful translation' of the received text. The value of their work is evident, especially in Job, Ecclesiastes and the prophetical books.

It is the work of the New Testament committee which has attracted most attention, whether for blame or praise. The critical resources at the disposal of scholars in 161 1 were very meagre, and the few early manuscripts with which they were acquainted failed to receive the attention they deserved. The results of modern critical methods could not fail to make the incompleteness of the " Received Text," and of the " Authorized Version," which was based on it, obvious. It had long been the opinion of all competent scholars that a thorough revision was necessary. A proposal in favour of this course was made in Convocation in 1856, but it was not until fourteen years later that the committee was appointed to undertake the work. The revisers' first task was to reconstruct the Greek text, as the necessary foundation of their work. In this difficult duty they were no doubt

influenced by Westcott and Hort's edition of the New Testament. These two scholars were members of the committee which prepared the Revised Version, and on the question of various readings they appear to have exercised a predominating influence. The revisers were privately supplied with instalments of Westcott and Hort's text as their work required them. But it is scarcely necessary to say that the Revised Version is not the work of one or two scholars. Different schools of criticism were represented on the committee, and the most careful discussion took place before any decision was formed. Every precaution was taken to ensure that the version should represent the result of the best scholarship of the time, applied to the work before it with constant devotion and with the highest sense of responsibility. The changes in the Greek text of the Authorized Version when compared with the textus receplus are numerous, but the contrast between the English versions of 161 1 and 1881 is all the more striking because of the difference in the method of translation which was adopted. The revisers aimed at the most scrupulous faithfulness. They adopted the plan — deliberately rejected by the translators of 161 1 — of always using the same English word for the same Greek word. " They endeavoured to enable the English reader to follow the corre- spondences of the original with the closest exactness, to catch the solemn repetition of words and phrases, to mark the subtleties of expression, to feel even the strangeness of unusual forms of speech."

The revision of the New Testament was completed in 407 meetings, distributed over more than ten years. It was formally presented to Convocation on May 17,1881. The revision of the Old Testament occupied 792 days, and was finished on June 20, 1884. The revised Apocrypha did not make its appearance until 1895.

The text of the Revised Version is printed in paragraphs, the old division of books into chapters and verses being retained for convenience of reference. By this arrangement the capricious divisions of some books is avoided. Various editions of the New Version have been published, the most complete being the edition of the whole Bible with marginal references. These references had their origin in the work of two small sub- committees of the revisers, but they received their present form at the hands of a specially appointed committee. The marginal references given in the original edition of the Authorized Version of 161 1 have been retained as far as possible.

The work of the revisers was received without enthusiasm. It was too thorough for the majority of religious people. Partisans found that havoc had been played with their proof texts. Ecclesiastical

conservatives were scandalized by the freedom with which the traditional text was treated. The advocates of change were discontented with the hesitating acceptance which their principles had obtained. The most vulnerable side of the revision was that on which the mass of English readers thought itself capable of forming a judgment. The general effect of so many small alterations was to spoil the

familiar sonorous style of the Authorized Version. The changes were freely denounced as equally petty and vexatious; they were, moreover, too often inconsistent with the avowed principles of the revisers. The method of determining readings and renderings by vote was not favourable to the consistency and literary character of the Version. A whole literature of criticism and apology made its appearance, and the achievement of so many years of patient labour seemed destined to perish in a storm of resentments. On the whole, the Revised Version weathered the storm more successfully than might have been expected. Its considerable excellences were better realized by students than stated by apologists. The hue and cry of the critics largely died away, and was replaced by a calmer and juster appreciation.

The work of the revisers has been sharply criticized from the standpoint of specialists in New Testament Greek. Dr Ruther- ford stated the case briefly and pointedly in the preface to his translation of the Epistle to the Romans (London, 1900). He maintains that " the Greek of the New Testament may never be understood as classical Greek is understood," and accuses the revisers of distorting the meaning " by translating in accordance with Attic idiom phrases that convey in later Greek a wholly different sense, the sense which the earlier translators in happy ignorance had recognized that the context demanded."

The use of the new Version has become general. Familiarity has mitigated the harshness of the revisers' renderings; scholar- ship, on the whole, has confirmed their readings. The Version has been publicly read in parish churches both in London and in the country. In Canterbury cathedral and Westminster Abbey it has definitely displaced the older Version. Bishops have acquiesced and congregations approved. It is no longer possible to maintain the plausible and damaging contention that the Revised Bible is ill suited for public use. The Upper House of the Convocation of Canterbury in May 1 898 appointed a commit- tee to consider the expediency of "permitting or encouraging" the use of the Revised Version in the public services of the Church. (H. H. H.)*

Bibliography. — The prfneipal works dealing with the separate versions have been referred to in the text of the article. The following authorities may also be cited :

For the version as a whole: J. R. Dore, Old Bibles (2nd ed., 1888) ; J. Eadie, The English Bible: an External and Critical History of the various English Translations of Scripture (2 vols., 1876: the most complete account) ; A. Edgar, The Bibles of England (1889) ; H. W. Hoare, The Evolution of the English Bible(2nd ed., 1902 : gives historical setting of the Versions); F. G. Kenyon, Our Bible and the Ancient Manuscripts (1895); J. H. Lupton, article on " English Versions," in Hastings' Diet, of the Bible (extra vol.) ; R. Lovett, The Printed English Bible, 1 525-1885 (1894); G. Milligan, The English Bible, a Sketch of its History (1895); J. I. Mombert, English Versions of the Bible (1883); F. Moulton, The History of the English Bible (2nd ed., 1884); T. H. Pattison, History of the English Bible (1894); J. Stoughton, Our English Bible, its Translations and Translators

For the earlier history: J. Lewis, History of English Translations of the Bible (1818); the historical accounts prefixed to Bagster's issue of The English Ilcxapla and of Forshall and Maddcn's edition of the Wycliffite Versions (Oxford, 1850). These are all to a great extent antiquated, their errors being repeated in almost all subse- quent accounts of the subject. The only trustworthy authority on the Anglo-Saxon Bible is A. S. Cook's " Introduction on Old English Translations of the Bible," in Biblical Quotations in Old English Prose-writers.

For the 14th and 15th centuries: See A. C. Paues, The Bible in the Fourteenth Century.

For the early printed Bibles: H. Cotton, List of Editions of the Bible (1852), Rhemes and Doway (1855) ; F. Fry, The Bible by Coverdale (1867); Description of the Great Bible, IS39 (1865); Bibliographical Descriptions of the Editions of the New Testament (1878); N. Pocock, " On the Bishops' and Genevan Bible," {Bibliographer, vols, i.-iv.) ; Prime Wendell, Fifteenth-Century Bibles (1888) ; John Wright, Early Bibles of America (1893).

For the Authorized Version: F. H. A. Scrivener, The Authorized Edition of the English Bible (1884). See also R. Gell, Essay toward the Amendment of the Authorized Version (1659); W. Kilburne, Dangerous Errors in . . . Bibles (1659) ; R. C. Trench, Onthe Authorized Version of the New Testament in connexion with some recent proposals for its revision (2nd ed., 1859).

For the Revised Version: J. B. Lightfoot, On a Fresh Revision of the English New Testament (London, 1 871 ; 3rd ed.. 1891); West- cott, Some Lessons of the Revised Version (London, 1897); Kennedy,

Ely Lectures on the Revised Version (London, 1882). The Revisers fully explained their principles and methods in the Preface. The American Committee of Revision issued an historical account of their work (New York, 1885). The case against the Revisers is ably stated in The Revision Revised, by Dean Burgon (London, 1883). The literary defects of the Version are elaborately exhibited by G. Washington Moon in two works : The Revisers' English (London, 1882), and Ecclesiastical English (London, 1886). See also Some Thoughts on the Textual Criticism of the New Testament, by G. Salmon, D.D. (London, 1897); Bishop Ellicott's Charge (1901). The Greek Text of the New Testament adopted by the Revisers was edited for the Clarendon Press by Archdeacon Palmer (Oxford, 1881). Parallel editions of the Bible, showing both the Authorized and Revised Versions, a large-type edition for public use, a reference edition, and (1900) a "Two Version " edition, have been issued by one or both the University Presses. (A. C. P.; H. H. H.)*

BIBLE CHRISTIANS, one of the denominations now merged in the United Methodist Church (see United Methodists), so called because its early preachers appealed solely to the Bible in confirmation of their doctrines. The denomination arose in the agricultural districts and fishing villages of north Cornwall and Devon; a district only slightly influenced by John Wesley and the original Methodist movement. The founder was William O'Bryan (afterwards Bryant), a Methodist lay preacher of Luxillian, Cornwall. Finding that the people had no evan- gelical preaching he began an itinerary to supply the need. The coastmen were expert smugglers and wreckers, the agriculturists were ignorant and drunken, the parish clergy were slothful, in many cases intemperate, and largely given to fox-hunting. Only in a parish or two was there any approach to religious ministry. O'Bryan commenced his labours in north Devon, and in 181 5 a small society was formed at Lake Farm, Shebbear. The move- ment had the seeds of great vitality in it. In 1819 the first conference was held at Launceston. There were present besides O'Bryan one accepted minister — James Thorne — fourteen minis- ters on trial and fifteen women preachers, a class that was always conspicuous in Che denomination. At that conference the work had

spread from Ring's Ash in Devon to Morrah, a lonely and desolate parish in west Cornwall. In 1820-1821 Kent, North- umberland, the Scilly and Norman {i.e. Channel) Islands appeared on the list of stations. Then came a serious break. In 1829 there was a severance between the larger part of the new -body and O'Bryan, who had claimed to be perpetual president, and to have all property vested in him personally. He tried to establish a separate conference, but failed, and in 1836 there was a re-union. O'Bryan left England for America, where he remained for the rest of his life, and his contingent (numbering 565 members and 4 ministers) returned to the original conference. The growth continued. In 1831 agents were sent to Canada and Prince Edward's Island, in 1850 to South Australia, in 1855 to Victoria, in 1866 to Queensland, in 1877 to New Zealand and in 1885 to China, so that the original O'Bryan tradition of fervid evangelism was amply maintained.

On O'Bryan's departure, James Thorne, the first fully recog- nized minister, at whose father's farm the connexion started, became its leader. Although reared as an ordinary farm lad, he proved to be a man of singular devotion and spiritual genius. He laid the foundations broadly in evangelism, finance, temper- ance and education, founding in the latter connexion a middle- class school at Shebbear, at which generations of ministers' sons and numerous students for the ministry have been educated. James Thorne was five times president of the conference and fifteen times secretary. He died in 1872. In this period there was much persecution. Landowners refused sites, and in the Isle of Wight the people worshipped for many months in a quarry. The preachers were sometimes imprisoned and many times assaulted. The old Methodist body even excommunicated persons for attending " Bryanite " meetings. Partly co-operative with James Thorne and at his death independently, the Church was favoured with the influence of Frederick William Bourne. He was a minister for fifty-five years, and served the Bible Christians as editor, missionary treasurer, book steward and three times president of conference. With him will always be associated the name of Billy Bray, an illiterate but inimitable Cornish evangelist, a memoir of whom, written by Bourne,

exerted a great influence in the religious life of the de- nomination.

In doctrine the Bible Christians did not differ from the other Methodists. In constitution they differed only slightly. There was an annual conference with full legislative power, and ability to hold and dispose of property, composed of an equal number of lay and ministerial representatives meeting together. The local churches were

grouped into circuits governed representatively by a quarterly meeting. The quarterly or circuit meetings were in turn organized into twelve districts, eleven in England and one in China. In 1906 the statistics showed 218 ministers, 32,549 members and 652 chapels, with 47,301 scholars in Sunday-schools. These figures include nearly 1400 full and probationary members in the China mission, the first-fruits of two years' labour amongst the Miao tribe. In the various colonial Methodist unions the Bible Christians have con- tributed a total of 159 ministers, 14,925 members and 660 chapels.

The community supported a regular ministry from the beginning. Its members have been keen evangelists, trusting largely to " re- vivals " for their success, staunch Radicals in politics and total abstainers to a man. Both ministers and people entered with interest and sympathy into the scheme for union between them- selves, the Methodist New Connexion and the United Methodist Free Church, which was successfully accomplished in 1906. See Methodism.

BIBLE SOCIETIES, associations for translating and circulating the Holy Scriptures. This object has engaged the attention of the leaders of Christendom from early times. In an extant letter, dated a.d. 331, the emperor Constantine requested Eusebius, bishop of Caesarea, to provide him with fifty copies of the Old and New Testaments for use in the principal churches in Constantinople. In 797 Charlemagne commissioned Alcuin to prepare an emended text of the Vulgate; copies of this text were multiplied, not always accurately, in the famous writing- schools at Tours. The first book printed in Europe was the Latin Bible, and Copinger estimates that 124 editions of the Vulgate had been issued by the end of the 15th century. The Italian Bible was printed a dozen times before a.d. 1500, and eighteen editions of the German Bible had already been published before Luther's version appeared.

The Reformation quickened men's interest in the Scriptures to an extraordinary degree, so that, notwithstanding the adverse attitude adopted by the Roman Church at and after the council of Trent, the translation and circulation of the Bible were taken in hand with fresh zeal, and continued in more systematic fashion.

Thus, the Revised French Geneva Bible of 1588, which was issued in folio, quarto and octavo, and became a standard text, bears the following note on the verso of the title: " Les frais decet ouvrage, imprime en trois diuerses formes en mesme temps, pour la commodite et contentement de toutes sortes de personnes, ont este liberalemet fournis par quelques gens de Men, qui n'ont cherche gagner pour leur

particulier, mais seulement de servir a Dieu et d, son Ltglise." The Corporation for the Promoting and Propagating of the Gospel of Jesus Christ in New England (founded in 1649) bore the expense of printing both the New Testament and the Bible as a whole (Cambridge, Mass., 1663 — the earliest Bible printed in America), which John Eliot, one of the Pilgrim Fathers, translated into "the language of the Massa- chusetts Indians," whom he evangelized. In Arnauld's Defence (1669) 0I the famous Port Royal version of the New Testament in French (issued, 1667), he states that it had been printed in many forms and sizes, including very cheap editions for' the poor, and goes on to describe how its circulation was promoted by " les sacri- fices que s'imposaient les pieux solitaires pour faire participer les plus indigents au bienfait de leur entreprise. Des que leur traduction fut prete, Us envoyerent de Paris un grand nombre de colporteurs charges de la vendre au prix de revient et meme, dans certaines cir Constances, a des prix reduits; et Us Qouvrirent la depense par des dons volon- taires " (E. Petavel, La Bible en France, p. 152)

To meet the cost of publishing the Finn Bible in 1685, the editor, J. Gezelius, bishop of Abo, obtained an order from the Swedish government for the appropriation of certain corn-tithes, still known as Bibel Tryck-Tunnan. When the Finnish Bible Society began to publish editions of the Scriptures, the tsar Alexander I. contri- buted 5000 roubles from his privy purse, and ordered that these corn-tithes should again be appropriated to this purpose for five years from 1812. In 1701 at Frankfort-on-Main there appeared a quarto edition of the Ethiopic Psalter, whose editor, H. Ludolf, writes in his preface: " Quamobrem nullum gratius officium Christianae huic nationi a me praestari posse putavi, quam si Psalterium Aethiopicum, quod apud illos non aliter quam in membrana manuscriptum habetur, et caro satis venditur, typis tnandari, ejusque plurima exemplaria nomine Societatis Indicae in Habessinia gratis distribui curarem."

In 1719 appeared the first of numerous editions of the French

New Testament, connected with the name of the Abbe de Barne- ville, a priest of the Oratory at Paris. Impressed by the popular ignorance of the Scriptures, he himself translated, or caused others to translate, the New Testament into French from the Vulgate, and formed an

association to distribute copies systematically at low prices. The prefaces to his various editions contain details as to the methods of this association, and repeatedly insist on the importance of reading the Scriptures. (On this Societe biblique catholique fran- caise see O. Douen, Histoire de la societe biblique protestante de Paris, Paris, 1868, pp. 46-51.)

Christian missionaries to non-Christian lands have naturally Ven among the most skilful translators and the most assiduous distributors of the Bible. The earliest complete Arabic Bible was produced at Rome in 1671, by the Congregatio de Propaganda Fide. Protestant missionary societies have engaged energetically in the task not only of translating, but of printing, publishing and distributing the Scriptures. Thus the Society for Promoting Christian Knowledge (founded 1698), besides its other activities, has done much to cheapen and multiply copies of the Scriptures, not only in English and Welsh, but in many foreign languages. Early in the 18th century it printed editions in Arabic, and promoted the first versions of the Bible in Tamil and Telugu, made by the Danish Lutheran missionaries whom it then sup- ported in south India. The earliest New Testament (1767) and Old Testament (1783-1801) in Gaelic were published by the Society :n Scotland for Propagating Christian Knowledge (founded 1709). The S.P.C.K. now publishes versions of the Scriptures (either complete, or in part) in 38 different languages (without reckoning versions of the Prayer Book in 45 other languages) ; and during 1 905-1906 the S.P.C.K. issued in England 116,126 Bibles and 17,783 New Testaments.

The earliest noteworthy organization, formed for the specific purpose of circulating the Scriptures, was the Canstein Bible Institute {Bibelanstali) , founded in 1710 at Halle in Saxony, by Karl Hildebrand, baron von Canstein (1667-1719), who was associated with P. J. Spener and other leaders of Pietism in Germany. He invented a method of printing, perhaps somewhat akin to stereotyping — though the details are not clearly known, — whereby the Institute could produce Bibles and Testaments in Luther's version at a very low cost, and sell them, in small size, at prices equivalent to tod. and 3d. per copy, respectively. In 1722 editions of the Scriptures were also issued in Bohemian and Polish. At von Canstein's death he left the Institute to the care of his friend August Hermann Francke, founder in 1698 of the famous Waisenhaus (orphanage) at Halle. The Canstein Institute has issued some 6,000,000 copies of the Scriptures.

In England various Christian organizations, which arose out of the

Evangelical movement in the 18th century, took part in the wcrk. Among such may be mentioned the Society for Promoting Christian Knowledge among the Poor (1750); and the Society for the Support and Encouragement of Sunday Schools (1785). An institution was founded in 17ˆ0 under the name of the Bible Society, but as its sphere was restricted to soldiers and seamen the title was afterwards changed to the Naval and Military Bible Society. The first ship among whose crew it distributed the Scriptures was the " Royal George," which had 400 of this society's Bibles on board when it foundered at Spithead on the 29th of August 1782. The French Bible Society, instituted in 1792, came to an end in 1803, owing to the Revolution.

The British and Foreign Bible Society. — In 1804 was founded in London the British and Foreign Bible Society, the most important association of its kind. It originated in a proposal made to the committee of the Religious Tract Society, by the Rev. Thomas Charles of Bala, who found that his evangelistic and philanthropic labours in Wales were sorely hindered by the dearth of Welsh Bibles. His colleagues in the Religious Tract Society united with other earnest evangelical leaders to establish a new society, which should have for its sole object " to encourage a wider circulation of the Holy Scriptures, without note or comment." This simplicity of aim is combined with a catholicity of constitution which admits the co-operation of all persons interested in the society's object. The committee of management consists of thirty-six laymen, six of them being

foreigners resident in or near London, while of the remaining thirty, half are members of the Church of England, and half are members of other Christian denominations.

Supported by representative Christian leaders, such as Gran- ville Sharp, Zachary Macaulay, William Wilberforce, Charles Grant and Henry Thornton, with Lord Teignmouth, ex-governor- general of India, as its first president, and Dr Porteus, bishop of London, as its friendly counsellor, the new society made rapid progress. It spread throughout Great Britain, mainly by means of auxiliaries, i.e. local societies, affiliated but self-controlled, with subsidiary branches and associations (these last being often managed by women). Up to 181 6- 1817 the parent society had received from its auxiliaries altogether £420,000. This system continues to flourish. In 1905-1906 the society had about 5800 auxiliaries, branches and associations in England and Wales, and more than 2000 auxiliaries abroad, mainly in the British Colonies, many of which undertake

vigorous local work, besides remitting contributions to London.

The society's advance was chequered by several controversies. (a) Its fundamental law to circulate the Bible alone, without note or comment, was vehemently attacked by Bishop Marsh and other divines of the Church of England, who insisted that the Prayer Book ought to accompany the Bible, (b) Another more serious controversy related to the circulation — chiefly through affiliated societies on the continent — of Bibles containing the Deutero-canoni- cal books of the Old Testament. In 1826 the society finally resolved that its fundamental law be fully and distinctly recognized as exclud- ing the circulation " of those Books, or parts of Books, which are usually termed Apocryphal." This step, however, failed to satisfy most of the society's supporters in Scotland, who proceeded to form themselves into independent organizations, grouped for the most part round centres at Edinburgh and Glasgow. These were finally amalgamated in 1861 into the National Bible Society of Scotland. (c) A third dispute turned upon the admissibility of non-Trinitarians to the privilege of co-operation. The refusal of the society to alter its constitution so as formally to exclude such persons led to the formation (1831) of the Trinitarian Bible Society, which is still in existence, (d) A fourth controversy arose out of the restrictive renderings of the term " baptize " and its cognate terms, adopted by William Carey and his colleagues in their famous " Serampore Versions," towards publishing which the society had contributed up to 1830 nearly £30,000. Protests from other Indian missionaries led the society to determine that it could circulate only such versions as gave neutral renderings for the terms in question. As a sequel, the Bible Translation Society was founded in 1839 to issue versions embodying distinctively Baptist renderings.

By one of its original laws the British and Foreign Bible Society could circulate no copies of the Scriptures in English other than King James's Version of 161 1. In 1901 this law was widened to include the Revised English Version of 1881-1885.

From its foundation the society has successfully laboured to promote new and improved versions of the Scriptures. In 1804 the Bible, or some part of it, had been printed in about fifty-five different tongues. By the year 1906 versions, more or less complete, had been published in more than 530 distinct languages and dialects, and in 400 of these the work of translation, printing or distribution had been promoted by the society. Translations or revisions in scores of languages are still being carried on by companies of scholars and representative missionaries in different parts of the world, organized

under the society's auspices and largely at its expense. New versions are made, wherever practicable, from the original Hebrew or Greek text, and the results thus obtained have a high philological value and interest. The society's interdenominational character has commonly secured — what could hardly otherwise have been attained — the acceptance of the samp version by missions of different churches working side by side. The society supplies the Scriptures to missions of every Reformed Communion on such terms that, as a rule, the books distributed by the missions involve no charge on their funds. Except under special circumstances, the society does not encourage wholesale free distribution, but provides cheap editions at prices which the poorest can pay. On the whole it receives from sales about 40 % of what it expends in preparing, printing and circulating the books.

During the year 1905-1906 the society's circulation reached the unprecedented total of 5,977.453 copies, including 968,683 Bibles and 1,326,475 Testaments. Of the whole 1,921,000 volumes were issued from the Bible House, London, and 1,331,000 were in English or Welsh, circulating chiefly in England and the British colonies. The other main fields of distribution were as follows: — France, 203,000 copies; Central Europe, 679,000; Italy, 117,000; Spain and Portugal, 120,000; the Russian empire, 595,000; India, Burma and Ceylon, 768,000; Japan, 286,000; and China, 1,075,000 (most of these last being separate gospels).

The society spends £10,000 a year in grants to religious and philanthropic agencies at home. Outside the United Kingdom

it has its own agencies or secretaries in twenty-seven of the chief cities of the world, and maintains depots in 200 other centres. It employs 930 Christian colporteurs abroad, who sold in 1905-1906 over 2,250,000 volumes. It supports 670 native Christian Bible-women in the East, in connexion with forty different missionary organizations. The centenary festival in 1904 was celebrated with enthusiasm by the Reformed Churches and their foreign missions throughout the world. Messages of congratulation came from the rulers of every Protestant nation in Christendom, and a centenary thanksgiving fund of 250,000 guineas was raised for extending the society's work. During the year 1905-1906 the society expended £238,632, while its income was £231 ,964 (of which £98,204

represented receipts from sales). Up to the 31st of March 1906 the society had expended altogether £14,686,072, and had issued 198,515,199 copies of the Scriptures — of which more than 78,000,000 were in English.

In Scotland the Edinburgh Bible Society (1809), the Glasgow Bible Society (1812), and other Scottish auxiliaries, many of which had dissociated themselves from the British and Foreign Bible Society after 1826, were finally incorporated (1861) with the National Bible Society of Scotland, which has carried on vigorous work all over the world, especially in China. During 1905, with an income of £27,108, it issued 1,590,881 copies, 907,000 of which were circulated in China. Its total issues from 1861 to 1906 were 26,106,265 volumes.

In Ireland the Hibernian Bible Society (originally known as the Dublin Bible Society) was founded in 1806, and with it were federated kindred Irish associations formed at Cork, Belfast, Derry, &c. The Hibernian Bible Society, whose centenary was celebrated in 1906, had then issued a total of 5>7i3,837 copies. It sends an annual subsidy to aid the foreign work of the British and Foreign Bible Society.

Other European Societies. — The impluse which founded the British and Foreign Bible Society in 1804 soon spread over Europe, and, notwithstanding the turmoils of the Napoleonic wars, kindred organizations on similar lines quickly sprang up, promoted and subsidized by the British and Foreign Bible Society. Many of these secured royal and aristocratic patronage and encouragement — the tsar of Russia, the kings of Prussia, Bavaria, Sweden, Denmark and Wiirttemberg all lending their influence to the enterprise.

Within fourteen years the following Bible societies were in active operation: the Basel Bible Society (founded at Nuremberg, 1804), the Prussian Bible Society (founded as the Berlin Bible Society, 1805), the Revel Bible Society (1807), the Swedish Evangelical Society (1808), the Dorpat Bible Society (181 1), the Riga Bible Society (1812), the Finnish Bible Society (1812), the Hungarian Bible Institution (Pressburg, 181 2), the Wiirt- temberg Bible Society (Stuttgart, 181 2), the Swedish Bible Society (1814), the Danish Bible Society (1814), the Saxon Bible Society (Dresden, 1814), the Thuringian Bible Society (Erfurt, 1814), the Berg Bible Society (Eberfeld, 1814), the Hanover Bible Society (1814), the Hamburg-Altona Bible Society (1814), the Ltibeck Bible Society (1814), the Netherlands Bible Society (Amsterdam, 1814). These were increased

in 1815 by the Brunswick, Bremen, Schleswig-Holstein, Strassburg and Eichs- feld (Saxony) Bible Societies, and the Icelandic Bible Society. In 1816-1817 came the Norwegian Bible Society, the Polish Bible Society and ten minor German Bible Societies. Twelve cantonal societies had also been formed in Switzerland.

Up to 1816-1817 these societies had printed altogether 436,000 copies of the Scriptures, and had received from the British and Foreign Bible Society gifts amounting to over £62,000. The decision of the British and Foreign Bible Society in 1826 with regard to circulating the Apocrypha (see above) modified its relations with the most influential of these continental societies. Some of them were ultimately dissolved or suppressed through political or ecclesiastical opposition, the Roman Church proving especially hostile. But many of them still flourish, and are actively engaged in their original task.

The circulation of the Scriptures by German Bible Societies during 1905 was estimated as follows: — The Prussian Bible Society (Berlin), 182,000 copies; the Wiirttemberg Bible Institute (Stuttgart), 247,000; the Berg Bible Society (Eberfeld), 142,000; the Saxon Bible Society (Dresden), 44,000; the Central Bible Association (Nuremberg), 14,000; the Canstein Bible Institute (Halle), the

Schleswig-Holstein Bible Society, the Hamburg-Altona Bible Society and others, together 56,000.

During 1905, nine cantonal Bible societies in Switzerland circulated altogether 71,000 copies; the Netherlands Bible Society reported a circulation of 54,544 volumes, 48,137 of which were in Dutch; the Danish Bible Society circulated 45,289 copies; the Norwegian Bible Society circulated 67,058 copies; and in Sweden the Evangelical National Society distributed about- 110,000 copies. In Italy, by a departure from the traditional policy of the Roman Church, the newly formed " Pious Society of St Jerome for the Dissemination of the Holy Gospels " issued in 1901 from the Vatican press a new Italian version of the Four Gospels and Acts. By the end of 1905 the society announced that over 400,000 copies of this volume had been sold at 2d. a copy.

In France, the Societe biblique protestante de Paris, founded in 1818, with generous aid from the British and Foreign Bible Society, had a somewhat restricted basis and scope. In 1833 the Societe biblique francaise et etran'gere was formed on wider lines ; after its dissolution in 1863, many of its supporters joined the Societe biblique de France, which dates from 1864, and represents chiefly

members of the Eglise libre, and kindred French Evangelicals. During 1905 its issues were 34,475 copies, while the Societe biblique protestante de Paris issued 8061 popies.

Of these non-British societies the most noteworthy was established in Russia. In December 1812, while " the last shattered remnants of Napoleon's Grand Army struggled across the ice of the Niemen," the tsar Alexander I. sanctioned plans for a Bible society, which was promptly inaugurated at St Petersburg under the presidency of Prince Galitzin. Through the personal favour of the tsar, it made rapid and remarkable progress. Nobles and ministers of state, with the chief ecclesiastics not only of the Russian Church but of the Roman, the Uniat, the Armenian, the Greek, the Georgian and the Lutheran Churches, found themselves constrained to serve on its committees. By the close of 1823 the Russian Bible Society had formed 289 auxiliaries, extending eastwards to Yakutsk and Okhotsk; and had received altogether £145,640. In 1824, however, Prince Galitzin ceased to be procurator of the Holy Synod, and Seraphim, metropolitan of St Petersburg, became president of the Russian Bible Society. And in 1826, soon after his accession, the tsar Nicholas I. issued a ukase suspending the society's operations — after it had printed the Scriptures in thirty different languages, seventeen of which were new tongues, and had circulated 600,000 volumes from the Caucasus to Kamchatka. In 1828 Nicholas I. sanctioned the establishment of a Protestant Bible Society, which still exists, to supply the Scriptures only to Protestant subjects of the tsar (cf. Th. Schiemann, Geschichte Russlands unter Nikolaus I. vol. i. chap. ix.). In 1839 St. Petersburg became the headquarters of an agency of the British and Foreign Bible Society, which enjoys special facilities in Russia, and now annually circulates about 600,000 copies of_ the Scriptures, in fifty different languages, within the Russian empire.

In America the earliest Bible society was founded at Philadel- phia in 1808. Six more societies — including those of New York and of Massachusetts— were formed during 1809, and other societies, auxiliaries and associations quickly followed. In 1816 a convention of delegates representing 31 of these institu- tions met at New York and established the American Bible Society, with Elias Boudinot as president. All kindred organizations in the states gradually became amalgamated with this national body, and the federation was completed in 1839 by the adhesion of the Philadelphia Society (which now changed its name to the Pennsyl- vania Bible Society) . Not a few noteworthy versions of the Bible, such as those in Arabic, 15 dialects of Chinese, Armenian, and Zulu, and many American Indian, Philippine, and African lan- guages have appeared under the

auspices of the American Bible Society. Turkish, classical Chinese, and Korean versions have been made by the American and British societies jointly. The society's foreign agencies extend to China, Japan, Korea, the Turkish empire, Bulgaria, Egypt, Micronesia, Siam, Mexico, Cen- tral America, the South American republics, Cuba and the Philip- pines. In the year ending March 31st 1909 the income of the Society was $502,345, and it issued 2,153,028 copies of the Scrip- tures, nearly half of which went to readers outside the United States. The total distribution effected by the American Bible Society and its federated societies had in 1909 exceeded 84,000,000 volumes, in over a hundred different languages.

Authorities. — Besides the published reports of the societies in question, the following works may be mentioned: J. Owen, History of the First Ten Years of the British and Foreign Bible Society (London, 1816-1820) ; G. Browne, History of the Bible Society (London, 1859) ; Bertram, Geschichte der Cansteinschen Bibelanstalt (Halle, 1863); E. Petavel, La Bible en France (Paris, 1864); O. Douen, Histoire de la societe biblique protestante de Paris (Paris, 1868); G. Borrow,

The Bible in Spain (London, 1849) ; W. Canton, The History of the British and Foreign Bible Society (London, 1904 foil.) ; J. Ballinger, The Bible in Wales (London, 1906) ; T. H. Darlow and H. F. Moule, Historical Catalogue of the Printed Editions of Holy Scripture (London, vol. i. 1903, vol. ii. 1908). (T. H. D.)

BIBLIOGRAPHY AND BIBLIOLOGY. The word ˆXioypacbla was used in post-classical Greek for the writing of books, and as late as 1761, in Fenning's English Dictionary, a bibliographer is defined as " one who writes or copies books." The transition from the meaning " a writing of books " to that of " a writing about books," was accomplished in France in the 18th century — witness the publication in 1763 of the Bibliographie instructive of de Bure. In England the new meaning seems to have been popularized by the Rev. Thomas Frognall Dibdin early in the 19th century, while Southey preferred the rival form bibliology, which is now hardly used. Present custom inclines to restrict the province of bibliography to printed books as opposed to manuscripts, and on the other hand recognizes as coming within its scope almost everything in which a book-loving antiquary can be interested, including the history of printing (see

Typography), book-binding (q.v), book-illustration (see Illus- tration) and book-collecting (q.v.). The present article is only concerned with bibliography as the art of the examination, collation and description of books, their enumeration and arrangement in lists for purposes of information, and further with the literature of this subject, i.e. with the bibliography of bibliography.

Examination and Collation. — Books are submitted to examina- tion in order to discover their origin, or to test statements con- cerning it which there is reason to doubt, or to ascertain if they are perfect, and if perfect whether they are in their original condition or have been " made up " from other copies. The discovery of where, when and by whom a book, or fragment of a book, was printed, is the most difficult of these tasks, though as regards books printed in the 15th century it has been much facilitated by the numerous facsimiles enumerated under Incunabula (q.v.). In the article Book (q.v.) a sketch is given of the chief external characteristics of books in each century since the invention of printing. .Familiarity with books of different ages and countries soon creates a series of general ideas as to the dates and places with which any combination of these characteristics may be connected, and an experienced bibliographer, more especially if he knows something of the history of paper, will quickly narrow down the field of inquiry sufficiently to make special search possible.

As regards the correction of mis-statements in early books as to their place and origin, glaring piracies such as the Lyonnese counterfeits of the octavo editions of the classics printed by Aldus at Venice, and the numerous unauthorized editions of works by Luther, professing to be printed at Wittenberg, have long ago been exposed. A different variety of the same kind of puzzle arises from the existence of numerous original editions with fictitious imprints. As early as 1499 a Brescia printer, in order to evade the privilege granted to Aldus, gave to an edition of Politian the spurious imprint " Florentiae," and in the 16th century many controversial books printed in England purported to have been issued in German towns, or with pleasant humour, " at Rome before the castle of S. Angel at the sign of S. Peter." Only a knowledge of the general characteristics which a book printed at such a place and such a time should possess will secure avoidance of these traps, but when suspicion has been aroused the whole story will often be found in such books as Weller's Die maskirte Literatur der alteren mid neueren Sprachen (1856-1867), and Die falschen und fingir- ten Druckorte (1864), Brantt's Imprimeurs imaginaires et libraires supposes (1866), de Brouillant's La Liberie de la.Presse en France; Histoire de Pierre du Marteau,

imprimeur a Cologne, &˚c. (1888); in the various bibliographies of Erotica and in Brunet's Manuel de V Amateur and other handbooks for the use of collectors. A special case of this problem of piracies and spurious imprints is that of the modern photographic or type-facsimile forgery of small books possessing a high commercial value, such as the early editions of the letter of Columbus announcing his discovery

of the New World. Bad forgeries of this kind can be detected by the tendency of all photographic processes of reproduction to thicken letters and exaggerate every kind of defect, but the best of these imitations when printed on old paper require a specific knowledge of the originals and often cause great trouble. The type-facsimile forgeries are mostly of short pieces by Tennyson, George Eliot and A. C. Swinburne, printed (or supposed to have been printed — for it is doubtful if some of these " forgeries " ever had any originals) for circulation among friends. These trifles should never be purchased without a written guarantee.

When the edition to which a book belongs is known, further examination is needed to ascertain if it is perfect and in its original state. Where no standard collation is available, this can only be ascertained by a detailed examination of the quires or gatherings of which it is made up (see below). In the earliest books these are often very irregular. A large book was usually printed simultaneously in four or six sections on as many different presses, and the several compositors, if unable to end their sections at the end of a complete quire, would insert a single leaf to give more space, or sometimes leave a blank page, or half page, for lack of matter, occasionally adding the note " Hie nullus est defectus." A careful examination of the text, a task from which bibliographers often shrink, and a comparison with other editions, are the only remedies in these cases.

If a copy contains the right number of leaves, the further question arises as to whether any of these have been supplied from other copies, or are in facsimile. Few collectors even now are educated enough to prefer copies in the condition in which the ravages of time have left them to those which have been " completed " by dealers; hence many old books have been " made up " with leaves from other copies, or not infrequently from other editions. These meddlings often defy detection, but proof of them may be found in differences in the height and colour of the paper, in the two corresponding leaves at either end of a folio quire both possessing a watermark, or in their wiremarks not corresponding, or (in very early books) by the ornamentation added by hand being in a different style.

When it has been ascertained that a copy contains the right number of leaves and that all these leaves are original, the last point to be settled is as to whether it differs in any respect from the standard collation. Owing to the extreme slowness of the presswork for the first two centuries after the invention of printing, there were more opportunities for making small correc- tions while an old book was passing, through the press than there are in the case of modern ones, and on the other hand the balls used for inking the type sometimes caught up words or individual letters and these were replaced by the compositors as best they could. The small variations in the text noticed in different copies of the First Folio edition of Shakespeare, and again of Milton's Paradise Lost, are probably to be explained by a mixture of these two causes. Where a serious error was discovered after a sheet had been printed off, the leaf on which it occurred was sometimes cut out and a new leaf (called a " cancel ") printed to replace it and pasted on to the rest of the sheet. Variations between different copies of the first edition of Herrick's Hesperides which have puzzled all his editors are due to the presence of several of such cancels. Lastly, a printer when he had printed part of a book might wish to increase the size of the edition, and the leaves already printed off would have to be reprinted, thus causing a combination of identical and different leaves in different copies. The famous 42-line Bible of c. 1455, variously attributed to Gutenberg and to Fust and Schoeffer, and the Valerius Maximus printed by Schoeffer in 147 1, are instances of editions being thus enlarged while passing through the press. As each book was set up simultaneously on several different presses, the reprinted leaves occur at the beginning of each of the sections.

It should be mentioned that there are books of which it is difficult to find two copies in exact agreement. Either to quicken presswork or to comply with trade-regulations made in the interest of compositors, in some books of which large

numbers were required, e.g. the Paraphrases of Erasmus, the First Prayer-book of Edward VI., and the " Songs and Sonnets " known as Tottcll's Miscellany, each forme was set up two or more different times. The formes were then used at haphazard for printing, and both at this stage and when the printed sheets came to be stitched almost any number of different combinations might be made. The books named were all printed in the middle of the 16th century, but

probably later instances could be produced.

Description. — The ideal towards which all bibliographical work should be directed is the provision in an accessible form of a standard description of a perfect copy of every book of literary, historical or typographical interest as it first issued from the press, and of all the variant issues and editions of it. When such standard descriptions shall have been made, adequately checked and printed, it will be possible to describe every individual copy by a simple reference to them, with a statement of its differences, if any, and an insistence on the points bearing on the special object with which it is being re-described. Only in a few cases has any approach been made to a collection of such standard descriptions. One instance which may be cited is that of the entries of the 15th century books in the Reperlorium Biblio- graphicum of Ludwig Hain (1826-1838), which the addition of an asterisk marks as having been examined by Hain himself in the copies in the Royal library at Munich. The high standard of accuracy of these asterisked entries (save for the omission to note blank leaves at the beginning or end) has been so well established, and the Repcrtormm is so widely known, that in many catalogues of incunabula the short title of the book together with the number of Plain's entry has been usefully substituted for a long description. Books printed at Oxford up to 1640 can be equally well described by their short titles and a reference to Mr Falconer Madan's Early Oxford Press published in 1895, At present the number of works which can thus be taken as a standard is only small, owing partly to the greater and more accurate detail now demanded, partly to the absence of any system of co-operation among libraries, each of which is only willing to pay for catalogues relating exclusively to its own collections. It may be hoped that through the foundation of bibliographical institutes more work of this kind may be done. A standard description of any book must, as a rule, consist of the following sections, though in the case of works which have no typographical interest, some of the details may be advantage- ously omitted: — (a) A literal transcript of the title-page, also of the colophon, if any, and of any headings or other portions of the book serving to distinguish it from other issues; (b) Statements as to the size or form of the book, the gatherings or quires of which it is made up, with the total number of leaves, the measure- ment of an uncut copy or of the type-page, a note of the .types in which different parts of the book are printed, and a reference to any trustworthy information already in print; (c) A state- ment of the literary contents of the book and of the points at which they respectively begin; (d) A note giving any additional information which may be

needed.

(a) In transcribing the title-page and other parts of the book it is desirable not to omit intermediate words; if an omission is made it should be indicated by three dots placed close together. The end of a line should be indicated by an upright stroke. 1 It is a considerable gain to indicate to the eye in what types the words transcribed are printed, i.e. whether in roman, gothic letter, or italic, and in each case whether in majuscules or minuscules (" upper or lower case "). To do this, however, adds greatly not only to the cost of printing, but also to the liability of error. If roman minus- cules are used throughout, or roman for the text and italic for the imprint of colophon, the method of transliteration which the printer himself would have used should be adopted. Many of the best modern catalogues and bibliographies are disfigured by the occur- rence in them of such forms as " qvinqve," " qveen," " Evrope," due to an unintelligent transliteration of the forms QVINQVE, QVEEN, EVROPE, as they occur on title-pages at a date when " V " was the majuscule form of both " v " and " u ." If it is de-

1 Some bibliographers prefer to use double strokes to avoid con- fusion with the old-fashioned long commas. Others use a single stroke to indicate the space between two lines and increase the number of strokes where the space left is wider than this.

sired to retain the V forms the words should be printed in majus- cules. If minuscules are used, the words should be transliterated as quinque, queen, Europe, according to the practice of the old printers themselves.

A troublesome question often arises as to what notice should be taken in reproducing, the misprints which frequently occur in the original titles. Bibliographers who have satisfied themselves (and their readers) of .their own accuracy may reproduce them in silence, though it will need constant watchfulness to prevent the printer from " setting them right." Transcribers of only average accuracy will consult their happiness by indicating the misprint in some way, and the frequent use of (sic), more especially when printed in italics, or of the German (!), being ugly, probably the simplest plan is to add a note at the end stating that the misprints in question occur in the original.

(b) The " size " of a book is a technical expression for the relation of the individual leaves to the sheet of paper of which they form a part. A book in-folio means one in which the paper has been folded once,

so that each sheet has made two leaves. In a book in-quarto, each sheet has been folded twice so as to make four leaves. In an octavo another fold has produced eight leaves, and so on for books in l6mo, 32mo and 64mo. For books in twelves, twenty-fours, &c, the paper has at some stage to be folded in three instead of in two, and there will be some difference in form according to the way in which this is done. The size of a book printed on handmade paper ‘ ‘ is very simply recognized by holding up a page to the light. Certain white lines, called wire-lines, will be noticed, occurring as a rule about an inch apart, and running at right angles to the fine lines. These wire-lines are perpendicular in a folio, octavo, 32 mo, and horizontal in a quarto and i6mo. In a iamo, as the name implies, the sheet is folded in twelve; and in the earlier part at least of the 16th century this was done in such a way that the wire-lines are perpendicular, the height of the sheet forming two pages, as is the case in an octavo, while the width is divided into six instead of into four as in an octavo. The later habit has been to fold the sheet differently, the height of the sheet forming the width of four pages, and the width of the sheet the height of three pages, consequently the wire-lines are horizontal “_ (E. G. Duff, Early Printed Books, pp. 206-207).

The recognition of what is meant by the size of a book has been obscured by the erroneous idea that the quires or gatherings of which books are made up necessarily consist of single sheets, 2 If this were so all folios would be in gatherings of two leaves each ; all quartos in gatherings of four leaves; all octavos in gatherings of eights. In the case of books printed on handmade paper, this is generally true of octavos, but to reduce the amount of sewing the earliest folios were usually arranged in tens, i.e. in gatherings of five sheets or ten leaves, while in Shakespeare’s time English folios were mostly in sixes. In the same way quartos are often found made up in eights, and on the other hand the use of a half-sheet produces a gathering of only two leaves.

_ When a manuscript or early printed book was being prepared for binding, it was usual for the order in which the quires or gatherings were to be arranged to be indicated by signing them with the letters of the alphabet in their order, the alphabet generally used being the Latin, in which I stands for both I and J ; V for both U and V, and there is no W. If more than twenty-three letters were needed the contractions for et, con, rum and (less often) that for us, were used as additional signs, and for large books minuscules were used as well as majuscules, and the letters were doubled. In 1472 printed signatures came into use. If the quires or gatherings in the book to be described are signed in print, the signatures used should be quoted

without brackets. If they are not signed, the order of the gatherings should be noted by the letters of the alphabet in square brackets. In each case the number of leaves in each gathering should be shown by index-figures. Thus, six gatherings of eight leaves followed by one of four should be represented by the symbols A-F 8 G 4 . The ” make-up “of an old book in original binding is usually sufficiently shown by the strings in the middle of each quire. In books which have been rebound help may sometimes be obtained from the fact that between (roughly) 1750 and 1850, a period during which there was much rebinding of early books, the gatherings before being put into their new quires were mostly separately pressed, with the result that the outer pages of each gathering a-re much smoother than the rest. But the only safe guide to the make-up of an old book without printed signatures is a collation by means of the watermarks, i.e. the devices with which the papermaker as a rule marked each sheet (see Paper). In a folio book one of every pair of leaves should have a watermark in the middle of the paper. In a quarto some pairs of leaves will have no watermark; in others it will be found divided by the fold of the paper. As the great majority of books without printed signatures are in folio or quarto,

2 It may be noted that some confusion is caused in descriptions of books by the word ” sheet,” which should be restricted to the original sheet of paper which by folding becomes folio, quarto, &c, being applied also to the double-leaf of four pages. A word specially appropriated to this is greatly needed, and as gatherings of two, three, four, &c, of such double-leaves are known technically as duernions, ternions, quaternions, &c, the double-leaf itself might well be called a ” unit.”

the sequence of watermarked and un-watermarked leaves, if carefully worked out, will mostly reveal the ” make-up ” of the successive gatherings.

After the size and sequence of the gatherings has been stated, the total number of leaves should be noted, with a mention of any numeration of them given in the book. Any discrepancy between the total of the leaves assigned to the successive gatherings and the total as separately counted of course points to an error, and the reckonings must be repeated till they tally. Errors in the printed enumeration of the leaves of old books are common, and it is seldom

necessary to point them out in detail. When reference has to be made to a particular page of an old book, the printed signatures offer the readiest means, an index number placed below the letter indicating the number of the leaf in the gathering and the addition of "recto " or " verso " marking the upper or under page of the leaf. Thus "X 4 recto" (some bibliographers prefer the rather clumsier form " X 4 recto ") stands for the first page of the fourth leaf of the gathering signed X. Where there are no printed signa- tures the leaf-number may be given, the letters " a " and " b " above the numeral taking the place of " recto " and " verso " (leaf 99 a). Where some leaves of a book are numbered and others not, if the reference is to the printed numeration this should be stated. Printed leaf numeration is found as early as 1470, and became common about ten years later. Printed pagination did not become common till nearly the middle of the 16th century.

The foregoing details are all directed to showing which leaves of a book would be printed by the same pull of the press, how it was made up for binding, and how imperfections in any copy may be detected. They give little or no indication of the dimensions of the book. In the case of modern editions this may be done by adding one of the trade epithets, pott, foolscap, crown, &c, to the name of the size, which when thus qualified denotes paper of a particular measurement (see Paper). As, however, these measurements are not easily remembered, it is better to give the actual measurements in inches or millimetres of a page of an uncut copy. In old books uncut copies are not easily found, and it is useful instead of this to give the measurement in millimetres of the printed portion of the page (technically called the " type-page "), although this is subject to a variation of about 3 % in different copies, according to the degree to which they were damped for printing. To this is added a statement of the number of lines in the page measured. The character of the type (roman, gothic or italic) is next mentioned, and in the case of 15th-century books, its number in the sequence of founts used by the printer (see Incunabula). Finally a reference to any authoritative description already printed completes this portion of the entry. Thus the description of the collation of the first-dated book printed at Augsburg, the Meditationes of S. Bona- ventura, printed by Giinther Zainer in 1468, should read: Folio (a 10 , b-d 8 , e-g 10 , h 8) 72 leaves. Type-page (*) 202X120 mm.; 35 lines. Type 1 (gothic letter). Hain 3557. _

(c) While many books, and this is especially true of early ones, contain little or nothing beyond the bare text of a well-known work, others are well provided, not only with commentaries which are

almost sure to be mentioned on the title-page, or in the colophon (which the editor himself often wrote), but also with dedicatory letters, prefaces, complimentary verses, indexes and other accessories, the presence of which it is desirable to indicate. In these cases it is often convenient to show the entire contents of the book in the order in which they occur, noting the leaves or pages on which each begins. Thus in the first edition (1590) of the first three books of Spenser's Faerie Queene, the literary contents, their order, and the space they occupy can be concisely noted by taking the successive gather- ings according to their signatures and showing what comes on each page. Thus: Ai, recto, title; verso, dedication, "To the Most Mightie and Magnificent Empresse Elizabeth "; A 2 -Oo 8 , text of books i.-iii. ; Ppi, letter dated the 23rd of January 1589 [1590] to Sir Walter Raleigh expounding the intention of the work ; Pp 3 verso, commendatory verses signed W. R[aleigh], Hobynoll (Gabriel Harvey), R.S., H.B., W.L. and Ignoto; Pps-8, complimentary sonnets severally inscribed to Sir C. Hatton, the earls of Essex, Oxford, Northumberland and Ormond, Lord Ch. Howard, Lord Grey of Wilton and Sir W. Raleigh, and to Lady Carew and to the Ladies in the Court; and " Faults escaped in the print "; Qqi-4, fifteen other sonnets.

Some bibliographers prefer to reverse the order of notation, (title, Ai, recto; dedication, Ai, verso, &c), and no principle is sacrificed in doing so, though the order suggested usually works out the more neatly.

Enumeration and Arrangement. — In the 18th and early 19th centuries there was a tendency, especially among French writers, to exaggerate the scope of bibliography, on the ground that it was the duty of the bibliographer to appraise the value of all the books he recorded, and to indicate the exact place which each work should occupy in a logical classification of all literature based on a previous classification of all knowledge. Biblio- graphers are rfow more modest. They recognize that the 1 Here specify the page measured.

classification of human knowledge is a question for philosophers and men of science, that the knowledge of chemistry and of its history needed to make a good bibliography of chemistry is alto- gether extrinsic to bibliography itself; that all, in fact, to which bibliography can pretend is to suggest certain general principles of arrangement and to point out to some extent how they may be applied. The principles are neither numerous nor recondite. To illustrate the history of printing, books may be arranged according to the places and printing-houses where they were produced. For the

glorification of a province or county, they are sometimes grouped under the places where their authors were born or resided. For special purposes, they may be arranged according to the language or dialect in which they are written. But, speaking generally, the choice for a basis of arrangement rests between the alphabetical order of authors and titles, a chronological order according to date of publication, a " logical " or alphabetical order according to subjects, and some combina- tion of these methods. In exercising the choice the essential requisite is a really clear idea of the use to which the bibliography, when made, is to be put. If its chief object be to give detailed information about individual books, a strictly alphabetical arrangement " by authors and titles " {i.e. by the names of authors in their alphabetical order, and the titles of their books in alphabetical sequence under the names) will be the most useful, because it enables the student to obtain the information he seeks with the greatest ease. But while such an alphabetical arrangement offers the speediest access to individual entries, it has no other merit, unless the main object of the bibliography be to show what each author has written. If it is desired to illustrate the history and development of a subject, or the literary biography of an author, the books should be entered chronologically. If direction in reading is to be given, this can best be offered by a subject-index, in which the subjects are arranged alphabetically for speedy reference, and the books chronologically under the subject, so that the newest are always at the end. Lastly if the object is to show how far the whole field has been covered and what gaps remain to be filled, a class catalogue arranged according to what are considered the logical subdivisions of the subject has its advantages. It is important, however, to remember that, if the bulk of the bibliography is very large, a principle of arrangement which would be clear and useful on a small scale may be lost in the quantity of pages over which it extends. An arrangement which cannot be quickly grasped, whatever satisfaction it may give its author, is useless to readers, the measure of its inutility being the worn condition of the alphabetical index to which those who cannot carry a complicated " logical " arrangement in their heads are obliged to turn, in the first instance, to find what they want. It should be obvious that any system which necessitates a preliminary reference to a key or index rests under grave suspicion, and needs some clear counterbalancing gain to justify the loss of time which it entails. The main classification should always be that which will be most immediately useful to readers of the books. To throw light on the history of a subject and to indicate how far the field is covered are honourable objects for compilers, but should mostly be held subordinate to practical use. It is note- worthy also

that they may often be better forwarded by means of an index or table than by the main arrangement. The history of Hain's Repertorium Bibliographicum, which enumerates in an alphabetical arrangement of authors and titles some 16,000 books printed in the 15th century, is a good example of this. For sixty-five years it was of the utmost use for its accurate descrip- tions of individual books, but threw practically no light on the history of printing. In 1891 Dr Konrad Burger published an appendix to it containing an Index of Printers, since greatly enlarged in his index to Dr Copinger's Supplement to Hain (1902). The form of the index enables each printer's work to be seen at a glance, and the impetus given to the study of the history of printing was very great. But if the book had originally been arranged under Printers instead of Authors, it would have been far more difficult to use; its literary value would have been halved, and the record of the output of each press, now instantly

visible, would have been obscured by the fuller entries causing it to extend over many pages.

The Bibliography of Bibliography. — The zeal of students of early printing has provided the material for an almost exhaustive list (see Incunabula) of the books printed in the 15th century still extant. Of those printed in the years 1501-1536 there is a tentative enumeration in the continuation of Panzer's Annates Typographici (1803), and materials are gradually being collected for improving and extending this. But the projects once formed for a universal bibliography have dwindled in proportion as the output of the press has increased, and the nearest approaches to such a work are the printed catalogue of the library of the British Museum, and that of the Bibliotheque Nationale at Paris, now in progress. Of books of great rarity unrepresented in these catalogues a fairly sufficient record exists in Brunet's Manuel du libraire, the bibliographical collections of Mr W. C. Hazlitt, the Bibliographer' s Manual by Lowndes, and the other biblio- graphical works enumerated in the article on book-collecting (q.v.). When a universal bibliography was recognized as an impossibility, patriotism suggested the compilation of national bibliographies, and the Bibliotheca Britannica of Robert Watt (Edinburgh, 1824) remains an extraordinary example of what the zeal of a single man could accomplish in this direction, Querard's La France litteraire (Paris, 1827-1839), while it gives fuller titles, is

much less comprehensive, embracing mainly books of the 18th and early 19th centuries, and only such of these as appeared to the compiler to be written by " savants, historiens, et gens de lettres." In the works of Heinsius (All- gemeines Bucherlexikon, 1700-1815, Leipzig, 1812-1817), and Kayser (Bucherlexikon, 1750, &c, Leipzig, 1834, &c.) Germany possesses a fine record of her output of books during the last two centuries, and since the organization of the book-trade, contemporary lists of books, with resumes and indexes issued at intervals, exist for most European countries. For the period before these became of importance in England much biblio- graphical material has been collected in the Catalogues of English Books printed up to the end of the year 1640, issued by the British Museum in 1884, by the John Rylands library, Manchester, in 1895, and by the University library, Cambridge, in 1900-1906. A similar record of the rich English collections in the Bodleian library, Oxford, remains a great desideratum. While these substitutes for a universal author catalogue have gradually been provided, similar contributions to a universal subject catalogue have been made in the form of innumerable special bibliographies compiled by students or bookmen inter- ested in special subjects or departments of literature. The most important of these are enumerated in the bibliographical notes appended to articles in this Encyclopaedia, but many attempts have been made to compile separate catalogues of them.

The most recent of these bibliographies of bibliographies naturally take over all that is of any value in their predecessors, and it may suffice therefore to make special mention of the following : — Biblio- theca bibliographica. Kritisches Verzeichniss der das Gesammtgebiet der Bibliographie betrejfenden Lilteraiur des In- und Auslandes, in systematisches Ordnung bearbeitet von Dr Julius Petzholdt. Mit alphabetischcn Namen und Sachregister (Leipzig, 1866), 8vo, pp. xii. 940; Manuel de bibliographie generate, par Henri Stein (Paris, 1898), 8vo, pp. xx. 896; Manuel de bibliographie historique, par Ch. V. Langlois (Paris, 1901), l2mo, pp. xi. 623; A Register of National Bibliography. With a selection of the chief bibliographical works and articles printed in other Countries, by W. P. Courtney (London, I 9°5)i 8vo, pp. viii. 631.

It should also be noted that the List of Books of Reference in the Reading-Room of the British Museum, first published in 1889, and the Subject-index of the Modern Works added to the Library of the British Museum in the years 1881-1900, edited by G. K. Fortescue (supplements published every five years), include entries of a vast number of bibliographical works, and that an eclectic list, with a valuable introduction, will be found in Professor Ferguson's Some

Aspects of Bibliography (Edinburgh, 1900). (A. W. Po.)

BIBLIOMANCY (from the Gr. 0i£\lov, a book, and ixwrda, prophecy), a form of divination (q.v.) by means of the Bible or other books. The method employed is to open the Bible hap- hazard and be guided by the first verse which catches the eye. Among the Greeks and Romans the practice was known under

J the name of sortes Homericae or sorles Virgilianae, the books consulted being those of Homer or Virgil.

BIBRACTE, an ancient Gaulish town, the modern Mont Beuvray, near Autun in France. Here, on a hilltop 2500 ft. above sea-level, excavation has revealed a vast area of 330 acres, girt with a stone and wood rampart 3 m. long, and con- taining the remains of dwelling-houses, a temple of Bibractis, and the workshops of iron and bronze workers and enamellers. It was the capital of the Aedui in the time of Julius Caesar. Later on Augustus removed the inhabitants to his new town Augustodunum (Autun), to destroy the free native traditions. Another far more obscure town in Gaul, near Reims, also bore the name.

See Bulliot, Fouilles de Beuvray; Dechelette, Oppidum de Bibracte; also references s.v. Aedui.

BIBULUS, a surname of the Roman gens Calpurnia. The best- known of those who bore it was Marcus Calpurnius Bibulus, consul with Julius Caesar, 59 B.C. He was the candidate put forward by the aristocratical party in opposition to L. Lucceius, who was of the party of Caesar; and bribery was freely used, with the approval of even the rigid Cato (Suetonius, Caesar, 9), to secure his election. But he proved no match for his able colleague. He made an attempt to oppose the agrarian law introduced by Caesar for distributing the lands of Campania, but was overpowered and even personally ill-treated by the mob. After making vain complaints in the senate, he shut himself up in his own house during the remaining eight months of his consulship, taking no part in public business beyond fulminating edicts against Caesar's proceedings, which only provoked an attack upon his house by a mob of Caesar's partisans. His conduct gave rise to the jest, that Julius and Caesar were consuls during that year. When the relations of Caesar and Pompey became strained, Bibulus supported Pompey (Plutarch, Cato Minor, 41) and joined in proposing his election as sole consul (52 B.C.). Next year he went to Syria as proconsul and claimed credit for a victory gained by one of his officers over the Parthians, before his own arrival in

the province. After the expiration of his term of office, Pompey gave him com- mand of his fleet in the Ionian Sea. He proved himself utterly incapable; his chief exploit was the burning of thirty transports on their return from Epirus whither they had succeeded in conveying Caesar and some troops from Brundusium. He died soon afterwards (48) of fatigue and mortification (Caesar, Bell. Civ. iii. 5-18; Dio Cassius xli. 48). Although not a man of great importance, Bibulus showed great persistency as the enemy of Caesar. Cicero says of him that he was no orator, but a careful writer. By his wife Porcia, daughter of Cato, afterwards married to Brutus, he had three sons. The two eldest were murdered in Egypt by some of the soldiery of Gabinius; the youngest, Lucius Calpurnius Bibulus, fought on the side of the republic at the battle of Philippi, but surrendered to Antony soon after- wards, and was by him appointed to the command of his fleet. He died (about 32) while governor of Syria under Augustus. He wrote a short memoir of his step-father Brutus, which was used by Plutarch (Appian, B.C. iv. 136; Plutarch, Brutus,

13. 23).

BICE (from Fr. bis, a word of doubtful origin, meaning dark-coloured), a term erroneously applied in English to particular shades of green or blue pigments from the French terms vert bis and azur bis, dark green or blue. These colours are generally prepared from basic copper carbonates, but sometimes from ultramarine and other pigments.

BICESTER, a market town in the Woodstock parliamentary division of Oxfordshire, England, 12 m. N.N.E. of Oxford by a branch of the London & North-Western railway. Pop. of urban district (1901) 3023. It lies near the northern edge of the flat open plain of Ot Moor, in a pastoral country. The church of St Eadburg, the virgin of Aylesbury, is cruciform, with a western tower, and contains examples of Norman and each succeeding style. There is, moreover, in the nave a single rude angular arch considered to be Saxon. Incorporated with a farm-house, scanty Perpendicular remains are seen of an

Augustinian priory founded at the close of the 12th century. Bicester has considerable agricultural trade and a brewing industry. It is a favourite hunting centre.

The termination cester, commonly indicating Roman origin, does not do so here, and is perhaps copied from Alchester and Chesterton, 2 m. west of Bicester, where there is a small Roman site, probably a wayside village, at the meeting of roads from the south (Dorchester), west, north-east and east.

Bicester (Berncestre, Burencestre, Bissiter), according to the Domesday survey, was held by Robert d'Oily. In 1182 Gilbert Basset founded here an Augustinian priory, which from that date until its dissolution in 1538 became the centre of the industrial life and development of the town. In 1253 William Longspey obtained a grant of a fair at the feast of St Edburg, and a Friday market is mentioned in the 14th century. Richard II. granted a Monday market and a fair at the feast of St James the Apostle, and in 1440 an additional market was granted to be held in that part of the town called Bury-End, from this date known as Market-End. Bicester never possessed any manu- factures of importance, but the fairs and markets were much frequented, and in the 16th century the cattle market was especially famous.

See J. C. Blomfield, History of the Deanery of Bicester (London, 1882-1894); John Dunkin, History of Bicester (London, 1816).

BICHAT, MARIE FRANCOIS XAVIER (1771-1802), French anatomist and physiologist, was born at Thoirette (Jura) on the 14th of November 1771. His father, a physician, was his first instructor. He entered the college of Nantua, and afterwards studied at Lyons. In mathematics and the physical sciences he made rapid progress, but ultimately devoted himself to the study of anatomy and surgery, under the guidance of M. A. Petit (1766-1811), chief surgeon to the Hotel Dieu at Lyons. The revolutionary disturbances compelled him to fly from Lyous and take refuge in Paris in 1793. He there became a pupil of P. J. Desault, who was so strongly impressed with his genius that he took him into his house and treated him as his adopted son. For two years he actively participated in all the labours of Desault, prosecuting at the same time his own re- searches in anatomy and physiology. The sudden death of Desault in 1795 was a severe blow to Bichat. His first care was to acquit himself of the obligations he owed his benefactor, by contributing to the support of his widow and her son, and by conducting to a close the fourth volume of Desault's Journal de Chirurgie, to which he added a biographical memoir of its author. His next object was to reunite and digest in one body the surgical doctrines which Desault had published in various periodical works. Of these he composed, CEuvres chirurgicales de Desault, ou tableau de sa doctrine, et de sa pratique

dans le traitement des maladies externes (1798-1799), a work in which, although he professes only to set forth the ideas of another, he develops them with the clearness of one who is a master of the subject. In 1797 he began a course of anatomical demonstrations, and his success encouraged him to extend the plan of his lectures, and boldly to announce a course of operative surgery. In the following year, 1798, he gave in addition a separate course of physiology. A dangerous attack of haemoptysis interrupted his labours for a time; but the danger was no sooner past than he plunged into new engagements with the same ardour as before. He had now scope in his physiological lectures for a fuller exposition of his original views on the animal economy, which excited much attention in the medical schools at Paris. Sketches of these doctrines were given by him in three papers contained in the Memoirs of the Societ6 M6dicale d'Emulation, which he founded in 1796, and they were afterwards more fully developed in his Traiti sur les membranes (1800). His next publication was the Recherches physiologiques sur la vie et sur la mart (1800), and it was quickly followed by his Anatomic genirale (1801), the work which contains the fruits of his-most profound and original researches. He began another work, under the title Anatomie descriptive (1801-1803), in which the organs were arranged according to his peculiar classification of their functions, but lived to publish only the first two volumes.

It was completed on the same plan by his pupils, M. F. R. Buisson (1776-1805) and P. J. Roux (1780-1854).

Before Bichat had attained the age of eight-and-twenty he was appointed physician to the Hotel Dieu, a situation which opened an immense field to his ardent spirit of inquiry. In the investigation of diseases he pursued the same method of observa- tion and experiment which had characterized his researches in physiology. He learned their history by studying them at the bedside of his patients, and by accurate dissection of their bodies after death. He engaged in a series of examinations, with a view to ascertain the changes induced in the various organs by disease, and in less than six months he had opened above six hundred bodies. He was anxious also to determine with more precision than had been attempted before, the effects of remedial agents, and instituted with this view a series of direct experiments which yielded a vast store of valuable material. Towards the end of his life he was also engaged on a new classification of diseases. A fall from a staircase at the Hotel Dieu resulted in a fever, and, exhausted by his excessive labours and by constantly breathing the tainted air of the dissecting-room, he died on the 22nd of July 1802. His bust, together with that of Desault,

was placed in the Hotel Dieu by order of Napoleon.

BICHROMATES AND CHROMATES. Chromium trioxide dissolves readily in water, and the solution is supposed to contain chromic acid, H 2 CrQi; the salts of this acid are known as the chromates. In addition to these normal salts, others exist, namely bichromates, trichromates, &c, which may be regarded as combinations of one molecular proportion of the normal salt with one or more molecular proportions of chromium trioxide. The series will thus possess the following general formulae: —

M 2 Cr0 4 M 2 Cr 2 7 M 2 Cr 3 Oio &c. (M = one atom of a

normal chromate bichromate trichromate monovalent metal.)

Chromates. — The alkaline chromates are usually obtained by fusion of a chromium compound with an alkaline carbonate and an oxidizing agent, such for example as potassium nitrate or chlorate. The native chrome-ironstone (Cr 2 3 -FeO) may be used in this way as a source of such compounds, being fused in a reverberatory furnace, along with soda-ash and lime, the oxidizing agent in this case being atmospheric oxygen. They may also be prepared by oxidizing chromium salts (in alkaline solution) with hydrogen peroxide, chlorine, bleaching powder, potassium permanganate and manganese dioxide. The majority of the chromates are yellow in colour, and many of them are isomorphous with the corresponding sulphates. The alkaline chromates are soluble in water, those of most other metals being insoluble. By the addition of mineral acids, they are converted rapidly into bichromates. They are easily reduced in acid solution by sulphuretted hydrogen, and also by sulphur dioxide to chromium salts. The chromates are stable towards heat; they are poisonous, and may be recognized by the yellow precipitates they give with soluble barium and lead salts.*

Potassium chromate, K 2 CrO,i, may be prepared by neutralizing a solution of potassium bichromate with potassium carbonate or with caustic potash. It crystallizes in yellow rhombic prisms, and is readily soluble in water, the solution having a bitter taste and an alkaline reaction. When heated in a current of sulphuretted hydrogen, or carbon bisulphide, it yields a mixture of chromium sesquioxide and sulphide. When heated with sulphur it yields chromium sesquioxide. Sodium chromate, Na 2 CrO4-10H 2 O, forms pale yellow crystals isomorphous with hydrated scdium sulphate, Na 2 SC>4- 10H 2 O. It is deliquescent, and meltsat 23 C. (M. Berthelot). By evaporation of its aqueous solution at temperatures above 30 C. it may be ob- tained in the anhydrous condition. Lead chromate, PbCrC>4, occurs native as the mineral crocoisite, and may be obtained as an amor- phous pale yellow solid by precipitating a soluble lead salt by an alkaline chromate. It is used as a pigment under the name "chrome yellow." When digested for some time with a caustic alkali it is converted into a basic salt, PbCrCX-PbO, a pigment known as " chrome red." It melts readily, and on cooling resolidifies to a brown mass, which at moderately high temperatures gives off oxygen and leaves a residue of a basic lead salt; for this reason fused lead chromate is sometimes made use of in the analysis

of organic com- pounds. Silver chromate, Ag 2 Cr04, is a dark red amorphous powder obtained when silver nitrate is precipitated by an alkaline chromate. It is decomposed by the addition of caustic alkalis, forming silver oxide and an alkaline chromate.

Bichromates. — The bichromates are usually of a red or reddish-brown colour, those of the alkali metals being readily soluble in water. They are readily decomposed by heat, leaving a residue of the normal chromate and chromium sesquioxide, and liberating oxygen; ammonium bichromate, however, is completely decomposed

into chromium sesquioxide, water and nitrogen. Sulphuretted hydrogen and sulphur dioxide reduce them in acid solution to the condition of chromium salts.

Potassium bichromate, K 2 Cr 2 7 , is obtained by fusing chrome ironstone with soda ash and lime (see above), the calcium chromate formed in the process being decomposed by a hot solution of potassium sulphate. After the calcium sulphate has settled, the potassium chromate solution is converted into bichromate by the action of sulphuric acid, and the salt is allowed to crystallize. It forms large triclinic prisms of specific gravity 2-6-2-7, which are moderately soluble in cold water and readily soluble in hot water. The solution is strongly acid in reaction and is very poisonous. Potassium bichromate finds extensive application in organic chemistry as an oxidizing agent, being used for this purpose in dilute sulphuric acid solution, K,Cr 2 7 +4H 2 S0 4 = K 2 S0 4 +Cr 2 (S0 4) 3 +4H 2 +30. On the addition of concentrated sulphuric acid to a cold_ saturated solution of the salt, red crystals of chromium trioxide, Cr0 3 , separate (see Chromium), whilst when warmed with concentrated hydrochloric acid and a little water, potassium chlorochromate is produced. When heated with phosphorus trichloride in a sealed tube to i6o° C, potassium chlorochromate, phosphorus oxychloride, potassium chloride, and a complex chromium oxide (possibly Cr 3 O e) are produced (A. Michaelis, Jour. prak. Chem., 1871, ii. 4, p. 452). Potassium bichromate finds application in photography, in calico- printing, and in the preparation of bichromate cells. _ Sodium bichromate, Na 2 Cr 2 7 -2H 2 0, may be obtained by the addition of the requisite quantity of chromium trioxide to a solution of sodium chromate. It crystallizes in hyacinth-red prisms, which are very hygroscopic and melt at 320

C.

Trichromates. — The trichromates are obtained by the addition of nitric acid (of specific gravity about 1-2) to solutions of the bi-chromates. They form rhombic crystals of a red or brown red colour and are readily decomposed by warm water, with formation of the bichromate.

Perchromic Acid. — By the addition of hydrogen peroxide to a solution of chromic acid, a fine blue coloration due to a perchromic acid is produced which is readily absorbed by shaking out with ether. The following formulae have been assigned to the com- pound: — H 2 2 -Cr0 3 (H. Moissan, Comptes rendus, 1883, 97, p. 96); H 2 2 -2HCr0 4 (M. Berthelot, Comptes rendus, 1889, 108, p. 25); Cr 2 7 -xH 2 (L. C. A. Barreswil, Ann. chim. et phys.. 1847 [3], 20, p. 364), and CrO fl 3H 2 _(T. Fairley, Chem. News, 1876, 33, p. 237). The more recent investigations of H. G. Byers and E. E. Reed (Amer. Chem. Jour., 1904, 32, p. 503) show that if metallic potassium be added to an ethereal solution of the blue compound at — 20 C, hydrogen is liberated and a purple black precipitate of the per chromate, of composition KCr0 4 or K 2 Ci 2 G$, is produced; this com- pound is very unstable, and readily decomposes into oxygen and potassium bichromate. Similar sodium, ammonium, lithium, magnesium, calcium, barium and zinc salts have been obtained. It is shown that the blue solution most probably contains the acid of composition, H 2 Cr 2 0s, whilst in the presence of an excess of hydro- gen peroxide more highly oxidized products probably exist.

BICKER (connected by Skeat with bike, to thrust or strike), an Old English word (traced from the 13 th century) implying conflict or disputation. A poetical use, from the noise, is seen in Tennyson's Brook, " to bicker down the valley."

BICKERSTAFFE, ISAAC (c. 1735-0. 1812), English dramatist, was born in Ireland about 1735. At the age of eleven he was appointed a page to Lord Chesterfield, then lord lieutenant of Ireland, and subsequently held a commission in the Marines, but was dismissed the service under discreditable circumstances. He was the author of a large number of plays and burlesque farces interspersed with songs, produced between 1760 and 1771. The best-known are Maid of the Mill (founded on Richardson's Pamela), The Padlock, He Would if he Could, Love in a Village, The Hypocrite and The Captive. In 1772 Bickerstaffe, suspected of a capital offence, fled to the continent. The exact date of his death is unknown, but he is stated to have been still living in abject misery in 1812.

A full account of his dramatic productions is given in Biographia Dramatica, edited by Stephen Jones (1812).

BICKERSTETH, EDWARD (1786-1850), English evangelical divine, brother of Henry, Baron Langdale, master of the rolls (1836-1851), and uncle of Robert Bickersteth, bishop of Ripon (1857-1884), was born at Kirkby Lonsdale, and practised as a solicitor at Norwich from 1812 to 1815. In 1816 he took orders, and was made one of the secretaries of the Church Missionary Society. On receiving the living of Watton, Hertfordshire, in 1830, he resigned his secretaryship, but continued to lecture and preach, both for the Church Missionary Society and the Society for the Conversion of the Jews. His works include A Scripture

Help (London, 1816), which has been translated into many European languages, and Christian Psalmody (London, 1833), a collection of over 700 hymns, which forms the basis of the Hymnal Companion (London, 1870), compiled by his son, E. H. Bickersteth, bishop of Exeter (1885-1890). He was active in promoting the Evangelical Alliance of 1845, strongly opposed the Tractarian Movement, and was one of the founders of the Irish Church Missions, and Parker, Societies.

Edward Bickersteth (1814-1892), dean of Lichfield, was his nephew, and Edward Bickersteth (1850-1897), bishop of South Tokyo, his grandson.

BICYCLE (from prefix bi= twice, and Gr. kvk\os, a circle, wheel). The modern bicycle, as developed from the old veloci- pede (see Cycling), consists essentially of two wheels placed one behind the other and mounted on a frame which carries a saddle for the rider. Between the wheels is a crank-axle which the rider drives by means of the cranks and pedals, and its motion is transmitted to the rear or driving wheel either by a chain which passes over two chain wheels, one fixed on the crank-axle and the other on the hub of the rear wheel, or, in the chainless bicycle, by a tubular shaft and two pairs of bevel- wheels. The rear wheel is usually so arranged that it can turn, when the bicycle is running by its own momentum, inde- pendently of the chain and pedals (" free-wheel "), and a variable speed gear is often provided so that the rider may at will alter the ratio between the rate of revolution of the crank-axle and the driving wheel. The front, or steering wheel, is mounted in a fork having its two upper ends brazed into the "crown," to which also the lower end of the steering tube is brazed. The steering tube is mounted by ball bearings in the socket tube, which forms the forward portion of the

rear-frame.

The highest quality of materials and the most accurate workmanship are required to produce a first-class bicycle. Steel of 75 to 100 tons per sq. in. tensile strength is used in chains, spokes, &c. In balls and ball-races, hardness without brittleness, and homogeneity are of primary importance. Broken balls, or even traces of wear in bearings, are now seldom heard of in a first-class bicycle. The process of case-hardening, whereby an extremely hard outer skin is combined with a tough interior, has been brought to a high degree of perfection, and is applied to many parts of the bicycle, particularly chains, free-wheels and toothed- wheel variable speed gears. Interchangeability of parts is secured by working to the smallest possible limits of error of workmanship.

Frames. — Fig. 1 represents a road-racer. A full roadster would have the handles a little higher relatively to the saddle, and would be provided with mud-guards, free-wheel and sometimes a gear-case

d f

Fig. 1.

and variable speed gear. Fig. 2 shows a lady's bicycle with gear- case and dress-guard. The rear frame of the " diamond " type(fig. 1) is subjected to very small stresses due to vertical load. The front fork and steering post are subject to bending moment due to the reaction from the ground in the direction deb. A slight amount of elasticity in the front fork adds considerably to the comfort in riding over rough roads. When the brake is applied lightly to the front wheel, the reaction from the ground falls more closely along the axis of the front fork, and the bending moment at the crown is diminished. If the front brake is applied harder the reaction from the ground at d may pass through the crown, in which case the bending moment at the crown is zero. Still harder application of the brake causes a bending moment in the' opposite direction. In fig. I the axes of the top and bottom tubes of the rear frame are produced to meet at a.

If the reaction from the ground is in the direction da, the top and bottom tubes are subjected to pure compressive and tensile stresses respectively. When no brake pressure is applied a bending moment due to the overhang ab is superimposed on these tubes. Thus a short

socket head with top tube sloping downwards towards the head gives a stronger frame than a horizontal top tube. The steering axis ef is arranged so as to cut the ground at /, a little in front of the point of contact d of the wheel with the ground, giving a slight castor action, and making steering possible without use of the handle-bar. The rake of the steering head (that is the angle between ef and bd) and the set of the fork (that is the displace- ment of the wheel centre c from the axis ef) may be varied within tolerably large limits without much affecting the easy steering properties of the bicycle. The transverse stresses on the rear frame due to the action of pedalling are more severe than those due to the

Fig. 2.

vertical load. The pedal pressure is applied at a considerable dis- tance from the central plane of the bicycle, and the pedal pin, cranks and crank-axle are subjected to a bending moment which is transmitted by the ball bearings to the frame. The down- tube from the seat lug to the crank-bracket and the bottom tube from the foot of the steering socket tube to the crank- bracket are made fairly stout to resist this bending moment. Further, the pull of the chain causes a transverse bending moment in the plane of the chain-stays, which must be stiff enough under heavy pedal pressure.

The tubular portions of the frame are made of weldless cold- drawn steel tube. The junctions or lugs are usually of malleable cast iron, bored to fit the outside of the tube, the final union being effected by brazing. In very light bicycles the tubes are kept thin, 22 or 24 W.G. (-028 in. or -022 in. thickness) at the middle, and are strengthened at the ends by internal liners. Or butt-ended tubes are employed, the tubes being drawn thicker at the ends than in the middle. The steering post and fork sides especially should be thus strengthened at their junction with the crown. Some of the best makers use sheet steel stampings instead of cast lugs, greater lightness and strength being secured, and in some cases the sheet steel lugs are inside the tubes, so that the joints are all flush on the outside. The front fork blades are best made of sheet steel stamped to shape and with the edges brazed together to form a hollow tube. The sheet steel that can be thus employed has a much higher elastic limit than a weldless steel tube.

Bearings. — Ball bearings are universally used. Each row of balls runs between two ball-races of hardened steel, one on the stationary member, the other on the rotating member. The outer is called the " cup," and the inner the " cone." One of the four ball-races is

Fig. 3.

adjustable axially so that the bearing may run without any shake. The ball-races are often made of separate pieces of steel, but the crank-axle usually has the cones formed integral with it, the necessary hardness being obtained by case-hardening. According as the two cups face outwards or inwards the bearing is said to have outward or inward cups, and according as the adjustable ball race is the cone or cup, the bearing is said to be cone-adjusting or cup-

adjusting. Fig. 3 shows a ball-bearing hub with outward cups. The hub-shell H is turned out of mild steel, and the cups C are forced into the ends of the hub-shell and soldered thereto. A thin washer W is then spun into the end, for the purpose of retaining oil, and a thin internal tube T unites the two cups, and guides the oil fed in at the middle of the hub to the balls. The projecting flanges S are for the attachment of the tangent spokes used to build the hub into the wheel. The spindle A has the two cones screwed on it, one Q against a shoulder, the other C 2 adjustable. The spindle ends are passed through the back-fork ends and are there adjusted in position by the chain-tension adjusters. After adjustment the nuts N clamp the spindle securely between the fork-ends. The chain-wheel or free-wheel clutch is screwed on the end of the hub- shell, with a right-hand thread. The chain being at the right-hand side of the bicycle (as the rider is seated) the driving pull of the chain tends to screw the chain-wheel tight against the shoulder. A locking-ring R with a left-hand thread, screwed tight against the chain-wheel, prevents the latter from being unscrewed by back- pedalling. With a free-wheel clutch screwed on the hub, the locking- ring may be omitted.

Fig. 4 shows one end of the cup-adjusting hub, with inward bearings. The cones are formed of one piece with the spindles, and the adjusting cup C is screwed in the end of the hub shell, and locked in position by the screwed locking-ring R. The figure also illustrates a divided spindle for facilitating the removal of the tire for repair when required without disturbing the wheel, bearings, chain or gear-

Fig. 4.

case. The chain side of the hub-spindle, not shown in the figure, is secured to the frame in the usual way ; on the left side the spindle S projects very little beyond the adjusting cup. A distance washer W is placed between the end of the spindle S and the fork-end F. A detachable screw-pin, or the footstep, P, passes through the chain-adjusting draw-bolt B, the fork-end F, and the distance washer W,

and is screwed into the end of the spindle S, the hexagon head of the detachable pin drawing all the parts securely together. On unscrewing the detachable pin, the distance washer W drops out of place, leaving a clear space for removing the tire without disturbing any other part.

The inward-cups bearing retains more oil than the other form. The pressure on a ball being norma! to the surface of contact with the ball race, and each ball touching two ball races, the two points of contact must be in line with the centre of the ball. All the lines of pressure on the balls of a row meet at a point / on the axis of the spindle. The distance between the two points / (fig. 5) may be called the virtual length of the bearing. Other things being equal, the outward-cups bearing has a greater virtual length than the inward-cups bearing. In hubs and pedals where the actual distance between the two rows of balls is sufficient, this point is of little im- portance. At the crank-axle bearing, however, where the pedal pressure which produces pressure on the axle bearings is applied at a considerable overhang beyond the ball-races, the greater virtual length of the outward-cups is an advantage.

Fig. 5 shows diagrammatically the usual form of crank-axle bearing which has in- ward-cups and is cup- f\ adjusting. The end of the bracket is split and the cup after adjust- ment is clamped in position by the clamp- ing screw S. The usual mode of fastening the cranks to the axle is by round cotters C with a flat surface at a slight angle to the axis, thus forming a wedge, which is driven in tight. The small end of the cotter projects through the crank, and is screwed and held in place by a nut. The chain-wheel at the crank-axle is usually detachably fastened to the right-hand crank.*

Fig. 6.

The Rudge-Whitworth crank-bracket has outward cups and is cup-adjusting. The cranks are cotterless. Fig. 6 is a sectional view. The left crank and axle are forged in one piece. The fastening of

the right crank and chain- wheel is by multiple grooves and teeth, this fastening being better mechanically than the cotter type.

Pedals. — The pedal consists of a pedal body, on which the foot of the rider rests, mounted by ball-bearings on a pedal-pin, which is

secured to the end of the crank and turns with it. The pedal body is made in many forms, but usually the bearing-cups are contained in a tube from the ends of which project plates, carrying rubber blocks, or serrated plates (rat-trap pedals), on which the foot of the rider rests. Cone adjustment is most used. The fasten- ing of the pedal pin to the crank is best effected by screwing it up against a shoulder, the right and left crank eyes being tapped with right and left hand screws respectively. With this arrangement, if the pedal pin screw is a slack fit in the crank eye, the pressure on the pedal tends to screw it up against the shoulder.

Wheels. — Bicycle and tricycle wheels are made on the " sus- pension " principle, the spokes being of high-tenacity steel wire, screwed up to a certain initial tension, thus putting a circumferential compression on the rim. In the " artillery " wheel, the wooden spokes are in compression, and the rim is under tension. The rims, which are made to a section suitable for pneumatic tires (see Tire), may be of sheet steel or aluminium alloy rolled to the required section, either without joint or jointed by brazing or riveting. Wood rims are used on racing bicycles, but in England are not popular for roadster bicycles. Holes are drilled at or near the central plane of the rim for the spoke nipples, which have shoulders resting on the outer surface of the rim and shanks projecting through the rim towards the hub. The spoke ends are screwed to fit the nipples. The shank of the nipple has a square cut on its outside surface by which it can be screwed up. The spoke flanges on the hub are placed far apart arid the spread of the spokes gives the wheel lateral stability. Tangential rigidity under driving and braking is obtained by fastening the spokes to the hub tangentially (figs. I and 2). The hub fastening of the spoke is simply obtained by form- ing a hook and head on the spoke end, and passing it through a hole in the hub flange. The best spokes are butted at the ends, i.e. made of larger diameter than at the middle, to allow for screwing at one end arfd the hook bend at the other.

Chains. — There are two widely used types of chains. The " block " chain (fig. 7) consists of a series of central blocks connected

Fig. 7.

by side plates. The " roller " chain (fig. 8) consists of a series of outside and inside links. The outside link A is made up of two steel side plates P united by two shouldered rivets R. The inside link B consists of two side plates P united by two tubular pieces T, which form bushes for the rivets R and pivots for the rollers L. The rivets, bushes and rollers are case-hardened. Roller chains for cycles are

made in two pitches, J in. and f in., and in widths from J in. to } in. between the side plates of the inside links. The weight of 4 ft. length (96 links) of a J in. pitch J in. wide roller chain is about I2j oz., and its break- ing load is about 2000 lb. In a block chain the ends of the blocks engage with the foui~ \ta inrw-\B t ee th of the chain-wheels, and the same W Kjjg) Bl (6))) Pm |) surfaces continually coming into contact, the wear may become excessive, especially when exposed to mud and grit. In the roller chain the outer surfaces of the rollers engage with the teeth of the chain-wheels, and during the engagement and disengage- ment may roll slightly on the tubular rivets. The surface of contact of the roller and tubular rivet is not directly exposed to the dust and grit from the road. The rollers therefore serve the double purpose of (1) transferring the relative motion of the parts to a pair of surfaces under better conditions as regards lubrication, and (2) presenting a new part of the outside surface of the roller for the next engagement with the chain-wheel. The durability of roller

Fig. 8.

chains is thus much greater than that of block chains, under the usual conditions of cycling.

Chain-wheels. — The pitch line of the chain-wheel is polygonal (fig. 9), a, b, c, d being centres of adjacent joints of the chain when lying in contact with the wheel. The path of the joint a of the chain, relative to the chain-wheel as it enters on to and leaves the chain-wheel, is evi- dently the curve 03 aˆ

Owing to the polygonal pitch surfaces of the chain-wheels a chain does not transmit motion with con- stant speed-ratio of the shafts. The variation of speed-ratio in a chain with links of equal pitch is ap- proximately inversely proportional to the square of the number of Fig. 10.

teeth in the smaller chain-wheel, as

shown in the table annexed, in which the percentage variation is-
maximum speed-ratio -minimum speed-ratio „ average speed-ratio

Fig. 9.

- X 100.

Number of teeth on hub chain-wheel

10

12

14

16

18

20

24

28

Percentage variation

5-i

3-5

27

2-1

1-6

i-3

0-9

07

The rollers as they come in contact with the chain-wheel strike it with a speed proportional to the angular speed of the chain-wheel and to the pitch of the chain, causing a certain amount of noise.

Chain Adjustment. — To keep the chain running at correct tension, it is necessary to have some adjustment of the distance between the crank-axle and hub. This is obtained either by an eccentric adjustment at the crank-bracket, an eccentric adjustment at the hub-spindle or by draw-bolts at the fork-ends, the last method being most common.

Gear-case. — The modern roller chain by makers of repute is so durable that the necessity for a gear-case is not so great as when

chains were of inferior quality. But if the bicycle is to require the minimum amount of care and attention a gear-case should be fitted. The Sunbeam gear-case is built into the frame and is oil-retaining, and the chain, chain-wheels, free-wheel and two-speed gear are continually lubricated by an oil-bath. A detachable gear-case is not usually oil-retaining, but serves to exclude grit and mud from the chain.

Gear and Crank-length. — The " gear " of a bicycle is given by the formula Dni/n 2 where D is the diameter of the driving wheel in inches, ni and n 2 the numbers of teeth on the crank-axle and hub chain-wheels respectively. At each revolution of the crank-axle, the bicycle is moved forward a distance equal to the circumference of the circle of diameter equal to the gear. Thus with a 28 in. diameter driving-wheel, 18 teeth on the hub chain-wheel, 45 teeth on the crank-axle chain-wheel, the bicycle is geared to 70 in. The usual crank-length is 6| to 7 in. Cranks of 7J, 8 and 9 in. length can be had, but require a bicycle frame of special design. The gear should be roughly proportional to the crank-length. The gear 10 times the crank-length is a good proportion for an average rider.

Free-wheels. — A free-wheel clutch transmits the drive in one direction only, allowing the pedals to remain at rest at the will of the rider, while the bicycle runs on. With a free-wheel, chain breakages are reduced or nearly eliminated, as should the chain get accidentally caught the free-wheel comes into play. There are three principal types of free-wheel clutches — roller, ratchet and friction cone. The roller type was the earliest in use, but has fallen into disfavour. A sectional view of a ball-bearing ratchet free-wheel, with outer cover removed, is shown in fig. 11. The ring on which the three pawls and springs are carried is screwed on the end of the hub; the chain-wheel is combined with an inner ratchet wheel and is mounted by two rows of ball bearings on the pawl ring. The friction cone type of free-wheel clutch is usually combined with a brake

inside the hub, the whole combination being termed a coaster hub. Fig. 12 shows a sectional view of the Eadie two-speed coaster, in which the free-wheel clutch and brake are combined with a two-speed gear. The free-wheel clutch action is as follows: A forward pres- sure of the pedals turns the externally threaded driving cone H in the in- ternally threaded cone F, the latter being thus forced to the

right into engagement with the cup J which is screwed to the hub-shell, thus forming a friction driving clutch. The pedals being held stationary the driving cone H is stationary, and the hub running on the ball bearings G, the cone F travels towards the left until released from the cup J, when it also remains at rest. In this type of free-wheel clutch it is essential that there be little or no friction between the screwed surfaces of H and F, else on beginning to pedal, the cone F may remain stationary relative to the driving cone H, and no engagement between F and J may take place. If F be prevented from turning faster than the hub-shell, as is sometimes done by a light spring between the two, the engagement of the friction clutch must take place as soon as

Fig. ii.

Fig. 12. — Eadie Two-speed_Coaster Hub.

the pedals tend to move faster than the speed corresponding to that of the hub-shell.

Brakes of many types are used, differing in the place and mode of application. The tire brake has fallen into disuse, rim brakes and internal hub brakes being usual. The retarding force that can be applied by a brake is limited by the possibility of skidding the wheel. In riding at uniform speed, without acceleration, the greater part of the load is on the rear-wheel; but as soon as the brake is applied to cause retardation the wheel load distribution is altered, more load being thrown on the front wheel. Thus the most power- ful brake is one applied to the front wheel. On the other hand, a front-wheel brake often sets up an unpleasant vibration of the front fork. On a greasy road too powerful pressure on the front- wheel brake may cause a side-slip with no chance of recovery; while with the back-wheel brake recovery is possible. The Bowden system of transmission, which is largely used for cycle brake work, consists of a steel stranded cable inside a flexible tube formed by a closely wound spiral of steel wire, the cable being practically in- extensible and the spiral tube practically incompressible ; if the ends of the latter be fastened it forms a guide tube for the cable, any movement given to one end of the cable being transmitted to the other end. The spiral tube may be led round any corners, but the frictional resistance of the cable inside the spiral tube increases with the total angle of curvature of the guide tube; the laws of friction of a rope passing over a drum apply. In fitting the Bowden system the total curvature should therefore be kept as small as possible. With a back-pedalling rim brake the cycle cannot be wheeled back- wards unless a

special device is used to throw the operating clutch out of action. A back-pedalling brake is most conveniently applied inside the hub, as in the coaster hub. In the Eadie two-speed coaster (fig. 12) the braking action is obtained by the expansion of the steel band I against a phosphor bronze ring L carried by the rotating hub-shell. The steel band I is mounted on a disk with a projecting arm, the end of which is clipped to the frame tube. The expansion of the steel band is effected by the movement of the lever K fixed to the cone E. On moving the pedals backward the screw drive-ring H forces the cone nut F with which it engages to theleft into contact with the cone E. v The backward movement of the

pedals being continued sets up the required movement of the lever K, and applies the brake.

Variable Speed Gears. — The effort required to propel a bicycle varies greatly, according to the conditions of road surface, gradient up or down hill, wind against or behind. To meet these variable conditions, a variable speed-gear is an advantage. The action of the human motor is, however, so entirely different from that of a mechanical motor that it is easy, without practical experience, to over-estimate the value of a variable speed gear. Probably from 50 in. to 80 in. represents the greatest useful range of gear for an average rider. With a gear lower than 50 in., the speed of climbing a steep gradient is so slow that balancing difficulties begin, and it is better to walk up. With 80 in. gear and 7 in. cranks, the speed of pedalling, even at 25 miles an hour, is not irksome, provided the conditions are favourable. For those who have not cultivated the art of quick pedalling the useful range of gear under favourable conditions may be extended to say 90 in. or 100 in. The gear-ratio of a two-speed gear is the ratio of the high to the low gear. The most suitable gear-ratio for any rider will depend upon his personal physique and the nature of the country in which he rides. For a middle-aged rider of average physique a gear- ratio of 125: 100 is suit- able, for those of weaker physique the gear-ratio may with advantage be greater, say 137-5: 100; while for road racing it may be smaller, say 117 : 100. With a three-speed gear the low and high gears should be chosen respectively below and above the single gear which suits the rider, the middle gear being about the same as the rider's usual single gear.

All the variable speed gears at present made consist of toothed wheel Fig. 13. — Sunbeam Two-Speed Gear. mechanism either at the

hub or crank-bracket, and nearly all are based on the same epicyclic

train of toothed wheels. At one speed there is no relative motion of the toothed wheels, the whole mechanism revolving as one solid piece; this is called the " normal " speed. At the other speed one part of the mechanism is held stationary and the driven part revolves faster or slower than the driver, according as the gearing is up or down. In some two-speed gears the normal is the high speed, in others the low. In expressing the gear-ratio, the normal speed will be denoted by 100. At the normal gear there is of course no additional friction. The type of two-speed gear used practically settles whether the normal gear is at high or low speed; but it seems best, other things being equal, to have the low speed the normal gear, as then the conditions are worst. If the high speed is at normal gear, then at low speed the chain gears up and the two-speed gear gears down; which is, to say the least, a roundabout transmission.

Fig. 13 is a sectional view of the Sunbeam two-speed gear which is arranged at the crank-axle, and clearly shows the relative disposition of the toothed wheel mechanism common to nearly all cycle speed gears. The chain-wheel is fixed to the annular wheel A; the planet carrier C is fixed to the crank; and when the sun- wheel D is held stationary, the chain-wheel is driven faster than the cranks. When the sun-wheel D is released, the planet carrier C drives the annular wheel A by the ratchet free-wheel clutch; the part thus revolves as a solid piece, ˆ and gives the normal or low speed. The gear- ratio is 133-3 : I3 °-

Fig. 14 is a sectional view of the " Hub " two- speed gear, the chain-wheel or free-wheel clutch being omitted. In this the annular wheel is the driver, and the planet carrier is part of the hub-shell. When the central pinion is held stationary the hub is driven at a less speed than the chain-wheel ; the gear-ratio is 100 : 76-2.

In the Fagan two-speed gear, shown combined with the Eadie coaster hub in fig. 12, the sun-wheel B can be moved laterally by the striking gear, so as to engage with the chain-wheel centre C, giving normal gear, or with an internally toothed wheel A fixed to the spindle. The chain-wheel centre C carries the annular wheel, and the four planet pinions D are mounted on the driving cone H. Thus the gear gives a reduction of speed, the gear-ratio being '100 : 75-

The Sturmey- Archer three-speed hub (fig. 15) has gear-ratios 125 :

100 : 80. In the high gear position the epicyclic toothed wheels are to the extreme left position. The chain-wheel is mounted by a free-wheel on a drive-ring, with which the ends of the spindles of the planet wheels engage at high gear. The sun-wheel, not shown in the figure, is held stationary, and the annular wheel engages with a ring screwed to the hub-shell, by means of keys engaging in notches. The hub is thus driven at a higher speed than the chain- wheel. For normal gear, the striking gear draws the internal mechanism of the hub towards a central position, compressing a spring, disengaging the sun-wheel and locking the drive-ring hub and annular wheel together. At low gear, the internal mechanism

Fig. 15.

is drawn to the right-hand side, where the planet carrier engages with the end plate of the hub by means of claw-clutches. The annular wheel is still engaged with the drive-ring, and the sun-wheel is again locked to the spindle. The hub is thus driven at a lower speed.

Tandem Bicycles. — The weight of a roadster tandem is about the same as, or a trifle less than, that of two single roadster bicycles, but the frictional resistance of the mechanism, the rolling resistance of the tires, and the air resistance at a given speed are much less than twice the values for a single bicycle. Consequently, much higher speeds are attained on the level, and free-wheeling down hill is much faster. On the other hand for riding up hill on a moderate gradient, the effort required is about the same as on a single, while on very steep gradients the tandem is at a slight disadvantage. For the full enjoyment of tandem riding, therefore, a two-speed gear is a necessity, while a three-speed gear is better. In the Raleigh tandem (fig. 16) the frame design is such that it can be ridden, by two ladies, and the strength and rigidity is sufficient for two heavy- weight riders. The steering and control of the brakes is done by the front rider. Connected steering is employed in some tandems, allowing the rear rider to steer if necessary. For two expert tandem riders, connected steering is slightly more pleasurable than fixed handle grips for the rear rider, but on the other hand, divided control may lead to disaster at a critical moment. Most passengers on a tandem with connected steering unconsciously give the steering

Fig. 16.

a bias in one direction or the other, putting a nervous strain on the steersman which becomes almost intolerable towards the end of a long ride.

Motor Bicycles. — Fig. 17 shows a touring motor bicycle, fitted with luggage carrier and stand, the latter for supporting the bicycle while at rest. The average speed of a motor bicycle being much greater than that of a pedal bicycle the stresses on the frame due to moving over rough roads are greater. This necessitates greater strength and weight in all parts — frame, wheels and tires. To take this increased weight up steep gradients requires increased engine power. The weight of a touring motor bicycle may be from 150 to 200 lb. The drive is usually by a V belt of leather, or of canvas and rubber, the angle of the V being 28°. The engine speed at maxi- mum power is from 1500 to 2000 revolutions a minute, and the belt gears down in a ratio varying between J and j according to the cylinder capacity of the engine. The possibility of the belt slipping slightly is conducive to smoothness of drive; chain-driving, except in combination with a slipping clutch, is too harsh. The principal defect of the belt drive is that the belt stretches, and on coming to a steep hill may have to be tightened before the bicycle can be driven up. The control of the speed and power of the engine is effected by the throttle, extra air valve and spark advance, the

levers for which are all placed within convenient reach of the driver. As the engine is almost invariably air-cooled, the skilful manipulation of these three levers is essential for satisfactory results. On a good level road when the engine may be working at a small fraction of its maximum power, the proportion of air. mixed with the petrol vapour from the carburettor may be great, giving a " weak " mixture, yet one rich enough to be ignited in the cylinder. The throttle valve may be fully open and the spark advanced for high speed; the throttle partially closed and spark retarded for slow speed. Under these conditions the engine will run for an indefinite period without overheating. Up a steep gradient, the mixture may have to be made " richer " by partial closing of the extra air opening, and as more heat is evolved, the Cylinder walls may become over- heated, unless the engine power is sufficient to keep the bicycle moving through the air at a good speed. As the engine cannot run steadily at low speed, pedalling is resorted to for starting and for riding slowly through traffic. For this purpose, an " exhaust valve lifter " is usually fitted, by means of which the exhaust can be kept

Fig. 17.

permanently open, in order to relieve the resistance to pedalling which the compression stroke would otherwise offer.

The nominal rating of the horse-power of a motor cycle engine is

rather vague and indefinite. A 3-H.P. engine may have a cylinder of 76-80 mm. diameter and 76-80 mm. stroke. Twin-cylinder engines, with one crank, are largely used, and some excellent 4-cylinder motor bicycles are made with bevel gear transmission. The chief advantage of the multicylinder engine is the smoother drive obtained.

A " trailer " with two wheels for carrying a passenger can be attached to a motor bicycle, but the element of risk is increased. A side-car, with one additional wheel, forms a safer passenger carrier. (A. Sp.)

BIDA, a town and administrative district in the British protectorate of Northern Nigeria. Bida town, situated in 9° 5′ N, 6° E., 25 m. N. by E. of Muraji on the Niger, is the capital of the province of Nupe. It was founded in 1859 when Fula rule was established in Nupe, is walled and of considerable size. In 1909 it was connected by railway with Baro, 40 m. S.S.E., the river terminus of the Northern Nigeria railway. The inhabitants, mostly Hausa, carry on an extensive trade and are especially noted for their embossed brass and copper work. The Bida goblets, in which brass and copper are beautifully blended, are of extremely elegant design. The town also boasts a glass factory. The preparation of indigo and the dyeing of cloths are other flourishing industries. The streets are planted with huge shade-trees, so that as Bida is approached it looks like a forest.

In 1897 there was a two-days' fight outside the walls of Bida between the forces of the emir of Nupe and those of the Royal Niger Company, ending in the defeat of the Fula army (mostly cavalry). The victory was not followed at the time by a British occupation, and the defeated king returned after the withdrawal of the company's troops and re-established himself upon the throne. In 1900 he allied himself with other hostile chiefs and adopted an openly antagonistic attitude to the British govern- ment. In 1901 it became necessary for British troops to march on Bida. The emir fled, without fighting, to Kano. Another emir was appointed in his place, and the province of Nupe was placed under British administrative control. Since that date the town has been peaceful and very prosperous. A mission school has been established, and is attended by the sons of the emir and of the principal chiefs, who are desirous of learning to read and write English. The administrative district of Bida includes the town and is the western division of the province of Nupe (q.v.). (See also Nigeria: History.)

BIDDEFORD, a city of York county, Maine, U.S.A., on the Saco river, opposite Saco, and on the Atlantic Ocean, 15 m. S.W. of Portland. Pop. (1890) 14,443; i 1 ® 00) l6 , I 4S, of whom 7,149 were foreign-born (mostly French Canadians); (census, 1910J 17,079. Biddeford is served by the Boston & Maine railway, and is connected by electric lines with Portland and with Old Orchard Beach, a popular summer resort north of the Saco river. The climate and the scenery in and about Biddeford attract summer visitors and there are two resorts, Biddeford Pool and Fortune Rocks within the municipal limits; but the city is chiefly a manufacturing centre (third in rank among the cities of the state in 1905) — good water-power being furnished by the river — and cotton goods, foundry and machine shop products and lumber are the principal products, the first being by far the most important. The value of the factory products increased from $5,472,254 in 1900 to $6,948,722 in 1905, or 27 %. There are large quarries of granite of excellent quality. A permanent settlement was established on both sides of the river about 1630 under the leadership of Richard Vines (1585-1651) and was named Saco. In 17 18 the present name was adopted. In 1762 that portion of Biddeford which lay east of the river was incorporated as the town of Pepperellborough, for which name Saco was substituted in 1805. Biddeford was incorporated as a city in 1855.

BIDDER, GEORGE PARKER (1806-1878), English engineer, was born at Moreton Hampstead, in Devonshire, on the 14th of June 1806. From a very early age he manifested an extraordi- nary natural aptitude for calculation, which induced his father, who was a stone-mason, to exhibit him as a " calculating boy." In this way his talent was turned to profitable account, but his general education was in danger of being completely neglected. Interest, however, was taken in him by some of those who hap- pened to witness his performances, among them being Sir John Herschel, and it was arranged that he should be sent to school in Camberwell. There he did not remain, long, being removed by his father, who wished to exhibit him again, but he was saved from this misfortune and enabled to attend classes at Edinburgh University, largely through the kindness of Sir Henry Jardine, to whom he subsequently showed his gratitude by founding a " Jardine Bursary " at the university. On leaving college in 1824 he received a post in the ordnance survey, but gradually drifted into engineering work. In 1834 Robert Stephenson, whose acquaintance he had made in Edinburgh, offered him an appoint- ment on the London & Birmingham railway, and in

the succeeding year or two he began to assist George Stephenson in his parlia- mentary work, which at that time included schemes for railways between London and Brighton and between Manchester and Rugby via the Potteries. In this way he was introduced to engineering and parliamentary practice at a period of great activity which saw the establishment of the main features and principles that have since governed English railway construction. He is said to have been the best witness that ever entered a committee-room. He was quick to discover and take advantage of the weak points in an opponent's case, and his powers of men- tal calculation frequently stood him in good stead, as when, for example, an apparently casual glance at the plans of a railway enabled him to point out errors in the engineering data that were sufficient to secure rejection of the scheme to which he was opposed. In consequence there was scarcely an engineering proposal of any importance brought before parliament in con- nexion with which his services were not secured by one party or the other.

On the constructive side of his profession he was also busily occupied. In 1837 he was engaged with R. Stephenson in building the Blackwall railway, and it was be who designed the peculiar method of disconnecting a carriage at each station while the rest of the train went on without stopping, which was employed in the early days of that line when it was worked by means of a cable. Another series of railways with which he had much to do were those in the eastern counties which afterwards became the Great Eastern system. He also advised on the construction of the Belgian railways; with R.

Stephenson he made the first railway in Norway, from Christiania to Eidsvold; he was engineer-in-chief of the Danish railways; and he was largely concerned with railways in India, where he strongly and successfully opposed break of gauge on through- routes. But though he sometimes spoke of himself as a mere "railway-engineer," he was in reality very much more; there was indeed no branch of engineering in which he did not take an interest, as was shown by the assiduity with which for half a century he attended the weekly meetings of the Institution of Civil Engineers, of which he was elected president in i860. He was one of the first to recognize the value of the electric telegraph. That invention was in its infancy when, in 1837, jointly with R. Stephenson he recommended its introduction on a portion of the London & Birmingham and on the Blackwall lines, while three years later he advised that it should be adopted to facilitate the working of the single line between Norwich and Yarmouth. He was also one of the founders of the Electric Telegraph Com- pany, which enabled the public generally to enjoy the benefits of telegraphic communication. In hydraulic engineering, he was the designer of the

Victoria Docks (London), being responsible not only for their construction, but also for what was regarded by some people at the time as the foolish idea of utilizing the Essex marshes for dock accommodation on a large scale. His advice was frequently sought by the government on points both of naval and military engineering. He died at Dartmouth on the 28th of September 1878.

His son, George Parker Bidder, Junr. (1836-1896), who inherited much of his father's calculating power, was a suc- cessful parliamentary counsel and an authority on crypto- graphy.

BIDDERY, or Bidri (an Indian word, from Bedar or Bidar, a town in the Nizam's Dominions), an alloy of copper, lead, tin and zinc used in making various articles and ornaments which are inlaid with gold and silver.

BIDDING-PRAYER (O. Eng. biddan, to pray, cf. Ger. beten), the formula of prayer or exhortation to prayer said in England before the sermon in cathedrals, at university sermons, in the Inne of Court and elsewhere on special occasions. Such formulae are found in the ancient Greek liturgies, e.g. that of St Chrysostom, in the Gallican liturgy, and in the pre-Reformation liturgies of England. The form varies, but in all the character- istic feature is that the minister tells the people what to pray for. Thus in England in the 16th century it took the form of a direction to the people what to remember in " bidding their beads." In course of time the word " bid " in the sense of " pray " became obsolete and was confused with " bid " in the sense of " command " (from O. Eng. beodan, to offer, present, and hence to announce, or command; cf. Ger. bielen, to offer, gebieten, to command), and the bidding-prayer has come practically to mean the exhortation itself. A form of exhortation which " preachers and ministers shall move the people to join with them in prayer " is given in the 55th canon of the Church of England (1603).

BIDDLE, JOHN (1615-1662), frequently called the father of English Unitarianism, was born on the 14th of January 1615, at Wotton-under-Edge, in Gloucestershire. He was educated at the grammar school of his native town and at Magdalen Hall, Oxford. He graduated B.A. in 1638 and proceeded M.A. in 1 64 1, and was then appointed to the mastership of the free school in the city of Gloucester, where " he was much esteemed for his diligence in his profession, serenity of manners and sanctity of life." He also diligently prosecuted theological studies, and the results he arrived at were of such a nature as to draw down upon him the reprobation of the civic authorities. A treacherous friend obtained the manuscript of

his Twelve Arguments drawn out of Scripture, wherein the commonly received opinion touching the deity of the Holy Spirit is clearly and fully refuted; and in December 1645 he was summoned before the parliamentary committee then sitting at Gloucester. By them he was com- mitted to prison, though he was at the time labouring under a dangerous fever. He was released on bail after a short imprison- ment, but was in July 1647 called before parliament, which

*desired to inquire into his views. After tedious proceedings, during which Sir Henry Vane befriended him, Biddle was com- mitted to custody and his Twelve Arguments, which he had now published, was ordered by parliament to be seized and burned by the hangman. Notwithstanding this and the ordinance of the 2nd of May 1648, visiting denial of the doctrine of the Trinity with death, Biddle issued two tracts, one a Confession of Faith touching the Holy Trinity, and the other The Testimonies of Irenaeus, 6*c, concerning the one God and the Persons of the Trinity (1648). These were suppressed by government, and the Westminster assembly of divines eagerly pressed for the passing of an act by which heretics like Biddle could be put to death. This, however, was resisted by the army, an-d by many of the Independent parliamentarians; and after the death of the king, Biddle was allowed to reside in Staffordshire under sur- veillance. He engaged in preaching and in literary work, particularly an edition of the Septuagint, published by Roger Daniel. In February 1652 the general act of oblivion gave him complete freedom, and his adherents soon began to meet regularly for worship on Sundays. They were called Biddellians, or Socinians, or Unitarians, the name which has now become associated with their opinions. Biddle was not left long in peace. He translated some Socinian books, among others the Life of Socinus, and published two catechisms which excited a fury of indignation. He was summoned before the parliament in December 1654 and imprisoned. The dissolution of that body again set him at liberty for a short time, but he was presently brought up for some expressions used by him in a discussion with John Griffin, an illiterate Baptist pastor, who invoked the law against his superior opponent. He was put upon trial, and was only rescued by Cromwell, who sent him (October 1655) out of the way to one of the Scilly Islands, allowed him 100 crowns a year, and in 1658, on the solicitation of many friends, released him. For a few years he lived and taught quietly in the country, but returning to London he was in June 1662 again arrested, and fined £100. As he was unable to pay*

this sum, he was at once committed to prison, where fever, caused by the pestilential atmosphere, carried him off on the 22nd of September 1662.

BIDDLE, NICHOLAS (1786-1844), American financier, was born in Philadelphia on the 8th of January 1786. He was the nephew of a naval officer, Captain Nicholas Biddle (1750- 1778), who lost his life while fighting on the American side, during the War of American Independence. After almost finishing the prescribed course at the university of Pennsylvania, the boy went to Princeton, where he graduated with high honours in 1801. During 1804-1807 he was the secretary, first of John Armstrong, minister to France, and then of James Monroe, minister to Great Britain. After his return to America he prac- tised law for several years in Philadelphia, was an associate editor of Dennie's Portfolio, to which he contributed both prose and verse, and, with much literary skill, prepared for the press from the explorers' own journals a History of the Expedition under the Command of Captains Lewis and Clark (18 14). He was a prominent member of the Pennsylvania House of Representa- tives in 1810-1811 and of the Senate in 1814-1817, and in 1819 became, by President Monroe's appointment, one of the five government directors of the Bank of the United States. In 1823 he replaced Langdon Cheves as its president. In general he followed a conservative policy and showed marked ability in the management of the bank, but during President Andrew Jackson's warfare upon that institution, his character and his policy were violently assailed by the president and his followers. The bank's national charter lapsed in 1836, but it was immediately chartered by Pennsylvania as the " Bank of the United States, of Pennsylvania "; and Biddle remained president until 1839, two years before the bank failed. As president of the board of trustees appointed for the purpose, he took a prominent part in the establishment of Girard College, in accordance with the will of Stephen Girard (q.v.). He died in Philadelphia on the 27th of February 1844. His son, Charles John Biddle (1819-1873), served in the

Mexican War as a captain of infantry, earning the brevet of major at Chapul tepee; practised law in Philadelphia; was a repre- sentative in Congress in 1861-1863; was long editor-in-chief of the Philadelphia Age; and published ""The Case of Major Andre, with a Review of the Statement of it in Lord Mahon's History of England," in the Memoirs of the Historical Society of Pennsylvania (1858).

The best account of Nicholas Biddle's administration of the bank may be found in an excellent work, by Ralph C. H. Catterall, The

Second Bank of the United States (Chicago, 1903).

BIDEFORD, a seaport, market town and municipal borough in the Barnstaple parliamentary division of Devonshire, England, 8|m. S.W. of Barnstaple. Pop. (1901) 8754. It is served by the London & South- Western and the Bideford, Westward Ho & Appledore railways. It is picturesquely situated on two hills rising from the banks of the river Torridge, 3 m. above its junction with the estuary of the Taw. Many of the houses are built with timber framework in Elizabethan style, and the two parts of the town are united by a bridge of 24 arches, originally erected in the 14th century, when the revenue of certain lands was set apart for its upkeep. The church of St Mary, with the exception of the tower, is a modern reconstruction. A stone chancel screen and a Norman font are also preserved. Industries include the manufacture of earthenware, leather goods, sails, ropes and linen, and ironfounding. The small harbour has about 17 ft. of water at high tide, but is dry at low tide. An- thracite and a coarse potter's clay are found near the town. The borough is under a mayor, 4 aldermen and 12 councillors. Area, 3398 acres.

Bideford (Bedeford, Bydyford, Budeford, Bytheford) is not mentioned in pre-Conquest records, but according to Domesday it rendered geld for three hides to the king. From the time of the Conquest down to the 1 8th century, Bideford remained in the possession of the Grenville family, and it first appears as a borough in an undated charter (probably of the reign of Edward I.) from Richard de Grenville, confirming a charter from his grandfather, Richard de Grenville, fixing the rent and services due from the burgesses and granting them liberties .similar to those in use at Breteuil and a market every Monday. Another charter, dated 1271, confirms to Richard de Grenville and his heirs a market every Monday and five days' fair yearly at the feast of St Margaret (20th of July). In 1573 Elizabeth granted a charter creating Bideford a free borough corporate, with a common council consisting of a mayor, 5 aldermen and 7 chief burgesses, together with a recorder, town-clerk and 2 serjeants-ab-mace. This charter also granted the Tuesday market, which is still held, and three annual fairs in February, July and November, now discontinued. A later charter from James I. in 1610 added the right to have a town seal, 7 aldermen instead of 5, and 10 chief burgesses instead of 7, and continued in force until the Municipal Corporations Act of 1873, which established 4 alder- men and 12 common councillors. In the 16th century Sir Richard Grenville, the famous Virginian settler, did much to stimulate the commercial development of Bideford, which long maintained a very considerable trade with America, Spain and

the Mediterranean ports, the import of tobacco from Maryland and Virginia being especially noteworthy. From the beginning of the 18th century this gradually declined and gave place to a coasting trade in timber and coal, chiefly with Wales and Ireland. The silk industry which flourished in the 17th century is extinct.

See John Watkins, History of Bideford (Exeter, 1792). BIDPAI (or Pilpay), FABLES OF, the name given in the middle ages (from Sanskrit Vidya-pati, chief scholar) to a famous collection of Hindu stories. The origin of them is undoubtedly to be found in the Pancha Tantra, or Five Sections, an extensive body of early fables or apologues. A second collection, called the Hitopadesa, has become more widely known in Europe than the first, on which it is apparently founded. In the 6th century a.d., a translation into Pahlavi of a number of these old fables was made by a physician at the court of Chosroes I. Anushirvan, king of Persia. No traces of this Persian translation can now be found, but nearly two centuries later, Abdallah-ibn-Mokaffa translated the Persian into Arabic; and his version, which is known as the " Book of Kalilah and Dimna," from the two jackals in the first story, became the channel through which a knowledge of the fables was transmitted to Europe. It was translated into Greek by Simeon Sethus towards the close of the nth century; his version, however, does not appear to have been retranslated into any other European language. But the

Hebrew version of Rabbi Joel, made somewhat later, was trans- lated in the 13th century into Latin by John of Capua, a con- verted jew, in his Directorium vitae humanae (first published in 1480), and in that form became widely known. Since then the fables have been translated into nearly every European tongue. There are also versions of them in the modern Persian, Malay, Mongol and Afghan languages.

See Wilson's analysis of the Pancha Tantra, in the Mem. of the Royal Asiat. Soc. i. ; Silvestre de Sacy's introduction to his edition of the Kalilah and Dimna (1816) ; articles by the same in Notices et Extr. des MSS. de la Bib. du Roi, vols. ix. and x. ; German translation by Philipp Wolff, Bidpai's Fabeln (2 vols., 2nd ed., Stuttgart, 1839); the Anvar-i Suheili, Persian version of the Fables, translated by E. B. Eastwick (Hertford, 1854) ; Benfey, Pantscha Tantra, German translation with important introduction (2 vols., Leipzig, 1859);

other editions, by L. Fritze (ib. 1884) and R. Schmidt {ib. 1901); Max Miiller, Essays (Leipzig, 1872), vol. iii. pp. 303, &c. ; J. Jacobs' edition of Sir T. North's Morall Philosophie of Doni, the earliest English version of the fables (London, 1888) ; J. G. N. Keith-Falconer, Kalilah and Dimnah, or the Fables of Bidpai (Cambridge, , 1895), their history, with a translation of the later Syriac version and notes ; Leopold Hervieux, Les Fabulistes Latins, &c. v. Jean de Capoue el ses derives (1899) ; E. G. Browne, Persian Literat. (1906), ii. 350.

BIEKKICH, a town of Germany, in the Prussian province of Hesse-Nassau, on the right bank of the Rhine, 3 m. S. from Wiesbaden, of which it is the river port, and on the main line of railway from Cologne to Frankfort-on-Main. Pop. (1900) 15,048; (1905) 20,137. The palace of the former dukes of Nassau occupies a fine position on the river bank, and the shady gardens and groves attract large numbers of visitors during the summer. It is an important steamboat station for both passenger and cargo traffic, and besides manufactures of cement, dyes and soap, has a considerable trade in the wines of the district.

BIEDERMANN, FRIEDRICH KARL (1812-1901), German publicist and historian, was born at Leipzig on the 25th of September 181 2, and after studying at Leipzig and Heidelberg became professor in the university of his native town in 1838. His early writings show him as an ardent advocate of, German unity, and he was a member of the national parliament which met at Frankfort in 1848. Becoming a member of the Upper House of the parliament of Saxony, he advocated union under the leadership of Prussia; and, subsequently losing his pro- fessorship, he retired to Weimar, where he edited the Weima- rische Zeitung. Returning to Leipzig in 1863 he edited the Deutsche Allgemeine Zeitung, and regained his professorship in 1865. He was again a member of the Saxon Upper House, and from 1871 to 1874 a member of the German Reichstag. He died at Leipzig on the 5th of March 1901. Biedermann's chief works are: Erinnerungen aus der Paulskirche (Leipzig, 1849); Deutsch- land im 18. Jahrhundert (Leipzig, 1854-1880); Friedrich der grosse und sein Verhdltnis zur Entwickelung des deutscken Geistes- lebens (Brunswick, 1859); Geschichte Deutschlands 181 5-1871 (Berlin, 1891) ; Deutsche Volks- und Kultur geschichte (Wiesbaden, 1901). He also wrote the dramas, Kaiser HeinrichlV. (Weimar, 1861); Kaiser Otto III. (Leipzig, 1862); and Der letzte Bur ger- meister von Strassburg (Leipzig, 1870).

BIEL, GABRIEL (c. 1425-1495), scholastic philosopher, was born at

Spires (Speier). He was the first professor of theology at the newly founded (1477) university of Tubingen, of which he was twice rector. Some years before his death he entered a religious fraternity. His work consists in the systematic development of the views of his master, William of Occam. His Epitome et Collectorium ex Occamo super libros quatuor Sententiarum (1508, 1512, and various dates) is a clear and consistent account of the nominalist doctrine, and presents the complete system of scholastic thought from that point of view. The empirical individualism of the work, tending necessarily to limit the province of reason and extend that of faith, together with scattered utterances on special points, which gained for Biel the title of Papista Antipapista, had considerable influence in. giving form to the doctrines of Luther and Melanchthon. It is the best specimen of the final aspect of scholasticism. His other works also have been frequently reprinted. The title Ultimus Scholasticorum is often wrongly bestowed on Biel; scholasticism

did not cease with him, even in Germany, and continued to flourish long after his time in the universities of Spain.

See Linsenmann, in Theologischen Quartalschrift (Tubingen, 1865); Stockl, Phil. d. Mittela.lt. ii. § 269; H. Plitt, Gabriel Biel als Prediger (Erlangen, 1879); art. s.v. by P. Tschackert in Herzog-Hauck, Realencyklopddie, vol. iii. (1897); W. Roscher, Ges. d. National-okonomik (Munich. 1874), PP- 21-28; and works quoted under Scholasticism.

BIELEFELD, a town of Germany, in the Prussian province of Westphalia, 68 m. S.W. from Hanover on the main line to Cologne. Pop. (1885) 34,931; (1905) 71,797. It is situated at the foot of the Teuto burger Wald, and consists of two portions, separated by the river Lutter, which were first united into one town in 1520. Among its public buildings and institutions are the old town church, with a curious carved altar-piece, the town hall, the gymnasium and the provincial industrial school. On the height above the town is the old castle of Sparenburg, built in the 1 2th century by Bernhard, count of Lippe. It was for a long time employed as a prison, but was restored after its destruction by fire in 1877 and now contains a historical museum. Bielefeld is the centre of the Westphalian linen industry. It has also important plush, silk and hosiery manufactures, as well as extensive bleaching works, and does a very large export trade to all parts of the world in these branches. Engines, automobiles, biscuits, glass, pianos, furniture and paper are also manufactured.

Bielefeld is mentioned as early as the qth century, as Belan- velde, but its first recorded mention as a town is in 1233. It belonged at this time to the counts of Ravensberg, who often resided in the Sparenburg. It joined the Hanseatic league in 1270, and about the same time began to engage in the linen manufacture, which was greatly extended during the 16th and 1 7th centuries by a number of refugees from the Netherlands. In 1347 the town passed with the countship of Ravensberg to the duchy of Jiilich, and in 1666 to that of Brandenburg.

BIELITZ (Czech Bilsko, Polish Bielsko), a town of Austria, in Silesia, 80 m. S.E. of Troppau by rail. Pop. (1900) 16,885, chiefly German. It is situated on the Biala river, just opposite the Galician town of Biala and possesses a fine castle belonging to the Sulkowsky family, in favour of whom the lordship of Bielitz was raised to a duchy in 1752. It has an important woollen and linen industry, and manufactures of jute and machinery, as well as an active trade, especially of woollens, to the East. The town was founded in the 13th century, and in the 15th and 16th was a fortified place.

BIELLA, attown and episcopal see of Piedmont, Italy, in the province of Novara, 55 m. N.E. of Turin by rail, and 38 m. direct, situated on the S. edge of the lower Alps. Pop. (1901) town, 3454; commune, 19,267. The old town (1558 ft.) lies on a hill above the new town, and is reached from it by a cable tramway. It has fine palaces with decorations in terra-cotta; and a modern bath establishment is situated here. The new town contains the 1 5th-century cathedral and the fine Renaissance church of S. Sebastiano ; near the former is a baptistery of the 9th century. It is a considerable manufacturing centre for woollens, silks and cottons, electric power being furnished by the torrents descending from the mountains at the foot of which it lies. It is frequented as a tourist centre, and several hydropathic establishments and mountain resorts lie in the vicinity. ‘ BIENNE, or Biel, an industrial town in the Swiss canton of Bern. It is built between the N.E. end of the lake of the same name and the point at which the river Suze or Scheuss (on the right bank of which it is situated) issues from a deep cleft (called the Taubenloch) in the Jura range. Bienne is 19 m. by rail N.E. of Neuchatel, and 21m. N.W. of Bern. Its industrial importance is shown by the fact that it is the site of the West Swiss technical institute, which has departments for instruction in watch-making, in electricity, in engraving and chasing, and in subjects relating to railway, postal and telegraph matters. Its chief industries are watch-making, chain-making, the manu- facture of machines and other objects for use on railways, &c. Its rapidly increasing commercial activity accounts no doubt for the rapid rise

in its population, which in 1850 was but 3589, rose in 1870 to 8165, and in 1900 was 22,016, mainly Protestant,

and two-thirds German-speaking. The parish church of St Benedict dates from 1451, but was restored in 1775 — it has some fine 15th-century painted glass in the choir. In the town is the Schwab museum, which is chiefly notable for its fine col- lection of objects from the lake-dwellings. To the north-west of Bienne two funicular railways lead up to Evilard (or Leubringen) and Macolin (or Magglingen) ,both situated on the slope of the Jura.

First mentioned in the 12th century, Bienne continued for centuries to be under the jurisdiction of the prince-bishop of Basel. In 1279 (permanently in 1352) it made an alliance with Bern, in 1344 with Soleure, and in 1382 with Fribourg. But its attempts to be admitted into the Swiss Confederation were fruitless, though after it adopted the Reformation in 1525, it was closely associated with the Protestant cantons. In 1798 it was seized by the French, but in 1815, with the greater part of the bishopric of Basel, it became part of the canton of Bern.

See C. A. Bloesch, Geschichte der Stadt Bid (to 1854), (3 vols., Biel, 1855-1856). (W. A. B. C.)

BIENNE, LAKE OF, or Bielersee, a lake in Switzerland, S.W. of the town of Bienne, and extending along the southern foot of the Jura range. It is 75 m. in length, 2! m. broad and 249 ft. in depth, while its surface is 1424 ft. above the sea-level, and its area 16 sq. m. In it is the lie de St Pierre, where Rous- seau resided for a short time in 1765. Many traces of lake- dwellings have been discovered on the shores of the lake. It receives the river Suze or Scheuss at its north-east end, while the Hagneck canal leads the waters of the Aar into the lake, as that of Nidau conducts them out again. At the south-western end the river Thiele or Zihl flows into this lake from that of Neuchatel. (W. A. B. C.)

BIERSTADT, ALBERT (1830-1902), American landscape painter, was born in Solingen, Westphalia, Germany, on the 7th of January 1830, and was taken to the United States when about a year old. In 1853-1856 he studied painting at Diisseldorf. His pictures of the western part of the United States, and par- ticularly the Rocky

Mountains, made him widely popular. His " Estes Park, Colorado," is in the collection of the earl of Dunraven; his " Sierra Nevada " (1878) is in the Corcoran Gallery in Washington, and " The Valley of Yosemite " in the James Lenox collection in New York. He received many German and Austrian decorations, and was a chevalier of the French Legion of Honour. He rendered panoramic views with a certain ability, though his work was rather topographically correct and impressive than artistic in conception and execution. He was a member of the National Academy of Design of New York, and is represented by two historical paintings, " The Discovery of the Hudson River," and " The Settlement of California," in the Capitol in Washington, D.C. He died in New York City on the 18th of February 1902.

BIFROST, in Old Norse mythology, the rainbow, which was supposed to form the bridge by which the gods passed between heaven and earth. It was guarded by Heimdal, god of light.

BIGAMY (from Lat. bis, twice, and Gr. yctfios, marriage), in English law, according to the statute now in force (24 and 25 Vict. c. 100, § 57), the offence committed by a person who " being married shall marry any other person during the life of the former husband or wife." In the canon law the word had a rather wider meaning, and the marriage of a clerk in minor orders with a widow came within its scope. At the council of Lyons (a.d. 1274) bigamists were stripped of their privilege of clergy. This canon was adopted and explained by an English statute of 1276; and bigamy, therefore, became a usual counterplea to the claim of benefit of clergy. However, by an act of 1547 every person entitled to the benefit of clergy is to be allowed the same, " although he hath been divers times married to any single woman or single women, or to any widow or widows, or to two wives or more."

A bigamous marriage, by the ecclesiastical law of England, is simply void. By a statute of 1604 the offence was made a felony. This statute, after being repealed in 1828, was re-enacted and reproduced in the Offences against the Person Act 1861. It is immaterial whether the second marriage has taken place within

England and Ireland or elsewhere, and the offence may be dealt with in any county or place where the defendant shall be appre- hended or be in custody. The following clause embodies the necessary exceptions to the very general language used in the definition of the offence: — " Provided that nothing in this section contained shall extend to any second marriage contracted elsewhere than in England

and Ireland by any other than a British subject, or to any person marrying a second time whose husband or wife shall have been continuously absent from such person for the space of seven years then last past, and shall not have been known by such person to be living within that time, or shall extend to any person who at the time of such second marriage shall have been divorced from the bond of the first marriage, or to any person whose former marriage shall have been declared void by any court of competent jurisdiction." The punishment is penal servitude for not more than seven nor less than five years, or imprisonment with or without hard labour, not exceeding two years.

A valid marriage must be proved in the first instance in order to support a charge of bigamy. A voidable marriage, such as were marriages between persons within the prohibited degrees before the Marriage Act 1836, will be sufficient, but a marriage which is absolutely void as all such marriages now are, will not. For example, if a woman marry B during the lifetime of her husband A, and after A's death marry C during the lifetime of B, her marriage with C is not bigamous, because her marriage with B was a nullity. In regard to the second marriage (which constitutes the offence) the English courts have held that it is immaterial whether, but for the bigamy, it would have been a valid marriage or not. An uncle, for example, cannot marry his niece; but if being already married he goes through the ceremony of marriage with her he is guilty of bigamy. In an Irish case, however, it has been held that to constitute the offence the second marriage must be one which, but for the existence of the former marriage, would have been valid. With reference to the case in which the parties to the first marriage have been divorced, it may be observed that no sentence or act of any foreign country dissolving a vinculo a marriage contracted in England by persons continuing to be domiciled in England, for grounds on which it is not liable to be dissolved a vinculo in England will be recognized as a divorce (R. v. Lolley 1812, R. & R. 237). Hence, a divorce a vinculo for adultery, in a Scottish court, of persons married in England, is not within the statute. But if a pe'rson charged with bigamy in England can prove that he has been legally divorced by the law of the country where the divorced parties were domiciled at the time (even though the ground on which the divorce was granted was not one that would justify a divorce in England) it will be good defence to the charge. Criminal jurisdiction is always regarded as purely territorial, but bigamy (together with homicide and treason) is an exception to this rule. A British subject committing bigamy in any country may be tried for the same in the United Kingdom (Earl Russell's case, 1901).

In Scotland, at the date of the only statute respecting bigamy, that of 1 551, cap. 19, the offence seems to have been chiefly considered in a religious point of view, as a sort of perjury, or violation of the solemn vow or oath which was then used in contracting marriage; and, accordingly, it was ordained to be punished with the proper pains of perjury.

Bigamy was punished in England until the reign of William III. by death, then the penalty changed to life imprisonment and branding of the right hand. An act of George I. still in force lessened the penalty to deportation for seven years or imprisonment for two years with or without hard labour. The Offences against the Person Act 1861 changed deportation to penal servitude.

In the United States the law in regard to bigamy is practically founded on the English statute of 1604, with the exception that imprisonment and a fine, varying in the different states, were substituted instead of making the offence a felony. Congress has passed a statute declaring bigamy within the territories and places within the exclusive jurisdiction of the United

States to be a misdemeanour (U.S. Rev. Stat. § S3 5 2). By statute in some states, upon absence cf one spouse from the state for five years without being heard of, the other may marry again without committing bigamy, in other states the period is seven years. In most of the states, prosecutions for bigamy are barred after the lapse of a certain number of years. The marriage wherever solemnized must be a valid marriage according to the law of the place of solemnization; if void there, no prosecution for bigamy can be founded upon it. In some jurisdictions, an honest belief that a prior divorce of one of the parties was valid would be a defence to a prosecution for bigamy, in others the contrary is held.

On the continent of Europe, bigamy is punishable in most countries with varying terms, of imprisonment, with or without hard labour, according to the circumstances of the case.

See Stephen, History of Criminal Law; Dicey, Conflict of Laws; Report of the Royal Commission on Marriage Laws (1868).

BIGELOW, JOHN (1817-), American journalist and diplomat, was born at Maiden, New York, on the 25 th of Nov- ember 1817. He

graduated at Union College in 1835, practised law in New York for several years after 1839; took up journal- istic work; was joint owner (with William Cullen Bryant) and managing editor of the New York Evening Post (1849-1861); was United States consul at Paris in 1861-1864, and was minister to France in 1864-1867. While consul, Bigelow wrote Les Jttats-Unis a" Amerique en 1863 in order to counteract the apparent desire of the French people for a dissolution of the American Union, by showing them the relative importance of the commerce of the northern and southern states. On dis- covering in 1863 that a French shipbuilder, with the connivance of Napoleon III., was constructing two formidable iron-clads and two corvettes for the use of the Confederacy, he devoted his energies to thwarting this scheme, and succeeded in preventing the delivery of all but one of these vessels to the Confederate agents. In his work entitled France and the Confederate Navy (New York, 1888) he gives an account of this episode. In 1865- 1866, it devolved upon Bigelow, as minister to France, to repre- sent his government in its delicate negotiations concerning the French occupation of Mexico, and he discharged this difficult task with credit. From 1875 to 1877 he served as secretary of state of New York. He wrote books of travel, of popular biography, or of historical or political discussion, &c, from time to time; but his principal literary achievements were editions, between 1868 and 1888, of Franklin's autobiography and autobiographical writings, cop-iously annotated; and of the complete works of Franklin, in ten octavo volumes (New York, 1887-1889). These editions were based in part upon the editor's personal investiga- tions of manuscript sources in France and elsewhere, and sup- planted the well-known, long serviceable, but less accurate edition of Jared Sparks (Boston, 1836-1840) ; they have in turn been supplanted by the edition of A. H. Smythe (10 vols., 1905- 1907). Mr Bigelow was a close friend of Samuel J. Tilden, and became his literary executor, editing his speeches and other political writings (1885), publishing a biography in 1895, and editing a two-volume collection of Tilden's letters and literary memorials (1908). He also wrote a biography of William Cullen Bryant (1890). In 1897 he published a volume entitled The Mystery of Sleep (2nd ed., 1903). In 1909 he published Retro- spections of an Active Life.

BIGGAR, a police burgh of Lanarkshire, Scotland. Pop. (1901) 1366. It is situated about 10 m. S.E. of Carstairs Junction (Caledonian railway), where the lines from Edinburgh and Glasgow connect. Lying on Biggar Water and near the Clyde, in a bracing, picturesque, upland country, Biggar enjoys great vogue as a health and holiday resort. It was the birth- place of Dr John Brown, author

of Rab and his Friends, whose father was secession minister in the town. It was created a burgh of barony in 1451 and a police burgh in 1863. St Mary's church was founded in 1545 by Lord Fleming, the head of the ruling family in the district, whose seat, Boghall Castle, however, is now a ruin. John Gledstanes, great-grandfather of W. E. Gladstone, was a burgess of Biggar, and lies in the churchyard.

Easter Gledstanes, the seat of the family from the 13th to the 17th century, and the estate of Arthurshiels, occupied by them for nearly a hundred years more, are situated about 3I m. to the north-west of the burgh. On the top of Quothquan Law (1097 ft.), about 3 m. west is a rock called Wallace's Chair, from the tradition that he held a council there prior to the battle of Biggar in 1297. Lamington, nearly 6 m. south-west, is well situated on the Clyde. It is principally associated with the family of the Baillies, of whom the most notable were Cuthbert Baillie (d. 1514), lord high treasurer of Scotland, William Baillie, Lord Provand (d. 1593), the judge, and William Baillie (fl. 1648), the general whose strategy in opposition to the marquess of Mont- rose was so diligently stultified by the committee of estates. The ancient church of St Ninian's has a fine Norman doorway. Lamington Tower was reduced to its present fragmentary con- dition in the time of Edward I., when William Heselrig, the sheriff, laid siege to it. The defenders, Hugh de Bradfute and his son, were slain, and his daughter Marion — the betrothed, or, as some say, the wife of William Wallace — was conveyed to Lanark, where she was barbarously executed because she refused to re- veal the whereabouts of her lover. Wallace exacted swift venge- ance. He burnt out the English garrison and killed the sheriff.

BIGGLESWADE, a market town in the Biggleswade parlia- mentary division of Bedfordshire, England, 41 m. N. by W. of London by the Great Northern railway. Pop. of urban district (1901) 5120. It lies on the east bank of the Ivel, a tributary of the Ouse, in a flat plain in which vegetables are largely grown for the London markets. The town is a centre of this trade.

Biggleswade (Bichelswade, Beckeleswade, Bickleswade) is an ancient borough by prescription which has never returned repre- sentatives to parliament. The borough court was held by the lord of the manor. At the time of Edward the Confessor, Archbishop Stigand owned the manor, which according to Domesday passed to RaTf de Insula. Henry I. granted it to the bishop of Lincoln, under whose protection the borough evidently grew up. In 1547 the bishop surrendered his rights to the king, and in the 17th century Biggleswade formed part of the jointure of the queens of England. Owing to its important

position on the Roman road to the north the town became an agricultural centre for the surrounding district. In 1335 Edward III. renewed the bishop's licence to hold a Monday market, and annual fairs were held here from very early times. Those for horses are mentioned as famous by Camden. In addition to agriculture, Biggleswade was formerly engaged in straw-plaiting and lace manufacture.

BIGHT (O. Eng. bight, bend; cf. Ger. Bucht, a bay, and beugen, to bend), a nautical term for the loop or bent part of a rope, as distinguished from the ends; also a geographical term for a bay between two distant headlands, or with a shallow curve, e.g. the Bight of Benin, the Great Bight of Australia.

BIGNON, JEROME (1589-1656), French lawyer, was born at Paris in 1589. He was uncommonly precocious, and under his father's tuition had acquired an immense mass of knowledge before he was ten years of age. In 1600 was published a work by him entitled Chorographie, ou description de la Terre Sainte. The great reputation gained by this book introduced the author to Henry IV., who placed him for some time as a companion to the due de Vendome, and made him tutor to the dauphin, afterwards Louis XIII. In 1604 he wrote his Discours de la ville de Rome, and in the following year his Traite sommaire de Vilection du pape. He then devoted himself to the study of law, wrote in 16 10 a treatise on the precedency of the kings of France, which gave great satisfaction to Henry IV., and in 1613 edited, with learned notes, the Formulae of the jurist Marculfe. In 1620 he was made advocate-general to the grand council, and shortly afterwards a councillor of state, and in 1626 he became advocate-general to the parlement of Paris. In 1641 he re- signed his official dignity, and in 1642 was appointed by Richelieu to the charge of the royal library. He died in 1656.

BIGNON, LOUIS PIERRE EDOUARD, Baron (1771-1841), French diplomatist and historian, born on the 3rd of January 1 77 1, was the son of a dyer at Rouen. Though he had received a good education, he served throughout the early part of the revolutionary wars without rising above the rank of private. In 1797, however, the attention of Talleyrand, then minister of foreign affairs, was called to his exceptional abilities by General

Huet, and he was attached to the diplomatic service. After serving in the legations in Switzerland and the Cisalpine re- public, he was appointed in 1799 attache to the French legation at Berlin, of which three years later he became charge d'affaires. As minister-plenipotentiary at Cassel, between the years 1804 and 1806, he took a prominent share in the formation of the confedera- tion of the Rhine; and after the battle of Jena he returned to Prussia as administrator of the public domains and finances. He filled a similar function in Austria after the battle of Wagram. At the end of 18 10 he became French resident at Warsaw and was for a couple of years supreme in the affairs of the grand duchy.

The preparation of a constitution for Poland, on which he was engaged, was, however, interrupted by the events of 181 2. Bignon, after a short imprisonment at the hands of the allies, returned to France in time to witness the downfall of Napoleon. During the Hundred Days he once more entered Napoleon's service, and, after Waterloo, as minister of foreign affairs under the executive commission, it was he who signed the convention of the 3rd of July 18 15, by which Paris was handed over to the allies. Bignon did not re-enter public life until 1817, when he was elected to the chamber of deputies, in which he sat until 1830, consistent in his opposition to the reactionary policy of successive governments. His great reputation and his diplomatic experience gave a special weight to the attacks which he published on the policy of the continental allies, two of his works attracting special attention, Du Congres de Troppau ou Examen des pre- tentions des monarchies absolues a I'egard de la monarchie con- stitittionelle de Naples (Paris, 1821), and Les Cabinets et les peuples depuis 181 5 jusqu'd la fin de 1822 (Paris, 1822).

The revolution of 1830, which brought his party into power, only led to a very temporary resumption of office by Bignon. He was for a few weeks minister of foreign affairs in the first government of Louis Philippe, and again for a few weeks minister of public instruction. But the idea of making him responsible for the foreign policy of France could not be realized owing to the necessity under which Louis Philippe lay of courting the good- will of the powers, whom Bignon had offended by his outspoken writings. Elected deputy in 183 1 and member of the chamber of peers in 1839, he withdrew for the most part from politics, to, devote himself to his great work, the Histoire de France sous Napoleon (10 vols. 1829-1838, then 4 posthumous vols., 1847- 1850). This history, while suffering from the limitations of all contemporaneous narratives, contains much that does not exist elsewhere, and is one of the best-known sources

for the later histories of Napoleon's reign.

See Mignet, Notice historique sur la vie et les ouvrages de M. Bignon

(1848).

BIGOD, HUGH (d. n 77), earl of Norfolk, was the second son of Roger Bigod (d. 1107), the founder of the English family of this name. Hugh inherited large estates in East Anglia on the death of his brother William in n 20, and enjoyed the favour of Henry I. At first a supporter of Stephen during this king's struggle with the empress Matilda, Hugh was rewarded with the earldom of Norfolk before 1141. After having fought for the king at the battle of Lincoln the earl deserted him, assumed a position of armed neutrality during the general anarchy, and then assisted Henry II. in his efforts to obtain the throne. This king confirmed him in the possession of his earldom; but becoming restless under the rule of law initiated by Henry, he participated in the revolt of n 73, which so far as England was concerned centred round his possessions. Though defeated and compelled to surrender his castles, Bigod kept his lands and his earldom, and lived at peace with Henry II. until his death, which probably took place in Palestine.

His son Roger (d. 1221), who succeeded to the earldom of Norfolk, was confirmed in his earldom and other honours by Richard I., after he had fallen under the displeasure of Henry II. He took part in the negotiations for the release of Richard from prison, and after the king's return to England became justiciar. The earl was one of the leaders of the baronial party which obtained John's assent to Magna Carta, and his name appears among the signatories to this document.

Roger was succeeded as 3rd earl by his son, Hugh, who died in 1225, leaving a son, Roger (d. 1270), who became 4th earl of Norfolk. Through his mother, Matilda, a daughter of William Marshal, earl of Pembroke, Roger obtained the office of marshal of England in 1246. He was prominent among the barons who wrested the control of the government fr^m the hands of Henry III., and assisted Simon de Montfort. The earl married Isabella, daughter of William the Lion, king of Scotland, but left no sons.

Hugh, the 3rd earl, left a younger son, Hugh (d. 1266), who was chief justiciar of England from 1258 to 1260, and who fought for Henry III. at the battle of Lewes. The latter's son, Roger, succeeded his uncle Roger as 5th earl of Norfolk in 1270. This earl is the hero of a famous altercation with Edward I. in 1297, which arose out of

the king's command that Bigod should serve against the king of France in Gascony, while he went to Flanders. The earl asserted that by the tenure of his lands he was only com- pelled to serve across the seas in the company of the king himself, whereupon Edward said, "By God, earl, you shall either go or hang," to which Bigod replied, " By the same oath, king, I will neither go nor hang." The earl gained his point, and after Edward had left for France he and Humphrey Bohun, earl of Hereford, prevented the collection of an aid for the war and forced Edward to confirm the charters in this year and again in 1301. Stubbs says Bigod and Bohun " are but degenerate sons of mighty fathers; greater in their opportunities than in their patriotism." The earl died without issue in December 1306, when his title became extinct, and his estates reverted to the crown. The Bigods held the hereditary office of steward (dapifer) of the royal household, and their chief castle was at Framlingham in Suffolk.

See W. Stubbs, Constitutional History, vols. i. and ii. (1896-1897) ; J. R. Planche, "The Earls of East Anglia" (Brit. Arch. Ass., vol. xxi., 1865); and G. E. C(okayne), Complete Peerage, vol. vi.

(1895).

BIGOT, one obstinately and intolerantly holding particular religious opinions, who refuses to listen to reason and is ready to force others to agree with him; hence also applied to one who holds similar views on any subject. The early meaning of the word in English, at the end of the 16th century, was that of a religious hypocrite. The origin is obscure; it appears in French, in the forms bigot or bigos, in the 12th century romance of Girard of Roussillon, where it is applied to certain tribes of southern Gaul, and in the Roman du Rou of Wace (d. 1175?) as an abusive name given by the French to the Normans :

" Moult on Franchois Normans laidis et de meffais et de mesdis. Souvent lor dient reproviers, et claiment Bigos et Draschiers."

To this use has been attached the absurd origin from "ne se, bi god," the words in which, according to the 12th century chronicle, Rollo, duke of the Normans, refused to kiss the foot of Charles III., the Simple, king of the West Franks. The word may have some connexion with a corruption of Visigoth, a suggestion to which the use in the Girard romance lends colour. The meaning changed in French to that of "religious hypocrite" through the application, in the feminine bigote, to the members of the religious sisterhoods called Beguines (q.v.).

BIG RAPIDS, a city and the county-seat of Mecosta county, Michigan, U.S.A., on both sides of the Muskegon river, 56 m. N. by E. of Grand Rapids, in the west central portion of the lower peninsula. Pop. (1890) 5303; (1900) 4686, of whom 881 were foreign-born; (1910, U. S. census) 4519. It is served by the Pere Marquette and the Grand Rapids & Indiana railways. Big Rapids is the seat of the Ferris Institute (opened 1884, incorporated 1894), a large private co-educational school, founded by W. N. Ferris. The river, which falls 16 ft. within the city limits, is dammed a short distance south of the city, and 16,000 horse-power is generated, part of which is transmitted to the city. The principal manufactures are lumber and furniture, and saw-filing and filing-room machinery. Big Rapids, named from the falls of the Muskegon here, was settled in 1854, was platted in 1859 and was chartered as a city in 1869.

BIGSBY, JOHN JEREMIAH (1792-1881), English geologist and physician, the son of Dr John Bigsby, was born at Notting- ham on the 14th of August 1792. Educated at Edinburgh, where he took the degree of M.D., he joined the army medical service and was stationed at the Cape of Good Hope in 181 7. About a year later he went to Canada as medical officer to a regiment, and having developed much interest in geology he was commissioned in 1819 to report on the geology of Upper Canada. In 1822 he was appointed British secretary and medical officer to the Boundary Commission, and for several years he made extensive and important geological researches, contributing papers to the American Journal of Science and other scientific journals; and later embodying an account of his travels in a book entitled The Shoe and Canoe (1850). Returning to England in 1827 he practised medicine at Newark until 1846 when he removed to London, where he remained until the end of his life. He now took an active interest in the Geological Society of London, of which he had been elected a fellow in 1823. In 1869 he was elected a fellow of the Royal Society, and in 1874 he was awarded the Murchison medal by the council of the Geological Society. During the last twenty years of his long life he was continually at work preparing, after the most painstaking research, tabulated lists of the fossils of the Palaeozoic rocks. His Thesaurus Siluricus was published with the aid of the Royal Society in 1868; and the Thesaurus Devonico-Carboniferus in 1878. In 1877 he founded the Bigsby medal to be awarded by the Geological Society of London, with the stipulation that the receiver should not be more than forty-five years old. He

died in London on the 10th of February 1881.

BIHARI (properly Bihari), the name of the most western of the four forms of speech which comprise the Eastern Group of modern Indo-Aryan Languages (g.v.). The other members are Bengali, Oriya and Assamese (see Bengali). The number of speakers of Bihari in 1901 was 34,579,844 in British India, out of a total of 90,242,167 for the whole group. It is also the language of the inhabitants of the neighbouring Tarai districts of Nepal. In the present article it is throughout assumed that the reader is in possession of the facts described under the heads of Indo-Aryan Languages and Prakrit. The article Bengali may also be studied with advantage.

" Bihari " means the language of the province of " Bihar," and to a certain extent this is a true description. It is the direct descendant of the old Magadhi Prakrit (see Prakrit), of which the headquarters were South Bihar, or the present districts of Patna and Gaya. It is, however, also spoken considerably beyond the limits of this province. To the west it extends over the province of Agra so far as the longitude of Benares, and to the south it covers nearly the whole of the province of Chota Nagpur. Allowing for the speakers in Nepal, its area extends over about 90,000 sq. m., and the total number of people who claim it as a vernacular is about the same as the population of France. Bihari has beer, looked upon as a separate language only during the past twenty-five years. Before that it was grouped with all the, other languages spoken between Bengal and the Punjab, under the general term " Hindi."

The usual character employed for writing Bihari is that known as Kaithi, a cursive form of the well-known Nagari character of Upper India. The name of the character is derived from the Kayath or Kdyasth caste, whose profession is that of scribes. Kaithi is widely spread, under various names, all over northern India, and is the official character of Gujarati. The Nagari character is commonly employed for printed books, while the Brahmans of Tirhut have a character of their own, akin to that used for writing Bengali and Assamese. In the south of the Bihari tract the Oriya character belonging to the neighbouring Orissa is also found.

Bihari has to its east Bengali, also a language of the Outer Band. To its west it has Eastern Hindi, a language of the Intermediate Band (see Indo-Aryan Languages). While it must decidedly be classed as an Outer language, it nevertheless shows, as might be expected, some points of contact with the Intermediate ones. Nothing is so characteristic of Bengali as

its pronunciation of the vowel a and of the consonant s. The first is sounded like the in "hot" (transliterated 0). In Eastern Bihari the same vowel has a broad sound, but not so broad as in Bengali. As we go westwards this broad sound is gradually lost, till it entirely disappears in the most western dialect, Bhcjpuri. As regards s, the Magadhi Prakrit pronounced it as s, like the sh in " shin." The Prakrits of the West preserved its dental sound, like that of the .s in " sin." Here Bengali and Eastern Hindi exactly represent the ancient state of affairs. The former has the i-sound and the latter the s-sound. At the present day Bihari has abandoned the practice of the old Magadhi Prakrit in this respect, and pronounces its i's as clearly as in the West. There are political reasons for this. The pronunciation of s is a literal shibboleth between Bengal and Upper India. For centuries Bihar has been connected politically with the West, and has in the course of generations rid itself of the typical pronunciation of the East. On the other hand, a witness as to the former pronunciation of the letter is present in the fact that, in the Kaithi character, s is always written s. In the declension of nouns, Bihari follows Bengali more closely than it follows Eastern Hindi, and its conjugation is based on the same principles as those which obtain in the former language.

The age of Bihari as an independent language is unknown. We have songs written in it dating from the 1 5th century, and at that time it had received considerable literary Langua ge. culture. Bihari has three main dialects, which fall into two divisions, an eastern and a western. The eastern division includes Maithill or Tirhutia and Magahi. Magahi is the dialect of the country corresponding to the ancient Magadha, and may therefore be taken as the modern representative of the purest Magadhi Prakrit. Its northern boundary is generally the river Ganges, and its western the river Son. To the south it has overflowed into the northern half of Chota Nagpur. It is nearly related to Maithili, but it is quite uncultivated and has no literature, although it is the vernacular of the birthplace of Buddhism. Nowadays^t is often referred to by natives of other parts of the country as the typically boorish language of India. Maithili faces Magahi across the Ganges. It is the dialect of the old country of Mithila or Tirhut, famous from ancient times for its learning. Historically and politically it has long been closely connected with Oudh, the home of the hero Rama-candra, and its people are amongst the most conservative in India. Their language bears the national stamp. It has retained numerous antiquated forms, and parts of its grammar are extraordinarily complex. It has a small literature which has helped to preserve these peculiarities in full

play, so that though Magahi shares them, it has lost many which are still extant in the everyday talk of Mithila. The western division consists of the Bhojpuri dialect, spoken on both sides of the Gangetic valley, from near Patna to Benares. It has extended south-east into the southern half of Chota Nagpur, and is spoken by at least twenty millions of people who are as free from prejudice as the inhabitants of Mithila are conservative. The Bhojpuris are a fighting race, and their language is a practical one, made for everyday use, as simple and straightforward as Maithili and Magahi are complex. In fact, it might almost be classed as a separate language, had it any literature worthy of the name.

(Abbreviations: Mth. = Maithili, Mg. = Magahi, Bh. = Bhojpuri, B. = Bihari, Bg. = Bengali. Skr. = Sanskrit, Pr. = Prakrit. Mg. Pr. = Magadhi Prakrit.)

Vocabulary. — The Bihari vocabulary calls for few remarks. Tatsamas, or words borrowed in modern times from Sanskrit (see Indo-Aryan Languages), are few in number, while all the dialects are replete with honest home-born iadbhavas, used (unlike Bengali) both in the literary and in the colloquial language. Very few words are borrowed from Persian, Arabic or other languages.

Phonetics. — The stress-accent of Bihari follows the usual rules of modern Indo-Aryan vernaculars. In words of more than one syllable it cannot fall on the last, whether the vowel of that syllable be long or short, pronounced, half-pronounced, or not pronounced. With this exception, the accent always falls on the last long syllable. If there are no long syllables in the word, the accent is thrown back as far as possible, but never farther than the syllable before the antepenultimate. Thus, ki-sa-n(a) (final a not pronounced) ; pa-ni; hd-m”-ra; de-kiP-la-h?. In the last word there is a secondary

accent on the penultimate, owing to the following imperfect vowel (see below). When the first syllable of a word has not the main stress-accent, it also takes a secondary one, as in de-kh”-li-ai- nh’. When the letter a follows a syllable which has the accent (secondary or primary) it is only half pronounced, and is here denoted by a small ” above the line. In Mth. (but not in Mg. or Bh.) a final short i or u is often similarly very lightly pronounced, and is then represented by the same device. Before such an ” imper- fect ” .’ or*

” the preceding syllable has a secondary accent, if it has not already got the main one.

When a word ends in a preceded by a single uncompounded consonant, the a is not pronounced ; thus, kisana, sounded kisdn. This vowel is sometimes pronounced with a drawl, like the a in .” ball,” and is then transliterated &. When a has this sound it can end a word, and in this position is common in the second person of verbs; thus, dekhd, see thou. This sound is very frequently heard in Bhojpuri, and gives a peculiar tone to the whole dialect, which at once strikes the casual hearer. The usual short form of the letter c is a, but when this would lead to confusion it is shortened in Mth. and Mg. to a sound like that of a in the German Mann, and is then transliterated a. In Bh. it is always shortened to a. As an example, from pani, water, is formed the word paniyd, but (in Mth. and Mg.) from the word mdrab, to strike, we have Mth. mdr’li, Mg. mdfli, I struck, because marˆU (1%) would mean ” I died.” In Bh. mar”tt actually has both these meanings. The letters e and may be either long (e, 0) or short (e, 0). In Skr. the diphthongs di and &u (here transliterated Si, au) are much longer than the Bihari ai and au, which are contractions of only a+i and a-u respectively. We may compare the Sanskrit, or tatsama, at with the English ” aye,” and the tadbhava ai with the English ” I.” In counting syllables in Bihari, ai and au count each as two syllables, not each as one long syllable. The Skr. r appears only in tatsamas. Nasalization of vowels is extremely frequent. In this article it is represented by the sign ~ over the vowel, as in muh, mdr”ll and dekhflaW.

As regards consonants, d and dh, when medial, are pronounced as strongly burred r and rh, and are then transliterated as here shown. There is a constant tendency to change these to an ordinary dental r and rh ; thus, ghodd, pronounced ghdrd or ghdrd. The semi- vowels y and v are always pronounced like j and b respectively, unless they are simply euphonic letters put in to bridge the hiatus between two concurrent vowels ; thus yaiivana pronounced jauban, and maliyd for mali-d, ghofwd for ghor’-d. The sibilants s and s are both pronounced as a dental s, but (a relic of the old Mg. Pr.) are both invariably written as a palatal s in the Ka-ithi character. Thus, the English word ” session ” (sesan) is written sesan and pronounced sesan. The cerebral s, when uncompounded, is pro- nounced kh. When compounded, it generally has its proper sound. Thus, saspha, sixth, is pronounced khasth. As a general statement we may say that Bihari spelling is not fixed, and that there are often many ways of writing, and sometimes two or three ways of pronoun- cing, the same word.

The main typical characteristics of Mg. Pr. are that western Pr. 5 becomes i, and that western Pr. r becomes I. We have seen that the change of 5 to s occurs in Bengali but not in Bihari, and have given reasons for the change back to 5 in the latter language, although the Mg. Pr. i is retained in writing. In both Bengali and Bihari, a western r is not now represented by /, but is represented by r. This deviation from the Mg. Pr. rule is only apparent, and is due to the letter r representing two distinct sounds. In Skr., in the western Prakrits, and in the modern western languages, r is a cerebral letter, with a cerebral sound. In the modern eastern languages, r is a dental letter, with a dental sound. Everywhere, both in old times and at the present day, / was and is a dental letter. The meaning, therefore, of the change from western Pr. r to Mg. Pr. I was that the western r lost its cerebral sound, and became a dental letter, like I. That dental character is preserved in the r of the modern eastern languages. In fact, in Bihari r and / are frequently con- founded together, or with », another dental letter. Thus, we have kali or kdri, black; phar or phal, fruit; Skr. rajju-, B. leju-ri, a string ; Lakhnaur, the name of a town, quite commonly pronounced Nakhlaul; and the English names Kelly and Currie both pro- nounced indifferently kari or kali. Compare Assamese saril for Skr. iarira-.

The genius of the Bihari language is adverse to the existence of a long vowel in a tadbhava word, when it would occupy a position more than two syllables from the end. Thus, ghdrd, but ghor'wd; mdral, but mdfli. This is subject to various subsidiary rules which will be found in the grammars. The principle is a most important one, and, indeed, pervades all Indo-Aryan vernaculars of the present day, but it is carried out with the greatest thoroughness and con- sistency in Bihari. The whole system of declension and conjugation is subject to it. When a preceding i or e is shortened, the two together become ai, and similarly a shortened d--u or become au. Declension. — Bihari has a stronger sense of gender than the other languages of the Eastern Group. In the modern language the dis- tinction is in the main confined to animate beings, but in the older poetry the system of grammatical, as distinct from sexual, gender is in full swing. Except in the case of the interrogative pronoun, there is no neuter gender — words which in Skr. and Pr. were neuter being generally, but not always, treated as masculine. The plural

can everywhere be formed by the addition of some noun of multitude to the singular, and this is the universal rule in Mth., but in Mg. and Bh. it is generally made by adding n or (in Bh.) nh or ni to the singular, before all of which a final vowel is shortened. Thus ghor.d, a horse, ghdran, horses.

As for cases, the Apabhrarhsa locative -hi (-hi) and the ablative -hu (see Prakrit) terminations have survived in poetry, proverbs and the like, and each of them can now be used for any oblique case; but in ordinary language and in literature -hi and hi have become contracted to e and e, the former of which is employed for the instru mental and the latter for the locative case. Thus, ghar, house; ghar'e, by a house ; gharеˆ in a house. The old termination hu has also survived in sporadic instances, under the form 0, with an ablative sense. Cases are, however, usually formed, as elsewhere, by suffixing postpositions to a general oblique case (see Indo Aryan Languages). The oblique case in Bihari is generally the same as the nominative, but nouns ending in n, b, I or r, and some others, form it by adding d (a relic of the old Mg.Pr. genitive in -aha). Thus, maral, the act of striking, obi. mdrˆld (Mg. Pr. mdri-alldha). Another set of verbal nouns forms the oblique case in ai, e or a; thus, Bh. mar, the act of striking, mdre-ld, for striking, to strike. In Mg. every noun ending in a consonant may have its oblique form in e; thus, ghar, a house, ghar-ke or ghare-ke, of a house. The ai- or e- termination is another relic of the Apabhrarhsa -hi, and the a is a survival of the Ap. -hu.

The usual genitive postposition is k, which has become a suffix, and now forms part of the word to which it is attached, a final preceding vowel being frequently shortened. Thus, ghdrd, gen. ghordk. Other genitive postpositions are he, kar and ker. These, and all ether postpositions, are still separate words, and have not yet become suffixes. The more common postpositions are ' Acc- Dat. he; Instr.Abl. sa, se; Loc. mfi.., me. The genitive does not change to agree with the gender of the governing noun, as in Hindo stani, but in Bh. (not in Mth. or Mg.), when the governing noun is not in the nominative singular, the genitive postposition takes the oblique form kd; _thus, raja-ke mandir, the palace of the king; but rdja-kd mandir-me, in the palace of the king. In Mth. and Mg. .pronouns have a similar oblique genitive in d. There is no case of the agent, as in Hindostani ; the subject of all tenses of all verbs being always in the nominative case.

Every noun can have three forms, a short, a long and a redundant. The short form is sometimes weak and sometimes strong. Occa-sionally both weak and strong forms occur for the same word; thus, short weak, ghor; short strong, ghdrd; long, ghotˆwd; re- dundant, ghorauwd. This superfluity of forms is due to the existence of the pleonastic suffix ha in the Prakrit stage of the language (see Prakrit). In that stage the k of the suffix was already elided, so that we have the stages: — Skr. ghdta-ka-s, Pr. ghod-a-u, B. ghdrd (by contraction) or ghor"-wd (with insertion of a euphonic w). The

*redundant form is a result of the reduplication of the suffix, which was allowed in Pr. Thus. Skr. *ghdta-ka-ka-s, Pr. ghdda-a-a-u, B. ghorauwd (contracted from ghor'-wa-wa-a) . The long and redundant forms are mainly used in conversation. They are familiar and often contemptuous. Sometimes they give a definite force to the word, as ghorˆiud, the horse. In the feminine they are much used to form diminutives.*

As in other languages of the Eastern Group, the singulars of the personal pronouns have fallen into disuse. The plurals are used politely for the singulars, and new forms are made from these old plurals, to make new plurals. The old singulars survive in poetry and in the speech of villagers, but even here the nominative has disappeared and new nominatives have been formed from the oblique bases. All the pronouns have numerous optional forms. As a specimen of pronominal declension, we may give the most common forms of the first personal pronoun.

Maithili.

MagahT.

Bhojpuri.

Sing. Nom. Gen. Obi.

Plur. Nom. Gen. Obi.

ham

hamar

ham"ra

ham"rd sabh ham'rd sabhak ham"rd sabh

ham

hamar

ham"ra

ham"rani

ham a rani-ke

ham"rani

ham

hamar

ham”rd

hanfim-ka ham a ni-ke ham”ni

The important point to note in the above is that the oblique form singular is formed from the genitive. It is the oblique form of that case which is also used when agreeing with another noun in an oblique case. Thus, hamar ghar, my house; ham”rd ghar-mi, in my house; ham”ra-ke, to me. In Mth. the nominative plural is also the oblique form of the genitive singular, and in Bh. and Mg. it is the oblique form of the genitive plural. In Bengali the nominative plural of nouns substantive is formed in the same way from the genitive singular _(see Bengali). The_usual forms of the pronouns are ham, I; to, tu, thou; Mth. apPnah, Bh. raurd, Your Honour; i, this; 0, that, he; je, who; se, he; ke, who? Mth. ki, Mg.,*

1 The origin of the postpositions is discussed in the article Hindo-stani.

Bh. kd, what ? keo, keu, any one ; Mth. kicch”, Mg. kuchu, Bh. kachu, anything. The oblique forms of these vary greatly, and must be learned from the grammars.

Conjugation in Maithili and Magahi. — It is in the conjugation of the verb that the amazing complexity of the Mth. and Mg. grammars appears. The conjugation of the Bhojpuri verb is quite simple, and will be treated separately. In all three dialects the verb makes little or no distinction of number, but instead there is a distinction between non-honorific and honorific forms. In Mth. and Mg. this distinction applies not only to the subject but also to the object, so that for each person there are, in the first place, four groups of forms, viz. : —

I. Subject non-honorific, object non-honorific. II. Subject honorific, object non-honorific.

III. Subject non-honorific, object honorific.

IV. Subject honorific, object honorific.

English) substitutes the oblique form of the verbal noun for the present participle, as in mare hi, I am a-striking. The perfect is usually formed by adding the word for "is" to the past; thus, Mth. mdfli ach\ I have struck, lit. struck-by-me it-is. A pluperfect is similarly formed with the past tense of the auxiliary verb.

There are numerous irregular verbs. Most of the irregularities are due to the root ending in a vowel or in a weak consonant such as b (= Pr. v). Thus root pdb, obtain, past participle pdol, first singular, past tense, pauli. More definitely irregular are a few roots like kar, do, past participle kail. These last instances are cases in which the past participle is independently derived from a Skr. past participle, and is not formed as usual by adding the pleonastic suffix -al or -il (Skr., Pr., alia, illa K see Prakrit) to the Bihari root. Thus, Skr. krta-s, Pr. kaa-u, ka-ill-u, B. kail, instead of kar-al.

There is a long series of transitive verbs formed from intransitives and of causal verbs formed from transitives, generally by adding

Object : non-honorific.

Object : honorific.

c

u. Oh

Short Form.

Long Form.

Redundant Form.

Group III.

(Subject : non- honorific.)

Group IV. (Subject : honorific.)

Group I. (Subject : non- honorific.)

Group II. (Subject : honorific.)

Group I. (Subject : non- honorific.)

Group II. (Subject : honorific.)

Group I. (Subject : non- honorific.)

Group II. (Subject: honorific.)

I

2

mdfli or mdflalfl

mdrHiai

Or (with object in 2nd person)

mdfliau

mdrHiaik

Or (with object in 2nd person)

mar”liauk

1

mdfliainh’

marble

Same as 1st person.

mdfldh

Same as 1 st person, but no forms for object in 2nd person.

mdflahdk

Same as 1st person, but no forms for object in 2nd person.

mdr a lahunh’

Same as 1st person.

3

mdflak

mdflanV

mdral”kai Or (with object in 2nd person)

mdral”kau

Wanting

mdral a kaik Or (with object in 2nd person)

mdral”kauk

Wanting

mdral a kainh’

mdraPthinV

In Mth. all the forms in which the object is honorific end in -nh’. Mg. closely follows this, but the forms are more abraded.

Forms in which the object is non-honorific may be, as in the case of nouns, short, long or redundant. The long forms are made by adding ai (or in the second person -ah) to the short forms, and the redundant forms by adding k to the long forms. Again, if the object is in the second person, the ai of the long and redundant forms is changed to au. Finally, in the first person the non-honorific and honorific forms depending on the subject are the same, and are also identical with those forms of the second person in which the subject is honorific. We thus get the following paradigm of the Mth. past tense of the verb mdrab, to strike. The Mg. forms are very similar. Besides the above there are numerous optional forms. Moreover, these are only masculine forms. The feminine gender of the subject introduces new complications. It is impossible here to go into all these minutiae, interesting as they are to philologists. They must be learnt from the regular grammars. On the present occasion we shall confine ourselves to describing the formation of the principal parts of the verb.

In Mth. the usual verb substantive and auxiliary verb is, as in Bengali, based on the root ach (Skr. rcchati), the initial vowel being generally dropped, as in chi, I am; chalah”, I was; but ach\ he is. In Mg. we have hi or hiki, I am ; halu, I was. The finite verb has three verbal nouns or infinitives, viz. (from the root mar, strike), Mth. mar 1 or Mg. mar; mdrab; and mdral. All three are fully declined as nouns, the oblique forms being mdrai or mdre, mafbd, and mafia,

respectively. There are two participles, a present (Mth. mdrait = Pr. mdrentu) and a past (Mth. mdral — Pr. mdri-allu). The Mg. forms are very similar. The old Mg. Pr. present an,d imperative have survived, but all other tenses are made from verbal nouns or participles. The past tense (of which the conjugation for a Maithili transitive verb is given above) is formed by adding pronominal suffixes to the past participle. Thus, maral--i, struck-f by-me, becomes mdr'li, I struck. In the case of intransitive verbs, the suffixes may represent the nominative and not the instrumental case of the pronoun, and hence the conjugation is somewhat different. The future is a mixed tense. Generally speaking, the first two persons are formed from the verbal noun in b, which is by origin a future passive participle, and the third person is formed from the present participle. Thus, mdrab + ah", about-to-be-struck -f by-me, becomes ma^ati 1 , I shall strike, and mdrait + dh, striking + he, becomes mdftdh, he will strike (compare the English " he's going," for " he is on the point of going "). A past conditional is also formed by adding similar suffixes to the present participle, as in mdritah", (if) I had struck. This use of the present participle already existed in the Pr. age (cf. Hema-candra's Grammar, iii. 180). In Mth. the present definite and the imperfect are formed by conjugating the present or past tense respectively of the auxiliary verb with the present participle; thus marait chi, I am striking. Mg. (like vulgar

ab (Skr. dpaya-, Pr. ave-). Compound verbs are numerous. Noteworthy is the desiderative compound formed by adding the root cah, wish, to the dative of a verbal noun. Thus, ham dekhd-ke cahait-chi, I am wishing for the seeing, I wish to see.

Conjugation in Bhojpuri. — The Bh. conjugation is as simple as that of Mth. and Mg. is complex. In the first and second persons the plural is generally employed for the singular, but there is no change in the verb corresponding to the person or honour of the object. The usual verb substantive and auxiliary verb is derived in the present from the root bat or bar, be, as in bate or bare (Skr. vartate, Pr. vattai), he is. The past is derived from the root rah (Skr. rahati, Pr. rahai), as in rah"U or (contracted) rahi, I was. The verbal nouns and participles are nearly the same as in Mth.-Mg., the first verbal noun and the present participle being mar and mdrat, as in Mg. The old present and imperative, derived from the Mg. Pr. forms, are also employed in Bh. Thus, mare (Pr. marei), he strikes. This tense is often used as a present conditional. When it is wished to emphasize the sense of a present indicative, the syllable Id is suffixed. The same suffix is employed in Rajasthani, Naipali and Marathi to form the future, and in Bh. it is often also used with a future sense. The past tense is formed, as in Mth. Mg., by adding pronominal suffixes to the past participle; thus, mafli (mdra--li), I struck, as explained above. Similarly, for the first and second persons of the future we have mafbt, I shall strike, and so on, buf the third person is mart (Pr. mdrehi), he will strike, marihen (Pr. mdrehinti), they will strike. The periphrastic tenses are formed on the same principles as in Mth. As an example of Bh. conjugation we give the present, past and future tenses in all persons. There are a few additional optional forms, but nothing like the multi- plicity of meanings which we find in Mth. and Mg.

Present.

Past.

Future.

Sing. 1

2 3

Plur. 1

2 3

Not used mare-le mare-ld

mari-ld mdrd-la mare-le

Not used mafias mafle

mafU mar a ld maflen

Not used mafbe marl

mafbl mafbd marihen

It will be observed that the termination of the present changes in sympathy with the old present to which it is attached. In some parts of the Bh. area, especially in the district of Saran, # is sub- stituted for "l in the past. Thus, marui, I struck. The maru- is merely the past participle without the pleonastic termination alla which is used in Bihari, as explained under the Mth.-Mg. conjugation.

Irregular verbs, the formation of transitive and causal verbs, and the treatment of compound verbs, are on the same lines as in Mth.

Literature.

Bihari Literature. — In all three dialects there are numerous folk-epics transmitted by word of mouth. Several have been published at various times in the Journal 0} the Asiatic Society of Bengal and in the Zeitschrift der deutschen morgenlandischen Gesellschaft. The only dialect which has any real literature is Maithili. The earliest writer of whom we have any record is Vidyapati Thakkura (Bidyapati Thakur), who lived at the court of Raja Siva Sirhha of Sugaona in Tirhut in the 15th century. He was a voluminous Sanskrit writer, but his fame rests chiefly on his dainty lyrics in Maithili dealing with the loves of Radha and Krishna. These have exercised an important influence on the religious history of eastern India. They were adopted and enthusiastically recited by the reformer Caitanya (16th century), and through him became the home- poetry of the Bengali-speaking Lower Provinces. Their lan- guage was transformed (we can hardly say translated) into Bengali, and in that shape they have had numerous imitators. A collection of poems by the old Master-singer in their Maithili dress has been published by the present writer in his Chresto- mathy of that

language. The most admired of Vidyapati's successors is Manbodh Jha, who died in 1788. He composed a Haribans, or poetical life of Krishna, which has great popularity. Many dramas have been composed in Mithila. The fashion is to write the body of the work in Sanskrit and Prakrit, but the songs in Maithili. Two dramas, the Parijata-hara-na and the Rukmi-nl-parinaya, are attributed to Vidyapati. Among modern writers in the dialect, we may mention Harsanatha, an elegant lyric poet and author of a drama entitled Usa-harana, and Candra Jha, whose version of the Ramaydna and translation of Vidyapati's Sanskrit Purusa-pariksd are deservedly popular.

Authorities. — The Linguistic Survey of India, vol. v. part ii. (Calcutta, 1903), gives a complete conspectus of Bihari in all its dialects and sub-dialects. See also G. A. Grierson, Seven Grammars 0} the Dialects and Sub-dialects of the Bihari Language, parts i. to viii. (Calcutta, 1883-1887 — these deal with every form of Bihari except standard Maithili) ; and S. H. Kellogg, A Grammar of the Hindi Language, in which are treated High Hindi . . . also the Colloquial Dialects of . . . Bhojpur, Magadha, Maithila, &c. (2nd ed., London,

1893)-

For Maithili, see G. A. Grierson, An Introduction to the Maithilt Language of North Bihar, containing a Grammar, Chrestomathy and Vocabulary; part i. Grammar (Calcutta, 1881 ; 2nd ed., 1909) ; part ii. Chrestomathy and Vocabulary (Calcutta, 1882). For Vidyapati Thak- kura, see J. Beames," The Early Vaishnava Poets of Bengal," irxlndian Antiquary, ii. (1873), pp. 37 ff. ; the same, " On the Age and Country of Vidyapati," ibid. iv. (1875), pp. 299 ff. ;,anon. article in the Banga Darsana, vol. iv. (1282 B.S.),pp. 75 ff. ; Saradacarana Maitra, Introduction to Vidydpatir Padavali (2nd ed., Calcutta, 1285 B.S.) ; G. A. Grierson, Chrestomathy, as above; " Vidyapati and his Con- temporaries," Indian Antiquary, vol. xiv. (1885), pp. 182 ff. ; " On some Mediaeval Kings of Mithila," ibid. vol. xxviii. (1899), pp. 57 ff.

For Bhojpuri, see J. Beames, " Notes on the Bhojpuri Dialect of Hindi spoken in Western Bihar," in Journal of the Royal Asiatic Society, vol. iii. N.S., 1868, pp. 483 ff. ; A. F. R. Hoernle, A Grammar of the Eastern Hindi compared with the other Gaudian Languages (here " Eastern Hindi " means " Western Bhojpuri "), (London, 1880) ; J. R. Reid, Report on the Settlement Operations in the District of Azamgarh (Allahabad, 1881) — contains in appendices full

grammar and vocabulary of Western Bhojpuri).

No special works have been written about Magahi. (G. A. Gr.)

BIHARl-LAL, a name famous in Hindustani literature as the author of the Sat-sai, a collection of approximately seven hundred distichs, which is perhaps the most celebrated Hindi work of poetic art, as distinguished from narrative and simpler styles. The language is the form of Hindi called Braj-bhdsha, spoken in the country about Mathura, where the poet lived. The couplets are inspired by the Krishna side of Vishnu-worship, and the majority of them take the shape of amorous utterances of Radha, the chief of the Gopis or cowherd maidens of Braj, and her divine lover, the son of Vasudeva. Each couplet is independent and complete in itself, and is a triumph of skill in compression of language, felicity of description and rhetorical artifice. The distichs, in their collected form, are arranged, not in any sequence of narrative or dialogue, but according to the technical classification of the sentiments which they convey as set forth in the treatises on Indian rhetoric.

Little is known of the author beyond what he himself tells us. He was born in Gwalior, spent his boyhood in Bundelkhand,

and on his marriage settled in his father-in-law's household in Mathura. His father was named Kesab Ray; he was a twice- born (Dwija) by caste, which is generally understood to mean that he was a Brahman, though some assert that he belonged to the mixed caste, now called Ray, sprung from the offspring of a Brahman father by a Kshatriya mother. A couplet in the Sat-sai states that it was completed in a.d. 1662. It is certain that his patron, whom he calls Jai Shah, was the Raja of Amber or Jaipur, known as Mirza Jai Singh, who ruled from 161 7 to 1667 during the reigns of the emperors Jahangir, Shah Jahan and Aurangzeb. A couplet (No. 705) appears to refer to an event which occurred in 1665, and in which Raja Jai Singh was concerned. For this prince the couplets were composed, and for each dohd the poet is said to have received a gold piece worth sixteen rupees.

The collection very soon became celebrated. As the couplets are independent one of another, and were put together for- tuitously as composed, many different recensions exist; but the standard is that settled by an assembly of poets under the direction of Prince A'zam Shah, the third son of the emperor Aurangzeb (1653-1707), and hence called the A'zam-shahl; it comprises 726 couplets. The estimation in which the work is held may be measured by the number

of commentators who have devoted themselves to its elucidation, of whom Dr Grierson mentions seventeen. Two of them were Musalmans, and two other commentaries were composed for Musalman patrons. The collection has also twice been translated into Sanskrit.

The best-known commentary is that of Lallu-ji-Liil, entitled the Ldla-chandrika. The author was employed by Dr Gilchrist in the College of Fort William, where he finished his commentary in 1818. A critical edition of it has been published by Dr G. A. Grierson (Calcutta, government of India Press, 1896). (C. J. L.)

BIJAPUR, an ancient city and modern district of British India in the southern division of Bombay. It is a station on the Southern Mahratta railway, 60 m. S. of Sholapur. The ancient city was supplied with water by an elaborate underground system of reservoirs and aqueducts, which has been restored in part as a famine relief work. The population in 1901 was 23,811. The city used to be the extensive, splendid and opulent capital of an independent sovereignty of the same name, but now retains only the vestiges of its former grandeur. It is still, however, the most picturesque collection of ruins in India. The city of Bijapur owed its greatness to Yusuf Adil Shah, the founder of the independent state of Bijapur. It consists of three distinct portions — the citadel, the fort and the remains of the city. The citadel, built by Yusuf Adil Shah, a mile in circuit, is of great strength, well built of the most massive materials, and encompassed by a ditch 100 yds. wide, formerly supplied with water, but now nearly filled up with rubbish, so that its original depth cannot be discovered. Within the citadel are the remains of Hindu temples, which prove that Bijapur was an important town in pre-Mahommedan times. The fort, which was completed by Ali Adil Shah in 1566, is surrounded by a wall 6 m. in circumference. This wall is from 30 to 50 ft. high, and is strengthened with ninety-six massive bastions of various designs. In addition there are ten others at the various gateways. The width is about 25 ft.; from bastion to bastion runs a battle- mented curtained wall about 10 ft. high. The whole is surrounded by a deep moat 30 to 40 ft. broad. Inside these walls the Bijapur kings bade defiance to all comers. Outside the walls are the remains of a vast city, now for the most part in ruins, but the innumerable tombs, mosques, caravanserais and other edifices, which have resisted the havoc of time, afford abundant evidence of the ancient splendour of the place. Among its many buildings three are specially worthy of mention. The Gol Gunbaz, or tomb of Sultan Mahommed Adil Shah, which was built 1626-1656, is one of the most interesting buildings in the

world. It is a square building, 135 ft. each way, which is surmounted by a great circular dome 198 ft. high. The inside area (18,360 ft.) is greater than the Pantheon at Rome (13,833 sq. ft.). When first built the dome was covered by gold leaf, and the outer walls were adorned with stucco work picked out in gold and blue, but to-day there are very few traces of this

ornamentation. Of late years this mosque has been thoroughly restored, and one portion is now used as a museum in which all objects of interest discovered in the surrounding country are exhibited. Next to this comes the Ibrahim Roza, or tomb and mosque of Ibrahim Adil Shah II., which was completed about 1620 and is supposed to be one of the most exquisite buildings in the world after the Taj at Agra. It is said to have cost £1,700,000 and to have occupied thirty-six years in its con- struction. The Gagan Mahal, or ancient audience hall, is now a mass of ruins, but when complete must have been a beautiful building. The archway remains. It is over 60 ft. span and about 90 ft. high. Through this arch Sikandar Adil Shah, the last king of Bijapur, was brought bound with silver chains, while on a raised platform sat Aurangzeb, the Mogul emperor, who had left Delhi three years previously to conquer the Deccan. This magnificent palace, where so many scenes historic in the Bijapur dynasty occurred, is now the abode of hundreds of pigeons. Their cooing is the only sound that breaks the silence of the old halls.

History. — The founder of the Bijapur dynasty, Yusuf Adil Shah, is said by Ferishta to have been a son of the Ottoman sultan Murad II. When on his accession Mahommed II. gave orders for the strangling of all his brothers, Yusuf was saved by a stratagem of his mother. He went to India, where he took service under the Bahmani king of the Deccan, and ultimately became a person of great importance at the court of Mahmud II. In 1489 he took advantage of the break-up of the Bahmani power to establish himself as an independent sultan at Bijapur, his dominions including Goa on the west coast. He died in 151 1 (Goa had been taken by the Portuguese a few months before), and was succeeded by his son Ismail, who reigned prosperously till 1534. The next king worth mentioning is AH Adil Shah I., who reigned from 1557 to 1579 and, besides the fort, built the Jama Masjid or great mosque, the aqueducts and other notable works in the city. His son Ibrahim (d. 1626) maintained the prosperity of the state; but under his successor, Mahommed Adil Shah (d. 1656), the

rise of the Mahratta power under Sivaji began to make inroads upon it, and it was exposed to the yet more formidable ambition of Shah Jahan. On the death of Mahommed the succession passed to Ali Adil Shah II., and on his death in 1672 to his infant son, Sikandar Adil Shah, the last of the race. The kingdom had been for some time rapidly falling to ruin, and in 1686 the Mogul emperor Aurangzeb, who as Shah Jahan's general had unsuccessfully besieged the city under Mahommed Adil Shah, took Bijapur and annexed the kingdom to the Delhi empire. Among the curiosities of the capital is the celebrated monster gun (Malik-i-Maidan) , stated to be the largest piece of cast bronze ordnance in the world. It was captured from the king of Ahmednagar by the king of Bijapur about the middle of the 17th century. An inscription on the gun recording that fact was erased by Aurangzeb, who substituted the present inscription stating that he conquered Bijapur in 1686. The city and territory of Bijapur remained annexed to Delhi till 1724, when the nizam established his independence in the Deccan, and included Bijapur within his dominions. His sway over this portion of his acquisitions, however, was of brief duration; for, being defeated by the Peshwa in 1760, he was compelled to purchase peace by its cession to the Mahrattas. Upon the fall of the Peshwa in 1818 Bijapur passed into the hands of the British, and was by them included in the territory assigned to the raja of Satara. In 1848 the territory of Satara was escheated through the failure of heirs. The city was made the administra- tive headquarters of the district in 1885.

The district of Bijapur, formerly called Kaladgi, occupies a barren plain, sloping eastward from a string of feudatory Mahratta states to the nizam's dominions. It contains an area of 5669 sq. m., and its population in 1901 was 735,435, showing a decrease of 8% compared with an increase of 27% in the preceding decade, and a decrease of 21 % in the period between 1872 and 1881. These changes in population reveal the effects of famine, which was very severely felt in 1876-1878 and again in 1899-1000. There is very little irrigation in the district.

The principal crops are millet, wheat, pulse, oil-seeds and cotton. There are considerable manufactures of cotton and silk goods and blankets, and several factories for ginning and pressing cotton. The East Deccan line of the Southern Mahratta railway traverses the district from north to south.

BIJAWAR, a native state of central India, in the Bundelkhand agency. Area, 973 sq. m.; pop. (1901) 110,500; revenue, £10,000. Forests cover nearly half the total area of the state, which is believed

to be rich in minerals, but lack of transport facilities has hindered the development of its resources.

The state takes its name from the chief town, Bijawar (pop. in 1901, 5220), which was founded by Bijai Singh, one of the Gond chiefs of Garha Mandla, in the 17th century. It was conquered in the 18th century by Chhatarsal, the founder of Panna, a Rajput of the Bundela clan, by whose descendants it is still held. It was confirmed to Ratan Singh in 181 1 by the British government for the usual deed of allegiance. In 1857 Bhan Pratap Singh rendered signal services to the British during the Mutiny, being rewarded with certain privileges and a hereditary salute of eleven guns. In 1866 he received the title of maharaja, and the prefix sawai in 1877. Bhan Pratap was succeeded on his death in 1899 by his adopted son, Sanwant Singh, a son of the maharaja of Orchba.

BIJNOR, or Bijnaur, a town and district of British India in the Bareilly division of the United Provinces. The town is about 3 m. from the left bank of the Ganges. The population in 1901 was 17,583. There is a large trade in sugar. The American Methodists have a mission, which maintains some aided schools, and there is an English high school for boys.

The District of Bijnor has an area of 1791 sq. m. The aspect of the country is generally a level plain, but the northern part of it rises towards the Himalayas, the greatest elevation being 1342 ft. above the sea-level. The Koh and Ramganga are the principal rivers that flow through the district, and the Ganges forms its western boundary. In 1901 the population was 779,451, showing a decrease of 2 % in the decade. The country is watered in most parts by streams from the hills, but a series of small canals has been constructed. Sugar is largely exported. A line of the Oudh & Rohilkhand railway from Moradabad to Saharanpur runs through the district.

History. — Of the early history of Bijnor even after it passed under Mahommedan rule little is known with any certainty. The district was ravaged by Timur in 1399, and thenceforward nothing is heard of it till the time of Akbar, when it formed part of the Delhi empire and so continued undisturbed, save for occasional raids, so long as the power of the Moguls survived intact. In the early part of the 18th century, however, the Rohilla Pathans established their independence in the country called by them Rohilkhand; and about 1748 the Rohilla chief Ali Mahommed made his first annexations in Bijnor, the rest of which soon fell under the Rohilla domination. The northern districts were granted by Ali Mahommed to Najib Khan,

who gradually extended his influence west of the Ganges and at Delhi, receiving the title of Najib-ud-daula and becoming paymaster of the royal forces. His success, however, raised up powerful enemies against him, and at their instigation the Mahrattas invaded Bijnor. This was the beginning of a feud which con- tinued for years. Najib, indeed, held his own, and for the part played by him in the victory of Panipat was made vizier of the empire. After his death in 1770, however, his son Zabita Khan was defeated by the Mahrattas, who overran all Rohilkhand. In 1772 the nawab of Oudh made a treaty with the Rohillas, covenanting to expel the Mahrattas in return for a money payment. He carried out his part of the bargain; but the Rohilla chieftains refused to pay. In 1774 the nawab concluded with the government of Calcutta a treaty of alliance, and he now called upon the British, in accordance with its terms, to supply a brigade to assist him in enforcing his claims against the Rohillas. This was done; the Rohillas were driven beyond the Ganges, and Bijnor was incorporated in the territories of the nawab, who in 1801 ceded it to the East India Company. From this time thf history of Bijnor is uneventful, until the Mutiny of 1857, when

(on the 1st of June) it was occupied by the nawab of Najibabad, a grandson of Zabita Khan. In spite of fighting between the Hindus and the Mahommedan Pathans the nawab succeeded in maintaining his position until the 21st of April 1858, when he was defeated by the British at Nagina; whereupon British authority was restored.

BIKANIR, a native state of India, in the Rajputana agency, with an area of 23,311 sq. m. The natural aspect of the country is one desolate tract, without a single permanently running stream. Its surface is overspread with undulating sand-hills, of from 20 to 100 ft. above the average level, and so loose that men and quadrupeds stepping off the beaten track sink as if in snow. Two streams, the Katli and Ghaggar, attempt to flow through this dismal region, but are lost in its sands. Water is very scarce, and is raised from wells of from 250 to 340 ft. in depth. A few shallow salt lakes are filled by rain water, but they dry up on the setting in of the hot weather, leaving a thick crust of salt on their beds, which is used for commercial and domestic purposes. The inhabitants are very poor. They live chiefly by pasturage — rearing camels, of which their chief agricultural stock consists, and horses of a fine breed, which fetch good prices. From the wool which their sheep yield they manufac-

ture every article of native dress and good blankets. The other industries are leather work, sugar-refining, goldsmith's work, ivory carving, iron, brass, copper, stone masonry, tanning, weaving, dyeing and carpentry. The principal towns are Bikanir, the capital, Churu, Rajgarh, Ratangarh and Reni. In 1901 the population was 584,627, showing a decrease of 30% due to the results of famine. The revenue is £141,000. The military force consists of 500 men, besides the Imperial Service Corps of the same strength. The schools include a high school affiliated to the university of Allahabad, a school for the sons of nobles, and a girls' school called after Lady Elgin. The railway from Jodhpur has been extended towards Bhatinda in the Punjab; on the northern border, the Ghaggar canal in the Punjab irrigates about 5000 acres. Drought is of common occurrence. The famine of 1 899-1 900 was severely felt. The city of Bikanir has a railway station. The city is surrounded by a stone wall, 6 ft. thick, 15 to 30 ft. high and 3 J m. in circuit, with five gates and three sally-ports. The citadel is half a mile ncrth-east of the city, and is surrounded by a rampart with bastions. The population in 1901 was 53,075. There are manufactures of fine blankets and sugar-candy.

History. — In the 15th century the territory which now forms the state of Bikanir was occupied by Rajput clans, partly Jats, partly Mahommedans. About 1465 Bika, a Rathor Rajput, sixth son of Rao Jodha, chief of Marwar, started out to conquer the country. By taking advantage of the rivalries of the clans he succeeded; in 1485 he built the small fort at the capital which still bears his name, and in 1488 began the building of the city itself. He died in 1504, and his successors gradually extended their possessions. In the reign of Akbar the chiefs of Bikanir were esteemed among the most loyal adherents of the Delhi empire, and in 1570 Akbar married a daughter of Kalyan Singh. Kalyan's son, Rai Singh, who succeeded him in 1571, was one of Akbar's most distinguished generals and the first raja of Bikanir; his daughter married Selim, afterwards the emperor Jahangir. Two other distinguished chiefs of the house were Karan Singh (1 631-1669), who in the struggle of the sons of Shah Jahan for the throne threw in his lot with Aurangzeb, and his eldest son, Anup Singh (1669-1698), who fought with distinction in the Deccan, was conspicuous in the capture of Golconda, and earned the title of maharaja. From this time forward the history of Bikanir was mainly that of the wars with Jodhpur, which raged intermittently throughout the 18th century. In 1802, during one of these wars, Elphinstone passed through Bikanir on his way to Kabul; and the maharaja, Surat Singh (1 788-1828), applied to him for British

protection, which was, however, refused. In 181 5 Surat Singh's tyranny led to a general rising of his thakurs, and in 1816 the maharaja again applied for British protection. On the 9th of May 1818 a treaty was concluded, and order was restored in the country by British

troops. Ratan Singh, who succeeded his father in 1828, applied in vain in 1830 to the British government for aid against a fresh outbreak of his thakurs; but during the next five years dacoity became so rife on the borders that the government raised a special force to deal with it (the Shakhawati Brigade), and of this for seven years Bikanir contributed part of the cost. Hence- forth the relations of the maharajas with the British government were increasingly cordial. In 1842 Ratan Singh supplied camels for the Afghan expedition; in 1844 he reduced the dues on goods passing through his country, and he gave assistance in both Sikh campaigns. His son, Sardar Singh (1851-1872), was rewarded for help given during the Mutiny by an increase of territory. In 1868 a rising of the thakurs against his extortions led to the despatch of a British political officer, by whom affairs were adjusted. Sardar Singh had no son, and on his death in 1872 his widow and principal ministers selected Dungar Singh as his successor, with the approval of the British govern- ment. The principal event of his reign was the rebellion of the thakurs in 1883, owing to an attempt to increase the dues payable in lieu of military service; this led to the permanent location at Bikanir of a British political agent. Dungar Singh died in 7 without a son; but he had adopted his brother, Ganga

Singh (b. 1880), who succeeded as 21st chief of Bikanir with the approval of the government. He was educated at the Mayo College at Ajmere, and was invested with full powers in 1898. He attended King Edward's coronation in 1902, and accompanied the British army in person in the Chinese campaign of 1901 in command of the Bikanir Camel Corps, which also did good service in Somaliland in 1904. The state owes to this ruler the opening up of new railways across the great desert, which was formerly passable only by camels, and the tapping of the valu- able coal deposits that occur in the territory. For his conspicuous services he was given the Kaisar-i-Hind medal of the first class, made an honorary major in the Indian army, a G.C.I.E-, a K.C.S.I., and A.D.C. to the prince of Wales.

BILASPUR, a town and district of British India in the Chhat- tisgarh division of the Central Provinces. The town is situated on the right bank of the river Arpa. It is said to have been founded by a fisherwoman named Bilasa in the 17th century, and it still retains

her name. The place, however, came into note only after 1741, the year of the Mahratta invasion (see below), when a Mahratta official took up his abode there and began to build a fort which was never completed. In 1862 it was made the headquarters of the district. The population in 1901 was 18,937. It is an important junction on the Bengal-Nagpur railway, where the two lines from the west meet on their way to Calcutta, 255 m. from Nagpur.

The District of Bilaspur has an area of 7602 sq. m. It forms the upper half of the basin of the river Mahanadi. It is almost enclosed on the north, west and east by ranges of hills, while its southern boundary is generally open and accessible, well cultivated, and closely dotted with villages embedded in groups of fruit trees. The principal hills are — (1) the Maikal range, situated in the north-western extremity of the district; (2) a chain of hills forming part of the Vindhyan range, on the north; (3) the Korba hills, an off shoot of the Vindhyas, on the eastern boundary; and (4) the Sonakhan block of hills, in the vicinity of the Mahanadi river. The Mahanadi is the prin cipal river of the district, and governs the whole drainage and river system of the surrounding country. It takes its rise in a mountainous region which is described as the wildest of all wild parts of the Central Provinces, crosses the Bilaspur boundary near Seorinarain, and after a course of 25 m. in the south-eastern extremity of the district enters Sambalpur district. Within Bilaspur the river is everywhere navigable for six months in the year. Minor rivers are the Sakri, Hamp, Tesua, Agar, Maniari, Arpa, Kharod, Lilagar, Jonk and Bareri. The most important affluents of the Mahanadi are the Seonath and Hasdu. Besides the natural water supply afforded by the rivers, Bilaspur abounds in tanks. There are large forest areas, those belonging to the government covering over 600 sq. m. Sal (Shorea robusta) is the chief timber tree.

TT

93°

BILBAO

Bilaspur, which was formerly a very isolated tract, is now traversed in three directions by lines of the Bengal-Nagpur railway. It suffered severely from the famine of 1896-1897. In 1897 the general death-rate was as high as 90 per thousand, rising to 297 in Bilaspur town. It suffered no less severely in 1900, when in May the number of persons relieved rose to one- fourth of the total population.

In 1901 the population was 1,012,972, showing a decrease of J 3 %> compared with an increase of 14 % in the preceding decade. In 1906, however, the new district of Drug was formed, which took away 739 sq. m. from Bilaspur; the population on this reduced area of Bilaspur in 1901 was9i7,24o.

Among the Hindu inhabitants of the district, the Chamars and Pankas deserve particular notice. The former, who form the shoemaker and leather-dealing caste of the Hindu com- munity, had always been held in utter contempt by the other Hindu castes. But between 1820 and 1830 a religious movement, having for its object their freedom from the trammels of caste, was inaugurated by a member of the caste, named Ghasi Das, who preached the unity of God and the equality of men. Ghasi Das gave himself out as a messenger of God; he prohibited the adoration of idols, and enjoined the worship of the Supreme Being without any visible sign or representation. The followers of the new faith call themselves Satnamis, or the worshippers of Salnam or God. They do not keep the Hindu festivals and they defy the contempt of the Brahmans. Ghasi Das, the founder of the faith, was their first high priest. He died in 1850; his son succeeded him, but was assassinated (it was said by the Hindus), and the grandson succeeded him. The Pankas, who form about a sixth of the population, are all Kabirpanthis, or followers of Kabir, a religious reformer of the 15th century. There is no great difference between the Kabir Pankas and the Satnamis. They both abstain from meat and liquor, marry at the age of puberty, ordinarily celebrate their ceremonies through the agency of the elders of their own caste and bury their dead. The Pankas worship the Supreme Being under the name of Kabir, and the Chamars under the name of Salnam; while each community has a high priest to whom reverence is paid. At present the majority of the Pankas are cultivators, though formerly all were weavers. The Gonds are the most numerous among the aboriginal tribes, but so great an intermixture has taken place between them and the Hindu races that they have lost their language and most of their ethnical characteristics, such as the flat forehead, squat nose, prominent nostril, dark skin, &c, and are scarcely distinguishable from the other classes of the Hindu labouring population. In addition to some of the Hindu deities which they worship, the Gonds have their own gods — Bara Deva and Dula Deva. The Kan- wars are the next largest section of the aboriginal population. The upper class among them claim to be Rajputs, and are divided into numerous septs. Although an aboriginal tribe, the census returns them as a Hindu caste. All the northern landholders of Bilaspur belong to this tribe,

which consequently occupies an influential position.

The chief wealth of the district consists in its agricultural produce. Rice, wheat, pulses, millet, mustard, oil-seeds and cotton are the chief crops. Rice, the chief export, is sent to Bombay, Berar and northern India. The tussur silk industry is of considerable importance, and the silk is reputed the best in the Central Provinces. Sal and other timber is exported. Lac is sent in large quantities to Calcutta and Mirzapur. Coal and iron are the chief minerals ; sandstone for building purposes is quarried near Bilaspur and Seorinarain. Among local in- dustries the most important is the weaving trade.

The early history of the district is very obscure. From remote ages it was governed by kings of the Haihai dynasty of Ratanpur and Raipur, known as the Chhattisgarh rajas, on account of thirty-six forts (garhs), of which they were the lords. A genea- logical list of kings of this dynasty was carefully kept up to the fifty-fifth representative in the year 1741, when the country was seized without a struggle by the Mahrattas of Nagpur. From 1818 to 1830 Bilaspur came under the management of the British

government, the Mahratta chief of Nagpur being then a minor. In 1854 the country finally lapsed to the British government, the chief having died without issue. During the Sepoy mutiny a hill chief of the district gave some trouble, but he was speedily captured and executed.

BILBAO, formerly sometimes written Bilboa, the capital of the province of Biscay, in northern Spain; in 43° 15′ N. and 2 45′ W.; on the river Nervion on Ansa (in Basque Ibaizabal), and about 8 m. inland from the Bay of Biscay. Pop. (1900) 83,306. Bilbao is one of the principal seaports of Spain, and the greatest of Basque towns. It occupies a small but fertile and beautiful valley, shut in by mountains on every side except towards the sea, and containing the fortified haven of Portu- galete, the industrial town of Baracaldo (q.v.), and the villages of Santurce and Las Arenas, where the Nervion broadens to form the Bay of Bilbao at its mouth. Bilbao comprises two distinct parts, ancient and modern. The new town lies on the left bank, while the old town rises on the right in terraces. Communication across the river is afforded by five bridges, of which the oldest, San Antonio, is of stone, and dates from the 14th century. The houses in the principal streets are built of hewn stone, and are several storeys high, with projecting eaves that give shelter from both sun and rain. Many of the streets in the old town are very narrow,

and have an appearance of cleanliness and quiet. For a long time no carts or carriages were permitted to enter the city for fear of polluting and injuring the pavement, and the transport of goods was carried on in hand-carts. But after 1876 entirely new districts were mapped out on the left bank of the Nervion. Fine broad streets, splendid squares and public gardens, hotels, villas, palatial new public buildings and numerous schools came into existence. The part of the town on the right bank is, however, still the great centre of business, the narrow streets containing the best shops. There, too, are the banks, the town hall, the theatre, the principal clubs, and the principal churches, including that of Santiago, which dates from the 14th century. In and around Bilbao there are more than thirty convents and monasteries, and at Olaveaga, about a mile off, is the Jesuit university, attended by 850 students. Public education is not, however, entirely in the hands of the priesthood and nuns; there are an institute, a normal school to train teachers, a school of arts and handicrafts, a nautical school and numerous public primary schools for both sexes.

Few Spanish cities grew so rapidly in size, importance and wealth as Bilbao in the latter half of the 19th century. Its first bank was founded in 1857; its first railway (Bilbao-Tudela) opened in 1863. Thenceforward, despite the check it received from the Carlist rebellion of 1870-1876, and the contemporaneous decline of its wool and shipbuilding industries, its prosperity increased steadily. The population, 17,649 in 1870, rose to 50,734 m 1887, 74,076 in 1897, and 83,306 in 1900. This develop- ment was due principally to the growth of the mining and metallurgical industries. From a very early period, as the Old English word bilbo, " a sword," attests, Bilbao was celebrated for the excellent quality of its steel blades; in modern times it was the natural headquarters of the important steel and iron trades of the Basque Provinces. Hence it became the centre of a network of railway lines unsurpassed in Spain. The harbour works board, constituted in 1877, improved the river channel and the bar; made wharves and embankments; lighted the lower reaches of the river by electricity, so as to allow vessels to enter by night; and constructed a breakwater and counter-mole outside the bar of the river Nervion, between Santurce, Portu- galete and the opposite headland at the village of Algorta, so as to secure deep anchorage and easy access to the river. The first dry dock was constructed in 1896; in 1905 it was supple- mented by another, the largest in Spain. The exports are chiefly iron; the imports coal; large quantities of wine from Navarre and the Ebro valley are also sent abroad, and the importation of timber of all kinds from Scandinavia and Finland,

and coastwise from Asturias, is of great importance. In the coasting trade the exports are mostly pig-iron, codfish and some products of local industries and agriculture. The shipping

at Bilbao is mainly Spanish, owing to the multitude of small vessels employed in the coasting trade; but from 1880 onwards the majority of foreign ships were British. In 1904, 3310 vessels of 2,267,957 tons were accommodated at Bilbao; more than 2000 were Spanish and nearly 700 British. In the same year new harbour works and lighting arrangements were under- taken on a large scale, and a movement was initiated for the revival of shipbuilding. Besides the mining and metallurgic industries, Bilbao has breweries, tanneries, flour mills, glass works, brandy distilleries, and paper, soap, cotton and mosaic factories.

Bilbao, or Belvao, as it was often called, was founded by Don Pedro Lopez de Haro about 1300, and soon rose into importance. It was occupied by the French in 1795, and from 1808 to 1813; and in 1835 and 1874 it was unavailingly besieged by the Carlists.

BILBEIS, or Belbes, a town of lower Egypt, on the eastern arm of the Nile, 36 m. N.N.E. of Cairo by rail. Pop. (1907) 13,485. The Coptic name, Phelbes, seems to have been derived from Egyptian, but nothing is known of the place before medieval times. Considered the bulwark of the kingdom on that side, Bilbeis was by the Moslems defended with strong fortifications. In 1163-1164 it was besieged for three months by the crusaders under Amalric, and in 1168 was captured and pillaged by another army of crusaders. Napoleon in 1798 ordered the restoration of the fortifications, but they have again fallen into decay. Bilbeis was the first halting-place of the English cavalry in their march on Cairo after the fight at Tel-el-Kebir on the 13th of September 1882.

BILBERRY, Blaeberry or Whortleberry, known botanic- ally as V actinium myrtillus (natural order Ericaceae), a low- growing shrub, found in woods, copses and on heaths, chiefly in hilly districts. The stiff stems, from half a foot to two feet long, bear small ovate leaves with a serrate margin, and small, globose, rosy flowers tinged with green. The berries are dark blue, with a waxy bloom, and about one-third of an inch in diameter; they are used for tarts, preserves, &c. The plant is widely distributed throughout the north temperate and

ex- tends into the arctic zone. Cowberry is a closely allied species, V. Vitis-J.daea, growing in similar situations, but not found in the south-eastern portion of England, distinguished by its evergreen leaves and red acid berry.

BILBO (from the Spanish town Bilbao, formerly called in England " Bilboa," and famous, like Toledo, for its sword- blades), in the earliest English use, a sword, especially one of superior temper. In the plural form (as in Shakespeare's phrase " methought I lay worse than the mutines in the bilboes ") it meant the irons into which offenders were put on board ship.

BILDERDIJK, WILLEM (1756-1831), Dutch poet, the son of an Amsterdam physician, was born on the 7th of September 1756. When he was six years old an accident to his foot incapacitated him for ten years, and he developed habits of continuous and concentrated study. His parents were ardent partisans of the house of Orange, and Bilderdijk grew up with strong monarchical and Calvinistic convictions. He was, says Da Costa, " anti-revolutionary, anti-Barneveldtian, anti- Loevesteinish, anti-liberal." After studying at Leiden Univer- sity, he obtained his doctorate in law in 1782, and began to practise as an advocate at the Hague. Three years later he contracted an unhappy marriage with Rebecca Woesthoven. He refused in 1795 to take the oath to the new administration, and was consequently obliged to leave Holland. He went to Hamburg, and then to London, where his great learning procured him consideration. There he had as a pupil Katharina Wilhel- mina Schweickhardt (1776-1830), the daughter of a Dutch painter and herself a poet. When he left London in June 1797 for Braunschweig, this lady followed him, and after he had formally divorced his first wife (1802) they were married. In 1806 he was persuaded by his friends to return to Holland. He was kindly received by Louis Napoleon, who made him his librarian, and a member and eventually president (1809-1811) of the Royal Institute. After the abdication of Louis Napoleon he suffered great poverty ; on the accession of William of

Orange in 1813 he hoped to be made a professor, but was dis- appointed and became a history tutor at Leiden. He continued his vigorous campaign against liberal ideas to his death, which took place at Haarlem on the 18th of December 1831.

A picture of the Bilderdijk household is given in the letters (vol. v., 1850) of Robert Southey, who stayed some time with Bilderdijk in 1825. Madame Bilderdijk had translated Roderick into Dutch (1823-1824). For his work as a poet see Dutch Literature. His many-

sided activity showed itself also in historical criticism — Geschiedenis des Vaderlands (1832-1851, 13 vols.), a conservative commentary on Wagenaar's Voder- landsche Historic, in translations from Sophocles (1779 and 1789), of part of the Iliad, of the hymns and epigrams of Calli- machus, and from the Latin poets; in philology — Taal en Dichtkundige Verscheidenheden (1820-1825, 4 vols.); and in drama — the tragedies, Floris de Vijfde (1808), Willem I. van Holland (1808), and others. His most important poetical works are the didactic poem, De Ziekte der geleerden (" The Disease of the Learned "), 2 vols., 1807; a descriptive poem in the manner of Delille in Het Buitenleven (1803); and his fragmentary epic, De Ondergang der eerste wereld (1820). Other volumes were Mijne Verlustigung (Leiden, 1781), Bloemtjens (1785), Mengel-poezij (1799, 2 vols.), Poezij (1803-1807, 4 vols.), Mengelingen (1804-1808,4 vols.), Nieuwe Mengelingen (1806,2 vols.), Hollands Verlbssing (1813-1814, 2 vols.), V aderlandsche Uitboezemingen (Leiden, 1815), Winterbloemen (1811, 2 vols.), &c, in some of which his wife collaborated.

His poetical works were collected by I. da Costa (Haarlem, 1856-1859, 16 vols.), with a biography of the poet. See also " Mijne Levensbeschrijving " in Mengelingen en Fragmenlen . . . (1834); his Brieven (ed. 1836-1837) by I. da Costa and W. Messchert; Dr R. A. Kollewijn, Bilderdijk, Zijn Leven en werken . . . (2 vols., 1S91).

BILEJIK (Byzantine Belocome), chief town of the Ertoghrul sanjak of the Brusa vilayet in Asia Minor, altitude 1900 ft., situated on a hill a \ m. from its station on the Ismid-Angora railway. Pop. 10,500 (Moslems, 7200; Christians, 3300). It is an important centre of the silk industry, and has several silk- spinning factories.

BILFINGER (Bulffinger), GEORG BERNHARD (1693- 1750), German philosopher, mathematician and statesman, son of a Lutheran minister, was born on the 23rd of January 1693, at Kanstatt in Wurttemberg. As a boy he showed great aptitude for study, and at first devoted himself to theology, but under the influence of Wolff's writings he took up mathematics and philosophy on the lines of Wolff and Leibnitz. Returning to theology, he attempted to connect it with philosophy in a treatise, Dilucidationes philosophical, de deo, anima humana, mundo (Tubingen, 1725, 1746, 1768). This work, containing nothing original, but giving a clear representation of Wolff's philosophy, met with great success, and the author was appointed to the office of preacher at the castle of Tubingen and of reader in the school of theology. In 1721, after two years' study under Wolff, he became professor of philosophy at

Halle, and in 1724 professor of mathematics. His friends at Tubingen disapproved his new views, and in 1725, on Wolff's recommendation, he was invited by Peter the Great to lecture in St Petersburg, where he was well received. His success in winning the prize of a thousand crowns offered for a dissertation on the cause of gravity by the Academy of Sciences of Paris secured his return to his native land in 1 73 1. In 1735, largely on account of his knowledge of military engineering, Duke Charles Alexander (1733-173 7) made him a privy councillor, but his hands were tied owing to the frivolous atmosphere of the court. On the death of the duke, however, he became a member of the Regency Council, and devoted himself with energy and success to the reorganization of the state. In the departments of education, state-religion, agriculture and commerce, his administration was uniformly successful, and he became in a real sense the head of the state. He died at Stuttgart on the 18th of February 1750. After his return from Russia, he won the highest respect at home and abroad, and Frederick the Great is recorded to have said of him, " He was a great man whom I shall ever remember with admiration."

Beside the Dilucidationes, he wrote: — De harmonia animi et corporis humani commentatio (Frankfort and Leipzig, 1735; Tubingen, 1741); De origine et permissione mali (1724), an account of the Leibnitzian theodicy. .

For his life and times see Tafinger, Leichenrede (Stuttgart, 1750) ; Prof. Abel in Moser's Patriot. Archiv., 1788, 9, p. 369; Spittler, Verm. Schriften, 13, p. 421; G. Schwab in Morgenblatt (1830). For his philosophy, see R. Wahl, " Bilfinger's Monadologie " (Zeil- schrift filr Philos. vol. 85, pp. 66-92, 202-231 (Leipzig, 1884); E. Zeller, Geschichte d. deutsch. Philos. seit Leibnitz, pp. 283 foil., 294).

BILGE (a corruption of bulge, from Fr. bouge, Lat. bulga, a bag, deriving probably from an original Celtic word), the " belly " or widest part of a cask; the broad horizontal part of a ship's bottom above the keel; also the lowest interior part of the hull; hence " bilge-water," the foul water which collects in the bilge. " Bilge-keels " are pieces of timber fastened to the bottom of a ship to reduce rolling (see Shipbuilding).

BILHARZIOSIS. In various parts of Africa the inhabitants are liable

to suffer from a form of endemic haematuria caused by the presence of a parasite in the mucous membrane of the urinary passages. This parasite was discovered in 1852 by Bilharz, and hence is generally known as Bilharzia, though it has been more scientifically named Schistosoma haematobium. The condition to which it gives rise is that of bilharziosis. (For description and life history of the para- site see Trematodes.) In man the parasites and ova have been found in the minute veins of the bladder, ureter and pelvis of the kidney (more rarely in other organs), where they infest the mucous and submucous tissues. In an affected bladder the mucous membrane presents swollen vascular patches of varying size, or warty prominences on which the urinary salts may be deposited. The ova often serve as a nucleus for urinary calculi. Similar changes may take place in the ureter, and the consequent swelling lead to obstruction to the passage of urine, and if left untreated to pyelitis and pyonephrosis. If the rectum be affected the mucous membrane becomes thickened, polypoid growths form and large submucous haemorrhages may take place.

As to the mode of entrance of this parasite opinion is divided. Some authorities favour the view that the entrance is through the skin, urethra or rectum, the result of bathing in infected water; others that it is taken by the mouth in water or uncooked fish. The symptoms to which it gives rise are haematuria, pain in the perineal region and a greater or less degree of anaemia through loss of blood. If the disease continue, cystitis and its consequent train of symptoms ensue (see Bladder and Pro- state Diseases) . If the rectum be affected there is considerable discharge of mucus, and later prolapsus ani may be the result. But the symptoms vary to a remarkable extent, from the slightest producing but little discomfort, to the most severe resulting in death. The liquid extract of male fern is the only drug used with much success. The symptoms caused by the parasite must be treated as they arise. Polypoid growths of the rectum must be surgically treated.

BILIN (Czech Bilina), a town of Bohemia, Austria, 90 m. N. of Prague by rail. Pop. (1900) 7871, chiefly German. It is a very old town situated on the Biela, and contains a 17th- century castle, belonging to Prince Lobkowitz. In the vicinity of the towns are extensive lignite mines. Bilin is famous for its mineral springs, the Biliner Sauerbrunnen. They have a tempera- ture of 45-6° F., and contain a large proportion of bicarbonate of soda. About 4,000,000 bottles of water are exported annually, and another article of export is the salt recovered from the water by evaporation. About 5 m. to the S. of the Sauerbrunnen lies the Bofen or Biliner Stein (1763 ft.),

a large mass of phonolite or clinkstone, with rare flora and fine view. The town is indeed surrounded by basaltic rocks, the largest of them being the Radelstein (2460 ft.), from which a fine view is obtained.

BILL. There are three words in English with distinct mean- ings and derivations, (ij A written, originally sealed, document. The word is derived from the Early English bille, Anglo-Latin villa, from Latin bulla, in the medieval sense of " seal." It is a doublet, therefore, of " bull." (2) A common Teutonic word for a long-handled cutting weapon (0. Eng. bil, Miles, sword or

falchion, O. Sax. bill, M.H.G. Bil, Mod. Ger. Bille, a pickaxe; no connexion with Ger. Beil, an axe), of which the name and shape is preserved in the hedging-bills used for pruning hedges and lopping the branches of trees. For an account of the weapon see (2) below. (3) The beak of a bird. This may be connected with (2), but it does not appear in any Teutonic language other than English.

(1) In the sense of a document the word is used in various connexions in law and commerce.

In the English parliament, and similar legislative bodies, a bill is a form of statute {q.v.) submitted to either house, which when finally passed becomes an act. The modern system of legislating by means of bill and statute appears to have been introduced in the reign of Henry VI., superseding the older mode of proceeding by petitions from the Commons, assented to by the king, and afterwards enrolled by the judges. A bill consists of a preamble, reciting the necessity for legislation, and clauses which contain the enactments. (For procedure see Parliament.)

A Bill in Chancery, in former days, in English law, was a written statement of the plaintiff's case whereby he complained of the wrong upon which the suit was based and prayed for relief. By the Judicature Acts 1873 and 1875 its place was taken by a writ and statement of claim (see Pleading).

A Bill of Indictment is a presentment against a prisoner, charg- ing him with an offence, and presented at quarter sessions or assizes to the grand jury (see Indictment).

A Bill of Costs is an account setting forth the charges and dis- bursements incurred by a solicitor in the conduct of his client's business. The delivery of a bill of costs is by statute a condition

necessary before the solicitor can sue upon it (see Costs).

A Bill of Exceptions was formerly a statement in writing of objections to the ruling of a judge, who, at the trial, had mistaken the law, either in directing the jury, or in refusing or admitting evidence or otherwise. The bill of exceptions was tendered at any time before the verdict by counsel of the dissatisfied party, who required the judge to seal it. The case proceeded to the jury, and judgment being given, the point raised was brought before a court of error. Bills of exceptions were confined to civil cases. They were abolished by the Judicature Act 1875, and a " motion for a new trial " substituted (see Trial).

A Bill of Health is a document given to the master of a ship by the consul or other proper authority of the port from which he clears, describing the sanitary state of the place. A bill of health may be either " clean," " suspected " or " touched," or " foul." A " clean " bill imports that at the time the ship sailed, no disease of an infectious or contagious kind is known to exist; a "suspected" or "touched" bill, that no such disease has as yet appeared, but that there is reason to fear it; a "foul" bill, that such a disease actually exists at the time of the ship's departure. Bills of health are necessary where the destination of the ship is a country whose laws require the production of such a bill before the ship is allowed into port, and where, in default of such production, the ship is subjected to quarantine.

A Bill of Mortality in England was a weekly return issued under the supervision of the company of parish clerks showing the number of deaths in a parish. During the Tudor period England suffered much from plague, and various precautionary measures became necessary. Quarantine or isolation was the most im- portant, but to carry it out successfully it was necessary to have early warning of the existence of plague in each parish or house. For this purpose searchers — usually women — were appointed, who reported to the clerk the cause of each death in the parish. He, in turn, sent a report to the parish clerks' hall, from whence was issued weekly a return of all the deaths from plague and other causes in the various parishes, as well as a list of those parishes which were free from plague. Bills of mortality are usually said to date from 1538, when parish registers were estab- lished by Cromwell (Lord Essex) , but there is extant a bill which dates from August 153 5, and one which is possibly even earlier than this. It is certain that they first began to be compiled in a recognized manner in December 1603, and they were con- tinued regularly from that date down to 1842, when under the

Births and Deaths Registration Act 1836 they were superseded by the registrar-general's returns. It was not till 1728, when the ages of the dead were first introduced, that bills of mortality acquired any considerable statistical value. It was on the data thus furnished that the science of life insurance was founded.

A Bill of Particulars was, in law, a statement in writing, in- forming each party to a suit the precise nature of the case they !had to meet. It contained the plaintiff's cause of action or the defendant's set-off. Particulars are now usually indorsed on the pleadings (see Pleading).

A Bill of Peace is, in equity, a suit brought by a person to establish and perpetuate a right which he claims, and which from its nature may be controverted by different persons at different times and by different actions ; or where several attempts have already been unsuccessfully made to overthrow the same right, and justice requires that the party should be quieted in the right if it is already sufficiently established. Bills of this nature were usually filed where there was one general right to be established against a great number of persons, or where one person claimed or defended a right against many, or where many claimed or defended a right against one. Thus, a bill might be filed by a parson for tithes against his parishioners; by parishioners against a parson to establish a modus; by a lord against tenants for an encroachment under colour of a common right; or by tenants against a lord for disturbance of a common right. Bills were also filed in cases where the plaintiff had, after repeated and satisfactory trials, established his right at law, and yet was in danger of further litigation and obstruction to his right from new attempts to controvert it. Actions in the nature of bills of peace are still maintainable.

A Bill of Sight is a document furnished to a collector of customs or other proper officer by an importer of goods in England, who, being unable for want of full information to make a perfect entry of goods consigned to him, describes the same to the best of his knowledge and information. The goods may then be provision- ally landed, but perfect entry must be made within three days by indorsing on the bill of sight the necessary particulars. In default of perfect entry within three days the goods are taken to the king's warehouse, and if perfect entry is not made within one month and all duties and charges paid, they are sold for payment thereof. See the Customs Consolidation

Act 1876.

A Bill of Store is a license granted by the custom-house to re-import British goods into the United Kingdom. All British goods re-imported into the United Kingdom are entered as foreign, unless re-imported within ten years after their exporta- tion and unless the property in the goods continues and remains in the person by whom they were exported. But in such case they may be entered as British goods, by bill of store, with the exception of corn, grain, meal, flour and hops.

A Bill of Victualling or Victualling Bill, in its original meaning, is a list of all stores for shipment, but now an order from an export officer of the customs for the shipment from a bonded warehouse or for drawback of such stores as may be required and allowed with reference to the number of the crew and passengers on board a ship proceeding on an oversea voyage. It is made out by the master and countersigned by the collector of customs. Its object is to prevent frauds on the revenue. No such stores are supplied for the use of any ship nor any articles taken on board deemed to be stores unless they are borne upon the victualling bill, and any such stores relanded at any place in the United Kingdom without the sanction of the proper officers of the customs will be forfeited and the master and owner will each be liable to a penalty of treble the value of the stores or £100. A victualling bill serves as; a certificate of clearance when there is nothing but stores on board the ship.

Seealso Ad venture, Attainder, Indemnity, Letterof Credit, Bill of Exchange, Bill of Rights and Bill of Sale; for a bill of lading see Affreightment. (T. A. I.)

(2) In the sense of a weapon, the primitive forms of a bill suggest short scythe-blades or hedgers' bill-hooks mounted on tall staves. In such shape it is found in the hands of the English before the Conquest. English medieval documents make much

confusion between the bill and the halbert and other forms of staved weapons with cutting heads. Before the 15th century the bill had been reinforced with a pike head above the curved blade and another jutting at a right angle from the blade's back. In this form it became a popular English weapon, the " brown bill " of many ballads. Billmen are not found in the king's host at Crecy and Calais, the bowmen carrying malls or short swords, and Henry VII. 's contracts for troops do not name the bill, which may be regarded rather as the private man's weapon. But when, in the middle of the 15th century, Walter Strickland, a West- morland squire, contracts to raise armed

men, it is noticeable that more than half his horsemen carry the bill as their chief arm, while seventy-one bowmen are to march on foot with seventy-six billmen. In the 16th century the bill, with the halbert, fell out of use among regular troops, the pike taking their place on account of the longer staff, which made it a better defence against cavalry. It remained during the 17 th century as a watchman or constable's weapon, although rudely-fashioned bills were seen in Sedgemoor fight. (O. Ba.)

BILLAUD-VARENNE, JACQUES NICOLAS (1756-1819), French revolutionist, was the son of an avocat at the parlement of Paris. He was badly brought up by a feeble father, a mother who combined immorality with religion, and a libertine abbe. At nineteen he donned the robe of an Oratorian, but did not take the vows, and busied himself with literature rather than with religion. In 1785 he left the Oratorian college where he was prefect of studies, came to Paris, married and bought a position as avocat in the parlement. Early in 1789 he published at Amsterdam a three-volume work on the Despotisme des ministres de la France, and he adopted with enthusiasm the principles of the Revolution.

At the Jacobin club he became from 1790 one of the most violent of the anti-royalist orators. After the flight of Louis XVI. to Varennes, he published a pamphlet, L'Acephocratie, in which he demanded the establishment of a federal republic. On the rst of July, in a speech at the Jacobin club he spoke of a republic, and the reference called out the stormy derision of the partisans of the constitutional monarchy; but repeating his demand for a republic on the 1 5th of the same month, the speech was ordered to be printed and to be sent to the branch societies through- out France. In the night of the 10th of August 1792 he was elected one of the " deputy-commissioners " of the sections who shortly afterwards became the general council of the commune. He was accused, though proof is lacking, of having been an accomplice in the massacres in the prison of the Abbaye. Elected a deputy of Paris to the National Convention, he at once spoke in favour of the immediate abolition of the monarchy, and the next day demanded that all acts be dated from the year 1 of the republic. At the trial of Louis XVI. he added new charges to the accusation, proposed to refuse counsel to the king, and voted for dftath " within 24 hours." On the 2nd of June 1793 he proposed a decree of accusation against the Girondists; on the 9th, at the Jacobin club, he outlined a programme which the Convention was destined gradually to realize: th£ expulsion of all foreigners not naturalized, the establishment of an impost on the rich, the deprivation of the rights of citizenship of all " anti-social " men, the

creation of a revolutionary army, the licensing of all officers ci-devant nobles, the death penalty for unsuccessful generals. On the 15th of July he made a violent speech in the Convention in accusation of the Girondists. Sent in August as " representative on mission " to the departments of the Nord and of Pas-de-Calais, he showed himself inexorable to all suspects. On his return he was added to the Committee of Public Safety, which had decreed the arrest en masse of all suspects and the establishment of a revolutionary army, caused the extraordinary criminal tribunal to be named officially "Revolutionary Tribunal" (on the 29th of October 1793), demanded the execution of Marie Antoinette and then attacked Hebert and Danton. Meanwhile he published a book, Les Elements du ripublicanisme, in which he demanded a division of property, if not equally, at least proportionally among the citizens. But he became uneasy for his own safety and turned

against Robespierre, whom he attacked on the 8th Thermidor as a " moderate " and a Dantonist. Surprised and menaced by the Thermidorian reaction, he denounced its partisans to the Jacobin club. He was then attacked himself in the Convention for his cruelty, and a commission was appointed to examine his conduct and that of some other members of the former Com- mittee of Public Safety. He was arrested, and as a result of the insurrection of the 12th Germinal of the year 3 (the 1st of April 1795), the Convention decreed his immediate deportation to French Guiana. After the 18th Brumaire he refused the pardon offered by the First Consul. In 1816 he left Guiana and took refuge in Port-au-Prince (Haiti), where he died of dysentery.

*In 1 82 1 were published the Memoir es de Billaud-Varenne ecrits a Port-au-Prince (Paris, 2 vols.), but they are probably forgeries. An interesting autobiographical sketch of his youth, Tableau du premier age, composed in 1786, was published in 1888 in the review, La Revolution francaise. The facts of such a life need no comment. See, in addition to histories of the Revolution, F. A. Aulard, Les Orateurs de la legislative et de la convention (2nd ed., 1906). (R. A. *)*

BILLET. (1) (Like the Fr. billet, a diminutive of bilk, a writing), a small paper or " note," commonly used in the 18th and early 19th centuries as a " billet of invitation." A particular use of the word in this sense is to denote an order issued to a soldier entitling him to

quarters with a certain person (see Billeting). From meaning the official order, the word billet came to be loosely used of the quarters thus obtained, giving rise to such colloquial expressions as " a good billet." Hence arises the sense of " billet " as the destination allotted to any- thing, for example in the saying of William III. " every bullet has its billet." Another special sense of the word is that of a voting-paper, found in the 17th century, especially with refer- ence to the Act of Billets passed by the Scottish parliament in 1662.

(2) (From the diminutive billelte or billot of the Fr. bilk, the trunk of a tree) , a piece of wood roughly cylindrical, cut for use as fuel. In medieval England it was used of the club or blud- geon which was the weapon proper to the serf (Du Cange, s. Billus). The name has been transferred to various objects of a similar shape: to ingots of gold, for example, or bars of iron; and in heraldry, to a bearing of rectangular shape. The term is applied in architecture to a form of ornamental moulding much used in Norman and sometimes in Early English work. It bears a resemblance to small billets of wood arranged at regular intervals in a sunk moulding. In French architecture it is found in early work and there, sometimes, forms the decora- tion of a string-course under the gutter, with two or three rows of billets.

BILLETING, the providing of quarters {i.e. board and lodg- ings) for soldiers (see Billet, i). Troops have at all times made use of the shelter and local resources afforded by the villages on or near their line of march. The historical interest of billeting in England begins with the repeated petitions against it in the reigns of Elizabeth, James I. and Charles I., which culminated, in the Petition of Right. The billeting of troops was superintended by a civil magistrate of the district to which the troops were sent or through which they passed. The magis- trate, who acted under an order from the king, too often spared his friends at the expense of his political or personal opponents. Owing to the abuses to which the system led, it was declared illegal by the Petition of Right 1628, and again by an act of 1679. During the reign of James II., however, orders were frequently issued for billeting, and one of the grievances in the Bill of Rights was the quartering of soldiers contrary to law. On the organization of a standing army after the revolution it was necessary to make legal provision for billeting owing to the deficiency of barrack accommodation, which sufficed only for 5000 men. Accordingly, the Mutiny Act 1689 author- ized billeting among the various innkeepers and victuallers throughout the kingdom. This statute was renewed annually from 1689 to 1879, when the Army Discipline Act, consolidating the provisions of the Mutiny Act, was passed. This

statute was replaced by the Army Act 1881 (renewed annually by a

" commencement " act), which contains the provisions by which billeting is now regulated. But modern conditions have practically dispensed with the necessity for billeting; there is extensive barrack accommodation in most parts of the United Kingdom, and, moreover, troops are entrained or sent by sea when the distance to be covered is more than one day's march. In Scotland the provisions as to billeting were assimilated to those in England in 1857, and in Ireland in 1879. The Army (Annual) Act 1909 provided for the billeting of the Territorial forces in case of national emergency, on occupiers of any kind of house at the discretion of the chief officer of police.

BILLIARDS, an indoor game of skill, played on a rectangular table, 1 and consisting in the driving of small balls with a stick called a cue either against one another or into pockets according to the methods and rules described below. The name probably originated in the Fr. bilk (connected with Eng. " billet ") signi- fying a stick. Of the origin of the game comparatively little is known — Spain, Italy, France and Germany all being regarded as its original home by various authorities. In an American text-book, Modern Billiards, it is stated that Catkire More (Conn Cetchathach) , king of Ireland in the 2nd century, left behind him " fifty-five billiard balls, of brass, with the pools and cues of the same materials." The same writer refers to the travels of Anacharsis through Greece, 400 B.C., during which he saw a game analogous to billiards. French writers differ as to whether their country can claim its origin, though the name suggests this. While it is generally asserted that Henrique Devigne, an artist, who lived in the reign of Charles IX., gave form and rule to the pastime, the Dictionnaire universal and the Academie desjeux ascribe its invention to the English. Bouillet in the first work says: "Billiards appear to be derived from the game of bowls. It was anciently known in England, where, perhaps, it was invented. It was brought into France by Louis XIV., whose physician recommended this exercise." In the other work mentioned we read: " It would seem that the game was invented in England." It was certainly known and played in France in the time of Louis XI. (1423-1483). Strutt, a rather doubtful authority, notwithstanding the reputation attained by his Sports and Pastimes of the People of England, considers it probable that it was the ancient game of Paille-maille (Pall Mall) on a table instead of on the ground or floor — an improve- ment, he says, " which answered two good purposes: it pre- cluded the necessity of the player to kneel or stoop exceedingly when he struck the bowl, and accommodated the game to the limits of a chamber." Whatever its origin, and whatever the manner in which it was originally played, it

is certain that it was known in the time of Shakespeare, who makes Cleopatra, in the absence of Anthony, invite her attendant to join in the pastime —

" Let us to billiards: come, Charmian."

Ant. and Cleo. Act ii. sc. 5.

In Cotton's Compkal Gamester, published in 1674, we are told that this " most gentile, cleanly and ingenious game " was first played in Italy, though in another page he mentions Spain as its birthplace. At that date billiards must have been well enough known, for we are told that " for the excellency of the recreation, it is much approved of and played by most nations of Europe, especially in England, there being few towns of note therein which hath not a public billiard table, neither are they wanting in many noble and private families in the country."

The game was at one time played on a lawn, like modern croquet. 2 Some authorities consider that in this form it was

1 In 1907 an oval table was introduced in England by way of a change, but this variety is not here considered.

2 A later form of " lawn-billiards " again enjoyed a brief popu- larity during the latter half of the 19th century. It was played on a lawn, in the centre of which was a metal ring about 5! in. in dia- meter, planted upright in such a manner as to turn freely on its axis on a level with the ground. The players, two or more, were provided with implements resembling cues about 4 ft. long and ending in wire loops somewhat smaller in diameter than the wooden balls (one for each player), which were of such a size as barely to pass through the ring. In modern times such games as billiards have afforded scope for various imitations and modifications of this sort.

introduced into Europe from the Orient by the Crusaders. The ball was rolled or struck with a mallet or cue (with the latter, if Strutt's allusion to " inconveniences " is correct) through hoops or rings, and these were reproduced for indoor purposes on a billiard-table, as well as a " king " or pin which had to be struck. In the original tables, which were square, there was one pocket, a hole in the centre of the table, as on a bagatelle board, the hoop or ring being retained. Then

came similar pockets along one of the side cushions sunK in the bed of the table; and eventually the modern table was evolved, a true oblong or double- square, with pockets opening in the cushions at each corner and in the middle of each long side. The English tables are of this type, small bags of netting being attached to the pockets. The French and American game of billiards is played on a pocketless table. We shall deal first with the English game.

English Billiards

The English table consists of a framework of mahogany or other hard wood, with six legs, and strong enough to bear the weight of five slabs of slate, each 2f ft. wide by 6 ft. i| in., and about 2 in. thick. These having been fitted together with the utmost accuracy to form a level surface, and a green cloth of the finest texture having been tightly strained over it, the cushions are screwed on, and the pockets, for which provision has been made in the slates, are adjusted. As the inside edge of the cushion is not perpendicular to the bed of the table, but is bevelled away so that the top overhangs the base by about J of an in., the actual playing area of the table is 6 ft. wide but is ij in. short of 12 ft. long. The height of the table is 2 ft. 8 in. measured from the floor to the cloth. The cloth is in the shape shown in the diagram.

The three spots are on the centre line of the table, and are usually marked by small circular pieces of black tissue paper or court plaster; sometimes they are specially marked for the occasion in chalk. The baulk line and the D are marked either with chalk, tailors' pipeclay, or an ordinary lead pencil ; no other marks appear on the table. Smaller tables provide plenty of practice and amusement, pro- vided that the relation of the length to the breadth be observed. On these tables full- sized balls may be used, the pockets being made slightly smaller than in the full-size table.

In the early part of the 19th century the bed of the table was made of wood, occa- sionally of marble or stone ; green baize was used to cover both the bed and the cushions, the latter made of layers of list. Then as now the cushions proper were glued to a wooden framework which is screwed on to the bed of the table. The old list cushions possessed so little resilience that about 1835 india-rubber was substituted, the value of the improvement being somewhat modified by the fact that in cold weather the rubber A. The billiard spot became hard and never recovered its elas- measured from the ticity. Vulcanite resisted the cold, but was nearest point of the not "' fast " enough, i.e. did not permit the face of the cushion, ball to rebound

quickly; but eventually a B. Pyramid spot. substance was invented, practically proof

C. Centre spot. against cold and sufficiently elastic for XY. Baulk line. all purposes. Late in the_ 19th century

D. Semicircle of n| in. pneumatic cushions were tried, tubes into ‘ radius, known as the which air could be pumped, but they did

D. not become popular, though the so-called

” vacuum “cushions give good results. The shape of the face of the cushion has gone through many modifications, owing to the difficulty experienced in the accurate striking of the ball when resting against the cushion with only a small fractionˆ of it’s surface offered to the cue ; but low cushions are now made which expose nearly half of the upper part of the ball.

On the size and shape of the pockets depends the ease with which the players score. The mouth of the pocket, known as the ” fall ” or ” drop,” is part of the arc of a circle, the circle being larger in the case of the corner pockets than in that of the middle pockets; the cushions are cut ‘away to admit the passage of the ball. The corner pockets are measured by the length of the tangent drawn at the out- side point of the arc to the cushion on either side. The middle pockets are measured at the points where the arc terminates in the cushions. The fall of the middle pockets, i.e. the outside point of the

arc, is on the line of the outside face of the cushion ; that of the corner pockets is half way down the passage cut in the cushions.

From 1870 to 1885 matches for the championship were played on ” Championship Tables,” the pockets measuring only 3 in. at the ” fall.” The tables in ordinary use have jf-in. or 3f-in. pockets, but in the ” Standard Association Tables,” introduced by the Billiard Association at the end of the 19th century, the 35-in. pocket was adopted for all matches, while the fall of the middle pocket was with- drawn slightly from the cushion-line. Further, as the shape of the shoulders of the cushion at the pockets affects the facility of scoring, the Association adopted a much rounder shoulder than that used in ordinary tables, thereby requiring greater accuracy on the part of the player. In the championship tables the baulk line was only 28 in. from the cushion, and the radius of the D was reduced to 9! and afterwards to 10 in., the spot being 12J in. from the top cushion.

The principal games are three in number, — billiards proper,

pyramids and pool; and from these spring a variety of others. The object of the player in each game, however, is either to drive one or other of the balls into one or other of the pockets, or (only in billiards proper) to cause the striker's ball to come into suc- cessive contact with two other balls. The former stroke is known as a hazard (a term derived from the fact that the pockets used to be called hazards in old days), the latter as a cannon. When the ball is forced into a pocket the stroke is called a winning hazard; when the striker's ball falls into a pocket after contact with the object ball, the stroke is a losing hazard; " red hazards " mean that the red ball is the object-ball, " white hazards " the white.

Three balls are used in billiards proper, two white and one red. One of the white balls has a black spot at each end of an imaginary diameter, to distinguish it from the other, the white balls being known as spot-white (or " spot ") and " plain." They should be theoretically perfect spheres, of identical size and weight, and of equal durability in all parts. The size that is generally used in matches has a diameter of 2 T J 8 in., and the weight about 4! oz. It is exceedingly difficult to get three such ivory balls (the best sub- stance for elasticity) except by cutting up many tusks, and when procured the halls soon lose their perfection, partly because ivory is softer in one part than another, partly because it is very sus- ceptible to changes of weather and temperature, and unequally susceptible in different parts; it is also liable to slight injury in the ordinary course of play. Various substitutes have, therefore, been tried for ivory (q.v.), such as crystalate, or bonzoline (a celluloid compound), and even hollow steel; but their elasticity is inferior to that of ivory, so that the ball rebounds at a wider angle when it strikes. The price of a first-rate set of ivory balls is from four to six guineas; the composition balls cost about half a guinea apiece.

The cue is a rounded rod of seasoned ash about 4 ft. 9 in. in length, tapering from the butt, which is about ij in. in diameter, to the tip, which varies in size according to the fancy of the player. The average tip is, however, \ in. in diameter. The cue weighs generally between 14 and 18 oz. The tip of the cue is usually a leather cap or pad, which, being liable to slip along the surface of the ball in striking, is kept covered with chalk. To the leather tip, the inven. tion of a Frenchman named Mingin (about 1820), and to the control which it gives the player over the ball, the science of modern play is entirely due. The butt of the cue is generally spliced with ebony or some other heavy wood, since a shaft of plain ash is too light for its purpose, and is furthermore liable to warp. At one time it was lawful to use the butt of the cue or even a special instrument with a squared

spoon-shaped end called a mace (or mast), in making strokes or giving misses, but now all strokes must be made with the point. The cue is held in one hand, and with the other the player makes a " bridge " by placing wrist and finger-tips on the table, and extending his thumb so as to make a passage along which to slide his cue and to strike the ball. As it is not always possible to reach the ball in this way, longer cues (the " half-butt " and " long butt ") are required; they are used with a " rest," a shaft of wood at the end of which, perpendicular to the axis, is fastened an X of wood or metal, the cue being rested on the upper half while the lower is on the cloth. A " long rest," about 6 ft. long, is used with the long cues, the " short rest " (or " jigger ") about 4 ft. long, with the ordinary cue. A marking-board and stands or racks for rests and butts, with iron and brush for the table, and a cover for the table when not in use, complete the billiard " furniture " of the room, apart from its seating accommodation.

The game of billiards proper consists of the making of winning and losing hazards and cannons. It is usually played between two opponents (or four, two against two) for 100 or more points, three being scored for each red hazard, two for each white hazard and two for each cannon. Certain forfeitures on the other hand score to the opponent: running your ball off the table or into a pocket without having hit another ball, 3 (a coup) ; ordinary

misses (not hitting an object-ball), i. All these forfeits involve the termination of the turn. There are also " foul strokes " which score nothing to the opponent, and only involve the termination of the turn: such as playing with the wrong ball, forcing a ball off the table, hitting a ball twice, &c. When the red ball is pocketed it is replaced on the billiard-spot; if that is occupied, on the pyramid-spot; if that too, on the centre-spot; but if the opponent's white ball is pocketed it remains out of play till his turn comes. Public matches between adepts are played for higher points, but the rules which govern them are the same. The players have alternate turns, each being " in play " and continuing his " break " until he fails to score.

The game commences by stringing for the lead and choice of balls. The players standing behind the baulk line, strike each a ball from the semicircle up to the top cushion, and he whose ball on its return stops nearest the bottom cushion has the choice of lead and balls.

The red ball is placed on the spot at the commencement of the game, and the first player must " break the balls." The balls are said to be " broken " when the first player has struck the red or given a miss; and the opponent's ball when off the table is said to be " in hand." Breaking the balls thus takes place whenever the position, as at the beginning of the game, recurs. The first player (or the player at any stage of the game when he plays after being " in hand ") must place his own ball in any part of the D, or on the lines that form the D, and must play into the part of the table outside the baulk line, for he may not hit direct any ball that is " in baulk," i.e. on or behind the baulk-line; if he wishes to play at it he must first strike a cushion out of baulk (or, as it is called, bricole). If a player fails to score, the adversary plays, as soon as all the balls are at rest, either from baulk (if " in hand ") or from the place where his own ball has stopped. If by the same stroke a player makes two scores, i.e. a cannon and a hazard for instance, or a winning and a losing hazard, he scores for each of them. Thus if he pockets the red ball and the cue-ball, he scores six, or if he makes a cannon and holes the red ball, five. In the case of a cannon and a losing hazard, made by the same stroke, the value of the hazard depends on the ball first struck. Thus if the cue-ball strikes the red, cannons on to the white, and runs into a pocket, the stroke counts five points, but only one cannon can be made by the same stroke, even if the cue- ball strikes each of the others twice. If both object-balls are struck simultaneously it is considered that the red is struck first. Ten points are the most that can be scored by a single stroke with the cue, namely by striking the red ball first and then the white, and holing all three. If the white ball be struck first and the same series occurs, the value of the stroke is nine points. When the cue-ball and object-ball are touching, whatever the position, the red ball is spotted, the white object-ball put on the centre-spot, and the player plays from baulk.

There are various subtleties in the art of striking, which may be indicated, though only practice can really teach them; the simple stroke being one delivered slightly above the centre of the ball.

'The side-stroke is made by striking the object-ball on the side with the point of the cue. The effect of such a mode of striking the ball is to make it travel to the right or to the left, according as it is struck, with a winding or slightly circular motion; and its purpose is to cause the ball to proceed in a direction more or less slanting than is usual, or ordinary, when the ball is struck in or about the centre of its circumference. Many hazards and cannons, quite impossible to be made with the central stroke, are accomplished with ease and certainty by the side-stroke. It was the invention of the leather tip

which made side possible. The screw, or twist, is made by striking the ball low down, with a sharp, sudden blow. According as the ball is struck nearer and nearer to the cushion, it stops dead at the point of concussion with the object-ball, or recoils by a series of reverse revolutions, in the manner familiar to the schoolboy in throwing forward a hoop, and causing it to return to his hand by the twist given to its first impetus.

The follow is made by striking the ball high, with a flowing or following motion of the cue. Just as the low stroke impedes the motion of the ball, the follow expedites it.

In the drag the ball is struck low without the sudden jerk of the screw, and with less than the onward push of the follow.

The spot-stroke is a series of winning hazards made by pocketing the red ball in one of the corners from the spot. The great art is, first, to make sure of the hazard, and next, to leave the striking ball in such a position as to enable the player to make a similar stroke in one or other of the corner pockets. To such perfection was the spot-stroke brought, that at the end of the 19th century it was necessary to bar it out of the professional matches, and the " spot- barred " game became consequently the rule for all players. The leading English professionals so completely mastered the difficulties of the stroke and made such long successions of hazards that they practically killed all public interest in billiards, the game being little more than a monotonous series of spot-strokes. In 1888 W. J. Peall made 633 " spots " in succession, and in 1890 in a break of 3304 — the longest record — no less than 3183 of the points were scored through spot - stroke breaks. J. G. Sala, by use of the screw-back

made 186 successive hazards in one pocket, but C. Memmott is said to have made as many as 423 such strokes in succession. The spot-stroke was known and used in 1825, when a run of twenty-two " spots " caused quite a sensation. The player, whose name was Carr, offered to play any man in England, but though challenged by Edwin Kentfield never met him, so the latter became champion. Kentfield, however, did not regard the spot-stroke as genuine billiards, rarely played it himself, and had the pocket of his tables reduced to 3 in., and the billiard-spot moved nearer to the top of the table, so as to make the stroke exceedingly difficult. John Roberts, sen., who succeeded Kentfield as champion in 1849, worked hard at the stroke, but never made, in public, a longer run than 104 in succession. But W. Cook, John Roberts, jun., and others, assisted by the improvements made in the implements of the game, soon outdid

Roberts, sen., only to be themselves outdone by W. Peall and W. Mitchell, who made such huge breaks by means of the stroke that it was finally barred, the Association rules providing that only two " spots " may be made in succession unless a cannon is combined with a hazard, and that after the second hazard the red ball be placed on the centre-spot.

Top-of-the-Table Play. — When the spot-stroke was dying, many leading players, headed by John Roberts, jun., assiduously cultivated another form of rapid scoring, known as " top-of-the-table-play," the first principle of which is to collect the three balls at the top of the table near the spot. The balls are then manipulated by means of red winning hazards and cannons, the winning hazard not being made till the object-white can be left close to the spot.

The Push-stroke. — Long series of cannons were also made along the edge of the cushion, mainly by means of the " push-stroke," and with great rapidity, but eventually the push-stroke too was barred as unfair. It was usually employed when cue-ball and object-ball were very close together and the third ball was in a line, or nearly in a line with them; then by placing the tip of the cue very close to the cue-ball and pushing gently and carefully, not striking, the object-ball could be pushed aside and the cue-ball directed on ball 3.

Balls Jammed in Pockets. — If the two object-balls get jammed, either by accident or design, in the jaws of a corner pocket, an almost interminable series of cannons may be made by a skilful player. T. Taylor made as many as 729 cannons in 1891, but the American champion, Frank C. Ives, in a match with John Roberts, jun., easily beat this in 1893, by making 1267 cannons, before he deliberately broke up the balls. In Ives's case the balls, however, were just outside the jaws, which were skilfully used to keep the balls close together; but in this game, which was a compromise between English and American billiards, 2|-in. balls and 3i-in. pockets were used. Under the aegis of the Billiard Association a tacit understand- ing was arrived at that the position must be broken up, should it occur. A similar position came into discredit in 1907, in the case' of the " cradle-double-kiss " or " anchor " cannon, where the balls were not actually jammed, but so close on each side of a pocket that a long series of cannons could be made without disturbing the position — a stroke introduced by Lovejoy and carried to extremes by him, T. Reece and others (see below).

The Quill or Feather Stroke. — This stroke was barred early in the game's history. It could only be made when the cue-ball was in hand

and the object-ball just outside that part of the baulk-line that helps to form the D. The cue-ball was set so close to the object- ball as only not to touch it, and was then pushed very gently into the pocket, grazing the other so slightly as just to shake it, ajid no more. A number of similar strokes could thus be made before the object-ball was out of position.

A jenny is a losing hazard into one of the (generally top) pockets when the object-ball is close to the cushion along which the pocket lies: it requires to be played with the side required to turn the ball into the pocket. Long jennies to the top pockets are a difficult and pretty stroke : short jennies are into the middle pockets.

Masse and Pique.— A masse is a difficult stroke made by striking downwards on the upper surface of the cue-ball, the cue being held nearly at right angles to the table, and the point not being directed towards the centre of the ball. It is generally used to effect a cannon when the three balls are more or less in a line, the cue-ball and the object-ball being close together. The term masse is often used irregularly for pique, made when the object-ball is as close to the cue-ball as the latter to the cushion, or the third ball, or to make screwing impossible; the cue is then raised to an angle of almost 45 or 50° and its axis directed to the centre of the cue-ball, so that backward rotation is set up. Vignaux, the French player, says, " Le masse est un pique." Masse is in fact pique combined with side.

The perfection of billiards is to be found in the nice combination of the various strokes, in such fashion as to leave the balls in a favourable position after each individual hazard and cannon; and this perfection can only be attained by the most constant and unremitting practice. When the cue-ball is so played that its centre is aimed at the extreme edge of the object-ball, the cue-ball's course is diverted at what is called the " natural " or " half-ball " angle. If the balls were flat discs instead of spheres the edge of one ball would touch the centre of the other. The object-ball is struck at "three-quarter ball" or "quarter-ball" according as the edge of

the cue-ball appears to strike mid-way between the half-ball point and the centre or edge respectively of the object-ball. The half- ball angle is regarded as the standard angle for billiards, other angles being sometimes termed rather vaguely as " rather more or less than

half-ball." The angle of the cue-ball's new course would be about 45°, were the object-ball fixed, but as the object- ball moves immediately it is struck, the cue-ball is not actually diverted more than 33° from the prolongation of its original course, it being conventional among players to regard the prolongation of the course and not the original track when calculating the angle. The natural angle, and all angles, may be modified by side and screw ; the use of strength also makes the ball go off at a wider angle.

Development in Billiard Play. — The modern development of English billiards is due mainly to the skill of such leading players as John Roberts, sen., and his son of the same name. Indeed, their careers form the history of modern billiards from 1849 when the elder Roberts challenged Kentfield (who declined to play) for the championship. No useful comparison can be made between the last-named men, and the change of cushions from list to india-rubber further complicates the question. Kentfield represented the best of the old style of play, and was a most skilful performer; but Roberts had a genius for the game, combined with great nerve and physical power. This capacity for endur- ance enabled him to practise single strokes till they became certainties, when weaker men would have failed from sheer fatigue; and that process applied to the acquisition of the spot-stroke was what placed him decisively in front of the players of his day until a younger generation taught by him came forward. In 1869 the younger generation had caught him up, and soon afterwards surpassed him at this stroke; both W. Cook and J. Roberts, jun., carried it to greater perfection, but they were in turn put entirely in the shade by W. Mitchell and W. J. Peall. It is curious to realize that John Roberts, sen., developed the game chiefly by means of spot-play, whereas his son continued the process by abandoning it. The public, however, liked quick scoring and long breaks, and therefore a substitute had to be devised. This was provided chiefly by the younger Roberts, whose fertility of resource and manual dexterity eventually placed him by a very long way at the head of his profession. In exhibition matches he barred the spot-stroke and gave his attention chiefly to top-of-the-table play.

The next development was borrowed from the French game (see below), which consists entirely of cannons. Both French and American professors, giving undivided attention to cannons and not being permitted to use the push-stroke, arrived at a perfection in controlling or " nursing " the balls to which English players could not pretend; yet the principles involved in making a long series of cannons were applied, and leading professionals soon acquired the necessary delicacy of touch. The plan is to get the three balls close to

each other, say within a space which a hand can cover, and not more than from 4 to 8 in. from a cushion. The striker's ball should be behind the other two, one of which is nearer the cushion, the other a little farther off and farther forward. The striker's ball is tapped quietly on the one next the cushion, and hits the third ball so as to drive it an inch or two in a line parallel to the cushion. The ball first struck rebounds from the cushion, and at the close of the stroke all three balls are at rest in a position exactly similar to that at starting, which is called by the French position mere. Thus each stroke is a repetition of the previous one, the positions of the balls being relatively the same, but actually forming a series of short advances along the cushion. With the push-stroke a great number of these cannons could be quickly made, say 50 in 3J minutes; and, as that means 100 points, scoring was rapid. Most of the great spot-barred breaks con- tained long series of these cannons, and their value as records is correspondingly diminished, for in such hair's-breadth dis- tances very often no one but the player, and sometimes not even he, could tell whether a stroke was made or missed or was foul. Push-barred, the cannons are played nearly as fast; but with most men the series is shorter, massi strokes being used when the cannon cannot be directly played.

Championship. — When Kentfield declined to play in 1849, John Roberts, sen., assumed the title, and held the position till

1870, when he was defeated by his pupil W. Cook. The follow- ing table gives particulars of championship matches up to 188 5 : —

Points.

Date.

Players.

1200 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 3000

3000

Feb. 11, 1870 April 14, 1870 May 30, 1870 Nov. 28, 1870 Jan. 30, 1871 May 25, 1871 Nov. 21, 1871 Mar. 4, 1872 Feb. 4, 1874 May 24, 1875 Dec. 20, 1875 May 28, 1877 Nov. 8, 1880 Jan. 12, 13, i8£ March 30, 31, April 1, 1885 June 1, 2,3, 4, 1

Si and

Cook b. Roberts, sen. Roberts, jun., b. Cook . Roberts, jun., b. Bowles. Jos. Bennett b. Roberts, jun. Roberts, jun., b. Bennett Cook b. Roberts, jun. Cook b. Jos. Bennett Cook b. Roberts, jun. Cook b. Roberts, jun. Roberts, jun., b. Cook . Roberts, jun., b. Cook . Roberts, jun., b. Cook . Jos. Bennett b. Cook Jos. Bennett b. Taylor .

Roberts, jun. Roberts, jun.

b. Cook . b. Jos. Bennett

These games were played on three-inch-pocket tables, and John Roberts, jun., fairly contended that he remained champion till beaten on such a table under the rules in force when he won the title or under a new code to which he was a consenting party. A match was played for the championship between Roberts and Dawson ,in 1899 of 18,000 up, level. The main departure from a championship game lay in the table, which had ordinary, though not easy pockets, instead of three-inch pockets. The match excited much interest, because Dawson, who had already beaten North for the Billiard Association championship, was the first man for many years to play Roberts even; but Roberts secured the game by 1814 points. After this Dawson improved materially, and in 1899, f˚ r the second time, he won the Billiard Association championship. His position was challenged by Diggle and Stevenson, who contested a game of 9000 points. Stevenson won by 2900, but lost to Dawson by 2225 points; he beat him in January 1901, and though Dawson won a match before the close of the spring, Stevenson continued to establish his superiority, and at the beginning of 1907 was incontestably the English champion.

Records. — Record scores at billiards have greatly altered since W. Cook's break of 936, which included 292 spots, and was made in 1873. Big breaks are in some degree a measure of development; but too much weight must not be given to them, for tables vary considerably between easy and difficult ones, and comparisons are apt to mislead. Peall's break of 3304 (1890) is the largest " all-in " score on record; and in the modern spot-barred and push-barred game with a championship table, H. W. Stevenson in April 1904 made 788 against C. Dawson. In January 1905 John Roberts, however, made 821 in fifty minutes, in a match with J. Duncan, champion of Ireland; but this was not strictly a " record," since the table had not been measured officially by the Billiard Association. A break of 985 was made by Diggle in 1895 against Roberts, on a " standard table " (before the reduction in size of the pockets). On the 5th of March 1907 T. Reece began beating records by means of the "

anchor " stroke, making 1269 (5 21 cannons), and he made an unfinished 4593 with the same stroke (2268 cannons) on the 23rd of March. Further large breaks followed, including 23,769 by Dawson on the 20th of April 1907, and even more by Reece; and towards the end of the year the Billiard Association ruled the stroke out.

)t» Handicapping. — The obvious way of handicapping unequal players is for the stronger player to allow his opponent an agreed number of points by way of start. Or he may " owe " points, i.e. not begin to _ reckon his score till he has scored a certain number. A good plan is for the better player to agree to count no breaks that are below a certain figure. The giver of points scores all forfeits for misses, &c. If A can give B 20 points, and B can give C 25 points, the number of points that A can give C is calculated on the following

formula, 20+25 —

20X25

= 40. The handicap of " barring " one

or more pockets to the better player, he having only four or five pockets to play into, has been abolished in company with other methods that tended to make the game tedious.

Pyramids is played by two or four persons — in the latter case in sides, two and two. It is played with fifteen balls, placed close together by means of a frame in the form of a triangle or pyramid, with the apex towards the player, and a white striking ball. The centre of the apex ball covers the second or pyramid

spot, and the balls forming the pyramid should lie in a compact mass, the base in a straight line with the cushion.

Pyramids is a game entirely of winning hazards, and he who succeeds in pocketing the greatest number of balls wins. Usually the pyramid is made of fifteen red or coloured balls, with the strik- ing ball white. This white ball is common to both players. Having decided on the lead, the first player, placing his ball in the baulk-semicircle, strikes it up to the pyramid, with a view either to lodge a ball in a pocket or to get the white safely back into baulk. Should he fail to pocket a red ball, the other player goes on and strikes the

white ball from the place at which it stopped. When either succeeds in making a winning hazard, he plays at any other ball he chooses, and continues his break till he ceases to score; and so the game is continued by alternate breaks until the last red ball is pocketed. The game is commonly played for a stake upon the whole, and a proportionate sum upon each ball or life — as, for instance, 3s. game and is. balls. The player wins a life by pocketing a red ball or forcing it over the table ; and loses a life by running his own, the white, ball into a pocket, missing the red balls, or intentionally giving a miss. In this game the baulk is no protection; that is to say, the player can pocket any ball wherever it lies, either within or without the baulk line, and whether the white be in hand or not. This liberty is a great and certain advantage under many circumstances, especi- ally in the hands of a good player. It is not a very uncommon occurrence for an adept to pocket six or eight balls in a single break. Both Cook and Roberts have been known, indeed, to pocket the whole fifteen. If four persons play at pyramids, the rotation is decided by chance, and each plays alternately— partners, as in billiards, being allowed to advise each other, each going on and con- tinuing to play as long as he can, and ceasing when he misses a hazard. Foul strokes are reckoned as in billiards, except as regards balls touching each other. If two balls touch, the player proceeds with his game and scores a point for every winning hazard. When all the red balls but one are pocketed, he who made the last hazard plays with the white and his opponent with the red ; and so on alternately, till the game terminates by the holing of one or other ball. The pyramid balls are usually a little smaller than the billiard balls; the former are about 2 in. in diameter, the latter 2ˆ5 in. to 2§ in.

Losing Pyramids, seldom played, is the reverse of the last-named game, and consists of losing hazards, each player using the same striking ball, and taking a ball from the pyramid for every losing hazard. As in the other game, the baulk is no protection. Another variety of pyramids is known as Shell-out, a game at which any number of persons may play. The pyramid is formed as before, and the company play in rotation. For each winning hazard the striker receives from each player a small stake, and for each losing hazard he pays a like sum, till the game is concluded, by pocketing the white or the last coloured ball.

Pool, a game which may be played by two or more persons, consists entirely of winning hazards. Each player subscribes a certain stake to form the pool, and at starting has three chances or lives. He is then provided with a coloured or numbered ball, and the game commences thus: — The white ball is placed on the spot and the red is played at

it from the baulk semicircle. If the player pocket the white he receives the price of a life from the owner of the white; but if he fail, the next player, the yellow, plays on the red; and so on alternately till all have played, or till a ball be pocketed. When a ball is pocketed the striker plays on the ball nearest his own, and goes on playing as long as he can score.

The order of play is usually as follows : — The white ball is spotted ; red plays upon white; yellow upon red; then blue, brown, green, black, and spot-white follow in the order of succession named, white playing on spot-white. The order is similar for a larger number, but it is not common for more than seven or eight to join in a pool. The player wins a life for every ball pocketed, and receives the sum agreed on for each life from the owner of that ball. He loses a life to the owner of the ball he plays on and misses; or by making a losing hazard after striking such ball ; by playing at the wrong ball, by running a coup; or by forcing his ball over the table. Rules governing the game provide for many other incidents. A ball in baulk may be played at by the striker whose ball is in hand. If the striker's ball be angled — that is, so placed in the jaws of the pocket as not to allow him to strike the previously-played ball — he may have all the balls except his own and the object ball removed from the table to allow him to try bricole from the cushion. In some clubs and public rooms an angled ball is allowed to be moved an inch or two from the corner ; but with a ball so removed the player must not take a life. When the striker loses a life, the next in rotation plays at the ball nearest his own; but if the player's ball happen to be in hand, he plays at the ball nearest to the centre spot on the baulk line, whether it be in or out of baulk. In such a case the striker can play from any part of the semicircle. Any ball lying in the way of the striker's ball, and preventing him from taking fair aim and reaching the obiect-ball. must be removed, and replaced after the

stroke. If there be any doubt as to the nearest ball, the distance must be measured by the marker or umpire ; and if the distance be equal, the ball to be played upon must be decided by chance. If the striker first pocket the ball he plays on and then runs his own into a pocket, he loses a life to the player whose ball he pocketed, which ball is then to be considered in hand. The first player who loses all his three lives can " star "; that is, by paying into the pool a sum equal to his original stake, he is entitled to as many lives as the lowest number on the marking board. Thus if the lowest number be 2, he stars 2; if 1, he stars 1. Only one star is allowed in a pool ; and when there are only two players left in, no star can be purchased. The price of each life must be paid by the player losing it, immediately after the stroke

is made; and the stake or pool is finally won by the player who remains longest in the game. In the event, however, of the two players last left in the pool having an equal number of lives, they may either play for the whole or divide the stake. The latter, the usual course, is followed except when the combatants agree to play out the game. When three players are left, each with one life, and the striker makes a miss, the two remain- ing divide the pool without a stroke — this rule being intended to meet the possible case of two players combining to take advantage of a third. When the striker has to play, he may ask which ball he has to play at, and if being wrongly informed he play at the wrong ball, he does not lose a life. In clubs and public rooms it is usual for the marker to call the order and rotation of play: " Red upon white, and yellow's your player " ; and when a ball has been pocketed the fact is notified — " Brown upon blue, and green's your player, in hand " ; and so on till there are only two or three players left in the pool.

There are some varieties of the game which need brief mention.

Single Pool is the white winning hazard game, played for a stake and so much for each of three or more lives. Each person has a ball, usually white and spot-white. The white is spotted, and the other plays on it from the baulk semicircle; and then each plays alternately, spotting this ball after making a hazard. For each winning hazard the striker receives a life ; for each losing hazard he pays a life ; and the taker of the three lives wins the game. No star is allowed in single pool. The rules regulating pool are observed.

Nearest-Ball Pool is played by any number of persons with the ordinary coloured balls, and in the same order of succession. All the rules of pool are followed, except that the baulk is a protection. The white is spotted, and the red plays on it ; after that each striker plays upon the ball nearest the upper or outer side of the baulk-line; but if the balls lie within the baulk-line, and the striker's ball be in hand, he must play up to the top cushion, or place his ball on the spot. If his ball be not in hand, he plays at the nearest ball, wherever it may lie.

Black Pool. — In this game, which lasts for half-an-hour, there are no lives, the player whose ball is pocketed paying the stake to the pocketer. Each player receives a coloured ball and plays in order as in " Following Pool," the white ball being spotted; there is, in addition, however, a black ball, which is spotted on the centre-spot. When a player has taken a life he may — in some rooms and clubs must — play on the black ball. If he pockets it he receives a stake

from each player, paying a stake all round if he misses it, or commits any of the errors for which he would have to pay at " Following Pool." The black ball cannot be taken in consecutive strokes. Sometimes a pink ball, spotted on the pyramid spot, is added and a single stake is paid all round to the man who pockets it, and a double stake on the black; it is also permitted in some rooms to take blacks and pinks alternately without pocketing a coloured ball between the strokes. Again it is the custom in certain rooms to let a player, after the first round, play on any ball. The game is more amusing when as much freedom is allowed as possible, so that the taking of lives may be frequent. At the end of the half- hour the marker announces at the beginning of the round that it is the last round. White, who lost a stroke at the beginning by being spotted, has the last stroke. If a player wishes to enter the game during its progress his ball is put on the billiard-spot just before white plays, and he takes his first stroke at the end of the round.

Snooker Pool. — This is a game of many and elaborate rules. In principle it is a combination of pyramids and pool. The white ball is the cue-ball for all players. The pyramid balls, set up as in pyramids, count one point each, the yellow ball two points, green ball three, and so on. The black is put on the billiard-spot, the pink on the centre-spot, blue below the apex ball of the pyramid; brown, green and yellow on the diameter of the semicircle, brown on the middle spot, green on the right corner spot of the D, yellow on the left. The players, having decided the order of play, generally by distributing the pool balls from the basket, and playing in the order of colours as shown on the marking board, are obliged to strike a red ball first. If it is pocketed, the player scores one and is at liberty to play on any of the coloured balls; though in some clubs he is compelled to play on the yellow. If he pockets a coloured ball he scores the number of points which that ball is worth, and plays again on a red ball, the coloured ball being replaced on its spot, and so on ; but a red ball must always be pocketed before a more valuable ball can be played at. When all the red balls have been pocketed — none are put back on the table as at pyramids — the remaining balls must be pocketed in the pool order and are not replaced. The

penalties for missing a ball, running into a pocket, &c, are deducted from the player's score; they correspond to the values of the balls, one point if the red be missed, two if the yellow be missed, &c. If,

before hitting the proper ball, the player hits one of a higher value, the value of that ball is deducted from his score, but there is no further penalty. A player is " snookered " if his ball is so placed that he cannot hit a ball on which he is compelled to play. In this case he is allowed in some rooms to give a miss, but in such a way that the next player is not snookered; in others he must make a bona fide attempt to hit the proper ball off the cushion, being liable to the usual penalty if in so doing he hits a ball of higher value. In some rooms it is considered fair and part of the game to snooker an opponent deliberately; in others the practice is condemned. The rules are so variable in different places that even the printed rules are not of much value, owing to local by-laws.

Among other games of minor importance, being played in a less serious spirit than those mentioned, are Selling Pool, Nearest Ball Pool, Cork Pool and Skittle Pool. The directions for playing them may be found in Billiards (Badminton Library series).

French and American Billiards. — French and American billiards is played on a pocketless table, the only kind of table that is used in France, though the English table with six pockets is also occasionally to be found in America. For match purposes the table used measures 10 ft. by 5 ft., but in private houses and clubs 9 ft. by 4§ ft. is the usual size, while tables 8 ft. by 4 ft. are not uncommon. The balls, three in number as in English billiards, measure from 2j to 2§ in., the latter being" match " size. Since they are both larger and heavier than the English balls, the cues are somewhat heavier and more powerful, so that better effects can be produced by means of " side," masses, &c. Only cannons (called in America " caroms," in French caram- boles) are played, each counting one point.

The three-ball carom game is the recognized form of American billiards. The table is marked with a centre-spot, " red " spot and " white " spot. The first is on the centre of an imaginary line dividing the table longitudinally into halves; the red (for the red ball) and white spots are on the same line, half-way between the centre-spot and the end cushions, the white spot being on the string-line (corresponding to the English baulk-line). The right to play first is decided, as in England, by " stringing." The opponent's white ball and the red ball being spotted, the player plays from within the imaginary baulk-line. Each carom counts one point; a miss counts one to the opponent. A ball is re-spotted on its proper spot if it has been forced off the table. Should red be forced off the table and the red spot be occupied, it is placed on the white spot. White under similar conditions is set on the red spot. The centre spot is only used

when, a ball having been forced off the table, both spots are occupied. If a carom be made, and the ball afterwards jumps off the table, it is spotted and the count allowed. If the striker moves a ball not his own before he strikes, he cannot count but may play for safety. If he does so after making a carom the carom does not count, he forfeits one, and his break is ended. If he touches his own ball before he plays, he forfeits a point, and cannot play the stroke. Should he, however, touch his ball a second time, the opponent has the option of having the balls replaced as exactly as possible, or of playing on them as they are left. It is a foul stroke to play with the wrong ball, but if the offence is not detected before a second stroke has been made, the player may continue.

Such long runs of caroms, chiefly " on the rail " along the cushion, have been made by professional players (H. Kerkau, the German champion, making 7156 caroms in 1901 at Zurich), that various schemes have been devised to make the game more difficult. One of these is known as the " continuous baulk-line." Lines are drawn, 8, 14, 18 or even 22 in. from the rails, parallel to the side of the table, forming with them eight compartments. Of these 14 and 18 are the most general. Only one, two or three caroms, as previously arranged, are allowed to be made in every space, unless one at least of the object-balls is driven over a line. In the space left in the middle of the table any number of caroms may be made without restriction. In the case of the Triangular Baulk-line, lines are drawn at the four corners from the second " sight " on the side-rails to the first sight on the end-rails, forming four triangles within which only a limited number of caroms may be made, unless one object-ball at least be driven outside- one of the lines. The Anchor Baulk-lines were devised to checkmate the " anchor " shot, which consisted in getting the object-balls on the rail, one on either side of a baulk-line, and delicately manipulating them so as to make long series of caroms; each ball being in a different compartment, neither had to be driven over a line. The " anchor baulk-lines " form a tiny compartment, 6 in. by 3, and are drawn at the end of a baulk-line where it touches the rail and so divides the compartment into two squares. Only one shot is allowed in this " anchor-space," unless a ball be driven out of it. By these methods, " crotching " (getting them jammed in a corner) the balls, and long series of rail-caroms were abolished. The push-stroke is strictly forbidden.

The Cushion Carom game is a variety of the ordinary three-ball game, in which no carom counts unless the cue-ball touches a cushion before the carom is completed. There is also Three-Cushion Carom, which is explained by its title, and the Bank-Shot game, in

which the cue-ball must touch a cushion before it strikes either ball. The cushion carom games are often used in handicapping, other methods of which are for the better player to make a certain number of caroms "or no count," and for the weaker to receive a number of points in the game.

In France billiards was played exclusively by the aristocracy and the richer middle class until the first part of the 17th century, when the privilege of keeping billiard-rooms was accorded to the billardiers paulmiers, and billiards became the principal betting game and remained so until the time of Louis Philippe. The most prominent French player of late years is Maurice Vignaux. The French game became the accepted one in the United States about 1870, and the best American players have proved themselves superior to the French masters with the exception of Vignaux. The best- known American masters have been M. Daly, Shaafer, Slosson, Carter, Sexton and Frank C. Ives, doubtless the most brilliant player who ever lived. His record for the 18-in. baulk-line game was an average of" 50, with a high run of 290 points. In cushion-caroms he scored a run of 85.

The four-ball game, the original form of American billiards, is practically obsolete. It was formerly played on an English six- pocket table, with a dark-red and a light-red ball and two white ones. At present when played an ordinary table is used, the rules being identical with those of the three-ball game.

Pool is played in America on a six-pocket table with fifteen balls, each bearing a number. There are several varieties of the game, the most popular being Continuous Pool, an expanded form of Fifteen-Ball Pool, in which the balls are set up as in English pyramids, the game being won by the player pocketing the majority of the fifteen balls, each ball counting one point, the numbers being used only to distinguish them, as a player must always name, or " call," the ball he intends to pocket and the pocket into which he will drive it. The player who " breaks " (plays first) must send at least two balls to the cushion or forfeit three points. The usual method is to strike a corner ball just hard enough to do this but not hard enough to break up the balls, as in that case the second player would have too great an advantage. Balls pocketed by chance in the same play in which a called ball has been legitimately put down are counted; all others pocketed by accident are replaced on the table. In Fifteen-Ball Pool each frame (fifteen balls) constitutes a game. In Continuous Pool the game is for a series of points, generally 100, the balls being set up again after each frame and the player pocketing the last ball having the choice whether to break or cause his opponent to do so.

The balls in Fifteen-Ball Pool are generally all of one colour, usually red. In Pyramid Pool they are parti-coloured as well as numbered, and the game, which usually consists of a single frame, is won by the player who, when all fifteen balls have been pocketed, has scored the greatest aggregate of the numbers on the balls. In Chicago Pool each frame constitutes a game and is won by the player scoring the highest aggregate of numbers on the balls, which are set up round the cushion opposite the diamond sights, the 1 being placed in the middle of the top cushion, opposite the player, with the odd-numbered balls on the player's left and those with even numbers on his right. The arrangement of the balls, however, varies and is not important. Each player must strike the lowest- numbered ball still on the table, forfeiting the number of points represented by the ball should his ball first hit any other ball, or should he pocket his own ball. If he pockets the proper ball all others that fall into pockets on that play count for him also. Missing the ball played at forfeits three points (sometimes the number on the ball played at), as well as fouls of all kinds. Bottle Pool is played with a cue-ball, the 1 and 2 pool-balls and the leather pool-bottle, which is stood upon its mouth in the middle of the table. A carom on two balls counts 2 points; pocketing the I -ball counts 1; pocketing the 2-ball counts 2 ; upsetting bottle from carom counts 5 ; upsetting bottle to standing position counts 10, or, in many clubs, the game is won when this occurs. Otherwise the game is for 31 points, which number must be scored exactly, a player scoring more than that number being " burst," and having to begin over again. There are many penalties of one point, such as missing the object-ball, foul strokes, forcing a ball or the bottle off the table, pocketing one's own ball and upsetting the bottle without hitting a ball. The game of Thirty- Four is played without a bottle, the scoring being by caroms or pocketing the two obiect-balls. Exactly 34 must be scored or the player is " burst."

High-Low- Jack-Game is played with a set of pyramid balls by any number of players, the order of starting being determined by distributing the small balls from the pool-bottle. The 15-ball is High, the 1 Low, the 9 Jack, and the highest aggregate of numbers is the game, each of these four counting one point, the game consisting of seven points, and therefore lasting at least for two frames. The balls are set up with the three counting balls in the centre and broken as in pyramids, although balls accidentally falling into pockets count for the player, on which account the balls are some- times broken as violently as possible. When two or more players

have the same score the High ball wins before the Low, &c, as in the card game of the same title.

Pin Pool is played with two white balls, one red and five small pins set up in diamond form in the centre of the table with the pin counting 5 (the king-pin) in the middle, the pins being 3 in. apart. Each player is given a small ball from the bottle and this he keeps secret until he is able to announce that his points, added to the number on his small ball, amount to exactly 31. If he " bursts " he must begin again. Points are made only by knocking down pins, which are numbered I to 5. Should a player knock down with one stroke all four outside pins, leaving the 5-pin -standing, it is a " natural " and he wins the game.

Besides these common varieties of pool there are many others which are played in different parts of America, many of them local in character.

Bibliography. — The scientific features of billiards have been discussed at more or less length in several of the following older works: — E. White, Practical Treatise on the Game of Billiards(l8oj), this was partly a translation of a French treatise, published in 1805, and partly a compilation from the article in the Academic universelle des jeux, issued in the same year, and since frequently re-edited and reprinted; Le Musee des jeux (Paris, 1820); Monsieur Mingaud, The Noble Game of Billiards (Paris, 1834) ; a translation of the same, by John Thurston (London, 1835) ; Kentfield, On Billiards (London, 1839), founded principally on the foregoing works: Edward Russell Mardon, Billiards, Game 500 up (London, 1849) ; Turner, On Billiards, a series of diagrams with instructions (Nottingham, 1849); Captain Crawley, The Billiard Booh (London, 1866-1875); Roberts, On Billiards (1868); Fred. Hardy, Practical Billiards, edited by W. Dufton (1867); Joseph Bennett (ex-champion), Billiards (1873). These older books, however, are largely superseded by such modern authorities as the following: — J. Roberts, The Game of Billiards (London, 1898); W. Cook, Billiards (Burroughes & Watts); J. P. Buchanan, Hints on Billiards (Bell & Sons) ; Modern Billiards (The Brunswick – Balke – Collender Co., New York)'; Broadfoot, Billiards, Badminton Library (Longmans) ; Locock, Side and Screw (Longmans); M. Vignaux, Le Billard (Paris, 1889); A. Howard Cady, Billiards and Pool (Spalding's Home Library, New York); Thatcher, Championship Billiards, Old and New (Chicago, 1898). For those interested in the purely mathematical aspect of the game. Hemming,

Billiards Mathematically Treated, (Macmillan).

BILLINGTON, ELIZABETH (i768?-i8i8), British opera-singer, was born in London, her father being a German musician named Weichsel, and her mother a popular vocalist. She was trained in music, and at fourteen sang at a concert in Oxford. In 1783 •she married James Billington, a double-bass player. She had a voice of unusual compass, and as Rosetta in Love in a Village she had a great success at Covent Garden in 1786, being engaged for the season at a salary of £1000, a large sum for those days. Her position as a singer in London was now assured. In 1794 she and her husband went to Italy, and Mrs Billington appeared at Naples (where she was the heroine of a new opera, Inez di Castro, written for her by F. Bianchi), at Florence, at Venice and at Milan. Her husband died suddenly during the tour, and in 1799 she married a Frenchman named Felissent, whom, how- ever, she left in 1801. Returning to England she appeared alternately at Covent Garden and Drury Lane, her professional income during 1801 amounting to between £10,000 and £15,000. Henceforward she sang in Italian opera till the end of 1810, when ill-health forced her to abandon her profession. In 181 7 she was reconciled to her husband, and went with him to live near Venice, where she died on the 25th of August 1818.

BILLITON (Dutch Blitoeng), an island of the Dutch East Indies, between Banka and Borneo, from which it is separated respectively by Gaspar and Karimata straits. Politically it is under an assistant resident. It is roughly circular in form, its extreme, measurements being 55 m. by 43, and its area 1773 sq. m. In physical structure and in products it resembles Banka; its coasts are sandy or marshy; in the interior an extreme elevation of 1670 ft. is found. The geological formation is Devonian and granitic, with laterites. The mean annual rain- fall is heavy, 102 to 126 in. The day temperature varies from 8o° to 87° Fahr. The nights are very cool. Like Banka, Billiton is chiefly noted for its production of tin, the island forming the southern limit of the occurrence of this metal in this locality. There are upwards of 80 mines, which employ some 7500 work-men, and have produced more than 6500 tons of tin in a year. Iron is also worked. On the rocks along the coast are found tortoises, trepang and edible birds'nests, which are articles of export. The forests supply wood of different kinds for boat

building, in which the inhabitants are expert; and also provide trade in cocoa-nuts, sago, gum and other produce. The population is about 42,000, of whom some 12,000 are Chinese. The natives belong to two classes, the Orang Darat, the aborigines, thought to be akin to

the Battas and other branches of the pre-Malayan or Indonesian race; and the Orang Sekah, people of Malayan stock who live in boats. The coast is as a rule difficult of access, being beset with rocks and coral banks, and the best harbour is that at the chief town of Tanjong Pandan on the west coast. The island was formerly under the sultan of Palembang, by whom it was ceded to the British in 1812. As no mention was made of it in the treaty between the British and Dutch in 1814, the former at first refused to renounce their possession, and only recognized the Dutch claim in 1824. Till 1852 Billiton was dependent on Banka.

BILL OF EXCHANGE, a form of negotiable instrument, defined below, the history of which, though somewhat obscure, was ably summed up by Lord Chief Justice Cockburn in his judgment in Goodwin v. Robarts (1875), L.R. 10 Ex. pp. 346-358. Bills of exchange were probably invented by Florentine Jews. They were well known in England in the middle ages, though there is no reported decision on a bill of exchange before the year 1603. At first their use seems to have been confined to foreign bills between English and foreign merchants. It was afterwards extended to domestic bills between traders, and finally to bills of all persons, whether traders or not. But for some time after they had come into general employment, bills were always alleged in legal proceedings to be drawn secundum usum et consuetudinem mercatorum. The foundations of modern English law were laid by Lord Mansfield with the aid of juries of London merchants. No better tribunal of commerce could have been devised. Subsequent judicial decisions have developed and systematized the principles thus laid down. Promissory notes are of more modern origin than bills of exchange, and their validity as negotiable instruments was doubtful until it was confirmed by a statute of Anne (1 704) . Cheques are the creation of the modern system of banking.

Before 1882 the English law was to be found in 17 statutes dealing with isolated points, and about 2600 cases scattered over some 300 volumes of reports. The Bills of Exchange Act 1882 codifies for the United Kingdom the law relating to bills of exchange, promissory, notes and cheques. One peculiar Scottish rule is preserved, but in other respects uniform rules are laid down for England, Scotland and Ireland. After glancing briefly at the history of these instruments, it will probably be convenient to discuss the subject in the order followed by the act, namely, first, to treat of a bill of exchange, which is the original and typical negotiable instrument, and then to refer to the special provisions which apply to promissory notes and cheques. Two salient characteristics distinguish negotiable

instruments from other engagements to pay money. In the first place, the assignee of a negotiable instrument, to whom it is transferred by indorsement or delivery according to its tenor, can sue thereon in his own name; and, secondly, he holds it by an independent title. If he takes it in good faith and for value, he takes it free from " all equities," that is to say, all defects of title or grounds of defence which may have attached to it in the hands of any previous party. These characteristic privileges were conferred by the law merchant, which is part of the common law, and are now confirmed by statute.

Definition. — By § 3 of the act a bill of exchange is defined to be " an unconditional order in writing, addressed by one person to another, signed by the person giving it, requiring the person to whom it is addressed to pay on demand or at a fixed or deter- minable future time a sum certain in money to or to the order of a specified person, or to bearer." 1 The person who gives the order is called the drawer. The person thereby required to pay is called the drawee. If he assents to the order, he is then called

1 This is also the definition given in the United States, by § 126 of the general act relating to negotiable instruments, prepared by the conference of state commissioners on uniform legislation, and it has been adopted in the leading states.

the acceptor. An acceptance must be in writing and must be signed by the drawee. The mere signature of the drawee is sufficient (§17). The person to whom the money is payable is called the payee. The person to whom a bill is transferred by indorsement is called the indorsee. The generic term " holder " includes any person in possession of a bill who holds it either as payee, indorsee or bearer. A bill which in its origin is payable to order becomes payable to bearer if it is indorsed in blank. If the payee is a fictitious person the bill may be treated as payable to bearer (§7).

The following is a specimen of an ordinary form of a bill of exchange: —

£100 London, 1st January 1901.

Three months after date pay to the order of Mr J. Jones the sum of one hundred pounds for value received.

Brown & Co. To Messrs. Smith & Sons, Liverpool.

The scope of the definition given above may be realized by comparing it with the definition given by Sir John Comyns' Digest in the early part of the 18th century: — " A bill of exchange is when a man takes money in one country or city upon exchange, and draws a bill whereby he directs another person in another country or city to pay so much to A, or order, for value received of B, and subscribes it." Comyns' definition illustrates the original theory of a bill of exchange. A bill in its origin was a device to avoid the transmission of cash from place to place to settle trade debts. Now a bill of exchange is a substitute for money. It is immaterial whether it is payable in the place where it is drawn or not. It is immaterial whether it is stated to be given for value received or not, for the law itself raises a pre- sumption that it was given for value. But though bills are a substitute for cash payment, and though they constitute the commercial currency of the country, they must not be confounded with money. No man is bound to take a bill in payment of debt unless he has agreed to do so. If he does take a bill, the instru- ment ordinarily operates as conditional, and not as absolute payment. If the bill is dishonoured the debt revives. Under the laws of some continental countries, a creditor, as such, is entitled to draw on his debtor for the amount of his debt, but in England the obligation to accept or pay a bill rests solely on actual agreement. A bill of exchange must be an unconditional order to pay. If an instrument is made payable on a contingency, or out of a particular fund, so that its payment is dependent on the continued existence of that fund, it is invalid as a bill, though it may, of course, avail as an agreement or equitable assignment. In Scotland it has long been the law that a bill may operate as an assignment of funds in the hands of the drawee, and § 53 of the act preserves this rule.

Stamp. — Bills of exchange must be stamped, but the act of 1882 does not regulate the stamp. It merely saves the operation of the stamp laws, which necessarily vary from time to time according to the fluctuating needs and policy of the exchequer. Under the Stamp Act 1891, bills payable on demand are subject to a fixed stamp duty of one penny, and by the Finance Act 1899, a similar privilege is extended to bills expressed to be payable not more than three days after sight or date. The stamp may be impressed or adhesive. All other bills are liable to an ad valorem duty. Inland bills must be drawn on stamped paper, but foreign bills, of course, can be stamped with adhesive stamps. As a matter of policy, English law does not concern itself with foreign revenue laws. For English purposes, therefore, it is immaterial whether a bill drawn abroad is stamped in

accordance with the law of its place of origin or not. On arrival in England it has to conform to the English stamp laws.

Maturity. — A bill of exchange is payable on demand when it is expressed to be payable on demand, or at sight, or on presentation or when notice for payment is expressed. In calculating the maturity of bills payable at a future time, three days, called days of grace, must be added to the nominal due date of the bill. For instance, if a bill payable one month after sight is accepted on the 1st of January, it is really payable on the 4th of February, and not on the 1st of February as its tenor indicates. On the continent

generally days of grace have been abolished as anomalous and misleading. Their abolition has been proposed in England, but it has been opposed on the ground that it would curtail the credit of small traders who are accustomed to bills drawn at certain fixed periods of currency. When the last day of grace is a non- business day some complicated rules come into play (§ 14). Speaking generally, when the last day of grace falls on Sunday or a common law holiday the bill is payable on the preceding day, but when it falls on a bank holiday the bill is payable on the succeeding day. Complications arise when Sunday is preceded by a bank holiday; and, to add to the confusion, Christmas day is a bank holiday in Scotland, but a common law holiday in England. When the code was in committee an attempt was made to remove these anomalies, but it was successfully resisted by the bankers on alleged grounds of practical convenience.

Acceptance. — By the acceptance of a bill the drawee becomes the principal debtor on the instrument and the party primarily liable to pay it. The acceptor of a bill " by accepting it engages that he will pay it according to the tenor of his acceptance," and is precluded from denying the drawer's right to draw or the genuineness of his signature (§ 54). The acceptance may be either general or qualified. As a qualified acceptance is so far a disregard of the drawer's order, the holder is not obliged to take it; and if he chooses to take it he must give notice to antecedent parties, acting at his own risk if they dissent (§§ igand44). The drawer and indorsers of a bill are in the nature of sureties. They engage that the bill shall be duly accepted and paid according to its tenor, and that if it is dishonoured by non-acceptance or non-payment, as the case may be, they will compensate the holder provided that the requisite proceedings on dishonour are duly taken. Any indorser who is compelled to pay the bill has the like remedy as the holder against any antecedent party (§55). A person who is not the holder of a bill, but who backs it with his signature, thereby incurs the liability of an indorser to a holder in

due course (§ 56). An indorser may by express term either restrict or charge his ordinary liability as stated above. Prima facie every signature to a bill is presumed to have been given for valuable consideration. But sometimes this is not the case. For friendship, or other reasons, a man may be willing to lend his name and credit to another in a bill transaction. Hence arise what are called accommodation bills. Ordinarily the acceptor gives his acceptance to accommodate the drawer. But occasion- ally both drawer and acceptor sign to accommodate the payee, or even a person who is not a party to the bill at all. The criterion of an accommodation bill is the fact that the principal debtor according to the instrument has lent his name and is in substance a surety for some one else. The holder for value of an accommodation bill may enforce it exactly as if it was an ordinary bill, for that is the presumable intention of the parties. But if the bill is dishonoured the law takes cognizance of the true relations of the parties, and many of the rules relating to principal and surety come into play. Suppose a bill is accepted for the accommodation of the drawer. It is the drawer's du ty to provide the acceptor with funds to meet the bill at maturity. If he fails to do so, he cannot rely on the defence that the bill was not duly presented for payment or that he did not receive due notice of dishonour. If the holder, with notice of the real state of the facts, agrees to give time to the drawer to pay, he may thereby discharge the acceptor.

Holder in due Course. — The holder of a bill has special rights and special duties. He is the mercantile owner of the bill, but in order to establish his ownership he must show a mercantile title. The bill must be negotiated to him, that is to say, it must be transferred to him according to the forms prescribed by mercantile law. If the bill is payable to order, he must not only get possession of the bill, but he must also obtain the indorse- ment of the previous holder. If the bill is payable to bearer it is transferable by mere delivery. A bill is payable to bearer which is expressed to be so payable, or on which the only or last indorsement is an indorsement in blank. If a man lawfully obtains possession of a bill payable to order without the necessary indorsement, he may obtain some common law rights in respect

of it, but he is not the mercantile owner, and he is not technically the holder or bearer. But to get the full advantages of mer- cantile ownership the holder must be a "holder in due course " — that is to

say, he must satisfy three business conditions. First, he must have given value, or claim through some holder who has given value. Secondly, when he takes the bill, it must be regular on the face of it. In particular, the bill must not be overdue or known to be dishonoured. An overdue bill, or a bill which has been dishonoured, is still negotiable, but in a restricted sense. The transferee cannot acquire a better title than the party from whom he took it had (§ 36). Thirdly, he must take the bill honestly and without notice of any defect in the title of the transferor, — as, for instance, that the bill or acceptance had been obtained by fraud, or threats or for an illegal con- sideration. If he satisfies these conditions he obtains an in- defeasible title, and can enforce the bill against all parties thereto. The act substitutes the expression " holder in due course " for the somewhat cumbrous older expression " bona fide holder for value without notice." The statutory term has the advantage of being positive instead of negative. The French equivalent " tiers porteur de bonne foi " is expressive. Forgery, of course, stands on a different footing from a mere defect of title. A forged signature, as a general rule, is a nullity. A person who claims through a forged signature has no title himself, and cannot give a title to any one else (§ 24). Two exceptions to this general rule require to be noted. First, a banker who in the ordinary course of business pays a demand draft held under a forged indorsement is protected (§ 60). Secondly, if a bill be issued with material blanks in it, any per- son in possession of it has prima facie authority to fill them up, and if the instrument when complete gets into the hands of a holder in due course the presumption becomes absolute. As between the immediate parties the transaction may amount to forgery, but the holder in due course is protected (§ 20).

Dishonour. — The holder of a bill has special duties which he must fulfil in order to preserve his rights against the drawers and indorsers. They are not absolute duties; they are duties to use reasonable diligence. When a bill is payable after sight, presentment for acceptance is necessary in order to fix the maturity of the bill. Accordingly the bill must be presented for acceptance within a reasonable time. When a bill is payable on demand it must be presented for payment within a reasonable time. When it is payable at a future time it must be presented on the day that it is due. If the bill is dishonoured the holder must notify promptly the fact of dishonour to any drawer and indorser he wishes to charge. If, for example, the holder only gives notice of dishonour to the last indorser, he could not sue the drawer unless the last indorser or some other party liable has duly sent notice to the drawer. When a foreign

bill is dishonoured the holder must cause it to be protested by a notary public. The bill must be noted for protest on the day of its dishonour. If this be duly done, the protest, i.e. the formal notarial certificate attesting the dishonour, can be drawn up at any time as of the date of the noting. A dishonoured inland bill may be noted, and the holder can recover the expenses of noting, but no legal consequences attach thereto. In practice, however, noting is usually accepted as showing that a bill has been duly presented and has been dishonoured. Sometimes the drawer or indorser has reason to expect that the bill may be dishonoured by the drawee. In that case he may insert the name of a " referee in case of need." But whether he does so or not, when a bill has been duly noted for protest, any person may, with the consent of the holder, intervene for the honour of any party liable on the bill. If the bill has been dishonoured by non-acceptance it may be " accepted for honour supra protest." If it has been dishonoured by non-payment it may be paid supra protest. When a bill is thus paid and the proper formalities are complied with, the person who pays becomes invested with the rights and duties of the holder so far as regards the party for whose honour he has paid the bill, and all parties antecedent to him (§§ 65 to 68).

Discharge. — Normally a bill is discharged by payment in due

course, that is to say, by payment by the drawee or acceptor to the holder at or after maturity. But it may also be dis- charged in other ways, as for example by coincidence of right and liability (§ 61), voluntary renunciation (§ 62), cancellation (§ 63), or material alteration (§ 64).

Conflict of Laws. — A bill of exchange is the most cosmo- politan of all contracts. It may be drawn in one country, payable in another, and indorsed on its journey to its destination in two or three more. The laws of all these countries may differ. Provision for this conflict of laws is made by § 72, which lays down rules for determining by what law the rights and duties of the various parties are to be measured and regulated. Speak- ing broadly, these rules follow the maxim Locus regit actum. A man must be expected to know and follow the law of the place where he conducts his business, but no man can be expected to know the laws of every country through which a bill may travel. For safety of transmission from country to country bills are often made out in sets. The set usually consists of three counter- parts, each part being numbered and containing a reference to the other parts. The whole set then constitutes one bill, and the drawee must be careful only to accept one part, otherwise if different accepted parts get into the hands of different holders, he

may be liable to pay the bill twice (§ 71). Foreign bills circulating through different countries have given rise to many intricate questions of law. But the subject is perhaps one of diminishing importance, as in many trades the system of " cable transfers " is superseding the use of bills of exchange.

A cheque " is a bill of exchange drawn on a banker payable on demand" (§73). For the most part the rules of law applic- able to bills payable on demand apply in their entirety cheaues to cheques. But there are certain peculiar rules relating to the latter which arise from the fact that the relation- ship of banker and customer subsists between the drawer and drawee of a cheque. For example, when a person has an account at a bank he is, as an inference of law, entitled to draw on it by means of cheques. A right to overdraw, can, of course, only arise from agreement. The drawer of a cheque is not absolutely discharged by the holder's omission to present it for payment within a reasonable time. He is only discharged to the extent of any actual damage he may have suffered through the delay (§ 74). Apart from any question of delay, a banker's authority to pay his customer's cheques is determined by countermand of payment or by notice of the customer's death (§ 7S)- Of recent years the use of cheques has enormously increased, and they have now become the normal machinery by which all but the smallest debts are discharged. To guard against fraud, and to facilitate the safe transmission of cheques by post, a system of crossing has been devised which makes crossed cheques payable only through certain channels. The first act which gave legislative recognition to the practice of crossing was the 19 and 20 Vict. c. 95. That act was amended in 1858, and a consolidating and amending act was passed in 1876. The act of 1876 is now repealed, and its provisions are re-enacted with slight modifications by §§ 76 to 82 of the Bills of Exchange Act 1883. A cheque may be crossed either " gener- ally " or " specially." A cheque is crossed generally by drawing across it two parallel lines and writing between them the words " & Co." When a cheque is crossed generally it cannot be paid over the counter. It must be presented for payment by a banker. A cheque is crossed specially by adding the name of the banker, and then it can only be presented through that particular banker. A cheque, whether crossed generally or specially, may further be crossed with the words " not negotiable." A cheque crossed " not negotiable " is still transferable, but its negotiable quality is restricted. It is put on pretty much the same footing as an overdue bill. The person who takes it does not get, and cannot give a better title to it, than that which the person from whom he took it had. These provisions are supplemented

by provisions for the pro- tection of paying and collecting bankers who act in good faith and without negligence. Suppose that a cheque payable to bearer, which is crossed generally and with the words " not

negotiable," is stolen. The thief then gets a tradesman to cash it for him, and the tradesman gets the cheque paid on presentment through his banker. The banker who pays and the banker who receives the money for the tradesman are pro- tected, but the tradesman would be liable to refund the money to the true owner. Again, assuming payment of the cheque to have been stopped, the tradesman could not maintain an action against the drawer.

A promissory note is denned by section 83 of the act to be an " unconditional promise in writing made by one person to another, signed by the maker, engaging to pay on Promissory demand, or a ˆ a nxe d or determinable future time, a sum certain in money to or to the order of a specified person or to bearer." A promissory note may be made by two or more makers, and they may be liable either jointly, or jointly and severally, according to its tenor (§ 85). For the most part, rules of law applicable to a bill of exchange apply also to a promissory note, but they require adaptation. A note differs from a bill in this: it is a direct promise to pay, and not an order to pay. When it issues it bears on it the engagement of the principal debtor who is primarily liable thereon. The formula for applying to notes the rules as to bills is that " the maker of a note shall be deemed to correspond with the acceptoi of a bill, and the first indorser of a note shall be deemed to correspond with the drawer of a bill payable to drawer's order " (§ 89). Rules relating to presentment for acceptance, accept- ance, acceptance supra protest, and bills in a set, have no application to a note. Moreover, w T hen a foreign note is dis- honoured it is not necessary, for English purposes, to protest it. All promissory notes are, under the Stamp Act 1891, subject to an ad valorem stamp duty. Inland notes must be on impressed stamp paper. Foreign notes are stamped with adhesive stamps. For ordinary legal purposes a bank note may be regarded as a promissory note made by a banker payable to bearer on demand. It is, however, subject to special stamp regulations. It is not discharged by payment, but may be re-issued again and again. In the interests of the currency the issue of bank notes is subject to various statutory restrictions. A bank, other than the Bank of England, may not issue notes in

England unless it had a lawful note issue in 1844. On the other hand, Bank of England notes are legal tender except by the bank itself.

In fundamental principles there is general agreement between the laws of all commercial nations regarding negotiable in- struments. As Mr Justice Story, the great American laws?" lawyer, says: " The law respecting negotiable in- struments may be truly declared, in the language of Cicero, to be in a great measure not the law of a single country only, but of the whole commercial world. Non erit lex alia Romae, alia Athenis, alia nunc alia posthac, sed et apud omnes gentes et omni tempore, una eademque lex obtinebit " (Swift v. Tyson, 16 Peters 1). But in matters of detail each nation has impressed its individuality on its own system. The English law has been summarized above. Perhaps its special character- istics may be best brought out by comparing it with the French code and noting some salient divergences. English law has been developed gradually by judicial decision founded on trade custom. French law was codified in the 17th century by the " Ordonnance de 1673." The existing " Code de Commerce " amplifies but substantially adopts the provisions of the " Ordon- nance." The growth of French law was thus arrested at an early period of its development. The result is instructive. A reference to Marius' treatise on bills of exchange, published about 1670, or Beawes' Lex Mercatoria, published about 1740, shows that the law, or rather the practice, as to bills of ex- change was even then fairly well defined. Comparing the practice of that time with the law as it now stands, it will be seen that it has been modified in some important respects. For the most part, where English law differs from French law, the latter is in strict accordance with the rules laid down by Beawes. The fact is that, when Beawes wrote, the law or practice of both nations on this subject was nearly uniform. But English law has gone on growing while French law has stood

still. A bill of exchange in its origin was an instrument by which a trade debt due in one place was transferred to another place. This theory French law rigidly keeps in view. In Eng- land bills have developed into a paper currency of perfect flexibility. In France a bill represents a trade transaction; in England it is merely an instrument of credit. English law affords full play to the system of accommodation paper; French law endeavours to stamp it out. A comparison of some of the main points of difference between English and French law will show how the two theories work. In England it is no longer necessary to express on a bill that value has been given for it, for the law raises a presumption to that effect. In France the

nature of the consideration must be stated, and a false statement of value avoids the bill in the hands of all parties with notice. In England a bill may be drawn and payable in the same place. In France the place where a bill is drawn should be so far distant from the place where it is payable that there may be a possible rate of exchange between the two. This so- called rule of distantia loci is said to be disregarded now in practice, but the code is unaltered. As French lawyers put it, a bill of exchange necessarily presupposes a contract of exchange. In England since 1765 a bill may be drawn payable to bearer, though formerly it was otherwise. In France it must be payable to order; if it were not so it is clear that the rule requiring the consideration to be truly stated would be a nullity. In England a bill originally payable to order becomes payable to bearer when indorsed in blank. In France an indorsement in blank merely operates as a procuration. An indorsement, to operate as a negotiation, must be to order, and must state the considera- tion; in short, it must conform to the conditions of an original draft. In England, if a bill is dishonoured by non-acceptance, a right of action at once accrues to the holder. In France no cause of action arises unless the bill is again dishonoured at maturity; the holder in the meantime is only entitled to demand security from the drawer and indorsers. In England a sharp distinction is drawn between current and overdue bills. In France no such distinction is drawn. In England no protest is required in the case of the dishonour of an inland bill, notice of dishonour being sufficient. In France every dishonoured bill must be protested. Opinions may differ whether the English or the French system is better calculated to serve sound commerce and promote a healthy commercial morality. But an argument in favour of the English system may be derived from the fact that as the various continental codes are from time to time revised and re-enacted, they tend to depart from the French model and to approximate to the English rule. The effect upon English law of its codification has yet to be proved. A common objection to codification in England is that it deprives the law of its elastic character. But when principles are once settled common law has very little elasticity. On the other hand no code is final. Modern parliaments legislate very freely, and it is a much simpler task to alter statute law than to alter common law. Moreover, legislation is cheaper than litigation. One consequence of the codification of the English law relating to bills is clear gain. Nearly all the British colonies have adopted the act, and where countries are so closely connected as England and her colonies, it is an obvious advantage that their mercantile transactions should be governed by one and the same law expressed in the same words.

The ordinary text-books on the law of bills of exchange are constantly r^-edited and brought up to date. The following among others may be consulted : — Byles, Bills of Exchange ; Chalmers, Bills of Exchange; Daniel, Law of Negotiable Instruments (United States) ; Nouguier, Des lettres de change et des effets de commerce (France) ; Thorburn, Bills of Exchange Act 1882 (Scotland) ; Story, Bills of Exchange (United States); Hodgins, Bills of Exchange Act 18QO (Canada). (M. D. Ch.)

BILL OF RIGHTS, an important statute in English constitu- tional history. On the 13th of February 1689 the Declaration of Right, a document drawn up by a committee of the commons, and embodying the fundamental principles of the constitution, was delivered by the lords and commons to the prince and princess of Orange, afterwards William III. and Mary. In

December 1689 the rights claimed by the declaration were enacted with some alterations by the Bill of Rights, next to Magna Carta the greatest landmark in the constitutional history of England and the nearest approach to the written constitutions of other countries. The act (the full name of which is An Act declaring the Rights and Liberties of the Subject, and settling the Succession of the Crown), after reciting the unconstitutional proceedings of James II., the abdication of that king, the con- sequent vacancy of the crown, and the summons of the convention parliament, declared, on the part of the lords and commons, " for the vindicating and asserting their ancient rights and liberties " — " (1) That the pretended power of suspending of laws or the execution of laws by regal authority without consent of parliament is illegal. (2) That the pretended power of dispensing with laws or the execution of laws by regal authority, as it hath been assumed and exercised of late, is illegal. (3) That the commission forerecting the late court of commissioners for ecclesiastical causes, and all other commissions and courts of like nature, arc illegal and pernicious. (4) That levying money for or to the use of the crown, by pretence of prerogative, without grant of parliament, for longer time or in other manner than the same is or shall be granted, is illegal. (5) That it is the right of the subjects to petition the king, and all com- mitments and prosecutions for such petitioning are illegal. (6) That the raising or keeping a standing army within the kingdom in time of peace, unless it be with consent of parliament, is against law. (7) That the subjects which are

Protestants may have arms for their defence suitable to their conditions, and as allowed by law. (8) That elections of members of parliament ought to be free. (9) That the freedom of speech, and debates or proceedings in parlia- ment, ought not to be impeached or questioned in any court or place out of parliament. (10) That excessive bail ought not to be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted. (11) That jurors ought to be duly impanelled and returned and jurors which pass upon men in trials for high treason ought to be freeholders. (12) That all grants and promises of fines and for- feitures of particular persons before conviction are illegal and void. (13) And that for redress of all grievances, and for the amending, strengthening and preserving of the laws, parliament ought to be held frequently. And they do claim, demand and insist upon all and singular the premises, as their undoubted rights and liberties."

The further provisions of the act were concerned with the settlement of the crown upon the prince and princess of Orange, with the exception of § 12, which negatived the right of dis- pensation by non obstante 1 to or of any statute or any part thereof, unless a dispensation be allowed in the statute itself or by bill or bills to be passed during the then session of parliament.

It is to be noticed that the Declaration of Right and the Bill of Rights introduced no new principle into the English constitu- tion; it was merely a declaration of the law as it stood. In the United States, the main provisions of the Bill of Rights, so far as they are applicable, have been adopted both in the constitution of the United States and in the state constitutions.

BILL OF SALE, in its original sense, a legal document assign- ing personal property, and still used in connexion with the trans- ference of property in ships. The term has come to be applied to mortgages as well as to sales, and the expression " bill of sale " may now be understood to signify generally a document evidencing a sale or mortgage of personal chattels, unaccompanied by an actual transfer of possession to the purchaser or mortgagor.

The first English legislation on the subject was the Bills of Sale Act 1854, which, after reciting that " frauds were frequently committed upon creditors by secret bills of sale of personal chattels, whereby persons are enabled to keep up the appearance of being in good circumstances and possessed of property, and the grantees or holders of such bills of sale have the power of taking possession of the property of such person to the exclusion of the rest of their

creditors," provided that all bills of sale, as defined in the act, should be void against execution creditors unless registered. This act was amended by the Bills of Sale Act 1866. These acts were repealed and a new act passed, the Bills of Sale Act 1878, which, in the main, followed the lines of the act of 1854. The scope of this legislation was very much widened by the Bills of Sale Act (1878) Amendment Act 1882, which was intended primarily " to prevent needy persons being entrapped into signing complicated documents which they might

1 Non obstante (notwithstanding) means a licence from the crown to do that which could not be lawfully done without it.

often be unable to comprehend, and so being subjected by their creditors to the enforcement of harsh and unreasonable pro- visions " {Manchester &°c. Ry. Co. v. N.C. Wagon Co., 1888, 13 App. Ca. 554). The law is now regulated by these two acts, together with the Bills of Sale Acts of 1890 and 1891, which effected further small amendments by excluding from the operation of the principal acts instruments hypothecating, charging or declaring trusts on imported goods, during the interval between their unloading from a ship and their deposit in a warehouse, or re-shipping.

Under the acts of 1878 and 1882 bills of sale are of two kinds, i.e. absolute bills of sale (where chattels are sold absolutely to a purchaser), and bills of sale by way of security for the payment of money. The Bills of Sale Act 1878 governs both kinds and is the only act which applies to absolute bills. Bills of sale given by way of security for the payment of money on or after the 1st of November 1882 are governed by the act of 1882, which, however, does not apply to absolute bills. Section 4 of the act of 1878 defines a bill of sale as (1) including bills of sale, assign- ments, transfers, declarations of trust without transfer, inven- tories of goods with receipt thereto attached, or receipts for purchase moneys of goods and other assurances of personal chattels; the term assurance has been best explained as a document " on which the title of the transferee of the goods depends, either as the actual transfer of the property, or an agreement to transfer," Marsden v. Meadows, 1881, 7 Q.B.D. 80; (2) powers of attorney, authorities or licences to take possession of personal chattels as security for any debt; these words would not include a power of distress for rent in an ordinary lease or bona fide hiring or hire purchase agreements; (3) any agreement, whether intended or not to be followed by the execution of any other instrument, by which a right in equity to any personal chattels, or to any charge or security thereon, shall be conferred; (4) any mode of

disposition of trade machinery and attornments and other instruments giving powers of distress to secure a debt or advance. On the other hand, certain assur- ances and instruments are expressly exempt by statute from the definition: marriage settlements, assignments of ships, assign- ments for the benefit of creditors, bills of lading and dock warrants, and by the act of 1882, debentures and debenture stock of a company. The expression " personal chattels " is defined as goods, furniture and other articles capable of complete transfer by delivery, and (when separately assigned or charged) fixtures and growing crops.

Absolute Bills. — Absolute bills of sale must be duly attested by a solicitor, and the attestation must state that before execution the effect of it was explained to the grantor by the attesting solicitor. The consideration must be truly stated. The bill of sale, and all schedules and inventories annexed to or referred to in the bill, and also a true copy of the bill and of every schedule and inventory and of every attestation, together with an affidavit stating the time of making or giving the bill, its due execution and attestation and the residence and occupation of the grantor, and every attesting witness, must be presented to, and the copies filed by, the registrar within seven clear days. In the case of absolute bills the effect of non-compliance does not affect the validity of the bill as between the parties to it, but makes it void as against the trustee in bank- ruptcy and execution creditors of the grantor.

Bills by Way of Security. — All bills of sale given by way of security for the repayment Of money must be made in accordance with the form given in the schedule to the act of 1882, and they must not depart from the statutory form in anything which is not merely a matter of verbal difference. The form given in the schedule to the act is as follows : —

This Indenture made the day of between A. B.

of of the one part and C. D. of

of the other part, witnesseth that in consideration of the sum of £ now paid to A. B. by C. D., the receipt of which the said A. B. hereby acknowledges, he the said A. B. doth hereby assign unto C. D. his executors, administrators and assigns all and singular the several chattels and things specifically described in the schedule hereto annexed by way of security for the payment of the sum of £ and interest thereon at the rate of % per annum. And

the said A. B. doth further agree and declare that he will duly pay to the said C. D. the principal sum aforesaid together with the interest then due, by equal payments of £ on the day of

And the said A. B. doth also agree with the said C. D. that he will (here insert terms as to insurance, payment of rent, &c.

which the parties may agree to for the maintenance or defeasance of the security). Provided always that the chattels hereby assigned shall not be liable to seizure or to be taken possession of by the said C. D. for any cause other than those specified in § 7 of the Bills of Sale Act (1878) Amendment Act 1882.

In witness, &c. .

Signed and sealed by the said A. B. in the presence of met. r. {add witness's name, address and description).

Non-compliance with the requirement of the statute as to form renders a bill of sale void even as between the parties. The bill of sale must have annexed to it an inventory of the chattels comprised in it, and is void, except as against the grantor, in respect of any personal chattels not specifically described. It must be duly attested by one or more credible witnesses (not necessarily by a solicitor, as in the case of absolute bills). Every witness must sign his name and add his address and description. It must be duly_ registered within seven clear days after the execution thereof, or if it is executed in any place out of England then within seven clear days after the time at which it would in the ordinary course of post arrive in England if posted immediately after the execution. It must truly set forth the consideration. The grantor must be the true owner of the goods described in the schedule; as to any personal chattels of which he is not the true owner, the bill is void, except as against the grantor. Every bill of sale made or given in consideration of any sum under £30 is void. By § 7 of the act personal chattels shall only be liable to be seized or taken possession of in the following cases: — (1) If the grantor make default in payment of the debt or in the performance of any covenant or agreement contained in the bill and necessary for maintaining the security; (2) if the grantor becomes a bankrupt or suffers the goods to be distrained for rent, rates or taxes; (3) if the grantor fraudulently removes the goods from the premises; (4) if the

grantor does not, without reasonable excuse, upon demand in writing by the grantee, produce to him his last receipts for rent, rates or taxes; (5) if execution is levied against the goods of the grantor under any judgment. By § 13 personal chattels seized or taken possession of under a bill must not be re- moved or sold until after the expiration of five clear days from the date of seizure, and, if the goods have been wrongly seized, the grantor may within the five days apply to the High Court or a judge in chambers for an order to restrain the grantee from removing or selling the goods. The Bills of Sale Acts 1878 and 1882 do not apply to Scotland or Ireland. According to Scots law no security or charge can be created over moveable property without delivery of possession. The Irish statutes corresponding to the English acts are the Bills of Sale (Ireland) Act 1879 and the Amendment Act 1883.

The stamp duties payable on an absolute bill of sale are 2s. 6d. on every £25 secured up to £300; over £300, 5s. "on every £50. On bills of sale by way of security, Is. 3d. for every £50 up to £300 secured; over £300, 2s. 6d. for every £100. The fees payable on filing a bill of sale are, 5s. where the consideration (including further advances) does not exceed £100; above £100 and not exceeding £200, 10s. ; above £200, £1.

The various trade protection papers always publish the registra- tion of a bill of sale, and the usual effect is, therefore, to destroy the credit of any person giving one. (T. A. I.)

BILLROTH, ALBERT CHRISTIAN THEODOR (1829-1894), Viennese surgeon, was born on the 26th of April 1829 at Bergen, on the island of Riigen, his family being of Swedish origin. He studied at the universities of Greifswald, Gottingen and Berlin, and after taking his doctor's degree at the last in 1852, started on an educational tour, in the course of which he visited the medical schools of Vienna, Prague, Paris, Edinburgh and London. On his return to Berlin he acted as assistant to B. R. K. Langenbeck f rom 1853 to i86o,andthenacceptedtheprofessorship of surgery at Zurich. In 1867 he was invited to fill the same position at Vienna, and in that city the remainder of his pro- fessional life was spent. In 1887 he received the distinction, rarely bestowed on members of his profession, of a seat in the Austrian Herrnhaus. He died at Abbazia, on the Adriatic, where he had a beautiful villa, on the 6th of February 1894. Billroth was one of the most distinguished surgeons of his day. His boldness as an operator was only equalled by his skill and resourcefulness; no accident or emergency could disturb his coolness and presence of mind, and his ability to invent or carry out any new procedure that

might be demanded in the particular case with which he was dealing, gained for him the appellation of " surgeon of great initiatives." At the same time he was full of consideration for the comfort and well-being of his patient, and never forgot that he had before him a human being to be relieved, not a mere " case " for the display of technical dexterity. He was especially interested in military surgery, and during the Franco-German War volunteered to serve in the hospitals of

Mannheim and Weissenburg. His efforts did much to improve the arrangements for the transport and treatment of the wounded in war, and in a famous speech on the War Budget in 1891, he eloquently urged the necessity for an improved ambulance system, pointing out that the use of smokeless powder and the greater precision of the arms of modern warfare must tend to increase the number of men wounded, and that therefore more efficient means must be provided for removing them from the battlefield. Possessing a clear and graceful style, he was the author of numerous papers and books on medical subjects; his Allgemeine chirurgische Pathologie una 1 Therapie (1863) ran through many editions, and was translated into many languages. He was of an exceedingly artistic disposition, and in particular was devoted to music. A good performer on the pianoforte and violin, he was an intimate friend and admirer of Brahms, many of whose compositions were privately performed at his house before they were published. His work on the physiology of music (Wer ist musikalisch ?) was published after his death.

BILMA, or Kawar, an oasis in the heart of the Sahara desert, some 60 m. long by 10 broad. The inhabitants are Tibbu and Kanuri. The name Bilma is properly confined to the squthern part of this region, where is the chief settlement, called Bilma or Garu. This place is 800 m. due S. of the town of Tripoli and about 350 N. of the N.W. corner of Lake Chad. In the vicinity are a number of lakes, the waters of which on evapora- tion yield large quantities of very pure and fine salt, which is the object of an extensive trade with the countries of Central Africa. North of Bilma is the town of Dirki, said to date from the nth century. Near Bilma is a small circular oasis, kept green by a fine spring, but immediately to the south begins the most dreary part of the Saharan desert, over which the caravans travel for fifteen days without discovering the slightest trace of vegetable life. Gustav Nachtigal, who visited Bilma in 1870, records that the temperature during the day rarely sank below 113° Fahr. By the Anglo-French Declaration of the 21st of March 1899 Bilma was included in the French sphere of influence in West Africa. Turkey claimed the oasis as part of the hinter- land of Tripoli and garrisoned Bilma in 1902.

In 1906, however, a French force from Zinder occupied the town, no opposition being offered by- the Ottoman authorities. In 1907 the oasis and surrounding district was created a circle of the Military Territory of the Niger (see Sahara),

BILNEY, THOMAS (d. 1531), English martyr, was born at or near Norwich. The exact date of his birth is uncertain, but at all events it was not before 1495. He was educated at Trinity Hall, Cambridge, graduating LL.B. and taking holy orders in 1519. Finding no satisfaction in the mechanical system of the schoolmen, he turned his attention to the edition of the New Testament published by Erasmus in 1516. "Immediately," he records, " I felt a marvellous comfort and quietness." The Scriptures now became his chief study, and his influence led other young Cambridge men to think along the same lines. Among his friends were Matthew Parker, the future archbishop of Canterbury, and Hugh Latimer. Latimer, previously a strenuous conservative, was completely won over, and a warm friendship sprang up between him and Bilney. " By his con- fession," said Latimer, "I learned more than in twenty years before." In 1525 Bilney obtained a licence to preach through- out the diocese of Ely. He denounced saint and relic worship, together with pilgrimages to Walsingham and Canterbury, and jefused to accept the mediation of the saints. The diocesan authorities raised no objection, for, despite his reforming views in these directions, he was to the last perfectly orthodox on the power of the pope, the sacrifice of the mass, the doctrine of transubstantiation and the authority of the church. But Wolsey took a different view. In 1526 he appears to have summoned Bilney before him. On his taking an oath that he did not hold and would not disseminate the doctrines of Luther, Bilney was dismissed. But in the following year serious objection was taken to a series of sermons preached by him in and near London, and he was arrested and imprisoned in the Tower, Arraigned before Wolsey, Warham, archbishop of Canterbury,

and several bishops in the chapter-house at Westminster, he was convicted of heresy, sentence being deferred while efforts were made to induce him to recant, which eventually he did. After being kept for more than a year in the Tower, he was released in 1520, and went back to Cambridge. Here he was overcome with remorse for his apostasy, and after two years determined to preach again what he had held to be the truth. The churches being no longer open to him,

he preached openly in the fields, finally arriving • in Norwich, where the bishop, Richard Nix, caused him to be arrested. Articles were drawn up against him by Convocation, he was tried, degraded from his orders and handed over to the civil authorities to be burned. The sentence was carried out in London on the 19th of August 1 S3 1 . A parliamentary inquiry was threatened into this case, not because parliament approved of Bilney's doctrine but because it was alleged that Bilney's execution had been obtained by the eccle- siastics without the proper authorization by the state. In 1534 Bishop Nix was condemned on this charge to the confiscation of his property. The significance of Bilney's execution lies in the fact that on essential points he was an orthodox Roman Catholic. See Letters and Papers of Henry VIII. vols, iv.-v. ; Foxe's Acts and Monuments; Gairdner's History of the Church; Pollard's Henry VIII. (A. F. P.)

BILOXI, a city of Harrison county, Mississippi, U.S.A., in the south part of the state, on Biloxi Bay, a branch of the Mississippi Sound, which is a part of the Gulf of Mexico. By rail it is 80 m. N.E. of New Orleans and 61 m. S.E. of Mobile, Alabama. Pop. (1880) 1540; (1890) 3234; (1900) 5467 (949 be- ing negroes and 455 foreign — bom) ; (1010) 7988. The city is served by a branch of the Louisville & Nashville railway, and by an electric railway extending to Bay St Louis, through Gulfport (pop., 1900, 1060; 1910, 6386), 13 m. S.W., the port of entry of the Pearl River customs district, whose exports, chiefly timber, lumber, naval stores and charcoal, were valued at $8,392,271 in 1907. Biloxi is both a summer and a winter resort, particularly for the people of New Orleans and Mobile, and has a fine beach, extending for about 12 m. around its peninsula, and bordered by an automobile drive; along the beach are some attractive residences, hotels and boarding houses, and several sanatoriums. The city's principal industries are the canning of oysters, shrimp, fish, figs and vegetables, and the manufacture of fertilizers and flour. A beautiful thin faience with remarkable metallic glazes is made here. The municipality owns the water-works, the water being obtained from artesian wells. Pierre le Moyne d'Iberville (1661-1706) in 1699 built Fort Maurepas across the bay from the present city; and the settlement there, called Biloxi after the Biloxi Indians, was the first to be estab- lished by the French in this region. In 1702 this post, known as Old Biloxi, was abandoned, and the seat of government was removed to the Mobile river. In 17 12 a settlement was made on the present site, being the first permanent settlement within what is now the state of Mississippi. Many of the early settlers were French Canadians, who came down the Mississippi to join the new colony. Biloxi was again the capital from

17 19 until 1722. It was incorporated as a village in 1 8 7 2 , and was chartered as a city in 1896.

BILSTON, a market town of Staffordshire, England, 25 m. S.E. of Wolverhampton and 124 N.W. of London, in the Black Country. Pop. of urban district (1901) 24,034. It is served by the Great Western railway, and by the London & North- western at Ettingshall Road station. In the vicinity are very productive mines of coal and ironstone, as well as sand of fine quality for casting, and grinding-stoaes for cutlers. Bilston contains numerous furnaces, forges, rolling and slitting mills for the preparation of iron, and a great variety of factories for japanned and painted goods, brass-work and heavy iron goods. Though retaining no relics of antiquity, the town is very ancient, appearing in Domesday. The parish church of St Leonard, dating as it stands mainly from 1827, is on the site of a building of the 13th century. Bilston suffered severely from an outbreak of cholera in 1832. The town is within the parliamentary borough of Wolverhampton.

BILTONG, a South African Dutch word (from bil, buttock, and tong, tongue), for sun-dried strips of antelope or buffalo meat.

BIMANA (Lat. "two-handed"), a word first used by the naturalist Johann Friedrich Blumenbach to distinguish the order of man from Quadrumana or other mammals. The term was popularized by Cuvier, and the majority of writers followed him in its adoption. In 1863, however, Huxley in his Man's Place in Nature demonstrated that the higher apes might fairly be included in Bimana. Again and again it has been proved that the human great toe can be by constant practice used as a thumb; artists exist who have painted pictures grasping the brush with their toes, and violinists have been known to play their instru- ments in the same manner. Among many savage races there is developed a remarkable power of foot-grasp, which in a lesser degree is often so noticeable among sailors. Haeckel calls atten- tion to the fact that a baby can hold a spoon with the big-toe as with a thumb. Man, in a word, is potentially quadrumanous.

BIMETALLISM. The very general employment of both gold and silver for currency purposes (see Money) has given rise to serious practical difficulties which have in turn led to keen theoretical discussion as to the proper remedies to be employed. Though every arrangement under which two metals form the money of a region may be described as " bimetallism," the term — as often happens in economics — has received a specialized meaning. It denotes a system under which the two metals are freely received by the mint and are equally available

as legal tender. The last clause implies the establishment of a definite ratio in value between the two metals {e.g. 1 oz. of gold= 155 oz. of silver) so that the title " rated bimetallism " may be given to it, in contradistinction to the " unrated bimetallism " which exists wherever two metals circulate together, but have their relative values determined, not by law, but by " the higgling of the market." Further, the inventor of the term — H. Cernuschi in 1869 — regarded it as properly applicable to an international arrangement by which a number of states agree to adopt the same ratio, rather than to the use of the two metals by a single country, which may be described as national bimetallism. Inter- national bimetallism is at all events the form which has attracted attention in recent times, and it is certainly the most important.

Regarded from the historical point of view it appears that the failure of separate countries to maintain the two metals in circulation was the cause which produced the idea of bimetallism as an international system. We find first the upholders of a national double standard, as in France and the United States, and these are followed by the advocates of bimetallism set up by a combination of countries. The theoretical considerations which underlie the controversy between the supporters and the opponents of bimetallism find their appropriate place in the article Money, as does also the earlier history of the double standard. The circumstances that have led to the prominence of the bimetallic question and the principal events that have marked the course of the movement form the subject of this article.

In the earlier years of the 19th century, when the monetary disturbances that resulted from the Revolutionary wars had ceased, we find France (1803) and the United States (1792) with the double standard legally established. England, on the other hand, had in 181 6 accepted by law the gold standard, which had come into use in the 18th century. Silver formed the currency of the other European countries. The great discoveries of gold in California (1848) and Australia (1851) brought about the displacement of silver by gold in France, and the continuance of gold as the principal currency metal in the United States, where by the law of 1834 it had been somewhat over-rated (1 : 16) , as compared with the ratio adopted in France (1: 155), and had therefore expelled most of the silver previously in circulation. Between 1848 and i860 over £100,000,000 of gold was coined in France, while an equivalent amount of silver was exported, principally to the East.

At this time the weight of economic and official opinion was very

decidedly in favour of the single gold standard as the best system. In 1865 the Latin Union was established, in which the French currency system was adopted and was followed by the

international conference of 1867 in Paris (see Monetary Conferences), when gold was unanimously accepted as the standard for the proposed international system to be produced by co- ordinating the various currencies with that of the Latin Union.

A series of political and economic events speedily changed this situation. The Franco-German War (1870-71) deposed France from her leading position, and led to the establishment of a German gold currency with a different unit from the franc, accompanied by the demonetization of the silver currencies previously in use in the German states. The United States, where an inconvertible paper currency had been introduced during the Civil War, formally established the gold dollar as the standard coin (1873) and arranged for a return to specie payments (1878). At this time, too, the great production of gold which had marked the period 1850-1870 diminished, while very productive silver mines were discovered in the Pacific states of America. As a result of these combined influences the gold price of silver, which had risen a little during the height of the gold discoveries, began to fall rapidly, and the reverse process to that by which France had in the 'fifties acquired a gold currency came into operation. Silver, in accordance with Gresham's Law, was imported and offered for coinage. To obviate this the policy of limiting the coinage of silver (the Limping Standard) was adopted by the Latin Union. A further fall in the gold price of silver naturally resulted, and this made the position of Eastern trade and the finances of the Indian government in- secure. American silver producers, and the German government, as holders of a large mass of demonetized silver, were also sufferers by the depreciation. The effect on public and official opinion was shown by the English parliamentary committee on the depreciation of silver (1876), the American silver com- mission of the same year, and the appearance of many works on the subject, most of them advocating the double standard. On the initiative of the United States an international monetary conference met in Paris in 1878, but though the necessity of keeping a place for silver in the money of the world was recognized, the proposal to adopt the double standard for general use was rejected by the European states. By the Bland-Allison Act (Feb. 1878) the United States had provided for the coinage of a certain amount of silver per month as a mode of keeping up the price of the metal, which notwithstanding fell to 48 pence per oz. in 1879. The

prolonged depression of trade in America and Germany was attributed to the scarcity of money, due to what was described as " the outlawry of silver." By the joint action of France and the United States a fresh monetary conference was held in Paris in 1881, where the advocates of bimetallism were very strongly represented. After prolonged discussion no conclusion was reached, in consequence of the refusal of England and Germany to abandon the gold standard. Though an adjournment to the following year was resolved on, the conference did not reassemble, and the bimetallic movement took the form of agitation, carried on in each country. The English inquiry into the depression of trade (1885-1886) drew from the commission a recommendation for a fresh commission to investigate the relation of gold and silver. This latter body, appointed in 1886, obtained a great body of important evidence, and in 1888 closed its work by a report in which the views of the two sections of the commission were separately presented. Six members supported the existing gold standard and six were in favour of the bimetallic system. This inconclusive result was soon followed in the United States by the Sherman Act (1890), providing for a larger monthly coinage of silver. A temporary rise in the price of the metal was followed by a further fall, making the situation still more critical. A new monetary conference was summoned by the United States and met in Brussels in November 1892. To modify opposition the " desirability of increasing the use of silver " was the resolution proposed; the actual method being left open. This conference also proved abortive and adjourned to 1893, but like that of 1881 did not meet again.

International action having failed to secure any system of bimetallism, the United States and India sought to relieve their position by local legislation. The former repealed the Sherman

Act, and the latter closed its mints to the free coinage of silver (1893). As these measures were opposed to bimetallism in that they restricted the use of silver, and were followed by a lower price for that metal than had ever been known, the agitation in the United States and Europe continued. In America it took the form of advocating the free coinage of silver by the United States without waiting for other countries; and in this shape made the principal issue at the presidential elections of 1896 and 1900, in each of which it was emphatically rejected.

A further attempt at securing international bimetallism was made by Senator Wolcott's commission in 1897. The American envoys, in concert with the French government, proposed to England (1) the

reopening of the Indian mints, and (2) the annual purchase by England of £10,000,000 of silver. The French minister claimed further concessions which were regarded as inadmissible by the English government; but the fate of the mission was settled b)' the refusal of the Indian government to reopen its mints.

After the American election of 1900, bimetallism as a popular cause disappeared from view. The silver issue was withdrawn from the democratic platform in 1904, and the bimetallic move- ment died out in England.

Amongst the causes of this collapse the most important are: (1) the adoption of the gold standard by so many countries — Austria-Hungary (1892), Russia and Japan (1897), India (1899), Mexico (1904) — a movement which pointed to the complete triumph of gold in the future; (2) the great increase in the output of gold. Australia and South Africa so developed their gold mines as to bring the yield for 1906 to £81,000,000 as con- trasted with the less than £20,000,000 of 1883. This growing supply removed all that dread of a " gold famine " which served as a popular argument with bimetallists. To these may be added (3) the knowledge that experience had brought of the difficulties surrounding any attempt to establish a common ratio where the interests of different countries are so opposed; and (4) the great expansion of trade and industry, concomitantly with the wider adoption of the gold standard. Therefore, to quote the words of perhaps the ablest advocate of bimetallism, " The outcome of the prolonged controversy . . . appears to be that the commercial world will carry on its business principally and more and more on a gold basis, and that particular countries will endeavour in different ways to adjust their actual medium . . . to the gold standard " (Nicholson, Money and Monetary Prob- lems, 6th ed.).

Perhaps the principal service rendered by the many able minds engaged in the movement will prove to be the fuller development of the more difficult parts of monetary theory and the additional light thrown on the course of monetary history.

A proposal, sometimes confounded with bimetallism, is that for a standard composed of both gold and silver, which is better described as the Joint-standard or as Symmetallism.

Bibliography. — On the bimetallic side, Nicholson, Money and Monetary Problems (6th ed., 1903) ; F. A. Walker, International Bimetallism (1896); Barbour, The Theory of Bimetallism (1885);

Lord Aldenham (H. H. Gibbs), A Colloquy on Currency (1900); and the numerous pamphlets and leaflets of the Bimetallic League. Opposed to bimetallism, Giffen, The Case against Bimetallism (1892) ; Laughlin, History of Bimetallism in the United States (4th ed., 1897) ; Lord Farrer, Studies in Currency (1898), The Gold Standard (1898) — papers issued by the Gold Standard Defence Assoc. Leonard Darwin's Bimetallism aims at a judicial summary. See also Money, Monetary Conferences. (c. F. B.)

BIMLIPATAM, a town of British India, in the Vizagapatam district of Madras, on the sea-coast 18 m. N.E. of Vizagapatam. Pop. (1901) 10,212. It was formerly a Dutch factory, and is now the principal port of the district. The anchorage is an open roadstead protected to some extent by headlands with a light- house at Santapalli. Nearly half the sea-borne trade is conducted with foreign countries. The principal exports are oil-seeds, hides and jute.

BIN, a receptacle of various kinds, originally of wicker or basket work. The word appears in most European languages, cf . M.L. and Ital. henna, Ger. Benne, &c. ; etymologists trace the word to a r.oot meaning " to plait." It survives in various

connexions, e.g. dust-bin, wine-bin (for holding bottles), hop-bin, coal-bin, corn-bin.

BINAN, a town of the province of La Laguna, Luzon, Philip- pine Islands, on the W. shore of Laguna de Bay, about 20 m. S.S.E. of Manila. Pop. (1903) 9563. The town is surrounded by an extensive and extremely fertile plain which produces very large quantities of rice as well as a great variety of tropical fruits, and a ready market for these products is found in Manila whither they are shipped by boat. The language is Tagalog.

BINARY SYSTEM, in astronomy, a system composed of two stars revolving around each other under the influence of their mutual attraction. A distinction was formerly made between double stars of which the components were in revolution around each other, and those in which no relative motion was observed; but it is now considered that all double stars must really be binary systems.

BINCHOIS, EGIDIUS (d. 1460), an early 15th-century musical composer evidently named after his birthplace, Binche, near Mons.

He was esteemed by contemporary and later theorists as second only to Dunstable and Dufay.

BINGEN (anc. Vincum or Bingium), a town of Germany, in the grand-duchy of Hesse-Darmstadt, i; m. N.W. from Mainz, on the main line to Cologne. Pop. (1905) 9950. It is situated on the left bank of the Rhine opposite Rudesheim, at the confluence of the Nahe (or Nava), which is crossed near its mouth by a stone bridge, attributed to Drusus, and certainly of Roman origin, and an iron railway bridge. On a height immediately to the south- east is the ruined castle of Klopp, on the site of a fortress founded by Drusus, and higher still the celebrated chapel of St Roch (rebuilt in 1895 after a fire), where thousands of pilgrims gather on the first Sunday after the 16th of August. Apart from its situation, which renders it a convenient place of tourist resort, the town itself presents but few attractions. There are a Protestant and three Roman Catholic churches, among the latter the parish church with a crypt dating from the nth century, and a medieval town hall. It has a considerable commerce in wine, grain and cattle, and, new quays and a harbour having been recently constructed, does an extensive transit trade in coal and iron. A short way down the Rhine is the Bingerloch, a famous whirlpool, while about halfway between it and the town rises on a rock in the middle of the stream the Mduseturm (derived from Muserie, cannon), in which, according to legend, Archbishop Hatto II. of Mainz was in 969 eaten by mice (the legend being doubtless due to the erroneous derivation from Mause, mice). Another legend states that the Nibelung treasure is hidden here- abouts in the Rhine.

BINGERBRUCK, a town of Germany, in the Prussian Rhine province, at the confluence of the Nahe and the Rhine, lying just below Bingen, and at the junction of the main lines of railway — Mainz-Coblenz and Bingerbriick-Metz. It has an extensive trade in the wines of the district. Pop. 2500.

BINGHAM, JOSEPH (1668-17 23), English scholar and divine, was born at Wakefield in Yorkshire in September 1668. He was educated at University College, Oxford, of which he was made fellow in 1689 and tutor in 1691. A sermon preached by him from the university pulpit, St Mary's, on the meaning of the terms " Person " and " Substance " in the Fathers, brought upon him a most unjust accusation of heresy. He was compelled to give up his fellowship and leave the university; but he was immediately presented by Dr John Radcliffe to the rectory of Headbournworthy, near Winchester (1695). In this country retirement he began his laborious and valuable work entitled Origines Ecclesiasticae, or Antiquities of the

Christian Church, the first volume of which appeared in 1708 and the tenth and last in 1722. His design, learnedly, exhaustively and impartially executed, was " to give such a methodical account of the anti- quities of the Christian Church as others have done of the Greek and Roman and Jewish antiquities, by reducing the ancient customs, usages and practices of the church under certain proper heads, whereby the reader may take a view at once of any par- ticular usage or custom of Christians for four or five centuries." Notwithstanding his learning and merit, Bingham received no

higher preferment than that of Headbournworthy till 171 2, when he was collated to the rectory of Havant, near Portsmouth, by Sir Jonathan Trelawney, bishop of Winchester. Nearly all his little property was lost in the great South Sea Bubble of 1720. He died on the 17th of August 1723.

BINGHAMTON, a city and the county-seat of Broome county, New York, U.S.A., in the south part of the state, on both banks of the north branch of the Susquehanna river, at the mouth of the Chenango river. Pop. (1880) 17,317; (1890) 35,005; (1900) 39)647, of whom 4272 were foreign-born; (1910), 48,443. It is an important railway centre, being served by the Delaware & Hudson, the Erie, and the Delaware, Lackawanna & West- ern railways; and an extensive system of electric rail- ways connects it with the suburbs and neighbouring towns. Binghamton is picturesquely situated and has a number of parks, the most attractive of which are Ross Park of 100 acres and Ely Park of 134 acres. Among the principal buildings are the city hall, the court-house, the post-office, the Binghamton city hospital, Stone opera-house, the Carnegie library (1904), the central high school, and a state armoury. Binghamton has also some fine office buildings. Among the city's educational and charitable institutions are the Lady Jane Grey school (for girls), St Joseph's academy, St Mary's home for orphans, the Susquehanna Valley orphan asylum, and a state hospital for the insane. Binghamton is a manufacturing centre of consider- able importance, ranking twelfth in the state in 1905 in the value of factory products, $13,907,403, which was an increase of 32-0% over the value of the factory products in 1900; among its manufactures are tobacco, cigars, chewing tobacco and 6nuff (value in 1905, $2,879,217), patent medicines (value in 1905, $2,133,198), flour and grist mill products ($1,089,910), men's clothing ($833,835), and, of less importance, commercial and computing scales and time recorders, chemicals, distilled liquor, beer, fire-alarm apparatus, overalls, agricultural implements, wagons, electrical apparatus, refined oil, sheet metal, paper bags and envelopes, tacks and nails, window glass, glass-ware,

clocks, whips and furniture (especially Morris chairs). In the village of Lestershire (pop. in 1910, 3775; incorporated in 1892), about 2 m. west, and in Endicott, another suburb, are large boot and shoe factories. The municipality owns and operates the water-works. When Binghamton was first settled, about 1787, it was known as Chenango Point. Its site was originally included in the so-called " Bingham Patent," a tract on both sides of the Susquehanna river owned by William Bingham (1 751-1804), a Philadelphia merchant, who was a member of the Continental Congress in 1787-1788 and of the United States Senate in 1795- 1801, being president pro tempore of the Senate from the 16th of February to the 3rd of March 1797. In 1800 a village was laid out by an agent of Mr Bingham, and was named Bingham- ton. In 1834 it was incorporated as a village, and in 1867 was chartered as a city.

BINGLEY, a market town in the Otley parliamentary division of the West Riding of Yorkshire, England, on the Aire, 5! m. N.W. of Bradford, on the Midland railway. Pop. of urban district (1901) 18,449. The church of All Saints is good Per- pendicular, though considerably restored. The large industrial population is engaged principally in the worsted and cotton manufacture. The neighbourhood is populous, but the natural beauty of the Aire valley is not greatly impaired.

BINIOU, or Bignou, a species of cornemuse or bagpipe, still in use at the present day in Brittany. The biniou is a primitive kind of bagpipe consisting of a leather bag inflated by means of a short valved insufflation tube or blow-pipe, a chaunter with conical bore furnished with a double reed concealed within the stock or socket (see Bag-pipe), and seven holes, the first being duplicated to accommodate left- and right-handed players.

The scale of the biniou is usually

W^M

1 See Victor Mahillon, Catalogue descriptif, vol. ii. (Ghent, 1896), P- 353i No. 1 126; and Captain C. R. Da}', Descriptive Catalogue of Musical Instruments (London, 1891), p. 62, No. 135.

and the single drone is tuned to the lower octave of the first hole &EE ±EE-

The more primitive biniou, still occasionally found in the remote districts of Cornouailles and Morbihan, has a chaunter with but five holes, 1 giving part of the scale of D, the drone being also tuned to D. The drone of the biniou is of box- wood, handsomely inlaid with tin, and has a single or beating reed hidden within the stock.

The word biniou or bignou (a Gallicized form), often errone- ously derived from bigno, se renfler beaucoup — an etymology not supported by Breton dictionaries — is the Breton plural form of benvek, instrument, tool, i.e. binviou, binvijou. 2 The word is also found in the phrase, " Sac'h ar biniou " (a biniou bag), a bag used by weavers to hold their tools, spindles, &c. The biniou is still the traditional and popular instrument of the Breton peasants of Cornouailles and Morbihan, and is almost inseparable from the bombard (q.v.), which is no other than a survival of the medieval musette, hautbois or chalemie, formerly associated with the bag-pipe in western Europe (see Oboe). At all festivals, at the pardons, wedding feasts and threshing dances, the two traditional musicians or sonneurs give out in shrill penetrating tones the ancient Breton rondes 3 and melodies.

BINMALEY, a town of the province of Pangasinan, Luzon, Philippine Islands, on the delta of the Agno river, about 5 m. W. of Dagupan, the north terminus of the Manila & Dagupan railway. Pop. (1903) 16,439. It has important fisheries, and manufactures salt, pottery, roofing (made of nipa leaves), and nipa wine. Rice and cocoanuts are the principal agricultural products of the town.

BINNACLE (before 18th century bittacle, through Span. btiacula, from Lat. habilaculum, a little dwelling), a case on the deck of a ship, generally in front of the steersman, in which is kept a compass, and a light by which the compass is read at night.

BINNEY, EDWARD WILLIAM (1812-1881), English geologist, was born at Morton, in Nottinghamshire, in 1812. He was articled to a solicitor in Chesterfield, and in 1836 settled at Manchester. He retired soon afterwards from legal practice and gave his chief attention to geological pursuits. He assisted in 1838 in founding the Manchester Geological Society, of which he was then chosen one of the honorary secretaries; he was elected president in 1857, and again in 1865. He was also successively secretary and president of the Literary and Philo- sophical Society of Manchester. Working especially at the Carboniferous and Permian rocks of the north of England, he studied also the Drift deposits of Lancashire, and made himself familiar with the geology of the country around Manchester.

On the Coal Measures in particular he became an acknowledged authority, and his Observations on the Structure of Fossil Plants found in the Carboniferous Strata (1868-1875) formed one of the monographs of the Palaeontographical Society. His large collection of fossils was placed in Owens College. He was elected a fellow of the Royal Society in 1856. He died at Manchester on the 19th of December 1881.

BINNEY, HORACE (1780-1875), American lawyer, was born in Philadelphia, Pennsylvania, on the 4th of January 1780. He graduated at Harvard College in 1797, and studied law in the office of Jared Ingersoll (1749-1822), who had been a member of the Constitutional convention of 1787, and who from 1791 to 1800 and again from 1811 to 1816 was the attorney-general of Pennsylvania. Admitted to the bar in Philadelphia in 1800, Binney practised with great success for half a century, and was recognized as one of the leaders of the bar in the United States. He served in the Pennsylvania legislature in 1806-1807, and was a Whig member of the National House of Representatives from 1833 until 1835, ably defending the United States Bank, and in general opposing the policy of President Andrew Jackson. His

1 See N. Quellien, Chansons et danses des Bretons (Paris, 1889), p. 39, and note, where the description of the instrument is not technical.

1 See Le Gonidec, Dictionnaire breton-francais, ed. by T. Hersart de la Villemarque; and N. Quellien, op. cit. p. 37, note.

3 For examples of these see N. Quellien, op. cit. part ii.

most famous case, in which he was unsuccessfully opposed by Daniel Webster, was the case of Bidal v. Girard's Executors, which involved the disposition of the fortune of Stephen Girard (q.v.). Binney's argument in this case greatly influenced the interpretation of the law of charities. Binney made many public addresses, the most noteworthy of which, entitled Life and Character of Chief Justice Marshall, was published in 1835. He also published Leaders of the Old Bar of Philadelphia (1858), and an Inquiry into the Formation of Washington's Farewell Address (1859); and during the Civil War he issued three pamphlets (1861, 1862 and 1865), discussing the right of habeas corpus under the American Constitution, and justifying President Lincoln in his suspension of the writ.

See the Life of Horace Binney (Philadelphia, 1904), [by his

grandson, C. C. Binney.

BINNEY, THOMAS (1798-1874), English Congregationalist divine, was born of Presbyterian parents at Newcastle-on-Tyne in 1 798, and educated at an ordinary day school. After spending seven years in the employment of a bookseller he entered the theological school at Wymondley, Herts, now incorporated in New College, Hampstead. In 1829, after short pastorates at Bedford (New Meeting) and Newport, Isle of Wight, he accepted a call to the historic Weigh House chapel, London. Here he became very popular, and it was found necessary to build a much larger chapel on Fish Street Hill, to which the congregation removed in 1834. An address delivered on the occasion of the laying of the foundation stone was published, with an appendix containing a strong attack on the influence of the Church of England, which gave rise to a long and bitter controversy. Throughout his whole career Binney was a vigorous opponent of the state church principle, but those who simply classified him as a narrow-minded political dissenter did him injustice. His liberality of view and breadth of ecclesiastical sympathy entitle him to rank on questions of Nonconformity among the most distinguished of the school of Richard Baxter; and he main- tained friendly relations with many of the dignitaries of the Established Church. He continued to discharge the duties of the ministry until 1869, when he resigned. In 1845 he paid a visit to Canada and the United States, and in 1857-1859 to the Australian colonies. The university of Aberdeen conferred the LL.D. degree on him in 1852, and he was twice chairman of the Congregational Union of England and Wales.

Binney was the pioneer in a much-needed improvement of the forms of service in Nonconformist churches, and gave a special impulse to congregational psalmody by the publication of a book entitled The Service of Song in the House of the Lord. Of numerous other works the best-known is his Is it Possible to Make the Best of Both Worlds? an expansion of a lecture delivered to young men in Exeter Hall, which attained a circulation of 30,000 copies within a year of its publication. He wrote much devotional verse, including the well-known hymn " Eternal Light! Eternal Light!" His last sermon was preached in November 1873, and after some months of suffering he died on the 24th of February 1874. Dean Stanley assisted at his funeral service in Abney Park cemetery.

BINOCULAR INSTRUMENT, or briefly Binocular, 4 an apparatus through which objects are viewed with both eyes. In this article only those instruments will be considered in which solid objects or objects in space are viewed; reference should be made to the article

Stereoscope for the instruments in which plane representations are offered to both eyes. The natural vision is such that different central projections of the objects are communicated to both eyes; the difference of the two perspective representations arises from the fact that the projection centres are laterally separated by an interval about equal to the distance between the eyes (the inter-pupillary distance). Binocular in- struments should aid the natural spatial or stereoscopic vision, or make it possible if the eyes fail. If the objects be so far

4 The term binocular (from the Lat. bini, two at a time, and oculi, eyes) was originally an adjective used to describe things adapted for the simultaneous use of both eyes, as in " binocular vision," "a binocular telescope or microscope"; now "a binocular" is used as a noun, meaning a binocular microscope, a field-glass, &c.

distant that the two perspectives formed by the naked eye are no more distinguished from each other, recourse may be had to binocular telescopes and range-finders; and if the objects be so small that, in order to observe details on them, we must bring our eyes so close to the objects that they cannot accommodate the images, recourse may be had to binocular microscopes and magnifying glasses.

The construction of binocular instruments dates back over several centuries, and has now been brought to great perfection. The subject of their theory and history has been exhaustively treated by M. von Rohr, Die binokularen Instrumente (Berlin, 1907), the first publication to present a complete account of these instruments.

Binocular Instruments for Observation only. — The first binocular telescope, consisting of two telescopes placed side by side, was Telescone constructed in 1608 by Johann Lipperhey, the inventor of the ordinary or Dutch telescope. The subject was next taken up by the monks. The Capuchin Antonius Maria Schyrlaus (Schyrl) de Rheita (1597-1660) described in 1645 the construction of double terrestrial telescopes. Greater success

attended the efforts of the Capuchin Cherubin d'Orleans, who flourished at about the same time, and con- structed large double telescopes of the Dutch type of high magnifica- tion, for use in war,

and smaller instruments of lower magnification; these instruments were provided with mechanism for adjusting to the interval between the eyes of the observer (fig. 1). After these discoveries the subject received no more attention until the 19th century; no improvements of these instruments are recorded in the literature of the second half of the 1 8th century.

The re-invention of the Dutch binocular telescope apparently dates from 1823, and is to be assigned to the Viennese optician, Johann Fried- rich Voigtlander (1779-1859); but the credit of having placed these instruments on the market probably belongs to J. P. Lemiere in Paris, who, in 1825, took out a French patent for an improve- ment of the Dutch double telescope. Lemiere's instruments were furnished with a common focusing arrangement, and the adapting to the inter-pupillary distance was effected by

Fig. 1.

Fig. 2.

turning the two parallel telescopes round their common axis. The development of this instrument was studied by opticians for the remainder of the first half of the 19th century; the last improvement apparently was made by P. G. Bardou in 1854, and by H. Helmholtz in 1857 when he described the telestereoscope (fig. 2) with telescopic magnification. By utilizing the telescope with prism-inversion, devised in 1851 by Ignazio Porro (1795-1875), A. A. Boulanger succeeded in producing a binocular of an entirely new type in 1859 (fig. 3). But he overlooked the possibility of increasing the distance between the objectives; Camille Nachet introduced this im-provement in 1875, but. his instruments did not meet with much popularity. This was probably due to the fact that, at this time,

MictO' scope,

the manufacture of the glass for the prisms was too difficult; this was overcome by E. Abbe, after the founding of the glass- works at Jena, who effected, independently of his predecessors, the wider separation of the ob- jectives (fig. 4), and increased it in the telestereoscope (fig. 5), or relief telescope, in a manner nearly approaching to Helm-holtz's proposal.

The first binocular microscope was invented by the previously mentioned Father Cherubin, whose in- strument consisted of two inverting systems, and con- sequently gave a totally wrong

impression of depth, i.e. de- pressions appeared as elevations, and vice versa, or, as we must say after Charles Wheatstone, it presented a pseudoscopic im- pression; this quality, however, was not recognized by the microscopists of the time. The instrument subsequently fell into complete neglect for nearly two centuries, to be revived in 1852 3-

by Charles Wheatstone, who has stated that he had previously studied the problem; the publication of his views in his second great paper " On Binocular Vision," 1 in the Phil. Trans, for 1852, undoubtedly stimulated the investigation of this instrument, which was carried on with zeal and success more especially in England and the United States. In 1853 the American J. L. Riddell (1807-1867) de- vised his binocular microscope, which contained the essentials of Wheatstone's pseudoscope. F. H. Wenham, another constructor, did not at first succeed in avoid- ing the pseudoscopic effect, but, by the application of refracting dividing prisms, he subsequently arrived at orthoscopic representa- tions and continued the de- velopment of the different methods for producing micro- photographic stereograms; this was effected in the first case by IG ' 4-

placing a diaphragm over one half of the objective for each exposure, and in the second case by a suitable direction of the illuminating pencil (fig. 6). Of greater benefit, how- ever, for stimulating interest in binocular microscopes, was his invention of reflecting dividing prisms (fig. 7). Other experiments, begun by Powell and Lealand, and developed with greater skill by Wenham, were concerned with the binocular vision of identical images. Such an impression could not possibly be stereoscopic, and these experiments

Fig. 5.

led to the construction of a non-stereoscopic binocular micro- scope. Of the other workers in this field mention may be made 1 The first part appeared in 1838.

of Alfred Nachet, who in 1853, and subsequently in 1863, brought forward two forms of binocular microscope.

The earliest stages of the development of the binocular microscope had been always confined to those instruments with one objective, in the immediate neighbourhood of which the systems for dividing the

pencil were placed. At a later date attempts were made to separate the two halves of the objective by modifying the eye-piece; this led to the construction of stereoscopic eye-pieces, initiated by R. B. Tolles, E. Abbe and A. Prazmowski. Of special importance is the work of Abbe; although, as he himself has stated, his methods accidentally led to the Wenham system, he certainly was far above his prede- cessors in his theoretical treatment of the problem, and in the perspicuity and clearness of his explanation. To him is also due the re-establishment of the instruments, which Wenham had abandoned by reason of too great technical difficulties (fig. 8). The newest form of the binocular microscope is very similar to the oldest form in which two completely separated

Fig. 6.

Fig. 7.

Fig. 8.

micro- scope.

tubes were employed. The inventor, H. S. Greenough, employs two systems for setting up the image, in order to avoid the pseudoscopic effect. After experiments in the Zeiss works, the erecting of Porro's prisms simultaneously permitted a con- venient adaptation to the eye-distance of the observer.

The first binocular magnifying glass or simple microscope

(German, Lupe) was devised by J. L. Riddell in 1853; in this

instrument (fig. 9) the pencil of light is transmitted

Simple t tne e y es by means of two pairs of parallel mirrors.

Of the many different improvements mention may

be made of A. Nachet's. H. Westien made use of two

Chevalier-Brucke's simple microscopes with their long working

distances in order to form an instrument in which the curvature

of the image was not entirely avoided. Mention may also be made of the binoculars of K. Fritzsch (formerly Pro- kesch) and E. Berger.

Binocular Instruments for Range-finding. — For measur- ing

purposes binocular tele- scopes with parallel axes are the only types employed. The measurement is effected by adjoin- ing to the space or interval to be measured some means of measure- ment defined; for example, by a fixed scale which extends into the space, or by a movable point (Wandermarke). This instru- ment shows a transition to the stereoscope, inasmuch as the scale or means of measurement is not directly observed, but to each eye a plane representation is offered, just as in the stereoscope; the space to be measured, on the other hand, is portrayed in exactly the same way as in the double telescope. The method for superposing the two spaces on one another was deduced by Sir David' Brewster in 1856, but he does not appear to have dealt with the problem of range-finding. The problem was attacked in 1861 by A. Rollet; later, in 1866, E. Mach published a promising idea, and finally — independently of the researches of his predecessors — Hektor de Grousilliers, in

Fig. 9.

partnership with the Zeiss firm (E. Abbe and C. Pulfrich), con- structed the first stereoscopic ra'ige-finder suitable for practical use. (O. Hr.)

BINOMIAL (from the Lat. hi-, bis, twice, and nomen, a name or term), in mathematics, a word first introduced by Robert Recorde (1557) to denote a quantity composed of the sum or difference to two terms; as a--b, a — b. The terms trinomial, quadrinomial, multinomial, &c, are applied to expressions composed similarly of three, four or many quantities.

The binomial theorem is a celebrated theorem, originally

due to Sir Isaac Newton, by which any power of a

binomial can be expressed as a series. In its modern form

the theorem, which is true for all values of n, is written as

n.n — i. – _■ . n.n — i.n — 2 . . , rrr,

— — aVˆH — — aV 3 ... + a". ine

1.2 1.2.3

(x -f a) n = x"+»ax"~ 1 -\ —

reader is referred to the article Algebra for the proof and

applications of this theorem ; here we shall only treat of the history of its discovery.

The original form of the theorem was first given in a letter, dated the 13th of June 1676, from Sir Isaac Newton to Henry Oldenburg for communication to Wilhelm G. Leibnitz, although Newton had discovered it some years previously. Newton

*there states that (# + #)" -^ + 2,12 + 2^2*3 + 2^*

■ *cq. . . &C,*

where p + pq is the quantity whose— power or root is required, p the first term of that quantity, and q the quotient of the rest divided by p, — the power, which may be a positive or negative integer or a fraction, and a, b, c, &c, the several terms in order,

e.g. a = p"

, m m-

b = —aq, c = ——

*m *' 2;*

-bq, and so on.

In a second letter, dated the 24th of October 1676, to Olden- burg, Newton gave the train of reasoning by which he devised the theorem.

" In the beginning of my mathematical studies, when I was perus- ing the works of the celebrated Dr Wallis, and considering the series by the interpolation of which he exhibits the area of the circle and hyperbola (for instance, in this series of curves whose common base

*or axis is x, and the ordinates respectively (1— xx) 5 , (1— **)*,*

(1 — xx) 2 , (1 — xx), &c), I perceived that if the areas of the alternate curves, which arex, x — Jx 3 ,x— xfx 3 + ixVx — fx 3 + fx 6 — ^x 7 ,&c., could be interpolated, we should obtain the areas of the intermediate ones, the first of which (1 —xxj* is the area of the circle. Now in order to [do] this, it appeared that in all the series the first term was x; that the second terms §x 3 , \x 3 , fx 3 , &c, were in arithmetical pro- gression ; and consequently that the first two terms of all the series*

to be interpolated would be x-

x-

. x-

&c.

3 ”” 3 ”” 3

” Now for the interpolation of the rest, I considered that the denominators I, 3, 5, &c, were in arithmetical progression; and that therefore only the numerical coefficients of the numerators were to be investigated. But these in the alternate areas, which are given, were the sarfte with the figures of which the several powers of II consist, viz., of li°, II 1 , II 2 , n 3 , &c, that is, the first I ; the second, 1,1; the third, 1,2, 1, ; the fourth I, 3, 3, 1 ; and so on. I enquired therefore how, in these series, the rest of the terms may be derived from the first two being given; and I found that by putting m for the second figure or term, the rest should be produced by the con-

**yt ft ivy) — T fyt _ 2*

tinued multiplication of the terms of this series — – — X — 5 — X — – — ... ■

&c. . . . This rule I therefore applied to the series to be interpolated.

-x 3 And since, in the series for the circle, the second term was 2 —, I put

m = ... And hence I found the required area of the circular segment

to be x— — — — -— iti

tODeX 3 5 7

produced the interpolated areas of other curves; as also the

area of the hyperbola and the other alternates in this series

(i+xx)-, (i+xx), (l+xx) 2 , &c. . . . Having proceeded so far, I*

considered that the terms (1 — xx) 2 , (1 — xx), (1 — xx)\ (1 — xxY, &c, that is 1, 1—x 1 , l-2× 2 +x 4 , 1 — 3× 2 +3× 4 — x 6 , &c, might be interpolated in the same manner as the areas generated . by them, and for this, nothing more was required than to omit the denominators I, 3, 5, 7, &c, in the terms expressing the*

areas; that is, the coefficients of the terms of the quantity to

be interpolated (1— xx)* or (1— xx) s ˆ 2 , or generally (1— xx) m will

&c. . . . And in the same manner might be

be produced by the continued multiplication of this series

The binomial theorem was thus discovered as a development of John Wallis's investigations in the method of interpolation. Newton gave no proof, and it was in the Ars Conjectandi (17 13) that James Bernoulli's proof for positive integral values of the exponent was first published, although Bernoulli must have discovered it many years previously. A rigorous demonstration was wanting for many years, Leonhard Euler's proof for negative and fractional values being faulty, and was finally given by Niels Heinrik Abel.

The multi- (or poly-) nomial theorem has for its object the expansion of any power of a multinomial and was discussed in 1697 by Abraham Demoivre (see Combinatorial Analysis).

References. — For the history of the binomial theorem, see John Coiiins, Commercium Epistolicum (1712); S. P. Rigaud, The Correspondence of Scientific Men of the 17th Century (1841); M. Cantor, Geschichte der Mathematik (1894-1901).

BINTURONG (Arctictis binturong), the single species of the viverrine genus Arctictis, ranging from Nepal through the Malay Peninsula to Sumatra and Java. This animal, also called the bear-cat, is allied to the palm-civets, or paradoxures, but differs from the rest of the family (Viverridae) by its tufted ears and long, bushy, prehensile tail, which is thick at the root and almost equals in length the head and body together (from 28 to 33 inches). The fur is long and coarse, of a dull black hue with a grey wash on the head and fore-limbs. In habits the binturong is nocturnal and arboreal, inhabiting forests, and living on small vertebrates, worms, insects and fruits. It is said to be naturally fierce, but when taken young is easily tamed and becomes gentle and playful.

BINYON, LAURENCE (1869-), English poet, born at Lancaster on the 10th of August 1869, was educated at St Paul's school, London,

and Trinity College, Oxford, where he won the Newdigate prize in 1890 for his Persephone. He entered the department of printed books at the British Museum in 1893, and was transferred to the department of prints and drawings in 1895, the Catalogue of English Drawings in the British Museum (1898, &c.) being by him. As a poet he is represented by Lyric Poems (1894), Poems (Oxford, 1895), London Visions (2 vols., 1895-1898), The Praise of Life (1896), Porphyrion and other Poems (1898), Odes (1900), The Death of Adam (1903), Penthe- silea (1903), Dream come true (1905), Paris and Oenone (1906), a one-act tragedy, and Attila, a poetical drama (1907); as an art critic by monographs on the 17th-century Dutch etchers, on John Crome and John Sell Cotman, contributed to the Portfolio, &c. In 1906 he published the first volume of a series of reproductions from William Blake, with a critical introduction.

See also R. A. Streatfeild, Two Poets of the New Century (1901), and W. Archer, Poets of the Younger Generation (1902).

BIO-BIO, a river of southern Chile, rising in the Pifio Hachado pass across the Andes, 38 45′ S. lat., and flowing in a general north-westerly direction to the Pacific at Concepcion, where it is 2 m. wide and forms an excellent harbour. It has a total length of about 225 m., nearly one half of which is navigable.

BIO-BIO, an inland province of southern Chile, bounded N., W. and S. respectively by the provinces of Concepcion, Arauco and Malleco, and E. by Argentina. It has an area of 5246 sq. m. of well-wooded and mountainous country, and exports timber to a large extent. The great trunk railway from San- tiago S. to Puerto Montt crosses the western part of the province and also connects it with the port of Concepcion. The capital, Los Angeles (est. pop. 7777 in 1902) lies 155 m. E. of this railway and is connected with it by a branch line.

BIOGENESIS (from the Gr. /3ios, life, and yivecris, genera- tion, birth) , a biological term for the theory according to which each living organism, however simple, arises by a process of budding, fission, spore-formation of sexual reproduction from a parent organism. Under the heading of Abiogenesis (q.v.) is discussed the series of steps by which the modern acceptance of biogenesis and rejection of abiogenesis has been brought

about. No biological generalization rests on a wider series o observations, or has been subjected to a more critical scrutiny than that every living organism has come into existence from a living portion or portions of a pre-existing organism. In the articles*

Reproduction and Heredity the details of the relations between parent and offspring are discussed. There remains for treatment here a curious collateral issue of the theory. It is within common observation that parent and off- spring are alike: that the new organism resembles that from which it has come into existence: in fine, biogenesis is homo- genesis. Every organism takes origin from a parent organism of the same kind. The conception of homogenesis, however, does not imply an absolute similarity between parent and organism. In the first place, the normal life-cycle of plants and animals exhibits what is known as alternation of generations, so that any individual in the chain may resemble its grand-parent and its grand-child, and differ markedly from its parent and child. Next, any organism may pass through a series of free-living larval stages, so that the new organism at first resembles its parent only very remotely, corresponding to an early stage in the life-history of that parent. (See Embryology, Larval Forms and Reproduction.) Finally, the conception of homogenesis does not exclude the differences between parent and offspring that continually occur, forming the material for the slow altera- tion of stocks in the course of evolution (see Variation and Selection). Homogenesis means simply that such organism comes into existence directly from a parent organism of the same race, and hence of the same species, sub-species, genus and so forth.

From time to time there have been observers who have maintained a belief in the opposite theory, to which the name heterogenesis has been given. According to the latter theory, the offspring of a given organism may be utterly different from itself, so that a known animal may give rise to another known animal of a different race, species, genus, or even family, or to a plant, or vice versa. The most extreme cases of this belief is the well- known fable of the " barnacle-geese," an illustrated account of which was printed in an early volume of the Royal Society of London. Buds of a particular tree growing near the sea were described as producing barnacles, and these, falling into the water, were supposed to develop into geese. The whole story was an imaginary embroidery of the facts that barnacles attach themselves to submerged timber and that a species of goose is known as the bernicle goose. In modern times the exponents of heterogenesis have limited themselves to cases of microscopic animals and plants, and in most cases, the observations that they have brought forward have been explained by minuter observation as cases of parasitism. No serious observer, acquainted with modern microscopic technical methods, has been able to confirm the explanation of their observations given by the few

modern believers in heterogenesis. (P. C. M.)

BIOGRAPHY (from the Gr. filos, life, and ypa

The true conception of biography, therefore, as the faithful portrait of a soul in its adventures through life, is very modern.

We may question whether it existed, save in rare and acci- dental instances, until the 17 th century. The personage described was, in earlier times, treated either from the philo- sophical or from the historical point of view. In the former case, rhetoric inevitably clouded the definiteness of the picture; the object was to produce a grandiose moral effect, to clothe the subject with all the virtues or with all the vices; to make his career a splendid example or else a solemn warning. The consequence is that we have to piece together unconsidered incidents and the accidental record of features in order to obtain an approximate estimate. We may believe, for instance, that a faithful and unprejudiced study of the emperor Julian, from the life, would be a very different thing from the impression left upon us by the passions of Cyril or of Theodoret. In considering what biography, in its pure sense, ought to be, we must insist on what it is not. It is not a philosophical treatise nor a polemical pamphlet. It is not, even, a portion of the human contemporary chronicle. Broad views are entirely out of place in biography, and there is perhaps no greater literary mistake than to attempt what is called the " Life and Times " of a man. In an adequate record of the " times," the man is bound to sink into significance; even a " Life and Times " of Napoleon I. would be an impossible task. History deals with fragments ot the vast roll of events; it must always begin abruptly and close in the middle of affairs; it must always deal, impartially, with a vast number of persons. Biography is a study sharply defined by two definite events, birth and death. It fills its canvas with one figure, and other personages, however great in themselves, must always be subsidiary to the central hero. The only remnant of the old rhetorical purpose of " lives " which clearer modern purpose can afford to retain is the relative light thrown on military or intellectual or social genius by the achievements of the selected subject. Even this must be watched with great care, lest the desire to illuminate that genius, and make it consistent, should lead the biographer to glose over frailties or obscure irregularities. In the old " lives " of great men, this is precisely what was done. If the facts did not lend

themselves to the great initial thesis, so much the worse for them. They must be ignored or falsified, since the whole object of the work was to " teach a lesson," to magnify a certain tendency of conduct. It was very difficult to persuade the literary world that, whatever biography is, it is not an opportunity for panegyric or invective, and the lack of this perception destroys our faith in most of the records of personal life in ancient and medieval times. It is impossible to avoid suspecting that Suetonius loaded his canvas with black in order to excite hatred against the Roman emperors; it is still more difficult to accept more than one page in three of the stories of the professional hagiographers. As long as it was a pious merit to deform the truth, biography could not hope to flourish. It appears to have originally asserted itself when the primitive instinct of sympathy began to have free play, that is to say, not much or often before the 17th century. Moreover, the peculiar curiosity which legitimate biography satisfies is essentially a modern thing; and presupposes our observation of life not unduly clouded by moral passion or prejudice.

Among the ancients, biography was not specifically cultivated until comparatively later times. The lost " Lives " of Critias were probably political pamphlets. We meet first with deliberate biography in Xenophon's memoirs of Socrates, a work of epoch- making value. Towards the close of the 1st century, Plutarch wrote one of the most fascinating books in the world's literature, his Parallel Lives of 46 Greeks and Romans. In later Greek, the Life of Apollonius of Tyana was written by Philostratus, who also produced a Lives of the Sophists. In the 3rd century, Diogenes Laertius compiled a Lives of the Philosophers, which is of greater interest than a Lives of the Sophists composed a hundred years later by Eunapius. Finally in the 10th century, Suidas added a biographical section to his celebrated Lexicon. In Latin literature, the earliest biography we meet with is the fragment of the Illustrious Men of Cornelius Nepos. Memoirs began to be largely written at the close of the Augustan age,

but these, like the Life of Alexander the Great, by Q. Curtius Rufus, were rather historical than biographical. Tacitus composed a life of his father-in-law, Agricola; this is a work of the most elegant and stately beauty. Suetonius was the author of several biographical compilations, of which the Lives of the Twelve Caesars is the best-known; this was produced in the year 120. Marius Maximus, in the 4th century, continued the series of emperors down to Heliogabalus, but his work has not been preserved. The Augustan History, finished under Constantine, takes its place, and was concluded and edited by Flavius Vopiscus.

Biography hardly begins to exist in English literature until the close of the reign of Henry VIII. William Roper (1496-1578) wrote a touching life of his father-in-law, Sir Thomas More, and George Cavendish (1500-1561?), a memoir of Cardinal Wolsey which is a masterpiece of liveliness and grace. It is with these two works, both of which remained in manuscript until the 17th century, that biography in England begins. The lives of English writers compiled by John Bale (1495-1563) are much more primitive and slight. John Leland (d. 1552) and John Pits (1560-1616) were antiquaries who affected a species of biography. In the early part of the 17th century, the absence of the habit of memoir writing extremely impoverishes our knowledge of the illustrious authors of the age, of none of whom there are preserved such records as our curiosity would delight in. The absence of any such chronicle was felt, and two writers, Thomas Heywood and Sir Aston Cokayne, proposed to write lives of the poets of their time. Unfortunately they never carried their plans into execution. The pioneer of deliberate English biography was Izaak Walton, who, in 1640, published a Life of Donne, followed in 1651 by that of Sir Henry Wotton, in 1665 by that of Richard Hooker, in 1670 by that of George Herbert, and in 1678 by that of Dr Robert Saunderson. These five reprinted, under the title of Walton's Lives, were not only charming in themselves, but the forerunners of a whole class of English literature. Meanwhile, Fuller was preparing his History of the Worthies of England, which appeared after his death, in 1662, and John Aubrey (1626-1697) was compiling his Minutes of Lives, which show such a perfect comprehension of the personal element that should underlie biography; these have only in our own days been completely given to the public. Edward, Lord Herbert of Cherbury (1 583-1648), wrote a brilliant auto- biography, first printed in 1764; that of Anne Harrison, Lady Fanshawe (1625-1680), remained unknown until 1829. A very curious essay in biography is the memoir of Colonel John Hutchinson, written by his widow, Lucy, between 1664 and 1671. Margaret Lucas, duchess of Newcastle (i624?-i674), wrote her own life (1656) and that of her duke (1667). The Athena Oxonienses of Anthony a Wood (1632-1695) was a complicated celebration of the wit, wisdom and learning of Oxford nota- bilities since the Reformation. In 1668 Thomas Sprat (1635- 1713) wrote a Life of Cowley, which was very much admired and which exercised for many years a baneful influence on British biography. Sprat considered that all familiar anecdote and picturesque detail should be omitted in the composition of a memoir, and that moral effect and a solemn vagueness should be aimed at. The celebrated funeral orations of Jeremy Taylor were of the same order of eloquence, and the wind of those grandiose*

compositions destroyed the young shoot of genuine and simple biography which had budded in Walton and Aubrey.

FrOm this time forth, for more than half a century, English biography became a highly artificial and rhetorical thing, lacking all the salient features of honest portraiture. William Oldys (1696-1761) was the first to speak out boldly; in 1747, in the preface to the Biographia Britannica, he pointed out " the cruelty, we might even say the impiety, of sacrificing the glory of great characters to trivial circumstances and mere convene iency," and attacked the timid and scrupulous superficiality of those who undertook to write lives of eminent men, while omitting everything which gave definition to the portrait. In 1753 the Lives of the Poets, which bore the name of Theophilus Cibber (1703-1758), but was mainly written by Robert Shiels

(d. I7S3). gave a great deal of valuable information with regard to the personal adventures of our writers. Dr Johnson's Life of Savage (1744), though containing some passages of extreme interest, was a work of imperfect form, but Mason's Life and Letters of Gray (1774) marks a great advance in the art of bio- graphy. This was the earliest memoir in which correspondence of a familiar kind was used to illustrate and to expand the narra- tive, and Mason's Gray is really the pioneer of almost all modern English biography. For the first time it was now admitted that letters to intimate friends, not written with a view to publication, might be used with advantage to illustrate the real character of the writer. Boswell, it is certain, availed himself of Mason's example, while improving upon it, and in 1791 he published his Life of Dr Samuel Johnson, which is the most interesting example of biography existing in English, or perhaps in any language.

As soon as the model of Boswell became familiar to biographers, it could no longer be said that any secret in the art was left unknown to them, and the biographies of the 19th century are all more or less founded upon the magnificent type of the Life of Johnson. But few have even approached it in courage, picturesqueness or mastery of portraiture. In the next genera- tion Southey's lives of Nelson (1813) and John Wesley (1820) at once became classics; but the pre-eminent specimen of early 19-century biography is Lockhart's superb Life of Sir Waller Scott (183 7-1 83 8). The biographies of the 19th century are far too numerous to be mentioned here in detail; in the

various articles dedicated to particular men and women in this Encyclopaedia, the date and authorship of the authori- tative life of each person will in most cases be found appended. Towards the close of the century there was unquestionably an excess, and even an abuse, in the habit of biography. It became the custom a few years or even months after the decease of an individual who had occupied a passing place in the eyes of the public, to issue a " Life " of him; in many cases such bio- graphy was a labour of utter supererogation. But the custom has become general, and it is very unlikely, notwithstanding the ephemeral interest of readers in the majority of the subjects, that it will ever go out of fashion, for it directly indulges both vanity and sentiment. What is true of Great Britain is true, though in less measure, of all other modern nations, and it is not necessary here to deal with more than the early manifestations of biography in the principal European literatures.

To Switzerland appears due the honour of having given birth to the earliest biographical dictionary ever compiled, the Biblio- theca Universalis of Konrad Gesner (1516-1565), published at Zurich in Latin, Greek and Hebrew, from 1545 to 1549. A very rare work, by a writer of the greatest obscurity, the Prosopo- graphia of Verdier de Vauprivas, published at Lyons in 1573, professed to deal with the lives of all illustrious persons who had flourished since the beginning of the world.

In medieval and renaissance France there existed numerous memoirs and histories, such as those of Brantome, into which the lives of great men were inserted, and in which a biographical character was given to studies of virtue and valour, or of the reverse. But the honour of being the earliest deliberate contri- bution to biography is generally given to the Acta Sanctorum, compiled by the Bollandists, the first volume of which appeared in 1653. This was the first biographical dictionary compiled in Europe, and its publication produced a great sensation. It was confined to the lives of saints and martyrs, but in- 1674 Louis Moreri, in his Grand Dictionnaire, included a biographical section of a general character. But the earliest biographical dictionary which had anything of a modern form was the cele- brated Dictionnaire historique et critique of Pierre Bayle, in 1696; the lives in this great work, however, are too often used as mere excuses for developing the philosophical and contro- versial views of the author; they are nevertheless the result of genuine research and have a true biographical view. The Dictionnaire was translated into English in 1734, and had a wide influence in creating a legitimate interest in biography in England.

In Italian literature, biography does not take a prominent place until the 15 th century. The Lives of Illustrious Florentines, in which a valuable memoir of Dante occurs, was written in Latin by Filippo Villani. Vespasiano da Bistrici (1421-1498) compiled a set of biographies of his contemporaries, which are excellent of their kind. The so-called Life of Cas- truccio Castracani, by Machiavelli, is hardly a biography, but a brilliant essay on the ideals of statecraft. Paolo Giovio (1483- 1552) wrote the lives of poets and soldiers whom he had known. All these attempts, however, seem insignificant by the side of the autobiography of Benvenuto Cellini (1501-1571), confessedly one of the most entertaining works of the world's literature. A great deal of biography is scattered throughout the historical compilations of the Italian renaissance, and the Lives of the Artists, by Giorgio Vasari (1512-1574), is a storehouse of anec- dotes admirably told. We find nothing else that requires special mention till we reach the memoir- writers of the 18th century, with the autobiographies of Count Carlo Gozzi and Alfieri; and on the whole, Italy, although adopting in the 19th century the habit of biography, has rarely excelled in it.

In Spanish literature Fernan Perez de Guzman (1378-1460), with great originality, enshrined, in his Generations and Like- nesses, a series of admirable literary portraits; he has been called the Plutarch of Spain. But, in spite of numerous lives of saints, poets and soldiers, Spanish literature has not excelled in bio- graphy, nor has it produced a single work of this class which is universally read. In Germany there is little to record before the close of the 18th century.

In the course of the 19th century a new thing in biography was invented, in the shape of dictionaries of national biography. Of these, the first which was carried to a successful conclusion was the Swedish (1835-1857), which occupied 23 volumes. This dictionary was followed by the Dutch (1852-1878), in 24 volumes; the Austrian (1856-1891), in 35 volumes; the Belgian (which was begun in 1866); the German (1875-1900), in 45 volumes; and others, representing nearly all the countries of Europe. England was behind the competitors named above, but when she joined the ranks a work was produced the value of which can hardly be exaggerated. The project was started in 1882 by the publisher George Smith (1824-1901), who con- sulted Mr (afterwards Sir) Leslie Stephen. The first volume of the English Dictionary of National Biography was published on the 1st of January 1885, under Stephen's editorship. A volume was published quarterly, with complete punctuality until Midsummer 1900, when volume 63 closed the work, which was presently extended by the issue of three supplementary volumes. In

May 1891 Leslie Stephen resigned the editorship and was succeeded by Mr Sidney Lee, who conducted the work to its prosperous close, bringing it up to the death of Queen Victoria. The Dictionary of National Biography contains the lives of more than 30,000 persons, and has proved of inestim- able service in elucidating the private annals of the British people. (E. G.)

BIOLOGY (Gr. /3ios, life). The biological sciences are those which deal with the phenomena manifested by living matter; and though it is customary and convenient to group apart such of these phenomena as are termed mental, and such of them as are exhibited by men in society, under the heads of psychology and sociology, yet it must be allowed that no natural boundary separates the subject matter of the latter sciences from that of biology. Psychology is inseparably linked with physiology; and the phases of social life exhibited by animals other than man, which sometimes curiously fore- shadow human policy, fall strictly within the province of the biologist.

On the other hand, the biological sciences are sharply marked off from the abiological, or those which treat of the phenomena manifested by not-living matter, in so far as the properties of living matter distinguish it absolutely from all other kinds of things, and as the present state of knowledge furnishes us with no link between the living and the not-living.

These distinctive properties of living matter are — i. Its chemical composition — containing, as it invariably does, one or more forms of a complex compound of carbon, hydrogen, The pro- ° x yg en an d nitrogen, the so-called protein or albumin parties of (which has never yet been obtained except as a pro- liring ,j uc t f living bodies), united with a large proportion matter. ˆ wa ter, and forming the chief constituent of a sub- stance which, in its primary unmodified state, is known as protoplasm.

2. Its universal disintegration and waste by oxidation; and its concomitant reintegration by the intussusception of new matter.

A process of waste resulting from the decomposition of the molecules of the protoplasm, in virtue of which they break up into more highly oxidated products, which cease to form any part of the living body, is a constant concomitant of life. There is reason to believe that

carbonic acid is always one of these waste products, while the others contain the remainder of the carbon, the nitrogen, the hydrogen and the other elements which may enter into the composition of the protoplasm.

The new matter taken in to make good this constant loss is either a ready-formed protoplasmic material, supplied by some other living being, or it consists of the elements of protoplasm, united together in simpler combinations, which consequently have to be built up into protoplasm by the agency of the living matter itself. In either case, the addition of molecules to those which already existed takes place, not at the surface of the living mass, but by interposition between the existing molecules of the latter. If the processes of disintegration and of reconstruc- tion which characterize life balance one another, the size of the mass of living matter remains stationary, while, if the recon- structive process is the more rapid, the living body grows. But the increase of size which constitutes growth is the result of a process of molecular intussusception, and therefore differs altogether from the process of growth by accretion, which may be observed in crystals and is effected purely by the external addition of new matter — so that, in the well-known aphorism of Linnaeus, the word " grow " as applied to stones signifies a totally different process from what is called " growth " in plants and animals.

3. Its tendency to undergo cyclical changes.

In the ordinary course of nature, all living matter proceeds from pre-existing living matter, a portion of the latter being detached and acquiring an independent existence. The new form takes on the characters of that from which it arose; ex- hibits the same power of propagating itself by means of an off- shoot; and, sooner or later, like its predecessor, ceases to live, and is resolved into more highly oxidated compounds of its elements.

Thus an individual living body is not only constantly changing its substance, but its size and form are undergoing continual modifications, the end of which is the death and decay of that individual; the continuation of the kind being secured by the detachment of portions which tend to run through the same cycle of forms as the parent. No forms of matter which are either not living, or have not been derived from living matter, exhibit these three properties, nor any approach to the remarkable phenomena defined under the second and third heads. But in addition to these distinctive characters, living matter has some other peculiarities, the chief of which are the dependence of all its activities upon moisture and upon

heat, within a limited range of temperature, and the fact that it usually possesses a certain structure or organization.

As has been said, a large proportion of water enters into the composition of all living matter; a certain amount of drying arrests vital activity, and the complete abstraction Life con- f tn j s wa t er is absolutely incompatible with either mo˚isture. y actual or potential life. But many of the simpler forms of life may undergo desiccation to such an extent as to arrest their vital manifestations and convert them into the semblance of not-living matter, and yet remain potentially alive. That is to say, on being duly moistened they return to life again. And this revivification may take place after months, or even years, of arrested life.

The properties of living matter are intimately related to temperature. Not only does exposure to heat sufficient to coagulate protein matter destroy life, by demolishing Llte coa . the molecular structure upon which life depends; but ditioaed all vital activity, all phenomena of nutritive growth, by tern- movement and reproduction are possible only be- P erature – tween certain limits of temperature. These limits may be set down as from a little above the freezing point of water to a little below the boiling point It is to be noted, however, that these limits apply to the living matter itself, and many of the apparent exceptions are due to cases in which the living matter is enclosed in protective wrappings capable of resisting heat and cold. In many low organisms, such as the spores of bacteria, the thick, non-conducting wall may preserve the living protoplasm from subjection to external temperatures below freezing point, or above boiling point, but all the evidence goes to show that applications of such cold or heat, if prolonged or arranged so as to penetrate to the living matter, destroy life. In warm-blooded animals, such as birds and mammals, protective mechanisms for the regulation of temperature enable them to endure exposure to extreme heat or cold, but in such cases the actually living cells do not appreciably rise or fall in temperature. A variation of a very few degrees in the blood itself produces death.

Recent investigations point to the conclusion that the immedi- ate cause of the arrest of vitality, in the first place, and of its destruction, in the second, is the coagulation of certain substances in the protoplasm, and that the latter contains various coagul- able matters, which solidify at different temperatures. And it remains to be seen, how far the death of any form of living matter, at a given temperature, depends on the destruction of its funda- mental substance at that heat, and how far death is brought about by the coagulation of merely accessory compounds.

It may be safely said of all those living things which are large enough to enable us to trust the evidence of microscopes, that they are heterogeneous optically, and that their different parts, and especially the surface layer, as Life and contrasted with the interior, differ physically and °^„" za ~ chemically; while, in most living things, mere hetero- geneity is exchanged for a definite structure, whereby the body is distinguished into visibly different parts, which possess different powers or functions. Living things which present this visible structure are said to be organized; and so widely does organiza- tion obtain among living beings, that organized and living are not • unfrequently used as if they were terms of co-extensive applicability. This, however, is not exactly accurate, if it be thereby implied that all living things have a visible organization, as there are numerous forms of living matter of which it cannot properly be said that they possess either a definite structure or permanently specialized organs: though, doubtless, the simplest particle of living matter must possess a highly complex molecular structure, which is far beyond the reach of vision.

The broad distinctions which, as a matter of fact, exist between every known form of living substance and every other component of the material world, justify the separation of the biological sciences from all others. But it must not be supposed that the differences between living and not-living matter are such as to justify the assumption that the forces at work in the one are different from those which are to be met with in the other. Considered apart from the phenomena of consciousness, the phenomena of life are all dependent upon the working of the same physical and Chemical forces as those which are active in the rest of the world. It may be convenient to use the terms " vitality " and " vital force " to denote the causes of certain great groups of natural operations, as we employ the names of " electricity " and " electrical force " to denote others; but it ceases to be proper to do so, if such a name implies the absurd assumption that " electricity " and " vitality " are entities playing the part of efficient causes of electrical or vital pheno- mena. A mass of living protoplasm is simply a molecular machine of great complexity, the total results of the working 'of which, or its vital phenomena, depend — on the one hand,

upon its construction, and, on the other, upon the energy supplied to it; and to speak of " vitality " as anything but the name of a series of

operations is as if one should talk of the " horologity " of a clock.

Living matter, or protoplasm and the products of its meta- morphosis, may be regarded under four aspects: — ciassifica- i- It has a certain external and internal form, the tion of the latter being more usually called structure;

phenomena 2 _ j t 0CCU pi e s a certain position in space and in of life. r

time;

3. It is the subject of the operation of certain forces in virtue of which it undergoes internal changes, modifies external objects, and is modified by them ; and

4. Its form, place and powers are the effects of certain causes.

In correspondence with these four aspects of its subject, biology is logically divisible into four chief subdivisions — I. Morphology; II. Distribution; III. Physiology; IV. Aetiology.

Various accidental circumstances, however, have brought it about that the actual distribution of scientific work does not correspond with the logical subdivisions of biology. The differ- ence in technical methods and the historical evolution of teaching posts (for in all civilized countries the progress of biological knowledge has been very closely associated with the existence of institutions for the diffusion of knowledge and for professional education) have been the chief contributory causes to this practical confusion. Details of the morphology of plants will be found in the articles relating to the chief groups of plants, those of animals in the corresponding articles on groups of animals, while the classification of animals adopted in this work will be found in the article Zoology. Distribution is treated of under Zoological Distribution, Plankton, Palaeonto- logy and Plants: Distribution. Physiology and its allied articles deal with the subject generally and in relation to man, while the special physiology of plants is dealt with in a section of the article Plants. Aetiology is treated of under the heading Evolution. But practical necessity has given rise to the existence of many other divisions; see Cytology, for the structure of cells; Embryology, for the development of individual organisms; Heredity and Reproduction, for the relations between parents and offspring. (T. H. H. ; P. C. M.)

BION, Greek bucolic poet, was born at Phlossa near Smyrna, and flourished about 100 B.C. The account formerly given of him, that he

was the contemporary and imitator of Theocritus, the friend and tutor of Moschus, and lived about 280 B.C., is now generally regarded as incorrect. W. Stein (De Moschi et Bionis aetate, Tubingen, 1893) puts Bion, chiefly on metrical grounds, in the first half of the 1st century B.C. Nothing is known of him except that he lived in Sicily. The story that he died of poison, administered to him by some jealous rivals, who afterwards suffered the penalty of their crime, is probably only an invention of the author of the ' Emrd^ws Bicovos (see Moschus) . Although his poems are included in the general class of bucolic poetry, the remains show little of the vigour and truthfulness to nature characteristic of Theocritus. They breathe an exaggerated sentimentality, and show traces of the overstrained reflection frequently observable in later developments of pastoral poetry. The longest and best of them is the Lament for Adonis ('EttitcmPios 'ASowiSos). It refers to the first day of the festival of Adonis (q.v.), on which the death of the favourite of Aphrodite was lamented, thus forming an introduction to the Adoniazusae of Theocritus, the subject of which is the second day, when the reunion of Adonis and Aphrodite was celebrated. Fragments of his other pieces are preserved in Stobaeus; the epithalamium of Achilles and Deidameia is not his.

Bion and Moschus have been edited separately by G. Hermann (1849) and C. Ziegler (Tubingen, 1869), the Epitaphios Adonidos by H. L. Ahrens (1854) and E. Hiller in Beitrdge zur Textegeschichte der griechischen Bukoliker (1888). Bion's poems are generally included in the editions of Theocritus. There are English translations by J. Banks (1853) in Bohn's Classical Library, and by Andrew Lang (1889), with Theocritus and Moschus; there is an edition of the

text by U. Wilamowitz-Mollendorff in the Oxford Scriptorum Classicorum Bibliotheca (1905). On the date of Bion see F. Biicheler in Rheinisches Museum, xxx. (1875), pp. 33-41 1 also G. Knaack in Pauly-Wissowa's Realencyclopddie, s.v. ; and F. Susemihl, Geschichte der griechischen Litteratur in der Alexandrinerzeit, i. (1891), p. 233.

BION, of Borysthenes (Olbia), in Sarmatia, Greek moralist and philosopher, flourished in the first half of the 3rd century B.C. He was of low origin, his mother being a courtesan and his father a dealer in salt fish, with which he combined the occupa- tion of smuggling. Bion, when a young man, was sold as a slave to a rhetorician, who gave him his freedom and made him his heir. After the death of his patron, Bion went to Athens to study philosophy. Here he attached himself in succession to the Academy, the Cynics,

the Cyrenaics and the Peripatetics. One of his teachers was the Cyrenaic Theodorus, called " the atheist," whose influence is clearly shown in Bion's attitude towards the gods. After the manner of the sophists of the period, Bion travelled through Greece and Macedonia, and was admitted to the literary circle at the court of Antigonus Gonatas. He subsequently taught philosophy at Rhodes and died at Chalcis in Euboea. His life was written by Diogenes Laertius. Bion was essentially a popular writer, and in his Diatribae he satirized the follies of mankind in a manner calculated to appeal to the sympathies of a low-class audience. While eulogizing poverty and philosophy, he attacked the gods, musicians, geometricians, astrologers, and the wealthy, and denied the efficacy of prayer. His influence is distinctly traceable in succeeding writers, e.g. in the satires of Menippus. Horace (Epistles, ii. 2. 60) alludes to his satires and caustic wit (sal nigrum) . An idea of his writings can be gathered from the fragments of Teles, a cynic philosopher who lived towards the end of the 3rd century, and who made great use of them. Specimens of his apophthegms may be found in Diogenes Laertius and the florilegium of Stobaeus, while there are traces of his influence in Seneca. |

See Hoogvliet, De Vita, Doctrina, et Scriptis Bionis (1821); Ros-' signol, Fragmenta Bionis Borysthenitae (1830) ; Heinze, De Horatio Bionis Imitatore (1889).

BIOT, JEAN BAPTISTE (1774-1862), French physicist, was born at Paris on the 21st of April 1774. After serving for a short time in the artillery, he was appointed in 1797 professor of mathematics at Beauvais, and in 1800 he became professor of physics at the College de France, through the influence of Laplace, from whom he had sought and obtained the favour of reading the proof sheets of the MScanique celeste. Three years later, at an unusually early age, he was elected a member of the Academy of Sciences, and in 1804 he accompanied Gay Lussac on the first balloon ascent undertaken for scientific purposes. In 1806 he was associated with F. J. D. Arago, with whom he had already carried out investigations on the refractive properties of different gases, in the measurement of an arc of the meridian in Spain, and in subsequent years he was engaged in various other geodetic determinations. In 1814 he was made chevalier and in 1849 commander, of the Legion of Honour. He failed in his ambition of becoming perpetual secretary of the Academy of Sciences, but was somewhat consoled by his election as a member of the French Academy in 1856. He died in Paris on the 3rd of February 1862. His researches extended to almost every branch of physical science, but his most im- portant work was of an

optical character. He was especially interested in questions relating to the polarization of light, and his observations in this field, which gained him the Rumford medal of the Royal Society in 1840, laid the foundations of the polarimetric analysis of sugar.

Biot was an extremely prolific writer, and besides a great number of scientific memoirs, biographies, &c, his published works include: Analyse de la micanique celeste de M. Laplace (1801); Traite analytique des courbes et des surfaces du second degrS (1802); Recherches sur I'integraiion des Equations diffSren- tielles partiettes et sur les vibrations des surfaces (1803); Traite de physique (1816) ; Recueil d' observations geodisiques, astronomiques et physiques exicutees en Espagne et Ecosse, with Arago (1821); Memoir e sur la vraie constitution de V atmosphere terrestre (1841); Traits ilementaire d 'astronomic physique (1805); Recherches sur

plusieurs points de I'astronomie Sgyptienne (1823) ; Recherches sur I'ancienne astronomic chinoise (1840); Etudes sur I'astronomie indienne et sur I'astronomie chinoise (1862); Essai sur Vhistoire generate des sciences pendant la Revolution (1803); Discours sur Montaigne (181 2); Lettres sur V approvisionnement de Paris et sur le commerce des grains (1835); Melanges scientifiques et litteraires (1858).

His son, Edouard Constant Biot (1803-1850), after amass- ing a competence from railway engineering, turned to, the study of Chinese subjects, and published Causes de I'abolition de I'esclavage ancien en Occident (1840) ; Dictionnaire des noms anciens et modernes des villes et des arrondissements compris dans V empire chinois (1842); Essai sur Vhistoire de V instruction publique en Chine et de la corporation des lettres (1847); Memoire sur les colonies militaires et agricoles des chinois (1850).

BIOTITE, an important rock-forming mineral belonging to the group of micas (

Like the other micas, it is monoclinic with pseudo-hexagonal symmetry (figs. 1, 2) and possesses a perfect cleavage in one direction ©. Biotite is, however, readily distinguished by its darker colour, strong pleochroism, and small optic axial angle.

*t^"\ e *

l

tn'v—

—• ?..vi.v

.''*

^

Fig. 1.

Fig. 2.

The colour is usually dark-green or brown; thick crystals are often deep-black and opaque. The absorption of light-rays vibrating parallel to the cleavage is much greater than of rays vibrating in a direction perpendicular thereto, and in dark- coloured crystals the former are almost completely absorbed. The angle between the optic axes is usually very small, the crystals being often practically uniaxial; an axial angle of 50° has, however, been recorded in a dark-coloured biotite. The specific gravity of biotite is, as a rule, higher than that of other micas, varying from 2-7 to 3-1 according to the amount of iron present. The hardness is 2\ to 3.

Several varieties of biotite are distinguished. By G. Tscher- mak it is divided into two classes, meroxene and anomite; in the former the plane of the optic axis coincides with the plane of symmetry, whilst in the latter it is perpendicular thereto. Meroxene includes nearly all ordinary biotite, and is the name given by A. Breithaupt in 1841 to the Vesuvian crystals; on the other hand, anomite (named from avo/ ws, " contrary to law ") is of rare occurrence. Haughtonite and siderophyllite are black varieties rich in ferrous iron, and lepidomelane (from Xe-iris, a scale, and /ueXas, black) is a variety rich in ferric iron. In barytobiotite and manganophyllite the magnesia is partly re- placed by baryta and manganous oxide respectively. Rubellane, hydrobiotite, pseudobiotite, and others are altered forms of biotite, which is a mineral particularly liable to decomposition with the production of chlorites and vermiculites.

Biotite is a common constituent of igneous and crystalline rocks: in granite, gneiss and mica-schist it is often associated with muscovite (white mica), the two kinds having sometimes grown in parallel position. In volcanic rocks, and in nearly all

other kinds of igneous rocks with the exception of granite, biotite

occurs to the exclusion of the muscovite. In the dyke-rocks known as mica-traps or mica-lamprophyres biotite is especially abundant. It is also one of the most characteristic products of contact-metamorphism, being developed in sedimentary and other rocks at their contact with granite masses. In the ejected blocks of crystalline limestone of Monte Somma, Vesuvius, the most perfectly developed crystals of biotite (figs. 1, 2), or indeed of any of the micas, are found in abundance, associated with brilliant crystals of augite, olivine, humite, &c.

Although biotite (black mica) is much more common and widely distributed than white mica, yet it is of far less economic importance. The small size of the sheets, their dark colour and want of transparency render the material of little value. Large, cleavable masses yielding fine smoky-black and green sheets, sufficiently elastic for industrial purposes, are, however, found in Renfrew county, Ontario. (L. J. S.)

BIPARTITE (from the Lat. bi-, two, and partire, to divide). In a general sense, the word means having two corresponding parts or in duplicate. In geometry, a bipartite curve consists of two distinct branches (see Parabola, figs. 3,5). In botany, the word is applied to leaves divided into two parts near the base. A bipartient factor is a number whose square exactly divides another number. In zoology, the Bipartiti was a name given by P. A. Latreille to a group of carnivorous Coleoptera.

BIPONT EDITIONS, the name of a famous series of editions, in 50 volumes, of Greek and Latin classical authors, so called from Bipontium, the modern Latin name of Zweibriicken or Deux- Ponts in Bavaria, where they were first issued in 1779. Their place of publication was afterwards transferred to Strassburg. See Butters, Uber die Editiones Bipontinae (1877). BIQUADRATIC (from the Lat. bi-, bis, twice, and quadratus, squared). In mathematics, the biquadratic power or root of a quantity is its fourth power or root (see Algebra); a biquad- ratic equation is an equation in which the highest power of the unknown is the fourth (see Equation: Biquadratic) .

BIQUINTILE (from Lat. prefix bi-, twice, quinlilis, fifth), the aspect of two planets which are distant from each other twice the fifth part of a great circle, i.e. 144 . It was one of the new aspects introduced by Kepler.

BIRBHUM, a district of British India in the B.urdwan division of

Bengal, situated in the Gangetic plain and partly on the hills, being bounded on the south by the river Ajai. The admini- strative headquarters are at Suri, which is the only town in the district. The area comprises 1 7 5 2 sq. m. The eastern portion of the district is the ordinary alluvial plain of the Gangetic delta; the western part consists of undulating beds of laterite resting on a rock basis, and covered with small scrub jungle. The Ajai, Bakheswar and Mor or Maurakshi, are the principal rivers of the district, but they are merely hill streams and only navigable in the rains. In 1901 the population was 902,280, showing an increase of 13% in the decade. The principal industry is the spinning and weaving of silk, chiefly from tussur or jungle silk- worms. There are also several lac factories. The loop-line of the East Indian railway runs through the district, with a junction at Nalhati for Murshidabad.

History. — Birbhum in the early part of the 13th century was a Hindu state, with its capital at Rajnagar or Nagar. In the course of the century it was conquered by the Pathans and formed part of the Pathan kingdom of Bengal. At the beginning of the 1 8th century it appears as a kind of military fief held under the nawab of Murshidabad by one Asadullah Pathan, whose family had probably been its chieftains since the fall of the Pathan dynasty of Bengal in 1600. It passed into British possession in 1 76 s , but the East India Company did not assume its direct govern- ment until 1787, when that course became necessary. In the interval it had been a prey to armed bands from the highlands of Chota Nagpur, with whom the raja was unable to cope, and who practically brought the trade of the Company in the district to a standstill. The two border principalities of Birbhum and Bankura were accordingly united into a district under a British collector, being, however, separated again in 1793. By 1789, after

considerable trouble, the marauders were driven back into their mountains, and since that time (except during the Santal rising of 1855) the district has been one of the most peaceful and prosperous in India.

See Imperial Gazetteer of India (Oxford, 1908), vol. viii. s.v.

BIRCH, SAMUEL (1813-1885), English Egyptologist and antiquary, was born on the 3rd of November 1813, being the son of the rector of

St Mary Woolnoth, London. From an early age he manifested a tendency to the study of out-of-the-way subjects, and after a brief employment in the Record Office obtained in 1836 an appointment in the antiquities department of the British Museum on account of his knowledge of Chinese. He soon extended his researches to Egyptian, and when the cumbrous department came to be divided he was appointed to the charge of the Egyptian and Assyrian branch. In the latter language he had assistance, but for many years there was only one other person in the institution — in a different department — ■ who knew anything of ancient Egyptian, and the entire arrange- ment of the department devolved upon Birch. He found time nevertheless for Egyptological work of the highest value, includ- ing a hieroglyphical grammar and dictionary, translations of The Book of the Dead and the Harris papyrus, and numerous catalogues and guides. He further wrote what was long a standard history of pottery, investigated the Cypriote syllabary, and proved by various publications that he had not lost his old interest in Chinese. Paradoxical in many of his views on things in general, he was sound and cautious as a philologist; while learned and laborious, he possessed much of the instinctive divination of genius. He died on the 27th of December 1885.

BIRCH, THOMAS (1705-1766), English historian, son of Joseph Birch, a coffee-mill maker, was born at Clerkenwell on the 23rd of November 1705. He preferred study to business, but as his parents were Quakers he did not go to the university. Not- withstanding this circumstance, he was ordained deacon in the Church of England in 1730 and priest in 173 1. As a strong supporter of the Whigs, he gained the favour of Philip Yorke, afterwards lord chancellor and first earl of Hardwicke, and his subsequent preferments were largely due to this friendship. He held successively a number of benefices in different counties, and finally in London. In 1735 he became a member of the Society of Antiquaries, and was elected a fellow of the Royal Society, of which he was secretary from 1752 to 1765. In 1728 he had married Hannah Cox, who died in the following year. Birch was killed on the 9th of January 1766 by a fall from his horse, and was buried in the church of St Margaret Pattens, London, of which he was then rector. He left his books and manuscripts to the British Museum, and a sum of about £500 to increase the salaries of the three assistant librarians.

Birch had an enormous capacity for work and was engaged in a large number of literary undertakings. In spite of their dulness many of his works are of considerable value, although'Horace Walpole questioned his " parts, taste and judgment." He carried on an

extensive correspondence with some of the leading men of his time, and many of his letters appear in Literary Anecdotes of the 18th Century (London, 1812-1815) and Illustra- tions of the Literary History of the i8thCentury (London, iSjy-i8ˆS) by J. Nichols, in the Bibliotheca Topographica Britaanica, vol. iii. (London, 1780-1790), and in Boswell's Life of Johnson. Birch wrote most of the English lives in the General Dictionary, Historical and Critical, 10 vols. (London, 1734-1741), assisted in the composition of the Athenian Letters (London, 1810) , edited the State Papers of John Thurloe (London, 1742) and the State Papers of W. Murdin (London, 1759). He also wrote a Life of the Right Honourable Robert Boyle (London, 1744); Inquiry into the share which King Charles I. had in the transactions of the Earl of Glamorgan for bringing over a body of Irish rebels (London, 1756); Historical view of Negotiations between the Courts of England, France and Brussels 15Q2-161J (London, 1749); Life of Arch- bishop Tittotson (London, 1753); Memoirs of the Reign of Queen Elizabeth from 1581 (London, 1754); History of the Royal Society of London (London, 1756— 1757) ; Life of Henry, Prince of Wales (London, 1760), and many other works. Among the

papers left at his death were some which were published in 1848 as the Court and Times of James I. and the Court and Times of Charles I.

See W. P. Courtney in the Dictionary of National Biography, vol. v. (1886); A. Kippis, Biographia Britannica (London, 1778-1793); Horace Walpole, Letters (London, 1891).

BIRCH (Betula), a genus of plants allied to the alder (Alnus), and like it a member of the natural order Betulaceae. The various species of,birch are mostly trees of medium size, but several of than are merely shrubs. They are as a rule of a very hardy character, thriving best in northern latitudes — the trees having round, slender branches, and serrate, deciduous leaves, with barren and fertile catkins on the same tree, and winged fruits, the so-called seeds. The bark in most of the trees occurs in fine soft membranous layers, the outer cuticle of which peels off in thin, white, papery sheets.

The common white or silver birch (B. alba) (see fig.) grows throughout the greater part of Europe, and also in Asia Minor, Siberia and North America, reaching in the north to the extreme limits of forest vege- tation, and stretch- ing southward on the European con- tinent as a forest tree to 45 N. lat., be- yond which birches occur only in special situations or as iso- lated trees. It is well known in England for its graceful habit, the slender, grey — or

white — barked stem, the delicate, droop- ing branches and the quivering leaves, a bright, clear green in spring, becoming duller in the sum- mer, but often keep- ing their greenness rather late into the autumn. The male and female flowers are borne on separate catkins in April and May. It is a short- lived tree, generally from 40 to 50 ft.

high with a trunk seldom more than 1 ft. in diameter. It flourishes in light soils and is one of the few trees that will grow amongst heather; owing to the large number of " winged seeds " which are readily scattered by the wind, it spreads rapidly, springing up where the soil is dry and covering clear- ings or waste places.

The birch is one of the most wide-spread and generally useful of forest trees of Russia, occurring in that empire in vast forests, in many instances alone, and in other cases mingled with pines, poplars and other forest trees. The wood is highly valued by carriage-builders, upholsterers and turners, on account of its toughness and tenacity, and in Russia it is prized as firewood and a source of charcoal. A very extensive domestic industry in Russia consists in the manufacture of wooden spoons, which are made to the extent of 30,000,000 annually, mostly of birch. Its pliant and flexible branches are made into brooms; and in ancient Rome the fasces of the lictors, with which they cleared the way for the magistrates, were made up of birch rods. A similar use of birch rods has continued among pedagogues to times so recent that the birch is yet, literally or metaphorically, the instrument of school-room discipline. The bark of the common birch is much more durable, and industrially of greater

From Strasburger, Lehrbuch der Botanik.

Betula alba. 1 , Branch with male (a) and female (b) inflorescences; 2, bract with three male flowers; 3, bract with three female flowers; 4, infrutescence ; 5, fruit. (After Wossidlo.)

value, than the wood. It is impermeable to water, and is there- fore used in northern countries for roofing, for domestic utensils, for boxes and jars to contain both solid and liquid substances, and for a kind of bark shoes, of which it is estimated 25 millions of pairs are annually worn by the Russian peasantry. The jars and boxes of birch bark made by Russian peasants are often stamped with very effective

patterns. By dry distillation the bark yields an empyreumatic oil, called diogott in Russia, used in the preparation of Russia leather; to this oil the peculiar pleasant odour of the leather is due. The bark itself is used in tanning; and by the Samoiedes and Kamchatkans it is ground up and eaten on account of the starchy matter it contains. A sugary sap is drawn from the trunk in the spring before the opening of the leaf-buds, and is fermented into a kind of beer and vinegar. The whole tree, but especially the bark and leaves, has a very pleasant resinous odour, and from the young leaves and buds an essential oil is distilled with water. The leaves are used as fodder in northern latitudes.

The species which belong peculiarly to America (B. lenta, excelsa, nigra, papyracea, &c.) are generally similar in appearance and properties to B. alba, and have the same range of applica- tions. The largest and most valuable is the black birch (B. lenta) found abundantly over an extensive area in British North America, growing 60 to 70 ft. high and 2 to 3 ft. in diameter. It is a wood most extensively used for furniture and for carriage- building, being tough in texture and bearing shocks well, while much of it has a handsome grain and it is susceptible of a fine polish. The bark, which is dark brown or reddish, and very durable, is used by Indians and backwoodsmen in the same way as the bark of B. alba is used in northern Europe.

The canoe or paper birch (B. papyracea) is found as far north as 70 N. on the American continent, but it becomes rare and stunted in the Arctic circle. Professor Charles Sprague Sargent says: " It is one of the most widely distributed trees of North America. From Labrador it ranges to the southern shores of Hudson's Bay and to those of the Great Bear Lake, and to the valley of the Yukon and the coast of Alaska, forming with the aspen, the larch, the balsam poplar, the banksian pine, the black and white spruces and the balsam fir, the great subarctic transcontinental forest; and southward it ranges through all the forest region of the Dominion of Canada and the northern states." It is a tree of the greatest value to the inhabitants of the Mackenzie river district in British North America. Its bark is used for the construction of canoes, and for drinking-cups, dishes and baskets. From the wood, platters, axe-handles, snow-shoe frames, and dog sledges are made, and it is worked into articles of furniture which are susceptible of a good polish. The sap which flows in the spring is drawn off and boiled down to an agreeable spirit, or fermented with a birch- wine of consider- able alcoholic strength. The bark is also used as a substitute for paper. A species (B. Bhojputtra) growing on the Himalayan Mountains, as high up as

9000 ft., yields large quantities of fine thin papery bark, extensively sent down to the plains as a sub- stitute for wrapping paper, for cov«ring the " snakes " of hookahs and for umbrellas. It is also said to be used as writing paper by the mountaineers; and in Kashmir it is in general use for roofing houses.

BIRCH-PFEIFFER, CHARLOTTE (1800-1868), German actress and dramatic writer, was born at Stuttgart on the 23rd of June 1800, the daughter of an estate agent named Pfeiffer. She received her early training at the Munich court theatre, and in 1818 began to play leading tragic roles at various theatres. In 1825 she married trie historian Christian Birch of Copenhagen, but continued to act. From 1837 to 1843 she managed the theatre at Zurich. In 1844 she accepted an engagement at the royal theatre in Berlin, to which she remained attached until her death on the 24th of August 1868. Her intimate knowledge of the technical necessities of the stage fitted her for the successful dramatization of many popular novels, and her plays, adapted and original, make twenty three volumes, Gesammelte drama tische Werke (Leip. 1 863-1 880). Many still retain the public favour. Her novels and tales, Gesammelte Novellen und

ErzMungen, were collected in three volumes (Leip. 1863- i86 S).

Her daughter, Wilhelmine von Hillern (b. 1836), born at Munich, went on the stage, but retired upon her marriage in 1857. After 1889 she lived in Oberammergau and won a reputation as a novelist. Her most popular works are Ein Arzt der Seele (1869, 4th ed. 1886); and Die Geier-Wally (1883), which was dramatized and translated into English as The Vulture Maiden (Leip. 1876).

BIRD, the common English name for feathered vertebrates, members of the class Aves. The word in Old Eng. is brid and in Mid. Eng. byrd or bryd, and in early uses meant the young or nestlings only. It is partly due to this early meaning that the derivation from the root of " brood " has been usually accepted; this the New English Dictionary regards as " inadmissible." The word does not occur in any other Teutonic language. As a generic name for the feathered vertebrates " bird " has replaced the older " fowl," a common Teutonic word, appearing in German as Vogel. " Bird," when it passed from its earliest meaning of " nestlings," seems to have been applied to the smaller, and " fowl " to the larger species, a distinction which was retained by Johnson. In modern usage " fowl," except in " wild-fowl " or " water-fowl," is confined to domestic poultry.

The scope of the anatomical part of the following article is a general

account of the structure of birds (Aves) in so far as they, as a class, differ from other vertebrates, notably reptiles and mammals, whilst features especially characteristic, peculiar or unique, have been dwelt upon at greater length so far as space permitted. References to original papers indicate further sources of information. For a comprehensive account the reader may be referred to Prof. M. Fiirbringer's enormous work Untersuchungen zur Morphologic und Systemalik der Vogel, 4to., 2 vols. (1888); H. G. Bronn's Klassen und Ordnungen des Thierreichs, vol. vi., " Aves," Leipzig, completed 1893 by Gadow; and A. Newton's Dictionary of Birds, London, 1896. For the history of the classification of birds see the article Ornithology, where also the more important ornithological works are mentioned. Egg, Feather (including Moult), Migration, &c, also form separate articles to which reference should be made. In this article (a) the general anatomy of birds is discussed, (b) fossil birds, (c) the geographical distribution of birds, (d) the latest classification of birds.

A. Anatomy or Birds

1. Skeleton.

■*Skull. — When W. K. Parker wrote the account of the skull m the article Birds for the 9th edition of the Encyclopaedia Britannica, he had still to wrestle with the general problem of the composition and evolution of the skull. That chapter of comparative anatomy (together with other anatomical details, for which see the separate articles) is now dealt with in the article Skull; here only the most avine features are alluded to, and since some of Parker's original illustrations have been retained, the description has been shortened considerably.*

One general feature of the adult bird's skull is the almost complete disappearance of the sutures between the bones of the cranium proper, whilst another is the great movability of the whole palatal and other suspensorial apparatus. The occipital condyle (fig. 1) is a single knob, being formed almost wholly by the basi-occipital, while the lateral occipitals (often perversely called exoccipitals) take but little share in it. Part of the membranous roof between the supra-occipital and parietal bones frequently remains unossified and presents in the macerated skull a pair of fontanelles. The squa-mosals form the posterior outer margin of the orbits and are frequently continued into two lateral downward processes across the temporal fossa. One of these, the processus orbitatis posterior, often combines with an outgrowth of the alisphenoid, and may be, e.g. in

cockatoos, continued forwards to the lacrymal bone, so as to form a complete infraorbital bridge. The posterior, so-called processus Zygomaticus is very variable; in many Galli it encloses a foramen by distally joining the orbital process. The ethmoid frequently appears on the dorsal surface between the frontals. There are three periotic bones (pro-, epi-, opisth-otic). The prootic encloses between it and the lateral occipital the fenestra ovalis, into which fits the columella of the ear. The epiotic is often small, ossifies irregularly,

and fuses with the supra-occipital. The opisthotic lies between the epiotic and the lateral occipital with which it ultimately fuses; in some birds, e.g. in Larus, it extends far enough to help to bound the

Fig. 1. — End view of skull of a Chicken three weeks old. Here the opisthotic bone ap- pears in the occipital region, as in the adult Chelonian. (After W. K. Parker.) bo, Basi-occipital. bt, Basi-temporal. eo, Opisthotic. /, Frontal. fm, Foramen magnum. fo, Fontanella. oc, Occipital condyle. op, Opisthotic. p, Parietal. pf, Post-frontal. sc, Sinus canal in

supra-occipital. so, Supra-occipital. sq, Squamosal. 8, Exit of vagus nerve.

later on fused with, a pair of membrane bones, the basi-temporals, homologous in part with the parasphenoid of lower vertebrates. They contribute to the formation of the auditory meatus, and of the right and left carotid canals which accompany the eustachian tubes.

~TT

Fig. 2. — Ripe Chick's head, i| in. long. (After W. K. Parker.)

as, Alisphenoid. pf,

bo, Basi-occipital. pg,

bt, Basi-temporal. pn,

dpx, Dentary process of pre- ppx,

maxilla.

eo, Opisthotic. prp, eu, Eustachian tube.

/, Frontal. 37,

fm, Foramen magnum. so,

j, Jugal. sq,

I, Lacrymal. ty,

mx, Maxilla. “,

mxp, Maxillo-palatine process. 8,

oc, Occipital condyle. 9. pa, Palatine. ■

Post-frontal.

Pterygoid.

Prenasal cartilage.

Palatine process of pre- maxillary.

Pterygoid process of sphe- noid.

Quadratojugal.

Supra-occipital.

Squamosal.

Tympanic cavity.

Vomer.

Exit of vagus nerve.

Exit of hypoglossal nerve.

i-J-

In many birds the basisphenoids send out a pair of basipterygoid processes by which they articulate with the pterygoids. Dorso-laterally the basisphenoid is joined by the alisphenoid, which forms most of the posterior wall of the orbit. The orbito-sphenoids diverge only posteriorly, otherwise they are practically unpaired and form the median interorbital septum, which is very large in correlation

with the extraordinary size of" the eyeballs. ,

Prefrontal bones are absent ; post-frontals are possibly indicated by a frequently occurring separate centre of ossification in the post-orbital process, to which the frontals always contribute. The lacrymal is always present, and perforated by a glandular duct. Attached to it or the neighbouring frontal is often a supraorbital; infraorbitals occur also, attached to the jugal or downward process of the lacrymal. The nasals were used by A. H. Garrod to distinguish the birds as holorhinal (fig. 2) where the anterior margin of the nasal is concave, and schizorhinal where this posterior border of the outer nares is continued backwards into a slit which extends beyond the frontal processes of the pre- maxilla. Many birds possess a more or less well developed cross- joint in front of the frontals and lacrymals, perhaps best developed in Anseres and Psittaci. Owing to this joint the whole upper beak can be moved up and down with extra facility, according to the shoving forwards or backwards of the palato-pterygo-quad- rate apparatus which moves sledge – like upon the cranial basis. The premaxilla is always unpaired, but each half has three long processes directed backwards; one fuses with the maxillary bone, an- other helps to form the anterior part of the palate, while the third, together with its fellow, forms the " culmen " and ex- tends backwards to the frontals, or rather to the ethmoid which there crops up on the surface. The maxil- laries (fig. 3) have besides others, a maxillo-palatine pro- cess directed inwards in a transverse hori- zontal direction. The palatines are long, always fused an- teriorly with the premaxilla, and fre- quently with the maxillo-palatine processes; posteriorly they slide upon the presphenoidal rostrum, and articulate in most birds with the pterygoids; they form the greater part of the palatal roof and border the choanae or inner nares. Between these, resting vertically upon the rostrum, appears the vomer; very variable in shape and size, often reduced to a mere trace, as in the Galli, or even absent, broken up into a pair of tiny splints in Pici.

The taxonomic importance of the configurations of the palate was first pointed out by J. de Cornay. T. H. Huxley, in 1868, divided the carinate birds into Dromaeo-, Schizo-, Desmo-, and Aegitho-gnathae, an arrangement which for many years had a considerable influence upon classification. However, subsequent additions and corrections have detracted much from its value, especially when it became understood that the above sub-orders are by no means natural groups. Dromaeognathae have a struthious palate, with a broad vomer meeting in front the broad maxillo-palatal plates, while behind it reaches the pterygoids. The only representatives are the

Tinamous. Schizognathae, e.g. fowls (fig. 4), pigeons, gulls, plovers, rails and penguins, have the vomer pointed in front while the maxillo-palatines are free, leaving a fissure between the vomer and themselves. The schizognathous formation is doubtless the most primitive, and its representatives form a tolerably natural

m

lift

»

#-

P —

Fig. 3. — Skull of an old Fowl, upper view. (After W. K. Parker.) ■*

Lateral occipital, npx, Nasal process of

Si

eth, Ethmoid. /, Frontal. j, Jugal. /, Lacrymal. n. Nostril. np, Upper process of nasal.

premaxillary. p, Parietal. pf, Post-frontal. px, Premaxilla. §j> Quadratojugal. so, Supra-occipital. sq, Squamosal.

assembly. Desmognathae (fig. 5) were supposed to have the maxillo-palatines united across the middle line, either directly or by the inter-

Fig. 4.— Skull of adult Fowl. This skull is unusually schizognathous, the vomer (v.) being very small, and the maxillo- pala- tine process (mxp) much aborted.

Basi-occipital. Basi-temporal. Lateral occi- pital. Eus tac h ia n tube. ic, Internalcarotid. j, Jugal. /, Lacrymal. mx, Maxilla. mxp, Maxillo-pala- tine process. oc, Occipital con- dyle. pa, Palatine. pf, Post-frontal. pg. Pterygoid. prp, Pterygoid pro- cess of sphenoid. px, Premaxilla. q, Quadrate. , t V< Quadratojugal. -b.t. r0Si Rostrum of basi-sphenoid. Supra-occipital. Vomer. Exit of vagus

nerve. Exit of hypo- glossal nerve. (After W. K. Parker.)

mediation of ossifications in the nasal septum. This is a hopeless assembly. Parker and Fiirbringer have demonstrated that desmo-

Fig. 5.— Skull of nestling Sparrow- ha wk(Accipiter nisus) , palatal view. The circular space on each side of the basi-tem- poral (bt.) is the open- ing of the anterior tympanic recess. The basi-pterygoids (bpg) are mere knobs, and the common eusta- chian opening is seen between them. The maxillo- palatine plates (mxp) are dot- ted to show their spongy character. bt, Basi-temporal. bpg, Basi-pterygoid. eo, Lateral occipital. /, Frontal. fm, Foramen magnum. j, Jugal. /, Lacrymal. mpg, Mesopterygoid

process of W. K.

Parker. mx. Maxillary. mxp, Maxillo-palatine

process. op, Opisthotic. pa, Palatine. pg, Pterygoid.

8, Exit of vagus nerve. . 9, Exit of hypo- glossal nerve.

px, Premaxilla. pto, Prootic. q, Quadrate. qj, Quadratojugal.

sn, Nasal septum. so, Supra-occipital. ty, Tympanic cavity. v, Vomer. (After W. K. Parker.)

are all derived from some schizognathous group or other. The Aegithognathae, meant to comprise the passeres, woodpeckers and swifts, &c, are really schizognathous but with a vomer which is broadly truncated in front.

The remainder of the appendicular skeleton (fig. 6) of the head requires little description. The maxillaries are connected with the distal anterior corner of the quadrate by the thin, splint-like jugal and quadratojugal. The quadrate is invariably a conspicuous bone and movably articulating with the cranium and by a special process with the pterygoid. The mandible is composed of several bones as in reptiles. The os articulare bears on its inner side the inner mandibular process which serves for the insertion of part of the digastric muscle or opener of the mouth; another portion of this muscle is attached to the os angulare, which frequently forms a

gnathism has been produced in half a dozen ways, implying numerous cases of co n vergence without any nearer relationship than that they

Fig. 6. — Skull of adult Fowl. Here the temporal fossa is bridged over by the junction of the post-frontal and squamosal processes {pf., sq.). The processes of the mandible (tap, pap) are character- istic of this type, and of the anseres.

a, Angular of mandible. pa.

ar, Articular. pap,

bt, Basi-temporal.

d, Dentary. pe,

eo, Lateral occipital. pf,

eth, Ethmoid. pg,

f, Frontal. ps,

tap, Interangular process of px,

mandible. q,

ios, Interorbital septum. qj,

j, Jugal. sa,

I, Lacrymal. so,

mx, Maxillan sq,*

n, Nasal. ty,

os, Orbito-sphenoid. v,

p, Parietal. 1,

Palatine. .Posterior angular process

of mandible. Ethmoid. Post-frontal. Pterygoid. Pre-sphenoid. Premaxilla. Quadrate. Quadratojugal. Supra-angular or coronoid. Supra-occipital. Squamosal. Tympanic cavity. Vomer. Exit of olfactory nerve.

posterior mandibular process. The greater part of the under-jaw is formed by the right and left dentaries,, which in all recent birds are fused together in front. Supra-angular and coronoid splint-bones serve for the insertion of part of the temporal or masseter muscle. Additional splints rest on the inner side of the jaw. Like the crocodiles, birds possess a siphonium, i.e. a membranous, or ossified, tube which rises from a pneumatic foramen in the os articulare, on the median side of the articulation, and passes upwards between the quadrate and lateral occipital bone, opening into the cavity of the middle ear.

The Hyoid apparatus is, in its detail, subject to many variations in accord with the very diverse uses to which the tongue of birds is

-e.br

fir

-6S. r

put. It consists of (1) the basihyal variously called copula, or corpus linguae, or unpaired middle portion. (2) The urohyal like- wise unpaired, rested ventrally on the larynx. (3) The os ento- glossum originally paired, but coalescing into an arrow-headed piece, attached to the anterior end of the basihyal and lodged in the tongue proper. It is homologous with the distal ends of the ceratohyals or ventral elements of the hyoidean or second visceral arch. The dorsal or hyomandibular portion of this same arch is transformed into the auditory chain, ending in the fenestra ovalis. (4) A pair of thyrohyals, homologous with the posterior hyoid horns of mammals, i.e. third visceral or first branchial arch. As the most developed pair in birds they are com- monly, although wrongly, called the hyoid horns. They articulate upon facets of the hinder outer corners of the basihyal.

The vertebrae are stereospondylous, the centrum or body and the arch being com- pletely fused into one mass, leaving not even a neuro-central suture. The arch alone sends out processes, viz. the spinous process, the anterior and posterior oblique (commonly called pre- and post-zygapophyses), and the transverse processes. The latter articulate with the tuberculurh of the corresponding rib, while the capitulum articulates by a knob on the side of the anterior end of the centrum. In the cervical region the ribs are much reduced, fused with their verte- brae and enclosing the transverse canal or foramen. When the vertebrae are free their centra articulate with each other by com- plicated joints, exhibiting four types. (1) Amphicoelous ; each end of the centrum is concave; this, the lowest condition, is embryonic, but was retained in Archaeopteryx and in the thoracic vertebrae of Ichthyornis. (2) Procoelous, concave in front; only in the atlas, for the reception of the occipital condyle. (3) Opisthocoelous, or concave behind, only occasionally found in the thoracic region, e.g. Sphenisci. (4) Hetero- coelous (fig. 8) or saddle-shaped; the anterior surface is concave in a transverse, but convex in a vertical direction, which on posterior surface shows the conditions re- versed. This is the most perfect arrangement attained by the vertebral column, and is typical of, and restricted to, birds. The inter- vertebral joints are further complicated by the interposition of

a cartilaginous or fibrous pad or ring. This pad varies much; it is morphologically the homologue of the pair of basiventral elements which by their lateral extension give origin to the corre- sponding ribs. Later those pads fuse with the anterior end of the centrum of the vertebra to which they belong; where the vertebral column is rendered inflexible, the disks are ossified with the centra and all trace of them is lost. Sometimes the pad is reduced to a ventral semi-ring or meniscus; it retains its largest almost original shape size in the second vertebra, the axis or epistropheus, where

-S.&

c.A

Fig. 7. — Oshyoides of adult Fowl.

c.h, Ceratohyals (con- fluent).

b.h, The so-called basi- hyal, answering to the first basi- branchial of a fish.

b.br, Basi-branchial, or urohyal, an- swering to the rest of the basi-branchial series.

c.h, e.br, together form the thyro- hyal, answering to the first cer-ato- and epi- branchials.

it forms a separately ossifying piece which connects, and coossifies with, the odontoid process (the centrum of the atlas) and the centrum of the second vertebra. Sometimes the ventral portions of these pads

form paired or un- paired little ossifica- tions, then generally described as inter- centra; such are not uncommon on the tail. The atlas is com- posed of three pieces; a pair of lateral ele- ments (the right and left dorsal arch pieces) joining above the spinal cord, and a ventral piece equiva- lent to the first basi- ventral elements, i.e. serially homologous with the intervertebral pads. In the adults the atlas forms a more or less solid ring. A remnant of the chorda dor salts and its sheath persists as the ligamenlum suspensortum between the central portions of the successive vertebrae.

Fig. 8. — A cervical vertebra from the middle of the neck of a Fowl; natural size, a, Side view; b. upper view; c, lower view; pr.z, pre-zygapophyses ; pt.z, post-zygapo- physes.

In birds we distinguish between the following regions of the axial skeleton. (1) Cervical vertebrae, or those between the skull and the first vertebra which is connected with the sternum by a pair of complete ribs. The last 1 to 5 of these vertebrae have movable ribs which do not reach the sternum, and are called cervico-dorsals. (2) Dorsals, those which begin with the first thoracic rib, and end at the last that is not fused with the ilium. The term " lumbar " vertebrae is inapplicable to birds. (3) Pelvic, all those which are fused with the iliac portion of the pelvis, generally a considerable number. (4) Caudal, those which are not connected with the pelvis. It is to be noted that often no absolute line of demarcation can be drawn in regard to these regions, their definitions being rather convenient than morpho- logical.

In comparison with all other verte- brates the number of neck-vertebrae of the birds is considerably increased; the lowest number, 14 to 15, is that of most Passeres and many other Coracio- morphae; the largest numbers, 20 or 21, are found in the ostrich, 23 in Cygnus olor and 25 in the black swan. Dorsal vertebrae frequently have a ventral outgrowth of the centrum; these hypa- pophyses may be simple vertical blades, X-shaped, or paired knobs; they serve for the attachment of the thoracic origin of the longus collianticus muscle, reaching their greatest development in Sphenisci and Colymbidae. In many birds some of the thoracic vertebrae are more or less coossified, in most pigeons for instance the 15th to 17th; in most Galli the last cervical and the next three or four thoracics are coalesced, &c. The pelvic vertebrae include of course the sacrum. There are only two or three vertebrae which are equivalent to those of the reptiles; these true sacrals are situated in a level just behind the acetabulum; as a rule between these two primary sacral vertebrae issues the last of the spinal nerves which con- tributes to the composition of the sciadic plexus. These true sacrals alone are connected with the ilium by pro cesses which are really equivalent to size, seen modified ribs; but the pelvis of birds d./,Dorso-lumbar, s, sacral, extends considerably farther forwards c, caudal vertebrae, and backwards, gradually coming into

contact with other vertebrae, which in various ways send out connecting transverse processes or buttresses, and thus become and post-sacral vertebrae (fig. 9). The most anterior of the ilium often, overlaps one or more short lumbar

Fig. 9. — The " sacrum" of a young Fowl; natural from below.

pre part

ribs and fuses with them, or even a long, complete thoracic rib. Similarly during the growth of the bird the posterior end of the ilium connects itself with the transverse processes of vertebrae which were originally free, thus transforming them from caudals into secondary post-sacrals. Individual, specific and generic variations are frequent.

The last six or seven caudal vertebrae coalesce into the pygostyle, an upright blade which carries the rectrices. Such a pygostyle is absent in Archaeopteryx, Hesperornis, Tinami and Ratitae, but it occurs individually in old specimens of the ostrich and the kiwi. In Ichthyornis it is very small. In all the Neornithes the total number of caudal vertebrae, inclusive of those which coalesce, is reduced to at least 13.

Sternum (figs. 10 and 11). — Charac- teristic features of the sternum are the following. There is a well-marked pro- cessus lateralis anterior (the right and left together equivalent to the_ mam- malian manubrium), which is the product of two or three ribs, the dorsal parts of which reduced ribs remain as cervico-dorsal ribs. Then follows the rib-bearing portion and then the processus lateralis posterior; this also is the product of ribs, con- sequently the right and left processes together are equivalent to the xiphoid process or xiphisternum of the mammals. The lateral process in most birds sends out an outgrowth, directed out and upwards, overlapping some of the ribs, the processus obliquus. The median and posterior extension of the body of the sternum is a direct outgrowth of the latter, therefore

Fig. 10.— Aside view of the Chick's sternum.

called raeta-sternum. The anterior margin of the sternum, between the right and left anterior lateral processes receives in sockets the feet of the coracoids. Between them arises a median crest, which varies much in extent and composition, and is of considerable taxo- nomic value. It is represented either by a spina interna or by a

spina externa, or by both, or they join to form a spina communis which is often very large and some- times ends in a bifurcation. Even- tually, when the right and left feet of the coracoids overlap each other, the anterior sternal spine contains a foramen. The keel,

or carina sterni, is formed as a direct cartilaginous out- growth of the body of the sternum, ossifying from a special centre. This keel is much reduced in the Fig. II— Sternum of a Chick (Gallus domes- New Zealand few) three days old, lower view. The cartilage Parrot,_ Mnngops, is shaded and dotted, and the bony centers are l Jr. bS ln various %ht and striated. §& Ed io£

taire. It is absent in the Ratitae, which from this feature have received their name, but considerable traces of a cartilaginous keel occur in the embryo of the ostrich, showing undeniably that the absence of a keel in the recent bird is not a primitive, fundamental feature. The keel has been lost, and is being lost, at various epochs and by various groups of birds. The swim- ming Hesperornis (see Odontornithes) was also devoid of such a structure. In many birds the spaces between the metasternum and the posterior processes and again the spaces between this and the oblique process are filled up by proceeding ossification and either remain as notches, or as fenestrae, or they are completely abolished so that the breastbone is turned into one solid more or less oblong plate.

Shoulder Girdle. — Scapula, coracoid and clavicle, meet to form the foramen triosseum, through which passes the tendon of the supra- coracoideus, or subclavius muscle to the tuberculum superius of the humerus. The coracoid is one of the most characteristic bones of the bird's skeleton. Its upper end forms the acrocoracoid process, against the inner surface of which leans the proximal portion of the clavicle. From the inner side of the neck of the coracoid arises the precoracoidal process, the remnant of the precoracoid. Only in the ostrich this element is almost typically complete, although soon fused at either end with the coracoid. Near the base of the pre- coracoidal process is a small foramen for the passage of the nervus supracoracoideus. In most birds the feet of the coracoids do not touch each other; in some groups they meet, in others one overlaps the other, the right lying ventrally upon the left. The scapula is sabre- shaped, and extends backwards over the ribs, lying almost parallel to the vertebral column. This is -a. peculiar character of all birds. The clavicles, when united, as usual, form the furcula; mostly the distal median portion is drawn out into a hypocleidium of various shape. Often it reaches the keel of the sternum, with subsequent syndesmosis or even synostosis, e.g. in the gannet. In birds of various groups the clavicles are more or less degenerated, the reduction beginning at the distal end. This condition occurs in the Ratitae as well as in the well- flying Platyrcecinae amongst parrots.

The fore-limb or wing (fig. 12) ; highly specialized for flight, which,

initiated and made possible mainly by the strong development of quill-feathers, has turned the wing into a unique organ. The humerus with its crests, ridges and processes, presents so many modi- fications characteristic of the various groups of birds, that its con- figuration alone is not only of considerable taxonomic value but that almost any genus, excepting, of course, those of Passeres, can be " spotted " by a close examination and comparison of this bone. When the wing is folded the long glenoid surface of the head of the humerus js bordered above by the tuberculum externum or superius, in the middle and below by the tuberculum medium or inferius for the insertion of the coraco-brackialis posterior muscle. From the outer tuberculum extends the large crista superior (insertion of pectoralis major and of deltoideus major muscles). The ventral portion of the neck is formed by the strong crista inferior, on the median side of which is the deep fossa subtrochanterica by which air sacs enter the humerus. On the outer side of the humerus between the head and the crista inferior is a groove lodging one of the coraco-hurneral ligaments. The distal end of the humerus ends in a trochlea, with

a larger knob for the ulna and a smaller oval knob foi tiie radius. Above this knob is often present an ectepicondylar process whence arise the tendons of the ulnar and radial flexors. The radius is the straighter and more slender of the two forearm bones. Its proximal end forms a shallow cup for articulation with the outer condyle of the humerus; the distal end bears a knob which fits into the radial carpal. The ulna is curved and rather stout ; it articulates with both carpal bones; the cubital quills often cause rugosities on its dorsal surface. Of wrist-bones only two remain in the adult bird; the original distal carpals coalesce with the proximal end of the meta- carpals. These are reduced, in all birds, to three, but traces of the fourth have been observed in embryos. The first metacarpal is short and fuses throughout its length with the second. This and the third are much longer and fuse together at their upper and distal

Fig. 12. — Bones of Fowl's right wing, adult, nat. size. h, Humerus. r, Radius. u, Ulnar. r', u', Radial and ulnar carpal

bones; with the three digits

I., II., III.

ends, leaving as a rule a space between the shafts. The pollex and the third finger are as a rule reduced to one phalanx each, while the index still has two. The first and second fingers frequently carry a little claw. The greatest reduction of the hand-skeleton is met with in

Dromaeus and in Apteryx, which retain only the index finger. It is of importance for our understanding of the position of the Ratitae in the system, that the wing-skeleton of the ostrich and rhea is an exact repetition of that of typical flying birds ; the bones are much more slender, and the muscles are considerably reduced in strength also to a lesser extent in numbers, but the total length of the wing of an ostrich or a rhea is actually and comparatively enormous. Starting with the kiwi and cassowary, people have go into the habit of confounding flightless with wingless conditions. It is absolutely certain that the wings of the Ratitae bear the strongest testimony that they are the descendants of typical flying birds.*

The pelvis (fig. 13), consisting of the sacrum (already described) and the pelvic arch, namely ilium, ischium and pubis, it follows that only birds and mammals possess a pelvis proper, whilst such is entirely absent in the Amphibia and in reptiles with the exception of some of the Dinosaurs. The ventral inner margin of the pre- acetabular portion of the ilium is attached to the pre-sacral vertebrae, whilst the inner and dorsal margin of the postacetabular portion is attached to the primary sacral and the postsacral vertebrae. In rare cases the right and left preacetabular blades fuse with each other above the spinous processes. In front of the acetabulum a thick process of the ilium descends to meet the pubis, and a similar pro- cess behind meets the ischium. The acetabulum is completely sur- rounded by these three bones, but its cup always retains an open foramen; from its posterior rim arises the strong antitrochanter. The ischium and postacetabular ilium originally enclose the ischiadic notch or incisura ischiadica. This primitive condition occurs only in the Odontornithes (q.v.), Ratitae and Tinami; in all others this notch becomes converted into a foramen ischiadicum, through which pass the big stems ot the ischiadic nerves and most of the blood- vessels of the hind-limb. The pubis consists of a short anterior portion (spina pubica or pectineal process, homologous with the prepubic process of Dinosaurs) and the long and slender pubis proper (equivalent to the processus lateralis pubis of most reptiles). The shaft of the pubis runs parallel with that of the ischium, with which it is connected by a short ligamentous or bony bridge; this cuts off from the long tncisura pubo-ischiadica a proximal portion, the foramen obturatum, for the passage of the obturator nerve. Only in the ostrich the distal ends of

the pubes meet, forming a dagger- shaped symphysis, which is curved forwards. The pectineal process

Fig. 13. — Pelvis and caudal vertebrae of adult Fowl, side view, natural size. Il. Ilium ; Is, ischium ; Pb, pubis ; d.l, dorso-lumbar vertebrae ; Cd, caudal vertebrae ; Am, acetabulum.

is variable ; it may grow entirely from the pubis, or both pubis and ilium partake of its formation, or lastly its pubic portion may be lost and the process is entirely formed by the ilium. It is largest in the Galli and some of the Cuculi, in others it is hardly indicated. It served originally for the origin of the ambiens muscle (see Muscular System below) ; shifting or disappearance of this muscle, of course, influences the process.

The Hind Limb. — The femur often possesses a well visible pneumatic foramen on the median side of the proximal end of its shaft. The inner condyle, the intercondylar sulcus, and a portion only of its outer condyle, articulate with corresponding facets of the tibia. The outer condyle articulates mainly with the fibula. There is a patella, intercalated in the tendon of the femori-tibialis or extensor cruris muscle. In Colymbus the patella is reduced to a small ossicle, its function being taken by the greatly developed pyramidalprocessus tibialis anterior; in Podiceps and Hesperornis the patella itself is large and pyramidal. The distal half of the fibula is very slender and normally does not reach the ankle-joint; it is attached to the peroneal ridge of the tibia. On the anterior side of the tibia, is the intercondylar sulcus, which is crossed by an oblique bridge of tendon or bone, acting as a pulley for the tendon of the extensor digitorum communis muscle. The condyles of the tibia are in reality not parts of this bone, but are the three proximal tarsalia which fuse together and with the distal end of the tibia. The distal tarsalia likewise fuse together, and then on to the upper ends of the metatarsals; the tarsale centrale remain: sometimes as a separate osseous nodule, buried in the inter-articular pad. Consequently the ankle-joint of birds is absolutely cruro-tarsal and tarso-metatarsal, i.e. intertarsal, an arrangement absolutely diagnostic of birds if it did not also occur in some of the Dinosaurs. Of the metatarsals the fifth occurs as an embryonic vestige near the joint ; the first is reduced to its distal portion, and is, with the hallux, shoved on to the inner and posterior side of the foot, at least in the majority of birds. The three middle metatarsals become fused together into a cannon bone; the upper part of the third middle metatarsal projects behind and forms

the so-called hypotarsus, which in various ways, characteristic of the

different groups of birds (with one or more sulci, grooved or perforated), acts as guiding pulley to the tendons of the flexor muscles of the toes. Normally the four toes have two, three, four and five phalanges respectively, but in Cypselus the number is reduced to three in the front toes. Reduction of the number of toes (the fifth shows no traces whatever, not even in Archaeopteryx) begins with the hallux, which is completely or partly absent in many birds ; the second toe is absent in Struthio only. The short feet of the penguins are quite plantigrade, in adaptation to which habit the metatarsals lie in one plane and are incompletely co-ossified, thus presenting a pseudo-primitive condition.

Literature. — Only a mere fraction of the enormous literature dealing with the skeleton of birds can here be mentioned.

M. E. Alix Essai sur Vappareil locomoteur des oiseaux (Paris, 1874) ; E. Blanchard, " Recherches sur les caracteres osteologiques des oiseaux appliquees a la classification," Ann. Set. Nat. Ser. iv., t. xi. ; W. Dames, " Uber Brustbein Schulter- und Beckengiirtel der Archaeopteryx," Math. Naturw. Mitih., Berlin, vii., 1897, pp. 476-492; T. C. Eyton, Osteologia avium (London, 1858-1881), with many plates; C. Gegenbaur, Untersuch. z. vergl. Anat. d. Wirbel-thiere, I. Carpus und Tarsus, II. Schulter gilrtel (Leipzig, 1 864-1 865); P. Harting, L Appareil Spislernal des oiseaux (Utrecht, 1864) ; T. H. Huxley, On the Classification of Birds and on the Taxonomic Value of the Modifications of certain of the Cranial Bones. . ." P.Z.S., 1867; G. Jaeger, " Das Wirbelkorpergelenk der Vogel," Sitzb. K. Ak. Wiss., Wien, xxxiii., 1858; A. Johnson, " On the Development of the Pelvic Girdle and Skeleton of the Hind-limb in the Chick," Q.J. M.S., xxiii., 1883, pp. 399-411; K. F. Kessler, " Osteologie der

Vogelfiisse," Bull. Soc. Imp. Nat., Moscow, xiv., , 1841 ; B. Lindsay, " On the Avian Sternum," P.Z.S., 1885; E. Mehnert, " Entwickelung des Ospelvis der Vogel," Morph. Jahrb., xiii., 1877; A. B. Meyer, Abbildungen von Vogel-Skeletten (Dresden, 1879) ; St G. Mivart, " On the Axial Skeleton of the Ostrich, Struthionidae, Pelecanidae," Trans. Zool. Soc. viii., 1874; x., 1877; E. S. Morse, " On the Carpus and Tarsus of Birds," Ann. Lye. N.H., New York, x., 1874; J. S. Parker, "Ob- servations on the Anatomy and Development of Apteryx," Phil. Trans., 1890, pp. 1-110, 17 pis.; W. K. Parker, numerous papers in Trans. L.S., R.S. and Z.S., e.g. " Osteology of Gallinaceous Birds," T.Z.S., v., 1863 ; " Rhinochetus," ibid. vi. ; "Skull of Aegithognathous Birds," ibid, x., 1878; "Skull in the Ostrich Tribe," Phil. Trans, vol. 156, 1866; " Skull of Common Fowl," ibid. vol. 159, 1870; "Skull of Picidae," T. Linn. Soc, 1875; "

Monograph on the Structure and Development of the Shoulder-girdle and Sternum," Ray Soc. London, 1868; W. P. Pycraft, " On the Morphology and Phytogeny of the Palaeognathae (Ratitae and Crypturi) and Neognathae," Trans. Zool. Soc. xv., 1900, pp. 149-290, pis. 42-45; id. " Some points in the morphology of the Palate of the Neognathae," T. Linn. Soc. 28, pp. 343-357, pis. 31-32; P. Suschkin, " Zur Morphologie des Vogelskelets. I. Schadel von Tinnunculus," Mem. Soc, Moscow, xvi., 1900, pp. 1-63, pis.

2. Muscular System.

Of the muscles of the stem or axis, those of the neck and tail are well-developed and specialized, while those of the lower back are more or less reduced, or even completely degenerated owing to the rigidity of this region, brought about by the great antero-posterior extent of the pelvis.

The muscles of the limbs show a great amount of special- ization, away from the fundamental reptilian and mammalian conditions. The muscles of the fore limbs are most aberrant, but at the same time more uniformly developed than those of the hinder extremities. The reasons are obvious. The whole wing is a unique modification, deeply affecting the skeletal, muscular and tegumentary structures, but fluttering, skimming, sailing, soaring are motions much more akin to one another than climbing and grasping, running, scratching, paddling and wading. The modifications of the hind-limbs are in fact many times greater (such as extremely long legs, with four, three or only two toes; very short legs, almost incapable of walking, with all four toes directed forwards, or two or one backwards, and two or more connected and therefore bound to act together, in various

ways. Thus it has come to pass that the muscles of the hind limbs are, like their framework, more easily compared with those of reptiles and mammals than are the wings, whilst within the class of birds they show an enormous amount of variation in direct correlation with their manifold requirements. The only really aberrant modifications of the wing-muscles are found in the Ratitae, where they are, however, all easily explained by reduction, and in the penguins, where the wings are greatly specialized into blades for

rowing with screw-like motions.

The wing of the bird is folded in a unique way, namely, the radius parallel with the humerus, and the whole wrist and hand with their ulnar side against the ulna; upper and forearm in a state of supination, the hand in that of strong abduction. Dorsal and ventral bending, even in the extended wing, is almost impossible. Consequently only a few of the original extensor muscles have been preserved, but these are much modified into very independent organs, notably the extensor metacarpi radialis longus, the ext. metac. ulnaris and the two radio- and ulnari-metacarpi muscles, all of which are inserted upon the rnetacarpus by means of long tendons. The chief muscular mass, arising from the sternum in the shape of a U> is the pectoralis muscle; its fibres converge into a strong tendon, which is inserted upon the greater tubercle and upper crest of the humerus, which it depresses and slightly rotates forwards during the down- stroke. This great muscle covers completely the supracoracoideus, generally described as the second pectoral, or subclavius muscle, in reality homologous with the mammalian supraspinous muscle. This arises mostly from the angle formed by the keel with the body of the sternum, passes by a strong tendon through the foramen tri- osseum, and is inserted upon the upper tubercle of the humeral crest, which it rotates and abducts. The extent of the origin of this muscle from the sternum, on which it leaves converging, parallel or diverging impressions, is of some taxonomic value.

Much labour has been bestowed by A. H. Garrod and Max Fiirbringer upon the investigation of the variations of the inserting tendons of the patagial muscles (fig. 14), mainly from a taxonomic

-

S Exp. sec.

From Newton's Dictionary of' Birds, by permission of A. & C. Black.

Fig. 14. — Wing muscles of a Goose. Bi, Biceps; Elast. sec, elastic vinculum and Exp. sec, expansor secundariorum; Pt.br and Pt.lg, short and long propatagial muscles ; Tri, triceps.

point of view. The propatagialis longus muscle is composed of slips from the deltoid, pectoral, biceps and cucullaris muscles; Its strong belly originates near the shoulder joint from clavicle, cora- coid and scapula. Its elastic tendon runs directly to the carpus, forming thereby the outer margin of the anterior patagium, or fold of skin

between the upper and forearm, which it serves to extend, together with the propatagialis brevis muscle. This runs down the anterior and outer side of the upper arm, and is attached to the proximal tendon of the extensor metacarpi radialis longus, a little below the outer condyle of the humerus. In most birds the tendon is split into several portions, one of which is often attached to the outer side of the ulna, below the elbow joint, while others are in variable but characteristic ways connected with similar slips of the propatagialis longus. The posterior patagium, the fold between trunk and inner surface of the upper arm, is stretched by the meta- patagialis muscle, which is composed of slips from the serratus, superficialis, latissimus dor si and the expansor secundariorum muscles. This, the stretcher of the cubital quills, is a very interesting muscle. Arising as a long tendon from the sterno-scapular ligament, it passes the axilla by means of a fibrous pulley, accompanies the axillary vessels and nerves along the humerus, and is inserted by a few fleshy fibres on the base of the last two or three cubital quills. Here, alone, at the distal portion of the tendon, occur muscular fibres, but these are unstriped, belonging to the category of cutaneous muscles. We have here the interesting fact that a muscle (portion of the triceps humeri of the reptiles) has been reduced to a tendon, which in a secon- dary way has become connected with cutaneous muscles, which, when strongly developed, represent its belly.

The flexor digitorum sublimis muscle arises fleshy from the long elastic band which extends from the inner humeral condyle along the ventral surface of the ulna to the ulnar carpal bone, over which the tendon runs to insert itself on the radial anterior side of the first phalanx of the second digit. Owing to the elasticity of the humero-carpal band the wing remains closed without any special muscular exertion, while, when the wing is extended, this band assists in keeping it taut. The arm-muscles have been studied in an absolutely exhaustive manner by Furbringer, who in his monumental work has tabulated and then scrutinized the chief characters of fourteen selected muscles. The results are as interesting from a morphological point of view (showing the subtle and gradual modifications of these organs in their various adaptations), as they are sparse in taxonomic value, far less satisfactory than are those of the hind-limb. ■He was, however, the first to show clearly that the Ratitae are the retrograde descendants of flying ancestors, that the various groups of surviving Ratitae are, as such, a polyphyletic group, and he has gone fully into the interesting question of the development and subsequent loss of the power of flight, a loss which has taken place not only in different orders of birds but also at various geological

periods, and is still taking place. Very important are also the investigations which show how, for instance in such fundamentally different groups as petrels and gulls, similar bionomic conditions have produced step by step a marvellously close convergence, not only in general appearance, but even in many details of structure.

Of the muscles of the hind-limbs likewise only a few can be mentioned. The ambiens muscle, long and spindle-shaped, lying immediately beneath the skin, extending from the pectineal process or ilio-pubic spine to the knee, is the most median of the muscles of the thigh. When typically developed its long tendon passes the knee-joint, turning towards its outer side, and lastly, without being anywhere attached to the knee, it forms one of the heads of the flexor perforatus digit, ii. or iiL One of the functions of this peculiar muscle (which is similarly developed in crocodiles, but absent, or not differentiated from the ilio-tibial and ilio-femoral mass, in other vertebrates) is that its contraction helps to close the second and third toes. Too much has been made of this feature since Sir R. Owen (Cyclop. Anat. Phys. i. p. 296, 1835), following G. A. Borelli (De motu animalium, Rome, 1680), explained that birds are enabled to grasp the twig on which they rest whilst sleeping, without having to make any muscular exertion, because the weight of the body bends the knee and ankle-joints, over both of which pass the tendons of this compound muscle. There are many perching birds, e.g. all the Passeres, which do not possess this muscle at all, whilst many of those which have it fully developed, e.g. Anseres, can hardly be said to " perch."

Garrod went so far as to divide all the birds into Homalogonatae and Anomalogonatae, according to the presence or absence of the ambiens muscle. This resulted in a failure. To appreciate this, it is sufficient to enumerate the birds without the critical muscle: Passeriformes and Coraciiformes , without exception; Ardeae and Podiceps; lastly various genera of storks, pigeons, parrots, petrels and auks. The loss has taken place, and still takes place, independently in widely different groups. It follows, first, that the absence of this muscle does not always indicate relationship; secondly that we can derive birds that are without it from a group which still possess it, but not vice versa. The absence of the ambiens muscle in all owls, which apparently use their feet in the same way as the Accipitres (all of which possess it), indicates that owls are not developed from the latter, but from a group which, like the other Coraciiformes, had already lost their muscle.

Garrod further attributed much taxonomic value to the caud- ilio-

femoralis muscle (fig. 15). This, when fully developed, consists of two parts, but inserted by a single ribbon-like tendon upon the hinder surface of the femur, near the end of its first third ; the caudal part, femoro-caudalis, expressed by Garrod by the symbol A , arises from transverse processes of the tail; the iliac part (accessoro- femoro-caudal of Garrod, with the symbol B), arises mostly from the outer surface of the postacetabular ilium. Of course this double- headed condition is the more primitive, and as such exists in most nidifugous birds, but in many of these, as well as in many nidicolous birds, either the caudal or the iliac head is absent, and in a very few (Cancroma, Dicholophus, Steatornis and some Catkartes) the whole muscle is absent. The caud-ilio flexorius (semitendinosus of most authors) arises from the transverse processes of the tail, and from the distal half of the postacetabular ilium, thence passing as a broad ribbon to the popliteal region, where it splits into two portions. One of these, broad and fleshy, is inserted upon the posterior surface of the distal third of the femur. This portion, morphologically the original, was named the " accessory semitendinosus " with the symbol F; the other portion descends on the hinder aspect of the leg and joins the fascia of the inner femoral head of the gastrocnemius muscle. In many birds the insertion is shifted from the femur to the neck of the tibia, in which case the " accessory head " is said to be absent, a condition expressed by Garrod by the symbol X. By combining the four symbols A, B, X, Y, according to their presence or absence, Garrod got a considerable number of formulae, each of which was overruled, so to speak, by the two categories of the presence or absence of the ambiens muscle. It needs hardly to be pointed out why such a purely mechanical scheme was doomed to

failure. Its author, with a considerable mathematical and mechanical bias, reckoned entirely with the quantity, not with the quality of his units, and relied almost implicitly upon his formulae. It is, however, fair to state that his system was not built entirely upon these muscular variations, but rather upon a more laborious combination of anatomical characters, which were so selected that they presumably could not stand in direct correlation with each other, notably the oil-gland, caeca, carotids, nasal bones and above all, the muscles of the thigh. He was, indeed, the first to show clearly the relationship of the heron-like birds with the Steganopodes ; of stork-

like, birds with the American vultures; the great difference between the latter and the other birds of prey; the connexion of the gulls and auks with the plovers, and that of the sand-grouse with the

■*Ihtib.*

From Newton's Dictionary of Birds.

Fig. 15. — Left thigh-muscles of a Rail. Outer view after removal of the Il.fb, ilio-fibularis and Il.tib, ilio-tibialis.

A, Caudal. N, Sciatic nerve.

B, Iliac portion of caud-ilio-femoralis. Is.fm, Ischio-femoralis. X, Caud-ilio-flexorius. Is.fl, Ischio-fibularis. F, " Accessory " portion of the same. Sart. Sartorius.

Pif, Pubischio-femoralis.

pigeons — discoveries expressed in the new terms of the orders Ciconiiformes and 'Charadriiformes. These are instances, now well understood, that almost every organic system, even when studied by itself, may yield valuable indications as to the natural affinities of the various groups of birds. That Garrod has so very much advanced the classification of birds is ultimately due to his com- prehensive anatomical knowledge and general insight.

To return to these thigh muscles. The most primitive combina- tion, ambiens and A B X Y, is the most common; next follows that of A X Y, meaning the reduction of B, i.e. the iliac portion of the caud-ilio-femoralis; A B X and B X Y are less common; A X and X Y are rare and occur only in smaller groups, as in sub- families or genera ; B X occurs only in Podiceps. But the greatest reduction, with only A remaining, is characteristic of such a hetero- geneous assembly as Accipitres, Cypselidae. Trochilidae, Striges and Fregata. This fact alone is sufficient proof that these conditions, or rather reductions, have been acquired independently of the various groups. A B Y, A Y, A B, X Y and B do not occur _ at all, some of them for obvious reasons. Occasionally there is an instruc- tive progressive evolution expressed in these formula; for instance Phaethon, in various other respects the lowest of the Steganopodes, has A X Y, Sula and Phalacrocorax have A X, Fregata, the most specialized of these birds, has arrived at the reduced formula A. Further, the combinations B X Y and A X Y cannot be derived from each other, but both directly from A B X Y in two different directions. Keeping this in mind, we may fairly conclude that the flamingo with B X Y points to an

ancestral condition A B X Y, which is still represented by Platalea and Ibis, whilst the other storks proper have taken a different line, leading to A X Y.

Literature. — Well nigh complete lists of the enormous myo- logical literature are contained in Ftirbringer's Untersuchungen zur Morphologie und Systematik der Vogel, and in Gadow's vol. Vogel of Bronn's Klassen und Ordnungen des Tierreichs. Only a few papers and works can be mentioned here, with the remark that few authors have paid attention to the all-important innervation of the muscles. A. Carlsson, Beitrdge zur Kenntniss der Anatomie der Schwimmvogel; K. Svensk, Vet. Ak. Handlinger. J. G. No. 3 (1884); A. Alix, Essai sur Vappareil locomoteur des oiseaux (Paris, 1874); H. Gadow, Zur vergl. Anat. der Muskulatur des Beckens und der hinteren Gliedmasse der Ratiten , 4 (Jena, 1880) ; A. H. Garrod, " On Certain Muscles of the Thigh of Birds and on their value in Classification," P.Z.S., 1873, pp. 624-644; 1874, pp. m-123. Other papers by Garrod, 1875, PP- 339-348 (deep plantor tendons) ; 1876, pp. 506-519 (wing-muscles

of Passeres), &c. ; J. G. de Man, Vergelijkende myologische en neuro- logische Studien over Amphibien en Vogels (Leiden, 1873), (Corvidae) ; A. Milne-Edwards, Recherches anatomiques et paleontologiques pour servir d. Vhistoire des oiseaux fossiles de la France (Paris, 1867-1868), torn. i. pis. ix.x. (Aquilaand Callus) ; R. Owen, article "Aves," Todds' Cyclopaed. of Anat. and Phys. i. (London, 1835); " On the Anatomy of the Southern Apteryx," Trans. Zool. Soc, iii., 1849; A. Quenner stedt, " Studierifoglarnasanatomi," Lunds Univers. Aarsk.,ix., 1872 (hind-limb of swimming birds) ; G. Rolleston, " On the Homologies of Certain Muscles connected with the Shoulder-joint," Trans. Linn. Soc, xxvi., 1868 ; R. W. Shufeldt, The Myology of the Raven (London, 1891); M. Watson, " Report on the Anatomy of the Sphenisciidae," Challenger Reports, 1883.

3. Nervous System.

Brain. — The more characteristic features of the bird's brain show clearly a further development of the reptilian type, not always terminal features in a direct line, but rather side-depar- tures, sometimes even a secondary sinking to a lower level, and in almost every case in a direction away from those funda- mentally reptilian lines which have led to the •characters typical of, and peculiar to, the mammals.

The forebrain forms the bulk of the whole brain, but the large size of

the hemispheres is due to the greater development of the basal and lateral portions (pedunculi cerebri and corpora striata), while the pallium (the portion external to the lateral ventricles) is thin, and restricted to the median side of each hemisphere. As a direct result of this undoubtedly secondary reduction of the pallium — due to the excessive preponderance of the basal and lateral parts — the corpus callosum (i.e. the transverse commissure of the right and left pallium) is in birds reduced to a narrow flat bundle of a few white fibres; it is situated immediately above and behind the much stronger anterior commissure, i.e. the connexion between the corpora striata, or chief remaining part of the hemispheres. Owing to the small size of the olfactory lobes the anterior arms of the latter commissure are wanting. There is very little grey matter in the cortex of the hemispheres, the surface of which is devoid of convolutions, mostly quite smooth; in others, for instance pigeons, fowls and birds of prey, a very slight furrow might be compared with the Sylvian fissure.

The Thalamencephalon is much reduced. The epiphysis, or pineal body, is quite as degenerate as in mammals, although still forming a long stalk as in reptiles. In birds, this stalk consists entirely of blood-vessels, which in the adult enclose no terminal vesicle, and fuse with the membranous linings of the skull. The midbrain is repre- sented chiefly by the optic lobes, the cortex of which alone is homo- logous with the corpora quadragemina of the mammals. Their transverse dorsal connexion is the posterior commissure; otherwise the whole roof portion of the midbrain is reduced to a thin membrane, continuous with that which covers the Sylvian aqueduct, and this ventricle sends a lateral cavity into each optic lobe, as is the case in reptiles. The right and left lobes themselves are rent asunder (so to speak), so that they are freely visible from above, filling the corners formed by the hemispheres and the cerebellum. The latter is, in comparison with mammals; represented by its middle portion only, the vermis; in a sagittal section it shows an extremely well developed arbor vitae, produced by the transverse, repeated folding of the whole organ. In comparison with reptiles the cerebellum of birds shows high development. Forwards it covers, and has driven asunder, the optic lobes; backwards it hides the much shortened medulla oblongata.

Several futile attempts have been made to draw conclusions as to the intelligence of various birds, from comparison of the weight of the whole brain with that of the body, or the weight of the hemi- spheres with that of other parts of the central nervous system.

The brachial plexus is formed by four or five of the lowest cervical

nerves; the last nerve of this plexus often marks the boundary of the cervical and thoracic vertebrae. The composition of the plexus varies much, not only in different species, but even individually. The most careful obse'rvations are those by Furbringer. The serial number of these nerves depends chiefly upon the length of the neck, the extremes being represented by Cypselus (ioth-i4th cervical) and Cygnus (22nd-24th), the usual numbers of the common fowl being the I3th-I7th nerves.

The Crural Plexus is divided into a crural, ischiadic and pubic portion. The first is generally composed of three nerves, the hind-most of which, the furcalis, issues in most birds between the last two lumbo-sacral vertebrae, and then divides, one half going to the crural, the other to the sciatic portions. The obturatorius nerve invariably comes from the two main stems of the crural. The ischiadic portion consists generally of five or six nerves, which leave the pelvis as one thick system through the ilio-ischiadic foramen. The last nerve which contributes to the ischiadic plexus leaves the spinal column in most birds either between the two primary sacral vertebrae, or just below the hindmost of them, and sends a branch to the pubic portion which is composed of post-ischiadic nerves, partly imbedded in the kidneys, and innervates the ventral muscles between the tail and pubis, together with those of the cloaca and copulatory organs.

- *The Sympathetic System forms a chain on either side of the verte- bral column. In the region of the neck lateral strands pass through the transverse canal of the cervical vertebrae ; but from the thoracic region onwards, where the cardiac branch to the heart is given off, each strand is double and the basal ganglia are successively con- nected with the next by a branch which runs ventrally over the capitulum of the rib, and by another which passes directly through the foramen or space formed between capitulum and tuberculum. In the pelvic region, from about the level of the posterior end of the ischiadic plexus, the strand of each side becomes single again, passing ventrally over the transverse processes. Lastly, towards the caudal region the right and left strands approach and anastomose, eventually coalescing in the mid line.*

Literature. — A. Burara, " Das Grosshirn der Vogel," Zeitschr. wiss. Zool., 38, 1883, pp. 430-466, pis. 24-25; F. Leuret and P. Gratiolet, Anatomie comparee du systeme nerveux (Paris, 1839-1857), with atlas; A.Meckel, "Anatomie des Gehirns derVogeX," m Meckel' s Archiv f. Physiol, vol. ii. ; H. F. Osborn, " The Origin of the Corpus Callosum, a contribution upon the Cerebral Commissures of the Vertebrata," Morphol. Jahrbuch, 1886, xii. pp. 223-251, pis. 13-14; M. A. Schulgin, ' Lobi optici der Vogel," Zool. Anzeig. iv. pp. 277 and 303; E. R. A. Serres, Anatomie comparee du cerveau (Paris, 1824, 4 pis.); L. Stieda, " Studien iiber das centrale Nervensystem der Vogel und Saugethiere," Zeitschr. wiss. Zool. xix., 1869, pp. 1-92, pis.; J. Swan, Illustrations of the Comparative Anatomy of the Nervous System (London, 1835, 4to, with plates).

Concerning the spinal nerves and their plexus: H. v. Jhering, Das peripherische Nervensystem der Wirbeltiere (Leipzig, 1871); W. A. Haswell, " Notes on the Anatomy of Birds," Proc. Linn. Soc. N.S.W. iii., 1879; M. Fiirbringer, " Zur Lehre von den Umbil- dungen der Nervenplexus, " Morph. Jahrb. v., 1879, p. 358.

4. Organs of Sense.

The Eye is essentially reptilian, but in sharpness of vision, power and quickness of accommodation it surpasses that of the mammals. The eyeball, instead of being globular, resembles rather the tube of a short and thick opera-glass.

The anterior half of the sclerotic is composed of a ring of some ten to seventeen cartilaginous or bony scales which partly overlap each other. Another cartilage or ossification, the posterior sclerotic ring, occurs within the walls of the posterior portion of the cup, and surrounds, especially in the Pici and in the Passeres, the entrance of the optic nerve. The iris is in most young birds at first brown or dull-coloured, but with maturity attains often very bright tints which add considerably to the charm of the bird; sexual dimorphism is in this respect of common occurrence. The iris contains a sphincter and a dilator muscle; the former, supplied by branches from the oculomotorius nerve, is under control of the will, whilst the dilator fibres belong to the sympathetic system. When fully dilated, the pupil is round in all birds; when contracted it is usually round, rarely oval as in the fowl. From near the entrance of the optic nerve, through the original choroidal fissure, arises the much-folded pecten, deeply pigmented and very vascular, far into the vitreous humour. The number of its folds varies considerably, from three in Caprimulgus to nearly thirty in crow (Corvus). Apteryx, which since Owen has

generally been stated to be devoid of such an organ, likewise possesses a pecten; its base is, however, trumpet-shaped, covers almost the whole of the optic disk, and extends nearly to the lens in the shape of a thick, densely pigmented cone, without any plications, resembling in these respects the pecten of many Lacer- tilia (see G. L. Johnson, Phil. Trans., 1901, p. 54). In the retina the cones prevail in numbers over the rods, as in the mammals, and their tips contain, as in other Sauropsida, coloured drops of oil, mostly red or yellow. Near the posterior pole of the fundus, but somewhat excentrically placed towards the temporal or outer side, is the fovea centralis, a slight depression in the retina, composed almost entirely of cones, the spot of most acute vision. Many birds possess besides this temporal fovea a second fovea nearer the nasal side. It is supposed that the latter serves monocular, the other the binocular vision, most birds being able to converge their eyes upon one spot. Consequently the whole field of vision of these birds possesses three points where vision is most acute. It may here be remembered that of the mammalia man and monkeys alone are capable of convergence, and have a circumscribed macular area.

Of the outer eyelids, the lower alone is movable in most birds, as in reptiles, and it frequently contains a rather large saucer-shaped cartilage, the tarsus palpebralis. The margins of the lids are sometimes furnished with eyelashes, e.g. in the ostrich and in the Amazon parrots, which are vestigial feathers without barbs. During the embryonic stage the lids are fused together, and either become separated shortly before the bird is hatched, as is the case with most Nidifugae, or else the blind condition prevails for some time, in the young Nidicolae. All birds have, like most reptiles, a well- developed third lid or " nictitating membrane," which moves from the inner canthus obliquely upwards and backwards over the cornea. The moving mechanism is a further and much higher development of that which prevails in reptiles, there being two muscles com- pletely separate from each other. Both are supplied by the abducens

nerve, together with the rectus externus muscle. One, the quadratus or bursalis muscle, arises from the hinder surface of the eyeball, and forms with its narrow margin, which is directed towards the optic nerve, a pulley for the long tendon of the pyramidalis muscle. This arises from the_ nasal surface of the ball, and its tendon passes into the somewhat imperfectly transparent nictitating membrane. The quadrate muscle adjusts the motion, and prevents pressure upon the optic nerve; during the state of relaxation of both muscles the nictitans withdraws through its own elasticity.

See R. Leuckart in Graefe and Saemisch's Handbuch d. Ophthalmologic (Leipzig, 1876, vol. i. chap. 7) ; H. Muller, Gesammelte Schriften (Otto Becker, Leipzig, 1872), and Arch. f. Ophthalmol, iii.; Ch. Rouget, " Recherches anatomiques et physiologiques sur les appareils erectiles," " Appareil de l'adaptation de l'ceil "... Compt. Rend. (Paris, xlii., 1856, pp. 937-941) ; M. Schultze, art. " Retina," in Strieker's Handbuch der Gewebelehre, 1871, vol. ii. ; J. R. Slonaker, " Comp. Study of the Area of Acute Vision in Vertebrates," Journ. Morph., 1897.

Ear. — The outer opening of the ear is, with rare exceptions, concealed by feathers, which are often rather stiff, or modified into bristles. There is no other protection, but slight, imper- fectly movable folds of skin arise from the outer rim. The largest ear-opening is met with in the owls, with correspondingly larger folds of skin, the function of which is less that of protection than, probably, the catching of sound. In many owls the right and left ears are asymmetrical, and this asymmetry affects the whole of the temporal region, all the bones which surround the outer and middle ear, notably the squamosal and the quadrate, so that the skull becomes lopsided, one ear being turned ob- liquely down, the other upwards. (For, detail see Collett, Christiania Vidensk. Forhandl., 1881, No. 3.)

The middle ear communicates with the mouth by the Eustachian tubes, which pass between the basisphenoid and basioccipital bones, and unite upon the ventral side of the sphenoid, a little behind its articulation with the pterygoids, where they open into the mouth cavity by a short membranous duct. The columellar apparatus, or auditory chain of ossicles (fig. 16), extending between the fenestra ovalis and the tympanic membrane or drum, consists of (1) the long and slen- der columella, a straight, ossified rod which fits with a disk into the fenestra ovalis; it is homologous with the stapes (m.st.), although not stirrup- shaped; (2) the extra-columellar mass. This is chiefly cartilaginous and sends out three processes: the .dorsal (s. st.) is attached to the upper wall of the drum cavity; the outermost (e. st.) is fastened on to the middle of the drum membrane; the third, ventral or in- fracolumellar process (i. st.) is directed downwards and tapers out into a thin, partly cartilaginous, strand, which originally extended to the inner corner of the articular portion of the man- dible, but on its long way comes to grief, being squeezed in between the pterygoid and quadrate. This long downward process being homologous with an almost exactly identical arrange- ment in the crocodile, and with the „ r , 1

Fig.

ain Lateral

16. — Auditory of Chicken. ...H....U.J .,. ,,,,,,,,,, L an d basal views,

extracol'umellar mass, that between (After w – K – Parker), stapes and drum, is equivalent to incus and malleus of the mam- malia. There is^ in birds, no annulus tympanicus. Birds possess an ear-muscle which at least acts as a tensor tympani; it arises near the occipital condyle, passes through a hole into the tympanic cavity, and its tendon is, in various ways, attached to the inside of the membrane and the neighbouring extracolumellar processes.

As regards the inner ear, the endolymphatic duct ends in a closed saccus, imbedded in the dura mater of the cranial cavity. The apex of the cochlea is turned towards, and almost reaches the anterior wall of the occipital condyle; at most it makes but half a twist or turn; it possesses both Reissner's membrane and the organ of Corti. Although the scala tympani is so rudimentary, not reaching a higher level than in most of the reptiles, and remaining far below the mammalia, birds do not only hear extremely well, but they distinguish between and " understand " pitch, notes and melodies.

See G. Breschet, Recherches anatomiques et physiologiques sur Vorgane de V audition chez les oiseaux (Paris, 1836), with Atlas; C. Hasse, various papers in Zeitschr. f. wiss. Zool. vol. xvii, and in Anatomische Studien, pts. ii. and iv. (Breslau, 1871); I. Ibsen, Atlas anatomicus auris internae (Copenhagen, 1 846); G. Retzius, Das Gehbrorgan der Wirbelthiere (Stockholm, 1884), ii. pp. 139-198, pis. 15-20.

Nose. — The olfactory organ is poorly developed, and it is still a question whether birds possess much power of smell; many are certainly devoid of it.

The olfactory perceptive membrane is restricted to the posterior innermost region of the nasal chamber, where it covers a slight bulging-out prominence on the nasal wall. This so-called third, upper or posterior conch is not a true conch, nor is that of the vestibulum ;

only the middle one forms a scroll, and this corresponds to the only one of reptiles and the lower of the mammals. The nasal cavity communicates with the mouth by the choanae or posterior nares, situated between the palatine process of the maxil- lary, the palatine and the vomer. The outer nares or nostrils are most variable in size and shape. In the Steganopodes they tend to become much reduced, e.g. in cormorants (Phalacrocoracidae) , and especially in Sula, where the nasal slits become completely closed up, and the greater portion of the nasal cavity is also abolished, being restricted to the olfactory region with its unusually wide choanae. The nasal septum is often more or less incomplete, pro- ducing nares perviac, e.g. in the Cathartae, in the Anseres, gulls, rails and various other aquatic birds. The secretions of the mucous membrane of the nasal cavity, and a pair of naso-lacrymal glands (not to be confounded with the Harderian and the lacrymal glands), moisten and clean the chamber. The glands are variable in size and position; when very large, e.g. in plovers, they extend upon the forehead, causing deep impressions on the bones of the skull. Jacobson's organ has been lost by the birds, apparently without a trace in the embryonic fowl, but T. J. Parker has described vestiges of the corresponding cartilages in the Apteryx {Phil. Trans., 1890).

See C. Gegenbaur, " TJber die Nasenmuscheln der Vogel," Jena Zeitschr. vii., 1873, pp. 1-21.

5. Vascular System.

The heart lies in the middle line of the body, its long axis being parallel with that of the trunk. The whole ventral surface of the pericardium is exposed when the sternum is removed. The right and left halves are completely divided by septa, no mixture of the venous and arterial blood being possible, an advance upon reptilian conditions, even the highest.

The atria are comparatively small, the walls being thin, especially those of the right, which possesses numerous muscular ridges pro- jecting into the cavity presenting a honeycombed appearance. The interauricular septum is mostly entirely membranous; in the middle it is thinner, rather transparent, but there is no depression or fossa ovalis. The whole sinus venosus has become part of the right atrium. It receives the three great venous trunks of the body, namely the vena cava superior dextra, the vena cava superior sinistra more dor- sally, and the vena cava inferior more to the right and below ; the opening of the last is guarded by two prominent valves in place of the mammalian valvula Eustachii. The right ventricle occupies the

ventral portion of the heart. The communication with the atrium is guarded by a valvula cardiaca dextra, which only in function represents the mammalian tricuspid ; it consists of an oblique reduplication of the muscular fibres together with the endocardiac lining of the right ventricle, while the opposite wall is convex and forms neither a velum nor papillary muscles, nor chordae tendineae. The right anterior corner of the right ventricle passes into the short stem, guarded by three semi-lunar valves, which divides into the two pulmonary arteries. There are likewise two pulmonary veins, entering the left atrium by one orifice. Two or three membranous flaps, held by numerous chordae tendineae, form a true mitral valve, and allow the blood to pass through the left ostium atrioventriculare. The blood leaves the heart past three semi-lunar valves, by the right aorta, this being alone functional, a feature characteristic of, and peculiar to, birds. Remnants of the left aortic arch persist sometimes in the shape of a ligamentous strand. The aortic trunk is very short, sends off the coronary arteries and then the left aorta brachiocephalica, while the rest divides into the right brachiocephalic and the aorta descendens. Each brachiocephalic soon sends off. its subclavian, while in the normal or more usual cases the rest proceeds as the carotid trunk, inclusive of the vertebral artery. But the carotids show several interesting modifications which have been examined chiefly by C. L. Nitzsch and by A. H. Garrod. (1) The right and left carotids converge towards the middle and extend up the neck, imbedded in a furrow along the ventral surface of the cervical vertebrae. This is the usual arrangement. (2) The two carotids are fused into one carotis conjuncta, imbedded in a special median osseous semicanal of the vertebrae; e.g. herons, flamingos, and some parrots. (3) There is one carotis conjuncta, but the basal portion of its original right component is obliterated, leaving a so- called c. primaria sinistra, an unfortunate name. Such Aves laevocarotidinae of Garrod are common, e.g. all the Passeriformes. (4) The reverse of the third modification, producing a c. primaria dextra in the bustard Eupodotis. In other likewise very rare cases a left, or a left and right, superficial carotids are developed and take the place of the then vanished deep or primary carotids.

Venous System. — The bird's liver receives nearly all the blood from the stomach, gut, pancreas and spleen, as well as from the left liver itself, into the right hepatic lobe, by a right and left portal vein. The venae hepaticae magnae join the vena cava posterior and thereby form with it the vena cava inferior. The left hepatica magna receives also the umbilical vein, which persists on the visceral surface of the abdominal wall, often anastomosing with the epigastric veins. A

likewise unpaired vena coccygeo-mesenterica is usually present. There is no renal portal system, excepting unimportant vestiges of such a system in the head kidneys.

Lymphatic System. — The white blood-corpuscles are produced in the follicles at the base of the intestinal villi. The lymph vessels of the tail and hinder parts of the body enter the hypogastric veins ; and at the point of junction, on either side, lies a small lymph heart, which often persists until maturity. The red blood-corpuscles are in- variably oval disks, with a central nucleus which causes a slight swelling; hence they are oval and biconvex.

See A. H. Garrod, " On the Carotid Arteries of Birds," Proc. Zool. Soc, 1873, PP- 457-47 2 ; E- A. Lauth, " Memoire sur les vaisseaux lymphatiques des oiseaux," Ann. Sci. nat. (iii. 1824), p. 381; J. J. Mackay, " the Development of the Branchial Arterial Arches in Birds, with special reference to the Origin of the Subclavians and Carotids," Phil. Trans. 179 B (1888), pp. 111-141 ; L. A. Neugebauer, " Systema venosum avium," Nov. Act. Leopold. Carol, xxi., 1844, pp. 517-698, IS pis. ; R. Gasch, " Beitrage zur vergl. Anatomie des Herzens der Vogel und Reptilien," Arch. f. Naturgesch., 1888.

6. Respiratory System.

The lungs are small and occupy only the dorsal portion of the thoracic cavity. There is only one right and one left lobe, each traversed through its whole length by a mesobronckium, whence arise about ten secondary bronchia; these send off radially arranged parabronchia, which end blindly near the surface. The walls of these tertiary tubes send out, in all direc- tions, canaliculi aeriferi which, ending in slight swellings, recall the mammalian aveoli.

Highly specialized air-sacs are characteristic of all birds. They are very thin-walled membranes, very poor in blood-vessels, formed by the bulged-out pleural or peritoneal covering of the lungs, through the parabronchial tubes of which they are filled with air. Their function is not quite clear. The usual sugges- tion, that the warm air contained within them assists the bird in flight, balloon-like, is absurd. They assist in the extremely rapid and vigorous ventilation of the lungs, the latter being capable of but very limited expansion and contraction in birds. Exchange of gas through the walls of the air-sacs, almost devoid of blood-vessels, can at best be much restricted.

There are five pairs of larger sacs belonging to the pulmonary system: — (1) prebronchial or cervical, extending sometimes far up the neck, even into the cranial cavities; the throat-bags of the prairie fowls (Cupidonia and Pedioecetes) are a further development; (2) subbronchial or interclavicular; (3 and 4) anterior and posterior thoracic or intermediate ; (5) abdominal sacs. Most of these extend through narrow apertures — foramina pneumatica — into the hollow bones, sometimes, e.g. in hornbills and screamers, into every part of the skeleton, or, in the shape of innumerable pneumatic cells, even beneath the skin. There is also a naso-pharyngeal or tym- panic system of air-sacs, restricted to the head (cf. the siphonium described in connexion with the mandible), but filling also such curious organs as the frontal excrescence of Chasmorhynchus, the Brazilian bell-bird, the throat-bag of the adjutant stork, and the gular pouch of the bustard.

The trachea or windpipe is strengthened by numerous cartilaginous, often osseous, complete rings, but in the emeu several of these rings are incomplete in the medioventral line, and permit the inner lining of the trachea to bulge out into a large neck-pouch, which is used by both sexes as a resounding bag. In humming-birds and petrels the trachea is partly divided by a vertical, longitudinal, cartilaginous septum. In some of those birds which have a peculiarly harsh or trumpeting voice, the trachea is lengthened, forming loops which lie subcutaneously (capercally, curassow), or it enters and dilates the symphysis of the furcula (crested guineafowl) ; or, e.g. in the cranes and in the hooper swan, even the whole crest of the sternum becomes invaded by the much elongated, manifolded trachea.

The syrinx or lower larynx is the most interesting and absolutely avine modification, although absent as a voice-producing organ (probably due to retrogression) in most Ratitae, storks, turkey buzzards (Cathartes) and Steganopodes. The syrinx is a modification of the lower part of the trachea and of the adjoining bronchi. Essential are vibrating membranes between the cartilaginous frame-work, and next, special muscles for regulating the tension. The majority of birds possess a pair of internal tympaniform membranes forming the inner or median walls of the bronchi, which are there furnished with semi-rings only. External tympaniform membranes

exist, with great variations, between the specialized one or two last tracheal and some of the first bronchial rings.

According to the position of the chief sound-producing membranes, three types of syrinx are distinguishable:— (1) Tracheo-bronchial, by far the commonest form, of which the two others are to a certain extent modifications. The essential feature is that the proximal end of the inner membranes is attached to the last pair of tracheal rings; outer tympaniform membranes exist generally between the 2nd, 3rd and 4th bronchial semi-rings. This type attains its highest development in the Oscines, but it occurs also in many other orders. (2) Syrinx bronchialis. The outer membranes are spread out between two or more successive bronchial semi-rings, a distance from the trachea which is, in typical cases, devoid of sounding membranes; some Cuculi, Caprimulgi, and some owls. (3) Syrinx trachealis. The lower portion of the trachea consists of thin membranes, about half a dozen of the rings being very thin or deficient. Inner and outer membranes may exist on the bronchi. The Tracheophonae among the Passeriformes, the possessors of this specialized although low type of syrinx, form a tolerably well-marked group, entirely neo- tropical. But indications of such a syrinx occur also in Pittidae, pigeons and gallinaceous birds (Gallidae), the last cases being clearly analogous.

Whilst the type of syrinx affords no help in classification, it is very different with its muscles. These — as indicated by their supply from a branch of the hypoglossal nerve, which descends on either side of the trachea — are, so to speak, a detached, now mostly independent colony of glosso-pharyngeal muscles. Omitting the paired tracheo-clavicular muscles, we restrict ourselves to the syringeal proper, those which extend between tracheal and bronchial rings. Their numbers vary from one pair to seven, and they are inserted either upon the middle portion of the bronchial semi-rings (Mesomyodi), or upon the ends of these semi-rings where these pass into the inner tympaniform membrane (Acromyodi). The former is morphologically the more primitive condition, and is found in the overwhelming majority of birds, including many Passeriformes. The acromyodian type is restricted almost entirely to the Oscines. Further, according to these muscles being inserted only upon the dorsal, or only upon the ventral, or on both ends of the semi-rings, we distinguish between an-, kat- and diacromyodi. _ But the distinction between such Acromyodi and the Mesomyodi is not always safe. For instance, the Tyranninae are anacromyod, while the closely allied Pipras and Cotingas are katacromyod; both these modifications can be shown to have been derived but recently from the weak meso- and oligomyodian condition which prevails in the

majority of the so-called Oligomyodi. On the other hand, the diacromyodian type can have been developed only from a strong muscular basis which could split into a dorsal and a ventral mass; moreover, no Passeres are known to be intermediate between those that are diacromyodian and those that are not.

Attempts to derive the anacromyodian and the katacromyodian from the diacromyodian condition are easy on paper, but quite hope- less when hampered by the knowledge of anatomical facts and how to use them. There remains but one logical way, namely, to dis- tinguish as follows: — (1) Passeres anisomyodi, in which the syrinx muscles are unequally inserted, either on the middle or on one end of the semi-rings, either dorsal or ventral. This type comprises the Clamatores. (2) Passeres diacromyodi, in which some of the syrinx muscles are attached to the dorsal, and some to the ventral ends, those ends being, so to say, equally treated. This type comprises the Oscines. Both types represent rather two divergent lines than successive stages, although that of the Clamatores remains at a lower level, possessing at the utmost three pairs of muscles, whilst these range in the Oscines from rarely two or three to five or seven.

This way of using the characters of the syrinx for the classification of the Passeriformes seems simple, but it took a long time to accom-plish. Joh. Muller introduced the terms Polymyodi and Tracheo-phones, Huxley that of Oligomyodi; Muller himself had, moreover, pointed out the more important characters of the mode of insertion, but it was Garrod who invented the corresponding terms of Acro- and Mesomyodi (= Tracheophones + Oligomyodi). (For further his-torical detail, see Ornithology). After W. A. Forbes had investi- gated such important genera as Philepitta and Xenicus, P.L. Sclater, A. Newton and R. B. Sharpe divided the Passeres respectively into Oscines, Oligomyodae, Tracheophonae and Pseudoscines (= Suboscines) ; Oligomyodae, Tracheophonae and Acromyodae; Oscines, Oligomyodae, Tracheophonae and Atrichiidae. Ignoring the fact that some Oligo- myodae are meso- and others acromyodian, they tried to combine two irreconcilable principles, namely, mere numbers against quality.

Bibliography. — M.Baer, "Beitr.z. Kenntnissd.Atemwerkzeuge bei den Vogeln," Zeitschr. uriss. Zool. lxi. 1896, pp. 420-498; Campana, Physioldgie de la respiration chez les oiseaux. Anatomie de Vappareil pneumatique . . . (Paris, 1875); A. H. Garrod, " Major Divisions of Passerine Birds (syrinx, &c.)," P.Z.S., 1876, pp. 506-519; and " On the Conformation of the Thoracic Extremity of the Trachea in the Class Aves," P.Z.S., 1879, pp. 357-38°; J- Muller,

Stimmorgane der Passerinen, Miiller's Arch. (1847); and Abh. Akad. Wiss. (Berlin, 1845-1847), translation by F. J. Bell, Oxford, 1878; H. Strasser, " Luftsacke der Vogel," Morph. Jahrb. iii., 1877, pp. 179-227; C. Wunderlich, " Unterer Kehlkopf der Vogel," Nov. Act. Leop. Carol., 1884; Ph. C. Sappey, Recherches sur Vappareil

respiratoire des oiseaux (Paris, 1847) ; W. A. Forbes, " Contributions to the Anatomy of Passerine Birds (syrinx)," P.Z.S., 1880, pp. 380-

386, 387-391; 1881, pp. 435-737; 1882, pp. 544-546, 569-571 ;.w.

Yarrell, " Observations on the tracheae of Birds," Trans. Linn. Soc, 1827, pp. 378-391-

7. Digestive System.

For a general account of the digestive organs, see Alimentary Canal. Here only a few peculiar features may be mentioned.

The young pigeons are fed by both parents with a peculiar stuff, the product of the strongly proliferating epithelial cells of the crop, which cells undergo a cheese-like fatty degeneration, and mixed with mucus, perhaps also with the proventricular juice, make up a milk-like fluid. Should the young die or be removed during this period, the parents are liable to die, suffering severely from the turgid congestion of the hypertrophied walls of the crop.

The male of the hornbills, Bucerotinae, feeds his mate, which is imprisoned, or walled-up in a hollow tree, during the whole time of incubation, by regorging his food. This bolus is surrounded, as by a bag, by the cast-up lining of the gizzard. Since this process is repeated for many days the habitual reaction of the stomach well-nigh exhausts the male. A graphic account of this is given in Livingstone's travels.

The hoactzin, Opisthocomus, feeds to a great extent upon the leaves of the aroid Montrichardia or Caladium arborescens. The crop is modified into a large and very rugose triturating apparatus, while the gizzard, thereby relieved of its function, is reduced to the utmost. The large and heavy crop has caused aunique modificationof the sternal apparatus. The keel is pushed back to the distal third of the sternum, whilst the original anterior margin of the keel is correspondingly elongated, and the furcula fused with the rostral portion.

In the ostrich, Struthio, the craze of overloading the stomach with

pebbles which, when triturated into sand, are not voided, has brought about a dislocation, so that the enormously widened and stretched space between proventriculus and gizzard forms a bag, directed downwards, whilst the gizzard itself with part of the duodenum is rotated round its axis to more than 100 °. A similar rotation and dislocation occurs in various petrels, in correlation with the indigestible sepia-bills, &c, which these birds swallow in great quantities. In Plotus, the snakebird, the pyloric chamber of the stomach is beset with a mass of hair-like stiff filaments which permit nothing but fluid to pass into the duodenum. The gizzard of various birds which are addicted to eating hairy caterpillars, e.g. Cuculus canorus and trogons, is often lined with the broken-off hairs of these caterpillars, which, penetrating the cuticle, assume a regular spiral arrangement, due to the rotatory motion of the muscles of the gizzard.

8. Cloaca and Genital Organs.

The cloaca is divided by transverse circular folds, which project from its inner walls, into three successive chambers. The inner- most, the coprodaeum, is an oval dilatation of the end of the rectum, and attains its greatest size in those birds whose faeces are very fluid; it serves entirely as the temporary receptacle of the faeces and the urine. The next chamber, the urodaeum, is small, and receives in its dorso-lateral wall the ureters and the genital ducts; above and below this chamber is closed by circular folds, the lower of which, towards the ventral side, passes into the coating of the copulatory organ when such is present. The urodaeum serves only as a passage, the urine being mixed with the faeces in the chamber above. The third or outermost chamber, the proctodaeum, is closed externally by the sphincter ani; the orifice is quite circular. It lodges the copulatory organ, and on its dorsal wall lies the bursa Fabricii, an organ peculiar to birds. It is most developed in the young of both sexes, is of unknown function, and becomes more or less obliterated in the adult. Only in the ostrich it remains through- out life, being specialized into a large receptacle for the urine, an absolutely unique arrangement. A true urinary bladder, i.e. a ventral dilatation of the urodaeum, is absent in all birds. It is significant that the whole type of their cloaca much resembles that of the Crocodilia and Chelonia, in opposition to that of the Lacertilia.

The penis, and its much reduced vestige of the female, is developed from the ventral wall of the proctodaeum. It occurs in two different forms. In the Ratitae, except Rhea, it consists mainly of a right and left united half {corpora fibrosa), with a deep longitudinal furrow on

the dorsal side, and much resembles the same organ in crocodiles and tortoises. It is protruded and retracted by special muscles which are partly attached to the ventral, distal end of the ilium. Another type exists in Rhea and in the A nseriformes, greatly special- ized by being spirally twisted and partly reversible like the finger of a glove. This is mainly due to the greater development of an un- paired, median portion, analogous to the mammalian corpus spongio- sum, which is much less prominent in the Ratitae; the muscles of this type are derived solely from the anal sphincter. In other Carinatae, e.g. tinamous and storks, the penis is very much smaller and simpler, with every appearance of a degenerated organ. In the great majority of birds it has disappeared completely and the primi- tive way of everting the cloaca is resorted to.

Both ricrht and left testes are functional. They become greatly

enlarged in the breeding season; in the sparrow, for instance, from the size of a mustard seed to that of a small cherry. The vas deferens descends with many undulations down the lateral side of the ureter of the same side, and opens upon a small papilla into the urodaeum. Extraordinary increase in length during the breeding season causes the vasa deferentia in some of the African weaver- birds to protrude, or to bulge out the cloacal walls beyond the vent. The spermatozoa exhibit many differences in shape, size and pro- portions, in the various groups of birds. They have been studied minutely by E. Ballowitz.

Only the left ovary becomes functional, with rare individual ex- ceptions. Both present the appearance of diminutive clusters of grapes, at the anterior end of the kidneys, close to the suprarenal bodies, separated from each other by the descending aorta and by the vena cava where this is formed by the right and left vena iliaca communis. During the breeding season many more eggs are de- veloped than reach maturity, amounting in most birds to several dozens. Those germs which do not ripen during the season under- go a process of resorption, and in the winter the whole ovary dwindles to often a diminutive size. In young birds both oviducts are almost equal in size, but the right soon degenerates into an insignificant strand. During every laying season the left duct in- creases

enormously by new formation of its component fibres. For instance, in the fowl its volume increases about fifty-fold, growing from some 6 in. in length and scarcely one line in width to more than 2 ft. in length and i in. in thickness. The upper, wide opening of the duct is attached by elastic, peritoneal lamellae to the hinder margin of the left lung; the middle portion of the duct is glandular and thick - walled, for the deposition of the albumen; it is connected by a short, constricted " isthmus " (where the shell-membrane is formed) with a dilated " uterus " in which the egg receives its cal- careous shell and eventual pigmentation.

Bibliography. — A. v. Brunn, Riickbildung nicht ausgestossener Eierstockseier, Henle Festschrift (Bonn, 1882); E. Ballowitz, "Die Spermatozoen der Vogel," Arch. Mikr. Anat. xxxii., 1888, pis. 14-18; M. Sacchi, " Contribuzione all' istiologia del ovidotto dei saurop- sidi," Att. Soc. Ital., Milano, vol. xxx. ; W. A. Forbes, " On the Bursa Fabricii in Birds," P.Z.S., 1877, pp. 304-318; H. Gadow, " Remarks on the Cloaca and on the Copulatory Organs of the Amniota." Phil. Trans., 1887, pp. 5-37, pis. 2-5; Martin Saint Ange, "Etude de l'appareil reproducteur dans les cinq classes d'animaux vertebres," Mem. Ac. Soc, Paris, xiv., 1856; E. Retterer, " Contribution a l'etude du cloaque et de la bourse de Fabricius, " Robin's Journ. de Vanat, et physiol., 1885, pp. 369-454. pis. 17-19-

B. Fossil Birds

Much had naturally been expected from the study of fossil birds, but, so far as the making of classifications is concerned, they have proved rather a source of perplexities. So long as the characters of new fossils are only of specific and generic value, it is mostly possible to assign the birds to their proper place, but when these characters indicate new families or orders, for instance Hesperornithes, Ichthyornithes, Palaelodi, their owners are put outside the more tersely constructed classifications applicable to modern birds. It is no exaggeration to say that the genus, often even the species, can be determined from almost any recent bone, but in the case of Miocene, and still more, of Eocene fossils, we have often to deal with strange families, which either represent an extinct side branch, or which connect several recent groups with each other. Our artificially-established classifications collapse whilst we gain further insight into the mutual affinities of the existing groups. Of course this must be so if evolution is true. But it also follows that, if every extinct and recent bird were known, neither species, nor genera, nor families, nor orders could be defined. We should be able to construct the pedigree of every group, in other words, the gigantic natural system,

but there would be no classification. Much light has also been thrown by fossil birds upon the study of geographical distribution. The key to the distribution of recent groups lies in that of the extinct forms. Not only have many absolutely new families been discovered, but many kinds of modern birds are now known to have existed also in countries which they are now extinct. There were, for instance, trogons, secretary-birds, parrots, and other now Ethiopian forms in Miocene France. Ostriches, undistinguishable from Struthio, have been found in Samos and in the Sivalik Hills.

The proper study of fossil birds may be said to have begun with A. Milne-Edwards, whose magnificent Oiseaux fossiles de la France was published from 1867 to 1871. This work deals chiefly with mid-Tertiary forms. A new impetus was given by O. C.

Marsh, who, after 1870, discovered a great number of bird remains in the Cretaceous strata of North America. The most important result is the proof that, until the end of the Cretaceous epoch, most, if not all, birds were still possessed of teeth (see Odontornithes).

The oldest known bird is the Archaeopteryx (q.v.), of the upper Oolite in Bavaria. The imprints in the enormously older new red sandstone or Lower Trias of Connecticut,, and originally named Ornithichnites, belong to Dinosaurian Reptiles.

A wide gap separates Archaeopteryx from the next order of fossil birds of the Cretaceous epoch, and, since freshwater deposits of that age are rare, bird remains are uncommon. Many bones formerly referred to birds have since proved to belong to Pterodactyls, e.g. Cimoliornis from the English Chalk. But in 1858 were discerned in the Upper Greensand of Cambridge- shire remains which are now known as Enaliornis. W. Dames has described bones from the Chalk of southern Sweden under the name of Scaniornis, probably allied to Palaelodus. From the Cretaceous rocks of North America a large number of birds have been described by O. C. Marsh. Of these the most interest- ing are Ichthyornis (= Graculavus) and Hesperornis, from the Cretaceous shales of Kansas. They were placed by Marsh in a distinct subclass of birds, Odontornithes (q.v.). Probably all birds of Cretaceous age were still possessed of teeth. Baptornis, another of Marsh's genera, seems to be allied to Enaliornis, Palaeotringa and Talmatornis, were by him referred to Limicoline and Passerine birds. Laornis from the Cretaceous marls of New Jersey was as large as a swan.

The lower Eocene has furnished a greater number of bird bones.

Some of the largest are those of Gastornis, with three species from France, Belgium and England. Much difference of opinion obtains as to the affinities of these birds, which were far larger than an ostrich; they were undoubtedly incapable of flight and there are indications of teeth in the upper jaw. Provisionally this genus has been grouped with the Ratitae, which at any rate are a heterogenous assembly. Sir R. Owen's Dasornis, of the London Clay, known from an imperfect cranium, and E. D. Cope's Diatryma of New Mexico, based upon a gigantic

Fig. 17. — Remains of head of Odontopteryx, from the original in the British Museum; side view; natural size.

metatarsus, may also belong there. The London Clay of South England has likewise supplied some long upper arm bones, Argillomis. The most remarkable specimen is a skull, Odonto- pteryx toliapicus (figs. 17, 18) ; the edges of the jaws were serrated

Fig. 18. — Remains of head of Odontopteryx, seen from above.

like those of certain tortoises. The character of this skull and the compound rhamphotheca (known by the imprints left upon the jaws) indicate affinities with the Steganopodes. Remnants

of a heron-like bird, Proherodius, of agull-like creature, Halcyornis, a raptorial Lithornis; and a supposed Passerine from Glarus in Switzerland, called Protornis = Osteornis, complete the list.

The upper Eocene has yielded many birds, most of which are at least close forerunners of recent genera, the differentiation into the leading orders and families being already well marked, e.g. Gallinaceous birds, stork- and crane-like waders, rails, birds of prey, cormorants, &c. Especially numerous bones have been found in the Paris basin, chiefly described by G. Cuvier, F. L. P. Gervais, E. Blanchard, and above all by A. Milne-Edwards, and in the equivalent beds of Hampshire. Others have been dis- covered in Wyoming; a giant penguin, Palaeeudyptes, is known from New Zealand, and Palaeospheniscus from Patagonia. The Miocene has yielded by far the greatest number of bird-bones, including even eggs and imprints' of feathers. For instance, from the lower Miocene beds of Allier and

Puy-de-D6me Milne- Edwards has described about 50 species. Of these Palaelodus was an ancestral flamingo, but with shorter legs; Limnatornis is referred to the hoopoes. The existing genera include Anas, Aquila, Bubo, Columba, Cypselus, Lanius, Picus, Phalacrocorax, Sula, &c. Very interesting is the fact that Serpentarius, Psittacus and Trogon are amongst this list of birds, which are now restricted to the tropics. A similarly mixed avifauna has been found in the mid-Miocene beds of various other parts of France, Germany and Italy. In Colorado and New Mexico Marsh has detected bones of Meleagris, Puffinus, Sula and Uria, all existing genera; but the first is especially suggestive, since it is one of the most characteristic forms of the New World.

Here may be interpolated a short account of the very peculiar avifauna found in the Tertiary strata of Santa Cruz in Patagonia. Instead of the age of lower Eocene, as had been stated originally, these beds are not older than mid-Miocene, and not a few of the bones are of a much younger, even latest Tertiary date. Discovered, and partly described, by F. Ameghino, the bones have been sumptuously monographed by F. P. Moreno and A. Mercerat, who proposed for them the name of Stereornithes, a new order of birds, mostly gigantic in size, and said to combine the characters of Anseres, Herodiones and Accipitres. But the whole mass of bones is in hopeless disorder, apparently without any record of association. At any rate, the " Stereornithes," accepted as such in Bronn's Thierreich, and in Newton's Dictionary of Birds, had to be dissolved as an unnatural, haphazard assembly. Many of these birds, to judge from the enormous size of their hind-limbs, were undoubtedly flightless, e.g. Brontornis, and remind us of the Eocene Gastornis of Europe. Phororhacos, the most extraordinary of all, belongs to the Gruiformes, perhaps also Pelecyomis and Liornis. On the other hand, the late Tertiary Dryornis is a member of the Cathartae or American vultures, and Mesembriornis, likewise of late Tertiary date, is a close forerunner of the recent genus Rhea.

Pliocene remains are less numerous than those of the Miocene. From Pikermi in Greece is known a Gallus, a Phasianus and a large Grus. From Samos a large stork, Amphipelargus, and a typical Struthio; from the Sivalik Hills on the southern flanks of the Himalayas also an ostrich, and another Ratite with three toes, Hypselornis, as well as Leptoptilus, Pelecanus and Phalacro- corax. The fossil egg of a struthious bird, Struthiolilhus , has been found near Cherson, south Russia, and in north China. The Suffolk Crag has yielded the unmistakable bones of an albatross, Diomedea.

Most Pleistocene birds are generically, even specifically, identical with recent foirms; some, however, have become extinct, or they have become exterminated by man. A great number of birds' bones have been found in caves, and among them some bearing marks of human workmanship. In France we have a large and extinct crane, Grus primigenia, but more inter- esting are the numerous relics of two species, the concomitants even now of the reindeer, which were abundant in that country at the period when this beast flourished there,and have followed it in its northward retreat. These are the snowy owl, Nyctea

scandiaca, and the willow-grouse, Lagopus alius. A gigantic swan, Cygnus falconeri, is known from the Zebug cavern in Malta. From caves of Minas Geraes in Brazil, O. Winge has determined at least 126 species, of which nearly all still survive in the country. Kitchen-middens of England, Ireland and Denmark reveal the existence of the capercally, Tetrao urogallus, and of the great auk or gare-fowl, Alca impennis; both species long since vanished from those countries. In the fens of East Anglia have been found two humeri, one of them immature, of a true Pele- canus, a bird now no longer inhabiting middle Europe.

Until a very recent epoch there flourished in Madagascar huge birds referable to the Ratitae, e.g. Aepyornis maximus, which laid enormous eggs, and not unnaturally recalls the mythical " roc " that figures so largely in Arabian tales. New Zealand has also yielded many flightless birds, notably the numerous species and genera of Dinornithidae, some of which survived into the 19th century (see Moa); Pseudapteryx allied to the Kiwi) Cnemiornis, a big', flightless goose; Aptornis and Notornis, flightless rails; and Harpagornis, a truly gigantic bird of prey with tremendous wings and talons.

It is, of course, quite impossible, in a survey of extinct birds, to divide them into those which are bona fide fossil, sub-fossil, recently extirpated and partially exterminated. Nor is it possible, except in a few cases, to decide whether they have come to an

From a tracing by M. A. Milne-Edwards of the original drawing in a MS. Journal kept during Wolphart Harmanszoon's voyage to Mauritius (a.d. 1601-1602), penes H. Schlegel (Proc.2ool.Soc. 1875, p. 350). Reduced.

Fig. 19. — Extinct Crested Parrot of Mauritius (Lophopsittacus mauritianus).

end through the agency of man or through so-called natural causes. Like other creatures birds have come, some to flourish and stay, others to die out.

Mauritius is famous for the dodo, killed off by man; there was also a curiously crested parrot, Lophopsittacus (fig. 19). In the Mare aux Songes have been found the bones of another

Fig. 20. — Mandible of Aphanapteryx, side view. (From the original in the Museum of Zoology of the University of Cambridge.)

parrot, of ducks, pigeons, rails, herons, geese and of a dwarf darter, Plotus nanus, all sub-fossil, now extinct. Very inter- esting is Aphanapteryx (fig. 20), a long-billed, flightless rail, practically the same as Erythromachus of Rodriguez and Dia- phorapteryx of Chatham Island. Reunion possessed the peculiar starling, Fregilupus. Rodriguez was inhabited by Pezophaps, the solitaire, N ecro psittacus and Palaeornis exsul, which is now

probably extinct. The Antilles tell a similar tale. The great auk. once common on the British coasts, those of Denmark, the east coast of North America, then restricted to those of New- foundland, Greenland and Iceland, has been killed by man, and the same fate has overtaken the Labrador duck, the Phillip Island parrot, Nestor productus, and the large cormorant of

Fig. 21. — Pied Duck (Somateria labradora), male and female. (From specimens in the British Museum. Reduced.)

Bering Island, Phalacrocorax perspicillatus; and how long will the flightless cormorant, Ph. harrisi of the Galapagos, survive its quite recent discovery?

Authorities. — A. Milne-Edwards, Recherches anatomiques et paleontologiques pour servir d. I'histoire des oiseaux fossiles de la France (Paris, 1867-1868); F. P. Moreno and A. Mercerat, Catalogo de los Pajaros fosiles de la Republica Argentina. Anales Mus. La Plata, 1891, 21 pis.; O. C. Marsh, Odontornilhes; A monograph of the Extinct Toothed Birds of North America (New Haven, Conn., 1880); R. Lydekker, article " Fossil Birds," in A. Newton's

Dictionary of Birds (London, 1893); Cat. Foss. Birds, Brit. Museum, 1891; K. v. Zittel, Handbuch der Palaontologie, i. 3 (1887-1890) ; C. W. Andrews, " On the Extinct Birds of Patagonia," Tr. Zool. Soc. xv., 1899, pp. 55-86. pis. 14-17.

C. Geographical Distribution The study of the extinct organisms of any country leads to a proper appreciation of its existing flora and fauna; while, on the other hand, a due consideration of the plants and animals which may predominate within its bounds cannot fail to throw more or less light on the changes it has in the course of ages undergone. That is to say, the distribution of forms in time is a subject so much connected with the distribution of forms in space, that the one can hardly be separated from the other. Granting this is a general truth, it must yet be acknowledged as a special fact, that in fossil birds we have as yet but scanty means of arriving at any precise results which will justify bold generalization in the matter of avine distribution. Remains of extinct birds are, compared with those of other classes of vertebrates, exceedingly scarce, and these have been found in very few, widely separated countries. The great problems involved in the study of geographical distribution must there- fore be based mainly upon the other classes, both vertebrate and invertebrate, which, moreover, enjoy less great facilities of locomotion than the birds.

Yet it so happens that the great zoogeographical regions of the world, now more or less generally accepted, have been based upon the distribution of birds. The whole subject was properly introduced by Treviranus, 1 who in his large philo- sophical work devotes considerable space to the " geographical

1 Treviranus, Biologie oder Philosophie der lebenden Natur, vol. ii. cap. 4, § 2 (Gottingen, 1803).

*distribution of animals." Next we have to mention F. Tiede- mann, 2 the Heidelberg anatomist, who has been generally ignored, although he surpassed many a recent zoogeographer by the wide view he took of the problem; in fact he was the first to connect distribution with environmental or bionomic factors; e.g. the remark on p. 481 of his work that " the countries of the East Indian flora have no kinds of birds in common with America which are vegetable feeders." L. K. Schmarda 3 divided the land into twenty-one realms, character- izing these mainly by their birds. P. L. Sclater * was the first to divide the world into a few great " regions," the Palaearctic, Ethiopian, Indian and Australian forming one group, the " Old World " (Palaeogaea); and the Nearctic and Neotropical form- ing a*

second, the New World (Neogaea). Birds being of all animals most particularly adapted for extended and rapid locomotion, it became necessary for him to eliminate from his consideration those groups, be they small or large, which are of more or less universal occurrence, and to ground his results on what was at that time commonly known as the order Insessores or Passeres, comprehending the orders now differen- tiated as Passeriformes, Coraciiformes and Cuculiformes, in other words the mass of arboreal birds. His six main divisions — practically adopted by A. R. Wallace 6 in his epoch-making work — are excellent, taken separately. They express the main complexes of land with their dependencies in well-chosen terms; for instance the " Neotropical region " stands short for South and Central America with the Antilles.

But these six divisions of Sclater and Wallace are not all equivalent, only some are of primary importance; they require co- and sub-ordination. This most important advance was made by T. H. Huxley. 6 Some of the " regions " have now to be called subregions, e.g. the Nearctic and the Palaearctic. The reduction of the Oriental to a subregion, with consequent " provincial " rank of its main subdivisions, will probably be objected to, but these are matters of taste and prejudice. Above all it should be borne in mind that nearly all the last subdivisions or provinces are of very little real value and most of them are inapplicable to other classes of animals.

Besides some occasional references in the text, only a few more of the general works dealing with the distribution of birds can here be mentioned. Especial attention has to be drawn to the article " Geographical Distribution," in Newton's Dictionary of Birds. See also A. Heilprin, The Geographical and Zoological Distribution of Animals (New York, 1887); W. Marshall and A. Reichenow, two maps with much detail, although badly arranged, in Berghaus' Physikalischer Atlas, pt. vi. (Atlasd. Thierverbreitung), (Gotha, 1887) ; A. Reichenow, " Die Begrenzung zoogeographischer Regionen vom ornithologischen Standpunkte," Zoolog. Jahrb. iii., 1888, pp. 671-704, pi. xxvi. ; E. L. Trouessart, La Geographie zoologique (Paris, 1890).

The scheme adopted in the following account stands as follows : —

(New Zealand subregion.

(A) Austrogaea or I. Australian Region j Australian „

(Papuan „

(Antillean „

(B) Neogaea or II. Neotropical Region j Columbian „

(Patagonian „

(III. Holarctic Region \ Nearctic _

(C) Arctogaea 1 IV . Palaeotropical] Ethiopian

(Region j Oriental ,','

In the following account the characterization of the various regions and subregions has to a very great extent been adopted from Newton's article in his Dictionary of Birds, and from the chapter on distribution in the article on " Birds " in the Encyclopaedia Britannica, 9th edition. This applies especially

2 F. Tiedemann, Anatomie und Natur geschichte der Vogel, vol. ii. §§ 127-255 (Heidelberg, 1814). 8 L. K. Schmarda, Die geographische Verbreitung der Thiere (Wien,

1853)-

4 P. L. Sclater on the general geographical distribution of the members of the class " Aves," 2. Linn. Soc. ii. pp. 130-145, 1858.

6 A. R. Wallace, The Geographical Distribution of Animals, with a study of the Relations of Living and Extinct Faunas as elucidating the Past Changes of the Earth's Surface, 2 vols. (London, 1876).

6 T. H. Huxley, " On the Classification and Distribution of the Alectoromorphae," P.Z.S., 1868, pp. 313-319.

DISTRIBUTION]

to those instances in which the members of families, genera and species are mentioned. The families are those which are enumerated in Garow's classification. The numbers of genera and species of birds are, of course, a matter of personal inclination. If we take a moderate computation the number of recent species may be taken at 10,000-11 ,00c 1 Dr R. B. Sharpe increases their number to about 15,000 in the New. Hand-List of Birds, published by the British Museum. In the first two volumes fossil birds, occasionally based upon a fragmentary bone only, are also included.

(A) Austrogaea, the Australian region in the wider sense.with the

Papuan, Australian and New Zealand subregions, including also Poly- nesia. We may here quote Newton (Encyclopaedia Britannica, 9th ed. , " Birds," p. 738) on the remarkable differences between this region and the rest of the Old World : — " The prevalent zoological features of any Region are of two kinds — negative and positive. It is there- fore just as much the business of the zoogeographer, who wishes to arrive at the truth, to ascertain what groups of animals are wanting in any particular locality (altogether independently of its extent) as to determine those which are forthcoming there. Of course, in the former case it would be absurd to regard as a physical feature of any great value the absence from a district of groups which do not occur except in its immediate neighbourhood; but when we find that certain groups, though abounding in some part of the vicinity, either suddenly cease from appearing or appear only in very reduced numbers, and occasionally in abnormal forms, the fact obviously has an important bearing. Now, mere geographical con- siderations, taken from the situation and configuration of the islands of the so-called Indian or Malay Archipelago, would indicate that they extended in an unbroken series from the shores of the Strait of Malacca to the southern coast of New Guinea, which confronts that of north Australia in Torres Strait, or even farther to the east- ward. Indeed, the very name Australasia, often applied to this part of the world, would induce the belief that all the countless islands, be they large or small — and some of them are among the largest on the globe — -were but a southern prolongation of the mainland of Asia. But so far from this being the case a very definite barrier is interposed. A strait, some 15 m. or so in width, and separating the two fertile but otherwise insignificant islands of Bali and Lombok, makes such a frontier as can hardly be shown to exist elsewhere. The former of these two islands belongs to the Indian Region, the latter to the Australian, and between them there is absolutely no true transition — that is, no species are common to both which cannot be easily accounted for by the various accidents and migrations that in the course of time must have tended to mingle the productions of islands so close to one another. The faunas of the two are as absolutely distinct as those of South America and Africa, and it is only because they are separated by a narrow strait instead of the broad Atlantic that they have become so slightly connected by the interchange of a few species and genera.

" Now, first, of the forms of birds which are prevalent throughout the Indian Region, but are entirely wanting in the Australian, we have at once the bulbuls (Ixidae), very characteristic of most parts of Africa and Asia, including the sub-group Phyllornithinae, which is peculiar

to the Indian Region; the widely-spread families of barbets (Megalaeminae) and vultures (Vulturidae); and the phea- sants (Pliasianidae) , which attain so great a development in various parts of the Asiatic continent and islands that there must their home be regarded as fixed. Some naturalists would add the finches (Fringillidae) , rightly if we assume that the Ploceidae or weavers constitute a separate family. Then, of forms which are but weakly represented, we have the otherwise abundant thrushes (Turdidae), and, above all, the woodpeckers (Picidae), of which only very few species, out of 400, just cross the boundary and occur in Lombok, Celebes or the Moluccas, but are unknown elsewhere in the region."

But the Australian region is also remarkable for its ornithic singularity. All the existing Ratitae (with the exception of the ostriches of Africa and South America, belonging to the genera Strulhio and Rhea, and comprising at most but five species) are found in Austrogaea and nowhere else. Of the Passeres the honey-suckers (Meliphagidae) are most characteristic, and, abounding in

1 The following old-fashioned rough computation may serve as an indication of the relative size of the orders and suborders of recent birds: — ■

Charadriiformes

genera and species, extend to almost every part of the region, yet only one species of Ptilolis oversteps its limits, crossing the sea from Lombok to Bali. Other peculiar families are much more confined. But the positive characteristics of the region as a whole are not its peculiar forms alone ; there are at least four families which, being feebly represented elsewhere, here attain the maximum of develop-ment. Such are the thick-headed shrikes (Pachycephalidae) , the caterpillar-eaters (Campephagidae) , the flower-peckers (Dicaeidae), and the swallow-flycatchers (Artamidae) . Besides these, three or perhaps four groups, though widely distributed throughout the world, arrive in the Australian region at their culmination, present- ing an abundance of most varied forms. These are the weaver-birds (Ploceidae), and the moreporks (Podargidae), but especially the kingfishers (Alcedinidae) and the pigeons (Columbidae), the species belonging to the two last obtaining in this region a degree of pro-minence and beauty which is elsewhere unequalled.

The boundaries of the subregions are not well defined.

The New Zealand Subregion, considered by Professors Newton and Huxley and various other zoogeographers as deserving the rank of a region, is, and to all appearance has long been, more isolated than any other portion of the globe. Besides the three larger islands numerous satellites belong to the subregion, as Lord Howe, Norfolk and Kermadec islands, with the Chatham, Auckland and Macquarie groups. The main affinities of the avifauna are, of course, Australian. The most extraordinary feature is unquestionably the former existence of the gigantic Dinornithes or moas (q.v.) and, another family of Ratitae, the weird-looking kiwis or Apteryges, which are totally unlike any other existing birds. Of other peculiar genera it

Ratitae Colymbiformes Sphenisciformes Procellariiformes Ciconiiformes . Anseriformes . Falconiformes . Tinamiformes . Galliformes Gruiformes

20 Charadrntormes . 650 (incl. Columbae

20 350)

15 Cucuhformes . 600 (incl. Psittaci

90 400)

150 Coraciiformes . 1600 (incl. Trochili 150 and Pici)

360 Passeres Clamatores 1000

40 Passeres Oseines . 5000

370

250 Total about 10,300 species

Fig. 22. — Extinct Phillip-Island Parrot (Nestor productus). (From speeimen in the British Museum. Reduced.)

will suffice to mention only the more remarkable. The Rallidae present the very noteworthy woodhens, Ocydrontus, and the takahe, Notornis, which is almost extinct. The widely-spread plovers, Charadriidae, have two not less singular generic developments, Thinornis, and the extraordinary wrybill, Anarhynchus. There is an owl, type of the genus Sceloglaux. Of parrots, Slringops, the kakapo or owl-parrot, is certainly peculiar, while Nestor constitutes a peculiar subfamily of the brush-tongued parrots or Trichoglossidae.

Xenicus and Acanthositta form a little family of truly mesomyodean Passeres Clamatores. Of the Meliphagidae the genera Prosthemadera, Pogonornis and Anthornis are peculiar. The starlings, Slurnidae, are represented by Callaeas, Creadion and the very abnormal Heterolocha. The gallinaceous birds are represented by a quail, Coturnix novae zealandiae, now exterminated. A large flightless goose, Cnemiornis, allied to the Australian Cereopsis, and the gigantic rapacious Harpagornis, have died out recently, with the moas. In all, there is a wonderful amount of specialization, though perhaps in a very straight line from generalized forms; but the affinity to Australian or Polynesian types is in many cases clearly traceable, and it cannot be supposed but that these last are of cognate origin with those of New Zealand. A very long period of isolation must have been required to produce the difference so manifestly to be observed, but a few forms seem at rare intervals to have immigrated, and this immigration would appear to be kept up to our own day, as shown by the instance of Zosterops lateralis, which is said to have lately made its first appearance, and to have established itself in the country, as well as by the fact of two cuckoos,*

the widely-ranging Eudynamis taitensis and Chrysococcyx lucidus, which are annual visitors.

Polynesia forms, of course, part of Austrogaea. Its.extent is so vast that it necessarily contains some peculiar, outlying forms, so to say forgotten, which in their long-continued isolation have specialized themselves. For instance, the kagu (Rhinochetus) of New Caledonia, a queerly specialized form with Gruine affinities pointing only to South America. The toothbilled pigeon (Didunculus) is restricted to Samoa. Most interesting is the avifauna of the Sandwich islands ; entirely devoid of Psittaci and of Coraciiformes, these islands show an extraordinary development of its peculiar family Drepanidae, which are probably of South or Central American descent. Acrulocercus is a Meliphagine, and a peculiar genus. There are a raven (Corvus), a coot (Fulica), the well-known Sandwich island goose (Bernicla sandvicensis) , now very commonly domesticated in Europe ; and some flycatchers and thrushlike birds.

The Australian Subregion comprises Australia and Tasmania. In the north it is influenced, of course, by its proximity to Papuasia, whence there is a considerable admixture of genera which do not proceed beyond the tropics, and of these Casuarius is a striking example. The Cape York peninsula practically belongs to Papuasia. As a whole, Australia is rich in parrots, of which it has several very peculiar forms, but Picarians in old-fashioned parlance, of all sorts — certain kingfishers excepted — are few in number, and the pigeons are also comparatively scarce, no doubt because of the many arboreal predaceous marsupials. The continent, however, possesses the two important genera of the Pseudoscines, namely the lyre-birds (Menura) and the scrub-birds (Atrichia). Among the more curious forms of other land-birds may be especially mentioned the Megapodiidae, Lipoa and Talegallus, the rail Tribonyx and Pedionomus, which represents the otherwise palaeotropical Turnices in Australia. The presence of bustards (Eupodotis) is a curious example of interrupted distribution, since none other of the Otididae are found nearer than India. The Ratitae are represented by two species of emeu (Dromaeus), besides the cassowary of Cape York peninsula, and the extinct Dromomis and Genyornis with its enormous skull.

The Papuan Subregion, chiefly New Guinea with its depend- encies, the Timor group of islands, the Moluccas and Celebes. On the whole its avifauna presents some very remarkable features. Its most distinctive characteristic is the presence of the birds of paradise, which are almost peculiar to it; for, granting that the bower-birds, Chlamydodera and others, of Australia, belong to the same family, they are far less highly specialized than the beautiful and extraordinary forms which are found, within very restricted limits, in the various islands of the subregion. Another chief feature is the extraordinary development of the cassowaries, the richness and specialization of the kingfishers, parrots, pigeons, honeysuckers and some remarkable flycatchers. It has several marked deficiencies compared with Australia, among which are the babblers (Timeliidae), weaver birds (Ploceidae), the Platycercinae among parrots, diurnal birds of prey and the emeus. As a whole, the birds of Papua are remarkable for their brilliance of plumage, or their metallic colour- ing. The birds of paradise, the racquet-tailed kingfishers, Tany- siptera, the largest and smallest of parrots, Calyptorhynchus and Nasiterna, and the great crowned pigeons, Goura, are very char- acteristic ; and so are the various Megapodes.

(B) Neogaea, or the Neotropical region. — Excepting towards the north, where, in Mexico, it meets, and inosculates with the Nearctic

subregion, the boundaries of the Neotropical region are simple enough to trace, comprehending as it does the whole of South America and all Central America ; besides including the Falkland islands to the south-east and the Galapagos under the equator to the west, as well as the Antilles or West India islands up to the Florida channel.

Owing to the comparatively scanty number of harmful mammalian types, the birds play a considerable part in this large region, and some authorities consider its avifauna the richest in the world. The entire number of species amounts to about 3600. Of these 2000, or a good deal more than half, belong to the order Passeriformes. But the characteristic nature of the avifauna is more clearly brought out when we learn that of the 2000 species just mentioned only about 1070 belong to the higher suborder of Oscines, that means to say, nearly one-half belong to the lower suborder Clamatores. This is a state of things which exists nowhere else; for except in Australia, where a few indigenous and peculiar low non-Oscines are found, and in the Nearctic country, whither one family of Clama- tores, viz. the Tyrannidae, has evidently been led by the geographical continuity of its soil with that of the Neotropical region, such forms do not occur elsewhere. Accordingly their disproportionate pre- valence in South America points unerringly to the lower rank of the avifauna of the region as a whole, and therefore to the propriety of putting it next in order to that of the Australian region, the general fauna of which is admittedly the lowest in the world. Huxley has urged with his wonted perspicuity the alliance of these t\vp regions as Notogaea, basing his opinion, besides other weighty evidence, in great measure on the evidence afforded by the two main sections of the Galli, viz. the Peristeropodes and the Alectoropodes, the former composed of the families Megapodiidae, almost wholly Australian, and the Cracidae, entirely Neotropical. (Cf. P.Z.S., 1868. pp. 294-319.)

Leaving, however, this matter as in some degree hypothetical, we have as genera, families, or perhaps even larger groups, a great many very remarkable forms which are characteristic of, or peculiar to, the Neotropical region in part, if not as a whole. Of families we find twenty-three, or maybe more, absolutely restricted thereto, besides at least eight which, being peculiar to the New World, extend their range into the Nearctic region, but are there so feebly developed that their origin may be safely ascribed to the southern portion of America. First in point of importance comes the extra- ordinarily beautiful family of humming-birds (Trochilidae), with nearly 150 genera (of which only three occur in the Nearctic region) and more than 400 species. Then the tyrants (Tyrannidae), with more than

seventy genera (ten of which range into the northern region), and over 300 species. To these follow the tanagers (Tana- gridae), with upwards of forty genera (only one of which crosses the border), and about 300 species; the piculules (Dendrocolaptidae), with as many genera, and over 200 species; the ant-thrushes, (Formicariidae) , with more than thirty genera, and nearly 200 species ; together with other groups which, if not so large as those just named, are yet just as well defined, and possibly more significant, namely, the tapaculos (Pteroptochidae) , the toucans (Rhamphastidae) , the jacamars (Galbulidae) , the motmots (Monotidae), the todies (Todidae), the trumpeters (Psophiidae), and the screamers (Pala- medeidae); besides such isolated forms as the seriema (Cariama), and the sun-bittern (Eurypyga).

The nature of the South American avifauna will perhaps become still more evident if we arrange the characteristic members as follows :»

1. Birds which are restricted to, probably indigenous of the region: Rhea; Palamedea and Chauna, the screamers; Tinami; P sophia, Dicholophus, Eurypyga, Heliornis of the Gruiform assembly ; Thinocorys and Attagis; Cracidae; Opisthocomus ; of parrots A ra and Conurus with their allies ; Monotidae, incl. Todus; Steatornis; Galbulinae and Bucconinae; Rhamphastidae; Formicariidae, Pteroptochidae, and of the Tyrannidae the Cotinginae.

2. Birds which are indigenous, but extend far into North America : Cathartae, Trochilidae, Tyrannidae.

3. Birds which are originally immigrants from North America: Podicipedidae, with the flightless Centropelma on Lake Titicaca; Ceryle, the only genus of kingfishers in the New World ; all the Oscines.

More or less cosmopolitan groups like herons, Falconidae, Anseres, Columbae, &c, and circumtropical families like Parridae, Trogonidae, Capitonidae, are to be excluded from these lists as indifferent. The differences between the Neotropical avifauna and that of North America are fundamental and prove the independence or superior value of the Neotropical region as one of the principal realms.

It is difficult to subdivide the Neotropical region into sub- regions; the best suggestion is that of Newton: Antillean, with the exception of the islands of Trinidad and Tobago, as well as those which lie on the northern coast of South America ; Patagonian, including Chile and part of Peru ; Columbian, comprising the rest of the continent and also Central America.

The Antillean Subregion is in many respects one of the most suggestive and interesting, comparatively small though it be. For narrow as are the channels between Cuba and the opposite coast of Central America, between the Bahamas and Florida, and between Grenada and Tobago, the fauna of the Antillean chain, instead of being a mixture of that of the almost contiguous countries, differs much from all, and exhibits in some groups a degree of speciality which may be not unfitly compared with that of oceanic islands. Except such as are of coral formation, the Antilles are hilly, not to say mountainous, their summits rising in places to an elevation of 8000 ft., and nearly all, prior to their occupation by Europeans, were covered with luxuriant forest, which, assisting in the collection and condensation of the clouds brought by the trade winds, ensured

its own vitality by precipitating frequent and long-continued rains upon the fertile soil. Under such conditions we might expect to find an extremely plentiful animal population, one as rich as that which inhabits the same latitudes in Central America, not many degrees farther to the west; but no instance perhaps can be cited which shows more strikingly the difference between a continental and an" insular fauna, since, making every allowance for the ravages of cultivation by civilized man, the contrary is the case, and possibly no area of land so highly favoured by nature is so poorly furnished with the higher forms of animal life. (Here, as over so large a portion of the Australian region, we find birds constituting the supreme class — the scarcity of mammals being accounted for in some measure as a normal effect of insularity. '

There is one peculiar subfamily, Todinae, represented by only four species of Todus. We note the absence of Ratitae, Tinami, Cracidae, Rhamphastidae, and any of those gruiform genera which are so characteristic of the continent. There is no family of birds common to the Nearctic area and the Antillean subregion without occurring also in other parts of the Neotropical region, a fact which proves its affinity to the latter.

The Patagonian Subregion, most extratropical, is naturally devoid of a good many typically tropical birds, or these are but poorly represented, for instance Caerebidae, Mniotiltidae, Tanagridae, Vireonidae. On the other hand some of the most characteristic

features of the whole region are here well represented, e.g. Rhea, Tinami, Chauna, Dicholophus, Attagis, Pteroptochidae, and indeed therein we find some of the best evidence of the antiquity of its population, both recent and extinct (cf. the numerous fossils of the Santa Cruz formation), and also the nearest resemblance to the fauna of Austrogaea.

(C) Arctogaea is Huxley's well-chosen term for all the rest of the world (including the Nearctic, Palaearctic, Indian and Ethiopian regions of P. L. Sclater) in opposition to Notogaea. Faunistically, although not geographically, the Nearctic and Palaearctic areas must form the two subdivisions of one great unit, for which the " Holarctic

region " is now the generally accepted term.

The Holarctic Region, comprising North America and the extra-tropical mass of land of the Old World, may from an ornithological point of view be characterized by the Colymbi, Alcidae, Gallidae or Alectoropodous Galli, and the Oscines, which have here reached their highest development; while Ratitae, Tinami, Psittaci, and non-Oscine Passeres (with the exception of Tyrannidae extending into North America and Conurus carolinensis) are absent.

Nearctic Subregion. — The close affinity of North America with the Palaearctic avifauna becomes at once apparent if we exclude those groups of birds which we have good reason to believe have their original home in the Neotropical region, notably numerous Tyrannidae, humming-birds and the turkey-buzzards.

The following groups may be mentioned as characteristic and typically American, and, since we consider them as comparatively recent immigrants into the Neotropical region, as originally peculiar to the Nearctic area: Mniotiltidae, Vireonidae, Icteridae, Meleagris and various Tetraoninae. Restricted to and peculiar to the sub-region is only the little Oscine family of Chamaeidae, restricted to the coast district of California. " More than one-third of the genera of Nearctic birds are 'common also to the Palaearctic subregion. If we take the number of Nearctic species at 700, w r hich is perhaps an exaggeration, and that of the Palaearctic at 850, we find that, exclusive of stragglers, there are about 120 common to the two areas. Nearly 20 more are properly Palaearctic, but occasionally occur in America, and about 50 are Nearctic, which from time to time stray to Europe or Asia. This, however, is by no means the only point of resemblance. Of many genera, the so-called species found in the New World are represented in the Old by forms so like them that often none but an expert can distinguish them, and of such repre-sentative ' species ' about 80 might be enumerated " (Newton, Diet. Birds, p. 335).

Of the many attempts to subdivide the Nearctic subregion, the same authority favours that of Dr S. F. Baird, who distinguishes between Canadian, Alleghanian, Middle or Missourian, Californian and Alaskan provinces. Dr Hart Merriam takes the broad point of view " that the whole of extratropical North America consists of but two primary life regions, a Boreal region, which is circumpolar, and a Sonoran or Mexican tableland region which is unique." The first of these supports Newton's contention of the essential unity of the Nearctic and Palaearctic areas. In any case the various Nearctic

subdivisions completely merge into each other, just as is to be expected from the physical configuration and other bionomic conditions of the North American continent.

The Palaearctic Subregion is, broadly speaking, Europe and Asia, with the exception of India and China. The propriety of comprehending this enormous tract in one zoological " region " was first shown by Dr P. L. Sclater, and as regards the distribution of most classes of animals there have been few to doubt that it is an extremely natural one. Not indeed altogether so homogeneous as the Nearctic area, it presents, however, even at its extreme points, no very striking difference between the bulk of its birds. Though Japan is far removed from western Europe, and though a few generic forms and still fewer families inhabit the one without also frequenting the other, yet there is a most astonishing similarity in a large portion of their respective birds. In some cases the closest examination has failed to detect any distinction that may be called specific between the members of their avifauna; but in most it is possible to discover just sufficient difference to warrant a separation of the subjects. Nevertheless, it is clear that in Japan we have, as it were, a repetition of some of our most familiar species — the redbreast and the hedge- sparrow, for example — slightly modified in plumage or otherwise, so as to furnish instances of the most accurate representation, e.g. Cyanopica cooki of Portugal and Spain, and C. cyana of Amoorland and Japan.

Like the Nearctic the Palaearctic subregion seems to possess but one single peculiar family of land birds, the Panuridae, represented by the beautiful species known to Englishmen as the bearded tit- mouse, Panurus biarmicus. The entire number of Palaearctic families are, according to Newton, 67, and of the genera 323. Of these 128 are common to the Nearctic subregion. Species of 51 more seem to occur as true natives within the Ethiopian and Indian regions, and besides these 18 appear to be common to the Ethiopian without being found in the Indian, and no fewer than 71 to the Indian without occurring in the Ethiopian. To compare the Palae- arctic genera with those of the Australian and Neotropical regions would be simply a waste of time, for the points of resemblance are extremely few, and such as they are they lead to nothing. It will therefore be seen from the above that next to the Nearctic area the

Palaearctic has a much greater affinity to any other, a fact which might be expected from geographical considerations.

Having shown this much we have next to deal with the peculiarities

of the vast Palaearctic subregion. At the lowest computation 37 genera seem to be peculiar to it, though it is certain that species of several are regularly wont to wander beyond its limits in winter seeking a southern climate. Of the peculiar genera only a few examples may be mentioned: Eurynorhynchus, the spoon-billed sandpiper of Siberia ; Syrrhaptes, the sandgrouse of central Asia ; Muscicapa of Europe.

We distinguish between a Siberian, Mongolian, Mediterranean and European province, none of which can be well defined. The islands of the Canaries, Madeira and the Azores belong to the Medi- terranean province, and offer some peculiarities of great interest. The Azores have been monographed by F. D. Godman {Nat. Hist, of the Azores or Western Islands, London, 1870). There is a general tendency among these insular birds to vary more or less from their continental representatives, and this is especially shown by the former having always darker plumage and stronger bills and legs. In one instance the variation is so excessive that it fully justifies the establishment of a specific distinction. This is the case of the bullfinch of the more western of these islands {Pyrrhula murina), the male of which, instead of the ruddy breast of its well-known congener {P. vulgaris), has that part of a sober mouse-colour. A similar sombre hue distinguishes the peculiar chaffinch of the Canary Islands (Fringilla teydea), but to these islands as well as the Azores and Madeiras there belongs in common another chaffinch (P. tintillon) which, though very nearly allied to that of Mauritania (F. spodogenia) is perfectly recognizable, and not found elsewhere. Madeira has also its peculiar golden-crested wren (Regulus maderensis) , and its peculiar pigeon [Columba trocaz), while two allied forms of the latter (C. laurivora and C. bollii) are found only in the Canaries. Further on this subject we must not go; we can only state that Godman has shown good reason for declaring that the avifauna of all these islands is the effect of colonization extending over a long period of years, and going on now.

Palaeotropical Region. — Muchcanbe said in favour of combin- ing the mostly tropical portion of the great mass of land of the Old World (excluding, of course, Austrogaea or the Australian region) into one region, for which Oscar Drude's well-chosen term " palaeo-tropical " has been adopted (cf. Bronn's Thierreich, System Part. p. 296, 1893). This region naturally comprises the African and Indian areas, conformably to be called subregions.

Both subregions possess, besides others, the following character- istic birds: Ratitae, viz. Struthio in Africa and Arabia, fossil also in the

Sivalik Hills, and Aepyornithidae in Madagascar; PitHdae, Bucerotinae and Upupinae, of which Upupa itself in India, Madagascar and Africa; Coraciidae; Pycnonotidae or bulbuls; Trogonidae, of which the Asiatic genera are the less specialized in opposition to the Neotropical forms; Vulturidae; Leptoptilus, Anastomus and Ciconia among the storks; Pteroclidae; Treroninae among pigeons. Of other families which, however, extend their range more or less far into the Australian realm, may be mentioned Otididae, the bustards; Meropidae or bee-eaters; Muscicapidae or flycatchers; Sturnidae or starlings.

The Ethiopian Subregion comprises the whole of Africa and Madagascar, except the Barbarj' States, but including Arabia; in the north-east the subregion melts into the Palaearctic between Palestine and the Persian Gulf. Some authors are inclined to extend its limits still farther to the eastwards, through Beluchistan and even beyond the Indus.

So large a portion of the Ethiopian subregion lies between the tropics that no surprise need be expressed at the richness of its fauna relatively to that of the last two subregions we have considered. Between fifty and sixty so-called families of land birds alone are found within its limits, and of them at least nine are peculiar; the typical genera of which are Buphaga, Euryceros, Philepitta, Musopkaga, Irrisor, Leptosoma, Colius, Serpentarius, Struthio, Aepyornis. It is singular that only the first three of them belong to the order Passeriformes, a proportion which is not maintained in any other tropical region. The number of peculiar genera, besides those just mentioned, is too great for them to be named here; some of the most remarkable on the continent are: Balaeniceps, the whale- headed heron; Balaearica, the crowned crane; Podica, finfoot; Numida and allied genera of guinea fowls.

The natural division of the subregion is that into an African and a Madagascar province. Subdivision of the continental portion is beset with great difficulties, and none of the numerous attempts have proved long-lived. The forest-clad basin of the Congo, with the coastal districts of the bay of Guinea, seem to form one domain in opposition to the rest.

The Malagasy province comprises, besides Madagascar, the Mascarene, Comoro and Seychelle islands. It may be safely deemed the most peculiar area of the earth's surface, while from the richness and multifariousness of its animal, and especially of its ornithic population, New Zealand cannot be compared with it. In A.

Grandidier's magnificent Histoire physique, naturelle et politique de Madagascar, vol. xii. (Paris, 1875-1884), are enumerated 238 species as belonging to the island, of which 129 are peculiar to it, and among those are no fewer than 35 peculiar genera. Euryceros of the

Oscines, and" Philepitla of the Clamatores, are remarkable enough to form the types of Passeriform families, and Mesites half-way between Galli and Gruiformes is of prime importance. The Passerine Falculia, with its recently extinguished allies Fregilupus and Necropsar of the Mascarenes; the Coraciine Brachypteracias, Atelornis and Geobiastes, are very abundant, while Heliodilus is an owl belonging to that subfamily which is otherwise represented only by the widely-spread barn owl, Strix flammea. Lastly must be noted the extinct tall Ratite species of Aepyornis with its several fancy genera. But, as Newton charmingly puts it {Diet. Birds, p. 353), the avifauna of Madagascar is not entirely composed of such singularities as these. We have homely genera, even among the true Passeres, occurring there — such as Alauda, Acrocephalus, Motacilla and Pratincola, while the Cisticola madagascariensis is only distinguishable from the well-known fan-tailed warbler, C. schoenicola of Europe, Africa and India by its rather darker coloration. But there are also species, though not Passerine, which are absolutely identical with those of Britain, the barn owl, common quail, pigmy rail, and little grebe or dabchick, all of them common and apparently resident in the island. Mauritius had the dodo (q.v.), Lophopsittacus and Aphanapteryx. Rodriguez had the solitaire, Necropsittacus and Necropsar. Bourbon or Reunion had Fregilupus.

Some of the Malagasy avifauna is certainly ancient, aboriginal, and even points to India; other forms indicate clearly their African

Fig. 23. — Extinct Starling of Reunion (Fregilupus varius), adapted from figures by Daubenton, Levaillant and others. Reduced.

origin; while, lastly, such strikingly characteristic Indo-African birds as hornbills are unaccountably absent.

The Oriental Subregion comprises all the countries and numerous islands between the Palaearctic and Australian areas; it possesses

upwards of seventy families, of which, however, only one is peculiar, but this family, the Eurylaemidae or broadbills, is of great importance since it represents all the Subclamatores. Of the many characteristic birds may be mentioned Pycnonotidae or bulbuls, of which the Phyllornithinae are peculiar, Campephagidae or cuckoo-shrikes, Dicruridae or drongos, Nectariniidae or sunbirds; pheasants, together with Pavo and Gallus. Some of the similarities to the Ethiopian and the great differences from the Australian avifauna have already been pointed out. Naturally no line whatever can be drawn between the Oriental and the Palaearctic subregions, and many otherwise essentially Indo-Malayan families extend far into the Australian realm, far across Wallace's line, whilst the reverse takes place to a much more moderate extent. Certainly the Oriental area, m spite of its considerable size, cannot possibly claim the standing of a primary region. It is a continuation of the great Arctogaea into the tropics.

Following H. J. Elwes we subdivide the whole subregion into a Himalo-Chinese, Indian and Malayan province. These divisions had the approval of W. T. Blanford, who proposed the terms Cis- and Transgangetic for the two first. The Himalo-Chinese or Trans-gangetic province shows the characteristics of its avifauna also far away to the eastward in Formosa, Hainan and Cochin China, and again in a lesser degree to the southward in the mountains of Malacca and Sumatra. Indo-China is especially rich in Eurylaemidae, China proper and the Himalayas in pheasants.

The Indian or Cisgangetic province is the least rich of the three so far as peculiar genera are concerned.

The Malayan province comprising the Malay islands, besides the Malay peninsula, and the very remarkable Philippines, possess an extraordinary number of peculiar and interesting genera.

The influence of the Australian realm is indicated by a Megapode in Celebes, another in Borneo and Labuan, and a third in the Nicobar islands (which, however, like the Andamans, belong to the Indian province), but there are no cockatoos, these keeping strictly to the other side of Wallace's line, whence we started on this survey of the world's avifauna.

D. Classification of Birds Fiirbringer's great work, published in the year 1888 by the Natura Artis Magistra Society of Amsterdam, enabled Gadow not only to continue for the next five years the same lines of morphological research, but also further to investigate those

questions which were still left in abeyance or seemed to require renewed study. The resulting " classification is based on the examination, mostly autoptic, of a far greater number of characters than any that had preceded it ; moreover, they were chosen in a different way, discernment being exercised in sifting and weighing them, so as to determine, so far as possible, the relative value of each, according as that value may vary in different groups, and not to produce a mere mechanical ' key ' after the fashion become of late years so common " (Newton's Dictionary of Birds, Introduction, p. 103). It is not the quantity but the quality of the anatomical and bionomic characters which determines their taxonomic value, and a few fundamental characters are better indications of the affinities of given groups of birds than a great number of agreements if these can be shown to be cases of isomorphism or heterophyletic, convergent analogy. Nature possesses three great educational or develop- mental schools — terrestrial, aquatic and aerial life. Each of these affords animal, vegetable or mixed ˆ.diet. Animal diet implies the greatest variety with regard to locality and the modes of procuring the food. Each of these schools impresses its pupils, in the case of the birds, with its own stamp, but there are many combinations, since in the course of phyletic development many a group of birds has exchanged one school for another. Origin- ally terrestrial groups have taken to an entirely aquatic life, and vice versd; others, originally endowed with the power of flight, have become, or are transforming themselves into, absolutely cursorial forms; some members of one group live entirely on seeds, while others have become fierce fishers, and so forth. Only by the most careful inquiry into their history can their relationship or pedigree be unravelled. A statement may now be given of Gadow's classification of birds, in which the extinct forms have been intercalated so far as possible. The few char- acters assigned to the various groups are sufficiently diagnostic when taken together, although they are not always those upon which the classification has been established: —

Class AVES

I. Sub-class Archaeornitb.es.— The three fingers and their metacarpals remain separate, each with a claw. Well-developed remiges. Both jaws with alveolar teeth. Amphicoelous. Caudal vertebrae more than thirteen, without a pygostyle, but with about twelve pairs of rectrices. Archaeopteryx, A. litho- graphica, s. macroura, two specimens from the upper Oolite of Solenhofen, Bavaria.

II. Sub-class Neornithes. — Metacarpals fused. Second finger the

longest. Not more than thirteen caudal vertebrae.

I. Division Ratitae. — Terrestrial, flightless. Without sternal keel. Quadrate bone with single proximal knob. With- out pygostyle. Coracoid and scapula fused. Compound rhamphotheca. Adult without apteria. With copulatory organ. A collective polyphyletic or heterogeneous group, originally cosmopolitan; with certainty existing since the Miocene.

1. Order Struthiones. — With pubic symphysis. Two toes only,

third and fourth. Struthio, ostrich, Pliocene of Samos and of north-west India, now Africa and Arabia.

2. Order Rheae. — With long ischiadic symphysis. Three toes.

Mesembriornis, Miocene or Pliocene of Argentina. Rhea, South America.

3. Order Casuarii. — Three toes. Aftershaft as long as the other

1 half. Casuarius and Dromaeus, Australian. Hypselornis, Pliocene of Sivalik Hills.

4. Order Apteryges. — Four toes. Bill long and slender. Apteryx,

New Zealand.

5. Order Dinornithes. — -Three or four toes. Bill short. Anterior

limbs extremely reduced. Dinornis, numerous species, recently extinct, New Zealand.

6. Order Aepyornithes. — Aepyornis, recently extinct, Mada-

gascar.

To the Ratitae belong possibly also the imperfectly known Diatryma, Eocene ef New Mexico, Gastornis and Dasornis, Eocene of Europe, Genyomis, Pleistocene of Australia.

II. Division Odontolcae. — Marine, flightless, without sternal keel. Upper and lower jaws with teeth in furrows. Cret- aceous epoch. Enaliornis, England, vertebrae chiefly biconcave; Hesperornis, North America, vertebrae heterocoelous.

III. Division Carinatae. — With keeled sternum.

1. Order Ichthyomithes. — Power of flight well developed. Verte-

brae still amphicoelous. With small pygostyle. Incisura ischiadica. With alveolar teeth. Cretaceous of Kansas. Ichthyornis, Apaiornis.

2. Order Colymbiformes. — Plantigrade, nidifugous, aquatic. All

toes webbed, fourth largest, hallux short ; metatarsus laterally compressed ; tibia with high, pyramidal crest. Bill straight, pointed, with simple sheath.

Sub-order 1. Colymbi, Divers. Front toes completely

webbed. Holarctk. Colymbus. Sub-order 2. Podicipedes, Grebes. Toes lobated. Cosmo- politan.

3. Order Sphenisciformes. — Nidicolous, marine. Flightless, wings

transformed into rowing paddles. Sphenisci, penguins. Antarctic and southern temperate coasts. Since the Eocene.

4. Order Procellariiform.es. — Well flying, pelagic, nidicolous.

Hallux absent or vestigial. Rhamphotheca compound. Cosmopolitan. Tubinares, petrels and albatrosses.

5. Order Ciconiiformes. — Swimmers or waders. Desmognathous,

without basipterygoid processes; with one pair of sterno- tracheal muscles.

Sub-order 1. Steganopodes. — Well flying, aquatic, nidicolous; with all the four toes webbed together. Rhamphotheca compound; cosmopolitan. Phaethon, tropic-bird; Sula, gannet; Phalacrocorax, cormorant and Plotus, snake-bird ; Fregata, frigate-bird ; Pelecanus. Here also Pelagornis, Miocene of France; Argillornis and probably Odontopteryx from the London Clay.

Sub-order 2. Ardeae. — Piscivorous, nidicolous, waders; with complicated hypotarsus and with long cervical apteria. Ardeidae,

cosmopolitan; including Cancroma, Neotropical, Balaeniceps, Scopidae, Ethiopian. Pro- herodius, Eocene of England.

Sub-order 3. Ciconiae. — Zoophagous, nidicolous, waders; with simple hypotarsus and without cervical apteria. Cosmopolitan. Ciconiidae, storks. Ibidae, ibises and spoonbills. Propelargus, Oligocene.

Sub-order 4. Phoenicopteri. — Flamingos. Nidifugous, waders; with simple hypotarsus and without cervical apteria. Front toes completely webbed; hallux very short or absent ; feed chiefly on small aquatic inverte- brates. Phoenicopterus, cosmopolitan. Oligocene Elornis and, allied, Palaelodus.

6. Order Anseriformes. — Desmognathous, nidifugous; with two

pairs of sterno-tracheal muscles, with complete basipterygoid processes and with a penis.

Sub-order 1. Palamedeae. — Screamers. Ribs without uncinate processes. Hypotarsus simple. Neotropical. Chauna, Palamedea. Sub-order 2. Anseres. — Family Anatidae. Hypotarsus complex. Anser, Anas, Cygnus, since Miocene. Cnemiornis, Pleistocene, New Zealand, flightless.

7. Order Falconiformes. — Birds of prey. Carnivorous, desmo-

gnathous, nidicolous, without functional caeca. Terrestrial,

aerial.

Sub-order 1. Cathartae. — American vultures. Withnares perviae. Cathartes, turkey buzzards, Sarcorhamphus gryphus, condor Gypagus papa, king vulture. Sub-order 2. Accipitres. — With nares imperviae. Serpent- ariidae, secretary-bird, Ethiopian; Miocene, France. Vulturidae, Old World vultures, excluding Australia. Falconidae, cosmopolitan, since the Eocene. Harpa- gornis, Pleistocene, New Zealand; Lithornis, Eocene, England. Pandionidae, ospreys or fish hawks, cosmo- politan. S. Order Tinamiformes. — Nidifugous, with incisura ischiadica,

without pygostyle. Herbivorous, terrestrial, neotropical.

Crypturi, tinamous.

9. Order Galliformes. — Schizognathous, herbivorous, terrestrial.

With ten functional remiges. With strong spinae sterni.

Sub-order 1. Mesites. — Without basipterygoid processes, and with large spina interna. Mesites, Madagascar.

Sub-order 2. Turnices. — Hemipodes or button-quails. Nidifugous; vomer large; sternum without processus obliqui. Hallux absent or vestigial. Old World. Turnix, Pedionomus.

Sub-order 3. Galli. — With large spina communis, and with large processus obliqui. Hallux functional. Mega- podiidae, Australian region. Cracidae, curassows and guans, neotropical. Gallidae, cosmopolitan.

Sub-order 4. Opisthocomi. — Arboreal, with long spina externa ; without basipterygoid processes. Opisthocomus hoatzin, Guiana, Venezuela and Amazon countries.

10. Order Gruifonnes. Legs of the wading type. Without

basipterygoid processes. Without spina interna. Nidifugous. Essentially schizognathous. Ralhdae, cosmopolitan, since Oligocene. Rallus, Fulica, Ocydromus, &c, Gallinula nesiotis, Tristan d'Acunha, flightless. Notornis, New Zealand, flight- less, nearly extinct. Aptornis, New Zealand, flightless, extinct. Aphanapteryx (Mauritius) = Erythromachus (Rodriguez) = Diaphorapteryx (Chatham Island), flightless and recently extinct. Gypsornis, upper Eocene, France. Gruidae, cranes, cosmopolitan, allied Phororhacos, Tertiary of Argentina. Dicholophidae, cariamas, neotropical. Otididae, bustards, Old World. Rhinochetidae, kagus, New Caledonia. Eurypygidae, sun-bittern, neotropical. Heliornithidae, finfoots, tropical.

11. Order Charadriiformes. — Schizognathous. With eleven remiges,

of which the terminal very short. Aquinto-cubital. Spinae sterni short, separate.

Sub-order 1. Limicolae. — Nidifugous, without spina interna sterni. Hypotarsus complicated. Charadritdae, plovers. Chionidtdae, sheath-bill. Glareolidae, wading swallows and coursers. Thinocorythidae, seed-snipes. Oedicnemididae, thick-knees. Parridae.

Sub-order 2. Lari. — Aquatic, vomer complete. Without basipterygoid processes. Front toes webbed; hallux small or absent. Large supraorbital glands. Since Miocene. Laridae, gulls, cosmopolitan. Alcidae, auks, northern half of periarctic region.

Sub-order 3. Pterocles. — Sand-grouse. Nidifugous. Vomer vestigial. With large crop and caeca. Hallux vestigial or absent since Oligocene. Africa to India, and Siberia. Pterocles and Syrrhaptes.

Sub-order 4. Columbae.— Pigeons. Nidicolous. Vomer vestigial. With large crop, vestigial caeca. Columbidae, cosmopolitan, since Miocene. Dididae, flightless, recently extinct. Didus, dodo, Mauritius. Pezophaps, solitaire, Rodriguez.

12. Order Cuculiformes. — Desmognathous, nidicolous; zygodac-

tylous, or with the outer toe reversible.

Sub-order 1. Cuculi. — Cuckoos. Quinto-cubital. Cuculidae, cosmopolitan._ Musophagidae, plantain-eaters and touracos, Ethiopian since Miocene.

Sub-order 2. Psittaci. — Parrots. Zygodactylous ; aquinto- cubital. Cosmopolitan, chiefly tropical. Trichoglossidae, lories, Austro-Malayan. Nestor, New Zealand. Cyclo- psittacus, Eos, Lorius, &c. Psittacidae, tongue smooth, incl. Stringops.

13. Order Coraciifonnes.— Nidicolous. Nares imperviae, holo-

*rhinal. Downs restricted to the apteria or absent. Thirteen to fifteen cervical vertebrae. Mostly desmognathous. Deep plantar tendons connected with each other. **

Sub-order 1. Coraciae. — Either (1) with long spina externa sterni, Coraciidae, rollers, Old World. Momotidae, neotropical, motmots and todies. Alcedinidae, king- fishers, cosmopolitan or (2) with long spina communis. Meropidae, bee-eaters, Old World. Upupidae, Upupinae, hoopoes: palaearctic and palaeotropical. Bucerotinae, hornbills, palaeotropical; Irrisorinae, woodhoopoes, Ethiopian.

Sub-order 2. Striges. — Owls. Outer toe reversible. Schizognathous. Long caeca. Flexor tendons normal. Hypotarsus simple. Cosmopolitan.

Sub-order. 3. Caprimolgi. — Nightjars. Nocturnal. With gaping mouth. Ten remiges and ten rectrices. Spinae sterni vestigial. Caeca functional. Steatornithidae, Steatornis, oil-bird or guacharo, South America. Podargidae, Australasian, Caprimulgidae, cosmopolitan.

Sub-order 4. Cypseli. — Tenth terminal remex the longest. With short spinae sterni. Without caeca. Gypselidae, swifts, cosmopolitan.

Trochilidae, humming-birds, American.

Sub-order 5. Colii. — Mouse-birds. First and fourth toes reversible. Ethiopian.

Sub-order 6. Trogones. — Trogons. Heterodactyle, first and second toes directed forwards, third and fourth backwards. Tropical. Trogon gallicus, Miocene of France.

Sub-order 7. Pici. — Zygodactylous. Tendon of the flexor hallucis longus muscle sending a strong vinculum to that of the flexor profundus muscle, the tendon of which goes to the third toe only. Galbulidae, puff-birds and jacamars, neotropical. Capitonidae, barbets, tropical. Rhamphastidae, toucans, neotropical. Picidae, wood- peckers, cosmopolitan, excepting Madagascar and Australian region. 14. Order Passeriformes. — Nidicolous. Aegithognathous, without basipterygoid processes. Spina externa sterni large, spina interna absent. Quinto-cubital, toes normal. Apparently since the upper Eocene.

Sub-order 1. Passeres Anisomyodae. — Syrinx . muscles entirely lateral or attached to the dorsal or ventral corners of the bronchial semi-rings. (1) Subclamatores. Deep plantar tendons connected by a vinculum. Eury- laemidae, broad-bills, Indian and Indo-Malayan. (2) Clamatores. Deep flexor tendons not connected. Pitlidae, palaeotropical. Xenicidae, New Zealand. Tyrannidae, American, Formicariidae, Pteroptochidae, neotropical. Sub-order 2. Passeres Diacromyodae. — Syrinx muscles of either side attached to the dorsal and ventral corners of the rings. Hallux strong, with a large claw. (1) Suboscines with Menura, lyre-bird, and Atrichia, scrub-bird, in Australia. (2) Oscines, the true singing-birds, with more than 5000 recent species, are mostly divided into some thirty " families," few of which can be defined. The fourteen orders of the Carinatae are further congregated into four "Legions": — I. COLYMBOMORPHAE = Ichthyornithes + Colymbiformes +

Sphenisciformes f Procellariiformes. II. PELARGOMORPHAE = Ciconiiformes + Anseriformes + Falconiformes.

III. ALECTOROMORPHAE = Tinamifonnes + Galliformes +

Gruiformes + Charadriiformes.

IV. CORACIOMORPHAE = Cuculiformes + Coraciiformes +

Passeriformes.

These four legions are again combined into two " Brigades," the first of which comprises the first and second legions, while the second brigade contains the third and fourth legions.

Thus the whole classification becomes a rounded-off phylogenetic system, which, at least in its broad outlines, seems to approach the natural system, the ideal goal of the scientific ornithologist. The main branches of the resultant " tree " may be rendered as follows : — •

CORACIOMORPHAE

+

ODONTOLCAE..COLYMBO- + PELARGO- ALECTOROMORPHAE. .RATITAE MORPHAE MORPHAE

NEORNITHES

The Odontolcae seem to be an early specialized offshoot of the Colymbo-Pelargomorphous brigade, while the Ratitae represent a number of side branches of early Alectoromorphae. The Ratitae branched off, probably during the Eocene period, from that still indifferent stock which gave rise to the Tinami + Galli + Gruiformes, when the members of this stock were still in possession of those archaic characters which distinguish Ratitae from Carinatae. It follows that new groups of Ratitae can no longer be developed since there are no Carinatae living which still retain so many low characters, e.g. configuration of the palate, precoracoid, pelvis, intestinal convolutions, copulatory organ, &c. Loss of the keel is co-ordinated with the power of using the forelimbs for locomotion; although a " Ratite " character, it is not sufficient to turn a Notornis, Cnemiornis or Stringops, not even a Phororhacos into a_ member of the Ratitae.

Another branch of the Alectoromorphae, in particular of the Galliformes, when these were still scarcely separated from the Gruiformes, especially rail-like birds, leads through Opisthocomi to the Cuculiformes. These are, again in an ascending direction, connected with the Coraciiformes, out of which have arisen the Passeriformes, and these have blossomed into the Oscines, which, as the apotheosis of bird life, have conquered the whole inhabitable world. (H. F. G.)

BIRD-LOUSE, any small flat degenerate wingless neuropterous insect of the group Mallophaga, parasitic upon birds and mammals and feeding upon dermal excretions or upon the softer parts of hair and feathers. The term " biting-lice " is sometimes given to these parasites, in allusion to the mandibulate character of their mouth-parts, which serves to distinguish them at once from the true lice of the order Rhynchota in which the jaws are haustellate.

BIRD'S-EYE, a name applied to various small bright flowers, especially those which have a small spot or " eye " in the centre. The primula is thus spoken of, on account of its yello\V centre,

also the adonis, or " pheasant's eye," and the blue veronica, or germander speedwell. The word is also applied to a sort of tobacco, in which the stalks (of a mottled colour) are cut u> together with the leaves. From a similar sense comes the phrase " bird's-eye maple," a speckled variety of maple-wood, or the " bird's-eye handkerchief " mentioned in Thackeray's novels.*

BIRDSNESTING, a general term for the pursuit of collecting and preserving birds' eggs, with or without the nests themselves. The nests and eggs of wild birds are. nowadays protected by local laws almost everywhere in both Great Britain and the United States. By law they may be taken for scientific purposes only, by special licence. In order not to interfere seriously with breeding it is customary to take but one egg from a nest, and, if the nest itself be taken, to wait until the young birds have left it. Every egg, unless " hard-set," should be blown as soon as removed from the nest. This is done by opening a small hole in its side by means of a drill with a conical head, manufactured for the purpose, a minute hole for the insertion of the drill-head having first been made in the shell with a needle, which is then used to stir up the contents, so that they shall flow easily. A blow-pipe with a curved mouth is then inserted, the egg is held hole downwards, and the contents blown out. The old-fashioned method of making two holes in the egg is thus superseded. Should the egg be " hard-set " a somewhat larger hole is made and its edges reinforced with layers of paper pasted round them. Minute forceps are then introduced and the embryo cut into pieces small enough to pass through the hole. The inside of the egg is then rinsed out with clean water, and also before being placed in the cabinet, with a solution of corrosive sublimate, which prevents decay and consequent discoloration of the inner membrane. Finally the egg is placed with the hole downwards upon a sheet of white blotting-paper to dry. The authentication of the eggs is the most important duty of an egg-collector, next to identifying the specimens. According to some the

best method is to mark with a fine pen on the egg itself the variety, scientific name, locality of nest, date of taking and the initials of the collector, as well as a reference to his note-book or cata- logue. Others advocate keeping the authentication separate with only a numbered reference on the egg itself. Eggs should not be transported in bran or sawdust, but in strong wool-lined boxes. The best cabinets are fitted with drawers, pulled out to inspect the eggs, but at other times closed to preserve them from the light, which is injurious to their delicate colouring. When an entire nest is taken it should be disinfected with hypo- sulphite of soda or insect-powder.

See Birdnesling and Bird-Skinning, by E. Newman (London, 1888) ; The Young Collector's Handbook of British Birds' Nests and Eggs, by W. H. Bath (London, 1888); Birds' Nests, Eggs and Egg- Collecting, by R. Kearton (London, 1890); British Birds' Eggs and Nests, by J. C. Atkinson (London, 1898); Nests and Eggs of North American Birds, by Ernest Ingersoll (1880-1881).

BIRDS OF PARADISE, a group of passerine birds inhabiting New Guinea and the adjacent islands, so named by the Dutch voyagers in allusion to the brilliancy of their plumage, and to the current belief that, possessing neither wings nor feet, they passed their lives in the air, sustained on their ample plumes, rest- ing only at long intervals suspended from the branches of lofty trees by the wire-like feathers of the tail, and drawing their food " from the dews of heaven and the nectar of flowers." Such stories obtained credence from the fact that so late as the year 1760, when Linnaeus named the principal species apoda, or " footless," no perfect specimen had been seen in Europe, the natives who sold the skins to coast traders invariably depriving them of feet and wings. The birds now usually included under this name belong to the family Paradiseidae, closely allied to the crows. The largest is the great emerald bird (Paradisea apoda), about the size of the common jay. Its head and neck are covered with short thick-set feathers, resembling velvet pile, of a bright straw colour above, and a brilliant emerald green beneath. From under the shoulders on each side springs a dense tuft of golden- orange plumes, about 2 ft. in length, which the bird can raise at pleasure, so as to enclose the greater part of its body. The

two centre tail feathers attain a length of 34 in., and, being desti- tute of webs, have a thin wire-like appearance. This splendid

plumage, however, belongs only to the adult males, the females being exceedingly plain birds of a nearly uniform dusky brown colour, and possessing neither plumes nor lengthened tail feathers. The young males at first resemble the females, and it is only after the fourth moulting, according to A. R. Wallace, who has studied those birds in their native haunts, that they assume the perfect plumage of their sex, which, however, they retain permanently afterwards, and not during the breeding season only as was formerly supposed. At that season the males assemble, in numbers varying from twelve to twenty, on certain trees, and there disport themselves, so as to display their mag- nificent plumes in presence of the females. Wallace in his Malay Archipelago, vol. ii., thus describes the attitude of the male birds at one of those " sacaleli," or dancing parties, as the natives call them; " their wings," he says, " are raised vertically over the back, the head is bent down and stretched out, and the long plumes are raised up and expanded till they form two magnificent golden fans striped with deep red at the base, and fading off into the pale brown tint of the finely-divided and softly-waving points; the whole bird is then overshadowed by them, the crouching body, yellow head, and emerald green

*throat, forming but the founda- tion and setting to the golden glory which waves above." It is at this season that those birds are ˆz%/ chiefly captured. *r<. The bird-catcher having found a tree thus selected for a " dancing party," builds a hut among the lower branches in which to conceal himself. As soon as the male birds have begun their graceful antics, he shoots them, one after the other, with blunt arrows, for the purpose of stunning and bringing them to the ground without drawing blood, which would injure their plumage; and so eager are those birds in their courtship that almost all the males are thus brought down before the danger is perceived. The natives in preparing the skins remove both feet and wings, so as to give more prominence to the commercially valuable tuft of plumes. They also remove the skull, and the skin is then dried in a smoky hut. The great emerald bird, so far as yet known, is only found in the Aru Islands. The lesser bird of paradise (Paradisea minor), though smaller in size and somewhat less brilliant in plumage, in other respects closely resembles the preceding species. It is also more common, and much more widely distributed, being found throughout New Guinea and the neighbouring islands. Its plumes are those most generally used as ornaments for ladies' head-dresses. Both species are omnivorous, fee"ding voraciously on fruits and insects. They are strong, active birds, and are believed to be polygamous. The king bird of paradise {Cicin- nurus regius) is one of the smallest and most*

brilliant of the group, and is specially distinguished by its two middle tail feathers, the ends of which alone are webbed, and coiled into a beautiful spiral disk of a lovely emerald green. In the red bird of paradise {Paradisea rubra) the same feathers are greatly elongated and destitute of webs, but differ from those in the other species, in being flattened out like ribbons. They are only found in the small island of Waigiu off the coast of New Guinea. Of the long-billed paradise birds the most remarkable is that known

Standard Wing Bird of Paradise (Semioptera wallacei).

as the " twelve-wired " (Seleucides alba), its delicate yellow plumes, twelve of which are transformed into wire-like bristles nearly a foot long, affording a striking contrast to the dark metallic tints of the rest of its plumage. (A. N.)

BIRDWOOD, SIR GEORGE CHRISTOPHER MOLESWORTH (1832-), Anglo-Indian official and writer, son of General Christopher Birdwood, was born at Belgaum, in the Bombay presidency, on the 8th of December 1832. He was educated at Plymouth grammar-school and Edinburgh University, where he took his M.D. degree. Entering the Bombay Medical Service in 1854, he served in the Persian War of 1856-57, and subsequently became professor at the Grant Medical College, registrar of the university, curator of the museum, and sheriff at Bombay, besides acting as secretary of the Asiatic and Horticultural societies. His work on the Economic Vegetable Products of the Bombay Presidency reached its twelfth edition in 1868. He interested himself prominently also in the municipal life of the city, where he acquired great influence and popularity. He was obliged by ill-health in 1868 to return to England, where he entered the revenue and statistics department of the India Office (1871-1902). Whilst engaged there he published important volumes on the industrial arts of India, the ancient records of the India Office, and the first letter-book of the East India Company. He devoted much time and energy to the encouragement of Indian art, on various aspects of which he wrote valuable monographs, and his name was identified with the representation of India at all the principal international exhibitions from 1857 to 1901. (See Journal of Indian Art, vol. viii. " The Life and Work of Sir George Birdwood.") His researches on the subject of incense {Trans. Linn. Soc. xxvii., 1871; Ency. Brit. 9th ed., "Incense," 1881; revised for the present edition by him) , a good example of his mastery of detail, have made his historical and botanical account of this subject a classic. Nor can his lifelong association with journalism of the best sort be overlooked. From boyhood he was a diligent

contributor of special information to magazines and newspapers; in India he helped to convert the Standard into the Times of India, and edited the Bombay Saturday Review, and after his return to London he wrote for the Pall Mall, Athenaeum, Academy, and Times; and with Chenery, the editor of The Times, and others he took the initiative (1882) in cele- brating the anniversary of Lord Beaconsfield's death as " Prim- rose Day" (April 19). He kept up his connexion with India by constant coAributions to the .Indian press; and his long friendships with Indian princes and the leading educated native Indians made his intimate knowledge of the country of peculiar value in the handling of the problems of the Indian empire. In 1887 he was created a K.C.I.E.; and, besides being given his LL.D. degree by Cambridge, he was also made an officer of the Legion of Honour and a laureate of the French Academy.

BIREJIK (Arab. Bir; classical, Apamea- Zeugma), a town of North-West Mesopotamia, in the Aleppo vilayet, altitude 1 1 70 ft. , built on a limestone cliff 400 ft. high on the left bank of- the Euphrates. Pop. about 10,000, three-quarters Moslem. It is situated at one of the most important crossings of the Euphrates, where there was, in ancient times, a bridge of boats, and is now a ferry on the road from Aleppo to Urfa, Diarbekr and Mosul. Birejik corresponds actually to Apamea, which lay opposite Zeugma, and commanded the bridge with its strong castle (Kala Beda) now much ruined. The place seems to have had a pre-Seleucid existence as Birtha, a name which revived under Roman rule (we hear of the emperor Julian resting there on his march into Mesopotamia, a.d. 363), and is preserved to this day. The ferry over an unusually deep and narrow part of the Euphrates has been used from time immemorial in the passage from North Syria to Haran (Charrae), Edessa and North Meso- potamia, and was second in importance only to that at Thapsacus, by which crossed the route to Babylon and South Mesopotamia. Birejik was the scene of an unusually cruel massacre and persecution of Armenians in 1895.

BIREN (or Bdhren), ERNST JOHANN (1690-1772), duke of Courland, was the grandson of a groom in the service of Duke

Jacob III. of Courland, who bestowed upon him a small estate, which Biren's father inherited and where Biren himself was born. He received what little education he had at the academy of Konigsberg, from which he was expelled for riotous conduct. In 1 7 14 he set out

to seek his fortune in Russia, and unsuccess- fully solicited a place at the shabby court of the princess Sophia Charlotte, the consort of the tsarevich Alexius. Returning to Mittau, he succeeded in gaining a footing at court there through one of his sisters, who was the fancy of the ruling minister, Peter Bestuzhev, whose established mistress was no less a person than the young duchess Anne Ivanovna. During his patron's absence, Biren, a handsome, insinuating fellow, suc- ceeded in supplanting him in the favour of Anne, and procuring the disgrace and banishment of Bestuzhev and his family. From henceforth to the end of her life Biren's influence over the duchess was paramount. On the elevation of Anne to the Russian throne in 1740, Biren, who had in the meantime married a Fraulein von Treiden, came to Moscow, and honours and riches were heaped upon him. At. the coronation (19th May) he was made grand-chamberlain, a count of the empire, on which occasion he is said to have adopted the arms of the French ducal house of Biron, and was presented with an estate at Wenden with 50,000 crowns a year. He soon made himself cordially detested by Russians of every class. He was not indeed the monster of iniquity he is popularly supposed to have been. His vices were rather of the sordid than of the satanic order. He had insinuating manners and could make himself very agreeable if he chose; but he was mean, treacherous, rapacious, suspicious and horribly vindictive. During the latter years of Anne's reign, Biren increased enormously in power and riches. His apartments in the palace adjoined those of the empress, and his liveries, furnitures and equipages were scarcely less costly than hers. Half the bribes intended for the Russian court passed through his coffers. He had landed estates everywhere. A special department of state looked after his brood mares and stallions. The magnificence of his plate astonished the French ambassador, and the diamonds of his duchess were the envy of princes. The climax of this wondrous elevation was reached when, on the extinction of the line of Kettler, the estates of Courland, in June 1737, elected him their reigning duke. He was almost as much loathed in Courland as in Russia; but the will of the empress was the law of the land, and large sums of money, smuggled into Courland in the shape of bills payable in Amsterdam to bearer, speedily convinced the electors. On her death-bed Anne, very unwill- ingly and only at his urgent entreaty, appointed him regent during the minority of the baby emperor, Ivan VI. Her common- sense told her that the only way she could save the man she loved from the vengeance of his enemies after her death was to facilitate in time his descent from his untenable position. Finally, on the 26th of October 1740, a so-called "positive declaration " signed by 194 dignitaries, in the name of the Russian nation, conferred the regency on Biren.

Biren's regency lasted exactly three weeks. At midnight of the 19th of November 1740 he was seized in his bedroom by his ancient rival, Field Marshal Miinnich. The commission appointed to try his case condemned him (nth of April 1741) to death by quartering, but this sentence was commuted by the clemency of the new regent, Anna Leopoldovna, the mother of Ivan VI., to banishment for life at Pelin in Siberia. All Biren's vast property was confiscated, including his diamonds, worth £600,000. For twenty-two years the ex-regent disappeared from the high places of history. He re-emerges for a brief moment in 1762, when the philo-German Peter III. summoned him to court. He was now too old to be in any one's way, and that, no doubt, was the reason why Catherine II. re-established him (1763) in his duchy, which he bequeathed to his son Peter. Misfortune had chastened him, and the last years of his rule were just and even benevolent, if somewhat autocratic. He died at Mittau, his capital, on the 28th of December 1772.

See Robert Nisbet Bain, The Pupils of Peter the Great (London, 1897); Christoph Hermann von Manstein, Memoirs (Eng. ed.,

London, 1856); Claudius Rondeau, Diplomatic Dispatches from Russia (St Petersburg, 1889-1892). (R. N. B.)

BIRETTA (Ital. berretta, Med. Lat. biretum, birettum, dim. of birrus, " a hooded cloak "; from the Fr. form barrette is derived the Eng. " barret-cap "), a cap worn by the Catholic clergy. It is square and stiff, being made of a framework of cardboard covered with cloth or silk; on the top, along the sutures of the stuff, are three or four raised, board-like, arched ridges, at the junction of which in the centre is a knob or tassel (fioccus). Its colour varies with the rank of the wearer, that of the pope being white, of the cardinals red, of bishops purple, and of the lower clergy black. It is not in the strictest sense a liturgical head-dress, its use not being confined to liturgical functions. In these functions, moreover, its use is strictly limited; e.g. it is worn at low masses by the priest only when he goes to and from the altar, at high masses also when the celebrant sits during the singing of the Kyrie, Gloria and Creed, and at pro- cessions when these take place outside the church and are not sacramental, and so on.

Though the form of the biretta, devised in the 17th century, is peculiar to the Roman Church, it is but a variant of the original biretum, which developed in various countries into head-coverings of different shapes and significance. At the outset there was little to distinguish the biretum from the pileus or pileolus (skull-cap), a non-

liturgical cap worn by dignitaries of the Church under the mitre and even under the biretta. When the word biretum first appears in the 13th century, it practically means no more than " cap," and is used as a synonym of pileus. As an ecclesiastical vestment the cap can be traced, under the name of pileus, to the 12th century; under that of infula, to the end of the 10th. It would seem to have been worn by the cantors as a protection against cold. The same utilitarian reason led to its introduction among the clergy generally. Thus in 1243 Pope Innocent IV. granted leave to the Benedictines of St Augustine's at Canterbury, and to those of Winchester, to wear the pileus in choir. With the extension of its use, too, the custom grew ud (c. 1300) of investing clerks with the biretum as the symbol of the transfer of a benefice, a custom which survives, in Roman Catholic countries, in the solemn delivery of the red biretta by the head of the state to newly created cardinals, who afterwards go to Rome to receive the red hat. This red biretta is called the zucchetto.

This use of the biretum as a symbol of office or dignity was not confined to the clergy. With various modifications of form it was worn by all persons of standing, e.g. barons, judges, and doctors and masters of the universities. The biretum was also used in the investiture of laymen with office, e.g. a duke or the prefect of the city of Rome (Du Cange, Gloss, s.v. birretum). The "cap of maintenance" or "cap of estate," still borne be- fore the British sovereign on state occasions, is a barret – cap of the type of the 14th and 15th centuries; it is of crimson velvet, turned up with ermine. By the 16th cen- tury the barret-cap had become the common head-gecr of all people of substance, men and women. It was flat, squure or round, sometimes with edges that could be turned up or down according to convenience, and was often elaborately decorated. By the 17 th century it had given place in ordinary civil life to the brimmed hat; but in various shapes it still survives as official head-gear in many European countries: the Barett, worn in church by the Lutheran clergy, in the courts by German lawyers, and by the deans and rectors of the universities, the barrette of French judges and barristers, the " black cap " of the English judge, and the " college cap " familiar in English and American universities, and vulgarly known as the " mortar-board."

Meanwhile the ecclesiastical developments of the biretum are not without interest and significance. Originally this had been a round cap, low or moderately high, slightly bulging out at the top, and ornamented with a round knob. By the 16th century, both in England and on the continent, a tendency had begun to emphasize the ridges of the sutures and thus produce a square shape. Henceforth the

evolution followed different lines. In England, in the 17 th century, the square flat top began to be

enlarged, forming a rim of thick stuff projecting beyond the close-fitting cap. This was the " square cap " so virulently denounced by the Puritans as a symbol of High Church Erastian- ism. With the triumph of High Church principles at the Restora- tion it was natural that a loyal clergy should desire to emphasize this squareness, and the consequent exaggeration of the square top of the cap necessitated a further stiffening. In the 18th century, accordingly, the top began to be made of a board of wood or card covered with cloth, the close-fitting cap proper retired farther from the edges, the knob developed into a long tassel, and the evolution of the modem " college cap " was complete (see fig. 1).

On the continent, meanwhile, in the Roman Catholic Church, the biretum had ' also developed into its present characteristic

form, and by a very similar pro- cess. By the end of the 16th cen- tury the square shape was every- where prevalent; at the beginning of the 17th cen- tury cardboard was introduced to stiffen the sides and emphasize the squareness, and the actual form of the bir- etta, as described above, had be- Only in Spain has the biretta continued

Fig. 1 a, Pileus of Archbishop Warham (d. 1532).

Square cap of Archbishop Cranmer (d. 1556). Square cap of Archbishop Parker (d. 1575). Square cap of Archbishop Whitgift (d. 1583). Square cap of Archbishop Laud (d. 1645).

All these are from portraits at Lambeth. Square cap of George Morley, bishop of

Winchester (d. 1684). Modern college cap.

come fixed (see fig. 2)

to be worn without the raised ridges.

The use of the Roman biretta has been introduced by a certain number of the clergy into the Anglican Church. It is clear that there is no historical justification for this; for though both college cap and

biretta are developed from the same " square cap," the biretta in its actual shape is strictly associated with the post- Reformation Roman Church, and its actual ceremonial use is of late growth. Braun (Liturgische Gewandung, p. 513) thinks that the symbolism of the cross may have had some influence

in fixing and pro- pagating the square shape, and he quotes a decree of the synod of Aix (1585) ordering the clergy to wear a biretta sewn in the form of a cross (biretum in modum crucis consutum, ut ecclesiasticos homi- nes decel). So far as the legality of of England is con-

(Redrawn from Braun's Liturgische Gewandung.)

Fig. 2. — Illustrations of the biretum from monuments in the cathedrals of — 0, Brandenburg (1281). e, Wurzburg (1521).

b, Augsburg (1342). /, Regensburg(i564).

c, Bamberg (1483). g, ib. (1605?).

d, Regensburg (1550). h, Bamberg (1626).

the use of the biretta in the Church cerned, this was pronounced by Sir R. Phillimore in the Court of Arches (Elphinstone v. Purchas, 1870) to be legal " as a protection to the head when needed," but this decision was reversed on appeal by the judicial committee of the privy council {Hebbert v. Purchas, 187 1). Of late years the old square cap of soft padded cloth or velvet has been revived in the Anglican Church by some dignitaries.

See J. Braun, S.J., Die liturgische Gewandung (Freiburg-i-B., 1907) ; Hierurgica Anglicana, part ii. (London, 1903) ; H. Druitt, Costume on Brasses (London, 1906). (W. A. P.)

BIRGER (?-i266), Swedish statesman, nephew of Birger Brosa, and the most famous member of the ancient noble family of the Folkungeatten, which had so much to say for itself in early Swedish history, was created jarl of Bjalbo by King Erik Eriksson in 1 248 and married the king's sister. On Erik's death

(1250) Birger's son Valdemar was elected king while his father acted as regent. During the sixteen years of his sway Sweden advanced greatly in fame and prosperity. In 1249 he led an expedition to Finland, built the fortress of Tavastthus, and thus laid the foundations of Sweden's oversea empire. He also built Stockholm,

and enriched it by making it the chief mart for the trade of Ltibeck, with which city he concluded a commercial treaty. As a lawgiver also Birger laboured strenuously in the interests of civilization. In his old age he married the daughter of King Abel. There is a fine statue of the great jarl in the Riddarholm church at Stockholm, erected by Fogelberg at the expense of the Stockholm magistracy in 1884. He is also the central figure of Fr. Hedberg's drama Brollopet pa, Ulfasa (1865). See Sveriges Historia, vol. i. (Stockholm, 1879-1883).

BIRIBI, or Cavagnole, a French game of chance, prohibited by law since 1837. It is played on a board on which the numbers 1 to 70 are marked. The players put their stakes on the numbers they wish to back. The banker is provided with a bag from which he draws a case containing a ticket, the tickets correspond- ing with the numbers on the board. The banker calls out the number, and the player who has backed it receives sixty-four times his stake; the other stakes go to the banker. In the French army " to be sent to Biribi " is a cant term for being sent to the disciplinary battalion in Algeria.

BIRJEND, the capital of Kain, a sub-province of Khorasan in Persia, in 32° 53′ N. 59° 10′ E., and at an elevation of 4550 ft. Pop. about 25,000. It is situated 328 m. from Meshed by the direct road, in a fertile valley running east and west, of which the southern boundary is a lofty range of barren hills known as Kuh i Bakeran. Through the valley runs the Khusp river, which loses itself in the desert towards the west; it is, however, generally dry. The water-supply of the town and of the 70 or 80 villages under its jurisdiction is very scanty. On the east of the town at the foot of a hill stands a dilapidated fort. Birjend has six good caravanserais, a college and some mosques; post and telegraph offices were established there in 1902.

BIRKBECK, GEORGE (1776-1841), English physician and philanthropist, was born at Settle in Yorkshire on the 10th of January 1776. He early evinced a strong predilection for scientific pursuits; and in 1799, after graduating as doctor of medicine, he was appointed to the chair of natural philosophy at the Andersonian Institution of Glasgow. In the following year he delivered, for the benefit of the working-classes, a gratuitous course of scientific lectures, which were continued during the two following years and proved eminently successful. He removed to London in 1804, and there he endeavoured to prosecute his philanthropic schemes, at first without much encouragement, but ultimately with marked success. In 1823 he contributed to found the Mechanics' Institute, the name of which was afterwards changed to Birkbeck Institution or College, in honour of its founder. He was appointed director of the institute,

which he had originally endowed with the sum of £3700, and held the office till his death on the 1st of December 1 84 1. The sphere of usefulness of the institution was gradually enlarged, and an enlargement of the buildings was carried out in 1883-1885. The college now holds day and evening classes in many of the sciences, in literature, languages and art.

BIRKENFELD, a town of Germany, capital of the principality of the same name, on the Zimmerbach, 25 m. S.E. of Trier and on the main line of railway from Bingerbriick to Neunkirchen. Pop. 2500. Close by, on an eminence, lie the ruins of the castle of Birkenfeld, dating from the 14th century, once the residence of the counts palatine of Zweibrucken. The town has an Evan- gelical and a Roman Catholic church, a grand-ducal high school and a hospital. Besides brewing and tanning, its industries include the manufacture of tobacco and chicory. There is also a considerable trade in cattle.

The Principality of Birkenfeld is hilly and well-forested; agriculture prospers on the cleared lands, and fruit is grown in the valley of the Nahe, the principal stream. Ironstone and roofing slates are quarried, and there is some industry in agate- polishing and the manufacture of trinkets. The principality

has an area of 312 sq. m. and a population (1900) of 43,409, chiefly Protestants. It is formed out of the former lordships of Dachstuhl and Oberstein, of part of the ancient countship of Sponheim, and sections of the duchy of Jiilich, which were granted to the grand-duke of Oldenburg by the congress of Vienna in 1815. It is entirely an enclave in Prussian territory, and though it is represented in the Oldenburg diet, it is governed by a separate Regierungskollegium, consisting of a president and two members, who are responsible to the Oldenburg ministry.

BIRKENHEAD, a municipal, county and parliamentary borough, and seaport of Cheshire, England, on the river Mersey, 195 m. N.W. of London. Pop. (1901) 110,915. It lies opposite Liverpool, on the east shore of the peninsula of Wirral, and is served by the Birkenhead (London & North-Western and Great Western joint) and the Wirral railways. It is wholly of modern growth, although the name of Byrkhed is traced to the forest which is believed to have extended between the mouths of the Dee and the Ribble in Lancashire. A

Benedictine monastery was founded (c. 1150) by Hamon de Mascy, third baron of Dunham Massey, and dedicated to St Mary and St James. It drew its main revenues from tolls levied at the Mersey ferry; and its prior sat in the parliament of the earls of Chester, enjoying all the dignities and privileges of a Palatinate baron. A fine crypt, along with remains of the prior's lodging, refectory and chapel, may still be viewed, as the priory was purchased by private subscription and handed over to the municipality in

1896.

The rise of Birkenhead, from a hamlet of some 50 inhabitants in 18 18 to its present importance, was due in the first place to the foresight and enterprise of William Laird, who purchased in 1824 a few acres of land on the banks of a marshy stream, known as Wallasey Pool, which flowed into the Mersey about 2 m. west of the village. Among other engineers, Telford and Stephenson favoured the project of converting Wallasey Pool into a great basin for shipping; but, largely owing to the fears of Liverpool lest a formidable rival should thus be created, it was not until 1843 that parliamentary powers were obtained, and the work entrusted to James Rendel, who finished it in less than five years. The docks, which covered an area of 7 acres, were opened in 1847, and after thrice changing hands were made over in 1858 to the Mersey Docks and Harbour Board, a body created by act of 1857, to control the harbourage on both sides of the river.

Meanwhile, the town itself grew rapidly. In 1833 an act was passed for paving, watching, cleansing and improving the streets; as well as for the regulation of police, and the establish- ment of a market. The Improvement Commissioners constituted by this act included the mayor, bailiffs and four aldermen of Liverpool, under whose care the main streets were laid out on a regular plan, intersecting one another at right angles; and the first iron tramway in England was laid down. Electricity was subsequently applied to the tramway system. Noteworthy public buildings are St Aidan's College, a large brick building in Tudor style, for the use of Anglican students in theology; the market hall (184s); town hall, a free library with branches, borough hospital, built at the cost of Sir John Laird; and many schools both public and private, including the industrial schools built as a memorial to Albert, prince consort, at the cost of Sir W. Jackson, and the school of art, given by Sir John Laird. There are many handsome modern churches, all built since 182 1. Roman Catholics are especially numerous, owing to the presence of a large Irish population. The town is well furnished with open spaces.

Birkenhead Park was opened in 1847, Mersey Park in 1885; while a tract of moorland 6 m. distant in the township of Thurstaston, was allotted to the borough of Birken- head in 1887; and Meols Common, comprising over 50 acres of pastureland on the shores of Liverpool Bay, was made over to the corporation in 1900.

The increase of railway accommodation has been swift. In 1878 the old Monks Ferry station on the Great Western system was superseded by the opening of the Woodside passenger station, and a few years later the Birkenhead town station was

opened. In 1886 the Mersey tunnel, connecting Birkenhead with Liverpool, was opened by the prince of Wales. The system extends from Rock Ferry and Park stations on the Cheshire side to the low-level at Central Station in Liverpool, and has connexions on the Cheshire side with the Great Western, North- western, Wirral and various local lines. The Wrexham, Mold & Connah's Quay railway, which was taken over by the Great Central company in 1905, helped to bring the mineral wealth of Flint and North Wales generally into the Birkenhead docks.

Woodside Ferry may still be regarded as the principal entrance to Birkenhead and the Wirral from Liverpool. The exclusive right of ferryage was granted to the priory in 1332. In 1842 the Birkenhead Commissioners purchased it, under an act of parliament, from the lord of the manor, Mr F. R. Price. In 1897 the corporation further acquired the rights over the Rock Ferry and the New Ferry at the southern end of the town. Despite competition from the Mersey tunnel, these ferries continue to transport millions of passengers annually, and have a considerable share in the heavy goods traffic.

Though at the outset a mere commercial offshoot of Liverpool, Birkenhead has acquired a large export trade in coal and manu-factured articles, importing guano, grain and cattle in return. Iron foundries, breweries, oil-cake and seed mills also exist side by side with such immense engineering and shipbuilding works as the Britannia Works, Canada Works, and, above all, Laird's shipbuilding works, where several early iron vessels were built, and many cruisers and battleships have been launched. Huge warehouses and sheds have been erected along the quays for the storage of freight. In 1847 the Birkenhead Dock Ware- housing Company opened its first warehouse, capable of holding 80,000 tons of goods. A line called the Dock Extension railway was carried round the whole, and the company erected, for their workmen, the Dock Cottages. This entire property is now under the authority of the Mersey Docks and

Harbour Board. The pile of buildings known as the corn warehouses are traversed by a canal which gives access to its several departments, and are provided with mechanical grain-elevators. There are also extensive lairages for live-stock, and cold storage for dead meat. On the north and north-east, and partly on the east, Birkenhead is bounded by its docks, which extend, for a distance exceeding 2 m., from the landing-stage at Woodside Ferry to the Wall- asey Bridge. Of these the principal are the Egerton, Morpeth, Morpeth Branch and Wallasey Docks; while the Alfred Dock, with its three entrances, nineteen pairs of lock-gates, 8 acres of water, and 460 lin. yds. of quay-space, fulfils the part of an entrance-lock to the whole system. The great Float, now occupying the site of Wallasey Pool, separates Birkenhead from Poulton-cum-Seacombe in the parish of Wallasey. It forms an immense dock of 120 acres, with a quay-space of about 5 m.; and communicates on the E. with a low-water basin of about 14 acres and with the Alfred Dock; on the S.E. with the Morpeth, Morpeth Branch and Egerton Docks. The Morpeth Dock (about 11 acres, quay-space 1299 lin. yds.) is in communication with the Morpeth Branch Dock (about 3! acres, quay-space 600 lin. yds.); both being set apart for the use of steamers. The total water-space of these docks amounts to 165 acres, and the lineal quay-space is about 9! m. The entrances to the Birkenhead Docks are capable of docking the largest class of steamers afloat. The massive iron bridges across the dock entrances are opened and closed by hydraulic power, which is likewise applied to the cranes, coal-hoists, warehouse-lifts and other machinery about the docks. At the extreme western end of the West Float are three large graving docks, two about 750 ft. in length, and 130 and 80 ft. respectively in width; while the largest measures about 900 ft. in length and 130 ft. in width.

In 1861 Birkenhead was created a parliamentary borough, returning one member. In 1877 it received a municipal charter, the boundaries of the borough including the suburban townships of Tranmere, Claughton, Oxton and part of Higher Bebington. The borough is under a mayor, 14 aldermen and 42 councillors. Area, 3848 acres.

BIRMINGHAM

983

BIRMINGHAM, a city and the county-seat of Jefferson county, Alabama, U.S.A., in the north-central part of the state, 96 m. N.W. of Montgomery, at an altitude of 600 ft. It is served by the Southern, the Louisville & Nashville, the Seaboard Air Line, the Central of

Georgia, the Alabama Great Southern (of the Queen & Crescent Route), the Illinois Central, the At- lanta, Birmingham & Atlantic, the Birmingham Southern (for freight only), and the Kansas City, Memphis & Birmingham (Frisco system) railways. Pop. (1800) 26,178; (1000) 38,415, of whom 16,575 were 0I negro descent, and 1776 were foreign- born; (1910) 132,685. Birmingham is situated in Jones Valley, between two mountains which lie south-east and north-west of the city. Its streets are wide and well constructed, and there are sixteen public parks, three of which, East Lake, Lakeview and Capitol, are particularly attractive. Among the principal buildings are the First National bank, the immense Union station and the Saint Vincent hospital ; besides several fine office and school buildings (including the beautiful manual training high school) and churches. Although the state constitution restricts municipal investments, a Waring or " Separate " sewage system has been established. The most important educational institutions are the Birmingham medical college and college of pharmacy; the Birmingham dental college; a school of art and a conservatory of music. At East Lake station, in the north-east of the city, is Howard College (Baptist; founded at Marion, Perry county, in 1841 as an academy; granted first collegiate degrees in 1848; opened in East Lake in 1887); and 2 m. west of the city is the North Alabama Con- ference College (Methodist Episcopal South), opened in 1897.

Birmingham, situated in an immensely rich iron, coal and limestone region, is the principal manufacturing centre in the state, and the most important centre for the production and manufacture of iron in the southern states. In the decade 1890-1900 the value of the products of Birmingham's manu- factories increased 78.9% from $7,064,248 to $12,581,066; in 1900 establishments under the " factory system " produced goods valued at $8,599,418, in 1905 at $7,592,958, a decrease

of 11.7%.

Immediately outside the city limits in 1905 there were many large manufactories, including the repair shops of the Southern railroad; iron and steel, car wheels and cotton-oil were among the products of the suburban factories. In Jefferson county there were in 1900 more than 300 mining and manufacturing establishments, engaged, chiefly, in the production of iron, coal and coke, and a majority of these are in Birmingham and its sub- urban towns. A short distance south of the city is Red Mountain, 25 m. long and about 225 ft. high, rich in hematite iron ore; valuable limestone deposits are found some 30 m. distant, and in the vicinity are three great coalfields, the

Warrior, the Coosa and the Cahaba. These natural advantages make possible the production of pig iron at an unusually low cost. In 1900 the Birmingham district produced six-sevenths of the total pig iron exported from the United States, and in 1902 nine-tenths of Alabama's coal, coke and pig iron; in '1905 Jefferson county produced 67.5 % of the total iron and steel product of the state, and 62.5% of the pig iron produced by the state. The first steel plant in the southern states was established at Birmingham in 1897; in 1902, at Ensley, one of the suburbs, there were 10 furnaces controlled by one company. The city has also a large trade in cotton, the annual receipts averaging about 100,000 bales. Among the manufactures are cotton goods, cotton-seed oil, yarn, furniture and machinery. Birmingham also has important lumber interests.

The city is a product of the industrial transformation in the southern states since the Civil War. In 1870 the site was a cotton field, where two railways, the South & North, and the •Alabama & Chattanooga, now part respectively of the Louis- ville & Nashville and the Southern System, met, 2 m. from Elyton. In 1871 a land company, promoted by railway officials, founded Birmingham. Within four months the population was 1200; by 1873 it was 2500; in 1880 it was 3086; and in 1890 it had reached 26,178.

BIRMINGHAM, a city and a municipal, county, and parlia- mentary borough, the metropolis of one of the greatest industrial districts in England. Pop. (1901) 522,204. It lies in the north- west of Warwickshire, but its suburbs extend into Staffordshire on the north and west, and into Worcestershire on the south. It is 113 m. north-west from London by the London & North- western railway, lying on the loop line between Rugby and Stafford; it is also served by the northern line of the Great Western, and by the north and west (Derby-Bristol) line of the Midland railway.

Site. — Birmingham, built upon the New Red Sandstone, is situated in the valleys of the Rea and other small feeders of the river Tame, near their sources, and upon the rising ground between these valleys. The site is, therefore, boldly undulating, varying from 200 to 600 ft. above sea-level, steadily rising towards the north and west, while the well-marked line of the Lickey hills skirts the site on the south-west, extending thence south-eastward. From the high ground to the south-east Birmingham thus presents the appearance of a vast semicircular amphitheatre, the masses of houses broken by innumerable factory-chimneys; the whole scene conveying a remarkable impression of a community of untiring industrial activity. The area of the town is nearly 20 sq. m., the greatest length from north to south 7 m., and

the greatest breadth about 4 m. Yet Birmingham is a fraction only of an industrial district, of which it forms the south-eastern extremity, which itself resembles one vast city, and embraces such famous manufacturing towns as Dudley, Wolverhampton, Walsall, Wednesbury and many others. This is the district commonly known as the " Black Country," which forms part of the South Staffordshire industrial district. Birmingham, however, does not lie actually within the "Black Country" properly so-called.

Streets and Buildings. — The plan of the town, as dictated by the site, is irregular; the streets are mostly winding, and often somewhat narrow. In the centre are several fine thoroughfares, containing nearly all the most important buildings. New Street, Corporation Street and Colmore Row are the chief of these. At the western end of New Street is a fine group of buildings, including the council house and art gallery, the town hall and post office. The council house and art gallery, begun in 1874 and completed in 1881, is in Renaissance style, and the material is Darley Dale, Spinkwell and Wrexham stone. The entrance is surmounted with a pediment filled with groups of excellent sculpture. The erection of that part which forms the art gallery was the work of the gas committee, to whom the council granted the site on condition that they would build such a gallery over their own office, the council having no powers at the time to raise the required funds. The art gallery contains a fine collection of modern paintings, including masterpieces of David Cox, Millais, Hunt, Henry Moore, Albert Moore, Briton-Riviere and Burne- Jones. In the industrial hall are rich stores of Oriental metal work, Limoges enamel, English and foreign glass and Japanese ceramics. In the side galleries are various textiles, and Persian, Rhodian, Gres de Flandres and other pottery. There is a remarkable collection of Wedgwood. Notable also is the collection of arms, which is probably the most complete in existence. The purchase of pictures has been made from time to time by means of ah art gallery purchase fund of £12,000, privately contributed and placed under the control of the corporation. Many valuable works of art are the gift of individuals. In 1906 plans were obtained for additional municipal offices and another art gallery on a site on the opposite side of Edmund Street from the council house. The town hall, completed in 1850, is severely classic, modelled upon a Greek temple. The lower stage consists of a plinth or basement, 23 ft. high, upon which is reared a facade of peripteral character, with eight Corinthian columns (36 ft. high) at the two principal fronts, and thirteen columns on each side. These columns (imitated from those of the temple of Jupiter Stator at Rome) support a bold and enriched cornice, finished at each end

with a lofty pediment and entablature. The exterior of the hall is built of Anglesea marble. The interior consists chiefly of a regularly-built room,

designed specially for meetings and concerts, with an orchestra containing a fine organ. The hall seats upwards of 2000 persons, but when cleared of benches, as is the case at great political meetings, over 5000 may find standing room. The Midland Institute, adjacent to the town hall on the west, has a fine lecture theatre. To the south lie the post office, the inland revenue office and Queen's College. To the north is the Gothic building of Mason College, an institution merged in the univer- sity. The Central free library, adjoining the Midland Institute, was rebuilt in 1879, after a fire which destroyed the fine Shake- speare library, the Cervantes collection, and a large series of books on, and antiquities of, Warwickshire, known as the Staunton collection. The Shakespeare series was as far as possible replaced, and the whole forms one of the largest refer- ence and lending libraries in England. Edmund Street and Colmore Row are fine thoroughfares running parallel in a north-easterly direction from either side of the council house; in the first the principal building is the school of art, in the second are several noteworthy private buildings. Both terminate at Snow Hill station, that of the Great Western railway. New Street station, that of the London & North Western and Mid- land railways, lies close to the street of that name, fronted by the Queen's hotel. The station is nearly a quarter of a mile in length. The roof of the older portion consist's of a vast arch of glass and iron, carried on pillars on each side, and measuring 1 100 ft. in length, 80 ft. in height, and 212 ft. in width in a single span. The building of the Royal Society of Artists fronts New Street itself with a fine classic portico; here are also the exchange (Gothic) and the grammar school of King Edward VI., a Per- pendicular building dating from 1840, designed by Sir Charles Barry. Corporation Street was the outcome of a great " Im- provement scheme" initiated in 1875, with the object of clearing away a mass of insanitary property from the centre of the town and of constructing a main thoroughfare from the centre to the north-eastern outlet, starting from New Street, near the railway station to Bull Street, and thence continuing to the Aston Road. The scheme received parliamentary sanction in 1876, and was finished in 1882 at a cost of £1,520,657. This led to an almost total extinction of the residential quarter in the centre of the town. The finest building in this handsome street is the Victoria

assize courts. The foundation stone was laid by Queen Victoria in 1887, after Birmingham had been created an assize district; the building was completed in 1891. There is a hand- some entrance, and within is a great hall, 80 ft. by 40, with a series of stained-glass windows. The exterior is red, and highly ornamented in the style of the Renaissance.

Among other noteworthy buildings are the county court, education offices and military drill hall. Among a fine series of statues and monuments may be mentioned the statue of Nelson by Richard Westmacott, in the Bull Ring; those of Joseph Sturge, at the Five Ways, and of Thomas Attwood, the founder of the Political Union, in Stephenson Place, both by J. E. Thomas; James Watt, a singularly beautiful work, in Ratcliff Place, by Alexander Munro; Sir Robert Peel, in New Street, by Peter Hollins; Albert, prince consort, in the council house, by J. H. Foley; and Queen Victoria, by Thomas Woolner; Sir Rowland Hill, in the hall of the post office, by Matthew Noble; and Dr Priestley, in New Street, by F. J. Williamson. There is also a fountain behind the town hall, commemorative of the mayoralty of Mr Joseph Chamberlain, and flanked by statues of Sir Josiah Mason, and George Dawson, who took active part in the municipal reform movement previous to Mr Chamberlain's years of office. Sir Francis Chantrey's famous statue of James Watt is in a special chapel at Handsworth church.

Suburbs. — The principal streets radiating from central Birmingham to the suburbs are served by electric tramways worked by the corporation, and also by motor omnibuses. The principal suburbs are as follows. Edgbaston and Harborne lie south-west of the centre of the city, being approached by Broad Street. These form a residential district principally inhabited by the richer classes, and owing to the enforcement

of strict rules by the ground landlord, retain a remarkable semi-rural character, almost every house having a garden. Here, moreover, are Calthorpe Park, the botanical gardens, and the large private grounds attached to Edgbaston Hall, also the Warwickshire county cricket ground . To the south of Edgbaston, however, are the growing manufacturing districts of Selly Oak and Bourneville, and south of these, Northfield and King's Norton, in Worcestershire. The districts to the east of central Birmingham are Balsall Heath, Sparkbrook, Small Heath and Saltley. On the south-east is the residential suburb of Moseley, and on the east that of Yardley. Between Moseley and King's Heath to the south, is Highbury, the seat of Mr Joseph Chamber- lain, whose active interest in the affairs of

the town, both during his mayoralty (1873-1876) and at other times, was a principal factor in such works as the municipalization of the gas and water supply, the Corporation Street improvement, and the foundation of Birmingham University. On the east side the transition from town to country is clearly marked. This, however, is not the case on the west side, where the borough of Smethwick adjoins Birmingham, and the roads through West Bromwich and towards Oldbury and Dudley have the character of continuous streets. On this side are Soho and Handsworth, which gives name to a parliamentary division of Staffordshire. To the north lies Aston Manor, a municipal borough of itself, with Perry Bar beyond. To the north-east a populous district extends towards the town of Sutton Coldfield. Aston Hall is a fine Jacobean mansion standing in an extensive park. Aston Lower Grounds is an adjacent pleasure-ground. Besides these and the Edg- baston grounds the chief parks are Summersfield Park, towards Smethwick; Soho Park; Victoria Park, Handsworth; Adderley Park, towards Saltley; and Victoria Park, Small Heath. There is a race-course at Castle Bromwich, 3 m. east of the town.

Churches and Religion.— Birmingham is not rich in ecclesi- astical architecture. It became a bishopric under the Bishoprics of Southwark and Birmingham Act 1904, including the arch- deaconry of Birmingham and the rural deanery of Handsworth, previously in the diocese of Worcester. Before 1821 it was in the diocese of Lichfield. There were formerly a religious house, the priory of St Thomas the Apostle, and a Gild of the Holy Cross, an association partly religious and partly charitable, having a chantry in the parish church. The possessions of the priory went to the crown at the dissolution, and the building was destroyed before the close of the 16th century. The lands of the Gild of the Holy Cross were granted by Edward VI. to trustees for the support of the free grammar school. Until 1715 there was but one parish church, St Martin's, a rectory, having the tithes of the entire parish of Birmingham. St Martin's was erected about the middle of the 13th century, but in the course of ages was so disfigured, internally and externally, as to present no traces, except in the tower and spire, of its former character. In 1853 the tower was found to be in a dangerous condition, and together with the spire was rebuilt. In 1873 the remaining part of the old church was removed without disturbing the monu- ments, and a larger edifice was erected in its place. St. Philip's, a stately Italian structure, designed by Archer, a pupil of Wren, was the next church erected. It was consecrated in 1715, enlarged in 1884, and became the pro-cathedral on the foundation of the diocese. It contains a rich series of stained-glass windows by Burne-Jones. Then followed St

Bartholomew's in 1749, St Mary's in 1774, St Paul's in 1779, St James's, Ashted, in 1791, and others. St Alban's is a good example of J. L. Pearson's work, and Edgbaston church is a picturesque Perpendicular structure.

Under the Commonwealth Birmingham was a stronghold of Puritanism. Clarendon speaks of it and the neighbourhood as " the most eminently corrupted of any in England." Baxter, on the other hand, commending the garrison of Coventry, says it contained " the most religious men of the parts round about, especially from Birmingham." The traditional reputation for Nonconformity is maintained by the town, all varieties of dissenters being numerous and influential. The Unitarians, the

oldest body established here, have among their chapels a hand- some structure in Bristol Road, the Old Meeting, which in 1885 replaced the building in which the congregation was formed on the Presbyterian model by a number of ministers ejected under the Act of Uniformity. Another chapel, the New Meeting, in Moor Street, is memorable as having been the place of Dr Joseph Priestley's ministerial labours from 1780 onwards. In 1862 the Unitarians removed from this place to a new Gothic edifice, called the church of the Messiah, in Broad Street, where they preserve a monument of Priestley, with a medallion portrait in profile, and an inscription written by Priestley's friend, Dr Parr. The first meeting-house of the Society of Friends dates from about 1690. Among Independent chapels, that of Carr's Lane had John Angell James and Robert William Dale as ministers. The Baptists first erected a chapel in Cannon Street in 1738. The Wesleyan Methodists were established in Birmingham by John Wesley himself in 1745, when he was roughly handled while preaching on Gosta Green. In 1903 a very fine central hall, with lofty tower, was opened by this body, in the style of the Renaissance, fronting upon Corporation, Ryder and Dalton streets. The Presbyterians have also places of worship, and the Jews have a synagogue. From the revolution of 1688 until 1789 the Roman Catholics had no place of worship here; but Birmingham is now a Roman Catholic bishopric. The cathedral of St Chad was built from the designs of A. W. Pugin. At Erdington, towards Sutton Coldfield, is a large Benedictine Abbey (1897) of the Beuron congregation, founded as a monastery in 1876; and in the vicinity, at Oscott, is St Mary's College, where the chapel is a fine example of Pugin's work.

Cardinal Newman was superior of the Oratory of St Philip Neri from its foundation in 1851.

Administration. — The government of the town resided origin ally in the high and low bailiffs, both officers chosen at the court of the lord of the manor, and acting as his deputies. The system was a loose one, but by degrees it became somewhat organized, and crown writs were addressed to the bailiffs. In 1832, when the town was enfranchised, they were made the returning officers. About the beginning of the 19th century, however, a more regular system was instituted, by an act creating a body of street com- missioners, who acted for the parish of Birmingham, the hamlets outside its boundaries having similar boards of their own. The annoyance and difficulty caused by these bodies, thirteen in number, led to a demand for the incorporation of Birmingham as a borough; and a charter was accordingly granted by the crown in 1838, vesting the general government in a mayor, sixteen aldermen and forty-seven councillors. The powers of this body were, however, unusually restricted, the other local governing bodies remaining in existence. It was not until 1851 that an act of parliament was obtained, abolishing all governing authorities excepting the town council, and transferring all powers to this body. Another local act was obtained in 1862, and in 1883 these various acts were combined into the Birming- ham Corporation Consolidation Act. In 1889 Birmingham was created a city, and a grant made of an official coat of arms carry- ing supporters. The title of lord mayor was conferred on the chief magistrate in 1897. The city council consists of eighteen aldermen and fifty-four councillors, selected from eighteen wards ; it is divided into seventeen committees, most of which consist of eight members. The corporation is the largest employer of labour in the borough, and is also a large landowner.

The gas, electric and water supplies are in its hands. The gas supply was taken over in 1875, and the electric in 1900 for £420,000. The local sources of water-supply are the rivers Bourne and Blythe, the Plant Brook and the Perry Stream, and eight deep wells. These works can provide 20 million gallons daily in dry weather. A large area outside the city boundaries is supplied, and in 1891, the demand having risen to nearly 17 millions a day, new sources had to be considered, and it was determined to seek an entirely new supply in Wales. By an act of 1892 power was given to acquire the watershed of the rivers Elan and Claerwen, tributaries of the Wye, lying west of Rhyader in Wales, and to construct the necessary works, the capital

authorized being £6,000,000. About £5,900,000 had been spent

when, on the 21st of July 1904, King Edward VII. formally opened the supply. Two reservoirs on the river Elan, formed by masonry dams from 98 to 128 ft. above the river-bed, were then completed, the construction of the three planned on the Claer- wen being deferred until necessity should arise. Nearly a mile below the confluence of the rivers the great Caban Coch dam, 122 ft. high, and the same in thickness at the base, and 600 ft. long at the top, holds up the water for over 4 m. in the Elan, and over 2 in the Claerwen, having a capacity of 1500 million gallons. A series of thirty filter beds is included in the original scheme; and the water travels 73-3 m. from the source to Birmingham by gravity alone with a fall of about 170 ft. The area of the gathering ground is 45,562 acres, the mean annual rainfall in the district being 63 in. The complete scheme provided water for fifty years in advance, and a maximum of 75 million gallons a day was taken into account, in addition to 27 million gallons for compensation water to the river. The part of the works opened in 1904 provided about 27 million gallons of supply daily to the city. The corporation is obliged by the act to supply towns within 15 m. of the line of the aqueduct. A village for the accommodation of workmen was established near the Caban Coch dam; and the corporation adopted a modified form of the Gothenburg system in respect of the supply of intoxicating liquors, permitting no publican to open a licensed house.

The administration of the poor-law is vested in a board of guardians of sixty members for the parish of Birmingham. The parish of Edgbaston (wholly within the borough) is in the poor-law union of King's Norton, and that part of the parish of Aston included in the borough is in the Aston Union. There are three workhouses — that for Birmingham parish, situated at Birmingham Heath, is capable of receiving over 2000 inmates. In 1882 a superintendent relieving officer was appointed, and a system of cross-visitation started for the purpose of checking abuses of outdoor relief. Workhouses, infirmaries and cottage homes are managed by the board, on which women first sat in 1880. The administration of justice was performed from 1838 to 1884 by a court of quarter sessions, with a recorder, and a court of petty sessions. In 1884 Birmingham was made an assize district of Warwickshire. In 1905 a special juvenile offenders' court was initiated. The borough gaol is at Winson Green towards Smethwick. The drainage system is managed by the Birmingham, Tame and Rea District drainage board, constituted in 1877, and consisting of members from the city council and from districts outside the municipal area.

Birmingham was enfranchised in 1832, when two representa- tives

were assigned to it, and Thomas Attwood and Joshua Scholefield, leaders of the Political Union, were elected. In 1867 three members were assigned, and in 1885 the number was increased to seven, and a corresponding number of parliamentary divisions created, namely Bordesley, Central, East, Edgbaston, North, South and West. By the Provincial Local Government Board Act of 1891 four local board districts were added to the city of Birmingham for local government — Harborne (Stafford- shire), Balsall Heath (Worcestershire), Saltley and the rural hamlet of Little Bromwich (Warwickshire). These districts were by the act declared to be in the county of Warwick, though still remaining in their respective counties for the exercise of freehold votes. By this act the boundaries of the city were made conterminous for parliamentary, municipal and school board purposes. The area is 12,639 acres.

The population of Birmingham in 1700 was about 15,000. In 1 801 it was 73,000, and it increased rapidly through the century. In 1891 it was 478,113 and in 1901, 522,204.

Education. — The oldest educational institution is the grammar school of King Edward VI., founded in 1552 out of the lands of the Gild of the Holy Cross, then of the annual value of £21. The endowments now yield upwards of £37,000. The principal school included in the foundation is the boys' high school, held in the building in New Street. It has a classical and a modern side, and educates about 500 boys. Adjoining it, in a new building opened in 1896, is a large high school for girls, with 300

pupils. There are also on the foundation seven middle schools, called grammar schools, four for girls and three for boys, situated in different parts of the city, and containing about 1900 pupils altogether. The schools have numerous scholarships tenable at the schools as well as exhibitions to the universities and other places of higher education. Queen's College, founded in 1828 as a school of medicine, subsequently embraced other subjects, though in 1882 only the medical and theological departments were maintained. In 1882 a large part of the scientific teaching, hitherto done by special professors in Queen's College, was taken over by Mason College, and in 1892 the whole medical department was removed to the same institution under an order from the court of chancery. This change helped to advance the Birming- ham medical school to a position of

high repute. The theological students (Church of England) of Queen's College are few. The idea of developing Queen's College into a university had long existed. But it was destined to be realized in connexion with Mason College, founded by Sir Josiah Mason in 1870. Subse- quent deeds (1874 and 1881) added Greek and Latin to the practical, mechanical and artistic curriculum of the original foundation, and provided that instruction may be given in all such other subjects as the trustees may from time to time judge necessary, while once in every fifteen years the provisions of the deed may be varied to meet changing needs — theology only being definitely excluded. In 1897 a new act was passed at the instance of the trustees, creating a court of 180 members, and removing the theological restriction. A measure of' popular ˆUy. er " control is given through the appointment by the city council of five out of the eleven trustees. In 1898 a public meeting carried a resolution in favour of creating a uni- versity. It was estimated that a quarter of a million was needed to endow and equip a university on the scale proposed. Including £50,000 offered by Mr Andrew Carnegie, an equal amount from an anonymous donor, and the rest from local subscribers, in the autumn of 1899, £323,000 had been subscribed, and the privy council was at once petitioned for a charter, which was granted. The draft provided for the the incorporation of the university of Birmingham with faculties of science, arts, medicine and com- merce, with power to grant degrees, and for its government by a court of governors (of which women may be members), a council and a senate. Mason College was merged in the univer- sity. The faculty of commerce constitutes a distinctive feature in the scheme of the university, the object being to bring its teaching into close touch with the industrial life of the city, the district and the kingdom. In 1905 Sir Edward Elgar (who resigned in 1908) became the first occupant of a chair of music, founded owing to the liberality of Mr Richard Peyton. From the same year great strides were made in the development of the scientific departments of the university. A site at Edgbaston was given by Lord Calthorpe, and the erection of a complete and costly set of buildings was undertaken.

The Municipal School of Art was formed by the transference to the corporation in 1885 of the then existing school of art and the society of arts, and by the erection of the building in Margaret Street, the site having already been given and a portion of the cost provided by private donors. There are one central school and two branch schools. Evening classes are also held in some of the provided schools. The Midland Institute, the building of which was founded in 1855, and enlarged subsequently, includes a general literary and an industrial

department. A marked development took place in 1885, when, fresh room having been provided by the removal of the school of art hitherto held in the building, the industrial department was greatly enlarged, resulting in the creation of one of the best metallurgical schools in the kingdom. The Municipal Technical School was established in 1893 in the building of the Midland Institute, and in 1895 was housed in a fine building of its own, in Suffolk Street, whither the whole of the scientific teaching of the institute was transferred. It contains metallurgical and engineering workshops and laboratories, lecture theatres for the teaching of chemistry and physics, a women's department, and rooms for the teaching of machine drawing and building con-

struction. Among other educational foundations may be men- tioned a number of industrial schools, reformatories and private schools of a good class.

The principal libraries are the Birmingham library, founded in 1798 by Dr Priestley, in a modern building, the Central free library, and other free libraries in different parts of the city, each with a lending department and a reading room.

Charities. — The general hospital, the foundation of Dr Ash, an eminent local physician, was opened in 1779. The old building was replaced in 1897 by a splendid new one in St Mary's Square, costing £206,000. The Queen's hospital, Bath Row, the other large hospital of the town, was founded in 1840 by W. Sands Cox, F.R.S., an eminent local surgeon, who also founded the Queen's College as a medical school. The general dispensary, the officers of which visit patients at their own homes, relieves about 8000 yearly. The children's hospital (free) estab- lished in 1864 by Dr Heslop, has two establishments — for out- patients (a handsome Gothic building) in Steelhouse Lane, and an in-patient department in Broad Street. There is also a women's hospital (free) for the special diseases of women; a lying-in charity; special hospitals for diseases of the eye, the ear, bodily deformities, and the teeth; and a homoeopathic hospital. The parish of Birmingham maintains a large infirmary at the workhouse (Birmingham Heath), and a dispensary for out-patients in Paradise Street. The majority of the. hospitals and dispensaries are free. Nearly all these medical charities depend upon subscriptions, donations, legacies and income from invested property. There are two public organizations for aiding the charities, both of which were begun in Birmingham. One is a simultaneous collection in October in churches and chapels, on the Sunday called Hospital Sunday, established in 1859; the other is the Saturday

Hospital collection, made by the work-people in March, which was established in 1873. A musical festival is held triennially in aid of the general hospital. There is a sanatorium at Blackwell, near the Lickey Hill, 10 m. south of Birmingham, common to all the hospitals. Amongst the non-medical charities the principal are the blind institution and the deaf and dumb asylum, both at Edgbaston; and Sir Josiah Mason's orphanage at Erdington. There are also in the town numerous almhouses for aged persons, the chief of which are Lench's Trust, the James Charities, and the Licensed Victuallers' asylum. Besides, the general benefit societies, such as the Oddfellows', Foresters', &c, which are strongly supported in Birmingham, the work-people have numerous clubs of a charitable kind, and there are several important local provident societies of a general character, with many thousand members.

Commerce. — From an early period Birmingham has been a seat of manufactures in metal. Hutton, the historian of the town, claims for it Saxon or even British antiquity in this respect, but without foundation. The first direct mention of Birmingham 1 trades is to be found in Leland's Itinerary (1538). He writes: — " I came through a pretty street as ever I entered into Berming- ham towne. This street, as I remember, is called Dirtey [Deritend]. In it dwell smiths and cutlers. There be many smithes in the towne that use to make knives and all manner of cutlery tooles, and many lorimers that make bittes, and a great many naylors, so that a great part of the towne is main- tained by smithes, who have their iron and sea-cole out of Staffordshire." The cutlers no longer exist, this trade having gone to Sheffield; but the smiths remain, and the heavier cutting tools are still largely made here. The wide importance of Birmingham as a centre of manufactures began towards the close of the 17th century, one great source of it being the absolute freedom of the town, there being no. gilds, companies or restric- tions of any kind; besides which the easy access to cheap coal and iron indirectly helped the development. It is remarkable that two important trades, now located elsewhere, were first established here. Steel was made in Birmingham until 1797, but then ceased to be so for about seventy years, when an experiment in steel-making was made by a single firm. Cotton-spinning was begun in Birmingham by John Wyatt, Lewis Paul and Thomas Warren as early as 1730; but the speculation was

abandoned before the end of the century. The great staple of

Birmingham is metal-working in all its various forms. The chief variety is the brass-working trade. Iron-working, though largely carried on, is a much less important trade, works of this kind being chiefly established in the Staffordshire district. Jewelry, gold, silver and gilt come next to brass. The remarkable development of this branch of industry is demonstrated by the increase in the amount of gold and silver marked, as recorded by the Assay office — the figures of 48,123 oz. of gold and 84,323 02. of silver in 1870 had been increased to 363,000 oz. of gold and nearly 3,000,000 oz. of silver by the end of the century. Then follow " small arms " of all kinds. Until 1906 a Royal Small Arms factory was maintained by the government at Sparkbrook, but it was then transferred to the Birmingham Small Arms Company, which had already extensive works in the district. Buttons, hooks and eyes, pins and other articles used for dress, constitute a large class of manufactures. Glass, especially table glass, is a renowned staple of the town. Screws, nails, &c, are made in enormous quantities; indeed, Birmingham has a monopoly of the English screw trade. Steel pens are also a specialty, the name best known in this connexion being that of Sir Josiah Mason. Electro-plating, first established in 1841 by the firm of Elkington, is one of the leading trades. Among other branches of manufacture are wire-drawing, bell founding, metal rolling, railway-carriage building (a large and important industry), the manufacture of cutting implements and tools of all kinds, die-sinking, papier-mache making and a variety of others. In 1897 there was a sudden development of cycle manu- facturing, followed in 1899 by an almost equally sudden collapse, but this industry is maintained and accompanied by the manufac- ture of motor cars, tyres and accessories, for which Birmingham is one of the principal centres in Great Britain.

Birmingham may claim as her own the perfection of the steam engine, through the genius of James Watt and the courage of Matthew Boulton. The memory of the great Soho factory is one of the most precious heritages of the town, and Watt's own private workshop continues just as he left it, with no single article disturbed, carefully preserved in the garret of his house at Heathfield. The mention of Watt and of Soho recalls the memories of distinguished inventors and others who have been connected with Birmingham. Here John Baskerville, the printer, carried on his work. An institution called the Lunar Society, which met each month about the time of full moon, brought together a brilliant company — Watt, Boulton, Joseph Priestley, Josiah Wedgwood, Erasmus Darwin, Samuel Parr, Dr William Wither- ing, Richard Lovell Edgeworth, Sir

Joseph Banks, Sir William Herschel, Dr Solander, John Roebuck, James Keir and many others. William Murdock, the inventor of gas, was a Soho man, and first used his invention to light the Soho factory at the peace of Amiens in 1802. The series of inventors is continued by the names of Gillott, Elkington, Chance, Mason and others. Thomas Rickman, the reviver and historian of Gothic architec- ture, practised as an architect in Birmingham. William Hutton, the antiquary and historian, carried on his bookselling business here. Many of the best engravers were Birmingham men, notably James Tibbitts Willmore and John Pye, the special translators of Turner's marvellous creations. Attwood, Joseph Parkes, John Bright and Joseph Chamberlain speak for Bir- mingham in the region of politics and statesmanship.

One of the most marked features of social life in Birmingham is the fact that contrasts in the distribution of wealth are less strongly marked than in most other great cities. The distance between the poorest and the richest is bridged over by a larger number of intermediate gradations. Colossal fortunes are few; on the other hand there is a numerous class of rich men. These, however, for the greater part are actually engaged in trade or manufactures, and hold their place in local life rather on account of industry pursued than of wealth possessed. The number of the leisured class, enjoying large incomes without participating in any local industry, is relatively small, but is said to be on the increase. There are many manufacturing companies, but great private firms are also numerous. In regard to labour conditions,*

/

the system of small masters holds its own in the manufactures of Birmingham, and shows no signs of extinction. One effect of this condition is that capital and labour are not brought into enmity, and consequently strikes and disputes are infrequent. As regards the condition of the working classes it may be noted that Birmingham was the birthplace of the freehold land and building societies, by which workmen are enabled on easy terms to acquire houses of their own. The risk of an over- crowded population is consequently minimized; the houses, moreover, are generally well situated as regards light and air, and many have small gardens. Among industrial communities where peculiar attention is paid to the housing of workmen and their families, that of Bourneville, occupied by the employes of Messrs Cadbury, chocolate manufacturers, is well known.

History: — Owing to its rapid expansion, and the consequent newness of most of the public and other buildings, Birmingham is often supposed to be a modern town. It was, however, in existence as a community in the Saxon period. Proof of this was given in 1309 by William de Bermingham, then lord of the manor, who showed in a law-suit that his ancestors had a market in the place and levied tolls before the Conquest. Some authors have endeavoured to identify the town with the supposed Roman station called Bremenium, but this claim has long been abandoned as fabulous. A Roman road runs north and south across the site of the town, but no remains have been found other than a very few coins. The origin of the name is untraceable; the spelling itself has passed through about 100 different forms. Dugdale, the historian of Warwickshire, adopts Bromwycham, and regards it as of Saxon derivation. Hutton, the historian of Birmingham, has the fanciful etymology of Brom (broom), wych (a descent), and ham (a home), making together the home on the hill by the heath.

In Domesday Book Birmingham is rated at four miles of land with half a mile of woods, the whole valued at £203. Two hundred years later the family of de Bermingham, the owners of the place, come into sight, one of them, William, being killed at the battle of Evesham, in 1265, fighting with Simon de Montfort and the barons against Henry III. The son of this William afterwards took part in the French war, and was made prisoner; his father's estates, forfeited by treason, were restored to him. Thenceforward the family engaged in various local and other offices, but seemingly abstained from politics. They held the place until 1527, when Edward de Bermingham was deprived of his property by means of John Dudley, duke of Northumberland, who trumped up a pretended charge of riot and robbery against him and procured Birmingham for himself. On the attainder of Dudley the manor passed to the crown, and was granted to Thomas Marrow, of Berkswell, from whom by marriage and descent it went to Christopher Musgrave, and finally, as regards the only valuable part — the market tolls — by purchase to the town itself. In the Wars of the Roses it does not seem that Birmingham took any part; but energy revived in the Civil War under Charles I., when the town sided actively with the Parliamentarians. In 1642, when Charles was marching from Shrewsbury to relieve Banbury, the Birmingham people seized part of his baggage, including much plate, money and wine, which they sent to the Parliamentary garrison at Warwick. Before the battle of Edgehill Charles rested for two nights at Aston Hall, near the town, as the guest of Sir Thomas Holte. The Birmingham people resented this by helping the Parlia- mentarians to

cannonade the Hall and to levy a fine upon Sir Thomas Holte. They also supplied the Parliamentary army with 15,000 sword blades, refusing to make a single blade for the Royalists. These manifestations of hostility were avenged in April 1643 by Prince Rupert, who, with 2000 men and several pieces of artillery, attacked the town, planting his cannon on an eminence near Sparkbrook, still known as Camphill, The towns- people resisted, but were beaten, many persons being killed or wounded. Amongst the former was Lord Denbigh, one of the Royalist officers. Having captured the place, Prince Rupert allowed his troops to plunder it, to burn about eighty houses and to set their prisoners to ransom. He also levied a fine of £30,000,

equal to at least £100,000 of the present value of money. This bitter lesson kept Birmingham quiet during the rest of the Civil War, though the sympathies of the people with the Parliament- arians were unabated. In 1665 Birmingham suffered heavy losses by the plague, great numbers of dead being buried in the Pest Field, at Ladywood, then a lonely place far outside the town, but long since thickly covered with buildings. In 1688 the Revolution provoked a temporary outbreak of Protestant feeling. James II. had given timber from the royal forest of Needwood, near Burton, to build a Roman Catholic chapel and convent in a place still called Mass-house Lane. This edifice the mob promptly destroyed when James gave place to William and Mary. Rather more than a century of quiet prosperity ensued, and then occurred the serious and most lamentable outbreak of popular fury known as the Church and King riots of 1791. For some years there had been much political activity in Bir- mingham, the dissenters, particularly the Unitarians, being desirous of relief from the political and religious disabilities under which they laboured. The leader in these movements was the famous Dr Priestley, who kept up an active controversy with the local clergy and others, and thus drew upon himself and his co-religionists the hatred of the more violent members of the Church and Tory party. The smouldering fire broke out on the occasion of the French Revolution. On the 14th of July a dinner of Birmingham Liberals was held at the Royal hotel to celebrate the destruction of the Bastille. This was the signal of a popular outbreak. A Church and King mob, encouraged and organized by leaders of better station, who were too cowardly to show themselves, began an attack upon the Unitarians. Priestley was not present at the dinner, but his house at Fair Hill,

Spark- brook, was one of the first to be sacked and burnt — his library and laboratory, with all his manuscripts, the records of life-long scientific and philosophical inquiries, perishing in the flames. The house and library of Hutton the historian were also destroyed. The Unitarian chapel was burnt, and several houses belonging to members of the sect were sacked and burnt. The riot continued until a strong body of troops was marched into the town, but before their arrival damage to the amount of more than £60,000 had been done. Some of the rioters perished in the burning buildings, in the cellars of which they drank themselves into stupefaction. Others were tried and imprisoned, and four of the prisoners were hanged. The persecuted Unitarians recovered a small part of their losses from the county; but Priestley himself, owing in a great measure to the unworthy prejudice against him, was forced to remove to the United States of America, where he spent the rest of his life. A late atonement was made by the town to his memory in 1873, by the erection of a statue in his honour in front of the town hall and the foundation of a Priestley scholarship at the Midland Institute. As if ashamed of the excesses of 1791, Birmingham thenceforth became, with one or two exceptions, a peaceful town. In the dismal period from 1817 to 1819, when the manufacturing districts were heavily distressed and were disturbed by riots, Birmingham remained quiet. Even when some of the inhabitants were tried and punished for demanding parliamentary repre- sentation, and for electing Sir Charles Wolseley as their delegate, there was no demonstration of violence — the wise counsels of the leaders inducing orderly submission to the law. The same prudent course was observed when in the Reform agitation of 183 1-1 83 2 the Political Union was formed, under the leadership of Thomas Attwood, to promote the passing of the Reform Bill. Almost the whole town, and great part of the surrounding district, joined in this agitation; vast meetings were held on Newhall Hill; there was much talk of marching upon London 100,000 strong; but, owing to the firmness and statesmanship of Attwood and his associates, there was no rioting or any sign of violence. Ultimately the Political Union succeeded in its object, and Birmingham helped to secure for the nation the enfranchisement of the middle classes and other political reforms. One exception to the tranquillity of the town has to be recorded — the occurrence of riots in 1839, during the Chartist agitation. Chartism took a strong hold in Birmingham, and, under the

influence of Feargus O'Connor and some of his associates, nightly meetings of a threatening character were held in the Bull Ring. The magistrates resolved to put these down, and having obtained the help

of a detachment of the metropolitan police — the town then having no local police force — a meeting was dispersed, and a riot ensued, which resulted in injury to several persons and required military force to suppress it. This happened on the 4th of July. On the 15th of the same month another meeting took place, and the mob, strongly armed and numbering many thousands, set fire to several houses in the Bull Ring, some of which were burned to the ground and others were greatly damaged. The military again interfered, and order was restored, several of the ringleaders being afterwards tried and imprisoned for their share in the disturbance. There was another riot in 1867, caused by the ferocious attacks of a lecturer named Murphy upon the Roman Catholics, which led to the sacking of a street chiefly inhabited by Irishmen; but the incident was comparatively trivial and further disorders were prevented by the prompt action of the authorities.

See W. Hutton, History of Birmingham (2nd ed., Birm., 1783); J. A. Langford, A Century of Birmingham Life, 1741-1841 (Birm., 1868), and Modern Birmingham and its Institutions, 1841-1871 (Birm., 1873) ; J. T. Bunce, History of the Corporation of Birmingham (Birm., 1885).

BIRNEY, JAMES GILLESPIE (1792-1857), American reformer, leader of the conservative abolitionists in the United States from about 1835 to 1845, was born in Danville, Kentucky, of a family of wealth and influence, on the 4th of February 1792. He graduated at the College of New Jersey (now Princeton Uni- versity) in 1810. In 1814, after a course of legal study, he began the practice of the law at Danville. He entered immediately, as a Democrat, into Kentucky politics, and political ambition caused his removal in 18 18 to northern Alabama, near Huntsville. There was at that time in the south-west much anti-slavery sentiment. Birney's father was among those who advocated a " free state " constitution for Kentucky, and the home environ- ment of the boy had thus fostered a questioning attitude towards slavery, though later he was himself a slave-holder. In the general assembly of Kentucky in 1816, and in that of Alabama in 1819, he opposed inter-state rendition of fugitive slaves and championed liberal slave-laws. His career as a lawyer in Alabama was exceptionally brilliant; but his political career was abruptly wrecked by his opposition in 18 19 to Andrew Jackson, whose friends controlled the state. His tariff and anti- siavery views, moreover, carried him more and more away from the Democratic party and toward the Whigs.

About 1826 he began to show an active interest in the American

Colonization Society, and in 1832-1833 served as its agent in the south-west. In 1833 he returned to Danville, and devoted himself wholly to the anti-slavery cause. He freed his own slaves in 1834. Convinced that gradual emancipation would merely stimulate the inter-state slave trade, and that the dangers of a mixed labour system were greater than those of emancipa- tion in mass, he formally repudiated colonization in 1834; moreover, gradualism had become for him an unjustifiable compromise in a matter of religion and justice. At this time also he abandoned the Whig party. He delivered anti-slavery addresses in the North, accepted the vice-presidency of the American Anti-Slavery Society and announced his intention to establish an anti-slavery journal at Danville (1835). For this he was ostracized from Kentucky society; his anti-slavery journals were withheld in the mails; he could not secure a public hall or a printer. In these circumstances, he removed to Cincinnati, Ohio, and there, in January 1836, founded the Philanthropist, which, in spite of rancorous opposition, became of great influence in the north-west. Birney soon relinquished its active control in order to serve the Anti-Slavery Society as secretary and as a lecturer. He favoured immediatism, but he differed sharply from the Garrisonian abolitionists, who abhorred the federal Constitution and favoured secession. He always wrote, spoke and laboured for the permanent safety of the Union. The assaults of the South in defence of slavery upon free speech, free press, the right of petition and trial by jury, he pronounced

"exorbitant claims … on the liberties of the free states"; the contest had become, he said, " one not alone of freedom for the blacks but of freedom for the whites." Twenty-three years before William H. Seward characterized as an " irrepressible conflict "the antagonism between freedom and slavery, Birney proclaimed: " There will be no cessation of conflict until slavery shall be exterminated or liberty destroyed " — " liberty and slavery cannot both live in juxtaposition" (1835). The ends being political, so also, thought Birney, must be the means; as parties in the south were fusing, he laboured to re-align parties in the north, and advocated the formation of an independent anti- slavery party. After the separation of the Garrisonian and the political abolitionists in 1840 the new party was formed, and in 1840, and again in 1844, as the Liberty party (q.v.), it made Birney its candidate for the presidency. In 1840 he received 7069 votes; in 1844, 62,263. A fall from his horse in

184s made him a hopeless invalid, and completely removed him from public life. He died at Perth Amboy, New Jersey, on the 25th of November 1857.

Two of Birney's sons, William Birney (1810-1907) and David Bell Birney (1825-1864), were prominent as officers on the Federal side during the Civil War in America.

See James G. Birney and His Times (New York, 1890), by his son, William Birney; and his principal writings: On the Sin of Holding Slaves (1834). Letter on Colonization (1834), Vindication of Abolition- ists (1835), American Churches the Bulwark of American Slavery (1840, 3rd ed. 1885) ; Speeches in England (1840) ; and Case of Strader el al. v. Graham (1852).

BIRON, ARMAND DE GONTAUT, Baron de (1524-1592), a celebrated French soldier of the 16th century. His family, one of the numerous branches of the house of Gontaut, took its title from the territory of Biron in Perigord, where on a hill between the Dropt and the Lide still stands the magnificent castle begun by the lords of Biron in the nth century. As a page of the queen of Navarre Biron attracted the notice of the marshal de Brissac, with whom he saw active service in Italy. A wound received by him in his early years made him lame for life, but he did not withdraw from the military career, and he held a command in Guise's regiment of light horse in 1557. A little later he became chief of a cavalry regiment, and in the wars of religion he repeatedly distinguished himself.

His great services to the royal cause at Dreux, St Denis, Jarnac and Moncontour were rewarded in 1569 by his appointment as a privy councillor of the king and grand master of artillery. He commanded the royal forces at the siege of La Rochelle in 1572, and four years later was made a marshal of France. From 1576 to 1588 he was almost continuously employed in high command. From 1589 he supported the cause of Henry of Navarre, but was suspected of prolonging the civil wars in his own interest. Biron was killed by a cannon-ball at the siege of Epernay on the 26th of July 1592. He was a man of considerable literary attainments, and used to carry a pocket-book, in which he noted everything that appeared remarkable. Some of his letters are preserved in the Bibliotheque Nationale and in the British Museum; these include a treatise on the art of war.

His son, Charles de Gontaut, due de Biron (1562-1602), fought brilliantly for the royal party against the League. He was made admiral of France in 1592, and marshal in 1594; governor of

Burgundy in 1595, he took the towns of Beaune, Autun, Auxonne and Dijon, and distinguished himself at the battle of Fontaine-Francaise. In 1596 he was sent to fight the Spaniards in Flanders, Picardy and Artois. After the peace of Vervins he discharged a mission at Brussels (1598). From that time he was engaged in intrigues with Spain and Savoy, and, notwithstanding, directed the expedition sent against the duke of Savoy (1599-1600). After fulfilling diplomatic missions for Henry IV. in England and Switzerland (1600), he was accused and convicted of high treason and was beheaded in the Bastille on the 31st of July 1602.

His collateral descendant, Armand Louis de Gontaut, due de Lauzun, afterwards due de Biron (1747-1793), is known for the part he played in the War of American Independence and the revolutionary wars. Until 1 788, when he succeeded to the duchy

of Biron on the death of his uncle, — Louis Antoine de Gontaut, due de Biron (1700-1788) — he bore the title of due de Lauzun, which had passed, on the death of Antoine Nompas de Caumont, due de Lauzun (1633-1723), to his niece, the wife of Charles Armand de Gontaut, due de Biron (1663-17 56). After for a while wasting his fortune in dissipation in various parts of Europe, he attracted attention by an essay on the military defences of Great Britain and her colonies (£tat de dSfense d' Angleterre et de toutes ses possessions dans les quatres parties du monde). This led to his appointment to a command against the English in 1779, in which he gained several successes. In the following year he took a conspicuous part in the War of American Independence, and on his return to France was made marechal de camp. In 1 789 he was returned as deputy to the states-general by the noblesse of Quercy, and attached himself to the revolutionary cause. In 1 79 1 he was sent by the Constituent Assembly to receive the oath of the army of Flanders, and subsequently was appointed to its command. In July 1792 he was nominated commander of the army of the Rhine, with the duty of watching the movements of the Austrians. In May 1 793 he was transferred to the command of the army of La Rochelle, operating against the insurgents of La Vendee. He gained several successes, among them the capture of Saumur and the victory of Parthenay; but the insubordination of his troops and the intrigues of revolutionary agents made his position intolerable and he sent in his resignation. He was thereupon accused by the notorious Carrier of incivisme and undue leniency to the insurgents, deprived of his command (July), imprisoned in the Abbaye and condemned to death by the Revolutionary Tribunal. He was guillotined on the 31st of December 1793. Some Memoires, which come down to 1783, were published

under his name in 1822 (new ed. 1858), and in 1865 letters said to have been written by him in 1789 to friends in the country, describing the states-general.

BIRR, or Parsonstown, a market-town of King's county, Ireland, on an acclivity rising above the Birr, and on a branch of the Great Southern & Western railway by which it is 87 m. W.S.W. from Dublin. Pop. of urban district (1901) 4438. Cumberland Square, in which there is a Doric column surmounted by a statue of the duke of Cumberland, to commemorate the battle of Culloden, is the point from which the several principal streets diverge in regular form. The fine castle of Birr, beside its historical interest, has gained celebrity on account of the reflecting telescope erected here (1828-1845) by William, third earl of Rosse. This is 56 ft. in length and weighs 3 tons; and there is another smaller instrument. Among institutions the model and preparatory schools of the Brothers of the Presentation Order are noteworthy. There is a bronze statue by Foley of Lord Rosse (d. 1867). Some trade is carried on in corn and timber, and in brewing and distilling.

An abbey was founded at Birr by St Brendan (d. 573), to whom the present parish church is dedicated. The district formed part of Ely O' Carroll, and was not included in King's county till the time of James I. A great battle is said to have been fought near Birr in the 3rd century between Cormac, son of Cond of the Hundred Battles, and the people of Munster. The castle was the chief seat of the O'Carrolls. In the reign of James I. it and its appendages were assigned to Lawrence Parsons, brother of Sir William Parsons, surveyor-general. From him the alternative name of the town is derived. The castle was more than once besieged in the time of Cromwell, and was taken by Ireton in 1650. It also suffered assault in 1688 and 1690.

BIRRELL, AUGUSTINE (1850-), English author and politician, son of a Nonconformist minister, was born near Liverpool on the 19th of January 1850. He was educated at Amersham Hall school and at Trinity Hall, Cambridge. He went to the bar, and gradually obtained a good practice; in 1893 he became a K.C., and he was professor of law at University College from 1896 to 1899. But it was as a literary critic of unusually clever style and an original vein of wit, that he first became known to the public, with his volume of essays entitled Obiter Dicta (1884). In 1889 he was returned to parliament for West Fifeshire as a Liberal. In the House of Commons his light

but pointed humour gradually led to the coining of a new word, ” barrelling,” and his literary and oratorical reputation grew apace. Whether he was writing miscellaneous essays or law-books, his characteristic style prevailed, and his books on copyright and on trusts were novelties indeed among legal textbooks, no less sparkling than his literary Obiter Dicta. A second series of the latter appeared in 1887. Res Judicatae in 1892 and various other volumes followed, for he was in request among publishers and editors, and his easy charm of style and acute grasp of interesting detail gave him a front place among contemporary men of letters. Mr Birrell was first married in 1878, but his wife died next year, and in 1888 he married Mrs Lionel Tennyson, daughter of the poet Frederick Locker (Locker-Lampson). At the general election of 1900 he preferred to contest the N.E. division of Manchester rather than retain his seat in Fifeshire, but was defeated. He did valuable service, however, to his party by presiding over the Liberal Publication Department, and at the general election of 1906 he was returned for a division of Bristol. He had been included in Sir Henry Campbell-Bannerman’s cabinet, and as minister for education he was responsible for the education bill which was the chief government measure in their first session. But the prolonged controversy over the bill, and its withdrawal in the autumn owing to the refusal of the govern- ment to accept modifications made by the House of Lords in the denominational interest, made his retention of that office impossible, and he was transferred (January 1907) to the post of chief secretary for Ireland, which he subsequently retained when Mr Asquith became prime minister in 1908. In the session of 1907 he introduced an Irish Councils bill, a sort of half-way house to Home Rule; but it was unexpectedly repudiated by a Nationalist convention in Dublin and the bill was promptly withdrawn. His prestige as a minister, already injured by these two blows, suffered further during the autumn and winter from the cattle- driving agitation in Ireland, which he at first feebly criticized and finally strongly denounced, but which his refusal to utilize the Crimes Act made him powerless to stop by the processes of the ” ordinary law “; and the scandal arising out of the theft of the Dublin crown jewels in the autumn of 1907 was a further blot on the Irish administration. On the other hand his scheme for a reconstituted Irish Roman Catholic university was very favourably received, and its acceptance in 1908 did much to restore his reputation for statesmanship.

BIRTH (a word common in various forms to Teutonic languages from the root of the verb ” to bear “), the act of bringing forth a child, or

the fact of its being born; so also a synonym for descent or lineage. In law, a child not actually born, but en ventre sa mere, is supposed for many purposes to be actually born, and may take any benefit to which it would have been entitled if actually born, i.e. it may take as legatee or devisee, or even as next-of-kin or heir, but none of these conditions will take effect, unless the child is born alive (see Medical Jurisprudence). The given year of age of a child is gained at the first instant of the day preceding the birthday, and no account is taken of parts of a day, e.g. a child born at 11.59 on the night of the 2nd~3rd of May 1900, would be of age the first moment after midnight of the ist-2nd of May 1921. In English law, by the Offences against the Person Act of 186 1, it is a misdemeanour punishable by a maximum of two years' imprisonment with hard labour, to endeavour to conceal the birth of a child by any secret disposition of its dead body, whether the child died before, after or at its birth.

Registration of Births. — The registration of baptisms is said to have been first introduced by Thomas Cromwell when vicar- general in 1538, but it is only in comparatively modern times that registration has been fully carried out. The law relating to the registration of births was consolidated for England by the Births and Deaths Registration Act 1874, and for Ireland by the Births and Deaths Registration Act (Ireland) 1880. In Scotland it depends upon the Registration of Births, Deaths and Marriages (Scotland) Act 1854, as amended by later acts. Previously to the passing of the Births and Deaths Registration Act 1836, the records of the births were compiled from parish registers, which were formerly a part of the ecclesiastical organization, and con-

tinued to be attached, more or less, to the church till the passing of the act of 1836. That act provided a far more complete machinery than that before existing for the exact record of all births. The new system relieved the clergy from all functions previously thrown upon them, and finally, after improvement by subsequent acts, was made compulsory in 1874. The act of 1836 established a general register office in London, presided over by an officer called the registrar-general, with general superintendence over everything relating to registration. The registrar-general is appointed under the Great Seal. Every poor- law union or parish is divided into districts, each of which is called by a distinct name, and is in charge of a registrar, who is a local officer appointed by the guardians of the union. Over each .union is a superintendent registrar, who has supervision over the registrars within his district. The office of super- intendent registrar is usually filled by the clerk to the guardians of the union. He receives quarterly from every registrar within his district certified

copies of the births registered by him and having verified their correctness, transmits them to the registrar-general. He takes charge of the register-books within the district, when filled. Every registrar is required to inform himself carefully of every birth which happens within his sub-district and register the same, with the various particulars required, according to the forms laid down for the purpose. It is the duty of the father or mother of any child born alive, or in their default, then of the occupier of the house (if he knows of the birth) or of any person present at the birth or having charge of the child, to give to the registrars, within forty-two days after the day of the birth, information of the particulars required to be registered concerning the birth, and in the presence of the registrar to sign the register. Every person required to give information con- cerning any birth who wilfully refuses to answer questions put to him by the registrar concerning the particulars required to be registered, or who refuses or fails without reasonable excuse to give information of any birth, becomes liable to a penalty of forty shillings. After three months a birth can only be registered in the presence of the superintendent registrar, and after the expiration of twelve months a birth can only be registered with the written authority of the registrar-general. In the case of an illegitimate child, no person as the father of such child is required to give information, nor is the name of any one entered in the register as the father of such a child, unless at the joint request of the mother and the person who acknowledges himself to be the father. An additional duty is placed upon the father by the Notification of Births Act 1907. By that act it is the duty of the father of a child if he is actually residing in the house where the birth takes place at the time of its occurrence to give notice in writing of the birth to the medical officer of health of the district in which the child is born within thirty-six hours of the birth. The same duty is also imposed upon any person in attendance (i.e. medical practitioner or midwife) upon the mother at the time of or within six hours after the birth. The medical officer of health is then in a posi- tion to take such steps, by advice or otherwise, as may, in his opinion lead to the prevention of infant mortality. Notice under the act is given by posting a prepaid letter or postcard to the medical officer of health giving the necessary information. Failure to give notice entails on summary conviction a penalty not exceeding twenty shillings. The act is optional to local authorities, but may be enforced within any area by the Local Government Board. By the Births and Deaths Registration Act 1874 and the Merchant Shipping Act 1894, commanding officers of ships trading to or from British ports must, under a penalty, transmit returns of all births occurring on board their ships to the registrar-general of shipping, who furnishes

certified copies of such returns to the registrars-general for England, Scotland and Ireland. These returns of births (and deaths) constitute the " Marine Register Book."

Registration is very efficiently carried out in practically every European country, with the exceptions of Turkey and Russia. In the United States laws requiring registration vary in the different states.

Tax on Birth. — In 1694 an act was passed in England for " granting to His Majesty certain rates and duties upon marriages, births and burials, upon bachelors and widowers for the term of five years, for carrying on the war against France with vigour." The taxes were graduated, rising from four shillings on the burial of the humblest person to £50 in the case of a duke or duchess. The duty on births varied according to the rank of the parents. A duke paid £30 on the birth of an eldest son, and £25 for every other child; a baronet or knight, £5 for an eldest son, and £1 each for other children. An archbishop or bishop, or a doctor of divinity, law or physic paid £1 for every child; a gentleman having a personal estate of £600 or a real estate worth £50 per annum, paid ten shillings on the birth of each child. Every other person not receiving alms paid a tax of two shillings on the birth of each child. This measure, however, was only temporary, and passed for revenue purposes solely.

See also articles Illegitimacy; Infanticide; Legitimacy and Legitimation; Population; Succession; Obstetrics, &c.

BIRUNI [Abu-r-Raihan Muhammad al-Biruni] (973-1048), Arabian scholar, was born of Persian parentage in Khwarizm (Khiva), and was a Shi'ite in religion. He devoted his youth to the study of history, chronology, mathematics, astronomy, philosophy and medicine. He corresponded with Ibn Slna (see Avicenna), and the answers of the latter are still preserved in the British Museum. For some years he lived in Jurjan, and then went to India, where he remained some years teaching Greek philosophy and learning Indian. In 1017 he was taken by Mahmud of Ghazni to Afghanistan, where he remained until his death in 1048. His Athdr ul-Bakiya (Vestiges of the Past) was published by C. E. Sachau (Leipzig, 1878), and a translation into English under the title The Chronology of Ancient Nations (London, 1879). His History of India was published by C. E. Sachau (London, 1887), and an English translation (2 vols., London, 1888).

Other works of his, chiefly on mathematics and astronomy, are still in manuscript only.

See C. Brockelmann, Geschichte der arabischen Litteralur (Weimar, 1898), vol. i. pp. 475-476. (G. W. T.)

BISALTAE, a Thracian people on the lower Strymon (Struma; Karasu, " black water "), in the district between Amphipolis and Heraclea Sintica on the east and Crestonice on the west. They also made their way into the peninsulas of Acte and Pallene in the south, beyond the river Nestus in the east, and are even said to have raided Cardia. Under a separate king at the time of the Persian wars, they were annexed by Alexander I. (498-454 B.C.) to the kingdom of Macedonia. At the division of Macedonia into four districts by the Romans after the battle of Pydna (168) the Bisaltae were included in Macedonia Prima (Livy xlv. 29).

Their country was rich in figs, vines and olive trees; the silver mines in the mountain range of Dysorum brought in a talent a day to their conqueror Alexander. The Bisaltae are referred to by Virgil {Georgics, iii. 461) in connexion with the treatment of the diseases of sheep. The fact that their eponymus is said to have been the son of Helios and Ge points to a very early settlement in the district.

See Smith's Diet, of Greek and Roman Geography; M. Ihm in Pauly-Wissowa's Realencyclopddie, iii. part i. (1897) ; W. Tomaschek, Die alien Thraker (Vienna, 1893) ; and for the coins of the Bisaltic kings, B. V. Head, Historia Numorum, p. 178.

BISCAY (Vizcaya), a maritime province of northern Spain; bounded on the N. by the Bay of Biscay, E. by Guipuzcoa, S. by Alava and W. by Burgos and Santander. Pop. (1900) 311,361; area, 836 sq.m. A small strip of isolated territory within the borders of Biscay, on the west, is officially included in the province of Santander. Biscay is one of the Basque Provinces, and its name is occasionally employed as geographically equivalent to Basque, in that case including the three provinces of Biscay proper, Guipuzcoa and Alava. The coast-line, which extends from Ondarroa to a short distance east of Castro Urdiales, is bold and rugged, and in some places is deeply indented. The surface of the country is for the most part very mountainous, being traversed towards the south by the great Cantabrian chain; but at the same time it is diversified with numerous narrow valleys and small plains. Some of the mountains are almost entirely

composed of naked calcareous rock, but most of them were formerly

covered to their summits with forests of oaks, chestnuts or pine trees, now destroyed to provide fuel. Holly and arbutus are common, and furze and heath abound in the poorer parts. The only river of any size is the Nervion, Ansa or Ibaizabal, on which Bilbao is situated; the others, which are numerous, are merely large mountain streams. The climate is rather inclement and variable; but the thermometer seldom drops below freezing- point, nor does snow fall frequently in winter except on the highest summits. The rainfall is on an average greater than in any province except those of the extreme north-west. The soil, though not very fertile, except in some of the valleys and sheltered hillsides, produces wheat, maize, barley, rye, flax, grapes, peaches, apples and other fruits. The mountainous slopes of Biscay are studded with the traditional Basque caserio, or farmhouse, in which the peasantry live on the metayer system, dividing the profits of the soil with absentee landlords. The farms are generally small, and are for the most part tilled by manual labour. The fisheries are actively prosecuted along the coast by a hardy race of fishers, who were the first of their craft in Europe to pursue the whale, formerly abundant in the Bay of Biscay. Cod, bream, tunny and anchovy are the principal fish taken. The fishing fleet consists of several hundred boats, manned by nearly 5000 men and boys. Biscay is very rich in minerals. Iron of the finest quality is found in almost every part, and forms a main article of export. At the beginning of the 20th century an average of about 5,000,000 tons was produced every year, and many large foundries were at work. Lead and zinc are mined in much smaller quantities, alum and sulphur are also present, and marble, lime and sandstone are abundant. Another very important industry is the manufacture of dynamite and other explosives at Baracaldo, closely connected with the mining interests. There are also potteries, paper, soap and shoe factories, flour mills and breweries, and the many mineral springs and spas are frequented by people from all parts of Spain. The mining and industrial interests of Biscay were very materially assisted by the quick and important development of means of communication of every kind. The provincial and parish roads, kept up by the local government, are excellent. No province in Spain had at the beginning of the 20th century such a complete network of railways, all built since 1870.

Bilbao (pop. 83,306), the capital and principal port, and Baracaldo (15,013), an important industrial town, are described in separate articles. Sestao (10,833) is the only other town of more than 10,000 inhabitants; the port of Bermeo (9061) is the chief fishing station; Durango (4319), on the river of the same name, was founded by the early kings of Navarre in the 10th century, obtained the rank of a

countship in 11 53, and contains one of the oldest churches in the Basque Provinces, San Pedro de Tavira; Guernica (3250), a picturesque village on the river Mondaca, was until 1876 the meeting-place of the provincial parliament. The deputies assembled under an old oak-tree, celebrated by the Basque poet, Jose Maria Iparraguirre, in a song which is regarded by the Spanish Basques almost as a national anthem. For the history of the Basques, see Basque Provinces; for their origin, language and customs, see Basques. The inhabitants of Biscay are intelligent, enterprising and well-educated; and, owing to the uniformly high birth-rate, low death-rate, and very slight loss by emigration, their numbers increased rapidly during the latter part of the 19th century, until in 1900 the density of population (372-4 per sq. m.) was greater than in any other Srjanish province.

BISCAY, BAY OF (Fr. Golfe de Gascogne; Sp. Golfo de Vizcaya), an inlet of the Atlantic Ocean; bounded on the E. and N.E. by France, as far as the island of Ushant, and on the S. by Spain as far as Cape Ortegal. The Bay of Biscay is the Sinus Aquitanicus, Sinus Cantabricus or Cantaber Oceanus of the Romans; hence it is sometimes known as the Cantabrian Sea. Its modern English "name is a corrupt form of the Spanish Vizcaya. The bay forms a fairly regular curve, broken on the French sea- board only by the estuaries of the Loire, Garonne, Adour and other rivers. The rugged Spanish coast is indented by many

fjord-like inlets, especially in the west, where navigation is sometimes difficult and dangerous; but its rivers are comparatively unimportant. The exposed position of the bay, and the diversity of its currents, have rendered it notorious for its storms.

BISCEGLIE (perhaps anc. Natiolum), a seaport and .epis- copal see of Apulia, Italy, on the E.S.E. coast, in the province of Bari, from which it is distant 21J m. by rail. Pop. (1001) 30,885. Two towers, one some 90 ft. high, of a once strong Norman castle still remain; the cathedral belongs to the same period. The church of S. Margherita, founded in 1197, has fine ˆcanopied Gothic tombs of the Falcone family.

BISCHOFSWERDA, a town of Germany, in the kingdom of Saxony, on the Wesenitz, and at the junction of the Dresden- Gorlitz and

Bischofswerda-Zittau railways in the governmental district of Bautzen. Pop . (1905) 7465. There are cloth, artificial flower, and cigar factories, glass-works, potteries, and in the neighbourhood large granite quarries. It is famous as the scene of a battle, on the 12th of May 1813, between the French and the Allies after Napoleon's retreat from Moscow. It was the residence of Benno, bishop of Meissen, in the nth century, and the " Bishop's Road " still runs from here to Meissen.

BISCHWEILER, a town of Germany, in the imperial territory of Alsace-Lorraine, district of Lower Alsace, 23 m. by rail N. by E. from Strassburg. Pop. (1900) 7897. It has manufactures of jute and machinery, brewing and iron-founding.

BISCUIT (pronounced according to the old spelling " bisket," a Fr. form from Lat. bis, twice, and coctum, cooked, in reference to the original method of preparation; cf. Ital. biscotto, Sp. bizcocho, &c), a form of unvesiculated bread (q.v.), which is made in thin cakes of various shapes and baked in such a way as to be crisp and short. In the United States of America biscuits of this kind are usually called crackers, but the word biscuit is used there, as also in the north of England, for vesi- culated bread baked in little flat loaves or cakes. Earthenware, porcelain, &c, which has undergone its first baking and is ready to be glazed is also known as biscuit or bisque.

The raw material chiefly used in biscuit manufacture is flour, but many other substances, such as butter, sugar, salt, various flavouring essences, &c, are also employed. The flour used by the biscuit-maker differs somewhat from that preferred by the bread-baker. In the main the bread-baker wants flour of some strength, that is to say, flour capable of absorbing a considerable proportion of water and of making a loaf of more or less volume. For biscuits flour strength is not such a desideratum, and as a matter of fact such moisture as is used to make the dough is largely evaporated by the oven; but, except for the commoner kind of biscuits, colour is most essential, as well as sweetness of flavour. In a large biscuit factory several hundred different kinds of biscuits are made, ranging from plain water biscuits to the daintiest fancy biscuits glistening in sugar and piping. The storage required for such an establishment is extensive, but lifts serve to handle both raw material and finished products with a minimum of labour. The flour used by a firm which has a reputation to maintain is sifted as a precaution against the presence of bits of string or other foreign bodies which will make their way into flour sacked by the most careful of millers, and like the butter, sugar and other raw materials, is carefully inspected and tested before being

accepted. After blending it is run through a shoot or sleeve to the mixers, which may be of any type used in bakehouses (see Bread). From the mixers or kneaders the dough is delivered on a flat table, or it may go direct to a pair of rolls. These consist of iron rollers with a reversing motion, between which the dough is rolled backwards and forwards into sheets of uniform thickness. The next stage

is the feeding of portions of this slab of dough to a cutting and panning machine. In details this apparatus differs as supplied by different makers, but the broad principle is the same in every case. The dough, after first passing through a pair of gauging rollers, which still further thin out the sheet and are capable of regulating its thickness with the utmost nicety, is received by an endless conveyor-band of webbing or similar material. By this band it is carried forward by intermittent motion to a set of punches or stamps which descend on it in quick succession, and serve to mould the surface and cut the edges to the required pattern. This operation completed, the moulded dough passes forward on the same endless band. The dough has now been cut into two distinct divisions, the moulded biscuits and the unworked portion which forms a continuous sheet of a sort of scrap. The latter is separated from the moulded dough, and is carried upwards by another band, which delivers it on a tray or box whence it is returned to the rollers to be reworked. The moulded dough intended for the oven is carried along by the first band and is gently deposited on trays of sheet iron or woven wire. These trays are taken from the machine by boys and placed on the travelling-chains at the oven, or the trays may be automatically moved forward by a travelling-band and placed on the oven. The oven used for biscuit-baking is quite unlike any bread oven. It is much longer and is provided with sets of endless chains moving in parallel lines, and travelling over sprocket-wheel terminals and intermediate supports. The chains have special attachments on which the "trays of biscuits are rested, and thus pass them through the oven, and discharge them at the opposite end. Some ovens are provided with a sort of endless belt of iron plates on which the biscuits are placed. These travelling bands are used chiefly for ship and also for dog biscuits, but the most usual type is the oven in which trays are moved on the travelling chains already described. The exact rate of travel, or the time during which the biscuits are in the oven, can be easily adjusted by means of countershafts and leather belts running on cone pulleys fitted at the discharging end. The heat of the oven as well as the rate of travel is varied according to the kind of biscuit, some varieties requiring a gentle heat and a comparatively long sojourn in the oven, while others must be exposed to a fierce heat, but only for a few minutes.

The ovens, fired by coke, may be 38 to 50 ft. in length. Their temperature is not generally raised above 500 degrees, but the speed of travel of the trays ranges between 3 \ and 25 minutes. The whole process of biscuit-making is thus rapid and continuous. The dough is kneaded in the mixers in a few minutes, and when discharged on the dough table is rapidly moulded into the required form by the cutter and panner. By means of endless bands the material is kept moving forwards, whether on the cutter, or in the oven. For certain fancy biscuits special processes are used. Piping and sugar decoration is still necessarily done by hand, and the glaze on some fancy biscuits is imparted by spraying the moulded biscuit with very fine jets of fresh milk. Cracknels are made from a very stiff dough, and when cut out are thrown into coppers of boiling water. They speedily float to the top, remaining apart and not forming ir.to groups. From these coppers they are taken out in trays pierced sg as to drain off the water. Then they go into vats of cold water, from which they are again removed, and after being strained of their moisture are panned and baked in a fierce oven. (G. F. Z.) BISECTRIX (fern, of Lat. bisector, from bi-, two, secare, to cut), in geometry, the same as bisector, i.e. a point which divides a line, or a line which divides an angle, into two equal parts; in crystallography it denotes the bisector of the angle between the optic axes.

PRINTED IN U.S.A.

VOL04_BISHARIN-CALGARY

Britannica

THE

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

FIRST edit

Ion, published

in three

volumes,

1768— 1771.

SECOND ,

» > >

ten

1777— 1784.

THIRD ,

y ?

eighteen

17S8— 1797.

FOURTH ,

9 »

twenty

1801 — 1810.

FIFTH ,

9 »

twenty

1815—1817.

SIXTH ,

» »

twenty

1823 — 1824.

SEVENTH ,

> »

twenty-one

1830— 1842.

EIGHTH ,

» J

twenty-two

l8 53— 1860.

NINTH ,

> >

twenty-five

1875—1889.

TENTH ,

, ninth edition and eleven

supplementary volumes,

1902 — 1903.

ELEVENTH ,

, publi

shed

in twenty-nine volumes,

1910 — 1911.

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the UNIVERSITY OF CAMBRIDGE

All rights reurvtd

THE

ENCYCLOPEDIA BRITANNICA

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME IV

BISHARTN to CALGARY

New York

Encyclopaedia Britannica, Inc.

342 Madison Avenue

Copyright, in the United States of America, 1910,

by

The Encyclopaedia Britannica Company.

INITIALS USED IN VOLUME IV. TO IDENTIFY INDIVIDUAL

CONTRIBUTORS,! WITH THE HEADINGS OF THE

ARTICLES IN THIS VOLUME SO SIGNED.

A. B. R. A. B. H.

A. E. S.

A. F. P.

A.

Go

.*

A.

H.

B.

A.

H.

-S.

A.

H.

Sm

A. J. G.

A. J. L.

A. Lo.

A.

Me.

A.

M. C.

A.

N.

A.

S. C.

A. T. Q.-C

A.

W. H.*

Alfred Barton Rendle, F.R.S., F.L.S., M.A., D.Sc. Keeper of the Department of Botany, British Museum.

A. E. Houghton.

Formerly Correspondent of the Standard in Spain. Author of Restoration of the Bourbons in Spain.

Arthur Everett Shipley, F.R.S., M.A., D.Sc.

\ Botany.

Cabrera.

Fellow and Tutor of Christ's College, Cambridge. Reader in Zoology, Cambridge i Brachiopoda. University. Joint-editor of the Cambridge Natural History. I

Albert Frederick Pollard, M.A., F.R.Hist.Soc.

Professor of English History in the University of London. Fellow of all Souls' College, Oxford. Assistant Editor of the Dictionary of National Biography, 1893- 1901. Lothian Prizeman (Oxford), 1892. Arnold Prizeman, 1898. Author of England under the Protector Somerset; Henry VIII.; Thomas Cranmer; &c.

Rev. Alexander Gordon, M.A.

Lecturer on Church History in the University of Manchester.

Bonner; Burghley, Baron.

J Blandrata; Brenz; I Buckholdt.

Arthur Henry Bullen. f

Founder of the Shakespeare Head Press, Stratford-on-Avon. Editor of Collection “j Burton, Robert. of Old English Plays; Lyrics from the Song Books of the Elizabethan Age; &c. I

Bushire.

Brooch.

Sir A. Houtum-Schindler, CLE.

General in the Persian Army. Author of Eastern Persian Irak.

Arthur Hamilton Smith, M.A., F.S.A.

Keeper of the Department of Greek and Roman Antiquities in the British Museum. . Member of the Imperial German Archaeological Institute. Author of Catalogue of Greek Sculpture in the British Museum ; &c. L

Rev. Alexander J. Grieve, M.A., B.D. f

Professor of New Testament and Church History, Yorkshire United Independent -I Butler Bishop (in part).

College, Bradford. Sometime Registrar of Madras University, and Member of

Mysore Educational Service. l _ . , _ ,. . _

r Bogota; Bolivia: Geography

Andrew Jackson Lamoureux. _ _ _ _ .... J and Statistics; Brazil: Gee-

Librarian, College of Agriculture, Cornell University, de Janeiro), 18 79-1 901.

Editor of the Rio News (Rio ‘

graphy and Statistics; Buenos Aires.

Auguste Longnon.

Professor at the College de France. Director of the Ecole des Hautes Etudes. Chevalier of the Legion of Honour. Member of the Institute. Author of Geo- graphie de la Gaule au VI. siecle; Documents relatifs au

comte de Champagne et de Brie; &c.

Mrs Alice Meynell.

Author of Poems ; Later Poems ; The Rhythm of Life and other Essays ; &c.

Miss Agnes Mary Clerke.

See the biographical article: Clerke, A. M.

Alfred Newton, F.R.S.

See the biographical article: Newton, Alfred.

Alan Summerly Cole, C.B. r

Formerly Assistant Secretary, Board of Education, South Kensington. Author of J Brocade Ornament in European Silks ; Catalogue of Tapestry, Embroidery, Lace and Egyptian 1 Textiles in Victoria and Albert Museum; &c.

Sir Arthur T. Quiller-Couch.

See the biographical article: Quiller-Couch, Sir A. T.

Arthur William Holland. f Brandenburg: Margr aviate-.

Formerly Scholar of St John's College, Oxford. Bacon Scholar of Gray's Inn, 1900. \ Burdett, Sir Francis.

1 A complete list, showing all individual contributors, appears in the final volumvs.

Blois: Countship of.

Browning, Elizabeth Barrett

Brahe, Tycho.

Bunting; Bustard; Buzzard.

\ Brown, Thomas Edward.

A. W. Po.

A. W. R,

B. R.

INITIALS AND HEADINGS OF ARTICLES

c.

B.

•

c.

D.

c.

D.

W

c.

E.

•

c.

E.

A.

Book;

Book Collecting.

Editor of Encyclopaedia of the Laws < Boarding-House.

Bitumen.

Brequigny.

Bookbinding.

C. El.

C. E. S. C. H.

C. K. S. C. L. K. C. Pf.

C. S. S.

C W. W.

D. B. Ma.

D. C. B. D. C. T. D. F. T.

D.H.

Alfred William Pollard, M.A.

Assistant Keeper of Printed Books, British Museum. Fellow of King's College, London. Hon. Secretary, Bibliographical Society. Editor of Books about Books and Bibliographica. Joint-editor of The Library. Chief Editor of the " Globe " Chaucer.

Alexander Wood Renton, M.A., LL.B.

Puisne Judge of the Supreme Court of Ceylon. of England.

Sir Boverton Redwood, D.Sc, F.R.S. (Edin.), F.I.C., Assoc.Inst.C.E., M.Inst.M.E. Adviser on Petroleum to the Admiralty, Home Office, India Office, Corporation of London, and Port of Londpn Authority. President of the Society of Chemical – Industry. Member of the Council of the Chemical Society. Member of Council of Institute of Chemistry. Author of Cantor Lectures on Petroleum ; Petroleum and its Products; Chemical Technology; &c.

Charles Bemont, D. is. L., Litt.D. (Oxon.). See the biographical article : Bemont, C.

Cyril J. H. Davenport, F.S.A.

Assistant to the Keeper of Printed Books, British Museum. Cantor Lecturer on Decorative Bookbindings, Society of Arts. Author of Royal English Bookbindings ; ' English Embroidered Bookbindings ; History of the Book ; &c.

Hon. Carroll Davidson Wright.

See the biographical article : Wright, C. D.

Charles Everitt, M.A., F.C.S., F.G.S., F.R.A.S. Formerly Scholar of Magdalen College, Oxford.

C. E. Akers.

Formerly The Times Correspondent in Buenos Aires. America, 1854-1904.

Sir Charles Norton Edgcumbe Eliot, K.C.M.G., C.B., M.A., LL.D., D.C.L. f

Vice-Chancellor of Sheffield University. Formerly Fellow of Trinity College, Oxford. . . .

H.M.‘s Commissioner and Commander-in-Chief for the British East Africa Pro- 1 Bokhara (in part). tectorate ; Agent and Consul-General at Zanzibar ; and Consul-General for German East Africa, 1900-1904. Author of Turkey in Europe; Letters from the FarEast;&c. ‘-

Hon. Charles Emory Smith.

See the biographical article: Smith, Charles Emory.

Charles Hose, D.Sc.

Formerly Divisional Resident and Member of the Supreme Council of Sarawak. . Author of A Descriptive Account of the Mammals of Borneo, and numerous papers in scientific journals. L

Cllment King Shorter. f

Editor of the Sphere. Author of Charlotte Bronte and her Circle; The Brontes : “j Bronte, C, E. and A.

Life and Letters; &c. L

Charles Lethbridge Kingsford, M.A., F.R.Hist.S., F.S.A.

Assistant Secretary to the Board of Education. Author of Life of Henry V. Editor –

of Chronicles of London and Stow’s Survey of London.

Christian Pfister, D. is. L.

(“Building Societies: United

\ States.

\ Bone: Industrial.

Author of A History of South A Brazil: History (in part).

Blaine.

Brunei.

Buckingham, 2nd Duke of.

Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour. Author of J u rnn i. sm« Atude sur le regne de Robert le Pieux; Le Duche merovingien d' Alsace et la legende de\ Brunnllaa ' Saint-Odile. I

Charles Scott Sherrington, D.Sc, M.D., M.A., LL.D., F.R.S. 1

Professor of Physiology, University of Liverpool. Foreign Member of Academies J of Rome, Vienna, Brussels, Gottingen, &c. Author of The Integrative Action of the] Nervous System.

Major-General Sir Charles William Wilson, K.C.B., K.C.M.G., F.R.S., R.E.

(1836-1897).

Secretary to the North American Boundary Commission, 1858-1862. British, Commissioner on the Servian Boundary Commission. Director-General of the Ordnance Survey, 1886-1894. Director-General of Military Education, 1895- 1898. Author of From Korti to Khartum; Life of Lord Clive; &c.

Duncan Black Macdonald, M.A., D.D.

Professor of Semitic Languages, Hartford Theological Seminary, U.S.A. Author of _ Development of Muslim Theology, Jurisprudence and Constitutional Theory ; Selections from Ibn Khaldun; Religious Altitude and Life in Islam; &c.

Demetrius Charles Boulger.

Author of History of Belgium.; England and Russia in Central Asia; History of – China ; Life of Gordon ; India in the 19th Century ; &c.

David Croal Thomson.

Formerly Editor of the Art Journal. Author of Tlie Brothers Maris; The Barbizon- School of Painters; Life of ” Phiz ” ; Life of Bewick ; &c.

Donald Francis Tovey.

Balrfol College, Oxford. Author of Essays in Musical Analysis: comprising The . Classical Concerts, The Goldberg Variations, and analyses of many other classical works.

David Hannay.

Formerly British Vice-Consul at Barcelona. J3iy-i6S8; Life of Emilia Castelar; &c.

Author of Short History of Royal Navy,

Brain: Physiology.

Caesarea Mazaca (in part).

Bukhara; Cadi.

Bruges; Brussels.

Browne, Hablot Knight.

Boccherini; Bruckner.

Bouvet; Brenton; Brigandage; Buccaneers; . Byng; Calderon, Rodrigo.

INITIALS AND HEADINGS OF ARTICLES

vu

D. LI. T.

D. Mn. E.Br.

E. Ca. E. C. B.

E.

Es

E.

G.

E.

H.

C.

E.

H.

B.

E.

H.

M,

E.

K.

E. L. B.

E. Ma.

E. 0.* E. Pr.

E.Wa.

E. W. B.

F. By.

F. D. A. F. G. P.

F.H. F. J. C,

Daniel Lleufer Thomas.

Stipendiary Magistrate for Pontypridd and Rhondda. Formerly Assistant Com- missioner to the Labour Commission and Secretary to the Welsh Land Commission.

Rev. Dugald Macfadyen, M.A.

Minister of South Grove Congregational Church, Highgate. Director of the London Missionary Society. Author of Constructive Congregational

Ideals.

Ernest Barker, M.A.

Fellow of, and Lecturer in Modern History at, St John's College, Oxford. Fellow and Tutor of Merton College. Craven Scholar, 1895.

Egerton Castle, M.A., F.S.A.

Trinity College, Cambridge. Author of English Book Plates ; Bibliotheca Dimicatcria ; &c.

Right Rev. Edward Cuthbert Butler, O.S.B., D.Litt. Abbot of Downside Abbey, Bath.

Edmond Esmonin.

Edmund Gosse, LL.D.

See the biographical article : Gosse, Edmund

Ernest Hartley Coleridge, M.A.

Balliol College, Oxford. Editor of Byron's Poems; Letters of Samuel Taylor Cole- ridge; &c.

Sir Edward H. Bunbury, Bart., M.A., F.R.G.S. (d. 1895).

M.P. for Bury St Edmunds, 1847-1852. Author of A History of Ancient Geography; &c.

Brecon; Caerphilly.

("Blaikie; Boston, Thomas; 1 Bruce, Alexander Balmain; L Cairns, John.

Formerly i Bohemund.

Book Plates.

|" Bridgittines;

■\ Brothers of Common Life; •-Bruno, Saint.

fBombelles, Marc Marie, I Marquis de. ("Bjornson; Blank Verse; ■j Bouts-Rimes; Bucolics; L Busken-Huet.

Byron.

H Bithynia (in pari).

Ellis Hovell Minns, M.A. j” B 0sporus cimmerius*

Lecturer and Assistant Librarian, and formerly Fellow of Pembroke College, 1 RiifKni ‘

Cambridge. University Lecturer in Palaeography. I BUdlm.

Bleaching.

■J Brook Farm.

Head Master of Eton i Boat.

Edmund Knecht, Ph.D., F.I.C.

Professor of Technological Chemistry, Manchester University. Head of Chemical Department, Municipal School of Technology, Manchester. Examiner in Dyeing, City and Guilds of London Institute. Author of A Manual of Dyeing; &c. Editor of Journal of the Society of Dyers and Colourists.

Edward Livermore Burlingame, A.M., Ph.D.

Editor of Scribner’s Magazine. Formerly on Staff of New York Tribune.

Edward Manson.

Barrister-at-Law, Middle Temple. Joint-editor with Sir John Macdonell, C.B., i Bond. of the Journal of Comparative Legislation. Author of Law of Trading Companies ; &c.

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc. f

Consulting Surgeon to St Mary’s Hospital, London, and to the Children’s Hospital, J Bladder and Prostate Diseases; Great Ormond Street. Late Examiner in Surgery at the Universities of Cam- 1 Bone: Medical. bridge, Durham and London. Author of A Manual of Anatomy for Senior Students. <-

Edgar Prestage. f

Special Lecturer in Portuguese Literature in the University of Manchester. Com- J mendador, Portuguese Order of S. Thiago. Corresponding Member of Lisbon Royal | Bocage. Academy of Sciences, Lisbon Geographical Society, &c. Examiner in Portuguese in

the University of London, Manchester, &c. *-

Rev. Edmond Warre, M.A., D.D., D.C.L., C.B., C.V.O.

Provost of Eton. Hon. Fellow of Balliol College, Oxford. College, 1884-1905. Author of Grammar of Rowing; &c.

Sir Edward William Brabrook, C.B.

Barrister-at-Law, Lincoln's Inn. Chief Registrar of Friendly Societies, 1891-1904. J Building Societies: Author of Building Societies; Provident Societies and Industrial Welfare; Institutions 1 United Kingdom, for Thrift ; &c. I

Frank Brinkley. f

Captain R.N. Foreign Adviser to Nippon Yusen Kaisha, Tokyo. Correspondent of J p._; n T c i nrl r1 c The Times in Japan. Editor of the Japan Mail. Formerly Professor of Mathe- com " ««*nua. matics at Imperial Engineering College, Tokyo. Author of Japan ; &c. I

Frank Dawson Adams, D.Sc, Ph.D., F.R.S., F.G.S. [

Dean of the Faculty of Applied Science, and Logan Professor of Geology, McGill { British Columbia (in part). University, Montreal. President of Canadian Mining Institute. I

Frederick Gymer Parsons, F.R.C.S., F.Z.S., F.R.Anthrop.Inst.

Vice-President, Anatomical Society of Great Britain and Ireland. Lecturer on Anatomy at St Thomas's Hospital and the London School of Medicine for Women. ! Brain: Anatomy. Formerly Examiner in the Universities of Cambridge, Aberdeen, London and Bir mingham; and Hunterian Professor at the Royal College of Surgeons.

Francis Hueffer, Ph.D. (1845-1899).

Formerly Musical Critic of The Times.- Author of The Troubadours: a History of ˆ Provencal Life and Literature in the Middle Ages; Richard Wagner and the Music of' the Future. Editor of Great Musicians.

Sir Francis J. Campbell, LL.D., F.R.G.S., F.S.A.

Principal, Royal Normal College for the Blind, Norwood, London. Papers on the Education of the Blind.

Boccaccio.

Author oi\ Blindness.

Vlll

F. J* M. F. LI. G.

INITIALS AND HEADINGS OF ARTICLES

F.

L.

L.

F.

R.

C.

F.

R.

M.

F.

We.

F.

W

Ha

F.

W

M.

G.

A.

B.

G. E.

G. F. Z. G. G. P.* G. L. G.

G. M. D.

G.

T. G.

G.

W. Ca.

G.

W. T.

H.

Br.

H.

Ch.

H.

CI.

H. De. H. Fr. H. H. J. H. M. C.

Francis John Haverfield, M.A., LL.D., F.S.A.

Camden Professor of Ancient History in the University of Oxford. Fellow of Brasenose College. Fellow of the British Academy. Formerly Censor, Student, Tutor and Librarian of Christ Church, Oxford. Ford's Lecturer, 1906-1907. Author of Monographs on Roman History, especially Roman Britain ; &c.

Francis Llewelyn Griffith, M.A., Ph.D., F.S.A.

Reader in Egyptology, Oxford University. Editor of the Archaeological Survey and Archaeological Reports of the Egypt Exploration Fund. Hon. Member of ˆImperial German Archaeological Institute, the Societe Asiatique, and the Institut Egyptien, Cairo. Author of Stones of the High Priests of Memphis; Catalogue of the Demotic Papyri in the

Rylands Collection, Manchester ; &c.

Lady Lugard.

See the biographical article: Lugard, Sir F. J. D.

Frank R. Cana.

Author of South Africa from the Great Trek to the Union.

Francis Richard Maunsell, C.M.G.

Lieut. -Col. R.A. Military Vice-Consul, Sivas, Trebizond, Van (Kurdistan), 1897- 1898. Military Attache, British Embassy, Constantinople, 1901-1905. Author of Central Kurdistan ; &c.

Frederick Wedmore.

See the biographical article : Wedmore, F.

Frederick William Hasluck, M.A.

Assistant Director, British School of Archaeology, College, Cambridge. Browne's Medallist, 1901.

Frederick William Maitland, LL.D.

See the biographical article: Maitland, F. W.

George A. Boulenger, D.Sc, Ph.D., F.R.S.

In charge of the Collections of Reptiles and Fishes, Department of Zoology, British ' Museum. Vice-President of the Zoological Society of London.

Rev. George Edmundson, M.A., F.R.Hist.S. [Bolivia: History {in part)]

Formerly Fellow and Tutor of Brasenose College, Oxford. Ford's Lecturer, 1909- J Brabant: Duchy 1910. Employed by British Government in preparation of the British Case in the | D ra7 :i. it- < / • h ,\

Boadicea;

Britain: Pre- Roman and

Roman; Caerleon; Caledonia.

Bubastis;

Busiris;

Buto.

J Bornu;

I British Empire.

4 British East Africa.

Bitlis.

Boudin.

Athens. Fellow of King’s -j Bithynia (in part).

{‘

Bracton.

Caecilia.

{

Bread.

Burial and Burial Acts.

Blood: Pathology of the.

British Columbia (in part).

British Guiana-Venezuelan and British Guiana-Brazilian boundary arbitrations.

G. F. Zimmer, A.M.Inst.CE., F.Z.S.

Author of Mechanical Handling of Material.

George Grenville Phillimore, M.A., B.C.L.

Christ Church, Oxford. Barrister-at-Law, Middle Temple.

George Lovell Gulland, M.A., M.D., F.R.C.P. (Edin.).

Assistant Physician to the Royal Infirmary, Edinburgh. Lecturer on

Medicine at Surgeons' Hall, Edinburgh.

George Mercer Dawson, LL.D., F.R.S.

Formerly Director of the Geological Survey of Canada. Geologist and Naturalist to H.M. North American Boundary Commission, 1873-1875; one of H.M. Bering Sea Commissioners, 1891. Author of numerous scientific and technical reports printed by the Canadian Government.

Sir George D. Taubman Goldie.

See the biographical article: Goldie, Sir G. D. T.

George Washington Cable.

See the biographical article: Cable, G. W.

Rev. Griffithes Wheeler Thatcher, M.A., B.D. r

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and J Buhturl; Old Testament History at Mansfield College, Oxford. 1 Buslrl.

Henry Bradley, M.A., Ph.D. r

Joint-editor of the New English Dictionary (Oxford). Fellow of the British Academy. J Caedmon. Author of The Story of the Goths; The Making of English; &c. 1

Hugh Chisholm, M.A. r Boulanger

Formerly Scholar of Corpus Christi College, Oxford. Editor of the nth Edition of -j oriJomtn ' T aura n the Encyclopaedia Britannica. Co-editor of the 10th edition. I BrlQ S man > Liaura U.

-T

Brazza, Count de.

\ Bryant, William Cullen.

Sir Hugh Charles Clifford, K. C.M.G.

Colonial Secretary, Ceylon. Fellow of the Royal Colonial Institute. Formerly Resident, Pahang. Colonial Secretary, Trinidad and Tobago, 1903-1907. Author- of Studies in Brown Humanity; Further India; &c. Joint-author of A Dictionary of the Malay Language.

Rev. Hippolyte Delehaye, S.J.

Bollandist. Joint-editor of the Acta Sanctorum.

Borneo.

Henri Frantz.

Art Critic, Gazette des Beaux Arts (Paris).

Sir Henry Hamilton Johnston, K.C.B., G.C.M.G. See the biographical article: Johnston, Sir H. H.

Hector Munro Chad wick, M.A.

Fellow and Librarian of Clare College Cambridge. Saxon Institutions.

j Bollandists.

J Bocklin; LBonheur, Rosa.

\ British Central Africa.

Author of Studies on Anglo-

\ Britain:

1

Anglo-Saxon.

H.

. P. B.

H.

S.J.

H.

W. C. D,

H.

W. S.

J.

A. F. M.

J.

, G.

C. A,

J.

G.

H.

J.

G.

Sc.

J.

H.

R.

J.

HI

. R.

J.

J.*

J.

M.

M.

J.

Mo.

-

J.

N.

J.

P.-

B.

J.

P.

Pe.

INITIALS AND HEADINGS OF ARTICLES ix

Henry Percival Biggar. – J

Author of The Voyages of the Cabots to Greenland. \ Cabot, John.

Henry Stuart Jones, M.A. r

Formerly Fellow and Tutor of Trinity College, Oxford, and Director of the British J p ae . np t..v School at Rome. Member of the German Imperial Archaeological Institute. 1 oaesar > JuuUS. Author of The Roman Empire ; &c. I

Henry William Carless Davis, M.A. f Bohun;

Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls' College, Oxford, < Breaute, Falkes de; 1895-1902. Author of Charlemagne; England under the Normans and Angevins; &c. Burgh Hubert de.

H. Wickham Steed. f

Correspondent of The Times at Rome (1897-1902) and Vienna. 1 Bonghi, RuggerO.

John Alexander Fuller Maitland, M.A., F.S.A. f

Musical Critic of The Times. Author of Life of Schumann; The Musician's Pilgrim- age; Masters of German Music; English Music in the Nineteenth Century; The Age\ Brahms. of Bach and Handel. Editor of the new edition of Grove's Dictionary of Music and Musicians; &c.

“—

J. A. H. John Allen Howe, B.Sc. ■ J Bunter;

Curator and Librarian, Museum of Practical Geology, London. 1 Cainozoic.

J. A. M. James Alexander Manson. r

Formerly Literary Editor of the Daily Chronicle. Author of The Bowler’s Handbook ; -I Bowls. &c. [

J. B.* Joseph Burton. J” uric* (in part).

Partner in Pilkington’s Tile and Pottery Co., Clifton Junction, Manchester. 1

J. Bt. James Bartlett. f „ . . .

Lecturer on Construction, Architecture, Sanitation, Quantities, &c, King’s College, J BrlCKWOrK, London. Member of Society of Architects, Institute of Junior Engineers, Quantity 1 Building. Surveyors’ Association. Author of Quantities. I

J.C.C. J. W Comyns-Carr. J Blak wmiam >

Author of Essays on Art; &c. [.

J. D. B. James David Bourchier, M.A., F.R.G.S. r

Correspondent of The Times in South-Eastern Europe. Commander of the Orders J _ ,

of Prince Danilo of Montenegro and of the Saviour of Greece, and Officer of the] Bulgaria.

Order of St Alexander of Bulgaria. I

J. E. H. Julius Eggeling, Ph.D. [nrahman. n-ohmano.

Professor of Sanskrit and Comparative Philology, Edinburgh University. Formerly -I ° ra J| man » Branmana, Secretary and Librarian to Royal Asiatic Society. (_ Branmanism.

3. F.-K. James Fitzmaurice-Kelly, Litt.D., F.R.Hist.S. (”

Gilmour Professor of Spanish Language and Literature, Liverpool

University. I Breton de lOS HerrerOS;

Norman MacColl Lecturer, Cambridge University. Fellow of the British Academy. 1 Caballero;

Knight Commander of the Order of Alphonso XII. Author of A History of Spanish Calderon de la Barca

Literature; &c. *-

John George Clark Anderson, M.A. f

Censor and Tutor of Christ Church, Oxford. Formerly Fellow of Lincoln College, -j Caesarea Mazaca (in part). Craven Fellow (Oxford), 1896. Conington Prizeman, 1893. L

Joseph G. Horner, A.M.I.Mech.E. J Boiler; Boiler-making;

Author of Plating and Boiler Making; Practical Metal Turning; &c. 1 Brazing and Soldering.

Sir James George Scott, K.C.I. E. f

Superintendent and Political Officer, Southern Shan States. Author of Burma ; 1 Burma. The Upper Burma Gazetteer.

John Horace Round, M.A., LL.D. (Edin.). J

Author of Feudal England; Studies in Peerage and Family History; Peerage and] Burgh. Pedigree; &c. [_

John Holland Rose, M.A., Litt.D. r

Christ's College, Cambridge. Lecturer on Modern History to the Cambridge Uni- J Bonaparte: Family (in part). versity Local Lectures Syndicate. Author of Life of Napoleon I. ; Napoleonic 1 Bourrienne Studies; The Development of the European Nations; The Life of Pitt; &c. [

Joseph Jefferson. r .

See the biographical article: Jefferson, J. \ Booth, Edwin.

John Malcolm Mitchell. ˆBoule*

Sometime Scholar of Queen's College, Oxford. Lecturer in Classics, East London i ' .

College (University of London). Joint-editor of Grote's History of Greece. I Br««0, Giordano (in part).

Viscount Morley of Blackburn. J T> llr fc rj mlln j

See the biographical article: Morley, Viscount. \ BurKe > MmBMl

John Nichol. { n „_ c „„. ,

See the biographical article: Nichol, John. ˆ Burns, KODeri.

James George Joseph Penderel-Brodhurst. ("Bookcase; Boulle;

Editor of the Guardian (London). \ Cabinet: Furniture.

Rev. John Punnett Peters, Ph.D., D.D. f

Canon Residentiary, Cathedral of New York. Formerly Professor of Hebrew in j Bismya; the University of Pennsylvania. Director of the University Expedition to Baby- "j Borsippa; Ionia, 1888-1895. Author of Nippur, or Explorations and Adventures on the Calah. Euphrates; Scriptures. Hebrew and Christian. ' <■

X

J. S. F.

J. T. M.

J. T. S.* J. W. D.

J. W. He.

K. G. J.

K. J.

K. S. L.

L. B. L. D.* L. F. S. L. F. V.-H.

L. G. L. J. S.

L. R. D.

L. S. L. V.*

INITIALS AND HEADINGS OF ARTICLES

M.

M.

Bat.

M.

Br.

M.

G.

John Smith Flett, D.Sc, F.G.S.

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in . Edinburgh University. Neill Medallist of the Royal Society of Edinburgh* Bigsby Medallist of the Geological Society of London.

James Tayler Milton, M.I.C.E.

Chief Engineer Surveyor to Lloyd's Registry of Shipping. Vice-President, Institute -of Naval Architects. Member of Council, Institute of Marine Engineers. Author of many papers on Marine Engineering subjects.

James Thomson Shotwell, Ph.D.

Professor of History in Columbia University, New York City.

Captain J. Whitly Dixon, R.N.

Nautical Assessor to Court of Appeal since 1906. Formerly Staff Commander, Medway Fleet Reserve.

James Wycliffe Headlam, M.A.

Staff Inspector of Secondary Schools under the Board of Education. Formerly Fellow of King's College, Cambridge. Professor of Greek and Ancient History at Queen's College, London. Author of Bismarck and the Foundation of the German Empire; &c.

Kingsley Garland Jayne.

Sometime Scholar of Wadham College, Oxford. Author of Vasco da Gama and his Successors.

J Borolanite; 1 Breccia.

‘ Boiler.

Boniface, Saint.

Buoy; Cable.

Matthew Arnold Prizeman, 1903,

A. Keith Johnston.

See the biographical article: Johnston, A. K.

Kathleen Schlesinger.

Author of The Instruments of the Orchestra ; &c.

Count Lutzow, Litt.D. (Oxon.), Ph.D. (Prague), F.R.G.S.

Chamberlain of H.M. the Emperor of Austria, King of Bohemia. Hon. Member of the Royal Society of Literature. Member of the Bohemian Academy, &c. Author of Bohemia: An Historical Sketch; The Historians of Bohemia (Ilchester Lecture, Oxford, 1904) ; The Life and Times of John Hus; &c.

Laurence Binyon.

See the biographical article : Binyon, L.

Louis Duchesne.

See the biographical article: Duchesne, L. M. O.

Leslie Frederic Scott, K.C., M.A.

New College, Oxford. Joint Hon. Secretary of International Maritime Committee.

Leveson Francis Vernon-Harcourt, M.A., M.Inst.CE. (1839-1907). f

Professor of Civil Engineering at University College, London, 1882-1905. British J Breakwater; Member of Jury for Civil Engineering, Paris Exhibition, 1900. Author of Rivers I Caisson. and Canals; Harbours and Docks; Civil Engineering as Applied in Construction; &c. *-

Bismarck; Bucher, Lothar.

/Bosnia and Herzegovina; 1 British Honduras.

-j Brazil: History (in part).

Bombardon; Bow; Buccina; Bugle; Bumbulum.

Bohemia: History and Litero lure.

Burne-Jones, Sir E. B. Boniface (Popes I.-VII.). Broker.

Laurence Ginnell, M.P.

Barrister, Middle Temple and Irish Bar. Author of Brehon Laws; Land and Liberty; ‘ &c. M.P. for North Westmeath since 1906.

Leonard James Spencer, M.A.

Assistant in Department of Mineralogy, Natural History Museum, South Kensington. Formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar. – Editor of the Mineralogical Magazine. Author of English translations of M. Bauer’s Precious Stones and R. Brauns’s Mineral Kingdom.

Lawrence Robert Dicksee, M.Com. (Birmingham), F.C.A.

Lecturer, London School of Economics and Political Science. Formerly Professor of Accounting at Birmingham University. Author of Auditing; Advanced Account-‘ ing; Book-keeping; &c.

Sir Leslie Stephen, K.C.B.

See the biographical article: Stephen, Sir L.

Luigi Villari.

Italian Foreign Office (Emigration Department). Formerly Newspaper Corre- spondent in East of Europe. Italian Vice-Consul in New Orleans, 1906; Phil-, adelphia, 1907; and Boston, U.S.A., 1907-1910. Author of Italian Life in Town and Country ; Giovanni Segantini ; Russia under the Great Shadow ; Fire and Sword in the Caucasus ; &c.

Lord Macaulay.

See the biographical article: Macaulay, T. B. M., Baron.

Miss Mary Bateson (1865-1906).

Formerly Fellow of Newnham College, Cambridge. Author of Medieval England; Borough Customs; &c.

Miss Margaret Bryant.

Moses Gaster, Ph.D. (Leipzig).

Chief Rabbi of the Sephardic Communities of England. Vice-President, Zionist Congress, 1898, 1899, 1900. Ilchester Lecturer at Oxford on Slavonic and By- zantine Literature, 1886 and 1891. President, Folklore Society of England. Vice-President, Anglo-Jewish Association. Author of History of Rumanian Popular Literature; A New Hebrew Fragment of Ben-Sira; The Hebrew Version of the Secretum Secretorum of Aristotle.

Brehon Laws.

Bismuthite; Blende; Boracite; Bournonite; Brochantite; Bromlite; Bronzite; Brookite; Brucite; Bytownite; Calamine; Calcite.

Book-keeping.

Browning, Robert.

Borgia, Cesare; Borgia, Lucrezia; Cagliostro.

j Bunyan, John.

Borough: English. ■I Caesar: Medieval Legends.

Bogomils; Brancovan.

INITIALS AND HEADINGS OF ARTICLES

XI

M.P.*

M. St J. N. W. T.

0.8a.

O.Br. 0. H.

P. A. K. P. C. M.

P. C. Y. P. Si.

P. G. K. P.S.

P. W. C.

R.

A.*

R. Ad.

R.

A. S.

M

R.

G.

R.

LP.

R.

J.M.

R.

L.*

R.

N. 8.

Leon Jacques Maxime Prinet. r

Formerly Archivist to the French National Archives. Auxiliary of the Institute of T> r : _„ i. rJiSfoon. France (Academy of Moral and Political Sciences). Author of V Industrie du sel en\ » r |enne-ie-onaieaU, Franche-Comte; Les Armoiries ecarteles des conjoints; Francois I et le comte de Bour- Wrissac, Dukes Of. gogne. L

Molyneux St John. -J British Columbia: {in part).

Northcote Whitbridge Thomas, M.A. C

Government Anthropologist to Southern Nigeria. Corresponding Member of the | Tj nnmBr _ Societe d' Anthropologic de Paris. Author of Thought Transference ; Kinship and "1 -Boomerang. Marriage in A ustralia ; &c.

Oswald Barron, F.S.A.

Hon. Genealogist to Standing Council of the Honourable Society of the Baronetage. Editor of the Ancestor, 1902-1905.

Oscar Briliant.

Olaus Magnus Friedrich Henrici, Ph.D., LL.D., F.R.S.

Professor of Mechanics and Mathematics in the Central Technical College of the City . and Guilds of London Institute. Author of Vectors and Rotors; Congruent Figures; &c.

Prince Peter Alexeivitch Kropotkin.

See the biographical article : Kropotkin, P. A.

Peter Chalmers Mitchell, M.A., D.Sc, LL.D., F.R.S.

Secretary to the Zoological Society of London. University Demonstrator in Com- parative Anatomy and Assistant to Linacre Professor at Oxford, 1888-1891. Lecturer on Biology at Charing Cross Hospital, 1892-1894; at London Hospital, 1894. Examiner in Biology to the Royal College of Physicians, 1892-1896, 1901- 1903. Examiner in Zoology to the University of London, 1903.

Philip Chesney Yorke, M.A. Magdalen College, Oxford.

Peter Giles, M.A., LL.D., Litt.D.

Fellow and Classical Lecturer of Emmanuel College, Cambridge, and University Reader in Comparative Philology. Late Secretary of the Cambridge Philological Society. Author of Manual of Comparative Philology; &c.

Paul G. Konody.

Art Critic of the Observer and the Daily Mail. Formerly Editor of the Artist. • Author of The Art of Walter Crane; Velasquez, Life and Work; &c.

Philip Schidrowitz, Ph.D., F.C.S.

Member of Council, Institute of Brewing. Member of Committee of Society of '_ Chemical Industry. Author of numerous articles on the Chemistry and Technology of Brewing, Distilling, &c.

Peter William Clayden (d. 1902).

Formerly President, Institute of Journalists, London. Literary Editor of the Daily News. Author of Scientific Men and Religious Teachers; England under Lord- Beaconsfield; Early Life of Samuel Rogers; Rogers and his Contemporaries; England under the Coalition; &c.

Butler: Family.

J Bohemia: Geography and I Statistics; Budapest.

Calculating Machines.

(“Bokhara: (in part); \ Bulgaria: Eastern.

Breeds and Breeding.

Boleyn, Anne; Bolingbroke;

Bothwell;

Bristol, 1st and 2nd Earls of;

Buckingham, 1st Duke of

(in part) ; Buckingham, 2nd Duke of.

Bordone.

Brandy; Brewing.

Bright, John.

Robert Anchel.

Archivist to the Department de l’Eure.

Robert Adamson, LL.D.

See the biographical article : Adamson, R.

Robert Alexander Stewart Macalister, M.A., F.S.A.

St John’s College, Cambridge. Director of Excavations for the Palestine tion Fund.

Richard Garnett, LL.D.

See the biographical article: Garnett, R.

R. I. Pocock, F.Z.S.

Superintendent of the Zoological Gardens, London.

Ronald John McNeill, M.A. r

Christ Church, Oxford. Barrister-at-Law. Formerly Editor of St James’s Gazette, -\ Bunker Hill. London.

fBoissy D’ Anglais, Francois 1 Antoine de.

f Bonaventura, Saint; j Bruno, Giordano (in part) ; I Butler, Bishop (in part). (” Bozrah; Explora j Caesarea Palaestina; L Caesarea Philippi.

{

Burton, John Hill.

f Book-Scorpion;

I Caddis-Fly and Caddis- Worm.

Richard Lydekker, F.R.S., F.L.S.

Member of Staff of Geological Survey of India, 1874-1882. Author of Catalogues of’ Fossil Mammals, Reptiles and Birds in British Museum ; &c.

Robert Nisbet Bain (d. 1909).

Assistant Librarian, British Museum, 1883-1909. Author of Scandinavia: the Political History of Denmark, Norway and Sweden, 15 13-1900; The First Romanovs, < 16 1 j to 1725; Slavonic Europe: the Political History of Poland and Russia from 1469 to 1796; &c.

Bison;

Bovidae;

Buffalo.

Bocskay, Stephen; Boris Fedorovich Godunov; Boyar; Brahe, Per; Buslaev, Fedor Ivanovich.

Xll R. P.* R. Po.

S. A. C.

S. C. StC. S. H. V.*

S. L.-P.

S. R. G.

T. AS.

T. Ba.

T. G. Br. T. H. H.*

T. Se.

T. W.-D. T. W. R. D.

W. A. B. C.

W. A. P. W. B.* W. B. S.*

Cain; Caleb.

INITIALS AND HEADINGS OF ARTICLES

Robert Peele. /Blasting;

Professor of Mining in Columbia University, New York. \ Boring.

Rene Poupardin, D. es L. r

Secretary to the Ecole des Chartes. Honorary Librarian to the Bibliotheque J Nationale. Author of Le Royaume de Bourgogne; Le Royaume de Provence sous les\ Burgundy, Carolingiens ; &c. [_

Stanley Arthur Cook, M.A.

Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Editor for Palestine Exploration Fund. Examiner in Hebrew and Aramaic, London University, 1904-1908. Council of Royal Asiatic Society, 1904-1905. Author of Glossary of Aramaic Inscriptions; The Laws of Moses and the Code of Hammurabi; Critical Notes on Old Testament History; Religion of Ancient Palestine; &c.

Sidney Colvin, M.A., Litt.D.

See the biographical article: Colvin, Sidney.

Viscount St Cyres.

See the biographical article: Iddesleigh: ist Earl of.

Sydney Howard Vines, M.A., D.Sc, F.R.S., F.L.S.

Sherardian Professor of Botany, Oxford University. Fellow of Magdalen College. Author of Lectures on the Physiology of Plants ; Text-Book of Botany ; &c.

Stanley Lane-Poole, M.A., Litt.D.

Formerly Professor of Arabic, Dublin University, and Examiner in the University of Wales. Corresponding Member of the Imperial Russian Archaeological Society. Member of the Khedivial Commission for the Preservation of the Monuments of 1 Arab Art, &c. Author of Life of Lord Stratford de Redcliffe; Life of Sir Harry I Parkes ; Cairo ; Turkey ; &c. Editor of The Koran ; The Thousand and One Nights ; &c. [

Botticelli.

Bossuet.

{Brongniart, Adolphe Theodore.

Burton, Sir Richard Francis.

Samuel Rawson Gardiner, LL.D., D.C.L.

See the biographical article: Gardiner, S. R.

Thomas Ashby, M.A., D.Litt. (Oxon.).

Director of British School of Archaeology at Rome. Member of the Imperial German Archaeological Institute. Formerly Scholar of Christ Church, Oxford. Craven Fellow, 1897. Conington Prizeman, 1906. Author of The Classical Topography of the Roman Campagna.

Sir Thomas Barclay, M.P.

Member of the Institute of International Law. Member of the Supreme Council of the Congo Free State. Officer of the Legion of Honour. Author of Problems of International Practice and Diplomacy; &c. M.P. for Blackburn, 1910.

Author of Essentials

Thomas Gregor Brodie, M.D., F.R.S.

Professor of Physiology in the University of Toronto. Experimental Physiology.

Sir Thomas Hungerford Holdich, K.C.M.G., K.C.I. E., D.Sc.

Superintendent, Frontier Surveys, India, 1892-1898. Gold Medallist, R.G.S., London, 1887. Author of The Indian Borderland; The Countries of the King’s Award; India; Tibet; &c.

f Buckingham, 1st Duke of (it, I part).

Bologna; Bolsena; Bononia;

Borgo San Donnino;

Bovianum; Bovillae;

Bracciano; Brescia;

Brindisi; Brundisium;

Bruttli; Caere; Cagli;

Cagliari; Caietae Portus; I Calabria.

Blockade.

Anatomy and Physiology.

f Blood

Bolan Pass; Brahmaputra.

Thomas Seccombe, M.A. r

Lecturer in History, East London and Birkbeck Colleges, University of London.) Boswell. Stanhope Prizeman, Oxford, 1887. . Assistant Editor of Dictionary of National"] Biography, 1891-1901. Author of The Age of Johnson; &c. I

Theodore Watts-Dunton.

See the biographical article: Watts-Dunton, T.

T. W. Rhys Davids, LL.D., Ph.D.

Professor of Comparative Religion, Manchester University. President of the Pali Text Society. Fellow of the British Academy. Secretary and Librarian of Royal . Asiatic Society, 1885-1902. Author of Buddhism; Sacred Books of the Buddhists Early Buddhism; Buddhist India; Dialogues of the Buddha; &c.

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D. (Bern). Fellow of Magdalen College, Oxford. Professor of English History, ,St David's College, Lampeter, 1880-1881. Author of Guide du Haul Dauphine; The Range of i the Todi; Guide to Grindelwald ; Guide

to Switzerland; The Alps in Nature and in History; &c. Editor of the Alpine Journal, 1880-1889, &c.

Borrow.

Buddha;

Buddhaghosa;

Buddhism.

Bitzius; Blane, Mont; Bonstetten; Botzen; Bourrit; Bregenz; Brenner Pass; Briancon; Brieg; Brienz, Lake of; Brignoles; Brixen; Burckhardt, Jakob; Burgdofi

Bishop; Brunhild.

Walter Alison Phillips, M.A.

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, . Oxford. Author of Modern Europe; &c.

William Burton, M.A., F.C.S. r

Chairman, Joint Committee of Pottery Manufacturers of Great Britain. Author of J Brick (in part). English Stoneware and Earthenware ; &c. [

William Barclay Squire, M.A., F.S.A., F.R.G.S. r

Assistant in charge of Printed Music, British Museum. Hon. Secretary of the J g vr fl Purcell Society. Formerly Musical Critic of Westminster Gazette, Saturday Review 1 * * and Globe. Editor of Byrd's Masses. L

INITIALS AND HEADINGS OF ARTICLES

X1U

w

c.

S.

w

c.

U.

w.

Hd.

w.

H.

L.

w.

H.

W.*

w.

J.

H.*

w.

L.

w.

L.

6.

w.

L.

R. C.

w.

M.

R.

w.

R.

L.

w.

S.

J.

w.

Wr.

w.

W

F.*

w.

W

R.*

William Charles Smith, K.C., M.A., LL.D.

Formerly Sheriff of Ross, Cromarty and Sutherland. Editor of Judicial Review, –

1889-1900.

William Cawthorne Unwin, LL.D., F.R.S., M.Inst.C.E., M.Inst.M.E., A.R.I B.A. .

Emeritus Professor of Engineering, Central Technical College, City and Guilds of London Institute. Author of Wrought Iron Bridges and Roofs ; Treatise on Hydraulics. I

Wilfranc Hubbard. f_ ,. . TT . 1 ,. ˆ A

Correspondent of The Times in Rome. j Bolivia: History (in part).

William H. Lang, D.Sc. f

Barker Professor of Cryptogamic Botany, University of Manchester. Author of . Papers on Botanical Subjects, including Morphology and life history of Bryophyta, Pteridophyta and Gymnosperms, in scientific journals.

William Henry Whitfeld, M.A.

Trinity College, Cambridge. Card Editor of the Field.

W. J. Hughan.

Past Senior Grand Deacon of Freemasons of England, 1874. Hon. Senior Warden – of Grand Lodges of Egypt, Quebec and Iona, &c.

Right Rev. William Lawrence, D.D., LL.D.

Bishop of Massachusetts. Author of Study of Phillips Brooks; Life of Roger – Wolcotl; &c.

William Lawson Grant, M.A. f

Professor of Colonial History, Queen's University, Kingston, Canada. Formerly J ' Beit Lecturer in Colonial History, Oxford University. Editor of Acts of the Privy 1 1 Council (Canadian Series). I

William Liest Readwin Cates (1821-1895).

Editor of Dictionary of General Biography. Author of A History of England from the Death of Edward the Confessor to the Death of King John. Part author of Encyclo- paedia of Chronology.

William Michael Rossetti.

See the biographical article: Rossetti, Dante Gabriel.

Borough: Irish and Scottish.

Bridges.

Bryophyta. Bridge: Game. Builders' Rites.

Brooks, Phillips.

Brock, Sir Isaac; Brown, George.

Boscovich.

W. R. Lethaby, F.S.A.

Principal of the Central School of Arts and Crafts under the London County Council. Author of Architecture, Mysticism and Myth; &c.

William Stanley Jevons. LL.D.

See the biographical article: Jevons, William Stanley.

Williston Walker, Ph.D., D.D.

Professor of Church History, Yale University. Author of History of the Congrega- tional Churches in the United States; The Reformation; John Calvin; &c. [_

William Warde Fowler, M.A. f

Fellow of Lincoln College, Oxford. Sub-Rector, 1881-1904. Gifford Lecturer, J Bona Dea. Edinburgh University, 1908. Author of The City-State of the Greeks and Romans; 1 The Roman Festivals of the Republican Period ; &c. I

William Walker Rockwell, Lie. Theol. J" ij on jf aee (p n e s VIII.-IX.).

Assistant Professor of Church History, Union Theological Seminary, New York. \ "'

Brown, Ford Madox.

Byzantine Art.

Boole.

Bushnell, Horace.

PRINCIPAL UNSIGNED ARTICLES

Bismuth.

Bizet, Georges.

Black Sea.

Blackstone.

Blake, Robert.

Blanc, Louis.

Blasphemy.

Blenheim.

Blowpipe.

Blucher.

Bliintschli.

Bockh.

Boehme.

Boeotia.

Boetius.

Boileau-Despreaux.

Bolivar.

Bombay.

Bonn.

Bonnet, Charles.

Bookselling.

Bopp.

Boraginaceae.

Bordeaux.

Borders, The.

Boric Acid.

Boron.

Borromeo.

Boston.

Bptocudos.

Bottomry.

Bouguereau.

Bourbon.

Bourges.

Bourget.

Bow-Leg.

Bowling.

Bowring, Sir John.

Boxing.

Boyle, Robert.

Bracelet.

Brackley.

Bradford.

Bradlaugh, Charles.

Brahma Samaj.

Brake.

Brandes.

Brassey.

Breadalbane.

Bread-Fruit.

Breconshire.

Bremen.

Breslau.

Brest.

Bretschneider.

Breviary.

Brewster, Sir David.

Bribery.

Brisbane.

Bristol.

Brittany.

Broglie, de.

Bromine.

Bronchitis.

Bronze.

Brooke, Fulke Greville.

Brooke, Sir James.

Brooklyn.

Brougham.

Brown, John.

Browne, Sir Thomas.

Brunei.

Brunswick.

Brush.

Brutus.

Bryan, William J. Buchanan, George. Buchanan, James. Bucharest. Buckingham, Earls,

Marquesses and

Dukes of. Buckinghamshire. Buckle. Budget.

Buffalo, U.S.A. Buffon, G. L. E., Comte

de. Bull-Fighting. Bull Run. Bttlow, Prince von. Bunsen, C. C. J., Baron

von. Bunsen, Robert Wilhelm

von. iurdett-Coutts,

Baroness. Burglary. Burgos. Burmese Wars.

Burnet, Gilbert.

Burney, Charles.

Burr, Aaron.

Bushmen.

Bute.

Butler, Benjamin

Franklin. Butler, Samuel. Button. Buxton.

Buxtorf, Johannes. Byzantium. Cab.

Cabbage.

Cabinet (Political). Cactus.

Cairnes, Prof. Elliot. Cairns, 1st Earl. Cairo.

Caisson Disease. Caithness. Calabar Bean. Calcium. Calcutta.

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

VOLUME IV

BISH&RlN (the anc. Ichthyophagi), a nomad tribe of African ” Arabs,” of Hamitic origin, dwelling in the eastern part of the Nubian desert. In the middle ages they were known as Beja {q.v.), and they are the most characteristic of the Nubian ” Arabs.” With the Ababda and Hadendoa they represent the Blemmyes of classical writers. Linguistically and geographically the Bisharln form a connecting link between the Hamitic popula- tions and the Egyptians. Nominally they are Mahommedans. They, however, preserve some non-Islamic religious practices, and exhibit traces of animal-worship in their rule of never killing the serpent or the partridge, which are regarded as sacred.

BISHOP, SIR HENRY ROWLEY (1786-1855), English musical composer, was born in London on the 18th of November 1786. He

received his artistic training from Francisco Bianchi, and in 1804 wrote the music to a piece called Angelina, which was performed at Margate. His next composition was the music to the ballet of Tamerlan et Bajazet, produced in 1806 at the King's theatre. This proved successful, and was followed within two years by several others, of which Caractacus, a pantomimic ballet, written for Drury Lane, may be named. In 1809 his first opera, The Circassian's Bride, was produced at Drury Lane; but unfortunately the theatre was burned down after one per- formance, and the score of the work perished in the flames. His next work of importance, the opera of The Maniac, written for the Lyceum in 1810, established his reputation, and probably secured for him an appointment for three years as composer for Covent Garden theatre. The numerous works — operas, burlettas, cantatas, incidental music to Shakespeare's plays, &c. — which he composed while in this position, are in great part forgotten. The most successful were — The Virgin of the Sun (181 2), The Miller and his Men (1813), Guy Mannering and The Slave (1816), Maid Marian and Clari, introducing the well-known air of " Home, Sweet Home " (1822). In 1825 Bishop was induced by Elliston to transfer his services from Covent Garden to the rival house in Drury Lane, for which he wrote with unusual care the opera of Aladdin, intended to compete with Weber's Oberon, commissioned by the other house. The result was a failure, and with Aladdin Bishop's career as an operatic composer may be said to close. On the formation of the Philharmonic Society (1813) Bishop was appointed one of the directors, and he took his turn as conductor of its concerts during the period when that office was held by different musicians in rotation. In 1 830 he was appointed musical director at Vauxhall; and it was in the course of this engagement that he wrote the popular song " My Pretty Jane." His sacred cantata, The Seventh Day, was written for the Philharmonic Society and performed in 1833. In 1839 he was made bachelor in music at Oxford. In 1841 he was appointed to the Reid chair of music in the university of Edinburgh, but

he resigned the office in 1843. He was knighted in 1842, being the first musician who ever received that honour. In 1848 he suc- ceeded Dr Crotch in the chair of music at Oxford. The music for the ode on the occasion of the installation of Lord Derby as chancellor of the university (1853) proved to be his last work. He died on the 30th of April 1855 in impoverished circumstances, though few composers ever made more by their labours. Bishop was twice married: to Miss Lyon and Miss Anne Riviere. Both he and his wives were singers. His name lives in connexion with his numerous glees, songs and smaller

compositions. His melodies are clear, flowing, appropriate and often charming; and his harmony is always pure, simple and sweet.

BISHOP, ISABELLA (1832-1904), English traveller and author, daughter of the Rev. Edward Bird, rector of Tattenhall, Cheshire, was born in Yorkshire on the 15th of October 1832. Isabella Bird began to travel when she was twenty-two. Her first book, The Englishwoman in A merica (1856), consisted of her correspond- ence during a visit to Canada undertaken for her health. She visited the Rocky Mountains, the South Pacific, Australia and« New Zealand, producing some brightly written books of travel. But her reputation was made by the records of her extensive travels in Asia: Unbeaten Tracks in Japan (2 vols., 1880), Journeys in Persia and Kurdistan (2 vols., 1891), Among the Tibetans (1894), Korea and her Neighbours (2 vols., 1898), The Yangtze Valley and Beyond (1899), Chinese Pictures (1900). She married in 1881 Dr John Bishop, an Edinburgh physician, and was left a widow in 1886. In 1892 she became the first lady fellow of the Royal Geographical Society, and in 1901 she rode a thousand miles in Morocco and the Atlas Mountains. She died in Edinburgh on the 7th of October 1904.

See Anna M. Stoddart, The Life of Isabella Bird (1906).

BISHOP (A.S. bisceop, from Lat. episcopus, Gr. kirlaKcnros, ” overlooker ” or ” overseer “), in certain branches of the Christian Church, an ecclesiastic consecrated or set apart to perform certain spiritual functions, and to exercise oversight over the lower clergy (priests or presbyters, deacons, &c). In the Catholic Church bishops take rank at the head of the sacerdotal hierarchy, and have certain spiritual powers peculiar to their office, but opinion has long been divided as to whether they constitute a separate order or form merely a higher degree of the order of priests (ordo sacerdotium) .

In the Roman Catholic Church the bishop belongs to the highest order of the hierarchy, and in this respect is the peer even of the pope, who addresses him as “venerable brother.” By the decree of the council of Trent he must be thirty catholic. years of age, of legitimate birth, and of approved learning and virtue. The method of his selection varies in different countries. In France, under the Concordat, the sovereign — and under the republic the president — had the right

of nomination. The same is true of Austria (except four sees), Bavaria, Spain and Portugal. In some countries the bishop is elected by the cathedral chapter (as in Wurttemberg), or by the bishops of the provinces (as in Ireland). In others, as in Great Britain, the United States of America and Belgium, the pope selects one out of a list submitted by the chapter. In all cases the nomination or election is subject to confirmation by the Holy See. Before this is granted the candidate is submitted to a double examination as to his fitness, first by a papal delegate at his place of residence {processus informativus in parjibus electi), and afterwards by the Roman Congregation of Cardinals assigned for this purpose {processus electionis definitivus in curia). In the event of both processes proving satisfactory, the bishop-elect is confirmed, preconized, and so far promoted that he is allowed to exercise the rights of jurisdiction in his see. He can- not, however, exercise the functions proper to the episcopal order {potestas ordinis) until his consecration, which ordinarily takes place within three months of his confirmation. The bishop is con- secrated, after taking the oath of fidelity to the Holy See, and subscribing the profession of faith, by a bishop appointed by the pope for the purpose, assisted by at least two other bishops or prelates, the main features of the act being the laying on of hands, the anointing with oil, and the delivery of the pastoral staff and other symbols of the office. After consecration the new bishop is solemnly enthroned and blesses the assembled congregation.

The potestas ordinis of the bishop is not peculiar to the Roman Church, and, in general, is claimed by all bishops, whether Oriental or Anglican, belonging to churches which have retained the Catholic tradition in this respect. Besides the full functions of the presbyterate, or priesthood, bishops have the sole right (i) to confer holy orders, (2) to administer confirmation, (3) to prepare the holy oil, or chrism, (4) to consecrate sacred places or utensils (churches, churchyards, altars, &c), (5) to give the benediction to abbots and abbesses, (6) to anoint kings. In the matter of their rights of jurisdiction, however, Roman Catholic bishops differ from others in their peculiar responsibility to the Holy See. Some of their powers of legislation and admini- stration they possess motu proprio in virtue of their position as diocesan bishops, others they enjoy under special faculties granted by the Holy See; but all bishops are bound, by an oath taken at the time of their consecration, to go to Rome at fixed ‘intervals {visitare sacra lintina apostolorum) to report in person, and in writing, on the state of their dioceses.

The Roman bishop ranks immediately after the cardinals; he is styled reverendissimus, sanctissimus or bealissimus. In English the style is ”

Right Reverend “; the bishop being addressed as ” my lord bishop.”

The insignia {pontificalia or pontificals) of the Roman Catholic bishop are (1) a ring with a jewel, symbolizing fidelity to the church, (2) the pastoral staff, (3) the pectoral cross, (4) the vestments, consisting of the caligae, stockings and sandals, the tunicle, and purple gloves, (5) the mitre, symbol of the royal priesthood, (6) the throne {cathedra), surmounted by a baldachin or canopy, on the gospel side of the choir in the cathedral church.

The spiritual function and character of the Anglican bishops, allowing for the doctrinal changes effected at the Reformation, are similar to those of the Roman. They alone can ‘ administer the rite of confirmation, ordain priests and deacons, and exercise a certain dispensing power. In the established Church of England the appointment of bishops is vested effectively in the crown, though the old form of election by the cathedral chapter is retained. They must be learned presbyters at least thirty years of age, born in lawful wedlock, and of good life and behaviour. The mode of appointment is regulated by 25 Henry VIII. c. 20, re-enacted in 1 Elizabeth c. 1 (Act of Supremacy 1558). On a vacancy occurring, the dean and chapter notify the king thereof in chancery, and pray leave to make election. A licence under the Great Seal to proceed to the election of a bishop, known as the conge d’eslire, together with a letter missive containing the name of the king’s nominee, is thereupon sent to the dean and chapter, who are bound under the penalties of Praemunire to proceed within twelve days to

the election of the person named in it. In the event of their refusing obedience or neglecting to elect, the bishop may be appointed by letters patent under the Great Seal without the form of election. Upon the election being reported to the crown, a mandate issues from the crown to the archbishop and metro- politan, requesting him and commanding him to confirm the election, and to invest and consecrate the bishop-elect. There- upon the archbishop issues a commission to his vicar-general to examine formally the process of the election of the bishop, and to supply by his authority all defects in matters of form, and to administer to the bishop-elect the oaths of allegiance, of supremacy and of canonical obedience (see Confirmation op Bishops). In the disestablished and daughter Churches the election is by the synod of the Church, as in Ireland, or by a diocesan convention, as in the United States of America.

In the Church of England the potestas ordinis is conferred by consecration. This is usually carried out by an archbishop, who is

assisted by two or more bishops. The essential ” form ” of the consecration is in the simultaneous ” laying on of hands ” by the consecrating prelates. After this the new bishop, who has so far been vested only in a rochet, retires and puts on the rest of the episcopal habit, viz. the chimere. After consecration the bishop is competent to exercise all the spiritual functions of his office; but a bishopric in the Established Church, being a barony, is under the guardianship of the crown during a vacancy, and has to be conferred afresh on each new holder. A bishop, then, cannot enter into the enjoyment of the temporalities of his see, including his rights of presentation to benefices, before doing homage to the king. This is done in the ancient feudal form, surviving elsewhere only in the conferring of the M.A. degree at Cambridge. The bishop kneels before the king, places his hands between his, and recites an oath of temporal allegiance; he then kisses hands.

Besides the functions exercised in virtue of their order, bishops are also empowered by law to exercise a certain jurisdiction over all consecrated places and over all ordained persons. This jurisdiction they exercise for the most part through their con- sistorial courts, or through commissioners appointed under the Church Discipline Act of 1840. By the Clergy Discipline Act of 1892 it was decreed that the trial of clerks accused of unfitness to exercise the cure of souls should be before the consistory court with five assessors. Under the Public Worship Regulation Act of 1874, which gave to churchwardens and aggrieved parishioners the right to institute proceedings against the clergy for breaches of the law in the conduct of divine service, a discretionary right was reserved to the bishop to stay proceedings.

The bishops also exercise a certain jurisdiction over marriages, inasmuch as they have by the canons of the Church of England a power of dispensing with the proclamation of banns before marriage. These dispensations are termed marriage licences, and their legal validity is recognised by the Marriage Act of 1823. The bishops had formerly jurisdiction over all questions touching the validity of marriages and the status of married persons, but this jurisdiction has been transferred from the consistorial courts of the bishops to a court of the crown by the Matri- monial Causes Act of 1857, They have in a similar manner been relieved of their jurisdiction in testamentary matters, and in matters of defamation and of brawling in churches; and the only jurisdiction which they continue to exercise over the general laity is with regard to their use of the churches and churchyards. The churchwardens, who are representative officers of the parishes, are also executive officers of the bishops in all matters touching the decency and order of the churches and of the

churchyards, and they are responsible to the bishops for the due discharge of their duties; but the abolition of church rates has relieved the churchwardens of the most onerous part of their duties, which was connected with the stewardship of the church funds of their parishes.

The bishops are still authorized by law to dedicate and set apart buildings for the solemnization of divine service, and grounds for the performance of burials, according to the rites and ceremonies of the Church of England; and such buildings

and grounds, after they have been duly consecrated according to law, cannot be diverted to any secular purpose except under the authority of an act of parliament.

The bishops of England have also jurisdiction to examine clerks who may be presented to benefices within their respective dioceses, and they are bound in each case by the 95th canon of 1604 to inquire and inform themselves of the sufficiency of each clerk within twenty-eight days, after which time, if they have not rejected him as insufficiently qualified, they are bound to institute him, or to license him, as the case may be; to the benefice, and thereupon to send their mandate to the archdeacon to induct him into the temporalities of the benefice. Where the bishop himself is patron of a benefice within his own diocese he is empowered to collate a clerk to it, — in other words, to confer it on the clerk without the latter being presented to him. Where the clerk himself is patron of the living, the bishop may institute him on his own petition. (See Benefice.)

As spiritual peers, bishops of the Church of England have (subject to the limitations stated below) seats in the House of Lords, though whether as barons or in their spiritual character has been a matter of dispute. The latter, however, would seem to be the case, since a bishop was entitled to his writ of summons after confirmation and before doing homage for his barony. Doubts having been raised whether a bishop of the Church of England, being a lord of parliament, could resign his seat in the Upper House, although several precedents to that effect are on record, a statute of the realm, which was confined to the case of the bishops of London and Durham, was passed in 1856, declaring that on the resignation of their sees being accepted by their respective metropolitans, those bishops should cease to sit as lords of parliament, and their sees should be filled up in the manner provided by law in the case of the avoidance of a bishopric. In 1869 the Bishops' Resignation Act was passed. It provided that, on any

bishop desiring to retire on account of age or incapacity, the sovereign should be empowered to declare the see void by an order in council, the retiring bishop or arch- bishop to be secured the use of the episcopal residence for life and a pension of one-third of the revenues of the see, or £2000, whichever sum should prove the larger. Other sections defined the proceedings for proving, in case of need, the incapacity of a bishop, provided for the appointment of coadjutors and defined their status (Phillimore i. 82).

In view of the necessity for increasing the episcopate in the 19th century and the objection to the consequent increase of the spiritual peers in the Upper House, it was finally enacted by the Bishoprics Act of 1878 that only the archbishops and the bishops of London, Winchester and Durham should be always entitled to writs summoning them to the House of Lords. The rest of the twenty-five seats are filled up, as a vacancy occurs, according to seniority of consecration.

■ Bishops of the Church of England rank in order of precedency immediately above barons. They may marry, but their wives as such enjoy no title or precedence. Bishops are addressed as "■ Right Reverend " and have legally the style of " Lord," which, as in the case of Roman Catholic bishops in England, is extended to all, whether suffragans or holders of colonial bishoprics, by courtesy.

The insignia of the Anglican bishop are the rochet and the chimere, and the episcopal throne on the gospel side of the chancel of the cathedral church. The use of the mitre, pastoral staff and pectoral cross, which had fallen into complete disuse by the end of the 18th century, has been now very commonly, though not universally, revived; and, in some cases, the inter- pretation put upon the " Ornaments rubric " by the modern High Church school has led to a more complete revival of the pre-Reformation vestments.

In the Orthodox Church of the East and the various com- munions springing from it, the potestas ordinis of the bishop is the same as in the Western Church. Among his Eastern* qualifications the most peculiar is that he must be unmarried, which, since the secular priests are com- pelled to marry, entails his belonging to the " black clergy " or

monks. The insignia of an oriental bishop, with considerable t variation in form, are essentially the same as those of the Catholic West.

Besides bishops presiding over definite sees, there have been from time immemorial in the Christian Church bishops holding their jurisdiction in subordination to the bishop of the diocese. (1) The oldest of these were the chorepiscopi Sab ” (rrjs x&pas kiriffKoroi.), i.e. country bishops, who were bishops. delegated by the bishops of the cities in the early church to exercise jurisdiction in the remote towns and villages as these were converted from paganism. Their functions varied in different times and places, and by some it has been held that they were originally only presbyters. In any case, this class of bishops, which had been greatly curtailed in the East in A.D. 343 by the council of Laodicea, was practically extinct everywhere by the 10th century. It survived longest in Ireland, where in 1152 a synod, presided over by the papal legate, decreed that, after the death of the existing holders of the office, no more should be consecrated. Their place was taken by arch-presbyterr and rural deans. (2) The Episcopi regionarii, or gentium, were simply missionary bishops without definite sees. Such were, at the outset, Boniface, the apostle of Germany, and Willibrord, the apostle of the Frisians. (3) Bishops in partibus infidelium were originally those who had been expelled from their sees by the pagans, and, while retaining their titles, were appointed to assist diocesan bishops in their work. In later times the custom arose of consecrating bishops for this purpose, or merely as an honorary distinction, with a title derived from some place once included within, but now beyond the bounds of Christendom. (4) Coadjutor bishops are such as are appointed to assist the bishop of the diocese when incapacitated by infirmity or by other causes from fulfilling his functions alone. Coadjutors in the early church were appointed with a view to their succeeding to the see; but this, though common in practice, is no longer the rule. In the Church of England the appointment and rights of co- adjutor bishops were regulated by the Bishops’ Resignation Act of 1869. . Under this act the coadjutor bishop has the right of succession to the see, or in the case of the archiepiscopal sees and those of London, Winchester and Durham, to the “see vacated by the bishop, translated from another diocese to fill the vacancy. (5) Suffragan bishops {episcopi suffraganei or auxiliares) are those appointed to assist diocesan bishops in their pontifical functions when hindered by infirmity, public affairs or other causes. In the Roman Church the appointment of the suffragan rests with, the pope, on the petition of the bishop, who must £>rove that such is the custom of the see, name a suitable priest and guarantee his maintenance. The suffragan is given a title in partibus, but never that of archbishop, and the same title is never given to two suffragans in succession. In the Church of England the status of suffragan bishops was regulated by the Act 26 Henry VIII. c. 14. Under this statute,

which, after long remaining inoperative, was amended and again put into force by the Suffragans' Nomination Act of 1888, every, archbishop and bishop, being disposed to have a suffragan to assist him, may name two honest and discreet spiritual persons for the crown to give to one of them the title, name, style and dignity of a bishop of any one of twenty-six sees enumerated in the statute, as the crown may think convenient. The crown, having made choice of one of such persons, is empowered to present him by letters patent under the great seal to the metro- politan, requiring him to consecrate him to the same name, title, style and dignity of a bishop; and the person so conse- crated is thereupon entitled to exercise, under a commission from the bishop who has nominated him, such authority and jurisdiction, within the diocese of such bishop, as shall be given to him by the commission, and no other.

The title of bishop survived the Reformation in certain of the Lutheran churches of the continent, in Denmark, Norway, Finland, Sweden and Transylvania; it was tern- porarily restored in Prussia in 1701, for the coronation churches. of King Frederick I., again between 1816 and 1840 by Frederick William III., and in Nassau in 181 8. In these latter

cases, however, the title bishop is, equivalent to that of " super- intendent," the form most generally employed. The Lutheran bishops, as a rule, do not possess or claim unbroken "apostolic succession"; those of Finland and Sweden are, however, an exception. The Lutheran bishops of Transylvania sit, with the Roman and Orthodox bishops, in the Hungarian Upper House. In some cases the secularization of. episcopal principalities at the Reformation led to the survival of the title of bishop as a purely secular distinction. Thus the see of Osnabruck (Osna- burgh) was occupied, from the peace of Westphalia to 1802, alternately by a Catholic and a Protestant prince. From 1762 to 1802 it was held by Frederick, duke of York, the last prince- bishop. Similarly, the bishopric of Schwerin survived as a Protestant prince-bishopric until 1648, when it was finally secularized and annexed to Mecklenburg; and'the See of Liibeck was held by Protestant " bishops " from 1530 till its annexation to Oldenburg in 1803. 1

In other Protestant communities, e.g. the Moravians, the Methodist Episcopal Church and the Mormons, the office and title of bishop have survived, or been created. Their functions and status will be found described in the accounts of the several churches.

See Wetzer and Welte, Kirchenlexikon, s. “Bischof” and “Weihen” ; Hinschius, Kirchenrecht, vol. ii. ; Herzog-Hauck, Realencyklopadie, s. ” Bischof ” (the author rather arbitrarily classes Anglican with Lutheran bishops as not bishops in any proper sense at all) ; Phillimore’s Ecclesiastical Law, the articles Order, Holy; Vest- ments; Ecclesiastical Jurisdiction; Episcopacy. (W. A. P.)

BISHOP AUCKLAND, a market town in the Bishop Auckland parliamentary division of Durham, England, 11 m. S.S.W. of the city of Durham, the junction of several branches of the North Eastern railway. Pop. of urban district (1901) 11,969. It is beautifully situated on an eminence near the confluence of the Wear and the Gaunless. The parish church is 1 m. distant, at Auckland St Andrews, a fine cruciform structure, formerly collegiate, in style mainly Early English, but with earlier portions. The palace of the bishops of Durham, which stands at the north- east end of the town, is a spacious and splendid, though irregular pile v The site of the palace was first chosen by Bishop Anthony Beck, in the time of Edward I. The present building covers about 5 acres, and is surrounded by a park of 800 acres. On the Wear i|m. above Bishop Auckland there is a small and very ancient church at Escomb, massively built and tapering from the bottom upward. It is believed to date from the 7th century, and some of the stones are evidently from a Roman building, one bearing an inscription. These, no doubt, came from Bin- chester, a short distance up stream, where remains of a Roman fort (Vinovia) are traceable. It guarded the great Roman north road from York to Hadrian’s wall. The industrial population of Bishop Auckland is principally employed in the neighbouring collieries and iron works.

BISHOP’S CASTLE, a market town and municipal borough in the southern parliamentary division of Shropshire, England; the terminus of the Bishop’s Castle light railway from Craven Arms. Pop. (1901) 1378. It is pleasantly situated in a hilly district to the east of Clun Forest, climbing the flank and occupy- ing the summit of an eminence. Of the castle of the bishops of Hereford, which gave the town its name, there are only the slightest fragments remaining. The town has some agricultural trade. It is governed by a mayor, 4 aldermen and 1 2 councillors. Area, 1867 acres.

Bishop’s Castle was included in the manor of Lydbury; which belonged to the church of Hereford before the Conquest., The castle, at first called Lydbury Castle, was built by one of the bishops of Hereford between 1085 and 1 154, to protect his manor from the Welsh, and the town which sprang up round thecastle walls acquired the name of Bishop’s Castle in the 13th century. In 1292 the bishop claimed to

have a market every Friday, a fair on the eve, day and

1 The title prince-bishop, attached in Austria to the sees of Laibach, Seckau, Gurk, Brixen, Trent and Lavant, and in Prussia to that of Breslau, no longer implies any secular jurisdiction, but is merely a title of honour recognized by the state, owing either to the importance of the sees pr for reasons purely historical.

morrow qf the Decollation of St John f and assize of bread and aje in Bishop's Castle, which his predecessors had held from time : immemorial. Ten years later he received a grant from Richard II. of a market every Wednesday and a fair on the 2nd of November and two days following. Although the town was evidently a borough by the 13th century, since the burgesses are mentioned as early as 1292, it has no charter earlier than the incorporation charter granted by Queen Elizabeth in 1572. This was confirmed by James I. in 1617 and by James II. in 1688. In 1584 Bishop's Castle returned two members to parliament, and was represented until 1832, when it was disfranchised. –

BISHOP STORTFORD, a market town in the Hertford parlia- mentary division of Hertfordshire, England; 305 m. N.N.E. from London by the Cambridge line of the Great Eastern railway. Pop. of urban district (190 1) 7143. It lies on the river Stort, close to the county boundary with Essex, and has water-com- munication with London through the Lea and Stort Navigation. The church of St Michael, standing high above the valley, is a fine embattled Perpendicular building with western tower and spire. The high school, > formerly the grammar school, was founded : in the time of Elizabeth. Here were educated Sir Henry Chauncy, an early historian of Hertfordshire (d. 17 19), and Cecil Rhodes, who was born at Bishop Stortford in 1853. There are a Nonconformist grammar school, a diocesan training college for mistresses* and other educational establishments. The industries include brewing and malting, coach-building, lime-burning and founding, and there are important horse and cattle markets.

Before the Conquest the manor of Bishop Stortford is said to have 'belonged to Eddeva the Fair, wife of Harold, who sold it to the bishop of London, from whom it was taken by William the Conqueror. William restored it after a few years, and with it gave the bishop a small castle called Waytemore, of which there are scanty remains. The dungeon of this castle, called " Bishop's Hole " or " Bishop's Prison," was used as an ecclesiastical prison' until the 16th century. The town now possesses no early incorporation charters, and although both Chauncy and Salmon in their histories of Hertfordshire state that it

was created a borough by charter of King John in 1206, the charter cannot now be found. The first mention of Bishop Stortford as a borough occurs in 1311, in which year the burgesses returned two members to parliament. The town: was represented from that date until 1332, and again in 1335-1336, but the privilege was then allowed to lapse and has never been revived.

BISKRA, a town of Algeria, in the arrondissement of Batna > department of Constantine, 150 m. S.W. of the city of Constantine and connected with it and with Philippeville by rail. It lies in the Sahara 360 ft. above the sea, on the right bank of the Wad Biskra, a river which, often nearly dry for many months in the year, becomes a mighty torrent after one or two days' rain in winter. The name Biskra applies to a union of five or six villages of the usual Saharan type, scattered through an oasis 3 m. in length by less than 1 m. broad, and separated by huge gardens full of palm and olive trees. The houses are built of hardened mud, with doors and roof of palm wood. The foreign settlement is on the .north of the oasis; it consists of a broad main street, the rue Berthe (from which a few side streets branch at right angles), lined with European houses, the whole in the style of a typical French winter resort, a beautiful public garden, with the church in the centre, an arcade, a pretentious mairie in pseudo-Moorish style with entrance guarded by terra-cotta lions, some good shops, a number of excellent hotels and cafes, a casino, clubs, and, near by, a street of dancing and singing girls of the tribe qf Walad-Nail. East of the public garden is Fort St Germain, named after an officer killed in the insurrection of the Zaatcha in 1849; it is capable of resisting any attack of the Arabs, and extensive enough to shelter the whole of the civil population, who took refuge therein during the rebellion of 1871. It contains barracks, hospital and government offices. To the south-east lies the Villa Landon with magnificent gardens filled with tropical plants. The population (1906) of the chief settlement was 4218, of the whole oasis 10,413.

From November to April the climate of Biskra is delightful. Nowhere in Algeria can be found- more genial temperature or clearer skies, and while in summer the thermometer often registers 110° F. in the shade, and 90 at night, the pure dryness of the air in this practically rainless region makes the heat

endurable. The only drawback to the climate is the prevalence of high cold winds in winter. These winds cause temperatures as low as 36 , but the mean reading, on an average of ten years,

is 73°-

In the oasis are some 200,000 fruit trees, of which about 150,000 are date-palms, the rest being olives, pomegranates and apricots. In the centre of the oasis is the old kasbah or citadel.

In 1844 the due d'Aumale occupied this fort, and here, on the night of the 12th of May of that year, the 68 men who formed the French garrison were, with one exception, massacred by Arabs. In the fort are a few fragments of Roman work — all that remains of the Roman post Ad Piscinam.

Biskra is the capital of the Ziban (plural of Zab), a race of mixed Berber and Arab origin, whose villages extend from the southern slopes of the Aures to the Shat Melrir. These villages, built in oases dotted over the desert, nestle in groves of date- palms and fruit trees and waving fields of barley. The most interesting village is that of Sidi Okba, 12 m. south-east of Biskra. It is built of houses of one story made of sun-dried bricks. The mosque is square, with a flat roof supported on clay columns, and crowned by a minaret. In the north-west corner of the mosque is the tomb of Sidi Okba, the leader of the Arabs who. in the 1st century of the Hegira conquered Africa for Islam from Egypt to Tangier. Sidi Okba was killed by the Berbers near this place in a.d. 682. On his tomb is the inscription in Cufic characters, " This is the tomb of Okba, son of Nafi. May God have mercy upon him." No older Arabic inscription is known to exist in Africa.

BISLEY, a village of Surrey, England, 3J m. N.W. of Woking. The ranges of the National Rifle Association were transferred from Wimbledon here in 1890. (See Rifle.)

BISMARCK, OTTO EDUARD LEOPOLD VON, Prince, duke of Lauenburg (1815-1898), German statesman, was born on the 1st of April 1815, at the manor-house of Schonhausen, his father's seat in the mark of Brandenburg. The family has, since the 14th century, belonged to the landed gentry, and many members had held high office in the kingdom of Prussia. His father (d. 1845), of whom he always spoke with much affection, was a quiet, unassuming man, who retired from the army in early life with the rank of captain of cavalry {Rittmeister) . His mother, a daughter of Mencken, cabinet secretary to the king, was a woman of strong character and ability, who had been brought up at Berlin under the "Aufklarung." Her ambition was centred in her sons, but Bismarck in his recollections 6f his childhood missed the influences of maternal tenderness. There were several children of the marriage, which took place in 1806, but all died in childhood except Bernhard (1810-1893), Otto, and one sister, Malvina (b. 1827), who married in 1845 Oscar von Arnim. Young Bismarck was educated in BerHn, first at a private school, then at the gymnasium of the Graue Kloster (Grey Friars). At the age of seventeen he went to the university of Gottingen, where he spent a little over a year; he joined the corps of the Hannoverana and took a leading part

in the social life of the students. He completed his studies at Berlin, and in 1835 passed the examinations which admitted him to the public service. He was intended for the diplomatic service, but spent some months at ■ Aix-la-Chapelle in administrative work, and then was transferred to Potsdam and the judicial side. He soon retired from the public service; he conceived a great distaste for it, and had shown himself defective in discipline and regu- larity. In 1839, after his mother's death, he undertook, with his brother, the management of the family estates in Pomerania; at this time most of the estate attached to Schonhausen had to be sold. In 1844, after the marriage of his sister, he went to live with his father at Schonhausen. He and his brother took an active part in local affairs, and in 1846 he was appointed Deichhauptmann, an office in which he was responsible for the care of the dykes by which the country, in the neighbourhood of the Elbe, was preserved from inundation. During these years he travelled in England, France and Switzerland. The influence of his mother, and his own wide reading and critical character, made him at one time inclined to hold liberal opinions on govern-

ment and religion, but he was strongly affected by the religious revival of the early years, of the reign of Frederick William IV.; his opinions underwent a great change, and under the influence of the neighbouring country gentlemen he acquired those strong principles in favour of monarchical governmentas the expression of the Christian state, of which he was to become the most cele- brated exponent. His religious convictions were strengthened by his marriage to Johanna von Puttkamer, which took place in 1847. ■■•■■.

In the same year he entered public life, being chosen as substitute for the representative of the lower nobility of his district in the estates-general, which were in that year summoned to Berlin. He took his seat with ParII * m the extreme right, and distinguished himself by the CTreer.ˆ vigour and originality with which he defended the rights of the king and the Christian monarchy against the Liberals. When the revolution broke out in the following year he offered to bring the peasants of Schonhausen to Berlin in order to : defend the king against the revolutionary party, and in the last meeting of the estates voted in a minority of two against the address thanking the king for granting a constitution. He did not sit in any of the assemblies summoned during the revolu- tionary year, but took a very active part in the formation of a union of the Conservative party, and was one of the founders of the Kreuzzeihmg, which has sinCe then been the organ of the Monarchical party in.Prussia. In the new parliament which was elected at the beginning of 1849, he sat for Brandenburg, and was one of the most frequent and most incisive speakers of what was called the

Junker party. He took a prominent part in the discussions on the new Prussian constitution, always defending the power of the king. His speeches of this period show great debating skill, combined with strong originality and imagination. His constant theme was, that the party disputes were a struggle for power between the forces of revolution, which derived their strength from the fighters on the barricades, and the Christian monarchy, and that between these opposed principles no com- promise was possible. He took also a considerable part in the debates on the foreign policy of the Prussian government; he defended the government for not accepting the Frankfort constitution, and opposed the policy of Radowitz, on the ground that the Prussian king would be subjected to the control of a non-Prussian parliament. The only thing, he said, that had come out of the revolutionary year unharmed, and had saved Prussia from dissolution and Germany from anarchy, was the Prussian army and the Prussian civil service; and in the debates on foreign policy he opposed the numerous plans for bringing about the union of Germany, by subjecting the crown and Prussia to a common German parliament. He had a seat in the parliament of Erfurt, but only went there in order to oppose the constitution which the parliament had framed. He foresaw that the policy of the government would lead it into a position when it would have to fight against Austria on behalf of a con- stitution by which Prussia itself would be dissolved, and he was, therefore, one of the few prominent politicians who defended the complete change of front which followed the surrender of Olmiitz.

It was probably his speeches on German policy which induced the king to appoint him Prussian representative at the restored diet of Frankfort in 185 1. The appointment was a bold one, as he was entirely without diplomatic ex- C ˆJ1T perience, but he justified the confidence placed in him. During the eight years he spent at Frankfort he acquired an unrivalled knowledge of German politics. He was often used for important missions, as in 1852, when he was sent to Vienna. He was entrusted with the negotiations by which the duke of Augustenburg was persuaded to assent to the arrangements by which he resigned his claims to Schleswig and Holstein. The period he spent at Frankfort, however, was of most importance because of the change it brought about in his own political opinions. When he went to Frankfort he was still under the influence of the extreme Prussian Conservatives, men like the Gerlachs, who regarded the maintenance of the principle of the

Christian monarchy against the revolution as the chief duty of the

Prussian government. He was prepared on this ground for a close alliance with Austria. He found, however*, a deliberate intention on the part of Austria to humble Prussia, and to degrade her from the position of an equal power, and also great jealousy of Prussia among the smaller German princes, many of whom owed their thrones to the Prussian soldiers, who, as in Saxony and Baden, had crushed the insurgents. He therefore came to the conclusion that if Prussia was to regain the position she had lost she must be prepared for the opposition of Austria, and must strengthen herself by alliances with other powers. The solidarity of Conservative interests appeared to him now a dangerous fiction. At the time of the Crimean War he advocated alliance with Russia, and it was to a great extent owing to his advice that Prussia did not join the western powers. After- wards he urged a good understanding with Napoleon, but his advice was met by the insuperable objection of King Frederick William IV. to any alliance with a ruler of revolutionary origin.

The change of ministry which followed the establishment of a regency in 1857 made it desirable to appoint a new envoy at Frankfort, and in 1858 Bismarck was appointed ambassador at St Petersburg, where he remained for four years. During this period he acquired some knowledge of Russian, and gained the warm regard of the tsar, as well as of the dowager-empress, herself a Prussian princess. During the first two years he had little influence on the Prussian government; the Liberal minister's distrusted his known opinions on parliamentary government, and the monarchical feeling of the prince regent was offended by Bismarck's avowed readiness for alliance with the Italians and his disregard of the rights of other princes. The failure of the ministry, and the estrangement between King William and the Liberal party, opened to him the way to power. Roon, who was appointed minister of war in 1861, was an old friend of his, and through him Bismarck was thenceforward kept closely informed of the condition of affairs in Berlin. On several occasions the prospect of entering the ministry was open to him, but nothing came of it, apparently because he required a free hand in foreign affairs, and this the king was not prepared to give him. When an acute crisis arose out of the refusal of parlia- ment, in 1862, to vote the money required for the reorganization of the army, which the king and Roon had carried through, he was summoned to Berlin; but the king was still unable to make up his mind to appoint him, although he felt that Bismarck was the only man who had the courage and capacity for con- ducting the struggle with parliament. He was, therefore, in June, made ambassador at Paris as a temporary expedient. There he had the opportunity for renewing the good under- standing with Napoleon

which had been begun in 1857. He also paid a short visit to England, but it does not appear that this had any political results. In September the parliament, by a large majority, threw out the budget, and the king, having nowhere else to turn for help, at Roon's advice summoned Bismarck to Berlin and appointed him minister-president and foreign minister.

Bismarck's duty as minister was to carry on the government against the wishes of the Lower House, so as to enable the king to complete and maintain the reorganized army. The opposition of the House was supported by the country and by a large party at court, including the queen and crown prince. The indignation which his appointment caused was intense; he was known only by the reputation which in his early years he had won as a violent ultra-Conservative, and the apprehensions were increased by his first speech, in which he said that the German question could not be settled by speeches and parliamentary decrees, but only by blood and iron. His early fall was predicted, and it was feared that he might bring down the monarchy with him. Standing almost alone he succeeded in the task he had undertaken. For four years he ruled without a budget, taking advantage of an omission in the constitution which did not specify what was to happen in case the crown and the two Houses could not agree on a budget. . The conflict of the ministers and the House assumed at times the

Ministry.

form of bitter personal hostility; in 1863 the ministers refused any longer to attend the sittings, and Bismarck challenged Virchow, one of his strongest opponents, to a duel, which, however, did not take place. In 1852 he had fought a duel with pistols against Georg von Vindre, a political opponent. In June 1863, as soon as parliament had risen, Bismarck published ordinances controlling the liberty of the press, which, though in accordance with the letter, seemed opposed to the intentions of the constitution, and it was on this occasion that the crown prince, hitherto a silent opponent, publicly dissociated himself from the policy of his father's ministers. Bismarck depended for his position solely on the confidence of the king, and the necessity for defending himself against the attempts to destroy this confidence added greatly to the suspiciousness of his nature. He was, however, really indispensable, for his resignation must be followed by a Liberal ministry, parliamentary control over the army, and probably the abdication of the king. Not only, therefore, was he secure in the continuance of the king's support, but he had also the complete control of foreign affairs. Thus he could afford to ignore the criticism

of the House, and the king was obliged to acquiesce in the policy of a minister to whom he owed so much.

. He soon gave to the policy of the monarchy a resolution which had long been wanting. When the emperor of Austria summoned a meeting of the German princes at Frank- fort to discuss a reform of the confederation, Bismarck pottcy insisted that the king of Prussia must not attend. He remained away, and his absence in itself made the congress unavailingˆ There can be no doubt that from the time he entered on office Bismarck was determined to bring to an issue the long struggle for supremacy in Germany between the house of Habsburg and the house of Hohenzollern. Before he was able to complete his preparations for this, two unforeseen occurrences completely altered the European situation, and caused the conflict to be postponed for three years. The first was the outbreak of rebellion in Poland. Bismarck, an inheritor of the older Prussian traditions, and recollecting how much of the greatness of Prussia had been gained at the expense of the Poles, offered his help to the tsar. By this he placed himself in opposi- tion to the universal feeling of western Europe; no act of his life added so much to the repulsion with which at this time he was regarded as an enemy of liberty and right. He won, however, the gratitude of the tsar and the support of Russia, which in the next years was to be of vital service to him. Even more serious were the difficulties arising in Denmark. On the death of King Frederick VII. in 1863, Prince Frederick of Augustenburg came forward as claimant to the duchies of Schleswig and Holstein, which had hitherto been joined to the crown of Denmark. He was strongly supported by the whole German nation and by many of its princes. Bismarck, however, once more was obliged to oppose the current of national feeling, which imperiously demanded that the German duchies should be rescued from a foreign yoke. Prussia was bound by the treaty of London of 1852, which guaranteed the integrity of the Danish monarchy; to have disregarded this would have been to bring about a coalition against Germany similar to that of 1851. Moreover, he held that it would be of no advantage to Prussia to create a new German state; if Denmark were to lose the duchies, he desired that Prussia should acquire them, and to recognize the Augustenburg claims would make this impossible. His resist- ance to the national desire made him appear a traitor to his country. To check the agitation he turned for help to Austria; and an alliance of the two powers, so lately at variance, was formed. He then falsified all the predictions of the opposition by going to war with Denmark, not, as they had required, in support of Augustenburg, but on the ground that the king of Denmark had violated his promise not to oppress his German subjects. Austria

continued to act with Prussia, and, after the defeat of the Danes, at the peace of Vienna the sovereignty of the duchies was surrendered to the two allies — the first step towards annexation by Prussia. There is no part of Bismarck's diplomatic work which deserves such careful study as these

events. Watched as he was by countless enemies at home and airoadj) a. single: false step would have brought ruin and disgrace on himself ; the growing national excitement would have burst through all restraint, and again, as fifteen years before, Germany .divided and unorganized would have had to capitulate to the orders of foreign powers (see Schleswig-Holstein Question). The peace of Vienna left him once more free to return to his plder policy. ; For the next eighteen months he was occupied , ., in preparing for war with . Austria. For this war he

Austria. was a i° ne responsible; he undertook; it deliberately as . the only means of securing Prussian ascendancy in, Germany. The actual cause of dispute was the disposition of the conquered duchies, for Austria now wished to put Augus- tenburg in as duke, a plan to which Bismarck would not assent. In 1865 a provisional arrangement was made by the treaty of pastein, for Bismarck was not yet ready. He would not risk a war unless he was certain of success, and for this he required the .alliance of Italy and French support; both he secured during the next year. In October 1865 he visited Napoleon at Biarritz and Paris. No formal treaty was made, but Napoleon promised to regard favourably an extension of Prussian power in Germany; while Bismarck led the emperor to believe that Prussia would help him in extending the frontier of France. A treaty of alliance with Italy was arranged in the spring of 1866; and jijsmarck then with much difficulty overcame the reluctance of the king to embark in a war with his old ally. The results of: the war entirely justified his calculations. Prussia, though opposed by all the German states except a few principalities in the north, completely defeated all her enemies, and at the end of a few weeks the whole of Germany lay at her feet.

The war of 1866 is more than that of 1870 the crisis of modern German history. It finally settled the controversy which had begun more than a hundred years before, and left , – mined that, the unity of Germany should be brought

about not by revolutionary means as in 1848, not as in 1849 had been attempted by voluntary agreement of the princes, not by Austria, but

by the sword of Prussia. This was the great work iof Bismarck's life; he had completed the programme fore- shadowed in his early speeches, and finished the work of Frederick ■the Great.: It is also the. turning-point in Bismarck's own life. Having secured the dominance of the crown in Prussia and of Prussia, in Germany, he could afford to make a reconciliation with the parties which had been his chief opponents, and turn to them for help in building up a new Germany. The settlement of 1866 was peculiarly his work. We must notice, first, how in ˆarranging the terms of peace he opposed the king and the military party who wished to advance on Vienna and annex part of Austrian Silesia; with greater foresight helooked to renewing the old friendship with Austria,- and insisted (even with the threat of resignation) that no territory should be demanded. The southern states he treated with equal moderation, and thereby iwas able to arrange an offensive and defensive alliance with therm. . On the other hand,in order to secure the complete control of North Germany, which was his immediate object, he required that the whole of Hanover, Hesse-Cassel, Hesse-Nassau and the .city of Frankfort, as well as the Elbe duchies, should be absorbed ; jn Prussia. He then formed a separate confederation of the North German states, but did not attempt to unite the whole of Ger- .many, partly because of the internal difficulties which this would have produced, partly because it would have brought about a ,war with France. In the new confederation he became sole responsible, minister, with the title Bundes-Kanzler; this position he held till 1890, in addition to his former post of premier minister. In 187 1 the title was altered to Reichs-Kanzler.

The reconciliation with the Prussian parliament he effected by bringing in a. "bill of indemnity for the money which had been spent without leave of parliament. The Radicals still continued -their opposition, but he thereby made possible the formation ,01. a large party of moderate Liberals, who thenceforward -supported him in his new Nationalist policy. He also, in the ! constitution for the new confederation, introduced a parliament

(Bundestag) elected by universal suffrage. This was the chief demand of the revolutionists in 1848; it was one to which in his early life he had been strongly opposed. His experience at Frankfort had diminished his dislike of popular representation, and it was probably to the advice of Lassalle that his adoption of universal suffrage was due. He first publicly proposed it just before the war; by carrying it out, notwithstanding the apprehensions of many Liberal politicians, he placed the new constitution on a firmer base than would otherwise have been possible.

Up to 1866 he had always appeared to be an opponent of the National party in Germany, now he became their leader. His next task was to complete the work which was half-finished, and it was this which brought about the second of the great wars which he undertook.

The relations with Napoleon III. form one of the most inter- esting but obscurest episodes in Bismarck's career. We have seen that he did not share the common prejudice against co-operation with France. He found Napoleon an ^" are willing to aid Prussia as he had aided Piedmont, and France. was ready to accept his assistance. There was this difference, that he asked only for neutrality, not armed assist- ance, and it is improbable that he ever intended to alienate any German territory; he showed himself, however, on more than one occasion, ready to discuss plans for extending French territory, on the side of Belgium and Switzerland. Napoleon, who had not anticipated the rapid success of Prussia, after the battle of Koniggratz at the request of Austria came forward as mediator, and there were a few days during which it was probable that Prussia would have to meet a French attempt to dictate terms of peace. Bismarck in this crisis by deferring to the emperor in appearance avoided the danger, but he knew that he had been deceived, and the cordial understanding was never renewed. Immediately after .an armistice had been arranged, Benedetti, at the orders of the French government, demanded as recompense a large tract of German territory on the left bank of the Rhine. This Bismarck peremptorily refused, declaring that he would rather have war. Benedetti then made another proposal, submitting a draft treaty by which France was to support Prussia in adding the South German states to the new con- federation, and Germany was to support France in the annexa- tion of Luxemburg and Belgium. Bismarck discussed, but did not. conclude the treaty; he kept, however, a copy of the draft in Benedetti's handwriting, and published it in The Times in the summer of 1870 so as to injure the credit of Napoleon in England. The failure of the scheme made a contest with France inevitable, at least unless the Germans were willing to forgo the purpose of completing the work of German unity, and during the next four years the two nations were each preparing for the struggle, and each watching to take the other at a disadvantage.

It is necessary, then, to keep in mind the general situation in considering Bismarck's conduct in the months immediately preceding the war of 1870. In 1 8 6 7 there was a dispute regarding the right to garrison Luxemburg. Bismarck then produced the secret treaties with the southern states, an act which was, as it were, a challenge to France by the whole of Germany. During the next three years the Ultramontane party hoped to bring about an anti-Prussian revolution,

and Napoleon was working for an alliance with Austria, where Beust, an old opponent of Bismarck's, was chancellor. Bismarck was doubtless well informed as to the progress of the negotiations, for he had established intimate relations with the Hungarians. The pressure at home for completing the work of German unity was so strong that he could with difficulty resist it, and in 1870 he was much embarrassed by a request from Baden to be admitted to the confederation, which he had to refuse. It is therefore not surprising that he eagerly welcomed the opportunity of gaining the goodwill of Spain, and supported by all the means in his power the offer made by Marshal Prim that Prince Leopold of Hohenzollern should be chosen king of that country. It was only by his urgent and repeated representations that the prince was persuaded against his will to accept. The negotiations were

carried out with the greatest secrecy, but as soon as the accept- ance was made known the French government intervened and declared that the project was inadmissible. Bismarck was away at Varzin, but on his instructions the Prussian foreign office in answer to inquiries denied all knowledge or responsibility. This was necessary, because it would have caused a bad impression in Germany had he gone to war with France in support of the prince's candidature. The king, by receiving Benedetti at Ems, departed from the policy of reserve Bismarck himself adopted, and Bismarck (who had now gone to Berlin) found himself in a position of such difficulty that he contemplated resignation. The French, however, by changing and extending their demands enabled him to find a cause of war of such nature that the whole of Germany would be united against French telegram, aggression. France asked for a letter of apology, and Benedetti personally requested from the king a promise that he would never allow the candidature to be resumed. Bismarck published the telegram in which this information and the refusal of the king were conveyed, but by omitting part of the telegram made it appear that the request and refusal had both been conveyed in a more abrupt form than had really been the case. 1 But even apart from this, the publica- tion of the French demand, which could not be complied with, must have brought about a war.

In the campaign of 1870-71 Bismarck accompanied the head- quarters of the army, as he had done in 1866. He was present at the battle of Gravelotte and at the surrender of Sedan, and it was on the morning

of the 2nd of September that he had his famous meeting with Napoleon after the surrender of the emperor. He accompanied the king to Paris, and spent many months at Versailles. Here he was occupied chiefly with the arrangements for admitting the southern states to the confedera- tion, and the establishment of the empire. He also underwent much anxiety lest the efforts of Thiers to bring about an inter- ference by the neutral powers might be successful. He had to carry on the negotiations with the French preliminary to the surrender of Paris, and to enforce upon them the German terms of peace.

For Bismarck's political career after 1870 we must refer to the article Germany, for he was thenceforward entirely absorbed After 1870 * n ˆ e ^^^ °f hi s country. The foreign policy he controlled absolutely. As chancellor he was responsible for the whole internal policy of the empire, and his influence is to be seen in every department of state, especially, however, in the great change of policy after 1878. During the earlier period the estrangement from the Conservatives, which had begun in 1866, became very marked, and brought about a violent quarrel with many of his old friends, which culminated in the celebrated Arnim trial. He incurred much criticism during the struggle with the Roman Catholic Church, and in 1873 he was shot at and slightly wounded by a youth called Rullmann, who pro- fessed to be an adherent of the Clerical party. Once before, in 1866, just before the outbreak of war, his life had been attempted by a young man called Cohen, a native of Wiirttemberg, who wished to save Germany from a fratricidal war. In 1872 he retired from the presidency of the Prussian ministry, but returned after a few months. On several occasions he offered to retire, but the emperor always refused his consent, on the last time with the word " Never." In 1877 he took a long leave of absence for ten months. His health at this time was very bad. In 1878 he presided over the congress of Berlin. The following years were chiefly occupied, besides foreign affairs, which were always his first care, with important commercial reforms, and he held at this time also the office of Prussian minister of trade in addition to his other posts. During this period his relations with the

1 It was not till many years later that our knowledge of these events (which is still incomplete) was established; in 1894 the publication of the memoirs of the king of Rumania showed, what had hitherto been denied, that Bismarck had taken a leading part in urging the election of the prince of Hohenzollern. It was in 1892 that the language used by Bismarck himself made it necessary for the German government to publish the original form of the Ems telegram.

Reichstag were often very unsatisfactory, and at ho time did he resort

so freely to prosecutions in the law-courts in order to injure his opponents, so that the expression Bismarck-Beleidigung was invented. He was engaged at this time in a great struggle with the Social-Democrats, whom he tried to crush by exceptional penal laws. The death of the emperor William in 1888 made a serious difference in his position. He had been bound to him by a long term of loyal service, which had been rewarded with equal loyalty. For his relations to the emperors Frederick and William II., and for the events connected with his dismissal from office in March 1890, we must refer to the articles under those names.

After his retirement he resided at Friedrichsruh, near Hamburg, a house on his Lauenburg estates. His criticisms of the govern- ment, given sometimes in conversation, sometimes in the columns of the Hamburger Nachrichten, caused an open breach between him and the emperor; and the new chancellor, Count Caprivi, in a circular despatch which was afterwards published, warned all German envoys that no real importance must be attached to what he said. When he visited Vienna for his son's wedding the German ambassador, Prince Reuss, was forbidden to take any notice of him. A reconciliation was effected in 1893. In 1895 his eightieth birthday was celebrated with great enthusi- asm: the Reichstag alone, owing to the opposition of the Clericals and the Socialists, refused to vote an address. In 1891 he had been elected a member of the Reichstag, but he never took his seat. He died at Friedrichsruh on the 31st of July 1898. –

Bismarck was made a count in 1865; in 187 1 he received the rank of Fiirst (prince). On his retirement the emperor created him duke of Lauenburg, but he never used the title, which was not inherited by his son. In 1866 he received £60,000 as his share of the donation voted by the Reichstag for the victorious generals. With this he purchased the estate of Varzin in Pomerania, which henceforth he used as a country residence in preference to Schonhausen. In 1871 the emperor presented him with a large part of the domains of the duchy of Lauenburg. On his seventieth birthday a large sum of money (£270,000) was raised by public subscription, of which half was devoted to repurchasing the estate of Schonhausen for him, and the rest was used by him to establish a fund for the assistance of schoolmasters. As a young man he was an officer in the Landwehr and militia, and in addi- tion to his civil honours he was eventually raised to the rank of general. Among the numerous orders he received we may mention that he was the first Protestant on whom the pope be- stowed the order of Christ; this was done after the cessation of the Kulturkampf and the reference of the dispute with Spain concerning the Caroline Islands to the arbitration of the pope.

Bismarck's wife died in 1894. He left one daughter and two sons. Herbert (1840-1904), the elder, was wounded at Mars-le- Tour, afterwards entered the foreign office, and acted as private secretary to his father (1871-1881). In 1882 he became councillor to the embassy at London, in 1884 was transferred to St Peters- burg, and in 1885 became under-secretary of state for foreign affairs. In 1884 he had been elected to the Reichstag, but had to resign his seat when, in 1886, he was made secretary of state for foreign affairs and Prussian minister. He conducted many of the negotiations with Great Britain on colonial affairs. He retired in 1890 at the same time as his father, and in 1893 was again elected to the Reichstag. He married Countess Margarete Hoyos in 1892, and died on the 18th of September 1904. He left two daughters and three sons, of whom the eldest, Otto Christian Archibald (b. 1897), succeeded to the princely title. The second son, Wilhelm, who was president of the province of Prussia, died in 1901. By his wife, Sybilla von Arnim-Krochlen- dorff , he left three daughters and a son, Count Nikolaus (b. 1896).

Authorities. — The literature on Bismarck's life is very extensive, and it is only possible to enumerate a few of the most important books. The first place belongs to his own works. These include his own memoirs, published after his death, under the title Gedanken und Erinnerungen ; there is an English translation, Bismarck: his Reflections and Reminiscences (London, 1898). They are incomplete, but contain very valuable discussions on particular points. : The speeches are of the greatest importance both for his character and for political history; of the numerous editions that by Horst Kbhl, in

12 vols. (Stuttgart, 1892-1894), is the best; there is a cheap edition in Reclam's Universalb'ibliothek. Bismarck was an admirable letter-writer, and numbers of his private letters have been published; a collected edition has been brought out by Horst Kohl. His letters to his wife were published by Prince Herbert Bismarck (Stuttgart, 1900). A translation of a small selection of the private letters was published in 1876 by F. Maxse. Of great value for the years 1851- 1858 is the correspondence with General L. v. Gerlach, which has been edited by Horst Kohl (3rd ed., Berlin, 1893). A selection of the political letters was also published under the title Politische Briefe aus den Jahren 1 849-1 899 (2nd ed., Berlin, 1890). Of far greater importance are the collections of despatches and state papers edited by Herr v. Poschinger. These include four volumes entitled Preussen im Bundestag, 1851-1859 (4 vols., Leipzig, 1882-1885), which contain his despatches during the time he was at Frankfort. Next in import-

ance are two works, Bismarck als Volkswirth and Aktenstiicke zur Wirthschaftspolitik des Fiirsten Bismarck, which are part of the collection of state papers, Akenstilcke zur Gesckichte der Wirthschaftspolitik in Preussen. They contain full information on Bismarck's com- mercial policy, including a number of important state papers. A useful general collection io that by Ludwig Hahn, Bismarck, sein politisches Leben, &c. (5 vols., Berlin, 1878-1891), which includes a selection from letters, speeches and newspaper articles. These collections have only been possible owing to the extreme generosity which Bismarck showed in permitting the publication of documents; he always professed to have no secrets. A full account of the diplo- matic history from 1863 to 1866 is given by Sybel in Die Begrundung des deutschen Reichs (Munich, 1889-1894), written with the help of the Prussian archives. The last two volumes, covering 1866-1870, are of less value, as he was not able to use the archives for this period. Poschinger has also edited a series of works in which anecdotes, minutes of interviews and conversations are recorded; they are, however, of very unequal value. They are Bismarck und die Parlamentarier, Fiirst Bismarck und der Bundesrath, Die An- sprache des Filrsten Bismarck, Neue Tischgesprdche, and Bismarck und die Diplomaten. Selections from these have been published in English by Charles Lowe, The Tabletalk of Prince Bismarck, and by Sidney Whitman, Conversations with Bismarck. By far the fullest guide to Bismarck's life is Horst Kohl's Fiirst Bismarck, Regesten zu einer wissenschaftlichen Biographie (Leipzig, 1891-1892), which contains a record of Bismarck's actions on each day, with references to and extracts from his letters and speeches. For the works of Moritz Busch, which contain graphic pictures of his daily life, see the article Busch. Further materials were published periodically in the Bismarck- Jahrbuch, edited by Horst Kohl (Berlin, 1894-1896; Stuttgart, 1897-1899). Herr v. Poschinger also brought out a Bismarck Portfeuille. Of German biographies may be mentioned Hans Blum, Bismarck und seine Zeit (6 vols., Munich, 1894-1895), with a volume of appendices, &c. (1898); Heyck, Bismarck (Biele- feld, 1898); Kreutzer, Otto von Bismarck (2 vols., Leipzig, 1900); Klein- Hattingen, Bismarck und seine Welt, 1815-1871, Bd. i. (Berlin, 1902) ; Lenz, Geschichte Bismarcks (Leipzig, 1902) ; Penzler, Fiirst Bismarck nach seiner Entlassung (7 vols., ib. 1897-1898); Liman, one volume under the same title (ib. 1901). There are English biographies by Charles Lowe, Bismarck, a Political Biography (revised edition in 1 vol., 1895), by James Headlam (1899), and by F.Stearns (Philadelphia, 1900). A useful bibliography of all works on Bismarck up to 1895 is Paul Schulze and Otto Roller's Bismarck- Literatur (Leipzig, 1896). . . (J.W. He.)

BISMARCK, the capital of North Dakota, U.S.A., and the county-seat of Burleigh county, on the E. bank of the Missouri river, in the S. central part of the state. Pop. (1890) 2186; (1900) 3319, of whom 746 were foreign-born; (1905) 4913; (1910) 5443. It is on the main line of the Northern Pacific, and on the Minneapolis, St Paul & Sault Ste Marie railways; and steamboats run from here to Mannhaven, Mercer county, and Fort Yates, Morton county. The city is about 1650 ft. above sea-level. It contains the state capitol, the state penitentiary, a U.S. land office, a U.S. surveyor-general's office, a U.S. Indian school and a U.S. weather station; about a mile S. of the city is Fort Lincoln, a United States army post. Bismarck is the headquarters for navigation of the upper Missouri river, is situated in a good agricultural region, and has a large wholesale trade, shipping grain, hides, furs, wool and coal. It was founded in 1873, and was chartered as a city in 1876; from 1883 to 1889 it was the capital of Dakota Territory, on the division of which it became the capital of North Dakota.

BISMARCK ARCHIPELAGO, the collective name of a large number of islands lying N. and N.E. of New Guinea, between i° and 7 S., and 146 and 153° E., belonging to Germany. The largest island is New Pomerania, and the archipelago also includes New Mecklenburg, New Hanover, with small attendant islands, the Admiralty Islands and a chain of islands oS the

coast of New Guinea, the whole system lying in the form of a great amphitheatre of oval shape. The archipelago was named in honour of the first chancellor of the German empire, after a German protectorate had been declared in 1884. (See Admiralty Islands, New Mecklenburg, New Pomerania, New Guinea.)

BISMILLAH, an Arabic exclamation, meaning " in the name of God."

BISMUTH, a metallic chemical element; symbol Bi, atomic weight 208-5 (0= 16). It was probably unknown to the Greeks and Romans, but during the middle ages it became quite familiar, notwithstanding its frequent confusion with other metals. In 1450 Basil Valentine referred to it by the name " wismut," and characterized it as a metal; some years later Paracelsus termed it " wissmat," and, in allusion to its brittle nature, affirmed it to be a "bastard" or "half-metal"; Georgius Agricola used the form " wissmuth," latinized to " bisemutum," and also the term " plumbum cineareum." Its elementary nature was imperfectly understood; and the impure specimens obtained by the early chemists explain, in some measure, its confusion with tin, lead, antimony, zinc and other metals; in 1595 Andreas Libavius confused it with antimony, and in 1675 Nicolas Lemery with

zinc. These obscurities began to be finally cleared up with the researches of Johann Heinrich Pott (1692- 1777), a pupil of Stahl, published in his Exercitationes chemicae de Wismutho (1769), and of N. Geoffroy, son of Claude Joseph Geoffroy, whose contribution to our knowledge of this metal appeared in the Memoir es de I'academie fran $aise for 1753. Torbern Olof Bergman reinvestigated its properties and deter- mined its reactions; his account, which was published in his Opuscula, contains the first fairly accurate description of the metal.

Ores and Minerals. — The principal source of bismuth is the native metal, which is occasionally met with as a mineral, usually in reticulated and arborescent shapes or as foliated and granular masses with a crystalline fracture. Although bismuth is readily obtained in fine crystals by artificial means, yet natural crystals are rare and usually indistinct: they belong to the rhombohedral system and a cube-like rhombohedron with interfacial angles of 92 20′ is the predomi- nating form. There is a perfect cleavage perpendicular to the trigonal axis of the crystals: the fact that only two (opposite) corners of the cube-like crystals can be truncated by cleavage at once distinguishes them from true cubes. When not tarnished, the mineral has a silver- white colour with a tinge of red, and the lustre is metallic. Hardness 2-2J; specific gravity 9-70-9-83. The slight variations in specific gravity are due to the presence of small amounts of arsenic, sulphur or tellurium, or to enclosed impurities.

Bismuth occurs in metalliferous veins traversing gneiss or clay-slate, and is usually associated with ores of silver and cobalt. Well-known localities are Schneeberg in Saxony and Joachims thai in Bohemia; at the former it has been found as arborescent groups penetrating brown jasper, which material has occasionally been cut and polished for small ornaments. The mineral has been found in some Cornish mines and is fairly abundant in Bolivia (near Sorata, and at Tasna in Potosi). It is the chief commercial source of bismuth.

The oxide, bismuth ochre, Bi_2O_3, and the sulphide, bismuth glance or bismuthite, are also of commercial importance. The former is found, generally mixed with iron, copper and arsenic oxides, in Bohemia, Siberia, Cornwall, France (Meymac) and other localities; it also occurs admixed with bismuth carbonate and hydrate. The hydrated carbonate, bismutite, is of less importance; it occurs in Cornwall, Bolivia, Arizona and else- where.

Of the rarer bismuth minerals we may notice the following: — the complex sulphides, copper bismuth glance or wittichenite, $BiCu_3S_3$, silver bismuth glance, bismuth cobalt pyrites, bismuth nickel pyrites

or saynite, needle ore (patrinite or aikinite), $BiCuPbS_3$, emplectite, $CuBiS_2$, and kobellite, $BiAsPb_3S_6$; the sulphotelluride tetradymite; the selenide guanajuatite, Bi_2Se_3,

the basic tellurate montanite, $Bi_2(OH)_4Te_04$; the silicates eulytite and agricolite, Biˆ SiQiˆ; and the uranyl arsenate walpurgite, $Bi(U0_2)_3(OH)$ M $(As0_4)_4$.

Metallurgy. — Bismuth is extracted from its ores by dry, wet, or electro-metallurgical methods, the choice depending upon the composition of the ore and economic conditions. The dry process is more frequently practised, for the easy reducibility of the oxide and sulphide, together with the low melting-point of the metal, renders it possible to effect a ready separation of the metal from the gangue and impurities. The extraction from ores in which the bismuth is present in the metallic condition may be accomplished by a simple liquation, or melting, in which the temperature isvjust . sufficient to melt the bismuth, or by a complete fusion of the ore. The first process never extracts all the bismuth, as much as one- third being retained in the matte or speiss; the second is more satisfactory, since the extraction is more complete, and also allows the addition of reducing agents to decompose any admixed bismuth oxide or sulphide. In the liquation process the ore is heated in inclined cylindrical retorts, and the molten metal is tapped at the lower end ; the residues being removed from the upper end. The fusion process is preferably carried out in crucible furnaces; shaft furnaces are unsatisfactory on account of the disintegrating action of the molten bismuth on the furnace linings.

Sulphuretted ores are smelted, either with or without a preliminary calcination, with metallic iron; calcined ores may be smelted with carbon (coal). The reactions are strictly analogous to those which occur in the smelting of galena (see Lead), the carbon reducing any oxide, either present originally in the ore or produced in the calcination, and the iron combining with the sulphur of the bismuthite. A certain amount of bismuth sulphate is always formed during the calcination; this is subsequently reduced to the sulphide and ultimately to the metal in the fusion. Calcination in reverberatory furnaces and a subsequent smelting in the same type of furnace with the addition of about_3 % of coal, lime, soda and fluorspar, has been adopted for treating the Bolivian, ores, which generally contain the sulphides of bismuth, copper, iron, antimony, lead and a little silver.

The lowest layer of the molten mass is principally metallic bismuth, the succeeding layers are a bismuth copper matte, which is subsequently worked up, and a slag. Ores containing the oxide and carbonate are treated either by smelting with carbon or by a wet process.

In the wet process the ores, in which the bismuth is present as oxide or carbonate, are dissolved out with hydrochloric acid, or, if the bismuth is to be extracted from a matte or alloy, the solvent employed is aqua regia or strong sulphuric acid. The solution of metallic chlorides or sulphates so obtained is precipitated by iron, the metallic bismuth filtered, washed with water, pressed in canvas bags, and finally fused in graphite crucibles, the surface being pro- tected by a layer of charcoal. Another process consists in adding water to the solution and so precipitating the bismuth as oxy- chloride, which is then converted into the metal.

The crude metal obtained by the preceding processes is generally contaminated by arsenic, sulphur, iron, nickel, cobalt and antimony, and sometimes with silver or gold. A dry method of purification consists in a liquation on a hearth of peculiar construction, which occasions the separation of the unreduced bismuth sulphide and the bulk of the other impurities. A better process is to remelt the metal in crucibles with the addition of certain refining agents. The details of this process vary very considerably, being conditioned by the composi- tion of the impure metal and the practice of particular works. The wet refining process is more tedious and expensive, and is only exceptionally employed, as in the case of preparing the pure metal or its salts for pharmaceutical or chemical purposes. The basic nitrate is the salt generally prepared, and, in general outline, the process consists in dissolving the metal in nitric acid, adding water to the solution, boiling the precipitated basic nitrate with ah alkali to remove the arsenic and lead, dissolving the residue in nitric acid, and reprecipitating as basic nitrate with water. J. F. W. Hampe prepared chemically pure bismuth by fusing the metal with sodium carbonate and sulphur, dissolving the bismuth sulphide so formed in nitric acid, precipitating the bismuth as the basic nitrate, re- dissolving this salt in nitric acid, and then precipitating with ammonia. The bismuth hydroxide so obtained is finally reduced by hydrogen.

Properties. — Bismuth is a very brittle metal with a white crystal- line fracture and a characteristic reddish-white colour. It crystal- lizes in rhombohedra belonging to the hexagonal system, having interfacial angles of 87 ° 40’. According to G. Wˆ A. Kahlbaum, Roth and Siedler (Zeil. Anorg. Chem. 29, p. 294), its specific gravity is 9-78143;

Roberts and Wrightson give the specific gravity of solid bismuth as 9-82, and of molten bismuth as 10-055. It therefore expands on solidification; and as it retains this property in a number of alloys, the metal receives extensive application in forming type-metals. Its melting-point is variously given as 268-3° (F- Rudberg and A. D. von Riemsdijk) and 270-5° (C. C. Person); commercial bismuth melts at 260° (Ledebur), and electrolytic bismuth at 264° (Classen). It vaporizes in a vacuum at 292°, and its boiling-point, under atmospheric pressure, is between 1090° and 1450° (T. Carnelley and W. C. Williams). Regnault determined its

specific heat between 0° and ioo° to be 0-0368 ;' Kahlbaum, RotH and Siedler (loc. cit.) give the value 0-03055. Its thermal conductivity is the lowest of all metals, being 18'as compared with silver as 10*00; its coefficient of expansion between 0° and 100° is 0-001341.. Its electrical conductivity is approximately 1-2, silver at 0°' being taken as 100; it is the most diamagnetic substance known, and its therrrio-electric properties render it especially valuable for the construction of thermopiles. ■' ' ■;

The metal oxidizes very slowly in dry air at ordinary temperatures; but somewhat more rapidly in moist air or when heated. ' • Jn the last case it becomes coated with a greyish-black layer of ' an oxidfe (dioxide (?)),at a red heat the layer consists of the trioxide (Bi 2 p 3); and is yellow or green in the case of pure bismuth, 1 and Violet or'blue if impure; at a bright red heat it burns with a bluish flame to the trioxide. Bismuth combines directly with the halogens, and the' elements of the sulphur group. It readily dissolves, in nitric acid, aqua regia, and hot sulphuric acid, but tardily in hot hydrochloric acid. It is precipitated as the metal from solutions of its salts by the metals of the alkalis and alkaline earths, 'zinc; iron, copper, &C; In its ;chem»cal affinities it resembles arsenic and antimony; an important distinction is that it forms no hydrogen' /compound analogous to arsine and stibine. ' '•' , V '.""

Alloys. — -Bismuth readily forms alloys with other metals. Treated with sodammonium it yields a bluish-black mass, BiN;a 3 , which takes fire in the air and decomposes water. A brittle potassium alloy of silver-white colour and lamellar fracture is obtained by calcining 20 parts of bisfriuth with 16 of crearn'of tartar, a*t a strong red heat. When present in other 'metals, even in very Small quantity, bismuth renders them brittle and impairs their electrical conductivity.' With mercury it forms amalgams. Bismuth is a component of many ternary alloys characterized by their "low fusibility and expansion in solidification; many ' of them are used in : the arts (see FusiBtE

Metal),; ”’ ■■’ ‘■ : ‘ ‘ : ‘ ‘ ‘

Compounds. — Bismuth forms four oxides, of which the trioxide, Bi 2 3 , is the most important. This compound occurs in nature as bismuth ochre, and may be prepared artificially by oxidizing the metal at a red heat, or by heating the carbonate, nitrate’ .or hydrate; .Thus obtained it is a’ yellow powder, soluble, in’ the mineral acids to form soluble salts, which are readily precipitated as basic salts ;When the solution is diluted. It melt? to a reddish-brown liquid, , which solidifies to a yellow crystalline mass’ori cooling. The hydrate, Bi(OH) 3 , is obtained as a white powder by adding potash to a solution of a bismuth salt. Bismuth dioxide, BiO or Bi 2 2 , is said to be formed by the limited oxidation of the metal, and as a brown pre- cipitate by adding mixed solutions of bismuth and stannous chlorides to a solution of caustic potash. Bismuth tetroxide, Bi 2 04, sometimes termed bismuth bismuthate, is obtained by melting bismuth ,tfioxide with potash, or by igniting bismuth trioxide with potash and potas- sium chlorate. It is also formed ‘by oxidizing bismuth trioxide suspended in caustic potash with chlorine.‘thepentoxide being formed simultaneously; oxidation and, potassium ferricyanide simply gives the tetroxide (Hauser and Vanino, Zeit. Anorg. Chem., 1904,39, p.381). The hydrate, Bi 2 Cv2H 2 0, is also known. Bismuth pentoxide, Bi 2 C 6 , is obtained by heating bismuthic acid, HBi0 3 ; to 130° C. ; this acid (in the form of its salts) being the product of the continued oxidation of an alkaline solution of bismuth trioxide.

Bismuth forms two chlorides : BiCl 2 and BiCl 3 . The dichloride, BiCl 2 , is obtained as a brown crystalline powder by fusing the metal with the trichloride, or in a current of chlorine, or by heating the metal with calomel to 250°. Water decomposes it to metallic bismuth and the oxychloride, BiOCl. Bismuth trichloride, BiCl 3 , was obtained by Robert Boyle by heating the metal with corrosive sublimate. It is the final product of burning bismuth in an excess of chlorine. It is a white substance, melting at 225°-230° and boiling at 435°-44l°. With excess of water, it gives a white pre- cipitate of the oxychloride, BiOCl. Bismuth trichloride forms double compounds with hydrochloric acid, the chlorides of the alkaline metals, ammonia, nitric oxide and nitrosyl chloride. Bismuth tri- fluoride, BiF 3 , a white powder, bismuth tribromide, BiBr 8 , golden yellow crystals, bismuth iodide, Bil 3 , greyish-black crystals, are also known. These compounds closely resemble the trichloride in their methods of preparation and their properties, forming oxyhaloids with water, and double compounds with ammonia, &c.

Carbonates. — The basic carbonate, 2(BiO) 2 C0 3 -H 2 0, obtained as

a white precipitate when an alkaline carbonate is added to a solution of bismuth nitrate, is employed in medicine. Another basic carbonate, 3(BiO) 2 C0 3 -2Bi(OH) 3 -3H 2 0, constitutes the mineral bismutite.

Nitrates. — The normal nitrate, Bi(N0 3) 3 5H 2 0, is obtained in large transparent asymmetric prisms by evaporating; a solution of the metal in nitric acid. The action of water on this solution pro duces a crystalline precipitate of basic nitrate, probably Bi(QH) 2 N0 3 , though it varies with the amount of water employed. This pre- cipitate constitutes the ” magistery of bismuth ” or ” subnitrate of bismuth ” of pharmacy, and under the name of pearl white, blanc d’Espagne or blanc de fard has long been used as a cosmetic.

Sulphides. — Bismuth combines directly with ‘ sulphur to form, a disulphide, BisSi, and a trisulphide, Bi 2 S 3 ,, the latter compound being formed when the sulphur is in excess. A hydrated disulphide,’ Bi 2 S 2 -2H 2 0, is obtained by passing sulphuretted hydrogen into a solution of bismuth nitrate and stannous chloride. Bismuth

bisulphide is a grey metallic substance, which is decomposed by hydrochloric acid with the separation of metallic bismuth and the formation of bismuth trichloride. Bismuth trisulphide, Bi 2 S3, constitutes, the mineral hismuthite, and may be prepared by direct union of its constituents, or as a brown precipitate by passing sulphuretted hydrogen into a solution of a bismuth salt. It is, easily soluble in nitric acid. When heated to 200° it assumes the crystalline form of bismuthite. Bismuth forms several oxysulphides : B14O3S constitutes the mineral karelinite found at the Zavodinski mine in the Altai ;Bi 6 OaS4, and Bi 2 O s S have been prepared artificially. Bismuth also forms the sulphohaloids, BiSCl, BiSBr, BiSI, analogous to the oyxhaloids.

Bismuth sulphate, Bi 2 (S04)s, is obtained as a white powder by dissolving the metal or sulphide in concentrated sulphuric acid. Water decomposes it, giving a basic salt, Bi 2 (S04)(OH)4, which on heating gives (BiO) 2 S04. Other basic salts are known, ‘■ Bismuth forms compounds similar to the trisulphide with the elements selenium and tellurium. The tritelluride constitutes the mineral tetradymite, Bi 2 Te3. ‘

4»ˆTraces of bismuth may be detected by treating the solution with

excess of tartaric acid, potash and stannous chloride,, a precipitate or dark colpration of bismuth oxide being formed' even when only one part of bismuth is present in 20,000 of water. The: blackish brown sulphide precipitated from bismuth salts by sulphur- etted hydrogen is insoluble in ammonium sulphide, but is readily dissolved by nitric acid, The metal can be reduced by magnesium, 2inc, cadmium, iron, tin, copper and substances like hypo-' phosphorous acid- from acid solutions or froffi alkaline ones by : formaldehyde. In quantitative estimations, it is generally weighed as: oxide, after precipitation as sulphide or carbonate, or in the; metallic form, reduced as above.

; Pharmacology. — The salts of bismuth are feebly antiseptic. Taken 'internally the subnitrate, coming into contact with water, tends to decompose, gradually liberating nitric acid, one of the most, powerful antiseptics. The physical properties of the powder also give it a mild astringent action. There are no remote actions.

Tfkrapcutics.— -The subnitrate of bismuth is invaluable in certain cases of dyspepsia, and still more notably so in diarrhoea. It owes its value to the decomposition described above, by means of which a powerful antiseptic action is safely and continuously exerted. There is hardly a safer drug. It may be given in drachm doses with impunity. It colours the faeces black owing to the formation of sulphide.

BISMUTHITE, a somewhat rare mineral, consisting of bismuth trisulphide, Bi 2 S3. It crystallizes in the orthorhombic system and is ispmorphous with stibnite (Sb2S 3) , which it closely resembles in appearance. It forms loose interlacing aggregates of acicular crystals without terminal faces (only in a single instance has a terminated crystal been observed), or as masses with a foliated or fibrous structure. An important character is the perfect: cleavage in one direction parallel to the length of the needles.: The colour is lead-grey inclining to tin-white and often with a yellowish or iridescent tarnish. The hardness is 2; specific; grayity 6/4-6'S- Bismuthite occurs at several localities in, Cornwall and Bolivia, often in association with native bismuth: and tin-ores. Other localities are known; for instance, Brandy Gill in Caldbeck Fells, Cumberland, where with molybdenite and apatite it is embedded in white quartz. The mineral was known to A. Cronstedt in 1758, and was named bismuthine by F. S. Beudant in 1832. This name, which is also used in the forms Bismuthite and bismuthinite, is rather unfortunate, since it is : readily confused with bismite (bismuth oxide) and bismutitc (basic bismuth carbonate), especially as the latter has also been; used in the form bismuthite. The name bismuth-glance or, bismutholamprite for the species under consideration is free from this objection. (L. J.S.)

BISMYA, a group of ruin mounds, about 1 m. long and 5 m. wide, consisting of a number of low ridges, nowhere exceeding 40 ft. in height, lying in the Jezireh, somewhat nearer to the Tigris than the Euphrates, about a day's journey to the south-east of Nippur, a little below 32° N. and about 45° 40′ E. Excavations conducted here for six months, 'from Christmas of 1903 to June 1904, for the university of Chicago, by Dr Edgar J. Banks, proved that these' mounds covered the site of the ancient city of Adab (Ud-Nun), hitherto known only from a brief mention of its name in the introduction. to the Khammurabi code (e. 2250 B.C.). The city was divided into two parts by a canal, on an island in ■which stood the temple, E-mach, with a ziggurat, or stage tower. It was evidently once a city of considerable importance, but

deserted at a very early peripd, since the ruins found close to the surface of the mounds belong to Dungi and Ur Gur, kings of Ur in the earlier part of the third millennium B.C. Immediately below these, as at Nippur, were found the remains of Naram-Sin and Sar-gpn, c. 3000 B.C. Below these there were still 35 ft. of stratified remains, constituting seven-eighths of the total depth of the ruins. Besides the remains of buildings, walls, graves, &c, Dr Banks discovered a large number of inscribed clay tablets of a very early period, bronze and stone tablets, bronze implements and the like. But the two most nptable discoveries were a complete statue in white marble, apparently the most ancient yet found in Babylonia (now in the museum in Cpnstantinpple), bearing the inscription—" E-mach, King Da-uclu, King of, Ud-Nun "; and a temple refuse heap, consisting of great quantities of fragments of vases in marble, alabaster, onyx, porphyry and granite, some of which were inscribed, and others engraved and inlaid with ivory and precious stones. ' (J. P. Pe.)

' BISON, the name of the one existing species of European wild ox, Bos (Bison) bonasus, known in Russian as zubr. Together with the nearly allied New World animal known in Europe as the (North) American bison, but in its own country as " buffalo," and scientifically as Bos (Bison) bison, the bison represents a group of the ox tribe distinguished from other species by the greater breadth and convexity of the forehead, superior length of limb, and the longer spinal processes of the dorsal vertebrae, which, with the powerful muscles attached for the support of the massive head, form a protuberance or hump on the shoulders. The bisons have also fourteen pairs of ribs, while the common ox has only thirteen. The forehead and neck of both species are covered with long, shaggy hair of a dark brown colour; and in winter the whole of the neck, shoulders and hump are similarly clothed, so as to form a curly, felted mane. This mane in the European species disappears in summer; but in the American bison it

is to a considerable extent persistent.

The bison is now the largest European quadruped, measuring about 10 ft. long, exclusive of the tail, and standing nearly 6 ft. high. Formerly it was abundant throughout Europe, as is proved by the fossil remains of this or a closely allied form found on the continent and in . England, associated with those of the extinct mammoth and rhinoceros. Caesar mentions the bison as abounding, along with the extinct aurochs or wild ox, in the forests of Germany and Belgium, where it appears to have been occasionally captured and afterwards exhibited alive in the Roman amphitheatres. At that period, and long after, it seems to have been common throughout central Europe, as we learn from the evidence of Herberstein in the 16th century. Nowadays bison are found in a truly wild condition only in the forests of the Caucasus, where they are specially protected by the Russian government. There is, however, a herd, somewhat in the condition of park-animals, in the forest of Byelovitsa, in Lithu- ania, where it is protected by the tsar, but nevertheless is gradually dying out. In 1862 the Lithuanian bisons numbered over 1200, but by 1872 they had diminished to 528, and in 1892 there were only 491. The prince of Pless has a small herd at Promnitz, his Silesian estate, founded by the gift of a bull and three cows by Alexander II. in 1855, his herd being the source of the menagerie supply.

Bison feed on a coarse aromatic grass, and browse on the leaves, shoots, bark and twigs of trees;

The American bison is distinguished from its European cousin by the following among other features: The hind-quarters are weaker and fall away more suddenly, while the withers are proportionately higher. Especially characteristic is the great mass of brown or blackish brown hair clothing the head, neck and forepart of the body. The shape of the skull and horns is also different; the horns themselves being shorter, thicker, blunter and more sharply curved, while the forehead of the skull is more convex and the sockets of the eyes are more distinctly tubular. This species formerly ranged over a third of North America in countless numbers, but is now practically extinct. The great herd was separated into a northern and

southern division by the completion of the Union Pacific railway, and the annual rate of destruction from 1870 to 1875 has been estimated

at 2,500,000 head. In 1880 the completion of the Northern Pacific railway led to an attack upon the northern herd. The last of the Dakota bisons were destroyed by Indians in 1883, leaving then less than 1000 wild individuals in the United States.

A count which was concluded at the end of February 1903, put the number of captive bisons at 11 19, of which 969 were in parks and zoological gardens in the United States, 41 in Canada and 109 in Europe. At the same time it was estimated that there were 34 wild bison in the United States and 600 in Canada.

In England small herds are kept by the duke of Bedford at Woburn Abbey, Bedfordshire, and by Mr C. J. Leyland at Haggerston Castle, Northumberland.

Two races of the American bison have been distinguished — the typical prairie form, and the woodland race, B. bison athabascae; but the two are very similar. (R. L.*)

BISQUE (a French word of unknown origin, formerly spelt in English “bisk”), a term for odds given in the games of tennis, lawn tennis, croquet and golf; in the two former a bisque is one point to be taken at any time during a ” set ” at the choice of the receiver of the odds, while in croquet and golf it is one extra stroke to be taken similarly during a game. The name is given, in cookery, to a thick soup, made particularly of crayfish or lobsters.

BISSELL, GEOBGE EDWIN (1839-), American sculptor, son of a quarryman and marble-cutter, was born at New Preston, Connecticut, on the 16th of February 1839. During the Civil War he served as a private in the 23rd Connecticut volunteers in the Department of the Gulf (1862-1863), and on being mustered out became acting assistant paymaster in the South Atlantic squadron. At the close of the war he joined his father in business. He studied the art of sculpture abroad in 1875-1876, and lived much in Paris during the years 1883-1896, with occasional visits to America. Among his more important works are the soldiers’ and sailers’ monument, and a statue of Colonel Chatfield, at Waterbury, Connecticut; and statues of General Gates at Saratoga, New York, of Chancellor John Watts in Trinity churchyard, New York City; of Colonel Abraham de Peyster in Bowling Green, New York City; of Abraham Lincoln at Edinburgh; of Burns and “Highland Mary,” in Ayr, Scotland; of Chancellor James Kent, in the Congressional library, Washington; and of President Arthur in Madison Square, New York City.

BISSEXT, or Bissextus (Lat. Ms, twice; sextus, sixth), the day intercalated by the Julian calendar in the February of every fourth year to make up the six hours by which the solar year was computed to exceed the year of 365 days. The day was inserted after the 24th of February, i.e. the 6th day before the calends (1st) of March; there was consequently, besides the sextus, or sixth before the calends, the bis-sextus or ” second sixth,” our 25th of February. In modern usage, with the exception of ecclesiastical calendars, the intercalary day is added for con- venience at the end of the month, and years in which February has 29 days are called ” bissextile,” or leap-years.

BISTRE, the French name of a brown paint made from the soot of wood, now largely superseded by Indian ink.

BIT (from the verb ” to bite,” either in the sense of a piece bitten off, or an act of biting, or a thing that bites or is bitten), generally, a piece of anything; the word is, however, used in various special senses, all derivable from its origin, either literally or metaphorically. The most common of these are (1) its use as the name of various tools, e.g. centre-bit; (2) a horse’s ” bit,” or the metal mouth-piece of the bridle; (3) in money, a small sum of money of varying value (e.g. threepenny-bit), especially in the West Indies and southern United States:

BITHUR, a town in the Cawnpore district of the United Provinces of India, 12 m. N.W. of Cawnpore city. Pop. (1901) 7173. It is chiefly notable for its connexion with the mutiny of 1857. The last of the peshwas, B a ji Rao, was banished to Bithur, and his adopted son, the Nana Sahib, made the town his head-

quarters. It was captured by Hayelock on the 19th of July 1857, when the Nana’s palaces were destroyed.

BITHYNIA (Bidvvla), an ancient district in the N.W. of Asia Minor, adjoining the Propontis, the Thracian Bosporus and the Euxine. According to Strabo it was bounded on the . E. by the river Sangarius; but the more commonly received division extended it to the Parthenius, which separated it from Paphlagonia, thus comprising the district inhabited by the Mariandyni. On the W. and S.W. it was separated from Mysia by the river Rhyndacus; and on the S. it adjoined Phrygia Epictetus and Galatia. It is in great part occupied by moun- tains and forests, but has valleys and districts near the sea-coast of great fertility. The most important mountain range is the (so-called) ” Mysian ” Olympus (7600 ft.), which towers above Brusaandis clearly visible as far away as Constantinople (70 m.). Its summits are covered with snow for a great part of the year. East of this the range

now called Ala-Dagh extends for above 100 m. from the Sangarius to Paphlagonia. Both of these ranges belong to that border of mountains which bounds the great table- land of Asia Minor. The country between them and the coast, covered with forests and traversed by few lines of route, is still imperfectly known. But the broad tract which projects towards the west as far as the shores of the Bosporus, though hilly and covered with forests — the Turkish Aghatch Denizi, or “The Ocean of Trees ” — is not traversed by any mountain chain. The west coast is indented by two deep inlets, (1) the northernmost, the Gulf of Ismid (anc. Gulf of Astacus), penetrating between 40 and 50 m. into the interior as far as Ismid (anc. Nicomedia), separated by an isthmus of only about 25 m. from the Black Sea; (2) the Gulf of Mudania or Gemlik (Gulf of Cius), about 25 m. long. At its extremity is situated the small town of Gemlik (anc. Cius) at the mouth of a valley, communicating with the lake of Isnik, on which was situated Nicaea.

The principal rivers are the Sangarius (mod. Sakaria), which traverses the province from south to north; the Rhyndacus, which separated it from Mysia; and the Billaeus (Filiyas), which rises in the Ala-Dagh, about 50 m. from the sea, and after flowing by Boli (anc. ClaudiopoHs) falls into the Euxine, close to the ruins of the ancient Tium, about 40 m. north-east of Heraclea, having a course of more than 100 m. The Parthenius (mod. Bartan), the boundary of the province towards the east, is a much less considerable stream.

Thenaturalresources of Bi thynia are still imperfectly developed. Its vast forests would furnish an almost inexhaustible supply of timber, if rendered accessible by roads. Coal also is known to exist near Eregli (Heraclea). The valleys towards the Black Sea abound in fruit trees of all kinds, while the valley of the Sangarius and the plains near Brusa and Isnik (Nicaea) are fertile and well cultivated. Extensive plantations of mulberry trees supply the silk for which Brusa has long been celebrated, and which is manufactured there on a large scale.

According to ancient authors (Herodotus, Xenophon, Strabo, &c), the Bithynians were an immigrant Thracian tribe. The existence of a tribe called Thyni in Thrace is well attested, and the two cognate tribes of the Thyni and Bithyni appear to have settled simultaneously in the adjoining parts of Asia, where they expelled or subdued the Mysians, Caucones, and other petty tribes, the Mariandyni alone maintaining themselves in the north- east. Herodotus mentions the Thyni and Bithyni as existing side by side; but ultimately the latter must have become the more important, as they gave their name to the country. They were incorporated by Croesus with the Lydian monarchy, with

which they fell under the dominion of Persia (546 B.C.), and were included in the satrapy of Phrygia, which comprised all the countries up to the Hellespont and Bosporus. But even before the conquest by Alexander the Bithynians appear to have asserted their independence, and successfully maintained it under two native princes, Bas and Zipoetes, the last of whom transmitted his power to his son Nicomedes I., the first to assume the title of king. This monarch founded Nicomedia, which soon rose to great prosperity, and during his long reign (278-250 B.C.), as well as those of his successors, Prusias I.,

Prusias II, and Nicomedes II. (149-91 B.C.), the kingdom of Bithynia held a considerable place among the minor monarchies of Asia. But the last king, Nicomedes III., was unable to maintain himself against Mithradates of Pontus, and, after being restored to his throne by the Roman senate, he bequeathed his kingdom by will to the Romans (74 B.C.). Bithynia now became a Roman province. Its limits were frequently varied, and it >yas commonly united for administrative purposes with the province of Pontus. This was the state of things in the time of Trajan, when the younger Pliny was appointed governor of the combined provinces (103-105 a.d.), a circumstance to which we are indebted for valuable information concerning the Roman provincial administration. Under the Byzantine empire Bithynia was again divided into two provinces, separated by the Sangarius, to the west of which the name of Bithynia was restricted.

The most important cities were Nicomedia and Nicaea, which disputed with one another the rank of capital. Both of these were founded after Alexander the Great; but at a much earlier period the Greeks had established on the coast the colonies of Cius (afterwards Prusias, mod. Gemlik) ; Chalcedon, at the entrance of the Bosporus, nearly opposite Constantinople; and Heraclea Pontica, on the Euxine, about 120 m. east of the Bos- porus. All these rose to be flourishing places of trade, as also Prusa at the foot of M. Olympus (see Brusa). The only other places of importance at the present day are Ismid (Nicomedia) and Scutari.

. See C. Texier, Asie Mineure (Paris, 1839); G. Perrot, Galatie et Bithynie (Paris, 1862); W. von Diest in Petermanns Mittheilungen, Erganzungsheft, 116 (Gotha, 1895). (E. H. B.; F. W. Ha.)

BITLIS, or Betlis (Arm. Paghesh), the chief town of a vilayet of the

same name in Asiatic Turkey, situated at an altitude of 4700 ft., in the deep, narrow valley of the Bitlis Chai, a tributary of the Tigris. The main part of the town and the bazaars are crowded alongside the stream, while suburbs with scattered houses among orchards and gardens extend up two tributary streams. The houses are massive and well built of a soft volcanic tufa, and with their courtyards and gardens climbing up the hillsides afford a striking picture. At the junction of two streams in the centre of the town is a fine old castle, partly ruined, which, according to local tradition, occupies the site of a fortress built by Alexander the Great. It is apparently an Arab building, as Arabic inscriptions appear on the walls, but as the town stands on the principal highway between the Van plateau and the Mesopotamian plain it must always have been of strategic importance. The bazaars are crowded, covered across with branches in summer, and typical of a Kurdish town. The population numbers 35,000, of whom about 12,000 are Armenians and the remainder are Kurds or of Kurdish descent.

Kurdish beys and sheiks have much influence in the town and wild mountain districts adjoining, while the Sasun moun- tains, the scene of successive Armenian revolutions of late years, are not far off to the west. The town was ruled by a semi- independent Kurdish bey as late as 1836. There are some fine old mosques and medresses (colleges), and the Armenians have a large monastery and churches. There are British, French and Russian consuls in the town, and a branch of the American Mission with schools is established also. The climate is healthy and the thermometer rarely falls below o° Fahr., but there is a heavy snowfall and the narrow streets are blocked for some five months in the year.

A good road runs southward down the pass, passing after a few miles some large chalybeate and sulphur springs. Roads also lead north to Mush and Erzerum and along the lake to Van. Postal communication is through Erzerum with Trebizond. Tobacco of an inferior quality is largely grown, and the chief industry is the weaving of a coarse red cloth. Manna and gum tragacanth are also collected. Fruit is also plentiful, and there are many vineyards close by.

The Bitlis vilayet comprises a very varied section of Asiatic Turkey, as it includes the Mush plain and the plateau country west of Lake Van, as well as a large extent of wild mountain

districts inhabited by turbulent Kurds and Armenians on either side of the central town of Bitlis, also some of the lower country about Sairt along the left bank of the main stream of the Tigris. The mountains

have been little explored, but are believed to be rich in minerals, iron, lead, copper, traces of gold and many mineral springs are known to exist. (F. R. M.)

BITONTO (anc. Butunti), a town and episcopal see of Apulia, Italy, in the province of Bari, 10 m. west by steam tramway fromBari. Pop. (1901) 30,617. It was a place of no importance in classical times. Its medieval walls are still preserved. Its cathedral is one of the finest examples of the Romanesque archi- tecture of Apulia, and has escaped damage from later restorations. The palazzo Sylos-Labini has a fine Renaissance court of 1502.

BITSCH (Fr. Bitche), a town of Germany, in Alsace-Lorraine, on the Horn, at the foot of the northern slope of the Vosges between Hagenau and Saargemiind. Pop. (1905) 4000. There are a Roman Catholic and a Protestant church, a classical school and an academy of forestry. The industries include shoe-making and watch-making, and there is some trade in grain and timber. The town of Bitsch, which was formed cfut of the villages of Rohr and Kaltenhausen in the 17th century, derives its name from the old stronghold (mentioned in n 72 as Bytis Castrum) standing on a rock some 250 ft. above the town. This had long given its name to the countship of Bitsch, which was originally in the possession of the dukes of Lorraine. In 1297 it passed by marriage to Eberhard I. of Zweibriicken, whose line became extinct in 1569, when the countship reverted to Lorraine. It passed with that duchy to France in 1766. After that date the town rapidly increased in population. The citadel, which had been constructed by Vauban on the site of the old castle after the capture of Bitsch by the French in 1624, had been destroyed when it was restored to Lorraine in 1698. This was restored and strengthened in 1740 into a fortress that proved impregnable in all succeeding wars. The attack upon it by the Prussians in 1793 was repulsed; in 181 5 they had to be content with blockading it; and in 1870, though it was closely invested by the Germans after the battle of Worth, it held out until the end of the war. A large part of the fortification is excavated in the red sandstone rock, and rendered bomb-proof; a supply of water is secured to the garrison by a deep well in the interior.

BITTER, KARL THEODORE FRANCIS (1867-), American sculptor, was born in Vienna on the 6th of December 1867. After studying art there, in 1889 he removed to the United States, where he became naturalized. In America he gained great popularity as a sculptor, and in 1906-1907 was presi- dent of the National Sculpture Society, New York. Among his principal works are: the Astor memorial gates, Trinity church, New York; ” Elements Controlled and Uncontrolled,”

on the Administration Building at the Chicago Exposition; a large relief, ” Triumph of Civilization,” in the waiting-room of the Broad Street station of the Pennsylvania railway in Philadelphia; decorations for the Dewey Naval Arch in New York City; the ” Standard Bearers,” at the Pan-American Exposition grounds; a sitting statue and a bust of Dr Pepper, provost of the University of Pennsylvania; and the Villard and Hubbard memorials in the New York chamber of commerce.

BITTERFELD, a town of Germany, in the Prussian province of Saxony, 26 m. N. from Leipzig by rail, on the river Mulde, and an important junction of railways from Leipzig and Halle to Berlin. Pop. (1900) 11,839. It manufactures drain-pipes, paper-roofing and machinery, and has saw-mills. Several coal-mines are in the vicinity. The town was built by a colony of Flemish immigrants in n 53. It was captured by the land- grave of Meissen in 1476, and belonged thenceforth to Saxony, until it was ceded to Prussia in 18 15. Owing to its pleasant situation and accessibility, it has become a favourite residence of business men of Leipzig and Halle.

BITTERLING {Rhodeus amarus), a little carp-like fish of central Europe, belonging to the Cyprinid family. In it we have a remarkable instance of symbiosis. The genital papilla of the female acquires a great development during the breeding season and becomes produced into a tube nearlv as long as the

fish itself; this acts as an ovipositor by means of which the comparatively few and large eggs (3 millimetres in diameter) are introduced through the gaping valves between the branchiae of pond mussels (Unio and Anodonta), where, after being in- seminated, they undergo their development, the fry leaving their host about a month later. The mollusc reciprocates by throwing off its embryos on the parent fish, in the skin of which they remain encysted for some time, the period of reproduction of the fish and mussel coinciding.

BITTERN, a genus of wading birds, belonging to the family Ardeidae, comprising several species closely allied to the herons, from which they differ chiefly in their shorter neck, the back of which is covered with down, and the front with long feathers’, which can be raised at pleasure. They are solitary birds, frequent- ing countries possessing extensive swamps, and marshy grounds, remaining at rest by day, concealed among the reeds and bushes of their haunts, and seeking

their food, which consists of fish, reptiles, insects and small quadrupeds, in the twilight. The

Bittern.

have greatly diminished its numbers and it is now only an un- certain visitor. Not a winter passes without its appearing in some numbers, when its uncommon aspect, its large size, and beautifully pencilled plumage cause it to be regarded as a great prize by the lucky gun-bearer to whom it falls a victim. Its value as a delicacy for the table, once so highly esteemed, has long vanished. The old fable of this bird inserting its beak into a reed or plunging it into the ground, and so causing the booming sound with which its name will be always associated, is also exploded, and nowadays indeed so few people in Britain have ever heard its loud and awful voice, which seems to be uttered only in the breeding-season, and is therefore unknown in a country where it no longer breeds, that incredulity as to its booming at all has in some quarters succeeded the old belief in this as in other reputed peculiarites of the species. The bittern in the days of falconry was strictly preserved, and afforded excellent sport. It sits crouching on the ground during the day, with its bill pointing in the air, a position from which it is not easily roused, and even when it takes wing, it's flight is neither swift nor long sustained. When wounded it requires to be approached with caution, as it will then attack either man or dog with its long sharp bill and its acute claws. It builds a rude nest among the reeds and flags, out Of the materials which surround it, and

the female lays four or five* eggs* bf'a brOWhish olive, ' During the breeding season it utters a booming- noise, front which it probably derives its generic name, Botaurus, and . which has made it in many places an object of superstitious , dreadi Its plumage for the'most partis of a pale buff colour, rayed anc[speckled with black and reddish brown. The American bittern {Botaurus lentigifiosus) i'.is somewhat smaller, than the European species, and is found throughout the central and southern portions Of North America. It also occurs' in' Britain as an occasional straggler. It is distinguishable by its uniform greyish- brown primaries, which want the tawny bars that characterizeˆ B. stellaris. Both species are good eating. .

BITTERN (from " bitter "), the mother liquor obtained ftom sea-water or brines after the separation of the. sodium chloride (common salt) by Crystallization. It contains various mag- nesium salts (sulphate, chloride, bromide and iodide) and, is employed; commercially for the manufacture of Epsom salts (magnesium sulphate) and bromine. The

same term is applied to a mixture of quassia, iron sulphate, cocculus indicus, liquorice. &c, used in adulterating beer.

BITTERS, the name given to aromatized (generally alcoholic) beverages containing a bitter substance ,‘pr Substances, used as tonics, appetizers or digestives. The bitterness is imparted by such substances as bitter orange rind, gentian, rhubarb, quassia, cascarilla, angostura, quinine and cinchona. Juniper, cinnamon”, carraway, camomile, cloves and other flavouring agents are also employed in conjunction with the bitter principles, alcohol and sugar. Sorne bitters are prepared by simple maceration and subsequent filtration (see Liqueurs), others by the more conv plicated distillation process. Those prepared by the latter process are the finer commercial articles.’ Bitters are usually Sold under the name of the substance which has been used to give them the predominant flavour, siich as orange, angostura or peach bitters, &c. The alcoholic strength of bitters varies, but is generally in the neighbourhood of 46% of alcohol. Some bitters, although possessing tonic properties; may be regarded as beverages pure and simple, notwithstanding the fact that they are seldom consumed in an undiluted” state; others again, are obviously medicinal preparations and should be treated as such!

BITUMEN, the name applied by the Romans to the various descriptions of natural hydrocarbons, the yard petroleum not being used in classical Latin. In its widest sense it embraces the whole range of these substances, including natural gas, the more or less liquid descriptions of petroleum, and’ the solid forms of asphalt, albertite, gilsonite or uintahite, elaterite, ozokerite and hatchettite. To distinguish bitumen intermediate in consistency between asphalt and the more liquid kinds of crude petroleum, the term maltha (Latin) is frequently employed. The bitumens of chief commercial importance may be grouped under the three headings of (1) natural gas, (2) petroleum, arid (3) asphalt, and will be found fully described under these titles. In the scriptures there are numerous references to bitumen, arnong which the following may be quoted: — In Genesis ix. 3, we are told that in the building of the tower of Babel ” slime had they for mortar,” and iii Genesis xiv. 10, that the vale of Siddim ” was full of slime-pits,” the word slime in the latter quotation from our version appearing as bitumen in the Vulgate. Herodotus alludes to the use of the bitumen brought down by the Is, a tributary of the Euphrates, as mortar in building the walls of Babylon; Diodorus, Curtius, ‘Josephus, Bochart and others make similar mention of this use of bitumen, and Vitruvius tells us that it was employed inadmixture with clay.

In its various forms, bitumen is one of the most widely dis- tributed of substances. It occurs, though sometimes only in small quantity, in aliriost every part of the globe, and ‘through- out the whole range of geological strata, from the Laurentian rocks to the most recent members of the Quaternary period. Although the gaseous and liquid forms of bitumen may be’ re- garded as having been formed in the strata in which, they are found or as having been received into such strata shortly after forrnation, the semi-solid and solid varieties may be considered to have been produced by the’ oxidation and evaporation of

liquid petroleum escaping from underlying or better preserved deposits into other strata, or into fissures where atmospheric action and loss of the more volatile constituents can take place. It should, however, be stated that there is some difference of opinion as to the precise manner of production of some of the solid forms of bitumen, and especially of ozokerite. (B. R.)

BITURIGES, a Celtic people, according to Livy (v. 34) the most powerful in Gaul in the time of Tarquinius Priscus. At some period unknown they split up into two branches — Bituriges Cubi and Bituriges Vivisci. The name is supposed to mean either ” rulers of the world ” or ” perpetual kings.”

The Bituriges Cubi, called simply Bituriges by Caesar, in whose time they acknowledged the supremacy of the Aedui, inhabited the modern diocese of Bourges, including the depart-‘ ments of Cher and Indre, and partly that of Allier. Their chief towns were Avaricum (Bourges), Argentomagus (Argenton-sur- Creuse), Neriomagus (Neris-les-Bains), Noviodunum (perhaps Villate). At the time of the rebellion of Vercingetorix (52 B.C.), Avaricum, after a desperate resistance, was taken by assault, and the inhabitants put to the sword. In the following year, the Bituriges submitted to Caesar, and under Augustus they were incorporated (in 28 B.C.) in Aquitania. Pliny (Nat. Hist. iv. iog) speaks of them as liberi, which points to their enjoying a certain amount of independence under Roman government. The district contained a number of iron works, and Caesar says they were skilled in driving galleries and mining operations,

The Bituriges Vivisci occupied the strip of land between the sea and the left bank of the Garonne, comprising the greater part of the

modern department of Gironde. Their capital was Burdigala (Bordeaux), even then a place of considerable import- ance and a wine-growing centre. Like the Cubi, they also are called liberi by Pliny.

See A. Desjardiris, Geographie historique de la Gaule romaine,ˆ ii. (1876-1893) ; A. Longnon, Geographie de la Gaule au VI' siecle (1878); A. Holder, Alt-celtischer Sprachschatz; T. R. Holmesi Caesar's Conquest of Gaul (1899).

BITZIUS, ALBRECHT (1797-1854), Swiss novelist, best known by his pen name of "Jeremias Gotthelf," was born on the 4th of October 1797 at Morat, where his father was pastor. In 1804 the home was moved to Utzenstorf, a village in the Bernese Emmenthal. Here young Bitzius grew up, receiving his early education and consorting with the boys of the village, as well as helping his father to cultivate his glebe. In 181 2 he went to complete his education at Bern, and in 1820 was received as a pastor. In 1821 he visited the university of Gottingen, but returned home in 1822 to act as his father's assistant. On his father's death (1824) he went in the same capacity to Herzogen-buchsee, and later to Bern (1829). Early in 1831 he went as assistant to the aged pastor of the village of Liitzelfliih, in the Upper Emmenthal (between Langnau and Burgdorf), being soon elected his successor (1832) and marrying one of his grand- daughters (1833). He spent the rest of his life there, dying on the 22nd of October 1854, and leaving three children (the son was a pastor, the two daughters married pastors). His first work, the Bauernspiegel, appeared in 1837. It purported to be the life of Jeremias Gotthelf, narrated by himself, and this name was later adopted by the author as his pen name. It is a living picture of Bernese (or, strictly speaking, Emmenthal) village life, true to nature, and not attempting to gloss over its defects and failings. It is written (like the rest of his works) in the Bernese dialect of the Emmenthal, though it must be remembered that Bitzius was not (like Auerbach) a peasant by birth, but belonged to the educated classes, so that he reproduces what he had seen and learnt, and not what he had himself personally experienced. The book was a great success, as it was a picture of real life, and not of fancifully beribboned 18th-century villagers. Among his later tales are the Leiden und Freuden eines Schulmeisters (1838-1839), Uli der Knecht (1841), with its continuation, Uli der Pachter (1849), Anne Bdbi Jowiiger (1843- 1844), Kathi die Grossmulter (1847), Die Kdserei in der Vehfreude (1850), and the Erlebnisse eines Schiddenbauers (1854). He published also several volumes of shorter tales. One slight

drawback to some of his writings is the echo of local political

controversies, for Bitzius was a Whig and strongly opposed U> the Radical party in the canton, which carried the day in 184&

Lives by C. Manuel, in the Berlin edition of Bitzius's works (Berlin, 1861); and by J. Ammann in vol. i. (Bern, 1884) of the Sammlung Bernischer Biographien. His works were issued in 24 vols, at Berlin, 1856-1861, while 10 vols., giving the original text of each story, were issued at Bern, 1898-1900 (edition not to be completed). (W. A. B. C.)

BIVOUAC (a French word generally said to have been intro- duced during the Thirty Years' War, perhaps derived from Beiwacht, extra guard), originally, a night-watch by a whole army under arms to prevent surprise. In modern military par- lance the word is used to mean a temporary encampment in the open field without tents, as opposed to " billets " or " canton- ment " on the one hand and " camp " on the other. The use of bivouacs permits an army to remain closely concentrated for all emergencies, and avoids the necessity for numerous wagons carrying tents. Constant bivouacs, however, are trying to the health of men and horses, and this method of quartering is never employed except when the military situation demands concentration and readiness. Thus the outposts would often: have to bivouac while the main body of the army lay in billets.

BIWA, a lake in the province of Omi, Japan. It measures 36 m. in length by 12 m. in extreme breadth, has an area of 180 sq. m., is about 330 ft. above sea-level, and has an extreme depth of some 300 ft. There are a few small islands in the lake, the principal being Chikubu-shima at the northern end.

Tradition alleges that Lake Biwa and the mountain of Fuji were produced simultaneously by an earthquake in 286 B.C. On the west of the lake the mountains Hiei-zan and Hira-yama slope down almost to its margin, and on the east a wide plain extends towards the boundaries of the province of Mino. It is drained by a river flowing out of its southern end, and taking its course into the sea at Osaka. This river bears in succession the names Of Seta-gawa, Uji-gawa and Yodo-gawa. The lake abounds with fish, and the beauty of its scenery is remarkable. Small steamboats ply constantly to the points of chief interest, and around its shores are to be viewed the Omi-no-hakkei, or " eight landscapes of Omi "; namely, the lake 'silvering under an autumn moon as one looks down from Ishi-yama; the snow at eve on Hira-yama; the glow of sunset at Seta; the groves and classic temple of Mii-dera as, the evening bell sounds; boats sailing home from Yabase; cloudless peaks at Awazu; rain at nightfall over Karasaki; and wild geese sweeping down to Katata. The lake is connected with Kyoto by a

canal constructed in 1890, and is thus brought into water communication with Osaka. ‘

BIXIO, NINO (1821-1873), Italian soldier, was born on the 2nd of October 182 1. While still a boy he was compelled by his parents to embrace a maritime career. After numerous adventures he returned to Italy in 1846, joined the Giovine Italia, and, on 4th November 1847, made himself conspicuous at Genoa by seizing the bridle of Charles Albert’s horse and crying, ” Pass the Ticino, Sire, and we are all with you.” He fought through the campaign of 1848, became captain under Garibaldi at Rome in 1849, taking prisoners an entire French battalion, and gaining the gold medal for military valour. In 1859 he commanded a Garibaldian battalion, and gained the military cross of Savoy. Joining the Marsala expedition in i860, he turned the day in favour of Garibaldi at Calatafimi, was wounded at Palermo, but recovered in time to besiege Reggio in Calabria (21st of August i860), and, though again wounded, took part in the battle of Volturno, where his leg was broken. Elected deputy in 1861, he endeavoured to reconcile Cavour and Garibaldi. In 1866, at the head of the seventh division, he covered the Italian retreat from Custozza, ignoring the Austrian summons to surrender. Created senator in February 1870, he was in the following September given command of a division during the movement against Rome, took Civita. Vecchia, and participated in the general attack upon Rome (20th September 1870). He died of cholera at Achin Bay in Sumatra en roule for Batavia, whither he

had gone in command of a commercial expedition (16th December

BIZERTA (properly pronounced Ben Zert; Fr. Bizerte), a seaport of Tunisia, in 37 17′ N., o° 50′ E. Pop. about 12,000. Next to Toulon, Bizerta is the most important naval port of France in the Mediterranean. It occupies a commanding strategical position in the narrowest part of the sea, being 714 m. E. of Gibraltar, 1168 m. W.N.W. of Port Said, 240 m. N.W. of Malta, and 420 m. S. by E. of Toulon. It is 60 m. by rail N.N.W. of Tunis. The town is built on the shores of the Mediterranean at the point where the. Lake of Bizerta enters the sea through a natural channel, the mouth of which has been canalized. The modern town lies almost entirely on the north side of the canal. A little farther north are the ancient citadel, the walled ” Arab ” town and the old harbour (disused). The present outer harbour covers about 300 acres and is formed by two converging jetties and a

breakwater. The north jetty is 4000 ft. long, the east jetty 3300 ft., and the breakwater— which protects the port from the prevalent north-east winds — 2300 ft. long. The entrance to the canal is in the centre of the outer harbour. The canal is 2600 ft. long and 787 ft. wide on the surface. Its banks are lined with quays, and ships drawing 26 ft. of water can moor alongside. At the end of the canal is a large commercial harbour, beyond which the channel opens into the lake— in reality an arm of the sea— roughly circular in form and covering about 50 sq. m., two-thirds of its waters having a depth of 30 to 40 ft. The lake, which merchant vessels are not allowed to enter, contains the naval port and arsenal. There is a torpedo and submarine boat station on the north side of the channel at the entrance to the lake, but the principal naval works are at Sidi Abdallah at the south-west corner of the lake and 10 m. from the open sea. Here is an enclosed basin covering 123 acres with ample quayage, dry docks and everything necessary to the accommodation, repair, revictualling and coaling of a numerous fleet. Barracks, hospitals and water- works have been built, the military town, called Ferryville, being self-contained.

Fortifications have been built for the protection of the port. They comprise (a) the older works surrounding the town; (b) a group of coast batteries on the high ground of Cape Bizerta or Guardia, 4 m. north-north-west of the town; these are grouped round a powerful fort called JebelKebir, and have a command of 300 to 800 ft. above sea-level; (c) another group of batteries on the narrow ground between the sea and the lake to the east of the town; the highest of these is the Jebel Tuila battery 265 ft. above sea-level.

The Lake of Bizerta, called Tinja by the Arabs, abounds in excellent fish, especially mullets, the, dried roe of which, called botargo, is largely exported, and the fishing industry employs a large proportion of the inhabitants. The western shore of the lake is low, and in many places is covered with olive trees to the water's edge. The south-eastern shores are hilly and wooded, and behind them rises a range of picturesque hills. A narrow and shallow channel leads from the western side of the lake into another sheet of water, the Lake of Ishkul, so called from Jebel Ishkul, a hill on its southern bank 1740 ft. high. The Lake of Ishkul is nearly as large as the first lake, but is very shallow. Its waters are generally sweet.

Bizerta occupies the site of the ancient Tyrian colony, Hippo Zarytus or Diarrhytus, the harbour of which, by means of a spacious pier, protecting it from the north-east wind, was rendered one of the safest and finest on this coast. The town became a Roman colony, and was conquered by the Arabs in the 7th century. The place thereafter was

subject either to the rulers of Tunis or of Constantine, but the citizens were noted for their frequent revolts. They threw in their lot (c. 1 530) with the pirate Khair-ed-Din, and subsequently received a Turkish garrison. Bizerta was captured by the Spaniards in 153 s, but not long afterwards came under the Tunisian government. Centuries of neglect followed, and the ancient port was almost choked up, though the value of the fisheries saved the town from utter decay. Its strategical importance was one of. the causes

which led. to the occupation of Tunisia by the French in 1881. In 1890 a concession for a new canal and harbour was granted to a company, and five years later the new port was formally opened. Since then the canal has been widened and deepened, and the naval port at Sidi Abdallah created.

BIZET [Alexandre Cesar. Leopold] GEORGES (1838-1875), French musical composer, was born at Bougival, near Paris, on the 25th of October 1838, the son of a singing-master. He displayed musical ability at an early age, and was sent to the Paris Conservatoire, where he studied under Halevy and speedily distinguished himself, carrying off prizes for organ and fugue, and finally in 1857, after an ineffectual attempt in the previous year, the Grand Prix de Rome for a cantata called Cloris et Clotilde. A success of a different kind also befell him at this time. Offenbach, then manager of the Theatre des Bouffes-Parisiens, had organized a competition for an operetta, in which young Bizet was awarded the first prize in conjunction with Charles Leeocq, each of them writing an operetta called Docteur Miracle. After the three years spent in Rome, an obligation imposed by the French government on the winners of the first prize at the Conservatoire, Bizet returned to Paris, where he achieved a reputation as a pianist and accompanist. On the 23rd of September 1863 his first opera, Les Pecheurs de perles, was brought out at the Theatre Lyrique, but owing possibly to the' somewhat uninteresting nature of the story, the opera did not enjoy a very long run. The qualities displayed by the composer, however, were amply recognized, although the music was stated, by some critics, to exhibit traces of Wagnerian influence. Wagnerism at that period was a sort of spectre that haunted the imagination of many leading members of the musical press. It sufficed for a work to be at all out of the common for the epithet ” Wagnerian “to be applied to it. The term, it may be said, was intended to be condemnatory, and it was applied with little understanding as to its real meaning. The score of the Pecheurs de perles contains several charming numbers; its dreamy melodies are well adapted to fit a story laid in Eastern climes, and the music reveals a decided dramatic temperament. Some of its dances are now usually introduced into the

fourth act of Carmen. •

On the 3rd of June 1865 Bizet married a daughter of his old master, Halevy. His second opera, La Jolie Fille de Perth, produced at the Theatre Lyrique on 26th December 1867, was scarcely a step in advance. The libretto was founded on Sir Walter Scott's novel, but the opera lacks unity of style, and its pages are marred by concessions to the vocalist. One number has survived, the characteristic Bohemian dance which has been interpolated into the fourth act of Carmen. In his third opera Bizet returned to an oriental subject. Djamileh, a one-act opera, given at the Opera Comique on the 22nd of May 1872, is certainly one of his most individual efforts. Again were accusations of Wagnerism hurled at the composer's head, and Djamileh did not achieve the success it undoubtedly deserved. The composer was more fortunate with the incidental music he wrote to Alphonse Daudet's drama, L' Arlesienne, produced in October 1872. Different numbers from this, arranged in the form of suites, have often been heard in the concert-room. Rarely have poetry and imagination been so well allied as in these exquisite pages,, which seem to reflect the sunny skies of Provence.

Bizet's masterpiece, Carmen, was brought out at the Opera Comique on the 3rd of March 187 5. It was based on a version by Meilhac and Halevy of a study by Prosper Merimee— in which the dramatic element was obscured by much descriptive writing. The detection of the drama underlying this psychological narrative was in itself a brilliant discovery, and in reconstructing the story in dramatic form the authors produced one of the most famous libretti in the whole range of opera. Still more striking than the libretto was the music composed by Bizet, in which the peculiar use of the flute and of the lowest notes of the harp deserves particular attention.

On the 3rd of June, three months after the production of Carmen in Paris, the genial composer expired after a few hours' illness from a heart affection. Before dying he had the satisfaction

BJORNEBORG-ˆBLACHFORD

of knowing that Carmen had been accepted for production at Vienna. After the Austrian capital came Brussels, Berlin and, in 1878, London, when Carmen was brought out at Her Majesty's theatre with immense success. The influence exercised by Bizet on dramatic music has been very great, and may be discerned in the realistic works of the young Italian school, as well as in those of his own countrymen.

BJORNEBORG (Finnish, Port), a district town of Finland, province of Abo-Bjorneborg, on the E. coast of the Gulf of Bothnia, at the mouth of the Kumo. Lat. 5 1° 8′ N., long. 46° o’ E. Pop. (1904) 16,053, mostly Swedes. Large vessels cannot enter its roadstead, and stop at Rafso. The town has shipbuilding wharves, machine works, and several tanneries and brick-works, and has a total trade of over 16,000,000 marks, the chief export being timber.

BJORNSON, BJORNSTJERNE (1832-1010), Norwegian poet, novelist and dramatist, was born on the 8th of December 1832 at the farmstead of Bjorgen, in Kvikne, in Osterdal, Norway. In 1837 his father, who had been pastor of Kvikne, was trans- ferred to the parish of Noesset, in Romsdal; in this romantic district the childhood of Bjornson was spent. After some teaching at the neighbouring town of Molde, he was sent at the age of seventeen to a well-known school in Christiania to study for the university; his instinct for poetry was already awakened, and indeed he had written verses from his eleventh year; He matriculated at the university of Christiania in 1852, and soon began to work as a journalist, especially as a dramatic critic. In 1857 appeared Synnove Solbakken, the first of Bjornson’s peasant-novels; in 1858 this was followed by Arne, in i860 by A Happy Boy, and in 1868 by The Fisher Maiden. These are the most important specimens of his bonde-fortaellinger or peasant-tales — a section of his literary work which has made a profound im- pression in his own country, and has made him popular through- out the world. Two of the tales, Arne and Synnove Solbakken, offer perhaps finer examples of the pure peasant-story than are to be found elsewhere in literature.

Bjornson was anxious ” to create a new saga in the light of the peasant,” as he put it, and he thought this should be done, not merely in prose fiction, but in national dramas or folke-stykker . The earliest of these was a one-act piece the scene of which is laid in the 12th century, Between the Battles, written in 1855, but not produced until 1857. He was especially influenced at this time by the study of Baggesen and Oehlenschlager, during a visit to Copenhagen 1856-1857. Between the Battles was followed by Lame Hulda in 1858, and King Sverre in 1861. All these efforts, however, were far excelled by the splendid trilogy of Sigurd the Bastard, which Bjornson issued in 1862. This raised him to the front rank among the younger poets of Europe. His Sigurd the Crusader should be added to the category of these heroic plays, although it was not printed until 1872.

At the close of 1857 Bjornson had been appointed director of the theatre at Bergen, a post which he held, with much journal- istic work, for two years, when he returned to the capital. From i860 to

1863 he travelled widely throughout Europe. Early in 1865 he undertook the management of the Christiania theatre, and brought out his popular comedy of The Newly Married and his romantic tragedy of Mary Stuart in Scotland. Although Bjornson has introduced into his novels and plays songs of extraordinary beauty, he was never a very copious writer of verse; in 1870 he published his Poems and Songs and the epic cycle called Arnljot Gelline; the latter volume contains the magnificent ode called “Bergliot,” Bjornson’s finest contribution to lyrical poetry. Between 1864 and 1874, in the very prime of life, Bjornson displayed a slackening of the intellectual forces very remarkable in a man of his energy; he was indeed during these years mainly occupied with politics, and with his business as a theatrical manager. This was the period of Bjornson’s most fiery propaganda as a radical agitator. In 18 71 he began to supplement his journalistic work in this direction by delivering lectures over the length and breadth of the northern countries. He possessed to a surprising degree the arts of the orator, com- bined with a magnificent physical prestige. From 1873 to 1876

Bjornson was ahsent from Norway, and in the peace of voluntary exile he recovered his imaginative powers. His new departure as a dramatic author began with A Bankruptcy ‘and The Editor in 1874, social dramas of an extremely modern and realistic cast.

The poet now settled on his estate of Aulestad in Gausdal. In- 1877 he : published another ; novel, ‘ Magnhild — an imperfect production, in which his ideas on social questions were seen to be in a state of fermentation, and gave expression to his republican sentiments in the polemical play called The King, to a later edition of which he prefixed an essay on ” Intellectual Freedom,” in further explanation of his position. Captain Mansana, an episode of the war of Italian independence, belongs to 1878. Extremely anxious to obtain a full success on the stage, Bjornson concentrated his powers on a drama of social life, Leonardo (1879), which raised a violent controversy. A satirical play, The New System, was produced a few weeks later. Although these plays of Bjornson’s second period were greatly discussed, none of them (except A Bankruptcy) pleased on the boards. When once more he produced a social drama, A .Gauntlet, in 1883, he was unable to persuade any manager to stage it, except in a modified form, though this play gives the full measure of his power as a dramatist. In the autumn of the same year, Bjornson published a mystical or symbolic drama Beyond our Powers, dealing with the abnormal features of religious excitement with extraordinary force;

this was not acted until 1899, when it achieved a great success.

Meanwhile, Bjornson's political attitude had brought upon him a charge of high treason, and he took refuge for a time in Germany, returning to Norway in 1882. Convinced that the theatre was practically closed to him, he turned back to the novel, and published in 1884, Flags are Flying in Town and Port, embodying his theories on heredity and education. In 1889 he printed another long and still more remarkable novel, In God's Way, which is chiefly concerned with the same problems. The same year saw the publication of a comedy, Geography and Love, which continues to be played with success. A number of short stories, of a more or less didactic character, dealing with startling points of emotional experience, were collected in 1894; among them those which produced the greatest sensation were Dust, Mother's Hands, and Absalom's Hair. Later plays were a political tragedy called Paul Lange and Tor a Parsberg (1898), a second part of Beyond our Powers (1895), Laboremus (1901), At Storhove (1902), and Daglannct (1904). In 1899, at the opening of the National theatre, Bjornson received an ovation, and his saga-drama of Sigurd the Crusader was performed.

A subject which interested him greatly, and on which he occupied his indefatigable pen, was the question of the bonde- maal, the adopting of a national language for Norway distinct from the dansk-norsk (Dano-Norwegian), in which her literature has hitherto been written. Bjpmson's strong and sometimes rather narrow patriotism did not blind him to the fatal folly of such a proposal, and his lectures and pamphlets against the maal- straev in its extreme form did more than anything else to save the language in this dangerous moment. Bjornson was one of the original members of the Nobel committee, and was re-elected in 1900. In 1903 he was awarded the Nobel prize for literature. Bjornson had done as much as any other man to rouse Norwegian national feeling, but in 1903, on the verge of the rupture between Norway and Sweden, he preached conciliation and moderation to the Norwegians. He was an eloquent advocate of Pan-Germanism, and, writing to the Figaro in 190S, he outlined a Pan-Germanic alliance of northern Europe and North America. He died on the 26th of April 1910.

See Bjornson's Samlede Vaerker (Copenhagen, 1900-1902, 1 1 vols.) ; The Novels of Bjornstjerne Bjornson (1894, & c -)< edited by Edmund Gosse; G. Brandes, Critical Studies (1899); E. Tissot, Le drame norvegien (1893); C. D. 'af Wirsen, Kritiker (1901) ; Chr. Collin, Bjornstjerne Bjornson (2 vols., German ed., 1903), the most complete biography and criticism at present available; and B. Halvorsen, Norsk

Formatter Lexikon (1885). (E.G.)

BLACHFORD, FREDERIC ROGERS, Baron (1811-1889), British civil servant, eldest son of Sir Frederick Leman Rogers, 7th Bart, (whom he succeeded in the baronetcy in 1851), was

born in London on the 31st of January 181 1. He was educated at Eton and Oriel College, Oxford, where he had a brilliant career, winning the Craven University scholarship, and taking a double first-class in classics and mathematics. He became a fellow of Oriel (1833), and won the Vinerian scholarship (1834), and fellowship (1840). He was called to the bar in 1837, but never practised. At school and at Oxford he was a contemporary of W. E. Gladstone, and at Oxford he began a lifelong friendship with J. H. Newman and R. W. Church; his classical and literary tastes, and his combination of liberalism in politics with High Church views in religion, together with his good social position and interesting character, made him an admired member of their circles. For two or three years (1841-1844) he wrote for The Times, and he helped to found The Guardian in 1846; he also did a good deal to assist the Tractarian movement. But he eventually settled down to the life of a government official. He began in 1844 as registrar of joint-stock companies, and in 1846 became commissioner of lands and emigration. Between 1857 and 1859 he was engaged in government missions abroad, con- nected with colonial questions, and in i860 he was appointed permanent under-secretary of state for the colonies. Sir Frederic Rogers was the guiding spirit of the colonial office under six successive secretaries of state, and on his retirement in 1871 was raised to the peerage as Baron Blachford of Wisdome, a title taken from his place in Devonshire. He died on the 21st of November 1889.

A volume of his letters, edited by G. E. Marindin (1896), contains an interesting Life, partly autobiographical.

BLACK, ADAM (1784-1874), Scottish publisher, founder of the firm of A. & C. Black, the son of a builder, was born in Edinburgh on the 20th of February 1784. After serving his apprenticeship to the bookselling trade in Edinburgh and London, he began business for himself in Edinburgh in 1808. By 1826 he was recognized as one of the principal booksellers in the city; and a few years later he was joined in business by his nephew Charles. The two most important events connected

with the history of the firm were the publication of the 7th, 8th and 9th editions of the Encyclopaedia Britannica, and the purchase of the stock and copyright of the Waverley Novels. The copyright of the Encyclopaedia passed into the hands of Adam Black and a few friends in 1827. Ini85i the firm bought the copyright of the Waverley Novels for £27,000; and in 1861 they became the proprietors of De Quincey's works. Adam Black was twice lord provost of Edinburgh, and represented the city in parliament from 1856 to 1865. He retired from business in 1865, and died on the 24th of January 1874. He was succeeded by his sons, who removed their business in 1895 to London. There is a bronze statue of Adam Black in East Princes Street Gardens, Edinburgh.

See Memoirs of Adam Black, edited by Alexander Nicholson (2nd ed., Edinburgh, 1885).

BLACK, JEREMIAH SULLIVAN (1810-1883), American lawyer and statesman, was born in Stony Creek township, Somerset county, Pennsylvania, on the 10th of January 1810. He was largely self-educated, and before he was of age was admitted to the Pennsylvania bar. He gradually became one of the leading American lawyers, and in 1851-1857 was a member of the supreme court of Pennsylvania (chief-justice 1851-1854). In 1857 he entered President Buchanan's cabinet as attorney- general of the United States. In this capacity he successfully contested the validity of the " California land claims " — claims to about 19,000 sq. m. of land, fraudulently alleged to have been granted to land-grabbers and others by the Mexican government prior to the close of the Mexican War. From the 17 th of December i860 to the 4th of March 1861 he was secretary of state. Perhaps the most influential of President Buchanan's official advisers, he denied the constitutionality of secession, and urged that Fort Sumter be properly reinforced and defended. " For . . . the vigorous assertion at last in word and in deed that the United States is a nation," says James Ford Rhodes, " for pointing out the way in which the authority of the Federal government might be exercised without infringing on the rights _

of the states, the gratitude of the American people is due to Jeremiah S. Black." He became reporter to the Supreme Court of the United States in 1861, but after publishing the reports for the years 1861 and 1862 he resigned, and devoted himself almost exclusively to his private practice, appearing in such important cases before the Supreme Court as the one known as Ex-Parte Milligan, in which he ably defended the right of trial by jury, the McCardle case and the United States v. Blyew et al. After the Civil War he vigorously opposed

the Congressional plan of reconstructing the late Confederate states, and himself drafted the message qi President Johnson, vetoing the Recon- struction Act of the 2nd of March 1867. Black was also for a short time counsel for President Andrew Johnson, in his trial on the article of impeachment, before the United States Senate, and for William W. Belknap (1829-1890), secretary of war from 1869 to 1876, who in 1876 was impeached on a charge of cor- ruption; and with others he represented Samuel J. Tilden during the contest for the presidency between Tilden and Hayes (see Electoral Commission). He died at Brockie, Penn- sylvania, on the 19th of August 1883.

See Essays and Speeches of Jeremiah S. Black, with a Biographical Sketch (New York, 1885), by his son, C. F. Black.

BLACK, JOSEPH (1728-1799), Scottish chemist and physicist, was born in 1728 at Bordeaux, where his father — a native of Belfast but of Scottish descent — was engaged in the wine trade. At the age of twelve he was sent to a grammar school in Belfast, whence he removed in 1746 to study medicine in Glasgow. There he had William Cullen for his instructor in chemistry, and the relation between the two soon became that of professor and assistant rather than of master and pupil. The action of lithon- triptic medicines, especially lime-water, was one of the questions of the day, and through his investigations of this subject Black was led to the chemical discoveries associated with his name. The causticity of alkaline bodies was explained at that time as depending on the presence in them of the principle of fire, “phlogiston”; quicklime, for instance, was chalk which had taken up phlogiston, and when mild alkalis such as sodium or potassium carbonate were causticized by its aid, the phlogiston was supposed to pass from it to them. Black showed that on the contrary causticization meant the loss of something, as proved by loss of weight; and this something he found to be an ” air,” which, because it was fixed in the substance before it was causticized, he spoke of as ” fixed air.” Taking magnesia alba, which he distinguished from limestone with which it had pre- viously been confused, he showed that on being heated it lost weight owing to the escape of this fixed air (named carbonic acid by Lavoisier in 1 781), and that the weight was regained when the calcined product was made to reabsorb the fixed air with which it had parted. These investigations, by which Black not only gave a great impetus to the chemistry of gases by clearly indicating the existence of a gas distinct from common air, but also anticipated Lavoisier and modern chemistry by his appeal to the balance, were described in the thesis De humore acido a cibis orto, et magnesia alba, which he presented for his doctor’s degree in 1754; and a fuller account of them was read before the Medical Society of

Edinburgh in June 1755, and published in the following year as Experiments upon magnesia, quicklime and some other alkaline substances.

It is curious that Black left to others the detailed study of this ” fixed air ” he had discovered. Probably the explanation is pressure of other work. In 1756 he succeeded Cullen as lecturer in chemistry at Glasgow, and was also appointed professor of anatomy, though that post he was glad to exchange for the chair of medicine. The preparation of lectures thus took up much of his time, and he was also gaining an extensive practice as a physician. Moreover, his attention was engaged on studies which ultimately led to his doctrine of latent heat. He noticed that when ice melts it takes up a quantity of heat without undergoing any change of temperature, and he argued that this heat, which as was usual in his time he looked upon as a subtle fluid, must have combined with the particles of ice and thus become latent in its substance. This hypothesis he verified quantitatively

by experiments, performed at the end of 176 1. In 1764, with the aid of his assistant, William Irvine (1743-1787), he further measured the latent heat of steam, though not very accurately. This doctrine of latent heat he taught in his lectures from 1761 onwards, and in April 1762 he described his work to a literary society in Glasgow. But he never published any detailed account of it, so that others, such as J. A. Deluc, were able to claim the credit of his results. In the course. of his inquiries he also noticed that different bodies in equal masses require different amounts of heat to raise them to the same temperature, and so founded the doctrine of specific heats; he also showed that equal additions or abstractions of heat produced equal variations of bulk in the liquid of his thermometers. In 1766 he succeeded Cullen in the chair of chemistry in Edinburgh, where he devoted practically all his time to the preparation of his lectures. Never very robust, his health gradually became weaker and ultimately he was reduced to the condition of a valetudinarian. In 1795 he received the aid of a coadjutor in his professorship, and two years later he lectured for the last time. He died in Edinburgh on the 6th of December 1799 (not on the 26th of November as stated in Robison’s life).

As a scientific investigator, Black was conspicuous for the carefulness of his work and his caution in drawing conclusions. Holding that chemistry had not attained the rank of a science — his lectures dealt

with the “effects of heat and mixture” — he had an almost morbid horror of hasty generalization or of anything that had the pretensions of a fully fledged system. This mental attitude, combined with a certain lack of initiative and the weakness of his health, probably prevented him from doing full justice to his splendid powers of experimental research. Apart from the work already mentioned he published only two papers during his life-time — “The supposed effect of boiling on water, in disposing it to freeze more readily ” {Phil. Trans., 1775), and ” An analysis of the waters of the hot springs in Iceland ” {Trans. Roy. Soc. Ed., 1794).

After his death his lectures were written out from his own notes, supplemented by those of some of his pupils, and published with a biographical preface by his friend and colleague, Professor John Robison (1 739-1805), in 1803, as Lectures on the Elements of Chemistry ; delivered in the University of Edinburgh.

BLACK, WILLIAM (1841-1898), British novelist, was born at Glasgow on the 9th of November 1841. His early ambition was to be a painter, but he made no way, and soon had recourse to journalism for a living. He was at first employed in newspaper offices in Glasgow, but obtained a post on the Morning Star in London, and at once proved himself a descriptive writer of exceptional vivacity. During the war between Prussia and- Austria in 1866 he represented the Morning Star at the front, and was taken prisoner. This paper shortly afterwards failed, and Black joined the editorial staff of the Daily News. He also edited the Examiner, at a time when that periodical was already moribund. After his first success in fiction, he gave up journal- ism, and devoted himself entirely to the production of novels. For nearly thirty years he was successful in retaining the popular favour. He died at Brighton on the 10th of December 1898, without having experienced any of that reaction of the public taste which so often follows upon conspicuous successes in fiction. Black’s first novel, James Merle, published in 1864, was a com- plete failure; his second, Love or Marriage (1868), attracted but very slight attention. In Silk Attire (1869) and Kilmeny (1870) marked a great advance on his first work, but in 1871 A Daughter of Heth suddenly raised him to the height of popularity, and he followed up this success by a string of favourites. Among the best of his books are The Strange Adventures of a Phaeton (1872); A Princess of Thule (1874); Madcap Violet (1876); Macleod of Dare (1878); White Wings (1880); Sunrise (1880); Shandon Bells (1883); Judith Shakespeare (1884); White Heather (1885) ; Donald Ross of Heimra (1891) ; Highland Cousins (1894) ; and Wild Eelin (1898). Black was a thoroughgoing sportsman, particularly fond of fishing and yachting, and his best stories are those

which are laid amid the breezy mountains of his native land, or upon the deck of a yacht at sea off its wild coast. His

descriptions of such scenery are simple and picturesque* He was a word-painter rather than a student of human nature. His women are stronger than his men, and among them are many wayward and lovable creatures; but subtlety of intuition plays no part in his characterization. Black also contributed a life of Oliver Goldsmith to the English Men of Letters series.

BLACK APE, a sooty, black, short-tailed, and long-faced representative of the macaques, inhabiting the island of Celebes, and generally regarded as forming a genus by itself, under the name of Cynopithecus niger, but sometimes relegated to the rank of a subgenus of Macacus. The nostrils open obliquely at some distance from the end of the snout, and the head carries a crest of long hair. There are several local races, one of which was long regarded as a separate species under the name of the Moor macaque, Macacus maurus. (See Primates.)

BLACKBALL, a token used for voting by ballot against the election of a candidate for membership of a club or other association. Formerly white and black balls about the size of pigeons' eggs were used respectively to represent votes for and against a candidate for such election; and although this method is now generally obsolete, the term " blackball " survives both as noun and verb. The rules of most clubs provide that a stated proportion of "blackballs " shall exclude candidates proposed for election, and the candidates so excluded are said to have been " blackballed "; but the ballot {q.v.) is now usually conducted by a method in which the favourable and adverse votes are not distinguished by different coloured balls at all. Either voting papers are employed, or balls — of which the colour has no significance — are cast into different compartments of a ballot- box according as they are favourable or adverse to the candidate.

BLACKBERRY, or Bramble, known botanically as Rubus fruticosus (natural order Rosaceae), a native of the north tem- perate region of the Old World, and abundant in the British Isles as a copse and hedge-plant. It is characterized by its prickly stem, leaves with usually three or five ovate, coarsely toothed stalked leaflets, many of which persist through the winter, white or pink flowers in terminal clusters, and black or red-purple fruits, each consisting of numerous succulent drupels crowded on a dry conical receptacle. It is a most variable plant, exhibiting many more or less distinct forms which are regarded by different authorities as sub-species or species In America several forms of the native blackberry, Rubus nigrobaccus (formerly known as

R. villosus), are widely cultivated; it is described as one of the most important and profitable of bush-fruits.

For details see F. W. Card in L. H. Bailey's Cyclopedia of American Horticulture (1900).

BLACKBIRD {Turdus merula), the name commonly given to a well-known British bird of the Turdidae family, for which the ancient name was ousel {q.v.), Anglo-Saxon osle, equivalent of the German Amsel, a form of the word found in several old English books. The plumage of the male is of a uniform black colour, that of the female various shades of brown, while the bill of the male, especially during the breeding season, is of a bright gamboge yellow. The blackbird is of a shy and restless dis- position, courting concealment, and rarely seen in flocks, or otherwise than singly or in pairs, and taking flight when startled with a sharp shrill cry. It builds its nest in March, or early in April, in thick bushes or in ivy-clad trees, and usually rears at least two broods each season. The nest is a neat structure of coarse grass and moss, mixed with earth, and plastered internally with mud, and here the female lays from four to six eggs of a blue colour speckled with brown. The blackbird feeds chiefly on fruits, worms, the larvae of insects and snails, extracting the last from their shells by dexterously chipping them on stones; and though it is generally regarded as an enemy of the garden, it is probable that the amount of damage by it to the fruit is largely compensated for by its undoubted services as a vermin-killer. The notes of the blackbird are rich and full, but monotonous as compared with those of the song-thrush. Like many other singing birds it is, in the wild state, a

mocking-bird, having been heard to imitate the song of the nightingale, the crowing of a cock, and even the cackling of a hen. In confinement it can be taught to whistle a variety of tunes, and even to imitate the human voice.

The blackbird is found in every country of Europe, even breeding — although rarely— beyond the arctic circle, and in eastern Asia as well as in North Africa and the Atlantic islands. In most parts of its range it is migratory, and in Britain every autumn its numbers receive considerable accession from passing visitors. Allied species inhabit most parts of the world, excepting Africa south of the Sahara, New Zealand and Australia proper, and North America. In some of these

the legs as well as the bill are yellow or orange; and in a few both sexes are glossy black. The ring-ousel, Turdus torquatus, has a dark bill and conspicuous white gorget, whence its name. It is rarer and more local than the common blackbird, and occurs in England only as a temporary spring and autumn visitor.

BLACK BUCK (Antilope cervicapra), the Indian Antelope, the sole species of its genus. This antelope, widely distributed in India, with the exception of Ceylon and the region east of the Bay of Bengal, stands about 32 in. high at the shoulder; the general hue is brown deepening with age to black; chest, belly and inner sides of limbs pure white, as are the muzzle and chin, and an area round the eyes. The horns are long, ringed, and form spirals with from three to five turns. The doe is smaller in size, yellowish-fawn above, and this hue obtains also in young males. These antelopes frequent grassy districts and are usually found in herds. Coursing black-buck with the cheeta (q.v.) is a favourite Indian sport.

BLACKBURN, COLIN BLACKBURN, Baron (1813-1896), British judge, was born in Selkirkshire in 1813, and educated at Eton and at Trinity College, Cambridge, taking high mathe- matical honours in 1835. He was called to the bar in 1838, and went the northern circuit. His progress was at first slow, and he employed himself in reporting and editing, with T. F. Ellis, eight volumes of the highly-esteemed Ellis and Blackburn reports. His deficiency in all the more brilliant qualities of the advocate almost confined his practice to commercial cases, in which he obtained considerable employment in his circuit; but he continued to belong to the outside bar, and was so little known to the legal world that his promotion to a puisne judgeship in the court of queen's bench in 1859 was at first ascribed to Lord Campbell's partiality for his countrymen, but Lord Lyndhurst, Lord Wensleydale and Lord Cranworth came forward to defend the appointment. Blackburn himself is said to have thought that a county court judgeship was about to be offered him, which he had resolved to decline. He soon proved himself one of the soundest lawyers on the bench, and when he was promoted to the court of appeal in 1876 was considered the highest authority on common law. In 1876 he was made a lord of appeal and a life peer. Both in this capacity and as judge of the queen's bench he delivered many judgments of the highest importance, and no decisions have been received with greater respect. In 1886 he was appointed a member of the commission charged to prepare a digest of the criminal law, but retired on account of indisposition in the following year. He died at his country residence, Doonholm in Ayrshire, on the 8th of January 1896. He was the author of a valuable work on the Law of Sales.

See The Times, 10th of January 1896; E. Manson, Builders 0} our Law (1904).

BLACKBURN, JONATHAN (c. 1700-e. 1765), American portrait painter, was born in Connecticut. He seems to have been the son of a painter, and to have had a studio in Boston in 1 7 50-1 765; among his patrons were many important early American families, including the Apthorps, Amorys, Bulfinches, Lowells, Ewings, Saltonstalls, Winthrops, Winslows and Otises of Boston. Some of his portraits are in the possession of the public library of Lexington, Massachusetts, and of the Massa- chusetts Historical Society, but most of them are privately owned and are scattered over the country, the majority being in Boston. John Singleton Copley was his pupil, and it is said that he finally left his studio in Boston, through jealousy of

Copley's superior success. He was a good portrait painter, and some of his pictures were long attributed to Copley.

BLACKBURN, a municipal, county aiid parliamentary borough of Lancashire, England, 210 m. N.W. by N. from London, and 24J N.NW. from Manchester, served by the Lancashire & Yorkshire and the London & North Western railways, with several lines from all parts of the county. Pop. (1891) 120,064; (1901) 127,626. It lies in the valley of a stream called in early times the Blackeburn, but now known as the Brook. The hills in the vicinity rise to some 900 ft., and among English manufacturing towns Blackburn ranks high in beauty of situation. Besides numerous churches and chapels the public buildings comprise a large town hall (1856), market house, exchange, county courts municipal offices, chamber of commerce, free library, and, outside the town, an infirmary. There are an Elizabethan grammar school, in modern buildings (1884) and an excellent technical school. The Corporation Park and Queen's Park are well laid out, and contain ornamental waters. There is an efficient tramway service, connecting the town with Darwen, 5 m. south. The cotton industry employs thousands of operatives , the iron trade is also very considerable, and many are engaged in the making of machines; but a former woollen manufacture is almost extinct. Blackburn's speciality in the cotton industry is weaving. Coal, lime and building stone are abundant in the neighbourhood. Blackburn received a charter of incorporation in 1851, and is governed by a mayor, 14 aldermen and 42 councillors. The county borough was created in 1888. The parliamentary borough, which returns two members, is co- extensive with the municipal, and lies between the Accrington and Darwen divisions of the county. Area, 7432 acres.

Blackburn is of considerable antiquity; indeed, the 6th century is allocated to the original foundation of a church on the site of the present parish church. Of another church on this site Cranmer was rector after the Reformation. Blackburn was for some time the chief town of a district called Blackburnshire, and as early as the reign of Elizabeth ranked as a flourishing market town. About the middle of the 17th century it became famous for its ” checks,” which were afterwards superseded by a similar linen-and-cotton fabric known as ” Blackburn greys.” In the,, 1 8th century the ability of certain natives of the town greatly fostered its cotton industry; thus James Hargreaves here probably invented his spinning jenny about 1764, though the operatives, fearing a reduction of labour, would have none of it, and forced him to quit the town for Nottingham. He was in the employment of Robert Peel, grandfather of the prime minister of that name, who here instituted the factory system, and as the director of a large business carefully fostered the improvement of methods.

See W. A. Abram, History of Blackburn (Blackburn, 1897).

BLACKBURNE, FRANCIS (1782-1867), lord chancellor of Ireland, was born at Great Footstown, Co. Meath, Ireland, oil the nth of November 1782. Educated at Trinity College, Dublin, he was called to the English bar in 1805, and practised with great success on the home circuit. Called to the Irish bar in 1822, he vigorously administered the Insurrection Act in Limerick for two years, effectually restoring order in the district. In 1826 he became a serjeant-at-law, and in 1830, and again, in 1841, was attorney-general for Ireland. In 1842 he became master of the rolls in Ireland, in 1846 chief-justice of the queen’s bench, and in 1852 (and again in 1866) lord chancellor of Ireland. In 1856 he was made a lord justice of appeal in Ireland. He is remembered as having prosecuted O’Connell and presided at the trial of Smith O’Brien. He died on the 17th of September

1867.

BLACKCOCK (Tetrao tetrix), the English name given to a bird of the family Tetraonidae or grouse, the female of which is known as the grey hen and the young as poults. In size and plumage the two sexes offer a striking contrast, the male weighing about 4 lb, its plumage for the most part of a rich glossy black shot with blue and purple, the lateral tail feathers curved outwards so as to form, when raised,- a fan-like crescent, and the eyebrows destitute of feathers and of a bright vermilion red. The female,

on the other hand, weighs only 2 lb, its plumage is of a russet brown colour irregularly barred with black, and its tail feathers are but slightly forked. The males are polygamous, and during autumn and winter associate together, feeding in flocks apart from the females; but with the approach of spring they separate, each selecting a locality for itself, from which it drives off all intruders, and where morning and evening it seeks to attract the other sex by a display of its beautiful plumage, which at this season attains its greatest perfection, and by a peculiar cry, which Selby describes as ” a crowing note, and another similar to the noise made by the whetting of a scythe.” The nest, composed of a few stalks of grass, is built on the ground, usually

Blackcock.

beneath the shadow of a low bush or a tuft of tall grass, and here the female lays from six to -ten eggs of a dirty-yellow colour speckled with dark brown. The blackcock then rejoins his male associates, and the female is left to perform the labours of hatching and rearing her young brood. The plumage of both sexes is at first like that of the female, but after moulting the young males gradually assume the more brilliant plumage of their sex. There are also many cases on record, and specimens may be seen in the principal museums, of old female birds assuming, to a greater or less extent, the plumage of the male. The blackcock is very generally distributed over the highland districts of northern and central Europe, and in some parts of Asia. It is found on the principal heaths in the south of England, but is specially abundant in the Highlands of Scotland.

BLACK COUNTRY, THE, a name commonly applied to a district lying principally in S. Staffordshire, but extending into Worcestershire and Warwickshire, England. This is one of the chief manufacturing centres in the United Kingdom, and the name arises from the effect of numerous collieries and furnaces, which darken the face of the district, the buildings and the atmosphere. Coal, ironstone and clay are mined in close proximity, and every sort of iron and steel goods is produced. The district extends 15 m. N. W. from Birmingham, and includes Smethwick, West Bromwich, Dudley, Oldbury, Sedgley, Tipton, Bilston, Wednesbury, Wolverhampton and Walsall as its most important centres. The ceaseless activity of the Black Country is most readily realized when it is traversed, or viewed from such an elevation as Dudley Castle Hill, at night, when the glare of furnaces appears in every direction. The district is served by numerous branches of the Great Western, London & North Western, and Midland railways, and is

intersected by canals, which carry a heavy traffic, and in some places are made to surmount physical obstacles with remarkable engineering skill, as in the case of the Castle Hill tunnels at Dudley. Among the numerous branches of industry there are several characteristic of certain individual centres. Thus, locks are a specialty at

Wolverhampton and Willenhall, and keys at Wednesfield; horses' bits, harness-fittings and saddlery at Walsall and Blox- wich, anchors and cables at Tipton, glass at Smethwick, and nails and chains at Cradley.

BLACK DROP, in astronomy, an apparent distortion of the planet Mercury or Venus at the time of internal contact with the limb of the sun at the beginning or end of a transit. It has been in the past a source of much perplexity to observers of transits, but is now understood to be a result of irradiation, produced by the atmosphere or by the aberration of the telescope.

BLACKFOOT (Siksika), a tribe and confederacy of North American Indians of Algonquian stock. The name is explained as an allusion to their leggings being observed by the whites to have become blackened by marching over the freshly burned prairie. Their range was around the headwaters of the Missouri, from the Yellowstone northward to the North Saskatchewan and westward to the Rockies. The confederacy consisted of three tribes, the Blackfoot or Siksika proper, the Kaina and the Piegan. During the early years of the 19th century the Black- foots were one of the strongest Indian confederacies of the north- west, numbering some 40,000. At the beginning of the 20th century there were about 5000, some in Montana and some in Canada.

See Jean L'Heureux, Customs and Religious Ideas of Blackfoot Indians in J. A. I., vol. xv. (1886) ; G. B. Grinnell, Blackfoot Lodge Tales (1892); G. Catlin, North American Indians (1876); Handbook of American Indians (Washington, 1907), under " Siksika."

BLACK FOREST (Ger. Schwarzwald; the Silva Marciana and Abnoba of the Romans), a mountainous district of south-west Germany, having an area of 1844 sq. m., of which about two- thirds lie in the grand duchy of Baden and the remaining third in the kingdom of Wiirttemberg. Bounded on the south and west by the valley of the Rhine, to which its declivities abruptly descend, and running parallel to, and forming the counterpart of the Vosges beyond, it slopes more gently down to the valley of the Neckar in the north and to that of the Nagold (a tributary of the Neckar) on the north-east. Its total length is 100 m., and its breadth varies from 36 m. in the south to 21 in the

centre and 13 in the north. The deep valley of the Kinzig divides it laterally into halves, of which the southern, with an average elevation of 3000 ft., is the wilder and contains the loftiest peaks, which again mostly lie towards the western side. Among them are the Feld- berg (4898 ft.), the Herzogenhorn (4600), the Blossling (4260) and the Blauen (3820). The northern half has an average height of 2000 ft. On the east side are several lakes, and here the majority of the streams take their rise. The configuration of the hills is mainly conical and the geological formation consists of gneiss, granite (in the south) and red sandstone. The district is poor in minerals; the yield of silver and copper has almost ceased, but there are workable coal seams near Offenburg, where the Kinzig debouches on the plain. The climate in the higher districts is raw and the produce is mostly confined to hardy cereals, such as oats. But the valleys, especially those on the western side, are warm and healthy, enclose good pasture land and furnish fruits and wine in rich profusion. They are clothed up to a height of about 2000 ft. with luxuriant woods of oak and beech, and above these again and up to an elevation of 4000 ft., surrounding the hills with a dense dark belt, are the forests of fir which have given the name to the district. The summits of the highest peaks are bare, but even on them snow seldom lies throughout the summer.

The Black Forest produces excellent timber, which is partly sawn in the valleys and partly exported down the Rhine in logs. Among other industries are the manufactures of watches, clocks, toys and musical instruments. There are numerous mineral springs, and among the watering places Baden-Baden and Wildbad are famous. The towns of Freiburg, Rastatt, Offenburg and Lahr, which lie under the western declivities, are the chief centres for the productions of the interior.

The Black Forest is a favourite tourist resort and is opened up by numerous railways. In addition to the main lines in the valleys of the Rhine and Neckar, which are connected with the towns lying on its fringe, the district is intersected by the

Schwarzwaldbahn from Offenburg to Singen, from which various small local lines ramify.

BLACK HAWK [Ma’katawimesheka’ka, ” Black Sparrow Hawk”], (i 767-1838, American Indian warrior of the Sauk and Fox tribes, was born at the Sauk village on Rock river, near the Mississippi, in 1767.

He was a member of the Thunder gens of the Sauk tribej and, though neither an hereditary nor an elected chief, was for some time the recognized war leader of the Sauk and Foxes. From his youth he was intensely bloodthirsty and hostile to the Americans. Immediately after the acquisition of ” Louisiana,” the Federal government took steps for the removal of the Sauk and Foxes, who had always been a disturbing element among the north-western Indians, to the west bank of the Mississippi river. As early as 1804, by a treaty signed at St Louis on the 3rd of November, they agreed to the removal in return for an annuity of $1000. British influences were still strong in the upper Mississippi valley and undoubtedly led Black Hawk and the chiefs of the Sauk and Fox confederacy to repudi- ate this agreement of 1804, and subsequently to enter into the conspiracy of Tecumseh and take part with the British in the war of 18 1 2. The treaties of 1815 at Portage des Sioux (with the Foxes) and of 1816 at St Louis (with the Sauk) substantially renewed that of 1804. That of 1816 was signed by Black Hawk himself, who declared, however, when in 1823 Chief Keokuk and a majority of the two nations crossed the river, that the consent of the chiefs had been obtained by fraud. In 1830 a final treaty was signed at Prairie du Chien, by which all title to the lands of the Sauk and Foxes east of the Mississippi was ceded to the government, and provision was made for the immediate opening of the tract to settlers. Black Hawk, leading the party in opposi- tion to Keokuk, at once refused to accede to this cession and threatened to retaliate if his lands Were invaded. This pre- cipitated what is known as the Black Hawk War. Settlers began pouring into the new region in the early spring of 1831, and Black Hawk in June attacked several villages near the Illinois- Wisconsin line. After massacring several isolated families, he was driven off by a force of Illinois militia. He renewed his attack in the following year (1832), but after several minor engagements, in most of which he was successful, he was defeated (21st of July) at Wisconsin Heights on the Wisconsin river, opposite Prairie du Sac, by Michigan volunteers under Colonels Henry Dodge and James D. Henry, and fleeing westward was again decisively defeated on the Mississippi at the mouth of the Bad Axe river (on the 1st and 2nd of August) by General Henry Atkinson. His band was completely dispersed, and he himself was captured by a party of Winnebagoes. At Fort Armstrong, Rock Island, on the 21st of September, a treaty was signed, by which a large tract of the Sauk and Fox territory was ceded to the United States; and the United States granted to them a reservation of 400 sq. m., the payment of $20,006 a year for thirty years, and the settlement of certain traders’ claims against the tribe. With several warriors Black Hawk was sent to Fortress Monroe, Virginia, where he was confined for a few weeks;

afterwards he was taken by the government through the principal Eastern cities. On his release he settled in 1837 on the Sauk and Fox reservation on the Des Moines river, in Iowa, where he died on the 3rd of October 1838.

See Frank E. Stevens, The Black Hawk War (Chicago, 1903) ; R. G. Thwaites, ” The Story of the Black Hawk War ” in vol. xii. of the Collections of the State Historical Society of Wisconsin ; J. B. Patterson, Life of Ma-ka-tai-me-she-kia-kiak or Black Hawk (Boston, . 1834), purporting to be Black Hawk’s story as told by himself; 1 and Benjamin Drake, Life of Black Hawk (Cincinnati, 1846).

BLACKHEATH, an open common in the south-east of London, England, mainly in the metropolitan borough of Lewisham. This high-lying tract was crossed by the Roman Watling Street from Kent, on a line approximating to that of the modern Shooter’s Hill; and was a rallying ground of Wat Tyler (1381), of Jack Cade (1450), and of Audley, leader of the Cornish rebels, defeated and captured here by the troops of Henry VII. in 1497. It also witnessed the acclamations of the citizens of London on the return of Henry V. from the victory of Agincourt, the formal meeting between Henry VIII. and Anne of Cleves, and that

between the army of the restoration and Charles II. The introduction into England of the game of golf is traditionally placed here in 1608, and attributed to King James I. and his Scottish followers. The common, the area of which is 267 acres, is still used for this and other pastimes. For the residential district to which Blackheath gives name, see Lewisham.

BLACK HILLS, an isolated group of mountains, covering an area of about 6000 sq. m. in the adjoining corners of South Dakota and Wyoming, U.S.A. They rise on an average some 2000 ft. above their base, the highest peak, Harney, having an altitude above the sea of 7216 ft. They are drained and in large part enclosed by the North (or Belle Fourche) and South forks of the Cheyenne river (at whose junction a fur-trading post was established about 1830); and are surrounded by semi-arid, alkaline plains lying 3000 to 3500 ft. above the sea. The mass has an elliptical shape, its long axis, which extends nearly N.N.W.-S.S.E., being about 120 m. and its shorter axis about 40 m. long. The hills are formed by a short, broad, anticlinal fold, which is flat or nearly so on its summit. From this fold the stratified beds have in large part been removed, the more recent having been almost entirely eroded from the elevated mass. The edges of these are now found encircling the mountains and forming a series of fairly

continuous rims of hogbacks. The carboniferous and older stratified beds still cover the west half of the hills, while from the east half they have been removed, exposing the granite. Scientific exploration began in 1849, and systematic geological investigation about 1875. Rich gold placers had already been discovered, and in 1875 the Sioux Indians within whose territory the hills had until then been included, were removed, and the lands were open to white settlers. Subsequently low-grade quartz mines were found and developed, and have furnished a notable part of the gold supply of the country (about $100,000,000 from 1875 to 1901). The output is to-day relatively small in comparison with that of many other fields, but there are one or two permanent gold mines of great value working low-grade ore. The silver product from 1879 to 1901 was about $4,154,000. Deposits of copper, tin, iron and tungsten have been discovered, and a variety of Other mineral products (graphite, mica, spodumene, coal, petroleum, &c). In sharp contrast to the surrounding plains the climate is subhumid, especially in the higher Harney region. There is an abundance of fertile soil and magnificent grazing land. A third of the total area is covered with forests of pine and other trees, which have for the most part been made a forest-reserve by the national government. Jagged crags, : sudden abysses, magnificent canyons, forests with open parks, undulating hills, mountain prairies, freaks of weathering and erosion, and the enclosing lines of the successive hog-backs afford scenery of remarkable variety and wild beauty. There are several interesting limestone caverns, and Sylvan Lake, in the high mountain district, is an important resort.

See the publications of the United States Geological Survey (especially Professional Paper No. 26, Economic Resources of the Northern Black Hills, 1904), and of the South Dakota School of Mines (Bulletin No. 4, containing a history and bibliography of Black Hills investigations) ; also R. L. Dodge, The Black Hills: A Minute Description . . . (New York, 1876).

BLACKIE, JOHN STUART (1809-1895), Scottish scholar and man of letters, was born in Glasgow on the 28th of July 1809. He was educated at the New Academy and afterwards at the Marischal College, in Aberdeen, where his father was manager of the Commerical Bank. After attending classes at Edinburgh University (1825-1826), Blackie spent three years at Aberdeen as a student of theology. In 1829 he went to Germany, and after studying at Gottingen and Berlin (where he came under the influence of Heeren, Ottfried Miiller, Schleiermacher, Neander and Bockh) he accompanied Bunsen to Italy and Rome. The years spent abroad extinguished his former wish to enter the Church, and at his father’s desire he gave

himself up to the study of law. He had already, in 1824, been placed in a lawyer's office, but only remained there six months. By the time he was admitted a member of the Faculty of Advocates (1834) he had acquired a strong love of the classics and a taste for letters in

general. A translation of Faust, which he published in 1834, met with considerable success. After a year or two of desultory literary work he was (May 1839) appointed to the newly- instituted chair of Humanity (Latin) in the Marischal College. Difficulties arose in the way of his installation, owing to the action of the Presbytery on his refusing to sign unreservedly the Con- fession of Faith; but these were eventually overcome, and he took up his duties as professor in November 1841. In the following year he married. • From the first his professorial lectures were conspicuous for the unconventional enthusiasm with which he endeavoured to revivify the study of the classics; and his growing reputation, added to the attention excited by a translation of Aeschylus which he published in 1850, led to his appointment in 1852 to the professorship of Greek at Edinburgh University, in succession to George Dunbar, a post which he con- tinued to hold for thirty years. He was somewhat erratic in his methods, but his lectures were a triumph of influential person- ality. A journey to Greece in 1853 prompted his essay On the Living Language of the Greeks, a favourite theme of his, especially in his later years; he adopted for himself a modern Greek pronunciation, and before his death he endowed a travelling scholarship to enable students to learn Greek at Athens. Scottish nationality was another source of enthusiasm with him; and in this connexion he displayed real sympathy with Highland home life and the grievances of the crofters. The foundation of the Celtic chair at Edinburgh University was mainly due to his efforts. In- spite of the many calls upon his time be produced a considerable amount of literary work, usually on classical or Scottish subjects, including some poems and songs of no mean order. He died in Edinburgh on the 2nd of March 1895. Blackie was a Radical and Scottish nationalist in politics, but of a fearlessly independent type; he was one of the " characters " of the Edinburgh of the day, and was a well-known figure as he went about in his plaid, worn shepherd-wise, wearing a broad-brimmed hat, and carrying a big stick. His published works include (besides several volumes of verse) Homer and the Iliad (1866), maintaining the unity of the poems; Four Phases of Morals: Socrates, Aristotle, Christianity, Utilitarianism (1871); Essay on Self-Culture (1874); Horae Hellenicae (1874); The Language and Literature of the

Scottish Highlands (1876); The Natural History of Atheism (1877); The Wise Men of Greece (1877); Lay Sermons (1881); Altavona (1882); The Wisdom of Goethe (1883); The Scottish Highlanders and the Land Laws (1885); Life of Burns (1888); Scottish Song (1889); Essays on Subjects of Moral and Social Interest (1890); Christianity and the Ideal of Humanity (1893). Amongst his political writings may be mentioned a pamphlet On Democracy (1867), On Forms of Government (1867), and Political Tracts (1868).

See Anna M. Stoddart, John Stuart Blackie (1895) ; A. Stodart-Walker, Selected Poems of J. S. Blackie, with an appreciation (1896) ; Howard Angus Kennedy, Professor Blackie (1895).

BLACK ISLE, The, a district in the east of the county of Ross and Cromarty, Scotland, bounded N. by Cromarty Firth, E. by Moray Firth, S. by Inner Moray Firth (or Firth of Inverness) and Beauly Firth, and W. by the river Conon and the parish of Urray. It is a diamond-shaped peninsula jutting out from the mainland in a north-easterly direction, the longer axis, from Muir of Ord station to the South Sutor at the entrance to Cromarty Firth, measuring 20 m., and the shorter, from Ferryton Point to CraigtonPoint, due north and south, 12 m., and it has a coast- line of 52 m. Originally called Ardmeanach (Gaelic ard, height; manaich, monk, ” the monk’s height,” from an old religious house on the finely-wooded ridge of Mulbuie), it derived its customary name from the fact that, since snow does not lie in winter, the promontory looks black while the surrounding country is white. Within its limits are comprised the parishes of Urquhart and Logie Wester, Killearnan, Knockbain (Gaelic cnoc, hill; bdn, white), Avoch (pron. Auch), Rosemarkie, Resolis (Gaelic rudha or ros soluis, ” cape of the light “) or Kirkmichael and Cromarty. The Black Isle branch of the Highland railway runs from Muir of Ord to Fortrose; steamers connect Cromarty with Invergordon and Inverness, and Fortrose with Inverness; and there are ferries,

on the southern coast, at North Kessock (for Inverness) and Chanonry (for Fort George), and, on the northern coast, at Alcaig (for Dingwall), Newhallpoint (for Invergordon), and Cromarty (for Nigg). The principal towns are Cromarty and Fortrose. Rosehaugh, near Avoch, belonged to Sir George Mackenzie, founder of the Advocates’ library in Edinburgh, who earned the sobriquet of ” Bloody ” from his persecution of the Covenanters. Redcastle, on the shore, near Killearnan church, dates from n 79 and is said to have been the earliest inhabited house in the north of Scotland. On the forfeiture of the earldom of Ross it became a royal castle (being visited by Queen Mary), and afterwards passed for a period into the hands of the

Mackenzies of Gairloch. The chief industries are agri- culture — high farming flourishes owing to the great fertility of the peninsula — sandstone-quarrying and fisheries (mainly from Avoch) . The whole district, though lacking water, is picturesque and was once forested. The Mulbuie ridge, the highest point of which is 838 ft. above the sea, occupies the centre and is the only elevated ground. Antiquarian remains are somewhat numerous, such as forts and cairns in Cromarty parish, and stone circles in Urquhart and Logie Wester and Knockbain parishes, the latter also containing a hut circle and rock fortress.

BLACKLOCK, THOMAS (1721-1791), Scottish poet, the son of a bricklayer, was born at Annan, in Dumfriesshire, in 1721. When not quite six months old he lost his sight by small- pox, and his career is largely interesting as that of one who achieved what he did in spite of blindness. Shortly after his father's death in 1740, some of Blacklock's poems began to be handed about among his acquaintances and friends, who arranged for his education at the grammar-school, and subsequently at the university of Edinburgh, where he was a student of divinity. His first volume of Poems was published in 1746. In 1754 he became deputy librarian for the Faculty of Advocates, by the kindness of Hume. He was eventually estranged from Hume, and defended James Beattie's attack on that philosopher. Black- lock was among the first friends of Burns in Edinburgh, being one of the earliest to recognize his genius. He was in 1762 ordained minister of the church of Kirkcudbright, a position which he soon resigned; in 1767 the degree of doctor in divinity was conferred on him by Marischal College, Aberdeen. He died on the 7th of July 1791.

An edition of his poems in 1793 contains a life by Henry Mackenzie.

BLACKMAIL, a term, in English law, used in three special meanings, at different times. The usual derivation of the second half of the word is from Norman Fr. maille (medalia; cf. "medal"), small copper coin; the New English Dictionary derives from " mail " (q.v.), meaning rent or tribute. (1) The primary meaning of " blackmail " was rent paid in labour, grain or baser metal (i.e. money other than sterling money), called reditus nigri, in contradistinction to rent paid in silver or white money (mailles blanches). (2) In the northern counties of Eng- land (Northumberland, Westmorland and the bishopric of Durham) it signified a tribute in money, corn, cattle or other consideration exacted from farmers and small owners by free- booters in return for immunity from robbers or moss-troopers. By a statute of 1601 it was made a felony without benefit of clergy to receive or pay such tribute, but the practice lingered until the union of England and Scotland in 1707. (3) The word now signifies extortion of money or property by

threats of libel, presecution, exposure, &c. See such headings as Coercion, Conspiracy, Extortion, and authorities quoted under Criminal Law.

BLACKMORE, SIR RICHARD (c. 1650-1729), English phy- sician and writer, was born at “Corsham, in Wiltshire, about 1650. He was educated at Westminster school and St Edmund Hall, Oxford. He was for some time a schoolmaster, but finally, after graduating in medicine at Padua, he settled in practice as a physician in London. He supported the principles of the Revolution, and was accordingly knighted in 1697. He held the office of physician in ordinary both to William III. and Anne, and died on the 9th of October 1729. Blackmore had a

passion for writing epics. Prince Arthur, an Heroick Poem in X Books appeared in 1695, and was followed by six other long poems before 1723. Of these Creation . . . (1712), a philo- sophic poem intended to refute the atheism of Vanini, Hobbes and Spinoza, and to unfold the intellectual philosophy of Locke, was the most favourably received. Dr Johnson anticipated that this poem would transmit the author to posterity ” among the first favourites of the English muse,” while John Dennis went so far as to describe it. as ” a philosophical poem, which has equalled that of Lucretius in the beauty of its versification, and infinitely surpassed it in the solidity and strength of its reason- ing.” These opinions have not been justified, for the poem, like everything else that Blackmore wrote, is dull and tedious. His Creation appears in Johnson’s and Anderson’s collections of the British poets. He left also works on medicine and on theological subjects.

BLACKMORE, RICHARD DODDRIDGE (1825-1900), English novelist, was born on the 7th of June 1825 at Longworth, Berk- shire, of which village his father was curate in charge. He was educated at Blundell’s school, Tiverton, and Exeter College, Oxford, where he obtained a scholarship. In 1847 he took a second class in classics. Two years later he entered as a student at the Middle Temple, and was called to the bar in 1852. His first publication was a volume of Poems by Melanter (1854), which showed no particular promise, nor did the succeeding volume, Epullia (1855), suggest that Blackmore had the makings of a poet. He was nevertheless enthusiastic in his pursuit of literature; and when, a few years later, the complete breakdown of his health rendered it clear that he must remove from London, he deter- mined

to combine a literary life in the country with a business career as a market-gardener. He acquired land at Teddington, and set earnestly to work, the literary fruits of his new surround- ings being a translation of the Georgics, published in 1862. In 1864 he published his first novel, Clara Vaughan, the merits of which were promptly recognized. Cradock Nowell (1866) followed, but it was in 1869 that he suddenly sprang into fame with Lorna Doone. This fine story was a pioneer in the romantic revival; and appearing at a jaded hour, it was presently recog- nized as a work of singular charm, vigour and imagination. Its success could scarcely be repeated, and though Blackmore wrote many other capital stories, of which the best known are The Maid of Sker (1872), Chrislowell (1880), Perlycross (1894), Tales from the Telling House (1896) and Dariel (1897), he will always be remembered almost exclusively as the author of Lorna Doone. He continued his quiet country life to the last, and died at Teddington on the 20th of January 1900, in his seventy-fifth year. Lorna Doone has the true out-of-door atmosphere, is shot through and through with adventurous spirit, and in its dramatic moments shows both vigour and intensity. The heroine, though she is invested with qualities of faery which are scarcely human, is an idyllic and haunting figure; and John Ridd, the bluff hero, is, both in purpose and achievement, a veritable giant of romance. The story is a classic of the West country, and the many pilgrimages that are made annually to the Doone Valley (the actual characteristics of which differ materially from the descriptions given in the novel) are entirely inspired by the buoyant imagination of Richard Blackmore. A memorial window and tablet to his memory were erected in Exeter cathedral in 1904.

BLACK MOUNTAIN, a mountain range and district on the Hazara border of the North-West Frontier Province of India. It is inhabited by Yusafzai Pathans. The Black Mountain itself has a total length of 25 to 50 m., and an average height of 8000ft. above the sea. It rises from the Indus basin near the village of Kiara, up to its watershed by Bruddur; thence it runs north- west by north to the point on the crest known as Chittabut. From Chittabut the range runs due north, finally descending by two large spurs to the Indus again. The tribes which inhabit the western face of the Black Mountain are the Hassanzais (2300 fighting men), the Akazais (1165 fighting men) and the Chagar- zais (4890 fighting men), all sub-sections of the Yusafzai Pathans. It was in this district that the Hindostani Fanatics had their

stronghold, and they were responsible for much of the unrest on this part of the border.

The Black Mountain is chiefly notable for four British expeditions : —

1. Under Lieut.-Colonel F. Mackeson, in 1852-53, against the Hassanzais. The occasion was the murder of two British customs officers. A force of 3800 British troops traversed their country, destroying their villages and grain, &c.

2. Under Major-General A. T. Wilde, in 1868. The occasion was an attack on a British police post at Oghi in the Agror Valley by all three tribes. A force of 12,500 British troops entered the country and the tribes made submission.

3. The First Hazara Expedition in 1888. The cause was the constant raids made by the tribes on villages in British territory, culminating in an attack on a small British detachment, in which two English officers were killed. A force of 1 2,500 British troops traversed the country of the tribes, and severely punished them. Punishment was also inflicted on the Hindostani Fanatics of Palosi.

4. The Second Hazara Expedition of 1891. The Black Mountain tribes fired on a force within British limits. A force of 7300 British troops traversed the country. The tribesmen made their submission and entered into an agreement with government to preserve the peace of the border.

The Black Mountain tribes took no part in the general frontier rising of 1897, and after the disappearance of the Hindostani Fanatics they sank into comparative unimportance . .

BLACKPOOL, a municipal and county borough and seaside resort in the Blackpool parliamentary division of Lancashire, England, 46 m. N. of Liverpool, served by the Lancashire & Yorkshire, and London & North Western railways. Pop. (1891) 23,846; (1901) 47,346. The town, which is quite modern, contains many churches and chapels of all denominations, a town hall, public libraries, the Victoria hospital, three piers, theatres, ball-rooms, and other places of public amusement, including a lofty tower, resembling the Eiffel Tower of Paris. The municipality maintains an electric tram service. There are handsome promenades along the sea front, which command fine views. Extensive works upon these, affording a sea front unsurpassed by that of any English watering-place, were com- pleted in 1905. The beach is sandy and the bathing good. The borough was created in 1876 (county borough, 1904), and is governed by a mayor, 12 aldermen and 36 councillors. Area, exclusive of foreshore, 3496 acres; including foreshore, 4244 acres.

BLACK ROD (more fully, ” Gentleman Usher of the Black Rod “), an

official of the House of Lords, instituted in 1350. His appointment is by royal letters patent, and his title is due to his staff of office, an ebony stick surmounted with a gold lion. He is a personal attendant of the sovereign in the Upper House, and is also usher of the order of the Garter, being doorkeeper at the meetings of the knights' chapter. He is responsible for the maintenance of order in the House of Lords, and on him falls the duty of arresting any peer guilty of breach of privilege or other offence of which the House takes cognizance. But the duty which brings him most into prominence is that of summoning the Commons and their speaker to the Upper House to hear a speech from the throne or the royal assent given to bills. If the sovereign is present in parliament, Black Rod commands the attendance of the gentlemen of the Commons, but when lords commissioners represent the king, he only desires such attendance. Black Rod is on such occasions the central figure of a curious ceremony of much historic significance. As soon as the attend- ants of the House of Commons are aware of his approach, they close the doors in his face. Black Rod then strikes three times with his staff, and on being asked " Who is there? " replies " Black Rod." Being then admitted he advances to the bar of the House, makes three obeisances and says, " Mr Speaker, the king commands this honourable House to attend his majesty immediately in the House of Lords." This formality originated in the famous attempt of Charles I. to arrest the five members, Hampden, Pym, Holies, Hesilrige and Strode, in 1642. Indignant

at this breach of privilege, the House of Commons has ever since maintained its right of freedom of speech and uninterrupted debate by the closing of the doors on the king's representative.

BLACK SEA (or Euxine; anc. Pontus Euxinus), 1 a body of water lying almost entirely between the latitudes 41 and 45 N., but extending to about 47 N. near Odessa. It is bounded N. by the southern coast of Russia; W. by Rumania, Turkey and Bulgaria; S. and E. by Asia Minor. The northern boundary is broken at Kertch by a strait entering into the Sea of Azov, and at the junction of the western and southern boundary is the Bosporus, which unites the Black Sea with the Mediterranean through the Sea of Marmora and the Dardanelles. The 100 fathom line is about 10 to 20 m. from the shore except in the north-west corner between Varna and Sevastopol, where it extends 140 m. seawards. The greatest depth is 1030 fathoms (1227 Russian fathoms) near the centre, there being only one basin. The steepest

incline outside 100 fathoms is to the south- east of the Crimea and at Amastra; the incline to the greater depths is also steep off the Caucasus and between Trebizond and Ba.tum. The conditions that prevail in the Black Sea are very different from those of the Mediterranean or any other sea. The existence of sulphuretted hydrogen in great quantities below 100 fathoms, the extensive chemical precipitation of calcium car- bonate, the stagnant nature of its deep waters, and the absence of deep-sea life are conditions which make it impossible to discuss it along with the physical and biological conditions of the Mediter- ranean proper.

The depths of the Black Sea are lifeless, higher organic life not being known to exist below 100 fathoms. Fossiliferous remains of Dreissena, Cardium and other molluscs have, however, been dredged up, which help to show that conditions formerly existed in the Black Sea similar to those that exist at the present day in the Caspian Sea. According to N. Andrusov, when the union of the Black Sea with the Mediterranean through the Bosporus took place, salt water rushed into it along the bottom of the Bosporus and killed the fauna of the less saline waters. This gave rise to a production of sulphuretted hydrogen which is found in the deposits, as well as in the deeper waters.

Observations in temperature and salinity have only been taken during summer. During summer the surface salinity of the Black Sea is from 1 ■ 70 to 2 -oo % down to 50 fathoms, whereas in the greater depths it attains a salinity of 2-25%. The temperature is rather remarkable, there being an intermediate cold layer between 25 and 50 fathoms. This is due to the sinking of the cold surface water (which in winter reaches freezing-point) on to the top of the denser more saline water of the greater depths. There is thus a minimum circulation in the greater depths causing there uniformity of temperature, an absence of the circulation of oxygen by other means than diffusion, and a protection of the sulphuretted hydrogen from the oxidation which takes place in homologous situations in the open ocean. The temperature down to 25 fathoms is from 78-3° to 46-2° F., and in the cold layer, between 25 and 50 fathoms, is from 46-2° to 43-5° F., rising again in greater depths to 48- 2°F.

The Sea of Marmora may be looked upon as an arm of the Aegean Sea and thus part of the Mediterranean proper. Its salinity is comparable to that of the eastern basin of the Mediter- ranean, which is greater than that of the Black Sea, viz. 4%. Similar currents exist in the Bosporus to those of the Strait of Gibraltar. Water of less salinity flows outwards from the Black Sea as an upper current, and water of greater salinity from the Sea of Marmora flows into the Black Sea as an under-

current. This under-current flows towards Cape Tarhangut, where it divides into a left and right branch. The left branch is appreciably noticed near Odessa and the north-west corner; the right branch sweeps past the Crimea, strikes the Caucasian shore (where it comes to the surface running across, but not into, the south-east corner of the Black Sea), and finally disperses flowing westwards along the northern coast of Asia Minor between Cape Jason and

1 The early Greek navigators gave it the epithet of axenus, i.e. unfriendly to' strangers, but as Greek colonies sprang up on the shores this was changed to euxinus, friendly to strangers.

Sinope. This current causes a warmer climate where it strikes. So marked is this current that it has to be taken into account in the navigation of the Black Sea.

The Sea of Azov is exceedingly shallow, being only about 6 fathoms in its deepest part, and it is largely influenced by the river Don. Its water is considerably fresher than the Black Sea, varying from 1-55 to o-68%. It freezes more readily and is not affected by the Mediterranean current.

See N. Andrusov, " Physical Exploration of the Black Sea," in Geographical Journal, vol. i. p. 49.

BLACK SEA (Russ. Chcrnomorskaya) , a military district ef the province of Kuban, formerly an independent province Of Transcaucasia, Russia; it includes the narrow strip of land along the N.E. coast of the Black Sea from Novorossiysk to the vicinity of Pitsunda, between the sea and the crest of the main range of the Caucasus. Area, 2836 sq. m. Pop. (1897) 54,228; (1906, estimate) 71,900. It is penetrated by numerous spurs of this range, which strike the sea abruptly at right angles to the coast, and in many cases plunge down into it sheer. Owing to its southern exposure, its sheltered position, and a copious rainfall, vegetation, in part of a sub-tropical character, grows in great profusion. In consequence, however, of the moun- tainous character of the region, it is divided into a large number of more or less isolated districts, and there is little intercourse with the country north of the Caucasus, the passes over the range being few and difficult (see Caucasus). But since the Russians became masters of this region, its former inhabitants (Circassian tribes) have emigrated in thousands, so that the country is now only thinly inhabited. It is divided into three districts- Novorossiysk, with the town (pop. in 1897, 16,208) of the same name, which acts as the capital of the Black Sea district; Velyaminovsk; and Sochi.

Novorossiysk is connected by rail, at the west end of the Caucasus, with the Rostov- Vladikavkaz line, and a mountain road leadsirom Velyaminovsk (or Tuapse) to Maikop in the province of Kuban.

BLACKSTONE, SIR WILLIAM (1723-1780), English jurist, was born in London, on the 10th of July 1723. His parents' having died when he was young, his early education, under the care of his uncle, Dr Thomas Bigg, was obtained at the Charter- house, from which, at the age of fifteen, he was sent to Pembroke College, Oxford. He was entered in the Middle Temple in 174 1. In 1 744 he was elected a fellow of All Souls' College. From this period he divided his time between the university and the Temple, where he took chambers in order to attend the law courts. In 1746 he was called to the bar. Though but little known or distinguished as a pleader, he was actively 'employed* during his occasional residences at the university, in taking part in the internal management of his college. In May 1749, as a small reward for his services, and to give him further oppor- tunities of advancing the interests of the college, Blackstone was appointed steward of its manors. In the same year, on the resignation of his uncle, Seymour Richmond, he was elected recorder of the borough of Wallingford in Berkshire. In 1750 he became doctor of civil law. In 1753 he decided to retire from London work to his fellowship and an academical life, still con- tinuing the practice of his profession as a provincial counsel.

His lectures on the laws of England appear to have been an early and favourite idea; for in the Michaelmas term immedi- ately after he abandoned London, he entered on the duty of reading them at Oxford; and we are told by the author of his Life, that even at their commencement, the high expectations formed from the acknowledged abilities of the lecturer attracted to these lectures a very crowded class of young men of the first families, characters and hopes. Bentham, however, declares that he was a " formal, precise and affected lecturer — just what you would expect from the character of his writings — cold, reserved and wary, exhibiting a frigid pride." It was not till the year 1758 that the lectures in the form they now bear were read in the university. Blackstone, having been unanimously elected to the newly-founded Vinerian professorship, on the 25th of October read his first introductory lecture, afterwards prefixed to the first volume of his celebrated Commentaries. It is doubtful

whether the Commentaries were originally intended for the press; but many imperfect and incorrect copies having got into circulation, and a pirated edition of them being either published or preparing for publication in Ireland, the author thought proper to print a correct edition himself, and in November 1765 published the first volume, under the title of Commentaries 011 the Laws of England. The remaining parts of the work were given to the world in the course of the four succeeding years. It may be remarked that before this period the reputation which his lectures had deservedly acquired for him had induced him to resume practice in London; and, contrary to the general order of the profession, he who had quitted the bar for an academic life was sent back from the college to the bar with a considerable increase of business. He was likewise elected to . parliament, first for Hindon, and afterwards for Westbury in Wilts; but in neither of these departments did he equal the expectations which his writings had raised. The part he took in the Middlesex election drew upon him many attacks as well as a severe anim- adversion from the caustic pen of " Junius." This circumstance probably strengthened the aversion he professed to parliamentary attendance, " where," he said, " amidst the rage of contending parties, a man of moderation must expect to meet with no quarter from any side." In 17 70 he declined the place of solicitor- general; but shortly afterwards, on the promotion of Sir Joseph Yates to a seat, in the court of common pleas, he accepted a seat on the bench, and on the death of Sir Joseph succeeded him there also. He died on the 14th of February 1780.

The design of the Commentaries is exhibited in his first Vinerian lecture printed in the introduction to them. The author there dwells on the importance of noblemen, gentlemen and educated persons generally being well acquainted with the laws of the country; and his treatise, accordingly, is as far as possible a popular exposition of the laws of England. Falling into the common error of identifying the various meanings of the word law, he advances from the law of nature (being either the revealed or the inferred will of God) to municipal law, which he defines to be a rule of civil conduct prescribed by the supreme power in a state commanding what is right and prohibiting what is wrong. On this definition he founds the division observed in the Com- mentaries. The objects of law are rights and wrongs. Rights are either rights of persons or rights of things. Wrongs are either public or private. These four headings form respectively the subjects of the four books, of the Commentaries.

Blackstone was by no means what would now be called a scientific jurist. He has only the vaguest possible grasp of the elementary conceptions of law. He evidently regards the law of gravitation, the

law of nature, and the law of England, as different examples of the same principle — as rules of action or conduct imposed by a superior power on its subjects. He propounds in terms the doctrine that municipal or positive laws derive their validity from their conformity to the so-called law of nature or law of God. ” No human laws,” he says, ” are of any validity if contrary to this.” His distinction between rights of persons and rights of things, implying, as it would appear, that things as well as persons have rights, is attributable to a misunderstanding of the technical terms of the Roman law. In distinguishing between private and public wrongs (civil injuries and crimes) he fails to seize the true principle of the division. Austin, who accused him of following slavishly the method of Hale’s Analysis of the Law, declares that he ” blindly adopts the mistakes of his rude and compendious model; missing invariably, with a nice and surprising infelicity, the pregnant but obscure suggestions which it proffered to his attention, and which would have guided a discerning and inventive writer to an arrangement comparatively just.” By the want of precise and closely-defined terms, and his tendency to substitute loose literary phrases, he falls occasionally into irreconcilable contra- dictions. Even in discussing a subject of such immense import- ance as equity, he hardly takes pains to discriminate between the legal and popular senses of the word, and, from the small place which equity jurisprudence occupies in his arrangement, he would scarcely seem to have realized its true position in the

law of England. Subject, however, to these strictures the completeness of the treatise, its serviceable if not scientific order, and the power of lucid exposition possessed by the author demand emphatic recognition. Blackstone’s defects as a jurist are more conspicuous in his treatment of the underlying principles and fundamental divisions of the law than in his account of its substantive principles.

Blackstone by no means confines himself to the work of a legal commentator. It is his business, especially when he touches on the framework of society, to find a basis in history and reason for all the most characteristic English institutions. There is not much either of philosophy or fairness in this part of his work. Whether through the natural conservatism of a lawyer, or through his own timidity and subserviency as a man and a politician, he is always found to be a specious defender of the existing order of things. Bentham accuses him of being the enemy of all reform, and the unscrupulous champion of every form of professional chicanery. Austin says that he truckled to the sinister interests and mischievous prejudices of power, and that he flattered the overweening conceit of the English in their own institutions. He displays much ingenuity in giving a plausible form to

common prejudices and fallacies; but it is by no means clear that he was not imposed upon himself. More undeniable than the political fairness of the treatise is its merits as a work of literature. It is written in a most graceful and attractive style, and although no opportunity of embellishment has been lost, the language is always simple and clear. Whether it is owing to its literary graces, or to its success in flattering the prejudices of the public to which it was addressed, the influence of the book in England has been extraordinary. Not lawyers only, and lawyers perhaps even less than others, accepted it as an authoritative revelation of the law. It performed for educated society in England much the same service as was rendered to the people of Rome by the publication of their previously unknown laws. It is more correct to regard it as a handbook of the law for laymen than as a legal treatise; and as the first and only book of the kind in England it has been received with some- what indiscriminating reverence. It is certain that a vast amount of the constitutional sentiment of the country has been inspired by its pages. To this day Blackstone's criticism of the English constitution would probably express the most profound political convictions of the majority of the English people. Long after it has ceased to be of much practical value as an authority in the courts, it remains the arbiter of all public dis- cussions on the law or the constitution. On such occasions the Commentaries are apt to be construed as strictly as if they were a code. It is curious to observe how much importance is attached to the ipsissima verba of a writer who aimed more at presenting a picture intelligible to laymen than at recording the principles of the law with technical accuracy of detail.

See also the article English Law.

BLACK VEIL, in the Roman Catholic Church, the symbol of the most complete renunciation of the world and adoption of a nun's life. On the appointed day the nun goes through all the ritual of the marriage ceremony, after a solemn mass at which all the inmates of the convent assist. She is dressed in bridal white with wreath and veil, and receives a wedding-ring, as spouse of the Church. Afterwards she presides at a wedding- breakfast, at which a bride-cake is cut. She thus bids adieu to all her friends, and having previously taken the white veil, the betrothal, she now assumes the black, and for ever forswears the world and its pleasures. Her hair is cut short, and her bridal robes are exchanged for the sombre religious habit. Her Wedding- ring, however, she continues to wear, and it is buried with her.

BLACKWATER, the name of a number of rivers and streams in England, Scotland and Ireland. The Blackwater in Essex, which rises near Saffron Walden, has a course of about 40 m. to the North Sea.

The most important river of the name is in southern Ireland, rising in the hills on the borders of the counties Cork and Kerry, and flowing nearly due east for the greater part of its course, as far as Cappoquin, where it turns abruptly south- ward, and discharges through an estuary into Youghal Bay.

The length of its valley (excluding the lesser windings of the river) is about 90 m., and the drainage area about 1300 sq. m. It is navigable only for a few miles above the mouth, but its salmon fisheries are both attractive to sportsmen and of consider- able commercial value. The scenery of its banks is at many points very beautiful.

BLACKWATER FEVER, a disease occurring in tropical countries and elsewhere, which is often classed with malaria (q.v.). It is characterized by irregular febrile paroxysms, accom- panied by rigors, bilious vomiting, jaundice and haemoglobinuria (Sambon). It has a wide geographical distribution, including tropical Africa, parts of Asia, the West Indies, the southern United States, and — in Europe — Greece, Sicily and Sardinia; but its range is not coextensive with malaria. Malarial parasites have occasionally been found in the blood. Some authorities believe it to be caused by the excessive use of quinine, taken to combat malaria. This theory has had the support of Koch, but it is not generally accepted. If it were correct, one would expect blackwater fever to be regularly prevalent in malarial countries and to be more or less coextensive with the use of quinine, which is not at all the case. It often resembles yellow fever, but the characteristic black vomit of yellow fever rarely occurs in blackwater fever, while the black urine from which the latter derives its name is equally rare in the former. According to the modern school of tropical para- sitology, blackwater fever is neither a form of malaria nor produced by quinine, but a specific disease due to a protozoal parasite akin to that which causes the red water fever of cattle.

BLACKWELL, THOMAS (1701-1757), Scottish classical scholar, was born at Aberdeen on the 4th of August 1701. He took the degree of M.A. at the Marischal College in 17 18. He was appointed professor of Greek in 1723, and was principal of the institution from 1 748 until his death on the 8th of March 1757. In 1735 his first work, An Inquiry into the Life and Writings of Homer, was published anonymously. It was re- printed in 1736, and followed (in 1747) by Proofs of the Enquiry into Homer’s Life and Writings, a translation of the copious

notes in foreign languages which had previously appeared. This work, intended to explain the causes of the superiority of Homer to all the poets who preceded or followed him, shows considerable research, and contains many curious and interesting details; but its want of method made Bentley say that, when he had gone through half of it, he had forgotten the beginning, and, when he had finished the reading of it, he had forgotten the whole. Blackwell's next work (also published anonymously in 1748) was Letters Concerning Mythology. In 1752 he took the degree of doctor of laws, and in the following year published the first volume of Memoirs of the Court of Augustus; the second volume appeared in 1755, the third in 1764 (prepared for the press, after Blackwell's death, by John Mills) . This work shows considerable originality and erudition, but is even more unmethodical than his earlier writings and full of unnecessary digressions. Blackwell has been called the restorer of Greek literature in the north of Scotland; but his good qualities were somewhat spoiled by pomposity and affectation, which exposed him to ridicule. '

BLACKWOOD, WILLIAM (1776-1834), Scottish publisher, founder of the firm of William Blackwood & Sons, was born of humble parents at Edinburgh on the 20th of November 1776. At the age of fourteen he was apprenticed to a firm of booksellers in Edinburgh, and he followed his calling also in Glasgow and London for several years. Returning to Edinburgh in 1804, he opened a shop in South Bridge Street for the sale of old, rare and curious books. He undertook the Scottish agency for John Murray and other London publishers, and gradually drifted into publishing on his own account, removing in 18 16 to Princes Street. On the 1st of April 1817 was issued the first number of the Edinburgh Monthly Magazine, which on its seventh number, bore the name of Blackwood's as the leading part of the title. " Maga," as this magazine soon came to be called, was the organ of the Scottish Tory party, and round it gathered a host of able writers. William Blackwood died on the 16th of September 1834, and was succeeded by his two sons, Alexander and Robert,

who added a London branch to the firm. In 1845 Alexander Blackwood died, and shortly afterwards Robert.

A younger brother, John Blackwood (1818-1879), succeeded to the business; four years later he was joined by Major William Blackwood, who continued in the firm until his death in 1861. In 1862 the major's elder son, William Blackwood (b. 1836), was taken into partnership. John Blackwood, was a man of strong personality and great business discernment; it was in the pages of his magazine that George Eliot's first stories, Scenes of Clerical Life, appeared. He also inaugurated the

” Ancient Classics for English readers ” series. On his death Mr William Blackwood was left in sole control of the business. With him were associated his nephews, George William and J. H. Black- wood, sons of Major George Blackwood, who was killed at Maiwand in 1880.

See Annals of a Publishing House; William Blackwood and his Sons . . . (1897-1898), the first two volumes of which were Written by Mrs Oliphant; the third, dealing with John Blackwood, by his daughter, Mrs Gerald Porter.

BLADDER (from A.S. blaeddre, connected with blawan, to blow, cf. Ger. blase), the membranous sac in animals which receives the urine secreted from the kidneys. The word is also used for any similar sac, such as the gall-bladder, the swim- bladder in fishes, or the small vesicle in various seaweeds.

BLADDER AND PROSTATE DISEASES. The urinary bladder in man (for the anatomy see Urinary System), being the temporary reservoir of the renal secretion, and, as such, containing the urine for longer or shorter periods, is liable to various important affections. These are dealt with in the first part of this article. The diseases of the prostate are so intimately allied that they are best considered, as in the subsequent section, as part of the same subject.

Diseases of the Bladder.

Cystitis, or inflammation of the bladder, which may be acute or chronic, is due to the invasion of the mucous lining by micro-organisms, which gain access either from the urethra, the kidneys or the blood-stream. It is easy to see how c y stu,s – the diplococci of gonorrhoea may infect the bladder-membrane by direct extension of the inflammation, and how the bacilli which are swarming in the neighbouring bowel may find access to the urethra or bladder when the intervening tissues have been rendered penetrable by a wound or by inflammation. Sometimes, however, especially in the female, the germs from the large intestine enter the bladder by way of the vulva and the urethra.

Any condition leading to disturbance of the function of the bladder, such as enlargement of the prostate, stricture of the urethra, stone, or injury, may cause cystitis by preparing the way for bacillary invasion. The bacilli of tuberculosis and of typhoid fever may set up cystitis by coming down into the bladder from the kidneys with the urine, or they reach it by the blood-stream, or invade it by the urethra. Another way of cystitis being set up is by the introduction of the germs of

suppuration by a catheter or bougie sweeping them in from the urethra; or the instrument itself may be unsterilized and dirty and so may introduce them. It used formerly to be thought that wet or cold was enough to cause inflammation of the bladder, but the probability is that this acts only by lowering the resistance of the lining membrane of the bladder, and preparing it for the invasion of the germs which were merely waiting for an oppor- tunity. In the same way, gout or injury may lead to the lurking bacilli being enabled to effect their attack. But in every case disease-germs are the cause of the trouble, and they may be found in the urine. The first effect of inflammation is to render the bladder irritable, so that as soon as a few drops of urine have collected, the individual has intense or uncontrollable desire to micturate. The effort may be very painful and may be accom- panied by bleeding from the overloaded blood-vessels of the inflamed membrane. In addition to blood, pus is likely to be found in the urine, which by this time is alkaline and ammoniacal, and teeming with micro-organisms. As regards treatment, the patient should be at once sent to bed in a warm room, and should

sit several times a day in a very hot hip-bath. When he has got back to bed, a fomentation under oil-silk, or some other water- proof material, should be placed over the lower part of the abdomen. The diet should be milk (diluted with hot or cold water), barley-water, and bread and butter; no alcoholic drink should be allowed. If the urine is acid, bicarbonate of soda may be given, or citrate of soda; if alkaline, urotropine — a derivative of formic aldehyde — may prove a useful urinary disinfectant. If the straining and distress are great, a suppository of \ or \ a grain of morphia may be introduced into the rectum every two or three hours. The bowels must be kept freely open. If the urine is foul, the bladder should be frequently washed out by a soft catheter and two or three feet of india-rubber tubing with a funnel at the other end, weak and abundant hot lotions of Sanitas or Condy's fluid being used.

Chronic cystitis is the condition left when the acute symptoms have passed away, but it is liable at any moment to resume the acute condition. If the cystitis is very intractable, refusing to yield to hot irrigations, and to washings with nitrate of silver lotion, it may be advisable to open the bladder from the front, and to explore, treat, drain and rest it.

In tuberculous cystitis there is added to the symptoms the discovery of the bacilli of tuberculosis in the urine, and cysto- scopic examination may reveal the presence of tubercles of the mucous membrane or even of ulceration. The patient is probably losing weight, and he may present foci of tuberculosis at the back of the testicle, the lung or kidney, or in a joint or bone, or in a lymphatic gland. Treatment is rebellious and unpromising. Washings and lotions give but temporary relief, and if the bladder is opened for rest, and for a more direct treatment, the germs of suppuration may enter, and, working in conjunction with the bacilli, may cause great havoc. Koch's tuberculin treatment should certainly be given a trial. This consists of the injection into the body of an emulsion of dead tubercle bacilli which have been sterilized by heat. As a result of this injection the blood sets to work to form an " opsonin " — a protective material which so modifies the disease-germs as to render them attractive to the white corpuscles of the patient's blood (phago- cytes), which then seize upon and destroy them. Sir A. E. Wright has devised a delicate method of examination of the blood (the calculation of the opsonic index) which tells when the tuberculin injections should be resorted to and when withheld (see Blood).

Calculi and Gravel. — Uric acid is deposited from the urine either as small crystals resembling cayenne pepper, or else, in combina- tion with soda and ammonia, as an amorphous " brick- Stone. (j ust „ ˆ epos j tj w hich, on cooling, leaves a red stain on the bottom of the vessel, soluble in hot water. These substances are derived from the disintegration of nitrogenized food taken in excess of demand, and from the breaking down of the human tissues. They occur therefore in fevers, in wasting diseases, and in the normal subject after excessive muscular exercises, especially if these exercises have been accompanied with so much perspira- tion that the excess of water from the blood has escaped by the skin rather than by the kidneys. The abundance of this deposit is in accordance with the amount of heat developed and work done in the body, and corresponds with the dust and ashes raked out of the fire-box of the locomotive after a long run. But supposing that the uric acid debris continues to be excessive, the risk of the formation of renal qx vesical calculi becomes consider- able, and it may be advisable to place the patient on a restricted nitrogenized diet, to induce him to drink large quantities of water, and to keep his bowels so loose with watery laxatives, such as Epsom salts or sulphate of soda, that the waste products of his body are made to escape by the bowels rather than by the kidneys. In addition to the salts just mentioned, an occasional dose of blue pill will prove helpful. A course of treatment at Contrex6ville or Carlsbad may be taken with

advantage.

Alkaline urine is unable to hold the phosphates of ammonia and magnesia in solution, so they are deposited in abundance either in the kidney or bladder. If the voided urine is allowed to stand in a tall glass they sink to the bottom with pus and mucus in a cloudy

deposit. To remedy this condition it is necessary to treat the cystitis with which the bacterial decomposition of the urine is associated. It may be that a calculus of acid urine, such as one of uric acid or oxalate of lime, has been resting in the bladder and keeping up incessant irritation, and that the micro-organisms of decomposition or suppuration have found their way to the mucous lining of the bladder from either the bowel, the urethra or the blood-stream; undergoing cultivation there they break up the urea into carbonate of ammonia and so render the urine alkaline. This alkaline urine deposits its phosphates, which light upon the calculus and encrust it with a mortary shell, which may go on increasing in size until it may even fill the bladder. Sometimes the nucleus of a calculus is a chip of bone or a blood-clot, or some foreign substance which has been introduced into the bladder. Sooner or later the urine becomes alkaline and the calculus is encrusted with lime salts. .

When urine contains a larger amount of chemical constituents than it can conveniently hold in solution, a certain quantity crys- tallizes out, and may be deposited in the kidney or in the bladder. If the crystals run together in the kidney the resulting concretion may either remain in that organ or may find its way into the bladder, where it may remain to form the nucleus of a larger vesical calculus, or, especially in the case of females, it may, while still small, escape from the bladder during micturition.

In children, in whom there is a rapid disintegration of nitro- genized tissues, a uric acid calculus in escaping from the bladder may block the urethra and give rise to sudden retention of urine. On introducing a metal “sound,” the surgeon may strike the stone, and if it happens to be near the bladder he may push it back and subsequently remove it by crushing. But if it has made its way some distance along the urethra, so that he can feel it from the outside, he should remove it by a clean incision.

A stone in the bladder worries the nerves of the mucous membrane, and, giving them the impression that the bladder contains much water, causes the desire and need for micturition to be constant. The irritation causes an excessive secretion of mucus, just as a piece of grit

under the eyelid causes a constant running from the eye. So the urine, if allowed to stand, gives a copious deposit. During micturition the contracting bladder bruises its congested blood-vessels against the stone, so that towards the end of micturition blood appears in the urine. Lastly, cystitis occurs, and the urine contains fetid pus. A stone in the bladder gives rise to pain at the end of the penis, and it is apt suddenly to stop the flow of urine during micturition.

The association of any of these symptoms leads the surgeon to suspect the presence of a stone in the bladder, and he confirms his suspicions by introducing a slender steel rod, a ” sound,” by which he strikes and feels the stone. Further confirmation may be obtained by the help of the X-rays, or, in the adult, by using a cystoscope. In a child the stone may often be felt by a finger in the rectum, the front of the bladder being pressed by a hand on the lower part of the abdomen. The cystoscope is a straight, hollow metal tube about the size of a long cedar pencil, which the surgeon introduces into the adult bladder, which has already been filled with warm boracic lotion. Down the tube run two fine wires which control a minute electric lamp at the bladder end of the instrument. At that end also is a small glass window which prevents the fluid escaping by the tube, and also a prism; at the other end of the tube is an eye-piece. By the use of this slender speculum the practised surgeon can recognize the presence of tubercle or tuberculous ulceration of the bladder, stone, or other foreign material, and innocent or malignant growths. He can also watch the urine entering the bladder by the openings of the ureters, and deter- mine from which kidney blood or pus is coming.

The treatment of stone in the bladder is governed by various conditions. Speaking generally, the surgeon prefers to introduce a lithotrite and crush the stone into small fragments, and then to flush out the fragments by using a full-sized, hollow metal catheter and an india-rubber wash-bottle. Even in children this operation may generally be adopted with success, the stone being crushed to atoms and the fragments being washed out to

the last small chip. But if the stone is a very hard one (as are some of the oxalate of lime calculi), or if it is very large, or if the bladder or the prostate gland is in a state of advanced disease, or if the urethra is not roomy enough to admit instru- ments of adequate calibre, the crushing operation (lilholrity) must be deemed unsuitable, and the

stone must be removed by a cutting operation {lithotomy) .

Lithotomy. — Cutting for stone has been long practised; but up to the beginning of the 19th century it was performed only by a few men, who, bolder than their contemporaries, had specially worked at that operation and had attained celebrity as skilful lithotomists. Patients went long distances to be operated on by them, and certain of the older surgeons, as William Cheselden, performed a large number of operations with most excellent results. The operation was by an incision from the perineum, and is ordinarily spoken of as lateral litho- tomy. It was splendidly designed, and gave good results, especially in children. But it is now a thing of the past, having almost entirely given place to the high or supra-pubic operation. In the high operation the patient, being duly prepared, is placed upon his back and the bladder is washed out with hot boracic lotion, and when the lotion returns quite clean a final injection is made until the bladder is felt rising above the pubes. Then the india-rubber tube is removed from the silver catheter by which the injection has been made, and the end of the catheter is plugged by a spigot. An incision is then made in the middle line of the abdomen over the bladder region. The incision must be kept as low as possible, so that the bladder may be reached below the peritoneum, which, higher up, gives it an external, serous coat. As the bladder is approached, a good many veins are seen to be in the way, some of which have to be wounded. The bladder-wall is recognized by its coarse network of pale muscular fibres, through which, on each side of the middle line, a strong suture is passed, so that when the bladder is opened and the lotion comes rushing out, the opening which has been made into the bladder may not sink into the depths of the pelvis. A finger introduced into the bladder makes out the exact size and position of the stone, or stones, and the removal is effected by special forceps. Bleeding having ceased, the bladder-wound ;ls partly or entirely closed by sutures an'd allowed to fall into the pelvis, the catheter having been removed. It is advisable to leave a drainage tube in the abdominal wound for a while, so that if urine leaks from the bladder-wound it may find a ready escape to the dressings.

Litholapaxy. — Lithotrity consists of two parts — the crushing of the stone, and the removal of the detritus. The two stages are now carried out at one " sitting," without an interval being allowed between them, as was formerly the practice, and the term " litholapaxy " designates this method. The patient having been anaesthetized, 10 oz. of hot boracic lotion are in- jected, and the crushing instrument, the lithotrite, is then passed into the bladder. The lithotrite has two blades, a " male " and a " female," the latter fenestrated, the former

solid with its sur- face notched. When the stone is fixed between the blades the screw is used, and great pressure is applied evenly, gradually and continuously to the stone. The lithotrite is made of very tough steel, so that hard stones may be crushed without danger of the instrument breaking or bending. Care must be taken not to catch the bladder-wall with the lithotrite. This danger is avoided by raising the point of the lithotrite immediately after grasping the stone and before crushing. The stone breaks into two or more pieces, and these fragments must be crushed, one by one, until they are powdered fine enough to escape by the large evacuating catheter. If the stone be large and hard, half an hour or longer may be required to crush it sufficiently fine. When the surgeon fails to catch any more large pieces, the pre- sumption is that the stone has been thoroughly broken up. The lithotrite is then withdrawn and the detritus is washed out by an " aspirator," which consists of a stiff elastic ball which is connected with a trap, into which fragments of stone fall so as not to pass out on the instrument being used at later periods in the operation. A large catheter, with the eye very near the end of

the short curve, is passed into the bladder; the aspirator, full of boracic lotion, is attached to the catheter, and a few ounces of the fluid are expressed from the aspirator into the bladder by squeezing the rubber ball. When the pressure is taken off the ball, it dilates and draws the fluid out of the bladder, and with it some of the detritus, which falls into the trap. This is re- peated until all the fragments have been removed. After the operation the patient sometimes suffers from discomfort. His urine should be drawn off by a soft catheter at regular intervals for a few days. If the pain be severe, it can generally be relieved by fomentations. The patient must be kept in bed after the operation, and in cases where the stone has been large and the bladder irritable, the surgeon should insist on his remaining there for at least a week; in those cases which go on favourably the patients are soon able to perform their ordinary duties. Fatal terminations, however, do now and again occur from sup- pression of urine, the result of the old-standing kidney disease which so often complicates these cases.

To Brigade-Surgeon Lieutenant-Colonel Dennis Francis Keegan, of the Indian Medical Service, is due the fact that the operation of crushing and promptly removing all fragments of a vesical calculus is as well suited for boys as for men. In entire opposition to long-standing European prejudices, Keegan's operation is now firmly and permanently established. The old operation (Cheselden's) of cutting a stone out through the bottom of a boy's bladder is now seldom resorted to, and if a stone in a boy is found too large or too hard to

lend itself to the crushing operation, it is removed by a vertical incision through the lower part of the anterior wall of the abdomen, as described above. For a successful performance of the crushing operation in a boy a small lithotrite has, of course, to be used, and it must be of the very best English make. The operation has to be done with the utmost gentleness and thoroughness, not a particle of the crushed stone being left in the bladder, since otherwise the piece left becomes the nucleus of a fresh stone and the trouble recurs.

The treatment of vesical calculi by other means than operative surgery is of little value. Attempts have been made to dissolve them by internal remedies, or by the injection of chemical agents into the bladder; but, although such methods have for a time been apparently successful, they have invariably been found worthless for removing calculi once actually formed/ Nevertheless, much can be done towards preventing the formation of calculi in those who have a tendency to their formation, by attention to diet, by taking proper exercise, and by the internal administration of drugs.

Rupture of the bladder may be caused by a kick or blow over the upper part of the abdomen, or by a wheel passing over it; or it may be a complication of fracture of the pelvis. If the rupture is in that part of the bladder which is uncovered by the peritoneum, the extravasated urine may be cut down upon and let out with good prospect of success; but if the rupture is in the upper or hinder part of the bladder the urine is let loose into the general peritoneal cavity and sets up peritonitis, which is more than likely to prove fatal. If the surgeon knows that the bladder is ruptured he should operate at once in order to provide escape for the urine, and also to sew up the rent. If the possibility of the bladder being ruptured be even suspected, the surgeon should pass a catheter. Perhaps he draws off an ounce or two of blood-stained urine. This makes him doubly suspicious, so he injects into the bladder five, eight or ten ounces of warm boracic lotion, and, leaving it there for a few minutes, he measures the amount which he is able afterwards to withdraw; if he finds that a certain amount is lost he is assured that a leakage has taken place and he at once proceeds to operate. If only the diagnosis is made promptly, and the operation is at once undertaken, the outlook is not unfavourable. A generation or so back nearly all the cases of rupture of bladder ended fatally.

Villous disease of the bladder is innocent; that is to say, it does not spread to the neighbouring structures or implicate the lymphatic glands. The villi are slender, branched, filamentous processes which, springing from the floor of the bladder, float in the urine like seaweed.

They are freely supplied with blood-vessels, so that when a piece, of a villus is broken off there is likely to be blood in the urine. Indeed, painless haemorrhage is one of the characteristic features of the disease, and when fragments of the ” seaweed ” are found in the urine the diagnosis is clear. If the bladder is opened from the front, as already described, the villi may be nipped off by special forceps and the disease permanently cured.

Malignant disease of the bladder is almost always the warty form of cancer known as epithelioma. It springs as a sessile growth from the mucous membrane of the floor near the opening of one of the ureters, and, worrying the sensory nerves, causes irritability of the bladder and incontinence of urine. In due course septic germs reach the bladder, either from the urethra, the bowel, the kidneys or the blood-stream, and cystitis sets in. When ulceration has taken place, blood occurs in the urine, and the patient — generally beyond middle age — suffers dull or lancinating pains. Eventually the rectum may also be involved and the distress becomes extreme. The presence of the growth may be determined by sounding the bladder, by the cystoscope, and by the finger in the rectum. If the growth invades the outlet, retention of urine may occur, and the surgeon may be compelled to open the bladder from the front of the abdomen. In cases where operation is out of the question, washing the bladder with hot boracic lotion may give great relief. The treatment of cancer of the bladder by operation is, as a rule, un- satisfactory, because of the close proximity of the growth to the ureters and to the rectum. If, however, the disease were recognized early and had not invaded the neighbouring structures, and if it were upon the upper or the anterior part of the bladder, its removal might be hopefully undertaken.

Hypertrophy and Dilatation. — When there is long-continued obstruction to the flow of urine, as in stricture of the urethra, or enlargement of the prostate, the bladder-wall becomes much thickened, the muscular fibres increasing both in size and number; the condition is known as ” hypertrophy.” Hypertrophy may be accompanied by dilatation of the bladder, a condition which the bladder may assume when the voiding of its contents is interfered with for a length of time.

Paralysis of the bladder is a want of contractile power in the muscular fibres of the bladder-wall. It may result from injuries whereby the

spinal cord is lacerated or pressed upon, so that the micturition centre, which is situated in the lumbar region, is thrown out of working order. The result may be either retention or in- continence of urine ; sometimes there is at first retention, which later is followed by incontinence. Paralysis is also met with in certain nervous diseases, as in locomotor ataxia, and in various cerebral lesions, as in apoplexy.

Atony of the bladder is a paresis or partial paralysis. It is due to a want of tone in the muscular fibres, and is frequently the result of over-distension of the bladder, such as may occur in cases of enlargement of the prostate. The patient is unable to empty the bladder, and the condition of atony gets increasingly worse.

In both paralysis and atony the indication is carefully to prevent over-distension by the urine being retained too long, and at the same time to treat by appropriate means the cause which has produced or is keeping up the condition.

Incontinence of urine may occur in the adult or in the child, but is due to widely different causes in the two cases. In the child it may be simply a bad habit, the child not having been properly trained; but more frequently there is a want of control in the micturition-centre, so that the child passes its water unwittingly, especially during the night. In adults it is not so much a condition of incontinence in the sense of water being passed against the will, but is a suggestion that the bladder is already full, the water which passes being the overflow from a too full reservoir. It is usually caused by an obstruction external to the bladder, e.g. enlarged pro- state or stricture of the urethra; a calculus may produce the con- dition. In the child an attempt mustbe made to improve the tone of the micturition-centre by the use of belladonna or strychnine internally, and of a blister or faradism externally over the lumbar region, and every effort should be made to train the child to pass water at stated times and regular intervals. In the adult the cause which produces the over-distension must be removed if possible; but, as a rule, the patient has to be provided with a catheter, which he can pass before the bladder has filled to overflowing. A soft flexible catheter should be given in preference to a rigid or semi- rigid one. The best form is the red-rubber catheter, and he should be taught the need of keeping it absolutely clean. In the case of children incontinence of urine means irritability; in adults it means overflow.

The condition termed by Sir James Paget stammering micturition is analogous to speech stammering, and occurs in those who are nervous and easily put out. It would seem to be due to the sphincter of the

bladder not relaxing synchronously with the contraction of the detrusor, and is sometimes caused by external irritation, such as preputial adhesions. Occasionally not a drop of urine can be passed, or a little passes and then a sudden stoppage occurs; the more the patient strains the worse he becomes, until at last there is complete retention of urine. The trouble can sometimes be cured by the removal of irritating causes, and in these cases, as well as in those in which no such cause can be discovered, care should be taken to avoid those difficulties which have given rise to the patient's worst failures. If at any time he should fail to perform the act of micturition, he ought not to strain, but should quietly wait for a little before making any further effort. Regularity in the times of making water is also of much importance.

Retention of urine may occur in paralysis of the bladder, or in conditions where the patient is suffering from an illness which blunts

the nervous sensibility, such as apoplexy, concussion of the brain, or typhoid fever. It is, however, more commonly due to obstruc- tion anterior to the bladder, as in stricture of the urethra or enlarge- ment of the prostate. The distended bladder can be felt as a rounded swelling above the pubes, and perhaps reaching to the level of the navel. Percussion over it gives a dull note. When the bladder is distended, it is necessary to evacuate it as soon as possible. If there is no obstruction to the flow of urine, the retention being due to atony or paralysis, a soft catheter is passed and the water drawn off. But when there is an obstruction which cannot be overcome, aspiration has to be resorted to, the needle of the aspirator being pushed through the abdominal wall into the bladder. The point of puncture in the abdominal wall is in the middle line a few inches above the symphysis pubis. The bladder may be emptied in this way very many times in the same person with only good result.

Diseases of Prostate Gland.

The prostate gland may become acutely inflamed as the result of the backward extension of gonorrhoeal inflammation of the urethra; it may also be attacked by the germs of ordinary suppuration as well as by the bacilli of tuberculosis. A sudden enlargement of a large gland lying against the outlets of the bladder and the bowel renders micturition difficult, painful or impossible, and interferes with defaecation. Pressure of the seat of the chair upon the perineum also causes distress, so the man sits sideways and on the edge of the seat. If abscess forms, it should be incised from the perineum; if allowed to run its course it may burst into the bladder, the urethra or the rectum,

and set up serious complication. The treatment of prostatitis (inflammation of the prostate) consists in rest in bed, sitz-baths and fomentations. If retention of urine takes place a soft catheter must be passed. In the early stage of an acute attack a dozen leeches upon the perineum may do good. The bowels must be kept freely open, and from time to time, as the pain demands, a morphia suppository may be introduced into the bowel.

Chronic prostatitis is a legacy from a recent or long-past attack of gonorrhoea. The enlargement gives rise to a feeling of weight and fulness in the perineum, irritability of the bladder, and a gleety urethral discharge. Manual examination reveals the presence of a large, hard mass in front of the bladder, and in the mass there can often be felt softish or tender areas which seem to threaten abscess. On urine being passed into a glass, a cloudiness is seen, and material like pieces of vermicelli or broken threads may be noticed. These are the castings from the long tubular glands, and are characteristic of chronic inflammation of the prostate. The occasional passage of a large metal bougie, the use of weak lotions of nitrate of silver, the administration of quinine and iron, and the application of blisters to the perineum, may be tried as circumstances direct. The patient should lead a quiet life, free from sexual excitement. Horse-exercise, cycle-riding, rough games and alcohol should be avoided.

Enlargement of the prostate exists in a considerable proportion of men of about sixty years of age and onward. It consists of an uncontrolled growth of the normal muscular and glandular tissue of the prostate, interfering with, or absolutely stopping, the outflow of the urine. Gently pushing the bladder upwards and backwards, it increases the length of the urethra, so that in order to draw off retained urine the catheter must be longer than ordinary, but inasmuch as there is no actual narrowing of the passage it may be of full calibre. The beak should be well turned up so that it may ride in front of, and surmount, the median enlargement. Because of the thick, ring-like mass of new tissue around the outlet of the bladder, there is difficulty in micturition, and because the muscular bladder wall is now unable to contract upon all its contents a certain amount of urine is retained. As the enlarged prostate bulges up in the floor of the bladder, a pouch or hollow forms behind it, from which the muscular wall is unable to dislodge the stagnant urine. This keeps up constant irritation, and if by chance the germs of decomposition find their way thither, cystitis sets in and the patient's condition becomes serious, not only because of the risk to which his tired and irritated kidneys are submitted, but because of the possibility of a phosphatic stone being formed in the bladder. The seriousness of enlargement of the prostate does not

depend upon the size of the growth so much as upon the inability of the patient to empty his bladder completely.

The surgeon forms his estimate of the size of the prostate by rectal examination. But sometimes a patient has retention of urine from

enlarged prostate, when by this method of manual examination the amount of increase appears quite unimportant. The explanation is that the enlargement is chiefly confined to a small piece of the gland which protrudes like a tongue into the water-way. Robert M°Gill of Leeds was the first surgeon to remove by a supra-pubic operation this tongue-like process of new prostatic growth. Attempts had sometimes been made to get rid of it by instrumentation through the urethra, but they had not met with much success.

When the surgeon has made out the existence of an enlargement of the prostate, the next thing is to find to what extent this interferes with the bladder being emptied. To do this, he asks the patient to pass. as much water as he is able, and then with due precautions introduces a soft catheter and measures the amount of urine which he thus draws off — half an ounce, an ounce, two ounces, however much it may be. It is this ” residual urine ” which causes the annoyance and the danger of enlarged prostate, and unless arrangements can be made for its regular withdrawal serious trouble is almost certain to ensue. The passing of a large catheter may have the effect of so opening up the water-way that, at any rate for a time, the irritability of the bladder may cease, in which case the patient may be instructed in the art of passing a catheter for himself. Or the surgeon may find that in addition to the regular passing of a large catheteran occasional washing-out of the bladder with hot boracic lotion is all that is needed in the way of active treatment. At the same time, howeverj the patient is placed upon a plain and wholesome diet with little or no alcohol, and he is instructed to lead in every respect a regular and quiet life. To many men with enlarged prostate the passing of an instrument night and morning is no great hardship, while to others the idea of leading what is called a ” catheter life ” appears intolerable, or, having for a time been patiently carried out, is found not only severely trying but greatly disappointing.

In some people the very first passing of a catheter sets up a local and constitutional disturbance, the bladder being rendered irritable and

intolerant, the temperature going up, and shiverings and perspirations manifesting themselves. This condition was formerly called ” catheter fever,” and was looked upon as something mys- terious and peculiar. It is now generally understood to be the result of septic inoculation of the interior of the bladder.

Lastly, in other persons the passing of the catheter is attended with so much difficulty, distress or bleeding, that something more helpful and effectual is urgently called for.

Operative Treatment.— It has long been known that large tumours of the uterus sometimes dwindle if the ovaries are removed by operation, and Professor William White of Phila- delphia thought that prostatic growths might be similarly influenced by the removal of the testicles. Beyond question considerable improvement has followed this operation in cases of enlargement of the prostate, especially where the enlargement seetaed to be general, soft and vascular. A similar though perhaps a slower effect is produced when the duct of the testis, the vas deferens, is divided on each side of the body. If there is no great urgency about the case this treatment may well be tried, the bladder being all the while duly emptied by catheter and washed by irrigation. But if the case is urgent, there being difficulty or bleeding with the passing of the catheter, the bladder being excessively irritable and the urine foul, a more radical measure is needed. The best operation is that upon the lines laid down by Robert M°Gill, who opened the bladder through the anterior abdominal wall and removed that part of the prostate gland which was blocking the water-way. M e GiU’s operation was improved upon by Eugene Fuller of New York, who, in 1895, published a full account of his procedure. 1 Having opened the bladder from the front (as in supra-pubic lithotomy), he introduced his left index finger into the rectum and thrust the prostate gland towards the right index finger, which was then in the bladder. With the nail of that finger, or with the end of a pair of scissors, he made a rent in the mucous membrane of the bladder and the capsule of the gland, and then shelled out the mass of new tissue which had caused the prostatic enlargement. This operation is called ” prostatectomy,” which means the removal of the prostate gland. The prostate gland, however, is not removed, but only a muscular and glandular mass (adenoma), which, growing within the prostatic capsule, encircles the urethra and squeezes the original gland tissue out of existence. Following on the lines of M c Gill and Fuller, P. J. Freyer has done excellent work in England towards placing this operation upon a sound basis.

Subsequently to the operation the bladder enjoys complete

1 Diseases of the Genito-urinary System, by Eugene Fuller, M.D. (London and New York, 1900).

and needful rest, and the kidneys, which previously were in a condition of perpetual disturbance, improve in working power. The wound in the bladder and in the abdominal wall gradually closes; the function of the bladder returns, and the patient is soon able to go back to his usual occupation in greatly improved health and vigour. The operation is, necessarily, a serious one, and the age of the patient, the condition of his bladder, of his kidneys, and of his blood-vessels, require to- be taken into con- sideration; still, the operation gives an excellent account of itself in statistics, and if a practical surgeon advises a patient to accept its risks his counsel may well be followed.

Malignant disease of the prostate is distinguished from senile glandular enlargement by the rapidity of its growth, by the freeneSs of the bleeding which is associated with the introduction of a catheter, and by the marked wasting which the individual undergoes. Unfortunately, by the time that the cancerous nature of the disease is definitely recognized, the prospect of relief being afforded by operation is small. (E. O.*)

BLADDER-WORT, the name given to a submerged water plant, Utricidariq vulgaris, with finely divided leaves upon which are borne small bladders provided with trap-door entrances which open only inwards. Small crustaceans and other aquatic animals push their way into the bladders and are unable to escape. The products of the decay of the organisms thus

A, Bladder of .Utricularia neglecta (after Darwin), enlarged. B, stellate hairs from interior of bladder of U. vulgaris.

captured are absorbed into the plant by star-shaped hairs which line the interior of the bladder. In this way the plant is supplied with nitrogenous food from the animal kingdom. Bladder-wort bears small, yellow, two-lipped flowers on a stem which rises above the surface of the water. It is found in pools and ditches in the British Isles, and is widely distributed in the north temperate zone. The genus contains about two hundred species in tropical and temperate regions.

BLADES, WILLIAM (1824-1890), English printer and biblio- grapher, was born at Clapham, London, on the 5th of December 1824. In 1840 he was apprenticed to his' father's printing business in London, being subsequently taken into partnership. The firm was afterwards known as Blades, East & Blades. His interest in printing led him to make a study of the volumes produced by Caxton's press, and of the early history of printing in England. His Life and Typography of William Caxton, England's First Printer, was published in 1861-1863, and the conclusions which he set forth were arrived at by a careful examination of types in the early books, each class of type being traced from its first use to the time when, spoilt by wear, it passed out of Caxton's hands. Some 450 volumes from the Caxton Press were thus carefully compared and classified in chronological order. In 1877 Blades took an active part in organizing the Caxton celebration, and strongly supported the foundation of the Library Association. He was a keen collector of old books, prints and medals. His publications relate chiefly to the early history of printing, the Enemies of Books, his most popular work, being produced in 1881. He died at Sutton in Surrey on the 27th of April 1890.

BLAENAVON, or Blaenafon, an urban district in the northern parliamentary division of Monmouthshire, England, 15 m. N. by W. of Newport, on the Great Western, London & North Western and Rhymney railways. Pop. (igoi) 10,869. It lies in the upper- most part of the Afon Lwyd valley, at an elevation exceeding 1000 ft, in a wild and mountainous district, on the eastern

edge of the great coal and iron mining region of Glamorganshire and Monmouthshire. There are very extensive iron and steel works, with blast furnaces and rolling mills in the district, which employ the large industrial population.

BLAGOVYESHCHENSK, a town of East Siberia, chief town of the Amur government, on the left bank of the Amur, near its confluence with the Zeya in 50 15′ N. lat. and 127 38′ E. long., 610 m. by river above Khabarovsk. Founded in 1856, the town had, in 1900, 37,368 inhabitants, and is the seat of the bishop of Amur and Kamchatka. There are steam flour-mills and iron- works. It is a centre for tea exported to Russia, cattle brought from Transbaikalia and Mongolia for the Amur, and for grain.

BLAIKIE, WILLIAM GARDEN (1820-1899), Scottish divine, was born on the 5th of February 1820, at Aberdeen, where his father had been the first provost of the reformed corporation. After studying at the Marischal College, where Alexander Bain and David Masson were among his contemporaries, he went in 1839 to Edinburgh to complete his theological course under Thomas Chalmers. In 1842 he was presented to the living of Drumblade by Lord Kintore, with whose family he was con- nected. The Disruption controversy reached its climax immedi- ately afterwards, and Blaikie, whose sympathies were entirely with Chalmers, was one of the 474 ministers who signed the deed of demission and gave up their livings. He was Free Church minister at Pilrig, between Edinburgh and Leith, from 1844 to 1868. Keenly interested in questions of social reform, his first publication was a pamphlet, which was afterwards enlarged into a book called Belter Days for Working People. It received public commendation from Lord Brougham, and 60,000 copies were sold. He formed an association for providing better homes for working people, and the Pilrig Model Buildings were erected. He also undertook the editorship of the Free Church Magazine, and then that of the North British Review, which he carried on until 1863. In 1864 he was asked to undertake the Scottish editorship of the Sunday Magazine, and for this magazine much of his most characteristic literary work was done, especially in the editorial notes, then a new feature in magazine literature.

In 1868 Blaikie was called to the chair of apologetics and pastoral theology at New College, Edinburgh. In dealing with the latter subject

he was seen at his very best. He had wide experience, a comprehensive grasp of facts, abundant sympathy, an extensive knowledge of men, and a great capacity for teaching. In 1870 he was one of two representatives chosen from the Free Church of Scotland to attend the united general assembly of the Presbyterian churches of the United States. He prolonged his visit to make a thorough acquaintance with American Presbyterianism, and this, followed by a similar tour in Europe, fitted him to become the real founder of the Presby- terian Alliance. Much of his strength in the later years of life was given to this work. In 1892 he was elected to the chairman- ship of the general assembly, the last of the moderators who had entered the church before the disruption. In 1897 he resigned his professorship, and died on the 1 ith of June 1899.

Blaikie was an ardent philanthropist, and an active and intelligent temperance reformer, in days when this was far from easy. He raised £14,000 for the relief of the Waldensian churches. Although he took an active part in the affairs of his denomination, he was not a mere ecclesiastic. He had a keen eye for the evidences of spiritual growth or decline, and emphasized the need of maintaining a high level of spiritual life. He welcomed Moody to Scotland, and the evangelist made his headquarters with him during his first visit. His best books are The Work of the Ministry — A Manual of Homiletic and Pastoral Theology (1873); The Books of Samuel in the Expositors' Bible Series (2 vols.); The Personal Life of David Livingstone (1880); After Fifty Years (1893), an account of the Disruption Movement in the form of letters of a grandfather; Thomas Chalmers (1896). ' (D. Mn.)

BLAINE, JAMES GILLESPIE (1830-1893), American states- man, was born in West Brownsville, Pennsylvania, on the 31st of January 1830, of sturdy Scottish-Irish stock on the side of his father. He was the great-grandson of Colonel Ephraim Blaine

(1 741-1804), who during the War of Independence served in the American army, from 1778 to 1782 as commissary-general of the Northern Department. With many early evidences of literary capacity and political aptitude, J. G. Blaine graduated at Washington College in Washington, Pennsylvania, in 1847, and subsequently taught successively in the Military Institute, Georgetown, Kentucky, and in the Institution for the Blind at Philadelphia. During this period, also, he studied law. Settling in Augusta, Maine, in 1854, he became editor of the Kennebec Journal, and subsequently of the Portland Advertiser. But his editorial work was soon abandoned for a more active public career. He was elected to the lower house of the state legislature in 1858, and served four years, the last two as speaker. He also became

chairman of the Republican state committee in 1859, and for more than twenty years personally directed every campaign of his party.

In 1862 he was elected to Congress, serving in the House thirteen years (December 1863 to December 1876), followed by a little over four years in the Senate. He was chosen speaker of the House in 1869 and served three terms. The House was the fit arena for his political and parliamentary ability. He was a ready and powerful debater, full of resource, and dexterous in con- troversy. The tempestuous politics of the war and reconstruction period suited his aggressive nature and constructive talent. The measures for the rehabilitation of the states that had seceded from the Union occupied the chief attention of Congress for several years, and Blaine bore a leading part in framing and discussing them. The primary question related to the basis of representation upon which they should be restored to their full rank in the political system. A powerful section contended that the basis should be the body of legal voters, on the ground that the South could not then secure an increment of political power: on account of the emancipated blacks unless these blacks were admitted to political rights. Blaine, on the other hand, con- tended that representation should be based on population instead of voters, as being fairer to the North, where the ratio of voters varied widely, and he insisted that it should be safeguarded by security for impartial suffrage. This view prevailed, and the Fourteenth Amendment to the Constitution was substantially Blaine's proposition. In the same spirit he opposed a scheme of military governments for the southern states, unless associated with a plan by which, upon the acceptance of prescribed con- ditions, they could release themselves from military rule and resume civil government. He was the first in Congress to oppose the claim, which gained momentary and widespread favour in 1867, that the public debt, pledged in coin, should be paid in greenbacks. The protection of naturalized citizens who, on return to their native land, were subject to prosecution on charges of disloyalty, enlisted his active interest and support, and the agitation, in which he was conspicuous, led to the treaty of 1870 between the United States and Great Britain, which placed adopted and native citizens on the same footing.

As the presidential election of 1876 approached, Blaine was clearly the popular favourite of his party. His chance for securing the nomination, however, was materially lessened by persistent charges which were brought against him by the Democrats that as a member of Congress he had been guilty of corruption in his relations with the Little Rock & Fort Smith and the Northern Pacific railways. 1 By the majority of Republicans, at least, he was considered to have cleared

himself completely, and in the Republican national convention he missed by only twenty-eight votes the nomination for president, being finally beaten by a combination of the supporters of all the other candidates. Thereupon he entered the Senate, where his activity was unabated. Currency legislation was especially prominent. Blaine, who had previously opposed greenback inflation now resisted depreciated silver coinage. He was the earnest champion of the advancement of American shipping, and advocated liberal subsidies, insisting that the policy of protection should be applied on sea as well as on land. The Republican national

1 This attack led to a dramatic scene in the House, in which Blaine fervidly asseverated his denial.

convention of 1880, divided between the two nearly equal forces of Blaine and General U. S. Grant — John Sherman of Ohio also having a considerable following— struggled through thirty-six ballots, when the friends of Blaine, combining with those of Sherman, succeeded in nominating General James A. Garfield. In the new administration Blaine became secretary of state, but, owing to the assassination of President Garfield and the re- organization of the cabinet by President Chester A. Arthur, he held the office only until December 1881. His brief service was distinguished by several notable steps. In order to promote the friendly understanding and co-operation of the nations on the American continents he projected a Pan-American congress, which, after being arranged for, was frustrated by his retirement. He also sought to secure a modification of the Clayton-Bulwer treaty, and in an extended correspondence with the British government strongly asserted the policy of an exclusive American control of any isthmian canal which might be built to connect the Atlantic and Pacific oceans.

With undiminished hold on the imagination and devotion of his followers he was nominated for president in 1884. After a heated canvass, in which he made a series of brilliant speeches, he was beaten by a narrow margin in New York. By many, including Blaine himself, the defeat was attributed to the effect of a phrase, ” Rum, Romanism and Rebellion,” used by a clergyman, Rev. Samuel D. Burchard (1812-1891), on the 29th of October 1884, in Blaine’s presence, to characterize what, in his opinion, the Democratic party stood for. The phrase was not Blaine’s, but his opponents made use of it to misrepresent his attitude toward the Roman Catholics, large

numbers of whom are supposed, in consequence, to have withdrawn their support. Refusing to be a presidential candidate in 1888, he became secretary of state under President Harrison, and resumed his work which had been interrupted nearly eight years before. The Pan-American congress, then projected, now met in Washington, and Blaine, as its master spirit, presided over and guided its deliberation through its session of five months. Its most im- portant conclusions were for reciprocity in trade, a continental railway and compulsory arbitration in international complications. Shaping the tariff legislation for this policy, Blaine negotiated a large number of reciprocity treaties which augmented the com- merce of his country. He upheld American rights in Samoa, pursued a vigorous diplomacy with Italy over the lynching of eleven Italians, all except three of them American naturalized citizens, in New Orleans on the 14th of May 1891, held a firm attitude during the strained relations between the United States and Chile (growing largely out of the killing and wounding of American sailors of the U.S. ship ” Baltimore ” by Chileans in Valparaiso on the 16th of October 1891), and carried on with Great Britain a resolute controversy over the seal fisheries of Bering Sea, — a difference afterwards settled by arbitration. He resigned on the 4th of June 1892, on the eve of the meeting of the Republican national convention, wherein his name was ineffectu- ally used, and he died at Washington, D.C., on the 27th of January 1893.

During his later years of leisure he wrote Twenty Years of Congress (1884-1886), a brilliant historical work in two volumes. Of singularly alert faculties, with a remarkable knowledge of the men and history of his country, and an extraordinary memory, his masterful talent for politics and state-craft, together with his captivating manner and engaging personality, gave him, for nearly two decades, an unrivalled hold upon the fealty and affection of his party.

See the Biography of James G. Blaine (Norwich, Conn., 1895) by Mary Abigail Dodge (“Gail Hamilton”), and, in the “American Statesmen Series,” James G. Blaine (Boston, 1905) by C. E. Stan- wood; also Mrs Blaine’s Letters (1908). (C. E. S.)

BLAINVILLE, HENRI MARIE DUCROTAY DE (1777-1850), French naturalist, was born at Arques, near Dieppe, on the 12th of September 1777. About 1796 he went to Paris to study painting, but he ultimately devoted himself to natural history, and attracted the attention of Baron Cuvier, for whom he occasionally lectured at the College de France and at the iv. 2

Athenaeum. In 181 2 he was aided by Cuvier to obtain the chaii of

anatomy and zoology in the Faculty of Sciences at Paris, but subsequently an estrangement grew up between the two men and ended in open enmity. In 1825 Blainville was admitted a member of the Academy of Sciences; and in 1830 he was appointed to succeed J. B. Lamarck in the chair of natural history at the museum. Two years later, on the death of Cuvier, he obtained the chair of comparative anatomy, which he con- tinued to occupy for the space of eighteen years, proving him- self no unworthy successor to his great teacher. He died at Paris on the 1st of May 1850. Besides many separate memoirs, he was the author of Prodrome d'une nouvelle distribution mitho- dique du regne animal (181 6); Osteographie ou description iconographique comparSe du squelelte, &c. (1839-1864); Faune francaise (1821-1830); Cours de physiologie ginirale et comparee (1833); Manuel de malacologie et de conchyliologie (1825-1827); Histoire des sciences de Forganisme (1845).

BLAIR, FRANCIS PRESTON (1791-1876), American journa- list and politician, was born at Abingdon, Virginia, on the 12th of April 1 791. He removed to Kentucky, graduated at Transyl- vania University in 181 1, took to journalism, and was a contributor to Amos Kendall's paper, the Argus, at Frank- fort, In 1830, having become an ardent follower of Andrew Jackson, he was made editor of the Washington Globe, the recognized organ of the Jackson party. In this capacity, and as a member of Jackson's "Kitchen Cabinet," he long exerted a powerful influence; the Globe was the administration organ until 1841, and the chief Democratic organ until 1845; Blair ceased to be its editor in 1849. In 1848 he actively supported Martin Van Buren, the Free Soil candidate, for the presidency, and in 1852 he supported Franklin Pierce, but soon afterwards helped to organize the new Republican party, and presided at its preliminary convention at Pittsburg, Pennsylvania, in February 1856. He was influential in securing the nomination of John C. Fremont at the June convention (1856), and of Abraham Lincoln in i860. After Lincoln's re-election in 1864 Blair thought that his former close personal relations with the Confederate leaders might aid in bringing about a cessation of hostilities, and with Lincoln's consent went unofficially to Richmond and induced President Jefferson Davis to appoint com- missioners to confer with representatives of the United States. This resulted in the futile " Hampton Roads Conference " of the 3rd of February 1865 (see Lincoln, Abraham). After the Civil War Blair became a supporter of President Johnson's recon- struction policy, and eventually rejoined the Democratic party. He died at Silver Spring, Maryland, on the 18th of October 1876.

His son, Montgomery Blair (1813-1883), politician and lawyer, was

born in Franklin county, Kentucky, on the 10th of May 1813. He graduated at West Point in 1835, but, after a year's service in the Seminole War, left the army, studied law, and began practice at St Louis, Missouri. After serving as United States district attorney (1839-1843), as mayor of St Louis (1842-1843), and as judge of the court of common pleas (1843-1849), he removed to Maryland (1852), and devoted himself to law practice principally in the Federal supreme coui t. He was United States solicitor in the court of claims from 1855 until 1858, and was associated with George T. Curtis as counsel for the plaintiff in the Dred Scott case in 1857. In i860 he took an active part in the presidential campaign in behalf of Lincoln, in whose cabinet he was postmaster-general from 1861 until September 1864, when he resigned as a result of the hostility of the Radical Republican faction, who stipulated that Blair's retirement should follow the withdrawal of Fremont's name as a candidate for the presidential nomination in that year. Under his administration such reforms and improvements as the establishment of free city delivery, the adoption of a money order system, and the use of railway mail cars were instituted — the last having been suggested by George B. Armstrong (d. 1871), of Chicago, who from 1869 until his death was general superintendent of the United States railway mail service. Differing from the Republican party on the reconstruction policy, Blair gave his adherence to the Democratic party after the Civil

War. He died at Silver Spring, Maryland, on the 27 th of July

1883. ;

Another son, Francis Preston Blair, jun. (1821-1875'), soldier and political leader, was born at Lexington, Kentucky, on the 19th of February 1821. After graduating at Princeton in 1841 he practised law in St Louis, and later served in the Mexican War. He was ardently opposed to the extension of slavery and supported Martin Van Buren, the Free Soil can- didate for the presidency in 1848. He served from 1852 to 1856 in the Missouri legislature as a Free Soil Democrat, in 1856 joined the Republican party, and in 1857-1860 and 1861-1862 was a member of Congress, where he proved an able debater. Immediately after South Carolina's secession, Blair, believing that the southern leaders were planning to carry Missouri into the movement, began active efforts to prevent it and personally [organized and equipped a secret body of 1000 men to be ready for the emergency.

When hostilities became inevitable, acting in conjunction with Captain (later General) Nathaniel Lyon, he suddenly transferred the arms in the Federal arsenal at St Louis to Alton, Illinois, and a few days later (May 10, 1861) surrounded and captured a force of state guards which ha!d been stationed at Camp Jackson in the suburbs of St Louis with the intention of seizing the arsenal. This action gave the Federal cause a decisive initial advantage in Missouri. Blair was pro- moted brigadier-general of volunteers in August 1862 and a major-general in November 1862. In Congress as chairman of the important military affairs committee his services were of ihe greatest value. He commanded a division in the Vicksburg campaign and in the fighting about Chattanooga, and was one of Sherman's corps commanders in the final campaigns in Georgia and the Carolinas. In 1866 like his father and brother he opposed the Congressional reconstruction policy, and on that issue left the Republican party. In 1868 he was the Demo- cratic candidate for -vice-president on the ticket with Horatio Seymour. In 1871-1873 he was a United States senator from Missouri. He died in St Louis, on the 8th of July 1875.

BLAIR, HUGH (1718-1800), Scottish Presbyterian divine, was born on the 7th of April 1718, at Edinburgh, where his father was a merchant. Entering the university in 1730 he graduated M.A. in 1739; his thesis, De Fundamentis et Obliga- tione Legis Naturae, contains an outline of the moral principles afterwards unfolded in his sermons. He was licensed to preach in 1 741, and a few months later the earl of Leven, hearing of his eloquence, presented him to the parish of Collessie in Fife. In 1743 he was elected to the second charge of the Canongate church, Edinburgh, where he ministered until removed to Lady Yester's, one of the city churches, in 1754. In 1757 the university of St Andrews conferred on him the degree of D.D., and in the following year he was promoted to the High Church, Edinburgh, the most important charge in Scotland. In 1759 he began, under the patronage of Lord Kames, to deliver a course of lectures on composition, the success of which led to the foundation of a chair of rhetoric and belles lettres in the Edinburgh University. To this chair he was appointed in 1762, with a salary of £70 a year. Having long taken interest in the Celtic poetry of the Highlands, he published in 1763 a laudatory Dissertation on Macpherson's Ossian, the authenticity of which he maintained. In 1777 the first volume of his Sermons appeared. It was succeeded by four other volumes, all of which met with the greatest success. Samuel Johnson praised them warmly, and they were translated into almost every language of Europe. In 1780 George III. conferred upon Blair a pension of £200 a year. In 1783 he retired from his professorship and published his Lectures on Rhetoric, which have

been frequently reprinted. He died on the 27 th of December 1800. Blair belonged to the ” moderate ” or latitudinarian party, and his Sermons have been criticized as wanting in doctrinal definiteness. His works display little originality, but are written in a flowing and elaborate style. He is remembered chiefly by the place he fills in the literature of his time. Blair’s Sermons is a typical religious book of the period that preceded the Anglican revival.

See J. Hall, Account of Life and Writings of Hugh Blair (1807).

BLAIR, JAMES (1656-1743), American divine and educa- tionalist, was born in Scotland, probably at Edinburgh, in 1656. He graduated M.A. at Edinburgh University in 1673, was beneficed in the Episcopal Church in Scotland, and for a time was rector of Cranston Parish in the diocese of Edinburgh. In 1682 he left Scotland for England, and three years later was sent by the bishop of London, Henry Compton, as a missionary to Virginia. He soon gained great influence over the colonists both in ecclesiastical and in civil affairs, and, according to Prof. Moses Coit Tyler, ” probably no other man in the colonial time did so much for the intellectual life of Virginia.” He was the minister of Henrico parish from 1685 until 1694, of the Jamestown church from 1694 until 1710, and of Bruton church at Williamsburg from 1710 until his death. From 1689 until his death he was the commissary of the bishop of London for Virginia, the highest ecclesiastical position in the colony, his duties consisting ■” in visiting the parishes, correcting the lives of the clergy, and keeping them orderly.” In 1693, by the appointment of King William III., he became a member of the council of Virginia, of which he was for many years the president. Largely because of charges brought against them by Blair, Governor Sir Edmund Andros, Lieutenant-governor Francis Nicholson, and Lieutenant- governor Alexander Spotswood were removed in 1698, 1705 and 1722 respectively. Blair’s greatest service to the colony was rendered as the founder, and the president from 1693 until his death, of the College of William and Mary, for which he himself secured a charter in England. ” Thus, James Blair may be called,” says Tyler, ” the creator of the healthiest and most extensive intellectual influence that was felt in the Southern group of colonies before the Revolution.” He died on the 18th of April 1743, and was buried at Jamestown, Va. He published a collection of 117 discourses under the title Our Saviour’s Divine Sermon on the Mount (4 vols., 1722; second edition, 1732), and, in collaboration with Henry Hartwell and Edward Chilton, a work entitled The Present State of Virginia and the College (1727; written in 1693), probably the best account of the Virginia of that time.

See Daniel E. Motley's Life of Commissary James Blair (Baltimore, 1901 ; series xix. No. 10, of the Johns Hopkins University Studies in Historical and Political Science), and, for a short sketch and an estimate, M. C. Tyler's A History of American Literature, 1607-1765 (New York, 1878).

BLAIR, ROBERT (1 699-1 746), Scottish poet, eldest son of the Rev. Robert Blair, one of the king's chaplains, was born at Edinburgh in 1699. He was educated at Edinburgh University and in Holland, and in 1731 was appointed to the living of Athelstaneford in East Lothian. He married in 1738 Isabella, daughter of Professor William Law. The possession of a small fortune gave him leisure for his favourite pursuits, gardening and the study of English poets. He died at Athelstaneford on the 4th of February 1746. His only considerable work, The Grave (1743), is a poem written in blank verse of great vigour and freshness, and is much less conventional than its gloomy subject might lead one to expect. Its religious subject no doubt contributed to its great popularity, especially in Scotland; but the vogue it attained was justified by its picturesque imagery and occasional felicity of expression. It inspired William Blake to undertake a series of twelve illustrative designs, which were engraved by Louis Schiavonetti, and published in 1808.

See the biographical introduction prefixed to his Poetical Works, by Dr Robert Anderson, in his Poets of Great Britain, vol. viii. (I794-)

BLAIR ATHOLL (Gaelic blair, " a plain "), a village and parish of Perthshire, Scotland, 35! m. N.W. of Perth by the Highland railway. Pop. (1901) 367; of parish, 1722. It is situated at the confluence of the Tilt and the Garry. The oldest part of Blair Castle, a seat of the duke of Atholl, dates from 1269; as restored and enlarged in 1869-1872 from the plans of David Bryce, R.S.A., it is a magnificent example of the Scottish baronial style. It was occupied by the marquess of Montrose prior to the battle of Tippermuir in 1644, stormed by the Cromwellians in 1653, and garrisoned on behalf of James II. in 1689. The Young Pretender stayed in it in 174s, and the duke of

Cumberland in 1746. The body of Viscount Dundee, conveyed hither from the battlefield of Killiecrankie, was buried in the church of Old Blair, in which a monument was erected to his memory in 1889 by the 7th duke of Atholl. The grounds surrounding the castle are among the

most beautiful in the Highlands. A golf course has been laid down south-east of the village, between the railway and the Garry, and every September a great display of Highland games is held. Ben-y-gloe (3671 ft. high), the scene of the hunt given in 1529 by the earl of Atholl in honour of James V. and the queen dowager, may be climbed by way of Fender Burn, a left-hand tributary of the Tilt. The falls of Fender, near the old bridge' of Tilt, are eclipsed by the falls of Bruar, 4 m. west of Blair Atholl, formed by the Bruar, which, rising in Ben Dearg (3304 ft.), flows into the Garry after an impetuous course of 10 m.

BLAIRGOWRIE, a police burgh of Perthshire, Scotland, situated on the Ericht. Pop. (1901) 3378. It is the terminus of a branch line of the Caledonian railway from Coupar Angus, from which it is 4J m. distant, and is 16 m. N. by E. of Perth by road. The town is entirely modern, and owes its progress to the water-power supplied by the Ericht for linen and jute factories. There are also sawmills, breweries and a large factory for bee appliances. Strawberries, raspberries and other fruits are largely grown in the neighbourhood. A park was presented to the town in 1892. On the left bank of the Ericht, opposite Blairgowrie, with which it is connected by a four-arched bridge, stands the town and police burgh of Rattray (pop. 2019), where there are flax and jute mills. Donald Cargill the Covenanter, who was executed at Edinburgh, was a native of the parish. Four miles west of Blairgowrie, on the coach road to Dunkeld, lies Loch Clunie, of some interest historically. On a crannog in the lake are the ruins of a small castle which belonged to James (" the Admirable ") Crichton, and the large mound near the loch was the site of the castle in which Edward I. lodged on one of his Scottish expeditions.

BLAKE, EDWARD (1833-), Irish-Canadian statesman, eldest son of William Hume Blake of Cashel Grove, Co. Galway, who settled in Canada in 1832, and there became a distinguished lawyer and chancellor of Ontario, was born on the 13th of October 1833 at Adelaide in Middlesex county, Ontario. Edu- cated at Upper Canada College and the university of Toronto, Blake was called to the bar in 1856 and quickly obtained a good practice, becoming Q.C. in 1864. In 1867 he was elected member for West Durham in the Dominion parliament, and for South Bruce in the provincial legislature, in which he became leader of the Liberal opposition two years later. On the defeat of John Sandfield Macdonald's government in 1871 Blake became prime minister of Ontario, but resigned this office the same year in consequence of the abolition of dual representation. He declined the leadership of the Liberal party in the Dominion parliament, but, having taken an active part in bringing about the

overthrow of Sir John Macdonald's ministry in 1873, joined the Liberal cabinet of Alexander Mackenzie, though without portfolio or salary. Impaired health soon compelled him to resign, and to take the voyage to Europe; on his return in 1875 he rejoined the cabinet as minister of justice, in which office it fell to him to take the chief part in framing the constitution of the supreme court of Canada. Continued ill-health compelled him in 1877 again to seek rest in Europe, having first exchanged the portfolio of justice for the less exacting office of president of the council. During his absence the Liberal government was driven from power by the elections of 1878; and Blake himself, having failed to secure re-election, was for a short time without a seat in parliament. From 1880 to 1887 he was leader of the opposition, being succeeded on his resignation of the position in the latter year by Mr (afterwards Sir) Wilfrid Laurier. In 1892 he became a member of the British House of Commons as an Irish Nationalist, being elected for South Longford. But he did not fulfil the expectations which had been formed on the strength of his colonial reputation; he took no very prominent part in debate, and gave little evidence of his undoubted oratorical gifts. In 1907 he retired from public life. In 1858 he had married

Margaret, daughter of Benjamin Cronyn, first bishop of Huron.

See John Charles Dent, The Last Forty Years: Canada Since the Union of 184.1 (2 vols., Toronto, 1881) ; J. S. Willison, Sir Wilfrid Laurier and the Liberal Party (2 vols., London, 1904).

BLAKE, ROBERT (1599-1657), English parliamentarian and admiral, was born at Bridgwater in Somersetshire. The day of his birth is not known, but he was baptized oh the 27th of September 1599. Blake was the eldest son of a well-to-do merchant, and received his early education at the grammar school of Bridgwater. In 1615 he was sent to Oxford, entering at first St Alban's Hall, but removing afterwards to Wadham College, then recently founded. He remained at the university till 1625, but failed to obtain any college preferment. Nothing is known of his life with certainty for the next fifteen years. An anonymous Dutch writer, in the Hollandische Mercurius (1652), represents him as saying that he had lived in Schiedam " for five or six years " in his youth. He doubtless engaged in trade, and apparently with success. When, after eleven years of kingship without parliaments, a parliament was summoned to meet in April 1640, Blake was elected to represent his native borough, This parliament, named "the Short," was dissolved in three weeks, and the career of Blake as a politician was suspended. Two years later the inevitable conflict began. Blake declared for the Parliament, and served under Sir John

Horner. In 1643 he was entrusted with the command of one of the forts of Bristol, This he stoutly held during the siege of the town by Prince Rupert, and earned the approval of parliament by refusing to surrender his post till duly informed of the capitulation. In 1644 he gained high distinction by the resolute defence of Lyme in Dorsetshire. The siege was raised on the 23rd of May, and on the 8th of July Blake took Taunton by surprise, and notwith- standing its imperfect defences and inadequate supplies, held the town for the Parliament against two sieges by the Royalists until July 1645, when it was relieved by Fairfax. In 1645 he re-entered parliament as member for Taunton, when the Royalist Colonel Windham was expelled.

He adhered to the Parliamentary party after the king's death, and within a month (February 1649) was appointed, with Colonels Dean and Popham, to the command of the fleet, under the title of General of the Sea. In April he was sent in pursuit of Prince Rupert, who with the Royalist fleet had entered the harbour of Kinsale in Ireland. There he blockaded the prince for six months; and when the latter, in want of provisions, and hopeless of relief, succeeded in making his escape with the flee! and in reaching the Tagus, Blake followed him thither, and again blockaded him for some months. The king of Portugal refusing permission for Blake to attack his enemy, the latter made re- prisals by falling on the Portuguese fleet, richly laden, returning from Brazil. He captured seventeen ships and burnt three, bringing his prizes home without molestation. After revictual- ling his fleet, he sailed again, captured a French man-of-war, and then pursued Prince Rupert, who had been asked to go away by the Portuguese and had entered the Mediterranean. In November 1650 Blake destroyed the bulk of the Royalist squadron near Cartagena. The thanks of parliament were voted to Blake, and he received a grant of /iooo. He was continued in his office of admiral and general of the sea; and in May following he took, in conjunction with Ayscue, the Scilly Islands. For this service the thanks of parliament were again awarded him, and he was soon after made a member of the council of state.

In 1652 war broke out with the Dutch, who had made great preparations for the conflict. In March the command of the fleet was given to Blake for nine months; and in the middle of May the Dutch fleet of forty-five ships, led by their great admiral Tromp, appeared in the Downs. Blake, who had only twenty ships, sailed to meet them, and the battle took place off Dover on the 19th of May. The Dutch were defeated in an engagement of four or five hours, lost two ships, and withdrew under cover of darkness. Attempts at accommodation were made by the states, but they failed. Early in July war was formally declared,

and in the same month Blake captured a large part of the Dutch fishery-fleet and the twelve men-of-war that formed their convoy. On the 28th of September Blake and Penn again encountered the Dutch fleet, now commanded by De Ruyter and De Witt, off the Kentish Knock, defeated it, and chased it for two days. The Dutch took refuge in Goree. A third battle was fought near the end of November. By this time the ships under Blake's command had been reduced in number to forty, and nearly the half of these were useless for want of seamen. Tromp, who had been reinstated in command, appeared in the Downs, with a fleet of eighty ships besides ten fireships. Blake, nevertheless, risked a battle off Dungeness, but was defeated, and withdrew into the Thames. The English fleet having been refitted, put to sea again in February 1653; and on the 18th Blake, at the head of eighty ships, encountered Tromp in the Channel. The Dutch force, according to Clarendon, numbered 100 ships of war, but according to the official reports of the Dutch, only seventy. The battle was severe, and continued through three days, the Dutch, however, retreating, and taking refuge in the shallow waters off the French coast. In this action Blake was severely wounded. The three English admirals put to sea again in May; and on the 3rd and 4th of June another battle was fought near the North Foreland. On the first day Dean and Monk were repulsed by Tromp; but on the second day the scales were turned by the arrival of Blake, and the Dutch retreated to the Texel.

Ill-health now compelled Blake to retire from the service for a time, and he did not appear again on the seas for about eighteen months; meanwhile he sat as a member of the Little Parliament (Barebones's). In November 1654 he was selected by Cromwell to conduct a fleet to the Mediterranean to exact compensation from the duke of Tuscany, the knights of Malta, and the piratical states of North Africa, for wrongs done to English merchants. This mission he executed with his accustomed spirit and with complete success. Tunis alone dared to resist his demands, and Tunis paid the penalty of the destruction of its two fortresses by English guns. In the winter of 1655-1656, war being declared against Spain, Blake was sent to cruise off Cadiz and the neigh- bouring coasts, to intercept the Spanish shipping. One of his captains captured a part of the Plate fleet in September 1656. In April 1657 Blake, then in very ill health, suffering from dropsy and scurvy, and anxious to have assistance in his arduous duties, heard that the Plate fleet lay at anchor in the bay of Santa Cruz, in the island of Teneriffe. The position was a very strong one, defended by a castle

and several forts with guns. Under the shelter of these lay a fleet of sixteen ships drawn up in crescent order. Captain Stayner was ordered to enter the bay and fall on the fleet. This he did. Blake followed him. Broad- sides were poured into the castle and the forts at the same time; and soon nothing was left but ruined walls and charred fragments of burnt ships. The wind was blowing hard into the bay; but suddenly, and fortunately for the heroic Blake, it shifted, and carried him safely out to sea. ” The whole action,” says Clar- endon, ” was so incredible that all men who knew the place wondered that any sober man, with what courage soever en- dowed, would ever have undertaken it; and they could hardly persuade themselves to believe what they had done; while the Spaniards comforted themselves with the belief that they were devils and not men who had destroyed them in such a manner.” The English lost one ship and 200 men killed and wounded. The thanks of parliament were voted to officers and men; and a very costly jewel (diamond ring) was presented to Blake, ” as a testimony,” says Cromwell in his letter of 10th June, ” of our own and the parliament’s good acceptance of your carriage in this action.” ” This was the last action of the brave Blake.”

After again cruising for a time off Cadiz, his health failing more and more, he was compelled to make homewards before the summer was over. He died at sea, but within sight of Ply- mouth, on the 17th of August 1657. His body was brought to London and embalmed, and after lying in state at Greenwich House was interred with great pomp and solemnity in Westminster

Abbey. , In 1661 Charles II. ordered the exhumation of Blake’s body, with those of the mother and daughter of Cromwell and several others. They were cast out of the abbey, and were reburied in the churchyard of St Margaret’s. “But that regard,” says Johnson, ” which was denied his body has been paid to his better remains, his name and hjs memory. Nor has any writer dared to deny him the praise of intrepidity, honesty, contempt of wealth, and love of his country.” Clarendon bears the follow- ing testimony to his excellence as a commander: — ” He was the first man that declined the old track, and made it apparent that the science might be attained in less time than was imagined. He was the first man that brought ships to contemn castles on the shore, which had ever been thought very formidable, but were discovered by him to make a noise only, and to fright those who could be rarely hurt by them.”

A life of Blake is included in the work entitled Lives, English and Foreign. Dr Johnson wrote a short life of him, and in 1852 appeared Hepworth Dixon’s fuller narrative, Robert Blake, Admiral and General

at Sea. Much new matter for the biography of Blake will be fourid in the Letters and Papers Relating to the First Dutch War, edited by S. R. Gardiner for the Navy Records Society (1898-1899.)

BLAKE, WILLIAM (1757-1827), English poet and painter, was born in London, on the 28th of November 1757. His father, James Blake, kept a hosier's shop in Broad Street, Golden Square; and from the scanty education which the young artist received, it may be judged that the circumstances of the family were not very prosperous. For the facts of William Blake's early life the world is indebted to a little book, called A Father's Memoirs on a Child, written by Dr Malkin in 1806. Here we learn that young Blake quickly developed a taste for design, which his father appears to have had sufficient intelligence to recognize and assist by every means in his power. At the age of ten the boy was sent to a drawing school kept by Henry Pars in the Strand, and at the same time he was already cultivating his own taste by constant attendance at the different art sale rooms, where he was known as the " little connoisseur " Here he began to collect prints after Michelangelo, and Raphael, Diirer and Heemskerk, while at the school in the Strand he had the opportunity of drawing from the antique. After four years of this preliminary instruction Blake entered upon another branch of art study. In 1777 he was apprenticed to James Basire, an engraver of repute, and with him he remained seven years. His apprenticeship had an important bearing on Blake's artistic education, and marks the department of art in which he was made technically proficient. In 1778, at the end of his apprenticeship, he proceeded to the school of the Royal Academy, where he continued his early study from the antique, and had for the first time an opportunity of drawing from the living model.

This is in brief all that is known of Blake's artistic education. That he ever, at the academy or elsewhere, systematically studied painting we do not know; but that he had already begun the practice of water colour for himself is ascertained. So far, however, the course of his training in art schools, and under Basire, was calculated to render him proficient only as a draughtsman and an engraver. He had learned how to draw, and he had mastered besides the practical difficulties of engraving, and with these qualifications he entered upon his career. In 1780 he exhibited a picture in the Royal Academy Exhibition, conjectured to have been executed in water colours, and he continued to contribute to the annual exhibitions up to the year 1808. In 1782 he married Catherine Boucher, the daughter of a market- gardener at Battersea, with whom he lived always on affectionate terms, and the young couple after their marriage established themselves in Green Street, Leicester Fields. Blake had already become acquainted with

some of the rising artists of his time, amongst them Stothard, Flaxman and Fuseli, and he now began to see something of literary society. At the house of the Rev. Henry Mathew, in Rathbone Place, he used to recite and some times to sing poems of his own composition, and it was through the influence of this gentleman, combined with that of Flaxman, that Blake's first volume of poetry was printed and published in 1783. From this time forward the artist came before the world in a double capacity. By education as well as native

talent, he was pledged to the life of a painter, and these Poetical Sketches, though they are often no more than the utterances of a boy, are no less decisive in marking Blake as a future poet.

For a while the two gifts are exhibited in association. To the close of his life Blake continued to print and publish, after a manner of his own, the inventions of his verse illustrated by original designs, but there is a certain period in his career when the union of the two gifts is peculiarly close, and when their service to one another is unquestionable. In 1784 Blake, moving from Green Street, set up in company with a fellow-pupil, Parker, as print-seller and engraver next to his father's house in Broad Street, Golden Square, but in 1787 this partnership was severed, and he established an independent business in Poland Street. It was from this house, and in 1787, that the Songs of Innocence were published, a work that must always be remarkable for beauty both of verse and of design, as well as for the singular method by which the two were combined and expressed by the artist. Blake became in fact Jais own printer and publisher. He engraved upon copper, by a process devised by himself, both the text of his poems and the surrounding decorative design, and to the pages printed from the copper plates an appropriate colouring was afterwards added by hand. The poetic genius already discernible in the first volume of Poetical Sketches is here more decisively expressed, and some of the songs in this volume deserve to take rank with the best things of their kind in our literature. In an age of enfeebled poetic style, when Words- worth, with more weighty apparatus, had as yet scarcely begun his reform of English versification, Blake, unaided by any con- temporary influence, produced a work of fresh and living beauty; and if the Songs of Innocence established Blake's claim to the title of poet, the setting in which they were given to the world proved that he was also something more. For the full develop- ment of his artistic powers we have to wait till a later date, but here at least he

exhibits a just and original understanding of the sources of decorative beauty. Each page of these poems is a study of design, full of invention, and often wrought with the utmost delicacy of workmanship. The artist retained to the end this feeling for decorative effect; but as time went on, he considerably enlarged the imaginative scope of his work, and decoration then became the condition rather than the aim of his labour.

Notwithstanding the distinct and precious qualities of this volume, it attracted but slight attention, a fact perhaps not very wonderful, when the system of publication is taken into account. Blake, however, proceeded with other work of the same kind. The same year he published The Book of Thel, more decidedly mystic in its poetry, but scarcely less beautiful as a piece of illumination; The Marriage of Heaven and Hell followed in 1790; and in 1793 there are added The Gates of Paradise, The Vision of the Daughters of Albion, and some other " Prophetic Books." It becomes abundantly clear on reaching this point in his career that Blake's utterances cannot be judged by ordinary rules. The Songs of Experience, put forth in 1 794 as a companion to the earlier Songs of Innocence, are for the most part intelligible and coherent, but in these intervening works of prophecy, as they were called by the author, we get the first public expression of that phase of his character and of his genius upon which a charge of insanity has been founded. The question whether Blake was or was not mad seems likely to remain in dispute, but there can be no doubt whatever that he was at different periods of his life under the influence of illusions for which there are no outward facts to account, and that much of what he wrote is so far wanting in the quality of sanity as to be without a logical coherence. On the other hand, it is equally clear that no madness imputed to Blake could equal that which would be involved in the rejection of his work on this ground. The greatness of Blake's mind is even better established than its frailty, and in considering the work that he has left we must remember that it is by the sublimity of his genius, and not by any mental defect, that he is most clearly distinguished from his fellows. With the publication of the Songs of Experience Blake's poetic career,

so far at least as ordinary readers are concerned, may be said to close. A writer of prophecy he continued for many years, but the works by which he is best known in poetry are those earlier and simpler efforts, supplemented by a few pieces taken from various sources, some of which were of later production. But although Blake the poet ceases in a general sense at this date, Blake the artist is only just entering upon his career. In the Songs of Innocence and Experience, and even in some of the earlier Books of Prophecy, the two gifts worked together

in perfect balance and harmony; but at this point the supremacy of the artistic faculty asserts itself, and for the remainder of his life Blake was pre-eminently a designer and engraver. The labour of poetical composition continues, but the product passes beyond the range of general comprehension; while, with apparent inconsistency, the work of the artist gains steadily iv strength and coherence, and never to the last loses its hold upon the understanding. It may almost be said without exaggeration that his earliest poetic work, The Songs of Innocence, and nearly his latest effort in design, the illustrations to The Book of Job, take rank among the sanest and most admirable products of his genius. Nor is the fact, astonishing enough at first sight, quite beyond a possible explanation. As Blake advanced in his poetic career, he was gradually hindered and finally overpowered by a tendency that was most serviceable to him in design. His inclination to substitute a symbol for a conception, to make an image do duty for an idea, became an insuperable obstacle to literary success. He endeavoured constantly to treat the intellectual material of verse as if it could be moulded into sensuous form, with the inevitable result that as the ideas to be expressed advanced in complexity and depth of meaning, his poetic gifts became gradually more inadequate to the task of interpretation. The earlier poems dealing with simpler themes, and put forward at a time when the bent of the artist's mind was not strictly determined, do not suffer from this difficulty; the symbolism then only enriches an idea of no intellectual intricacy; but when Blake began to concern himself with profounder problems the want of a more logical understanding of language made itself strikingly apparent. If his ways of thought and modes of workmanship had not been developed with an intensity almost morbid, he would probably have been able to distinguish and keep separate the double functions of art and literature. As it is, however, he remains as an extreme illustration of the ascendancy of the artistic faculty. For this tendency to translate ideas into image, and to find for every thought, however simple or sublime, a precise and sensuous form, is of the essence of pure artistic invention. If this be accepted as the dominant bent of Blake's genius, it is not so wonderful that his work in art should have strengthened in proportion as his poetic powers waned; but whether the explanation satisfies all the require- ments of the case or not, the fact remains, and cannot be over- looked by any student of Blake's career.

In 1 796 Blake was actively employed in the work of illustration. Edwards, a bookseller of New Bond Street, projected a new edition of Young's Night Thoughts, and Blake was chosen to illustrate the work. It was to have been issued in parts, but for some reason not very clear

the enterprise failed, and only a first part, including forty-three designs, was given to the world. These designs were engraved by Blake himself, and they are interesting not only for their own merit but for the peculiar system by which the illustration has been associated with the text. It was afterwards discovered that the artist had executed original designs in water-colour for the whole series, and these drawings, 537 in number, form one of the most interesting records of Blake's genius. Gilchrist, the painter's biographer, in commenting upon the engraved plates, regrets the absence of colour, " the use of which Blake so well understood, to relieve his simple design and give it significance," and an examination of the original water-colour drawings fully supports the justice of his criticism. Soon after the publication of this work Blake was introduced by Flaxman to the poet Hayley, and in the year 1 801 he accepted the suggestion of the latter, that he should take up his residence at Felpham in Sussex. The mild and

amiable poet had planned to write a life of Cowper, and for the illustration of this and other works he sought Blake's help and companionship. The residence at Felph'am continued for three years, partly pleasant and partly irksome to Blake, but appar- ently not very profitable to the progress of his art. One of the annoyances of his stay was a malicious prosecution for traason set on foot by a common soldier whom Blake had summarily ejected from his garden; but a more serious drawback was the increasing irritation which the painter seems to have experienced from association with Hayley. In 1 804 Blake returned to London, to take up his residence in South Moulton Street, and as the fruit of his residence in Felpham, he published, in the manner already described, the prophetic books called the Jerusalem, The Emanation of the Giant Albion, and Milton. The first of these is a very notable performance in regard to artistic invention. Many of the designs stand out from the text in complete in- dependence, and are now and then of the very finest quality.

In the years 1804-1805 Blake executed a series of designs in illustration of Robert Blair's The Grave, of much beauty and grandeur, though showing stronger traces of imitation of Italian art than any earlier production. These designs were purchased from the artist by an adventurous and unscrupulous publisher, Cromek, for the paltry sum of £21, and afterwards published in a series of engravings by Schiavonetti. Despite the ill treatment Blake received in the matter,

and the other evils, including a quarrel with his friend Stothard as to priority of invention of a design illustrating the Canterbury Pilgrims, which his association with Cromek involved, the book gained for him a larger amount of popularity than he at any other time secured. Stothard's picture of the Canterbury Pilgrims was exhibited in 1807, and in 1809 Blake, in emulation of his' rival's success, having himself painted in water-colour a picture of the same subject, opened an exhibition, and drew up a Descriptive Catalogue, curious and interesting, and containing a very valuable criticism of Chaucer.

The remainder of the artist's life is not outwardly eventful. In 1813 he formed, through the introduction of George Cumber- land of Bristol, a valuable friendship with John Linnell and other rising water-colour painters. Amongst the group Blake seems to have found special sympathy in the society of John Varley, who, himself addicted to astrology, encouraged Blake to cultivate his gift of inspired vision; and it is probably to this influence that we are indebted for several curious drawings made from visions, especially the celebrated "ghost of a flea " and the very humorous portrait of the builder of the Pyramids. In 182 1 Blake removed to Fountain Court; in the Strand, where he died on the 1 2th of August 1827. The chief work of these last years was the splendid series of engraved designs in illustration of the book of Job. Here we find the highest imaginative qualities of Blake's art united to the technical means of expression which he best understood. Both the invention and the engraving are in all ways remarkable, and the series may fairly be cited in support of a very high estimate of his genius. None of his works is without the trace of that peculiar artistic instinct and power which seizes the pictorial element of ideas, simple or sublime, and translates them into the appropriate language of sense; but here the double faculty finds the happiest exercise. The grandeur of the theme is duly reflected in the simple and sublime images of the artist's design, and in the presence of these plates we are made to feel the power of the artist over the expressional resources of human form, as well as his sympathy with the imaginative significance of his subject.

A life of Blake, with selections from his works, by Alexander Gilchrist, was published in 1863 (new edition by W. G. Robertson, 1906) ; in 1868 A. C. Swinburne published a critical essay on his genius, remarkable for a full examination of the Prophetic Books, and in 1874 William Michael Rossetti published a memoir prefixed to an edition of the poems. In 1893 appeared The Works of William Blake, edited by E. J. Ellis and W. B. Yeats. But for a long time all the editors paid too little attention to a correct following of Blake's own MSS. The text of the poems was finally edited with exemplary care and thoroughness

by John Sampson in his edition of the Poetical Works (1905), which has rescued Blake from the ” improvements ” of previous editors. See also The Letters of

William Blake, together . with a Life by Frederick Tatham; edited by A. G. B. Russell (1906); and Basil de Selincourt, William, Blake (1909). (J. C. C.)

BLAKELOCK, RALPH ALBERT (1847-), American painter, was born in New York, on the 15th of October, 1847. He graduated at the College of the City of New York in 1867. In art he was self-taught and markedly original. Until ill-health necessitated the abandonment of his profession, he was a most prolific worker, his subjects including pictures of North American Indian life, and landscapes — notably such canvases as “The Indian Fisherman”; “Ta-wo-koka: or Circle Dance”; “Silvery Moonlight”; “A Waterfall by Moonlight”; “Soli- tude”; and “Moonlight on Long Island Sound.”

BLAKENEY, WILLIAM BLAKENEY, Baron (1672-1761), British soldier, was born. at Mount Blakeney in Limerick in 1672. Destined by his father for politics, he soon showed a decided preference for a military career, and at the age of eighteen headed the tenants in defending the Blakeney estate against the Rap- parees. As a volunteer he went to the war in Flanders, and at the siege of Venlo in 1702 won his commission. He served as a subaltern throughout Marlborough’s campaigns, and is said to have been the first to drill troops by signal of drum or colour. For many years after the peace of Utrecht he served unnoticed, and was sixty-five years of age before he became a colonel. This neglect, which was said to be due to the hostility of Lord Verney, ceased when the duke of Richmond was appointed colonel of Blakeney’s regiment, and thenceforward his advance was rapid. Brigadier-general in the Cartagena expedition of 1741, and major-general a little later, he distinguished himself by his gallant and successful defence of Stirling Castle against the Highlanders in 1745. Two years later George II. made him lieutenant-general and lieutenant-governor of Minorca. The governor of that island never set foot in it, and Blakeney was left in command for ten years.

In 1756 the Seven Years’ War was preluded by a swift descent of the French on Minorca. Fifteen thousand troops under marshal the due de Richelieu, escorted by a strong squadron under the marquis de la Gallisonniere, landed on the island on the 1 8th of April, and at once began the siege of Fort St Philip, where Blakeney commanded at most some 5000 soldiers and workmen. The defence, in spite of crumbling walls and rotted gun platforms, had already lasted a month when a

British fleet under vice-admiral the Hon. John Byng appeared. La Gallison- niere and Byng fought, on the 20th of May, an indecisive battle, after which the relieving squadron sailed away and Blakeney was left to his fate. A second expedition subsequently appeared off Minorca, but it was then too late, for after a heroic resistance of - seventy-one days the old general had been compelled to surrender the fort to Richelieu (April 18-June 28, 1756). Only the ruined fortifications were the prize of the victors. Blakeney and his little garrison were transported to Gibraltar with absolute liberty to serve again. Byng was tried and executed; Blakeney, on his return to England, found himself the hero of the nation. Rewards came freely to the veteran. He was made colonel of the Enniskillen regiment of infantry, knight of the Bath, and Baron Blakeney of Mount Blakeney in the Irish peerage. A little later Van Most's statue of him was erected in Dublin, and his popularity continued unabated for the short remainder of his life. He died on the 20th of September 1761, and was buried in Westminster Abbey. , See Memoirs of General William Blakeney (1757).

BLAKESLEY, JOSEPH WILLIAMS (1808-1885), English divine, was born in London on the 6th of March 1808, and was educated at St Paul's school, London, and at Corpus Christi and Trinity Colleges, Cambridge. In 1831 he was elected a fellow, and in 1839 a tutor of Trinity. In 1833 he took holy orders, and from 1845 to 1872 held the college living of Ware, Hertfordshire. Over the signature " Hertfordshire Incumbent " he contributed a large number of letters to The Times on the leading social and political subjects of the day, and he also wrote many reviews of books for that paper. In 1863 he was made a canon of Canter- bury, and in 1872 dean of Lincoln. Dean Blakesley was the

author of the first English Life of Aristotle (1839), an edition of Herodotus (1852-1854) in the Bibliotheca Classica, and Four Months in Algeria (1859). He died on the 18th of April 1885.

BLAMIRE, SUSANNA (1747-1794), English poet, daughter of a Cumberland yeoman, was born at Cardew Hall, near Dalston, in January 1 747. Her mother died while she was a child, and she was brought up by her aunt, a Mrs Simpson of Thackwood, who sent her niece to the village school at Raughton Head. Susanna Blamire's earliest poem is " Written in a Churchyard, on seeing a number of

cattle grazing," in imitation of Gray. She lived an uneventful life among the farmers of the neighbourhood, and her gaiety and good-humour made her a favourite in rustic society. In 1767 her elder sister Sarah married Colonel Graham of Gart- more. " An Epistle to her friends at Gartmore " gives a playful description of the monotonous simplicity of her life. To her Perthshire visits her songs in the Scottish vernacular are no doubt partly due. Her chief friend was Catharine Gilpin of Scaleby Castle. The two ladies spent the winters together in Carlisle, and wrote poems in common. Susanna Blamire died in Carlisle on the 5th of April 1794. The poems which were not collected during her lifetime, were first published in 1842 by Henry Lonsdale as The Poetical Works of Miss Susanna Blamire, " the Muse of Cumberland," with a memoir by Mr Patrick Maxwell. Some of her songs rank among the very best of north- country lyrics. " And ye shall walk in silk attire " and " What ails this heart o' mine," are well known, and were included in Johnson's Scots' Musical Museum.

BLANC, (Jean Joseph Charles) LOUIS (1811-1882), French politician and historian, was born on the 29th of October 181 1 at Madrid, where his father held the post of inspector-general of finance under Joseph Bonaparte. Failing to receive aid from Pozzo di Borgo, his mother's uncle, Louis Blanc studied law in Paris, living in poverty, and became a contributor to various journals. In the Revue du progrbs, which he founded, he published in 1839 his study on L' Organisation du travail. The principles laid down in this famous essay form the key to Louis Blanc's whole political career. He attributes all the evils that afflict society to the pressure of competition, whereby the weaker are driven to the wall. He demanded the equalization of wages, and the merging of personal interests in the common good — ■" & chacun selon ses besoins, de chacun selon ses facultes." This was to be effected by the establishment of " social workshops," a sort of combined co-operative society and trade-union, where the workmen in each trade were to unite their efforts for their common benefit. In 1841 he published his Histoire de dix ans 1830-1840, an attack upon the monarchy of July. It ran through four editions in four years.

In 1847 he published the two first volumes of his Histoire de la Revolution Francaise. Its publication was interrupted by the revolution of 1848, when Louis Blanc became a member of the provisional government. It was on his motion that, on the 25th of February, the government undertook " to guarantee the existence of the workmen by work "; and though his demand for the establishment of a ministry of labour was refused — as beyond the competence of a provisional government — he was appointed to preside over the government labour commission {Commission du Gouvernement pour

les travailleurs) established at the Luxembourg to inquire into and report on the labour question. On the 10th of May he renewed, in the National Assembly, his proposal for a ministry of labour, but the temper of the majority was hostile to socialism, and the proposal was again rejected. His responsibility for the disastrous experiment of the national workshops he himself denied in his Appel aux honnltes gens (Paris, 1849), written in London after his flight; but by the insurgent mob of the 15th of May and by the victorious Moderates alike he was regarded as responsible. Between the sansculottes, who tried to force him to place himself at their head, and the national guards, who maltreated him, he was nearly done to death. Rescued with difficulty, he escaped with a false passport to Belgium, and thence to London; in his absence he was condemned by the special tribunal established at Bourges, in contumaciam, to deportation. Against trial and sentence he

alike protested, developing his protest in a series of articles in the Nouveau Monde, a review published in Paris under his direction. These he afterwards collected and published as Pages de I'histoire de la revolution de 1848 (Brussels, 1850).

During his stay in England he /made use of the unique collection of materials for the revolutionary period preserved at the British Museum to complete his Histoire dela Resolution Franqaise 12 vols. (1847-1862). In 1858 he published a reply to Lord Normanby's A Year of Revolution in Paris (1858), which he developed later into his Histoire de la revolution de 1848 (2 vols., 1870-1880). As far back as 1839 Louis Blanc had vehemently opposed the idea of a Napoleonic restoration, predicting that it would be "despotism without glory," " the Empire without the Emperor." He therefore remained in exile till the fall of the Second Empire in September 1870, after which he returned to Paris and served as a private in the national guard. On the 8th of February 187 1 he was elected a member of the National Assembly, in which he maintained that the republic was " the necessary form of national sovereignty," and voted for the continuation of the war; yet, though a member of the extreme Left, he was too clear-minded to sympathize with the Commune, and exerted his influence in vain on the side of moderation. In 1878 he advocated the abolition of the presidency and the senate. In January 1879 he introduced into the chamber a proposal for the amnesty of the Communists, which was carried. This was his last important act. His declining years were darkened by ill-health and by the death, in 1876, of his wife (Christina Groh), an Englishwoman whom he had married in 1865. He died at Cannes on the 6th of December 1882, and on the 12th of December received a state funeral in the cemetery of Pere-

Lachaise.

Louis Blanc possessed a picturesque and vivid style, and considerable power of research; but the fervour with which he expressed his convictions, while placing him in the first rank of orators, tended to turn his historical writings into political pamphlets. His political and social ideas have had a great influence on the development of socialism in France. His Discours politiques (1847-1881) was published in 1882. His most important works, besides those already mentioned, are Lettres sur I'Angleterre (1866-1867), Dix annees de I'histoire de l' Angleterre (1879-1881), and Questions d'aujourd'hui et de demain

(1873-1884).

See L. Fiaux, Louis Blanc (1883).

BLANC, MONT, the culminating point (15,782 ft.) of the mountain range of the same name, which forms part of the Pennine Alps, and is divided unequally between France, Italy and Switzerland. The actual highest summit is wholly French and is the loftiest peak in the Alps, and in Europe also, if certain peaks in the Caucasus be excluded. At Geneva the mountain was in former days named the Montagne Maudite, but the present name seems to have been always used locally. On the north is the valley of Chamonix, and on the east the head of the valley of Aosta. Among the great glaciers which stream from the peak the most noteworthy are those of Bossons and Taconnaz (northern slope) and of Brenva and Miage (southern slope). The first ascent was made in 1 786 by two Chamonix men, Jacques Balmat and Dr Michel Paccard, and the second in 1 787 by Balmat with two local men. Later in 1787 H. B. de Saussure made the third ascent, memorable in many respects, and was followed a week later by Colonel Beaufoy, the first Englishman to gain the top. These ascents were all made from Chamonix, which is still the usual starting point, though routes have been forced up the peak from nearly every side, those on the Italian side being much steeper than that from Chamonix. The ascent from Chamonix is now frequently made in summer (rarely in winter also), but, owing to the great height of the mountain, the view is unsatis- factory, though very extensive (Lyons is visible). There is an inn at the Grands Mulets (9909 ft.). In 1890 M. Vallot built an observatory and shelter hut (14,312 ft.) on the Bosses du Droma- daire (north-west ridge of the mountain), and in 1893 T. J. C. Janssen constructed an observatory just below the very summit.

SeeC.Durier, Le Mont Blanc (4th ed., Paris, 1897) ; C.E.Mathews, The

Annals of Mont Blanc (London. 1898); P. Giissfeldt, Der

Montblanc (Berlin, 1894, also a French translation, Geneva, I L. Kurz, Climbers' Guide to the Chain of Mont Blanc, section vi. (London, 1892) ; L. Kurz and X. Imfeld, Carte de la chaine du Mont Blanc (1896, new edition 1905). (W. A. B. C.)

BLANCHARD, SAMUEL LAMAN (1804-1845), British author and journalist, the son of a painter and glazier, was born at Great Yarmouth on the 15th of May 1804. He was educated at St Olave's school, Southwark, and then became clerk to a proctor in Doctors' Commons. At an early age he developed literary tastes, contributing dramatic sketches to a paper called Drama. For a short time he was a member of a travelling dramatic company, but subsequently became a proof-reader in London, and wrote for the Monthly Magazine. In 1827 he was made secretary of the Zoological Society, a post which he held for three years. In 1828 he published Lyric Offerings, dedicated to Charles Lamb. He had a verj varied journalistic experience, editing in succession the Monthly Magazine, the True Sun, the Constitu- tional, the Court Journal, the Courier, and George Cruikshank's Omnibus; and from 1841 till his death he was connected with the Examiner. In 1846 Bulwer-Lytton collected a number of his prose-essays under the title Sketches of Life, to which a memoir of the author was prefixed. His verse was collected in 1876 by Blanchard Jerrold. Over-work broke down his strength, and, unnerved by the death of his wife, he died by his own hand on the 15th of February 1845.

His eldest son, Sidney Laman Blanchard, who was the author of Yesterday and To-day in India, died in 1883.

BLANCHE, JACQUES EMILE (1 86 1-) , French painter, was born in Paris. He enjoyed an excellent cosmopolitan education, and was brought up at Passy in a house once belonging to the princesse de Lamballe, which still retained the atmosphere of 18th-century elegance and refinement and influenced his taste and work. Although he received some instruction in painting from Gervex, he may be regarded as self-taught. He acquired a great reputation as a portrait painter; his art is derived from French and English sources, refined, sometimes super-elegant, but. full of character. Among his chief works are his portraits of his father, of Pierre Louys, the Thaulow family, Aubrey Beardsley and Yvette Guilbert.

BLANCHE OF CASTILE (1188-1252), wife of Louis VIII. of France,

third daughter of Alphonso VIII., king of Castile, and of Eleanor of England, daughter of Henry II., was born at Valencia. In consequence of a treaty between Philip Augustus and John of England, she was betrothed to the former's son, Louis, and was brought to France, in the spring of 1200, by John's mother Eleanor. On the 22nd of May 1200 the treaty was finally signed, John ceding with his niece the fiefs of Issoudun and Gracay, together with those that Andre de Chavigny, lord of Chateauroux, held in Berry, of the English crown. The marriage was celebrated the next day, at Portmort on the right bank of the Seine, in John's domains, as those of Philip lay under an interdict.

Blanche first displayed her great qualities in 1216, when Louis,- who on the death of John claimed the English crown in her right, invaded England, only to find a united nation against him. Philip Augustus refused to help his son, and Blanche was his sole support. The queen established herself at Calais and organized two fleets, one of which was commanded by Eustace the Monk, and an army under Robert of Courtenay; but all her resolution and energy were in vain. Although it would seem that her masterful temper exercised a sensible influence upon her husband's gentler character, her role during his reign (1223-1226) is not well known. Upon his death he left Blanche regent and guardian of his children. Of her twelve or thirteen children, six had died, and Louis, the heir — afterwards the sainted Louis IX., — was but twelve years old. The situation was critical, for the hard- won domains of the house of Capet seemed likely to fall to pieces during a minority. Blanche had to bear the whole burden of affairs alone, to break up a league of the barons (1226), and to repel the attack of the king of England (1 230). But her" energy and firmness overcame all dangers. There was an end to the calumnies circulated against her, based on the poetical homage rendered her by Theobald IV., count of Champagne, and the

prolonged stay in Paris of the papal legate, Romano Bonaventura, cardinal of Sant' Angelo. The nobles were awed by her warlike preparations or won over by adroit diplomacy, and their league was broken up. St Louis owed his realm to his mother, but he himself always remained somewhat under the spell of her imperious personality. After he came of age (1236) her influence upon him may still be traced. In 1248 she again became regent, during Louis IX. 's absence on the crusade, a project which she had strongly opposed. In the disasters which followed she main- tained peace, while draining the land of men and money to aid her son in the East. At last her

strength failed her. She fell ill at Melun in November 1252, and was taken to Paris, but lived only a few days. She was buried at Maubuisson.

Besides the works ‘of Joinville and William of Nangis, see FJie Berger, ” Histoire de Blanche de Castille, reine de France,” in Bibliotheque des ecoles franqaises d’Athenes et de Rome { vol. lxx. (Paris, 1895) ; Le Nain de Tillemont, ” Vie de Saint Louis,” ed. by J. de Gaulle for the Societe de I’histoire de France (6 vols., 1847- 1851) ; and Paulin Paris, ” Nouvelles recherches sur les mceurs de la reine Blanche et de Thibaud,” in Cabinet historique (1858).

BLANCH FEE, or Blanch Holding (from Fr. blanc, white), an ancient tenure in Scottish land law, the duty payable being in silver or white money in contradistinction to gold. The phrase was afterwards applied to any holding of which the quit-rent was merely nominal, such as a penny, a peppercorn, &c.

BLANDFORD, or Blandford Forum, a market town, and municipal borough in the northern parliamentary division of Dorsetshire, England, on the Stour, 19 m. N.W. of Bournemouth by the Somerset & Dorset railway. Pop. (1901) 3649. The town is ancient, but was almost wholly destroyed by fire in the 1 8th century. The church of St Peter and St Paul, a classical building, was built in 1732. There are a grammar-school (founded in 1521 at Milton Abbas, transferred to Blandford in 1775), a Blue Coat school (1729), and other educational charities. Remnants of a mansion of the 14th century, Damory Court, are seen in a farmhouse, and an adjoining Perpendicular chapel is used as a barn. There are numerous early earthworks on the chalk hills in the neighbourhood. The fine modern mansion of Bryanston, in the park adjoining the town, is the seat of Lord Portman. The municipal borough is under a mayor, 4 aldermen and 12 councillors. Area, 145 acres.

BLANDRATA, or Biandrata, GIORGIO (c. 1515-1588), Italian physician and polemic, who came of the De Blandrate family, powerful from the early part of the 13th century, was born at Saluzzo, the youngest son of Bernardino Biandrata. He graduated in arts and medicine at Montpellier in 1533, and specialized in the functional and nervous disorders of women. In 1544 he made his first acquaintance with Transylvania; in 1553 he was with Alciati in the Grisons; in 1557 he spent a year at Geneva, in constant intercourse with Calvin, who dis- trusted him. He attended the English wife (Jane Stafford) of Count Celso Massimiliano Martinengo, preacher of the Italian church at Geneva, and fostered anti-trinitarian opinions in that church. In 1558

he found it expedient to remove to Poland, where he became a leader of the heretical party at the synods of Pinczow (1558) and Ksionzh (1560 and 1562). His point was the suppression of extremes of opinion, on the basis of a confession literally drawn from Scripture. He obtained the position of court physician to the queen dowager, the Milanese Bona Sforza. She had been instrumental in the burning (1539) of Catharine Weygel, at the age of eighty, for anti-trinitarian opinions; but the writings of Ochino had altered her views, which were now anti-Catholic. In 1563 Biandrata transferred his services to the Transylvanian court, where the daughters of his patroness were married to ruling princes. He revisited Poland (1576) in the train of Stephen Bathory, whose tolerance permitted the propagation of heresies; and when (1579) Chris- topher Bathory introduced the Jesuits into Transylvania, Biandrata found means of conciliating them. Throughout his career he was accompanied by his two brothers, Ludovico and Alphonso, the former being canon of Saluzzo. In Transylvania, Biandrata co-operated with Francis David (d. 1579), the anti- trinitarian bishop, but in 1578 two circumstances broke the

connexion. Blaridrata was charged with “Italian vice”; David renounced the worship of Christ. To influence David, Blandrata sent for Faustus Socinus from Basel. Socinus was David’s guest, but the discussion between them led to no result. At the instance of Blandrata, David was tried and condemned to prison at Deva (in which he died) on the charge of innovation. Having amassed a fortune, Blandrata returned to the com- munion of Rome. His end is obscure. According to the Jesuit, Jacob Wujek, he was strangled by a nephew (Giorgio, son of Alphonso) in May 1588. He published a few polemical writings, some in conjunction with David.

See Malacarne, Commentario delle Opere e delle Vicende di G. Biandrata (Padova, 1814); Wallace, Anti-trinitarian Biography, vol. ii. (1850). (A. Go.*)

BLANE, SIR GILBERT (1740-1834), Scottish physician, was born at Blanefield, Ayrshire, on the 29th of August 1749. He was educated at Edinburgh university, and shortly after his removal to London became private physician to Lord Rodney, whom he accompanied to the West Indies in 1779. He did much to improve the health of the fleet by attention to the diet of the sailors and by enforcing due sanitary precautions, and it was largely through him that in 1795 the use of

lime-juice was made obligatory throughout the navy as a preventive of scurvy. Enjoying a number of court and hospital appointments he built up a good practice for himself in London, and the government constantly consulted him on questions of public hygiene. He was made a baronet in 181 2 in reward for the services he rendered in connexion with the return of the Walcheren expedition. He died in London on the 26th of June 1834. Among his works were Observations on the Diseases of Seamen (1795) and Elements of Medical Logic (1819).

BLANFORD, WILLIAM THOMAS (1832-1905), English geologist and naturalist, was born in London on the 7th of October 1832. He was educated in private schools in Brighton and Paris, and with a view to the adoption of a mercantile career spent two years in a business house at Civita Vecchia. On return- ing to England in 185 1 he was induced to enter the newly estab- lished Royal School of Mines, which his younger brother Henry F. Blanford (1834-1893), afterwards head of the Indian Meteoro- logical Department, had already joined; he then spent a year in the mining school at Freiburg, and towards the close of 1854 both he and his brother obtained posts on the Geological Survey of India. In that service he remained for twenty-seven years, retiring in 1882. He was engaged in various parts of India, in the Raniganj coalfield, in Bombay, and in the coalfield near Talchir, where boulders considered to have been ice-borne were found in the Talchir strata — a remarkable discovery con- firmed by subsequent observations of other geologists in equiva- lent strata elsewhere. His attention was given not only to geology but to zoology, and especially to the land-mollusca and to the vertebrates. In 1866 he was attached to the Abyssinian expedition, accompanying the army to Magdala and back; and in 1871-1872 he was appointed a member of the Persian Boundary Commission. The best use was made of the excep- tional opportunities of studying the natural history of those countries. For his many contributions to geological science Dr Blanford was in 1883 awarded the Wollaston medal by the Geological Society of London; and for his labours on the zoology and geology of British India he received in 1901 a royal medal from the Royal Society. He had been elected F.R.S. in 1874, and was chosen president of the Geological Society in 1888. He was created CLE. in 1904. He died in London on the 23rd of June 1905. His principal publications were: Observations on the Geology and Zoology of Abyssinia (1870), and Manual of the Geology of India, with H. B. Medlicott (1879).

Biography, with bibliography and portrait, in Geological Magazine, January 1905.

BLANK (from the Fr. blanc, white), a. word used in various senses

based on that of ” left white,” i.e. requiring something to be filled in; thus a ” blank cheque ” is one which requires the amount to be inserted, an insurance policy in blank, where the name of the beneficiary is lacking, ” blank verse ” (q.v.)

verse without rhyme, ” blank cartridge ” that contains only powder and no ball or shot. The word is also used, as a sub- stantive, for a ticket in a lottery or sweepstake which does not carry a number or the name of a horse running or for an unstamped metal disc in coining.

BLANKENBERGHE, a seaside watering-place on the North Sea in the province of West Flanders, Belgium, 12 m. N.E. of Ostend, and about 9 m. N.W. of Bruges, with which it is connected by railway. It is more bracing than Ostend, and has a fine parade over a mile in length. During the season, which extends from June to September, it receives a large number of visitors, probably over 60,000 altogether, from Germany as well as from Belgium. There is a small fishing port as well as a considerable fishing-fleet. Two miles north of this place along the dunes is Zeebrugge, the point at which the new ship-canal from Bruges enters the North Sea. Fixed population

(1904) 5925.

BLANKENBURG. (1) A town and health resort of Germany, in the duchy of Brunswick, at the N. foot of the Harz Mountains, 12 m. by rail S.W. from Halberstadt. Pop. (1901) 10,173. It has been in large part rebuilt since a fire in 1836, and possesses a castle, with various collections, a museum of antiquities, an old town hall and churches. There are pine-needle baths and a hospital for nervous diseases. Gardening is a speciality. In the vicinity is a cliff or ridge of rock called Teufelsmauer (Devil’s wall), from which fine views are obtained across the plain and into the deep gorges of the Harz Mountains.

(2) Another Blankenburg, also a health-resort, is situated in Schwarzburg-Rudolstadt, Thuringia, at the confluence of the rivers Rinne and Schwarza, and at the entrance of the Schwar- zatal. Its environs are charming, and to the north of it, on an eminence, rise the fine ruins of the castle of Greifenstein, built by the German king Henry I., and from 1275 to 1583 the seat of a cadet branch of the counts of Schwarzburg.

BLANKETEERS, the nickname given to some 5000 operatives who on the 10th of March 181 7 met in St Peter’s Field, near Manchester, to march to London, each carrying blankets or rugs. Their object was to see the prince regent and lay their grievances before him. The Habeas

Corpus Act was suspended, and the leaders were seized and imprisoned. The bulk of the demon- stration yielded at once. The few stragglers who persisted in the march were intercepted by troops, and treated with consider- able severity. Eventually the spokesmen had an interview with the ministers, and some reforms were the result.

BLANK VERSE, the unrhymed measure of iambic deca- syllable in five beats which is usually adopted in English epic and dramatic poetry. The epithet is due to the absence of the rhyme which the ear expects at the end of successive lines. The decasyllabic line occurs for the first time in a Provencal poem of the 10th century, but in the earliest instances preserved it is already constructed with such regularity as to suggest that it was no new invention. It was certainly being used almost simultaneously in the north of France. Chaucer employed it in his Compleynte to Pitie about 1370. In all the literatures of western Europe it became generally used, but always with rhyme. In the beginning of the 16th century, however, certain Italian poets made the experiment of writing decasyllables without rhyme. The tragedy of Sophonisba (1515) of G. G. Trissino (1478-1550) was the earliest work completed in this form; it was followed in 1525 by the didactic poem Le Apt (The Bees), of Giovanni Rucellai (1475-1525), who announced his intention of writing ” Con verso Etrusco dalle rime sciolto,” in consequence of which expression this kind of metre was called versi sciolti or blank verse. In a very short time this form was largely adopted in Italian dramatic poetry, and the comedies of Ariosto, the Aminta of Tasso and the Pastor Fido of Guarini are composed in it. The iambic blank verse of Italy was, how- ever, mainly hendecasyllabic, not decasyllabic, and under French influences the habit of rhyme soon returned.

Before the close of Trissino’s life, however, his invention had been introduced into another literature, where it was destined to enjoy a longer and more glorious existence. Towards the

close of the reign of Henry VIII., Henry Howard, earl of Surrey, translated two books of the Aeneid into English rhymeless verse, ” drawing ” them ‘* into a strange metre.” Surrey’s blank verse is stiff and timid, permitting itself no divergence from the exact iambic movement: —

“Who can express the slaughter of that night,

Or tell the number of the corpses slain,

Or can in tears bewail them worthily?

The ancient famous city falleth down,

That many years did hold such seignory.”

Surrey soon found an imitator in Nicholas Grimoald, and in 1562 blank verse was first applied to English dramatic poetry in the Gorboduc of Sackville and Norton. In 1576, in the Steel Glass of Gascoigne, it was first used for satire, and by the year 1585 it had come into almost universal use for theatrical purposes. In Lyly’s The Woman in the Moon and Peek’s Arraignment of Paris (both of 1584) we find blank verse struggling with rhymed verse and successfully holding its own. The earliest play written entirely in blank verse is supposed to be The Misfortunes of Arthur (1587) of Thomas Hughes. Marlowe now immediately followed, with the magnificent movement of his Tamburlaine (1589), which was mocked by satirical critics as ” the swelling bombast of bragging blank verse” (Nash) and ” the spacious volubility of a drumming decasyllable ” (Greene), but which introduced a great new music into English poetry, in such ” mighty lines “as

” Still climbing after knowledge infinite, And always moving as the restless spheres,”

or: —

” See where Christ’s blood streams in the firmament! ”

Except, however, when he is stirred by a particularly vivid emotion, the blank verse of Marlowe continues to be’ monotonous and uniform. It still depends too exclusively on a counting of syllables. But Shakespeare, after having returned to rhyme in his earliest dramas, particularly in The Two Gentlemen of Verona, adopted blank verse conclusively about the time that the career of Marlowe was closing, and he carried it to the greatest perfection in variety, suppleness and fulness. He released it from the excessive bondage that it had hitherto endured; as Robert Bridges has said, ” Shakespeare, whose early verse may be described as syllabic, gradually came to write a verse dependent on stress.” In comparison with that of his predecessors and successors, the blank verse of Shakespeare is essentially regular, and his prosody marks the admirable mean between the stiffness of his dramatic forerunners and the laxity of those who followed him. Most of Shakespeare’s lines conform to the normal type of the decasyllable,

and the rest are accounted for by familiar and rational rules of variation. The ease and fluidity of his prosody were abused by his successors, particularly by Beaumont and Fletcher, who employed the soft feminine ending to excess ; in Massinger dramatic blank verse came too near to prose, and in Heywood and Shirley it was relaxed to the point of losing all nervous vigour.

The later dramatists gradually abandoned that rigorous difference which should always be preserved between the cadence of verse and prose, and the example of Ford, who endeavoured to revive the old severity of blank verse, was not followed. But just as the form was sinking into dramatic desuetude, it took new life in the direction of epic, and found its noblest proficient in the person of John Milton. The most intricate and therefore the most interesting blank verse which has been written is that of Milton in the great poems of his later life. He reduced the elisions, which had been frequent in the Elizabethan poets, to law; he admitted an extraordinary variety in the number of stresses; he deliberately inverted the rhythm in order to produce particular effects; and he multiplied at will the caesurae or breaks in a line. Such verses as

” Arraying with reflected purple and gold — Shoots invisible virtue even to the deep — Universal reproach, far worse to bear — Me, me only, just object of his ire ” — • are not mistaken in rhythm, nor to be scanned by forcing them to obey the conventional stress. They are instances, and

Paradise Lost is full of such, of Milton’s exquisite art in ringing changes upon the metrical type of ten syllables, five stresses and a rising rhythm, so as to make the whole texture of the verse respond to his poetical thought. Writing many years later in Paradise Regained and in Samson Agonistes, Milton retained his system of blank verse in its general characteristics, but he treated it with increased dryness and with a certain harshness of effect. It is certainly in his biblical drama that blank verse has been pushed to its most artificial and technical perfection, and it is there that Milton’s theories are to be studied best; yet it must be confessed that learning excludes beauty in some of the very audacious irregularities which he here permits himself in Samson Agonistes. Such lines as

” Made arms ridiculous, useless the forgery — My griefs not only pain me as a lingering disease — Drunk with idolatry, drunk with wine — Justly, yet despair not of his final pardon ” —

are constructed with perfect comprehension of metrical law, yet they

differ so much from the normal structure of blank verse that they need to be explained, and to imitate them would be perilous. A persistent weakness in the third foot has ever been the snare of English blank verse, and it is this element of monotony and dulness which Milton is ceaselessly endeavouring to obviate by his wonderful inversions, elisions and breaks.

After the Restoration, and after a brief period of experiment with rhymed plays, the dramatists returned to the use of blank verse, and in the hands of Otway, Lee and Dryden, it recovered much of its magnificence. In the 18th century, Thomson and others made use of a very regular and somewhat monotonous form of blank verse for descriptive and didactic poems, of which the Night Thoughts of Young is, from a metrical point of view, the most interesting. With these poets the form is little open to licence, while inversions and breaks are avoided as much as possible. Since the 18th century, blank verse has been subjected to constant revision in the hands of Wordsworth, Coleridge, Shelley, Keats, Tennyson, the Brownings and Swinburne, but no radical changes, of a nature unknown to Shakespeare and Milton, have been introduced into it.

See J. A. Symonds, Blank Verse (1895); Walter Thomas, Le Decasyllabe romain et sa fortune en Europe (1904); Robert Bridges Milton's Prosody (1894); Ed. Guest, A History of English Rhythms (1882) ; J. Mothere, Les Theories du vers heroique anglais (1886) ; J. Schipper, Englische Metrik (1881-1888). (E. G.)

BLANQUI, JEROME ADOLPHE (1798-1854), French econo- mist, was born at Nice on the 21st of November 1798. Begin- ning life as a schoolmaster in Paris, he was attracted to the study of economics by the lectures of J. B. Say, whose pupil and assist- ant he became. Upon the recommendation of Say he" was in 1825 appointed professor of industrial economy and of history at the Conservatoire des Arts et Metiers. In 1833 he succeeded Say as professor of political economy at the same institution, and in 1838 was elected a member of the Academie des Sciences Morales et Politiques. In 1838 appeared his most important work, Histoire de I'economie politique en Europe, depuis les anciens jusqu'd nos jours. He was indefatigable in research, and for the purposes of his economic inquiries travelled over almost the whole of Europe and visited Algeria and the East. He contributed much to our knowledge of the conditions of the working-classes, especially in France. Other works of Blanqui were De la situation Sconomique et morale de I'Espagne en 1846; Resume de I'histoire du commerce et de Vindustrie (1826); PrScis Mementaire d'economie politique (1826); Les Classes ouvrieres en France (1848).

BLANQUI, LOUIS AUGUSTE (1805-1881), French publicist, was born on the 8th of February 1805 at Puget-Theniers, where his father, Jean Dominique Blanqui, was at that time sub- prefect. He studied both law and medicine, but found his real vocation in politics, and at once constituted himself a champion of the most advanced opinions. He took an active part in the revolution of July 1830, and continuing to maintain the doctrine of republicanism during the reign of Louis Philippe, was con- demned to repeated terms of imprisonment. Implicated in the armed outbreak of the Soci6te des Saisons, of which he was a

leading spirit, he was in the following year, 1840, condemned to death, a sentence that was afterwards commuted to imprison- ment for life. He was released by the revolution of 1848, only to resume his attacks on existing institutions. The revolution, he declared, was a mere change of name. The violence of the Sociiti rSpublicaine centrale, which was founded by Blanqui to demand a modification of the government, brought him into conflict with the more moderate Republicans, and in 1849 ne was condemned to ten years' imprisonment. In 1865, while serving a further term of imprisonment under the Empire, he contrived to escape, and henceforth continued his propaganda against the government from abroad, until the general amnesty of i860 enabled him to return to France. Blanqui's leaning towards violent measures was illustrated in 1870 by two un- successful armed demonstrations: one on the 12th of January at the funeral of Victor Noir, the journalist shot by Pierre Bonaparte; the other on the 14th of August, when he led an attempt to seize some guns at a barrack. Upon the fall of the Empire, through the revolution of the 4th of September, Blanqui established the club and journal La patrie en danger. He was one of the band that for a moment seized the reins of power on the 31st of October, and for his share in that outbreak he was again condemned to death on the 17 th of March of the following year. A few days afterwards the insurrection ' which established the Commune broke out, and Blanqui 'was elected a member of the insurgent government, but his detention in prison prevented him from taking an active part. Nevertheless he was in 1872 condemned along with the other members of the Commune to transportation; but on account of his broken health this sentence was commuted to one of imprisonment. In 1879 he was elected a deputy for Bordeaux; although the election was pronounced invalid, Blanqui was set at liberty, and at once resumed his work of agitation. At the

end of 1880, after a speech at a revolutionary meeting in Paris, he was struck down by apoplexy, and expired on the 1st of January 1881. Blanqui's uncompromising communism, and his determination to enforce it by violence, necessarily brought him into conflict with every French government, and half his life was spent in prison. Besides his innumerable contributions to journalism, he published an astronomical work entitled L'Eternite par les astres (1872), and after his death his writings on economic and social questions were collected under the title of Critique sociale (1885).

A biography by G. Geffroy, L'Enferme (1897), is highly coloured and decidedly partisan.

BLANTYRE, the chief town of the Nyasaland protectorate, British Central Africa. It is situated about 3000 ft. above the sea in the Shire Highlands 306 m. by river and rail N.N.W. of the Chinde mouth of the Zambezi. Pop. about 6000 natives and 100 whites. It is the headquarters of the principal trading firms and missionary societies in the protectorate. It is also a station on the African trans-continental telegraph line. The chief building is the Church of Scotland church, a fine red brick building, a mixture of Norman and Byzantine styles, with lofty turrets and white domes. It stands in a large open space and is approached by an avenue of cypresses and eucalyptus. The church was built entirely by native labour. Blantyre was founded in 1876 by Scottish missionaries, and is named after the birthplace of David Livingstone.

BLANTYRE (Gaelic, "the warm retreat"), a parish of Lanarkshire, Scotland. Pop.- (1901) 14,145. The parish lies a few miles south-east of Glasgow, and contains High Blantyre (pop. 2521), Blantyre Works (or Low Blantyre), Stonefield and several villages. The whole district is rich in coal, the mining of which is extensively carried on. Blantyre Works (pop. 1683) was the birthplace of David Livingstone (1813-1873) and his brother Charles (1821-1873), who as lads were both employed as piecers in a local cotton-mill. The scanty remains of Blantyre Priory, founded towards the close of the 13th century, stand on the left bank of the Clyde, almost opposite the beautiful ruins of Bothwell Castle. High Blantyre and Blantyre Works are connected with Glasgow by the Caledonian railway. Stonefield (pop. 7288), the most populous place in

the parish, entirely occupied with mining, lies between High Blantyre and Blantyre Works. Calderwood Castle on Rotten Calder Water, near High Blantyre, is situated amid picturesque scenery.

BLARNEY, a small town of Co. Cork, Ireland, in the mid parliamentary division, 5 m. N.W. of the city of Cork on the Cork & Muskerry light railway. Pop. (1901) 928. There is a large manufacture of tweed. The name ” blarney ” has passed into the language to denote a peculiar kind of persuasive eloquence, alleged to be characteristic of the natives of Ireland. The ” Blarney Stone,” the kissing of which is said to confer this faculty, is pointed out within the castle. The origin of this belief is not known. The castle, built c. 1446 by Cormac McCarthy, was of immense strength, and parts of its walls are as much as 18 ft. thick. To its founder is traced by some the origin of the term ” blarney,” since he delayed by persuasion and promises the surrender of the castle to the lord president. Richard Millikin’s song, ” The Groves of Blarney ” (c. 1798), contributed to the fame of the castle, which is also bound up with the civil history of the county and the War of the Great Rebellion.

BLASHFIELD, EDWIN HOWLAND (1848-), American

artist, was born on the 15th of December 1848 in New York City; He was a pupil of Bonnat in Paris, and became (1888) a member of the National Academy of Design in New York. For some years a genre painter, he later turned to decorative work, marked by rare delicacy and beauty of colouring. He painted mural decorations for a dome in the manufacturers’ building at the Chicago Exposition of 1893; for the dome of the Congressional library, Washington; for the capitol at St Paul, Minnesota; for the Baltimore court-house; in New York City for the Appellate court house, the grand ball-room of the Waldorf-Astoria hotel, the Lawyers’ club, and the residences of W. K. Vanderbilt and Collis P. Huntington; and in Philadelphia for the residence of George W. Drexel. With his wife he wrote Italian Cities (1900) and edited Vasari’s Lives of the Painters (1896), and was well known as a lecturer and writer on art. He became president of the Society of Mural Painters, and of the Society of American Artists.

BLASIUS (or Blaise), SAINT, bishop of Sebaste or Sivas in Asia Minor, martyred under Diocletian on the 3rd of February 316. The Roman Catholic Church holds his festival on the 3rd of February, the Orthodox Eastern Church on the nth. His flesh is said to have been torn with woolcombers’ irons before he was beheaded, and this seems to be the only reason why he has always been regarded as the patron saint of woolcombers. In pre-Reformation England St Blaise was a very popular saint, and the council of Oxford in 1222 forbade all work on his festival. Owing to a miracle which he is alleged to have worked on a child suffering from a throat affection, who was brought to him on his way to execution, St Blaise’s aid has always been held potent in

throat and lung diseases. The woolcombers of England still celebrate St Blaise's day with a procession and general festivities. He forms one of a group of fourteen (i.e. twice seven) saints, who for their help in time of need have been associated as objects of particularly devoted worship in Roman Catholic Germany since the middle of the 1 5th century. See William Hone, Every Day Book, i. 210.

BLASPHEMY (through the Fr. from Gr. /3Xa, to injure, and $1^17, speech), literally, defamation or evil speaking, but more peculiarly restricted to an indignity offered to the Deity by words or writing. By the Mosaic law death by stoning was the punishment for blasphemy (Lev. xxiv. 16). The 77th Novel of Justinian assigned death as the penalty, as did also the Capitularies. The common law of England treats blasphemy as an indictable offence. All blasphemies against God, as denying His being, or providence, all contumelious reproaches of Jesus Christ, all profane scoffing at the Holy Scriptures, or exposing any part thereof to contempt or ridicule, are punishable by the temporal courts with fine, imprisonment and also infamous corporal punishment. An act of Edward VI. (1547; repealed

r 553» and revived 1558) enacts that persons reviling the sacra- ment of the Lord's Supper, by contemptuous words or otherwise, shall suffer imprisonment. Persons denying the Trinity were deprived of the benefit of the Act of Toleration by an act of 1688. An act of 1697-1698, commonly called the Blasphemy Act, enacts that if any person, educated in or having made profession of the Christian religion, should by writing, preaching, teaching or advised speaking, deny any one of the Persons of the Holy Trinity to be God, or should assert or maintain that there are more gods than one, or should deny the Christian religion to be true, or the Holy Scriptures to be of divine authority, he should, upon the first offence, be rendered incapable of holding any office or place of trust, and for the second incapable of bringing any action, of being guardian or executor, or of taking a legacy or deed of gift, and should suffer three years' imprisonment without bail. It has been held that a person offending under the statute is also indictable at common law {Rex v. Carlisle, 1819, where Mr Justice Best remarks, " In the age of toleration, when that statute passed, neither churchmen nor sectarians wished to protect in their infidelity those who disbelieved the Holy Scriptures"). An act of 1812-1813 excepts from these enact- ments " persons denying as therein mentioned respecting the Holy Trinity," but otherwise the

common and the statute law on the subject remain as stated. In the case of Rex v. Woolston (1728) the court declared that they would not suffer it to be debated whether to write against Christianity in general was not an offence punishable in the temporal courts at common law, but they did not intend to include disputes between learned men on particular controverted points.

The law against blasphemy has practically ceased to be put in active operation. In 1841 Edward Moxon was found guilty of the publication of a blasphemous libel (Shelley's Queen Mab), the prosecution having been instituted by Henry Hetherington, who had previously been condemned to four months' imprisonment for a similar offence, and wished to test the law under which he was punished. In the case of Cowan v. Milboum (1867) the defendant had broken his contract to let a lecture-room to the plaintiff, on discovering that the intended lectures were to maintain that " the character of Christ is defective, and his teaching misleading, and that the Bible is no more inspired than any other book," and the court of exchequer held that the publication of such doctrine was blasphemy, and the contract therefore illegal. On that occasion the court reaffirmed the dictum of Chief Justice Hale, that Christianity is part of the laws of England. The commissioners on criminal law (sixth report) remark that " although the law forbids all denial of the being and providence of God or the Christian religion, it is only when irreligion assumes the form of an insult to God and man that the interference of the criminal law has taken place." In England the last prominent prosecution for blasphemy was the case of R. v. Ramsey &" Foote, 1883, 48 L.T. 739, when the editor, publisher and printer of the Freethinker were sentenced to imprisonment; but police court proceedings were taken as late as 1908 against an obscure Hyde Park orator who had become a public nuisance.

Profane cursing and swearing is made punishable by the Profane Oaths Act 1745, which directs the offender to be brought before a justice of the peace, and fined five shillings, two shillings or one shilling, according as he is a gentleman, below the rank of gentleman, or a common labourer, soldier, &c.

By the law of Scotland, as it originally stood, the punishment of blasphemy was death, but by an act of 1825, amended in 1837, blasphemy was made punishable by fine or imprisonment or both.

In France, blasphemy (which included, also, speaking against the Holy Virgin and the saints, denying one's faith, or speaking with impiety of holy things) was from very early times punished with great severity.

The punishment was death in various forms, burning alive, mutilation, torture or corporal punishment. In the United States the common law of England was largely followed, and in most of the states, also, statutes were enacted against the offence, but, as in England, the law is practically

never put in force. In Germany, the punishment for blasphemy is imprisonment varying from one day to three years, according to the gravity of the offence. To constitute the offence, the blasphemy must be uttered in public, be offensive in character, and have wounded the religious susceptibilities of some other person. In Austria, whoever commits blasphemy by speech or writing is liable to imprisonment for any term from six months up to ten years, according to the seriousness of the offence.

BLASS, FRIEDRICH (1843-1907), German classical scholar, was born on the 22nd of January 1843 at Osnabriick. After studying at Gottingen and Bonn from i860 to 1863, he lectured at several gymnasia and at the university of Konigsberg. In 1876 be was appointed extraordinary professor of classical philology at Kiel, and ordinary professor in 1881. In 1892 he accepted a professorship at Halle, where he died on the 5th of March 1907. He frequently visited England, and was intimately acquainted with leading British scholars. He received an honorary degree from Dublin University in 1892, and his readiness to place the results of his labours at the disposal of others, together with the courtesy and kindliness of his disposition, won the respect of all who knew him. Blass is chiefly known for his works in connexion with the study of Greek oratory: Die griechische Beredsamkeit von Alexander bis auf Augustus (1865); Die attische Beredsamkeit (1868-1880; 2nd ed., 1887-1898), his greatest work; editions for the Teubner series of Andocides (1880), Antiphon (1881), Hypereides (1881, 1804), Demosthenes (Dindorf's ed., 1885), Isocrates (1886), Dinarchus (1888), Demosthenes (Rehdantz' ed., 1893), Aeschines (1896), Lycurgus, Leocrates (1902); Die Rhythmen der atliscben Kunslprosa (1901); Die Rhythmen der asianischen und romischen Kunstprosa (1905). Among his other works are editions of Eudoxus of Cnidus (1887), the 'KBˆvaiuv iroKLTeia (4th ed., 1903), a work of great importance, and Bacchy- lides (3rd. ed., 1904) ; Grammatik des neutestamentlichen Griechisch (1902; Eng. trans, by H. St John Thackeray, 1905); Hermeneu- tik und Kritik and Paldographie, Buchwesen, und Handschrijten- kunde (vol. i. of Miiller's Handbuch der klassischen Altertums- wissenschaft, 1891); JJber die Aussprache des Griechischen (1888; Eng. trans, by W. J. Purton, 1890); Die Interpolationen in der Odyssee (1904); contributions to Collitz's Sammlung der griechi- schen

Dialektinschriften; editions of the texts of certain portions of the New Testament (Gospels and Acts). His last work was an. edition of the Choephori (1906).

See notices in the Academy, March 16, 1907 (J. P. Mahaffy) ; Classical Review, May 1907 (J. E. Sandys), which contains also a review of Die Rhythmen der asianischen und romischen Kunstprosa.

BLASTING, the process of rending or breaking apart a solid body, such as rock, by exploding within it or in contact with it some explosive substance. The explosion is accompanied by the sudden development of gas at a high temperature and under a tension sufficiently great to overcome the resistance of the enclosing body, which is thus shattered and disintegrated. Before the introduction of explosives, rock was laboriously excavated by hammer and chisel, or by the ancient process of ” fire-setting,” i.e. building a fire against the rock, which, on cooling, splits and flakes off. To hasten disintegration, water was often applied to the heated rock, the loosened portion being afterwards removed by pick or hammer and wedge. In modern times blasting has become a necessity for the excavation of rock and other hard material, as in open surface cuts, quarrying, tunnelling, shaft-sinking and mining operations in general.

For blasting, a hole is generally drilled to receive the charge of explosive. The depth and diameter of the hole and the quantity of explosive used are all variable, depending on the character of the rock and of the explosive, the shape of the mass to be blasted, the presence or absence of cracks or fissures, and the position of the hole with respect to the free surface of the rock. The shock of a blast produces impulsive waves acting radially in all directions, the force being greatest at the centre of explosion and varying inversely as the square of the distance from the charge. This is evidenced by the observed facts. Immediately surrounding the explosive, the rock is often finely, splintered and crushed. Beyond this is a zone in which it is completely broken and

displaced or projected, leaving an enveloping mass of more or less ragged fractured rock only partially loosened. Lastly, the diminishing waves produce vibrations which are transmitted to considerable distances. Theoretically, if a charge of explosive be tired in a solid material of perfectly homogeneous texture and at a proper distance

from the free surface, a conical mass will be blown out to the full depth of the drill hole, leaving a funnel- shaped cavity. No rock, however, is of uniform mineralogical and physical character, so that in practice there is only a rough approximation to the conical crater, even under the most favour- able conditions. Generally, the shape of the mass blasted out is extremely irregular, because of the variable texture of the rock and the presence of cracks, fissures and cleavage planes. The ultimate or resultant useful effect of the explosion of a confined charge is in the direction where the least resistance is presented. In the actual work of rock excavation it is only by trial, or by deductions based on experience, that the behaviour of a given rock can be determined and the quantity of explosive required properly proportioned.

Blasting, as usually carried on, comprises several operations: (i) drilling holes in the rock to be blasted; (2) placing in the hole the charge of explosive, with its fuze; (3) tamping the charge, i.e. compacting it and filling the remainder of the hole with some suitable material for preventing the charge from blowing out without breaking the ground; (4) igniting or detonating the charge; (5) clearing away the broken material. The holes for blasting are made either by hand, with hammer and drill or jumper, or by machine drill, the latter being driven by steam, compressed air, or electricity, or,in rare cases,by hydraulic power. Drill holes ordinarily vary in diameter from 1 to 3 in., and in depth from a few inches up to 15 or 20 ft. or more. The deeper holes are made only in surface excavation of rock, the shallower, to a maximum depth of say 12 ft., being suitable for tunnelling and mining operations.

Hand Drilling. — -The work is either ” single-hand ” or ” double-hand.” In single-hand drilling, the miner wields the hammer with one hand, and with the other holds the drill or ” bit,” rotating it slightly after every blow in order to keep the hole round and prevent the drill from sticking fast; in double-hand work, one man strikes, while the other holds and rotates the drill. For large and deep holes, two hammermen are sometimes employed.

A miner’s drill is a steel bar, occasionally round but generally of octagonal cross-section, one end of which is forged out to a cutting edge (fig. 1). The edge of the drill is made either straight, like that of a chisel, or with a convex curve, the latter shape being best for very hard rock. For hard rock the cutting edge should be rather thicker and blunter, and therefore stronger, than for soft rock. Drills are made of high-grade steel, as they must FlG. I. be tempered accurately and uniformly. The diameter of drill steel for hand work is usually from j

to I in., and the length of cutting edge, or gauge, of the drill is always greater than the diameter of the shank, in the proportion of from 7 ‘4 to 4-3. Holes over 10 or 12 in. deep generally require the use of a set of drills of different lengths and depending in number on the depth required. The shortest drill, for starting the hole, has the widest cutting edge, the edges of the others being successively narrower and graduated to follow each other properly, as drill after drill is dulled in deepening the hole. Thus the hole decreases in diameter as it is made deeper. The miner’s hammer (fig. 2) ranges in weight from 3! to 4i ft for single-hand drilling, up to 8 or 10 ft for double-hand. If the hole is directed downward, a little water is poured into it at intervals, to keep the cutting edge of the drill cool and make a thin mud of the cuttings. From time to time the hole is cleaned out by the ” scraper ” or ” spoon,” a

long slender iron bar, forged in the shape of a hollow semi-cylinder, with one end flattened and turned over at right angles. If the hole is directed steeply upward and the rock is dry, the cuttings will run out continuously during the drilling; other

ployed for drilling holes horizontally or upward. Other tools used in connexion with rock-drilling are the pick and gad.

Holes drilled by hand usually vary in depth from say 18 to 36 in., according to the nature of the rock and purpose of the work, though deeper holes are often made. For soft rock, single-hand drilling is from 20 to 30% cheaper than double-hand, but this difference does not hold good for the harder rocks. For these double-hand drilling is preferable, and may even be essential, to secure a reason- able speed of work.

Machine Drills. — The intro- duction of machine drills in the latter part of the 19th cen- tury exerted an important in- fluence on the work of rock excavation in general, and specially on the art of mining. By their use many great tun- nels and other works involving rock excavation under adverse conditions have been rapidly

and successfully carried out. Before the invention of

machine drills such work pro- gressed slowly and with diffi- culty. Nearly all machine

drills are of the reciprocating

or percussive type, in which

the drill bit is firmly clamped

to the piston rod and delivers

a rapid succession of strong .

blows on the bottom of the –

hole. The ordinary compressed

air drill (which may, for surface

work, be operated also by

steam) may be taken as an

illustration. The piston works

in a cylinder, provided with a

that of

Fig. 3. — Ingersoll-Sergeant Mining Drill.

valve motion somewhat similar to a steam-engine, together with an automatic device for producing the necessary rotation of the piston and drill bit. While at work the machine is mounted on a heavy tripod (fig. 3) ; or, if underground, sometimes on an iron column or bar, firmly wedged in position between the roof and floor, or side walls, of the tunnel or mine working. As the hole is deepened, the entire drill head, is gradually fed forward on its support by a screw feed, a succession of longer and longer drill bits being used as required.

Among the numerous types and makes of percussion drill may be named the following: — Adelaide, Climax, Darlington, Dubois-Frangois, Ferroux, Froelich, Hirnant, Ingersoll, Jeffrey, Leyner, McKiernan, Rand, Schram, Sergeant, Sullivan and Wood.

One of the simplest of the machine drills is the Darlington (figs. 4 and 5): a is the cylinder; 6, piston rod; c, bit; d,d, air inlets,

Inches 12

Figs. 4 and 5. — Darlington’s Rock Drill.

Fig. 2. — Sledge-hammer.

wise the scraper is necessary, or a small pipe with a plunger like a syringe is used for washing out the cuttings. The ” jumper ” is a long

steel bar, with cutting edges on one or both ends, which is alternately raised and dropped in the hole by one or two men. In rock work the jumper is rarely used except for holes directed steeply downward, though for coal or soft shale or slate it may be em-

either being used according to the position of the drill while at work; h, piston; j, rifle-bar for rotating piston and bit; k, ratchet attached to j ; I, brass nut, screwed into h, and in which j works ; /, chuck for holding drill-bit; n, air port communicating between ends of cylinder, front and back of piston; 0, exhaust port. This machine has no valve. From- its construction, the compressed air (or steam) is always acting on the annular shoulder round the for- ward end of the piston. The piston is thereby forced back on the

in-stroke until the port » is uncovered. This admits the compressed air to the rear end of the cylinder, and as the area of this end of the piston is much greater than that of the shoulder on the other end, the piston is driven forward and strikes its blow. When it has advanced far enough to cover the exhaust port o, the air behind the piston is exhausted, and, under the constant inward pressure noted above, the stroke is reversed. The rotation of piston and bit is caused by the rifle-bar j. On the outward stroke, j, with its ratchet k, is free to turn under a couple of pawls and springs, and consequently the piston delivers its blow without rotation. On the inward stroke the ratchet is held fast by the pawls, and the piston and bit are forced to rotate through a small part of a revolution. The cylinder is fed forward with respect to the shell r, by rotating the handle p, which works a long screw-bar engaging with a nut on the under side of the cylinder. The shell r is bolted to the clamp s, which in turn is mounted on the hollow column or bar g, or on a tripod, according to (he character of the work. By means of the adjustable clamp s, the machine can be set for drilling a hole in any desired direction. The drill makes from 400 to 800 strokes per minute.

The ” New Ingersoll ” drill, which may be taken as an example of the numerous machines in which valves are used, is shown in section in fig. 6. The steam or compressed air is distributed through the ports alternately to the ends of the cylinder, by the reciprocations of a spool-valve working in a chest mounted on the cylinder. The movements of this valve are caused by the strokes of the main piston, which, by means of the wide annular groove around the middle of the

piston, alternately open and close the spool-valve exhaust ports. Fig. 3 shows the Ingersoll “Light Mining drill,” as mounted on a tripod, and in position for drilling a hole vertically downward. In the Leyner drill the drill-bit is not connected to the piston, but is struck a quick succession of blows by the latter. An important feature of this machine is the provision lor directing a stream of water into the hole for clearing out the cuttings. For this purpose the shank of the drill-bit is perforated longitudinally, the water being supplied under pressure from a small tank, to which compressed air is led.

A rock drill of entirely different design, the Brandt, has been successfully used in Europe for driving railway tunnels. It is operated by hydraulic power, the pressure water being supplied by a pump. The hollow drill-bit, which has a serrated cutting edge, is forced under heavy pressure against the bottom of the hole, and is rotated slowly — at six to eight revolutions per minute — by a pair of small hydraulic cylinders, thus grinding and crushing the rock instead of chipping it. The bottom of the hole is kept clean and the drill-bit cooled by a stream of water passing down through its hollow shank. On account of its size and weight, this machine is not suitable for mine work.

Most of the machine drills are made in a number of sizes, from 2 in. up to 5 in. diameter of cylinder, the larger sizes being capable of drilling holes 5 in. diameter and 30 ft. deep. They range in weight from say 95 to 690 lb for the drill head (unmounted), the tripods weighing from 40 to 260 lb, exclusive of the weights placed for stability on the tripod legs (fig. 3). The sizes in most common use for mining are from 2.\ in. to 3ˆ in. diameter of cylinder. In rock of average hardness the best drills make from 4 to 75 linear ft. of hole per hour. For use in narrow veins, or other confined workings underground, several extremely small and light compressed air drills have been introduced, as, for example, the Franke and Wonder, the first of which weighs complete only 16 lb, and the second 18 lb. These drills are held in the hands of the miner in the required position, and strike a rapid succession of light blows. A large number of mechanical drills operated by hand power have been invented. Some imitate hand-drilling in the mode of delivering the blow; in

has been successfully used in collieries, viz. rotary auger drills, mounted on light columns and driven through gearing hy diminutive motors. These are intended for boring in coal, slate or other similar soft material. Hand augers resembling a carpenter’s brace and bit are also often used in collieries.

Whatever may be the method of drilling, after the hole has been

completed to the depth required, it is finally cleaned out by a scraper or swab; or, when compressed air drills are used, by a jet of air directed into the hole by a short piece of pipe connected through a flexible hose with the compressed air supply pipe. The hole is then ready for the charge.

Location and Arrangement of Holes. — For hand drilling in mining the position of the holes is determined largely by the character and

Fig. 7.

shape of the face of rock to be blasted. The miner observes the joints and cracks of the rock, placing the holes to take advantage of them and so obtain the best result from the blast. In driving a tunnel or drift, as in figs. 7 and 8, the rock joints can be made of material assistance by beginning with hole No. I and following in succession by Nos. 2, 3 and 4. Frequently the ore, or vein matter, is separated from the wall-rock by a thin, soft layer of clay (D,D, fig. 8). This would act almost as a free face, and the first holes of the round would be directed at an angle towards it, for blasting out a wedge; after which the positions of the other holes would be chosen.

When machine drills are employed, less attention is given to natural cracks or joints, chiefly because when the drill is once set up several holes at different angles can be drilled in succession by merely swinging the cylinder of the machine into a new position with respect to its m o u n t i ng. According to one method, the holes are placed with

Fig. 9.

Fig. 10.

Fig. 6. — New Ingersoll Drill.

others the drill-bit is caused to reciprocate by means of combinations of crank and spring. None of these machines is entirely satisfactory, and but few are in use.

Among percussion rock-drills operated by electricity are the Bladray, Box, Durkee, Marvin and Siemens-Halske. The Marvin drill works with a solenoid ; most of the others have crank and spring movements for producing the reciprocations of the piston. Power is furnished by a small electric motor, either mounted on the machine itself, as with the Box drill, or more often standing on the ground and transmitting its power through a flexible shaft. Although rather frequently used,

electric percussion drills cannot yet be considered entirely successful, at least for mine service, in competition with compressed air machines. Another type of electric drill, however,

some degree of symmetry, in roughly concentric rings, as shown by figs. 9 and 10. The centre holes are blasted first, and are followed by the others in one or more volleys as indicated by the dotted lines. Another method is the ” centre cut,” in which the holes are drilled in parallel rows on each side of the centre line of the tunnel, drift or shaft. Those in the two rows nearest the middle are directed towards each other, and enclose a prism of rock, which is first blasted out by heavy charges, after which the rows of side holes will break with relatively light charges.

Explosives.— A great variety of explosives are in use for blasting purposes. Up to 1864, gunpowder was the only available explosive, but in that year Alfred Nobel first applied nitro- glycerin for blasting, and in 1867 invented dynamite. This name was originally applied to his mixture of nitroglycerin with kieselguhr, but now includes also other mechanical mixtures or chemical compounds which develop a high explosive force as compared with gunpowder. Besides these there are the so-called nameless or safety explosives, used in collieries where inflammable gases are given off from the coal.

Gunpowder, or black powder, is seldom used for rock- blasting, except in quarrying building-stone, where slow explosives of relatively low power are desirable to avoid shattering the stone, and in such collieries as do not require the use of safety explosives. Gunpowder is exploded by deflagration, by means of a fuze, and exerts a comparatively slow and rending force. The high explosives, on the other hand, are exploded by detonation, through the agency of a fuze and fulminating cap, exerting a quick, shattering, rather than a rending force. Dyna- mites and flameless explosives are made in a variety of strengths, and are packed in waterproofed cartridges of different sizes. The grades of dynamite most commonly employed contain from 35 to 60% of nitroglycerin; the stronger are used for tough rock or deep holes, or for holes unfavourably placed in narrow mine workings, as sometimes in shaft-sinking or tunnelling. When of good quality high explosives are safer to handle than gunpowder,

as they cannot be ignited by sparks and are not so easily exploded.

The ordinary dynamites used in mining are about four times as powerful as gunpowder.

Nitroglycerin in its liquid form is now rarely used for blasting,

Cartly because its full strength is not often necessary but chiefly ecause of the difficulty and danger of transporting, handling and charging it. If employed at all, it is charged in thin tinned plate cases or rubber-cloth cartridges.

Blasting with Black Powder. — The powder is coarse-grained, usually from | to fV in. in size, and is charged in paper cartridges, 8 to 10 in. long and of a proper diameter to fit loosely in the drill hole. A piece of fuze, long enough to reach a little beyond the mouth of the hole, is inserted in the cartridge and tied fast. For wet holes paraffined paper is used, the miner waterproofing the joints with grease. When more than one cartridge is required for the blast, that which has the fuze attached is usually charged last. The cartridges are carefully rammed down by a wooden tamping bar and the remainder of the hole filled with tamping. This consists of finely broken rock, dry clay or other comminuted material, carefully compacted by the tamping bar on top of the charge. The fuze is a cord, having in the centre a core of gunpowder, enclosed in several layers of linen or hemp waterproofed covering. It is ignited by the miner's candle or lamp, or by a candle end so placed at the mouth of the hole that the flame must burn its way through the fuze cover- ing. As the fuze burns slowly, at the rate of 2 or 3 ft. per minute, the miner uses a sufficient length to allow him to reach a place of safety.

For blasting in coal, " squibs " instead of fuzes are often used. A squib is simply a tiny paper rocket, about | in. diameter by 3 in. long, containing fine gunpowder and having a sulphur slow-match at one end. It is fired into the charge through a channel in the tamping. This channel may be formed by a piece of J in. gas pipe, tamped in the hole and reaching the charge; or a " needle," a long taper iron rod, is laid longitudinally in the hole, with its point entering the charge, and after the tamping is finished, by carefully withdrawing the needle a little channel is left, through which the squib is fired. In this connexion it may be noted that for breaking ground in gassy collieries several substitutes for explosives have been used to a limited extent, e.g. plugs of dry wood driven tightly into a row of drill holes, and which on being wetted swell and split the coal; quicklime cartridges, which expand powerfully On the application of water; simple wedges, driven by hammer into the drill holes; multiple wedges, inserted in the holes and operated by hydraulic pressure from a small hand force-

pump.

Blasting with High Explosives. — High explosives are fired either by ordinary fuze and detonating cap or by electric fuze. Detonating caps of ordinary strength contain 10 to 15 grains of fulminating mixture. The cap is crimped tight on the end of the fuze, embedded in the cartridge, and on being exploded by fire from the fuze detonates the charge. The number of cartridges charged depends on the depth of hole, the length of the line of least resistance, and the toughness and other characteristics of the rock. Each cartridge should be solidly tamped, and, to avoid waste spaces in the hole, which would reduce the effect of the blast, it is customary to split the paper covering lengthwise with a knife. This allows the dynamite to spread under the pressure of the tamping bar. The cap is often placed in the cartridge preceding the last one charged, but it is better to insert it last, in a piece of cartridge called a ” primer.” Though the dynamites are not exploded by sparks, they should nevertheless always be handled carefully. It is not so essential to fill the hole completely and so thoroughly to compact the tamping, as in charging black powder, because of the greater rapidity and shattering force of the explosion of dynamite; tamping, however, should never be omitted, as it increases the efficiency of the blast. In exploding dynamite, strong caps, containing say 15 grains of fulminating powder, produce the best results. Weaker caps are not economical, as they do not produce complete detonation of the dynamite. This is specially true if the weather be cold. Dynamite then becomes less sensitive, and the cartridges should be gently warmed before charging, to a temperature of not more than §0° F. Poisonous fumes are often produced by the explosion of the nitro- glycerin compounds. These are probably largely due to incomplete detonation, by which part of the nitroglycerin is vaporized or merely burned. This is most likely to occur when the dynamite is chilled, or of poor quality, or when the cap is too weak, There is generally but little inconvenience from the fumes, except in confined underground workings, where ventilation is imperfect.

Like nitroglycerin, the common dynamites freeze at a temperature of from 42 ° to 46 F. They are then comparatively safe, and so far as possible should be transported in the frozen state. At very low temperatures dynamite again becomes somewhat sensitive to shock. When it is frozen at ordinary temperatures even the strongest detonating caps fail to develop the full force. In thawing dynamite, care must be exercised. The fact that a small quantity will often burn quietly has led to the dangerously mistaken notion that mere heating will not cause explosion. It is chiefly a question of tempera- ture. If the quantity ignited by flame be large enough to heat the entire mass to

the detonating point (say 36cr F.) before all is con- sumed, an explosion will result. Furthermore, dynamite, when even moderately heated, becomes extremely sensitive to shocks.

There are several accepted modes of thawing dynamite: (1) In a water bath, the cartridges being placed in a vessel surrounded on the sides and bottom by warm water contained in a larger enclosing vessel. The warm water may be renewed from time to time, or the water bath placed over a candle or small lamp, not on a stove. (2) In two vessels, similar to the above, with the space between them occupied by air, provided the heat applied can be definitely limited, as by using a candle. (3) When large quantities of dynamite are used a supply may be kept on shelves in a wooden room or chamber, warmed by a stove, or by a coil of pipe heated by exhaust steam from an engine. Live steam should not be used, as the heat might become excessive. Thawing should always take place slowly, never before an open fire or by direct contact with a stove or steam pipes and care must be taken that the heat does not rise high enough to cause sweating or exudation of liquid nitroglycerin from the cartridges, which would be a source of danger.

For the storage of explosives at mines, &c. , proper magazines must be provided, situated in a safe place, not too near other buildings, and preferably of light though fireproof construction. Masonry magazines, though safer from some points of view, may be the cause of greater damage in event of an explosion, because the brick or stones act as projectiles. Isolated and abandoned mine workings, if dry, are sometimes used as magazines.

Firing blasts by electricity has a wide application for both surface and underground work. An electrical fuze (fig. 11) consists of a pair of fine, insulated copper wires, several feet long and about 3*5 of an inch in diameter, with their bare ends inserted in a detonating cap. For firing, the fuze wires are joined to long leading wires, connected with some source of electric current. By joining the fuze wires in series or in groups, any number of holes may be fired simultaneously, according to the current avail- able. A round of holes fired in this way, as for driving tunnels, sinking shafts, or in large surface excavations, produces better results, both in economy of explosive and effect of the blast, than when the holes are fired singly or in succession. Also, the miners are enabled to prepare for the blast with more care and deliberation, and then to reach a place of safety before the current is transmitted. Another advantage is that there is no danger of a hole ” hanging fire,” which sometimes causes accidents in using ordinary fuzes.

Hanging fire may be due to a cut, broken or dam- aged powder fuze, which may smoulder for some time before communicating fire to the charge. ” Miss-fires,” which also are of not infrequent occurrence with both ordinary and electric fuzes, are cases where explosion from any cause fails to take place. After waiting a sufficient length of time before approaching the charged hole, the miner carefully removes the tamping down to within a few inches of the explosives and inserts and fires another cartridge, the concussion usually detonat- ing the entire charge. Sometimes another hole is drilled near the one which has missed. No attempt to remove the old charge should ever be made. p IG IJ)

High tension electricity, generated by a frictiohal El ec tricaJ machine, provided with a condenser, was formerly Fuze much used for blasting. The bare ends of the fuze wires in the detonating cap are placed say | in. apart, leaving a gap across which a spark is discharged, passing through a priming charge of some sensitive composition. The priming is not only combustible but also a conductor of electricity, such as an intimate mixture of potassium chlorate with copper sulphide and phosphide. By the combustion of the priming the fulminate mixture in the cap is detonated. As these fuzes are more apt to deteriorate when exposed to dampness than fuzes for low- tension current, and the generating machine is rather clumsy and fragile, low-tension current is more generally employed. It may be generated by a small, portable dynamo, operated by hand, or may be derived from a battery or from any convenient electric circuit. The ends of the fuze wires in the detonating cap are connected by a fine platinum filament (fig. 11), embedded in a guncotton priming on top of the fulminating mixture, and explosion results from the heat generated by the resistance opposed to the passage of the current through the filament. Blasting machines are made in several sizes, the smaller ones being capable of firing simultaneously from ten to twenty holes. The fuzes must obviously be of uniform electrical resistance, to ensure that all the connected charges will explode simultanefously. The premature explosion of any one of the fuzes would break the circuit.

In the actual operations of blasting, definite rules for the pro- portioning of the charges are rarely observed, and although the blasts made by a skilful miner seldom fail to do their work, it is a common fault that too much, rather than too little, explosive is used. The high explosives are specially liable to be wasted, probably through lack of appreciation of their power as compared with that of black powder. Among the indications of excessive charges are the pro- duction of much finely broken rock or of crushed and splintered rock around the bottom of the hole, and excessive displacement or projection of the

rock broken by the blast. In beginning any new piece of work, such waste may be avoided or reduced by making

trial shots with different charges and depths of hole, and noting the results; also by letting contracts under which the workmen pay for the explosive. In surface rock excavation the location and deter- mination of the depth of the holes and the quantity of explosive used, are occasionally put in charge of one or more skilled men, who direct the work and are responsible for the results obtained.

Blasting in surface excavations and quarries is sometimes done on an immense scale — called ” mammoth blasting.” Shafts are sunk, or tunnels driven, in the mass of rock to be blasted, and, connected with them, a number of chambers are excavated to receive the charges of explosive. The preparation for such blasts may occupy months, and many tons of gunpowder or dynamite are at times exploded simultaneously, breaking or dislodging thou- sands, or even hundreds of thousands, of tons of rock. This method is adopted for getting stone cheaply, as for building macadamized roads, dams and breakwaters, obtaining limestone for blast furnace flux, and occasionally in excavating large railway cuttings. It is also applied in submarine blasting for the removal of reefs obstructing navigation, and sometimes for loosening extensive banks of partly cemented gold-bearing gravel, preparatory to washing by hydraulic mining.

Authorities. — For further information on drilling and blasting see: — Callon, Lectures on Mining (1876), vol. i. chs. v. and vi.; Foster, Text-book of Ore and Stone Mining, (1900), ch. iv. ; Hughes, Text-book of Coal Mining (1901), ch. iii. ; H. S. Drinker, Tunnelling, Explosive Compounds and Rock Drills (1878) ; M. C. Ihlseng, Manual of Mining (1905), pp. 596-696; Kohler, Der Bergbaukunde (1897), pp. 104-208; Daw, The Blasting of Rock (1898); Prelini, Earth and Rock Excavation (1905), chs. v., vi. and vii.; Gillette, The Excavation of Rock (1904); Guttmann, Blasting (1892); Spon’s Dictionary of Engineering, art. “Boring and Blasting”; Eissler, Modern High Explosives (1893), pts. ii. and iii.; Walke, Lectures on Explosives (1897), chs. xix.xxii. Also: Proc. Inst. Civ. Eng. (London), vol. Ixxxv. p. 264; Trans. Inst. Min. Eng. (England), vols, xiv., xv. and xvi. (arts, by VV. Maurice), vol. xxvi. pp. 322, 348, vol. xxiv. p. 526 and vol. xxv. p. 108; Trans. Amer. Soc. Civ. Eng., vol. xxvii. P 53°; Trans. Amer. Inst. Min. Eng., vol. xviii. p. 370, vol. xxix p. 405 and vol. xxxiv. p. 871; South Wales Inst. Eng. (1888);

Jour. Ass. Eng. Socs., vol. vii. p. 58; Jour. Chem. Met. and Mining Soc. of South Africa, August 1905 ; School of Mines Quarterly, N. Y., vol. ix. p. 308; Colliery Guardian, April 15, 1898, and February 6, 1903; Mines and Minerals, February 1905, p. 348, January 1906, p. 259, and April 1906, p. 393; Eng. and Mining Jour., April 19, 1902, p. 552; The Engineer, February 24, 1905; Elec. Rev., June 9, 1899; Eng. News, vol. xxxii. p. 249, and August 3, 1905; Gluckauf, September 28, 1901, and July 5, 1902; Osterr. Zeitschr. f. Berg- u. Huttenwesen, May 18, 25, 1901, April 18, 1903 and November, 18, 1905; Annales des mines, vol. xviii. pp. 217-248. (R. P.*)

BLAUBEUREN, a town of Germany, in the kingdom of Wiirttemberg, 12 m. W. of Ulm, with which it is connected by- railway. Pop. (1900) 31 14. It is romantically situated in a wild and deep valley of the Swabian Alps at an altitude of 1600 ft. and is partly surrounded by ancient walls. Of the three churches (two Evangelical and one Roman Catholic) the most remarkable is the abbey church {Klosterkirche) , a late Gothic building dating from 1465-1496, the choir of which contains beautiful 15th century carved choir-stalls and a fine high altar with a triptych (1496) . The choir only is used for service (Protestant) , the nave being used as a gymnasium. The town church (Stadtkirche) also has a fine altar with triptych. The Benedictine abbey, founded in 1095, was used after the Reformation as a school, and is now an Evangelical theological seminary. There are two hospitals in the town.

BLAVATSKY, HELENA PETROVNA (1831-1891), Russian theosophist, was born at Ekaterinoslav, on the 31st of July (O.S.) 183 i,the daughter of Colonel Peter Hahn, a member of a Mecklen- burg family, settled in Russia. She married in her seventeenth year a man very much her senior, Nicephore Blavatsky, a Russian official in Caucasia, from whom she was separated after a few months; in later days, when seeking to invest herself with a halo of virginity, she described the marriage as a nominal one. During the next twenty years Mme Blavatsky appears to have travelled widely in Canada, Texas, Mexico and India, with two attempts on Tibet. In one of these she seems to have crossed the frontier alone in disguise, been lost in the desert, and, after many adventures, been conducted back by a party of horsemen. The years from 1848 to 1858 were alluded to subsequently as “the veiled period ” of her life, and she spoke vaguely of a seven years’ sojourn in ” Little and Great Tibet,” or preferably of a ” Hima- layan retreat.” Ini8s8 she revisited Russia, where she created a sensation as a spiritualistic medium. About 1870 she acquired

prominence among the spiritualists of the United States, where she

lived for six years, becoming a naturalized citizen. Her leisure was occupied with the study of occult and kabbalistic literature, to which she soon added that of the sacred writings of India, through the medium of translations. In 1875 she conceived the plan of combining the spiritualistic ” control ” with the Buddhistic legends about Tibetan sages. Henceforth she determined to exclude all control save that of two Tibetan adepts or “mahatmas.” The mahatmas exhibited their “astral bodies ” to her, ” precipitated ” messages which reached her from the confines of Tibet in an instant of time, supplied her with sound doctrine, and incited her to perform tricks for the con- version of sceptics. At New York, on the 17th of November 1875, with the aid of Colonel Henry S. Olcolt, she founded the ” Theosophical Society “with the object of (1) forming a universal brotherhood of man,(2) studying and making known the ancient religions, philosophies and sciences, (3) investigating the laws of nature and developing the divine powers latent in man. The Brahmanic and Buddhistic literature supplied the society with its terminology, and its doctrines were a curious amalgam of Egyptian, kabbalistic, occultist, Indian and modern spiritual- istic ideas and formulas. Mme Blavatsky’s principal books were Isis Unveiled (New York, 1877), The Secret Doctrine, the Synthesis of Science, Religion and Philosophy (1888), The Key to Theosophy (1891). The two first of these are a mosaic of unacknowledged quotations from such books as K. R. H. Mackenzie’s Royal Masonic Encyclopaedia, C. W. King’s Gnostics, Zeller’s Plato, the works on magic by Dunlop, E. Salverte, Joseph Ennemoser, and Des Mousseaux, and the- mystical writings of Eliphas Levi (L. A. Constant). A Glossary of Theosophical Terms (1890-1892) was compiled for the benefit of her disciples. But the appearance of Home’s Lights and Shadoivs of Spiritualism (1877) had a pre- judicial effect upon the propaganda, and Heliona P. Blavatsky (as she began to style herself) retired to India. Thence she con- tributed some clever papers, ” From the Caves and Jungles of Hindostan ” (published separately in English, London, 1892) to the Russky Vyestnik. Defeated in her object of obtaining em- ployment in the Russian secret service, she resumed her efforts to gain converts to theosophy. For this purpose the exhibition of ” physical phenomena ” was found necessary. Her jugglery was cleverly conceived, but on three occasions was exposed in the most conclusive manner. Nevertheless, her cleverness, volubility, energy and will-power enabled her to maintain her ground, and when she died on the 8th of May 1891 (White Lotus Day), at the theosophical headquarters in the Avenue Road, London, she was the acknowledged head of a community numbering not far short of 100,000, with journalistic organs in London, Paris, New York and Madras.

Much information respecting her will be found in V. S. Solovyov's Modern Priestess of Isis, translated by Walter Leaf (1895), in Arthur Lillie's Madame Blavatsky and Her Theosophy (1895), and in the report made to the Society for Psychical Research by the Cambridge graduate despatched to investigate her dpings in India. See also the article Theosophy.

BLAYDES, FREDERICK HENRY MARVELL (1818-1908), English classical scholar, was born at Hampton Court Green, on the 29th of September 1818, being a collateral descendant of Andrew Marvell, the satirist and friend of Milton. He was educated at St Peter's school, York, and Christ Church, Oxford. He was Hertford scholar in 1838, took a second class in literae humaniores in 1840, and was subsequently elected to a student- ship at Christ Church. In 1842 he took orders, and from 1843 to 1886 was vicar of Harringworth in Northamptonshire. During a long life he devoted himself almost entirely to the study of the Greek dramatists. His editions and philological papers are remarkable for bold conjectural emendations of corrupt (and other) passages. His distinction was recognized by his being made an honorary LL.D. of Dublin, Ph.D. of the university of Buda Pest and a fellow of the royal society of letters at Athens. He died at Southsea on the 7th of September 1908.

His works include: — Aristophanes: Comedies and Fragments, with critical notes and commentary (1880-1893); Clouds, Knights, Frogs, Wasps (1873-1878) ; Opera Omnia, with critical notes (1886);

Sophocles,; Oedipus Coloneus, Oedipus Tyrannus and Antigone (in the Bibliotheca Classica, 1859) ; Philoctetes (1870), Trachiniae (1871), Eleclra (1873), Ajax (1875), Antigone (1905) ; Aeschylus : Agamemnon (1898), Choephori (1899), Eumenides (1900), Adversaria Critica tn Comicorum Graecorum Fragmenta (1890); in Tragicorum Craec. Frag. (1894), in Aeschylum (1895), in Varios Poetas Graecos et Latinos (1898), in Aristophanem (1899), in Sophoclem (1899), * M Euripidem (1901), tw Herodotum (1901); Analecta Comica Graeca (1905) ; Analecta Tragica Graeca (1906).

BLAYDON, an urban district in the Chester-le-Street parlia- mentary division of Durham, England, on the Tyne, 4 m. W. of Newcastle by a branch of the North-Eastern railway. -Pop. (1 88 1) 10,687; (1901) 19,617. The chief industries are coal-mining, iron-founding, pipe, fire-

brick, chemical manure and bottle manufactures. In the vicinity is the beautiful old mansion of Stella, and below it Stellaheugh, to which the victorious Scottish army crossed from Newburn on the Northumberland bank in 1640, after which they occupied Newcastle.

BLAYE-ET-STE LUCE, a town of south-western France, capital of an arrondissement in the department of Gironde, on the right bank of the Gironde (here over 2 m. wide), 35 m. N. of Bordeaux by rail. Pop. (1906) of the town, 3423; of the com- mune, 4890. The town has a citadel built by Vauban on a rock beside the river, and embracing in its enceinte ruins of an old Gothic chateau. The latter contains the tomb of Caribert, king of Toulouse, and spn of Clotaire II. Blaye is also defended by the Fort Pate on an island in the river and the Fort Medoc on its left bank, both of the 17th century. The town is the seat of a sub-prefect, and has tribunals of first instance and of commerce and a communal college. It has a small river-port, and carries on trade in wine, brandy, grain, fruit and timber. The industries include the building of small vessels, distilling, flour-milling, and the manufacture of oil and candles. Fine red wine is produced in the district.

In ancient times Blaye (Blavia) was a port of the Santones. Tradition states that the hero Roland was buried in its basilica, which was on the site of the citadel. It was early an important stronghold which played an important part in the wars against the English and the Religious Wars. The duchess of Berry was imprisoned in its fortress in 1832-1833.

BLAZE (A.-S. Maese, a torch), a fire or bright flame; more nearly akin to the Ger. Mass, pale or shining white, is the use of the word for the white mark on the face of a horse or cow, and the American use for a mark made on a tree by cutting off a piece of the bark. The word ” to blaze,” in the sense of to noise abroad, comes from the A.-S. blaesan, to blow, cf. the Ger. blasen; in sense, if not in origin, it is confused with ” blazon ” in heraldry.

BLAZON, a heraldic shield, a coat of arms properly ” de- scribed ” according to the rules of heraldry, hence a proper heraldic description of such a coat. The O. Fr. Mason seems originally to have meant simply a shield as a means of defence and not a shield-shaped surface for the display of armorial bearings, but this is difficult to reconcile with the generally accepted derivation from the Ger. Masen, to blow, proclaim, English ” blaze,” to noise abroad, to declare. In the 16th century the heraldic term, and ” blaze ” and ” blazon ” in the sense of proclaim, had much influence on each other.

BLEACHING, the process of whitening or depriving objects of colour, an operation incessantly in activity in nature by the influence of light, air and moisture. The art of bleaching, of which we have here to treat, consists in inducing the rapid operation of whitening agencies, and as an industry it is mostly directed to cotton, linen, silk, wool and other textile fibres, but it is also applied to the whitening of paper-pulp, bees'-wax and some oils and other substances. The term bleaching is derived from the A.-S. blaecan, to bleach, or to fade, from which also comes the cognate German word bleichen, to whiten or render pale. Bleachers, down to the end of the 18th century, were known in England as " whitsters," a name obviously derived from the nature of their calling.

The operation of bleaching must from its very nature be of the same antiquity as the work of washing textures of linen,

cotton or other vegetable fibres. Clothing repeatedly washed, and exposed in the open air to dry, gradually assumes a whiter and whiter hue, and our ancestors cannot have failed to notice and take advantage of this fact. Scarcely anything is known with certainty of the art of bleaching as practised by the nations of antiquity. Egypt in early ages was the great centre of textile manufactures, and her white and coloured linens were in high repute among contemporary nations. As a uniformly well- bleached basis is necessary for the production of a satisfactory dye on cloth, it may be assumed that the Egyptians were fairly proficient in bleaching, and that still more so were the Phoenicians with their brilliant and famous purple dyes. We learn, from Pliny, that different plants, and likewise the ashes of plants, which no doubt contained alkali, were employed as detergents. He . mentions particularly the Struthium as much used for bleaching in Greece, a plant which has been identified by some with Gypsophila Struthium. But as it does not appear from John Sibthorp's Flora Graeca, edited by Sir James Smith, that this species is a native of Greece, Dr Sibthorp's conjecture that the Struthium of the ancients was the Saponaria officinalis, a plant common in Greece, is certainly more probable.

In modern times, down to the middle of the 18th century, the Dutch possessed almost a monopoly of the bleaching trade although we find mention of bleach-works at Southwark near London as early as the middle of the 17th century. It was customary to send all the brown linen, then largely manufactured in Scotland, to Holland to be bleached. It was sent away in the month of March, and not returned till the end of October, being thus out of the hands of the merchant more than half a year.

The Dutch mode of bleaching, which was mostly conducted in the neighbourhood of Haarlem, was to steep the linen first in a waste lye, and then for about a week in a potash lye poured over it boiling hot. The cloth being taken out of this lye and washed, was next put into wooden vessels containing butter- milk, in which it lay under a pressure for five or six days. After this\,it was spread upon the grass, and kept wet for several months, exposed to the sunshine of summer.

In 1728 James Adair from Belfast proposed to the Scottish Board of Manufactures to establish a bleachfield in Galloway; this proposal the board approved of, and in the same year re- solved to devote £2900 as premiums for the establishment of bleachfields throughout the country. In 1732 a method of bleaching with kelp, introduced-by R. Holden, also from Ireland, was submitted to the board; and with their assistance Holden established a bleachfield for prosecuting his process at Pitkerro, near Dundee.

The bleaching process, as at that time performed, was very tedious, occupying a complete summer. It consisted in steeping the cloth in alkaline lyes for several days, washing it clean, and spreading it upon the grass for some weeks. The steeping in alkaline lyes, called bucking, and the bleaching on the grass, called crofting, were repeated alternately for five or six times. The cloth was then steeped for some days in sour milk, washed clean and crofted. These processes were repeated, diminishing every time the strength of the alkaline lye, till the linen had acquired the requisite whiteness.

For the first improvement in this tedious process, which was faithfully copied from the Dutch bleachfields, manufacturers were indebted to Dr Francis Home of Edinburgh, to whom the Board of Trustees paid £100 for his experiments in bleaching. He proposed to substitute water acidulated with sulphuric acid for the sour milk previously employed, a suggestion made in consequence of the new mode of preparing sulphuric acid, con- trived some time before by Dr John Roebuck, which reduced the price of that acid to less than one-third of what it had formerly been. When this change was first adopted by x the bleachers, there was the same outcry against its corrosive effects as arose when chlorine was substituted for crofting. A great advantage was found to result from the use of sulphuric acid, which was that a souring with sulphuric acid required at the longest only twenty-four hours, and often not more than twelve; whereas, when sour milk was employed, six weeks, or even two

months, were requisite, according to the state of the weather. In consequence of this. improvement, the process of bleaching was shortened from eight months to four, which enabled the merchant to dispose of his goods so much the sooner, and conse- quently to trade with less capital.

No further modification of consequence was introduced in the art till the year 1787, when a most important change was initiated by the use of chlorine (q.v.), an element which had been discovered by C. W. Scheele in Sweden about thirteen years before. The discovery that this gas possesses the property of destroying vegetable colours, led Berthollet to suspect that it might be introduced with advantage into the art of bleaching, and that it would enable practical bleachers greatly to shorten their processes. In a paper on chlorine or oxygenated muriatic acid, read before the Academy of Sciences at Paris in April 1785, and published in the Journal de Physique for May of the same year (vol. xxvi. p. 325), he mentions that he had tried the effect of the gas in bleaching cloth, and found that it answered perfectly. This idea is still further developed in a paper on the same substance, published in the Journal de Physique for 1786. In 1786 he exhibited the experiment to James Watt; who, immediately upon his return to England, commenced a practical examination of the subject, and was accordingly the person who first introduced the new method of bleaching into Great Britain. We find from Watt's own testimony that chlorine was practically employed in the bleachfield of his father-in-law, Mr Macgregor, in the neighbourhood of Glasgow, in March 1787. Shortly thereafter the method was introduced at Aberdeen by Messrs Gordon, Barron & Co., on information received from De Saussure through Professor Patrick Copland of Aberdeen. Thomas Henry of Manchester was the first to bleach with chlorine in the Lancashire district, and to his independent investigations several of the early improvements in the application of the material were due.

In these early experiments, the bleacher had to make his own chlorine and the goods were bleached either by exposing them in chambers to the action of the gas or by steeping them in its aqueous solution. If we consider the inconveniences which must have arisen in working with such a pungent substance as free chlorine, with its detrimental effect on the health of the work- people, it will be readily understood that the process did not at first meet with any great amount of success. The first important improvement was the introduction in 1792 of eau de Javel, which was prepared at the Javel works near Paris by absorbing chlorine in a solution of potash (1 part) in water (8 parts) until

effervescence began. The greatest impetus to the bleaching industry was, however, given by the introduction in 1799 of chloride of lime, or bleaching-powder, by Charles Tennant of Glasgow, whereby the bleacher was supplied with a reagent in solid form which contained up to one-third of its weight of avail- able chlorine. Latterly frequent attempts have been made to replace bleaching-powder by hypochlorite of soda, which is prepared by the bleacher as re'quired, by the electrolytic decom- position of a solution of common salt in specially constructed cells, but up to the present this mode of procedure has met with only a limited success (see Alkali Manufacture).

Bleaching of Cotton.

Cotton is bleached in the raw state, as yarn and in the piece. In the raw state, and as yarn, the only impurities present are those which are naturally contained in the fibres and which include cotton wax, fatty acids, pectic substances, colouring matters, albuminoids and mineral matter, amounting in all to some s % of the weight of the material. Both in the raw state and in the manufactured condition cotton also contains small black particles which adhere firmly to the material and are technically known as " motes." These consist of fragments of the cotton seed husk, which cannot be completely removed by mechanical means. The bleaching of cotton pieces is more complicated, since the bleacher is called upon to remove the sizing materials with which the manufacturer strengthens the warp before weaving (see below).

In principle, the bleaching of cotton is a comparatively simple process in which three main operations are involved, viz. (1) boiling with an alkali; (2) bleaching the organic colouring matters by means of a hypochlorite or some other oxidizing agent; (3) souring, i.e. treating with weak hydrochloric or sulphuric acid. For loose cotton and yarn these three operations are sufficient, but for piece goods a larger number of operations is usually necessary in order to obtain a satisfactory result.

Loose Cotton.— The bleaching of loose or raw cotton previous to spinning is only carried out to a very limited extent, and consists' essentially in* first steeping the' material in a warm solution of soda for some hours, after which it is washed and treated with a solution of bleaching powder or sodium hypochlorite. It is then . again washed, soured with weak sulphuric or hydrochloric acid, and ultimately washed free from acid. Careful treatment is necessary in order to avoid any undue matting of the fibres, while any drastic treatment, such as heating with caustic soda and soap, as used for other cotton

materials, cannot be employed, since the natural wax. would thereby be removed, and this would detract from the spinning qualities of the fibre. In case the cotton is not intended to be spun, but is to serve for cotton wool or for the manufacture of gun cotton, more drastic treatment can be employed, and is, in fact, desirable. Thus, cotton waste is first extracted with petroleum spirit or some other suitable solvent, in order to remove any mineral oil or grease which may be present. It is then boiled with dilute caustic soda and resin soap, washed, bleached white with bleaching-powder,' washed, soured and finally washed free from acid. In these opera- tions, a certain amount of matting is unavoidable, and it is conse- quently necessary to open out the material after drying, ih scutchers.

Cotton Yarn.— Cotton yarn is bleached in the form of cops, hanks or warps. In principle the processes employed are the same in each, case, but the machinery necessarily differs. Most yarn is bleached in the hank, and it will suffice to give an account of this process only, The sequence of operations is the same as in the bleaching of cotton waste, and these can be conducted for small lots in an ordinary rectangular wooden vat as used in dyeing, in which the yarn is suspended in the liquor from poles which rest with their ends on the two longer sides of the vat. For bleaching yarn in bulk, however, this mode of procedure would involve so much manual labour that the process would become too expensive. It is, therefore, mainly" with the object of economy that machinery has been introduced, by means of which large quantities can be dealt with at a time.

The first operation, viz. that of boiling in alkali, is carried out in a " kier," a large, egg-ended, upright cylindrical vessel, constructed of boiler-plate and capable of treating, from one to three tons of yarn at a time. In construction, the kiers used for yarn bleaching are similar in construction to those used for pieces (see below). The yarn to be bleached is evenly packed in the kier, and is then boiled by means of steam with the alkaline lye (3-4 % of soda ash or 2 % caustic soda on the weight of the cotton being usually employed) for periods varying from six to twelve hours. It is essential that a thorough circulation of the liquor should be maintained during the boiling, and this is effected either by means of a steam injector, or in other ways. As a rule low pressure kiers (working up to 10 lb pressure) are employed for yarn bleaching, though some bleachers prefer to use high pressure kiers for the purpose.

When the boiling has continued for the requisite time (6-8 hours), the steam is shut off, and the kier liquor blown off, when the yarn is washed in the kier by filling the latter with water and then running

off, this operation being repeated two or three times. The hanks are, now transferred to a stone cistern provided with a false bottom, from beneath which a pipe connects the cistern with a well situated below the floor line. The well contains a solution of bleaching- powder, usually of 2° Tw. strength, and this is drawn up by means of a centrifugal brass pump and showered over the top of the goods through a perforated wooden tray, passing then by gravitation through the goods back into the well. The circulation is maintained for one and a half to two hours, when the yarn will be found to be white. The bleaching-powder solution is now allowed to drain off, and water is circulated through the cistern to wash out what bleach- ing powder remains in the goods. The souring is next carried out either in the same or in a separate cistern by circulating hydrochloric or sulphuric acid of 2° Tw. for about half an hour. This is also allowed to drain, and the yarn is thoroughly washed to remove all acid, when it is taken out and wrung or hydroextracted. At this stage the yarn may be dyed in light or bright shades without further treatment, but if it is to be sold as white yarn, it is blued. The blueing may either be effected by dyeing or tinting with a colouring matter like Victoria blue 4R or acid violet, or by treatment in wash stocks with a suspension of ultramarine in weak soap until the colour is uniformly distributed throughout the material. The yarn is now straightened out and dried.

The bleaching of cotton yarn is a very straightforward process, and it is very seldom that either complications or faults arise, providing that reasonable care and supervision are exercised.

The raison d'etre of the various operations is comparatively simple.

BLEACHING

Si

The effect of boiling with alkali is to remove the pectic acid, the fatty acids, part of the cotton wax and the bulk of the colouring matter, while the albuminoids are destroyed and the motes swelled up. If soap be used along with the alkali, the whole of the wax is removed by emulsification. In the operation of bleaching proper, the calcium hypochlorite of the chloride of lime through coming into contact with the carbonic acid of the atmosphere suffers decomposition according to the equation, $Ca(OCl)_2 + CO_2 + H_2O \rightarrow CaCO_3 + 2HOCl$, and the hypochlorous acid thus liberated destroys the colouring matter still remaining from the first operation, by oxidation. At the same time the motes which were swelled up by the alkali are broken up into small fragments and are thus removed. In the operation of souring, the

lime which has been deposited on the fibres during the treatment with bleaching powder is dissolved, while at the same time any other metallic oxides (iron, copper, &c.) are removed.

Cotton Pieces. — By far the largest bulk of cotton is bleached in the piece, as it can be more conveniently and more economically , dealt with in this form than in any other. Though similar in prin- ciple to yarn bleaching, the process of piece bleaching is somewhat more complex because the pieces contain in addition to the natural impurities of the cotton a considerable amount of foreign matter in the form of size which has been incorporated with the warp before weaving, with the object of strengthening it. This size consists essentially of starch (farina), with additions of tallow, zinc chloride, and occasionally other substances such as paraffin wax, magnesium chloride, soap, &c, all of which .must be removed if a perfect bleach is to result. Besides, mineral oil stains from the machinery of the weaving-shed are of common occurrence in piece goods.

Cotton pieces are bleached either for whites, for prints or for dyed goods. The processes employed for these different classes vary but slightly and only in detail. The most drastic bleach is that required for goods which are subsequently to be printed. For dyed goods, the main object is not so much to obtain a perfect white as to remove any impurities which might interfere with the dyeing, while avoiding the formation of any oxycellulose. In bleaching for whites (" market bleaching ") it is essential that the white should be as perfect as possible, and such goods are consequently invariably blued after bleaching.

For small lots (1-20 pieces) the bleaching can be conducted on very simple machinery. Thus many small piece dyers conduct the whole of their bleaching on the jigger, a simple form of dyeing machine on which most cotton piece goods are dyed (see Dyeing). For muslins, laces and other very light fabrics, which will not stand rough handling, the operations are conducted mainly by hand, washing being effected in the dash-wheel (fig. 1), which consists of a

cylindrical box, revolv- ing on its axis. It has four divisions, as shown by the dotted lines, and an opening into each division. A number of pieces are put into each, abundance of water is admitted be- hind, and the knocking of the pieces as they alternately dash from one side of the division to the other during the revolution of the wheel effects the washing. The process lasts from four to six minutes. For velveteens, cor- duroys, heavy drills, pocketings and other fabrics in which creasing has to be avoided as much as possible, the so-called " open

bleach ” is resorted to, which differs from the ordinary process chiefly in that the goods are treated throughout at full width.

The great bulk of cotton pieces is bleached in rope form, i.e. stitched together end to end and laterally collapsed, so that they will pass through a ring of 4 to 5 in. in diameter.

The first operation which the goods undergo on arriving in the grey-room of the bleachworks is that of stamping with tar or some other indelible material in order that they may be identified after passing through the whole process. They are then stitched together end to end by means of special sewing machines, the stitch being of such a nature (chain stitch) that the thread can be ripped out at one pull at the end of the operations.

Singeing. — In the condition in which the pieces leave the loom and come into the hands of the bleacher, the surface of the fabric is seen to be covered with a nap of projecting fibres which gives it a downy appearance. For some classes of goods this is not a dis- advantage, but in the majority of cases, especially for prints where a clean surface is essential, the nap is removed before bleaching. This is usually effected by running the pieces at full width over a couple of, arched copper plates heated to a full red heat by direct fire. An arrangement of the kind is shown in fig. 2, in which the singe-plates, o and b, are mounted over the flues of a coal fire. The plate 6 is most highly heated, a being at the end of the flue farthest

Fig. 1. — Section of a Dash -wheel.

removed from the fire. The cloth enters over a rail A, and in passing over the plate a is thoroughly dried and prepared for the singeing it receives when it comes to the highly-heated plate b. A block d, carrying two rails in the space between the plates, can be raised or loweredso as to increase or lessen the pressure of the cloth against the plates, or, if necessary, to lift it quite free of contact with them. The pieces on leaving the singeing machine are passed either through a water trough or through a steam box with the object of extinguishing sparks, and are then plaited down. The speed at

Fig. 2. — Section of Singe-stove.

which the pieces travel over the singe plates is necessarily considerable and varies with different classes of material. 1

In lieu of plates, a cast-iron cylinder is sometimes employed (‘ roller singeing “), the heating being effected by causing the flame of the fire

to be drawn through the roller, which is carried on two small rollers, at each end and revolves slowly in the reverse direction to that followed by the piece, thus exposing continuously a freshly heated surface and avoiding uneven cooling.

For figured pieces which have an uneven surface, it is obvious that plate or roller singeing would only affect the portions which project most, leaving the rest untouched. For such goods, ” gas singeing ” is employed, which consists in running the pieces over a non-luminous gas flame, the breadth of which slightly exceeds that of the piece, or in drawing the flame right through the piece. 2 The construction of an ordinary gas singeing apparatus is seen in section in rig- 3- Coal gas mixed with air is sent under pressure through pipe a ino the burners b, b, where the mixture burns with an intense heat. The cloth travels in the direction of the arrows, and in passing over the small nap rollers c comes into contact with the flame four times in succession before leaving the machjne.

Gas singeing is also used for plain goods, and being cleaner and under better control has largely replaced plate singeing.

At this stage the goods which have been browned on the surface by singeing are ready for the bleaching operations. A great many innovations have been introduced in recent years in the bleaching of calico, but although it is generally admitted that in point of view of time and economy many of these processes offer considerable advantages, the old process, in which a lime boil precedes the other operations, is still the one which is most largely employed by bleachers in England. In this, the sequence of operations is the following — ■

_ Grey Washing. — This operation (which is sometimes omitted) simply consists in running the pieces through an ordinary washing machine (as shown in fig. 5) through water in order to wet them out. On leaving the machine they are piled in a heap and left over night, when fermentation sets in, which results in the starch being to a large extent hydrolysed and rendered soluble in water.

Lime Boil. — In this operation, which is also known as bowking (Ger. beuchen), the pieces are first run through milk of lime contained in an ordinary washing machine and of such a strength

1 Besides being used for cotton goods, plate singeing is also employed for certain classes of worsted goods (alpacas, bunting, &c), and for most union. goods (cotton warp and worsted weft).

2 A machine working on this principle has been constructed by F. Binder, and the makers of the machine (Messrs Mather & Piatt, Ltd.) claim that it does better service than the machines constructed on the older principle.

Fig. 3. — Gas Singeing Apparatus.

that they take up about 4% of their weight of lime (CaO). They are then run over winches and guided through smooth porcelain rings (" pot-eyes ") into the kier, where they are evenly packed by boys who enter the vessel through the manhole at the top. It is of the greatest importance that the goods should be evenly packed, for, if channels or loosely-packed places are left, the liquor circulating through the kier, when boiling is subsequently in progress, will follow the line of least resistance, and the result is an uneven treat- ment. Of the numerous forms of kier in use, the injector kier is the one most generally adopted. This consists of an egg-ended cylindrical vessel constructed of stout boiler plate and shown in sectional elevation in fig. 4. The kier is from 10 to 12 ft. in height and from 6 to 7 ft. in diameter, and stands on three iron legs riveted to the sides, but not shown in the figure. The bottom exit pipe E is covered with a shield-shaped false bottom of boiler plate, or (and this is more usual) the whole bottom of the kier is covered with large rounded stones from the river bed, the object in either case being simply to provide space for the accumulation of liquor and to prevent the pipe E being blocked. The cloth is evenly packed up to within about 3 to 4 ft. of the manholes M, when lime water is run in through the liquor pipe until the level of the liquid reaches within about 2 ft. of the top of the goods. The manholes are now closed, and steam is turned on at the injector J by opening the valve v. The effect of this is to suck the liquor through E, and to force it up through pipe P into the top of the kier, where it dashes against the umbrella- shaped shield U and is distributed over the pieces, through which it percolates, until on arriving at E it is again carried to the top of the kier, a continuous circulation being thus effected. As the circulation proceeds, the steam condensing in the liquor rapidly heats the latter to the boil, and as soon as, in the opinion of the fore- man, all air has been expelled, the blow-through tap is closed and the boiling is continued for periods varying from six to twelve hours under 20-60 lb pressure. Steam is now turned off, and by opening the valve V the liquor, which is of a dark-brown colour, is forced out by the pressure of the steam it contains.

The pieces are now run through a continuous washing machine, which is provided with a plentiful supply of water. The machine,

__-_— Floor Level

Fig. 4. — High Pressure Blow-through Kier.

which is shown in fig. 5, consists essentially of a wooden vat, over which there is a pair of heavy wooden (sycamore) bowls or squeezers. The pieces enter the machine at each end, as indicated by the arrows, and pass rapidly through the bowls down to the bottom of the vat over a loose roller, thence between the first pair of guide pegs through the bowls again, and travel thus in a spiral direction until they arrive at the middle of the machine, when they leave at the side opposite to that on which they entered. The same type of machine is used for liming, chemicking, and souring.

The next operation is the ” grey sour,” in which the goods are run through a washing machine containing hydrochloric acid of 2° Tw. strength, with the object of dissolving out the lime which the goods retain in considerable quantity after the lime boil. The goods are then well washed, and are now boiled again in the ash bowking kier, which is similar in construction to the lime kier, with soda ash (3%) and a solution of rosin (i|%) in caustic soda (ij%)

Fig. 5. — Roller Washing Machine.

for eight to ten hours. For white bleaching the rosin soap is omitted, soda ash alone being employed.

The pieces are now washed free from alkali and the bleaching proper or “chemicking” follows. This operation may be effected in various ways, but the most efficient is to run the goods in a wash- ing machine through bleaching powder solution at j°-i° Tw., and allow them to lie loosely piled over night, or in some cases for a longer period. They are now washed, run through dilute sulphuric or hydrochloric acid at 2° Tw. (” white sour “) and washed again. Should the white not appear satisfactory at this stage (and this is usually the case with very heavy or dense materials) , they are boiled again in soda ash, chemicked with bleaching powder at |° Tw. or even weaker, soured and washed. It is of the utmost importance that the final washing should be as thorough as possible, in order to completely remove the acid, for if only small quantities of the latter are left in the goods, they are liable to become tender in the subsequent drying, through formation of hydrocellulose.

The modern processes of bleaching cotton pieces differ from the one described above, chiefly in that the lime boil is entirely dispensed with, its place being taken by a treatment in the kier with caustic soda (or a mixture of caustic soda and soda ash) and resin soap. The best known and probably the most widely practised of these processes is one which was worked out by the late M. Horace Koechlin in conjunction with Sir William Mather, and this differs from the old process not only in the sequence of the operations but also in the construction of the kier. This consists of a horizontal egg-ended cylinder, and is shown in transverse and longitudinal sections in figs. 6 and 7. One of the ends E constitutes a door which can be raised or lowered by means of the power-driven chain C. , The goods to be bleached are packed in wagons W outside the kier, and when filled these are pushed home into the kier, so that the pipes p fit with their flanges on to the fixed pipes at the bottom of the kier. The heating is effected by means of steam pipes at the lowest extremity of the kier, while the circulation of the liquor is brought about by means of the centrifugal pump P, which draws the liquor through the pipes p from beneath the false bottoms of the wagons and showers it over distributors D on to the goods. By this mode of working a considerable economy is effected in point of time, as the kier can be worked almost continuously; for as soon as one lot of goods has been boiled, the wagons are run out and two freshly-packed wagons take their place. The following is the sequence of operations: — The goods are first steeped over night in

dilute sulphuric acid, after which they are washed and run through old kier liquor from a previous operation. They are then packed evenly in the wagons which are pushed into the kier, and, the door having been closed, they are boiled for about eight hours at 7-15 lb pressure with a liquor containing soda ash, caustic soda, resin soap and a small quantity of sulphite of soda. The rest of the operations (chemicking, souring and washing) are the same as in the old process. A somewhat different principle is involved in the Thies-Herzig process. In this the kier is vertical, and the circulation of the liquor is effected by means of a centrifugal or other form of pump, while the heating of the liquor is brought about outside the kier in a separate

The machine consists essentially of a series of copper or tinned iron cylinders, which are geared together so as to run at a uniform speed. Steam at 10-15 lb pressure is admitted through the iournalled bearings

at one side of the machine, and the condensed water is forced out continuously through the bearings at the other side. The pieces pass in the direction of the arrow (fig. 9) over a scrimp rail or expanding roller round the first cylinder, then in a zigzag direction over all succeeding cylinders, and ultimately leave the machine dry, being mechanically plaited down at the other end.

If the bleaching process has been properly conducted, the pieces should not only show a uniform pure white colour, but their strength should remain unimpaired. Careful experiments conducted by the late Mr Charles O'Neill showed in fact that carefully bleached cotton may actually be stronger than in the unbleached condition, and this result has since been corroborated by others. Excessive blueing, which is frequently resorted to in order to cover the defects of imperfect bleaching, can readily be detected by washing a sample of the material in water, or, better still, in water containing a little ammonia, and then comparing with the original. The formation of oxycellulose during the bleaching process may either take place in bojling under pressure with lime or caustic soda in consequence of the presence of air in the kier, or through excessive action of bleaching powder, which may either result from the latter not being properly dissolved or being used too strong. Its detection may be effected by

dyeing a sample of the bleached cotton in a cold, very dilute solution of methylene blue for about ten minutes, when any portions of the fabric in which the cellulose has been con- verted into oxycellulose will assume a darker colour than the rest. The depth of the colour is at the same time an indication of the extent to which such conversion has taken place. Most bleached cotton contains some oxycellulose, but as long as the formation has not proceeded far enough to cause tendering, its presence is of no importance in white goods. If, on the other hand, the cotton has to be subsequently dyed with direct cotton colours (see Dyeing), the presence of oxycellulose may result in un- even dyeing. Tendering of the pieces, due to insufficient wash- ing after the final souring operation, is a common defect in bleached goods. As a rule the free acid can be detected by extracting the tendered material with distilled water and adding to the extract a drop of methyl orange solution, when the latter will turn pink if free acid be present. Other defects which may occur in bleached goods are iron stains, mineral oil stains, and defects due to the addition of paraffin wax in the size.

Fig. 7. — The Mather Kier, longitudinal section.

vessel between the pump and the kier by means of indirect steam. The

sequence of operations is similar to that adopted in the Mather-Koechlin process, differing chiefly from the latter in the first operation, which consists in running the goods, after singeing, through very dilute boiling sulphuric or hydrochloric acid, containing in either case a small proportion of hydrofluoric acid, and then running them through a steam box, the whole operation lasting from twenty to sixty seconds.

Bleached by any of the above processes, the cloth is next passed over a mechanical contrivance known as a ” scutcher,” which opens it out from the rope form to its full breadth, and is then dried on a continuous drying machine. Fig. 8 shows the appearance and construction of an improved form of the horizontal drying machine, which is in more common use for piece goods than the vertical form.

Bleaching of Linen. The bleaching of linen is a much more complicated and tedious process than the bleaching of cotton. This is due in part to the fact that in linen the impurities amount to 20% or more of the weight of the fibre, whereas in cotton they do not usually exceed 5%. Furthermore these im- purities, which include colouring matter, intracellular sub- stances and a peculiar wax known as “flax wax,” are more difficult to attack than those which are present in cotton, and the difficulty is still further enhanced in the case of piece goods owing to their dense or impervious character.

Till towards the end of the 18th century the bleaching of linen both in the north of Ireland and in Scotland was accomplished by bowking in cows’ dung and souring with sour milk, the pieces being exposed to light on the grass between these operations for prolonged periods. Subsequently potash and later on soda

was substituted for the cows’ dmig, while sour milk was replaced by sulphuric acid. This ” natural bleach ” is still in use in Holland, a higher price being paid for linen bleached in thisway than for the same material bleached with the aid of bleaching powder. In the year 1744 Dr James Ferguson of Belfast received a premium of £300 from the Irish Linen Board for the application of lime in the bleaching of linen. Notwithstanding this reward,

Fig. 8.— Mather & Piatt’s Horizontal Drying Machine.

the use of lime in the bleaching of linen was for a long time-

afterwards forbidden in Ireland under statutory penalties, and so late as 1815 Mr Barklie, a respectable'; linen bleacher of Linen Vale, near Keady, was " prosecuted for using lime in the whiten- ing of linens in his bleachyard."

The methods at present employed fof the bleaching of linen are, except in one or two unimportant particulars, the same as were used in the middle of the 19th century. In principle they resemble those used in cotton bleaching; but require to be fre- quently repeated, while an additional operation, 'which is a relic of the old-fashioned process, viz. that of '■ "grassing" or "croft- ing," is still essential for the production of the finest whites. Considerably more care has to be exercised in linen bleaching than is the case with cotton, and the process consequently necessitates a greater amount of manual labour. The practical result of this is that whereas cotton pieces can be bleached and finished in less than a week, linen pieces require at least six weeks. Many attempts have naturally been made to shorten and cheapen the process, but without success. The use of stronger reagents and more drastic treatment, which would at first suggest itself, incurs the risk of injury to the fibre, not so much in respect to actual tendering as to the destruction of its characteristic gloss, while if too drastic a treatment is employed at the beginning the colouring matter is liable to become set in the fibre, and it is then almost impossible to remove it. Among the many modern improvements which have been suggested, mention may be made of the use of hypochlorite of soda in place of bleaching powder, the use of oil in the first treatment in alkali (Cross & Parkes), while de Keukelaere suggests the use of sodium sulphide for this purpose. With the object of dispensing with the operation of grassing, which besides necessitating much manual labour is subject to the influences of the atmospheric conditions, Siemens & Halske of Berlin have suggested exposure of the goods in a chamber to the action of electrolytically prepared ozone. ˆ Jardin seeks to achieve the same object by steeping the linen in dilute nitric acid.

Since the qualities of linen which are submitted to the bleacher vary considerably, and the mode of treatment has to be varied accordingly, it is not possible to give more than a bare outline of linen bleaching.

Linen is bleached in the yarn and in the piece. Whenever one of the operations is repeated, the strength of the reagent is successively diminished. In yarn-bleaching the sequence of the operations is about as follows:— (1) Boil in kier with soda ash. (2) Reel in bleaching powder. This operation, which is peculiar to linen bleaching, consists in suspending the hanks from a square roller into bleaching powder

solution contained in a shallow stone trough. The roller revolves slowly, so that the hanks, while passing continu- ously through the bleaching powder, are for the greater part of the time being exposed to the air. , (3) Sour in sulphuric acid. (4) Scald in soda ash. (The term ” scalding ” means boiling in a kier.) (5) Reel in bleaching pow- der. (6) Sour in sulphuric acid. (7) Scald in soda ash. (8) Dip, i.e. steep in bleaching powder. (9) Sour in sulphuric acid. (10) Scald in soda ash. (n) Dip in bleaching powder. (12) Sour in sulphuric acid. For a full white, two more operations are usually required, viz. (13) scald in soda ash, and (14) dip in bleaching powder. Washing intervenes between all these operations.

Pieces are not stamped as in the case oi, cotton, but thread-marked by hand with cotton dyed Turkey red. They are then sewn together end to end, and subjected to the following operations :—

Boil with lime in kier. The pieces are now separated and made up into bundles (except in the case of very light linens, which may pass through the whole of the operations in rope form) and soured with sulphuric acid.

First lye boil with soda ash and caustic soda. – Second lye boil. For some classes of goods no less than six lye boils may be required.

Grass between lye boils (according to their number). ! Rub with rubbing boards. This is also a speciality in linen bleaching, and consists of a mechanical treatment with soft soap, the object of which is to remove black stains in the yarn. » Bleach with hypochlorite of soda.

Scald. The two latter treatments are repeated three to five times, each series constituting a ” turn.” Grassing intervenes between each turn, and in some instances the pieces are rubbed before the last soda boil.

The pieces are next steeped in large vessels (kiers) in weak hypo-

FlG. 9.— Diagram showing the Horizontal Drying Machine threaded with Cloth.

chlorite of soda, and then in weak sulphuric acid, these treatments being repeated several times. Ultimately the goods are mill- washed, blued with smalt and dried.

Bleaching of other Vegetable Textile Fabrics. Hemp may be bleached by a process similar to that used for linen, but this is seldom done owing to the expense entailed. China grass is bleached like cotton.

Jute contains in its raw state a considerable amount of colouring matter and intracellular substance. Since the individual fibres are very shortj the

complete removal of .the latter would be attended by a disintegration of the material. Although it is possible to bleach jute white; this'is seldom if ever carried out on a la,rge scale owing' to the great expense involved. ' A half bleach on jute is obtained by steeping the goods alternately in bleaching powder (or hypo chlorite of soda) and sulphuric acid, washing intervening. For a cream these treatments are repeated.

Bleaching of Straw. ■■■ In the Luton district, straw is bleached principally in the form of plait, in which form it is imported. The bleaching is effected by steeping the straw for periods varying from twelve hours to several days in fairly strong alkaline peroxide of hydrogen. The number of baths depends upon the quality of straw and the degree of whiteness required. Good whites are thus obtained, aijd no further process would be necessary if the hats had not subsequently to be "blocked" or pressed at a high temperature which brings about a deterioration of the colour. After bleaching with peroxide and drying, the straw consequently undergoes a further process of sulphuring, i.e. exposure to gaseous sulphurous acid. Panama hats are bleached after making up, but in this case only peroxide of hydrogen is used and a very lengthy treatment entailing sometimes fourteen days' steeping is required.

Bleaching of Wool. ■ In the Condition in which it is delivered to the manufacturers wool is generally a very impure article, even if it has been washed on the sheep's back before shearing. The impurities which it contains consist in the main of the natural grease (in reality a kind of wax) exuded from the skin of the sheep and technically known as the " yolk," the dried-up perspiration from the body of the sheep, technically called " suint," and dust, dirt, burrs, ire, which mechanically adhere to the sticky surfaces of the fibres. In this condition wool is quite unfit for any manufacturing purposes and must be cleansed before any mechanical operations can be commenced. Formerly the washing was effected in stale urine, which owed its detergent properties mainly to the presence of ammonium carbonate. The stale urine or lant was diluted with four to five times its bulk of water, and in this liquor, heated to 4b°-so° C, the Washing was effected.

At the present day this method has been entirely abandoned, the

washing or ” scouring ” being effected with soap, assisted by ammonia, potash, soda or silicate of soda. The finest quali- ties of wool are washed with soft soap and potash, while for inferior qualities, cheaper detergents are employed. The operation is in principle perfectly simple, the wool being sub- merged in the warm soap solution, where it is moved about with forks arid then taken out and allowed to drain. A second treatment in weaker soap serves to complete the process. In dealing with large quantities, wocl-washing machines are em- ployed, which consist essentially of long cast-iron troughs which contain the soap solution. The wool to be washed is fed in at one end of the machine and is slowly propelled to the other end by means b’f a system of mechanically-driven forks or rakes. As it passes from the machine, it is squeezed through a pair of rollers. Three such machines are usually required for efficient washing, the first containing the strongest and the third the weakest soap.

The washing of wool is in the main a mechanical process, in which the water dissolves out the suint while the soap emulsifies the yolk and thus removes it from the fibre. The attendant earthy impurities pass mechanically into the surrounding liquid and are swilled away.

In some works the wool is washed first with water alone, the aqueous extract thus obtained being evaporated to dryness and the residue calcined. A very good quality of potash is thus obtained as a by-product. In many works in Yorkshire and elsewhere, the dirty soap liquors obtained in wool-washing are riot allowed to run to waste, but are run into tanks and there treated with sulphuric acid. The effect of this treatment is to decompose the soap, and the fatty acids along with the wool-grease rise as a rnagma to the surface. The purified product is known m fllfc’ trade as “Yorkshire grease.”

Attempts have been made from time to time to extract the natural grease from wool by means of organic solvents, such as carbon bisulphide, carbon tetrachloride, petroleum spirit, &c, but have not met with much success.

Worsted yarn spun on the English system, as well as woollen yarn and fabrics made from them, contain oil which has been incorporated with the wool to facilitate the spinning. This oil must be got rid of previous to bleaching, and this is effected by scouring in warm soap with or without the assistance of alkalis.

The actual bleaching of wool may be effected in two ways, viz. by treating the material either with sulphurous acid or with hydrogen peroxide. Sulphurous acid may either be applied in the gaseous form

or in solution as bisulphite of soda. In working by the first method, which is technically known as ” stoving,” the scoured yarn is wetted in very weak soap containing a small amount of blue colouring matter, wrung or hydro-extracted and then suspended in a chamber or stove. Sulphur contained in a vessel on the floor of the ‘chamber is now lighted, and the door having been closed, is allowed to burn itself out. The goods are left thus exposed to the sulphur dioxide overnight, when they are taken out and washed in water. For piece goods a somewhat different arrangement is employed, the pieces passing through a slit into a chamber supplied with sulphur dioxide, then slowly up and down over a large number of rollers and ultimately emerging again at the same slit. Wool may also be bleached by steeping in a fairly strong solution of bisulphite of soda and then washing well in water. Wool bleached with sulphurous acid or bisulphite is readily affected by alkalis, the natural yellow colour returning on washing with soap or soda. A more permanent bleach is obtained by steeping the wool in hydrogen peroxide (of 12 volumes strength), let down with about three times its bulk of water and rendered slightly alkaline with ammonia or silicate of soda. Black or brown wools cannot be bleached white, but when treated with peroxide they assume a golden colour, a change which is frequently desired in human hair.

Bleaching of Silk.

In raw silk, the fibre proper is uniformly coated with a proteid substance known as silk-gum, silk-glue or sericine which amounts to 19-25 % of the weight of the material, and it is only after’ the removal of this coating that the characteristic properties of the fibre become apparent. This is effected by the process of ” dis- charging ” or ” boiling-off,” which consists in suspending the hanks of raw silk over poles or sticks in a vat containing a strong hot soap solution (30 % of soap on the weight of the silk). The liquor is kept just below boiling point for two or three hours, the hanks being turned from time to time. During the process, the sericine at first swells up considerably, the fibres becoming slippery, but as the operation proceeds it passes into solution. It is important that only soft water should be used for boiling-off since calcareous impurities are liable to mar the lustre of the silk.

The silk is now rinsed in weak soda solution and wrung. In this condition it is suitable for being dyed, but if it is to be bleached, the hanks are tied up loosely with smooth tape, put into coarse linen bags to prevent the silk becoming entangled, and boiled again in soap solution which is half as strong as that used in the first operation. The

hanks are now taken out, rinsed in a weak soda solution, washed in water and wrung.

The actual bleaching of silk is usually effected by stoving as in the case of wool, with this difference, that the operation is repeated several times and blueing or tinting with other colours is effected after bleaching. Silk may also be bleached with peroxide of hydrogen, but this method is only used for certain qualities of spun silk and for tussore.

Ornamental feathers are best bleached by steeping in peroxide of hydrogen, rendered slightly alkaline by the addition of ammonia. The same treatment is applied to the bleaching of ivory. If peroxide of hydrogen could be prepared at a moderate cost, it would doubtless find a much more extensive application in bleaching, since it combines efficiency with safety, and gives good results with both vegetable and animal substances. (E. K.)

BLEAK, or Blick (Alburnus lucidus), a small fish of the Cyprinid family, allied to the bream and the minnow, but with a more elongate body, resembling a sardine. It is found in European streams, and is caught by anglers, being also a favourite in aquariums. The well-known and important industry of ” Essence Orientale ” and artificial pearls, carried on in France and Germany with the crystalline silvery colouring matter of

the bleak, was introduced from China about the middle of the 17 th century.

BLEEK, FRIEDRICH (1793-1859), German Biblical scholar, was born on the 4th of July 1793, at Ahrensbok, in Holstein, a village near Liibeck. His father sent him in his sixteenth year to the gymnasium at Liibeck, where he became so much inter- ested in ancient languages that he abandoned his idea of a legal career and resolved to devote himself to the study of theology. After spending some time at the university of Kiel, he went to Berlin, where, from 1814 to 1817, he studied under De Wette, Neander and Schleiermacher. So highly were his merits appreciated by his professors — Schleiermacher was accustomed to say that he possessed a special charisma for the science of ” Introduction ” — that in 1818 after he had passed the examina- tions for entering the ministry he was recalled to Berlin as Repetent or

tutorial fellow in theology, a temporary post which the theological faculty had obtained for him. Besides dis- charging his duties in the theological seminary, he published two dissertations in Schleiermacher's and G. C. F. Lucke's Journal{\ 819-1820,1822), one on the origin and composition of the Sibylline Oracles " Uber die Entstehung und Zusammensetzung der Sibyllinischen Orakel," and another on the authorship and design of the Book of Daniel, " Uber Verfasser und Zweck des Buches Daniel." These articles attracted much attention, and were distinguished by those qualities of solid learning, thorough investigation and candour of judgment which characterized all his writings. Bleek's merits as a rising scholar were recog- nized by the minister of public instruction, who continued his stipend as Repetent for a third year, and promised further advancement in due time. But the attitude of the political authority underwent a change. De Wette was dismissed from his professorship in 18 19, and Bleek, a favourite pupil, incurred the suspicion of the government as an extreme democrat. Not only was his stipend as Repetent discontinued, but his nomination to the office of professor extraordinarius, which had already been signed by the minister Karl Altenstein, was withheld. At length it was found that Bleek had been con- founded with a certain Baueleven Blech, and in 1823 he received the appointment.

During the six years that Bleek remained at Berlin, he twice declined a call to the office of professor ordinarius of theology, once to Greifswald and once to Konigsberg. In 1829, however, he was induced to accept Lucke's chair in the recently-founded university of Bonn, and entered upon his duties there in the summer of the same year. For thirty years he laboured with ever-increasing success, due not to any attractions of manner or to the enunciation of novel or bizarre opinions, but to the sound- ness of his investigations, the impartiality of his judgments, and the clearness of his method. In 1843 he was raised to the office of consistorial councillor, and was selected by the university to hold the office of rector, a distinction which has not since been conferred upon any theologian of the Reformed Church. He died suddenly of apoplexy on the 27th of February 1859.

Bleek's works belong entirely to the departments of Biblical criticism and exegesis. His views on questions of Old Testament criticism were " advanced " in his own day; for on all the disputed points concerning the unity and authorship of the books of the Old Covenant he was opposed to received opinion. But with respect to the New Testament his position was con- servative. An opponent of the Tubingen school, his defence of the genuineness and authenticity of the gospel of St John is among the ablest that have been written; and although on

some minor points his views did not altogether coincide with those of the traditional school, his critical labours on the New Testament must nevertheless be regarded as among the most important contributions to the maintenance of orthodox opinions. His greatest work, his commentary on the epistle to the Hebrews {Brief an die Hebraer erldutert durch Einleitung, Ubersetzung, und fortlaufenden Commentar, in three parts, 1828, 1836 and 1840) won the highest praise from men like De Wette and Fr. Delitzsch. This work was abridged by Bleek for his college lectures, and was published in that condensed form in

1868. In 1846 he published his contributions to the criticism, of the gospels (Beitrage zur Evangelien Kritik, pt. i.), which contained his defence of St John's gospel, and arose out of a review of J. H. A. Ebrard's Wissenschaftliche Kritik der Evangeli- schen Geschichte (1842).

After his death were published: — (1) His Introduction to the Old Testament (Einleitung in das Alte Testament), (3rd ed., 1869); Eng. trans, by G. H. Venables (from 2nd ed., 1869); in 1878 a new edition (the 4th) appeared under the editorship of J. Wellhausen, who made extensive alterations and additions; (2) his Introduction to the New Testament (3rd ed., W. Mangold, 1875), Eng. trans, (from 2nd German ed.) by William Urwick (1869, 1870) ; (3) his Exposition of the First Three Gospels (Synoptische Erklarung der drei ersten Evangelien), by H. Holtzmann (1862); (4) his Lectures on the Apocalypse (Vorlesungen uber die Apokalyps'e) , (Eng. trans. 1875). Besides these there has also appeared a small volume containing Lectures on Colossians, Philemon and Ephesians (Berlin, 1865). Bleek also contributed many articles to the Studien und Kritiken. For further information as to Bleek's life and writings, see Kamp- hausen's article in Herzog-Hauck, Realencyklopadie; Frederic Lichtenberger's Histoire des idees religieuses en Allemagne, vol. iil. ; Diestel's Geschichte des Alten Testamentes (1869) ; and T. K. Cheyne's Founders of Old Testament Criticism (1893).

BLEEK, WILHELM HEINRICH IMMANUEL (1827-1875), German philologist, son of Friedrich Bleek, was born in 1827 at Berlin. He studied first at Bonn and afterwards at Berlin, where his attention was directed towards the philological peculiarities of the South African languages. In his doctor's dissertation (Bonn, 1851), De nominum generibus linguarum Africae Australis, he endeavoured to show that the Hottentot language was of North African descent. In 1854 his health prevented him accompanying Dr W. B. Baikie in the expedition to the Niger; but in the following year he accompanied Bishop Colenso

to Natal, and was enabled to prosecute his researches into the language and customs of the Kaffirs. Towards the close of 1856 he settled at Cape Town, and in 1857 was appointed interpreter by Sir George Grey. In 1859 he was compelled by ill-health to visit Europe, and on his return in the following year he was made librarian of the valuable collection of books pre- sented to the colony by Sir George Grey. In 1869 he visited England, where the value of his services was recognized by a pension from the civil list. He died at Cape Town on the 17 th of August 1875. His works, which are of considerable importance, for African and Australian philology, consist of the Vocabulary of the Mozambique Language (London, 1856); Handbook of African, Australian and Polynesian Philology (Cape Town and; London, 3 vols., 1858-1863); Comparative Grammar of the South African Languages (vol. i., London, 1869); Reynard the Fox in South Africa, or Hottentot Fables and Tales (London, 1864) ; Origin of Language (London, 1869).

BLENDE, or Sphalerite, a naturally occurring zinc sulphide, ZnS, and an important ore of zinc. The name blende was used by G. Agricola in 1546, and is from the German blenden, to blind, or deceive, because the mineral resembles lead-ore in r appearance but contains no lead, and was consequently often rejected as worthless. Sphalerite, introduced by E. F. Glocker in 1847, has the same meaning (Gr. o-

Crystals of blende belong to that sub- class of the cubic system in which there are six planes of symmetry parallel to the faces of the rhombic dodecahedron and none parallel to the cubic faces; in other words, the, crystals are cubic with inclined hemihedrism, and have no centre of symmetry. The fundamental form is the tetrahedron. Fig. 1 shows a combination of two tetrahedra, in which the four faces of one tetrahedron are larger than the four faces of the other: further, the two sets of faces difer in surface

characters, those of one set being dull and striated, whilst those of the other set are bright and smooth. A common ‘ form, shown in fig. 2, is a combination of the rhombic dodecahedron with a three-faced tetrahedron y (311); the six faces meeting in each triad axis are often rounded together into low conical forms. The crystals are frequently twinned, the twin-axis coinciding with a triad axis; a rhombic dodecahedron so twinned (fig. 3) has no re-entrant angles. An important character of blende is the perfect dodecahedral cleavage,

there being six directions of cleavage parallel to the faces of the rhombic dodecahedron, and angles between which are 6o°.

When chemically pure, which is rarely the case, blende is colourless and transparent; usually, however, the mineral is yellow, brown or black, and often opaque, the depth of colour and degree of transparency depending on the amount of iron present. The streak, or colour of the powder, is brownish or light yellow, rarely white. The lustre is resinous to adamantine, and the index of refraction high (2-369 for sodium light). The substance is usually optically isotropic, though sometimes it exhibits anomalous double refraction; fibrous zinc sulphide which is doubly refracting is to be referred to the hexagonal

Fig. 2.

Fig. 3.

species wurtzite. The specific gravity is 4-0, and the hardness 4. Crystals exhibit pyroelectrical characters, since they possess four uniterminal triad axes of symmetry.

Crystals of blende are of very common occurrence, but owing to twinning and distortion and curvature of the faces, they are often rather complex and difficult to decipher. For this reason the mineral is not always readily recognized by inspection, though the perfect dodecahedral cleavage, the adamantine lustre, and the brown streak are characters which may be relied upon. The mineral is also frequently found massive, with a coarse or fine granular structure and a crystalline fracture; sometimes it occurs as a soft, white, amorphous deposit resem- bling artificially precipitated zinc sulphide. A compact variety of a pale liver-brown colour and forming concentric layers with a reniform surface is known in Germany as Schalen- blende or Leberblende.

A few varieties of blende are distinguished by special names, these varieties depending on differences in colour and chemical composition.' A pure white blende from Franklin in New Jersey is known as cleiophane; snow-white crystals are also found at Nordmark in Vermland, Sweden. Black blende containing ferrous sulphide, in amounts up to 15 or 20 % isomorphously replacing zinc sulphide, is known as marmatite (from Marmato near Guayabal in Colombia, South America) and christophite (from St Christophe mine at Breitenbrunn near Eibenstock in Saxony). Transparent blende of a red or reddish-brown colour, such as that found near Holywell in

Flintshire, is known as ” ruby-blende ” or ” ruby-zinc.” Pftbramite is the name given to a cadmiferous blende from Pribram in Bohemia. Other varieties contain small amounts of mercury, tin, man- ganese or thallium. The elements gallium and indium were discovered in blende.

Blende occurs in metalliferous veins, often in association with galena, also with chalcopyrite, barytes, fluorspar, &c. In ore- deposits containing both lead and zinc, such as those filling cavities in the limestones of the north of England and of Missouri, the galena is usually found in the upper part of the deposit, the blende not being reached until the deeper parts are worked.

Blende is also found sporadically in sedimentary rocks; for example, in nodules of clay-ironstone in the Coal Measures, in the cement-doggers of the Lias, and in the casts of fossil shells. It has occasionally been found on the old timbers of mines. In these cases the zinc sulphide has probably arisen from the reduction of sulphate by organic matter.

Localities for fine crystallized specimens are numerous. Mention may be made of the brilliant black crystals from Alston Moor in Cumberland, St Agnes in Cornwall and Derbyshire. Yellow crystals are found at Kapnik-Banya, near Nagy-Banya in Hungary. Transparent yellow cleavage masses of large size occur in limestone in the zinc mines at Picos de Europa in the province of Santander, Spain. Beautiful isolated tetrahedra of transparent yellow blende are found in the snow-white crystalline dolomite of the Binnenthal in the Valais, Switzerland. (L. J. S.)

BLENHEIM (Ger. Blindheim), a village of Bavaria, Germany, in the district of Swabia, on the left bank of the Danube, 30 m. N.E. from Ulm by rail, a few miles below Hochstadt. Pop. 700. It was the scene of the defeat of the French and Bavarians under Marshals Tallard and Marsin, on the 13th of August 1704, by the English and the Austrians under the duke of Marlborough and Prince Eugene. In consideration of his military services and especially his decisive victory, a princely mansion was erected by parliament for the duke of Marlborough near Woodstock in Oxfordshire, England, and was named Blenheim Palace after this place.

The battle of Blenheim is also called Hochstadt, but the title accepted in England has the advantage that it distinguishes this battle from that won on the same ground a year previously, by the elector of Bavaria over the imperial general Styrum (9-20 September 1703), and from the fighting between the Austrians under Krag and the French under Moreau in June 1800 (see French Revolutionary Wars). The ground

between the hills and the marshy valley of the Danube forms a defile through which the main road from Donauworth led to Ulm; parallel streams divide the narrow plain into strips. On one of these streams, the Nebel, the French and Bavarians (somewhat superior in numbers) took up their position facing eastward, their right flank resting on the Danube, their left in the under- features of the hilly ground, and their front covered by the Nebel, on which were the villages of Oberglau, Unterglau and Blenheim. The imperialist army of Eugene and the allies under Marlborough (52,000 strong) encamped 5 m. to the eastward along another stream, their flanks similarly protected. On the 2nd-i3th of August 1704 Eugene and Marlborough set their forces in motion towards the hostile camps; several streams had to be crossed on the march, and it was seven o'clock (five hours after moving off) when the British of Marlborough's left wing, next the Danube, deployed opposite Blenheim, which Tallard thereupon garrisoned with a large force of his best infantry, aided by a battery of 24-pounder guns. The French and Bavarians were taken somewhat by surprise, and were arrayed in two separate armies, each with its cavalry on the wings and its foot in the centre. Thus the centre of the combined forces consisted of the cavalry of Marsin's right and of Tallard's left.

Here was the only good ground for mounted troops, and Marlborough followed Tallard's example when forming up to attack, but it resulted from the dispositions of the French marshal that this weak point of junction of his two armies was exactly that at which decisive action was to be expected. Tallard therefore had a few horse on his right between the Danube and Blenheim, a mass of infantry in his centre atBlenheim itself, and a long line of cavalry supported by a few battalions forming his left wing in the plain, and connecting with the right of Marsin's army. This army was similarly drawn up. The cavalry right wing was in the open, the French infantry near Oberglau, which was strongly held, the Bavarian infantry next on the left, and finally the Bavarian cavalry with a force of foot on the extreme left in the hills. The elector of Bavaria com- manded his own troops in person. Marlborough and Eugene on their part were to attack respectively Tallard and Marsin. The

right wing under Eugene had to make a difficult march over broken ground before it could form up for battle, and Marl- borough waited, with his army in order of battle between Unterglau and Blenheim,

until his colleague should be ready. At 12.30 the battle opened. Lord Cutts, with a detachment of Marlborough's left wing, attacked Blenheim with the utmost fury. A third of the leading brigade (British) was killed ˆnd wounded in the vain attempt to break through the strong defences of the village, and some French squadrons charged upon it as it retired; a colour was captured in the melee, but a Hessian brigade in second line drove back the cavalry and retook the colour. After the repulse of these squadrons, in which some British cavalry from the centre took part, Cutts again moved forward. The second attack, though pressed even more fiercely, fared no better than the first, and the losses were heavier than before. The duke then ordered Cutts to observe the enemy in Blenheim, and concentrated all his attention on the centre. Here, between Unterglau and Blenheim, preparations were being made, under cover of artillery, for the crossing of the Nebel, and farther up-stream a corps was sent to attack Oberglau. This attack failed completely, and it was not until Marlborough himself, with fresh battalions, drove the French back into Oberglau that the allies were free to cross the Nebel. ' In the meanwhile the first line of Marlborough's infantry had crossed lower down, and the first line of cavalry, following them across, had been somewhat severely handled by Tallard's cavalry. The squadrons under the Prussian general Bothmar, however, made a dashing charge, and achieved considerable temporary success. Eugene was now closely engaged with the elector of Bavaria, and both sides were losing heavily. But Eugene carried out his holding attack successfully. Marsin dared not reinforce Tallard to any extent, and the duke was preparing for the grand attack. His whole force, except the detachment of Cutts, was now across the Nebel, and he had formed it in several lines with the cavalry in front. Marlborough himself led the cavalry; the French squadrons received the attack at the halt, and were soon broken. Marsin's right swung back towards its own army.: Those squadrons of Tallard's left which retained their order fell back towards the Danube, and a great gap was opened in the centre of the defence, through which the victorious squadrons poured. Wheeling to their left the pursuers drove hundreds of fugitives into the Danube, and Eugene was now pressing the army of Marsin towards Marlborough, who re-formed and faced northward to cut off its retreat. Tallard was already a prisoner, but in the dusk and confusion Marsin slipped through between the duke and Eugene. General Churchill, Marlborough's brother, had meanwhile surrounded the French garrison of Blenheim; and after one or two attempts to break out, twenty-four ba ttalions of infantry and four regiments of dragoons, many of them the finest of the French army, surrendered.

The losses of the allies are stated at 4500 killed and 7500 wounded (British 670 killed and 1500 wounded). Of the French and Bavarians 11,000 men, 100 guns and, 200 colours and standards were taken; besides the killed and wounded, the numbers of which were large but uncertain — many were drowned in the Danube. Marsin's army, though it lost heavily, was drawn off in good order; Tallard's was almost annihilated.

BLENNERHASSETT, HARMAN (1765-1831), Irish-American lawyer, son of an Irish country gentleman of English stock settled in Co. Kerry, was born on the 8th of October 1765. He was educated at Trinity College, Dublin, and in 1790 was called to the Irish bar. After living for several years on the continent, he married in 1796 his niece, Margaret Agnew, daughter of Robert Agnew, the lieutenant-governor of the Isle of Man. Ostracised by their families for this step the couple decided to settle in America, where Blennerhassett in 1798 bought an island in the Ohio river about 2 m. below Parkersburg, West Virginia. Here in 1805 he received a visit from Aaron Burr (q.v.), in whose conspiracy he became interested, furnishing liberal funds for its support, and offering the use of his island as a rendezvous for the gathering of arms and supplies and the training of volunteers. Wkn the conspiracy collapsed, the mansion and

island were occupied and plundered by the Virginia militia. Blennerhassett fled, was twice arrested and remained a prisoner until after Burr's release; The island was then abandoned, and Blennerhassett was in. turn a cotton planter in Mississippi, and a lawyer (1819-1822) in Montreal, Canada. After returning to Ireland, he died in the island of Guernsey on the 2nd of February 1831. His wife, who had considerable literary talent and who published The Deserted Isle (1822) and The Widow of the Rock and Other Poems (1824), returned to the United States in 1840, and died soon afterward in New York City while attempting to obtain through Congress payment for property destroyed on the island.

See William H. Safford, Life ofHarman Blennerhassett (Cincinnati, 1853) ; W. H. Safford (editor), The Blennerhassett Papers (Cincinnati, 1864); and "The True Story of Harman Blennerhassett," by Therese Blennerhassett-Adams, in the Century Magazine for July 1 90 1, vol. lxii.

BLERA (mod. Bieda), an ancient Etruscan town on the Via Clodia, about 3 2 m. N.N. W. of Rome. It was of little importance, and is only mentioned by geographers and. in inscriptions. It is situated on a long, narrow tongue of rock at the junction of two deep glens. Some

remains of the town walls still exist, and also two ancient bridges, both belonging to the Via Clodia, and many tombs hewn in the rock — small chambers imitating the architectural forms of houses, with beams and rafters represented in relief. See G, Dennis, Cities and Cemeteries of Etruria, i. 207. There was another Blera in Apulia, on the road from Venusia to Tarentum.

BLESSINGTON, MARGUERITE, Countess of (1789-1849), Irish novelist and miscellaneous writer, daughter of Edmund Power, a small landowner, was born near Clonmel, Co. Tipperary, Ireland, on the 1st of September 1789. Her childhood was made unhappy by her father's character and poverty, and her early womanhood wretched by her compulsory marriage at the age of fifteen to a Captain Maurice St Leger Farmer, whose drunken habits brought him at last as a debtor to the king's bench prison, where, in October 181.7, he died. His wife had left him some time before, and in February 1818 she married Charles John Gardiner, earl of Blessington. Of rare beauty, charm and wit, she was no less distinguished for her generosity and for the extravagant tastes which she shared with her husband, which resulted in encumbering his estates with a load of debt. In the autumn of 1822 they went abroad, spent four months of the next year at Genoa in close intimacy with Byron, and remained on the continent till Lord Blessington's deathin May 1829. Some time before this they had been joined by Count D'Orsay, who in 1827 married Lady Harriet Gardiner, Lord Blessington's only daughter by a former wife. D'Orsay, who had soon separated from his wife, now accompanied Lady Blessington to England and lived with her till her death. Their home, first at Seamore Place, and afterwards Gore House, Kensington, became a centre of attraction for whatever was distinguished in literature, learning, art, science and fashion. After her husband's death she supplemented her diminished income by contributing to various periodicals as well as by writing novels. She was for some years editor of The Book of Beauty and The Keepsake, popular annuals of the day. In 1834 she published her Conversa- tions with Lord Byron. Her Idler in Italy (1839-1840), and Idler in France (1841) were popular for their personal gossip and anecdote, descriptions of nature and sentiment. Early in 1849, Count D'Orsay left Gore House to escape his creditors; the furniture and decorations were sold, and Lady Blessington joined the count in Paris, where she died on the 4th of June 1849.

Her Literary Life and Correspondence (3 vols.), edited by R. R. Madden, appeared in 1855. Her portrait was painted in 1808 by Sir Thomas Lawrence.

BLIDA, a town of Algeria, in the department of Algiers, 32 m. by

railway S.W. from Algiers, on the line to Oran. Pop. (1906) 16,866. It lies surrounded with orchards and gardens, 630 ft. above the sea, at the base of the Little Atlas, on the southern edge of the fertile plain of the Metija, and the right bank of the Wad-el-Kebir affluent of the Chiffa. The abundant water of this stream provides power for large corn

mills and several factories, and also supplies the town, with its numerous fountains and irrigated gardens. Blida is surrounded by a wall of considerable extent, pierced by six gates, and is further defended by Fort Mimieh, crowning a steep hill on the left bank of the river. The present town, French in character, has well-built modern streets with many arcades, and numbers among its buildings several mosques and churches, extensive barracks and a large military hospital. The principal square, the place d'Armes, is surrounded by arcaded houses and shaded by trees. The centre of a fertile district, and a post on one of the main routes in the country, Blida has a flourishing trade, chiefly in oranges and flour. The orange groves contain over 50,000 trees, and in April the air for miles round is laden with the scent of the orange blossoms. In the public gardens is a group of magnificent olive trees. The products of the neigh- • bouring cork trees and cedar groves are a source of revenue to the .town. In the vicinity are the villages of Joinville and Montpensier, which owe their origin to military camps estab- lished by Marshal Valee in 1838; and on the road to Medea are the tombs of the marabout Mahommed-el-Kebir, who died in 1580, and his two sons.

Blida, i.e. boleida, diminutive of the Arab word belad, city, occupies the site of a military station in the time of the Romans, but the present town appears to date from the 16th century. A mosque was built by order of Khair-ed-din Barbarossa, and under the Turks the town was of some importance. In 1825 it was nearly destroyed by an earthquake, but was speedily rebuilt on a site about a mile distant from the ruins. It was not till 1838 that it was finally held by the French, though they had been in possession for a short time eight years before. In April 1906 it was chosen as the place of detention of Behanzin, the ex-king of Dahomey, who died in December of that year.

Blida is the chief town of a commune of the same name, having (1906) a population of 33, 332.

BLIGH, WILLIAM (1754-1817), English admiral, was born of a good Cornish family in 1754. He accompanied Captain Cook in his second expedition (177 2-1 774) as sailing-master of the ” Resolution.” During the voyage, the bread-fruit, already known to Dampier, was found by them at Otaheite; and after seeing service under Lord Howe and elsewhere, ” Bread-fruit Bligh,” as he was nicknamed, was despatched at the end of 1787 to the Pacific in command of H.M.S. ” Bounty,” for the purpose of introducing it into the West Indies from the South Sea Islands. Bligh sailed from Otaheite, after remaining there about six months; but, when near the Friendly Islands, a mutiny (April 28, 1789) broke out on board the “Bounty,” headed by Fletcher Christian, the master’s mate, and Bligh, with eighteen others, was set adrift in the launch. The mutineers themselves settled on Pitcairn Island (q.v.), but some of them were after- wards captured, brought to England and in three cases executed. This mutiny, which forms the subject of Byron’s Island, did not arise so much from tyranny on the part of Bligh as from attachments contracted between the seamen and the women of Otaheite. After suffering severely from hunger, thirst and storms, Bligh and his companions landed at Timor in the East Indies, having performed a voyage of about 4000 m. in an open boat. Bligh returned to England in 1790, and he was soon afterwards appointed to the ” Providence,” in which he effected the purpose of his former appointment by introducing the bread-fruit tree into the West India Islands. He showed great courage at the mutiny of the Nore in 1797, and in the same year took part in the battle of Camperdown, where Admiral Duncan defeated the Dutch under De Winter. In 1801 he commanded the ” Glatton ” (54) at the battle of Copenhagen, and received the personal commendations of Nelson. In 1805 he was appointed ” captain general and governor of New South Wales.” As he made himself intensely unpopular by the harsh exercise of authority, he was deposed in January 1808 by a mutiny headed by Major George Johnston of the 102nd foot, and was imprisoned by the mutineers till 1810. He re- turned to England in 1811, was promoted to rear-admiral in

that year, and to vice-admiral in 1814. Major Johnston was tried by court martial at Chelsea in 181 1, and was dismissed the service. Bligh, who was an active, persevering and courageous officer, died in London in 18 1 7.

BLIND, MATHILDE (1841-1896), English author, was born at Mannheim on the 21st of March 1841. Her father was a banker named Cohen, but she took the name of Blind after her step-father, the political writer, Karl Blind (1 826-1 907), one of the exiled leaders of the Baden insurrection in 1 848-1 849, and an ardent supporter of the

various 19th-century movements for the freedom and autonomy of struggling nationalities. The family was compelled to take refuge in England, where Mathilde devoted herself to literature and to the higher education of women. She produced also three long poems, ” The Prophecy of St Oran ” (1881), ” The Heather on Fire” (1886), an in- dignant protest against the evictions in the Highlands, and ” The Ascent of Man ” (1888), which was to be the epic of the theory of evolution. She wrote biographies of George Eliot (1883) and Madame Roland (1886), and translated D.F. Strauss’s The Old Faith and the New (1873-1874) and the Memoirs of Marie Bashkirtsefi (1890). She died on the 26th of Nov- ember 1896, bequeathing her property to Newnham College, Cambridge.

A complete edition of her poems was edited by Mr Arthur Symons in 1900, with a biographical introduction by Dr Richard Garnett.

BUND HOOKEY, a game of chance, played with a full pack of cards. The deal, which is an advantage, is decided as at whist, the cards being shuffled and cut as at whist. The dealer gives a parcel of cards to each player including himself. Each player puts the amount of his stake on his cards, which he must not look at. The dealer has to take all bets. He then turns up his parcel, exposing the bottom card. Each player in turn does the same, winning or losing according as his cards are higher or lower than the dealer’s. Ties pay the dealer. The cards rank as at whist. The suits are of no importance, the cards taking precedence according to their face-value.

BLINDING, a form of punishment anciently common in many lands, being inflicted on thieves, adulterers, perjurers and other criminals. The inhabitants of Apollonia (Illyria) are said to have inflicted this penalty on their ” watch ” when found asleep at their posts. It was resorted to by the Roman emperors in their persecutions of the Christians. The method of destroying . the sight varied. Sometimes a mixture of lime and vinegar, or barely scalding vinegar alone, was poured into the eyes. Some- times a rope was twisted round the victim’s head till the eyes started out of their sockets. In the middle ages the punishment seems to have been changed from total blindness to a permanent injury to the eyes, amounting, however, almost to blindness, produced by holding a red-hot iron dish or basin before the face. Under the forest laws of the Norman kings of England blinding was a common penalty. Shakespeare makes King John order his nephew Arthur’s eyes to be burnt out.

BLINDMAN’S-BUFF (from an O. Fr. word, buffe, a blow, especially a blow on the cheek), a game in which one player is blindfolded and

made to catch and identify one of the others, who in sport push him about and ” buffet ” him.

BLINDNESS, the condition of being blind (a common Teutonic word), i.e. devoid of sight (see also Vision; and Eye: Diseases). The data furnished in various countries by the census of 1901 showed generally a decrease in blindness, due to the progress in medical science, use of antiseptics, better sanitation, control of infectious diseases, and better protection in shops and factories. Blindness is much more common in hot countries than in temperate and cold regions, but Finland and Iceland are excep- tions to the general rule. 1 In hot countries the eyes are affected by the glaring sunlight, the dust and the dryness of the air. From statistics in Italy, France and Belgium, localities on the coast seem to have more blind persons than those at a distance from the sea.

1 There are no late returns for Iceland, but the last available statistics gave 3400 per million. A paper written in 1903 on blindness in Egypt stated that 1 in every 50 of the population was blind.

The following table gives the number of blind persons as reported in the census of each country. Unless otherwise stated, it refers to the statistics of 1900.

Country.

Austria

Belgium

Canada

Denmark

England

France

Finland l

Germany

Hungary

Ireland

Italy

Holland (1890)

Norway

Portugal

Sweden

Switzerland (1895) ....

Scotland

Spain (1877)

Russia

United States (corrected census)

Total Number.

Number

per Million

of Population.

14.582 3448 3279 1047

25.317

27.174

3229

34.334

19.377

4 2 63

38,160

2114

1879

5650

3413

2107

3253 24,608

85,662

540

487

610

427

778

698 1191

609 1006

954 1 175

414

838 1040

664

722

727

1006

about 2000

1125

Causes and Prevention There are many cases of complete or partial blindness which might have been prevented, and a knowledge of the best methods of prevention and cure should be spread as widely as possible. Magnus, Bremer, Steffen and Rossler are of opinion that 40

% of the cases of blindness might have been prevented. Hayes gives 33.35% as positively avoidable, 38-75% possibly avoidable, and 46 • 2 7 % as a conservative estimate. Cohn regards blindness as certainly preventable in 33 %, as probably preventable in 43 %, and as quite unpreventable in only 24 %. If we take the lowest of these figures, and assume that 400 out of every 1000 blind persons might have been saved from such a calamity, we realize the importance of preventative measures. For the physiology and pathology of the eye generally, see Vision and

Eye.

The great majority of these cases are due to infantile purulent ophthalmia. This arises from inoculation of the eyes with hurtful material at time of birth. If the contagious Ophthal- discharges are allowed to remain, violent inflammation mia ‘ is set up which usually ends in the loss of sight. It

depends on the presence of a microbe, and the effective applica- tion of a weak solution of nitrate of silver is curative, if made in a proper manner at an early period of the case. In Germany, midwives are expressly prohibited by law from treating any affection of the eyes or eyelids of infants, however slight. On the appearance of the first symptoms, they are required to represent to the parents, or others in charge, that medical assistance is urgently needed, or, if necessary, they are themselves to report to the local authorities and the district doctor. Neglect of these regulations entails liability to punishment. Eleven of the United States of America have enacted laws requiring that, if one or both eyes of an infant should become inflamed, swollen or reddened at any time within two weeks of its birth, it shall be the duty of the midwife or nurse having charge of such infant to report in writing within six hours, to the health officer or some legally qualified physician, the fact that such inflammation, swelling or redness exists. The penalty for failure to comply is fine or imprisonment.

The following weighty words, from a paper prepared by Dr Park Lewis, of Buffalo, N.Y., for the American Medical Associa- tion, show that laws are not sufficient to prevent evil, unless supported by strong public sentiment: —

” When an enlightened, civilized and progressive nation quietly and passively, year after year, permits a multitude of its people un- necessarily to become blind, and more especially when one-quarter

1 Previous returns from Finland have shown a much larger number of

blind persons, but these statistics were supplied by the British consul in St Petersburg from the last census.

of these are infants, the reason for such a startling condition of affairs demands explanation. That such is the fact, practically all reliable ophthalmologists agree. •

” From a summary of carefully tabulated statistics it has been demonstrated that at least four-tenths of all existing blindness might have been avoided had proper preventative or curative measures been employed, while one-quarter of this, or one-tenth of the whole, is due to ophthalmia neonatorum, an infectious, prevent- able and almost absolutely curable disease. Perhaps this statement will take on a new meaning when it is added that there are in the state of New York alone more than 6000, and in the United States more than 50,000 blind people; of these 600 in the one state, and 5000 in the country, would have been saved from lives of darkness and unhappiness, in having lost all the joys that come through sight, and of more or less complete dependence — for no individual can be as self-sufficient without as with eyes — if a simple, safe and easily applied precautionary measure had been taken at the right time and in the right way to prevent this affliction. The following three vital facts are not questioned, but are universally accepted by those qualified to know : —

” 1. The ophthalmia of infancy is an infectious germ disease. ” 2. By the instillation of a silver salt in the eyes of a new-born infant the disease is prevented from developing in all but an exceed- ingly small number of the cases in which it would otherwise have appeared. .

” 3. In practically all those few exceptional cases the disease is absolutely curable, if like treatment is employed at a sufficiently early period. < .

” Since these facts are no longer subjects of discussion, but are universally accepted by all educated medical men, the natural inquiry follows: Why, as a common-sense proposition, are not these simple, harmless, preventive measures invariably employed} and why, in consequence of this neglect, does a nation sit quietly and indifferently by, making no attempt to prevent this enormous and needless waste of human eyes ? _

” The reasons are three-fold, and lie — first, with the medical profession; second, with the lay public; third, with the state.

” For the education of its blind children annually New York alone pays per capita at least $350, and a yearly gross sum amounting to much more than $100,000. If, as sometimes happens, the blind citizen is a dependent throughout a long life, the cost of maintenance is not less than $10,000, and the mere cost in money will be multi- plied many times in that a productive factor, by reason of blindness, has been removed from the community. ,,■•■’

” If, therefore, as an economic proposition, it were realized how vitally it concerns the state that not one child shall needlessly become blind, thereby increasing the public financial burden, there is no doubt that early and effective measures would be instituted to protect the state from this unnecessary and extravagant expenditure of public funds. ...

” Eleven states have passed legislative enactments requiring that the midwife shall report each case to the proper health authority, and affixing a penalty for the failure to do so. As has been intimated, however, it is not by any means always under the ministration of midwives that these cases occur, and, like all laws behind which is not a strong and well-informed public sentiment, this law is rarely enforced. A more effective method must be devised. Every physician having to do with the parturient woman, every obstet- rician, every midwife, must be frequently and constantly advised of the dangers and possibilities of this disease, the necessity of prevention, and the value of early and correct treatment. They must then have placed in their hands, ready for instant use, a safe and efficient preparation, issued by the health authorities as a guarantee as to its quality and efficiency.

” An important step was taken in this direction when a resolution was passed by the House of Delegates at the annual meeting of the New York State Medical Society, requesting the various health officers of the state to include ophthalmia neonatorum among contagious diseases which must be reported to the local boards of health. .....

” The second essential, in order that the cause of infantile ophthalmia be abolished, is that a solution of the necessary silver salt be prepared under the authority of somebody capable of in- spiring universal confidence, and that it be distributed by the health department of every state gratuitously to every obstetrician, physician or midwife qualified to care for the parturient woman. The nature of the solution, together with the character of the descriptive card which should accompany it, should be determined by a committee, chosen by the president of the American Medical Association, which should have

among its members at least one representative ophthalmologist, one obstetrician and one sanitarian; The conclusions of this committee should be reported back to the House of Delegates, so that the preparation and its text should carry with it, on the great authority of this association, the assurance that the solution is entirely safe and necessary, and that its use should invariably be part of the toilet of every new-born child, lne solution, probably silver nitrate, could be put up either by the state itself or by some trustworthy pharmacist, at an insignificant cost; its purity and sterility should be vouched for by the board of health of the state. It should be enclosed in specially prepared receptacles,

each containing a special quantity, and so arranged that it may be used drop by drop. These, properly enclosed, accompanied by a brief lucid explanation of the danger of the disease, the necessity of this germicide, the method of its employment, and the right subse- quent care of the eyes, should be sent to the obstetrician on the receipt of each birth certificate.

” I have said that responsibility for the indifference that is annu- ally resulting in such frightful disaster lies primarily with the state, the public and the medical profession.

” The state is already aroused to the necessity of taking effective measures to wipe out this controllable plague. Bills have been introduced in the legislature of Massachusetts and of New York, providing for the appointment of commissions for the blind, one of whose duties w i” De to study the causes of unnecessary blindness and to suggest preventative measures.”

One of the most common diseases of the eye is trachoma, often dalled “granular lids,” because the inner surface of the lid _ . seems to be covered with little granulations. The

‘ disease sometimes lasts for years without causing blindness, though it gives rise to great irritation. It is generally attended by a discharge, which is highly contagious, producing the same disease if it gets into other eyes. Want of cleanliness is one of the most important factors in the propagation of trachoma, hence its great prevalence in Oriental countries. Trachoma is very prevalent in Egypt, where those suffering from total or partial blindness are said to amount to 10% of the

population. During Napoleon's Egyptian campaign, nearly every soldier, out of an army of 32,000 men, was affected. During the following twenty years the disease spread through almost all European armies. In the Belgian army, there was one trachomatous soldier out of every five, and up to 1834 no less than 4000 soldiers had lost both eyes and 10,000 one eye. It is a disease which is very common in workhouse schools, orphan asylums and similar establishments. Unlike ophthalmia of riew-born children, it is difficult to cure, and a total separation of the diseased from the healthy children should be effected.

About one-half of those who are blinded by injuries lose the second eye by sympathetic ophthalmia. It is a constant source of danger to those who retain an eye blinded by thetic injury. Blindness from this cause can be prevented

Inflamma- by the removal of the injured eye, but unfortunately ilon ' the proposal often meets with opposition from the

patient.

Glaucoma is a disease which almost invariably leads to total

blindness; but in most cases it can be arrested by Glaucoma. . ' . . _

a simple operation if the case is seen suffi- ciently early.

Myopia, or " short-sight," makes itself apparent in children between the ages of seven and nine. Neglect of a year or two may do serious mischief. Short-sight, when not inherited, is produced by looking intently and con- tinuously at near objects. Children should be encouraged to describe objects at a distance, with which they are unacquainted, and parents should choose out-door occupations and amusements for children who show a tendency to short- sightedness.

A report was issued in 1906, by the school board of Glasgow, as to an investigation by Dr H. Wright Thomas, ophthalmic surgeon, regarding the eyesight of school children, which in- cludes the following passage. Dr Wright Thomas states that the teachers tested the visual acuteness of 52,493 children, and found 18,565, or 35%, to be below what is regarded as the normal standard. He examined the 18,565 defectives by retino- scopy, and found that 11,209, or 21 % of the whole, had ocular defects. The proportion of these cases was highest in the poor and closely-built districts and in old schools, and was lowest in the better-class schools and those near the outskirts of the city. Defective vision, apart from ocular defect, seems to be due partly

to want of training of the eyes for distant objects and partly to exhaustion of the eyes, which is easily induced when work is carried on in bad light, or the nutrition of the children is defective from bad feeding and unhealthy surround- ings. Regarding training of the eyes for distant objects, much might be done in the infant department by the total abolition of sewing, which is definitely hurtful to such young eyes, and

Short- sight.

the substitution of competitive games involving the recognition of small objects at a distance of 20 ft. or more. An annual testing by the teachers, followed by medical inspection of the children found defective, would soon cause all existing defects to be corrected, and would lead to the detection of those which develop during school life.

History of Institutions

Although there is a record of a hospital established by St Basil at Caesarea, Cappadocia, in the 4th century, a refuge by the hermit St Lymnee (d. c. 455) at Syr, Syria, in the 5th century, and an institution by St Bertrand, bishop of Le Mans, in the 7th century, the first public effort to benefit the blind was the founding of a hospital at Paris, in 1260, by Louis IX., for 300 blind persons. The common legend is that he founded it as an asylum for 300 of his soldiers who had become blinded in the crusade in Egypt, but the statutes of the founder are preserved, and no mention is made of crusaders. This Hospice des Quinze- Vingts, increased by subsequent additions to its funds, still assists the adult blind of France. The pensioners are divided into two classes — those who are inmates of the hospital (300), and those who receive pensions in the form of out -door relief. All appointments to inmates or pensions are vested in the minister of the Interior, and applicants must be of French nationality, totally blind and not less than forty years of age.

From the time of St Louis to the 18th century, there are records of isolated cases of blind persons who were educated, and of efforts to devise tangible apparatus to assist them.

Girolamo Cardan, the 16th-century Italian physician, con- ceived the idea that the blind could be taught to read and write by means of touch. About 1517 Francesco Lucas in Spain, and Rampazetto in Italy, made use of large letters cut in wood for instructing the blind. In 1646 a book, on the condition of the blind, was written by an Italian, and published in Italian and French, under the title of L'Aveugle afflige et

consols. In 1670 a book was written on the instruction of the blind by Lana Terzi, the Jesuit. In 1676 Jacques Bernoulli, the Swiss savant, taught a blind girl to read, but the means of her in- struction were not made known. In 1749 D. Diderot wrote his Leltre'sur Us aveugles a I' usage de ceux qui voient, to show how far the intellectual and moral nature of man is modified by blindness. Dr S. G. Howe, who many years after translated and printed the "Letter" in embossed type, characterizes it as abounding with errors of fact and inference, but also with beauties and suggestions. The heterodox speculations contained in his "Letter on the Blind " caused Diderot to be imprisoned three months in the Bastille. He was released because his services were required for the forthcoming Encyclopaedia. Rousseau visited Diderot in prison, and is reported to have suggested a system of embossed printing. J. Locke, G. W. Leibnitz, Molineau and others discussed the effect of blindness on the human mind. In Germany, Weissembourg had used signs in relief and taught Mile Paradis.

Prior to the 18th century, blind beggars existed in such numbers that they struggled for standing room in positions favourable for asking alms. Their very affliction led to their being used as spectacles for the amusement of the populace. The degraded state of the masses of the blind in France attracted the attention of Valentin Hauy. In 1 771, at the annual fair of St Ovid, in Paris, an innkeeper had a group of blind men attired in a ridiculous manner, decorated with peacock tails, asses' ears, and pasteboard spectacles without glasses, in which condition they gave a burlesque concert, for the profit of their employer. This sad scene was repeated day after day, and greeted with loud laughter by the gaping crowds. Among those who gazed at this outrage to humanity was the philanthropist Valentin Hauy, who left the disgraceful scene full of sorrow. " Yes," he said to himself, " I will substitute truth for this mocking parody. I will make the blind to read, and they shall be enabled to execute harmonious music." Hauy collected all the infor- mation he could gain respecting the blind, and began teaching a blind boy who had gained his living by begging at a church

door. Encouraged by the success of his pupil, Hatty collected other blind persons, and in 1785 founded in Paris the first school for the blind (the Institution Nationale des Jeunes Aveugles), and commenced the first printing in raised characters. In 1786, before Louis XVI. and his court at Versailles, he exhibited the attainments of his pupils in

reading, writing, arithmetic, geo- graphy and music, and in the same year published an account of his methods, entitled Essai sur V education des aveugles. As the novelty wore off, contributions almost came to an end, and the Blind School must have ceased to exist, had it not been taken, in 1 791, under the protection of the state.

The emperor of Russia, and later the dowager empress, having learned of Hatty's work, invited him to visit St Petersburg for the purpose of establishing a similar institution in the Russian capital. On his journey Haiiy was invited by the king of Prussia to Charlottenburg. He took part in the deliberations of the Academy of Sciences in Berlin, and as a result a school was founded there.

Edward Rushton, a blind man, was the projector of the first institution for the blind in England — the School for the Indigent Blind, Liverpool. In 1790 Rushton suggested to the literary and philosophical society of which he was a member, the estab- lishment of a benefit club for the indigent blind. The idea was communicated to his friend, J. Christie, a blind musician, and the latter thought the scheme should also include the instruc- tion of young blind persons. They circulated letters amongst individuals who would be likely to give their assistance, and the Rev. Henry Dannett warmly advocated the undertaking. It was mainly due to his co-operation and zeal that Messrs Rushton and Christie's plan was carried out, and the Liverpool asylum was opened in 1791. Thomas Blacklock of Edinburgh, a blind poet and scholar, translated Hatty's work on the Education of the Blind. He interested Mr David Millar, a blind gentle- man, the Rev. David Johnston and others in the subject, and after Blacklock's death the Edinburgh Asylum for the Relief of the Indigent and Industrious Blind was established (1793). Institutions were established in the United Kingdom in the following order : —

School for the Indigent Blind, Liverpool . . . 1791

Royal Blind Asylum, Edinburgh 1793

Bristol Asylum 1793

School for the Indigent Blind, Southwark (now

removed to Leatherhead) 1799

Norwich Asylum and School 1805

Richmond Asylum, Dublin 1810

Aberdeen Asylum 1812

Molyneux Asylum, Dublin 1815

Glasgow Asylum and School 1827

Belfast School 1 83 1

Wilberforce School, York 1833

Limerick Asylum 1834

London Society for Teaching the Blind to Read, St

John's Wood, N 1838

Royal Victoria School for the Blind, Newcastle-on-

Tyne 1838

West of England Institute for the Blind, Exeter . 1838

Henshaw's Blind Asylum, Manchester . . . 1839

County and City of Cork Asylum …. 1840

Catholic Asylum, Liverpool. ….. 1841

Brighton Asylum 1842

Midland Institute for the Blind, Nottingham . . 1843

General Institute for the Blind, Birmingham . . 1848

Macan Asylum, Armagh …... 1854

St Joseph's Asylum, Dublin 1858

St Mary's Asylum, Dublin 1858

Institute for the Blind, Devonport i860

South Devon and Cornwall Institute for the Blind,

Plymouth i860

School for the Blind, Southsea 1864

Institute for the Blind, Dundee 1865

South Wales Institute for the Blind, Swansea . 1865

School for the Blind, Leeds 1866

College for the Sons of Gentlemen, Worcester . 1866

Northern Counties Institute for the Blind, Inverness 1866 Royal Normal College and Academy of Music for the

Blind, Upper Norwood 1872

School for the Blind, Sheffield 1879

Barclay Home and School for Blind Girls, Brighton 1893

Homes for Blind Children, Preston . . . . 1895 North Stafford School, Stoke-on-Trent . . .1897

Many of the early institutions were asylums, and to the present day schools for the blind are regarded by the public as asylums rather than as educational establishments. With nearly all these schools workshops were connected. In 1856 Miss Gilbert, the blind daughter of the bishop of Chichester, established a workshop in Berners Street, London, and since that date workshops have been started in many of the provincial towns. .....

After the beginning of the 19th century, institutions for the blind were established in various parts of Europe. The iristitur tion at Vienna was founded in 1804 by Dr W; Klein, a blind man, and he remained at its head for fifty years. That of Berlin was established in 1806, Amsterdam, Prague and Dresden in 1808, Copenhagen in 181 1. There are more than 150 on the European continent, most of them receiving aid from the government, and being under government supervision.

The first school for the blind in the United States was founded in Boston, Mass., chiefly through the efforts of DrJohnD. Fisher, a young physician who visited the French school. It was incorporated in 1829, and in honour of T.H. Perkins (1764-1854) who gave his mansion to the institution was named the Perkins In r stitution and Massachusetts Asylum (now School) for the Blind. Aid was granted by the state from the beginning. In 183 1 Dr Samuel G. Howe (q.v.) was appointed director, and held that position for nearly forty-four years, being succeeded by his son-in-law Michael Anagnos (d. 1906), who established a kinder- garten for the blind at Jamaica Plain, in

connexion with the Perkins Institution. Dr Howe was interested in many charitable and sociological movements, but his life-work was on behalf of the blind. One of his most notable achievements was the education of Laura Bridgman (q.v.), who was deaf, dumb and blind, and this has since led to the education of Helen Keller and other blind deaf-mutes. The New York Institution was incorporated in 183 1, and the Pennsylvania Institution was founded at Philadelphia by the Society of Friends in 1833. The Ohio was founded at Columbus in 1837, Virginia at Staunton in 1839, Kentucky at Louisville in 1842, Tennessee at Nashville in 1844, and now every state in the Union makes provision for the education of the blind.

Statistics

In England and Wales the total number of persons returned in 1901 as afflicted with blindness was 25,317, being in the proportion of 778 per million living, or 1 blind persdn • in every 1285 of the population. The following table England shows that the proportion of blind persons to popula- Wahs. ‘ tion has diminished at each successive enumeration since 1851, in which year particulars of those afflicted in this manner were ascertained for the first time. It will, however, be noted that, although the decrease in the proportion of blind in the latest intercensal period was still considerable, yet the rate of decrease which had obtained between 1871 and 1891 was not maintained. –

Number of

Blind per Million

Persons Living to

Year.

Blind.

of the Population.

one Blind Person,;

1851

18,306

1 02 1

979

1861

19.352

964

1037

1871

21,590

951

1052

1881

22,832

879

.■• 1138 : –

1891

23.467

809

1236 .

1901

.25,317

778

1285

The following table, which gives the proportions of blind per million living at the earlier age-groups, shows that in the decennium 1891-1901, as also in recent previous intercensal periods, there was a decrease in the proportion of blind children in England and Wales generally; it thus lends support to the contention, in the General Report for 1891, that the decrease was due either to the lesser prevalence, or to the more efficient treatment, of purulent ophthalmia and other infantile maladies which may result in blindness.

BLINDNESS

63

Age-Period.

1851

1861

1871

1881

1891

1901

Under 5 years

5-10

10-15

15-20

20-25

198 297

365 416 481

196 256 366 415

443

185

259 }

359) 404

45i

166

288

388 422

, *55

(188

(290

370

385

129 192 323 329 359

Total under 25

339

322

317

298

269

261

In 1886 a royal commission on the Wind, deaf and dumb was appointed by the government, and, after taking much valuable evidence, issued an exhaustive and instructive report. Following on the practical recommendations submitted by this commission, the Elementary Education (Blind and Deaf Children) Act 1893, was passed, under which the education of the blind became for the first time compulsory. In terms of this statute, the school authorities were made responsible for the provision of suitable elementary education for blind children up to sixteen years of age, and grants. of £3, 3s. for elementary subjects, and of £2, 2s. for industrial training, were contributed by the state towards the cost of educating children in schools certified as efficient within the meaning of the. Elementary Education Act 1876. The principal aim of the Education Act of 1893 was to supply education in some useful profession or trade which will enable the blind to earn their livelihood and to become useful citizens; but the weak spot was that no provision was made therein for the completion of their education and industrial training after the age of sixteen.

In England and Wales, in 1907, there were twenty-four resident schools and forty-three workshops for the blind. In many of the large towns, day classes for the education of blind children have been established by local education authorities. There are forty-six home teaching societies, who send teachers to visit the blind in their homes, to teach adults who wish to learn to read, to act as colporteurs, to lend and exchange useful books, and to act as Scripture readers to those who are aged and infirm. All the home teaching societies for the blind and many public . libraries lend embossed books. The public library at Oxford has nearly 400 volumes of classical works for the use of university students.

A society was instituted in 1847 by ˆ r W. Moon for stereo- typing and embossing the Scriptures and other books in ” Moon ” type. The type has been adapted to over 400 languages and dialects. After Dr Moon’s death in 1884 the work was carried on by his daughter, Miss Adelaide Moon, and the books are much used by the adult blind.

In 1868 Dr T. R. Armitage, being aware of the great improve- ments which had been made in the education of the blind in other countries, founded the British and Foreign Blind Associa- tion. This association was formed for the purpose of promoting the education and employment of the blind, by ascertaining what had been done in these respects in various countries, by endeavouring to supply deficiencies where these were found to exist, and by attempting to bring about greater harmony of action between the different existing schools and institutions. It gave a new impetus to the education and training of the blind in the United Kingdom. At that time their education was in a state of chaos. The Bible, or a great part of it, had been printed in five different systems. The founders took as an axiom ; that the relative merits of .the various methods of education through the sense of touch should be decided by those and those only who have to rely on this sense. The council, who were all totally or partially blind, spent two years in comparing the different systems of embossed print. In 1869 and 1870 Dr Armitage corresponded with Dr J. R. Russ in regard to the New York Point. No trouble was spared to arrive at a right conclu- sion. The Braille system was finally adopted, and the association at once became a centre for supplying frames for writing Braille, printed books, maps, music and other educational apparatus for the blind. All books printed by the association are printed from stereotyped plates embossed by blind copyists. About 3000 separate works, varying in length from 1 to 12 volumes,

have been copied by hand to meet the requirements of public libraries and individuals. About 700 ladies, who give their services, make the

first Braille copy of these books, and they are recopied by “blind scribes, chiefly women and girls, who are paid for their work.

The National Lending library, London, was founded in 1882. It has over 5500 volumes in Braille and other types. Books are forwarded to all parts of the United Kingdom.

There are fourteen magazines published in embossed type in the United Kingdom. ■•

There are thirty-six pension societies — the principal are Hetherington’s, Day’s, the Qothworkers’, the Cordwainers’, the National Blind Relief Society, Royal Blind Pension Society and Indigent Blind Visiting Society.

The Gardner Trust administers the income of £300,000 left by Henry Gardner in 1879. The income is used for in- structing the blind in the profession of music, in suitable trades, handicrafts and professions other than music, for pensions, and free grants to institutions and individuals for special purposes.

According to the census of 1901, Scotland had ˆ253 (or 727 per million) blind persons, as against 2797 in 1891, but in a paper read at the conference in Edinburgh, 1906, the superintendent .

of the Glasgow Mission to the Out-door Blind’ stated Scotiana – that there were 758 employed or being educated in institutions, and 3238 known as ” out-door blind,” making a total of 3996. . There are in Scotland ten missions, so distributed as to cover the whole country, and regular visits are made as far north as the Orkney and Shetland Islands. In carrying on the work, there are twenty-four paid missionaries or teachers and a large number of voluntary helpers. These societies originated in a desire to teach the blind to read in their own homes, and to provide them with the Scriptures and other religious books, but the social, intellectual and temporal needs of the blind also receive a large share of attention. These teachers afford the best means of circulating embossed literature, therefore the library committee of the Glasgow corporation has agreed to purchase books and place them in the mission library instead of in the public library. As the institutions provide for only a small number of the blind, strenuous efforts are made by the committee and teachers of missions to find some employment for the many adults who come under their care.

In Glasgow, a ladies’ auxiliary furnishes work for 150 knitters, and

takes the responsibility of disposing of their work. In Scotland there are five schools for the young blind, and in connexion with each is a workshop for adults. In Edinburgh the school is at West Craigmillar, and the workshop in the city, but both are under the same board of directors.

According to the census of 1901, there were 4253 totally blind persons in Ireland, a proportion of 954 per million, as against 1 135 in 1891. Of these, 2430 were over 60 years of age and II over 100. These figures do not include the partially Ireland. blind, who numbered 12 17. The fact that so many aged blind persons are to be found in Ireland is doubtless due to an ophthalmic epidemic which occurred during the Irish famine. There are twelve institutions, a home mission and home teaching society; nine of these institutions are asylums, that system having been largely adopted in Ireland. The scarcity of manufacturing industries, except in a few northern counties, entails a lack of work suited to the blind. The Elementary Education Act (Blind and Deaf) does not extend to Ireland.

The following table gives the number of blind in age-groups in 1901 : —

Age-Period.

Number.

Age-Period.

Number.

Under 5 years

10

50-55

392

5-10

38

55-6o

314

10-15

64

60-65

617

15-20

73

65-70

382

20-25

95

70-75

540

25-30

116

75-80

306

30-35

146

80-85

37 2

35-40

146

85-90

118

40-45

205

95 and upwards

95

45-50

224

In the Dominion of Canada, South Africa, the states of the Australian Commonwealth and New Zealand, provision is made by the government for the education of the young blind, and in some cases for training the adults in handicrafts. Embossed literature is carried free of expense, and on the Victorian railways no charge is made for the guide who accompanies a blind person.

British Colonies.

6 4

The following were the census returns for 1901 : —

Victoria

. 1082

Tasmania .

173

New South Wales

. 884

New Zealand .

274 (1891)

South Australia

• 315

Natal . . .

68

Queensland

. 209

Cape Colony .

2802 (1904)

West Australia

. 121

Canada

3279

United States.

In Australia there are institutions for the blind at Melbourne, Sydney, Adelaide, Brighton, Brisbane and Maylands near Perth. In New Zealand the institution is at Auckland.

InCapeColony, between 1875 and 1891, there was an extraordinary increase in blindness, but between 1891 and 1904 the rate per 10,000 has decreased 23-78 %. There is an institution at Worcester for deaf-mutes and blind, founded in 1 88 1. It is supported by a government grant, fees and subscription.

Schools for the blind were established by the Dominion government at Brantford, Ontario (1871), and Halifax, Nova Scotia (1867).

In Montreal there are two private institutions, the M'Kay Institute for Protestant Deaf-Mutes and Blind, and a school for Roman Catholic children under the charge of the Sisters of Char- ity.

In the United States the education of the blind is not regarded as a charity, but forms

part of the educational system of the

country, and is carried on at the

public expense. According to the A nnualReporloi the Commissioner

of Education for 1908, there were 40 state schools, with 4340 pupils. The value of apparatus, grounds and buildings was $9,201,161. For salaries and other expenditure, the aggregate was $1,460,732. The United States government appropriates $10,000 annually for printing em- bossed books, which are distributed among the different state schools for the blind. Beside these state schools, there are workshops for the blind subsidized by the state government or the municipality. Commissions composed of able men have recently been appointed in several of the states to take charge of the affairs of the blind from infancy to old age. The ex- haustive summary of the 12th census enables these commissions to communicate with every blind person in their respective states. At the 1 2th census a change was made in the plan for securing the returns, and the work of the enumerators was restricted to a brief preliminary return, showing only the name, sex, age, post office address, and nature of the existing defects in all persons alleged to be blind or deaf. Dr Alexander Graham Bell, of Washington, D.C., was appointed expert special agent of the census office for the preparation of a report on the deaf and blind. He was empowered to conduct in his own name a correspondence relating to this branch of the census inquiry. A circular con- taining eighteen questions was addressed to every blind person given in the census, and from the data contained in the replies the following tables (I., II., III., IV.) have been compiled.

Table I. — The Blind, by Degree of Blindness and Sex.

BLINDNESS

The enumerators reported a total of 101,123 persons alleged to be blind as defined in the instructions contained in the schedules, but this number was greatly reduced as a result of the correspondence directly with the individuals, 8842 reporting that the alleged defect did not exist, and 6544 that they were blind only in one eye but were able to see with the other, and hence did not come within the scope of the inquiry. No replies were received in 19,884 cases in which personal schedules were sent, although repeated inquiries were made; consequently these cases were dropped. In 380 cases the personal schedules returned were too incomplete for use, and in 75 cases duplication was discovered. The number of cases remaining for statistical treatment, after making the eliminations

Table II. — The Blind, by Degree of Blindness, Age-Periods, Colour and Nativity.

Degree of Blindness and Age- Period.

All Classes.

White.

Coloured.

Total.

Native.

Foreign- born.

Number — ■ The blind . . Under 20 years . 20 years and over Age unknown.

64,763

8,308

56,165

290

56,535

7,252

49,067

216

45,479

6,937

38,388

154

10,694

231

10,420

43

8228

1056

7098

74

The totally blind Under 20 years . 20 years and over Age unknown.

35,645

4,123

31,363

159

30,359

3,543

26,704

112

23,636

3,377

20,179

80

6,511

129

6,363

19

5286

580

4659

47

The partially blind Under 20 years . 20 years and over Age unknown.

29,118

4,185 24,802

131

26,176

3,709

22,363

104

21,843

3,56o

18,209

74

4,i83

102

4,057 24

2942 476

2439

27

Number per 1 ,000,000

population of same age — ■

The blind ….

Under 20 years .

20 years and over

852

247

1,334

846

250

1,305

804

248

1,348

1,047

215

i,H3

896

229

1574

The totally blind Under 20 years . 20 years and over

469 123

745

454 122 710

418 121 708

637 120 698

576

126

1033

The partially blind Under 20 years . 20 years and over

-383 124

589

392

128

595

386 127 639

410 95

445

320 103

54i

Sex.

The Blind.

The

Totally

Blind.

The

Partially

Blind.

Number —

Total

Male

64,763

37,°H

27,709

35,645 20,144 15,501

29,n8

16,910 12,208

Per cent distribution —

Total

Male

1000

57-2 42-8

ioo-o

56-5

43-5

IOO-O

58-i

41-9

Number per 1,000,000 population of same sex —

Male

852 955 745

469 519

417

383 436 328

and corrections, was 64,763, representing 35,645 totally blind, and 29,118 partially blind. This number, however, can be considered only as the minimum, as an unknown proportion of the blind were not located by the enumerators, and doubtless a considerable porportion of the 19,884 persons who failed to return the personal schedules should be included in the total.

” Blindness, either total or partial, is so largely a defect of the aged,

and occurs with so much greater frequency as the age advances and the population diminishes, that in any comparison of the pro- portion of the blind in the general population of different classes, such as native and foreign-born whites, or white and coloured, the age distribution of the population of each class should be constantly borne in mind. The differences in this respect account for many of the differences in the gross ratios, and it is only when ratios are compared for classes of population of identical ages that their relative liability to blindness can be properly inferred."

Table II. shows the classification, by degree of blindness, of the blind under twenty years of age, twenty years of age and over, and of unknown age, with respect to colour and nativity, with the number at the specified ages per million of population in the same age-group.

The relationship or consanguinity of parents of the 64,763 blind was reported in 56,507 cases, in 2527 (or 4-5 %) of which the parents were related as cousins.

In 57,726 cases the inquiry as to the existence of blind relatives was answered; 10,967 (or 19%) of this number reported that they had blind relatives.

Of the 2527 blind persons whose parents were cousins, 993 (or 39-3%) had blind relatives, — 844 having blind brothers, sisters or ancestors, and 149 having blind collateral relatives or descendants.

Of the 53,980 blind whose parents were not related, 9490 (or 17-6%) had blind relatives, 7395 having blind brothers, sisters or ancestors, and 2095 having blind collateral relatives or descendants.

It was found that, of the 2527 blind whose parents were cousins, 632 (or 25%) were congenitally blind, of whom 350 (or 55-4%) had also blind relatives of the classes specified ; while, among the 53,980 whose parents were not so related, the number of congenitally blind was 3666 (or but 6-8%), of whom only 1023 (or 27-9%) had blind relatives.

In 1883 the number of blind in France was estimated at 32,056, the total population of the country being 38,000,000; 2548 of the

blind were under, and 29,568 above, 21 years of age; of the former

857 were receiving instruction in 21 schools supported by the state, p by the city of Paris, by some of the departments, and by

P”’”*- some religious bodies. The four Parisian institutions are the Institution Nationale des Jeunes Aveugles, the Ecole Braille (founded in 1883), the Etablissement des Sceurs Aveugles de St Paul

Table III.— The Blind, by Degree of Blindness and Ag

e-Periods.

The

The

Age-Period.

The Blind.

Totally

Partially

Blind.

Blind.

Number —

All ages

64,763

35,645

29,118

Under 10 years .

2,307

1,262

1,045

10-19 ,,

6,001

2,861

3.HO

20-29

.

4,861

2,851

2,010

30-39

»

5.024

3,o77

1,947

40-49

.

6,504

3,778

2,726

50-59

1

8,530

4,79i

3.739

60-69

>

10,507

5,835

4.672

70-79

»

11,421

6,132

5.289

80-89

1

7,49o

3,885

3.605

90-99

.

i,596

851

•745

100 years and over .

232

163

69

Age unknown

290

159

131

Number per 1,000,000 population

of same age —

All ages

852

469

383

Under 10 years .

128

70

58

10-19 ..

384

183

201

20-29 >.

35i

206

145

30-39 .. • •

478

293

185

40-49 .. • •

845

491

354

5o-59 >. • •

1,655

930

725

60-69 « ■

3,396

1,886

1,510

70-79 .. • •

8,136

4,368

3,768

80-89 „ . .

22,022

11,423

io,599

90-99 „ . .

52,746

28,125

24,621

100 years and over .

66,210

46,518

19,692

Age unknown

1,446

793

653

(founded in 1852), and that of the Freres de Saint Jean de Dieu (founded in 1875).

The number of the blind in Germany was about 39,000, or 870 per million in 1885. The number of institutions was 28, nearly all being educational, with a total of 2139 pupils. All these

Oermaay.

institutions, except two which are supported entirely by

private munificence, are largely assisted by the state, the communes or the provinces. Seventeen of them derive their entire require- ments from the state, so that they are quite inde- pendent of private charity, while the remainder are only supplemented from public funds so far as the private contributions fall short of the expenses.

The following extracts were made from an official communication from Hofrath Buttner, director of the institution for the blind in Dresden, Saxony tQ tne rova | commission, concerning the system. care anc j SU p erv ; s ; on (pjirsorge) of the blind after their discharge from the institution : —

” When twenty years of age, the blindare usually discharged from the institution. Long experience has taught us that the care and supervision of the blind after their discharge from the institution are quite as important as their education and training in the institution. It would, inouropinion, be unjust to remove them from their sad surround- ings, educate and accustom them to higher wants, and then allow them to sink backward into their former miserable way of life. After much delibera- tion it was decided to remain in connexion with

the discharged blind, to visit them in their places of abode, to learn their wants, to study the difficulties which they experienced in supporting themselves independently, and, as far as possible, to remove their grievances. Director Georgi began this work in 1843. Director Reinhard continued it from 1867 to 1879, and the present director has followed the same path. With the knowledge of these difficulties the Fiirsorge (care) for discharged blind steadily advanced, and has won the con- fidence of the Saxon people. It was decided that, on the discharge of the blind person, the director should select a trustworthy person, residing in his future place of abode, to give him advice and practical help, to protect him from imposition, and to keep up communication with the director. If this guardian is unable to advise or help, he then writes to the director, who, if necessary, comes to the place, and this is all the easier as he travels

rv. 3

free on all railways in Saxony. The result of these visits, as well as all communications from the guardian, the letters from the blind person, and every document relating to him, are entered in a register kept at the institution. These guardians are respectable, benevolent, practical men, capable of procuring custom for their wards. But there was no doubt that, in spite of these arrangements, the dis- charged blind were unable to support themselves without the assist- ance of capital, whether in money or outfit. The blind man can do as good work as the man who can see; but as a rule he does not work so quickly, and if the man who is not blind has to use every exertion to support himself and his family, the blind man to do the same requires some special help, without which he will either not be able to compete, or will have to lead a life of great privation.

” The first difficulty when a blind pupil is starting in life is to provide himself with the necessary tools and material. These the institution supplies to him, and continues through life to afford him moral and material help ; and by this means the greater part of the blind are enabled to save money for sickness and old age. Those who cannot return to their relations cannot at once meet all their expenses, and the weak and old need special help. A part of the money for their board and lodging is paid for those who have to be settled in other places on account of the death or untrustworthiness of their relatives.

” The fund for the discharged blind is administered by the director of the institution. The number of those assisted amounts at present to about 400, who live respectably in all parts of Saxony, are almost self-supporting, and feel themselves free men. For, just as a son does not

feel galled by a gift from his father, so they are not ashamed to receive assistance from their second paternal ‘ home, the institution.”

The number of the blind in Holland, according to the census of the 1st of December 1869, was 1593, or one in every 2247 of the general population. The Protestants and Roman Catholics were „ .. about equally balanced. No cognizance was taken of the nouaaa. blind in the census of 1879. There is only one blind institution, that of Amsterdam, with 60 pupils, with a preparatory school at Benuchem (with 20 pupils) and an asylum for adults with 52 inmates (unmarried). Besides these, there are workshops at Amsterdam, Rotterdam, the Hague, Utrecht and Middelburg.

According to the census of 1870, there were in Denmark 1249 blind (577 males and 672 females), or one blind for every 1428 persons. One institution has been established by government, _ i.e. the Royal Institution for the Blind, at Copenhagen; Uel ” nark – 100 children, aged 10 and upwards, are here educated. There is a preparatory school for blind children under 10 years of age, and an asylum for blind females, most of whom are former pupils of the royal school. An association for promoting the self-dependence of the blind assists not only former pupils of the school but every blind man or woman willing and able to work.

The number of blind persons in Sweden, according to the census

Table IV. — The Blind, by Consanguinity of Parents, Degree of Blindness, and Blind

Relatives of Other Classes.

Consanguinity of Parents.

Total.

Blind Brothers, Sisters or Ancestors.

Collateral Relatives

or De- scendants alone, Blind.

No Blind Relatives or Rela- tives by Marriage alone, Blind.

Not Stated.

All classes — The blind Totally blind Partially blind .

64,763 35,645 29,118

8629 4378 4251

2338 1215 1123

46,759 26,349 20,410

7037 3703 3334

Parents cousins — The blind

Totally blind . . Partially blind .

2,527 1,291 1,236

844 435 409

149

78

7i

1,456 739 717

78 39 39

Parents not cousins — The blind …. Totally blind . . Partially blind .

53,98o

29,892

24,088

7395 3720

3675

2095 1090 1005

43,368

24,541 18,827

1 122

54i

58i

Consanguinity of parents not stated — • The blind

Totally blind, . . Partially blind .

8,256 4,462 3,794

390

223 167

94

47 47

1.935

1,069

866

5837 3123 2714

of December 1880, was 3723, being at the rate of one blind person for every 1226 of the general population. At the beginning of the year 1879, the instruction of the blind in Sweden was com- pletely separated from that of the deaf and dumb, on the weaen. grounds that it hindered the intellectual development of the blind — a conclusion which experience shows to be tolerably correct. Since

July 1888 the Royal Institution of the Blind has obtained a new building at Tomteboda, near Stockholm.

The law of the 8th of July 1881, concerning the instruction of abnormal children, has imposed on the state the duty of establishing Norway. a sufficient number of schools for the blind in Norway, as well as for the other abnormal children. All the blind of the country, from 9 years of age until the age of 21 , are compelled to be educated,

with a maximum of 8 years of instruction for each pupil.

The census of 1873 showed that in Finland there were 7959 blind in a total population of about 2,000,000 inhabitants, the proportion Finland. reaching the very high figure of one for every 251 of the total population. Nevertheless there were only 160 of school age. For these there are two institutions, one at Helsingfors, where the instruction is given in the Swedish language, and where there are about 12 pupils, and another at Kuopio, where the in- struction is given in the Finnish language, and where the pupils number about 30.

According to information received from the I.R. Central Commis- sion for Statistics, the number of blind in the provinces represented Austria. m tne Austrian Reichsrath amounted to 15,582 in the year 1884. Of these, 2345 were children up to 15 years of age, namely 433 below 5, 779 from 5 to 10, and 11 13 from 10 to 15 years. The total number of institutions for blind children in Austria amounts to 8. The blind children of school age who are not placed in special institutions are compulsorily taught in the public general free schools, as far as practicable. The number of blind in the whole dominion of the crown of St Stephen was 208,391;

The number of blind persons in Italy was 21,718, according to the

census of 1881, and those of school age were estimated to form 25 %

Italy. ■ °f the whole, or about 5429 in number. But no special

; cognizance of the blind is taken in the government census.

There are 20 institutions, schools and workshops for the blind.

Statistics with regard to the number and condition of the blind in the Russian empire are of a very limited character, and it is only Russia. °f l ate y ears that any attempt has been made to draw up any accurate returns with regard to them. The total number of the blind throughout the ernpire is generally reckoned at from 160,000 to 200,000, thus making 1600 to 2000 per million inhabitants. In Russia there are 21 institutions for the support of the blind.

“In Egypt the blind are very numerous in comparison with other countries, and although no exact statistics are at present obtainable tjgypt on this point, it is computed that the proportion is at least one totally blind person to every 50 of the population.’ This is principally the result of acute ophthalmia occurring in infancy, and it is fostered by the superstitious observance which prevents the mothers from

washing their children from the time of birth until' they are two years old, at which late date only they are weaned. There is also a great deal of infection carelessly and ignorantly conveyed direct from eye to eye, by means of unwashed fingers, and this is accountable for the occurrence of much more eye-disease than any that may be caused by the' proverbial flies. The only employ- ment followed by the blind, both Mahommedan and Coptic (or native Christian), and' that only to a limited extent, is recitation aloud — the former repeating portions of the Koran at funerals, and the latter chanting the church-ritual in their services; the blind girls and women are without occupation. Practically no edupatioh is given to the blind as a class, and anything which they learn has to be acquired orally by frequent repetition. The blind were not always so completely neglected, as the native ecclesiastical authorities (Wakf) gave an annual grant of £2000 for the continued maintenance of a school for the blind and the deaf and dumb in Cairo, which taught about 80 day-pupils; the latter years of the school were passed under the ministry of education, and it was ultimately discontinued. Such a condition of affairs appealed to Dr T. R. Armitage, and explains his motive in trying to establish some proper means for affording the blind in Egypt the necessary scholastic instruction and other training. In Egypt, as in other countries, it is occasionally very difficult, and takes some time, to start any enterprise such as this on a satisfactory and practical footing, and it was left for Mrs T. R. Armitage to be the means of successfully carrying out her husband's wishes in this particular. In 1900 Mrs Armitage asked Dr Kenneth Scott to prepare a scheme for the education and welfare of the blind in Egypt, on lines suggested to her. This, through the British and Foreign Blind Association, was submitted to Queen Victoria, who graciously commanded it to be sent, through the foreign office, to the khedive, who in mark of approbation and encouragement generously gave a handsome donation towards its realization. The Institution for the Blind was established at Zeitoun, Cairo, early in the year 1901, through funds provided by Mrs T. R. Armitage. The object of the institution, which is wholly unsectarian in character, is to educate and train the blind mentally and physically and in industrial occupations, and at the same time to improve their moral standard, so that eventually they may become in great measure, or even completely, self-supporting. (Dr Kenneth Scott.)

India has a large proportion of blind inhabitants, ranging from one in 600 in some provinces, to one in 400 in others, with a total of more than half a million. Until recently, little had been done in

the way of organized effort to educate them, though many of the missionaries had helped individual cases. At Amritsar a large and

well-organized work for the blind has been carried on India.

for many years. This school has now been moved to Rajpur, and helps 70 blind women and children. In 1903 a govern- ment school and hospital were established at Bombay as a memorial to Queen Victoria. Reading, writing, arithmetic, tailoring, type- writing, carpentering, lathe-work and carpet-weaving are taught. There are small schools at Parantij, Calcutta, Palancottah, Calicut, Coorg, Chota-Nagpur, and at Moulmein in Burma. The memorial to Queen Victoria in Ceylon took the form of work for the blind. J. Knowles, with the help of L. Garthwaite of the Indian Civil Service, devised a scheme of oriental Braille, which has been adopted by the British and Foreign Bible Society for the production of the Scriptures in Eastern languages.

Blindness is very prevalent in China, and to eye-diseases, neglect and dirt, must be added leprosy and smallpox as causes. Blind beggars may be seen on every highway, clamouring for china. alms. A s i n India their pitiful condition attracted the attention of the v missionaries. W. H. Murray, a Scottish missionary in Peking, made a simple and ingenious adaptation of the Braille symbols to the complicated system of Chinese printing, in which over 4000 characters are required.' It was necessary to represent at least 408 sounds, and each one was given a corresponding Braille number. When a pupil reads the number he knows instantly the sound for which it stands. A school for the blind was established at Peking, and the version of the Scriptures printed at Peking can be read in all the provinces where the Northern Mandarin dialect is spoken(see Miss Gordon Cumming, The Inventor of the Numeral Type for China). A Braille code has recently been arranged for Mand.arin, based on a system of initials and finals, by Miss Garland of tne China Inland Mission. At Foochow there is a large school for boys and girls in connexion with the Church Missionary Society. At Ningpo, Amoy, Canton and Fukien work for the blind is carried on by the missionaries.

The blind in Japan have long been trained in massage, acupuncture and music, and until recently, with few exceptions, none but the blind engaged in these occupations. From three to five Japan years are required to become proficient in massage, but a blind person is then able to support himself. In Yokohama, with a population of half a million, there are 1000 men and women engaged in massage, and all but about 100 of these are blind. In 1878 a school for the blind and deaf-mutes was established in Kyoto, and soon after one in Tokyo. Japan has four schools for the blind, and seven combined schools for the blind and deaf-mutes.

As in other Eastern countries, blindness is very prevalent in Palestine. Ophthalmic hospitals and medical attendance are now available in the larger towns, and the missionary schools pj,jg S ti ae . have done much to inculcate habits of cleanliness, therefore there is a slight decrease in the number of the blind. The home and school for blind girls in Jerusalem is the outcome of a day school opened in 1896 by an American missionary. There is also a small school at Urfa under the auspices of the American mission in that town. ‘

Education

As more sensations are received through the eye than through any other organ, the mind of a blind child is vacant* and the training should begin early or the mind will degenerate. Indirectly the loss of sight results in inaction. If no ˆ/2w. one encourages a blind child to move, he will sit .’

quietly in a corner, and when he leaves his seat will move timidly about. This want of activity produces bad physical effects, and further delays mental growth. The blind are often injured, some of them ruined for life, through the ignorance and mistaken kindness of their friends during early childhood. They should be taught to walk, to go up and down stairs, to wash, dress and feed themselves.

They should be carefully taught correct postures and attitudes, and to avoid making grimaces. They should be told the require- ments of social conventions which a seeing child learns through watching his elders. They have no consciousness that their habits are disagreeable, and the earlier unsightly mannerisms are corrected the better. It is a fallacy to suppose that the other senses of the blind are naturally sharper than those of the seeing. It is only when the senses of hearing and touch have been cultivated that they partially replace sight, and such cultivation can begin with very young children.

Blind children have a stronger claim upon the public for education than other children, because they start at a dis- advantage in life, they carry a burden in their infirmity, they come mostly of poor parents, and without special instruction and training they are almost certain to become a public charge during life.

Public authorities should adopt the most efficient plan for preparing blind children to become active, independent men and women, rather

than consider the cheapest and easiest method of educating them. We cannot afford to give the blind an education that is not the best of its kind in the trade or profession they will have to follow. There are many seeing persons with little education who are useful citizens and successful in various industries, but an uneducated blind person is helpless, and must become dependent.

The surroundings of the blind do not favour the development of activity, self-reliance and independence. Parents and friends find it easier to attend to the wants and requirements of their blind children than to teach them to be self -helpful in the common acts of everyday life. A mistaken kindness leads the friends to guard every movement and prevent physical exertion. As a rule, the vitality of the blind is much below the average vitality of seeing persons, and any system of education which does not recognize and overcome this defect will be a failure. It is the lack of energy and determination, not the want of sight, that causes so many failures among the blind.

A practical system of education, which has for its object to make the blind independent and self-sustaining, must be based

upon a comprehensive course of physical development. trailing. A blind man who has received mechanical training,

general education, or musical instruction, without physical development, is like an engine provided with everything necessary except motive power.

Schools for the blind should be provided with well-equipped gymnasia, and the physical training should include various kinds of mass and apparatus work. Large and suitable playgrounds are also essential. Besides a free space where they can run and play, it should have a supply of swings, tilts, jumping-boards, stilts, chars-a-bancs, skittle-alleys, &c. Any game that allows of sides being taken adds greatly to the enjoyment, and is a powerful incentive to play. The pupils should be encouraged to enter into various competitions, as walking, running, jumping, leap-frog, sack-racing, shot-pitching, tug-of-war, &c. Cycling, rowing, swimming and roller-skating are not only beneficial but most enjoyable.

The subjects in the school curriculum should be varied according to the age and capacity of the pupils, but those

which cultivate the powers of observation and the training, perceptive faculties should have a first place. Object

lessons or nature study should have a large share of attention. Few people realize that a blind child knows nothing of the size, shape and appearance of common objects that lie beyond the reach of his arm. When he has once been shown how to learn their characteristics, he will go on acquiring a knowledge of his surroundings unaided by a teacher. Again, a careful drill in mental arithmetic, combining accuracy with rapidity, is essential. A good command of English should be cultivated by frequent exercises in composition, and by committing to memory passages of standard prose and poetry. In his secondary course, the choice of subjects must depend upon his future career. Above all, stimulate a love of good reading.

From the earliest years manual dexterity should be cultivated by kindergarten work, modelling, sewing, knitting and sloyd.

Blind children who have not had the advantage of

aI this early handwork find much more difficulty when

training, they begin a regular course in technical training.

Early manual training cultivates the perceptive

faculties, gives activity to the body, and prepares the hands and

fingers for pianoforte-playing, pianoforte-tuning and handicrafts.

Besides a good general education, the blind must have careful

and detailed training in some handicraft, or thorough preparation

for some profession. The trades and professions open C o ceo to t j lem are £ ew anc j jf t jj e y f a jj j n one f thggg they

Hon. cannot turn quickly to some other line of work. Those

who have charge of their education should avail themselves of the knowledge that has been gained in all countries, in order to decide wisely in regard to the trade or occupation for which each pupil should be prepared. It may be some kind

of handicraft, pianoforte-tuning, school-teaching, or the pro- fession of music; the talent and ability of each child should be carefully considered before finally deciding his future occupation, The failure to give the blind a practical education often means dependence through life.

Pianoforte-tuning as an employment for the blind originated in Paris. About 1830 Claud Montal and a blind fellow-pupil attempted to tune a piano. The seeing tuner in charge of the school pianos complained to the director, and ˆ£°” they were forbidden to touch the works, but the two tuning, friends procured an old piano and continued their efforts. Finally, the director, convinced of their skill, gave them charge of all the school pianos, and classes were soon started for the other pupils. When Montal left the institution he encountered great prejudice, but his skill in tuning became known to the professors of the Conservatoire, and his work rapidly increased and success was assured. Montal afterwards established a manufactory, and remained at its head for many years. Tuning is an excellent employment for the blind, and one in which they have certain advantages. The seeing who excel in the business go through a long apprenticeship, and one must give the blind even more careful preparation. They must work a number of hours daily, under suitable tuition, for several years. After a careful examination by an expert pianoforte- tuning authority, every duly qualified tuner should be furnished with an official certificate of proficiency, and tuners who cannot take the required examinations ought not to be allowed to impose upon the public.

Music in its various branches, when properly taught, is the best and most lucrative employment for the blind. To become successful in the profession, it is necessary for the blind to have opportunities of instruction, practice, training. study, and hearing music equal to those afforded the seeing, with whom they will have to compete in the open market. If the blind musician is to rise above mediocrity, systematic musical instruction in childhood is indispensable, and good instruction will avail little unless the practice is under constant and judicious supervision. The musical instruction, in its several branches of harmony, pianoforte, organ and vocal culture, must be addressed to the mind, not merely to the ear. This is the only possible method by which musical training can be made of practical .use to the blind. The blind music teacher or organist must have a well-disciplined mind, capable of analysing and dealing with music from an intellectual point of view. If the mental faculties have not been developed and thoroughly disciplined, the blind musician, however well he may play or sing, will be a failure as a teacher. The musical in- struction must be more thorough, more analytical, more com- prehensive, than corresponding instruction given to seeing persons. In 187 1 Dr Armitage published a book on the education and employment of the blind, in which he stated that of the blind musicians trained in the United Kingdom not more than one-half per cent were able to support themselves, whereas of those trained in the Paris school $0 %

supported themselves fully, and 30 % partially, by the profession of music.

To provide a better education and improve the musical training of the blind, the Royal Normal College was established in 1872. 1 Its object was to afford the young blind a thorough general and musical education, to qualify ˆ oyaI . them to earn a living by various intellectual pursuits, College. especially as organists, pianists, teachers and piano- forte-tuners. From the first, the founders of the college main- tained that the blind could only be made self-sustaining by increasing their intelligence, bodily activity and dexterity, by inculcating business habits, by arousing their self-respect, and by creating in their minds a belief in the possibility

1 Its principal (responsible, with Dr Armitage, the duke of West- minster and others, for its foundation) was Sir F. J. Campbell, LL.D., F.R.G.S., F.S.A., himself a blind man, who, born in Tennes- see, U.S.A., in 1832, and educated at the Nashville school, and after- wards in music at Leipzig and Berlin, had from 1858 to 1869 been associated with Dr Howe at the Perkins Institution, Boston. He was knighted in 1909.

of future self-maintenance. A kindergarten department was opened in 1881. In July 1896 Queen's Scholarship examina- tions were held at the Royal Normal College, for the first time, for blind students, and the institution recognized by the Educa- tion Department as a training college for blind school-teachers.

From the first day a pupil enters school until he finishes his course of training, care must be taken to implant business habits. Blind children are allowed to be idle and helpless at tioaal home; they do not learn to appreciate the value of needs. time, and in after years this is one of the most difficult lessons to inculcate. Having drifted through child- hood, they are content to drift through life. The important habits of punctuality, regularity and precision should be culti- vated in all the arrangements and requirements. A great effort should be made to lift the blind from pauperism. As soon as pupils enter a school, all semblance of pauper origin should be removed. They must be inspired with a desire for independence and a belief in its possibility. In the public mind blindness has been so long and closely associated with dependence and pauper- ism that schools for the blind, even the most

progressive, have been regarded hitherto as asylums rather than educational establishments. A sad mistake in the training of the blind is the lack of an earnest effort to improve their social condition. The fact that their education has been left to charity has helped to keep them in the ranks of dependents.

The question of day-classes versus boarding-schools has been much discussed. It is claimed by some that a blind child gains more independence if kept at home and educated in a school with the seeing. This theory is not verified by practical ex- perience. At home its blindness makes the child an exception, and often it takes little or no part in the active duties of every- day life. Again, in a class of seeing children the blind member is treated as an exception. The memory is cultivated at the expense of the other faculties, and the facility with which it recites in certain subjects causes it to make a false estimate of its attainments. The fundamental principles in different branches are imperfectly understood, from the failure to follow the illustrations of the teacher. In the playgrounds, a few irrepressibles join in active games, but most of the blind children prefer a quiet corner.

For the sake of economy, schools for deaf-mutes and the blind are sometimes united. As the requirements of the two classes are entirely separate and distinct, the union is undesirable, whether for general education or industrial training. The plan was tried in America, but has been given up in most of the states. To meet the difficulty of proper classification with small numbers, blind boys and girls are taught in the same classes. The acquaintances then made lead to intimacy in later years and foster intermarriage among the blind. Intermarriage among the blind is a calamity, both for them and for their children; some who might have been successful business men are to-day begging in the streets in consequence of intermarriage.

In every school or class there will be a certain number of young blind children who, from neglect, want of food, or other causes, are feeble in body and defective in intellect; such children are a great burden in any class or school, and require special treatment and instruction. Educational authorities should unite and have one or two schools in a healthful locality for mentally defective blind children.

More and more, in educational work for the seeing, there is a tendency to specialize, and thus enable each student to have the best possible instruction in the subjects that bear most directly on his future calling. To prepare the blind for self- maintenance, there should be an equally careful study of the ability of each child.

A scheme of education which has for its object to make the blind a self-sustaining class should include: kindergarten schools for children from 5 to 8 years of age; preparatory schools from 8 to n; intermediate schools from n to 14. At 14 an intelligent opinion can be formed in regard to the future career of the pupils. They will fall naturally into the follow- ing categories: — (a) A certain number will succeed better in

handicraft than in any other calling, and should be drafted into a suitable mechanical school. (6) A few will have special gifts for general business, and should be educated accordingly, (c) A few will have the ability and ambition to prepare for the university, and the special college should afford them the most thorough preparation for the university examinations, (d) Some will have the necessary talent, combined with the requisite character and industry, to succeed in the musical profession; in addition to a liberal education, these should have musical instruction, equal to that given to the seeing, in the best schools of music, (e) Some may achieve excellent success as pianoforte-tuners, and in a pianoforte-tuning school strict business habits should be cultivated, and the same attention to work required as is demanded of seeing workmen in well- regulated pianoforte factories.

The United Kingdom stands almost alone in allowing the education of the blind to depend upon charity. In the United States, each state government not only makes liberal provision for the education and training of the blind, but most of them provide grounds, buildings and a complete equipment in all de- partments. Although it costs much more per capita, from £40 to £60 per annum, the blind are as amply provided with the means of education as the seeing. The government of the United States appropriates $10,000 per annum for printing embossed books for the blind. Most of the European countries and the English colonies provide by taxation for the education of the blind.

Types

The earliest authentic records of tangible letters for the blind describe a plan of engraving the letters upon blocks of wood, the invention of Francesco Lucas, a Spaniard, who dedicated it to Philip II. of Spain in the 16th century. In 1640 Pierre Moreau, a writing-master in Paris, cast a movable leaden type for the use of the blind, but being without means to carry out his plan, abandoned it. Pins inserted in cushions were next tried, and large wooden letters. After these came a contrivance of Du Puiseaux, a blind man, who had metal letters cast and set them in a small frame with a handle. Whilst these experiments

were going on in France, attempts had also been made in Germany. R. Weissembourg (a resident of Mannheim), who lost his sight when about seven years of age, made use of letters cut in card- board, and afterwards pricked maps in the same material. By this method he taught Mile Paradis, the talented blind musician and the friend of Valentin Haiiy.

To Haiiy belongs the honour of being the first to emboss paper as a means of reading for the blind; his books were embossed in large and small italics, from movable type set by his pupils. The following is an account of the origin of his discovery. Haiiy's first pupil was Francois Lesueur, a blind boy whom he found begging at the porch door of St Germain des Pres. While Lesueur was sorting the papers on his teacher's desk, he came across a card strongly indented by the types in the press. The blind lad showed his master he could decipher several letters on the card. Immediately Haiiy traced with the handle of his pen some signs on paper. The boy read them, and the result was printing in relief, the greatest of Haiiy's discoveries. In 1821 Lady Elizabeth Lowther brought embossed books and types from Paris, and with the types her son, Sir Charles Lowther, Bart., printed for his own use the Gospel of St Matthew. The work of Haiiy was taken up by Mr Gall of Edinburgh, Mr Alston of Glasgow, Dr Howe of Boston, Mr Friedlander of Philadelphia, and others. In 1827 James Gall of Edinburgh embossed some elementary works, and published the Gospel of St John in 1834. His plan was to use the common English letter and replace curves by angles.

In 1832 the Edinburgh Society of Arts offered a gold medal for the best method of printing for the blind, and it was awarded to Dr Edmond Fry of London, whose alphabet consisted of ordinary capital letters without their small strokes. In 1836 the Rev. W. Taylor of York and John Alston in Glasgow began to print with Fry's type. Mr Alston's appeal for a printing fund met with a hearty response, and a grant of £400 was made by the treasury;

in 1838 he completed the New Testament, and at the end of 1840 the whole Bible was published in embossed print. In 1833 printing for the blind was commenced in the United States at Boston and Philadelphia. Dr S. G. Howe in Boston used small English letters without capitals, angles being employed instead of curves, while J. R. Friedlander in Philadelphia used only

h

o

V

b

c

D

E

f

V.3

i

c

5

ˆjimwnlj

P

1

1

J

.<

L

m

KJ

a

c

.&=

“1

^

c_

_o

R

>fl

T

u

0=3

<=£>

%

/

=3

y

w

X

Y

z

^

n

<

^> ,

— — II -J

^

f 3

3 D

1 s

L

v

E

3 > 2 >

Fig.

0/ L@vr

1. — Moon Alphabet.

Roman capitals. About 1838 T. M. Lucas of Bristol, a shorthand writer, and J. H. Frere of Blackheath, each introduced an alphabet of simpler forms, and based their systems on steno- graphy. In 1847 Dr Moon of Brighton brought out a system which partially retains the outline of the Roman letters. This type is easily read by the adult blind, and is still much used by the home teaching societies. The preceding methods are all known as line types, but the one which is now in general use is a point type.

In the early part of the 19th century Captain Charles Barbier,

right-hand row in which vertical line, of the printed table the speech sound is to be found.

Louis Braille, a pupil and afterwards a professor of the Institu- tion Nationale des Jeunes Aveugles, Paris, studied all the various methods in which arbitrary characters were used. Barbier's letter, although it gave a large number of combinations, was too long to be covered by the finger in reading, and Louis Braille reduced the number of dots. In 1834 Braille perfected his system. Dr Armitage considered it was the greatest advance that had ever been made in the education of the blind.

The Braille alphabet consists of varying combinations of six dots in an oblong, of which the vertical side contains three, and the

horizontal two dots

e •

•-

C

L M

•- —

X

Apparatus for writing Braille.

a French officer, substituted embossed dots for embossed lines. The slate for writing was also invented by him.

Barbier arranged a table of speech sounds, consisting of six lines with six sounds in each line. His rectangular cell contained two vertical rows of six points each. The number of points in the left-hand row indicates in which horizontal line, and that in the

There are 63 possible combinations

of these six dots, and after the letters of the alphabet have been supplied, the remaining signs are used for punctuation, con- tractions, &c.

” For writing, a ruler is used, consisting of a metal bed either grooved or marked by groups of little pits, each group consisting of six; over this bed is fitted a brass guide, punched with oblong holes whose vertical diameter is three-tenths of an inch, while the horizontal diameter is two-tenths. The pits are arranged in two parallel lines, and the guide is hinged on the bed in such a way that when the two are locked together the openings in the guide corre- spond exactly to the pits in the bed. The brass guide has a double row of openings, which enables the writer to write two lines; when these are written, he shifts his guide downwards until two little pins, which project from the under surface at its ends, drop into corre- sponding holes of a wooden board ; then two more lines are written, and this operation is repeated until the bottom of the page is reached. The paper is introduced between the frame and the metal bed. The instrument for writing is a blunt awl, which carries a little cap of paper before it into the grooves or pits of the bed, thereby producing a series of little pits in the paper on the side next the writer. When taken out and turned over, little prominences are felt, corresponding to the pits on the other side. The

reading is performed from left to right, consequently the writing is from right to left ; but this reversal presents no practical difficulty as soon as the pupil had caught the idea that in reading and writing alike he has to go forwards.

” The first ten letters, from ‘ a ‘ to ‘ j,’ are formed in the upper and middle grooves; the next ten, from ‘ k ‘ to ‘ t,’ are formed by adding one lower back dot to each letter of the first series ; the third row is formed from the first by adding two lower dots to each letter; the fourth row, similarly, by adding one lower front dot.

” The first ten letters, when preceded by the prefix for numbers,

stand for the nine numbers and the cipher. The same signs, written in the lower and middle grooves, instead of the tipperand middle, serve for punctua- tion. The seven last letters of each series stand for the seven musical notes — the first series represent- ing quavers, the second minims, the third semibreves, the fourth crotchets.

Rests, accidentals, and every other sign used in music can be readily and clearly expressed without having recourse to the staff of five lines which forms the basis of ordinary musical notation, and which, though it has been reproduced for the blind, can only be considered as serv- ing to give them an idea of the method employed by the seeing, and cannot, of course, be written. By means of this dotted system, a blind man is able to keep memoranda or accounts, write his own music, emboss his own books from dictation, and carry on correspondence/’

The Braille system for literature and music was brought into general use in England by Dr T. R. Armitage. Through his wise,

D

*•

F

H

• –

I

J

-•

N

-•

O

•-

and

a*

Q R

•• •- »• ••

for of

gh sh th wh ed er

••

ou

the

ow

•e

•-

with

-•

W -•

Braille Alphabet. The black dots represent the raised points of the sign in their position in relation to the group of six.

Fig. 2.

untiring zeal and noble generosity, every blind man, woman and child throughout the English-speaking world can now obtain not only the best literature, but the best music.

In America there are two modifications of the point type, known as New York point and American braille. In each of these the most frequently recurring letters are represented by the least number of dots.

The original Braille is used by the institutions for the blind in the British empire, European countries, Mexico, Brazil and Egypt.

Appliances for Educational Work

The apparatus for writing point alphabets has already been described. Frank H. Hall, former superintendent of the School for the Blind, Jacksonville, 111., U.S.A., has invented a Braille typewriter and stereotype maker; the latter embosses metal plates from which any number of copies can be printed. An automatic Braille-writer has been brought out in Germany, and William B. Wait (principal of the Institution for the Blind in New York City) has invented a machine for writing New York point. These machines are expensive, but A. Wayne of Birmingham has brought

-

- ***** ***** ***** *****

J ••••] «•••

- ***** ***** ***** ***** ***** *****

*••••

-

• **• ««

-

***•

• **• »•*« **.*»

• «**

• • **»* »••* *»*•

• ••*

• *••

• •••

• •»•

  - *******

«••

•»• ****«*• «***•*«

  - ******* ******* *******

»•••» •**•••* •*•*••* •**«««*• •••*»*• •*•••**

**•*

  -

«**• •*

• «*»

• «** **»«

  -

• *»•

• •*« •* •* *•*•

• •»•

• ***

• »

OnOnOaOa

9 + – X s : :: –

OdOaOaOa

Fig. 3. — Arithmetic Board, Pin and Characters. A, Shape of opening in the board for pin; B and C, pin.

out a cheap and effective Braille- writer. H. Stainsby, secretary of the Birmingham institution, and Wayne have invented a machine for writing Braille shorthand.

Many boards have been constructed to enable the blind to work arithmetical problems. The one which is most used was invented by the Rev. W. Taylor. The board has star-shaped openings in which a square pin fits in eight different positions. The pin has on one end a plain ridge and on the other a notched ridge; sixteen characters can be formed with the two ends. The board is also used for algebra, another set of type furnishing the algebraic symbols.

Books are prepared with raised geometrical diagrams; figures can be formed with bent wires on cushions, or on paper with a toothed wheel attached to one end of a pair of compasses.

Geography is studied by means of relief maps, manufactured in wood or paper. The physical maps and globes prepared for seeing children are used also for the blind.

Chiefly owing to the unremitting energy and liberality of Dr T. R. Armitage, in connexion with the British and Foreign Blind Association, all school appliances for the blind have been greatly improved and cheapened.

Employment

Reference has been made to the fact that music in its various branches furnishes the best and most lucrative employment for the blind. But those who have not the ability, or are too old to be trained for music

or some other profession, must depend upon handicrafts for their support. The principal ones taught in the various institutions are the making of baskets, brushes, mats, sacks, ships' fenders, brooms and mattresses, upholstery, wire-work, chair-caning, wood-chopping, &c. Females are taught to make fancy baskets and brushes, chair-caning, knitting, netting, weaving, sewing — hand and machine — crocheting, &c. It is difficult to find employment for blind girls. It is hoped that typewriting and massage will prove remunerative.

The blind, whether educated for the church, trained as teachers, musicians, pianoforte-tuners, or for any other trade or occupation, generally require assistance at the outset. They need help in finding suitable employment, recommendations for establishing a connexion, pecuniary assistance in providing outfits of books, tools, instruments,. &c, help in the selection and purchase of the best materials at the lowest wholesale rates, in the sale of their manufactured goods in the best markets, and if overtaken by reverses, judicious and timely help towards a fresh start. Every institution should keep in touch with its old pupils. The super- intendent who carefully studies the successes and failures of his pupils when they go into the world, will more wisely direct the work and energies of his present and future students.

Within recent years great improvements have been made in some of the progressive workshops for the blind. At the con- ference in London in 1902 Mr T. Stoddart gave the following information in regard to the work in Glasgow: — " We are build- ing very extensive additions to our workshops, which will enable us to accommodate 600 blind people. We mean to employ the most up-to-date methods, and are introducing electric power to drive the machinery and light the workshops. We have to do with the average blind adult recently deprived of sight after he has attained an age of from 2 5 to 40 or even 50 years. In Glasgow we have developed an industry eminently suitable for the employment of the blind, namely, the manufacture of new and the remaking of old bedding. There are industries which are purely local, where certain articles of manufacture largely used in one district are useless, or nearly so, in another; but the field in which this industry may be promoted is practically without limit. It is perhaps the employment par excellence for the blind, and among other advantages it has the following to recommend it: employment 1 is provided for the blind of both sexes and of all ages; there is no accumulation nor deterioration of stock; it yields an excellent profit, and its use is universal. We have been pushing this industry for years, our annual turnover in this particular department having exceeded £7000, and as we find it so suited to the capabilities of all grades of blind people, it is our intention to provide facilities for doing a

turnover of three times that amount. Instead of the thirty sewing-machines which we have at present running by power, we hope to employ 100 blind women. At cork-fender-making, also an industry of the most suitable kind, we are at present employing about thirty workers. It is also our intention to greatly develop and extend our mat -making department."

In the United States many blind persons are engaged in agricultural pursuits, and some are very successful in com- mercial pursuits. When a man loses his sight in adult life, if he can possibly follow the business in which he has previously been engaged, it is the best course for him. In the present day, work in manufactories is subdivided to such an extent that often some one portion can be done by a blind person; but it needs the interest of some enthusiastic believer in the capabilities of the blind to persuade the seeing manager that blind people can be safely employed in factories.

In England, at the time of the royal commission of 1889, upwards of 8000 blind persons, above the age of 21, were in receipt of relief from the guardians, of whom no less than 3278 were resident in workhouses or workhouse infirmaries. The

census returns for 1901 indicate that the number at that time was equally large. It would certainly be more economical to establish workshops where the able-bodied adult blind can be trained in some handicraft and employed.

The papers read at the various conferences show that, even under the most favourable circumstances, some are not able to earn enough for their support; nevertheless, employment improves their condition; there is no greater calamity than to live a life of compulsory idleness in total darkness. The cry of the blind is not alms but work. One of the workshops in western America has adopted the motto, " Independence through Industry," and it should be the aim of every civilized country to hasten the time when blindness and pauperism shall no longer be synonymous terms.

Biography It may be interesting, in conclusion, to mention some of the names of prominent blind people in history: —

Timoleon (c. 410-336 B.C.), a Greek general.

Aufidius, a Roman senator.

Bela II. (d. 1141), king of Hungary.

John, king of Bohemia (1296-1346), killed in the battle of Crecy.

John Zizca (c. 1376-1424), Bohemian general.

Basil III. (d. 1462), prince of Moscow.

Shah Alam (d. 1806), the last of the Great Moguls.

Diodorus, the instructor of Cicero.

Didymus of Alexandria (c. 308-395), mathematician, theo- logian and linguist.

Nicase of Malines (d. 1492), professor of law in the university of Cologne. The degree of doctor of divinity was conferred on him by the university of Louvain, and the pope granted a dispensation suspending the law of the Church, that he might be ordained as a priest.

Ludovico Scapinelli (b. 1585), professor at the universities of Bologna, Modena and Pisa.

James Schegkius (d. 1587), professor of philosophy and medicine at Tubingen.

Franciscus Salinas, professor of music at the university of Salamanca, in the 16th century. –

Nicholas Bacon (16th century), doctor of laws in the university of Brussels.

Count de Pagan of Avignon (b. 1604), mathematician of note.

John Milton (1608-1674), the poet.

Rev. Richard Lucas (1648-1715), prebendary of Westminster.

Nicholas Saunderson (q.v.; 1682-1739).

John Stanley (1713-1786), Mus. Bac. Oxon., was born in London in 1713. At seven he began to study music, and made such rapid progress that he was appointed organist of All-Hallows, Bread Street, at the age of eleven. He graduated as Mus. Bac. at Oxford when sixteen, and was organist of the Temple church at the age of twenty-

one. He composed a number of cantatas, and after the death of Handel he superintended the performance of Handel's oratorios at Covent Garden. He received the degree of doctor of music, and was master of the king's band.

Leonard Euler (1707-17S3), -the celebrated mathematician and astronomer.

■John Metcalf (b. 1717), road-builder and contractor.

Sir John Fielding (d. 1780), eminent lawyer and magistrate.

Thomas Blacklock (q.v. ; 1721-1791), Scottish scholar and poet.

Francois Huber (1 750-1831), Swiss naturalist, noted for his observations on bees.

Edward Rushton (b. 1756). At six years of age he entered the Liverpool free grammar school, and at eleven shipped for his first voyage in a West India merchantman. On a later voyage he was shipwrecked, and owed his life to the self- sacrifice of a negro. Rushton and the black man swam for their lives to a floating cask; the negro reached it first, saw Rushton about to sink, pushed the cask to the failing lad, and struck out for the shore, but never reached it. This incident made Rushton an enthusiastic champion through life of the cause of the negro. During a voyage to Dominica malignant ophthalmia broke out among the slave cargo, and Rushton caught the disease by attending them in the hold when all others refused help. This attack deprived him of sight, and cut short a promising nautical career at the age of nineteen. He struggled bravely against difficulties, and besides entering successfully into various literary engagements, maintained himself and family as a bookseller. A volume of his poems containing a memoir was published in 1824.

Marie Therese von Paradis (b. 1759), the daughter of an imperial councillor in Vienna. She was a godchild of the empress Marie Therese, and as her parents possessed rank and wealth, no expense was spared in her education. Weissem-

bourg, a blind man, was her tutor, and she learned to spell with letters cut out of pasteboard, and read words pricked upon cards with pins. She studied the piano with Richter (of Holland) and Kozeluch. She was a highly esteemed pianist, and Mozart wrote a concerto for her; she ako attained considerable skill on the organ, in singing and in composition. She made a concert tour of Europe, visiting the principal courts and everywhere achieving great success. She remained four

months in England, under the patronage of the queen. On her return to Vienna, through Paris, she met Valentin Hatiy. Towards the close of her life she devoted herself to teaching singing and the pianoforte with great success. James Holman {q.v.; 1786-1857), traveller. William H. Prescott {q.v. ; 1796-1859), the American historian. Several early 19th-century musicians held situations as organ- ists in London ; among them Grenville, Scott, Lockhart, Mather, Stiles and Warne. Louis Braille (1809-1852). In 1819 he went to the school fo. the blind in Paris. He became proficient on the organ, and held a post in one of the Paris churches. While a professor at the Institution Nationale des Jeunes Aveugles, he perfected his system of point writing. Alexander Rodenbach, Belgian statesman. When a member of the chamber of deputies, in 1836, he introduced and succeeded in establishing by law the right of blind and deaf-mute children to an education. Dr William Moon (1818-1894), the inventor of the type for the

blind which bears his name. Rev. W. H. Milburn, D.D. (1823-1903), the American chaplain, known in the United States as ” The Blind Man Eloquent.” He often travelled from thirty to fifty thousand miles a year, speaking and preaching every day. He was three times chaplain of the House of Representatives, and in 1893 was chosen to the chaplaincy of the senate. Dr T. R. Armitage (b. 1824). After spending his youth on the continent, he became a medical student, first at King’s College, and afterwards at Paris and Vienna. His career promised to be a brilliant one, but at the age of thirty-six failing sight caused him to abandon his profession. For the rest of his life he devoted his time and fortune to the interests of the blind. He reorganized the Indigent Blind Visiting Society, endowed its Samaritan fund, founded the British and Foreign Blind Association, and, in conjunction with the late duke of Westminster and others, founded the Royal Normal College. Elizabeth Gilbert _(b. 1826), daughter of the bishop of Chichester. She lost her sight at the age of three. She was educated at home, and took her full share of household duties and cares and pleasures. When she was twenty-seven, she began to consider the condition of the poor blind of London. She saw some one must befriend those who had been taught trades, some one who could supply material, give employ- ment or dispose of the articles manufactured. In 1854 her scheme was started, and work was given to six men in their own homes, but the number soon increased. In 1856 a committee was formed, a house converted into a factory, and the Association for Promoting the General Welfare of the Blind was founded. Rev. George Matheson, D.D. (b. 1842), preacher and writer of the Church of Scotland. The degree of D.D. was conferred on him

by the university of Edinburgh in 1879, and he was appointed Baird Lecturer in 1881, and St Giles' Lecturer in 1882. Henry Fawcett (1833-1884), professor of political economy at

Cambridge, and postmaster-general. W. H. Churchman of Pennsylvania, who was instrumental in establishing the schools for the blind in Tennessee, Indiana and Wisconsin. H. L. Hall, founder of the workshops and home for the blind in Philadelphia; by his energetic management he raised the standard of work for the adult blind throughout America. Bibliography. — See also W. H. Levy, Blindness and the Blind (1872) ; J. Wilson, Biography of the Blind (1838) ; Dr T. R. Armitage, Education and Employment of the Blind (2nd ed., 1882); R. H. Blair, Education of the Blind (1868) ; M. Anagnos, Education of the Blind (1882); H. J. Wilson, Institutions, Societies and Classes for the Blind in England and Wales (1907); Guillie, Instruction and Amusements of the Blind (1819); Dr W. Moon, Light for the Blind (1875); R- Meldrum, Light on Dark Paths (2nd ed., 1891) ; Dr H. Roth, Preven- tion of Blindness (1885), and his Physical Education of the Blind (1885); Report of Royal Commission (1889); Gavin Douglas, Remarkable Blind Persons (1829); John Bird, Social Pathology (1862); M. de la Sizeranne, The Blind in Useful Avocations (Paris, 1881), True Mission of Smaller Schools (Paris, 1884), The Blind in France (Paris, 1885), Two Years' Study and Work for the Blind (Paris, 1890), and The Blind as seen by a Blind Man [translated by Dr Park Lewis] (Paris, 1893); Dr Emile Javal, The Blind

Man's World [translated by Ernest Thomson] (Paris, 1904) ; Prof. A. Mell, Encyklopddisches Handbuch des Blindenwesens (Vienna, 1899). (F. J. C.)

BLISS, CORNELIUS NEWTON (1833-), American mer- chant and politician, was born at Fall River, Massachusetts, on the 26th of January 1833. He was educated in his native city and in New Orleans, where he early entered his step-father's counting-house. Returning to Massachusetts in 1849, he became a clerk and subsequently a junior partner in a prominent Boston commercial house. Later he removed to New York City to establish a branch of the firm. In 1881 he organized and became president of Bliss, Fabyan & Company, one of the largest wholesale dry goods houses in the country. A consistent advocate of the protective tariff, he was one of the organizers, and for many years president, of the American Protective Tariff League. In politics an

active Republican, he was chair man of the Republican state committee in 1887 and 1888, and contributed much to the success of the Harrison ticket in New York in the latter year. He was treasurer of the Republican national committee from 1892 to 1904, and was secretary of the interior in President McKinley's cabinet from 1897 to 1899.

BLISTER (a word found in many forms in Teutonic languages, cf. Ger. Blase; it is ultimately connected with the same root as in "blow," cf. "bladder"), a small vesicle filled with serous fluid raised on the skin by a burn, by rubbing on a hard surface, as on the hand in rowing, or by other injury; the term is also used of a similar condition of the skin caused artificially, as a counter-irritant in cases of inflammation, by the application of mustard, of various kinds of fly (see Canthaeides) and of other vesicatories. Similar small swellings, filled with fluid or air, on plants and on the surface of steel or paint, &c, are also called" blisters."

BLIZZARD (origin probably onomatopoeic, cf. " blast," "bluster"), a furious wind driving fine particles of choking, blinding snow whirling in icy clouds. The conditions to which the name was originally given occur with the northerly winds in rear of the cyclones crossing the eastern states of America during winter.

BLOCH, MARK ELIEZER (c. 17 23-1 799), German naturalist, was born at Ansbach, of poor Jewish parents, about 1723. After taking his degree as doctor at Frankfort-on-Oder he established himself as a physician at Berlin. His first scientific work of importance was an essay on intestinal worms, which gained a prize from the Academy of Copenhagen, but he is best known by his important work on fishes (see Ichthyology). Bloch was fifty-six when he began to write on ichthyological subjects. To begin at his time of life a work in which he intended not only to give full descriptions of the species known to him from specimens or drawings, but also to illustrate each species in a style truly magnificent for his time, was an undertaking the execution of which most men would have despaired of. Yet he accomplished not only this task, but even more than he at first contemplated. He died at Carlsbad on the 6th of August 1799.

BLOCK, MAURICE (1816-1901), French statistician, was born in Berlin of Jewish parents on the 18th of February 1816. He studied at Bonn and Giessen, but settled in Paris, becoming naturalized there. In 1844 he entered the French ministry of agriculture, becoming in 1852 one of the heads of the statistical department. He retired in 1862, and thenceforth devoted him- self entirely to statistical studies, which

have gained for him a wide reputation. He was elected a member of the Academie des Sciences Morales et Politiques in 1880. He died in Paris on the gth of January 1901. His principal works are: Dictionnaire de I' administration franqaise (1856); Statistique de la France (i860); Dictionnaire general de la politique (1862); L' Europe politique et sociale (1869); Traile theorique et pratique de statis- tique (1878); Les Progres de I'lconomie politique depuis Adam Smith (1890); he also edited from 1856 L' Annuaire de Veconomie politique et de la statistique, and wrote in German Die Bevolke- rung des franzosischen Kaiserreichs (1861); Die Bevolkerung Spaniens und Portugals (1861); and Die Machtstellung der europdischen Staaten (1862).

BLOCK (from the Fr. bloc, and possibly connected with an Old Ger. Block, obstruction, cf . " baulk ") , a piece of wood. The word is used in various senses, e.g. the block upon which people were beheaded, the block or mould upon which a hat is shaped, a pulley-block, a printing-block, &c. From the sense of a solid mass comes the expression, a "block" of houses, i.e. a rect- angular space covered with houses and bounded by four streets. From the sense of "obstruction" comes a "block" in traffic, a block in any proceedings, and the block system of signalling on railways.

BLOCKADE (Fr. blocus, Ger. Blokade), a term used in maritime warfare. Originally a blockade by sea was probably nothing more than the equivalent in maritime warfare of a blockade or siege on land in which the army investing the blockaded or besieged place is in actual physical possession of a zone through which it can prevent and forbid ingress and egress. An attempt to cross such a zone without the consent of the investing army would be an act of hostility against the besiegers. A maritime blockade, when it formed part of a siege, would obviously also be a close blockade, being part of the military cordon drawn round the besieged place. Even from the first, however, differences would begin to grow up in the conditions arising out of the operations on land and on sea. Thus whereas conveying merchandise across military lines would be a deliberate act of hostility against the investing force, a neutral ship which had sailed in ignorance of the blockade for the blockaded place might in good faith cross the blockade line without committing a hostile act against the investing force. With the development of recognition of neutral rights the involuntary character of the breach would be taken into account, and notice to neutral states and to approaching vessels would come into use. With the employment in warfare of larger vessels in the place of the more numerous small ones of an earlier age, notice, moreover, would tend to take the place of de facto investment, and at a time when communication between governments was still slow and precarious, such notice would sometimes be given as a possible measure of belligerent tactics before the blockade could be actually carried out. Out of these circumstances grew up the abuse of “paper blockades.”

The climax was reached in the ” Continental Blockade ” decreed by Napoleon in 1806, which continued till it was abolished by international agreement in 181 2. This blockade forbade all countries under French dominion or allied with France to have any communication with Great Britain. Great Britain replied in 1807 by a similar measure. The first nation to protest against these fictitious blockades was the United States. Already in 1800 John Marshall, secretary of state, wrote to the American minister in Great Britain pointing out objections which have since been universally admitted. In the following interesting passage he said: —

” Ports not effectually blockaded by a force capable of completely investing them have yet been declared in a state of blockade. . . . If the effectiveness of the blockade be dispensed with, then every port of the belligerent powers mayat all times be declared in that state, and the commerce of neutrals be thereby subjected to universal capture. But if this principle be strictly adhered to, the capacity to blockade

will be limited by the naval force of the belligerent, and, in consequence, the mischief to neutral commerce cannot be very extensive.ˆ It is, therefore, of the last importance to neutrals that this principle be maintained unimpaired. I observe that you have pressed this reasoning on the British minister, who replies that an occasional absence of a fleet from a blockaded port ought not to change the state of the place. Whatever force this observation may be entitled to, where that occasional absence has been produced by an accident, as a storm, which for a moment blows off a fleet and forces it from its station, which station it immediately resumes, I am persuaded that where a part of the fleet is applied, though only for a time, to other objects or comes into port, the very principle requiring an effective blockade, which is that the mischief can only be coextensive with the naval force of the belligerent, requires that during such temporary absence the commerce to the neutrals to the place should be free.” 1

1 John Marshall, secretary of state, to Rufus King, minister to England, 20th of September 1800, Am. State Papers, Class I, For. Rel. II, No. 181, J. B. Moore, Digest of International Law, vii. 788.

Again in 1803 James Madison wrote to the then American minister in London : —

” The law of nations requires to constitute a blockade that there should be the presence and position of a force rendering access to the prohibited place manifestly difficult and dangerous.” ‘

In 1826 and 1827 Great Britain as well as the United States asserted that blockades in order to be binding must be effective. This became gradually the recognized view, and when in 1856 the powers represented at the congress of Paris inserted in the declaration there adopted that ” blockades in order to be binding must be effective, that is to say, maintained by a force sufficient really to prevent access to the coast of an enemy,” they were merely enunciating a rule which neutral states had already become too powerful to allow belligerents to disregard.

Blockade is universally admitted to be a belligerent right to which under international law neutrals are obliged to submit. It is now also universally admitted that the above-quoted rule of the Declaration of Paris forms part of international law, in- dependently of the

declaration. Being, however, exclusively a belligerent right, it cannot be exercised except by a belligerent force. Even a de facto belligerent has the right to institute a blockade binding on neutrals if it has the means of making it effective, though the force opposed to it may treat the de facto belligerent as rebels.

It is also admitted that, being exclusively a belligerent right, it cannot be exercised in time of peace, but there has been some inconsistency in practice (see Pacific Blockade) which will probably lead governments, in order to avoid protests of neutral powers against belligerent rights being exercised in mere coercive proceedings, to exercise all the rights of belligerents and carry on de facto war to entitle them to use violence against neutral in- fringers. This was done in the case of the blockade of Venezuela by Great Britain, Germany and Italy in 1 902-1903.

The points upon which controversy still arises are as to what constitutes an ” effective ” blockade and what a sufficient notice of blockade to warrant the penalties of violation, viz. confiscation of the ship and of the cargo unless the evidence demonstrates the innocence of the cargo owners. A blockade to be effective must be maintained by a sufficient force to prevent the entrance of neutral vessels into the blockaded port or ports, and it must be duly proclaimed. Subject to these principles being complied with, ” the question of the legitimacy and effectiveness of a blockade is one of fact to be determined in each case upon the evidence presented ” (Thomas F. Bayard, American secretary of state, to Messrs Kamer & Co., 19th of February 1889). The British manual of naval prize law sums up the cases in which a blockade, validly instituted, ceases to be effectively maintained, as follows: — (1) If the blockading force abandons its position, unless the abandonment be merely temporary or caused by stress of weather, or (2) if it be driven away by the enemy, or (3) if it be negligent in its duties, or (4) if it be partial in the execution of its duties towards one ship rather than another, or towards the ships of one nation rather than those of another. These cases, however, are based on decisions of the British admiralty court and cannot be relied on absolutely as a statement of international law.

As regards notice the following American instructions were given to blockading officers in June 1898 : —

” Neutral vessels are entitled to notification of a blockade before they can be made prize for its attempted violation. The character of this notification is not material. It may be actual, as by a vessel of the blockading force, or constructive, as by a proclamation of the

government maintaining the blockade, or by common notoriety. If a neutral vessel can be shown to have had notice of the blockade in any way, she is good prize, and should be sent in for adjudication; but should formal notice not have been given, the rule of constructive knowledge arising from notoriety should be construed in a manner liberal to the neutral.

” Vessels appearing before a blockaded port, having sailed without notification, are entitled to actual notice by a blockading vessel.

1 James Madison, secretary of state, to Mr Thornton, 27th of October 1803, 14 MS. Dom. Let. 215. Moore, Digest of International Law, vii. 789.

They should be boarded by an officer, who should enter in the ship’s log the fact of such notice, such entry to include the name of the blockading vessel giving notice, the extent of the blockade, the date and place, verified by his official signature. The vessel is then to be set free; and should she again attempt to enter the same or any other blockaded port as to which she has had notice, she is good prize. Should it appear from a vessel’s clearance that she sailed after notice of blockade had been communicated to the country of her port of departure, or after the fact of blockade had, by a fair presump- tionˆ become commonly known at that port, she should be sent in as a prize.”

The passages in italics are not in accordance with the views held by other states, which do not recognize the binding char- acter of a diplomatic notification or of constructive notice from notoriety.

The subject was brought up at the second Hague Conference (1907) . The Italian and Mexican delegations submitted projects, but after a declaration by the British delegate in charge of the subject (Sir E. Satow) that blockade not having been included in the Russian programme, his government had given him no in- structions upon it, the subject, at his suggestion, was dropped. A Voeu, however, was adopted in favour of formulating rules on all branches of the laws and customs of naval war, and a con- vention was agreed to for the establishment of an international Prize Court (see Prize). Under Art. 7 of the latter convention the Court was to apply the ” rules of international law,” and in their absence the ” general principles of justice and equity.” As soon as possible after the close of the second Hague Con- ference the British government took steps to call a special conference of the maritime powers, which sat from December 4, 1908 to February 26, 1909. Among the subjects dealt with was Blockade,

the rules relating to which are as follow: —

Art._ 1. A blockademust not extend beyond the ports and coasts belonging to or occupied by the enemy.

Art. 2. In accordance with the Declaration of Paris of 1856, a blockade, in order to be binding, must be effective — that is to say, it must be maintained by a force sufficient really to prevent access to the enemy coastline.

Art. 3. The question whether a blockade is effective is a question of fact.

Art. 4. A blockade is not regarded as raised if the blockading force is temporarily withdrawn on account of stress of weather.

Art. 5. A blockade must be applied impartially to the ships of all nations.

Art. 6. The commander of a blockading force may give permission to a warship to enter, and subsequently to leave, a blockaded port.

Art. 7. In circumstances of distress, acknowledged by an officer of the blockading force, a neutral vessel may enter a place under blockade and subsequently leave it, provided that she has neither discharged nor shipped any cargo there.

Art. 8. A blockade, in order to be binding, must be declared in accordance with Article 9, and notified in accordance with Articles 11 and 16.

Art. 9. A declaration of blockade is made either by the blockading power or by the naval authorities acting in its name. It specifies (1) the date when the blockade begins; (2) the geographical limits of the coastline under blockade; (3) the period within which neutral vessels may come out.

Art. _ 10. If the operations of the blockading power, or of the naval authorities acting in its name, do not tally with the particulars, which, in accordance with Article 9 (1) and (2), must be inserted in the declaration of blockade, the declaration is void, and a new declaration is necessary in order to make the blockade operative.

Art. 11. A declaration of blockade is notified: (1) to neutral powers, by the blockading power by means of a communication addressed to the governments direct, or to their representatives accredited to it ; (2) to

the local authorities, by the officer command- ing the blockading force. The local authorities will, in turn, inform the foreign consular officers at the port or on the coastline under blockade as soon as possible.

Art. 12. The rules as to declaration and notification of blockade apply to cases where the limits of a blockade are extended, or where a blockade is re-established after having been raised.

Art. 13. The voluntary raising of a blockade, as also any re- striction in the limits of a blockade, must be notified in the manner prescribed by Article 11.

Art. 14. The liability of a neutral vessel to capture for breach of blockade is contingent on her knowledge, actual or presumptive, of the blockade.

Art. 15. Failing proof to the contrary, knowledge of the blockade is presumed if the vessel left a neutral port subsequently to the notification of the blockade to the power to which such port belongs, provided that such notification was made in sufficient time.

Art. 1 6. If a vessel approaching a blockaded port has no know- ledge, actual or presumptive, of the blockade, the notification must be made to the vessel itself by an officer of one of the ships of the blockading force. This notification should be entered in the vessel's logbook, and must state the day and hour, and the geographical position of the vessel at the time. If through the negligence of the officer commanding the blockading force no declaration of blockade has been notified to the local authorities, or if in the declaration, as notified, no period has been mentioned within which neutral vessels may come out, a neutral vessel coming out of the blockaded port must be allowed to pass free.

Art. 17. Neutral vessels may not be captured for breach of blockade except within the area of operations of the warships detailed to render the blockade effective.

Art. 18. The blockading forces must not bar access to neutral ports or coasts.

Art. 19. Whatever may be the ulterior destination of a vessel or of her

cargo, she cannot be captured for breach of blockade, if, at the moment, she is on her way to a non-blockaded port.

Art. 20. A vessel which has broken blockade outwards, or which has attempted to break blockade inwards, is liable to capture so long as she is pursued by a ship of the blockading force. If the pursuit is abandoned, or if the blockade is raised, her capture can no longer be effected.

Art. 21. A vessel found guilty of breach of blockade is liable to condemnation. The cargo is also condemned, unless it is proved that at the time of the shipment of the goods the shipper neither knew nor could have known of the intention to break the blockade. (T. Ba.)

BLOCKHOUSE, in fortification, a small roofed work serving as a fortified post for a small garrison. The word, common since 1500, is of uncertain origin, and was applied to what is now called a fort d'arrct, a detached fort blocking the access to a landing, channel, pass, bridge or defile. The modern blockhouse is a building, sometimes of two storeys, which is loopholed on all sides, and not infrequently, in the case of two-storey blockhouses, provided with a m&chicoulis gallery. Blockhouses are built of wood, brick, stone, corrugated iron or any material available. During the South African War (1899-1902) they were often sent from England to the front in ready-made sections.

BLOEMAERT, ABRAHAM (1564-1651), Dutch painter and engraver, was born at Gorinchem, the son of an architect. He was first a pupil of Gcrrit Splinter (pupil of Frans Floris) and of Joos de Beer, at Utrecht. He then spent three years in Paris, studying under several masters, and on his return to his native country received further training from Hieronymus Francken. In 1591 he went to Amsterdam, and four years later settled finally at Utrecht, where he became dean of the Gild of St Luke. He excelled more as a colourist than as a draughtsman, was extremely productive, and painted and etched historical and allegorical pictures, landscapes, still-life, animal pictures and flower pieces. Among his pupils are his four sons, Hendrick, Frederick, Cornelis and Adriaan (all of whom achieved consider- able reputation as painters or engravers), the two Honthorsts and Jacob G. Cuyp.

BLOEMEN, JAN FRANS VAN (1662-1740), Flemish painter, was born at Antwerp, and studied and lived in Italy. At Rome he was styled Orizonte, on account of his painting of distance in his landscapes, which are reminiscent of Gaspard Poussin and much admired. His brothers Pieter (1657-1719), styled Stan- daart (from his military pictures), and Norbert (1670-1746), were also well-known painters.

BLOEMFONTEIN, capital of the Orange Free State, in 29 8′ S., 26 18′ E. It is situated on the open veld, surrounded by a few low kopjes, 4518 ft. above the sea, 105 m. by rail E. by S. of Kimberley, 750 N.E. by E. of Cape Town, 450 N. by E. of Port Elizabeth, and 257 S.W. of Johannesburg.

Bloemfontein is a very pleasant town, regularly laid out with streets running at right angles and a large central market square. Many of the houses are surrounded by large wooded gardens. Through the town runs the Bloemspruit. After a disastrous flood in 1904 the course of this spring was straightened and six stone bridges placed across it. There are several fine public buildings, mostly built of red brick and a fine-grained white stone quarried in the neighbourhood. The Raadzaal, a building in the Renaissance style, faces Market Square. Formerly the meeting-place of the Orange Free State Raad, it is now the seat

of the provincial council. In front of the old Raadzaal (used as law courts) is a statue of President Brand. In Douglas Street is an unpretentious building used in turn as a church, a raadzaal, a court-house and a museum. In it was signed (1854) the convention which recognized the independence of the Free State Boers (see Orange Free State: History). Among the churches the most important, architecturally, are the Dutch Reformed, a building with two spires, and the Anglican cathedral, which has a fine interior. The chief educational establishment is Grey University College, built 1 906-1 908 at a cost of £125,000. It stands in grounds of 300 acres, a mile and a half from the town. In the town is the original Grey College, founded in 1856 by Sir George Grey, when governor of Cape Colony. The post and telegraph office in Market Square is one of the finest buildings in the town. The public library fs housed in a handsome building in Warden Street. Opposite it is the new national museum.

Bloemfontein possesses few manufactures, but is the trading centre of the province. Having a dry healthy climate, it is a favourite residential town and a resort for invalids, being recom- mended especially for pulmonary disease. The mean maximum temperature is 76-7° Fahr., the mean minimum 45-8°; the mean annual rainfall about 24 in. There is an excellent water-supply, obtained partly from Bloemspruit, but principally from the Modder river at Sanna's Post, 22 m. to the east, and from reservoirs at Moches Dam and Magdcpoort.

The population in 1904 was 33,883, of whom, including the garrison of 3487, 15,501 were white, compared with a white population of 2077 in 1890. The coloured inhabitants are mostly Bechuana and

Basuto. Most of the whites are of British origin, and English is the common language of all, including the Dutch.

The spruit or spring which gives its name to the town was called after one of the emigrant farmers, Jan Bloem. The town dates from 1846, in which year Major H. D. Warden, then British resident north of the Orange, selected the site as the seat of his administration. When in 1854 independence was conferred on the country the town was chosen by the Boers as the seat of government. It became noted for the intelligence of its citizens, and for the educational advantages it offered at the time when education among the Boers was thought of very lightly. In 1892 the railway connecting it with Cape Town and Johannesburg was completed. During the Anglo-Boer War of 1899-1902 it was occupied by the British under Lord Roberts without resistance (13th of March 1900), fourteen days after the surrender of General Cronje at Paardeberg. In Market Square on the 28th of the following May the annexation of the Orange Free State to the British dominions was proclaimed. – In 1907 the first session of the first parliament elected under the con- stitution granting the colony self-government was held in Bloemfontein. In 1910 when the colony became a province of the Union of South Africa under its old designation of Orange Free State, Bloemfontein was chosen as the seat of the Supreme Court of South Africa. Its growth as a business centre after the close of the war in 1902 was very marked. The rateable value increased from £709,000 in 1901 to £2,400,000 in 1905.

BLOET, ROBERT (d. n 23), English bishop, was chancellor to William I. and Rufus. From the latter he received the see of Lincoln (1093) in succession to Remigius. His private char- acter was indifferent; but he administered his see with skill and prudence, built largely, and kept a magnificent household, which served as a training-school even for the sons of nobles. Bloet was active in assisting Henry I. during the rebellion of 1 102, and became that monarch's justiciar. Latterly, however, he fell out of favour, and, although he had been very rich, was impoverished by the fines which the king extorted from him. Perhaps his wealth was his chief offence in the king's eyes; for he was in attendance on Henry when seized with his last illness. He was the patron of the chronicler Henry of Hunting- don, whom he advanced to an archdeaconry.

Henry of Huntingdon and W. Malmesbury (De Gestis Pontificum) are original authorities. See E. A. Freeman's William. Rufus; Sir James Ramsay, The Foundations of England, vol. ii. (H. W. C. D.)

BLOIS

BLUIS, LOUIS DE (1506-1566), Flemish mystical writer, generally known under the name of Blosius, was born in October 1506 at the chateau of Donstienne, near Liege, of an illustrious family to which several crowned heads were allied. He was educated at the court of the Netherlands with the future emperor Charles V. of Germany, who remained to the last his staunch friend. At the age of fourteen he received the Bene- dictine habit in the monastery of Liessies in Hainaut, of which he became abbot in 1530. Charles V. pressed in vain upon him the archbishopric of Cambrai, but Blosius studiously exerted himself in the reform of his monastery and in the com- position of devotional works. He died at his monastery on the 7th of January 1566.

Blosius's works, which were written in Latin, have been translated into almost every European language, and have appealed not only to Roman Catholics, but to many English laymen of note, such as W. E. Gladstone and Lord Coleridge. The best editions of his collected works are the first edition by J. Frojus (Louvain, 1568), and the Cologne reprints (1572, 1587). His best-known works are: — the Institutio Spiritualis (Eng. trans., A Book of Spiritual Instruction, London, 1900); Consolatio Pusillanimium (Eng. trans., Comfort for the Faint- Hearted, London, 1903); Sacellum Animae Fidelis (Eng. trans., The Sanctuary of the Faithful Soul, London, 1905); all these three works were translated and edited by Father Bertrand Wilberforce, O.P., and have been reprinted several times; and especially Speculum Monachorum (French trans, by Felicite de Lamennais, Paris, 1809; Eng. trans., Paris, 1676; re-edited by Lord Coleridge, London, 1871, 1872, and inserted in " Pater- noster " series, 1901).

See Georges de Blois, Louis de Blois, un Benedictin au XVI ^" e Steele (Paris, 1875), Eng. trans, by Lady Lovat (London, 1878, &c.).

BLOIS, a town of central France, capital of the department of Loir-et-Cher, 35 m. S.W. of Orleans, on the Orleans railway between that city and Tours. Pop. (1906) 18,457. Situated in a thickly-wooded district on the right bank of the Loire, it covers the summits and slopes of two eminences between which runs the principal thoroughfare of the town named after the philosopher Denis Papin. A bridge of the 18th century from which it presents the appearance of an amphitheatre, unites Blois with the suburb of Vienne on the left bank of the river. The streets of the higher and older part of the town are narrow and tortuous, and in places so steep that means of ascent is provided by flights of steps. The famous chateau of the family of Orleans (see Architecture:

Renaissance Architecture in France), a fine example of Renaissance architecture, stands on the more westerly of the two hills. It consists of three main wings, and a fourth and smaller wing, and is built round a court- yard. The most interesting portion is the north-west wing, which was erected by Francis I., and contains the room where Henry, duke of Guise, was assassinated by order of Henry III. The striking feature of the interior facade is the celebrated spiral staircase tower, the bays of which, with their beautifully sculp- tured balustrades, project into the courtyard (see Architecture, Plate VIII. fig. 84) . The north-east wing, in which is the entrance to the castle, was built by Louis XII. and is called after him; it contains picture-galleries and a museum. Opposite is the Gaston wing, erected by Gaston, duke of Orleans, brother of Louis XIII. , which contains a majestic domed staircase. In the north corner of the courtyard is the Salle des Etats, which, together with the donjon in the west corner, survives from the 13th century. Of the churches of Blois, the cathedral of St Louis, a building of the end of the 17th century, but in Gothic style, is surpassed in interest by St Nicolas, once the church of the abbey of St Laumer, and dating from the 1 2th and 13th centuries. The picturesqueness of the town is enhanced by many old mansions, the chief of which is the Renaissance Hotel d'Alluye, and by numerous fountains, among which that named after Louis XII. is of very graceful design. The prefecture, the law court, the corn-market and the fine stud-buildings are among the chief modern buildings.

Blois is the seat of a bishop, a prefect, and a court of assizes.

It has a tribunal offirst instance, a tribunal of commerce, a board of trade arbitration, a branch of the Bank of France, a communal college and training-colleges. The town is a market for the agricultural and pastoral regions of Beauce and Sologne, and has a considerable trade in grain, the wines of the Loire valley, and in horses and other live-stock. It manufactures boots and shoes, biscuits, chocolate, upholstering materials, furniture, machinery and earthenware, and has vinegar-works, breweries, leather-works and foundries.

Though of ancient origin, Blois is first distinctly mentioned by Gregory of Tours in the 6th century, and was not of any import- ance till the 9th century, when it became the seat of a powerful countship (see below). In 1196 Count Louis granted privileges to the townsmen; the commune, which survived throughout the middle ages, probably dated from this time. The counts of the Chatillon line resided at Blois more often than their pre- decessors, and the oldest parts of the chateau (13 th century) were built by them. In 1429 Joan of Arc made Blois her base of operations for the relief of Orleans. After his

captivity in England, Charles of Orleans in 1440 took up his residence in the chateau, where in 1462 his son, afterwards Louis XII., was born. In the 1 6th century Blois was often the resort of the French court. Its inhabitants included many Calvinists, and it was in 1562 and 1567 the scene of struggles between them and the supporters of the Roman church. In 1576 and 1588 Henry III., king of France, chose Blois as the meeting-place of the states- general, and in the latter year he brought about the murders of Henry, duke of Guise, and his brother, Louis, archbishop of Reims and cardinal, in the chateau, where their deaths were shortly followed by that of the queen-mother, Catherine de' Medici. From 1617 to 1619 Marie de' Medici, wife of King Henry IV., exiled from the court, lived at the chateau, which was soon afterwards given by Louis XIII. to his brother Gaston, duke of Orleans, who lived there till his death in 1660. The bishopric dates from the end of the 17th century. In 1814 Blois was for a short time the seat of the regency of Marie Louise, wife of Napoleon I.

See L. de la Saussaye, Blois et ses environs (1873) ; Histoire du chateau de Blois (1873); L. Bergevin et A. Dupre, Histoire de Blois

(1847).

BLOIS, Countship or. From 865 to about 940 the countship of Blois was one of those which were held in fee by the margrave of Neustria, Robert the Strong, and by his successors, the abbot Hugh, Odo (or Eudes), Robert II. and Hugh the Great. It then passed, about 940 and for nearly three centuries, to a new family of counts, whose chiefs, at first vassals of the dukes of France, Hugh the Great and Hugh Capet, became in 987, by the accession of the Capetian dynasty to the throne of France, the direct vassals of the crown. These new counts were originally very powerful. With the countship of Blois they united, from 940 to 1044, that of Touraine, and from about 950 to 12 18, and after- wards from 1269 to 1286, the countship of Chartres remained in their possession.

The counts of Blois of the house of the Theobalds (Thibauds) began with Theobald I., the Cheat, who became count about 940. He was succeeded by his son, Odo (Eudes) I., about 975. Theobald II., eldest son of Odo I., became count in 996, and was succeeded by Odo II., younger son of Odo I., about 1005. Odo II. was one of the most warlike barons of his time. With the already considerable domains which he held from his ancestors, he united the heritage of his kinsman, Stephen I., count of Troyes. In 1033 he disputed the crown of Burgundy with the emperor, Conrad the Salic, and perished in 1037 while fighting in Lorraine. He was succeeded in 103 7 by his eldest

son, Theobald III., who was defeated by the Angevins in 1044, and was forced to give up the town of Tours and its dependencies to the count of Anjou. In 1089 Stephen Henry, eldest son of Theobald III., became count. He took part in the first crusade, fell into the hands of the Saracens, and died in captivity; he married Adela, daughter of William I., king of England. In 1 102 Stephen Henry was succeeded by his son, Theobald IV. the Great, who united the countship of Troyes with his domains

in 1128. In 1135, on the death of his maternal uncle, Henry I., king of England, he was called to Normandy by the barons of the duchy, but soon renounced his claims on learning that his younger brother, Stephen, had just been proclaimed king of England. In 1 1 52 Theobald V. the Good, second son of Theobald IV., became count; he died in 1191 in Syria, at the siege of Acre. His son Louis succeeded in 1191, took part in the fourth crusade, and after the taking of Constantinople was rewarded with the duchy of Nicaea. He was killed at the battle of Adrianople in 1205, in which year he was succeeded by his son, Theobald VI. the Young, who died childless. In 1218 the countship passed to Margaret, eldest daughter of Theobald V., and to Walter (Gautier) of Avesnes, her third husband.

The Chatillon branch of the counts of Blois began in 1230 with Mary of Avesnes, daughter of Margaret of Blois and her husband, Hugh of Chatillon, count of St Pol. In 1241 her brother, John of Chatillon, became count of Blois, and was succeeded in 1279 by his daughter, Joan of Chatillon, who married Peter, count of Alencon, fifth son of Louis IX., king of France. In 1286 Joan, sold the countship of Chartres to the king of France. Hugh of Chatillon, her first-cousin, became count of Blois in 1293, and was succeeded by his son, Guy I., in 1307. In 1342 Louis II., eldest son of Guy I., died at the battle of Crecy, and his brother, Charles of Blois, disputed the duchy of Brittany with John of Montfort. Louis III., eldest son of Louis II., became count in 1346, and was succeeded by John II., second son of Louis II., in 1372. In 1381 Guy II., brother of Louis III. and John II., succeeded in 1381, but died childless. Overwhelmed with debt, he had sold the countship of Blois to Louis I., duke of Orleans, brother *of King Charles VI., who took possession of it in 1397.

In 1498 the countship of Blois was united with the crown by the accession of King Louis XII., grandson and second successor of Louis I.,

duke of Orleans.

See Bernier, Histoire de Blois (1682) ; La Saussaye, Histoire de la ville de Blois (1846). (A. Lo.)

BLOMEFIELD, FRANCIS (1705-1752), English topographer of the county of Norfolk, was born at Fersfield, Norfolk, on the 23rd of July 1705. On leaving Cambridge in 1727 he was ordained, becoming in 1729 rector of Hargham, Norfolk, and immediately afterwards rector of Fersfield, his father's family living. In 1733 he mooted the idea of a history of Norfolk, for which he had begun collecting material at the age of fifteen, and shortly afterwards, while, collecting further information for his book, discovered some of the famous Paston Letters. By 1736 he was ready to put some of the results of his researches into type. At the end of 1739 the first volume of the History of Norfolk was completed. It was printed at the author's own press, bought specially for the purpose. The second volume was ready in 1745. There is little doubt that in compiling his book Blome- field had frequent recourse to the existing historical collections of Le Neve, Kirkpatrick and Tanner, his own work being to a large extent one of expansion and addition. To Le Neve in particular a large share of the credit is due. When half-way through his third volume, Blomefield, who had come up to London in connexion with a special piece of research, caught smallpox, of which he died on the 16th of January 1752. The remainder of his work was published posthumously, and the whole eleven volumes were republished in London between 1805 and 1810.

BLOMFIELD, SIR ARTHUR WILLIAM (1829-1899), English architect, son of Bishop C. J. Blomfield, was born on the 6th of March 1829, and educated at Rugby and Trinity, Cambridge. He was then articled as an architect to P. C. Hardwick, and subsequently obtained a large practice on his own account. He became president of the Architectural Association in 1861, and a fellow (1867) and vice-president (1886) of the Royal Institute of British Architects. In 1887 he became architect to the Bank of England, and designed the law courts branch in Fleet Street, and he was associated with A. E. Street in the building of the law courts. In 1889 he was knighted. He died on the 30th of October 1899. He was twice married, and brought up two sons, Charles J. Blomfield and Arthur Conran Blomfield, to his own

profession, of which they became distinguished representatives. Among the numerous churches which Sir Arthur Blomfield designed, his work at St Saviour's, Southwark, is a notable example of his use of revived Gothic, and he was highly regarded as a restorer.

BLOMFIELD, CHARLES JAMES (1786-1857), English divine, was born on the 29th of May 1786 at Bury St Edmunds. He was educated at the local grammar school and at Trinity College, Cambridge, where he gained the Browne medals for Latin and Greek odes, and carried off the Craven scholarship. In 1808 he graduated as third wrangler and first medallist, and in the following year was elected to a fellowship at Trinity College. The first-fruits of his scholarship was an edition of the Prometheus of Aeschylus in 18 10; this was followed by editions of the Septem contra Thebas, Persae, Choephorae, and Agamemnon, of Callimachus, and of the fragments of Sappho, Sophron and Alcaeus. Blomfield, however, soon ceased to devote himself entirely to scholarship. He had been ordained in 1810, and held in quick succession the livings of Chesterford, Quarrington, Dunton, Great and Little Chesterford, and Tuddenham. In 18 17 he was appointed private chaplain to Wm. Howley, bishop of London. In 1819 he was nominated to the rich living of St Botolph's, Bishopsgate, and in 1822 he became archdeacon of Colchester. Two years later he was raised to the bishopric of Chester where he carried through many much-needed reforms. In 1828 he was translated to the bishopric of London, which he held for twenty- eight years. During this period his energy and zeal did much to extend the influence of the church. He was one of the best debaters in the House of Lords, took a leading position in the action for church reform which culminated in the ecclesiastical commission, and did much for the extension of the colonial episcopate; and his genial and kindly nature made him an, invaluable mediator in the controversies arising out of the tractarian movement. His health at last gave way, and in 1856 he was permitted to resign his bishopric, retaining Fulham Palace as his residence, with a pension of £6000 per annum. He died on the 5th of August 1857. His published works, exclusive of those above mentioned, consist of charges, sermons, lectures and pamphlets, and of a Manual of Private and Family Prayers. He was a frequent contributor to the quarterly reviews, chiefly on classical subjects.

See Memoirs of Charles James Blomfield, D. D., Bishop of London, with Selections from his Correspondence, edited by his son, Alfred Blom- field (1863) ; G. E. Biber, Bishop Blomfield and his Times (1857).

BLOMFIELD, EDWARD VALENTINE (1788-1816), English classical scholar, brother of Bishop C. J. Blomfield, was born at Bury St Edmunds on the 14th of February 1788. Going to Caius College, Cambridge, he was thirteenth wrangler in 181 1, obtained several of the classical prizes of the university, and became a fellow and lecturer at Emmanuel College. In 1813 he travelled in Germany and made the

acquaintance of some of the great scholars of Germany. On his return, he published in the Museum Criticum (No. ii.) an interesting paper on ” The Present State of Classical Literature in Germany.” Blomfield is chiefly known by his translation of Matthiae’s Greek Grammar (1 8 1 9) , which was prepared for the press by his brother. He died on the 9th of October 1816, his early death depriving Cambridge of one who seemed destined to take a high place amongst her most brilliant classical scholars.

See ” Memoir of Edward Valentine Blomfield,” by Bishop Monk, in Museum Criticum, No. vii.

BLONDEL, DAVID (1591-1655), French Protestant clergyman, was born at Chalons-sur-Marne in 1591, and died on the 6th of April 1655. In 1650 he succeeded G. J. Vossius in the professor- ship of history at Amsterdam. His works were very numerous; in some of them he showed a remarkable critical faculty, as in his dissertation on Pope Joan (1647, !657), in which he came to the conclusion, now universally accepted, that the whole story is a mere myth. Considerable Protestant indignation was excited against him on account of this book.

BLONDEL, JACQUES FRANQOIS (1705-1774), French archi- tect, began life as an architectural engraver, but developed into an architect of considerable distinction, if of no great

originality. As architect to Louis XV. from 1755 he necessarily did much in the rococo manner, although it would seem that he conformed to fashion rather than to artistic conviction. He was among the earliest founders of schools of architecture in France, and for this he was distinguished by the Academy; but he is now best remembered by his voluminous work L’ Architecture francaise, in which he was the continuator of Marot. The book is a precious collection of views of famous buildings, many of which have disappeared or been remodelled.

BLONDIN (1824-1897), French tight-rope walker and acrobat, was born at St Omer, France, on the 28th of February 1824. His real name was Jean Francois Gravelet. When five years old he was sent to the Ecole de Gymnase at Lyons and, after six months’ training as an acrobat, made his first public appearance as ” The Little Wonder.” His

superior skill and grace as well as the originality of the settings of his acts, made him a popular favourite. He especially owed his celebrity and fortune to his idea of crossing Niagara Falls on a tight-rope, n 00 ft. long, 160 ft. above the water. This he accomplished, first in 1859, a number of times, always with different theatric variations: blindfold, in a sack, trundling a wheelbarrow, on stilts, carrying a man on his back, sitting down midway while he made and ate an omelette. In 1861 Blondin first appeared in London, at the Crystal Palace, turning somersaults on stilts on a rope stretched across the central transept, 170 ft. from the ground. In 1862 he again gave a series of performances at the Crystal Palace, and elsewhere in England, and on the continent. After a period of retirement he reappeared in 1880, his final performance being given at Belfast in 1896. He died at Ealing, London, on the 19th of February 1897.

BLOOD, the circulating fluid in the veins and arteries of animals. The word itself is common to Teutonic languages; the 0. Eng. is bldd, cf. Gothic Moth, Dutch bloed, Ger. Blut. It is probably ultimately connectefl with the root which appears in ” blow,” ” bloom,” meaning flourishing or vigorous. The Gr. word for blood, at/uct, appears as a prefix haemo- in many compound words. As that on which the life depends, as the supposed seat of the passions and emotions, and as that part which a child is believed chiefly to inherit from its parents, the word “blood” is used in many figurative and transferred senses; thus ” to have his blood,” ” to fire the blood,” ” cold blood,” ” blood-royal,” ” half ” or ” whole blood,” &c. The expression ” blue blood ” is from the Spanish sangre azul. The nobles of Castile claimed to be free from all admixture with the darker blood of Moors or Jews, a proof being supposed to lie in the blue veins that showed in their fairer skins. The common English expletive ” bloody,” used as an adjective or adverb, has been given many fanciful origins; it has been supposed to be a contraction of ” by our Lady,” or an adaptation of the oath common during the 17th century, ” ‘sblood,” a contraction of ” God’s blood.” The exact origin of the expression is not quite clear, but it is certainly merely an application of the adjective formed from ” blood.” The New English Dictionary suggests that it refers to the use of ” blood ” for a young rowdy of aristo- cratic birth, which was common at the end of the 17th century, and later became synonymous with “dandy,” “buck,” &c; ” bloody drunk ” meant therefore “drunk as a blood,” “drunk as a lord.” The expression came into common colloquial use as a mere intensive, and was so used till the middle of the 18th century. There can be little doubt that the use of the word has been considerably affected by the idea of blood as the vital principle, and therefore something strong, vigorous, and parallel as an

intensive epithet with such expressions as ” thundering,” ” awfully ” and the like.

Anatomy and Physiology In all living organisms, except the most minute, only a mini- mum number of cells can come into immediate contact with the general world, whence is to be drawn the food supply for the whole organism. Hence those cells — and they are by far the most numerous — which do not lie on the food-absorbing surface, must gain their nutriment by some indirect means. Further,

each living cell produces waste products whose accumulation would speedily prove injurious to the cell, hence they must be constantly removed from its immediate neighbourhood and indeed from the organism as a whole. In this instance again, only a few cells can lie on a surface whence such materials can be directly discharged to the exterior. Hence the main number of the cells of the organism must depend upon some mechanism by which the waste products can be carried away from them to that group of cells whose duty it is to modify them, or dis- charge them from the body. These two ends are attained by the aid of a circulating fluid, a fluid which is constantly flowing past every cell of the body. From it the cells extract the food materials they require for their sustenance, and into it they dis- charge the waste materials resulting from their activity. This circulating medium is the blood.

Whilst undoubtedly the two functions of this circulating fluid above given are the more prominent, there are yet others of great importance. For instance, it is known that many tissues as a result of their activity produce certain chemical substances which are of essential importance to the life of other tissue cells. These substances — internal secretions as they are termed — are carried to the second tissue by the blood stream. Again, many instances are known in which two distant tissues com- municate with one another by means of chemical messengers, bodies termed hormones {bpixauv, to stir up), which are produced by one group of cells, and sent to the other group to excite them to activity. Here, also, the path by which such messengers travel is the blood stream. A further and most important manner in which the circulating fluid is utilized in the life of an animal is seen in the way in which it is employed in protecting the body should it be invaded by micro-organisms.

Hence it is clear that the blood is of the most vital importance to the healthy life of the body. But the fact that it is present as a circulating medium exposes the animal to a great dangef, viz. that it may be lost should any vessel carrying it become ruptured. This is constantly

liable to happen, but to minimize as far as possible any such loss, the blood is endowed with the peculiar property of clotting, i.e. of setting to a solid or stiff jelly by means of which the orifices of the torn vessels become plugged and the bleeding stayed.

The performance of these essential functions depends upon the maintenance of a continuous flow past all tissue cells, and this is attained by the circulatory mechanism, consisting of a central pump, the heart, and a system of ramifying tubes, the arteries, through which the blood is forced from the heart to every tissue (see Vascular System). A second set of tubes, the veins, collects the blood and returns it to the heart. In many invertebrates the circulating fluid is actually poured into the tissue spaces from the open terminals of the arteries. From these spaces it is in turn drained away by the veins. Such a system is termed a haemolymph system and the circulating fluid the haemolymph. Here the essential point gained is that the fluid is brought into direct contact with the tissue cells. In all vertebrates, the ends of the arteries are united to the commencements of the veins by a plexus of extremely minute tubes, the capillaries, consequently the blood is always retained within closed tubes and never comes into contact with the tissue cells. It is while passing through the capillaries that the blood performs its work; here the blood stream is at its slowest and is brought nearest to the tissue cell, only being separated from it by the extremely thin wall of the capillary and by an equally thin layer of fluid. Through this narrow barrier the interchanges between cell and blood take place.

The advantage gained in the vertebrate animal by retaining the blood in a closed system of tubes lies in the great diminution of resistance to the flow of blood, and the consequent great increase in rate of flow past the tissue cells. Hence any food stuffs which can travel quickly through the capillary wall to the tissue cell outside can be supplied in proportionately greater quantity within a given time, without requiring any very great increase in the concentration of that substance in the blood. Conversely, any highly diffusible substance may be withdrawn

from the tissues by the blood at a similarly increased pace. These conditions are more peculiarly of importance for the supply of oxygen and the removal of carbonic acid — especially for the former, because the amount of it which can be carried by the blood is small. But as the

rate at which a tissue lives, i.e. its activity, depends upon the rate of its chemical reactions, and as these are fundamentally oxidative, the more rapidly oxygen is carried to a tissue the more rapidly it can live, and the greater the amount of work it can perform within a given time. The rate of supply is of much less importance in the case of the other food substances because they are far more soluble in water, so that the supply in sufficient quantity can easily be met by a relatively slow blood flow. Hence we find that the gradual evolution of the animal kingdom goes hand in hand with the gradual development of a greater oxygen-carrying capacity of the blood and an increase in the rate of its flow.

In the groundwork of a tissue are a number of spaces — the tissue spaces. They are filled with fluid and intercommunicate freely, finally connecting with a number of fine tubes, the lymphatics, through which excess of fluid or any solid particles present are drained away. The contained fluid acts as an inter- mediary between the blood and the cell; from it, the cell takes its various food stuffs, these having in the first instance been derived from the blood, and into it the cell discharges its waste products. On the course of the lymphatics a number of typical structures, the lymphatic glands, are placed, and the lymph has to pass through these structures where any deleterious products are retained, and the fluid thus purified is drained away by further lymphatics and finally returned to the blood. Thus there is a second stream of fluid from the tissues, but one vastly slower than that of the blood. The flow is too slow for it to act as the vehicle for the removal of those waste products (carbonic acid, &c.) which must of necessity be removed quickly. These' must be removed by the blood. The same is true for the main number of other waste products, which, however, being of small molecular size are readily absorbed into the blood stream.

But in addition to fluid, the tissue spaces may at times be found to contain solid matter in the form of particles, which may represent the debris of destroyed cells, or which are, as is quite commonly the case, micro-organisms. Apparently such material cannot be removed from a tissue by absorption into the blood stream — indeed in the case of living organisms such an absorption would in many instances rapidly prove fatal, and special provision is made to prevent such an accident. These, therefore, are made to travel along the lymphatic channels, and so, before gaining access to the blood stream and thus to the body generally, have to run the gauntlet of the protective mechanism provided by the lymphatic glands, where in the major number of cases they are readily destroyed.

Hence we see that first and foremost we have to regard the blood as a food-carrier to all the cells of the body; in the second place as the vehicle carrying away most if not all the waste products; in a third direction, it is acting as a means for trans- mitting chemical substances manufactured in one tissue to distant cells of the body for whose nutrition or excitation they may be essential; and in addition to these important functions there is yet another whose value it is almost impossible to over- estimate, for it plays the essential role in rendering the animal immune to the attacks of invading organisms. The question of immunity is discussed elsewhere, and it is sufficient merely to indicate the chief means by which the blood subserves this essential protective mechanism. Should living organisms find their way into the surface cells or within the tissue spaces, the body fights them in a number of ways, (i) It may produce one or more chemical substances capable of neutralizing the toxic material produced by the organism. (2) It may produce chemical substances which act as poisons to the micro-organism, either paralysing it or actually killing it. Or (3) the organism may be attacked and taken up into the body of wandering cells, e.g. certain of the leucocytes, and then digested by them. Such cells are therefore called phagocytes {4>ayeiv, to eat). Thus, by its

power of reacting in these ways the body has become capable of withstanding the attacks of many different varieties of micro-organisms, of both animal and vegetable origin.

General Properties.— Blood is an opaque, viscid liquid of bright red colour possessing a distinct and characteristic odour,' especially when warm. Its opacity is due to the presence of a very large number of solid particles, the blood corpuscles, having a higher refractive index than that of the liquid in which they float. The specific gravity in man averages about 1-055. The specific gravity of the liquid portion, the plasma (Gr. irKaaixa, something formed or moulded, irXaaaav, to mould), is about 1-027, whilst that of the corpuscles amounts to 1-088. To litmus it reacts as a weak alkali.

Blood Plasma. —The plasma is a solution in water of a varied number of substances, and as a solvent it confers on the blood its power of acting as a carrier of food stuffs and waste products. One important food substance, oxygen, is, however, only partly carried in solution, being mainly combined with haemoglobin in the red corpuscles. The food stuffs carried by the plasma are proteins, carbohydrates, salts and water. The main waste products dissolved in it are ammonium carbonate, urea, urates, xanthin bases, creatin and small amounts of other nitrogenous bodies, carbonic acid as carbonates, other carbon compounds such as cholesterin, lecithin and a number of other

substances. Thus, if we take mammalian blood as a type, the plasma would have the following approximate composition: —

In 1000 grms. plasma —

Water 901-51

Substances not vaporizing at 120° C. —

Fibrin 8-o6

Other proteins and organic substances 81-92 Inorganic substances —

Chlorine Sulphuric acid Phosphoric acid Potassium Sodium Calcium Magnesium Oxygen _ .

3-536 0-129 0-145 0-314 3-410 0-298

0-218

0-455

8-505

98-49

Proteins. — The proteins of the blood plasma belong to the two classes of the albumins and the globulins. The globulins present are named fibrinogen and serum-globulin; as its name implies, the chief physiological property of fibrinogen is that it can give rise to fibrin, the solid substance formed when blood clots. It possesses the typical properties of a globulin, i.e. it coagulates on heating (in this instance at a temperature of 56° C), and is precipitated by half saturating its solution with ammonium sulphate. It differs from other globulins in that it is less soluble. It is only present in very small quantities, 0-4%. The other globulin, serum-globulin, is not coagulated until 75 C. is reached, and we now know that it is in reality a mixture of several proteins, but so far these have not been completely separated from one another and obtained in a pure form. On dialysing a solution of serum-globulin a part is precipitated, and this portion has been termed the eu-globulin fraction, the remainder being known, in contradistinction, as the pseudo-globulin. Again, on diluting a solution and adding a small amount of acetic acid a precipitate is formed which in some respects differs from the remainder of the globulin present. Whether in these two instances we are dealing with approximately pure substances is extremely doubtful. A further

important point in connexion with the chemistry of the globulins is that dextrose may be found among their decomposition products, i.e. that a part of it, or possibly the whole, possesses a glucoside character.

Serum-albumin gives all the typical colour and precipitation reactions of the albumins. If plasma be weakly acidified with sulphuric acid, then treated with crystals of ammonium sulphate until a slight precipitate forms, filtered and the filtrate allowed to evaporate very slowly, typical crystals of serum-albumin may form. According to many it is a uniform and specific

substance, but others hold the view that it consists of at least three distinct substances, as shown by the fact that if a solution be gradually heated coagulation will occur at three different temperatures, viz. at 73 , 77 and 84 C. On the other hand the close agreement between different analyses of even the amorphous preparations points to there being but one serum-albumin.

When blood clots two new proteins make their appearance in the fluid part of the blood, or serum, as it is now called. The first of these is fibrin ferment (for its origin see section on Clotting below). The other, fibrinoglobulin, possesses all the typical characteristics of the globulins and coagulates at 64° C.

Carbohydrates. — Three several carbohydrates are described as occurring in plasma, viz. glycogen, animal gum and dextrose. If glycogen is present in solution in the plasma it is there in very small quantities only, and has probably arisen from the destruc- tion of the white blood corpuscles, since some leucocytes un- doubtedly contain glycogen. A small amount of carbohydrate having the formula for starch and yielding a reducing sugar on hydrolysis with acid has also been described. The constant carbohydrate constituent of plasma, however, is dextrose. This is present to the approximate amount of 0-15 % in arterial blood. The amount may be much greater in’ the blood of the portal vein during carbohydrate absorption, and according to some observers there is less in venous than in arterial blood, but the difference is small and falls within the error of observation. The statement that when no absorption is taking place the blood of the hepatic vein is richer in dextrose than that of the portal vein (Bernard) is denied by Pavy.

Fats. — Plasma or serum is as a rule quite clear, but after a meal rich in fats it may become quite milky owing to the presence of neutral fats in a very fine state of subdivision. This suspended fat rapidly disappears from the blood after fat absorption has ceased. To some extent it varies in composition with that of the fat absorbed, but usually consists of the glycerides of the common fatty acids — palmitic, stearic and oleic. In addition, there is a small amount of fatty acid in solution in the plasma. As to the form in which this occurs there is some uncertainty. It is possibly present as a soap or even as a neutral fat, since a little can be dissolved in plasma, the solvent substance being probably protein or cholesterin. Fatty acids also appear to be present to some extent combined with cholesterin forming cholesterin esters (about 0-06%).

Other Organic Compounds. — In addition to the substances above described, belonging to the three main classes of food stuffs, there are still other organic bodies present in plasma in small amounts, which for convenience we may classify as non-nitro- genous and nitrogenous. Among the former may be mentioned lactic acid, glycerin, a lipochrome, and probably many other substances of a similar type whose separation has not yet been effected.

The non-protein nitrogenous constituents consist of the following: ammonia as carbonate or carbamate (0-2 to o-6%), urea (0-02 to 0-05%), creatine, cr;ainine, uric acid, xanthine, hypoxanthine and occasionally hippuric acid. Three ferments are also described as being present: (1) a glycolytic ferment exerting an action upon dextrose; (2) a lipase or fat-splitting ferment; and (3) a diastase capable of converting starch into sugar.

Salts. — The saline constituents of plasma comprise chlorides, phosphates, carbonates and possibly sulphates, of sodium, potassium, calcium and magnesium. The most abundant metal is sodium and the most abundant acid is hydrochloric. These two are present in sufficient amount to form about 0-65% of sodium chloride. The phosphate is present to about 0-02 %. Sulphuric acid is always present if the blood has been calcined for the purposes of the analysis, and may then be present to about 0-013 %. This is, however, probably produced during the destruction of the protein, since it has been shown that no sulphate can be removed from normal plasma by dialysis. The amount of potassium present (0-03 %) is less than one-tenth of that of the sodium, and the quantities of calcium and magnesium are even less.

Formed Elements. — When viewed under the microscope the main

number of these are seen to be small yellow bodies of very uniform size, size and shape varying, however, in different animals. When observed in bulk they have a red colour, their presence in fact giving the typical colour to blood. These are the red blood corpuscles or erythrocytes (Gr. kpvdpos, red). Mingled with them in the blood are a smaller number of corpuscles which possess no colour and have therefore been called white blood corpuscles or leucocytes (Gr. XevKos, white) . Lastly, there are present a large number of small lens-shaped structures, less in number than the red corpuscles, and much more difficult to distinguish. These are known as blood platelets.

Red Corpuscles. — These are present in very large numbers and, under normal conditions, all possess exactly the same appearance. With rare exceptionstheir shape is that of a biconcave disk with bevelled edges, the size varying somewhat in different animals, as is seen in the following table which gives their diameters: —

Man 0-0075 mm.

Dog _ 0-0073 mm.

Rabbit 0-0069 mm.

Cat 0-0065 mm.

Goat 0-0041 mm.

The coloured corpuscles of amphibia as well as of nearly all vertebrates below mammals are biconvex and elliptical. The following are the dimensions of some of the more common: —

Pigeon . . . 0-0147 mm. long by 0-0065 mm. wide.

Frog . .

Newt

Proteus .

Amphiuma

Their number also varies as follows Man …. 4,000,000 to

0-0223 >»

0-0157

0-0293 …

0-0195

0-0580 „

0-0350

0-0770 ,,

,, 0-0460

Goat Sheep Birds . Fish Frog . Proteus

5,000,000 per cub. mm.

9,000,000 to 10,000,000 ,, ,,

13,000,000 to 14,000,000 ,, „

1,000,000 to 4,000,000 „ ,,

250,000 to 2,000,000 ,, „ 500,000 per cub. mm.

36,000

In mammals they are apparently homogeneous in structure, have no nucleus, but possess a thin envelope. Their specific gravity is distinctly higher than that of the plasma (1-088), so that if clotting has been prevented, blood on standing yields a large deposit which may form as much as half the total volume of the blood.

Chemical Composition. — On destruction the red corpuscles yield two chief proteins, haemoglobin and a nucleo-protein, and a number of other substances similar to those usually obtained on the break-down of any cellular tissue, such for instance as lecithin, cholesterin and inorganic salts. The most important protein is the haemoglobin. To it the corpuscle owes its dis- tinctive property of acting as an oxygen carrier, for it possesses the power of combining chemically with oxygen and of yielding up that same oxygen whenever there is a decrease in the con- centration of the oxygen in the solvent. Thus in a given solution of haemoglobin the amount of it which is combined with oxygen depends absolutely on the oxygen concentration. The greatest dissociation of oxyhaemoglobin occurs as the oxygen tension falls from about 40 to 20 mm. of mercury. That the oxygen forms a definite compound with the haemoglobin is proved by the fact that haemoglobin thoroughly saturated with oxygen (oxy- haemoglobin)

has a definite absorption spectrum showing two bands between the D and E lines, whilst haemoglobin from which the oxygen has been completely removed only gives one band between those lines. In association with this, oxyhaemoglobin has a typical bright red colour, whereas haemoglobin is dark purple. A further striking characteristic of haemoglobin is that it contains iron in its molecule. The amount present, though small bears a perfectly definite quantitative relation to the amount of oxygen with which the haemoglobin is capable of combining (two atoms of oxygen to one of iron). One gram of haemoglobin crystals can combine with 1-34 cc. of oxygen. On destruction with an acid or alkali, haemoglobin yields a pigment portion, haematin, and a protein portion, globin, the latter belonging to the group of the histones (Gr. lards, web, tissue).

In this cleavage the iron is found in the pigment. By the use of a strong acid, it may be made to yield iron-free pigment, the remainder of the molecule being much further decomposed.

Destruction and Formation. — In the performance of their work the corpuscles gradually deteriorate. They are then destroyed, chiefly in the liver, but whether the whole of this process is effected by the liver alone is not decided. It is proved, however, that the destruction of the haemoglobin is entirely effected there. It was for a long time considered to be one of the functions of the spleen to examine the red corpuscles and to destroy or in some way to mark those no longer fitted for the performance of their work. It is proved that the destruction of the haemoglobin is entirely effected in the liver, since both the main cleavage products may be traced to this organ, which discharges the pigmentary portion as the bile pigment, but retains the iron-protein moiety at any rate for a time. The amount of bile pigment eliminated during the day indicates that the destruction must be consider- able, and since the number of corpuscles does not vary there must be an equivalent formation of new ones. This takes place in the red bone-marrow, where special cells are provided for their continuous production. In embryonic life their formation is effected in another way. Certain mesodermic cells, resembling those of the connective tissue, collect masses of haemoglobin, and from these elaborate red blood corpuscles which thus come to lie in the fluid part of the cell. By a canalization of the branches of these cells which unite with branches of other cells the pre- cursors of the blood capillaries are formed.

White Blood Corpuscles. — These constitute the second import- ant group of formed elements in the blood, and number about 1 2,000 to 20,000 per cubic mm. They are typical wandering cells carried to all parts of the body by the blood stream, but often leave that stream and gain the tissue spaces by passing through the capillary wall. They exist in many varieties and were first classified according as, under the microscope, they presented a granular appearance or appeared clear. The cells were also distinguished from one another according as they possessed fine or coarse granules. The granules are confined to the protoplasm of the cell, and it has been shown that they differ chemically, because their staining properties vary. Thus, some granules select an acid stain, and the cells containing them are then designated acidophile or eosinophile; 1 other granules select a basic stain and are called basophile, while yet others prefer a neutral stain (neuirophile).

In human blood the following varieties of leucocytes may be distinguished: —

1. The Polymorphonuclear Cell. — This possesses a nucleus of very complicated outline and a fair amount of protoplasm filled with numbers of fine granules which stain with eosin. They vary in size but are usually about o-oi mm. in diameter. They are highly amoeboid and phagocytic, and form about 70% of the total number of leucocytes.

2. The Coarsely Granular Eosinophile Cell. — These large cells contain a number of well-defined granules which stain deeply with acid dyes. The nucleus is crescentic. The cells amount to about 2 % of the total number of leucocytes, though the propor- tion varies considerably. They are actively amoeboid.

3. The Lymphocyte. — This is the smallest leucocyte, being only about 0-0065 mm. in diameter. It has a large spherical nucleus with a small rim of clear protoplasm surrounding it. It forms from 1 5 to 40 % of the number of leucocytes, and is less markedly amoeboid than the other varieties.

4. The Hyaline (Gr. va'ki.vos, glassy, crystalline, vaXos, glass) cell or macrocyte (Gr. /xa/cpos, long or large). — This is a cell similar to the last with a spherical, oval or indented nucleus, but it has much more protoplasm. It constitutes about 4 % of all the leucocytes and is highly amoeboid and phagocytic.

5. The Basophile Cell. — This possesses a spherical nucleus and the

protoplasm contains a small number of granules staining

1 The suffix -phile, Greek 4>i\dv, to love, prefer, is in scientific terminology frequently applied to substances that exhibit such preference for particular stains or reagents, the names of which form the first part of the word.

deeply with basic dyes. It is rarely found in the blood of adults except in certain diseases.

Functions. — These cells act as scavengers or as destroyers of living organisms that may have gained access to the tissue spaces. They play an important part in the chemical processes underlying the phenomena of immunity, and some at least are of importance in starting the process of clotting.

They are constantly suffering destruction in the performance of their work. Many, too, are lost to the body by their passage through the different mucous surfaces. Their origin is still obscure in many points. The lymphocytes are derived from lymphoid tissue, wherever it exists in the different parts of the body. The polymorphonuclear and eosinophile cells are derived from the bone-marrow, each by division of specific mother cells located in that tissue. The macrocyte is believed by many to represent a further stage in the development of the lymphocyte. Their rate of formation may be influenced by a variety of conditions — for instance, they are found to vary in number according to the diet and also, to a considerable extent, in disease.

Platelets. — The platelets or thrombocytes (Gr. 0p6,uj3os, clot) are the third class of formed elements occurring in mammalian blood. There are still, however, many observers who consider that platelets are not present in the normal circulating blood, but only make their appearance after it has been shed or other- wise injured. They are minute lens-shaped structures, and may amount to as many as 800,000 per cubic mm. Under certain conditions, examination has shown that they are protoplasmic and amoeboid, and that each one contains a central body of different staining properties from the remainder of the structure. This has been regarded by some as a nucleus. On being brought into contact with a foreign surface they adhere to it firmly, very rapidly passing through a number of phases resulting ultimately in the formation of granular debris. In shed blood they tend to collect into groups, and during clotting, fibrin filaments may be observed to shoot out from these clumps.

Variations in the Blood of different Animals. — If we contrast the

blood of different animals of the vertebrate class we find striking differences both in microscopic appearances and in chemical properties. In the first place, the corpuscles vary in amount and in kind. Thus, whilst in a mammal the corpuscles form 40 to 50 % of the total volume of the blood, in the lower vertebrates the volume is much less, e.g. in frogs as low as 25 % and in fishes even lower. The deficiency is chiefly in the red corpuscles, the ratio of white to red increasing as we examine the blood from animals lower in the scale. The corpuscles themselves are also found to vary, especially the red ones. In the mammal they are biconcave disks with bevelled edges, they do not contain a nucleus so that they are not cells. In the bird they are larger, ellipsoidal in shape and have a large nucleus in the centre of the cell. In reptiles and amphibia the red corpuscles are also nucleated, but the stroma portion containing the haemoglobin is arranged in a thickened annular part encircling the nucleus. When seen from the flat they are oval in section. In fishes the corpuscles show very much the same structure. A further very significant difference to be observed between the bloods of different vertebrates is in the amount of haemoglobin they contain; thus in the lower classes, fishes and amphibia, not only is the number of red corpuscles small but the amount of haemo- globin each corpuscle contains is relatively low. The concentra- tion of the haemoglobin in the corpuscles attains its maximum in the mammal and the bird. Since the haemoglobin is practically the same from whatever animal it is obtained and can only com- bine with the same amount of oxygen, the oxygen-capacity of the blood of any vertebrate is in direct proportion to the amount of haemoglobin it contains. Therefore we see that as we ascend the scale in the vertebrate series the oxygen-carrying capacity of the blood rises. This increase was a natural preliminary condition for the progress of evolution. In order that a more active animal might be developed the main essential was that the chemical processes of the cell should be carried out more rapidly, . and as these processes are fundamentally oxidative,

increased activity entails an increased rate of supply of oxygen. This latter has been brought about in the animal kingdom in two ways, first by an increase in the concentration of the haemo- globin of the blood effected by an increase both in the number of corpuscles and in the amount of haemoglobin contained in each, and secondly by an increase in the rate at which the blood has been made to pass through the tissues. In the lower vertebrates the blood pressure is low and the

haemoglobin content of the blood is low, consequently both rate of blood-flow and oxygen- content are low. In contrast with this, in higher vertebrates the blood pressure is high and the haemoglobin content of the blood is high, consequently both rate of blood-flow and oxygen-content are high. We must associate with this important step in evolu- tion the means employed for the more rapid absorption of oxygen and for its increased rate of discharge to the tissues, the most important features of which are a diminution in the size of the corpuscle and the attainment of its peculiar shape, both resulting in the production of a relatively enormous corpuscular surface in a unit volume of blood.

Variations are also found in the white corpuscles as well as in the red, but these differences are not so striking and lie chiefly in unimportant details of structure of individual cells. Enormous variations are to be found in different species of mammals, but the cells generally conform to the types of secreting cells or phagocytes.

The platelets also differ in the different species. In the frog, for instance, many are spindle-shaped and contain a nucleus-like structure. Birds' blood is stated to contain no platelets. The variations in number of these bodies have not. been satisfactorily ascertained on account of the difficulties involved in any attempt to preserve them and to render them visible under the microscope. Differences are also found in the chemical composition of the plasma. The chief variation is in the amount of protein present, which attains its maximum concentration in birds and mammals, while in reptiles, amphibia and fishes it is much less. The bloods of the latter two classes are much more watery than that of the mammal. Moreover, it has been proved that there are specific differences in the chemical nature of the various proteins present even between different varieties of mammals. Thus the ratio of the globulin fraction to the albumin fraction may vary considerably, and again, one or other of the proteins may be quite specific for the animal from which it is derived .

Clotting. — If a sample of blood be withdrawn from an animal, within a short time it undergoes a series of changes and becomes converted into a stiff jelly. It is said to clot. If the process is watched it is seen to start first from the surfaces where it is in contact with any foreign body; thence it extends through the blood until the whole mass sets solid. A short time elapses before this process commences — a time dependent upon two chief conditions, viz. the temperature at which the blood is kept and the extent of foreign surface with which it is brought into contact. Thus in a mammal the blood clots most quickly at a temperature a little above body temperature, while if the blood be

cooled quickly the clotting is considerably delayed and in the case of some animals altogether prevented. For example, human blood kept at body temperature clots in three minutes, while if allowed to cool to room temperature the first sign of clotting may not make its appearance until eight minutes after its removal from the body. The process of clotting is also considerably accelerated by making the blood flow in a thin stream over a wide surface. The full completion of the process occupies some time if the blood be kept quiet, but ultimately the whole mass of the blood becomes converted into a solid. At this stage the containing vessel may be inverted without any drop of fluid escaping. A short time after this stage has been reached drops of a yellow fluid appear upon the surface and, increasing in size and number, run together to form a layer of fluid separated from the clot. This fluid is termed serum; its appearance is due to the contraction of the clot, which thus squeezes out the fluid from between its solid constituents. Contraction continues for about twenty-four hours, at the end of which time a large quantity (one-third or more of the total volume) of serum may have

been separated. The clot contracts uniformly, thus preserving throughout the same general shape as that of the vessel in which the blood has been collected. Finally the clot swims freely in the serum which it has expressed.

The cause of the clot formation has been found to be the precipitation of a solid from the liquid plasma of the blood. This solid is in the form of very minute threads and hence is termed fibrin. The threads traverse the mass of blood in every possible direction, interlacing and thus confining in their meshes all the solid elements of the blood. Soon after their deposition they begin to contract, and as the meshwork they form is very minute they carry with them all the corpuscles of the blood. These with the fibrin form the shrunken clot.

If the rate at which blood clots be retarded either by cooling or by some other process the corpuscles may have time to settle, partially or completely, in which case distinct layers may form. The lowermost of these contains chiefly the red corpuscles, the second layer may be grey owing to the high percentage of leuco- cytes present, while a third, marked by opalescence only, may be very rich in platelets. Above these a clear layer of fluid may be found. This is plasma. The formation of these layers depends solely upon the rate of sedimentation of these elements, the rate depending partly upon differences in specific gravity, and partly upon the tendency the corpuscles have to run into clumps. Horse’s blood offers one of the best instances of the clumping of red corpuscles, and in this animal

sedimentation of the red corpuscles is most rapid.

If now such a sedimented blood is allowed to clot the process is found to start in the middle two layers, i.e. in those containing the white corpuscles and platelets. From these layers it spreads through the rest of the liquid, being most retarded, however, in the red corpuscle layer, and particularly so if the sedimentation has been very complete. Not only does the clotting process start from the layers containing the leuco- cytes and platelets, but in them it also proceeds more quickly. These observations clearly indicate that the clotting process is initiated by some change starting from these elements.

The object of the clotting of the blood is quite clear. It is to prevent, as far as possible, any loss of blood when there is an injury to an animal's vessels. The shed blood becomes con- verted into a solid, and this, extending into the interior of the ruptured vessel, forms a plug and thus arrests the bleeding. It is found that clotting is especially accelerated whenever the blood touches a foreign tissue, for instance, the outer layers of a torn blood-vessel wall, muscle tissue, &c, i.e. in exactly those conditions in which rapid clotting becomes of the greatest importance. Yet another very pregnant fact in connexion with clotting is that if an animal be bled rapidly and the blood collected in successive samples it is found that those collected last clot most quickly. Hence the more excessive the haemor- rhage in any case, the greater becomes the onset of the natural cure for the bleeding, viz. clotting.

When we begin to inquire into the nature of clotting we have to determine in the first place whence the fibrin is derived. It has long been known that two chemical substances at least are requisite for its production. Thus certain fluids are known, e.g. some samples of hydrocele or pericardial fluid, which will not clot spontaneously, but will clot rapidly when a small quantity of serum or of an old blood-clot is added to it. The constituent substance which is present in the first-named fluids is known as fibrinogen, and that present in the serum or the clot is known as fibrin-ferment or thrombin.

Fibrinogen is present in living blood dissolved in the plasma; it is also present in such fluids as hydrocele or pericardial effusions, which, though capable of clotting, do not clot spontaneously. Thrombin, on the other hand, does not exist in living blood, but only makes its appearance there after blood is shed. It is not yet certain what is the nature of the final reaction between fibrinogen and thrombin. The possibilities are, that thrombin may act — (i) by acting upon fibrinogen, which it in some way converts into fibrin, (2) by uniting

with fibrinogen to form fibrin, or (3) by yielding part of itself to the fibrinogen which thus

becomes converted into fibrin. The experimental study of the rate of fibrin formation, when different strengths of thrombin solutions are allowed to act upon a fibrinogen solution, leads us to the probable conclusion that the first of these three possi- bilities is the correct one, and that thrombin therefore exerts a true ferment action upon fibrinogen. It is known that in the reaction, in addition to the formation of fibrin, yet another protein makes its appearance. This is known as fibrinoglobulin, and apparently it arises from the fibrinogen, so that the change would be one of cleavage into fibrin and fibrinoglobulin. It is very noteworthy that although the amount of fibrin formed during the clotting appears very bulky, yet the actual weight is extremely small, not more than 0-4 grms. from 100 cc. of blood.

Having ascertained that the clotting is due to the action of thrombin upon fibrinogen, we now see that the next step to be explained is the origin of thrombin. It has been shown that the final step in its formation consists in the combination of another substance, termed prothrombin, with calcium. Any soluble calcium salt is found to be effective in this respect, and con- versely the removal of soluble calcium (e.g. by sodium oxalate) will prevent the formation of thrombin and therefore of clotting.

In the next place it can be proved that prothrombin does not exist as such in circulating blood, so that the problem becomes an inquiry as to the origin of prothrombin. Experiment has shown that in its turn prothrombin arises from yet another precursor, which is named thrombogen, and that thrombogen also is not to be found in circulating blood but only makes its appearance after the blood is shed. The conversion of throm- bogen into prothrombin has been proved to be due to the action of a second ferment which has been named thrombokinase, and this latter is again absent from living blood. Hence the question arises, whence are derived thrombogen and thrombokinase? In the study of this question it has been found that if the blood of birds be collected direct from an artery through a perfectly clean cannula into a clean and dust-free glass vessel, it does not clot spontaneously. The plasma collected from such blood is found to contain thrombogen but no thrombokinase. A some- what similar

plasma may be prepared from a mammal's blood by collecting samples of blood from an artery into vessels which have been thoroughly coated with paraffin, though in this instance thrombogen may be absent as well as thrombokinase. If plasma containing thrombogen but no thrombokinase be treated with a saline extract of any tissues it will soon clot. The saline extract contains thrombokinase. This ferment can therefore be derived from most tissues, including also the white blood corpuscles and the platelets. Thrombogen is produced from the leucocytes, but it is not yet certain whether it is also formed from the platelets. The discovery of the origin of the throm- bokinase from tissue cells explains a fact that has long been known, namely, that if in collecting blood, it is allowed to flow over cut tissues, clotting is most markedly accelerated. The fact that birds' blood if very carefully collected will not clot spontaneously tends to prove that thrombokinase is not derived from the leucocytes, and makes probable its origin from the platelets, for it is known that birds' blood apparently does not contain platelets, at any rate in the form in which they are found in mammalian blood. When examining the general properties of platelets, attention was drawn to the remarkably rapid manner in which they undergo change on coming into contact with a foreign surface. It is apparently the actual contact which initiates these changes, changes which are funda- mentally chemical in character, resulting in the production of thrombokinase and possibly also of thrombogen.

Thus as our knowledge at present stands the following statement gives a recapitulated account of the changes which constitute the many phases of clotting. When blood escapes from a blood-vessel it comes into contact with a foreign surface, either a tissue or the damaged walls of the cut vessel. Very speedily this contact results in the discharge of thrombogen and thrombokinase, the former from the white blood corpuscles and also possibly from the platelets, the latter from the platelets

or from the tissue with which the blood comes in contact. The interaction of these two bodies next results in the formation of prothrombin, which, combining with the calcium of any soluble lime salt present, forms thrombin or fibrin-ferment. The last step in the change is the action of thrombin upon fibrinogen to form fibrin, and the clot is complete.

The intrinsic value to the animal of these changes is quite plain. The power of clotting and thus stopping haemorrhage is of essential importance, and yet this clotting must not occur within the living blood-vessels, or it would speedily result in death. That the tissues

should be able to accelerate the process is of very obvious value. That the inner lining of the blood- vessels does not act as a foreign tissue is possibly due to the extreme smoothness of their surface.

Further, an animal must always be exposed to a possible danger in the absorption of some thrombin from a mass of clotted blood still retained within the body, and we know that if a quantity of active ferment be injected into the blood-stream intravascular clotting does result. Under all usual conditions this is obviated, the protective mechanism being of a twofold character. First, it is found that thrombin becomes converted very quickly into an inactive modification. Serum, for instance, very quickly loses its power of inducing clotting in fibrinogen solutions. Secondly, the body has been found to possess the power of making a substance, antithrombin, which can combine with thrombin forming a substance which is quite inactive as far as clotting is concerned. Finally, there is evidence that normal blood contains a small quantity of this substance, antithrombin, and that under certain conditions the amount present may be enormously increased. (T. G. Br.)

Pathology of the Blood.

The changes in the blood in disease are probably as numerous and varied as the diseases which attack the body, for the blood is not only the medium of respiration, but also of nutrition, of defence against organisms and of many other functions, none of which can be affected without corresponding alterations occurring in the circulating fluid. The immense majority of these changes are, however, so subtle that they escape detection by our present methods. But in certain directions, notably in regard to the relations with micro-organisms, changes in the blood-plasma can be made out, though they are not associated in all cases with changes in the formed elements which float in it, nor with any obvious microscopical or chemical alterations.

The phenomena of immunity to the attacks of bacteria or their toxins, of agglutinative action, of opsonic action, of the precipitin tests, and of haemolysis, are all largely f mmunity dependent on the inherent or acquired characters of the blood serum. It is a commonplace that different people vary in their susceptibility to the attacks of different organisms, and different species of animals also vary greatly. This ” natural immunity ” is due partly to the power possessed by the leucocytes or white blood corpuscles of taking into their bodies and digesting or holding in an inert state organisms which reach the blood — phagocytosis, — partly to certain bodies in the blood serum which have a bactericidal action, or whose presence enables the phagocytes

to deal more easily with the organisms. This natural immunity can be heightened when it exists, or an artificial immunity can be produced in various ways. Doses of organisms or their toxins can be injected on one or several occasions, and provided that the lethal dose be not reached, in most cases an increased power of resistance is produced. The organisms may be injected alive in a virulent condition, or with their virulence lessened by heat or cold, by antiseptics, by cultivation in the presence of oxygen, or by passage through other animals, or they may first be killed, or their toxins alone injected. The method chosen in each case depends on the organism dealt with. The result of this treat- ment is that in the animal treated protective substances appear in the serum, and these substances can be transferred to the serum of another animal or of man; in other words the active immunity of the experimental animal can be translated into

the passive immunity of man. According to the nature of the substances injected into the former, its serum may be antitoxic, if it has been immunized against any particular toxin, or anti- bacterial, if against an organism. Familiar examples of these are, of the former diphtheria antitoxin, of the latter anti-plague and anti-typhoid sera. An antitoxin exerts its effects by actual combination with the respective toxin, the combination being inert. It is probable that the ultimate source of the antitoxin is to be found in the living cells of the tissues and that it passes from them into the blood. The action of an antibacterial serum depends on the presence in it of a substance known as ” immune- body,” which has a special affinity and power of combining with the bacterium used. In order that it may exert this power it requires the presence of a substance normally present in the serum known as ” complement.” The development of these ” anti-bodies,” though jt has been studied mainly in connexion with bacteria and their toxins, is not confined to their action, but can be demonstrated in regard to many other substances, such as ferments, tissue cells, red corpuscles, &c. In some animals, for example, the blood serum has the power of dissolv- ing the red corpuscles of an animal of different species; e.g. the guinea-pig’s serum is ” haemolytic ” to the red corpuscles of the ox. This haemolytic power (haemolysis) can be increased by repeated injections of red corpuscles from the other animal, in this case also, as in the bacterial case, by the production and action of immune-body and complement. The antiserum pro- duced in the case of the red corpuscles may sometimes, if injected into the first animal, whose red corpuscles were used, cause

extensive destruction of its red corpuscles, with haemo- globinuria, and sometimes a fatal result.

Opsonic action depends on the presence of a substance, the ” opsonin,” in the serum of an immunized animal, which makes the organism in question more easily taken up by the phagocytes (leucocytes) of the blood. The opsonin becomes fixed to the organisms. It is present to a certain extent in normal serum, but can be greatly increased by the process of immunization; and the ” opsonic index,” or relation between the number of organisms taken up by leucocytes when treated with the serum of a healthy person or ” control,” and with the serum of a person affected with any bacterial disease and under treatment by immunization, is regarded by some as representing the degree of immunity produced.

Agglutinative action is evidence of the presence in a serum of a somewhat similar set of substances, known as ” agglutinins.” When a portion of an antiserum is added to an emulsion of the corresponding organism, the organisms, if they are motile, cease to move, and in any case become gathered together into clumps. In all probability several different bodies are concerned in this process. This reaction, in its practical applications at least, may be regarded as a reaction of infection rather than of im- munization as oidinarily understood, for it is found that the blood serum of patients suffering from typhoid, Malta fever, cholera, and many other bacterial diseases, agglutinates the corresponding organisms. This fact has come to be of great importance in diagnosis.

The precipitin test depends on a somewhat analogous reaction. If the serum of an animal be injected repeatedly into another animal of different species, a ” precipitin ” appears in the serum of the animal treated, which causes a precipitate when added to the serum of the first animal. The special importance of this fact is that it can be utilized as a method of distinguishing between human blood and that of animals, which is often of importance in medical jurisprudence.

In this summary the facts adduced are practically all biological, and are due to the extraordinary activity with which the study of bacteriology (

The methods at present employed in examining the blood

Anaemia.

clinically are: the enumeration of the red and white corpuscles per

cubic millimetre; the estimation of the percentage of haemoglobin and of the specific gravity of the blood; the micro- scopic examination of freshly-drawn blood and of blood films made upon cover-glasses, fixed and stained. In special cases the alkalinity and the rapidity of coagulation may be ascertained, or the blood may be examined bacteriologically. We have no universally accepted means of estimating, during life, the total amount of blood in the body, though the method of J. S. Haldane and J. Lorrain Smith, in which the total oxygen capacity of the blood is estimated, and its total volume worked out from that datum, has seemed to promise important results {Journ. of Physiol, vol. xxv. p. 331, 1900). After death the amount df blood sometimes seems to be increased, and sometimes, as in ” pernicious anaemia,” it is certainly diminished. But the high counts of red corpuscles which are occasionally reported as evidence of plethora or increase of the total blood are really only indications of concentration of the fluid except in certain rare cases. It is necessary, therefore, in examining blood diseases, to confine ourselves to the study of the blood-unit, which is always taken as the cubic millimetre, without reference to the number of units in the body. •

Anaemia is often used as a generic term for all blood diseases, for in almost all of them the haemoglobin is diminished, either as a result of diminution in the number of the red corpuscles in which it is contained, or because the individual red corpuscles contain a smaller amount of haemo- globin than the normal. As haemoglobin is the medium of respiratory interchange, its diminution causes obvious symptoms, which are much more easily appreciated by the patient than those caused by alterations in the plasma or the leucocytes. It is customary to divide anaemias into ” primary ” and ” second- ary “: the primary are those for which no adequate cause has as yet been discovered; the secondary, those whose cause is known. Among the former are usually included chlorosis, pernicious anaemia, and sometimes the leucocythaemias; among the latter, the anaemias due to such agencies as malignant disease, malaria, chronic metallic poisoning, chronic haemor- rhage, tubercle, Bright’s disease, infective processes, intestinal parasites, &c. As our knowledge advances, however, this dis- tinction will probably be given up, for the causes of several of the primary anaemias have been discovered. For example, the anaemia due to bothriocephalus, an intestinal parasite, is clinically indistinguishable from the other forms of pernicious anaemia with which it used to be included, and leucocythaemia has been declared by Lowit, though probably erroneously, to be due to a blood parasite closely related to that of malaria. In all these conditions there is a considerable similarity in the symptoms produced and in the

pathological anatomy. The general symptoms are pallor of the skin and mucous membranes, weakness and lassitude, shortness of breath, palpitation, a tendency to fainting, and usually also gastro-intestinal disturb- ance, headache and neuralgia. The heart is often dilated, and on auscultation the systolic murmurs associated with that condition are heard. In fatal cases the internal organs are found to be pale, and very often their cells contain an excessive amount of fat. In many anaemias there is a special tendency to haemorrhage. Most of the above symptoms and organic changes are directly due to diminished respiratory interchange from the loss of haemoglobin, and to its effect on the various organs involved. The diagnosis depends ultimately in all cases upon the examination of the blood.

Though the relative proportions of the leucocytes are probably continually undergoing change even in health, especially as the result of taking food, the number of red corpuscles remains much more constant. Through the agency of some unknown mechan- ism, the supply of fresh red corpuscles from the bone-marrow keeps pace with the destruction of effete corpuscles, and in health each corpuscle contains a definite and constant amount of haemoglobin. The disturbance of this arrangement in anaemia may be due to loss or to increased destruction of cor- puscles, to the supply of a smaller number of new ones, to a

diminution of the amount of haemoglobin in the individual new corpuscles, or to a combination of these causes. It is most easy to illustrate this by describing what happens after a haemor- rhage. If this is small, the loss is replaced by the fully-formed corpuscles held in reserve in the marrow, and there is no dis- turbance. If it is larger, the amount of fluid lost is first made up by fluid drawn from the tissues, so that the number of corpuscles is apparently diminished by dilution of the blood; the erythro- blasts, or formative red corpuscles, of the bone-marrow are stimulated to proliferation, and new corpuscles are quickly thrown into the circulation. These are apt, however, to be small and to contain a subnormal amount of haemoglobin, and it is only after some time that they are destroyed and their place taken by normal corpuscles. If the loss has been very great, nucleated red corpuscles may even be carried into the blood- stream. The blood possesses a great power of recovery, if time be given it, because the organ (bone-marrow) which forms so many of its elements never, in health, works at high pressure. Only a part of the marrow, the so-

called red marrow, is normally occupied by erythroblastic tissue, the rest of the medullary cavity of the bones being taken up by fat. If any long-continued demand for red corpuscles is made, the fat is absorbed, and its place gradually taken by red marrow. This compensatory change is found in all chronic anaemias, no matter what their cause may be, except in some rare cases in which the marrow does not react.

It is often very difficult, especially in ” secondary ” anaemias, to say which of the above processes is mainly at work. In acute anaemias, such as those associated with septicaemia, there is no doubt that blood destruction plays the principal part. But if the cause of anaemia is a chronic one, a gastric cancer, for instance, though there may possibly be an increased amount of destruction of corpuscles in some cases, and though there is often loss by haemorrhage, the cancer interferes with nutrition, the blood is impoverished and does not nourish the erythroblasts in the marrow sufficiently, and the new corpuscles which are turned out are few and poor in haemoglobin. In chronic anaemias, regeneration always goes on side by side with destruc- tion, and it is important to remember that the state of the blood in these conditions gives the measure, not of the amount of destruction which is taking place so much as of the amount of regeneration of which the organism is capable. The evidence of destruction has often to be sought for in other organs, or in secretions or excretions.

Of the so-called primary anaemias the most common is chlorosis, an anaemia which occurs only in the female sex, between the ages of fifteen and twenty-five as a rule. Its symptoms are those caused by a diminution of haemoglobin, and though it is never directly fatal, and is extremely amenable to treatment with iron preparations, its subjects very frequently suffer from relapses at varying intervals after the first attack. Its causation is probably complex. Bad hygienic conditions, over-fatigue, want of proper food, especially of the iron-contain- ing proteids of meat, the strain put upon the blood and blood- forming organs by the accession of puberty and the occurrence of menstruation, all probably play a part in it. It has also been suggested that internal secretions may be concerned in stimulat- ing the bone-marrow, and that in the female sex in particular the genital organs may act in this way. Imperfect assumption of function by these organs at puberty, caused perhaps by some of the above-mentioned conditions, might lead to sluggishness in the bone-marrow, and to the supply to the blood of the poorly-formed corpuscles deficient in haemoglobin which are characteristic of the disease. Chlorosis is the type of anaemias from imperfect blood-formation. Lorrain Smith has produced evidence to show that the total amount of haemoglobin in the body is not diminished in this disease, but that the blood-plasma is

greatly increased in amount, so that the haemoglobin is diluted and the amount in each blood-unit greatly lessened.

Pernicious anaemia is a rarer disease than chlorosis, occurs usually later in life, and is distributed nearly equally between the two sexes. But it is of great importance because of its almost uniformly fatal termination, though its downward course

is generally broken by temporary improvement on one or more occasions. The symptoms are those of a progressive anaemia, in which gastro-intestinal disturbance usually plays a large part, and nervous symptoms are common, and they become at last much more severe than those of any secondary anaemia. The patient may die in the first attack, but more usually, when things seem to be at their worst, improvement sets in, either spon- taneously or as the result of treatment, and the patient slowly regains apparent health. This remission may be followed by a relapse, that again by a remission, and so on, but as a rule the disease is fatal within, at the outside, two or three years.

The prime cause of the disease is not known. It seems probable indeed that the causal factors are numerous. Severe malarial infection, syphilis, pregnancy, chronic gastro-intestinal disease, chronic gas-poisoning, are all, in different cases, known to have been causally associated with it, and it is probable that a con- genital weakness of the bone-marrow has often to do with its production, as in many cases a family or hereditary history of the disease can be obtained. The condition is now regarded as a chronic toxaemia, partly because of the clinical symptoms and pathological appearances, partly because analogous con- ditions can be produced experimentally by such poisons as saponin and toluylendiamin, and partly because of the facts of bothriocephalus anaemia. The site of production of the toxin, or toxins, for it is possible that several may have the same effect on the blood, is possibly not always the same, but must often be the alimentary canal, as bothriocephalus anaemia proves. Not all persons affected with this intestinal tapeworm contract the disease, but only those in whose intestines the worm is dead and decomposing or sometimes only ” sick.” The expulsion of the worm puts an end to the absorption of the toxin and the patients recover. No adequate explanation of the formation of the toxin in the immense majority of the cases, in which there is no tapeworm, has yet been given. It is certain that no organism as yet known is concerned.

This toxaemia affects the marrow and through it the blood, the gastro-intestinal apparatus and the nervous system, especi- ally the spinal

cord, in different proportions in different cases. The effect upon the marrow is to alter the type of red corpuscle formation, causing a reversion to the embryonic condition, in which the nucleated red corpuscles are large (megaloblasts), and the corpuscles in the blood formed from them are also large, are apparently ill suited to the needs of the adult, and easily break down, as the deposits of iron in the liver, spleen, kidneys and marrow prove. Whether this reversion is due to an exhaustion of the normal process or to an inhibition of it is not definitely known. The result is that the circulating red corpuscles are enormously diminished; it is usual to find 1,000,000 or less in the cubic millimetre instead of the normal 5,000,000. Though the haemoglobin is of course absolutely diminished, it is always, in severe cases, present in relatively higher percentage than the red corpuscles, because the average red corpuscle is larger and contains more haemoglobin than the normal. The large nucleated red corpuscles (megaloblasts) with which the marrow is crowded, often appear in the blood.

Other anaemias, such ‘as those known as lymphadenoma, or Hodgkin’s disease, splenic anaemia, chloroma, leucanaemia and the anaemia pseudo-leucaemica of children, need not be described here, as they are either rare or their occurrence or nature is still too much under discussion.

The number and nature of the leucocytes in the blood bears no constant or necessary relation to the number or condition of the red corpuscles, and their variations depend on entirely different conditions. The number in the cytosl’s. cubic millimetre is usually about 7000, but may vary in health from 5000 to 10,000. A diminution in their number is known as leucopenia, and is found in starvation, in some infective diseases, as for example in typhoid fever, in malaria and Malta fever, and in pernicious anaemia. An increase is very much more frequent, and is known as leucocytosis, though in this term is usually connoted a relative increase in the proportion of the polymorphonuclear neutrophile leucocytes.

Leucocytosis occurs under a great variety of conditions, normally to a slight extent during digestion, during pregnancy, and after violent exercise, and abnormally after haemorrhage, in the course of inflammations and many infective diseases, in malignant disease, in such toxic states as uraemia, and after the ingestion of nuclein and

other substances. It does not occur in some infective diseases, the most important of which are typhoid fever, malaria, influenza, measles and uncomplicated tuberculosis. In all cases where it is sufficiently severe and long continued, the reserve space in the bone-marrow is filled up by the active proliferation of the leucocytes normally found there, and is used as a nursery for the leucocytes required in the blood. In many cases leucocytosis is known to be associated with the defence of the organism from injurious influences, and its amount depends on the relation between the severity of the attack and the power of resistance. There may be an increase in the proportions present in the blood of lymphocytes (lymphocytosis), and of eosinophile cells (eosinophilic,). This latter change is associated specially with some forms of asthma, with certain skin diseases, and with the presence of animal parasites in the body, such as ankylostoma and filaria.

The disease in which the number of leucocytes in the blood is greatest is leucocythaemia or leucaemia. There are two main Leucaemia. f° rms °f tms disease, in both of which there are anaemia, enlargement of the spleen and lymphatic glands, or of either of them, leucocytic hypertrophy of the bone-marrow, and deposits of leucocytes in the liver, kidney and other organs. The difference lies in the kind of leucocytes present in excess in the blood, blood-forming organs and deposits in, v the tissues. In the one form these are lymphocytes, which areAmnd in health mainly in the marrow, the blood itself, the lymph glands and in the lymphatic tissue round the ali- mentary canal; in the other they are the kinds of leucocytes normally found in the bone-marrow — myelocytes, neutrophile, basophile and eosinophile, and polymorphonuclear cells, also neutrophile, basophile and eosinophile. The clinical course of the two forms may differ. The first, known as lymphatic leucaemia or lymphaemia, may be acute, and prove fatal in a few weeks or even days with rapidly advancing anaemia, or may be chronic and last for one or two years or longer. The second, known as spleno-myelogenous leucaemia or myelaemia, is almost always chronic, and may last for several years. Re- covery does not take place, though remissions may occur. The use of the X-rays has been found to influence the course of this disease very favourably. The most recent view of the pathology of the disease is that it is due to an overgrowth of the bone- marrow leucocytes, analogous in some respects to tumour growth and caused by the removal of some controlling mechanism rather than by stimulation. The anaemia accompanying the disease is due partly to the leucocyte overgrowth, which takes up the space in the marrow belonging of right to red corpuscle formation and interferes with it. (G.L.G.)

BLOOD-LETTING. There are certain morbid conditions when a patient

may obtain marked relief from the abstraction of a certain amount of blood, from three or four ounces up to twenty or even thirty in extreme cases. This may be effected by vene- section, or the application of leeches, or more rarely by cupping (q.v.). Unfortunately, in years gone by, blood-letting was used to such excess, as a cure for almost every known disease, that public opinion is now extremely opposed to it. In certain pathological conditions, however, it brings relief and saves life when no other means would act with sufficient promptness to take its place.

Venesection, in which the blood is usually withdrawn from the median-basilic vein of the arm, has the disadvantage that it can only be performed by the medical man, and that the patient's friends are generally very much opposed to the idea. But the public are not nearly so prejudiced against the use of leeches; and as the nurse in charge can be instructed to use these if occasion arises, this is the form of blood-letting usually practised to-day. From one to twelve leeches are applied at the time, the average leech withdrawing some two drachms of blood. Should this prove insufficient, as much again can be abstracted

by the immediate application of hot fomentations to the wounds. They should always be applied over some bony prominence, that pressure may be effectively used to stop the haemorrhage afterwards. They should never be placed over superficial veins, or where there is much loose subcutaneous tissue. If, as is often the case, there is any difficulty in making them bite, the skin should be pricked at the desired spot with the point of a sterilized needle, and the leech will then attach itself without further trouble. Also they must be left to fall off of their own accord, the nurse never dragging them forcibly off. If cold and pressure fail to stop the subsequent haemorrhage, a little powdered alum or other styptic may be inserted in the wound. The following are the main indications for their use, though in some cases they are better replaced by venesection. (1) For stagnation of blood on the right side of the heart with constant dyspnoea, cyanosis, &c. In acute lung disease, the sudden obstruction to the passage of blood through the lungs throws such an increased strain on the right ventricle that it may dilate to the verge of paralysis; but by lessening the total volume of blood, the heart's work is lightened for a time, and the danger at the moment tided over. This is a condition frequently met with in the early stages of acute pneumonia, pleurisy and bronchitis, when the obstruction is in the lungs, the heart being normal. But the same result is also met with as a result of failure of compensation with back pressure in certain forms of heart disease (q.v.). (2) To lower arterial tension. In the early stages of cerebral

haemorrhage (before coma has supervened), when the heart is working vigorously and the tension of the pulse is high, a timely vene-section may lead to arrest of the haemorrhage by lowering the blood pressure and so giving the blood in the ruptured vessel an opportunity to coagulate. (3) In various convulsive attacks, as in acute uraemia.

BLOOD-MONEY, colloquially, the reward for betraying a criminal to justice. * More strictly it is used of the money-penalty paid in old days by a murderer to the kinsfolk of his victim. These fines completely protected the offender from the vengeance of the injured family. The system was common among the Scandinavian and Teutonic races previous to the introduction of Christianity, and a scale of payments, graduated according to the heinousness of the crime, was fixed by laws, which further settled who could exact the blood-mone}', and who were entitled to share it. Homicide was not the only crime thus expiable: blood-money could be exacted for all crimes of violence. Some acts, such as killing any one in a church or while asleep, or within the precincts of the royal palace, were " bot-less "; and the death penalty was inflicted. Such a criminal was outlawed, and his enemies could kill him wherever they found him.

BLOODSTONE, the popular name of the mineral heliotrope, which is a variety of dark green chalcedony or plasma, with bright red spots, splashes and streaks. The green colour is due to a chloritic mineral; the red to haematite. Some coarse kinds are opaque, resembling in this respect jasper, and some writers have sought to restrict the name "bloodstone" to green jasper, with red markings, thus making heliotrope a translucent and bloodstone an opaque stone, but, though convenient, such a distinction is not generally recognized. A good deal of bloodstone comes from India, where it occurs in the Deccan traps, and is cut and polished at Cambay. The stone is used for seals, knife-handles and various trivial ornaments. Bloodstone is not very widely distributed, but is found in the basaltic rocks of the Isle of Rum in the west of Scotland, and in a few other localities. Haematite (Gr. al/xa, blood), or native peroxide of iron, is also sometimes called " bloodstone."

BLOOM (from A.S. bloma, a flower), the blossom of flowering plants, or the powdery film on the skin of fresh-picked fruit; hence applied to the surface of newly-minted coins or to a cloudy appearance on the varnish of painting due to moisture; also, in metallurgy, a term used of the rough billets of iron and steel, which have undergone a preliminary hammering or rolling, and are ready for further working.

BLOOMER, AMELIA JENKS (1818-1894), American dress- reformer

and women's rights advocate, was born at Homer, New

York, on the 27th of May 1818. After her marriage in 1840 she established a periodical called The Lily, which had some success. In 1849 sne t0 ˚k up the idea — previously originated by Mrs Elizabeth Smith Miller — of a reform in woman's dress, and the wearing of a short skirt, with loose trousers, gathered round the ankles. The name of " bloomers " gradually became popularly attached to any divided-skirt or knickerbocker dress for women. Until her death on the 30th of December 1894 Mrs Bloomer took a prominent part in the temperance campaign and in that for woman's suffrage.

BLOOMFIELD, MAURICE (1855-), American Sanskrit scholar, was born on the 23rd of February 1855, in Bielitz, Austrian Silesia. He went to the United States in 1867, and ten years later graduated from Furman University, Greenville, South Carolina. He then studied Sanskrit at Yale, under W. D. Whitney, and at Johns Hopkins, to which university he returned as associate professor in 1881 after a stay of two years in Berlin and Leipzig, and soon afterwards was promoted professor of Sanskrit and comparative philology. His papers in the American Journal of Philology number a few in comparative linguistics, such as those on assimilation and adaptation in congeneric classes of words, and many valuable " Contributions to the Interpretation of the Vedas," and he is best known as a student of the Vedas. He translated, for Max-Miiller's Sacred Books of the East,the Hymns of the Atharva-Veda (1897) ; contributed to the Buhler-Kielhorn Grundriss der indo-arischen Philologie und Altertumskunde the section " The Atharva-Veda and the Gopatha Brahmana " (1899); was first to edit the Kaucika-Sutra (1890), and in 1907 published, in the Harvard Oriental series, A Vedic Concordance. In 1905 he published Cerberus, the Dog of Hades, a study in comparative mythology.

BLOOMFIELD, ROBERT (1766-1823), English poet, was born of humble parents at the village of Honington, Suffolk, on the 3rd of December 1766. He was apprenticed at the age of eleven to a farmer, but he was too small and frail for field labour, and four years later he came to London to work for a shoemaker. The poem that made his reputation, The Farmer's Boy, was written in a garret in Bell Alley. The manuscript, declined by several publishers, fell into the hands of Capell Lofft, who arranged for its publication with woodcuts by

Bewick in 1800. The success of the poem was remarkable, over 25,000 copies being sold in the next two years. His reputation was increased by the appearance of his Rural Tales (1802), News from the Farm (1804), Wild Flowers (1806) and The Banks of the Wye (1811). Influential friends attempted to provide for Bloomfield, but ill-health and possibly faults of temperament prevented the success of these efforts, and the poet died in poverty at Shefford, Bedfordshire, on the 19th of August 1823. His Remains in Poetry and Verse appeared in 1824.

BLOOMFIELD, a town of Essex county, New Jersey, U.S.A., about 12 m. W. of New York, and directly adjoining the city of Newark on the N. Pop. (1900) 9668, of whom 2267 were foreign- born; (1905, statecensus) 11,668; (1910), 15,070. Area, 5 42 sq.m. Bloomfield is served by the Erie, and the Delaware, Lacka wanna & Western railways, and by several electric lines connect- ing with Newark, Montclair, Orange, East Orange and other neighbouring places. It is a residential suburb of Newark and New York, is the seat of a German theological school (Presby- terian, 1869) and has the Jarvie Memorial library (1902). There is a Central Green, and in 1908 land was acquired for another park. Among the town's manufactures are silk and woollen goods, paper, electric elevators, electric lamps, rubber goods, safety pins, hats, cream separators, brushes and novelties. The value of the town's factory products increased from $3,370,924 in 1900 to $4,645,483 in 1905, or 37-8%. First settled about 1670-1675 by the Dutch and by New Englanders from the Newark colony, Bloomfield was long a part of Newark, the principal settlement at first being known as Wardsesson. In 1796 it was named Bloomfield in honour of General Joseph Bloomfield (1753-1823), who served (1775-1778) in the War of American Independence, reaching the rank of major, was governor of New Jersey in 1801-1802 and 1803-1812, brigadier-

general in the United States army during the War of 181 2, and a Democratic representative in Congress from 181 7 to 1821. The township of Bloomfield was incorporated in 181 2. From it were subsequently set off Belleville (1839), Montclair (1868) and Glen Ridge (1895).

BLOOMINGTON, a city and the county-seat of McLean county, Illinois, U.S.A., in the central part of the state, about 125 m. S.W. of Chicago. Pop. (1890) 20,484; (1900) 23,286, of whom 361 1 were foreign-born, there being a large German element; (1910 census) 25,768. The city is served by the Chicago & Alton, the Illinois Central, the Cleveland, Chicago, Cincinnati & St Louis, and the Lake Erie &

Western railways, and by electric inter-urban lines. Bloomington is the seat of the Illinois Wesleyan University (Methodist Episcopal, co-educational, founded in 1850), which comprises a college of liberal arts, an academy, a college of law, a college of music and a school of oratory, and in 1907 had 1350 students. In the town of Normal (pop. in 1900, 3795), 2 m. north of Bloomington, are the Illinois State Normal University (opened at Bloomington in 1857 and removed to its present site in i860), one of the first normal schools in the Middle West, and the state soldiers' orphans' home (1869). Bloomington has a public library, and Franklin and Miller parks; among its principal buildings are the court house, built of marble, and the Y.M.C.A. building. Among the manufacturing establishments are foundries arid machine shops, including the large shops of the Chicago & Alton railway, slaughtering and meat-packing establishments, flour and grist mills, printing and publishing establishments, a caramel factory and lumber factories. The value of the city's factory products increased from $3,011,899 in 1900 to $5,777,000 in 1905, or 91-8%. There are valuable coal mines Jfc and near the city, and the city is situated in a fine farming region. Bloomington derives its name from Blooming Grove, a small forest which was crossed by the trails leading from the Galena lead mines to Southern Illinois, from Lake Michigan to St Louis, and from the Eastern to the far Western states. The first settlement was made in 1822, but the town was not formally founded until 1 83 1, when it became the county-seat of McLean county. The first city charter was obtained in 1850, and in 1857 the public school system was established. In 1856 Bloomington was the meeting place of a state convention called by the Illinois editors who were opposed to the Kansas-Nebraska Bill (see Decatur). This was the first convention of the Republican party in Illinois; among the delegates were Abraham Lincoln, Richard Yates, John M. Palmer and Owen Lovejoy. The city has been the residence of a number of prominent men, including David Davis (1815-1886), an associate justice of the United States Supreme Court in 1862-1877, a member of the United States Senate in 1877-1883, and president pro tempore of the Senate in 1881-1883; Governor John M. Hamilton (184 7-1905), Governor Joseph W. Fifer (b. 1840); and Adlai Ewing Stevenson (b. 1835), a Democratic representative in Congress in 1875-1877 and 1879-1881, and vice-president of the United States in 1893-1897. Bloomington's prosperity increased after 1867, when coal was first successfully mined in the vicinity.

In the Transactions of the Illinois State Historical Society for 1905 may be found a paper, " The Bloomington Convention of 1856 and Those Who Participated in it."

BLOOMINGTON, a city and the county-seat of Monroe county, Indiana, U.S.A., about 45 m. S. by W. of Indianapolis. Pop. (1890) 4018; (1900) 6460, including 396 negroes; (1910) 8838. It is served by the Chicago, Indianapolis & Louisville and the Indianapolis Southern (Illinois Central) railways. Bloomington is the seat of the Indiana University (co-educational since 1868), established as a state seminary in 1820, and as Indiana College in 1828, and chartered as the State university in 1838; in 1907- 1908 it had 80 instructors, 2051 students, and a library of 65,000 volumes; its school of law was established in 1842, suspended in 1877 and re-established in 1889; its school of medicine was established in 1903; but most of the medical course is given in Indianapolis; a graduate school was organized in 1904; and a summer school (or summer term of eleven weeks) was first

held in 1905. Dr David Starr Jordan was the first president of the university in 1885-1891, when it was thoroughly reorganized and its curriculum put on the basis of major subjects and depart- ments. The university's biological station is on Winona Lake, Kosciusko county. Among the manufactures of Bloomington are furniture and wooden ware. There are valuable limestone quarries in the vicinity. The city was first settled about 1818.

BLOOMSBURG, a town and the county-seat of Columbia county, Pennsylvania, U.S.A., on Fishing Creek, 2 m. from its confluence with the Susquehanna, and about 40 m. S.W. of Wilkes-Barre. Pop. (1890) 4635; (1900) 6170 (213 foreign- born); (1910) 7413. It is served by the Delaware, Lackawanna & Western, the Philadelphia & Reading, and the Bloomsburg & Sullivan and the Susquehanna, Bloomsburg & Berwick railways (the last two only 30 m. and 39 m. long respectively); and is connected with Berwick, Catawissa and Danville by electric lines. The town is built on a bluff commanding ex- tensive views. Among the manufactures of Bloomsburg are railway cars, carriages, silk and woollen goods, furniture, carpets, wire-drawing machines and gun carriages. Iron ore was for- merly obtained from the neighbouring hills. The town is the seat of a state normal school, established as such in 1869. Bloomsburg was laid out as a town in 1802, became the county- seat in 1846, and was incorporated in 1870.

BLOUNT, CHARLES (1654-1693), English author, was born at Upper Holloway on the 27th of April 1654. His father, Sir Henry Blount

(1602-1682), was the author of a Voyage to the Levant, describing his own travels. He gave his son a careful education, and is said to have helped him in his Anima Mundi; or An Historical Narration of the Opinions of the Antients concern- ing Man's Soul after his Life, according to unenlightened Nature (1679), which gave great offence by the sceptical views expressed in it. It was suppressed by order of the bishop of London, and even burnt by some over-zealous official, but a re-issue was permitted. Blount was an admirer of Hobbes, and published his "Last Sayings" (1679), a pamphlet consisting of extracts from The Leviathan. Great is Diana of the Ephesians, or the Original of Idolatry, together with the Political Institution of the Gentiles' Sacrifices (1680) attracted severe criticism on the ground that in deprecating the evils of priestcraft Blount was attacking Christianity itself. His best-known book, The Two First Books of Philostratus concerning the Life of Apollonius Tyaneus , , . (1680), is said to have been prohibited in 1693, chiefly on account of the notes, which are stated by Bayle (note, s.v. Apollonius) to have been taken mainly from a MS. of Lord Herbert of Cherbury. Blount contributed materially to the removal of the restrictions on the freedom of the press, with two pamphlets (1693) by " Philopatris," mainly derived from Milton's Areopagitica. He also laid a successful trap for the censor, Edmund Bohun. Under the name of " Junius Brutus " he wrote a pamphlet entitled " King William and Queen Mary Conquerors." The title-page set forth the theory of the justice of title by conquest, which Blount knew to be agreeable to Bohun. It was duly licensed, but was ordered by the House of Commons to be burnt by the common hangman, as being diametrically opposed to the attitude of William's government on the subject. These proceedings showed the futility of the censorship, and hastened its overthrow.

Blount had fallen in love with his deceased wife's sister, and, in despair of overcoming her scruples as to the legality of such a marriage, shot himself in the head. He survived for some time, refusing help except from his sister-in-law. Alexander Pope asserted (Epilogue to the Satires, Note, i. 124) that he wounded himself in the arm, pretending to kill himself, and that the result was fatal contrary to his expectations. He died in August 1693.

Shortly before his death a collection of his pamphlets and private papers was printed with a preface by Charles Gildon, under the title of the Oracles of Reason. His Miscellaneous Works (1695) is a fuller edition by the same editor.

BLOUNT (or Blunt), EDWARD (b. 1565?), the printer, in conjunction with Isaac Jaggard, of Mr William Shakespeares

Comedies, Histories and Tragedies. Published according to the true Originall Copies (1623), usually known as the first folio of Shakespeare. It was produced under the direction of John Heming (d. 1630) and Henry Condell (d. 1627), both of whom had been Shakespeare's colleagues at the Globe theatre, but as Blount combined the functions of printer and editor on other occasions, it is fair to conjecture that he to some extent edited the first folio. The Stationers' Register states that he was the son of Ralph Blount or Blunt, merchant tailor of London, and apprenticed himself in 1578 for ten years to William Ponsonby, a stationer. He became a freeman of the Stationers' Company in 1588. Among the most important of his publications are Giovanni Florio's Italian-English dictionary and his translation of Montaigne, Marlowe's Hero and Leander, and the Sixe Court Comedies of John Lyly. He himself translated Ars Aulica, or the Courtier's Arte (1607) from the Italian of Lorenzo Ducci, and Christian Policie (1632) from the Spanish of Juan de Santa Maria.

BLOUNT, THOMAS (1618-1679), English antiquarian, was the son of one Myles Blount, of Orleton in Herefordshire. He was born at Bordesley, Worcestershire. Few details of his life are known. It appears that he was called to the bar at the Inner Temple, but, beingazealous Roman Catholic, his religioninterfered considerably with the practice of his profession. Retiring to his estate at Orleton, he devoted himself to the study of the law as an amateur, and also read widely in other branches of knowledge. He died at Orleton on the 26th of December 1679. His principal works are Glossographia; or, a dictionary interpreting the hard •words of whatsoever language, now used in our refined English tongue (1656, reprinted in 1707), which went through several editions and remains most amusing and instructive reading; Nomolexicon: a law dictionary interpreting such difficult and obscure words and terms as are found either in our common or statute, ancient or modern lawes (1670; third edition, with additions by W. Nelson, 1717); and Fragmenta Antiquitatis: Ancient Tenures of land, and jocular customs of some mannors (1679; enlarged by J. Beckwith and republished, with additions by H. M. Beckwith, in 1815; again revised and enlarged by W. C. Hazlitt, 1874). Blount's Boscobel (1651), giving an account of Charles II.'s preservation after Worcester, with the addition of the king's own account dictated to Pepys, has been edited with a bibliography by C. G. Thomas (1894).

BLOUNT, SIR THOMAS POPE (1649-1697), English author, eldest son of Sir Henry Blount and brother of Charles Blount iff. v.), was born at Upper Holloway on the 12th of September 1649. He succeeded to the estate of Tittenhanger on his mother's death in 1678, and in the following year was created a baronet. He represented the borough of

St Albans in the two last parlia- ments of Charles II. and was knight of the shire from the revolu- tion till his death. He married Jane, daughter of Sir Henry Caesar, by whom he had five sons and nine daughters. He died at Tittenhanger on the 30th of June 1697. His Censura cele- brorum authorum sive iractalus in quo varia virorum doctorum de clarissimis cujusque seculi scriptoribus judicia traduntur (1690) was originally compiled for Blount's own use, and is a dictionary in chronological order of what various eminent writers have said about one another. This necessarily involved enormous labour in Blount's time. It was published at Geneva in 1694 with all the quotations from modern languages translated into Latin, and again in 17 10. His other works are A Natural History, containing many not common observations extracted out of the best modern writers (1693), De re poetica, or remarks upon Poetry, with Characters and Censures of the most considerable Poets . . .(1694), and Essays on Several Occasions (1692). It is on this last work that his claims to be regarded as an original writer rest. The essays deal with the perversion of learning, a comparison between the ancients and the moderns (to the advantage of the latter), the education of children, and kindred topics. In the third edition (1697) he added an eighth essay, on religion, in which he deprecated the multiplication of ceremonies. He displays throughout a hatred of pedantry and convention, which makes his book still interesting.

See A. Kippis, Biographia Britannica (1780), vol. ii. For an account of Blount's family see Robert Clutterbuck. History and Antiquities of the County of Hertford (1815), vol. i. pp. 207-212.

BLOUNT, WILLIAM (1 749-1800), American politician, was born in Bertie county, North Carolina, on the 26th of March 1 749. He was a member of the Continental Congress in 1 783-1 784 and again in 1786-1787, of the constitutional convention at Phil- adelphia in 1787, and of the state convention which ratified the Federal constitution for North Carolina in 1789. From 1790 until 1796 he was, by President Washington's appointment, governor of the " Territory South of the Ohio River," created out of land ceded to the national government by North Carolina in 1789. He was also during this period the superintendent of Indian affairs for this part of the country. In 1791 he laid out Knoxville (Tennessee) as the seat of government. He presided over the constitutional convention of Tennessee in 1796, and, on the state being admitted to the Union, became one of its first

representatives in the United States Senate. In 1797 his connexion became known with a scheme, since called ” Blount’s Conspiracy,” which provided for the co-operation of the American frontiersmen, assisted by Indians, and an English force, in the seizure on behalf of Great Britain of the Floridas and Louisiana, then owned by Spain, with which power England was then at war. As this scheme, if carried out, involved the corrupting of two officials of the United States, an Indian agent and an interpreter, a breach of the neutrality of the United States, and the breach of Article V. of the treaty of San Lorenzo el Real (signed on the 27th of October 1795) between the United States and Spain, by which each power agreed not to incite the Indians to attack the other, Blount was impeached by the House of Representatives on the 7th of July 1797, and on the following day was formally expelled from the Senate for ” having been guilty of high misdemeanor, entirely inconsistent with his public trust and duty as a senator.” On the 29th of January 1798 articles of impeachment were adopted by the House of Repre- sentatives. On the 14th of January 1799, however, the Senate, sitting as a court of impeachment, decided that it had no jurisdic- tion, Blount not then being a member of the Senate, and, in the Senate’s opinion, not having been, even as a member, a civil officer of the United States, within the meaning of the con- stitution. The case is significant as being the first case of impeachment brought before the United States Senate. ” In a legal point of view, all that the case decides is that a senator of the United States who has been expelled from his seat is not after such expulsion subject to impeachment ” (Francis Wharton, State Trials). In effect, however, it also decided that a member of Congress was not in the meaning of the constitution a civil officer of the United States and therefore could not be impeached. The ” conspiracy ” was disavowed by the British government, which, however, seems to have secretly favoured it. Blount was enthusiastically supported by his constituents, and upon his return to Tennessee was made a member and the presiding officer of the state senate. He died at Knoxville on the 21st of March

1800.

For a defence of Blount, see General Marcus J. Wright’s Account of the Life and Services of William Blount (Washington, D. C, 1884).

BLOUSE, a word (taken from the French) used for any loosely fitting bodice belted at the waist. In France it meant originally the loose upper garment of linen or cotton, generally blue, worn by French workmen to preserve their clothing, and, by trans- ference, the workman himself.

BLOW, JOHN (1648-1708), English musical composer, was born in 1648, probably at North Collingham in Nottinghamshire. He became a chorister of the chapel royal, and distinguished himself by his proficiency in music; he composed several anthems at an unusually early age, including Lord, Thou hast been our refuge; Lord, rebuke me not; and the so-called ” club anthem,” / will always give thanks, the last in collaboration with Pelham Humphrey and William Turner, either in honour of a victory over the Dutch in 1665, or — more probably — simply to commemorate the friendly intercourse of the three choristers. To this time also belongs the composition of a two-part setting

of Herrick’s Goe, perjtir’d man, written at the request of Charles II. to imitate Carissimi’s Bite, cieli. In ˆ669 Blow became organist of Westminster Abbey. In 1673 he was made a gentle- man of the chapel royal, and in the September of this year he was married to Elizabeth Braddock, who died in childbirth ten years later. Blow, who by the year 1678 was a doctor of music, was named in 1685 one of the private musicians of James II. Between 1680 and 1687 he wrote the only stage composition by him of which any record survives, the Masque for the Entertain- ment of the King: Venus and Adonis. In this Mary Davies played the part of Venus, and her daughter by Charles II., Lady Mary Tudor, appeared as Cupid. In 1687 he became master of the choir of St Paul’s church; in 1695 he was elected organist of St Margaret’s, Westminster, and is said to have resumed his post as organist of Westminster Abbey, from which in 1680 he had retired or been dismissed to make way for Purccll. In 1699 he was appointed to the newly created post of composer to the chapel royal. Fourteen services and more than a hundred anthems by Blow are extant. In addition to his purely ecclesi- astical music Blow wrote Great sir, the joy of all our hearts, an ode for New Year’s day 1681-1682; similar compositions for 1683, 1686, 1687, 1688, 1689, 1693 (?), 1694 and 1700; odes, &c, for the celebration of St Cecilia’s day for 1684, 1691, 1695 and 1700; for the coronation of James II. two anthems, Behold, God, our Defender, and God spake sometimes in visions; some harpsichord pieces for the second part of Playford’s Musick’s Handmaid (1689); Epicedium for Queen Mary (1695); Ode on the Death of Purcell (1696). In 1700 he published his Amphion Anglicus, a collection of pieces of music for one, two, three and four voices, with a figured-bass accompaniment. A famous page in Burney’s History of Music is devoted to illustrations of ” Dr Blow’s Crudities,” most of which only show the meritorious if immature efforts in expression characteristic of English music at the time, while some of them (where Burney says ” Here we are lost “) are really excellent.

Blow died on the 1st of October 1708 at his house in Broad Sanctuary, and was buried in the north aisle of Westminster Abbey.

BLOW-GUN, a weapon consisting of a long tube, through which, by blowing with the mouth, arrows or other missiles can be shot accurately to a considerable distance. Blow-guns are used both in warefare and the chase by the South American Indian tribes inhabiting the region between the Amazon and Orinoco rivers, and by the Dyaks of Borneo. In the 18th century they were also known to certain North American Indians, especially the Choctaws and Cherokees of the lower Mississippi. Captain Bossu, in his Travels through Louisiana (1756), says of the Choctaws: ” They are very expert in shooting with an instru- ment made of reeds about 7 ft. long, into which they put a little arrow feathered with the wool of the thistle (wild cotton?).” The blow-guns of the South American Indians differ in style and workmanship. That of the Macusis of Guiana, called pucuna, is the most perfect. It is made of two tubes, the inner of which, called oorah, is a light reed | in. in diameter which often grows to a length of 1 5 ft. without a joint. This is enclosed, for protec- tion and solidity, in an outer tube of a variety of palm (Iriartella setigera). The mouth-piece is made of a circlet of silk-grass, and the farther end is feruled with a kind of nut, forming a sight. A rear open sight is formed of two teeth of a small rodent. The length of the pucuna is about 11 ft. and its weight i| ft>. The arrows, which are from 12 to 18 in. long and very slender, are made of ribs of the cocorite palm-leaf. They are usually feathered with a tuft of wild cotton, but some have in place of the cotton a thin strip of bark curled into a cone, which, when the shooter blows into the pucuna, expands and completely fills the tube, thus avoiding windage. Another kind of arrow is furnished with fibres of bark fixed along the shaft, imparting a rotary motion to the missile, a primitive example of the theory of the rifle. The arrows used in Peru are only a few inches long and as thin as fine knitting-needles. All South American blow-gun arrows are steeped in poison. The natives shoot very accurately with the pucuna at distances up to 50 or 60 yds.

The blow-gun of the Borneo Dyaks, called sumpitan, is from

6 to 7 ft. long and made of ironwood. The bore, of \ in., is made with, a long pointed piece of iron. At the muzzle a small iron hook is affixed, to serve as a sight, as well as a spear-head like a bayonet and for the same purpose. The arrows used with the sumpitan are about 10

in. long, pointed with fish-teeth, and feathered with pith. They are also envenomed with poison.

Poisoned arrows are also used by the natives of the Philippine island of Mindanao, whose blow-pipes, from 3 to 4 ft. long and made of bamboo, are often richly ornamented and even jewelled.

The principle of the blow-gun is, of course, the same as that of the common ” pea-shooter.”

See Sport with Rod and Gun in American Woods and Waters, by A. M. Mayer, vol. ii. (Edinburgh, 1884) ; Wanderings in South America, &c, by Charles Waterton (London, 1828); The Head Hunters of Borneo, by Carl Bock (London, 1881).

BLOWITZ, HENRI GEORGES STEPHAN ADOLPHE DE (1825-1903), Anglo-French journalist, was born, according to the account given in his memoirs, at his father’s chateau in Bohemia on the 28th of December 1825. At the age of fifteen he left home, and travelled over Europe for some years in company with a young professor of philology, acquiring a thorough knowledge of French, German and Italian and a mixed general education. The finances of his family becoming straitened, young Blowitz was on the point of starting to seek his fortune in America, when he became acquainted in Paris with M. de Falloux, minister of public instruction, who appointed him professor of foreign languages at the Tours Lycee, whence, after some years, he was transferred to the Marseilles Lycee. After marrying in 1859 he resigned his professorship, but remained at Marseilles, devoting himself to literature and politics. In 1869 information which he supplied to a legitimist newspaper at Marseilles with regard to the candidature of M. de Lesseps as deputy for that city led to a demand for his expulsion from France. He was, however, allowed to remain, but had to retire to the country. In 1870 his predictions of the approaching fall of the Empire caused the demand for his expulsion to be renewed. While his case was under discussion the battle of Sedan was fought, and Blowitz effectually ingratiated himself with the authorities by applying for naturalization as a French subject. Once naturalized, he returned to Marseilles, where he was fortunately able to render considerable service to Thiers, who subsequently employed him in collecting information at Versailles, and when this work was finished offered him the French consulship at Riga. Blowitz was on the point of accepting this post when Laurence Oliphant, then Paris correspondent of The Times, for which Blowitz had already done some occasional work, asked him to act as his regular assistant for a time, Frederick Hardman, the other Paris correspondent of The Times, being

absent. Blowitz accepted the offer, and when, later on, Oliphant was succeeded by Hardman he remained as assistant correspondent. In 1873 Hardman died, and Blowitz became chief Paris correspondent to The Times. In this capacity he soon became famous in the world of journalism and diplomacy. In 1875 the due de Decazes, then French foreign minister, showed Blowitz a confidential despatch from the French ambassador in Berlin (in which the latter warned his government that Germany was contemplating an attack on France), and requested the correspondent to expose the German designs in The Times. The publication of the facts effectually aroused European public opinion, and any such intention was immediately thwarted. Blowitz's most sensational journalistic feat was achieved in 1878, when his enterprise enabled The Times to publish the whole text of the treaty of Berlin at the actual moment that the treaty was being signed in Germany. In 1877 and again in 1888 Blowitz rendered considerable service to the French government by his exposure of internal designs upon the Republic. He died on the 18th of January 1903. My Memoirs, by H. S. de Blowitz, was published in 1903.
BLOWPIPE, in the arts and chemistry, a tube for directing a jet of air into a fire or into the flame of a lamp or gas jet, for the purpose of producing a high temperature by accelerating the combustion. The blowpipe has been in common use from the earliest times for soldering metals and working glass, but its introduction into systematic chemical analysis is to be

ascribed to A. F. Cronstedt, and not to Anton Swab, as has been maintained (see J. Landauer, Ber. 26, p. 898). The first work on this application of the blowpipe was by G. v. Engestrom, and was published in 1770 as an appendix to a treatise on mineralogy. Its application has been variously improved at the hands of T. O. Bergman, J. G. Gahn, J. J. Berzelius, C. F. Plattner and others, but more especially by the two last- named chemists.

The simplest and oldest form of blowpipe is a conical brass tube, about 7 in. in length, curved at the small end into a right angle, and terminating in a small round orifice, which is applied to the flame, while the larger end is applied to the mouth. Where the blast has to be kept up for only a few seconds, this instrument is quite serviceable, but in longer chemical operations inconvenience arises from the condensation of moisture exhaled by the lungs in the tube. Hence most blowpipes are now made with a cavity for retaining the moisture. Cronstedt placed a bulb in the centre of his blowpipe. Dr Joseph Black's instru- ment consists of a conical tube of tin plate, with a small brass tube, supporting the nozzle, inserted near the wider end, and a mouth-piece at the narrow end.

The sizes of orifice recommended by Plattner are 0-4 and 0-5 mm. A trumpet mouth-piece is recommended from the support it gives to the cheeks when inflated. The mode of blowing is peculiar, and requires some practice; an uninterrupted blast is kept up by the muscular action of the cheeks, while the ordinary respiration goes on through the nostrils.

If the flame of a candle or lamp be closely examined, it will be seen to consist of four parts — (a) a deep blue ring at the base, (b) a dark cone in the centre, (c) a luminous portion round this, and (d) an exterior pale blue envelope (see Flame). In blow- pipe work only two of these four parts are made use of, viz. the pale envelope, for oxidation, and the luminous portion, for reduction. To obtain a good oxidizing flame, the blowpipe is held with its nozzle inserted in the edge of the flame close over the level of the wick, and blown into gently and evenly. A conical jet is thus produced, consisting of an inner cone, with an outer one commencing near its apex — the former, corresponding to (a) in the free flame, blue and well defined; the latter corre- sponding to id), pale blue and vague. The heat is greatest just beyond the point of the inner cone, combustion being there most complete. Oxidation is better effected (if a very high temperature be not required) the farther the substance is from the apex of the inner cone, for the air has thus freer access. To obtain a good reducing flame (in which the combustible matter, very hot, but not yet burned, is disposed to take oxygen from any compound containing it), the nozzle, with smaller orifice, should just touch the flame at a point higher above the wick, and a somewhat weaker current of air should be blown. The flame then appears as a long, narrow, luminous cone, the end being enveloped by a dimly visible portion of flame correspond- ing to that which surrounds the free flame, while there is also a dark nucleus about the wick. The substance to be reduced is brought into the luminous portion, where the reducing power is strongest.

Various materials are used as supports for substances in the blowpipe flame; the principal are charcoal, platinum and glass or porcelain. Charcoal is valuable for its infusibility and low conductivity for heat (allowing substances to be strongly heated upon it), and for its powerful reducing properties; so that it is chiefly employed in testing the fusibility of minerals and in reduction. The best kind of charcoal is that of close-grained pine or alder; it is cut in short prisms, having a flat smooth surface at right angles to the rings of growth. In this a shallow hole is made for receiving the substance to be held in the flame. Gas-carbon is sometimes used, since it is more permanent in the flame than wood charcoal. Platinum is employed in oxi- dizing

processes, and in the fusion of substances with fluxes; also in observing the colouring effect of substances on the blow- pipe flame (which effect is apt to be somewhat masked by char- coal). Most commonly it is used in the form of wire, with a small bend or loop at the end.

The mouth blowpipe is unsuitable for the production of a large flame, and cannot be used for any lengthy operations; hence recourse must be made to types in which the air-blast is occasioned by mechanical means. The laboratory form in common use consists of a bellows worked by either hand or foot, and a special type of gas burner formed of two concentric tubes, one conveying the blast, the other the gas; the supply of air and gas being regulated by stopcocks. The hot blast blow- pipe of T. Fletcher, in which the blast is heated by passing through a copper coil heated by a separate burner, is only of service when a pointed flame of a fairly high temperature is required. Blowpipes in which oxygen is used as the blast have been manufactured by Fletcher, Russell & Co., and have proved of great service in conducting fusions which require a temperature above that yielded by the air-blowpipe.

For the applications of the blowpipe in chemical analysis see Chemistry : Analytical.

BLUCHER, GEEHARD LEBERECHT VON (1742-1819), Prussian general field marshal, prince of Wahlstadt in Silesia, was born at Rostock on the 16th of December 1742. In his fourteenth year he entered the service of Sweden, and in the Pomeranian campaign of 1760 he was taken prisoner by the Prussians. He was persuaded by his captors to enter the Prussian service. He took part in the later battles of the Seven Years' War, and as a hussar officer gained much experience of light cavalry work. In peace, however, his ardent spirit led him into excesses of all kinds, and being passed over for promotion he sent in his resignation, to which Frederick replied, " Captain Bliicher can take himself to the devil " (1773). He now settled down to farming, and in fifteen years he had acquired an honour- able independence. But he was unable to return to the army until after the death of Frederick the Great. He was then reinstated as major in his old regiment, the Red Hussars. He took part in the expedition to Holland in 1787, and in the following year became lieutenant-colonel. In 1789 he received the order pour le merile, and in 1794 he became

colonel of the Red Hussars. In 1793 and 1794 he distinguished himself in cavalry actions against the French, and for his success at Kirrweiler he was made a major-general. In 1801 he was promoted lieutenant-general.

He was one of the leaders of the war party in Prussia in 1805-1806, and served as a cavalry general in the disastrous campaign of the latter year. At Auerstadt Bliicher repeatedly charged at the head of the Prussian cavalry, but without success. In the retreat of the broken armies he commanded the rearguard of Prince Hohenlohe's corps, and upon the capitulation of the main body of Prenzlau he carried off a remnant of the Prussian army to the northward, and in the neighbourhood of Liibeck he fought a series of combats, which, however, ended in his being forced to surrender at Ratkau (November 7, 1806). His adversaries testified in his capitulation that it was caused by " want of provisions and ammunition." He was soon exchanged for General Victor, and was actively employed in Pomerania, at Berlin, and at Konigsberg until the conclusion of the war. After the war, Bliicher was looked upon as the natural leader of the patriot party, with which he was in close touch during the period of Napoleonic domination. His hopes of an alliance with Austria in the war of 1809 were disappointed. In this year he was made general of cavalry. In 181 2 he expressed himself so openly on the alliance of Russia with France that he was recalled from his military governorship of Pomerania and virtually banished from the court.

When at last the Napoleonic domination was ended by the outbreak of the War of Liberation in 1813, Bliicher of course was at once placed in high command, and he was present at Liitzen and Bautzen. During the armistice he worked at the organization of the Prussian forces, and when the war was resumed Bliicher became commander-in-chief of the Army of Silesia, with Gneisenau and Muffling as his principal staff officers, and 40,000 Prussians and 50,000 Russians under his control. The autumn campaign of 1813 will be found described in the article Napoleonic Campaigns, and it will here be sufficient to say that the most conspicuous military quality displayed by

Bliicher was his unrelenting energy. The irresolution and divergence of interests usual in allied armies found in him a restless opponent, and the knowledge that if he could not induce others to co-operate he was prepared to attempt the task in hand by himself often caused other generals to follow his lead. He defeated Marshal Macdonald at the Katzbach, and by his victory over Marmont at Mockern led the way to the decisive overthrow of Napoleon at Leipzig, which place was stormed by Bliicher's own army on the evening of the last day of

the battle. On the day of Mockern (October 16, 1813) Bliicher was made a general field marshal, and after the victory he pursued the routed French with his accustomed energy. In the winter of 1813-1814 Bliicher, with his chief staff officers, was mainly instrumental in inducing the allied sovereigns to carry the war into France itself. The combat of Brienne and the battle of La Rothiere were the chief incidents of the first stage of the celebrated campaign of 1814, and they were quickly followed by the victories of Napoleon over Bliicher at Champaubert, Vauxchamps and Montmirail. But the courage of the Prussian leader was un- diminished, and his great victory of Laon (March 9 to 10) practically decided the fate of the campaign. After this Bliicher infused some of his own energy into the operations of Prince Schwarzenberg's Army of Bohemia, and at last this army and the Army of Silesia marched in one body direct upon Paris. The victory of Montmartre, the entry of the allies into the French capital, and the overthrow of the First Empire were the direct consequences. Bliicher was disposed to make a severe retaliation upon Paris for the calamities that Prussia had suffered from the armies of France had not the allied commanders intervened to prevent it. Blowing up the bridge of Jena was said to be one of his contemplated acts. On the 3rd of June 1814 he was made prince of Wahlstadt (in Silesia on the Katzbach battlefield), and soon afterwards he paid a visit to England, being received everywhere with the greatest enthusiasm.

After the peace he retired to Silesia, but the return of Napoleon soon called him to further service. He was put in command of the Army of the Lower Rhine with General Gneisenau as his chief of staff (see Waterloo Campaign). In the campaign of 181 5 the Prussians sustained a very severe defeat at the outset at Ligny (June 16), in the course of which the old field marshal was ridden over by cavalry charges, his life being saved only by the devotion of his aide-de-camp, Count Nostitz. He was unable to resume command for some hours, and Gneisenau drew off the defeated army. The relations of the Prussian and the English headquarters were at this time very complicated, and it is uncertain whether Bliicher himself was responsible for the daring resolution to march to Wellington's assistance. This was in fact done, and after an incredibly severe march Bliicher's army intervened with decisive and crushing effect in the battle of Waterloo. The great victory was converted into a success absolutely decisive of the war by the relentless pursuit of the Prussians, and the allies re-entered Paris on the 7th of July. Prince Bliicher remained in the French capital for some months, but his age and infirmities compelled him to retire to his Silesian residence at Krieblowitz, where he died on the 12th of

September 1819, aged seventy-seven. He retained to the end of his life that wildness of character and proneness to excesses which had caused his dismissal from the army in his youth, but however they may be regarded, these faults sprang always from the ardent and vivid temperament which made Bliicher a dashing leader of horse. The qualities which made him a great general were his patriotism and the hatred of French domination which inspired every success of the War of Liberation. He was twice married, and had, by his first marriage, two sons and a daughter. Statues were erected to his memory at Berlin, Breslau and Rostock.

Of the various lives of Prince Bliicher, that by Varnhagen von Ense (1827) is the most important. His war diaries of 1793-1794, together with a memoir (written in 1805) on the subject of a national army, were edited by Golz and Ribbentrop (Campagne Journal 1793-4 von Gl. Lt. v. Bliicher).

BLUE (common in different forms to most European languages), the name of a colour, used in many colloquial

phrases. From the fact of various parties, political and other, having adopted the colour blue as their badge, various classes of people have come to be known as ” blue ” or ” blues”; thus ” true blue ” meant originally a staunch Presbyterian, the Covenanters having adopted blue as their colour as opposed to red, the royal colour; similarly, in the navy, there was in the 18th century a ” Blue Squadron,” Nelson being at one time ” Rear-Admiral of the Blue “; again, in 1690, the Royal Horse Guards were called the “Blues” from their blue uniforms, or, from their leader, the earl of Oxford, the “Oxford Blues”; also, from the blue ribbon worn by the knights of the Garter comes the use of the phrase as the highest mark of distinction that can be worn, especially applied on the turf to the winning of the Derby. The ” blue Peter ” is a rectangular blue flag, with a white square in the centre, hoisted at the top of the foremast as a signal that a vessel is about to leave port. At Oxford and Cambridge a man who represents his university in certain athletic sports is called a ” blue ” from the ” colours ” he is then entitled to wear, dark blue for Oxford and light blue for Cambridge.

BLUEBEARD, the monster of Charles Perrault’s tale of Barbe Bleue, who murdered his wives and hid their bodies in a locked room. Perrault’s tale was first printed in his Histoires et contes du terns passe (1697). The essentials of the story — Bluebeard’s prohibition to his wife to open a certain door during his absence, her disobedience, her

discovery of a gruesome secret, and her timely rescue from death — are to be found in other folklore stories, none of which, however, has attained the fame of Bluebeard. A close parallel exists in an Esthonian legend of a husband who had already killed eleven wives, and was prevented from killing the twelfth, who had opened a secret room, by a gooseherd, the friend of her childhood. In ” The Feather Bird ” of Grimm’s Hausmarchen, three sisters are the victims, the third being rescued by her brothers. Bluebeard, though Perrault does not state the number of his crimes, is generally credited with the murder of seven wives. His history belongs to the common stock of folklore, and has even been ingeniously fitted with a mythical interpretation. In France the Bluebeard legend has its local habitation in Brittany, but whether the existing traditions connecting him with Gilles de Rais (q.v.) or Comorre the Cursed, a Breton chief of the 6th century, were anterior to Perrault’s time, we have no means of determining. The identification of Bluebeard with Gilles de Rais, the bite ˆexter- mination of Michelet’s forcible language, persists locally in the neighbourhood of the various castles of the baron, especially at Machecoul and Tiffauges, the chief scenes of his infamous crimes. Gilles de Rais, however, had only one wife, who survived him, and his victims were in the majority of cases young boys. The traditional connexion may arise simply from the not improbable association of two monstrous tales. The less widespread identi- fication of Bluebeard with Comorre is supported by a series of frescoes dating only a few years later than the publication of Perrault’s story, in a chapel at St Nicolas de Bieuzy dedicated to St Tryphine, in which the tale of Bluebeard is depicted as the story of the saint, who in history was the wife of Comorre. Comorre or Conomor had his original headquarters at Carhaix, in Finistere. He extended his authority by marriage with the widow of Iona, chief of Domnonia, and attempted the life of his stepson Judwal, who fled to the Frankish court. About 547 or 548 he obtained in marriage, through the intercession of St Gildas, Tryphine, daughter of Weroc, count of Vannes. The pair lived in peace at Castel Finans for some time, but Comorre, disappointed in his ambitions in the Vannetais, presently threatened Tryphine. She took flight, but her husband found her hiding in a wood, when he gave her a wound on the skull and left her for dead. She was tended and restored to health by St Gildas, and after the birth of her son retired to a convent of her own foundation. Eventually Comorre was defeated and slain by Judwal. In legend St Tryphine was decapitated and miraculously restored to life by Gildas. Alain Bouchard (Grandes croniques, Nantes, 1531) asserts that Comorre had already put several wives to death before he married Tryphine. In the

Legendes bretonnes of the count d'Amezeuil the church legend becomes a charming fairy tale.

See also E. A. Vizetclly, Bluebeard (1902) ; E. Sidney Hartland, "The Forbidden Chamber," in Folklore, vol. iii. (1885); and the editions of the Contes of Charles Perrault (q.v.). Cf. A. France, Les Sept Femmes de Barbe Bleue (1909).

BLUE-BOOK, the general name given to the reports and other documents printed by order of the parliament of the United Kingdom, so called from their being usually covered with blue paper, though some are bound in drab and others have white covers. The printing of its proceedings was first adopted by the House of Commons in 1681, and in 1836 was commenced the practice of selling parliamentary papers to the public. All notices of questions, resolutions, votes and proceedings in both Houses of Parliament are issued each day during the session; other publications include the various papers issued by the different government departments, the reports of committees and commissions of inquiry, public bills, as well as returns, correspondence, &c, specially ordered to be printed by either house. The papers of each session are so arranged as to admit of being bound up in regular order, and are well indexed. The terms upon which blue-books, single papers, &c, are issued to the general public are one halfpenny per sheet of four pages, but for an annual subscription of £20 all the parliamentary publications of the year may be obtained ; but subscriptions can be arranged so that almost any particular class of publication can be obtained — for example, the daily votes and proceedings can be obtained for an annual subscription of £3, the House of Lords papers for £10, or the House of Commons papers for £15. Any publication can also be purchased separately.

Most foreign countries have a distinctive colour for the binding of their official publications. That of the United States varies, but foreign diplomatic correspondence is bound in red. The United States government publications are not only on sale (as a rule) but are widely supplied gratis, with the result that important publications soon get out of print, and it is difficult to obtain ac- cess to many valuable reports or other information, except at a public library. German official publications are bound in white ; French, in yellow; Austrian, in red; Portuguese, in white; Italian, in green; Spanish, in red; Mexican, in green; Japanese, in grey; Chinese, in yellow.

BLUESTOCKING, a derisive name for a literary woman. The term originated in or about 175°, when Mrs Elizabeth Montagu (q.v.) made a determined effort to introduce into society a healthier and more

intellectual tone, by holding assemblies at which literary conversation and discussions were to take the place of cards and gossip. Most of those attending were conspicuous by the plainness of their dress, and a Mr Benjamin Stillingfleet specially caused comment by always wearing blue or worsted stockings instead of the usual black silk. It was in special reference to him that Mrs Montagu's friends were called the Bluestocking Society or Club, and the women frequenting her house in Hill Street came to be known as the " Bluestocking Ladies " or simply " bluestockings." As an alternative explanation, the origin of the name is attributed to Mrs Montagu's deliberate adoption of blue stockings (in which fashion she was followed by all her women friends) as the badge of the society she wished to form. She is said to have obtained the idea from Paris, where in the 17th century there was a revival of a social reunion in 1590 on the lines of that formed in 1400 at Venice, the ladies and men of which wore blue stockings. The term had been applied in England as early as 1653 to the Little Parliament, in allusion to the puritanically plain and coarse dress of the members.

BLUFF (a word of uncertain origin; possibly connected with an obsolete Dutch word, blaf, broad), an adjective used of a ship, meaning broad and nearly vertical in the bows; similarly, of a cliff or shore, presenting a bold and nearly perpendicular front; of a person, good-natured and frank, with a rough or abrupt manner. Another word "bluff," perhaps connected with German verbliifen, to baffle, meant originally a horse's blinker, the corresponding verb meaning to blindfold: it survives

as a term in such games as poker, where " to bluff " means to bet heavily on a hand so as to make an opponent believe it to be stronger than it is; hence such phrases as " the game of bluff,"" a policy of bluff."

BLUM, ROBERT FREDERICK (1857-1903), American artist, was born in Cincinnati, Ohio, on the 9th of July 1857. He was employed for a time in a lithographic shop, and studied at the McMicken Art School of Design in Cincinnati, and at the Penn- sylvania Academy of Fine Arts in Philadelphia, but he was practically self-taught, and early showed great and original talent. He settled in New York in 1879, and his first published sketches — of Japanese jugglers — appeared in St Nicholas. His most important work is a large frieze in the Mendelssohn Music Hall, New York, " Music and the Dance " (1895). His pen-and- ink work for the Century magazine attracted wide

attention, as did his illustrations for Sir Edwin Arnold's Japonica. In the country and art of Japan he had been interested for many years. " A Daughter of Japan," drawn by Blum and W. J. Baer, was the cover of Scribner's Magazine for May 1893, and was one of the earliest pieces of colour-printing for an American magazine. In Scribner's for 1893 appeared also his " Artist's Letters from Japan." He was an admirer of Fortuny, whose methods some- what influenced his work. Blum's Venetian pictures, such as "A Bright Day at Venice" (1882), had lively charm and beauty. He died on the 8th of June 1903 in New York City. He was a member of the National Academy of Design, being elected after his exhibition in 1892 of " The Amcya "; and was president of the Painters in Pastel. Although an excellent draughtsman and etcher, it was as a colourist that he chiefly excelled.

BLUMENBACH, JOHANN FRIEDRICH (1752-1840), German physiologist and anthropologist, was born at Gotha on the nth of May 1752. After studying medicine at Jena, he graduated doctor at Gottingen in 1775, and was appointed extraordinary professor of medicine in 1776 and ordinary professor in 1778. He died at Gottingen on the 22nd of January 1840. He was the author of Institutiones Physiologicae (1787), and of a Hand- buch der vergleichcnden Anatomie (1804), both of which were very popular and went through many editions, but he is best known for his work in connexion with anthropology, of which science he has been justly called the founder. He was the first to show the value of comparative anatomy in the study of man's history, and his craniometrical researches justified his division of the human race into several great varieties or families, of which he enumerated five — the Caucasian or white race, the Mongolian or yellow, the Malayan or brown race, the Negro or black race, and the American or red race. This classification has been very generally received, and most later schemes have been modifications of it. His most important anthropological work was his description of sixty human crania published originally in fasciculi under the title Collcclionis suae craniorum diver sarum gentium illustratae decades (Gottingen, 1790-1828).

BLUMENTHAL, LEONHARD, Count von (1810-1900), Prussian field marshal, son of Captain Ludwig von Blumenthal (killed in 18 13 at the battle of Dennewitz), was born at Schwedt- on-Oder on the 30th of July 1810. Educated at the military schools of Culm and Berlin, he entered the Guards as 2nd lieu- tenant in 1827. After serving in the Rhine provinces, he joined the topographical division of the general staff in 1846. As lieutenant of the 31st foot he took part in 1848 in the suppression of the Berlin riots, and in 1849 was promoted captain on the general staff. The same year he served on the staff of General von

Bonin in the Schleswig-Holstein campaign, and so distin- guished himself, particularly at Fredericia, that he was appointed chief of the staff of the Schleswig-Holstein army. In 1850 he was general staff officer of the mobile division under von Tietzen in Hesse-Cassel. He was sent on a mission to England in that year (4th class of Red Eagle), and on several subsequent occa- sions. Having attained the rank of lieutenant-colonel, he was appointed personal adjutant to Prince Frederick Charles in 1859. In i860 he became colonel of the 31st, and later of the 71st, regiment. He was chief of the staff of the III. army corps when,

on the outbreak of the Danish War of 1864, he was nominated chief of the general staff of the army against Denmark, and displayed so much ability, particularly at Diippel and the passage to Alsen island, that he was promoted major-general and given the order pour le merite. In the war of 1866 Blumen- thal occupied the post of chief of the general staff to the crown prince of Prussia, commanding the 2nd army. It was upon this army that the brunt of the fighting fell, and at Koniggratz it decided the fortunes of the day. Blumcnthal's own part in these battles and in the campaign generally was most con- spicuous. On the field of Koniggratz the crown prince said to his chief of staff, " I know to whom I owe the conduct of my army," and Blumenthal soon received promotion to lieutenant- general and the oak-leaf of the order pour le merite. He was also made a knight of the Hohenzollern Order. From 1866 to 1870 he commanded the 14th division at Diisseldorf. In the Franco- German War of 1870-71 he was chief of staff of the 3rd army under the crown prince. Blumenthal's soldierly qualities and talent were never more conspicuous than in the critical days preceding the battle of Sedan, and his services in the war have been considered as scarcely less valuable and important than those of Moltke himself. In 187 1 Blumenthal represented Germany at the British manoeuvres at Chobham, and was given the command of the IV. army corps at Magdeburg. In 1873 he became a general of infantry, and ten years later he was made a count. In 1888 he was made a general field marshal, after which he was in command of the 4th and 3rd army inspections. He retired in 1896, and died at Quellendorf near Kothen on the 21st of December 1900.

Blumenthal's diary of 1866 and 1870-1871 has been edited by his son, Count Albrecht von Blumenthal [Tagebuch des G.F.M. von Blumenthal), 1902; an English translation (Journals of Count von Blumenthal) was published in 1903.

BLUNDERBUSS (a corruption of the Dutch donder, thunder, and the Dutch bus; cf. Ger. Biichse, a box or tube, hence a thunder-box or gun), an obsolete muzzle-loading firearm with a bell-shaped muzzle. Its calibre was large so that it could contain many balls or slugs, and it was intended to be fired at a short range, so that some of the charge was sure to take effect. The word is also used by analogy to describe a blundering and random person or talker.

BLUNT, JOHN HENRY (1823-1884), English divine, was born at Chelsea in 1823, and before going to the university of Durham in 1 8 50 was for some years engaged in business as a manufacturing chemist. He was ordained in 1852 and took his M.A. degree in 1855, publishing in the same year a work on The Atonement. He held in Succession several preferments, among them the vicarage of Kennington near Oxford (1868), which he vacated in 1873 for the crown living of Beverston in Gloucestershire. He had already gained some reputation as an industrious theologian, and had published among other works an annotated edition of the Prayer Book (1867), a History of the English Reformation (1868), and a Book of Church Law (1872), as well as a useful Dictionary of Doctrinal and Historical Theology (1870). The continuation of these labours was seen in a Dictionary of Sects and Heresies (1874), an Annotated Bible (3 vols., 1878-1879), and a Cyclopaedia of Religion (1884), and received recognition in the shape of the D.D. degree bestowed on him in 1882. He died in London on the nth of April 1884.

BLUNT, JOHN JAMES (1794-1855), English divine, was born at Newcastle-under-Lyme in Staffordshire, and educated at St John's College, Cambridge, where he took his degree as fifteenth wrangler and obtained a fellowship (1816). He was appointed a Wort's travelling bachelor 1818, and spent some time in Italy and Sicily, afterwards publishing an account of his journey. He proceeded M.A. in 1819, B.D. 1826, and was Hulsean Lecturer in 1 831-183 2 while holding a curacy in Shrop- shire. In 1834 he became rector of Great Oakley in Essex, and in 1839 was appointed Lady Margaret professor of divinity at Cambridge. In 1854 he declined the see of Salisbury, and he died on the 18th of June 1855. His chief book was Undesigned Coincidences in the Writings both of the Old and New Testaments

(1833; fuller edition, 1847). Some of his writings, among them the History of the Christian Church during the First Three Centuries and

the lectures On the Right Use of the Early Fathers, were published posthumously.

A short memoir of him appeared in 1856 from the hand of William Selwyn, his successor in the divinity professorship.

BLUNT, WILFRID SCAWEN (1840-), English poet and publicist, was born on the 17th of August 1840 at Petworth House, Sussex, the son of Francis Scawen Blunt, who served in the Peninsular War and was wounded at Corunna. He was educated at Stonyhurst and Oscott, and entered the diplomatic service in 1858, serving successively at Athens, Madrid, Paris and Lisbon. In 1867 he was sent to South America, and on his return to England retired from the service on his marriage with Lady Anne Noel, daughter of the earl of Lovelace and a grand-daughter of the poet Byron. In 1872 he succeeded, by the death of his elder brother, to the estate of Crabbet Park, Sussex, where he established a famous stud for the breeding of Arab horses, Mr and Lady Anne Blunt travelled repeatedly in northern Africa, Asia Minor and Arabia, two of their expeditions being described in Lady Anne's Bedouins of the Euphrates (2 vols., 1879) and A Pilgrimage to Nejd (2 vols., 1881). Mr Blunt became known as an ardent sympathizer with Mahommedan aspirations, and in his Future of Islam (1888) he directed attention to the forces which afterwards produced the movements of Pan-Islamism and Mahdism. Hs was a violent opponent of the English policy in the Sudan, and in The Wind and the Whirlwind (in verse, 1883) prophesied its downfall. He supported the national party in Egypt, and took a prominent part in the defence of Arabi Pasha. Ideas about India (1885) was the result of two visits to that country, the second in 1883-1884. In 1885 and 1886 he- stood unsuccessfully for parliament as a Home Ruler; and in 1887 he was arrested in Ireland while presiding over a political meeting in connexion with the agitation on Lord Clanricarde's estate, and was imprisoned for two months in Kilmainham . His best-known volume of verse, Love Sonnets of Proteus (1880), is a revelation of his real merits as an emotional poet. The Poetry of Wilfrid Blunt (1888), selected and edited by W. E. Henley and Mr George Wyndham, includes these sonnets, together with " Worth Forest, a Pastoral," " Griselda " (described as a " society novel in rhymed verse"), translations from the Arabic, and poems which had appeared in other volumes.

BLUNTSCHLI, JOHANN KASPAR (1808-1881), Swiss jurist and politician, was born at Zurich on the 7th of March 1808, the son of a soap and candle manufacturer. From school he passed into the Politische Institut (a seminary of law and political science) in his native town, and proceeding thence to the uni- versities of Berlin and

Bonn, took the degree of doctor juris in the latter in 1829. Returning to Zurich in 1830, he threw himself with ardour into the political strife which was at the time unsettling all the cantons of the Confederation, and in this year published Uber die Verfassung der Stadt Ziirich (On the Con- stitution of the City of Zurich) . This was followed by Das Volk und der Souveran (1830), a work in which, while pleading for constitutional government, he showed his bitter repugnance of the growing Swiss radicalism. Elected in 1837 a member of the Grosser Rath (Great Council), he became the champion of the moderate conservative party. Fascinated by the metaphysical views of the philosopher Fricdrich Rohmer (1814-1856), a man who attracted little other attention, he endeavoured in Psycho- logische Studien uber Staat und Kirche (1844) to apply them to political science generally, and in particular as a panacea for the constitutional troubles of Switzerland. Bluntschli, shortly before his death, remarked, ” I have gained renown as a jurist, but my greatest desert is to have comprehended Rohmer.” This philosophical essay, however, coupled with his uncompromising attitude towards both radicalism and ultramontanism, brought him many enemies, and rendered his continuance in the council, of which he had been elected president, impossible. He resigned his seat, and on the overthrow of the Sonderbund in 1847, perceiving that all hope of power for his party was lost, took leave of Switzerland with the pamphlet Stimme eines Schweizers

uber die Bundesreform (1847), and settled at Munich, where he became professor of constitutional law in 1848.

At Munich he devoted himself with energy to the special work of his chair, and, resisting the temptation to identify himself with politics, published Allgemeines Staalsrecht (1851-1852); Lehre vom modernen Staat (1875-1876); and, in conjunction with Karl Ludwig Theodor Brater (1819-1869), Deuisches Staats- worterbuch (n vols., 1857-1870; abridged by Edgar Loening in 3 vols., 1860-1875). Meanwhile he had assiduously worked at his code for the canton of Zurich, Privatrechlliches Gesetzbuch fur den Kanton Ziirich (4 vols., 1854-1856), a work which was much praised at the time, and which, particularly the section devoted to contracts, served as a model for codes both in Switzerland and other countries. In 1861 Bluntschli received a call to Heidelberg as professor of constitutional law (Staatsrecht), where he again entered the political arena, endeavouring in his Geschichte des allgcmeinen Staatsrcchts und der Politik (1864) ” to stimulate,” as he said, ” the political consciousness of the German people, to cleanse it of prejudices and to further it intellectually.” In his new home, Baden, he devoted his energies and

political influence, during the Austro-Prussian War of 1866, towards keeping the country neutral. From this time Bluntschli became active in the field of international law, and his fame as a jurist belongs rather to this province than to that of constitutional law. His Das moderne Kriegsrecht (1866); Das moderne Volkerrecht (1868), and Das Beutcrecht im Krieg (1878) are likely to remain invaluable text-books in this branch of the science of juris- prudence. He also wrote a pamphlet on the “Alabama ” case.

Bluntschli was one of the founders, at Ghent in 1873, of the Institute of International Law, and was the representative of the German emperor at the conference on the international laws of war at Brussels. During the latter years of his life he took a lively interest in the Protestantenvcrein, a society formed to combat reactionary and ultramontane views of theology. He died suddenly at Karlsruhe on the 21st of October 1881. His library was acquired by Johns Hopkins University at Baltimore, U.S.A.

Among his works, other than those before mentioned, may be cited Deutsches Privatrecht (1853-1854); Deutsche Staatslehre filr Gebildete (1874); and Deutsche Staatslehre und die heutige Slaatenwelt (1880).

For notices of Bluntschli’s life and works see his interesting autobiography, Denkwurdiges aus meinem Leben (1884); von Holtzendorff, Bluntschli und seine Verdienste urn die Staatswissen-schaften (1882); Brockhaus, Konversations-Lexicon (1901); and a biography by Meyer von. Kronau, in All gemeine deutsche Biographic

BLYTH, a market town and seaport of Northumberland, England, in the parliamentary borough of Morpeth, 9 m. E.S.E. of that town, at the mouth of the river Blyth, on a branch of the North Eastern railway. Pop. of urban district (1901) 5472. This is the port for a considerable coal-mining district, and its harbour, on the south side of the river, is provided with mechanical appliances for shipping coal. There are five dry docks, and upwards of i| m. of quayage. Timber is largely imported. Some shipbuilding and the manufacture of rope, sails and ship-fittings are carried on, and the fisheries are valuable. Blyth is also in considerable favour as a watering- place; there are a pleasant park, a pier, protecting the harbour, about 1 m. in length, and a sandy beach affording sea-bathing. The river Blyth rises near the village of Kirkheaton, and has an easterly course of about 25 m. through a deep, well- wooded and picturesque valley.

B’NAI B’RITH (or Sons of the Covenant), INDEPENDENT ORDER OF, a Jewish fraternal society. It was founded at New York in 1843 by a

number of German Jews, headed by Henry Jones, and is the oldest as well as the largest of the Jewish fraternal organizations. Its membership in 1908 was 35,870, its 481 lodges and 10 grand lodges being distributed over the United States, Germany, Austria-Hungary, Rumania, Egypt and Palestine. Its objects are to promote a high morality among Jews, regardless of differences as to dogma and ceremonial customs, and especially to inculcate the supreme virtues of

charity and brotherly love. Political and religious discussions were from the first excluded from the debates of the order. In 1851 the first grand lodge was established at New York; in 1856, the number of district lodges having increased, the supreme authority was vested in a central body consisting of one member from each lodge; and by the present constitution, adopted in 1868, this authority is vested in a president elected for five years, an executive committee and court of appeals (elected as before). The first lodge in Germany was instituted at Berlin in 1883. A large number of charitable and other public institutions have been established in the United States and elsewhere by the order, of which may be mentioned the large orphan asylum in Cleveland, the home for the aged and infirm at Yonkers, N.Y., the National Jewish hospital for consumptives at Denver, and the Maimonides library in New York City. The B'nai B'rith society has also co-operated largely with other Jewish philanthropic organizations in succouring distressed Israelites throughout the world.

See the Jewish Encyclopaedia (1902), s.v.

BOA, a name formerly applied to all large serpents which, devoid of poison fangs, kill their prey by constriction; but now confined to that subfamily of the Boidae which are devoid of teeth in the praemaxilla and are without supraorbital bones. The others are known as pythons (q.v.). The true boas comprise some forty species; most of them are American, but the genus Eryx inhabits North Africa, Greece and south-western Asia; the. genus Enygrus ranges from New Guinea to the Fiji; Casarea dussumieri is restricted to Round Island, near Mauritius; and two species of Boa and one of Corallus represent this subfamily in Madagascar, while all the other boas live in America, chiefly in tropical parts. All Boidae possess vestiges of pelvis and hind limbs, appearing externally as claw-like spurs on each side of the vent, but they are so small that they are practically without function in climbing. The usually short tail is prehensile.

One of the commonest species of the genus Boa is the Boa constrictor, which has a wide range from tropical Mexico to Brazil. The head is covered with small scales, only one of the preoculars being enlarged. The general colour is a delicate pale brown, with about a dozen and a half darker cross-bars, which are often connected by a still darker dorso-lateral streak, enclosing large oval spots. On each side is a series of large dark brown spots with light centres. On the tail the markings become bolder, brick red with black and yellow. The under parts are yellowish with black dots. This species rarely reaches a length of more than 10 ft. It climbs well, prefers open forest in the neighbourhood of water, is often found in plantations where it retires into a hole in the ground, and lives chiefly on birds and small mammals. Like most true boas, it is of a very gentle disposition and easily domesticates itself in the palm or reed thatched huts of the natives, where it hunts the rats during the night.

The term* ” boa ” is applied by analogy to a long article of women’s dress wound round the neck.

80ABDIL (a corruption of the name Abu Abdullah), the last Moorish king of Granada, called el chico, the little, and also el zogoybi, the unfortunate. A son of Muley Abu’l Hassan, king of Granada, he was proclaimed king in 1482 in place of his father, who was driven from the land. Boabdil soon after sought to gain prestige by invading Castile. He was taken prisoner at Lucena in 1483, and only obtained his freedom by consenting to hold Granada as a tributary kingdom under Ferdinand and Isabella, king and queen of Castile and Aragon. The next few years were consumed in struggles with his father and his uncle Abdullah ez Zagal. In 1491 Boabdil was summoned by Ferdinand and Isabella to surrender the city of Granada, and on his refusal it was besieged by the Castilians. Eventually, in January 1492, Granada was surrendered, and the king spent some time on the lands which he was allowed to hold in Andalusia. Subsequently he crossed to Africa, and is said to have been killed in battle fighting for his kinsman, the ruler of Fez. The spot from which Boabdil looked for the last time on Granada is still shown, and is known as ” the last sigh of the Moor ” (el ultimo suspire del Moro).

See J. A. Conde, Domin&eion de los Arabes en Espana (Paris, 1840), translated into English by Mrs J. Foster (London, 1854- i855) ; Washington Irving, The Alhambra (New York, ed. 1880).

BOADICEA, strictly Boudicca, a British queen in the time of the emperor Nero. Her husband Prasutagus ruled the Iceni (in what is now Norfolk) as an autonomous prince under Roman suzerainty. On his

death (a.d. 6,1) without male heir, his dominions were annexed, and the annexation was carried out brutally. He had by his will divided his private wealth between his two daughters and Nero, trusting thereby to win imperial favour for his family. Instead, his wife was scourged (doubtless for resisting the annexation), his daughters outraged, his chief tribesmen plundered. The proud, fierce queen and her people rose, and not alone. With them rose half Britain, enraged, for other causes, at Roman rule. Roman taxation and conscription lay heavy on the province; in addition, the Roman government had just revoked financial concessions made a few years earlier, and L. Annaeus Seneca, who combined the parts of a moralist and a money-lender, had abruptly recalled large loans made from his private wealth to British chiefs. A favourable chance for revolt was provided by the absence of the governor-general, Suetonius Paulinus, and most of his troops in North Wales and Anglesey. All south-east Britain joined the movement. Paulinus rushed back without waiting for his troops, but he could do nothing alone. The Britons burnt the Roman municipalities of Verulam and Colchester, the mart of London, and several military posts, massacred ” over 70,000 ” Romans and Britons friendly to Rome, and almost annihilated the Ninth Legion marching from Lincoln to the rescue. At last Paulinus, who seems to have rejoined his army, met the Britons in the field. The site of the battle is unknown. One writer has put it at Chester; others at London, where King’s Cross had once a narrow escape of being christened Boadicea’s Cross, and actually for many years bore the name of Battle Bridge, in supposed reference to this battle. Probably, however, it was on Watling Street, between London and Chester. In a desperate soldiers’ battle Rome regained the province. Boadicea took poison; thousands of Britons fell in the fight or were hunted down in the ensuing guerrilla. Finally, Rome adopted a kindlier policy, and Britain became quiet. But the scantiness of Romano-British remains in Norfolk may be due to the severity with which the Iceni were crushed.

See Tacitus, Annals, xiv. ; Agric. xv. ; Dio lxii. The name Boudicca seems to mean in Celtic much the same as Victoria.

(F. J. H.)

BOAR (O. Eng. bar; the word is found only in W. Ger. languages, cf. Dutch beer, Ger. Eber), the name given to the un- castrated male of the domestic pig (q.v.), and to some wild species of the family Suidae (see Swine). The European wild boar (Sus scrofa) is distributed over Europe, northern Africa, and central and northern Asia. It has long been extinct in the British Isles, where it once abounded, but traces have been found of its survival in Chartley Forest, Staffordshire, in an

entry of 1683 in an account-book of the steward of the manor, and it possibly remained till much later in the more remote parts of Scotland and Ireland (J. E. Harting, Extinct British Animals, 1880). The wild boar is still found in Europe, in marshy woodland districts where there is plenty of cover, and it is fairly plentiful in Spain, Austria, Russia and Germany, particularly in the Black Forest.

From the earliest times, owing to its great strength, speed, and ferocity when at bay, the boar has been one of the favourite beasts of the chase. Under the old forest laws of England it wat one of the ” beasts of the forest,” and, as such, under the Norman kings the unprivileged killing of it was punishable by death or the loss of a member. It was hunted in England and in Europe on foot and on horseback with dogs, while the weapon of attack was always the spear. In Europe the wild boar is still hunted with dogs, but the spear, except when used in emergencies and for giving the coup de grdce, has been given up for the gun. It is also shot in great forest drives in Austria, Germany and Russia. The Indian wild boar (Sus cristatus) is slightly taller than Sus scrofa, standing some 30 to 40 in. at the shoulder. It

is found throughout India, Ceylon and Burma. Here the horse and spear are still used, and the sport is one of the most popular in India. (See Pig-sticking.)

The boar is one of the four heraldic beasts of venery, and was the cognizance of Richard III., king of England. As an article of food the boar’s head was long considered a special delicacy, and its serving was attended with much ceremonial. At Queen’s College, Oxford, the dish is still brought on Christmas day in procession to the high-table, accompanied by the singing of a carol.

BOARD (O. Eng. lord), a plank or long narrow piece of timber. The word comes into various compounds to describe boards used for special purposes, or objects like boards (drawing- board, ironing-board, sounding-board, chess-board, cardboard, back-board, notice-board, scoring-board). The phrase “to keep one’s name on the boards,” at Cambridge University, signifies to remain a member of a college; at Oxford it is ” on the books.” In bookbinding, pasteboard covers are called boards. Board was early used of a table, hence such phrases as “bed and board,” “board and lodging”; or of a gaming- table, as in the phrase ” to sweep the board,” meaning to pocket all the stakes, hence,

figuratively, to carry all before one. The same meaning leads to ” Board of Trade,” ” Local Government Board,” &c.

From the meaning of border or side, and especially ship's side, comes " sea-board," meaning sea-coast, and the phrases "aboard" (Fr. abord), "over-board," "by the board"; similarly " weather-board," the side of a ship which is to wind- ward; " larboard and starboard " (the former of uncertain origin, Mid. Eng. laddeboard or latheboard; the latter meaning " steering side," O. Eng. steorbord, the rudder of early ships working over the steering side), signifying (to one standing at the stern and looking forward) the left and right sides of the ship respectively.

BOARDING-HOUSE, a private house in which the proprietor provides board and lodging for paying guests. The position of a guest in a boarding-house differs in English law, to some extent, on the one hand from that of a lodger in the ordinary sense of the term, and on the other from that of a guest in an inn. Unlike the lodger, he frequently has not the exclusive occupation of particular rooms. Unlike the guest in an inn, his landlord has no lien upon his property for rent or any other debt due in respect of his board (Thompson v. Lacy, 1820,3 B. and Aid. 283). The landlord is under an obligation to take reasonable care for the safety of property brought by a guest into his house, and is liable for damages in case of breach of this obligation (Scarborough v. Cosgrove, 1903, 2 K.B. 803). Again, unlike the innkeeper, a boarding-house keeper does not hold himself out as ready to receive all travellers for whom he has accommodation, for which they are ready to pay, and of course he is entitled to get rid of any guest on giving reasonable notice (see Lamond v. Richard, 1897, 1 Q.B. 541, 548). What is reasonable notice depends on the terms of the contract; and, subject thereto, the course of payment of rent is a material circumstance (see Landlord and Tenant). Apparently the same implied warranty of fitness for habitation at the commence- ment of the tenancy which exists in the case of furnished lodg- ings (see Lodger and Lodgings) exists also in the case of boarding-houses; and the guest in a boarding-house, like a lodger, is entitled to all the usual and necessary conveniences of a dwelling-house.

The law of the United States is similar to English law.

Under the French Code Civil, claims for subsistence furnished to a debtor and his family during the last year of his life by boarding-house keepers (maitres de pension) are privileged over the generality of moveables, the privilege being exerciseable after legal expenses, funeral expenses, the expenses of the last illness, and the wages of servants for the year elapsed and what is due for the current year (art. 2101 (5)). Keepers of taverns (aubergistes) and hotels (hdteliers) are

responsible for the goods of their guests — the committal of which to their custody is regarded as a deposit of necessity (dipdt necessaire). They are

liable for the loss of such goods by theft, whether by servants or strangers, but not where the loss is due to force majeure (arts. 1952-1954). Their liability for money and bearer securities not actually deposited is limited to 1000 francs (law of 18 th of April 1889). These provisions are reproduced in substance in the Civil Codes of Quebec (arts. 1814, 1815, 1994, 2006) and of St Lucia (art. 1889). In Quebec, boarding-house keepers have a lien on the goods of their guests for the value or price of any food or accommodation furnished to them, and have also a right to sell their baggage and other property, if the amount remains unpaid for three months, under conditions similar to those imposed on innkeepers in England (art. 18 16 A; and see Inns and Innkeepers); also in the Civil Code of St Lucia (arts. iS78, 1714, 1715)- ‘ (A. W. R.)

BOARDING-OUT SYSTEM, in the English poor law, the boarding-out of orphan or deserted children with suitable foster- parents. The practice was first authorized in 1868, though for many years previously it had been carried out by some boards of guardians on their own initiative. Boarding-out is governed by two orders of the Local Government Board, issued in 1 889. The first permits guardians to board-out children within their own union, except in the metropolis. The second governs the boarding-out of children in localities outside the union. The sum payable to the foster-parents is not to exceed 4s. per week for each child. ‘The system has been much discussed by authorities on the administration of the poor law. It has been objected that few working-men with an average-sized family can afford to devote such an amount for the maintenance of each child, and that, therefore, boarded-out children are better off than the children of the independent (Fawcett, Pauperism). Working-class guardians, also, do not favour the system, being suspicious as to the disinterestedness of the foster-parents. On the other hand, it is argued that from the economic and educational point of view much better results are obtained by boarding-out children; they are given a natural life, and when they grow up they are without effort merged in the general population (Mackay, Hist. Eng. Poor Law). See also Poor Law.

The ” boarding-out ” of lunatics is, in Scotland, a regular part of the lunacy administration. It has also been successfully adopted in Belgium. (See Insanity.)

BOARDMAN, GEORGE DANA (1801-1831), American Baptist

missionary, was born at Livermore, Me., and educated at Waterville College and Andover Theological Seminary. In 1825 he went to India as a missionary, and in 1827 to Burma, where his promising work among the Karens was cut short by his early death. His widow married another well-known Burmese missionary, Adoniram Judson.

His son, George Dana Boardman, the younger (1828-1903), made the voyage from Burma to America alone when six years of age. He graduated in 1852 at Brown University, and from the Newton Theological Institution in 1855. He held Baptist pastorates at Rochester (1856-1864), and at Philadelphia, and was president of the American Baptist Missionary Union, 1880- 1884. At Philadelphia he is said to have taken his congregation through every verse of the New Testament in 643 Wednesday evening lectures, which occupied nearly eighteen years, and afterwards to have begun on the Old Testament in similar fashion. Among his published works are Studies in the Model Prayer (1879), and Epiphanies of the Risen Lord (1879).

BOASE, HENRY SAMUEL (1799-1883), English geologist, the eldest son of Henry Boase (1763-1827), banker, of Madron, Cornwall, was born in London on the 2nd of September 1799. Educated partly at Tiverton grammar-school, and partly at Dublin, where he studied chemistry, he afterwards proceeded to Edinburgh and took the degree of M.D. in 1821. He then settled for some years as a medical practitioner at Penzance; there geology engaged his particular attention, and he became secretary of the Royal Geological Society of Cornwall. The results of his observations were embodied in his Treatise on Primary Geology (1834), a work of considerable merit in regard to the older crystalline and igneous rocks and the subject of

mineral veins. In 1837 he removed to London, where he remained for about a year, being elected F.R.S. In 1838 he became partner in a firm of bleachers at Dundee. He retired in 187 1, and died on the 5th of May 1883.

BOAT (O. Eng. bdt; the true etymological connexion with Dutch and Ger. boot, Fr. bateau, Ital. battello presents great difficulties; Celtic forms are from O. Eng.), a comparatively small open craft for conveyance on water, usually propelled by some form of oar or sail.

The origin of the word ” boat ” is probably to be looked for in the A.S.

bat = 3. stem, a stick, a piece of wood. If this be so, the term in its inception referred to the material of which the primitive vessel was constructed, and in this respect may well be contrasted with the word ” ship,” of which the primary idea was the process by which the material was fashioned and adapted for the use of man.

We may assume that primitive man, in his earliest efforts to achieve the feat of conveying himself and his belongings by water, succeeded in doing so — (1) by fastening together a quantity of material of sufficient buoyancy to float and carry him above the level of the water; (2) by scooping out a fallen tree so as to obtain buoyancy enough for the same purpose. In these two processes is to be found the genesis of both boat and ship, of which, though often used as convertible terms, the former is generally restricted to the smaller type of vessel such as is dealt with in this article. For the larger type the reader is referred to Ship.

Great must have been the triumph of the man who first discovered that the rushes or the trunks he had managed to tie together would, propelled by a stick or a branch (cf. ramus and remus) used as pole or paddle, convey him safely across the river or lake, which had hitherto been his barrier. But use multiplies wants, discovers deficiencies, suggests improvements. Man soon found out that he wanted to go faster than the raft would move, that the water washed over and up through it, and this need of speed, and of dry carrying power, which we find operative throughout the history of the boat down to the present day, drove him to devise other modes of flotation as well as to try to improve his first invention.

The invention of the hollowed trunk, of the ” dug-out ” (monoxylon), however it came about, whenever and wherever it came into comparison with the raft, must have superseded the latter for some purposes, though not by any means for all. It was superior to the raft in speed, and was, to a certain extent, water-tight. On the other hand it was inferior in carrying power and stability. But the two types once conceived had come to stay, and to them severally, or to attempts to combine the useful properties of both, may be traced all the varieties of vessel to which the name of boat may be applied.

The development of the raft is admirably illustrated in the description, given us by Homer in the Odyssey, of the construc- tion by the hero Ulysses of a vessel of the kind. Floating timber is cut down and carefully shaped and planed with axe and adze, and the timbers are then exactly fitted face to face and com- pacted with trenails and dowels, just as the flat floor of a lump or lighter might be fashioned

and fitted nowadays. A platform is raised upon the floor and a bulwark of osiers contrived to keep out the wash of the waves (cf. infra, Malay boats). It seems as if the poet, who was intimately acquainted with the sea ways of his time, intended to convey the idea of progress in construction, as illustrated by the technical skill of his hero, and the use of the various tools with which he supplies him.

On the other hand the dug-out had its limitations. The largest tree that could be thrown and scooped out afforded but a narrow space for carrying goods, and presented problems as to stability which must have been very difficult to solve. The shaping of bow and stern, the bulging out of the sides, the flattening of the bottom, the invention of a keel piece, the attempt to raise the sides by building up with planks, all led on towards the idea of constructing a boat properly so called, or perhaps to the invention of the canoe, which in some ways may be regarded as the intermediate stage between dug-out and boat.

Meanwhile the raft had undergone improvements such as those which Homer indicates. It had arrived at a floor composed of timbers squared and shaped. It had risen to a platform, the prototype of a deck. It was but a step to build up the sides and turn up the ends, and at this point we reach the genesis of ark and punt, of sanpan and junk, or, in other words, of all the many varieties of flat-bottomed craft.

When once we have reached the point at which the improve- ments in the construction of the raft and dug-out bring them, as it were, within sight of each other, we can enter upon the history of the development of boats properly so called, which, in accordance with the uses and the circumstances that dictated their build, may be said to be descended from the raft or the dug-out, or from the attempt to combine the respective advan- tages of the two original types.

Uses and circumstances are infinite in variety and have produced an infinite variety of boats. But we may safely say that in all cases the need to be satisfied, the nature of the material available, and the character of the difficulties to be overcome have governed the reason and tested the reasonableness of the architecture of the craft in use.

It is not proposed in this article to enter at any length into the details of the construction of boats, but it is desirable, for the sake of clearness, to indicate certain broad distinctions in the method of building, which, though they run back into the far past, in some form or other survive and are in use at the present day.

The tying of trunks together to form a raft is still not unknown in the

lumber trade of the Danube or of North America, nor was it in early days confined to the raft. It extended to many boats properly so called, even to many of those built by the Vikings of old. It may still be seen in the Madras surf boats, and in those constructed out of driftwood by the inhabitants of Easter Island in the south Pacific. Virgil, who was an archae- ologist, represents Charon's boat on the Styx as of this construction, and notes the defect, which still survives, in the craft of the kind when loaded —

" Gemuit sub pondere cymba Sutilis, et multam accepit rimosa paludem!"

Aen. vi. 303.

Next to the raft, and to be counted in direct descent from it-, comes the whole class of flat-bottomed boats including punts and lighters. As soon as the method of constructing a solid floor, with trenails and dowels, had been discovered, the method of converting it into a water-tight box was pursued, sides were attached plank fashion, with strong knees to stiffen them, and cross pieces to yoke or key (cf. £vyov, kAt/ is) them together. These thwarts once fixed naturally suggested seats for those that plied the paddle or the oar. The ends of the vessel were shaped into bow or stern, either turned up, or with the side planking convergent in stem or stern post, or joined together fore and aft by bulkheads fitted in, while interstices were made water-tight by caulking, and by smearing with bitumen or some resinous material.

The evolution of the boat as distinct from the punt, or flat- bottomed type, and following the configuration of the dug-out in its length and rounded bottom, must have taxed the inventive art and skill of constructors much more severely than that of the raft. It is possible that the coracle or the canoe may have suggested the construction of a framework of sufficient stiffness to carry a water-tight wooden skin, such as would successfully resist the pressure of wind and water. And in this regard two methods were open to the builder, both of which have survived to the present day: (1) the construction first of the shell of the boat, into which the stiffening ribs and cross ties were subsequently fitted; (2) the construction first of a framework of requisite size and shape, on to which the outer skin of the boat was subsequently attached.

Further, besides the primitive mode of tying the parts to- gether, two main types of build must be noticed, in accord- ance with which a boat is said to be either carvel-built or

clinker-built, (i) A boat is carvel-built when the planks are laid edge to edge so that they present a smooth surface without. (2) A boat is clinker-built when each plank is laid on so as to overlap the one below it, thus presenting a series of ledges running longitudinally.

The former method is said to be of Mediterranean, or perhaps of Eastern origin. The latter was probably invented by the old Scandinavian builders, and from them handed down through the fishing boats of the northern nations to our own time.

The accounts of vessels used by the Egyptians and Phoe- nicians generally refer to larger craft which naturally fall under the head of Ship (q.v.). The Nile boats, however, boats described by Herodotus (ii. 60), built of acacia wood,

were no doubt of various sizes, some of them quite small, but all following the same type of construction, built up brick fashion, the blocks being fastened internally to long poles secured by cross pieces, and the interstices caulked with papyrus. The ends rose high above the water, and to prevent hogging were often attached by a truss running longitudinally over crutches from stem to stern.

The Assyrian and Babylonian vessels described by Herodotus (i. 194), built up of twigs and boughs, and covered with skins smeared with bitumen, were really more like huge coracles and hardly deserve the name of boats.

The use of boats by the Greeks and Romans is attested by the frequent reference to them in Greek and Latin literature, though, as regards such small craft, the details given are hardly enough to form the basis of an accurate classification.

We hear of small boats attendant on a fleet (KtkqTwv, Thuc. i. 53), and of similar craft employed in piracy (Thuc. iv. 9), and in one case of a sculling boat, or pair oar (cucanov aiufapiKov, Thuc. iv. 67), which was carted up and down between the town of Megara and the sea, being used for the purpose of marauding at night. We are also familiar with the passage in the Acts (xxvii.) where in the storm they had hard work “to come by the boat”; which same boat the sailors afterwards “let down into the sea, under colour as though they would have cast anchors out of the foreship,” and would have escaped to land in her themselves, leaving the passengers to drown, if the

centurion and soldiers acting upon St Paul's advice had not cut off the ropes of the boat and let her fall off.

There can be little doubt that boat races were in vogue among the Greeks (see Prof. Gardner, Journal of Hellenic Studies, ii. 91 ff.), and probably formed part of the Panathenaic and Isthmian festivals. It is, however, difficult to prove that small boats took part in these races, though it is not unlikely that they may have done so. The testimony of the coins, such as it is, points to galleys, and the descriptive term (vtSiv a/uXXa) leads to the same conclusion.

It is hardly possible now to define the differences which separated aKaros, anariov, from Ke\r)S, Kekqnov, or from Xe/i/3oJ, or Ka.pa.fios. They seem all to have been rowing boats, probably carvel-built, some with keels {acatii modo carinata, Plin. ix. 19), and to have varied in size, some being simply sculling boats, and others running up to as many as thirty oars.

Similarly in Latin authors we have frequent mention of boats accompanying ships of war. Of this there is a well-known instance in the account of Caesar's invasion of Britain (B.C. iv. 26), when the boats of the fleet, and the pinnaces, were filled with soldiers and sent to assist the Legionaries who were being fiercely attacked as they waded on to the shore. There is also an instance in the civil war, which is a prototype of a modern attack of torpedo boats upon men of war, when Antonius manned the pinnaces of his large ships to the number of sixty, and with them attacked and defeated an imprudent squadron of Quad- riremes (B.C. hi. 24). The class of boats so frequently mentioned as actuariae seems to have contained craft of all sizes, and to have been used for all purposes, whether as pleasure boats or as despatch vessels, or for piracy. In fact the term was employed vaguely just as we speak of craft in general, iv. 4

The lembus, which is often referred to in Livy and Polybius, seems to have been of Illyrian origin, with fine lines and sharp bows. The class contained boats of various sizes and with a variable number of oars (biremis, Livy xxiv. 40, sexdecim, Livy xxxiv. 35); and it is interesting to note the origin in this case, as the invention of the light Liburnian galleys, which won the battle of Actium, and altered the whole system of naval construction, came from the same seaboard.

Besides these, the piratical myoparones (see Cic. In Verrem), and the poetical phaselus, deserve mention, but here again we are met with the difficulty of distinguishing boats from ships. There is also an interesting notice in Tacitus (Hist. iii. 47) of boats hastily constructed

by the natives of the northern coast of Asia Minor, which he describes as of broad beam with narrow sides- (probably meaning that the sides “tumbled home”), joined together without any fastenings of brass or iron. In a sea-way the sides were raised with planks added till they were cased in as with a roof, whence their name camarae, and so they rolled about in the waves, having prow and stern alike and convertible rowlocks, so that it was a matter of indifference and equally safe, or perhaps unsafe, whichever way they rowed.

Similar vessels were constructed by Germanicus in his north German campaign (Ann. ii. 6) and by the Suiones (Ger. 44). These also had stem and stern alike, and remind us of the old Norse construction, being rowed either way, having the oars loose in the rowlock, and not, as was usual in the south, attached by a thong to the thowl pin.

Lastly, as a class of boat directly descended from the raft, we may notice the flat-bottomed boats or punts or lighters which plied on the Tiber as ferry-boats, or carrying go’ods, which were called codicariae from caudex, the old word for a plank.

It is difficult to trace any order of development in the construc- tion of boats during the Byzantine period, or the middle ages. Sea-going vessels according to their size carried one or more boats, some of them small boats with two or four oars, others boats of a larger size fitted with masts and sail as well as with oars. We find lembus and phaselus as generic names in the earlier period, but the indications as to size and character are vague and variable. The same may be said of the batelli, coquets, chaloupes,chalans, gattes, &c, of which, in almost endless number and variety, the nautical erudition of M. Jal has collected the names in his monumental works, Archeologie navale and the Glossaire naulique.

It is clear, however, that in many instances the names, originally applied to boats properly so called, gradually attached themselves to larger vessels, as in the case of chaloupe and others, a fact which leads to the conclusion that the type of build followed originally in smaller vessels was often developed on a larger scale, according as it was found useful and convenient, while the name remained the same. Many of these types still survive and may be found in the Eastern seas, or in the Mediter- ranean or in the northern waters, each of which has its own peculiarities of build and rig.

It would be impossible within our limits to do justice to the number and variety of existing types in sea-going boats, and for more detailed information concerning them the reader would do well to consult

Mast and Sail in Europe and E x,stIa z Asia, by H. Warington Smyth, an excellent and exhaustive work, from which much of the information which follows regarding them has been derived.

In the Eastern seas the Chinese sanpan is ubiquitous. Origin- ally a small raft of three timbers with fore end upturned, it grew into a boat in very early times, and has given its name to a very large class of vessels. With flat bottom, and considerable width in proportion to its length, the normal sanpan runs out into two tails astern, the timbers rounding up, and the end being built in like a bulkhead, with room for the rudder to work between it and the transom which connects the two projecting upper timbers of the stern. Some of them are as much as 30 ft. in

u

length and 8 to 10 ft. in beam. They are good carriers and speedy under sail.

The Chinese in all probability were the earliest of all peoples to solve the chief problems of boat building, and after their own fashion to work out the art of navigation, which for them has now been set and unchanged for thousands of years. They appear to have used the lee-board and centre-board in junks and sanpans, and to have extended their trade to India and even beyond, centuries before anything like maritime enterprise is heard of in the north of Europe.

As regards the practice of long boat racing on rivers or tidal waters the Chinese are easily antecedent in time to the rest of the world. On great festivals in certain places the Dragon boat race forms part of the ceremony. The Dragon boats are just over 73 ft. long, with 4 ft. beam, and depth 21 in. The rowing or paddling space is about 63 ft. and the number of thwarts 27, thus giving exactly the same number of rowers as that of the Zygites in the Greek trireme. The two extremities of the boat are much cambered and rise to about 2 ft. above the water. At about 1 5 ft. from each end the single plank gives place to three, so as to offer a concave surface to the water. The paddle blade is spade-like in form and about 65 in. broad.

Both in Siam and Burma there is a very large river population, and boat racing is on festival days a common amusement. The typical craft, however, is the Duck-boat, which in the shape of hull is in direct

contrast to the dug-out form, and primarily intended for sailing. It is interesting to note that the Siamese method of slinging and using quarter rudders is the oldest used by men in sailing craft, being in fact the earliest development from the simple paddle rudder, which has in all ages been the first method of steering boats. The king of Siam's state barge, we are told, is steered by long paddles, precisely in the same way as is figured in the case of the Egyptian boats of the 3rd dynasty (6000 B.C.). On the other hand the slung quarter rudders are the same in fashion as those used by Roman and Greek merchantmen, by Norsemen and Anglo-Saxons, and by medieval seamen down to about the 14th century.

The Malays have generally the credit of being expert boat- builders, but the local conditions are not such as to favour the construction of a good type of boat. " Small displacement, hollow lines, V-shaped sections, shallow draught and lack of beam " result in want of stability and weatherliness. But it is among them that the ancient process of dug-out building still survives and flourishes, preserving all the primitive and ingenious methods of hollowing the tree trunk, of forcing its sides outwards, and in many cases building them up with added planks, so that from the dug-out a regular boat is formed, with increased though limited carrying power, increased though still hardly sufficient stability.

To ensure this last very necessary quality many devices and contrivances are resorted to.

In some cases (just as Ulysses is described as doing by Homer, Od. v. 256) the boatman fastens bundles of reeds or of bamboos all along the sides of his boat. These being very buoyant not only act as a defence against the wash of the waves, but are sufficient to keep the boat afloat in any sea.

But the most characteristic device is the outrigger, a piece of floating wood sharpened at both ends, which is fixed parallel to the longer axis of the boat, at a distance of two or three beams, by two or more poles laid at right angles to it. This, while not interfering materially with the speed of the boat, acts as a counterpoise to any pressure on it which would tend, owing to its lack of stability, to upset it, and makes it possible for the long narrow dug-out to face even the open sea. It is remarkable that this invention, which must have been seen by the Egyptians and Phoenicians in very early times, was not introduced by them into the Mediterranean. Possibly this was owing to the lack of large timber suitable for dug-outs, and the consequent evolution by them of boat from raft, with sufficient beam to rely upon for stability.

On the other hand in the boats of India the influence of Egyptian and Arab types of build is apparent, and the dinghy of

the Hugh is cited as being in form strangely like the ancient Egyptian model still preserved in the Ghizeh museum. Coming westward the dominant type of build is that of the Arab dhow, the boat class of which has all the characteristics of the larger vessel developed from it, plenty of beam, overhanging stem and transom stern. The planking of the shell over the wooden frame has a double thickness which conduces to dryness and durability in the craft.

On the Nile it is interesting to find the naggar preserving, in its construction out of blocks of acacia wood pinned together, the old-world fashion of building described by Herodotus. The gaiassa and dahabiah are too large to be classed as boats, but they and their smaller sisters follow the Arab type in build and rig.

It is noteworthy that nothing apparently of the ancient Egyptian or classical methods of build survives in the Mediter- ranean, while the records of the development of boat-building in the middle ages are meagre arid confusing. The best illustra- tions of ancient methods of construction, and of ancient seaman- ship, are to be found, if anywhere, in the East, that conservative storehouse of types and fashions, to which they were either communicated, or from which they were borrowed, by Egyptians or Phoenicians, from whom they were afterwards copied by Greeks and Romans.

In the Mediterranean the chief characteristics of the types belonging to it are ” carvel-build, high bow, round stern and deep rudder hung on stern post outside the vessel.”

In the eastern basin the long-bowed wide-sterned caique of the Bosporus is perhaps the type of boat best known, but both Greek and Italian waters abound with an unnumbered variety of boats of ” beautiful lines and great carrying power.” In the Adriatic, the Venetian gondola, and the light craft generally, are of the type developed from the raft, flat-bottomed, and capable of navigating shallow waters with minimum of draught and maximum of load.

In the western basin the majority of the smaller vessels are of the sharp-sterned build. Upon the boats of the felucca class, long vessels with easy lines and low free-board, suitable for rowing as well as sailing, the influence of the long galley of the middle ages was apparent. In Genoese waters at the beginning of the 19th century there were single-decked rowing vessels, which preserved the name of

galley, and were said to be the descendants of the Liburnians that defeated the many-banked vessels of Antonius at Actium. But the introduction of steam vessels has already relegated into obscurity these memorials of the past.

Along the Riviera and the Spanish coast a type of boat is noticeable which is peculiar for the inward curve of both stem and stern from a keel which has considerable camber, enabling them to be beached in a heavy surf.

On the Douro, in Portugal, it is said that the boats which may be seen laden with casks of wine, trailing behind them an enormously long steering paddle, are of Phoenician ancestry, and that the curious signs, which many of them have painted on the cross board over the cabin, are of Semitic origin though now undecipherable.

Coming to the northern waters, as with men, so with boats, we meet with a totally different type. Instead of the smooth exterior of the carvel-build, we have the more rugged form of clinker-built craft with great beam, and raking sterns and stems, and a wide flare forward. In the most northern waters the strakes of the sea-going boats are wide and of considerable thickness, of oak or fir, often compacted with wooden trenails, strong and fit to do battle with the rough seas and rough usage which they have to endure.

In most of these the origin of form and character is to be sought for in the old Viking vessels or long keeles of the 5th century A.D., with curved and elevated stem and stern posts, and without decks or, at the most, half decked.

In the Baltic and the North Sea most of the fishing boats follow this type, with, however, considerable variety in details. It is noticeable that here also, as in other parts of the world, and at other times, the pressing demand for speed and carrying power

has increased the size in almost all classes of boats till they pass into the category of ships. At the same time the carvel-build is becoming more common, while, in the struggle for life, steam and motor power are threatening to obliterate the old types of rowing and sailing boats altogether.

Next to the Norse skiff and its descendants, perhaps the oldest type of

boat in northern waters is to be found in Holland, where the conditions of navigation have hardly altered for centuries. It is to the Dutch that we chiefly owe the original of our pleasure craft, but, though we have developed these enormously, the Dutch boats have remained pretty much the same. The clinker-build and the wide rounded bow are now very much of the same character as they are represented in the old pictures of the 17th and 18th centuries.

The development of boat-building in the British Isles during the 19th century has been unceasing and would need a treatise to itself to do it justice. The expansion of the fishing industry and the pressure of competition have stimulated constant improvement in the craft engaged, and here also are observable the same tendencies to substitute carvel, though it is more expensive, for clinker build, and to increase the length and size of the boats, and the gradual supersession of sail and oar by steam Dower. Under these influences we hear of the fifie and the skqffie classes, old favourites in northern waters, being superseded by the more modern Zulu, which is supposed to unite the good qualities of both; and these in turn running to such a size as to take them outside the category of boats. But even in the case of smaller boats the Zulu model is widely followed, so that they have actually been imported to the Irish coast for the use of the crofter fishermen in the congested districts.

For the Shetland sexem and the broad boats of the Orkneys, and the nabbies of the west coast of Scotland, the curious will do well to refer to H. Warington Smyth's most excellent account.

On the eastern coast of England the influence of the Dutch type of build is manifest in many of the flat-bottomed and mostly round-ended craft, such as the Yorkshire Billyboy, and partly in the coble, which latter is interesting as built for launching off beaches against heavy seas, and as containing relics of Norse influence, though in the main of Dutch origin.

The life-boats of the eastern coast are in themselves an admir- able class of boat, with fine lines, great length, and shallow draught, wonderful in their daring work in foul weather and heavy seas, in which as a rule their services are required. Here, however, as in the fishing boats, the size is increasing, and steam is appropriating to itself the provinces of the sail and the oar.

The wherry of the Norfolk Broads has a type of its own, and is often fitted out as a pleasure boat. It is safe and comfortable for inland waters, but not the sort of boat to live in a sea-way in anything but

good weather.

The Thames and its estuary rejoice in a great variety of boats, of which the old Peter boat (so called after the legend of the foundation of the abbey on Thorney Island) preserved a very ancient type of build, shorter and broader than the old Thames pleasure wherry. But these and the old hatch boat have now almost disappeared. Possibly survivors may still be seen on the upper part of the tidal river. Round the English coast from the mouth of the Thames southwards the conditions of landing and of hauling up boats above high-water mark affect the type, demanding strong clinker-build and stout timbers. Hence there is a strong family resemblance in most of the short boats in use from the North Foreland round to Brighton. Among these are the life-boats of Deal and the other Channel ports, which have done and are still doing heroic work in saving life from wrecks upon the Goodwins and the other dangerous shoals that beset the narrowing sleeve of the English Channel.

Farther down, along the southern coast, and to the west, where harbours are more frequent, a finer and deeper class of boats, chiefly of carvel-build, is to be found. The Cornish ports are the home of a great boat-building industry, and from them a large number of the finest fishing boats in the world are turned out annually. Most of them are built with stem and stern alike, with full and bold quarters, and ample floor.

13* 4′ 8″

16

25

4′ 6″ 5′ 6″

27 5′ 6″

30 5′ 6″

30

8’ï”

2′ 8$’

36

10′ 2″

3′ 5″

42

n’ 6″

4′ 6″

It is not possible here to enumerate, much less to describe in detail, the variety of types in sea-going boats which have been elaborated in England and in America. For this purpose reference should be made to the list of works given at the end oi the article.

The following is a list of the boats at present used in the royal navy. They have all of them a deep fore foot, and with the exception of the whalers and Berthon boats, upright stems and transom sterns. The whalers have a raking stem and a sharp stern, and a certain amount of sheer in the bows.

Length. Beam. Depth. Feet. Ft. In. Ft. In.

la. Dinghy. Freeboard about 9 in.

Weight 3 cwt. 2 qr. Between

thwarts 2 ft. 9 in. Elm lb. Skiff dinghy for torpedo boats. Free- board about 9 in. Carry about

ten men in moderate weather.

Between thwarts 2 ft. 7J in.

Weight 3 cwt. 4B5. Yellow pine . 2a. Whaler for destroyers. 5 in. sheer.

Yellow pine

2b. Whaler. Between thwarts 2 ft. 10 in.

Freeboard about 12 in. Weight,

8 cwt. Strakes No. 13. Lap

f in. Elm

(All have bilge strakes with hand-holes.)

3. Gig. Between thwarts 2 ft. 9J in.

Weight 8 cwt. 2 qr. 15 lb. 13 Strakes. Elm

4. Cutter. Between thwarts 3 ft. 1 in.

To carry 49 men. Carvel built

5. Pinnace. Between thwarts 3 ft.

Carvel-built. Elm ….

6. Launch. Between thwarts 3 ft. 1 in.

To carry 140 men. Double skin diagonal. Teak ….

7. Berthon collapsible boats weighing

7 cwt. for destroyers.

With the exception of the larger classes, viz. cutters, pinnaces and launches, the V-shape of bottom is still preserved, which does not tend to stability, and it is difficult to see why the smaller classes have not followed the improvement made in their larger sisters.

Though the number and variety of sea-going boats is of much greater importance, no account of boats in general would be com- plete without reference to the development of pleasure craft upon rivers and inland waters, especially in ‘^lats’and England, during the past century. There is a legend, racing. dating from Saxon times, which tells of King Edgar the Peaceable being rowed on the Dee from his palace in Chester to the church of St John, by eight kings, himself the ninth, steering this ancient 8-oar; but not much is heard of rowing in England until 1453, when John Norman, lord mayor of London, set the example of going by water to Westminster, which, we are told, made him popular with the watermen of his day, as in consequence the use of pleasure boats by the citizens became common. Thus it was that the old Thames pleasure wherry, with its high bows and low sharp stern and V-shaped section, and the old skiff came into vogue, both of which have now given way to boats, mostly of clinker-build, but with rounder bottoms and greater depth, safer and more comfortable to row in.

In 171 s Thomas Doggett (q.v.) founded a race which is still rowed in

peculiar sculling boats, straked, and with sides flaring up to the sill of the rowlock. Strutt tells us of a regatta in 1775 in which watermen contended in pair-oared boats or skiffs.

At the beginning of the 19th century numerous rowing clubs flourished on the upper tidal waters of the Thames, and we hear of four-oared races from Westminster to Putney, and from Putney to Kew, in what we should now consider large and heavy boats, clinker-built, with bluff entry.

Longer boats, 8-oars, and 10-oars, seem to have been ex- istent at the end of the 18th century. Eton certainly had one 10-oar, and three 8-oars, and two 6-oars, before 1811. The record of 8-oar races at Oxford begins in 1815, at Cambridge in

1827. Pair-oar and sculling races in lighter boats seem to have come in soon after 1820, and the first Oxford and Cambridge eight-oared race was rowed in 1829, in which year also Eton and Westminster contended at Putney.

Henley regatta was founded in 1839, and since that date the building of racing boats, eights, fours, pairs, and sculling boats, has made great progress. The products of the present time are such, in lightness of build and swiftness of propulsion, as would have been thought impossible between 1810 and 1830.

In the middle of the 19th century the long boats in use were mostly clinker-built with a keel. At Oxford the torpids were rowed, as now, in clinker-built craft, but the summer races were rowed in carvel-built boats, which also had a keel.

In 1855 the first keelless 8-oar made its appearance at Henley, built by Mat Taylor for the Royal Chester Rowing Club. The new type was constructed on moulds, bottom upwards, a cedar skin bent and fitted on to the moulds, and the ribs built in after the boat had been turned over.

In 1857 Oxford rowed in a similar boat at Putney, 55 ft. long, 25 in. beam. From that time the keelless racing boat has held its own, fours and pairs and sculling boats all following suit. But with the introduction of sliding seats racing eights have developed in length to 63 ft. or more, with considerable camber, and a beam of 23-24 in.

There are, however, still advocates of the shorter type with broader beam, and it is noticeable that the Belgian boat that won the Grand Challenge at Henley in 1906 did not exceed 60 ft. The boat in which Oxford won the University race in 1901 was 56 ft. long with 27 in. of beam.

In sculling boats the acceptance of the Australian type of build has led to the construction of a much shorter boat with broader beam than that which was in vogue twenty years ago. The same tendency has not shown itself so pronouncedly in pair oars, but will no doubt be manifest in time as the build improves. In fact we may expect the controversy between long and short racing boats, and the proper method of propelling them re- spectively, to be carried a step farther. The tendency, with the long slide, and long type of boat, is to try to avoid “pinch” by adopting the scullers’ method of easy beginning, and strong drive with the legs, and sharp finish to follow, but it remains to be seen whether superior pace is not to be obtained in a shorter boat by sharp beginning at a reasonable angle to the boat’s side, and a continuous drive right out to the finish of the stroke.

Appended is a list of pleasure boats in use (1909) on the Thames, with their measurements (in feet and inches).

Depth. 9″ to 10″ 9″ to 10″ 8″ to 9″ 13″ from keel to

top of stem 7″ to 8″ 51″ to 6″ iol” to 14″

12″

9i’

15″ to 16″

13″ from keel to

top of stem 6″ from keel to

top of stem 12″ over all 6″ to 7″ 9″ to 10J” 12″ to 13″

Authorities. — For ancient boats: Diet. Ant., ” Navis “; C. Torr, Ancient Ships; Smith, Voyage and Shipwreck of St Paul; Graser, De re navali; Breusing, Die Nautik der Alten; Contre-amiral Serre, La Marine des anciens; Jules Var, V Art nautique dans Vantiquite. Medieval: Jal, Archeologie navale, and Glossaire nautique; Marquis de Folin, Bateaux et navires, progris de la construction navale; W. S. Lindsay, History of Merchant Shipping and Ancient Commerce. Modern: H. Warington

Smyth, Mast and Sail in Europe and Asia; Dixon Kempe, Manual of Yacht and Boat Sailing; H. C. Folkhard, The Sailing Boat; F. G. Aflalo, The Sea Fishing Industry of England and Wales; R. C. Leslie, Old Sea Wings, &c. (E. Wa.)

Class of Boat.

Length.

Beam.

Racing eight

• 56′ to 63′

23″ to 27″

Clinker eight .

. 56′ to 60′

24″ to 27″

Clinker four

. 38′ to 42′

23″ to 24″

Tub fours .

• 3°’ to 32′

3′8″- 3 ‘ 10″

Outrigger pair

30′ to 34′

14″ to 16″

Outrigger sculls

• 25′ to 30′

10″ to 13″

Coaching gigs .

. 26′ to 28′

3′ to 3′ 4″

Skiffs (Thames)

. 24′ to 26′

3′ 9″ to 4′

Skiffs (Eton) .

27′

2/ 3″

Gigs (pleasure) .

. 24′ to 26′

4′

Randans

. 27′ to 30′

4′ to 4′ 6″

Whiffs . . .

20′ to 23′

1′ 4″ to i‘6″

Whiff Gigs

19′ to 20′

2′ 8″ to 2′ 10″

Punts racers

30′ to 34′

1′ 3″ to 1′ 6″

,, semi racers

28′ to 30′

2′

„ pleasure

26′ to 28′

2′ 9″ to 3′

BOATSWAIN (pronounced ” bo ‘sun “; derived from ” boat ” and ” swain,” a servant), the warrant officer of the navy who in sailing-ships had particular charge of the boats, sails, rigging, colours, anchors and cordage. He superintended the rigging of the ship in dock, and it was his duty to summon the crew to work by a whistle. The office still remains, though with functions modified by the introduction of steam. In a merchant ship the boatswain is the foreman of the crew and is sometimes also third or fourth mate.

BOBBILI, a town of British India, in the Vizagapatam district of Madras, 70 m. north of Vizagapatam town. Pop. (1901) 17,387. It is the residence of a raja of old family, whose estate covers an area of 227 sq. m.; estimated income, £40,000; permanent land revenue, £9000.

The attack on the fort at Bobbili made by General Bussy in 1756 is one of the most memorable episodes in Indian history. There was a constant feud between the chief of Bobbili and the raja of Vizianagram; and when Bussy marched to restore order the raja persuaded him that the fault lay with the chief of Bobbili and joined the French with 11,000 men against his rival. In spite of the fact that the French field-pieces at once made practicable breaches in the mud walls of the fort, the defenders held out with desperate valour. Two assaults were repulsed after hours of hand-to-hand fighting; and when, after a fresh bombardment, the garrison saw that their case was hopeless, they killed their women and children, and only succumbed at last to a third assault because every man of them was either killed or mortally wounded. An old man, however, crept out of a hut with a child, whom he presented to Bussy as the son of the dead chief. Three nights later four followers of the chief of Bobbili crept into the tent of the raja of Vizianagram and stabbed him to death. The child, Chinna Ranga Rao, was invested by Bussy with his father’s estate, but during his minority it was seized by his uncle. After a temporary arrangement of terms with the raja of Vizianagram the old feud broke out again, and the Bobbili chief was forced to take refuge in the nizam’s country.

In 1794, however, on the break-up of the Vizianagram estate, Chinna Ranga Rao was restored by the British, and in 1801 a permanent settlement was made with his son. The title of raja was recognized as hereditary in the family; that of maharaja was conferred as a personal distinction on Sir Venkataswetachalapati Ranga Rao, K.C.I.E., the adopted great-great-grandson of Chinna Ranga Rao.

For the siege see Imp. Gazetteer of India (Oxford, 1908), s. v. ” Bobbili Estate.”

BOBBIO, a town and episcopal see of Lombardy, Italy, in the province of Pa via, 32! m. S.W. of Piacenza by road. Pop. (1901) 4848. Its most important building is the church dedicated to St Columban, who became first abbot of Bobbio in 595 or 612, and died there in 615. It was erected in Lombard style in the nth or 1 2th century (to which period the campanile belongs) and restored in the 13th. The cathedral is also interesting. Bobbio was especially famous for the manuscripts which belonged to the monastery of St Columban, and are now dispersed, the greater part being in the Vatican library at Rome, and others at Milan and Turin. The cathedral archives contain documents of the 10th and nth centuries.

See M. Stokes, Six Months in the Apennines (London, 1892), 154 seq.; C. Cipolla, in L ‘Arte (1904), 241.

BOBER, a river of Germany, the most considerable of the left bank tributaries of the Oder; it rises at an altitude of 2440 ft., on the northern (Silesian) side of the Riesengebirge. In its upper course it traverses a higher plateau, whence, after passing the town of Landeshut, it descends through a narrow and fertile valley to Kupferberg. Here its romantic middle course begins, and after dashing through a deep ravine between the towns of Hirschberg and Lowenberg, it gains the plain. In its lower course it meanders through pleasant pastures, bogland and pine forests in succession, receives the waters of various mountain streams, passes close by Bunzlau and through Sagan, and finally, after a course of 160 m., joins the Oder at Crossen. Swollen by the melting of the winter snows and by heavy rains in the

mountains, it is frequently a torrent, and is thus, except in the last few miles, unnavigable for either boats or rafts.

BOBRUISK, a town and formerly a first-class fortress of Russia, in the government of Minsk, and ioo m. by rail S.E. of the town of Minsk, in 53° 15′ N. lat. and 28° 52′ E. long., on the right bank of the Berezina river, and on the railway from Libau and Vilna to Ekaterinoslav. Pop. (i860) 23,761; (1897) 35,177, of whom one-half were Jews. In the reign of Alexander I. there was erected here, at the confluence of the Bobruiska with the Berezina, nearly a mile from the town, a fort, which success- fully withstood a bombardment by Napoleon in 181 2, and was made equal to the best in Europe by the emperor Nicholas I. It was demolished in 1897, the defences being antiquated. The town has a military hospital and a departmental college. There are ironworks and flour-mills; and corn and timber are shipped to Libau. The town was half burnt down in 1902.

BOCAGE, MANUEL MARIA BARBOSA DE (1765-1805), Portuguese poet, was a native of Setubal. His father had held important judicial and administrative appointments, and his mother, from whom he took his last surname, was the daughter of a Portuguese vice-admiral of French birth who had fought at the battle of Matapan. Bocage began to make verses in infancy, and being somewhat of a prodigy grew up to be flattered, self-conscious and unstable. At the age of fourteen, he suddenly left school and joined the 7th infantry regiment; but tiring of garrison life at Setubal after' two years, he decided to enter the navy. He proceeded to the royal marine academy in Lisbon, but instead of studying he pursued love adventures, and for the next five years burnt incense on many altars, while his retentive memory and extraordinary talent for improvisation gained him a host of admirers and turned his head. The Brazilian modinhas, little rhymed poems sung to a guitar at family parties, were then in great vogue, and Bocage added to his fame by writing a number of these, by his skill in extemporizing verses on a given theme, and by allegorical idyllic pieces, the subjects of which are similar to those of Watteau's and Boucher's pictures. In 1786 he was appointed gimrdamarinha in the Indian navy, and he reached Goa by way of Brazil in October. There he came into an ignorant society full of petty intrigue, where his particular talents found no scope to display themselves; the glamour of the East left him unmoved and the climate brought on a serious illness. In these circumstances he compared the heroic traditions of Portugal in Asia, which had induced him to leave home, with the reality, and wrote his satirical sonnets on " The Decadence of the Portuguese Empire in Asia," and those addressed to Affonso de Albuquerque and D. Joao de Castro. The irritation caused by these satires, together with rivalries in love affairs, made it advisable for him to leave Goa, and early in 1 789 he obtained the post of lieutenant of the infantry company at Damaun;

but he promptly deserted and made his way to Macao, where he arrived in July- August. According to a modern tradition much of the Lusiads had been written there, and Bocage probably travelled to China under the influence of Camoens, to whose life and misfortunes he loved to compare his own. Though he escaped the penalty of his desertion, he had no resources and lived on friends, whose help enabled him to return to Lisbon in the middle of the following year.

Once back in Portugal he found his old popularity, and resumed his vagabond existence. The age was one of reaction against the Pombaline reforms, and the famous, intendant of police, Manique, in his determination to keep out French revolu- tionary and atheistic propaganda, forbade the importation of foreign classics and the discussion of all liberal ideas. Hence the only vehicle of expression left was satire, which Bocage employed with an unsparing hand. His poverty compelled him to eat and sleep with friends like the turbulent friar Jose Agos ; tinho de Macedo (q.v.), and he soon fell under suspicion with Manique. He became a member of the New Arcadia, a literary society founded in 1790, under the name of Elmano Sadino, but left it three years later. Though including in its ranks most of the poets of the time, the New Arcadia produced little of real merit, and before long its adherents became enemies and

descended to an angry warfare of words. But Bocage's reputa- tion among the general public and with foreign travellers grew year by year. Beckford, the author of Vathek, for instance, describes him as " a pale, limber, odd-looking young man, the queerest but perhaps the most original of God's poetical creatures. This strange and versatile character may be said to possess the true wand of enchantment which at the will of its master either animates or petrifies." In 1797 enemies of Bocage belong- ing to the New Arcadia delated him to Manique, who on the pretext afforded by some anti-religious verses, the Epistola a Marilia, and by his loose life, arrested him when he was about to flee the country and lodged him in the Limoeiro, where he spent his thirty-second birthday. His sufferings induced him to a speedy recantation, and after much importuning of friends, he obtained his transfer in November from the state prison to that of the Inquisition, then a mild tribunal, and shortly after- wards recovered his liberty. He returned to his bohemian life and subsisted by writing empty Elogios Dramaticos for the theatres, printing volumes of verses and translating the didactic poems of Delillc, Castel and others, some second-rate French plays and Ovid's Metamorphoses. These resources and the help of brother Freemasons just enabled him to exist, and a purifying influence came into his life in the shape of a real affection for the two beautiful daughters of D. Antonio Bersane Leite, which drew from him

verses of true feeling mixed with regrets for the past. He would have married the younger lady, D. Anna Perpetua (Analia), but excesses had ruined his health. In 1801 his poetical rivalry with Macedo became more acute and personal, and ended by drawing from Bocage a stinging extempore poem, Pena de Taliao, which remains a monument to his powers of invective. In 1804 the malady from which he suffered increased, and the approach of death inspired some beautiful sonnets, including one directed to D. Maria (Maroia), elder sister of Analia, who visited and consoled him. He became reconciled to his enemies, and breathed his last on the 21st of December 1805. His end recalled that of Camoens, for he expired in poverty on the eve of the French invasion, while the singer of the Lusiads just failed to see the occupation of Portugal by the duke of Alva's army. The gulf that divides the life and.achieve- ments of these two poets is accounted for, less by difference of talent and temperament than by their environment, and it gives an accurate measure of the decline of Portugal in the two centuries that separate 1580 from 1805.

To Beckford, Bocage was " a powerful genius," and Link was struck by his nervous expression, harmonious versification and the fire of his poetry. He employed every variety of lyric and made his mark in all. His roundels are good, his epigrams witty, his satires rigorous and searching, his odes often full of nobility, but his fame must rest on his sonnets, which almost rival those of Camoens in power, elevation of thought and tender melancholy, though they lack the latter's scholarly refinement of phrasing. So dazzled were contemporary critics by his brilliant and inspired extemporizations that they ignored Bocage's licentiousness, and overlooked the slightness of his creative output and the artificial character of most of his poetry. In 1871 a monument was erected to the poet in the chief square of Setubal, and the centenary of his death was kept there with much circumstance in 1905.

The best editions of his collected works are those of I. F. da Silva, with a biographical and literary study by Rebello da Silva, in 6 vols. (Lisbon, 1853), and of Dr Theophilo Braga, in 8 vols. (Oporto, 1875-1876). See also I. F. da Silva. Diccionario Bibliographico Portuguez, vol. vi. pp. 45-53, and vol. xvi. pp. 260-264; Dr T. Braga, Bocage, sua vida e epocalitteraria, (Oporto, 1902). A striking portrait of Bocage by H. J. da Silva was engraved by Bartolozzi, who spent his last years in Lisbon. (E. Pr.)

BOCAGE (from 0. Fr. boscage, Late Lat. boscum, a wood), a French topographical term applied to several regions of France, the commonest characteristics of which are a granite formation and an

undulating or hilly surface, consisting largely of heath or reclaimed land, and dotted with clumps of trees. The most important districts designated by the word are (1) the Bocage of Normandy, which comprises portions of the

departments of Calvados, Manche and Orne; (2) the Bocage of Vendee, situated in the departments of Vendee, Deux-Sevres, Maine-et-Loire, and Loire-Inferieure.

BOCCACCIO, GIOVANNI (1313-1375), Italian author, whose Decameron is one of the classics of literature, was born in 13 13, as we know from a letter of Petrarch, in which that poet, who was born in 1304, calls himself the senior of his friend by- nine years. The place of his birth is somewhat doubtful — Florence, Paris and Certaldo being all mentioned by various writers as his native city. Boccaccio undoubtedly calls himself a Florentine, but this may refer merely to the Florentine citizen- ship acquired by his grandfather. The claim of Paris has been supported by Baldelli and Tiraboschi, mainly on the ground that his mother was a lady of good family in that city, where she met Boccaccio's father. There is a good deal in favour of Certaldo, a small town or castle in the valley of the Elsa, 20 m. from Florence, where the family had some property, and where the poet spent much of the latter part of his life. He always signed his name Boccaccio da Certaldo, and named that town as his birthplace in his own epitaph. Petrarch calls his friend Certaldese; and Filippo Villani, a contemporary, distinctly says that Boccaccio was born in Certaldo.

Boccaccio, an illegitimate son, as is put beyond dispute by the fact that a special licence had to be obtained when he desired to become a priest, was brought up with tender care by his father, who seems to have been a merchant of respectable rank. His elementary education he received from Giovanni da Strada, an esteemed teacher of grammar in Florence. But at an early age he was apprenticed to an eminent merchant, with whom he remained for six years, a time entirely lost to him, if we may believe his own statement. For from his tenderest years his soul was attached to that " alma poesis," which, on his tombstone, he names as the task and study of his life. In one of his works he relates that, in his seventh year, before he had ever seen a book of poetry or learned the rules of metrical composition, he began to write verse in his childish fashion, and earned for himself amongst his friends the name of " the poet." It is un- certain where Boccaccio

passed these six years of bondage; most likely he followed his master to various centres of commerce in Italy and France. We know at least that he was in Naples and Paris for some time, and the youthful impressions received in the latter city, as well as the knowledge of the French language acquired there, were of considerable influence on his later career. Yielding at last to his son's immutable aversion to commerce, the elder Boccaccio permitted him to adopt a course of study somewhat more congenial to the literary tastes of the young man. He was sent to a celebrated professor of canon law, at that time an important field of action both to the student and the practical jurist. According to some accounts —far from authentic, it is true — this professor was Cino da Pistoia, the friend of Dante, and himself a celebrated poet and scholar. But, whoever he may have been, Boccaccio's master was unable to inspire his pupil with scientific ardour. " Again," Boccaccio says, " I lost nearly six years. And so nauseous was this study to my mind, that neither the teaching of my master, nor the authority and command of my father, nor yet the exertions and reproof of my friends, could make me take to it, for my love of poetry was invincible."

About 1333 Boccaccio settled for some years at Naples, apparently sent there by his father to resume his mercantile pursuits, the canon law being finally abandoned. The place, it must be confessed, was little adapted to lead to a practical view of life one in whose heart the love of poetry was firmly rooted. The court of King Robert of Anjou at Naples was frequented by many Italian and French men of letters, the great Petrarch amongst the number. At the latter's public examination in the noble science of poetry by the king, previous to his receiving the laurel crown at Rome, Boccaccio was present, — without, however, making his personal acquaintance at this period. In the atmosphere of this gay court, enlivened and adorned by the wit of men and the beauty of women, Boccaccio lived for several years. We can imagine how the tedious duties

of the market and the counting-house became more and mort distasteful to his aspiring nature. We are told that, finding himself by chance on the supposed grave of Virgil, near Naples, Boccaccio on that sacred spot took the firm resolution of devoting himself for ever to poetry. But perhaps another event, which happened some time after, led quite as much as the first-men- tioned occurrence to this decisive turning-point in his life. On Easter-eve, 1341, in the church of San Lorenzo, Boccaccio saw for the first time the natural daughter of King Robert, Maria, whom he immortalized as Fiammetta in the noblest creations of his muse. Boccaccio's passion on seeing her was instantaneous, and (if we may accept as genuine the confessions

contained in one of her lover's works) was returned with equal ardour on the part of the lady. But not till after much delay did she yield to the amorous demands of the poet, in spite of her honour and her duty as the wife of another. All the information we have with regard to Maria or Fiammetta is derived from the works of Boccaccio himself, and owing to several apparently contradictory statements occurring in these works, the very existence of the lady has been doubted by commentators, who seem to forget that, surrounded by the chattering tongues of a court, and watched perhaps by a jealous husband, Boccaccio had all possible reason to give the appearance of fictitious incongruity to the effusions of his real passion. But there seems no more reason to call into question the main features of the story, or even the identity of the person, than there would be in the case of Petrarch's Laura or of Dante's Beatrice. It has been ingeniously pointed out by Baldelli, that the fact of her descent from King Robert being known only to Maria herself, and through her to Boccaccio, the latter was the more at liberty to refer to this circumstance, — • the bold expression of the truth serving in this case to increase the mystery with which the poets of the middle ages loved, or were obliged, to surround the objects of their praise. From Boccaccio's Ameto we learn that Maria's mother was, like his own, a French lady, whose husband, according to Baldelli's ingenious conjecture, was of the noble house of Aquino, and therefore of the same family with the celebrated Thomas Aquinas. Maria died, according to his account, long before her lover, who cherished her memory to the end of his life, as we see from a sonnet written shortly before his death.

The first work of Boccaccio, composed by him at Fiammetta's command, was the prose tale, Filocopo, describing the romantic love and adventures of Florio and Biancafiore, a favourite subject with the knightly minstrels of France, Italy and Germany. The treatment of the story by Boccaccio is not remarkable for originality or beauty, and the narrative is encumbered by classical allusions and allegorical conceits. The style also cannot be held worthy of the future great master of Italian prose. Considering, however, that this prose was in its infancy, and that this was Boccaccio's first attempt at remoulding the unwieldy material at his disposal, it would be unjust to deny that Filocopo is a highly interesting work, full of promise and all but articulate power. Another work, written about the same time by Fiam- metta's desire and dedicated to her, is the Teseide, an epic poem, and indeed the first heroic epic in the Italian language. The name is chosen somewhat inappropriately, as King Theseus plays a secondary part, and the interest of the story centres in the two noble knights, Palemone and Arcito, and their wooing of the beautiful Emelia. The Teseide is of

particular interest to the student of poetry, because it exhibits the first example of the ottava rima, a metre which was adopted by Tasso and Ariosto, and in English by Byron in Bon Juan. Another link between Boccaccio's epic and English literature is formed by the fact of Chaucer having in the Knight's Tale adopted its main features.

Boccaccio's poetry has been severely criticized by his country- men, and most severely by the author himself. On reading Petrarch's sonnets, Boccaccio resolved in a fit of despair to burn his own attempts, and only the kindly encouragement of his great friend prevented the holocaust. Posterity has justly differed from the author's sweeping self-criticism. It is true, that compared with Dante's grandeur and passion, and with Petrarch's absolute mastership of metre, and language, Boccaccio's

poetry seems to be somewhat thrown into shade. His verse is occasionally slip-shod, and particularly his epic poetry lacks what in modern parlance is called poetic diction, — the quality, that is, which distinguishes the elevated pathos of the recorder of heroic deeds from the easy grace of the mere conleur. This latter feature, so charmingly displayed in Boccaccio's prose, has to some extent proved fatal to his verse. At the same time, his narrative is always fluent and interesting, and his lyrical pieces, particularly the poetic interludes in the Decameron, abound with charming gallantry, and frequently rise to lyrical pathos.

About the year 1341 Boccaccio returned to Florence by command of his father, who in his old age desired the assistance and company of his son. Florence, at that time disturbed by civil feuds, and the silent gloom of his father's house could not but appear in an unfavourable light to one accustomed to the gay life of the Neapolitan court. But more than all this, Boccaccio regretted the separation from his beloved Fiammetta. The thought of her at once embittered and consoled his loneliness. Three of his works owe their existence to this period. With all of them Fiammetta is connected; of one of them she alone is the subject. The first work, called Ameto, describes the civilizing influence of love, which subdues the ferocious manners of the savage with its gentle power. Fiammetta, although not the heroine of the story, is amongst the nymphs who with their tales of true love soften the mind of the huntsman. Ameto is written in prose alternating with verse, specimens of which form occur in old and middle Latin writings. It is

more probable, however, that Boccaccio adopted it from that sweetest and purest blossom of medieval French literature, Aucassin et Nicolette, which dates from the 13th century, and was undoubtedly known to him. So pleased was Boccaccio with the idea embodied in the character of Ameto that he repeated its essential features in the Cimone of his Decameron (Day 5th, tale i.). The second work referred to is a poem in fifty chapters, called U amorosa Visione. It describes a dream in which the poet, guided by a lady, sees the heroes and lovers of ancient and medieval times. Boccaccio evidently has tried to imitate the celebrated Trionfi of Petrarch, but without much success. There is little organic development in the poem, which reads like the catalogue raisonne of a picture gallery; but it is remarkable from another point of view. It is perhaps the most astounding instance in literature of ingenuity wasted on trifles; even Edgar Poe, had he known Boccaccio's puzzle, must have confessed himself surpassed. For the whole of the Amorosa Visione is nothing but an acrostic on a gigantic scale. The poem is written, like the Divina Commedia, in terza rima, and the initial letters of all the triplets throughout the work compose three poems of considerable length, in the first of which the whole is dedicated to Boccaccio's lady-love, this time under her real name of Maria. In addition to this, the initial letters of the first, third, fifth, seventh and ninth lines of the dedicatory poem form the name of Maria; so that here we have the acrostic in the second degree. No wonder that thus entrammelled the poet's thought begins to flag and his language to halt. The third important work written by Boccaccio during his stay at Florence, or soon after his return to Naples, is called L' amorosa Fiammetta; and although written in prose, it contains more real poetry than the elaborate production just referred to. It purports to be Fiammetta's complaint after her lover, following the call of filial duty, had deserted her. Bitterly she deplores her fate, and upbraids her lover with coldness and want of devotion. Jealous fears add to her torture, not altogether unfounded, if we believe the commentators' assertion that the heroine of Ameto is in reality the beautiful Lucia, a Florentine lady loved by Boccaccio. Sadly Fiammetta recalls the moments of former bliss, the first meeting, the stolen embrace. Her narrative is indeed our chief source of information for the incidents of this strange love-story. It has been thought unlikely, and indeed impossible, that Boccaccio should thus have become the mouthpiece of a real lady's real passion for himself; but there seems nothing incongruous in the supposition that after a happy reunion the poet should have heard with satisfaction, and surrounded with the halo of ideal art, the story of his lady's sufferings. Moreover, the

language is too full of individual intensity to make the conjecture of

an entirely fictitious love affair intrinsicaUy probable. L' amo- rosa Fiammetta is a monody of passion sustained even to the verge of dulness, but strikingly real, and therefore artistically valuable.

By the intercession of an influential friend, Boccaccio at last obtained (in 1344) his father's permission to return to Naples, where in the meantime Giovanna, grand-daughter of King Robert, had succeeded to the crown. Being young and beautiful, fond of poetry and of the praise of poets, she received Boccaccio with all the distinction due to his literary fame. For many years she remained his faithful friend, and the poet returned her favour with grateful devotion. Even when the charge of having instigated, or at least connived at, the murder of her husband was but too clearly proved against her, Boccaccio was amongst the few who stood by her, and undertook the hopeless task of clearing her name from the dreadful stain. It was by her desire, no less than by that of Fiammetta, that he composed (between 1344 and 1350) most of the stories of his Decameron, which afterwards were collected and placed in the mouths of the Florentine ladies and gentlemen. During this time he also composed the Filostrato, a narrative poem, the chief interest of which, for the English reader, lies in its connexion with Chaucer. With a boldness pardonable only in men of genius, Chaucer adopted the main features of the plot, and literally translated 1 parts of Boccaccio's work, without so much as mentioning the name of his Italian source.

In 1350 Boccaccio returned to Florence, owing to the death of his father, who had made him guardian to his younger brother Jacopo. He was received with great distinction, and entered the service of the Republic, being at various times sent on important missions to the margrave of Brandenburg, and to the courts of several popes, both in Avignon and Rome. Boccaccio boasts of the friendly terms on which he had been with the great potentates of Europe, the emperor and pope amongst the number. But he was never a politician in the sense that Dante and Petrarch were. As a man of the world he enjoyed the society of the great, but his interest in the internal commotions of the Florentine state seems to have been very slight. Besides, he never liked Florence, and the expressions used by him regarding his fellow-citizens betray anything but patriotic prejudice. In a Latin eclogue he applies to them the term " Batrachos " (frogs), by which, he adds parenthetically — Ego intclligo Florentinorum morem; loquacissimi enim sumus, verum in rebus bellicis nihil valemus. The only important result of Boccaccio's diplomatic career was his intimacy with Petrarch. The first acquaintance of these two great men dates from the year 1350, when Boccaccio, then just returned to Florence, did all in his power to make the great poet's short stay in that city agreeable. When

in the following year the Florentines were anxious to draw men of great reputation to their newly-founded university, it was again Boccaccio who insisted on the claims of Petrarch to the most distinguished position. He himself accepted the mission of inviting his friend to Florence, and of announcing to Petrarch at the same time that the forfeited estates of his family had been restored to him. In this manner an intimate friendship grew up between them to be parted only by death. Common interests and common literary pursuits were the natural basis of their friendship, and both occupy prominent positions in the early history of that great intellectual revival commonly called the Renaissance.

During the 14th century the study of ancient literature was at a low ebb in Italy. The interest of the lay world was engrossed by political struggles, and the treasures of classical history and poetry were at the mercy of monks, too lazy or too ignorant to use, or even to preserve them. Boccaccio himself told that, on asking to see the library of the celebrated monastery of Monte Cassino, he was shown into a dusty room without a door to it. Many of the valuable manuscripts were mutilated; and his guide told him that the monks were in the habit of tearing leaves from the codices to turn them into psalters for children, or amulets for women at the price of four or five soldi apiece.

Boccaccio did all in his power to remove by word and example this barbarous indifference. He bought or copied with his own hand numerous valuable manuscripts, and an old writer remarks that if Boccaccio had been a professional copyist, the amount of his work might astonish us. His zealous endeavours for the revival of the all but forgotten Greek language in western Europe are well known. The most celebrated Italian scholars about the beginning of the 15th century were unable to read the Greek characters. Boccaccio deplored the ignorance of his age. He took lessons from Leone Pilato, a learned adventurer of the period, who had lived a long time in Thessaly and, although born in Calabria, pretended to be a Greek. By Boccaccio's advice Leone Pilato was appointed professor of Greek language and literature in the university of Florence, a position which he held for several years, not without great and lasting benefit for the revival of classical learning. Boccaccio was justly proud of having been intimately connected with the foundation of the first chair of Greek in Italy. But he did not forget, in his admira tion of classic literature, the great poets of his own country. He never tires in his praise of the

sublime Dante, whose works he copied with his own hand. He conjures his friend Petrarch to study the great Florentine, and to defend himself against the charges of wilful ignorance and envy brought against him. A life of Dante, and the commentaries on the first sixteen cantos of the Inferno, bear witness to Boccaccio's learning and enthusiasm.

In the chronological enumeration of our author's writings we now come to his most important work, the Decameron, a collection of one hundred stories, published in their combined form in 1353, although mostly written at an earlier date. This work marks in a certain sense the rise of Italian prose. It is true that Dante's Vita Nuova was written before, but its involved sentences, founded essentially on Latin constructions, cannot be compared with the infinite suppleness and precision of Boccaccio's prose. The Cento Novelle Antiche, on the other hand, which also precedes the Decameron in date, can hardly be said to be written in artistic language according to definite rules of grammar and style. Boccaccio for the first time speaks a new idiom, flexible and tender, like the character of the nation, and capable of rendering all the shades of feeling, from the coarse laugh of cynicism to the sigh of hopeless love. It is by the name of " Father of Italian Prose " that Boccaccio ought to be chiefly remembered.

Like most progressive movements in art and literature, Boccaccio's remoulding of Italian prose may be described as a " return to nature." It is indeed the nature of the Italian people itself which has become articulate in the Decameron; here we find southern grace and elegance, together with that unveiled naivete of impulse which is so striking and so amiable' a quality of the Italian character. The undesirable complement of the last-mentioned feature, a coarseness and indecency of conception and expression hardly comprehensible to the northern mind, also appears in the Decameron, particularly where the life and conversation of the lower classes are the subject of the story. At the same time, these descriptions of low life are so admirable, and the character of popular parlance rendered with such humour, as often to make the frown of moral disgust give way to a smile.

It is not surprising that a style so concise and yet so pliable so typical and yet so infiivddual, as that of Boccaccio wao of enormous influence on the further progress of a prose in a manner created by it. This influence has indeed prevailed down to the present time, to an extent beneficial upon the whole, although frequently fatal to the development of individual writers. Novelists like Giovanni Fiorentino or Franco Sacchetti are completely under the sway of their great

model; and Boccaccio's influence may be discerned equally in the plastic fulness of Machiavelli and in the pointed satire of Aretino. Without touching upon the individual merits of La.sca, Bandello and other novelists of the cinque-cento, it may be asserted that none of them created a style independent of their great predecessor. One cannot indeed but acquiesce in the authoritative utterance of

the Accademia della Crusca, which holds up the Decameron as the standard and model of Italian prose. Even the Della Cruscan writers themselves have been unable to deprive the language wholly of the fresh spontaneity of Boccaccio's manner, which in modern literature we again admire in Manzoni's Promessi sposi.

A detailed analysis of a work so well known as the Decameron would be unnecessary. The description of the plague of Florence preceding the stories is universally acknowledged to be a master- piece of epic grandeur and vividness. It ranks with the paintings of similar calamities by Thucydides, Defoe and Manzoni. Like Defoe, Boccaccio had to draw largely on hearsay and his own imagination, it being almost certain that in 1348 he was at Naples, and therefore no eye-witness of the scenes he describes. The stories themselves, a hundred in number, range from the highest pathos to the coarsest licentiousness. A creation like the patient Griselda, which international literature owes to Boccaccio, ought to atone for much that is morally and artistically objectionable in the Decameron. It may be said on this head, that his age and his country were not only deeply immoral, but in addition exceedingly outspoken. Moreover, his sources were anything but pure. Most of his improper stories are either anecdotes from real life, or they are taken from the fabliaux of medieval French poets. On comparing the latter class of stories (about one-fifth of the whole Decameron) with their French originals, one finds that Boccaccio has never added to, but has sometimes toned down the revolting ingredients. Notwithstanding this, it cannot be denied that the artistic value of the Decameron is greatly impaired by descriptions and expressions, the intentional licentiousness of which is but imperfectly veiled by an attempt at humour.

Boccaccio has been accused of plagiarism, particularly by French critics, who correctly state that the subjects of many stories in the Decameron are borrowed from their literature. A similar objection might be raised against Chaucer, Shakespeare, Goethe (in Faust), and indeed most of the master minds of all nations. Power of invention is not the only nor even the chief criterion of a great poet. He takes his subjects indiscriminately from his own fancy, or from the consciousness of his and other nations. Stories float about in the air,

known to all yet realized by few; the poet gathers their disjecta membra into an organic whole, and this he inspires and calls into life with the breath of his genius. It is in this sense that Boccaccio is the creator of those innumerable beautiful types and stories, which have since become household words amongst civilized nations. No author can equal him in these contributions to the store of international literature. There are indeed few great poets who have not in some way become indebted to the inexhaustible treasure of Boccaccio's creativeness. One of the greatest masterpieces of German literature, Lessing's Nathan the Wise, contains a story from Boccaccio {Decameron, Day 1st, tale iii.), and the list of English poets who have drawn from the same source comprises, among many others, the names of Chaucer, Lydgate, Dryden, Keats and Tennyson.

For ten years Boccaccio continued to reside in Florence, leaving the city only occasionally on diplomatic missions or on visits to his friends. His fame in the meantime began to spread far and wide, and his Decameron, in particular, was devoured by the fashionable ladies and gentlemen of the age. About 1360 he seems to have retired from the turbulent scenes of Florence to his native Certaldo, the secluded charms of which he describes with rapture. In the following year took place that strange turning-point in Boccaccio's career which is generally described as his conversion. It seems that a Carthusian monk came to him while at Certaldo charged with a posthumous message from another monk of the same order, to the effect that if Boccaccio did not at once abandon his godless ways in life and literature his death would ensue after a short time. It is also mentioned that the revelation to the friar on his deathbed of a secret known only to Boccaccio gave additional import to this alarming information. Boccaccio's impressionable nature was deeply moved. His life had been far from virtuous; in his

writings he had frequently sinned against the rules of morality, and worse still, he had attacked with bitter satire the institutions and servants of holy mother church. Terrified by the approach of immediate death, he resolved to sell his library, abandon literature, and devote the remainder of his life to penance and religious exercise. To this effect he wrote to Petrarch. We possess the poet's answer; it is a masterpiece of writing, and what is more, a proof of tenderest friendship. The message of the monk Petrarch is evidently inclined to treat simply as pious fraud, without, however, actually committing

himself to that opinion. ” No monk is required to tell thee of the shortness and precariousness of human life. Of the advice received accept what is good; abandon worldly cares, conquer thy passions, and reform thy soul and life of degraded habits. But do not give up the studies which are the true food of a healthy mind.” Boccaccio seems to have acted on this valuable advice. His later works, although written in Latin and scientific in character, are by no means of a religious kind. It seems, however, that his entering the church in 1362 is connected with the events just related.

In 1363 Boccaccio went on a visit to Naples to the seneschal Acciajuoli (the same Florentine who had in 1344 persuaded the elder Boccaccio to permit his son’s return to Naples), who commissioned him to write the story of his deeds of valour. On his arrival, however, the poet was treated with shameful neglect, and revenged himself by denying the possibility of relat- ing any valorous deeds for want of their existence. This de- claration, it must be confessed, came somewhat late, but it was provoked by a silly attack on the poet himself by one of the seneschal’s indiscreet friends.

During the next ten years Boccaccio led an unsettled life, residing chiefly at Florence or Certaldo, but frequently leaving his home on visits to Petrarch and other friends, and on various diplomatic errands in the service of the Republic. He seems to have been poor, having spent large sums in the purchase of books, but his independent spirit rejected the numerous splendid offers of hospitality made to him by friends and admirers. During this period he wrote four important Latin works — De Genealogia Deorum libri XV., a. compendium of mythological knowledge full of deep learning; De Montium, Silvarum, Lacuum, et Marium nominibus liber, a treatise on ancient geography; and two historical books — De Casibus Virorum et Feminarum Illustrium libri IX., interesting to the English reader as the original of John Lydgate’s Fall of Princes; and De Claris Mulieribus. To the list of his works ought to be added II Ninfale Fiesolano, a beautiful love-story in verse, and II Corbaccio ossia II Laberinto a” Amor e, a coarse satire on a Florentine widow who had jilted the poet, written about 1355, not to mention many eclogues in Latin and miscellaneous Rime in Italian (the latter collected by his biographer Count Baldelli in 1802).

In 1373 we find Boccaccio again settled at Certaldo. Here he was attacked by a terrible disease which brought him to the verge of death, and from the consequences of which he never quite recovered. But sickness could not subdue his intellectual vigour. When the Florentines established a chair for the ex- planation of the Divina

Commedia in their university, and offered it to Boccaccio, the senescent poet at once undertook the arduous duty. He delivered his first lecture on the 23rd of October 1373. The commentary on part of the Inferno, already alluded to, bears witness of his unabated power of intellect. In 1374 the news of the loss of his dearest friend Petrarch reached Boccaccio, and from this blow he may be said to have never recovered. Almost his dying efforts were devoted to the memory of his friend; urgently he entreated Petrarch's son-in-law to arrange the publication of the deceased poet's Latin epic Africa, a work of which the author had been far more proud than of his immortal sonnets to Laura.

In his last will Boccaccio left his library to his father confessor, and after his decease to the convent of Santo Spirito in Florence. His small property he bequeathed to his brother Jacopo. His own natural children had died before him. He himself died on the 21st of December 1375 at Certaldo, and was buried in the

church of SS. Jacopo e Filippo of that town. On his tombstone was engraved the epitaph composed by himself shortly before his death. It is calm and dignified, worthy indeed of a grea> life with a great purpose. These are the lines : —

" Hac sub mole jacent cineres ac ossa Joannis; Mens sedet ante Deum, meritis ornata laborum Mortalis vitae. Genitor Boccaccius ill! ; Patria Certaldum; studium fuit alma poesis." A complete edition of Boccaccio's Italian writings, in 17 vols., was published by Moutier (Florence, 1834). The life of Boccaccio has been written by Tiraboschi, Mazzuchelli, Count Baldelli (Vita di Boccaccio, Florence, 1806), and others. In English the best biography is Edward Hutton (1909.) The first printed edition of the Decameron is without date, place or printer's name ; but it is believed to belong to the year 1469 or 1470, and to have been printed at Florence. Besides this, Baldelli mentions eleven editions during the 15 th century. The entire number of editions by far exceeds a hundred. A curious expurgated edition, authorized by the pope, appeared at Florence, 1573. Here, however, the grossest in- decencies remain, the chief alteration being the change of the im- proper personages from priests and monks into laymen. The best old edition is that of Florence, 1527. Of modern reprints, that by Forfoni (Florence, 1857) deserves mention. Manni has written a Storia del Decamerone (1742), and a German scholar, M. Landau, who published (Vienna, 1869) a valuable investigation of the sources of the Decameron, subsequently brought out in 1877 a general study of Boccaccio's life and works. An interesting English translation of the Decameron appeared in 1624, under the title The Model oj

Mirth, Wit, Eloquence and Conversation.- (F. H.)

BOCCALINI, TRAJANO (1556-1613), Italian satirist, was born at Loretto in 1556. The son of an architect, he himself adopted that profession, and it appears that he commenced late in life to apply to literary pursuits. Pursuing his studies at Rome, he had the honour of teaching Bentivoglio, and acquired the friendship of the cardinals Gaetano and Borghesi, as well as of other distinguished personages. By their influence he obtained various posts, and was even appointed by Gregory XIII. governor of Benevento in the states of the church. Here, however, he seems to have acted imprudently, and he was soon recalled to Rome, where he shortly afterwards composed his most important work, the Ragguagli di Parnaso, in which Apollo is represented as receiving the complaints of all who present themselves, and distributing justice according to the merits of each particular case. The book is full of light and fantastic satire on the actions and writings of his eminent contemporaries, and some of its happier hits are among the hackneyed felicities of literature. To escape, it is said, from the hostility of those whom his shafts had wounded, he returned to Venice, and there, according to the register in the parochial church of Sta Maria Formosa, died of colic, accompanied with fever, on the 16th of November 1613. It was asserted, indeed, by contemporary writers that he had been beaten to death with sand-bags by a band of Spanish bravadoes, but the story seems without foundation. At the same time, it is evident from the Pietra del Paragone, which appeared after his death in 161 5, that whatever the feelings of the Spaniards towards him, he cherished against them feelings of the bitterest hostility. The only government, indeed, which is exempt from his attacks is that of Venice, a city for which he seems to have had a special affection.

The Ragguagli, first printed in 1612, has frequently been re-published. The Pietra has been translated into French, German, English and Latin; the English translator was Henry, earl of Monmouth, his version being entitled The Politicke Touchstone (London, 1674). Another posthumous publication of Boccalini was his Commentarii sopra Cornelio Tacito (Geneva, 1669). Many of his manuscripts are preserved still unprinted.

BOCCHERINI, LUIGI (1743-1805), Italian composer, son of an Italian bass-player, was born at Lucca, and studied at Rome, where he became a fine ‘cellist, and soon began to compose. He returned to Lucca, where for some years he was prominent as a player, and there he produced two oratorios and an opera. He toured in Europe, and in 1768 was received in Paris by Gossec and his circle with great

enthusiasm, his instrumental pieces being highly applauded; and from 1769 to 1785 he held the post of ” composer and virtuoso ” to the king of Spain’s brother, the infante Luis, at Madrid. He afterwards became ” chamber- composer ” to King Frederick William II. of Prussia, till 1797,

when he returned to Spain. He died at Madrid on the 28th of May 1805.

As an admirer of Haydn, and a voluminous writer of instru- mental music, chiefly for the violoncello, Boccherini represents the effect of the rapid progress of a new art on a mind too refined to be led into crudeness, too inventive and receptive to neglect any of the new artistic resources within its cognizance, and too superficial to grasp their real meaning. His mastery of the violoncello, and his advanced sense of beauty in instrumental tone-colour, must have made even his earlier works seem to contemporaries at least as novel and mature as any of those experiments at which Haydn, with eight years more of age and experience, was labouring in the development of the true new forms. Most of Boccherini’s technical resources proved useless to Haydn, and resemblances occur only in Haydn’s earliest works (e.g. most of the slow movements of the quartets in op. 3 and in some as late as op. 17); whichever derived the characteristics of such movements from the other, the advantage is decidedly with Boccherini. But the progress of music did not lie in the pro- duction of novel beauties of instrumental tone in a style in which polyphonic organization was either deliberately abandoned or replaced by a pleasing illusion, while the form in its larger aspects was a mere inorganic amplification of the old suite-forms, which presupposed a genuine polyphonic organization as the vitalizing principle of their otherwise purely decorative nature. The true tendency of the new sonata forms was to make instrumental music dramatic in its variety and contrasts, instead of merely decorative. Haydn from the outset buried himself with the handling of new rhythmic proportions; and if it is hardly an exaggeration to say that the surprising beauty of colour in such a specimen of Boccherini’s 125 string-quintets as that in E major (containing the popular minuet) is perhaps more modern and certainly safer in performance than any special effect Haydn ever achieved, it is nevertheless true that even this beauty fails to justify the length and monotony of the work. Where Haydn uses any fraction of the resources of such a, style, the ultimate effect is in proportion to

a purpose of which Boccherini, with all his genuine admiration of his elder brother in art, could form no conception. Boccherini's works are, however, still indispensable for violoncellists, both in their education and their concert repertories; and his position in musical history is assured as that of the most original and, next to Tartini, perhaps the greatest writer of music for stringed instruments in the late Italian amplifications of the older quasi-polyphonic sonata or suite-form that survived into the beginning of the 19th century in the works of Nardini. Boccherini may safely be regarded as its last real master. He was wittily characterized by the contemporary violinist Puppo as " the wife of Haydn "; which is very true, if man and woman are two different species; but not as true as e.g. the equally common saying that " Schubert is the wife of Beethoven," and still less true than that " Vittoria is the wife of Palestrina."

His life, with a Catalogue raisonne, was published by L. Picquot (1851). (D. F. T.)

BOCCHUS, king of Mauretania (about no B.C.), and father-in- law of Jugurtha. In 108 he vacillated between Jugurtha and the Romans, and joined Jugurtha only on his promising him the third part of his kingdom. The two kings were twice defeated. Bocchus again made overtures to the Romans, and after an interview with Sulla, who was Marius's quaestor at that time, sent ambassadors to Rome. At Rome the hope of an alliance was encouraged, but on condition that Bocchus showed himself deserving of it. After further negotiations with Sulla, he finally agreed to send a message to Jugurtha requesting his presence. Jugurtha fell into the trap and was given up to Sulla. Bocchus concluded a treaty with the Romans, and a portion of Numidia was added to his kingdom . Further to conciliate the Romans and especially Sulla,he sent to the Capitol a group of Victories guarding a device in gold showing Bocchus handing over Jugurtha to Sulla.

See Jugurtha; also Sallust, Jugurtha, 80-120; Plutarch, Marius, 8-32, Sulla, 3 ; A. H. J. Greenidge, History of Rome (London, 1904).

His son, Bocchus, was king of Mauretania, jointly with a

younger brother Bogud. As enemies of the senatorial party, their title was recognized by Caesar (49 B.C.). During the African war they invaded Numidia and conquered Cirta, the capital of the kingdom of Juba, who was thus obliged to abandon the idea of joining Metellus Scipio against Caesar. At the end of the war, Caesar bestowed upon Bocchus part of the territory of Massinissa, Juba's ally, which was

recovered after Caesar's murder by Massinissa's son Arabion.. Dio Cassius says that Bocchus sent his sons to support Sextus Pompeius in Spain, while Bogud fought on the side of Caesar, and there is no doubt that after Caesar's death Bocchus supported Octavian, and Bogud Antony. During Bogud's absence in Spain, his brother seized the whole of Numidia, and was confirmed sole ruler by Octavian. After his death in 33, Numidia was made a Roman province.

Bell. Afric, 25; Dio Cassius xli. 42, xliii. 36, xlviii. 45;Appian, Bell. Civ. ii. 96, iv. 54.

BOCHART, SAMUEL (1599-1667), French scholar, was born at Rouen on the 30th of May 1599. He was for many years a pastor of a Protestant church at Caen, and became tutor to Went worth Dillon, earl of Roscommon. In 1646 he published his Phaleg and Chanaan (Caen, 1646 and 1651), the two parts of his Geographia Sacra. His Hierozoicon, which treats of the animals of Scripture, was printed in London (2 vols., 1663). In 1652 Christina of Sweden invited him to Stockholm, where he studied the Arabian manuscripts in the queen's possession. He was accompanied by Pierre Daniel Huet, afterwards bishop of Avranches. On his. return to Caen he was received into the academy of that city. Bochart was a man of profound erudition; he possessed a thorough knowledge of the principal Oriental languages, including Hebrew, Syriac, Chaldaic and Arabic; and at an advanced age he wished to learn Ethiopic. He was so absorbed in his favourite study, that he saw Phoe- nician and nothing but Phoenician in everything, even in Celtic words, and hence the number of chimerical etymologies which swarm in his works. He died at Caen on the 16th of May 1667.

A complete edition of his works was published at Leiden, under the title of Sam. Bochart Opera Omnia (1675, 2 vols, folio; 4th ed., 3 vols., 1712). An Essay on the Life and Writings of Samuel Bochart, by W. R. Whittingham, appeared in 1829.

BOCHOLT, a town of Germany, in the Prussian province of Westphalia, near the frontier of Holland, 12 m. by rail north of Wesel. It is a seat of the cotton industry. Pop. (1900)

21,278.

BOCHUM, a town of Germany, in the Prussian province of Westphalia, n m. by rail west from Dortmund. Pop. (1905) 1 18,000. It is a centre of the iron and steel industries, producing principally cast steel, cast iron, iron pipes, wire and wire ropes, and lamps, with tin and zinc

works, coal-mining, factories for carpets, calcium carbide and paper-roofing, brickworks and breweries. The Bochumer Verein fur Bergbau (mining) und Gusstahl Fabrication (steel manufacture) is one of the principal trusts in this industry, founded in 1854. There are a mining and a metallurgical school.

BOCKH, PHILIPP AUGUST (1785-1867), German classical scholar and antiquarian, was born in Karlsruhe on the 24th of November 1785. He was sent to the gymnasium of his native place, and remained there until he left for the university of Halle (1803), where he devoted himself to the study of theology. F. A. Wolf was then creating there an enthusiasm for classical studies; Bockh fell under the spell, passed from theology to philology, and became the greatest of all Wolf's scholars. In 1807 he established himself as privat-docent in the university of Heidelberg and was shortly afterwards appointed a professor extraordinarius, becoming professor two years later. In 181 1 he removed to the new Berlin University, having been appointed professor of eloquence and classical literature. He remained there till his death on the 3rd of August 1867. He was elected a member of the Academy of Sciences of Berlin in 1814, and for a long time acted as its secretary. Many of the speeches contained in his Kleine Schriften were delivered in this latter capacity.

Bockh worked out the ideas of Wolf in regard to philology,

and illustrated them by his practice. Discarding the old notion that philology consisted in a minute acquaintance with words and the exercise of the critical art, he regarded it as the entire knowledge of antiquity, historical and philosophical. He divides philology into five parts: first, an inquiry into public acts, with a knowledge of times and places, into civil institutions, and also into law; second, an inquiry into private affairs; third, an exhibition of the religions and arts of the ancient nations; fourth, a history of all their moral and physical specula- tions and beliefs, and of their literatures; and fifth, a complete explanation of the language. These ideas in regard to philology Bockh set forth in a Latin oration delivered in 1822 (Gesammelte Heine Schriften, i.). In his speech at the opening of the congress of German philologists in 1850, he defined philology as the historical construction of the entire life — therefore, of all forms of culture and all the productions of a people in its practical and spiritual tendencies. He allows that such a work is too great for any one man;

but the very infinity of subjects is the stimulus to the pursuit of truth, and men strive because they have not attained (ib. ii.). An account of Bockh's division of philology will be found in Freund's Wie slndirt man Philologie ?

From 1806 till his death Bockh's literary activjty was unceas- ing. His principal works were the following: — (1) An edition of Pindar, the first volume of which (181 1) contains the text of the Epinician odes; a treatise, De Melris Pindari, in three books; and Notae Criticae: the second (1819) contains the Scholia; and part ii. of volume ii. (1821) contains a Latin translation, a commentary, the fragments and indices. It is still the most complete edition of Pindar that we have. But it was especially the treatise on the metres which placed Bockh in the first rank of scholars. This treatise forms an epoch in the treatment of the subject. In it the author threw aside all attempts to deter- mine the Greek metres by mere subjective standards, pointing out at the same time the close connexion between the music and the poetry of the Greeks. He investigated minutely the nature of Greek music as far as it can be ascertained, as well as all the details regarding Greek musical instruments; and he explained the statements of the ancient Greek writers on rhythm. In this manner he laid the foundation for a scientific treatment of Greek metres. (2) Die Staatshaushaltung der Athener, 181 7 (2nd ed. 1851, with a supplementary volume Urkunden iiber das Seewesen des attischen Staats; 3rd ed. by Frankel, 1886), translated into English by Sir George Cornewall Lewis (1828) under the title of The Public Economy of Athens. In it he investigated a subject of peculiar difficulty with profound learning. He amassed information from the whole range of Greek literature, carefully appraised the value of the informa- tion given, and shows throughout every portion of it rare critical ability and insight. A work of a similar kind was his Melrologische Untersuchungen iiber Gewichte, Miinzfilsse, und Masse des Alterthums (1838). (3) Bockh's third great work arose out of his second. In regard to the taxes and revenue of the Athenian state he derived a great deal of his most trustworthy information from inscriptions, many of which are given in his book. It was natural, therefore, that when the Berlin Academy of Sciences projected the plan of a Corpus Inscriptionum Grae- carum, Bockh should be chosen as the principal editor. This great work (1828-1877) is in four volumes, the third and fourth volumes being edited by J. Franz, E. Curtius, A. Kirchhoff and H. Rohl.

Bockh's activity was continually digressing into widely different fields. He gained for himself a foremost position amongst the investigators of ancient chronology, and his name occupies a place by the side of those of Ideler and Mommsen. His principal works on this subject were : Zur

Geschichte der Mondcyclen der Hellenen (1855); Epigraphisch-chronologische Studien (1856); Uber die vierjahrigen Sonnenkreise der Allen (1863), and several papers which he published in the Transactions of the Berlin Academy. Bockh also occupied himself with philosophy. One of his earliest papers was on the Platonic doctrine of the world, De Platonica corporis mundani fabrica (1809), followed by De Platonico Systemale Caelestium globorum

el de vera Indole Astronomiae Philolaice (1810), to which may be added Manetho und die Hundstemperiode (1845). In opposition to Otto Gruppe (1804-1876), he denied that Plato affirmed the diurnal rotation of the earth (Untersuchungen iiber das kosmische System des Platon, 1852), and when in opposition to him Grote published his opinions on the subject (Plato and the Rotation of the Earth) Bockh was ready with his reply. Another of his earlier papers, and one frequently referred to, was Commentatio Academica de simultate quae Platoni cum Xenophonle inlercessisse fertur (1811). Other philosophical writings were Commentatio in Platonis qui vulgo fertur Minoem (1806), and Philolaos' des Pythagoreers Lehren nebst den Bruchstiicken (181 9), in which he endeavoured to show the genuineness of the fragments.

Besides his edition of Pindar, Bockh published an edition of the Antigone of Sophocles (1843) with a poetical translation and essays. An early and important work on the Greek tra- gedians is his Graecae Tragoediae Principum . . . num ea quae super sunt et genuina omnia sint el forma primitive servala (1808).

The smaller writings of Bockh began to be collected in his lifetime. Three of the volumes were published before his death, and four after (Gesammelte kleine Schriften, 1858-1874). The first two consist of orations delivered in the university or academy of Berlin, or on public occasions. The third, fourth, fifth and sixth contain his contributions to the Transactions of the Berlin Academy, and the seventh contains his critiques. Bockh's lectures, delivered from 1809-1865, were published by Bratuschek under the title of Encyclo- pddie und Methodologie der philologischcn Wissenschaften (2nd ed., Klussmann, 1886). His philological and scientific theories are set forth in Elze, Uber Philologie als System (1845), and Reichhardt, Die Gliederung der Philologie entwickelt (1846). His correspondence with Ottfried Muller appeared at Leipzig in 1883. See Sachse, Erin- nerungen an August Bockh (1868); Stark, in the Verhandlungen der Wurzburger Philologensammlung (1868); Max Hoffmann, August Bockh (1901); and S. Reiter, in Neue Jahrbiicher fur das klassische Altertum (1902), p. 436.

BOCKLIN, ARNOLD (1827-1901), Swiss painter, was born at Basel on the 16th of October 1827. His father, Christian Frederick Bocklin (b. 1802), was descended from an old family of Schaffhausen, and engaged in the silk trade. His mother, Ursula Lippe, was a native of the same city. In 1846 he began his studies at the Dusseldorf academy under Schirmer, who recognized in him. a student of exceptional promise, and sent him to Antwerp and Brussels, where he copied the works of Flemish and Dutch masters. Bocklin then went to Paris, worked at the Louvre, and painted several landscapes; his ” Landscape and Ruin ” reveals at the same time a strong feeling for nature and a dramatic conception of scenery, After serving his time in the army he set out for Rome in March 1850, and the sight of the Eternal City was a fresh stimulus to his mind. So, too, was the influence of Italian nature and that of the dead pagan world. At Rome he married (June 20, 1853) Angela Rosa Lorenza Pascucci. In 1856 he returned to Munich, and remained there four years. He then exhibited the ” Great Park,” one of his earliest works, in which he treated ancient mythology with the stamp of individuality, which was the basis of his reputation. Of this period, too, are his ” Nymph and Satyr,” ” Heroic Landscape” (Diana Hunting), both of 1858, and “Sappho” (1859). These works, which were much discussed, together with Lenbach’s recommendation, gained him his appointment as professor at the Weimar academy. He held the office for two years, painting the ” Venus and Love,” a ” Portrait of Lenbach,” and a ” Saint Catherine.” He was again at Rome from 1862 to 1866, and there gave his fancy and his taste for violent colour free play in his ” Portrait of Mme Bocklin,” now in the Basel gallery, in ” An Anchorite in the Wilderness ” (1863) ; a ” Roman Tavern,” and ” Villa on the Sea-shore ” (1864) ; this last, one of his best pictures. He returned to Basel in 1866 to finish his frescoes in the gallery, and to paint, besides several portraits, ” The Magdalene with Christ” (1868); ” Anacreon’s Muse” (1869); and ” A Castle and Warriors ” (1871). His ” Portrait of Myself,” with Death playing a violin (1873), was painted after his return again to Munich, where he exhibited his famous ” Battle of the Centaurs” (in the Basel gallery); “Landscape with Moorish Horsemen” (in the Lucerne gallery); and “A Farm” (1875), From 1876 to 1885 Bocklin was working at Florence, and painted

a ” Pieta,” ” Ulysses and Calypso,” ” Prometheus,” and the ” Sacred Grove.” From 1886 to 1892 he settled at Zurich. Of this period are the ” Naiads at Play,” ” A Sea Idyll,” and ” War.” After 1892 Bocklin

resided at San Domenico, near Florence. An exhibition of his collected works was held at Basel from the 20th of September to the 24th of October 1897. He died on the 16th of January 1901.

His life has been written by Henri Mendelssohn. See also F. Hermann, Gazette des Beaux Arts (Paris, 1893); Max Lehrs, Arnold Bocklin, Ein Leitfaden znm Verstandniss seiner Kunst (Munich, 1897); W. Ritter, Arnold Bocklin (Gand, 1895); Katalog der Bocklin Jubilaums Ausstellung (Basel, 1897). (H. Fr.)

BOCLAND, Bockland or Bookxand (from A.S. hoc, book), an original mode of tenure of land, also called charter-land or deed-land. Bocland was folk-land granted to individuals in private ownership by a document (charter or book) in writing, with the signatures of the king and witenagemot; at first it was rarely, if ever, held by laymen, except for religious purposes. Bocland to a certain extent resembled full ownership in the modern sense, in that the owner could grant it in his lifetime, in the same manner as he had received it, by hoc or book, and also dispose of it by will. (See also Folkland.)

BOCSKAY, STEPHEN [Istvan] (1557-1606), prince of Tran- sylvania, the most eminent member of the ancient Bocskay family, son of Gyorgy Bocskay and Krisztina Sulyok, was born at Kolozsvar, Hungary. As the chief councillor of Prince Zsigmond Bathory, he advised his sovereign to contract an alliance with the emperor instead of holding to the Turk, and rendered important diplomatic services on frequent missions to Prague and Vienna. The enmity towards him of the later Bathory princes of Transylvania, who confiscated his estates, drove him to seek protection at the imperial court (1599); but the attempts of the emperor Rudolph II. to deprive Hungary of her constitution and the Protestants of their religious liberties speedily alienated Bocskay, especially after the terrible outrages inflicted on the Transylvanians by the imperial generals Basta and Belgiojoso from 1602 to 1604. Bocskay, to save the inde- pendence of Transylvania, assisted the Turks; and in 1605, as a reward for his part in driving Basta out of Transylvania, the Hungarian diet, assembled at Modgyes, elected him prince (1605), on which occasion the Ottoman sultan sent a special embassy to congratulate him and a splendid jewelled crown made in Persia. Bocskay refused the royal dignity, but made skilful use of the Turkish alliance. To save the Austrian provinces of Hungary, the archduke Matthias, setting aside his semi-lunatic imperial brother Rudolph, thereupon entered into negotiations with Bocskay, and ultimately the peace of Vienna was concluded (June 23, 1606), which guaranteed all the constitutional and religious rights and privileges of the Hungarians both in Tran- sylvania and imperial Hungary. Bocskay,

at the same time, was acknowledged as prince of Transylvania by the Austrian court, and the right of the Transylvanians to elect their own independent princes in future was officially recognized. The fortress of Tokaj and the counties of Bereg, Szatmar and Ugocsa were at the same time ceded to Bocskay, with reversion to Austria if he should die childless. Simultaneously, at Zsitvatorok, a peace, confirmatory of the peace of Vienna, was concluded with the Turks. Bocskay survived this signal and unprecedented triumph only a few months. He is said to have been poisoned (Decem- ber 29, 1606) by his chancellor, Mihaly Katay, who was hacked to bits by Bocskay's adherents in the market-place of Kassa.

See Political Correspondence of Stephen Bocskay (Hung.), edited by Karoly Szabo (Budapest, 1882); Jeno Thury, Stephen Bocskay's Rebellion (Hung.), Budapest, 1899. (R. N. B.)

BODE, JOHANN ELERT (1 747-1826), German astronomer, was born at Hamburg on the 19th of January 1747. Devoted to astronomy from his earliest years, he eagerly observed the heavens at a garret window with a telescope made by himself, and at nineteen began his career with the publication of a short work on the solar eclipse of the 5th of August 1766. This was followed by an elementary treatise on astronomy entitled Anleitung zur Kenntniss des gestirnten Himmels (1768, 10th ed.

1844), the success of which led to his being summoned to Berlin in 1772 for the purpose of computing ephemerides on an improved plan. There resulted the foundation by him, in 1774, of the well-known Astronomisches Jahrbuch, 51 yearly volumes of which he compiled and issued. He became director of the Berlin observatory in 1786, withdrew from official life in 1825, and died at Berlin on the 23rd of November 1826. His works were highly effective in diffusing throughout Germany a taste for astronomy. Besides those already mentioned he wrote: — Sammlung astronomischer Tafeln (3 vols., 1776); Erlauterung der Sternkunde (1776, 3rd ed. 1808); Uranographia (1801), a collection of 20 star-maps accompanied by a catalogue of 17,240 stars and nebulae. In one of his numerous incidental essays he propounded, in 1776, a theory of the solar constitution similar to that developed in 1795 by Sir William Herschel. He gave currency, moreover, to the empirical rule known as " B ode's Law," which was actually announced by Johann Daniel Titius of Wittenberg in 1772. It is expressed by the statement that the proportionate distances of the several planets from the sun may be represented by adding 4 to each term of the series; o, 3, 6, 12, 24, &c. The irregularity will be noticed of the first term, which shpuld be i|

instead of o. (See Solar System.)

See J. F. Encke, Berhn Abhandlungen (1827), p. xi. ; H. C. Schumacher, Astr. Nach. v. 255, 367 (1827); Poggendorff, Biog. literarisches Handwbrterbuch; Allgemeine deutsche Biographie, iii. 1.

BODEL, JEHAN (died c. 12 10), French tr owner e, was born at Arras in the second half of the 12th century. Very little is known of his life, but in 1205 he was about to start for the crusade when he was attacked by leprosy. In a touching poem called Le Conge (pr. by Meon in Recueil de fabliaux et contes, vol. i.) , he bade farewell to his friends and patrons, and begged for a nomination to a leper hospital. He wrote Le Jeu de Saint Nicolas, one of the earliest miracle plays preserved in French (printed in Monmerque and Michel's Thedtre franqais du moyen Age, 1839, and for the Soc. des bibliophiles franqais, 1831); the Chanson des Saisnes (ed. F. Michel 1839), four pastourelles (printed in K. Bartsch's Altfranz. Romanzen und Pastourellen, Leipzig, 1870); and probably, the eight fabliaux attributed to an unknown Jean Bedel. The legend of Saint Nicholas had already formed the subject of the Latin Ludus Sancti Nicholai of Hilarius. Bodel placed the scene partly on a field of battle in Africa, where the crusaders perish in a hopeless struggle, and partly in a tavern. The piece, loosely connected by the miracle of Saint Nicholas narrated in the prologue, ends with a wholesale conversion of the African king and his subjects. The dialogue in the tavern scenes is written in thieves' slang, and is very obscure. The Chanson des Saisnes, Bodel's authorship of which has been called in question, is a chanson de geste belonging to the period of decadence, and is really a ropian d'aventures based on earlier legends belonging to the Charlemagne cycle. It relates the wars of Charlemagne against the Saxons under Guiteclin de Sassoigne (Witikind or Widukind),with the second revolt of the Saxons and their final submission and conversion. Jehan Bodel makes no allusion to Ogier the Dane and many other personages of the Charlemagne cycle, but he mentions the defeat of Roland at Roncevaux. The romance is based on historical fact, but is overlaid with romantic detail. It really embraces three distinct legends — those of the wars against the Saxons, of Charlemagne's rebellious barons, and of Baudouim and Sebille. The earlier French poems on the subject are lost, but the substance of them is preserved in the Scandinavian versions of the Charlemagne cycle (supposed to have been derived from English sources) known as the Karlamagnussaga (ed. Unger, Christiania, i860) and Keiser Karl Magnus Kronike (Romantisk Digtnung, ed. C. J. Brandt, Copenhagen, 1877).

See also the article on Jehan Bodel by Paulin Paris in Hist. litt. de la

France, xx. pp. 605-638 ; Gaston Paris, Histoire poetique de Charlemagne (1865); Leon Gautier, Les Epopees francaises (revised edition, vol. iii. pp. 650-684), where there is a full analysis of the Chanson des Saisnes and a bibliography ; H. Meyer, in Ausgaben und Abhandlungen aus . . . der romanischen Philologie (Marburg, 1883), pp. 1-76, where its relation to the rest of the Charlemagne cycle is discussed.

BODENBACH (Czech Podmokly), a town of Bohemia, Austria, 83 m. N.N.E. of Prague by rail. Pop. (1900) 10,782, almost exclusively German. It is situated on the left bank of the Elbe opposite Tetschen, and is an important railway junction, con- taining also an Austrian and a Saxon custom-house. Bodenbach, which in the middle of the 19th century had only a few hundred inhabitants, has become a very important industrial centre. Its principal manufactures include cotton and woollen goods, earthenware and crockery, chemicals, chicory, chocolate, sweet- meats and preserves, and beer. It has also a very active transit trade.

BODENSTEDT, FRIEDRICH MARTIN VON (1819-1892), German author, was born at Peine, in Hanover, on the 22nd of April 1819. He studied in Gottingen, Munich and Berlin. His career was determined by his engagement in 1841 as tutor in the family of Prince Gallitzin at Moscow, where he gained a thorough knowledge of Russian. This led to his appointment in 1844 as the head of a public school at Tiflis, in Transcaucasia. He took the opportunity of his proximity to Persia to study Persian literature, and in 185 1 published a volume of original poetry in oriental guise under the fanciful title, Die Lieder des Mirza Schajfy (English trans, by E. d'Esterre, 1880). The success of this work can only be compared with that of Edward FitzGcrald's Omar Khayyam, produced in somewhat similar circumstances, but differed from it in being immediate. It has gone through 160 editions in Germany, and has been translated into almost all literary languages. Nor is this celebrity undeserved, for although Bodsnstedt does not attain the poetical elevation of FitzGcrald, his view of life is wider, more cheerful and more sane, while the execution is a model of grace. On his return from the East, Bodenstedt engaged for a while in journalism, married the daughter of a Hessian officer (Ma tilde, the Edlitam of his poems), and was in 1854 appointed professor of Slavonic at Munich. The rich stores of knowledge which Bodenstedt brought back from the East were turned to account in two important

books, Die Volker des Kaukasus mid ihre Freiheils-Kampfe gegen die Russen (1848), and Tcusend und ein Tag im Orient (1850). For some time Bodenstedt continued to devote himself to Slavonic subjects, producing translations of Pushkin, Lermontov, Turgweniev, and of the poets of the Ukraines, and writing a tragedy on the false Demetrius, and an epic, Ada die Lesghierin, on a Circassian theme. Finding, probably, this vein exhausted, he exchanged his professorship in 1858 for one of Early English literature, and published (1858-1860) a valuable work on the English drama- tists contemporary with Shakespeare, with copious translations. In 1862 he produced a standard translation of Shakespeare's sonnets, and between 1866 and 1872 published a complete version of the plays, with the help of many coadjutors. In 1867 he undertook the direction of the court theatre at Meiningen, and was ennobled by the duke. After 1873 he lived successively at Altona, Berlin and Wiesbaden, where he died on the 19th of April 1892. His later works consist of an autobiography (1888), successful translations from Hafiz and Omar Khayyam, and lyrics and dramas which added little to his reputation.

An edition of his collected works in 12 vols, was published at Berlin (1866-1869), and his Erzdhlungen und Romane at Jena (1871- 1872). For further biographical details, see Bodenstedt's Erin- nerungen aus meinem Leben (2 vols., Berlin, 1888-1890); and G. Schenck, Friedrich von Bodenstedt. Ein Dichterleben in seinen Briefen (Berlin, 1893).

BODHI VAMSA, a prose poem in elaborate Sanskritized Pali, composed by Upatissa in the reign of Mahinda IV. of Ceylon about a.d. 980. It is an adaptation of a previously existing work in Sinhalese on the same subject, and describes the bringing of a branch of the celebrated Bo or Bodhi tree (i.e. Wisdom Tree, under which the Buddha had attained wisdom) to Ceylon in the 3rd century B.C. The Bodhi Vamsa quotes verses from the Mahavamsa, but draws a great deal of its material from other sources; and it has occasionally preserved details of the older tradition not found in any other sources known to us.

Edition in Pali for the Pali Text Society by S. Arthur Strong (London, 1891).

BODICHON, BARBARA LEIGH SMITH (1827-1891), English educationalist, was born at Watlington, Norfolk, on the 8th of April 1827, the daughter of Benjamin Smith (1783-1860), long M.P. for Norwich. She early showed a force of character and catholicity of sympathy that later won her a prominent place among philanthropists and social workers. In 1857 she married an eminent French physician,

Dr Eugene Bodichon, and, although wintering many years in Algiers, continued to lead the movements she had initiated in behalf of Englishwomen. In 1869 she published her Brief Summary of the Laws of England concerning Women, which had a useful effect in helping forward the passage of the Married Women's Property Act. In 1866, co-operating with Miss Emily Davies, she matured a scheme for the extension of university education to women, and the first small experiment at Hitchin developed into Girton College, to which Mme Bodichon gave liberally of her time and money. With all her public interests she found time for society and her favourite art of painting. She studied under William H. Hunt, and her water-colours, exhibited at the Salon, the Academy and elsewhere, showed great originality and talent, and were admired by Corot and Daubigny. Her London salon included many of the literary and artistic celebrities of her day; she was George Eliot's most intimate friend, and, according to her, the first to recognize the authorship of Adam Bede. Her personal appearance is said to be described in that of Romola. Mme Bodichon died at Robertsbridge, Sussex, on the nth of June

1891.

BODIN, JEAN (1 530-1 596), French political philosopher, was born at Angers in 1530. Having studied law at Toulouse and lectured there on jurisprudence, he settled in Paris as an advocate, but soon applied himself to literature. In 1555 he published his first work, a translation of Oppian's Cynegeticon into Latin verse, with a commentary. The celebrated scholar, Turnebus, com- plained that some of his emendations had been appropriated without acknowledgment. In 1588, in refutation of the views of the seigneur de Malestroit, comptroller of the mint, who maintained that there had been no rise of prices in France during the three preceding centuries, he published his Responsio ad Paradoxa Malestretti (Reponse aux paradoxes de M. Malestroit), which the first time explained in a nearly satisfactory manner the revolution of prices which took place in the 16th century. Bodin showed a more rational appreciation than many of his contemporaries of the causes of this revolution, and the relation of the variations in money to the market values of wares in general as well as to the wages of labour. He saw that the amount of money in circulation did not constitute the wealth of the community, and that the prohibition of the export of the precious metals was rendered inoperative by the necessities of trade. This tract, the Discours stir les causes de I'extreme cherte qui ist aujourdhuy en France (1574), and the disquisi- tion on public revenues in the sixth book of the Ripublique, entitle Bodin to a distinguished position among the earlier economists.

His learning, genial disposition, and conversational powers won him the favor of Henry III. and of his brother, the due d'Alencon; and he was appointed king's attorney at Laon in 1576. In this year he married, performed his most brilliant service to his country, and completed his greatest literary work. Elected by the tiers Hat of Vermandois to represent it in the states-general of Blois, he contended with skill and boldness in extremely difficult circumstances for freedom of conscience, justice and peace. The nobility and clergy favoured the League, and urged the king to force his subjects to profess the Catholic religion. When Bodin found he could not prevent this resolution being carried, he contrived to get inserted in the petition drawn up by the states the clause " without war," which practically rendered nugatory all its other clauses. While he thus resisted the clergy and nobility he successfully opposed the demand of the king to be allowed to alienate the public lands and royal demesnes, although the chief deputies had been won over to assent. This lost him the favour of the king, who wanted money on any terms. In 1381 he acted as secretary to the due d'Alengon

no

when that prince came over to England to seek the hand of Queen Elizabeth. Here he had the pleasure of finding that the Ripublique was studied at London and Cambridge, although in a barbarous Latin translation. This determined him to translate his work into Latin himself (1586). The latter part of Bodin's life was spent at Laon, which he is said to have per- suaded to declare for the League in 1589, and for Henry IV. five years afterwards. He died of the plague in 1596, and was' buried in the church of the Carmelites.

With all his breadth and liberality of mind Bodin was a credulous believer in witchcraft, the virtues of numbers and the power of the stars, and in 1580 he published the Demonomanie des sorciers, a work which shows that he was not exempt from the prejudices of the age. Himself regarded by most of his con- temporaries as a sceptic, and by some as an atheist, he denounced all who dared to disbelieve in sorcery, and urged the burning of witches and wizards. It might, perhaps, have gone hard with him if his counsel had been strictly followed, as he confessed to have had from his thirty-seventh year a friendly demon, who, if properly invoked, touched his right ear when he purposed doing what was wrong, and his left when he meditated doing good.

His chief work, the Six livres de la Ripublique (Paris, 1576), which passed through several editions in his lifetime, that of 1583 having as an appendix L'Apologie de Rene Her pin (Bodin himself), was the first modern attempt to construct an elaborate system of political science. It is perhaps the most important work of its kind between Aristotle and modern writers. Though he was much indebted to Aristotle he used the material to advantage, adding much from his own experience and historical knowledge. In harmony with the conditions of his age, he approved of absolute governments, though at the same time they must, he thought, be controlled by constitutional laws. He entered into an elaborate defence of individual property against Plato and More, rather perhaps because the scheme of his work required the treatment of that theme than because it was practically urgent in his day, when the excesses of the Ana- baptists had produced a strong feeling against communistic doctrines. He was under the general influence of the mercan- tilist views, and approved of energetic governmental inter- ference in industrial matters, of high taxes on foreign manufac- tures and low duties on raw materials and articles of food, and attached great importance to a dense population. But he was not a blind follower of the system; he wished for unlimited freedom of trade in many cases; and he was in advance of his more eminent contemporary Montaigne in perceiving that the gain of one nation is not necessarily the loss of another. To the public finances, which he called " the sinews of the state," he devoted much attention, and insisted on the duties of the govern- ment in respect to the right adjustment of taxation. In general he deserves the praise of steadily keeping in view the higher aims and interests of society in connexion with the regulation and development of its material life.

Among his other works are Oratio de inslituenda in republica juventate (1559); Methodus ad facilem historiarum cognitionem (1566); Universale Naturae Theatrum (1596, French trans, by Fougerolles, 1597), and the Colloquium Heptaplomeres de abditis rerum sublimium arcanis, written in 1588, published first by Guhrauer(i84i), and in a complete form by L.Noack (1857). The last is a philosophy of naturalism in the form of a conversation between seven learned men — a Jew, a Mahommedan, a Lutheran, a Zwinglian, a Roman Catholic, an Epicurean and a Theist. The conclusion to which they are represented as coming is that they will live together in charity and toleration, and cease from further disputation as to religion. It is curious that Leibnitz, who originally regarded the Colloquium as the work of a pro- fessed enemy of Christianity, subsequently described it as a most valuable production (cf. M. Carriere, Weltanschauung, P- 3i7)-

See H. Baudrillart, /. Bodin et son temps (Paris, 1853) ; Ad. Franck, Reformateurs et publicistes de VEurope (Paris, 1864); N. Planchenault, Etudes sur Jean Bodin (Angers, 1858); E. de Barthe-

lemy, £tude sur J. Bodin (Paris, 1876) ; for the political philosophy of Bodin, see P. Janet, Hist, de la science polit. (3rd ed., Paris, 1887) ; Hancke, B. Studien iiber d. Begriff d. Souverdnitdt (Breslau, 1894), A. Bardoux. Les Legistes et leur influence sur la soc.francaise ; Fournol, Bodin predecesseur de Montesquieu (Paris, 1896) ; for his political economy, J. K. Ingram, Hist, of Pol. Econ. (London, 1888) ; for his ethical teaching, A. Desjardins, Les Moralistes francais du seizieme Steele, ch. v. ; and for his historical views, R. Flint's Philosophy of History in Europe (ed. 1893), pp. 190 foil.

BODKIN (Early Eng. boydekin, a dagger, a word of unknown origin, possibly connected with the Gaelic biodag, a short sword), a small, needle-like instrument of steel or bone with a flattened knob at one end, used in needlework. It has one or more slits or eyes, through which cord, tape or ribbon can be passed, for threading through a hem or series of loops. The word is also used of a small piercing instrument for making holes in cloth, &c. BODLE or Boddle (said to be from Bothwell, the name of a mint-master), a Scottish copper coin worth about one-sixth of an

1 English penny, first issued under Charles II. It survives in the phrase " not to care a bodle."

BODLEY, GEORGE FREDERICK (1827 -1907), English architect, was the youngest son of a physician at Brighton, his elder brother, the Rev. W. H. Bodley, becoming a well-known Roman Catholic preacher and a professor at Oscott. He was articled to the famous architect Sir Gilbert Scott, under whose influence he became imbued with the spirit of the Gothic revival, and he gradually became known as the chief exponent of 14th- century English Gothic, and the leading ecclesiastical architect in England. One of his first churches was St Michael and All Angels, Brighton (1855), and among his principal erections may be mentioned All Saints, Cambridge; Eton Mission church, Hackney Wick; Clumber church; Eccleston church; Hoar Cross church; St Augustine's, Pendlebury; Holy Trinity. Kensington; Chapel Allerton, Leeds; St Faith's, Brentford; Queen's College chapel, Cambridge; Marlborough College chapel; and Burton church. His domestic work included the London School Board offices, the new buildings at Magdalen, Oxford, and Hewell Grange (for Lord Windsor). From 1872 he had for twenty years the partnership of Mr T. Garner, who worked with him. He also designed (with his pupil James Vaughan) the cathedral at Washington,

D.C., U.S.A., and cathedrals at San Francisco and in Tasmania; and when Mr Gilbert Scott's design for his new Liverpool cathedral was successful in the competition he collaborated with the young architect in preparing for its erection. Bodley began contributing to the Royal Academy in 1854, and in 1881 was elected A.R.A., becoming R.A. in 1902. In addition to being a most learned master of architecture, he was a beautiful draughtsman, and a connoisseur in art; he pub- lished a volume of poems in 1899; and he was a designer of wall-papers and chintzes for Watts & Co., of Baker Street, London; in early life he had been in close alliance with the Pre-Raphaelites, and he did a great deal, like William Morris, to improve public taste in domestic decoration and furniture. He died on the 21st of October 1907, at Water Eaton, Oxford.

BODLEY, SIR THOMAS (1545-1613), English diplomatist and scholar, founder of the Bodleian library, Oxford, was born at Exeter on the 2nd of March 1545. During the reign of Queen Mary, his father, John Bodley, being obliged to leave the kingdom on account of his Protestant principles, went to live at Geneva.

1 In that university, in which Calvin and Beza were then teaching divinity, young B odley studied for a short time. On the accession of Queen Elizabeth he returned with his father to England, and

1 soon after entered Magdalen College, Oxford. In 1 563 he took his B. A. degree, and was admitted a fellow of Merton College. In 1 565 he read a Greek lecture in hall, took his M. A. degree the year after, and read natural philosophy in the public schools. In 1 569 he was proctor, and for some time after was deputy public orator. Quitting Oxford in 1576, he made the tour of Europe; shortly after his return he became gentleman-usher to Queen Elizabeth; and in 1587, apparently, he married Ann Ball, a widow lady of considerable fortune, the daughter of a Mr Carew of Bristol. In 1584 he entered parliament as member for Portsmouth, and represented St German's in 1586. In 1585 Bodley was entrusted

in

with a mission to form a league between Frederick II. of Denmark and certain German princes to assist Henry of Navarre. He was next despatched on a secret mission to France; and in 1588 he was sent to the Hague as minister, a post which demanded great diplomatic skill, for it was in the Netherlands that the power of Spain had to be fought.

The essential difficulties of his mission were complicated by the intrigues of the queen's ministers at home, and Bodley repeatedly begged that he might be recalled. He was finally permitted to return to England in 1 596, but finding his preferment obstructed by the jarring interests of Burleigh and Essex, he retired from public life. He was knighted on the 18th of April 1604. He is, however, remembered specially as the founder of the Bodleian at Oxford, practically the earliest public library in Europe (see Libraries). He determined, he said, " to take his farewell of state employments and to set up his staff at the library door in Oxford." In 1598 his offer to restore the old library was accepted by the university. Bodley not only used his private fortune in his undertaking, but induced many of his friends to make valuable gifts of books. In 1611 he began its permanent endowment, and at his death in London on the 28th of January 1613, the greater part of his fortune was left to it. He was buried in the choir of Merton College chapel where a monument of black and white marble was erected to him. . Sir Thomas wrote his own life to the year 1609, which, with the first draft of the statutes drawn up for the library, and his letters to the librarian, Thomas James, was published by Thomas Hearne, under the title of Reliquiae Bodleianae, or Authentic Remains of Sir Thomas Bodley (London, 1703, 8vo).

BODMER, JOHANN JAKOB (1698-1783), Swiss-German author, was born at Greifensee, near Zurich, on the 19th of July 1698. After first studying theology and then trying a commercial career, he finally found his vocation in letters. In 1725 he was appointed professor of Helvetian history in Zurich, a chair which he held for half a century, and in 1735 became a member of the " Grosser Rat." He published (1721-1723), in conjunction with J. J. Breitinger (1 701-17 74) and several others, Die Discourse der Mahlern, a weekly journal after the model of the Spectator. Through his prose translation of Milton's Paradise Lost (1732) and his successful endeavours to make a knowledge of English literature accessible to Germany, he aroused the hostile criticism of Gottsched (q.v.) and his school, a struggle which ended in the complete discomfiture of the latter. His most important writings are the treatises Von dem Wunderbaren in der Poesie (1740) and Kritische Betrachtungen iiber die poetischen Gemalde der Dichter (1741), in which he pleaded for the freedom of the imagination from the restriction imposed upon it by French pseudo-classicism. Bodmer's epics Die Sundfiuth (1751) and Noah (1751) are weak imitations of Klopstock's Messias, and his plays are entirely deficient in dramatic qualities. He did valuable service to German literature by his editions of the Minnesingers and part of the Nibelungenlied. He died at Zurich on the 2nd of January 1783.

See T. W. Danzel, Gottsched und seine Zeit (Leipzig, 1848); J. Criiger, J. C. Gottsched, Bodmer und Breitinger (Stuttgart, 1884); F. Braitmaier, Geschichte der poetischen Theorie und Kritik von den Diskursen der Maler bis auf Lessing (Leipzig, 1888) ; Denkschrift zu Bodmers 200. Geburtstag (Ziirich, 1900).

BODMIN, a market town and municipal borough in the Bodmin parliamentary division of Cornwall, England, the county town, 30J m. W.N.W. of Plymouth, on branches of the Great Western and London & South-Western railways. Pop. (1901) 5353. It lies between two hills in a short valley opening westward upon that of the Camel, at the southern extremity of the high open Bodmin Moor. The large church of St Petrock, mainly Per- pendicular, has earlier portions, and a late Norman font. East of it there is a ruined Decorated chapel of St Thomas of Canterbury, with a crypt. A tower of Tudor date, in the ceme- tery, marks the site of a chapel of the gild of the Holy Rood. Part of the buildings of a Franciscan friary, founded c. 1 240, are incorporated in the market-house, and the gateway remains in an altered form. At Bodmin are a prison, with civil and naval departments, the county gaol and asylum, the head- quarters of the constabulary, and those of the duke of Cornwall's

Light Infantry. Cattle, sheep and horse fairs are held, and there is a considerable agricultural trade. The borough is under a mayor, four aldermen and twelve councillors. Area, 2797 acres.

Traces of Roman occupation have been found in the western part of the parish, belonging to the first century a.d. Possibly tin-mining was carried on here at that period. The grant of a charter by King Edred to the prior and canons of Bodmin (Bomine, Bodman, Bodmyn) in respect of lands in Devonshire appears in an inspeximus of 1252. To its ecclesiastical associa- tions it owed its importance at the time of the Domesday survey, when St Petrock held the manor of Bodmin, wherein were sixty- eight houses and one market. To successive priors, as mesne lords, it also owed its earliest municipal privileges. King John's charter to the prior and convent, dated the 17th of July 1199, contained a clause (subsequently cancelled by Richard II.) by which burgesses were exempt from being impleaded, touching any tenements in their demesne, except before the king and his chief justice. Richard of Cornwall, king of the Romans, confirmed to the burgesses their gild merchant, Edward I. the pesage of tin, and Edward II. a market for tin and wool. Queen Elizabeth in 1563 constituted the town a free borough and the burgesses a body corporate, granting at the same time two fairs and a Saturday market. There are still held also three other fairs whose origin is uncertain. An amended charter granted in

1594 remained in force until 1789, when the corporation became extinct owing to the diminution of the burgesses. By virtue of a new charter of incorporation granted in 1798 and remodelled by the act of 1835, the corporation now consists of a mayor, four aldermen and twelve councillors. The first members for Bodmin were summoned in 1295. Retaining both its members in 1832, losing one in 1868 and the other in 1885, it has now become merged in the south-eastern division of the county. From 1715 to 1837 the assizes were generally held alternately at Launceston and Bodmin; since 1837 they have been held at Bodmin only. A court of probate has also been held at Bodmin since 1773. A festival known as “Bodmin Riding ” was formerly celebrated here on the Sunday and Monday following St Thomas’s day (July 7). It is thought by some to have been instituted in n 77 to celebrate the recovery of the bones of St Petrock.

See Victoria County History , Cornwall; Sir John Maclean, Parochial and Family History of the Deanery of Trigg Minor, Cornwall (3 vols.,

1873-1879).

BODO, a seaport on the north-western coast of Norway, in Nordland amt (county), lat. 67° 17′ N. Pop. (1900) 4827. The rock-bound harbour admits large vessels, and there is a brisk trade in fish and eider-down. The neighbouring country has many scenic attractions. Sixty miles inland (E.) rises the great massif of Sulitelma on the Swedish frontier, with its copper mines, broad snow-fields and glaciers. The fjords of the district include the imposing Beierenfjord, the Saltenfjord, and the Skjerstadf jord, at the narrow mouths of which, between islands, a remarkable cataract (Saltstrom) is formed at the turn of the tide. On this fjord is Skjerstad, a large scattered village.

BODONI, GIAMBATTISTA (1740-1813), Italian printer, was born in 1740 at Saluzzo in Piedmont, where his father owned a printing establishment. While yet a boy he began to engrave on wood. He at length went to Rome, and there became a compositor for the press of the Propaganda. He made himself acquainted with the Oriental languages, and thus was enabled to render essential service to the Propaganda press, by restoring and accurately distributing the types of several Oriental alpha- bets which had fallen into disorder. The infante Don Ferdinand, afterwards duke of Parma, having established, about 1760, a printing-house on the model of those in Paris, Madrid and Turin, Bodoni was placed at the head of this establishment, which he soon rendered the first of the kind in Europe. The beauty of his typography, &c, leaves nothing further to be desired; but the intrinsic value of his editions is seldom equal to their outward splendour. His

Homer, however, is a truly magnificent work; and, indeed, his Greek letters are faultless imitations of the best

Greek manuscript. His editions of the Greek, Latin, Italian and French classics are all highly prized for their typographical elegance, and some of them are not less remarkable for their accuracy. Bodoni died at Padua in 1813. In 1818 a magnifi- cent work appeared in two volumes quarto, entitled Manuale Tipografico, containing specimens of the vast collection of types which had belonged to him.

See De Lama, Vita del Cavaliere Giambattista Bodoni (1816).

BODY-SNATCHING, the secret disinterring of dead bodies in churchyards in order to sell them for the purpose of dissection. Those who practised body-snatching were frequently called resurrectionists or resurrection-men. Previous to the passing of the Anatomy Act 1832 (see Anatomy: History), no licence was required in Great Britain for opening an anatomical school, and there was no provision for supplying subjects to students for anatomical purposes. Therefore, though body-snatching was a misdemeanour at common law, punishable with fine and imprisonment, it was a sufficiently lucrative business to run the risk of detection. Body-snatching became so prevalent that it was not unusual for the relatives and friends of a deceased person to watch the grave for some time after burial, lest it should be violated. Iron coffins, too, were frequently used for burial, or the graves were protected by a framework of iron bars called mortsafes, well-preserved examples of which may still be seen in Greyfriars' churchyard, Edinburgh.

For a detailed history of body-snatching, see The Diary of a Resurrectionist, edited by I. B. Bailey (London, 1896), which also contains a full bibliography and the regulations in force in foreign countries for the supply of bodies for anatomical purposes.

BOECE (or Boyce), HECTOR (c. 1465 – c. 1536), Scottish historian, was born at Dundee about the year 1465, being descended of a family which for several generations had pos- sessed the barony of Panbride in Forfarshire. He received his early education at Dundee, and completed his course of study in the university of Paris, where he took the degree of B.D. He was appointed regent, or professor, of philosophy in the college of Montaigu; and there he was a

contemporary of Erasmus, who in two epistles has spoken of him in the highest terms. When William Elphinstone, bishop of Aberdeen, was laying his plans for the foundation of the university of Aberdeen (King's College) he made Boece his chief adviser; and the latter was persuaded, after receipt of the papal bull erecting the university (1494), to be the first principal. He was in Aberdeen about 1500 when lectures began in the new buildings, and he appears to have been well received by the canons of the cathedral, several of whom he has commemorated as men of learning. It was a part of his duty as principal to read lectures on divinity.

The emoluments of his office were poor, but he also enjoyed the income of a canonry at Aberdeen and of the vicarage of Tullynessle. Under the date of 14th July 1527, we find a " grant to Maister Hector " of an annual pension of £50, to be paid by the sheriff of Aberdeen out of the king's casualties; and on the 26th of July 1529 was issued a " precept for a lettre to Mr Hector Boys, professor of theology, of a pension of £50 Scots yearly, until the king promote him to a benefice of 100 marks Scots of yearly value; the said pension to be paid him by the custumars of Aberdeen." In 1533 and 1534, one-half of his pension was, however, paid by the king's treasurer, and the other half by the comptroller; and as no payment sub- sequent to that of Whitsuntide 1534 has been traced in the treasurer's accounts, he is supposed to have obtained the benefice soon after that period. This benefice was the rectorship of Tyrie.

In 1528, soon after the publication of his history, Boece received the degree of D.D. at Aberdeen; and on this occasion the magistrates voted him a present of a tun of wine when the new wines should arrive, or, according to his option, the sum of £20 to purchase bonnets. He appears to have survived till the year 1536; for on the 22nd of November in that year, the king presented John Garden to the rectory of Tyrie, vacant by the death of ” Mr Hector Boiss.” He died at Aberdeen, and was buried before the high altar at King’s College, beside the tomb of his patron Bishop Elphinstone.

His earliest publication, Episcoporum MurMacensium et Aberdonensium per Hector em Boetium Vitae, was printed at the press of Jodocus Badius (Paris, 1522). The notices of the early prelates are of little value, but the portion of the book in which he speaks of Bishop Elphinstone is of enduring merit. Here we likewise find an account of the foundation and constitution of the college, together with some notices of its earliest members. His fame rests chiefly on his History of Scotland, published in 1527 under the title Scolorum Historiae a prima gentis origine cum aliarum et rerum et gentium illustratione non vulgari. This edition contains seventeen books. Another edition, containing the eighteenth book and a fragment of the nineteenth, was published by Ferrerius, who has added an appendix of thirty- five pages (Paris, 1574).

The composition of the history displays much ability; but Boece’s imagination was, however, stronger than his judgment: of the extent of the historian’s credulity, his narrative exhibits many unequivocal proofs; and of deliberate invention or dis- tortion of facts not a few, though the latter are less flagrant and intentional than early 19th-century criticism has assumed. He professed to have obtained from the monastery of Icolmkill, through the good offices of the earl of Argyll, and his brother, John Campbell of Lundy, the treasurer, certain original his- torians of Scotland, and among the rest Veremundus, of whose writings not a single vestige is now to be found. In his dedication to the king he is pleased to state that Veremundus, a Spaniard by birth, was archdeacon of St Andrews, and that he wrote in Latin a history of Scotland from the origin of the nation to the reign of Malcolm III., to whom he inscribed his work. His propensity to the marvellous was at an early period exposed in the following verses by Leland: —

” Hectoris historic! tot quot mendacia scripsit Si vis ut numerem, lector amice, tibi, Me jubeas etiam ductus numerare marinos Et liquidi Stellas connumerare poli.”

Boece's History of Scotland was translated into Scottish prose by John Bellenden, and into verse by William Stewart. The Lives of the Bishops was reprinted for the Bannatyne Club, Edin., 1825, in a limited edition of sixty copies. A commonplace verse-rendering of the Life of Bishop Elphinstone, which was written by Alexander Gardyne in 1619, remains in MS. There is no modern edition of the history, though the versions of Bellenden and Stewart have been edited.

BOEHM, SIR JOSEPH EDGAR, Bart. (1834-1890), British sculptor, was born of Hungarian parentage on the 4th of July 1834 at Vienna, where his father was director of the imperial mint. After studying the plastic art in Italy and at Paris, he worked for a few years as a medallist in his native city. After a further period of study in England, he was so successful as an exhibitor at the Exhibition of 1862 that he determined to aban- don the execution of coins and medals, and to give his mind to portrait busts and statuettes, chiefly equestrian. The colossal statue of Queen Victoria, executed in marble (1869) for Windsor Castle, and the monument of the duke of Kent in St George's chapel, were his earliest great works, and so entirely to the taste of 'his royal patrons that he rose rapidly in favour with the court. He was made A.R.A. in 1878, and produced soon afterwards the statue of Carlyle on the Thames embankment at Chelsea. In 1881 he was appointed sculptor in ordinary to the queen, and in the ensuing year became full Academician. On the death of Dean Stanley, Boehm was commissioned to execute his sarcophagus in Westminster Abbey, and his achievement, a recumbent statue, has been pronounced to be one of the best portraits in modern sculpture. Less successful was his monu- ment to General Gordon in St Paul's cathedral. He executed the equestrian statue of the duke of Wellington at Hyde Park Corner, and designed the coinage for the Jubilee of Queen Victoria in 1887. Among his ideal subjects should be noted the " Herds- man and Bull." He died suddenly in his studio at South Kensington on the 12th of December 1890.

BOEHM VON BAWERK, EUGEN (1851-), Austrian economist and statesman, was born at Briinn on the 12th of February 1851. Entering the Austrian department of finance in 1872, he held various posts until 1880, when he became

qualified as a teacher of political economy in the university of Vienna. The following year, however, he transferred his services to the

university of Innsbruck, where he became professor in 1884. In 1889 he became councillor in the ministry of finance, and represented the government in the Lower House on all questions of taxation. In 1895 and again in 1897-1898 he was minister of finance. In 1899 he was made a member of the Upper House, and in 1900 again became minister of finance. One of the leaders of the Austrian school of economists, he has made notable criticisms on the theory of value in relation to cost as laid down by the ” classical school.” His more important works are Kapital und Kapitalzins (Innsbruck, 1884-1889), in two parts, translated by W. Smart, viz. Capital and Interest (part i., 1890), and The Positive Theory of Capital (part ii., 1891) ; Karl Marx and the Close of his System (trans. A. M. Macdonald,) ; Recent Literature on Interest (trans. W. A. Scott and

S. Feilbogen, 1903).

BOEHME (or Behmen), JAKOB (1575-1624), German mystical writer, whose surname (of which Fechner gives eight German varieties) appears in English literature as Beem, Behmont, &c, and notably Behmen, was born at Altseidenberg, in Upper Lusatia, a straggling hamlet among the hills, some 10 m. S.E. of Gorlitz. His father was a well-to-do peasant, and his first employment was that of herd boy on the Landskrone, a hill in the neighbourhood of Gorlitz; the only education he received was at the town-school of Seidenberg, a mile from his home. Seidenberg, to this day, is filled with shoemakers, and to a shoe- maker Jakob was apprenticed in his fourteenth year (1589), being judged not robust enough for husbandry. Ten years later (1599) we find him settled at Gorlitz as master-shoemaker, and married to Katharina, daughter of Hans Kuntzschmann, a thriving butcher in the town. After industriously pursuing his vocation for ten years, he bought (1610) the substantial house, which still preserves his name, close by the bridge, in the Neiss- Vorstadt. Two or three years later he gave up business, and did not resume it as a shoemaker; but for some years before his death he made and sold woollen gloves, regularly visiting Prague fair for this purpose.

Boehme’s authorship began in his 37th year (1612) with a treatise, Aurora, oder die Morgenrote im Aufgang, which though unfinished was surreptitiously copied, and eagerly circulated in MS. by Karl von Ender. This raised him at once out of his homely sphere, and made him the centre of a local circle of liberal thinkers, considerably above him in station and culture. The charge of heresy was, however, soon directed against him by Gregorius Richter, then pastor primarius of Gorlitz. Feeling ran so high after Richter’s pulpit denunciations, that, in July 161 3, the municipal council, fearing a disturbance of the

peace, made a show of examining Boehme, took possession of his fragmentary quarto, and dismissed the writer with an admonition to meddle no more with such matters. For five years he obeyed this injunction. But in 1618 began a second period of authorship; he poured forth, but did not publish, treatise after treatise, expository and polemical, in the next and the two following years. In 1622 he composed nothing but a few short pieces on true repentance, resignation, &c, which, however, devotionally speaking, are the most precious of all his writings. They were the only pieces offered to the public in his lifetime and with his permission, a fact which is evidence of the essentially religious and practical character of his mind. Their publication at Gorlitz, on New Year's day 1624, under the title of Der Weg zu Christo, was the signal for renewed clerical hostility. Boehme had by this time entered on the third and most prolific though the shortest period (1623-1624) of his speculation. His labours at the desk were interrupted in May 1624 by a summons to Dresden, where his famous " colloquy " with the Upper Consistorial court was made the occasion of a flattering but transient ovation on the part of a new circle of admirers. Richter died in August 1624, and Boehme did not long survive his pertinacious foe. Seized with a fever when away from home, he was with difficulty conveyed to Gorlitz. His wife was at Dresden on business; and during the first week of his malady he was nursed by a

literary friend. He died, after receiving the rites of the church, grudgingly administered by the authorities, on Sunday, the 17 th of November.

Boehme always professed that a direct inward opening or illumination was the only source of his speculative power. He pretended to no other revelation. Ecstatic raptures we should not expect, for he was essentially a Protestant mystic. No "thus saith the Lord " was claimed as his warrant, after the manner of Antoinette Bourignon, or Ludowick Muggleton; no spirits or angels held converse with him as with Swedenborg. It is needless to dwell, in the way either of acceptance or rejection, on the very few occasions in which his outward life seemed to him to come into contact with the invisible world. The apparition of the pail of gold to the herd boy on the Landskrone, the visit of the mysterious stranger to the young apprentice, the fascination of the luminous sheen, reflected from a common pewter dish, which first, in 1600, gave an intuitive turn to his meditations, the heavenly music which filled his ears as he lay dying— none of these matters is connected organically with the secret of Ins special power. The mysteries of which he discoursed were not reported to him: he " beheld " them. He saw the root of all mysteries, the Ungrund or

Urgrund, whence issue all contrasts and discordant principles, hardness and softness, severity and mildness, sweet and bitter, love and sorrow, heaven and hell. These he ” saw ” in their origin; these he attempted to describe in their issue, and to reconcile in their eternal result. He saw into the being of God; whence the birth or going forth of the divine manifestation. Nature lay unveiled to him, he was at home in the heart of things. ” His own book, which he himself was,” the microcosm of man, with his threefold life, was patent to his vision. Such was his own account of his qualification. If he failed it was in expression; he confessed himself a poor mouthpiece, though he saw with a sure spiritual eye.

It must not be supposed that the form in which Boehme’s pneumatic realism worked itself out in detail was shaped entirely from within. In his writings we trace the influence of Theophr. Bombast von Hohenheim, known as Paracelsus (1493-1541), of Kaspar Schwenkfeld (1490-1561), the first Protestant mystic, and of Valentin Weigel (1533-1588). From the school of Paracelsus came much of his puzzling phraseology, — his Turba and Tinctur and so forth, — a phraseology embarrassing to himself as well as to his readers. His friends plied him with foreign terms, which he was delighted to receive, interpreting them by an instinct, and using them often in a corrupted form and always in a sense of his own. Thus the word Idea called up before him. the image of ” a very fair, heavenly, and chaste virgin.” The title Aurora, by which his earliest treatise is best known, was furnished by Dr Balthasar Walther. These, however, were false helps, which only serve to obscure a difficult study, like the Flagrat and Lubet, with which his English translator veiled Boehme’s own honest Schreck and Lust. There is danger lest his crude science and his crude philosophical vocabulary conceal the fertility of Boehme’s ideas and the transcendent greatness of his religious insight. Few will take the pains to follow him through the interminable account of his seven Quellgeister, which remind us of Gnosticism; or even of his three first properties of eternal nature, in which his disciples find Newton’s formulae anticipated, and which certainly bear a marvellous resemblance to the three apxai- of Schelling’s Theogonische Natur. Boehme is always greatest when he breaks away from his fancies and his trammels, and allows speech to the voice of his heart. Then he is artless, clear and strong; and no man can help listening to him, whether he dive deep down with the conviction ” ohne Gift und Grimm kein Leben,” or rise with the belief that ” the being of all beings is a wrestling power,” or soar with the persuasion that Love ” in its height is as high as God.” The mystical poet of Silesia, Angelus Silesius, discerned where Boehme’s truest power lay when he sang —

” Im Wasser lebt der Fisch, die Pflanze in der Erdea, Der Vogel in der Luft, die Sonn’ am Firmament, Der Salamander muss im Feu’r erhaiten werden, Und Gottes Herz ist Jakob Bohme’s Element.”

ii4

BOEOTIA

The three periods of Boehme’s authorship constitute three distinct stages in the development of his philosophy. He himself marks a threefold division of his subject-matter: — i. Philosophia, i.e. the pursuit of the divine Sophia, a study of God in himself; this was attempted in the Aurora. 2. Asteo- logia, i.e., in the largest sense, cosmology, the manifestation of the divine in the structure of the world and of man; hereto belong, with others, Die drei Principien gottlichen Wesens; Vom dreifachen Leben der Menschen; Von der Menschwerdung Christi; , Von der Geburt und Bezeichnung alter Wesen (known as Signatura Rerum). 3. Theologia, i.e., in Scougall’s phrase, ” the life of God in the soul of man.” Of the speculative writings under this head the most important are Von der Gnadenwahl; Mysterium Magnum (a spiritual commentary on Genesis); Von Christi Testamenlen (the Sacraments).

Although Boehme’s philosophy is essentially theological, and his theology essentially philosophical, one would hardly describe him as a philosophical theologian; and, indeed, his position is not one in which either the philosopher or the theologian finds it easy to make himself completely at home. The philosopher finds no trace in Boehme of a conception of God which rests its own validity on an accord with the highest canons of reason or of morals; it is in the actual not in the ideal that Boehme seeks God, whom he discovers as the spring of natural powers and forces, rather than as the goal of advancing thought. The theologian is staggered by a language which breaks the fixed association of theological phrases, and strangely reversing the usual point of view, characteristically pictures God as underneath rather than above. Nature rises out of Him; we sink into Him. The Ungrund of the unmanifested Godhead is boldly represented in the English translations of Boehme by the word Abyss, in a sense altogether unexplained by its Biblical use. In the Theologia Germanica this tendency to regard God as the substantia, the underlying ground of all things, is accepted as a foundation for piety; the same view, when offered in the colder logic of Spinoza, is sometimes set aside as atheistical. The procession of spiritual forces and natural phenomena out of the Ungrund is described by Boehme in terms of a threefold manifestation, commended no doubt by the constitution of the

Christian Trinity, but exhibited in a form derived from the school of Paracelsus. From Weigel he learned a purely idealistic explanation of the universe, according to which it is not the resultant of material forces, but the expression of spiritual principles. These two explanations were fused in his mind till they issued forth as equivalent forms of one and the same thought. Further, Schwenkfeld supplied him with the germs of a transcendental exegesis, whereby the Christian Scriptures and the dogmata of Lutheran orthodoxy were opened up in harmony with his new-found views. Thus equipped, Boehme's own genius did the rest. A primary effort of Boehme's philosophy is to show how material powers are substantially one with moral forces. This is the object with which he draws out the dogmatic scheme which dictates the arrangement of his seven Quellgeister. Translating Boehme's thought out of the uncouth dialect of material symbols (as to which one doubts sometimes whether he means them as concrete instances, or as pictorial illustrations, or as a mere memoria teehnica), we find that Boehme conceives of the correlation of two triads of forces. Each triad consists of a thesis, an antithesis and a synthesis; and the two are connected by an important link. In the hidden life of the Godhead, which is at once Nichts and Alles, exists the original triad, viz. Attraction, Diffusion, and their resultant, the Agony of the unmanifested Godhead. The transition is made; by an act of will the divine Spirit comes to Light; and immediately the manifested life appears in the triad of Love, Expression, and their resultant, Visible Variety. As the action of contraries and their resultant are explained the relations of soul, body and spirit; of good, evil and free will; of the spheres of the angels, of Lucifer, and of this world. It is a more difficult problem to account on this philosophy for the introduction of evil. Boehme does not resort to dualism, nor has he the smallest sympathy with a pantheistic repudiation of the fact of sin. That the difficulty presses him is clear from the

progressive changes in his attempted solution of the problem. In the Aurora nothing save good proceeds from the Ungrund, though there is good that abides and good that falls — Christ and Lucifer. In the second stage of his writing the antithesis is directly generated as such; good and its contrary are coinci- dently given from the one creative source, as factors of life and movement; while in the third period evil is a direct outcome of the primary principle of divine manifestation — it is the wrath side of God. Corresponding to this change we trace a significant variation in the moral end contemplated by Boehme as the object of this world's life and history. In the first stage the world is created in remedy of a decline; in the second, for the adjustment of a balance of forces; in the third, to exhibit the eternal victory of good

over evil, of love over wrath.

Editions of Boehme's works were published by H. Betke (Amster- dam, 1675); by J. G. Gichtel (Amsterdam, 1682-1683, 10 vols.); by K. W. Schiebler (Leipzig, 1831-1847, 7 vols.). Translations of sundry treatises have been made into Latin (by J. A. Werdenhagen, 1632), Dutch (complete, by W. v. Bayerland, 1634-1641), and French (by Jean Made, c. 1640, and L. C. de Saint-Martin, 1800- 1809). Between 1644 and 1662 all Boehme's works were translated by John Ellistone (d. 1652) and John Sparrow, assisted by Durand Hotham and Humphrey Blunden, who paid for the undertaking. At that time regular societies of Behmenists, embracing not only the cultivated but the vulgar, existed in England and in Holland, They merged into the Quaker movement, holding already in common with Friends that salvation is nothing short of the very presence and life of Christ in the believer, and only kept apart by an objective doctrine of the sacraments which exposed them to the polemic of Quakers (e.g. J. Anderdon). Muggleton led an anthropomorphic reaction against them, and between the two currents they were swept away. The Philadelphian Society at the beginning of the l8tn century consisted of cultured mystics, Jane Lead, Pordage, Francis Lee, Bromley, &c, who fed upon Boehme. William Law (1686-I761) somewhat later recurred to the same spring, with the result, however, in those dry times of bringing his own good sense into question rather than of reviving the credit of his author. After Law's death the old English translation was in great part re-edited (4 vols., 1762-1784) as a tribute to his memory, by George Ward and Thomas Langcake, with plates from the designs of D. A. Freher (Brit. Mus. Add. MSS. 57 6 7~5794)- This forms what is commonly called Law's translation; to complete it a 5th vol. (l2mo, Dublin, 1820) is needed.

See also J. Hambetger, Die Lehre des deutschen Philosophen J. Boehmes (1844) ; Alb. Peip, J. Boehme der deutsche Philosoph (i860) ; von Harless, J. Boehme und die Alchimisten (1870, 2nd ed. 1882). For Boehme's life see the Memoirs by Abraham von Frankenberg (d. 1652) and others, trans, by F. Okely (1870) ; La Motte Fouque, J. Boehm, ein biographischer Denkstein (1831); H. A. Fechner, J. Boehme, sein Leben und seine Schriften (1857); H. L. Martensen, /. Boehme, Theosophiske Studier (Copenhagen, 1881; English trans. t885); J. Claassen, J. Boehme, sein Leben und seine theosophische Werke (Gutersloh, 1885) ; P. Deussen, J. Boehme, iiber sein Leben und seine Philosophie (Kiel, 1897).

BOEOTIA, a district of central Greece, stretching from Phocis and Locris in the W. and N. to Attica and Megaris in the S. between the

strait of Euboea and the Corinthian Gulf. This area, amounting in all to 1100 sq. m., naturally falls into two main divisions. In the north the basin of the Cephissus and Lake Copais lies between parallel mountain-walls continuing eastward the line of Parnassus in the extensive ridge of Helicon, the ” Mountain of the Muses ” (5470 ft.) and the east Locrian range in Mts. Ptoiim, Messapium and other smaller peaks. These ranges, which mostly lie close to the seaboard, form by their projecting spurs a narrow defile on the Phocian frontier, near the famous battlefield of Chaeroneia, and shut in Copais closely on the south between Coronea and Haliartus. The north-east barrier was pierced by underground passages (kata- vothra) which carried off the overflow from Copai’s. The southern portion of the land forms a plateau which slopes to Mt. Cithaeron, the frontier range between Boeotia and Attica. Within this terri- tory the low ridge of Teumessus separates the plain of Ismenus and Dirce, commanded by the citadel of Thebes, from the upland plain of the Asopus, the only Boeotian river that finds the eastern sea. Though the Boeotian climate suffered from the exhalations of Copais, which produced a heavy atmosphere with foggy winters and sultry summers, its rich soil was suited alike for crops, plantations and pasture; the Copais plain, though able to turn into marsh when the choking of the katavothra

caused the lake to encroach, being among the most fertile in Greece. The central position of Boeotia between two seas, the strategic strength of its frontiers and the ease of communi- cation within its extensive area were calculated to enhance its political importance. On the other hand the lack of good harbours hindered its maritime development; and the Boeotian nation, although it produced great men like Pindar, Epami- nondas, Pelopidas and Plutarch, was proverbially as dull as its native air. But credit should be given to the people for their splendid military qualities: both their cavalry and heavy infantry achieved a glorious record.

In the mythical days Boeotia played a prominent part. Of the two great centres of legends, Thebes with its Cadmean population figures as a military stronghold, and Orchomenus, the home of the Minyae, as an enterprising commercial city. The latter’s prosperity is still attested by its archaeological remains (notably the ” Treasury of Minyas “) and the traces of artificial conduits by which its engineers supplemented the natural outlets. The ” Boeotian ” population seems to have entered the land from the north at a date probably anterior to the Dorian

invasion. With the exception of the Minyae, the original peoples were soon absorbed by these immigrants, and the Boeotians henceforth appear as a homogeneous nation. In historical times the leading city of Boeotia was Thebes, whose central position and military strength made it a suitable capital. It was the constant ambition of the Thebans to absorb the other townships into a single state, just as Athens had annexed the Attic communities. But the outlying cities success- fully resisted this policy, and only allowed the formation of a loose federation which in early times seems to have possessed a merely religious character. While the Boeotians, unlike the Arcadians, generally acted as a united whole against foreign enemies, the constant struggle between the forces of central- ization and disruption perhaps went further than any other cause to check their development into a really powerful nation. Boeotia hardly figures in history before the late 6th century. Previous to this its people is chiefly known as the producer of a type of geometric pottery similar to the Dipylon ware of Athens. About 519 the resistance of Plataea to the federating policy of Thebes led to the interference of Athens on behalf of the former; on this occasion, and again in 507, the Athenians defeated the Boeotian levy. During the Persian invasion of 480, while some of the cities fought whole-heartedly in the ranks of the patriots, Thebes assisted the invaders. For a time the presidency of the Boeotian League was taken away from Thebes, but in 457 the Spartans reinstated that city as a bulwark against Athenian aggression. Athens retaliated by a sudden advance upon Boeotia, and after the victory of Oenophyta brought under its power the whole country excepting the capital. For ten years the land remained under Athenian control, which was exercised through the newly installed democracies; but in 447 the oligarchic majority raised an insurrection, and after a victory at Coronea regained their freedom and restored the old con- stitutions. In the Peloponnesian War the Boeotians, em- bittered by the early conflicts round Plataea, fought zealously against Athens. Though slightly estranged from Sparta after the peace of Nicias, they never abated their enmity against their neighbours. They rendered good service at Syracuse and Arginusae; but their greatest achievement was the decisive victory at Delium over the flower of the Athenian army (424), in which both their heavy infantry and their cavalry displayed unusual efficiency.

About this time the Boeotian League comprised eleven groups of sovereign cities and associated townships, each of which elected one Boeotarch or minister of war and foreign affairs, contributed sixty delegates to the federal council at Thebes, and supplied a contingent of about a thousand foot and a hundred horse to the federal army. A

safeguard against undue encroachment on the part of the central government was pro- vided in the councils of the individual cities, to which all im- portant questions of policy had to be submitted for ratification. These local councils, to which the propertied classes alone were

eligible, were subdivided into four sections, resembling the prytaneis of the Athenian council, which took it in turns to take previous cognizance of all new measures. 1

Boeotia took a prominent part in the war of the Corinthian League against Sparta, especially at Haliartus and Coronea (395~394)- This change of policy seems due mainly to the national resentment against foreign interference. Yet dis- affection against Thebes was now growing rife, and Sparta fostered this feeling by stipulating for the complete independ- ence of all the cities in the peace of Antalcidas (387). In 374 Pelopidas restored the Theban dominion. Boeotian contingents fought in all the campaigns of Epaminondas, and in the later wars against Phocis (356-346); while in the dealings with Philip of Macedon the federal cities appear merely as the tools of Thebes. The federal constitution was also brought into accord with the democratic governments now prevalent through- out the land. The sovereign – power was vested in the popular assembly, which elected the Boeotarchs (between seven and twelve in number), and sanctioned all laws. After the battle of Chaeroneia, in which the Boeotian heavy infantry once again distinguished itself, the land never rose again to prosperity. The destruction of Thebes by Alexander (335) seems to have paralysed the political energy of the Boeotians, though it led to an improvement in the federal constitution, by which each city received an equal vote. Henceforth they never pursued an independent policy, but followed the lead of protecting powers. Though the old military training and organization continued, the people proved unable to defend the frontiers, and the land became more than ever the ” dancing-ground of Ares.” Though enrolled for a short time in the Aetolian League (about 245 B.C.) Boeotia was generally loyal to Macedonia, and supported its later kings against Rome. In return for the excesses of the democracies Rome dissolved the league, which, however, was allowed to revive under Augustus, and merged with the other central Greek federations in the Achaean synod. The death-blow to the country’s prosperity was given by the devastations during the first Mithradatic War.

Save for a short period of prosperity under the Frankish rulers of Athens (1205-13 10), who repaired the kalavothra and fostered agriculture, Boeotia long continued in a state of decay, aggravated by

occasional barbarian incursions. The first step towards the country's recovery was not until 1895, when the outlets of Copais were again put into working order. Since then the northern plain has been largely reclaimed for agriculture, and the natural riches of the whole land are likely to develop under the influence of the railway to Athens. Boeotia is at present a Nomos with Livadia (the old Turkish capital) for its centre; the other surviving townships are quite unimportant. The population (65,816 in 1907) is largely Albanian.

Authorities. — Thuc. iv. 76-101; Xenophon, Hellenica, iii.-vii. ; Strabo, pp. 400-412 ; Pausanias ix. ; Theopompus (or Cratippus) in the Oxyrhynchus Papyri, vol. v. (London, 1908), No. 842, col. 12 ; W. M. Leake, Travels in Northern Greece, chs. xi.-xix. (London, 1835) '< H. F. Tozer, Geography of Greece (London, 1873), pp. 233-238; W. Rhys Roberts, The Ancient Boeotians (Cambridge, 1895); E. A. Freeman, Federal Government (ed. 1893, London), ch. iv. § 2; B. V. Head, Historia Numorum, pp. 291 sqq. (Oxford, 1887); W. Larfeld, Sylloge Inscriptionum Boeoticarum (Berlin, 1883). (See also Thebes.)

BOER, the Dutch form of the Eng. " boor," in its original signification of husbandman (Ger. Bauer), a name given to the Dutch farmers of South Africa, and especially to the Dutch population of the Transvaal and Orange River States. (See South Africa and, Transvaal.)

BOERHAAVE, HERMANN (1668-1738), Dutch physician and man of science, was born at Voorhout near Leiden on the 31st of December 1668. Entering the university of Leiden he took his degree in philosophy in 1689, with a dissertation De distinctione mentis a corpore, in which he attacked the doctrines of Epicurus, Hobbes and Spinoza. He then turned to the study . of medicine, in which he graduated in 1693 at Harderwyck in Guelderland. In 1701 he was appointed lecturer on the institutes

1 Thucydides (v. 38), in speaking of the " four councils of the Boeotians," is referring to the plenary bodies in the various states.

of medicine at Leiden; in his inaugural discourse, De commen- dando Hippocratis studio, he recommended to his pupils that great physician as their model. In 1709 he became professor of botany and medicine, and in that capacity he did good service, not only to his own university, but also to botanical science, by his improvements and

additions to the botanic garden of Leiden, and by the publication of numerous works descriptive of new species of plants. In 17 14, when he was appointed rector of the university, he succeeded Govert Bidloo (1649-17 13) in the chair of practical medicine, and in this capacity he had the merit of introducing the modern system of clinical instruction. Four years later he was appointed also to the chair of chemistry. In 1728 he was elected into the French Academy of Sciences, and two years later into the Royal Society of London. In 1729 declining health obliged him to resign the chairs of chemistry and botany; and he died, after a lingering and painful illness, on the 23rd of September 1738 at Leiden. His genius so raised the fame of the university of Leiden, especially as a school of medicine, that it became a resort of strangers from every part of Europe. All the princes of Europe sent him disciples, who found in this skilful professor not only an indefatigable teacher, but an affectionate guardian. When Peter the Great went to Holland in 1715, to instruct himself in maritime affairs, he also took lessons from Boerhaave. His reputation was not confined to Europe; a Chinese rflandarin wrote him a letter directed ” To the illustrious Boerhaave, physician in Europe,” and it reached him in due course.

His principal works are — Inslilutiones medicae (Leiden, 1 708) ; Aphorismi de cognoscendis et curandis morbis (Leiden, 1709), on which his pupil and assistant, Gerard van Swieten (1700-17 7 2) published a commentary in 5 vols. ; and Elementa chemiae (Paris,

1724).

BOETHUS, a sculptor of the Hellenistic age, a native of Carthage (or possibly Chalcedon) . His date cannot be accurately fixed, but was probably the 2nd century B.C. He was noted for his representations of children, in dealing with whom earlier Greek art had not been very successful; and especially for a group representing a boy struggling with a goose, of which several copies survive in museums.

BOETIUS (or Boethius), ANICIUS MANLIUS SEVERINUS (c. A.D. 480-524), Roman philosopher and statesman, described by Gibbon as ” the last of the Romans whom Cato or Tully could have acknowledged for their countryman.” The historians of the day give us but imperfect records or make unsatisfactory allusions. Later chroniclers indulged in the fictitious and the marvellous, and it is almost exclusively from his own books that trustworthy information can be obtained. There is considerable diversity among authorities as to his name. One editor of his De Consolatione, Bertius, thinks that he bore the praenomen of Flavius, but there is no authority for this

supposition. His father was Flavius Manlius Boetius, and it is probable that the Flavius Boetius, the praetorian prefect who was put to death in a.d. 455 by order of Valentinian III., was his grandfather, but these facts do not prove that he also had the praenomen of Flavius. Many of the earlier editions inserted the name of Torquatus, but it is not found in any of the best manuscripts. The last name is commonly written Boethius, from the idea that it is connected with the Greek j3ojj0os; but the best manuscripts agree in reading Boetius.

His boyhood was spent in Rome during the reign of Odoacer. We know nothing of his early years. A passage in a treatise falsely ascribed to him {De Disciplina Scholarium) and a mis- interpretation of a passage in Cassiodorus led early scholars to suppose that he spent some eighteen years in Athens pursuing his studies, but there is no foundation for this opinion. His father, consul in 487, seems to have died soon after; for Boetius states that, when he was bereaved of his parent, men of the highest rank took him under their charge {De Con. lib. ii. c. 3), especially the senator Q. Aur. Memmius Symmachus, whose daughter Rusticiana he married. By her he had two sons, Anicius Manlius Severinus Boetius and Q. Aurelius Memmius Symmachus. He became a favourite with Theodoric, the

Ostrogoth, who ruled in Rome from 500, and was one of his intimate friends. Boetius was consul in 510, and his sons, while still young, held the same honour together (522). Boetius regarded it as the height of his good fortune when he witnessed his two sons, consuls at the same time, convoyed from their home to the senate-house amid the enthusiasm of the masses. On that day, he tells us, while his sons occupied the curule chairs in the senate-house, he himself had the honour of pronouncing a panegyric on the monarch. But his good fortune did not last, and he attributes the calamities that came upon him to the ill-will which his bold maintenance of justice had caused, and to his opposition to every oppressive measure. Of this he mentions particular cases. A famine had begun to rage. The prefect of the praetbrium was determined to satisfy the soldiers, regardless altogether of the feelings of the provincials. He accordingly issued an edict for a coemptio, that is, an order compelling the provincials to sell their corn to the government, whether they would or not. This edict would have utterly ruined Campania. Boetius interfered. The case was brought before the king, and Boetius succeeded in averting the coemptio from the Campanians. And he gives as a crowning instance that he exposed himself to the hatred of the informer Cyprianus by preventing the punish- ment of Albinus, a man of consular rank. He mentions in another place that when at Verona the king was anxious to transfer the accusation of treason brought against

Albinus to the whole senate, he defended the senate at great risk. In consequence of the ill-will that Boetius had thus roused, he was accused of treason towards the end of the reign of Theodoric. The charges were that he had conspired against the king, that he was anxious to maintain the integrity of the senate, and to restore Rome to liberty, and that for this purpose he had written to the emperor Justin. Justin had, no doubt, special reasons for wishing to see an end to the reign of Theodoric. Justin was orthodox, Theodoric was an Arian. The orthodox subjects of Theodoric were suspicious of their ruler; and many would gladly have joined in a plot to displace him. The knowledge of this fact may have rendered Theodoric suspicious. But Boetius denied the accusation in unequivocal terms. He did indeed wish the integrity of the senate. He would fain have desired liberty, but all hope of it was gone. The letters addressed by him to Justin were forgeries, and he had not been guilty of any conspiracy. Notwithstanding his innocence he was condemned and sent to Ticinum (Pavia) where he was thrown into prison. It was during his confinement in this prison that he wrote his famous work De Consolatione Philosophiae. His goods were confiscated, and after an imprisonment of considerable duration he was put to death in 524. Procopius relates that Theodoric soon repented of his cruel deed, and that his death, which took place soon after, was hastened by remorse for the crime he had committed against his great counsellor.

Two or three centuries after the death of Boetius writers began to view his death as a martyrdom. Several Christian books were ascribed to him, and there was one especially on the Trinity (see below) which was regarded as proof that he had taken an active part against, the heresy of Theodoric. It was therefore for his orthodoxy that Boetius was put to death. And these writers delight to paint with minuteness the horrible tortures to which he was exposed and the marvellous actions which the saint performed at his death. He was locally regarded as a saint, but he was not canonized. The brick tower in Pavia in which he was confined was, and still is, an object of reverence to the country people. Finally, in the year 996, Otho III. ordered the bones of Boetius to be taken out of the place in which they had lain hid, and to be placed in the church of S. Pietro in Ciel d'Oro within a splendid tomb, for which Gerbert, afterwards Pope. Silvester II., wrote an inscription. Thence they were subsequently removed to a tomb beneath the high altar of the cathedral. It should be mentioned also that some have given him a decidedly Christian wife, of the name of Elpis, who wrote hymns, two of which are still extant (Daniel, Thes. Hymn. i. p. 156). This is a pure supposition inconsistent with chronology, and based only on a misinterpretation of

a passage in the De Consolatione.

The contemporaries of Boetius regarded him as a man of profound learning. Priscian the grammarian speaks of him as having attained the summit of honesty and of all sciences. Cassiodorus, magister officiorum under Theodoric and the intimate acquaintance of the philosopher, employs language equally strong, and Ennodius, the bishop of Pavia, knows no bounds for his admiration. Theodoric had a profound respect for his scientific abilities. He employed him in setting right the coinage. When he visited Rome with Gunibald, king of the Burgundians, he took him to Boetius, who showed them, amongst other mechanical contrivances, a sun-dial and a water-clock. The foreign monarch was astonished, and, at the request of Theodoric, Boetius had to prepare others of a similar nature, which were sent as presents to Gunibald.

The fame of Boetius increased after his death, and his influence during the middle ages was exceedingly powerful. His circum- stances peculiarly favoured this influence. He appeared at a time when contempt for intellectual pursuits had begun to pervade society. In his early years he was seized with a pas- sionate enthusiasm for Greek literature, and this continued through life. Even amidst the cares of the consulship he found time for commenting on the Categories of Aristotle. The idea laid hold of him of reviving the spirit of his countrymen by imbuing them with the thoughts of the great Greek writers. He formed the resolution to translate all the works of Aristotle and all the dialogues of Plato, and to reconcile the philosophy of Plato with that of Aristotle. He did not succeed in all t,hat he designed; but he did a great part of his work. He translated into Latin Aristotle's Analytica Priora et Posteriora, the Topica, and Elenchi Sophistici; and he wrote commentaries on Aristotle's Categories, on his book ittpl epfi-qvelas, also a commentary on the Isagoge of Porphyrius. These works formed to a large extent the source from which the middle ages derived their knowledge of Aristotle. (See Stahr, Aristoteles bei den Romern, pp. 196-234.) Boetius wrote also a commentary on the Topica of Cicero; and he was also the author of independent works on logic: — Intro- ductio ad Categoricos Syllogismos, in one book; De Syllogismis Categoricis, in two books; De Syllogismis Hypotheticis, in two books; De Divisione, in one book; De Definitione, in one book; De Differentiis Topicis, in four books.

We see from a statement of Cassiodorus that he furnished manuals for the quadrivium of the schools of the middle ages (the " quattuor matheseos disciplinae," as Boetius calls them) on arithmetic, music, geometry and astronomy. The statement of Cassiodorus that he translated Nicomachus is rhetorical. Boetius himself tells us in his preface addressed to his father-in- law Symmachus that he had taken liberties with the text of Nicomachus, that he had abridged the work when necessary, and that he had introduced formulae and diagrams of his own where he thought them useful for bringing out the meaning. His work on music also is not a translation from Pythagoras, who left no writing behind him. But Boetius belonged to the school of musical writers who based their science on the method of Pythagoras. They thought that it was not sufficient to trust to the ear alone, to determine the principles of music, as did practical musicians like Aristoxenus, but that along with the ear, physical experiments should be employed. The work of Boetius is in five books and is a very complete exposition of the subject. It long remained a text-book of music in the univer- sities of Oxford and Cambridge. It is still very valuable as a help in ascertaining the principles of ancient music, and gives us the opinions of some of the best ancient writers on the art. The manuscripts of the geometry of Boetius differ widely from each other. One editor, Godofredus Friedlein, thinks that there are only two manuscripts which can at all lay claim to contain the work of Boetius. He published the Ars Gcometriae, in two books, as given in these manuscripts; but critics are generally inclined to doubt the genuineness even of these. Professor Rand, Georgius Ernst and A. P. McKinlay regard the Ars as certainly inauthentic, while they accept the Interpretatio Euclidis (see works quoted in bibliography).

By far the most important and most famous of the works

of Boetius is his book De Consolatione Philosophiae. Gibbon justly describes it as " a golden volume, not unworthy of the leisure of Plato or Tully, but which claims incomparable merit from the barbarism of the times and the situation of the author." The high reputation it had in medieval times is attested by the numerous translations, commentaries and imitations of it which then appeared. Among others Asser, the instructor of Alfred the Great, and Robert Grosseteste, bishop of Lincoln, commented on it. Alfred translated it into Anglo-Saxon. Versions of it appeared in German, French, Italian, Spanish and Greek before the end of the 15th century. Chaucer translated it into English prose before the year 1382; and this translation was published by Caxton at Westminster, 1480. Lydgate followed in the wake of Chaucer. It is said that, after the invention of printing, amongst others Queen Elizabeth translated it, and that the work was well known to

Shakespeare. It was the basis of the earliest specimen of Provencal literature.

This famous work consists of five books. Its form is peculiar, and is an imitation of a similar work by Marcianus Capella, De Nuptiis Philologiae et Mercurii. It is alternately in prose and verse. The verse shows great facility of metrical composition, but a con- siderable portion of it is transferred from the tragedies of Seneca. The first book opens with a few verses, in which Boetius describes how his sorrows had brought him to a premature old age. As he is thus lamenting, a woman appears to him of dignified mien, whom he recognizes as his guardian, Philosophy. She, resolving to apply the remedy for his grief, questions him for that purpose. She finds that he believes that God rules the world, but does not know what he himself is; and this absence of self-knowledge is the cause of his weakness. In the second book Philosophy presents to Boetius Fortune, who is made to state to him the blessings he has enjoyed, and after that proceeds to discuss with him the kind of blessings that fortune can bestow, which are shown to be unsatisfactory and un- certain. In the third book Philosophy promises to lead him to true happiness, which is to be found in God alone, for since God is the highest good, and the highest good is true happiness, God is true happiness. Nor can real evil exist, for since God is all-powerful, and since he does not wish evil, evil must be non-existent. In the fourth book Boetius raises the question, Why, if the governor of the universe is good, do evils exist, and why is virtue often punished and vice rewarded? Philosophy proceeds to show that in fact vice is never unpunished nor virtue unrewarded. From this Philosophy passes into a discussion in regard to the nature of providence and fate, and shows that every fortune is good. The fifth and last book takes up the question of man's free will and God's foreknow- ledge, and, by an exposition of the nature of God, attempts to show that these doctrines are not subversive of each other; and the con- clusion is drawn that God remains a foreknowing spectator of all events, and the ever-present eternity of his vision agrees with the future quality of our actions, dispensing rewards to the good and punishments to the wicked.

Several theological works have been ascribed to Boetius, as has been already mentioned. The Consolatio affords conclusive proof that the author was not a practical believer in Christianity. The book contains expressions such as daemones, angelica virtus, and purgatoria dementia, which have been thought to be derived from the Christian faith; but they are used in a heathen sense, and are explained sufficiently by the circumstance that Boetius was on intimate terms with Christians. The writer nowhere finds consola- tion in any

Christian belief, and Christ is never named in the work. It is not impossible, however, that Boetius may have been brought up a Christian, and that in his early years he may have written some Christian books. Peiper thinks that the first three treatises are the productions of the early years of Boetius. The first, De Sancta Trinitate, is addressed to Symmachus (Domino Patri Sym- macho), and the result of the short discussion, which is of an abstract nature, and deals partly with the ten categories, is that unity is predicated absolutely, or, in regard to the substance of the Deity, trinity is predicated relatively. The second treatise is addressed to John the deacon ("Ad Joannem Diaconum"), and its subject is " Utrum Pater et Filius et Spiritus Sanctus de divinitate sub- stantialiter praedicentur." This treatise is shorter than the first, occupying only two or three pages, and the conclusion of the argu- ment is the same. The third treatise bears the title, Quomodo substantiae in eo quod sint bonae sint cum non sint substantialia bona. It contains nothing distinctly Christian, and it contains nothing of great value ; therefore its authorship is a matter of little consequence. Peiper thinks that, as the best MSS. uniformly assign these treatises to Boetius, they are to be regarded as his; that it is probable that Symmachus and John (who afterwards became Pope) were the men of highest distinction who took charge of him when he lost his father ; and that these treatises are the first-fruits of his studies, which he dedicates to his guardians and benefactors. He thinks that the variations in the inscriptions of the fifth treatise, which is not found in the best manuscript, are so great that the name of Boetius could

not have originally been in the title. The fourth book is also not found in the best manuscript, and two manuscripts have no inscrip- tion. He infers, from these facts, that there is no sure evidence for the authorship of the fourth and fifth treatises. The fifth treatise is Contra Eutychen et Nestorium. Both Eutyches and Nestorius are spoken of as living. A council is mentioned, in which a letter was read, expounding the opinion of the Eutychians for the first time. The novelty of the opinion is also alluded to. All these circumstances point to the council of Chalcedon (45l). The treatise was therefore written before the birth of Boetius, if it be not a forgery ; but there is no reason to suppose that the treatise was not a genuine production of the time to which it professes to belong. The fourth treatise, De Fide Catholica, does not contain any distinct chronological data ; but the tone and opinions of the treatise produce the impression that it probably belonged to the

same period as the treatise against Eutyches and Nestorius. Several inscriptions ascribe both these treatises to Boetius. It will be seen from this statement that Peiper bases his conclusions on grounds far too narrow; and on the whole it is perhaps more probable that Boetius wrote none of the four Christian treatises, particularly as they are not ascribed to him by any of his contemporaries. Three of them express in the strongest language the orthodox faith of the church in opposition to the Arian heresy, and these three put in unmistakable language the procession of the Holy Spirit from both Father and Son. The fourth argues for the orthodox belief of the two natures and one person of Christ. When the desire arose that it should be believed that Boetius perished from his opposition to the heresy of Theodoric, it was natural to ascribe to him works which were in harmony with this supposed fact. The works may really have been written by one Boetius, a bishop of Africa, as Jourdain supposes, or by some Saint Severinus, as Nitzsch conjectures, and the similarity of name may huve aided the transference of them to the heathen or neutral Boetius.

Important and, if genuine, decisive evidence upon this point is afforded by a passage in the Anecdoton Holderi, a fragment contained in a 10th-century MS. (ed. H. Usener, Leipzig, 1877). The fragment gives an extract from a previously unknown letter of Cassiodorus, the important words being ” Scripsit {i.e. Boetius) librum de sancta trinitate, et capita quaedam dogmatica, et librum contra Nestorium.” Nitzsch, however, held that this was a copyist’s gloss, harmonizing with the received Boetius legend, which had been transferred to the text, and did not consider that it outweighed the opposing internal evidence from De Cons. Phil.

Editions. — The first collected edition of the works of Boetius was published at Venice in 1492 (Basel, 1570) ; the last in J. P. Migne’s Patrologia, lxiii., lxiv. (Paris, 1847). Of the numerous editions of the De Consolatione the best are those of Theodorus Obbarius (Jena, 1843) and R. Peiper (Leipzig, 1871). The first contains prolegomena on the life and writings of Boetius, on his religion and philosophy, and on the manuscripts and editions, a critical apparatus, and notes. The text of the second was based on the fullest collation of MSS. up to that time, though a considerable number of MSS. still remained to be collated. In addition to an account of the MSS. used, it gives the Book of Lupus, ” De Metris Boetii,” the “Vita Boetii ” contained in some MSS., ” Elogia Boetii,” and a short list of the commentators, translators and imitators of the Consolatio. It contains also an account of the metres used by Boetius in the Consolatio, and a list of the passages which he has borrowed from the tragedies of Seneca. The work also includes the five treatises, four of them Christian, of which

mention has been made above. King Alfred's Anglo-Saxon version of the De Consolatione, with literal English translation, notes and glossary, was published by S. Fox (1835) and again by W. J. Sedgefield (1900); that of G. Colville (Colvile, Coldewel, 1556) was republished by E. B. Bax (1897); translation (mixed prose and verse) by H. R. James (1897). Queen Elizabeth's " Englishings " was reprinted in 1899; on the style, see A. Engel- brecht in Sitzungsber. der Wiener Akad. der Wissenschaften (1902), pp. 15-36. The De Institutione Arithmetica, De Institutione Musica, and the doubtful Geometria (for which see G. Ernst, De Geometricis Mis quae sub Boethii nomine nobis tradita sunt quaestiones, 1903 ; A. P. McKinlay in Harvard Classical Studies, 1907; M. Cantor, Geschichte der Mathematik, i., Leipzig, 1894; G. Friedlein, Gerbert, die Geometrie des Boethius, und die indischen Ziffern, Erlangen, 1861, are edited by G. Friedlein (Leipzig, 1867) ; German translation of the De Musica, with explanatory notes, by O. Paul (Leipzig, 1872), and on the sources W. Miekley, De Boethii libri de musica primi fontibus (Jena, 1899). Commentary on Aristotle's De Interpretation xepi «pM'!»'«as), ed. C. Meiser (Leipzig, 1877), and on Porphyry's Isagoge, ed. S. Brandt (Vienna, 1906).

Authorities. — On Boetius generally, see J. G. Sutterer, Der letzte Romer (Eichstadt, 1852); H. IJsener, Anecdoton Holderi (Leipzig, 1877); H. F. Stewart, Boethius: an Essay (Edinburgh 1891) ; T. Hodgkin, Italy and her Invaders, iii. bk. iv. ch. xii. (1896) A. Ebert, Allgemeine Geschichte der Lilt, des Mittelalters, i. (1889) Teuffel-Schwabe, Hist, of Roman Literature (Eng. trans., 1900), §478 on the date and order of his works, S. Brandt in Philologus, lxii, pp. 141-154, 234-279, and A. P. McKinlay, as above, with refs. on his " Songs," H. Huttinger, Studia in Boetii carmina collata (Regensburg, 1900) : on his style, G. Bednarz, De universo orationis colore Boethii (Breslau, 1883) : on his theological attitude and works,

F. A. B. Nitzsch, Das System des Boethius und die ihm zugeschriebenen theologischen Schriften (Berlin, i860), and art. in Herzog-Hauck's Realencyklopddie (1897) ; C. Jourdain, De I'Origine des traditions sur le christianisme de Boece (1861) ; Gaston Boissier, " Le Christianisme de Boece," in Journal des Savants (1889), pp. 449-462; A. Hilde- brand, Boethius und seine Stellung zum Christentume (Regensburg, 1885); G. Schepps, " Zu Pseudo-Boethius de fide catholica," in Zeitschrift fur wissenschaftliche Theologie, xxxviii. (1895).

BOG (from Ir. and Gael, bogach, bog, soft), a tract of soft, spongy, water-logged ground, composed of vegetation, chiefly mosses, in

various stages of decomposition. This vegetable matter when partially decomposed forms the substance known as ” peat ” (q.v.). When the accumulation of water is rapidly increased by excessive rainfall, there is a danger of a ” bog-slide,” or ” bog-burst,” which may obliterate the neighbouring culti- vated land with a deposit of the contents of the bog. Destructive bog-slides have occurred in Ireland, such as that of the Knock- nageeha Bog, Rathmore, Kerry, in 1896, at Castlerea, Ros- common, 1901, and at Kilmore, Galway, 1909.

There is a French game of cards called ” bog,” said to be of Italian origin, played with a piquet pack on a table with six divisions, one of which is known by the name of the game and forms the pool. It was fashionable during the Second Empire.

BOGATZKY, KARL HEINRICH VON (1690-17 74), German hymn-writer, was born at Jankowe in Lower Silesia on the 7th of September 1690. At first a page at the ducal court of Saxe- Weissenfels, he next studied law and theology at Jena and Halle; but ill-health preventing his preferment he settled at Glancha in Silesia, where he founded an orphanage. After living for a time at Kostritz, and from 1740 to 1745 at the court of Christian Ernst, duke of Saxe-Coburg, at Saalfeld, he made his home at the Waisenhaus (orphanage) at Halle, where he engaged in spiritual work and in composing hymns and sacred songs, until his death on the 15th of June 1774. Bogatzky’s chief works are Giildenes Schatzkdstlein der Kinder Gottes (17 18), which has reached more than sixty editions; and Ubung der Goltseligkeit in allerlei geistlichen Liedern (1750).

See Bogatzky’s autobiography — Lebenslauf von ihm selbst ge- schrieben (Halle, 1801 ; new ed., Berlin, 1872); and Ledderhose, Das Leben Bogatzky’s (Heidelberg, 1846) ; also Kelly, C. H. von Bogatzky’s Life and Work (London, 1889).

BOGHAZ KEUI, a small village in Asia Minor, north-west of Yuzgat in the Angora vilayet, remarkable for the ruins and rock-sculptures in its vicinity. The ruins are those of a ruling city of the oriental type which flourished in the pre-Greek period; and they are generally identified with Pteria (q.v.), a place taken by Croesus after he had crossed the Halys (Herodotus i. 76).

BOGIE, a northern English dialect word of unknown origin, applied to a kind of low truck or ” trolly.” In railway engineer- ing it is applied to an under-truck, most frequently with four wheels, which is often provided at one end of a locomotive or both ends of a carriage. It is pivoted or swivelled on the main frames, so that it can turn relatively

to the body of the vehicle or engine, and thus it enables the wheels readily to follow the curves of the line. It has no connexion with the series of words, such as ” bogey ” or ” bogy,” ” bogle,” ” boggle,” ” bogart ” (in Shakespeare “bug,” “bugs and goblins”), which are probably connected with the Welsh bwg, a spectre; hence the verb to ” boggle,” properly applied to a horse which shies at supposed spectres, and so meaning to hesitate, bungle.

BOGNOR, a seaside resort in the Chichester parliamentary division of Sussex, England, 66 m. S.S.W. from London by the London, Brighton & South Coast railway. Pop. of urban district (1901) 6180. Besides the parish church there is a Roman Catholic priory and church. The town possesses a pier and promenade, a theatre, assembly rooms, and numerous convalescent homes, including an establishment belonging to the Merchant Taylors’ Company. The church of the mother parish of South Bersted is Norman and Early English, and retains a fresco of the 16th century.

BOGO, a town of the province of Cebu, island of Cebu, Philip- pine Islands, on Bogo Bay at the mouth of the Bulac river, in the north-east part of the island. Pop. (1903) 14,915. The

climate is hot but healthy. The surrounding country is fertile, producing sugar, Indian corn, and maguay in abundance; rice, cacao and fruits are also produced. Hats, baskets, cloths and rope are woven and are exported to a limited extent; small quantities of copra are also exported. The fisheries are of considerable local importance. The language is Cebu-Visayan.

BOGODUKHOV, a town of Russia, in the government of Kharkov, 45 m. by rail N.W. of the city of that name, in 49 58′ N. lat. and 36° 9′ E. long., was formerly fortified. Pop. (i860) 10,522; (1897) 11,928. There seems to have been a settlement on this site as early as 1571. In 1709, at the time of the Russo- Swedish War, Bogodukhov was taken by Menshikov and the em- peror Alexius. It contains a cathedral, built in 1793. Boots, caps and furred gowns are manufactured, and gardening and tanning are carried on. The trade is principally in grain, cattle and fish. BOGOMILS, the name of an ancient religious community which had its origin in Bulgaria. It is difficult to ascertain whether the name was taken from the reputed founder of that sect, a certain pope Bogumil or Bogomil, or whether he assumed that name

after it had been given to the whole sect. The word is a direct translation into Slavonic of Massaliani, the Syrian name of the sect corresponding to the Greek Euchites. The Bogomils are identified with the Massaliani in Slavonic docu- ments of the 13th century. They are also known as Pftvlikeni, i.e. Paulicians. It is a complicated task to determine the true character and the tenets of any ancient sect, considering that almost all the information that has reached us has come from the opponents. The heretical literature has to a great extent either perished or been completely changed; but much has also survived in a modified written form or through oral tradition. Concerning the Bogomils something can be gathered from the information collected by Euthymius Zygadenus in the 12th century, and from the polemic Against the Heretics written in Slavonic by St Kozma during the 10th century. The old Slavonic lists of forbidden books of the 15th and 16th centuries also give us a clue to the discovery of this heretical literature and of the means the Bogomils employed to carry on their propaganda. Much may also be learnt from the doctrines of the numerous heretical sects which arose in Russia after the nth century.

The Bogomils were without doubt the connecting link between the so-called heretical sects of the East and those of the West. They were, moreover, the most active agents in disseminating such teachings in Russia and among all the nations of Europe. They may have found in some places a soil already prepared by more ancient tenets which had been preserved in spite of the persecution of the official Church, and handed down from the period of primitive Christianity. In the 12th and 13th centuries the Bogomils were already known in the West as “Bulgari.” In 1207 the Bulgarornm heresis is mentioned. In 1223 the Albigenses are declared to be the local Bougres, and at the same period mention is made of the ” Pope of the Albigenses who resided within the confines of Bulgaria.” The Cathars and Patarenes, the Waldenses, the Anabaptists, and in Russia the Strigolniki, Molokani and Dukhobortsi, have all at different times been either identified with the Bogomils or closely connected with them.

Doctrine. — From the imperfect and conflicting data which are alone available one positive result can be gathered, viz. that the Bogomils were both Adoptionists and Manichaeans. They had accepted the teaching of Paul of Samosata, though at a later period the name of Paul was believed to be that of the Apostle; and they were not quite free from the Dualistic principle of the Gnostics, at a later period too much identified with the teaching of Mani. They rejected the pneumatic Christianity of the orthodox churches and did not accept the docetic teaching of some of the other sects. Taking as our starting-

point the teaching of the heretical sects in Russia, notably those of the 14th century, which are a direct continuation of the doctrines held by the Bogomils, we find that they denied the divine birth of Christ, the personal coexistence of the Son with the Father and Holy Ghost, and the validity of sacraments and ceremonies. The miracles performed by Jesus were interpreted in a spiritual sense, not as real material occurrences; the Church was the in-

terior spiritual church in which all held equal share. Baptism was only to be practised on grown men and women. The Bogomils repudiated infant baptism, and considered the bap- tismal rite to be of a spiritual character neither by water nor by oil but by self-abnegation, prayers and chanting of hymns. Carp Strigolnik, who in the 14th century preached this doctrine in Novgorod, explained that St Paul had taught that simple- minded men should instruct one another; therefore they elected their ” teachers ” from among themselves to be their spiritual guides, and had no special priests. Prayers were to be said in private houses, not in separate buildings such as churches. Ordination was conferred by the congregation and not by any specially appointed minister. The congregation were the ” elect,” and each member could obtain the perfection of Christ and become a Christ or ” Chlist.” Marriage was not a sacra- ment. The Bogomils refused to fast on Mondays and Fridays. They rejected monachism. They declared Christ to be the Son of God only through grace like other prophets, and that the bread and wine of the eucharist were not transformed into flesh and blood; that the last judgment would be executed by God and not by Jesus; that the images and the cross were idols and the worship of saints and relics idolatry.

These Paulician doctrines have survived in the great Russian sects, and can be traced back to the teachings and practice of the Bogomils. But in addition to these doctrines of an adoptionist origin, they held the Manichaean dualistic conception of the origin of the world. This has been partly preserved in some” of their literary remains, and has taken deep root in the beliefs and traditions of the Bulgarians and other nations with whom they had come into close contact. The chief literature of all the heretical sects throughout the ages has been that of apocryphal Biblical narratives, and the popes Jeremiah or Bogumil are directly mentioned as authors of such forbidden books ” which no orthodox dare read.” Though these writings are mostly the same in origin as are known from the older lists of apocryphal books, they underwent in this case a certain modification at the hands of their Bogomil editors, so as to be used for the propaga- tion of their own specific doctrines. In its most simple and attractive form — one at the same time invested with the authority of the reputed holy author —

their account of the creation of the world and of man; the origin of sin and redemption, the history of the Cross, and the disputes between body and soul, right and wrong, heaven and hell, were embodied either in " Historiated Bibles" (Paleya 1) or in special dialogues held between Christ and his disciples, or between renowned Fathers of the Church who expounded these views in a simple manner adapted to the understanding of the people (Lucidaria). The Bogomils taught that God had two sons, the elder Satanail and the younger Michael. The elder son rebelled against the father and became the evil spirit. After his fall he created the lower heavens and the earth and tried in vain to create man; in the end he had to appeal to God for the Spirit. After creation Adam was allowed to till the ground on condition that he sold himself and his posterity to the owner of the earth. Then Michael was sent in the form of a man; he became identified with Jesus, and was "elected" by God after the baptism in the Jordan. When the Holy Ghost (Michael) appeared in the shape of the dove, Jesus received power to break the covenant in the form of a clay tablet (hierograpkon) held by Satanail from Adam. He had now become the angel Michael in a human form; as such he van- quished Satanail, and deprived him of the termination -il = God, in which his power resided. Satanail was thus transformed into Satan. Through his machinations the crucifixion took place, and Satan was the originator of the whole Orthodox community with its churches, vestments, ceremonies, sacraments and fasts, with its monks and priests. This world being the work of Satan, the perfect must eschew any and every excess of its pleasure. But the Bogomils did not go as far as to recommend asceticism. They held the " Lord's Prayer " in high respect as the most

1 These betray their Gnostic (Marcianite) spirit by the anti- Jewish tone of the oldest MSS, extant, though this prejudice tends to decrease in later MSS.

potent weapon against Satan, and had a number of conjurations against " evil spirits." Each community had its own twelve " apostles," and women could be raised to the rank of " elect." The Bogomils wore garments like mendicant friars and were known as keen missionaries,. travelling far and wide to propagate their doctrines. Healing the sick and conjuring the evil spirit, they traversed different countries and spread their apocryphal literature along with some of the books of the Old Testament, deeply influencing the religious spirit of the nations,

and preparing them for the Reformation. They sowed the seeds of a rich religious popular literature in the East as well as in the West. The Historiated Bible, the Letter from Heaven, the Wanderings through Heaven and Hell, the numerous Adam and Cross legends, the religious poems of the ” Kaleki perehozhie ” and other similar productions owe their dissemination to a large extent to the activity of the Bogomils of Bulgaria, and their successors in other lands.

History. — The Bogomil propaganda follows the mountain chains of central Europe, starting from the Balkans and con- tinuing along the Carpathian Mountains, the Alps and the Pyrenees, with ramifications north and south (Germany, England and Spain). In the middle of the 8th century the emperor Con- stantine Copronymus settled a number of Armenian Paulicians in Thracia. These were noted heretics and were persecuted by the Greek Church with fire and sword. The empress Theodora killed, drowned or hanged no fewer than 100,000. In the 10th century the emperor John Zimisces, himself of Armenian origin, transplanted no less than 200,000 Armenian Paulicians to Europe and settled them in the neighbourhood of Philippopolis, which henceforth became the centre of a far-reaching propaganda. Settled along the Balkans as a kind of bulwark against the invading Bulgars, the Armenians on the contrary soon frater- nized with the newcomers, whom they converted to their own views; even a prince of the Bulgarians adopted their teaching. According to Slavonic documents the founder of this sect was a certain priest Bogumil, who ” imbibed the Manichaean teaching and flourished at the time of the Bulgarian emperor Peter ” (927-968). According to another source the founder was called Jeremiah (or there was another priest associated with him by the name of Jeremiah). The Slavonic sources are unanimous on the point that his teaching was Manichaean. A Synodikon from the year 12 10 adds the names of his pupils or ” apostles,” Mihail, Todur, Dobri, Stefan, Vasilie and Peter, all thoroughly Slavonic names. Zealous missionaries carried their doctrines far and wide. In 1004, scarcely 15 years after the introduction of Christianity into Russia, we hear of a priest Adrian teaching the same doctrines as the Bogomils. He was imprisoned by Leontie, bishop of Kiev. In n 25 the Church in the south of Russia had to combat another heresiarch named Dmitri. The Church in Bulgaria also tried to extirpate Bogomilism. The popes in Rome whilst leading the Crusade against the Albigenses did not forget their counterpart in the Balkans and recommended the annihilation of the heretics.

The Bogomils spread westwards, and settled first in Servia; but at the end of the 12th century Stephen Nemanya, king of Servia, persecuted them and expelled them from the country. Large numbers took refuge

in Bosnia, where they were known under the name of Patarenes (q.v.) or Patareni. From Bosnia their influence extended into Italy (Piedmont) . The Hungarians undertook many crusades against the heretics in Bosnia, but towards the close of the 1 5th century the conquest of that country by the Turks put an end to their persecution. It is alleged that a large number of the Bosnian Paterenes, and especially the nobles, embraced Islam (see Bosnia and Herzegovina: History). Few or no remnants of Bogomilism have survived in Bosnia. The Ritual in Slavonic written by the Bosnian Radoslavov, and published in vol. xv. of the Starine of the South Slavonic Academy at Agram, shows great resemblance to the Cathar ritual published by Cunitz, 1853. See F. Racki, ” Bogomili i Paternai” in Rod, vols, vii., viii. and x. (Agram, 1870); Dollinger, Beitrage zur Ketzergeschichte d. Mittelalters, 2 vols. (Munich, 1890).

Under Turkish rule the Bogomils lived unmolested as Pavlikeni in their ancient stronghold near Philippopolis, and farther northward. In 1650 the Roman Catholic Church gathered them into its fold. No less than fourteen villages near Nicopolis embraced Catholicism, and a colony of Pavlikeni in the village of Cioplea near Bucharest followed the example of their brethren across the Danube.

Bibliography.— Euthymius Zygadenus, Narratio de Bogomilis, ed. . Gieseler (Gottingen, 1842); J. C. Wolf, Historic, Bogomilorum (Wittenberg, 1712); ” Slovo svyatago Kozmyi na eretiki,” in Kukuljevic Sakcinski, Arkiv zapovyestnicu jugoslavensku, vol iv pp. 69-97 (Agram, 1859); C. J. Jirecek, Geschichte d. Bulgaren, pp’ 155. 174-175 (Prague, 1876); Korolev, ” Dogmatichesko-to uchenie na Bogomil-tie, in Periodichesko spisanie, vols. vii. -viii. pp. 75-106 (Braila, 1873); A. Lombard, Pauliciens, Bulgares et Bons-hommes (Geneva, 1879); Episcopul Melchisedek, Lipovenismul, pp. 265 son (Bucharest, 1871); B. P. Hasdeu, Cuvenie den batrani, vol. ii pp 247 sqq. (Bucharest, 1879); F. C. Conybeare, The Key of Truth, pp. 73 sqq. and specially pp. 138 sqq. (Oxford, 1898); M. Gaster, Greeko- blavonic Literature, pp. 17 sqq. (London, 1887); O. Dahnhardt, Natursagen, vol. 1. pp. 38 sqq. (Leipzig and Berlin, 1907). (M. G.)

BOGORODSK, a town of central Russia, in the government of Moscow, and 38 m. by rail E.N.E. of the city of Moscow, on the Klyazma. It has woollen, cotton and silk mills, chemical factories and dye-works, and is famous for its gold brocade. Pop. (1897) 11,210.

BOGOS (Bilens), a pastoral race of mixed Hamitic descent, occupying the highlands immediately north of Abyssinia, now part of the Italian colony of Eritrea. They were formerly a self-governing community,

though subject to Abyssinia. The community is divided into two classes, the Shumaglieh or ” elders ” and TigrS or ” clients.” The latter are serfs of the former, who, however, cannot sell them. The Tigre goes with the land, and his master must protect him. In blood-money he is worth another Tigre or ninety-three cows, while an elder’s life is valued at one hundred and fifty-eight cattle or one of his own caste. The eldest son of a Shumaglieh inherits his father’s two-edged sword, white cows, lands and slaves, but the house goes to the youngest son. Female chastity is much valued, but women have no rights, inherit nothing, and are classed with the hyaena, the most despised animal throughout Abyssinia. The Bogo husband never sees the face or pronounces the name of his mother-in-law, while it is a crime for a wife to utter her husband’s or father-in-law’s name.

BOGOTA, or Santa Fe de Bogota, the capital of the republic of Colombia, and of the interior department of Cundinamarca, in 4° 6′ N. lat. and 78° 30′ W. long. Pop. about 125,000. The city is on the eastern margin of a large elevated plateau 8563 ft. above sea-level. The plateau may be described as a great bench or shelf on the western slope of the oriental Cordilleras, about 70 m. long and 30 m. wide, with a low rim on its western margin and backed by a high ridge on the east. The plain forming the plateau is well watered with numerous small lakes and streams. • These several small streams, one of which, the San Francisco, passes through the city, unite near the south-western extremity of the plateau and form the Rio Funza, or Bogota, which finally plunges over the edge at Tequendama in a beautiful, perpendicular fall of about 475 ft. The city is built upon a sloping plain at the base of two high mountains La Gaudalupe and Monserrate, upon whose crests stand two imposing churches. From a broad avenue on the upper side downward to the west slope the streets, through which run streams of cool, fresh water from the mountains above. The north and south streets cross these at right angles, and the blocks thus formed are like great terraces. A number of hand- somely-laid -out plazas, or squares, ornamented with gardens and statuary, have been preserved; on these face the principal public buildings and churches. In Plaza Bolivar is a statue of Bolivar by Pietro Tenerani (1789-1869), a pupil of Canova, and in Plaza Santander is one of General Francisco de Paula Santander (1792-1840). Facing on Plaza de la Constitucion are the capitol and cathedral. The streets are narrow and straight, but as a rule they are clean and well paved. Owing to the prevalence of earthquakes, private houses ars usually of one storey only, and are built of sun-dried bricks,

white-washed. But few of the public buildings are imposing in appearance, though good taste in style and decoration are often shown.

The city occupies an area of about_2-|Xi2 m – It has street cars, electric light and telephones. Short lines of railway con- nect it with Facatativa (24 m.) on the road to Honda, and with Zipaquira, where extensive salt mines are worked. A line of railway was also under construction in 1906 to Jirardot, at the head of navigation on the upper Magdalena. Bogota is an archiepiscopal see, founded in 1561, and is one of the strongholds of medieval clericalism in South America. It has a cathedral, rebuilt in 1814, and some 30 other churches, together with many old conventual buildings now used for secular purposes, their religious communities ha.ving been dissolved by Mosquera and their revenues devoted in great measure to education. The capitol, which is occupied by the executive and legislative departments, is an elegant and spacious building, erected since 1875. The interest which Bogota has always taken in education, and because of which she has been called the ” Athens of South America,” is shown in the number and character of her institu- tions of learning — a university, three endowed colleges, a school of chemistry and mineralogy, a national academy, a military school, a public library with some 50,000 volumes, a national observatory, a natural history museum and a botanic garden. The city also possesses a well-equipped mint, little used in recent years. The plain surrounding the city is very fertile, and pastures cattle and produces cereals, vegetables and fruit in abundance. It was the centre of Chibcha civilization before the Spanish conquest and sustained a large population. The climate is mild and temperate, the average annual temperature being about 58° and the rainfall about 43J in. The geographical location of the city is unfavourable to any great development in commerce and manufactures beyond local needs.

Bogota was founded in 1 538 by Gonzalo Jimenez de Quesada and was named Santa Fe de Bogota after his birthplace Santa Fe, and after the southern capital of the Chibchas, Bacata (or Funza). It was made the capital of the viceroyalty of Nueva Granada, and soon became one of the centres of Spanish colonial power and civilization on the South American continent. In 1811 its citizens revolted against Spanish rule and set up a government of their own, but in i8r6 the city was occupied by Pablo Morillo (1777-1838), the Spanish general, who subjected it to a ruthless military government until 1810, when Bolivar’s victory at Boyaca compelled its evacuation. On the creation

of the republic of Colombia, Bogota became its capital, and when that republic was dissolved into its three constituent parts it remained the capital of Nueva Granada. It has been the scene of many important events in the chequered history of Colombia. (A. J. L.)

BOGRA, or Bagtjra, a town and district of British India, in the Rajshahi division of eastern Bengal and Assam. The town is situated on the right bank of the river Karatoya. Pop. (1901) 7094. The District of Bogra, which was first formed in 1821, lies west of the main channel of the Brahmaputra. It contains an area of 1359 sq.m. Inigoi the population (on a reduced area) was 854,533, showing an increase of 11% in the decade. The district stretches out in a level plain, intersected by numerous streams and dotted with patches of jungle. The Karatoya river flows from north to south, dividing it into two portions, possessing very distinct characteristics. The eastern tract consists of rich alluvial soil, well watered, and subject to fertilizing inundations, yielding heavy crops of coaise rice, oil-seeds and jute. The western portion of the district is high-lying and produces the-finer qualities of rice. The principal rivers are formed by the different channels of the Brahmaputra, which river here bears the local names of the Konai, the Daokoba and the Jamuna, the last forming a portion of the eastern boundary of the district. Its bed is studded with alluvial islands. The Brahmaputra and its channels, together with three minor streams, the Bangali, Karatoya and Atrai, afford admirable facilities for commerce, and render every part of the district accessible to native cargo boats of large burden. The rivers swarm with fish. The former

production of indigo is extinct, and the industry of silk-spinning is decaying. There is no town with as many as 1 0,000 inhabitants, trade being conducted at riverside marts. Nor are there any metalled roads. Several lines of railway (the Eastern Bengal, &c), however, serve the district.

BOGUE, DAVID (1750-1825), British nonconformist divine, was born in the parish of Coldingham, Berwickshire. After a course of study in Edinburgh, he was licensed to preach by the Church of Scotland, but made his way to London (1721), where he taught in schools at Edmonton, Hampstead and Camberwell. He then settled as minister of the Congregational church at Gosport in Hampshire (1777), and to his pastoral duties added the charge of an institution for preparing men for the ministry. It was the age of the new-born missionary enterprise, and Bogue's academy was in a very large measure the seed from which the London Missionary Society took its growth. Bogue himself would have gone to India in 1796 but for the opposition of the East India Company. He also had much to do with founding the British and

Foreign Bible Society and the Religious Tract Society, and in conjunction with James Bennet, minister at Romsey, wrote a well-known History of Dissenters (3 vols., 1809). Another of his writings was an Essay on the Divine Authority of the New Testament. He died at Brighton on the 25th of October

1825.

BOGUS (of uncertain origin, possibly connected with the Fr. bagasse, sugar-cane refuse), a slang word, originally used in America of the apparatus employed in counterfeiting coins, and now generally of any sham or spurious transaction.

BOHEA (a word derived from the Wu-i hills in the Fuhkien province of China, b being substituted for IF or V), a kind of black tea (q.v.), or, in the 18th and early 19th centuries, tea generally, as in Pope's line, " So past her time 'twixt reading and bohea." Later the name " bohea " has been applied to an inferior quality of tea grown late in the season.

BOHEMIA 1 (Ger. Bohmen, Czech Cechy, Lat. Bohemia), a kingdom and crownland of Austria, bounded N.E. by Prussian Silesia, S.E. by Moravia and Lower Austria, S. by Upper Austria, S.W. by Bavaria and N.W. by Saxony. It has an area of 20,060 sq. m., or about two-thirds the size of Scotland, and forms the principal province of the Austrian empire. Situated in the geographical centre of the European continent, at about equal distance from all the European seas, enclosed by high moun- tains, and nevertheless easily accessible through Moravia from the Danubian plain and opened by the valley of the Elbe to the German plain, Bohemia was bound to play a leading part in the cultural development of Europe. It became early the scene of important historical events, the avenue and junction of the migration of peoples; and it forms the borderland between the German and Slavonic worlds.

Geography. — Bohemia has the form of an irregular rhomb, of which the northernmost place, Buchberg, just above Hainspach, is at the same time the farthest north in the whole Austro- Hungarian monarchy. From an orographic point of view, Bohemia constitutes amongst the Austrian provinces a separate massif, bordered on three sides by mountain ranges: on the S.W. by the Bohmerwald or Bohemian Forest; on the N.W. by the Erzgebirge or Ore Mountains; and on the N.E. by the Riesengebirge or Giant Mountains and other ranges of the Sudetes. The Bohmerwald, which, like its parallel range, the

1 As a guide to the English-speaking reader, the following notes on the pronunciation of Bohemian names are appended. The Czech (Cech) alphabet is the same as the English, with the omission of the letters q, w and x. Certain letters, however, vary in pronunciation, and are distinguished by diacritical marks, a device orginated by John Huss. The vowels a, e, i, (y), o, u, are pronounced as in Italian; but e = Eng. ye in ” yet,” and u = Eng. 00.

The consonants, b, d, f, k, 1, m, n, p, r, v, z, are as in English; g = Eng.g in ” gone “; s = £ng. initial s. But ii = Span. n (in canon); f = rsh; s = sh; z = zh (i.e. the French j); k before d=jj; v before k, p, s, t = f. Of the other consonants c = Eng. ts; c = ch; ch = Germ, ch; j =Eng. y, but is not pronounced before d, m, s. Accents on vowels lengthen them; on d and t they are softening marks. H is always pronounced in Czech. At the end of words and before k and t it = Germ, ch; in other places, as in bahno (morass) its pronunciation is somewhat softer.

Sudetes, has a general direction from S.E. to N.W., is divided by the pass of Neumarkinto two parts. The northern part (Czech Cesky Les) attains in the massif of Czerkov an altitude of 3300 ft., but the southern part (Czech Sumava) is at the same time the highest and the most picturesque part of the range, including on the Bohemian side the Osser (4053 ft.) and the Plockenstein (4513 ft.), although the highest peak, the Arber (4872), is in Bavaria. The beauty of this range of mountains consists in its pure crystalline torrents, in the numerous blue lakes of its valleys, and above all in the magnificent forests of oak and pine with which its sides are covered. The pass of Neumark, called also the pass of Neugedein, has always been the principal approach to Bohemia from Germany. It stretches towards the east, above the small town of Taus (Czech Domazlice, once called TuhoH, i.e. the Fortress), and is the place where some of the bloodiest battles in the history of Bohemia were fought. Here in the first half of the 7th century Samo repulsed the invading hordes of the Avars, which threatened the independence of the newly- settled Slavonic inhabitants; here also Wratislas II. defeated the German emperor Henry III. in a two-days’ battle (August 22 and 23, 1040). It was in the same place that the Hussites gained in 143 1 one of their greatest victories against a German army of crusaders, and another similar

German army was van- quished here by George of Podebrad.

The Erzgebirge (Czech Rudo Horl), which form the north-west frontier, have an average altitude of 2600 ft., and as their highest point, the Keilberg (4080 ft.). The numerous mining villages, the great number of cultivated areas and the easy passes, traversed by good roads, give those mountains in many places the aspect of a hilly undulating plain. Several of the villages are built very near the summit of the mountains, and one of them, Gottesgab (pop. about 1500), lies at an altitude of 334S ft., the highest place in Bohemia and central Germany. To the west the Erzgebirge combine through the Elstergebirge with the Fichtelgebirge, which in their turn are united with the Bohmerwald through the plateau of Waldsassen. To the east the Erzgebirge are separated from the Elbsandsteingebirge by the Nollendorf pass, traversed by the ancient military route to Saxony; it was the route followed by Napoleon I. after the battle of Dresden (1813). To the south stretches the ” Ther- mopylae of Bohemia,” the scene of the battle of Kulm and Arbesau. A little farther to the east the Elbe escapes into Saxony at the lowest point in Bohemia (alt. 367 ft.). The north- east frontier is formed by the Sudetes, which comprise the Lausitzergebirge (2500 ft.), the Isergebirge (with the highest peak, the Tafelfichte, 3683 ft.), the Jeschkengebirge (3322 ft.), and the Riesengebirge. The Riesengebirge (Czech Kroknose) are, after the Alps, among the highest mountains of central Europe, and attain in the Schneekoppe an altitude of 5264 ft. The last groups of the Sudetes in Bohemia are the Heuscheuerge- birge (2532 ft.) and the AdI’ergebirge (3664 ft.). The fourth side of the rhomb is formed by the so-called Bohemian-Moravian Hills, a plateau or broad series of low hills, composed of primitive rocks, and attaining in some places an altitude of 2500 ft.

The interior of Bohemia has sometimes been compared to a deep basin; but for the most part it is an undulating plateau, over 1000 ft. high, formed by a succession of terraces, which gradually slope down from south to north. Its lowest-lying points are not in the middle but in the north, in the valley of the Elbe, and the country can be divided into two parts by a line passing through Hohenmauth-Prague-Komotau. The part lying to the south of this line can be designated as highland, and only the part north of it as lowland. The mountain-ranges of the interior of Bohemia are the Brdywald (2798 ft.) in the middle; the Tepler Gebirge (2657 ft.), the Karsbader Gebirge (3057 ft.) and the Kaiserwald (3238 ft.), in the north-west part; while the northern corner is occupied by the Mittelgebirge (2739 ft.), a volcanic massif, stretching on both sides of the Elbe.

Bohemia belongs to the watershed of the Elbe, which rises within the territory and receives on the right the Iser and the Polzen, and on the left the Adler; the Eger with its affluent the Tepl; the Biela and the Moldau. But the principal river of

Bohemia, from every point of view, is the Moldau (Czech Vltava), not the Elbe. A glance at the hydrographic structure of Bohemia, which is of such a striking regularity, shows us that the Moldau is the main stem, while the Elbe and the other rivers are only lateral branches; moreover, the Elbe below Melnik, the point of its confluence with the Moldau, follows the general direction of the Moldau. Besides, the Moldau is the principal commercial artery of the country, being navigable below Budweis, while the Upper-Elbe is not navigable; its basin (11,890 sq. m.) is twice as great as that of the Elbe, and its width and depth are also greater. It has a length of 270 m., 47 m. longer than the Upper-Elbe, but it runs through a deep and narrow valley, in which there is neither road nor railway, extending from above Budweis to about 15 m. south of Prague. The Moldau receives on the right the Luzniza and the Sazawa and on the left the Wottawa and the Beraun. The Beraun is formed by the union of the Mies with the Radbusa, Angel and Uslawa, and is the third most important river of the country. There are only a few lakes, which are mostly found at high altitudes.

Climate. — Bohemia has a continental, generally healthy climate, which varies much in different parts of the country. It is mildest in the centre, where, e.g. at Prague, the mean annual temperature is 48-5° F. The rainfall varies also according to the districts, the rainy season being the summer. Thus the mean annual rainfall in the interior of Bohemia is 18 in., in the Riesen- gebirge 40 in., while in the Bohmerwald it reaches 60 to 70 in.

Agriculture. — Favoured with a suitable climate and inhabited by a thriving rural population, Bohemia is very highly developed in the matter of agriculture. Over 50% of the whole area is under cultivation and the soil is in many parts very fertile, the best-known regions being the ” Golden Road ” round Konig- gratz, the ” Paradise ” round Teplitz, and the ” Garden of Bohemia ” round Leitmeritz. The principal products are oats, rye, barley and wheat, but since the competition of Hungarian wheat large tracts of land have been converted to the cultivation of beetroot. The potato crop, which forms the staple food of the people, is great; the Saaz district is celebrated for hops, and the flax is also of a good quality. Fruit, especially plums, is very abundant and constitutes a great article of export. The forests cover 29-01% of the total area; meadows, 10-05, pastures 5-05, and

gardens 1-35%. Cattle-rearing is not so well developed as agriculture, but great flocks of geese are reared, especially in the south, and bee-cultivation constitutes another important industry. Pisciculture has been for centuries successfully pursued by the Bohemian peasants, and the attempts recently made for the rearing of silkworms have met with fair success.

Minerals. — Except salt, which is entirely absent, almost every useful metal and mineral is to be found. First in import- ance, both in quantity and in value, come lignite and coal. Some of the richest lignite fields in Europe are found in the north-east corner of Bohemia round Briix, Dux, Falkenau, Ossegg and Teplitz. Coal is mined round Kladno, Buschtehrad, Pilsen, Schlan, Rakonitz, Niirschan and Radnitz, the last- named place containing the oldest coal mines of Bohemia (17th century). Iron ores are found at Krusnahora and Nucic, and the principal foundries are round Kladno and Konigshof. Owing to the improvements in refining, Bohemia has become an important centre of the iron industry. Silver is extracted at Pribram and Joachimsthal, but the silver mines near Kutten- berg, famous in the middle ages, are now abandoned. Lead is extracted at Pribram, tin at Graupen in the Erzgebirge, the only place in Austria where this metal is found. Antimony is extracted at Milleschau near Tabor; uranium and radium near Joachims- thal; graphite near Krumau and Budweis; porcelain-earth near Carlsbad. Other minerals found in various places of Bohemia are copper, sulphur, cobalt, alum, nickel, arsenic and various sorts of precious stone, like the Bohemian garnet (pyrope), and building stone. A large amount of peat is collected, especially in the south-west of Bohemia, as well as a great quantity of asphalt.

Bohemia possesses over two hundred mineral springs, but only a few are used for medicinal purposes. Among them are

some of the most celebrated mineral springs in the world, such as Carlsbad, Marienbad, Franzensbad, Teplitz-Schonau and Bilin. Other springs of importance are Piillna, Sedlitz and Seidschitz near Brux; Giesshiibl near Carlsbad; Liebwerda, Konigswart, Sangerberg, Neudorf, Tetschen, Johannisbad, situated at the foot of the Schneekoppe, &c.

Manufactures and Commerce. — From an industrial point of view, Bohemia takes the first rank amongst the Austrian pro- vinces, and at the same time is one of the greatest manufacturing centres of Europe. Rich as the country is in coal and iron, and in water supplies which can be transformed into motive power, the inhabitants were not slow to utilize these advantages, so that the industry of Bohemia made enormous strides during the last half of the 19th century. The glass industry was introduced from Venice in the 13th century and soon attained a vast im- portance; the factories are in the neighbourhood of the moun- tains, where minerals, and especially silica and fuel, are plentiful. The finest product, the crystal-glass, is made round Haida and Steinschonau. The very extensive porcelain industry is concen- trated in and around Carlsbad. The textile industry stands in the front rank and is mostly concentrated in the north-east corner of Bohemia, round Reichenberg, and in the valley of the Lower Elbe.- The cloth manufacture is located at Reichenberg; Rumburg and Trautenau are the centre of the linen industry; woollen yarns are made at Aussig and Asch. Lace, which is pursued as a home-industry in the Erzgebirge region, has its principal centre at Weipert, while Strakonitz has the speciality of the manufacture of red fezes (Turkish caps). The metallurgic industries, favoured by the abundance of coal and iron, are concentrated round the mines. Industrial and agricultural machinery are manufactured at Reichenberg, Pilsen and Prague, and at the last-named place is also to be found a great establish- ment for the production of railway rolling-stock. Sugar refining is another industry, which, although of recent date, has had a very great development, and the breweries produce a beer which is appreciated all over the world. Other important branches of industry are:— the manufacture of chemicals at Prague and Aussig; pencils at Budweis; musical instruments at Graslitz and Schonbach; paper, leather, dyeing and calico- printing. Hand-in-hand with the industrial activity of the country goes its commercial development, which is stimulated by an extensive railway system, good roads and navigable rivers. The centre of the railway system, which had in 1898 a length of some 3500 m., or 30% of the total length of the Austrian railways, is Prague; and through the Elbe Bohemia has easy access to the sea for its export trade.

Population and Administration. — Bohemia had in 1900 a population of 6,318,280, which corresponds to 315 inhabitants per square mile. As regards numbers, it occupies the second place amongst the Austrian provinces, coming after Galicia, and as regards density of population it stands third, Silesia and Lower Austria, which contains Vienna, standing higher. In 1800 the population was a little over 3,000,000.

According to nationality, about 35% are Germans and 65% Czechs. The Czechs occupy the middle of the country, as well as its south and south-east region, while the Germans are concentrated near its borders, especially in the north and west, and are also found all over the country in the large towns. Besides, there are numerous German-speaking enclaves situated in purely Czech districts; on the other hand, the Czechs have shown a tendency to invade the purely German mining and manufacturing districts. Not- withstanding its rich natural resources and its great industrial development, Bohemia sends out a steady flow of emigrants, who either settle in the other provinces of the monarchy, in Germany and in Russia, or cross the Atlantic to America. To the Roman Catholic Church belong 96 % of the total population; Bohemia is divided into the archbishopric of Prague, and the three bishoprics of Budweis, Koniggratz and Leitmeritz.

Education is well advanced, and Bohemia has the lowest proportion of illiterates amongst the Austrian provinces. At the head of the educational establishments stand the two universities at Prague, one German and the other Czech.

Bohemia sends 130 deputies to the Reichsrat at Vienna; the local diet, to which belong ex officio the archbishop, the three bishops, and the two rectors of the universities, consists of 242 members. For administrative purposes Bohemia is divided into ninety-four districts and two autonomous municipalities, Prague (pop. 204,478), the capital, and Reichenberg (34,204). Other important towns are Pilsen (68,292), Budweis (39,360), Aussig (37, 2 SS), Schonau (24,110), Eger (23,665), Warnsdorf (21,150), Brux (21,525), Gablonz (21,086), Asch (18,675), Kladno (18,600), Pardubitz (17,029), Saaz (16,168), Komotau (15,925), Kolin (15,025), Kuttenberg (14,799), Trautenau (14,777), Carlsbad (14,640), Pribram (13,576), Jungbunzlau (13,479), Leitmeritz (13,075), Chrudim (13,017), Dux (11,921), B.oden- bach (10,782), Tabor (10,692), Bohmisch-Leipa (10,674), Rum- burg (10,382), Weipert (10,037).

See F. Umlauft, Die Lander Osterreich- Vngarns in Wort und Bild, (15 vols., Vienna, 1881-1889), vol. vii. ; Mikowec, Altertiimer und Denkwiirdigkeiten Bbhmen's (2 vols., Prague, 1859-1865) ; F. Rivnac, Reisehandbuchfur das Konigreich Bohmen (Prague, 1882), very useful for its numerous and detailed historical notes. (O. Br,)

History

The country derives its name from the Boii, a Celtic tribe which in the earliest historical period inhabited part of the land. According to very

ancient traditions accepted by the modern historians of Bohemia, the Boii, whose capital was called Boiohemum, were weakened by continual warfare with neigh- bouring tribes, and finally subdued by the Teutonic tribe of the Marcomanni (about 12 B.C.). The Marcomanni were afterwards expelled by other Teutonic tribes, and eventually Bohemia was conquered by Slavic tribes, of whom the Cechs (see Czech) were the most important. The date of the arrival of the Cechs in Bohemia is very uncertain, and the scanty references to the country in classical and Byzantine writers are rather misleading than otherwise. Recent archaeological c'ojgvest. research has proved the existence of Slavic inhabitants in Bohemia as far back as the beginning of the Christian era. The Cechs appear to have become the masters of the country in the 5th century. The first of their rulers mentioned in history is Samo, who is stated to have defeated the Avars, a Turanian tribe which had for a time obtained the overlordship over Bohemia. Samo also defeated the Franks in a great battle that took place at Wogatisburg (630), probably near the site of the present town of Eger. After the death of Samo the his- tory of Bohemia again becomes absolutely obscure for about 130 years. The next events that are recorded by the oldest chroniclers, such as Cosmas, refer to the foundation of a Bohemian prin- cipality by Krok (or Crocus) and his daughter Libussa. The latter is said to have married Pfemysl, a peasant who was found ploughing his field — a legend that is common in most Slavic countries. Beginning with this semi-mythic ruler, the ancient chroniclers have constructed a continuous list of Pfemyslide princes. Neither the deeds attributed to these princes nor the dates of their reigns can be considered as historical.

From the time of the introduction of Chris tianity into Bohemia the history of the country becomes less obscure. The first attempts to introduce Christianity undoubtedly came from Germany. They met with little success, as vanity. innate distrust of the Germans naturally rendered the Bohemians unfavourable to a creed which reached them from the realm of their western neighbours. Matters were different when Christianity approached them from Moravia, where its doctrine had been taught by Cyrillus and Methodius — Greek monks from Thessalonica. About the year 873 the Bohemian prince Bofivoj was baptized by Methodius, and the Bohemians now rapidly adopted the Christian faith. Of the rulers of Bohemia the most famous at this period was / a /" CeS " Wenceslas, surnamed the Holy, who in 935 was murdered by his brother Boleslav, and who was afterwards canonized by the Church of Rome. As Wenceslas had been an ally of Germany, his murder resulted in a war with that country, in which, as

far as we can judge by the scanty records of the time.

Boleslav.

Boleslav, the brother and successor of Wenceslas, was on the whole successful. During the reigns of Boleslav and his son,

Boleslav II., Bohemia extended its frontiers in several

directions. Boleslav II. indeed established his rule not only over Bohemia and Moravia, but also over a large part of Silesia, and over that part of Poland which is now the Austrian province of Galicia. Like most Slavic states at this and even a later period, the great Bohemian empire of Boleslav II. did not endure long. Boleslav III., son of Boleslav II., lost all his foreign possessions to Boleslav the Great, king of Poland. During his reign Bohemia was involved in constant civil war, caused by the dissensions between Boleslav III. and his brothers Jaromir and Ulrick. Though the prince succeeded in expelling his brothers from the country, his cruelty induced the Bohemians to dethrone him and to choose as their ruler the Polish prince viadtvoi Vladivoj, brother of Boleslav the Great, and son of the

Bohemian princess Dubravka (Dobrawa). Vladivoj attempted to strengthen his hold over Bohemia by securing the aid of Germany. He consented not only to continue to pay the tribute which the Germans had already obtained from several previous rulers of Bohemia, but also to become a vassal of the German empire and to receive the German title of duke. This state continued when after the death of Vladivoj – the Pfemyslide dynasty wasrestored. The Pfemyslide prince Bfetislav Bfetislav I !• (I0 37 _IO SS) restored the former power of Bohemia,

and again added Moravia, Silesia and a considerable part of Poland to the Bohemian dominions. To obviate the incessant struggles which had endangered the land at every vacancy of the throne, Bfetislav, with the consent of the nobles, decreed that the oldest member of the house of Pfemysl should be the ruler of Bohemia. Bfetislav was therefore succeeded first by his eldest son Spitihnev, and then by his second son Vratislav.

In 1088 Vratislav obtained the title of king from the emperor Henry IV., whom he had assisted in the struggle with the papal

see which is known as the contest about investitures. becomes Though the title of king was only conferred on Vratislav “king.” personally, the German king, Conrad III., conferred

on the Bohemian prince Sobeslav (1125-1140) the

title of hereditary cupbearer of the Empire, thus granting a

certain influence on the election of the emperors to Bohemia,

which hitherto had only obligations towards the Empire but no

part in its government. In n 56 the emperor Frederick I.

Barbarossa ceded Upper Lusatia to the Bohemian prince

Vladislav II., and conferred on him the title of king on condition

of his taking part in Frederick’s Italian campaigns. It was

intended that that title should henceforth be hereditary, but

it again fell into abeyance during the struggles between the

Pfemyslide princes which followed the abdication of Vladislav

in 1 1 73.

The consequences of these constant internal struggles were

twofold; the German influence became stronger, and the

pow T er of the sovereign declined, as the nobility on whose support

the competitors for the crown were obliged to rely constantly

obtained new privileges. In 1197 Pfemysl Ottakar became

undisputed ruler of Bohemia, and he was crowned as king in the

following year. The royal title of the Bohemian sovereigns

was continued uninterruptedly from that date. Wenceslas I.

(1 230-1 253) succeeded his father as king of Bohemia without

opposition. The last years of his reign were troubled by internal

r.n 1 _n discord. Wenceslas's son, Pfemysl Ottakar II., who Ottakar 11.
, ' . J ' .

under the sovereignty of his father ruled Moravia, became for a time the chief leader of the malcontents. A reconciliation between son and father, however, took place before the latter's death. Pfemysl Ottakar II. was one of the greatest of Bohemia's kings. He had during the lifetime of his father obtained possession of the archduchies of Austria, and, about the time of his accession to the Bohemian throne, the nobility of Styria also recognized him as their ruler. These extensions of his dominions involved Pfemysl Ottakar II. in repeated wars with Hungary. In 1260 he decisively defeated Bela, king of Hungary, in the great battle of Kressenbrunn.

After this victory Ottakar's power rose to its greatest height. He now obtained possession of Carinthia, Istria and parts of northern Italy. His possessions extended from the Giant Mountains in Bohemia to the Adriatic, and included almost all the parts of the present Habsburg empire west of the Leitha. His contemporaries called Ottakar " the man of gold " because of his great wealth, or " the man of iron " because of his mili- tary power. From political rather than racial causes Ottakar favoured the immigration of Germans into his dominions. He hoped to find in the German townsmen a counterpoise to the overwhelming power of the Bohemian nobility. In 1273 Rudolph, count of Habsburg, was elected king of the Romans. It is very probable that the German crown had previously been offered to Ottakar, but that he had refused it. Several causes, among others his Slavic nationality, which was likely to render him obnoxious to the Germans, contributed to his decision. As Rudolph immediately claimed as vacant fiefs of the Empire most of the lands held by Ottakar, war was inevitable. Ottakar was deserted by many of his new subjects, and even by part of the Bohemian nobility. He was therefore unable to resist the German king, and was obliged to surrender to him all his lands except Bohemia and Moravia, and to recognize Rudolph as his overlord. New dissensions between the two sovereigns broke out almost immediately. In 1278 Ottakar invaded the Austrian duchies, now under the rule of Rudolph, but was defeated and killed at the battle of Durnkrut on the Marchfeld.

Ottakar's son, Wenceslas II., was only seven years of age at the death of his father, and Otto of Brandenburg, a nephew of Ottakar, for a time governed Bohemia as guardian of the young sovereign. Otto's rule was very unpopular, las lL an insurrection broke out against him,

and Bohemia was for a time in a state of complete anarchy. The country was at last pacified through the intervention of Rudolph of Habsburg, and at the age of twelve Wenceslas became nominal ruler of the country. All power was, however, in the hands of Zavis of Falkenstein, one of the great Bohemian nobles, who had married the king's mother, Kunegunda. The power of Zavis at last became invidious to the king, by whose order he was beheaded in 1290. Wenceslas, though only nineteen years of age, henceforth governed Bohemia himself, and his short reign was a period of great happiness for the country. Poland also accepted the rule of Wenceslas and the Hungarian crown was offered to him. Towards the end of his reign Wenceslas became involved in war with Albert, archduke of Austria, after- wards king of the Romans. While preparing to invade Austria Wenceslas died suddenly (1305). His son and successor, Wenceslas III., was then only sixteen years of age, and he only ruled over Bohemia for one year. While planning a warlike expedition against Poland, on which country the Bohemian sovereigns now again maintained their claim, he was murdered by unknown assassins (1306). With him ended the rule of the Pfemyslide dynasty over Bohemia.

Albert, king of the Romans, declared that Bohemia was a vacant fief of the Empire, and, mainly by intimidation, induced the Bohemians to elect his son Rudolph as their sovereign; but Rudolph died after a reign of only one year. Though the Habsburg princes at this period already claimed a hereditary right to the Bohemian throne, the Bohemians determined to maintain their right of electing their sovereign, and they chose Henry, duke of Carinthia, who had married a daughter of King Wenceslas II. Henry soon became unpopular, as he was accused of unduly favouring the German settlers in Bohemia. It was decided to depose him, and the choice of the Bohemians now fell on John of Luxemburg, son of Henry, king of the Romans. The Luxemburg dynasty henceforth ruled Laxem- over Bohemia up to the time of its extinction at the burg death of Sigismund (1437). Though King John, by his marriage to the princess Elizabeth, a daughter of Wen- ceslas II., became more closely connected with Bohemia, he does not appear to have felt much interest in that country. Most of his life was spent in other lands, his campaigns ranging from Italy in the south to Lithuania in the north. It became

proverbial ” that nothing could be done in the world without the help of God and of the king of Bohemia.” The policy of John was founded on a close alliance with France, the country for which he felt most sympathy. Fighting as an ally of France he fell at the battle of Crecy (1346).

He was succeeded as king of Bohemia by his son Charles, whom the German electors had previously elected as their sovereign at Rense (1346). Charles proved one of the Charles greatest rulers of Bohemia, where his memory is still revered. Prague was his favourite residence, and by the foundation of the noiit mesto (new town) he greatly enlarged the city, which now had three times its former extent, and soon also trebled its population. He also added greatly to the importance of the city by founding the famous university of Prague. Charles succeeded in re-establishing order in Bohemia. The country had been in a very disturbed state in consequence of feuds that were incessant during the reign of John, who had almost always been absent from Bohemia. Charles also attempted to codify the obscure and contradictory laws of Bohemia; but this attempt failed through the resistance of the powerful nobility of the country. During the reign of Charles, the first symptoms of that movement in favour of church reform that afterwards acquired a world-wide import- ance, appeared in Bohemia. As Charles has often been accused of undue subserviency to the Church of Rome, it should be men- tioned that he granted his protection to several priests who favoured the cause of church reform. In his foreign policy Charles differed from his father. ‘ The relations with France gradually became colder, and at the end of his reign Charles favoured an alliance with England; he died in 1378 at the age of sixty-two, prematurely exhausted by arduous work.

Charles was succeeded by his son Wenceslas, who was then seventeen years of age. His reign marks the decline of the rule of the house of Luxemburg over Bohemia. He was a weak and incapable sovereign, but the very ex- aggerated accusations against him, which are found principally in the works of older historians, are mainly due to the fact that the king and to a larger extent his queen, Sophia, for a time furthered the cause of church reform, thus incurring the displeasure of Romanist writers. During the earlier part of the reign of Wenceslas a continual struggle took place between the king and the powerful Bohemian nobles, who indeed twice imprisoned their sovereign. Wenceslas also became involved in a dispute with the archbishop, which resulted in the death of the famous John of Nepomuk.

The later part of the reign of Wenceslas is a record of incipient religious conflict. The hold of the Church of Rome on Bohemia had already been weakened during the reign of King Huss and QYL &r \ es by attacks on the immorality of the clergy, Hussites, which proceeded from pious priests such as Milic and Waldhauser. The church schism, during which the rival pontiffs assailed each other with all the wild threats and objurgations of medieval theological strife, necessarily alienated the Bohemians to a yet greater extent. Almost the whole Bohemian nation therefore espoused the cause of Huss (q.v.). Wenceslas on the occasion of these disputes displayed the weakness and irresolution that always characterized him, but Queen Sophia openly favoured the cause of Huss, who for some time was her confessor. Huss was tried before the council of Constance (q.v.), to which he had proceeded with a letter of safe conduct given by Wenceslas's brother Sigismund, king of the Romans. He was declared a heretic and burnt on the 6th of July 141 5. The inevitable and immediate result of this event was the outbreak of civil war in Bohemia, where Huss was greatly revered by the large majority of the population. The nobles of Bohemia and Moravia met at Prague on the 2nd of September 1415, and sent to the council the famed Protestatio Bohemorum, in which they strongly protested against the execution of Huss, " a good, just and catholic man who had for many years been favourably known in the Kingdom by his life, conduct and fame, and who had been convicted of no offence." They further declared that all who affirmed that heresy existed

in Bohemia were " liars, vile traitors and calumniators of Bohemia and Moravia, the worst of all heretics, full of all evil, sons of the devil." They finally stated " that they would defend the law of our Lord Jesus Christ and its pious, humble and stead- fast preachers at the cost of their blood, scorning all fear and all human decrees that might be contrary to them." 1 This protest was a declaration of war against the Roman church, and marks the beginning of the Hussite wars. The council, indeed, summoned the nobles before its tribunal, but they refused to appear. A large number of the nobles and knights who had met at Prague formed a confederacy and declared that they consented to freedom of preaching the word of God on their estates, that they declined to recognize the authority of the council of Constance, but would obey the Bohemian bishops and a future pope lawfully elected. Meanwhile they declared the university of Prague the supreme authority in all matters of religion. The members of the confederacy attempted, though unsuccessfully, to induce King Wenceslas to become their leader. The Romanist nobles, who were not numerous, but some of whom owned vast estates, now also formed a

confederacy, pledging themselves to support the pope and the council. After the closing of the council in 1418, Sigismund, who — Wenceslas being childless — was heir to the Bohemian throne, sent a letter to his brother, which was practically a manifesto addressed to the Bohemian people. He threatened with the severest penalties all who should continue to resist the authority of Rome. Wenceslas maintained the vacillating attitude that was characteristic of his whole reign, though Queen Sophia still extended her protection to the reformers. By doing this, indeed, she incurred the wrath of the Church to so great an extent that an act of accusation against her was drawn up at the council of Constance. Intimidated by his brother, Wenceslas now attempted to stem the current of religious enthusiasm. Im- mediately after the death of Huss many priests who refused to administer communion in the two kinds — now the principal tenet of the adherents of Huss — had been expelled from their parishes. Wenceslas decreed that they should be reinstated, and it was only after some hesitation that he even permitted that religious services according to the Utraquist doctrine should be held in three of the churches of Prague. Some of the more advanced reformers left Prague and formed the party known as the Taborites, from the town of Tabor which became their centre. Troubles soon broke out at Prague. When on the 30th of July 1419, the Hussite priest, John of Zelivo, was leading a procession through the streets of Prague, stones were thrown at him and his followers from the town hall of the ” new town.” The Hussites, led by John Zizka (q.v.) , stormed the town-hall and threw the magistrates from its windows. On receiving the news of these riots King Wenceslas was immediately seized by an attack of apoplexy; a second fit on the 16th of August ended his life.

The news of the death of the king caused renewed rioting in Prague and many other Bohemian cities, from which many Germans, mostly adherents of the Church of Rome, were expelled. Finally a temporary truce was con- nwn’d. eluded, and, early in the following year, Sigismund, who now claimed the Bohemian crown as successor of his brother, arrived at Kutna Hora (Kuttenberg). Pope Martin V. on the 1st of March 1420 proclaimed a crusade against Bohemia, and crusaders from all parts of Europe joined Sigismund’s army. ” On the 30th day of June the Hungarian king, Sigismund, with a large army consisting of men of various countries, as well as of Bohemians, occupied the castle of Prague, determined to con- quer the city, which they considered a heretical community because they used the sacred chalice and accepted other evan- gelical truths.” 2 But the attempt of the crusaders to conquer Prague failed, and after an attack by them on the Vitkov (now Zizkov) hill had been repulsed by the desperate

bravery of the Taborites, led by Zizka, Sigismund determined to abandon

1 Protestatio Bohemorum, frequently printed in English and German, as well as in the Latin original.

2 Laurence of Bfezova's (contemporary) Kronika Husitskd.

the siege of Prague. An attempt of Sigismund to relieve the besieged garrison of the Vysehrad fortress on the outskirts of Prague also failed, as he was again entirely defeated at the battle of the Vysehrad (November i, 1420).

Royal authority now ceased in Bohemia. At a meeting of the diet at Caslav (June i, 1421) Sigismund was deposed. It was decided that a Polish prince should be chosen as sovereign, and that meanwhile a provisional government, composed of twenty men belonging to the various parties, should be estab- lished. In 1422 Sigismund again invaded Bohemia, but was decisively defeated by Zizka at Nemecky Brod (Deutschbrod). The Polish prince, Sigismund Korybutovic, now arrived in Bohemia, and was recognized as regent by the large majority of the inhabitants; but through the influence of the papal see

he was recalled by the rulers of Poland after a stay war.°" S °f on ty a * ew montns – After his departure, civil

war between the moderate Hussites (Calixtines or Utraquists) and the advanced Taborite party broke out for the first time, though there had previously been isolated disturbances between them. The return of Prince Korybutovic and the menace of a German invasion soon reunited the Bohemians, who gained a decisive victory over the Germans at Aussig in 1426. Shortly afterwards Korybutovic, who had taken part in this great victory, incurred the dislike of the extreme Hussites, and was obliged to leave Bohemia. All hope of establishing an independent Slav dynasty in Bohemia thus came to an end. In 1427 several German princes undertook a new crusade against the Hussites. With the German and other invaders were 1000 English arcners, bodyguard to Henry Beaufort, bishop of Winchester, who took part in the crusade as papal legate. The crusaders were seized by a sudden panic, both at Mies (Stfibro) and at Tachau, as soon as they

approached the Hussites, and they fled hurriedly across the mountains into Bavaria. Though internal disturbances again broke out, the Bohemians after this success assumed the offensive, and repeatedly invaded Hungary and the German states.

The impossibility of conquering Bohemia had now become obvious, and it was resolved that a council should meet at Basel (q.v.) to examine the demands of the Hussites. The Germans, however, influenced by Sigismund, determined to make a last attempt to subdue Bohemia by armed force. The Bohemians, as usual united in the moment of peril, defeated the Germans at Domazlice (Taus) on the 1st of August 1431, after a very short fight. In the course of the same year negotiations began at Basel, the Hussites being represented by a numerous embassy under the leadership of Prokop the Great. The negotiations proceeded very slowly, and in 1433 the Bohemians returned to their own country, accompanied, however, by envoys of the council. Dissensions had meanwhile again broken out in Bohemia, and they were now of a political rather than a religious nature. The more aristocratic Hussites raised an armed force which was known as ” the army of the nobles.” The Taborites also collected their men, who formed ” the army of the towns.” The two armies met at Lipan, near Kolin, on the 30th of May 1434. The Taborites were defeated, and the two Prokops and most of their other leaders perished on the battlefield. The victory of the moderate party paved the way to a reconciliation with Sigismund and the Church of Rome. The Bohemians

recognized Sigismund as their sovereign, but obtained “Com-considerable concessions with regard to religious pacts.” matters. These concessions, which were formulated

in the so-called Compacts, granted to the Bohemians the right of communion in both kinds, and of preaching the gospel freely, and also to a certain extent limited the power of the clergy to acquire worldly goods.

After the Compacts had been formally recognized at Iglau in Moravia, Sigismund proceeded to Prague and was accepted as king. He died in the following year (1437) and was succeeded by his son-in-law, Albert of Austria, whom the estates chose as their king. Albert died after he had reigned over Bohemia less than two years. Though it was known that Albert’s widow Elizabeth would shortly give birth to a child, the question as to

the succession to the throne again arose; for it was only in 1627 that

the question whether the Bohemian crown was elective or hereditary was decided for ever. The nobles formed two parties, one of which, the national one, had George of Podebrad (q.v.) as its leader. Ulrich of Rosenberg p^^ r ad. was the leader of the Roman or Austrian division of the nobility. The two parties finally came to an agreement known as the ” Letter of Peace ” (list mirny). Those who signed it pledged themselves to recognise the Compacts, and to support as archbishop of Prague, John of Rokycan, who had been chosen by the estates in accordance with an agreement made simul- taneously with the Compacts, but whom the Church of Rome refused to recognize. On the other hand, the national party abandoned the candidature to the throne of Prince Casimir of Poland, thus paving the way to the eventual succession of Albert’s heir. On the 22nd of February 1440 Queen Elizabeth gave birth to a son, who received the name of Ladislas. The Bohemians formally acknowledged him as their king, though only after their crown had been declined by Albert, duke of Bavaria. Ladislas remained in Austria under the guardianship of his uncle Frederick, duke of Styria, afterwards the emperor Frederick III., and Bohemia, still without regular government, continued to be the scene of constant conflicts between the rival parties of the nobility. In 1446 a general meeting of the estates of Bohemia together with those of Moravia, Silesia and Lusatia — and so-called ” lands of the Bohemian crown ” — took place. This meeting has exceptional importance for the constitutional history of Bohemia. It was* decreed that at the meeting of the estates their members should be divided into three bodies — known as curiae — representing the nobles, the knights and the towns. These curiae were to deliberate separately and only to meet for a final decision. An attempt made at this meeting to appoint a regent was unsuccessful. The negotiations with the papal see continued meanwhile, but led to no result, as the members of the Roman party used their influence at the papal court for the purpose of dissuading it from granting any con- cessions to their countrymen. Shortly after the termination of the diet of 1446 George of Podebrad therefore determined to appeal to the fortune of war. He assembled a considerable army at Kutna Hora and marched on Prague (1448). He occupied the town almost without resistance and assumed the regency over the kingdom. The diet in 1451 recognized his title, which was also sanctioned by the emperor Frederick III., guardian of the young king. Podebrad was none the less opposed, almost from the first, by the Romanists, who even concluded an alliance against him with their extreme opponents, Kolda of Zampach and the other remaining Taborites. In October 1453 Ladislas arrived in Bohemia and was crowned king at Prague; but he died somewhat suddenly on the 23rd of November 1457. George of PodSbrad has from the first frequently

been accused of having poisoned him, but historical research has proved that this accusation is entirely unfounded. The Bohemian throne was now again vacant, for, when electing Ladislas the estates had reaffirmed the elective character of the monarchy. Though there were several foreign candidates, the estates unanimously elected George of Podebrad, who had now for some time admini- stered the country. Though the Romanist lords, whom Podebrad had for a time won over, also voted for him, the election was considered a great victory of the national party and was welcomed with enthusiasm by the citizens of Prague.

During the earlier and more prosperous part of his reign the policy of King George was founded on a firm alliance with Matthias Corvinus, king of Hungary, through whose influence he was crowned by the Romanist bishop of Waitzen. The reign of King George, whose principal supporters were the men of the smaller nobility and of the towns, was at first very pros- perous. After a certain time, however, some of the Romanist nobles became hostile to the king, and, partly through their influence, he became involved in a protracted struggle with the papal see. It was in consequence of this struggle that some of George's far-reaching plans — he endeavoured for a time to obtain the supremacy over Germany — failed. After the negotiations

with Rome had proved unsuccessful George assembled the estates at Prague in 1452 and declared that he would to his death remain true to the communion in both kinds, and that he was ready to risk his life and his crown in the defence of his faith. The Romanist party in Bohemia became yet more embittered against the king, and at a meeting at Zelena Hora (Griinberg) in 1465 many nobles of the Roman religion joined in a confederacy against him. In the following year Pope Paul II. granted his moral support to the confederates by pronouncing sentence of excommunication against George of Podebrad and by releasing all Bohemians from their oath of allegiance to him. It was also through papal influence that King Matthias of Hungary, deserting his former ally, supported the lords of the league of Selena Hora. Desultory warfare broke out between the two parties, in which George was at first successful; but fortune changed when the king of Hungary invaded Moravia and obtained possession of Briinn, the capital of the country. At a meeting of the Catholic nobles of-

Bohemia and Moravia at Olmiitz in Moravia, Matthias was proclaimed king of Bohemia (May 3, 1469). In the following year George obtained some successes over his rival, but his death in 1471 for a time put a stop to the war. George of Podebrad, the only Hussite king of Bohemia, has always, with Charles IV., been the ruler of Bohemia whose memory has most endeared itself to his countrymen.

George of Podebrad had undoubtedly during the more pros- perous part of his reign intended to found a national dynasty. In later years, however, hope of obtaining' aid from Poland in his struggle against King Matthias induced him to offer the succession to the Bohemian throne to Vladislav (Wladislaus, Ladislaus), son of Casimir, king of Poland. No formal agreement was made, and at the death of George many Bohemian nobles supported the claim of Matthias of Hungary, who had already been pro- claimed king of Bohemia. Protracted negotiations ensued, but they ended by the election of Prince Vladislav of ˆPoland. p ° land at Kutna Hora, the 27th of May 1471- This election was a victory of the national party, and may be considered as evidence of the strong anti-clerical feeling which then prevailed in Bohemia; for Matthias was an unconditional adherent of Rome, while the Polish envoys who represented Vladislav promised that he would maintain the Compacts. At the beginning of his reign the new king was involved in a struggle with Matthias of Hungary, who maintained his claim to the Bohemian throne. Prolonged desultory warfare continued up to 1478, when a treaty concluded at Olmiitz secured Bohemia to Vladislav; Matthias was to retain the so-called " lands of the Bohemian crown " — Moravia, Silesia and Lusatia — during his lifetime, and they were to be restored to Bohemia after his death. Though Vladislav was faithful to his promise of maintaining the Compacts, and did not attempt to prevent the Bohemians from receiving the communion in both kinds, yet his policy was on the whole a reactionary one, both as regards matters of state and the religious controversies. The king appointed as government officials at Prague men of that section of the Utraquist party that was nearest to Rome, while a severe persecution of the extreme Hussites known as the Bohemian Brethren took place (see Hussites). Serious riots took place at Prague, and the more advanced Hussites stormed the three town halls of the city. The nobles of the same faith also formed a league to guard themselves against the menaced reaction. A meeting of all the estates at Kutna Hora in 1485, however, for a time restored peace. Both parties agreed to respect the religious views of their opponents and to abstain from all violence, and the Compacts were again confirmed.

As regards matters of state the reign of Vladislav is marked by a

decrease of the royal prerogative, while the power of the nobility attained an unprecedented height, at the expense, not only of the royal power, but also of the rights of the townsmen and peasants. A decree of 1487 practically established serfdom in Bohemia, where it had hitherto been almost unknown. It is impossible to exaggerate the importance of this measure for the future of Bohemia. The rulers of the country were henceforth unable to rely on that numerous sturdy and independent

peasantry of which the armies of 2izka and the Prokops had mainly consisted. Various enactments belonging to this reign also curtailed the rights of the Bohemian townsmen. A decree known as the " regulations of King Vladislav " codified these changes. It enumerated all the rights of the nobles and knights, but entirely ignored those of the towns. It was tacitly assumed that the townsmen had no inherent rights, but only such privileges as might be granted them by their sovereign with the consent of the nobles and knights. Civil discord was the inevitable consequence of these enactments. Several meeting? of the diet took place at which the towns were not represented. The latter in 1513 formed a confederacy to defend their rights, and chose Prince Bartholomew of Miinsterberg — a grandson of King George — as their leader.

Vladislav was elected king of Hungary in 1490 and many of the events of his later life belong to the history of Hungary. He married in 1 502 Anna de Candale, who was connected with the royal family of France. He had two children by her, Anna, who afterwards married the archduke Ferdinand of Austria, and Louis. Vladislav died in Hungary in 1516. His successor was his son Louis, who had already been crowned as king of Bohemia at the age of three. According to the instruc- tions of Vladislav, Sigismund, king of Poland, and the emperor Maximilian I. were to act as guardians of the young king. The Bohemian estates recognized this decision, but they refused to allow the guardians any right of interference in the affairs of Bohemia. The great Bohemian nobles, and in particular the supreme burgrave, Zdenek Leo, lord of Rozmital, ruled the country almost without control. The beginning of the nominal reign of King Louis is marked by an event which had great importance for the constitutional development of Bohemia. At a meeting of the estates in 151 7 known as the diet of St Wenceslas — as the members first assembled on the 28th of September, the anniversary of that saint — they came to terms and settled the questions which had been the causes of discord. The citizens renounced certain privileges which they had hitherto claimed, while the two other estates recognized their municipal autonomy and tacitly sanctioned their presence at the meetings of the diet, to which

they had already been informally readmitted since 1 508. At the first sitting of this diet, on the 24th of October, it was declared that the three estates had agreed henceforth ” to live together in friendly intercourse, as became men belonging to the same country and race.” In 1 52 2 Louis arrived in Bohemia from Hungary, of which country he had also been elected king. On his arrival at Prague he dismissed all the Bohemian state officials, including the powerful Leo of Rozmital. He appointed Charles of Miinsterberg, a cousin of Prince Bartholomew and also a ‘ grandson of King George, as regent of Bohemia during his absences, and John of Wartenberg as burgrave. The new officials appear to have supported the more advanced Hussite party, while Rozmital and the members of the town council of Prague who had acted in concert with him had been the allies of the Romanists and those Utraquists who were nearest to the Church of Rome. The new officials thus incurred the displeasure of King Louis, who was at that moment seeking the aid of the pope in his warfare with Turkey. The king therefore reinstated Leo of Rozmital in. his offices in 1525. Shortly afterwards Rozmital became involved in a feud with the lords of Rosenberg; the feud became a civil war, in which most of the nobles and cities of Bohemia took sides. Meanwhile Louis, who had returned to Hungary, opened his campaign against the Turks. He requested aid from his Bohemian subjects, and this was granted, by the Rosenberg faction, while Rozmital and his party purposely delayed sending any forces to Hungary. There were, therefore, but few Bohemian troops at the battle of Moha.cs (August 29, 1526) at which Louis was decisively defeated and perished.

The death of Louis found Bohemia in a state of great disorder, almost of anarchy. The two last kings had mainly resided in Hungary, and in spite of the temporary agreement obtained at the diet of St Wenceslas, the Bohemians had not succeeded in establishing a strong indigenous government which might have

taken the place of the absentee monarchs. Archduke Ferdinand of Austria — afterwards the emperor Ferdinand I. — laid claim to Origin of the Bohemian throne as husband of Anna, daughter the of King Vladislav. King Sigismund of Poland,

Habsburg j- ne dukes Louis and William of Bavaria, several ynas y. q^^

German princes, as well as several Bohemian noblemen, of whom Leo of Rozmital was the most important, were also candidates. The diet resolved to entrust the election to twenty-four of their members, chosen in equal number from the three estates. These electors, on the 23rd of October (1526), Ferdinand cnose Ferdinand of Habsburg as their king. This date

is memorable, as it marks the permanent accession of the Habsburg dynasty to the Bohemian throne, though the Austrian archdukes Rudolph and Albert had previously been rulers of Bohemia for short periods. Though Ferdinand fully shared that devotion to Rome which is traditional in the Habsburg dynasty, he showed great moderation in religious matters, particularly at the beginning of his reign. His principal object was to establish the hereditary right of his dynasty to the Bohemian throne, and this object he pursued with characteristic obstinacy. When a great fire broke out at Prague in 1541, which destroyed all the state documents, Ferdinand obtained the consent of the estates to the substitution of a charter stating that he had been recognized as king in consequence of the hereditary rights of his wife Anna, in the place of the former one, which had stated that he had become king by election. This caused great dissatisfaction and was one of the principal causes of the troubles that broke out shortly afterwards. Ferdinand had in 1531, mainly through the influence of his brother the emperor Charles V., been elected king of the Romans and heir to the Empire. He henceforth took a large part in the politics of Germany, particularly after he had in 1547 concluded a treaty of peace with Turkey, which assured the safety of the eastern frontiers of his dominions. Charles V. about the same time concluded his war with France, and the brothers determined to adopt a firmer policy towards the Protestants of Germany, whose power had recently greatly increased. The latter had, about the time of the recognition of Ferdinand as king of the Romans, and partly in consequence of that event, formed at Schmalkalden a league, of which John Frederick, elector of Saxony, and Philip, landgrave of Hesse, were the leaders. War broke out in Germany in the summer of 1 546, and Charles relied on the aid of his brother, while the German Protestants on the other hand appealed to their Bohemian co-religionists for aid.

Since the beginning of the Reformation in Germany the views of the Bohemian reformers had undergone a considerable change.

Some of the more advanced Utraquists differed but in the war little from the German Lutherans, while the Bohemian against Brethren, who at this moment greatly increased in German influence through the accession of several powerful

nobles, strongly sympathized with the Protestants of

Germany. Ferdinand's task of raising a Bohemian army in support of his brother was therefore a difficult one. He again employed his usual tortuous policy. He per- suaded the estates to vote a general levy of the forces of the country under the somewhat disingenuous pretext that Bohemia was menaced by the Turks; for at that period no armed force could be raised in Bohemia without the consent of the estates of the realm. Ferdinand fixed the town of Kaaden on the Saxon frontier as the spot where the troops were to meet, but on his arrival there he found that many cities and nobles — particularly those who belonged to the community of the Bohemian Brethren — had sent no men. Of the soldiers who arrived many were Protestants who sympathized with their German co-religionists. The Bohemian army refused to cross the Saxon frontier, and towards the end of the year 1 546 Ferdinand was obliged to disband his Bohemian forces. Early in the following year he again called on his Bohemian subjects to furnish an army in aid of his brother. Only a few of the Romanists and more retrograde Utraquists obeyed his order. The large majority of Bohemians, on the other hand, considered the moment opportune for recovering the ancient liberties of Bohemia, on which Ferdinand had encroached

Protest- antism.

in various ways by claiming hereditary right to the crown and by curtailing the old privileges of the land. The estates met at Prague in March 1547, without awaiting a royal summons- undoubtedly an unconstitutional proceeding. The assembly, in which the influence of the representatives of the town of Prague and of the knights and nobles who belonged to the Bohemian Brotherhood was predominant, had a very revolutionary char- acter. This became yet more marked when the news of the elector of Saxony's victory at Rochlitz reached Prague. The estates demanded the re-establishment of the elective character of the Bohemian kingdom, the recognition of religious liberty for all, and various enactments limiting the royal prerogative. It was decided to entrust the management of state affairs to a committee of twelve members chosen in equal number from the three estates. Of the members of the committee chosen by the knights and nobles four belonged to the Bohemian Brotherhood. The committee decided to equip an armed force, the command of which was conferred on Kaspar Pflug of Rabenstein (d. 1576). According to his instructions he was merely to march to the Saxon frontier, and there await further orders from the estates; there seems, however, little doubt that he was secretly instructed to afford aid to the German Protestants. Pflug marched to Joachimsthal on the frontier, but

refused to enter Saxon territory without a special command of the estates.

Meanwhile the great victory of the imperialists at Miihlberg had for a time crushed German Protestantism. The Bohemians were in a very difficult position. They had seriously offended their sovereign and yet afforded no aid to the German Pro- testants. The army of Pflug hastily dispersed, and the estates still assembled at Prague endeavoured to propitiate Ferdinand. They sent envoys to the camp of the king who, with his brother Charles, was then besieging Wittenberg. Ferdinand received the envoys better than they had perhaps expected. He indeed always maintained his plan of making Bohemia a hereditary kingdom under Habsburg rule, and of curtailing as far as possible its ancient constitution, but he did not wish to drive to despair a still warlike people. Ferdinand demanded that the Bohemians should renounce all alliances with the German Protestants, and declared that he would make his will known after his arrival in Prague. He arrived there on the 20th of July, with a large force of Spanish and Walloon mercenaries, and occupied the city almost without resistance. Ferdinand treated the nobles and knights with great forbearance, and contented himself with the confiscation of the estates of some of those who had been most compromised. On the other hand he dealt very severely with the towns — Prague in particular. He declared that their ancient privileges should be revised — a measure that practically signified a broad confiscation of lands that belonged to the municipalities. Ferdinand also forced the townsmen to accept the control of state officials who were to be called town-judges and in Prague town-captains. These royal representatives were given almost unlimited control over municipal affairs. The Bohemian Brethren were also severely persecuted, and their bishop Augusta was imprisoned for many years.

Ferdinand's policy here was as able as it always was. The peasantry had ceased to be dangerous since the establishment of serfdom; the power of the cities was now thoroughly under- mined. Ferdinand had only to deal with the nobles and knights, and he hoped that the influence of his court, and yet more that of the Jesuits, whom he established in Bohemia about this time, would gradually render them amenable to the royal will. If we consider the customs of his time Ferdinand cannot be con- sidered as having acted with cruelty in the moment of his success. Only four of the principal leaders of the revolt — two knights, and two citizens of Prague — were sentenced to death. They were decapitated on the square outside the Hradcany palace where the estates met on that day (August 22). This diet therefore became known as the " Krvavy'snem " (bloody diet). In one of the last

years of his life (1562) Ferdinand succeeded in obtaining the coronation of his eldest son Maximilian as king of Bohemia, thus ensuring to him the succession to the Bohemian throne. As Ferdinand I. acceded to the Hungarian throne at

the same time as to that of Bohemia, and as he also became king of the Romans and after the death of Charles V. emperor, many events of his life do not belong to the history of Bohemia. He died in 1564.

Maximilian succeeded his father as king of Bohemia without any opposition. Circumstances were greatly in his favour; he

had in his youth mainly been educated by Protestant ?,*” a tutors, and for a time openly avowed strong sympathy

for the party of church reform. This fact, which became known in Bohemia, secured for him the support of the Bohemian church reformers, while the Romanists and retrograde Utraquists were traditionally on the side of the house of Habs- burg. The reign of Maximilian did not fulfil the hopes that met it. Though he published new decrees against the Bohemian Brethren, he generally refused to sanction any measures against the Protestants, in spite of the advice of the Jesuits, who were gradually obtaining great influence in Bohemia. He did nothing, however, to satisfy the expectations of the partisans of church re- form, and indeed after a time began again to assist at the functions of the Roman church, from which he had long absented himself. Indifference, perhaps founded on religious scepticism, char- acterized the king during the many ecclesiastical disputes that played so large a part in his reign. In 1 567 Maximilian, who had also succeeded his father as king of Hungary and emperor, visited the Bohemians for the first time since his accession to the throne. Like most princes of the Habsburg dynasty, he was constantly confronted at this period by the difficulty of raising funds for warfare against the Turks. When he asked the Bohemians to grant him supplies for this purpose, they immedi- Abolttloa ately retorted by bringing forward their demands of the with regard to matters of religion. Their principal ••Com- demand appears somewhat strange in the light of the pacts. ” events of the past. The estates expressed the wish that the celebrated Compacts should cease to form part of the laws of the

country. These enactments had indeed granted freedom of worship to the most moderate Utraquists — men who, except that they claimed the right to receive the communion in both kinds, hardly differed in their faith from the Roman church. On the other hand Ferdinand I. had used the Compacts as an instrument which justified him in oppressing the Bohemian Brethren, and the advanced Utraquists, whose teaching now differed but little from that of Luther. He had argued that all those who professed doctrines differing from the Church of Rome more widely than did the retrograde Utraquists, were outside the pale of religious toleration. Maximilian, indifferent as usual to matters of religious controversy, consented to the abolition of the Compacts, and these enactments, which had once been sacred to the Bohemian people, perished unregretted by all parties. The Romanists had always hated them, believing them not to be in accord with the general custom of the papal church, while the Lutherans and Bohemian Brethren considered their suppression a guarantee of their own liberty of worship.

In 1575 Maximilian, who had long been absent from Bohemia, returned there, as the estates refused to grant subsidies to an absentee monarch. The sittings of the diet that met in 1 5 7 5 were very prolonged. The king maintained a vacillating attitude, influenced now by the threats of the Bohemians, now by the advice of the papal nuncio, who had followed him to Prague. The latter strongly represented to him how great would be the difficulties that he would encounter in his other dominions, should he make concessions to the Protestants of Bohemia. The principal demand of the Bohemians was that the ” Con- fession of Augsburg ” — a summary of Luther’s teaching Bohemica. — should be recognized in Bohemia. They further renewed the demand, which they had already expressed at the diet of 1567, that the estates should have the right of appointing the members of the consistory — the ecclesi- astical body which ruled the Utraquist church; for since the death of John of Rokycan that church had had no archbishop. After long deliberations and the king’s final refusal to recognize the confession of Augsburg, the majority of the diet, consisting of members of the Bohemian brotherhood and advanced Utra- iv. S

quists, drew up a profession of faith that became known as the Confessio Bohemica. It was in most points identical with the Augsburg confession, but differed from it with regard to the doctrine of the sacrament of the Lord’s Supper. Here the Bohemian profession agreed with the views of Calvin rather than with those of Luther. This is undoubtedly due to the influence of the Bohemian Brethren. The Confessio Bohemica was pre- sented to Maximilian, who verbally

expressed his approval, but would not consent to this being made public, and also refused his consent to the inclusion of the Confessio among the charters of the kingdom. Maximilian rejected the demand of the Bohemian estates, that they and not the king should in future appoint the members of the consistory. He finally, however, consented to exempt the Lutherans and advanced Utraquists from the jurisdiction of the consistory, and allowed them to choose fifteen defenders — five of whom were to belong to each of the estates — who were to have supreme control over the Lutheran church. These defenders were to appoint for each district a superintendent (moderator), who was to maintain order and discipline among the clergy. As the Bohemian Brotherhood had never recognized the consistory, that body now lost whatever influence it had still possessed. It became, indeed, subservient to the Romanist archbishopric of Prague, which had been re- established by Ferdinand I. Its members henceforth were men who on almost all points agreed with Rome, and sometimes even men who had joined the Roman church, but continued by order of their superiors to remain members of the consistory, where it was thought that their influence might be useful to their new creed.

The results of the diet of 1575 were on the whole favourable to the estates, and they seem to have taken this view, for almost immediately afterwards they recognized Maximilian's eldest son Rudolph as his successor and consented to his being crowned king of Bohemia. Maximilian died in the following year, and Rudolph succeeded him without any opposition. The events of the last years of the reign of Rudolph have the greatest importance for Bohemian history, but the earlier part of his reign requires little notice. As Rudolph had been educated in Spain it was at first thought that he would treat the Bohemian church reformers with great severity. The new sovereign, how- ever, showed with regard to the unceasing religious controversy the same apathy and indifference with which he also met matters of state. He had been from his early youth subject to fits of melancholia, and during several short periods was actually insane. Rudolph was a great patron of the arts, and he greatly contributed to the embellishment of Prague, which, as it was his favourite residence, became the centre of the vast Habsburg dominions. In 1600 the mental condition of Rudolph became so seriously impaired that the princes of the house of Habsburg thought it necessary to consider the future of the state, parti cularly as Rudolph had no legitimate descendants. Matthias, the eldest of his brothers, came to Prague and pointed out to Rudolph the necessity of appointing a coadjutor, should he be incapacitated from fulfilling his royal duties, and also of making arrangements concerning the succession to the throne. These

suggestions were indignantly repelled by Rudolph, whose anger was greatly increased by a letter of Pope Clement VIII. The pope in a forcible though formally courteous manner pointed out to him the evil results which his neglect of his royal duties would entail on his subjects, and called on him to appoint one of the Habsburg princes his successor both to the imperial crown and to the thrones of Bohemia, and Hungary. It is probable that the fear that the pope might make good the threats contained in this letter induced Rudolph, who had hitherto been indifferent to matters of religion, to become more subservient to the Roman church. The papal nuncio at Prague, in particular, appears for a time to have obtained great influence over the king. Under this influence, Rudolph in 1602 issued a decree which renewed obsolete enactments against the Bohemian Brethren that had been published by King Vladislav in 1508. The royal decree was purposely worded in an obscure manner. It referred to the Compacts that had

been abolished, and was liable to an interpretation excluding from tolerance all but the Romanists and the retrograde Utraquists. It appeared therefore as a menace to the Lutherans — and all the more advanced Utraquists had now embraced that creed — as well as to the Bohemian Brethren. The estates of Bohemia met at Prague in January 1603. The discussions were very stormy. Budovec of Budova, a nobleman belonging to the community of the Bohemian Brethren, became the leader of all those who were opposed to the Church of Rome. He vigorously attacked the royal decree, which he declared to be contrary to the promises made by King Maximilian. He, how- ever, advised the estates to vote the supplies that King Rudolph had demanded. Immediately after this vote had been passed, the diet was closed by order of the king. Though the royal power was at that period very weak in Bohemia, the open partisanship of the king encouraged the Romanist nobles, who were not numerous, but among whom were some owners of large estates, to attempt to re-establish the Roman creed on their territories. Some of these nobles committed great cruelties while attempting to obtain these forcible conversions.

Strife again broke out between Rudolph and his treacherous younger

brother Matthias, who used the religious and political controversies of the time for the purpose of supplanting his brother. The formal cause of the rupture between the two princes was Rudolph's refusal to sanction a treaty of peace with Turkey, which Matthias had concluded as his brother's repre- sentative in Hungary. The Hungarians accepted Matthias as their ruler, and when his forces entered Moravia the estates of that country had, by Charles, lord of Zerotin, also renounced the allegiance of Rudolph. Matthias then invaded Bohemia, and invited the estates of the kingdom to meet him at Caslav (Ceslau). In consequence of a sudden revolution of feeling for which it is difficult to account, the Bohemians declined the overtures of Matthias. The estates met at Prague in March

1608, and, though again submitting their demands concerning ecclesiastical matters to Rudolph, authorized him to levy troops for the defence of Bohemia. The forces of Matthias had meanwhile entered Bohemia and had arrived at Liben, a small town near Prague now incorporated with that city. Here Matthias, probably disappointed by the refusal of the Bohemians to join his standard, came to an understanding with his brother (June 25, 1608). Rudolph formally ceded to Matthias the government of Hungary, Moravia, and Upper and Lower Austria, but retained his rights as king of Bohemia.

Soon after the conclusion of this temporary settlement, the

estates of Bohemia again brought their demands before their

king. Rudolph had declined to discuss all religious

1609. matters during the time that the troops of his brother Demand occupied part of Bohemia. The diet that met on the for . 20th of January 1609 is one of the most important liberty* m ˆ e history °f Bohemia. Here, as so frequently

in the 17 th century, the religious controversies were largely influenced by personal enmities. Rudolph never forgave the treachery of his brother, and was secretly negotiating (at the time when he again appeared as champion of Catholicism) with Christian of Anhalt, the leader of the German Protestants. This was known to the court of Spain, and the Bohemians also knew that the king could therefore rely on no aid from that quarter. They were therefore not intimidated when Rudolph, vacillating as ever, suddenly assumed a most truculent attitude. The estates had at their meeting in March of the previous year drawn up a document consisting of twenty-five so-called Articles, which formulated their demands with regard to matters of religion.

The king now demanded that this document, which he considered illegal, should be delivered up to him for destruction. The ” articles ” expressed the wish that the Confessio Bohemica should be recognized as one of the funda- mental laws of the kingdom, and that complete religious liberty should be granted to all classes. They further demanded that the Protestants — as it now became customary to call jointly the Utraquists, Lutherans and Bohemian Brethren — and the Roman Catholics should have an equal right to hold all the

offices of state, and that the power of the Jesuits to acquire land should be limited. They finally asked for redress of several grievances caused by the misrule of Rudolph. This document had remained in the hands of Budova, who refused to deliver it to the king. The estates then chose twelve of their number — among whom was Count Henry Matthias Thurn — who were to negotiate with the king and his councillors. Protracted dis- cussions ensued, and the king finally stated, on the 31st of March, that he could grant no concessions in matters of religion. On the following day the estates met under the leadership of Budova. They decided to arm for the defence of their rights, and when the king immediately afterwards dissolved the diet, it was resolved to meet again after a month, even without a royal summons. When they returned to Prague, Adam of Sternberg, the burgrave, again informed Budova that the king would grant no concessions in ecclesiastical matters. Bohemia appeared to be on the verge of a revolution. It is unnecessary to record the frequent and contradictory resolutions of the king, influenced now by the extreme Romanists, now by those of his councillors who favoured a peaceful solution. Finally — on the 9th of July 1609 — Rudolph signed the famed ” Letter of Majesty ” which gave satisfaction to all the legitimate demands of the Bohemian Protestants. In the ” Letter of Majesty ” Rudolph recognized the Confessio Bohemica. He further granted to the Protestant estates the control over the university of Prague, and authorized them to elect the members of the Utraquist consistory. They were further empowered to elect ” defenders ” chosen in equal number from the estates of the nobles, knights and citizens, who were to superintend the execution of the enactments of the Letter of Majesty and generally to uphold the rights of the Protestants. On the same day the Romanist and the Protestant members of the diet also signed an agreement by which they guaranteed to each other full liberty of religious worship and declared that this liberty should be extended to all classes of the population.

In 161 1 the peace of Bohemia was again disturbed by the invasion of the archduke Leopold of Austria, bishop of Passau,

who probably acted in connivance with his cousin „ .... _. r – , /, T , , , , ... Matthias.

King Rudolph. Leopold succeeded in obtaining

possession of part of the town of Prague, but his army was defeated by the troops which the Bohemian estates had hurriedly raised, and he was obliged to leave Bohemia. Matthias con- sidered his hereditary rights menaced by the raid of Leopold and again occupied Bohemia. Mainly at his instigation the estates now formally deposed Rudolph, who survived his de- thronement only a few months, and died on the 20th of January 1612. Though Matthias had allied himself with the Bohemian Protestants during his prolonged struggle against his brother, he now adopted that policy favourable to the Church of Rome which is traditional of the Habsburg dynasty. His relations with the Bohemian Protestants, therefore, soon became strained. In 161 5 Matthias convoked a general diet, i.e. one that besides the Bohemian representatives included also the representatives of the ” lands of the Bohemian crown.” At the meeting of this diet the question of nationality, which through the constant religious controversies had receded to the background, again became predominant. Former enactments enforcing the use of the national language were reaffirmed, and it was decreed that Bohemian should be the “authorized ” {i.e. official) language of the country.

As Matthias was childless, the question as to the succession to the Bohemian throne again arose. The king wished to secure the succession to his cousin Ferdinand, duke of Styria. Ferdinand was known as a fanatical adherent of the Church of Rome and as a cruel persecutor of the Protestants of Styria. None the less the state officials of Bohemia, by not very scrupulous means, succeeded in persuading the estates to accept Ferdinand as heir to the throne and to consent to his coronation, which took place at Prague on the 17th of June 161 7. No doubt through the influence of Ferdinand, the policy of Matthias hence- forth assumed a yet more pronouncedly ultramontane character. The king’s councillors, all adherents of the Church of Rome,

openly expressed their hope that the Catholic Church would soon recover its ancient hold over Bohemia. On the other hand the

Bohemian Protestants, led by Count Thurn, one of the few nobles who had refused to vote for the recognition of Ferdinand as heir to the throne, did not wish to defer what they considered an inevitable conflict. It appeared to them more advantageous to encounter the weak Matthias than his younger and more fanatical successor. A comparatively unimportant incident precipitated matters. In December 161 7, the archbishop of Prague and the abbot of Bfevnov (Braunau) ordered the suppression of the Protestant religious services in churches that had been built on their domains. This was a direct infringement of the agreement concluded by the Romanist and Utraquist estates on the day on which King Rudolph had signed the Letter of Majesty. The defenders took immediate action, by inviting all Protestant members of the diet to meet at Prague. They assembled there on 21st of May 1618, and decided to proceed in full armour to the Hradcany palace to bring their complaints to the knowledge of the councillors of Matthias. On the following day, Thurn, Wenceslas of Ruppa, Ulrich of Kinsky, and other members of the more advanced party held a secret meeting, at which it was decided to put to death the most influential of Matthias's councillors. On the 23rd the representatives of the Protestants of Bohemia proceeded to the Hradcany. Violent accusations were brought forward, particularly against Martinic and Slavata, the king's most trusted councillors, who were accused of having advised him to oppose the wishes of the Bohemians. Finally these two councillors, together with Fabricius, secretary of the royal council, were thrown from the windows of the Hradcany into the moat below— an event known in history as the De-fenestration of Prague. Both Martinic and Slavata were but little injured, and succeeded in escaping from Prague. The Bohemians immediately established a provisional government consisting of thirty " directors," ten of whom were chosen by each of the estates. They also proceeded to raise an armed force, the command of which was given to Count Thurn. Hostilities with Austria began in July, when an imperial force entered Bohemia. The troops of Matthias were, however, soon repulsed by the Bohemians, and in November Thurn's army entered Austria, but was soon obliged to retire to Bohemia because of the lateness of the season.

In the following March the Bohemian crown became vacant by the death of Matthias. On the 31st of July the Bohemian War estates pronounced the formal deposition of Ferdinand,

with the and on the 26th of August they elected as their king emperor Frederick, elector palatine. The new king and his """" ' queen, Elizabeth of England, arrived in Bohemia in October, and were crowned somewhat later at St Vitus's cathedral in Prague. Warfare

with Austria continued during this year — 16 19. Thurn occupied Moravia, which now threw in its lot with Bohemia, and he even advanced on Vienna, but was soon obliged to retreat. In the following year events took a fatal turn for Bohemia. The powerful duke Maximilian of Bavaria joined his forces to those of Ferdinand, who had become Matthias's successor as emperor, and who was determined to reconquer Bohemia. Ferdinand also received aid from Spain, Poland and several Italian states. Even the Lutheran elector of Saxony espoused his cause. A large imperialist army, under the command of the duke of Bavaria, Tilly and Bouquoi, entered Bohemia in September 1620. After several skirmishes, in all of which the Bohemians were defeated, the imperial forces arrived at the outskirts of Prague on the evening of the 7th of November. On the following morning they attacked the Bohemian army, which occupied a slightly fortified position on the plateau known as the " Bila Hora " (White Hill). The Bohemians were defeated after a struggle of only a few hours, and on the evening of battle the imperialists already occupied the port of Prague, situated on the left bank of the Vltava (Moldau). King Frederick, who had lost all courage, hurriedly left Prague on the following morning.

Bohemia itself, as well as the lands of the Bohemian crown, now submitted to Ferdinand almost without resistance. The

battle of the White Hill marks an epoch in the history of Bohemia. The execution of the principal leaders of the national move- ment (June 21, 162 1) was followed by a system submis- of wholesale confiscation of the lands of all who sioaof had in any way participated in the national move- Bofiem '«- ment. Almost the entire ancient nobility of Bohemia was driven into exile, and adventurers from all countries, mostly men who had served in the imperial army, shared the spoils. Gradually all those who refused to recognize the creed of the Roman church were expelled from Bohemia, and by the use of terrible cruelty Catholicism was entirely re-established in the country. In 1627 Ferdinand published a decree, which formally suppressed the ancient free constitution of Bohemia, though a semblance of representative government was left to the country. The new constitution proclaimed the heredity of the Bohemian crown in the house of Habsburg. It added a new " estate," that of the clergy, to the three already existing. This estate, which was to take precedence of all the others, consisted of the Roman archbishop of Prague and of all the ecclesiastics who were endowed with landed estates. The diet was deprived of all legislative power, which was exclusively vested in the sovereign. At its meetings the diet was to discuss such matters only as were laid before it by the representatives of the king. The estates continued to have the

right of voting taxes, but they were specially forbidden to attach any conditions to the grants of money which they made to their sovereign. It was finally decreed that the German language should have equal right with the Bohemian one in all the government offices and law-courts of the kingdom. This had indeed become a necessity, since, in consequence of the vast confiscations, the greatest part of the land was in the hands of foreigners to whom the national language was unknown. Though these enactments still left some autonomy to Bohemia, the country gradually lost all individuality. Its history from this moment to the beginning of the 19th century is but a part of thai history of Austria (q.v.).

Bohemia was the theatre of hostilities during a large part of the Thirty Years' War, which had begun in its capital. In 163 1 the Saxons for a time occupied a large part of Bohemia, Bohemia and even attempted to re-establish Protestantism, under During the later period of the Thirty Years' War Austrian Bohemia was frequently pillaged by Swedish troops,

Bohemia was greatly curtailed, and though the chief repre- sentative of the sovereign in Prague continued to bear the ancient title of supreme burgrave, he was instructed to conform in all matters to the orders of the central government of Vienna. Yet more extreme measures tending to centralization were introduced by the emperor Joseph, who refused to be crowned at Prague as king of Bohemia. The powers of the Bohemian diet and of the royal officials at Prague were yet further limited, and the German language was introduced into all the upper schools of Bohemia. Some of the reforms introduced by Joseph were, incidentally and contrary to the wishes of their originator, favourable to the Bohemian nationality. Thus the greater liberty which he granted to the press enabled the Bohemians to publish a newspaper in the national language. After the death of Joseph in 1790 the Bohemian estates, whose meetings had been suspended during his reign, again assembled, but they at first made but scanty attempts to reassert their former rights. During the long Napoleonic wars, in which the house of Habsburg was almost continuously engaged, Bohemia continued in its previous leth- argic state. In 1804 a merely formal change in the constitu- tional position of Bohemia took place when Francis I. assumed the hereditary title of

emperor of Austria. It was stated in an imperial decree that the new title of the sovereign should in no way prejudice the ancient rights of Bohemia and that the sovereigns would continue to be crowned as kings of Bohemia.

After the re-establishment of European peace in 1815 the long-suppressed national aspirations of Bohemia began to revive. Revival of The national movement, however, at first only found national expression in the revival of Bohemian literature. aspira- The arbitrary and absolutist government of Prince

Metternich rendered all political action impossible in the lands ruled by the house of Habsburg. In spite of this pressure the estates of Bohemia began in 1845 t0 assume an attitude of opposition to the government of Vienna. They affirmed their right of voting the taxes of the country — a right that was due to them according to the constitution of 1627. To obtain the support of the wider classes of the population, they determined in 1847 to propose at their session of the following year that the towns should have a more extensive representation at the diet, that the control of the estates over the finances of the country should be made more stringent, and that the Bohemian language should be introduced into all the higher schools of the country. The revolutionary outbreak of 1848 prevented this meeting of the estates. When the news of the February revolu- tion in Paris reached Prague the excitement there was very great. On the nth of March a vast public meeting voted a petition to the government of Vienna which demanded that the Bohemian language should enjoy equal rights with the German in all the government offices of the country, that a general diet comprising all the Bohemian lands, but elected on an extensive suffrage, should be convoked, and that numerous liberal reforms should be introduced. The deputation which presented these demands in Vienna received a somewhat equivocal answer. In reply, however, to a second deputation, the emperor Ferdinand declared on the 8th of April that equality of rights would be secured to both nationalities in Bohemia, that the question of the reunion of Moravia and Silesia to Bohemia should be left to a general

meeting of representatives of all parts of Austria, and in 1848. t ˆ la * ; a new meeting of the estates of Bohemia, which

would include representatives of the principal towns, would shortly be convoked. This assembly, which was to have had full powers to create a new constitution, and which would have established complete autonomy, never met, though the election of its members took place on the 17th of May. In consequence of the general national movement

which is so characteristic of the year 1848, it was decided to hold at Prague a ” Slavic congress ” to which Slavs of all parts of the Austrian empire, as well as those belonging to other countries, were invited. The deliberations were interrupted by the serious riots that broke out in the streets of Prague on the 12th of June. They were suppressed after prolonged fighting and considerable bloodshed. The Austrian commander, Prince Windischgratz,

bombarded the city, which finally capitulated unconditionally. The nationalist and liberal movement in Bohemia was thus suddenly checked, though the Bohemians took part in the Austrian constituent assembly that met at Vienna, and after- wards at Kromefiz (Kremsier).

By the end of the year 1849 all constitutional government had ceased in Bohemia, as in all parts of the Habsburg empire. The reaction that now ensued was felt more severely than in any other part of the monarchy; for not only were all attempts to obtain self-government and liberty ruthlessly suppressed, but a determined attempt was made to exterminate the national language. The German language was again exclusively used in all schools and government offices, all Bohemian newspapers were suppressed, and even the society of the Bohemian museum — ■ a society composed of Bohemian noblemen and scholars — was for a time only allowed to hold its meetings under the supervision of the police.

The events of the Italian campaign of 1859 rendered the continuation of absolutism in the Austrian empire impossible. It was attempted to establish a constitutional system Austrian which, while maintaining to a certain extent the unity constitu- of the empire, should yet recognize the ancient consti- tionai\ tutional rights of some of the countries united under cba “g<:s. the rule of the house of Habsburg. A decree published on the 20th of October i860 established diets with limited powers. The composition of these parliamentary assemblies was to a certain extent modelled on that of the ancient diets of Bohemia and other parts of the empire. This decree was favourably received in Bohemia, but the hopes which it raised in the country fell when a new imperial decree appeared on the 26th of February 1 86 1 . This established a central parliament at Vienna with very extensive powers, and introduced an electoral system which was grossly partial to the Germans. The Bohemians indeed consented to send their representatives to Vienna, but they left the parlia- ment in 1863, stating that the assembly had encroached on the power which constitutionally belonged to the diet of Prague. Two years later the central parliament of Vienna was suspended, and in the following year — 1866 — the Austro-Prussian war caused a complete change in the

constitutional position of Bohemia. The congress of Vienna in 1815 had declared that that country should form part of the newly formed Germanic Confederation; this was done without consulting the estates of the country, as had been customary even after the battle of the White Hill on the occasion of serious constitutional changes. The treaty with Prussia, signed at Prague on the 23rd of August 1866, excluded from Germany all lands ruled by the house of Habsburg. As a natural consequence German influence declined in the Austrian empire, and in Bohemia in particular. While Hungary now obtained complete independence, the new constitution of 1867, which applied only to the German and Slavic parts of the Habsburg empire, maintained the system of centralization and attempted to maintain the waning German influence. The Bohemians energetically opposed this new constitution and refused to send representatives to Vienna.

In 1871 it appeared probable for a moment that the wishes of the Bohemians, who desired that their ancient constitution should be re-established in a modernized form, would „

‘ iccncwco

be realized. The new Austrian prime minister, Count struggles Karl Hohenwart, took office with the firm intention of 0/ accomplishing an agreement between Bohemia and Bohemian the other parts of the Habsburg empire. Prolonged ffj,” ‘ negotiations ensued, and an attempt was made to establish a constitutional system which, while satisfying the claims of the Bohemians, would yet have firmly connected them with the other lands ruled by the house of Habsburg. An imperial message addressed to the diet of Prague (September 14, 1871) stated that the sovereign ” in consideration of the former constitutional position of Bohemia and remembering the power and glory which its crown had given to his ancestors, and the constant fidelity of its population, gladly recognized the rights of the kingdom of Bohemia, and was willing to confirm this assurance by taking the coronation oath.” Various influenceˆ

LITERATURE]

caused the failure of this attempt to reconcile Bohemia with Austria. In 1872 a government with a pronounced German tendency took office in Vienna, and the Bohemians for a time again refused to attend

the parliamentary assemblies of Vienna and Prague. In 1879 Count Eduard Taaffe became Austrian prime minister, and he succeeded in persuading the represen- tatives of Bohemia to take part in the deliberations of the parliament of Vienna. They did so, after stating that they took this step without prejudice to their view that Bohemia with Moravia and Silesia constituted a separate state under the rule of the same sovereign as Austria and Hungary. The govern- ment of Count Taaffe, in recognition of this concession by the Bohemians, consented to remove some of the grossest anomalies connected with the electoral system of Bohemia, which had hitherto been grossly partial to the German minority of the population. The government of Count Taaffe also consented to the foundation of a Bohemian university at Prague, which greatly contributed to the intellectual development of the country. On the fall of the government of Count Taaffe, Prince Alfred Windischgratz became prime minister. The policy of his short-lived government was hostile to Bohemia and he was soon replaced by Count Badeni.

Badeni again attempted to conciliate Bohemia. He did not indeed consider it feasible to reopen the question of its autonomy,

but he endeavoured to remedy some of the most xuage"' serious grievances of the country. In the beginning question, of 1897 Count Badeni issued a decree which stated

that after a certain date all government officials who wished to be employed in Bohemia would have to prove a certain knowledge of the Bohemian as well as of the German language. This decree met with violent opposition on the part of the German inhabitants of Austria, and caused the fall of Count Badeni's cabinet at the end of the year 1897. After a brief interval he was succeeded by Count Thun and then by Count Clary, whose government repealed the decrees that had to a certain extent granted equal rights to the Bohemian language. In consequence troubles broke out in Prague, and were severely repressed by the Austrian authorities. During the subsequent ministries of Korber and Gautsch the Bohemians continued to oppose the central government of Vienna, and to assert their national rights.

See generally Count Liitzow, Bohemia, a Historical Sketch (London, 1896). The valuable collection of historical documents entitled Fontes Rerum Bohemicarum, published at Prague in the latter part of the 19th century, has superseded earlier ones such as Freherus (Marquard Freher), Rerum Bohemicarum Antiqui Scriptores. Simi- larly, the earlier historical works of Pubitschka, Pelzl and De Florgy are superseded by Frantisek Palacky's Geschichte von Bohmen (Prague,

1844-1867), which, however, ends with the year 1526. Rezek, Gindely and others have dealt with the history of Bohemia posterior to the year 1526. Professor Adolf Bachmann published (vol. i. in 1899, vol. ii. 1905) a Geschichte Bohmens up to 1526, which has a strongly marked German tendency. Of French works Pro- fessor Ernest Denis's Jean Hus, et la guerre des Hussites (Paris, 1878), Fin de I'independance boheme (2 vols., 1890), and La Boheme depuis la Montague Blanche (2 vols., 1903), give a continuous account of Bohemian history from the beginning of the 15th century. (L.)

Literature The earliest records of the Bohemian or Cech language are very ancient, though the so-called MSS. of Zelena Hora (Griine- berg) and Kralodvur (Koniginhof) are almost certainly forgeries of the early part of the 19th century. The earliest genuine documents of the Bohemian language comprise several hymns and legends; of the latter the legend of St Catherine and that of St Dorothy have the greatest value. Several ancient epic fragments have also been preserved, such as the Alexandreis and Tandarias a Floribella. These and other early Bohemian writings have been printed since the revival of Bohemian literature in the 19th century. Of considerable historical value is the rhymed chronicle generally though wrongly known as the chronicle of Dalimil. The author, who probably lived during the reign of King John (1310-1346), records the events of Bohemian history from the earliest period to the reign of King Henry of Carinthia, the immediate predecessor of John. A

strong feeling of racial antipathy to the Germans pervades the chronicle.

It is undoubtedly to be attributed to the high intellectual level which Bohemia attained in the 14th century that at that period we already find writers on religious and philo- sophical subjects who used the national language, literature. Of these the most important is Thomas of Stitny (c. 1331-1401). Of his works, which contain many ideas similar to those of his contemporary 8 Wycliffe, those entitled O obecnych vecech Krestanskych (on general Christian matters) and Besedni reel (in a rough translation " learned entertainments ") have most value. Stitny and some of his contemporaries whose Bohemian writings have perished are known as the forerunners of Huss. Huss, like many of his contemporaries in Bohemia, wrote both in Bohemian and in Latin. Of the Bohemian writings of Huss, who contributed greatly to the development of his native language, the most important is his Vyklad viry, desatera Boziho prikazani, a patere (exposition of the creed, the ten commandments and the Lord's Prayer) written in 141 2. Of his numerous other Bohemian works we may mention the

Postilla (collection of sermons), the treatises O poznani cesty prave k spaseni (the true road to salvation) and svatokupectvi (on simony), and a large collection of letters; those written in prison are very touching.

The years that followed the death of Huss formed in Bohemia a period of incessant theological strife. The anti-Roman or Hussite movement was largely a democratic one, and it is there- fore natural that the national language rather than Latin should have been used in the writings that belong to this period. Un- fortunately in consequence of the systematic destruction of all Bohemian writings which took place through the agency of the Jesuits, after the battle of the White Hill (1620), a large part of this controversial literature has perished. Thus the writings of the members of the extreme Hussite party, the so-called Taborites, have been entirely destroyed. Of the writings of the more moderate Hussites, known as the Calixtines or Utraquists, some have been preserved. Such are the books entitled Of the Great Torment of the Holy Church and the Lives of the Priests of Tabor, written in a sense violently hostile to that community. A Bohemian work by Archbishop John of Rokycan has also been preserved; it is entitled Postilla and is similar though inferior to the work of Huss that bears the same name.

A quite independent religious writer who belongs to the period of the Hussite wars is Peter Cheldcky (born in the last years of the 14th century, died 1460), who may be called the Tolstoy of the 15th. His dominant ideas were horror of bloodshed and the determination to accept unresistingly all, even unjust, decrees of the worldly authorities. Though a strenuous enemy of the Church of Rome, Chelcicky joined none of the Hussite parties. His masterpiece is the Sit viry (the net of faith). Among his other works his Postilla and polemical writings in the form of letters to Archbishop John of Rokycan and Bishop Nicolas of Pelhf imov deserve mention.

The Hussite period is rather poor in historical works written in the language of the country. We should, however, mention some chroniclers who were contemporaries and sometimes eye-witnesses of the events of the Hussite wars. Their writings have been collected and published by Frantisek Palacky under the title of Stare ceske letopisy.

In the 1 6th century when Bohemia was in a state of com- parative tranquillity, the native literature was largely developed. Besides the writers of the community of the Bohemian Brethren, we meet at this period with three historians of merit. Of these far the best-known is Wenceslas Hajek of Libocan. The year of his birth is uncertain, but we

read of him as a priest in 1524; he died in 1553- His great work Kronika ceska was dedicated to the emperor Ferdinand I., king of Bohemia, and appeared under the auspices of government officials. It has therefore a strong dynastic and Romanist tendency, and its circulation was permitted even at the time when most Bohemian books were prohibited and many totally destroyed. Hajek's book was translated into several languages and frequently quoted. We

find such second-hand quotations even in the works of many writers who had probably never heard of Hajek. His book is, however, inaccurate and grossly partial. Very little known on the other hand are the works of Bartos, surnamed " pisaf " (the writer), as he was for many years employed as secretary by the city of Prague, and those of Sixt of Ottersdorf. The work of Bartos (or Bartholomew) entitled the Chronicle of Prague has great historical value. He describes the troubles that befell Prague and Bohemia generally during the reign of the weak and absentee sovereign King Louis. The year of the birth of Bartos is uncertain, but it is known that he died in 1 539. The somewhat later work of Sixt of Ottersdorf (1 500-1 583) deals with a short but very important episode in the history of Bohemia. It is entitled Memorials of the Troubled Years 1546 and 1547- The book describes the unsuccessful rising of the Bohemians against Ferdinand I. of Austria. Sixt took a considerable part in this movement, a fact that greatly enhances the value of his book.

Though the life of Chelcicky, who has already been mentioned, was an isolated one, he is undoubtedly the indirect founder of the community of the " Bohemian Brethren," who greatly influenced Bohemian literature. Almost all their historical and theological works were written in the national language, which through their influence became far more refined and polished. Before referring to some of the writings of members of the community we should mention the famed translation of the Scriptures known as the Bible of Kralice. It was the joint work of several divines of the brotherhood, and was first printed at Kralice in Moravia in 1593. Brother Gregory, surnamed the patriarch of the brotherhood, has left a large number of writings dealing mainly with theological matters. Most important are the Letters to Archbishop Rokycan and the book On good and evil priests. After the death of Brother Gregory in 1480 discord broke out in the

community, and it resulted in very great literary activity. Brothers Lucas, Blahoslav and Jaffet, as well as Augusta, a bishop of the community, have left us numerous controversial works. Very interesting is the account of the captivity of Bishop Augusta, written by his companion the young priest Jan Bilek. We have evidence that numerous historical works written by members of the brotherhood existed, but most of them perished in the 17th century when nearly all anti-Roman books written in Bohemia were destroyed. Thus only fragments of Blahoslav's History of the Unity {i.e. the brotherhood) have been preserved. One of the historians of the brotherhood, Wenceslas Bfezan, wrote a History of the House of Rosenberg, of which only the biographies of William and Peter of Rosenberg have been preserved. The greatest writer of the brotherhood is John Amos Komensky or Comenius (1592- 1670). Of his many works written in his native language the most important is his Labyrinth of the World, an allegorical tale which is perhaps the most famous work written in Bohemian. 1 Many of the numerous devotional and educational writings of Comenius, — his works number 142, — are also written in his native tongue.

The year 1620, which witnessed the downfall of Bohemian independence, also marks the beginning of a period of decline of the national tongue, which indeed later, in the 18th century, was almost extinct as a written language. Yet we must notice besides Comenius two other writers, both historians, whose works belong to a date later than 1620. Of these one was an adherent of the nationalist, the other of the imperialist party. Paul Skala ze Zhofe (1582-c. 1640) was an official in the service of the " winter king " Frederick of the Palatinate. He for a time followed his sovereign into exile, and spent the last years of his life at Freiberg in Saxony. It was at this period of his life, after his political activity had ceased, that he wrote his historical works. His first work was a short book which is a mere series of chronological tables. Somewhat later he undertook a vast work entitled Histoire cirkevni (history of the church). In spite of its title the book, which consists of ten enormous MS. volumes,

1 This work has been translated into English by Count Liitzow for the " Temple Classics."

deals as much with political as with ecclesiastical matters. The most valuable part, that dealing with events of 1602 to 1623, of which Skala writes as a contemporary and often as an eye-witness, has been edited and published by Prof. Tieftrunk. A contem- porary and a political opponent of Skala was William Count Slavata (1572-1652). He was a faithful servant of the house of Habsburg, and one of the

government officials who were thrown from the windows of the Hradcany palace in 1618, at the begin- ning of the Bohemian uprising. In 1637 Slavata published his Pamety (memoirs) which deal exclusively with the events of the years 1618 and 1619, in which he had played so great a part. During the leisure of the last years of his long life Slavata com- posed a vast work entitled HistoricM Spisovani (historical works). It consists of fourteen large MS. volumes, two of which contain the previously-written memoirs. These two volumes have recently been edited and published by Dr Jos. Jirecek.

After the deaths of Skala, Slavata and Comenius, no works of any importance were written in the Bohemian 'language for a considerable period, and the new Austrian govern- ment endeavoured in every way to discourage the century use of that language. A change took place when the revival. romantic movement started at the beginning of the 19th century. The early revival of the Bohemian language was very modest, and at first almost exclusively translations from foreign languages were published. The first writer who again drew attention to the then almost forgotten Bohemian language was Joseph Dobrovsky (1753-1829). His works, which include a grammar of the Bohemian language and a history of Bohemian literature, were mostly written in German or Latin, and his only Bohemian works are some essays which he contributed to the early numbers of the Casopis Musea Krdlovstvi CeskSho (Journal of the Bohemian Museum) and a collection of letters.

It is, however, to four men belonging to a time somewhat subsequent to that of Dobrovsky' that the revival of the language and literature of Bohemia is mainly due. They are Jungmann, Kolar, Safafik and Palacky. Joseph Jungmann (1773-1847) published early in life numerous Bohemian translations of German and English writers. His most important works are his Dejepes literatury ceska (history of Bohemian literature), and his monumental German and Bohemian dictionary, which largely contributed to the development of the Bohemian language. John Kolar (1 793-1852) was the greatest poet of the Bohemian revival, and it is only in quite recent days that Bohemian poetry has risen to a higher level. Kolar's principal poem is the Slavy dcera (daughter of Slavia), a personification of the Slavic race. Its principal importance at the present time consists rather in the part it played in the revival of Bohemian literature than in its artistic value. Kolar's other works are mostly philological studies. Paul Joseph Safafik (1795-1861) was a very fruitful writer. .His Starozitnosti Slovanske (Slavic antiquities), an attempt to record the then almost unknown history and literature of the early Slavs, has still considerable value. Francis Palacky (1798-1876) is undoubtedly the

greatest of Bohemian historians. Among his many works his history of Bohemia from the earliest period to the year 1526 is the most important.

Other Bohemian writers whose work belongs mainly to the earlier part of the 19th century are the poets Francis Ladislav Celakovsky', author of the Ruze stolistova (the hundred-leaved rose), Erben, Macha, Tyl, to mention but a few of the most famous writers. The talented writer Karel Havlicek, the founder of Bohemian journalism, deserves special notice.

During the latter part of the 19th century, and particularly after the foundation of the national university in 1882, Bohemian literature has developed to an extent that few perhaps foresaw. Of older writers Bozena Nemcova, whose Babicka has been translated into many languages, and Benes Tfebizky, author of many historical novels, should be named. John Neruda (1834-1891) was a very fruitful and talented writer both of poetry and of prose. Perhaps the most valuable of his many works is his philosophical epic entitled Kosmicke basne (cosmic poems). Julius Zeyer (1841-1901) also wrote much both in prose and in verse. His epic poem entitled Vylehrad, which

celebrates the ancient glory of the acropolis of Prague, has great value, and of his many novels Jan Maria Plojhar has had the greatest success. Of later Bohemian poets the best are Adolf Heyduk, Svatopluk Cech and Jaroslav Vrchlicky (b. 1853). Of Svatopluk Cech's many poems, which are all inspired by national enthusiasm, Vaclav z Michalovic, Lesetinsky Kovar (the smith of Lesetin) and Basne otroka (the songs of a slave) are the most notable. While Vrchlicky (pseudonym of Emil Frida) has no less strong patriotic feelings, he has been more catholic in the choice of the subjects of his many works, both in poetry and in prose. Of his many collections of lyric poems Rok najihu (a year in the south), Poute k Eldoradu (pilgrimages to Eldorado) and Sonety Samotare (sonnets of a recluse) have particular value. Vrchlicky is also a very brilliant dramatist. Bohemian novelists have become very numerous. Mention should be made of Alois Jirasek, also a distinguished dramatic author; Jacob Arbes, whose Romanetta have great merit; and Vaclav Hladik, whose Evzen Voldan is a very striking representa- tion of the life of modern Prague. Like so many Bohemian authors, Hladik also is a copious dramatic author.

Bohemia has been very fruitful in historic writers. Wenceslas Tomek (1818-1905) left many historical works, of which his Dljepis mi&sta Prahy (history of the town of Prague) is the most important. Jaroslav Goll (b. 1846) is the author of many historical works, especially on the community of the Bohemian Brethren. Professor Joseph Kalousek has written much on the early history of Bohemia, and is also the author of a very valuable study of the ancient constitution (Statni pravo) of Bohemia. Dr Anton Rezek is the author of important historical studies, many of which appeared in the Journal of the Bohemian Museum and in the Cesky Casopis Historicity' (Bohemian Historical Review), which he founded in 1805 jointly with Professor Jaroslav Goll. More recently Dr Vaclav Flajshans has published some excellent studies on the life and writings of John Huss, and Professors Pic and Niederle have published learned archaeo- logical studies on the earliest period of. Bohemian history.

See Count Liitzow, A History of Bohemian Literature (London, 3899); W. R. Morfill, Slavonic Literature (1883); A. N. Pypin and V. D. Spasovic, History of Slavonic Literature (written in Russian, translated into German by Trangott Pech, Gesch. der slav. Literaturen, 2 vols. , Leipzig, 1 880-1 884) . There are modern histories of Bohemian literature written in the national language by Dr Karel Tieftrunk, Dr Vaclav Flajshans and Mr Jaroslav Vlaek. (L.)

BOHEMUND, the name of a series of princes of Antioch, afterwards counts of Tripoli. Their connexion is shown in the following table: —

Robert Guiscard = (1) Alberida: (2) Sicelgaeta.

Bohemund I. = Constance, daughter of Philip I. of France.

Bohemund II. = Alice, daughter of Baldwin II. of Jerusalem.

(1) Raymund = Constance =- (2) Raynald of Chatillon.

Bohemund III. = (2) Orguilleuse.

Bohemund IV. = (i)Plaisance.

I (2)Melisinda, daughter of Amalric II.

Bohemund V. = (i)Alice, widow of Hugh of Cyprus.

= (2)Luciana, daughter of count of Segni

Henry I. : of Cyprus

Hugh II.

Bohemund I. (c. a.d. 1058-nn), prince of Otranto and afterwards of Antioch, whose first name was Marc, was the eldest son of Robert Guiscard, dux Apidiae et Calabriae, by an early marriage contracted before 1059. He served under his father in the great attack on the East Roman empire (1080- 1085), and commanded the Normans during Guiscard's absence (1082-1084), penetrating into Thessaly as far as Larissa, but being repulsed by Alexius Comnenus. This early hostility to Alexius had a great influence in determining the course of his

future career, and thereby helped to determine the history of the First Crusade, of which Bohemund may be regarded as the leader. On the death of Guiscard in 1085, his younger son Roger, born " in the purple " of a Lombard princess Sicelgaeta, succeeded to the duchy of Apulia and Calabria, and a war arose between Bohemund (whom his father had destined for the throne of Constantinople) and Duke Roger. The war was finally composed by the mediation of Urban II. and the award of Otranto and other possessions to Bohemund. In 1096 Bohemund, along with his uncle the great count of Sicily, was attacking Amalfi, which had revolted against Duke Roger, when bands of crusaders began to pass, on their way through Italy to Constanti- nople. The zeal of the crusader came upon Bohemund: it is possible, too, that he saw in the First Crusade a chance of realizing his father's policy (which was also an old Norse instinct) of the Drang nach Osten, and hoped from the first to carve for himself an eastern principality. He gathered a fine Norman army (perhaps the finest division in the crusading host), at the head of which he crossed the Adriatic, and penetrated to Con- stantinople along the route he had tried to follow in 1082- 1084. He was careful to observe a "correct " attitude towards Alexius, and when he arrived at Constantinople in April 1097 he did homage to the emperor. He may have negotiated with Alexius about a principality at Antioch; if he did so, he had little encouragement. From Constantinople to Antioch Bohemund was the real leader of the First Crusade; and it says much for his leading that the First Crusade succeeded in crossing Asia Minor, which the Crusades of 1101, 1147 and 1189 failed to accomplish. A politique, Bohemund was resolved to engineer the enthusiasm of the crusaders to his own ends; and when his nephew Tancred left the main army at Heraclea, and attempted to establish a footing in Cilicia, the movement may have been already intended as a preparation for Bohemund's eastern principality. Bohemund was the first to get into position before Antioch (October 1097), and he took a great part in the siege, beating off the Mahommedan attempts at relief from the east, and connecting the besiegers on the west with the port of St Simeon and the Italian ships

which lay there. The capture of Antioch was due to his connexion with Firuz, one of the commanders in the city; but he would not bring matters to an issue until the possession of the city was assured him (May 1098), under the terror of the approach of Kerbogha with a great army of relief, and with a reservation in favour of Alexius, if Alexius should fulfil his promise to aid the crusaders. But Bohemund was not secure in the possession of Antioch, even after its

surrender and the defeat of Ker- bogha; he had to make good his claims against Raymund of Tou- louse, who championed the rights of Alexius. He obtained full possession in January 1099, and stayed in the neighbourhood of Antioch to secure his position,while the other crusaders moved southward to the capture of Jerusalem. He came to Jerusalem at Christmas 1099, and had Dago- bert of Pisa elected as patriarch, perhaps in order to check the growth of a strong Lothaiingian power in the city. It might seem in 1100 sister of Leo III. that Bohemund was destined to

r > l ‘ j°i f Tˆ rmenla ; found a great principalityin Antioch, Bohemund Vll.-o.s.p. · would F dwarf Jerusalem; he

had a fine territory, a good strategical position and a strong army. But he had to face two great forces — the East Roman empire, which claimed the whole of his territories and was supported in its claim by Raymund of Toulouse, and the strong Mahommedan principalities in the north-east of Syria. Against these two forces he failed. In 1 100 he was captured by Danish- mend of Sivas, and he languished in prison till 1103. Tancred took his place; but meanwhile Raymund established himself with the aid of Alexius in Tripoli, and was able to check the

I 1

= Plaisance Bohemund VI. = Sibylla,

i3‘6

BOHMER

expansion of Antioch to the south. Ransomed in 1103 by the generosity of an Armenian prince, Bohemund made it his first object to attack the neighbouring Mahommedan powers in order to gain supplies. But in heading an attack on Harran, in 1 104, he was severely defeated at Balich, near Rakka on the Euphrates. The defeat was decisive; it made impossible the great eastern principality which Bohemund had contemplated. It was followed by a Greek attack on Cilicia; and despairing of his own resources, Bohemund returned to

Europe for reinforce- ments in order to defend his position. His attractive personality won him the hand of Constance, the daughter of the French king, Philip I., and he collected a large army. Dazzled by his success, he resolved to use his army not to defend Antioch against the Greeks, but to attack Alexius. He did so; but Alexius, aided by the Venetians, proved too strong, and Bohemund had to submit to a humiliating peace (11 08), by which he became the vassal of Alexius, consented to receive his pay, with the title of Sebastos, and promised to cede disputed territories and to admit a Greek patriarch into Antioch. ‘ Henceforth Bohemund was a broken man. He died without returning to the East, and was buried at Canossa in Apulia, in mi. ‘

Literature. — The anonymous Gesta Francorum (edited by H. Hagenmeyer) is written by one of Bohemund’s followers; and the Alexiad of Anna Comnena is a primary authority for the whole of his life. His career is discussed by B. von Kugler, Bohemund und Tancred (Tubingen, 1862); while L. von Heinemann, Geschichte der Normannen in Sicilien und Vnteritalien (Leipzig, 1894), and R. Rohricht, Geschichte des ersten Kreuzzuges (Innsbruck, 1901), and Geschichte des Konigreichs Jerusalem (Innsbruck, 1898), may also be consulted for his history.

Bohemund II. (1108-1131), son of the great Bohemund by his marriage with Constance of France, was born in 1108, the year of his father’s defeat at Durazzo. In n 26 he came from Apulia to Antioch (which, since the fall of Roger, the successor of Tancred, in 1119, had been under the regency of Baldwin II.); and in 1127 he married Alice, the younger daughter of Baldwin. After some trouble with Joscelin of Edessa, and after joining with Baldwin II. in an attack on Damascus (1127), he was defeated and slain on his northern frontier by a Mahommedan army from Aleppo (1131). He hadshown that he had his father’s courage: if time had sufficed, he might have shown that he had the other qualities of the first Bohemund.

Bohemund III. was the son of Constance, daughter of Bohemund II., by her first husband, Raymund of Antioch. He succeeded his mother in the principality of Antioch in 1163, and first appears prominently in n 64, as regent of the kingdom of Jerusalem during the expedition of Amalric I. to Egypt. During the absence of Amalric, he was defeated and captured by Nureddin (August n 64) at Harenc, to the east of Antioch. He was at once ransomed by his brother-in-law, the emperor Manuel, and went to Constantinople, whence he returned with a Greek patriarch. In 1180 he deserted his second wife, the princess Orguilleuse, for a certain Sibylla, and he was in consequence excommunicated. By Orguilleuse he had had two sons, Ray- mund and

Bohemund (the future Bohemund IV.) , whose relations and actions determined the rest of his life. Raymund married Alice, a daughter of the Armenian prince Rhupen (Rupin) , brother of Leo of Armenia, and died in 1197, leaving behind him a son, Raymund Rhupen. Bohemund, the younger brother of Ray- mund, had succeeded the last count of Tripoli in the possession of that county, 1187; and the problem which occupied the last years of Bohemund III. was to determine whether his grandson, Raymund Rhupen, or his younger son, Bohemund, should succeed him in Antioch. Leo of Armenia was naturally the champion of his great-nephew, Raymund Rhupen; indeed he had already claimed Antioch in his own right, before the marriage of his niece to Raymund, in 1194, when he had captured Bohemund III. at Gastin, and attempted without success to force him to cede Antioch. 1 Bohemund the younger, however, prosecuted his claim with vigour, and even evicted his father from Antioch about 1 199: but he was ousted by Leo (now king of Armenia by

1 During the captivity of Bohemund III. the patriarch of Antioch helped to found a commune, which persisted, with its mayor and jurats, during the 13th century.

the grace of the emperor, Henry VI.), and Bohemund III. died in possession of his principality (1201).

Bohemund IV., younger son of Bohemund III. by his second wife Orguilleuse, became count of Tripoli in 1187, and succeeded his father in the principality of Antioch, to the exclusion of Raymund Rhupen, in 1201. But the dispute lasted for many years (Leo of Armenia continuing to champion the cause of his great-nephew), and long occupied the attention of Innocent III. Bohemund IV. enjoyed the support of the Templars (who, like the Knights of St John, had estates in Tripoli) and of the Greek inhabitants of Antioch, to whom he granted their own patriarch in 1207, while Leo appealed (1210-1211) both to Innocent III. and the empei or Otto IV., and was supported by the Hospitallers. In 1 2 16 Leo captured Antioch, and established Raymund Rhupen as its prince; but he lost it again in less than four years, and it was once more in the possession of Bohemund IV. when Leo died in 1220. Raymund Rhupen died in 1221; and after the event Bohemund reigned in Antioch and Tripoli till his death, proving himself a determined enemy of the Hospitallers, and thereby incurring excommunication in 1230. He first joined, and then deserted, the emperor Frederick II., during the crusade of 1228-29; and he was excluded from the operation of the treaty of 1229. When he died in 1233, ne had just concluded peace with the Hospitallers, and Gregory IX. had released him from the excommunication of 1230.

Bohemund V., son of Bohemund IV. by his wife Plaisance (daughter of Hugh of Gibelet) , succeeded his father in 1 233. He was prince of Antioch and count of Tripoli, like his father; and like him he enjoyed the alliance of the Templars and experienced the hostility of Armenia, which was not appeased till 1251, when the mediation of St Louis, and the marriage of the future Bohemund VI. to the sister of the Armenian king, finally brought peace. By his first marriage in 1225 with Alice, the widow of Hugh I. of Cyprus, Bohemund V. connected the history of Antioch for a time with that of Cyprus. He died in 1251. He had resided chiefly at Tripoli, and under him Antioch was left to be governed by its bailiff and commune.

Bohemund VI. was the son of Bohemund V. by Luciana, a daughter of the count of Segni, nephew of Innocent III. Born in 1237, Bohemund VI. succeeded his father in 1251, and was knighted by St Louis in 1252. His sister Plaisance had married in 1250 Henry I. of Cyprus, the son of Hugh I.; and the Cypriot connexion of Antioch, originally formed by the marriage of Bohe- mund V. and Alice, the widow of Hugh I., was thus maintained. In 1252 Bohemund VI. established himself in Antioch, leaving Tripoli to itself, and in 1257 he procured the recognition of his nephew, Hugh II., the son of Henry I. by Plaisance, as king of Jerusalem. He allied himself to the Mongols against the ad- vance of the Egyptian sultan; but in 1268 he lost Antioch to Bibars, and when he died in 1275 he was only count of Tripoli.

Bohemund VII. , son of Bohemund VI. by Sibylla, sister of Leo III. of Armenia, succeeded to the county of Tripoli in 1275, with his mother as regent. In his short and troubled reign he had trouble with the Templars who were established in Tripoli; and in the very year of his death (1287) he lost Laodicea to the sultan of Egypt. He died without issue; and as, within two years of his death, Tripoli was captured, the county of Tripoli may be said to have become extinct with him.

Literature. — The history of the Bohemunds is the history of the principality of Antioch, and, after Bohemund IV., of the county of Tripoli also. For Antioch, we possess its Assises (Venice, 1876) ; and two articles on its history have appeared in the Revue de I'Orient Latin (Paris, 1893, fol.), both by E. Rey (" Resume chronologique de l'histoire des princes d'Antioche," vol. iv., and " Les dignitaires de la principaute d'Antioche," vol. viii.). R. Rohricht, Geschichte des Konigreichs Jerusalem (Innsbruck, 1898), gives practically all that is known about the history of Antioch and Tripoli. (E. Br.)

BOHMER, JOHANN FRIEDRICH (1795-1863), German historian, son

of Karl Ludwig Bohmer (d. 1817), was born at Frankfort-on-Main on the 22nd of April 1795. Educated at the universities of Heidelberg and Gottingen, he showed an interest in art and visited Italy; but returning to Frankfort he turned his attention to the study of history, and became

secretary of the Gesellschaft fur alter e deutsche Geschichtskunde. He was also archivist and then librarian of the city of Frankfort. Bohmer had a great dislike of Prussia and the Protestant faith, and a corresponding affection for Austria and the Roman Catholic Church, to which, however, he did not belong. His critical sense was, perhaps, somewhat warped; but his researches are of great value to students. He died unmarried, at Frankfort, on the 22nd of October 1863. Bohmer's historical work was chiefly concerned with collecting and tabulating charters and other imperial documents of the middle ages. First appeared an abstract, the Regesta chronologico-diplomatica regum atque imperatorum Romanorum 911—1313 (Frankfort, 1831), which was followed by the Regesta chronologico-diplomatica Karolorum. Die Urkunden sdmtlicher Karolinger in kurzen A usziigen (Frank- fort, 1833), and a series of Regesta imperii. For the period 1314-1347 (Frankfort, 1839) the Regesta was followed by three, and for the period 1 246-1313 (Frankfort, 1844) by two supple- mentary volumes. The remaining period of the Regesta, as edited by Bohmer, is 1198-1254 (Stuttgart, 1849). These collections contain introductions and explanatory passages by the author. Very valuable also is the Fontes rerum Germanicarum (Stuttgart, 1843-1868), a collection of original authorities for German history during the 13th and 14th centuries. The fourth and last volume of this work was edited by A. Huber after the author's death. Other collections edited by Bohmer are: Die Reichsgesetze 900-1400 (Frankfort, 1832); Wittelsbachische Regesten von der Erwerbung des Herzogtums Bayern bis zu 1340 (Stuttgart, 1854); and Codex diplomaticus Moeno-Francofurtanus. Urkundenbuch der Reichsstadt Frankfurt (Frankfort, 1836; new edition by F. Law, 1901). Other volumes and editions of the Regesta imperii, edited by J. Ficker, E. Muhlbacher, E. Winkelmann and others, are largely based on Bohmer's work. Bohmer left a great amount of unpublished material, and after his death two other works were published from his papers: Acta imperii selecta, edited by J. Ficker (Innsbruck, 1870); and Regesta archiepiscoporum Magunlinensium, edited by C. Will (Innsbruck, 1877-1886).

See J. Janssen, /. F. Bohmers Leben, Briefe und kleinere Schriften (Freiburg, 1868).

BOHN, HENRY GEORGE (1796-1884), British publisher, son of a German bookbinder settled in England, was born in London on the 4th of January 1796. In 183 1 he started as a dealer in rare books and ” remainders.” In 1841 he issued his ” Guinea ” Catalogue of books, a monumental work containing 23,208 items. Bohn was noted for his book auction sales: one held in 1848 lasted four days, the catalogue comprising twenty folio pages. Printed on this catalogue was the information: ” Dinner at 2 o’clock, dessert at 4, tea at 5, and supper at 10.” The name of Bohn is principally remembered by the important Libraries which he inaugurated: these were begun in 1846 and comprised editions of standard works and translations, dealing with history, science, classics, theology and archaeology, con- sisting in all of 766 volumes. One of Bohn’s most useful and laborious undertakings was his revision (6 vols. 1864) of The Bibliographer’s Manual of English Literature (1834) of W. T. Lowndes. The plan includes bibliographical and critical notices, particulars of prices, &c, and a considerable addition to the original work. It had been one of Bohn’s ambitions to found a great publishing house, but, finding that his sons had no taste for the trade, he sold the Libraries in 1864 to Messrs. Bell and Daldy, afterwards G. Bell & Sons. Bohn was a man of wide culture and many interests. He himself made considerable contributions to his Libraries: he collected pictures, china and ivories, and was a famous rose-grower. He died at Twickenham on the 22nd of August 1884.

BOHTLINGK, OTTO VON (1815-1004) German Sanskrit scholar, was born on the 30th of May (nth of June O.S.) 1815 at St Petersburg. Having studied(1833-183 5) Oriental languages, particularly Arabic, Persian and Sanskrit, at the university of St Petersburg, he continued his studies in Germany, first in Berlin and then (1839-1842) in Bonn. Returning to St Peters- burg in 1842, he was attached to the Royal Academy of Sciences, and was elected an ordinary member of that society in 1855.

In t86o he was made ” Russian state councillor,” and later ” privy councillor ” with a title of nobility. In 1868 he settled at Jena, and in 1885 removed to Leipzig, where he resided until his death there on the 1st of April 1904. Bohtlingk was one of the most distinguished scholars of the 19th century, and his works are of pre-eminent value in the field of Indian and com- parative philology. His first great work was an edition of Panini’s Acht Bucher grammatischer Regeln (Bonn, 1839-1840), which was in reality a criticism of Franz Bopp’s philological methods. This book Bohtlingk again took up forty-seven years later, when he republished it with a complete translation under the title Paninis Grammatik mil Uberselzung (Leipzig, 1887). The earlier edition was followed by Vopadevas Grammatik (St Peters- burg, 1847) ; Uber die Sprache der Jakuten (St Petersburg, 1851) ; Indische Sprilche (2nd ed. in 3 parts, St Petersburg, 1870-1873, to which an index was published by Blau, Leipzig, 1 893) ; a critical ex- amination and translation of Chhandogya-upanishad (St Peters- burg, 1889) and a translation of Brihadaranyaka-upanishad (St Petersburg, 1889). In addition to these he published several smaller treatises, notably one on the Sanskrit accents, Uber den Accent im Sanskrit (1843). But his magnum opus is his great Sanskrit dictionary, Sanskrit- W orterbuch (7 vols., St Petersburg, 1853-1875; newed. 7 vols., St Petersburg, 1879-1889), which with the assistance of his two friends, Rudolf Roth (1821-1895) an d Albrecht Weber (b. 1825), was completed in twenty- three years. BOHUN, the name of a family which plays an important part in English history during the 13th and 14th centuries; it was taken from a village situated in the Cotentin between Coutances and the estuary of the Vire. The Bohuns came into England at, or shortly after, the Norman Conquest; but their early history there is obscure. The founder of their greatness was Humphrey III., who in the latter years of Henry I., makes his appearance as a dapifer, or steward, in the royal household. He married the daughter of Milo of Gloucester, and played an ambiguous part in Stephen’s reign, siding at first with the king and after- wards with the empress. Humphrey III. lived until 1187, but his history is uneventful. He remained loyal to Henry II. through all changes, and fought in n 73 at Farnham against the rebels of East Anglia. Outliving his eldest son, Humphrey IV., he was succeeded in the family estates by his grandson Henry. Flenry was connected with the royal house of Scotland through his mother Margaret, a sister of William the Lion; an alliance which no doubt assisted him to obtain the earldom of Hereford from John (1199). The lands of the family lay chiefly on the Welsh Marches, and from this date the Bohuns take a foremost place among the Marcher barons. Henry de Bohun figures with the earls of Clare and Gloucester among

the twenty-five barons who were elected by their fellows to enforce the terms of the Great Charter. In the subsequent civil war he fought on the side of Louis, and was captured at the battle of Lincoln (12 17). He took the cross in the same year and died on his pilgrimage (June 1, 1220). Humphrey V., his son and heir, returned to the path of loyalty, and was permitted, some time before 1239, to inherit the earldom of Essex from his maternal uncle, William de Mandeville. But in 1258 this Humphrey fell away, like his father, from the royal to the baronial cause. He served as a nominee of the opposition on the committee of twenty-four which was appointed, in the Oxford parliament of that year, to reform the administration. It was only the alliance of Montfort with Llewelyn of North Wales that brought the earl of Hereford back to his allegiance. Humphrey V. headed the first secession of the Welsh Marchers from the party of the opposition (1263), and was amongst the captives whom the Montfortians took at Lewes. The earl's son and name- sake was on the victorious side, and shared in the defeat of Evesham, which he did not long survive. Humphrey V. was, therefore, naturally selected as one of the twelve arbitrators to draw up the ban of Kenil worth (1266), by which the dis- inherited rebels were allowed to make their peace. Dying in 1275, he was succeeded by his grandson Humphrey VII. This Bohun lives in history as one of the recalcitrant barons of the year 1297, who extorted from Edward I. the Confirmatio Cartarum.

The motives of the earl's defiance were not altogether disin- terested. He had suffered twice from the chicanery of Edward's lawyers; in 1284 when a dispute between himself and the royal favourite, John Giffard, was decided in the latter's favour; and again in 1292 when he was punished with temporary im- prisonment and sequestration for a technical, and apparently unwitting, contempt of the king's court. In company, therefore, with the earl of Norfolk he refused to render foreign service in Gascony, on the plea that they were only bound to serve with the king, who was himself bound for Flanders. Their attitude brought to a head the general discontent which Edward had excited by his arbitrary taxation; and Edward was obliged to make a surrender on all the subjects of complaint. At Falkirk (1298) Humphrey VII. redeemed his character for loyalty. His son, Humphrey VIII., who succeeded him in the same year, was allowed to marry one of the king's daughters, Eleanor, the widowed countess of Holland (1302). This close connexion with the royal house did not prevent him, as it did not prevent Earl Thomas of Lancaster, from joining the

opposi- tion to the feeble Edward II. In 1310 Humphrey VIII. figured among the Lords Ordainers; though, with more patriotism than some of his fellow-commissioners, he afterwards followed the king to Bannockburn. He was taken captive in the battle, but exchanged for the wife of Robert Bruce. Subsequently he returned to the cause of his order, and fell on the side of Earl Thomas at the field of Boroughbridge (1322). With him, as with his father, the politics of the Marches had been the main con- sideration; his final change of side was due to jealousy of the younger Despenser, whose lordship of Glamorgan was too great for the comfort, of the Bohuns in Brecon. With the death of Humphrey VIII. the fortunes of the family enter on a more peaceful stage. Earl John (d. 1335) was inconspicuous; Humphrey IX. (d. 1361) merely distinguished himself as a captain in the Breton campaigns of the Hundred Years' War, winning the victories of Morlaix (1342) and La Roche Derrien (1347). His nephew and heir, Humphrey X., who inherited the earldom of Northampton from his father, was territorially the most important representative of the Bohuns. But the male line was extinguished by his death (1373)- The three earldoms and the broad lands of the Bohuns were divided between two co-heiresses. Both married members of the royal house. The elder, Eleanor, was given in 1374 to Thomas of Woodstock, seventh son of Edward III.; the younger, Mary, to Henry, earl of Derby, son of John of Gaunt and afterwards Henry IV., in 1380 or 1381. From these two marriages sprang the houses of Lancaster and Stafford.

See J. E. Doyle's Official Baronage of England (1886), the Complete Peerage of G. E. C(okayne), (1867-1898) ; T. F. Tout's " Wales and the March during the Barons' War," in Owens College Historical Essays, pp. 87-136 (1902); J. E. Morris' Welsh Wars of King Edward I., chs. vi., viii. (1901). (H. W. C. D.)

BOIARDO, MATTEO MARIA, Count (1434-1494), Italian poet, who came of a noble and illustrious house established at Ferrara, but originally from Reggio, was born at Scandiano, one of the.seignorial estates of his family, near Reggio di Modena, about the year 1434, according to Tiraboschi, or 1420 according to Mazzuchelli. At an early age he entered the university of Ferrara, where he acquired a good knowledge of Greek and Latin, and even of the Oriental languages, and was in due time admitted doctor in philosophy and in law. At the court of Ferrara, where he enjoyed the favour of Duke Borso d'Este and his successor Hercules, he was entrusted with several honourable employments, and in particular was named governor of Reggio, an appointment which he held in the year 1478. Three years afterwards he was elected captain of Modena, and reappointed governor of the

town and citadel of Reggio, where he died in the year 1494, though in what month is uncertain.

Almost all Boiardo's works, and especially his great poem of the Orlando Inamorato, were composed for the amusement of Duke Hercules and his court, though not written within its precincts. His practice, it is said, was to retire to Scandiano or some other of his estates, and there to devote himself to com- position; and Castelvetro, Vallisnieri, Mazzuchelli and Tira-

boschi all unite in stating that he took care to insert in the descriptions of his poem those of the agreeable environs of his chateau, and that the greater part of the names of his heroes, as Mandricardo, Gradasse, Sacripant, Agramant and others, were merely the names of some of his peasants, which, from their uncouthness, appeared to him proper to be given to Saracen warriors. Be this as it may, the Orlando Inamorato deserves to be considered as one of the most important poems in Italian literature, since it forms the first example of the romantic epic worthy to serve as a model, and, as such, undoubtedly produced Ariosto's Orlando Furioso. Gravina and Mazzuchell have said, and succeeding writers have repeated on their authority, that Boiardo proposed to himself as his model the Iliad of Homer; that Paris is besieged like the city of Troy; that Angelica holds the place of Helen; and that, in short, the one poem is a sort of reflex image of the other. In point of fact, however, the subject- matter of the poem is derived from the Fabulous Chronicle of the pseudo-Turpin; though, with the exception of the names of Charlemagne, Roland, Oliver, and some other principal warriors, who necessarily figure as important characters in the various scenes, there is little resemblance between the detailed plot of the one and that of the other. The poem, which Boiardo did not live to finish, was printed at Scandiano the year after his death, under the superintendence of his son Count Camillo. The title of the book is without date; but a Latin letter from Antonia Caraffa di Reggio, prefixed to the poem, is dated the kalends of June 1495. A second edition, also without date, but which must have been printed before the year 1500, appeared at Venice; and the poem was twice reprinted there during the first twenty years of the 16th century. These editions are the more curious and valuable since they contain nothing but the text of the author, which is comprised in three books, divided into cantos, the third book being incomplete. But Niccolo degli Agostini, an indifferent poet, had the courage to continue the work commenced by Boiardo, adding to it three books, which were printed at Venice in 1526-1531, in 4to; and since that time no edition of the Orlando has been printed without the continuation of Agostini, wretched as it unquestionably is. Boiardo's

poem suffers from the incurable defect of a laboured and heavy style. His story is skilfully constructed, the characters are well drawn and sustained throughout; many of the incidents show a power and fertility of imagination not inferior to that of Ariosto, but the perfect workmanship indispensable for a great work of art is wanting. The poem in its original shape was not popular, and has been completely superseded by the Rifacimento of Francesco Berni (q.v.).

The other works of Boiardo are — (1) II Timone, a comedy, Scandiano, 1500, 4to; (2) Sonnetti e Canzoni, Reggio, 1499, 4to; (3) Carmen Bucolicon, Reggio, 1500, 4to; (4) Cinque Capitoli in terza rima, Venice, 1523 or 1533; (5) Apulejo dell' Asino d'Oro, Venice, 1516, 1518; (6) Asino d'Oro de Luciano tradotto in volgare, Venice, 1523, 8vo; (7) Erodoto Alicarnasseo istorico, tradotto di Greco in Lingua Italiana, Venice, 1533 and 1538, 8vo; (8) Rerum Italicarum Scriptores.

See Panizzi's Boiardo (9 vols., 1830-1831).

BOIE, HEINRICH CHRISTIAN (1 744-1806), German author, was born at Meldorf in the then Danish province of Schleswig- Holstein on the 19th of July 1744. After studying law at Jena, he went in 1769 to GSttingen, where he became one of the leading spirits in the Gottingen " Dichterbund " or " Hain." Boie's poetical talent was not great, but his thorough knowledge of literature, his excellent taste and sound judgment, made him an ideal person to awake the poetical genius of others. Together with F. W. Gotter (q.v.) he founded in 1770 the Gottingen Musenalmanach, which he directed and edited until 1775, when, in conjunction with C. W. von DohrA (1751-1820), he brought out Das deulsche Museum, which became one of the best literary periodicals of the day. In 1776 Boie became secretary to the commander-in-chief at Hanover, and in 1781 was appointed administrator of the province of Suderditmarschen in Holstein. He died at Meldorf on the 3rd of March 1806.

See K. Weinhold, Heinrich Christian Boie (Halle, 1868).

BOIELDIEU, FRANCOIS ADRIEN (1775-1834), French composer of comic opera, was born at Rouen on the 15th of December 1775. He received his first musical education from M. Broche, the cathedral organist, who appears to have treated him very harshly. He began

composing songs and chamber music at a very early age — his first opera, La Fille coupable (the libretto by his father), and his second opera, Rosalie et Myrza, being produced on the stage of Rouen in 1795- Not satisfied with his local success he went to Paris in 1795. His scores were submitted to Cherubim, Mehul and others, but met with little approbation. Grand opera was the order of the day. Boieldieu had to fall back on his talent as a pianoforte-player for a livelihood. Success came at last from an unexpected source. P. J. Garat, a fashionable singer of the period, admired Boieldieu's touch on the piano, and made him his accompanist. In the drawing-rooms of the Directoire Garat sang the charming songs and ballads with which the young composer supplied him. Thus Boieldieu's reputation gradually extended to wider circles. In 1796 Les Deux lettres was produced, and in 1797 La Famille Suisse appeared for the first time on a Paris stage, and was well received. Several other operas followed in rapid succession, of which only Le Calife de Bagdad (1800) has escaped oblivion. After the enormous success of this work, Boieldieu felt the want of a thorough musical training and took lessons from Cherubini, the influence of that great master being clearly discernible in the higher artistic finish of his pupil's later compositions. In 1802 Boieldieu, to escape the domestic troubles caused by his marriage with Clotilde Aug. Mafleuroy, a celebrated ballet- dancer of the Paris opera, took flight and went to Russia, where he was received with open arms by the emperor Alexander. During his prolonged stay at St Petersburg he composed a number of operas. He also set to music the choruses of Racine's Alhalie, one of his few attempts at the tragic style of dramatic writing. In 181 1 he returned to his own country, where the following year witnessed the production of one of his finest works, Jean de Paris, in which he depicted with much felicity the charming coquetry of the queen of Navarre, the chivalrous verve of the king, the officious pedantry of the seneschal, and the amorous tenderness of the page. He succeeded Mehul as professor of composition at the Conservatoire in 18 17. Le Chapeau rouge was produced with great success in 1818. Boieldieu's second and greatest masterpiece was his Dame blanche (1825). The libretto, written by Scribe, was partly suggested by Walter Scott's Monastery, and several original Scottish tunes cleverly introduced by the composer add to the melodious charm and local colour of the work. Ori the death of his wife in 1825, Boieldieu married a singer. His own death was due to a violent attack of pulmonary disease. He vainly tried to escape the rapid progress of the illness by travel in Italy and the south of France, but returned to Paris only to die on the 8th of October 1834.

Lives of Boieldieu have been written by Pougin (Paris, 1875), J. A.

Refeuvaille (Rouen, 1836), Hequet (Paris, 1864), Emile Duval (Geneva, 1883). See also Adolphe Charles Adam, Demiers souvenirs d'un musicien.

BOIGNE, BENOiT DE, Count (1751-1830), the first of the French military adventurers in India, was born at Chambery in Savoy on the 8th of March 17 51, being the son of a fur merchant. He joined the Irish Brigade in France in 1768, and subsequently he entered the Russian service and was captured by the Turks. Hearing of the wealth of India, he made his way to that country, and after serving for a short time in the East India Company, he resigned and joined Mahadji Sindhia in 1784 for the purpose of training his troops in the European methods of war. In the battles of Lalsot and Chaksana Boigne and his two battalions proved their worth by holding the field when the rest of the Mahratta army was defeated by the Rajputs. In the battle of Agra (1788) he restored the Mahratta fortunes, and made Mahadji Sindhia undisputed master of Hindostan. This success led to his being given the command of a brigade of ten battalions of infantry, with which he won the victories of Patan and Merta in 1 790. In consequence Boigne was allowed

to raise two further brigades of disciplined infantry, and made

commander-in-chief of Sindhia's army. In the battle of Lakhairi

(1793) he defeated Holkar's army. On the death of Mahadji

Sindhia in 1794, Boigne could have made himself master of

Hindostan had he wished it, but he remained loyal to Daulat

Rao Sindhia. In 1795 his health began to fail, and he resigned

his command, and in the following year returned to Europe

with a fortune of £400,000. He lived in retirement during

the lifetime of Napoleon, but was greatly honoured by Louis

XVIII. He died on the 21st of June 1830.

See H. Compton, European Military Adventurers of Hindustan

(1892).

BOII (perhaps = " the terrible ") , a Celtic people, whose original home was Gallia Transalpina. They were known to the Romans, at

least by name, in the time of Plautus, as is shown by the contemptuous reference in the Captivi (888). At an early date they split up into two main groups, one of which made its way into Italy, the other into Germany. Some, however, appear to have stayed behind, since, during the Second Punic War, Magalus, a Boian prince, offered to show Hannibal the way into Italy after he had crossed the Pyrenees (Livy xxi. 29). The first group of immigrants is said to have crossed the Pennine Alps (Great St Bernard) into the valley of the Po. Finding the district already occupied, they proceeded over the river, drove out the Etruscans and Umbrians, and established themselves as far as the Apennines in the modern Romagna. According to Cato (in Pliny, Nat. Hist. iii. 116) they comprised as many as 112 different tribes, and from the remains discovered in the tombs at Hallstatt, La Tene and other places, they appear to have been fairly civilized. Several wars took place between them and the Romans. In 283 they were defeated, together with the Etruscans, at the Vadimonian lake; in 224, after the battle of Telamon in Etruria, they were forced to submit. But they still cherished a hatred of the Romans, and during the Second Punic War (218), irritated by the foundation of the Roman colonies of Cremona and Placentia, they rendered valuable assistance to Hannibal. They continued the struggle against Rome from 201 to 191, when they were finally subdued by P. Cornelius Scipio Nasica, and deprived of nearly half their territory. According to Strabo (v. p. 213) the Boii were driven back across the Alps and settled on the land of their kinsmen, the Taurisci, on the Danube, adjoining Vindelicia and Raetia. Most authorities, however, assume that there had been a settlement of the Boii on the Danube from very early times, in part of the modern Bohemia (anc. Boiohemum, ” land of the Boii “). About 60 B.C. some of the Boii migrated to Noricum and Pannonia, when 3?, 000 of them joined the expedition of the Helvetians into Gaul, and shared their defeat near Bibracte (58). They were subsequently allowed by Caesar to settle in the territory of the Aedui between the Loire and the Allier. Their chief town was Gorgobina (site uncertain) . Those who remained on the Danube were exterminated by the Dacian king, Boerebista, and the district they had occupied was afterwards called the ” desert’ of the Boii ” (Strabo vii. p. 292). In a.d. 69 a Boian named Mariccus stirred up a fanatical revolt, but was soon defeated and put to death. Some remnants of the Boii are mentioned as dwelling near Bordeaux; but Mommsen inclines to the opinion that the three groups (in Bordeaux, Bohemia and the Po districts) were not really scattered branches of one and the same stock, but that they are instances of a mere similarity of name.

The Boii, as we know them, belonged almost certainly to the Early

Iron age. They probably used long iron swords for dealing cutting blows, and from the size of the handles they must have been a race of large men (cf. Polybius ii. 30). For their ethno- logical affinities and especially their possible connexion with the Homeric Achaeans see W. Ridgeway's Early Age of Greece (vol. i., 1901).

See L. Contzen, Die Wanderungen der Ke'ten (Leipzig, 1861); A. Desjardins, GSograpkie historique de la Gaule romaine, ii. (1876- ! 893); T. R. Holmes, Caesar's Conquest of Gaul (1899), pp. 426-428; T. Mommsen, Hist, of Rome, ii. (Eng. trans. 5 vols., 1894), p. 373 note; M. Ihm in Pauly-Wissowa's , Realencyclopddie, iii. pt. I (1897); A. Holder, Alt-celtischer Sprachschatz.

BOIL, in medicine, a progressive local inflammation of the skin, taking the form of a hard suppurating tumour, with a core of dead tissue, resulting from infection by a microbe, Staphy- lococcus pyogenes, and commonly occurring in young persons whose blood is disordered, or as a complication in certain diseases. Treatment proceeds on the lines of bringing the mischief out, assisting the evacuation of the boil by the lancet, and clearing the system. In the English Bible, and also in popular medical terminology, "boil" is used of various forms of ulcerous affection. The boils which were one of the plagues in Egypt were apparently the bubonic plague. The terms Aleppo boil (or button), Delhi boil, Oriental boil, Biskra button, &c, have been given to a tropical epidemic, characterized by ulcers on the face, due to a diplococcus parasite.

BOILEAU-DESPREAUX, NICOLAS (1636-1711), French poet and critic, was born on the 1st of November 1636 in the rue de Jerusalem, Paris. The same Despreaux was derived from a small property at Crosne near Villeneuve Saint-Georges. He was the fifteenth child of Gilles Boileau, a clerk in the parle- ment. Two of his brothers attained some distinction: Gilles Boileau (1631-1669), the author of a translation of Epictetus; and Jacques Boileau, who became a canon of the Sainte-Chapelle, and made valuable contributions to church history. His mother died when he was two years old; and Nicolas Boileau, who had a delicate constitution, seems to have suffered something from want of care. Sainte-Beuve puts down his somewhat hard and unsympathetic outlook quite as much to the uninspiring circum- stances of these days as to the general character of his time. He cannot be said to have been early disenchanted, for he never seems to have

had any illusions; he grew up with a single passion, ” the hatred of stupid books.” He was educated at the College de Beauvais, and was then sent to study theology at the Sor- bonne. He exchanged theology for law, however, and was called to the bar on the 4th of December 1656. From the profession of law, after a short trial, he recoiled in disgust, complaining bitterly of the amount of chicanery which passed under the name of law and justice. His father died in 1657, leaving him a small fortune, and thenceforward he devoted himself to letters.

Such of his early poems as have been preserved hardly contain the promise of what he ultimately became. The first piece in which his peculiar powers were displayed was the first satire (1660), in imitation of the third satire of Juvenal; it embodied the farewell of a poet to the city of Paris. This was quickly followed by eight others, and the number was at a later period increased to twelve. A twofold interest attaches to the satires. In the first place the author skilfully parodies and attacks writers who at the time were placed in the very first rank, such as Jean Chapelain, the abbe Charles Cotin, Philippe Quinault and Georges de Scudery; he openly raised the standard of revolt against the older poets. But in the second place he showed both by precept and practice what were the poetical capabilities of the French language. Prose in the hands of such writers as Descartes and Pascal had proved itself a flexible and powerful instrument of expression, with a distinct mechanism and form. But except with Malherbe, there had been no attempt to fashion French versification according to rule or method. In Boileau for the first time appeared terseness and vigour of expression, with perfect regularity of verse structure. His admiration for Moliere found expression in the stanzas addressed to him (1663), and in the second satire (1664). In 1664 he composed his prose Dialogue des heros de roman, a satire on the elaborate romances of the time, which may be said to have once for all abolished the lucubrations of La Calprenede, Mile de Scudery and their fellows. Though fairly widely read in manuscript, the book was not published till 17 13, out of regard, it is said, for Mile de Scudery. To these early days belong the reunions at the Mouton Blanc and the Pomme du Pin, where Boileau, Moliere, Racine, Chapelle and Antoine Furetiere met to discuss literary questions. To Moliere and Racine he proved a constant friend, and supported their interests on many occasions.

In 1666, prompted by the publication of two unauthorized editions, he published Satires du Sieur D. . . ., containing

seven satires and the Discours au roi. From 1669 onwards appeared his -epistles, graver in tone than the satires, maturer in thought, more

exquisite and polished in style. The Epttres gained for him the favour of Louis XIV., who desired his presence at court. The king asked him which he thought his best verses. Whereupon Boileau diplomatically selected as his ” least bad ” some still unprinted lines in honour of the grand monarch and proceeded to recite them. He received forthwith a pension of 2000 livres. In 1674 his two masterpieces, V Art pottique and Le Lutrin, were published with some earlier works as the CEuvres diverses du sieur D. . . . The first, in imitation of the Ars Poetica of Horace, lays down the code for all future French verse, and may be said to fill in French literature a parallel place to that held by its prototype in Latin. On English literature the maxims of Boileau, through the translation revised by Dryden, and through the magnificent imitation of them in Pope’s Essay on Criticism, have exercised no slight influence. Boileau does not merely lay down rules for the language of poetry, but analyses carefully the various kinds of verse composition, and enunciates the principles peculiar to each. Of the four books of L’Art pottique, the first and last consist of general precepts, inculcating mainly the great rule of bon sens; the second treats of the pastoral, the elegy, the ode, the epigram and satire; and the third of tragic and epic poetry. Though the rules laid down are of value, their tendency is rather to hamper and render too mechanical the efforts of poetry. Boileau himself, a great, though ‘by no means infallible critic in verse, cannot be considered a great poet. He rendered the utmost service in destroying the exaggerated reputations of the mediocrities of his time, but his judgment was sometimes at fault. The Lutrin, a mock heroic poem, of which four cantos appeared in 1674, furnished Alexander Pope with a model for the Rape of the Lock, but the English poem is superior in richness of imagination and subtlety of invention. The fifth and sixth cantos, afterwards added by Boileau, rather detract from the beauty of the poem; the last canto in particular is quite unworthy of his genius. In 1674 appeared also his translation of Longinus On the Sublime, to which were added in 1693 certain critical reflections, chiefly directed against the theory of the superiorit)’ of the moderns over the ancients as advanced by Charles Perrault.

Boileau was made historiographer to the king in 1677. From this time the amount of his production diminished. To this period of his life belong the satire, Sur les femmes, the ode, Sur la prise de Namur, the epistles, A mes vers and Sur V amour de Dieu, and the satire Sur I’homme. The satires had raised up a crowd of enemies against Boileau. The 10th satire, on women, provoked an Apologie des femmes from Charles Perrault. Antoine Arnauld in the year of his death wrote a letter in defence of Boileau, but when at the desire of

his friends he submitted his reply to Bossuet, the bishop pronounced all satire to be in- compatible with the spirit of Christianity, and the 10th satire to be subversive of morality. The friends of Arnauld had declared that it was inconsistent with the dignity of a church- man to write on any subject so trivial as poetry. The epistle, Sur V amour de Dieu, was a triumphant vindication on the part of Boileau of the dignity of his art. It was not until the 15th of April 1684 that he was admitted to the Academy, and then only by the king's wish. In 1687 he retired to a country-house he had bought at Auteuil, which Racine, because of the numerous guests, calls his hotellerie d' Auteuil. In 1705 he sold his house and returned to Paris, where he lived with his confessor in the cloisters of Notre Dame. In the 12th satire, Sur V equivoque, he attacked the Jesuits in verses which Sainte-Beuve called a recapitulation of the Lettres provinciales of Pascal. This was written about 1705. He then gave his attention to the arrange- ment of a complete and definitive edition of his works. But the Jesuit fathers obtained from Louis XIV. the withdrawal of the privilege already granted for the publication, and demanded the suppression of the 12th satire. These annoyances are said to have hastened his death, which took place on the 13th of March 1711.

Boileau was a man of warm and kindly feelings, honest,

outspoken and benevolent. Many anecdotes are told of his frankness of speech at court, and of his generous actions. He holds a well-defined place in French literature, as the first who reduced its versification to rule, and taught the value of workman- ship for its own sake. His influence on English literature, through Pope and his contemporaries, was not less strong, though less durable. After much undue depreciation Boileau's critical work has been rehabilitated by recent writers, perhaps to the extent of some exaggeration in the other direction. It has been shown that in spite of undue harshness in individual cases most of his criticisms have been substantially adopted by his successors.

Numerous editions of Boileau's works were published during his lifetime. The last of these, CEuvres diver ses (1701), known as the " favourite " edition of the poet, was reprinted with variants and notes by Alphonse Pauly (2 vols., 1894). The critical text of his works was established by Berriat Saint-Prix, CEuvres de Boileau (4 vols., 1830-1837), who made use of some 350 editions. This text, edited

with notes by Paul Cheron, with the Boloeana of 1740, and an essay by Sainte-Beuve, was reprinted by Gamier freres (i860).

See also Sainte-Beuve, Causeries du lundi, vol. vi. ; F. Brunetiere, ” L’Esthetique de Boileau” {Revue des Deux Mondes, June 1889), and an exhaustive article by the same critic in La Grande encyclopedie ; G. Lanson, Boileau (1892), in the series of Grands ecrivains francais.

BOILER, a vessel in which water or other liquid is heated to the boiling point; specifically, the apparatus by which steam is produced from water, as one step in the process whereby the potential energy of coal or other fuel is converted into mechanical work by means of the steam-engine. Boilers of the latter kind must all possess certain essential features, whilst of other qualities that are desirable some may not be altogether compatible with the special conditions under which the boilers are to be worked. Amongst the essentials are a receptacle capable of containing the water and the steam produced by its evaporation, and strong enough continuously to withstand with safety the highest pressure of steam for which the boiler is intended. Another essential is a furnace for burning the fuel, and a further one is the provision of a sufficiency of heating surface for the transmission of the heat produced by the combustion of the fuel to the water which is required to be evaporated. Desirable qualities are that the arrangements of the furnaces should be such that a reasonably perfect combustion of the fuel should be possible, and that the heating surfaces should be capable of transmitting a large proportion of the heat produced to the water so as to obtain a high evaporative efficiency. Further, the design generally should be compact, not too heavy or costly, and such that the cleaning necessary to maintain the evaporative efficiency can be easily effected. It should also be such that the cost of upkeep will be small, and that only an average amount of skill and attention will be required under working conditions. It is for providing these qualities in different degrees according to the special requirements of various circumstances that the very different designs of the various types of boilers have been evolved.

Classes of Boilers. — Boilers generally may be divided into two distinct classes, one comprising those which are generally called ” tank ” boilers, containing relatively large quantities of water, and the other those which are generally called ” water-tube ” boilers, in which the water is mainly contained in numerous comparatively small tubes. There are, however, some types of boiler which combine to some extent the properties of both these classes. Each class has its representatives amongst both land and marine boilers. In ” tank ” boilers the outer shell is wholly or partially cylindrical, this form

being one in which the necessary strength can be obtained without the use of a large number of stays. The boilers are generally internally fired, the furnace plates being surrounded with water and forming the most efficient portion of the heating surfaces. On leaving the furnace the products of combustion are led into a chamber and thence through flues or through numerous small tubes which serve to transmit some of the heat of combustion to the water contained in the boiler. In ” water-tube ” boilers the fire is usually placed under a collection of tubes containing water and forming the major portion of the heating surface of the boiler. Both the fire and the tubes are enclosed in an outer casing of brickwork or other fire-resisting substance. In some forms of water-tube

Fig.

1. — Adamson Joint.

boiler the fire is entirely surrounded by water-tubes and the casing is in no part exposed to the direct action of the fire. In ” tank ” boilers generally no difficulty is experienced in keeping all the heating surfaces in close contact with water, but in ” water-tube ” boilers special provision has to be made in the design for maintaining the circulation of water through the tubes. (For ” flash ” boilers see Motor Vehicles, and for domestic hot-water boilers Heating.)

Tank Boilers. — Of large stationary boilers the forms most commonly used are those known as the ” Lancashire ” boiler, and its modification the ” Galloway ” boiler. These boilers are made from 26 to 30 ft. long, with diameters from 6| to Lanca-

8 ft., and have two cylindrical furnace flues which in the shire. “Lancashire ” boiler extend for its whole length (see fig. 3). The working pressure is about 60 lb per sq. in. in the older boilers, from 100 lb to 120 lb per sq. in. in those supplying steam to com- pound engines, and from 150 to 170 ft where triple expansion engines are used. In some cases they have been constructed for a pressure of 200 lb per sq. in. The furnace flues are usually made in sections from 3 to 3I ft. long. Each section consists of one plate bent into a cylindrical form, the longitudinal joint being welded, and is flanged at both ends, the various pieces being joined together by an ” Adamson ” joint (fig. 1). It will be seen that these joints do not expose either rivets or double thickness of plate to the action of the fire; they further serve as stiffening rings to prevent collapse of the flue. In most of these boilers the heating surface is increased by fitting in the furnace flues a number of ” Galloway ” tubes. These are conical tubes, made with a

flange at each end, by means of which they are connected to the furnace plate. They are so proportioned that the diameter of the large end of the tube is slightly greater than that of the flange of the small end; this enables them to be readily removed and replaced if necessary. These tubes not only add to the heating surface, but they stiffen the flue, promote circula- tion of the water in the boiler, and by mixing up the flue gases improve the evaporative efficiency.

In the ” Galloway ” boiler the two furnaces extend only for about

9 or 10 ft. into the boiler, and lead into a large chamber or flue in which a number of ” Galloway ” tubes are fitted, and which extends from the furnace end to the end of the boiler. A cross section of this flue showing the distribution of the Galloway tubes is shown in fig. 2. When boilers less than about 6J ft. in diameter are needed, a somewhat similar type to the Lancashire boiler is used containing only one furnace. This is called a ” Cornish ” boiler.

In all three types of boiler the brickwork is constructed to form one central flue passing along the bottom of the boiler and two side flues extending up the side nearly to the water- level. A cross section of the brickwork is shown in fig. 2. The usual arrangement is for the flue gases to be divided as they leave the internal flue; one- half returns along each side flue to the front of the boiler, and the whole then passes downwards into the central flue, travelling under the bottom of the boiler until the gases again reach the back end, where they pass into the chimney. In a few cases the arrangement is reversed, the gases first passing along the bottom flue and return- ing along the side flues. This latter arrangement, whilst promoting a more rapid circulation of water, has the dis- advantage of requiring two dampers, and it is not suitable for those cases in which heavy deposits form on the bottoms of the boilers.

Where floor space is limited and also for small installations, other forms of cylindrical boilers are used, most of them being of the vertical type. That most commonly used is the simple Vertical vertical boiler, with a plain vertical fire-box, and an internal smoke stack traversing the steam space. The fire-box is made slightly tapering in diameter, the space between it and the shell being filled with water. In all but the small sizes cross tubes are generally fitted. These are made about 9 in. in diameter of f-in. plate flanged at each end to enable them to be riveted to the fire-box plates. They are usually fitted with a slight inclination to facilitate water circulation.

*wmm.

m^mm*

Fig. 2.-

-Galloway Boiler : Section beyond the Bridge.

and a hand-hole closed by a suitable door is provided in the outer shell opposite to each tube for cleaning purposes. A boiler of this kind is illustrated in fig. 4. This form is often used on board ship for auxiliary purposes. Where more heating surface is required than can be obtained in the cross-tube boiler other types of vertical

made from plates originally rolled of a uniform thickness, made into a cylindrical form with a welded longitudinal joint and then corrugated, the only difference between them being in the shapes of the corrugations. In the other three types the plates from which the furnaces are made are rolled with ribs or thickened portions at

Fig. 3. — Lancashire Boiler (Messrs Tinker, Ltd.).

boiler are employed. For instance, in the ” Tyne ” boiler (fig. 5) the furnace is hemispherical, and the products of combustion are led into an upper combustion chamber traversed by four or more inclined water-tubes of about 9 in. diameter and by several vertical water-tubes of less diameter. In the ” Victoria ‘ boiler made by Messrs Clarke, Chapman & Co., and illustrated in fig. 6 , the furnace is hemispherical ; the furnace gases are led to an internal combustion chamber, and thence through numerous horizontal smoke-tubes to a smoke-box placed on the side of the boiler. In the somewhat similar boiler known as the ” Cochran,” the combustion chamber is made with a ” dry ” back. Instead of a water space at thebackof the chamber, doors lined with firebrick are fitted. These give easy

access to the tube ends.

The cylindrical multitubular re- „ . turn tube boiler is in

almost universal use in merchant steamers. It is made in various sizes ranging up to 17 ft. in diameter, the usual working pressure being from 160 to 200 lb per sq. in., although in some few cases pressures of 265 lb per sq. in. are in use. These boilers are of two types, double- . and single – ended. In single – ended boilers, which are those most

gener- ally used, the furnaces are fitted at one end only and vary in number from one in the smallest boiler to four in the largest. Three fur- naces are the most usual practice. Each furnace generally has its own separate combustion chamber. In four furnace boilers, however, one chamber is sometimes made com- mon to the two middle furnaces, and sometimes one chamber is fitted to each pair of side furnaces. In double-ended boilers furnaces are

‘ 1 fitted at each end. In some cases

. each furnace has a separate com-

- bustion chamber, but more usually

one chamber is made to serve for two furnaces, one at each end of the boiler. The two types of boilers are shown in figs. 7 and 8, which illustrate boilers made by Messrs D. Rowan & Co. of Glasgow, and which may be taken as representing good modern practice. The fur- naces used in the smaller sizes are often of the plain cylindrical type, the thickness of plate varying from J in. up to f in. according to the diameter of the furnace and the working pressure. Occasionally furnaces with ” Adamson ” joints -Simple Vertical Boiler. s ; m ii ar t o those used in Lancashire boilers are employed, but for large furnaces and for high pressures corrugated or ribbed furnaces are usually adopted. Sketches of the sections of these are shown in fig. 9. The sections of the Morison, Fox and Deighton types are

Fig. 4.-

distances of 9 in. These furnaces are stronger to resist collapse than plain furnaces of the same thickness, and accommodate them- selves more readily to changes of temperature.

There are two distinct types of connexion between the furnaces and the combustion chambers. In one, shown in fig. 8, the furnace is flanged at the crown portion for riveting to the tube plate, and the lower part of the furnace is riveted to the ” wrapper ” or side plate of the combustion chamber. In the other type, shown in fig. 7, and known generally as the ” Gourlay back end, “the end of the furnace is contracted into an oval conical form, and is then flanged outwards round the whole of its circumference. The tube plate is made to extend to the bottom of the combustion chamber, and the

Fig. 5. — Vertical Boiler with Water-tubes (the ” Tyne,” by Messrs Clarke, Chapman & Co.).

furnace is riveted to the tube plate. The advantage of the Gourlay back end is that in case of accident to the furnace it can be removed from the boiler and be replaced by one of the same design without disturbing the end plates, which is not possible with the other design.

BOILER

H3

The Gourlay back end, however, is not so stiff as the other, and more longitudinal stays are required in the boiler.

The flat sides and backs of the combustion chambers are stayed either to one another or to the shell of the boiler by numerous screw

|«oo*ooo*oo*oo* oooooooooooooo oooooooooooooo •OOIOOIOOO*OOI oooooooooooooo oooooooooooooo •oo«ooo»oo»oo« oooooooooooooo oooooooooooooo lOOIOOtOOOtOO* oooooooooooooo oo oooooooooooo • oo* 6oo*o OIOOI

©

©

©

if \

Fig. 6. — Vertical Boiler with internal combustion chamber (the ” Victoria,” by Messrs Clarke, Chapman & Co.).

stays which are screwed through the two plates they connect, and which are nearly always fitted with nuts inside the combustion chambers. The tops of the chambers are usually stayed by strong girders resting upon the tube plates and chamber back plates. In

plates. The end plates of the boiler in the steam space and below the combustion chambers are stayed by longitudinal stays passing through the whole length of the boiler and secured by double nuts at each end. The tube plates are strengthened by stay tubes screwed into them.

Where natural or chimney draught is used the tubes are generally made 3 or 3J in. outside diameter and are rarely more than 7 ft. long, but where ” forced ” draught is employed they are usually made 2j in. diameter and 8 to 8| ft. long. A clear space of if in. between the tubes is almost always arranged for, irrespective of size of tubes.

Stay tubes are screwed at both ends, the threads of the two ends being continuous so that they can be screwed into both tube plates ;

Loco- motive.

Fig. 7. — Single-ended Marine Boiler, a few cases, however, they are stayed by vertical stays attached to T bars riveted to the boiler shell. A few boilers are made in which the chamber tops are strengthened by heavy transverse girder

Fig. 8. — Double-ended Marine Boiler.

occasionally nuts are fitted to the front ends. The stay tubes are expanded into the plates and then beaded over.

The locomotive boiler consists of a cylindrical barrel attached to a portion containing the fire-box, which is nearly rectangular both in horizontal and vertical section. The fire-box sides are stayed to the fire-box shell by numerous stays about I in. in diameter, usually pitched 4 in. apart both vertically and horizontally. The top of the fire-box in small boilers is stayed by means of girder stays running longitudinally and supported at the ends upon the tube plate and the opposite fire-box plate. In some boilers the girders are partly supported by slings from the crown of the boiler. In larger boilers the crown of the boiler above the fire-box is made flat and the fire-box crown is supported by vertical stays connecting it with the shell crown. Provision is

generally made for the expansion of the tube plate, which is of copper, by allowing the two or rig three cross rows of stays nearest ˆ the tube plate to have freedom * of motion upwards but not down- 5 3 wards. The ordinary tubes are usually if in. diameter. The fire- Jj 3 bars are generally, though not always, made to slope down- wards away from the fire door, and just below the lowest tubes a fire-bridge or baffle is fitted, extending about half-way from the tube plate to the fire-door side of the fire-box. In some cases water-tubes are fitted, ex- tending right across the fire-box. In a boiler for the London & South- Western Railway Co., hav- ing a grate area of 31 5 sq. ft. and a total heating surface of 2727 sq. ft., there are 112 water-tubes each 2 1 in. diameter. These are arranged in two clusters, each containing 56, one set being placed above the fire-bridge, and the other set nearer the fire- door end of the boiler. The water-tubes are of seamless steel, fire-box side plates. In way side plates are supported by

and are expanded into the

of these tubes the outer shell

stay bars passing right through the water-tubes. The usual

pressure of locomotive boilers is about 175 lb to 200 lb per sq. in.

A good example of an express locomotive boiler is shown in fig. 10. In this case the grate area is 30.9 sq. ft. and the heating surface

Morison Type.

«— 6’—*

Fox Type.

Purves Type.

Deighton Type.

Fig. 9.

Brown’s Arched and Ribbed Type.

Brown’s Cambered Section.

2500 sq. ft. The barrel is 5 ft. 6 in. diameter, 16 ft. long between tube plates. The fire-box crown is stayed by vertical stays extending to the shell crown, except for the three rows of stays nearest the tube plates. These are supported by cross girders resting upon brackets secured to the outer shell.

usual pressure is 180 ft). Like all water-tube boilers, they require to be frequently cleaned if impure feed-water is used, but the straight- ness of their tubes enables their condition to be ascertained at any time when the boiler is out of use, and any accumulation of scale to be removed. The superheaters, which are frequently fitted, consist of two cross-boxes or headers placed transversely under the cylin- drical drum and connected by numerous C shaped tubes. They are situated between the tubes and the steam-chest, and are exposed to the heat of the furnace gases after their first passage across the tubes. The steam is taken by an internal pipe passing through the bottom of the drum into the upper cross-box, then through the C tubes into the lower box, and thence to the steam pipe. When steam is being raised, the

superheater is flooded with water, which is drained out through a blow-off pipe before communication is opened with the steam-pipe. In large boilers of this type, two steam-chests are placed side by side connected together by two cross steam pipes and by the mud drum. Each, however, has its own separate feed supply. The largest boiler made has two steam chests 4J ft. diameter by 25J ft. long a grate surface of 85 sq. ft., and a total heating surface of 6182 sq. ft.

Another type of water-tube boiler in use for stationary purposes is the ” Stirling ” (fig. 12). This boiler consists of four or. five horizontal drums, of which the three upper form the Stirling. steam-space, and the one or two lower contain water. The lower drums, where two are fitted, are connected to each other at about the middle of their height by horizontal tubes, and to the upper drums by numerous nearly vertical tubes which form the major portion of the heating surfaces. The central upper drum is at a slightly higher level than the others, and communicates with that nearest the back of the boiler by a set of curved tubes entirely above the water-level, and with the front drum by two sets — the upper one being above and the lower below the water-level. The whole boiler is enclosed in brickwork, into which the supporting

Babcock and Wilcox station- ary.

Fig. 10. — Express Locomotive Boiler, with widened fire-box (Great Northern Railway, England)

Water-Tube Boilers. — The ” Babcock & Wilcox ” boiler, as fitted for land purposes, and illustrated in fig. 1 1 , consists of a horizontal cylinder forming a steam chest, having dished ends and two specially constructed cross-boxes riveted to the bottom. Under the cylinder is placed a sloping nest of tubes, under the upper end of which is the fire. The sides and back of the boiler are enclosed in brickwork up to the height of the centre of the horizontal cylinder and the front is fitted with an iron casing lined with brick at the lower part. Suitable brickwork baffles are arranged between the tubes them- selves, and between the nests of tubes and the cylinder, to ensure a proper circulation of the products of combustion, which are made to pass between the tubes three times. The nest of tubes consists of several separate elements, each formed by a front and back header made of wrought steel of sinuous form connected by a number of tubes. The upper ends of the front headers are connected by short tubes to the front cross-box of the horizontal cylinder, the lower ends being closed. The upper ends of the back headers are connected by longer pipes to the back cross-box, and their lower ends by sfcort pipes to a horizontal

mud drum to which a blow-off cock and pipe are attached. The headers are furnished with holes on two opposite sides; those on one side form the means of con- nexion between the headers and tubes, and the others allow access for fixing the tubes in position and cleaning. The outer holes are oval, and closed by special fittings shown in fig. 18, the watertight- ness of the joints being secured by the outer cover plates. The holes being oval, the inside fitting can be placed in position from outside, and it is so made as to cover the opening and prevent any great outrush of steam or water should the bolt break. Any desired working pressure can be provided for in these boilers; in some special cases it rises as high as 500 lb per sq. in., but a more

columns and girders are built. Brickwork baffles compel the furnace gases to take specified courses among the tubes. It will be seen that the space between the boiler front and the tubes form a large combustion chamber into which all the furnace gases must pass before they enter the spaces between the tubes; in this chamber a baffle-bridge is sometimes built. Another chamber is formed between The feed-water enters the

the first and second sets of tubes.

back upper drum, and must pass down the third set of tubes into the lower drum before it reaches the other parts of the boiler. Thus the coldest water is always where the temperature of the furnace gases is lowest ; and as the current through the lower drum is slight, the solid matters separated from the feed-water while its temperature is being raised have an opportunity of settling to the bottom of this drum, where the heating is not great and where therefore their presence will not be injurious. When superheaters are required, they are made of two drums connected by numerous small tubes, and are somewhat similar in construction to the boiler proper. The superheater is placed between the first and second sets of tubes, where it is exposed to the furnace gases before too much heat has been taken from them. Arrangements are provided for flooding the superheater while steam is being raised, and for draining it before the steam is passed through it.

BOILER

H5

A somewhat similar boiler is made by Messrs. Clarke, Chapman & Co., and is known as the “Woodeson” boiler (fig. 13). It consists of three upper drums placed side by side connected Woodeson. t g e t ner by

numerous short tubes, some above and some below the water-level, and of three smaller lower drums also con- nected by short cross tubes. The upper and lower drums are

Fig. 11. — Babcock & Wilcox Water-tube Boiler fitted with Superheaters.

connected by numerous nearly vertical straight tubes. The whole is enclosed in firebrick casing. The design permits of the insides of all the tubes being readily inspected, and also of any tube being taken out and renewed without displacing any other part of the boiler.

The earliest form of water-tube boiler which came into general use in the British navy is the Belleville. Two views of this boiler are Belleville, shown in fig. 14. It is composed of two parts, the boiler proper and the ” economizer.” Each of these consists of several sets of elements placed side by side; those of the boiler proper are situated immediately over the fire, and those of the

Safety y«’»e’E??” , ‘ , Va,! ”

and except in the case of the upper and lower ones at the front of the boiler, each connects the upper end of one tube with the lower end of the next tube of the element. The boxes at the back of the boiler are all close-ended, but those at the front are provided with a small oval hole, opposite to each tube end, closed by an internal door with bolt and cross-bar; the purpose of these openings is to permit the inside of the tubes to be examined and cleaned. The lower front box of each element of the boiler proper is connected to a horizontal cross-tube of square section, called a “feed-collector,” which extends the whole width of the boiler. When the boiler is not in use, any element can be readily disconnected and a spare one inserted. The lower part of the steam-chest is connected to the feed-collector by vertical pipes at each end of the boiler, and prolongations of these pipes below the level of the feed-collector form closed pockets for the collection of sediment. The tubes are made of seamless steel. They are generally about 4.3 in. in external diameter; the two lower rows are f in. thick, the next two rows f t in., and the remainder about £ in. The construc- tion of the economizer is similar to that of the boiler proper, but the tubes are shorter and smaller, being generally about 2 J in. in diameter. The lower boxes of the econo- mizer elements are connected to a horizontal feed pipe which is kept supplied with water by a feed-pumping engine, and the upper boxes are connected to another horizontal pipe from which the heated feed-water is taken into the steam-chest. Both the boiler proper and the economizer are enclosed

in a casing which is formed of two thicknesses of thin iion separated by non-conducting material and lined with firebrick at the part between the fire-bar level and the lower rows of tubes. Along the front of the boiler, above the level of the firing-doors, there is a small tube having several nozzles directed across the fire-grate, and supplied with compressed air at a pres- sure of about 10 lb per sq. in. In this way not only is additional air supplied, but the gases issuing from

12. — Stirling Water-tube Boiler.

economizer in the uptake above the boiler, the intervening space being designed to act as a combustion chamber. Each element is constructed of a number of straight tubes connected at their ends by means of screwed joints to junction-boxes which are made of malleable cast iron. These are arranged vertically over one another,

Fig. 13. — Woodeson Boiler (Messrs Clarke, Chapman & Co.).

the fire are stirred up and mixed, their combustion being thereby facilitated before they pass into the spaces between the tubes. A similar air-tube is provided for the space between the

boiler proper and the economizer. Any water suspended in the steam is separated in a special separator fitted in the main steam- pipe, and the steam is further dried by passing through a reducing- valve, which ensures a steady pressure on the engine side of the valve, notwithstanding fluctuations of pressure in the boiler. The boiler pressure is usually maintained at about 50 lb per sq. in. in excess of that at which the engines are working, the excess forming a reservoir of energy to provide for irregular firing or feeding.

Another type of large-tube boiler which has been used in the British and in other navies is the ” Niclausse,” shown in fig. 15.

Nlclausse. ˆ ‘ s a ‘ so * n use on ‘ ant ˆ ‘ n severa ‘ electric-light installa- tions. It consists of ; a horizontal steam-chest under which is placed a number of elements arranged side by side over the fire, the whole being enclosed in an iron casing lined with firebrick where it is exposed to the direct action of the fire. Each element consists of a header of rectangular cross-section, fitted with two rows of inclined close-ended tubes, which slope downwards towards the back of the boiler with an inclination of 6° to the horizontal. The headers are

usually of malleable cast iron with diaphragms cast in them, but sometimes steel has been employed, the bottoms being closed by a riveted steel plate, and the diaphragms being made of the same material. The headers are

bolted to socket-pieces which are riveted to the bottom of the steam-chest, so that any element may be easily removed. The tube-holes are accurately bored, at an angle to suit the inclination of the tubes, through both the front and back of the headers and through the diaphragm, those in the header walls being slightly conical. The tubes themselves, which are made of seamless steel, are of peculiar construction. The lower or back ends are reduced in diameter and screwed and fitted with cap-nuts which entirely close them. The front ends are thickened by being upset, and the parts where they fit into the header walls and in the diaphragm are care- fully turned to gauge. The upper and lower parts of the tubes between these fitting portions are then cut away, the side portions only being retained, and the end is termed a ” lanterne.” A small water-circulating tube of thin sheet steel, fitted inside each generating tube, is open at the lower end, and at the other is secured to a smaller ” lanterne,” which, however, only extends from the front of the header to the diaphragm. This smaller ” lanterne ” closes the front end of the generating tube. The whole arrangement is such that when the tubes are in place only the small inner circulating tubes communicate with the space between the front of the header and the diaphragm, while the annular spaces in the generating tubes around the water-circulating tubes communicate only with the space between the diaphragm and the back of the header. The steam formed in the tubes escapes from them into this back space, through which it rises into the steam-chest, whilst the space in the front of the header always contains a down-current of water supplying the inner circulating tubes. The tubes are maintained in position by cross-bars, each secured by one stud-bolt screwed into the header

front wall, and each serving to fix two tubes. The products of com-bustion ascend directly from the fire amongst the tubes, and the combustion is rendered more complete by the introduction of jets of high-pressure air immediately over the fire, as in the ” Belleville ” boiler.

The ” Diirr ” boiler, in use in several vessels in the German navy, and in a few vessels of the British navy, in some respects resembles the ” Niclausse.” The separate headers of Durr

the latter, however, are replaced by one large water- chamber formed

of steel plates with welded joints, and instead of the tubes being secured by ” lanternes ” to two plates they are secured to the inner plate only by, conical joints, the, holes in the outer plate being closed by small round doors fitted from the inside. In fixing the tubes each is separately forced into its position by means of a small portable hydraulic jack. The lower ends of the caps are closed by cap-nuts made of a special heat-resisting alloy of copper and manganese. Circulation is provided for by a diaphragm in the water-chamber and by inner tubes as in the Niclausse boiler. Baffle plates are fitted amongst the tubes to ensure a circulation of the furnace gases amongst them. Above the main set of tubes is a smaller set arranged horizontally, and connected directly to the steam receiver. These are fitted with internal tubes, and an internal diaphragm is provided so that steam from the chest circulates through tfiese tubes on its way to the stop-valves. This supplementary set of tubes is intended to serve as a superheater, but the amount of surface is not sufficient to obtain more than a very small amount of superheat.

The Yarrow boiler (fig. 16) is largely in use in the British and also in several other navies. It consists of a large cylindrical steam Yarrow. chest and two lower water-chambers, connected by numerous straight tubes. In the boilers for large vessels all the tubes are of i| in. external diameter, but in the large express boilers the two rows nearest to the fire on each side are of 1 J in. and the remainder of 1 in. diameter. They are arranged with their centres forming equilateral triangles, and are spaced so that they can be cleaned externally both from the front of the boiler and also cross-ways in two directions. In some boilers the lower part of the steam-chest is connected with the water- chambers by large pipes outside the casings with the view of improving the circulation.

The largest size of single-ended large tube boiler in use has a” steam drum 4 ft. 2 in. diameter, a grate area of 73-5 sq. ft. and 3750 sq. ft. of heating surface, but much larger double- ended boilers have been made, these being fired from both ends.

In most of the boilers made, access to the inside is obtained by manholes in the steam- chest and water-chamber ends, but in the smaller sizes fitted in torpedo boats the water- chambers are too small for this, and they are each arranged in two parts connected by a bolted joint, which makes all the tube ends accessible.

The Babcock & Wilcox marine boiler (fig. 17) is much used in the American and British navies, and it has also been used in several yachts and merchant steamers. It consists of a horizontal cylindrical

steam-chest placed transversely over a group of elements, beneath which is the fire, the whole being enclosed in an iron casing lined with firebrick. Each element consists of a front and back header connected by numerous water-tubes which have a considerable inclination to facilitate the circulation. The upper ends of the front headers are situated immediately under the steam-chest and are connected to it by short nipples; by a similar means they are connected at the bottom to a pipe of square section which extends across the width of the boiler. Additional connexions are made by nearly vertical tubes between this cross-pipe and the bottom of the steam-chest. The back headers are each connected at their upper ends by means of two long horizontal tubes with the steam-chest, the bottom ends of the headers being closed. The headers are made of wrought steel, and except the outer pairs, which are flat on the outer portions, they are sinuous on both sides, the sinuosities fitting into one another. The tubes are of two sizes, the two lower rows and the "return tubes between the back headers and steam-chest being 3}! in. outside diameter, and the remaining tubes \\ in. The small tubes are arranged in groups of two or four to nearly all of the sinuosities of the headers, the purpose of this arrangement being to give opportunities for the furnace gases to become well mixed together, and to ensure their contact with the heating sur- faces. Access for securing the tubes in the headers is provided by a hole formed on the other side of the header opposite each of the tubes, where they are grouped in fours, and by one larger hole opposite each group of two tubes. The larger holes are oval, and are closed by fittings similar to those used in the land boiler (fig. 18). The smaller holes are conical, with the larger diameter on the inside,

and are closed by special conical fittings: the conical portion and bolt are one forging, and the nut is close-ended. In case of the breakage of the bolt, the fitting would be retained in place by the steam-pressure. A set of firebrick baffles is placed so as to cover rather more than half of the spaces between the upper of the two bottom rows of large tubes, and another set of baffles covers about two-thirds of the spaces between the upper small tubes. Vertical baffles are also built between the smaller tubes, as shown in the longitudinal section. These baffles compel the products of com- bustion to circulate among the tubes in the direction shown by the arrows. Experience has shown that this arrangement gives a better evaporative efficiency than where the furnace gases are allowed to pass unbaffled straight up between the

tubes. The boilers are usually fitted in pairs placed back to back, and one side of each is always made accessible. On this side the casing is provided with

Fig. 15. — Niclausse Boiler — transverse section.

numerous small doors, through any of which a steam jet can be inserted for the purpose of sweeping the tubes.

A class of water-tube boilers largely in use in torpedo-boat destroyers and cruisers, where the maximum of power is required in proportion to the total weight of the installation, is h iki* 33 generally known as express boilers. In these the tubes boilers. arg ma j e f sraa]i er diameter than those used in the boilers already described, and the boilers are designed to admit of a high rate of combustion of fuel obtained by a high degree of _" forced draught." Of these express boilers the Yarrow is of similar con- struction to the large tube Yarrow boiler already described, with the exception that the tubes are smaller in diameter and much more closely arranged.

In the Normand boiler (fig. 19) there are three chambers, as in the Yarrow, connected together by a large number of bent tubes which Normand f° rm tne heating surface, and also connected at each end by large outside circulating tubes. The two outer rows of heating tubes on each side are arranged to touch one another for nearly their whole length so as to form a " water-wall " for the protection of the outer casing. They enter the steam-chest at about

the water-level. The two inner rows of tubes, which are bent to the form shown in the figure, also form a water-wall for the larger portion of the length of the boiler, and thus compel the products of com- bustion to pass in a definite course amongst all the tubes. In the Blechynden and White-Foster boilers there are also three chambers connected by bent tubes, the curvature being so arranged that in the former boiler any of the tubes can be taken out of the boiler through small doors provided in the upper part of the steam-chest, and in the White-Foster boiler they can be taken out through the manhole in the end of the steam-chest.

In the Reed boiler the tubes are longer and more curved than in the Normand boiler, and there are no " water-walls," the products of combustion passing from the fire-grate amongst all _ .

the tubes direct to the chimney. The special feature of ««*«•

the boiler is that each tube, instead of being expanded into the tube

plate, is fitted at each end with specially designed screw and nut connexions to enable them to be quickly taken out and replaced if necessary. At their lower ends the tubes are reduced in diameter to enable smaller chambers to be used than would otherwise be necessary. Provision is made, for access to the lower tube ends by means of numerous doors in the water- chambers. Access to the top ends is obtained in the steam-chest.

Messrs John I. Thornycroft & Co. make two forms of express boiler. One called the Thornycroft boiler consists of three Thorav chambers connected by tubes which „

are straight for the major portion of their length but bent at each end to enable them to enter the steam- and water-chambers normally. The outer rows of tubes form ” water- walls ” at their lower parts, but permit the passage of the gases between them at their upper ends. Similarly the inner rows form ” water-walls ” at their upper parts, but are open at the lower ends. The products of combustion are thus compelled to pass over the whole of the heating surfaces. The fire-rows of tubes in this boiler are made if in. outside diameter and the remainder are made if in. diameter. Large outside circulating pipes are provided at the front end of the boiler.

In the other type of boiler, known as the Thornycroft-Schulz boiler (fig. 20), there are four chambers, and thefire-grateis arranged Thorn in two separate portions. The two croft- 3 ” outermost rows of tubes on each side schulz. are arranged to form water-walls at their lower part, and permit the gases to pass between them at the upper part. The rows nearest the fires are arranged similarly to those in the Thornycroft boiler. Circulation in the outer sets of tubes is arranged for by outer cir- culating pipes of large diameter connecting the steam- and water-chambers. For the middle water-chamber several nearly vertical down- comers are provided in the centre of the boiler. Boilers of this type are extensively used in the British and German navies.

Material of Boilers. — In ordinary land boilers and in marine boilers of all types the plates and stays are almost invariably made of mild steel. For the shell plates and for long stays, a quality having a tensile strength ranging from 28 to 32 tons per sq. in. is usually employed, and for furnaces and flues, for plates which have to be flanged, and for short-screwed stays, a somewhat softer steel with a strength ranging from 26 to 30 tons per sq. in. is used. The tubes of ordinary land and marine boilers are usually made of lap-welded wrought iron. In water-tube boilers for naval purposes seamless steel tubes are invariably used. In locomotive boilers the shells are generally of mild

steel, the fire-box plates of copper (in America of steel), the fire-box side stays of copper or special bronze, and other stays of steel. The tubes are usually of brass with a composition either of two parts by weight of copper to one of zinc or 70% copper, 30% zinc; sometimes, however, copper tubes and occasionally steel tubes are used. Where water tubes are used they are made of seamless steel.

Boiler Accessories. — All boilers must be provided with certain mountings and accessories. The water-level in them must be kept above the highest part of the heating surfaces. In some

land boilers, and in some of the water-tube boilers used on shipboard, the feeding is automatically regulated by mechanism actuated by a float, but in these cases means of regulating the feed-supply by hand are also provided. In most boilers hand regulation only is relied upon. The actual level of water in the boiler is ascertained by a glass water-gauge, which consists of a glass tube and three cocks, two communicating directly with the boiler, one above and one below the desired water-level, and the third acting as a blow-out for cleaning the gauge and for testing its working. Three small try-cocks are also fitted, one just at, one above, and one below the proper water-level. The feeding of the boiler is sometimes performed by a pump driven from the main engine, sometimes by an independent steam-pump, and sometimes by means of an injector. The feed- water ft admitted by a ” check-valve,” the lift of which is regulated by a screw and

Fig. 16. — Yarrow Water-tube Boiler.

hand-wheel, and which when the feed-pump is not working is kept on its seating by the boiler pressure.

Every boiler is in addition supplied with a steam-gauge to indicate the steam-pressure, with a stop-valve for regulating the admission of steam to the steam-pipes, and with one or two safety- valves. These last in stationary boilers usually consist of valves kept in their seats against the steam-pressure in the boiler by levers carrying weights, but in marine and locomotive boilers the valves are kept closed by means of steel springs. One at least of the safety-valves is fitted with easing gear by which it can be lifted at any time for blowing off the steam. Blow-out cocks are fitted for emptying the boiler.

Openings must always be made in boilers for access for cleaning and

examination. When these are large enough to allow a man to enter the boiler they are termed man-holes. They are usually made oval, as this shape permits the doors by which they are closed to be placed on the inside so that the pressure upon them tends to keep them shut. The doors are held in place by one or

two bolts, secured to cross-bars or ” dogs ” outside the boiler. It is important in making these doors that they should fit the holes so accurately that the jointing material cannot be forced out of its proper position. In the few cases where doors are fitted outside a boiler, so that the steam-pressure tends to open them, they are always secured by several bolts so that the breakage of one bolt will not allow the door to be forced off.

Waler-softening. — Seeing that the impurities contained in the feed-water are not evaporated in the steam they become con- centrated in the boiler water. Most of them become precipitated in the boiler either in the form of mud or else as scale which forms on the heating surfaces. Some of the mud and such of the impurities as remain soluble may be removed by means of the blow-off cocks, but the scale can only be removed by periodical cleaning. Incrustations on the heat- ing surface not only lessen the efficiency of the boiler by obstructing the transmission of heat through the plates and tubes, but if excessive they become a source of considerable danger by permitting the plates to become over- heated and thereby weakened. When the feed- water is very impure, there- fore, the boilers used are those which permit of very easy cleaning, such as the Lancashire, Galloway and Cornish types, to the exclusion of multitubular or water-tube boilers in which thorough cleaning is more difficult. In other cases, however, the feed-water is puri- fied by passing it through some type of ” softener ” before pumping it into the boiler. Most of the impurities in ordinary feed-water are either lime or magnesia salts, which although soluble in cold water are much less so in hot water. In the ” softener ” measured quantities of feed-water and of some chemical reagents are thoroughly mixed and at the same time the tem- perature is raised either by exhaust steam or by other means. Most of the impurity is thus precipitated, and some of the remainder is converted into more soluble salts which remain in solution in the boiler until blown out. The water is filtered before being pumped into the boiler. The quantity and kind of chemical employed is determined according to the nature and amount of the impurity in the ” hard ” feed-water.

Thermal Storage. — In some cases where the work required is very intermittent, ” thermal storage ” is employed. Above the boiler a large cylindrical storage vessel is placed, having sufficient capacity to

contain enough feed-water to supply the boiler throughout the periods when the maximum output is required. The upper part of this storage vessel is always in free communication with the steam space of the boiler, and from the lower part of it the feed- water may be run into the boiler when required. The feed- water is delivered into the upper part of the vessel, and arrangements are made by which before it falls to the bottom of the chamber it runs over very extended sur- faces exposed to the steam, its temperature being thus raised to that of the steam. At times when less than the normal supply of steam is required for the engine more than the average quantity of feed-water is pumped into the chamber, and the excess accumu- lates with its temperature raised to the evaporation point. When an extra supply of steam is required, the feed-pump is stopped and the boiler is fed with the hot water stored in the chamber. Besides the ” storage ” effect, it is found that many

of the impurities of the feed become deposited in the chamber, where they are comparatively harmless and from which they are readily removable.

Oil Separators. — When the steam from the engines is con- densed and used as feed-water, as is the case with marine boilers, much difficulty is often experienced with the oil which passes

metallic contact between the zinc and the boiler-plate. The function of the zinc is to set up galvanic action; it plays the part of the negative metal, and is dissolved while the metal of the shell is kept electro-positive. Care must always be taken that the fragments which break off the zinc as it wastes away cannot fall upon the heating surfaces of the boiler.

Longitudinal section. Fig. 17.-

Section at AB — Front elevation. -Babcock &’ Wilcox Water-tube Boiler (marine type).

over with the steam. Feed-filters are employed to stop the coarser particles of the oil, but some of the oil becomes ” emulsi- fied ” or suspended in the water in such extremely minute particles that they pass through the finest filtering materials. On the evaporation of the water in the boiler, this oil is left as a thin film upon the heating surfaces, and by preventing the actual contact of water with the plates

has been the cause of serious trouble. An attempt has been made to overcome the emulsion difficulty by uniformly mixing with the water a small quantity of solution of lime. On the water being raised in temperature the lime is precipitated, and the minute particles separated apparently attract the small globules of oil and become aggregated in sufficient size to deposit themselves in quiet parts of the boiler, whence they can be occasionally removed either by blowing out or by cleaning. Much, however, still remains Lo be done before the oil difficulty will be thoroughly removed.

Corrosion. — When chemicals of any kind are used to soften or purify feed-water it is essential that neither they nor the products they form should have a corrosive effect upon the boiler-plates, &c. Much of the corrosion which occasionally occurs has been traced to the action of the oxygen of the air which enters the boiler in solution in the feed-water, and the best practice now provides for the delivery of the feed into the boiler at such positions that the air evolved from it as it becomes heated passes direct to the steam space without having an opportunity of becoming disengaged upon the under-water surfaces of the boiler.

Where corrosion is feared it is usual to fit zinc slabs in the water spaces of the boiler. Experience shows that it is better to make them of rolled rather than of cast zinc, and to secure them on studs which can be kept bright, so as to ensure a direct

Evaporators. — In marine boilers the waste of water which occurs from leakages in the cycle of the evaporation in the boiler, use in the engine, condensation in the condenser and return to the boiler as feed-water, is made up by fresh water distilled from sea-water in ” evaporators. ” Of these there are many forms with different provisions for cleaning the coils, but they are all identical in principle. They are fed with sea-water, and means are provided for blowing out the brine produced in them when some of the water is evaporated. The heat required for the evaporation is obtained from live steam from the boilers, which is admitted into coils of copper pipe. The water condensed in these coils is returned direct to the feed- water, and the steam evaporated from the sea-water is led either ^^. into the low-pressure receiver of llllii the steam-engine or into the condenser.

Efficiency of Boilers. — The use- ful work obtained from any boiler depends upon many considera- tions. For a high efficiency, that is, a large amount of steam produced in proportion to the amount of fuel consumed, different FlG – 18.— Handhole Fittings, conditions have to be fulfilled

from those required where a large output of steam from a given plant is of more importance than economy of fuel. For a high efficiency, completeness of combustion of fuel must be combined with sufficient heating surface to absorb so much of the heat

produced as will reduce the temperature of the funnel gases to nearly that of steam. Completeness of combustion can only be obtained by admitting considerably more air to the fire than is theoretically necessary fully to oxidize the combustible portions of the fuel, and by providing sufficient time and oppor- tunity for a thorough mixture of the air and furnace gases to take place before the temperature is lowered to that critical point below which combustion will not take place. It is gener- ally considered that the amount of excess air required is nearly equal to that theoretically necessary; experience, however, tends to show that much less than this is really required if proper means are provided for ensuring an early complete mix- ture of the gases. Different means are needed to effect this with different kinds of coal, those necessary for properly burning Welsh coal being altogether unsuitable for use with North Country or Scottish coal. As all the excess air has to be raised to the same temperature as that of the really burnt gases, it follows that an excess of air passing through the fire lowers the temperature in the fire and flues, and therefore lessens the heat transmission; and as it leaves the boiler at a high temperature it carries off some of the heat produced. A reduction of the amount of air, therefore, may, by increasing the fire temperature

purposes, although ” natural ” draught is the more common, many boiler installations are fitted with ” forced ” draught arrangements. Two distinct systems are used. In that known as the ” closed stokehold ” the stokehold compartment of the vessel is so closed that the only exit for air from it is through the fires . Air is driven into the stokehold by means of fans which are made so that they can maintain an air pressure in the stokehold above that of the outside atmosphere. This is the system almost universally adopted in war vessels, and it is used also in some fast passenger ships. The air pressure usually adopted in large vessels is that corresponding to a height of from i to 15 in. of water, whilst so much as 4 in. is sometimes used in torpedo-boats and similar craft. This is, of course, in addition to the chimney-draught due to the height of the funnel. In the closed ashpit or Howden system, the stokehold is open, and fans drive the air round a number of tubes, situated in the uptake, through which the products of

combustion pass on their way to the chimney. The air thus becomes heated, and part of it is then delivered into the ashpit below the fire and part into a casing round the furnace front from which it enter; the furnace above the fire. In locomotive boilers the draught is produced by the blast or the exhaust steam. With natural drau«J»* a

SECTION ON C C.

SECTION ON B B

SECTION ON A A,

Fig. 19. — Normand Boiler.

and lessening the chimney waste, actually increase the efficiency even if at the same time it is accompanied by a slight incomplete- ness of combustion.

Mechanical Stoking. — Most boilers are hand-fired, a system involving much labour and frequent openings of the furnace doors, whereby large quantities of cold air are admitted above the fires. Many systems of mechanical stoking have been tried, but none has been found free from objections. That most usually employed is known as the ” chain-grate ” stoker. In this system, which is illustrated in fig. 13 (Woodeson boiler), the grate consists of a wide endless chain formed of short cast-iron bars; this passes over suitable drums at the front and back of the boiler, by the slow rotation of which the grate travels very slowly from front to back. The coal, which is broken small, is fed from a hopper over the whole width of the grate, the thick- ness of the fire being regulated by a door which can be raised or lowered as desired. Thus the volatile portions of the coal are distilled at the front of the fire, and pass over the incandescent fuel at the back end. The speed of travel is so regulated that by the time the remaining parts of the fuel reach the back end the combustion is nearly complete. It will be seen that the fire becomes thinner towards the back, and too much air is prevented from entering the thin portion by means of vanes actuated from the front of the boiler.

Draught. — In most boilers the draught necessary for com- bustion is ” natural,” i.e. produced by a chimney. For marine

combustion of about 15 to 20 lb. of coal per sq. ft. of grate area per hour can be obtained. With forced draught much greater rates can be maintained, ranging from 20 lb to 35 lb in the larger vessels with a moderate air pressure, to as much as 70 and even 80 lb per sq. ft. in the express types of boiler used in torpedo boats and similar craft.

Performance of Boilers. — The makers of several types of boilers have published particulars regarding the efficiency of the boilers they construct, but naturally these results have been obtained under the most favourable circumstances which may not always represent the conditions of ordinary working. The following table of actual results of marine boiler trials, made at the instance of the British admiralty, is particularly useful becuase the trials were made with great care under working conditions, the whole of the coal being weighed and the feed-water measured throughout the trials by skilled observers. The various trials can be compared amongst themselves as South Welsh coal of excellent quality was used in all cases.

In experimental tests such as those above referred to, many conditions have to be taken into account, the principal being the duration of the trial. It is essential that the condition of the boiler at the conclusion of the test should be precisely the same as at the commencement, both as regards the quantity of un- consumed coals on the fire-grate and the quantity of water and the steam-pressure in the boiler. The longer the period over which the observations are taken the less is the influence of errors

in the estimation of these particulars. Further, in order properly to represent working conditions, the rate of combustion of the fuel throughout the trial must be the same as that intended to be used in ordinary working, and the duration of the test must be sufficient. to include proportionately as much cleaning of fires as would occur under the normal working conditions. The tests should always be made with the kind of coal intended to be generally used, and the records should include a test of the calorific value of a sample of the fuel carefully selected so as fairly

Trials of Various Ty

be conveniently treated together, because similar materials and methods are employed in each, notwithstanding that many points of divergence in practice generally relegate them to separate departments. The materials used are chiefly iron and steel. The methods mostly adopted are those involved in the working of plates and rolled sections, which vastly predominate over the bars and rods used chiefly in the smithy. But there are numerous differences in methods of construction. Flanging occupies a large place in

boilermaking, for end-plates, tube-plates, furnace

pes of Marine Boilers

Description of Boiler.

Grate Area sq. ft.

Heating Surface sq. ft.

Duration of Trial Hours.

Coal

burned

per sq. ft.

of Grate

per Hour.

Air Pressure in Stoke- hold- Inches of Water.

Chimney

Draught —

Inches of

Water.

Water E per lb.

vaporated of Coal.

Water evapor- ated per so. ft. of Heating Surface.

Thermal Units per ft of Coal.

Efficiency

of

Boiler

%.

Actual.

From and at 212 F.

B>.

B>.

a.

Ordinary cylindrical single- f

81

2308

25

14-2

Nil

0-36

8-56

10-26

4-26

14,267

69-7

ended; 3 furnaces; 155 lb J

,,

24

13-9

,,

0-50

8-84

io-33

4-32

14,697

68-0

working pressure ; closed j

,,

9

30-3

o-8i

o-39

7-93

9-27

8-46

14,686

61-4

stokehold system 1 {

,,

8J

29-1

0-65

032

8-84

10-34

905

I4,6l2

68-4

Ordinary cylindrical single- f ended; 3 furnaces; 210 IbJ working pressure ; closed! ashpit, Howden system 2 [

63-2

2876 in boiler,

766 in air

heaters

13

20-6

In Ash- pit

1-53

0-58

11-30

12-33

5-H

14.475

82-3

Niclausse water-tube; 160 IbJ working pressure 1

46

1322

8

8

37

12-8

21-9

20-2

Nil

11

0-20 0-20 0-29

8 8 7

41 01 62

10-15 9-40 9-00

3-75 611

5-44

14,680 14,760 14,600

669

62-1

60-5

» f

34

990

9

I4-0

O-IO

0-23

8

77

10-50

4-17

14,640

69-8

Niclausse water-tube ; 250 IbJ

”

9

22-0

0-27

0-23

7

68

9-06

5-74

14,640

60-4

working pressure 1

”

90

15-4

Nil

Not ascer- tained

7

61

9-08

4-00

14,630

59-9

Babcock water-tube; 3$j in. tubes; 260 lb working-ˆ pressure ,

36

IOIO

9

9

90

13-0

20-0

14-5

o-‘i8 Nil

0-26 0-20

Not ascer- tained

9

8 8

31 58 09

11-02 10-11

9-53

4-3°

613 4-18

14,590

H,590

73-2 67-0 63-1

62

2167

28

18-4

,,

o-45

8

94

io-6i

4-61

14,520

70-7

”

”

24

192

”

0-47

8

93

10-59

4-82

14,390

71-1

Babcock water-tube; \% in.

”

”

12

20-5

”

0-42

9

42

11-04

5-4i

14,080

75-8

tubes; 270 lb working-

”

tt

7

28-9

0-50

Not ascer-

8

54

9-88

6-91

H,390

66-3

pressure 3

tained

”

11

30

19-9

Nil

0-38

10

11

12-00

6-01

H,530

79-9

[

”

”

29

27-1

0-66

0-23

9

96

11-67

8-05

14,630

77-1

Belleville water-tube with

44

(“910 in boiler

24J

15-8

Nil

0-36

9

65

II-46

4-94

14,697

77-2

economizers; 320 Ib-j working pressure

J 447 in econo- 1 mizer;

24 11

17-4 19-8

M

o-39 o-43

9 9

33 39

II-OO

11-03

5-3°

6-38

14,805 14,578

71-8 73-3

[1357 total

8

27-2

”

o-39

8

28

9-79

7-78

I4,6ll

65-0

56

2896

26

16-9

i»

0-31

9

57

n-45

3-12

14,750

75-0

’’

n

26

18-2

JJ

0-31

9

37

n-33

3-3°

14,500

75-7

Yarrow water-tube; if in.

,,

n

25

21-3

,,

0-31

8

83

10-45

3-63

13,500

75-2

tubes; 250 lb working

,,

”

3°

35-4

o-53

0-26

8

82

10-59

6-04

14,430

70-9

pressure

”

”

8

41-9

0-86

0-31

8

24

9-94

6-69

14,500

66-3

”

’’

8

33-7

0-31

0-30

8

39

9-93

5-47

14,680

65-4

’’

”

8

39-8

0-82

0-24

8

85

10-43

6-8i

14,530

69-5

71 1

‘ 26

161

Nil

o-39

7

95

9-50

3-24

14,500

63-8

”

26

177

”

0-30

7

06

9-28

3-43

14,620

61-7

”

2671 in boiler,

25

2I-I

,,

0-31

7

62

9-08

4-°5

14,650

60-3

Diirr water-tube; 250 lb working pressure

140 in super- heater ;

7 – 8

33-8 26-7

0-70

o-33

0-36

o-35

7 7

72 86

9-29 9-26

6-59 5-30

H,570

14,320

62-7 63-1

,,

28 1 1 total

8

34-6

i-ii

0-20

8

02

9-53

7-02

14,230

64-8

,,

22

34-8

o-73

0-16

6

84

8-o6

6-02

14,430

54-o

”

24

29-9

o-35

0-12

7

62

9-00

5-75

14,240

6l-2

» J

v. 20

19-9

Nil

0-21

7.30

8-33

3-66

14,240

58-6

%

1 In the first three trials no retarders were used in the tubes

2 In this trial retarders were used in the tubes.

3 The first four trials were made with horizontal baffles above

In the last trial retarders were used, the tubes; the last two trials with the baffling described in the text.

to represent the bulk of the coal used during the trial. The periodic records taken are the weights of the fuel used and of the ashes, &c, produced, the temperature and quantity of the feed-water, the steam pressure maintained, and the wetness of the steam produced. This last should be ascertained from samples taken from the steam pipe at a position where the full pressure is maintained. In order to reduce to a common standard observations taken under different conditions of feed temperatures and steam pressures, the results are calculated to an equivalent evaporation at the atmospheric pressure from a feed temperature of 212° F. (J. T. Ml.)

Boiler Making The practice of the boiler, bridge and girder shops may here

flues, &c, but is scarcely represented in bridge and girder work. Plates are bent to cylindrical shapes in boilermaking, for shells and furnaces, but not in girder work. Welding is much more common in the first than in the second, furnace flues being always welded and stand pipes frequently. In boiler work holes are generally drilled through the seams of adjacent plates. In bridge work each plate or bar is usually drilled or punched apart from its fellows. Boilers, again, being subject to high temperatures and pressures, must be constructed with provisions to ensure some elasticity and freedom of movement under vary- ing temperatures to prevent fractures or grooving, and must be made of materials that combine high ductility with strength when heated to furnace temperatures. Flanging of certain parts, judicious staying, limitation of the length of the tubes,

the forms of which are inherently weak, provide for the first; the selection of steel or iron of high percentage elongation, and the imposition of temper, or bending tests, both hot and cold, provide for the second.

The following are the leading features of present-day methods.

It might be hastily supposed that, because plates, angles, tees, channels and joist sections are rolled ready for use, little work could

be left for the plater and boilermaker. But actually so much is involved that subdivisions of tasks are numerous; the operations of templet-making, rolling, planing, punching and shearing, bending,

quent stress, with liability to produce fracture. But it has been found that, when a shorn edge is planed and a punched hole enlarged by reamering, no harm results, provided not less than about ˆ in. is removed. A great advance was therefore made when specifica- tions first insisted on the removal of the rough edges before the parts were united. .

In the work of riveting another evil long existed. When holes are punched it is practically impossible to ensure the exact coincidence of holes in different plates which have to be brought together lor the purpose of riveting. From this followed the use of the dritt, a tapered rod driven forcibly by hammer blows through correspond-

Fig. 20.— Thornycroft-Schulz Water-tube Boiler.

welding and forging, flanging, drilling, riveting, caulking, and tubing require the labours of several groups of machine attendants, and ot eangs of unskilled labourers or helpers. Some operations also have to be done at a red or white heat, others cold. To the first belong flanging and welding, to the latter generally all the other operations. Heating is necessary for the rolling of tubes of small diameter; bending is done cold or hot according to circumstances.

The fact that some kinds of treatment, as shearing and punching, flanging and bending, are of a very violent character explains why practice has changed radically in regard to the method of performing these operations in cases where safety is a cardinal matter. Shearing and punching are both severely detrusive operations performed on cold metal; both leave jagged edges and, as experience has proved, very minute cracks, the tendency of which is to extend under subse-

ine holes in adjacent plates, by whidi violent treatment the holes were forcibly drawn into alignment. This drifting stressed the plates, setting up permanent strains and enlarging incipient cracks, and many boiler explosions have been clearly traceable to the abuse of this tool Then, next, specifications insisted that all holes should be enlarged by reamering after the plates were in place. But even that did not prove a safeguard, because it often happened that the metal reamered was nearly all removed from one side of a hole, so leaving the other side just as the punch had torn it. Ultimately came the era of drilling rivet-holes, to which there is no exception now in high- class boiler work.

For average girder and bridge work the practice of punching and reamering is still in use, because the conditions ol service are not so severe as are those in steam boilers.

Flanging signifies the turning or bending over of the edges ot a

plate to afford a means of union to other plates. Examples occur in the back end-plates of Lancashire and Cornish boilers, the front and back plates of marine boilers, the fire-boxes of locomotive boilers, the crowns of vertical boilers, the ends of conical cross-tubes, and the Adamson seams of furnace flues. This practice has superseded the older system of effecting union by means of rings forming two sides of a rectangular section (angle iron rings). These were a fruitful source of grooving and explosions in steam, boilers, because their sharp angular form lacked elasticity; hence the reason for the substitution of a flange turned with a large radius, which afforded the elasticity necessary to counteract the effects of changes in tempera- ture. In girder work where such conditions do not exist, the method of union with angles is of course retained. In the early days of flang- ing the process was performed in detail by a skilled workman (the angle ironsmith), and it is still so done in small establishments. A length of edge of about 10 in. or a foot is heated, and bent by hammering around the edge of a block of iron of suitable shape. Then another ” heat ” is taken and flanged, and another, until the work is complete. But in modern boiler shops little hand work is ever done; instead, plates 4 ft., 6 ft., or 8 ft. in diameter, and fire- box plates for locomotive boilers, have their entire flanges bent at a single squeeze between massive dies in a hydraulic press. In the case of the ends of marine boilers which are too large for such treat- ment, a special form of press bends the edges over in successive heats. The flanges of Adamson seams are rolled over in a special machine. A length of flue is rotated on a table, while the flange is turned over within a minute between revolving rollers. There is another advantage in the adoption of machine -flanging, besides the enormous saving of time, namely, that the material suffers far less injury than it does in hand-flanging.

These differences in practice would not have assumed such magni- tude but for the introduction of mild steel in place of malleable iron. Iron suffers less from overheating and irregular heating than does steel. Steel possesses higher ductility, but it is also more liable to develop cracks if subjected to improper treatment. All this and much

more is writ large in the early testing of steel, and is reflected in present-day practice.

A feature peculiar to the boiler and plating shops is the enormous number of rivet holes which have to be made, and of rivets to be inserted. These requirements are reflected in machine design. To punch or drill holes singly is too slow a process in the best practice, and so machines are made .for producing many holes simultaneously. Besides this, the different sections of boilers are drilled in machines of different types, some for shells, some for furnaces, some peculiar to the shells or furnaces of one type of boilers, others to those of another type only. And generally now these machines not only drill, but can also be adjusted to drill to exact pitch, the necessity thus being avoided of marking out the holes as guides to the drills.

Hand-riveting has mostly been displaced by hydraulic and pneumatic machines, with resulting great saving in cost,, and the advantage of more trustworthy and uniform results. For boiler work, machines are mostly of fixed type; for bridge and girder work they are portable, being slung from chains and provided with pressure water or compressed air by systems of flexible pipes.

Welding fills a large place in boiler work, but it is that of the edges of plates chiefly, predominating over that of the bars and rods of the smithy. The edges to be united are thin and long, so that short lengths have to be done in succession at successive ” heats.” Much of this is hand work, and ” gluts ” or insertion pieces are generally preferred to overlapping joints. But in large shops, steam-driven power hammers are used for closing the welds. Parts that are commonly welded are the furnace flues, the conical cross-tubes and angle rings.

Another aspect of the work of these departments is the immense proportions of the modern machine tools used. This development is due in great degree to the substitution of steel for iron. The steel shell-plates of the largest boilers are I J in. thick, and these have to be bent into cylindrical forms. In the old days of iron boilers the capacity of rolls never exceeded about | in. plate. Often, alterna- tively to rolling, these thick plates are bent by squeezing them in successive sections between huge blocks operated by hydraulic pressure acting on toggle levers. And other machines besides the rolls are made more massive than formerly to deal with the immense plates of modern marine boilers.

The boiler and plating shops have been affected by the general tendency to specialize manufactures. Firms have fallen into the

practice of restricting their range of product, with increase in volume. The time has gone past when a single shop could turn out several classes of boilers, and undertake any bridge and girder work as well. One reason is to be found in the diminution of hand work and the growth of the machine tool. Almost every distinct operation on every section of a boiler or bridge may now be accomplished by one of several highly specialized machines. Repetitive operations are provided for thus, and by a system of templeting. If twenty or fifty similar boilers are made in a year, each plate, hole, flange or stay will be exactly like every similar one in the set. Dimensions of plates will be marked from a sample or templet plate, and holes will be marked similarly; or in many cases they are not marked at all, but pitched and drilled at once by self-acting mechanism embodied in drilling machines specially designed for, one set of

operations on one kind of plate. Hundreds of bracing bars for bridges and girders will be cut off all alike, and drilled or punched from a templet bar, so that they are ready to take their place in bridge or girder without any adjustments or fitting. (J. G. H.)

BOILING TO DEATH, a punishment once common both in England and on the continent. The only extant legislative notice of it in England occurs in an act passed in 1531 during the reign of Henry VIII., providing that convicted poisoners should be boiled to death; it is,' however, frequently mentioned earlier as a punishment for coining. The Chronicles of the Grey Friars (published by the Camden Society, 1852) have an account of boiling for poisoning at Smithfield in the year 1522, the man being fastened to a chain and lowered into boiling water several times until he died. The preamble of the statute of Henry VIII. (which made poisoning treason) in 1531 recites that one Richard Roose (or Coke), a cook, by putting poison in some food intended for the household of the bishop of Roch- ester and for the poor of the parish of Lambeth, killed a man and woman.- He was found guilty of treason and sentenced to be boiled to death without benefit of clergy. He was publicly boiled at Smithfield. In the same year a maid-servant for poison- ing her mistress was boiled at King's Lynn. In 1542 Margaret Davy, a servant, for poisoning her employer, was boiled at Smithfield. In the reign of Edward VI., in 1547, the act was repealed.

See also W. Andrews, Old Time Punishments (Hull, 1890) ; Notes and Queries, vol. i. (1862), vol. ix. (1867); Du Cange (s.v. Caldariis decoquere) .

BOIS BRUITS, or Brules (a French translation of their Indian name

Sichangu), a sub-tribe of North American Dakota Indians (Teton river division). The name is most frequently associated with the half-breeds in Manitoba, who in 1869 came into temporary prominence in connexion with Riel's Rebellion (see Red River); at that time they had lost all tribal purity, and were alternatively called Metis (half-castes), the majority being descendants of French-Canadians.

BOIS£, a city and the county-seat of Ada county, Idaho, U.S.A., and the capital of the state, situated on the N. side of the Boise river, in the S.W. part of the state, at an altitude of about 2700 ft. Pop. (1890) 23 11; (1900) 5957; (1910) 17,358. It is served by the Oregon Short Line railway, being the terminus of a branch connecting with the main line at Nampa, about 20 m. W. ; and by electric lines connecting with Caldwell and Nampa. The principal buildings are the state capitol, the United States assay office, a Carnegie library, a natatorium, and the Federal building, containing the post office, the United States circuit and district court rooms, and a U.S. land office. Boise is the seat of the state school for the deaf and blind (1906), and just outside the city limits are the state soldiers' home and the state penitentiary. About 2 m. from the city are Federal barracks. Hot water (175° F.) from artesian wells near the city is utilized for the natatorium and to heat many residences and public buildings. The Boise valley is an excellent country for raising apples, prunes and other fruits. The manufactured products of the city are such as are demanded by a mining country, principally lumber, flour and machine-shop products. Boise is the trade centre of the surrounding fruit-growing, agricultural and mining country, and is an important wool market. The oldest settle- ment in the vicinity was made by the Hudson's Bay Fur Company on the west side of the Boise river, before i860; the present city, chartered in 1864, dates from 1863. After 1900 the city grew very rapidly, principally owing to the great irrigation schemes in southern Idaho; the water for the immense Boise-Payette irrigation system is taken from the Boise, 8 m. above the city. (See Idaho.)

BOISGOBEY, FORTUNE" DU (1824-1891), French writer of fiction, whose real surname was Castille, was born at Granville (Manche) on the nth of September 1824. He served in the army pay department in Algeria from 1844 to 1848, and extended his travels to the East. He made his literary debut in the Petit journal with a story entitled Deux come'diens (1868). With Le Forcat colonel (1872) he became one of the most popular feuilleton writers. His police stories, though not so convincing

as those of fimile Gaboriau, with whom his name is generally associated, had a great circulation, and many of them have been translated into English. Among his stories may be mentioned: Les Mysteres du nouveau Paris (1876), Le Demi-Monde sous la Terreur (1877), Les Nuits de Constantinople (1882), Le Cri du sang (1885), La Main froide (1889). Boisgobey died on the 26th of February 1891.

BOISGUILBERT, PIERRE LE PESANT, Sieur de (1676- 1714), French economist, was born at Rouen of an ancient noble family of Normandy, allied to that of Corneille. He received his classical education in Rouen, entered the magistracy and became judge at Monti villiers, near Havre. In 1690 he became president of the bailliage of Rouen, a post which he retained almost until his death, leaving it to his son. In these two situations he made a close study of local economic conditions, personally, supervising the cultivation of his lands, and entering into relations with the principal merchants of Rouen. He was thus led to consider the misery of the people under the burden of taxation. In 1695 he published his principal work, Le Detail de la France; la cause de la diminution de ses Mens, et la facilite du remede. ... In it he drew a picture of the general ruin of all classes of Frenchmen, caused by the bad economic' regime. In opposition to Colbert's views he held that the wealth of a country consists, not in the abundance of money which it possesses but in what it produces and exchanges. The remedy for the evils of the time was not so much the reduction as the equaliza- tion of the imposts, which would allow the poor to consume more, raise the production and add to the general wealth. He demanded the reform of the laille, the suppression of internal customs duties and greater freedom of trade. In his Factum de la France, published in 1705 or 1706, he gave a more concise rlsumS of his ideas. But his proposal to substitute for all aides and customs duties a single capitation tax of a tenth of the revenue of all property was naturally opposed by the farmers of taxes and found little support. Indeed his work, written in a diffuse and inelegant style, passed almost unnoticed. Saint Simon relates that he once asked a hearing of the comte de Pontchartrain, saying that he would at first believe him mad, then become interested, and then see he was right. Pontchar- train bluntly told him that he did think him mad, and turned his back on him. With Michel de Chamillart, whom he had known as intendant of Rouen (1689-1690), he had no better success. Upon the disgrace of Vauban, whose Dime royale had much in common with Boisguilbert's plan, Boisguilbert violently attacked the controller in a pamphlet, Supplement au detail de la France. The book was seized and condemned, and its author exiled to Auvergne, though

soon allowed to return. At last in 1710 the controller-general, Nicolas Des- marets, established a new impost, the ” tenth ” (dixieme), which had some analogy with the project of Boisguilbert. Instead of replacing the former imposts, however, Desmarets simply added his dixieme to them;- the experiment was naturally disastrous, and the idea was abandoned.

In 1712 appeared a Testament politique de M. de Vauban, which is simply Boisguilbert’s Detail de la France. Vauban’s Dime royale was formerly wrongly attributed to him. Boisguilbert’s works were collected by Daire in the first volume of the Collection des grands Sconomistes. His letters are in the Correspondance des contrdleurs generaux, vol. i., published by M. de Boislisle.

BOISROBERT, FRANCOIS LE METEL DE (1592-1662), French poet, was born at Caen in 1592. He was trained for the law, and practised for some time at the bar at Rouen. About 1622 he went to Paris, and by the next year had established a footing at court, for he had a share in the ballet of the Bacchanales performed at the Louvre in February. He accompanied an em- bassy to England in 1625, and in 1630 visited Rome, where he won the favour of Urban VIII. by his wit. He took orders, and was made a canon of Rouen. He had been introduced to Richelieu in 1623, and by his humour and his talent as a raconteur soon made himself indispensable to the cardinal. Boisrobert became one of the five poets who carried out Richelieu’s dramatic ideas. He had a passion for play, and was a friend of Ninon de l’Enclos; and his enemies found ready weapons against him

in the undisguised looseness of his life. He was more than once disgraced, but never for long, although in his later years he was compelled to give more attention to his duties as a priest. It was Boisrobert who suggested to Richelieu the plan of the Aca- demy, and he was one of its earliest and most active members. Rich as he was through the benefices conferred on him by his patron, he was liberal to men of letters. After the death of Richelieu, he attached himself to Mazarin, whom he served faithfully throughout the Fronde. He died on the 30th of March 1662. He wrote a number of comedies, to one of which, La Belle Plaideuse, Moliere’s L’Avare is said to owe something; and also some volumes of verse. The licentious Contes, published under the name of his brother D’Ouville, are often attributed to him.

BOISSARD, JEAN JACQUES (1528-1602), French antiquary and Latin poet, was born at Besancon. He studied at Louvain; but, disgusted by the severity of his master, he secretly left that seminary, and after traversing a great part of Germany reached Italy, where he remained

several years and was often reduced to great straits. His residence in Italy developed in his mind a taste for antiquities, and he soon formed a collection of the most curious monuments from Rome and its vicinity. He then visited the -islands of the Archipelago, with the intention of travelling through Greece, but a severe illness obliged him to return to Rome. Here he resumed his favourite pursuits with great ardour, and having completed his collection, returned to his native country; but not being permitted to profess publicly the Protestant religion, which he had embraced some time before, he withdrew to Metz, where he died on the 30th of October 1602. His most important works are: Poemata (1574); Emblemata (1584); Icones Virorum Illustrium (1597); Vitae et Icones Sultanorum Turcicorum, &c. (1597); Theatrum Vitae Humanae (1596); Romanae Urbis Topographia (1 597-1602), now very rare; De Divinatione et Magicis Praestigiis (1605); Habitus Variarum Orbis Gentium (1581), ornamented with seventy illuminated figures. ■- –

BOISSIER, MARIE LOUIS ANTOINE GASTON (1823-1908), French classical scholar, and secretary of the French Academy, was born at Nimes on the 15th of August 1823. The Roman monuments of his native town very early attracted Gaston Boissier to the study of ancient history. He made epigraphy his particular theme, and at the age of twenty-three became a professor of rhetoric at Angouleme, where he lived and worked for ten years without further ambition. A travelling inspector of the university, however, happened to hear him lecture, and Boissier was called to Paris to be professor at the Lycee Charle- magne. He began his literary career by a thesis on the poet Attius (1857) and a study on the life and work of M. Terentius Varro (1 86 1) . In 1 86 1 he was made professor of Latin oratory at the College de France, and he became an active contributor to the Revue des deux mondes. In 1865 he published Ciciron et ses amis (Eng. trans, by A. D. Jones, 1897), which has enjoyed a success such as rarely falls to the lot of a work of erudition. In studying the manners of ancient Rome, Boissier had learned to re-create its society and to reproduce its characteristics with exquisite vivacity. In 1874 he published La Religion romaine d'Auguste aux Antonins (2 vols.), in which he analysed the great religious movement of antiquity that preceded the accept- ance of Christianity. In L'Opposition sous les Cisars (1875) he drew a remarkable picture of the political decadence of Rome under the early successors of Augustus. By this time Boissier had drawn to himself the universal respect of scholars and men of letters, and on the death of H. J. G. Patin, the author of Etudes sur les tragiques grecs, in 1876, he was elected a member of the French Academy, of which he was appointed perpetual secretary in 1895.

His later works – include Promenades archiologiques : Rome et Pompei (1880; second series, 1886); L'Afrique romaine, promenades archeologiques (1901); La Fin du paganisme (2 vols., 1891); Le Conjuration de Catilina (1905); Tacite (1903, Eng, trans, by W. G. Hutchison, 1906). He was a representative example of the French talent for lucidity and elegance applied

with entire seriousness to weighty matters of literature. Though he devoted himself mainly to his great theme, the reconstruction of the elements of Roman society, he also wrote monographs on Madame de Sevignt (1887) and Saint-Simon (1892). He died in June 1908.

BOISSONADE DE FONTARABIE, JEAN FRANCOIS (1774- 1857), French classical scholar, was born at Paris on the 12th of August 1774. In 1792 he entered the public service during the administration of General Dumouriez. Driven from it in 1795, he was restored by Lucien Bonaparte, during whose time of office he served as secretary to the prefecture of the Upper Marne. He then definitely resigned public employment and devoted him- self to the study of Greek. In 1809 he was appointed deputy professor of Greek at the faculty of letters at Paris, and titular professor in 18 13 on the death of P. H. Larcher. In 1828 he succeeded J. B. Gail in the chair of Greek at the College de France. He also held the offices of librarian of the Bibliotheque du Roi, and of perpetual secretary of the Academie des Inscrip- tions. He died on the 8th of September 1857. Boissonade chiefly devoted his attention to later Greek literature: Philo- stratus, Heroica (1806) and Epistolae (1842); Marinus, Vita procli (1814); Tiberius Rhetor, De Figuris (1815); Nicetas Eugenianus, Drosilla et Charicles (1819); Herodian, Partitiones (1819); Aristaenetus, Epistolae (1822); Eunapius, Vitae Sophis- tarum (1822); Babrius, Fables (1844); Tzetzes, Allegoriae Iliados (185 1); and a Collection of Greek Poets in 24 vols. The Anecdota Graeca (1829-1833) and Anecdota Nova (1844) are important for Byzantine history and the Greek grammarians.

A selection of his papers was published by F. Colincamp, Critique litteraire sous le premier Empire (1863), vol. i. of which contains a complete list of his works, and a " Notice Historique sur Monsieur B.," by Naudet.

BOISSY D'ANGLAS, FRANCOIS ANTOINE DE (1756-1828), French statesman, received a careful education and busied himself at first

with literature. He had been a member of several provincial academies before coming to Paris, where he purchased a position as advocate to the parlement. In 1789 he was elected by the third estate of the senechdkssee of Annonay as deputy to the states-general. He was one of those who induced the states-general to proclaim itself a National Assembly on the 17 th of June 1789; approved, in several speeches, of the capture of the Bastille and of the taking of the royal family to Paris (October 1789); demanded that strict measures be taken against the royalists who were intriguing in the south of France, and published some pamphlets on finance. During the Legislative Assembly he was procureur-syndic for the directory of the department of Ardeche. Elected to the Convention, he sat in the centre, " le Marais," voting in the trial of Louis XVI. for his detention until deportation should be judged expedient for the state. He was then sent on a mission to Lyons to investigate the frauds in connexion with the supplies of the army of the Alps. During the Terror he was one of those deputies of the centre who sup- ported Robespierre; but he was gained over by the members of the Mountain hostile to Robespierre, and his support, along with that of some other leaders of the Marais, made possible the 9th Thermidor. He was then elected a member of the Committee of Public Safety and charged with the superintendence of the pro- visioning of Paris. He presented the report supporting the decree of the 3rd Ventose of the year III. which established liberty of worship. In the critical days of Germinal and of Prairial of the year III. he showed great courage. On the 12th Germinal he was in the tribune, reading a report on the food supplies, when the hall of the Convention was invaded by the rioters, and when they withdrew he quietly continued where he had been interrupted. On the 1st Prairial he presided over the Con- vention, and remained unmoved by the insults and menaces of the insurgents. When the head of the deputy, Jean Feraud, was presented to him on the end of a pike, he saluted it impassively. He was reporter of the committee which drew up the constitu- tion of the year III., and his report shows keen apprehension of a return of the Reign of Terror, and presents reactionary measures as precautions against the re-establishment of " tyranny

and anarchy." This report, the proposal that he made (August 27, 1795) to lessen the severity of the revolutionary laws, and the eulogies he received from several Paris sections suspected of disloyalty to the republic, resulted in his being obliged to justify himself (October 15, 1795). As a member of the Council of the Five Hundred he became more and more suspected of royalism. He presented a measure in favour of full liberty for the press, which at that time was almost unani- mously reactionary, protested against the outlawry of

returned imigrSs, spoke in favour of the deported priests and attacked the Directory. Accordingly he was proscribed on the 18th Fructidor, and lived in England until the Consulate. In 1801 he was made a member of the Tribunate, and in 1805 a senator. In 1814 he voted for Napoleon's abdication, which won for him a seat in the chamber of peers ; but during the Hundred Days he served Napoleon, and in consequence, on the second Restoration, was for a short while excluded. In the chamber he still sought to obtain liberty for the press — a theme upon which he published a volume of his speeches (Paris, 1817). He was a member of the Institute from its foundation, and in 1816, at the reorganiza- tion, became a member of the Academie des Inscriptions et Belles-Lettres. He published in 1819-1821 a two-volume Essai sur la vie et les opinions de M. de Malesherbes.

See F. A. Aulard, Les Orateurs de la Revolution (2nd ed., 1906) ; L. Sciout, Le Directoire (4 vols., 1895); and the " Notice sur la vie et les oeuvres de M. Boissy d'Anglas " in the Memoires de V Academie des Inscriptions, ix. (R. A.*)

BOITO, ARRIGO (1842-), Italian poet and musical composer, was born at Padua on the 24th of February 1842. He studied music at the Milan Conservatoire, but even. in those early days he devoted as much of his time to literature as to music, forecasting the divided allegiance which was to be the chief characteristic of his life's history. While at the Conserva- toire he wrote and composed, in collaboration with Franco Faccio, a cantata, Le Sorelle d' Italia, which was performed with success. On completing his studies Boito travelled for some years, and after his return to Italy settled down in Milan, dividing his time between journalism and music. In 1866 he fought under Garibaldi, and in 1868 conducted the first performance of his opera Mefistofele at the Scala theatre, Milan. The work failed completely, and was withdrawn after a second performance. It was revived in 1875 at Bologna in a much altered and ab- breviated form, when its success was beyond question. It was performed in London in 1 880 with success, but in spite of frequent revivals has never succeeded in' firmly establishing itself in popular favour. Boito treated the Faust legend in a spirit far more nearly akin to the conception of Goethe than is found in Gounod's Faust, but, in spite of many isolated beauties, his opera lacks cohesion and dramatic interest. His energies were afterwards chiefly devoted to the composition of libretti, of which the principal are Otello and Falstaff, set to music by Verdi; La Gioconda, set by Ponchielli; Amleto, set by Faccio; and Ero e Leandre, set by Bottesini and Mancinelli. These works display a rare knowledge of the requirements of dramatic poetry, together with uncommon literary value. Boito also published a book of poems and a novel, L'Alfier

Meno. The degree of doctor of music was conferred upon him in 1893 by the university of Cambridge.

BOIVIN, FRANCOIS DE, Baron de Villars (d. 1618), French chronicler, entered the service of Charles, Marshal Brissac, as secretary, and accompanied him to Piedmont in 1550 when the marshal went to take command of the French troops in the war with Spain. Remaining in this service he was sent after the defeat of the French at St Quentin in 1557 to assure the French king Henry II. of the support of Brissac. He took part in the negotiations which led to the treaty of Cateau-Cambresis in April 1559, but was unable to prevent Henry II. from ceding the conquests made by Brissac. Boivin wrote Memoires sur les guerres dimelees tant dans le Piemont qu'au Montferrat et ducht de Milan par Charles de Cosse, comte de Brissac (Paris, 1607), which, in spite of some drawbacks, is valuable as the testimony of an eye-witness of the war. An edition, carefully revised,

appears in the Mimoires relatifs a Vhistoire de France, tome x., edited by J. F. Michaud and J. J. F. Poujoulat (Paris, 1850). He also wrote Instruction sur les affaires d'ttat (Lyons, 1610).

See J. Lelong, Bibliotheque historique de la France (Paris, 1768-

1778).

BOKENAM, OSBERN (i393?i447?), English author, was born, by his own account, on the 6th of October 1393. Dr Horstmann suggests that he may have been a native of Bokeham, now Bookham, in Surrey, and derived his name from the place. In a concluding note to his Lives of the Saints he is described as " a Suffolke man, frere Austyn of Stoke Clare." He travelled in Italy on at least two occasions, and in 1445 was a pilgrim to Santiago de Compostela. He wrote a series of thirteen legends of holy maidens and women. These are written chiefly in seven and eight-lined stanzas, and nine of them are preceded by prologues. Bokenam was a follower of Chaucer and Lydgate, and doubtless had in mind Chaucer's Legend of Good Women. His chief, but by no means his only, source was the Legenda Aurea of Jacobus de Voragine, archbishop of Genoa, whom he cites as " Januence." The first of the legends, Vita Scae Margaretae, virginis et martiris, was written for his friend, Thomas Burgh, a Cambridge monk; others are dedicated to pious ladies who desired the history of their name-saints.

The Arundel MS. 327 (British Museum) is a unique copy of Bokenam's work; it was finished, according to the concluding note, in 1447, and pre- sented by the scribe, Thomas Burgh, to a convent unnamed " that the nuns may remember him and his sister, Dame Betrice Burgh." The poems were edited (1835) for the Roxburghe Club with the title Lyvys of Seyntys . . ., and by Dr Carl Horstmann as Osbern Bokenams Legenden (Heilbronn, 1883), in E. Kblbing's Altengl. Bibliothek, vol. i. Both editions include a dialogue written in Latin and English taken from Dugdale's Monasticon Anglicanum (ed. 1846, vol. vi. p. 1600); " this dialogue betwixt a Secular asking and a Frere answerynge at the grave of Dame Johan of Acres shewith the lyneal descent of the lordis of the honoure of Clare fro . . . MCCXLVIII to . . . MCCCLVI" Bokenam wrote, as he tells us, plainly, in the Suffolk speech. He explains his lack of decoration on the plea that the finest flowers had been already plucked by Chaucer, Gower and Lydgate.

BOKHARA, or Bukhara (the common central Asian pro- nunciation is Bukhara), a state of central Asia, under the pro- tection of Russia. It lies on the right bank of the middle Oxus, between 37° and 41° N., and between 62 and 72 E., and is bounded by the Russian governments of Syr-darya, Samarkand and Ferghana on the N., the Pamirs on the E., Afghanistan on the S., and the Transcaspian territory and Khiva on the W. Its south-eastern frontier on the Pamirs is undetermined except where it touches the Russian dominions. Including the khanates of Karateghin and Darvaz the area is about 85,000 sq. m. The western portion of the state is a plain watered by the Zaraf shan and by countless irrigation canals drawn from it. It has in the east the Karnap-chul steppe, covered with grass in early summer, and in the north an intrusion of the Kara-kum sand desert. Land suitable for cultivation is found only in oases, where it is watered by irrigation canals, but these oases are very fertile. The middle portion of the state is occupied by high plateaus, about 4000 ft. in altitude, sloping from the Tian-shan, and inter- sected by numerous rivers, flowing towards the Oxus. This region, very fertile in the valleys and enjoying a cooler and damper climate than the lower plains, is densely populated, and agri- culture and cattle-breeding are carried on extensively. Here are the towns of Karshi, Kitab, Shaar, Chirakchi and Guzar or Huzar. The Hissar range, a westward continuation of the Alai Mountains, separates the Zarafshan from the tributaries of the Oxus — the Surkhan, Kafirnihan and Vakhsh. Its length is about 200 m., and its passes, 1000 to 3000 ft. below the surround- ing peaks, reach altitudes of 1 2,000 to 14,000 ft. and are extremely difficult. Numbers of rivers pierce or flow in wild gorges between its spurs. Its southern foot-hills, covered with loess, make the fertile valleys of Hissar and the Vakhsh. The climate is so

dry, and the rains are so scarce, that an absence of forests and Alpine

meadows is characteristic of the ridge; but when heavy rain falls simultaneously with the melting of the snows in the moun- tains, the watercourses become filled with furious torrents, which create great havoc. The main glaciers (12) are on the north slope, but none creeps below 10,000 to 12,000 ft. The Peter the Great range, or Periokh-tau, in Karateghin, south of the valley of the Vakhsh, runs west-south-west to east-north-east for about 130 m., and is higher than the Hissar range. From the meridian of Garm or Harm it rises above the snowline, attaining at least 18,000 ft. in the Sary-kaudal peak, and 20,000 ft. farther east where it joins the snow-clad Darvaz range, and where the group Sandal, adorned with several glaciers, rises to 24,000 or 25,000 ft. Only three passes, very difficult, are known across it. . ■ ■

Darvaz, a small vassal state of Bokhara, is situated on the Panj, where it makes its sharp bend westwards, and is emphatic- ally a mountainous region, agriculture being possible only in the lower parts of the valleys. The population, about 35,000, consists chiefly of Moslem Tajiks, and the closely-related Galchas, and its chief town is Kala-i-khumb on the Panj, at an altitude of 4370 ft.

The chief river of Bokhara is the Oxus or Amu-darya, which separates it from Afghanistan on the south, and then flows along its south-west border. It is navigated from the mouth of the Surkhan, and steamboats ply on it up to Karki near the Afghan frontier. The next largest river, the Zarafshan, 660 m. long, the water of which is largely utilized for irrigation, is lost in the sands 20 m. before reaching the Oxus. The Kashka-darya, which flows westwards out of the glaciers of Hazret-sultan (west of the Hissar range), supplies the Shahri-sabs (properly Shaar- sabiz) oasis with water, but is lost in the desert to the west of Karshi.

The climate of Bokhara is extreme. In the lowlands a very hot summer is followed by a short but cold winter, during which a frost of -20 Fahr. may set in, and the Oxus may freeze for a fortnight. In the highlands this hot and dry summer is followed by four months of winter; and, finally, in the regions above 8000 ft. there is a great development of snowfields and glaciers, the passes are buried under snow, and the short summer is rainy. The lowlands are sometimes visited by terrible sand-storms from the west, which exhaust men and kill the cotton trees. Malaria is widely prevalent, and in some years, after a wet spring, assumes a malignant character.

The population is estimated at 1 , 2 50,000. The dominant race is the Uzbegs, who are fanatical Moslem Sunnites, scorn work, despise their Iranian subjects, and maintain their old division into tribes or clans. The nomad Turkomans and the nomad Kirghiz are also of Turkish origin; while the Sarts, who constitute the bulk of the population in the towns, are a mixture of Turks with Iranians. The great bulk of the population in the country is composed of Iranian Tajiks, who differ but very little from Sarts. Besides these there are Afghans, Persians, Jews, Arabs and Armenians. Much of the trade is in the hands of a colony of Hindus from Shikarpur. Nearly 20 % of the population are nomads and about 15 % semi-nomads.

On the irrigated lowlands rice, wheat and other cereals are cultivated, and exported to the highlands. Cotton is widely grown and exported. Silk is largely produced, and tobacco, wine, flax, hemp and fruits are cultivated. Cattle-breeding is vigorously prosecuted in Hissar and the highlands generally. Cotton, silks, woollen cloth, and felt are manufactured, also boots, saddles, cutlery and weapons, pottery and various oils. Salt, as also some iron and copper, and small quantities of gold are extracted. Trade has been greatly promoted by the building of the Transcaspian railway across the country (from Charjui on the Oxus to Kati-kurgan) in 1886-1888. The exports to Russia consist of raw cotton and silk, lamb-skins, fruits and carpets, and the imports of manufactured goods and sugar. The imports from India are cottons, tea, shawls and indigo. There are very few roads; goods are transported on camels, or on horses and donkeys in the hilly tracts.

Bokhara has for ages been looked upon as the centre of Mussulman erudition in central Asia. About one-fourth of the

population is said to be able to read and write. The primary schools are numerous in the capital, as well as in the other cities, and even exist in villages, and madrasas or theological seminaries for higher courses of study are comparatively plentiful. The mullahs or priests enjoy very great influence, but the people are very superstitious, believing in witchcraft, omens, spirits and the evil eye. Women occupy a low position in the social scale, though slavery has been abolished at the instance of Russia. The emir of Bokhara is an autocratic ruler, his power being limited only by the traditional custom (skeriat) of the Mussul- mans. He maintains an, army of some n,ooo men, but is subject to Russian control, being in fact a vassal of that empire.

History. — Bokhara was known to the ancients under the name of Sogdiana. It was too far removed to the east ever to be brought under the dominion of Rome, but it has shared deeply in all the various and bloody revolutions of Asia. The foundation of the capital is ascribed to Efrasiab, the great Persian hero. After the conquests cf Alexander the Great Sogdiana formed part of the empire of the Seleucidae, and shared the fortunes of the rather better-known Bactria. Somewhat later the nomad Yue-chi began to move into the valley of the Oxus from the east, and gradually became a settled territorial power in Bactria and Sogdiana, and the dominions of their king, Kadphises I. (who is believed to have come to the throne about a.d. 45), extended from Bokhara to the Indus. The district, however, was re- conquered by Persia under the Sassanian dynasty, and we hear of Nestorian Christians at Samarkand, at any rate in the 6th century. Islam was introduced shortly after the Arab conquest of Persia (640-642) and speedily became the dominant faith. In the early centuries of Mahommedan rule Sogdiana was one of the most celebrated and flourishing districts of central Asia. It was called Sughd, and contained the two great cities of Samarkand and Bokhara, of which the former was generally the seat of government, while the latter had a high reputation as a seat of religion and learning. During the early middle ages this legion was also known as Ma wara '1 Nahr or Ma-vera-un-nahr, the meaning of which is given in the alternative classical title of Transoxiana. Malik Shah, third of the Seljuk dynasty of Persia, passed the Oxus about the end of the nth century, and subdued the whole country watered by that river and the Jaxartes. In 1216 Bokhara was again subdued by Mahommed Shah Khwarizm, but his conquest was wrested from him by Jenghiz Khan in 1220. The country was wasted by the fury of this savage conqueror, but recovered something of its former prosperity under Ogdai Khan, his son, whose disposition was humane and benevolent. His posterity kept possession till 1369, when Timur or Tamerlane bore down everything before him, and established his capital at Samarkand, which with Bokhara regained for a time its former splendour. Babar, the fifth in descent from Timur j was originally prince of Ferghana, but conquered Samarkand and northern India, where he founded the Mogul (Mughal) empire. His descendants ruled in the country until about 1500, when it was overrun by the Uzbeg Tatars, under Abulkhair or Ebulkheir Khan, the founder of the Shaibani dynasty, with which the history of Bokhara properly commences. The most remarkable representative of this family was Abdullah Khan (1556-1598), who greatly extended the limits of his kingdom by the conquest of Badakshan., Herat and Meshhed, and increased its prosperity by the public works which he authorized. Before the close of the century, however, the dynasty was

extinct, and Bokhara was at once desolated by a Kirghiz invasion and distracted by a disputed succession. At length, in 1598, Baki Mehemet Khan, of the Astrakhan branch of the Timur family, mounted the throne, and thus introduced the dynasty of the Ashtarkhanides. The principal event of his reign was the defeat he inflicted on Shah Abbas of Persia in the neighbourhood of Balkh. His brother Vali Mehemet, who succeeded in 1605, soon alienated his subjects, and was supplanted by his nephew Imamkuli. After a highly prosperous reign this prince resigned in favour of his brother, Nazr Mehemet, under whom the country was greatly troubled by the rebellion of his sons, who continued to quarrel with each

other after their father's death. Meanwhile the district of Khiva, previously subject to Bokhara, was made an independent khanate by Abdul-Gazi Bahadur Khan; and in the reign of Subhankuli, who ascended the throne in 1680, the political power of Bokhara was still further lessened, though it continued to enjoy the unbounded respect of the Sunnite Mahommedans. Subhankuli died in 1702, and a war of succession broke out between his two sons, who were supported by the rivalry of two Uzbeg tribes. After five years the contest terminated in favour of Obeidullah, who was little better than a puppet in the hands of Rehim Bi Atalik, his vizier. The invasion of Nadir Shah of Persia came to complete the degradation of the land; and in 1740 the feeble king, Abu '1-Faiz, paid homage to the conqueror, and was soon after murdered and supplanted by his vizier. The time of the Ashtarkhanides had been for the most part a time of dissolution and decay; fanaticism and imbecility went hand in hand. On its fall (1785) the throne was seized by the Manghit family in the person of Mir Ma'sum, who pretended to the most extravagant sanctity, and proved by his military career that he had no small amount of ability. He turned his attention to the encroachments of the Afghans, and in 1781 reconquered the greater part of what had been lost to the south of the Oxus. Dying in 1802 he was succeeded by Said, who in bigotry and fanaticism was a true son of his father. In 1826 Nasrullah mounted the throne, and began with the murder of his brother a reign of continued oppression and cruelty. Meanwhile Bokhara became an object of rivalry to Russia and England, and envoys were sent by both nations to cultivate the favour of the emir, who treated the Russians with arrogance and the English with contempt. Two emissaries of the British government, Colonel C. Stoddart and Captain A. Conolly, were thrown by Nasrullah into prison, where they were put to death in 1842. In 1862-1864 Arminius Vambery made in the disguise of a dervish a memorable journey through this fanatical state. At this time the Russian armies were gradually advancing, and at last they

appeared in Khokand; but the new emir, Mozaffer-eddin, instead of attempt- ing to expiate the insults of his predecessor, sent a letter to General M. G. Chemayev summoning him to evacuate the country, and threatening to raise all the faithful against him. In 1866 the Russians invaded the territory of Bokhara proper, and a decisive battle was fought on the 20th of May at Irdjar on the left bank of the Jaxartes. The Bokharians were defeated ; but after a period of reluctant peace they forced the emir to renew the war. In 1868 the Russians entered Samarkand (May 14), and the emir was constrained to submit to the terms of the conqueror, becoming henceforward only a Russian puppet.

See Khanikov's Bokhara, translated by De Bode (1845) ; Vambery, Travels in Central Asia (1864), Sketches of Central Asia (1868), and History of Bokhara (1873); Fedchenko's "Sketch of the Zarafshan Valley" in Journ. R. Geogr. Soc. (1870); Hellwald, Die Russen in Central Asien (1873); Lipsky, Upper Bukhara, in Russian (1902); Skrine and Ross, The Heart of Asia (1899) ; Lord Ronaldshay, Outskirts of Empire in Asia (1904) ; and Le Strange, The Lands of the Eastern Caliphate (1905). (P. A. K. ; C. El.)

BOKHARA {Bokhara-i-Sherif) , capital of the state of Bokhara, on the left bank of the Zarafshan, and on the irrigation canal of Shahri-rud, situated in a fertile plain. It is 8 m. from the Bokhara station of the Transcaspian railway, 162 m. by rail W. of Samarkand, in 39° 47′ N. lat. and 64 27′ E. long. The city is surrounded by a stone wall 28 ft. high and 8 m. long, with semicircular towers and eleven gates of little value as a defence. The present city was begun in a.d. 830 on the site of an older city, was destroyed by Jenghiz Khan in 1220, and rebuilt sub- sequently. The water-supply is very unhealthy. The city has no less than 360 mosques. Nearly 10,000 pupils are said to receive their education in its 140 madrasas or theological colleges; primary schools are kept at most mosques. Some of these buildings exhibit very, fine architecture. The most notable of the mosques is the Mir- Arab, built in the 16th century, with its beautiful lecture halls; the chief mosque of the emir is the Mejid-kalyan, or Kok-humbez, close by which stands a brick minaret, 203 ft. high, from the top of which state criminals used to be thrown until 1871. Of the numerous squares the Raghistan

is the principal. It has on one side the citadel, erected on an artificially made eminence 45 ft. high, surrounded by a wall 1 m. long, and

containing the palace of the emir, the houses of the chief functionaries, the prison and the water-cisterns. The houses are mostly one-storeyed, built of unburned bricks, and have flat roofs.

Bokhara has for ages been a centre of learning and religious life. The mysticism which took hold on Persia in the middle ages spreadjalso to Bokhara, and later, when the Mongol invasions of the 13 th century laid waste Samarkand and other Moslem cities, Bokhara, remaining independent, continued to be a chief seat of Islamitic learning. The madrasa libraries, some of which were very rich, have been scattered and lost, or confiscated by the emirs, or have perished in conflagrations. But there are still treasures of literature concealed in private libraries, and Afghan, Persian, Armenian and Turkish bibliophiles still repair to Bokhara to buy rare books. Bokhara is, in fact, the principal book-market of central Asia. The population is supposed by Russian travellers not to exceed 50,000 or 60,000, but is otherwise estimated at 75,000 to 100,000. Amongst them is a large and ancient colony of Jews. Bokhara is the most important trading town in central Asia. In the city bazaars are made or sold silk stuffs, metal (especially copper) wares, Kara-kul (i.e. astrakhan) lamb-skins and carpets.

New Bokhara, or Kagan, a Russian town near the railway station, 8 m. from Bokhara itself, is rapidly growing, on a territory ceded by the emir. Pop. 2000. (P. A. K.)

BOKSBURG, a town of the Transvaal; 14 m. E. of Johannes- burg by rail. Pop. of the municipality (1904) 14, 757, of whom 4175 were whites. It is the headquarters of the Witwatersrand coal mining industry. The collieries extend from Boksburg east- ward to Springs, n m. distant. Brakpan, the largest colliery in South Africa, lies midway between the places named.

BOLAN PASS, an important pass on the Baluch frontier, connecting Jacobabad and Sibi with Quetta, which has always occupied animportant place in the history of British campaigns in Afghanistan. Since the treaty of Gandamak, which was signed at the close of the first phase of the Afghan War in 1879, the Bolan route has been brought directly under British control, and it was selected for the first alignment of the Sind-Pishin railway from the plains to the plateau. From Sibi the line runs south-west, skirting the hills to Rindli, and originally followed the course of the Bolan stream to its head on the plateau. The destructive action of floods, however, led to the abandonment of this alignment, and the railway now follows the Mashkaf valley (which debouches into the plains close to Sibi), and is

carried from near the head of the Mashkaf to a junction with the Bolan at Mach. An alternative route from Sibi to Quetta was found in the Harnai valley to the N.E. of Sibi, the line starting in exactly the opposite direction to that of the Bolan and entering the hills at Nari. The Harnai route, although longer, is the one adopted for all ordinary traffic, the Bolan loop being reserved for emergencies. At the Khundilani gorge of the Bolan route conglomerate cliffs enclose the valley rising to a height of 800 ft., and at Sir-i-Bolan the passage between the limestone rocks hardly admits of three persons riding abreast. The tempera- ture of the pass in summer is very high, whereas in winter, near its head, the cold is extreme, and the ice-cold wind rush- ing down the narrow outlet becomes destructive to life. Since 1877, when the Quetta agency was founded, the freedom of the pass from plundering bands of Baluch marauders (chiefly Marris) has been secured, and it is now as safe as any pass in Scotland. (T. H. H.*)

BOLAS (plural of Span, bola, ball), a South American Indian weapon of war and the chase, consisting of balls of stone attached to the ends of a rope of twisted or braided hide or hemp. Charles Darwin .thus describes them in his Voyage of the Beagle: ” The bolas, or balls, are of two kinds: the simplest, which is used chiefly for catching ostriches, consists of two round stones, covered with leather, and united by a thin, plaited thong, about 8 ft. long. The other kind differs only in having three balls united. by thongs to a common centre. The Gaucho (native of

Spanish descent) holds the smallest of the three in his hand, and whirls the other two around his head; then, taking aim, sends them like chain shot revolving through the air. The balls no sooner strike any object, than, winding round it, they cross each other and become firmly hitched.” Bolas have been used for centuries in the South American pampas and even the forest regions of the Rio Grande. F. Ratzel {History of Mankind) supposes them to be a form of lasso. The Eskimos use a some- what similar weapon to kill birds. Bolas perdidas (i.e. lost) are stones attached to a very short thong, or, in some cases, having none at all.

BOLBEC, a town of northern France, in the department of Seine-Inferieure, on the Bolbec, 19 m. E.N.E. of Havre by rail. Pop. (1906) 10,959. Bolbec is important for its cotton spinning and weaving, and carries on the dyeing and printing of the fabric, and the manufacture of sugar. There are a chamber of commerce and a board of trade-arbitration. The town was enthusiastic in the cause of the Reformed Religion in the 16th century, and still contains many Protestants. It was burned almost to the ground in 1765.

BOLE (Gr. /3«Xos, ” a clod of earth”), a clay-like substance of red, brown or yellow colour, consisting essentially of hydrous aluminium silicate, with more or less iron. Most bole differs from ordinary clay in not being plastic, but in dropping to pieces when placed in water, thus behaving rather like fuller’s-earth. Bole was formerly in great repute medicinally, the most famous kind being the Lemnian Earth (yrj Arjfj,via), from the Isle of Lemnos in the Greek Archipelago. The earth was dug with much cere- mony only once a year, and having been mixed with goats’ blood was made into little cakes or balls, which were stamped by the priests, whence they became known as Terra sigillata (” sealed earth “). Large quantities of bole occur as red partings between the successive lava flows of the Tertiary volcanic series in the north of Ireland and the west of Scotland. Here it seems to have resulted from the decomposition of the basalt and kindred rocks by meteoric agencies, during periods of volcanic repose. In Antrim the bole is associated with lithomarge, bauxite and pisolitic iron-ore. Bole occurs in like manner between the great sheets of the Deccan traps in India; and a similar substance is also found interbedded with some of the doleritic lavas of Etna.

In the sense of stem or trunk of a tree, ” bole ” is from the O. Norwegian bolr, cf. Ger. Bohle, plank. It is probably connected with the large number of words, such as ” boll, ” ” ball,” ” bowl,” &c, which stand for a round object.

BOLESLAUS I., called ” The Great,” king of Poland (d. 1025), was the son of Mieszko, first Christian prince of Poland, and the Bohemian princess Dobrawa, or Bona, whose chaplain, Jordan, converted the court from paganism to Catholicism. He succeeded his father in 992. A born warrior, he speedily raised the little struggling Polish principality on the Vistula to the rank of a great power. In 996 he gained a seaboard by seizing Pomerania, and subsequently took advantage of the troubles in Bohemia to occupy Cracow, previously a Czech city. Like his contem- poraries, Stephen of Hungary and Canute of Denmark, Boleslaus recognized from the first the essential superiority of Christianity over every other form of religion, and he deserves with them the name of ” Great ” because he deliberately associated himself with the new faith. Thus despite an inordinate love of adventure, which makes him appear rather a wandering chieftain than an established ruler, he was essentially a man of insight and progress. He showed great sagacity in receiving the fugitive Adalbert, bishop of Prague, and when the saint suffered martyrdom at the hands of the pagan Slavs (April 23, 997), Boleslaus purchased his relics and solemnly laid them in the church of Gnesen, founded by his father, which now became the metropolitan see of Poland. It was at Gnesen

that Boleslaus in the year 1000 entertained Otto III. so magnificently that the emperor, declaring such a man too worthy to be merely princeps, conferred upon him the royal crown, though twenty-five years later, in the last year of his life, Boleslaus thought it necessary to crown himself king a second time. On the death of Otto, Boleslaus invaded Germany, penetrated to the Elbe, occupying Stralsund and

Meissen on his way, and extended his dominions to the Elster and the Saale. He also occupied Bohemia, till driven out by the emperor Henry IV. in 1004. The German war was terminated in 1018 by the peace of Bautzen, greatly to the advantage of Boleslaus, who retained Lusatia. He then turned his arms against Jaroslav, grand duke of Kiev, whom he routed on the banks of the Bug, then the boundary between Russia and Poland. For ten months Boleslaus remained at Kiev, whence he addressed triumphant letters to the emperors of the East and West. At his death in 1025 he left Poland one of the mightiest states of Europe, extending from the Bug to the Elbe, and from the Baltic to the Danube, and possessing besides the overlordship of Russia. But his greatest achievement was the establishment in Poland of a native church, the first step towards political independence. See J. N. Pawlowski, St Adalbert (Danzig, i860); Chronica Nestoris (Vienna, i860) ; Heinrich R. von Zeissberg, Die Kriege Kaiser Heinrichs II. mit Herzog Boleslaw I. (Vienna, 1368).

BOLESLAUS II., called ” The Bold,” king of Poland (1030- 1081), eldest son of Casimir I., succeeded his father in 1058. The domestic order and tranquillity of the kingdom had been restored by his painstaking father, but Poland had shrunk territorially since the age of his grandfather Boleslaus I., and it was the aim of Boleslaus II. to restore her dignity and im- portance. The nearest enemy was Bohemia, to whcm Poland had lately been compelled to pay tribute for her oldest possession, Silesia. But Boleslaus’s first Bohemian war proved unsuccessful, and was terminated by the marriage of his sister Swatawa with the Czech king Wratyslaus II. On the other hand Boleslaus’s ally, the fugitive Magyar prince Bela, succeeded with Polish assistance in winning the crown of Hungary. In the East Boleslaus was more successful. In 1069 he succeeded in placing Izaslaus on the throne of Kiev, thereby confirming Poland’s overlordship over Russia and enabling Boleslaus to chastise his other enemies, Bohemia among them, with the co-operation of his Russian auxiliaries. But Wratyslaus of Bohemia speedily appealed to the

emperor for help, and a war between Poland and the Empire was only prevented by the sudden rupture of Henry IV. with the Holy See and the momentous events which led to the humiliating surrender of the emperor at Canossa. There is nothing to show that Boleslaus took any part in this struggle, though at this time he was on the best of terms with Gregory VII. and there was some talk of sending papal legates to restore order in the Polish Church. On the 26th of December 1076 Boleslaus encircled his own brows with the royal diadem, a striking proof that the Polish kings did not even yet consider their title quite secure. A second successful expedition to Kiev to reinstate his protege Izaslaus, is Boleslaus's last recorded exploit. Almost immediately afterwards (1079) we find him an exile in Hungary, where "he died about 1081. The cause of this sudden eclipse was the cruel vengeance he took on the milites, or noble order, who, emulating the example of their brethren in Bohemia, were already attempting to curb the royal power. The churchmen headed by Stanislaus Szczepanowski, bishop of Cracow, took the side of the nobles, whose grievances seem to have been real. Boleslaus in his fury slew the saintly bishop, but so general was the popular indignation that he had to fly his kingdom.

See M. Maksymilian Gumplowicz, Zur Geschichte Polens im Mittelalter (Innsbruck, 1898); W. P. Augerstein, Der Konflikt des polnischen Konigs Boleslaw II. mit dem Bischof Stanislaus (Thorn,

1895)-

BOLESLAUS III., king of Poland (1086-1139), the son of Wladislaus I. and Judith of Bohemia, was born on the 23rd of December 1086 and succeeded his father in 1102. His earlier years were troubled continually by the intrigues of his natural half-brother Zbigniew, who till he was imprisoned and blinded involved Boleslaus in frequent contests with Bohemia and the emperor Henry V. The first of the German wars began in 1109, when Henry, materially assisted by the Bohemians, invaded Silesia. It was mainly a war of sieges, Henry sitting down before Lubusz, Glogau and Breslau, all of which he failed to take. The Poles avoided an encounter in the open field, but harried the Germans so successfully around B reslau that the plain was covered

with corpses, which Henry had to leave to the dogs on his dis- astrous retreat; hence the scene of the action was known as " the field of dogs." The chief political result of this disaster was the complete independence of Poland for the next quarter of a century. It was during this respite that Boleslaus devoted himself to the main business of his life — the subjugation of Pomerania (i.e. the maritime province)

with the view of gaining access to the sea. Pomerania, protected on the south by virgin forests and almost impenetrable morasses, was in those days inhabited by a valiant and savage Slavonic race akin to the Wends, who clung to paganism with unconquerable obstinacy. The possession of a seaboard enabled them to maintain fleets and build relatively large towns such as Stettin and Kolberg, whilst they ravaged at will the territories of their southern neighbours the Poles. In self-defence Boleslaus was obliged to subdue them. The struggle began in 1109, when Boleslaus inflicted a terrible defeat on the Pomeranians at Nackel which compelled their temporary submission. In n 20-1 124 the rebellion of his vassal Prince Warceslaus of Stettin again brought Boleslaus into the country, but the resistance was as stout as ever, and only after 18,000 of his followers had fallen and 8000 more had been ex- patriated did Warceslaus submit to his conqueror. The obstinacy of the resistance convinced Boleslaus that Pomerania must be christianized before it could be completely subdued; and this important work was partially accomplished by St Otto, bishop of Bamberg, an old friend of Boleslaus's father, who knew the Slavonic languages. In 11 24 the southern portions of the land were converted by St Otto, but it was only under the threat of extermination if they persisted in their evil ways that the people of Stettin accepted the faith in the following year. In n 28, at the council of Usedom, St Otto appointed his disciple Boniface bishop of Julin, the first Pomeranian diocese, and the foundation of a better order of things was laid. In his later years Boleslaus waged an unsuccessful war with Hungary and Bohemia, and was forced to claim the mediation of the emperor Lothair, to whom he did homage for Pomerania and Riigen at the diet of Merseburg in 1135. He died in 1139.

See Gallus, Chronicon, ed. Finkal (Cracow, 1899) ; Maksymilian Gumplowicz, Zur Geschichte Polens im Mittelalter (Innsbruck, 1898).

BOLETUS, a well-marked genus of fungi (order Polyporeae), characterized by the central stem, the cap or pileus, the soft, fleshy tissue, and the vertical, closely-packed tubes or pores which cover the under surface of the pileus and are easily de- tachable. The species all grow on the ground, in woods or under trees, in the early autumn. They are brown, red or yellow in colour; the pores also vary in colour from pure white to brown, red, yellow or green, and are from one or two lines to nearly an inch long. A few are poisonous; several are good for eating. One of the greatest favourites for the table is Boletus edulis, recognized by its brown cap and white pores which become green when old. It is the ceps of the continental European markets. There are forty-nine British species of Boletus.

BOLEYN (or Bullen), ANNE (c. 1507-1536), queen of Henry VIII. of England, daughter of Sir Thomas Boleyn, afterwards earl of Wiltshire and Ormonde, and of Elizabeth, daughter of Thomas Howard, earl of Surrey, afterwards duke of Norfolk, was born, according to Camden, in 1507, but her birth has been ascribed, though not conclusively, to an earlier date (to 1502 or 1 501) by some later writers. 1 In 1514 she accompanied Mary Tudor to France on the marriage of the princess to Louis XII., remained there after the king's death, and became one of the women in waiting to Queen Claude, wife of Francis I. She returned in 1521 or 1522 to England, where she had many admirers and suitors. Among the former was the poet Sir Thomas Wyatt, 2 and among the latter, Henry Percy, heir of the earl of Northumberland, a marriage with whom, however, was stopped by the king and another match provided for her in the

1 See Anne Boleyn, by P. Friedman; The Early Life of Anne Boleyn, by J. H. Round; and J. Gairdner in Eng. Hist. Review, viii. 53, 299, and x. 104.

2 According to the Chronicle of King Henry VIII., tr. by M. A. S. Hume, p. 68, she was his mistress.

person of Sir James Butler. Anne Boleyn, however, remained unmarried, and a series of grants and favours bestowed by Henry on her father between 1522 and 1525 have been taken, though very doubtfully, as a symptom of the king's affections. Unlike her sister Mary, who had fallen a victim to Henry's solicitations, 1 Anne had no intention of being the king's mistress; she meant to be his queen, and her conduct seems to have been governed entirely by motives of ambition. The exact period of the be- ginning of Anne's relations with Henry is not known. They have been surmised as originating as early as 1 5 23 ; but there is nothing to prove that Henry's passion was anterior to the proceedings taken for the divorce in May 1527, the celebrated love letters being undated. Her name is first openly connected with the king's as a possible wife in the event of Catherine's divorce, in a letter of Mendoza, the imperial ambassador, to Charles V. of the 1 6th of August 1 527,2 during the absence in France of Wolsey, who, not blinded by passion like Henry, naturally opposed the undesirable alliance, and was negotiating a marriage with Renee, daughter of Louis XII. Henry meanwhile, however, had sent William Knight, his secretary, on a separate mission to Rome to obtain

facilities for his marriage with Anne; and on the cardinal's return in August he found her installed as the king's companion and proposed successor to Catherine of Aragon. After the king's final separation from his wife in July 1-531, Anne's position was still more marked, and in 1532 she accom- panied Henry on the visit to Francis I., while Catherine was left at home neglected and practically a prisoner. Soon after their return Anne was found to be pregnant, and in consequence Henry married her about the 25th of January 1533 3 (the exact date is unknown), their union not being made public till the following Easter. Subsequently, on the 23rd of May, their marriage was declared valid and that with Catherine null, and in June Anne was crowned with great state in Westminster Abbey. Anne Boleyn had now reached the zenith of her hopes. A weak, giddy woman of no stability of character, her success turned her head and caused her to behave with insolence and impropriety, in strong contrast with Catherine's quiet dignity under her misfortunes. She, and not the king, probably was the author of the petty persecutions inflicted upon Catherine and upon the princess Mary, and her jealousy of the latter showed itself in spiteful malice. Mary was to be forced into the position of a humble attendant upon Anne's infant, and her ears were to be boxed if she proved recalcitrant. She urged that both should be brought to trial under the new statute of succession passed in 1534, which declared her own children the lawful heirs to the throne. She was reported as saying that when the king gave opportunity by leaving England, she would put Mary to death even if she were burnt or flayed alive for it. 4 She incurred the remonstrances of the privy council and alienated her own friends and relations. Her uncle, the duke of Norfolk, whom she was reported to have treated " worse than a dog," reviled her, calling her a "grande putaine." But her dsay of triumph was destined to be even shorter than that of her predecessor. There were soon signs that Henry's affection, which had before been a genuine passion, had cooled or ceased. He resented her arrogance, and a few months after the marriage he gave her cause for jealousy, and disputes arose. A strange and mysterious fate had prepared for Anne the same domestic griefs that had vexed and ruined Catherine and caused her abandonment. In September 1 533 the birth of a daughter, afterwards Queen Elizabeth, instead of the long-hoped-for son, was a heavy disappointment; next year

1 Of this there is no direct proof, but the statement rests upon contemporary belief and chiefly upon the extraordinary terms of the dispensation granted to Henry to marry Anne Boleyn, which in- cluded the suspension of all canons relating to impediments created by " affinity rising ex illicito coitu in any degree even in the first."

Froude rejects the whole story, Divorce of Catherine of Aragon, p. 54; and see Friedman's Anne Boleyn, ii. 323.

2 Cal. of St. Pap. England and Spain, iii. pt. ii. p. 327.

3 According to Cranmer, Letters and Papers of Henry VIII. vi. p. 300, the only authority; and Cranmer himself only knew of it a fortnight after. The marriage was commonly antedated to the 14th of November 1532.

4 Cal. of St. Pap. England and Spain, v. 198.

there was a miscarriage, and on the 29th of January 1536, the day of Catherine's funeral, she gave birth to a dead male child.

On the 1st of May following the king suddenly broke up a tournament at Greenwich, leaving the company in bewilderment and consternation. The cause was soon known. Inquiries had been made on reports of the queen's ill-conduct, and several of her reputed lovers had been arrested. On the 2nd Anne her- self was committed to the Tower on a charge of adultery with various persons, including her own brother, Lord Rochford. On the 1 2th Sir Francis Weston, Henry Norris, William Brereton and Mark Smeaton were declared guilty of high treason, while Anne herself and Lord Rochford were condemned unanimously by an assembly of twenty-six peers on the 15th. Her uncle, the duke of Norfolk, presided as lord steward, and gave sentence, weeping, that his niece was to be burned or beheaded as pleased the king. Her former lover, the earl of Northumberland, left the court seized with sudden illness. Her father, who was excused attendance, had, however, been present at the trial of the other offenders, and had there declared- his conviction, of his daughter's guilt. On the 16th, hoping probably to save herself by these means, she informed Cranmer of a certain sup- posed impediment to her marriage with the king — according to some accounts a previous marriage with Northumberland, though the latter solemnly and positively denied it — which was never disclosed, but which, having been considered by the archbishop and a committee of ecclesiastical lawyers, was pronounced, on the 17th, sufficient to invalidate her marriage. The same day all her reputed lovers were executed; and on the 19th she herself suffered death on Tower Green, her head being struck off with a sword by the executioner of Calais brought to England for the purpose. 6 She had regarded the prospect of death with courage and almost with levity, laughing heartily as she put her hands about her " little neck " and recalled the skill of the executioner. " I have seen many men " (wrote Sir William Kingston,

governor of the Tower) “and also women executed, and all they have been in great sorrow, and to my knowledge this lady has much joy and pleasure in death.” On the following day Henry was betrothed to Jane Seymour.

Amidst the vituperations of the adherents of the papacy and the later Elizabethan eulogies, and in the absence of the records on which her sentence was pronounced, Anne Boleyn’s guilt remains unproved. To Sir William Kingston she protested her entire innocence, and on the scaffold while expressing her submission she made no confession. 6 Smeaton alone of her supposed lovers made a full confession, and it is possible that his statement was drawn from him by threats of torture or hopes of pardon. Norris, according to one account, 7 also confessed, but subsequently declared that he had been betrayed into making his statement. The others were all said to have ” confessed in a manner ” on the scaffold, but much weight cannot be placed on these general confessions, which were, according to the custom of the time, a declaration of submission to the king’s will and of general repentance rather than acknowledgment of the special crime. ” I pray God save the king,” Anne herself is reported to have said on the scaffold, ” and send him long to reign over you, for a gentler nor a more merciful prince was there never; and to me he was ever a good, a gentle and sovereign lord.” A principal witness for the charge of incest was Rochford’s own wife, a woman of infamous character, afterwards executed for complicity in the intrigues of Catherine Howard. The discovery of Anne’s misdeeds coincided in an extraordinary manner with Henry’s disappointment in not obtaining by her a male heir, while the king’s despotic power and the universal unpopularity of Anne both tended to hinder the administration of pure justice. Nevertheless, though unproved, Anne’s guilt is more than probable. It is almost incredible that two grand

6 Letters and Papers of Henry VIII. x. pp. 374, 381, 385.

6 According to the most trustworthy accounts, but see Letters and Papers, x. p. 382. The well-known letter to Henry VIII. attributed to her is now recognized as an Elizabethan forgery.

7 Archaeologia, xxiii. 64.

juries, a petty jury, and a tribunal consisting of nearly all the lay peers

of England, with the evidence before them which we do not now possess, should have all unanimously passed a sentence of guilt contrary to the facts and their convictions, and that such a sentence should have been supported by Anne's own father and uncle. Every year since her marriage Anne had given birth to a child, and Henry had no reason to despair of more; while, if Henry's state of health was such as was reported, the desire for children, which Anne shared with him, may be urged as an argument for her guilt. Sir Francis Weston in a letter to his family almost acknowledges his guilt in praying for pardon, especially for offences against his wife; 1 Anne's own conduct and character almost prepare us for some catastrophe. Whether innocent or guilty, however, her fate caused no regrets and her misfortunes did not raise a single champion or defender. The sordid incidents of her rise, and the insolence with which she used her triumph, had alienated all hearts from the unhappy woman. Among the people she had always been intensely 'disliked; the love of justice, and the fear of trade losses imminent upon a breach with Charles V., combined to render her unpopular. She appealed to the king's less refined instincts, and Henry's deterioration of character may be dated from his connexion with her. She is described as " not one of the handsomest women in the world; she is of a middling stature, swarthy complexion, long neck, wide mouth, bosom not much raised, and in fact has nothing but the English king's great appetite, and her eyes which are black and beautiful, and take great effect." 2 Cranmer admired her — " sitting in her hair " (i.e. with her hair falling over her shoulders, which seems to have been her custom on great occasions), " upon a horse litter, richly apparelled," at her coronation. 3

Bibliography. — Art. in the Diet, of Nat. Biography and authori- ties cited; Henry VIII. by A. F. Pollard (1905); Anne Boleyn, by P. Friedman (1884); The Early Life of Anne Boleyn, by J. H. Round (1886) ; The Divorce of Catherine of Aragon, by J. A. Froude (1891); " Der Ursprung der Ehescheidung Konig Heinrichs VIII." and " Der Sturz des Cardinals Wolsey," by W. Busch (Historisches Taschenbuch, vi. Folge viii. 273 and ix. 41, 1889 and 1890); Lives, by Miss E. O. Benger (1821); and Miss A. Strickland, Lives of the Queens of England (1851), vol. ii.; Notices of Historic Persons Buried in the Tower of London, by D. C. Bell (1877); The Wives of Henry VIII. by M. A. S. Hume (1905); Excerpta Historica, by N. H. Nicolas (1831), p. 260; Spanish Chronicle of Henry VIII. tr. by M. A. S. Hume (1889); Records of the Reformation, by N. Pocock (1870) ; Harleian Miscellany (1808), iii. 47 (the love letters) ; Archaeo- logia, xxiii. 64 (memorial of G. Constantyne) ; Eng. Hist. Rev. v. 544, viii. 53, 299, x. 104; State

Trials, i. 410; History of Henry VIII. by Lord Herbert of Cherbury; E. Hall's Chronicle: Original Letters, ed. by Sir H. Ellis, i. ser., ii. 37, 53 et seq., ii. ser., ii. 10; Extracts from the Life of Queen Anne Boleigne, by G. Wyat (1817); The Negotiations of Thomas Wolsey, by Sir W. Cavendish (164 1, rep. Harleian Misc. 1810 v.) ; C. Wriothesley's Chronicle (Camden Soc, 1875-1877); Notes and Queries, 8 ser., viii. 141, 189, 313, 350; II Successo de la Morte de la Regina de Inghilterra (1536); The Maner of the Tryumphe of Caleys and Bullen, and the Noble Tryumphaunt Coronacyon of Queen Anne (1533, rep. 1884); State Papers Henry VIII.; Letters and Papers of Henry VIII., by Brewer and Gardiner, esp. the prefaces; Col. of State Pap. England and Spain, Venetian and Foreign (1 558-1 559), p. 525 (an account full of obvious errors) ; Cotton MSS. (Brit. Mus.), Otho C. 10; " Baga de secretis " in Rep. iii., App. ii. of Dep. Keeper of Public Records, p. 242; " Romische Dokumente,' : v., M. S. Ehses (Gorres-gesellschaft, Bd. ii., 1893). See also articles on Catherine of Aragon and Henry VIII. (P. C. Y.)

BOLGARI, or Bolgary, a ruined town of Russia, in the gov- ernment of Kazan, 4 m. from the left bank of the Volga, in 55 N. lat. It is generally considered to have been the capital of the Bulgarians when they were established in that part of Europe (5th to 15th century). Ruins of the old walls and towers still survive, as well as numerous kurgans or burial-mounds, with inscriptions, some in Arabic (1222-1341), others in Armenian (years 557, 984 and 986), and yet others in Turkic. Upon being opened these tombs were found to contain weapons, implements, utensils, and silver and copper coins, bearing inscriptions,

1 Letters and Papers, x. 358.

1 " Sanuto Diaries," October 31, 1532, in Cal. of St. Pap. Venetian, iv. p. 365-

' Original Letters, ed. by Sir H. Ellis, 1 ser. ii. 37, and Cal. of St. Pap. Venetian, iv. 351, 418.

some in ordinary Arabic, others in Kufic (a kind of epigraphic Arabic). These and other antiquities collected here (1722) are preserved in museums at Kazan, Moscow and St Petersburg. The ruins, which were practically discovered in the reign of Peter the Great, were visited and described by Pallas, Humboldt and others. The city of Bolgari was destroyed by the Mongols in 1238, and again by Tamerlane early in

the following century, after which it served as the capital of the Khans (sovereign princes) of the Golden Horde of Mongols, and finally, in the second half of the 15th century it became a part of the principality of Kazan, and so eventually of Russia. The Arab geographer Ibn Haukal states that in his time, near the end of the 10th century, it was a place of 10,000 inhabitants.

See Ibn Fadhlan, Nachrichten iiber die Wolga Bulgaren (Ger. trans, by Frahn, St Petersburg, 1832).

BOLI, the chief town of a sanjak of the Kastamuni vilayet in Asia Minor, altitude 2500 ft., situated in a rich plain watered by the Boli Su, a tributary of the Filiyas Chai (Billaeus). Pop. (1894) 10,796 (Moslems, 9642; Greeks, 758; Armenians, 396). Cotton and leather are manufactured; the country around is fertile, and in the neighbourhood are large forests of oak, beech, elm, chestnut and pine, the timber of which is partly used locally and partly exported to Constantinople. Three miles east of Boli, at Eskihissar, are the ruins of Bithynium, the birthplace of Antinous, also called Anlinoopolis, and in Byzantine times Claudiopolis. In and around Boli are numerous marbles with Greek inscriptions, chiefly sepulchral, and architectural frag- ments. At Ilija, south of the town, are warm springs much prized for their medicinal properties.

BOLINGBROKE, HENRY ST JOHN, Viscount (1678-1751), English statesman and writer, son of Sir Henry St John, Bart, (afterwards 1st Viscount St John, a member of a younger branch of the family of the earls of Bolingbroke and barons St John of Bletso), and of Lady Mary Rich, daughter of the 2nd earl of Warwick, was baptized on the 10th of October 1678, and was educated at Eton. He travelled abroad during 1698 and 1699 and acquired an exceptional knowledge of French. The dissipa- tion and extravagance of his youth exceeded all limits and surprised his contemporaries. He spent weeks in riotous orgies and outdrank the most experienced drunkards. An informant of Goldsmith saw him once ” run naked through the park in a state of intoxication.” Throughput his career he desired, says Swift, his intimate friend, to be thought the Alcibiades or Petronius of his age, and to mix licentious orgies with the highest political responsibilities. 4 In 1700 he married Frances, daughter of Sir Henry Winchcombe, Bart., of Bucklebury, Berkshire, but matrimony while improving his fortune did not redeem his morals.

He was returned to parliament in 1701 for the family borough of Woptton Bassett in Wiltshire. He declared himself a Tory, attached himself to Harley (afterwards Lord Oxford), then speaker, whom he

now addressed as ” dear master,” and distin- guished himself by his eloquence in debate, eclipsing his school- fellow, Walpole, and gaining an extraordinary ascendancy over the House of Commons. In May he had charge of the bill for securing the Protestant succession; he took part in the impeach- ment of the Whig lords for their conduct concerning the Partition treaties, and opposed the oath abjuring the Pretender. In March 1702 he was chosen commissioner for taking the public accounts. After Anne’s accession he supported the bills in 1702 and 1704 against occasional conformity, and took a leading part in the disputes which arose between the two Houses. In 1704 St John took office with Harley as secretary at war, thus being brought into intimate relations with Marlborough, by whom he was treated with paternal partiality. In 1 708 he quitted office with Harley on the failure of the latter’s intrigue, and retired to the country till 1 7 10, when he became a privy councillor and secretary of state in Harley’s new ministry, representing Berkshire in parliament. He supported the bill for requiring a real property qualification for a seat in parliament. In 17 n he founded the

- Swift’s Inquiry into the Behaviour of the Queen’s Last Ministry; Mrs Delaney’s Correspondence, 2 ser., iii. 168-

Brothers’ Club, a society of Tory politicians and men of letters, and the same year witnessed the failure of the two expeditions to the West Indies and to Canada promoted by him. In 171 2 he was the author of the bill taxing newspapers. But the great business of the new government was the making of the peace with France. The refusal of the Whigs to grant terms in 1706, and again in 1 700 when Louis XIV. offered to yield every point for which the allies professed to be fighting, showed that the war was not being continued for English national interests, and the ministry were supported by the queen, the parliament and the people in their design to terminate hostilities. But various obstacles arose from the diversity of aims among the allies; and St John was induced, contrary to the most solemn obligations, to enter into separate and secret negotiations with France for the security of English interests. In ‘May 1712 St John ordered the duke of Ormonde, who had succeeded Marlborough in the com- mand, to refrain from any further engagement. These instruc- tions were communicated to the French, though not to the allies, Louis putting

Dunkirk as security into possession of England, and the shameful spectacle was witnessed of the desertion by the English troops of their allies almost on the battlefield. Subsequently St John received the congratulations of the French minister, Torcy, on the occasion of the French victory over Prince Eugene at Denain.

In August St John, who had on the 7th of July been created Viscount Bolingbroke and Baron St John of Lydiard Tregoze, went to France to conduct negotiations, and signed an armistice between England and France for four months on the 10th. Finally the treaty of Utrecht was signed on the 31st of March 17 13 by all the allies except the emperor. The first production of Addison's Cato was made by the Whigs the occasion of a great demonstra- tion of indignation against the peace, and by Bolingbroke for presenting the actor Booth with a purse of fifty guineas for "defending the cause of liberty against a perpetual dictator" (Marlborough). In the terms granted to England there was perhaps little to criticize. But the manner of the peacemaking, which had been carried on by a series of underhand conspiracies with the enemy instead of by open conferences with the allies, and was characterized throughout by a violation of the most solemn international assurances, left a deep and lasting stain upon the national honour and credit ; and not less dishonourable was the abandonment of the Catalans by the treaty. For all this Bolingbroke must be held primarily responsible. In June his commercial treaty with France, establishing free trade with that country, was rejected. Meanwhile the friendship between Bolingbroke and Harley, which formed the basis of the whole Tory administration, had been gradually dissolved. In March 171 1, by Guiscard's attempt on his life, Harley got the wound which had been intended for St John, with all the credit. In May Harley obtained the earldom of Oxford and was made lord treasurer, while in July St John was greatly disappointed at receiving only his viscountcy instead of the earldom lately extinct in his family, and at being passed over for the Garter. In September 17 13 Swift came to London, and made a last but vain attempt to reconcile his two friends. But now a further cause of difference had arisen. The queen's health was visibly breaking, and the Tory ministers could only look forward to their own downfall on the accession of the elector of Hanover. Both Oxford 1 and Bolingbroke had< maintained for some time secret communications with James, and promised their help in restoring him at the queen's death. The aims of the former, prudent, procrastinating and vacillating by nature, never ex- tended probably beyond the propitiation of his Tory followers; and it is difficult to imagine that Bolingbroke could have really advocated the Pretender's recall, whose divine right he repudi-

ated and whose religion and principles he despised. Neverthe- less, whatever his chief motive may have been, whether to dis- place Oxford as leader of the party, to strengthen his position and that of the faction in order to dictate terms to the future king, or to reinstate James, Bolingbroke, yielding to his more impetuous and adventurous disposition, went much further 1 Berwick's Mem. (Petitot), vol. lxvi. 219.

than Oxford. It is possible to suppose a connexion between his zeal for making peace with France and a desire to forward the Pretender's interests or win support from the Jacobites. 2 During his diplomatic mission to France he had incurred blame for remaining at the opera while the Pretender was present, 3 and according to the Mackintosh transcripts he had several secret interviews with him. Regular communications were kept up subsequently. In March 17 14 Herville, the French envoy in London, sent to Torcy, the French foreign minister in Paris, the substance of two long conversations with Bolingbroke in which the latter advised patience till after the accession of George, when a great reaction was to be expected in favour of the Pre- tender. At the same time he spoke of the treachery of Marl- borough and Berwick, and of one other, presumably Oxford, whom he refused to name, all of whom were in communication with Hanover. 4 Both Oxford and Bolingbroke warned James that he could have little chance of success unless he changed his religion, but the latter's refusal (March 13) does not appear to have stopped the communications. Bolingbroke gradually superseded Oxford in the leadership. Lady Masham, the queen's favourite, quarrelled with Oxford and identified herself with Bolingbroke's interests. The harsh treatment of the Hanoverian demands was inspired by him, and won favour with the queen, while Oxford's influence declined; and by his support of the Schism Bill in May 1714, a violent Tory measure forbidding all education by dissenters by making an episcopal licence obligatory for schoolmasters, he probably intended to compel Oxford to give up the game. Finally, a charge of corruption brought by Oxford in July against Bolingbroke and Lady Masham, in connexion with the commercial treaty with Spain, failed, and the lord treasurer was dismissed or retired on the 27 th of July.

Bolingbroke was now supreme, and everything appeared tending inevitably to a Jacobite restoration. The Jacobite Sir William Windham had been made chancellor of the exchequer, important military posts were placed in the hands of the faction, and a new ministry of Jacobites was projected. But now the queen's sudden death on the 1st of August, and the appointment of Shrewsbury to the lord treasurership, instantly changed the whole scene and ruined

Bolingbroke. ” The earl, of Oxford was removed on Tuesday,” he wote to Swift on the 3rd of August, ” the queen died on Sunday! What a world is this and how does fortune banter us!” According to Herville, the French envoy, Bolingbroke declared to him that in six weeks he could have secured everything. Nevertheless the exact nature of his projects remains obscure. It is probable that his statement in his letter to Windham that ” none of us had any very settled resolution ” is true, though his declaration in the Patriot King that ” there were no designs on foot … to place the crown on the head of the Pretender” is a palpable falsehood. His great object was doubtless to gain supreme power and to keep it by any means, and by any betrayal that the circumstances demanded; and it is not without* significance perhaps that on the very day of Oxford’s dismissal he gave a dinner to the Whig leaders, and on the day preceding the queen’s death ordered overtures to be made to the elector. 6

On the accession of George I. the illuminations and bonfire at Lord Bolingbroke’s house in Golden Square were ” particularly fine and remarkable,” 6 but he was immediately dismissed from office. He retired to Bucklebury and is said to have now written the answer to the Secret History of the White Staff accusing him of Jacobitism. In March 1 7 1 5 he in vain attempted to defend the late ministry in the new parliament; and on the announcement of Walpole’s intended attack upon the authors of the treaty of Utrecht he fled in disguise (March 28, 1715) to Paris, where he was well received, after having addressed a letter to Lord Lansdowne from Dover protesting his innocence

2 Hist. MSS. Comm., Portland MSS. v. 235.

3 Stuart MSS. (Roxburghe Club), ii. 383.

4 HisL_ MSS. Comm., MSS. of H. M. the King, Stuart Papers, i. p. xlviii.

6 Sichel’s Bolingbroke, i. 340 ; Lockhart Papers, i. 460; Macpherson, ii. 529.

6 Wentworth Papers, 408.

and challenging ” the most inveterate pf his enemies to produce any instance of his criminal correspondence.” Bolingbroke in July entirely identified himself with the interests of the Pretender, whose secretary

he became, and on the 10th of September he was attainted. But his counsel was neglected for that of ignorant refugees and Irish priests. The expedition of 1715 was resolved upon against his advice. He drew up James's declaration, but the assurances he had inserted concerning the security of the Church of England were cancelled by the priests. He remained at Paris, and endeavoured to establish relations with the regent. On the return of James, as the result of petty intrigues and jealousies, Bolingbroke was dismissed from his office. He now renounced all further efforts on the Pretender's behalf. 1 Replying to Mary of Modena, who had sent a message deprecating his ill-will, he wished his arm might rot off if he ever used pen or sword in their service again ! 2

He now turned to the English government in hopes of pardon. In March 1 7 16 he declared his final abandonment of the Pretender and promised to use his influence to secure the withdrawal of his friends; but he refused to betray any secrets or any in- dividuals. He wrote his Reflexions upon Exile, and in 171 7 his letter to Sir W. Windham in explanation of his position, generally considered one of his finest compositions, but not published till 1753 after his death. The same year he formed a liaison with Marie Claire Deschamps de Marcilly, widow of the marquis de Villette, whom he married in 1720 after the death in 17 18 of Lady Bolingbroke, whom he had treated with cruel neglect. He bought and resided at the estate of La Source near Orleans, studied philosophy, criticized the chronology of the Bible, and was visited amongst others by Voltaire, who expressed un- bounded admiration for his learning and politeness. In 1723, through the medium of the king's mistress, the duchess of Kendal, he at last received his pardon, returned to London in June or July, and placed his services at the disposal of Walpole, by whom, however, his offers to procure the accession of several Tories to the administration were received very coldly. During the following winter he made himself useful in France in gaining information for the government. In 1725 an act was passed enabling him to hold real estate but without power of alienating it. 3 But this had been effected in consequence of a peremptory order of the king, against Walpole's wishes, who succeeded in maintaining his exclusion from the House of Lords. He now bought an estate at Dawley, near Uxbridge, where he renewed his intimacy with Pope, Swift and Voltaire, took part in Pope's literary squabbles, and wrote the philosophy for the Essay on Man. On the first occasion which offered itself, that of Pulteney's rupture with Walpole in 1726, he endeavoured to organize an opposition in conjunction with the former and Windham; and in 1727 began his celebrated series of letters to the Craftsman, attacking the Walpoles,

signed an ” Occasional Writer.” He gained over the duchess of Kendal with a bribe of £11,000 from his wife’s estates, and with Walpole’s approval obtained an audience with George. His success was imminent, and it was thought his appointment as chief minister was assured. In Walpole’s own words, ” as St John had the duchess entirely on his side I need not add what must or might in time have been the consequence,” and he prepared for his dismissal. But once more Bolingbroke’s ” fortune turned rotten at the very moment it grew ripe,” 4 and his projects and hopes were ruined by the king’s death in June. 6 Further papers from his pen signed ” John Trot ” appeared in the Craftsman in 1728, and in 1730 followed Remarks on the History of England by Humphrey Old- castle, attacking the Walpoles’ policy. The assault on the govern-

1 Hist. MSS. Comm., Stuart Papers, i. 500; Berwick’s Mem. (Petitot), vol. lxvi. 262.

2 Coxe’s Walpole, i. 200; Stuart Papers, ii. 511, and also 446,460.

3 Hist. MSS. Comm., Onslow MSS. 515.

- Bolingbroke to Swift, June 24th, 1727. He adds, ” to hanker after a court is below either you or me.”

6 Sichel’s Bolingbroke, ii. 267; Stanhope, ii. 163; Hist. MSS. Comm., Onslow MSS. 516, 8th Rep. Pt. III. App. p. 3. This remarkable incident is discredited by H. Walpole in Letters (ed. 1903), iii. 269; but he was not always well informed concerning his father’s career.

ment prompted by Bolingbroke was continued in the House of Commons by Windham, and great efforts were made to estab- lish the alliance between the Tories and the Opposition Whigs. The Excise Bill in 1733 and the Septennial Bill in the following year offered opportunities for further attacks on the government, which Bolingbroke supported by a new series of papers in the Craftsman styled ” A Dissertation on Parties “; but the whole movement collapsed after the new elections, which returned Walpole to power in 1735 with a large majority.

Bolingbroke retired baffled and disappointed from the fray to France in June, residing principally at the chateau of Argeville near Fontainebleau. He now wrote his Letters on the Study of History (printed privately before his death and published in 1752), and the True Use of Retirement. In 1738 he visited England, became one of the leading friends and advisers of Frederick, prince of Wales, who

now headed the opposition, and wrote for the occasion The Patriot King, which together with a previous essay, The Spirit of Patriotism, and The Slate of Parties at the Accession of George I., were entrusted to Pope and not published. Having failed, however, to obtain any share in politics, he returned to France in 1739, and subsequently sold Dawley. In 1742 and 1743 he again visited England and quarrelled with Warburton. In 1744 he settled finally at Bat- tersea with his friend Hugh Hume, 3rd earl of Marchmont, and was present at Pope's death in May. The discovery that the poet had printed secretly 1500 copies of The Patriot King, caused him to publish a correct version in 1749, and stirred up a further altercation with Warburton, who defended his friend against Bolingbroke's bitter aspersions, the latter, whose con- duct was generally reprehended, publishing a Familiar Epistle to the most Impudent Man Living. In 1744 he had been very busy assisting in the negotiations for the establishment of the new " broad bottom " administration, and showed no sympathy for the Jacobite expedition in 1745. He recommended the tutor for Prince George, afterwards George III. About 1749 he wrote the Present State of the Nation, an unfinished pamphlet. Lord Chesterfield records the last words heard from him: " God who placed me here will do what He pleases with me hereafter and He knows best what to do." He died on the 12th of December 1 7 5 1 , his wife having predeceased him in 1750. They were both buried in the parish church at Battersea, where a monument with medallions and inscriptions composed by Bolingbroke was erected to their memory.

The writings and career of Bolingbroke make a far weaker impression upon posterity than they made on contemporaries. His genius and character were superficial; his abilities were exercised upon ephemeral objects, and not inspired by lasting or universal ideas. Bute and George III. indeed derived their political ideas from The Patriot King, but the influence which he is said to have exercised upon Voltaire, Gibbon and Burke is very problematical. Burke wrote his Vindication of Natural Society in imitation of Bolingbroke's style, but in refutation of his principles; and in the Reflections on the French Revolution he exclaims, " Who now reads Bolingbroke, who ever read him through?" Burke denies that Bolingbroke's words left "any permanent impression on his mind." Bolingbroke's conversation, described by Lord Chesterfield as " such a flowing happiness of expression that even his most familiar conversations if taken down in writing would have borne the press without the least correction," his delightful companionship, his wit, good looks, and social qualities which charmed during his lifetime and made firm friendships with men of the most opposite character, can now only be faintly imagined. His

most brilliant gift was his eloquence, which according to Swift was acknowledged by men of all factions to be unrivalled. None of his great orations has survived, a loss regretted by Pitt more than that of the missing books of Livy and Tacitus, and no art perishes more completely with its possessor than that of oratory. His political works, in which the expression is often splendidly eloquent, spirited and dignified, are for the most part exceedingly rhetorical in style, while his philosophical essays were undertaken with the chief object of displaying his eloquence, and no characteristic renders

writings less readable for posterity. They are both deficient in solidity and in permanent interest. The first deals with mere party questions without sincerity and without depth; and the 'second, composed as an amusement in retirement without any serious preparation, in their attacks on metaphysics and theology and in their feeble deism present no originality and carry no conviction. Both kinds reflect in their Voltairian superficiality Bolingbroke's manner of life, which was throughout uninspired by any great ideas or principles and thoroughly false and super- ficial. Though a libertine and a free-thinker, he had championed the most bigoted and tyrannical high-church measures. His diplo- macy had been subordinated to party necessities. He had supported by turns and simultaneously Jacobite and Hanoverian interests. He had only conceived the idea of The Patriot King in the person of the worthless Frederick in order to stir up sedition, while his eulogies on retirement and study were pro- nounced from an enforced exile. He only attacked party government because he was excluded from it, and only railed at corruption because it was the corruption of his antagonists and not his own. His public life presents none of those acts of devotion and self-sacrifice which often redeem a career char- acterized by errors, follies and even crimes.

One may deplore his unfortunate history and wasted genius, but it is impossible to regret his exclusion from the government of England. He was succeeded in the title as 2nd Viscount Bolingbroke, according to the special remainder, by his nephew Frederick, 3rd Viscount St John (a title granted to Bolingbroke's father in 17 16), from whom the title has descended.

Bibliography. — Bolingbroke's collected works, including his chief political writings already mentioned and his philosophical essays Concerning the Nature, Extent and Reality of Human Knowledge, On

the Folly and Presumption of Philosophers, On the Rise and Progress of Monotheism, and On Authority in Matters of Religion, were first pub- lished in Mallet's faulty edition in 1 754, — according to Johnson's well- known denunciation, " the blunderbuss charged against religion and morality," — and subsequently in 1778, 1809 and 1841. A Collection of Political Tracts by Bolingbroke was published in 1748. His Letters were published by G. Parke in 1798, and by Grimoard, Lettres historiques, politiques, philosophiques, &c, in 1808; for others see Pope's and Swift's Correspondence; W. Coxe's Walpole; Philli- more's Life of Lyttelton ; Hardwick State Papers, vol. ii. ; Marchmont Papers, ed. by Sir G. H. Rose (1831); Letters to Lord Chancellor Hardwicke in Add. MSS. Brit. Museum (see Index, 1894-1899), mostly transcribed by W. Sichel; Hist. MSS. Comm., MSS. of Marquis of Bath, Duke of Portland at Welbeck; while a further collection of his letters relating to the treaty of Utrecht is in the British Museum. For his attempts at verse see Walpole's Royal and Noble Authors (1806), iv. 209 et seq. See also bibliography of his works in Sichel, ii. 456, 249.

A life of Bolingbroke appeared in his lifetime about 1740, entitled Authentic Memoirs (in the Grenville Library, Brit. Mus.), which recounted his escapades ; other contemporary accounts were published in 1752 and 1754, and a life by Goldsmith in 1770. Of the more modern biographies may be noted that in the Diet, of Nat. Biog. by Sir Leslie Stephen, 1897; by C. de Remusat in V Angleterre au i8me siecle (1856), vol. i. ; by T. Macknight (1863); by J. Churtori 1 Collins (1886); by A. Hassall (1889); and by Walter Sichel (1901- 1902), elaborate and brilliant, but unduly eulogistic. (P. C. Y.)

BOLIVAR, SIMON (1783-1830), the hero of South American independence, was born in the city of Caracas, Venezuela, on the 24th of July 1783. His father was Juan Vicente Bolivar y Ponte, and his mother Maria Concepcion Palacios y Sojo, both descended from noble families in Venezuela. Bolivar was sent to Europe to prosecute his studies, and resided at Madrid for several years. Having completed his education, he spent some time in travelling, chiefly in the south of Europe, and visited Paris, where he was an eye-witness of some of the last scenes of the Revolution. Returning to Madrid, he married, in 1801, the daughter of Don N. Toro, uncle of the marquis of Toro in Caracas, and embarked with her for Venezuela, intending, it is said, to devote himself to the improvement of his large estate. But the premature death of his young wife, who fell a victim to yellow fever, drove him again to Europe. Returning home in 1809 he passed through the United States, where, for the first time, he had an opportunity of observing the working of free institu- tions; and soon

after his arrival in Venezuela he appears to have identified himself with the cause of independence which had already agitated the Spanish colonies for some years. Being one

of the promoters of the insurrection at Caracas in April 18 10, he received a colonel's commission from the revolutionary junta, and was associated with Louis Lopez Mendez in a mission to the court of Great Britain. Venezuela declared its independence on the 5th of July 1811, and in the following year the war com- menced in earnest by the advance of Monteverde with the Spanish troops. Bolivar was entrusted with the command of the import- ant post of Puerto Cabello, but not being supported he had to evacuate the place; and owing to the inaction of Miranda the Spaniards recovered their hold over the country.

Like others of the revolutionists Bolivar took to flight, and succeeded in reaching Curacao in safety. He did not, however, remain long in retirement, but in September 1812, hearing of important movements in New Granada, repaired to Cartagena, where he received a commission to operate against the Spanish troops on the Magdalena river. In this expedition he proved eminently successful, driving the Spaniards from post to post, until arriving at the confines of Venezuela he boldly determined to enter that province and try conclusions with General Monte- verde himself. His troops did not number more than 500 men; but, in spite of many discouragements, he forced his way to Merida and Truxillo, towns of some importance in the west of Venezuela, and succeeded in raising the population to his support. Forming his increased forces into two divisions, he committed the charge of one to his colleague Rivas, and push- ing on for Caracas the capital, issued his decree of " war to the death." A decisive battle ensued at Lastoguanes, where the Spanish troops under Monteverde sustained a crushing defeat. Caracas was entered in triumph on the 4th of August 1813, and Monteverde took refuge in Puerto Cabello. General Marino effected the liberation of the eastern district of Venezuela, and the patriots obtained entire possession of the country in January 1814. This success was, however, of very brief duration. The royalists, effectually roused by the reverses they had sustained, concentrated all their means, and a number of sanguinary encounters ensued. Bolivar was eventually defeated by Boves near Cura, in the plains of La Puerta, and compelled to embark for Cumana with the shattered remains of his forces. Caracas was retaken by the Spaniards in July; and before the end of the year 1 8 14 the royalists were again the undisputed masters of Venezuela. From Cumana Bolivar repaired to Cartagena, and thence to Tunja, where the revolutionary congress of New Granada was sitting. Here, notwithstanding his misfortunes

and the efforts of his personal enemies, he was received and treated with great consideration. T ne congress appointed him to conduct an ex- pedition against Santa Fe de Bogota, where Don Cundinamarca had refused to acknowledge the new coalition of the provinces. In December 1814 he appeared before Bogota with a force of 2000 men, and obliged the recalcitrant leaders to capitulate, — a service for which he received the thanks of congress. In the meanwhile Santa Martha had fallen into the hands of the royalists, and Bolivar was ordered to the relief of the place. In this, however, he was not successful, General Morillo having landed an overwhelming Spanish force. Hopeless of the attempt he resigned his commission and embarked for Kingston, Jamaica, in May 18 14. While residing there an attempt was made upon his life by a hired assassin, who, in mistake, murdered his secretary.

From Kingston Bolivar went to Aux Cayes in Haiti, where he was furnished with a small force by President Petion. An expedition was organized, and landed on the mainland in May

1816, but proved a failure. Nothing daunted, however, he ob- tained reinforcements at Aux Cayes, and in December landed first in Margarita, and then at Barcelona. Here a provisional government was formed, and troops were assembled to resist Morillo, who was then advancing at the head of a strong division. The hostile forces encountered each other on the 16th of February

1817, when a desperate conflict ensued, which lasted during that and the two following days,and ended in the defeat of the royalists. Morillo retired in disorder, and being met on his retreat by J. A. Paez with his llaneros, suffered an additional and more complete overthrow. Being now recognized as commander-in-chief,Bolivar

proceeded in his career of victory, and before the close of the year had fixed his headquarters at Angostura on the Orinoco. At the opening of the congress which assembled in that city on the 1 5th February 18 19 he submitted an elaborate exposition of his views on government, and concluded by surrendering his authority into the hands of congress. Being, however, required to resume his power, and retain it until the independence of the country had been completely established, he reorganized his troops, and set out from Angostura, in order to cross the Cordilleras, effect a junction with General Santander, who com-

manded the republican force in New Granada, and bring their united forces into action against the common enemy. This bold and original design was crowned with complete success. In July 1819 he entered Tunja, after a sharp action on the adjoining heights; and on the 7th of August he gained the victory of Boyaca, which gave him immediate possession of Bogota and all New Granada.

His return to Angostura was a sort of national festival. He was hailed as the deliverer and father of his country, and all manner of distinctions and congratulations were heaped upon him. Availing himself, of the favourable moment, he obtained the enactment of the fundamental law of the 17th of December 1819, by which the republics of Venezuela and New Granada were henceforth to be united in a single state, under his presi- dency, by the title of the Republic of Colombia. The seat of government was also transferred provisionally to Rosario de Cucuta, on the frontier of the two provinces, and Bolivar again took the field. Being now at the head of the most numerous and best appointed army the republicans had yet assembled, he gained important advantages over the Spaniards under Morillo, and on the 25th of November 1820 concluded at Truxillo an armistice of six months, probably in the hope that the Span- iards would come to terms, and that the further effusion of blood might be spared. If such were his views, however, they were disappointed. Morillo was recalled, and General Torre assumed the command. The armistice was allowed to expire, and a renewal of the contest became inevitable. Bolivar therefore resolved, if possible, to strike a decisive blow; and this accord- ingly he did at Carabobo, where, encountering Torre, he so completely routed the Spaniards that the shattered remains of their army were forced to take refuge in Puerto Cabello, where two years after they surrendered to Paez. The battle of Carabobo may be considered as having put an end to the war in Venezuela. On the 29th of June 1821 Bolivar entered Caracas, and by the close of the year the Spaniards were driven from every part of the province except Puerto Cabello. The next step was to secure, by permanent political institutions, the independence which had been so dearly purchased; and, accordingly, on the 30th of August 182 1 the constitution of Colombia was adopted with general approbation, Bolivar himself being president, and Santander vice-president.

There was, however, more work for him to do. The Spaniards, though expelled from Colombia, still held possession of the neigh- bouring provinces of Ecuador and Peru; and Bolivar determined to complete the liberation of the whole country. Placing him- self at the head of the army, he marched on Quito in Ecuador. A severe battle was fought at Pichincha, where, by the prowess of his colleague Sucre, the

Spaniards were routed, and Quito was entered by the republicans in June 1822. Bolivar then marched upon Lima, which the royalists evacuated at his approach; and entering the capital in triumph, he was invested with absolute power as dictator, and authorized to call into action all the resources of the country. Owing, however, to the intrigues of the republican factions in Peru he was forced to withdraw to Truxillo, leaving the capital to the mercy of the Spaniards under Canterac, by whom it was immediately occu- pied. But this misfortune proved only temporary. By June 1824 the liberating army was completely organized; and taking the field soon after, it routed the vanguard of the enemy. Im- proving his advantage, Bolivar pressed forward, and on the 6th of August defeated Canterac on the plains of Junin, after which he returned to Lima, leaving Sucre to follow the royalists in

their retreat to Upper Peru — an exploit which the latter executed with equal ‘ ability and success, gaining a decisive victory at Ayacucho, and thus completing the dispersion of the Spanish force. The possessions of the Spaniards in Peru were now confined to the castles of Callao, which Rodil maintained for upwards of a year, in spite of all the means that could be em- ployed for their reduction. In June 1825 Bolivar visited Upper Peru, which, having detached itself from the government of Buenos Aires, was formed into a separate state, called Bolivia, in honour of the liberator. The first congress of the new republic assembled in August 1825, when Bolivar was declared perpetual protector, and requested to prepare for it a constitu- tion of government.

His care was now directed to the administration of the affairs of the freed provinces. His endeavours to satisfy his country- men in this respect did not always meet with encouragement, and sometimes exposed him to slander. In December 1824 Bolivar convoked a constituent congress for the February following; but this body, taking into consideration the unsettled state of the country, thought it proper to invest him with dictatorial power for another year. His project of a constitution for Bolivia was presented to the congress of that state on the 25th of May 1826, accompanied with an address, in which he embodied his opinions respecting the form of government which he conceived most expedient for the newly established republics. This code, how- ever, did not give satisfaction. Its most extraordinary feature consisted in the provision for lodging the executive authority in the hands of a president for life, without responsibility and with power to nominate his successor, a proposal which alarmed the friends of liberty, and excited lively apprehensions amongst the republicans of Buenos Aires and Chile; whilst in Peru, Bolivar was

accused of a design to unite into one state Colombia, Peru and Bolivia, and to render himself perpetual dictator of the confederacy.

In the meanwhile the affairs of Colombia had taken a turn which demanded the presence of Bolivar in his own country. During his absence Santander had administered the government of the state ably and uprightly, and its independence had been recognized by other countries. But Paez, who commanded in Venezuela, having been accused of arbitrary conduct in the enrol- ment of the citizens of Caracas in the militia, refused obedience to the summons of the senate, and placed himself in a state of open rebellion against the government, being encouraged by a disaffected party in the northern deoartments who desired separation from the rest of the republic

Accordingly, having entrusted the government to a council nominated by himself, with Santa Cruz at its head, Bolivar set out from Lima in September 1826, and hastening to Bogota, arrived there on the 14th of November. He immediately assumed the extraordinary powers which by the constitution the president was authorized to exercise in case of rebellion. After a short stay in the capital he pressed forward to stop the effusion of blood in Venezuela, where matters had gone much farther than he could have contemplated. On the 31st of December he reached Puerto Cabello, and the following day he issued a decree offering a general amnesty. He had then a friendly meeting with Paez and soon after entered Caracas, where he fixed his headquarters, in order to check the northern depart- ments, which had been the principal theatre of the disturbances. In the meanwhile Bolivar and Santander were re-elected to the respective offices of president and vice-president, and by law they should have qualified as such in January 1827. In February, ho w- ever,Bolivar formally resigned the presidency of therepublic,at the same time expressing a determination to refute the imputations of ambition which had been so freely cast upon him, by retiring into private life, and spending the remainder of his days on his patrimonial estate. Santander combated this proposal, urging him to resume his station as constitutional president, and declar- ing his own conviction that the troubles and agitations of the country could only be appeased by the authority and personal influence of the liberator himself. This view being confirmed by a resolution of congress, although it was not a unanimous

one, Bolivar decided to resume his functions, and he repaired to

Bogota to take the oaths. Before his arrival, however, he issued simultaneously three separate decrees — one granting a general amnesty, another convoking a national convention at Ocafia, and a third for establishing constitutional order throughout Colombia. His arrival was accelerated by the occurrence of events in Peru and the southern departments which struck at the very foundation of his power. Not long after his departure from Lima, the Bolivian code had been adopted as the constitution of Peru, and Bolivar had been declared president for life on the 9th of December 1826, the anniversary of the battle of Ayacucho. At this time the Colombian auxiliary army was cantoned in Peru, and the third division, stationed at Lima, consisting of veteran troops under Lara and Sands, became distrustful of Bolivar's designs on the freedom of the republic. Accordingly, in about six weeks after the adoption of Bolivar's new constitution, a counter-revolution in the government of Peru was effected by this body of dissatisfied veterans, and the Peruvians, availing themselves of the opportunity, abjured the Bolivian code, deposed the council appointed by the liberator, and proceeded to organize a provisional government for themselves. After this bloodless revolution the third division embarked at Callao on the 17th of March 1827, and landed in the southern department of Colombia in the following month. Intelligence of these events reached Bolivar while in the north of Colombia, and he lost no time in preparing to march against the refractory troops, who formerly had placed such implicit confidence in him. But he was spared the necessity of coming to blows, for the leaders, finding the government in the hands of the national executive, had peaceably submitted to General Ovando. In the meanwhile Bolivar had accepted the presidency, and resumed the functions belonging to his official position. But although Colombia was, to all external appearance, restored to tranquillity, the nation was divided into two parties. Bolivar had, no doubt, regained the personal confidence of the officers and soldiers of the third division; but the republican party, with Santander at their head, continued to regard with undisguised apprehension his ascendancy over the army, suspecting him of a desire to imitate the career of Napoleon. In the meanwhile all parties looked anxiously to the convention of Ocafia, which was to assemble in March 1828, for a decided expression of the national will. The republicans hoped that the issue of its deliberations would be favourable to their views; whilst the military, on the other hand, did not conceal their conviction that a stronger and more permanent form of government was essential to the public welfare. The latter view seems to have prevailed. In virtue of a decree, dated Bogota, the 27th of August 1828, Bolivar assumed the supreme power in Colombia, and continued to exercise it until his death, which took

place at San Pedro, near Santa Marta, on the 17th of December 1830.

Bolivar spent nine-tenths of a splendid patrimony in the service of his country; and although he had for a considerable period unlimited control over the revenues of three countries — Colombia, Peru and Bolivia — he died without a shilling of public money in his possession. He achieved the independence of three states, and called forth a new spirit in the southern portion of the New World. He purified the administration of justice; he encouraged the arts and sciences; he fostered national interests, and he induced other countries to recognize that independence which was in a great measure the fruit of his own exertions. His remains were removed in 1842 to Caracas, where a monu- ment was erected to his memory; a statue was put up in Bogota in 1846; in 1858 the Peruvians followed the example by erecting an equestrian statue of the liberator in Lima; and in 1884 a statue was erected in Central Park, New York.

Twenty-two volumes of official documents bearing on Bolivar's career were officially published at Caracas in 1826-1833. There are lives by Larrazabal (New York, 1866) ; Rojas (Madrid, 1883) ; and Ducoudray-Holstein (Paris, 1831). Two volumes of his corre- spondence were published in New York in 1866.

BOLlVAR, till 1908 a department of Colombia, bounded N. and W. by the Caribbean Sea, E. by the departments of Magdalena and Santander, S, by Antioquia and S.W. by Cauca.

It has an area of 27,028 sq. m., composed in great part of low, alluvial plains, densely wooded, but slightly cultivated and unsuited for north European labour. The population, estimated at 323,097 in 1899, is composed largely of mixed races; in some localities the inhabitants of mixed race are estimated to constitute four-fifths of the population. The capital, Cartagena on the Caribbean coast, was once the principal commercial entrepdt of Colombia. Other important towns are Barranquilla and Mompox (8000), on the Magdalena river, and Corozal (9000) and Lorica (10,596 in 1902), near the' western coast.

BOLfVAR, an inland state of Venezuela, lying S. of the Orinoco and Apure, with the Yuruari territory on the E., the Caroni river forming the boundary, and the Amazonas territory and Brazil on the S. Frequent political changes in Venezuela have led to various modifications in the size and outlines of this state, which comprises large areas of uninhabited territory. It is a country of extensive plains {llanos) covered in the rainy season with nutritious grass which disappears completely in the dry season, and of great forests and

numerous rivers. Its population was given in 1894 as 135,232, but its area has been largely reduced since then. The capital is Ciudad Bolivar, formerly called Angostura, which is situated on the right bank of the Orinoco about 240 m. above its mouth; pop. 11,686. Vessels of light draught easily ascend the Orinoco to this point, and a considerable trade is carried on, the exports being cocoa, sugar, cotton, hides, jerked beef and various forest products.

BOLIVIA, an inland republic of South America, once a part of the Spanish vice-royalty of Peru and known as the province of Charcas, or Upper Peru. It is the third largest political division of the continent, and extends, approximately, from 9° 44′ to 22° 50′ S. lat., and from 58 to 70 W. long. It is bounded N. and E. by Brazil, S. by Paraguay and Argentina, and W. by Chile and Peru. Estimates of area vary widely and have been considerably confused by repeated losses of territory in boundary disputes with neighbouring states, and no figures can be given which may not be changed to some extent by further revisions. Official estimates are 640,226 and 703,633 sq. m., but Supan {Die Bevolkerung der Erde, 1904) places it at 515,156 sq. m.

Boundaries. — The boundary line between Bolivia and Brazil has its origin in the limits between the Spanish and Portuguese colonies determined by the treaties of Madrid and San Ildefonso (1750 and 1777), which were modified by the treaties of 1867 and 1903. Beginning at the outlet of Bahia Negra into the Paraguay river, lat. 28 08′ 35″ S., the line ascends the latter to a point on the west bank 9 kilometres below Fort Coimbra, thence inland 4 kilometres to a point in lat. 19 45′ 36″ S. and long. 58 04′ 12-7″ W., whence it follows an irregular course N. and E. of N. to Lakes Mandiore, Gaiba or Gahiba, and Uberaba, then up the San Matias river and N. along the Sierra Ricardo Franco to the headwaters of the Rio Verde, a tributary of the Guapore. This part of the boundary was turned inland from the Paraguay to include, within Brazilian jurisdiction, Fort Coimbra, Corumba and other settlements on the west bank, and was modified in 1903 by the recession of about n 58 sq. m. to Bolivia to provide better commercial facilities on the Paraguay. The line follows the Verde, Guapore, Mamore and Madeira rivers down to the mouth of the Abuna, in about lat. 9 44′ S., as determined by the treaty of 1903. This is a part of the original colonial frontier, which extended down the Madeira to a point midway between the Beni and the Amazon, and then ran due W. to the Javary. The treaty of 1867 changed this starting- point to the mouth of the Beni, in lat. io° 20′ S., and designated a straight line to the source of the Javary as the frontier, which gave to Brazil a large area of territory; but when the valuable rubber forests of the upper Purus became known the Brazilians

invaded them and demanded another modification of the boundary line. This was finally settled in 1903 by the treaty of Petropolis, which provided that the line should ascend the Abuna river to lat. 10° 20′ S., thence along that parallel W. to the Rapirran river which is followed to its principal source, thence due W. to the Ituxy river which is followed W. tq its source, thence to the

source of Bahia Creek which is followed to the Acre or Aquiry river, thence up the latter to its source, whence if east of the 69th meridian it runs direct to the nth parallel which will form the boundary line to the Peruvian frontier. This frontier gave about 60,000 sq. m. of territory to Brazil, for which the latter gave an indemnity of £2,000,000 and about 1158 sq. m. of territory on the Matto Grosso frontier. The boundary with Paraguay is unsettled, but an unratified treaty of the 23rd of November 1894 provides that the line shall start from a point on the Paraguay river 3 m. north of Fort Olimpo and run south-west in a straight line to an intersection with the Pilcomayo in long. 6i° 28′ W., where it unites with the Argentine boundary. The boundary with Chile was greatly modified by the results of the war of 1879-83, as determined by the treaties of 1884, 1886 and 1895, Bolivia losing her department of the littoral on the Pacific and all access to the coast except by the grace of the conqueror. Provisions were made in 1895 for the cession of the port of Mejillones del Norte and a right of way across the province of Tarapaca, but Peru protested, and negotiations followed for the cession of Cobija, in the province of Antofagasta. These negotia- tions proved fruitless, and in 1904 Bolivia accepted a pecuniary indemnity in lieu of territory. The new boundary line starts from the summit of the Sapaleri (or Zapalegui), where the

Emery Walker sc

Argentine, Bolivian and Chilean boundaries converge, and runs west to Licancaur, thence north to the most southern source of Lake Ascotan which it follows to and across this lake in the direction of the Oyahua volcano, and thence in a straight line to the Tua volcano, on the frontier of the province of Tarapaca. From this point the line follows the summits of the Cordillera Silillica north to the Cerro Paquiza, on the Tacna frontier, and to the Nevado Pomarape, near the

frontier of Peru. Thence it continues north to an intersection with the Desaguadero, in about 16 45′ S. lat., follows that river to the Winamarca lagoon and Lake Titicaca, and crosses the latter diagonally to Huaicho on the north shore. From this point the line crosses the Cordillera Real through the valley of the San Juan del Oro to Suches Lake, follows the Cololo and Apolobamba ranges to the headwaters of the Sina river, and thence down that stream to the Inambari. Thence the line either follows the latter to its confluence with the Madre de Dios, or the water-parting between that river and the Tambopata or Pando, to the valley of the Madre de Dios, from which point it runs dife north to 12 40′ S. lat., and north-west to the new Brazilian frontier. The N.W. angle on the map repre- sents the Bolivian claim until the settlement of 1909, which gave the territory to Peru.

Physiography. — Roughly calculated, two-fifths of the total area

of Bolivia is comprised within the Andean Cordilleras which cross its south-west corner and project east toward the Brazilian high- lands in the form of a great obtuse angle. The Cordilleras, divided into two great parallel chains, with flanking ranges and spurs to the east, reach their greatest breadth at this point and form the massif of the Andean system. It is made up of a number of parallel ranges enclosing great elevated plateaus broken by transverse ranges and deep ravines. North-east of Lake Titicaca there is a confused mass or knot (the Nudo de Apolobamba) of lofty intersecting ridges which include some of the highest peaks in South America. Below this mountainous area the ranges open out and enclose extensive plateaus. The western range, the Cordillera Occidental, a part of the boundary between Bolivia and the northern provinces of Chile, closely follows the coast outline and forms the western rampart of the great Bolivian tableland or alta-planicie, which extends from the Vilcanota knot in Peru, south to the Serrania de Lipez on the Argentine frontier, is 500 m. long, and about 80 m. broad, and contains about 40,000 sq. m. The northern part of this plateau is com- monly called the puna; the southern part, the ” desert of Lipez,” in character and appearance is part of the great Puna de Atacama. This plateau has an average elevation of about 12,650 ft. near Lake Titicaca, but descends about 1000 ft. toward its southern extremity. It is a great lacustrine basin where once existed an inland sea having an outlet to the east through the La Paz gorge. The plateau is bleak and inhospitable in the north, barren and arid toward the

south, containing great saline depressions covered with water in the rainy season, and broken by ridges and peaks, the highest being the Cerro de Tahua, 17,454 ft. Overlooking the plateau from the west are the snow- clad peaks of Pomarape (20,505 ft.), Parinacota (20,918 ft.), Sajama (21,047), Huallatiri (21,654), Lirima (10,128), and the three volcanic peaks, Oyahua (19,226), San Pedro y Pablo (19,423) and Licancaur (19,685). The eastern rampart of this great plateau is formed by the Cordillera Oriental, which ex- tends north-west into Peru under the name of Carabaya, and south to the frontier in broken ranges, one of which trends south- east in the vicinity of Sucre. The main part of this great range, known as the Cordillera Real, and one of the most imposing mountain masses of the world, extends from the Peruvian border south-east to the 1 8th parallel and exhibits a series of snow- crowned peaks, notably the triple-crested Illampu or Sorata (21,490 ft.), Illimani (Conway, 21,204), Cacaaca (20,571) and Chachacomani (21,434). Of the ranges extending south from the Cordillera Real and branching out between the 18th and 19th parallels, the more prominent are the Frailes which forms the eastern rampart of the great central plateau and which is cele- brated for its mineral deposits, the Chichas which runs south from the vicinity of Potosi to the Argentine frontier, and the Livichuco which turns south-east and forms the watershed between the Cachimayo and Pilcomayo. The more prominent peaks in and between these ranges are the Asanaque (16,857), Michaga (17,389), Cuzco (17,930), Potosi (15,381), Chorolque (18,480) and Tuluma (15,584). At the southern extremity of the great plateau is the transverse Serrania de Lipez, the culminating crest of which stands 16,404 ft. above sea-level. The eastern rampart of the Bolivian highlands comprises two distinct chains — the Sierra de Cochabamba on the north-east and the Sierra de Misiones on the east. Between these and the Cordillera Oriental is an apparently confused mass of broken, intersecting ranges, which on closer examination are found to conform more or less closely to the two outside ranges. These have been deeply cut by rivers, especially on the north-east, where the rain- fall is heavier. The region enclosed by these ranges is extremely rugged in character, but it is esteemed highly for its fertile valleys and its fine climate, and is called the ” Bolivian Switzer- land.” Lying wholly within the tropics, these mountain masses form one of the most interesting as well’ as one of the most imposing and difficult regions of the world. At their feet and in their lower valleys the heat is intense and the vegetation is tropical. Above these are cool, temperate slopes and valleys, and high above these, bleak, wind-swept passes and snowclad

peaks. West of the Cordillera Oriental, where special conditions

prevail, a great desert plateau stretches entirely across one corner of the republic. Apart from the Andean system there is a group of low, broken, gneiss ranges stretching along the east side of Bolivia among the upper affluents of the Mamore and Guapore, which appear to belong to the older Brazilian orographic system, from which they have been separated by the erosive action of water. They are known as the Sierras de Chiquitos, and are geologically interesting because of their proximity to the eastern projection of the Andes. Their culminating point is Cerro Cochii, 3894 ft. above sea-level, but for the most part they are but little more than ranges of low wooded hills, having in general a north-west and south-east direction between the 1 5th and 19th parallels.

The popular conception of Bolivia is that of an extremely rugged mountainous country, although fully three-fifths of it, including the Chiquitos region, is composed of low alluvial plains, great swamps and flooded bottomlands, and gently undulating forest regions. In the extreme south are the Bolivian Chaco and the llanos (open grassy plains) of Manzo, while above these in eastern Chuquisaca and southern Santa Cruz are exten- sive swamps and low-lying plains, subject toperiodical inundations and of little value for agricultural and pastoral purposes. There are considerable areas in this part of Bolivia, however, which lie above the floods and afford rich grazing lands. The great drawback to this region is defective drainage; the streams have too sluggish a current to carry off the water in the rainy season. Between the Chiquitos sierras and the Andes are the Llanos de Chiquitos, which have a higher general elevation and a more diversified surface. North of this elevation, which formed the southern shore of the ancient Mojos Lake, are the llanos of Guarayos and Mojos, occupying an extensive region traversed by the Guapore, San Miguel, Guapaˆ, Mamore, Yacuma, Beni and Madre de Dios rivers and their Numerous tributaries. It was once covered by the great Mojos Lake, and still contains large undrained areas, like that of LakeRojoagua (or Roguaguado). It contains rich agricultural districts and extensive open plains where cattle-raising has been successfully followed since the days of the Jesuit missions in that region. The lower slopes of the Andes, especially toward the north-west, where the country is traversed by the Beni and Madre de Dios, are covered with heavy forests. This is one of the richest districts of Bolivia and is capable of sustaining a large population.

The river-systems of Bolivia fall naturally into three distinct regions — the Amazon, La Plata and Central Plateau. The first includes the rivers flowing directly and indirectly into the Madeira, one of the great tributaries of the Amazon, together with some small tributaries of the

Acre and Purus in the north, all of which form a drainage basin covering more than one-half of the republic. The two principal rivers of this system are the Mamore and Beni, which unite in lat. io° 20′ S. to form the Madeira. The Mamore, the upper part of which is called the Chimor6, rises on the north-east slopes of the Sierra de Cochabamba a little south of the 17th parallel, and follows a northerly serpentine course to its confluence with the Beni, the greater part of which course is between the 65th and 66th meridians. The river has a length of about 600 m., fully three-fourths of which, from Chimore (925 ft. above sea level) to the rapids near its mouth, passes across a level plain and is navigable. The principalBolivian tributary of the Mamore, the Guapay or Grande, which is larger and longer than the former above their confluence and should be considered the main stream, rises in the Cordillera Oriental east of Lake Pampa Aullaguas, and flows east to the north extremity of the Sierra de Misiones, where it emerges upon the Bolivian lowlands. Turning to the north in a magnificent curve, it passes around the south-east extremity of the Sierra de Cochabamba, skirts the Llanos de Chiquitos, and, turning to the north-west, unites with the Mamore at Junta de los Rios in about 1 5° 20′ S. lat. and 64° 40′ W. long. It has a tortuous course of over 700 m., which is described as not navigable. The principal tributaries of the Guapay are the Mizque, Piray 01 Sara and Yapacani, the last rising on the east slopes of the

Cordillera Real, flowing east by Cochabamba to the sierras of that name where it breaks through with a great bend to the north. The other large Bolivian tributaries of the Mamore, all rising on the north-east flanks of the Andes, are the Chapare, Secure, Manique or Apere and Yacuma, the last draining a region of lakes and swamps north of the Sierra Chamaya. The Beni and its great affluent, the Madre de Dios, though of smaller volume and extent than the Mamore, are of much greater economic importance, owing to their navigability, the fertility of the region they drain, and the great forests along their banks. North of the Beni, the Abuna flows into the Madeira. Several of its south tributaries belong to Bolivia. The Guapore, or Itenez, an affluent of the Mamore, is the third large river of this Bolivian drainage basin, but it rises in Brazil, on the south slopes of the Sierra dos Parecis, where it flows in a great bend to the south and then west of north to the Bolivian frontier in 14 S. lat. From this point to its

junction with the Mamore, a little north of the 12th parallel, it flows in a north- westerly direction and forms the boundary line between the two republics. Its Brazilian tributaries are comparatively unimport- ant, but from Bolivia it receives the Baures and the San Miguel, both rising in the Sierras de Chiquitos and flowing north-west across the llanos to the Guapore. The Baures has one large tributary, the Blanco, and the Itonama (San Miguel) has its origin in Lake Concepcion, lying among the west ranges of the Chiquitos mountains 952 ft. above sea-level.

The south-east drainage basin, which is smaller and economic- ally less important than that of the Madeira, discharges into the Paraguay and extends from the Sierras de Chiquitos south to the Argentine frontier, and from the Cordillera Oriental east to the Paraguay. It possesses only one large river in Bolivia, the Pilcomayo, which rises on the east slopes of the Cordillera Oriental opposite the south end of Lake Pampa Aullaguas and flows east and south-east through the sierra region to the Bolivian Chaco. It flows through a nearly level country with so sluggish a current that its channels are greatly obstructed. Nothing definite is known of its tributaries in the Chaco, but in the sierra region it possesses a number of small tributaries, the largest of which are the Cachimayo, Mataca and Pilaya or Camblaya, the latter formed by the Cotagaita and San Juan. The Bermejo, which is an Argentine river, receives one large tributary from the Bolivian uplands, the Tarija or Rio Grande, which drains a small district south-east of the Santa Victoria sierra. The Bolivian tributaries of the upper Paraguay are small and un- important. The Otuquis, the most southern of the group, is formed by the San Rafael and Tucabaca, which drain both slopes of the Cerro Cochii range; but is lost in some great marshes 50 m. from the Paraguay. Another considerable stream of this region, which is lost in the great marshy districts of the Bolivian plain, is the Parapiti, which rises on the eastern slopes of the Sierra de Misiones and flows north-east through a low plain for about 150 m. until lost.

The third drainage basin is that of the great central plateau, or alta-planicie. This is one of the most elevated lacustrine basins in the world, and though it once drained eastward, now has no surface outlet. Lake Titicaca receives the waters of several short streams from the neighbouring heights and dis- charges through the Desaguadero, a sluggish river flowing south for 184 m. with a gradually diminishing depth to Lake Pampa Aullaguas or Poopo. The Desaguadero is navigable for small craft, and has two or three small tributaries from the west. Two small streams empty into Lake Pampa Aullaguas, which has a small outlet in the Lacahahuira flowing west for 60 m. to the

Cienegas de (salt-swamps of) Coipasa. The drainage of this extensive district seems to be wholly absorbed by the dry soil of the desert and by evaporation. In the extreme south the Rio Grande de Lipez is absorbed in the same way.

Few of the Bolivian lakes are at all well known. The great lacustrine basin between the Beni and the Mamore contains several lakes and lagoons, two of them of large size. These are Lake Rogagua whose waters find their way into the Beni through Rio Negro, and the Roguaguado lagoon and tiarshes which

cover a large area of territory near the Mamore. The latter has an elevation little, if any, above the level of the Mamore, which apparently drains this region, and .its area has been estimated at about 580 sq. m. Lake Concepcion, in the Chiquitos moun- tains, belongs to this same hydrographic area. In the south-east there are several large shallow lakes whose character and size change with the season. They fill slight depressions and are caused by defective drainage. Near the Paraguay there are several of these lakes, partly caused by obstructed outlets, such as Bahia Negra, Caceres, Mandiore, Gaiba and Uberaba, some of them of sufficient depth to be navigable by small craft. Above the latter are the great Xarayes swamps, sometimes described as a lake. This region, like that of the north, is subject to periodical inundations in the summer months (November-March or even May), when extensive areas of level country are flooded and traffic is possible only by the use of boats. The two principal lakes of the plateau region are Titicaca and Pampa Aullaguas or Poopo. The former lies near the north end of the great Bolivian alta-planicie, 12,644 ft- above sea-level, being one of the most elevated lakes of the world. It is indented with numerous bays and coves; its greatest length is 138 m., and its greatest breadth 69 m. According to a survey made by Dr M. Neveau-Lemaire {La Geographie, ix. p. 409, Paris, 1904), its water surface, exclud- ing islands and peninsulas, is 1969 sq. m., and its greatest depth is 892 ft. The level of the lake rises about 5 in. in summer; the loss in winter is even greater. The lake belongs to both Bolivia and Peru, and is navigated by steamers running between Bolivian ports and the Peruvian railway port of Puno. The outlet of the lake is through the Desaguadero river. It has several islands, the largest of which bears the same name and contains highly interesting archaeological monuments of a prehistoric civilization usually attributed to the Incas. Lake Pampa Aullaguas or Poopo is about 180 m. south-east of Titicaca, and is fed princi- pally by its outflow. It lies 505 ft. below the level of Titicaca, which gives an average fall for the Desaguadero of very nearly 2 1 ft. per mile. The Pampa Aullaguas has an estimated

area of 386 sq. m., and has one large inhabited island. The lake is shallow and the district about it is sparsely populated. Its outlet is through the Lacahahuira river into the Coipasa swamp, and it is estimated that the outflow is much less than the inflow, showing a considerable loss by evaporation and earth absorption.

Having no sea-coast, Bolivia has no seaport except what may be granted in usufruct by Chile.

Geology. — The eastern ranges of the Bolivian Andes are formed of Palaeozoic rocks with granitic and other intrusions; the Western Cordillera consists chiefly of Jurassic and Cretaceous beds, together with the lavas and ashes of the great volcanoes; while the intervening plateau is covered by freshwater and terrestrial deposits through which rise ridges of Palaeozoic rock and of a series of red sandstones and gypsiferous marls of somewhat uncertain age (probably, in part at least, Cretaceous). The Palaeozoic beds have yielded fossils of Cambrian, Ordovician, Devonian and Carboniferous age. In southern Bolivia Cambrian and Ordovician beds form the greater part of the eastern Andes, but farther north the Devonian and Carboniferous are extensively developed, especially in the north-eastern ranges. The hills, known as the Chiquitos, which rise from the plains of eastern Bolivia, are composed of ancient sedimentary rocks of unknown age. The Palaeozoic beds are directly overlaid by a series of red sandstones and gypsiferous marls, similar to the formation petrolifera of Argentina and Brazil. At the base there is frequently a conglomerate or tuff of porphyritic rocks. Marine fossils found by Gustav Steinmann in the middle of the series are said to indicate an age not earlier than the Jurassic, and Steinmann refers them to the Lower Cretaceous. It is, however, not improbable that the series may represent more than one geological system. No later marine deposits have been found either in the eastern Andes or in the plains of Bolivia, but freshwater beds of Tertiary and later date occupy a wide area. The recent deposits, which cover so large a part of the depression between the Eastern and the Western Cordillera, appear to be partly of torrential origin, like the talus-fans at the foot of mountain ranges in other dry regions; but Lakes Titicaca and Pampa Aullaguas (Poopo) were undoubtedly at one time rather more extensive than they are to-day. The volcanoes of Bolivia lie almost entirely in the Western Cordillera — the great summits of the eastern range, such as Illimani and Sorata, being formed of Palaeozoic rocks with granitic and other intrusions. The gold, silver and tin of Bolivia occur chiefly in the Palaeozoic rocks of the eastern ranges. The copper belongs mostly to the red sandstone series.

[FAUNA AND FLORA

Climate. — Bolivia lies wholly within the torrid zone, and variations in temperature are therefore due to elevation, moun- tain barriers and prevailing winds. The country possesses every gradation of temperature, from that of the tropical low- lands to the Arctic cold of the snow-capped peaks directly above. This vertical arrangement of climatic zones is modified to some extent (less than in Argentina) by varying rainfall conditions, which are governed by the high mountain ranges crossing one corner of the republic, and also by the prevailing winds. The trade winds give to S. Bolivia a wet and dry season similar to that of N. Argentina. Farther north, and east of the Cordillera Oriental, rains fall throughout the year, though the_ summer months (November-March) are usually described as the rainy season. On the west side of the Cordillera, which extracts the moisture from the prevailing easterly winds, the elevated plateaus have a limited rainfall in the north, which diminishes toward the south untO the surface becomes absolutely barren. Brief and furious rain-storms sometimes sweep the northern plateau, but these are not frequent and occur during a short season only. Electrical wind storms are frequent in these high altitudes.

Bolivia has a wide range of temperature between places of the same latitude. The natives designate the Bolivian climatic zones as yungas, valle or medio yungas, cabezera de valle, puna and puna brava. The yungas comprises all the lowlands and the mountain valleys up to an elevation of 5000 ft. The temperature is tropical, winter is unknown and the atmosphere is exceedingly humid. The mean temperature, according to official estimates, is 70 F., but this prob- ably represents the average between the higher elevations and the low country. The valle zone includes the deep valleys from 5000 to 9500 ft. , has a warm climate with moderate variations in temperature and no cold weather, is sub-tropical in character and productions, and is sometimes described as a region of perpetual summer. The cabezera de valle, as the name indicates, includes the heads of the deep valleys above the valle zone, with elevations ranging from 9500 to 11,000 ft.; its climate is temperate, is divided into regular seasons, and is favourable to the production of cereals and vegetables. The puna, which lies between 11,000 and 12,500 ft., includes the great central plateau of Bolivia. It has but two seasons, a cold summer or autumn and winter. The air is cold and dry, and the warmer season is too

short for the production of anything but potatoes and barley. The mean temperature is officially estimated as 54° F. The puna brava extends from 12,500 ft. up to the snow limit (about 17,500 ft.), and covers a bleak, inhospitable territory, inhabited only by shepherds and miners. Above this is the region of eternal snow, an Arctic zone within the tropics. In general, the sub-tropical (valle) and temperate (cabezera de valle) regions of Bolivia are healthy and agreeable, have a plentiful rainfall, moderate temperature in the shade, and varied and abundant products. There is a high rate of mortality among the natives, due to un- sanitary habits and diet, and not to the climate. In the tropical yungas the ground is covered with decaying vegetation, and malaria and fevers are common. There are localities in the open country and on exposed elevations where healthy conditions prevail, but the greater part of this region is considered unhealthy. The prevailing winds are easterly, bringing moisture across Brazil from the Atlantic, but eastern Bolivia is also exposed to hot, oppressive winds from the north, and to violent cold winds (surazos) from the Argentine plains, which have been known to cause a fall of temperature of 36 ° within a few hours. According to the Sinopsis Estadistica y Geogrdfica de la Republica de Bolivia (La Paz, 1903), the average mean temperature and the annual rainfall in eastern Bolivia are as follows: 10° S. lat., 90-8° F. and 31-5 in. rainfall; 15° S. lat., 86° F. and 30-7 in. rainfall; 20° S. lat., 81° F. and 30 in. rainfall; and 25° S. lat., 76ˆ8° F. and 29-3 in. rainfall.

Fauna. — The indigenous fauna of Bolivia corresponds closely to that of the neighbouring districts of Argentina, Brazil and Peru. Numerous species of monkeys inhabit the forests of the tropical region, together with the puma, jaguar, wildcat, coati, tapir or anta, sloth, ant-bear, paca (Coelogenys paca) and capy- biara. A rare species of bear, the Ursus ornatus (spectacled bear) is found among the wooded Andean foothills. The chinchilla (C. laniger), also found in northern Argentina and Chile, inhabits the colder plateau regions and is prized for its fur. The plateau species of the viscacha (Lagidium cuvieri) and the widely distributed South American otter (Lutra paranensis) are also hunted for their skins. The peccary, which prefers a partially open country, ranges from, the Chaco to the densely wooded districts of the north. There are two or three species of deer, the most common being the large marsh deer of the Chaco; but the deer are not numerous. The armadillo, opossum, ferret and skunk

are widely distributed. The amphibia are well represented throughout the lower tropical districts. Alligators are found in the tributaries of the Paraguay and their lagoons, lizards and turtles are numerous, and the batrachians are represented by several species. Snakes are also

numerous, including rattle- snakes and the great boa-constrictors of the Amazon region.

The most interesting of all the Bolivian animals, however, are the guanaco (Auchenia huanaco) and its congeners, the llama (A. llama), alpaca (A pacos) and vicuna (A. vicugna), belonging to the Camelidae, with the structure and habits of the African camel, but smaller, having no hump, and inhabiting a mountain- ous and not a level sandy region. They are able to go without food and drink for long periods, and inhabit the arid and semi- arid plateaus of the Andes and the steppes of Patagonia. The guanaco is supposed to be the original type, is the largest of the four, and has the greatest range from Peru to Tierra del Fuego. The llama and alpaca were domesticated long before the dis- covery of America, but the guanaco and vicuna are found in a wild state only. The llama is used as a pack animal in Bolivia and Peru, and its coarse wool is used in the making of garments for the natives. The alpaca is highly prized for its fine wool, which is a staple export from Bolivia, but the animal is reared with difficulty and the product cannot be largely increased. The vicuna also is celebrated for its wool, which the natives weave into beautiful and costly ponchos (blanket cloaks) and other wearing apparel. The guanaco is hunted for its skin, which, when dressed, makes an attractive rug or robe. The slaughter of the guanaco and vicuna is rapidly diminishing their number. The rearing of llamas and alpacas is a recognized industry in the Bolivian highlands and is wholly in the hands of the Indians, who alone seem to understand the habits and peculiarities of these interesting animals.

Of birds and insects the genera and species are very numerous and interesting. The high sierras are frequented by condors and eagles of the largest size, and the whole country by the common vulture, while the American ostrich (Rhea americanus) and a species of large stork (the bata or jaburu, Mycteria ameri- cana; maximum height, 8 ft.; spread of wings, 8 ft. 6 in.) inhabit the tropical plains and valleys. Waterfowl are numerous and the forests of the warm valleys are filled with song-birds and birds of beautiful plumage. Many species of humming-birds are found even far up in the mountains, and great numbers of parrots, araras and toucans, beautiful of feather but harsh of voice, enliven the forests of the lowlands.

Like other South American states, Bolivia benefited greatly from the introduction of European animals. Horses, cattle, sheep, goats, swine and poultry were introduced, and are now sources of food and wealth to a large part of the population. Mules are used to a large extent as pack animals, but they are imported from Argentina. Silkworms have

been bred with success in some departments, and the cochineal insect is found wherever the conditions are favourable for the cactus.

Flora. — Owing to the diversities in altitude the flora of Bolivia represents every climatic zone, from the scanty Arctic vegetation of the lofty Cordilleras to the luxuriant tropical forests of the Amazon basin. Between these extremes the diversity in vege- table life is as great as that of climate and soil. The flora of Bolivia has been studied less than the flora of the neighbouring republics, however, because of the inaccessibility of these inland regions. Among the more important productions, the potato, oca (Oxalis tuber osa), quinoa (Chenopodium quinoa) and some coarse grasses characterize the puna region, while barley, an exotic, is widely grown for fodder. Indian corn was cultivated in the temperate and warm regions long before the advent of Europeans, who introduced wheat, rye, oats, beans, pease and the fruits and vegetables of the Old World, for each of which a favourable soil and climate was easily found. In the sub-tropical and tropical zones the indigenous plants are the sweet potato, cassava (Manihot utilissima and M. aipi), peanuts, pine- apple, guava, chirimoya (Anona cherimolia), pawpaw (Carica papaya), ipecacuanha (Cephaelis), sarsaparilla, vanilla, false jalap (Mirabilis jalapa), copaiba, tolu (Myroxylon toluiferum) ,

POPULATION]

rubber-producing trees, dyewoods, cotton and a great number of beautiful hardwoods, such as jacaranda, mahogany, rosewood, quebracho, colo, cedar, walnut, &c. Among the fruits many of the most common are exotics, as the orange, lemon, lime, fig, date, grape, &c, while others, as the banana, caju or cashew (Ana- cardium occidentale) and aguacate avocado or alligator pear, have a disputed origin. Coca, one of the most important plants of the country, is cultivated on the eastern slopes of the Andes at an altitude of 5°°° to 6000 ft., where the temperature is uniform and frosts are unknown. Quina or calisaya is a natural product of the eastern Andes, and is found at an altitude of 3000 to 9000 ft. above sea-level. The calisaya trees of Bolivia rank among the best, and their bark forms an important item in her foreign trade. The destructive methods of collecting the bark are steadily diminishing the natural sources of supply, and experiments in cinchona cultivation were undertaken during the last quarter of the 19th century, with fair prospects of

success. The most important of the indigenous forest products, however, is rubber, derived principally from the Hevea guayanensis (var. brasiliensis) , growing along the river courses in the yungas regions of the north, though maniqoba rubber is also obtained from Manihot Glaziovii on the drier uplands. Among the exotics, sugar-cane, rice and tobacco are cultivated in the warm districts.

Population. — The population of Bolivia is composed of Indians, Caucasians of European origin, and a mixture of the two races, generally described as mestizos. There is also a very small percentage of Africans, descendants of the negro slaves introduced in colonial times. A roughly-taken census of 1900 gives the total population as 1,816,271, including the Litoral department, now belonging to Chile (49,8 20) , and estimates the- number of wild Indians of the forest regions at 91,000. Of this total, 50-7 % were classed as Indians, 12-8 % as whites, 26ˆ8 % as mestizos, 0-3 % as negroes, and 9-4 % as unknown. In 1904 an official esti- mate made the population 2,181,415, also including the Litoral (59,784), but of course all census returns and estimates in such a country are subject to many allowances. The Indian population (920,86c) is largely composed of the so-called civilized tribes of the Andes, which once formed part of the nationality ruled by the Incas, and of those of the Mojos and Chiquitos regions, which were organized into industrial communities by the Jesuits in the 17th century. The former, which are chiefly Aymaras south of the latitude of Lake Titicaca, attained a considerable degree of civilization before the discovery of America and have been in closer contact with Europeans than the other tribes of Bolivia. It is doubtful, however, whether their condition has been improved under these influences. The Mojos and Chiquitos tribes, also, have been less pros- perous since the expulsion of the Jesuits, but they have remained together in organized communities, and have followed the industries and preserved the religion taught them as well as circumstances permitted. Both these groups of Indians are peaceable and industrious, and form an important labouring element. They are addicted to the excessive use of chica (a native beer made from Indian corn), and have little or no ambition to improve their condition, but this may be attributed in part to their profound ignorance and to the state of peonage in which they are held. Inhabiting the southern part of the Bolivian plain are the Chiriguanos, a detached tribe of the Guarani race which drifted westward to the vicinity of the Andes long ago. They are of a superior physical and mental type, and have made noteworthy progress toward civilization. They are agriculturists and stock-raisers and have the reputation of being peaceable and industrious. The remaining native tribes under the supervision of the

state have made little progress, and their number is said to be decreasing (notwithstanding the favourable climatic conditions under which most of them live) because of unsanitary and intemperate habits, and for other causes not well understood, one being the custom

noticed by early travellers among some of the tribes of the La Plata region of avoiding the rearing of children. (See Southey's History of Brazil, iii. pp. 402, 673.) Of the wild Indians very little is known in regard to either numbers or customs.

The white population (231,088) is descended in great part from the early Spanish adventurers who entered the country in search of mineral wealth. To these have been added a small number of Spanish Americans from neighbouring republics and some Portuguese Americans from Brazil. There has been no direct immigration from Europe, though Europeans of various nationalities have found their way into the country and settled there as miners or traders. The percentage of whites therefore does not increase as in Argentina and Brazil, and cannot until means are found to promote European immigration.

The mestizos (486,018) are less numerous than the Indians, but outnumber the whites by more than two to one. It has been said of the mestizos elsewhere that they inherit the vices of both races and the virtues of neither. Yet, with a decreasing Indian population, and with a white population wanting in energy, barely able to hold its own and comprising only one-eighth of the total, the future of Bolivia mainly depends on them. As a rule they are ignorant, unprogressive and apathetic, intensely superstitious, cruel and intemperate, though individual strong characters have been produced. It may be that education and experience will develop the mestizos into a vigorous progressive nationality, but the first century of self-government can hardly be said to have given much promise of such a result.

Divisions and Towns. — The republic is divided into eight departments and one territory, and these are subdivided into 54 provinces, 415 cantons, 232 vice-cantons, 18 missions and one colony. The names, areas and populations of the depart- ments, with their capitals, according to the census of 1900, to which corrections must be made on account of the loss of territory to Brazil in 1 903 , are as follows : —

Department.

Area sq. m. from Official . Sources.

Population

1900. 1

Capitals.

Population

1900.

La Paz …. El Beni ….

Cochabamba . Santa Cruz .

Chuquisaca .

Tarija

Nat. Territory

53-777

102,111 19,127 23,3 2 8

141,368

48,801

26,418

33,036

192,260

445.6i6

32,180

86,081

328,163

209,592

325,615

204,434

102,887

31,883

La Paz

Trinidad Oruro

Cochabamba Santa Cruz de

la Sierra Potosi Sucre Tarija

54,713 . 2,556 13,575 21,886

15,874

. 20,910

20,967

6,980

640,226

1,766,451

The total area according to Gotha computations, with correc- tions for loss of territory to Brazil in 1903, is 515,156 sq. m.

There are no populous towns other than the provincial capitals above enumerated. Four of these capitals — Sucre or Chuquisaca, La Paz, Cochabamba and Oruro — have served as the national capital, and Sucre was chosen, but after the revolution of 1898 the capital was at La Paz, which is the commercial metropolis and is more accessible than Sucre. Among the smaller towns prominent because of an industry or commercial position, may be mentioned the Huanchaca mining centre of Pulacayo (pop. 6512), where 3200 men are employed in the mines and surface works of this great silver mining company; Uyuni (pop. 1587), the junction of the Pulacayo branch with the Antofagasta and Oruro railway, and also the converging point for several important highways and projected railways; and Tupiza (pop. 1644), a commercial and mining centre near the Argentine frontier, and the terminus of the Argentine railway extension into Bolivia. All these towns are in the department of Potosi. Viacha (pop. 1670), a small station on the railway from Guaqui to Alto de La Paz, 14 m. from the latter, is the starting point of an important projected railway to Oruro. In the department of Cochabamba,

1 The figures for population include a 5 % addition for omissions, sundry corrections and the estimated number of wild Indians.

Tarata (4681) and Totora (3501) are two important trading centres, and in the department of Santa Cruz, Ascensi6n (pop. 4784) is a large mission station in the Chiquitos hills.

Communications. — Under a treaty with Brazil in 1903 and with Chile in 1904 (ratified 1905) provisions were made for railway construction in Bolivia to bring this isolated region into more effective communication with the outside world. Brazil agreed to construct a railway around the falls of the Madeira (about 180 m. long) to give north-eastern Bolivia access to the Amazon, and paid down £2,000,000 in cash which Bolivia was to expend on railway construction within her own territory. Chile also agreed to construct a railway from Arica to La Paz, 295 m. (the Bolivian section becoming the property of Bolivia fifteen years after completion), and to pay the interest (not over 5%) which Bolivia might guarantee on the capital invested in certain in- terior railways if constructed within thirty years, providing these interest payments should not exceed £100,000 a year, nor exceed £1,600,000 in the aggregate. Argentina had already undertaken to extend her northern railway from Jujuy to the Bolivian frontier town of Tupiza, and the Peruvian Corporation had constructed for the Bolivian government a short line (54 m. long) from Guaqui, on Lake Titicaca, to Alto de La Paz. which is connected with the city of La Paz, 1493 ft. below, by an electric line 5 m. long. This line gives La Paz access to the Peruvian port of Mollendo, 496 m. distant, and promises in time to give it railway communication with Cuzco. Rivalry for the control of her trade, therefore, promises to give Bolivia the railways needed for the development of her resources. Up to 1903 the only railways in Bolivia were the Antofagasta and Oruro line, with a total length of 574 m., of which 350 m. are within Bolivian territory, a private branch of that line (26 m. long) running to the Pulacayo mines, and the line (54 m. long) from Guaqui to Alto de La Paz — a total of only 430 m. As a result of her war with Chile in 1878-81, the railways (282 m. long) of her Litoral department passed under Chilean control. Lines were in 1907 projected from La Paz to the navigable waters of the Beni, from La Paz to Cochabamba, from Viacha to Oruro, from Uyuni to Potosi and Sucre, from Uyuni to

Tupiza, and from Arica to La Paz via Corocoro. The central northern line of the Argentine government was completed to the Bolivian frontier in 1908, and this line was designed to extend to Tupiza. The undertaking of the Arica-La Paz line by the Chilean government, also, was an important step towards the improvement of the economic situation in Bolivia. Both these lines offer the country new outlets for its products.

Public highways have been constructed between the large cities and to some points on the frontiers, and subsidized stage coaches are run on some of them. The roads are rough and at times almost impassable, however, and the river crossings difficult and dangerous. The large cities are connected with one another by telegraph lines and are in communication with the outside world through Argentina, Chile and Peru. Telegraph ser- vice dates from 1880, and in 1904 there were 3115 m. in operation, of which 1936 belonged to the state and 1179 to private corpora- tions. The latter includes the lines belonging to the Antofagasta and Oruro railway, which are partly within Chilean territory. Bolivia is a member of the International Postal Union, and has parcel and money order conventions with some foreign countries. Special agreements have been made, also, with Argentina, Chile and Peru for the transmission of the Bolivian foreign mails.

The loss of her maritime department has left Bolivia with no other ports than those of Lake Titicaca (especially Guaqui, or Huaqui, which trades with the Peruvian port of Puno), and those of the Madeira and Paraguay rivers and their affluents. As none of these can be reached without transhipment in foreign territory, the cost of transport is increased, and her neighbours are enabled to exclude Bolivia from direct commercial intercourse with other nations. An exception formerly existed at Puerto Acre, on the Acre river, to which ocean-going steamers could ascend from Para, but Brazil first closed the Puriis and Acre rivers to foreign vessels seeking this port, and then under a treaty of 1903 acquired possession of the port and adjacent

territory. Since then Bolivia's outlet to the Amazon is restricted to the Madeira river, the navigation of which is interrupted by a series of falls before Bolivian territory is reached. The Bolivian port of entry for this trade, Villa Bella, is situated above the falls of the Madeira at the confluence of the Beni and Mamor6, and is reached from the lower river by a long and costly portage. It is also shut off from the navigable rivers above by the falls of the Beni and Mamore. The railway to be built by Brazil will remedy this unfavourable situation, will afford a better outlet for north-eastern Bolivia, and should promote a more rapid development of that region, which is covered

with an admirable system of navigable rivers above the falls of the Beni and Mamore. Connected with the upper Paraguay are Puerto Pacheco on Bahia Negra, Puerto Suarez (about 1600 m. from Buenos Aires by river), on Lake Caceres, through which passes the bulk of Bolivian trade in that direction, and Puerto Quijarro, on Lake Gaiba, a projected port said to be more accessible than any other in this region. Whenever the trade of southern Bolivia becomes important enough to warrant the expense of opening a navigable channel in the Pilcomayo, direct river communica- tion with Buenos Aires and Montevideo will be possible.

Industries. — Stock-raising was one of the earliest industries of the country after that of mining. Horses, formerly success- fully raised in certain parts of the north, have not flourished there since the introduction of a peste from Brazil, but some are now raised in La Paz and other departments of the temperate region. The Jesuit founders of the Mojos missions took cattle with them when they entered that region to labour among the Indians, with the result that the Mojos and Chiquitos llanos were soon well stocked, and have since afforded an unfailing supply of beef for the neighbouring inland markets. Their inaccessibility and the costs of transportation have prevented a development of the industry and a consequent improvement in stock, but the persistency of the industry under conditions so unfavourable is evidence that the soil and climate are suited to its requirements. Farther south the llanos of Chuquisaca and Tarija also sustain large herds of cattle on the more elevated districts, and on the well-watered plains of the Chaco. There are small districts in La Paz, Potosi and Cochabamba, also, where cattle are raised. Apart from the cattle driven into the mining districts for consumption, a number of saladeros are employed in preparing (usually salting and sun-drying) beef for the home markets. The hides are exported. Goats are raised in the warm and temperate regions, and sheep for their wool in the latter. On the higher and colder plateaus much attention is given to the breeding of llamas and alpacas. Another industry of a different character is that of breeding the fur-bearing chinchilla (C. laniger), which is a native of the higher plateaus. The Bolivian government has prohibited the exportation of the live animals and is encouraging their production.

The agricultural resources of the republic are varied and of great value, but their development has been slow and hesitating. The cultivation of cereals, fruits and vegetables in the temperate and warm valleys of the Andes followed closely the mining settlements. Sugar-cane also was introduced at an early date, but as the demand for sugar was limited the product was devoted chiefly to the manufacture of

rum, which is the principal object of cane cultivation in Bolivia to-day. The climatic conditions are highly favourable for this product in eastern Bolivia, but it is heavily taxed and is restricted to a small home market. Rice is another exotic grown in the tropical districts of eastern Bolivia, but the quantity produced is far from sufficient to meet local requirements. Tobacco of a fair quality is produced in the warm regions of the east, including the yungas valleys of La Paz and Cochabamba; cacao of a superior grade is grown in the department of Beni, where large orchards were planted at the missions, and also in the warm Andean valleys of La Paz and Cochabamba; and coffee of the best flavour is grown in some of the warmer districts of the eastern Andes. The two indigenous products which receive most attention, perhaps, are those of quinoa and coca. Quinoa is grown in large quantities, and is a staple article of food among the natives. Coca is highly

esteemed by the natives, who masticate the leaf, and is also an article of export for medicinal purposes. It is extensively culti- vated in the departments of Cochabamba and La Paz, especially in the province of Yungas.

In the exploitation of her forest products, however, are to be found the industries that yield the greatest immediate profit to Bolivia. The most prominent and profitable of these is that of rubber-collecting, which was begun in Bolivia between 1880 and 1890, and which reached a registered annual output of nearly 3500 metric tons just before Bolivia's best rubber forests were transferred to Brazil in 1903. There still remain extensive areas of forest on the Beni and Madre de Dios in which the rubber- producing Hevea is to be found. Although representing less value in the aggregate, the collecting of cinchona bark is one of the oldest forest industries of Bolivia, which is said still to have large areas of virgin forest to draw upon. The Bolivian pro-duct is of the best because of the high percentage of quinine sulphate which it yields. The industry is destructive in method, and the area of cinchona forests is steadily diminishing. Many other Bolivian plants are commercially valuable, and organized industry and trade in them will certainly be profitable.

The industrial activities of the Bolivian people are still of a very

primitive character. An act was passed in 1894 authorizing the government to offer premiums and grant advantageous concessions for the development of manufacturing industries, especially in sugar production, but conditions have not been favourable and the results have been disappointing. Spinning and weaving are carried on among the people as a household occupation, and fabrics are made of an exceptionally substantial character. It is not uncommon to see the natives busily twirling their rude spindles as they follow their troops of pack animals over rough mountain roads, and the yarn produced is woven into cloth in their own houses on rough Spanish looms of colonial patterns. Not only is coarse cloth for their own garments made in this manner from the fleece of the llama, but cotton and woollen goods of a serviceable character are manufactured, and still finer fabrics are woven from the wool of the alpaca and vicuna, sometimes mixed with silk or lamb's wool. The Indian women are expert weavers, and their handiwork often commands high prices. In the Mojos and Chiquitos districts the natives were taught by the Jesuit missionaries to weave an excellent cotton cloth, and the industry still exists. Cashmere, baize, waterproof ponchos of fine wool and silk, and many other fabrics are made by the Indians of the Andean departments. They are skilled in the use of dyes, and the Indian women pride themselves on a large number of finely-woven, brilliantly-coloured petticoats. Tanning and saddlery are carried on by the natives with primitive methods, but with excellent results. They are skilful in the preparation of lap robes and rugs from the skins of the alpaca and vicuna. The home markets are supplied, by native industry, with cigars and cigarettes, soap, candles, hats, gloves, starch, cheese and pottery. Sugar is still made in the old way, and there is a small production of wine and silk in certain districts. No country is better supplied with water power, and electric lighting and electric power plants have been established at La Paz.

Commerce. — The foreign trade of Bolivia is comparatively unimportant, but the statistical returns are incomplete and un- satisfactory; the imports of 1904 aggregated only £1,734,551 in value, and the exports only £1,851,758. The imports con- sisted of cottons, woollens, live-stock, provisions, hardware and machinery, wines, spirits and clothing. The principal exports were (in 1903) silver and its ores (£636,743), tin and its ores (£i,o39, 2 98), copper ores (£157,609), bismuth (£16,354), other minerals(£20, 94 8), rubber (£260,559), coca (£28, 907), and cinchona (£9 Z 97) — total exports, £2,453,638. These figures, however, do not correctly represent the aggregates of Bolivian trade, as her imports and exports passing through Antofagasta, Arica and Mollendo are to a large extent

credited to Chile and Peru. The import trade of Bolivia is restricted by the poverty of the people. The geographical position limits the exports to mineral, forest and some pastoral products, owing to cost of transportation and the tariffs of neighbouring countries.

Government. — The government of Bolivia is a ” unitarian ” or centralized republic, representative in form, but autocratic in some important particulars. The constitution in force (1908) was adopted on the 28th of October 1880, and is a model in form and profession. The executive branch of the government is presided over by a president and two vice-presidents, who are elected by direct popular vote for a period of four years, and are not eligible for re-election for the next succeeding term. The president is assisted by a cabinet of five ministers of state, viz.: foreign relations and worship; finance and industry; interior and fomento; justice and public instruction; war and coloniza- tion. Every executive act must be countersigned by a minister of state, who is held responsible for its character and enforcement, and may be prosecuted before the supreme court for its illegality and effects. The legislative branch is represented by a national congress of two houses — a Senate and Chamber of Deputies. The Senate is composed of 16 members, two from each depart- ment, who are elected by direct popular vote for a period of six years, one-third retiring every two years. The Chamber oi Deputies is composed of 72 members, who are elected for a period of four years, one-half retiring every two years. In impeachment trials the Chamber prosecutes and the Senate sits as a court, as in the United States. One of the duties of the Chamber is to elect the justices of the supreme court. Congress meets annually and its sessions are for sixty days, which may be extended to ninety days. The chambers have separate and concurrent powers defined by the constitution. The right of suffrage is exercised by all male citizens, twenty-one years of age, or over, if single, and eighteen years, or over, if married, who can read and write, and own real estate or have an income of 200 bolivianos a year, said income not to be compensation for services as a servant. The electoral body is therefore small, and is under the control of a political oligarchy which practically rules the country, no matter which party is in power.

The Bolivian judiciary consists of a national supreme court, eight superior district courts, lower district courts, and juzgados de instruction for the investigation and preparation of cases. The corregidores and alcaldes also exercise the functions of a justice of the peace in the cantons and rural districts. The supreme court is composed of seven justices elected by the Chamber of Deputies from lists of three names for each seat sent in by the Senate. A justice can

be removed only by impeach- ment proceedings before the Senate.

The supreme administration in each department is vested in a prefect appointed by and responsible solely to the president. As the prefect has the appointment of subordinate department officials, including the alcaldes, the authority of the national executive reaches every hamlet in the republic, and may easily become autocratic. There are no legislative assemblies in the departments, and their government rests with the national executive and congress. Subordinate to the prefects are the sub- prefects in the provinces, the corregidores in the cantons and the alcaldes in the rural districts — all appointed officials. The national territory adjacent to Brazil and Peru is governed by two delegados nacionales, appointees of the president. The depart- ment capitals are provided with municipal councils which have jurisdiction over certain local affairs, and over the construction and maintenance of some of the highways.

Army. — The military forces of the republic in 1905 included 2890 regulars and an enrolled force of 80,000 men, divided into a first reserve of 30,000, a second reserve of 40,000, and 10,000 territorial guards. The enrolled force is, however, both un- organized and unarmed. The strength of the army is fixed in each year's budget. That for 1903 consisted of 2933 officers and men, of which 275 were commissioned and 558 non-commissioned officers, 181 musicians, and only 1906 rank and file. A conscrip- tion law of 1894 provides for a compulsory military service between the ages of twenty- one and fifty years, with two years' actual service in the regulars for those between twenty- one and twenty-five, but the law is practically a dead letter. There is a military school with 60 cadets, and an arsenal at La Paz.

Education. — Although Bolivia has a free and compulsory school system, education and the provision for education have made little progress. Only a small percentage of the people can read and write. Although Spanish is the language of the dominant minority, Quichua, Aymara. and Guarani are the languages of the natives, who form a majority of the population. A considerable percentage of the Indians do not understand Spanish at all, and they even resist every effort to force it upon them. Even the cholos (mestizos) are more familiar with the native idioms than with Spanish, as is the case in some parts of

Argentina and Paraguay. According to official estimates for 1901, the total number of primary schools in the republic was 733, with 938 teachers and 41,587 pupils — the total cost of their maintenance being estimated at 585,365 bolivianos, or only 14-07 bolivianos per pupil (about £1:4:6). The school enrolment was only one in 43-7 of population, compared with one in 10 for Argentina. The schools are largely under the control of the municipalities, though nearly half of them are maintained by the national government, by the Church and by private means. There were in the same year 13 institutions of secondary and 14 of superior instruction. The latter include so-called uni- versities at Sucre (Chuquisaca), La Paz, Cochabamba, Tarija, Potosi, Santa Cruz and Oruro — all of which give instruction in law, the first three in medicine and the first four in theology. The university at Sucre, which dates from colonial times, and that at La Paz, are the only ones on the list sufficiently well equipped to merit the title. Secondary instruction is under the control of the universities, and public instruction in general is under the direction of a cabinet minister. All educational matters, however, are practically under the supervision of the Church. The total appropriation for educational purposes in 1901 was 756,943 bolivianos, or £66,232:63. There are a military academy at La Paz, an agricultural school at Umala in the depart- ment of La Paz, a mining and civil engineering school at Oruro, commercial schools at Sucre and Trinidad, and several mission schools under the direction of religious orders.

Religion. — The constitution of Bolivia, art. 2, defines the attitude of the republic toward the Church in the following words: — ” The state recognizes and supports the Roman Apostolic Catholic religion, the public exercise of any other worship being prohibited, except in -the colonies where _ it is tolerated.” This toleration is tacitly extended to res’ident foreigners belonging to other religious sects. The census of 1900 enumerated the Roman Catholic population at 1,609,365, and that of other creeds at 24,245, which gives the former 985 and the latter 1 5 in every thousand. The domesticated Indians profess the Roman Catholic faith, but it is tinged with the superstitions of their ancestors. They hold the clergy in great fear and reverence, however, and are deeply influenced by the forms and ceremonies of the church, which have changed little since the first Spanish settlements. Bolivia is divided into an archbishopric and three bishoprics. The first includes the departments of Chuquisaca, Oruro, Potosi, Tarija and the Chilean province of Antofagasta, with its seat at Sucre, and is known as the archbishopric of La Plata. The sees of the three bishoprics are La Paz, Cochabamba and Santa Cruz. Mission work among the Indians is entrusted to the Propaganda Fide, which has five colleges and a large

number of missions, and receives a small subvention from the state. It is estimated that these missions have charge of fully 20,000 Indians. The annual appropriation for the Church is about £17,150. The religious orders, which have never been suppressed in Bolivia, maintain several convents.

Finance. — No itemized returns of receipts and expenditures are ever published, and the estimates presented to congress by the cabinet ministers furnish the only source from which infor- mation can be drawn. The expenditures are not large, and taxation is not considered heavy. The estimated revenues and expenditures for 1904 and 1905 at 21 pence per boliviano, were as follows: 1904, revenue £632,773 : 15s., expenditure £748,571 : ics.; 1905, revenue £693,763 : 17 : 6, expenditure £828,937 : 19 : 9. The revenues are derived principally from duties and fees on imports, excise taxes on spirits, wines, tobacco

and sugar, general, mining taxes and export duties on minerals (except silver), export duties on rubber and coca, taxes on the profits of stock companies, fees for licences and patents, stamp taxes, and postal and telegraph revenues. Nominally, the import duties are moderate, so much so that Bolivia is sometimes called a ” free-trade country,” but this is a misnomer, for in addition to the schedule rates of 10 to 40% ad valorem on im- ports, there are a consular fee of i§% for the registration of invoices exceeding 200 bolivianos, a consumption tax of 10 centavos per quintal (46 kilogrammes), fees for viseing certi- ficates to accompany merchandise in transit, special “octroi” taxes on certain kinds of merchandise controlled by monopolies (spirits, tobacco, &c), and the import and consumption taxes levied by the departments and municipalities. The expenditures are chiefly for official salaries, subsidies, public works, church and mission support, justice, public instruction, military ex- penses, and interest on the public debt. The appropriations for 1905 were as follows: war, 2,081,119 bolivianos; finance and industry, 1,462,259; government and fomento, 2,021,428; justice and public instruction, 1,878,941.

The acknowledged public debt of the country is comparatively small. At the close of the war with Chile there was an in- demnity debt due to citizens of that republic of 6,550,830 bolivianos, which had been nearly liquidated in 1904 when Chile took over the unpaid balance. This was Bolivia’s only foreign debt. In 1905 her internal debt, including 1,998,500 bolivianos of treasury bills, amounted to 6,243,270 bolivianos (£546,286). The government in 1903 authorized the issue of treasury notes for the department of Beni and the National Territory to the amount of one million bolivianos (£87,500), for the redemption of which 10% of the customs receipts of the two districts

is set apart. The paper currency of the republic consists of bank-notes issued by four private banks, and is therefore no part of the public debt. The amount in circulation on the 30th of June 1903 was officially estimated at 9,144,254 bolivianos (£800,122), issued on a par with silver. The coinage of the country is of silver, nickel and copper. The silver coins are of the denomina- tions of 1 boliviano, or 100 centavos, 50, 20, 10 and 5 centavos, and the issue of these coins from the Potosi mint is said to be about 1,500,000 bolivianos a year. The silver mining com- panies are required by law to send to the mint 20% of their product. The silver boliviano, however, is rarely seen in circu- lation because of the cheaper paper currency. To check the exportation of silver coin, the fractional denominations have been slightly debased. The nickel coins are of 5 and 10 centavos, and the copper 1 and 2 centavos.

The departmental revenues, which are derived from excise and land taxes, mining grants, tithes, inheritance taxes, tolls, stamp taxes, subsidies from the national treasury and other small taxes, were estimated at 2,296,172 bolivianos in 1903, and the expenditures at 2,295,791 bolivianos. The expenditures were chiefly for justice, police, public works, public instruction and the Church. The municipal revenues aggregated 2,317,670 bolivianos in 1902, and the expenditures 61,510 bolivianos in excess of that sum. These revenues are derived from a lighting tax, leases and ground rents, cemetery fees, consumption and market taxes, licences, tolls, taxes on hides and skins, personal and various minor taxes. There is a multiplication of taxes in trade which recalls the old colonial alcabala tax, and it serves to restrict commerce and augment the cost of goods in much the same way, if not to the same degree.

Authorities. — M. V. Ballivian, Apuntes sobre la industria de goma elastica, &c. (La Paz, 1896); Noticia Politica, Geogrdfica, Industrial, y Estadistica de Bolivia (La Paz, 1900) ; Breves Indica- ciones para el Inmigrante y el Viajero a Bolivia (La Paz, 1898); Monografias de la Industria Minera en Bolivia, three parts (La Paz, 1899-1900) ; Relaciones Geogrdficas de Bolivia existentes en el Archivo de la Oficina Nacional de Inmigracion, &c. (La Paz, 1898); M. V. Ballivian and Eduardo Idiaquez, Diccionario Geogrdfico de la Re- publica de Bolivia (La Paz, 1900) ; Andre Bresson, Sept annees d' explorations, de voyages et de sejours dans I'Amerique australe (Paris, 1886); Enrique Bolland, Exploraciones practicadas en el Alto Paraguay y en la Laguna Gaiba (Buenos Aires, 1901); G. E. Church, The Route to Bolivia via the River Amazon (London, 1877);

HISTORY]

G. E. Church, " Bolivia by the Rio de la Plata Route," Geogr. Jour. xix. pp. 64-73 (London, 1902) ; C. B. Cisneros and R. E. Garcia, Geografia Comercial de la America del Sur (Lima, 1898); Sir W. M. Conway, Climbing and Exploration in the Bolivian Andes (London, 1903) ; M. Dalence, Bosquejo estadistico de Bolivia (Chuquisaca, 1878) ; J. L. Moreno, Nociones de geografia de Bolivia (Sucre, 1889) ; Edward D. Mathews, Up the Amazon and Madeira Rivers, through Bolivia and Peru (London, 1879); Carlos Matzenauer, Bolivia in historischer, geographischer und cultureller Hinsicht (Vienna, 1897); M. F. Soldan, Narracion de Guerra de Chile contra Peru y Bolivia (La Paz, 1884) ; C. M. Pepper, Panama to Patagonia (Chicago, 1906) ; A. Petrocokino, Along the Andes, in Bolivia, Peru, and Ecuador (London, 1903) ; Cornte C. d'Ursel, Sud Amerique: Seiours et voyages au Bresil, en Bolivie, &c. (Paris, 1879); Charles Wiener, Perou et Bolivie (Paris, 1880); Bolivia, Geographical Sketch, Natural Resources, Sˆc, Intern. Bur. of the American Republics (Washington, 1904) ; Boletin de la Oficina Nacional de Inmigracion, Estadistica y Propaganda Geogrdfica (La Paz) ; Sinopsis estadistica y geogrdfica de la Republica de Bolivia (3 vols., La Paz, 1902-1904) ; G. de Crequi- Montfort, " Exploration en Bolivie," in La Geographie, ix. pp. 79-86 (Paris, 1904); M. Neveau-Lemaire, " Le Titicaca et le Poopo," &c, in La Geographie, ix. pp. 409-430 (Paris, 1904) ; British Foreign Office Diplomatic and Consular Reports (London) ; United States Consular Reports ; Stanford's Compendium of Geography and Travel, vol. i., South and Central America (London, 1904). For Geology see A. d'Orbigny, Voyage dans I' Amerique meridionale, vol. iii. pt. iii. (Paris, 1842) ; D. Forbes, " On the Geology of Bolivia and Peru," Quart. Journ. Geol. Soc. vol. xvii. (London, 1861), pp. 7-62, pis. i.-iii. ; A. Ulrich, "Palaeozoische Versteinerungen aus Bolivien," Neues Jahrb. f. Min. Band viii. (1893), pp. 5-1 16, pis. i.-v. ; G. Steinmann, &c, " Geologie des sudostlichen Boliviens," Centralb.f. Min., Jahrg. (1904), pp. 1-4. (A. J. L.)

History

The country now forming the republic of Bolivia, named after the great liberator Simon Bolivar (q.v.), was in early days simply a portion of the empire of the Incas of Peru (q.v.). After the conquest of Peru by the Spaniards in the 1 6th century the natives were subjected to much tyranny and oppression, though it must in fairness be said that much of it was carried out in defiance of the efforts and the wishes of the Spanish home government, whose legislative efforts to protect the

Indians from serfdom and ill-usage met with scant respect at the hands of the distant settlers and mine-owners, who bid defiance to the humane and protective regulations of the council of the Indies, and treated the unhappy natives little better than beasts of burden. The statement, moreover, that some eight millions of Indians perished through forced labour in the mines is a gross exaggeration. The annual diminution in the number of the Indian population was undoubtedly very great, but it was due far more to the result of European epidemics and to indulgence in alcohol than to hard work. The abortive insurrection of 1780-82, led by the Inca Tupac Amaru, was never a general rising, and was directed rather against Creole tyranny than against Spanish rule. The heavy losses sustained by the Indians during that outbreak, and their dislike and distrust of the colonial Spaniard, account for the comparative indifference with which they viewed the rise and progress of the 18 14 colonial revolt against Spain, which gave the South American states their independence.

We are only concerned here with the War of Independence so far as it affected Upper Peru, the Bolivia of later days. When the patriots of Buenos Aires had succeeded in liberating Ya” 0t nd- f rom tne dominion of Spain the interior provinces of eace. the Rio de la Plata, they turned their arms against

their enemies who held Upper Peru. An almost un- interrupted warfare followed, from July 1809 till August 1825, with alternate successes on the side of the Spanish or royalist and the South American or patriot forces, — the scene of action lying chiefly between the Argentine provinces of Salta and Jujuy and the shores of Lake Titicaca. The first movement of the war was the successful invasion of Upper Peru by the army of Buenos Aires, under General Balcarce, which, after twice defeat- ing the Spanish troops, was able to celebrate the first anni- versary of independence near Lake Titicaca, in May 1811. Soon, however, the patriot army, owing to the dissolute conduct and negligence of its leaders, became disorganized, and was attacked and defeated, in June 181 1, by the Spanish army under General Goyeneche, and driven back into Jujuy. Four years of warfare,

in which victory was alternately with the Spaniards and the patriots, was terminated in 1815 by the total rout of the latter in a battle which took place between Potosi and Oruro. To this succeeded a revolt of the Indians of the southern provinces of Peru, and the object being the independence of the whole country, it was joined by numerous Creoles. This insurrection was, however, speedily put down by the royalists. In 1816 the Spanish general Laserna, having been appointed commander-in- chief of Upper Peru, made an attempt to invade the

Argentine provinces, intending to march on Buenos Aires, but he was completely foiled in this by the activity of the irregular gaucho troops of Salta and Jujuy, and was forced to retire. During this time and in the six succeeding years a guerrilla warfare was maintained by the patriots of Upper Peru, who had taken refuge in the mountains, chiefly of the province of Yungas, and who frequently harassed the royalist troops. In June 1823 the expedition of General Santa Cruz, prepared with great zeal and activity at Lima, marched in two divisions upon Upper Peru, and in the following months of July and August the whole country between La Paz and Oruro was occupied by his forces; but later, the indecision and want of judgment displayed by Santa Cruz allowed a retreat to be made before a smaller royalist army, and a severe storm converted their retreat into a precipitate flight, only a remnant of the expedition again reaching Lima. In 1824, after the great battle of Ayacucho in Lower Peru, General Sucre, whose valour had contributed so much to the patriot success of that day, marched with a part of the victorious army into Upper Peru. On the news of the victory a universal rising of the patriots took place, and before Sucre had reached Oruro and Puno, in February 1825, La Paz was already in their possession, and the royalist garrisons of several towns had gone over to their side. The Spanish general Olaneta, with a diminished army of 2000 men, was confined to the province of Potosi, where he held out till March 1825, when he was mortally wounded in an action with some of his own revolted troops.

General Sucre was now invested with the supreme command in Upper Peru, until the requisite measures could be taken to establish in that country a regular and constitutional government. Deputies from the various provinces to the number of fifty-four were assembled at Chuquisaca, the capital, to decide upon the question proposed to them on the part of the government of the Argentine provinces, whether they would or would not remain separate from that country. In August 1825 they decided this question, declaring it to be the national will that Upper Peru should in future constitute a distinct and independent nation. This assembly continued theirsession, although the primary object of their meeting had thus been accomplished, and afterwards gave the name of Bolivia to the country, — issuing at the same time a formal declaration of independence.

The first general assembly of deputies of Bolivia dissolved itself on the 6th of October 1825, and a new congress was sum- moned and formally installed at Chuquisaca on the 25th of May 1826, to take into consideration the constitution prepared by Bolivar for the new republic. A favourable report was made to that body by a committee appointed to examine it, on which it was approved by the congress,

and declared to be the constitu- tion of the republic; and as such, it was sworn to by the people. General Sucre was chosen president for life, according to the constitution, but only accepted the appointment for the space of two years, and on the express condition that 2000 Colombian troops should be permitted to remain with him.

The independence of the country, so dearly bought, did not, however, secure for it a peaceful future. Repeated risings occurred, till in the end of 1827 General Sucre and his Colombian troops were driven from La Paz. A new congress was formed at Chuquisaca in April 1828, which modified the constitution given by Bolivar, and chose Marshal Santa Cruz for president; but only a year later a revolution, led by General Blanco, threw the country into disorder and for a time overturned the govern- ment. Quiet being again restored in 1831, Santa Cruz pro- mulgated the code of laws which bore his name, and brought the

financial affairs of the country into some order; he also con- cluded a treaty of commerce with Peru, and for several years Bolivia remained in peace. In 1835, when a struggle for the chief power had made two factions in the neighbouring republic of Peru, Santa Cruz was induced to take a part in the contest; he marched into that country, and after defeating General Gamarra, the leader of one of the opposing parties, completed the pacification of Peru in the spring of 1836, named himself its protector, and had in view a confederation of the two countries. At this juncture the government of Chile interfered actively, and espousing the cause of Gamarra, sent troops into Peru. Three years of fighting ensued till in a battle at Jungay in June 1839 Santa Cruz was defeated and exiled, Gamarra became president of Peru, and General Velasco provisional chief in Bolivia. The Santa Cruz party, however, remained strong in Bolivia, and soon revolted successfully against the new head of the government, ultimately installing General Ballivian in the chief power. Taking advantage of the disturbed condition of Bolivia, Gamarra made an attempt to annex the rich province of La Paz, invading it in August 1841 and besieging the capital; but in a battle with Ballivian his army was totally routed, and Gamarra himself was killed. The Bolivian general was now in turn to

invade Peru, when Chile again interfered to prevent him. Ballivian remained in the presidency till 1848, when he retired to Valparaiso, and in the end of that year General Belzu, after leading a successful military revolution, took the chief power, and during his presidency endeavoured to promote agriculture, industry and trade. General Jorge Cordova succeeded him, but had not been long in office when a new revolt in September 1857, originating with the garrison of Oruro, spread over the land, and compelled him to quit the country. His place was taken by Dr Jose Maria Linares, the originator of the revolution, who, taking into his own hands all the powers of government, and acting with the greatest severity, caused himself to be proclaimed dictator in March 1858. Fresh disturbances led to the deposition of Linares in 1861, when Dr Maria de Acha was chosen president. In 1862 a treaty of peace and commerce with the United States was ratified, and in the following year a similar treaty was concluded with Belgium; but new causes of disagreement with Chile had arisen in the discovery of rich beds of guano on the eastern coast-land of the desert of Atacama, which threatened warfare, and were only set at rest by the treaty of August 1866, in which the 24th parallel of latitude was adopted as the boundary between the two republics. A new military revolution, led by Maria Melgarejo, broke out in 1865, and in February of that year the troops of President Acha were, defeated in a battle near Potosi, when Melgarejo took the dominion of the country. After defeating two revolutions, in 1865 and 1866, the new president declared a political amnesty, and in 1869, after imposing a revised constitution on the country, he became its dictator.

In January 187 1 President Melgarejo was in his turn deposed and driven from the country by a revolution headed by Colonel

Augustin Morales. The latter, becoming president, history. was himself murdered in November 1872 and was

succeeded by Colonel Adolfo Ballivian, who died in 1874. Under this president Bolivia entered upon a secret agree- ment with Peru which was destined to have grave consequences for both countries. To understand the reasons that urged Bolivia to take this step it is necessary to go back to the above- mentioned treaty of 1866 between Chile and Bolivia. By this instrument Bolivia, besides conceding the 24th parallel as the boundary of Chilean territory, agreed that Chile should have a half share of the customs and full facilities for trading on the coast that lay between the 23rd and 24th parallels, Chile at that time being largely interested in the trade of that region. It was also agreed that Chile should be allowed to mine and export the products of this district without tax or hindrance on the part of

Bolivia. In 1870, in further consideration of the sum of $10,000, Bolivia granted to an Anglo-Chilean company the right of work- ing certain nitrate deposits north of the 24th parallel. The great wealth which was passing into Chilean hands owing to these

compacts created no little discontent in Bolivia, nor was Peru any better pleased with the hold that Chilean capital was estab- lishing in the rich district of Tarapaca. On 6th February 1873 Bolivia entered upon a secret agreement with Peru, the ostensible object of which was the preservation of their territorial integrity and their mutual defence against exterior aggression. There can be no doubt that the aggression contemplated as possible by both countries was a further encroachment on the part of Chile.

Upon the death of Adolfo Ballivian, immediately after the conclusion of this treaty with Peru, Dr Tomas Frias succeeded to the presidency. He signed yet another treaty with Chile, by which the latter agreed to withdraw her claim to half the duties levied in Bolivian ports on condition that all Chilean industries established in Bolivian territory should be free from duty for twenty-five years. This treaty was never ratified, and four years later General Hilarion Daza, who had succeeded Dr Frias as president in 1876, demanded as the price of Bolivia's consent that a tax of 10 cents per quintal should be paid on all nitrates exported from the country, further declaring that, unless this levy was paid, nitrates in the hands of the exporters would be seized by the Bolivian government. As an answer to these de- mands, and in order to protect the property of Chilean subjects, the Chilean fleet was sent to blockade the ports of Antofagasta, Cobija and Tocapilla. On the 14th February 1879 the Chilean colonel Sotomayor occupied Antofagasta, and on 1st March, a fortnight later, the Bolivian government declared war.

An offer on the part of Peru to act as mediator met with no favour from Chile. The existence of the secret treaty, well known to the Chilean government, rendered the intervention of Peru more than questionable, and the law passed by the latter in 1875, which practically created a monopoly of the Tarapaca nitrate beds to the serious prejudice of Chilean enterprise, offered no guarantee of her good faith. Chile replied by curtly demanding the annulment of the secret treaty and an assurance of Peruvian neutrality. Both demands being refused, she declared war upon Peru.

The superiority of the Chileans at sea, though checked for some time by the heroic gallantry of the Peruvians, soon enabled them to land a sufficient number of troops to meet the allied forces which had

concentrated at Arica and other points in the south. The Bolivian ports were already in Chilean hands, and a sea attack upon Pisagua surprised and routed the troops under the Peruvian general Buendia and opened the way into the southern territory of Peru. General Daza, who should have co- operated with Buendia, turned back, on receiving news of the Peruvian defeat, and led the Bolivian troops to Tacna in a hasty and somewhat disorderly retreat. The fall of San Francisco followed, and Iquique, which was evacuated by the allies with- out a struggle, was occupied. Severe fighting took place before Tarapaca surrendered, but the end of 1879 saw the Chileans in complete possession of the province.

Meanwhile a double revolution took place in Peru and Bolivia. In the former country General Prado was deposed and Colonel Pierola proclaimed dictator. The Bolivians followed the example of their allies. The troops at Tacna, indignant at the inglorious part they had been condemned to play by the incompetence or cowardice of their president, deprived him of their command and elected Colonel Camacho to lead them. At the same time a revolution in La Paz proclaimed General Narciso Campero presi- dent, and he was elected to that post in the following June by the ordinary procedure of the constitution. During 1880 the war was chiefly maintained at sea between Chile and Peru, Bolivia taking little or no part in the struggle. In January of 1881 were fought the battles of Chorillos and Miraflores, attended by heavy slaughter and savage excesses on the part of the Chilean troops. They were followed almost immediately by the surrender of Lima and Callao, which left the Chileans practically masters of Peru. In the interior, however, where the Peruvian admiral Montero had formed a provisional government, the war still lingered, and in September 1882 a conference took place between the latter and President Campero, at which it was decided that they should hold out for better terms. But the Peruvians

wearied of the useless struggle. On the 20th of October 1883 they concluded a treaty of peace with Chile; the troops at Are- quipa, under Admiral Montero, surrendered that town, and Montero himself, coldly received in Bolivia, whither he had fled for refuge, withdrew from the country to Europe. On the 9th of November the Chilean army of occupation was concentrated at Arequipa, while what remained of the Bolivian army lay at Oruro. Negotiations were opened, and on nth December a peace was signed between Chile and Bolivia. By this

treaty Bolivia ceded to Chile the whole of its sea-coast, including the port of Cobija.

On the 1 8th of May 1895 a treaty was signed at Santiago between Chile and Bolivia, ” with a view to strengthening the bonds of friendship which unite the two countries,” and, ” in accord with the higher necessity that the future development and commercial prosperity of Bolivia require her free access to the sea.” By this treaty Chile declared that if, in consequence of the plebiscite (to take place under the treaty of Ancon with Peru), or by virtue of direct arrangement, she should “acquire dominion and permanent sovereignty over the territories of Tacna and Arica, she undertakes to transfer them to Bolivia in the same form and to the same extent as she may acquire them “; the republic of Bolivia paying as an indemnity for that transfer $5,000,000 silver. If this cession should be effected, Chile should advance her own frontier north of Camerones to Vitor, from the sea up to the frontier which actually separates that district from Bolivia. Chile also pledged herself to use her utmost endeavour, either separately or jointly with Bolivia, to obtain possession of Tacna and Arica. If she failed, she bound herself to cede to Bolivia the roadstead (caleta) of Vitor, or another analogous one, and $5,000,000 silver. Supplementary protocols to this treaty stipulated that the port to be ceded must ” fully satisfy the present and future requirements ” of the commerce of Bolivia.

On the 23rd of May 1895 further treaties of peace and com- merce were signed with Chile, but the provisions with regard to the cession of a seaport to Bolivia still remained unfulfilled. During those ten years of recovery on the part of Bolivia from the effects of the war, the presidency was held by Dr Pacheco, who succeeded Campero, and held office for the full term; by Dr Aniceto Arce, who held it until 1892, and by Dr Mariano Baptista, his successor. In 1896 Dr Severo Alonso became president, and during his tenure of office diplomatic relations were resumed with Great Britain, Sefior Aramayo being sent to London as minister plenipotentiary in July 1897. As an outcome of his mission an extradition treaty was concluded with Great Britain in March 1898.

In December an attempt was made to pass a law creating Sucre the perpetual capital of the republic. Until this Sucre had taken its turn with La Paz, Cochabamba and Oruro. La Paz rose in open revolt. On the 1 7th of January of the following year a battle was fought some 40 m. from La Paz between the insurgents and the government forces, in which the latter were defeated with the loss of a colonel and forty-three men. Colonel Pando, the insurgent leader, having gained a

strong following, marched upon Oruro, and entered that town on nth April 1899, after completely defeating the government troops. Dr Severo Alonso took refuge in Chilean territory; and Colonel Pando formed a provisional government. He had no difficulty in obtaining his election to the presidency without opposition. He entered upon office on the 26th of October, and proved himself to be a strong and capable chief magistrate. He had to deal with two difficult settlements as to boundaries with Chile and Brazil, and to take steps for improving the means of communica- tion in the country, by this means reviving its mining and other industries. The dispute with Brazil over the rich Acre rubber- producing territory was accentuated by the majority of those engaged in the rubber industry being Brazilians, who resented the attempts of Bolivian officials to exercise authority in the district. This led to a declaration of independence on the part of the state of Acre, and the despatch of a body of Bolivian troops in 1900 to restore order. There was no desire, however,

on the part of President Pando to involve himself in hostilities with Brazil, and in a spirit of concession the dispute was settled amicably by diplomatic means, and a treaty signed in November 1903. A new boundary line was drawn, and a portion of the Acre province ceded to Brazil in consideration of a cash indemnity of $10,000,000.

The long-standing dispute with Chile with regard to its occupa- tion of the former Bolivian provinces of Tacna and Arica under the Parto de Tregna of the 4th of April 1884 was more difficult to arrange satisfactorily. In 1895 there had been some prospect of Chile conceding an outlet on the sea in exchange for a recogni- tion of the Chilean ownership of Tacna and Arica. The discovery, however, of secret negotiations between Bolivia and Argentina caused Chile to change its conciliatory attitude. Bolivia was in no position to venture upon hostilities or to compel the Chileans to make concessions, and the final settlement of the boundary dispute between Argentina and Chile deprived the Bclivians of the hope of obtaining the support of the Argentines. President Pando and his successor, Ismail Montes, who became president in 1904, saw that it was necessary to yield, and to make the best terms they could. A treaty was accordingly ratified in 1905, which was in many ways advantageous to Bolivia, though the republic was compelled to cede to Chile the maritime provinces occupied by the latter power since the war of 188 1, and to do without a seaport. The government of Chile undertook to construct a railway at its own cost from Arica to the Bolivian capital, La Paz, and to give the Bolivians free transit through Chilean territory to certain towns on the coast. Chile further agreed to pay Bolivia a cash indemnity and lend certain pecuniary assistance to the construction of

other railways necessary for the opening out of the country.

See C. Wiener, Bolivie et Perou (Paris, 1880); E. Mossbach, Bolivia (Leipzig, 1875); Theodore Child, The South American Republics (New York, 1891); Vicente de Ballivian y Rizas, Archive Boliviano. Cottecion de documentes relativos a la historia de Bolivia (Paris, 1872); Ramon Sotomayor Valdes, Estudio historico de Bolivia bajo la administracion del General don Jose Maria Achd con una introducion que contiene el compendio de la Guerra de la inde- pendent i de los gobiernos de dicha Republica hasta 1861 (Santiago de Chile, 1874). (W. Hd.; G. E.)

BOLKHOV, a town of Russia, in the government of Orel, and 35 m. N. of the city of Orel. Pop. (1897) 20,703. It is prettily situated amongst orchards and possesses a cathedral. There is a lively trade in hemp, hemp-seed oil, hemp goods and cattle, and there are hemp-mills, soap-works and tanneries. The much-venerated monastery, Optina Pustyn, is close by.

BOLL, a botanical term for a fruit-pod, particularly of the cotton plant. The word is in O. Eng. holla, which is also repre- sented in ” bowl,” a round vessel for liquids, a variant due to ” bowl,” ball, which is from the Fr. boule. ” Boll ” is also used, chiefly in Scotland and the north of England, as a measure of weight for flour = i4o lb, and of capacity for grain: 16 pecks = 1 boll.

BOLLANDISTS, the Belgian Jesuits who publish the Acta Sanctorum, the great collection of biographies and legends of the saints, arranged by days, in the order of the calendar. The original idea was conceived by a Jesuit father, Heribert Rosweyde (see Hagiology), and was explained by him in a sort of pro- spectus, which he issued in 1607 under the title of Fasti sanctorum quorum vitae in Belgicis Bibliothecis manuscriptae. His intention was to publish in eighteen volumes the lives of the saints com- piled from the MSS., at the same time adding sober notes. At the time of his death (1629) he had collected a large amount of material, but had not been able actually to begin the work. A Jesuit father, John Bolland, was appointed to carry on the pro- ject, and was sent to Antwerp. He continued to amass material, and extended the scope of the work. In 1643 the two volumes for January appeared. The three volumes for February ap- peared in 1658, the three for March in 1668, the three for April in 1675, and so on. In 1635 Henschenius (Godfried Henschen) was associated with Bolland, ana collaborated in the work until 1681. From 1659 to i7i4Papebroch (Daniel van Papenbroeck) collabor- ated. This was the most brilliant period in the history of the

Acta Sanctorum. The freedom of Papebroch's criticism made him many enemies, and he had often to defend himself against their attacks. The work was continued — with some inequalities, but always in the same spirit — until the suppression of the Society of Jesus in 1773. The last volume published was vol. iii. of October, which appeared in 1770.

On the dispersion of the Jesuits the Bollandists were authorized to continue their work, and remained at Antwerp until 1778, when they were transferred to Brussels, to the monastery of canons regular of Coudenberg. Here they published vol. iv. of October in 1780, and vol. v. of October in 1786, when the monastery of Coudenberg was suppressed. In 1788 the work of the Bollandists ceased. The remains of their library were acquired by the Premonstratensians of Tongerloo, who en- deavoured to continue the work, and in their abbey vol. vi. of October appeared in 1794.

After the re-establishment of the Society of Jesus in Belgium the work was again taken up in 1837, at the suggestion of the Academie Royale of Belgium and with the support of the Belgian government, and the Bollandists were installed at the college of St Michael in Brussels. In 1845 appeared vol. vii. of October, the first of the new series, which reached vol. xiii. of October in 1883. In this series the Jesuit fathers Joseph van der Moere, Joseph van Hecke, Benjamin Bossue, Victor and Remi de Buck, Ant. Tinnebroeck, Edu. Carpentier and Henr. Matagne collaborated. Father John Martinov of Theazan was entrusted with the editing of the Annus Graeco-Siavicus, which appeared in the beginning of vol. xi. of October in 1864.

In 1882 the activities of the Bollandists were exerted in a new direction, with a view to bringing the work more into line with the progress of historical methods. A quarterly review was established under the title of Analecta Bollandiana by the Jesuit fathers C. de Smedt, G. van Hooff and J. de Backer. This reached its 25th volume in 1906, and was edited by the Bollandists de Smedt, F. van Ontroy, H. Delehaye, A. Porcelet and P. Peeters. This review contains studies in preparation for the continuation and remoulding of the Acta Sanctorum, inedited texts, dissertations, and, since 1892, a Bulletin des publications hagiographiques, containing criticisms of recent works on hagio- graphic questions. In addition to this review, the Bollandists undertook the analysis of the hagiographic MSS. in the principal libraries. Besides numerous library catalogues published in the Analecta {e.g. those of Chartres, Namur, Ghent, Messina, Venice, etc.), separate volumes were devoted to the Latin MSS. in the Bibliotheque Royale at Brussels (2vols., 1886-1889), to the Latin and Greek MSS. in the Bibliotheque Nationale at Paris (5 vols., 1889-1896), to the Greek MSS. in the Vatican (1899), and to the Latin MSS. in the libraries of Rome (1905 seq.). They also prepared inventories of the hagiographic texts hitherto published, and of these there have appeared the Bibliotheca hagiographica graeca (1895), the Bibliotheca hagiographica latina (1899) and the Bibliotheca hagiographica Orientalis. These indispensable works delayed the publication of the principal collection,- but tended to give it a more solid basis and a strictly scientific stamp. In 1887 appeared vol. i. for November; in 1894, vol. ii., preceded by the Martyrologium Hieronymianum by J. B. de Rossi and the abbe Louis Duchesne; in 1902, the Propylaeum ad Acta Sanctorum Novembris, comprising the Synaxarium ecclesiae Constantino- politanae.

There are three editions of the Ada Sanctorum: the original edition (Antwerp, Tongerloo and Brussels, 63 vols., 1643-1902); the Venice

edition, stopping at vol. v. of September (1734-1770) ; and the Paris edition, stopping at vol. xiii. of October (61 vols., T863-1883). In addition to these, there is a volume of tables, edited by the abbe Rigollot.

See Acta Sanctorum apologeticis libris . . . vindicala (Antwerp, 1755); L. P. Gachard, Memoire historique sur les Bollandistes (Brussels, 1835); van Hecke, ” De ratione operis Bollandiani ” (Acta Sanctorum Octobris, vii.) ; and Cardinal J. B. Pitra, Etudes sur la collection des Actes des Saints (Paris, 1880). (H. De.)

BOLOGNA, GIOVANNI DA (1524-1608) [Ital. for his real name, Jean Bologne or Boullongne], French sculptor, was born at Douai in 1 5 24. His early training as a sculptor was conducted at

Antwerp, but at the age of twenty-five he went to Italy and he settled in 1553 in Florence, where his best works still remain. His two most celebrated productions are the single bronze figure of Mercury, poised on one foot, resting on the head of a zephyr, as if in the act of springing into the air (in the Bargello gallery), and the marble group known as the Rape of the Sabines, which was executed for Francesco de’ Medici and received this name, Lanzi informs us, after it was finished. It is now in the Loggia de Lanzi of the ducal piazza. Giovanni was also em- ployed at Genoa, where he executed various excellent works, chiefly in bronze. Most of his pieces are characterized by great spirit and elegance. His great fountain at Bologna (1563-1567) is remarkable for beauty of proportion. Noteworthy also are his two fountains in the Boboli gardens, one completed in 1576 and the other in 1585. He also cast the fine bronze equestrian statue of Cosimo de’ Medici at Florence and the very richly decorated west door of Pisa cathedral. One of Bologna’s best works, a group of two nude figures fighting, is now lost. A fine copy in lead was at one time in the front quadrangle of Brasenose College, Oxford. In 1 88 1 it was sold for old lead by the principal and fellows of the college, and was melted down by the plumber who bought it. See La Vie et I’ceuvre de Jean Bologne, par Abel Desjardins, d’aprte les manuscrits — recueillis par Foucques de Vagnonville (1883, numerous illustrations; list of works).

BOLOGNA, a city and archiepiscopal see of Emilia, Italy, the capital of the province of Bologna, and headquarters of the VI. army corps. It is situated at the edge of the plain of Emilia, 180 ft. above sea-level at the base of the Apennines, 82 m. due N. of Florence by rail, 63 m. by road and 50 m. direct, and 134 m. S.E. of Milan by rail. Pop. (1901) town, 102,122; commune) iS3 > 5 01 – The more or less rectangular Roman city, orientated on the points of the compass, with its streets

arranged at right angles, can be easily distinguished from the outer city, which received its fortifications in 1 206 (see G. Gozzadini, Studi archeologico-topografici sulla citta di Bologna, Bologna, 1868). The streets leading to the gates of the latter radiate from the outskirts, and not from the centre, of the former. Some of the oldest churches, however, lie outside the limits of the Roman city (of which no buildings remain above ground) such as S. Stefano, S. Giovanni in Monte and SS. Vitale ed Agricola. The first consists of a group of no less than seven different buildings, of different dates; the earliest of which, the former cathedral of SS. Pietro e Paolo, was constructed about the middle of the 4th century, in part with the debris of Roman buildings; while S. Sepolcro, a circular church with ornamentation in brick and an imitation of opus reticulatum, should probably be attributed to the 6th or 7th centuries. The present cathedral (S. Pietro), erected in 910, is now almost entirely in the baroque style. The largest church in the town, however, is that of S. Petronio, the patron saint of Bologna, which was begun in 1390; only the nave and aisles as far as the transepts were, however, completed, but even this is a fine fragment, in the Gothic style, measuring 384 ft. long, and 157 wide, whereas the projected length of the whole (a cruciform basilica) was over 700 ft., with a breadth across the transepts of 460 ft., and a dome 500 ft. high over the crossing (see F. Cavazza in Rassegna d' Arte, 1905, 161). The church of S. Domenico, which contains the body of the saint, who died here in 1221, is unfinished externally, while the interior was remodelled in the 18th century. There are many other churches of interest, among them S. Francesco, perhaps the finest medieval building in Bologna, begun in 1246 and finished in 1260; it has a fine brick campanile of the end of the 14th century. It was restored to sacred uses in 1887, and has been carefully liberated from later alterations (U. Berti in Rassegna d' Arte, 1901, 55). The church of Corpus Dominii has fine 15th-century terra cottas on the facade (F. Malaguzzi Valeri in Archivio Storico dell' Arte, ser. ii. vol. ii. (Rome, 1896), 72). The centre of the town is formed by the Piazza Vittorio Emanuele (formerly Piazza Maggiore), and the Piazza del Nettuno, which lie at right angles to one another. Here are the church of S. Petronio, the massive Palazzo Comunale, dating from 1245, the Palazzo del Podesta, completed in the same year, and the

fine bronze statue of Neptune by Giovanni da Bologna (Jean Bologne of Douai).

The famous university of Bologna was founded in the nth century (its foundation by Theodosius the Great in a.d. 425 is legendary), and acquired a European reputation as a school of jurisprudence under Pepo, the first known teacher at Bologna of Roman law (about 1076), and his successor Irnerius and their followers the glossators. The students numbered between three and five thousand in the 12th to the 15th century, and in 1262, it is said, nearly ten thousand (among them were both Dante and Petrarch). Anatomy was taught here in the 14th century. But despite its fame, the university, though an autonomous corporation, does not seem to have had any fixed residence: the professors lectured in their own houses, or later in rooms hired or lent by the civic authorities. It was only in 1520 that the professors of law were given apartments in a building belong- ing to the church of S. Petronio; and in 1562, by order of Pius IV., the university itself was constructed close by, by Carlo Borromeo, then cardinal legate. The reason of this measure was no doubt partly disciplinary, Bologna itself having in 1506 passed under the dominion of the papacy. Shortly after this, in 1564, Tasso was a student there, and was tried for writing a satirical poem. One of the most famous professors was Marcello Malpighi, a great anatomist of the 17th century. The building has served as the communal library since 1838. Its courtyard contains the arms of those students who were elected as representatives of their respective nations or faculties. The university has since 1803 been established in the (16th century) Palazzo Poggi. Between 1815 and 1848 the number of students sank to about a hundred in some years, chiefly owing to the political persecutions of the government: in 1859 the number had risen t° 355. It now possesses four faculties and is attended by some 1700 students. Among its professors women have more than once been numbered.

The Museo Civico is one of the most important museums in Italy, containing especially fine collections of antiquities from Bologna and its neighbourhood. The picture gallery is equally important in its way, affording a survey both of the earlier Bolognese paintings and of the works of the Bolognese eclectics of the 16th and 17th centuries, the Caracci, Guido Reni, Domeni- chino, Guercino, &c. The primitive masters are not of great excellence, but the works of the masters of the 15th century, especially those of Francesco Francia (1430-1517) and Lorenzo Costa of Ferrara (1460-1535), are of considerable merit. The great treasure of the collection is, however, Raphael's S. Cecilia, painted for the church of S. Giovanni in Monte, about 151 5.

The two leaning towers, the Torre Asinelli and the Torre Garisenda, dating from 1100 and 11 10 respectively, are among the most remarkable structures in Bologna: they are square brick towers, the

former being 320 ft. in height and 4 ft. out of the perpendicular, the latter (unfinished) 163 ft. high and 10 ft. out of the perpendicular. The town contains many fine private palaces, dating from the 13th century onwards. The streets are as a rule arcaded, and this characteristic has been preserved in modern additions, which have on the whole been made with considerable taste, as have also the numerous restorations of medieval buildings. A fine view may be had from the Madonna di S. Luca, on the south-west of the town (938 ft.).

Among the specialities of Bologna may be noted the salami or mortadella (Bologna sausage), tortellini (a kind of macaroni) and liqueurs.

Bologna is an important railway centre, just as the ancient Bononia was a meeting-point of important roads. Here the main line from Milan divides, one portion going on parallel to the line of the ancient Via Aemilia (which it has followed from Piacenza downwards) to Rimini, Ancona and Brindisi, and the other through the Apennines to Florence and thence to Rome. Another line runs to Ferrara and Padua, another (eventually to be prolonged to Verona) to S. Felice sul Panaro, and a third toBudrio and Portomaggiore (a station on the line from Ferrara to Ravenna). Steam tramways run to Vignola, Pieve di Cento and Malalbergo.

Bologna was only for a short while subject to the Lombards, remaining generally under the rule of the exarchate of Ravenna, until this in 756 was given by Pippin to the papacy. It was sacked by the Hungarians in 902, but otherwise its history is little known, and it is uncertain when it acquired its freedom and its motto Libertas. But the first ” constitution ” of the commune of Bologna dates from about 11 23, and at that time we find it «, free and independent city. From the 12th to the 14th century it was very frequently at war, and strongly supported the Guelph cause against Frederick II. and against the neighbouring cities of Romagna and Emilia; indeed, in 1249 the Bolognese took Enzio, the emperor’s son, prisoner, and kept him in confinement for the rest of his life. But the struggles between Guelphs and Ghibellines in Bologna itself soon followed, and the commune was so weakened that in 1337 Taddeo de’ Pepoli made himself master of the town, and in 1350 his son sold it to Giovanni Visconti of Milan. Ten years later it was given to the papacy, but soon revolted and recovered its liberty. In 1401 Giovanni Bentivoglio made himself lord of Bologna, but was killed in a rebellion of 1402. It then returned to the Visconti, and after various struggles with the papacy was again secured in 1438 by the Bentivoglio, who held it till 1506, when Pope Julius II. drove them out, and brought Bologna once more under the

papacy, under the sway of which it remained (except in the Napoleonic period between 1796 and 181 5 and during the revolutions of 1821 and 1831) until in i860 it became part of the kingdom of Italy.

Among the most illustrious natives of Bologna may be noted Luigi Galvani (173 7-1 798), the discoverer of galvanism, and Prospero Lambertini (Pope Benedict XIV.).

See C. Ricci'Guida diBologna (3rd ed., Bologna, 1900). (T. As.)

BOLSENA (anc. Volsinii), 1 a town of the province of Rome, Italy, 12 m. W.S.W. of Orvieto by road, situated on the north- east bank of the lake of Bolsena. Pop. (1901) 3286. The town is dominated" by a picturesque medieval castle, and contains the church of S. Christina (martyred by drowning in the lake, according to the legend, in 278) which dates from the nth century and contains some frescoes, perhaps of the school of Giotto. It has a fine Renaissance facade, constructed about 1500 by Cardinal Giovanni de' Medici (afterwards Pope Leo X.), and some good terra cottas by the Delia Robbia. Beneath the church are catacombs, with the tomb of the saint, discovered in 1880 (E. Stevenson in Notizie degli Scavi, 1880, 262; G. B. de Rossi in Bullettino d' Archeologia Cristiana, 1880, 109). At one of the altars in this crypt occurred the miracle of Bolsena in 1 263. A Bohemian priest, sceptical of the doctrine of transubstantia- tion, was convinced of its truth by the appearance of drops of blood on the host he was consecrating. In commemoration of this Pope Urban IV. instituted the festival of Corpus Christi, and ordered the erection of the cathedral of Orvieto. The miracle forms the subject of a celebrated fresco by Raphael in the Vatican.

The Lake of Bolsena (anc. Lacus V olsiniensis) , 1000 ft. above sea-level, 71 sq. m. in area, and 480 ft. deep, is almost circular, and was the central point of a large volcanic district, though it is probably not itself an extinct crater. Its sides show fine basaltic formation in places. It abounds in fish, but its banks are some- what deserted and not free from malaria. It contains two islands, Bisentina and Martana, the former containing a church constructed by Vignola, the latter remains of the castle where Amalasuntha, the daughter of Theodoric, was imprisoned and strangled. (T. As.)

BOLSOVER, an urban district in the north-eastern parlia- mentary division of Derbyshire, England, si m – E. of Chester- field, on branch lines of the Midland and the Great Central railways. Pop. (1901) 6844. It lies at a considerable height on a sharp slope above a stream

tributary to the river Rother. The castle round which the town grew up was founded

1 According to the theory now generally adopted, the Etruscan Volsinii occupied the site of Orvieto, which was hence called Urbs vetus in late classical and medieval times, while the Roman Volsinii was transferred to Bolaena (see Volsinii).

shortly after the Conquest by William Peveril, but the existing building, a fine castellated residence, was erected on its site in 1613. The town itself was fortified, and traces of early works remain. The church of St Mary is of Norman and later date; it contains some interesting early stone-carving, and monuments to the family of Cavendish, who acquired the castle in the 16th century. Coal-mining and quarrying are carried on in the neighbourhood of Bolsover. ,

BOLSWARD, a town in the province of Friesland, Holland, 65 m. W.N.W. of Sneek. A steam-tramway connects it with Sneek, Makkum, Harlingen and Franeker. Pop. (1900) 6517. The Great church, or St Martin's (1446-1466) is a large building containing some good carving, a fine organ and the tombs of many Frisian nobles. The so-called Small church, dating from about 1280, also contains fine carving and tombstones; and is the remnant of a Franciscan convent which once existed here. Bolsward also possesses a beautiful renaissance town-hall (1614-1618) and various educational and charitable institutions, including a music and a drawing school. It has an active trade in agricultural produce, and some spinning-mills and tile and pottery works. The town is mentioned in 725, when it was situated on the Middle Sea. When this receded, a canal was cut to the Zuider Zee, and in 1422 it was made a Hansa town.

The medieval constitution of Bolsward, though in its govern- ment by eight scabini, with judicial, and four councillors with administrative functions, it followed the ordinary type of Dutch cities, was in some ways peculiar. The family of Jongema had certain hereditary rights in the administration, which, though not mentioned in the town charter of 1455, were defined in that of 1464. According to this the head of the family sat for two years with the scabini and the third year with the councillors, and had the right to administer an oath to one of each body. More singular was the influential position assigned, in civic legislation and administration, to the clergy, to whom in con- junction

with the councillors, there was even, in certain cases, an appeal from the judgment of the scabini.

See C. Hegel, Stadte u. Gilden der germanischen Volker im Mittel-alter (Leipzig, 1891).

BOLT, an O. Eng. word (compare Ger. Boh, an arrow), for a ” quarrel ” or cross-bow shaft, or the pin which fastened a door. From the swift flight of an arrow comes the verb ” to bolt,” as applied to a horse, &c, and such expressions as ” bolt upright,” meaning straight upright; also the American use of ” bolt” for refusing to support a candidate nominated by one’s own party. In the sense of a straight pin for a fastening, the word has come to mean various sorts of appliances. From the sense of ” fasten- ing together ” is derived the use of the word ” bolt ” as a definite length (in a roll) of a fabric (40 ft. of canvas, &c).

From another ” bolt ” or ” boult,” to sift (through O. Fr. buleter, from the Med. Lat. buretare or buletare), come such expressions as in Shakespeare’s Winter’s Tale l “The fann’d- snow, That’s bolted by the northern blasts twice o’er,” or such a figurative use as in Burke’s ” The report of the committee was examined and sifted and bolted to the bran.” From this sense comes that of to moot, or discuss, as in Milton’s Cotnus, ” I hate when vice can bolt her arguments.”

BOLTON, DUKES OF. The title of duke of Bolton was held in the family of Powlett or Paulet from 1689 to 1794. Charles Powlett, the 1st duke (c. 1625-1699), who became 6th marquess of Winchester on his father’s death in 1675, had been member of parliament for Winchester and then for Hampshire from 1660 to 1675. Having supported the claim of William and Mary to the English throne in 1688, he was restored to the privy council and to the office of lord-lieutenant of Hampshire, and was created duke of Bolton in April 1689. An eccentric man, hostile to Halifax and afterwards to Marlborough, he is said to have travelled during 1687 with four coaches and 100 horsemen, sleeping during the day and giving entertainments at night. He died in February 1699, and was succeeded by his elder son, Charles, 2nd duke of Bolton (1 661-17 2 2), who had also been a member of parliament for Hampshire and a supporter of William of Orange. He was lord-lieutenant of Hampshire and of Dorset,

a commissioner to arrange the union of England and Scotland; and was twice a lord justice of the kingdom. He was also lord chamberlain of the royal household; governor of the Isle of Wight; and for two

short periods was lord-lieutenant of Ireland. His third wife was Henrietta (d. 1730), a natural daughter of James, duke of Monmouth. According to Swift this duke was ” a great booby.” His eldest son, Charles, 3rd duke of Bolton (1685-1754), was a member of parliament from 1705 to 1717, when he was made a peer as Baron Pawlet of Basing. He filled many of the public offices which had been held by his father, and also attained high rank in the British army. Having displeased Sir Robert Walpole he was deprived of several of his offices in 1733; but some of them were afterwards restored to him, and he raised a regiment for service against the Jacobites in 1745. He was a famous gallant, and married for his second wife the singer, Lavinia Fenton (d. 1760), a lady who had previously been his mistress. He died in August 1754, and was succeeded as 4th duke by his brother Harry (c. 1690-17 59), who had been a member of parliament for forty years, and who followed the late duke as lord-lieutenant of Hampshire. The 4th duke’s son, Charles (c. 1718-1765), who became 5th duke in October 1759, committed suicide in London in July 1765, and was succeeded by his brother Harry (c. 1719-1794), an admiral in the navy, on whose death without sons, in December 1794, the dukedom became extinct. The other family titles descended to a kinsman, George Paulet (1 722-1800), who thus became 12th marquess of Winchester. In 1778 Thomas Orde (1746-1807) married Jean Mary (d. 1814), a natural daughter of the 5th duke of Bolton, and this lady inherited Bolton Castle and other properties on the death of the 6th duke. Having taken the additional name of Powlett, Orde was created Baron Bolton in 1797, and the barony has descended to his heirs.

BOLTON (or Boulton), EDMUND (i575?-i6 3 3?), English historian and poet, was born by his own account in 1575. He was brought up a Roman Catholic, and was educated at Trinity Hall, Cambridge, afterwards residing in London at the Inner Temple. In 1600 he contributed to England’s Helicon. He was a retainer of the duke of Buckingham, and through his influence he secured a small place at the court of James I. Bolton formulated a scheme for the establishment of an English academy, but the project fell through after the death of the king, who had regarded it favourably. He wrote a Life of King Henry II. for Speed’s Chronicle, but his Catholic sympathies betrayed themselves in his treatment of Thomas Becket, and a life by Dr John Barcham was substituted (Wood, Ath. Oxon. ed. Bliss, iii. 36). The most important of his numerous works are Hypercrilica (1618?), a short critical treatise valuable for its notices of contemporary authors, reprinted in Joseph Haslewood’s Ancient Critical Essays (vol. ii., 1815); Nero Caesar, or Monarchic Depraved (1624), with special note

of British affairs. Bolton was still living in 1633, but the date of his death is unknown.

BOLTON (Bolton-le-Moors), a municipal, county and parlia- mentary borough of Lancashire, England, 196 m. N.W. by N. from London and 11 m. N.W. from Manchester. Pop. (1891) 146,487; (1901) 168,215. Area, 15,279 acres. It has stations on the London & North- Western and the Lancashire & Yorkshire railways, with running powers for the Midland railway. It is divided by the Croal, a small tributary of the Irwell, into Great and Little Bolton, and as the full name implies, is surrounded by high moorland. Although of early origin, its appearance, like that of other great manufacturing towns of the vicinity, is wholly modern. It owes not a little to the attractions of its site. The only remnants of antiquity are two houses of the 16th century in Little Bolton, of which one is a specially good example of Tudor work. The site of the church of St Peter has long been occupied by a parish church (there was one in the 12th century, if not earlier), but the existing building dates only from 1870. There may also be mentioned a large number of other places of worship, a town hall with fine classical facade and tower, market hall, museums of natural history and of art and industry, an exchange, *)£embly rooms, and various benevolent institutions. Several free libraries are maintained. Lever's grammar school,

founded in 1641, had Robert Ainsworth, the Latin lexicographer, and John Lempriere, author of the classical dictionary, among its masters. There are municipal technical schools. A large public park, opened in 1866, was laid out as a relief work for unemployed operatives during the cotton famine of the earlier part of the decade. On the moors to the north-west, and includ- ing Rivington Pike (1192 ft.), is another public park, and there are various smaller pleasure grounds. A large number of cotton mills furnish the chief source of industry; printing, dyeing and bleaching of cotton and calico, spinning and weaving machine making, iron and steel works, and collieries in the neighbourhood, are also important. The speciality, however, is fine spinning, a process assisted by the damp climate. The parliamentary borough, created in 1832 and returning two members, falls within the Westhoughton division of the county. Before 1838, when Bolton was incorporated, the town was governed by a borough- reeve and two constables appointed at the annual court-leet. The county borough was created in 1888. The corporation consists of a mayor, 24

aldermen and 72 councillors.

The earliest form of the name is Bodleton or Botheltun, and the most important of the later forms are Bodeltown, Botheltun- le-Moors, Bowelton, Boltune, Bolton-super-Moras, Bolton-in-ye- Moors, Bolton-le-Moors. The manor was granted by William I. to Roger de Poictou, and passed through the families of Ferrers and Pilkington to the Harringtons of Hornby Castle, who lost it with their other estates for their adherence to Richard III. In 1485 Henry VII. granted it to the first earl of Derby. The manor is now held by different lords, but the earls of Derby still have a fourth part. The manor of Little Bolton seems to have been, at least from Henry III.'s reign, distinct from that of Great Bolton, and was held till the 17th century by the Botheltons or Boltons.

From early days Bolton was famous for its woollen manu- factures. In Richard I.'s reign an aulneger, whose duty it was to measure and stamp all bundles of woollen goods, was appointed, and it is clear, therefore, that the place was already a centre of the woollen cloth trade. In 1 3 3 7 the industry received an impulse from the settlement of a party of Flemish clothiers, and extended so greatly that when it was found necessary in 1 566 to appoint by act of parliament deputies to assist the aulnegers, Bolton is named as one of the places where these deputies were to be employed. Leland in his Itinerary (1558) recorded the fact that Bolton made cottons, which were in reality woollen goods. Real cotton goods were not made in Lancashire till 1641, when Bolton is named as the chief seat of the manufacture of fustians, vermilions and dimities. After the revocation of the edict of Nantes the settlement of some French refugees further stimulated this industry. It was here that velvets were first made about 1756, by Jeremiah Clarke, and muslins and cotton quiltlngs in 1763. The cotton trade received an astonishing impetus from the inventions of Sir Richard Arkwright (1770), and Samuel Crompton (1780), both of whom were born in the parish. Soon after the introduction of machinery, spinning factories were erected, and the first built in Bolton is said to have been set up in 1780. The number rapidly increased, and in 1851 there were 66 cotton mills with 860,000 throstle spindles at work. The cognate industry of bleaching has been carried on since early in the r8th century, and large ironworks grew up in the latter half of the 19th century. In 1791 a canal was con- structed from Manchester to Bolton, and by an act of parliament (1792) Bolton Moor was enclosed.

During the Civil War Bolton sided with the parliament, and in February 1643 and March 1644 the royalist forces assaulted the town,

but were on both occasions repulsed. On the 28th of May 1644, however, it was attacked by Prince Rupert and Lord Derby, and stormed with great slaughter. On the 15th of October 1651 Lord Derby, who had been taken prisoner after the battle of Worcester, was brought here and executed the same day.

Up to the beginning of the 19th century the market day was Monday, but the customary Saturday market gradually super- seded this old chartered market. In 1251 William de Ferrers

obtained from the crown a charter for a weekly market and a yearly fair, but gradually this annual fair was replaced by four others chiefly for horses and cattle. The New Year and Whit- suntide Show fairs only arose during the 19th century.

BOLTON ABBEY, a village in the West Riding of Yorkshire, England, 22 m. N.W. from Leeds and si from Ilkley by the Midland railway. It takes its name, inaccurately, from the great foundation of Bolton Priory, the ruins of which are among the most exquisitely situated in England. They stand near the right bank of the upper Wharfe, the valley of which is beautifully wooded and closely enclosed by hills. The earliest part of the church is of transitional Norman date; the nave, which is perfect, is Early English and Decorated. The transepts and choir are ruined, and the remains of domestic buildings are slight. The manor of Bolton Abbey with the rest of the district of Craven was granted by William the Conqueror to Robert de Romili, who evidently held it in 1086, although there is no mention made of it in the Domesday survey. William de Meschines and Cicely de Romili, his wife, heiress of Robert, founded and endowed a priory at Embsay or Emmesay, near Skipton, in 1 1 20, but it was moved here in 1 1 5 1 by their daughter, Alice de Romili, wife of William FitzDuncan, who gave the manor to the monks in exchange for other lands. After the dissolution of the monasteries the manor was sold in 1542 to Henry Clifford, 2nd earl of Cumberland, whose descendants, the dukes of Devonshire, now hold it.

See J. D. Whitaker, LL.D., F.S.A., History of the District of Craven (ed. Morant, 1878); Dugdale's Monasticon Anglicanum.

BOLZANO, BERNHARD (1781-1848), Austrian priest and philosopher, was born at Prague or. the 5th of October 1781. He distinguished himself at an early age, and on his ordina- tion to the priesthood (1805) was appointed professor of the philosophy of religion in Prague University. His lectures, in which he endeavoured to show that Catholic theology is in complete harmony with reason, were received

with eager interest by the younger generation of thinkers. But his views met with much opposition; and it was only through the protection of the archbishop, Prince Salm-Salm, that he was enabled to retain his chair. In 1820 he was accused of being connected with some of the students' revolutionary societies, and was compelled to resign. Several doctrines extracted from his works were condemned at Rome, and he was suspended from his priestly functions, spending the rest of his life in literary work. He died at Prague on the 18th of December 1848. The most important of his numerous works are the Wissenschaftslehre, oder Versuch einer neuen Darstellung der Logik, advocating a scientific method in the study of logic (4 vols., Sulzbach, 1837); the Lehrbuch der Religionswissenschaft (4 vols., Sulzbach, 1834), a philosophic representation of all the dogmas of Roman Catholic theology; and Athanasia, oder Grilnde fiir die Unsterblichkeit der Seele (2nd ed., Mainz, 1838). In philosophy he followed Reinhard in ethics and the monadology of Leibnitz, though he was also influenced by Kant.

See Lebensbeschreibung des Dr Bolzano (an autobiography, 1836) ; Wisshaupt, Skizzen aus dem Leben Dr Bolzanos (1850); Palagy, Kant und Bolzano (Halle, 1902).

BOM A (properly Mboma), a port on the north bank of the river Congo about 60 m. from its mouth, the administrative capital of Belgian Congo. Pop. about 5000. It was one of the places at which the European traders on the west coast of Africa established stations in the 16th and 17th centuries. It became the entrepot for the commerce of the lower Congo and a well- known mart for slaves. The trade was chiefly in the hands of Dutch merchants, but British, French and Portuguese firms also had factories there. No European power exercised sover- eignty, though shadowy claims were from time to time put forward by Portugal (see Africa, § 5). In 1884 the natives of Boma granted a protectorate of their country to the Inter- national Association of the Congo.

See H. M. Stanley, The Congo and the Founding of its Free State (London, 1885).

BOMB, a term formerly used for an explosive shell (see Am- munition) fired by artillery. The word is derived from the

Gr. ˆoˆjSos, a hammering, buzzing noise, cf. ” bombard ” (q.v.). At the present day it is most frequently used of a shattering or incendiary grenade, or of an explosive vessel actuated by clock- work or trip mechanism, employed to destroy life or property. In naval warfare, before the introduction of the shell gun, ex- plosive projectiles were carried principally by special vessels known as bomb-vessels, bombards or, colloquially, bombs.

In geology, the name ” bomb ” is given to certain masses of lava which have been hurled forth from a volcanic vent by explosive action. In shape they are spheroidal, ellipsoidal or discoidal; in structure they may be solid, hollow or more or less cavernous; whilst in size they vary from that of a walnut to masses weighing several tons. It is generally held that the form is partly due to rotation of the mass during its aerial flight, and in some cases the bomb becomes twisted by a gyratory movement. According, however, to Dr H. J. Johns ton-La vis, many of the so-called bombs of Vesuvius are not projectiles, but merely globular masses formed in a stream of lava; and in like manner Professor J. D. Dana showed that what were regarded as bombs in Hawaii are in many cases merely lava-balls that have not been hurled through the air. Certain masses of pumice ejected from Vulcano have been called by Johnston-Lavis ” bread-crust bombs,” since they present a coating of obsidian which has been bent and cracked in a way suggestive of the crust of a roll. It is probable that here the acid magna was expelled in a very viscous condition, and the crust which formed on cooling was burst by the steam from the occluded water. Some of the bombs thrown out during recent eruptions of Etna consist of white granular quartz, encased in a black scoriaceous crust, the quartz representing an altered sandstone. The bombs of granular olivine, found in some of the tuffs in the Eifel, are represented in most geological collections (see Volcano).

BOMBARD (derived through Med. Lat. and Fr. forms from Gr. fiopfitiv, to make a humming noise), a term applied in the middle ages to a sort of cannon, used chiefly in sieges, and throwing heavy stone balls; hence the later use as a verb (see Bombardment). The name, in various forms, was also given to a medieval musical instrument (” bombard,” ” bumhart,” ” pumhart,” ” pommer “), the forerunner of the bass oboe or schalmey. At the present day a small primitive oboe called bombarde, with eight holes but no keys, is used among the Breton peasants.

BOMBARDIER, originally an artilleryman in charge of a bombard; now a non-commissioned officer in the artillery of the British army, ranking below a corporal.

BOMBARDMENT, an attack by artillery fire directed against fortifications, troops in position or towns and buildings. In its strict sense the term is only applied to the bombardment of defenceless or undefended objects, houses, public buildings, &c, the object of the assailant being to dishearten his opponent, and specially to force the civil population and authorities of a besieged place to persuade the military commandant to capitulate before the actual defences of the place have been reduced to impotence. It is, therefore, obvious that mere bombardment can only achieve its object when the amount of suffering inflicted upon non-combatants is sufficient to break down their resolution, and when the commandant permits himself, to be influenced or coerced by the sufferers. A threat of bombardment will sometimes induce a place to surrender, but instances of its fulfilment being followed by success are rare; and, in general, with a determined commandant, bombardments fail of their object. Further, an intentionally terrific fire at a large target, unlike the slow, steady and minutely accurate ” artillery attacks ” directed upon the fortifications, requires the expendi- ture of large quantities of ammunition, and wears out the guns of the attack. Bombardments are, however, frequently resorted to in order to test the temper of the garrison and the civil popu- lation, a notable instance being that of Strassburg in 1870. The term is often loosely employed to describe artillery attacks upon forts or fortified positions in preparation for assaults by infantry.

BOMBARDON, or Bass Tuba, the name given to the bass and contrabass of the brass wind in military bands, called in the orchestra bass tuba.

The name of bombardon is unquestionably derived from bom- bardone, the Italian for contrabass pommer (bombard), which, before the invention of the fagotto, formed the bass of medieval orchestras; it is also used for a bass reed stop of 16 ft. tone on the organ. The bombardon was the very first bass wind instrument fitted with valves, and it was at first known as the corno basso, clavicor or bass horn (not to be confounded with the bass horn with keys, which on being perfected became the ophicleide). The name was attached more to the position of the wind instru- ments as bass than to the individual instrument. The original corno basso was a brass instrument of narrow bore with the pistons set horizontally. The valve-ophicleide in F of German make had a wider bore and three vertical pistons, but it was only a “half instrument,” measuring about 12 ft. A. Kalk- brenner, in his life of W. Wieprecht (1882), states that in the Jager military bands of Prussia the corno basso (keyed bass horn) was introduced as bass in 1829, and the bombardon (or valve-ophicleide) in 183 1; in the Guards these instruments were superseded in 1835 by the bass tuba

invented by Wieprecht and J. G. Moritz.

The modern bombardon is made in two forms: the upright model, used in stationary band music; and the circular model, known as the helicon, worn round the body with the large bell resting on the left shoulder, after the style of the Roman cornu (see Horn), which is a more convenient way of carrying this heavy instrument when marching. The bombardon, and the euphonium, of which it is the bass, are the outcome of the application of valves to the bugle family whereby the saxhorns were also produced. The radical difference between the saxhorns and the tubas (including the bombardon) is that the latter have a sufficiently wide conical bore to allow of the production of fundamental sounds in a rich, full quality of immense power. This difference, first recognized in Germany and Austria, has given rise in those countries to the classification of the brass wind as ” half ” and ” whole ” instruments (Halbe and Ganze Instrumente). When the brass wind instruments with conical bore and cup-shaped mouthpiece first came into use, it was a well-understood principle that the tube of each instrument must theoretically be made twice as long as an organ pipe giving the same note; for example, the French horn sounding the 8ft. C of an 8 ft. organ pipe, must have a tube 16 ft. long; C then becomes the second harmonic of the series for the 16 ft. tube, the first or fundamental being unobtainable. After the intro- duction of pistons, instrument-makers experimenting with the bugle, which has a conical bore of very wide diameter in propor- tion to the length, found that baritone and bass instruments constructed on the same principle gave out the fundamental full and clear. A new “era in the construction of brass wind instruments was thus inaugurated, and now that the proportions of the bugle have been adopted, the tubes of the tubas are made just half the length of those of the older instruments, correspond- ing to the length of the organ pipe of the same pitch, so that a euphonium sounding 8 ft. C no longer needs to be 16 ft. long but only 8 ft. The older instruments, such as the saxhorns, with narrow bore, have therefore been denominated ” half instruments,” because only half the length of the instrument is of practical utility, while the tubas with wide bore are styled “whole instruments.” 1 Bombardons are made in E flat and F of the 16 ft. octave, corresponding to the orchestral bass tuba, double bass in strings, and pedal clarinet and contrafagotto in the wood wind. The bombardon in B flat or C, an octave lower than the euphonium, corresponds to the contrabass tuba in the orchestra.

1 See Dr E. Schafhautl’s article on Musical Instruments, section 4 of Bericht der Beurtheilungscommission bei der Allg. deutschen Industrie-Ausstellung, 1854 (Munich, 1855), pp. 169- 170; also Friedr.

Zamminer, Die Musik und die Musikinstrumente in ihrer Beziehung zu den Gesetzen der Akustik (Giessen, 1855), P- 313-

BOMBAY CITY

183

The bombardons possess a chromatic compass of 3! to 4 octaves. The harmonic series consists o£ the harmonics from the 1st to the 8th.

Bombardon in E Flat.

am-

For the bombardon in F, one tone higher.

Harmonic Series of the Contrabass Bombardon in C*

-^. Compass.

- For the Bfc» bombardon, one tone lower. ** Or higher still for a first-rate player with a good lip.

&va bassa.

The lowest notes produced by the valves are very difficult to obtain, for the lips seldom have sufficient power to set in vibration a column of air of such immense length, at a rate of vibration slow enough to synchronize with that of notes of such deep pitch. 1 Even when they are played, the lowest valve notes can hardly be heard unless doubled an octave higher by another bombardon.

Bombardons are generally treated as non-transposing instruments, the music being written as sounded, except in France and Belgium, where transposition is usual. The intervening notes are obtained by means of pistons or valves, which, on being depressed, either admit the wind into additional lengths of tubing to lower the pitch, or cut off a length in order to raise it. Bombardons usually have three or four pistons lowering the pitch of the instrument respectively I, J, ij and 2j tones (in Belgium, I, J, 2 and 3 tones). The valve system, disposal of the tubing and shape and position of the bell differ considerably in the various models of well-known makers. In Germany and Austria 2 what is known as the cylinder action is largely used; for the piston or pump is substituted a four- way brass cock operated by means of a key and a series of cranks.

In order to obtain a complete chromatic scale throughout the compass, there must be, as on the slide-trombone, seven different positions or lengths of tubing available, each having its harmonic series. These different lengths are obtained on the bombardon by means of a combination of pistons: the simultaneous use of Nos. 2 and 3 lowers the pitch two tones; of Nos. 1, 2 and 3, three tones; of Nos. I, 2, 3, 4, five and a half tones, &c. A combination of pistons, however, fails to give the interval with an absolutely correct intonation, since the length of tubing thrown open is not of the theoretical length required to produce it. Many ingenious con- trivances have been invented from time to time to remedy this inherent defect of the valve system, such as the six-valve independent system of Adolphe Sax; the Besson Registre, giving eight inde- pendent positions ; the Besson compensating system Transpositeur ; the Boosey automatic compensating piston invented by D. J. Blaikley, and V. Mahillon's automatic regulating pistons. More recently the Besson enharmonic valve system, with six independent tuning slides and three pistons, and Rudall, Carte & Company's new (Klussmann's patent) bore, conical throughout the open tube and additional lengths, have produced instruments which leave nothing to be desired as to intonation. (See Valves and Tuba.) (K. S.)

BOMBAY CITY, the capital of Bombay Presidency, and the chief seaport of western India, situated in 18° 55′ N. and 7 2 54′ E. The city stands on an island of the same name, which forms one of a group now connected by causeways with the mainland. The area is 22 sq. m.; and the population of the town and island (1901) 776,006 (estimate in 1906, 977,822). Bombay is the second most populous city in the Indian empire, having fallen behind Calcutta at the census of 1901. Its position on the side of India nearest to Europe, its advantages as a port and a railway centre, and its monopoly of the cotton industry, are counteracted by the fact that the region which it serves cannot vie with the valley of the Ganges in point of fertility and has no great waterway like the Ganges or Brahma- putra. Nevertheless Bombay pushes Calcutta hard for supremacy in point of population and commercial prosperity.

The Bombay Island, or, as it ought to be more correctly called, the Bombay Peninsula, stands out from a coast ennobled by lofty hills, and its harbour is studded by rocky islands and precipices, whose peaks rise to a great height. The approach

1 V. C. Mahillon, Elements d'acoustigue musicale et instrumentale (Bruxelles, 1874), p. 153.

8 The bombardon is used in the military bands of Austria, but in those of Germany it has been superseded by a bass tuba differing slightly in form and construction from the bombardons and bass tubas used in England, France, Belgium and Austria.

from the sea discloses one of the finest panoramas in the world, —the only European analogy being the Bay of Naples. The island consists of a plain about 11 m. long by 3 broad, flanked by two parallel lines of low hills. A neck of land stretching towards the south-west forms the harbour on its eastern side, sheltering it from the force of the open sea, and enclosing an expanse of water from 5 to 7 m. wide. At the south-west of the island, Back Bay, a shallow basin rather more than 2 m. in breadth, runs inland for about 3 m. between the extreme points of the two ranges of hills. On a slightly raised strip of land between the head of Back Bay and the harbour is situated the fort, the nucleus of the city of Bombay. From this point the land slopes westward towards the central plain, a low-lying tract, which before the construction of the embankment known as the Hornby Vellard, used at high tide to be submerged by the sea. The town itself consists of well-built and unusually hand- some native bazaars, and of spacious streets devoted to European commerce. In the native bazaar the houses rise three or four storeys in height, with elaborately carved pillars and front work. Some of the European hotels and commercial buildings are on the American scale, and have no rival in any other city of India. The Taj Mahal hotel, which was built by the Tata family in 1904, is the most palatial and modern hotel in India. The private houses of the European residents lie apart alike from the native and from the mercantile quarters of the town. As a rule, each is built in a large garden or compound; and although the style of architecture is less imposing than that of the stately residences in Calcutta, it is well suited to the climate, and has a beauty and comfort of its own. The favourite suburb is Malabar hill, a high ridge running out into the sea, and terraced to the top by handsome houses, which command one of the finest views, of its kind, in the world. Of recent years wealthy natives have been competing with Europeans for the possession of this desirable quarter. To the right of this ridge, looking towards the sea, runs another suburb known as Breach Candy, built close upon the beach and within the refreshing sound of the waves. To the left of Malabar hill lies Back Bay, with a pro- montory on its farther shore, which marks the site of the old Bombay Fort; its walls are demolished, and the area is chiefly devoted to mercantile buildings. Farther round the island, beyond the fort, is Mazagon Bay, commanding the harbour, and the centre of maritime activity. The defences of the port, remodelled and armed with the latest guns, consist of batteries on the

islands in the harbour, in addition to which there are three large batteries on the mainland. There is also a torpedo- boat detachment stationed in the harbour.

No city in the world has a finer water-front than Bombay. The great line of public offices along the esplanade and facing Back Bay, which are in the Gothic style mixed with Saracenic, are not individually distinguished for architectural merit, but they have a cumulative effect of great dignity. The other most notable buildings in the city are the Victoria terminus of the Great Indian Peninsula railway and the Taj Mahal hotel. Towards the northern end of Malabar hill lie the Parsee Towers of Silence, where the Parsees expose their dead till the flesh is devoured by vultures, and then cast the bones into a well where they crumble into dust. The foundation-stone of a museum was laid by the prince of Wales in 1905. 1

Local Government. — The port of Bombay (including docks and warehouses) is managed by a port trust, the members of which are nominated by the government from among the com- mercial community. The municipal government of the city was framed by an act of the Bombay legislative council passed in 1888. The governing body consists of a municipal corporation and a town council. The corporation is composed of 7 2 members, of whom 1 6 are nominated by the government. Of the remainder, 36 are elected by the ratepayers, 16 by the justices of the peace, 2 by the senate of the university, and 2 by the chamber of commerce. The council, which forms the standing committee of the corporation, consists of 12 members, of whom 4 are nominated by the government and the rest elected by the cor- poration. The members of the corporation include Europeans,

Hindus, Mahommedans and Parsees. The Bombay University was constituted in 1857 as an examining body, on the model of the university of London. The chief educational institutions in Bombay City are the government Elphinstone College, two missionary colleges (Wilson and St Xavier), the Grant medical college, the government law school, the Sir Jamsetjee Jeejeebhoy school of art, and the Victoria Jubilee technical institute.

Docks. — The dockyard, originally built in 1736, has a sea-face of nearly 700 yds. and an area of about 200 acres. There are five graving

docks, three of which together make one large dock 648 ft. long, while the other two make a single dock 582 ft. long. There are also four building slips opposite the Apollo Bandar (landing-place) on the south-east side of the enclosure. The dock- yard is lighted by electricity, so that work can be carried on by night as well as day. Bombay is the only important place near the sea in India where the rise of the tide is sufficient to permit docks on the largest scale. The highest spring tides here reach 17 ft., but the average is 14 ft. Prince's dock, of which the foundation-stone was laid by the prince of Wales in 1875, was opened in 1879, and is 1460 ft. long by 1000 ft. broad, with a water area of 30 acres; while the Victoria dock, which was completed and opened in 1887-1888, has a water area of 25 acres. South of the Victoria dock, the foundation-stone of the Alexandra dock, the largest in India, was laid by the prince of Wales in 1905.

Cotton Mills. — The milling industry is, next to the docks, the chief feature of Bombay's commercial success. The staple manufacture is cotton-spinning, but in addition to this there are flour mills and workshops to supply local needs. The number of factories increased from fifty-three in 1881 to eighty-three in 1890, and that decade saw the influx of a great industrial popula- tion from the surrounding districts; but the decade 1891-1901 witnessed at least a temporary set-back owing to the ravages caused by plague and the effects of over-production. In addition to the actual mortality it inflicted, the plague caused an exodus of the population from the island, disorganized the labour at the docks and in the mills, and swallowed up large sums which were spent by the municipality on plague operations and sanitary improvements. After 1901, however, both population and trade began to revive again. In 1901 there were 131,796 persons employed in the cotton industry.

Population. — Owing to its central position between East and West and to the diversity of races in India, no city in the world can show a greater variety of type than Bombay. The Mahratta race is the dominant element next to the European rulers, but in addition to them are a great and influential section of Parsee merchants, Arab traders from the Gulf, Afghans and Sikhs from northern India, Bengalis, Rajputs, Chinese, Japanese, Malays, negroes, Tibetans, Sinhalese and Siamese. Bombay is the great port and meeting-place of the Eastern world. Out of the large sections of its population, Hindu, Mahommedan, Parsee, Jain and Christian, the Parsees are one of the smallest and yet the most influential. They number only some 46,000 all told, but most of the great business houses are owned by Parsee millionaires and most of the large charities are founded by them.

History. — The name of the island and city of Bombay is de- rived from Mumba (a form of Parvati), the goddess of the Kolis, a race of husbandmen and fishermen who were the earliest known inhabitants, having occupied the island probably about the beginning of the Christian era. Bombay originally consisted of seven islands (the Heptanesia of Ptolemy) and formed an outlying portion of the dominions of successive dynasties domi- nant in western India: Satavahanas, Mauryas, Chalukyas and Rashtrakutas. In the Maurya and Chalukya period (450-750) the city of Puri on Elephanta Island was the principal place in Bombay harbour. The first town built on Bombay Island was Mahikavati (Mahim) ,founded by King Bhima, probably a member of the house of the Yadavas of Deogiri, as a result of Ala-ud-din Khilji's raid into the Deccan in 1294. It remained under Hindu rule until 1348, when it was captured by a Mahommedan force from Gujarat; and the islands remained part of the province (later kingdom) of Gujarat till 1534, when they were ceded by Sultan Bahadur to the Portuguese.

The island did not prosper under Portuguese rule. By the system known as aforamento the lands were gradually parcelled out into a number of fiefs granted, under the crown of Portugal, to individuals or to religious corporations in return for military service or equivalent quit-rents. The northern districts were divided among the Franciscans and Jesuits, who built a number of churches, some of which still survive. The intolerance of their rule did not favour the growth of the settlement, which in 1661, when it was transferred to the British, had a population of only 10,000. The English had, however, long recognized its value as a naval base, and it was for this reason that they fought the battle of Swally (1614-1615), attempted to capture the place in 1626, and that the Surat Council urged the purchase of Bombay from the Portuguese. In 1 6 54 the directors of the Company drew Cromwell's attention to this suggestion, laying stress on the excellence of its harbour and its safety from attack by land. It finally became the property of the British in 1661 as part of the dowry of the infanta Catherine of Portugal on her marriage to Charles II., but was not actually occupied by the British until 1665, when they experienced much difficulty in overcoming the opposition of the Portuguese, and especially of the religious orders, to the cession. In 1668 it was transferred by the crown to the East India Company, who placed it under the factory of Surat.

The real foundation of the modern city dates from this time, and was the work of Gerald Aungier (or Angier), brother of Francis Aungier, 3rd Lord Aungier of Longford and 1st earl of Longford in Ireland (d. 1700), who succeeded Sir George Oxenden as president of Surat in 1

669 and died in 1 6 7 7 . At this time Bom- bay was threatened by the Mahrattas from inland, by the Malabar pirates and the Dutch from the sea, and was cut off from the mainland by the Portuguese, who still occupied the island of Salsette and had established a customs-barrier in the channel between Bombay and the shore. In spite of the niggardly policy of the court of directors, who refused to incur the expense of employing skilled engineers, Aungier succeeded in fortifying the town and shore; he also raised a force of militia and regulars, the latter mainly Germans (as more trustworthy than the riff-raff collected in London by the Company's crimps). In 1672 Aungier transferred his headquarters to Bombay, and after frightening off an imposing Dutch fleet, which in 1670 attempted to surprise the island, set to work to organize the settlement anew. To this task he brought a mind singularly enlightened and a sincere belief in the best traditions of English liberty. In its fiscal policy, in its religious intolerance, and in its cruel and contemptuous treatment of the natives, Portuguese rule had been alike oppressive. Aungier altered all this. With the consent of " a general assembly of the chief representatives of the people " he commuted the burdensome land tax for a fixed money payment; he protected all castes in the. celebration of their religious ceremonies; and he forbade any compulsion of natives to carry burdens against their will. The result was that the population of Bombay increased rapidly; a special quarter was set apart for the banya, or capitalist, class of Hindus; while Parsees and Armenians flocked to a city where they were secure of freedom alike for their trade and their religion. Within eight years the population had grown from 10,000 to 60,000. The immediate result of this concentration of people in a spot so unwholesome was the prevalence of disease, produced by the appalling sanitary conditions. This, too, Aungier set himself to remedy. In 1675 he initiated the works for draining the foul tidal swamps; and, failing the consent of the Company to the erection of a regular hospital, he turned the law court into an infirmary. He also set up three courts of justice: a tribunal for petty causes under a factor with native assessors, a court of appeal under the deputy governor and members of council, and a court-martial. A regular police force was also established and a gaol built in the Bazaar. 1

During this period, however, the position of Bombay was sufficiently precarious. The Malabar pirates, though the city itself was too strong for them, were a constant menace to its 1 Hunter, Hist, of British India, ii. pp. 212, &c.

trade; and it required all the genius of Aungier to maintain the settlement, isolated as it was between the rival powers of the Mahrattas and the Mogul empire. After his death, on the 30th of June 1677, its situation became even more precarious. Even under Aungier the Siddi admirals of the Moguls had asserted their right to use Bombay harbour as winter quarters for their fleet, though they had failed to secure it as a base against the Mahrattas. Under his weak successor (Rolt, 1677-1682), the English waters, the value of which had now been proved, became the battle-ground between the rival navies, and for some years Bombay lay at the mercy of both. The Company's rule, more- over, was exposed to another danger. The niggardly policy of the board of directors, more intent on peaceful dividends than on warlike rule, could not but be galling to soldiers of fortune. A mutiny at Bombay in 1674 had only been suppressed by the execution of the ringleader; and in 1683 a more formidable movement took place under Richard Keigwin, a naval officer who had been appointed governor of St Helena in reward for the part played by him in the capture of the island from the Dutch in 1673. Keigwin, elected governor of Bombay by popular vote, issued a proclamation in the king's name, citing the " intolerable extortions, oppressions and exactions " of the Company, and declaring his government under the immediate authority of the crown. He ruled with moderation, reformed the system of taxation, obtained notable concessions from the Mahrattas, and increased the trade of the port by the admission of " interlopers." But he failed to extend the rebellion beyond Bombay; and when a letter arrived, under the royal sign manual, ordering him to surrender the fort to Sir John Child, appointed admiral and captain-general of the Company's forces, he obeyed. 1

Meanwhile the Company had decided to consider Bombay as " an independent settlement, and the seat of the power and trade of the English in the East Indies." But a variety of causes set back the development of the city, notably the prevalence of plague and cholera due to the silting up of the creeks that divided its component islands; and it was not till after the amalgamation of the old and new companies in 1708 that the governor's seat was transferred from Surat to Bombay. In 17 18 the city wall was completed ; settlers began to stream in, especially from distracted Gujarat; and a series of wise administrative reforms increased this tendency until in 1744 the popula- tion, which in 1718 had sunk to 16,000, had risen to 70,000. Meanwhile the Mahratta conquest of Bassein and Salsette (1737—1739) had put a stop to the hostility of the Portuguese, and a treaty of alliance with the Siddis (1733) had secured a base of supplies on the mainland. The French wars of 1744-1748 and 1756-1763 led to a

further strengthening of the fortifications; and the influx of settlers from the mainland made the questions of supplies and of the protection of trade from piracy more pressing. The former was in part settled by the acquisition of Bankot (1755) as a result of an alliance with the peshwa, the latter by the successful expedition under Watson and Clive against Vijayadrug (1756). During this period, too, the import- ance of Bombay as a naval base, long since recognized, was increased by the building of a dock (1750), a second being added in 1762. The year 1770 saw the beginning of the cotton trade with China, the result of a famine in that country, the Chinese government having issued an edict commanding more land to be used for growing grain. This, too, was a period of searching reforms in the administration and the planning and building of the city; the result being a further immense growth of its population, which in 1780 was 113,000. This was still further increased by the famine of 1803, which drove large numbers of people from Konkan and the Deccan to seek employment in Bombay. A great fire broke out in the fort in the same year and caused enormous loss; but it enabled the government to open wider thoroughfares in the more congested parts, and greatly stimulated the tendency of the natives to build their houses and

1 See Hunter, op. oil. ii. 205, &c. He received a full pardon, was appointed later to the command of a frigate in the royal navy, and fell while leading the assault on St Christopher's (June 21, I690).

shops outside the walls of the fort in what are now some of the busiest parts of the city.

The British victory over thS Mahrattas and the annexation of the Deccan opened a new period of unrestricted development for Bombay. At this time, too (1 8 1 9) , its fortunes were vigorously fostered by Mounts tuart Elphinstone, and in 1838 the population had risen to 236,000. But in the next fifty years it more than doubled itself, the figures for 1891 being 821,000. This great leap was due to the influence of railways, of which the first line was completed in 1853, the opening of the Suez Canal, and the foundation of cotton factories. In 1 866- 186 7 the tide of pros- perity was interrupted by a financial crisis, due to the fall in the price of cotton on the termination of the American war. Bombay, however, soon recovered herself, and in 1891 was more prosperous than ever before; but during the ensuing decade great havoc was played by plague (q.v.) with both her population and her trade. In addition to a decline of 6 % in the population, the exports also declined by 7 %, whereas Calcutta's exports rose during the same period by 38 %.

See S. M. Edwardes, The Rise of Bombay (1902) ; James Douglas, Bombay and Western India (1893); G. W. Forrest, Cities of India (1903) ; Sir William Hunter, History of British India (London, 1900); Imp. Gazetteer of India (Oxford, 1908), 5.11. ” Bombay City.”

BOMBAY FURNITURE. “Bombay blackwood furniture” is a term applied to a rather extensive class of articles manu- factured in the city of Bombay and in the towns of Surat and Ahmedabad in India. The wood used is Shisham or blackwood (Dalbergia), a hard-grained dark-coloured timber which with proper treatment assumes a beautiful natural polish. Much of the so-called Bombay furniture is clumsy and inelegant in form, defects which it is suggested by experts, like Sir George Birdwood, it owes to the circumstance that the original models were Dutch. Some of the smaller articles, such as flower stands, small tables, and ornamental stands, are, however, of exceedingly graceful contour, and good examples are highly prized by collectors. The carving at its best is lace-like in character, and apart from its inherent beauty is attractive on account of the ingenuity shown by the worker in adapting his design in detail to the purpose of the article he is fashioning. The workmen who manufacture the most artistic Bombay furniture are a special class with inherited traditions. Often a man knows only one design, which has been transmitted to him by his father, who in his turn had had it from his father before him. In recent years under European auspices efforts have been made with a certain measure of success to modernize the industry by introducing portions of the native work into furniture of Western design. In the main, however, the conventional patterns are still adhered to. ” Bombay boxes ” are inlaid in geometrical patterns on wood. The inlay- ing materials consist of the wire, sandal wood, sapan wood, ebony, ivory and stags’ horns, and the effect produced by the combination of minute pieces of these various substances is altogether peculiar and distinctive.

BOMBAY PRESIDENCY, a province or presidency of British India, consisting partly of British districts, and partly of native states under the administration of a governor. This territory extends from 13 53′ to 28 45′ N., and from 66° 40′ to 76° 30′ E., and is bounded on the N. by Baluchistan, the Punjab and Rajputana; on the E. by Indore, the Central Provinces and Hyderabad; on the S. by Madras and Mysore; and on the W. by the Arabian Sea. Within these limits lie the Portuguese settlements of Diu, Damaun and Goa, and the native state of Baroda which has direct relations with the government of India; while politically Bombay includes the settlement of Aden. The total area, including Sind but excluding Aden, is 188,745 sq. m., of which 122,984 sq. m. are under British and 65,761 under native rule. The

total population (1901) is 25,468,209, of which 18,515,587 are resident in British territory and 6,908,648 in native states. The province is divided into four commissioner- ships and twenty-six districts. The four divisions are the northern or Gujarat, the central or Deccan, the southern or Carnatic, and Sind. The twenty-six districts are: Bombay City, Ahmedabad, Broach, Kaira, Panch Mahals, Surat, Thana,

Ahmednagar, Khandesh (partitioned into two districts in 1906), Nasik, Poona, Satara, Sholapur, Belgaum, Bijapur, Dharwar, Kanara, Kolaba, Ratnagiri, Karachi, Hyderabad, Shikarpur, Thar and Parkar, and Upper Sind Frontier. The native states comprise in all 353 separate units, which are administered either by political agents or by the collectors of the districts in which the smaller states are situated. The chief groups of states are North Gujarat, comprising Cutch, Kathiawar agency, Palanpur agency, Mahi Kantha agency, Rewa Kantha agency and Cambay; South Gujarat, comprising Dharampur, Bansda and Sachin; North Konkan, Nasik and Khandesh, comprising Khandesh political agency, Surgana and Jawhar; South Konkan and Dharwar, comprising Janjira, Sawantwari and Savanur; the Deccan Satara Jagirs, comprising Akalkot, Bhor, Aundh, Phaltan, Jath and Daphlapur; the southern Mahratta states, comprising Kolhapur and other states, and Khairpur in Sind. The native states under the supervision of the government of Bombay are divided, historically and geographically, into two main groups. The northern or Gujarat group includes the territories of the gaekwar of Baroda, with the smaller states which form the administrative divisions of Cutch, Palanpur, Rewa Kantha, and Mahi Kantha. These territories, with the exception of Cutch, have an historical connexion, as being the allies or tributaries of the gaekwar in 1805, when] final engage- ments were included between that prince and the British government. The southern or Mahratta group includes Kolhapur, Akalkot, Sawantwari, and the Satara and southern Mahratta Jagirs, and has an historical bond of union in the friendship they showed to the British in their final struggle with the power of the peshwa in 1818. The remaining territories may con- veniently be divided into a small cluster of independent zamin- daris, situated in the wild and hilly tracts at the northern extremity of the Sahyadri range, and certain principalities which, from their history or geographical position, are to some extent isolated from the rest of the presidency.

Physical Aspects. — The Bombay Presidency consists of a long strip of land along the Indian Ocean from the south of the Punjab to the north of Mysore. The coast is rock-bound and difficult of access; and though it contains several bays forming fair- weather ports for vessels engaged in the coasting trade, Bombay, Karachi-in-Sind, Marmagoa and Karwar alone have harbours sufficiently land-locked to protect shipping during the prevalence of the south-west monsoon. The coast-line is regular and little broken, save by the Gulfs of Cambay and Cutch, between which lies the peninsula of Kathiawar.

Speaking generally, a range of hills, known as the Western Ghats, runs down the coast, at places rising in splendid bluffs and precipices from the water's edge, at others retreat- ing inland, and leaving a flat fertile strip of 5 to 50 m. between their base and the sea. In the north of the presidency on the right bank of the Indus, the Hala mountains, a continuation of the great Suleiman range, separate British India from the dominions of the khan of Kalat. Leaving Sind, and passing by the ridges of low sandhills, — the leading feature of the desert east of the Indus, — and the isolated hills of Cutch and Kathiawar, which form geologically the western extremity of the Aravalli range, the first extensive mountain range is that separating Gujarat from the states of central India. The rugged and mountainous country south of the Tapti forms the northern extremity of the Sahyadri or Western Ghats. This great range of hills, sometimes overhanging the ocean, and generally running parallel to it at a distance nowhere exceeding 50 m., with an average elevation of about 1800 ft., contains individual peaks rising to more than double that height. They stretch southwards for upwards of 500 m., with a breadth of 10 to 20 m. The western declivity is abrupt, the land at the base of the hills being but slightly raised above the level of the sea. As is usually the case with the trap formation, they descend to the plains in terraces with abrupt fronts. The landward slope is in many places very gentle, the crest of the range being sometimes but slightly raised above the level of the plateau of the Deccan. Their best-known elevation is Mahabaleshwar, 4500 ft. high, a

Moaa tains.

Plains.

Rivers.

fine plateau, 37 m. from Poona, covered with rich vegetation, and used by the Bombay government as its summer retreat and sanitarium. In the neighbourhood of the Sahyadri hills, par- ticularly towards the

northern extremity of the range, the country is rugged and broken, containing isolated peaks, masses of rock and spurs, which, running eastward, form watersheds for the great rivers of the Deccan. The Satpura hills separate the valley of the Tapti from the valley of the Nerbudda, and the district of Khandesh from the territories of Indore. The Satmala or Ajanta hills, which are rather the northern slope of the plateau than a distinct range of hills, separate Khandesh from the Nizam's Dominions.

The more level parts of Bombay consist of five well-demarcated tracts — Sind, Gujarat, the Konkan, the Deccan, and the Carnatic. Sind, or the lower valley of the Indus, is very flat, with but scanty vegetation, and depending for productive- ness entirely on irrigation. Gujarat, except on its northern parts, consists of rich, highly cultivated alluvial plains, watered by the Tapti and Nerbudda, but not much subject to inundation. The Konkan lies between the Western Ghats and the sea. It is a rugged and difficult country, intersected by creeks, and abound- ing in isolated peaks and detached ranges of hills. The plains of the Deccan and Khandesh are watered by large rivers, but as the rainfall is uncertain, they are generally, during the greater part of the year, bleak and devoid of vegetation. The Carnatic plain, or the country south of the river Kistna, consists of extensive tracts of black or cotton soil in a high state of cultivation.

The chief river of western India is the Indus, which enters the presidency from the north of Sind and flowing south in a tortuous course, falls into the Arabian Sea by several mouths, such as the Ghizri creek, Khudi creek, Pitiani creek, Sisa creek, Hajamro creek, Vatho creek, Mall creek, Wari creek, Bhitiara creek, Sir creek and Khori creek. In the dry season the bed varies at different places from 480 to 1600 yds. The flood season begins in March and continues till September, the average depth of the river rising from 9 to 24 ft., and the velocity of the current increasing from 3 to 7 m. an hour. Next to the Indus comes the Nerbudda. Rising in the Central Pro- vinces, and traversing the dominions of Holkar, the Nerbudda enters the presidency at the north-western extremity of the Khandesh district, flows eastward, and after a course of 700 m. from its source, falls into the Gulf of Cambay, forming near its mouth the alluvial plain of Broach, one of the richest districts of Bombay. For about 100 m. from the sea the Nerbudda is at all seasons navigable by small boats, and during the rains by vessels of from 30 to 50 tons burden. The Tapti enters the presidency a few miles south of the town of Burhanpur, a station on the Great Indian Peninsula railway, flows eastward through the district of Khandesh, the native state of Rewa Kantha and the district of Surat, and falls into the Gulf of Cambay, a few miles west of

the town of Surat. The Tapti drains about 250 m. of country, and is, in a commercial point of view, the most useful of the Gujarat rivers. Besides these there are many minor streams. The Banas and the Saraswati take their rise in the Aravalli hills, and flowing eastward through the native state of Palanpur, fall into the Runn of Cutch. The Sabarmati and the Mahi rise in the Mahi Kantha hills, and flowing southwards, drain the districts of Northern Gujarat, and fall into the sea near the head of the Gulf of Cambay. The streams which, rising in tlie Sahyadri range, or Western Ghats, flow westward into the Arabian Sea, are of little importance. During the rains they are formidable torrents, but with the return of the fair weather they dwindle away, and during the hot season, with a few exceptions, they almost dry up. Clear and rapid as they descend the hills, on reaching the lowlands of the Konkan they become muddy and brackish creeks. The Kanarese rivers have a larger body of water and a more regular flow than the streams of the Konkan. One of them, the Sharawati, forcing its way through the western ridge of the Ghats, plunges from the high to the low country by a succession of falls, the principal of which is 800 ft. in height. The Sahyadri, or Western Ghats, also throw off to the eastward

the two principal rivers of the Madras Presidency, the Godavari and the Kistna. These rivers collect countless tributary streams, some of them of considerable size, and drain the entire plain of the Deccan as they pass eastward towards the Bay of Bengal.

The Manchar Lake is situated on the right bank of the Indus. During inundations it attains a length of 20 m., and a breadth , . of 10, covering a total area estimated at 180 sq. m.

But the most peculiar lacustrine feature of the pre- sidency is the Runn or Lake of Cutch, which, according to the season of the year, is a salt marsh, an inland lake, or an arm of the sea with an area of 8000 sq. m. It forms the western boundary of the province of Gujarat, and when flooded during the rains unites the Gulfs of Cutch and Cambay, and converts the territory of Cutch into an island.

Geology; — South of Gujarat nearly the whole of Bombay is covered by the horizontal lava flows of the Deccan Trap series, and these flows spread over the greater part of the Kathiawar peninsula and extend into Cutch. In Cutch and Kathiawar they are underlaid by Jurassic and Neocomian beds. The Jurassic beds are marine and contain numerous

Ammonites, but the beds which are referred to the Neocomian include a series of sandstones and shales with remains of plants. Several of the plants are identical with forms which occur in the upper portion of the Gondwana system. Tertiary limestones, sand- stones and shales overlie the Deccan Trap in Cutch, but the greatest development of deposits of this age is to be met with on the western side of the Indus (see Sind). The plain of Sind and of eastern Gujarat is covered by alluvium and wind-blown sand.

Climate. — Great varieties of climate are met with in the presidency. In its extreme dryness and heat, combined with the aridity of a sandy soil, Upper Sind resembles the sultry deserts of Africa. The mean maximum temperature at Hyderabad, in Lower Sind, during the six hottest months of the year, is 98 F. in the shade, and the water of the Indus reaches blood heat; in Upper Sind it is even hotter, and the thermometer has been known to register 130° in tne shade. In Cutch and in Gujarat the heat, though less, is still very great. The Konkan is hot and moist, the fall of rain during the monsoon sometimes approaching 300 in. The table-land of the Deccan above the Ghats, on the contrary, has an agreeable climate except in the hot months, as has also the southern Mahratta country; and in the hills of Mahabaleshwar, Singarh, and other detached heights, Europeans may go out at all hours with impunity. Bombay Island itself, though in general cooled by the sea breeze, is oppressively hot during May and October. The south-west monsoon generally sets in about the first week in June, and pours down volumes of rain along the coast. From June to October travelling is difficult and unpleasant, except in Sind, where the monsoon rains exert little influence.

Forests. — Bombay Presidency possesses two great classes of forests — those of the hills and those of the alluvial plains. The hill forests are scattered over a wide area, extending from 23 to 14 N. lat. Most of them lie among the Sahyadri hills or Western Ghats. The alluvial forests lie in Sind, on or close to the banks of the Indus, and extend over an area of 550 sq. m. The principal timber trees in the forests are — teak; blackwood of two varieties {Dalbergia Sisu andDalbergia latifolia), Dalbergia ujainensis, Pterocarpus Marsupium, Terminalia glabra, Acacia arabica, Acacia Catechu, Nauclea cordifolia, Nauclea parvifolia, Bidelia spinosa, Hardwickia binata, Juga xylocarpa, Populus euphratica, and Tamarindus indica. The forests contain many trees which, on account of their fruits, nuts or berries, are valuable, irrespective of the quality of their timber. Among these are the mango (Mangifera indica); the jack {Artocarpus integrifolia) , Zizyphus Jujuba, Aegle Marmelos, Terminalia Chebula, Calophyllum Inophyllum, Bassia latifolia and Pongamia glabra. The jungle tribes

collect gum from several varieties of trees, and in Sind the Forest Department derives a small revenue from lac. The palms of the presidency consist of cocoa-nut, date, palmyra and areca catechu.

Population. — The census of 1901 gave a total of 25,468,209, out of which the chief religions furnished the following numbers : —

Hindu . Mahommedan Jain . . Zoroastrian . Christian

19,916,438

4.567.295

535,950

78,552

216,118

In Sind Islam has been the predominant religion from the earliest Arab conquest in the 8th century. In Gujarat the predominant religion is Hinduism, though petty Mahommedan kingdoms have left their influence in many parts of the province. The Deccan is the home of the Mahrattas, who constitute 30% of the population. The Konkan is notable for various Christian castes, owing their origin to Portuguese rule; while in the Carnatic* Lingayatism, a Hindu reformation movement of the 12th century, has been embraced by 45% of the population. The Mahrattas are the dominating race next to the Europeans and number (1901) 3,650,000, composed of 1,900,000 Kunbis, 350,000 Konkanis, and 1,400,000 Mahrattas not otherwise specified.

Languages. — The chief languages of the presidency are Sindhi in Sind, Cutchi in Cutch, Gujarati and Hindustani in Gujarat, Mahratti in Thana and the central division, Gujarati and Mahratti in Khandesh, and Mahratti and Kanarese in the southern division. There are also Bhil (120,000) and Gipsy (30,000) dialects.

Agriculture. — The staple crops are as follows: — Joar {Sorghum vulgare) and bajra (Holcus spicatus) are the staple food grains in the Deccan and Khandesh. Rice is the chief product of the Konkan. Wheat, generally grown in the northern part of the Presidency, but specially in Sind and Gujarat, is exported to Europe in large quantities from Karachi, and on a smaller scale from Bombay. Barley is principally grown in the northern parts of the presidency. Nachani (Eleusine coracana) and kodra {Paspalum scrobiculatum) , inferior grains grown

on the hill-sides, furnish food to the Kolis, Bhils, Waralis, and other aboriginal tribes. Of the pulses the most important are gram (Cicer arie- tinum), tax (Cajanusindicus), kulti (Dolichos biflorus) , and mug (Phaseolus Mungo). Principal oil-seeds: til {Sesamum orien- tate), mustard, castor-oil, safflower and linseed. Of fibres the most important are cotton, Deccan hemp {Hibiscus cannabinus), and sunn or tag {Crotalaria juncea). Much has been done to improve the cotton of the presidency. American varieties have been introduced with much advantage in the Dharwar collec- torate and other parts of the southern Mahratta country. In Khandes"h the indigenous plant from which one of the lowest classes of cotton in the Bombay market takes its name has been almost entirely superseded by the superior Hinganghat variety. Miscellaneous crops: sugar-cane, requiring a rich soil and a perennial water-supply, and only grown in favoured localities, red pepper, potatoes, turmeric and tobacco.

Manufactures. — The chief feature of the modern industrial life of Bombay is the great development in the growth and manufacture of cotton. Large steam mills have rapidly sprung up in Bombay City, Ahmedabad and Khandesh. In 1905 there were 432 factories in the presidency, of which by far the greater number were engaged in the preparation and manufacture of cotton. The industry is centred in Bombay City and Island, which contains nearly two-thirds of the mills. During the decade 1891-1901 the mill industry passed through a period of depression due to widespread plague and famine, but on the whole there has been a marked expansion of the trade as well as a great im- provemeift in the class of goods produced. In addition to the mills there are (1901) 178,000 hand-loom weavers in the province, who still have a position of their own in the manipulation of designs woven into the cloth. Silk goods are manufactured in Ahmedabad, Surat, Yeola, Nasik, Thana and Bombay, the material being often decorated with printed or woven designs; but owing to the competition of European goods most branches of the industry are declining. The custom of investing savings in gold and silver ornaments gives employment to many goldsmiths; the metal is usually supplied by the customer, and

the goldsmith charges for his labour. Ahmedabad and Surat are famous for their carved wood-work. Many of the houses in Ahmedabad are covered with elaborate wood-carving, and ex- cellent examples exist in Broach, Baroda, Surat, Nasik and Yeola. Salt is made

in large quantities in the government works at Kharaghoda and Udu in Ahmedabad, whence it is exported by rail to Gujarat and central India. There is one brewery at Dapuri near Poona.

Railways and Irrigation. — The province is well supplied with railways, all of which, with one exception, concentrate at Bombay City. The exception is the North-Western line, which enters Sind from the Punjab and finds its natural terminus at Karachi. The other chief lines are the Great Indian Peninsula, Indian Midland, Bombay, Baroda & Central India, Rajputana- Malwa & Southern Mahratta systems. In 1905 the total length of railway under the Bombay government open f6r traffic was 7980 m. These figures do not include the railway system in Sind. With the exception of Sind, the water-supply of the Bombay Presidency does not lend itself to the construction of large irrigation works.

Army. — Under Lord Kitchener's re-arrangement of the Indian army in 1904 the old Bombay command was abolished and its place was taken by the Western army corps under a lieutenant-general. The army corps was divided into three divisions under major-generals. The 4th division, with head- quarters at Quetta, comprises the troops in the Quetta and Sind districts. The 5th division, with headquarters at Mhow, consists of three brigades, located at Nasirabad, Jubbulpore and Jhansi, and includes the previous Mhow, Deesa, Nagpur, Ner-budda and Bundelkhand districts, with the B6mbay district north of the Tapti. The 6th division, with headquarters at Poona, consists of three brigades, located at Bombay, Ahmed- nagar and Aden. It comprises the previous Poona district, Bombay district south of the Tapti, Belgaum district north of the Tungabhadra, and Dharwar and Aurungabad districts.

Education. — The university of Bombay, established in 1857, is a body corporate, consisting of a chancellor, vice-chancellor and fellows. The governor of Bombay is ex officio chancellor. The education department is under a director of public instruc- tion, who is responsible for the administration of the department in accordance with the general educational policy of the state. The native states have generally adopted the government system. Baroda and the Kathiawar states employ their own inspectors. In 1905 the total number of educational institutions was 10,194 with 593,431 pupils. There are ten art colleges, of which two are managed by government, three by native states, and five are under private management. According to the census of 1901, out of a population of 25J millions nearly 24 millions were illiterate.

Administration. — The government of Bombay is administered by a governor in council consisting of the governor as president and two ordinary members. The governor is appointed from England; the council is appointed by the crown, and selected from the Indian civil service. These are the executive members of government. For making laws there is a legislative council, consisting of the governor and his executive council, with certain other persons, not fewer than eight or more than twenty, at least half of them being non-officials. Each of the members of the executive council has in his charge one or two departments of the government; and each department has a secretary, an under-secretary, and an assistant secretary, with a numerous staff of clerks. The political administration of the native states is under the superintendence of British agents placed at the principal native courts; their position varies in different states according to the relations in which the princi- palities stand with the paramount power. The administration of justice throughout the presidency is conducted by a high court at Bombay, consisting of a chief justice and seven puisne judges, along with district and assistant judges throughout the districts of the presidency. The administration of the districts is carried on by collectors, assistant collectors, and a varying number of supernumerary assistants.

History. — In the earliest times of which any record remains the greater part of the west coast of India was occupied by Dravidian tribes, living under their kings in fortified villages, carrying on the simpler arts of life, and holding a faith in which the propitiation of spirits and demons played the chief part. There is evidence, however, that so early as 1000 B.C. an export trade existed to the Red Sea by way of East Africa, and before 750 B.C. a similar trade had sprung up with Babylon by way of the Persian Gulf. It was by this latter route that the traders brought back to India the Brahmi alphabet, the art of brick- making and the legend of the Flood. Later still the settlement of Brahmans along the west coast had already Aryanized the country in religion, and to some extent in language, before the Persian conquest of the Indus valley at the close of the 6th century B.C. The Persian dominion did not long survive; and the march of Alexander the Great down the Indus paved the way for Chandragupta and the Maurya empire. Under this empire Ujjain was the seat of a viceroy, a prince of the imperial house, who ruled over Kathiawar, Malwa and Gujarat. On the death of Asoka in 231 B.C. the empire of the Mauryas broke up, and their heritage in the west fell to the Andhra dynasty of the Satavahanas of Paithan on the Godavari, a Dravidian family whose dominion by 200 B.C. stretched across the peninsula from the deltas of the Godavari and Kistna to Nasik and the Western Ghats. About a.d.

210, however, their power in the west seems to have died out, and their place was taken by the foreign dynasty of the Kshaharatas, the Saka satraps of Surashtra (Kathiawar), who in 120 had mastered Ujjain and Gujarat and had built up a rival kingdom to the north. Since about a.d. 40 the coast cities had been much enriched by trade with the Roman empire, which both the Satavahanas and the satraps did much to encourage; but after the fall of Palmyra (273) and the extinction of the main Kshaharata dynasty (c. 300) this commerce fell into decay. The history of the century and a half that follows is very obscure; short-lived Saka dynasties succeeded one another until, about 388, the country was conquered by the Guptas of Magadha, who kept a precarious tenure of it till about 470, when their empire was destroyed by the White Huns, or Ephthal- ites (q.v.), who, after breaking the power of Persia and assailing the Kushan kingdom of Kabul, poured into India, conquered Sind, and established their dominion as far south as the Nerbudda.

Under the Hun tyranny, which lasted till the overthrow of the White Huns on the Oxus by the Turks (c. 565), native dynasties had survived, or new ones had established themselves. In Kathiawar a chief named Bhatarka, probably of foreign origin, had established himself at Valabhi (Wala) on the ruins of the Gupta power (c. 500), and founded a dynasty which lasted until it was overthrown by Arab invaders from Sind in 770. 1 The northern Konkan was held by the Mauryas of Puri near Bombay, the southerly coast by the Kadambas of Vanavasi, while in the southern Deccan Chalukyas and Rashtrakutas struggled for the mastery. A new power, too, appeared from the north: the Gurjaras (ancestors, it is supposed, of the Gujar caste), who had probably entered India with the White Huns, established their power over Gujarat and (c. 600) overran north- eastern Kathiawar, made the raja of Valabhi their tributary, and established a branch at Broach (585-740). During the short- lived empire of Harsha (d. 647 or 648), Malwa, Gujarat and Kathiawar were subject to his sway; but the southern boundary of his kingdom was the Nerbudda, south of which the Chalukyas in the 7th century, having overcome the Rashtrakutas and other rivals, had absorbed the smaller kingdoms into their empire. In 710-711 (92 a.h.) the Arabs invaded India, and in 712 con- quered and established themselves in Sind; they did not, however, attempt any serious attack on the Gurjara and Chalukya empires, confining themselves to more or less serious raids. In 770 they destroyed the city of Valabhi and, as already mentioned, brought its dynasty to an end. Meanwhile the Chalukyas, after successfully struggling with the Pallavas (whose capital was taken by Vikramaditya II., c. 740), had in their turn suc- cumbed to their ancient rivals the Rashtrakutas, who

succeeded 1 V. A. Smith, Early History of India, p. 295.

to the bulk of their dominions, including Gujarat, where they had set up a branch line. For some two centuries (c. 750-950) there was a balance of power between the Gurjaras and Rash- trakutas, neither kingdom being strong enough to encroach on the other to any extent. The Rashtrakutas were, moreover, debarred from large schemes of conquest by dissensions with the branch dynasty which they had set up in Gujarat and by the constant threat of attack by the Chalukyas from Mysore. Nevertheless their power and magnificence (they were notable builders and patrons of literature) greatly impressed the Arabs, by whom the king was known as Balhara {i.e. Vallhaba, ” well-beloved “), a title borrowed from the preceding dynasty. Under them the Konkan and the coast farther south were governed by chiefs of the Silahara family, whose rule is mainly notable for the revival of trade with the Persian Gulf and, doubtless as a result of this, the arrival in 775 on the west coast of a number of Parsee refugees, who found, in a country where three religions were already equally honoured, the toleration denied to them in Mussulman Persia. But in the 10th century the Rashtrakuta power began to break up; in 961 Mularaja Solanki (Chalukya) conquered the kingdom of Anhilvada (Anhilvara) in Gujarat, where his dynasty reigned till 1242; and twelve years later the Chalukyas once more overthrew the Rashtrakutas in the Deccan, establishing their capital at Kalyani, while a branch line was set. up in southern Gujarat. Farther south the Silaharas, however, continued to rule the coast, and succeeded in maintaining their independence until after the final fall of the Chalukyas in n 92. The cause of the downfall of the dynasty, splendid and enlightened as any of its predecessors, was the system of governing by means of great feudatories, which also proved fatal to the Solanki rajas of Anhilvada. From n 43 onward the power of the latter had been overshadowed by that of the Vaghela chiefs of Dholka, and during the same period the Deccan had been rapidly lapsing into absolute anarchy, amid which rival chiefs struggled for the supreme power. In the end the Yadavas of Devagiri (Daulatabad) prevailed, and in 1192 established a short-lived empire to which the Dholka princes were ultimately forced to become tributary.

But meanwhile a new power had appeared, which was destined to establish the Mussulman domination in western and southern India. In 1023 Mahmud of Ghazni had already invaded Gujarat with a large

army, destroyed the national Hindu idol of Somnath, and carried away an immense booty. Mahommed Ghori also invaded Gujarat, and left a garrison in its capital. But it was not till after the Mussulman power was firmly established in northern India that the Mahommedan sovereigns of Delhi attempted the conquest of the south. In 1294 the emperor Ala-ud-din first invaded the Deccan, and in 1 297 he conquered Gujarat. In 131 2 the Mahommedan arms were triumphant through the Mahratta country; and seven years later the whole of Malabar fell a prey to the invaders. In the middle of the 14th century the weakness of the Delhi sovereigns tempted the governors of provinces to revolt against their distant master, and to form independent kingdoms. In this way the Bahmani kingdom was established in the Deccan, and embraced a part of the Bombay presidency. Ahmednagar and Gujarat also became the seats of a new kingdom. In 1573 Akbar conquered Gujarat and reannexed it to the empire; in 1599 he effected the reconques.t of Khandesh, and in 1600 that of Ahmednagar. From this time the country was never tranquil, and Ahmednagar became the focus of constant rebellions. During the latter part of the 17th century the Mahrattas rose into power, and almost every part of the country now comprising the presidency of Bombay fell under their sway. In 1498 the Portuguese came first to Calicut, their earliest possession in the presidency being the island of Anjidiv. After their victory at Diu over the Egyp- tian fleet their mastery of the Indian Ocean was undisputed, and they proceeded to establish themselves on the coast. They captured Goa in 1510, Malacca in 1511, and Ormuz in 1515. They next took advantage of the decay of the kingdom of Gujarat to occupy Chaul (1531), Bassein with its dependencies, including Bombay (1 534) , Diu (1 53 5) and Daman (1559). But the inherent

vices of their intolerant system undermined their power, even before their Dutch and English rivals appeared on the scene.

The first English settlement in the Bombay presidency was in 1 6 1 8, when the East India Company established a factory a t Surat, protected by a charter obtained from the emperor Jahangir. In 1626 the Dutch and English made an unsuccessful attempt to gain possession of the island of Bombay, and in 1653 proposals were suggested for its purchase from the Portuguese. In 1661 it was ceded to the English crown, as part of the dower of the infanta Catherine of Portugal on her marriage with Charles II. So lightly was the acquisition esteemed in England, and so unsuccessful was the administration of the crown officers, that in 1668 Bombay was transferred to the East India Company for an annual payment of £10. At the time of the transfer, powers for its defence and for the

administration of justice were also conferred; a European regiment Vas enrolled; and the fortifications erected proved sufficient to deter the Dutch from their intended attack in 1673 (see Bombay City: History). In 1687 Bombay was placed at the head of all the Company's possessions in India; but in 1753 the government of Bombay became subordinate to that of Calcutta. The first collision of the English with the Mahratta power was in 1774 and resulted in 1782 in the treaty of Salbai, by which Salsette was ceded to the British, while Broach was handed over to Sindhia. More important were the results of the second Mahratta war, which ended in 1803. Surat had already been annexed in 1800; the East India Company now received the districts of Broach, Kaira, &c.

In 1803 the Bombay presidency included only Salsette, the islands of the harbour (since 1774), Surat and Bankot (since 1756); but between this date and 1827 the framework of the presidency took its present shape. The Gujarat districts were taken over by the Bombay government in 1805 and enlarged in 1818; and the first measures for the settlement of Kathiawar and Mahi Kantha were taken between 1807 and 1820. Baji Rao, the last of the peshwas, who had attempted to shake off the British yoke, was defeated, captured and pensioned (1817- 18 1 8), and large portions of his dominions (Poona, Ahmednagar, Nasik, Sholapur, Belgaum, Kaladgi, Dharwar, &c.) were included in the presidency, the settlement of which was completed by Mountstuart Elphinstone, governor from 1819 to 1827. His policy was to rule as far as possible on native lines, avoiding all changes for which the population was not yet ripe; but the grosser abuses of the old regime were stopped, the country was pacified, the laws were codified, and courts and schools were established. The period that followed is notable mainly for the enlargement of the presidency through the lapse of certain native states, by the addition of Aden (1839) and Sind (1843), and the lease of the Panch Mahals from Sindhia (1853). The establishment of an orderly administration, one outcome 'of which was a general fall of prices that made the unwonted regularity of the collection of taxes doubly unwelcome, naturally excited a certain amount of misgiving and resentment; but on the whole the population was prosperous and contented, and under Lord Elphinstone (1853-1860) the presidency passed through the crisis of the Mutiny without any general rising. Outbreaks among the troops at Karachi, Ahmedabad and' Kolhapur were quickly put down, two regiments being disbanded, and the rebellions in Gujarat, among the Bhils, and in the southern Mahratta country were local and isolated. Under Sir Bartle Frere (1862-1867) agricultural prosperity reached its highest point, as a result of the American Civil War and the

consequent enormous demand for Indian cotton in Europe. The money thus poured into the country produced an epidemic of speculation known as the ” Share Mania ” (1864-1865), which ended in a commercial crisis and the failure of the bank of Bombay (1866). But the peasantry gained on the whole more than they lost, and the trade of Bombay was not per- manently injured. Sir Bartle Frere encouraged the completion of the great trunk lines of railways, and with the funds obtained by the demolition of the town walls (1862) he began the magnifi- cent series of public buildings that now adorn Bombay.

During recent times the entire history of Bombay has been sadly affected by plague and famine. Bubonic plague, of a fatal and contagious nature, first broke out in Bombay City in September 1896, and, despite all the efforts of the government, quickly spread to the surrounding country. Down to the end of October 1902 over 531,000 deaths had taken place due to plague. In 1903-1904 there were 426,387 cases with 316,523 deaths, and iQ‘04-1905 there were 285,897 cases with 212,948 deaths. The great cities of Bombay, Karachi and Poona suffered most severely. A few districts in Gujarat almost entirely escaped; but the mortality was very heavy in Satara, Thana, Surat, Poona, Kolaba, and in the native states of Cutch, Baroda, Kolhapur and Palanpur. The only sanitary measure that can be said to have been successful was complete migration, which could only be adopted in villages and smaller towns. Inoculation was extensively tried in some cases. Segregation was the one general method of fighting the disease; but, unfor- tunately, it was misunderstood by the people and led to some deplorable outbreaks. In Poona, during 1897, two European officials were assassinated; the editor of a prominent native paper was sentenced to imprisonment for sedition; and two leaders of the Brahman community were placed in confinement. At Bombay, in March 1898, a riot begun by Mahommedan weavers was not suppressed until several Europeans had been fatally injured. In Nasik district, in January 1898, the native chairman of the plague committee was brutally murdered by a mob. But on the whole the people submitted with characteristic docility to the sanitary regulations of the government. Bombay, like the Central Provinces, suffered from famine twice within three years. The failure of the monsoon of 1896 caused wide- spread distress throughout the Deccan, over an area of 46,000 sq. m., with a population of 7 millions. The largest number of persons on relief was 301,056 in September 1897; and the total expenditure on famine relief was Rs.i, 28,000,000.

The measures adopted were signally successful, both in saving life and in mitigating distress. In 1899 the monsoon again failed in Gujarat, where famine hitherto had been almost unknown; and the winter rains failed in the Deccan, so that distress gradually spread over almost the entire presidency. The worst feature was a virulent outbreak of cholera in Gujarat, especially in the native states. In April 1900 the total number of persons in receipt of relief was 1,281,159 in British districts, 566,671 in native states, and 71,734 in Baroda. For 1900-1901 the total expenditure on famine relief was nearly 3 crores (say, £2,000,000 sterling) ; and a continuance of drought necessitated an estimate of 1 crore in the budget of the following year. The Bombay government exhausted its balances in 1897, and was subsequently dependent on grants from the government of India.

See Sir James Campbell, Gazetteer of Bombay (26 vols., 1896); S. M. Edwardes, The Rise of Bombay (1902); James Douglas, Bombay and Western India (1893) ; and Sir William Lee-Warner, The Presidency of Bombay (Society of Arts, 1904) ; The Imperial Gazetteer of India (Oxford, 1908) ; and for the early history, V. A. Smith, The Early History of India (2nd ed., Oxford, 1908).

BOMBAZINE, or Bombasine, a stuff originally made of silk or silk and wool, and now also made of cotton and wool or of wool alone. Good bombazine is made with a silk warp and a worsted weft. It is twilled or corded and used for dress-material. Black bombazine has been used largely for mourning, but the material has gone out of fashion. The word is derived from the obsolete French bombasin, applied originally to silk but afterwards to ” tree-silk ” or cotton. Bombazine is said to have been made in England in Queen Elizabeth’s reign, and early in the 19th century it was largely made at Norwich.

BOMBELLES, MARC MARIE, Marquis de (1744-1822), French diplomatist and ecclesiastic, was the son of the comte de Bombelles, tutor and guardian of the duke of Orleans. He was born at Bitsch in Lorraine, and served in the army through the Seven Years’ War. In 1765 he entered the diplomatic service, and after several diplomatic missions became ambassador of France to Portugal in 1786, being charged to win over that country to the Family Compact; but the madness of the queen

and then the death of the king prevented his success. He was transferred to Vienna early in 1789, but the Revolution cut short his diplomatic career, and he was deprived of his post in September 1790. He remained attached to Louis XVI., and was employed on secret missions to other sovereigns, to gain their aid for Louis. In 1792 he

emigrated, and after Valmy lived in retirement in Switzerland. In 1804, after the death of his wife, he withdrew to the monastery of Briinn in Austria, and became bishop of Oberglogau in Prussia. In 1815 he returned to France, and became bishop of Amiens (18 19). He died in Paris in 1822.

His son, Louis Philippe, comte de Bombelles (1780-1843), born at Regensburg, passed his life in the diplomatic service of Austria. In i8i4he became Austrian ambassador to Denmark, and in 1816 filled a similar position at Dresden. (E. Es.)

BOMBERG, DANIEL, a famous Christian printer of Hebrew books. His chief activity was in Venice between 15 16 and 1549 (the year of his death) . Bomberg introduced a new era in Hebrew typography. Among other great enterprises, he published the editio princeps (1516-1517) of the rabbinical Bible (Hebrew text with rabbinical commentaries, &c). He also produced the first complete edition of the Talmud (1520-1523) .

BONA, JOHN (1609-1674), Italian cardinal and author, was born at Mondovi in Piedmont, on the 10th of October 1609. In 1624 he joined the Congregation of Feuillants and was succes- sively elected prior of Asti, abbot of Mondovi and general of his order. He was created cardinal in 1669 by Clement IX., and during the conclave, which followed that pope's death, was regarded as a possible candidate for the papacy. He died on the 27th of October 1674. Bona's writings are mainly concerned with liturgical and devotional subjects. Of the numerous editions of his works, the best are those of Paris (1677), Turin (1747) and Antwerp (1777). Stores of interesting rubrical information, interspersed with verses and prayers, are to be found in the De Libris Liturgicis and the Divina Psalmodia; recent advances in liturgical studies, however, have somewhat lessened their value. The De Discretione Spirituum treats of certain higher phases of mysticism; the Via Compendii ad Deum was well translated in 1876 by Henry Collins, O. Cist., under the title of An Easy Way to God. Sir Roger L'Estrange's translation {The Guide to Heaven, 1680) of the Manuductio ad Coelum was reprinted in 1898, and a new edition of the Principia Vitae Christianae, ed. by D. O'Connor, appeared in 1906. The devo- tional treatise De Sacrificio Missae is the classical work in its field (new edition by Ildephonsus Cummins, 1903).

The chief source for the life of Bona is the biography by the Cistercian abbot Bertolotti (Asti, 1677) ; the best modern study is by A. Ighina (Mondovi, 1874).

BONA (Bone), a seaport of Algeria, in 36 53′ N., 7 46′ E., on a bay of the Mediterranean, chief town of an arrondissement in the department of Constantine, 220 m. by rail W. of Tunis, and 136 m. N.E. of Constantine. The town, which is situated at the foot of the wooded heights of Edugh, is surrounded with a modern rampart erected • outside the old Arab wall, the compass of which was found too small for its growth. Much of the old town has been demolished, and its general character now is that of a flourishing French city. The streets are wide and well laid out, but some are very steep. Through the centre of the town runs a broad tree-lined promenade, the Cours Jerome-Bertagna, formerly the Cours National, in which are the principal buildings —theatre, banks, hotels. At its southern end, by the quay, is a bronze statue of Thiers, and at the northern end, the cathedral of St Augustine, a large church built in quasi-Byzantine style. In it is preserved a relic supposed to be the right arm of St Augustine, brought from Pavia in 1842. The Grand Mosque, built out of ruins of the ancient Hippo, occupies one side of the chief square, the Place d'Armes. There are barracks with accommodation for 3000 men, and civil and military hospitals. The Kasbah (citadel) stands on a hill at the north-east of the town. The inner harbour, covering 25 acres, is surrounded by fine quays at which vessels drawing 2 2 ft. can be moored. Beyond is a spacious outer harbour, built 1857-1868 and enlarged in

1905-1907. Bona is in direct steamship communication with Marseilles, and is the centre of a large commerce, ranking after Algiers and Oran alone in Algeria. It imports general mer- chandise and manufactures, and exports phosphates, iron, zinc, barley, sheep, wool, cork, esparto, &c. There are manufactories of native garments, tapestry and leather. The marshes at the mouths of the Seybuse and Bujema rivers, which enter the sea to the south of Bona, have been drained by a system of canals, to the improvement of the sanitary condition of the town, which has the further advantage of an abundant water supply obtained from the Edugh hills. There are cork woods and marble quarries in the vicinity, and the valley of the Seybuse and the neighbour- ing plains are rich in agricultural produce. The population of the town of Bona in 1906 was 36,004, of the commune 42,934, of the arrondissement, which includes La Calle (q.v.) and 11 other communes, 77,803.

Bona is identified with the ancient Aphrodisium, the seaport of Hippo

Regius or Ubbo, but it derives its name from the latter city, the ruins of which, consisting of large cisterns, now restored, and fragments of walls, are about a mile to the south of the town. In the first three centuries of the Christian era Hippo was one of the richest cities in Roman Africa; but its chief title to fame is derived from its connexion with St Augustine, who lived here as priest and bishop for thirty-five years. Hippo was captured by the Vandals under Genseric in 431, after a siege of fourteen months, during which Augustine died. Only the cathedral, together with Augustine's library and MSS., escaped the general destruction. The town Avas partially restored by Belisarius, and again sacked by the Arabs in the 7th century. On the top of the hill on which Hippo stood, a large basilica, with chancel towards the west, dedicated to St Augustine, was opened in 1900. An altar surmounted by a bronze statue of the saint has also been erected among the ruins. The place was named Hippo Regius -(Royal) by the Romans because it was a favourite residence of the Numidian kings. Bona (Arabic annaba, "the city of jujube trees "), which has passed through many vicissitudes, was built by the Arabs, and was for centuries a possession of the rulers of Tunis, who built the Kasbah in 1 300. From the beginning of the 14th to the middle of the 15th century it was frequented by Italians and Spaniards, and in the 16th it was held for some time by Charles V., who strengthened its citadel. Thereafter it was held in turn by Genoese, Tunisians and Algerines. From the time of Louis XIV. to the Revolution, the French Compagnie d'Afrique maintained a very active trade with the port. The town was occupied by the French for a few months in 1830 and reoccupied in 1832, when Captains Armandy and Yusuf with a small force of marines seized the Kasbah and held it for some months until help arrived. From that time the history of Bona is one of industrial development, greatly stimulated since 1883 by the discovery of the phosphate beds at Tebessa.

BONA DEA, the " good goddess," an old Roman deity of fruitfulness, both in the earth and in women. She was identified with Fauna, and by later syncretism also with Ops and Maia — the latter no doubt because the dedication-day of her temple on the Aventine was 1st May (Ovid, Fasti, v. 149 foil.). This temple was cared for, and the cult attended, by women only, and the same was the case at a second celebration at the begin- ning of December in the house of a magistrate with imperium, which became famous owing to the profanation of these mysteries by P. Clodius in 62 B.C., and the political consequences of his act. Wine and myrtle were tabooed in the cult of this deity, and myths grew up to explain these features of the cult, of which an account may be read in W. W. Fowler's Roman

Festivals, pp. 103 foil. Herbs with healing properties were kept in her temple, and also snakes, the usual symbol of the medicinal art. Her victim was a porca, as in the cults of other deities of fertility, and was called damium, and we are told that the goddess herself was known as Damia and her priestess as damiatrix. These names are almost certainly Greek; Damia is found worshipped at several places in Greece, and also at Tarentum, where there was a festival called Dameia. It is thus highly probable that on the cult of the original Roman goddess was engrafted the Greek

one of Damia, perhaps after the conquest of Tarentum (272 B.C.). It is no longer possible to distinguish clearly the Greek and Roman elements in this curious cult, though it is itself quite intelligible as that of an Earth-goddess with mysteries attached. See also Pauly-Wissowa, Realencyclopddie. (W. W. F. *)

BONA FIDE (Lat. ” in good faith “), in law, a term implying the absence of all fraud or unfair dealing or acting. It is usually employed in conjunction with a noun, e.g. ” bona fide purchaser,” one who has purchased property from its legal owner, to whom he has paid the consideration, and from whom he has taken a legal conveyance, without having any notice of any trust affect- ing the property; ” bona fide holder ” of a bill of exchange, one who has taken a bill complete and regular on the face of it, before it was overdue, and in good faith and for value, and without notice of any defect in the title of the person who negotiated it to him; ” bona fide traveller ” under the licensing acts, one whose lodging-place during the preceding night is at least 3 m. distant from the place where he demands to be supplied with liquor, such distance being calculated by the nearest public thoroughfare.

BONALD, LOUIS GABRIEL AMBROISE, Vicomte de (1754- 1840), French philosopher and politician, was born at LeMonna, near Millau in Aveyron, on the 2nd of October 1754. Disliking the principles of the Revolution, he emigrated in 1791, joined the army of the prince of Conde, and soon afterwards settled at Heidelberg. There he wrote his first important work, the highly conservative Theorie du pouvoir politique et religieux (3 vols., 1796; new ed., Paris, 1854, 2 vols.), which was con- demned by the Directory. Returning to France he found himself an object of suspicion, and was obliged to live in retirement. In 1806 he was associated with Chateaubriand and Fievee in the conduct of the Mercure de France, and two years later was appointed councillor of the Imperial University which he had often attacked. After the restoration he was a member of the council of public instruction, and from 18 15 to 1822 sat in the chamber as

deputy. His speeches were on the extreme con- servative side; he even advocated a literary censorship. In 1822 he was made minister of state, and presided over the censor- ship commission. In the following year he was made a peer, a dignity which he lost through refusing to take the oath in 1830. From 1816 he had been a member of the Academy. He took no part in public affairs after 1830, but retired to his seat at Le Monna, where he died on the 23rd of November 1840. Bonald was one of the leading writers of the theocratic or traditionalist school, which included de Maistre, Lamennais, Ballanche and d'Eckstein. His writings are mainly on social and political philosophy, and are based ultimately on one great principle, the divine origin of language. In his own words, " L'homme pense sa parole avant de parler sa pensee/'; the first language contained the essence of all truth. From this he deduces the existence of God, the divine origin and consequent supreme authority of the Holy Scriptures, and the infallibility of the church. While this thought lies at the root of all his speculations there is a formula of constant ap- plication. All relations may be stated as the triad of cause, means and effect, which he sees repeated throughout nature. Thus, in the universe, he finds the first cause as mover, move- ment as the means, and bodies as the result; in the state, power as the cause, ministers as the means, and subjects as the effects; in the family, the same relation is exemplified by father, mother and children. These three terms bear specific relations to one another; the first is to the second as the second to the third. Thus, in the great triad of the religious world — God, the Mediator, and Man — God is to the God-Man as the God-Man is to Man. On this basis he constructed a system of political absolutism which lacks two things only: — well-grounded premisses instead of baseless hypotheses, and the acquiescence of those who were to be subjected to it.

Bonald's style is remarkably fine; ornate, but pure and vigorous. Many fruitful thoughts are scattered among his works, but his system scarcely deserves the name of a philosophy. In abstract thought he was a mere dilettante, and his strength

lay in the vigour and sincerity of his statements rather than in cogency of reasoning.

He had four sons. Of these, Victor de Bonald (1780-1871) followed his father in his exile, was rector of the academy of Montpellier after the

restoration, but lost his post during the Hundred Days. Regaining it at the second restoration, he resigned finally in 1830. He wrote Des vrais principes opposes aux erreurs du XIX' sie.de (1833), Moise et les geologues modernes (1835), and a life of his father. Louis Jacques Maurice (1787-1870), cardinal (1841), was condemned by the council of state for a pastoral letter attacking Dupin the elder's Manuel de droit ecclesiastique. In 1848 he held a memorial service " for those who fell gloriously in defence of civil and religious liberty." In 1851 he nevertheless advocated in the senate the maintenance of the temporal power of Rome by force of arms. Henri (d. 1846) was a contributor to legitimist journals; and Rene was interim prefect of Aveyron in 181 7.

Besides the Theorie above mentioned, the vicomte de Bonald published Essai analytique sur les lots naturelles de I'ordre social (1800); Legislation primitive (1802); Du divorce considers au XIX' siecle (1801); Recherches philosophiques sur les premiers objets de connaissances morales (2 vols., 1818) ; Melanges litteraires et politiques, demonstration philosophique du principe constitutif de la societe (18 19, 1852). The first collected edition appeared in 12 vols., 1817-1819; the latest is that of the Abbe Migne (3 vols., 1859).

See Notice sur M. le Vicomte de Bonald (1841, ed. Avignon, 1853), (by his son Victor) ; Damiron, Phil, en France au XIX" siecle ; Windelband, History of Philosophy (trans. J. H. Tufts, 1893); E. Faguet in Rev. des deux mondes (April 15, 1889).

BONAPARTE, the name of a family made famous by Napoleon I. (q.v.), emperor of the French. The French form Bonaparte was not commonly used, even by Napoleon, until after the spring of 1796. The original name was Buonaparte, which was borne in the early middle ages by several distinct families in Italy. One of these, which settled at Florence before the year 1100, divided in the 13 th century into the two branches of San Miniato and Sarzana. A member of this latter, Francesco Buonaparte, emigrated in the middle of the 16th century to Corsica, where his descendants continued to occupy themselves with the affairs of law and the magistracy.

Carlo Buonaparte [Charles Marie de Bonaparte] (1746- 1785), the father of Napoleon I., took his degree in law at the Napoleon's university of Pisa, and after the conquest of Corsica father by the French became assessor to the royal court of aad Ajaccio and the neighbouring districts. His restless

mother. an(j dissatisfied nature led him to press or intrigue for other

posts, and to embark in risky business enterprises which compromised the fortune of his family for many years to come. In 1764 he married Letizia Ramolino, a beautiful and high-spirited girl, aged fourteen, descended from a well-con- nected family domiciled in Corsica since the middle of the 1 5th century. The first two children, born in 1765 and 1767, died in infancy; Joseph (see below), the first son who survived, was born in 1768, and Napoleon in 1769. The latter was born in the midst of the troubles consequent on the French conquest, Letizia having recently accompanied her husband in several journeys and escapes. Her firm and courageous disposition showed itself at that trying time and throughout the whole of her singularly varied career. Simple and frugal in her tastes, and devout in thought and manner of life, she helped to bind her children to the life of Corsica, while her husband, a schemer by nature and a Voltairian by conviction, pointed the way to careers in France, the opening up of which moulded the fortunes of the family and the destinies of Europe. He died of cancer in the stomach at Montpellier in 1785.

Letizia lived to witness the glory and the downfall of her great son, surviving Napoleon I. by sixteen years. She never accom- modated herself to the part she was called on to play during the Empire, and, though endowed with immense wealth and distinguished by the title of Madame Mere, lived mainly in retirement, and in the exercise of a strict domestic economy which her early privations had made a second nature to her, but which rendered her very unpopular in France and was dis- pleasing to Napoleon. After the events of 1814 she joined the

emperor in the island of Elba and was privy to his plans of escape, returning to Paris during the Hundred Days. After the final downfall of Waterloo, she took up her residence at Rome, where Pope Pius VII. treated her with great kindness and consideration, and protected her from the suspicious attentions of the powers of the Grand Alliance. In 181 8 she addressed a pathetic letter to the powers assembled at the congress of Aix, petitioning for Napoleon's release, on the ground that his mortal illness had removed any possibility of his ever again becoming a menace to the world's peace. The letter remained unanswered, the powers having reason to believe that it was a mere political move, and that its terms had been previously concerted with Napoleon. Henceforth, saddened by the death of Napoleon, of her daughters Pauline and Elisa, and of several grandchildren, she lived a life of mournful seclusion. In 1829 she was crippled by a serious fall, and was all but blind before her death in 1836.

For the Bonaparte family in general, and Carlo and Letizia, see Storia

genealogica della famiglia Bonaparte, delta sua origine fi.no all' estinzione del ramo gid esisente nella cittd di S. Miniato, scritta da un Samminiatese (D. Morali) (Florence, 1 846) ; F. de Stefani, Le antichitd dei Bonaparte; precede per una introduzione (L. Beretta) (Venice, 1857) ; L. Ambrosini and A. Huard, La Famille imperiale. Hist, de la famille Bonaparte depuis son origine jusqu'en i860 (Paris, i860) ;

C. Leynadier, Histoire de la famille Bonaparte de Van 1050 a. I' an 1848 (continuee jusqu'en 1866 par de la Brugere) (Paris, 1866) ; A. Klein- schmidt, Die Eliern und Geschwister Napoleons I. (Berlin, 1876);

D. A. Bingham, The Marriages of the Bonapartes (2 vols., London, 1881) ; F. Masson, Napoleon et sa famille (4 vols., Paris, 1897-1900) ; A. Chuquet, La Jeunesse de Napoleon (3 vols., Paris, 1897-1899); T. Nasica, Memoires sur I'enfance et la jeunesse de NapoUon jusqu'd, I'dge de vingt-trois ans; precedes d'une notice historique sur son pere; Baron H. Larrey, Madame Mere (2 vols., Paris, 1892); Clara Tschudi, Napoleons Mutter: aus dem Norwegischen ubersetzt von H. von Lenk (Leipzig, 1901).

The brothers and sisters of Napoleon I., taken m order of age, are the following: —

I. Joseph (1768-1844), was born at Corte in Corsica, on the 7th of January 1768. He was educated at the college at Autun in France, returned to Corsica in 1784, shortly after the death of his father, and thereafter studied law at ^° h ’”°°’ s the university of Pisa. He became a barrister at an a Bastia in June 1788, and was soon elected a councillor sisters: of the municipality of Ajaccio. Like his brothers, {• Jose P h Napoleon and Lucien, he embraced the French or parte ~ . democratic side, and on the victory of the Paolist party fled with his family from Corsica and sought refuge in France. After spending a short time in Paris, where he was disgusted with the excesses of the Jacobins, he settled at Marseilles and married Mile Julie Clary, daughter of a merchant of that town. The Bonapartes moved from place to place, mainly with the view of concerting measures for the recovery of Corsica. Joseph took part in these efforts and went on a mission to Genoa in 1795. In 1796 he accompanied his brother Napolegn in the early part of the Italian campaign, and had some part in the negotiations with Sardinia which led to the armistice of Cherasco (April 28), the news of which he bore to the French government. Later he proceeded to Leghorn, took part in the French expedition for the recovery of Corsica, and, along with the

commissioner of the French Republic, Miot de Melito, helped in the reorganization of that island. In March 1797 he was ap- pointed by the Directory, minister to the court of Parma, and early in the summer he proceeded to Rome in the same capacity. Discords arose between the Vatican and the French Republic, and it is clear that Napoleon and the French Directory ordered Joseph to encourage revolutionary movements in Rome. On the 28th of December 1797 a disturbance took place opposite the French embassy, which led to the death of the French general, Leonard Duphot. Joseph at once left Rome, which soon became a republic. Repairing to Paris, he entered on parliamentary life, becoming one of the members for Corsica in the Council of Five Hundred. He made no mark in the chamber and retired in 1799.

Before the coup d'etat of Brumaire he helped Napoleon in making overtures to Sieyes and Moreau, but otherwise did little. Thereafter he refused to enter the ministry, but became a member

of the council of state and of the Corps Lfgislatif, where his advice on the state of public opinion was frequently useful. He had a hand in the negotiations for the Concordat, but, according to Lucien Bonaparte, looked on that measure as " ill-advised and retrograde." His services in the diplomatic sphere were more important. At Mortfontaine, his country-house, he con- cluded with the envoy of the United States a convention which bears that name (1800). He also presided over the negotiations which led to the treaty of Luneville with Austria (February 9, 1801); and he and Maret represented France in the lengthy discussions with the British envoy, Lord "Cornwallis, which resulted in the signature of the treaty of Amiens (March 25, 1802). This diplomatic triumph in its turn led to the con- solidation of Napoleon's power as First Consul for life (August 1, 1802) with the chief voice in the selection of his successor. On this question the brothers disagreed. As neither Joseph nor Napoleon had a male heir, the eldest brother, whose ideas of primogeniture were very strict, claimed to be recognized as heir, while Napoleon wished to recognize the son of Louis Bonaparte. On the proclamation of the French empire (May 1804) the friction became acute. Napoleon offered to make Joseph king of Lombardy if he would waive all claim of suc- cession to the French throne, but met with a firm refusal.

Meanwhile Joseph had striven earnestly, but in vain, to avert a

rupture with England, which came about in May 1803. In 1805 he acted as chief of the French government while Napoleon was campaigning in Germany. Early in 1806 he proceeded to Naples with a French force in order to expel the Bourbon dynasty from southern Italy, Napoleon adding the promise that the Neapolitan crown would be for Joseph if he chose to accept it. The conquest of the mainland was speedily effected, though Gaeta, Reggio and the rock of Scylla held out for some months. The Bourbon court retired to Sicily, where it had the protection of a British force. By the decree of the 30th of March 1806 Napoleon proclaimed Joseph king of Naples, but allowed him to keep intact his claims to the throne of France. In several letters he enjoined his brother to greater firmness in his administration: " These peoples in Italy, and in general all nations, if they do not find their masters, are disposed to re- bellion and mutiny." The memoirs of Count Miot de Melito, whom Joseph appointed minister of war, show how great were the difficulties with which the new monarch had to contend — an almost bankrupt treasury, a fickle and degraded populace, Bourbon intrigues and plots, and frequent attacks by the British from Sicily. General Stuart's victory at Maida (July 3) shook Joseph's throne to its base; but the surrender of Gaeta soon enabled Massena to march southwards and subdue Calabria. During his brief reign at Naples, Joseph effected many improve- ments; he abolished the relics of feudalism, reformed the monastic orders, reorganized the judicial, financial and educa- tional systems, and initiated several public works. In everything he showed his desire to carry out the aims which he expressed to his consort in April 1806: " Justice demands that I should make this people as happy as the scourge of war will permit."

From these well-meant, but not alwayfe successful, efforts he was suddenly called away by Napoleon to take the crown of Spain (May 1808). There his difficulties were far greater. Despite the benevolent intentions announced to the Spaniards in his proclamation dated Bayonne, 23rd of June 1808, all reconciliation between them and the French was impossible after Napoleon's treatment of their de facto king, Ferdinand VII. For the varying fortunes of King Joseph in Spain and in the eventful years of the Peninsular War, see Spain and Peninsular War. His sovereignty was little more than titular. Compelled to leave Madrid hastily in August 1808, owing to the Spanish success at Baylen, he was reinstated by Napoleon at the close of the year; and he was thereafter kept in a subordinate position which led him on four occasions to offer to abdicate. The emperor took no notice of these offers, and ordered him to govern with more energy. Between February and May 18 10 the emperor placed the

northern and north-eastern provinces under the command of French generals as military districts, virtually IV. 7

independent of Joseph's authority. Again the king protested, but in vain. As his trusted adviser, Miot de Melito, observed in his memoirs, Joseph tried to be constitutional king of Spain, whereas after the experience of the years 1808- 1809 he could only succeed in the Peninsula by becoming " the mere instrument of a military power." " Bearing a title which was only an oppressive burden, the king had in reality ceased to exist as a monarch, and barely retained some semblance of authority over a small part of the French army as a general. Reduced by the exhausted state of his treasury to the last extremity he at length seriously thought of departure." Joseph took this step in April 181 1, and proceeded to Paris in order to extort better terms, or offer his abdication; but he had to return with a monthly subsidy of 500,000 francs and the promise that the army of the centre (the smallest of the five French armies) should be under his control. Late in that year Napoleon united Catalonia to France. Wellington's victory at Salamanca (July 22, 1812) compelled Joseph to leave his capital; and despite the retirement of the British in the autumn of that year, Joseph's authority never fully recovered from that blow. The end of his nominal rule came in the next year, when Wellington utterly overthrew the chief French army, commanded by King Joseph and Marshal Jourdan, at Vittoria (June 21, 18 13). The king fled from Spain, was disgraced by Napoleon, and received the order to retire incognito to Mortfontaine. The emperor wrote to the minister of war (July ir, 1813): — "His [Joseph's] behaviour has never ceased bringing misfortune upon my army; it is time to make an end of it."

Napoleon was equally dissatisfied with his brother's conduct as lieutenant-general of France, while he himself was conducting the campaign of 18 14 in the east of France. On the 30th of March, Joseph empowered Marmont to make a truce with the assailants of Paris if they should be in overpowering strength. On the surrender of the capital Joseph at once retired. The part which he played during the Hundred Days (181 5) was also insignificant. It is strange that, four days after Waterloo, Napoleon should have urged him to inspirit the Chamber of Deputies with a view to a national resistance (Lettres nouvelles de Napoleon) . In point of fact Joseph did little beyond seeking to further the emperor's plans of escape to America. After the surrender of his brother to the captain of H.M.S. " Bellerophon " at Rochefort, Joseph went to the United States. Settling in Bordentown, New Jersey, he adopted the title of comte de Survilliers, and sought to promote plans for the rescue of his brother from St Helena. In 1830 he

pleaded, but unsuccessfully, for the recognition of the claims of the duke of Reichstadt (king . of Rome) to the French throne. He afterwards visited England, and for a time resided at Genoa and Florence. In the latter city, the cradle of his race, he died on the 28th of July 1844. In person he somewhat resembled Napoleon, but utterly lacked his strength and energy. He was fitted for an embassy or judgeship, but was too mild, supine and luxurious for the tasks thrust upon him by his brother. Yet his correspondence and memoirs prove that he retained for Napoleon warm feelings of affection.

Of the many works dealing with Joseph Bonaparte we may cite Baron A. du Casse, Memoires et correspondance politique et mxlitaire du roi Joseph (10 vols., Paris, 1854), and Les Rois freres de Napoleon (1883); J. S. C. Abbott, History of Joseph Bonaparte (New York, 1869); G. Bertin, Joseph Bonaparte in America; Joseph Bonaparte juge par ses contemporains (anon.) ; the Memoirs of Count Miot de Melito (translation, edited by General Fleischmann, 2 vols., 1881); R. M. Johnston, The Napoleonic Empire in Southern Italy (2 vols., with an excellent bibliography, London, 1904) ; Correspondence of Napoleon with Joseph Bonaparte (2 vols., New York, 1856); Baron A. du Casse, Histoire des . . . traites de Mortfontaine, de Luneville et d'Amiens,_ &c. (1855-1857); F. Masson, Napoleon et sa famille (4 vols., Paris, 1889-1900).

II. Lucien (1775-1840), prince of Canino, was born at Ajaccio on the 2 1st of May 1775. He followed his elder brothers to the schools of Autun and Brienne. At that time he b' ^". " wished to enter the French army, but, being debarred parte. by defective sight, was destined for the church, and with this aim in view went to the seminary at Aix in Provence (1 786) . His excitable and volatile disposition agreed ill with the

discipline of the place, and on the outbreak of the Revolution in 1789 he eagerly espoused the democratic and anti-clerical move- ment then sweeping over France. On returning to Corsica he became the leading speaker in the Jacobin club at Ajaccio. Pushing even Napoleon to more decided action, Lucien urged his brothers to break with Paoli, the leader of the more con- servative party, which sought to ally itself with England as against the regicide republic of France. He headed a

Corsican deputation which went to France in order to denounce Paoli and to solicit aid for the democrats; but, on the Paolists gaining the upper hand, the Bonapartes left the island and joined Lucien at Toulon. In the south of France he worked hard for the Jacobinical cause, and figured as ” Brutus ” in the Jacobin club of the small town of St Maximin (then renamed Marathon). There on the 4th of May 1794 he married Mile Catherine Boyer, though he was a minor and had not the consent of his family — an act which brought him into a state almost approach- ing disgrace and penury. The coup d’etat of Thermidor (July 28, 1794) compelled the young disciple of Robespierre hurriedly to leave St Maximin, and to accept a small post at St Chamans. There he was arrested and imprisoned for a time until Napoleon’s influence procured his release, and further gained for him a post 1 as commissioner in the French army campaigning in Germany. Lucien soon conceived a dislike for a duty which opened up no vista for his powers of oratory and political intrigue, and repaired to Corsica. In the hope of being elected a deputy of the island, he refused an appointment offered by Napoleon in the army of Egypt in 1798. His hopes were fulfilled, and in 1798 he entered the Council of Five Hundred at Paris. There his vivacious eloquence brought him into prominence, and he was president of that body on the eventful day of the 19th of Brumaire (November 10) 1799, when Napoleon overthrew the national councils of France at the palace of St Cloud. The refusal of Lucien to put the vote of outlawry, for which the majority of the council clamoured, his opportune closing of the sitting, and his appeal to the soldiers outside to disperse les representants du poignard, turned the scale in favour of his brother.

By a strange irony this event, the chief event of Lucien’s life, was fatal to the cause of democracy of which he had been the most eager exponent. In one of his earlier letters to his brother Joseph, Lucien stated that he had detected in Napoleon ” an ambition not altogether egotistic but which surpassed his love for the general weal; ... in case of a counter-revolution he would try to ride on the crest of events.” Napoleon having by his help triumphed over parliamentary institutions in France, Lucien’s suspicion of his brother became a dominant feeling; and the relations between them became strained during the period of the consulate (1799-1804). He accepted office as minister of the interior, but was soon deprived of it owing to political and personal differences with the First Consul. In order to soften the blow, Napoleon appointed him ambassador to the court of Madrid (November 1800). There again Lucien displeased his brother. France and Spain were then about to partition Portugal, and the Spanish forces were beginning to invade that land, when the court of Lisbon

succeeded, owing (it is said) to the free use of bribes, in inducing Godoy, the Spanish minister, and Lucien Bonaparte to sign the preliminaries of peace on the 6th of June 1801 at Badajoz. The First Consul, finding his plans of seizing Lisbon frustrated, remonstrated with his brother, who thereupon resigned his post, and returned to Paris, there taking part in the opposition which the Tribunate offered to some of Napoleon's schemes. Lucien's next proceeding completed the breach between the two brothers. His wife had died in 1800; he became enamoured of a Mme Jouberthou in the early summer of 1802, made her his mistress, and finally, despite the express prohibition of the First Consul, secretly married her at his residence of Plessis (on October 23, 1803). At that time Napoleon was pressing Lucien for important reasons of state to marry the widow of the king of Etruria, and on hearing of his brother's action he ordered him to leave French territory. Lucien departed for Italy with his wife and infant son, after annoying Napoleon by bestowing on her publicly the

name of Bonaparte. He also charged Joseph never to try to reconcile Napoleon to him.

For some years he lived in Italy, chiefly at Rome, showing marked hostility to the emperor. In December 1807 the latter sought to come to an arrangement by which Lucien would take his place as a French prince, provided that he would annul his marriage. This step Lucien refused to take; and after residing for some time at his estate of Canino, from which he took the papal title of prince of Canino,. he left for America. Captured by a British ship, he was taken to Malta and thence to England, where he resided under some measure of surveillance up to the peace of 1814. Returning to Rome, he offered Napoleon his help during the Hundred Days (1815), stood by his side at the " Champ de Mai " at Paris, and was the last to defend his prerogatives at the time of his second abdication. He spent the rest of his life in Italy, and died at Rome on the 29th of June 1840. His family comprised four sons and six daughters. He wrote an epic, Charlemagne, ou I'Eglise delivree (2 vols., 1814), also La Verile sur les Cent Jours and Memoirs, which were not completed.

For sources see T. Jung, Lucien Bonaparte et ses memoires (3 vols., Paris, 1 882-1 883); an anonymous work, Le Prince Lucien Bona- parte et sa famille (Paris, 1888); F. Masson, Napoleon et sa famille (4 vols., Paris, 1897-1900), and H. Houssaye, " 1815 " (3 vols., Paris, 1 899- 1 905).

III. Marianne Elisa (1777ˆ1820) was born at Ajaccio on the 3rd of January 1777. Owing to the efforts of her brothers she entered the establishment of St Cyr near Paris as a ” king’s scholar.” On its disruption by the revolutionists in 1792 Napoleon took charge of her and brought her back to Ajaccio. She. shared the fortunes of the family in the south of France, and on the 5th of May 1797 married Felix Bacciochi, a well-connected Corsican. In 1805, after the foundation of the French empire, Napoleon bestowed upon her the principality of Piombino and shortly afterwards Lucca; in 1808 her importunities gained for her the grand duchy of Tuscany. Bacciochi being almost a nullity, her pride and ability had a great influence on the administration and on Italian affairs in general. Her relations with Napoleon were frequently strained; and in 1813-1814 she abetted Murat in his enterprises (see Murat). After her brother’s fall she retired, with the title of countess of Compignano, first to Bologna and afterwards to Santo Andrea near Trieste,, where she died on the 6th of August 1820.

See J. Turquan, Les Sceurs de Napoleon (Paris, 1896) ; P. Mar-mothan, Eiisa Bonaparte (Paris, 1898); E. Rodocanachi, Elisa Bonaparte en Italie (Paris, 1900) ; F. Masson, Napoleon et sa famille (4 vols., Paris, 1897-1900).

IV. Louis (1 778-1846) was born at Ajaccio on the 2nd of September 1778. His elder brother Napoleon supervised

his education with much care, gaining for him scholar- * Louis ships to the royal military schools of France, and during the time when the elder brother was a lieutenant in garrison at Auxonne Louis shared his scanty fare. In 1795 Napoleon procured for him admission to the military school at Chalons, and wrote thus of the boy: — ” I am very pleased with Louis; he fulfils my hopes; intelligence, warmth, good health, talent, good address, kindness — he possesses all these qualities.” Louis went through the Italian campaign of 1796-97 with Napoleon and acted as his aide-de-camp in Egypt in 1798-99. In 1802 the First Consul married him to Hortense Beauharnais, a forced union which led to most deplorable results. In 1804 Louis was raised to the rank of general, and entered the council of state in order to perfect his knowledge of administrative affairs. In the next year he became governor of Paris and under- took various military and administrative duties.

After the victory of Austerlitz (December 2, 1805) Napoleon began to plan the formation of a ring of states surrounding, and in close alliance with, the French empire. He destined Louis for the throne of

Holland, and proclaimed him king of that country on the 6th of June 1806. From the first the emperor reproached him with being too easy with his subjects and with courting popularity too much. The increasing rigour of the continental

system brought the two brothers to an open rupture. Their relations were embittered by a violent jealousy which Louis conceived against his wife. In 1808 the emperor offered Louis the throne of Spain then vacant; but on Louis refusing to accept it the honour went to Joseph. The dispute between Louis and the emperor continued. In the latter part of 1809 Napoleon virtually resolved to annex Holland, in order to stop the trade which the Dutch secretly carried on with England. At the close of the year Louis went to Paris, partly in order to procure a divorce from Hortense and partly to gain better terms for Holland. He failed in both respects. In January 1 8 10 Napoleon annexed the island of Walcheren, alleging that Louis had not done his share in defending the interests of France at the time of the British Walcheren expedition (1809). The French troops also occupied Breda and Bergen-op-Zoom. Louis gave way on all the points in dispute; but his acquiescence only postponed the crisis. After the collapse of negotiations with Great Britain in the spring of 1810, the emperor again pressed Louis hard, and finally sent French troops against the Dutch capital. Thereupon Louis, despairing of offering resistance, fled from his kingdom and finally settled at Toplitz in Bohemia. On the 9th of July 18 10 Napoleon annexed Holland to the French empire. Louis spent the rest of his life separated from his wife, and in 181 5 gained the custody of his elder son. He lived chiefly at Rome, concerning himself with literary and philosophic studies and with the fortunes of his sons. Their devotion to the national and democratic cause in Italy in 1830-183 1 gave him much pleasure, which was overclouded by the death of the elder, Napoleon Louis, in the spring campaign of 183 1 in the Romagna. The failure of his other son, Charles Louis Napoleon (afterwards Napoleon III.), to wrest the French crown from Louis Philippe by the attempts at Strassburg and Boulogne also caused him much disappointment. He died on the 25th of July 1846 and was buried at St Leu. Under more favourable conditions Louis would have gained a name for kindness and philanthropy, proofs of which did indeed appear during his reign in Holland and gained him the esteem of his subjects; but his morbid sensitiveness served to embitter his

relations both of a domestic and of a political nature and to sour his own disposition. His literary works are unimportant. His sons were Napoleon Charles (1802-1807), Napoleon Louis (1804- 1831), and Charles Louis Napoleon (1808-1873), afterwards emperor of the French as Napoleon III. (?.».)•

The chief works on the life and reign of Louis are le comte de Saint-Leu, Documents historiques et reflexions sur le gouvernement de la Hollande 3 vols., 2nd ed., Paris, 1820) ; F. Rocquain, Napoleon I er et le Roi Louis, d'apres les documents conserves aux archives nationales (Paris, 1875); Baron A. du Casse, Les Rois freres de Napoleon (Paris, 1883) ; A Gamier, La Cour de Hollande sous le regnede Louis Bonaparte, par un auditeur (Paris and Amsterdam, 1823) ; T. Jorissen, Napoleon I" et le roi de Hollande (1806-1813) d'apres des documents authentiques et inedits (Paris and The Hague, 1868); V. Loosjes, Louis Bonaparte, Koning van Holland (Amsterdam, 1888); L. Wichers, De Regeering van Koning Lodewijk Napoleon (1806-1810) (Utrecht, 1892); F. Masson, Napoleon et sa famille (4 vols., Paris, 1897-1900).

V. Marie Pauline (1780-1825), the gayest and most beautiful member of the family, was born at Ajaccio on the 5. Pauline. 20t ˆ °* October 1780. At seventeen years of age she married General Leclerc, a staff officer of Napoleon, and accompanied him to St Domingo, where he died of yellow fever in 1802. Returning to Paris she espoused Prince Camillo Borghese (August 23, 1803) and went to reside with him in Rome. She soon tired of him, returned to Paris and gratified her whims in ways that caused some scandal. In 1806 she received the title of duchess of Guastalla. Her offhand treatment of the new empress, Marie Louise, in 18 10 led to her removal from court. Neverthe- less in 1814 she repaired with "Madame Mere " to Elba, and is said to have expressed a wish to share Napoleon's exile in St Helena. She died in 1825 of cancer. Canova's statue of her as Venus reclining on a couch is well known.

See J. Turquan, Les Sceurs de Napoleon: les princesses Ulisa, Pauline et Caroline (Paris, 1896); F. Masson, Napoleon et sa famille (4 vols., Paris, 1897-1900).

VI. Maria Annunciata Caroline (1 782-1839) was born at Ajaccio on the 25th of March 1782. Early in 1800 she married Joachim Murat, whose interests she afterwards advanced with all the power of her ambitious and Murat. "* intriguing nature. He became governor of Paris, marshal of France (1804), grand duke of Berg and of Cleves (1806), lieutenant of the emperor in Spain (1808), and early in the summer of that year king of Naples. The distance of this capital from

Paris displeased Caroline; her relations with Napoleon became strained, and she associated herself with the equivocal movements of her husband in 1814-1815. Before his tragic end at Pizzo on the 13th of October 1815, she had retired to Austrian territory and was placed under some measure of restraint. Finally she lived at Trieste with her sister Elisa. She died on the 18th of May 1839.

See J. Turquan, Caroline Murat, reine de Naples (Paris, 1899); F. Masson, Napoleon et sa famille (4 vols., Paris, 1897-1900). See also under Murat, Joachim.

VII. Jerome (1784-1860) was born at Ajaccio on the 15th of November 1784; he shared the fortunes of the family in the early years of the French Revolution, was then educated at Juilly and was called to the side of his 7 ‘ • ,er ° me brother, then First Consul of France, in 1800. Many par t e . stories are told illustrating his impetuous but affection- ate nature. While in the Consular Guard he fought a duel with the younger brother of General Davout and was wounded. Soon afterwards he was transferred to the navy and cruised in the West Indies, until, when blockaded by a British cruiser, he left his ship and travelled through the United States. At Baltimore he fell in love with Miss Elizabeth Patterson, and,though a minor, married her. This disregard of discipline and of the laws of France greatly annoyed Napoleon; and when in 1805 Jerome brought his wife to Europe, the emperor ordered her to be excluded from his states. Jerome vainly sought to bend his brother’s will in an interview at Alexandria. In May 1805 he received command of a small squadron in the Mediterranean, while his wife proceeded to Camberwell, where she gave birth to a son. In November Jerome sailed in a squadron commanded by Admiral Willaumez, which was to ravage the West Indies ; but it was scattered by a storm. After damaging British commerce in the North Atlantic, Jerome reached France with his ship in safety in August 1806. Napoleon made him a prince of France, and gave him command of a division of South Germans in the campaign of 1806. After Jena, Jerome received the surrender of several Prussian towns. An imperial decree having annulled the Patterson marriage, the emperor united Jerome to the princess Catherine of Wurttemberg; and in pursuance of the terms of the treaty of Tilsit (July 7, 1807) raised him to the throne of the new kingdom of Westphalia. There Jerome, though frequently rebuked by the emperor, displayed his fondness for luxury, indulged in numerous amours and ran deeply into debt. In some respects his kingdom benefited by the connexion with France. Feudalism was abolished; the Code Napoleon was introduced; the Jews were freed from repressive laws; and education received some impulse in its higher departments. But the unpopularity of

Jerome's rule was shown by the part taken by the peasants in the abortive rising headed by Baron Wilhelm von Dornberg and other Westphalian officers in April 1809. Despite heavy taxation, the state debt increased greatly; and the sending of a contingent to Russia in 181 2 brought the state to the verge of bankruptcy. In the early part of that campaign Jerome was entrusted with an important movement which might have brought the southern Russian army into grave danger; on his failure (which was probably due to his lack of energy) the emperor promptly subjected him to the control of Marshal Davout, and Jerome returned to Cassel. In 1813, on the fall of the Napoleonic regime in Germany, Jerome retired to France, and in 1814 spent some time in Switzerland and at Trieste. Returning to France in 1815, he commanded a division on the French left wing at Waterloo and attacked Hougomont with great pertinacity. On Napoleon's second abdication Jerome proceeded to Wurttemberg, was threatened with arrest

unless he gave up his wife and child, and was kept under surveillance at Goppingen; finally he was allowed to proceed to Augsburg, and thereafter resided at Trieste, or in Italy or Switzerland. His consort died in 1835. He returned to France in 1847, and after the rise of Louis Napoleon to power, became succes- sively governor of the Invalides, marshal of France and president of the senate. He died on the 24th of June i860. His children were Jerome Napoleon (see XIV.), Mathilde (see XII.) and Napoleon Joseph Charles Paul (born in 1822); the last was afterwards known as Prince Napoleon (see XI. below) and finally became the heir to the fortunes of the Napoleonic dynasty.

The chief works relating to Jerome Bonaparte are : Baron Albert du Casse, Memoires et correspondance du roi Jerome et de la reine Catherine (7 vols., Paris, 1861-1866) and Les Rois freres de Napoleon (1883); M. M. Kaisenberg, Konig Jerome Napoleon; W. T. R. Saffell, The Bonaparte-Patterson Marriage; August von Schloss- berger, Briefwechsel de- Kbnigin Katharina und des Konigs Jerome von Westfalen mil Konig Friedrich von Wiirttemberg (Stuttgart, 1886-1887). supplemented by du Casse in Corresp. inedite de la reine Catherine de Westphalie (Paris, 1 888-1 893); A. Martinet, Jerome Napoleon, roi de Westfalie (Paris, 1902) ; P. W. Sergeant, The Burlesque Napoleon (1905) ; F. Masson, Napoleon et sa famille (4 vols., Paris, 1 897-1 900). (J. Hl. R.)

The fortunes of the Bonaparte family may be further followed under the later biographies of its leading members, mainly descendants of Lucien (II. above) and Jerome (VII. above).

VIII. Charles Lucien Jules Laurent (1803-1857), prince of Canino, son of Lucien Bonaparte, was a scientist rather than a oe d- politician. He married his cousin, Zenaide Bonaparte, ants ot ” daughter of Joseph, in 1 8 2 2 . At the age of twenty-two Lucien: he began the publication of an American Ornithology 8. Charles. ˆ vo j s>) Philadelphia, 1825-1833), which established his scientific reputation. A series of other works in zoology followed: Iconographia della fauna Itaiica (3 vols., Rome, 1832- 1841), Catalogo metodico degli uccelli europei (1 vol., Bologna, 1842), Catalogo metodico dei pesci europei (1 vol., Naples, 1845, 4to), Catalogo metodico dei mammiferi europei (1 vol., Milan, 1845), Telachorum tabula analytica (Neufchatel, 1838). He was elected honorary member of the academy of Upsala in 1833, of that of Berlin in 1843, and correspondent of the Institute of France in 1844. Towards 1847 he took part in the political agitation in Italy, and presided over scientific congresses, notably at Venice, where he declared himself in favour of the independence of Italy and the expulsion of the Austrians. He entered the Junto of Rome in 1848 and was elected deputy by Viterbo to the national assembly. The failure of the revolution forced him to leave Italy in July 1849. He gained Holland, then France, where he turned again to science. His principal works were, Conspectus systematis ornithologiae, maslozologiae, erpeto- logiae et amphibologiae, Ichthyologiae (Leiden, 1850), Tableau des oiseaux-moitches (Paris, 1854), Ornithologie fossile (Paris, 1858). Eight children survived him: Joseph Lucien Charles Napoleon, prince of Canino (1824-1865), who died without heirs; Lucien Louis Joseph Napoleon, born in 1828, who took holy orders in 1853 and became a cardinal in 1868; Julie Charlotte Zenaide Pauline Laetitia Desiree Bartholomee, who married the marquis of Roccagiovine; Charlotte Honorine Josephine, who married Count Primoli; Marie Desiree Eugenie Josephine Philomene, who married the count Campello ; Auguste Amelie Maximilienne Jacqueline, who married Count Gabrielli; Napoleon Charles Gregoire Jacques Philippe, born in 1839, who married the princess Ruspoli, by whom he had two daughters; and Bathilde Aloyse Leonie, who married the comte de Cambaceres. The branch is now extinct.

IX. Louis Lucien (1813-1891), son of Lucien Bonaparte, was born at Thorngrove, Worcestershire, England, on the 4th of

January 1813. He passed his youth in England, not going to France until 1848, when, after the revolution, he was elected deputy for

Corsica on the 28th of November 1848; his election having been invalidated, he was returned as deputy for the Seine in June 1849. He sat in the right of the Legislative Assembly, but had no direct part in the coup d'etat of his cousin on the 2nd of December 1851. Napoleon III. named him senator and prince, but he took hardly any part in

9. Louis Lucien.

politics during the Second Empire, and after the proclamation of the Third Republic in 1870 he withdrew to England. There he busied himself with philology, and published notably some works on the Basque language: Grammaire basque, Remarques sur plusieurs assertions concernant la langue basque (1876), Observa- tions sur le basque Fontarabie (1878). He died on the 3rd of November 1891, leaving no children.

X. Pierre Napoleon (1815-1881), son of Lucien Bona- parte, was born at Rome on the 12th of September 1815. He began his life of adventure at the age of fifteen, join- ing the insurrectionary bands in the Romagna (1830- 183 1); was then in the United States, where he went to join his uncle Joseph, and in Colombia with General Santander (1832). Returning to Rome he was taken prisoner by order of the pope (1835-1836). He finally took refuge in England. At the revolution of 1848 he returned to France and was elected deputy for Corsica to the Constituent Assembly. He declared himself an out-and-out republican and voted even with the socialists. He pronounced himself in favour of the national workshops and against the loi Falloux. His attitude contributed greatly to give popular confidence to his cousin Louis Napoleon (Napoleon III.), of whose coup d'Uat on the 2nd of December 185 1 he disapproved; but he was soon reconciled to the emperor, and accepted the title of prince. The republicans at once abandoned him. From that time on he led a debauched life, and lost all political importance. He turned to literature and published some mediocre poems. In January 1870 a violent incident brought him again into prominence. As the result of a controversy with Paschal Grousset, the latter sent him two journalists to provoke him to a duel. Pierre Bonaparte took them personally to account, and during a violent discussion he drew his revolver and killed one of them, Victor Noir. This crime greatly excited the republican press, which demanded his trial. The High Court acquitted him, and criticism then fell upon the government. Pierre Bonaparte died in obscurity at Versailles on the 7th of April 1881. He had married the daughter of a Paris working-man, Justine Eleanore Ruffin, by whom he had, before his marriage, two children: (1) Roland Napoleon, born on the 19th of May 1858, who entered the army, was excluded from it in 1886, and then

devoted himself to geography and scientific explorations; (2) Jeanne, wife of the marquis de Vence.

XL Napoleon Joseph Charles Paul, commonly known as Prince Napoleon, or by the sobriquet of ” Plon-Plon,” l (1822-1891), was the second son of Jerome Bona- parte, king of Westphalia, by his wife Catherine, prin- Desce ” am cess of Wiirttemberg, and was born at Trieste on the j er0 me: 9th of September 1822. He soon rendered himself //. Prince popular by his advanced democratic ideas, which Napoleon he expressed on all possible occasions. After the pˆT French revolution of 1848 he was elected to the National Assembly as a representative of Corsica, and (his elder brother, Jerome Napoleon Charles, dying in 1847) assumed the name of Jerome. Notwithstanding his ostensible opposition to the coup d’itat of 185 1, he was designated, upon the establish- ment of the Empire, as successor to the throne if Napoleon III. should die childless, and received a liberal dotation, but was allowed no share in public affairs. Privately he professed him- self the representative of the Napoleonic tradition in its demo- cratic aspect, and associated mainly with men of advanced political opinions. At court he represented the Liberal party against the empress Eugenie. In 1854 he took part in the Crimean campaign as general of division. His conduct at the battle of the Alma occasioned imputations upon his personal courage, but they seem to have been entirely groundless. Re- turning to France he undertook the chief direction of the National Exhibition of 1855, in which he manifested great capacity. In 1858 he was appointed minister for the Colonies and Algeria, and his administration aroused great hopes, but his activity was diverted into a different channel by his sudden marriage

1 Derivea, it is supposed, from the nickname “Plomb-plomb,” or “Craint-plomb” (fear-lea4) , given- bim by his soldiers in the Crimea.

in January 1859 with the princess Marie Clo tilde of Savoy, daughter of Victor Emmanuel, a prelude to the war for the liberation of Italy. In this war Prince Napoleon commanded the French corps that occupied Tuscany, and it was expected that he would become ruler of the principality, but he refused to exert any pressure upon the inhabitants, who preferred union with the Italian kingdom. The next few years were chiefly distinguished by remarkable speeches which displayed the prince in the unexpected character of a great orator. Unfortunately

his indiscretion equalled his eloquence: one speech (1861) sent him to America to avoid a duel with the duke d'Aumale; another (1865), in which he justly but intemperately protested against the Mexican expedition, cost him all his official dignities. Never- theless he was influential in effecting the reform by which in 1869 it was sought to reconcile the Empire with Liberal principles. The fatal war of 1870 was resolved upon during his absence in Norway, and was strongly condemned by him. After the first disasters he undertook an ineffectual mission to Italy to implore the aid of his father-in-law; and after the fall of the Empire lived in comparative retirement until in 1879 the death of Napoleon III.'s son, the Prince Imperial (see XIII. below), made him direct heir to the Napoleonic succession. His part as imperial pretender was unfortunate and inglorious: his demo- cratic opinions were unacceptable to the imperial party, and before his death he was virtually deposed in favour of his son Prince Napoleon Victor, who, supported by Paul de Cassagnac and others, openly declared himself a candidate for the throne in 1884. He died at Rome on the 17th of March 1891. In the character of his intellect, as in personal appearance, he bore an extraordinary resemblance to the first Napoleon, possessing the same marvellous lucidity of insight, and the same gift of infallibly distinguishing the essential from the non-essential. He was a warm friend of literature and art, and in a private station would have achieved high distinction as a man of letters.

His eldest son, Prince Napoleon Victor Jerome Frederic (b. 1862), became at his death the recognized head of the French Bonapartist party. The second son, Prince Louis Napoleon, an officer in the Russian army, showed a steadier disposition, and was more favoured in some monarchist quarters; in 1906 he was made governor of the Caucasus.

XII. Mathilde Letitia Wilhelmine (1820-1904), daughter of Jerome, and sister of Prince Napoleon (XL), was born at

Trieste on the 20th of May 1820; after being almost Mathilde. betrothed to her cousin Louis Napoleon, in 1840 she

was married to Prince Anatole Demidov. His conduct, however, led to a separation within five years, and the tsar Nicholas compelled him to make Princess Mathilde a handsome allowance. After the election of Louis Napoleon to the presi- dency of the republic she took up her residence in Paris, and did the honours of the Elysee till his marriage. She continued to live in Paris, having great influence as a friend and patron of men of art and letters, till her death on the 2nd of January 1904. '

XIII. Napoleon Eugene Louis Jean Joseph (1856-1879), Prince Imperial, only son of the emperor Napoleon III. and the

. _. empress Eugenie, was born at Paris on the 16th of imperial: March 1 8 56. He was a delicate boy, but when the son of war of 1870 broke out his mother sent him to the army, Napoleon to wm popularity for him, and the government journals vaunted his bravery. After the first defeats he had to flee from France with the empress, and settled in England at Chislehurst, completing his military education at Woolwich. On the death of his father on the 9th of January 1873 the Imperialists proclaimed him Napoleon IV., and he became the official Pretender. He was naturally inactive, but he was influenced by his mother on the one hand, and by the Bonapartist leaders in France on the other. They thought that he should win his crown by military prestige, and he was persuaded to attach himself as a volunteer to the English expedition to Zulu- land in February 1879. It was a blunder to have allowed him to go, and the blunder ended in a tragedy, for while out on a reconnaissance with a few troopers they were surprised by Zulus,

and the Prince Imperial was killed (June 1, 1879). His body was brought back to England, and buried at Chislehurst.

XIV. The Bonapartes of Baltimore are a branch of the family settled in America, descended from Jerome Bonaparte (VII.) by his union with Elizabeth (b. 1785), daughter of William Patterson, a Baltimore merchant, probably descended from the Robert Paterson who was the original of Sir Walter Scott's " Old Mortality." The marriage took place at Baltimore on the 24th of December 1803, but it was greatly disliked by Napoleon, who refused to recognize its legality. However, it was valid according to American law, and Pope Pius VII. refused to declare it void. Nevertheless Jerome was forced by his brother to separate himself from his wife, whom he had brought to Europe, and after a stay in England Madame Patterson, or Madame Bona- parte, as she was usually called, returned to Baltimore. She died in 1879. Jerome's only child by this marriage was Jerome Napoleon Bonaparte (1805-1870), who was born in England, but resided chiefly in Baltimore, and is said to have shown a marked resemblance to his uncle, the great emperor. He was on good terms with Jerome, who for some time made him a large allowance, and father and son occasionally met. His elder son, also called Jerome Napoleon Bonaparte (183 2-1893), entered the French army, with which he served in the Crimea and in Italy.

Charles Joseph Bonaparte (b. 1851), younger son of the first Jerome

Napoleon Bonaparte, and a grandson of Jerome, king of Westphalia, attained a distinguished place in American politics. Born at Baltimore on the 9th of June 1851 and edu- cated at Harvard University, he became a lawyer in 1874 and has been president of the National Municipal League and has filled other public positions. He was secretary of the navy in President Roosevelt's cabinet from July 1905 to December 1906, and then attorney-general of the United States until March 1909.

BONAR, HORATIUS (1 808-1 889), Scottish Presbyterian divine, was born in Edinburgh on the 19th of December 1808, and educated at the high school and university of his native city. After a term of mission work at Leith, he was appointed parish minister of Kelso in 1837, and at the Disruption of 1843 became minister of the newly formed Free Church, where he remained till 1866, when he went to the Chalmers memorial church, Edin- burgh. He had in 1853 received the D.D. degree from Aberdeen University, and in 1883 he was moderator of the general assembly of his church. He died on the 31st of July 1889. Bonar was a prolific writer of religious literature, and edited several journals, including the Christian Treasury, the Presbyterian Review and the Quarterly Journal of Prophecy; but his best work was done in hymnology, and he published three series of Hymns of Faith and Hope between 1857 and 1866 (new ed., 1886). Nearly every modern hymnal contains perhaps a score of his hymns, including " Go, labour on," " I heard the voice of Jesus say," " Here, O my Lord, I see Thee face to face," " When the weary, seeking rest."

See Horatius Bonar, D.D., a Memorial (iS

BONA VENTURA, SAINT (John of Fidanza), Franciscan theologian, was born in 1221 at Bagnarea in Tuscany. He was destined by his mother for the church, and is said to have received his cognomen of Bonaventura from St Francis of Assisi, who performed on him a miraculous cure. He entered the Franciscan order in 1243, and studied at Paris possibly under Alexander of Hales, and certainly under Alexander's successor, John of Rochelle, to whose chair he succeeded in 1253. Three years earlier his fame had gained for him permission to read upon the Sentences, and in 1255 he received the degree of doctor. So high was his reputation that in the following year he was elected general of his order. It was by his orders that Roger Bacon was interdicted from lecturing at Oxford, and compelled to put himself under the surveillance of the order at Paris. He was instrumental in procuring the election of Gregory X., who rewarded him with the titles of cardinal and bishop of Albano, and insisted on his presence at the great council of Lyons in the year 1274. At this meeting he died.

Bonaventura's character seems not unworthy of the eulo- gistic title, " Doctor Seraphicus," bestowed on him by his

contemporaries, and of the place assigned to him by Dante in his Paradise He was formally canonized in 1482 by Sixtus IV., and ranked as sixth among the great doctors of the church by Sixtus V. in 1587. His works, as arranged in the Lyons edition (7 vols., folio), consist of expositions and sermons, filling the first three volumes; of a commentary on the Sentences of Lombardus, in two volumes, celebrated among medieval theo- logians as incomparably the best exposition of the third part; and of minor treatises filling the remaining two volumes, and including a life of St Francis. The smaller works are the most important, and of them the best are the famous Itinerarium Mentis ad Deum, Breviloquium, De Reductione Artium ad Theo- logiam, Soliloquium, and De septem ilineribus aeternitatis, in which most of what is individual in his teaching is contained.

In philosophy Bonaventura presents a marked contrast to his great contemporaries, Thomas Aquinas and Roger Bacon. While these may be taken as representing respectively physical science yet in its infancy, and Aristotelian scholasticism in its most perfect form, he brings before us the mystical and Platoniz- ing mode of speculation which had already to some extent found expression in Hugo and Richard of St Victor, and in Bernard of Clairvaux. To him the purely intellectual element, though never absent, is of inferior interest when compared with the living power of the affections or the heart. He rejects the authority of Aristotle, to whose influence he ascribes much of the heretical tendency of the age, and some of whose cardinal doctrines — such as the eternity of the world — he combats vigorously. But the Platonism he received was Plato as under- stood by St Augustine, and as he had been handed down by the Alexandrian school and the author of the mystical works passing under the name of Dionysius the Areopagite. Bonaventura accepts as Platonic the theory that ideas do not exist in rerum natura, but as thoughts of the divine mind, according to which actual things were formed; and this conception has no slight influence upon his philosophy. Like all the great scholastic doctors he starts with the discussion of the relations between reason and faith. All the sciences are but the handmaids of theology; reason can discover some of the moral truths which form the

groundwork of the Christian system, but others it can only receive and apprehend through divine illumination. In order to obtain this illumination the soul must employ the proper means, which are prayer, the exercise of the virtues, whereby it is rendered fit to accept the divine light, and medi- tation which may rise even to ecstatic union with God. The supreme end of life is such union, union in contemplation or intellect and in intense absorbing love; but it cannot be entirely reached in this life, and remains as a hope for futurity. The mind in contemplating God has three distinct aspects, stages or grades — the senses, giving empirical knowledge of what is without and discerning the traces (vestigia) of the divine in the world; the reason, which examines the soul itself, the image of the divine Being; and lastly, pure intellect (intelligentia), which, in a transcendent act, grasps the Being of the divine cause. To these three correspond the three kinds of theology — theologia symbolica, theologia propria and theologia mystica. Each stage is subdivided, for in contemplating the outer world we may use the senses or the imagination; we may rise to a knowledge of God per vestigia or in vesiigiis. In the first case the three great properties of physical bodies — weight, number, measure, — in the second the division of created things into the classes of those that have merely physical existence, those that have life, and those that have thought, irresistibly lead us to conclude the power, wisdom and goodness of the Triune God. So in the second stage we may ascend to the knowledge of God, per imaginem, by reason, or in imagine, by the pure understanding (intellectus); in the one case the triple division — memory, understanding and will, — in the other the Christian virtues — faith, hope and charity, — leading again to the conception of a Trinity of divine qualities — eternity, truth and goodness. In the last stage we have first intelligentia, pure intellect, contem- plating the essential being of God, and finding itself compelled by necessity of thought to hold absolute being as the first notion,

for non-being cannot be conceived apart from being, of which it is but the privation. To this notion of absolute being, which is perfect and the greatest of all, objective existence must be ascribed. In its last and highest form of activity the mind rests in the contemplation of the infinite goodness of God, which is apprehended by means of the highest facidty, the apex mentis or synderesis. This spark of the divine illumination is common to all forms of mysticism, but Bonaventura adds to it peculiarly Christian elements. The complete yielding up of mind and heart to God is unattainable without divine grace, and nothing renders us so fit to receive this gift as the meditative and ascetic life of the cloister. The monastic life is the best means of grace.

Bonaventura, however, is not merely a meditative thinker, whose works may form good manuals of devotion; he is a dogmatic theologian of high rank, and on all the disputed questions of scholastic thought, such as universals, matter, the principle of individualism, or the intellectus agens, he gives weighty and well-reasoned decisions. He agrees with Albertus Magnus in regarding theology as a practical science; its truths, according to his view, are peculiarly adapted to influence the affections. He discusses very carefully the nature and meaning of the divine attributes; considers universals to be the ideal forms pre-existing in the divine mind according to which things were shaped; holds matter to be pure potentiality which receives individual being and determinateness from the formative power of God, acting according to the ideas; and finally maintains that the intellectus agens has no separate existence. On these and on many other points of scholastic philosophy the Seraphic Doctor exhibits a combination of subtilty and moderation which makes his works peculiarly valuable.

Editions. — 7 vols., Rome, 1588-1596; 7 vols., Lyons, 1668; 13 vols., Venice, 1751 ff. ; by A. C. Peltier, 15 vols., Paris, 1863 ff. ; 10 vols.,. Rome, 1882-1892. K. J. Hefele edited the Breviloquium and the Itin. Mentis (3rd ed., Tubingen, 1862); two volumes of selections were issued by Alix in 1853-1856.

Literature. — W. A. Hollenberg, Studien zu Bonaventura (1862) ; F. Nitzsch, art. in Herzog-Hauck, Realencyk. fur prot. Theol., where a list of monographs is given, to which add one by De Chevance (1899). (R. Ad.;X.)

BONCHAMPS, CHARLES MELCHIOR ARTUS, Marquis de (c. 1 760-1 793), Vendean leader, was born at Jouverteil, Anjou. He gained his first military experience in the American War of Independence, and on his return to France was made a captain of grenadiers in the French army. He was a staunch upholder of the monarchy, and at the outbreak of the French Revolution resigned his command and retired to his chateau at St Florent. In the spring of 1793 he was chosen leader by the insurgents of the Vendee, and to his counsels may be attributed in great measure the success of the peasants' arms. He was present at the taking of Bressuire, Thouars and Fontenay, at which last place he was wounded; but dissensions among their leaders weakened the insurgents, and at the bloody battle of Cholet (October 1793) the Vendeans sustained a severe defeat and Bonchamps was mortally wounded. He died the next day. It is said that his last act was the pardoning of five thousand republican prisoners, whom his troops had sworn to kill in revenge for his death. A statue of him by David d' Angers stands in the church of St Florent.

BOND, SIR EDWARD AUGUSTUS (1815-1898), English librarian, was born at Hanwell on the 31st of December 1813, the son of a schoolmaster. He was educated at Merchant Taylors' school, and in 1832 obtained a post in the*public record office. In 1838 he became an assistant in the Manuscript department of the British Museum, ˆwhere he attracted the notice of his chief, Sir Frederick Madden, the most eminent palaeographer of his day, and in 1852 he was made Egerton librarian. In 1856 he became assistant keeper of MSS., and in 1867 was promoted io the post of keeper. His work in re- organizing the manuscript department was of lasting value, and to him is due the classified catalogue of MSS., and the improved efficiency and punctuality of publication of the department. In 1878 he was appointed principal librarian. Under his supervision were erected the new buildings of the

" White Wing," which provide accommodation for prints, drawings, manuscripts and newspapers, and the purchase of the Stowe MSS. was concluded while he remained in office. He founded, in conjunction with Sir E. Maunde Thompson, the Palaeographical Society, and first made classical palaeography an exact science. He was made LL.D. of Cambridge in 1879, created C.B. in 1885, and K.C.B. the day before his death on the 2nd of January 1898. He was the editor of four volumes of facsimiles of Anglo-Saxon charters from 679 to the Conquest, The Speeches in the Trial of Warren Hastings (1859-1861), and a number of other interesting historic documents.

BOND, 1 in English law, an obligation by deed. Its design is to secure that the obligor, i.e. the person giving the bond, will either pay a sum of money, or do or refrain from doing some act ; and for this purpose the obligor binds himself in a penalty to the obligee, with a condition added that, if the obligor pays the sum secured — which is usually half the penalty — or does or refrains from doing the specified act, the bond shall be void: otherwise it shall remain in full force. This condition is known as the defeasance because it defeats or undoes the bond. The form of a common money bond runs as follows: —

Know Al! Men by these presents that I, A. B. (name, address and description of obligor) , am bound to C. D. (name, address and descrip- tion of obligee) in the sum of £[2000] to be paid to the said (obligee), his executors, administrators or assigns or to his or their attorney or attorneys, for which payment I bind myself by these

presents. Sealed with my seal. Dated this day of 19 .

The condition of the above-written bond is such that if the above A. B., his heirs, executors or administrators, shall on the day of pay to the above-named C. D., his heirs, executors,

administrators or assigns the sum of £[1000], with interest for the same from the date of the above-written bond at the rate of per cent per annum without any deduction, then the above-written bond shall be void : otherwise the bond shall remain in full force.

Signed, sealed and delivered by the above-named A. B. in the presence of (witness)

Recitals are frequently added to explain the circumstances under which the bond is given.

If the condition is not performed, i.e. if the obligor does not pay the money by the day stipulated, or do or refrain from doing the act provided for, the bond becomes forfeit or absolute at law, and charges the obligor and his estate (see Conveyancing Act 1881, s. 59). In old days, when a bond was forfeit, the whole penalty was recoverable at law and payment post diem could not be pleaded to an action on it, but the court of chancery early interposed to prevent oppression. It held the penalty of a bond tobe the form, not the substance of it, a pledge merely to secure repayment of the sum bona fide advanced, and would not permit a man to take more than in conscience he ought, i.e. in case of a common money bond, his principal, interest and expenses. This equitable relief received statutory recognition by an act of 1705, which provided that, in case of a common money bond, payment of the lesser sum with interest and costs shall be taken in full satisfaction of the bond. An obligee of a common money bond can, since the date of the Judicature Act, obtain summary judgment under O. xiv. (R.S.C. 1883) by specially endorsing his writ under O. iii. R. 6.

Bonds were, however, and still are given to secure performance of a variety of matters other than the payment of a sum of money at a fixed date. They may be given and are given, for instance,

1 This word, meaning ” that which binds,” is a phonetic variant of ” band,” and is derived from the Teutonic root seen in bindan, to bind; it must be distinguished from the obsolete “bond,” meaning originally a householder. In the laws of Canute this word is used as equal to the Old English ceorl (see Churl), and thus, as the churl’s position became

less free after the Norman Conquest, the ” bond ” approximated to the ” villein,” and still later to the ” serf.” The word is in Old English bonda, and appears in ” husband ” (q.v.), and is derived from the root of the verb bua, to dwell, to have a house, the Latin colere, and thus in origin is cognate with German Bauer and English ” boor,” The transition in meaning to the idea of serfdom, and hence to slavery, is due to an early confusion with ” bond,” from ” bind.” The same wrong connexion appears in the transition of meaning in ” bondage,” properly ” tenure in villein- age,” but now used as synonymous with ” slavery.” A trace of the early meaning still survives in ” bondager ” {q.v.).

to guarantee the fidelity of a clerk, of a rent collector, or of a person in an office of public trust, or to secure that an intended husband will settle a sum on his wife in the event of her surviving him, or that a building contract shall be carried out, or that a rival business shall not be carried on by the obligor except within certain limits of time and space. The same object can often be attained — and more conveniently attained— by a covenant than by bond, and covenants have in the practice of conveyancers largely superseded bonds, but there are cases where security by bond is still preferable to security by covenant. Thus under a bond to secure an annuity, if the obligor makes default, judgment may be entered for the penalty and stand as security for the future payments without the necessity of bringing a fresh action for each payment. In cases of bonds with special conditions, such as those instanced above, the remedy of the obligee for breach of the condition is prescribed by an act of 1696, the procedure under which is preserved by the Judicature Act (O. xxii. R. 1, O. xiii. R. 14). The obligee assigns the particular breaches of which he complains, damages in respect of such breaches are assessed, and, on payment into court by the obligor of the amount of such damages, the court enters a stay of execution. A difficulty which has much exercised and still exercises the courts is to determine, in these cases of special conditions, whether the sum for which the bond is given is a true penalty or only liquidated damages. There is nothing to prevent the parties to a bond from agreeing the damages for a breach, and if they have done so, the court will not interfere, as it will in the case of a penalty. The leading case on the subject is Kemble v. Farren (1829; 6 Bing. 148).

Bonds given to secure the doing of anything which is contrary to the policy of the law are void. Such, for instance, is a bond given to a woman for future cohabitation (as distinguished from past cohabitation), or a marriage brocage bond, that is, a bond given to procure a marriage between parties. (See the matri- monial agency

case, Hermann v. Charlesworth, 1905, 2 K.B. 123). It was not without design that Shakespeare laid the scene of Shylock's suit on Antonio's bond in a Venetian court; the bond would have had short shrift in an English court.

Post Obit Bonds. — A post obit bond is one given by an expectant heir or legatee, payable on or after the death of the person from whom the obligor has expectations. Such a bond, if the obligee has exacted unconscionable terms, may be set aside.

Bottomry Bonds. — A bottomry bond is a contract of hypothecation by which the owner of a ship, or the master as his agent, borrows money for the use of the ship to meet some emergency, e.g. necessary repairs, and pledges the ship (or keel or bottom of the ship, partem pro toto) as security for repayment. If the ship safely accomplishes her voyage, the obligee gets his money back with the agreed interest : if the ship is totally lost, he loses it altogether.

Lloyd's Bonds. — Lloyd's bonds are instruments under the seal of a railway company, admitting the indebtedness of the company to the obligee to a specified amount for work done or goods supplied, with a covenant to pay him such amount with interest on a future day. They are a device by which railway companies were enabled to increase their indebtedness without technically violating their charter. The name is derived from the counsel who settled the form of the bond.

Debenture Bonds. — Debenture bonds are bonds secured only by the covenant of the company without any floating or fixed charge on the assets. (See Debentures and Debenture Stock.)

Recognizance. — A recognizance differs from a bond in being entered into before a court of record and thereby becoming an obligation of record.

Heritable bond is a Scots law term, meaning a bond for money, joined with a conveyance of land, and held by a creditor as security for his debt.

For goods " in bond " see Bonded Warehouse. (E. Ma.)

BONDAGER, a word meaning generally a servant, but speci- ally used in the south of Scotland and Northumberland as the term for a female outworker whom a married farm-labourer, living in a cottage attached to the farm, undertakes as a condition of his tenancy to supply for field-labour, sometimes also to board and lodge. The origin of the system was a dearth of field-labour.

BONDE, GUSTAF, Count (1620-1667), Swedish statesman. He is remarkable for being the persistent advocate of a pacific policy at a time when war on the slightest provocation was the watchword of every Swedish politician. Even the popular

Polish adventure of Charles X. was strenuously opposed by Bonde, though when once it was decided upon he materially assisted the king to find the means for carrying it on. He was also in favour of strict economy coupled with the recovery of the royal domains which had fallen into the hands of the nobles, though his natural partiality for his fellow-peers came out clearly enough when in 1655 he was appointed a member of Charles X.'s land-recovery commission. In 1659 he succeeded Herman Fleming as lord high treasurer, and was one of the council of regency appointed to govern Sweden during the minority of Charles XI. In 1661 he presented to the senate a plan which aimed at rendering Sweden altogether independent of foreign subsidies, by a policy of peace, economy and trade-development, and by further recovery of alienated estates. His budget in the following year, framed on the same principles, subsequently served as an invaluable guide to Charles XI. Bonde's extra- ordinary tenacity of purpose enabled him for some years to carry out his programme, despite the opposition of the majority of the senate and his co-regents, who preferred the more adventur- ous methods of the chancellor Magnus de la Gardie, ultimately so ruinous to Sweden. But the ambition of the oligarchs, and the fear and jealousy of innumerable monopolists who rose in arms against his policy of economy, proved at last too strong for Bonde, while the costly and useless expedition against Bremen in 1665, undertaken contrary to his advice, completed the ruin of the finances. In his later years Bonde's powers of resistance were weakened by sickness and mortification at the triumph of reckless extravagance, and he practically retired from the government some time before his death.

See Martin Veibull, Sveriges Storhetstid (Stockholm, 1881).

BONDED WAREHOUSE, a warehouse established by the state, or by private enterprise, in which goods liable to duty are lodged until the duty upon them has been paid. Previous to the establishment of bonded warehouses in England the pay- ment of duties on imported goods had to be made at the time of importation, or a bond with security for future payment given to the revenue authorities. The

inconveniences of this system were many; it was not always possible for the importer to find sureties, and he had often to make an immediate sale of the goods, in order to raise the duty, frequently selling when the market was depressed and prices low; the duty, having to be paid in a lump sum, raised the price of the goods by the amount of the interest on the capital required to pay the duty; competition was stifled from the fact that large capital was required for the importation of the more heavily taxed articles; there was also the difficulty of granting an exact equivalent drawback to the exporter, on goods which had already paid duty. To obviate these difficulties and to put a check upon frauds on the revenue, Sir Robert Walpole proposed in his " excise scheme " of 1733, the system of warehousing, so far as concerned tobacco and wine. The proposal, however, was very unpopular, and it was not till 1803 that the system was actually adopted. By an act of that year imported goods were to be placed in warehouses approved by the customs authorities, and importers were to give " bonds " for payment of duties when the goods were removed. It was from this that the warehouses received the name of " bonded " or " bonding." The Customs Consolidation Act 1853 dispensed with the giving of bonds, and laid down various provisions for securing the payment of customs duties on goods warehoused. These provisions are contained in the Customs Consolidation Act 1876, and the amending statutes, the Customs and Inland Revenue Act 1880, and the Revenue Act 1883. The warehouses are known as " king's warehouses," and by s. 284 of the act of 1876 are defined as " any place pro- vided by the crown or approved by the commissioners of customs, for the deposit of goods for security thereof, and the duties due thereon." By s. 12 of the same act the treasury may appoint warehousing ports or places, and the commissioners of customs may from time to time approve and appoint ware- houses in such ports or places where goods may be warehoused or kept, and fix the amount of rent payable in respect of the goods. The proprietor or occupier of every warehouse so approved

(except existing warehouses of special security in respect of which security by bond has hitherto been dispensed with), or some one on his behalf, must, before any goods be warehoused therein, give security by bond, or such other security as the commissioners may approve of, for the payment of the full duties chargeable on any goods warehoused therein, or for the due exportation thereof (s. 13). All goods deposited in a ware- house, without payment of duty on the first importation, upon being entered for home consumption, are chargeable with existing duties on like goods under any customs acts in force at the time of passing such entry (s. 19). The act also

prescribes various rules for the unshipping, landing, examination, ware- housing and custody of goods, and the penalties on breach. The system of warehousing has proved of great advantage both to importers and purchasers, as the payment of duty is deferred until the goods are required, while the title-deeds, or warrants, are transferable by endorsement.

While the goods are in the warehouse ("in bond") the owner may subject them to various processes necessary to fit them for the market, such as the repacking and mixing of tea, the racking, vatting, mixing and bottling of wines and spirits, the roasting of coffee, the manufacture of certain kinds of tobacco, &c, and certain specific allowances are made in respect of waste arising from such processes or from leakage, evaporation and the like.

BONDU, a French protectorate in West Africa, dependent on the colony of Senegal. Bondu lies between the Faleme river and the upper course of the Gambia, that is between 13 and 15 N., and 12° and 13 W. The country is an elevated plateau, with hills in the southern and central parts. These are generally unproductive, and covered with stunted wood; but the lower country is fertile, and finely clothed with the baobab, the tamarind and various valuable fruit-trees Bondu is traversed by torrents, which flow rapidly during the rains but are empty in the dry season, such streams being known in this part of West Africa as marigots. The inhabitants are mostly Fula, though the trade is largely in the hands of Mandingos. The religion and laws of the country are Mahommedan, though the precepts of that faith are not very rigorously observed. Mungo Park, the first European traveller to visit the country, passed through Bondu in 1795, and had to submit to many exactions from the reigning prince. The royal residence was then at Fatteconda; but when Major W. Gray, a British officer who attempted to solve the Niger problem, visited Bondu in 1818 it had been removed to Bulibani, a small town, with about 3000 population, surrounded by a strong clay wall. In August 1845 the king of Bondu signed a treaty recognizing French sovereignty over his country. The treaty was disregarded by the natives, but in 1858 Bondu came definitely under French control. The country has since enjoyed considerable prosperity (see Senegal).

See A. Rangon, Le Bondou: Stude de geographie el d'histoire soudaniennes de 168 1 & nos jours (Bordeaux, 1894).

BONE, HENRY (1755-1834), English enamel painter, was born at Truro. He was much employed by London jewellers for small designs in enamel, before his merits as an artist were well known to the

public. In 1800 the beauty of his pieces attracted the notice of the Royal Academy, of which he was then admitted as an associate; in 18 11 he was made an academician. Up to 183 1 he executed many beautiful miniature pieces of much larger size than had been attempted before in England; among these his eighty-five portraits of the time of Queen Elizabeth, of different sizes, from 5 by 4 to 13 by 8 in. are most admired. They were disposed of by public sale after his death. His Bacchus and Ariadne, after Titian, painted on a plate, brought the great price of 2200 guineas.

BONE (a word common in various forms to Teutonic languages, in many of which it is confined to the shank of the leg, as in the German Bein), the hard tissue constituting the framework of the animal skeleton. For anatomy see Skeleton and Connective Tissues.

Bone Diseases and Injuries. — The more specific diseases affecting the bones of the human body are treated under separate

Ostitis.

headings; in this article inflammation of bone and fractures are dealt with.

Ostitis (oariov, bone), or inflammation of bone, may be acute or chronic. Acute ostitis is one of the most serious diseases which can be met with in young people. It is due to the cultivation of virulent germs in the delicat'e growing tissue of the bone and in the marrow. Another name for it is septic osteomyelitis, which has the advantage of expressing the cause as well as the exact seat (five\6s, marrow) of the inflam- mation. The name of the micro-organism causing the inflam- mation is Staphylococcus pyogenes aureus, which means that the germs collect in clusters like grapes, that they are of the virulent pus-producing kind, and that they have a yellow tinge. As a rule, the germs find their way to the bone by the blood-stream, which they have entered through the membrane lining the mouth or gullet, or some other part of the alimentary canal. In the pre-antiseptic days they often entered the sawn bone during the amputation of a limb, and were not infrequently the cause of blood-poisoning and death. When the individual is well and strong, and there has been no hurt, strain or accident to lower the power of resistance of the bone, the staphylococci may circulate harmlessly in the blood, until they are

gradually eaten up by the white corpuscles; but if a bone has been injured it offers a likely and attractive focus to the wandering germs.

The disease is infective. That is to say, the micro-organisms having begun to germinate in the damaged bone find their way by the blood-stream into other tissues, and developing after their kind, are apt to cause blood-poisoning. Should a surgeon prick his finger whilst operating on a case of septic osteomyelitis his blood also might be poisoned, and he would run the risk of losing his finger, his hand, or even his life. The starting-point of the disease is the delicate growing tissue recently deposited between the main part of the shaft of the bone (diaphysis) and the cartila- ginous end. And it often happens that the earliest complaint of pain is just above or below the knee; just above the ankle, the elbow or the wrist. It the surgeon is prompt in operating he may find the disease limited to that spot. In the case of infants, the germs are very apt to make their way into the neighbouring joint, giving rise to the very serious disease known as acute arthritis of infants.

Probably the first sign of there being anything amiss with the limb will be a complaint of aches or pains near a joint; and these pains are apt to be miscalled rheumatic. Perhaps they occur during convalescence from scarlet or typhoid fever, or after exposure to injury, or to wet or cold, or after unusual fatigue. The part becomes swollen, hot, red and excessively tender; the tenderness, however, is not in the skin but in the bone, and in the engorged membrane around it, the periosteum. The tem- perature may run up to 104°, and may be associated with con- vulsions or shiverings. The patient's nights are disturbed, and very likely he has violent delirium. If the case is allowed to drift on, abscess forms, and death may ensue from septic pneumonia, or pericarditis, or from some other form of blood-poisoning.

As soon as the disease is recognized an incision should be made down to the bone, and the affected area should be scraped out, and disinfected with a solution of corrosive sublimate. A considerable area of the bone may be found stripped bare by sub-periosteal abscess, and necrosis is likely to ensue.' Perhaps the shaft of the bone will have to be opened up in the chief part of its length in order that it may be cleared of germs and pus. The surgeon is more apt to err on the side of doing too little in these serious cases than too much. It may be that the whole of that piece of bone (diaphysis) which lies between the joint-ends is found loose in a large abscess cavity, and in some cases immediate amputa- tion of the limb may be found necessary in order to save life; in other cases, amputation may be called for later because

of long- continued suppuration and grave constitutional disturbance. Several bones may be affected at the same time, and large pieces of them may be killed outright (multiple necrosis) by inflam- matory engorgement and devastating abscess.

Septic ostitis may be confounded with erysipelas and rheuma-

tism, but the central thickening and tenderness should suffice to distinguish it.

Chronic ostitis and periostitis denote long-continued and increased vascular supply. This may be due to injury, syphilis or rheumatism. The disease is found chiefly in the shafts of the bones. There is a dull pain in the bone, which is worse at night, and the inflamed piece of bone is thickened and tender. The lump thus formed is called a hard node, and its outline shows clearly by X-rays. The affected limb should be rested and kept elevated. Leeches and fomentations may ease the pain, and iodide of potassium is the most useful medicine.

Chronic inflammation of tuberculous origin affects the soft, cancellated tissue of such bones as the vertebrae, and the bones of the hands and feet, as well as the spongy ends of the long bones. In tuberculous ostitis the presence of the bacilli in the spongy tissue causes an escape of colourless corpuscles from the blood, which, collecting around the bacilli, form a small greyish white heap, a tubercle. These tubercles may be present in large numbers at the expense of the living tissue, and a rarefying ostitis is thus produced. Later the tubercles break down and form tuberculous abscesses, which slowly, and almost painlessly, find escape upon the surface. They should not be allowed to open spontaneously, however, as the wounds are then likely to become infected with pus-producing germs, and fuel being added to the fire, as it were, destruction advances with increased rapidity. The treatment for these tuberculous foci is to place the limb or the part at absolute rest upon a splint, to give plenty of fresh air to the patient, and to prescribe cod-liver oil and iron. And when it is seen that in spite of the adoption of these measures the tubercu- lous abscess is advancing towards the surface, the surgeon should cut down upon the part, scrape out the foci, and disinfect with some strong antiseptic lotion. Consideration should also be given to the treatment by injection of tuberculin.

Caries (rottenness, decay) is the name given to tuberculous disease of bone when the tubercles are running together and are breaking down the cancellous tissue. In short, caries generally means tuberculous ostitis, though syphilitic ulceration of bone has also received the same

name.

Fractures. — A bone may be broken at the part where it is struck (fracture from direct violence), or it may break in conse- quence of a strain applied to it (fracture from indirect picture. violence) , or the fracture may be due to muscular action as when a violent cough causes a rib to break. In the first case the fracture is generally transverse and in the second more or less oblique. The fully developed bone is broken fairly across; the soft bones of young people may simply be bent — green stick or willow fracture. Fractures are either simple or compound. A simple fracture is analogous to the subcutaneous laceration in the soft parts, and a compound one to an open wound in the soft parts. The wound of the soft parts in the compound fracture may be due either to the force which caused the fracture, as in the case of a cart-wheel going over a limb, first wounding the soft parts and then fracturing the bone, or to the sharp point of the fractured bone coming out through the skin. In either case there is a com- munication between the external air and injured bone, and the probability arises of the germs of suppuration finding their way to the seat of fracture. This greatly increases the risks of the case, for septic inflammation and suppuration may lead to delayed union, to death of large pieces of the bone (necrosis) , and to osteo- myelitis and to blood-poisoning. In the treatment of a fracture, every care should be taken to prevent any sharp fragment coming near the skin. Careless handling has often been the means of a simple fracture being converted into a compound one.

In most cases of fracture crepitus can be made out; this is the feeling elicited when two rough osseous surfaces are rubbed together. When a bone is merely bent there is, of course, no crepitus. It is also absent in fractures in which the broken extremities are driven into one another (impacted fracture^). In order to get firm bony union it is necessary to secure accurate apposition of the fragments. Putting the broken ends together is termed ” setting the fracture,” and the needful amount of rest is obtained by the use of splints. As a rule, it is also advisable to

fix with the splint the joint above or below the fracture. In cases in which a splintering of the bone into a joint has taken place, more especially in those cases in which tendons have been injured, there may be a good deal of effusion into the joint and the tendon sheaths, and this may be organized into fibrous tissue leading to permanent

stiffness. This is particularly apt to occur in old people. Care must be taken in such instances by gentle exercises, and by passive movement during the process of cure, to keep the joint and tendons free. To take a common example, — in fracture close to the wrist joint, it is necessary to arrange the splint so that the patient can move his fingers and thumb, and the splint must be taken off every day, in order that the wrist and fingers may be gently bent, straightened and exercised.

The treatment of fractures has undergone considerable im- provement of late years. Simple fractures are not kept so long at rest in splints, but are constantly ” taken down ” in order that massage and movements of the limb may be resorted to. This, of course, is done with the utmost gentleness, and with the result that swelling, pain and other evidences of the serious injury quickly disappear, whilst a more rapid and complete recovery is ensured. Stiff hands and feet after fracture are much less frequently met with. By the aid of the X-rays it is now easy for the surgeon to assure himself that fractured surfaces have been well adjusted and are in close apposition. But if they are not in a satisfactory position, and it be found impracticable to assure their close adjustment by ordinary methods, the surgeon now, without undue loss of time, cuts down upon the broken ends and fixes them together by a strong wire suture, which remains permanently in the tissues. If the fracture be associated with an open wound of the part (compound fracture), and the broken ends are found incapable of easy adjustment, immediate wiring together of the fragments is now considered to be a necessary part of the primary treatment. The French surgeon, Just Lucas-Championniere, has done more than any one else to show the advantage of discreet movements, of massage and of exercises in the treatment of fractures.

Special Fracture in Young People. — The long bones of children and growing persons consist of a shaft with cartilaginous ends in which bone is developed. As the result of injury, the end of the bone may become detached, a variety of fracture known as diastasis. Such a fracture — however well treated — may be followed by arrest of growth of the bone or by stiffness of the neighbouring joint.

Delayed union means that consolidation is taking place very slowly, if at all. This may be due to local or constitutional causes, but provided the bones are in good position, nothing further than patience, with massage, and with due attention to general health-measures, is necessary.

An ununited fracture is one in which after many weeks or months no attempt has been made by nature to consolidate the parts. This may

be due to the ends not having been brought close enough together; to the seat of fracture having been constantly disturbed; to muscle or tendon being interposed between the broken ends, or to the existence of some consti- tutional defect in the patient. Except in the last-named condition, the treatment consists in cutting down to the broken ends; freshening them up by sawing off a thin slice, and by adjusting and fixing them by a wire or screw. Ununited fracture of the leg-bones in children is a most unsatisfactory and rebellious condition to deal with.

There is still a difference of opinion as to the best way of treating a recent fi jcture of the patella (knee-cap) . Many surgeons are still content to follow the old plan of fixing the limb on a back-splint, or in plaster of Paris splints, and awaiting the result. It is beyond question that a large percentage of these cases recover with a perfectly useful limb — especially if the fibrous bond of union between the pieces of the broken knee-cap is adequately protected against being stretched by bending the leg at too early a date. But in some cases the fragments have been eventually found wide apart, the patient being left with an enfeebled limb. Still, at any rate, this line of treatment was [

unassociated with risk. But after Lister showed (1883) that with due care and cleanliness the knee-joint could be opened, and the fragments of the broken patella secured in close apposition by a stout wire suture, the treatment of the injury underwent a remarkable change. The great advantage of Lister's treatment was that the fragments, being fixed close together by the wire stitch, became solidly united by bone, and the joint became as sound as it was before. Some surgeons, however, objected to the operation — in spite of the excellence of the results obtainable by it— because of the undoubted, risk which it entailed of the joint becoming invaded by septic micro-organisms. As a sort of compromise, Professor A. E. J. Barker introduced the method, which he deemed to be less hazardous, of holding the fragments close together by means of a strong silver wire passed round them vertically by a large needle without actually laying open the joint. But experience has shown that in the hands of careful and skilful surgeons Lister's operation of openly wiring the fragments gives a perfect result with a comparatively small risk. Other surgeons secure the fragments in close contact for bony union by passing a silk or metal suture around them circumferentially. Many years ago Lister remarked that the careful selection of one's patients is an antiseptic measure — by which he meant that if a surgeon intended to get the most perfect results for his operative work, he must carefully consider whether any individual patient is physically adapted for the performance upon him of any particular operation. This aphorism implies that not every patient with a broken knee-cap is suited for the

opening of his knee-joint, or even for the sub- cutaneous adjustment of the broken fragments. An operative procedure which is admirably suited for one patient might result in disaster when adopted for another, and it is an important part of the surgeon's business to know what to advise in each individual case. (£. o.*)

Industrial Applications of Bones. — By the increasing inventiveness of man, the industrial utilization of animal bone has been so developed that not one of the constituents fails to reappear in commerce. Composed of mineral matter — phosphates, &c. — fat and gelatinous substances, the phosphates are used as artificial manures, the fat is worked up by the soap-maker and chandler, and the gelatinous matter forms the basis of the gelatin and glue of commerce ; while by the dry distillation of bones from which the gelatin has been but partially removed, there are obtained a carbonaceous residue — animal charcoal — and a tarry distillate, from which " bone oil " and bone pitch are obtained. To these by-products there must be added the direct uses of bone — for making buttons, knife-handles, &c. — when an estimate is desired of the commercial importance of these components of the animal frame.

While most of the world's supply of bones goes to the glue and gelatin works, the leg and thigh bones, termed " marrows " and " knuckles," are used for the manufacture of bone articles. The treatment which they receive is very different from that practised in the glue-works. The ends are removed by a saw, and the bones are steeped in a 1% brine solution for three to four days in order to separate the fibrous matter. The bones are now heated with water, and allowed to simmer for about six hours. This removes a part of the fat and gelatinous matter; the former rises as a scum, the latter passes into solution, and the bones remain sufficiently firm to be worked up by the lathe, &c. The fat is skimmed off, and, after bleaching, reappears as a component of fine soaps, or, if un- bleached, the oil is expressed and is used as an adulterant of other oils, while the stearine or solid matter goes to the candle-maker; the gelatinous water is used (after filtration) for making size for cardboard boxes; while the bones are scrubbed, dried, and then transferred to the bone-worker.

The glue-worker first removes the fat, which is supplied to the soap and candle trades; the bones are now treated for glue {q.v.) ; and the residue is worked up for manures, &c. These residues are ground to a fine or coarse meal, and supplied either directly as a fertilizer or treated with sulphuric acid to form the more soluble superphosphates, which are more readily assimilated by growing plants. _ In some places, especially South America, the residues are burned in a retort to

a white ash, the ” bone-ash ” of commerce, which contains some 70-80% of tricaleium phosphate, and is much used as a manure, and in the manufacture of high-grade super- phosphates. In the gelatin industry (see Gelatin) the mineral matter has to be recovered from its solution in hydrochloric acid. To effect this, the liquors are freed from suspended matter by filtration, and then run into vats where they are mixed with milk of lime, or some similar neutralizer. The slightly soluble bicalcium phosphate, $CaHP0_4$, is first precipitated, which, with more lime, gives ordinary tricaleium phosphate, $Ca_3(P0_4)_2$. The contents of

the vats are filter-pressed, and the cakes dried on plates supported on racks in heated chambers. This product is a very valuable manure, and is also used in the manufacture of phosphorus.

Instead of extracting all the gelatinous matter from degreased bones, the practice of extracting about one half and carbonizing the residue is frequently adopted. The bones are heated in hori- zontal cast-iron retorts, holding about 5 cwt., and the operation occupies about twelve to thirteen hours. The residue in the retorts is removed while still red-hot to air-tight vessels in which it is allowed to cool. It is then passed through grinding mills, and is subsequently riddled by revolving cylindrical sieves. The yield is from 55 to 60 % of the bones carbonized, and the product contains about 10 % of carbon and about 75 % of calcium phosphate, the remainder being various inorganic salts and moisture (6-7 %). Animal char- coal has a deep black colour, and is much used as a filtering and clarifying material. The vapours evolved during carbonization are condensed in vertical air condensers. The liquid separates into two layers : the upper tarry layer is floated off and redistilled ; the distillate is termed ” bone oil,” l and mainly consists of many fatty amines and pyridine derivatives, characterized by a most disgusting odour; the residue is ” bone pitch,” and finds application in the manufacture of black varnishes and like compositions. The lower layer is ammoniacal liquor; it is transferred to stills, distilled with steam, and the ammonia received in sulphuric acid ; the ammonium sulphate, which separates, is removed, drained and dried, and is principally used as a manure. Both during the carbonization of the bones and the distillation of the tar inflammable gases are evolved ; these are generally used, after purification, for motive or illuminating purposes. (C. E.*)

BONE BED, a term loosely used by geologists when speaking generally of any stratum or deposit which contains bones of whatever kind. It is also applied to those brecciated and stalag- mitic deposits on the floor of caves, which frequently contain osseous remains. In a more restricted sense it is used to connote certain thin layers of bony fragments, which occur upon well- defined geological horizons. One of the best-known of these is the Ludlow Bone Bed, which is found at the base of the Downton Sandstone in the Upper Ludlow series. At Ludlow itself, two such beds are actually known, separated by about 14 ft. of strata. Although quite thin, the Ludlow Bone Bed can be followed from that town into Gloucestershire for a distance of 45 m. It is almost made up of fragments of spines, teeth and scales of ganoid fish. Another well-known bed, formerly known as the ” Bristol ” or ” Lias ” Bone Bed, exists in the form of several thin layers of micaceous sandstone, with the remains of fish and saurians, which occur in the Rhaetic Black Paper Shales that lie above the Keuper marls in the south-west of England. It is noteworthy that a similar bone bed has been traced on the same geological horizon in Brunswick, Hanover and Franconia. A bone bed has also been observed at the base of the Carboni- ferous limestone series in certain parts of the south-west of England.

BONE-LACE, a kind of lace made upon a cushion from linen thread; the pattern is marked out with pins, round which are twisted the different threads, each wound on its own bobbin. The lace was so called from the fact that bobbins were formerly made of bone.

BONER (or Bonerius), ULRICH (fl. 14th century), German- Swiss writer of fables, was born in Bern. He was descended of an old Bernese family, and, as far as can be ascertained, took clerical orders and became a monk; yet as it appears that he subsequently married, it is certain that he received the ” tonsure ” only, and was thus entitled to the benefit of the clerici uxoriati, who, on divesting themselves of the clerical garb, could return to secular life. He is mentioned in records between 1324 and 1349, but neither before nor after these dates. He wrote, in Middle High German, a collection of fables entitled Der Edelstein (c. 1349), one hundred in number, which were based principally on those of Avianus (4th century) and the Anonymus (edited by I. Nevelet, 1610). This work he dedicated to the Bernese patrician and poet, Johann von Rinkenberg, advocatus (Vogt) of Brienz (d. c. 1350). It was printed in 1461 at Bamberg; and it is claimed for it that it was the first book

1 Bone oil, also known as Dippel’s oil, was originally produced by the distillation of stags’ horns; it is of interest in the history of chemistry,

since from it were isolated in 1846 by T. Anderson pyridine and some of its homologues.

printed in the German language. Boner treats his sources with considerable freedom and originality; he writes a clear and simple style, and the necessarily didactic tone of the collection is relieved by touches of humour.

Der Edelstein has been edited by G. F. Benecke (Berlin, 1816) and Franz Pfeiffer (Leipzig, 1844); a translation into modern German by K. Pannier will be found . in Reclam's Universal-Bibliothek (Leipzig, 1895). See also G. E. Lessing in Zur Geschichte und Literatur (Werke, ix.); C. Waas, Die Quellen der Beispiele Boners (Giessen, 1897).

BO'NESS, or Borrowstounness, a municipal and police burgh and seaport of Linlithgowshire, Scotland. Pop. (i89i)6295;(i90i) 9306. It lies on the southern shore of the Firth of Forth, 17 m. W. by N. of Edinburgh, and 24 m. by rail, being the terminus of the North British railway's branch line from Manuel. In the 1 8th century it ranked next to Leith as a port, but the growth of Grangemouth, higher up the firth, seriously affected its ship- ping trade, which is, however, yet considerable, coal and pig-iron forming the principal exports, and pit props from the Baltic the leading import. It has an extensive harbour (the area of the dock being 7 J acres). The great industries are coal-mining — some of the pits extending for a long distance beneath the firth — iron-founding (with several blast furnaces) and engineering, but it has also important manufactures of salt, soap, vitriol and other chemicals. Shipbuilding and whaling are extinct. Traces of the wall of Antoninus which ran through the parish may still be made out, especially near Inveravon. Blackness, on the coast farther east, was the seaport of Linlithgow till the rise of Bo'ness, but its small export trade now mainly consists of coal, bricks, tiles and lime. Its castle, standing on a promontory, is of unknown age. James III. of Scotland is stated to have consigned certain of the insurgent nobles to its cells; and later it was used as a prison in which many of the Covenanters were immured. It was one of the four castles that had to be maintained by the Articles of Union, but when its uselessness for defensive purposes became apparent, it was converted into an ammunition depot. Kinneil House, 1 m. south of Bo'ness, a seat of the duke of Hamilton, formerly a keep, was fortified by the regent Arran, plundered by the rebels in Queen Mary's reign, and reconstructed in the time of Charles II. Dr John. Roebuck (1718-1794), founder of the Carron Iron Works, occupied it for several years from 1764. It was here that, on his invitation, James Watt constructed a model of his steam-engine, which was tested in a now disused colliery. Though Roebuck lost all his

money in the coal-mines and salt works which he established at Bo'ness, the development of the mineral resources of the district may be regarded as due to him.

BONFIGLI, BENEDETTO, 15th century Italian painter, was born at Perugia. Until near the middle of the 15th century the Umbrian school was far behind those of Florence and the North, but in the person of Perugino and some of his followers it suddenly advanced into the very first rank. Among the latter none holds a more distinguished place than Benedetto Bonfigli. The most important of his extant works are a series, in fresco, of the life of St Louis of Toulouse, in the communal palace of Perugia.

BONFIRE (in Early English " bone-fire," Scottish " bane-fire "), originally a fire of bones, now any large fire lit in the open air on an occasion of rejoicing. Though the spelling "bonfire" was used in the 16th century, the earlier "bone-fire" was common till 1760. The earliest known instance of the derivation of the word occurred as ban fyre ignis ossium in the Catholicon A nglicum, a.d. 1483. Other derivations, now rejected, have been sought for the word. Thus some have thought it Baal-fire, passing through Bael, Baen to Bane. Others have declared it to be boon- fire by analogy with boen-harow, i.e. "harrowing by gift," the suggestion being that these fires were " contribution " fires, every one in the neighbourhood contributing a portion of the material, just as in Northumberland the " contributed Ploughing Days " are known as Bone-daags.

Whatever the origin of the word, it has long had several meanings — (a) a fire of bones, (b) a fire for corpses, a funeral pile, (c) a fire for immolation, such as that in which heretics and

proscribed books were burnt, (d) a large fire lit in the open air, on occasions of national rejoicing, or as a signal of alarm such as the bonfires which warned England of the approach of the Armada. Throughout Europe the peasants from time imme- morial have lighted bonfires on certain days of the year, and danced around or leapt over them. This custom can be traced back to the middle ages, and certain usages in antiquity so nearly resemble it as to suggest that the bonfire has its origin in the early days of heathen Europe. Indeed the earliest proof of the observance of these bonfire ceremonies in Europe is afforded by the attempts made by Christian synods in the 7th and 8th

centuries to suppress them as pagan. Thus the third council of Constantinople (a.d. 680), by its 65th canon, orders: ” Those fires that are kindled by certaine people on new moones before their shops and houses, over which also they use ridiculously and foolishly to leape, by a certaine antient custome, we command them from henceforth to cease.” And the Synodus Francica under Pope Zachary, a.d. 742, forbids ” those sacrilegious fires which they call Nedjri (or bonefires) , and all other observations of the Pagans whatsoever.” Leaping over the fires is mentioned among the superstitious rites used at the Palilia (the feast of Pales, the shepherds’ goddess) in Ovid’s Fasti, when the shep- herds lit heaps of straw and jumped over them as they burned. The lighting of the bonfires in Christian festivals was significant of the compromise made with the heathen by the early Church. In Cornwall bonfires are lighted on the eve of St John the Baptist and St Peter’s day, and midsummer is thence called in Cornish Goluan, which means both ” light ” and ” festivity.” Some- times effigies are burned in these fires, or a pretence is made of burning a living person in them, and there are grounds for believ- ing that anciently human sacrifices were actually made in the bonfires. Spring and midsummer are the usual times at which these bonfires are lighted, but in some countries they are made at Hallowe’en (October 31) and at Christmas. In spring the 1st Sunday in Lent, Easter eve and the 1st of May are the commonest dates.

See J. G. Frazer, Golden Bough, vol. iii., for a very full account of the bonfire customs of Europe, &c.

BONGARS, JACQUES (1554-1612), French scholar and diplo- matist, was born at Orleans, and was brought up in the reformed faith. He obtained his early education at Marburg and Jena, and returning to France continued his studies at Orleans and Bourges. After spending some time in Rome he visited eastern Europe, and subsequently made the acquaintance of Segur Pardaillan, a representative of Henry, king of Navarre, after- wards Henry IV. of France. He entered the service of Pardaillan, and in 1587 was sent on a mission to many of the princes of northern Europe, after which he visited England to obtain help from Queen Elizabeth for Henry of Navarre. He continued to serve Henry as a diplomatist, and in 1593 became the repre- sentative of the French king at the courts of the imperial princes. Vigorously seconding the efforts of Henry to curtail the power of the house of Habsburg, he spent health and money ungrudg- ingly in this service, and continued his labours until the king’s murder in 1610. He then returned to France, and died at Paris on the 29th of July 161 2. Bongars wrote an abridgment of Justin’s abridgment of the history of Trogus Pompeius under the title Juslinus, Tragi Pompeii Historiarum

Philip picarum epitoma de manuscriptis codicibus emendatior et prologis auctior (Paris, 1581). He collected the works of several French writers who as contemporaries described the crusades, and published them under the title Gesta Dei per Francos (Hanover, 161 1). Another collection made by Bongars is the Rerum Hungaricarum scriptores varii (Frankfort, 1600). His Epistolae were published at Leiden in 1647, and a French translation at Paris in 1668- 1670. Many of his papers are preserved in the library at Bern, to which they were presented in 1632, and a list of them was made in 1634. Other papers and copies of instructions are now in several libraries in Paris; and copies of other instructions are in the British Museum.

See H. Hagen, Jacobus Bongarsius (Bern, 1874) ; L. Anquez, Henri IV et VAllemagne (Paris, 1887).

BONGHI, RUGGERO (1828-1895), Italian scholar, writer and politician, was born at Naples on the 20th of March 1828. Exiled from Naples in consequence of the movement of 1848, he took refuge in Tuscany, whence he was compelled to flee to Turin on account of a pungent article against the Bourbons. At Turin he resumed his philosophic studies and his translation of Plato, but in 1858 refused a professorship of Greek at Pavia, under the Austrian government, only to accept it in 1859 from the Italian government after the liberation of Lombardy. In i860, with the Cavour party, he opposed the work of Garibaldi, Crispi and Bertani at Naples, and became secretary of Luigi Carlo Farini during the latter's lieutenancy, but in 1865 assumed contemporaneously the editorship of the Perseveranza of Milan and the chair of Latin literature at Florence. Elected deputy in i860 he became celebrated by the biting wit of his speeches, while, as journalist, the acrimony of his polemical writings made him a redoubtable adversary. Though an ardent supporter of the historic Right, and, as such, entrusted by the Lanza cabinet with the defence of the law of guarantees in 1870, he was no respecter of persons, his caustic tongue sparing neither friend nor foe. Appointed minister for public instruction in 1873, he, with feverish activity, reformed the Italian educational system, suppressed the privileges of the university of Naples, founded the Vittorio Emanuele library in Rome, and prevented the establishment of a Catholic university in the capital. Upon the fall of the Right from power in 1876 he joined the opposition, and, with characteristic vivacity, protracted during two months the debate on Baccelli's University Reform Bill, securing, single-handed, its rejection. A bitter critic of King Humbert, both in the Perseveranza and in the Nuova Antologia, he was, in 1893, excluded from court, only securing readmission shortly before his death on the 22nd of October 1895. In foreign policy a Francophil, he combated the Triple Alliance, and took considerable part in the organization of the inter-parliamentary peace conference. (H. W. S.)

BONGO (Dor or Deran), a tribe of Nilotic negroes, probably related to the Zandeh tribes of the Welle district, inhabiting the south-west portion of the Bahr-el-Ghazal province, Anglo- Egyptian Sudan. G. A. Schweinfurth, who lived two years among them, declares that before the advent of the slave-raiders, c. 1850, they numbered at least 300,000. Slave-raiders, and later the dervishes, greatly reduced their numbers, and it was not until the establishment of effective control by the Sudan government (1904-1906) that recuperation was possible.

The Bongo formerly lived in countless little independent and peaceful communities, and under the Sudan government they again manage their own affairs. Their huts are well built, and some- times 24 ft. high. The Bongo are a race of medium height, inclined to be thick-set, with a red-brown complexion — “like the soil upon which they reside ” — and black hair. Schweinfurth declares their heads to be nearly round, no other African race, to his knowledge, possessing a higher cephalic index. The women incline to steatopygia in later life, and this deposit of fat, together with the tail of bast which they wore, gave them, as they walked, Schweinfurth says, the appearance of ” dancing baboons.” The Bongo men formerly wore only a loin-cloth, and many dozen iron rings on the arms (arranged to form a sort of armour), while the women had simply a girdle, to which was attached a tuft of grass. Both sexes now largely use cotton cloths as dresses. The tribal ornaments consist of nails or plugs which are passed through the lower lip. The women often wear a disk several inches in diameter in this fashion, together with a ring or a bit of straw in the upper lip, straws in the alae of the nostrils, and a ring in the septum. The Bongo, unlike other of the upper Nile Negroes, are not great cattle-breeders, but employ their time in agriculture. The crops mostly cultivated are sorghum, tobacco, sesame and durra. The Bongo eat the fruits, tubers and fungi in which the country is rich. They also eat almost every creature— bird, beast, insect and reptile, with the exception of the dog. They despise no flesh, fresh or putrid. They drive the vulture from carrion, and eat with relish the intestinal worms of the ox. Earth-eating, too, is

common among them. They are particularly skilled in the smelting and working of iron. Iron forms the currency of the country, and is extensively employed for all kinds of useful and ornamental purposes. Bongo spears, knives, rings, and other articles are frequently fashioned with great artistic elaboration. They have a variety of musical instruments — drums, stringed instruments, and horns — in the practice of which they take great delight; and they indulge in a vocal recitative which seems intended to imitate a succession of natural sounds. Schweinfurth says that Bongo music is like the raging of the elements. Marriage is by purchase; and a man is allowed to acquire three wives, but not more. Tattooing is partially practised. As regards burial, the corpse is bound in a crouching position with the knees drawn up to the chin; men are placed in the grave with the face to the north, and women with the face to the south. The form of the grave is

peculiar, consisting of a niche in a vertical shaft, recalling the mastaba graves of the ancient Egyptians. The tombs are frequently ornamented with rough wooden figures intended to represent the deceased. Of the immortality of the soul they have no defined notion; and their only approach to a knowledge of a beneficent deity con- sists in a vague idea of luck. They have, however, a most intense belief in a great variety of petty goblins and witches, which are essentially malignant. Arrows, spears and clubs form their weapons, the first two distinguished by a multiplicity of barbs. Euphorbia juice is used as a poison for the arrows. Shields are rare. Their language is musical, and abounds in the vowels and a; its vocabulary of concrete terms is very rich, but the same word has often a great variety of meanings. The gram- matical structure is simple. As a race the Bongo are gentle and industrious, and exhibit strong family affection.

See G. A. Schweinfurth, The Heart of Africa (London, 1873) ; VV. Junker, Travels in Africa (Eng. edit., London, 1890-1892).

BONGO {Boocercus eurycerus), a West African bushbuck, the largest of the group. The male is deep chestnut, marked on the body with narrow white stripes, on the chest with a white crescent, and on the face by two white spots below the eye. In the East African bongo {B. e. Isaaei) the body hue is stronger and richer. There is, as yet, no evidence as to whether the females of the true bongo bear horns, though it is probable they do; but as the horns are present in both sexes of the East African form, Mr Oldfield Thomas has made that the type of the genus. 1

BONHAM, a town and the county-seat of Fannin county, Texas, U.S.A., about 14 m. S. of the Red river, in the north-east part of the state, and 70 m. N. of Dallas. Pop. (1890) 3361; (1900)5042 (1223 being negroes); (1910), 4844. It is served by the Missouri, Kansas & Texas, and the Texas & Pacific railways. Bonham is the seat of Carlton College (Christian), a woman's college founded in 1867; and its high school is one of the best in the state. It is a trading and shipping centre of an extensive farming territory devoted to the raising of live- stock and to the growing of cotton, Indian corn, fruit, &c. It has large cotton gins and compresses, a large cotton mill, flour mills, canning and ice factories, railway repair shops, planing mills and carriage works. The town was named in honour of J. B. Bonham, a native of South Carolina, who was killed in the Alamo. The first settle- ment here was made in 1836. The town was incorporated in 1850, and was reincorporated in 1886.

BONHEUR [Makie Rosalie], ROSA (1822-1899), French painter, was

born at Bordeaux on the 22nd of March 1822. She was of Jewish origin. Jacques Wiener, the Belgian medallist, a native of Venloo, says that he and Raymond Bonheur, Rosa's father, used to attend synagogue in that town; while another authority asserts that Rosa used to be known in common parlance by the name of Rosa Mazeltov (a Hebrew term for " good luck," Gallicf Bonheur). She was the eldest of four children, all of whom were artists — Auguste (1824-1884) painted animals and landscape; Juliette (1830-1891) was " honourably mentioned " at the exhibition of 1855; Isidore, born in 1827, was a sculptor of animals. Rosa at an early age was taught to draw by her 1 Annals and Mag. Nat. Hist. vol. x. (seventh series), p. 309.

father (who died in 1849), and he, perceiving her very remarkable talent, permitted her to abandon the business of dressmaking, to which, much against her will, she had been put, in order to devote herself wholly to art. From 1840 to 1845 she exhibited at the salon, and five times received a prize; in 1848 a medal was awarded to her. Her fame dates more especially from the exhibition of 1855; from that time Rosa Bonheur's works were much sought after in England, where collectors and public galleries competed eagerly for them. What is chiefly remark- able and admirable in her work is that, like her contemporary, Jacques Raymond Brascassat (1804-1867), she represents animals as they really are, as she saw them in the country. Her gift of accurate observation was, however, allied to a certain dryness of style in painting; she often failed to give a perfect sense of atmosphere. On the other hand, the anatomy of her animals is always faultlessly true. There is nothing feminine in her handling; her treatment is always manly and firm. Of her many works we may note the following: — " Ploughing in the Nivernais " (1848), in the Luxembourg gallery; " The Horse Fair " (1853), one of the two replicas of which is in the National Gallery, London, the original being in the United States; and " Hay Harvest in Auvergne " (1835). She was decorated with the Legion of Honour by the empress Eugenie, and was subsequently promoted to the rank of " officer " of the order. After 1867 Rosa Bonheur exhibited but once in the salon, in 1899, a few weeks before her death. She lived quietly at her country house at By, near Fontainebleau, where for some years she had held gratuitous classes for drawing. She left at her death a considerable number of pictures, studies, drawings and etchings, which were sold by auction in Paris in the spring of 1900. (H. Fr.)

BONHEUR DU JOUR, the name for a lady's writing-desk, so called because, when it was introduced in France about 1760, it speedily became intensely fashionable. The bonheur du jour is always very

light and graceful; its special characteristic is a raised back, which may form a little cabinet or a nest of drawers, or may simply be fitted with.a mirror. The top, often surrounded with a chased and gilded bronze gallery, serves for placing small ornaments. Beneath the writing surface there is usually a single drawer. The details vary greatly, but the general characteristics are always traceable. The bonheur du jour has never been so delicate, so charming, so coquettish as in the quarter of a century which followed its introduction. The choicer examples of the time are inlaid with marqueterie, edged with exotic woods, set in gilded bronze, or enriched with panels of Oriental lacquer.

BONI {Bone), a vassal state of the government of Celebes, Dutch East Indies, in the south-west peninsula of Celebes, on the Gulf of Boni. Area, 2600 sq. m. It produces rice, tobacco, coffee, cotton and sugar-cane, none of them important as ex- ports. The breeds of buffaloes and horses in this state are highly esteemed. The chief town, Boni, lies 80 m. N.E. of Macassar, and 2\ m. from the east coast of the peninsula. The native race of Bugis (q.v.), whose number within this area is about 70,000, is one of the most interesting in the whole archipelago.

Boni was once the most powerful state of Celebes, all the other princes being regarded as vassals of its ruler, but its history is not known in detail. In 1666 the rajah Palakkah, whose father and grandfather had been murdered by the family of Hassan, the tyrant of Sumatra, made common cause with the Dutch against that despot. From that date till the beginning of the 19th century Dutch influence in the state remained un- disputed. In 1814, however, Boni fell into the hands of the British, who retained it for two years; but by the European treaties concluded on the downfall of Napoleon it reverted to its original colonizers. Their influence, however, was resisted more than once by the natives. An expedition in 1825, under General van Geen, was not fully successful in enforcing it; and in 1858 and the following year two expeditions were necessary to oppose an attempt by the princess regent towards independence. In i860 a new prince, owning allegiance to the EPuttfh, was se’t up. As in other native states in Celebes,

succession to the throne in the female line has precedence over the male line.

For the wars in Boni, see Perelaer, De Bonische expedition, 1859-

1860 (Leiden, 1872) ; and Meyers, in the Militaire Spectator (1880).

BONIFACE, SAINT (680-754), the apostle of Germany, whose real name was Wynfrith, was born of a good Saxon family at Crediton or Kirton in Devonshire. While still young he became a monk, and studied grammar and theology first at Exeter, then at Nutcell near Winchester, under the abbot Winberht. He soon distinguished himself both as scholar and preacher, and had every inducement to remain in his monastery, but in 716 he followed the example of other Saxon monks and set out as missionary to Frisia. He was soon obliged to return, however, probably owing to the hostility of Radbod, king of the Frisians, then at war with Charles Martel. At the end of 717 he went to Rome, where in 719 Pope Gregory II. commissioned him to evangelize Germany and to counteract the influence of the Irish monks- there. Crossing the Alps, Boniface visited Bavaria and Thuringia, but upon hearing of the death of Radbod he hurried again to Frisia, where, under the direction of his countryman Willibrord (d. 738), the first bishop of Utrecht, he preached successfully for three years. About 722 he visited Hesse and Thuringia, won over some chieftains, and converted and baptized great numbers of the heathen. Having sent special word to Gregory of his success, he was summoned to Rome and conse- crated bishop on the 30th of November 722, after taking an oath of obedience to the pope. Then his mission was enlarged. He re- turned with letters of recommendation to Charles Martel, charged not only to convert the heathen but to suppress heresy as well.

Charles's protection, as he himself confessed, made possible his great career. Armed with it he passed safely into heathen Germany and began a systematic crusade, baptizing, overturning idols, founding churches and monasteries, and calling from England a band of missionary helpers, monks and nuns, some of whom have become famous: St Lull, his successor in the see at Mainz; St Burchard, bishop of Wiirzburg; St Gregory, abbot at Utrecht; Willibald, his biographer; St Lioba, St Walburge, St Thecla. In 732 Boniface was created archbishop. In 738 for the third time he went to Rome. On his return he organized the church in Bavaria into the four bishoprics of Regensburg, Freising, Salzburg and Passau. Then his power was extended still further. In 741 Pope Zacharias made him legate, and charged him with the reformation of the whole Frankish church. With the support of Carloman and Pippin, who had just succeeded Charles Martel as mayors of the palace, Boniface set to work. As he had done in Bavaria, he organized the east Frankish church into four bishoprics, Erfurt, Wiirzburg, Buraburg and Eichstadt, and set over them his own monks. In 742 he presided at what is generally counted as the first

German council. At the same period he founded the abbey of Fulda, as a centre for German monastic culture, placing it under the Bavarian Sturm, whose biography gives us so many picturesque glimpses of the time, and making its rule stricter than the Benedictine. Then came a theological and disciplinary controversy with Virgil, the Irish bishop of Salzburg, who held, among other heresies, that there were other worlds than ours. Virgil must have been a most remarkable man; in spite of his leanings toward science he held his own against' Boniface, and was canonized after his death. Boniface was more successful in France. There a certain Adalbert or Aldebert, a Frankish bishop of Neustria, had caused great disturbance. He had been performing miracles, and claimed to have received his relics, not from Rome like those of Boniface, but directly from the angels. Planting crosses in the open fields he drew the people to desert the churches, and had won a great following throughout all Neustria. Opinions are divided as to whether he was a Culdee, a representative of a national Frankish movement, or simply the charlatan that Boniface paints him. At the instance of Pippin, Boniface secured Adalbert's condemna- tion at the synod of Soissons in 744; but he, and Clement, a Scottish missionary and a heretic on predestination, continued to find followers in spite of legate, council and pope, for three or four years more.

Between 746 and 748 Boniface was made bishop of Mainz, and became metropolitan over the Rhine bishoprics and Utrecht, as well as over those he had established in Germany — thus founding the pre-eminence of the see of Mainz. In 747 a synod of the Frankish bishops sent to Rome a formal statement of their submission to the papal authority. The significance of this act can only be realized when one recalls the tendencies toward the formation of national churches, which had been so powerful under the Merovingians. Boniface does not seem to have taken part in the anointing of Pippin as king of the Franks in 752. In 7 54 he resigned his archbishopric in favour of Lull, and took up again his earliest plan of a mission to Frisia; but on the 5th of June 754 he and his companions were massacred by the heathen near Dockum. His remains were afterwards taken to Fulda.

St Boniface has well been called the proconsul of the papacy. His organizing genius, even more than his missionary zeal, left its mark upon the German church throughout all the middle ages. The missionary movement which until his day had been almost independent of control, largely carried on by schismatic Irish monks, was brought under the direction of Rome. But in so welding together the scattered centres and binding them to the papacy, Boniface seems to have been actuated by simple zeal for unity of the faith, and not by a conscious political motive.

Though pre-eminently a man of action, Boniface has left several literary remains. We have above all his Letters (Epistolae) , difficult to date, but extremely important from the standpoint of history, dogma, or literature; see Dummler's edition in the Monumenta Germaniae historica, 1892. Besides these there are a grammar {De octo partibus orationibus, ed. Mai, in Classici Auctores, t. vii.), some sermons of contested authenticity, some poems {Aenigmata, ed. Diimmler, Poetae latini aevi Carolini, i. 1881), a penitential, and some Dicta Bonifacii (ed. Nurnberger

in Theologische Quartalschrift, Tubingen, vol. 70, 1888), the authenticity of which it is hard to prove or to refute. Migne in his Patrologia Latina (vol. 89) has reproduced the edition of Boniface's works by Giles (London, 1844).

There are very many monographs on Boniface and on different phases of his life (see Potthast, Bibliotheca medii aevi, and Ulysse Chevalier's Bibliographic, 2nd ed. for indications), but none that is completely satisfactory. Among recent studies are those of B. Kuhlmann, Der heilige Bonijatius, Apostel der Deutschen (Paderborn, 1895), and of G. Kurth, Saint Boniface (2nd ed., 1902). W. Levison has edited the Vitae sancti Bonifatii (Hanover, 1905). (J. T. S.*)

BONIFACE (Bonifacius) , the name of nine of the popes.

Boniface I., bishop of Rome from 418 to 422. At the death of Pope Zosimus, the Roman clergy were divided into two factions, one of which elected the deacon Eulalius, and the other the priest Boniface. The imperial government, in the interests of public order, commanded the two competitors to leave the town, reserving the decision of the case to a council. Eulalius having broken his ban, the emperor Honorius decided to recognize Boniface, and the council was countermanded. But the faction of Eulalius long continued to foment disorders, and the secular authority was compelled to intervene.

Boniface II., pope from 530 to 532, was by birth a Goth, and owed his election to the nomination of his predecessor, Felix IV., and to the influence of the Gothic king. The Roman electors had opposed to him a priest of Alexandria called Dioscorus, who died a month after his election, and thus left the position open for him. Boniface endeavoured to nominate his own successor, thus transforming into law, or at least into custom, the proceeding by which he had benefited; but the clergy and the senate of Rome forced him to cancel this arrangement.

Boniface III. was pope from the 15th of February to the 1 2th of November 606. He obtained from Phocas recognition of the ” headship of the church at Rome,” which signifies, no doubt, that Phocas compelled the patriarch of Constantinople to abandon (momentarily) his claim to the title of oecumenical patriarch.

Boniface IV. was pope from 608 to 615. He received from the emperor Phocas the Pantheon at Rome, which was converted into a Christian church.

Boniface V., pope from 619 to 625, did much for the christian- izing of England. Bede mentions (Hist. Eccl.) that he wrote encouraging letters to Mellitus, archbishop of Canterbury, and Justus, bishop of Rochester, and quotes three letters — to Justus, to Eadwin, king of Northumbria, and to his wife jEthelberga. William of Malmesbury gives a letter to Justus of the year 625, in which Canterbury is constituted the metropolitan see of Britain for ever.

Boniface VI. was elected pope in April 896, and died fifteen days afterwards.

Boniface VII. was pope from August 984 to July 985. His family name was Franco. In 974 he was substituted by Cres- centius and the Roman barons for Benedict VI., who had been assassinated. He was ejected by Count Sicco, the representative of the emperor Otto II., and fled to Constantinople. On the death of Otto (983) he returned, seized Pope John XIV., threw him into prison, and installed himself in his place. (L. D.*)

Boniface VIII. (Benedetto Gaetano), pope from 1294 to 1303, was born of noble family at Anagni, studied canon and civil law in Italy and possibly at Paris. After being appointed to canonicates at Todi (June 1260) and in France, he became an advocate and then a notary at the papal court. With Cardinal Ottoboni, who was to aid the English king, Henry III., against the bishops of the baronial party, he was besieged in the Tower of London by the rebellious earl of Gloucester, but was rescued by the future Edward I., on the 27th of April 1267. Created cardinal deacon in 1281, and in 1291 cardinal priest (SS. Sylvestri et Martini), he was entrusted with many diplo- matic missions and became very influential in the Sacred College. He helped the ineffective Celestine V. to abdicate, and was him- self chosen pope

at Naples on the 24th of December 1294. Contrary to custom, the election was not made unanimous, probably because of the hostility of certain French cardinals. Celestine attempted to rule in extreme monastic poverty and humility; not so Boniface, who ardently asserted the lordship of the papacy over all the kingdoms of the world. He was crowned at Rome in January 1295 with great pomp. He planned to pacify the West and then recover the Holy Land from the infidel; but during his nine years' reign, so far from being a peacemaker, he involved the papacy itself in a series of controversies with leading European powers. Avarice, lofty claims and frequent exhibitions of arrogance made him many foes. The policy of supporting the interests of the house of Anjou in Sicily proved a grand failure. The attempt to build up great estates for his family made most of the Colonna his enemies. Until 1303 he refused to recognize Albert of Austria as the rightful German king. Assuming that he was overlord of Hungary, he declared that its crown should fall to the house of Anjou. He humbled Eric VI. of Denmark, but was unsuccess- ful in the attempt to try Edward I., the conqueror of Scotland, on the charge of interfering with a papal fief; for parliament declared in 1301 that Scotland had never been a fief of Rome. The most noted conflict of Boniface was that with Philip IV. of France. In 1 296, by the bull Clericis laicos, the pope forbade the levying of taxes, however disguised, on the clergy without his consent. Forced to recede from this position, Boniface canonized Louis IX. (1297). The hostilities were later renewed; in 1302 Boniface himself drafted and published the indubitably genuine bull Unam sanctum, one of the strongest official state- ments of the papal prerogative ever made. The weight of opinion now tends to deny that any part of this much-discussed document save the last sentence bears the marks of an infallible utterance. The French vice-chancellor Guillaume de Nogaret was sent to arrest the pope, against whom grave charges had been brought, and bring him to France to be deposed by an oecumenical council. The accusation of heresy has usually been dismissed as a slander; but recent investigations make it probable, though not quite certain, that Boniface privately held certain Averroistic tenets, such as the denial of the immor- tality of the soul. With Sciarra Colonna, Nogaret surprised Boniface at Anagni, on the 7th of September 1303, as the latter was about to pronounce the sentence of excommunication

against the king. After a nine-hours' truce the palace was stormed, and Boniface was found lying in his bed, a cross clasped to his breast; that he was sitting in full regalia on the papal throne is a legend. Nogaret claimed that he saved the pope's life from the vengeful Colonna. Threatened, but not maltreated, the pope had remained three days

under arrest when the citizens of Anagni freed him. He was conducted to Rome, only to be confined in the Vatican by the Orsini. He died on the nth or 12th of October 1303, not eighty-six years old, as has commonly been believed, but perhaps under seventy, at all events not over seventy-five. ” He shall come in like a fox, reign like a lion, die like a dog,” is a gibe wrongly held to be a prophecy of his unfortunate predecessor. Dante, who had become embittered against Boniface while on a political mission in Rome, calls him the ” Prince of the new Pharisees ” (Inferno, 27, 85), but laments that ” in his Vicar Christ was made a cap tive,” and was “mocked a second time” (Purgatory, 20, 87 f.). Authorities. — Digard, Faucon and Thomas, Les Registres de Boniface VIII (Paris, 1884 ff.); Wetzcr and Welte, Kirckenlexikon, vol. ii. (2nd ed., Freiburg, 1883), 1037-1062; Herzog-Hauck, Realencyklopddie, vol. iii. (3rd ed., Leipzig, 1897), 291-300, contains an elaborate bibliography; J. Loserth, Geschickte des spdteren Miltelalters (Munich, 1903), 206-232; H. Finke, Aus den Tagen Bonifaz VIII. (Minister, 1902) is dreary but. epoch-making; Gottin- giscke gelehrte Anzeigen, Jahrgang 166, 857-869 (Berlin, 1904); R. Scholz, Die Publizisiik zur Zeit Philipps des Schonen und Bonifaz VIII. (Stuttgart, 1903); K. Wenck, “War Bonifaz VIII. ein Ketzer?” in von Sybel’s Historische Zeitschrift, vol. xciv. (Munich, I 9°5)> 1-66. Special literature on Unam Sanclam: C. Mirbt, Quellen zur Geschickte des Papsttums (2nd ed., Tubingen, 1901), 148 f. ; Kirckenlexikon, xii. (1901), 229-240, an exhaustive discus- sion; H. Finke, 146-190; J. H. Robinson, Readings in European History, vol. i. (Boston, 1904), 346 ff. On Clericis laicos: Gee and Hardy, Documents Illustrative of English Church History (London, 1896), 87 ff. (W. W. R.*)

Boniface IX. (Piero Tomacelli), pope from 1389 to 1404, was born at Naples of a poor but ancient family. Created cardinal by Urban VI., he was elected successor to the latter on the 2nd of November 1389. In 1391 he canonized Birgitta of Sweden. He was able to restore Roman authority in the major part of the papal states, and in 1398 put an end to the republican liberties of the city itself. Boniface won Naples, which had owed spiritual allegiance to the antipopes Clement VII. and Benedict XIII. of Avignon, to the Roman obedience. In 1403 he ventured at last to confirm the deposition of the emperor Wenceslaus and the election of Rupert. Negotiations for the healing of the Great Schism were without result. In spite of his inferior education, the contemporaries of Boniface trusted his prudence and moral character; yet when in financial straits he sold offices, and in 1399 transformed the annates into a per- manent tax. In 1390 he celebrated the regular jubilee, but a rather informal one held in 1400 proved more profitable. Though probably not personally avaricious, he was justly

accused of nepotism. He died on the 1st of October 1404, being still under sixty years of age. (W. W. R.*)

BONIFACE OF SAVOY (d. 1270), archbishop of Canterbury, became primate in 1243, through the favour of Henry III., of whose queen, Eleanor of Provence, he was an uncle. Boniface, though a man of violent temper and too often absent from his see, showed some sympathy with the reforming party in the English church. Though in 1250 he provoked the English bishops by claiming the right of visitation in their dioceses, he took the lead at the council of Merton (1258) in vindicating the privileges of his order. In the barons' war he took the royalist side, but did not distinguish himself by great activity.

See Matthew Paris, Chronica Majora; Francois Mugnier, Les Savoyards en Angleterre (Chambery, 1890).

BONIFACIO, a maritime town at the southern extremity of Corsica, in the arrondissement of Sartene, 87 m. S.S.E. of Ajaccio by road. Pop. (1906) 2940. Bonifacio, which overlooks the straits of that name separating Corsica from Sardinia, occupies a remarkable situation on the summit of a peninsula of white calcareous rock, extending parallel to the coast and enclosing a narrow and secure harbour. Below the town and in the cliffs facing it the rock is hollowed into caverns accessible only by boat.

St Dominic, a church built in the 13th century by the Templars, and the cathedral of Santa Maria Maggiore which belongs mainly to the 1 2th century, are the chief buildings. The fortifications and citadel date from the 16th and 17th centuries. A massive medieval tower serves as a powder-magazine. The trade of Boni- facio, which is carried on chiefly with Sardinia, is in cereals, wine, cork and olive-oil of fine quality. Cork-cutting, tobacco-manu- facture and coral-fishing are carried on. The olive is largely culti- vated in the neighbourhood and there are oil-works in the town.

Bonifacio was founded about 828 by the Tuscan marquis whose name it bears, as a defence against the Saracen pirates. At the end of the nth century it became subject to Pisa, and at the end of the 12th was taken and colonized by the Genoese, whose influence may be traced in the character of the population. In 1420 it heroically withstood a protracted siege by Alphonso V. of Aragon. In 1554 it fell into the

hands of the Franco-Turkish army.

BONIFACIUS (d. 432), the Roman governor of the province of Africa who is generally believed to have invited the Vandals into that province in revenge for the hostile action of Placidia, ruling in behalf of her son the emperor Valentinian III. (428-429). That action is by Procopius attributed to his rival Aetius, but the earliest authorities speak of a certain Felix, chief minister of Placidia, as the calumniator of Bonifacius. Whether he really invited the Vandals or not, there is no doubt that he soon turned against them and bravely defended the city of Hippo from their attacks. In 432 he returned to Italy, was received into favour by Placidia, and appointed master of the soldiery. Aetius, how- ever, resented his promotion, the two rivals met, perhaps in single combat, and Bonifacius, though victorious, received a wound from the effects of which he died three months later.

The authorities for the extremely obscure and difficult history of these transactions are well discussed by E. A. Freeman in an article in the English Historical Review, July 1887, to which the reader is referred. But compare also Gibbon, Decline and Fall of the Roman Empire, vol. iii. pp. 505-506, edited by J. B. Bury (London, 1897).

BONIN ISLANDS, called by the Japanese Ogasawara-jima, a chain of small islands belonging to Japan, stretching nearly due north and south, a little east of 142 E., and from 26° 35′ to 27° 45′ N., about 500 m. from the mainland of Japan. They number twenty, according to Japanese investigations, and have a coast-line of 174-65 m. and a superficies of 28-82 sq. m. Only ten of them have any appreciable size, and these are named — commencing from the north — Muko-shima (Bridegroom Island), Nakadachi-shima (Go-between Island 1), Yome-shima (Bride Island), Ototo-jima (Younger-brother Island), Ani-shima (Elder- brother Island), Chichi-jima (Father Island), Haha-jima (Mother Island), Mei-jima (Niece Island), Ani-jima (Elder-sister Island) and Imoto-jima (Younger-sister Island) . European geographers have been accustomed to divide the islands into three groups for purposes of nomenclature, calling the northern group the Parry Islands, the central the Beechey Islands and the southern the Coffin or Bailey Islands. The second largest of all, Chichi-jima, in Japanese cartography was called Peel Island in 1827 by Captain Beechey, and the same officer gave the name of Stapleton Island to the Ototo-jima of the Japanese, and that of Buckland Island to their Ani-jima. To complete this account of Captain Beechey's nomenclature, it may be added that he called a large bay on the south of Peel Island Fitton Bay, and a bay on the south-west of Buckland Island Walker Bay. 2 Port Lloyd, the chief anchorage (situated on Peel Island), is considered by

Commodore Perry — who visited the islands in 1853 and strongly urged the establishment of a United States coaling station there — to have been formerly the crater of a volcano from which the surrounding hills were thrown up, the entrance to the harbour being a fissure through which lava used to pour into the sea. The islands are, indeed, plainly volcanic in their nature.

History. — The diversity of nomenclature indicated above

1 Referring to the Japanese custom of employing a go-between to arrange a marriage.

2 These details are taken from The Bonin Islands by Russell Robertson, formerly H.B.M. consul in Yokohama, who visited the islands in 1875.

suggests that the ownership of the islands was for some time doubtful. According to Japanese annals they were discovered towards the close of the 16th century, and added to the fief of a Daimyo, Ogasawa Sadayori, whence the name Ogasawara- jima. They were also called Bunin-jima (corrupted by foreigners into Bonin) because of their being without (bu) inhabitants (nin). Effective occupation did not take place, however, and com' munications with the islands ceased altogether in 1635, as was a natural consequence of the Japanese government's veto against the construction of sea-going vessels. In 1728 fitful communica- tion was restored by the then representative of the Ogasawara family, only to be again interrupted until 1861, when an unsuc- cessful attempt was made to establish a Japanese colony at Port Lloyd. Meanwhile, Captain Beechey visited the islands in the " Blossom," assigned names to some of them, and published a description of their features. Next a small party consisting of two British subjects, two American citizens, and a Dane, sailed from the Sandwich Islands for Port Lloyd in 1830, taking with them some Hawaiian natives. These colonists hoisted the British flag on Peel Island (Chichi-jima), and settled there. When Commodore Perry arrived in 1853, there were on Peel Island thirty-one inhabitants, four being English, four American, one Portuguese and the rest natives of the Sandwich Islands, the Ladrones, &c. ; and when Mr Russell Robertson visited the place in 1875, the colony had grown to sixty-nine, of whom only five were pure whites. Mr Robertson found them without education, without religion, without laws and without any system of govern- ment, but living comfortably on clearings of cultivated land. English was the language of the settlers, and they regarded themselves as a British colony. But in 1861 the British govern- ment renounced all claim to the islands in recognition of Japan's right of possession. There is now regular steam

communication; the affairs of the islands are duly administered, and the popula- tion has grown to about 4500. There are no mountains of any considerable height in the Ogasawara Islands, but the scenery is hilly with occasional bold crags. The vegetation is almost tropically luxuriant — palms, wild pineapples, and ferns growing profusely, and the valleys being filled with wild beans and patches of taro. Mr Robertson catalogues a number of valuable timbers that are obtained there, among them being Tremana, cedar, rose-wood, iron-wood (red and white), box- wood, sandal and white oak. The kekop tree, the orange, the laurel, the jumper, the wild cactus, the curry plant, wild sage and celery flourish. No minerals have been discovered. The shores are covered with coral; earthquakes and tidal waves are frequent, the latter not taking the form of bores, but of a sudden steady rise and equally sudden fall in the level of the sea; the climate is rather tropical than temperate, but sickness is almost unknown among the residents. (F. By.)

BONITZ, HEBMANN (1814-1888), German scholar, was born at Langensalza in Saxony on the 29th of July 1814. Having studied at Leipzig under G. Hermann and at Berlin under Bockh and Lachmann, he became successively teacher at the Blochmann institute in Dresden (1836), Oberlehrer at the Friedrich-Wilhelms gymnasium (1838) and the Graues Kloster (1840) in Berlin, professor at the gymnasium at Stettin (1842), professor at the university of Vienna (1849), member of the imperial academy (1854), member of the council of education (1864), and director of the Graues Kloster gymnasium (1867). He retired in 1888, and died on the 25th of July in that year at Berlin. He took great interest in higher education, and was chiefly responsible for the system of teaching and examination in use in the high schools of Prussia after 1882. But it is as a commentator on Plato and Aristotle that he is best known outside Germany. His most important works in this connexion are: Disputationes Platonicae Duae (1837); Platonische Studien (3rd ed., 1886); Observationes Criticae in Aristotelis Libros Metaphysicos (1842); Observationes Criticae in Aristotelis quae feruntur Magna M or alia et Ethica Eudemia (1844); Alexandri Aphrodisiensis Commentarius in Libros Metaphysicos Aristotelis (1847); Aristotelis Metaphysica (1848-1849); tjber die Kate- goriendesA.(i&53); Aristotelische Studien (1862-1867); Index

Aristotelicus (1870). Other works: Uber den Ursprung der homerischen Gedichte (5th ed., 1881); Beitrdge zur Erklarung des

Thukydides (1854), des Sophokles (1856-1857). He also wrote largely on classical and educational subjects, mainly for the Zeitschrift fiir die bsterreichischen Gymnasien.

A full list of his writings is given in the obituary notice by T. Gompertz in the Biographisches Jahrbuchfiir Altertumskunde (1890).

BONIVARD, FRANCOIS (1493-1570), the hero of Byron's poem, The Prisoner of Chillon, was born at Seyssel of an old Savoyard family. Bonivard has been described as " a man of the Renaissance who had strayed into the age of the Reforma- tion." His real character and history are, however, widely different from the legendary account which was popularized by Byron. In 15 10 he succeeded his uncle, who had educated him, as prior of the Cluniac priory of St Victor, close to Geneva. He naturally, therefore, opposed the attempts of the duke of Savoy, aided by his relative, the bishop of the city, to maintain his rights as lord of Geneva. He was imprisoned by the duke at Gex from 1519 to 1521, lost his priory, and became more and more anti-Savoyard. In 1530 he was again seized by the duke and imprisoned for four years underground, in the castle of Chillon, till he was released in 1536 by the Bernese, who then wrested Vaud from the duke. He had been imprisoned for political reasons, for he did not become a Protestant till after his release, and then found that his priory had been destroyed in 1534. He obtained a pension from Geneva, and was four times married, but owing to his extravagances was always in debt. He was officially entrusted in 1542 with the task of compiling a history of Geneva from the earliest times. In 1551 his MS. of the Chroniques de Geneve (ending in 1530) was sub- mitted to Calvin for correction, but it was not published till 1831. The best edition is that of 1867. The work is uncritical and partial, but is his best title to fame.

BONN, a town of Germany, in the Prussian Rhine province, on the left bank of the Rhine, 15 m. S. by E. from Cologne, on the main line of railway to Mainz, and at the junction of the lines to the Eif el and (by ferry) to the right bank of the Rhine. Pop. (1885) 35,989; (1905) 81,997. The river is here crossed by a fine bridge (1896-1898), 1417 ft. in length, flanked by an embankment 2 m. long, above and parallel with which is the Coblenzer-strasse, with beautiful villas and pretty gardens reaching down to the Rhine. The central part of the town is composed of narrow streets, but the outskirts contain numerous fine buildings, and the appearance of the town from the river is attractive. There are six Roman Catholic and two Protestant churches, the most important of which is the Munster (minster), an imposing edifice of grey stone, in the Romanesque and Transition styles, surmounted by

five towers, of which the central, rising to a height of 315 ft., is a landmark in the Rhine valley. The church dates from the nth, 12th and 13th centuries, was restored in 1875 and following years and in 1 890-1 894 was adorned with paintings. Among other churches are the Stifts- kirche (monasterial church), rebuilt 1879-1884; the Jesuiten-kirche (1693); the Minoritenkirche (1278-1318), the Herz Jesu-kirche (1862) and the Marienkirche (1892). There is also a synagogue, and the university chapel serves as an English church. The town also possesses a town hall situate on the market square and dating from 1737, a fine block of law-court buildings, several high-grade schools and a theatre.

By far the finest of the buildings, however, is the famous university, which occupies the larger part of the southern frontage of the town. The present establishment only dates from 1818, and owes its existence to King Frederick William III. of Prussia; but as early as 1786 the academy which had been founded about nine years before was raised by Archbishop Maximilian Frederick of Cologne to the rank of a university, and continued to exercise its functions till 1794, when it was dissolved by the last elector. The building now occupied by the university was originally the electoral palace, constructed about 1717 out of the materials of the old fortifications. It was remodelled after the town came into Prussian possession. There are five faculties in the university — a legal, a medical,, and a

philosophic, and one of Roman Catholic and another Protestant theology. The library numbers upwards of 230,000 volumes; and the antiquarian museum contains a valuable collection of Roman relics discovered in the neighbourhood. Connected with the university are also physiological, pathological and chemical institutes, five clinical departments and a laboratory. An academy of agriculture, with a natural history museum and botanic garden attached, is established in the palace of Clemens- ruhe at Poppelsdorf, which is reached by a fine avenue about a mile long, bordered on both sides by a double row of chestnut trees. A splendid observatory, long under the charge of Friedrich Wilhelm Argelander, stands on the south side of the road. The Roman Catholic archiepiscopal theological college, beautifully situated on an eminence overlooking the Rhine, dates from 1892.

Beethoven was born in Bonn, and a statue was erected to him in the Miinster-platz in 1845. B. G. Niebuhr is buried in the cemetery outside of the Sterntor, where a monument was placed to his memory by Frederick William IV. Here are also the tombs of A. W. von Schlegel, the diplomatist Christian Karl von Bunsen, Robert Schumann, Karl Simrock, E. M. Arndt and Schiller’s wife. The town is adorned with a

marble monu- ment commemorating the war of 1870-71, a handsome fountain, and a statue of the Old Catholic bishop Reinkens. In 1889 a museum of Beethoven relics was opened in the house in which the composer was born. There are further a municipal museum, arranged in a private house since 1882, an academic art museum (1884), with some classic originals, a creation of F. G. Welcker, and the provincial museum, standing near the railway station, which contains a collection of medieval stone monuments and works of art, besides a small picture gallery.

One of the most conspicuous features of Bonn, viewed from the river, is the pilgrimage (monastic) church of Kreuzberg (1627), behind and above Poppelsdorf; it has a flight of 28 steps, which pilgrims used to ascend on their knees. ” Der alte Zoll,” commanding a magnificent view of the Siebengebirge, is the only remaining bulwark of the old fortifications, the Sterntor having been removed in order to open up better communication with the rapidly increasing western suburbs and the terminus of the light railway to Cologne.

But for its university Bonn would be a place of comparatively little importance, its trade and commerce being of moderate dimensions. Its principal industries are jute spinning and weaving, and the manufacture of porcelain, flags, machinery and beer, and it has some trade in wine. There are considerable numbers of foreign residents, notably English, attracted by the natural beauty of the place and by the educational facilities it affords.

Bonn (Bonna or Castro, Bonnensia) , originally a town of the Ubii, became at an early period the site of a Roman military settlement, and as such is frequently mentioned by Tacitus. It was the scene, in a.d. 70, of a battle in which the Romans were defeated by Claudius Civilis, the valiant leader of the Batavians. Greatly reduced by successive barbarian inroads, it was restored about 359 by the emperor Julian. In the centuries that followed the break-up of the Roman empire it again suffered much from barbarian attacks, and was finally devastated in 889 by bands of Norse raiders who had sailed up the Rhine. It was again fortified by Konrad von Hochstaden, archbishop of Cologne (1 238-1 261), whose successor, Engelbert von Falken- burg (d. 1274), driven out of his cathedral city by the towns- people, established himself here (1265); from which time until 1 794 it remained the residence of the electors of Cologne. During the various wars that devastated Germany in the 16th, 17th and 18th centuries, the town was frequently besieged and occupied by the several belligerents, but continued to belong to the electors till 1794, when the French took possession of it. At the peace of Luneville they were formally

recognized in their occupation; but in 181 5 the town was made over by the congress of Vienna to Prussia. The fortifications had been dismantled in 17 17.

See F. Ritter, Entstehung der drei dltesten Siadte am Rhein: Koln, Bonn und Mainz (Bonn, 1851); H. von Sybel, Die Grilndung der Unvoersitat Bonn (1868) ; and Fuhrer von Hesse (10th ed., 1901).

BONNAT, LEON JOSEPH FLORENTIN (1833-), French painter, was born at Bayonne on the 20th of June 1833. He was educated in Spain, under Madrazo at Madrid, and his long series of portraits shows the influence of Velasquez and the Spanish realists. In 1869 he won a medal of honour at Paris, where he became one of the leading artists of his day, and in 1888 he became professor of painting at the Ecole des Beaux Arts. In May 1905 he succeeded Paul Dubois as director. His vivid portrait-painting is his most characteristic work, but his subject pictures, such as the ” Martyrdom of St Denis ” in the Pantheon, are also famous.

BONNE-CARRERE, GUILLAUME DE (1754-1825), French diplomatist, was born at Muret in Languedoc on the 13th of February 1754. He began his career in the army, but soon entered the diplomatic service under Vergennes. A friend of Mirabeau and of Dumouriez, he became very active at the Revolu- tion, and Dumouriez re-established for him the title of director- general of the department of foreign affairs (March 1792). He remained at the ministry, preserving the habits of the diplomacy of the old regime, until December 1792, when he was sent to Belgium as agent of the republic, but he was involved in the treason of Dumouriez and was arrested on the 2nd of April 1793. To justify himself, he published an account of his conduct from the beginning of the Revolution. He was freed from prison in July 1794. Napoleon did not trust him, and gave him only some unimportant missions. After 181 5 Bonne-Carrere retired into private life, directing a profitable business in public carriages between Paris and Versailles.

BONNER, EDMUND (i5oo?-is69), bishop of London, was perhaps the natural son of George Savage, rector of Davenham, Cheshire, by Elizabeth Frodsham, who was afterwards married to Edmund Bonner, a sawyer of Hanley in Worcestershire. This account, which was printed with many circumstantial details by Strype (Eccles. Mem. III. i. 172-173), was disputed by Strype’s contemporary, Sir Edmund

Lechmere, who asserted on not very satisfactory evidence (ib. Annals, I. ii. 300) that Bonner was of legitimate birth. He was educated at Broadgates Hall, now Pembroke College, Oxford, graduating bachelor of civil and canon law in June 15 19. He was ordained about the same time, and admitted D.C.L. in 1525. In 1529 he was Wolsey's chaplain, and he was with the cardinal at Cawood at the time of his arrest. Subsequently he was transferred, perhaps through Cromwell's influence, to the service of the king, and in January 1532 he was sent to Rome to obstruct the judicial proceedings against Henry in the papal curia. In October 1533 he was en- trusted with the unmannerly task of intimating to Clement VII., while he was the guest of Francis I. at Marseilles, Henry's appeal from the pope to a general council; but there seems to be no good authority for Burnet's story that Clement threatened to have him burnt alive. For these and other services Bonner had been rewarded by- the grant of several livings, and in 1535 he was made archdeacon of Leicester.

Towards the end of that year he was sent to further what he called "the cause of the Gospel" (Letters and Papers, 1536, No. 469) in North Germany; and in 1536 he wrote a preface to Gardiner's De vera Obedientia, which asserted the royal, denied the papal, supremacy, and was received with delight by the Lutherans. After a brief embassy to the emperor in the spring of 1 538, Bonner superseded Gardiner at Paris, and began his mission by sending Cromwell a long list of accusations against his pre- decessor (ib. 1538, ii. 144). He was almost as bitter against Wyatt and Mason, whom he denounced as a " papist," and the violence of his conduct led Francis I. to threaten him with a hundred strokes of the halberd. He seems, however, to have pleased his patron, Cromwell, and perhaps Henry, by his energy in seeing the king's " Great " Bible in English through the press in Paris. He was already king's chaplain; his appointment at Paris had been accompanied by promotion to the see of Hereford, and before he returned to take possession he was trans- lated to the bishopric of London (October 1539).

Hitherto Bonner had been known as a somewhat coarse and unscrupulous tool of Cromwellˆa sort of ecclesiastical Wriothesley,

He is not known to have protested against any of the changes effected by his masters; he professed to be no theologian, and was wont, when asked theological questions, to refer his inter- rogators to the divines. He had graduated in law, and not in theology. There was nothing in the Reformation to appeal to him, except the repudiation of papal control; and he was one of those numerous Englishmen whose views were faithfully reflected in the Six Articles. He became a staunch

Conservative, and, apart from his embassy to the emperor in 15 24-1 543, was mainly occupied during the last years of Henry's reign in brandishing the " whip with six strings."

The accession of Edward VI, opened a fresh and more credit- able chapter in Bonner's career. Like Gardiner, he could hardly repudiate that royal supremacy, in the establishment of which he had been so active an agent; but he began to doubt that supremacy when he saw to what uses it could be put by a Protestant council, and either he or Gardiner evolved the theory that the royal supremacy was in abeyance during a royal minority. The ground was skijfully chosen, but it was not legally nor constitutionally tenable. Both he and Gardiner had in fact sought fresh licences to exercise their ecclesiastical jurisdiction from the young king; and, if he was supreme enough to confer jurisdiction, he was supreme enough to issue the injunc- tions and order the visitation to which Bonner objected. More- over, if a minority involved an abeyance of the royal supremacy in the ecclesiastical sphere, it must do the same in the temporal sphere, and there could be nothing but anarchy. It was on this question that Bonner came into conflict with Edward's govern- ment. He resisted the visitation of August 1547, and was committed to the Fleet; but he withdrew his opposition, and was released in time to take an active part against the govern- ment in the parliament of November 1547. In the next session, November 1548-March 1549, he was a leading opponent of the first Act of Uniformity and Book of Common Prayer. When these became law, he neglected to enforce them, and on the 1st of September 1549 he was required by the council to main- tain at St Paul's Cross that the royal authority was as great as if the king were forty years of age. He failed to comply, and after a seven days' trial he was deprived of his bishopric by an ecclesiastical court over which Cranmer presided, and was sent to the Marshalsea. The fall of Somerset in the following month raised Bonner's hopes, and he appealed from Cranmer to the council. After a struggle the Protestant faction gained the upper hand, and on the 7th of February 1550 Bonner's deprivation was confirmed by the council sitting in the Star Chamber, and he was further condemned to perpetual imprisonment.

He was released by Mary's accession, and was at once restored to his see, his deprivation being regarded as invalid and Ridley as an intruder. He vigorously restored Roman Catholicism in his diocese, made no difficulty about submitting to the papal jurisdiction which he had forsworn, and in 1555 began the persecution to which he owes his fame. His apologists explain that his action was merely " official," but Bonner was one of those who brought it to pass that the condemnation of heretics to the fire should be part of his ordinary

official duties. The enforce- ment of the first Book of Common Prayer had also been part of his official duties; and the fact that Bonner made no such protest against the burning of heretics as he had done in the former case shows that he found it the more congenial duty. Tunstal was as good a Catholic as Bonner; he left a different repute behind him, a clear enough indication of a difference in their deeds.

On the other hand, Bonner did not go out of his way to perse- cute; many of his victims were forced upon him by the council, which sometimes thought that he had not been severe enough (see Acts of the P.C. 1554-1556, pp. 115, 139; 1556-1558, pp. 18, 19, 216, 276). So completely had the state dominated the church that religious persecutions had become state perse- cutions, and Bonner was acting as an ecclesiastical sheriff in the most refractory district of the realm. Even Foxe records instances in which Bonner failed to persecute. But he had

no mercy for a fallen foe; and he is seen at his worst in his brutal jeers at Cranmer, when he was entrusted with the duty of degrading his former chief. It is a more remarkable fact that, in spite of his prominence, neither Henry VIII. nor Mary should ever have admitted him to the privy council. He seems to have been regarded by his own party as a useful instrument, especially in disagreeable work, rather than as a desirable colleague.

On her accession Elizabeth refused to allow him to kiss her hand; but he sat and voted in the parliament and convocation of 1559. In May he refused to take the oath of supremacy, acquiring like his colleagues consistency with old age. He was sent to the Marshalsea, and a few years later was indicted on a charge of praemunire on refusing the oath when tendered him by his diocesan, Bishop Home of Winchester. He challenged the legality of Home's consecration, and a special act of parlia- ment was passed to meet the point, while the charge against Bonner was withdrawn. He died in the Marshalsea on the 5th of September 1569, and was buried in St George's, Southwark, at midnight to avoid the risk of a hostile demonstration.

See Letters and Papers of Henry VIII. vols, iv.-xx. ; Acts of the Privy Council (1542-1569); Lords' Journals, vol. i. ; Wilkins' Concilia; Foxe's Acts and Monuments, ed. Townsend; Burnet, ed. Pocock; Strype's Works; Gough's Index to Parker Soc. Publ.; S. R. Maitland's Essays on

the Ref. ; Froude's and R. W. Dixon's Histories; Pollard's Cranmer and England under Somerset; other authorities cited in Diet. Nat. Biogr. (A. F. P.)

BONNET, CHARLES (1720-1793), Swiss naturalist and philosophical writer, was born at Geneva on the 13 th of March 1720, of a French family driven into Switzerland by the re- ligious persecution in the 16th century. He made law his profession, but his favourite pursuit was the study of natural science. The account of the ant-lion in N. A. Pluche's Spectacle de la nature, which he read in his sixteenth year, turned his attention to insect life. He procured R. A. F. de Reaumur's work on insects, and with the help of live specimens succeeded in adding many observations to those of Reaumur and Pluche. In 1 740 Bonnet communicated to the academy of sciences a paper containing a series of experiments establishing what is now termed parthenogenesis in aphides or tree-lice, which obtained for him the honour of being admitted a corresponding member of the academy. In 1741 he began to study reproduction by fusion and the regeneration of lost parts in the freshwater hydra and other animals; and in the following year he discovered that the respiration of caterpillars and butterflies is performed by pores, to which the name of stigmata has since been given. In 1743 he was admitted a fellow of the Royal Society; and in the same year he became a doctor of laws — his last act in connexion with a profession which had ever been distasteful to him.

His first published work appeared in 1745, entitled Traitl d'insectologie, in which were collected his various discoveries regarding insects, along with a preface on the development of germs and the scale of organized beings. Botany, particularly the leaves of plants, next attracted his attention; and after several years of diligent study, rendered irksome by the increas- ing weakness of his eyesight, he published in 1754 one of the most original and interesting of his works, Recherches sur Pusage des feuilles dans les pi antes; in which among other things he advances many considerations tending to show (as has quite recently been done by Francis Darwin) that plants are endowed with powers of sensation and discernment. But Bonnet's eye-sight, which threatened to fail altogether, caused him to turn to philosophy. In 1754 his Essai de psychologie was published anonymously in London. This was followed by the Essai analytique sur les facultis de I'dme (Copenhagen, 1760), in which he develops his views regarding the physiological conditions of mental activity. He returned to physical science, but to the speculative side of it, in his Considerations sur les corps organises (Amsterdam, 1762), designed to refute the theory of epigenesis, and to explain and defend the doctrine of pre-existent germs. In his Contemplation de la nature (Amsterdam,

1 764-1 765; translated into Italian, German, English and Dutch), one of his

most popular and delightful works, he sets forth, in eloquent language, the theory that all the beings in nature form a gradual scale rising from lowest to highest, without any break in its continuity. His last important work was the Palinginisie philosophique (Geneva, 1769-1770); in it he treats of the past and future of living beings, and supports the idea of the survival of all animals, and the perfecting of their faculties in a future state.

Bonnet's life was uneventful. He seems never to have left Switzerland, nor does he appear to have taken any part in public affairs except for the period between 1752 and 1768, during which he was a member of the council of the republic. The last twenty five years of his life he spent quietly in the country, at Genthod, near Geneva, where he died after a long and painful illness on the 20th of May 1793. His wife was a lady of the family of De la Rive.

They had no children, but Madame Bonnet's nephew, the celebrated H. B. de Saussure, was brought up as their son.

Bonnet's philosophical system may be outlined as follows. Man is a compound of two distinct substances, mind and body, the one immaterial and the other material. All knowledge originates in sensations; sensations follow (whether as physical effects or merely as sequents Bonnet will not say) vibrations in the nerves appropriate to each; and lastly, the nerves are made to vibrate by external physical stimulus. A nerve once set in motion by a particular object tends to reproduce that motion; so that when it a second time receives an impression from the same object it vibrates with less resistance. The sensation accompanying this increased flexibility in the nerve is, according to Bonnet, the condition of memory. When reflection — that is, the active element in mind — is applied to the acquisition and combination of sensations, those abstract ideas are formed which, though generally distinguished from, are thus merely sensations in combination only. That which puts the mind into activity is pleasure or pain; happiness is the end of human existence. Bonnet's metaphysical theory is based on two principles borrowed from Leibnitz — first, that there are not successive acts of creation, but that the universe is completed by the single original act of the divine will, and thereafter moves on by its own inherent force; and secondly, that there is no break in the continuity of existence. The divine Being origin- ally created a multitude of germs in a graduated scale, each with an inherent power of self-development. At every suc- cessive step

in the progress of the universe, these germs, as progressively modified, advance nearer to perfection; if some advanced and others did not there would be a gap in the con- tinuity of the chain. Thus not man only but all other forms of existence are immortal. Nor is man's mind alone immortal; his body also will pass into the higher stage, not, indeed, the body he now possesses, but a finer one of which the germ at present exists within him. It is impossible, however, to reach absolute perfection, because the distance is infinite. In this final proposition Bonnet violates his own principle of continuity, by postulating an interval between the highest created being and the Divine. It is also difficult to understand whether the constant advance to perfection is performed by each individual, or only by each race of beings as a whole. There seems, in fact, to be an oscillation between two distinct but analogous doctrines — that of the constantly increasing advancement of the individual in future stages of existence, and that of the constantly increas- ing advancement of the race as a whole according to the succes- sive evolutions of the globe.

Bonnet's complete works appeared at Neuchatel in 1779-1783, partly revised by himself. An English translation of certain portions of the Palingenesie. philosophique was published in 1787, under the title. Philosophical and Critical Inquiries concerning Christianity. See also A. Lemoine, Charles Bonnet (Paris, 1850) ; the due de Caraman, Charles Bonnet, philosophe et naturaliste (Paris, 1859) '< Max Offner, Die Psychologie C. B. (Leipzig, 1893) ; Toh. Speck, in Arch. f. Gesch. d. Philos. x. (1897), xi. (1897), pp. 58 foil., xi. (1898) pp. 1-211 ; J. Trembley, Vie privee et litteraire de C. B. (Bern, 1794).

BONNET (from Lat. bonetum, a kind of stuff, then the cap made of this stuff), originally a soft cap or covering for the head,

the common term in English till the end of the 17th century; this sense survives in Scotland, especially as applied to the cap known as a " glengarry." The " bonnet " of a ship's sail now means an additional piece laced on to the bottom, but it seems to have formerly meant a piece laced to the top, the term " to vail the bonnet " being found at the beginning of the 16th century to mean " strike sail " (from the Fr. avaler), to let down. In modern times " bonnet " has come to be used of a type of head-covering for women, differentiated from " hat " by fitting closely to the head and often having no brim, but varying considerably in shape according to the period and fashion. The term,

by a natural extension,, is also applied to certain protective devices, as in a steam-engine or safety-lamp, or in slang use to a gambler's accomplice, a decoy.

BONNEVAL, CLAUDE ALEXANDRE, Comte de (1675- 1747), French adventurer, known also as Ahmed Pasha, was the descendant of an old family of Limousin. He was born on the 14th of July 1675, and at the age of thirteen joined the Royal Marine Corps. After three years he entered the army, in which he rose to the command of a regiment. He served in the Italian campaigns under Catinat, Villeroi and Vendome, and in the Netherlands under Luxemburg, giving proofs of indomitable courage and great military ability. His insolent bearing towards the minister of war was made matter for a court-martial (1704). He was condemned to death, but saved himself by flight to Germany. Through the influence of Prince Eugene he obtained a general's command in the Austrian army, and fought with great bravery and distinction against France, and afterwards against Turkey. He was present at Malplaquet, and was severely wounded at Peterwardein. The proceedings against him in France were then allowed to drop, and he visited Paris, and married a daughter of Marshal de Biron. He returned, however, after a short time to the Austrian army, and fought with dis- tinction at Belgrade. He might now have risen to the highest rank, had he not made himself disagreeable to Prince Eugene, who sent him as master of the ordnance to the Low Countries. There his ungovernable temper led him into a quarrel with the marquis de Prie, Eugene's deputy governor in the Netherlands, who answered his challenge by placing him in confinement. A court-martial was again held upon him, and he was con- demned to death; but the emperor commuted the sentence to one year's imprisonment and banishment. Bonneval, soon after his release, offered his services to the Turkish government, professed the Mahommedan faith, and took the name of Ahmed. He was made a pasha, and appointed to organize and command the artillery. He rendered valuable services to the sultan in his war with Russia, and with the famous Nadir Shah. As a reward he received the governorship of Chios, but he soon fell under the suspicion of the Porte, and was banished for a time to the shores of the Black Sea. He was meditating a return to Europe and Christianity when he died at Constantinople on the 23rd of March 1747.

The Memoirs published under his name are spurious. See Prince de Ligne, Memoire sur le comte de Bonneval (Paris, 1817); and A. Vandal, Le Pacha Bonneval (Paris, 1885).

BONNEVILLE, BENJAMIN L. E. (1795-1878), American military engineer and explorer, was born in France about 1795. He emigrated

to the United States in early youth, and graduated at the United States Military Academy at West Point in 181 5. He was engaged in the construction of military roads in the south-west, and became a captain of infantry in 1825. In 1831-1836, having obtained leave of absence from the army, he conducted, largely on his own responsibility, an exploring expedition to the Rocky Mountains, proceeding up the Platte river through parts of the later states of Colorado and Wyoming into the Great Salt Lake basin and thence into California. After being absolutely cut off from civilization for several years, and having his name struck from the army list, he returned with an interesting and valuable account of his adventures, which was edited and amplified by Washington Irving and published under the title The Rocky Mountains: or Scenes, Incidents, and Adven- tures in the Far West; from the Journal of Captain Benjamin

L. E. Bonneville of the Army of the United States (2 vols., 1837), subsequent editions bearing the title The Adventures of Captain Bonneville, U.S.A., in the Rocky Mountains and the Far West. Bonneville became a major in 1845, and was breveted lieutenant-colonel for gallantry in the battles of Contreras and Churubusco during the Mexican War. He became a colonel in 1855, com- manded the Gila river expedition against the Apaches in 1857, and from 1858 to 1861 commanded the department of New Mexico. He was retired in 1861, but served during the Civil War as recruiting officer and commandant of barracks at St Louis, Missouri, receiving the brevet rank of brigadier- general in 1865. He died at Fort Smith, Arkansas, on the 12th of June 1878. The extinct glacial lake which once covered what is now north-western Utah has been named in his honour.

BONNEY, THOMAS GEORGE (1833-), English geologist, eldest son of the Rev. Thomas Bonney, master of the grammar school at Rugeley, was born in that town on the 27th of July 1833. Educated at Uppingham and St John's College, Cam- bridge, he graduated as 12th wrangler in 1856, and was ordained in the following year. From 1856 to 1861 he was mathematical master at Westminster school, and geology was pursued by him only as a recreation, mainly in Alpine regions. In 1868 he was appointed tutor at St John's College and lecturer in geology. His attention was specially directed to the study of the igneous and metamorphic rocks in Alpine regions and in various parts of England, in the Lizard, at Salcombe, in Charnwood Forest, in Wales and the Scottish Highlands. In 1877 he was chosen professor of geology in University College, London. He became secretary and afterwards president of the Geological Society (1884-1886), secretary of the British Association (1881-1885), president of the Mineralogical Society and of the Alpine Club. He was also in 1887 appointed

honorary canon of Manchester. His purely scientific works are: Cambridgeshire Geology (1875); The Story of our Planet (1893) ; Charles Lyell and Modem Geology (1895); Ice Work, Past and Present (1896); Volcanoes (1899). In addition to many papers published in the Quarterly Journal of the Geological Society and Geological Magazine, he wrote several popular works on Alpine Regions, on English and Welsh scenery, as well as on theological subjects.

See Geological Magazine for September 1901 (with bibliography).

BONNIER, ANGE ELISABETH LOUIS ANTOINE (1749- 1799), French diplomatist, was a member of the Legislative Assembly and of the Convention, where he voted with the majority. During the Directory he was charged with diplo- matic missions, first to Lille and then to the congress of Rastadt (October 1797), where the negotiations dragged wearily along and were finally broken. On the 28th of April 1799 the pleni- potentiaries on leaving Rastadt were assailed at the gates of the town by Hungarian hussars, probably charged to secure their papers. Bonnier and one of his colleagues, Claude Roberjot, were killed. The other, Jean Debry, was wounded.

See Huefer, Der Rastadtergesandtenmord (Bonn, 1896).

BONNIVET, GUILLAUME GOUFFIER, Seigneur de (c. 1488-1525), French soldier, was the younger brother of Artus Gouffier, seigneur de Boisy, tutor of Francis I. of France. Bonnivet was brought up with Francis, and after the young king's accession he became one of the most powerful of the royal favourites. In 151 5 he was made admiral of France. In the imperial election of 15 19 he superintended the candidature of Francis, and spent vast sums of money in his efforts to secure the votes of the electors, but without success. He was the implacable enemy of the constable de Bourbon and contributed to his downfall. In command of the army of Navarre in 1521, he occupied Fuenterrabia and was probably responsible for its non-restoration and for the consequent renewal of hostilities. He succeeded Marshal Lautrec in 1523 in the command of the army of Italy and entered the Milanese, but was defeated and forced to effect a disastrous retreat, in which the chevalier Bayard perished. He was one of the principal commanders of the army which Francis led into Italy at the end of 1524, and died at the battle of Pavia on the 24th of February 1525. Bran- t6me says that it was at Bonnivet's suggestion that the battle

of Pavia was fought, and that, seeing the disaster he had caused, he courted and found death heroically in the fight. In spite of his failures as a general and diplomatist, his handsome face and brilliant wit enabled him to retain throughout his life the intimacy and confidence of his king. He was a man of licentious life. According to Brantome he was the successful rival of the king for the favours of Madame de Chateaubriand, and if we may believe him to have been — as is very probable — the hero of the fourth story of the Heptameron, Marguerite d'Angouleme had occasion to resist his importunities.

Authorities. — Bonnivet's correspondence in the Bibliotheque Nationale, Paris ; memoirs of the time ; complete works of Brant6me, vol. iii., published by Ludovic Lalanne for the Societe de l'Histoire de France (1864 seq.). See also Ernest Lavisse, Histoire de France, vol. v., by H. Lemonnier (1903-1904).

BONOMI, GIUSEPPI (173 0-1808), English architect, was born at Rome on the 19th of January 1739. After attaining a considerable reputation in Italy, he came in 1767 to England, and finally settled in practice there. He was the innocent cause of the retirement of Sir Joshua Reynolds from the presidency of the Royal Academy. Sir Joshua wished him to become a full Academician, regarding him as a fitting occupant of the then vacant chair of perspective. But the majority of the Acade- micians were opposed to this suggestion, and Bonomi was elected an associate only, and that merely by the president's casting vote. Bonomi was largely responsible for the revival of classical architecture in England. His most famous work was the Italian villa at Roseneath, Dumbartonshire, designed for the duke of Argyll. In 1804 he was appointed honorary architect to St Peter's at Rome. He died in London on the 9th of March 1808.

His son, GiuSEPPi Bonomi (1796-1878), studied art in London at the Royal Academy, and became a sculptor, but is best known as an illustrator of the leading Egyptological publications of his day. From 1824 to 1832 he was in Egypt, making drawings of the monuments in the company of Burton, Lane and Wilkin- son. In 1833 he visited the rnosque of Omar, returning with detailed drawings, and from 1842 to 1844 was again in Egypt,. attached to the Prussian government exploration expedition under Lepsius. He assisted in the arrangement of the Egyptian court at the Crystal Palace in 1853, and in 1861 was appointed curator of the Soane Museum. He died on the 3rd of March

1878.

BONONCINI (or Buononcini), GIOVANNI BATTISTA (1672?- 1750?),

Italian musical composer, was the son of the composer Giovanni Maria Bononcini, best known as the author of a treatise entitled II Musico Prattico (Bologna, 1673), and brother of the composer Marc' Antonio Bononcini, with whom he has often been confused. He is said to have been born at Modena in 1672, but the date of his birth must probably be placed some ten years earlier. He was a pupil of his father and of Colonna, and produced his first operas, Tullo Ostilio and Serse, at Rome in 1694. In 1696 he was at the court of Berlin, and between 1700 and 1720 divided his time between Vienna and Italy. In 1720 he was summoned to London by the Royal Academy of Music, and produced several operas, enjoying the protection of the Marlborough family. About 1731 it was discovered that he had a few years previously palmed off a madrigal by Lotti as his own work, and after a long correspondence he was obliged to leave the country. He remained for several years in France, and in 1 748 was summoned to Vienna to compose music in honour of the peace of Aix-la-Chapelle. He then went to Venice as a composer of operas, and nothing more is known of his life.

Bononcini's rivalry with Handel will always ensure him immortality, but he was in himself a musician of considerable merit, and seems to have influenced the style, not only of Handel but even of Alessandro Scarlatti. Either he or his brother (our knowledge of the two composers' lives is at present not sufficient to distinguish their works clearly) was the inventor of that sharply rhythmical style conspicuous in II Trionfo di Camilla (1697), the success of which at Naples probably induced Scar- latti to adopt a similar type of melody. It is noticeable in the once popular air of Bononcini, L'esperto nocchiero, and in the air

Vado ben spesso, long attributed to Salvator Rosa, but really by Bononcini.

BONONIA (mod. Bologna), the chief town of ancient Aemilia (see Aemilia, Via), in Italy. It was said by classical writers to be of Etruscan origin, and to have been founded, under the name Felsina, from Perusia by Aucnus or Ocnus. Excavations of recent years have, however, led to the discovery of some 600 ancient Italic (Ligurian?) huts, and of cemeteries of the same and the succeeding (Umbrian) periods (800-600? B.C.), of which the latter immediately preceded the Etruscan civil- ization (c. 600-400 B.C.). An extensive Etruscan necropolis, too, was discovered on the site of the modern cemetery (A. Zannoni, Scavi della Certosa, Bologna, 1876), and others in the public garden and on the Arnoaldi Veli property (Notizie degli Scavi, indice 1876-1900, s.v. "Bologna"). In 196 B.C., when the town first appears

in history, it was already in the possession of the Boii, and had probably by this time changed its name, and in 189 B.C. it became a Roman colony. After the conquest of the mountain tribes, its importance was assured by its position on the Via Aemilia, by which it was connected in 187 B.C. with Ariminum and Placentia, and on the road, constructed in the same year, to Arretium; while another road was made, perhaps in 175 B.C., to Aquilelia. It thus became the centre of the road system of north Italy. In 90 B.C. it acquired Roman citizenship. In 43 B.C. it was used as his base of operations against Decius Brutus by Mark Antony, who settled colonists here; Augustus added others later, constructing a new aqueduct from the Letta, a tributary of the Rhenus, which was restored to use in 1881 (G. Gozzadini in Notizie degli Scavi, 1881, 162). After a fire in a.d. 53 the emperor Claudius made a subvention of 10 million sesterces (£1,087,500). Bononia seems, in fact, to have been one of the most important cities of ancient Italy, as Bologna is of modern Italy. It was able to resist Alaric in 410 and to preserve its existence during the general ruin. It afterwards belonged to the Greek exarchate of Ravenna. Of remains of the Roman period, however, there are none above ground, though various discoveries have been made from time to time within the city walls, the modern streets corresponding more or less, as it seems, with the ancient lines. Remains of the bridge of the Via Aemilia over the Rhenus have also been found — consisting of parts of the parapets on each side, in brick-faced concrete which belong to a restoration, the original construction (probably by Augustus in 2 B.C.) having been in blocks of Veronese red marble — and also of a massive protecting wall slightly above it, of late date, in the construction of which a large number of Roman tombstones were used. The bed of the river was found to have risen at least 20 ft. since the collapse of this bridge (about a.d. 1000), the total length of which must have been about 650 ft. and the width between the parapets 385- ft. See E. Brizio in Notizie degli Scavi (1896), 125, 450; (1897) 330; (1898)4651(1902)532. (T. As.)

BONPLAND, AIMS' JACQUES ALEXANDRE (1773-1858), French traveller and botanist, whose real name was Goujand, was born at La Rochelle on the 22nd of August 1773. After serving as a surgeon in the French army and studying under J. N. Corvisart at Paris, he accompanied A. von Humboldt during five years of travel in Mexico, Colombia and the districts border- ing on the Orinoco and Amazon. In these explorations he collected and classified about 6000 plants till then mostly un- known in Europe, which he afterwards described in Plantes equinoxiales, &c. (Paris, 1808-1816). On returning to Paris he received a pension and the superintendence of the gardens at

Malmaison, and published Monographie des Me'lastomi'es (1806), and Description des plantes rares de Navarre (181 3). In 1816 he set out, taking with him various European plants, for Buenos Aires, where he was elected professor of natural history, an office which he soon quitted in order to explore central South America. While journeying to Bolivia he was arrested in 1821, by command of Dr Francia, the dictator of Paraguay, who detained him until 1831. On regaining liberty he resided at San Borga in the pro- vince of Corrientes, until his removal in 1853 to Santa Anna, where he died on the 4th of May 1858.

BONSTETTEN, CHARLES VICTOR DE (1745-1832), Swiss writer, an excellent type of a liberal patrician, more French than Swiss, and a good representative of the Gallicized Bern of the 1 8th century. By birth a member of one of the great patrician families of Bern, he was educated in his native town, at Yverdon, and (1 763-1 766) at Geneva, where he came under the influence of Rousseau and of Charles Bonnet, and imbibed liberal sentiments. Recalled to Bern by his father, he was soon sent to Leiden, and then visited (1769) England, where he became a friend of the poet Gray. After his father's death (1770) he made a long journey in Italy, and on his return to Bern (1774) entered poli- tical life, for which he was unfitted by reason of his liberal ideas, which led him to patronize and encourage Johannes Muller, the future Swiss historian. In 1779 he was named the Bernese bailiff of Saanen or Gessenay (here he wrote his Lettres pastorales sur une contree de la Suisse, published in German in 1781), and in 1787 was transferred in a similar capacity to Nyon, from which post he had to retire after taking part (1791) in a festival to celebrate the destruction of the Bastille. From 1795 to 1797 he governed (for the Swiss Confederation) the Italian-speaking districts of Lugano, Locarno, Mendrisio and Val Maggia, of which he published (1797) a pleasing description, and into which he is said to have introduced the cultivation of the potato. The French revolution of 1798 in Switzerland drove him again into private life. He spent the years 1798 to 1801 in Denmark, with his friend Fredirika Brun, and then settled down in 1803 in Geneva for the rest of his life. There he enjoyed the society of many distinguished persons, among whom was (1809-1817) Madame de Stael. It was during this period that he published his most celebrated work, L' Homme du midi et I'homme du nord (1824), a study of the influence of climate on different nations, the north being exalted at the expense of the south. Among his other works are the

Recherches sur la nature el les lots de I' imagination (1807), and the Etudes de I'homme, ou Recherches sur les facultSs de penser et de sentir (1821), but he was better as an observer than as a philosopher.

Lives by A. Steinlen (Lausanne, i860), by C. Morell (Winterthur, 1861), and by R. Willy (Bern, 1898). See also vol. xiv. of Sainte-Beuve's Causeries du Lundi. (W. A. B. C.)

BONUS (a jocular application of the Lat. bonus, for bonum, " a good thing "), a sum paid to shareholders in a joint-stock company, as an addition to the ordinary dividend, and generally given out of accumulated profits, or out of profits gained from exceptional transactions. As used by insurance companies, the word denotes the addition made to the amount of a policy by a distribution pro rata of accumulated profits or surplus. In a more general sense, bonus is any payment or remuneration over and above what is due and promised.

BONZE (from Japanese bonzo, probably a mispronunciation of Chinese fan sung, " religious person "), the European name for the members of the Buddhist religious orders of Japan and China. The word is loosely used of all the Buddhist priests in those and the neighbouring countries.

BOOK, the common name for any literary production of some bulk, now applied particularly to a printed composition forming a volume, or, if in more than one volume, a single organic literary work. The word is also used descriptively for the internal divisions or sections of a comprehensive work.

The word " book " is found with variations of form and gender in all the Teutonic languages, the original form postulated for it being a strong feminine Boks, which must have been used in the sense of a writing-tablet. The most obvious connexion of this is with the old English boc, a beech tree, and though this is not free from philological difficulties, no probable alternative has been suggested.

As early as 2400 B.C., in Babylonia, legal decisions, revenue accounts, &c. were inscribed in cuneiform characters on clay tablets and placed in jars, arranged on shelves and labelled by clay tablets attached by straws. In the 7th century B.C. a library of literary works written on such tablets existed at Nineveh, founded by Sargan (721-705 B.C.). As in the case of the " Creation " series at the British Museum the narrative was

sometimes continued from one tablet to another, and some of the

tablets are inscribed with entries forming a catalogue of the library. These clay tablets are perhaps entitled to be called books, but they are out of the direct ancestry of the modern printed book with which we are here chiefly concerned. One of the earliest direct ancestors of this extant is a roll of eighteen columns in Egyptian hieratic writing of about the 25th century B.C. in the Musee de Louvre at Paris, preserving the maxims of Ptah-hetep. Papyrus, the material on which the manuscript (known as the Papyrus Prisse) is written, was made from the pith of a reed chiefly found in Egypt, and is believed to have been in use as a writing material as early as about 4000 B.C. It continued to be the usual vehicle of writing until the early centuries of the Christian era, was used for pontifical bulls until a.d. 1022, and occasionally even later; while in Coptic manuscripts, for which its use had been revived in the 7 th century, it was employed as late as about a.d. 1250. It was from the name by which they called the papyrus, fivpXos or /3tj3Xos, that the Greeks formed PifiXiov, their word for a book, the plural of which (mis- taken for a feminine singular) has given us our own word Bible. In the 2nd century B.C. Eumenes II., king of Pergamus, finding papyrus hard to procure, introduced improvements into the preparations of the skins of sheep and calves for writing purposes, and was rewarded by the name of his kingdom being preserved in the word pergamentum, whence our ” parchment,” by which the dressed material is’known. In the 10th century the supremacy which parchment had gradually established was attacked by the introduction from the East of a new writing material made from a pulp of linen rags, and the name of the vanquished papyrus was transferred to this new rival. Paper- mills were set up in Europe in the 12th century, and the use of paper gained ground, though not very rapidly, until on the invention of printing, the demand for a cheap material for books, and the ease with which paper could be worked on a press, gave it a practical monopoly. This it preserved until nearly the end of the 19th century, when substances mainly composed of wood-pulp, esparto grass and clay largely took its place, while continu- ing, as in the transition from papyrus to linen-pulp, to pass under the same name (see Paper).

So long as the use of papyrus was predominant the usual form of a book was that of the volumen or roll, wound round a stick, or sticks. The modern form of book, called by the Latins codex (a word originally used for the stump of a tree, or block of wood, and thence for the three-leaved tablets into which the block was sawn) was coming into fashion in Martial’s time at Rome, and gained ground in proportion as parchment superseded papyrus. The volumen as it was unrolled revealed a series of narrow columns of writing, and the

influence of this arrangement is seen in the number of columns in the earliest codices. Thus in the Codex Sinaiticus and Codex Vaticanus of the Bible, both of the 4th century, there are respectively four and three columns to a page; in the Codex Alexandrinus (5th century) only two; in the Codex Bezae (6th century) only one, and from this date to the invention of printing, while there were great changes in handwriting, the arrangement of books changed very little, single or double columns being used as was found convenient. In the external form of books there was much the same conserva- tism. In the Codex Amiatinus written in England in the 8th century one of the miniatures shows a book in a red leather cover, and the arrangement of the pattern on this curiously resembles that of the' 15th-century red leather bindings predominant in the Biblioteca Laurenziana at Florence, in which the codex itself is preserved. In the same way some of the small stamps used in Oxford bindings in the 15th century are nearly indistin- guishable from those used in England three centuries earlier. Much fuller details as to the history of written books in these as well as other respects will be found in the article Manuscript, to which the following account of the fortunes of books after the invention of printing must be regarded as supplementary.

Between a manuscript written in a formal book-hand and an early printed copy of the same work, printed in the same district as the manuscript had been written, the difference in general

appearance was very slight. The printer's type (see Typography) would as a rule be based on a handwriting considered by the scribes appropriate to works of the same class; the chapter ' headings, headlines, initial-letters, paragraph marks, and in some cases illustrations, would be added by hand in a style which might closely resemble the like decorations in the manuscript from which the text was being printed; there would be no title-page, and very probably no statement of any kind that the book was printed, or as to where, when or by whom it was produced. Information as to these points, if given at all, was reserved for a paragraph at the end of the book, called by bibliographers a colophon (q.v.), to which the printer often attached a device consisting of his arms, or those of the town in which he worked, or a fanciful design. These devices are sometimes beautiful and often take the place of a statement of the printer's name. Many facsimiles or copies of them have been published. 1 The first dated title-page known 2 is a nine-line paragraph on an otherwise blank

page giving the title of the book, Sermo ad populum predicabilis in festo presentations Beatissime Marie Semper Virginis, with some words in its praise, the date 1470 in roman numerals, and a reference to further information on the next page. The book in which this title-page occurs was printed by Arnold ther Hoernen at Cologne. Six years later Erhard Rat- dolt and his partners at Venice printed their names and the date, together with some verses describing the book, on the title- page of a Latin calendar, and surrounded the whole with a border in four pieces. For another twenty years, however, when title-pages were used at all, they usually consisted merely of the short title of the book, with sometimes a woodcut or the printer's (subsequently the publisher's) device beneath it, decoration being more often bestowed on the first page of text,which was some- times surrounded by an ornamental border. Title-pagescompleted by the addition of the name and address of printer or publisher, and also by the date, did not become common till about 1520.

While the development of the title-page was thus slow the completion of the book, independently of handwork, in other respects was fairly rapid. Printed illustrations appear first in the form of rude woodcuts in some small books produced at Bam- berg by Albrecht Pfister about 1461. Pagination and headlines were first used by ther Hoernen at Cologne in 1470 and 147 1; printed signatures to guide binders in arranging the quires cor- rectly (see Bibliography and Bibliology) by Johann Koelhoff , also at Cologne in 1472. Illustrations abound in the books printed at Augsburg in the early 'seventies, and in the 'eighties are common in Germany, France and the Low Countries,while in Italy their full development dated from about 1490. Ex- periments were made in both Italy and France with illustrations engraved on copper, but in the 15th century these met with no success.

Bound with wooden boards covered with stamped leather, or with half of the boards left uncovered, many of the earliest printed books are immensely large and heavy, especially the great choir-books, the Bibles and the Biblical and legal commentaries, in which a great mass of notes surrounds the text. The paper on which these large books were printed was also extraordinarily thick and strong. For more popular books small folio was at first a favourite size, but towards the end of the century small thin quartos were much in vogue. Psalters, books of hours,

1 Works especially devoted to these facsimiles are:— Berjeau's Early Dutch, German and English Printers' Marks (London, 1866) ; W. Roberts's Printers' Marks (London, 1893); Silvestre's Marques typographiques (French; Paris, 1853-1867); Die Biichermarken oder

Buchdrucker und Verlegerzeichen (Strassburg, 1 892-1 898), the successive parts containing the devices used in Alsace, Italy, Basel, Frankfort, Mainz and Cologne; and Marques typographiques des imprimeurs el libr aires qui ont exerce dans les Pays-Bas (Gand, 1894). Numerous devices are also reproduced in histories of printing and in volumes of facsimiles of early types.

2 An edition of a bull of Pope Pius II. in the John Rylands library, Manchester, in types used by Fust and Schoeffer at Mainz, bears printed on the top of the first page the words ” Dis ist die bul zu dutsch die unser allerheiligster vatter der bapst Pius herusgesant hait widder die snoden ungleubigen turcken.” This is attributed to the year 1463, and is claimed as the first book with a printed title-page.

and other prayer-books were practically the only very small books in use. Owing to changes, not only in the value of money but in the coinage, the cost of books in the 15th century is ex- tremely difficult to ascertain. A vellum copy of the first printed Bible (Mainz, c. 1455) in two large folio volumes, when rubricated and illuminated, is said to have been worth 100 florins. In 1467 the bishop of Aleria writing to Pope Paul II. speaks of the introduction of printing having reduced prices to one-fifth of what they had previously been. Fifteen ” Legends ” bequeathed by Caxton to St Margaret’s, Westminster, were sold at prices varying from 6s. 8d. to 5s. This would be cheap for a large work like the Golden Legend, but the bequest was more probably of copies of the Sarum Legenda, or Lectionary, a much smaller book.

16th Century. — The popularization of the small octavo by Aldus at Venice in 1501 and the introduction in these handy books of a new type, the italic, had far-reaching consequences. Italics grew steadily in favour during the greater part of the century, and about 1570 had almost become the standard vernacular type of Italy. In France also they were very popular, the attempt to introduce a rival French cursive type {lettres de civilite) attaining no success. In England they gained only slight popularity, but roman type, which had not been used at all in the 15th century, made steady progress in its contest with black letter, which by the end of the century was little used save for Bibles and proclamations. The modern practice in the use of i and j, u and v dates from about 1580, though not firmly established till the reign of Charles I.

In the second quarter of the 16th century the French printers at Paris and Lyons halved the size of the Aldine octavos in their small sextodecimos, which found a ready market, though not a lasting one, the printers of Antwerp and Leiden ousting them with still smaller

books in 24mo or small twelves. These little books were printed on paper much thinner than had previously been used. The size and weight of books was also reduced by the substitution of pasteboards for wooden sides. Gold tooling came into use on bindings, and in the second half of the century very elaborate decoration was in vogue in France until checked by a sumptuary law.. On the other hand a steady decline in the quality of paper combined with the abandonment of the old simple outline woodcuts for much more ambitious designs made it increasingly difficult for printers to do justice to the artists' work, and woodcuts, at first in the Low Countries and afterwards in England and elsewhere, were gradually superseded by copper- plates printed separately from the text. At the beginning of this century in England a ballad or Christmas carol sold for a halfpenny and thin quarto chapbooks for 4d. (a price which lasted through the century), the Great Bible of 1541 was priced at 10s. in sheets and 12s. bound, Edward VI.'s prayer-book (1549) at 2s. 2d. unbound, and 3s. 8d. in paste or boards; Sidney's Arcadia and other works in 1 598 sold for 9s.

17th Century. — Although the miniature editions issued by the Elzevirs at Leiden, especially those published about 1635, have attracted collectors, printing in the 17 th century was at its worst, reaching its lowest depths in England in the second quarter. After this there was a steady improvement, partly due to slight modifications of the old printing presses, adopted first in Holland and copied by the English printers. In the first half of the century many English books, although poorly printed, were ornamented with attractive frontispieces, or portraits, engraved on copper. During the same period, English prayer- books and small Bibles and New Testaments were frequently covered with gay embroideries in coloured silks and gold or silver thread. In the second half of the century the leather bindings of Samuel Mearne, to some extent imitated from those of the great French binder Le Gascon, were the daintiest England had yet produced. For trade bindings rough calf and sheepskin were most used, and the practice of lettering books on the back, instead of on the sides or fore-edges or not at all, came gradually into favour. Owing to the increase of money, and in some cases to the action of monopolists, in others to the increased payments made to authors, book-prices rather rose than fell. Thus church Bibles, which had been sold at 10s. in 1541, rose successively to

Platf

Fig. i.— WINCHESTER DOMES- DAY BOOK OF THE 12TH CENTURY.

Dark brown morocco, blind stamped.

Fig. 2.— ST. CUTIIBERT'S GOSPELS. Red leather with repousse design, prob- ably the work of the 7th or 8th century. The fine lines are impressed by hand, and painted blue and yellow r .

Fig. 4.— BINDING MADE FOR JAMES I. Dark blue morocco, gold tooled. The red in the coat-of-arms inlaid with red morocco.

Fig. 3.-

-BINDING MADE FOR JEAN GROLIER. Pale brown morocco, gold tooled.

Fig.

Srn <

5.— COMMON PRAYER (LONDON, 1678), :oth red morocco, gold tooled with black fillets. Bound by Samuel Mearne.

Fig. 6.— IE LIVRE DES STA- TUTS ET ORDONNANCES DE UORDRE DU BENVIST SAINCT ESPRIT (PARIS, 1578). Brown morocco, gold tooled, arms

of Henry III., King of France. Bound

by Nicholas Eve.

Fig. 7.— CATALOGUE OF THE PICTURES AT HAGLEY HALL.

Red niger morocco, gold tooled. Bound by Douglas Cockerell.

Fig. 8.— WALTON'S COMPLEAT ANGLER (1772).

Golden brown morocco, gold tooled. Bound by Miss E. M. MacColl.

25s., 30s. and (in 1641) to 40s. Single plays in quarto cost 6d. each in Shakespeare's time, is. after the Restoration. The Shakespeare folio of 1623 is said to have been published at £1. Bishop Walton's polyglot Bible in six large volumes was sold for £10 to subscribers, but resulted in a heavy loss. Izaak Walton's Compleat Angler was priced at is. 6d. in sheepskin, Paradise Lost at 3s., The Pilgrim's Progress at is. 6d.;

Dryden's Virgil was published by subscription at £s : 5 s – It was a hand- some book, ornamented with plates; but in the case of this and other subscription books a desire to honour or befriend the author was mainly responsible for the high price.

18th Century. — During this century there was a notable im- provement alike in paper, type and presswork in both France and England, and towards the end of the century in Germany and Italy also. Books became generally neat and sometimes elegant. Book- illustration revived with the French livres-a- vignettes, and English books were illustrated by Gravelot and other French artists. In the last quarter of the century the work of Bewick heralded a great revival in woodcut illustrations, or as the use of the graver now entitled them to be called, wood engravings. The best 18th-century binders, until the advent of Roger Payne, were inferior to those of the 17th century, but the technique of the average work was better. In trade bindings the use of sheepskin and calf became much less common, and books were mostly cased in paper boards. The practice of pub- lishing poetry by subscription at a very high price, which Dryden had found lucrative, was followed by Prior and Pope. Single poems by Pope, however, were sold at is. and is. 6d. Novels were mostly in several volumes. The price at the beginning of the century was mostly is. 6d. each. It then remained fairly steady for many years, and at the close of the century rose again. Thus Miss Burney's Evelina (3 vols., 1778) sold for 7S. 6d., her Cecilia (5 vols., 1782) for 12s. 6d., and her Camilla (5 vols., 1796) for £1 :is. Johnson's Dictionary (2 vols, folio, 1755) cost £4:43. in sheets, £4 :15s. in boards.

19th Century. — A great change in the appearance of books was caused by the use first of glazed calico (about 1820), afterwards (about 1830) of cloth for the cases of books as issued by their publishers. At first the lettering was printed on paper labels, but soon it was stamped in gilt on the cloth, and in the last quarter of the century many very beautiful covers were designed for English and American books. The designs for leather bindings were for many years chiefly imitated from older work, but to- wards the end of the 'eighties much greater originality began to be shown. Book illustrations passed through many phases. As subsidiary methods colour-prints, line engravings, lithographs and etchings were all used during the first half of the century, but the main reliance was on wood-engraving, in which extra- ordinary technical skill was developed. In the 'sixties and the years which immediately preceded and followed them many of the chief English artists supplied the engravers with drawings. In the last decade of the century wood-engraving was practically killed by the perfection attained by photographic methods of reproduction (see

Process), the most popular of these methods entailing the use of paper heavily coated with china clay. During the century trade-printing, both in England and America, steadily improved, and the work done by William Morris at his Kelmscott Press (1891-1896), and by other amateur printers who imitated him, set a new standard of beauty of type and ornament, and of richness of general effect. On the other hand the demand for cheap reprints of famous works induced by the immense extension of the reading public was supplied by scores of pretty if flimsy editions at is. 6d. and is. and even less. The problem of how to produce books at moderate prices on good paper and well sewn, was left for the 20th century to settle. About 1894 the number of such medium-priced books was greatly increased in England by the substitution of single-volume novels at 6s. each (subject to discount) for the three-volume editions at 31s. 6d. The preposterous price of 10s. 6d. a volume had been adopted during the first popularity of the Waverly Novels, and despite the example of France, where the standard price was 3 fr. 50, had continued in force for the greater part of the century. Even after

novels were sold at reasonable rates artificial prices were main- tained for books of travel and biographies, so that the circu- lating libraries were practically the only customers for the first editions. (See Publishing and Bookselling). (A. W. Po.)

BOOKBINDING. Bindings or covers to protect written or printed matter have always followed the shapes of the material on which the writing or printing was done. Very early inscrip- tions on rocks or wood needed no coverings, and the earliest instances of protective covers are to be found among the smaller Assyrian tablets of about the 8th century B.C. These tablets, with cuneiform inscriptions recording sales of slaves, loans of money and small matters generally, are often enclosed in an outer shell of the same shape and impressed with a short title. Egyptian papyrus rolls were generally kept in roll form, bound round with papyrus tape and often sealed with seals origins of Nile mud; and the rolls in turn were often preserved in rectangular hollows cut in wood. The next earliest material to papyrus used for writing upon was tree bark. Bark books, still commonly used by uncultured nations, often consisting of collections of magical formulae or medical receipts, are generally rolls, folded backwards and forwards upon themselves like the sides of a concertina. At Pompeii in 1875 several diptychs were found, the wooden leaves hollowed on the inner sides, filled with blackened wax, and hinged together at the back with leather thongs. Writings were found scratched on the wax, one of them being a record of a payment to Umbricia Januaria in a.d. 55. This is the earliest known Latin manuscript. The diptychs are the

prototypes of the modern book. From about the 1st to the 6th century, ornamental diptychs were made of carved ivory, and presented to great personages by the Roman consuls.

Rolls of papyrus, vellum or paper were written upon in three ways. (1) In short lines, at right angles to the length of the roll. (2) In long lines each the entire length of the roll. (3) In short lines parallel to the length of the roll, each column or page of writing having a space left on each side of it. Rolls written in the first of these ways were simply rolled up and kept in cylinders of like shape, sometimes several together, with a title tag at the end of each, in a box called a scrinium. In the case of the second form, the most obvious instances of which are to be found in the Buddhist prayer-wheels, the rolls were and are kept in circular boxes with handles through the centres so that. they can revolve easily. In the third manner of arranging the manuscript the page forms-show very clearly, and it is still used in the scrolls of the law in Jewish synagogues, kept on two rollers, one at each end. But this form of writing also developed a new method for its own more convenient preservation. A roll of this kind can be folded up, backwards and forwards, the bend coming in the vacant spaces between the columns of writing. When ihis is done it at once becomes a book, and takes the Chinese and Japanese form known as orihon—aM the writing, on one side of the roll or strip of paper and all the other side blank. Some books of this kind are simply guarded by two boards, but generally they are fastened together along one of the sides, which then becomes the back of the book. The earliest fastening of such books consists of a lacing with some cord or fibre run through holes stabbed right through the substance of the roll, near the edge. Now the orihon is complete, and it is the link between the roll and the book. This ” stabbed ” form of binding is the earliest method of keeping the leaves of a book together; it occurs in the case of a Coptic papyrus of about the 8th century found at Thebes, but it is rarely used in the case of papyrus, as the material is too brittle to retain the .threads properly.

The method of folding vellum into pages seems to have been first followed about the 5th century. The sheets” were folded once, and gatherings of four or more folded sheets were made, so that stitches through the fold at the back would hold all the sheets together and each leaf could be conveniently turned over. Very soon an obvious plan of fixing several of these gatherings, or quires, together was followed by the simple expedient of fastening the threads at the back round a strong strip of leather or vellum held at right angles to the line of the backs. This early plan of ” sewing ” books is to-day used in the case of valuable

books; it is known as ” flexible ” work, and has never been improved upon.

As soon as the method of sewing quires together in this way became well understood, it was found that the projecting bands at the back needed protection, so that when all the quires were joined together and, so far, finished, strips of leather were fastened all over the back. But it was also found that vellum leaves were apt to curl strongly, ahd to counteract this tendency strong wooden boards were put on each side. The loose ends of the bands were fastened to the boards, which hinged upon them, and the protecting strip of leather at the back was drawn over the boards far enough to cover the hinge. So we get the medieval ” half-binding ” which shows the strip of leather over the back of the book, projecting for a short way over the boards, the rest of which is left uncovered. The boards were usually kept closed by means of clasps in front.

The leather strip soon developed, and covered the whole of the boards, ” whole ” binding as it is called, and it was quickly found that these fine flat pieces of leather offered a splendid field for artistic decoration.

The first ornamentation on leather bindings was probably made by means of impressions from small metal points or lines, pressed upon the leather. This in time led to the T*r« S tf purposeful cutting of small decorative stamps to be binding. used in the same way. It is considered that English binders excelled in this art of ” blind’” stamping, that is, without the use of gold leaf. Most of the stamps were cut intaglio, so that their impressions are in cameo form. Such bindings were made to perfection during the 12th and 13th centuries at Durham, Oxford, Cambridge, London and other places. One of the most charming examples left is the binding of the Winchester Domesday Book of the 12th century (Plate, fig. 1), now belonging to the Society of Antiquaries of London.

From about the 7 th to the 16th century illuminated manuscripts were held in the greatest esteem. Among them can be found not only exquisite calligraphy but exquisite miniature painting. Moreover, the gorgeousness of the illuminations inside suggested gorgeousness of the outside coverings, so we find splendid work in metals with jewels, enamels and carved ivory, dating from the 7th-century Gospels of

Theodolinda at Monza, the Irish cumdach of the Slowe Missal, the Lindau Gospels now in America, and the Gospels of Charlemagne in the Victoria and Albert Museum at South Kensington, to the magnificent bindings of 14th-century Limoges enamel in the British Museum. Such English bindings of this kind — intrinsically precious — as may have existed have all disappeared, — most likely they were melted up by Henry VIII. or Edward VI.; but at Stonyhurst there is a book known as St Cuthbert's Gospels, which is bound in red leather with a repousse design upon it, and is probably the work of the 7th or 8th century (Plate, fig. 2).

When printing was introduced into Europe about the middle of the 15th century, there was very soon a reaction against the large, beautiful and valuable illuminated MSS. and their equally precious covers. Printing brought small books, cheap books, ugly books, generally bound in calf, goatskin or sheepskin, and ornamented with large panel stamps in blind. But a new art came into birth very shortly, namely the art of gold tooling on leather, which in capable hands is almost a great art, and specimens of the work of the few great masters that have prac- tised it are now much sought after and likely to increase in estimation and value. All this, as usual, brings a school of skilled faussaires into the field, and already the collector of fine bindings must be wary, or he may easily give thousands of pounds for forged or made-up objects that are worth but little.

In the matter of leather bindings with gold tooling, an art which was probably brought to Venice from the East, the finest examples are to be found in late 15th-century Italian work. The art quickly spread, and Thomas Berthelet, Royal Binder to Henry VIII., seems to have been the first binder who practised it in England. Berthelet's work is strongly Italian in feeling, especially at first, and it is likely that he was taught the new art by an Italian master; he worked until about 1558.

During the late 1 5th and the 16th century in England, numbers of fine printed books were bound in velvet and satin, sometimes set with enamels, sometimes embroidered. These books, having strong threads of metal freely used upon them, have lasted much better than would be expected, and instances of such work made for Henry VIII. are still in excellent condition, and most decorative.

The fashion of ornamenting English royal books with heraldic designs, which is considered to have begun in the reign of Edward IV., has continued without break. The same fashion in books belonging to private owners was first followed during the later Tudor period, and then numbers were made, and have been, more or less, ever since.

During the whole Tudor period several small bindings of gold ornamented with enamels were made. Some of these still exist, and they are charming little jewels. They were always provided with a ring at the top, no doubt for attaching to the girdle.

Aldus Manutius, the great Venetian printer, had several of his books charmingly bound in dark morocco with ” Aldine ” knot leaves and small dolphins both in blind and gold tooling; and Giunta, a Florentine printer, had his books bound in a similar way but without the dolphins. Many early Venetian bindings have recessed panels, made by the use of double boards, the upper of which is pierced, finished in true oriental fashion.

Jean Grolier, viscount d’Aguisy, treasurer of France in 1545, was a great collector of fine books, most of which were bound for himself, and bear upon them his legend, Portio mea domine sit in terra viventium, and also his name, Io Grolierii et Amicorum (Plate, fig- 3) . Tommaso Maioli, an Italian collector of about the same time, used the same form of legend. Books bound for him are curiously marked with atoms of gold remaining in the irregu- larities of the leather.

Demetrio Canevari, physician to Pope Urban VIII., had his books bound in dark green or deep red morocco, and upon them is a fine cameo stamp with a design of Apollo driving a chariot with one white horse and one black horse towards a mountain on which is a silver Pegasus. The stamp was coloured, but in most cases the colour has now worn off. Round the stamp is the legend 0P6Q2 KAI MH AOSK2S.

The Italian bindings which were made for popes and cardinals are always of much interest and often of high merit, but as a rule later Italian bindings are disappointing.

Geoffrey Tory, printer and engraver to Francis I. of France, designed some fine bindings, some for himself and quite possibly some for Jean Grolier.

For Henry II. of France much highly decorative work in bind- ing was done, richly gilded and coloured. These bindings have upon them the king’s initials, the initials of his queen, Catherine de’ Medici, and the emblems of crescents and bows. Henry’s device was a crescent with the legend, Donee impleat totum orbem. Bindings of similar style were made for Diane de Poitiers, duchesse de Valentinois, with her initials and the same devices of crescents and bows. They are always fine work.

German bindings are mostly in pigskin, finely stamped in blind. Several are, however, in calf. Gilding, when it exists, is generally bad.

In England during the 17th century much fine work was done in binding, most of it in morocco, but Henry, prince of Wales, always had his books bound in calf. The Jacobean style is heraldic, with semis of small stamps and heavy corners, but James I. has left some very fine bindings in another style (Plate, fig. 4), very possibly done for him by John Gibson, who bound the royal books while James was king of Scotland only. During the reign of Charles I. Nicholas Ferrar founded his curious establishment at Little Gidding, and there his niece Mary Collet and her sisters set up a bindery. They made large scrap-books, harmonies of the Gospels and other parts of the Bible, with illustrations, and bound them magnificently in velvet stamped in gold and silver. They were taught by a binder who worked for John and Thomas Buck, printers to the university of Cam- bridge, and the Little Gidding stamps are often identical with Buck's.

Samuel Mearne (d. 1683) was royal binder to Charles II., and invented the cottage style of decoration, a style which has lasted till the present day; the Bible on which Edward VII. took the coronation oath was ornamented in that way. An inner rectangle is run parallel to the edges of the book, and the upper and lower lines are broken outwards into the outline of a gable roof. Mearne's work as a binder (Plate, fig. 5) is of the highest merit. Many of his books have their fore-edge painted in such a way that the work is invisible when the book is shut, and only shows when the edges are fanned out.

In France 16th- and 17th-century binding is distinguished by the work of such masters as Nicholas Eve, who bound the beauti- ful Livre des Statuts et Ordonnances de I'ordre du Benvist Sainct Esprit for Henry III. (Plate, fig. 6) ; Clovis Eve, who is credited with the invention of the style known as " fanfare," a delicate tracery over the boards of a book, filled out with spirals of leafy stems; and Le Gascon, who invented the dotted work which has been used more or less ever since. Le Gascon caused his small gilding tools — curves ana arabesques — to be scored across, so that when impressions were made from them a dotted line showed instead of a right line. Florimond Badier worked in a style very similar to that of Le Gascon and sometimes signed his work, which Le Gascon never did. Le Gascon had many imita- tors, the best and closest being Poncyn and Magnus, Dutch binders who

worked at Amsterdam in che 17th century, and his style has been continuously followed to .he present day.

The bindings of Padeloup le Jeune often have small tickets with his name upon them; they usually have borders of lace- like gold tooling known as ” dentelle ” and are often inlaid. He belonged to a family of binders, all of whom were excellent workmen, and lived in the 17th and 18th centuries.

The Deromes were another of the great French families of binders; the most celebrated was Nicholas Denis, called ” Le Jeune,” born in 1731. He used dentelle borders resembling those of Padeloup, but with little birds interspersed among the arabesques — ” dentelles a. l’oiscau.”

Among the many French binders of the 18th century who used delicate inlays of coloured leathers, Jean Charles le Monnier was perhaps the most skilled. He often signed his bindings in small capitals impressed in gold somewhere about the inlaid part.

Eliot and Chapman bound the library of Robert Harley, earl of Oxford, about the middle of the 18th century. The bind- ings are in morocco, with broad, richly gold-tooled borders, and usually a diamond-shaped centre-piece. This is known as the Harleian style.

Thomas Hollis had his books bound in fine red morocco, ornamented with small, well-cut stamps engraved by Thomas Pingo, the medallist. These stamps comprise a cap of liberty, a figure of liberty, a figure of Britannia and several smaller ones.

Towards the end of the 18th century, when binding in England was decoratively at a low level, Roger Payne, a native of Windsor, came to London and set up as a bookbinder. He was a splendid workman, and introduced richly gold-tooled corner-pieces, ornamental ” doublures ” or inside linings, and also invented the graining of morocco, graining it, however, in one direction only, known as the ” straight grain.” It is said that Payne cut his own binding tools of iron; they certainly are exquisitely made, and in many of his bindings he has put a written description of loving work he has done upon them. Payne was, unfortunately, a drunkard, but he has in spite of this rendered an immortal service to the art of bookbinding in England.

In 1785 John Edwards of Halifax patented a method of making vellum transparent, and using it as a covering over delicate paintings. He also painted pictures on the fore-edges of many of his books in the same manner as that followed by Samuel Mearne in the 17th century, so

that they did not show until the book was opened. John Whitaker used calf for his bindings, but ornamented the calf in a curious way with strong acids and with prints from engraved metal plates. Both Edwards and Whitaker liked classical borders and ornaments, -and their bindings are in consequence often known as ” Etruscan.”

The main styles used in England at the beginning of the 19th

century were nothing more than distant imitations of Roger Payne. Kalthoeber, Staggemeier, Walther and Hering were all disciples of this master, but Charles Lewis worked on original lines. He developed arabesques and paid particular attention to richly gold-tooled doublures. He also used gold end papers, and the bands at the back of his bindings are often double and always broad, flat and gold-tooled. His workmanship is excellent ; he worked largely for Thomas’ Gren ville and other great collectors.

French binding of the 19th century is remarkable for wonderful technical excellence in every part. Among the most skilled of these admirable workmen and artists may be particularly men- tioned Thouvenin, Bauzonnet, Lortic, Niedree, Cape and Duru, and fortunately they generally sign their work in small gold lettering either on the back of their bindings or inside along the lower edge.

Recent years have witnessed a marked revival of interest in the art of bookbinding, but modem binders have two serious difficulties to contend with. One of these is the pre- valence of bad paper, overladen with clay and with methods wood pulp, and also the fact that many of the modern leathers are badly prepared and dangerously treated with sulphuric acid, which in time inevitably rots the fibre. The Society of Arts has appointed committees of experts to report upon both of these evils, and the published accounts of both inquiries are of much value, and it is to be hoped that the results may be beneficial. Concurrently with the revival of the artistic side of the subject, there has also arisen a remarkable development in the technical processes, owing to the invention of ingenious and delicate machinery which is capable of executing the work which had hitherto been always laboriously done by hand. The processes of folding the printed sheets, and sewing them together on bands, rounding the backs when sewn, and of making the outer cases, covering them with cloth or leather and stamping designs upon them, can now all be efficiently executed by means of machines. The saving in time and labour thus effected is very great, although it must be said that the old methods of carrying out the process of sewing and rounding the backs of books by hand labour were safer and stronger, as well as being much less liable to bruise and injure the

paper. These processes unfortun- ately are not only slow but also necessitate highly skilled labour. Already the larger trade binders utilize machines extensively and advantageously, but exclusively high-class trade binders do not as yet materially depart from the older methods. Private binders have naturally no reason to use machines at all. Fine and delicate examples of large metal blocks or dies have been very successfully used for the decoration of covers measuring about 1 1 5 by 8 in.

Besides the large trade binders working mainly by the help of machinery, and producing a great quantity of bound work which is not expected to last long, there also exists in London, Paris, New York and other large cities, a small class of art binders who work throughout upon the principles which have been continuously in use for first-class work ever since about the 5th century. The initial impetus to this school can be traced to William Morris, who himself made some beautiful designs for bookbindings, to be executed both in gold and in blind. Although he probably did not fully appreciate either the peculiar limitations or the possibilities of the art of gold-tooling on leather, nevertheless his genius guided him truly as to the spirit in which the designs should be conceived. The revived art soon reached its first stage of development under the guidance of Mr T. J. Cobden-Sanderson, who may fairly be considered as the founder of the modern school of design for gold-tooling on book-covers, the pre-eminence and individuality of his work in this direction being proved by the number of his imitators. Among the most successful of his pupils is Mr Douglas Cockerell, whose work (Plate, fig. 7) is distinguished by a marked originality of treatment, while it shows a scholarly appreciation of ancient methods. Mr Alfred de Sauty has succeeded in developing a new and admirable style in inlaid leathers, combined with deli- cate pointille work. A number of women artists, both in England

and in America, have already discovered in bookbinding a fitting and lucrative field for their energies. One, Miss Sarah Prideaux, is not only skilled and original in her own work, but she has also given us much valuable literature on her subject. Miss E. M. MacColl may claim to be the inventor of the small curved gold line produced by means of a tiny wheel, for though the possibility of producing such a line in blind was known for a long time, it was rarely used. The graceful curves and lines found on Miss MacColl’s work have been designed for her by her

brother, Mr D. S. MacColl (Plate, fig. 8). Miss Joanna Birkenruth recalls the highly decorative medieval binding by her use of jewels cut en cabochon, but set in morocco instead of gold or silver, and there are many others who are working well and earnestly at art binding with delicate skill and taste. Outside

full advantage of them can only be taken where there is a large edition of one book.

Book-sewing machines (fig. 9) are of two kinds: one sews the books on bands, either flat or round, and the other supplies the place of bands by a kind of chain stitch. The band-working „ machines bring the return thread back by pulling it ew ag ‘

through the upper and lower edges of the back of each section, thereby to some extent weakening each section, but at the same time this weakening can be to some extent neutralized by careful head-banding. The other system, where the band is replaced by a chain stitch, brings back the return thread inside each section ; the objection to this is that there is a flattening out of the back of the book, which becomes a difficulty when the subsequent operation of covering the book begins. The sections are sewn continuously in a long line, and are afterwards cut apart. The threads catch into hooked needles and are drawn through holes made by piercers set to a certain distance; a shuttle like that used in an ordinary sewing-machine

Fig. 9. — Book-sewing Machine.

the inner circle of professional bookbinders there has grown up a new profession, that of the designer for pictorial book- covers, especially those intended to be shown in colour on cloth or paper. Among notable designers may be mentioned Lewis F. Day, A. A. Turbayne, Walter Crane and Charles Ricketts.

Machine-bindine. — The principal types of machine for commercial binding are described below. They are almost all due to American or German ingenuity. It may be noted that, while books sewn by hand on bands have the loose ends of the bands actually drawn through the boards and strongly fastened to them through their substance, no machines for covering sewn books will do this so effectively. All they will do as a rule is to paste down to the inner surfaces of the boards the loose ends of the tapes on which the sewing is done. So that, although it may last a long time if not much used, a ” cased ” book is likely to slip out of its cover as soon as the paste fixing it perishes. Modern bookbinding machines of all kinds are_ usually driven by

power, and in consequence of the neces- sary setting of most of them accurately to some particular size of book, they are not suitable for binding books of different sizes; the

sews the inner thread backwards and forwards. Each section is placed upon a sort of metal saddle by the hand of the operator, one after the other, the machine working continuously unless the action is cut off or controlled by a foot-lever or pedal. This machine is much quieter to work, and although the inner threads are too bulky to be quite satisfactory, this is not a serious matter like the cutting of the upper and lower edges of the back already described, and, moreover, is probably capable of being either improved away or so minimized that it will become of small importance.

The Martini book-sewing machine, which sews books on tape without cutting up head or tail — a most important improvement — and also forms complete Kettle stitches, will sew books of any size up to 18 in. The needles are straight, and the necessary adjustments for various sizes of books are very simple.

The machine for rounding and backing sewn books requires a rather elaborate and very careful setting of several parts to the exact requirement of each size to be worked. The sewn Oaundlnv book with the back glued is caught in a clip and forced be- * ad g tween two tight rollers, the result being that the hitherto backloe flat back is automatically turned into a rounded shape (figs. 10 and 11). The book is then drawn forward, by a continuance

of the onward movement, until it reaches the rounding plate, which is a block of steel with a polished groove a little larger than the size required. This rounding plate moves within a small arc by means of heavy counter-weights, and on the back of the book being strongly pressed against it, it receives the permanent form of the groove cut in it, at the same time a strong grip on each side of the book causes the ledge to rise up along each outer edge of the back. This ledge it is which enables the boards to be subsequently fixed in such a way as to hinge on a line outside the actual and natural boundary of the book. Before the discovery of the possibility of producing this ledge, the boards of books hinged upon a line coincident with the inner edges of the back, the result of which was that when the book was opened there was an invariable tendency to open and pull away the few outer

sections of the paper or vellum itself — a destructive and disagreeable peculiarity. These machines are capable, after they are properly set, of rounding and backing about 750 volumes of the same size within an hour.

The machine for making cases, or “case” covers (fig. 12), for books is large and complicated, but beautifully effective. It contains altogether over fifty springs, some of which are very small, like watch

Fig. 10. — Section of back of Fig. ii. — Section of same book after book sewn on bands. it has passed through the machine

for rounding and backing.

fittings, while others are large and powerful. The machine is fed with pieces of cardboard cut exactly to the sizes of the required boards, other pieces cut to the size of the back, and a long roll of the cloth with which the cases are to be covered, and when set working the roll of cloth is gradually unwound and glued by contact with a roller, which is drawn along until it reaches a point where the two boards are ingeniously dropped upon it one by one, then on again to where a long arm swings backwards and forwards, at each move- ment picking up a piece of cardboard for the back and placing it gently exactly upon the glued bed left for it between the two boards already fixed. Next, as the cloth passes along, it comes under the sharp influence of two rectangular gouges which cut out the corners, the remaining side pieces being gradually but irresistibly turned up by hollow raisers and flattened down by small rollers, a very delicate piece of machinery finishing the corners in a masterly way. Then, lastly, an arrangement of raisers and rollers acting at right angles to the last mentioned turn over and press out the remaining pieces of cloth. Of course each piece of cloth is cut across at the proper point before the turning up begins. This machine is capable, of

producing 1200 cases in an hour of any size that the machine will take.

The Smyth casing-in machine (fig. 13) pastes the sides of a book as required and then attaches the cover over all. Cleverly arranged rollers catch the book, and by a carefully regulated pressure fix the cover in the proper position. There is a ” jointing-in ” device which

Fig. 13. — Smyth Casing-in Machine.

A. Cases. I.

B. Side of Case Hopper. 2.

C. Paste box. 3.

D. Head Clamp Rod.

E. Head Clamp.

1st position. 2nd position.

3rd position and finished book. When in 2nd position the book drops to level of paste box.

at a critical moment forces the joints in the cover into the joints in the book. It will work books from 4 to 22 in. in length and from J to 3 in. in thickness, and can cover from 10 to 15 books per minute.

Here may also be mentioned the Sheridan wrappering machine, which covers magazines and pamphlets ranging from 5 to 12 in. in length at the rate of 40 a minute.

Wiring is a cheap method of keeping together thin parts of periodicals or tracts. The machine that executes it is simple in construction

Case-making Machine.

and use. It drives a short wire pin, bent at right angles at each end, through the folds of the sections of a book or through the entire Whins thickness, sideways, after the manner of stabbing. The projecting ends, when through the substance of the paper, are bent over and flattened so as to grip firmly. The metal used for these pins was at first very liable to rust, and consequently did much damage to the paper near it, but this defect has now been largely remedied. At the same time the principle of using hard metal wire instead of flexible hempen thread is essentially vicious, and should only be used as a temporary expedient for publications of little value.

The machines (fig. 14) now used for blocking designs upon book-covers are practically the same as have been employed for many Bl U

oc as to better inking of the rollers for colour work, and

better heating of the blocks used for gold work. A blocking press is

now, in consequence of the size of many of the blocks, a large and cumbersome machine. The block itself is fixed firmly in a strong metal bed, and a movable table in front of it is fitted with gauges which keep the cover exactly in its right place. For gold

Fig. 14. — Blocking Machine.

work the block is kept at the proper temperature by means of gas jets, and the cover being properly overlaid with gold leaf is passed, on its table, directly under the block and then pressed steadily upwards against it, lowered, drawn out, and the superfluous gold rubbed off. The same process is followed in the case of colour blocks, only now the block need not be heated, but is inked by means of a roller for each impression. A separate printing is neces- sary for each colour. These printings always require great care on the part of the operator, who has to watch the working of each pull very carefully, and if any readjustment is wanted, to make it at once, so that it is difficult to estimate at what rate they can be made. In the matter of gold blocking there must be great care exercised in the matter of the heat of the block, for if it is too hot the gold will adhere where it is not wanted, and if too cool it will not adhere where it is required. Great nicety is also necessary as to the exact pressure required as well as the precise number of moments during which the block should be in contact with the gold, hich is fastened to the cloth or leather by means of the solidification y heat of egg albumen. Blocking presses are mainly of German make, but Scottish and English presses are also largely used.

Authorities. — See the Anglo-Saxon Review (1899-1901); C. J. Davenport, Royal English Bookbindings (1896), Cantor Lectures on Bookbinding (1898), English Embroidered Bookbindings (1899), Life of Thomas Berthelet (1901), Life of Samuel Mearne (1906); W. Y. Fletcher, English Bookbindings in the British Museum (1895), Foreign Bookbindings in the British Museum (1896); L. Gruel, Manuel de I'amateur de relieures (1887); H. P. Home, The Binding of Books (1894); S. T. Prideaux, Historical Sketch of Bookbinding (1893); F. Thoinan, Les Relieurs francais (1893); O. Uzanne, La Relieure moderne (1887); H. B. Wheatley, Remarkable Bindings in the British Museum (1889); J. W. Zaehnsdorf, The Art of Book- binding (1880). (C. D.)

BOOKCASE, an article of furniture, forming a shelved re- ceptacle, usually perpendicular or horizontal, for the storage of books. When books, being written by hand, were excessively

t

scarce,they were kept in small coffers which the great carried about with them on their journeys. As manuscript volumes accumulated in the religious houses or in regal palaces, they were stored upon shelves or in cupboards, and it is from these cupboards that the bookcase of to-day directly descends. At a somewhat later date the doors were, for convenience' sake, discarded, and the evolution of the bookcase made one step forward. Even then, however, the volumes were not arranged in the modern fashion. They were either placed in piles upon their sides, or if upright, were ranged with their backs to the wall and their edges outwards. The band of leather, vellum or parchment which closed the book was often used for the inscription of the title, which was thus on the fore-edge instead of on the back. It was not until the invention of printing had greatly cheapened books that it became the practice to write the title on the back and place the edges inwards. Early bookcases were usually of oak, which is still deemed to be the most appropriate wood for a stately library. The oldest bookcases in England are those in the Bodleian library at Oxford, which were placed in position in the last year or two of the 1 6th century; in that library are the earliest extant examples of shelved galleries over the flat wall-cases. Long ranges of book-shelves are necessarily somewhat severe in appearance, and many attempts have been made by means of carved cornices and pilasters to give them a more riant appearance — attempts which were never so successful as in the hands of the great English cabinet-makers of the second "half of the 18th century.

Both Chippendale and Sheraton made or designed great numbers of bookcases, mostly glazed with little lozenges encased in fret-work frames often of great charm and elegance. The alluring grace of some of Sheraton's satinwood bookcases has very rarely indeed been equalled. The French cabinet- makers of the same period were also highly successful with small ornamental cases. Mahogany, rosewood, satinwood and even choicer exotic timbers were used; they were often inlaid with marqueterie and mounted with chased and gilded bronze. Dwarf bookcases were frequently finished with a slab of choice marble at the top. In the great public libraries of the 20th century the bookcases are often of iron, as in the British Museum where the shelves are covered with cowhide, of steel, as in the library of Congress at Washington, or of slate, as in the Fitz- william library at Cambridge. There are three systems of arranging bookcases — flat against the wall; in " stacks " or ranges parallel to each other with merely enough space between to allow of the passage of a librarian; or in bays or alcoves where cases jut out into the room at right angles to the wall-cases. The stack system is suitable only for public libraries where economy of space is essential; the bay system is not only hand-

some but utilizes the space to great advantage. The library of the city of London at the Guildhall is a peculiarly effective example of the bay arrangement.

The whole question of the construction and arrangement of book-cases was learnedly discussed in the light of experience by W. E. Gladstone in the Nineteenth Century for March 1890. (J. P.-B.)

BOOK-COLLECTING, the bringing together of books which in their contents, their form or the history of the individual copy possess some element of permanent interest, and either actually or prospectively are rare, in the sense of being difficult to procure. This qualification of rarity, which figufes much too largely in the popular view of book-collecting, is entirely sub- ordinate to that of interest, for the rarity of a book devoid of interest is a matter of no concern. On the other hand so long as a book (or anything else) is and appears likely to continue to be easilyprocurable at any moment, no one has any reason for collect- ing it. The anticipation that it will always be easily procurable is often unfounded; but so long as the anticipation exists it restrains collecting, with the result that Horn-books are much rarer than First Folio Shakespeares. It has even been laid down that the ultimate rarity of books varies in the inverse ratio of the number of copies originally printed, and though the generaliza- tion is a little sweeping, it is not far from the truth. To triumph over small difficulties being the chief element in games of skill, the

different varieties of book-collecting, which offer almost as many varieties of grades of difficulty, make excellent hobbies. But in its essence the pastime of a book-collector is identical with the official work of the curator of a museum, and thus also with one branch of the duties of the librarian of any library of respectable age. In its inception every library is a literary workshop, with more or less of a garden or recreation ground attached according as its managers are influenced by the humanities or by a narrow conception of utility. As the library grows, the books and editions which have been the tools of one generation pass out of use; and it becomes largely a depository or storehouse of a stock much of which is dead. But from out of this seemingly dead stock preserved at haphazard, critics and antiquaries gradually pick out books which they find to be still alive. Of some of these the interest cannot be reproduced in its entirety by any mere reprint, and it is this salvage which forms the literary museum. Book-

collectors are privileged to leap at once to this stage in their relations with books, using the dealers' shops and catalogues as depositories from which to pick the books which will best fit with the aim or central idea of their collection. For in the modern private collection, as in the modern museum, the need for a central idea must be fully recognized. Neither the collector nor the curator can be content to keep a mere curiosity-shop. It is the collector's business to illustrate his central idea by his choice of examples, by the care with which he describes them and the skill with which they are arranged. In all these matters many amateurs rival, if they do not outstrip, the professional curators and librarians, and not seldom their collections are made with a view to their ultimate transference to public ownership. In any case it is by the zeal of collectors that books which otherwise would have perished from neglect are discovered, cared for and preserved, and those who achieve these results certainly deserve well of the community.

Whenever a high degree of civilization has been attained book-lovers have multiplied, and to the student with his modest desire to read his favourite author in a well-written or well-printed copy there has been added a class of owners suspected of caring more for the externals of books than for the enjoyment to be obtained by reading them. But although adumbrations of it existed under the Roman empire and towards the end of the middle ages, book-collecting, as it is now under- stood, is essentially of modern growth. A glance through what must be regarded as the medieval text-book on the love of books, the Philobiblon, attributed to Richard de Bury (written in 1345), shows that it deals almost exclusively with the delights of litera- ture, and Sebastian Brant's attack on the book-fool, written a century and a half later, demonstrates nothing more than that the possession of books is a poor substitute for learning. This is so obviously true that before book-collecting in the modern sense can begin it is essential that there should be no lack of books to read, just as until cups and saucers became plentiful there was no room for the collector of old china. Even when the invention of printing had reduced the cost of books by some 80 %, book-collectors did not immediately appear. There is a natural temptation to imagine that the early book-owners, whose libraries have enriched modern collectors with some of their best-known treasures, must necessarily have been collectors themselves. This is far from being the case. Hardly a book of all that Jean Grolier (1470-1565) caused to be bound so taste- fully for himself and his friends reveals any antiquarian instincts in its liberal owner, who bought partly to encourage the best printers of his day, partly to provide his friends with the most recent fruits of Renaissance

scholarship. In England Arch- bishop Cranmer, Lords Arundel and Lumley, and Henry, prince of Wales (1594-1612), in France the famous historian Jacques Auguste de Thou (1553-1617), brought together the best books of their day in all departments of learned literature, put them into handsome leather jackets, and enriched them with their coats of arms, heraldic badges or other marks of possession. But they brought their books together for use and study, to be read by themselves and by the scholars who frequented their houses, and no evidence has been produced that they appreciated

what a collector might now call the points of a book other than its fine condition and literary or informational merits. Again, not a few other more or less famous men have been dubbed col- lectors on the score of a scanty shelf full of volumes known to have been stamped with their arms. Collecting, as distinct both from the formation of working libraries and from casual ownership of this latter kind, may perhaps be said to have begun in England at the time of the antiquarian reaction produced by the book massacres when the monasteries were dissolved by Henry VIIL, and the university and college libraries and the parish service books were plundered and stript by the commissioners of Edward VI. To rescue good books from perishing is one of the main objects of book-collecting, and when Archbishop Parker and Sir Robert Cotton set to work to gather what they could of the scattered records of English statecraft and literature, and of the decorative art bestowed so lavishly on the books of public and private devotion, they were book-collectors in a sense and on a scale to which few of their modern imitators can pretend. Men of more slender purses, and armed with none of Archbishop Parker's special powers, worked according to their ability on similar lines. Humphrey Dyson, an Elizabethan notary, who collected contemporary proclamations and books from the early English presses, and George Thomason (d. 1666), the bookseller who bought, stored and catalogued all the pamphlet literature of the Civil War, were mindful of the future historians of the days in which they lived. By the end of the 1 7th century book-collect- ing was in full swing all over Europe, and much of its apparatus had come into existence. In 1676 book auctions were introduced into England from Holland, and soon we can trace in priced cata- logues the beginning of a taste for Caxtons, and the books prized by collectors slowly fought their way up from amid the heavy volumes of theology by which they were at first overwhelmed.

While book-collecting thus came into existence it was rather as an added grace in the formation of a fine library than as a separate

pursuit. Almost all the large book-buyers of the 16th, 17 th and 1 8th centuries bought with a public object, or were rewarded for their zeal by their treasures being thought worthy of a public resting-place. Sir Thomas Smith (d.1577) bequeathed his books to Queens' College, Cambridge; Archbishop Parker's were left under severe restrictions to Corpus Christi College in the same university; Sir Thomas Bodley refounded during his lifetime the university library at Oxford, to which also Laud gave liberally and Selden bequeathed his books. The library of Archbishop Williams went to St John's College, Cambridge; that of Archbishop Usher was bought for Trinity College, Dublin. The mathematical and scientific books of Thomas Howard, earl of Norfolk (d. 1646), were given by his grandson to the Royal Society; the heraldic collections of Ralph Sheldon (d. 1684) to Heralds' College; the library in which Pepys took so much pleasure to Magdalene College, Cambridge. Bishop Moore'sbooks, including a little volume of Caxton quartos, almost all unique, were bought by George I. and presented to the university library at Cambridge. Archbishop Marsh, who had previously bought Stillingfleet's printed books (his manuscripts went to Oxford), founded a library at Dublin. The immense accumulations of Thomas Rawlinson (d. 1725) provided materials for a series of auctions, and Harley's printed books were sold to Osbourne the bookseller. But the trend was all towards public ownership'. While Richard Rawlinson (d. 1755) allowed his brother's books to be sold, the best of his own were bequeathed to Oxford, and the Harleian MSS. were offered to the nation at a sum far below their value. A similar offer of the great collections formed by Sir Hans Sloane, including some 50,000 printed books, together with the need for taking better care of what remained of the Cotton manuscripts, vested in trustees for public use in 1702 and partially destroyed by fire in 1731, led to the foundation of the British Museum in 1753, and this on its opening in 1757 was almost immediately enriched by George II. 's gift of the old royal library, formed by the kings and queens of England from Henry VII. to Charles II., and by Henry, prince of Wales, son of James I., who had bought the books belonging to Archbishop Cranmer and Lords Arundel and Lumley. A few notable book-

buyers could not afford to bequeath their treasures to libraries, e.g. Richard Smith, the secondary of the Poultry Compter (d. 1675), at whose book-sale (1682) a dozen Caxtons sold for from 2s. to 18s. apiece, Dr Francis Bernard (d. 1698), Narcissus Luttrell(d. 1732) and

Dr Richard Mead (d. 1 7 54) . At the opposite end of the scale, in the earls of Sunderland (d. 1722) and Pem- broke (d. 1733), we have early examples of the attempts, seldom successful, of book-loving peers to make their libraries into permanent heirlooms. But as has been said, the drift up to 1760 was all towards public ownership, and the libraries were for the most part general in character, though the interest in typo- graphical antiquities was already well marked.

When George III. came to the throne he found himself book- less, and the magnificent library of over 80,000 books and pamph- lets and 440 manuscripts which he accumulated shows on a large scale the catholic and literary spirit of the book-lovers of his day. As befitted the library of an English king it was rich in English classics as well as in those of Greece and Rome, and the typo- graphical first-fruits of Mainz, Rome and Venice were balanced by numerous works from the first presses of Westminster, London and Oxford. This noble library passed in 1823 to the British Museum, which had already received the much smaller but care- fully chosen collection of the Rev. C. M. Cracherode (d. 1799), and in 1846 was further enriched by the wonderful library formed by Thomas Grenville,thelastofitsgreatbook-loving benefactors, who died in that year, aged ninety-one. A few less wealthy men had kept up the old public-spirited tradition during George III.‘s reign, Garrick bequeathing his fine collection of English plays and Sir Joseph Banks his natural history books to the British Museum, while Capell’s Shakespearian treasures enriched Trinity College, Cambridge, and those of Malone went to the Bodleian library at Oxford, the formation of these special collections, in place of the large general library with a sprinkling of rarities, being in itself worth noting. But the noble book-buyers celebrated by the Rev. Thomas Frognall Dibdin in his numerous bibliographical works kept mainly on the old lines, though with aims less patriotic than their predecessors. The duke of Roxburghe’s books were sold in 1812, and the excitement produced by the auction, more especially by the competition between Lord Spencer and the duke of Marlborough (at that time marquess of Blandford) for an edition of Boccaccio printed by Valdarfer at Venice in 147 1, led to the formation of the Roxburghe Club at a commemorative dinner. In 1819 the duke of Marlborough’s books were sold, and the Boccaccio for which he had paid £2260 went to Earl Spencer (d. 1834) for £750, to pass with the rest of his rare books to Mrs Rylands in 1892, and by her gift to the John Rylands library at Manchester in 1899. The books of Sir M. M. Sykes were sold in 1824, those of J. B.Inglisin 1826 (after which he collected again) and those of George Hibbert in 1829. Thei5o,ooovolumes brought together by Richard Heber at an expense of about £100,000 were disposed of by successive sales during the

years 1834-1837 and realized not much more than half their cost. The wonderful library of William Beckford (d. 1844), especially rich in fine bindings, be- queathed to his daughter, the duchessof Hamilton, was sold in 1882, with the Hamilton manuscripts, for the most part to the German government. Their dispersal was preceded in 1881 by that of the Sunderland collection, already mentioned. The library of Brian Fairfax (d. 1749), which had passed to the earls of Jersey, was sold in 1885, that of Sir John Thorold (d. 1815) in 1884, his ” Gutenberg ” Bible fetching £3900 and his Mainz Psalter £4950. The great collection of manuscripts formed by Sir Thomas Phillipps (d. 1872) has furnished materials for numerous sales. The printed books of the earl of Ashburnham (d. 1878) kept the auctioneers busy in 1897 and 1898; his manuscripts were sold, some to the British government (the Stowe collec- tion shared between the British Museum and Dublin), the Ger- man government (part of the Libri and Barrois collection, all, save one MS. of 13th century German ballads, resold to France), the Italian government (the rest of the Libri collection) Mr Yates Thompson (the MSS. known as the Appendix) and Mr J. Pierpont Morgan (the Lindau Gospels). The collections formed by Mr W, H, Miller (d. 1848, mainly English poetry), the

duke of Devonshire (d. 1858) and Mr Henry Huth (d. 1878), are still intact.

Among the book-buyers of the reign of George III., John Ratcliffe, an ex-coal-merchant, and James West had devoted themselves specially to Caxtons (of which the former possessed 48 and the latter 34) and the products of other early English presses. The collections of Capell and Garrick were also small and homogeneous. Each section, moreover, of some of the great libraries that have just been enumerated might fairly be con- sidered a collection in itself, the union of several collections in the same library being made possible by the wealth of their purchaser and the small prices fetched by most classes of books in com- parison with those which are now paid. But perhaps the modern cabinet theory of book-collecting was first carried out with conspicuous skill by Henry Perkins (d. 1855), whose 865 fine manuscripts and specimens of early printing, when sold in 1870, realized nearly £26,000. If surrounded by a sufficient quantity of general literature the collection might not have seemed noticeably different from some of those already mentioned, but the growing cost of books, together with difficulties as to house- room, combined to discourage miscellaneous buying on a large scale, and what has been called the ” cabinet ” theory of collect- ing, so well carried out by Henry Perkins, became increasingly popular among book buyers, alike in France, England and the United States of America. Henri Beraldi, in

his catalogue of his own collection (printed 1892), has described how in France a little band of book-loving amateurs grew up who laughed at the bibliophile de la vicille roche as they disrespectfully called their predecessors, and prided themselves on the unity and com- pactness of their own treasures. In place of the miscellaneous library in which every class of book claimed to be represented, and which needed a special room or gallery to house it, they aimed at small collections which should epitomize the owner's tastes and require nothing bulkier than a neat bookcase or cabinet to hold them. The French bibliophiles whom M. Beraldi celebrated applied this theory with great success to collecting the dainty French illustrated books of the 18th century which were their especial favourites. In England Richard Fisher treated his fine examples of early book-illustration as part of his collection of engravings,etchings and woodcuts(illustrated catalogue printed 1879), and Frederick Locker (Locker-Lampson) formed in two small bookcases such a gathering of first editions of English imagi- native literature that the mere catalogue of it (printed in 1886) produced the effect of a stately and picturesque procession. Some of the book-hoards of previous generations could have spared the equivalent of the Locker collection without seeming noticeably the poorer, but the compactness and unity of this small collection, in which every book appears to have been bought for a special reason and to form an integral part of the whole, gave it an artistic individuality which was a pleasant triumph for its owner, and excited so much interest among American admirers of Mr Locker's poetry that it may be said to have set a fashion. As another example of the value of a small collection, both for delight and for historical and artistic study, mention may be made of the little roomful of manuscripts and incunabula which William Morris brought together to illustrate the history of the bookish arts in the middle ages before the Renaissance introduced new ideals. Many living collectors are workin g in a similar spirit, and as this spirit spreads the monotony of the old libraries, in which the same editions of the same books recurred with weari- some frequency, should be replaced by much greater individuality and variety. Moreover, if they can be grouped round some central idea cheap books may yield just as good sport to the collector as expensive ones, and the collector of quite modem works may render admirable service to posterity. The only limitation is against books specially manufactured to attract him, or artificially made rare. A quite wholesome interest in contem- porary first editions was brought to nought about 1889 by the booksellers beginning to hoard copies of Browning's Asolando and Mr Lang's Blue Fairy Book on the day of publication, while a graceful but quite minor poet was made ridiculous by £100 being asked for a set of his privately printed

opuscula. The

petty gambling in books printed at the Kelmscott and Doves' presses, and in the fine paper copies of a certain Life of Queen Victoria, for which a premium of 250% was asked before pub- lication, is another proof that until the manufacturing stage is over collecting cannot safely begin. But with this exception the field is open, and the 19th century offers as good a hunting ground as any of its predecessors.

While book-collecting may thus take an endless variety of forms the heads under which these may be grouped are few and fairly easily defined. They may be here briefly in- Objects dkated together with some notes as to the literature methods, which has grown up round them. The development which bibliographical literature has taken is indeed very significant of the changed ideals of collectors. Brunet's Manuel du libraire, first published in 1810, attained its fifth edition in 1860-1864, and has never since been re-edited (sup- plement, 1878-1880). The Bibliographer's Manual of English Literature by W. T. Lowndes, first published in 1834, was revised by H. G. Bohn in 1857-1864, and of this also no further edition has been printed. These two works between them gave all the information the old-fashioned collectors required, the Trisor de livres rares et precieux by J. G. T. Graesse (Dresden, 1850-1867, supplementary volume in 1869) adding little to the information given by Brunet. The day of the omnivorous collector being past, the place of these general manuals has been taken by more detailed bibliographies and handbooks on special books, and though new editions of both Lowndes and Brunet would be useful to librarians and booksellers no publisher has had the courage to produce them.

To attract a collector a book must appeal to his eye, his mind or his imagination, and many famous books appeal to all three. A book may be beautiful by virtue of its binding, its illustrations or the simple perfection and harmony of its print and paper. The attraction of a fine binding has always been felt in France, the high prices quoted for Elzevirs and French first editions being often due much more to their 17th and 18th century jackets than to the books themselves. The appreciation of old bindings has greatly increased in England since the exhibition of them at the Burlington Fine Arts Club in 1891 (illustrated catalogue printed the same year), English blind stamped bindings, embroidered bindings, and bindings attributable to Samuel

Meame (temp. Charles II.) being much more sought after than formerly. (See Bookbinding.)

Illustrated books of certain periods are also much in request, and with the exception of a few which early celebrity has pre- vented becoming rare have increased inordinately in price. The primitive woodcuts in incunabula are now almost too highly appreciated, and while the Nuremburg Chronicle (1493) seldom fetches more than £30 or the Hypnerotomachia Poliphili (Venice, 1499) more than £120, rarer books are priced in hundreds. The best books on the subject are : for Italy, Lippmann's Wood Engrav- ing in Italy in the 15th Century (1888), Kristeller's Early Florentine Woodcuts (1897), the due de Rivoli's (Prince d'Essling's) Bibliographie des livres a figures vinitiens 1469-1525 (1892, new edition 1906); for Germany, Muther's Die deutsche Bucherillustration der Gothik und Friihrenaissance (1884); for Holland and Belgium, Sir W. M. Conway's The Woodcutters of the Netherlands in the 15th Century (1884); for France the material will all be found in Claudin's Histoire de V imprimerie enFrance (1900, &c). Some information on the illustrated books of the early 16th century is given in Butsch's Die Bucherorna- mentik der Renaissance (1878), but the pretty French books of the middle of the century and the later Dutch and English copper- engraved book illustrations (for the latter see Colvin's Early Engraving and Engravers inEngland, 1905) have been imperfectly appreciated. Thisicannot be said of the French books of the 1 8th century chronicled by H. Cohen, Guide de Vamateur de livre d gravures du XVIII' siecle (5th ed., 1886), much of the same information, with a little more about English books, being given in Lewine's Bibliography of Eighteenth Century Art and Illustrated Books (1898). English books with coloured illustra- tions, for which there has arisen a sudden fashion, are well

described in Martin Hardie's English Colour Books (1906). Bewick's work has been described by Mr Austin Dobson.

Appreciation of finely printed books has seldom extended much beyond the 15th century. In addition to the works mentioned in the article on incunabulaˆ. ») ,note may be made of Humphrey's Masterpieces of the Early Printers and Engravers (1870), while Lippmann's Druckschriften des XV bis XVIII Jahrhunderts (1884-1887) covers, though not- very fully, the later period.

Among books which make an intellectual appeal to the col- lectors may be classed all works of historical value which have not been reprinted, or of which the original editions are more authentic, or convincing, than modem reprints. It is evident that these cover a vast

field, and that the collector in taking possession of any corner of it is at once the servant and rival of historical students. Lord Crawford's vast collections of English, Scottish and Irish proclamations and of papal bulls may be cited as capital instances of the work which a collector may do for the promotion of historical research, and the philological library brought together by Prince Lucien Bonaparte {An Attempt at a Catalogue by V. Collins, published 1894) and the Foxwell collection of early books on political economy (presented to the university of London by the Goldsmiths' Company) are two other instances of recent date. Much collecting of this kind is now being carried on by the libraries of institutes and societies connected with special professions and studies, but there is ample room also for private collectors to work on these lines.

Of books which appeal to a collector's imagination the most obvious examples are those which can be associated with some famous person or event. A book which has belonged to a king or queen (more especially one who, like Mary queen of Scots, has appealed to popular sympathies), or to a great statesman, soldier or poet, which bears any mark of having been valued by him, or of being connected with any striking incident in his life, has an interest which defies analysis. Collectors themselves have a natural tenderness for their predecessors, and a copy of a famous work is all the more regarded if its pedigree can be traced through a long series of book-loving owners. Hence the production of such works as Great Book-Collectors by Charles and Mary Elton (1893), English Book-Collectors by W. Y. Fletcher (1902) and Guigard's Nouvel armorial du bibliophile (1890). Books condemned to be burnt, or which have caused the persecu- tion of their authors, have an imaginative interest of another kind, though one which seems to have appealed more to writers of books than to collectors. As has already been noted, most of the books specially valued by collectors make a double or triple appeal to the collecting instinct, and the desire to possess first editions may be accounted for partly by their positive superiority over reprints for purposes of study, partly by the associations which they can be proved to possess or which imagination creates for them. The value set on them is at least to some extent fanciful. It would be difficult, for instance, to justify the high prices paid by collectors of the days of George III. for the first printed editions of the Greek and Latin classics. With few exceptions these are of no value as texts, and there are no possible associations by which they can be linked with the personality of their authors. It may be doubted whether any one now collects them save as specimens of printing, though no class of books which has once been prized ever sinks back into absolute obscurity. On the other hand the prestige of

the first editions of. English and French literary masterpieces has immensely increased. A first folio Shakespeare (1623) was in 1906 sold separately for £3000, and the MacGeorge copies of the first four folios (1623, 1632, 1663-1664 and 1685) fetched collectively the high price of £10,000. The quarto editions of Shakespeare plays have appreciated even more, several of these little books, once sold at 6d. apiece, having fetched over £1000, while the unknown and unique copy of the 1594 edition of Titus Andronicus, dis- covered in Sweden, speedily passed to an American collector for £2000. Information as to early editions of famous English books will be found in Lowndes' Bibliographer's Manual, in Hazlitt's Handbook to the Popular Poetical and Dramatic Literature of Great Britain from the Invention of Printing to the Restoration

(1867) and his subsequent Collections and Notes (1876-1903), and as to more recent books in Slater's Early Editions, a biblio- graphical survey of the works of some popular modern authors (1894), while French classics have found an excellent chronicler in Jules Le Petit (Bibliographie des principales editions originales d'ecrivains franqais du XV au XVIII" Steele, 1888).

In most cases there is a marked falling off in the interest with which early editions other than the first are regarded, and con- sequently in the prices paid for them, though important changes in the text give to the edition in which they first occur some shadow of the prestige attaching to an original issue. One of the recognized byways of book-collecting, however, used to be the collection of as many editions as possible of the same work. When this result in the acquisition of numerous late editions of no value for the text its only usefulness would appear to be the index it may offer to the author's popularity. But in translations of the Bible, inliturgical works, andineditionspublished during the author's life the aid offered to the study of the development of the final text by a long row of intermediate editions may be very great.

Another instance in which imagination reinforces the more positive interest a book may possess is in the case of editions which can be connected with the origin, diffusion or development of printing. Piety suggests that book-lovers should take a special interest in the history of the art which has done so much for their happiness, and in this respect they have mostly shown themselves religious. The first book

printed in any town is reasonably coveted by local antiquaries, and the desire to measure the amount and quality of the work of every early printer has caused the preservation of thousands of books which would otherwise have perished. (See Incunabula.)

The financial side of book-collecting may be studied in Slater's Book-Prices Current, published annually since 1887, and in Livingston's American Book Prices Current, and in the same author's Auction Prices of Books (1905). While largely influenced by fashion the prices given for books are never wholly unreason- able. They are determined, firstly by the positive or associative interest which can be found in the book itself, secondly by the infrequency with which copies come into the market compared with the number and wealth of their would-be possessors, and thirdly, except in the case of books of the greatest interest and rarity, by the condition of the copy offered in respect to com- pleteness, size, freshness and absence of stains. (A. W. Po.)

BOOK-KEEPING, a systematic record of business transactions, in a form conveniently available for reference, made by indi- viduals or corporations engaged in commercial or financial opera- tions with a view to enabling them with the minimum amount of trouble and of dislocation to the business itself to ascertain at any time (1) the detailed particulars of the transactions under- taken, and (2) the cumulative effect upon the business and its financial relations to others. Book-keeping, sometimes described as a science and sometimes as an art, partakes of the nature of both. It is not so much a "discovery as a growth, the crude methods of former days having been gradually improved to meet the changing requirements of business, and this process of evolution is still going on. The ideal of any system of book-keeping is the maximum of record combined with the minimum of labour, but as dishonesty has to be guarded against, no system of book-keeping can be regarded as adequate which does not enable the record to be readily verified as a true and complete statement of the transactions involved. Such a verification is called an audit, and in the case of public and other large con- cerns is ordinarily undertaken by professional accountants (q.v.). Where the book-keeping staff is large it is usually organized so that its members, to some extern at least, check each other's work, and to that extent an audit, known as a "staff audit" or " internal check," is frequently performed by the book-keeping staff itself.

Formerly, when credit was a considerably less important factor than now in commercial transactions, book-keeping was frequently limited to an account of receipts and payments of money ; and in early times,

before money was in use, to an account of the receipt and issue of goods of different kinds. Even now

iv. &

what may be called the ” cash system ” of accounts is almost exclusively used by governments, local authorities, and charit- able and other institutions; but in business it is equally necessary to record movements of credit, as a mere statement of receipts and payments of money would show only a part of the total number of transactions undertaken. As for practical purposes some limit must be placed upon the daily record of transac- tions, certain classes show only a record of cash receipts and payments, which must, when it is desired to ascertain the actual position of affairs, be adjusted by bringing into account those transactions which have not yet been completed by the receipt or payment of money. For instance, it is usual to charge customers with goods sold to them at the date when the sale takes place, and to give them credit for the amount received in payment upon the date of receipt (thus completely recording every phase of the transaction as and when it occurs); but in connexion (say) with wages it is not usual to give each workman credit for the services rendered by him from day to day, but merely to charge up the amounts, when paid, to a wages account, which thus at any date only shows the amounts which have actually been paid, and takes no cognisance of the sums accruing due. When, therefore, it is desired to ascertain the actual expenditure upon wages for any given period, it is necessary to allow for the payments made during that period in respect of work previously performed, and to add the value of work performed during the current period which remains unpaid. In the majority of businesses those accounts which deal with various forms of standing expenses are thus dealt with, and in consequence the record, as it appears from day to day, is pro tanto incomplete. Another very important series of transactions which is not included in the ordinary day-to-day record is that representing the loss gradually accruing by reason of waste, or depreciation, of assets or general equipment of the business; proper allowance for these losses must of course be made whenevei it is desired to ascertain the true position of affairs. v s

The origin of book-keeping is lost in obscurity, but recent researches would appear to show that some method of keeping accounts has existed from the remotest times. Baby- Ionian records have been found dating back as far as 2600 B.C., written with a stylus on small slabs of clay, and it is of interest to note {Records of the Past, xi. 89) that these slabs or tablets ” usually contain impressions from cylinder seals, and nail marks, which were considered to be a man’s natural seal,”

thus showing that the modern method of identifying criminals by finger prints had its counterpart in Babylonia some 4500 years ago. Egyptian records were commonly written on papyrus, and contemporary pictures show a scribe keeping account of the quantities of grain brought into and removed from the government store-houses. It will thus be seen that some form of book-keeping existed long before bound books were known, and therefore the more general term accounting would seem to be preferable — the more so as the most modern develop- ments are in the direction of again abandoning the bound book in favour of loose or easily detached sheets of paper or card, thus capable of being rearranged as circumstances or convenience may dictate. Most of the earlier accounting records are in the nature of a mere narrative of events, which — however complete in itself — failed to fulfil the second requirement of an adequate system of book-keeping already referred to. Prior to the use of money nothing in this direction could of course well be at- tempted; but for a long time after its employment became general money values were recorded in Roman figures, which naturally did not lend themselves to ready calculation.

At the present-time it may be generally stated that all book- keeping records are kept in three distinct columns, dealing respectively with the date of the transaction, its nature, and its money value. The earliest extant example of accounts so kept is probably a ledger in the Advocates' library at Edinburgh, dated 1697, which, it is of interest to note, is ruled by hand. Prior to that time, however, double-entry book-keeping had been in general use. The exact date of its introduction is unknown; but it was certainly not. as has been frequently stated, the

Madera methods.

invention of Lucas de Bergo, in or about 1494. This, however, is the date of the first issue (at Venice) of a printed book entitled Everything about Arithmetic, Geometry and Proportion, by Luca Paciolo, which contains inter alia an explanation of book-keeping by double-entry as then understood; but in all probability, the system had then been in use for something like 200 years. It is perhaps unfortunate that from 1494 until comparatively recent times the literature of accounting has been provided by theorists and students, rather than by practical

business men, and it may well be doubted, therefore, whether it accurately describes contemporary procedure. Another illusion which it is necessary to expose in the interests of truth is the value attached to Jones's English System of Book-keeping by Single or Double Entry, published at Bristol in 1796. Before publishing this book, E. T. Jones issued a prospectus, stating that he had patented an entirely new and greatly improved system, and that subscribers (at a guinea a copy) would be entitled to a special licence empowering them to put the new invention into practice in their own book-keeping. With this bait he secured thousands of subscribers, but so far as can be gathered his system was entirely without merit, and it is chiefly of interest as indicating the value, even then, of advertising.

It is impossible here to describe fully all the improvements that have been made in methods of accounting during recent years, but it is proposed to deal with the more important of these improvements, after the general principles upon which all systems of book- keeping are based have been briefly described.

The centre of all book-keeping systems is the ledger, and it may be said that all other books are only kept as a matter of practical convenience — – hence the name " subsidiary books " that is frequently applied thereto. Inasmuch, however, as the transactions are first recorded in these sub- sidiary books, and afterwards classified therefrom into the ledger, the names books of entry or books of first entry are often employed. Subsidiary books which do not form the basis of subsequent entries into the ledger, but are merely used for statistical purposes, are known us statistical or auxiliary books. In the early days of book-keeping the ledger com- prised merely those accounts which it was thought desirable to keep accessible, and was not a complete record of all transactions. Thus in many instances records were only kept of transactions with other business houses, known as personal accounts. In the earliest examples transactions tending to reduce indebtedness were recorded in order of date, as they occurred underneath transactions recording the creation of the indebtedness; and the amount of the reduction was subtracted from the sum of the indebtedness up to that date. This method was found to be inconvenient, and the next step was to keep one account of the transactions recording the creation of indebted- ness and another account (called the contra account) of those transactions reducing or extinguishing it. For convenience these two accounts were kept on opposite sides of the ledger, and thus was evolved the Dr. and Cr. account as at present in general use: —

Dr. A.B. Contra. Cr.

but as a matter of convenience is usually ruled off each time all indebtedness is extinguished, and also at certain periodical intervals, so that the state of the account may then be readily apparent.

A mere collection of personal accounts is, however, obviously a very incomplete record of the transactions of any business, and does not suffice to enable a statement of its financial position to be prepared. So at an early date other Singh- accounts were added to the ledger, recording the a” c ˆ nte . acquisition of and disposal of different classes of property, such accounts being generally known as real accounts. These accounts are kept upon the same principle as personal accounts, in that all expenditure upon the part of the business is recorded upon the Dr. side, and all receipts upon the Cr. side; the excess of the debit entries over the credit entries thus showing the value placed upon those assets that still remain the property of the business. With the aid of personal and real accounts properly written up to date, it is possible at any time to prepare a statement of assets and liabilities showing the financial position of a business, and the following is an example of such a statement, which shows also how the profit made by the business may be thus ascertained, assuming that the financial position at the commencement of the current financial period, and the movements of capital into and out of the business during the period, are capable of being ascertained.

State of Affairs as at 31ST December 1906

Liabilities.

A ssets.

Trade Creditors .

£4.96i

10

Fixtures, Furni-

Bills Payable . .

2,620

18

4

ture, &c.

£1,269

4 3

Balance’, being ex-

Stock on hand

5,751

3 10

cess of assets

Trade Debtors

3,842

7 9

over liabilities

Bills Receivable .

7,468

H 3

(or ” Capital “)

Cash at Bank

4,169

5 5

at this date,

carried down . Amount of Capi-

14,918

7

2

Balance brought

£22,500

15

6

£22,500

15 6

tal on 1st Jan.

down

£14,918

7 2

1906.

£15,010

1

7

Balance, being net

Amount drawn

profit for the

out of business

year ended this

during year

date

1,408

5

7

ended this date.

1500

£16,418

7

2

£16,418

7 2

Date.

Narrative.

Amount.

Date.

Narrative.

Amount.

£ *• d.

£ *. d.

In this form of account all transactions creating indebtedness due from the person named therein to the business — that is to say, all benefits received by that person from the business — are recorded upon the left-hand, or Dr. side, and per contra all transactions representing benefits imparted by him, giving rise to a liability on the part of the business, are recorded upon the Cr. side. The account may run on indefinitely,

The method of accounting hitherto described represents single-entry, which— ˆalbeit manifestly incomplete — is still very generally used by small business houses, and particularly by retail traders. Its essential weakness is that it provides no auto- matic check upon the clerical accuracy of the record, and, should any mistake be made in the keeping of the books, or in the extraction therefrom of the lists of assets and liabilities, the statement of assets and liabilities and the profit or loss of the current financial period, will be incorrect to an equal extent. It was to avoid this obvious weakness of single-entry that the system of double-entry was evolved.

The essential principle of double-entry is that it constitutes a complete record of every business transaction, and as these transactions are invariably cross-dealings — involving simultaneously the receipt of a benefit by some one antl the imparting of a benefit by some one — a complete record of transactions from both points of view necessitates an entry of equal amount upon debit and credit sides of the ledger. Hence it follows that, if the clerical work be correctly performed, the aggregate amount entered up upon the debit side of the ledger must at all times equal the aggregate amount entered up upon the credit side; and thus a complete list of all ledger balances will show an agreement of the total debit balances with the total credit balances. Such a list is called a trial balance, an example of which is given below. It should be observed, however, that the test supplied by the trial balance is a

purely mechanical one, and does not prove the absolute accuracy of the ledger as

Doable entry.

a record of transactions. Thus transactions which have actually taken place may have been omitted from the books altogether, or they may have been recorded to the wrong accounts, or the money values attached to them may be incorrect; or, yet again, fictitious records may be entered

Trial Balance, 31ST December 1906

Dr.

Cr.

I

Capital account

£15,010 1 7

5

Drawings

1,500

20

Trade creditors

4,961 10

24

Fixtures, furniture, &c.

1,269

4

3

27

Bills payable .

2,620 18 4

40

Bad debts

7i

4

2

44

Stock 1st Jan. 1906 .

4,078

16

4

,SO

Discounts allowed

975

3

3

53

Trade debtors .

3.842

7

9

60

Discounts received .

1,117 J 7 8

65

Wages and salaries .

1,865

12

75

Depreciation .

141

5

7«

Rent, rates and taxes

1,242

13

8

82

General expenses

1,087

8

qo

Bills receivable

7,468

H

3

97

Purchases

44,731

2

10

IOO

Sales .

48,732 4 9

C56

Cash at bank .

4,169

5

5

£72,442

12

4

£72,442 12 4

in the ledger of transactions which have never taken place. A trial balance is thus no very adequate safeguard against fraud, nor does it bring to light mistakes in the monetary value attach- ing to the various transactions recorded. This last point is of especial importance, in that the monetary value of transactions may have been correctly recorded in the first instance, but owing to altered circumstances may have become inaccurate at a later date. This of course means that the altered circumstances constitute an additional ” transaction ” which has been omitted. It will be observed, therefore, that in order to complete the record of the transactions by double-entry, it has become

necessary to introduce into the ledger a third class of accounts, known

as impersonal or nominal accounts. These accounts record the transferences of money, or of money's worth, which, so far from representing a mere reshuffling of assets and liabilities, involve an increase in or a reduction of the amount invested in the business, i.e. a profit or a loss. Transactions representing profits are recorded upon the Cr. side of nominal accounts, and those representing losses (including expenses) upon the Dr. side. This is consistent with the rules already laid down in connexion with real and nominal accounts, inasmuch as expenditure which does not result in the acquisition of an asset is a loss, whereas receipts which do not involve the creation of liabilities represent profits. All debit balances therefore that are not assets are losses, and per contra all credit balances that are not liabilities are profits. So that, inasmuch as double-entry provides inter alia a complete statement under suitable headings of all profits and all losses, it is possible by aggregating these results to deduce therefrom the net profit or loss of carrying on the business • — and that by a method entirely distinct from that previously described in connexion with single-entry, thus constituting a valuable additional check. Taking the trial balance shown above, the following represent the trading account, profit and loss account, and balance sheet compiled therefrom. The trading account may be variously regarded as the account recording the movements of goods which represent the stock-in-trade, and as a preliminary to (or a subdivision of) the profit and loss account. The balance sheet is a statement of the assets and liabilities; but — inasmuch as, by transferring the balance of the profit and loss account to the capital account, it is possible to bring the latter account up to date and to show the credit balance representing the surplus of assets over liabilities to date — the balance sheet, instead of showing a difference, or a " balance," representing what is assumed to be the amount of the capital to date, shows an absolute agreement of assets upon the one hand and of liabilities plus capital upon the other. The two sides of the account thus balance — hence the name.

Balance sheet.

Dr.

Trading Account for the Year ended 31st December 1906

Cr.

To Stock on hand, 1st Jan. 1906 ,, Purchases ….. ,, Gross Profit, transferred to Profit and Loss account

£4,078 16 4

44,731 2 10

5-673 9 5

By Sales . ,, Stock on hand,

31st Dec. 1906

£48,732 4 9

5,751 3 10

£54,483 8 7

£54,483 8 7

Dr.

Profit and Loss Account for the Year ended 31st December 1906

Cr.

To Rent, rates and taxes £1242 13 8 ,, Salaries and wages 1865 12 o ,, General expenses . 1087 8 o

Discounts allowed . Bad debts …. Depreciation …. Net Profit for the year transferred to Capital account

£4195 13 8

975 3 3

71 4 2

141 o 5

1408 5 7

£6791 7 1

By Gross Profit as per Trading Account ,, Discount received

£5673 9 5

1117 17 8

£6791 7 1

Dr.

Balance Sheet as at 31st December 1906

Cr.

To A. B., Capital account „ Trade creditors „ Bills payable .

£i4,9l8

4,961 2,620

7 2

10 o

18 4

£22,500 15 6

By Fixtures, furniture, &c ,, Stock on hand ,, Trade debtors „ Bills receivable . „ Cash at bank

£1,269

5,751 3,842 7,468 4,169

3 10

9 3 5

£22,500 15 6

Dr.

A.B., Capital Account

Cr.

1906.

Dec. 31

To Drawings account „ Balance carried down

£1,500

14,918 7 2

1906.

Jan. 1 Dec. 31

1907.

Jan. 1

By Balance from last account ,, Profit and Loss account, being net profit for the year ended this date

By Balance brought down.'

£15.010 1 7

1,408 5 7

£16,418 7 2

£16,418 7 2

£14,918 7 a

Journal.

In the foregoing example the customary method has been followed of deducting withdrawals of capital from the capital account and of adding profits thereto. Sometimes, however, the balance of the capital account remains constant, and the draw- ings and net profits are transferred to a separate account called current account. This plan is but rarely observed in the case of undertakings owned by individuals, or private firms, but is invariably adopted in connexion with joint-stock companies, although in such cases the name appropriation of profit account is generally employed.

Although it is now usual to employ several books of first-entry, in the case of comparatively small businesses one such book is sufficient for all purposes, in that it is practicable for one person to record all the transactions that take place as and when they occur. A book of this description is called the journal, and for many years represented the only book of first-entry employed in book-keeping. An example of the journal is given below. The entries appearing therein are such as would be necessary to prepare the trading and profit and loss accounts

from the trial balance shown above, and to bring the capital account up to date.

In modern times, however, with the growth of business, it was soon found impracticable to keep one book of first-entry for all transactions, and accordingly it became necessary either to treat the journal as an intermediate book, in which the trans- actions might be brought together and focused as a preliminary to being recorded in the ledger, or else to split up the journal into numerous books of first-entry, each of which might in that case be employed for the record of a particular class of transaction. The first method has been generally adopted in the continental countries of Europe, as will be shown later on, whereas in Great Britain and in North America the latter method more generally obtains; that is, instead of having one journal in which all classes of transactions are recorded in the first instance, it is usual to employ several journals, as follows: — a sales journal, sales book or day book, to record particulars of goods sold; a bought journal,

Journal 1906

now generally kept in sections. Thus the cash account and the bank account are frequently bound together in one separate book called the cash book, showing in parallel columns the move- ments of office cash and of cash at the bank, and by the addition Day Book 1906

Forward – 27th December.-

A. Brown,

492 New Street, Walworth — 2 doz. V.C. port 31/-

1 ,, A.C. pale brandy 49/-

-28 th December.

Fredk. Newton,

Farleigh House, Epsom-

1 gall. E. Pale sherry

2 doz. O.B. Heidsieck

1892

2 gall. P. Scotch

13/6

160/-

21/-

Robert French,

214 High Road, Sutton — 6 doz. F. D.Pommard, 1899 30/-

1 „ M.F. Margaux, 1893 66/-

2 „ A. Niersteiner 24/-

£320

290

£013 6

16 o o

220

£900

360 280

£376i 7 8

5 11 o

18 15 6

14 14 o

£3800 8 2

Dec. 31

Trading account To Stock account . ,, Purchases account

no

44 97

100

44

no

no

120

120

78 65 82

50 40

75

60 120

120 1

1

5

Dr.

£48,809 19 2

48,732 4 9

5,75i 3 10

5,673 9 5

5,383 1 6

1,117 17 8 1,408 5 7 1,500

Cr.

£4,078 16 4

44,731 2 10

54,483 8 7 5,673 9 5

1,242 13 8 1,865 12 1,087 8

975 3 3

71 4 2

141 5

1,117 17 8

1,408 5 7

1,500

••

Sales account . Stock account . To Trading account

>i

Trading account

To Profit and Loss account

i»

Profit and Loss account To Rent, rates and taxes ,, Salaries and wages ,, General expenses ,, Discounts allowed ,, Bad debts ,, Depreciation

»*

Discounts received .

To Profit and Loss account

it

Profit and Loss account To A.B., Capital account

A.B., Capital account To Drawings account

£118,376 1 11

£118,376 1 11

invoice book or purchases book, to record particulars of goods purchased; a returns inwards book, to record particulars of goods sold but subsequently returned by customers; a returns outwards book, to record the like particulars with regard to goods purchased and subsequently returned; a bills receivable book, to record particulars of

bills of exchange received from debtors; and a bills payable booh, to record particulars of bills of exchange given to creditors. With a view still further to split up the work, thus enabling a large staff to be simultaneously engaged, the ledger itself is

of a third column for discounts the necessity of keeping an additional book of first entry as a discount journal may also be avoided. Of late years, however, most businesses pay all moneys received into their bankers without deduction, and pay all accounts by cheque; the necessity of an account for office cash thus no longer exists, save in connexion with petty payments, which are recorded in a separate book called the petty cash book. With regard to the remaining ledger accounts, personal accounts— which are the most numerous — are frequently separated from the real and nominal accounts, and are further subdivided so that customers' accounts are kept separate from the accounts of trade creditors. The customers' accounts are kept in a ledger (or, if need be, in several ledgers) called sales ledgers, or sold ledgers; while the accounts of trade creditors are similarly kept in purchases ledgers or bought ledgers. The nominal and real accounts, if together, are kept in what is called the general ledger; but this may be further subdivided into a nominal ledger and a private ledger. This last sub- division is, however, rarely made upon a scientific basis, for such accounts as the profit and loss account and trading account are generally kept in the private ledger although strictly speaking nominal accounts ; while the bills receivable account and the bills payable account are generally kept in the nominal ledger, so as to reduce to a minimum the amount of clerical work in connexion with the private ledger, which is kept either by the principal himself or by his confidential employee. By the employment of adjust- ment accounts, which complete the double-entry record in each ledger, these various ledgers may readily be made self-balancing, thus enabling clerical errors to be localized and responsibility enforced.

Of recent years considerable attention has been devoted to further modifications of book-keeping methods with a view to reducing clerical work, increasing the speed with which results are available, and enabling them to be handled more quickly

and with greater certainty. Tabular book-keeping is a device to achieve one or more of these ends by the substitution of books ruled with numerous columns for the more usual 7afc»/ar f orm . The

system may be applied either to books of keeping. ˆ rst entry or to ledgers. As applied to books of first- entry it enables the same book to deal conveniently with more than one class of transaction; thus if the trad- ing of a business is divided into several departments, by providing a separate column for the sales of each depart-

computed; after which they are filed away in a form convenient for reference. Sometimes the process is carried a step further, and the original slips, filed away with suitable guide-cards indicating the nature of the account, themselves constitute the ledger record — which in such cases is to be found scattered over a number of sheets, one for each transaction, instead of, as in the case of the ordinary book ledger, a considerable number of transac- tions being recorded upon a single page. This adaptation of the slip system is impracticable except in cases where the transactions

Reference No.

Name of Debtor.

Amount

due on

1st Oct.

1906.

Charges

for Current Quarter.

Total Debit.

Date received.

Amount received.

Discounts.

Allowances.

Bad Debts.

Amount

due on

31st Dec.

1906.

Re- marks.

£ s. d.

£ s. d.

£ s. d.

ment it is possible readily to arrive at separate totals for the aggregate sales of each, thus simplifying the preparation of departmental trading accounts. As applied to ledgers, the application of the system may be best described by the aid of the above example (the proceedings of the columns being given only), which shows how a very large number of personal accounts may be recorded upon a single opening of a ledger provided the number of entries to be made against each individual be few.

Fig. 1. — Card-Ledger Tray (Library Bureau System).

Another important application of modern methods consists of what may be described as the slip system, which is in many respects a reversion to the method of keeping records system. upon movable slabs or tablets, as in the Babylonian ac- counts referred to at the beginning of this article. This system may be applied to books of first-entry, or to ledgers, or to both. As applied to books of first-entry it aims at so modifying the original record of the transaction — whether it represents an invoice for goods sold or an acknowledgment given for money received — that a facsimile duplicate may be taken of the original entry by the aid of a carbon sheet, which instead of being immovably bound up in a book is capable of being handled separately and placed in any desired order or position, and thus more readily recorded in the ledger. Postings are thus made direct from the original slips, which have been first sorted out into an order convenient for that purpose, and afterwards re- sorted so that the total sales of each department may be readily

£ s. d.

£ s. d.

£ s. d.

£ s. d.

£ s. d.

with each individual are few in number, and is not worth adoption unless the exceedingly large number of personal accounts makes it important as far as possible to avoid all duplication of clerical work. The more usual adaptation of the slip system to ledgers is to be found in the employment of card ledgers or loose-leaf ledgers. With card ledgers (fig. 1) each ledger account is upon an independent sheet of cardboard suitably arranged in drawers or cabinets. The system is advantageous as allowing all dead matter to be eliminated from the record continuously in use, and as permitting the order in which the accounts stand to be varied from time to time as convenience dictates, thus (if necessary) enabling the accounts to be always kept in alphabetical order in spite of the addition of new accounts and the dropping out of old ones. An especial convenience of the card system is that in times of pressure any desired number of book-keepers may be simultaneously employed, whereas the maximum number that can be usefully employed upon any bound book is two. The loose-leaf ledger (fig. 2) may be described as midway between

Fig. 2. — Loose-Leaf Ledger (Library Bureau System).

card and bound ledgers. It consists of a number of sheets in book form, so bound as to be capable of being readily separated when desired. The loose-leaf ledger thus embraces most of the advantages of the card ledger, while remaining sufficiently like the more old-fashioned book ledger as to enable it to be readily handled by those whose previous experience has been confined to the latter. Both the card and loose-leaf systems will be frequently found of value for records in connexion with cost and stores accounts, quite irrespective of their advantages in connexion with the book-keeping records pure and simple of certain businesses.

All book-keeping methods rest upon the same fundamental principles, but their development in practice in different countries is to some extent influenced by the manner in which business is there conducted, and by the legislative Legislative

require- ments.

requirements imposed by the several states. In France traders are required by the Code of Commerce to keep three books — a journal, an inventory and a letter book, some- what elaborate provisions being

made to identify these books, and to prevent substitution. The compulsory journal makes the employment of numerous books of first-entry impossible without an undesirable amount of duplication, and wherever

this provision obtains the book-keeping methods are in an accordingly comparatively backward state. The inventory book comprises periodical lists of ledger balances and the balance sheet, records which are invariably kept under every adequate system, although not always in a book specially set aside for that purpose. In Germany the statutory requirements are similar to those in France, save that the journal is not compulsory; but there is an additional provision that the accounts are to be kept in bound books with the pages numbered consecutively— a requirement which makes the introduction of card or loose- leaf ledgers of doubtful legality. A balance sheet must be drawn up every year; but where a stock-in-trade is from its nature or its size difficult to take, it is sufficient for an inventory to be taken every two years. In Belgium the law requires every merchant to keep a journal recording his transactions from day to day, which (with the balance book) must be initialled by a prescribed officer. All letters and telegrams received, and copies of all such sent, must be preserved for ten years. The Commercial Code of Spain requires an inventory, journal, ledger, letter book and invoice book to be kept; while that of Portugal prescribes the use of a balance book, journal, ledger and copy- letter book. The law of Holland requires business men to keep books in which are correctly recorded their commercial transac- tions, letters received and copies of letters sent. It also provides for the preparation of an annual balance sheet. The law of Rumania makes the employment of journal, inventory book and ledger compulsory, a small tax per page being charged on the two first named. There are no special provisions as to book- keeping contained in the Russian law, nor in the United States law, but in Russia public companies have to supply the govern- ment with copies of their annual accounts, which are published in a state newspaper, and in the United States certain classes of companies have to submit their accounts to an official audit In general terms it may be stated that at the present time the employment of card and loose-leaf ledger systems is more general in the United States than in Great Britain.

Apart from the organizations of professional accountants, there is none of note devoted to the scientific study of book- „ keeping other

than purely educational institutions.

Among the universities those in the United States were the first to include accounting as part of their curriculum; while in Great Britain the London School of Economics (uni- versity of London), the university of Birmingham, and the Victoria University of Manchester have, so far, alone treated the subject seriously and upon adequate lines. Quite recently Japan has been making a movement in the same direction, and other countries will doubtless follow suit. In England there have for a number of years past been various bodies — such for in- stance as the Society of Arts, the London Chamber of Commerce and Owens College, Manchester — which hold examinations in book-keeping and grant diplomas to successful candidates, while most of the polytechnics and technical schools give in- struction in book-keeping; these latter, however, for the most part regard it as a ” craft ” merely.

Authorities. — Those interested in the bibliography of book- keeping are referred to the catalogue of the library of the Institute of Chartered Accountants in England and Wales, which probably contains the most complete collection in existence of ancient and modern works on accounting, both British and foreign. The following short list comprises those most likely to be found of general interest : G. van de Linde, Book-keeping (1898); L. R. Dicksee, Book-keeping (5th ed., 1906) and Advanced Accounting (2nd ed., 1905); Encyclo- paedia of Accounting, ed. by G. Lisle (1903) ; Accountants’ Library, ed. by the editor of The Accountant (1901); J. W. Heaps, The Antiquity of Book-keeping (1898) ; History of Accounting and Accoun- tants, ed. by R. Brown (1905). (L. R. D.)

BOOK-PLATES. The book-plate, or ex-libris, a printed label intended to indicate ownership in individual volumes, is nearly as old as the printed book itself. It bears very much the same relation to the hand-painted armorial or otherwise symbolical personal device found in medieval manuscripts that the printed page does to the scribe’s work. The earliest known examples of book-plates are German. According to Friedrich Warnecke, of Berlin (one of the best authorities on the subject), the oldest

movable ex-libris are certain woodcuts representing a shield of arms supported by an angel (fig. i), which were pasted in books

Fig. 1. — Gift-plate of Hildebrand Brandenburg of Biberach to the Monastery of Buxheim (c. 1480).

presented to the Carthusian monastery of Buxheim by Brother Hildebrand Brandenburg of Biberach, about the year 1480 — ■ the date being fixed by that of the recorded gift. The woodcut, in imitation of similar devices in old MSS., is hand-painted. In France the most ancient ex-libris as yet discovered is that of one Jean Bertaud de la Tour-Blanche, the date of which is 1529 ;

J^Q.TZacon equesauratus & mapni figilli dlngliae Cufios librum banc bi- bliothecae Cantabrigdicauit,

1574,

Fig. 2. — 'Book-plate of Sir Nicholas Bacon (slightly reduced).

and in England that of Sir Nicholas Bacon, a gift-plate for the books he presented to the university of Cambridge (fig. 2).

Holland comes next with the plate of a certain Anna van der Aa, in 1597; then Italy with one attributed to the year 1622. The earliest known American example is the plain printed label of one John Williams, 1679.

A sketch of the history of the book-plate, either as a minor work of symbolical and decorative art, or as an accessory to the binding of books, must obviously begin in Germany, not only because the earliest examples known are German, but also because they are found in great numbers long before the fashion spread to other countries, and are often of the highest artistic interest. Albrecht Diirer is known to have actually engraved at least six plates (some of very important size) between 1503 and 1516 (fig. 3), and to have supplied designs for many others. Several notable plates are ascribed to Lucas Cranach and to Hans Holbein, and to that bevy of so-called Little Masters, the

Fig. 3. — Book-plate of Lazarus Spengler, by Albrecht Diirer, 1515 (reduced).

Behams, Virgil Solis, Matthias Zundt, Jost Amman, Saldorfer, Georg Hiipschmann and others. The influence of these draughts- men over the decorative styles of Germany has been felt through subsequent centuries down to the present day, notwithstanding the invasion of successive Italian and French fashions during the 17th and 1 8th centuries, and the marked effort at originality of composition

observable among modern designers. The heavy, over-elaborated German style never seems to have affected neighbouring countries; but since it was undoubtedly from Germany that was spread the fashion of ornamental book-plates as marks of possession, the history of German ex-libris remains on that account one of high interest to all those who are curious in the matter.

It was not before the 17th century that the movable ex-libris became tolerably common in France. Up to that time the more luxurious habit of stamping the cover with a personal device had been in such general favour with book-owners as to render the use of labels superfluous. From the middle of the century, however, the ex-libris proper became quite naturalized; examples of that period are very numerous, and, as a rule, are very hand-

some. It may be here pointed out that the expression ex-libris, used as a substantive, which is now the recognized term for book-plate everywhere on the continent, found its origin in France. The words only occur in the personal tokens of other nationalities long after they had become a recognized inscription on French labels.

In many ways the consideration of the English book-plate, in its numerous styles, from the late Elizabethan to the late Victorian period, is peculiarly interesting. In all its varieties it reflects with great fidelity the prevailing taste in decorative art at different epochs. Of English examples, none thus far seems to have been discovered of older date than the gift-plate of Sir Nicholas Bacon; for the celebrated, gorgeous, hand-painted armorial device attached to a folio that once belonged to Henry VIII. , and now reposes in the King's library, British Museum, does not come under the head of book-plate in its modern sense. The next is that of Sir Thomas Tresham, dated 1585. Until the last quarter of the 17th century the number of authentic English plates is very limited. Their composition is always remarkably simple, and displays nothing of the German elaborateness. They are as a rule very plainly armorial, and the decoration is usually limited to a symmetrical arrangement of mantling, with an occa- sional display of palms or wreaths. Soon after the Restoration, however, a book-plate seems to have suddenly become an estab- lished accessory to most well-ordered libraries. Book-plates of that period offer very distinctive characteristics. In the sim- plicity of their heraldic arrangements they recall those of the previous age; but their physiognomy is totally different. In the first place, they invariably display the tincture lines and dots, after the method originally devised in the middle of the century by Petra Sancta, the author of Tesserae Genlilitiae, which by this time had become adopted throughout Europe. In the second, the

mantling assumes a much more elaborate appearance — one that irresistibly recalls that of the periwig of the period — surrounding the face of the shield. This style was undoubtedly imported from France, but it assumed a character of its own in England. As a matter of fact, thenceforth until the dawn of the French Revolution, English modes of decoration in book- plates, as in most other chattels, follow at some years' distance the ruling French taste. The main characteristics of the style which prevailed during the Queen Anne and early Georgian periods are: — ornamental frames suggestive of carved oak, a frequent use of fish-scales, trellis or diapered patterns, for the decoration of plain surfaces; and, in the armorial display, a marked reduction in the importance of the mantling. The intro- duction of the scallop-shell as an almost constant element of ornamentation gives already a foretaste of the Rocaille-Coquille, the so-called Chippendale fashions of the next reign. As a matter of fact, during the middle third of the century this rococo style (of which the Convers plate [fig. 4] gives a tolerably typical sample) affects the book-plate as universally as all other decora- tive objects. Its chief element is a fanciful arrangement of scroll and shell work with curveting acanthus-like sprays — an arrangement which in the examples of the best period is generally made asymmetrical in order to give freer scope for a variety of countercurves. Straight or concentric lines and all appearances of flat surface are studiously avoided; the helmet and its symmetrical mantling tends to disappear, and is replaced by the plain crest on a fillet. The earlier examples of this manner are tolerably ponderous and simple. Later, however, the com- position becomes exceedingly light and complicated; every conceivable and often incongruous element of decoration is introduced, from cupids to dragons, from flowerets to Chinese pagodas. During the early part of George III.'s reign there is a return to greater sobriety of ornamentation, and a style more truly national, which may be called the urn style, makes its appearance. Book-plates of this period have invariably a physiognomy which at once recalls the decorative manner made popular by architects and designers such as Chambers, the Adams, Josiah Wedgwood, Hepplewhite and Sheraton. The shield shows a plain spade-like outline, manifestly based upon that of the pseudo-classic urn then so much to the fore. The

ornamental accessories are symmetrical palms and sprays, wreaths and ribands. The architectural boss is also an im- portant factor. In many plates, indeed, the shield of arms takes quite a subsidiary

position by the side of the predominantly architectural urn. From the beginning of the 19th century, until

£jc Libria Petri yfntonii Corners Laudownsis N°

Fig. 4. — Book-plate of P. A. Convers, 1762.

comparatively recent days, no special style of decoration seems to have established itself. The immense majority of examples display a plain shield of arms with motto on a scroll below, and crest on a fillet above. Of late years, however, a rapid impetus appears to have been given to the designing of ex-libris; a new era, in fact, has begun for the book-plate, one of great interest. The main styles of decoration (and these, other data being

fl

rfiprancis Cfrvt/n of/andcmor in the Ccrunty\ s f Glamorgan. Md of&>rd=Jil>if m the J V County of 0)eiˆnjEjq'i6 S 8ˆ

Fig. 5. — Book-plate of Francis Gwyn of Lansanor, 1698.

absent, must always in the case of old examples remain the criteria of date) have already been noticed. It is, however, necessary to point out that certain styles of composition were also prevalent at certain periods. Many of the older plates (like the majority of the most modern ones) were essentially pictorial.

Of this kind the best-defined English genus may be recalled: the library interior — a term which explains itself— and book-piles, exemplified by the ex-libris (fig. 6) of W. Hewer, Samuel Pepys's secretary. We have also many portrait-plates, of which, perhaps, the most notable are those of Samuel Pepys himself and of John Gibbs, the architect; allegories, such as were en- graved by Hogarth, Bartolozzi, John Pine and George Vertue ; landscape-plates, by wood engravers of the Bewick school (see Plate), &c. In most of these the armorial element plays but a secondary part.

The value attached to book-plates, otherwise than as an object of purely personal interest, is comparatively modern. The study of and the taste for collecting these private tokens of book- ownership hardly date farther back than the year 1875. The first real impetus was given by the appearance of the Guide to the Study of Book-Plates, by Lord de Tabley (then the Hon. Leicester Warren) in 1880. This work, highly interesting from many points of view, established what is now accepted as the general classification of styles: early armorial {i.e.

previous to Restoration, exemplified by the Nicholas Bacon plate) ; Jacobean, a somewhat misleading term, but distinctly understood to include-

Fig. 6. — Book-plate of William Hewer, 1699.

the heavy decorative manner of the Restoration, Queen Anne and early Georgian days (the Lansanor plate, fig. 5, is typically Jacobean); Chippendale (the style above described as rococo, tolerably well represented by the French plate of Convers); wreath and ribbon, belonging to the period described as that of the urn, &c. Since then the literature on the subject has grown considerably. Societies of collectors have been founded, first in England, then in Germany and France, and in the United States, most of them issuing a journal or archives: The Journal of the Ex-libris Society (London), the Archives de la sociSle francaise de collectionneurs d'ex-libris (Paris)', both of these monthlies; the Ex-libris Zeitschrift (Berlin), a quarterly.

Much has been written for and against book-plate collecting. If, on the one hand, the more enthusiastic ex-librists (for such a word has actually been coined) have made the some- what ridiculous claim of science for " ex-librisme," the bitter animadversion, on the other, of a certain class of intolerant bibliophiles upon the vandalism of removing book-plates from old books has at times been rather extravagant. Book- plates are undoubtedly very often of high interest (and of a value often far greater than the odd volume in which they are found affixed), either as specimens of bygone decorative fashion or as personal relics of well-known personages. There can be no

BOOK-PLATES

Plate.

BOOK-PLATE OF ROBERT PINKNEY. By Thomas Bewick.

FREIHERRLv.LIPPERHEIDE'sche BfcJCHERSAMMLUNG

Nr.

BOOK-PLATE OF CHARLES DEXTER ALLEN. By E. D. French.

BOOK-PLATE OF FREIHERR V. LIPPERHEIDE. By Kakl Rickelt.

BOOK-PLATE OF SIR ARTHUR VICARS. By C. W. Sherborn.

BOOK-SCORPION— BOOKSELLING

question, for instance, that engravings or designs by artists such as Holbein and Diirer and the Little Masters of Germany, by Charles Eisen, Hubert Frangois Bourguignon, dit Gravelot, D. N. Chodowiecki or Simon Gribelin; by W. Marshall, W. Faithorne, David Loggan, Sir Robert Strange, Francesco Piranesi; by Hogarth, Cipriani, Bartolozzi, John Keyse Sherwin, William Henshaw, Hewitt or Bewick and his imitators; or, to come to modern times, that the occasional examples traced to the handicraft of Thomas Stothard, Thackeray, Millais, Maclise, Bell Scott, T. G. Jackson, Walter Crane, Caldecott, Stacy Marks, Edwin Abbey, Kate Greenaway, Gordon Browne, Herbert Railton, Aubrey Beardsley, Alfred Parsons, D. Y. Cameron, Paul Avril — are worth collecting.

Until the advent of the new taste the devising of book-plates was almost invariably left to the routine skill of the heraldic stationer. Of late years the composition of personal book- tokens has become recognized as a minor branch of a higher art, and there has come into fashion an entirely new class of designs which, for all their wonderful variety, bear as unmistakable a character as that of the most definite styles of bygone days. Broadly speaking, it may be said that the purely heraldic element tends to become subsidiary and the allegorical or symbolic to assert itself more strongly. Among modern English artists who have more specially paid attention to the devising of book-plates, and have produced admirable designs, may be mentioned C. W. Sherborn, G. W. Eve, Robert Anning Bell, J. D. Batten, Erat Harrison, J. Forbes Nixon, Charles Ricketts, John Vinycomb, John Leighton and Warrington Hogg. The development in various directions of process work, by facilitating and cheap- ening the reproduction of beautiful and elaborate designs, has no doubt helped much to popularize the book-plate — a thing which in older days was almost invariably restricted to ancestral libraries or to collections otherwise important. Thus the great majority of modern plates are reproduced by process. There are, however, a few artists left who devote to book-plates their skill with the graver. Some of the work they produce challenges comparison with the finest productions of bygone engravers. Of these the best-known are C. W. Sherborn (see Plate) and G. W. Eve in England, and in America J. W. Spenceley of Boston, Mass., K. W. F. Hopson of New Haven, Conn., and E. D. French of New York City (see Plate).

Authorities.— The curious in the matter of book-plate composi- tion will find it treated in the various volumes of the Ex-libris Series (London). See also A. Poulet-Malassis, Les Ex-libris francais (1875);

Hon. J. Leicester Warren (Lord de Tabley), A Guide to the Study of Book-plates (1880) ; Sir A. W. Franks, Notes on Book-plates, 1574-1800 (private, 1887) ; Friedrich Warnecke, Die deutschen Biicherzeichen (1890); Henri Bouchot, Les Ex-libris et les marques de possession du livre (1891); Egerton Castle, English Book-plates (1892); Walter Hamilton, French Book-plates (1892), Dated Book- plates (1895) ; H. W. Fincham, Artists and Engravers of British and American Book-plates (1897) ; German Book-plates, by Count K. E. zu Leiningen-Westerburg, translated by G. R. Denis (1901). (E. Ca.)

BOOK-SCORPION, or False Scorpion, minute arachnids superficially resembling tailless scorpions and belonging to the order Pseudoscorpiones of the class Arachnida. Occurring in all temperate and tropical countries, book-scorpions live for the most part under stones, beneath the bark of trees or in vegetable detritus. A few species, however, like the common British forms Chelifer cancroides and Chiridium museorum, frequent human dwellings and are found in books, old chests, furniture, &c. ; others like Ganypus liltoralis and allied species may be found under stones or pieces of coral between tide-marks; while others, which are for the most part blind, live permanently in dark caves. Their food consists of minute insects or mites. It is possibly for the purpose of feeding on parasitic mites that book-scorpions lodge themselves beneath the wing-cases of large tropical beetles ; and the same explanation, in default of a better, may be extended to their well-known and oft-recorded habit of seizing hold of the legs of horse-flies or other two-winged insects. For safety during hibernation and moulting, book-scorpions spin a small spherical cocoon. They are oviparous; and the eggs after being laid are carried about by the mother, attached to the lower surface of her body, the young remaining with their parent until

they have acquired their definite form and are able to shift for themselves. (R. I. P.)

BOOKSELLING. The trade in books is of a very ancient date. The early poets and orators recited their effusions in public to induce their hearers to possess written copies of their poems or orations. Frequently they were taken down viva voce, and transcripts sold to such as were wealthy enough to purchase. In the book of Jeremiah the prophet is represented as dictating to Baruch the scribe, who, when questioned, described the mode in which his book was written. These scribes were, in fact, the earliest booksellers, and supplied copies as they were de- manded. Aristotle, we are told, possessed a somewhat extensive library; and Plato is recorded to have paid the large sum of one hundred minae for three small treatises of Philolaus the

Pythagorean. When the Alexandrian library was founded about 300 B.C., various expedients were resorted to for the purpose of procuring books, and this appears to have stimulated the energies of the Athenian booksellers, who were termed /3i/3Xtwv KaxijXot. In Rome, towards the end of the republic, it became the fashion to have a library as part of the household furniture; and the booksellers, librarii (Cic. D. Leg. iii. 20) or bibliopolae (Martial iv. 71, xiii. 3), carried on a flourishing trade. Their shops (taberna librarii, Cicero, Phil. ii. 9) were chiefly in the Argiletum, and in the Vicus Sandalarius. On the door, or on the side posts, was a list of the books on sale; and Martial (i. 118), who mentions this also, says that a copy of his First Book of Epigrams might be purchased for five denarii. In the time of Augustus the great booksellers were the Sosii. According to Justinian (ii. 1. 33), a law was passed securing to the scribes the property in the materials used; and in this may, perhaps, be traced the first germ of the modern law of copyright.

The spread of Christianity naturally created a great demand for copies of the Gospels and other sacred books, and later on ‘ for missals and other devotional volumes for church and private use. Benedict Biscop, the founder of the abbey at Wearmouth in England, brought home with him from France (671) a whole cargo of books, part of which he had ” bought,” but from whom is not mentioned. Passing by the intermediate ages we find that previous to the Reformation, the text writers or stationers (stacyoneres) , who sold copies of the books then in use — the ABC, the Paternoster, Creed, Ave Maria and other MS. copies of prayers, in the neighbourhood of St Paul’s, London, — were, in 1403, formed into a gild. Some of these ” stacyoneres ” had stalls or stations built against the very walls of the cathedral itself, in the same manner as they are still to be found in some of the older continental cities. In Henry Anstey’s Munimenta Academica, published under the direction of the master of the rolls, we catch a glimpse of the ” sworn ” university bookseller or stationer, John More of Oxford, who apparently first supplied pupils with their books, and then acted the part of a pawnbroker. Anstey says (p. 77), ” The fact is that they (the students) mostly could not afford to buy books, and had they been able, would not have found the advantage so considerable as might be sup- posed, the instruction given being almost wholly oral. The chief source of supplying books was by purchase from the university sworn stationers, who had to a great extent a mono- poly. Of such books there were plainly very large numbers constantly changing hands.” Besides the sworn stationers there were many booksellers in Oxford who were not sworn ; for one of the statutes, passed in the year 1373, expressly recites that, in consequence of their presence, ” books of

great value are sold and carried away from Oxford, the owners of them are cheated, and the sworn stationers are deprived of their lawful business." It was, therefore, enacted that no bookseller except two sworn stationers or their deputies, should sell any book being either his own property or that of another, exceeding half a mark in value, under a pain of imprisonment, or, if the offence was repeated, of abjuring his trade within the university.

" The trade in bookselling seems," says Hallam, " to have been established at Paris and Bologna in the 12th century; the lawyers and universities called it into life. It is very improbable that it existed in what we properly call the dark ages. Peter of

Blois mentions a book which he had bought of a public dealer (a quodam publico mangone librorum); but we do not find many distinct accounts of them till the next age. These dealers were denominated stationarii, perhaps from the open stalls at which they carried on their business, though statio is a general word for a shop in low Latin. They appear, by the old statutes of the university of Paris, and by those of Bologna, to have sold books upon commission, and are sometimes, though not uniformly, distinguished from the librarii, a word which, having originally been confined to the copyists of books, was afterwards applied to those who traded in them. They sold parchment and other materials of writing, which have retained the name of stationery, and they naturally exercised the kindred occupations of bind- ing and decorating. They probably employed transcribers; we find at least that there was a profession of copyists in the universities and in large cities."

The modern system of bookselling dates from soon after the introduction of printing. The earliest printers were also editors and booksellers; but being unable to sell every copy of the works they printed, they had agents at most of the seats of learning. Antony Koburger, who introduced the art of printing into Nuremberg in 1470, although a printer, was more of a bookseller; for, besides his own sixteen shops, we are informed by his bio- graphers that he had agents for the sale of his books in every city of Christendom. Wynkyn de Worde, who succeeded to Caxton's press in Westminster, had a shop in Fleet Street.

The religious dissensions of the continent, and the Reforma- tion in

England under Henry VIII. and Edward VI., created a great demand for books; but in England neither Tudor nor Stuart could tolerate a free press, and various efforts were made to curb it. The first patent for the office of king's printer was granted to Thomas Berthelet by Henry VIII. in 1529, but only "such books as were first licensed were to be printed. At that time even the purchase or possession of an unlicensed book was a punishable offence. In 1556 the Company of Stationers was incorporated, and very extensive powers were granted in order that obnoxious books might be repressed. In the following reigns the Star Chamber exercised a pretty effectual censorship; but, in spite of all precaution, such was the demand for books of a polemical nature, that many were printed abroad and surreptitiously introduced into England. Queen Elizabeth inter- fered but little with books except when they emanated from Roman Catholics, or touched upon her royal prerogatives; and towards the end of her reign, and during that of her pedantic successor, James, bookselling flourished. Archbishop Laud, who was no friend to booksellers, introduced many arbitrary restric- tions; but they were all, or nearly all, removed during the time of the Commonwealth. So much had bookselling increased during the Protectorate that, in 1658, was published A Catalogue of the most Vendible Books in England, digested under the heads of Divinity, History, Physic, &c, with School Books, Hebrew, Greek and Latin, and an Introduction, for the use of Schools, by W. London. A bad time immediately followed. The Restoration also restored the office of Licenser of the Press, which continued till 1694.

In the first English Copyright Act (1 709) , which specially relates to booksellers, it is enacted that, if any person shall think the published price of a book unreasonably high, he may thereupon make complaint to the archbishop of Canterbury, and to certain other persons named, who shall thereupon examine into his complaint, and if well founded reduce the price; and any bookseller charging more than the price so fixed shall be fined £5 for every copy sold. Apparently this enactment remained a dead letter.

For later times it is necessary to make a gradual distinction between booksellers, whose trade consists in selling books, either by retail or wholesale, and publishers, whose business involves the production of the books from the author's manuscripts, and who are the intermediaries between author and bookseller, just as the booksellers (in the restricted sense) are intermediaries between the author and publisher and the public. The article on Publishing (q.v.) deals more particularly with this second class, who, though originally booksellers, gradually took a higher

rank in the book-trade, and whose influence upon the history of literature has often been very great. The convenience of this distinction is not impaired by the fact either that a publisher is also a wholesale bookseller, or that a still more recent develop- ment in publishing (as in the instance of the direct sale in 1902, by the London Times, of the supplementary volumes to the 9th edition of the Encyclopaedia Britannica, which were also ” pub- lished ” by The Times) started a reaction to some extent in the way of amalgamating the two functions. The scheme of The Times Book Club (started in 1905) was, again, a combination of a subscription library with the business of bookselling (see Newspapers); and it brought the organization of a newspaper, with all its means of achieving publicity, into the work of pushing the sale of books, in a way which practically introduced a new factor into the bookselling business.

During the 19th century it remains the fact that the distinction between publisher and bookseller — literary promoter and shop-keeper — became fundamental. The booksellers, as such, were engaged either in wholesale bookselling, or in the retail, the old or second-hand, and the periodical trades.

Coming between the publisher and the retail bookseller is the important distributing agency of the wholesale bookseller. It is to him that the retailer looks for his miscellaneous supplies, as it is simply impossible for him to stock one-half of the books published. In Paternoster Row, London, which has for over a hundred years been the centre of this industry, may be seen the collectors from the shops of the retail booksellers, busily engaged in obtaining the books ordered by the book-buying public. It is also through these agencies that the country bookseller obtains his miscellaneous supplies. At the leading house in this department of bookselling almost any book can be found, or information obtained concerning it. At one of these establishments over 1,000,000 books are constantly kept in stock. It is here that the publisher calls first on showing or ” subscribing ” a new book, a critical process, for by the number thus subscribed the fate of a book is sometimes determined.

What may be termed the third partner in publishing and its ramification is the retail bookseller; and to protect his interests there was established in 1890 a London booksellers’ society, which had for its object the restriction of discounts to 25 %, and also to arrange prices generally and control all details connected with the trade. The society a few years afterwards widened its field of operations so as to include the whole of the United Kingdom, and its designation then became ” The Associated Booksellers of Great Britain and Ireland.”

The trade inold or (as they are sometimes called) second-hand books is in a sense, no doubt, a higher class of business, requiring a knowledge of bibliography, while the transactions are with individual books rather than with numbers of copies. Occasionally dealers in this class of books replenish their stocks by purchasing remainders of books, which, having ceased from one cause or another to sell with the publisher, they offer to the public as bargains. The periodical trade grew up during the 19th century, and was in its infancy when the Penny Magazine, Chambers's Journal, and similar publications first appeared. The growth of this important part of the business was greatly promoted by the abolition of the newspaper stamp and of the duty upon paper, the introduction of attractive illustrations, and the facilities offered for purchasing books by instalments.

The history of bookselling in America has a special interest. The Spanish settlements drew away from the old country much of its enterprise and best talent, and the presses of Mexico and other cities teemed with publications mostly of a religious character, but many others, especially linguistic and historical, were also published. Bookselling in the United States was of a somewhat later growth, although printing was introduced into Boston as early as 1676, Philadelphia in 1685, and New York in 1693. Franklin had served to make the trade illustrious, yet few persons were engaged in it at the commencement of the 19th century. Books chiefly for scholars and libraries were imported from Europe; but after the second war printing- presses multiplied rapidly, and with the spread of newspapers and education there also arose a demand for books, and publishers set to work to secure the advantages offered by the wide field of English literature, the whole of which they had the liberty of reaping free of all cost beyond that of production. The works of Scott, Byron, Moore, Southey, Wordsworth, and indeed of every author of note, were reprinted without the smallest payment to author or proprietor. Half the names of the authors in the so- called "American" catalogue of books printed between 1820 and 1852 are British. By this means the works of the best

authors were brought to the doors of all classes in the cheapest variety of forms. In consequence of the Civil War, the high price of labour, and the restrictive duties laid on in order to protect native industry, coupled with the frequent intercourse with England, a great change took place, and American publishers and booksellers, while there was

still no international copyright, made liberal offers for early sheets of new publications. Boston, New York and Philadelphia still retained their old supremacy as bookselling centres. Meanwhile, the distinct publishing busi- ness also grew, till gradually the conditions of business became assimilated to those of Europe.

In the course of the 16th and 17th centuries the Low Countries for a time became the chief centre of the bookselling world, and many of the finest folios and quartos in our libraries bear the names of Jansen, Blauw or Plantin, with the imprint of Amster- dam, Utrecht, Leiden or Antwerp, while the Elzevirs besides other works produced their charming little pocket classics. The southern towns of Douai and St Omer at the same time furnished polemical works in English.

Under Publishing are noticed various further developments of this subject. Much interesting information on the history of the book trade will be found in Charles Knight's Biography of William Caxton, and in the same author's Shadows of the Old Booksellers (1865). See also Henry Curwen, History of Booksellers (1873) ; and Heinrich Lempertz, Bilder-Hefte zur Geschichte des Biicherhandels (Cologne, 1854).

BOOLE, GEORGE (1815-1864), English logician and mathe- matician, was born in Lincoln on the 2nd of November 181 5. His father was a tradesman of limited means, but of studious character and active mind. Being especially interested in mathematical science, the father gave his son his first lessons; but the extraordinary mathematical powers of George Boole did not manifest themselves in early life. At first his favourite subject was classics. Not until the age of seventeen did he attack the higher mathematics, and his progress was much retarded by the want of efficient help. When about sixteen years of age he became assistant-master in a private school at Doncaster, and he maintained himself to the end of his life in one grade or other of the scholastic profession. Few distinguished men, indeed, have had a less eventful life. Almost the only changes which can be called events are his successful establishment of a school at Lincoln, its removal to Waddington, his appointment in 1849 as professor of mathematics in the Queen's College at Cork, and his marriage in 1855 to Miss Mary Everest, who, as Mrs Boole, afterwards wrote several useful educational works on her husband's principles.

To the public Boole was known only as the author of numerous abstruse papers on mathematical topics, and of three or four distinct publications which have become standard works. His earliest published paper was one upon the " Theory of Analytical Transformations," printed in the Cambridge Mathematical Journal for

1839, and it led to a friendship between Boole and D. F. Gregory, the editor of the journal, which lasted until the premature death of the latter in 1844. A long list of Boole's memoirs and detached papers, both on logical and mathematical topics, will be found in the Catalogue of Scientific Memoirs pub- lished by the Royal Society, and in the supplementary volume on Differential Equations, edited by Isaac Todhunter. To the Cambridge Mathematical Journal and its successor, the Cambridge and Dublin Mathematical Journal, Boole contributed in all twenty-two articles. In the third and fourth series of the Philo- sophical Magazine will be found sixteen papers. The Royal Society printed six important memoirs in the Philosophical Transactions, and a few other memoirs are to be found in the Transactions of the Royal Society of Edinburgh and of the Royal Irish Academy, in the Bulletin de V Academie de St-Petersbourg for 1862 (under the name G. Boldt, vol. iv. pp. 198-215), and in Crelle's Journal. To these lists should be added a paper on the mathematical basis of logic, published in the Mechanic's Magazine for 1848. The works of Boole are thus contained in about fifty scattered articles and a few separate publications.

Only two systematic treatises on mathematical subjects were completed by Boole during his lifetime. The well-known

Treatise on Differential Equations appeared in 1859, and was followed, the next year, by a Treatise on the Calculus of Finite Differences, designed to serve as a sequel to the former work. These treatises are valuable contributions to the important branches of mathematics in question, and Boole, in composing them, seems to have combined elementary exposition with the profound investigation of the philosophy of the subject in a manner hardly admitting of improvement. To a certain extent these works embody the more important discoveries of their author. In the 16th and 17th chapters of the Differential Equations we find, for instance, a lucid account of the general symbolic method, the bold and skilful employment of which led to Boole's chief discoveries, and of a general method in analysis, originally described in his famous memoir printed in the Philo- sophical Transactions for 1844. Boole was one of the most eminent of those who perceived that the symbols of operation could be separated from those of quantity and treated as distinct objects of calculation. His principal characteristic was perfect con- fidence in any result obtained by the treatment of symbols in accordance with their primary laws and conditions, and an almost unrivalled skill and power in tracing out these results.

During the last few years of his life Boole was constantly engaged in

extending his researches with the object of producing a second edition of his Differential Equations much more complete than the first edition; and part of his last vacation was spent in the libraries of the Royal Society and the British Museum. But this new edition was never completed. Even the manu- scripts left at his death were so incomplete that Todhunter, into whose, hands they were put, found it impossible to use them in the publication of a second edition of the original treatise, and wisely printed them, in 1865, in a supplementary volume.

With the exception of Augustus de Morgan, Boole was probably the first English mathematician since the time of John Wallis who had also written upon logic. His novel views of logical method were due to the same profound confidence in symbolic reasoning to which he had successfully trusted in mathematical investigation. Speculations concerning a calculus of reasoning had at different times occupied Boole's thoughts, but it was not till the spring of 1847 that he put his ideas into the pamphlet called Mathematical Analysis of Logic. Boole afterwards regarded this as a hasty and imperfect exposition of his logical system, and he desired that his much larger work, An Investigation of the Laws of Thought, on which are founded the Mathematical Theories of Logic and Probabilities (1854), should alone be considered as containing a mature statement of his views. Nevertheless, there is a charm of originality about his earlier logical work which no competent reader can fail to appreciate. He did not regard logic as a branch of mathematics, as the title of his earlier pamphlet might be taken to imply, but he pointed out such a deep analogy between the symbols of algebra and those which can be made, in his opinion, to represent logical forms and syllogisms, that we can hardly help saying that logic is mathe- matics restricted to the two quantities, o and 1. By unity Boole denoted the universe of thinkable objects; literal symbols, such as x, y, z, v, u, &c, were used with the elective meaning attaching to common adjectives and substantives. Thus, if * = horned and y = sheep, then the successive acts of election represented by x and y, if performed on unity, give the whole of the class horned sheep. Boole showed that elective symbols of this kind obey the same primary laws of combination as alge- braical symbols, whence it followed that they could be added, subtracted, multiplied and even divided, almost exactly in the same manner as numbers. Thus, 1— x would represent the operation of selecting all things in the world except horned things, that is, all not horned things, and (1 — x) (1 — y) would give us all things neither horned nor sheep. By the use of such symbols propositions could be reduced to the form of equations, and the syllogistic conclusion from

two premises was obtained by eliminating the middle term according to ordinary algebraic rules.

Still more original and remarkable, however, was that part of his system, fully stated in his Laws of Thought, which formed

a general symbolic method of logical inference. Given any propositions involving any number of terms, Boole showed how, by the purely symbolic treatment of the premises, to draw any conclusion logically contained in those premises. The second part of the Laws of Thought contained a corresponding attempt to discover a general method in probabilities, which should enable us from the given probabilities of any system of events to determine the consequent probability of any other event logically connected with the given events.

Though Boole published little except his mathematical and logical works, his acquaintance with general literature was wide and deep. Dante was his favourite poet, and he preferred the Paradiso to the Inferno. The metaphysics of Aristotle, the ethics of Spinoza, the philosophical works of Cicero, and many kindred works, were also frequent subjects of study. His reflections upon scientific, philosophical and religious questions are contained in four addresses upon The Genius of Sir Isaac Newton, The Right Use of Leisure, The Claims of Science and The Social Aspect of Intellectual Culture, which he delivered and printed at different times.

The personal character of Boole inspired all his friends with the deepest esteem. He was marked by the modesty of true genius, and his life was given to the single-minded pursuit of truth. Though he received a medal from the Royal Society for his memoir of 1844, and the honorary degree of LL.D. from the university of Dublin, he neither sought nor received the ordinary rewards to which his discoveries would entitle him. On the 8th of December 1864, in the full vigour of his intellectual powers, he died of an attack of fever, ending in suffusion on the lungs.

An excellent sketch of his life and works, by the Rev. R. Harley, F R.S., is to be found in the British Quarterly Review for July 1866, No. 87. (W. S. J.)

BOOM, a word of Teutonic origin (cf. the Ger. Baum, tree, and the

Eng. beam) for a pole, bar or barrier, used especially as a nautical term, for a long spar, used to extend a sail at the foot (main-boom, jib-boom, &c.) . The ” boom ” of a cannon (note of a bell, cry of the bittern) is distinct from this, being onomatopoeic. In the sense of a barrier, a boom is generally formed of timber lashed together, or of chains, built across the mouth of a river or harbour as a means of defence. Possibly from the metaphor of a breaking boom, and the accompanying rush and roar, or from the rush of rising waters (mingled with the onomatopoeic use), ” boom ” began in America to be used of a sudden ” spurt ” or access of industrial activity, as in the phrase ” a boom in cotton.” Hence the verb ” to boom,” meaning to advertise or push into public favour.

BOOMERANG, a missile weapon of the Australian aborigines and other peoples. The word is taken from the native name used by a single tribe in New South Wales, and was mentioned in 1827 by Captain King as ” the Port Jackson term ” (Nav. Surv. Coasts Austral, i. 355). It has been erroneously connected with the womera or spear-thrower, and equally erroneously regarded as onomatopoeic — for it does not ” boom ” but whistles in the air. Two main types may be distinguished: (a) the return boomerang; (b) the non-return or war boomerang. Both types are found in most parts of Australia; the return form was, according to General Pitt-Rivers, used in ancient Egypt; and a weapon which has a close resemblance to the boomerang survives to the present day in North-East Africa, whence it has spread in allied forms made of metal (throwing knives). Among the Dravidians of South India is found a boomerang-shaped instru- ment which can be made to return. It is, however, still uncertain whether the so-called boomerangs of Egypt and India have any real resemblance to the Australian return boomerang. The Hopis (Moquis) of Arizona use a non-return form. The general form of both weapons is the same. They are sickle-shaped, and made of wood (in India of ivory or steel), so modelled that the thickness is about £th of the breadth, which again is Tˆth of the length, the last varying from 6 in. to 3 or 4 ft. The return boomerang, which may have two straight arms at an angle of from 70 to 120 , but in Australia is always curved at an angle of 90 or more, is usually 2 to 3 ft. in length and weighs some 8 oz. ;

Fig. 1.

the arms have a skew, being twisted 2° or 3 from the plane running through the centre of the weapon, so that B and D (fig. 1) are above it, A and E below it; the ends AB and DE are also to some extent raised above the plane of the weapon at C; the cross section is asymmetrical, the upper side in the figure being convex, the lower flat or nearly so ;

g

this must be thrown with the right hand. The non-return boomerang

has a skew in the opposite direction a // ^^^P

but is otherwise similar. b ^^ e

The peculiarity of the boomer- ang's flight depends mainly on its skew. The return boomerang is held vertically, the concave side forward, and thrown in a plane parallel to the surface of the ground, as much rotation as possible being imparted to it. It travels straight for 30 yds. or more, with nearly vertical rota- tion; then it inclines to the left, lying over on the flat side and rising in the air; after describing a circle of 50 or more yards in diameter it returns to the thrower. Some observers state that it returns after striking the object; it is certainly possible to strike the ground without affecting the return. Throws of 100 yds. or more, before the leftward curve begins, can be accomplished by Australian natives, the weapon rising as much as 150 ft. in the air and circling five times before returning. The non-return type

Fig. 2.-

-Flight in Horizontal Plane.

Fig. 3.

-Flight in Vertical Plane.

may also be made to return in a nearly straight line by throwing it at an angle of 45 , but normally it is thrown like the return type, and will then travel an immense distance. No accurate measurements of Australian throws are available, but an English throw of 180 yds. has been recorded, compared with the same thrower's 70 yds. with the cricket ball.

The war boomerang in an expert's hand is a deadly weapon, and the lighter hunting boomerang is also effective. The return boomerang is chiefly used as a plaything or for killing birds, and is often as dangerous to the thrower as to the object at which it is aimed.

See Pitt-Rivers (Lane Fox) in Anthropological and Archaeological Fragments, "Primitive Warfare"; also in Journ. Roval United Service Inst. xii. No. 51; British Ass. Report (1872); Catalogue of Bethnal Green Collection, p. 28 ; Buchner in Globus, lxxxviii. 39, 63 ; G. T.

Walker in Phil. Trans, cxc. 23; Wide World Mag. ii. 626; Nature, xiv. 248, lxiv. 338; Brough Smyth, Aborigines of Victoria, i. 310-329; Roth, Ethnological Studies. (N. W. T.)

BOONE, DANIEL (1 734-1820), American pioneer and back-woodsman, of English descent, was born near the present city of Reading, Pennsylvania, on the 2nd of November (N.S.) 1734. About 1751 his father, Squire Boone, with his family settled in the Yadkin Valley in what is now Davie county, North Carolina, then on the frontier. Daniel worked on his father's farm, and spent much of his time hunting and trapping. In 1 7 5 5 he served as a wagoner and blacksmith in Braddock's disastrous expedi- tion against the Indians. In 1765 he visited Florida, and in 1767 he first visited the Kentucky region. With several companions, including John Finley, who had been there as early as 1752, he spent two years, 1769-1771, roaming about what is now Kentucky, meeting with numberless adventures, coming in conflict with roving bands of Indians, and collecting bear, beaver and deer skins. He served in Lord Dunmore's War (1774), and in 1775 led to Kentucky the party of settlers who founded Boonesborough, long an important settlement. On the 7th of February 1778 he,

and the party he led, were captured by a band of Shawnees. He was adopted into the Shawnee tribe, was taken to Detroit, and on the return from that place escaped, reaching Boones- borough, after a perilous journey of 160 m., within four days, in time to give warning of a formidable attack by his captors. In repelling this attack, which lasted from the 8th to the 17th of September, he bore a conspicuous part. He also took part in the sanguinary " Battle of Blue Licks " in 1782. For a time he represented the settlers in the Virginia legislature (Kentucky then being a part of Virginia), and he also served as deputy surveyor, sheriff and county lieutenant of Fayette county, one of the three counties into which Kentucky was then divided. Having lost all his land through his carelessness in regard to titles, he removed in 1788 to Point Pleasant, Virginia (now W. Va.), whence about 1799 he removed to a place in what is now Missouri, about 45 m. west of St Louis, in territory then owned by Spain. He received a grant of 1000 arpents (about 845 acres) of land, and was appointed syndic of the district. After the United States gained possession of " Louisiana " in 1803, Boone's title was found to be defective, and he was again dispossessed. He died on the 22nd of September 1820, and in 1845 his

remains were removed to Frankfort, Kentucky, where a monument has been erected to his memory. Boone was a typical American pioneer and backwoodsman, a great hunter and trapper, highly skilled in all the arts of woodcraft, familiar with the Indians and their methods of warfare, a famous Indian fighter, restless, resourceful and fearless. His services, however, have been greatly over-estimated, and he was not, as is popularly believed, either the first to explore or the first to settle the Kentucky region.

The best biography is that by Reuben G. Thwaites, Daniel Boone (New York, 1902).

BOONE, a city and the county-seat of Boone county, Iowa, U.S.A., a short distance from the Des Moines river and near the centre of the state. Pop. (1890) 6520; (1900) 8880; (1905, state census) 9500 (1334 foreign-born); (1910) 10,347. It is served by the Chicago & North-Western (which has construction and repair shops here), the Chicago, Milwaukee & St Paul railways, and by the Fort Dodge, Des Moines & Southern (inter-urban) railway, which connects with Des Moines, Ames, &c. Boone is an important coal centre; bricks and tiles are manufactured from the clay obtained near by; there is a packing plant for the manufacture of beef and pork products; and from the rich farming section by which the city is surrounded come large quantities of grain, some of which is milled here, and live-stock. Boone was laid out in 1865, was incorporated as a town in 1866, and was chartered as a city in 1868.

BOONVILLE, a city and the county-seat of Cooper county, Missouri, U.S.A., on the right bank of the Missouri river, about 210 m. W. by N.of St Louis. Pop. (1890) 4141; (1900) 4377, including 1 1 1 1 negroes; (1910) 4252. It is served by the Missouri Pacific, and the Missouri, Kansas & Texas railways. The city lies along a bluff about 100 ft. above the river. It is the seat of the Missouri training school for boys (1889), and of the Kemper military school (1844). Among its manufactures are earthen- ware, tobacco, vinegar, flour, farm-gates (iron), sash and doors, marble and granite monuments, carriages and bricks. Iron, zinc and lead are found in the vicinity, and some coal is mined. Boonville, named in honour of Daniel Boone, was settled in 1810, was laid out in 1817, incorporated as a village in 1839, and chartered as a city of the third class in 1896. Here on the 17th of June 1861, Captain (Major-General) Nathaniel Lyon, commanding about 2000 Union troops, defeated a slightly larger, but undisciplined Confederate force under Brigadier- General John S. Marmaduke. David Barton (d. 1837), oneof the first two United States senators from Missouri, was buried here.

BOORDE (or Borde), ANDREW (i49o?-is 4 9), English physician and author, was born at Boord's Hill, Holms Dale, Sussex. He was educated at Oxford, and was admitted a member of the Carthusian order while under age. In 1521 he was " dispensed from religion " in order that he might act as suffragan bishop of Chichester, though he never actually filled

the office, and in 1529 he was freed from his monastic vows, not being able to endure, as he said, the " rugorosite off your rely- gyon." He then went abroad to study medicine, and on his return was summoned to attend the duke of Norfolk. He subsequently visited the universities of Orleans, Poitiers, Toulouse, Montpellier and Wittenberg, saw the practice of surgery at Rome, and went on pilgrimage with others of his nation to Compostella in Navarre. In 1534 Boorde was again in London at the Charterhouse, and in 1536 wrote to Thomas Cromwell, complaining that he was in " thraldom " there. Cromwell set him at liberty, and after entertaining him at his house at Bishops Waltham in Hampshire, seems to have entrusted him with a mission to find out the state of public feeling abroad with regard to the English king. He writes to Cromwell from various places, and from Catalonia he sends him the seeds of rhubarb, two hundred years before that plant was generally cultivated in England. Two letters in 1535 and 1536 to the prior of the Charterhouse anxiously argue for his complete release from monastic vows. In 1536 he was studying medicine at Glasgow and gathering his observations about the Scots and the " devellyshe dysposicion of a Scottysh man, not to love nor favour an Englishe man." About 1538 Boorde set out on his most extensive journey, visiting nearly all the countries of Europe except Russia and Turkey, and making his way to Jerusalem. Of these travels he wrote a full itinerary, lost un- fortunately by Cromwell, to whom it was sent. He finally settled at Montpellier and before 1542 had completed his Fyrst Boke of the Introduction of Knowledge, which ranks as the earliest continental guide book, his Dietary and his Brevyary. He probably returned to England in 1542, and lived at Winchester and perhaps at Pevensey. John Ponet, bishop of Winchester, in an Apology against Bishop Gardiner, relates as matter of common knowledge that in 1547 Doctor Boord, a physician and a holy man, who still kept the Carthusian rules of fasting and wearing a hair shirt, was convicted in Winchester of keeping in his house three loose women. For this offence, apparently, he was imprisoned in the Fleet, where he made his will on the 9th of April 1549. It was proved on the 25th of the same month. Thomas Hearne (Benedicius Abbas, i. p. 52) says that he went round like a quack doctor to country fairs, and therefore rashly supposed him to have been the original merry-

andrew.

Andrew Boorde was no doubt a learned physician, and he has left two amusing and often sensible works on domestic hygiene and medicine, but his most entertaining book is The Fyrst Boke of the Introduction of Knowledge. The whyche dothe teache a man to speake parte of all maner of languages, and to know the usage and fashion of all maner of countreys. And for to know the moste parte of all maner of coynes of money, the whych is currant in every region. Made by Andrew Borde, of Physycke Doctor. Dedycated to the right honourable and gracious lady Mary daughter of our soverayne Lorde Kyng Henry the eyght (c. 1547). The Englishman describes himself and his foibles — his fickleness, his fondness for new fashions and his obstinacy — in lively verse. Then follows a geographical description of the country, followed by a model dialogue in the Cornish language. Each country in turn is dealt with on similar lines. His other authentic works are: Here foloweth a Compendyous Regimente or Dyetary of health, made in Mountpyllor (Thomas Colwell, 1562), of which there are undated and doubtless earlier editions; The Brevyary of Health (1347?); The Princyples of Astronamy (1547?); “The Peregrination of Doctor Board,” printed by Thomas Hearne in Benedictus Abbas Petroburgensis, vol. ii. (1735) ; A Pronostycacyon or an Almanacke for the yere of our lorde MCCCCCXLV. made by Andrew Boorde. His Itinerary of Europe and Treatyse upon Berdes are lost. Several jest-books are attributed to him without authority — The Merie Tales of the Mad Men of Gotam (earliest extant edition, 1630), Scogin’s Jests (1626), A mcry jest of the Mylner of Abyngton, with his wyfe, and his daughter, and of two poore scholers of Cam- bridge (printed by Wynkyn de Worde), and a Latin poem, Nos Vagabunduli.

See Dr F. J. Furnivall’s reprint of the Introduction and some other selections for the Early English Text Society (new series, 1870).

BOOS, MARTIN (1762-1825), German Roman Catholic theo- logian, was born at Huttenried in Bavaria on the 25th of December 1762. Orphaned at the age of four, he was reared by an uncle at Augsburg, who finally sent him to the university of Dillingen. There he laid the foundation of the modest piety by which his whole life was distinguished. After serving as priest in several Bavarian towns, he made his way in 1799 to Linz in Austria, where he was welcomed by Bishop Gall, and set to work first at Leonding and then at

Waldneukirchen, becoming in 1806 pastor at Gallneukirchen. His pietistic movement won con- siderable way among the Catholic laity, and even attracted some fifty or sixty priests. The death of Gall and other powerful friends, however, exposed him to bitter enmity and persecution from about 18 12, and he had to answer endless accusations in the consistorial courts. His enemies followed him when he returned to Bavaria, but in 181 7 the Prussian government appointed him to a professorship at Diisseldorf, and in 1819 gave him the pastorate at Sayn near Neuwied. He died on the 29th of August 1825.

See Life by J. Gossner (1831).

BOOT. (1) (From the O. Eng. bol, a word common to Teutonic languages, e.g. Goth, bota, ” good, advantage,” O.H.G. Buoza, Mod. Ger. Busse, ” penance, fine “; cf. ” better,” the compara- tive of ” good “), profit or advantage. The word survives in ” bootless,” i.e. useless or unavailing, and in such expressions, chiefly archaistic, as ” what boots it?” ” Bote,” an old form, survives in some old compound legal words, such as ” house- bote,” ” fire-bote,” ” hedge-bote,” &c, for particular rights of ” estover,” the Norman French word corresponding to the Saxon ” bote ” (see Estovers and Commons). The same form survives also in such expressions as ” thief-bo te ” for the Old English customary compensation paid for injuries.

(2) (A word of uncertain origin, which came into English through the 0. Fr. bote, modern botte; Med. Lat. bolta or bota), a covering for the foot. Properly a boot covers the whole lower part of the leg, sometimes reaching to or above the knee, but in common usage it is applied to one which reaches only above the ankle, and is thus distinguished from ” shoe ” (see Costume and Shoe).

The ” boot ” of a coach has the same derivation. It was originally applied to the fixed outside step, the French botte, then to the uncovered spaces on or beside the step on which the attendants sat facing sideways. Both senses are now obsolete, the term now being applied to the covered receptacles under the seats of the guard and coachman.

The Boot, Boots or Bootikin was an instrument of torture formerly in use to extort confessions from suspected persons, or obtain evidence from unwilling witnesses. It originated in Scotland, but the date of its first use is unknown. It was certainly frequently employed there in the latter years of the 16th century. In a case of forgery in 1579 two witnesses, a clergyman and an attorney, were so tortured. In a letter

dated 1 583 at the Record Office in London, Walsingham instructs the English ambassador at Edinburgh to have Father Holt, an English Jesuit, ” put to the boots.” It seems to have fallen into disuse after 1630, but was revived in 1666 on the occasion of the Covenanters’ rebellion, and was employed during the reigns of Charles II. and James II. Upon the accession of William III. the Scottish convention denounced ” the use of torture, without evidence and in ordinary crimes, as contrary to law.” However, a year or so later, one Neville Payne, an Englishman suspected of treasonable motives for visiting Scotland, was put to the torture under the authority of a warrant signed by the king. This is the last recorded case of its use, torture being finally abolished in Scotland in 1709. It was not used in England after 1640. The boot was made of iron or wood and iron fastened on the leg, between which and the boot wedges were driven by blows from a mallet. After each blow a question was put to the victim, and the ordeal was con- tinued until he gave the information or fainted. The wedges were usually placed against the calf of the leg, but Bishop Burnet says that they were sometimes put against the shin-bone. A similar instrument, called ” Spanish boots,” was used in Germany.

There were also iron boots which were heated on the victim’s foot. A less cruel form was a boot or buskin made wet and drawn upon the legs and then dried with fire.

BOOTES (Gr. j3owttis, a ploughman, from fiovs, an ox), a con- stellation of the northern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.), and perhaps alluded to in the book of Job (see Arcturus), and by Homer and Hesiod. The ancient Greeks symbolized it as a man walking, with his right hand grasping a club, and his left extending up- wards and holding the leash of two dogs, which are apparently barking at the Great Bear. Ptolemy catalogues twenty-three stars, Tycho Brahe twenty-eight, Hevelius fifty-two. In addition to Arcturus, the brightest in the group, the most interesting stars of this constellation are: e Bootis, a beautiful double star composed of a yellow star of magnitude 3, and a blue star of magnitude 6f; £ Bootis, a double star composed of a yellow star, magnitude 45, and a purple star, magnitude 6§; and W. Bootis, an irregularly variable star. This constellation has been known by many other names — Areas, Arctophylax, Arcturus minor, Bubuleus, Bubulus, Canis latrans, Clamator, Icarus, Lycaon, Philometus, Plaustri custos, Plorans, Thegnis, Voci- f era tor; the Arabs termed it Aramech or Archamech; Hesychius named it Orion; Jules Schiller, St Sylvester; Schickard, Nimrod; and Weigelius, the Three Swedish Crowns.

BOOTH, BARTON (1681-1733), English actor, who came of a good

Lancashire family, was educated at Westminster school, where his success in the Latin play Andria gave him an inclination for the stage. He was intended for the church; but in 1698 he ran away from Trinity College, Cambridge, and obtained employ- ment in a theatrical company in Dublin, where he made his first appearance as Oroonoko. After two seasons in Ireland he returned to London, where Betterton, who on an earlier applica- tion had withheld his active aid, probably out of regard for Booth's family, now gave him all the assistance in his power. At Lincoln's Inn Fields (1700-1704) he first appeared as Maximus in Valentinian, and his success was immediate. He was at the Haymarket with Betterton from 1705 to 1708, and for the next twenty years at Drury Lane. Booth died on the 10th of May 1733, and was buried in Westminster Abbey. His greatest parts, after the title-part of Addison's Cato, which established his reputation as a tragedian, were probably Hotspur and Brutus. His Lear was deemed worthy of comparison with Garrick's. As the ghost in Hamlet he is said never to have had a superior. Among his other Shakespearian roles were Mark Antony, Timon of Athens and Othello. He also played to perfection the gay Lothario in Rowe's Fair Penitent. Booth was twice married; his second wife, Hester Santlow, an actress of some merit, survived him.

See Cibber, Lives and Characters of the most eminent Actors and Actresses (1753); Victor, Memoirs of the Life of Barton Booth (1733).

BOOTH, CHARLES (1840-), English sociologist, was born at Liverpool on the 30th of March 1840. In 1862 he became a partner in Alfred Booth & Company, a Liverpool firm engaged in the Brazil trade, and subsequently chairman of the Booth Steamship Company. He devoted much time, and no inconsider- able sums of money, to inquiries into the statistical aspects of social questions. The results of these are chiefly embodied in a work entitled Life and Labour of the People in London (1891- 1903), of which the earlier portion appeared under the title of Life and Labour in 1889. The book is designed to show " the numerical relation which poverty, misery and depravity bear to regular earnings and comparative comfort, and to describe the general conditions under which each class lives." It contains a most striking series of maps, in which the varying degrees of poverty are represented street by street, by shades of colour. The data for the work were derived in part from the detailed records kept by school-board " visitors," partly from systematic inquiries directed by Mr Booth himself, supplemented by information derived from relieving officers and the Charity Organization Society. Mr Booth also paid much attention to a kindred subject — the lot of the aged poor. In 1894 he published a volume of statistics on the subject, and, in 1891

and 1899, works on Old-age pensions, his scheme for the latter depending on a general provision of pensions of five shillings a week to all aged persons, irrespective of the cost to the state. He married, in 1871, the daughter of Charles Zachary Macaulay. In 1904 he was made a privy councillor.

BOOTH, EDWIN [THOMAS] (1833-1893), American actor, was the second son of the actor Junius Brutus Booth, and was born in Belair, Maryland, on the 13th of November 1833. Hi3 father (1796-1852) was born in London on the 1st of May 1796, and, after trying printing, law, painting and the sea, made his first appearance on the stage in 1813, and appeared in London at Covent Garden in 1815. He became almost at once a great favourite, and a rival of Kean, whom he was thought to resemble. To Kean's Othello nevertheless he played Iago on several occasions. Richard III., Hamlet, King Lear, Shylock and Sir Giles Overreach were his best parts, and in America, whither he removed in 1821, they brought him great popularity. His eccentricities sometimes bordered on insanity, and his excited and furious fencing as Richard III. and as Hamlet frequently com- pelled the Richmond and Laertes to fight for their lives in deadly earnest.

Edwin Booth's first regular appearance was at the Boston Museum on the 10th of September 1849, as Tressel to his father's Richard, in Colley Cibber's version of Richard III. He was lithe and graceful in figure, buoyant in spirits; his dark hair fell in waving curls across his brow, and his eyes were soft, luminous and most expressive. His father watched him with great interest, but with evident disappointment, and the members of the theatrical profession, who held the acting of the elder Booth in great reverence, seemed to agree that the genius of the father had not descended td the son. Edwin Booth's first ap- pearance in New York was in the character of Wilford in The Iron Chest, which he played at the National theatre in Chatham Street, on the 27th of September 1850. A year later, on the illness of the father, the son took his place in the character of Richard III. It was not until after his parent's death that the son conquered for himself an unassailable position on the stage. Between 1852 and 1856 he played in California, Australia and the Sandwich Islands, and those who had known him in the east were surprised when the news came that he had captivated his audiences with his brilliant acting. From this time for- ward his dramatic triumphs were warmly acknowledged. His Hamlet, Richard and Richelieu were pronounced to be superior to the

performances of Edwin Forrest; his success as Sir Giles Overreach in A New Way to Pay Old Debts surpassed his father's. In 1862 he became manager of the Winter Garden theatre, New York, where he gave a series of Shakespearian productions of then unexampled magnificence (1864-1867), including Hamlet, Othello and The Merchant of Venice. The splendour of this period in his career was dashed for many months when in 1865 his brother, John Wilkes Booth, assassinated President Lincoln (see Lincoln, Abraham). The three Booth brothers, Junius Brutus (1821-1&83), Edwin and John Wilkes (1830-1865), had played together in Julius Caesar in the autumn of the previous year — the performance being memorable both for its own excellence, and for the tragic situation into which two of the principal performers were subsequently hurled by. the crime of the third. Edwin Booth did not reappear on the stage until the 3rd of January 1866, when he played Hamlet at the Winter Garden theatre, the audience showing by unstinted applause their conviction that the glory of the one brother would never be imperilled by the infamy of the other.

In 1868-1869 Edwin Booth built a theatre of his own — Booth's theatre, at the corner of 23rd Street and 6th Avenue, New York — and organized an excellent stock company, which produced Romeo and Juliet, The Winter's Tale, Julius Caesar, Macbeth, Much Ado about Nothing, The Merchant of Venice and other plays. In all cases Booth used the true text of Shakespeare, thus antedating by many years a similar reform in England. Almost invariably his ventures were successful, but he was of a generous and confiding nature, and his management was not economical. In 1 874 the grand dramatic structure he had raised was taken from him, and with it went his

entire fortune. By arduous toil, however, he again accumulated wealth, in the use of which his generous nature was shown. He converted his spacious residence in Gramercy Park, New York, into a club — The Players' — for the elect of his profession, and for such members of other professions as they might choose. The house, with all his books and works of art, and many in- valuable mementos of the stage, became the property of the club. A single apartment he kept for himself. In this he died on the 7th of June 1893. Among his parts were Macbeth, Lear, Othello, Iago, Shylock, Wolsey, Richard II., Richard III., Benedick, Petruccio, Richelieu, Sir Giles Overreach, Brutus (Payne's), Bertuccio (in Tom Taylor's The Fool's Revenge), Ruy Bias, Don Cesar de Bazan, and many more. His most famous part was Hamlet, for which his extraordinary grace and beauty and his eloquent sensibility peculiarly fitted him. He probably played the part of tener than any other actor before or since. He visited London in 1851, and again in 1880 and in 1882, playing at the Haymarket

theatre with brilliant success. In the last year he also visited Germany, where his acting was received with the highest enthusiasm. His last appearance was in Brooklyn as Hamlet in 1891. Booth was twice married: in i860 to Mary Devlin (d. 1863), and in 1869 to Mary F. McVicker (d. 1881). He left by his first wife one daughter, Edwina Booth Grossman, who published Edwin Booth: Recollections (New York, 1894).

Edwin Booth's prompt-books were edited by William Winter (1878). In a series of volumes, Actors and Actresses of Great Britain and America, edited by Lawrence Hutton and Brander Matthews, Edwin Booth contributed recollections of his father, which contain much valuable autobiographic material. For the same series Lawrence Barrett contributed an article on Edwin Booth. See also William Winter, Life and Art of Edwin Booth (1893) ; Lawrence Hutton, Edwin Booth (1893) ; Henry A. Clapp, Reminiscences of a Dramatic Critic (Boston, 1902) ; A. B. Clarke. The Elder and the Younger Booth (Boston, 1882). (J. J.*)

BOOTH, WILLIAM (1829-), founder and " general " of the Salvation Army (q.v.), was born at Nottingham on the 10th of April 1829. At the age of fifteen his mind took a strongly religious turn, under the influence of the Wesleyan Methodists, in which body he became a local preacher. In 1849 he came to London, where, according to his own account, his passion for open-air preaching caused his severance from the Wesleyans. Joining the Methodist New Connexion, he was ordained a minis- ter, but, not being employed as he wished in active " travelling evangelization," left that body also in 1861. Meanwhile he had (1855) married Miss Catherine Mumford, and had a family of four children. Both he and his wife occupied themselves with preaching, first in Cornwall and then in Cardiff and Walsall. At the last-named place was first organized a " Hallelujah band " of converted criminals and others, who testified in public of their conversion. In 1864 Booth went to London and continued his services in tents and in the open air, and founded a body which was successively known as the East London Revival Society, the East London Christian Mission, the Christian Mission and (in 1878) the Salvation Army. The Army operates (1) by outdoor meetings and processions; (2) by visiting public-houses, prisons, private houses; (3) by holding meetings in theatres, factories and other unusual buildings; (4) by using the most popular song-tunes and the language of everyday life, &c. ; (5) by making every convert a daily witness for Christ, both in public and private. The army is a quasi-military organization, and Booth modelled its "Orders and Regulations" on those of the British army. Its early " campaigns " excited violent opposition, a " Skeleton Army "

being organized to break up the meetings, and for many years Booth's followers were subjected to fine and im- prisonment as breakers of the peace. Since 1889, however, these disorders have been little heard of. The operations of the army were extended in 1880 to the United States, in 1881 to Australia, and spread to the European continent, to India, Ceylon and elsewhere, " General " Booth himself being an in- defatigable traveller, organizer and speaker. His wife (b. 1829) died in 1 890. By her preaching at Gateshead, where her husband was circuit minister, in i860, she began the women's ministry which is so prominent a feature of the army's work. A biography of her by Mr Booth Tucker appeared in 1892.

In 1890 " General " Booth attracted further public attention by the publication of a work entitled In Darkest England, and the Way Out, in which he proposed to remedy pauperism and vice by a series of ten expedients: (1) the city colony; (2) the farm colony; (3) the over-sea colony; (4) the household salvage brigade; (5) the rescue homes for fallen women; (6) deliverance for the drunkard; (7) the prison-gate brigade; (8) the poor man's bank; (9) the poor man's lawyer; (10) Whitechapel-by- the-Sea. Money was liberally subscribed and a large part of the scheme was carried out. The opposition and ridicule with which Booth's work was for many years received gave way, towards the end of the 19th century, to very widespread sympathy as his genius and its results were more fully realized.

The active encouragement of King Edward VII., at whose instance in 1902 he was invited officially to be present at the coronation ceremony, marked the completeness of the change; and when, in 1905, the " general " went on a progress through England, he was received in state by the mayors and corpora- tions of many towns. In the United States also, and elsewhere, his work was cordially encouraged by the authorities.

See T. F.Coates, The Life Story of General Booth (2nd ed., London, 1906), and bibliography under Salvation Army.

BOOTH (connected with a Teutonic root meaning to dwell, whence also " bower "), primarily a temporary dwelling of boughs or other slight materials. Later the word gained the special meaning of a market stall or any non-permanent erection, such as a tent at a fair, where goods were on sale. Later still it was applied to the temporary

structure where votes were regis- tered, viz. polling-booth. Temporary booths erected for the weekly markets naturally tended to become permanent shops. Thus Stow states that the houses in Old Fish Street, London, ” were at first but movable boards set out on market days to show their fish there to be sold; but procuring licence to set up sheds, they grew to shops, and by little and little, to tall houses.” As bothy or bothie, in Scotland, meaning generally a hut or cottage, the word was specially applied to a barrack-like room on large farms where the unmarried labourers were lodged. This, known as the Bothy system, was formerly common in Aberdeenshire and other parts of northern Scotland.

BOOTHIA (Boothia Felix), a peninsula of British North America, belonging to Franklin district, and having an area of 13,100 sq. m., between 69 30′ and 71 50′ N. and 91° 30′ and 97° W. Its northernmost promontory, Murchison Point, is also the northernmost point of the American mainland. It was dis- covered by Captain (afterwards Sir James) Ross, during his expedition of 1829-1833, and was named after Sir Felix Booth, who had been chiefly instrumental in fitting out the expedition. Boothia forms the western side of Boothia Gulf. From the main mass of the continent the peninsula is almost separated by lakes and inlets; and a narrow channel known as Bellot Strait inter- venes between it and North Somerset Island, which was dis- covered by Sir E. Parry in 1819. The peninsula is not only interesting for its connexion with the Franklin expedition and the Franklin search, but is of scientific importance from the north magnetic pole having been first distinctly localized here ,by Ross, on the western side, in 70 5′ N., 96° 47′ W.

Boothia Gulf separates the north-western portion of Baffin Land and Melville Peninsula from Boothia Peninsula. It is connected with Barrow Strait and Lancaster Sound by Prince Regent Inlet, with Franklin Strait by Bellot Strait, and with Fox Channel by Fury and Hecla Strait. The principal bays are Committee and Pelly in the southern portion, and Lord Mayor in the western.

BOOTLE, a municipal and county borough in the Bootle parliamentary division of Lancashire, England; at the mouth of the Mersey, forming a northern suburb of Liverpool. Pop. (1901) 58,566; an increase by nearly nine times in forty years. The great docks on this, the east bank of the Mersey, extend into the borough, but are considered as a whole under Liverpool (q.v.). Such features, moreover, as communications, water- supply, &c, may be considered as part of the greater systems of the same citv. The chief buildings and institutions are a hand-

some town hall, a museum, free libraries, technical schools, and several public pleasure grounds. Bootle was incorporated in 1868 and was created a county borough in 1888; the corporation consists of a mayor, 10 aldermen and 30 councillors. A proposal to include it within the city of Liverpool was rejected in parlia- ment in July 1903. Area, 1576 acres.

BOOTY (apparently influenced by ” boot,” 0. Eng. bot, ad- vantage or profit, through an adaptation from an earlier form cognate with Ger. Beute and Fr. butin), plunder or gain. The phrase ” to play booty,” dating from the 16th century, means to play into a confederate’s hands, or to play intentionally badly at first in order to deceive an opponent.

BOPP, FRANZ (1791-1867), German philologist, was born at Mainz on the 14th of September 1791. In consequence of the political troubles of that time, his parents removed to Aschaffen- burg, in Bavaria, where he received a liberal education at the Lyceum. It was here that his attention was drawn to the languages and literature of the East by the eloquent lectures of Karl J. Windischmann, who, with G. F. Creuzer, J. J. Gorres, and the brothers Schlegel, was full of enthusiasm for Indian wisdom and philosophy. And further, Fr. Schlegel’s book, Uber die Sprache und Weisheit der Indier (Heidelberg, 1808), which was just then exerting a powerful influence on the minds of German philosophers and historians, could not fail to stimulate also Bopp’s interest in the sacred language of the Hindus. In 1812 he went to Paris at the expense of the Bavarian government, with a view to devote himself vigorously to the study of Sanskrit. There he enjoyed the society of such eminent men as A. L. Chezy, S. de Sacy, L. M. Langles, and, above all, of Alexander Hamilton (1762-1824), who had acquired, when in India, an acquaintance with Sanskrit, and had brought out, conjointly with Langles, a descriptive catalogue of the Sanskrit manuscripts of the Imperial library. At that library Bopp had access not only to the rich collection of Sanskrit manuscripts, most of which had been brought from India by Father Pons early in the 1 8th century, but also to the Sanskrit books which had up to that time issued from the Calcutta and Serampore presses. The first fruit of his four years’ study in Paris appeared at Frankfort- on-Main in 181 6, under the title Uber das Conjugationssystem der Sanskritsprache in Vergleichung mit jenem der griechischen, lateinischen, persischen und germanischen Sprache, and it was accompanied with a preface from the pen of Windischmann. In this first book Bopp entered at once on the path on which the philological researches of his whole subsequent life were concentrated. It was not that he wished to prove the common parentage of Sanskrit with Persian, Greek, Latin and German,

for that had long been established; but his object was to trace the common origin of their grammatical forms, of their inflections from composition, — a task which had never been attempted. By a historical analysis of those forms, as applied to the verb, he furnished the first trustworthy materials for a history of the languages compared.

After a brief sojourn in Germany, Bopp came to London, where he made the acquaintance of Sir Charles Wilkins and H. T. Colebrooke, and became the friend of Wilhelm von Humboldt, then Prussian ambassador at the court of St James's, to whom he gave instruction in Sanskrit. He brought out, in the Annals of Oriental Literature (London, 1820), an essay entitled, " Analy- tical Comparison of the Sanskrit, Greek, Latin and Teutonic Languages," in which he extended to all parts of the grammar what he had done in his first book for the verb alone. He had previously published a critical edition, with a Latin translation and notes, of the story of Nala and Damayanti (London, 18 19), the most beautiful episode of the Mahabharata. Other episodes of the Mahabharata — Indralokagamanam, and three others (Berlin, 1824) ; Diluvium, and three others (Berlin, 1829) ; and a new edi- tion of Nala (Berlin, 1832) — followed in due course, all of which, with A. W. Schlegel's edition of the Bhagavadglta (1823), proved excellent aids in initiating the early student into the reading of Sanskrit texts. On the publication, in Calcutta, of the whole Ma- habharata, Bopp discontinued editing Sanskrit texts, and confined himself thenceforth exclusively to grammatical investigations.

After a short residence at G6ttingen, Bopp was, on the recom- mendation of Humboldt, appointed to the chair of Sanskrit and comparative grammar at Berlin in 1821, and was elected member of the Royal Prussian Academy in the following year. He brought out, in 1827, his Ausfilhrliches Lehrgebdude der Sanskrita- Sprache, on which he had been engaged since 182 1. A new edition, in Latin, was commenced in the following year, and completed in 1832; and a shorter grammar appeared in 1834. At the same time he compiled a Sanskrit and Latin glossary (1830) in which, more especially in the second and third editions (1847 and 1867), account was also taken of the cognate languages. His chief activity, however, centred on the elaboration of his Comparative Grammar, which appeared in six parts at consider- able intervals (Berlin, 1833, 1835, 1842, 1847, 1849, 1852), under the title Vergleichende Grammatik des Sanskrit, Zend,

Griechi- schen, Lateinischen, Litthauischen, Altslavischen, Gothischen, und Deutschen. How carefully this work was matured may be gathered from the series of monographs printed in the Trans- actions of the Berlin Academy (1824 to 1831), by which it was preceded. They bear the general title, Vergleichende Zerglie- derung des Sanskrits und der mit ihm verwandten Sprachen. Two other essays (on the " Numerals," 1835) followed the publication of the first part of the Comparative Grammar. The Old-Slavonian began to take its stand among the languages compared from the second part onwards. The work was translated into English by E. B. Eastwick in 1845. A second German edition, thoroughly revised (1856-1861), comprised also the Old-Armenian. From this edition an excellent French translation was made by Pro- fessor Michel Breal in 1866. The task which Bopp endeavoured to carry out in his Comparative Grammar was threefold, — to give a description of the original grammatical structure of the languages as deduced from their intercomparison, to trace their phonetic laws, and to investigate the origin of their grammatical forms. The first and second points were subservient to the third. As Bopp's researches were based on the best available sources, and incorporated every new item of information that came to light, so they continued to widen and deepen in their progress. Witness his monographs on the vowel system in the Teutonic languages (1836), on the Celtic languages (1839), on the Old- Prussian (1853) and Albanian languages (1854), on the accent in Sanskrit and Greek (1854), on the relationship of the Malayo- Polynesian with the Indo-European languages (1840), and on the Caucasian languages (1846). In the two last mentioned the impetus of his genius led him on a wrong track. Bopp has been charged with neglecting the study of the native Sanskrit grammars, but in those early days of Sanskrit studies the requisite materials were not accessible in the great libraries of Europe; and if they had been, they would have absorbed his exclusive attention for years, while such grammars as those of Wilkins and Colebrooke, from which his grammatical knowledge was derived, were all based on native grammars. The further charge that Bopp, in his Comparative Grammar, gave undue prominence to Sanskrit may be disproved by his own words; for, as early as the year 1820, he gave it as his opinion that frequently the cognate languages serve to elucidate grammatical forms lost in Sanskrit {Annals of Or. Lit. i. 3), — an opinion which he further developed in all his subsequent writings.

Bopp's researches, carried with wonderful penetration into the most minute and almost microscopical details of linguistic phenomena, have led to the opening up of a wide and distant view into the original

seats, the closer or more distant affinity, and the tenets, practices and domestic usages of the ancient Indo-European nations, and the science of comparative grammar may truly be said to date from his earliest publication. In grateful recognition of that fact, on the fiftieth anniversary (May 16, 1866) of the date of Windischmann's preface to that work, a fund called Die Bopp-Stiftung, for the promotion of the study of Sanskrit and comparative grammar, was established at Berlin, to which liberal contributions were made by his numerous pupils and admirers in all parts of the globe. Bopp lived to see the results of his labours everywhere accepted, and his name justly celebrated. But he died, on the 23rd of October 1867, a poor

man, — though his genuine kindliness and unselfishness, his devotion to his family and friends, and his rare modesty, endeared him to all who knew him.

See M. Breal's translation of Bopp's Vergl. Gramm. (1866) introduction; Th. Benfey, Gesch. der Sprach'wissenschaft (1869); A. Kuhn in Unsere Zeit, Neue Folge, iv. 1 (1868) ; Lefmann, Franz Bopp (Berlin,

1891-1897).

BOPPARD, a town of Germany, in the Prussian Rhine pro- vince, on the left bank of the Rhine, 12 m. S. of Coblenz on the mainline to Cologne. Pop. (1900) 5806. It is an old town still partly surrounded by medieval walls, and its most noteworthy buildings are the Roman Catholic parish church (12th and 13th centuries); the Carmelite church (1318), the former castle, now used for administrative offices; the Evangelical church (1851, enlarged in 1887); and the former Benedictine monastery of the Marienberg, founded n 23 and since 1839 a hydropathic establishment, crowning a hill 100 ft. above the Rhine. Boppard is a favourite tourist centre, and being less pent in by hills than many other places in this part of the picturesque gorge of the Rhine, has in modern times become a residential town. It has some comparatively insignificant industries, such as tanning and tobacco manufacture; its direct trade is in wine and fruit.

Boppard (Baudobriga) was founded by the Romans; under the Merovingian dynasty it became a royal residence. During the middle ages it was a considerable centre of commerce and shipping, and under the Hohenstaufen emperors was raised to the rank of a free imperial city. In 13 12, however, the emperor Henry VII. pledged the town to his brother Baldwin, archbishop- elector of Trier, and it remained in the possession of the electors until it was absorbed by France during the Revolutionary epoch. It was assigned by the

congress of Vienna in 1815 to Prussia.

BORA, an Italian name for a violent cold northerly and north- easterly wind, common in the Adriatic, especially on the Istrian and Dalmatian coasts. There is always a northern tendency in the winds on the north Mediterranean shores in winter owing to the cold air of the mountains sliding down to the sea where the pressure is less. When, therefore, a cyclone is formed over the Mediterranean, the currents in its north-western area draw the air from the cold northern regions, and during the passage of the cyclone the bora prevails. The bora also occurs at Novorossiysk on the Black Sea. It is precisely similar in character to the mistral which prevails in Provence and along the French Mediterranean littoral.

BORACITE, a mineral of special interest on account of its optical anomalies. Small crystals bounded on all sides by sharply defined faces are found in considerable numbers embedded in gypsum and anhydrite in the salt deposits at Liineburg in Hanover, where it was first observed in 1787. In external form these crystals are cubic with inclined hemihedrism, the symmetry being the same as in blende and tetrahedrite. Their habit varies according to whether the tetrahedron (fig. 1), the cube (fig. 2). or the rhombic dodecahedron (fig. 3) predominates. Penetration

Fig. 1. Fig. 2.

Crystals of Boracite.

Fig. 3.

twins with a tetrahedron face as twin-plane are sometimes observed. The crystals vary from translucent to transparent, are possessed of a vitreous lustre, and are colourless or white, though often tinged with grey, yellow or green. The hardness is as high as 7 on Mohs' scale ; specific gravity 3 • o. As first observed by R. J. Hauy in 1791, the crystals are markedly pyroelectric; a cube when heated becomes positively electrified on four of its corners and negatively on the four opposite corners. In a

crystal such as represented in fig. 3, the smaller and dull tetra- hedral faces 5 are situated at the analogous poles (which become positively electrified when the crystal is heated), and the larger and bright

tetrahedral faces s' at the antilogous poles.

The characters so far enumerated are strictly in accordance with cubic symmetry, but when a crystal is examined in polarized light, it will be seen to be doubly refracting, as was first observed by Sir David Brewster in 1821. Thin sections show twin- lamellae, and a division into definite areas which are optically biaxial. By cutting sections in suitable directions, it may be proved that a rhombic dodecahedral crystal is really built up of twelve orthorhombic pyramids, the apices of which meet in the centre and the bases coincide with the dodecahedral faces of the compound (pseudo-cubic) crystal. Crystals of other forms show other types of internal structure. When the crystals are heated these optical characters change, and at a temperature of 265° the crystals suddenly become optically isotropic ; on cooling, however, the complexity of internal structure reappears. Various explanations have been offered to account for these " optical anomalies " of boracite. Some observers have attributed them to alteration, others to internal strains in the crystals, which originally grew as truly cubic at a temperature above 265°. It would, however, appear that there are really two crystalline modifications of the boracite substance, a cubic modification stable above 265 and an orthorhombic (or monoclinic) one stable at a lower temperature. This is strictly analogous to the case of silver iodide, of which cubic and rhombohedral modifications exist at different temperatures; but whereas rhombohedral as well as pseudo-cubic crystals of silver iodide (iodyrite) are known in nature, only pseudo-cubic crystals of boracite have as yet been met with.

Chemically, boracite is a magnesium borate and chloride with the formula Mg7Cl 2 Bi 6 03o. A small amount of iron is sometimes present, and an iron-boracite with half the magnesium replaced by ferrous iron has been called huyssenite. The mineral is in- soluble in water, but soluble in hydrochloric acid. On exposure it is liable to slow alteration, owing to the absorption of water by the magnesium chloride: an altered form is known as parasite.

In addition to embedded crystals, a massive variety, known as stassfurtite, occurs as nodules in the salt deposits at Stassfurt in Prussia: that from the carnaliite layer is compact, resembling fine-grained marble, and white or greenish in colour, whilst that from the kainite layer is soft and earthy, and yellowish or reddish in colour. (L. J. S.)

BORAGE (pronounced like " courage "; possibly from Lat. bona, rough hair), a herb (Borago officinalis) with bright blue flowers and hairy

leaves and stem, considered to have some virtue as a cordial and a febrifuge; used as an ingredient in salads or in making claret-cup, &c.

BORAGINACEAE, an order of plants belonging to the sym- petalous section of dicotyledons, and a member of the series Tubiflorae. It is represented in Britain by bugloss (Echium) (fig. 1), comfrey (Symphytum) , Myosotis, hounds-tongue (Cyno- glossum) (fig. 2), and other genera, while borage (Borago offici- nalis) (fig. 3) occurs as a garden escape in waste ground. The plants are rough-haired annual or perennial herbs, more rarely shrubby or arborescent, as in Cordia and Ehretia, which are tropical or sub-tropical. The leaves, which are generally alternate, are usually entire and narrow: the radical leaves in some genera, as Pulmonaria (lungwort) and Cynoglossum, differ in form from the stem-leaves, being generally broader and some- times heart-shaped. A characteristic feature is the one-sided (dorsiventral) inflorescence, well illustrated in forget-me-not and other species of Myosotis; the cyme is at first closely coiled, becoming uncoiled as the flowers open. At the same time there is often a change in colour in the flowers, which are red in bud, becoming blue as they expand, as in Myosotis, Echium, Sym- phytum and others. The flowers are generally regular; the form of the corolla varies widely. Thus in borage it is rotate, tubular in comfrey, funnel-shaped in hounds-tongue, and salver- shaped in alkanet (Anchusa); the throat is often closed by

scale-like outgrowths from the corolla, forming the so-called corona. A departure from the usual regular corolla occurs in Echium and a few allied genera, where it is oblique; in Lycopsis it is also bent.

The five stamens alternate in position with the lobes of the corolla. The ovary, of two carpels, is seated on a ring-like disk

2. Corolla split open.

3. Calyx.

4. Pistil.

5. One stamen.

which secretes honey, median constriction in

Fig. 1. — Viper’s Bugloss (Echium vulgare), about i nat. size. I. Single flower, about nat. size. 6. Calyx surrounding nutlets. r * -” -”■ 7. Same part of calyx cut

away.

8. Two nutlets.

9. Same enlarged.

Each carpel becomes divided by a four portions, each containing one ovule; the style springs from the centre of the group of four divisions.

The flowers show well-marked adaptation to insect-visits. Their colour and tendency to arrangement on one surface, with the presence of honey, serve to attract insects. The scales around the throat of the corolla protect the pollen and honey from wet or undesirable visitors, and by their difference in colour from the cor- olla-lobes, as in the yellow eye of forget-me-not, may serve to indicate the position of the honey. In most genera the fruit consists of one- seeded nutlets, generally four, but one or more may be undeveloped. The shape of the nutlet and the character of its coat are very varied. Thus in Lithospermum the nutlets are hard like a stone, in Myosotis usually polished, in Cynoglossum covered with bristles, &c.

The order is widely spread in of Forget-me-not; (2) ripe temperate and tropical regions, and fruits, contains 85 genera with about 1200 species. Its chief centre is the Mediterranean region, whence it extends over central

Fig. 2. — (1) Inflorescence

Europe and Asia, becoming less frequent northwards. A smaller centre occurs on the Pacific side of North America. The order is less developed in the south temperate zone. The order is of little economic value. Several genera, such as

Fig. 3. — (1) Flower of Borage; (2) same in vertical section en- larged; (3) horizontal plan of flower; (4) flower of Comfrey after removal of corolla, showing unripe fruit.

borage and Pulmonaria, were formerly used in medicine, and the roots yield purple or brown dyes, as in Alkanna tinctoria (alkanet). Heliotrope or cherry-pie (Heliotropium peruvianum) is a well-known garden plant.

BORAS, a town of Sweden, in the district {Ian) of Elfsborg, 45 m. E. of Gothenburg by rail, on the river Viske. Pop. (1880) 4723; (1900)

15,837. It ranks among the first twelve towns in Sweden both in population and in the value of its manufac- turing industries. These are principally textile, as there are numerous cotton spinning and weaving mills, together with a technical weaving school. The town was founded in 1632 by King Gustavus Adolphus.

BORAX (sodium pyroborate or sodium biborate), Na 2 B 4 07, a substance which appears in commerce under two forms, namely “common” or prismatic borax, Na 2 B 4 O7T0H 2 O, and ” jewellers’ ” or octahedral borax, Na 2 B 4 Gv5H 2 0. It is to be noted that the term ” borax ” was used by the alchemists in a very vague manner, and is therefore not to be taken as meaning the substance now specifically known by the name. Prismatic borax is found widely distributed as a natural product (see below, Mineralogy) in Tibet, and in Canada, Peru and Transylvania, while the bed of Borax Lake, near Clear Lake in California, is occupied by a large mass of crystallized borax, which is fit for use by the assayer without undergoing any preliminary purification. The supply of borax is, however, mainly derived from the boric acid of Tuscany, which is fused in a reverberatory furnace with half its weight of sodium carbonate, and the mass after cooling is extracted with warm water. An alternative method is to dissolve sodium carbonate in lead-lined steam- heated pans, and add the boric acid gradually; the solution then being concentrated until the borax crystallizes. Borax is also prepared from the naturally occurring calcium borate, which is mixed in a finely divided condition with the requisite quantity of soda ash; the mixture is fused, extracted with water and concentrated until the solution commences to crystallize.

From a supersaturated aqueous solution of borax, the penta- hydrate, Na2B 4 07‘5H 2 0, is deposited when evaporation takes place at somewhat high temperatures. The same hydrate can be prepared by dissolving borax in water until the solution has a specific gravity of 1-246 and then allowing the solution to cool. The pentahydrate is deposited between 79 C. and 56 C. ; below this temperature the decahydrateorˆordinary borax, Na 2 B4O7-10H2O, is deposited. Crystals of ordinary borax swell up to a very great extent on heating, losing their water of crystallization and melting to a clear white glass. I The crystals of octahedral borax fuse more easily than those of the prismatic form and are less liable to split when heated, so that they are preferable for soldering or fluxing. Fused borax dissolves many metallic oxides, forming complex borates which in many cases show I characteristic colours. Its use in soldering depends on the fact that solder only adheres to the surface of an untarnished metal, and conse- quently a little borax is placed on the surface of the metal and heated by the soldering iron in order to remove any superficial film of oxide.

It is also used for glazing pottery, in glass-making and the glazing of linen.

Boric acid (q.v.) being only a weak acid, its salts readily undergo hydrolytic dissociation in aqueous solution, and this property can be readily shown with a concentrated aqueous solution of borax, for by adding litmus and then just sufficient acetic acid to turn the litmus red, the addition of a large volume of water to the solution changes the colour back to blue again. The boric acid being scarcely

ionized gives only a very small quantity of hydrogen ions, whilst the base (sodium hydroxide) produced by the hydrolysis occasioned by the dilution of the solution, being a ” strong base,” is highly ionized and gives a comparatively large amount of hydroxyl ions. In the solution, therefore, there is now an excess of hydroxyl ions; consequently it has an alkaline reaction and the litmus turns blue.

Mineralogy. — The Tibetan mineral deposits have been known since very early times, and formerly the crude material was exported to Europe, under the name of lineal, for the preparation of pure borax and other boron salts. The most westerly of the Tibetan deposits are in the lake-plain of Pugha on the Rulangchu, a tributary of the Indus, at an elevation of 15,000 ft.: here the impure borax (sokaga) occurs over an area of about 2 sq. m., and is covered by a saline efflorescence; successive crops are obtained by the action of rain and snow and subsequent evaporation. Deposits of purer material (chu (sale or water borax) occur at the lakes of Rudok, situated to the east of the Pugha district; also still farther to the east at the great lakes Tengri Nor, north of Lhasa, and several other places. More recently, the extensive deposits of borates (chiefly, however, of calcium; see Colemanite) in the Mohave desert on the borders of California and Nevada, and in the Atacama desert in South America, have been the chief commercial sources of boron compounds. The boron contained in solution in the salt lakes has very probably been supplied by hot springs and solfataras of volcanic origin, such as those which at the present day charge the waters of the lagoons in Tuscany with boric acid. The deposits formed by evaporation from these lakes and marshes or salines, are mixtures of borates, various alkaline salts (sodium carbonate, sulphate, chloride), gypsum, &c. In the mud of the lakes and in the surrounding marshy soil fine isolated crystals of borax are frequently found. For example, crystals up to 7 in. in length and weighing a pound each have been found in large numbers at Borax Lake in Lake county, and at Borax Lake in San Bernardino county, both in California.

Borax crystallizes with ten molecules of water, the composition of the crystals being Na2B 4 O7-|-10H2O. The crystals belong to the monoclinic system, and it is a curious fact that in habit and angles they closely resemble pyroxene (a silicate of calcium, magnesium and iron). There is a perfect cleavage parallel to the orthopinacoid and less perfect cleavages parallel to the faces of the prism. The mineral is transparent to opaque and white, sometimes greyish, bluish or greenish in colour. Hardness 2-2 J; sp. gr. 1-69-1-72.

The optical characters are interesting, because of the striking crossed dispersion of the optic axes, of which phenomenon borax affords the best example. The optic figure seen in convergent polarized light through a section cut parallel to the plane of sym- metry of a borax crystal is symmetrical only with respect to the central point. The plane of the optic axes for red light is inclined at 2° to that for blue light, and the angle between the optic axes themselves is 3 greater for red than for blue light.

BORDA, JEAN CHARLES (1733-1799), French mathematician and nautical astronomer, was born at Dax on the 4th of May 1 733 . He studied at La Fleche, and at an early age obtained a com- mission in the cavalry. In 1756 he presented a Memoire sur le mouvement des projectiles to the Academy of Sciences, who elected him a member. He was present at the battle of Hastembeck, and soon afterwards joined the naval service. He visited the Azores and the Canary Islands, of which he constructed an admirable map. In 1782 his frigate was taken by a British squadron; he himself was carried to England, but was almost immediately released on parole and returned to France. He died at Paris on the 20th of February 1799. Borda contributed a long series of valuable memoirs to the Academy of Sciences. His researches in hydrodynamics were highly useful for marine engineering, while the reflecting and repeating circles, as im- proved by him, were of great service in nautical astronomy. He was associated with J. B. J. Delambre and P. F. A. Mechain in the attempt to determine an arc of the meridian, and the greater number of the instruments employed in the task were invented by him.

See J. B. Biot, ” Notice sur Borda ” in the Mem. de VAcad. des Sciences, iv.

BORDAGE. (1) A nautical term (from Fr. lord, side) for the planking on a ship’s side. (2) A feudal term (from Lat. borda, a cottage) for the tenure by which a certain class of villein held

their cottages; also the services due from these villeins or ” bordars.” A ” bordar ” (Med. Lat. bardarius) was a villein who obtained a cottage from his lord in return for menial services (see Villenage).

BORDEAUX, a city of south-western France, capital of the department of Gironde, 359 m. S.S.W. of Paris by a main line of the Orleans railway and 159 m. N.W. of Toulouse on the main line of the Southern railway. Pop. (1906) 237,707. Bordeaux, one of the finest and most extensive cities in France, is situated on the left or west bank of the Garonne about 60 m. from the sea, in a plain which comprises the wine-growing district of Medoc. The Garonne at this point describes a semicircle, separating the city proper on the left bank from the important suburb of La Bastide on the right bank. The river is crossed by the Pont de Bordeaux, a fine stone structure of the early 19th century, measuring 1534 ft. in length, and by a railway bridge connecting the station of the Orleans railway company in La Bastide with that of the Southern company on the left bank. Looking west from the Pont de Bordeaux, the view embraces a crescent of wide and busy quays with a background of lofty warehouses, factories and mansions, behind which rise towers and steeples. Almost at the centre of the line of quays is the Place des Quin- conces, round which lie the narrow, winding streets in which the life of the city is concentrated. Outside this quarter, which con- tains most of the important buildings, the streets are narrow and quiet and bordered by the low white houses which at Bordeaux take the place of the high tenements characteristic of other large French towns. The whole city is surrounded by a semicircle of boulevards, beyond which lie the suburbs of Le Bouscat, Cauderan, Merignac, Talence and Begles. The principal prome- nades are situated close together near the centre of the city. They comprise the beautiful public garden, the allees de Tourny and the Place des Quinconces. The latter is planted with plane trees, among which stand two huge statues of Montaigne and Montesquieu, and terminates upon the quays with two rostral columns which serve as lighthouses. On its west side there is a monument to the Girondin deputies proscribed under the convention in 1793. At its south-west corner the Place des Quinconces opens into the Place de la Comedie, which contains the Grand Theatre (18th century), the masterpiece of the archi- tect Victor Louis. The Place de la Comedie, the centre of business in Bordeaux, is traversed by a street which, under the names of Cours du Chapeau-Rouge, rue de l’lntendance and rue Judaique, runs from the Place de la Bourse and the quai de la Douane on the east to the outer boulevards on the west. Another important thoroughfare, the rue Sainte Catherine, runs at right angles to the rue de l’lntendance and

enters the Place de la Comedie on the south. The Pont de Bordeaux is continued by the Cours Victor Hugo, a curved street crossing the rue Sainte Catherine and leading to the cathedral of St Andre. This church, dating from the nth to the 14th centuries, is a building in the Gothic style with certain Romanesque features, chief among which are the arches in the nave. It consists of a large nave without aisles, a transept at the extremities of which are the main entrances, and a choir, flanked by double aisles and chapels and containing many works of art. Both the north and south facades are richly decorated with sculpture and statuary. Of the four towers flanking the principal portals, only those to the north are surmounted by spires. Near the choir stands an isolated tower. It contains the great bell of the cathedral and is known as the Clocher Pey-Berland, after the archbishop of Bordeaux who erected it in the 15th century. Of the numerous other churches of Bordeaux the most notable are St Seurin (nth to the 15th centuries), with a finely sculptured southern portal; Ste Croix (12th and 13th centuries), remarkable for its Roman- esque fagade; and St Michel, a fine Gothic building of the 15th and 16th centuries. The bell tower of St Michel, which has the highest spire (354 ft.) in the south of France, dates from the end of the 15th century, and, like that of the cathedral, stands apart from its church. The palace of the Faculties of Science and of Letters (1881-1886) contains the tomb of Michel de Montaigne. The prefecture, the h6tel de ville, the bourse and the

custom-house belong to the 15th century. The law-courts and the hospital of St Andr6 (the foundation of which dates from 1390) belong to the first half of the 19th century. Of greater antiquarian interest is the Palais Gallien, situated near the public garden, consisting of remains of lofty arcades, vaulting and fragments of wall, which once formed part of a Roman amphitheatre. Bordeaux lost its fortifications in the 18th cen- tury, but four of the old gateways or triumphal arches belonging to that period still remain. Still older are the Porte de Cailhau, once the entrance to the Palais de l'Ombriere, which before its destruction was the residence of the duke of Aquitaine, and the Porte de l'Hotel de Ville, the former of the 1 5th, the latter of the 13th and 16th centuries.

Bordeaux is the seat of an archbishop, the headquarters of the XVIII. army corps, the centre of an academie (educational division) and the seat of a court of appeal. A court of assizes is held there, and there are tribunals of first instance and of commerce, a council of trade-arbitrators, a chamber of commerce and a branch of the Bank of France. Its educational institutions include faculties of law, of science, of letters and of medicine and pharmacy, a faculty of Catholic

theology, lycees, training colleges, a higher school of commerce, a chair of agriculture, a school of fine art and a naval school of medicine. There are several museums, including one with a large collection of pictures and sculptures, a library with over 200,000 volumes and numerous learned societies.

The trade of Bordeaux, the fourth port in France, is chiefly carried on by sea. Its port, 5ˆ m. long and on the average 550 yds. wide, is formed by the basin of the Garonne and is divided into two portions by the Pont de Bordeaux. That to the south is used only by small craft; that to the north is accessible to vessels drawing from 21 to 26 ft. according to the state of the tide. From 1000 to 1200 vessels can be accommodated in the harbour, which is lined on both sides by quays and sloping wharves served by railway lines. At the northen extremity of the harbour, on the left bank, there is a floating basin of 25 acres in extent, capable of receiving the largest vessels; it has over 1900 yds. of quays and is furnished with a repairing dock and with elaborate machinery for the loading and unloading of goods. In 1907 the construction of new docks behind this basin was begun. The city maintains commercial relations with nearly all countries, but chiefly with Great Britain, Spain, Argentina, Portugal and the United States. The most important line of steamers using the port is the South American service of the Messageries Maritimes. The total value of the exports and imports of Bordeaux averages between 25 and 26 millions sterling yearly. Of this amount exports make up 13! millions, of which the sales of wine bring in about one quarter. The city is the centre of the trade in ” Bordeaux ” wines, and the wine-cellars of the quays are one of its principal sights. Other principal exports are brandy, hides and skins, sugar, rice, woollen and cotton goods, salt-fish, chemicals, oil-cake, pitwood, fruit, potatoes and other vegetables. The chief imports are wool, fish, timber, rice, wine, rubber, coal, oil-grains, hardware, agricultural and other machinery and chemicals. A large fleet is annually despatched to the cod-fisheries of Newfoundland and Iceland. The most important industry is ship-building and re- fitting. Ironclads and torpedo-boats as well as merchant vessels are constructed. Railway carriages are also built. The industries subsidiary -to the wine-trade, such as wine-mixing, cooperage and the making of bottles, corks, capsules, straw envelopes and wooden cases, occupy many hands. There are also flour-mills, sugar-refineries, breweries, distilleries, oil-works, cod-drying works, manufactories of canned and preserved fruits, vegetables and meat, and of chocolate. Chemicals, leather, iron-ware, machinery and pottery are manufactured, and a tobacco factory employs 1500 hands.

Bordeaux (Burdigala) was originally the chief town of the Bituriges

Vivisci. Under the Roman empire it became a flourishing commercial city, and in the 4th century it was made the capital of Aquitania Secunda. Ausonius, a writer of the 4th century, who was a native of the place, describes it as four-square

and surrounded with walls and lofty towers, and celebrates its importance as one of the greatest educational centres of Gaul. In the evils that resulted from the disintegration of the empire Bordeaux had its full share, and did not recover its prosperity till the beginning of the 10th century. Along with Guienne it belonged to the English kings for nearly three hundred years (1154-1453), and was for a time the seat of the brilliant court of Edward the Black Prince, whose son Richard was born in the city. An extensive commerce was gradually developed between the- Bordeaux merchants and their fellow-subjects in England, — London, Hull, Exeter, Dartmouth, Bristol and Chester being the principal ports with which they traded. The English administra- tion was favourable to the liberties as well as to the trade of the city. In 1235 it received the right of electing its mayors, who were assisted in the administration by a ” jurade ” or municipal council. The influence of Bordeaux was still further increased when several important towns of the region, among them St Emilion and Libourne, united in a federation under its leadership. The defeat of the English at the battle of Castillon in 1453 was followed, after a siege of three months, by the submission of Bordeaux to Charles VII. The privileges of the city were at once curtailed, and were only partially restored under Louis XL, who established there the parlement of Guienne. In 1548 the in- habitants resisted the imposition of the salt - tax by force of arms, a rebellion for which they were punished by the constable Anne de Montmorency with merciless severity.

The reformed religion found numerous adherents at Bordeaux, and after the massacre of St Bartholomew nearly three hundred of its inhabitants lost their lives. The 17th century was a period of disturbance. The city was for a time the chief support of the Fronde, and on two occasions, in 1653 and 1675, troops were sent to repress insurrections against royal measures. In the middle of the 1 8th century, a period of commercial and architectural activity for Bordeaux, the marquis de Tourny, intendant of Guienne, did much to improve the city by widening the streets and laying out public squares. It was the headquarters of the Girondists at the Revolution, and during the Reign of Terror suffered almost as severely as Lyons

and Marseilles. Its com- merce was greatly reduced under Napoleon I. In 1814 it declared for the house of Bourbon; and Louis XVIII. afterwards gave the title of due de Bordeaux to his grand-nephew, better known as the comte de Chambord. In 1870 the French government was transferred to Bordeaux from Tours on the approach of the Germans to the latter city.

See Camille Jullian, Hist, de Bordeaux, depuis les origines jusqu'en 1895 (Bordeaux, 1895) ; T. Malvezin, Hist, du commerce de Bordeaux (Bordeaux, 1892); Bordeaux, apercu historique, sol, population, in- dustrie, commerce, administration (Bordeaux, 1892).

BORDEN, SIR FREDERICK WILLIAM (1847-), Canadian statesman, was born at Cornwallis, Nova Scotia, on the 14th of May 1847. He was educated at King's College, Windsor, and at Harvard University, and for some years practised medicine at Canning, Nova Scotia. In 1874 he was elected to the Canadian parliament as Liberal member for King's county. In 1896 he became minister of militia and defence in the Liberal ministry.

BORDEN, ROBERT LAIRD (1854-), Canadian statesman, was born at Grand Pre, Nova Scotia, on the 26th of June 1854. In 1878 he was called to the bar, and became a leading lawyer in his native province. In 1896 he was elected to the Canadian parliament for the city of Halifax, but later lost his seat there and was elected for Carlton. In February 1901 , on the resignation of Sir Charles Tupper, he became leader of the Conservative opposition. At the general election of 1908 he was returned again for Halifax.

BORDENTOWN, a city of Burlington county, New Jersey, U.S.A., on the E. bank of the Delaware river, 6 m. S. of Trenton and 28 m. N.E. of Philadelphia. Pop. (1890) 4232; (1900) 4110; (1905) 4073; (1910) 4250. It is served by the Pennsyl- vania railway, the Camden & Trenton railway (an electric line, forming part of the line between Philadelphia and New York) and by freight and passenger steamboat lines on the Delaware. Bordentown is attractively sitSiaterd 6n a bfoad -"level plain; 65 ft.

above the river, with wide, beautifully shaded streets. The city is the seat of the Bordentown Military Institute (with the Wood- ward memorial library), of the state manual training and industrial school for coloured youth, of the St Joseph's convent and mother-house of the Sisters of Mercy, and of St Joseph's academy for girls. There are ship-yards, iron foundries and forges, machine shops, shirt factories, a pottery for the manu- facture of sanitary earthenware, a woollen mill

and canning factories. The first settlers on the site of the city were several Quaker families v/ho came in the 18th century. Bordentown was laid out by Joseph Borden, in whose honour it was named; was incorporated as a borough in 1825; was re-incorporated in 1849, and was chartered as a city in 1867. It was the home for some years of Francis Hopkinson and of his son Joseph Hopkin- son (whose residences are still standing), and from 1817 to 1832 and in 1837-1839 was the home of Joseph Bonaparte, ex-king of Spain, who lived on a handsome estate known as ” Bonaparte’s Park,” which he laid out with considerable magnificence. Here he entertained many distinguished visitors, including Lafayette. The legislature of New Jersey passed a special law, enabling him, as an alien, to own real property, and it is said to have been in reference to this that the state received its nickname ” Spain.” Prince Napoleon Lucien Charles Murat, the second son of Joachim Murat, also lived here for many years; and the estate known as ” Ironsides ” was long the home of Rear-Admiral Charles Stewart. The Camden & Amboy railway, begun in 1831 and completed from Bordentown to South Amboy (34 m.) in 1832, was one of the first railways in the United States; in September 183 1 the famous engine “Johnny Bull,” built in England and imported for this railway, had its first trial at Bordentown, and a monument now marks the site where the first rails were laid.

See E. M. Woodward, Bonaparte’s Park and the Murats (Trenton,

1879).

BORDERS, THE, a name applied to the territory on both sides of the boundary line between England and Scotland. The term has also a literary and historical as well as a geographical sense, and is most frequently employed of the Scottish side. The line begins on the coast of Berwickshire at a spot 3 m. N. by W. of Berwick, and, after running a short distance W. and S., reaches the Tweed near the village of Paxton, whence it keeps to the river to a point just beyond Carham. There it strikes off S.S.E. to the Cheviot Hills, the watershed of which for 35 m. constitutes the boundary, which is thereafter formed by a series of streams — Bells Burn, the Kershope, Liddel and Esk. After following the last named for 1 m. it cuts across country due west to the Sark, which it follows to the river’s mouth at the head of the Solway Firth. The length of the boundary thus described is 108 m., but in a direct line from the Solway to the North Sea the distance is only 70 m. At the extreme east end a small district of 8 sq. m., consisting of the tract north of the Tweed which is not included in Scotland, forms the ” bounds ” or ” liberties ” of Berwick, or the country of the borough and town of Berwick-on-Tweed. At the extreme west between

the Sark and Esk as far up the latter as its junction with the Liddel, there was a strip of country, a ” No man’s land,” for generations the haunt of outlaws and brigands. This was called the Debatable Land, because the possession of it was a constant source of contention between England and Scotland until its boundaries were finally adjusted in 1552. The English Border counties are Northumberland and Cumberland, the Scottish Berwick, Roxburgh and Dumfries; though historically, and still by usage, the Scottish shires of Selkirk and Peebles have always been classed as Border shires. On the English side the region is watered by the Till, Bowmont, Coquet, Rede and North Tyne; on the Scottish by the Tweed, Whiteadder, Leet, Kale, Jed, Kershope, Liddel, Esk and Sark. Physically there is a marked difference between the country on each side. On the southern it mostly consists of lofty, bleak moorland, affording subsistence for sheep and cattle, and rugged glens and ravines, while on the northern there are many stretches of fertile soil, especially in the valleys and dales, and the landscape is often romarrffe and beautiful. Railway communication is

supplied by the east coast route to Berwick, the Waverley route through Liddesdale, the London & North-Western by Carlisle, the North British branch from Berwick to St Boswells, and the North Eastern lines from Berwick to Kelso, Alnwick to Coldstream, and Newcastle to Carlisle.

At frequent intervals during a period of 1 500 years the region was the scene of strife and lawlessness. The Roman road of Watling Street crossed the Cheviots at Brownhartlaw (1664 ft.), close to the camp of Ad Fines, by means of which the warlike Brigantes on the south and the Gadeni and Otadeni on the north were held in check, while another Roman road, the Wheel Causeway, passed into Scotland near the headwaters of the North Tyne and Liddel. (For early history see Lothian; Northumbria; Strathclyde.) In the 12th century were founded the abbeys of Hexham and Alnwick, the priory church of Lindisfarne and the cathedral of Carlisle on the English side, and on the Scottish the abbeys of Jedburgh, Kelso, Melrose and Dryburgh. The deaths of Alexander III. (1286) and Margaret the Maid of Norway (1290), whose right to the throne had been acknowledged, plunged the country into the wars of the suc- cession and independence, and until the union of the crowns in 1603 the borders were frequently disturbed. Berwick and Carlisle were repeatedly assailed, and battles took place at

Halidon Hill (1333), Otterburn (1388), Nisbet (1402), Homiidon (1402), Piperden (1435), Hedgeley Moor (1464), Flodden (1513), Solway Moss (1542), and Ancrum Moor (1544), in addition to many fights arising out of family feuds and raids fomented by the Armstrongs, Eiiots, Grahams, Johnstones, Maxwells and other families, of which the most serious were the encounters at Arkenholme (Langholm) in 1455, the Raid of Reidswire (1575), and the bloody combat at Dryfe Sands (1593). The English expeditions of 1544 and 1545 were exceptionally disastrous, since they involved the destruction of the four Scottish border abbeys, the sack of many towns, and the obliteration of Roxburgh. The only other important conflict belongs to the Covenanters' time, when the marquess of Montrose was defeated at Philip- haugh in 1645. Partly for the defence of the kingdoms and partly to overawe the freebooters and mosstroopers who were a perpetual menace to the peace until they were suppressed in the 17th century, castles were erected at various points on both sides of the border.

Even during the period when relations between England and Scotland were strained, the sovereigns of both countries recog- nized it to be their duty to protect property and regulate the lawlessness of the borders. The frontier was divided into the East, Middle and West Marches, each under the control of an English and a Scots warden. The posts were generally filled by eminent and capable men who had to keep the peace, enforce punishment for breach of the law, and take care that neither country encroached on the boundary of the other. The wardens usually conferred once a year on matters of common interest, and as a rale their meetings were conducted in a friendly spirit, though in 1575 a display of temper led to the affair of the Raid of Reidswire. The appointment was not only one of the most important in this quarter of the kingdom, but lucrative as well, part of the fines and forfeits falling to the warden, who was also entitled to ration and forage for his retinue. On the occasion of his first public progress to London, James I. of England attended service in Berwick church (March 27, 1603) " to return thanks for his peaceful entry into his new dominions." Anxious to blot out all memory of the bitter past, he forbade the use of the word " Borders," hoping that the designation " Middle Shires " might take its place. Frontier fortresses were also to be dismantled and their garrisons reduced to nominal strength. In course of time this policy had the desired effect, though the expression " Borders " proved too convenient geographically to be dropped, the king's proposed amendment being in point of fact merely sentimental and, in the relative positions then and now of England and Scotland, meaningless. Some English strongholds, such as Alnwick, Chillingham,

Ford and Naworth, have been modernized; others, like Norham, Wark.and Wark- worth, are picturesque ruins; but most of the Scottish fortresses

have been demolished and their sites built over, or are now represented by grass-grown mounds. Another familiar feature in the landscape is the chain of peel towers crossing the country from coast to coast. Many were homes of marauding chiefs, and nearly all were used as beacon-stations to give alarm of foray or invasion. Early in the 18th century the Scottish gipsies found a congenial home on the Roxburghshire side of the Cheviots; and at a later period the Scottish border became notorious for a hundred years as offering hospitality to runaway couples who were clandestinely married at Gretna Green, Coldstream or Lamberton. The toll-house of Lamberton displayed the follow- ing intimation — ” Ginger-beer sold here and marriages per- formed on the most reasonable terms.”

Border ballads occupy a distinctive place in English literature. Many of them were rescued from oblivion by Sir Walter Scott, who ransacked the district for materials for his Minstrelsy oj the Scottish Border, which appeared in 1802 and 1803. Border traditions and folklore, and the picturesque, pathetic and stirring incidents of which the country was so often the scene, appealed strongly to James Hogg (” the Ettrick Shepherd “), John Wilson (” Christopher North “), and John Mackay Wilson (1804- 1835), whose Tales 0} the Borders, published in 1835, lone enjoyed popular favour.

Besides the works just mentioned see Sir Herbert Maxwell, History of Dumfries and Galloway (1896); George Ridpath, Border History of England and Scotland (1776) ; Professor John Veilch, History and Poetry of the Scottish Border (1877); Sir George Douglas, History of the Border Counties (Scots), (1899); W. S. Crockett, The Scott Country (1902).

BORDIGHERA, a town of Liguria, Italy, in the province of Porto Maurizio, 91 m. S.W. of Genoa by rail, and 3 m. E.N.E. of Ventimiglia. Pop. (1901) 4673. It is a favourite winter resort, especially for visitors from England, and is situated in beautiful coast scenery. It has fine gardens, and its flowers and palms are especially famous: the former are largely exported, while the latter serve for the supply of palm branches for St Peter’s at Rome and other churches on Palm Sunday. The new museum contains a unique collection of the flora of the Riviera. From 1682 until the Napoleonic period, Bordighera was the capital of a small republic of the villages of the neighbouring valleys.

BORDONE, PARIS (1495-1570), Venetian painter, was born at Treviso, and entered the bottega of Titian in 1509. Vasari, to whom we are indebted for nearly all the facts of Bordone's life — later research has not added much to our knowledge — holds that he did not spend many years with Titian and set himself to imitate the manner of Giorgione to the utmost of his power. As a matter of fact, the Giorgionesque traits in Bordone's earlier works are derived entirely from Titian, whom he imitated so closely that to this day some of his paintings pass under Titian's name. Crowe and Cavalcaselle and Dr Bode ascribe to Bordone the " Baptism of Christ " in the Capitoline gallery, but Morelli sees in it an early work of Titian. Paris Bordone subsequently executed many important mural paintings in Venice, Treviso and Vicenza, all of which have perished. In 1538 he was invited to France by Francis I., at whose court he painted many portraits, though no trace of them is to be found in French collections, the two portraits at the Louvre being later acquisitions. On his return journey he undertook works of great importance for the Fugger palace at Augsburg, which again have been lost sight of. Bordone's pictures are of very unequal merit. They have a certain nobility of style, and that golden harmony of colour which he derived from Titian, together with the realistic conception of the human figure and the dignified character of his portraiture. On the other hand, his nudes are a little coarse in form, and the action of his figures is frequently unnatural and affected. A true child of the Renaissance, he also painted a number of religious pictures, numerous mytho- logical scenes, allegories, nymphs, cupids and subjects from Ovid's fables, but he excelled as a portraitist. His principal surviving work is the " Fisherman and Doge " at the Venice Academy. The National Gallery, London, has a " Daphnis and Chloe" and a portrait of a lady, whilst a "Holy Family" from his brush is at Bridgwater House. Other important works of

his are the " Madonna " in the Tadini collection at Lovere, the paintings in the Duomo of Treviso, two mythological pictures at the Villa Borghese and the Doria palace in Rome, the " Chess Players " in Berlin, a very little-known portrait of superb quality in the possession of the landgrave of Hesse at Kronberg, and a " Baptism of Christ " in Philadelphia. Besides these, there are examples of his art in Bergamo, Milan, Genoa, Padua, Siena, Venice, Florence, Munich, Dresden and Vienna.

Beyond some references in general works on Italian painting, very little has been written on Paris Bordone since the days of Vasari. In 1900 the committee of the fourth centenary of Paris Bordone, Treviso, published L. Barlo and G. Biscaro's Delia Vita e delle Opere di Paris Bordone ; and the Nuova A ntologia (November 16, 1900). contains a sixteen-page paper on Paris Bordone by P. G. Molmenti. (P. G. K.)

BORE, a high tidal wave rushing up a narrow estuary or tidal river. The bore of the Severn is produced by a tide that rises 18 ft. in an hour and a half. This body of water becomes compressed in the narrowing funnel-shaped estuary, and heaped up into an advancing wave extending from bank to bank. The phenomenon is also particularly well illustrated in the Bay of Fundy. The origin of this word is doubtful, but it is usually referred to a Scandinavian word bdra, a wave, billow. The other name by which the phenomenon is known, " eagre," is also of unknown origin. There is, of course, no connexion with " bore," to make a hole by piercing or drilling, which is a common Teutonic word, cf. Ger. bohren, the Indo-European root being seen in Lat. forare, to pierce, Gr. 4 > a.pos, plough. For the making of deep holes for shafts, wells, &c, see Boring. The substantival use of this word is generally confined to the circular cavity of objects of tubular shape, particularly of a gun, hence the internal diameter of a gun, its " calibre " (see Gun). A " bore " is also a tiresome, wearying person, particularly one who persistently harps on one subject, in or out of season, whatever interest his audience may take in it. This has generally been taken to be merely a metaphorical use of " bore," to pierce. The earliest sense, however, in which it is found in English (1766, in certain letters printed in Jesse's Life of George Selwyn) is that of ennui, and a French origin is suggested. The New English Dictionary conjectures a possible source in Fr. bourrer, to stuff, satiate.

BOREAS, in Greek mythology, a personification of the north wind. He was described as the son of Astraeus and Eos, brother of Hesperus, Notus and Zephyrus. His dwelling-place was on Mount Haemus in Thrace, or at Salmydessus, near the country of the Hyperboreans. He was said to have carried off the beautiful Oreithyia, a daughter of Erechtheus, king of Athens, when he found her leading the dance at a festival, or gathering flowers on the banks of the Ilissus or some other spot in the neighbourhood of Athens. He had before wooed her in vain, and now carried her off to Mount Haemus, where they lived as king and queen of the winds, and had two sons, Zetes and Calais, and two daughters, Cleopatra and Chione (Apollodorus iii. 15; Ovid,. Metam. vi. 677). For the loss of Oreithyia the Athenians in after times counted on Boreas's friendliness, and were assured of it when he sent

storms which wrecked the Persian fleet at Athos and at Sepias (Herodotus vii. 189). For this they erected to him a sanctuary or altar near the Ilissus, and held a festival (Boreasmos) in his honour. Thurii also, which was a colony of Athens, offered sacrifice to him as Euergetes every year, because he had destroyed the hostile fleet of Dionysius the elder (Aelian, Var. Hist. xii. 61). In works of art Boreas was repre- sented as bearded, powerful, draped against cold, and winged. On the Tower of the Winds at Athens he is figured holding a shell, such as is blown by Tritons. Boreas carrying off Oreithyia is the subject of a beautiful bronze relief in- the British Museum, found in the island of Calymna. The same subject occurs frequently on'painted Greek vases.

BOREL, PETRUS, whose full name was Pierre Joseph Borel d'Hauterive (1809-18 59), French writer, was born at Lyons on the 26th of June 1809. His father had been ruined by taking part in the resistance offered by the Lyonnese royalists against the Convention, and Petrus Borel was educated in Paris to be an architect. He soon abandoned his profession

to become one of the most violent partisans of the Romantic movement. His extravagant sentiments were illustrated in various volumes: Rhapsodies (1832), poems; Champavert, contes immoraux (1833); Madame Putiphar (1839), &c. His works did not. rescue him from poverty, but through the kindness of Theophile Gautier and Mme de Girardin he obtained a small place in the civil service. He died at Mostaganem in Algeria on the 14th of July 1859.

See Jules Claretie, Petrus Borel, le Lycanthrope (1865) ; and Ch. Asselineau, Bibliographie romantique (1872).

BORELLI, GIOVANNI ALFONSO (1608-1679), Italian physiologist and physicist, was born at Naples on the 28th of January 1608. He was appointed professor of mathematics at Messina in 1649 and at Pisa in 1656. In 1667 he returned to Messina, but in 1674 was obliged to retire to Rome, where he lived under the protection of Christina, queen of Sweden, and died on the 31st of December 1679. His best-known work is De motu animalium (Rome, 1680-168 1), in which he sought to explain the movements of the animal body on mechanical principles ; he thus ranks as the founder of the iatrophysical school. In a letter, Del movimento della cometa apparsa il mese di decetnbre 1664, published in 1665 under the pseudonym Pier Maria Mutoli, he was the first to suggest the idea of a parabolic path; and another of his astronomical works was Theorica mediceorum planetarum ex causis physicis deducta (Florence, 1666) , in which he considered the

influence of attraction on the satellites of Jupiter. He also wrote: Della Causa delle Febbri maligni (Pisa, 1658); De Renum usu Judicium (Strassburg, 1664); Euclides Restitulus (Pisa, 1658); Apollonii Pergaei Conicorum libri v., vi. et vii. (Florence, 1661); De vi percussionis (Bologna, 1667); Meteoro- logia Aetnea (Reggio, 1669); and De motionibus naturalibus a gravitate pendentibus (Bologna, 1670).

BORGA (Finnish Porvoo), a seaport in the province of Nyland, grand duchy of Finland, situated at the entrance of the river Borga into the Gulf of Finland, about 33 m. by rail N.W. of Helsingfors. Pop. (1810) 1693; (1870) 3478; (1904) 5255. It is the seat of a Lutheran bishopric which extends over the provinces of Viborg and St Michel with portions of Tavastehus and Nyland; it possesses a beautiful cathedral, and a high school (where the well-known Finnish poet Runeberg lectured for many years), and is the seat of a court of appeal. The weaving of sail-cloth and the manufacture of tobacco are the principal industries, and the chief articles of trade are wood, butter and furs. Borga was once a city of great dignity and importance, but the rapid growth of Helsingfors has somewhat eclipsed it. In 1809, when the estates of Finland were summoned to a special diet to decide the future of the country, Borga. was the place of meeting, and it was in the cathedral that the emperor Alexander I. pledged himself as grand duke ‘ of Finland to maintain the constitution and liberties of the grand duchy.

BORGHESE, a noble Italian family of Sienese origin, first mentioned in 1238, a member of which, Marcantonio Borghese, settled in Rome and was the father of Camillo Borghese (1550- 1620), elected pope under the title of Paul V. (1605). Paul created his nephew prince of Vivero on the 17th of November 1609, and Philip III. of Spain conferred the title of prince of Sulmona on him in 1610. The family took its place among the higher Roman nobility by the marriage of the prince’s son Paolo with Olimpia, heiress of the Aldobrandini family, in 1614. In 1803 Camillo Filippo Ludovico, Prince Borghese (b. 1775), married Pauline, sister of the emperor Napoleon, and widow of General Leclerc. In 1806 he was made duke of Guastalla, and for some years acted as governor of the Piedmontese and Genoese provinces. After the fall of Napoleon he fixed his residence at Florence, where he died in 1832. The Borghese palace at Rome is one of the most magnificent buildings in the city, and contained a splendid gallery of pictures, most of which have been transferred to the Villa Borghese outside the Porto del Popolo, now Villa Umberto I., the property of the Italian government.

See A. von Reumont, Geschichte der Stadt Rom, iii. 605, 609. 617, &c.

; Almanack de Gotha (Gotha, 1902); J. H. Douglas, The Principal Noble Families of Rome (Rome, 1905).

BORGHESI, BARTOLOMMEO (1781-1860), Italian anti- quarian, was born at Savignano, near Rimini, on the nth of Julyi78i. He studied at Bologna and Rome. Having weakened his eyesight by the study of documents of the middle ages, he turned his attention to epigraphy and numismatics. At Rome he arranged and catalogued several collections of coins, amongst them those of the Vatican, a task which he undertook for Pius VII. In consequence of the disturbances of 1821, Borghesi retired to San Marino, where he died on the 16th of April i860. Although mainly an enthusiastic student, he was for some time podesta of the little republic. His monumental work, Nuovi Frammenti dei Fasti Consolari Capitolini (1818-1820), attracted the attention of the learned world as furnishing positive bases for the chronology of Roman history, while his contributions to Italian archaeological journals established his reputation as a numismatist and antiquarian. Before his death, Borghesi con- ceived the design of publishing a collection of all the Latin inscriptions of the Roman world. The work was taken up by the Academy of Berlin under the auspices of Mommsen, and the result was the Corpus Inscriptionum Latinarum. Napoleon III. ordered the publication of a complete edition of the works of Borghesi. This edition, in ten volumes, of which the first appeared in 1862, was not completed until 1897.

BORGIA, CESARE, duke of Valentinois and Romagna (1476- I 5°7)> was the son of Pope Alexander VI. by Vanozza dei Cattanei. He was born at Rome while his father was cardinal, and on the latter's elevation to the papacy (1492) he was created archbishop of Valencia, and a year later cardinal. Cesare was Alexander's favourite son, and it was for him that the pope's notorious nepotism was most extensively practised. In the early years of his father's pontificate he led a profligate life at the Vatican. When Charles VIII. left Rome for the conquest of Naples (January 25, 1495), Cesare accompanied him as a hostage for the pope's good behaviour, but he escaped at Velletri and returned to Rome. He soon began to give proofs of the violence for which he afterwards became notorious; when in 1497 his brother Giovanni, duke of Gandia, was murdered, the deed was attributed, in all probability with reason, to Cesare. It was suggested that the motive of the murder was the brothers' rivalry in the affection of Donna Sancha, wife of Giuffre, the pope's youngest son, while there were yet

darker hints at in- cestuous relations of Cesare and the ■ duke with their sister Lucrezia. But it is more probable that Cesare, who contemplated exchanging his ecclesiastical dignities for a secular career, regarded his brother's splendid position with envy, and was determined to enjoy the whole of his father's favours.

In July 1497 Cesare went to Naples as papal legate and crowned Frederick of Aragon king. Now that the duke of Gandia was dead, the pope needed Cesare to carry out his political schemes, and tried to arrange a wealthy marriage for him. Cesare wished to marry Carlotta, the daughter of the king of Naples, but both she and her father resolutely refused an alliance with " a priest, the bastard of a priest." In August 1498, Cesare in the consistory asked for the permission of the cardinals and the pope to renounce the priesthood, and the latter granted it " for the good of his soul." On the 1st of October he set forth for France with a magnificent retinue as papal legate to Louis XII., to bring him the pope's bull annulling his marriage with Jeanne of France (Louis wished to marry Anne of Brittany). In exchange he received the duchy of Valentinois, as well as military assistance for his own enterprises. He found Carlotta of Naples in France, and having again tried to win her over in vain, he had to content himself with Charlotte d'Albret, sister of the king of Navarre (May 1499) . Alexander now contemplated sending Cesare to Romagna to subdue the turbulent local despots, and with the help of the French king carve a principality for himself out of those territories owing nominal allegiance to the pope. Cesare made Cesena his headquarters, and with an army consisting of 300 French lances, 4000 Gascons and Swiss, besides Italian troops, he attacked Imola, which surrendered at once, and then besieged Forli, held by Caterina Sforza (q.v.), the widow of Girolamo Riario. She held out gallantly, but was at

last forced to surrender on the 22nd of January 1500; Cesare treated her with consideration, and she ended her days in a convent. The Sforzas having expelled the French from Milan, Cesare returned to Rome in February, his schemes checked for the moment; his father rewarded him for his successes by making him gonfaloniere of the church and conferring many honours on him; he remained in Rome and took part in bull fights and other carnival festivities. In July occurred the murder of the duke of Bisceglie, Lucrezia Borgia's third husband. He was attacked by assassins on the steps of St Peter's and badly wounded; attendants carried him to a cardinal's house, and, fearing poison, he was nursed only by his wife and Sancha, his sister-in-law. Again Cesare was suspected as the instigator of the deed, and in fact he almost admitted it himself. Bisceglie was related to the Neapolitan dynasty, with whose enemies the pope was allied, and he

had had a quarrel with Cesare. When it appeared that he was recovering from his wounds, Cesare had him murdered, but not apparently without provocation, for, according to the Venetian ambassador Cappello, the duke had tried to murder Cesare first.

In October 1 500 Cesare again set out for the Romagna, on the strength of Venetian friendship, with an army of 10,000 men. Pandolfo Malatesta of Rimini and Giovanni Sforza of Pesaro fled, and those cities opened their gates to Cesare. Faenza held out, for the people were devoted to their lord, Astorre Manfredi, a handsome and virtuous youth of eighteen. Manfredi surren- dered in April 1501, on the promise that his life should be spared; but Cesare broke his word, and sent him a prisoner to Rome, where he was afterwards foully outraged and put to death. After taking Castel Bolognese he returned to Rome in June, to take part in the Franco-Spanish intrigues for the partition of Naples. He was now lord of an extensive territory, and the pope created him duke of Romagna. His cruelty, his utter want of scruple, and his good fortune made him a terror to all Italy. His avidity was insatiable and he could brook no opposition; but, unlike his father, he was morose, silent and unsympathetic. His next conquests were Camerino and Urbino, but his power was now greatly shaken by the conspiracy of La Magione (a castle near Perugia where the plotters met). Several of the princes deposed by him, the Orsinis, and some of his own captains, such as Vitellozzo Vitelli (q.v.), Oliverotto da Fermo, and G. P. Baglioni, who had been given estates but feared to lose them, joined forces to conspire against the Borgias. Risings broke out at Urbino and in Romagna, and the papal troops were defeated; Cesare could find no allies, and it seemed as though all Italy was about to turn against the hated family, when the French king promised help, and this was enough to frighten the confederates into coming to terms. Most of them had shown very little political or military skill, and several were ready to betray each other. But Cesare, while trusting no one, proved a match for them all. During his operations in northern Romagna, Vitelli, Oliverotto, Paolo Orsini, and the duke of Gravina, to show their repentance, seized Senigallia, which still held for the duke of Urbino, in his name. Cesare arrived at that town, decoyed the unsuspecting condoltieri into his house, had them all arrested, and twoof them, Vitelli and Oliverotto, strangled (December 31, 1502).

He was back in Rome early in 1503, and took part in reducing the last rebel Orsinis. He was gathering troops for a new ex- pedition in central Italy in the summer, when both he and his father were simultaneously seized with fever. The pope died on the 18th of August, while Cesare was still incapacitated, and this unfortunate

coincidence proved his ruin; it was the one contin- gency for which he had not provided. On all sides his enemies rose up against him; in Romagna the deposed princes prepared to regain their own, and the Orsinis raised their heads once more in Rome. Cesare's position was greatly shaken, and when he tried to browbeat the cardinals by means of Don Michelotto and his bravos, they refused to be intimidated; he had to leave Rome in September, trusting that the Spanish cardinals would elect a candidate friendly to his house. At the conclave Francesco Todeschini-Piccolomini, was elected as Piu? III., and he showed every disposition to be peaceful and respectable, btft he was old

and in bad health. Cesare's dominion at once began to fall to pieces; Guidobaldo, duke of Urbino, returned to his duchy with Venetian help; and the lords of Piombino, Rimini and Pesaro soon regained their own; Cesena, defended by a governor faithful to Cesare, alone held out. Pius III. died on the 18th of October 1503, and a new conclave was held. Cesare, who could still count on the Spanish cardinals, wished to prevent the election of Giuliano della Rovere, the enemy of his house, but the latter's chances were so greatly improved that it was necessary to come to terms with him. On the 1st of November he was elected, and assumed the name of Julius II. He showed no ill- will towards Cesare, but declared that the latter's territories must be restored to the church, for " we desire the honour of recovering what our predecessors have wrongfully alienated." Venice hoped to intervene in Romagna and establish her pro- tectorate over the principalities, but this Julius was determined to prevent, and after trying in vain to use Cesare as a means of keeping out the Venetians, he had him arrested. Borgia's power was now at an end, and he was obliged to surrender all his castles in Romagna save Cesena, Forli and Bettinoro, whose governors refused to accept an order of surrender from a master who was a prisoner. Finally, it was agreed that if Cesare were set at liberty he would surrender the castles; this having been accomplished, he departed for Naples, where the Spaniards were in possession. The Spanish governor, Gonzalo de Cordova, had given him a safe-conduct, and he was meditating fresh plans, when Gonzalo arrested him by the order of Ferdinand of Spain as a disturber of the peace of Italy (May 1504). In August he was sent to Spain, where he remained a prisoner for two years; in November 1 506 he made his escape, and fled to the court of his brother-in-law, the king of Navarre, under whom he took service. While besieging the

castle of Viana, held by the rebellious count of Lerin, he was killed (March 12, 1507).

Cesare Borgia was a type of the adventurers with which the Italy of the Renaissance swarmed, but he was cleverer and more unscrupulous than his rivals. His methods of conquest were ferocious and treacherous; but once the conquest was made he governed his subjects with firmness and justice, so that his rule was preferred to the anarchy of factions and local despots. But he was certainly not a man of genius, as has long been imagined, and his success was chiefly due to the support of the papacy; once his father was dead his career was at an end, and he could no longer play a prominent part in Italian affairs. His fall proved on how unsound a basis his system had been built up.

The chief authorities for the life of Cesare Borgia are the same as those of Alexander VI., especially M. Creighton's History of the Papacy, vol. v. (London, 1897) ; F. Gregorovius's Geschichte der Stadt Rom, vol. vii. (Stuttgart, 1881) ; and P. Villari's Machiavelli (London 1892); also C. Yriarte, Cesar Borgia (Paris, 1889), an admirable piece of writing; Schubert-Soldern, Die Borgia und ihre Zeit (Dresden, 1902), which contains the latest discoveries on the subject; and E. Alvisi, Cesare Borgia, Duca di Romagna (Imola, 1878). (L. V.*)

BORGIA, FRANCIS (1510-1572), Roman Catholic saint, duke of Gandia, and general of the order of Jesuits, was born at Gandia (Valencia) on the 10th of October 1510, and from boy- hood was remarkable for his piety. Educated from his twelfth year at Saragossa under the charge of his uncle the archbishop, he had begun to show a strong inclination towards the monastic life, when his father sent him in 1528 to the court of Charles V. Here he distinguished himself, and on his marriage with Eleanor de Castro, a Portuguese lady of high rank, he was created marquis of Lombay, and was appointed master of the horse to the empress. He accompanied Charles on his African expedition in 1535, and also into Provence in 1536; and on the death of the empress in 1539 he was deputed to convoy the body to the burial-place in Granada. This sad duty confirmed his determina- tion to leave the court, and also, should he survive his consort, to embrace the monastic life. On his return to Toledo, however, new honours were thrust upon him, much against his will; he was made viceroy of Catalonia and commander of the order of St James. At Barcelona, the seat of his government, he lived a life of great austerity, but discharged his official duties with energy and efficiency until 1543, when, having succeeded his

father in the dukedom, he at length obtained permission to resign his

viceroyalty and to retire to a more congenial mode of life at Gandia. Having already held some correspondence with Ignatius Loyola, he now powerfully encouraged the recently founded order of Jesus. One of his first cares at Gandia was to build a Jesuit college; and on the death of Eleanor in 1546, he resolved to become himself a member of the society. The difficulties arising from political and family circumstances were removed by a papal dispensation, which allowed him, in the interests of his young children, to retain his dignities and worldly possessions for four years after taking the vows. In 1550 he visited Rome, where he was received with every mark of distinction, and where he furnished the means for building the Collegium Romanum. Returning to Spain in the following year, he formally resigned his rank and estate in favour of his eldest son, assumed the Jesuit habit, was ordained priest, and entered upon a life of penance and prayer. At his own earnest request, seconded by Loyola, a proposal that he should be created a cardinal by Julius III. was departed from; and at the command of his superior he employed himself in the work of itinerant preaching. In 1554 he was appointed commissary-general of the order in Spain, Portugal and the Indies, in which capacity he showed great activity, and was successful in founding many new and thriving colleges. In 1556, shortly after Charles V. retired, Borgia had an interview with him, but would not yield to his inducements to transfer his allegiance to the older order of Hieronymites. Some time afterwards Borgia was employed by Charles to conduct negotiations with reference to a project which was to secure for Don Carlos of Spain the Portuguese succession in the event of the death of his cousin Don Sebastian. On the death of Lainez in 1 565, Francis Borgia was chosen to succeed him as third general of the Jesuits. In this capacity he showed great zeal and ad- ministrative skill; and so great was the progress of the society under his government that he has sometimes been called ” its second founder.” The peculiarities which are most characteristic of the order were, however, derived from Loyola and Lainez, rather than from Borgia, whose ideal was a simple monasticism rather than a life of manifold and influential contact with the world. He died at Rome on the 30th of September 1572. He was beatified by Urban VIII. in 1624, and canonized by Clement X. in 1671, his festival being afterwards (1683) fixed by Innocent XL for the 10th of October.

Several works by St Francis Borgia have been published, the principal of these being a series of Exercises similar to the Exercitia Spiritualia of Loyola, and a treatise Rhetorica Concionandi. The Opera Omnia were published at Brussels in 1675. His life was written by his confessor Pedro de Ribadeneira. See also A. Butler’s Lives of the

Saints, and the Breviarium Romanum (second nocturn for October 10).

BORGIA, LUCREZIA (1480-1519), duchess of Ferrara, daughter of Cardinal Rodrigo Borgia, afterwards Pope Alexander VI. (q.v.), by his mistress Vanozza dei Cattanei, was born at Rome in 1480. Her early years were spent at her mother's house near her father's splendid palace; but later she was given over to the care of Adriana de Mila, a relation of Cardinal Borgia and mother-in-law of Giulia Farnese, another of his mistresses. Lucrezia was educated according to the usual curriculum of Renaissance ladies of rank, and was taught languages, music, embroidery, painting, &c; she was famed for her beauty and charm, but the corrupt court of Rome in which she was brought up was not conducive to a good moral education. Her father at first contemplated a Spanish marriage for her, and at the age of eleven she was betrothed to Don Cherubin de Centelles, a Spanish nobleman. But the engagement was broken off almost immediately, and Lucrezia was married by proxy to another Spaniard, Don Gasparo de Procida, son of the count of Aversa. On the death of Innocent VIII. (1492), Cardinal Borgia was elected pope as Alexander VI., and, contemplating a yet more ambitious marriage for his daughter, he annulled the union with Procida; in February 1493 Lucrezia was betrothed to Giovanni Sforza, lord of Pesaro, with whose family Alexander was now in close alliance. The wedding was celebrated in June; but when the pope's policy changed and he became friendly to the king

of Naples, the enemy of the house of Sforza, he planned the subjugation of the vassal lords of Romagna, and Giovanni, feeling his position insecure, left Rome for Pesaro with his wife. By- Christmas 1495 they were back in Rome; the pope had all his children around him, and celebrated the carnival with a series of magnificent festivities. But he decided that he had done with Sforza, and annulled the marriage on the ground of the husband's impotence (March 1497). In order to cement his alliance with Naples, he married Lucrezia to Alphonso of Aragon, duke of Bisceglie, a handsome youth of eighteen, related to the Nea- politan king. But he too realized the fickleness of the Borgias' favour when Alexander backed up Louis XII. of France in the latter's schemes for the conquest of Naples. Bisceglie fled from Rome, fearing for his life, and the pope sent Lucrezia to receive the homage of the city of Spoleto as governor. On her return to Rome in

1499, her husband, who really loved her, was induced to join her once more. A year later he was murdered by the order of her brother Cesare. After the death of Bisceglie, Lucrezia retired to Nepi, and then returned to Rome, where she acted for a time a,s regent during Alexander's absence. The latter now was anxious for a union between his daughter and Alphonso, son and heir to Ercole d' Este, duke of Ferrara. The negotiations were somewhat difficult, as neither Alphonso nor his father was anxious for a connexion with the house of Borgia, and Lucrezia's own reputation was not unblemished. However, by bribes and threats the opposition was overcome, and in September 1501 the marriage was celebrated by proxy with great magnificence in Rome. On Lucrezia's arrival at Ferrara she won over her reluctant husband by her youthful charm (she was only twenty- two), and from that time forth she led a peaceful life, about which there was hardly a breath of scandal. On the death of Ercole in 1505, her husband became duke, and she gathered many learned men, poets and artists at her court, among whom were Ariosto, Cardinal Bembo, Aldus Manutius the printer, and the painters Titian and Dosso Dossi. She devoted herself to the education of her children and to charitable works; the only tragedy connected with this period of her life is the murder of Ercole Strozzi, who is said to have admired her and fallen a victim to Alphonso's jealousy. She died on the 24th of June 1519, leaving three sons and a daughter by the duke of Ferrara, besides one son Rodrigo by the duke of Bisceglie, and possibly another of doubtful paternity. She seems to have been a woman of very mediocre talents, and only played a part in history because she was the daughter of Alexander VI. and the sister of Cesare Borgia. While she was in Rome she was probably no better and no worse than the women around her, but there is no serious evidence for the charges of incest with her father and brothers which were brought against her by the scandal-mongers of the time.

See the bibliographies for Alexander VI. and Borgia, Cesare; and especially F. Gregorovius's Lucrezia Borgia (Stuttgart, 1874), the standard work on the subject; also W. Gilbert's Lucrezia Borgia, Duchess of Ferrara (London, 1869), which, while containing much information, is quite without historic value; and G. Campori's "Una Vittima della Storia, Lucrezia Borgia, " in the Nuova A ntologia (August 31, 1866), which aims at the rehabilitation of Lucrezia. (L. V.*)

BORGLUM, SOLON HANNIBAL (1868-), American sculptor, was born in Ogden, Utah, on the 22nd of December 1868, the son of a Danish wood-carver. He studied under Louis F. Rebisso in the Cincinnati art school in 1895-1897, and under Fremiet in Paris. He took as his chief

subjects incidents of western life, cowboys and Indians, with which he was familiar from his years on the ranch; notably ” Lassoing Wild Horses,” ” Stampeding Wild Horses,” ” Last Round-up,” ” On the Border of White Man’s Land,” and ” Burial on the Plains.” His elder brother, Gutzon Borglum (b. 1867), also showed himself an artist of some originality.

BORGOGNONE, AMBROGIO (fl. 1473-1524), Italian painter of the Milanese school, whose real name was Ambrogio Stefani da Fossano, was approximately contemporary with Leonardo da Vinci, but represented, at least during a great part of his career, the tendencies of Lombard art anterior to the arrival of that master — the tendencies which he had adopted and perfected

from the hands of his predecessors Foppa and Zenale. We are not precisely informed of the dates either of the death or the birth of Borgognone, who was born at Fossano in Piedmont, and whose appellation was due to his artistic affiliation to the Bur- gundian school. His fame is principally associated with that of one great building, the Certosa, or church and convent of the Carthusians at Pavia, for which he worked much and in many different ways. It is certain, indeed, that there is no truth in the tradition which represents him as having designed, in 1473, the celebrated facade of the Certosa itself. His residence there appears to have been of eight years’ duration, from i486, when he furnished the designs of the figures of the virgin, saints and apostles for the choir-stalls, executed in tarsia or inlaid wood work by Bartolommeo Pola, till 1494, when he returned to Milan. Only one known picture, an altar-piece at the church San Eustorgio, can with probability be assigned to a period of his career earlier than i486. For two years after his return to Milan he worked at the church of San Satiro in that city. From 1497 he was engaged for some time in decorating with paintings the church of the Incoronata in the neighbouring town at Lodi. Our notices of him thenceforth are few and far between. In 1508 he painted for a church in Bergamo; in 151 2 his signature appears in a public document of Milan; in 1524 — and this is our last authentic record — he painted a series of frescoes illustrating the life of St Sisinius in the portico of San Simpliciano at Milan. Without having produced any works of signal power or beauty, Borgognone is a painter of marked individuality. He holds an interesting place in the most interesting period of Italian art. The National Gallery, London, has two fair examples of his work — the separate fragments of a silk banner painted for the Certosa, and containing the heads of two kneeling groups severally of men and women; and a large altar-piece of the marriage of St Catherine, painted for the chapel of Rebecchino near Pavia. But to judge of his

real powers and peculiar ideals — his system of faint and clear colouring, whether in fresco, tempera or oil; his somewhat slender and pallid types, not without something that reminds us of northern art in their Teutonic sentimentality as well as their Teutonic fidelity of portraiture; the conflict of his instinctive love of placidity and calm with a somewhat forced and borrowed energy in figures where energy is demanded, his conservatism in the matter of storied and minutely diversified backgrounds — to judge of these qualities of the master as they are, it is necessary to study first the great series of his frescoes and altar-pieces at the Certosa, and next those remains of later frescoes and altar- pieces at Milan and Lodi, in which we find the influence of Leonardo and of the new time mingling with, but not expelling, his first predilections.

BORGO SAN DONNINO, a town and episcopal see of Emilia, Italy, in the province of Parma, 14 m. N.W. by rail from the town of Parma. Pop. (1901) town, 6251; commune, 12,109. It occupies the site of the ancient Fidentia, on the Via Aemilia; no doubt, as its name shows, of Roman origin. Here M. Lucullus defeated the democrats under Carbo in 82 b.c. It was inde- pendent under Vespasian, but seems soon to have become a village dependent on Parma. Its presefnt name comes from the martyr- dom of S. Domninus under Maximian in-A.D. 304. The cathedral, erected in honour of this saint, is one of the finest and best- preserved Lombardo-Romanesque churches of the nth- 13th centuries in north Italy. The upper part of the facade is incom- plete, but the lower, with its three portals and sculptures, is very fine; the interior is simple and well-proportioned, and has not been spoilt by restorations. For the benitier, a work of the early nth century, see Rdssegna d' 'Arte, 1905, 180. Not far from the town is the small church of S. Antonio del Viennese, a 13th- century structure in brick (ib., 1906, 2 2) . The Palazzo Comunale, in the Gothic-Lombard style, is a work of the 14th century. Borgo S. Donnino is an important centre for the produce and cattle of Emilia. (T. As.)

BORGU, or Barba, an inland country of West Africa. The western part is included in the French colony of Dahomey (q.v.) ; the eastern division forms the Borgu province of the British protectorate of Nigeria. Borgu is bounded N.E. and E. by the

Niger, S. by the Yoruba country, N. W. by Gurma. The country consists of an elevated plain traversed by rivers draining north or east

to the Niger. The water-parting between the Niger basin and the coast streams of Dahomey and Lagos runs north-east and south-west near the western frontier. In about 10° N., below the town of Bussa, rapids block the course of the Niger, navigable up to that point from the sea. The soil is mostly fertile, and is fairly cultivated, producing in abundance millet, yams, plantains and limes. The acacia tree is common, and from it gum-arabic of good quality is obtained. From the nut of the horse-radish tree ben oil is expressed. Cattle are numerous and of excellent breed, and game is abundant. Borgu is in- habited by a number of pagan negro tribes, several of whom were dependent on the chief of Nikki, a town in the centre of the country, the chief being spoken of as sultan of Borgu. The king of Bussa was another more or less powerful potentate. In the early years of the 19th century Borgu was invaded by the Fula (q.v.), but the Bariba (as the people are called collectively) main- tained their independence. In 1894 Borgu became the object of rivalry between France and England. The Royal Niger Company, which had already concluded a treaty of protection with the king of Bussa, sent out Captain (afterwards Sir) F. D. Lugard to negotiate treaties with the king of Nikki and other chiefs, and Lugard succeeded in doing so a few days before the arrival of French expeditions from the west. Disregarding the British treaties, French officers concluded others with various chiefs, invaded Bussa and established themselves at various points on the Niger. To defend British interests, the West African Frontier Force was raised locally under Lugard's com- mand, and a period of great tension ensued, British and French troops facing one another at several places. A conflict was, how- ever, averted, and by the convention of June 1898 the western part of Borgu was declared French and the eastern British, the French withdrawing from all places on the lower Niger.

The British portion of Borgu has an area of about 12,000 sq. m. Up to the period of inclusion within the protectorate of Nigeria little or nothing was known of the country, though there were interesting legends of the antiquity of its history. The population was entirely independent, and resisted with success not only the Fula from the north but also the armies of Dahomey and Mossi from the south and west. Travellers who attempted to penetrate this country had never returned. Since 1898 the country has been opened, and from being the most lawless and truculent of people the Bariba have become singularly amenable and law- abiding. Provincial courts are established, but there is little crime in the province. The British garrisons have been replaced by civil police. The assessment of taxes under British adminis- tration was successfully carried out in 1904, and taxes are collected without trouble. In south Borgu the people are

agricultural but not industrious or inclined for trade. In the north there are some pastoral settlements of Fula. The Bariba themselves remain agricultural. Cart-roads have been constructed between the town of Kiama and the Niger. The agricultural resources of Borgu are great, and as the population increases with the cessation of war and by immigration the country should show marked development. Shea trees are abundant. Elephants are still to be found in the fifty-mile strip of forest land which stretches between the Niger and the interior of the province. The forest contains valuable sylvan products, and there are great possibilities for the cultivation of rubber. There are also extensive areas of fine land suitable for cotton, with the water-way of the Niger close at hand. Labour might be brought from Yorubaland close by, and a Yoruba colony has been experiment- ally started. (See Nigeria and Bussa.)

BORIC ACID, or Boracic Acid, H3BO3, an acid obtained by dissolving boron trioxide in water. It was first prepared by Wilhelm Romberg (1652-1715) from borax, by the action of mineral acids, and was given the name sal sedativum Hombergi. The presence of boric acid or its salts has been noted in sea-water, whilst it is also said to exist in plants and especially in almost all fruits (A. H. Allen, Analyst, 1904, 301). The free acid is found native in certain volcanic districts such as Tuscany, the Lipari

Islands and Nevada, issuing mixed with steam from fissures in the ground; it is also found as a constituent of many minerals (borax, boracite, boronatrocalcite and colemanite).

The chief source of boric acid for commercial purposes is the Maremma of Tuscany, an extensive and desolate tract of country over which jets of vapour and heated gases (soffioni) and springs of boiling water spurt out from chasms and fissures. In some places the fissures open directly into the air, but in other parts of the district they are covered by small muddy lakes (lagoni). The soffioni contain a small quantity of boric acid (usually less than o-i%), together with a certain amount of ammoniacal vapours. In order to obtain the acid, a series of basins is con- structed over the vents, and so arranged as to permit of the passage of water through them by gravitation. Water is led into the highest basin and by the action of the heated gases is soon brought into a state of ebullition; after remaining in this basin for about a day, it is run off into the second one and is treated there in a similar manner. The operation is carried on through the entire series, until the liquor in the last basin contains about 2 % of boric acid. It is then run into settling tanks, from which it next passes into the evaporating pans, which are shallow lead- lined pans heated by the gases of the

soffioni. These pans are worked on a continuous system, the liquor in the first being concentrated and run off into a second, and so on, until it is sufficiently concentrated to crystallize. The crystals are purified by recrystallization from water. Artificial soffioni are sometimes prepared by boring through the rock until the fissures are reached, and the water so obtained is occasionally sufficiently impregnated with boric acid to be evaporated directly. Boric acid is also obtained from boronatrocalcite by treatment with sulphuric acid, followed by the evaporation of the solution so obtained. The residue is then heated in a current of superheated steam, in which the boric acid volatilizes and distils over. It may also be obtained by the decomposition of boracite with hot hydrochloric acid. In small quantities, it may be prepared by the addition of concentrated sulphuric acid to a cold saturated solution of borax.

$$Na_2B_4O_7 + H_2SO_4 + 5H_2 = Na_2SO_4 + 4H_3BO_3 .$$

Boric acid crystallizes from water in white nacreous laminae belonging to the triclinic system ; it is difficultly soluble in cold water, but dissolves readily in hot water. It is one of the ” weak ” acids, its dissociation constant being only 0-03169 (J. Walker, Jour, of Chem. Soc, 1900, lxxvii. 5), and consequently its salts are appreci- ably hydrolysed in aqueous solution. The free acid turns blue litmus to a claret colour. Its action upon turmeric is characteristic; a turmeric paper moistened with a solution of boric acid turns brown, the colour becoming much darker as the paper dries; while the addition of sodium or potassium hydroxide turns it almost black. Boric acid is easilyn/soluble in alcohol, and if the vapour of the solution be inflamed it burns with a characteristic vivid green colour. The acid on being heated to 100° C. loses water and is converted into metaboric acid, HBO_3 ; at 140° C, pyroboric acid, $H_2B_4O_7$, is produced ; at still higher temperatures, boron trioxide is formed. The salts of the normal or orthoboric acid in all probability do not exist ; meta- boric acid, however, forms several well-defined salts which are readily converted, even by carbon dioxide, into salts of pyroboric acid. That orthoboric acid is a tribasic acid is shown by the formation of ethyl orthoborate on esterification, the vapour density of which corresponds to the molecular formula $B(OC_5H_5)_3$; the molecular formula of the acid must consequently be B(OH)j or H_3BO_3. The metallic borates are generally obtained in the hydrated condition, and with the exception of those of the alkali metals, are insoluble in water. The most important of the borates is sodium pyroborate or borax (q.v.).

Borax and boracic acid are feeble but useful antiseptics. Hence they may be used to preserve food-substances, such as milk and butter (see

Adulteration). In medicine boracic acid is used in solution to relieve itching, but its chief use is as a mild antiseptic to impregnate lint or cotton-wool. Recent work has shown it is too feeble to be relied upon alone, but where really efficient antiseptics, such as mercuric chloride and iodide, and carbolic acid, have been already employed, boracic acid (which, unlike these, is non-poisonous and non-irritant) may legitimately be used to maintain the aseptic or non-bacterial condition which they have obtained. Borax taken internally is of some value in irritability of the bladder, but as a urinary antiseptic it is now surpassed by several recently introduced drugs, such as urotropine.

BORING. The operations of deep boring are resorted to for ascertaining the nature, thickness and extent of the various

geological formations underlying the surface of the earth. Among the purposes for which boring is specifically employed are: (i) prospecting or searching for mineral deposits; (2) sinking petroleum, natural gas, artesian or salt wells; (3) de- termining the depth below the surface of bed-rock or other firm substratum, together with the character of the overlying materials, preparatory to mining or civil engineering operations; (4) carrying on geological or other scientific explorations.

Prospecting by boring is practised most successfully in the case of mineral deposits of large area, which are nearly horizontal, or at least not highly inclined; e.g. deposits of coal, iron, lead and salt. Wide, flat beds of such minerals may be pierced at any desired number of points. The depth at which each hole enters the deposit and the thickness of the mineral itself are readily ascertained, so that a map may be constructed with some degree of accuracy. Samples of the mineral are also secured, furnishing data as to the value of the deposit. While boring is sometimes adopted for prospecting irregular and steeply inclined mineral deposits of small area, the results are obviously less trustworthy than under the conditions named above, and may be actually misleading unless a large number of holes are bored. Incident- ally, bore-holes supply information as to the character and depth of the valueless depositions of earth or rock overlying the mineral deposit. Such data assist in deciding upon the appropriate method for, and in estimating the cost of, sinking shafts or driving tunnels for the development and exploitation of the deposit. In sinking petroleum wells, boring serves not only for discovering the oil-bearing strata but also for extracting the oil. This industry has become of great

importance in many parts of the United States, in southern Russia and elsewhere. Rock salt deposits are sometimes worked through bore-holes, by introduc- ing water and pumping out the solution of brine for further treatment. The sinking of artesian wells is another application of boring. They are often hundreds, and sometimes thousands, of feet in depth. A well in St Louis, Missouri, has a depth of

3843 ft.

Boring is useful in mines themselves for a variety of purposes, such as exploring the deposit ahead of the workings, searching for neighbouring veins, and sounding the ground on approaching dangerous inundated workings. In the coal regions of Pennsyl- vania, bore-holes are often sunk for carrying steam pipes and hoisting ropes underground at points remote from a shaft.

Several of the methods of boring in soft ground are employed in connexion with civil engineering operations; as for ascertain- ing the depth below the surface to solid rock, preparatory to excavating for and designing deep foundations for heavy struc- tures, and for estimating the cost of large scale excavations in earth and rock.

Lastly, a number of deep holes have been bored for geological exploration or for observing the increase of temperature in depth in the earth's crust; for example, at Paruschowitz, Silesia, about 6700 ft. deep; at Leipzig, Germany, 6265 ft.; near Pittsburg, Pennsylvania, 5532 ft.; and at Wheeling, West Virginia, nearly 5000 ft. The two last mentioned were intended to obtain as complete a knowledge as possible of the bituminous coal and oil- bearing formations.

There are five methods of boring, viz.: by (1) earth augers, (2) drive pipes, (3) long, jointed rods and drop drill, (4) the rope system, in which the rods are replaced by rope, (5) rotary drills. The first two methods are adapted to soft or earthy soils only; the others are for rock.

I. Earth augers comprise spiral and pod augers. The ordinary spiral auger resembles the wood auger commonly used by carpenters. It is attached to the rod or stem by a socket joint, successive sections of rod being added as the hole is deepened. The auger is rotated by means of horizontal levers, clamped to the rod — by hand for holes of small diameter (2 to 6 in.), the larger sizes (8 to 16 in.) by horse

Cower. Clayey, cohesive soils, containing few stones, are readily ored; stony ground with difficulty. The operation of the auger is

intermittent. After a few revolutions it is raised and emptied, the soil clinging between the spirals. Depths to 50 or 60 ft. are usually bored by hand; deeper holes by horse power. For sandy, non-cohesive soils, the auger may be encircled by a close-fitting sheet-iron cylinder to prevent the soil from falling out.

Pod augers generally vary in diameter from 8 to 20 in. A common

form (fig. 1) consists of two curved iron plates, one attached to the rod rigidly, the other by hinge and key. By being turned through a few revolutions the pod is filled, and is then raised and emptied. For boring in sandy soils, the open sides are closed by hinged plates. Fig. 2 shows another type of pod auger. For holes of large diameter earth augers are handled with the aid of a light derrick.

2. Drive pipes are widely used, both for testing the depth and character of soft material overlying solid rock and as a necessary pre-liminary to rock boring, when some thickness of surface soil must first be passed through. In its simplest form the drive pipe consists of one or more lengths of wrought iron pipe, open at both ends and from J in. to 6 in. diameter. When of small size the pipe is driven by a heavy hammer; for deep and large holes, a light pile-driver becomes necessary. The lower end of the pipe is provided with an annular steel shoe; the upper end has a drivehead for receiving the blows of the hammer. Successive lengths are screwed on as required. For p , , shallow holes the pipe is cleaned Auger.

out by a ” bailer ” or ” sand-pump ” — a cylinder 4 to 6 ft. long, with a valve in the lower end. It is lowered at intervals, filled by being dashed up and down, and then raised and emptied. If, after reaching some depth, the external frictional resistance prevents the pipe from sinking farther, another pipe of small diameter may be inserted and the driving continued. Drive pipes are often sunk by applying weights at the surface and slowly rotating by a lever. Two pipes are then used, one inside the other. Water is pumped down the inner pipe, thus loosening the soil, raising the debris and in- creasing the speed of driving. The ” driven well ” for water supply is an adaptation of the drive pipe and put down in the same way.

3. Drill and Rods. — This method has long been used in Europe and else- where for deep boring. In the United States it is rarely employed for depths greater than 200 or 300 ft. The usual form of cutting tool or drill is shown in fig. 3. The iron rods are from I to 2 in. square, in long lengths with screw joints (fig. 4). Wooden rods are occasionally used. For shallow holes

Fig. 1.

Fig. 2.

Fig. 3. Drill Bit.

Fig. 4. Rod Joint.

(50 to 75 ft.) the work is done by hand, one or two cross-bars being clamped to the rod. The men alternately raise and drop the drill, meanwhile slowly walking around and around to rotate the bit and so keep the hole true. The cuttings are cleaned out by a bailer, as for drive pipes.

In boring by hand, the practical limit of depth is soon reached, on account of the increasing weight of the rods. For going deeper a ” spring-pole ” may be used. This is a tapering pole, say 30 ft. long and 5 or 6 in. diameter at the small end. It rests in an inclined position on a fulcrum set about 10 ft. JL JL

from the butt, the latter being firmly fixed. The rods TT TT

are suspended from the end of the pole, which ex- J \ )\

tends at a height of several feet over the mouth of the hole. With the aid of the spring of the pole the strokes are produced by a slight effort on the part of the driller. Average speeds of 6 to 10 ft. per 10 hours are easily made, to depths of 200 to 250 ft.

For deep boring the rod system requires a more elaborate plant. The rods are suspended from a heavy ” walking beam ” or lever, usually oscillated by a steam engine. By means of a screw-Feed device, the rods, which are rotated slightly after every stroke, are gradually fed down as the hole is deepened, length after length being added. A tall derrick carries the sheaves and ropes by which the rods and tools are manipulated. The drill bit cannot be attached rigidly to the rods as in shallow boring, because the momentum of the heavy moving parts, transmitted directly to the bit as the blow is struck, would cause excessive vibration and breakage. It becomes neces- sary, therefore, to introduce a sliding-link joint be- tween the rods and bit. One form of link is shown Sliding Link, in fig. 5. On striking its blow, the bit comes to rest, while the rods continue to descend to the end of the stroke, the upper member of the link sliding down upon the lower. Then, on the up stroke the lower link, with the bit, is raised for delivering another blow. For large holes the striking weight is, say, 800 to 1000 lb, length of stroke 2j to 5 ft., and speed from 20 to 30 strokes per

minute.

Fig. 5.

By using the sliding link the cross-section and weight of the rods may be greatly reduced, the only strain being that of tension. To deliver a sharp, effective blow, however, the rods must drop with a quick stroke, which brings a heavy strain upon the operating machinery. For overcoming this difficulty, various ” free- falling tools ” have been devised. By these the bit is allowed to fall by gravity; the rod follows on its measured down stroke, and picks up the bit. Free-falling tools are of two classes: (1) those by which the bit is released automatically; (2) those operated by a sudden twist imparted to the rod by the drillman. One of the best known of the first class is the Kind free-fall (fig. 6). The shank of the bit is gripped and released by the jaws J,J, worked through a toggle joint by move- ments of the disk D, When the rod begins its down- ward stroke, the resistance of the water in the hole slightly raises D, thus opening the jaws and releasing the bit, which falls by gravity. On reaching the end of the stroke the jaws again catch the shank of the bit and raise it for delivering another blow. The Fabian free-fall may be noted as an example of the second class (see Kohler, Lehrbuch der Bergbaukunde, p. 57). Tools are sometimes used for cutting an annular groove in the bottom of the hole, and raising to the surface the core so formed, for observing the character of the rock.

4. Rope and Drop Tools. — This method was long ago

used in China. Because of its extensive application

in the oil-fields it is generally designated in the

United States as the ” oil-well system.” In its

various modifications it is often employed also in

general prospecting of mineral deposits and in sinking

artesian, natural gas and salt wells. One of its forms

Fig. 6. is known in England as the Mather & Piatt system.

Kind Free- The chief point of difference from rod-boring is Falling Tool, the substitution of rope for the jointed rods. For deep boring it possesses the advantage of saving the large amount of time consumed in raising and lowering the rods, as required whenever the hole is to be cleaned out, or a dull bit replaced, since the tools are rapidly run up or down by means of the rope with which they are operated while drilling. The speed of rope-boring is therefore but little affected by increase of depth, while with rod-boring it falls off rapidly. In its simplest form the so-called ” string of tools,” suspended from the rope, is composed of the bit or drill, jars and rope-socket. The jars are a pair of sliding links, similar to those used for rod-boring, but serving a different purpose, viz. to produce a sharp shock on the upward stroke, as the jars come together, for loosening the bit should it tend to stick fast in the hole. A heavy bar (auger stem) is generally inserted between the jars and bit, for increasing the force of the blow. The weight of another bar above the jars (sinker-bar) keeps the rope taut. The length of stroke and feed are regulated by the ” temper-screw ” (fig. 7), a feed device resembling that used for rod-boring. Clamped to it is the drill rope, which is let out at intervals, as the hole is deepened. The bits usually range from 3 to 8 in. diameter, the speed of boring being generally between 20 and 40 ft. per 24

hours, according to the kind of rock. A great

variety of special ” fishing tools ” are made, for

use in case of breakage of parts in the hole or other

accident.

5. Diamond Drill. — The methodsdescribedabove are capable of boring holes vertically down- ward only. By the diamond drill, holes can be bored in any direction, from vertically downward to vertically upward. It has the further ad- vantage of making an annular hole from which is obtained a core, furnishing a practically complete cross-section of the strata penetrated ; the thick- ness and character of each stratum are shown, together with its depth below the surface. Thus, the diamond drill is peculiarly well adapted for prospecting mineral deposits from which samples are desired. The first practical application of diamonds for drilling in rock was made in 1863 by Professor Rudolph Leschot, a civil engineer of Paris.

The apparatus consists essentially of a line of

hollow rods, coupled by screw joints, an annular

steel bit or crown, set with diamonds, being

Fig. 7- attached to the lower end. By means of a small

Temper Screw, engine on the surface the rods are rapidly rotated

and fed down automatically as the hole is

deepened. The speed of rotation is from 300 to 800 revolut’ons

per minute, depending on the character of the rock and diameter

of the bit. While boring a stream of water is forced down the

hollow rods by a pump, passing back to the surface through the

annular space between the rods and the walls of the drill hole. The

cuttings are thus carried to the surface, leaving the bottom of the hole

clean and unobstructed. For recovering the core and inspecting the bit and diamonds, the rods are raised at every 3 to 8 ft. of depth. This is done by a small drum and rope, operated by the driving engine. Diamond drills of standard designs (fig. 8) bore holes from I ft to 2f in. diameter, yielding cores of 1 to 1 { f in. diameter, and are capable of reaching depths of a few hundred to 4000 ft. or more. They re- quire from 8 to 30 boiler horse-power. Large machines will bore shallower holes up to 6, 9 or even 12 in. diameter. For operating

Fig. 10. Diamond Drill Bit.

Fig. 8. — Little Champion Rock Drill. Fig. 9.

in underground workings of mines, small and compact machines

are sometimes mounted on columns (fig. 9). They bore 1 1 to I ft in.

holes to depths of 300 to 400 ft., cores being 5 to 1 in. diameter.

Hand-power drills are also built. In the South African goldfields

several diamond drill holes from 4500 to 5200 ft. deep have been

successfully bored. Rates of advance for core-drilling to moderate

depths range usually from 2 to 3 ft. per hour,

including ordinary delay s,though in favourable

rock much higher speeds are often attained.

In deep holes the speeds diminish, because of

time consumed in raising and lowering the rods.

If no core is desired a ” solid bit ” is used.

The drilling then proceeds faster, as it is only

necessary to raise the rods occasionally, for

examining the condition of the bit.

The driving engine has two inclined cylin- ders, coupled to a crank-shaft, by which, through gearing, the drill-rod is rotated. The rods are wrought iron or steel tubes, in 5 to 10 ft. lengths. For produc- ing the feed two devices are employed, the differential screw and hydraulic cylinder. For the differential feed (fig. 9) the engine has a hollow left-hand threaded screw-shaft, to which the rods are coupled. This shaft is driven by a spline and bevel gearing and is supported by a threaded feed-nut, carried in the lower bearing. Geared to the screw-shaft is a light counter-shaft. By prop- erly proportioning the number of teeth in the system of gear-wheels, the feed-nut is caused to revolve a little faster than the screw-shaft, so that the drill-rod is fed downward a small fraction of an inch for each revolution. To vary the rate of feed, as suitable for different rocks, three pairs of gears with different ratios of teeth are provided. The screw-shaft and gearing are carried by a swivel-head, which can be rotated in a vertical plane, for boring holes at an angle.

The hydraulic feed is an improvement on the above, in that the rate of feed is inde- pendent of the rotative speed of the rods and can be adjusted with the utmost nicety. There are either one or two feed cylinders, supplied with water from the pump. The rod, while rotating freely, is supported by the feed cylinder piston and caused to move slowly downward by allowing the water to pass from the lower to the upper part of the cylinder. A valve regulates the passage of the water and hence the rate of feed. .«..-.

The bit (fig. 10 and fig. 11, B) is of soft Fig. ii.

steel, set with six to eight or more diamonds, Core Lifter and Barrel, according to its diameter. The diamonds,

usually from ij to 2§ carats in size, are carefully set in the bit, projecting but slightly from its surface. Two kinds of diamonds are used, ” carbons ” and ” borts.” The carbons are opaque, dark

in colour, tougher than the brilliant, and have no cleavage planes. They are therefore suitable for drilling in hard rock. Borts are rough, imperfect brilliants, and are best used for the softer rocks. As the bit

wears, the stones must be reset from time to time. The wear of carbons in a well-set bit is small, though extremely variable. Above the bit are the core-lifter and core-barrel. The core-lifter (fig. n, A) is a device for gripping and breaking off the core and raising it to the surface. The barrel, 3 to 10 ft. long, fits closely in the hole and is often spirally grooved for the passage of the water and debris. It serves partly as a guide, tending to keep the hole straight, partly for holding and protecting the core.

Diamond drills do not work satisfactorily in broken, fissured rock, as the carbons are liable to be injured, loosened or torn from their settings. In these circumstances, and for soft rocks, the diamond bit may be replaced by a steel toothed bit. Another apparatus for core-drilling is the Davis Calyx drill. For hard rock it has an annular bit, accompanied by a quantity of chilled steel shot; for soft rock, a toothed bit is used.

Diamond drill holes are rarely straight, and usually deviate considerably from the direction in which they are started. Very deep holes have been found to vary as much as 45 ° and even 60 ° from their true direction. This is due to the fact that the rods do not fit closely in the hole and therefore bend. It is also likely to occur in drilling through inclined strata, specially when of different degrees of hardness. By using a long and closely fitting core-barrel the liability to deviation is reduced, but cannot be wholly prevented. Holes which are nearly horizontal always deflect upward, because the sag of the rods tilts up tire bit. Diamond drill holes should there- fore always be surveyed. This is done by lowering into the hole instruments for observing at a number of successive points the direc- tion and degree of deviation. 1 If accurately surveyed a crooked hole may be quite as useful as a straight one.

Authorities. — For further information on boring see Trans. Amer. Inst. Mining Engs. vol. ii. p. 241, vol. xxvii. p. 123; C. le Neve Foster, Text-book of Ore and Stone Mining, chap. iii. ; Glilckauf, 9th December 1899, 20th and 27th May 1905; Scientific American, 21st August 1886; Engineering and Mining Jour. vol. lviii. p. 268, vol. lxx. p. 699, vol. lxxx. p. 920; Trans. Inst. Mining Engs., England, vol. xxiii. p. 685 ; School of Mines Quarterly, N. Y., vol. xvi. p. I ; Zeitschr. filr Berg- Hiitten- und Salinenwesen, vol. xxv. p. 29 ; Denny, ” Diamond Drilling,” Mines and Minerals, vol. xx., August 1899, p. 7, to January 1900, p. 241 ; Mining Jour., 26th January 1901 ; Mining and Scientific Press, 28th November 1903, p. 353 ; Ost. Zeitschr. filr Berg- und Huttenwesen, 21st May, 4th June 1904; Trans. Inst. Mining and Metallurgy, vol. xii. p. 301 ; Engineering Magazine, March 1896, p.

1075. (R. P.*)

BORIS FEDOROVICH GODUNOV, tsar of Muscovy (c. 1551- 1605), the most famous member of an ancient, now extinct, Russian family of Tatar origin, which migrated from the Horde to Muscovy in the 14th century. Boris' career of service began at the court of Ivan the Terrible. He is mentioned in 1570 as taking part in the Serpeisk campaign as one of the archers of the guard. In 1571 he strengthened his position at court by his marriage with Maria, the daughter of Ivan's abominable favourite Malyuta Skuratov. In 1580 the tsar chose Irene, the sister of Boris, to be the bride of the tsarevich Theodore, on which occasion Boris was promoted to the rank of boyar. On his death- bed Ivan appointed Boris one of the guardians of his son and successor; for Theodore, despite his seven-and-twenty years, was of somewhat weak intellect. The reign of Theodore began with a rebellion in favour of the infant tsarevich Demetrius, the son of Ivan's fifth wife Marie Nagaya, a rebellion resulting in the banishment of Demetrius, with his mother and her relations, to their appanage at Uglich. On the occasion of the tsar's corona- tion (May 31, 1584), Boris was loaded with honours and riches, yet he held but the second place in the regency during the life- time of his co-guardian Nikita Romanovich, on whose death, in August, he was left without any serious rival. A conspiracy against him of all the other great boyars and the metropolitan Dionysy, which sought to break Boris' power by divorcing the tsar from Godunov's childless sister, only ended in the banish- ment or tonsuring of the malcontents. Henceforth Godunov was omnipotent. The direction of affairs passed entirely into his hands, and he corresponded with foreign princes as their equal. His policy was generally pacific, but always most prudent. In 1595 he recovered from Sweden the towns lost during the former reign. Five years previously he had defeated a Tatar raid upon Moscow, for which service he received the title of sluga,

1 Brough, Mine Surveying, pp. 276-278; Marriott, Trans. Inst. Mining and Metallurgy, vol. xiv. p. 255.

an obsolete dignity even higher than that of boyar. Towards Turkey he maintained an independent attitude, supporting an anti-Turkish faction in the Crimea, and furnishing the emperor with subsidies in his war against the sultan. Godunov en- couraged English merchants to trade with Russia by exempting them from tolls. He civilized the north-eastern and south- eastern borders of Muscovy by building numerous towns and fortresses to keep the Tatar and Finnic tribes in order. Samara, Saratov, and Tsaritsyn and a whole series of lesser towns derive from him. He also re-colonized Siberia, which had been

slipping from the grasp of Muscovy, and formed scores of new settlements, including Tobolsk and other large centres. It was during his government that the Muscovite church received its patri- archate, which placed it on an equality with the other Eastern churches and emancipated it from the influence of the metro- politan of Kiev. Boris' most important domestic reform was the ukaz (1587) forbidding the peasantry to transfer themselves from one landowner to another, thus binding them to the soil. The object of this ordinance was to secure revenue, but it led to the institution of serfdom in its most grinding form. The-sudden death of the tsarevich Demetrius at Uglich (May 15, 1591) has commonly been attributed to Boris, because it cleared his way to the throne ; but this is no clear proof that he was person- ally concerned in that tragedy. The same may be said of the many, often absurd, accusations subsequently brought against him by jealous rivals or ignorant contemporaries who hated Godunov's reforms as novelties.

On the death of the childless tsar Theodore (January 7, 1598), self-preservation quite as much as ambition constrained Boris to seize the throne. Had he not done so, lifelong seclusion in a monastery would have been his lightest fate. His election was proposed by the patriarch Job, who acted on the conviction that Boris was the one man capable of coping with the extraordinary difficulties of an unexampled situation. Boris, however, would only accept the throne from a Zemsky Sobor, or national assembly, which met on the 17th of February, and unanimously elected him on the 21st. On the 1st of September he was solemnly crowned tsar. During the first years of his reign he was both popular and prosperous, and ruled the people excellently well. Enlightened as he was, he fully recognized the intellectual inferiority of Russia as compared with the West, and did his utmost to bring about a better state of things. He was the first tsar to import foreign teachers on a great scale, the first to send young Russians abroad to be educated, the first to allow Lutheran churches to be built in Russia. He also felt the necessity of a Baltic seaboard, and attempted to obtain Livonia by diplomatic means. He cultivated friendly relations with the Scandinavians, in order to intermarry if possible with foreign royal houses, so as to increase the dignity of his own dynasty. That Boris was one of the greatest of the Muscovite tsars there can be no doubt. But his great qualities were overbalanced by an incurable suspiciousness, which made it impossible for him to act cordially with those about him. His fear of possible pretenders induced him to go so far as to forbid the greatest of the boyars to marry. He also encouraged informers and persecuted suspects on their unsupported state- ments. The Romanov family in especial suffered severely from these delations. Boris died suddenly (April 13, 1605),

leaving one son, Theodore II., who succeeded him for a few months and then was foully murdered by the enemies of the Goduncvs.

See Platon Vasilievich Pavlov, On the Historical Significance of the Reign of Boris Godunov (Rus.) (Moscow, 1850) ; Sergyei Mikhailivich Solovev, History of Russia (Rus.) (2nd ed., vols, vii.-viii., St Petersburg, 1897). (R. N. B.)

BORISOGLYEBSK, a town of Russia, in the government of Tambov, 100 m. S.S.E. of the city of that name, in 51° 22′ N. lat. and 43 4′ E. long. It was founded in 1646 to defend the southern frontiers of Muscovy against the Crimean Tatars, and in 1696 was surrounded by wooden fortifications. The principal industries are the preparation of wool, iron-casting, soap-boiling, tallow- melting, and brick-making; and there is an active trade in grain, wool, cattle, and leather, and two important annual fairs. Pop. (1867) 12,254; (1897) 22,370.

BORKU, or Borgu, a region of Central Africa between 17° and 19° N. and 18° and 21 E., forming part of the transitional zone between the arid wastes of the Sahara and the fertile lands of the central Sudan. It is bounded N. by the Tibesti Mountains, and is in great measure occupied by lesser elevations belonging to the same system. These hills to the south and east merge into the plains of Wadai and Darfur. South-west, in the direction of Lake Chad, is the Bodele basin. The drainage of the country is to the lake, but the numerous khors with which its surface is scored are mostly dry or contain water for brief periods only. A considerable part of the soil is light sand drifted about by the wind. The irrigated and fertile portions consist mainly of a number of valleys separated from each other by low and irregular limestone rocks. They furnish excellent dates. Barley is also cultivated. The northern valleys are inhabited by a settled popu- lation of Tibbu stock, known as the Daza, and by colonies of negroes; the others are mainly visited by nomadic Berber and Arab tribes. The inhabitants own large numbers of goats and asses.

A caravan route from Barca and the Kufra oasis passes through Borku to Lake Chad. The country long remained unknown to Europeans. Gustav Nachtigal spent some time in it in the year 187 1, and gave a valuable account of the region and its inhabitants in his book, Sahara und Sudan (Berlin, 1879-1889). In 1899 Borku, by agreement with Great Britain, was assigned to the French sphere of influence. The

country, which had for- merly been periodically raided by the Walad Sliman Arabs, was then governed by the Senussi (q.v.), who had placed garrisons in the chief centres of population. From it raids were made on French territory. In 1907 a French column from Kanem entered Borku, but after capturing Ain Galakka, the principal Senussi station, retired. Borku is also called Borgu, but must not be confounded with the Borgu (q.v.) west of the Niger.

A summary of Nachtigal's writing on Borku will be found in section 28 of Gustav Nachtigal's Reisen in der Sahara und im Sudan (1 vol.), arranged by Albert Frankel (Leipzig, 1887). See also an article (with map) by Commdt. Bordeaux in La Geographic, Oct. 1908.

BORKUM, an island of Germany, in the North Sea, belonging to the Prussian province of Hanover, the westernmost of the East Frisian chain, lying between the east and west arms of the estuary of the Ems, and opposite to the Dollart. Pop. about 2500. The island is 5 m. long and 25 m. broad, is a favourite summer resort, and is visited annually by about 20,000 persons. There is a daily steamboat service with Emden, Leer and Ham- burg during the summer months. The island affords pasture for cattle, and a breeding-place for sea-birds.

BORLASE, WILLIAM (1695-1772), English antiquary and naturalist, was born at Pendeen in Cornwall, of an ancient family, on the 2nd of February 1695. He was educated at Exeter College, Oxford, and in 1719 was ordained. In 1722 he was presented to the rectory of Ludgvan, and in 1732 he obtained in addition the vicarage of St Just, his native parish. In the parish of Ludgvan were rich copper works, abounding with mineral and metallic fossils, of which he made a collection, and thus was led to study somewhat minutely the natural history of the county. In 1750 he was admitted a fellow of the Royal Society; and in 1754 he published, at Oxford, his Antiquities of Cornwall (2nd ed., London, 1769). His next publication was Observations on the Ancient and Present State of the Islands of Scilly, and their Importance to the Trade of Great Britain (Oxford, 1756). In 1758 appeared his Natural History of Cornwall. He presented to the Ashmolean museum, Oxford, a variety of fossils and antiquities, which he had described in his works, and received the thanks of the university and the degree of LL.D. He died on the 31st of August 1772. Borlase was well acquainted with most of the leading literary men of the time, particularly with Alexander Pope, with whom he kept up a long correspond- ence, and for whose grotto at Twickenham he furnished the greater part of the fossils and minerals.

Borlase's letters to Pope, St Aubyn and others, with answers, fill

several volumes of MS. There are also MS. notes on Cornwall, and a complete unpublished treatise Concerning the Creation and Deluge. Some account of these MSS., with extracts from them, was given

in the Quarterly Review, October 1875. Borlase's memoirs of his own life were published in Nichol's Literary Anecdotes, vol. v.

BORMIO (Ger. Worms), a town of Lombardy, Italy, in the province of Sondrio, 415 m. N.E. of the town of Sondrio. Pop. (1901) 1814. It is situated in the Valtellina (the valley of the Adda), 4020 ft. above sea-level, at the foot of the Stelvio pass, and, owing to its position, was of some military importance in the middle ages. It contains interesting churches and picturesque towers. A cemetery of pre-Roman date was discovered at Bormio in 1820.

The baths of Bormio, 2 m. farther up the valley, are mentioned by Pliny and Cassiodorus, the secretary of Theodoric, and are much frequented.

BORN, IGNAZ, Edler von (1742-1791), Austrian mineralo- gist and metallurgist, was born of a noble family at Karlsburg, in Transylvania, on the 26th of December 1742. Educated in a Jesuit college in Vienna, he was for sixteen months a member of the order, but left it and studied law at Prague. Then he travelled extensively in Germany, Holland and France, studying mineralogy, and on his return to Prague in 1770 entered the department of mines and the mint. In 1 776 he was appointed by Maria Theresa to arrange the imperial museum at Vienna, where he was nominated to the council of mines and the mint, and continued to reside until his death on the 24th of July 1791. He introduced a method of extracting metals by amalgamation ijjber das Anquicken der Erze, 1786), and other improvements in mining and other technical processes. His publications also include Lithophylacium Bornianum (1772-1775) and Bergbau- kunde (1789), besides several museum catalogues. Von Born attempted satire with no great success. Die Slaatsperiicke, a tale published without his knowledge in 1772, and an attack on Father Hell, the Jesuit, and king's astronomer at Vienna, are two of his satirical works. Part of a satire, entitled Monachologia, in which the monks are described in the technical language of natural history, is also ascribed to him. Von Born was well acquainted with Latin and the principal modern languages of Europe, and with many branches of science not immediately connected with metallurgy and mineralogy. He took an active part in the political changes in Hungary. After the death of the emperor Joseph II., the diet of the states of Hungary re scinded many innovations of that ruler, and conferred the rights of denizen on

several persons who had been favourable to the cause of the Hungarians, and, amongst others, on von Born. At the time of his death in 1791, he was employed in writing a work entitled Fasti Leopoldini, probably relating to the prudent conduct of Leopold II., the successor of Joseph, towards the Hungariahs.

BORNA, a town of Germany in the kingdom of Saxony, on the Wyhra at its junction with the Pleisse, 17 m. S. by E. of Leipzig by rail. Pop. (1905) 9176. The industries include peat-cutting, iron foundries, organ, pianoforte, felt and shoe factories.

BORNE, KARL LUDWIG (1786-1837), German political writer and satirist, was born on the 6th of May 1786 at Frankfort- on-Main, where his father, Jakob Baruch, carried on the business of a banker. He received his early education at Giessen, but as Jews were ineligible at that time for public appointments in Frankfort, young Baruch was sent to study medicine at Berlin under a physician, Markus Flerz, in whose house he resided. Young Baruch became deeply enamoured of his patron's wife, the talented and beautiful Henriette Herz (1764-1847), and gave vent to his adoration in a series of remarkable letters. Tiring of medical science, which he had subsequently pursued at Halle, he studied constitutional law and political science at Heidelberg and Giessen, and in 18 n took his doctor's degree at the latter university. On his return to Frankfort, now constituted as a grand duchy under the sovereignty of the prince bishop Karl von Dalberg, he received (1811) the appointment of police actuary in that city. The old conditions, however, returned in 18 14 and he was obliged to resign his office. Embittered by the oppression under which the Jews suffered in Germany, he engaged in journal- ism, and edited the Frankfort liberal newspapers, Staatsristretto and Die Zeitsckmngen. In 1818 he became a convert to Lutheran

protestantism, changing his name from Lob Baruch to Ludwig Borne. This step was taken less out of religious conviction than, as in the case of so many of his descent, in order to improve his social standing. From 1818 to 1821 he edited Die Wage, a paper distinguished by its lively political articles and its power- ful but sarcastic theatrical criticisms. This paper was suppressed by the police authorities, and in 182 1 Borne quitted for a while the field of publicist writing and led a retired life in Paris, Ham- burg and Frankfort. After the July Revolution (1830), he hurried to Paris, expecting to find the newly-

constituted state of society somewhat in accordance with his own ideas of freedom. Although to some extent disappointed in his hopes, he was not disposed to look any more kindly on the political condition of Germany; this lent additional zest to the brilliant satirical letters (Briefe aus Paris, 1830-1833, published Paris, 1834), which he began to publish in his last literary venture, La Balance, a revival under its French name of Die Wage. The Briefe aus Paris was Borne's most important publication, and a landmark in the history of German journalism. Its appearance led him to be regarded as one of the leaders of the new literary party of " Young Germany." He died at Paris on the 12th of February

1837.

Borne's works are remarkable for brilliancy of style and for a thorough French vein of satire. His best criticism is to be found in his Denkrede auf Jean Paul (1826), a writer for whom he had warm sympathy and admiration, in his Dramaturgische Blatter (1820-1834), and the witty satire, Menzel der Franzosenfresser (1837). He also wrote a number of short stories and sketches, of which the best known are the Monograpkie der deutschen Post- schnecke (1829) and Der Esskiinstler (1822).

The first edition of his Gesammelte Schriften appeared at Hamburg (1829-1834.) in 14 volumes, followed by 6 volumes of Nachgelassene Schriften (Mannheim, 1844-1850); more complete is the edition in 12 volumes (Hamburg, 1862-1863), reprinted in 1868 and subsequently. The latest complete edition is that edited by A. Klaar (8 vols., Leipzig, 1900). For further biographical matter see K. Gutzkow, Bornes Leben (Hamburg, 1840), and M. Holzmann, L. Borne, sein Leben und sein Wirken (Berlin, 1888). Bornes Briefe an Henriette Herz (1802-1807), first published in 1861, have been re-edited by L. Geiger (Oldenburg, 1905), who has also published Borne's Berliner Briefe (1828) (Berlin, 1905). See also .Heine's witty attack on Borne (Werke, ed. Elster, vii.), G. Gervinus' essay in his Historiche Schriften (Darmstadt, 1838), and the chapters in G. Brandes, Hovedstromninger i det iQdeAarhundredesLitteratur vol. vi. (Copenhagen, 1890, German trans. 1891 ; English trans. 1905), and in J. Proelss, Das junge Deutschland (Stuttgart, 1892).

BORNEO, a great island of the Malay Archipelago, extending from 7° N. to 4 20′ S., and from 108° 53′ to 119 22′ E. It is 830 m. long from N.E. to S.W., by 600 m. in maximum breadth. Its area according to the calculations of the Topographical Bureau of Batavia (1894) comprises 293,496 sq. m. These figures are admittedly approximate, and Meyer,

who is generally accurate, gives the area of Borneo at 289,860 sq. m. It is roughly, however, five times as large as England and Wales. Politically Borneo is divided into four portions: (1) British North Borneo, the territory exploited and administered by the Chartered British North Borneo Company, to which a separate section of this article is devoted; (2) Brunei (q.v.), a Malayan sultanate under British protection; (3) Sarawak (q.v.), the large territory ruled by raja Brooke, and under British protection in so far as its foreign relations are concerned; and (4) Dutch Borneo, which comprises the remainder and by far the largest and most valuable portion of the island.

Physical Features. — The general character of the country is mountainous, though none of the ranges attains to any great elevation, and Kinabalu, the highest peak in the island, which is situated near its north-western extremity, is only 13,698 ft. above sea-level. There is no proper nucleus of mountains whence chains ramify in different directions. The central and west central parts of the island, however, are occupied by three mountain chains and a plateau. These chains are: (1) the folded chain of the upper Kapuas, which divides the western division of Dutch Borneo from Sarawak, extends west to east, and attains near the sources of the Kapuas river a height of 5000 to 6000 ft. ; (2) the Schwaner chain, south of the Kapuas, whose summits

range from 3000 to 7500 ft., the latter being the height of Bukit Raja, a plateau which divides the waters of the Kapuas from the rivers of southern Borneo; and (3) the M tiller chain, between the eastern parts of the Madi plateau (presently to be mentioned) and the Kapuas chain, a volcanic region presenting heights, such as Bukit Terata (4700 ft.), which were once active but are now long extinct volcanos. The Madi plateau lies between the Kapuas and the Schwaner chains. Its height is from 3000 to 4000 ft., and it is clothed with tropical high fens. These mountain systems are homologous in structure with those, not of Celebes or of Halma- hera, but of Malacca, Banka and Billiton. From the eastern end of the Kapuas mountains there are further to be observed: (1) A chain running north-north-east, which forms the boundary between Sarawak and Dutch Borneo, the highest peak of which, Gunong Tebang, approaches 10,000 ft. This chain “can hardly be said to extend continuously to the extreme north of the island, but it carries on the line of elevation towards the mountains of Sarawak to the west, and those of British North Borneo to the north, of which latter Kinabalu is the most remarkable. The mountains of North Borneo are more particularly referred to in the portion of this article which deals with that territory. (2) A chain which runs eastward from the central mountains and terminates in the great promontory of the

east coast, known variously as Cape Kanior or Kaniungan. (3) A well-marked chain running in a south-easterly direction among the congeries of hills that extend south-eastward from the central mountains, and attaining, near the southern part of the east coast, heights up to and exceeding 6000 ft.

Coasts. — Resting on a submarine plateau of no great depth, the coasts of Borneo are for the most part rimmed round by low alluvial lands, of a marshy, sandy and sometimes swampy character. In places the sands are fringed by long lines of Casuarina trees; in others, and more especially in the neighbour- hood of some of the river mouths, there are deep banks of black mud covered with mangroves; in others the coast presents to the sea bold headlands, cliffs, mostly of a reddish hue, sparsely clad with greenery, or rolling hills covered by a growth of rank grass. The depth of the sea around the shore rarely exceeds a maximum depth of 1 to 3 fathoms, and the coast as a whole offers few accessible ports. The towns and seaports are to be found as a rule at or near the mouths of those rivers which are not barricaded too efficiently by bars formed of mud or sand. All round the long coast-line of Dutch Borneo there are only seven ports of call, which are habitually made use of by the ships of the Dutch Packet Company. They are Pontianak, Banjermasin, Kota Bharu, Pasir, Samarinda, Beru and Bulungan. The islands off the coast are not numerous. Excluding some of alluvial forma- tion at the mouths of many of the rivers, and others along the shore which owe their existence to volcanic upheaval, the principal islands are Banguey and Balambangan at the northern extremity, Labuan (.q.v.), a British colony off the west coast of the territory of North Borneo, and the Karimata Islands off the south-west coast. On Great Karimata is situated the village of Palembang with a population of about 500 souls employed in fishing, mining for iron, and trading in forest produce.

Rivers. — The rivers play a very important part in the economy of Borneo, both as highways and as lines along which run the main arteries of population. Hydrographically the island may be divided into five principal versants. Of these the shortest embraces the north-western slope, north of the Kapuas range, and discharges its waters into the China Sea. The most important of its rivers are the Sarawak, the Batang-Lupar, the Sarebas, the Rejang (navigable for more than 100 m.), the Baram, theLimbang or Brunei river, and the Padas. The rivers of British North Borneo to the north of the Padas are of no importance and of scant practical utility, owing to the fact that the mountain range here approaches very closely to the coast with which it runs parallel. In the south-western versant the largest river is the Kapuas, which, rising near the centre of the island, falls into the sea

between Mampawa and Sukadana after a long and winding course. This river, of volume varying with the tide and the amount of rainfall, is normally navigable by small steamers and

native prahus, of a draught of 4 to 5 ft., for 300 to 400 m., that is to say, from Pontianak up to Sintang, and thence as far as Benut. The middle part of this river, wider and more shallow than the lower reaches, gives rise to a region of inundation and lakes which extend as far as the northern mountain chain. Among its considerable tributaries may be mentioned the southern Melawi with its affluent the Penuh. It reaches the sea through several channels in a wide marshy delta. The Sambas, north of the Kapuas, is navigable in its lower course for vessels drawing 25 ft. Rivers lying to the south of the Kapuas, but of less importance in the way of size, commerce and navigation, are the Simpang, Pawanand Kandawangan,in the neighbourhood of whose mouths, or upon the adjacent coast, the principal native villages are situated in each case. The Barito, which is the principal river of the southern versant, takes its rise in the Kuti Lama Lake, and IV. 9 r

falls into the Java Sea in 114 30′ E. Its upper reaches are greatly impeded by rocks, rapids and waterfalls, but the lower part of its course is wide, and traverses a rich, alluvial district, much of which is marshy. Cross branches unite it with two rivers of considerable size towards the west, the Kapuas Murung or Little Dyak, and the Kahayan or Great Dyak. The Katingan or Mendawci, the Sampit, Pembuang or Surian and the Kota Waringin are rivers that fall into the sea farther to the west. The rivers of the southern versant are waters of capacious drainage, the basin of the Kahayan having, for instance, an area of 16,000 sq. m., and the Barito one of 38,000 sq. m. These rivers are navigable for two-thirds of their course by steamers of a fair size, but in many cases the bars at their mouths present considerable difficulties to ships drawing anything over 8 or 9 ft. Most of the larger affluents of the Barito are also navigable throughout the

greater part of their courses. The south-eastern like the north- western corner of the island is watered by a considerable number of short

mountain streams. The one great river of the eastern versant is the Kutei or Mahakan, which, rising in the central mountains, flows east with a sinuous course and falls by numerous mouths into the Straits of Macassar. At a great distance from its mouth it has still a depth of three fathoms, and in all its physical features it is comparable to the Kapuas and Barito. The Kayan or Bulungan river is the only other in the eastern versant that calls for mention. Most of the rivers of the northern versant are comparatively small, as the island narrows into a kind of pro- montory. Of these the Kinabatangan in the territory of British North Borneo is the most important. Lakes are neither numerous nor very large. In most cases they are more fittingly described as swamps. In the flood area of the upper Kapuas, of which mention has already been made, there occurs Lake Luar, and there are several lake expanses of a similar character in the basins of the Barito and Kutei rivers. The only really fine natural harbour in the island of which any use has been made is that of Sandakan, the principal settlement of the North Borneo Company on the north coast.

Geology. — The geology of Borneo is very imperfectly known The mountain range which lies between Sarawak and the Dutch possessions, and may be looked upon as the backbone of the island, consists chiefly of crystalline schists, together with slates, sandstones and limestones. All these beds are much disturbed and folded. The sedimentary deposits were formerly believed to be Palaeozoic, but Jurassic fossils have since been found in them, and it is probable that several different formations are represented. Somewhat similar rocks appear to form the axis of the range in south-east Borneo, and possibly of the Tampatung Mountains. But the Muller range, the Madi plateau, and the Schwaner Mountains of west Borneo, consist chiefly of almost undisturbed sedimentary and volcanic rocks of Tertiary age. The low-lying country between the mountain ranges is covered for the most part by Tertiary and Quaternary deposits, but Cretaceous beds occur at several localities. Some of the older rocks of the mountain regions have been referred to the Devonian, but the evidence cannot be considered conclusive. Vertebraria and Phyllotheca, plants characteristic of the Indian Gondwana series, have been recorded in Sarawak; and marine forms, similar to those of the lower part of the Australian Carboniferous system, are stated to occur in the limestone of north Borneo. P seudomonotis salinaria, a Triassic form, has been noted from the schists of the west of Borneo. In the Kapoewas district radiolarian cherts supposed to be of Jurassic age are met with. Undoubted Jurassic fossils, belonging to several horizons, have been described from west Borneo and Sarawak. The Cretaceous beds, which have long been known in west Borneo, are comparatively little

disturbed. They consist for the most part of marls with Orbitolina concava, and are referred to the Cenomanian. Cretaceous beds of somewhat later date are found in the Marpapura district in south-east Borneo. The Tertiary system includes conglomerates, sandstones, limestones and marls, which appear to be of Eocene, Oligocene and Miocene age. They contain numerous seams of coal. The Tertiary beds generally lie nearly horizontal and form the lower hills, but in the Madi plateau and the Schwaner range they rise to a height of several thousand feet. Volcanic rocks of Tertiary and late Cretaceous age are exten- sively developed, especially in the Muller Mountains. The whole of this consists of tuffs and lavas, andesites prevailing in the west and rhyolites and dacites in the east.

Minerals. — The mineral wealth of Borneo is great and varied. It includes diamonds, the majority of which, however, are of a somewhat yellow colour, gold, quicksilver, cinnabar, copper, iron, tin, antimony, mineral oils, sulphur, rock-salt, marble and coal. The exploitation of the mines suffers in many cases from the difficulties and expense of transport, the high duties payable in Dutch Borneo to the native princes, the competition among the rival companies, and often the limited quantities of the – minerals found in the mines. The districts of Sambas and Landak in the west, the Kahayan river, the mountain valleys of the extreme south-east and parts of Sarawak furnish the largest quantities of gold, which is obtained for the most part from alluvial washings. The Borneo Company is engaged in working gold-mines in the upper part of the Sarawak valley, and the prospects of the enterprise, which is conducted on a fairly ex- tensive scale, are known to be encouraging. Diamonds are also found widely distributed and mainly in the same regions as the gold. The Kapuas valley has so far yielded the largest quantity, and Pontianak is, for diamonds, the principal port of export.

Considerable progress has been made in the development of the oil-fields in Dutch Borneo, and the Ncdcrlandsch Indische Industrie en Handel Maatschappij, the Dutch business of the Shell Transport and Trading Company, increased its output from 123,592 tons in 1901 to 285,720 tons in 1904, and showed further satisfactory increase thereafter. This company owns extensive oil-fields at Balik Papan and Sanga-Sanga. The quality of the oil varies in a remarkable way according to the depth. The upper stratum is struck at a depth of 600 to 700 ft., and yields a natural liquid fuel of heavy specific gravity. The next source is met with at about 1 200 ft., yielding an oil which is much lighter in weight and, as such, more suitable for treatment in the refinery. The former oil is almost invariably of an asphalte basis, whereas the latter sometimes is found to contain a considerable

percentage of paraffin wax. The average daily production is very high, owing to a large number of the wells flowing under the natural pressure of the gas. There is every reason to believe that the oil-fields of Dutch Borneo have a great future. Coal mines have, in many instances, been opened and abandoned, failure being due to the difficulty of production. Coal of good quality has been found in Pengaron and elsewhere in the Banjer- masin district, but most Borneo coal is considerably below this average of excellence. It has also been found in fair quantities at various places in the Kutei valley and in Sarawak. The coal- mines of Labuan have been worked spasmodically, but success has never attended the venture. Sadohg yields something under 130 tons a day, and the Brooketown mine, the property of the raja of Sarawak, yields some 50 tons a day of rather indifferent coal. The discovery that Borneo produced antimony was made in 1825 by John Crawfurd, the orientalist, who learned in that year that a quantity had been brought to Singapore by a native trader as ballast. The supply is practically unlimited and widely distributed. The principal mine is at Bidi in Sarawak.

Climate and Health. — As is to be anticipated, having regard to its insular position and to the fact that the equator passes through the very middle of the island, the climate is at once hot and very damp. In the hills and in the interior regions are found which may almost be described as temperate, but on the coasts the atmo- sphere is dense, humid and oppressive. Throughout the average temperature is from 78 to 8o° F., but the thermometer rarely falls below 70 , except in the hills, and occasionally on excep- tional days mounts as high as 96° in the shade. The rainy westerly winds (S.W. and N.W.) prevail at all the meteoro- logical stations, not the comparatively dry south-east wind. Even at Banjermasin, near the south coast, the north-west wind brings annually a rainfall of 60 in., as against 33 in. of rain carried by the south-east wind. The difference between the seasons is not rigidly marked. The climate is practically un- changing all the year round, the atmosphere being uniformly moist, and though days of continuous downpour are rare, com- paratively few days pass without a shower. Most rain falls between November and May, and at this season the torrents are tremendous while they last, and squalls of wind are frequent and violent, almost invariably preceding a downpour. Over such an extensive area there, is, of course, great variety in the climatic character of different districts, especially when viewed in relation to health. Some places, such as Bidi in Sarawak, for instance, are notoriously unhealthy; but from the statistics of the Dutch government, and the records of Sarawak and British North Borneo, it would appear that the European in Borneo has in general not

appreciably more to fear than his fellow in Java, or in the Federated Malay States of the Malayan Peninsula. Among the native races the prevailing diseases, apart from those of a malarial origin, are chiefly such as arise from bad and in- sufficient food, from intemperance, and from want of cleanliness. The habit of allowing their meat to putrefy before regarding it as fit for food, and of encouraging children of tender age to drink to intoxication, accounts for absence of old folk and the heavy mortality which are to be observed among the Muruts of British North Borneo and some of the other more debased tribes of the interior of the island. Scrofula and various forms of lupus are common among the natives throughout the country and

especially in the interior; elephantiasis is frequently met with on the coast. Smallpox, dysentery and fevers, frequently of a bilious character, are endemic and occasionally epidemic. Cholera breaks out from time to time and works great havoc, as was the case in 1903 when one of the raja of Sarawak's punitive expeditions was stricken while ascending the Limbang river by boat, and lost many hundreds of its numbers before the coast could be regained. Ophthalmia is common and sometimes will attack whole tribes. About one sixth of the native population of the interior, and a smaller proportion of those living on the coast, suffer from a kind of ringworm called kurap, which also prevails almost universally among the Sakai and Semang, the aboriginal hill tribes of the Malayan Peninsula. The disease is believed to be aggravated by chronic anaemia. Consumption is not uncommon.

Fauna. — The fauna of Borneo comprises a large variety of species, many of which are numerically of great importance. Among the quadrupeds the most remarkable is the orang-utan (Malay, 6rang utan, i.e. jungle man), as the huge ape, called mias or m&yas by the natives, is* named by Europeans. Numerous species of monkey are found in Borneo, including the wahwah, a kind of gibbon, a creature far more human in appearance and habits than the orang-utan, and several Semnopitheci, such as the long-nosed ape and the golden-black or chrysomelas. The large- eyed Stenops tardigradus also deserves mention. The larger beasts of prey are not met with, and little check is therefore put on the natural fecundity of the graminivorous species. A small panther and the clouded tiger (so called) — Felis macroscelis — are the largest animals of the cat kind that occur in Borneo. The Bengal tiger is not found. The Malay or honey-bear is very common.

The rhinoceros and the elephant both occur in the northern part of the island, though both are somewhat rare, and in this connexion it should be noted that the distribution of quadrupeds as between Borneo, Sumatra and the Malayan Peninsula is somewhat peculiar and seemingly somewhat cap- ricious. Many quadrupeds, such as the honey-bear and the rhinoceros, are common to all, but while the tiger is common both in the Malayan Peninsula and in Sumatra, it does not occur in Borneo; the elephant, so common in the peninsula, and found in Borneo, is unknown in Sumatra; and the orang-utan, so plentiful in parts of Borneo and parts of Sumatra, has never been discovered in the Malay Peninsula. It has been suggested, but with very scant measure of probability, that the existence of elephants in Borneo, whose confinement to a single district is remarkable and unexplained, is due to importation; and the fact is on record that when Magellan's ships visited Brunei in 1522 tame elephants were in use at the court of the sultan of Brunei. Wild oxen of the Sunda race, not to be in any way con- founded with the Malayan seladang or gaur, are rare, but the whole country swarms with wild swine, and the babirusa, a pig with curious horn-like tusks, is not uncommon. Alligators are found in most of the rivers, and the gavial is less frequently met with. Three or four species of deer are common, including the mouse-deer, or plandok, an animal of remarkable grace and beauty, about the size of a hare but considerably less heavy. Squirrels, flying-squirrels, porcupines, civet-cats, rats, bats, flying-foxes and lizards are found in great variety; snakes of various kinds, from the boa-constrictor downward, are abundant, while the forests swarm with tree-leeches, and the marshes with horse-leeches and frogs. A remarkable flying-frog was discovered by Professor A. R. Wallace. Birds are somewhat rare in some quarters. The most important are eagles, kites, vultures, falcons, owls, horn-bills, cranes, pheasants (notably the argus, fire-back and peacock-pheasants), partridges, ravens, crows, parrots, pigeons, woodpeckers, doves, snipe, quail and swallows. Of most of these birds several varieties are met with. The Cypselus esculentus, or edible-nest swift, is very common, and the nests, which are built mostly in limestone caves, are esteemed the best in the archipelago. Mosquitoes and sand-flies are the chief insect pests, and in some districts are very troublesome. Several kinds of parasitic jungle ticks cause much annoyance to men and to beasts. There are also two kinds of ants, the sSmut dpi (" fire

ant") and the stmut Idda ("pepper ant"), whose bites are peculiarly painful. Hornets, bees and wasps of many varieties abound. The honey and the wax of the wild bee are collected by the natives. Butterflies and moths are remarkable for their number, size, variety and beauty.

Beetles are no less numer- ously represented, as is to be expected in a country so richly wooded as Borneo. The swamps and rivers, as well as the sur- rounding seas, swarm with fish. The siawan is a species of fish found in the rivers and valued for its spawn, which is salted. The natives are expert and ingenious fishermen. Turtles, trepang and pearl-shell are of some commercial importance.

The dog, the cat, the pig, the domestic fowl (which is not very obviously related to the bantam of the woods), the buffalo, a smaller breed than that met with in the Malayan Peninsula, and in some districts bullocks of the Brahmin breed and small horses, are the principal domestic animals. The character of the country and the nomadic habits of many of the natives of the interior, who rarely occupy their villages for more than a few years in succession, have not proved favourable to pastoral modes of life. The buffaloes are used not only in agriculture, but also as beasts of burden, as draught-animals and for the saddle. Horses, introduced by Europeans and owned only by the wealthier classes, are found in Banjermasin and in Sarawak. In British North Borneo, and especially in the district of Tem- pasuk on the north-west coast, Borneo ponies, bred originally, it is supposed, from the stock which is indigenous to the Sulu archipelago, are common.

Flora. — The flora of Borneo is very rich, the greater portion of the surface of the island being clothed in luxuriant vegetation. The king of the forest is the tapan, which, rising to a great height without fork or branch, culminates in a splendid dome of foliage. The official seats of some of the chiefs are constructed from the wood of this tree. Iron-wood, remarkable for the durability of its timber, is abundant; it is used by the natives for the pillars of their homes and forms an article of export, chiefly to Hong- Kong. It is rivalled in hardness by the kdyu tSmbSsu. In all, about sixty kinds of timber of marketable quality are furnished in more or less profusion, but the difficulty of extraction, even in the regions situated in close proximity to the large waterways, renders it improbable that the timber trade of Borneo will attain to any very great dimensions until other and easier sources of supply have become exhausted. Palm-trees are abundant in great variety, including the nlpah, which is much used for thatch- ing, the cabbage, fan, sugar, coco and sago palms. The last two furnish large supplies of food to the natives, some copra is ex- ported, and sago factories, mostly in the hands of Chinese, prepare sago for the Dutch and British markets. Gutta-percha {gStah percha in the vernacular), camphor, cinnamon, cloves, nutmegs, gambir and betel, or areca-nuts, are all produced in the island; most of the tropical fruits flourish, including the much-admired but, to the uninitiated, most evil-smelling durian, a

large fruit with an exceedingly strong outer covering composed of stout pyramidal spikes, which grows upon the branches of a tall tree and occasionally in falling inflicts considerable injuries upon passers-by. Yams, several kinds of sweet potatoes, melons, pumpkins, cucumbers, pineapples, bananas and mangosteens are cultivated, as also are a large number of other fruits. Rice is grown in irrigated lands near the rivers and in the swamps, and also in rude clearings in the interior; sugar-cane of superior quality in Sambas and Montrado; cotton, sometimes exported in small quantities, on the banks of the Negara, a tributary of the Barito; tobacco, used very largely now in the production of cigars, in various parts of northern Borneo; and tobacco for native consumption, which is of small commercial importance, is cultivated in most parts of the island. Indigo, coffee and pepper have been cultivated since 1855 in the western division of Dutch Borneo. Among the more beautiful of the flowering plants are rhododendrons, orchids and pitcher-plants — the latter reaching extraordinary development, especially in the northern districts about Kinabalu. Epiphytous plants are very common, many that are usually independent assuming here the parasitic character; the Vanda lowii, for example, grows on the

lower branches of trees, and its strange pendent flower-stalks often hang down so as almost to reach the ground. Ferns are abundant, but not so varied as in Java.

Population. — The population of Borneo is not known with any approach to accuracy, but according to the political divisions of the island it is estimated as follows: —

Dutch Borneo British North Borneo Sarawak Brunei

1,130,000

200,000

500,000

20,000

No effective census of the population has ever been taken, and vast areas in Dutch Borneo and in British North Borneo remain unexplored, and free from any practical authority or control. In Sarawak, owing to

the high administrative genius of the first raja and his successor, the natives have been brought far more completely under control, but the raja has never found occasion to utilize the machinery of his government for the accurate enumeration of his subjects.

Dutch Borneo is divided for administrative purposes into two divisions, the western and the south and eastern respectively. Of the two, the former is under the more complete and effective control. The estimated population in the western division is 413,000 and in the south and eastern 717,000. Europeans number barely 1000; Arabs about 3000, and Chinese, mainly in the western division, -over 40,000. In both divisions there is an average density of little more than 1 to every 2 sq. m. The sparseness of the population throughout the Dutch territory is due to a variety of causes — to the physical character of the country, which for the most part restricts the area of population to the near neighbourhood of the rivers; to the low standard of civilization to which the majority of the natives have attained and the consequent disregard of sanitation and hygiene; to wars, piracy and head-hunting, the last of which has not even yet been effectually checked among some of the tribes of the interior; and to the aggression and oppressions in earlier times of Malayan, Arab and Bugis settlers. Among the natives, more especially of the interior, an innate restlessness which leads to a life of spasmodic nomadism, poverty, insufficient nourishment, an incredible improvidence which induces them to convert into intoxicating liquor a large portion of their annual crops, feasts of a semi-religious character which are invariably accompanied by prolonged drunken orgies, and certain superstitions which necessitate the frequent procuration of abortion, have contributed to check the growth of population. In Sambas, Montrado and some parts of Pontianak, the greater density of the population is due to the greater fertility of the soil, the opening of mines, the navigation and trade plied on the larger rivers, and the con- centration of the population at the junctions of rivers, the mouths of rivers and the seats of government. Of the chief place in the western division, Pontianak has about 9000 inhabitants; Sambas about 8000; Montrado, Mampawa and Landak between 2000 and 4000 each; and in the south and eastern division there are Banjermasin with nearly 50,000 inhabitants; Marabahan, Amuntai, Negara, Samarinda and Tengarung with populations of from 5000 to 10,000 inhabitants each. In Amuntai and Marta- pura early Hindu colonization, of which the traces and the influence still are manifest, the fertile soil, trade and industry aided by navigable rivers, have co-operated towards the growth of population to a degree which presents a marked contrast to the conditions in the interior parts of the Upper Barito and of the

more westerly rivers. Only a very small proportion of the Europeans in Dutch Borneo live by agriculture and industry, the great majority of them being officials. The Arabs and Chinese are engaged in trading, mining, fishing and agriculture. Of the natives fully 90 % live by agriculture, which, however, is for the most part of a somewhat primitive description. The industries of the natives are confined to such crafts as spinning and weaving and dyeing, the manufacture of iron weapons and implements, boat- and shipbuilding, &c. More particularly in the south- eastern division, and especially in the districts of Negara, Banjermasin, Amuntai and Martapura, shipbuilding, iron- forging, gold- and silversmith's work, and the polishing of

diamonds, are industries of high development in the larger centres of population.

Races. — The peoples of Borneo belong to a considerable variety of races, of different origin and degrees of civilization. The most important numerically are the Dyaks, the Dusuns and Muruts of the interior, the Malays, among whom must be counted such Malayan tribes as the Bajaus, Ilanuns, &c, the Bugis, who were originally immigrants from Celebes, and the Chinese. The Dutch, and to a minor extent the Arabs, are of importance on account of their political influence in Dutch Borneo, while the British communities have a similar importance in Sarawak and in British North Borneo. Accounts of the Malays, Dyaks and Bugis are given under their several headings, and some information concerning the Dusuns and Muruts will be found in the section below, which deals with British North Borneo. The connexion of the Chinese with Borneo calls for notice here. They seem to have been the first civilized people who had dealings with Borneo, if the colonization of a portion of the south-eastern corner of the island by Hindus be excepted. The Chinese annals speak of tribute paid to the empire by Pha-la on the north-east coast of the island as early as the 7th century, and later documents mention a Chinese colonization in the 15th century. The traditions of the Malays and Dyaks seem to con- firm the statements, and many of the leading families of Brunei in north-west Borneo claim to have Chinese blood in their veins, while the annals of Sulu record an extensive Chinese immigration about 1575. However this may be, it is certain that the flourishing condition of Borneo in the 16th and 17th centuries was largely due to the energy of Chinese settlers and to trade with China. In the 18th century there was a consider- able Chinese population settled in Brunei, engaged for the most part in planting and exporting pepper, but the consistent oppression of the native rajas destroyed their industry and led eventually to the practical extirpation of the

Chinese. The Malay chiefs of other districts encouraged immigration from China with a view to developing the mineral resources of their territories, and before long Chinese settlers were to be found in considerable numbers in Sambas, Montrado, Pontianak and elsewhere. They were at first forbidden to engage in commerce or agriculture, to carry firearms, to possess or manufacture gun- powder. About 1779 the Dutch acquired immediate authority over all strangers, and thus assumed responsibility for the control of the Chinese, who presently proved themselves some- what troublesome. Their numbers constantly increased and were reinforced by new immigrants, and pushing inland in search of fresh mineral-bearing areas, they contracted frequent inter- marriages with the Dyaks and other non-Mahommedan natives. They brought with them from China their aptitude for the organization of secret societies which, almost from the first, assumed the guise of political associations. These secret societies furnished them with a machinery whereby collective action was rendered easy, and under astute leaders they offered a formidable opposition to the Dutch government. Later, when driven into the interior and eventually out of Dutch territory, they cost the first raja of Sarawak some severe contests before they were at last reduced to obedience. Serious disturbances among the Chinese are now in Borneo matters of ancient history, and to-day the Chinaman forms perhaps the most valuable element in the civilization and development of the island, just as does his fellow in the mining states of the Malayan Peninsula. They are in- dustrious, frugal and intelligent;' the richer among them are excellent men of business and are peculiarly equitable in their dealings; the majority of all classes can read and write their own script, and the second generation acquires an education of an European type with great facility. The bulk of the shop- keeping, trading and mining industries, so long as the mining is of an alluvial character, is in Chinese hands. The greater part of the Chinese on the west coast are originally drawn from the boundaries of Kwang-tung and Kwang-si. They are called Kehs by the Malays, and are of the same tribes as those which furnish the bulk of the workers to the tin mines of the Malay Peninsula. They are a rough and hardy people, and are

apt at times to be turbulent. The shopkeeping class comes mostly from Fuh-kien and the coast districts of Amoy. They are known to the Borneans as Ollohs.

History. — As far as is known, Borneo never formed a political unity, and even its geographical unity as an island is a fact unappreciated by the vast majority of its native inhabitants. The name of Kalamantan has been given by some Europeans (on what original authority it is not possible now to ascertain) as the native name for the island of Borneo considered as a whole; but it is safe to aver that among the natives of the island itself Borneo has never borne any general designation. To this day, among the natives of the Malayan Archipelago, men speak of going to Pontianak, to Sambas or to Brunei, as the case may be, but make use of no term which recognizes that these localities are part of a single whole. The only archaeological remains are a few Hindu temples, and it is probable that the early settlement of the south-eastern portion of the island by Hindus dates from some time during the first six centuries of our era. There exist, however, no data, not even any trustworthy tradition, from which to reconstruct the early history of Borneo. Borneo began to be known to Europeans after the fall of Malacca in 1511, when Alphonso d' Albuquerque despatched Antonio d' Abreu with three ships in search of the Molucca or Spice Islands with instructions to establish friendly relations with all the native states that he might encounter on his way. D 'Abreu, sailing in a south- easterly direction from the Straits of Malacca, skirted the southern coast of Borneo and laid up his ships at Amboyna, a small island near the south-western extremity of Ceram. He returned to Malacca in 1314, leaving one of his captains, Francisco Serrano, at Ternate , where Magellan's followers found him in 1 5 2 1 . After Magellan's death, his comrades sailed from the Moluccas across the Celebes into the Sulu Sea, and were the first white men who are known to have visited Brunei on the north-west coast of Borneo, where they arrived in 1 522. Pigafetta gives an interest- ing account of the place and of the reception of the adventurers by the sultan. The Molucca Islands being, at that time, the principal objective of European traders, and the route followed by Magellan's ships being frequently used, Borneo was often touched at during the remainder of the 16th century, and trade relations with Brunei were successfully established by the Portuguese. In 1573 the Spaniards tried somewhat unsuccess- fully to obtain a share of this commerce, but it was not until 1580, when a dethroned sultan appealed to them for asistance and by their agency was restored to his own, that they attained their object. Thereafter the Spaniards maintained a fitful intercourse with Brunei, varied by not infrequent hostilities, and in 1645 a punitive expedition on a larger scale than hereto- fore was sent to chastise Brunei for persistent acts of piracy. No attempt at annexation followed upon this action, commerce rather than territory being at this period the prime object of both the Spaniards and the Portuguese, whose

influence upon the natives was accordingly proportionately small. The only effort at proselytizing of which we have record came to an untimely end in the death of the Theatine monk, Antonio Venti- miglia, who had been its originator. Meanwhile the Dutch and British East India Companies had been formed, had destroyed the monopoly so long enjoyed'by the Portuguese, and to a less extent the Spaniards, in the trade of the Malayan Archipelago, and had gained a footing in Borneo. The establishment of Dutch trading-posts on the west coast of Borneo dates from 1604, nine years after the first Dutch fleet, under Houtman, sailed from the Texel to dispute with the Portuguese the posses- sion of the Eastern trade, and in 1608 Samuel Blommaert was appointed Dutch resident, or head factor, in Landak and Suke- dana. The first appearance of the British in Borneo dates from 1609, and by 1698 they had an important settlement at Banjer- masin, whence they were subsequently expelled by the influence of the Dutch, who about 1733 obtained from the sultan a trad- ing monopoly. The Dutch, in fact, speedily became the pre- dominant European race throughout the Malay Archipelago, defeating the British by superior energy and enterprise, and the trading-posts all along the western and southern coasts of

Borneo were presently their exclusive possessions, the sultan of Bantam, who was the overlord of these districts, ceding his rights to the Dutch. The British meanwhile had turned their attention to the north of the island, over which the sultan of Sulu exercised the rights of suzerain, and from him, in 1759, Alexander Dalrymple obtained possession of the island of Balambangan, and the whole of the north-eastern promontory. A military post was established, but it was destroyed in 1775 by the natives under the ddto' , or vassal chiefs, who resented the cession of their territory. This mishap rendered a treaty, which had been concluded in 1774 with, the sultan of Brunei, practically a dead letter, and by the end of the century British influence in Borneo was to all intents and purposes at an end. The Dutch also mismanaged their affairs in Borneo and suffered from a series of misfortunes which led Marshal Daendels in 1809 to order the abandonment of all their posts. The natives of the coasts of Borneo, assisted and stimulated by immigrants from the neighbouring islands to the north, devoted themselves more and more to organized piracy, and putting to sea in great fleets manned by two and three thousand men on cruises that lasted for two and even three years, they terrorized the neighbouring seas and rendered the trade of civilized nations almost impossible for a prolonged period. During the occupation of Java by the British an embassy was despatched to Sir Stamford Raffles by the sultan of Banjermasin asking for assistance,

and in 181 1 Alexander Hare was despatched thither as commissioner and resident. He not only obtained for his government an advantageous treaty, but secured for himself a grant of a district which he proceeded to colonize and cultivate. About the same time a British expedition was also sent against Sambas and a post established at Pontianak. On the restoration of Java to the Dutch in 1816, all these arrangements were cancelled, and the Dutch government was left in undisputed possession of the field. An energetic policy was soon after adopted, and about half the kingdom of Banjermasin was surrendered to the Dutch by its sultan in 1823, further concessions being made two years later. Meanwhile, George Muller, while exploring the east coast, obtained from the sultan of Kutei an acknowledgment of Dutch authority, a concession speedily repented by its donor, since the enterprising traveller was shortly afterwards killed. The out- break of war in Java caused Borneo to be more or less neglected by the Dutch for a considerable period, and no effective check was imposed upon the natives with a view to stopping piracy, which was annually becoming more and more unendurable. On the rise of Singapore direct trade had been established with Sarawak and Brunei, and it became a matter of moment to British merchants that this traffic should be safe. In 1838 Sir James Brooke, an Englishman, whose attention had been turned to the state of affairs in the Eastern Archipelago, set out for Borneo, determined, if possible, to remedy the evil. By 1841 he had obtained from the sultan of Brunei the grant of supreme authority over Sarawak, in which state, on the sultan's behalf, he had waged a successful war, and before many years had elapsed he had, with the aid of the British government, suc- ceeded in suppressing piracy (see Brooke, Sir James; and Sarawak). In 1847 the sultan of Brunei agreed to make no cession of territory to any nation .or individual without the consent of Great Britain. Since then more and more territory has been ceded by the sultans of Brunei to the raja of Sarawak and to British North Borneo, and to-day the merest remnant of his once extensive state is left within the jurisdiction of the sultan. The treaty in 1847 put an end once for all to the hopes which the Dutch had cherished of including the whole island in their dominions, but it served also to stimulate their efforts to consolidate their power within the sphere already subjected to their influence. Gunong Tebur, Tanjong, and Bulungan had made nominal submission to them in 1834, and in 1844 the sultan of Kutei acknowledged their protectorate, a treaty of a similar character being concluded about the same time with Pasir. The boundaries of British and Dutch Borneo . were finally defined by a treaty concluded on the 20th of June 1 89 1. In spite of this, however, large areas in the interior,

both in Dutch Borneo and in the territory owned by the British North Borneo Company, are still only nominally under European control, and have experienced few direct effects of European administration.

British North Borneo or Sabah

Sabah is the name applied by the natives to certain portions of the territory situated on the north-western coast of the island, and originally in no way included the remainder of the country now owned by the British North Borneo Company. It has become customary, however, for the name to be used by Europeans in Borneo to denote the whole of the company's territory, and little by little the more educated natives are insensibly adopting the practice.

History. — As has been seen, the British connexion with north- ern and north-western Borneo terminated with the 18th century, nor was it resumed until 1838, when Raja Brooke set out for Brunei and Sarawak. The island of Labuan (q.v.) was occupied by the British as a crown colony in 1848, and this may be taken as the starting-point of renewed British relations with that portion of northern Borneo which is situated to the north of Brunei. In 1872 the Labuan Trading Company was established in Sandakan, the fine harbour on the northern coast which was subsequently the capital of the North Borneo Company's territory. In 1878, through the instrumentality of Mr (after- wards Sir) Alfred Dent, the sultan of Sulu was induced to transfer to a syndicate, formed by Baron Overbeck and Mr Dent, all his rights in North Borneo, of which, as has been seen, he had been from time immemorial the overlord. The chief promoters of this syndicate were Sir Rutherford Alcock, Admiral the Hon. Sir Harry Keppel, who at an earlier stage of his career had rendered great assistance to the first raja of Sarawak in the suppression of piracy, and Mr Richard B. Martin. Early in 188 1 the British North Borneo Provisional Association, Limited, was formed to take over the concession which had been obtained from the sultan of Sulu, and in November of that year a petition was addressed to Queen Victoria praying for a royal charter. This was granted, and subsequently the British North Borneo Company, which was formed in May 1882, took over, in spite of some diplomatic protests on the part of the Dutch and Spanish governments, all the sovereign and territorial rights ceded by the original grants, and proceeded under its charter to organize the administration of the territory. The company subsequently acquired

further sovereign and territorial rights from the sultan of Brunei and his chiefs in addition to some which had already been obtained at the time of the formation of the company. The Putatan river was ceded in May 1884, the Padas district, including the Padas and Kalias rivers, in November of the same year, the Kawang river in February 1885, and the Mantanani islands in April 1885. In 1888, by an agreement with the " State of North Borneo," the territory of the company was made a British protectorate, but its administration remained entirely in the hands of the company, the crown reserving only control of its foreign relations, and the appointment of its governors being required to receive the formal sanction of the secretary of state for the colonies. In 1890 the British government placed the colony of Labuan under the administration of the company, the governor of the state of North Borneo thereafter holding a royal commission as governor of Labuan in addition to his commission from the company. This arrangement held good until 1905, when, in answer to the frequently and strongly expressed desire of the colonists, Labuan was removed from the jurisdiction of the company and attached to the colony of the Straits Settlements. In March 1898 arrangements were made whereby the sultan of Brunei ceded to the company all his sovereign and territorial rights to the districts situated to the north of the Padas river which up to that time had been retained by him. This had the effect of rounding off the company's territories, and had the additional advantage of doing away with the various no-man's lands which had long been used by the discontented among the natives as so many Caves of Adullam. The company's acquisi- tion of territory was viewed with considerable dissatisfaction

by many of the natives, and this found expression in frequent acts of violence. The most noted and the most successful of the native leaders was a Bajau named Mat Saleh (Mahomet Saleh), who for many years defied the company, whose policy in his regard was marked by considerable weakness and vacillation. In 1898 a composition was made with him, the terms of which were unfortunately not defined with sufficient clearness, and he retired into the Tambunan country, to the east of the range which runs parallel with the west coast, where for a period he lorded it unchecked over the Dusun tribes of the valley. In 1899 it was found necessary to expel him, since his acts of aggres- sion and defiance were no longer endurable. A short, and this time a successful campaign followed, resulting, on the 31st of January 1900, in the death of Mat Saleh, and the destruction of his defences. Some of his followers who escaped raided the town of Kudat on Marudu Bay in April of the same year, but caused more panic than damage, and little by little during the next years the last smouldering

embers of rebellion were extinguished. At the present time, though effective administration of the more inaccessible districts of the interior cannot be said to have been established even yet, the pacification of the native population is to all intents and purposes complete. The Tambunan district, the last stronghold of Mat Saleh, is now thoroughly settled. It is some 500 sq. m. in extent, and carries a population of perhaps 12,000.

Geography. — The state of North Borneo may roughly be said to form a pentagon of which three sides, the north-west, north- east and east are washed by the sea, while the remaining two sides, the south-west and the south, are bordered respectively by the Malayan sultanate of Brunei, and by the territories of the raja of Sarawak and of the Dutch government. The boundary between the company's territory and the Dutch government is defined by the treaty concluded in June 1891, of which mention has already been made.

The total area of the company's territory is estimated at about 31,000 sq. m., with a coast-line of over 900 m. The greater portion is exceedingly hilly and in parts mountainous, and the interior consists almost entirely of highlands with here and there open valleys and plateaus of 50 to 60 sq. m. in extent. On the west coast the mountain range, as already noted, runs parallel with the seashore at a distance from it of about 15 m. Of this range the central feature is the mountain of Kinabalu, which is composed of porphyritic granite and igneous rocks and attains to a height of 13,698 ft. Mount Madalon, some 15 or 20 m. to the north, is 5000 ft. in height, and inland across the valley of the Pagalan river, which runs through the Tambunan country and falls into the Padas, rises the peak of Trus Madi, estimated to be 11,000 ft. above sea-level. The valley of the Pagalan is itself for the most part from 1000 to 2000 ft. above the sea, form- ing a string of small plateaus marking the sites of former lakes. From the base of Trus Madi to the eastern coast the country consists of huddled hills broken here and there by regions of a more mountainous character. The principal plateaus are in the Tambunan and Kaningau valleys, in the basin of the Pagalan, and the Ranau plain to the eastward of the base of Kinabalu. Similar plateaus of minor importance are to be found dotted about the interior. The proximity of the mountain range to the seashore causes the rivers of the west coast, with the single exception of the Padas, to be rapid, boulder-obstructed, shallow streams of little value as means of communication for a distance of more than half a dozen miles from their mouths. The Padas is navigable for light-draught steam-launches and native boats for a distance of nearly 50 m. from its mouth, and smaller craft can be punted up as far as Rayoh, some 15 m. farther, but at this point its

bed is obstructed by impassable falls and rapids, which are of such a character that nothing can even be brought down them. Even below Rayoh navigation is rendered difficult and occasionally dangerous by similar obstructions. The other principal rivers of the west coast are the Kalias, Kimanis, Benoneh, Papar, Kinarut, Putatan, Inaman, Mengkabong, Tampasuk and Pandasan, none of which, however, is of any great importance as a means of communication. There is a stout breed of pony

raised along the Tampasuk, which is also noted for the Kalupis waterfall (1500 ft.), one of the highest in the world, though the volume of water is not great. Here also are the principal Bajau settlements. Throughout the Malayan Archipelago the words Bajau and perompak (pirate) are still used as synonymous terms. At the northern extremity of the island Marudu Bay receives the waters of the Marudu which rises on the western side of Mount Madalon. On the east coast the principal rivers are the Sugut, which rises in the hills to the east of Kinabalu and forms its delta near Torongohok or Pura-Pura Island; the Labuk, which has its sources 70 m. inland and debouches into Labuk Bay; and the Kinabatangan, the largest and most important river in the territory, which is believed to have its rise eastward of the range of which Trus Madi is the principal feature, and is navigable by steamer for a considerable distance and by native boats for a distance of over 100 m. from its mouth. Some valuable tobacco land, which, however, is somewhat liable to flood, and some remarkable burial-caves are found in the valley of the Kinabatangan. The remaining rivers of the east coast are the Segamah, which rises west of Darvel Bay, the Kumpong, and the Kalabakang, which debouches into Cowie Harbour. Taking it as a whole, the company's territory is much less generously watered than are other parts of Borneo, which again compares unfavourably in this respect with the Malayan states of the peninsula. Many of the rivers, especially those of the west coast, are obstructed by bars at their mouths that render them difficult of access. Several of the natural harbours of North Borneo, on the other hand, are accessible, safe and commodious. Sandakan Harbour, on the north-east coast (5° 40′ N., 118° 10′ E.), runs inland for some 17 m. with a very irregular outline broken by the mouths of numerous creeks and streams. The mouth, only 2 m. across, is split into two channels by the little, high, bluff- like island of Barhala. The depth in the main entrance varies from 10 to 17 fathoms, and vessels drawing 20 ft. can advance half-way up the bay. The principal town in the

territory, and the seat of government (though an attempt has been unsuccess- fully made to transfer this to Jesselton on the west coast), is Sandakan, situated just inside the mouth of the Sarwaka inlet. At Silam, on Darvel Bay, there is good anchorage; and Kudat in Marudu Bay, first surveyed by Commander Johnstone of H.M.S. ” f/geria ” in 1881, is a small but useful harbour.

Climate and Population, — The climate of North Borneo is tropical, hot, damp and enervating. The rainfall is steady and not usually excessive. The shade temperature at Sandakan ordinarily ranges from 72 to 94 F. The population of the company’s territory is not’ known with any approach to accuracy, but is estimated, somewhat liberally, to amount to 175,000, including 16,000 Chinese. Of this total about three-fourths are found in the districts of the west coast. The seashore and the country bordering closely on the west coast are inhabited chiefly by Dusuns, by Kadayans, by Bajaus and Ilanuns — both Malayan tribes — and by Brunei Malays. The east coast is very sparsely populated and its inhabitants are mostly Bajaus and settlers from the neighbouring Sulu archipelago. The interior is dotted with infrequent villages inhabited by Dusuns or by Muruts, a village ordinarily consisting of a single long hut divided up into cubicles, one for the use of each family, opening out on to a common verandah along which the skulls captured by the tribe are festooned. It has been customary to speak of these tribes as belonging to the Dyak group, but the Muruts would certainly seem to be the representatives of the aboriginal inhabitants of the island, and there is much reason to think that the Dusuns also must be classed as distinct from the Dyaks. The Dusun language, it is interesting to note, presents very curious gram- matical complications and refinements such as are not to be found among the tongues spoken by any of the other peoples of the Malayan Archipelago or the mainland of south-eastern Asia. Dusuns and Muruts alike are in a very low state of civiliza- tion, and both indulge inordinately in the use of intoxicating liquors of their own manufacture.

Settlements and Communication. — The company possesses a number of small stations along the coast, of which Sandakan,

with a population of 9 500, is the most important. The remainder which call for separate mention are Lahat Datu on Darvel Bay on the east coast; Kudat on Marudu Bay and Jesselton on Gaya Bay on the west coast. A railway of indifferent construction runs along the west coast from Jesselton to Weston on Brunei Bay, with a branch along the banks of the Padas to Tenom above the rapids. It was originally intended that this should eventually be extended across the territory

to Cowie Harbour (Sabuko Bay) on the east coast, but the extraordinary engineering difficulties which oppose themselves to such an extension, the sparse population of the territory, and the failure of the existing line to justify the expectations entertained by its designers, combine to render the prosecution of any such project highly improbable. Sandakan is connected by telegraph with Mempakul on the west coast whence a cable runs to Labuan and so gives telegraphic communication with Singapore. The overland line from Mem- pakul to Sandakan, however, passes through forest-clad and very difficult country, and telegraphic communication is therefore subject to very frequent interruption. Telegraphic communica- tion between Mempakul and Kudat, via Jesselton, has also been established and is more regularly and successfully maintained. The only roads in the territory are bridle-paths in the immediate vicinity of the company's principal stations. The Sabah Steam- ship Company, subsidized by the Chartered Company, runs steamers along the coast, calling at all the company's stations at which native produce is accumulated. A German firm runs vessels at approximately bi-monthly intervals from Singapore to Labuan and thence to Sandakan, calling in on occasion at Jesselton and Kudat en route. There is also fairly frequent communication between Sandakan and Hong-Kong, a journey of four days' steaming.

Products and Trade. — The capabilities of the company's territory are only dimly known. Coal has been found in the neighbourhood of Cowie Harbour and elsewhere, but though its quality is believed to be as good as that exported from Dutch Borneo, it is not yet known whether it exists in payable quantities. Gold has been found in alluvial deposits on the banks of some of the rivers of the east coast, but here again the quantity available is still in serious doubt. The territory as a whole has been very imperfectly examined by geologists, and no opinion can at present be hazarded as to the mineral wealth or poverty of the company's property. Traces of mineral oil, iron ores, copper, zinc and antimony have been found, but the wealth of North Borneo still lies mainly in its jungle produce. It possesses a great profusion of excellent timber, but the difficulty of extraction has so far restricted the lumber industry within somewhat modest limits. Gutta, rubber, rattans, mangrove-bark, edible nuts, guano, edible birds'nests, &c, are all valuable articles of export. The principal cultivated produce is tobacco, sago, cocoanuts, coffee, pepper, gambier and sugar canes. Of these the tobacco and the sago are the most important. Between 1886 and 1900 the value of the tobacco crop increased from £471 to £200,000.

As is common throughout Malayan lands, the trade of North Borneo is

largely in the hands of Chinese shopkeepers who send their agents inland to attend the Tamus (Malay, t&mu, to meet) or fairs, which are the recognized scenes of barter between the natives of the interior and those of the coast. At Sandakan there is a Chinese population of over 2000.

Administration. — For administrative purposes the territory is divided into nine provinces: Alcock and Dewhurst in the north; Keppel on the west; Martin in the centre; Myburgh, Mayne and Elphinstone on the east coast; and Dent and Cunliffe in the south. The boundaries of these provinces, how- ever, are purely arbitrary and not accurately defined. The form of government is modelled roughly upon the system adopted in the Malay States of the peninsula during the early days of their administration by British residents. The government is vested primarily in the court of directors appointed under the company's charter, which may be compared to the colonial office in its relation to a British colony, though the court of directors interests itself far more closely than does the colonial

department in the smaller details of local administration. The supreme authority on the spot is represented by the governor, under whom are the residents of Kudat, Darvel Bay and Keppel, officers who occupy much the same position as that usually known by the title of magistrate and collector. The less im- portant districts are administered by district magistrates, who also collect the taxes. The principal departments, whose chiefs reside at the capital, are the treasury, the land and survey, the public works, the constabulary, the medical and the judicial. The secretariat is under the charge of a government secretary who ranks next in precedence to the governor. Legislation is by the proclamation of the governor, but there is a council, meeting at irregular intervals, upon which the principal heads of departments and one unofficial member have seats. The public service is recruited by nomination by the court of directors. The governor is the chief judge of the court of appeal, but a judge who is subordinate to him takes all ordinary supreme Court cases. The laws are the Indian Penal and Civil Procedure Codes and Evidence Acts, supplemented by a few local laws pro- mulgated by proclamation. There is an Imam's court for the trial of cases affecting Mahommedan law of marriage, succession, &c. The native chiefs are responsible to the government for the preservation of law and order in their districts. They have restricted judicial powers. The constabulary numbers some

600 men and consists of a mixed force of Sikhs, Pathans, Punjabi Mahommedans, Dyaks and Malays, officered by a few Europeans. There is a Protestant mission which supports a church — the only stone building in the territory — and a school at Sandakan, with branches at Kudat, Kaningau and Tambunan. The Roman Catholic mission maintains an orphanage, a church and school at Sandakan, and has missions among the Dusuns at several points on the west coast and in the Tambunan country. Its head- quarters are at Kuching in Sarawak. The Chinese have their joss-houses and the Mahommedans a few small mosques, but the vast majority of the native inhabitants are pagans who have no buildings set apart for religious purposes.

Finance and Money. — The principal sources of revenue are the licences granted for the importation and retailing of opium, wine and spirits, which are in the hands of Chinese; a customs duty of 5 % on imports; an export tax of 5 % on jungle produce; a poll-tax sanctioned by ancient native custom; and a stamp duty. A land revenue is derived from the sale of government lands, from quit rents and fees of transfer, &c. Judicial fees bring in a small amount, and the issue and sale of postage and revenue stamps have proved a fruitful source of income. The people of the country are by no means heavily taxed, a large number of the natives of the interior escaping all payment of dues to the company, the revenue being for the most part contributed by the more civilized members of the community residing in the neighbourhood of the company's stations. There are bank agencies in Sandakan, and the company does banking business when required. The state, which has adopted the penny postage, is in the Postal Union, and money orders on North Borneo are issued in the United Kingdom and in most British colonies and vice versa. Notes issued by the principal banks in Singapore were made current in North Borneo in 1900. There is also a government note issue issued by the company for use within the territory only. The currency is the Mexican and British dollar, the company issuing its own copper coin — viz. cents and half cents. It is proposed to adopt the coinage of the Straits Settlements, and measures have been taken with a view to the accomplishment of this. In the interior the principal medium of exchange among the natives is the large earthenware jars, imported originally, it is believed, from China, which form the chief wealth both of tribes and individuals. (H. Cl.)

Authorities. — Among early works may be mentioned, S. Blom- maert, Discours ende ghelegentheyt van het eylandt Borneo int Jear i6oq; Hachelyke reystogt van Jacob Jansz. de Roy na Borneo en Atchin injiet jaar i6qi; Beeckman, Visit to Borneo, 1718, in J. Pinkerton's General Collections (1808-1814); F. Valentijn in Ond en Nieuw Oost

Indien (Dordrecht, 1724-1726). See also H. Keppel, Expedition to Borneo of H. M.S. ” Dido ” (London, 1846) ; R. Mundy, Narrative of Events in Borneo and Celebes (London, 1848) ; F. S.

Marryat, Borneo, &c. (1 848) ; P. J .Veth, Borneo’s Westerafdeeling (Zalt- Bommel, 1854 and 1856) ; S. M filler, Reizen en onderzoekingen in den Indischen Archipel (Amsterdam, 1857); C. Bock, Head-hunters of Borneo (London, 1881), and Reis in Oost en Zuid-Borneo (The Hague, 1887); J. Hatton, The New Ceylon, a Sketch of British North Borneo (London, 1882); F. Hatton, North Borneo (London, 1885); T. Posewitz, Borneo . . . Verbreitung der nutzbaren Mineralien (Berlin, 1889), Eng. trans., Borneo; its Geology and Mineral Resources (London, 1892); J. Whitehead, Exploration of Mount Kini Balu (London, 1893); Mrs W. B. Pryor, A Decade in Borneo (London, 1894); H. Ling Roth, The Natives of Sarawak and North Borneo (London, 1896); G. A. F. Molengraaf, Geologische Verkinningstochten in Centraal Borneo (Leiden, 1900, Eng. trans. 1902) ; A. W. Niewen- huis, In Centraal Borneo (Leiden, 1901), and Quer durch Borneo (Leiden, 1904), &c; W. H. Furness, Home Life of Borneo Head- hunters (London, 1902) ; O. Beccari, Nelle Foreste di Borneo (Florence, 1902), Eng. trans., Wanderings in the Great Forests of Borneo (London, 1904) ; D. Cator, Everyday Life among the Head-hunters (London, I9°5)- For geology, besides the works of Posewitz and Molengraaf already cited, see R. B. Newton in Geol. Mag., 1897, pp. 407-415, and Proc. Malac. Soc, London, vol. v. (1902-1903), pp. 403-409. A series of papers on the palaeontology of the island will be found in the several volumes of the Samml. Geol. R. Mus., Leiden.

BORNHOLM, an island in the Baltic Sea, 22 m. S.E. of the Swedish coast, belonging to Denmark, lying on 15° E., and between 55° and 55° 18′ N., and measuring 24 m. from S.E. to N.W. and 19 (extreme) from E. to W. Pop. (1901) 40,889. The surface is generally hilly; the scenery is fine in the north, where the cliffs reach a height of 135 ft., and the granite hill of Hellig- domsklipper dominates the island. Besides freestone, exported for building, limestone, blue marble, and porcelain-clay are worked. A little coal is found and used locally, but it is not of good quality. Oats, flax and hemp are cultivated. The inhabitants are employed in agriculture, fishing, brewing, distillation and the manufacture of earthenware. Weaving and clock-making are also carried on to some extent. The capital is Ronne (115 m. by sea from Copenhagen), and there are five other small towns on the island — Svanike, Nekso, Hasle, Allinge, and Sandvig. A railway connects Ronne with Nekso (22 m. E. by S.), where a bust commemorates J. N. Madvig, the philologist, who was born there in 1804 (d. 1886). Blanch’s Hotel, 10 m. N. of Ronne, is the most favoured resort on the

island, which attracts many visitors. On the north-west coast are the ruins of the castle of Hammershus, which was built in 1158, and long served as a state prison; while another old castle, erected by Christian V. in 1684, and important as com- manding the entrance to the Baltic, is situated on Christianso, one of a small group of islands 15 m. E. by N. The island of Bornholm has had an eventful history. In early times it was long the independent seat of marauding Vikings. In the 12th century it became a fief of the archbishop of Lund. In 15 10 it was captured by the Hanseatic League, in 1522 it came under Danish sway, and in 1526 it was made directly subject to the city of Liibeck. In 1645 the Swedes took it by storm, and their possession of it was confirmed by the peace of Roskilde in 1658; but the sympathies of the people were with Denmark, and a popular insurrection succeeded in expelling the Swedish forces, the island coming finally into the possession of Denmark in 1660.

BORNIER, HENRI, Vicomte de (1825-1901) French poet and dramatist, was born at Lunel (Herault) on the 25th of December 1825. He came to Paris in 1845 wit h the object of studying law, but in that year he published a volume of verse, Les Premieres Feuittes, and the Comedie Frangaise accepted a play of his entitled Le Mariage de Luther. He was given a post in the library of the Arsenal, where he served for half a century, becoming director in 1889. In 1875 was produced at the Theatre Francais his heroic drama in verse, La Fille de Roland. The action of the play turns on the love of Gerald, son of the traitor Ganelon, for the daughter of Roland. The patriotic subject and the nobility of the character of Gerald, who renounces Berthe when he learns his real origin, procured for the piece a great success. The conflict between honour and love and the grandiose sentiment of the play inevitably provoked comparison with Corneille. The piece would indeed be a masterpiece if, as its critics were not slow to point out, the verse had been quite equal to the subject. Among the numerous other works of M. de

Bornier should be mentioned: Dimitri (1876), libretto of an opera by M. V. de Joncieres; and the dramas, Les Noces d'Attila (1880) and Mahomet (1888). The production of this last piece was forbidden in deference to the representations of the Turkish ambassador. Henri de Bornier was critic of the Nouvelle Revue from 1879 to 1887. His Poesies computes were published in 1894. He died in January 1901.

BORNU, a country in the Central Sudan, lying W. and S. of Lake Chad. It is bounded W. and S. by the Hausa states and N. by the Sahara. Formerly an independent Mahommedan sultanate it has been divided between Great Britain, Germany and France. To France has fallen a portion of northern Bornu and also Zinder (q.v.), a tributary state to the north-west, while the south-west part is incorporated in the German colony of Cameroon. Three-fourths of Bornu proper, some 50,000 sq. m., forms part of the British protectorate of Nigeria.

Bornu is for the most part an alluvial plain, the country sloping gradually to Lake Chad, which formerly spread over a much larger area than it now occupies. The Komadugu (i.e. river) Waube — generally known as the Yo — and its tributaries rise in the highlands which, beyond the western border of Bornu, form the watershed between the Niger and Chad systems, and flow north and east across the plains to Lake, Chad, the Yo in its last few miles marking the frontier between the French and British possessions. In the south-west a part of Bornu drains to the Benue. The rivers are intermittent, and water in southern Bornu is obtained only from wells, which are sunk to a great depth. The vast plain of Bornu is stoneless, except for rare outcrops of ironstone, and consists of the porous fissured black earth called ” cotton soil ” in India, alternating with, or more probably overlaid by, sand. Throughout the flat country water is apparently found everywhere at a depth of 54 ft., corresponding to the level of Chad. Towards Damjiri in the north-west the country becomes more broken, hilly and timbered. In the south limestone is found near Gujba and also along the Gongola tributary of the Benue. A forest of red and green barked acacia, yielding the species of gum most valuable in the market, extends from the Gongola to Gujba. Immense baobabs (Adansonia digitata), fine tamarinds and a few trees of the genus Ficus are met with in the south. North of Maifoni (latitude 12° N.) the baobab ceases, except at Kuka, where extensive plantations have been made, and its place is taken by the Kigelia and also by a very handsome species of Diospyros. North of Kuka is a dense belt of Hyphaene palm with fine tamarinds and figs. Cotton and indigo grow wild, and afford the materials for the cloths, finely dyed with blue stripes, which form the staple fabric of the country. On the shores of Lake Chad the cotton grown is of a peculiarly fine quality. Rice and wheat of excellent quality are raised, but in small quantities, the staple food being a species of millet called gussub, which is made into a kind of paste and eaten with butter or honey. Ground-nuts, yams, sweet potatoes, several sorts of beans and grains, peppers, onions, water-melons and tomatoes are grown. Of fruit trees the country possesses the lime and fig.

Wild animals, in great numbers, find both food and cover in the extensive districts of wood and marsh. Lions, giraffes, elephants, hyenas, crocodiles, hippopotami, antelopes, gazelles and ostriches are found. The horse, the camel and the ox are the chief domestic animals ; all are used as beasts of burden. The country abounds with bees, and honey forms one of the chief Bornuese delicacies.

The climate, especially from March to the end of June, is oppressively hot, rising sometimes to 105° and 107 , and even during most of the night not falling much below ioo°. In May the wet season begins, with violent storms of thunder and lightning. In the end of June the rivers and lakes begin to overflow, and for several months the rains, accompanied with sultry weather, are almost incessant. The inhabitants at this season suffer greatly from fevers. In October the rains abate; cool, fresh winds blow from the west and north-west; and for several months the climate is healthy and agreeable.

Inhabitants. — The inhabitants, of whom the great majority

profess Mahommedanism, are divided into Negroes and those of mixed blood, i.e. Negro and Berber, Arab or other crossing. The total population of British Bornu is estimated at 500,000. The dominant tribe, called Bornuese, Berberi or Kanuri, a Negro race with an infusion of Berber blood, have black skins, large mouths, thick lips and broad noses, but good teeth and high foreheads. The females add to their want of beauty by extensive tattooing; they also stain their faces with indigo, and dye their front teeth black and their canine teeth red. The law allows polygamy, but the richest men have seldom more than two or three wives. The marriage ceremonies last for a whole week, the first three days being spent in feasting on the favourite national dishes, and the others appropriated to certain symbolical rites. A favourite amusement is the watching of wrestling matches. A game bearing some resemblance to chess, played with beans and holes in the sand, is also a favourite occupation.

The pastoral districts of the country are occupied by the Shuwas, who are of Arab origin, and speak a well-preserved dialect of Arabic. Of the date of their immigration from the East there is no record; but they were in the country as early as the middle of the 17th century. They are divided into numerous distinct clans. Their villages in general consist of rudely constructed huts, of an exaggerated conical form. Another tribe, called La Salas, inhabits a number of low fertile islands in Lake Chad, separated from the mainland by fordable channels.

The Bornuese are noted horsemen, and in times of war the horses, as

well as the riders, used to be cased in light iron mail. The Shuwas, however, are clad only in a light shirt, and the Kanembu spearmen go almost naked, and fight with shield and spear. It is indispensable to a chief of rank that he should possess a huge belly, and when high feeding cannot produce this, padding gives the appearance of it. Notwithstanding the heat of the climate, the body is enveloped in successive robes, the number indicating the rank of the wearer. The head likewise is enclosed in numerous turbans. The prevailing language in Bornu is the Kanuri. It has no affinity, according to Heinrich Barth, with the great Berber family. A grammar was published in 1854 by S. W. Koelle, as well as a volume of tales and fables, with a translation and vocabulary.

The towns in Bornu, which have populations varying from 10,000 to 50,000 or more, are surrounded with walls 35 or 40 ft. in height and 20 ft. in thickness, having at each of the four corners a triple gate, composed of strong planks of wood, with bars of iron. The abodes of the principal inhabitants form an enclosed square, in which are separate houses for each of the wives; the chief's palace consists of turrets connected together by terraces. These are well built of a reddish clay, highly polished, so as to resemble stucco ; the interior roof, though composed only of branches, is tastefully constructed. Maidugari, which in 1908 became the seat of the native government, is a thriving com- mercial town some 70 m. south-west of Lake Chad. The former capital, Kuka (q.v.), and Ngornu (the town of " blessing "), are near the shores of Lake Chad. On the Yo are still to be seen extensive remains of Old Bornu or Birni and Gambarou or. Gha.mbaru, which were destroyed by the Fula about 1809. Dikwa, the capital chosen by Rabah (see below), lies in the German part of Bornu.

History. — The history of Bornu goes back to the 9th century A.D., but its early portions are very fragmentary and dubious. The first dynasty known is that of the Sefuwa or descendants of Sef, which came to the throne in the person of Dugu or Duku, and had its capital at Njimiye (Jima) in Kanem on the north-east shores of Lake Chad. The Sefuwa are of Berber origin, the descent from Sef, the Himyaritic ruler, being mythical. From this Berber strain comes the name Berberi or Ba-Berberche, applied by the Hausa to the inhabitants of Bornu. Mahom- medanism was adopted towards the end of the nth century, and has since continued the religion of the country. From 1 1 94 to 1220 reigned Selma II., under whom the power of the kingdom was greatly extended; and Dunama II.. his successor

was also a powerful and warlike prince. In the following reigns the prosperity of the country began to diminish, and about 1386 the dynasty was expelled from Njimiye, and forced to seek refuge in the western part of its territory by the invasion of the Bulala. Mai Ali (I.) Ghajideni, who founded the city of Birni, rendered his country once more redoubtable and strong. His successor, Idris II., completely vanquished the Bulala and subju- gated Kanem ; and under Mahommed V., the next monarch, Bornu reached its highest pitch of greatness. At this period Zinder became a tributary state. A series of for the most part peaceful reigns succeeded till about the middle of the 18th century, when Ali (IV.) Omarmi entered upon a violent struggle with the Tuareg or Imoshagh. Under his son Ahmed (about 1808) the kingdom began to be harassed by the Fula, who had already conquered the Hausa country. Expelled from his capital by the invaders, Ahmed was only restored by the assistance of the fakir Mahommed al-Amin al-Kanemi, who, pretending to a celestial mission, hoisted the green flag of the Prophet, and undertook the deliverance of his country. The Fula appear to have been taken by sufprise, and were in ten months driven completely out of Bornu. The conqueror invested the nearest heir of the ancient kings with all the appearance of sovereignty — reserving for himself, however, under the title of sheik, all its reality. The court of the sultan (shehu) was established at New Bornu, or Birni, which was made the capital, the old city having been destroyed during the Fula invasion; while the sheik, in military state, took up his residence at the new city of Kuka. Fairly established, he ruled the country with a rod of iron, and at the same time inspired his subjects with a superstitious notion of his sanctity. His zeal was peculiarly directed against moral or religious offences. The most frivolous faults of women, as talking too loud, and walking in the street unveiled, rendered the offender liable to public indictment, while graver errors were visited with the most ignominious punishments, and often with death itself. Kanemi died in 1835, and was succeeded by his son, Sheik Omar, who altogether abolished the nominal kingship of- the Sefuwa.

During Omar’s reign, which lasted about fifty years, Bornu was visited by many Europeans, who reached it via Tripoli and the Sahara. The first to enter the country were Walter Oudney, Hugh Clapperton and Dixon Denham (1823). They were followed in 1851-1855 by Heinrich Barth. Later travellers in- cluded Gerhard Rohlfs (1866) and Gustav Nachtigal. All these travellers were well received by the Kanuri, whose power from the middle of the 1 9th century began to decay. This was foreseen by Barth; and Nachtigal, who in 1870 conveyed presents sent

by King William of Prussia, in acknowledgment of the sheik's kindness to many German explorers, writes thus in December 1872:

" The rapid declension of Bornu is an undeniable and lamentable fact. It is taking place with increasing rapidity, and the boundless weakness of Sheik Omar — otherwise so worthy and brave a man — must bear almost all the blame. His sons and ministers plunder the provinces in an almost unheard-of manner; trade and inter- course are almost at a standstill; good faith and confidence exist no more. The indolence of the court avoids military expeditions, and anarchy and a lack of security on the routes are the consequences. . . . Thus the sheik and the land grow poorer and poorer, and public morality sinks lower and lower."

After the visit of Nachtigal the country was visited by no European traveller until 1892, when Colonel P. L. Monteil resided for a time at Kuka during his great journey from the Senegal to Tripoli. The French traveller noticed many signs of decadence, the energy of the people being sapped by luxury, while a virtual anarchy prevailed owing to rivalries and intrigues among members of the royal family. The chief of Zinder had ceased to pay tribute, and the sultan was not strong enough to exact it by force. At the same time a danger was threatening from the south-east, where the negro adventurer Rabah, once a slave of Zobeir Pasha, was menacing the kingdom of Bagirmi. After making himself master of the fortified town of Manifa, Rabah proceeded against Bornu, defeating the army of the sultan Ahsem in two pitched battles. In December 1893 Ahsem fled from Kuka, which was entered by Rabah and soon afterwards destroyed, the capital being transferred to Dikwa in the south-

east of the kingdom. These events ruined for many years the trade between Tripoli and Kuka by the long-established route via Bilma. Rabah had raised a large, well-drilled army, and proved a formidable opponent to the French in their advance on Lake Chad from the south. However in 1900 he was killed at Kussuri near the lower Shari, by the combined forces of three French expeditions which had been converging from the Congo, the Sahara and the Niger.

By an Anglo-French agreement of 1898 the tributary state of Zinder in the north had been included in the French sphere, and after the defeat of Rabah French military expeditions occupied both the German and British portions of Bornu, but in 1902 on the appearance of British and German expeditions' the French withdrew to their own country east of the Shari. The British placed on the throne of Bornu Shehu Garbai, a descendant of the ancient sultans, and Kuka was again

chosen as the capital of the state. From that date British Bornu has been under administrative control. It has been divided into East and West Bornu, the line of division being fixed approximately at longitude 12°, and placed under the administration of a resident. Maifoni and Kuka were selected for British stations in the east, and Damjiri and Gujba in the west. Garrisons are quartered at these points. The province has been mapped, and a network of tracks available for wheeled transport has been made through it. Water communication with the Benue and Niger has been opened through the Gongola river. The shehu, who took the oath of t allegiance to the British crown on the occasion of his formal installation in November 1904, is maintained in all local dignity as a native chief, and co-operates loyally with the British administration. Peace has prevailed in Bornu since the British occupation, and it is estimated that the population has increased by immigration to about 50% more than it was in 1902. The people are industrious. Extensive areas are being brought under cultivation, and taxes are collected without difficulty. Owing to its increasing commercial importance, the native capital was in 1908 transferred to Maidugari (see also Nigeria: History; and Rabah).

Authorities. — Heinrich Barth's Travels in North and Central Africa (1857, new ed., London, 1890) contains an exact picture of the state in the period (c. 1850) preceding its decay. The earlier Travels of Denham and Clapperton (London, 1828) may also be consulted, as well as Rohlfs, Land und Volk in Afrika (Bremen, 1 870) ; Nachtigal, Sahara und Sudan, vol. i. (Berlin, 1879); and Monteil, de St.Louis & Tripoli par le lac Tchad (Paris, 1895). For later infor mation consult Lady Lugard's A Tropical Dependency (London, 1905) , and the Annual Reports, from 1900 onward, on Northern Nigeria, issued by the Colonial Office, London. (F. L. L.)

BORODIN, ALEXANDER PORFYRIEVICH (1834-1887), Russian musical composer, natural son of a Russian prince, was born in St Petersburg on the 12th of November 1834. He was brought up to the medical profession, and in 1862 was appointed assistant professor of chemistry at the St Petersburg academy of medicine. He wrote several works on chemistry, and took a leading part in advocating women's education, helping to found the school of medicine for women, and lecturing there from 1872 till his death. But he is best known as a musician. His interest in music was indeed stimulated from 1862 onwards by his friend- ship with Balakirev, and from 1863 by his marriage with a lady who was an accomplished pianist; but in his earlier years he had been proficient both in playing the piano, violin, 'cello and other instruments, and also in composing; and during life he did his best to pursue his studies in both music and chemistry with

equal enthusiasm. Like other Russian composers he owed much to the influence of Liszt at Weimar. His first symphony was written in 1862-1867; his opera Prince Igor, begun in 1869, was left unfinished at his death, and was completed by Rimsky- Korsakov and Glazounov (1889); his symphonic sketch, “In the Steppes ” (1880) is, however, his best-known work. Borodin also wrote a second symphony (1871-1877), part of a third (orchestrated after his death by Glazounov), and a few string quartets and some fine songs. His music is characteristically Russian, and of an advanced modern type. He died suddenly at St Petersburg, on the 28th of February 1887.

BORODINO, a village of Russia, 70 m. W. by S. of Moscow, on the Kolotscha, an affluent of the river Moskva, famous as the scene of a great battle between the army of Napoleon and the Russians under Kutusov on the 7th of September 1812. Though the battle is remembered chiefly for the terrible losses incurred by both sides, in many respects it is an excellent example of Napoleon’s tactical methods. After preliminary fighting on the 5th of September both sides prepared for battle on the 6th, Napoleon holding back in the hope of confirming the enemy in his resolution to fight a decisive battle. For the same reason the French right wing, which could have manoeuvred the Russians from their position, was designedly weakened. The Russian right, bent back at an angle and strongly posted, was also neglected, for Napoleon intended to make a direct frontal attack. The enemy’s right centre near the village of Borodino was to be attacked by the viceroy of Italy, Eugene, who was afterwards to roll up the Russian line towards its centre, the so-called ” great redoubt,” which was to be attacked directly from the front by Ney and Junot. Farther to the French right, Davout was to attack frontally a group of field works on which the Russian left centre was formed; and the extreme right of the French army was composed of the weak corps of Poniatowski. The cavalry corps were assigned to the various leaders named, and the Guard was held in reserve. The whole line was not more than about 2 m. long, giving an average of over 20 men per yard. When the Russians closed on their centre they were even more densely massed, and their reserves were subjected to an effective fire from the French field guns. At 6 a.m. on the 7 th of September the French attack began. By 8 a.m. the Russian centre was driven in, and though a furious counter-attack enabled Prince Bagration’s troops to win back their original line, fresh French troops under Davout and Ney drove them back again. But the Russians,

though they lost ground elsewhere, still clung to the great redoubt, and for a time the advance of the French was suspended by Napoleon's order, owing to a cavalry attack by the Russians on Eugene's extreme left. When this alarm was ended the advance was resumed. Napoleon had now collected a sufficient target for his guns. A terrific bombardment by the artillery was followed by the decisive charge of the battle, made by great masses of cavalry. The horsemen, followed by the infantry, charged at speed, broke the Russian line in two, and the French squadrons entered the gorge of the great redoubt just as Eugene's infantry climbed up its faces. In a fearful mitie the Russian garrison of the redoubt was almost annihilated. The defenders were now dislodged from their main line and the battle was practically at an end. Napoleon has been criticized for not using the Guard, which was intact, to complete the victory. There is, however, no evidence that any further expenditure of men would have had good results. Napoleon had imposed his will on the enemy so far that they ceded possession of Moscow without further resistance. That the defeat and losses of the' Russian field army did not end the war was due to the national spirit of the Russians, not to military miscalculations of Napoleon. Had it not been for this spirit, Borodino would have been decisive of the war without 'the final blow of the Guard. As it was, the Russians lost about 42,000 men out of 121,000; Napoleon's army (of which one-half consisted of the contingents of subject allies — Germany, Poland, Switzerland, Holland, &c.) 32,000 out of 130,000 (Berndt, Zahl im Kriege). On the side of the French 31 general officers were killed, wounded or taken, and amongst the killed were General Montbrun, who fell at the head of his cavalry corps, and Auguste Caulaincourt, who took Montbrun's place and fell in the melee in the redoubt. The Russians lost 22 generals, amongst them Prince Bagra- tion, who died of his wounds after the battle, and to whose memory a monument was erected on the battle-field by the tsar Nicholas I.

BOROLANITE, one of the most remarkable rocks of the British Isles, found on the shores of Loch Borolan in Sutherland- shire, after which it has been named. In this locality there is a considerable area of granite rich in red alkali felspar, and passing, by diminution in the amount of its quartz, into quartz-

syenites (nordmarkites) and syenites. At the margins of the outcrop patches of nepheline-syenite occur; usually the nepheline is decomposed, but occasionally it is well-preserved; the other ingredients of the rock are brown garnet (melanite) and aegirine. The abundance of melanite is very unusual in igneous rocks, though some syenites, leucitophyres, and aegirine-felsites resemble borolanite in

this respect. In places the nepheline- syenite assumes the form of a dark rock with large rounded white spots. These last consist of an intermixture of nepheline or sodalite and alkali-felspar. From the analogy of certain leucite- syenites which are known in Arkansas, it is very probable that these spots represent original leucites which have been changed into aggregates of the above-named minerals. They resemble leucite in their shape, but have not yet been proved to have its crystalline outlines. The " pseudo-leucites," as they have been called, measure one-quarter to three-quarters of an inch across. The dark matrix consists of biotite, aegirine-augite and melanite. Connected with the borolanite there are other types of nepheline-syenite and pegmatite. In Finland, melanite- bearing nepheline rocks have been found and described as Ijolite, but the only other locality for melanite-leucite-syenite is Magnet Cove in Arkansas. (J. S. F.)

BORON (symbol B, atomic weight n), one of the non-metallic elements, occurring in nature in the form of boracic (boric) acid, and in various borates such as borax, tincal, boronatrocalcite and boracite. It was isolated by J. Gay Lussac and L. Thenard in 1808 by heating boron trioxide with potassium, in an iron tube. It was also isolated at about the same time by Sir H. Davy, from boracic acid. It may be obtained as a dark brown amor- phous powder by placing a mixture of 10 parts of the roughly powdered oxide with 6 parts of metallic sodium in a red-hot crucible, and covering the mixture with a layer of well-dried common salt. After the vigorous reaction has ceased and all the sodium has been used up, the mass is thrown into dilute hydrochloric acid, when the soluble sodium salts go into solution, and the insoluble boron remains as a brown powder, which may by filtered off and dried. H. Moissan {Ann. Chim. Phys., 1895, 6, p. 296) heats three parts of the oxide with one part of magnesium powder. The dark product obtained is washed with water, hydrochloric acid and hydrofluoric acid, and finally calcined again with the oxide or with borax, being protected from air during the operation by a layer of charcoal. Pure amorphous boron is a chestnut-coloured powder of specific gravity 2-45; it sublimes in the electric arc, is totally unaffected by air at ordinary temperatures, and burns on strong ignition with pro- duction of the oxide B 2 3 and the nitride BN. It combines directly with fluorine at ordinary temperature, and with chlorine, bromine and sulphur on heating. It does not react with the alkali metals, but combines with magnesium at a low red heat to form a boride, and with other metals at more or less elevated temperatures. It reduces many metallic oxides, such as lead monoxide and cupric oxide, and decomposes water at a red heat. Heated with sulphuric acid and with nitric acid it is oxidized to boric acid, whilst on fusion

with alkaline carbonates and hydroxides it gives a borate of the alkali metal. Like silicon and carbon, very varying values had been given for its specific heat, until H. F. Weber showed that the specific heat increases rapidly with increasing temperature. By strongly heating a mixture of boron trioxide and aluminium, protected from the air by a layer of charcoal, F. Wohler and H. Sainte-Claire Deville obtained a grey product, from which, on dissolving out the aluminium with sodium hydroxide, they obtained a crystalline product, which they thought to be a modification of boron, but which was shown later to be a mixture of aluminium borides with more or less carbon. Boron dissolves in molten alu- minium, and on cooling, transparent, almost colourless crystals are obtained, possessing a lustre, hardness and refractivity near that of the diamond. In 1904 K. A. Kuhne (D.R.P. 147,87.1) described a process in which external heating is not necessary, a mixture of aluminium turnings, sulphur and boric acid being ignited by a hot iron rod, the resulting aluminium suiphide, formed as a by-product, being decomposed by water.

Boron hydride has probably never been isolated in the pure con- dition ; on heating boron trioxide with magnesium filings, a mag- nesium boride Mg s B 2 is obtained, and if this be decomposed with dilute hydrochloric acid a very evil-smelling gas, consisting of a mixture of hydrogen and boron hydride, is obtained. This mixture burns with a green flame forming boron trioxide; whilst boron is deposited on passing the gas mixture through a hot tube, or on depressing a cold surface in the gas flame. By cooling it with liquid air Sir W. Ramsay and H. S. Hatfield obtained from it a gas of composition B3H3. The mixture probably contained also some BH 3 (W. Ramsay and H. S. Hatfield, Proc. Chem. Soc, 17, p. 152). Boron fluoride BF 3 was first prepared in 1808 by Gay Lussacand L. Thenard and is best obtained by heating a mixture of the trioxide and fluorspar with concentrated sulphuric acid. It is a colourless pungent gas which is exceedingly soluble in water. It fumes strongly in air, and does not attack glass. It rapidly absorbs the elements of water wherever possible, so that a strip of paper plunged into the gas is rapidly charred. It does not burn, neither does it support combustion. A saturated solution of the gas, in water, is a colourless, oily, strongly fuming liquid which after a time decomposes, with separation of metaboric acid, leaving hydrofluoboric acid HF-BF3 in solution. This acid cannot be isolated in the free condition, but many of its salts are known. Boron fluoride also combines with ammonia gas, equal

volumes of the two gases giving a white crystal- line solid of composition BF 3 -NH 3 ; with excess of ammonia gas, colourless liquids BF 3 -2NH 3 and BFV3NH3 are produced, which on heating lose ammonia and are converted into the solid form.

Boron chloride BCI3 results when amorphous boron is heated in chlorine gas, or more readily, on passing a stream of chlorine over a heated mixture of boron trioxide and charcoal, the volatile product being condensed in a tube surrounded by a freezing mixture. It is a colourless fuming liquid boiling at 17-18 C , and is readily decomposed by water with formation of boric and hydrochloric acids. It unites readily with ammonia gas forming a white crystalline solid of composition 2BCl3-3NH 3 .

Boron bromide BBr 3 can be formed by direct union of the two elements, but is best obtained by the method used for the preparation of the chloride. It is a colourless fuming liquid boiling at 90-5° C. With water and with ammonia it undergoes the same reactions as the chloride. Boron and iodine do not combine directly, but gaseous hydriodic acid reacts with amorphous boron to form the iodide, ‘ BI3, which can also be obtained by passing boron chloride and hydriodic acid through a red-hot porcelain tube. It is a white crystalline solid of melting point 43 C. ; it boils at 210° C, and it can be distilled without decomposition. It is decomposed by water, and with a solution of yellow phosphorus in carbon bisulphide it gives a red powder of composition PBI 2 , which sublimes in vacuo at 210 C. to red crystals, and when heated in a current of hydrogen loses its iodine and leaves a residue of boron phosphide PB.

Boron nitride BN is formed when boron is burned either in air or in nitrogen, but can be obtained more readily by heating to redness in a platinum crucible a mixture of one part of anhydrous borax with two parts of dry ammonium chloride. After fusion, the melt is well washed with dilute hydrochloric acid and then with water, the nitride remaining as a white powder. It can also be prepared by heating borimide B 2 (NH) 3 ; or by heating boron trioxide with a metallic cyanide. It is insoluble in water and unaffected by most reagents, but when heated in a current of steam or boiled for some time with a caustic alkali, slowly decomposes with evolution of ammonia and the formation of boron trioxide or an alkaline borate; it dissolves slowly in hydrofluoric acid.

Borimide B 2 (NH) 3 is obtained on long heating of the compound B 2 S 3 -6NH 3 in a stream of hydrogen, or ammonia gas at 115-120 C. It is a white solid which decomposes on heating into boron nitride and

ammonia. Long-continued heating with water also decomposes it slowly.

Boron sulphide B 2 S 3 can be obtained by the direct union of the two elements at a white heat or from the tri-iodide and sulphur at 440 C., but is most conveniently prepared by heating a mixture of the trioxide and carbon in a stream of carbon bisulphide vapour. It forms slightly coloured small crystals possessing a strong disagree- able smell, and is rapidly decomposed by water with the formation of boric acid and sulphuretted hydrogen. _ A pentasulphide B 2 S 6 is prepared, in an impure condition, by heating a solution of sulphur in carbon bisulphide with boron iodide, and forms a white crystalline powder which decomposes under the influence of water into sulphur, sulphuretted hydrogen and boric acid.

Boron trioxide B 2 3 is the only known oxide of boron; and may be prepared by heating amorphous boron in oxygen, or better, by strongly igniting boric acid. After fusion the mass solidifies to a transparent vitreous solid which dissolves readily in water to form boric acid (q.v.) ; it is exceedingly hygroscopic and even on standing in moist air becomes opaque through absorption of water and for- mation of boric acid. Its specific gravity is 1-83 (J. Dumas). It is not volatile below a white heat, and consequently, if heated with salts of more volatile acids, it expels the acid forming oxide from such salts; for example, if potassium sulphate be heated with boron trioxide, sulphur trioxide is liberated and potassium borate formed. It also possesses the power of combining with most metallic oxides

at high temperatures, forming borates, which in many cases show characteristic colours. Many organic compounds of boron are known; thus, from the action of the trichloride on ethyl alcohol or on methyl alcohol, ethyl borate B(OC 2 H 5)3 and methyl borate B(OCH 3) 3 are obtained. These are colourless liquids boiling at 119 C.and 72° C. respectively, and both are readily decomposed by water. By the action of zinc methyl on ethyl borate, in the requisite proportions, boron trimethyl is obtained, thus: — 2B(OC 2 H 6) 2 |

q(-. 3 j_j as a colourless spontaneously

inflammable gas of unbearable smell. Boron triethyl B(C 2 H 5) 3 is obtained in the same manner, by using zinc ethyl. It is a colourless spontaneously inflammable liquid of boiling point 95 C. By the action of one molecule of ethyl borate on two molecules of zinc ethyl, the compound B(C 2 H 5) 2 -OC 2 H 5 diethylboron ethoxide is obtained as a colourless liquid boiling at 102 C. By the action of water it is

converted into B(C 2 H(j) 2 -OH, and this latter compound on exposure to air takes up oxygen slowly, forming the compound B-C 2 H 6 -OC 2 H s OH, which, with water, gives B(C 2 H 6)(OH) 2 . From the condensation of two molecules of ethyl borate with one molecule of zinc ethyl the compound B2-C 2 H5-(OC 2 H 6)5 is obtained as a colour- less liquid of boiling point 112° C. Boron triethyl and boron tri- methyl both combine with ammonia. ‘ –

The atomic weight of boron has been determined by estimating the water content of pure borax (J. Berzelius), also by conversion of anhydrous borax into sodium chloride (W. Ramsay and E. Aston) and from analysis of the bromide and chloride (Sainte-Claire Deville) ; the values obtained ranging from 10-73 to 11-04. Boron can be estimated by precipitation as potassium fluoborate, which is insoluble in a mixture of potassium acetate and alcohol. For this purpose only boric acid or its potassium salt must be present; and to ensure this, the borate can be distilled with sulphuric acid and methyl alcohol and the volatile ester absorbed in potash.

BOROUGH [Burrough, Burrowe, Borrows], STEVEN (1525-1584), English navigator, was born at Northam in Devon- shire on the 25th of September 1525. In 1553 he took part in the expedition which was despatched from the Thames under Sir Hugh Willoughby to look for a northern passage to Cathay and India, serving as master of the ” Edward Bonaventure,” on which Richard Chancellor sailed as pilot in chief. Separated by a storm from the ” Bona Esperanza ” and the ” Bona Confi- dentia,” the other two ships of the expedition, Borough proceeded on his voyage alone, and sailing into the White Sea, in the words of his epitaph, ” discouered Moscouia by the Northerne sea passage to St Nicholas ” (Archangel). In a second expedition, made in the ” Serchthrift ” in 1556, he discovered Kara Strait, between Novaya Zemlya and Vaygach island. In 1560 he was in charge of another expedition to Russia, and, probably in 1558, he also made a voyage to Spain. At the beginning of 1563 he was appointed chief pilot and one of the four masters of the queen’s ships in the Medway, and in this office he spent the rest of his life. He died on the 12th of July 1584, and was buried at Chatham. His son, Christopher Borough, wrote a description of a trading expedition made in 1579-1581 from the White Sea to the Caspian and back.

His younger brother, William Borough, born in 1536, also at Northam, served as an ordinary seaman in the ” Edward Bonaventure” on her voyage to Russia in 1553, and subse- quently made many voyages to St Nicholas. Later he transferred his services from the merchant adventurers to the crown. As commander of the ” Lion ” he accompanied Sir Francis Drake in his Cadiz expedition of 1587, but he got himself into trouble by presuming to disagree with his chief concerning the wisdom of the attack on Lagos. He died in 1599. He was the author of A Discourse of the Variation of the Compas, or Magneticall Needle (1581), and some of the charts he made are preserved at the British Museum and Hatfield.

BOROUGH (A.S. nominative burh, dative byrig, which pro- duces some of the place-names ending in bury, a sheltered or fortified place, the camp of refuge of a tribe, the stronghold of a chieftain; cf. Ger. Burg, Fr. bor, bore, bourg), the term for a town, considered as a unit of local government.

History of the English Borough. — After the early English settle- ment, when Roman fortifications ceased to shelter hostile nations, their colonies and camps were used by the Anglo-Saxon invaders to form tribal strongholds; nevertheless burhs on the sites of Roman colonies show no continuity with Roman municipal organization. The

resettlement of the Roman Durovernum as

the burh of the men of (East) Kent, under a changed name, the name ” burh of the men of Kent,” Cant-wara-byrig (Canterbury), illustrates this point. The burh of the men of West Kent was Hrofesceaster (Durobrivae), Rochester, and many other ceasters mark the existence of a Roman camp occupied by an early English burh. The tribal burh was protected by an earthen wall, and a general obligation to build and maintain burns at the royal command was enforced by Anglo-Saxon law. Offences in disturbance of the peace of the burh were punished by higher fines than breaches of the peace of the ” ham ” or ordinary dwelling. The burh was the home of the king -as well as the asylum of the tribe, and there is reason to think that the boundary of the borough was annually sanctified by a religious ceremony, and hence the long retention of a processional perambulation. Possibly the ” hedge ” or ” wall ” of the borough gave it, besides safety, a sanctity analogous to that enjoyed by the Germanic assembly while gathered within its ” hedge,” which the priests solemnly set up when the assembly gathered, and removed when it was over. While the ” peace ” of the Germanic assembly was essentially temporary, the ” peace ” of the burh was sacred all the year round. Its ” hedge ” was never removed. The sanctity of the burh was enjoyed by all the dwellings of the king, at first perhaps only during his term of residence. Neither in the early English language nor in the contemporary Latin was there any fixed usage differentiating the various words descriptive of the several forms of human settlement, and the tribal refuges cannot accordingly be clearly distinguished from villages or the strongholds of individuals by any purely nomenclative test. It is not till after the Danish invasions that it becomes easier to draw a distinction between the burhs that served as military strongholds for national defence and the royal vills which served no such purpose. Some of the royal vills eventually entered the class of boroughs, but by another route, and for the present the private stronghold and the royal dwelling may be neglected. It was the public stronghold and the administrative centre of a dependent district which was the source of the main features peculiar to the borough.

Many causes tended to create peculiar conditions in the boroughs built for national defence. They were placed where artificial defence was most needed, at the junction of roads, in the plains, on the rivers, at the centres naturally marked out for trade, seldom where hills or

marshes formed a sufficient natural defence. The burhs drew commerce by every channel; the camp and the palace, the administrative centre, the ecclesiastical centre (for the mother-church of the state was placed in its chief burh), all looked to the market for their maintenance. The burh was provided by law with a mint and royal moneyers and exchangers, with an authorized scale for weights and measures. Mercantile transactions in the burhs or ports, as they were called when their commercial rather than their military importance was accentuated, were placed by law under special legal privileges in order no doubt to secure the king's hold upon his toll. Over the burh or port was set a reeve, a royal officer answerable to the king for his dues from the burh, his rents for lands and houses, his customs on commerce, his share of the profits from judicial fines. At least from the 10th century the burh had a "moot" or court, the relation of which to the other courts is matter of speculation. A law of Edgar, about 960, required that it should meet three times a year, these being in all likelihood assemblies at which attendance was compulsory on all tenants of the burghal district, when pleas concerning life and liberty and land were held, and men were compelled to find pledges answerable for their good conduct. At these great meetings the borough reeve (gereja) presided, declaring the law and guiding the judg- ments given by the suitors of the court. The reeve was supported by a group of assistants, called in Devon the "witan," in the boroughs of the Danelaw by a group of (generally twelve) " lawmen," in other towns probably by a group of aldermen, senior burgesses, with military and police authority, whose office was in some cases hereditary. These persons assisted the reeve at the great meetings of the full court, and sat with him as judges at the subordinate meetings which were held to settle the

unfinished causes and minor causes. There was no compulsion on those not specially summoned to attend these extra meetings. At these subordinate jurisdictional assemblies, held in public, and acting by the same authority as the annual gathering of all the burh-wara, other business concerning borough administration was decided, at least in later days, and it is to these assemblies that the origin of the town council may in many cases be ascribed. In the larger towns the division into wards, with a separate police system, can be traced at an early time, appearing as a unit of military organization, answerable for the defence of a gate of the town. The police system of London is described in detail in a record of 930-940. Here the free people were grouped in associa- tions of ten, each under the superintendence of a headman. The bishops and reeves who belonged to the "court of London" appear as the directors of the system, and in them we may

see the aldermen of the wards of a later time. The use of the word bertha for ward at Canterbury, and the fact that the London wardmoot at a later time was used for the frankpledge system as well as for the organization of the muster, point to a connexion between the military and the police systems in the towns. At the end of the 9th and beginning of the 10th century there is evidence of a systematic ” timbering ” of new burhs, with the object of providing strongholds for the defence of Wessex against the Danes, and it appears that the surrounding districts were charged with their maintenance. In charters of this period a “haw,” or enclosed area within a burh, was often conveyed by charter as if it were an apanage of the lands in the neighbourhood with which it was conveyed; the Norman settlers who succeeded to lands in the county succeeded therewith to houses in the burhs, for a close association existed between the ” thegns ” of the shire and the shirestow, an association partly perhaps of duty and also of privilege. The king granted borough ” haws ” as places of refuge in Kent, and in London he gave them with commercial privileges to his bishops. What has been called the ” heterogeneous ” tenure of the shirestow, one of the most conspicuous characteristics of that particular type of borough, was further increased by the liberty which some burgesses enjoyed to ” commend ” themselves to a lord of their own choosing, promising to that lord suit and service and perhaps rent in return for protection. Over these burgesses the lords could claim jurisdictional rights, and these were in some cases increased by royal grants of special rights within certain ” sokes.” The great boroughs were honeycombed with sokes, or areas of seignorial jurisdiction, within which the royal reeve’s authority was greatly restricted while that of the lord’s reeve took pre- cedence. Even the haws, being ” burhs ” or strongholds within a stronghold, enjoyed a local ” peace ” which protected from official intrusion. Besides heterogeneity of tenure and juris- diction in the borough, there was also heterogeneity of status; there were burh-thegns and cnihts, mercatores, burgesses of various kinds, the three groups representing perhaps military, commercial and agricultural elements. The burh generally shows signs of having been originally a village settlement, surrounded by open fields, of which the borough boundary before 1835 will suggest the outline. This area was as a rule eventually the area of borough jurisdiction. There is some evidence pointing to the fact that the restriction of the borough authority to this area is not ancient, but due to the Norman settlement. The wide districts over which the boroughs had had authority were placed under the control of the Norman castle which was itself built by means of the old English levy of ” burh-work.” The borough court was allowed to continue its work only within its own immediate territory, and, to prevent conflict, the castle

was placed outside the borough. Losing their place in the national scheme of defence, the burgess ” cnihts ” made commerce their principal object under the encouragement of the old privileges of the walled place.

Besides the great co-operative strongholds in which many lords had burgesses, there were small boroughs held by a single lord. In many cases boroughs of this ” seignorial ” type were created upon the royal estates. Out of the king’s vill, as a rule the jurisdictional centre of a hundred, there was sometimes created

a borough. The lines’ of division before Domesday Book are obscure, but it is probable that in some cases, by a royal grant of jurisdiction, the inhabitants of a populous royal vill, where a hundred court for the district was already held, were authorized to establish a permanent court, for the settlement of their dis- putes, distinct from the hundred court of the district. Boroughs of this type with a uniform tenure were created not only on the king’s estates but also on those of his tenants-in-chief, and in 1086 they were probably already numerous. A borough was usually, though perhaps not invariably, the companion of a Norman castle. In some cases a French ” bourg ” was created by the side of an English borough, and the two remained for many generations distinct in their laws and customs: in other cases a French ” bourg ” was settled by the side of an English village. A large number of the followers of the Norman lords ■ had been almost certainly town-dwellers in their own country, and lost none of their burghal privileges by the migration. Every castle needed for its maintenance a group of skilled artisans, and the lords wished to draw to the castle gates all kinds of commodities for the castle’s provision. The strength of the garrison made the neighbourhood of the castle a place of danger to men unprotected by legal privilege; and in order to invite to its neighbourhood desirable settlers, legal privileges similar to those enjoyed in Norman or English boroughs were guaranteed to those who would build on the plots which were offered to colonists. A low fixed rental, release from the renders required of villeins, release from the jurisdiction of the castle, and the creation of a separate borough jurisdiction, with or without the right to choose their own officers, rules fixing the maximum of fees and fines, or promising assessment of the fines by the burgesses themselves, the cancelling of all the castellan’s rights, especially the right to take a forced levy of food for the castle from all within the area of his jurisdiction, freedom from

arbitrary tallage, freedom of movement, the right to alienate property and devise land, these and many other privileges named in the early seignorial charters were what constituted the Norman liber burgus of the seignorial type. Not all these privileges were tnjoyed by all boroughs; some very meagre releases of seignorial rights accompanied the lord's charter which created a borough and made burgesses out of villeins. However liberal the grant, the lord or his reeve still remained in close personal relation with the burgesses of such places, and this character, together with the uniformity of their tenure, continued to hold them apart from the boroughs of the old English type, where all varieties of personal relationship between the lords and their groups of tenants might subsist. The royal charters granting the right to retain old customs prevented the systematic introduction into the old boroughs of some of the incidents of feudalism. Rights of the king took precedence of those of the lord, and devise with the king's consent was legal. By these means the lords' position was weakened, and other seignorial claims were later evaded or contested. 'The rights which the lords failed to keep were divided between the king and the municipality; in London, for instance, the king obtained all escheats, while the borough court secured the right of wardship of burgess orphans.

From Norman times the yearly profit of the royal boroughs was as a rule included in the general " farm " rendered for the county by the sheriff; sometimes it was rendered by a royal farmer apart from the county-farm. The king generally accepted a composition for all the various items due from the borough. The burgesses were united in their efforts to keep that com- position unchanged in amount, and to secure the provision of the right amount at the right time for fear that it should be increased by way of punishment. The levy of fines on rent arrear, and the distraints for debt due, which were obtained through the borough court, were a matter of interest to the burgesses of the court, and first taught the burgesses co-operative action. Money was raised, possibly by order of the borough court, to buy a charter from the king giving the right to choose officers who should answer directly to the exchequer and not through the sheriff of the county. The sheriff was in many cases also the constable of the castle, set by the Normans to overawe

the English boroughs; his powers were great and dangerous enough to make him an officer specially obnoxious to the boroughs. Henry I. about 1131 gave the London citizens the right to choose their own sheriffs and a justiciar answerable for keeping the pleas of the crown. In 1130 the Lincoln citizens paid to hold their city in chief of the king. By the end of the 1 2th century many towns paid by the hand of their

own reeves, and John's charters began to make rules as to the freedom of choice to be allowed in the nomination of borough officers and as to the royal power of dismissal. In Richard I.'s reign London imitated the French communes in styling the chief officer a mayor; in 1208 Winchester also had a mayor, and the title soon became no rarity. The chartered right to choose two of more citizens to keep the pleas of the crown gave to many boroughs the control of their coroners, who occupied the position of the London justiciar of earlier days, subject to those con- siderable modifications which Henry II.'s systematizatiort of the criminal law had introduced. Burgesses who had gone for criminal and civil justice to their own court in disputes between themselves, or between themselves and strangers who were in their town, secured confirmation of this right by charter, not to exclude the justices in eyre, but to exempt themselves from the necessity of pleading in a distant court. The burgess, whether plaintiff or defendant, was a privileged person, and could claim in this respect a " benefit " somewhat similar to the benefit of clergy. In permitting the boroughs to answer through their own officers for his dues, the king handed oyer to the boroughs the farming of his rents and a large number of rights which would eventually prove to be sources of great profit.

No records exist showing the nature of municipal proceedings at the time of the first purchase of charters. Certain it is that the communities in the 12th century became alive to the possi- bilities of their new position, that trade received a new impulse, and the vague constitutional powers of the borough court acquired a new need for definition. At first the selection of officers who were to treat with the exchequer and to keep the royal pleas was almost certainly restricted to a few rich persons who could find the necessary securities. Nominated probably in one of the smaller judicial assemblies, the choice was announced at the great Michaelmas assembly of the whole community, and it is not till the next century that we hear of any attempt of the " vulgus " to make a different selection from that of the magnates. The " vulgus " were able to take effective action by means of the several craft organizations, and first found the necessity to do so when taxation was heavy or when questions of trade legislation were mooted (see Gilds). The taxation of the boroughs in the reign of Henry II. was assessed by the king's justices, who fixed the sums due per capita; but if the borough made an offer of a gift, the assessment was made by the burgesses. In the first case the taxation fell on the magnates. In the levy per communam the assessment was made through the wardmoots (in London) and the burden fell on the poorer class. In Henry II.'s reign London was taxed by both methods, the

barones majores by head, the barones minores through the wardmoot. The pressure of taxation led in the 13th century to a closer definition of the burghal constitutions; the commons sought to get an audit of accounts, and (in London) not only to hear but to treat of municipal affairs. By the end of the century London had definitely established two councils, that of the mayor and aldermen, representing the old borough court, and a common council, representing the voice of the commonalty, as expressed through the city wards. The choice of councillors in the wards rested probably with the aldermen and the ward jury summoned by them to make the presentments. In some cases juries were summoned not to represent different areas but different classes; thus at Lincoln there were in 1272 juries of the rich, the middling and the poor, chosen presumably by authority from groups divided by means of the tax roll. Elsewhere the several groups of traders and artisans made of their gilds all- powerful agencies for organizing joint action among classes of commons united by a trade interest, and the history of the towns becomes the history of the struggle between the gilds which

captured control of the council and the gilds which were excluded therefrom. Many municipal revolutions took place, and a large number of constitutional experiments were tried all over the country from the 13 th century onward. Schemes which directed a gradual co-optation, two to choose four, these six to choose more, and 30 in widening circles from a centre of officialdom, found much favour throughout the middle ages. A plan, like the London plan, of two companies, alderman and council, was widely favoured in the 14th century, perhaps in imitation of the Houses of Lords and Commons. The mayor was sometimes styled the ” sovereign ” and was given many prerogatives. Great respect was paid to the “ancients,” those, namely, who had already held municipal office. Not till the 15th century were orderly arrangements for counting ” voices ” arrived at in a few of the most highly developed towns, and these were used only in the small assemblies of the governing body, not in the large electoral assemblies of the people.

In Londom in the 13 th century there was a regular system for the admission of new members to the borough ” franchise,” which was at first regarded not as conferring any form of suffrage but as a means to secure a privileged position in the borough court and in the trade of the borough. Admission could be obtained by inheritance, by purchase

or gift, in some places by marriage, and in London, at least from 1275, by a municipal register of apprenticeship. The new freeman in return for his privileges was bound to share with the other burgesses all the burdens of taxation, control, &c, which fell upon burgesses. Personal service was not always necessary, and in some towns there were many non-resident burgesses. When in later times admission to this freedom came to be used as means to secure the parliamentary franchise, the freedom of the borough was freely sold and given. The elections in which the commons of the boroughs first took interest were those of the borough magistrates. Where the commons succeeded for a time in asserting their right to take part in borough elections they were rarely able to keep it, not in all cases perhaps because their power was feared, but sometimes because of the riotous pro- ceedings which ensued. These led to government interference, which no party in the borough desired. The possibility of a forfeiture of their enfranchised position made the burgesses on the whole fairly submissive. In the 13th century London repeatedly was ” taken into the king’s hand,” subjected to heavy fines and put under the constable of the Tower. In the 15th century disturbances in the boroughs led to the issue of new constitutions, some of which were the outcome of royal charters, others the result of parliamentary legislation. The development of the law of corporations also at this time compelled the boroughs to seek new charters which should satisfy the now exacting demands of the law. The charters of incorporation were issued at a time when the state was looking more and more to the borough authorities as part of its executive and judicial staff, and thus the government was closely interested in the manner of their selection. The new charters were drafted in such a way as to narrow the popular control. The corporations were placed under a council and in a number of cases popular control was excluded altogether, the whole system being made one of co- optation. The absence of popular protest may be ascribed in part to the fact that the old popular control had been more nominal than real, and the new charter gave as a rule two councils of considerable size. These councils bore a heavy burden of taxation in meeting royal loans and benevolences, paying per capita like the magnates of the 12th century, and for a time there is on the whole little evidence of friction between the governors and the governed. Throughout, popular opinion in the closest of corporations had a means of expression, though none of execution, in the presentments of the leet juries and sessions juries. By means of their ” verdicts ” they could use threats against the governing body, express their resentment against acts of the council which benefited the governing body rather than the town, and call in the aid of the justices of assize where the members of the governing body were suspected of fraud- Elizabeth

repeatedly declared her dislike of incorpora-

tions ” because of the abuses committed by their head rulers,” but in her reign they were fairly easily controlled by the privy council, which directed their choice of members of parliament and secured supporters of the government policy to fill vacancies on the borough bench. The practice in Tudor and Stuart charters of specifying by name the members of the governing body and holders of special offices opened the way to a ” purging ” of the hostile spirits when new charters were required. There were also rather vaguely worded clauses authorizing the dismissal of officers for misconduct, though as a rule the appointments were for life. When under the Stuarts and under the Common- wealth political and religious feeling ran high in the boroughs, use was made of these clauses both by the majority on the council and by the central government to mould the character of the council by a drastic ” purging.” Another means of control first used under the Commonwealth was afforded by the various acts of parliament, which subjected all holders of municipal office to the test of an oath. Under the Commonwealth there was no improvement in the methods used by the central govern- ment to control the boroughs. All opponents of the ruling policy were disfranchised and disqualified for office by act of parliament in 1652. Cases arising out of the act were to be tried by commissioners, and the commissions of the major-generals gave them opportunity to control the borough policy. Few Commonwealth charters have been preserved, though several were issued in response to the requests of the corporations. In some cases the charters used words which appeared to point to an opportunity for popular elections in boroughs where a usage of election by the town council had been established. In 1598 the judges gave an opinion that the town councils could by by-law determine laws for the government of the town regardless of the terms of the charter. In the 18th century the judges decided to the contrary. But even where a usage of popular election was established, there were means of controlling the result of a parliamentary election. The close corporations, though their right to choose a member of parliament might be doubtful, had the sole right to admit new burgesses, and in order to determine parliamentary elections they enfranchised non- residents. Where conflicts arose over the choice of a member, and two selections were made, the matter came before the House of Commons. On various occasions the House decided in favour of the popularly elected candidate against the nominee of the town council, on the general principle that neither the royal charter nor a by-law could curtail this particular franchise. But as each case was separately determined by a body swayed by the dominant political party, no one principle was steadily adhered to in

the trial of election petitions. The royal right to create boroughs was freely used by Elizabeth and James I. as a means' of securing a submissive parliament. The later Stuarts abandoned this method, and the few new boroughs made by the Georges were not made for political reasons. The object of the later Stuarts was to control the corporations already in existence, not to make new ones. Charles II. from the time of his restora- tion decided to exercise a strict control of the close corporations in order to secure not only submissive parliaments, but also a pliant executive among the borough justices, and pliant juries, which were impanelled at the selection of the borough officers. In 1660 it was made a rule that all future charters should reserve expressly to the crown the first nomination of the aldermen, recorder and town-clerk, and a proviso should be entered placing with the common council the return of the member of parliament. The Corporation Act of 1661 gave power to royal commissioners to settle the composition of the town councils, and to remove all who refused the sacraments of the Church of England or were suspected of disaffection, even though they offered to take the necessary oaths. Even so the difficulty of securing sub- missive juries was again so great in 1682 that a general attack on the borough franchises was begun by the crown. A London jury having returned a verdict hostile to the crown, after various attempts to bend the city to his will, Charles II. issued a quo warranto against the mayor and commonalty in order to charge the citizens with illegal encroachments upon their chartered

rights. The want of a sound philosophical principle in the laws which were intended to regulate the actions of organized groups of men made it easy for the crown judges to find flaws in the legality of the actions of the boroughs, and also made it possible for the Londoners to argue that no execution could be taken against the mayor, commonalty and citizens, a " body politic invisible "; that the indictment lay only against every particular member of the governing body; and that the corporation as a corporation was incapable of suffering a forfeiture or of making a surrender. The judges gave a judgment for the king, the charters were forfeited and the government placed with a court of aldermen of the king's own choosing. Until James II. yielded, there was no common council in London. The novelty of the proceedings of Charles II. and James II. lay in using the weapon of the quo warranto systematically to ensure a general revocation of charters. The new charters which were then granted

required the king's consent for the more important appointments, and gave him power to remove officers without reason given. Under James II. in 1687 six commissioners were appointed to " regulate " the corporations and remove from them all persons who were opposed to the abolition of the penal laws against Catholics. The new appointments were made under a writ which ran, " We will and require you to elect " (a named person). When James II. sought to withdraw from his disastrous policy, he issued a proclamation (October 17, 1688) restoring to the boroughs their ancient charters. The governing charter thenceforth in many boroughs, though not in all, was the charter w"hich had established a close corporation, and from this time on to 1835 the boroughs made no progress in constitutional growth. The tendency for the close corporation to treat the members of the governing body as the only corporators, and to repudiate the idea that the corporation was answerable to the inhabitants of the borough if the corporate property was squandered, became more and more manifest as the history of the past slipped into oblivion. The corporators came to regard themselves as members of a club, legally warranted in dividing the lands and goods of the same among themselves whensoever such a division should seem profitable. Even where the constitution of the corporation was not close by charter, the franchise tended to become restricted to an ever-dwindling electorate, as the old methods for the extension of the municipal franchise by other means than inheritance died out of use. At Ipswich in 1833 the " freemen " numbered only one fifty-fifth of the population. If the electorate was increased, it was increased by the wholesale admission to the freedom of voters willing to vote as directed by the corpora- tion at parliamentary elections. The growth of corruption in the boroughs continued unchecked until the era of the Reform Bill. Several boroughs had by that time become insolvent, and some had recourse to their member of parliament to eke out their revenues. In Buckingham the mayor received the whole town revenue without rendering account; sometimes, however, heavy charges fell upon the officers. Before the Reform era dissatisfaction with the corporations was mainly shown by the number of local acts of parliament which placed under the authority of special commissioners a variety of administrative details, which if the corporation had not been suspected would certainly have been assigned to its care. The trust offered another convenient means of escape from difficulty, and in some towns out of the trust was developed a system of municipal administration where there was no recognized corporation. Thus at Peterborough the feoffees who had succeeded to the control of certain ancient charities constituted a form of town council with very restricted powers. In the 17th century Sheffield was brought under the

act ” to redress the misemploy- ment of lands given to charitable uses,” and the municipal administration of what had been a borough passed into the hands of the trustees of the Burgery or town trust.

The many special authorities created under act of parliament led to much confusion, conflict and overlapping, and increased the need for a general reform. The reform of the boroughs was treated as part of the question of parliamentary reform. In 1832 the exclusive privileges of the corporations in parliamentary

elections having been abolished and male occupiers enfranchised, the question of the municipal franchise was next dealt with. In 1833 a commission inquired into the administration of the municipal corporations. The result of the inquiry was the Municipal Corporations Act 1835, which gave the municipal franchise to the ratepayers. In all the municipal corporations dealt with by the act, the town council was to consist of a mayor, aldermen and councillors, and the councils were given like powers, being divided into those with and those without a commission of the peace. The minutes were to be open to the inspection of any burgess, and an audit of accounts was required. The exclusive rights of retail trading, which in some towns were restricted to freemen of the borough, were abolished. The system of police, which in some places was still medieval in character, was placed under the control of the council. The various privileged areas within the bounds of a borough were with few exceptions made part of the borough. The powers of the council to alienate corporate property were closely restricted. The operations of the act were extended by later legislation, and the divers amendments and enactments which followed were con- solidated in the Municipal Corporations Act 1882. (M. Bat.)

Irish Boroughs. — In Ireland the earliest traces of burghal life are connected with the maritime settlements on the southern and eastern coast. The invasion of Henry II. colonized these Ostman ports with Anglo-Norman communities, who brought with them, or afterwards obtained, municipal charters of a favourable kind. The English settlement obviously depended on the advantages which the burgesses possessed over the native population outside. Quite different from these were the new close boroughs which during the plantation of Ulster James I. introduced from England. The conquest was by this time completed, and by a rigorous enforcement of the Supremacy and Uniformity Acts the existing liberties of the older boroughs were almost entirely withdrawn. By the new rules published (in terms of the Act of Settlement and Explanation) in 1672 resident traders were permitted to become freemen, but neither this regulation nor the

ordinary admissions through birth, marriage and apprenticeship succeeded in giving to Ireland free and vigorous municipalities. The corrupt admission of non- resident freemen, in order to outvote the ancient freeholders in parliamentary elections, and the systematic exclusion of Roman Catholics, soon divorced the ” commonalty ” from true local interests, and made the corporations, which elected them- selves or selected the constituency, dangerously unpopular.

Scottish Boroughs. — In Scotland burghs or burrows are divided into royal burghs, burghs of regality and burghs of barony. The first were erected by royal charter, and every burgess held direct of the crown. It was, therefore, impossible to subfeu the burgh lands, — a distinction still traceable in modern conveyanc- ing. Where perhaps no charter ever existed, the law on proof of immemorial possession of the privileges of a royal burgh has presumed that a charter of erection once existed. The charter gave power to elect provost, bailies and council, a power long exercised under the act of 1469, which directed the new council to be chosen annually by the retiring council, and the magistrates by both councils. The jurisdiction of these magistrates, which was specially reserved in the act of 1747 abolishing heritable jurisdictions, was originally cumulative with, and as large as, that of the sheriff. It is now confined to police offences, summary ejections, orders for interim aliment (for prisoners), payment of burgh dues and delivery of title deeds. Three head courts were held in the year, at which all burgesses were obliged to attend, and at which public business was done and private transactions were ratified. There were three classes of burgesses — burgesses in sua arte, members of one or other of the corporations; bur- gesses who were gild brothers; and simple burgesses. The Leges Burgorum apparently contemplate that all respectable inhabitants should have the franchise, but a ceremony of ad- mission was required, at which the applicant swore fealty and promised to watch and ward for the community, and to pay his ” maill ” to the king. These borough maills, or rents, and the great and small customs of burghs, formed a large part of the.

royal revenue, and, although frequently leased or feued out for a fixed duty, were on the accession of James I. annexed to the crown as an alimentary fund. Burgh customs still stand in the peculiar position of being neither adjudgeable nor arrestable; they are therefore bad security. The early charters contain the usual privileges of holding a market, of exemption from toll or tribute, and that distraint will be

allowed only for the burgess's own debts. There was also the usual strife between the gildry and the craftsmen, who were generally prohibited from trading, and of whom dyers, fleshers and shoemakers were forbidden to enter the gildry. Deacons, wardens and visitors were appointed by the crafts, and the rate of wages was fixed by the magistrates. The crafts in Scotland were frequently incorporated, not by royal charter, but, as in the case of the cordiners of Edinburgh, by seals of cause from the corporation. The trade history of the free burghs is very important. Thus in 1466 the privilege of importing and exporting merchandise was confined to freemen, burgesses and their factors. Ships were directed to trade to the king's free burghs, there to pay the customs, and to receive their acquets or custom-house seals; and in 1303 persons dwelling outside burghs were forbidden to " use any merchandise," or to sell wine or staple goods. An act of 1633, erroneously called a Ratification of the privileges of burghs, extended these privileges of buying and selling to retail as well as wholesale trade, but restricted their enjoyment to royal burghs. Accordingly, in 1672, a general declaratory act was passed confirming to the freemen in royal burghs the wholesale trade in wine, wax, silk, dyeing materials, &c, permitting generally to all persons the export of native raw material, specially permitting the burgesses of barony and regality to export their own manufactures, and such goods as they may buy in " markets," and to import against these consignments certain materials for tillage, building, or for use in their own manufactures, with a general permission to retail all commodities. This extraordinary system was again changed in 1690 by an act which declared that freemen of royal burghs should have the sole right of importing everything by sea or land except bestial, and also of exporting by sea everything which was not native raw material, which might be freely exported by land. The gentry were always allowed to import for their personal consumption and to export an equal quantity of commodities. The act mentions that the royal burghs as an estate of the kingdom contributed one-sixth part of all public impositions, and were obliged to build and maintain prison- houses. Some of these trade privileges were not abolished till

1846.

In the north of Scotland there was an association of free burghs called the Hanse or Ansus; and the lord chamberlain, by his Iter, or circuit of visitation, maintained a common stand- ard of right and duties in all burghs, and examined the state of the " common good," the accounts of which in 1535 were appointed to be laid before the auditors in exchequer. The chamberlain latterly presided in the Curia Quatuor Burgorum (Edinburgh, Berwick, Stirling, Roxburgh), which not only

made regulations in trade, but decided questions of private right (e.g. succession), according to the varying customs of burghs. This court frequently met at Haddington; in 1454 it was fixed at Edinburgh. The more modern convention of royal burghs (which appeared as a judicial persona in the Court of Session so late as 1839) probably dates from the act of James III. (1487, c. in), which appointed the commissioners of burghs, both north and south, to meet yearly at Inverkeithing " to treat of the welfare of merchandise, the good rule and statutes for the common profit of burghs, and to provide for remeid upon the skaith and injuries sustained within the burghs." Among the more important functions of this body (on whose decrees at one time summary diligence proceeded) were the prohibition of undue exactions within burghs, the revisal of the " set " or mode of municipal election, and the pro rata division among the burghs of the parliamentary subsidy required from the third estate. The reform of the municipalities, and the complete representation of the mercantile interests in the united parliament, deprived this body of any importance.

Burghs of regality and of barony held in vassalage of some great lordship, lay or ecclesiastical, but were always in theory or in practice created by crown grant. They received jurisdiction in civil and criminal matters,' generally cumulative with that of the baron or the lord of regality, who in some cases obtained the right of nominating magistrates. Powers to hold markets and to levy customs were likewise given to these burghs.

The Scottish burghs emerged slowly into political importance. In 1295 the procurators of six burghs ratified the agreement for the marriage of Edward Baliol; and in 1326 they were recog- nized as a third estate, granting a tenth penny on all rents for the king's life, if he should apply it for the public good. The commissioners of burghs received from the exchequer their costages or expenses of attending parliament. The burghs were represented in the judicial committee, and in the committee on articles appointed during the reign of James V. After the Reformation, in spite of the annexation of kirk lands to the crown, and the increased burdens laid on temporal lands, the proportion of general taxation borne by the burghs (viz. is. 6d.) was ex- pressly preserved by act 1587, c. 112. The number of commis- sioners, of course, fluctuated from time to time. Cromwell assigned ten members to the Scottish burghs in the second parliament of Three Nations (1654). The general practice until 16 19 had been, apparently, that each burgh should send two members. In that year (by an arrangement with the convention of burghs) certain groups of burghs returned one member, Edinburgh returning two. Under art. 22 of the

treaty of Union the number of members for royal burghs was fixed at fifteen, who were elected in Edinburgh by the magistrates and town council, and in the groups of burghs by delegates chosen ad hoc. (W. C. S.)

See C. Gross, Bibliography of British Municipal History (1897), which contains all needful references up to that date; F. W. Mait- land, Township and Borough (1898) ; A. Ballard, Domesday Boroughs (1904) ; M. Bateson, Borough Customs (1904-1906) ; S. and B. Webb, English Local Government (3 vols., 1906-1908). For the character of the modern Scottish burgh see Mabel Atkinson, Local Government in Scotland (Edinburgh, 1904), where other works are mentioned.

BOROUGHBRIDGE, a market town in the Ripon parliamentary division of the West Riding of Yorkshire, England; 22 m. N.W. of York on a branch of the North Eastern railway. Pop. (1901) 830. It lies in the central plain of Yorkshire, on the river Ure near its confluence with the Swale. It is in the parish of Aid- borough, the village of that name (q.v.), celebrated for its Roman remains, lying a mile south-east.

About half a mile to the west of Boroughbridge there are three upright stones called the Devil's Arrows, which are of uncertain origin but probably of the Celtic period. The manor of Borough- bridge, then called Burc, was held by Edward the Confessor and passed to William the Conqueror, but suffered so much from the ravages of his soldiers that by 1086 it had decreased in value from £10 to 55s. When the site of the Great North Road was altered, towards the end of the nth century, a bridge was built across the Ure, about half a mile above the Roman bridge at Aldborough, and called Burgh bridge or Ponteburgem. This caused a village to spring up, and it afterwards increased so much as to become a market town. In 1229 Boroughbridge, as part of the manor of Aldborough, was granted to Hubert de Burgh, but was forfeited a few years later by his son who fought against the king at Evesham. It then remained a royal manor until Charles I. granted it to several citizens of London, from whom it passed through numerous hands to the present owner. The history of Boroughbridge during the early 14th century centres round the war with Scotland, and cul- minates with the battle fought there in 1 321. When in 13 1 7 the Scots invaded England, they penetrated as far south as Borough- bridge and burnt the town. Boroughbridge was evidently a borough by prescription, and as such was called upon to return two members to parliament in 1299. It was not represented again until 1553, when the privilege was revived. The town was finally disfranchised in 1832. In 1504 the bailiff and inhabitants of Boroughbridge received a grant of two fairs, and Charles II. in 1670

created three new fairs in the borough, on the 12th of June, the 5th of August and the 12th of October, and leased them to Francis Calvert and Thomas Wilkinson for ninety-nine years.

BOROUGH ENGLISH, a custom prevailing in certain ancient English boroughs, and in districts attached to them (where the lands are held in socage) , and also in certain copyhold manors (chiefly in Surrey, Middlesex, Suffolk and Sussex), by which in general lands descend to the youngest son, to the exclusion of all

the other children, of the person dying seised and intestate. Descent to the youngest brother to the exclusion of all other collaterals, where there is no issue, is sometimes included in the general definition, but this is really a special custom to be proved from the court-rolls of the manor and from local reputa- tion — a custom which is sometimes extended to the youngest sister, uncle, aunt. Generally, however, Borough English, apart from specialties, may be said to differ from gavelkind in not including collaterals. It is often found in connexion with the distinct custom that the widow shall take as dower the whole and not merely one-third of her husband's lands.

The origin of the custom of Borough English has been much disputed. Though frequently claimed to be of Saxon origin, there is no direct evidence of such being the case. The first mention of the custom in England occurs in Glanvil, without, however, any explanation as to its origin. Littleton's explana- tion, which is the more usually accepted, is that custom casts the inheritance upon the youngest, because after the death of his parents he is least able to support himself, and more likely to be left destitute of any other support. Blackstone derived Borough English from the usages of pastoral life, the elder sons migrating and the youngest remaining to look after the household. C. I. Elton claims it to be a survival of pre-Aryan times. It was referred to by the Normans as " the custom of the English towns." In the Yearbook of 22 Edward IV. fol. 32b it is described as the custom of Nottingham, which is made clear by the report of a trial in the first year of Edward III. where it was found that in Nottingham there were two districts, the one the Burgh- Frauncoyes, the other the Burgh-Engloyes, where descent was to the youngest son, from which circumstance the custom has derived its name. On the European continent the custom of junior-rights is not unknown, more particularly in Germany, and it has by some been ascribed to the jus

primae nociis (q.v.). It is also said to exist amongst the Mongols.

See also Gavelkind; Inheritance; Primogeniture; Tenure; Blackstone's Commentaries; Coke's Institutes; Corny n's Digest of the Law; Elton's Origin of English History; Pollock and Maitland, History of English Law.

BORROMEAN ISLANDS, a group of four islands on the W. side of Lago Maggiore off Baveno and Stresa. The southern- most, the Isola Bella, is famous for its chateau and terraced gardens, constructed by Count Vitaliano Borromeo (d. 1690). To the N.W. is the Isola dei Pescatori, containing a fishing village; and to the N.E. of this the Isola Madre, the largest of the group, with a chateau and garden; and to the N. again, off Pallanza, is the little Isola S. Giovanni.

BORROMEO, CARLO (1538-1584), saint and cardinal of the Roman Catholic Church, son of Ghiberto Borromeo, count of Arona, and Margarita de' Medici, was born at the castle of Arona on Lago Maggiore on the 2nd of October 1538. When he was about twelve years old, Giulio Cesare Borromeo resigned to him an abbacy, the revenue of which he applied wholly in charity to the poor. He studied the civil and canon law at Pavia. In 1554 his father died, and, although he had an elder brother, Count Federigo, he was requested by the family to take the management of their domestic affairs. After a time, however, he resumed his studies, and in 1559 he took his doctor's degree. In 1560 his uncle, Cardinal Angelo de'Medici, was raised to the pontificate as Pius IV. Borromeo was made prothonotary, entrusted with both the public and the privy seal of the ecclesi- astical state, and created cardinal with the administration of Romagna and the March of Ancona, and the supervision of the Franciscans, the Carmelites and the knights of Malta. He was thus at the age of twenty-two practically the leading statesman of the papal court. Soon after he was raised to the archbishopric of Milan. In compliance with the pope's desire, he lived in great splendour; yet his own temperance and humility were never brought into question. He established an academy of learned persons, and published their memoirs as the Nodes Vaticanae. About the same time he also founded and endowed a college at Pavia, which he dedicated to Justina, virgin and martyr. On the death of his elder brother Federigo, he was advised to quit

the church and marry, that his family might not become extinct. He declined the proposal, however, and became henceforward still more fervent in exercises of piety, and more zealous for the welfare of the church. Owing to his influence over Pius IV., he was able to facilitate the final deliberations of the council of Trent, and he took a large

share in the drawing up of the Tridentine catechism (Catechismus Romanus).

On the death of Pius IV. (1566), the skill and diligence of Borromeo contributed materially to suppressing the cabals of the conclave. Subsequently he devoted himself wholly to the reformation of his diocese, which had fallen into a most un- satisfactory condition owing to the prolonged absences of its previous archbishops. He made a series of pastoral visits, and restored decency and dignity to divine service. In conformity with the decrees of the council of Trent, he cleared the cathedral of its gorgeous tombs, rich ornaments, banners, arms, sparing not even the monuments of his own relatives. He divided the nave of the church into two compartments for the separation of the sexes. He extended his reforms to the collegiate churches (even to the fraternities of penitents and particularly that of St John the Baptist), and to the monasteries. The great abuses which had overrun the church at this time arose principally from the ignorance of the clergy. Borromeo, therefore, estab- lished seminaries, colleges and communities for the education of candidates for holy orders. The most remarkable, perhaps, of his foundations was the fraternity of the Oblates, a society whose members were pledged to give aid to the church when and where it might be required. He further paved the way for the ” Golden ” or ” Borromean ” league formed in 1586 by the Swiss Catholic cantons of Switzerland to expel heretics if necessary by armed force.

In 1576, when Milan was visited by the plague, he went about giving directions for accommodating the sick and burying the dead, avoiding no danger and sparing no expense. He visited all the neighbouring parishes where the contagion raged, distributing money, providing accommodation for the sick, and punishing those, especially the clergy, who were remiss in discharging their duties. He met with much opposition to his reforms. The governor of the province, and many of the senators, apprehensive that the cardinal’s ordinances and proceedings would encroach upon the civil jurisdiction, addressed remonstrances and com- plaints to the courts of Rome and Madrid. But Borromeo had more formidable difficulties to struggle with, in the inveterate opposition of several religious orders, particularly that of the Humiliati (Brothers of Humility Some members of that society formed a conspiracy against his life, and a shot was fired at him in the archiepiscopal chapel under circumstances which led to the belief that his escape was miraculous. The number of his enemies was increased by his successful attack on his Jesuit confessor Ribera, who with other members of the college of Milan was found to be guilty of unnatural offences. His manifold labours and austerities appear to have

shortened his life. He was seized with an intermittent fever, and died at Milan on the 4th of November 1584. He was canonized in 1610, and his feast is celebrated on the 4th of November.

Besides the Nodes Vaticanae, to which he appears to have contributed, the only literary relics of this intrepid and zealous reformer are some homilies, discourses and sermons, with a collection of letters. His sermons, which have little literary merit, were published by J. A. Sax (5 vols., Milan, 1 747-1 748), and have been translated into many languages. The record of his episcopate is to be found in the two volumes of the Ada Ecdesiae Mediolanensis (Milan, 1599). Contrary to his last wishes a memorial was erected to him in Milan cathedral, as well as a statue 70 ft. high on the hill above Arona, by his admirers who regarded him as the leader of a Counter-Reformation.

His nephew, Federigo Borromeo (1564-1631), was archbishop of Milan from 1595, and in 1609 founded the Ambrosian library in that city.

See G. P. Giussano, Vita di S. Carle Borromeo (1610, Eng. ed. by H. E. Manning, London, 1884) ; A. Sala, Documents circa la vita e la gesta di Borromeo (4 vols., Milan, 1857-1859) ; Chanoine Silvain,

Histoire de St Charles Borromee (Milan, 1884); and A. Cantono, Un grande riformatore del secolo XVI (Florence, 1904); article ” Borromaus ” in Herzog-Hauck, Realencyklopddie (Leipzig, 1897).

BORROMINI, FRANCESCO (1599-1667), Italian architect, was born at Bissone in 1 599. He was the chief representative of the style known in architecture as ” baroque,” which marked a fearless and often reckless departure from the traditional laws of the Renaissance, and often obtained originality only at the cost of beauty or wisdom. One of the main opponents of this style was Barocchio (q.v.). Borromini was much employed in the middle of the 17th century at Rome. His principal works are the church of St Agnese in Piazza Navona, the church of La Sapienza in Rome, the church of San Carlino alle Fontane, the church of the Collegio di Propaganda, and the restoration of San Giovanni in Laterano. . He died by his own hand at Rome in 1667. Engravings of his chief compositions are to be found in the posthumous work, Francisci Borromini opus Architectonicum

(1727).

BORROW, GEORGE HENRY (1803-1881), English traveUer, linguist and author, was born at East Dereham, Norfolk, on the 5th of July 1803, of a middle-class Cornish family. His father was a recruiting officer, and his mother a Norfolk lady of French extraction. From 1816 to 1818 Borrow attended, with no very great profit, the grammar school at Norwich. After leaving school he was articled to a firm of Norwich solicitors, where he neglected the law, but gave a great deal of desultory attention to languages. He was encouraged in these studies by William Taylor, the friend of Southey. On the death of his father, in 1824 he went to London to seek his fortune as a literary adventurer. In 1826 he published a volume of Romantic Ballads translated from the Danish. Engaged by Sir Richard Phillips, the publisher, as a hack-writer at starvation wages, his ex- periences in London were bitter indeed. His struggles at last became so dire that if he would escape Chatterton's doom, he must leave London and either return to Norwich and share his mother's narrow income, or turn to account in some way the magnificent physical strength with which nature had endowed him. Determining on the latter of these courses, he left London on tramp. As he stood considerably more than 6 ft. in height, was a fairly trained athlete, and had a countenance of extraordinary impressiveness, if not ©f commanding beauty — Greek in type with a dash of the Hebrew — we may assume that there had never before appeared on the English high-roads so majestic- looking a tramp as he who, on an afternoon in May, left his squalid lodging with bundle and stick to begin life on the roads. Shaping his course to the south-west, he soon found himself on Salisbury Plain. And then his extraordinary adventures began. After a v/hile he became a travelling hedge-smith, and it was while pursuing this avocation that he made the acquaintance of the splendid road-girl, born at Long Melford workhouse, whom he has immortalized under the name of Isopel Berners. He was now brought much into contact with the gipsies, and this fact gave him the most important subject-matter for his writings. For picturesque as is Borrow's style, it is this subject- matter of his, the Romany world of Great Britain, which — if his pictures of that world are true — will keep his writings alive. Now that the better class of gipsies are migrating so rapidly to America that scarcely any are left in England, Borrow's pictures of them are challenged as being too idealistic. It is unfortunate that no one who knew Borrow, and the gryengroes or horse- dealers with whom he associated, and whom he depicted, has ever written about him and them. Full of " documents " as is Dr Knapp's painstaking biography, it cannot be said to give a vital picture of Borrow and his surroundings during this most interesting period of his life. It is this same peculiar class of gipsies (the gryengroes) with whom the present writer was brought into

contact, and he can only refer, in justification of Borrow's descriptions of them, to certain publications of his own, where the whole question is discussed at length, and where he has set out to prove that Borrow's pictures of the section of the English gipsies he knew are not idealized. But there is one great blemish in all Borrow's dramatic scenes of gipsy life, wheresoever

they may be laid. This was pointed out by the gentleman who " read " Zincali for Mr Murray, the publisher: —

" The dialogues are amongst the best parts of the book; but in several of them the tone of the speakers, of those especially who are in humble life, is too correct and elevated, and therefore out of character. This takes away from their effect. I think it would be very advisable that Mr Borrow should go over them with reference to this point, simplifying a few of the terms of expression and introducing a few contractions — don'ts, can'ts, &c. This would improve them greatly."

It is the same with his pictures of the English gipsies. The reader has only to compare the dialogues between gipsies given in that photographic study of Romany life, In Gipsy Tents, by F. H. Groome, with the dialogues in Lavengro and The Romany Rye, to see how the illusion in Borrow's narrative is disturbed by the uncolloquial locutions of the speakers. It is true, no doubt, that all Romanies, especially perhaps the English and Hungarian, have a passion for the use of high-sounding words, and the present writer has shown this in his remarks upon the Czigany Czindol, who is said to have taught the Czigany language to the archduke Joseph, often called the " Gipsy Archduke." But after all allowance is made for this racial peculiarity, Borrow's presentation of it considerably weakens our belief in Mr and Mrs Petulengro, Ursula, and the rest, to find them using complex sentences and bookish words which, even among English people, are rarely heard in conversation. As to the deep impression that Borrow made upon his gipsy friends, that is partly explained by the singular nobility of his appearance, for the gipsies of all countries are extremely sensitive upon matters of this kind. The silvery whiteness of the thick crop of hair which Borrow retained to the last seemed to add in a remarkable way to the nobility of his hairless face, but also it gave to the face a kind of strange look " not a bit like a Gorgio's," to use the words of one of his gipsy friends. Moreover, the shy, defiant, stand-off way which Borrow assumed in the company of his social equals left him entirely when he was with the gipsies. The result of this was that these wanderers knew him better than did his own country- men.

Seven years after the events recorded in Lavengro and The Romany Rye Borrow obtained the post of agent to the Bible Society, in which capacity he visited St Petersburg (1833-1835) (where he published Tar gum, a collection of translations), and Spain, Portugal and Morocco (1835-1839). From 1837 to 1839 he acted as correspondent to the Morning Herald. The result of these travels and adventures was the publication, in 1841, of Zincali, or The Gypsies in Spain, the original MS. of which, in the hands of the present writer, shows how careful was Borrow's method of work. In 1843 appeared The Bible in Spain, when suddenly Borrow became famous. Every page of the book glows with freshness, picturesqueness and vivacity. In 1840 he married Mary Clarke, the widow of a naval officer, and permanently settled at Oulton Broad, near Lowestoft, with her and her daughter. Here he began to write again. Very likely Borrow would never have told the world about his vagabond life in England as a hedge-smith had not The Bible in Spain made him famous as a wanderer. Lavengro appeared in 1851 with a success which, compared with that of The Bible in Spain, was only partial. He was much chagrined at this, and although Lavengro broke off in the midst of a scene in the Dingle, and only broke off there because the three volumes would hold no more, it was not until 1857 that he published the sequel, The Romany Rye. In 1844 he travelled in south-eastern Europe, and in 1854 he made a tour with his step-daughter in Wales. This tour he described in Wild Wales, published in 1862. In 1874 he brought out a volume of ill-digested material upon the Romany tongue, Romano Lavo-lil, or Word-book of the Gypsy Language, a book which has been exhaustively analysed and criticized by Mr John Sampson. In the summer of 1874 he left London, bade adieu to Mr Murray and a few friends, and returned to Oulton. On the 26th of July 1881 he was found dead in his house at Oulton, in his seventy-ninth year.

Borrow was indisputably a linguist of wide knowledge, though he was not a scholar in the strict sense. The variety of his

attainments is shown by his translation of the Church of England Homilies into Manchu, of the Gospel of St Luke into the Git dialect of the Gitanos, of The Sleeping Bard from the Cambrian- British, and of Bluebeard into Turkish. But it is not Borrow's linguistic accomplishments that have kept his name fresh, and will continue to keep it fresh for many a generation to come. It is his character, his unique character as expressed, or partially expressed, in his books.

Among all the “remarkable individuals ” (to use his favourite expression) who during the middle of the 19th century figured in the world of letters, Borrow was surely the most eccentric, the most whimsical, and in many ways the most extraordinary. There was scarcely a point in which he resembled any other writer of his time. With regard to Lavengro and The Romany Rye, there has been very much discussion as to how much Dichlung is mingled with the Wahrheit in those fascinating books. Had it not been for the amazingly clumsy pieces of fiction which he threw into the narrative, few readers would have doubted the autobiographical nature of the two books. Such incidents as are here alluded to shed an air of unreality over the whole. It has been said by Dr Knapp that Borrow never created a character, and that to one who thoroughly knows the times and Borrow’s writings the originals are easily recognizable. This is true, no doubt, as regards people whom he knew at Norwich, and indeed generally as regards those he knew before the period of his gipsy wanderings. It must not be supposed, however, that such a character as the man who ” touched ” to avert the evil chance is in any sense a portrait of an individual with whom he had been brought into contact. The character has so many of Borrow’s own eccentricities that it might rather be called a portrait of himself. There was nothing that Borrow strove against with more energy than the curious impulse, which he seems to have shared with Dr Johnson, to touch the objects along his path in order to save himself from the evil chance. He never conquere d the superstition. In walking through Richmond Park with the present writer he would step out of his way constantly to touch a tree, and he was offended if the friend he was with seemed to observe it. Many of the peculiarities of the man who taught himself Chinese in order to distract his mind from painful thoughts were also Borrow’s own. (T. W.-D.)

BORSIPPA (Barsip in the Babylonian and Assyrian inscrip- tions; Borsif in the Talmud; mod. Birs or Birs-Nimrud), the Greek name of an ancient city about 15 m. S.W. of Babylon and 10 m. from Hillah, on the Nahr Hiridieh, or Hindieh canal, formerly known as ” the Euphrates of Borsippa,” and even during the Arabic period called ” the river of Birs.” Borsippa was the sister city of Babylon, and is often called in the inscrip- tions Babylon II., also the ” city without equal.” Its patron god was Nebo or Nabu. Like Babylon Borsippa is not mentioned in the oldest inscriptions, but comes into importance first after Khammurabi had made Babylon the capital of the whole land, somewhere before 2000 B.C. He built or rebuilt the temple E-Zida at this place, dedicating it, however, to Marduk (Bel-Merodach). But although Khammurabi himself does not seem to have honoured Nebo

(q.v.), subsequent kings recognized him as the deity of E-Zida and made him the son of Marduk (q.v.). Each new year his image was taken to visit his father, in Babylon, who in his turn gave him escort homeward, and his temple was second in wealth and importance only to E-Saggila, the temple of Marduk \n Babylon. As with Babylon, so with Borsippa, the time of Nebuchadrezzar was the period of its greatest prosperity. In general Borsippa shared the fate of Babylon, falling into decay after the time of Alexander, and finally in the middle ages into ruins. The site of the ancient city is represented by two large ruin mounds. Of these the north-westerly, the lower of the two, but the larger in superficial area, is called Ibrahim Khalll, from a ziara, or shrine, of Abraham, the friend of God, which stands on its highest point. According to Arabic lore, based on Jewish legends, at this spot Nimrod sought to throw Abraham into a fiery furnace, from which he was saved by the grace of God. Excavations were first conducted here by the French Expedition Scientifique en Mesopotamie in 1852, with small result. In 1879 and 1880 Hormuzd Rassam conducted more extensive, although

unsystematic, excavations in this mound, finding a considerable quantity of inscribed tablets and the like, now in the British Museum; but by far the greater part of this ruin still remains unexplored. The south-westerly mound, the Birs proper, is probably the most conspicuous and striking ruin in all Irak. On the top of a hill over 100 ft. high rises a pointed mass of vitrified brick split down the centre, over 40 ft. high, about which lie huge masses of vitrified brick, some as much as 1 5 ft. in diameter, and also single enamelled bricks, generally bearing an inscription of Nebuchadrezzar, twisted, curled and broken, apparently by great heat. Jewish and Arabic tradition makes this the Tower of Babel, which was supposed to have been destroyed by light- ning. Excavations conducted here by Sir Henry Rawlinson in 1854 showed it to be the stage tower or ziggurat, called the ” house of the seven divisions of heaven and earth,” of E-Zida, the temple of Nebo. On a large platform rose seven solid terraces, each smaller than the one below it, the lowest being 272 ft. square and 26 ft. high. Each of these terraces was faced with bricks of a different colour. The approach to this ziggurat was toward the north-east, and on this side lay also the principal rooms of the temple of which this was the tower. These rooms were partly excavated by Hormuzd Rassam in 1879-1880. In its final form this temple and tower were the work of Nebuchad- rezzar, but from the clay cylinders found by Sir Henry Rawlinson in two of the corners of the tower it appears that he restored an incomplete ziggurat of a former king, ” which was long since fallen into decay.” Some of the best authorities believe that it

was this ambitious but incomplete and ruinous ziggurat, existing before the time of Nebuchadrezzar, which gave occasion to or afforded local attachment for the Biblical story of the Tower of Babel.

Authorities. — H. C. Rawlinson, Journal of the Royal Asiatic Society (i860); J. Oppert, Expedition scientifique en Mesopotamie (Paris, 1863); F. Delitzsch, Wo lag das Parodies? (Leipzig, 1881); J. P. Peters, Nippur (New York and London, 1896); H. Rassam, Asshur and the Land of Nimrod (London and New York, 1897); M. Jastrow, Religion of Babylonia and Assyria (Boston, 1898); see also Babylon, Babel. (J. p. Pe.)

BORT, or Boart, an inferior kind of diamond, unfit for cutting but useful as an abrasive agent. The typical bort occurs in small spherical masses, of greyish colour, rough or drusy on the surface, and showing on fracture a radiate crystalline structure. These masses, known in Brazil as bolas, are often called ” shot bort ” or ” round bort.” Much of the bort consists of irregular aggregates of imperfect crystals. In trade, the term bort is extended to all small and impure diamonds, and crystalline fragments of diamond, useless as gem-stones. A large proportion of the output of some of the South African mines consists of such material. This bort is crushed in steel mortars to form diamond powder, which is largely used in lapidaries’ work.

BORY DE SAINT-VINCENT, JEAN BAPTISTE GEORGE MARIE (1780-1846), French naturalist, was born at Agen in 1780. He was sent as naturalist with Captain Nicholas Baudin’s expedition to Australia in 1798, but left the vessel at Mauritius, and spent two years in exploring Reunion and other islands. Joining the army on his return, he was present at the battles of Ulm and Austerlitz, and in 1808 went to Spain with Marshal Soult. His attachment to the Napoleonic dynasty and dislike to the Bourbons were shown in various ways during 1815, and his name was consequently placed on the list of the proscribed; but after wandering in disguise from place to place he was allowed quietly to return to Paris in 1820. In 1829 he was placed at the head of a scientific expedition to the Morea, and in 1839 he had charge of the exploration of Algeria. He died on the 23rd of December 1846. He was editor of the Dictionnaire classique d’histoire naturelle, and among his separate productions were: — Essais sur les lies Fortunees (1802); Voyage dans les lies d’Afrique (1803); Voyage souterrain, ou description du plateau de Saint- Pierre de Maestricht et de ses vastes cryptes (1 8 2 1) ; L’Homme, essai zoologique sur le genre humain (1827); Resume de la geographie de la Ptninsule (1838).

BORZHOM, a watering-place of Russian Transcaucasia, in the government of Tiflis, and 93 m. by rail W. of the city of

Tiflis. Pop. (1897) 5800. It is situated at an altitude of 2750 ft. in the Borzhom gorge, a narrow rift in the Little Caucasus mountains, and on the Kura. Its warm climate, its two hot springs (71 f °-8 2° Fahr.) and its beautiful parks make it a favourite summer resort, and give it its popular name of ” the pearl of Caucasus.” The bottled mineral waters are very extensively exported.

BOS, LAMBERT (1670-1717), Dutch scholar and critic, was born at Workum in Friesland, where his father was headmaster of the school. He went to the university of Franeker (suppressed by Napoleon in 181 1), and was appointed professor of Greek there in 1704; after an uneventful life he died at Franeker in 1717. His most famous work, Ellipses Graecae (1702), was translated into English by John Seager (1830); and his Anti- quiiates Graecae (17 14) passed through several editions. He also published Velus Teslamentum, Ex Versione Ixx. Interpretum (1709); notes on Thomas Magister (1698); Exercitationes Philologicae (1700); Animadversiones ad Scriptores quosdam Graecos (17 15); and two small treatises on Accents and Greek Syntax.

BOSA, a seaport and episcopal see on the W. coast of Sardinia, in the province of Cagliari, 30 m. W. of Macomer by rail. Pop. (1901) 6846. The height above the town is crowned by a castle of the Malaspina family. The cathedral, founded in the 12th century, restored in the 15th, and rebuilt in 1806, is fine. There are some tanneries, and the fishing industry is important, but the coral production of Sicily has entirely destroyed that of Bosa since 1887. The district produces oil and wine. The present town of Bosa was founded in 1112 by the Malaspina, ijm. from the site of the ancient town (Bosa or Calmedia), where a well- preserved church still exists. The old town is of Roman origin, but is only mentioned by Pliny and Ptolemy, and as a station on the coast-road in the Itineraries (Corp. Inscr. Lat. x. 7939 seq.). One of the inscriptions preserved in the old cathedral records the erection of four silver statues, of Antoninus Pius, his wife Faustina and their two sons.

BOSBOOM-TOUSSAINT, ANNA LOUISA GEERTRUIDA (181 2-1886), Dutch novelist, was born at Alkmaar in north Holland on the 16th of September 181 2. Her father, named Toussaint, a local chemist of

Huguenot descent, gave her a fair education, and at an early period of her career she developed a taste for historical research, fostered, perhaps, by a forced indoor life, the result of weak health. In 1851 she married the Dutch painter, Johannes Bosboom (1817-1891), and thereafter was known as Mrs Bosboom-Toussaint. Her first romance, Almagro, appeared in 1837, followed by the Graaj van Devonshire {The Earl of Devonshire) in 1838; the Engelschen te Rome {The English at Rome) in 1840, and Het Huis Lauernesse {The House of Lauernesse) in 1841, an episode of the Reformation, translated into many European languages. These stories, mainly founded upon some of the most interesting epochs of Dutch history, betrayed a remarkable grasp of facts and situations, combined with an undoubted mastery over her mother tongue, though her style is sometimes involved, and not always faultless. Ten years (1840— 1850) were mainly devoted to further studies, the result of which was revealed in 1851-1854, when her Leycester in Nederland (3 vols.), Vrouwen van het Leyceslersche Tydperk {Women of Leicester's Epoch, 3 vols.), and Gideon Florensz (3 vols.) appeared, a series dealing with Robert Dudley's adventures in the Low Countries. After 1870 Mrs Bosboom-Toussaint abandoned historical romance for the modern society novel, but her Delftsche Wonderdokter {The Necromancer of Delft, 1871, 3 vols.) and Majoor Frans (1875, 3 vols.) did not command the success of her earlier works. Major Frank has been translated into English (1885). She died at the Hague on the 13th of April 1886. Her novels have been published there in a collected edition (1885-1888, 25 vols.).

BOSC, LOUIS AUGUSTIN GUILLAUME (1759-1828), French naturalist, was born at Paris on the 29th of January 1759. He was educated at the college of Dijon, where he showed a taste for botany, and he followed up his studies in Paris at the Jardin des Plantes, where he made the acquaintance of Mme M. J. P.

Roland. At the age of eighteen he obtained a government appointment, and he rose to be one of the chief officials in the postal department. Under the ministry of J. M. Roland in 1792 he also held the post of superintendent of prisons, but the violent outbreaks of 1793 drove him from office, and compelled him to take refuge in flight. For some months he lay concealed at Sainte-Radegonde, in the forest of Montmorency, barely subsist- ing on roots and vegetables. He was enabled to return to Paris on the fall of Robespierre, and under the title Appel a Vimpartiale posterity par la citoyenne Roland published a manuscript Mme Roland had entrusted to him before her execution. Soon afterwards he set out for America, resolving to explore the natural riches of that country. The immense materials he gathered were never published in a complete form, but much went to

enrich the works of B. G. E. de Lacepede, P. A. Latreille and others. After his return, on the establishment of the Directory, he was reinstated in his old office. Of this he was again deprived by the coup d'etat of 1799, and for a time he was in great destitution; but by his copious contributions to scientific literature he contrived to support himself and to lay the founda- tions of a solid reputation. He was engaged on the new Diction- naire d'histoire naturelle, and on the Encyclopedic methodique, he edited the Diclionnaire raisonne et universel d' agriculture, and was one of the editors of the Annates de V 'agriculture francaise. He was made inspector of the gardens at Versailles, and of the public nurseries belonging to the ministry of the interior. The last years of his life were devoted to an elaborate work on the vine, for which he had amassed an immense quantity of materials, but his death at Paris on the 10th of July 1828 prevented its completion.

BOSCAN ALMOGAVER, JUAN (1490 ?-i 542), Spanish poet, was born about the close of the 1 5th century. He was a Catalan of patrician birth, and, after some years of military service, became tutor to the duke of Alva. His poems were published in 1 543 at Barcelona by his widow. They are divided into sections which mark the stages of Boscan's poetical evolution. The first book contains poems in the old Castilian metres, written in his youth, before 1526, in which year he became acquainted with the Venetian ambassador, Andrea Navagiero, who urged him to adopt Italian measures, and this advice gave a new turn to Boscan's activity. The remaining books contain a number of pieces in the Italian manner, the longest of these being Hero y Leander, a poem in blank verse, based on Musaeus. Boscan's best effort, the Octava Rima, is a skilful imitation of Petrarch and Bembo. Boscan also published in 1534 an admirable translation of Castiglione's // Corlegiano. Italian measures had been introduced into Spanish literature by Santillana and Villalpando; it is Boscan's distinction to have naturalized these forms definitively, and to have founded a poetic school.

The best edition of his poems is that issued at Madrid in 1875 by W. J. Knapp; for his indebtedness to earlier writers, see Francesco Flamini, Studi di storia literaria italiana e straniera (Livorno, 1895).

BOSCASTLE, a small seaport and watering-place in the Launceston parliamentary division of Cornwall, England, 5 m. N. of Camelford station on the London & South-Western railway. Pop. (civil parish of Forrabury, 1901) 329. The village rises steeply above a very narrow cove on the north coast, sheltered, but difficult of access, vessels having to be warped into it by means of hawsers. A mound on a hill

above the harbour marks the site of a Norman castle. The parish church of St Symphorian, Forrabury, also stands high, overlooking the Atlantic from Willapark Point. The tower is without bells, and the tradition that a ship bearing a peal hither was wrecked within sight of the harbour, and that the lost bells may still be heard to toll beneath the waves, has been made famous by a ballad of the Cornish poet Robert Stephen Hawker, vicar of Moorwinstow. The coast scenery near Boscastle is severely beautiful, with abrupt cliffs fully exposed to the sea, and broken only by a few picturesque inlets such as Crackington Cove and Pentargan Cove. Inland are bare moors, diversified by narrow dales.

BOSCAWEN, EDWARD (1711-1761), British admiral, was born on the 19th of August 1 7 1 1 . He was the third son of Hugh,

1st Viscount Falmouth! He early entered the navy, and in 1739 distinguished himself at the taking of Porto Bellow At the siege of Cartagena, in March 1 741, at the head of a party of seamen, he took a battery of fifteen 24-pounders, while exposed to the fire of another fort. On his return to England in the following year he married, and entered parliament as member for Truro. In 1744 he captured the French frigate ” Medee,” commanded by M. de Hocquart, the first ship taken in the war. In May 1747 he signalized himself in the engagement off Cape Finisterre, and was wounded in the shoulder with a musket-ball. Hocquart again became his prisoner, and the French ships, ten in number, were taken. On the 15th of July he was made rear-admiral and commander-in-chief of the expedition to the East Indies. On the 29th of July 1748 he arrived off Fort St David’s, and soon after laid siege to Pondicherry; but the sickness of his men and the approach of the monsoons led to the raising of the siege. Soon afterwards he received news of the peace, and Madras was delivered up to him by the French. In April 1750 he arrived in England, and was the next year made one of the lords of the Admiralty, and chosen an elder brother of the Trinity House. In February 1755 he was appointed vice-admiral, and in April he intercepted the French squadron bound to North America, and took the ” Alcide ” and”Lys”of sixty-four guns each. Hoc- quart became his prisoner for the third time, and Boscawen returned to Spithead with his prizes and 1500 prisoners. For this exploit, he received the thanks of parliament. In 1758 he was appointed admiral of the blue and commander-in-chief of the expedition to Cape Breton, when, in conjunction with General

Amherst, he took the fortress of Louisburg, and the island of Cape Breton — services for which he again received the thanks of the House of Commons. In 1759, being appointed to command in the Mediterranean, he pursued the French fleet, commanded by M. de la Clue, and after a sharp engagement in Lagos Bay took three large ships and burnt two, returning to Spithead with his prizes and 2000 prisoners. The victory defeated the proposed concentration of the French fleet in Brest to cover an invasion of England. In December 1760 he was appointed general of the marines, with a salary of £3000 per annum, and was also sworn a member of the privy council. He died at his seat near Guildford on the 10th of January 1761.

BOSCH (or Bos), JEROM (c. 1460-1518), the name generally given, from his birthplace Hertogenbosch, to Hieronymus van Aeken, the Dutch painter. He was probably a pupil of Albert Ouwater, and may be called the Breughel of the 15th century, for he devoted himself to the invention of bizarre types, diableries, and scenes of the kind generally associated with Breughel, whose art is to a great extent based on Bosch's. He was a satirist much in advance of his time, and one of the most original and ingenious artists of the 15 th century. He exercised great influence on Lucas Cranach, who frequently copied his paintings. His works were much admired in Spain, especially by Philip II., at whose court Bosch painted for some time. One of his chief works is the " Last Judgment " at the Berlin gallery, which also owns a little " St Jerome in the Desert." " The Fall of the Rebellious Angels " and the " St Anthony " triptych are in the Brussels museum, and two important triptychs are at the Munich gallery. The Lippmann collection in Berlin contains an important " Adoration of the Magi," the Antwerp museum a " Passion," and a practically unknown painting from his brush is at the Naples museum.

BOSCOVICH, ROGER JOSEPH (i 7 ii?i787), Italian mathe^ matician and natural philosopher, one of the earliest of foreign savants to adopt Newton's gravitation theory, was born at Ragusa in Dalmatia on the 18th of May 1711, according to the usual account, but ten years earlier according to Lalande (Eloge, 1792). In his fifteenth year, after passing through the usual elementary studies, he entered the Society of Jesus. On com pleting his noviciate, which was spent at Rome, he studied mathematics and physics at the Collegium Romanum; and so brilliant was his progress in these sciences that in 1740 he was appointed professor of mathematics in the college. For this post he was especially fitted by his acquaintance with recent

advances in science, and by his skill in a classical severity of demonstration, acquired by a thorough study of the works of the

Greek geometricians. Several years before this appointment he had made himself a name by an elegant solution of the problem to find the sun's equator and determine the period of its rotation by observation of the spots on its surface. Notwithstanding the arduous duties of his professorship he found time for investi- gation in all the fields of physical science; and he published a very large number of dissertations, some of them of considerable length, on a wide variety of subjects. Among these subjects were the transit of Mercury, the Aurora Borealis, the figure of the earth, the observation of the fixed stars, the inequalities in terrestrial gravitation, the application of mathematics to the theory of the telescope, the limits of certainty in astronomical observations, the solid of greatest attraction, the cycloid, the logistic curve, the theory of comets, the tides, the law of con- tinuity, the double refraction micrometer, various problems of spherical trigonometry, &c. In 1742 he was consulted, with other men of science, by the pope, Benedict XIV., as to the best means of securing the stability of the dome of St Peter's, Rome, in which a crack had been discovered. His suggestion was adopted. Shortly after he engaged to take part in the Portuguese expedition for the survey of Brazil, and the measurement of a degree of the meridian; but he yielded to the urgent request of the pope that he would remain in Italy and undertake a similar task there. Accordingly, in conjunction with Christopher Maire, an English Jesuit, he measured an arc of two degrees between Rome and Rimini. The operations were begun towards the close of 1750, and were completed in about two years. An account of them was published in 1755, entitled De Litteraria expeditione per pontificam ditionem ad dimetiendos duos meridiani gradus a PP. Maire et Boscovich. The value of this work was increased by a carefully prepared map of the States of the Church. A French translation appeared in 1770. A dispute having arisen between the grand duke of Tuscany and the republic of Lucca with respect to the drainage of a lake, Boscovich was sent, in 1757, as agent of Lucca to Vienna, and succeeded in bringing about a satisfactory arrangement of the matter. In the following year he published at Vienna his famous work, Theoria philpsophiae naturalis redacta ad unicam legem virium in nalura existentium, containing his atomic theory (see Molecule) . Another occasion for the exercise of his diplomatic ability soon after presented itself. A suspicion having arisen on the part of the British government that ships of war had been fitted out in the port of Ragusa for the service of France, and that the neutrality of Ragusa had thus been violated, Boscovich was selected to undertake an embassy to London (1760), to vindicate the character of his native place and satisfy the government. This mission he discharged successfully, with credit to himself and satisfaction to his countrymen. During his stay in

England he was elected a fellow of the Royal Society. He soon after paid this society the compliment of dedicating to it his Latin poem, entitled De Solis et Lunae Defectibus (London, 1764). This prolix composition, one of a class which at that time was much in vogue — metrical epitomes of the facts of science — contains in about five thousand lines, illustrated by voluminous notes, a compendium of astronomy. It was for the most part written on horseback, during the author's rides in the country while engaged in his meridian measurements. The book is character- ized by G. B. J. Delambre as " uninstructive to an astronomer and unintelligible to any one else."

On leaving England Boscovich travelled in Turkey, but ill- health compelled him soon to return to Italy. In 1764 he was called to the chair of mathematics at the university of Pavia, and this post he held, together with the directorship of the observatory of Brera, for six years. He was invited by the Royal Society of London to undertake an expedition to California to'observe the transit of Venus in 1769; but this was prevented by the recent decree of the Spanish government for the expulsion of the Jesuits from its dominions. The vanity, egotism and petulance of Boscovich provoked his rivals and made him many enemies, so that in hope of peace he was driven to frequent

change of residence. About 1770 he removed to Milan, where he continued to teach and to hold the directorship of the observatory of Brera; but being deprived of his post by the intrigues of his associates he was about to retire to his native place, when the news reached him (1773) of the suppression of his order in Italy. Uncertainty as to his future led him to accept an invitation from the king of France to Paris, where he was naturalized and was appointed director of optics for the marine, an office instituted for him, with a pension of 8000 livres. He remained there ten years, but his position became irksome, and at length intolerable. He continued, however, to devote himself diligently to the pursuits of science, and published many remarkable memoirs. Among them were an elegant solution of the problem to determine the orbit of a comet from three observations, and memoirs on the micrometer and achromatic telescopes. In 1783 he returned to Italy, and spent two years at Bassano, where he occupied himself with the publication of his Opera pertinenlia ad opticam et astronomiam, b"c, which appeared in 1785 in five volumes quarto. After a visit of some months to the convent of Vallombrosa, he went to Milan and resumed his literary labours. But his health was failing, his reputation

was on the wane, his works did not sell, and he gradually sank a prey to illness and disappointment. He fell into melancholy, imbecility, and at last madness, with lucid intervals, and died at Milan on the 15th (13th) of February 1787. In addition to the works already mentioned Boscovich published Elemenla universae matheseos (1754), the substance of the course of study prepared for his pupils; and a narrative of his travels, entitled Giornale di un viaggio da Constantinopoli in Polonia, of which several editions and a French translation appeared. His latest labour was the editing of the Latin poems of his friend Benedict Stay on the philosophy of Descartes, with scientific annotations and supplements. (W. L. R. C.)

BOSNIA AND HERZEGOVINA, or Bosnia-Herzegovina, two provinces formerly included in European Turkey, which now, together with Dalmatia, form the southernmost territories of the Austro-Hungarian Monarchy. The name Herzegovina is also written Hertzegovina, Hertsegovina or, in Croatian, Herce- govina. In shape roughly resembling an equilateral triangle, with base uppermost, Bosnia and Herzegovina cover an area of 19,696 sq. m., in the north-west of the Balkan Peninsula. They are bounded N. and N.W. by Croatia-Slavonia; W. and S.W. by Dalmatia; S.E. by Montenegro and the Sanjak of Novibazar; and N.E. by Servia. Opposite to the promontory of Sabbioncello, and at the entrance to the Bocche di Cattaro, the frontier of Herzegovina comes down to the Adriatic; but these two strips of coast do not contain any good harbour, and extend only for a total distance of 14J m. Bosnia is altogether an inland territory.

1. Physical Features. — Along the Dalmatian border, and through the centre of Bosnia, runs the backbone of the Dinaric Alps, which attain their greatest altitudes (6000-7500 ft.) near Travnik, Serajevo and Mostar. There are numerous high valleys shut in among the mountains of this range; the most noteworthy being the plain of Livno, which lies parallel to the Dalmatian border, at a height of 500 ft. above the sea. The zone of highlands throughout Bosnia and Herzegovina reaches a mean altitude of 1500 ft., while summits of more than 4000 ft. occur frequently. To the north-east of the Dinaric Alps extends a region of mountain, moor and forest, with deeply sunk alluvial basins, which finally expand into the lowlands of the Posavina, or Vale of the Save, forming the southernmost fringe of the Hungarian Alfold. Bosnia belongs wholly to the watershed of the Save, and its rivers to the Danubian system, no large stream finding a way to the Adriatic. The Save flows eastward along the northern frontier for 23 7 m. It is joined by four main tributaries, the Drina, Bosna, Vrbas and Una. The Drina is formed on the Montenegrin frontier by the united streams of the Tara and Piva; curving north-eastwards past Visegrad, it marches

for 102 m. with Servian territory, and falls into the Save at Racha, after a total course of 155 m. The Bosna issues from many springs near Serajevo, and winds for 107 m. northward, through a succession of fertile glens, reaching the Save 1 m. west of Samac.

Farther west, the Vrbas cuts a channel through the Dinaric Alps, and, after passing Jajce and Banjaluka, meets the Save 94 m. from its own headwaters. The Una rises on the Croatian border, and, after skirting the Pljesevica Planina, in Croatia, turns sharply to the north-east; serving as a frontier stream for 37 m. before entering the Save at Jasenovac. Its length is 98 m. At Novi it is joined by the Sana, a considerable affluent.

Herzegovina, which lies south of Bosnia, in a parallelogram defined by Montenegro, Dalmatia, the Dinaric Alps, and an irregular line drawn from a point 25 m. west-north-west of Mostar to the bend of the river Narenta, differs in many respects from the larger territory. Its mountains, which belong to the Adriatic watershed, and form a continuation of the Montenegrin highlands, are less rounded and more dolomitic in character. They descend in parallel ridges of grey Karst limestone, south-westwards to the sea; their last summits reappear in the multitude of rocky islands along the Dalmatian littoral. As in the peaks of Orjen, Orobac, Samotica and Veliki Kap, their height often exceeds 6000 ft. West of the Narenta, their flanks are in places covered with forests of beech and pine, but north-east of that river they present for the most part a scene of barren desolation. Their monotony is varied only by the fruitful river-valleys and poljes, or upland hollows, where the smaller towns and villages are grouped; the districts or cantons thus formed are walled round by a natural rampart of limestone. These poljes may be described as oases in what is otherwise a desert expanse of mountains. The surface of some, as notably the Mostarsko Blato, lying west of Mostar, is marshy, and in spring forms a lake; others are watered by streams which disappear in swallow-holes of the rock, and make their way by underground channels either to the sea or the Narenta. The most conspicuous example of these is the TrebinjcHca, which disappears in two swallow-holes in Popovopolye, and after making its way by a subterranean passage through a range of mountains, wells up in the mighty source of Ombla near Ragusa, and hurries in undiminished volume to the Adriatic. The Narenta, or Neretva, is the one large river of Herzegovina which flows above ground throughout its length. Rising on the Montenegrin border, under the Lebrsnik mountains, it flows north-westwards at the foot of the Dinaric Alps; and, near Konjica, sweeps round suddenly to the south, and falls into the Adriatic near Metkovic, after traversing 125 m. North of Mostar, it cleaves a passage

through the celebrated Narenta defile, a narrow gorge, 12 m. long, overshadowed by mountains which rise on either side and culminate in Lupoglav (6796 ft.) on the east, and Cvrstnica (7205 ft.) on the west.

2. Geology and Minerals. — Geologically, the highlands of Bosnia and Herzegovina are to be regarded, in both their orographic and tectonic character, as a continuation of the South Alpine calcareous belt. Along the west frontier there appear broad and strongly marked zones of Cretaceous limestone, alternating with Jurassic and Triassic, joined by a strip of Palaeozoic formations running from the north-west corner of Bosnia. Next, proceeding from this region in an easterly direction, are the Neogene freshwater formations, filling up the greatest part of the north-east of Bosnia, as also a zone of flysch intermingled with several strips of eruptive rock. In the south-east of Bosnia the predominant formations are Triassic and Palaeozoic strata with red sandstone and quartzite. Along the whole northern rim of Bosnia, as also in the fluvial and Karst valleys {poljes), are found diluvial and alluvial formations, interrupted at one place by an isolated granite layer. Bosnia is rich in minerals, including coal, iron, copper, chrome, manganese, cinnabar, zinc and mercury, besides marble and much excellent building stone. Among the mountains, gold and silver were worked by the Romans, and, in the middle ages, by the Ragusans. After 1881 the Mining Company of Bosnia began to develop the coal and iron fields; and from 1886 its operations were continued by the government. Valuable salt is obtained from the pits at Dolnja Tuzla, and the southern part of Herze- govina yields asphalt and lignite. Mineral springs also abound, and those of Ilidze, near Serajevo, have been utilized since the

days of the Romans; but the majority remained unexploited at the beginning of the 20th century.

3. Climate. — In climate Bosnia differs considerably from Herzegovina. In both alike the scirocco, bringing rain from the south-west, is a prevalent wind, as well as the bora, the fearful north-north-easter of Illyria, which, sweeping down the lateral valleys of the Dinaric Alps, overwhelms everything in its path. The snow-fall is slight, and, except on a few of the loftier peaks, the snow soon melts. In Bosnia the weather resembles that of the south Austrian highlands, generally mild, though apt to be bitterly cold in winter. In Serajevo

the mean annual tempera- ture is 50° Fahr. Herzegovina has more affinity to the Dalmatian mountains, oppressively hot in summer, when the mercury often rises beyond no Fahr. The winter rains of the Karst region show that it belongs to the sub-tropical climatic zone.

4. Fauna. — In 1893 the bones of a cave-bear (Ursus spelaeus) were taken from a cavern of the Bjelasnica range, in Herze- govina, a discovery without parallel in the Balkan Peninsula. Of existing species the bear, wild-boar, badger, roe-deer and chamois may occasionally be seen in the remotest wilds of mountain and forest. Hares are uncommon, and the last red- deer was shot in 18 14; but wolves, otters and squirrels abound. Snipe, woodcock, ducks and rails, in vast flocks, haunt the banks of the Drina and Save; while the crane, pelican, wild-swan and wild-goose are fairly plentiful. The lammergeier {Gypaetus barbatus) had almost become extinct in 1900; but several varieties of eagle and falcon are left. Falconry was long a pastime of the Moslem landlords. The destruction of game, recklessly carried out under Turkish rule, is prevented by the laws of 1880, 1883 and 1893, which enforced a close time, and rendered shooting-licences necessary. The list of reptiles in- cludes the venomous Vipera ammodytes and Pelias berus, while scorpions and lizards infest the stony wastes of the Karst. In the museum at Serajevo there is a large entomological collec- tion, including the remarkable Pogonus anophthalmus, from the underground Karst caves. The caves are rich in curious kinds of fish, Paraphoxinus Gethaldii, which is unknown elsewhere, Chondrostoma phoximus, Phoxinellus alepidatus and others, which are caught and eaten by the peasantry. In Herzegovina, although many of the high mountain tarns are unproductive, the eel-fisheries of the Narenta are of considerable value. Leech- gathering is a characteristic Bosnian industry. The streams of both territories yield excellent trout and crayfish; salmon, sturgeon and sterlet, from the Danube, are netted in the Save.

5. Flora. — Serajevo museum has a collection of the Bosnian flora, representing over 3000 species; among them, the rare P is Veronica crinita, Pinus leucodermis, Picea omorica and

Daphne Blagayana. About 50% of the occupied territory is clothed with forest. ” Bosnia begins with the forest,” says a native proverb, ” Herzegovina with the rock “; and this account is, broadly speaking, accurate, although the Bosnian Karst is as bare as that of Herzegovina. Below the mountain crests, where only the hardiest lichens and mosses can survive, comes a belt of large timber, including many giant trees, 200 ft. high, and 20 ft. in girth at the level of a man’s shoulder. Dense brushwood prevails on the foothills. There are three main zones

of woodland. Up to 2500 ft. among the ranges of northern Bosnia, the sunnier slopes are overgrown by oaks, the shadier by beeches. Farther south, in central Bosnia, the oak rarely mounts beyond the foothills, being superseded by the beech, elm, ash, fir and pine, up to 5000 ft. The third zone is characterized by the predominance, up to 6000 ft., of the fir, pine and other conifers. In all three zones occur the chestnut, aspen, willow (especially Salix laurea), hornbeam, birch, alder, juniper and yew; while the mountain ash, hazel, wild plum, wild pear and other wild fruit trees are found at rarer intervals. Until 1878 the forests were almost neglected; afterwards, the government was forced to levy a graduated tax on goats, owing to the damage they inflicted upon young trees, and to curtail the popular rights of cutting timber and fir- wood and of pasturage. These measures were largely successful, but in 1902 the export of oak staves was discontinued owing to a shortage of supply.

6. Agriculture. — In 1895, according to the agricultural survey, the surface of Bosnia and Herzegovina was laid out as follows: —

Acres.

Plough-land 2,355,499

Garden-ground 103,040

Meadow 739,200

Vineyards 12,598

Pasture 1,875,840

Forest 5,670,619

Unproductive 210,998

Apart from the arid wastes of the Karst, the soil is well adapted for the growing of cereals, especially Indian corn; olives, vines, mulberries, figs, pomegranates, melons, oranges, lemons, rice and tobacco flourish in Herzegovina and the more sheltered portions of Bosnia. Near Doboj, on the Bosna, there is a state sugar-refinery, for which beetroot is largely grown in the vicinity. Pyrethrum cinerariaefolium is exported for the manufacture of insect-powder, and sunflowers are cultivated for the oil contained in their seeds. The plum-orchards of the Posavina furnish prunes and a spirit called slivovica, shlivovitsa or sliwowitz. This district is the headquarters of a thriving trade in pigs. Poultry, bees and silkworms are commonly kept. On the whole agriculture is

backward, despite the richness of the soil; for the cultivators are a very conservative race, and prefer the methods and implements of their ancestors. Many improvements were, nevertheless, introduced by the government after 1878. Machinery was lent to the farmers, and free grants of seed were made. Model farms were established at Livno and at Gacko, on the Montenegrin border; a school of viticulture near Mostar; a model poultry-farm at Prijedor, close to the Croatian boundary; a school of agriculture and dairy farming at Ilidze; and another school at Modric, near the mouth of the Bosna, where a certain number of village schoolmasters are annually trained, for six weeks, in practical husbandry. Seed is distributed, and agricul- tural machinery lent, by the government. To better the breeds of live-stock, a stud-farm was opened near Serajevo, and foreign horses, cattle, sheep and poultry are imported.

7. Land Tenure. — The zadruga, or household community, more common in Servia (q.v.), survives to a small extent in Bosnia and Herzegovina; but, as a rule, the tenure of land resembles the system called metayage. At the time of the Austrian occupa- tion (1878) it was regulated by a Turkish enactment 1 of the 12th of September 1859. Apart from gardens and house-property, all land was, according to this enactment, owned by the state; in practice, it was held by the Moslem begs or beys (nobles) and agas (landlords), who let it to the peasantry. The landlord received from his tenant (kmei) a fixed percentage, usually one third (tretina), of the annual produce; and, of the remaining two thirds, the cash equivalent of one tenth (desetina) went to the state. The amount of the desetina was always fixed first, and served as a basis for the assessment of the tretina, which, however, was generally paid in kind. At any time the tenant could re-linquish his holding; but he could only be evicted for refusing to pay his tretina, for wilful neglect of his land or for damage done to it. The landlord was bound to keep his tenants' dwellings and outhouses in repair. Should he desire to sell his estates, the right of pre-emption belonged to the tenants, or, in default, to the neighbours. Thus foreign speculators in land were excluded, while a class of peasant proprietors was created; its numbers being increased by the custom that, if any man reclaimed a piece of waste land, it became his own property after ten years. The Turkish land-system remained in force during the entire period of the occupation (1878-1908). It had worked, on the whole, satisfactorily; and between 1885 and 1895 the number of peasants farming their own land rose from 117,000 to 200,000. One conspicuous feature of the Bosnian land-system is the Moslem Vakuf, or ecclesiastical property, consisting of estates dedicated to such charitable purposes as poor-relief, and the endowment of mosques,

schools, hospitals, cemeteries and baths. It is administered by a central board of Moslem officials, who meet in

1 This was soon modified in detail. Arrears of debt, for instance, were made recoverable for one year only, instead of the ten years allowed by Turkish law.

Serajevo, under state supervision. Its income rose to £25,000 in 1895, having quadrupled itself in ten years. The Vakuf tenants were at that time extremely prosperous, for their rent had been fixed for ten years in advance on the basis of the year's harvest, and so had not risen proportionately to the value of their holdings.

8. Industries and Commerce. — Beside agriculture, which em- ployed over 88% of the whole population in 1895, the other industries are insignificant. Chief among them are weaving and leather and metal work, carried on by the workmen in their own houses. There are also government workshops, opened with a view to a higher technical and artistic development of the house industry. More particularly, chased and inlaid metallic wares, bez (thin cotton) and carpet – weaving receive government support. Besides the sugar-refinery already mentioned, there were in 1900 four tobacco factories, a national printing-press, an annular furnace for brick-burning, an iron-foundry and several blast-furnaces, under the management of the state. Among the larger private establishments there existed in the same year seven breweries, one brandy distillery, two jam, two soap and candle factories, two building and furniture works, a factory for spinning thread, one iron and steel works, one paper and one ammonia and soda factory, and one mineral-oil refinery.

In respect of foreign trade Bosnia and Herzegovina were in 1882 included in the customs and commercial system of Austria- Hungary, to the extinction of all intermediate imposts. Since 1898 special statistics have been drawn up respecting their trade also with Austria and Hungary. According to these statistics the most important articles of export are coal and turf, fruit, minerals, soda, iron and steel, and cattle. Other articles of export are chemicals, dyeing and tanning stuffs, tobacco, sugar-beet and kitchen-salt. The imports consist principally of food stuffs, building materials, drinks, sugar, machinery, glass, fats, clothes, wooden and stone wares, and various manufactured goods.

There is a national bank in Serajevo, which carries on a hypothecary credit business and manages the wholesale trade of the tobacco factories. There are savings banks in Banjaluka, Bjelina and Brcka.

9. Communications. — The construction of carriage-roads, wholly neglected by the Turks, was carried out on a large scale by the Austrians. Two railways were also built, in connexion with the Hungarian state system. One crosses the Una at Kostajnica, and, after skirting the right bank of that river as far as Novi, strikes eastward to Banjaluka. The other, a narrow- gauge line, crosses the Save at Bosna Brod, and follows the Bosna to Serajevo, throwing out branches eastward beyond Dolnja Tuzla, and westward to Jajce and Bugojno. It then pierces through the mountains of northern Herzegovina, traverses the Narenta valley, and runs almost parallel with the coast to Trebinje, Ragusa and the Bocche di Cattaro. Up to this point the railways of the occupied territory were complete in 1901. A farther line, from Serajevo to the frontiers of Servia and Novibazar, was undertaken in 1902, and by 1906 782 m. of railway were open. Small steamers ply on the Drina, Save and Una, but the Bosna, though broad from its very source, is, like theVrbas, too full of shallows to be utilized; while the Narenta only begins to be navigable when it enters Dalmatia. All the railway lines, like the postal, telegraphic and telephonic services, are state property. In many of the principal towns there are also government hotels.

Serajevo, with 41,543 inhabitants in 1895, is the capital of the combined provinces, and other important places are Mostar (17,010), the capital of Herzegovina, Banjaluka (14,812), Dolnja. Tuzla (11,034), Travnik (6626), Livno (5273), Visoko(5ooo), Foca (4217), Jajce (3929) and Trebinje (2966). All these are described in separate articles.

10. Population and National Characteristics. — In 1895 the population, which tends to increase slowly, with a preponderance of males over females, numbered 1,568,092. The alien element is small, consisting chiefly of Austro-Hungarians, gipsies, Italians and Jews. Spanish is a comomon language of the Jews, whose ancestors fled hither, during the 16th century, to escape ! ‘:e Inquisition. The natives are officially described as Bosniaks,

but classify themselves according to religion. Thus the Roman Catholics prefer the name of Croats, Hrvats or Latins; the Orthodox, of Serbs; the Moslems, of Turks. All alike belong to the Serbo-Croatian branch of the Slavonic race; and all speak a language almost identical with Servian, though written by the Roman Catholics in Latin instead

of Cyrillic letters. A full account of this language, and its literature, is given under Servia and Croatia-Slavonia. To avoid offending either ” Serbs ” or ” Croats,” it is officially designated ” Bosnisch.” In some parts of Herzegovina the dress, manners and physical type of the peasantry are akin to those of Montenegro. The Bosnians or Bosniaks resemble their Servian kinsfolk in both appearance and character. They have the same love for poetry, music and romance; the same intense pride in their race and history; many of the same superstitions and customs. The Christians retain the Servian costume, modified in detail, as by the occasional use of the turban or fez. The ” Turkish ” women have in some districts abandoned the veil; but in others they even cover the eyes when they leave home. Poly- gamy is almost unknown, possibly because many of the ” Turks ” are descended from the austere Bogomils, who were, in most cases, converted to Islam, but more probably because the ” Turks ” are as a rule too poor to provide for more than one wife on the scale required by Islamic law. In general, the people of Bosnia and Herzegovina are sober and thrifty, subsisting chiefly on Indian corn, dried meat, milk and vegetables. Their houses are built of timber and thatch, or clay tiles, except in the Karst region, where stone is more plentiful than wood. Family ties are strong, and the women are not ill-treated, although they share in all kinds of manual labour.

n. Government. — At the time of the Austrian annexation in 1908, the only remaining token of Ottoman suzerainty was that the foreign consuls received their exequatur from Turkey, instead of Austria; otherwise the government of the country was conducted in the name of the Austrian emperor, through the imperial minister of finance at Vienna, who controlled the civil service for the occupied territory. Its central bureau, with departments of the interior, religion and education, finance and justice, was established at Serajevo; and its members were largely recruited among the Austrian Slavs, who were better able than the Germans to comprehend the local customs and language. A consultative assembly, composed of the highest ecclesiastical authorities, together with 1 2 popular representatives, also met at Serajevo. For administrative purposes the country was divided into 6 districts or prefectures (kreise), which were subdivided into 49 subprefectures (bezirke).

Every large town has a mayor and deputy mayor, appointed by the government, and a town council, of whom one third are similarly appointed, while the citizens choose the rest; a pro- portionate number of councillors representing each religious community. To ensure economy, the decisions of this body are supervised by a government commissioner. The commune is preserved, somewhat as

in Servia (q.v.), but with modified powers. Each district has its court of law, where cases are tried by three official judges and two assessors, selected from the leading citizens. The assessors vote equally with the judges, and three votes decide the verdict. Except where the litigants and witnesses are German, the Serbo-Croatian language is used. An appeal, on points of law alone, may be carried to the supreme court in Serajevo, and there tried by five judges without assessors. In cases not involving a sum greater than 300 florins (£25), no appeal will lie; and where only 50 florins (£4:3:4) are in question,- the case is summarily decided at the Bagatelle Gericht, or court for trifling cases. The number of lawyers admitted to practice is strictly limited. As far as possible, the Turkish law was retained during the period of occupation; all cases between Moslems were settled in separate courts by Moslem judges, against whom there was an appeal to the supreme court, aided by assessors. All able-bodied males are liable, on reaching their 21st year, for 3 years' service with the colours, and 9 years in the reserve. The garrison numbers about 20,000 Austrian troops, and there are 7100 native troops. The principal military

stations are Bjelina, Zvornik, Visegrad, Gorazda, Foca, Bilek, Avtovac and Trebinje, along the eastern frontier; Mostar and Stolac in the south; Livno in the west; and Bihafi in the north.

12. Religion. — In 1895 43% of the population were Orthodox Christians, 35% Moslems and 21% Roman Catholics. The patriarch of Constantinople is the nominal head of the Orthodox priesthood; but by an arrangement concluded in 1879, his authority was delegated to the Austrian emperor, in exchange for a revenue equal to the tribute previously paid by the clergy of the provinces; and his nominations for the metropolitanate of Serajevo, and the bishoprics of Dolnja Tuzla, Banjaluka and Mostar require the imperial assent. Under Turkish rale the communes chose their own parish priests, but this right is now vested in the government. The Roman Catholics have an archbishop in Serajevo, a bishop in Mostar and an apostolic administrator in Banjaluka. Serajevo is also the seat of the Jewish chief rabbi; and of the highest Moslem ecclesiastic, or reis-el-ulema, who with his council is nominated and paid by the government. The inferior Moslem clergy draw their stipends from the Vakuf. Considerable bitterness prevails between the rival confessions, each aiming at political ascendancy, but the government favours none. In order to conciliate even the Moslems,

who include the bulk of the great landholders and of the urban population, its representatives visit the mosques in state on festivals; grants are made for the Mecca pilgrimage; and even the howling Dervishes in Serajevo are maintained by the state.

13. Education. — Education for boys and girls between the ages of seven and fifteen is free, but not compulsory. The state supports primary schools (352 in 1905), where reading, writing, arithmetic and history are taught; and separate instruction is given by the Orthodox, Roman Catholic, Jewish and Moslem clergy. There are also various private schools, belonging to the different religious communities. These receive a grant from the government, which nevertheless encourages all parents to send their children to its own schools. One of the earliest and best-known private schools is the orphanage at Serajevo, founded in 1869 by two English ladies, Miss Irby and Miss Mackenzie. In the Moslem schools, which, in 1905, com- prised 855 mehtebs or primary schools, and 41 madrasas or high schools, instruction is usually given in Turkish or Arabic; while in Orthodox schools the books are printed in Cyrillic characters.

For higher education there were in 1908 three gymnasia, a real-school at Banjaluka, a technical college and a teachers' training-college at Serajevo, where, also, is the state school for Moslem law-students, called scheriatschule from the sheri or Turkish code; and various theological, commercial and art institutes. Promising pupils are frequently sent to Vienna University, with scholarships, which may be forfeited if the holders engage in political agitation.

14. Antiquities. — Up to 1900 no traces of palaeolithic man had been discovered in Bosnia or Herzegovina; but many later prehistoric remains are preserved in Serajevo museum. The neolithic station of Butmir, near Ilidze, was probably a lake-dwellers' colony, and has yielded numerous stone and horn implements, clay figures and pottery. Not far off, similar relics were found at Sobunar, Zlatiste and Debelobrdo; iron and bronze ornaments, vessels and weapons, often of elaborate design, occur in the huts and cemeteries of Glasinac, and in the cemetery of Jezerine, where they are associated with objects in silver, tin, amber, glass, &c. Among the numerous finds made in other districts may be mentioned the discovery, at Vrankamer, near Bihac, of 98 African coins, the oldest of which dates from 300 B.C. Many vestiges of Roman rule survive, such as roads, mines, ruins, tombs, coins, frescoes and inscriptions. Such remains 'occur frequently near Bihac, Foca, Livno, Jajce and Serajevo; and especially near the sources of the Drina. The period between the downfall of Roman power, late in the 5th century, and the growth of a Bosnian state, in the nth, is

poorer in antiquities. The later middle ages are represented by several monasteries, and many castles, such as those of Dervent, Doboj, Maglaj, 2epce and Vranduk, on the Bosna; Bihac, on

the Una; Prijedor and Kljud, on the Sana; and Stolac, Gabela, Irebinje and Konjica, in Herzegovina. The bridge across the Narenta, at Konjica, is said to date from the 10th century. A group of signs carved on some rocks near Visegrad have been regarded as cuneiform writing, but are probably medieval masonic symbols. In a few cases, such as the Begova Dzamia at Serajevo, the Foca mosques and the Mostar bridge, the buildings raised by the Turks are of high architectural merit. More remarkable are the tombstones, generally measuring 6 ft. in length, 3 in height and 3 in breadth, which have been supposed to mark the graves of the Bogomils. These are, as a rule, quite unadorned, a few only being decorated with rude bas-reliefs of animals, plants, weapons, the crescent and star, or, very rarely, the cross.

15. History. — Under Roman rule Bosnia had no separate name or history, and until the great Slavonic immigration of 636 it remained an undifferentiated part of Ulyria (q.v.). Owing to the scarcity of authoritative docu- otttle ments, it is impossible to describe in detail the events Banate. of the next three centuries. During this period Bosnia became the generally accepted name for the valley of the Bosna (ancient Basanius); and subsequently for several outlying and tributary principalities, notably those of Soli, afterwards Tuzla; Usora, along the south-eastern bank of the Save; Donji Kraj, the later Krajina, Kraina or Turkish Croatia, in the north-west; and Rama, the modern district of Livno. The old Illyrian population was rapidly absorbed or expelled, its Latin institutions being replaced by the autonomous tribal divisions, or Zupanates, of the Slavs. Pressure from Hungary and Byzantium gradually welded these isolated social units into a single nation, whose ruler was known as the Ban (q.v.).* But the central power remained weak, and the country possessed no strong natural frontiers. It seems probable that the bans were originally viceroys of the Croatian kings, who resumed their sovereignty over Bosnia from 958 to 1010. Thenceforward, until 1180, the bans continued subject to the Eastern empire or Hungary, with brief intervals of independence. The territory now called Herzegovina was also subject to various foreign powers. It comprised the principalities of Tribunia or Travunja, with its capital at Trebinje; and Hlum or Hum, the Zachlumia of Constantine Porphyrogenitus, who gives a clear picture of this region as it was in the 10th century* 1

The schism between Eastern and Western Christendom left Bosnia

divided between the Greek and Latin Churches. Early in the 12th century a new religion, that of the Bogomils (q.v.), was introduced, and denounced as heretical, coatro-* Its converts nevertheless included many of the Bosnian versies. nobles and the ban Kulin (1180-1204), whose reign was long proverbial for its prosperity, owing to the flourishing state of commerce and agriculture, and the extensive mining operations carried on by the Ragusans. An unusually able ruler, connected by marriage with the powerful Servian dynasty of Nemanya, and by treaty with the republic of Ragusa, 2 Kulin perceived in the new doctrines a barrier between his subjects and Hungary. He was compelled to recant, under strong pressure from Pope Innocent III. and Bela III. of Hungary; but, despite all efforts, Bogomilism incessantly gained ground. In 1232 Stephen, the successor of Kulin, was dethroned by the native magnates, who chose instead Matthew Ninoslav, a Bogomil. This event illustrates the three dominant character- istics of Bosnian history: the strength of the aristocracy; the corresponding weakness of the central authority, enhanced by the lack of any definite rule of inheritance; and the supreme influence of religion. Threatened by Pope Gregory IX. with a crusade, Ninoslav was baptized, only to abjure Christianity in 1233. For six years he withstood the Hungarian crusaders, led by Kaloman, duke of Croatia; in 1241 the Tatar invasion of

1 De Administrando Imperio, 33 and 34. The names of Chulmia and Chelmo, applied to this region by later Latin and Italian chroniclers, are occasionally adopted by English writers.

2 For the commercial and political relations of Ragusa and Bosnia, see L. Villari, The Republic of Ragusa (London, 1904).

Hungary afforded him a brief respite; and in 1244 peace was concluded after a Bosnian campaign against Croatia. A renewal of the crusade proving equally vain, in 1247 Pope Innocent III. entered into friendly negotiations with the ban, whose country was for the moment an independent and formidable state. The importance attached to its conversion is well attested by the correspondence of Pope Gregory IX. with Ninoslav and various Bosnian ecclesiastics. 1

On the death of Ninoslav in 1250, vigorous efforts were made to exterminate the Bpgomil heresy; and to this end, Bela IV., Period of who appeared as the champion of Roman Catholicism, Hungarian

secured the election of his nominee Prijesda to the suprem- banate. Direct Hungarian suzerainty lasted until acy ‘ 1299, the bans preserving only a shadow of their

former power. From 1299 to 1322 the country was ruled by the Croatian princes, Paul and Mladen Subic, who, though vassals of Hungary, reunited the provinces of Upper and Lower Bosnia, created by the Hungarians in order to prevent the growth of a dangerous national unity. A rising of the native magnates in 1322 resulted in the election of the Bogomil, Stephen Kotromanic, last and greatest of the Bosnian bans.

At this period the Servian empire had reached its zenith; Hungary, governed by the feeble monarch, Charles Robert of Anjou, was striving to crush the insurgent magnates Step”*” f Croatia; Venice, whose commercial interests were manic. imperilled, desired to restore peace and maintain the balance of power. Dread of Servia impelled Kotro- manic’ to aid Hungary. In an unsuccessful war against the Croats (1322-26), from which Venice derived the sole advantage, the ban appears to have learned the value of sea-power; immedi- ately afterwards he occupied the principality of Hlum and the Dalmatian littoral between Spalato and the river Narenta. Ragusa furnished him with money and a fleet, in return for a guarantee of protection; commercial treaties with Venice further strengthened his position; and the Vatican, which had instigated the Croats to invade the dominions of their heretical neighbour (1337-40), was conciliated by his conversion to Roman Catholicism. Defeated by the Servian tsar Dushan, and driven to ally himself with Servia and Venice against Louis I. of Hungary, Kotromanic returned to his allegiance in 1344. Four years later his influence brought about a truce between Hungary and the Venetians, who had agreed with Bosnia for mutual support against the Croats; and in 1353, the year of his death, his daughter Elizabeth was married to King Louis. . Stephen Tvrtko, the nephew and successor of Kotromanic, was a minor, and for thirteen years his mother, Helena, acted as regent. Establish- Confronted by civil war, and deprived of Hlum by ment of the Hungarians, she was compelled to acknowledge the the suzerainty of Stephen Dushan, and afterwards

Bosnian f l ou j s _ But in 1366 Tvrtko overcame all opposition at home, and forthwith embarked on a career of conquest, recapturing Hlum and annexing part of Dalmatia. The death of Stephen Dushan, in 1356, had left his empire defenceless against the Hungarians, Turks and other enemies; and to win help from Bosnia the Servian tsar Lazar ceded to Tvrtko a large tract of territory, including the principality of Tribunia. In 1376 Tvrtko was crowned as ” Stephen I., king of Bosnia,

Servia, and all the Sea-coast," although Lazar retained his own title and a diminished authority. The death of Louis in 1392, the regency of his widow Elizabeth, and a fresh outbreak in Croatia, enabled Tvrtko to fulfil his predecessor's designs by establishing a maritime state. With Venetian aid he wrested from Hungary the entire Adriatic littoral between Fiume and Cattaro, except the city of Zara; thus adding Dalmatia to his kingdom at the moment when Servia was lost through the Otto- man victory of Kossovo (1389). At his coronation he had proclaimed his purpose to revive the ancient Servian empire; in 1378 he had married the daughter of the last Bulgarian tsar; and it is probable that he dreamed of founding an empire which should extend from the Adriatic to the Black Sea. The disaster 1 Given by Theiner, Vetera monumenta Hungariam . . . illustrantia,

1- 73-185-

of Kossovo, though fatal to his ambition, did not immediately react on Bosnia itself; and when Tvrtko died in 1391, his kingdom was still at the summit of its prosperity.

Kotromanic and Tvrtko had known how to crush or conciliate their turbulent magnates, whose power reasserted itself under Dabisa (Stephen II., 1391-1398), a brother of Tvrtko. Sigismond of Hungary profited by the disorder that Decline of ensued to regain Croatia and Dalmatia; and in 1398 Bosn ; an the Turks, aided by renegade Slavs, 2 overran Bosnia, kingdom. Ostoja (Stephen III., 1398-1418), an illegitimate son of Tvrtko, proved a puppet in the hands of Hrvoje Vukcic, duke of Spalato, Sandalj Hranic, 3 and other leaders of the aristocracy, who fought indifferently against the Turks, the Hun- garians, the king or one another. Some upheld a rival claimant to the throne in Tvrtkovic, a legitimate son of Tvrtko, and all took sides in the incessant feud between Bogomils and Roman Catholics. During the reigns of Ostojic (Stephen IV., 1418-1421) and Tvrtkovic (Stephen V., 1421-1444) Bosnia was thus left an easy prey to the Turks, who exacted a yearly tribute, after again ravaging the country, and carrying off many thousands of slaves, with a vast store of plunder.

The losses inflicted on the Turks by Hunyadi Janos, and the attempt to organize a defensive league among the neighbouring Christian lands, temporarily averted the ruin of Bosnia under ThomasOstojic (Stephen VI. ,1444-1461). conquest. Hoping to gain active support from the Vatican, Ostojic renounced Bogomilism, and persecuted his former co- religionists, until the menace of an insurrection forced him to grant an amnesty. His position was endangered by the growing power of his father-in-law, Stephen Vukcic, an ardent Bogomil, who had united

Tribunia and Hlum into a single principality. Vukcic — or Cosaccia, as he is frequently called by the contemporary chroniclers, from his birthplace, Cosac — was the first and last holder of the title ” Duke of St Sava,” conferred on him by the emperor Frederick III. in 1448; and from this title is derived the name Herzegovina, or ” the Duchy.” Hardly had the king become reconciled with this formidable antagonist, when, in 1453, the death of Hunyadi, and the fall of Constantinople, left Bosnia defenceless against the Turks. In 1460 it was again invaded. Venice and the Papacy were ‘unable, and Hungary unwilling, to render assistance; while the Croats proved actively hostile. Ostojic died in 1461, and his successor Tomasevic (Stephen VII., 1461-1463) surrendered to the Turks and was beheaded. Herzegovina, where VukSic offered a desperate resistance, held out until 1483; but apart from the heroic defence of Jajce, the efforts of the Bosnians were feeble and inglorious, many of the Bogomils joining the enemy. From 1463 the greater part of the country submitted to the Turks; but the districts of Jajce and Srebrenica were occupied by Hungarian garrisons, and organized as a separate “banate” or “kingdom of Bosnia,” until 1526, when the Hungarian power was broken at Mohacs. In 1528 Jajce sur- rendered, after repelling every attack by the Turkish armies for 65 years.

The fall of Jajce was the consummation of theTurkish conquest. It was followed by the flight of large bodies of Christian refugees. Many of the Roman Catholics withdrew into Croatia-Slavonia and south Hungary, where they ultimately fell again under Ottoman dominion. Others found shelter in Rome or Venice, and a large number settled in Ragusa, where they doubtless contributed to the remarkable literary development ofthei6th . and 17th centuries in which the use of the Bosnian dialect was a characteristic feature. Some of the most daring spirits waged war on their conquesors from Clissa in Dalmatia, and afterwards from Zengg in maritime Croatia, where they formed the notorious pirate community of the Uskoks (q.v.). There was less induce- ment for the Orthodox inhabitants to emigrate, because almost

2 This is the first recorded instance of such an alliance. The Slavs were probably Bogomils.

3 These magnates played a considerable part in the politics of south-eastetn Europe; see especially their correspondence with the Venetian Republic, given by Shafarik, Acta archivi Veneti, &c.

all the neighbouring lands were governed by Moslems or Roman Catholics; and at home the peasants were permitted to retain their creed and communal organization. Judged by its influence. on Bosnian politics, the Orthodox community was relatively unimportant at the Turkish conquest; and its subsequent growth is perhaps due to the official recognition of the Greek Church, as the representative of Christianity in Turkey. The Christian aristocracy lost its privileges, but its ancient titles of duke (vojvod) and count (knez) did not disappear. The first was retained by the leaders who still carried on the struggle for liberty in Montenegro; the second was transferred to the headmen of the communes. Many of the Franciscans refused to abandon their work, and in 1463 they received a charter from the sultan Mahomet II., which is still preserved in the monastery of Fojnica, near Travnik. This toleration of religious orders, though it did not prevent occasional outrages, remained to the last character- istic of Turkish policy in Bosnia; and even in 1868 a colony of Trappist monks was permitted to settle in Banjaluka.

The Turkish triumph was the opportunity of the Bogomils, who thenceforth, assuming a new character, controlled the Bosnia destinies of their country for more than three centuries. under Bosnia was regarded by successive sultans as the Turkish gateway into Hungary; hatred of the Hungarians

and their religion was hereditary among the Bogo- mils. Thus the desire for vengeance and the prospect of a brilliant military career impelled the Bogomil magnates to adopt the creed of Islam, which, in its austerity, presented some points of resemblance to their own doctrines. The nominal governor of the country was the Turkish vali, who resided at Banjaluka or Travnik, and rarely interfered in local affairs, if the taxes were duly paid. Below him ranked the newly con- verted Moslem aristocracy, who adopted the dress, titles and etiquette of the Turkish court, without relinquishing their language or many of their old customs. They dwelt in fortified towns or castles, where the vali was only admitted on sufferance for a few days; and, at the outset, they formed a separate military caste, headed by 48 kapetans — landholders exercising unfettered authority over their retainers and Christian serfs, but bound, in return, to provide a company of mounted troops for the service of their sovereign. Their favourite pursuits were fighting, either against a common enemy or among themselves', hunting, hawking and listening to the minstrels who celebrated their exploits. Their yearly visits to Serajevo assumed in time the character of an informal parliament, for the discussion of

national questions; and their rights tended always to increase, and to become hereditary, in fact, though not in law. In every important campaign of the Turkish armies, these descendants of the Bogomils were represented; they amassed considerable wealth from the spoils of war, and frequently rose to high military and administrative positions. Thus, in 1570, Ali Pasha, a native of Herzegovina, became grand vizier; and he was succeeded by the distinguished soldier and statesman, Mahomet Beg Sokolovic, a Bosnian. Below the feudal nobility and their Moslem soldiers came the Christian serfs, tillers of the soil and taxpayers, whose lives and property were at the mercy of their lords. The hardships of their lot, and, above all, the system by which the strongest of their sons were carried off as recruits for the corps of janissaries (q.v.), frequently drove them to brigand- age, and occasionally to open revolt.

These conditions lasted until the 19th century, and meanwhile the country was involved in the series of wars waged by the

Turks against Austria, Hungary and Venice. In the history Krajina and all along the Montenegrin frontier, 1528-1821. Moslems and Christians carried on a ceaseless feud,

irrespective of any treaties concluded by their rulers; while the Turkish campaigns in Hungary provided constant occupation for the nobles during a large part of the 16th and 17th centuries. But after the Ottoman defeat at Vienna in 1683, the situation changed. Instead of extending the foreign conquests of their sultan, the Bosnians were hard pressed to defend their own borders. Zvornik fell before the Austro-Hungarian army in 1688, and the Turkish vali, who was

still officially styled the ” vali of Hungary,” removed his head-quarters from Banjaluka to Travnik, a more southerly, and therefore a safer capital. Two years later, the imperial troops reached Dolnja Tuzla, and retired with 3000 Roman Catholic emigrants. Serajevo was burned in 1697 by Eugene of Savoy, who similarly deported 40,000 Christians. The treaties of Carlowitz (1699) and Passarowitz (1718) deprived the Turks of all the Primorje, or littoral of Herzegovina, except the narrow enclaves of Klek and Suttorina, left to sunder the Ragusan dominions from those of Venice. At the same time a strip of territory in northern Bosnia was ceded to Austria, which was thus able to control both banks of the Save. This territory was restored to Turkey in 1739, at the peace of Belgrade; 1 but in 1790 it was reoccupied by Austrian troops. Finally, in 1791, the treaty of Sistova again fixed the line of the Save and Una as the Bosnian frontier.

The reform of the Ottoman government contemplated by the sultan Mahmud II. (1808-1839) was bitterly resented in Bosnia, where Turkish prestige had already been weakened by the establishment of Servian autonomy under r ? b \^ ns Karageorge. Many of the janissaries had married and settled on the land, forming a strongly conservative and fanatical caste, friendly to the Moslem nobles, who now dreaded the curtailment of their own privileges. Their opportunity came in 1820, when the Porte was striving to repress the insurrections in Moldavia, Albania and Greece. A first Bosnian revolt was crushed in 182 1; a second, due principally to the massacre of the janissaries, was quelled with much bloodshed in 1827. After the Russo-Turkish War of 1828-29, a further attempt at reform was initiated by the sultan and his grand vizier, Reshid Pasha. Two years later came a most formidable outbreak; the sultan was denounced as false to Islam, and the Bosnian nobles gathered at Banjaluka, determined to march on Constantinople, and reconquer the Ottoman empire for the true faith. A holy war was preached by their leader, Hussein Aga Berberli, a brilliant soldier and orator, who called himself Zmaj Bosanski, the ” Dragon of Bosnia,” and was regarded by his followers as a saint. The Moslems of Herzegovina, under Ali Pasha Rizvanbegovic, remained loyal to the Porte, but in Bosnia Hussein Aga encountered little resistance. At Kossovo he was reinforced by 20,000 Albanians, led by the rebel Mustapha Pasha; and within a few weeks the united armies occupied the whole of Bulgaria, and a large part of Macedonia. Their career was checked by Reshid Pasha, who persuaded the two victorious commanders to intrigue against one another, secured the division of their forces, and then fell upon each in turn. The rout of the Albanians at Prilipe and the capture of Mustapha at Scutari were followed by an invasion of Bosnia. After a desperate defence, Hussein Aga fled to Esseg in Croatia-Slavonia; his appeal for pardon was rejected, and in 1832 he was banished for life to Tribizond. The power of the Bosnian nobles, though shaken by their defeat, remained unbroken; and they resisted vigorously when their kapetanates were abolished in 1837; and again when a measure of equality before the law was conceded to the Christians in 1839. In Herzegovina, Ali Pasha Rizvan- begovifi reaped the reward of his fidelity. He was left free to tyrannize over his Christian subjects, a king in all but name. In 1840 he descended from his mountain stronghold of Stolac to wage war upon the vladika Peter II. of Montenegro, and simultaneously to suppress a Christian rising. Peace was arranged at Ragusa in 1842, and it was rumoured that Ali had concluded a secret alliance with Montenegro, hoping to shake off the suzerainty of the sultan, and to found an entirely inde- pendent kingdom. It is impossible to verify this charge, but during the troubled

years that ensued, Ali pursued an elaborate policy of intrigue. He sent large bribes to influential persons at Constantinople; he aided the Turkish vali to repress the Christians, who had again revolted; and he supported the Bosnian nobles against reforms imposed by the vali. At last, in 1850, a Turkish army was despatched to restore quiet. Ali

*For details of these events see Umar Effendi, History of the War in Bosnia (1737-1739)- Translated by C. Fraser (London, 1830).

Pasha openly professed himself a loyal subject, but secretly sent reinforcements to the rebel aristocracy. The Turks proved everywhere successful. After a cordial reception by their commander Omer or Omar Pasha, Ali was imprisoned; he was shortly afterwards assassinated, lest his lavish bribery of Turkish officials should restore him to favour, and bring disgrace on his captor (March 185 1).

The downfall of the Moslem aristocracy resulted in an import- ant administrative change: Serajevo, which had long been the

commercial centre of the country, and the jealously c °" oa guarded stronghold of the nobles, superseded Travnik serfs. as the official capital, and the residence of the vali.

A variety of other reforms, including the reorganization of Moslem education, were introduced by Omer Pasha, who governed the country until i860. But as the administration grew stronger, the position of the peasantry became worse. They had now to satisfy the imperial tax-farmers and excisemen, as well as their feudal lords. The begs and agas continued to exact their forced labour and one- third of their produce; the central government imposed a tithe which had become an eighth by 1875. Three kinds of cattle- tax, the tax for exemption from military service, levied on every newborn male, forced labour on the roads, forced loan of horses, a heavy excise on grapes and tobacco, and a variety of lesser taxes combined to burden the Christian serfs; but even more galling than the amount was the manner in which these dues were exacted — the extortionate assessments of tax-farmers and excisemen, the brutal licence of the soldiery who were quartered on recalcitrant villagers. A crisis was precipitated by the example of Servian independence, the hope of Austrian intervention, and the public bankruptcy of Turkey.

Sporadic insurrections had already broken out among the Bosnian Christians, and on the 1st of July 1875 the villagers

of Nevesinje, which gives its name to a mountain Christian ran g e east f Mostar, rose against the Turks. Within 1S7S. a Iew weeks the whole country was involved. The

Herzegovinians, under their leaders Peko Pavlovic, Socica, Ljubibratic, and others, held out for a year against all the forces that Turkey could despatch against them. 1 In July

1876 Servia and Montenegro joined the struggle, and in April

1877 Russia declared war on the sultan.

The Austro-Hungarian occupation, authorized on the 13th of July 1878 by the treaty of Berlin (arts. 23 and 26), was not Austro- easily effected; and, owing to the difficulty of military Hungarian operations among the mountains, it was necessary to occupa- employ a force of 200,000 men. Haji Loja, the MW-/90S native leader, was supported by a body of Albanians and mutinous Turkish troops, while the whole Moslem population bitterly resented the proposed change. The losses on both sides were very heavy, and, besides those who fell in battle, many of the insurgents were executed under martial law. But after a series of stubbornly contested engage- ments, the Austrian general, Philippovic, entered Serajevo on the 19th of August, and ended the campaign on the 20th of September, by the capture of Bihac in the north-west, and of Klobuk in Herzegovina. The government of the country was then handed over to the imperial ministry of finance; but the bureaucratic methods of the finance ministers, Baron von Hoffmann and Joseph de Szlavy, resulted only in the insurrec- tion of 1881-82. Order was restored in June 1882, when the administration was entrusted to Benjamin von Kallay (?.»•), as imperial minister of finance. Kallay retained this position until his death on the 13 th of July 1903, when he was succeeded by Baron Stephan Burian de Rajecz. During this period life and property were rendered secure, and great progress was achieved, on the lines already indicated, in creating an efficient civil service, harmonizing Moslem law with new enactments, promoting commerce, carrying out important public works, and reorganizing the fiscal and educational systems. All classes

1 For the Christian rebellion and its causes; see A. J. Evans, Through Bosnia and Herzegovina on Foot (London, 1876) ; and W. J. Stillman, Herzegovina and the Late Uprising (London, 1877).

and creeds were treated impartially; and, although the admini- stration has been reproached alike for undue harshness and undue leniency, neither accusation can be sustained. Critics have also urged that Kallay fostered the desire for material welfare at the cost of every other national ideal; that, despite his own popularity, he never secured the goodwill of the people for Austria-Hungary; that he left the agrarian difficulty un- solved, and the hostile religious factions unreconciled. These charges are not wholly unfounded; but the chief social and political evils in Bosnia and Herzegovina may be traced to historical causes operative long before the Austro-Hungarian occupation, and above all to the political ambition of the rival

churches. Justly to estimate the work done by Kallay, it is only necessary to point to the contrast between Bosnia in 1882 and Bosnia in 1903; for in 21 years the anarchy and ruin entailed by four centuries of misrule were transformed into a condition of prosperity unsurpassed in south-eastern Europe.

It was no doubt natural that Austrian statesmen should wish to end the anomalous situation created by the treaty of Berlin, by incorporating Bosnia and Herzegovina into the Dual Monarchy. The treaty had contemplated the Austrian evacuation of the occupied provinces after the restora- tlon. tion of order and prosperity; and this had been expressly stipulated in an agreement signed by the Austro-Hungarian and Ottoman plenipotentiaries at Berlin, as a con- dition of Turkish assent to the provisions of the treaty. But the Turkish reform movement of 1908 seemed to promise a revival of Ottoman power, which might in time have enabled the Turks to demand the promised evacuation, and thus to reap all the ultimate benefits of the Austrian administration. The reforms in Turkey certainly encouraged the Serb and Moslem inhabitants of the occupied territory to petition the emperor for the grant of a constitution similar to that in force in the provinces of Austria proper. But the Austro-Hungarian government, profiting by the weakness of Russia after the war with Japan, and aware that the proclamation of Bulgarian independence was imminent, had already decided to annex Bosnia and Herzegovina, in spite of the pledges given at Berlin, and although the proposal was unpopular in Hungary. Its decision, after being communicated to the sovereigns of the powers signatory to the treaty of Berlin, in a series of autograph letters from the emperor Francis Joseph, was made known to Bosnia and Herzegovina in an imperial rescript published on the 7th of October 1908. The Serb and Moslem delegates, who had started on the same day for Budapest, to present their petition to the emperor, learned from the rescript that the government intended to concede to their compatriots ” a share in the legislation and administration of provincial affairs, and equal protection for all religious beliefs, languages and racial distinctions.” The separate administration was, however, to be maintained, and the rescript did not promise that the new provincial diet would be more than a consultative assembly, elected on a strictly limited franchise.

Bibliography. — G. Capus, A travers la Bosnie et V Herzegovine (Paris, 1896) contains a detailed and fully illustrated account of the combined provinces, their resources and population. J. Asboth, An Official Tour through Bosnia and Herzegovina (London, 1890) is valuable for details of local history, antiquities and topography:

A. Bordeaux, La Bosnie populaire (Paris, 1904) for social life and mining. Much information is also contained in the works by Lamouche, Miller, Thomson, Joanne, Cambon, Millet, Hamard and Laveleye, cited under the heading Balkan Peninsula. See also

B. Nikasinovic, Bosnien und die Herzegovina unter der Verwaltung der osterreich-ungarischen Monarchic (Berlin, 1901, &c), and M. Oransz, Auf dem Rade dutch Kroatien und Bosnien (Vienna, 1903). The best map is that of the Austrian General Staff. See also for geology, J. Cvijic, Morphologische und glaciate Studien aus Bosnien (Vienna, 1900) ; F. Katzer, Geologischer Fiihrer durch Bosnien und Herzegovina (Serajevo, 1903) ; P. Ballif, Wasserbauten in Bosnien und Herze- govina (Vienna, 1896). Sport: ” Snaffle,” In the Land of the Bora (London, 1897). Agriculture and Commerce: annual British consular reports, and the official Ergebnisse der Viehzahlungen (1879 and 1895), and Landwirlschaft in Bosnien und Herzegovina (1899). The chief official publications are in German. For antiquities, see R. Munro, Through Bosnia-Herzegovina and Dalmatia (Edinburgh, 1900); A. J. Evans, Illyrian Letters (London, 1878) ; W. Radimsky Die

neolithisclx Station von Butmir (Vienna 1895-1898); P. Ballif, Romische Strassen in Bosnien und Herzegovina (Vienna, 1893, &c). No adequate history of Bosnia was published up to the 20th century ; but the chief materials for such a work are contained in the following books : — A. Theiner, Vetera monumenta historica Hungarian! sacram Ulustrantia (Rome, i860) and Vetera monumenta Slavorum Meridio- nalium (1. Rome, 1863; 2 Agram, 1875), — these are collections of Latin documents from the Vatican library; V. Makushev, Monu- menta historica Slavorum Meridionalium (Belgrade, 1885); Y. Shafarik, Acta archivi Yeneti spectantia ad historiam Serborum, &c. (Belgrade, 1860-1862) ; F. Miklosich, Monumenta Serbica (Vienna, 1858). Other important authorities are G. Lucio, De Regno Dal- matiae et Croatiae (Amsterdam, 1666); M. Orbini, Regno degli Slavi (Pesaro 1601); D. Farlatus and others, Illyricum Sacrum (Venice, 1751-1819) ; C. du Fresne du Cange, Illyricum vetus et novum (1746) ; M. Simek Politische Geschichte des Konigreiches Bosnien und Rama (Vienna, 1787). The best modern history, though valueless for the period after 1463’, is by P. Coquelle, Histoire du Montenegro et de la Bosnie (Paris, 1895). See also V. Klaic, Geschichte Bosniens (Leipzig 1884). J. Spalaikovitch (Spalajkovic), in La Bosnie et VHerzegovine (Paris, 1897), give a critical account of the Austro- Hungarian administration.

(K. G. J.)

BOSPORUS, or Bosphortjs (Gr. B6o-xopos = ox-ford, tradition- ally connected with Io, daughter of Inachus, who, in the form of a heifer, crossed the Thracian Bosporus on her wanderings). By the ancients this name, signifying a strait, was especially applied to the Bosporus Cimmerius (see below), and the Bosporus Thracius; but when used without any adjective it now denotes the latter, which unites the Black Sea with the Sea of Marmora and forms part of the boundary between Europe and Asia. The channel is 18 m. long, and has a maximum breadth at the northern entrance of 2 j m., a minimum breadth of about 800 yds., and a depth varying from 20 to 66 fathoms in mid-stream. In the centre there is a rapid current from the Black Sea to the Sea of Marmora, but a counter-current sets in the opposite direction below the surface and along the shores. The surface current varies in speed, but averages nearly 3 m. an hour; though at narrow places it may run at double this pace. The strait is very rarely frozen over, though history records a few instances; and the Golden Horn, the inlet on either side of which Constantinople lies, has been partially frozen over occasionally in modern times. The shores of the Bosporus are composed in the northern portion of different volcanic rocks, such as dolerite, granite and trachyte; but along the remaining course of the channel the prevailing formations are Devonian, consisting of sandstones, marls, quartzose conglomerates, and calcareous deposits of various kinds. The scenery on both sides is of the most varied and beautiful description, many villages lining each well-wooded shore, while on the European side are numerous fine residences of the wealthy class of Constantinople. The Bosporus is under Turkish dominion, and by treaty of 1841, confirmed by the treaty of Berlin in 1878 and at other times, no ship of war other than Turkish may pass through the strait (or through the Dardanelles) without the countenance of the Porte. (See also Constantinople.)

BOSPORUS CIMMERIUS, the ancient name for the Straits of Kerch or Yenikale, connecting the Black Sea and the Sea of Azov; the Cimmerii (q.v.) were the ancient inhabitants. The straits are about 25 m. long and 2\ m. broad at the narrowest, and are formed by an eastern extension of the Crimea and the peninsula of Taman, a kind of continuation of the Caucasus. This in ancient times seems to have formed a group of islands intersected by arms of the Hypanis or Kuban and various sounds now silted up. The whole district was dotted with Greek cities; on the west side, Panticapaeum (Kerch, q.v.), the chief of all, often itself called Bosporus, and Nymphaeum (Eltegen) ; on the east Phanagoria (Sennaja),Cepi,Hermonassa,Portus Sindicus, Gorgippia (Anapa). These were mostly settled by Milesians,

Panticapaeum in the 7th or early in the 6th century B.C., but Phanagoria (c. 540 B.C.) was a colony of Teos, and Nymphaeum .had some connexion with Athens — at least it appears to have been a member of the Delian Confederacy. The towns have left hardly any architectural or sculptural remains, but the numerous barrows in their neighbourhood have yielded very beautiful objects now mostly preserved in the Hermitage in St Petersburg. They comprise especially gold work, vases exported from Athens,

textiles and specimens of carpentry and marquetry. The numerous terra-cottas are rather rude in style.

According to Diodorus Siculus (xii. 31) the locality was governed from 480 to 438 B.C. by the Archaeanactidae, probably a ruling family, who gave place to a tyrant Spartocus (438-431 B.C.), apparently a Thracian. He founded a dynasty which seems to have endured until c. no B.C. The Spartocids have left many inscriptions which tell us that the earlier members of the house ruled as archons of the Greek cities and kings of various native tribes, notably the Sindi of the island district and other branches of the Maitae (Maeotae). The text of Diodorus, the inscriptions and the coins do not supply sufficient material for a complete list of them. Satyrus (431-387), the successor of Spartocus, established his rule over the whole district, adding Nymphaeum to his dominions and laying siege to Theodosia, which was a serious commercial rival by reason of its ice-free port and direct proximity to the cornfields of the eastern Crimea. It was reserved for his son Leucon (387-347) to take this city. He was succeeded by his two sons conjointly, Spartocus II. and Paerisades; the former died in 342 and his brother reigned alone until 310. Then followed a civil war in which Eumelus (3 10-303) was successful. His successor was Spartocus III. (303-283) and after him Paerisades II. Succeeding princes repeated the family names, but we cannot assign them any certain order. We know only that the last of them, a Paerisades, unable to make headway against the power of the natives, called in the help of Diophantus, general of Mithradates VI. (the Great) of Pontus, promising to hand over his kingdom to that prince. He was slain “by a Scythian Saumacus who led a rebellion against him. The house of Spartocus was well known as a line of enlightened and wise princes; although Greek opinion could not deny that they were, strictly speaking, tyrants, they are always described as dynasts. They maintained close relations with Athens, their best customers for the Bosporan corn export, of which Leucon I. set the staple at Theodosia, where the Attic ships were allowed special privileges. We have many references to this in the Attic orators. In return the Athenians granted him Athenian citizenship and set up decrees in honour of him and his

sons. Mithradates the Great entrusted the Bosporus Cimmerius to his son Machares, who, however, deserted to the Romans. But even when driven out of his own kingdom by Pompey, Mithradates was strong enough to regain the Bosporus Cimmerius, and Machares slew himself. Subsequently the Bosporans again rose in revolt under Pharnaces, another of the old king's sons. After the death of Mithradates (b.c 63), this Pharnaces (63-47) made his submission to Pompey, but tried to regain his dominion during the civil war. He was defeated by Caesar at Zela,and on his return to Rome was slain by a pretender Asander who married his daughter Dynamis, and in spite of Roman nominees ruled as archon, and later as king, until 16 B.C. After his death Dynamis was compelled to marry an adventurer Scribonius, but the Romans under Agrippa inter- fered and set Polemon (14-8) in his place. To him succeeded Aspurgus (8 b. c.a. d. 38 ?), son of Asander, who founded a line of kings which endured with certain interruptions until a.d. 341. These kings, who mostly bore the Thracian names of Cotys, Rhescuporis, Rhoemetalces, and the native name Sauromates, claimed descent from Mithradates the Great, and used the Pontic era (starting from 297 B.C.) introduced by him, regularly placing dates upon their coins and inscriptions. Hence we know their names and dates fairly well, though scarcely any events of their reigns are recorded. Their kingdom covered the eastern half of the Crimea and the Taman peninsula, and extended along the east coast of the Sea of Azov to Tanais at the mouth of the Don, a great mart for trade with the interior. They carried on a perpetual war with the native tribes, and in this were sup ported by their Roman suzerains, who even lent the assistance of garrison and fleet. At times rival kings of some other race arose and probably produced some disorganization. At one of these periods (a.d. 255) the Goths and Borani were enabled to seize Bosporan shipping and raid the shores of Asia Minor. With the last coin of the last Rhescuporis, a.d. 341 , materials for a connected history of the Bosporus Cimmerius come to an end. The

kingdom probably succumbed to the Huns established in the neighbourhood. In later times it seems in some sort to have been revived under Byzantine protection, and from time to time Byzantine officers built fortresses and exercised authority at Bosporus, which was constituted an archbishopric. They also held Ta Matarcha on the Asiatic side of the strait, a town which in the 10th and nth centuries became the seat of the Russian principality of Tmutarakan, which in its turn gave place to Tatar domination.

The Bosporan kingdom is interesting as the first Hellenistic state, the first, that is to say, in which a mixed population adopted the Greek language and civilization. It depended for its prosperity upon the export of wheat, fish and slaves, and this commerce supported a class whose wealth and vulgarity are exemplified by the contents of the numerous tombs to which reference has been made. In later times a Jewish element was added to the population, and under its influence were developed in all the cities of the kingdom, especially Tanais, societies of ” worshippers of the highest God,” apparently professing a monotheism which without being distinctively Jewish or Christian was purer than any found among the inhabitants of the Empire.

We possess a large series of coins of Panticapaeum and other cities from the 5th century B.C. The gold staters of Panticapaeum bearing Pan’s head and a griffin are specially remarkable for their weight and fine workmanship. We have also coins with the names of the later Spartocids and a singularly complete series of dated solidi issued by the later or Achaemenian dynasty; in them may be noticed the swift degeneration of the gold solidus through silver and potin to bronze (see also Numismatics).

See, for history, introduction to V. V. Latyshev, Insert, orae Septent. Ponti Euxini { vol. ii. (St Petersburg, 1890) ; art. ” Bosporus” (2) by C. G. Brandis in Pauly-Wissowa, Realencycl. vol. iii. 757 (Stuttgart, 1899); E. H. Minns, Scythians and Greeks (Cambridge, 1907). For inscriptions, Latyshev as above and vol. iv. (St Peters- burg, 1901). Coins: B. Koehne, Musee Kotschoubey (St Petersburg, 1855). Religious Societies: E. Schiirer in Sitzber. d. k. pr. Akad. d. Wissenschaft zu Berlin (1897), i. pp. 200-227. Excavations: Anti- suites du Bosphore cimmerien (St Petersburg, 1854, repr. Paris, 1892) and Compte rendu and Bulletin de la Commission Imp. Archeo- logique de St-Petersbourg. (E. H. M.)

BOSQUET, PIERRE FRANQOIS JOSEPH (1810-1861), French marshal, entered the artillery in 1833, and a year later went to Algeria. Here he soon did good service, and made himself remarkable not only for technical skill but the moral qualities indispensable for high command. Becoming captain in 1839, he greatly distinguished himself at the actions of Sidi-Lakhdar and Oued-Melah. He was soon afterwards given the command of a battalion of native tirailleurs, and in 1843 was thanked in general orders for his brilliant work against the Flittahs. In 1845 he became lieutenant-colonel, and in 1847 colonel of a French line regiment. In the following year he was in charge of the Oran district, where his swift suppression of an insurrection won him further promotion to the grade of general of

brigade, in whichjank he went through the campaign of Kabulia, receiving a severe wound. In 1853 he returned to France after nineteen years' absence, a general of division. Bosquet was amongst the earliest chosen to serve in the Crimean War, and at the battle of the Alma his division led the French attack. When the Anglo-French troops formed the siege of Sevastopol, Bosquet's corps of two divisions protected them against interruption. His timely intervention at Inkerman (November 5, 1854) secured the victory for the allies. During 1855 Bosquet's corps occupied the right wing of the besieging armies opposite the Mamelon and Malakov. He himself led his corps at the storming of the Mamelon (June 7), and at the grand assault of the 8th of September he was in command of the whole of the storming troops. In the struggle for the Malakov he received another serious wound. At the age of forty-five Bosquet, now one of the foremost soldiers in Europe, became a senator and a marshal of France, but his health was broken, and he lived only a few years longer. He had the grand cross of the Bath, the grand cross of the Legion of Honour, and the Medjidieh of the 1st class.

BOSS. (1) (From the O. Eng. boce, a swelling, cf. Ital. bozza, and Fr. bosse, possibly connected with the O. Ger. bozan, to beat) ,

a round protuberance; the projecting centre or " umbo " of a buckler; in geology a projection of rock through strata of another species; in architecture, the projecting keystone of the ribs of a vault which masks their junction; the term is also applied to similar projecting blocks at every intersection. The boss was often richly carved, generally with conventional foliage but sometimes with angels, animals or grotesque figures. The boss was also employed in the flat timber ceilings of the 15th century, where it formed the junction of cross-ribs. (2) (From the Dutch baas, a word used by the Dutch settlers in New York for " master," and so generally used by the Kaffirs in South Africa; connected with the Ger. Base, cousin, meaning a " chief kinsman," the head of a household or family), a col- loquial term, first used in America, for an employer, a foreman, and generally any one who gives orders, especially in American political slang for the manager of a party organization.

BOSSI, GIUSEPPE (1777-1816), Italian painter and writer on art, was born at the village of Busto Arsizio, near Milan. He was educated at the college of Monza; and his early fondness for drawing was fostered by the director of the college, who supplied him with prints after the works of Agostino Caracci for copies. He then studied at the academy of Brera at Milan, and about 1795 went to Rome, where he formed an intimate friendship with Canova. On his return to Milan he became

assistant secretary, and then secretary, of the Academy of Fine Arts. He rendered important service in the organization of this new institution. In 1804, in conjunction with Oriani, he drew up the rules of the three academies of art of Bologna, Venice and Milan, and soon after was rewarded with the decoration of the Iron Crown. On the occasion of the visit of Napoleon I. to Milan in 1805, Bossi exhibited a drawing of the Last Judgment of Michelangelo, and pictures representing Aurora and Night, Oedipus and Creon, and the Italian Parnassus. By command of Prince Eugene, viceroy of Italy, Bossi undertook to make a copy of the Last Supper of Leonardo, then almost obliterated, for the purpose of getting it rendered in mosaic. The drawing was made from the remains of the original with the aid of copies and the best prints. The mosaic was executed by Raffaelli, and was placed in the imperial gallery of Vienna. Bossi made another copy in oil, which was placed in the museum of Brera. This museum owed to him a fine collection of casts of great works of sculpture acquired at Paris, Rome and Florence. Bossi devoted a large part of his life to the study of the works of Leonardo; and his last work was a series of drawings in monochrome representing incidents in the life of that great master. He left unfinished a large cartoon in black chalk of the Dead Christ in the bosom of Mary, with John and the Magdalene. In 1810 he published a special work in large quarto, entitled Del Cenacolo di Leonardo da Vinci, which had the merit of greatly interesting Goethe. His other works are DelleOpinioni di Leonardo intorno alia simmetria de' cor pi umani (1 8 1 1) , and Del Tipo dell' arte della pittura (1816). Bossi died,at Milan on the 15th of December 1816. A monument by Canova was erected to his memory in the Ambrosian library, and a bust was placed in the Brera.

BOSSU, RENE LE (1631-1680), French critic, was born in Paris on the 16th of March 163 1. He studied at Nanterre, and in 1649 became one of the regular canons of Sainte-Genevieve. He wrote Parallhle des principes de la physique d'Aristole et de celle de RenS Descartes (1674), and a Traite du poeme ipique, highly praised by Boileau, the leading doctrine of which was that the subject should be chosen before the characters, and that the action should be arranged without reference to the personages who are to figure in the scene. He died on the 14th of March 1680.

BOSSUET, JAQUES BENIGNE (1627-1704), French divine, orator and writer, was born at Dijon on the 27th of September 1627. He came of a family of prosperous Burgundian lawyers; his father was a judge of the parliament (a provincial high court) at Dijon, afterwards at Metz. The boy was sent to school with the Jesuits of Dijon till 1642, when he went up to the college of Navarre in Paris to begin the study of

theology; for a pious mother had brought him up to look on the priesthood as his natural vocation. At Navarre he gained a great reputation for

hard work; fellow-students nicknamed him Bos suelus aratro— an ox broken in to the plough. But his abilities became known beyond the college walls. He was taken up by the Hotel de Rambouillet, a great centre of aristocratic culture and the original home of the Precieuses. Here he became the subject of a celebrated experiment. A dispute having arisen about extempore preaching, the boy of sixteen was put up, late one night, to deliver an impromptu discourse. He acquitted himself as well as in more conventional examinations. In 1652 he took a brilliant degree in divinity, and was ordained priest. The next seven years he spent at Metz, where his father's influence had got him a canonry at the early age of thirteen; to this was now added the more important office of archdeacon. He was plunged at once into the thick of controversy; for nearly half Metz was Protestant, and Bossuet's first appearance in print was a refutation of the Huguenot pastor Paul Ferry (1655). To reconcile the Protestants with the Roman Church became the great object of his dreams; and for this purpose he began to train himself carefully for the pulpit, an all-important centre of influence in a land where political assemblies were unknown, and novels and newspapers scarcely born. Not that he reached perfection at a bound. His youthful imagination was unbridled, and his ideas ran easily into a kind of paradoxical subtlety, redolent of the divinity school. But these blemishes vanished when he settled in Paris (1659), and three years later mounted the pulpit of the Chapel Royal.

In Paris the congregations had no mercy on purely clerical logic or clerical taste; if a preacher wished to catch their ear, he must manage to address them in terms they would agree to consider sensible and well-bred. Not that Bossuet thought too much of their good opinion. Having very stern ideas of the dignity of a priest, he refused to descend to the usual devices for arousing popular interest. The narrative element in his sermons grows shorter with each year. He never drew satirical pictures, like his great rival Bourdaloue. He would not write out his discourses in full, much less learn them off by heart: of the two hundred printed in his Works all but a fraction are rough drafts. No wonder ladies like Mme de Sevigne forsook him, when Bourdaloue dawned on the Paris horizon in 1669; though Fenelon and La Bruyere, two much sounder critics, refused to follow

their example. Bossuet possessed the full equipment of the orator, voice, language, flexibility and strength. He never needed to strain for effect; his genius struck out at a single blow the thought, the feeling and the word. What he said of Martin Luther applies peculiarly to himself: he could “fling his fury into theses,” and thus unite the dry light of argument with the fire and heat of passion. These qualities reach their highest point in the Or arsons funebres. Bossuet was always best when at work on a large canvas; besides, here no conscientious scruples intervened to prevent him giving much time and thought to the artistic side of his subject. For the Oraison, as its name betokened, stood midway between the sermon proper and what would nowadays be called a J)iographical sketch. At least, that was what Bossuet made it; for on this field he stood not merely first, but alone. His three great masterpieces were delivered at the funerals of Henrietta Maria, widow of Charles I. (1669), her daughter, Henrietta, duchess of Orleans (1670), and the great soldier Conde (1687).

Apart from these state occasions, Bossuet seldom appeared in a Paris pulpit after 1669. In that year he was gazetted bishop of Condom in Gascony, though he resigned the charge on being appointed tutor to the dauphin, only child of Louis XIV., and now a boy of nine (1670). The choice was scarcely fortunate. Bossuet unbent as far as he could, but his genius was by no means fitted to enter into the feelings of a child; and the dauphin was a cross, ungainly, sullen lad, who grew up to be a merely genealogical incident at his father’s court. Probably no one was happier than the tutor, when his charge’s sixteenth birthday came round, and he was promptly married off to a Bavarian princess. Still the nine years at court were by no means wasted. Hitherto Bossuet had published nothing, except his answer to Ferry. Now he sat down to write for his pupil’s instruction — or rather, to fit himself to give that instruc-

tion — a remarkable trilogy. First came the Traits de la con- naissance de Dieu el de soi-meme, then the Discours sur I’histoire universelle, lastly the Politique tiree de I’Ecriture Sainte. The three books fit into each other. The Traite is a general sketch of the nature of God and the nature of man. The Discours is a history of God’s dealings with humanity in the past. The Politique is a code of rights and duties drawn up in the light thrown by those dealings. Not that Bossuet literally supposed that the last word of political wisdom had been said by the Old Testament. His conclusions are only ” drawn from Holy Scripture,” because he wished to gain the highest possible sanction for the institutions of his country — to hallow the France of Louis XIV. by proving its astonishing likeness to the Israel of Solomon. Then, too, the veil of Holy Scripture enabled him to speak out more boldly than

court-etiquette would have other- wise allowed, to remind the son of Louis XIV. that kings have duties as well as rights. Louis had often forgotten these duties, but Louis' son would bear them in mind. The tutor's imagination looked forward to a time when France would blossom into Utopia, with a Christian philosopher on the throne. That is what made him so stalwart a champion of authority in all its forms: " le roi, JSsus-Christ et I'Eglise, Dieu en ces trois noms," he says in a characteristic letter. And the object of his books is to provide authority with a rational basis. For Bossuet's worship of authority by no means killed his confidence in reason; what it did was to make him doubt the honesty of those who reasoned otherwise than himself. The whole chain of argument seemed to him so clear and simple. Philosophy proved that a God exists, and that He shapes and governs the course of human affairs. History showed that this governance is, for the most part, indirect, exercised through certain venerable corpora- tions, as well civil as ecclesiastical, all of which demand implicit obedience as the immediate representatives of God. Thus all revolt, whether civil or religious, is a direct defiance of the Almighty. Cromwell becomes a moral monster, and the revoca- tion of the edict of Nantes is " the greatest achievement of the second Constantine." Not that Bossuet glorified the status quo simply as a clerical bigot. The France of his youth had known the misery of divided counsels and civil war; the France of his manhood, brought together undet an absolute sovereign, had suddenly shot up into a splendour only comparable with ancient Rome. Why not, then, strain every nerve to hold innovation at bay and prolong that splendour for all time? Bossuet's own Discours sur I'histoire universelle might have furnished an answer, for there the fall of many empires is detailed. But then the Discours was composed under a single preoccupation. To Bossuet the establishment of Christianity was the one point of real importance in the whole history of the world. Over Mahomet and the East he passed without a word; on Greece and Rome he only touched in so far as they formed part of the Praeparatio Evangelica. And yet his Discours is far more than a theological pamphlet. Pascal, in utter scorn for science, might refer the rise and fall of empires to Providence or chance — the nose of Cleopatra, or " a little grain of sand " in the English lord protector's veins. Bossuet held fast to his principle that God works through secondary causes. "It is His will that every great change should have its roots in the ages that went before it." Bossuet, accordingly, made a heroic attempt to grapple with origins and causes, and in this way his book deserves its place as one of the very first of philosophic histories.

From writing history he turned to history in the making. In 1681 he

was gazetted bishop of Meaux; but before he could take possession of his see, he was drawn into a violent quarrel between Louis XIV. and the pope (see Gallicanism). Here he found himself between two fires. To support the pope meant supporting the Jesuits; and he hated their casuists and devotion aisie almost as much as Pascal himself. To oppose the pope was to play into the hands of Louis, who was frankly anxious to humble the Church before the State. So Bossuet steered a middle course. Before the general assembly of the French clergy he preached a great sermon on the unity of the Church, and made it a magnificent plea for compromise. As Louis

insisted on his clergy making an anti-papal declaration, Bossuet got leave to draw it up, and made it as moderate as he could. And when the pope declared it null and void, he set to work on a gigantic Defensio Cleri Gallicani, only published after his death.

The Gallican storm a little abated, he turned back to a project very near his heart. Ever since the early days at Metz he had been busy with schemes for uniting the Huguenots to the Roman Church. In 1668 he converted Turenne; in 1670 he published an Exposition de la foi catholique, so moderate in tone that adversaries were driven to accuse him of having fraudulently watered down the Roman dogmas to suit a Protestant taste. Finally in 1688 appeared his great Histoire des variations des iglises protestantes, perhaps the most brilliant of all his works. Few writers could have made the Justification controversy interesting or even intelligible. His argument is simple enough. Without rules an organized society cannot hold together, and rules require an authorized interpreter. The Protestant churches had thrown over this interpreter; and Bossuet had small trouble in showing that, the longer they lived, the more they varied on increasingly important points. For the moment the Protestants were pulverized; but before long they began to ask whether variation was necessarily so great an evil. Between 1691 and 1 701 Bossuet corresponded with Leibnitz with a view to reunion, but negotiations broke down precisely at this point. Individual Roman doctrines Leibnitz thought his countrymen might accept, but he flatly refused to guarantee that they would necessarily believe to-morrow what they believe to-day. ” We prefer,” he said, ” a church eternally variable and for ever moving forwards.” Next, Protestant writers began to accumulate some startling proofs of Rome’s own variations; and here they were backed up by Richard Simon, a priest of the Paris Oratory, and the father of Biblical criticism

in France. He accused St Augustine, Bossuet's own special master, of having corrupted the primitive doctrine of Grace. Bossuet set to work on a Defense de la tradition, but Simon calmly went on to raise issues graver still. Under a veil of politely ironical circumlocutions, such as did not deceive the bishop of Meaux, he claimed his right to interpret the Bible like any other book. Bossuet denounced him again and again; Simon told his friends he would wait until " the old fellow " was no more. Another Oratorian proved more dangerous still. Simon had endangered miracles by applying to them lay rules of evidence, but Malebranche abrogated miracles altogether. It was blasphemous, he argued, to suppose that the Author of nature would break through a reign of law He had Himself established. Bossuet might scribble nova, mira, falsa, in the margins of his book and urge on Fenelon to attack- them; Malebranche politely met his threats by saying that to be refuted by such a pen would do him too much honour. These repeated checks soured Bossuet's temper. In his earlier controversies he had borne himself with great magnanimity, and the Huguenot ministers he refuted found him a kindly advocate at court. Even his approval of the revocation of the edict of Nantes stopped far short of approving dragonades within his diocese of Meaux. But now his patience was wearing out. A dissertation by one Father Caffaro, an obscure Italian monk, became his excuse for writing certain violent Maximes sur la eomtdie (1694) wherein he made an outrageous attack on the memory of Moliere, dead more than twenty years. Three years later he was battling with Fenelon over the love of God, and employing methods of controversy at least as odious as Fenelon's own (1697-1699). All that can be said in his defence is that Fenelon, four-and- twenty years his junior, was an old pupil, who had suddenly grown into a rival; and that on the matter of principle most authorities thought him right.

Amid these gloomy occupations Bossuet's life came slowly to an end. Till he was over seventy he had scarcely known what illness was; but in 1702 he was attacked by the stone. Two years later he was a hopeless invalid, and on the 12th of April 1704 he passed quietly away. Of his private life there is little to record. Meaux found him an excellent and devoted bishop, much more attentive to diocesan concerns than his more stirring occupations would seem to allow. In general society he was iv. 10

kindly and affable enough, though somewhat ill at ease. Until he was over forty, he had lived among purely ecclesiastical surroundings; and it was probably want of self-confidence, more than want of moral courage, that made him shut his eyes a little too closely to the disorders of Louis XIV.'s private life. After all, he was not the king's

confessor; and to ” reform ” Louis, before age and Mme de Maintenon had sobered him down, would have taxed the powers of Daniel or Ezekiel. But in his books Bossuet was anything but timid. AH of them, even the attacks on Simon, breathe an air of masculine belief in reason, rare enough among the apologists of any age. Bossuet would willingly have undertaken, as Malebranche actually undertook, to make an intelligent Chinaman accept all his ideas, if only he could be induced to lend them his attention. But his best praise is to have brought all the powers of language to paint an undying picture of a vanished world, where religion and letters, laws and science, were conceived of as fixed unalterable planets, circling for ever round one central Sun.

Authorities. — The best edition of Bossuet’s sermons is the QLuvres oratoires de Bossuet, edited by Abbe Lebarq, in 6 vols. (Paris, 1890 1896). His complete works were edited by Lachat, in 31 vols.(Paris, 1862-1864). A complete list of the innumerable works relating to him will be found in the Bossuet number of the Bibliotheque des bibliographies critiques, compiled by Canon Charles Urbain, and published by the Societe des fitudes Historiques (Paris, 1900). The general reader will find all he requires in the respective studies of M. Rebelliau, Bossuet (Paris, 1900), and M. Gustave Lanson, Bossuet (Paris, 1901). In English there is a modest Bossuet by Mrs Sidney Lear (London, 1874), and two remarkable studies by Sir J. Fitz- James Stephen in the second volume of his Horae Sabbaticae (London, 1892). (St. C.)

BOSTANAI, the name of the first exilarch under Mahommedan rule, in the middle of the 7th century. The exilarchs had their seat in Persia, and were practically the secular heads of the Jewish community in the Orient.

BOSTON, THOMAS (1676-1732), Scottish divine, was born at Duns on the 17th of March 1676. His father, John Boston, and his mother, Alison Trotter, were both Covenanters. He was educated at Edinburgh, and licensed in 1697 by the presbytery of Chirnside. In 1699 he became minister of the small parish of Simprin, where there were in all ” not more than 90 examinable persons.” In 1704 he found, while visiting a member of his flock, a book which had been brought into Scotland by a common- wealth soldier. This was the famous Marrow of Modern Divinity, by Edward Fisher, a compendium of the opinions of leading Reformation divines on the doctrine of grace and the offer of the Gospel. Its object was to demonstrate the unconditional freeness of the Gospel. It cleared away such conditions as repentance, or some degree of outward or inward reformation, and argued that where

Christ is heartily received, full repentance and a new life follow. On Boston's recommendation, Hog of Carnock reprinted The Marrow in 17 18; and Boston also published an edition with notes of his own. The book, being attacked from the standpoint of high Calvinism, became the standard of a far-reaching movement in Scottish Presbyterianism. The " Marrow men " were marked by the zeal of their service and the effect of their preaching. As they remained Calvinists they could not preach a' universal atonement; they were in fact extreme particular redemptionists. In 1707 Boston was translated to Ettrick. He distinguished himself by being the only member of the assembly who entered a protest against what he deemed the inadequate sentence passed on John Simson, professor of divinity at Glasgow, who was accused of heterodox teaching on the Incarnation. He died on the 20th of May 1732. His books, The Fourfold State, The Crook in the Lot, and his Body of Divinity and Miscellanies, long exercised a powerful influence over the Scottish peasantry.

His Memoirs were published in 1776 (ed. G. D. Low, 1908). An edition of his works in 12 volumes appeared in 1849. (D. Mk.)

BOSTON, a municipal and parliamentary borough and seaport of Lincolnshire, England, on the river Witham, 4 m. from its mouth in the Wash, 107 m. N. of London by the Great Northern railway. Pop. (1901) 15,667. It lies in a flat agricultural fen district, drained by numerous cuts, some of which are navigable. The church of St Botolph is a superb Decorated

building, one of the largest and finest parish churches in the kingdom. A Decorated chapel in it, formerly desecrated, was restored to sacred use by citizens of Boston, Massachusetts, U.S.A., in 1857, in memory of the connexion of that city with the English town. The western tower, commonly known as Boston Stump, forms a landmark for 40 m. Its foundations were the first to be laid of the present church (which is on the site of an earlier one), but the construction was arrested until the Perpendicular period, of the work of which it is a magnificent example. It somewhat resembles the completed tower of Antwerp cathedral, and is crowned by a graceful octagonal lantern, the whole being nearly 290 ft. in height. The church of Skirbeck, 1 m. south-east, though extensively restored, retains good Early English

details. Other buildings of interest are the guildhall, a 15th-century structure of brick; Shodfriars Hall, a half-timbered house adjacent to slight remains of a Dominican priory; the free grammar school, founded in 1554, with a fine gateway of wrought iron of the 17th century brought from St Botolph's church; and the Hussey Tower of brick, part of a mansion of the 16th century. Public institutions include a people's park and large municipal buildings (1904).

As a port Boston was of ancient importance, but in the 18th century the river had silted up so far as to exclude vessels ex- ceeding about 50 tons. In 188 2- 1884 a dock some 7 acres in extent was constructed, with an entrance lock giving access to the quay sides for vessels of 3000 tons. The bed of the river was deepened to 27 ft. for 3 m. below the town, and a new cut of 3 m. was made from the mouth into deep water. An iron swing-bridge connects the dock with the Great Northern railway. There is a repairing slipway accommodating vessels of 800 tons. Imports, principally timber, grain, cotton and linseed, increased owing to these improvements from £116,179 i n x 88i to £816,698 in 1899; and exports (coal, machinery and manufactured goods) from £83,000 in 1883 to £261,873 in 1899. The deep-sea and coastal fisheries are important. Engineering, oil-cake, tobacco, sail and rope works are the principal industries in the town. Boston returns one member to parliament. The parliamentary borough falls within the Holland or Spalding division of the county. The municipal borough is under a mayor, 6 aldermen and 18 councillors. Area, 2727 acres.

Boston (Icanhoe, St Botolph or Botolph's Town) derives its name from St Botolph, who in 654 founded a monastery here, which was destroyed by the Danes, 870. Although not mentioned in Domesday, Boston was probably granted as part of Skirbeck to Alan, earl of Brittany. The excellent commercial position of the town at the mouth of the Witham explains its speedy rise into importance. King John by charter of 1204 granted the bailiff of Boston sole jurisdiction in the town. By the 13th century it was a great com mercial centre second only to London in paying £780 for two years to the fifteenth levied in 1205, and Edward III. made it a staple port for wool in 1369. The Hanseatic and Flemish merchants largely increased its prosperity, but on the withdrawal of the Han- seatic League about 1470 and the break-upof the gild system Boston's prosperity began to wane, and for some centuries it remained almost without trade. Nevertheless it was raised to the rank of a free borough by Henry VIII.'s charter of 1546, confirmed by Edward VI. in 1547, by Mary in 1553, by Elizabeth (who granted a court of admiralty) in 1558 and 1573, and by James I. in 1608. Boston sent members to the great councils in 1337, 1352 and

1353; and from 1552 to 1885 two members were returned to each parliament. The Redistribution Act 1885 reduced the representation to one member. In 1257 a market was granted to the abbot of Crowland and in 1308 to John, earl of Brittany. The great annual mart was held before 1218 and attended by many German and other merchants. Two annual fairs and two weekly markets were granted by Henry VIII.'s charter, and are still held. The Great Mart survives only in the Beast Mart held on the nth of December.

See Pishey Thompson, History and Antiquities of Boston and the Hundred of Skirbeck (Boston, 1856) ; George Jebb, Guide to the Church of St Botolph, with Notes on the History of Boston ; Victoria County History: Lincolnshire.

BOSTON, the capital of the state of Massachusetts, U.S.A., in Suffolk county; lat. 42 21′ 27-6″ N, long. 71 3′ 30″ W. Pop. (1900) 560,892, (197,129 being foreign born); (1905, state census) 595,580; (1910), 670,585. Boston is the terminus of the Boston & Albany (New York Central), the Old Colony system of the New Yofk, New Haven & Hartford, and the Boston & Maine railway systems, each of which controls several minor roads once in-

dependent. The city lies on Massachusetts bay, on what was once a pear-shaped peninsula attached to the mainland by a narrow, marshy neck, often swept by the spray and water. On the north is the Charles river, which widens here into a broad, originally much broader, inner harbour or back-bay. The surface of the peninsula was very hilly and irregular, the shore-line was deeply indented with coves, and there were salt marshes that fringed the neck and the river-channel and were left oozy by the ebbing tides. Until after the War of Independence the primitive topography remained unchanged, but it wrs afterwards subjected to changes greater than those effected on the site of any other American city. The area of the original Boston was only 783 acres, but by the filling in of tidal flats (since 1804) this was increased to 1829 acres; while the larger corporate Boston of the present day — including the annexed territories of South Boston (1804), Roxbury (1868), Charlestown, Dorchester, Brighton and West Roxbury (1874)— comprehends almost 43 sq. m. The beautiful Public Garden and the finest residential quarter of the city — the Back Bay, so called from that inner harbour from whose waters it was reclaimed (1856-1886) — stand on what was once the narrowest, but to-day is the widest and fairest portion of the original site. Whole forests, vast quarries of granite, and hills of gravel were used in fringing the water margins, constructing wharves, piers and causeways, redeeming flats, and furnishing piling and solid foundations for buildings. At the edge

of the Common, which is now well within the city, the British troops in 1775 took their boats on the eve of the battle of Lexington; and the post-office, now in the very heart of the business section of the city, stands on the original shore-line. The reclaimed territory is level and excellently drained. The original territory still preserves to a large degree its irregularity of surface, but its hills have been much degraded or wholly razed. Beacon Hill, so called from its ancient use as a signal warning station, is still the most conspicuous topographical feature of the city, but it has been changed from a bold and picturesque eminence into a gentle slope. After the great fire of 1872 it became possible, in the reconstruction of the business district, to widen and straighten its streets and create squares, and so provide for the traffic that had long outgrown the narrow, crooked ways of the older city. Atlantic Avenue, along the harbour front, was created, and Washington Street, the chief business artery, was largely remade after 1866. It is probable that up to 1875, at least, there had been a larger outlay of labour, material and money, in reducing, levelling and reclaiming territory, and in straightening and widening thoroughfares J in Boston, than had been expended for the same purposes in all the other chief cities of the United States together. Washington Street, still narrow, is perhaps the most crowded and congested thoroughfare in America. The finest residence streets are in the Back Bay, which is laid out, in sharp contrast with the older quarters, in a regular, rectangular arrangement. The North End, the original city and afterwards the fashionable quarter, is now given over to the Jews and foreign colonies.

The harbour islands, three of which have been ceded to the United States for the purpose of fortification, are numerous, and render the navigation of the shipping channels difficult and easily guarded. Though tortuous of access, the channels afford a clear passage of 27-35 ft. since great improvements were undertaken by the national government in 1892, 1899, 1902 and 1907, and the harbour, when reached, is secure. It affords nearly 60 sq. m. of anchorage, but the wharf line, for lack of early reservation, is not so large as it might and should have been. The islands in the harbour, now bare, were for the most part heavily wooded when first occupied. It has been found impossible to afforest them on account of the roughness of the sea-air, and the wash from their bluffs into the harbour has involved large expense in the erection of sea-walls. Castle Island has been fortified since the earliest days; Fort Independence, on this island, and Forts Winthrop and Warren on neighbouring islands, constitute permanent harbour defences. The broad watercourses

1 On the alteration of streets alone $26,691,496 were expended from

1822 to 1880.

around the peninsula are spanned by causeways and bridges, East Boston only, that the harbours may be open to the navy- yard at Charlestown, being reached by ferry (1870), and by the electric subway under the harbour. • At the Charlestown navy-yard (1800) there are docks, manufactories, foundries, machine-shops, ordnance stores, rope-walks, furnaces, casting- pits, timber sheds, ordnance-parks, ship-houses, &c. The famous frigate ” Independence ” was launched here in 1814, the more famous ” Constitution ” having been launched while the yard was still private in 1797. The first bridge over the Charles, to Charlestown, was opened in 1786. The bridge of chief artistic merit is the Cambridge Bridge (1908), which replaced the old West Boston Bridge, and is one feature of improvements long projected for the beautifying of the Charles river basin.

Comparatively few relics of the early town have been spared by time and the improvements of the modern city. Three cemeteries remain intact — King’s chapel burying ground, with the graves of John Winthrop and John Cotton; the Old Granary burial ground in the heart of the city, where Samuel Sewall, the parents of Franklin, John Hancock, James Otis and Samuel Adams are buried; and Copp’s Hill burial ground, containing the tombs of the Mathersˆ Christ church (1723) is the oldest church of the city; in its tower the signal lanterns were displayed for Paul Revere on the night of the 18th of April 1775. The Old South church (1730-1782), the old state house (1748, restored 1882), and Faneuil Hall (1762-1763, enlarged 1805, reconstructed 1898) are rich in memorable associations of the period preceding the War of Independence. The second was the seat of the royal government of Massachusetts during the provincial period, and within its walls from 1760 to 1775 the questions of colonial dependence or independence probably first came into evident conflict. The Old South church has many associations; it was, for instance, the meeting-place of the people after the ” Boston Massacre ” of 1770, when they demanded the removal of the British troops from the city; and here, too, were held the meetings that led up to the ” Boston Tea Party ” of 1773. Faneuil Hall (the original hall of the name was given to the city by Peter Faneuil, a Huguenot merchant, in 1742) is associated, like the Old South, with the patriotic oratory of revolutionary days and is called ” the cradle of American liberty.” Its association with reform movements and great public issues of later

times is not less close and interesting. 1 The adjoining Quincy market may be mentioned because its construction (1826) was utilized to open six new streets, widen a seventh, and secure flats, docks and wharf rights — all without laying tax or debt upon the city. The original King's chapel (1688, present building 1749-17 54) was the first Episcopal church of Boston, which bitterly resented the action of the royal governor in 1687 in using the Old South for the services of the Church of England. The new state house, the oldest portion of which (designed by Charles Bulfinch) was erected in 1 795-1 798, was enlarged in 1853-1856, and again by a huge addition in 1 889-1 898 (total cost about $6,800,000 to 1900). Architecturally, everything is subordinated to a con- formity with the style of the original portion; and its gilded dome is a conspicuous landmark. Other buildings of local importance are the city hall (1865); the United States government building (1871-1878, cost about $6,000,000); the county court-house (1887-1893, $2,250,000); the custom-house (1837- 1848); and the chamber of commerce (1892).

Copley Square, in the Back Bay, is finely distinguished by a group of exceptional buildings: Trinity church, the old Museum of Fine Arts, the public library and the new Old South church. Trinity (1877, cost $800,000), in yellowish granite with dark sand- stone trimmings, the masterpiece of H. H. Richardson, is built in the Romanesque style of southern France; it is a Latin cross surmounted by a massive central tower, with smaller towers and an adjacent chapel reached by open cloisters that distribute the balance (see Architecture, Plate XVI. fig. 137). It has windows by La Farge, William Morris, Burne-Jones and others.

1 Faneuil Hall is the headquarters of the Ancient and Honourable Artillery Company of Boston, the oldest military organization of the country, organized in 1638.

The library (1888-1895; cost $2,486,000, exclusive of the site, given by the state) is a dignified, finely proportioned building of pinkish-grey stone, built in the style of the Italian Renaissance, suggesting a Florentine palace. It has an imposing exterior (see Architecture, Plate XVI. fig. 135), a beautiful inner court, and notable decorative features and embellishments, including bronze doors by D. C. French, a statue of Sir Henry Vane by Macmonnies, a fine staircase in Siena marble, some characteristic decorative panels by Puvis de Chavannes (illustrating the history of science and literature), and other notable decorative paintings by John S. Sargent (on the history of religion), Edwin A. Abbey (on the quest of the Holy Grail) . The old Museum of Fine Arts (1876) is a red brick edifice in modern Gothic style, with

trimmings of light stone and terra-cotta. The new Old South (the successor of the Old South, which is now a museum) is a handsome structure of Italian Gothic style, with a fine campanile. The dignified buildings of the Massachusetts Insti- tute of Technology are near. In Huntington Avenue, at its junction with Massachusetts Avenue, is another group of hand- some new buildings, including Horticultural Hall, Symphony Hall (1900) and the New England Conservatory of Music. In the Back Bay Fens, reclaimed swamps laid out by F. L. Olmsted, still other groups have formed — among others those of the marble buildings of the Harvard medical school; Fenway Court, a building in the style, internally, of a Venetian palace, that houses the art treasures of Mrs. J. L. Gardner, and Simmons College. Here, too, is the new building (1908) of the Museum of Fine Arts. Throughout the Fens excellently effective use is being made of monumental buildings grouped in ample grounds.

Boston compares favourably with other American cities in the character of its public and private architecture. The height of buildings in the business section is limited to 125 ft., and in some places to 90 ft.

One of the great public works of Boston is its subway for electric trams, about 3 m. long, in part with four tracks and in part with two, constructed since 1895 at a cost of about $7,500,000 up to 1905. The branch to East Boston (i900-i904)passesbeneath the harbour bed and extends from Scollay Square, Boston, to Maverick Square, East Boston; it was the first all-cement tunnel (diameter, 23-6 ft.) in the world. The subway was built by the city, but leased and operated by a private company on such terms as to repay its cost in forty years. Another tunnel has been added to the system, under Washington Street. The narrow streets and the traffic congestion o.f the business district presented difficult problems of urban transit, but the system is of exceptional efficiency. There is an elevated road whose trains, like the surface cars, are accommodated in the centre of the city by the subway. All the various roads — surface, elevated (about 7 m., built 1896-1901), and subway — are controlled, almost wholly, by one company. They all connect and interchange passengers freely; so that the ordinary American five-cent fare enables a passenger to travel between almost any two points over an area of 100 sq. m. The two huge steam-railway stations of , the Boston & Maine and the Boston & Albany systems also deserve mention. The former (the North, or Union station, 1893) covers 9 acres and has 23 tracks; the latter (the South Terminal, 1898), one of the largest stations in the world, covers 13 acres and has 32 tracks, and is used by the Boston & Albany and by the New York, New Haven & Hartford railways.

A noteworthy feature of the metropolitan public water service was begun in 1896 in the Wachusett lake reservoir at Clinton, on the Nashua river. The basin here excavated by ten years of labour, lying 385 ft. above high-tide level of Boston harbour, has an area of 6-5 sq. m., an average depth of 46 ft., and a capacity of 63,068,000,000 gallons of water. It is the largest municipal reservoir in the world, 2 yet

2 The dam is 1250 ft. long, with a maximum height of 129 ft., only 750 ft. having a depth of more than 40 ft. from high water to rock. The entire surface of the basin was scraped to bed rock, sand or mineral earth, this alone costing $3,000,000. Connected with the reservoir is an aqueduct, of which 2 m. are tunnel and 7 m. covered masonry. The metropolitan system as planned in 1905 for the near future contemplated storage for 80,000,000,000 gallons.

it is only part of a system planned for the service of the metro- politan area.

The park system is quite unique among American cities. The Common, a park of 48 acres, in the centre of the city, has been a public reservation since 1634, and no city park in the world is cherished more affectionately for historical associations. Adjoining it is the Public Garden of 24 acres (1859), part of the made area of the city. Commonwealth Avenue, one of the Back Bay streets running from the foot of the Public Garden, is one of the finest residence streets of the country. It is 240 ft. wide, with four rows of trees shading the parking of its central mall, and is a link through the Back Bay Fens with the beautiful outer park system. The park system consists of two concentric rings, the inner being the city system proper, the outer the metropolitan system undertaken by the commonwealth in co-operation with the city. The former has been laid out since 1875, and includes upwards of 2300 acres, with more than 100 m. of walks, drives and rides. Its central ornament is Franklin Park (527 acres). The metropolitan system, which extends around the city on a radius of 10 to 12 m., was begun in 1893. It embraces over 10,000 acres, including the Blue Hill reservation (about 5000 acres), the highest land in eastern Massachusetts, a beautiful reservation of forest, crag and pond known as Middlesex Fells, two large beach bath reservations on the harbour at Revere and Hull (Nantasket), and the boating section of the Charles river. At the end of 1907 more than $13,000,000 had been

expended on the system. Including the local parks of the cities and towns of the metropolitan district there are over 17,000 acres of pleasure grounds within the metropolitan park district. Boston was the pioneer municipality of the country in the establishment of open-air gymnasiums. A great improve- ment, planned for many years, was brought nearer by the com- pletion of the new Cambridge Bridge. This improvement was projected to include the damming of the Charles river, and the creation of a great freshwater basin, with drive-ways of reclaimed land along the shores, and other adornments, somewhat after the model of the Alster basins at Hamburg.

Art and Literature. — The Museum of Fine Arts was founded in 1870 (though there were art exhibits collected from 1826 onward) and its present building was erected in 1908. It has one of the finest collections of casts in existence, a number of original pieces of Greek statuary, the second-best collection in the world of Aretine ware, the finest collection of Japanese pottery, and probably the largest and finest of Japanese paintings in existence. Among the memorials to men of Massachusetts (a large part of them Bostonians) commemorated by monuments in the Common, the Public Garden, the grounds of the state house, the city hall, and other public places of the city, are statues of Charles Sumner, Josiah Quincy and John A. Andrew by Thomas Ball; of Generals Joseph Hooker and William F. Bartlett, and of Rufus Choate by Daniel C. French; of W. L. Garrison and Charles Devens by Olin L. Warner; of Samuel Adams by Anne Whitney; of John Winthrop and Benjamin Franklin by R. S. Greenough; of Edward Everett (W. W. Story), Colonel W. Prescott (Story), Horace Mann (E. Stebbins), Daniel Webster (H. Powers), W. E. Channing (H. Adams), N. P. Banks (H. H. Kitson), Phillips Brooks (A. St Gaudens), and J. B. O'Reilly (D. C. French).

Among other important monuments are a group by J. Q. A. Ward commemorating the first proof of the anaesthetic properties of ether, made in 1846 in the Massachusetts General Hospital by Dr W. T. G. Morton; an emancipation group of Thomas Ball with a portrait statue of Lincoln; a fine equestrian statue, by the same sculptor, of Washington, one of the best works in the country (1869); an army and navy monument in the Common by Martin Millmore, in memory of the Civil War; another (1888) recording the death of those who fell in the Boston Massacre of 1770; statues of Admiral D. G. Farragut (H. H. Kitson), Leif Ericson (Anne Whitney), and Alexander

reservoirs holding 2,200,000,000 gallons for immediate use, aqueducts capable of carrying 420,000,000 gallons daily, and a minimum daily supply of 173,000.000 gallons.

Hamilton (W. Rimmer); and a magnificent bronze bas-relief

(1897) by Augustus St Gaudens commemorating the departure from Boston of Colonel Robert G. Shaw with the first regiment of negro soldiers enlisted in the Civil War. There is an art department of the city government, under unpaid commissioners, appointed by the mayor from candidates named by local art and literary institutions; and without their approval no work of art can now become the property of the city.

The public library, containing 922,348 volumes in January 1908, is the second library of the country in size, and is the largest free circulating library in the world (circulation 1907, 1,529,111 volumes) . There was a public municipal library in Boston before 1674 — probably in 1653; but it was burned in 1747 and was apparently never replaced. The present library (antedated by several circulating, social and professional collections) may justly be said to have had its origin in the efforts of the Parisian, Alexandre Vattemare (1796-1864), from 1830 on, to foster international exchanges. From 1847 to 1851 he arranged gifts from France to American libraries aggregating 30,655 volumes, and a gift of 50 volumes by the city of Paris in 1843 (reciprocated in 1849 with more than 1000 volumes contributed by private citizens) was the nucleus of the Boston public library. Its legal foundation dates from 1848. Among the special collections are the George Ticknor library of Spanish and Portuguese books (6393 vols.), very full sets of United States and British public documents, the Bowditch mathematical library (7090 vols.), the Galatea collection on the history of women (2193 vols.), the Barton library, including one of the finest existing collections of Shakespeariana (3309 vols., beside many in the general library), the A. A. Brown library of music (9886 vols.) , a very full collection on the anthropology and ethnology of Europe, and more than 100,000 volumes on the history, biography, geography and literature of the United States. The library is supported almost entirely by municipal appropriations, though holding also considerable trust funds ($388,742 in 1905). The other notable book-collections of the city include those of the Athenaeum, founded in 1807 (about 230,000 vols, and pamphlets), the Massachusetts Historical Society (founded 1791; 50,300), the Boston medical library (founded 1874; about 80,000), the New England Historic-Genealogical Society (founded 1845; 33,750 volumes and 34,150 pamphlets), the state library (founded 1826; 140,000), the American Academy of Arts and Sciences (founded 1780; 30,000), the Boston Society of Natural History (founded 1830; about 35,000 volumes and 27,000 pamphlets).

The leading educational institutions are the Massachusetts Institute of

Technology, the largest purely scientific and tech- nical school in the country, opened to students (including women) in 1865, four years after the granting of a charter to Prof. W. B. Rogers, the first president; Boston University (chartered in 1869; Methodist Episcopal; co-educational); the New England Conservatory of Music (co-educational; private; 1867, incorporated 1880), the largest in the United States, having 2400 students. in 1905-1906; the Massachusetts College of Pharmacy (1852); the Massachusetts Normal Art School (1873); the School of Drawing and Painting (1876) of the Museum of Fine Arts; Boston College (i860), Roman Catholic, under the Society of Jesus; St John's Theological Seminary (1880), Roman Catholic; Simmons College (1899) for women, and several departments of Harvard University. The Institute of Technology has an exceptional reputation for the wide range of its instruction and its high standards of scholarship. It was a pioneer in introducing as a feature of its original plans laboratory instruction in physics, mechanics and mining. The architects of the United States navy are sent here for instruction in their most advanced courses. Boston University was endowed by Isaac Rich (1801-1872), a Boston fish-merchant, Lee Claflin (1791-1871), a shoe manufacturer and a benefactor of Wesleyan University and of Wilbraham Seminary, and Jacob Sleeper. It has been co-educational from the beginning. Its faculties of theology — founded in 1841 at Newbury, Vt, as the Biblical Institute; in 184 7-1867 in Concord, N.H.; and in 1867-1871 the Boston Theological Seminary — law, music, medicine, liberal

arts and agriculture (at Amherst, in association with the Massa- chusetts Agricultural College), all antedate 1876. The funds for Simmons College were left by John Simmons in 1870, who wished to found a school to teach the professions and " branches of art, science and industry best calculated to enable the scholars to acquire an independent livelihood." The Lowell Institute (q.v.), established in 1839 (by John Lowell, Jr., who bequeathed $237,000 for the purpose), provides yearly courses of free public lectures, and its lecturers have included many of the leading scholars of America and Europe. During each winter, also, a series of public lectures on American history is delivered in the Old South meeting house. The public schools, particularly the secondary schools, enjoy a very high reputation. The new English High and Latin school, founded in 1635, is the oldest school of the country. A girls' Latin school, with the same standards as the boys' school, was established in 1878 (an outcome of

the same movement that founded Radcliff e College) . There are large numbers of private schools, in art, music and academic studies.

In theatrical matters Boston is now one of the chief American centres. The Federal Street theatre — the first regular theatre- was established in 1794, the old Puritan feeling having had its natural influence in keeping Boston behind New York and Philadelphia in this respect. The dramatic history of the city is largely associated with the Boston Museum, built in 1841 by Moses Kimball on Tremont Street, and rebuilt in 1846 and 1880; here for half a century the principal theatrical perform- ances were given (see an interesting article in the New England Magazine, June 1903), in later years under the management of R. Montgomery Field, until in 1903 the famous Boston Museum was swept away, as other interesting old places of entertainment (the old Federal Street theatre, the Tremont theatre, &c.) had been, in the course of further building changes. The Boston theatre dates from 1854, and there were seventeen theatres altogether in 1900.

As a musical centre Boston rivals New York. Among musical organizations may be mentioned the Handel and Haydn Society (181 5), the Harvard Musical Association (1837), the Philharmonic (1880) and the Symphony Orchestra, organized in 1881 by the generosity of Henry Lee Higginson. This orchestra has done much for music not only in Boston but in the United States generally. In 1908 the Boston Opera Company was incorporated, and an opera house has been erected on the north side of Huntington Avenue.

Boston was the undisputed literary centre of America until the later decades of the 19th century, and still retains a con- siderable and important colony of writers and artists. Its ascend- ancy was identical with the long predominance of the New England literary school, who lived in Boston or in the country round about. Two Boston periodicals (one no longer so) that still hold an exceptional position in periodical literature, the North American Review (1815) and the Atlantic Monthly (1857), date from this period. The great majority of names in the long list of worthies of the commonwealth — writers, statesmen, orators, artists, philanthropists, reformers and scholars, are intimately connected with Boston. Among the city's daily newspapers the Boston Herald (1846), the Boston Globe, the Evening Transcript (1830), the Advertiser (1813) and the Post (1831) are the most important.

Industry and Commerce. — Boston is fringed with wharves. Commercial interests are largely concentrated in East Boston. Railway connexion with Worcester, Lowell and Providence was opened in

1835; with Albany, N.Y., and thereby with various lines of interior communication, in 1841 (double track, 1868); with Fitchburg, in 1845; and in 1851 connexion was completed with the Great Lakes and Canada. In 1840 Boston was selected as the American terminus of the Cunard Line, the first regular line of trans-Atlantic steamers. The following decade was the most active of the city's history as regards the ocean carrying trade. Boston ships went to all parts of the globe. The Cunard arrangement was the first of various measures that worked for a commercial rapprochement between the New England states and Canada, culminating in the reciprocity treaty

of 1854, and Boston's interests are foremost to-day in demanding a return to relations of reciprocity. Beginning about 1855 the commerce of the port greatly declined. The Cunard service has not been continuous. In 1869 there was not one vessel steam- ing directly for Europe; in 1900 there were 973 for foreign ports. Great improvements of the harbour were undertaken in 1902 by the United States government, looking to the creation of two broad channels 35 ft. deep. Railway rates have also been a matter of vital importance in recent years; Boston, like New York, complaining of discriminations in favour of Phil- adelphia, Baltimore, New Orleans and Galveston. Boston also feels the competition of Montreal and Portland; the Canadian roads being untrammelled in the matter of freight differentials. Boston is the second import port of the United States, but its exports in 1907 were less than those of Philadelphia, of Galveston, or of New Orleans. The total tonnage in foreign trade entering and leaving in 1907 was 5,148,429 tons; and in the same year 9616 coasting vessels (tonnage, 10,261,474) arrived in Boston. The value of imports and exports for 1907 were respectively $123,414,168 and $104,610,908. Fibres and vegetable grasses, wool, hides and skins, cotton, sugar, iron and steel and their manufactures, chemicals, coal, and leather and its manufactures are the leading imports; provisions, leather and its manufactures, cotton and its manufactures, breadstuffs, iron and steel and their manufactures are the leading exports. In the exportation of cattle, and of the various meat and dairy products classed as provisions, Boston is easily second to New York. It is the largest wool and the largest fish market of the United States, being in each second in the world to London only.

Manufacturing is to-day the most distinctive industry, as was commerce in colonial times. The value of all manufactured products from establishments under the " factory system " in 1900 was $162,764,523; in 1905 it was $184,351,163. Among the leading and more distinctive items were printing and publishing ($21,023,855 in 1905); sugar and molasses refining ($15,746,547 in 1900; figures not

published in 1905 because of the industry being in the hands of a single owner); men's clothing (in 1900, -$8,609,475, in 1905, $11,246,004); women's clothing (in 1900, $3,258,483, in 1905, $5,705,470); boots and shoes (in 1900, $3,882,655, in 1905, $5,575,927); boot and shoe cut stock (in 1905, $5,211,445); malt liquors (in 1900, $7,518,668, in 1905, $6,715,215); confectionery (in 1900, $4,455,184, in 1905, $6,210,023); tobacco products (in 1900, $3,504,603, in 1905, $4,592,698); pianos and organs ($3,670,771 in 1905); other musical instruments and materials (in 1905, $231,780); rubber and elastic goods (in 1900, $3,139,783, in 1905, $2,887,323); steam fittings and heating apparatus (in 1900, $2,876,327, in IOO S> $3,3S4,° 2 °); bottling, furniture, &c. Art tiles and pottery are manufactured in Chelsea. Shipbuilding and allied industries early became of great importance. The Waltham watch and the Singer sewing-machine had their beginning in Boston in 1850. The making of the Chickering pianos goes back to 1823, and of Mason & Hamlin reed organs to 1854; these are to-day very important and distinctive manufactures of the city. The ready-made clothing industry began about 1830.

Government. — Beyond a recognition of its existence in 1630, when it was renamed, Boston can show no legal incorporation before 1822; although the uncertain boundaries between the powers of colony and township prompted repeated petitions to the legislature for incorporation, beginning as early as 1650. In 1822 Boston became a city. Thus for nearly two centuries it preserved intact its old " town " government, disposing of all its affairs in the " town-meeting " of its citizens. Excellent political training such a government unquestionably offered; but it became unworkable as disparities of social condition increased, as the number of legal voters (above 7000 in 1822) became greater, and as the population ceased to be homogeneous in blood. All the citizens did not assemble; on the contrary ordinary business seldom drew out more than a hundred voters, and often a mere handful. From very early days executive officers known as " select-men," constables, clerks of markets, hog reeves, packers of meat and fish, &c, were chosen; and the

select-men, particularly, gained power as the attendance of the freemen on meetings grew onerous. Interested cliques could control the business of the town-meeting in ordinary times, and boisterousness marred its democractic excellence in exciting times.

Large sums were voted loosely, and expended by executive boards without any budgetary control. The whole system was full of looseness, complexity and makeshifts. But the tenacity with which it was clung to, proved that it was suited to the community; and whether helpful or harmful to, it was not inconsistent with, the continuance of growth and prosperity. Various other Massachusetts townships, as they have grown older, have been similarly compelled to abandon their old form of government. The powers of the old township were much more extensive than those of the present city of Boston, including as they did the determination of the residence of strangers, the allotment of land, the grant of citizenship, the fixing of wages and prices, of the conditions of lawsuits and even a voice in matters of peace and war. The city charter was revised in 1 8 54, and again reconstructed in important particulars by laws of 1 88 s separating the executive and legislative powers, and by subsequent acts. A complete alteration of the govern- ment has indeed been effected since 1885. Boston proper is only the centre of a large metropolitan area, closely settled, with interests in large part common. This metropolitan area, within a radius of approximately 10 m. about the state house, contained in 1900 about 40% of the population of the state. In the last two decades of the 19th century the question of giving to this greater city some general government, fully consolidated or of limited powers, was a standing question of expediency. The commonwealth has four times recognized a community of metro- politan interests in creating state commissions since 1882 for the union of such interests, beginning with a metropolitan health district in that year. The metropolitan water district (1895) included in 1908 Boston and seventeen cities or townships in its environs; the metropolitan sewerage district (1889) twenty four; the park service (1893) thirty-nine. Local sentiment was firmly against complete consolidation. The creation of the state commissions, independent of the- city's control, but able to commit the city indefinitely by undertaking expensive works and new debt, was resented. Independence is further curtailed by other state boards semi-independent of the city — the police commission of three members from 1885 to 1906, and in 1906 a single police commissioner, appointed by the governor, a licensing board of three members, appointed by the governor; the transit commission,. &c. There are, further, county offices (Suffolk county comprises only Boston, Chelsea, Revere and Winthrop), generally independent of the city, though the latter pays practically all the bills.

A new charter went into effect in 1910. It provided for municipal elections in January; for the election of a mayor for four years; for his

recall at the end of two years if a majority of the registered voters so vote in the state election in November in the second year of his tewn; for the summary removal for cause by the mayor of any department head or other of his appointees, for a city council of one chamber of nine members, elected at large each for three years; for nomination by petition; for a permanent finance commission appointed by the governor; for the confirmation of the mayor's appointments by the state civil service commission; for the mayor's preparation of the annual budget (in which items may be reduced but not increased by the council), and for his absolute veto of appropriations except for school use. The school committee (who serve gratui- tously) appoint the superintendent and supervisors of schools. The number of members of the school-board was in 1905 reduced from twenty-four to five, elected by the city at large, and serving for one, two or three years; at the same time power was centralized in the hands of the superintendent of schools. Civil service reform principles cover the entire municipal administration. The city's work is done under an eight-hour law.

An analysis of city election returns for the decade 1890-1899 showed that the interest of the. citizens was greatest in the choice

of a president; then, successively, in the choice of a mayor, a governor, the determination of liquor-license questions by referendum, and the settlement of other referenda. On 21 referenda, 10 being questions of license, the ratio of actual to registered voters ranged on the latter from 57-00 to 75-38% (mean 67-15), and on other referenda from 75-63 to 33-40 (mean 61-39), — the mean for all, 64-18. But the average of two presi- dential votes was 85-37%; and the maxima, minima and means for mayors and governors were respectively 83-86, 74-99, 78-36 and 84-73, 61-78, 75-72. Of those who might, only some 50 to 65% actually register. Women vote for school committee- men (categories as above, 95-18, 59-62, 76-49%). On a referen- dum in 1895 on the expediency of granting municipal suffrage to women only 59-08% of the women who were registered voted, and probably less than 10% of those entitled to be registered.

Hospitals, asylums, refuges and homes, pauper, reformatory and penal institutions, flower missions, relief associations, and other charitable or philanthropic organizations, private and public, number several hundreds. The Associated Charities is an incorporated organization for systematizing the various charities of the city. The Massachusetts general hospital (1811-1821) — with a branch for mental and nervous diseases, McLean hospital (1816), in the township of Belmont (post-office, Waverley) about 6 m. W.N.W. of Boston; the Perkins Institution

and Massa- chusetts school for the blind (1832), famous for its conduct by Samuel G. Howe, and for association with Laura Bridgman and Helen Keller; the Massachusetts school for idiotic and feeble-minded children (1839); and the Massachusetts charitable eye and ear infirmary (1824), all receive financial aid from the commonwealth, which has representation in their management. The city hospital dates from 1864. A floating hospital for women and children in the summer months, with permanent and tran- sient wards, has been maintained since 1894 (incorporated 1901). Boston was one of the first municipalities of the country to make provision for the separate treatment of juvenile offenders; in 1906 a juvenile court was established. A People's Palace dedicated to the work of the Salvation Army, and containing baths, gymnasium, a public hall, a library, sleeping-rooms, an employment bureau, free medical and legal bureaus, &c, was opened in 1906. Simmons College and Harvard University main- tain the Boston school for social workers (1904). Beneficent social work out of the more usual type is directed by the music and bath departments of the city government. In the provi- sion of public gymnasiums and baths (1866) Boston was the pioneer city of the country, and remains the most advanced. The beach reservations of the metropolitan park system at Revere and Nantasket, and several smaller city beaches are a special feature of this service. Benjamin Franklin, who was born and spent his boyhood in Boston, left £1000 to the city in his will; it amounted in 1905 to $403,000, and constituted a fund to be used for the good of the labouring class of the city.

Largely owing to activity in public works Boston has long been the most expensively governed of American cities. The average yearly expenditure for ten years preceding 1904 was $27,354,416, exclusive of payments on funded and floating debts. The running expenses per-capita in 1900 were $35.23; more than twice the average of 86 leading cities of the country (New York, $23.92; Chicago, $11.62). Schools, police, charities, water, streets and parks are the items of heaviest cost. The cost of the public schools for the five years from 1901-1902 to 1906-1907 was $27,883,937, of which $7,057,895.42 was for new buildings; the cost of the police department was $11,387,314.66 for the six years 1902-1907; and of the water department $4,941,343.37 for the six years 1902- 1907;. of charities and social work a much larger sum. The re- making of the city was enormously expensive, especially the altera- tion of the streets after 1866, when the city received power to make such alterations and assess a part of the improvements upon abutting estates. The creation of the city water-system has also been exces- sively costly, and the

total cost up to the 31st of January 1908 of the works remaining to the city after the creation of the metro- politan board in 1898 was about $17,000,000. The metropolitan water board — of whose expenditures Boston bears only a share — expended from 1895 to 1900 $20,693,870 ; and the system was planned to consume finally probably 40 millions at least. The city park

system proper had cost $16,627,033 up to 1899 inclusive; and the metropolitan parks $13,679,456 up to 1907 inclusive. There are no municipal lighting-plants; but the companies upon which the city depends for its service are (with all others) subject to the control of a state commission. In 1885 a state law placed a limit on the contractable debt and upon the taxation rate of the city. Revenues were not realized adequate to its lavish undertakings, and loans were used to meet current expenses. The limits were altered subsequently, but the net debt has continued to rise. In 1822 it was $100,000; in 1850, $6,195,144; in 1886, $24,712,820; in 1904, $58,216,725; in 1907, $70,781,969 (gross debt, $104,206,706) — this included the debt of Suffolk county which in 1907 was $3,517,000. The chief objects for which the city debt was created were in 1907, in millions of dollars: highways, 24-07, parks, 16-29, drainage and sewers, 15-05, rapid transit, 13-57 and water-works, 4-53. Boston paid in 1907 36 % of all state taxes, and about 33, 62, 47 and 79 % respectively of the assessments for the metropolitan sewer, parks, boulevards and water services. About a third of its revenue goes for such uses or for Suffolk county expenditures over which it has but limited control. The improvement of the Back Bay and of the South Boston flats was in considerable measure forced upon the city by the commonwealth. The debt per capita is as high as the cost of current administration relatively to other cities. The average interest rate on the city obligations in 1907 was about 3-7 %. The city's tax valuation in 1907 was $1,313,471,556 (in 1822, $42,140,200; in 1850, $180,000,500), of which only $242,606,856 represented per- sonalty; although in the judgment of the city board of trade such property cannot by any possibility be inferior in value to realty.

Population. — Up to the War of Independence the population was not only American, but it was in its ideas and standards essentially Puritan; modern liberalism, however, has introduced new standards of social life. In 1900 35-1 % of the inhabitants were foreign-born, and 72-2% wholly or in part of foreign parentage. Irish, English-Canadian,

Russian, Italian, English and German are the leading races. Of the foreign-born popula- tion these elements constituted respectively 35-6, 24-0, 7-6, 7-0, 6-7 and 5-3%. Large foreign colonies, like adjoining but unmixing nations, divide among themselves a large part of the city, and give to its life a cosmopolitan colour of varied speech, opinion, habits, traditions, social relations and religions. Most remarkable of all, the Roman Catholic churches, in this strong * hold of exiled Puritanism where Catholics were so long under the heavy ban of law, outnumber those of any single Protestant denomination; Irish Catholics dominate the poKtics of the city, and Protestants and Catholics have been aligned against each other on the question of the control of the public schools. Despite, however, its heavy foreign admixture the old American- ism of the city remains strikingly predominant. The population of Boston at the end of each decennial period since 1790 was as follows:— (1790), 18,320; (1800), 24,937; (1810), 33,787; (1820), 43,298; (1830), 61,392; (1840), 93,383; (185°), 136,881; (i860), 177,840; (1870), 250,526; (1880), 362,839; (1890),

448,477; (1900), 560,892.

History. — John Smith visited Boston Harbour in 1614, and it was explored in 1621 by a party from Plymouth. There were various attempts to settle about its borders in the following years before John Endecott in 1628 landed at Salem as governor of the colony of Massachusetts bay, within which Boston was included. In June 1630 Joh*n Winthrop's company reached Charlestown. At that time a " bookish recluse," William Blaxton (Blackstone), one of the several " old planters " scattered about the bay, had for several years been living on Boston peninsula. The location seemed one suitable for commerce and defence, and the Winthrop party chose it for their settlement. The triple summit of Beacon Hill, of which no trace remains to-day (or possibly a reference to the three hills of the then peninsula, Beacon, Copp's and Fort) led to the adoption of the name Trimountaine for the peninsula, — a name perpetuated variously in present municipal nomenclature as in Tremont; but on the 17 th of September 1630, the date adopted for anni- versary celebrations, it was ordered that " Trimountaine shall be called Boston," after the borough of that name in Lincolnshire, England, of which several of the leading settlers had formerly been prominent citizens. 1

1 In 1 85 1 the mayor of the English Boston sent over a copy of that city's seals, framed in oak from St Botolph's church, of which John Cotton, the famous Boston divine (he came over in 1633) had been vicar. The seals now hang in the city hall. In 1855 a number of

For several years it was uncertain whether Cambridge, Charlestown or Boston should be the capital of the colony, but in 1632 the General Court agreed ” by general consent, that Boston is the fittest place for public meetings of any place in the Bay.” It rapidly became the wealthiest and most populous. Throughout the 17th century its history is so largely that of Massachusetts generally that they are inseparable. Theological systems were largely concerned. The chief features of this epoch — the Antinomian dissensions, the Quaker and Baptist persecutions, the witchcraft delusion (four witches were executed in Boston, in 1648, 1651, 1656, 1688) &c. — are referred to in the article Massachusetts (q.v.). In 1692 the first permanent and successful printing press was established; in 1704 the first newspaper in America, the Boston News-Letter, which was published weekly until 1776. Puritanism steadily mellowed under many influences. By the turn of the first century bigotry was distinctly weakened. Among the marks of the second half of the 17th century was growing material prosperity, and there were those who thought their fellows unduly willing to relax church tests of fellowship when good trade was in question. There was an unpleasant Englishman who declared in 1699 that he found ” Money Their God, and Large Possessions the only Heaven they Covet.” Prices were low, foreign commerce was already large, business thriving; wealth gave social status; the official British class lent a lustre to society; and Boston ” town ” was drawing society from the ” country.” Of the two-score or so of families most prominent in the first century hardly one retained place in the similar list for the early years of the second. Boston was a prosperous, thrifty, English country town, one traveller thought. Another, Daniel Neal, in 1720, found Boston con- versation” as polite as in most of the cities and towns in England, many of their merchants having the advantage of a free con- versation with travellers; so that a gentleman from London would almost think himself at home at Boston, when he observes the number of people, their houses, their furniture, their tables, their dress and conversation, which perhaps is as splendid and showy as that of the most considerable tradesmen in London.”

The population, which was almost stationary through much of the century, was about 20,000 in the years immediately before the War of Independence. At this time Boston was the most flourishing town of North America. It built ships as cheaply as any place in the world, it carried goods for other colonies, it traded — often evading British laws — with Europe, Guinea, Madagascar and above all with the West Indies. The merchant princes and social leaders of the time are painted with elaborate show of luxury in the canvases of Copley. The great English writers of Queen Anne’s reign seem to have been but

little known in the colony, and the local literature, though changed somewhat in character, showed but scant improvement. About the middle of the century restrictions upon the press began to disappear. At the same time questions of trade, of local politics, finally of colonial autonomy, of imperial policy, had gradually, but already long since, replaced theology in leading interest. In the years 1760-1776 Boston was the most frequently recurring and most important name in British colonial history. Senti- ments of limited independence of the British government had been developing since the very beginning of the settlement (see Massachusetts), and their strength in 1689 had been strikingly exhibited in the local revolution of that year, when the royal governor, Sir Edmund Andros, and other high officials, were frightened into surrender and were imprisoned. This movement, it should be noted, was a popular rising, and not the work of a few leaders.

The incidents that marked the approach of the War of Inde- pendence need barely be adverted to. Opposition to the measures of the British government for taxing and oppressing the colonies began in Boston. The argument of Otis on the writs of assistance

Americans, including Charles Francis Adams and Edward Everett, and also various descendants of Cotton, united to restore the south- west chapel of St Botolph's church, and to erect in it a memorial tablet to Cotton's memory. The total amount raised by subscription for this purpose was £673.

was in 1760-1761. The Stamp Act, passed in 1765, was repealed in 1766; it was opposed in Boston by a surprising show of determined and unified public sentiment. Troops were first quartered in the town in 1768. In 1770, on the 5th of March, in a street brawl, a number of citizens were killed or wounded by the soldiers, who fired into a crowd that were baiting a sentry. This incident is known as the " Boston Massacre." The Tea Act of 1773 was defied by the emptying into the harbour of three cargoes of tea on the 1 6th of December 1 7 73 , by a party of citizens disguised as Indians, after the people in town-meeting had ex- hausted every effort, through a period of weeks, to procure the return of the tea-ships to England. To this act Great Britain replied by various penal regulations and reconstructive acts of government. She quartered troops in Boston; she made the juries, sheriffs and judges of the colony dependent on the royal officers; she

ordered capital offenders to be tried in Nova Scotia or England; she endeavoured completely to control or to abolish town-meetings; and finally, by the so-called ” Boston Port Bill,” she closed the port of Boston on the 1st of June 1774. Not even a ferry, a scow or other boat could move in the harbour. Marblehead and Salem were made ports of entry, and Salem was made the capital. But they would not profit by Boston’s mis- fortune. The people covenanted not to use British goods and to suspend trade with Great Britain. From near neighbours and from distant colonies came provisions and encouragement. In October 1774, when General Gage refused recognition to the Massachusetts general court at Salem, the members adjourned to Concord as the first provincial congress. Finally came war, with Lexington and Bunker Hill, and beleaguerment by the colonial army; until on the 17th of March 1776 the British were compelled by Washington to evacuate the city. With them went about 1100 Tory refugees, many of them of the finest families of the city and province. The evacuation closed the heroic period of Boston’s history. War did not again approach the city.

The years from 1776 to the end of ” town ” government in 1822 were marked by slow growth and prosperity. Commerce and manufactures alike took great impetus. Direct trade with the East Indies began about 1785, with Russia in 1787. A Boston vessel, the ” Columbia ” (Captain Robert Gray), opened trade with the north-west coast of America, and was the first American ship to circumnavigate the globe (1787-1700). In 1805 Boston began the export of ice to Jamaica, a trade which was gradually extended to Cuba, to ports of the southern states, and finally to Rio de Janeiro and Calcutta (1833), declining only after the Civil War; it enabled Boston to control the American trade of Calcutta against New York throughout the entire period. But of course it was far less important than various other articles of trade in the aggregate values of commerce. It was Boston commerce that was most sorely hurt by the embargo and non-importation policy of President Jefferson. In manufactures the foundation was laid of the city’s wealth. In politics the period is characterized by Boston’s connexion with the fortunes of the Federalist party. The city was warmly in favour of the adoption of the federal constitution of 1787; itven Samuel Adams was rejected for Congress because he was backward in its support. It was the losses entailed upon her commerce by the commercial policy of Jefferson’s administra- tion that embittered Boston against the Democratic-Republican party and put her public men in the forefront of the opposition to its policies that culminated in lukewarmness toward the War of 181 2, and in the Hartford Convention of 18 14. .

Some mention must be made of the Unitarian movement. Unitarian

tendencies away from the Calvinism of the old Con- gregational churches were plainly evident about 1750, and it is said by Andrew P. Peabody (1811-1893) that by 1780 nearly all the Congregational pulpits around Boston were filled by Uni- tarians. Organized Unitarianism in Boston dates from 1785. In 1782 King's chapel (Episcopal) became Unitarian, and in r8o5 one of that faith was made professor of divinity in Harvard. But the Unitarianism of those times, even the Unitarianism of Channing, was very different from that of to-day. Theodore

Parker and Channing have been the greatest leaders. The American Unitarian Association, organized in 1825, has always retained its headquarters in Boston. The theological and philosophical developments of the second quarter of the 19th century were characterized by the transcendental movement (see Massachusetts).

In the period from 1822 to the Civil War anti-slavery is the most striking feature of Boston's annals. Garrison established the Liberator in 1831; W. E. Channing became active in the cause of abolition in 1835, and Wendell Phillips a little later. In 1835 a mob, composed in part of wealthy and high-standing citizens, attacked a city-building, and dragged Garrison through the streets until the mayor secured his safety by putting him in gaol. But times changed. In 1850 a reception was given in Faneuil Hall in honour of the English anti-slavery leader, George Thompson, whose reported intention to address Boston- ians in 1835 precipitated the riot of that year. In 185 1 the Court House was surrounded with chains to prevent the " rescue " of a slave (Sims) held for rendition under the Fugitive Slave Law; another slave (Shadrach) was released this same year, and in 1854 there was a riot and intense excitement over the rendition of Anthony Burns. Boston had long since taken her place in the very front of anti-slavery ranks, and with the rest of Massachusetts was playing somewhat the same part as in the years before the War of Independence.

Later events of importance have already been indicated in • essentials. On the 9th-ioth of November 1872 a terrible fire swept the business part of the city, destroying hundreds of build- ings of brick and granite, and inflicting a loss of some $75,000,000. Within two years the whole area, solidly rebuilt and with widened and straightened streets, showed no traces of the ruin except an appearance superior in all respects to that presented before the fire. The expense of this re-creation probably duplicated, at least, the loss from the conflagration. Since this time there has been no set-back to the prosperity of the city. But it is not upon material prosperity that Boston rests its claims for consideration. It prides itself on its schools, its libraries, its literary

traditions, its splendid public works and its reputation as the chief centre of American culture.

Authorities. — See the annual City Documents; also Justin Winsor (ed.) The Memorial History of Boston, including Suffolk County . . . 1630-1880 (4 vols., Boston, 1880-1881), a work that covers every phase of the city's growth, history and life ; S. A. Drake, The History and Antiquities of . . . Boston (2 vols., Boston, 1854; and later editions) , and Old Landmarks and Historic Personages of Boston (Boston, 1873, and later editions) ; Josiah Quincy, A Municipal History of . . . Boston . . . to . . 1830 (Boston, 1852) ; C. W. Ernst, Constitutional History of Boston (Boston, 1894) > H. H. Sprague, City Government in Boston — its Rise and Development (Boston, 1890); E. E. Hale, Historic Boston and its Neighbourhood (New York, 1898), and L. Swift, Literary Landmarks of Boston (Boston, 1903). A great mass of original historical documents have been published by the registry department of the city government since 1876 (34 v. to 1905). Boston has been described in many works of fiction, and the reader may be referred to the novels of E. L. Bynner, to L. Maria Childs' The Rebels, to J. F. Cooper's Lionel Lincoln, to the early novels of W. D. Ho'wells (also those of Arlo Bates), to O. W. Holmes' Poet and Autocrat, and Hawthorne's Scarlet Letter, as pictures of Boston life at various periods since early colonial days.

BOSTON, a game of cards invented during the last quarter of the 1 8th century. It is said to have originated in Boston, Massachusetts, during the siege b}' the British. It seems to have been invented by the officers of the French fleet which lay for a time off the town of Marblehead, and the name of the two small islands in Marblehead harbour which have, from the period of the American Revolution, been called Great and Little Misery, correspond with expressions used in the game. William Tudor, in his Letters on the Eastern States, published in 1821, states somewhat differently that " A game of cards was invented in Versailles and called in honour of the town, Boston; the points of the game are allusive, 'great independence,' ' little independ- ence,' ' great misery,' ' little misery,' &c. It is composed partly of whist and partly of quadrille, though partaking mostly of the former." The game enjoyed an extraordinary vogue in high French society, where it was the fashion at that time to admire

all things American. " The ladies . . . filled my pockets with bon-bons,

and . . . called me He petit Bostonien.' It was indeed by the name of Bostonian that all Americans were known in France then. The war having broken out in Boston and the first great battle fought in its neighbourhood, gave to that name universal celebrity. A game invented at that time, played with cards, was called ' Boston,' and is to this day (1830) exceedingly fashionable at Paris by that appellation " (Recollections of Samuel Breck, Philadelphia, 1877). There was a tradition that Dr Franklin was fond of the game and even that he had a hand in its invention. At the middle of the 19th century it was still popular in Europe, and to a less degree in America, but its favour has steadily declined since then.

The rules of Boston recognized in English-speaking countries differ somewhat from those in vogue in France. According to the former, twopacksof 52 cards are used, which rank as in whist, both for cutting and dealing. Four players take part, and there are usually no partners. Counters are used, generally of three colours andvalues, and each hand is settled for as soon as finished. The entire first pack is dealt out by fours and fives, and the second pack is cut for the trump, the suit of the card turned being " first preference," the other suit of the same colour " second preference " or " colour," while the two remaining suits are " plain suits." The eldest hand then announces that he will make a certain number of tricks pro- vided he may name the trump, or lose a certain number without trumps. The different bids are called by various names, but the usual ones are as follows: — To win five tricks, " Boston." _ (To win) " six tricks." (To win) " seven tricks." To lose twelve tricks, after discarding one card that is not shown, " little misere." (To win) " eight tricks." (To win) " nine tricks." To lose every trick, " grand misere." (To win) " ten tricks." (To win) " eleven tricks." To lose twelve tricks, after discarding one card that is not shown, the remaining twelve cards being exposed on the table but not liable to be called, " little spread." (To win) " twelve tricks." To lose every trick with exposed cards, " grand spread." To win thirteen tricks, " grand slam." If a player does not care to bid he may pass, and the next player bids. Succeeding players may " overcall," i.e. overbid, previous bidders. Players passing may thereafter bid only " tniseres." If a player bids seven but makes ten he is paid for the three extra tricks, but on a lower scale than if he had bid ten. If no bid should be made, a " misere partout " (general poverty) is often played, the trump being turned down and each player striving to take as few tricks as possible. Payments are made by each loser according to the value of the winner's bid and the overtricks he has scored. There are regular tables of payments. In America over- tricks are not usually paid for. In French Boston the knave of diamonds arbitrarily wins over all other

cards, even trumps. The names of the different bids remind one of the period of the American Revolution, including ” Independence,” ” Philadelphia,” ” Souve- raine,” ” Concordia,” &c. Other variations of the game are Boston de Fontainebleau and Russian Boston.

BOSTONITE, in petrology, a fine-grained, pale-coloured, grey or pinkish rock, which consists essentially of alkali-felspar (orthoclase, microperthite, &c). Some of them contain a small amount of interstitial quartz (quartz-bostonites) ; others have a small percentage of lime, which occasions the presence of a plagioclase felspar (maenite, gauteite, lime-bos tonite). Other minerals, except apatite, zircon and magnetite, are typically absent. They have very much the same composition as the trachytes; and many rocks of this series have been grouped with these or with the orthop (hyres. Typically they occur as dikes or as thin sills, often in association with nepheline-syenite; and they seem to bear a complementary relationship to certain types of lamprophyre, such as camptonite and monchiquite. Though nowhere very common they have a wide distribution, being known from Scotland, Wales, Massachusetts, Montreal, Portugal, Bohemia, &c. The lindoites and quartz-lindoites of Norway are closely allied to the bostonites.

BOSTROM, CHRISTOFFER JACOB (1797-1866), Swedish philosopher, was born at Pitea and studied at Upsala, where from 1840 to 1863 he was professor of practical philosophy. His philosophy, as he himself described it, is a thoroughgoing rational idealism founded on the principle that the only true reality is spiritual. God is Infinite Spirit in whom all existence is contained, and is outside the limitations of time and space. Thus Bostrom protests not only against empiricism but also against those doctrines of Christian theology which seemed to him to picture God as something less than Pure Spirit. In ethics the highest aim is the direction of actions by reason in harmony

with the Divine; so the state, like the individual, exists solely in God, and in its most perfect form consists in the harmonious obedience of all its members to a constitutional monarch; the perfection of mankind as a whole is to be sought in a rational orderly system of such states in obedience to Universal Reason. This system differs from Platonism in that the ” ideas ” of God are not archetypal abstractions but concrete personalities.

Bostrom’s writings were edited by H. Edfeldt (2 vols., Upsala, 1883). For his school see Sweden: Literature; also H. Hoffding, Filosofien i Sverig (German trans, in Philos. Monatsheften, 1879), and History of Mod. Philos. (Eng. trans., 1900), p. 284; R. Falckenberg, Hist, of Phil.

(Eng. trans., 1895); A. Nyblaeus, Om den Bostromske filosofien (Lund, 1883), and Karakteristik af den Bostromska filosofien (Lund, 1892).

BOSWELL, JAMES (1740-1795), Scottish man of letters, the biographer of Samuel Johnson, was born at Edinburgh on the 29th of October 1740. His grandfather was in good practice at the Scottish bar, and his father, Alexander Boswell of Auchinleck, was also a noted advocate, who, on his elevation to the supreme court in 1754, took the name of his Ayrshire property as Lord Auchinleck. A Thomas Boswell (said upon doubtful evidence to have been a minstrel in the household of James IV.) was killed at Flodden, and since 1513 the family had greatly improved its position in the world by intermarriage with the first Scots nobility. In contradiction to his father, a rigid Presbyterian Whig, James was ” a fine boy, wore a white cockade, and prayed for King James until his uncle Cochrane gave him a shilling to pray for King George, which he accordingly did ” (” Whigs of all ages are made in the same way ” was Johnson’s comment). He met one or two English boys, and acquired a ” tincture of polite letters ” at the high school in Edinburgh. Like R. L. Stevenson, he early frequented society such as that of the actors at the Edinburgh theatre, sternly disapproved of by his father. At the university, where he was constrained for a season to study civil law, he met William Johnson Temple, his future friend and correspondent. The letters of Boswell to his ” Atticus ” were first published by Bentley in 1857. One winter he spent at Glasgow, where he sat under Adam Smith, who was then lecturing on moral philosophy and rhetoric.

In 1760 he was first brought into contact with ” the elegance, the refinement and the liberality ” of London society, for which he had long sighed. The young earl of Eglintoun took him to Newmarket and introduced him into the society of ” the great, the gay and the ingenious.” He wrote a poem called ” The Cub at Newmarket,” published by Dodsley in 1762, and had visions of entering the Guards. Reclaimed with some difficulty by his father from his rakish companions in the metropolis, he contrived to alleviate the irksomeness of law study in Edinburgh by forcing his acquaintance upon the celebrities then assembled in the northern capital, among them Kames, Blair, Robertson, Hume and Sir David Dalrymple (Lord Hailes), of whose sayings on the Northern Circuit he kept a brief journal. Boswell had already realized his vocation, the exercise of which was to give a new word to the language. He had begun to Boswellize. He was already on the track of bigger game — the biggest available in the Britain of that day. In the spring of 1763 Boswell came to a composition with his father. He consented to give up his pursuit of a guidon in the Guards and three and sixpence a day on

condi- tion that his father would allow him to study civil law on the continent. He set out in April 1763 by ” the best road in Scot- land ” with a servant, on horseback like himself, in ” a cocked hat, a brown wig, brown coat made in the court fashion, red vest, corduroy small clothes and long military boots.” On Monday, the 1 6th of May 1763, in the back shop of Tom Davies the book- seller, No. 8 Russell Street, Covent Garden, James Boswell first met ” Dictionary Johnson,” the great man of his dreams, and was severely buffeted by him. Eight days later, on Tuesday, the 24th of May, Boswell boldly called on Mr Johnson at his chambers on the first floor of No. 1 Inner Temple Lane. On this occasion Johnson pressed him to stay; on the 13’th of June he said, ” Come to me as often as you can “; on the 25th of June Boswell gave the great man a little sketch of his own life, and Johnson exclaimed with warmth, ” Give me your hand; I have

taken a liking to you.” Boswell experienced a variety of sensations, among which exultation was predominant. Some one asked, ” Who is this Scotch cur at Johnson’s heels? ” ” He is not a cur,” replied Goldsmith, ” he is only a bur. Tom Davies flung him at Johnson in sport, and he has the faculty of sticking.” Johnson was fifty-four at this time and Boswell twenty-three. After June 1763 they met on something like 270 subsequent days. These meetings formed the memorable part of BoswelPs life, and they are told inimitably in his famous biography of his friend.

The friendship, consecrated by the most delightful of bio- graphies, and one of the most gorgeous feasts in the whole banquet of letters, was not so ill-assorted as has been incon- siderately maintained. BoswelPs freshness at the table of conversation gave a new zest to every maxim that Johnson enunciated, while Boswell developed a perfect genius for inter- preting the kind of worldly philosophy at which Johnson was so unapproachable. Both men welcomed an excuse for avoiding the task-work of life. Johnson’s favourite indulgence was to talk; Boswell’s great idea of success to elicit memorable con- versation. Boswell is almost equally admirable as a reporter and as an interviewer, as a collector and as a researcher. He prepared meetings for Johnson, he prepared topics for him, he drew him out on questions of the day, he secured a copy of his famous letter to Lord Chesterfield, he obtained an almost verbatim report of Johnson’s interview with the king, he fre- quented the tea-table of Miss Williams, he attended the testy old scholar on lengthy

peregrinations in the Highlands and in the midlands. ” Sir,” said Johnson to his follower, ” you appear to have only two subjects, yourself and me, and I am sick of both.” Yet thorough as the scheme was from the outset, and admirable as was the devotedness of the biographer, Boswell was far too volatile a man to confine himself to any one ambition in life that was not consistent with a large amount of present fame and notoriety. He would have liked to Boswellize the popular idol Wilkes, or Chatham, or Voltaire, or even the great Frederick himself. As it was, during his continental tour he managed in the autumn of 1765 to get on terms with Pasquale di Paoli, the leader of the Corsican insurgents in their unwise struggle against Genoa. After a few weeks in Corsica he returned to London in February 1766, and was received by Johnson with the utmost cordiality. In accordance with the family compact referred to he was now admitted advocate at Edinburgh, and signalized his return to the law by an enthusiastic pamphlet entitled The Essence of the Douglas Cause (November 1767), in which he vigorously repelled the charge of imposture from the youthful claimant. In the same year he issued a little book called Dorando, containing a history of the Douglas cause in the guise of a Spanish tale, and bringing the story to a conclusion by the triumph of Archibald Douglas in the law courts. Editors who published extracts while the case was still subjudice were censured severely by the court of session; but though his identity was notorious the author himself escaped censure. In the spring of 1768 Boswell published through the Foulis brothers of Glasgow his Account of Corsica, Journal of a Tour to that Island, and Memoirs of Pascal Paoli. The liveliness of personal impression which he managed to communicate to all his books gained for this one a deserved success, and the Tour was promptly translated into French, German, Italian and Dutch. Walpole and others, jeered, but Boswell was talked about everywhere, as Paoli Boswell or Paoli’s Englishman, and to aid the mob in the task of identifying him at the Shakespeare jubilee of 1769 he took the trouble to insert a placard in his hat bearing the legend ” Corsica Boswell.” The amazing costume of ” a Corsican chief ” which he wore on this occasion was described at length in the magazines.

On the 25th of November 1769, after a short tour in Ireland undertaken to empty his head of Corsica (Johnson’s emphatic direction), Boswell married his cousin Margaret Montgomery at Lainshaw in Ayrshire. For some years henceforth his visits to London were brief, but on the 30th of April 1773 he was present at his admission to the Literary Club, for which honour he had been proposed by Johnson himself, and in the autumn of this

year in the course of his tour to the Hebrides Johnson visited the

Boswells in Ayrshire. Neither Boswell's father nor his wife shared his enthusiasm for the lexicographer. Lord Auchinleck remarked that Jamie was " gane clean gyte . . . And whose tail do ye think he has pinned himself to now, man? A dominie, an auld dominie, that keepit a schule and ca'd it an academy!" Housewives less prim than Mrs Boswell might have objected to Johnson's habitof turning lighted candles upside down when in the parlour to make them burn better. She called the great man a bear. Boswell's Journal of a Tour in the Hebrides was written for the most part during the journey, but was not published until the spring of 1 786. The diary of Pepys was not then known to the public, and Boswell's indiscretions as to the emotions aroused in him by the neat ladies' maids at Inveraray, and the extremity of drunkenness which he exhibited at Corrichatachin, created a literary sensation and sent the Tour through three editions in one year. In the meantime his pecuniary and other difficulties at home were great; he made hardly more than £100 a year by his profession, and his relations with his father were chronically strained. In 1 7 7 5 he began to keep terms at the Inner Temple and managed to see a good deal of Johnson, between whom and John Wilkes he succeeded in bringing about a meeting at the famous dinner at Dilly 's on the 1 5th of May 1776. On the 30th of August 1782 his father died, leaving him an estate worth £1600 a year. On the 30th of June 1 784, Boswell met Johnson for the last time at a dinner at Sir Joshua Reynolds's. He accompanied him back in the eoach from Leicester Square to Bolt Court. " We bade adieu to each other affectionately in the carriage. When he had got down upon the foot pavement he called out ' Fare you well ' ; and without looking back, sprung away with a kind of pathetic briskness, if I may use that expression, which seemed to indicate a struggle to conceal uneasiness, and impressed me with a fore- boding of our long, long separation." Johnson died that year, and two years later the Boswells moved to London. In 1 789 Mrs Boswell died, leaving five children. She had been an excellent mother and a good wife, despite the infidelities and drunkenness of her husband, and from her death Boswell relapsed into worse excesses, grievously aggravated by hypochondria. He died of a complication of disorders at his house in Great Poland Street on the 19th of May 1795, and was buried a fortnight later at Auchinleck.

Up to the eve of his last illness Boswell had been busy upon his magnum opus, The Life of Samuel Johnson, which was in process of crystallization to the last. The first edition was published in two quarto volumes in an edition of 1700 copies on the 16th of May 1791. He was preparing a third edition when he died; this was completed by his friend Edmund Malone, who brought out a fifth edition in 1807.

That of James Boswell junior (the editor of Malone's Variorum Shakespeare, 1821) appeared in 1811.

The Life of Johnson was written on a scale practically unknown to biographers before Boswell. It is a full-length with all the blotches and pimples revealed (" I will not make my tiger a cat to please anybody," wrote " Bozzy "). It may be overmuch an exhibition of oddities, but it is also, be it remembered, a pioneer application of the experimental method to the determination of human character. Its size and lack of divisions (to divide it into chapters was an original device of Croker's) are a draw- back, and have prevented Boswell's Life from that assured triumph abroad which has fallen to the lot of various English classics such as Robinson Crusoe or Gulliver's Travels. But wherever English is spoken, it has become a veritable sacred book and has pervaded English life and thought in the same way, that the Bible, Shakespeare and Bunyan have done. Boswell has successfully (to use his own phrase) " Johnsonized " Britain, but has not yet Johnsonized the planet. The model originally proposed to himself by Boswell was Mason's Life of Gray, but he far surpassed that, or indeed any other, model. The fashion that Boswell adopted of giving the conversations not in the neutral tints of oratio obliqua but in full oratio recta was a stroke of genius. But he is far from being the mere mechanical trans- mitter of good things. He is a dramatic and descriptive artist of the first order. The extraordinary vitality of his figures postulates

a certain admixture of fiction, and it is certain that Boswell exaggerates the sympathy expressed in word or deed by Johnson for some of his own tenderer foibles. But, on the whole, the best judges are of opinion that Boswell's accuracy is exceptional, as it is undoubtedly seconded by a power of observation of a singular retentiveness and intensity. The difficulty of dramatic description can only be realized, as Jowett well pointed out, by those who have attempted it, and it is not until we compare Boswell's reports with those of less skilful hearers that we can appreciate the skill with which the essence of a conversation is extracted, and the whole scene indicated by a few telling touches. The result is that Johnson, not, it is true, in the early days of his poverty, total idleness and the pride of literature, but in the fulness of fame and competence of fortune from 1763 to 1784, is better known to us than any other man in history. The old theory to explain such a marvel (originally propounded by Gray when the Tour in Corsica appeared) that " any fool may write a

valuable book by chance ” is now regarded as untenable. If fool is a word to describe Boswell (and his folly was at times transcendent) he wrote his great book because and not in despite of the fact that he was one. There can be no doubt, in fact, that he was a biographical genius, and that he arranged his oppor- tunities just as he prepared his transitions and introduced those inimitable glosses by which Johnson’s motives are ex- plained, his state of mind upon particular occasions indicated, and the general feeling of his company conveyed. This remark- able literary faculty, however, was but a fraction of the total make-up requisite to produce such a masterpiece as the Life. There is a touch of genius, too, in the naif and imperturbable good nature and persistency (” Sir, I will not be baited with ‘ what ‘ and ‘ why.’ ‘ Why is a cow’s tail long?’ ‘ Why is a fox’s tail bushy?’ “), and even in the abnegation of all personal dignity, with which Boswell pursued his hero. As he himself said of Goldsmith, ” He had sagacity enough to cultivate assiduously the acquaintance of Johnson, and his faculties were gradually enlarged.” Character, the vital principle of the individual, is the ignis fatuus of the mechanical biographer. Its attainment may be secured by a variety of means — witness Xenophon, Cellini, Aubrey, Lockhart and Froude — but it has never been attained with such complete intensity as by Boswell in his Life of Johnson. The more we study Boswell, the more we compare him with other biographers, the greater his work appears.

The eleventh edition of Boswell’s Johnson was brought out by John Wilson Croker in 183 1; in this the original text is expanded by numerous letters and variorum anecdotes and is already knee- deep in annotation. Its blunders provoked the celebrated and mutually corrective criticisms of Macaulay and Carlyle. Its value as an unrivalled granary of Johnsoniana, stored opportunely before the last links with a Johnsonian age had disappeared, has not been adequately recognized. A new edition of the original text was issued in 1874 by Percy Fitzgerald (who has also written a useful life of James Boswell in 2 vols., London, 1891) ; a six-volume edition, including the Tour and Johnsoniana, was published by the Rev. Alexander Napier in 1884; the definitive edition is that by Dr Birkbeck Hill in 6 vols., 1887, with copious annotations and a model index. A generously illustrated edition was completed in 1907 in two large volumes by Roger Ingpen, and reprints of value have also been edited by R. Carruthers (with woodcuts), A. Birrell, Mowbray Morris (Globe edition) and Austin Dobson. A short biography of Boswell was written in 1896 by W. Keith Leask. Boswell’s commonplace-book was published in 1876, under the title of Boswelliana, with a memoir by the Rev. C. Rogers. (T. Se.)

BOSWORTH, JOSEPH (1789-1876), British Anglo-Saxon scholar, was born in Derbyshire in 1789. Educated at Repton, whence he proceeded to Aberdeen University, he became in 181 7 vicar of Little Horwood, Buckinghamshire, and devoted his spare time to literature and particularly to the study of Anglo-Saxon. In 1823 appeared his Elements of Anglo-Saxon Grammar. In 1829 Bosworth went to Holland as chaplain, first at Amsterdam and then at Rotterdam. He remained in Holland until 1840, working there on his Dictionary of the Anglo-Saxon Language (1838), his best-known work. In 1857 he became rector of Water Shelford, Buckinghamshire, and in the following year was appointed Rawlinson professor of Anglo-Saxon at Oxford. He gave to the university of Cambridge in 1867 £10,000 for the

establishment of a professorship of Anglo-Saxon. He died on the 27th of May 1876, leaving behind him a mass of annotations on the Anglo-Saxon charters.

BOTANY (from Gr. (iorravq, plant; fioo-nav, to graze), the science which includes everything relating to the vegetable kingdom, whether in a living or in a fossil state. It embraces a consideration of the external forms of plants — of their anatomical structure, however minute — of the functions which they perform — of their arrangement and classification — of their distribution over the globe at the present and at former epochs — and of the uses to which they are subservient. It examines the plant in its earliest state of development, and follows it through all its stages of progress until it attains maturity. It takes a comprehensive view of all the plants which cover the earth, from the minutest organism, only visible by the aid of the microscope, to the most gigantic productions of the tropics. It marks the relations which subsist between all members of the plant world, including those between existing groups and those which are known only from their fossilized remains preserved in the rocks. We deal here with the history and evolution of the science.

The plants which adorn the globe more or less in all countries must necessarily have attracted the attention of mankind from the earliest times. The science that treats of them dates back to the days of Solomon, who ” spake of trees, from the cedar of Lebanon to the hyssop on the wall.” The Chaldaeans, Egyptians and Greeks were the early cultivators of science, and botany was not neglected, although the study of it was mixed up with crude speculations as to vegetable life, and as to the change of plants into animals. About 300 years before Christ Theophrastus wrote a History of Plants, and described about 500 species used for the treatment of diseases. Dioscorides, a

Greek writer, who appears to have flourished about the time of Nero, issued a work on Materia Medica. The elder Pliny described about a thousand plants, many of them famous for their medicinal virtues. Asiatic and Arabian writers also took up this subject. Little, however, was done in the science of botany, properly so called, until the 1 6th century of the Christian era, when the revival of learning dispelled the darkness which had long hung over Europe. Otto Brunfels, a physician of Bern, has been looked upon as the restorer of the science in Europe. In his Herbarium, printed at Strassburg (1530-1536), he gave descriptions of a large number of plants, chiefly those of central Europe, illustrated by beautiful woodcuts. He was followed by other writers, — Leonhard Fuchs, whose Historia Stirpium (Basel, 1542) is worthy of special note for its excellent woodcuts; Hieronymus Bock, whose Kreutter Buch appeared in 1539; and William Turner, ” The Father of English Botany,” the first part of whose New Herbal, printed in English, was issued in 1551. The descriptions in these early works were encumbered with much medicinal detail, including speculations as to the virtues of plants. Plants which were strikingly alike were placed together, but there was at first little attempt at systematic classification. A crude system, based on the external appearance of plants and their uses to man, was gradually evolved, and is well illustrated in the Herbal, issued in 1597 by John Gerard (1545-1612), a barber-surgeon, who had a garden in Holborn, and was a keen student of British plants.

One of the earliest attempts at a methodical arrangement of plants was made in Florence by Andreas Caesalpinus (1519- 1603), who is called by Linnaeus primus verus systematicus. In his work De Plantis, published at Florence in 1583, he dis- tributed the 1520 plants then known into fifteen classes, the distinguishing characters being taken from the fruit.

John Ray (1627-1705) did much to advance the science of botany,’ and was also a good zoologist. He promulgated a system which may be considered as the dawn of the ” natural system ” of the present day (Ray, Melhodus Plantarum, 1682). He separated flowering from flowerless plants, and divided the former into Dicotyledons and Monocotyledons. His orders (or ” classes “) were founded to some extent on a correct idea of the affinities of plants, and he far outstripped his contemporaries in his enlightened views of arrangement.

About the year 1670 Dr Robert Morison 1 (1620-1683), the first professor of botany at Oxford, published a systematic arrangement of plants, largely on the lines previously suggested by Caesalpinus. He divided them into eighteen classes, dis- tinguishing plants according as they were woody or herbaceous, and taking into account the nature of the flowers and fruit. In 1690 Rivinus 2 promulgated a classification founded chiefly on the forms of the flowers. J. P. de Tournefort 3 (1656-1708), who about the same time took up the subject of vegetable taxonomy, was long at the head of the French school of botany, and published a systematic arrangement in 1 694-1 700. He described about 8000 species of plants, and distributed them into twenty-two classes, chiefly according to the form of the corolla, distinguishing herbs and under-shrubs on the one hand from trees and shrubs on the other. The system of Tournefort was for a long time adopted on the continent, but was ultimately displaced by that of Carl von Linne, or Linnaeus (q.v. ; 1 707-1 778).

The system of Linnaeus was founded on characters derived from the stamens and pistils, the so-called sexual organs of the flower, and hence it is often called the sexual system. It is an artificial method, because it takes into account only a few marked characters in plants, and does not propose to unite them by natural affinities. It is an index to a department of the book of nature, and as such is useful to the student. It does not aspire to any higher character, and although it cannot be looked upon as a scientific and natural arrangement, still it has a certain facility of application which at once commended it. It does not of itself give the student a view of the true relations of plants, and by leading to the discovery of the name of a plant, it is only a stepping-stone to the natural system. Linnaeus himself claimed nothing higher for it. He says — ” Methodi Naturalis fragmenta studiose inquirenda sunt. Primum et ultimum hoc in botanicis desideratum est. Natura non facit saltus. Plantae omnes utrinque affinitatem monstrant, uti territorium in mappa geographica.” Accordingly, besides his artificial index, he also promulgated fragments of a natural method of arrange- ment.

The Linnean system was strongly supported by Sir James Edward Smith (1759-1828), who adopted it in his English Flora, and who also became possessor of the Linnean collection. The system was for a long time the only one taught in the schools of Britain, even after it had been discarded by those in France and in other continental countries.

The foundation of botanic gardens during the 16th and 17th centuries did much in the way of advancing botany. They were at first appropriated chiefly to the cultivation of medicinal plants. This was

especially the case at universities, where medical schools existed. The first botanic garden was established at Padua in 1545, and was followed by that of Pisa. The garden at Leiden dates from 1577, that at Leipzig from 1579. Gardens also early existed at Florence and Bologna. The Montpellier garden was founded in 1592, that of Giessen in 1605, of Strass- burgin 1620, of Altdorf in 1625, and of Jena in 1629. The Jardin des Plantes at Paris was .established in 1626, and the Upsala garden in 1627. The botanic garden at Oxford was founded in 1632. The garden at Edinburgh was founded by Sir Andrew Balfour and Sir Robert Sibbald in 1670, and, under the name of the Physic Garden, was placed under the superintendence of James Sutherland, afterwards professor of botany in the uni- versity. The garden at Kew dates from about 1730, when Frederick, prince of Wales, obtained a long lease of Kew House and its gardens from the Capel family. After his death in 1751 his widow, Princess Augusta of Saxe-Gotha, showed great interest in their scientific development, and in 1759 engaged William Aiton to establish a Physic Garden. The garden of the Royal Dublin Society at Glasnevin was opened about 1796; that of Trinity College, Dublin, in 1807; and that of Glasgow

1 Morison, Praeludia Botanica (1672) ; Plantarum Historia Universalis (1680).

2 Rivinus (Augustus Quirinus) paterno nomine Bachmann, Introductio genezalis in Rem Herbariam (Lipsiae, 1690).

3 Tournefort, Elemens de botanique (1694) ; Institutiones Rei Herbariae (1700).

in 1818. The Madrid garden dates from 1763, and that of Coimbrafrom 1773. Jean Gesner (1709-1790)ˆ Swiss physician and botanist, states that at the end of the 18th century there were 1600 botanic gardens in Europe.

A new era dawned on botanical classification with the work of Antoine Laurent de Jussieu (1 748-1836). His uncle, Bernard de Jussieu, had adopted the principles of Linnaeus's Fragmenta in his arrangement of the plants in the royal garden at the Trianon. At an early age Antoine became botanical demonstrator in the Jardin des Plantes, and was thus led to devote his time to the science of botany. Being called upon to arrange the plants in the garden, he necessarily had to consider the best method of doing so, and, following the lines already suggested by his uncle, adopted a system founded in a certain degree on that of Ray, in which he embraced all the discoveries in organography, adopted the simplicity of the Linnean definitions, and

displayed the natural affinities of plants. His Genera Plantarum, begun in 1778, and finally published in 1789, was an important advance, and formed the basis of all natural classifications. One of the early supporters of this natural method was Augustin Pyramus de Candolle (1778-1841), who in 1813 published his Theorie elementaire de la botanique, in which he showed that the affinities of plants are to be sought by the comparative study of the form and development of organs (morphology), not of their functions (physiology). His Prodromus Systematis Naturalis Regni Vege- tabilis was intended to embrace an arrangement and description of all known plants. The work was continued after his death, by his son Alphonse de Candolle, with the aid of other eminent botanists, and embraces descriptions of the genera and species of the orders of Dicotyledonous plants. The system followed by de Candolle is a modification of that of Jussieu.

In arranging plants according to a natural method, we require to have a thorough knowledge of structural and morphological botany, and hence we find that the advances made in these departments have materially aided the efforts of systematic botanists.

Robert Brown (1773-1858) was the first British botanist to support and advocate the natural system of classification. The publication of his Prodromus Florae Novae Hollandiae (in 1810), according to the natural method, led the way to the adoption of that method in the universities and schools of Britain. In 1827 Brown announced his important discovery of the distinction between Angiosperms and Gymnosperms, and the philosophical character of his work led A. von Humboldt to refer to him as ” Botanicorum facile princeps.” In 1830 John Lindley published the first edition of his Introduction to the Natural System, em- bodying a slight modification of de Candolle’s system. From the year 1832 up to 1859 great advances were made in systematic botany, both in Britain and on the continent of Europe. The Enchiridion and Genera Plantarum of S. L. Endlicher (1804- 1849), the Prodromus of de Candolle, and the Vegetable Kingdom (1846) of J. Lindley became the guides in systematic botany, according to the natural system.

The least satisfactory part of all these systems was that con- cerned with the lower plants or Cryptogams as contrasted with the higher or flowering plants (Phanerogams) . The development of the compound microscope rendered possible the accurate study of their life-histories; and the publication in 1851 of the results of Wilhelm Hofmeister’s researches on the comparative embryology of the higher Cryptogamia shed a flood of light on their relationships to each other and to the higher plants, and supplied the basis for the distinction of the great

groups Thal- lophyta, Bryophyta, Pteridophyta and Phanerogamae, the last named including Gymnospermae and Angiospermae.

A system of classification for the Phanerogams, or, as they are frequently now called, Spermatophyta (seed-plants), which has been much used in Great Britain and in America, is that of Bentham and Hooker, whose Genera Plantarum (1862-1883) is a descriptive account of all the genera of flowering plants, based on their careful examination. The arrangement is a modification of that adopted by the de Candolles. Another system differing somewhat in detail is that of A. W. Eichler (Berlin, 1883), a

modified form of which was elaborated by Dr Adolf Engler of Berlin, the principal editor of Die natiirliche Pflanzenfamilien.

The study of the anatomy and physiology of plants did not keep pace with the advance in classification. Nehemiah Grew and his contemporary Marcello Malpighi were the earliest dis- coverers in the department of plant anatomy. Both authors laid an account of the results of their study of plant structure before the Royal Society of London almost at the same time in 1671. Malpighi's complete work, Anatome Plantarum, appeared in 1675 and Grew's Anatomy of Plants in 1682. For more than a hundred years the study of internal structure was neglected. In 1802 appeared the Traite d'anatomie et de physiologie vegetale of C.F. B. de Mirbel (1776-1854), which was quickly followed by other publications by Kurt Sprengel, L. C. Treviranus (1779-1864), and others. In 1812 J. J. P. Moldenhawer isolated cells by maceration of tissues in water. The work of F. J. F. Meyen and H. von Mohl in the middle of the 19th century placed the study of plant anatomy on a more scientific basis. Reference must also be made to M. J. Schleiden (1 804-1881) and F. linger (1800-1870), while in K. W. von Nageli's investigations on molecular structure and the growth of the cell membrane we recognize the origin of modern methods of the study of cell- structure included under cytology (q.v.). The work of Karl Sanio and Th. Hartig advanced knowledge on the structure and development of tissues, while A. de Bary's Comparative Anatomy of the Phanerogams and Ferns (1877) supplied an admirable presentation of the facts so far known. Since then the work has been carried on by Ph. van Tieghem and his pupils, and others, who have sought to correlate the large mass of facts and to find some general underlying principles (see Plants: Anatomy of).

The subject of fertilization was one which early excited attention. The

idea of the existence of separate sexes in plants was entertained in early times, long before separate male and female organs had been demonstrated. The production of dates in Egypt, by bringing two kinds of flowers into contact, proves that in very remote periods some notions were entertained on the subject. Female date-palms only were cultivated, and wild ones were brought from the desert in order to fertilize them. Herodotus informs us that the Babylonians knew of old that there were male and female date-trees, and that the female required the concurrence of the male to become fertile. This fact was also known to the Egyptians, the Phoenicians and other nations of Asia and Africa. The Babylonians suspended male clusters from wild dates over the females ; but they seem to have supposed that the fertility thus produced depended on the presence of small flies among the wild flowers, which, by entering the female flowers, caused them to set and ripen. The process was called palmification. Theophrastus, who succeeded Aristotle in his school in the 114th Olympiad, frequently mentions the sexes of plants, but he does not appear to have determined the organs of reproduction. Pliny, who flourished under Vespasian, speaks particularly of a male and female palm, but his statements were not founded on any real knowledge of the organs. From Theophrastus down to Caesalplnus, who died at Rome in 1603, there does not appear to have been any attention paid to the reproductive organs of plants. Caesalpinus had his attention directed to the subject, and he speaks of a halitus or emanation from the male plants causing fertility in the female.

Nehemiah Grew seems to have been the first to describe, in a paper on the Anatomy of Plants, read before the Royal Society in November 1676, the functions of the stamens and pistils. Up to this period all was vague conjecture. Grew speaks of the attire, or the stamens, as being the male parts, and refers to conversations with Sir Thomas Millington, Sedleian professor at Oxford, to whom the credit of the sexual theory seems really to belong. Grew says that ” when the attire or apices break or open, the globules or dust falls down on the seedcase or uterus, and touches it with a prolific virtue.” Ray adopted Grew’s views, and states various arguments to prove their correctness in the preface to his work on European plants, published in 1694. In 1694 R. J. Camerarius, professor of botany and medicine at

Tubingen, published a letter on the sexes of plants, in which he refers to the stamens and pistils as the organs of reproduction, and states the difficulties he had encountered in determining the organs of Cryptogamic plants. In 1703 Samuel Morland, in a paper read before the Royal Society, stated that the farina (pollen) is a congeries of seminal plants, one of which must be conveyed into every ovum or

seed before it can become prolific. In this remarkable statement he seems to anticipate in part the discoveries afterwards made as to pollen tubes, and more par- ticularly the peculiar views promulgated by Schleiden. In 1711 E. F. Geoffroy, in a memoir presented to the Royal Academy at Paris, supported the views of Grew and others as to the sexes of plants. He states that the germ is never to be seen in the seed till the apices (anthers) shed their dust; and that if the stamina be cut out before the apices open, the seed will either not ripen, or be barren if it ripens. He mentions two experiments made by him to prove this — one by cutting off the staminal flowers in Maize, and the other by rearing the female plant of Mercurialis apart from the male. In these instances most of the flowers were abortive, but a few were fertile, which he attributes to the dust of the apices having been wafted by the wind from other plants.

Linnaeus took up the subject in the inauguration of his sexual system. He first published his views in 1736, and he thus writes — ” Antheras et stigmata constituere sexum plantarum, a palmicolis, Millingtono, Grewio, Rayo, Camerario, Godofredo, Morlando, Vaillantio, Blairio, Jussievio, Bradleyo, Royeno, Logano, &c, detectum, descriptum, et pro infallibili assumptum; nee ullum, apertis oculis considerantem cujuscunque plantae flores, latere potest.” He divided plants into sexual and asexual, the former being Phanerogamous or flowering, and the latter Cryptogamous or flowerless. In the latter division of plants he could not detect stamens and pistils, and he did not investigate the mode in which their germs were produced. He was no physiologist, and did not promulgate any views as to the em- bryogenic process. His followers were chiefly engaged in the arrangement and classification of plants, and while descriptive botany made great advances the physiological department of the science was neglected. His views were not, however, adopted at once by all, for we find Charles Alston stating arguments against them in his Dissertation on the Sexes of Plants. Alston’s observa- tions were founded on what occurred in certain unisexual plants, such as Mercurialis, Spinach, Hemp, Hop and Bryony. The conclusion at which he arrives is that the pollen is not in all flowering plants necessary for impregnation, for fertile seeds can be produced without its influence. He supports parthenogenesis in some plants. Soon after the promulgation of Linnaeus’s method of classification, the attention of botanists was directed to the study of Cryptogamic plants, and the valuable work of Johann Hedwig (1 730-1 799) on the reproductive organs of mosses made its appearance in 1782. He was one of the first to point out the existence of certain cellular bodies in these plants which appeared to perform the functions of reproductive organs, and to them the names

of antheridia and pistillidia were given. This opened up a new field of research, and led the way in the study of Cryptogamic reproduction, which has since been much advanced by the labours of numerous botanical inquiries. The interesting observations of Morland, already quoted, seem to have been neglected, and no one attempted to follow in the path which he had pointed out. Botanists were for a long time content to know that the scattering of the pollen from the anther, and its applica- tion to the stigma, were necessary for the production of perfect seed, but the stages of the process of fertilization remained un-explored. The matter seemed involved in mystery, and no one attempted to raise the veil which hung over the subject of embryogeny. The general view was, that the embryo originated in the ovule, which was in some obscure manner fertilized by the pollen.

In 181 5 L. C. Treviranus, professor of botany in Bonn, roused the attention of botanists to the development of the embryo, but although he made valuable researches, he did not add much in the way of new information. In 1823 G. B. Amici discovered the

existence of pollen tubes, and he was followed by A. T. Brongniart and R. Brown. The latter traced the tubes as far as the nucleus of the ovule. These important discoveries mark a new epoch in embryology, and may be said to be the foundation of the views now entertained, which were materially aided by the subsequent elucidation of the process of cytogenesis, or cell-development, by Schleiden, Schwann, Mohl and others. The whole subject of fertilization and development of the embryo has been more recently investigated with great assiduity and zeal, as regards both cryptogamous and phanerogamous plants, and details must be sought in the various special articles. The observations of Darwin as to the fertilization of orchids, Primula, Linum and Lylhrum, and other plants, and the part which insects take in this function, gave an explanation of the observations of Christian Konrad Sprengel, made at the close of the 18th century, and opened up a new phase in the study of botany, which has been followed by Hermann Miiller, Federico Delpino and others, and more recently by Paul Knuth.

One of the earliest workers at plant physiology was Stephen Hales. In his Statical Essays (1727) he gave an account of numerous experiments and observations which he had made on the nutrition of plants and the movement of sap in them. He showed that the gaseous

constituents of the air contribute largely to the nourishment of plants, and that the leaves are the organs which elaborate the food; the importance of leaves in nutrition had been previously pointed out by Malpighi in a short account of nutrition which forms an appendix to his anatomical work. The birth of modern chemistry in the work of J. Priestley and Lavoisier, at the close of the 18th century, made possible the scientific study of plant-nutrition, though Jan Ingenhousz in 1779 discovered that plants incessantly give out carbonic acid gas, but that the green leaves and shoots only exhale oxygen in sunlight or clear daylight, thereby indicating the distinction between assimilation of carbonic acid gas (photosynthesis) and respiration. N. T. de Saussure (1767-1845) gave precision to the science of plant-nutrition by use of quantitative methods. The subjects of plant nutrition and respiration were further studied by R. J. H. Dutrochet towards the middle of the century, and Liebig's application of chemistry to agriculture and physio- logy put beyond question the parts played by the atmosphere and the soil in the nutrition of plants.

The phenomena of movements of the organs of plants attracted the attention of John Ray (1693), who ascribed the movements of the leaf of Mimosa and others to alteration in temperature. Linnaeus also studied the periodical movements of flowers and leaves, and referred to the assumption of the night-position as the sleep-movement. Early in the 19th century Andrew Knight showed by experiment that the vertical growth of stems and roots is due to the influence of gravitation, and made other observations on the relation between the position assumed by plant organs and external directive forces, and later Dutrochet, H. von Mohl and others contributed to the advance of this phase of plant physiology. Darwin's experiments in reference to the movements of climbing and twining plants, and of leaves in insectivorous plants, have opened up a wide field of inquiry as to the relation between plants and the various external factors, which has attracted numerous workers. By the work of Julius Sachs and his pupils plant physiology was established on a scientific basis, and became an important part of the study of plants, for the development of which reference may be made to the article Plants: Physiology. The study of form and development has advanced under the name " morphology," with the progress of which are associated the names of K. Goebel, E. Strasburger, A. de Bary and others, while more recently, as cytology {q.v.), the intimate study of the cell and its contents has attracted considerable attention.

The department of geographical botany made rapid advance by means of the various scientific expeditions which have been sent to all quarters of the globe, as well as by individual effort (see Plants:

Distribution) since the time of A. von Humboldt. The question of the mode in which the floras of islands and of continents have been formed gave rise to important speculations

by such eminent botanical travellers as Charles Darwin, Sir J. D. Hooker, A. R. Wallace and others. The connexion between climate and vegetation has also been studied. Quite recently under the name of " Ecology " or " Oecology " the study of plants in relation to each other and to their environment has become the subject of systematic investigation.

The subject of palaeontological botany (see Palaeobotany) has been advanced by the researches of both botanists and geologists. The nature of the climate at different epochs of the earth's history has also been determined from the character of the flora. The works of A. T. Brongniart, H. R. Goeppert and W. P. Schimper advanced this department of science. Among others who contributed valuable papers on the subject may be noticed Oswald Heer (1809-1883), who made observations on the Miocene flora, especially in Arctic regions; Gaston de Saporta (1823-1895), who examined the Tertiary flora; Sir J. W. Dawson and Leo Lesquereux, and others who reported on the Canadian and American fossil plants. In Great Britain also W. C. William- son, by his study of the structure of the plants of the coal-measures, opened up a new line of research which has been followed by Bertrand Renault, D. H. Scott, A. C. Seward and others, and has led to important discoveries on the nature of extinct groups of plants and also on the phylogeny of existing groups.

Botany may be divided into the following departments: —

1. Structural, having reference to the form and structure of the various parts, including (a) Morphology, the study of the general form of the organs and their development — this will be treated in a series of articles dealing with the great subdivisions of plants (see Angiosperms, Gymnosperms, Pteridophyta, Bryophyta, Algae, Lichens, Fungi and Bacteriology) and the more important organs (see Stem, Leaf, Root, Flower, Fruit) ; (b) Anatomy, the study of internal structure, including minute anatomy or histology (see Plants: Anatomy).

2. Cytology (q.v.), the intimate structure and behaviour of the cell and its contents — protoplasm, nucleus, &c.

3. Physiology, the study of the life-functions of the entire plant and its organs (see Plants: Physiology).

4. Systematic, the arrangement and classification of plants <(see Plants: Classification).

5. Distribution or Geographical Botany, the consideration of the distribution of plants on the earth's surface (see Plants: Distribution) .

6. Palaeontology, the study of the fossils found in the various strata of which the earth is composed (see Palaeobotany).

7. Ecology or Oecology, the study of plants in relation to each other and to their environment (see Plants: Ecology).

Besides these departments which deal with Botany as a science, there are various applications of botany, such as forestry (see Forests and Forestry), agriculture (q.v.), horticulture (q.v.), and materia medica (for use in medicine; see the separate articles on each plant). (A. B. R.)

BOTANY BAY, an inlet on the coast of Cumberland county, New South Wales, Australia, 5 m. south of the city of Sydney. On its shore is the township of Botany, forming a suburb of Sydney, with which it is connected by a tramway. It was first visited by Captain Cook in 1770, who landed at a spot marked by a monument, and took possession of the territory for the crown. The bay received its name from Joseph Banks, the botanist of the expedition, on account of the variety of its flora. When, on the revolt of the New England colonies, the convict establish- ments in America were no longer available (see Deportation and New South Wales), the attention of the British government, then under the leadership of Pitt, was turned to Botany Bay; and in 1 787 Commodore Arthur Phillip was commissioned to form a penal settlement there. Finding, on his arrival, however, that the locality was ill suited for such a purpose, he removed north- wards to the site of the present city of Sydney. The name of Botany Bay seems to have struck the popular fancy, and con- tinued to be used in a general way for any convict establishment in Australia. The transportation of criminals to New South Wales was discontinued in 1840.

BOTHA, LOUIS (1862-), Boer general and statesman, was the son of one of the " Voortrekkers," and was born on the 27th of September 1862 at Grey town (Natal). He saw active service in savage warfare, and in 1887 served as a field-cornet. Subse- quently he settled in the Vryheid district, which he represented in the Volksraad of 1897. In the war of 1899 he served at first under Lucas Meyer in northern Natal,

but soon rose to higher commands. He was in command of the Boers at the battles of Colenso and Spion Kop, and these victories earned him so great a reputation that on the death of P. J. Joubert, Botha was made commander-in-chief of the Transvaal Boers. His capacity was again demonstrated in the action of Belfast-Dalmanutha (August 23-28, 1900), and after the fall of Pretoria he reorganized the Boer resistance with a view to prolonged guerrilla warfare. In this task, and in the subsequent operations of the war, he was aided by his able lieu tenants de la Rey and de Wet. The success of his measures was seen in the steady resistance offered by the Boers to the very close of the three years' war. He was the chief representative of his countrymen in the peace negotia- tions of 1902, after which, with de Wet and de la Rey, he visited Europe in order to raise funds to enable the Boers to resume their former avocations. In the period of reconstruction under British rule, General Botha, who was still looked upon as the leader of the Boer people, took a prominent part in politics, advocating always measures which he considered as tending to the main- tenance of peace and good order and the re-establishment of prosperity in the Transvaal. After the grant of self-government to the Transvaal in 1907, General Botha was called upon by Lord Selbome to form a government, and in the spring of the same year he took part in the conference of colonial premiers held in London. During his visit to England on this occasion General Botha declared the whole-hearted adhesion of the Transvaal to the British empire, and his intention to work for the welfare of the country regardless of racial differences. (See Transvaal: History.)

BOTHNIA, GULF OF, the northern part of the Baltic Sea (q.v.). The name is preserved from the former territory of Bothnia, of which the western part is now included in Sweden, the eastern in Finland.

BOTHWELL, JAMES HEPBURN, 4TH Earl of, duke of Orkney and Shetland (c. 1536-1578), husband of Mary, queen of Scots, son of Patrick, 3rd earl of Bothwell, and of Agnes, daughter of Henry, Lord Sinclair, was born about 1536. His father, Patrick, the 3rd earl (c. 1512-1556), was the only son of Adam, the 2nd earl, who was killed at Flodden, and the grandson of Patrick (d. c. 1508), 3rd Lord Hailes and 1st earl of Bothwell. It was this Patrick who laid the foundation of the family fortunes. Having fought against King James III. at the battle of Sauchie- burn in 1488, he was rewarded by the new king, James IV., with the earldom of Bothwell, the office of lord high admiral and other dignities. He also received many grants of land, including the lordship of Bothwell, which had been taken from John Ramsay, Lord Bothwell (d. 1513), the favourite of James III.

James Hepburn succeeded in 1556 to his father's titles, lands and hereditary offices, including that of lord high admiral of Scotland. Though a Protestant, he supported the government of Mary of Guise, showed himself violently anti-English, and led a raid into England, subsequently in 1559 meeting the English commissioners and signing articles for peace on the border. The same year he seized £1000 secretly sent by Elizabeth to the lords of the congregation. In retaliation Arran occupied and stripped his castle at Crichton, whereupon Bothwell in November • sent Arran a challenge, which the latter declined. In December he was sent by the queen dowager to secure Stirling, and in 1560 was despatched on a mission to France, visiting Denmark on the way, where he either married or seduced Anne, daughter of Christopher Thorssen, whom he afterwards deserted, and who came to Scotland in 1563 to obtain redress. He joined Mary at Paris in September, and in 1 561 was sent by her as a commissioner to summon the parliament; in February he arrived in Edinburgh and was chosen a privy councillor on the 6th of September. He now entered into obligations to keep the peace with his

various rivals, but was soon implicated in riots and partisan disorders, and was ordered in December to leave the city. In March 1562, having made up his quarrel with Arran, he was accused of having proposed to the latter a project for seizing the queen, and in May he was imprisoned in Edinburgh castle, whence he succeeded in escaping on the 28th of August. On the 23rd of September he submitted to the queen. Murray's influence, however, being now supreme, he embarked in December for France, but was driven by storms on to Holy Island, where h<*. was detained, and was subsequently, on the 18th of January 1564, seized at Berwick and sent by Elizabeth to the Tower, whence he was soon liberated and proceeded to France. After these adventures he returned to Scotland in March 1565, but withdrew once more before the superior strength of his opponents to France. The same year, however, he was recalled by Mary to aid in the suppression of Murray's rebellion, successfully eluding the ships of Elizabeth sent to capture him. As lieutenant of the Marches he was employed in settling disputes on the border, but used his power to instigate thieving and disorders, and is de- scribed by Cecil's correspondents as " as naughty a man as liveth and much given to the most detestable vices," " as false as a devil," " one that the godly of this whole nation hath a cause to curse for ever." 1 In February 1566 Bothwell, in spite of his previous matrimonial engagements — and he had also been united by " handfasting " to Janet Betoun of Cranstouh Riddell — married Jane, daughter of George Gordon, 4th earl of Huntly. Notwithstanding his insulting language concerning Mary and the fact

that he was the " stoutest " in refusing mass, he became one of her chief advisers, but his complete ascendancy over her mind and affections dates from the murder of Rizzio on the 9th of March 1566. The queen required a protector, whom she found, not in the feeble Darnley, nor in any of the leaders of the factions, but in the strong, determined earl who had ever been a stanch supporter of the throne against the Protestant party and English influence. In Bothwell also, " the glorious, rasb and hazardous young man," romantic, handsome, charming even in his guilt, Mary gained what she lacked in her husband, a lover. He now stood forth as her champion; Mary took refuge with him at Dunbar, presented him, among other estates, with the castle there and the chief lands of the earldom of March, and made him the most powerful noble in the south of Scotland. Her partiality for him increased as her contempt and hatred of Darnley became more confirmed. On the 7 th of October he was dangerously wounded, and the queen showed her anxiety for his safety by riding 40 miles to visit him, incurring a severe illness. In November she visited him at Dunbar, and in December took place the conference at Craigmillar at which both were present, and at which the disposal of Darnley was arranged, Bothwell with some others subsequently signing the bond to accomplish his murder. He himself superintended all the preparations, visiting Darnley with Mary on the night of the crime, Sunday, 9th of February 1567, attending the queen on her return to Holyrood for the ball, and riding back to Kirk o' Field to carry out the crime. After the explosion he hurried back to Holyrood and feigned surprise at the receipt of the news half an hour later, ascribing the catastrophe to " the strangest accident that ever chancit, to wit, the fouder (lightning) came out of the luft (sky) and had burnt the king's house." 2

Bothwell’s power was new greater, and the queen’s affection for him more ardent than ever. She was reported to have said that she cared not to lose France, England and her own country for him, and would go with him to the world’s end in a white petti- coat ere she left him. 3 He was gratified with further rewards, and his success was clouded by no stings of conscience or remorse. According to Melville he had designs on the life of the young prince. On the demand of Lennox, Darnley’s father, Bothwell was put upon his trial in April, but Lennox, having been for- bidden to enter the city with more than six attendants, refused to attend, and Bothwell was declared not guilty. The queen’s

1 Col. of State Papers, Scottish, i. 679.

2 Sir James Melville’s Mem. 174.

3 Col. of State Pap., Foreign, 1566-1568, p. 212.

intention to marry Both well, which had been kept a strict secret before the issue of the trial, was now made public. On the 19th of April he obtained the consent and support of the Protestant lords, who signed a bond in his favour. On the 24th he seized Mary's willing person near Edinburgh, and carried her to his castle at Dunbar. On the 3rd of May Bothwell's divorce from his wife was decreed by the civil court, on the ground of his adultery with a maidservant, and on the 7th by the Roman Catholic court on the ground of consanguinity. Archbishop Hamilton, how- ever, who now granted the decree, had himself obtained a papal dispensation for the marriage, 1 and in consequence it is extremely doubtful whether according to the Roman Catholic law Bothwell and Mary were ever husband and wife. On the 12th Bothwell was created duke of Orkney and Shetland and the marriage took place on the 15th according to the Protestant usage, the Roman Catholic rite being performed, according to some accounts, afterwards in addition. 2

Bothwell's triumph, however, was shortlived. The nobles, both Protestant and Roman Catholic, now immediately united to effect his destruction. In June Mary and Bothwell fled from Holyrood to Borthwick Castle, whence Bothwell, on the place being surrounded by Morton and his followers, escaped to Dunbar, Mary subsequently joining him. Thence they marched with a strong force towards Edinburgh, meeting the lords on the 15th of June at Carberry Hill. Bothwell invited any one of the nobles to single combat, but Mary forbade the acceptance of the challenge. Meanwhile, during the negotiations, the queen's troops had been deserting; a surrender became inevitable, and Bothwell returned to Dunbar, parting from Mary for ever. Subsequently Bothwell left Dunbar for the north, visited Orkney and Shetland, and in July placed himself at the head of a band of pirates, and after eluding all attempts to capture him, arrived at Karm Sound in Norway. Here he was confronted by his first wife or victim, Anne Thorssen, whose claims he satisfied by the gift of a ship and promises of an annuity, and on his identity becoming known he was sent by the authorities to Copenhagen, where he arrived on the 30th of September. He wrote Les Affaires du co;nte de Boduel, exhibiting himself as the victim of the malice of his enemies, and gained King Frederick II. 's good- will by an offer to restore the Orkneys and Shetlands to Denmark. In consequence the king allowed

him to remain at Copenhagen, and refused all requests for his surrender. In January 1 568 he was removed to Malmoe in Sweden. He corresponded frequently with Mary, but there being no hopes whatever of his restoration, and a new suitor being found in the duke of Norfolk, Mary demanded a divorce, on pleas which recall those of Henry VIII. in the matter of Catherine of Aragon. The divorce was finally granted by the pope in September 1570 on the ground of her pre- nuptial ravishment by Bothwell, 3 and met with no opposition from the latter. After the downfall of Mary, Bothwell's good treatment came to an end, and on the 16th of June 1573 he was removed to the castle of Dragsholm or Adelersborg in Zealand. Here the close and solitary confinement, and the dreary and hopeless inactivity to which he was condemned, proved a terrible punishment for the full-blooded, energetic and masterful Both- well. He sank into insanity, and died on the 14th of April 1578. He was buried at the church of Faareveille, where a coffin, doubt- fully supposed to be his, was opened in 1858. A portrait was taken of the head of the body found therein, now in the museum of the Society of Antiquaries in Scotland. His so-called death-bed confession is not genuine.

He left no lawful descendants; but his nephew, Francis Stewart Hepburn, who, through his father, John Stewart, prior of Coldingham, was a grandson of King James V., and was thus related to Mary, queen of Scots, and the regent Murray, was in 1581 created earl of Bothwell. He was lord high admiral of Scotland, and was a person of some importance at the court of James VI. during the time when the influence of the Protestants was uppermost. He was anxious that Mary Stuart's death

1 Hist. MSS. Comm. Rep. ii. p. 177.

2 Cat. of State Pap., Scottish, ii. 333.

3 Cat. of State Pap., Foreign, 1569-1371, p. 372.

should be avenged by an invasion of England, «wj in 1589 he suffered a short imprisonment for his share in a rising. By this time he had completely lost the royal favour. Again imprisoned, this time on a charge of witchcraft, he escaped from captivity in 1 591, and was deprived by parliament of his lands and titles; as an outlaw his career was one of extraordinary lawlessness. In 1 591 he attempted to seize Holyrood palace, and in 1593 he captured the king, forcing from him a promise of pardon. But almost at once he reverted to his former manner of life, and, although James failed to apprehend him, he was forced to take refuge in France about 1595- He died at Naples before

July 1614. This earl had three sons, but his titles were never restored.

Bibliography. — See the article in the Diet, of Nat. Biog. and authorities; Les Affaires du comte de Boduel (written January 1568, publ. Bannatyne Club, 1829); ” Memoirs of James, Earl of Both- well,” in G. Chalmers’s Life of Mary, Queen of Scots (1818) ; Life of Bothwell, by F. Schiern (trans. 1880); Pieces et documents relatifs au comte de Bothwell, by Prince A. Lobanoff (1856); Appendix to the Hist, of Scotland, by G. Buchanan (1721); Sir James Melville’s Memoirs (Bannatyne Club, 1827); A Lost Chapter in the Hist. o\ Mary, Queen of Scots, by J. Stuart (1874); J- H. Burton’s Hist. $ Scotland (1873) ; A. Lang’s Hist, of Scotland, ii. (1902) ; Archaeologia, xxxviii. 308; Col. of State Papers, Foreign, Scottish, Venetian, vii; Exchequer Rolls of Scotland, xix. and xx., Domestic, Border Papers’, Hist. MSS. Comm., MSS. of Marq. of Salisbury, i. ii. See also Mary, Queen of Scots. (P. C. Y.)

BOTHWELL, a town of Lanarkshire, Scotland. Pop. of town (1901) 3015; of parish (1901) 45,905. The town lies on the right bank of the Clyde, 9 m. E.S.E. of Glasgow by the North British and Caledonian railways. Owing to its pleasant situation it has become a residential quarter of Glasgow. The choir of the old Gothic church of 1398 (restored at the end of the 19th century) forms a portion of the parish church. Joanna Baillie, the poetess, was born in the manse, and a memorial has been erected in her honour. The river is crossed by a suspension bridge as well as the bridge near which, on the 22nd of June 1679, was fought the battle of Bothwell Bridge between the Royalists, under the duke of Monmouth, and the Covenanters, in which the latter lost 500 men and 1000 prisoners. Adjoining this bridge, on the level north-eastern bank, is the castle that once belonged to James Hamilton of Bothwellhaugh (fl. 1 566-1 580), the assassin of the regent Murray; and near the present farmhouse the South Calder is spanned by a Roman bridge. The picturesque ruins of Bothwell Castle occupy a conspicuous position on the side of the river, which here takes the bold sweep famed in Scottish song as Bothwell bank. The fortress belonged to Sir Andrew Moray, who fell at Stirling in 1297, and passed by marriage to the Douglases. The lordship was bestowed in 1487 on Patrick Hepburn, 3rd Lord Hailes, 1st earl of Bothwell, who resigned it in 1491 in favour of Archibald Douglas, 5th earl of Angus. It thus reverted to the Douglases and now belongs to the earl of Home, a descendant. The castle is a fine example of Gothic, and mainly consists of a great oblong quadrangle, flanked on the south side by circular towers. At the east end are the remains of the chapel. A dungeon bears the nickname of ” Wallace’s Beef Barrel.” The unpretending mansion near by was built by Archibald Douglas, 1st

earl of Forfar (1653-1712). The parish of Bothwell contains several flourishing towns and villages, all owing their prosperity to the abundance of coal, iron and oil- shale. The principal places, most of which have stations on the North British or Caledonian railway or both, are Bothwell Park, Carfin, Chapelhall, Bellshill (pop. 8786), Holytown, Mossend, Newarthill,Uddingston (pop. 7463), Clydesdale, Hamilton Palace, Colliery Rows and Tennochside.

BOTOCUDOS (from Port, botoque, a plug, in allusion to the wooden disks or plugs worn in their lips and ears), the foreign name for a tribe of South American Indians of eastern Brazil, also known as the Aimores or Aimbores. They appear to have no collective tribal name for themselves. Some are called Nac- nanuk or Nac-poruk, ” sons of the soil.” The name Botocudos cannot be traced much farther back than the writings of Prince Maximilian von Neuwied (Reise nach Bresilien, Frankfort-on- Main, 1820). When the Portuguese adventurer Vasco Fernando Coutinho reached the east coast of Brazil in 1535, he erected a

fort at the head of Espirito Santo Bay to defend himself against ” the Aimores and other tribes.” The original home of the tribe comprised most of the present province of Espirito Santo, and reached inland to the headwaters of Rio Grande (Belmonte) and Rio Doce on the eastern slopes of the Serra do Espinhacao, but the Botocudos are now mainly confined to the country between Rio Pardo and Rio Doce, and seldom roam westward beyond Serra dos Aimores into Minas Geraes. It was in the latter district that at the close of the 18th century they came into collision with the whites, who were attracted thither by the diamond fields.

The Botocudos are nomads, wandering naked in the woods and living on forest products. They are below the medium height, but broad-shouldered and remarkable for the muscular develop- ment and depth of their chests. Their arms and legs are, how- ever, soft and fleshy, and their feet and hands small. Their features, which vary individually almost as much as those of Europeans, are broad and flat, with prominent brow, high cheek- bones, small bridgeless nose, wide nostrils and slight projection of the jaws. They are longheaded, and their hair is coarse, black and lank. Their colour is a light yellowish brown, some- times almost approaching white. The general yellow tint emphasizes their Mongolic appearance, which all travellers have

noticed. The Botocudos were themselves greatly struck by the Chinese coolies, whom they met in Brazilian seaports, and whom they at once accepted as kinsmen (Henri Hollard, De I'homme et des races humaines, Paris, 1853). 1 Some few Botocudos have settled and become civilized, but the great bulk of them, number- ing between twelve and fourteen thousand, are still the wildest of savages. During the earlier frontier wars (1790-1820) every effort was made to extirpate them. They were regarded by the Portuguese as no better than wild beasts. Smallpox was de- liberately spread among them; poisoned food was scattered in the forests; by such infamous means the coast districts about Rios Doce and Belmonte were cleared, and one Portuguese com- mander boasted that he had either slain with his own hands or ordered to be butchered many hundreds of them. Their imple- ments and domestic utensils are all of wood; their only weapons are ree J spears and bows and arrows. Their dwellings are rough shelters of leaf and bast, seldom 4 ft. high. So far as the language of the Botocudos is known, it would appear that they have no means of expressing the numerals higher than one. Their only musical instrument is a small bamboo nose-flute. They attribute all the blessings of life to the " day-fire " (sun) and all evil to " night-fire " (moon). At the graves of the dead they keep fires burning for some days to scare away evil spirits, and during storms and eclipses arrows are shot into the sky to drive away demons.

The most conspicuous feature of the Botocudos is the lem- beitera, or wooden plug or disk which is worn in the lower lip and the lobe of the ear. This disk, made of the specially light and carefully dried wood of the barriguda tree (Chorisia ventri- cosa), is called by the natives themselves embure, whence Augustin Saint Hilaire suggests the probable derivation of their name Aimbore (Voyages dans I'intirieur du Bresil 1816- 1821, Paris, 1830). It is worn only in the under-lip, now chiefly by women, but formerly by men also. The operation for pre- paring the lip begins often as early as the eighth year, when an initial boring is made by a hard pointed stick, and gradually extended by the insertion of larger and larger disks or plugs, sometimes at last as much as 3 in. in diameter. Notwith- standing the lightness of the wood the tembeitera weighs down the lip, which at first sticks out horizontally and at last becomes a mere ring of skin around the wood. Ear-plugs are also worn, of such size as to distend the lobe down to the shoulders. Ear- ornaments of like nature are common in south and even central America, at least as far north as Honduras. .When Columbus discovered this latter country during his fourth voyage (1502)

1 A parallel case is that of the Bashkir soldiers of Orenburg, who

formed part of the Russian army sent to put down the Hungarian revolt of 1848, and who recognized their Ugrian kinsmen in the Zeklars and other Magyars settled in the Danube basin.

he named part of the seaboard Costa de la Oreja, from the con- spicuously distended ears of the natives. Early Spanish ex- plorers also gave the name Orejones or ” big-eared ” to several Amazon tribes. *•;>.«

See A. R. Wallace, Travels on the Amazon (1853-1900); H. H. Bancroft, Hist, of Pacific States (San Francisco, 1882), vol. i. p. 211; A. H. Keane, ” On the Botocudos ” in Journ. Anthrop. Instit. vol. xiii. (1884) ; J. R. Peixoto, Novos Estudios Craniologicos sobre os Botocuds (Rio Janeiro, 1882); Prof. C. F. Hartt, Geology and Physical Geography of Brazil (Boston, 1870), pp. 577-606.

BOTORI, a Japanese game played at the naval, military and other schools, by two sides of equal number, usually about one hundred, each of which defends a pole about 8 ft. high firmly set in the ground, the poles being about 200 yds. distant from each other. The object of each party is to overthrow the adversaries’ pole while keeping their own upright. Pulling, hauling and wrestling are allowed, but no striking or kicking. The players resort to all kinds of massed formations to arrive at the enemies’ pole, and frequently succeed in passing over their heads and shoulders one or more comrades, who are thus enabled to reach the pole and bear it down unless pulled off in time by its defenders. A game similar in character is played by the Sophomore and Freshman classes of Amherst College (Massachusetts), called the ” Flag-rush.” It was instituted at the instance of the faculty to take the place of the traditional ” Cane-rush,” a general milie between the two classes for the ultimate possession of a stout walking-stick, which became so rough that students were frequently seriously injured. In the ” Flag-rush ” a small flag is set upon a padded post about 6 ft. high, and is defended by one class while the other endeavours, as at Botori, to overthrow it. If the flag is not captured or torn down within a certain time the defending side wins.

BOTOSHANI (Botosani), the capital of the department of Botoshani, Rumania; on a small tributary of the river Jijia, and in one of the richest agricultural and pastoral regions of the north Moldavian hills. Pop. (1900) 32,193. Botoshani is com- mercially important as the town through which goods from Poland and Galicia pass in transit for the south; being situated on a branch railway between Dorohoi and on the main line from Czernowitz to Galatz. It has extensive starch and flour mills; and Botoshani flour is highly prized in Rumania, besides

being largely exported to Turkey and the United Kingdom. Botoshani owes its name to a Tatar chief, Batus or Batu Khan, grandson of Jenghiz Khan, who occupied the country in the 13th century. There are large colonies of Armenians and Jews.

BO-TREE, or Bodhi-Tree, the name given by the Buddhists of India and Ceylon to the Pipul or sacred wild fig (Ficus religiosa). It is regarded as sacred, and one at least is planted near aach temple. These are traditionally supposed to be derived from the original one, the Bodhi-tree of Buddhist annals, beneath which the Buddha is traditionally supposed to have attained perfect knowledge. The Bo-tree at the ruined city of Anuradha- pura, 80 m. north of Kandy, grown from a branch of the parent- tree sent to Ceylon from India by King Asoka in the 3rd century B.C., is said to have been planted in 288 B.C., and is to this day worshipped by throngs of pilgrims who come long distances to pray before it. Usually a bo-tree is planted on the graves of the Kandy priests.

BOTRYTIS, a minute fungus which appears as a brownish-grey mould on decaying vegetation or on damaged fruits. Under a hand-lens it is seen to consist of tiny, upright, brown stalks which are branched at the tips, each branchlet being crowned with a naked head of pale-coloured spores. It is a very common fungus, growing everywhere in the open or in greenhouses, and can be found at almost any season. It has also a bad record as a plant disease. If it once gains entrance into one of the higher plants, it spreads rapidly, killing the tissues and reducing them to a rotten condition. Seedling pines, lilies and many other cultivated plants are subject to attack by Botrytis. Some of the species exist in two other growth-forms, so different in appearance from the Botrytis that they have been regarded as distinct plants: — a sclerotium, which is a hard compact mass of fungal filaments, or mycelium, that can retain its vitality for a

considerable time in a resting condition; and a stalked Peziza, or cup-fungus, which grows out of the sclerotium. The latter is the perfect form of fruit. The Botrytis mould is known as the conidial form

BOTTA, CARLO GIUSEPPE GUGLIELMO (1766-1837), Italian historian, was born at San Giorgio Canavese in Piedmont. He studied medicine at the university of Turin, and obtained his doctor’s degree when about twenty years of age. Having rendered himself obnoxious

to the government during the political commotions that followed the French Revolution, he was imprisoned for over a year; and on his release in 1795 he withdrew to France, only to return to his native country as a surgeon in the French army, whose progress he followed as far as Venice. Here he joined the expedition to Corfu, from which he did not return to Italy till 1798. At first he favoured French policy in Italy, contributed to the annexation of Piedmont by France in 1799, and was an admirer of Napoleon; but he afterwards changed his views, realizing the necessity for the union of all Italians and for their freedom from foreign control. After the separation of Piedmont from France in 1814 he retired into private life, but, fearing persecution at home, became a French citizen. In 1 8 1 7 he was appointed rector of the university of Rouen, but in 1822 was removed owing to clerical influence. Amid all the vicissitudes of his early manhood Botta had never allowed his pen to be long idle, and in the political quiet that followed 1816 he naturally devoted himself more exclusively to literature. In 1824 he published a history of Italy from 1789 to 1814 (4 vols.), on which his fame principally rests; he himself had been an eyewitness of many of the events described. His continuation of Guicciardini, which he was afterwards en- couraged to undertake, is a careful and laborious work, but is not based on original authorities and is of small value. Though living in Paris he was in both these works the ardent exponent of that recoil against everything French which took place throughout Europe. A careful exclusion of all Gallicisms, as a reaction against the French influences of the day, is one of the marked features of his style, which is not infrequently impassioned and eloquent, though at the same time cumbrous, involved and ornate. Botta died at Paris in August 1837, in comparative poverty, but in the enjoyment of an extensive and well-earned reputation.

His son, Paul Emile Botta (1802-1870), was a distinguished traveller and Assyrian archaeologist, whose excavations at Khorsabad (1843) were among the first efforts in the line of investigation afterwards pursued by Layard.

The works of Carlo Botta are Storia naturale e medica dell' Isola di Corfu (1798) ; an Italian translation of Born's Joannis Physiophili specimen monachologiae (1801); Souvenirs d'un voyage en Dalmalie (1802); Storia della guerra dell' Independenza d' America (1809); Camilla, a poem (1815); Storia d'ltalia dal 1789 al 1814 (1824, new ed., Prato, 1862); Storia d'ltalia in continuazione al Guicciardini (1832, new ed., Milan, 1878). See C. Dionisiotti, Vita di Carlo Botta (Turin, 1 867) ; C. Pavesio, Carlo Botta e le sue opere storiche (Florence, 1874); Scipione Botta, Vita privata di Carlo Botta (Florence,

1877); A. d'Ancona e O. Bacci, Manuela della Letteratura Italiana (Florence, 1894), vol. v. pp. 245 eeq.

BOTTESINI, GIOVANNI (1823-1889), Italian contrabassist and musical composer, was born at Crema in Lombardy on the 24th of December 1823. He studied music at the Milan Con- servatoire, devoting himself especially to the double-bass, an instrument with which his name is principally associated. On leaving Milan he spent some time in America and also occupied the position of principal double-bass in the theatre at Havana. Here his first opera, Cristoforo Colombo, was produced in 1847. In 1849 he made his first appearance in England, playing double- bass solos at one of the Musical Union concerts. After this he made frequent visits to England, and his extraordinary command of his unwieldy instrument gained him great popularity in London and the provinces. Apart from his triumphs as an executant, Bottesini was a conductor of European reputation, and earned some success as a composer, though his work had not sufficient individuality to survive the changes of taste and fashion. He was conductor at the Theatre des Italiens in Paris from 1855 to 1857, where his second opera, L'Assedio di Firenze, was produced

in 1856. In 1861 and 1862 he conducted at Palermo, supervising the production of his opera Marion Delorme in 1862, and in 1863 at Barcelona. During these years he diversified the toils of conducting by repeated concert tours through the principal countries of Europe. In 1871 he conducted a season of Italian opera at the Lyceum theatre in London, during which his opera Ali Baba was produced, and at the close of the year he was chosen by Verdi to conduct the first performance of A'ida, which took place at Cairo on 27th December 1871. Bottesini wrote three operas besides those already mentioned: II Diavolo della Notte (Milan, 1859); Vinciguerra (Paris, 1870); and Ero e Leandro (Turin, 1880), the last named to a libretto by Arrigo Boito, which was subsequently set by Mancinelli. He also wrote The Garden of Olivet, a devotional oratorio (libretto by Joseph Bennett), which was produced at the Norwich festival in 1887, a concerto for the double-bass, and numerous songs, and minor instrumental pieces. Bottesini died at Parma on the 7th of July 1889.

BOTTICELLI, SANDRO, properly Alessandro di Mariano dei Filipepi (1444-1510), Florentine painter, was born at Florence in 1444, in a house in the Via Nuova, Borg' Ognissanti. This was the home of his father, Mariano di Vanni dei Filipepi, a struggling tanner. Sandro, the youngest child but one of his parents, derived the name Botticelli, by which he was commonly known, not, as related by Vasari, from a goldsmith to whom he was apprenticed, but from his eldest brother

Giovanni, a pros- perous broker, who seems to have taken charge of the boy, and who for some reason bore the nickname Botticello or Little Barrel. A return made in 1437 by his father describes Sandro as aged thirteen, weak in health, and still at school (if the words sta al legare are to be taken as a misspelling of sta al leggere, otherwise they might perhaps mean that he was apprenticed either to a jeweller or a bookbinder). One of his elder brothers, Antonio, who afterwards became a bookseller, was at this time in business as a goldsmith and gold-leaf-beater, and with him Sandro was very probably first put to work. Having shown an irrepressible bent towards painting, he was apprenticed in 1458-1459 to Fra Filippo Lippi, in whose workshop he remained as an assistant apparently until 1467, when the master went to carry out a commission for the decoration with frescoes of the cathedral church of Spoleto. During his apprentice years Sandro was no doubt employed with other pupils upon the great series of frescoes in the choir of the Pieve at Prato upon which his master was for long intermittently engaged. The later among these frescoes in many respects anticipate, by charm of sentiment, animation of movement and rhythmic flutter of draperies, some of the prevailing characteristics of Sandro's own style. One of Sandro's earliest extant pictures, the oblong " Adoration of the Magi " at the National Gallery, London (No. 592, long ascribed in error to Filippino), shows him almost entirely under the influence of his first master. Left in Florence on Fra Filippo's departure to Spoleto, he can be traced gradually developing his individuality under various influences, among which that of the realistic school of the Pollaiuoii is for some time the strongest. From that school he acquired a knowledge of bodily structure and movement, and a searching and ex- pressive precision of linear draughtsmanship, which he could never have learnt from his first master. The Pollaiuolo influence dominates, with some slight admixture of that of Verrocchio, in the fine figure of Fortitude, now in the Uffizi, which was painted by Botticelli for the Mercanzia about 1470; this is one of a series of the seven Virtues, of which the other six, it seems, were executed by Piero Pollaiuolo from the designs of his brother Antonio. The same influence is again very manifest in the two brilliant little pictures at the Uffizi in which the youthful Botticelli has illustrated the story of Judith and Holof ernes; in his injured portrait of a man holding a medal of Cosimo de' Medici, No. 1 286 at the Uffizi; and in his life-sized " St Sebastian " at Berlin, which we know to have been painted for the church of Sta Maria Maggiore in 1473. Tradition and internal evidence seem also to point to Botticelli's having occasionally helped, in his earliest or Pollaiuolo period, to furnish designs to the

school of engravings in Florence which had been founded by the goldsmith Maso Finiguerra.

Some authorities hold that he must have attended for a while the much-frequented workshop of Verrocchio. But the ” Forti- tude ” is the only authenticated early picture in which the Verrocchio influence is really much apparent; the various other pictures on which this opinion is founded, chiefly Madonnas dispersed among the museums of Naples, Florence, Paris and elsewhere, have been shown to be in all probability the work not of Sandro himself, but of an anonymous artist, influenced partly by him and partly by Verrocchio, whose individuality it has been endeavoured to reconstruct under the provisional name of Amico di Sandro. At the same time we know that the young Botticelli stood in friendly relations with some of the pupils in Verrocchio’s workshop, particularly with Leonardo da Vinci. Among the many ” Madonnas ” which bear Botticelli’s name in galleries public and private, the earliest which carries the unmistakable stamp of his own hand and invention is that which passed from the Chigi collection at Rome to that of Mrs Gardner at Boston. At the beginning of 1474 he entered into an agreement to work at Pisa, both in the Campo Santo and in the chapel of the Incoronata in the Duomo, but after spending some months in that city abandoned the task, we know not why. Next in the order of his preserved works comes probably the much-injured round of the ” Adoration of the Magi ” in the National Gallery (No. 1033) , long ascribed in error, like the earlier oblong panel of the same subject, to Filippino Lippi. (To about this date is assigned by some the well-known ” Assumption of the Virgin surrounded with the heavenly hierarchies,” formerly at Hamilton Palace and now in the National- Gallery [No. n 26]; but recent criticism has proved that the tradition is mistaken which since Vasari’s time has ascribed this picture to Botticelli, and that it is in reality the work of a subordinate painter somewhat similarly named, Francesco Botticini.)

A more mature and more celebrated ” Adoration of the Magi ” than either of those in the National Gallery is that now in the Uffizi, which Botticelli painted for Giovanni Lami, probably in 1477, and which was originally placed over an altar against the front wall of the church of Sta Maria Novella to the right inside the main entrance. The scene is here less crowded than in some other of the master’s representations of the subject, the concep- tion entirely sane and masculine, with none

of those elements of bizarre fantasy and over-strained sentiment to which he was sometimes addicted and which his imitators so much exaggerated ; the execution vigorous and masterly. The picture has, moreover, special interest as containing lifelike portraits of some of the chief members of the Medici family. Like other leading artists of his time in Florence, Botticelli had already begun to profit by the patronage of this family. For the house of Lorenzo II Magnifico in the Via Larga he painted a decorative piece of Pallas with lance and shield (not to be confounded with the banner painted with a similar allegoric device of Pallas by Verrocchio, to be carried by Giuliano de'Medici in the famous tournament in 1475 in which he wore the favour qf La Bella Simonetta, the wife of his friend Marco Vespucci). This Pallas by Botticelli is now lost, as are several other decorative works in fresco and panel recorded to have been done by him for Lorenzo II Magnifico between 1475 andLorenzo'sdeathini492. ButSandro's more especial patron, for whom were executed several of his most important still extant works, was another Lorenzo, the son of Pierfrancesco de' Medici, grandson of a natural brother of Cosimo Pater Patriae, and inheritor of a vast share of the family estates and interests. For the villa of this younger Lorenzo at Castello Botticelli painted about 1477-1478 the famous picture of " Primavera " or Spring now in the Academy at Florence. The design, inspired by Poliziano's poem the " Giostra," with reminiscences of Lucretius and of Horace (perhaps also, as has lately been suggested, of the late Latin " Mythologikon " of Fulgentius) thrown in, is of an enchanting fantasy, and breathes the finest and most essential spirit of the early Renaissance at Florence. Venus fancifully draped, with Cupid hovering above her, stands in a grove of orange and myrtle and welcomes the approach of Spring, who

enters heralded by Mercury, with Flora and Zephyrus gently urging her on. In pictures like this and in the later " Birth of Venus," the Florentine genius, brooding with passion on the little that it really yet knew of the antique, and using frankly and freshly the much that it was daily learning of the truths of bodily structure and action, creates a style wholly new, in which something of the strained and pining mysticism of the middle ages is intimately and exquisitely blended with the newly awakened spirit of naturalism and the revived pagan delight in bodily form and movement and richness of linear rhythm. In connexion with this and other classic and allegoric pictures by the master, much romantic speculation has been idly spent on the supposition that the chief personages were figured in the likeness of Giuliano de' Medici and Simonetta Vespucci. Simonetta in point of fact died in 1476, Giuliano was murdered in 1478; the web of

romance which has been spun about their names in modern days is quite unsubstantial; and there is no reason whatever why Botticelli should have introduced the likenesses of these two supposed lovers (for it is not even certain that they were lovers at all) in pictures all of which were demonstrably painted after the death of one and most of them after the death of both.

The tragedy of Giuliano ‘s assassination by the Pazzi con- spirators in 1478 was a public event which certainly brought employment to Botticelli. After the capture and execution of the criminals he was commissioned to paint their effigies hanging by the neck on the walls of the Palazzo del Podesta, above the entrance of what was formerly the Dogana. In the course of Florentine history public buildings had on several previous occasions received a similar grim decoration: the last had been when Andrea del Castagno painted in 1434 the effigies, hanging by the heels, of the chief citizens outlawed and expelled on the return of Cosimo de’Medici. Perhaps from the time of this Pazzi commission may be dated the evidences which are found in some of Botticelli’s work of a closer study than heretofore of the virile methods and energetic types of Castagno. His frescoes of the hanged conspirators held their place for sixteen years only, and were destroyed in 1494 in consequence of another revolution in the city’s politics. Two years later (1480) he painted in rivalry with Ghirlandaio a grand figure of St Augustine on the choir screen of the Ognissanti; now removed to another part of the church. About the same time we find clear evidence of his contributing designs to the workshops of the ” fine-manner ” engravers in the shape of a beautiful print of the triumph of Bacchus and Ariadne adapted from an antique sarcophagus (the only example known is in the British Museum), as well as in nineteen small cuts executed for the edition of Dante with the commentary of Landino printed at Florence in 1481 by Lorenzo della Magna. This series of prints was discontinued after canto xix., perhaps because of the material difficulties involved by the use of line engravings for the decoration of a printed page, perhaps because the artist was at this time called away to Rome to undertake the most important commission of his life. Due possibly to the same call is the unfinished condition of a much- damaged, crowded ” Adoration of the Magi ” by Botticelli preserved in the Uffizi, the design of which seems to have influenced Leonardo da Vinci in his own Adoration (which in like manner remains unfinished) of nearly the same date, also at the Uffizi.

The task with which Botticelli was charged at Rome was to take part with other leading artists of the time (Ghirlandaio, Cosimo Rosselli, Perugino and Pinturicchio) in the decoration of Sixtus IV.‘s chapel at

the Vatican, the ceiling of which was afterwards destined to be the field of Michelangelo's noblest labours. Internal evidence shows that Sandro and his assistants bore a chief share in the series of papal portraits which decorate the niches between the windows. His share in the decoration of the walls with subjects from the Old and the New Testament consists of three frescoes, one illustrating the history of Moses (several episodes of his early life arranged in a single composition) ; another the destruction of Korah, Dathan and Abiram; a third the temptation of Christ by Satan (in this case the main theme is relegated to the background, while the foreground is filled with an

animated scene representing the ritual for the purification of a leper). On these three frescoes Botticelli laboured for about a year and a half at the height of his powers, and they may be taken as the central and most important productions of his career, though they are far from being the best-known, and from their situation on the dimmed and stained walls of the chapel are by no means easy of inspection. Skill in the interlinking of complicated groups; in the principal actors energy of dramatic action and expression not yet overstrained, as it came to be in the artist's later work; an incisive vigour of portraiture in the personages of the male bystanders; in the faces and figures of the women an equally vital grasp of the model, combined with that peculiar strain of haunting and melancholy grace which is this artist's own; the most expressive care and skill in linear draughtsman- ship, the richest and most inventive charm in fanciful costume and decorative colouring, all combine to distinguish them. During this time of his stay in Rome (1481-1482) Botticelli is recorded also to have painted another " Adoration of the Magi," his fifth or sixth embodiment of the same subject; this has been identified, no doubt rightly, with a picture now in the Hermitage gallery at St Petersburg.

Returning to Florence towards the end of 1482, Botticelli worked there for the next ten years, until the death of Lorenzo II Magnifico in 1492, with but slight variations in manner and senti- ment, in the now formed manner of his middle life. Some of the recorded works of this time have perished; but a good many have been preserved, and except in the few cases where the dates of commission and payment can be established by existing records, their sequence can only be conjectured from internal evidence. A scheme of work which he was to have undertaken with other artists in the Sala dei Gigli in the Palazzo Pubblico came to nothing (1483); a set of important mythologic

frescoes carried out by him in the vestibule of a villa of Lorenzo II Magnifico at Spedaletto near Volterra in 1484 has been destroyed by the effects first of damp and then of fire. To 1482-1483 belongs the fine altar-piece of San Barnabo (a Madonna and Child with six saints and four angels), now in the academy at Florence. Very nearly of the same time must be the most popular and most often copied, though very far from the best-preserved, of his works, the round picture of the Madonna with singing angels in the Uffizi, known, from the text written in the open choir- book, as the ” Magnificat.” Somewhere near this must be placed the beautiful and highly finished drawing of ” Abundance,” which has passed through the Rogers, Morris Moore and Malcolm collections into the British Museum, as well as a small Madonna in the Poldi-Pezzoli collection at Milan, and the fine full-faced portrait of a young man, probably some pupil or apprentice in the studio, at the National Gallery (No. 626). For the marriage of Antonio Pucci to Lucrezia Dini in 1483 Botticelli designed, and his pupils or assistants carried out, the interesting and dramatic set of four panels illustrating Boccaccio’s tale of Nastagio degl’ Onesti, which were formerly in the collection of Mr Barker and are now dispersed. His magnificent and perfectly preserved altar-piece of the Madonna between the twosaints John, now in the Berlin gallery, was painted for the Bardi chapel in the church of San Spirito in i486. In the same year he helped to celebrate the marriage of Lorenzo Tornabuoni with Giovanna degli Albizzi by an exquisite pair of symbolical frescoes, the remains of which, after they had been brought to light from under a coat of whitewash on the walls of the Villa Lemmi, were removed in 1882 to the Louvre. Within a few years of the same ‘ date (1485-1488) should apparently be placed that second masterpiece of fanciful classicism done for Lorenzo di Pier- francesco’s villa at Castello, the ” Birth of Venus,” now in the Uffizi, the design of which seems to have been chiefly inspired by the ” Stanze ” of Poliziano, perhaps also by the Pervigilium Veneris; together with the scarcely less admirable ” Mars and Venus ” of the National Gallery, conceived in the master’s peculiar vein of virile sanity mingled with exquisite caprice; and the most beautiful and characteristic of all his Madonnas, the round of the ” Virgin with the Pomegranate ” (Uffizi). The fine picture of ” Pallas and the Centaur,” rediscovered after an

occupation of many years in the private apartments of the Pitti Palace, would seem to belong to about 1488, and to celebrate the security of Florentine affairs and the quelling of the spirit of tumult in the last years of the power of the great Lorenzo (1488- 1490). ” The Annunciation ” from the convent of Cestello, now in the Uffizi, shows a design adapted from Donatello, and ex- pressive, in its bending

movements and vehement gestures, of that agitation of spirit the signs of which become increasingly perceptible in Botticelli's work from about this time until the end. The great altar-piece at San Marco with its predelle, com- missioned by the Arte della Seta in 1488 and finished in 1490, with the incomparable ring of dancing and quiring angels encircling the crowned Virgin in the upper sky, is the last of Botticelli's altar-pieces on a great scale. To nearly the same date probably belongs his deeply felt and beautifully preserved small painting of the " Last Communion of St Jerome " belonging to the Marchese Farinola.

In 1490 Botticelli was called to take part with other artists in a consultation as to the completion of the facade of the Duomo, and to bear a share with Alessio Baldovinetti and others in the mosaic decorations of the chapel of San Zenobio in the same church. The death of Lorenzo II Magnifico in 1492, and the accession to chief power of his worthless son Piero, soon plunged Florence into political troubles, to which were by and by added the profound spiritual agitation consequent upon the preaching and influence of Savonarola. Lorenzo di Pierfrancesco de' Medici, who with his brother Giovanni was in a position of political rivalry against their cousin Piero, continued his patron- age of Botticelli; and it was for him, apparently chiefly between the years 1492 and 1495, that the master undertook to execute a set of drawings in illustration of Dante on a far more elaborate and ambitious plan than the little designs for the engraver which had been interrupted in 1481. Eighty-five of these draw- ings are in the famous manuscript acquired for the Berlin museum at the sale of the Hamilton Palace collection in 1882, and eleven more in the Vatican library at Rome. The series is one of the most interesting that has been preserved by any ancient master; revealing an intimate knowledge of and profound sympathy with the text; full of Botticelli's characteristic poetic yearning and vehemence of expression, his half-childish intensity of vision; exquisite in lightness of touch and in swaying, rhythmical grace of linear composition and design. These gifts were less suited on the whole to the illustration of the Hell than of the later parts of the poem, and in the fiercer episodes there is often some puerility and inadequacy of invention. Throughout the Hell and Purgatory Botticelli maintains a careful adherence to the text, illustrating the several progressive incidents of each canto on a single page in the old-fashioned way. In the Paradise he gives a freer rein to his invention, and his designs become less a literal illustration of the text than an imaginative commentary on it. Almost all interest is centred on the persons of Dante and Beatrice, who are shown us again and again in various phases of ascending progress and rapt

contemplation, often with little more than a bare sym- bolical suggestion of the beatific visions presented to them. Most of the drawings remain in pen outline only over a light preliminary sketch with the lead stylus; all were probably intended to be finished in colour, as a few actually are. To the period of these drawings (1492-1497) would seem to belong the fine and finely preserved small round of the ” Virgin and Child with Angels ” at the Ambrosiana, Milan, and the famous ” Calumny of Apelles ” at the Uffizi, inspired no doubt by some contemporary translation of the text by Lucian, and equally remarkable by a certain feverish energy in its sentiment and composition, and by its exquisite finish and richness of execution and detail. Probably the small ” St Augustine ” in the Uffizi, the injured ” Judith with the head of Holofernes ” in the Kauf- mann collection at Berlin, and the ” Virgin and Child with St John,” belonging to Mr Heseltine in London, are works of the same period.

Simone di Mariano, a brother of Botticelli long resident at Naples, returned to Florence in 1493 an< i shared Sandro's home in the Via Nuova. He soon became a devoted follower of

Savonarola, and has left a manuscript chronicle which is one of the best sources for the history of the friar and of his movement. Sandro himself seems to have remained aloof from the movement almost until the date of the execution of Savonarola and his two followers in 1498. At least there is clear evidence of his being in the confidence and employ of Lorenzo di Pierfrancesco so late as 1496 and 1497, which he could not possibly have been ■ had he then been an avowed member of the party of the Piagnoni. It was probably the enforced departure of Lorenzo from Florence in 1497 that brought to a premature end the master’s great undertaking on the illustration of Dante. After Lorenzo’s return, following on the overthrow and death of Savonarola in 1498, we find no trace of any further relations between him and Botticelli, who by that time would seem to have become a declared devotee of the friar’s memory and an adherent, like his brother, of the defeated side. During these years of swift political and spiritual revolution in Florence, documents give some glimpses of him: in 1497 as painting in the monastery of Monticelli a fresco of St Francis which has perished; in the winter of the same year as bound over to keep the peace with, a neighbour living next to the small suburban villa which Sandro held jointly with his brother Simone in the parish of San Sepolcro; in 1499 as paying belated matriculation

fees to the gild of doctors and druggists (of which the painters were a branch); and again in 1499 as carrying out some decorative paintings for a member of the Vespucci family. It has been suggested, probably with reason, that portions of these decorations are to be recognized in two panels of dramatic scenes from Roman history, one illustrat- ing the story of Virginia, which has passed with the collection of Senatore Morelli into the gallery at Bergamo, the other a history of Lucretia formerly belonging to Lord Ashburnham, which passed into Mrs Gardner's collection at Boston. These and the few works still remaining to be mentioned are all strongly marked by the strained vehemence of design and feeling char- acteristic of the master's later years, when he dramatizes his own high-strung emotions in figures flung forward and swaying out of all balance in the vehemence of action, with looks cast agonizingly earthward or heavenward, and gestures of wild yearning or appeal. These characters prevail still more in a small Pieta at the Poldi-Pezzoli gallery, probably a contemporary copy of one which the master is recorded to have painted for the Panciatichi chapel in the church of Sta Maria Maggiore; they are present to a degree even of caricature in the larger and coarser painting of the same subject which bears the master's name in the Munich gallery, but is probably only a work of his school. The mystic vein of religious and political speculation into which Botticelli had by this time fallen has its finest illustra- tion in the beautiful symbolic " Nativity " which passed in succession from the Aldobrandini, the Ottley, and the Fuller Maitland collections into the National Gallery in 1882, with the apocalyptic inscription in Greek which the master has added to make his meaning clear (No. 1034). In a kindred vein is a much-injured symbolic " Magdalene at the foot of the Cross " in private possession at Lyons. Among extant pictures those which from internal evidence we must put latest in the master's career are three panels illustrating the story of St Zenobius, of which one is at Dresden and the other two in the collection of Dr Mond in London. The documentary notices of him after 1500 are few. In 1502 he is mentioned in the correspondence of Isabella d'Este, marchioness of Gonzaga, and in a poem by Ugolino Verino. In 1 503-1 504 he served on the committee of artists appointed to decide where the colossal David of Michel- angelo should be placed. In these and the following years we find him paying fees to the company of St Luke, and the next thing recorded of him is his death, followed by his burial in the Ortaccio or garden burial-ground of the Ognissanti, in May

1510-

The strong vein of poetical fantasy and mystical imagination in Botticelli, to which many of his paintings testify, and the capacity for

religious conviction and emotional conversion which made of him an ardent, if belated, disciple of Savonarola, coexisted in him, according to all records, with a strong vein

of the laughing humour and love of rough practical and verbal jesting which belonged to the Florentine character in his age. His studio in the Via Nuova is said to have been the resort, not only of pupils and assistants, of whom a number seem to have been at all times working for him, but of a company of more or less idle gossips with brains full of rumour and tongues always wagging. Vasari's account of the straits into which he was led by his absorption in the study of Dante and his ad- hesion to the sect of Savonarola are evidently much exaggerated, since there is proof that he lived and died, not rich indeed, but possessed of property enough to keep him from any real pinch of distress. The story of his work and life, after having been the subject in recent years of much half-informed study and speculation, has at length been fully elucidated in the work of Mr H. P. Home cited below, — a masterpiece of documentary research and critical exposition.

Bibliography. — Vasari, Le Opere (ed. Milanesi), vol. iii. ; Crowe-Cavalcaselle, Hist, of Painting in Italy, vol. ii. ; Fr. Lippmann, Botticellis Zeichnungen zu Dantes Gbttlicher Kombdie; Dr Karl Woermann, " Sandro Botticelli " (in Dohme, Kunst u. Kiinstler) ; Dr Hermann Ulmann, Sandro Botticelli; Dr E. Steinmann, Sandro Botticelli (in Knackfuss series, valuable for the author's elucidation of the Sixtine frescoes) ; I. B. Supino, Sandro Botticelli; Bernhard Berenson, The Drawings of Florentine Painters; The Florentine Painters of the Renaissance (2nd ed.) ; The Study and Criticism of Italian Art; papers in the Burlington Magazine, the Gazette des Beaux-Arts (to this critic is due the first systematic attempt to dis- criminate between the original work of Botticelli and that of his various pupils); J. Mesnil, Miscellanea d'Arte and papers in the Rivista d'Arte, &c. ; W. Warburg, Sandro Botticelli's " Geburt der Venus " and " Friihling " ; Julia Cartwright (Mrs Ady), The Life and Art of Sandro Botticelli (1904); F. Wickhoff in the Jahrbuch der k. Preussischen Kunstsammlungen (1906); Herbert P. Home, Alessandro Filipepi commonly called Sandro Botticelli (1908); this last authority practically supersedes all others. (S. C.)

BOTTIGER, KARL AUGUST (1760-1835), German archaeo- logist, was born at Reichenbach on the 8th of June 1760. He was educated at the school of Pforta, and the university of Leipzig. After holding minor educational posts, he obtained in 1791, through the influence of Herder, the appointment of rector of the gymnasium at Weimar,

where he entered into a circle of literary men, including Wieland, Schiller, and Goethe. He published in 1803 a learned work, Sabina, oder Morgenszenen im Putzzimmer einer reichen Romerin, a description of a wealthy Roman lady's toilette, and a work on ancient art, Griechische Vasengemdlde. At the same time he assisted in editing the Journal des Luxus und der Moden, the Deutsche Merkur, and the London and Paris. In 1804 he was called to Dresden as super-intendent of the studies of the court pages, and received the rank of privy councillor. In 18 14 he was made director of studies at the court academy, and inspector of the Museum of Antiquities. He died at Dresden on the 17th of November 1835. His chief works are: — Ideen zur Archdologie der Malerei, i. (1811) (no more published); Kunstmythologie (1811); Vorlesungen und Aufsalze zur Alterthumskunde (1817); Amalthed (1821-1825); Ideen zur Kunstmythologie (1826-1836). The Opuscula et Carmina Latina were published separately in 1837; "with a collection of his smaller pieces, Kleine Schriften (1837-1838), including a complete list of his works (56 pages). His biography was written by his son Karl Wilhelm Bottiger (1790-1862), for some time professor of history at Erlangen, and author of several valuable histories (History of Germany, History of Saxony, History of Bavaria, Universal History of Biographies).

BOTTLE (Fr. bouteille, from a diminutive of the Lat. butta, a flask; cf. Eng. " butt "), a vessel for containing liquids, gener- ally as opposed to one for drinking from (though this probably is not excluded), and with a narrow neck to facilitate closing and pouring. The first bottles were probably made of the skins of animals. In the Iliad (iii. 247) the attendants are represented as bearing wine for use in a bottle made of goat's skin. The ancient Egyptians used skins for this purpose, and from the language employed by Herodotus (ii. 1 2 1) , it appears that a bottle was formed by sewing up the skin and leaving the projection of the leg and foot to serve as a vent, which was hence termed irode&v. The aperture was closed with a plug or a string Skin

Roman Skin Bottles, from specimens at Pompeii and Herculaneum.

bottles of various forms occur on Egyptian monuments. The Greeks and Romans also were accustomed to use bottles made of skins; and in the southern parts Europe they are still used for the transport of wine. The first of explicit reference to bottles of skin in Scripture occurs in Joshua (ix. 4), where it is said that

the Gibeonites took ” old sacks upon their asses, and wine-bottles old and rent and bound up.” The objection to putting ” new wine into old bottles ” (Matt. ix. 17) is that the skin, already stretched and weakened by use, is liable to burst under the pressure of the gas from new wine. Skins are still most extensively used throughout western Asia for the conveyance and storage of water. It is an error to represent the bottles of the ancient Hebrews as being made exclusively of skins. In Jer. xix. 1 the prophet speaks of ” a potter’s earthen vessel.” The Egyptians (see Egypt: Art and Archaeology) possessed vases and bottles of hard stone, alabaster, glass, ivory, bone, porcelain, bronze, silver and gold, and also of glazed pottery or common earthenware. In modern times bottles are usually made of glass (q.v.), or occasionally of earthenware. The glass bottle industry has attained enormous dimensions, whether for wine, beer, &c, or mineral waters; and labour-saving machinery for filling the bottles has been introduced, as well as for corking or stopper- ing, for labelling and for washing them.

BOTTLE-BRUSH PLANTS, a genus of Australian plants, known botanically as Callistemon, and belongiug to the myrtle family (Myrtaceae) . They take their name from the resemblance of the head of flowers to a bottle-brush. They are well known in cultivation as greenhouse shrubs; the flower owes its beauty to the numerous long thread-like stamens which far exceed the small petals. Callistemon salignus is a valuable hard wood.

BOTTLENOSE WHALE (Hyperoodon rostratus), a member of the sperm-whale family, which is an inhabitant of the North Atlantic, passing the summer in the Spitzbergen seas and going farther south in winter. It resembles the sperm-whale in possessing a large store of oil in the upper part of the head, which yields spermaceti when refined; on this account, and also for the sake of the blubber, which supplies an oil almost in- distinguishable from sperm-oil, this whale became the object of a regular chase in the latter half of the 19th century. In length these whales vary between 20 ft. and 30 ft. ; and in colour from black on the upper surface in the young to light brown in old animals, the under-parts being greyish white. There is no notch between the flukes, as in other whales, but the hinder part of the tail is rounded. Bottlenoses feed on cuttle-fishes and squills, and are practically toothless; the only teeth which exist in the adult being a small pair at the front of the lower jaw, concealed beneath the gum during life. Examples have frequently been recorded on the British coasts. In November 1904 a female, 24 ft. long, and a calf 1 5 ft. long were driven ashore at Whitstable. (See Cetacea.)

BOTTOMRY, a maritime contract by which a ship (or bottom) is hypothecated in security for money borrowed for expenses incurred in the course of her voyage, under the condition that if she arrive at her destination the ship shall be liable for repayment of the loan, together with such premium thereon as may have been agreed for; but that if the ship be lost, the lender shall have no claim against the borrower either for the sum advanced or for the premium. The freight may be pledged as well as the ship, and, if necessary, the cargo also. In some cases the personal obligation of the shipmaster is also included. When money is borrowed on the security of the cargo alone, it is said to be taken up at respondentia; but it is now only in rare and exceptional

cases that it could be competent to the shipmaster to pledge the cargo, except under a general bottomry obligation, along with the ship and freight. In consideration of the risks assumed by the lender, the bottomry premium (sometimes termed maritime interest) is usually high, varying of course with the nature of the risk and the difficulty of procuring funds.

A bottomry contract may be written out in any form which sufficiently shows the conditions agreed on between the parties; but it is usually drawn up in the form of a bond which confers a maritime lien (q.v.). The document must show, either by express terms or from its general tenor, that the risk of loss is assumed by the lender, — this being the consideration for which the high premium is conceded. The lender may transfer the bond by indorsation, in the same manner as a bill of exchange or bill of lading, and the right to recover its value becomes vested in the indorsees. (See Bond.)

According to the law of England, a bottomry contract remains in force so long as the ship exists in the form of a ship, whatever amount of damage she may have sustained. Consequently, the ” constructive total loss ” which is recognized in marine insurance, when the ship is damaged to such an extent that she is not worth repairing, is not recognized in reference to bottomry, and will not absolve the borrower from his obligation. But if the ship go to pieces, the borrower is freed from all liability under the bottomry contract; and the lender is not entitled to receive any share of the proceeds of such of the ship’s stores or materials as may have been saved from the wreck. Money advanced on bottomry is not liable in England for general average losses. If the ship should deviate from the voyage for which the funds were advanced, her subsequent loss will not discharge the obligation of the borrower under the bottomry contract. If she should not proceed at all on her intended voyage, the lender is not entitled to recover the bottomry premium in addition to his

advance, but only the ordinary rate of interest for the temporary loan. As the bottomry premium is presumed, in every case, to cover the risks incurred by the lender, he is not entitled to charge the borrower with the premium which he may pay for insurance of the sum advanced, in addition to that stipulated in the bond.

The contract of bottomry seems to have arisen from the custom of permitting the master of a ship, when in a foreign country, to pledge the ship in order to raise money for repairs, or other extraordinary expenditures rendered necessary in the course of the voyage. Circumstances often arise, in which, without the exercise of this power on the part of the master, it would be impossible to provide means for accomplishing the voyage; and it is better that the master should have authority to burden the ship, and, if necessary, the freight and cargo also, in security for the money which has become requisite, than that the adventure should be defeated by inability to proceed. But the right of the master to pledge the ship or goods must always be created by necessity; if exercised without necessity the contract will be void. Accordingly, the master of a British ship has no power to grant a bottomry bond at a British port, or at any foreign port where he might raise funds on the personal credit of the shipowners. Neither has he any power to pledge the ship or goods for private debts of his own, but only for such supplies as are indispensable for the purposes of the voyage. And in all cases he ought, if possible, to communicate with the owners of the ship, and with the proprietor of the cargo before pledging their property (" The Bonaparte," 1853, 8 Moo. P.C. 473; "The Staffordshire," 1872, L.R. 4 P.C. 194). Increased facility of communication, by telegraph and otherwise, has given additional stringency to this rule, and caused a decline in the practice of giving bottomry bonds.

The bottomry lender must use reasonable diligence to ascertain that a real necessity exists for the loan; but he is not bound to see to the application of the money advanced. If the lender has originally advanced the funds on the personal credit of the owner he is not entitled to require a bottomry obligation. A bond procured from the shipmaster by improper compulsion would be void.

ii

The power of the master to pledge the cargo depends upon there being

some reasonable prospect of benefit to it by his so doing. He has no such power except in virtue of circumstances which may oblige him to assume the character of agent for the cargo, in the absence of any other party authorized to act on its behalf. Under ordinary circumstances he is not at liberty to pledge the cargo for repairs to the ship. If indeed the goods be of a perishable nature, and if it be impossible to get the ship repaired in sufficient time to obviate serious loss on them by delay, without including them under the bottomry contract, he has power to do so, because it may fairly be assumed, in the case supposed, that the cargo will be benefited by this procedure. The general principle is, that the master must act for the cargo, with a reasonable view to the interests of its proprietors, under the whole circumstances of the case. When he does this his proceedings will be sustained; but should he manifestly pre- judice the interests of the cargo by including it under bottomry for the mere purpose of relieving the ship, or of earning the freight, the owners of the cargo will not be bound by the bottomry contract. Any bottomry or respondentia bond may be good in part or bad in part, according as the master may have acted within or beyond the scope of his legitimate authority in granting it. If two or more bottomry bonds have been granted at different stages of the voyage, and the value of the property be insufficient to discharge them all, the last-dated bond has the priority of payment, as having furnished the means of preserving the ship, and thereby preventing the total loss of the security for the previous bonds.

When the sum due under a bottomry bond over ship, freight and cargo is not paid at the stipulated time, proceedings may be taken by the bondholder for recovery of the freight and for the sale of the ship; and should the proceeds of these be insufficient to discharge the claim, a judicial sale of the cargo may be re- sorted to. As a general rule the value of the ship and freight must be exhausted before recourse can be taken against the cargo. A bottomry bond gives no remedy to the lenders against the. owners of the ship or cargo personally. The whole liability under it may be met by the surrender of the property pledged, whether the value so surrendered covers the amount of the bond or not. But the owners of the ship, though not liable to the bondholder for more than the value of the ship and freight, may be further liable to the proprietors of the cargo for any sum in excess of the cargo’s proper share of the expenses, taken by the bondholder out of the proceeds of the cargo to satisfy the bond after the ship and freight have been exhausted.

The bottomry premium must be ultimately paid by the parties for whose benefit the advances were obtained, as ascertained on the final

adjustment of the average expenditures at the port of destination.

The practice of pledging property subject to maritime risks was common among the ancient Greeks, being known as indoins or bavtiov (see Demosthenes' speeches Pro Phormione, Contra Lacritum and In Dionysodorum) ; it passed into Roman law as foenus nauticum or usura maritima.

See also LlteN: Maritime; and generally Abbott on Shipping (14th ed., 1901).

BOTZARIS [Bozzaris], MARCO (c. 1788-1823), leader in the War of Greek Independence, born at Suli in Albania, was the second son of Kitzo Botzaris, murdered at Arta in 1809 by order of Ali of Iannina. In 1803, after the capture of Suli by AH Pasha, Marco, with the remnant of the Suliots, crossed over to the Ionian Islands, where he ultimately took service in an Albanian regiment in French pay. In 1814 he joined the Greek patriotic society known as the Hetairia Philike, and in 1820, with other Suliots, made common cause with Ali of Iannina against the Ottomans. On the outbreak of the Greek revolt, he distinguished himself by his courage, tenacity and skill as a partisan leader in the fighting in western Hellas, and was con- spicuous in the defence of Missolonghi during the first siege (1822-1823). On the night of the 21st of August 1823 he led the celebrated attack at Karpenisi of 3 50 Suliots on 4000 Albanians who formed the vanguard of the army with which Mustai Pasha was advancing to reinforce the besiegers. The rout of the Turks

was complete; but Botzaris himself fell. His memory is still celebrated in popular ballads in Greece. Marco Botzaris's brother Kosta (Constantine), who fought at Karpenisi and completed the victory, lived to become a general and senator in the Greek kingdom. He died at Athens on the 13th of November 1853. Marco's son, Dimitri Botzaris, born in 1813, was three times minister of war under the kings Otho and George. He died at Athens on the 17th of August 1870.

BOTZEN, or Bozen (Ital. Bolzano), a town in the Austrian province of Tirol, situated at the confluence of the Talfer with the Eisak, and a short way above the junction of the latter with the Adige or Etsch. It is built at a height of 869 ft., and is a station on the Brenner railway, being 58 m. S. of that pass and 35 m. N. of Trent. In 1900 it had a population of 13,632, Romanist and mainly German-speaking, though the Italian ele- ment is said to be increasing. Botzen is a Teutonic town amid Italian surroundings. It is well built, and boasts of a fine old

Gothic parish church, dating from the 14th and 15th centuries, opposite which a statue was erected in 1889 to the memory of the famous Minnesanger, Walther von der Vogelweide, who, according to some accounts, was born (c. n 70) at a farm above Waidbruck, to the north of Botzen. Botzen is the busiest commercial town in the German-speaking portion of Tirol, being admirably situated at the junction of the Brenner route from Germany to Italy with that from Switzerland down the Upper Adige valley or the Vintschgau. Hence the transit trade has always been very considerable (it has four large fairs annually), while the local wine is mentioned as early as the 7th century. Lately its prosperity has been increased by the rise into favour as a winter resort of the village of Gries, on the other bank of the Talfer, and now practically a suburb of Botzen.

The pons Drusi (probably over the Adige, just below Botzen) is mentioned in the 4th century by the Pcutinger Table. In the 7th to 8th centuries Botzen was held by a dynasty of Bavarian counts. But in 1027, with the rest of the diocese of Trent, it was given by the emperor Conrad II. to the bishop of Trent. From 1028 onwards it was ruled by local counts, the vassals of the bishops, but after Tirol fell into the hands of the Habsburgers (1363) their power grew at the expense of that of the bishops. In 1381 Leopold granted to the citizens the privilege of having a town council, while in 1462 the bishops resigned all rights of jurisdiction over the town to the Habsburgers, so that its later history is merged in that of Tirol. (W. A. B. C.)

BOUCHARDON, EDME (1698-1762), French sculptor, was esteemed in his day the greatest sculptor of his time. Born at Chaumont, he became the pupil of Guillaume Coustou and gained the prix de Rome in 1722. Resisting the tendency of the day he was classic in his taste, pure and chaste, always correct, charming and distinguished, a great stickler for all the finish that sand-paper could give. During the ten years he remained at Rome, Bouchardon made a striking bust of Pope Benedict XIII. (1730). In 1746 he produced his first acclaimed master-piece, ” Cupid fashioning a Bow out of the Club of Hercules,” perfect in it’s grace, but cold in the purity of its classic design. His two other leading chefs-d’oeuvre are the fountain in the rue de Grenelle, Paris, the first portions of which had been finished and exhibited in 1740, and the equestrian statue of Louis XV., a commission from the city of Paris. This superb work, which, when the model was produced, was declared the finest work of its’ kind ever produced in France, Bouchardon did not live to finish, but left its completion to Pigalie. It was destroyed during the Revolution.

Among the chief books on the sculptor and his art are Vie d’Edme

Bouchardon, by le comte de Caylus (Paris, 1762); Notice sur Edme Bouchardon, sculpteur, by E. Jolibois (Versailles, 1837); Notice historique sur Edme Bouchardon, by J. Carnandet (Paris, 1855); and French Architects and Sculptors of the 18th Century, by Lady Dilke (London, 1900).

BOUCHER, FRANCOIS (1703-1770), French painter, was born in Paris, and at first was employed by Jean Francois Cars (1670- 1739), the engraver, father of the engraver Laurent Cars (1699- 1771), to make designs and illustrations for books. In 1727,

however, he went to Italy, and at Rome became well known as a painter. He returned to Paris in 1731 and soon became a favourite in society. His picture ” Rinaldo and Armida ” (1734) is now in the Louvre. He was made inspector of the Gobelins factory in 1755 and court painter in 1765, and was employed by Madame de Pompadour both to paint her portrait and to execute various decorative works. He died in 1770. His Watteau-like style and graceful voluptuousness gave him the title of the Anacreon of painting, but his repute declined until recent years. The Wallace collection, at Hertford House, has some of his finest pictures, outside the Louvre. His etchings were also numerous and masterly.

See Antoine Bret’s notice in the Necrologe des hommes celebres for 1 77 1, and the monographs by the brothers de Goncourt and Paul Mantz.

BOUCHER, JONATHAN (1 738-1804), English divine and philologist, was born in the hamlet of Blencogo, near Wigton, Cumberland, on the 12th of March 1738. He was educated at the Wigton grammar school, and about 1754 went to Virginia, where he became a private tutor in the families of Virginia planters. Among his charges was John Parke Custis, the step-son of George Washington, with whom he began a long and intimate friendship. Returning to England, he was ordained by the bishop of London in March 1762, and at once sailed again for America, where he remained until 1775 as rector of various Virginia and Maryland parishes, including Hanover, King George’s county, Virginia, and St Anne’s at Annapolis, Maryland. He was widely known as an eloquent preacher, and his scholarly attainments won for him the friendship and esteem of some of the ablest scholars in the colonies. During his residence in Maryland he vigorously opposed the

” vestry act,” by which the powers and emoluments of the Maryland pastors were greatly diminished. When the struggle between the colonies and the mother country began, although he felt much sympathy for the former, his opposition to any form of obstruction to the Stamp Act and other measures, and his denunciation of a resort to force created a breach between him and his parish, and in a fiery farewell discourse preached after the opening of hostilities he declared that no power on earth should prevent him from praying and shouting ” God save the King.” In the succeeding autumn he returned to England, where his loyalism was rewarded by a government pension. In 1784 he became vicar of Epsom in Surrey, where he continued until his death on the 27th of April 1804, becoming known as one of the most eloquent preachers of his day. He was an accomplished writer and scholar, contributed largely to William Hutchinson’s History of the County of Cumber- land (2 vols., 1704 seq.), and published A View of the Causes and Consequences of the American Revolution (1797), dedicated to George Washington, and consisting of thirteen discourses delivered in America between 1763 and 1775. His philological studies, to which the last fourteen years of his life were devoted, resulted in the compilation of ” A Glossary of Provincial and Archaic Words,” intended as a supplement to Dr Johnson’s Dictionary, but never published except in part, which finally in 1831 passed into the hands of the English compilers of Webster’s’ Dictionary, by whom it was utilized.

His son, Barton Boucher (1794-1865), rector of Fonthill Bishops, Wiltshire, in 1856, was well known as the author of religious tracts, hymns and novels.

BOUCHER DE CREVEOEUR DE PERTHES, JACQUES (1788-1868), French geologist and antiquary, was born on the 10th of September 1788 at Rethel, Ardennes, France. He was the eldest son of Jules Armand Guillaume Boucher de Crevecceur, botanist and customs officer, and of Etienne- Jeanne-Marie de Perthes (whose surname he was authorized by royal decree in 1818 to assume in addition to his father’s). In 1802 he entered government employ as an officer of customs. His duties kept him for six years in Italy, whence returning (in 181 1) he found rapid promotion at home, and finally was appointed (March 1825) to succeed his father as director of the douane at Abbeville, where he remained for the rest of his life, being superannuated in January 1853, and dying on the 5th of August 1868. His

leisure was chiefly devoted to the study of what was afterwards called the Stone Age, ” antediluvian man,” as he expressed it. About the year

1830 he had found, in the gravels of the Somme valley, flints which in his opinion bore evidence of human handiwork; but not until many years afterwards did he make public the important discovery of a worked flint implement with remains of elephant, rhinoceros, &c, in the gravels of Menchecourt. This was in 1846. A few years later he com- menced the issue of his monumental work, Anliquites celtiques et an fdiluviennes (1847, 1857, 1864; 3 vols.), a work in which he was the first to establish the existence of man in the Pleistocene or early Quaternary period. His views met with little approval, partly because he had previously propounded theories regarding the antiquity of man without facts to support them, partly because the figures in his book were badly executed and they included drawings of flints which showed no clear sign of work- manship. In 1855 Dr Jean Paul Rigollot (1810-1873), of Amiens, strongly advocated the authenticity of the flint implements; but it was not until 1858 that Hugh Falconer (q.v.) saw the collection at Abbeville and induced Prestwich (q.v.) in the following year to visit the locality. Prestwich then definitely agreed that the flint implements were the work of man, and that they occurred in undisturbed ground in association with remains of extinct mammalia. In 1863 his discovery of a human jaw, together with worked flints, in a gravel-pit at Moulin- Quignon near Abbeville seemed to “vindicate Boucher de Perthes entirely; but doubt was thrown on the antiquity of the human remains (owing to the possibility of interment), though not on the good faith of the discoverer, who was the same year made an officer of the Legion of Honour together with Quatrefages his champion. Boucher de Perthes displayed activity in many other directions. For more than thirty years he filled the presidential chair of the Societe d’Emulation at Abbeville, to the publications of which he contributed articles on a wide range of subjects. He was the author of several tragedies, two books of fiction, several works of travel, and a number of books on economic and philanthropic questions. To his scientific books may be added De I’homme antidiluvien et de ses ceuvres (Paris, i860).

See Alcius Ledien, Boucher de Perthes; sa vie, ses ceuvres, sa correspondance (Abbeville, 1885); Lady Prestwich, “Recollections of M. Boucher de Perthes ” (with portrait) in Essays Descriptive and Biographical (1901).

BOUCHES-DU-RHONE, a maritime department of south- eastern France situated at the mouth of the Rhone. Area, 2026 sq. m. Pop. (1906) 765,918. Formed in 1790 from western Provence, it is bounded N. by Vaucluse, from which it is separated by the Durance, E. by Var, W. by Gard, and S. by the Medi- terranean, along which its seaboard stretches for about 120 m. The western portion consists of

the Camargue (q.v.), a low and marshy plain enclosed between the Rhone and the Petit-Rhone, and comprising the Rhone delta. A large portion of its surface is covered by lagoons and pools (itangs), the largest of which is the Etang de Vaccares; to the east of the Camargue is situated the remarkable stretch of country called the Crau, which is strewn with pebbles like the sea-beach; and farther east and north there are various ranges of mountains of moderate elevation be- longing to the Alpine system. The Etang de Berre, a lagoon covering an area of nearly 60 sq. m., is situated near the sea to the south-east of the Crau. A few small tributaries of the Rhone and the Durance, a number of streams, such as the Arc and the Touloubre, which flow into the Etang de Berre, and the Huveaune, which finds its way directly to the sea, are the only rivers that properly belong to the department.

Bouches-du-Rh6ne enjoys the beautiful climate of the Medi- terranean coast, the chief drawback being the mistral, the icy north-west wind blowing from the central plateau of France. The proportion of arable land is small, though the quantity has been considerably increased by artificial irrigation and by the draining of marshland. Cereals, of which wheat and oats are the commonest, are grown in the Camargue and the plain of Aries, but they are of less importance than the olive-tree, which

is grown largely in the east of the department and supplies the oil-works of Marseilles. The vine is also cultivated, the method of submersion being used as a safeguard against phylloxera. In the cantons of the north-west large quantities of early vege- tables are produced. Of live-stock, sheep alone are raised to any extent. Almonds, figs, capers, mulberry trees and silk- worms are sources of considerable profit. Iron is worked, but the most important mines are those of lignite, in which between 2000 and 3000 workmen are employed ; the department also pro- duces bauxite, building-stone, lime, cement, gypsum, clay, sand and gravel and marble. The salt marshes employ many workmen, and the amount of sea-salt obtained exceeds in quantity the pro- duce of any other department in France. Marseilles, the capital, is by far the most important industrial town. In its oil-works, soap-works, metallurgical works, shipbuilding works, distilleries, flour-mills, chemical works, tanneries, engineering and machinery works, brick and tile works, manufactories of preserved foods and biscuits, and other industrial establishments, is concentrated

most of the manufacturing activity of the department. To these must be added the potteries of the industrial town of Aubagne, the silk-works in the north-west cantons, and various paper and cardboard manufactories, while several of the industries of Marseilles, such as the distilling of oil, metal-founding, ship- building and soap-making, are common to the whole of Bouches- du-Rhone. Fishing is also an important industry. Cereals, flour, silk, woollen and cotton goods, wine,, brandy, oils, soap, sugar and coffee are chief exports; cereals, oil-seeds, wine and brandy, raw sugar, cattle, timber, silk, wool, cotton, coal, &c, are im- ported. The foreign commerce of the department, which is principally carried on in the Mediterranean basin, is for the most part concentrated in the capital; the minor ports are Martigues, Cassis and La Ciotat. Internal trade is facilitated by the canal from Aries to Port-de-Bouc and two smaller canals, in all about 35 m. in length. The Rhone and the Petit-Rhone are both navigable within the department.

Bouches-du-Rh6ne is divided into the three arrondissements of Marseilles, Aix and Aries (33 cantons, in communes). It belongs to the archiepiscopal province of Aix, to the region of the XV. army corps, the headquarters of which are at Marseilles, and to the acadSmie (educational division) of Aix. Its court of appeal is at Aix. Marseilles, Aix, Aries, La Ciotat, Martigues, Salon, Les Saintes-Maries, St Remy, Les Baux and Tarascon, the principal places, are separately noticed. Objects of interest elsewhere may be mentioned. Near Saint-Chamas there is a remarkable Roman bridge over the Touloubre, which probably dates from the 1st century B.C. and is thus the oldest in France. It is supported on one semicircular span and has triumphal arches at either end. At Vernegues there are re- mains of a Roman temple known as the ” Maison-Basse.” The famous abbey of Montmajour, of which the oldest parts are the Romanesque church and cloister, is 2§ m. from Aries. At Orgon there are the ruins of a chateau of the 1 5th century, and near La Roque d’Antheron the church and other buildings of the Cistercian abbey of Silvacane, founded in the 12 th century.

BOUCHOR, MAURICE (1855-), French poet, was born on the 15th of December 1855 in Paris. He published in succession Chansons joyeuses (1874), Poemes de I’amour et de la mer (1875), Le Faust modeme (1878) in prose and verse, and Les Conies parisiens (1880) in verse. His Aurore (1883) showed a tendency to religious mysticism, which reached its fullest expression in Les Symboles (1888; new series, 1895), the most interesting of his works. Bouchor (whose brother, Joseph Felix Bouchor, b. 1853, became well known as an artist) was a sculptor as well as a poet, and he designed and worked

the figures used in his charming pieces as marionettes, the words being recited or chanted by himself or his friends behind the scenes. These miniature dramas on religious subjects, Tobie (1889), Noel (1890) and Sainte Cecile (1892), were produced in Paris at the Theatre des Marion- nettes. A one-act verse drama by Bouchor, Conte de Noel, was played at the Theatre Francais in 1895, but Dieu le veut (1888) was not produced. In conjunction with the musician Julien Tiersot (b. 1857), he made efforts for the preservation of

the French folk-songs, and published Chants populaires pour les icoles (1897).

BOUCHOTTE, JEAN BAPTISTE NOEL (1754-1840), French minister, was born at Metz on the 25th of December 1754. At the outbreak of the Revolution he was a captain of cavalry, and his zeal led to his being made colonel and given the command at Cambrai. When Dumouriez delivered up to the Austrians the minister of war, the marquis de Beurnonville, in April 1793, Bouchotte, who had bravely defended Cambrai, was called by the Convention to be minister of war, where he remained until the 31st of March 1794. The predominant r&le of the Committee of Public Safety during that period did not leave much scope for the new minister, yet he rendered some services in the organization of the republican armies, and chose his officers with insight, among them Kleber, Massena, Moreau and Bonaparte. During the Thermidorian reaction, in spite of his incontestable honesty, he was accused by the anti-revolutionists. He was tried by the tribunal of the Eure-et-Loire and acquitted. Then he withdrew from politics, and lived in retirement until his death on the 8th of June 1840.

BOUCICAULT, DION (1822-1890), Irish actor and playwright, was born in Dublin on the 26th of December 1822, the son of a French refugee and an Irish mother. Before he was twenty he was fortunate enough to make an immediate success as a dramatist with London Assurance, produced at Covent Garden on the 4th of March 1841, with a cast that included Charles Matthews, William Farren, Mrs Nesbitt and Madame Vestris. He rapidly followed this with a number of other plays, among the most successful of the early ones being Old Heads and Young Hearts, Louis XL, and The Corsican Brothers. In June 1852 he made his first appearance as an actor in a melodrama of his own entitled The Vampire at the Princess's theatre. From 1853 to 1869 he was in the United States, where he was always a popular favourite. On his return to England he produced at the Adelphi a dramatic adaptation of Gerald Griffin's novel, The Collegians, entitled The Colleen Bawn. This play, one of the most successful of modern

times, was performed in almost every city of the United Kingdom and the United States, and made its author a handsome fortune, which he lost in the management of various London theatres. It was followed by The Octoroon (1861), the popularity of which was almost as great. Boucicault's next marked success was at the Princess's theatre in 1865 with Arrah-na-Pogue, in which he played the part of a Wicklow carman. This, and his admirable creation of Con in his play The Shaughraun (first produced at Drury Lane in 1875), won him the reputation of being the best stage Irishman of his time. In 1875 he returned to New York City and finally made his home there, but he paid occasional visits to London, where his last appearance was made in his play, The Jilt, in 1 886. The Streets of London and After Dark were two of his late successes as a dramatist. He died in New York on the 18th of September 1890. Boucicault was twice married, his first wife being Agnes Robertson, the adopted daughter of Charles Kean, and herself an actress of unusual ability. Three children, Dion (b. 1859), Aubrey (b. 1868) and Nina, also became dis- tinguished in the profession.

BOUCICAUT, JEAN [Jean le Meingre, called Boucicaut] {c. 1366-1421), marshal of France, was the son of another Jean ie Meingre, also known as Boucicaut, marshal of France, who died on the 15th of March 1368 (N.S.). At a very early age he became a soldier; he fought in Normandy, in Flanders and in Prussia, distinguishing himself at the battle of Roosebeke in 1382; and then after a campaign in Spain he journeyed to the Holy Land. Boucicaut's great desire appears to have been to fight the Turk, and in 1396 he was one of the French soldiers who marched to the defence of Hungary and shared in the Christian defeat at Nicopolis, where he narrowly escaped death. After remaining for some months a captive in the hands of the sultan, he obtained his ransom and returned to France; then in 1399 he was sent at the head of an army to aid the Eastern emperor, Manuel II. , who was harassed by the Turks. Boucicaut drove the enemy from his position before Constantinople and returned to France for fresh troops, but instead of proceeding

again to eastern Europe, he was despatched in 1401 to Genoa, who in 1396 had placed herself under the dominion of France. Here he was successful in restoring order and in making the French occupation effective, and he was soon able to turn his attention to the defence of the Genoese possessions in the Medi- terranean. The energy which he

showed in this direction involved him not only in a quarrel with Janus, king of Cyprus, but led also to a short war with Venice, whose fleet he encountered off Modon in the Archipelago in October 1403. This battle has been claimed by both sides as a victory. Peace was soon made with the republic, and then in 1409, while the marshal was absent on a campaign in northern Italy, Genoa threw off the French yoke, and Boucicaut, unable to reduce her again to submission, retired to Languedoc. He fought at Agincourt, where he was taken prisoner, and died in England. Boucicaut, who was very skilful in the tournament, founded the order of the Dame blanche a I'ecu vert, a society the object of which was to defend the wives and daughters of absent knights.

There is in existence an anonymous account of Boucicaut's life and adventures, entitled Livre des faits du bon messire Jean le Meingre dit Boucicaut, which was published in Paris by T. Godefroy in 1620. See J. Delaville le Roulx, La France en Orient: expeditions du marechal Boucicaut (Paris, 1

BOUDIN, EUGENE (1824-1898), French painter of the paysage de mer, was the son of a pilot. Born at Honfleur he was cabin- boy for a while on board the rickety steamer that plied between Havre and Honfleur across the estuary of the Seine. But before old age came on him, Boudin's father abandoned seafaring, and the son gave it up too, having of course no real vocation for it, though he preserved to his last days much of a sailor's character, — frankness, accessibility, open-heartedness. Boudin the elder now established himself as stationer and frame-maker; this time in the greater seaport town of Havre; and Eugene helped in the little business, and, in stolen hours, produced certain drawings. That was a time at which the romantic out- lines of the Norman coast engaged Isabey, and the green wide valleys of the inland country engaged Troyon; and Troyon and Isabey, and Millet too, came to the shop at Havre. Young Boudin found his desire to be a painter stimulated by their influence; his work made a certain progress, and the interest taken in the young man resulted in his being granted for a short term of years by the town of his adoption a pension, that he might study painting. He studied partly in Paris; but whatever individuality he possessed in those years was hidden and covered, rather than disclosed. An instance of tiresome, elaborate labour — good enough, no doubt, as groundwork, and not out of keeping with what at least was the popular taste of that day — is his " Pardon of Sainte Anne de la Palud," a Breton scene, of 1858, in which he introduced the young Breton woman who was immediately to become his wife. This conscientious and unmoving picture hangs in the museum of Havre, along with a hundred later, fresher, thoroughly

individual studies and sketches, the gift of Boudin's brother, Louis Boudin, after the painter's death. Re-established at Honfleur, Boudin was married and poor. But his work gained character and added, to merely academic correctness, character and charm. He was beginning to be himself by 1864 or 1865 — that was the first of such periods of his as may be accounted good — and, though not at that time so fully a master of transient effects of weather as he became later, he began then to paint with a success genuinely artistic the scenes of the harbour and the estuary, which no longer lost vivacity by deliberate and too obvious completeness. The war of 1870-71 found Boudin impecunious but great, for then there had well begun the series of freshly and vigorously conceived canvases and panels, which record the impressions of a precursor of the Impressionists in presence of the Channel waters, and of those autumn skies, or skies of summer, now radiant, now uncertain, which hung over the small ports and the rocky or chalk-cliff coasts, over the watering-places, Trouville, Dieppe, and over those larger harbours, with port and avant-port and bassin, of Dunkirk, of Havre. In the war time, Boudin was in Brittany and then in the Low Countries. About 1875-

1876 he was at Rotterdam and Bordeaux. That great bird's r eye vision of Bordeaux which is in the Luxembourg dates from these years, and in these years he was at Rotterdam, the com- panion of Jongkind, with whom he had so much in common, but whose work, like his, free and fearless and unconventional, can never be said with accuracy to have seriously influenced his own. Doing excellent things continually through all the 'seventies, when he was in late middle age — gaining scope in colour, having now so many notes — faithful no longer wholly to his amazing range of subtle greys, now blithe and silvery, now nobly deep — sending to the Salon great canvases, and to the few enlightened people who would buy them of him the toile or panel of most moderate size on which he best of all ex- pressed himself — Boudin was yet not acceptable to the public or to the fashionable dealer. The late 'eighties had to come and Boudin to be elderly before there was a sale for his work at any prices that were in the least substantial. Broadly speaking his work in those very 'eighties was not so good as the labour, essentially delicate and fresh and just, of some years earlier, nor had it always the attractiveness of the impulsive deliverances of some years later, when the inspired sketch was the thing that he generally stopped at. Old age found him strong and receptive. Only in the very last year of his life was there per- ceptible a positive deterioration. Not very long before it, Boudin, in a visit to Venice, had produced impressions of Venice for which much more was to be said than that they were not Ziem's. And the deep colouring of

the South, on days when the sunshine blazes least, had been caught by him and presented nobly at Antibes and Villefranche. At last, resorting to the south again as a refuge from ill-health, and recognizing soon that the relief it could give him was almost spent, he resolved that it should not be for him, in the words of Maurice Barres, a " tombefleurie," and he returned, hastily, weak and sinking, to his home at Deauville, that he might at least die within sight of Channel waters and under Channel skies. As a " marine painter " — more properly as a painter of subjects in which water must have some part, and as curiously expert in the rendering of all that goes upon the sea, and as the painter too of the green banks of tidal rivers and of the long-stretched beach, with crinolined Parisienne noted as ably as the sailor-folk — Boudin stands alone. Beside him others are apt to seem rather theatrical — or if they do not romance they appear, perhaps, to chronicle dully. The pastels of Boudin — summary and economic even in the 'sixties, at a time when his painted work was less free — obtained the splendid eulogy of Baudelaire, and it was no other than Corot who, before his pictures, said to him: " You are the master of the sky."

See also Gustave Cahen, Eugene Boudin (Paris, 1899) ; Arsene Alexandre, Essais; Frederick Wedmore, Whistler and Others (1906).

(F. We.)

BOUDINOT, ELIAS (1740-1821), American revolutionary leader, was bom at Philadelphia, Pennsylvania, of Huguenot descent, on the 2nd of May 1740. He studied law at Princeton, New Jersey, in the office of Richard Stockton, whose sister Hannah he married in 1762, and in November 1760 he was licensed as a counsellor and attorney-at-law, afterwards practising at Elizabethtown, New Jersey. On the approach of the War of Independence he allied himself with the conservative Whigs. He was a deputy to the provincial congress of New Jersey from May to August 1775, and from May 1777 until July 1778 was the commissary-general of prisoners, with the rank of colonel, in the continental army. He was one of the New Jersey members of the continental congress in 1778 and again from 1781 until 1783, and from November 1782 until October 1783 was president of that body, acting also for a short time, after the resignation of Robert R. Livingston, as secretary for foreign affairs. From 1789 to 1795 he sat as a member of the national House of Repre- sentatives, and from 1795 until 1805 he was the director of the United States mint at Philadelphia. He took an active part in the founding of the American Bible Society in 1816, of which he became the first president. He was a trustee and a benefactor of the college of New Jersey (afterwards

Princeton University).

In reply to Thomas Paine's Age of Reason, he published the Age of Revelation (1790); he also published a volume entitled A Star in the West, or a Humble Attempt to Discover the Long Lost Ten Tribes of Israel (18 16), in which he endeavours to prove that the American Indians may be the ten lost tribes. Boudinot died at Burlington, New Jersey, on the 24th of October 1821.

See The Life, Public Services, Addresses and Letters of Elias Boudinot, edited by J. J. Boudinot (Boston and New York, 1896).

BOUE, AMI (1794-1881), Austrian geologist, was born at Hamburg on the 16th of March 1794, and received his early education there and in Geneva and Paris. Proceeding to Edin- burgh to study medicine at the university, he came under Ihe influence of Robert Jameson, whose teachings in geology and mineralogy inspired his future career. Boue was thus led to make geological expeditions to various parts of Scotland and the Hebrides, and after taking his degree of M.D. in 1817 he settled for some years in Paris. In 1820 he issued his Essai giologique sur I'Ecosse, in which the eruptive rocks in particular were carefully described. He travelled much in Germany, Austria and southern Europe, studying various geological forma- tions, and becoming one of the pioneers in geological research; he was one of the founders of the Societe Geologique de France in 1830, and was its president in 1835. In 1841 he settled in Vienna, and became naturalized as an Austrian. He died on the 21st of November 1881. To the Imperial Academy of Sciences at Vienna he communicated important papers on the geology of the Balkan States (1859-1870), and he also published Memoires g6ologiques et paleontologiques (Paris, 1832) and La Turquie d'Europe; observations sur la giographie, la giologie, I'histoire naturelle, &V. (Paris, 1840).

BOUFFLERS, LOUIS FRANCOIS, Due de, comte de Cagny (1644-1711), marshal of France, was born on the 10th of January 1644. He entered the army and saw service in 1663 at the siege of Marsal, becoming in 1 669 colonel of dragoons. In the conquest of Lorraine (1670) he served under Marshal de Crequi. In Hol- land he served under Turenne, frequently distinguishing himself by his skill and bravery; and when Turenne was killed by a cannon-shot in 1675 he commanded the rear-guard during the retreat of the French army. He

was already a brigadier, and in 1677 he became marichal de camp. He served throughout the campaigns of the time with increasing distinction, and in 1681 became lieutenant-general. He commanded the French army on the Moselle, which opened the War of the League of Augsburg with a series of victories; then he led a corps to the Sambre, and reinforced Luxemburg on the eve of the battle of Fleurus. In 1 69 1 he acted as lieutenant-general under the king in person; and during the investment of Mons he was wounded in an attack on the town. He was present with the king at the siege of Namur in 1692, and took part in the victory of Steinkirk. For his services he was raised in 1692 to the rank of marshal of France, and in 1694 was made a duke. In 1694 he was appointed governor of French Flanders and of the town of Lille. By a skilful manoeuvre he threw himself into Namur in 1695, and only surrendered to his besiegers after he had lost 8000 of his 13,000 men. In the conferences which terminated in the peace of Ryswick he had a principal share. During the following war, when Lille was threatened with a siege by Marlborough and Eugene, BoufHers was appointed to the command, and made a most gallant resistance of three months. He was rewarded and honoured by the king for his defence of Lille, as if he had been victorious. It was indeed a species of triumph; his enemy, appreciating his merits, allowed him to dictate his own terms of capitulation. In 1708 he was made a peer of France. In 1709, when the affairs of France were threatened with the most urgent danger, Boufflers offered to serve under his junior, Villars, and was with him at the battle of Malplaquet. Here he displayed the highest skill, and after Villars was wounded he conducted the retreat of the French army without losing either cannon or prisoners. He died at Fontainebleau on the 22nd of August

1711.

See F. . . ., Vie du Mai. de Boufflers' (Lille, 1852), and Pere Delarue's and Pere Poisson's Oraisons funibres du Mai. B. (1712).

BOUFFLERS, STANISLAS JEAN, Chevalier de (1737- 181 5), French statesman and man of letters, was born near Nancy on the 31st of May 1738. He was the son of Louis Francois, marquis de Boufflers. His mother, Marie Catherine de Beauveau Craon, was the mistress of Stanislas Leszczynski, and the boy was brought up at the court of Luneville. He spent six months in study for the priesthood at Saint Sulpice, Paris, and during his residence there he put in circulation a story which became ex- tremely popular, Aline, reine de Golconde. Boufflers did not, however, take the vows, as his ambitions were military. He entered the order of the Knights of Malta, so that he might be able to follow the career of arms without sacrificing the

revenues of a benefice he had received in Lorraine from King Stanislas. After serving in various campaigns he reached the grade of marichal de camp in 1784, and in the next year was sent to West Africa as governor of Senegal. He proved an excellent ad- ministrator, and did what he could to mitigate the horrors of the slave trade; and he interested himself in opening up the material resources of the colony, so that his departure in 1787 was regarded as a real calamity by both colonists and negroes. The Mimoires secrets of Bachaumont give the current opinion that Boufflers was sent to Senegal because he was in disgrace at court; but the real reason appears to have been a desire to pay his debts before his marriage with Mme de Sabran, which took place soon after his return to France. Boufflers was admitted to the Academy in 1788, and subsequently became a member of the states-general. During the Revolution he found an asylum with Prince Henry of Prussia at Rheinsberg. At the Restoration he was made joint-librarian of the Bibliotheque Mazarine. His wit and his skill in light verse had won him a great reputation, and he was one of the idols of the Parisian salons. His paradoxical character was described in an epigram attributed to Antoine de Rivarol, ” abbi libertin, militaire philosophe, diplomate chan- sonnier, emigre palriole, republicain courtisan.” He died in Paris on the 18th of January 181 5.

His CEuvres completes were published under his own supervision in 1803. A selection of his stories in prose and verse was edited by Eugene Asse in 1878; his Poesies by O. Uzanne in 1886; and the Correspondance inedite de la comtesse de Sabran et du chevalier de Boufflers (1 778-1 788), by E. de Magnieu and Henri Prat in 1875.

BOUGAINVILLE, LOUIS ANTOINE DE (1729-1811), French navigator, was born at Paris on the nth of November 1729. He was the son of a notary, and in early life studied law, but soon abandoned the profession, and in 1753 entered the army in the corps of musketeers. At the age of twenty-five he pub- lished a treatise on the integral calculus, as a supplement to De l’Hopital’s treatise, . Des infiniment pelits. In 1 7 5 5 he was sent to London as secretary to the French embassy, and was made a member of the Royal Society. In 1756 he went to Canada as captain of dragoons and aide-de-camp to the marquis de Mont- calm; and having distinguished himself in the war against England, was rewarded with the rank of colonel and the cross of St Louis. He afterwards served in the Seven Years’ War from 1761 to 1763. After the peace, when the French govern- ment conceived the project of colonizing the Falkland Islands, Bougainville undertook the task at his own expense. But the settlement having excited the jealousy of the Spaniards, the French government gave it up to them,

on condition of their indemnifying Bougainville. He was then appointed to the command of the frigate ” La Boudeuse ” and the transport ” L’fitoile,” and set sail in December 1766 on a voyage of discovery round the world. Having executed his commission of delivering up the Falkland Islands to the Spanish, Bougainville proceeded on his expedition, and touched at Buenos Aires. Passing through the Straits of Magellan, he visited the Tuamotu archipelago, and Tahiti, where the English navigator Wallis had touched eight months before. He proceeded across the Pacific Ocean by way of the Samoan group, which he named the Navigators Islands, the New Hebrides and the Solomon Islands. His men now suffering from scurvy, and his vessels requiring refitting, he anchored at Bum, one of the Moluccas, where the governor of the Dutch settlement supplied his wants. It was the beginning of September, and the expedition took

advantage of the easterly monsoon, which carried them to Batavia. In March 1 769 the expedition arrived at St Malo, with the loss of only seven out of upwards of 200 men. Bougainville’s account of the voyage (Paris, 1771) is written with simplicity and some humour. After an interval of several years, he again accepted a naval command and saw much active service between 1779 and 1782. In the memorable engagement of the 1 2 th of April 1782, in which Rodney defeated the comte de Grasse, near Mar- tinique, Bougainville, who commanded the ” Auguste,” succeeded in rallying eight ships of his own division, and bringing them safely into St Eustace. He was created chef d’escadre, and on re- entering the army, was given the rank of marechal de camp. After the peace he returned to Paris, and obtained the place of associate of the Academy. He projected a voyage of discovery towards the north pole, but this did not meet with support from the French government. Bougainville obtained the rank of vice-admiral in 1791; and in 1792, having escaped almost miraculously from the massacres of Paris, he retired to his estate in Normandy. He was chosen a member of the Institute at its formation, and returning to Paris became a member of the Board of Longitude. In his old age Napoleon I. made him a senator, count of the empire, and member of the Legion of Honour. He died at Paris on the 31st of August 1811. He was married and had three sons, who served in the French army.

Bougainville’s name is given to the largest member of the Solomon Islands, which belongs to Germany; and to the strait which divides it

from the British island of Choiseul. It is also applied to the strait between Mallicollo and Espiritu Santo Islands of the New Hebrides group, and the South American climbing plant Bougainvillea, often cultivated in greenhouses, is named after him.

BOUGHTON, GEORGE HENRY (1834-1905), Anglo-American painter, was born in England, but his parents went to the United States in 1839, and he was brought up at Albany, N.Y. He studied art in Paris in 1861-62, and subsequently lived mainly in London; he was much influenced by Frederick Walker, and the delicacy and grace of his pictures soon made his reputation. He was elected an A.R.A. in 1879, and R.A. in 1896, and a member of the National Academy of Design in New York in 1871. His pictures of Dutch life and scenery were especially characteristic; and his subject-pictures, such as the ” Return of the Mayflower ” and ” The Scarlet Letter,” were very popular in America.

BOUGIE, a seaport of Algeria, chief town of an arrondissement in the department of Constantine, 120 m. E. of Algiers. The town, which is defended by a wall built since the French occupa- tion, and by detached forts, is beautifully situated on the slope of Mount Guraya. Behind it are the heights of Mounts Babor and Tababort, rising some 6400 ft. and crowned with forests of pinsapo fir and cedar. The most interesting buildings in the town are the ancient forts, Borj-el-Ahmer and Abd-el-Kader, and the kasbah or citadel, rectangular in form, flanked by bastions and towers, and bearing inscriptions stating that it was built by the Spaniards in 1545. Parts of the Roman wall exist, and considerable portions of that built by the Hammadites in the nth century. The streets are very steep, and many are ascended by stairs. The harbour, sheltered from the east by a breakwater, was enlarged in 1897-1902. It covers 63 acres and has a depth of water of 23 to 30 ft. Bougie is the natural port of Kabylia, and under the French rule its commerce — chiefly in oils, wools, hides and minerals — has greatly developed; a branch railway runs to Beni Mansur on the main line from Constantine to Oran. Pop. (1906) of the town, 10,419; of the commune, 17,540; of the arrondissement, which includes eight communes, 37,711.

Bougie, if it be correctly identified with the Saldae of the Romans, is a town of great antiquity, and probably owes its origin to the Carthaginians. Early in the 5th century Genseric the Vandal surrounded it with walls and for some time made it his capital. En-Nasr (1062-1088), the most powerful of the Berber dynasty of Hammad, made Bougie the seat of his govern- ment, and it became the greatest commercial centre of the North

African coast, attaining a high degree of civilization. From an old MS. it appears that as early as 1068 the heliograph was in common use, special towers, with mirrors properly arranged, being built for the

purpose of signalling. The Italian merchants of the 12th and 13th centuries owned numerous buildings in the city, such as warehouses, baths and churches. At the end of the 13th century Bougie passed under the dominion of the Hafsides, and in the 15th century it became one of the strong- holds of the Barbary pirates. It enjoyed partial independence under amirs of Hafside origin, but in January 15 10 was captured by the Spaniards under Pedro Navarro. The Spaniards strongly fortified the place and held it against two attacks by the corsairs Barbarossa. In 1555, however, Bougie was taken by Salah Rais, the pasha of Algiers. Leo Africanus, in his Africae descriptio, speaks of the ” magnificence ” of the temples, palaces and other buildings of the city in his day (c. 1525), but it appears to have fallen into decay not long afterwards. When the French took the town from the Algerians in 1833 it consisted of little more than a few fortifications and ruins. It is said that the French word for a candle is derived from the name of the town, candles being first made of wax imported from Bougie.

BOUGUER, PIERRE (1698-1758), French mathematician, was born on the 16th of February 1698. His father, John Bouguer, one of the best hydrographers of his time, was regius professor of hydrography at Croisic in lower Brittany, and author of a treatise on navigation. In 17 13 he was appointed to succeed his father as professor of hydrography. In 1727 he gained the prize given by the Academie des Sciences for his paper ” On the best manner of forming and distributing the masts of ships “; and two other prizes, one for his dissertation ” On the best method of observing the altitude of stars at sea,” the other for his paper ” On the best method of observing the variation of the compass at sea.” These were published in the Prix de I’ Academie des Sciences. In 1729 he published Essai d’ optique sur la gradation de la lumiere, the object of which is to define the quantity of light lost by passing through a given extent of the atmosphere. He found the light of the sun to be 300 times more intense than that of the moon, and thus made some of the earliest measurements in photometry. In 1730 he was made professor of hydrography at Havre, and succeeded P. L. M. de Maupertuis as associate geometer of the Academie des Sciences. He also invented a heliometer, afterwards perfected by Fraunhofer. He was afterwards promoted in the Academy to the place of Maupertuis, and went to reside in Paris. In 1735 Bouguer sailed with C. M. de la Condamine for Peru, in order to measure a degree of the meridian near the equator. Ten years were spent in this operation, a full account of which was published by Bouguer in 1749, Figure de la terre dtterminie. His later writings were nearly all upon the theory of navigation. He died on the 15th of

August 1758.

The following is a list of his principal works: — Traite a” optique sur la gradation de la lumiere (1729 and 1760) ; Entretiens sur la cause d’inclinaison des orbites des planetes (1734); Traite de navire, &c. (1746, 4to); La Figure de la terre dkerminee, &c. (1749), 4to; Nouveau traite de navigation, contenant la theorie et la pratique du pilotage (1753); Solution des principaux problemes sur la manoeuvre des vaisseaux (1757); Operations faites pour la verification du degre du meridien entre Paris et Amiens, par Mess. Bouguer, Camus, Cassini et Pingre (1757).

See J. E. Montucla, Histoire des mathematiques (1802).

BOUGUEREAU, ADOLPHE WILLIAM (1825-1905), French painter, was born at La Rochelle on the 30th of November 1825. From 1843 till 1850 he went through the course of training at the Ecole des Beaux-Arts, and in 1850 divided the Grand Prix de Rome scholarship with Baudry, the subject set being ‘ ‘ Zenobia on the banks of the Araxes.” On his return from Rome in 1855 he was employed in decorating several aristocratic residences, deriving inspiration from the frescoes which he. had seen at Pompeii and Herculaneum, and which had already suggested his ” Idyll ” (1853). He also began in 1847 to exhibit regularly at the Salon. ” The Martyr’s Triumph,” the body of St Cecilia borne to the catacombs, was placed in the Luxembourg after being exhibited at the Paris Exhibition of 1855; and in the same

year he exhibited ” Fraternal Love,” a ” Portrait ” and a ” Study.” The state subsequently commissioned him to paint the emperor’s visit to the sufferers by the inundations at Tarascon. In 1857 Bouguereau received a first prize medal. Nine of his panels executed in wax-painting for the mansion of M. Bartholomy were much discussed — ” Love,” ” Friendship,” “Fortune,” ” Spring,” ” Summer,” ” Dancing,” ” Arion on a Sea-horse,” a ” Bacchante ” and the ” Four Divisions of the Day.” He also exhibited at the Salon ” The Return of Tobit ” (now in the Dijon gallery) . While in antique subjects he showed much grace of design, in his ” Napoleon,” a work of evident labour, he betrayed a lack of ease in the treatment of modern costume. Bouguereau subsequently exhibited ” Love Wounded ” (1859), “The Day of the Dead” (at Bordeaux), “The First Discord ” (1861, in the Club at Limoges), ” The Return from the Fields ” (a picture in which

Theophile Gautier recognized ” a pure feeling for the antique “), ” A Fawn and Bacchante ” and “Peace”; in 1863 a “Holy Family,” “Remorse,” “A Bac- chante teasing a Goat ” (in the Bordeaux gallery); in 1864 ” A Bather” (at Ghent), and “Sleep”; in 1865 “An Indigent Family,” and a portrait of Mme Bartholomy; in 1866 “A First Cause,” and ” Covetousness,” with ” Philomela and Procne “; and some decorative work for M. Montlun at La Rochelle, for M. Emile Pereire in Paris, and for the churches of St Clotilde and St Augustin; and in 1866 the large painting of ” Apollo and the Muses on Olympus,” in the Great Theatre at Bordeaux. Among other works by this artist may be mentioned ” Between Love and Riches ” (1869), ” A Girl Bathing ” (1870), “In Harvest Time” (1872), “Nymphs and Satyrs” (1873), ” Charity ” and ” Homer and his Guide ” (1874), ” Virgin and Child,” ” Jesus and John the Baptist,” ” Return of Spring ” (which was purchased by an American collector, and was de- stroyed by a fanatic who objected to the nudity), a ” Pieta ” (1876), ” A Girl defending herself from Love ” (1880), ” Night ” (1883), “The Youth of Bacchus” (1884), ” Biblis ” (1885), “Love Disarmed” (1886), “Love Victorious” (1887), “The Holy Women at the Sepulchre ” and ” The Little Beggar Girls” (1890), ” Love in a Shower ” and ” First Jewels ” (1891). To the Exhibition of 1900 were contributed some of Bouguereau’s best-known pictures. Most of his works, especially “The Triumph of Venus ” (1856) and ” Charity,” are popularly known through engravings. ” Prayer,” ” The Invocation ” and ” Sappho ” have been engraved by M. Thirion, ” The Golden Age ” by M. Annetombe. Bouguereau’s pictures, highly appreciated by the general public, have been severely criticized by the partisans of a freer and fresher style of art, who have reproached him with being too content to revive the formulas and subjects of the antique. At the Paris Exhibition of 1867 Bouguereau took a third-class medal, in 1878 a medal of honour, and the same again in the Salon of 1885. He was chosen by the Society of French Artists to be their vice-president, a post he filled with much energy. He was made a member of the Legion of Honour in 1 8 56 , an officer of the Order 26th of July 1876, and commander 12th of July 1885. He succeeded Isidore Pils as member of the Institute, 8th of January 1876. He died on the 20th of August 1905.

See Ch. Vendryes, Catalogue illustre des ceuvres de Bouguereau (Paris, 1885); Jules Claretie, Peintres et sculpteurs contemporains (Paris, 1874); P. G. Hamerton, French Painters; Artistes modernes: dictionnaire illustre des beaux-arts (1885); ” W. Bouguereau,” Port-folio (1875); fimile Bayard, “William Bouguereau,” Monde moderne (1897).

BOUHOURS, DOMINIQUE (1628-1702), French critic, was born in

Paris in 1628. He entered the Society of Jesus at the age of sixteen, and was appointed to read lectures on literature in the college of Clermont at Paris, and on rhetoric at Tours. He afterwards became private tutor to the two sons of the duke of Longueville. He was sent to Dunkirk to the Romanist refugees from England, and in the midst of his missionary occupations published several books. In 1665 or 1666 he returned to Paris, and published in 167 1 Les Entreticns d'Ariste et d'Eugene, a critical work on the French language, printed five times at Paris, twice at Grenoble, and afterwards at Lyons, Brussels, Amsterdam, Leiden, &c. The chief of his other works

are La Maniere de Men penser sur les ouvrages d'esprit (1687), Doutessurlalanguefrancaise(l6']4.), ViedeSaint Ignacede Loyola (1679), Vie de Saint Francois Xavier (1682), and a translation of the New Testament into French (1697). His practice of publish- ing secular books and works of devotion alternately led to the mot, " qu'il servait le monde et le ciel par semestre." Bouhours died at Paris on the 27th of May 1702.

See Georges Doucieux, Un Jesuits homme de lettres au dix-septieme Steele: Le pere Bouhours (1886). For a list of Bouhours' works ses Backer and Sommervogel, Bibliotheque de la Compagnie de Jesus, i. pp. 1886 et seq.

BOUILHET, LOUIS HYACINTHE (1822-1869), French poet and dramatist, was born at Cany, Seine Inferieure, on the 27th of May 1822. He was a schoolfellow of Gustave Flaubert, to whom he dedicated his first work, Meloenis (1851), a narrative poem in five cantos, dealing with Roman manners under the emperor Commodus. His volume of poems entitled Fossiles attracted considerable attention, on account of the attempt therein to use science as a subject for poetry. These poems were included also in Festons et astragales (1859). As a dramatist he secured a success with his first play, Madame de Montarcy (1856), which ran for seventy-eight nights at the Odeon; and H&lene Feyron (1858) and L'Oncle Million (i860) were also favourably received. But of his other plays, some of them of real merit, only the Conjuration d'Amboise (1866) met with any great success. Bouilhet died on the 18th of July 1869, at Rouen. Flaubert published his posthumous poems with a notice of the author, in 1872.

See also Maxime du Camp, Souvenirs litteraires ("1882); and H. de la Ville de Mirmont, Le Poke Louis Bouilhet (1888).

BOUILLE\ FRANQOIS CLAUDE AMOUR, Marquis de (1739- 1800), French general. He served in the Seven Years' War, and as governor in

the Antilles conducted operations against the English in the War of American Independence. On his return to France he was named governor of the Three Bishoprics, of Alsace and of Franche-Comte. Hostile to the Revolution, he had continual quarrels with the municipality of Metz, and brutally suppressed the military insurrections at Metz and Nancy, which had been provoked by the harsh conduct of certain noble officers. Then he proposed to Louis XVI. to take refuge in a frontier town where an appeal could be made to other nations against the revolutionists. When this project failed as a result of Louis XVI. ‘s arrest at Varennes, Bouille went to Russia to induce Catherine II. to intervene in favour of the king, and then to England, where he died in 1800, after serving in various royalist attempts on France. He left Memoires sur la Revolu- tion Jranqaise depuis son origine jusqu’d la retraite du due de Brunswick (Paris, 1801).

BOUILLON, formerly the seat of a dukedom in the Ardennes, now a small town in the Belgian province of Luxemburg. Pop. (1904) 2721. It is most picturesquely situated in the valley under the rocky ridge on which are still the very well preserved remains of the castle of Godfrey of Bouillon (q.v.), the leader of the first crusade. The town, 690 ft. above the sea, but lying in a basin, skirts both banks of the river Semois which is crossed by two bridges. The stream forms a loop round and almost encircles the castle, from which there are beautiful views of the sinuous valley and the opposite well-wooded heights. The whole effect of the grim castle, the silvery stream and the verdant woods makes one of the most striking scenes in Belgium. In the 8th and 9th centuries Bouillon was one of the castles of the counts of Ardenne and Bouillon. In the 10th and nth centuries the family took the higher titles of dukes of Lower Lorraine and Bouillon. These dukes all bore the name of Godfrey (Gode- froy) and the fifth of them was the great crusader. He was the son of Eustace, count of Boulogne, which has led many com- mentators into the error of saying that Godfrey of Bouillon was born at the French port, whereas he was really born in the castle of Baisy near Genappe and Waterloo. His mother was Ida d’Ardenne, sister of the fourth Godfrey (” the Hunchback “), and the successful defence of the castle when a mere youth of seventeen on her behalf was the first feat of arms of the future conqueror of Jerusalem. This medieval fortress, strong by

art as well as position before the invention of modern artillery, has since undergone numerous sieges. In order to undertake the crusade Godfrey sold the castle of Bouillon to the prince bishop of Liege, and the title of duke of Bouillon remained the appendage of the bishopric till 1678, or for 580 years. The bishops appointed ” chatelains,” one of whom was the celebrated ” Wild Boar of the Ardennes,” William de la Marck. His descendants made themselves quasi-independent and called themselves princes of Sedan and dukes of Bouillon, and they were even recognized by the king of France. The possession of Bouillon thenceforward became a constant cause of strife until in 1678 Louis XIV. garrisoned it under the treaty of Nijmwegen. From 1594 to 1641 the duchy remained vested in the French family of La Tour d’Auvergne, one of whom (Henry, viscount of Turenne and marshal of France) had married in 1591 Charlotte de la Marck, the last of her race. In 1676 the duke of Crequy seized it in the name of Louis XIV., who in 1678 gave it to Godefroy Marie de La Tour d’Auvergne, whose descendants continued in possession till 1705. Bouillon remained French till 1814, and Vauban called it ” the key of the Ardennes.” In 1760 the elder Rousseau established here the famous press of the Encyclopaedists. In 1814-1815, before the decrees of the Vienna Congress were known, an extra- ordinary attempt was made by Philippe d’Auvergne of the British navy, the cousin and adopted son of the last duke, to revive the ancient duchy of Bouillon. The people of Bouillon freely recognized him, and Louis XVIII. was well pleased with the arrangement, but the congress assigned Bouillon to the Netherlands. Napoleon III. on his way to Germany after Sedan slept one night in the little town, which is a convenient centre for visiting that battlefield.

BOUILLOTTE, a French game of cards, very popular during the Revolution, and again for some years from 1830. Five, four or three persons may play; a piquet pack is used, from which, in case five play, the sevens, when four the knaves, and when three the queens also, are omitted. Counters or chips, as in poker, are used. Before the deal each player ” antes ” one counter, after which each, the ” age ” passing, may ” raise ” the pot; those not ” seeing the raise ” being obliged to drop out. Three cards are dealt to each player, and a thirteenth, called the retourne, when -four play, turned up. Each player must then bet, call, raise or drop out. When a call is made the hands are shown and the best hand wins. The hands rank as follows: brelan carre, four of a kind, one being the retourne; simple brelan, three of a kind, ace being high; brilan favori, three of a kind, one being the retourne. When no player holds a brelan the hand holding the greatest number of pips wins, ace counting 11, and court cards 10.

BOUILLY, JEAN NICOLAS (1763-1842), French author, was born near Tours on the 24th of January 1763. At the outbreak of the Revolution he held office under the new govern- ment, and had a considerable share in the organization of primary education. In 1799 he retired from public life to devote himself, to literature. His numerous works include the musical comedy, Pierre le Grand (1790), for Gretry's music, and the opera, Les Deux Journe'es (1800), music by Cherubini; also L' 'Abbe de I'epSe (1800), and some other plays; and Causeries d'un vieillard (1807), Contes a mafdle (1809), and Les Adieux du vieux conieur (1835). His Leonore (1798) formed the basis of the libretto of the Fidelio of Beethoven. Bouilly died in Paris on the 14th of April 1842.

See Bouilly, Mes recapitulations (3 vols., 1836-1837); E. LegouvS, Soixante ans de souvenir (1 » re partie, 1886).

BOULAINVILLIERS, HENRI, Comte de (1658-1722), French political writer, was born at St Saire in Normandy in 1658. He was educated at the college of Juilly, and served in the army until 1697. He wrote a number of historical works (published after his death), of which the most important were the following: Histoire de I'ancien gouvernemcnt de la France (La Haye, 1727); Etat de la France, avec des memoires sur I'ancien gouvernement (London, 1727); Histoire de la pairie de France (London, 1753); Histoire des Arabes (1731). His writings are characterized by

an extravagant admiration of the feudal system. He was an aristocrat of the most pronounced type, attacking absolute monarchy on the one hand and popular government on the other. He was at great pains to prove the pretensions of his own family to ancient nobility, and maintained that the govern- ment should be entrusted solely to men of his class. He died in Paris on the 23rd of January 1722.

BOULANGER, the name of several French artists: — Jean (1 606-1 660), a pupil of Guido Reni at Bologna, who had an academy at Modena; his cousin Jean (1 607-1 680), a celebrated line-engraver; the latter's son Matthieu, another engraver; Louis (1806-1867), a subject-painter, the friend of Victor Hugo, and director of the imperial school of art at Dijon; the best- known, Gustave Rodolphe Clarence (1824-1888), a pupil of Paul Delaroche, a notable painter of Oriental and Greek and Roman subjects, and a member of the Institute (1882); and Clement (1805-1842), a pupil of Ingres.

BOULANGER, GEORGE ERNEST JEAN MARIE (1837-1891), French. general, was born at Rennes on the 29th of April 1837. He entered the

army in 1856, and served in Algeria, Italy, Cochin-China and the Franco- German War, earning the reputa- tion of being a smart soldier. He was made a brigadier-general in 1880, on the recommendation of the due d'Aumale, then commanding the VII. army corps, and Boulanger's expressions of gratitude and devotion on this occasion were remembered against him afterwards when, as war minister in M. Freycinet's cabinet, he erased the name of the due d'Aumale from the army list, as part of the republican campaign against the Orleanist and Bonapartist princes. In 1882 his appointment as director of infantry at the war office enabled him to make himself con- spicuous as a military reformer; and in 1884 he was appointed to command the army occupying Tunis, but was recalled owing to his differences of opinion with M. Cambon, the political resident. He returned to Paris, and began to take part in politics under the aegis of M. C16menceau and the Radical party; and in January 1886, when M. Freycinet was brought into power by the support of the Radical leader, Boulanger was given the post of war minister.

By introducing genuine reforms for the benefit of officers and common soldiers alike, and by laying himself out for popularity in the most pronounced fashion — notably by his fire-eating attitude towards Germany in April 1887 in connexion with the Schnaebele frontier incident — Boulanger came to be accepted by the mob as the man destined to give France her revenge for the disasters of 1870, and to be used simultaneously as a tool by all the anti-Republican intriguers. His action with regard to the royal princes has already been referred to, but it should be added that Boulanger was taunted in the Senate with his ingratitude to the due d'Aumale, and denied that he had ever used the words alleged. His letters containing them were, however, published, and the charge was proved. Boulanger fought a bloodless duel with the baron de Lareinty over this affair, but it had no effect at the moment in dimming his popularity, and on M. Freycinet's defeat in December 1886 he was retained by M. Goblet at the war office. M. Clemenceau, however, had by this time abandoned his patronage of Boulanger, who was becoming so inconveniently prominent that, in May 1887, M. Goblet was not sorry to get rid of him by resigning. The mob clamoured for their " brav' general," but M. Rouvier, who next formed a cabinet, declined to take him as a colleague, and Boulanger was sent to Clermont- Ferrand to command an army corps. A Boulangist " movement " was now in full swing. The Bonapartists had attached them- selves to the general, and even the comte de Paris encouraged his foUowers to support him, to the dismay of those old-fashioned Royalists who resented Boulanger's treatment of the due d'Aumale. His name was the theme of the popular song of the moment

— ” C’est Boulanger qu’il nous faut “; the general and his black horse became the idol of the Parisian populace; and he was urged to play the part of a plebiscitary candidate for the presidency.

The general’s vanity lent itself to what was asked of it; after various symptoms of insubordination had shown themselves, he

was deprived of his command in 1888 for twice coming to Paris without leave, and finally on the recommendation of a council of inquiry composed of five generals, his name was removed from the army list. He was, however, almost at once elected to the chamber for the Nord, his political programme being a demand for a revision of the constitution. In the chamber he was in a minority, since genuine Republicans of all varieties began to see what his success would mean, and his actions were accordingly directed to keeping the public gaze upon himself. A popular hero survives many deficiencies, and neither his failure as an orator nor the humiliation of a discomfiture in a duel with M. Floquet, then an elderly civilian, sufficed to check the enthusiasm of his following. During 1888 his personality was the dominating feature of French politics, and, when he resigned his seat as a protest against the reception given by the chamber to his revisionist proposals, constituencies vied with one another in selecting him as their representative. At last, in January 1889, he was returned for Paris by an overwhelming majority. He had now become an open menace to the parliamentary Republic. Had Boulanger immediately placed himself at the head of a revolt he might at this moment have effected the coup aV ttat which the intriguers had worked for, and might not improbably have made himself master of France; but the favourable opportunity passed. The government, with M. Constans as minister of the interior, had been quietly taking its measures for bringing a prosecution against him, and within two months a warrant was signed for his arrest. To the astonish- ment of his friends, on the 1st of April he fled from Paris before it could be executed, going first to Brussels and then to London. It was the end of the political danger, though Boulangist echoes continued for a little while to reverberate at the polls during 1889 and 1890. Boulanger himself, having been tried and con- demned in absentia for treason, in October 1889 went to live in Jersey, but nobody now paid much attention to his doings. The world was startled, however, on the 30th of September 1891 by hearing that he had committed suicide in a cemetery at Brussels by blowing out his brains on the grave of his mistress, Madame de

Bonnemains (nee Marguerite Crouzet), who had died in the preceding July.

See also the article France: History; and Verly, Le General Boulanger et la conspiration monarchique (Paris, 1893). (H. Ch.)

BOULAY DE LA MEURTHE, ANTOINE JACQUES CLAUDE JOSEPH, Comte (1761-1840), French politician and magistrate, son of an agricultural labourer, was born at Chamousey (Vosges) on the 19th of February 1761. Called to the bar at Nancy in 1783, he presently went ‘to Paris, where he rapidly acquired a reputation as a lawyer and a speaker. He supported the revo- lutionary cause in Lorraine, and fought at Valmy (1792) and Wissembourg (1793) in the republican army. But his moderate principles brought suspicion on him, and during the Terror he had to go into hiding. He represented La Meurthe in the Council of Five Hundred, of which he was twice president, but his views developed steadily in the conservative direction. Fearing a possible renewal of the Terror, he became an active member of the plot for the overthrow of the Directory in November 1799. He was rewarded by the presidency of the legislative commission formed by Napoleon to draw up the new constitution; and as president of the legislative section of the council of state he examined and revised the draft of the civil code. In eight years of hard work as director of a special land commission he settled the titles of land acquired by the French nation at the Revolution, and placed on an unassailable basis the rights of the proprietors who had bought this land from the government. He received the grand cross of the Legion of Honour and the title of count, was a member of Napoleon’s privy council, but was never in high favour at court. After Waterloo he tried to obtain the recog- nition of Napoleon II. He was placed under surveillance at Nancy, and later at Halberstadt and Frankfort-on-Main. He was allowed to return to France in 1819, but took no further active part in politics, although he presented himself unsuccess- fully for parliamentary election in 1824 and 1827. He died in Paris on the 4th of February 1840. He published two books on

English history — Essai sur les causes qui, en 1649, amenerent en Angleterre I ‘ Uablissement de la r&publique (Paris, 1799), and Tableau politique des regnes de Charles II et Jacques II, derniers rois de la maison de Stuart (The Hague, 1818)— which contained much indirect criticism of the Directory and the Restoration governments. He devoted the last years of his life to writing his memoirs, which, with the exception of a fragment on the Theorie constitutionnelle de Sieyes (1836), remained unpublished.

His elder son, Comte Henri Georges Botjlay de la Meurthe (1797-1858), was a constant Bonapartist, and after the election of Louis Napoleon to the presidency, was named (January 1849) vice-president of the republic. He zealously promoted popular education, and became in 1842 president of the society for elementary instruction.

BOULDER, a city and the county-seat of Boulder county, Colorado, U.S.A., about 30 m. N.W. of Denver. Pop. (1890) 3330; (1900) 6150 (693 foreign-born); (1910)9539. It is served by the Union Pacific, the Colorado & Southern, and the Denver, Boulder & Western railways ; the last connects with the neighbour- ing mining camps, and affords fine views of mountain scenery. Boulder lies about 5300 ft. above the sea on Middle Boulder Creek, a branch of the St Vrain river about 30 m. from its confluence with the Platte, and has a beautiful situation in the valley at the foot of the mountains. The state university of Colorado, established at Boulder by an act of 1861, was opened in 1877; it includes a college of liberal arts, school of medicine (1883), school of law (1892), college of engineering (1893), graduate school, college of commerce (1906), college of education (1908), and a summer school (1904), and has a library of about 42,000 volumes. There are a fine park of 2840 acres, the property of the city, and three beautiful canons near Boulder. At the southern limits, in a beautiful situation 400 ft. above the city, are the grounds of an annual summer school, the Colorado Chautauqua. The climate is beneficial for those afflicted with bronchial and pulmonary troubles; the average mean annual temperature for eleven years ending with 1907 was 51 F. There are medicinal springs in the vicinity. The water-works are owned and operated by the city, the water being obtained from lakes at the foot of the Arapahoe Peak glacier in the Snowy Range, 20 m. from the city. The surrounding country is irri- gated, and successfully combines agriculture and mining. There are ore sampling works and brick-making establishments. Oil and natural gas abound in the vicinity; there are oil refineries in the city; and in Boulder county, especially at Nederland, 18 m. south-west, and at Eldora, about 22 m. south-west of the city, has been obtained since 1900 most of the tungsten mined in the United States; the output in 1907 was valued at about $520,000. The first settlement near the site of Boulder was made in the autumn of 1858. Placer gold was discovered on an affluent of Boulder Creek in January 1859. The town was laid out and organized in February 1859, and a city charter was secured in 1871 and another in 1882.

BOULDER (short for ” boulder-stone,” of uncertain origin; cf. Swed. bullersten, a large stone which causes a noise of rippling water in a stream, from bullra, to make a loud noise), a large stone, weathered or

water-worn; especially a geological term for a large mass of rock transported to a distance from the formation to which it belongs. Similarly, in mining, a mass of ore found at a distance from the lode.

BOULDER CLAY, in geology, a deposit of clay, often full of boulders, which is formed in and beneath glaciers and ice-sheets wherever they are found, but is in a special sense the typical deposit of the Glacial Period in northern Europe and America. Boulder clay is variously known as ” till ” or ” ground moraine ” (Ger. Blocklehme, Geschiebsmergel or Grundmorane; Fr. argile d. blocaux, moraine profonde; Swed. Krosstenslera). It is usually a stiff, tough clay devoid of stratification; though some varieties are distinctly laminated. Occasionally, within the boulder clay, there are irregular lenticular masses of more or less stratified sand, gravel or loam. As the boulder clay is the result of the abrasion (direct or indirect) of the older rocks over which the ice has travelled, it takes its colour from them; thus, in Britain,

over Triassic and Old Red Sandstone areas the clay is red, over Carboniferous rocks it is often black, over Silurian rock it may be buff or grey, and where the ice has passed over chalk the clay may be quite white and chalky (chalky boulder clay). Much boulder clay is of a bluish-grey colour where unexposed, but it becomes brown upon being weathered.

The boulders are held within the clay in an irregular manner, and they vary in size from mere pellets up to masses many tons in weight. Usually they are somewhat oblong, and often they possess a flat side or ” sole “; they may be angular, sub-angular, or well rounded, and, if they are hard rocks, they frequently bear grooves and scratches caused by contact with other rocks while held firmly in the moving ice. Like the clay in which they are borne, the boulders belong to districts over which the ice has travelled; in some regions they are mainly limestones or sandstones; in others they are granite, basalts, gneisses, &c. ; indeed, they may consist of any hard rock. By the nature of the contained boulders it is often possible to trace the path along which a vanished ice-sheet moved; thus in the Glacial drift of the east coast of England many Scandinavian rocks can be recognized.

With the exception of foraminifera which have been found in the boulder clay of widely separated regions, fossils are practi- cally

unknown; but in some maritime districts marine shells have been incorporated with the clay. See Glacial Period; and Glacier.

BOULE (Gr. fiovXii,, literally “will,” “advice”; hence a ” council “), the general term in ancient Greece for an advisory council. In the loose Homeric state, as in all primitive societies, there was a council of this kind, probably composed of the heads of families, i.e. of the leading princes or nobles, who met usually on the summons of the king for the purpose of consultation. Sometimes, however, it met on its own initiative, and laid sugges- tions before the king. It formed a means of communication between the king and the freemen assembled in the Agora. In Dorian states this aristocratic form of government was retained (for the Spartan Council of Elders see Gerousia). In Athens the ancient council was called the Boule until the institution of a democratic council, or committee of the Ecclesia, when, for purposes of distinction, it was described as ” the Boule on the Areopagus,” or, more shortly, ” the Areopagus ” {q.v.). It must be clearly understood that the second, or Solonian Boule, was entirely different from the Areopagus which represented the Homeric Council of the King throughout Athenian history, even after the ” mutilation ” carried out by Ephialtes. Further, it is, as will appear below, a profound mistake to call the second Boule a ” senate.” There is no real analogy between the Roman senate and the Athenian council of Five Hundred.

Before describing the Athenian Boule, the only one of its kind of which we have even fairly detailed information, it is necessary to mention that councils existed in other Greek states also, both oligarchic and democratic. A Boule was in the first place a necessary part of a Greek oligarchy; the transition from monarchy to oligarchy was nominally begun by the gradual transference of the powers of the monarch to the Boule of nobles. Further, in the Greek democracy, the larger democratic Boule was equally essential. The general assembly of the people was utterly unsuited to the proper management of state affairs in all their minutiae. We therefore find councils of both kinds in almost all the states of Greece, (i) At Corinth we learn that there was an oligarchic council of unknown numbers presided over by eight leaders (Nicol. Damasc. Frag. 60). It was probably like the old Homeric council, except that its constitution did not depend on a birth qualification, but on a high census. This was natural in Corinth where, according to Herodotus (ii. 167), mercantile pursuits bore no stigma. (2) From an inscription we learn that the Athenians, in imposing a constitution on Erythrae (about 450 B.C.), included a council analogous to their own. (3) In Elis (Thuc. v. 47) there was an aristocratic council of ninety, which was superseded by a popular council of six hundred (471). (4) Similarly in Argos there were an

aristocratic council of eighty and later a popular council of much larger size (Thuc.

v. 47). Councils are also found at (5) Rhodes, (6) Megalopolis (democratic), (7) Corcyra (democratic), (Thuc. iii. 70). Of these seven the most instructive is that of Erythrae, which proves that in the 5 th century the Council of Five Hundred was so efficient in Athens that a similar body was imposed at Erythrae (and probably in the other tributary cities).

The Boule at Athens. History. — The origin of the second Boule, or Council of Four Hundred, at Athens is involved in obscurity. In the Aristotelian Constitution of Athens (c. 4), it is stated that Draco established a council of 401, and that he transferred to it some of the functions of the Council 01 Areopagus (q.v.). It is, however, generally held (see Draco) that this statement is untrue, and that it was Solon who first established the council as a part of the constitution. Thirdly, it has been held that the council was not invented either by Draco or by Solon, but was of older and unknown origin. Fourthly, it has also been maintained by some recent writers that no BoulS existed before Cleisthenes. The principal evidence for this view is the omission of any reference to the Boule in one of the earliest Athenian inscriptions, that relating to Salamis (Hicks and Hill, No. 4), where in place of the customary formula of a later age, e5oˆ€ rfj (5ov\§ Kal toj 5-qnV, we have the formula ‘t&oxaev tco 5i7;iiCjj. This argument is far from conclusive, and it is clear from the Constitution (c. 20) that the resistance of the Boule to Cleomenes and Isagoras was anterior to the legislation of Clei- sthenes (i.e. that the Boule in question was the Solonian and not the Cleisthenian). On the whole it is reasonable to conclude that it was Solon who invented the Boule to act as a semi-demo- cratic check upon the democracy, whose power he was increasing at the expense of the oligarchs by giving new powers to the people in the Ecclesia and the Dicasteries. Practically nothing is known of the operations of this council until the struggle between Isagoras and Cleisthenes (Herod, v. 72). Solon’s council had been based on the four Ionic tribes. When Clei- sthenes created the new ten tribes in order to destroy the local influence of dominant families and to give the country demes a share in government, he changed the Solonian council into a body of 500 members, 50 from each tribe. This new body (see below) was the keystone of the Cleisthenean democracy, and may be said in a sense to have embodied the principle of local representation. After Cleisthenes, the council remained un-altered till 306 B.C., when, on the addition of two new tribes named after Antigonus and his son, Demetrius Poliorcetes, its numbers were increased to 600. In a.d. 126-127 the old number of 500 was restored.

A council of 750 members is mentioned in an inscription of the early 3rd century a.d., and about a.d. 400 the number of councillors had fallen to 300.

Constitution and Functions. — (a) Under Solon the council consisted of 400 members, 100 from each of the four Ionic tribes. It is certain that all classes were eligible except the Thetes, but the method of appointment is not known. Three suggestions have been made, (1) that each tribe chose its representatives, (2) that they were chosen by lot from qualified citizens in rotation, (3) that the combined method of selection by lot from a larger number of elected candidates was employed. According to the passage in Plutarch's Solon the functions of this body were from the first probouleutic (i.e. it prepared the business for the Ecclesia). Others hold that this function was not assigned to it until the Cleisthenean reforms. When we consider, however, the double danger of leaving the Ecclesia in full power, and yet under the presidency of the aristocratic archons, it seems probable that the pro- bouleutic functions were devised by Solon as a method of main- taining the balance. On this hypothesis the Solonian Boule was from the first what it certainly was later, a committee of the Ecclesia, i.e. not a " senate." It may be regarded as certain that the system of Prytaneis was the invention of Cleisthenes, not of Solon, (b) Under Cleisthenes the cle '~ , council reached its full development as a democratic council. representative body. Its actual organization is still uncertain, but it may be inferred that it became gradually a more strictly self -existent body than the Solonian council. Every

Solon's council.

full citizen of thirty years of age was eligible, and, unlike other civil offices, it was permissible to serve twice, but not more than twice (Ath. Pol. c. 62). It may be regarded as certain, although our evidence is derived from inscriptions which date from the 3rd century B.C., that from the first the Bouleutae were appointed by the demes, in numbers proportionate to the size of the deme, and that from the first also the method of sortition was employed. For each councillor chosen by lot, a substitute was chosen in case of death or disgrace. After nomination each had to pass before the old council an examination in which the whole of his private life was scrutinized. After this, the councillors had to take an oath that they (1) would act according to the laws, (2) would give the best advice in their power, and (3) would carry out the

examination of their successors in an impartial spirit. As symbols of office they wore wreaths; they received payment originally at the rate of one drachma a day, 1 at the end of the 4th century of five obols a day. At the end of the year of office each councillor had to render an account of his work, and if the council had done well the people voted crowns of honour. Within its own sphere the council exercised disciplinary control over its members by the device known as Ecphyllophoria; it could provisionally suspend a member, pending a formal trial before the whole council assembled ad hoc. The council had further a complete system of scribes or secretaries (grammateis) , private treasury officials, and a paid herald who summoned the Boule and the Ecclesia. The meetings took place generally in the council hall (Bouleuterion) , but on special occasions in the theatre, the stadium, the dockyards, the Acropolis or the Theseum. They were normally public, the audience being separated by a barrier, but on occasions of peculiar importance the public was excluded.

The Ecclesia, owing to its size and constitution, was unable to meet more than three or four times a month; the council, on Prytaneis. t ˆ e other hand, was in continuous session, except on feast days. It was impossible that the Five Hundred should all sit every day, and, therefore, to facilitate the despatch of business, the system of Prytaneis was introduced, probably by Cleisthenes. By this system the year was divided into ten equal periods. During each of these periods the council was represented by the fifty councillors of one of the ten tribes, who acted as a committee for carrying on business for a tenth of the year. Each of these committees was led by a president (Epi-states), who acted as chairman of the Boule and the Ecclesia also, and a third of its numbers lived permanently during their period of office in the Tholos (Dome) or Skias, a round building where they (with certain other officials and honoured citizens) dined at the public expense. In 378-377 B.C. (or perhaps in the archonship of Eucleides, 403) the presidency of the Ecclesia was transferred to the Epistates of the Proedri, the Proedri being a body of nine chosen by lot by the Epistates of the Prytaneis from the remaining nine tribes. It was the duty of the Boule {i.e. the Prytany which was for the time in session) to prepare all business for the consideration of the Ecclesia. Their recom- mendation (,Trpoj3ov\ev fia) was presented to the popular assembly (for procedure, see Ecclesia), which either passed it as it stood or made amendments subject to certain conditions. It must be clearly understood that the recommendation of the council had no intrinsic force until by the votes of the Ecclesia it passed into law as a psephism. But in addition to this function, the Council of the Five Hundred had large administrative and judicial control. (1) It was

before the council that the Poletae arranged the farming of public revenues, the receipt of tenders for public works and the sale of confiscated property; further, it dealt with defaulting collectors (enXoyas), exacted the debts of private persons to the state, and probably drew up annual estimates. (2) It supervised the treasury payments of the Apodectae (" Receivers ") and the " Treasurers of the God." (3) From Demosthenes (In Androt.) it is clear that it had to arrange for the provision of so many triremes per annum and

1 The institution of pay for the councillors may safely be ascribed to Pericles although we have no direct evidence of it before 41 1 B. c. (Thuc. viii. 69; see Pericles).

the award of the trierarchic crown. (4) It arranged for the maintenance of the cavalry and the special levies from the demes. (5) It heard certain cases of eisangelia (impeachment) and had the right to fine up to 500 drachmas, or hand the case over to the Heliaea. The cases which it tried were mainly prosecutions for crimes against the state {e.g. treason, conspiracy, bribery). In later times it acted mainly as a court of first instance. Subsequently (Ath. Pol. c. 45) its powers were limited and an appeal was allowed to the popular courts. (6) The council presided over the dokimasia (consideration of fitness) of the magistrates ; this examination, which was originally concerned with a candidate's moral and physical fitness, de- generated into a mere inquiry into his politics. (7) In foreign affairs the council as the only body in permanent session naturally received foreign envoys and introduced them to the Ecclesia. Further, the Boule, with the Strategi (" Generals "), took treaty oaths, after the Ecclesia had decided on the terms. The Xeno- phontic Politeia states that the council of the 5th century was " concerned with war," but in the 4th century it chiefly super- vised the docks and the fleet. On two occasions at least the council was specially endowed with full powers; Demosthenes {De Fals. Leg. p. 389) states that the people gave it full powers to send ambassadors to Philip, and Andocides (De Myst. 14 foil.) states that it had full power to investigate the affair of the mutila- tion of the Hermae on the night before the sailing of the Sicilian Expedition.

It will be seen that this democratic council was absolutely essential to the working of the Athenian state. Without having any final legislative authority, it was a necessary part of the legislative machinery, and it may be regarded as certain that a large proportion of its recommendations were passed without alteration or even discussion by the Ecclesia. The Boule was, therefore, in the strict sense a

committee of the Ecclesia, and was immediately connected with a system of sub-committees which exercised executive functions.

Bibliography. — With thisarticle compare Ecclesia, Strategus, Archon, Draco, Solon, Cleisthenes, where collateral information is given. Besides the chief histories of Greece (Grote, ed. 1907, Meyer &c), see Gilbert, Constitutional Antiquities (Eng. trans, by E. J. Brooks and T. Nicklin, 189s; J. B. Bury, History of Greece (1900); A. H. J. Greenidge Handbook of Greek Constitutional History (1896) ; J. E. Sandys' edition of the Constitution of Athens; Boeckh, Die Staatshaushaltung der Athener* (1886); Schomann, Griechische Altertumer (1897-1902); Busolt, Die griechischen Staats- und Rechtsaltertumer (1902). See also H. Swoboda, Die griechischen Volksbeschliisse (1890); Szanto, Das griechische Bilrgerrecht (1892); Perrot, Essai sur le droit public d'Athenes (1869). It should be observed that all works published before 1891 are so far useless that they are without the information contained in the Constitution of Athens (a. v.). See also Greek Law. (J. M. M.)

BOULEVARD (a Fr. word, earlier boulevart, from Dutch or Ger. Bollwerk, cf. Eng. " bulwark "), originally, in fortification, an earthwork with a broad platform for artillery. It came into use owing to the width of the gangways in medieval walls being insufficient for the mounting of artillery thereon. The boulevard or bulwark was usually an earthen outwork mounting artillery, and so placed in advance as to prevent the guns of a besieger from battering the foot of the main walls. It was as a rule circular. Semicircular demi-boulevards were often constructed round the bases of the old masonry towers with the same object. In modern times the word is most frequently used to denote a promenade laid out on the site of a former fortification, and, by analogy, a broad avenue in a town planted with rows of trees.

BOULLE, ANDRE CHARLES (1642-1732), French cabinet- maker, who gave his name to a fashion of inlaying known as Boulle or Buhl work. The son of Jean Boulle, a member of a family of ebenistes who had already achieved distinction — Pierre Boulle, who died c. 1636, was for many years tourneur et menuisier du roy des cabinets d'ebene, — he became the most famous of his name and was, indeed, the second cabinet-maker — the first was Jean Mace — who has acquired individual renown. That must have begun at a comparatively early age, for at thirty he had already been granted one of those lodgings in the galleries of the Louvre which had been set apart by Henry IV. for the use of the

most talented of the artists employed by the crown. To be admitted to these galleries was not only to receive a signal mark of royal favour, but to enjoy the important privilege of freedom from the trammels of the trade gilds. Boulle was given the deceased Jean Mace's own lodging in 1672 by Louis XIV. upon the recommendation of Colbert, who described him as " le plus habile iUniste de Paris," but in the patent conferring this privilege he is described also as " chaser, gilder and maker of marqueterie." Boulle appears to have been originally a painter, since the first payment to him by the crown of which there is any record (1669) specifies " outrages de peinture." He was employed for many years at Versailles, where the mirrored walls, the floors of " wood mosaic,'-' the inlaid panelling and the pieces in marqueterie in the Cabinet du Dauphin were regarded as his most remarkable work. These rooms were long since dismantled and tneir contents dispersed, but Boulle's drawings for the work are in the Musee des Arts D6coratifs. His royal commissions were, indeed, innumerable, as we leam both from the Comptes des bdtiments and from the correspondence of Louvois. Not only the most magnificent of French monarchs, but foreign princes and the great nobles and financiers of his own country crowded him with commissions, and the mot of the abbe de Marolles, " Boulle y lourne en ovale," has become a stock quotation in the literature of French cabinet-making. Yet despite his distinction, the facility with which he worked, the high prices he obtained, and his workshops full of clever craftsmen, Boulle appears to have been constantly short of money. He did not always pay his workmen, clients who had made considerable advances failed to obtain the fine things they had ordered, more than one application was made for permission to arrest him for debt under orders of the courts within the asylum of the Louvre, and in 1 704 we find the king giving him six months' protection from his creditors on condition that he used the time to regulate his affairs or " ce sera la derniere grace que sa majeste lui fera la-dessus." Twenty years later one of his sons was arrested at Fontainebleau and kept in prison for debt until the king had him released. In 1720 his finances were still further embarrassed by a fire which, beginning in another atelier, extended to his twenty workshops and destroyed most of the seasoned materials, appliances, models and finished work of which they were full. The salvage was sold and a petition for pecuniary help was sent to the regent, the result of which does not appeir. It would seem that Boulle

was never a good man of business, but, according to his friend Mariette, many of his pecuniary difficulties were caused by his passion for collecting pictures, engravings and other objects of art — the inventory of his losses in the fire, which exceeded £40,000 in amount, enumerates many old masters, including forty-eight drawings by Raphael and the manuscript journal kept by Rubens in Italy. He attended every sale of drawings and engravings, borrowed at high interest to pay for his pur- chases, and when the next sale took place, fresh expedients were devised for obtaining more money. Collecting was to Boulle a mania of which, says his friend, it was impossible to cure him. Thus he died in 1732, full of fame, years and debts. He left four sons who followed in his footsteps in more senses than one — Jean Philippe (born before 1690, dead before 1745), Pierre Benoit (d. 1741), Charles Andre (1685-1749) and Charles Joseph (1688-1754). Their affairs were embarrassed throughout their lives, and the three last are known to have died in debt.

AH greatness is the product of its opportunities, and.the elder Boulle was made by the happy circumstances of his time. He was born into a France which was just entering upon the most brilliant period of sumptuary magnificence which any nation has known in modern times. Louis XIV., so avid of the delights of the eye, by the reckless extravagance of his example turned the thoughts of his courtiers to domestic splendours which had hitherto been rare. The spacious palaces which arose in his time needed rich embellishment, and Boulle, who had not only inherited the rather flamboyant Italian traditions of the late Renaissance, but had ibenisterie in his blood, arose, as some such man invariably does arise, to gratify tastes in which personal pride and love of art were not unequally intermingled. He was

by no means the first Frenchman to practise the delightful art of marqueterie, nor was he quite the inventor of the peculiar type of inlay which is chiefly associated with his name; but no artist, before or since, has used these motives with such astonish- ing skill, courage and surety. He produced pieces of monumental solidity blazing with harmonious colour, or gleaming with the sober and dignified reticence of ebony, ivory and white metal. The Renaissance artists chiefly employed wood in making furniture, ornamenting it with gilding and painting, and inlaying it with agate, cornelian, lapis-lazuli, marble of various tints, ivory, tortoise-shell, mother-of-pearl and various woods. Boulle improved upon this by inlaying brass devices into wood or tortoise-shell, which last he greatly used according to the design he had immediately in view, whether flowers, scenes, scrolls, &c; to these he sometimes added enamelled metal. Indeed the use of tortoise-shell

became so characteristic that any furniture, however cheap and common, which has a reddish fond that might by the ignorant be mistaken for inlay, is now described as ” Buhl ” — the name is the invention of the British auctioneer and furniture-maker. In this process the brass is thin, and, like the ornamental wood or tortoise-shell, forms a veneer. In the first instance the production of his work was costly, owing to the quantity of valuable material that was cut away and wasted, and, in addition, the labour lost in separately cutting for each article or copy of a pattern. By a subsequent improvement Boulle effected an economy by gluing together various sheets of material and sawing through the whole, so that an equal number of figures and matrices were produced at one operation. Boulle adopted from time to time various plans for the improvement of his designs. He placed gold-leaf or other suitable material under the tortoise-shell to produce such effect as he required; he chased the brass-work with a graver for a like purpose, and, when the metal required to be fastened down with brass pins or nails, these were hammered flat and disguised by ornamental chasing. He also adopted, in relief or in the round, brass feet, brackets, edgings, and other ornaments of appropriate design, partly to protect the corners and edges of his work, and partly for decora- tion. He subsequently used other brass mountings, such as claw-feet to pedestals, or figures in high or low relief, according to the effect he desired to produce. These mounts in the pieces that undoubtedly come from Boulle’s atelier are nearly always of the greatest excellence. They were cast in the rough — the tools of the chaser gave them their sharpness, their minute finish, their jewel-like smoothness.

Unhappily it is by no means easy, even for the expert, to declare the authenticity of a commode, a bureau, or a table in the manner of Boulle and to all appearance from his workshops. His sons unquestionably carried on the traditions for some years after his death, and his imitators were many and capable. A few of the more magnificent pedigree-pieces are among the world’s mobiliary treasures. There are, for instance, the two famous armoires, which fetched £12,075 at the Hamilton Palace sale; the marqueterie commodes, enriched with bronze mounts, in the Bibliotheque Mazarine; various cabinets and commodes and tables in the Louvre, the Musee Cluny and the Mobilier National; the marriage coffers of the dauphin which were in the San Donato collection. There are several fine authenticated pieces in the Wallace collection at Hertford House, together with others consummately imitated, probably in the Louis Seize period. On the rare occasions when a pedigree example comes into the auction-room, it invariably commands a high price; but there can be little doubt that the most splendid and sumptuous

specimens of Boulle are diminishing in number, while the second and third classes of his work are perhaps becoming more numerous. The truth is that this wonderful work, with its engraved or inlaid designs of Berainj its myriads of tiny pieces of ivory and copper, ebony and tortoise-shell, all kept together with glue and tiny chased nails, and applied very often to a rather soft, white wood, is not meet to withstand the ravages of time and the variations of the atmosphere. Alternate heat and humidity are even greater enemies of inlaid furniture than time and wear— such delicate things are rarely much used, and

are protected from ordinary chances of deterioration. There is consequently reason to rejoice when a piece of real artistry in furniture finds its final home in a museum, where a degree of warmth is maintained which, however distressing it may be to the visitor, at least preserves the contents from one of the worst enemies of the collector. (J. P.-B.)

BOULOGNE, or Boullongne, the name of a family of French painters. Louis (1609-1674), who was one of the original members of the Academy of Painting and Sculpture (1648), became celebrated under Louis XIV. His traditions were con- tinued by his children: Genevieve (1645-1708), who married the sculptor Jacques Clerion; Madeleine (1646-1710), whose work survives in the Trophies d'armes at Versailles; Bon (1649- 171 7), a successful teacher and decorative artist; and Louis the younger (1654-1733), who copied Raphael's cartoons for the Gobelins tapestry, and besides taking a high place as a painter was also a designer of medals.

BOULOGNE-SUR-MER, a fortified seaport of northern France and chief town of an arrondissement in Pas-de-Calais, situated on the shore of the English Channel at the mouth of the river Liane, 157 m. N.N.W. of Paris on the Northern railway, and 28 m. by sea S.E. of Folkestone, Kent. Pop. (1906) 49,636. Boulogne occupies the summit and slopes of a ridge of hills skirting the right bank of the Liane; the industrial quarter of Capecure extends along the opposite bank, and is reached by two bridges, while the river is also crossed by a double railway viaduct. The town consists of two parts, the Haute Ville and the Basse Ville. The former, situated on the top of the hill, is of comparatively small extent, and forms almost a parallelogram, surrounded by ramparts of the 13th century, and, outside them, by boulevards, and

entered by ancient gateways. In this part are the law court, the chateau and the hotel de ville (built in the 18th century), and a belfry tower of the 13th and 17th centuries is in the immediate neighbourhood. In the chateau (13 th cen- tury) now used as barracks, the emperor Napoleon III. was confined after the abortive insurrection of 1840. At some dis- tance north-west stands the church of Notre-Dame, a well-known place of pilgrimage, erected (1827-1866) on the site of an old building destroyed in the Revolution, of which the extensive crypt still remains. The modern town stretches from the foot of the hill to the harbour, along which it extends, terminating in an expanse of sandy beach frequented by bathers, and pro- vided with a bathing establishment and casino. It contains several good streets, some of which are, however, very steep. A main street, named successively rue de la Lampe, St Nicolas and Grande rue, extends from the bridge across the Liane to the promenade by the side of the ramparts. This is intersected first by the Quai Gambetta, and farther back by the rue Victor Hugo and the rue Nationale, which contain the principal shops. The public buildings include several modern churches, two hospitals and a museum with collections of antiquities, natural history, porcelain, &c. Connected with the museum is a public library with 75,000 volumes and a number of valuable manuscripts, many of them richly illuminated. There are English churches in the town, and numerous boarding-schools intended for English pupils. Boulogne is the seat of a sub-prefect, and has tribunals of first instance and of commerce, a board of trade-arbitrators, a chamber of commerce and a branch of the Bank of France. There are also communal colleges, a national school of music, and schools of hydrography, commerce and industry. Boulogne has for a long time been one of the most anglicized of French cities; and in the tourist season a continuous stream of English travellers reach the continent at this point.

The harbour is formed by the mouth of the Liane. Two jetties enclose a channel leading into the river, which forms a tidal basin with a depth at neap-tides of 24 ft. Alongside this is an extensive dock, and behind it an inner port. There is also a tidal basin opening off the entrance channel. The depth of water in the river-harbour is 33 ft. at spring-tide and 24 ft. at neap-tide; in the sluice of the dock the numbers are 29J and 23! respectively. The commerce of Boulogne consists chiefly in the importation of jute, wool, woven goods of silk and’ wool, skins,

threads, coal, timber, and iron and steel, and the exportation of wine, woven goods, table fruit, potatoes and other vegetables, skins, motor-cars, forage and cement. The average annual value of the exports in

the five years 1901-1905 was £10,953,000 (£u,7°4,ooo in the years 1896-1900), and of the imports £6,064,000 (£7,003,000 in the years 1896-1900). From 1901 to 1905 the annual average of vessels entered, exclusive of fishing- smacks, was 2735, tonnage 1,747,699; and cleared 2750, tonnage 1,748,297. The total number of passengers between Folkestone and Boulogne in 1906 was 295,000 or 49% above the average for the years 1901-1905. These travelled by the steamers of the South-Eastern & Chatham railway company. The liners of the Dutch-American, Hamburg-American and other companies also call at the port. In the extent and value of its fisheries Boulogne is exceeded by no seaport in France. The most important branch is the herring-fishery; next in value is the mackerel. Large quantities of fresh fish are transmitted to Paris by railway, but an abundant supply is reserved to the town itself. The fishermen live for the most part in a separate quarter called La Beurriere, situated in the upper part of the town. In 1905 the fisheries of Boulogne and the neighbouring village of Staples employed over 400 boats and 4500 men, the value of the fish taken being estimated at £1,025,000. Among the numerous industrial establishments in Boulogne and its environs may be mentioned foundries, cement-factories, important steel- pen manufactories, oil-works, dye-works, fish-curing works, flax-mills, saw-mills, and manufactories of cloth, fireproof ware, chocolate, boots and shoes, and soap. Shipbuilding is also carried on.

Among the objects of interest in the neighbourhood the most remarkable is the Colonne de la Grande Armee, erected on the high ground above the town, in honour of Napoleon I., on occasion of the projected invasion of England, for which he here made great preparations. The pillar, which is of the Doric order, 166 ft. high, is surmounted by a statue of the emperor by A. S. Bosio. Though begun in 1804, the monument was not completed till 1841. On the edge of the cliff to the east of the port are some rude brick remains of an old building called Tour d'Ordre, said to be the ruins of a tower built by Caligula at the time of his intended invasion of Britain.

Boulogne is identified with the Gessoriacum of the Romans, under whom it was an important harbour. It is suggested that it was the Partus Itius where Julius Caesar assembled his fleet (see Itius Portus). At an early period it began to be known as Bononia, a name which has been gradually modified into the present form. The town was destroyed by the Normans in 882, but restored about 912. During the Carolingian period Boulogne was the chief town of a countship that was for long the subject of dispute between Flanders and Ponthieu. From the year 965 it belonged to the house of Ponthieu, of which Godfrey of Bouillon, the first king of Jerusalem, was a scion. Stephen

of Blois, who became king of England in 1 13 5, had married Mahaut, daughter and heiress of Eustace, count of Boulogne. Their daughter Mary married Matthew of Alsace (d. n 73), and her daughter Ida (d. 1216) married Renaud of Dammartin. Of this last marriage was issue Mahaut, countess of Boulogne, wife of Philip Hurepel (d. 1 234) , a son of King Philip Augustus. To her succeeded the house of Brabant, issue of Mahaut of Boulogne, sister of Ida, and wife of Henry I. of Brabant; and then the house of Auvergne, issue of Alice, daughter of Henry I. .of Brabant, inherited the Boulonnais. It remained in the posses- sion of descendants of these families until Philip the Good, duke of Burgundy, seized uponit in 1419. In 1477 Louis XI. of France reconquered it, and reunited it to the French crown, giving Lauraguais as compensation to Bertrand IV. de la Tour, count of Auvergne, heir of the house of Auvergne. To avoid doing homage to Mary of Burgundy, suzerain of the Boulonnais and countess of Artois, Louis XL declared the countship of Boulogne to be held in fee of Our Lady of Boulogne. In 1544 Henry VIII. — more successful in this than Henry III. had been in 1347 — took the town by siege; but it was restored to France in 1550.

From 1566 to the end of the 18th century it was the seat of a bishopric.

BOULOGNE-SUR-SEINE, a town of northern France, in the department of Seine, on the right bank of the Seine, S.W. of Paris and immediately outside the fortifications. Pop. (1906) 49,412. The town has a Gothic church of the 14th and 15th centuries (restored in 1863) founded in honour of Notre-Dame of Boulogne-sur-Mer. To this fact is due the name of the place, which was previously called Menus-les-St Cloud. Laundrying is extensively carried on as well as the manufacture of metal boxes, soap, oil and furniture, and there are numerous handsome residences. For the neighbouring Bois de Boulogne see Paris.

BOULTON, MATTHEW (1728-1809), English manufacturer and engineer, was born on the 3rd of September 1728, at Bir- mingham, where his father, Matthew Boulton the elder, was a manufacturer of metal articles of various kinds. To this business he succeeded on his father's death in 1759, and in consequence of its growth removed his works in 1762 from Snowhill to what was then a tract of barren heath at Soho, 2 nr. north of Birmingham. Here he undertook the

manufacture of artistic objects in metal, as well as the reproduction of oil paint- ings by a mechanical process in which he was associated with Francis Eginton (173 7-1 805), who subsequently achieved a reputation as a worker in stained or enamelled glass. About 1767, Boulton, who was finding the need of improving the motive power for his machinery, made the acquaintance of James Watt, who on his side appreciated the advantages offered by the Soho works for the development of his steam-engine. In 1772 Watt's partner, Dr John Roebuck, got into financial difficulties, and Boulton, to .whom he owed £1200, accepted the two-thirds share in Watt's patent held by him in satisfaction of the debt. Three years later Boulton and Watt formally entered into partnership, and it was mainly through the energy and self-sacrifice of the former, who devoted all the capital he possessed or could borrow to the enterprise, that the steam-engine was at length made a commercial success. It was also owing to Boulton that in 1 7 7 5 an act of parliament was obtained extending the term of Watt's 1769 patent to 1799. In 1800 the two partners retired from the business, which they handed over to their sons, Matthew Robinson Boulton and James Watt junior. In 1788 Boulton turned his attention to coining machinery, and erected at Soho a complete plant with which he struck coins for the Sierra Leone and East India companies and for Russia, and in 1797 produced a new copper coinage for Great Britain. In 1797 he took out a patent in connexion with raising water on the principle of the hydraulic ram. He died at Birmingham on the 18th of August

1809.

BOUND, or Boundary (from O. Fr. bonde, Med. Lat. bodena or bulina, a frontier line), that which serves to indicate the limit or extent of land. It is usually defined by a certain mark, such as a post, ditch, hedge, dyke, wall of stones, &c, though on the other hand it may have to be ascertained by reference to a plan or by measurement. In law, the exact boundary of land is always a matter of evidence; where no evidence is available, the court acts on presumption. For example, the boundary of land on opposite sides of a road, whether public or private, is presumed to be the middle line of the road. Where two fields are separated by a hedge and ditch the boundary line will run between the hedge and the ditch. Boundaries of parishes, at common law, depended upon ancient and immemorial custom, and in many parishes great care was taken to perpetuate the boundaries of the parish by perambulations from time to time. The confusion of local boundaries in England was the subject of several commissions and committees in the 19th century, and much information will be found in their reports (1868, 1870, 1873, 1888). The Local Government Act

1888, ss. 50-63, contains provisions for the alteration of local areas.

BOUNDS, BEATING THE, an ancient custom still observed in many English parishes. In former times when maps were rare it was usual to make a formal perambulation of the parish boundaries on Ascension day or during Rogation week. The latter is in the north of England still called ” Gang Week ”

or ” Ganging Days ” from this ” ganging ” or procession. The priest of the parish with the churchwardens and the parochial officials headed a crowd of boys who, armed with green boughs, beat with them the parish border-stones. Sometimes the boys were themselves whipped or even violently bumped on the boundary-stones to make them remember. The object of taking boys was obviously to ensure that witnesses to the boundaries should survive as long as possible. In England the custom is as old as Anglo-Saxon days, as it is mentioned in laws of Alfred and iEthelstan. It is thought that it may have been derived from the Roman Terminalia, a festival celebrated on the 22nd of February in honour of Terminus, the god of landmarks, to whom cakes and wine were offered, sports and dancing taking place at the boundaries. In England a parish-ale or feast was always held after the perambulation, which assured its popularity, and in Henry VIII. ‘s reign the occasion had become an excuse for so much revelry that it attracted the condemnation of a preacher who declared ” these solemne and accustomable processions and supplications be nowe growen into a right foule and detestable abuse.” Beating the bounds had a religious side in the practice which originated the term Rogation, the accompanying clergy being supposed to beseech (rogare) the divine blessing upon the parish lands for the ensuing harvest. This feature originated in the 5th century, when Mamercus, bishop of Vienne, instituted special prayers and fasting and processions on these days. This clerical side of the parish bounds-beating was one of the religious functions prohibited by the Injunctions of Queen Elizabeth; but it was then ordered that the perambulation should continue to be performed as a quasi-secular function, so that evidence of the boundaries of parishes, &c. might be preserved (Gibson, Codex juris Ecclesiastici Anglicani (1761) pp. 213-214). Bequests were sometimes made in connexion with bounds-beating. Thus at Leighton Buzzard on Rogation Monday, in accordance with the will of one Edward Wilkes, a London merchant who died in 1646, the trustees of his almshouses accompanied the boys. The will was read and beer and plum rolls distributed. A remarkable feature of the bequest was that while the will is read one of the boys has to stand on his head.

BOUNTY (through O. Fr. bontet, from Lat. bonitas, goodness), a gift or gratuity; more usually, a premium paid by a govern- ment to encourage some branch of production or industry, as in England in the case of the bounty on corn, first granted in 1688 and abolished in 18 14, the herring-fishery bounties, the bounties on sail-cloth, linen and other goods. It is admitted that the giving of bounties is generally impolitic, though they may some- times be justified as a measure of state. The most striking modern example of a bounty was that on sugar (q.v.) . Somewhat akin to bounties are the subsidies granted to shipping (q.v.) by many countries. Bounties or, as they may equally weU be termed, grants are often given, more especially in new countries, for the destruction of beasts of prey; in the United States and some other countries, bounties have been given for tree-planting; France has given bounties to encourage the Newfoundland fisheries.

Bounty was also the name given to the money paid to induce men to enlist in the army or navy, and, in the United Kingdom, to the sum given on entering the militia reserve. During the American Civil War, many recruits joined solely for the sake of the bounty offered, and afterwards deserted; they were called ” bounty-jumpers.” The term bounty was also applied in the English navy to signify money payable to the officers and crew of a ship in respect of services on particular occasions.

Queen Anne’s Bounty (q.v.) is a fund applied for the augmenta- tion of poor livings in the established church.

King’s Bounty is a grant made by the sovereign of his royal bounty to those of his subjects whose wives are delivered of three or more children at a birth.

BOURBAKI, CHARLES DENIS SAUTER (1816-1897), French general, was born at Pau on the 22nd of April 1816, the son of a Greek colonel who died in the War of Independence in 1827. He entered St Cyr, and in 1836 joined the Zouaves, becoming lieutenant of the Foreign Legion in 1838, and aide-de-camp to

King Louis Philippe. It was in the African expedition that he first came to the front. In 1842 he was captain in the Zouaves; 1847, colonel of the Turcos; in 1850, lieutenant-colonel of the 1st Zouaves; 1851, colonel; 1854, brigadier-general. In the Crimean War he commanded a

portion of the Algerian troops; and at the Alma, Inkerman and Sevastopol Bourbaki's name became famous. In 1857. he was made general of division, commanding in 1859 at Lyons. His success in the war with Italy was only second to that of MacMahon, and in 1862 he was pro- posed as a candidate for the vacant Greek throne, but declined the proffered honour. In 1870 the emperor entrusted him with the command of the Imperial Guard, and he played an important part in the fighting round Metz.

A curious incident of the siege of Metz is connected with Bourbaki's name. A man who called himself Regnier, 1 about the 21st of September, appeared at Hastings, to seek an interview with the refugee empress Eugenie, and failing to obtain this he managed to get from the young prince imperial a signed photo- graph with a message to the emperor Napoleon. This he used, by means of a safe-conduct from Bismarck, as credentials to Marshal Bazaine, to whom he presented himself at Metz, telling him on the empress's alleged authority that peace was about to be signed and that either Marshal Canrobert or General Bourbaki was to go to Hastings for the purpose. Bourbaki at once went to England, with Prussian connivance, as though he had a recognized mission, only to discover from the empress at Hastings that a trick had been played on him; and as soon as he could manage he returned to France. He offered his services to Gambetta and received the command of the Northern Army, but was recalled on the 19th of November and transferred to the Army of the Loire. In command of the hastily-trained and ill-equipped Army of the East, Bourbaki made the attempt to raise the siege of Belfort, which, after the victory of Villersexel, ended in the repulse of the French in the three days' battle of the Lisaine. Other German forces under Manteuffel now closed upon Bourbaki, and he was eventually driven over the Swiss frontier with the remnant of his forces (see Franco-German War). His troops were in the most desperate condition, owing to lack of food; and out of 150,000 men under him when he started, only 84,000 escaped from the Germans into Swiss territory. Bourbaki himself, rather than submit to the humiliation of a probable surrender, on the 26th of January 1871 delegated his functions to General Clinchant, and in the night fired a pistol at his own head, but the bullet, owing to a deviation of the weapon, was flattened against his skull and his life was saved. General Clinchant carried Bourbaki into Switzerland, and he recovered sufficiently to return to France. In July 1871 he again took the command at Lyons, and subsequently became military governor. In 1 88 1, owing to his political opinions, he was placed on the retired list. In 1885 he was an unsuccessful candidate for the senate. He died on the 27th of September 1897. A patriotic

Frenchman and a brilliant soldier and leader, Bourbaki, like some other French generals of the Second Empire whose training had been obtained in Africa, was found wanting in the higher elements of command when the European conditions of 1870 were concerned.

BOURBON. The noble family of Bourbon, from which so many European kings have sprung, took its name from Bourbon 1'Archambault, chief town of a lordship which in the 10th century was one of the largest baronies of the kingdom of France. The limits of the lordship, which was called the Bourbonnais, were approximately those of the modem department of Allier, being on the N. the Nivernais and Berry, on the E. Burgundy and Lyonnais, on the S. Auvergne and Marche and on the W. Berry.

1 The whole Regnier affair remained a mystery ; the man himself — who on following Bourbaki to England made the impression on Lord Granville (see the Life of Lord Granville, by Lord Fitzmaurice, ii. 61) of being a " swindler " but honestly wishing to serve the empress — was afterwards mixed up in the Humbert frauds of 1902-1903; he published his own version of the affair in 1870 in a pamphlet, Quel est voire nom? It has been suspected that on the part either of Bazaine or of the German authorities some undisclosed intrigue was on foot.

The first of the long line of Bourbons known in history was Adh6mar or Aimar, who was invested with the barony towards the close of the 9th century. Matilda, heiress of the first house of Bourbon, brought this lordship to the family of Dampierre by her marriage, in 1196, with Guy of Dampierre, marshal of Champagne (d. 1215). In 1272 Beatrix, daughter of Agnes of Bourbon-Dampierre, and her husband John of Burgundy, married Robert, count of Clermont, sixth son of Louis IX. (St Louis) of France. The elder branches of the family had become extinct, and their son Louis became duke of Bourbon in 1327. In 1488 the line of his descendants enddd with Jean II., who died in that year. The whole estates passed to Jean's brother Pierre, lord of Beaujeu, who was married to Anne, daughter of Louis XL Pierre died in 1503, leaving only a daughter, Suzanne, who, in 1505, married Charles de Montpensier, heir of the Montpensier branch of the Bourbon family. Charles, afterwards constable of France, who took the title of duke of Bourbon on his marriage, was born in 1489, and at an early age was looked upon as one of the finest soldiers and gentlemen in France. With the constable ended the direct line from Pierre L, duke of Bourbon (d. 1356). But the fourth in descent from Pierre's brother, Jacques, count of La Marche, Louis, count of Vendome and Chartres (d. 1446), became the ancestor of the royal house of Bourbon and of the noble families of Conde, Conti and Mont- pensier. The fourth in

direct descent from Louis of Vendome was Antoine de Bourbon, who in 1548 married Jeanne d'Albret, heiress of Navarre, and became king of Navarre in 1554. Their son became king of France as Henry IV. Henry was succeeded by his son, Louis XIII. , who left two sons, Louis XIV., and Philip, duke of Orleans, head of the Orleans branch. Louis XIV. 's son, the dauphin, died before his father, and left three sons, one of whom died without issue. Of the others the elder, Louis of Burgundy, died in 171 2, and his only surviving son became Louis XV. The younger, Philip, duke of Anjou, became king of Spain, and founded the Spanish branch of the Bourbon family. Louis XV. was succeeded by his grandson, Louis XVI., who perished on the scaffold. At the restoration the throne of France was occupied by Louis XVIIL, brother of Louis XVI., who in turn was succeeded by his brother Charles X. The second son of Charles X., the due de Berry, left a son, Henri Charles Ferdinand Marie Dieudonne d'Artois, due de Bordeaux, and comte de Chambord (g.v.). From Louis XIV.'s brother, Philip, descended another claimant of the throne. Philip's son was the regent Orleans, whose great-grandson, " Philippe Egalite," perished on the scaffold in 1793. Egalite's son, Louis Philippe, was king of the French from 1830 to 1848; his grandson, Louis Philippe, comte de Paris (1 838-1 894), inherited on the death of the comte de Chambord the rights of that prince to the throne of France, and was called by the royalists Philip VII. He had a son, Louis Philippe Robert, due d'Orleans, called by his adherents Philip VIII.

Spanish Branch. — Philip, duke of Anjou, grandson of Louis XIV., became king of Spain as Philip V., in 1700. He was succeeded in 1746 by his son Ferdinand VI., who died in 1759 without family, and was followed by his brother Charles III. Charles III.'s eldest son became Charles IV. of Spain in 1788, while his second son, Ferdinand, was made king of Naples in 1759. Charles IV. was deposed by Napoleon, but in 1814 his son, Ferdinand VII., again obtained his throne. Ferdinand was succeeded by his daughter Isabella, who in 1870 abdicated in favour of her son, Alphonso XII. (d. 1885). Alphonso's posthumous son became king of Spain as Alphonso XIII. Ferdinand's brother, Don Carlos (d. 1855), claimed the throne in 1833 on the ground of the Salic law, and a fierce war raged for some years in the north of Spain. His son Don Carlos, count de Montemolin (1818-1861), revived the claim, but was defeated and compelled to sign a renunciation. The nephew of the latter, Don Carlos Maria Juan Isidor, duke of Madrid, for some years carried on war in Spain with the object of attaining the rights contended for by the Carlist party.

Neapolitan Branch. — The first Bourbon who wore the crown of Naples was Charles III. of Spain, who on his succession to

o

m

o «

o

w

(/I

O § B -8

w I

O £

u

O

o

<

w o

c

o d5

55

OS M

.-5.2 O

.So 7

Ph a,ˆ •Mi,

3

-a

Hf CO

a cot

•-” r _: 3 03 i(-~

CU IO

.•SOT- j o o w* hˆ

3

a)

- 4) ON

CU Rˆ-s

a os 10

Q, CU 00 Ph «-. lO Q/+- l>

O P<

.3 CU

9 3

30*

-ˆH ˆ1 W

io*T3

‘3

O

_)

J3

■.§&&

:3ˆ00 JZ V ”

ˆw CO

‘3 o J7

►J c

3

CO

3 _

Ovo

en S 00

‘3£T

0) M

3

T3

CD

In . E on

> >5w K

3

T3

t-i

1) ‘35

a

o °V_ “IS-

JT

3

•§”°l -si? 1 –

U-i

~s° T-

-3 ‘02

cu cu 00

3

G

o

•V R—n

CU cu~

3

CD

s

3 c3 ft C 11 N

E °a

‘-N cu —

3

T3

W

CO

- l-t

as w o

_G R “5

£ ai O

- £ <*

[fl M M

4)«-i . CO J,— ‘

•R.S U 3

3

° *Oc»*

(/J 4ˆ t-t

o

＞＞w

R5S _ o co

■M W R .

-o ™

10

Go .

_0J CUCO

3

R

0)

fa “.

CO J3

O

C 00

. 10

R \S

3 w

03 t-i ˆ T 4) 1

- £ 00 — * 5 _

o J

a

(U cu M”- 1 ˆ cu Al R co 11 cu

3ˆ os— en

T3

i °5.

> >

R^^

3 M

how

.2 3 w

— ‘3cq I –

Jog

3

J3 •-3 3«

.2 1 — »£ > - 1° J3 CN

2 w

ˆw-

3

O

» w

2 lr)

S5:

£ > 00

-XT

3 » > .

o w

iˆ

3 u O •ˆ CU N

Urn °o

fe Oci

jb Ja n

u

Rxi

. * 1-

co w O

ˆ rt E 00

k p 3

3 O

3 13

3

CT

|H CO

R O

3

cS

o

T3 R cu

G

cu w — On

bo

- G < « I R —

< 0J

“3 “5

. o ■*

co MOO

cu~S- A!

3

l- < CO

S •”

St-

> K

_XT

.2 4

en 10

3 io

•goo

«-

^

Jii

ji

cS

CO

R –

■a

G

•0 aˆ-

cS

R * > ■*•

OS Goo

>

G Oco

ˆs

> <

Cjt,-. JU

b ° w

Ul

cu co

*i

‘3

-RPhoo

3

T3

M-i

jst: T

O

Ph “ci-

1h

CU

—«cco

£

3 3 w

bo

O O —

3

J O

03

-0

-r co

“3

a G

u

°>c«

3

a8ˆ

■M

jaOoo

03

G oj

Phˆ «

.

T3

.2

3ˆj

_cu

O 3

＞-)-o

03

E

.9″

BOURBON

327

•3 ” 3 ■§

a

8

a

a m

J3 Oh

3 co

*C no

eS *h

1— 1 10

H £°°

esr 1 1

fe o e

1-5 C 2oo

fe £•

_cS

a*o\

.2<« _3^„ 1 _

00*

3-i O

eD CO

•o2»

- Cu JJ 10 01 o 00

3^

o o

— cdwi t-

1-. o n

3

O

u

1

- -C ‘ Ph

^

3

O

:ount Aqui b. 18

t-J

L_ es 7 –

.S o

fa”

■M C

-&J C nJ I

cS 3CQ (N

fa O ”” ■

” u 00

ON

10

c ° f- 00

3 -u 5 «

eS 3.3ˆ2.

o 8o»

NO

Is 00

“3 c S T

> ON

1-1 00

en -

- v I –

“Coo

- :*

js £■

US

-a “ >

eft ˆ 00

3

•a

■9

« O H

fa.£3

3

Coo

■O

y w

[/J O rt M

-o-g S»* o. S ca .

< 8ˆe

.a-

-CMS

cS co Jhoo fa.”.

c •+ I — O 00

D. ■

8 ST

ccjoo COO

-c «

1) .

.&00

-:3 °°

.a 00

uoo

_C00 C3 w

1-1 .

fa.Q

eft O

.2 k-

J3 .

E 10

ˆ om

crj

-o E a

I 3 ˆ00

_S >« 1 –

C ..NO

O On

a .

“c”— o?

cOoo

-0ˆ5

•a M

0ˆ1 « “ < . J,

CO o 00

N-ˆ QJ 00

3 % -‘

•a

S’o’ – > <ˆ

K flJCO 4h a) 00

cs

O§00 -JJ K.

_~ ˆ M _ 6 00

r”\°£ ‘3″

3

-a

＋-

?N 00

o»

O 00

- T (“1

_c--- a .

ˆ CO

-QOO

c r a L

.1ˆ 00

o t

I”

a 00

J3ˆ

a

& < w 5

_2 -3 6

•9 ˆ !Soo

00

ª o

- en -0.fi ON

<°£

0)

cSˆ-, 3 o

c3

Qˆoo HOOn — o

o

bo

C

3′

.- o On

j;Sc- •o

S s

IE 1 –

§-s

to tn o

£? G

C 1-.

D .a

n£

cˆ 1 o o .

•PS

nj 3

B?T3 Oii

Sg £00

c «

o

u

e.S

b”0 SI S.5J

So2

is

T_

c

3

J3

X

en

(/)

3

1

O

＞n

03

C

O

;.J

eft

(ft

X

M

C

C3

-a

3

O

c

S s

O 3

＞— J3 T3 O

eft O CU

■a eu ^^

E”°.

-2

■ota j: ojo

«-3

_eS

cS c eft CS

to

o S ■^ en

4) “3

•2 j

cS s g E eu

•a*

o.S tu”3

eftfe

oa’ >

C3

X

Coo

3 « O v -‘

o

eS

jj” is 00

euPn 00

-•£ I*. M

00 ■

<&

e

3

T3

O en 10 2 00 4J o .2 00 u e3N '— ^ — cS w '- 1 jB

td

vs

&00

— eft i-i O .

L_Soo

328

the Spanish throne in 1759, resigned his- kingdom of Naples to his son Ferdinand. Ferdinand was deposed by Napoleon, but afterwards regained his throne, and took the title of Ferdinand I., king of the Two Sicilies. In 1825 he was succeeded by his son Francis, who in turn was succeeded in 1830 by his son Ferdinand II. Ferdinand II. died in 1859, and in the following year his successor Francis II. was deprived of his kingdom, which was incorporated into the gradually-uniting Italy.

Duchies of Lucca and Parma. — In 1748 the duchy of Parma was conferred on Philip, youngest son of Philip V. of Spain. He was succeeded by his son Ferdinand in 1765. Parma was ceded to France in i8or, Ferdinand's son Louis being made king of Etruria, but the French only took possession of the duchy after Ferdinand's death in 1802. Louis's son Charles Louis was forced to surrender Etruria to France in 1807, and he was given the duchy of Lucca by the congress of Vienna in 1815. In 1847, on the death of Marie Louise, widow of Napoleon, who had received Parma and Piacenza in accordance with the terms of the treaty of Paris of 1814, Charles Louis succeeded to the duchies as Charles II., at the same time surrendering Lucca to Tuscany. In 1849 he abdicated in favour of his

son, Charles III., who married a daughter of the duke of Berry, and was assassiiiated in 1854, being succeeded by his son Robert. In i860 the duchies were annexed by Victor Emmanuel to the new kingdom of Italy.

Bastard Branches. — There are numerous bastard branches of the family of Bourbon, the most famous being the Vendome branch, descended from Caesar, natural son of Henry IV., and the Maine and Toulouse branches, descended from the two natural sons of Louis XIV. and Madame de Montespan.

See Coiffier de Moret, Histoire du Bourbonnais et des Bourbons (2 vols., 1824) ; Berand, Histoire des sires et dues de Bourbon (1835) ; Desormeaux, Histoire de la maison de Bourbon (5 vols., 1 782-1 788) ; Achaintre, Histoire genealogique et chronologique de la maison royale de Bourbon (2 vols., 1 825-1 826); and Dussieux, Genealogie de la maison de Bourbon (1872).

BOURBON, CHARLES, Duke of (1490-1527), constable of France, second son of Gilbert, count of Montpensier and dauphin of Auvergne, was born on the 17th of February 1490, his mother being a Gonzaga. In 1505 he married Suzanne, heiress of Peter II., duke of Bourbon, by Anne of France, daughter of King Louis XL, and assumed the title of duke of Bourbon. The addition of this duchy to the numerous duchies, countships and other fiefs which he had inherited on the death of his elder brother Louis in 1501, made him at the age of fifteen the wealthiest noble in Europe. He gained his first military experience in the Italian campaigns of Louis XII., taking part in the suppres- sion of the Genoese revolt (1507) and contributing to the victory over the Venetians at Agnadello (May 14, 1509). Shortly after the accession of Francis I. Bourbon received the office of constable of France, and for his brilliant services at the battle of Marignano (September 1515) he was made governor of the Milanese, which he succeeded in defending against an attack of the emperor Maximilian. But dissensions arose between Francis and the constable. Grave, haughty and taciturn, Bourbon was but ill suited to the levities of the court, and his vast wealth and influence kindled in the king a feeling of resentment, if not of fear. The duke was recalled from the government of the Milanese; his official salary and the sums he had borrowed for war expenses remained unpaid; and in the campaign in the Netherlands against the emperor Charles V. the command of the vanguard, one of the most cherished prerogatives of the constables, was taken from him. The death of his wife without surviving issue, on the 28th of April 1521, afforded the mother of the king, Louise of Savoy, a means to gratify her greed, and at the same time to revenge herself on Bourbon, who had slighted her love. A suit was instituted at her instance against the duke in the parlement of Paris, in which Louise, as grand-daughter of Charles, duke of Bourbon (d. 1456), claimed the female

and some of the male fiefs of the duchy of Bourbon, while the king claimed those fiefs which were originally appanages, as escheating to the crown, and other claims were put forward. Before the parlement was able to arrive at a decision, Francis handed over

to his mother a part of the Bourbon estates, and ordered the remainder to be sequestrated.

Smarting under these injuries, Bourbon, who for some time had been coquetting with the enemies of France, renewed his negotiations with the emperor and Henry VIII. of England. It was agreed that the constable should raise in his own dominions an armed force to assist the emperor in an invasion of France, and should receive in return the hand of Eleonora, queen dowager of Portugal, or of another of the emperor's sisters, and an independent kingdom comprising his own lands together with Dauphine and Provence. He was required, too, to swear fidelity to Henry VIII. as king of France. But Bourbon's plans were hampered by the presence of the French troops assembling for the invasion of Italy, and for this reason he was unable to effect a junction with the emperor's German troops from the east. News of the conspiracy soon reached the ears of Francis, who was on his way to take command of the Italian expedition. In an interview with Bourbon at Moulins the king endeavoured to persuade him to accompany the French army into Italy, but without success. Bourbon remained at Moulins for a few days, and after many vicissitudes escaped into Italy. The joint invasion of France by the emperor and his ally of England had failed signally, mainly through lack of money and defects of combination. In the spring of 1524, however, Bourbon at the head of the imperialists in Lombardy forced the French across the Sesia (where the chevalier Bayard was mortally wounded) and drove them out of Italy. In August 1524 he invested Marseilles, but being unable to prevent the introduction of supplies by Andrea Doria, the Genoese admiral in the service of Francis, he was forced to raise the siege and retreat to the Milanese. He took part in the battle of Pa via (1525), where Francis was defeated and taken prisoner. But Bourbon's troops were clamouring for pay, and the duke was driven to extreme measures to satisfy their demands. Cheated of his kingdom and his bride after the treaty of Madrid (1526), Bourbon had been offered the duchy of Milan by way of compensation. He now levied contributions from the townsmen, and demanded 20,000 ducats for the liberation of the chancellor Girolamo Morone (d. 1529), who had been imprisoned for an attempt to realize his dream of an Italy purged of the foreigner. But the sums thus raised were wholly inadequate. In February 1527 Bourbon's army was joined by a body of German mercenaries, mostly Protestants, and the combined forces advanced towards the papal states. Refusing to recognize the truce which the viceroy of Naples had concluded with Pope Clement VII., Bourbon hastened to put into execution the emperor's plan of

attaching Clement to his side by a display of force. But the troops, starving and without pay, were in open mutiny, and Spaniards and Lutherans alike were eager for plunder. On the 5th of May 1527 the imperial army appeared before the walls of Rome. On the following morning Bourbon attacked the Leonine City, and while mounting a scaling ladder fell mortally wounded by a shot, which Benvenuto Cellini in his Life claims to have fired. After Bourbon's death his troops took and sacked Rome.

See E. Armstrong, Charles V. (London, 1902) ; Cambridge Mod. Hist. vol. ii., bibliography to chaps, i. ii. and iii.

BOURBON-LANCY, a watering-place of east-central France in the department of Saone-et-Loire, on a hill about 2 m. from the right bank of the Loire and on the Borne, 52 m. S.S.E. of Nevers by rail. Pop. (1906) town, 1896; commune, 4266. The town possesses thermal springs, resorted to in the Roman period, and- ancient baths and other remains have been found. The waters, which are saline and ferruginous, are used for drinking and bathing, in cases of rheumatism, &c. Their temperature varies from 117 to 132 F. Cardinal Richelieu, Madame de Sevigne, James II. of England, and other celebrated persons visited the springs in the 17th and 18th centuries. The town has a well-equipped bathing establishment, a large hospital, and a church of the nth and 12th centuries (used as an archaeo- logical museum), and there are ruins of an old stronghold on a hill overlooking the town. A belfry pierced by a gateway of

the 15th century and houses of the 15th and 16th centuries also remain. The industries of the town include the manufacture of farm implements.

In the middle ages Bourbon-Lancy was an important strong- hold and a fief of the Bourbon family, from the name of a member of which the suffix to its name is derived.

BOURBON L'ARCHAMBAULT, a town of central France in the department of Allier, on the Burge, 16 m. W. of Moulins by rail. Pop. (1906) 2306. The town has thermal springs known in Roman times, which are used in cases of scrofula and rheumatism. The bathing-establishment is owned by the state. A church dating from the 12th century, and ruins of a castle of the dukes of Bourbon (13th and 15th centuries), including a cylindrical keep, are of interest. There are a military and a civil hospital in the town. Stone is quarried in the vicinity. Bourbon (Aquae Borvonis or Bormonis) was anciently the capital of the Bourbonnais and gave its name

to the great Bourbon family. The affix Archambault is the name of one of its early lords.

BOURBONNE-LES-BAINS, a- town of eastern France, in the department of Haute-Marne, 355 m. by rail E.N.E. of Langres. Pop. (1906) 3738. It is much frequented on account of its hot saline springs, which were known to the Romans under the name Aquae Borvonis. The heat of these springs varies from no° to 156° F. The waters are used in cases of lymphatic affections, scrofula, rheumatism, wounds, &c. The principal buildings are a church of the 12th century, the state bathing-establishment and the military hospital ; there are also the remains of a castle. Timber-sawing and plaster manufacture are carried on in the town. In the neighbourhood are the buildings of the celebrated Cistercian abbey of Morimond.

BOURCHIER, ARTHUR (1864-), English actor, was born in Berkshire in 1864, and educated at Eton and Christ Church, Oxford. At the university he became prominent as an amateur actor in connexion with the O.U.A.D.C, which he founded, and in 1889 he joined Mrs Langtry as a professional. He also acted with Charles Wyndham at the Criterion, and was for a while in Daly's company in America. In 1894 he married the actress Violet Vanbrugh, elder sister of the no less well-known actress Irene Vanbrugh, and he and his wife subsequently took the lead- ing parts under his management of the Garrick theatre. Both as tragedian and comedian Mr Bourchier took high rank on the London stage, and his career as actor-manager was remarkable for the production of a number of successful modern plays, by Mr Sutro and others.

BOURCHIER, THOMAS (c. 1404-1486), English archbishop, lord chancellor and cardinal, was a younger son of William Bourchier, count of Eu (d. 1420), and through his mother, Anne, a daughter of Thomas of Woodstock, duke of Gloucester, was a descendant of Edward III. One of his brothers was Henry, earl of Essex (d. 1483), and his grand-nephew was John, Lord Berners, the translator of Froissart. Educated at Oxford and then entering the church, he obtained rapid promotion, and after holding some minor appointments he became bishop of Worcester in 1434. In the same year he was chancellor of the university of Oxford, and in 1443 he was appointed bishop of Ely; then in April 1454 he was made archbishop of Canterbury, becoming lord chancellor of England in the following March. Bourchier's short term of office as chancellor coincided with the opening of the Wars of the Roses, and at first he was not a strong partisan, although he lost his position as chancellor when Richard, duke of York, was deprived of power in October 1456. Afterwards, in 1458, he helped to reconcile the contending parties, but when the war was renewed in 1459 he appears as a decided Yorkist; he crowned Edward IV. in June 1461, and four years later he performed a similar service for the queen, Elizabeth

Woodville. In 1457 Bourchier took the chief part in the trial of Reginald Pecock, bishop of Chichester, for heresy; in 1467 he was created a cardinal; and in 1475 he was one of the four arbitrators appointed to arrange the details of the treaty of Picquigny between England and France. After the death of Edward IV. in 1483 Bourchier persuaded the queen to allow

her younger son, Richard, duke of York, to share his brother's residence in the Tower of London; and although he had sworn to be faithful to Edward V. before his father's death, he crowned Richard III. in July 1483. He was, however, in no way implicated in the murder of the young princes, and he was probably a participant in the conspiracies against Richard. The third English king crowned by Bourchier was Henry VII., whom he also married to Elizabeth of York in January i486. The archbishop died on the 30th of March i486 at his residence, Knole, near Sevenoaks, and was buried in Canterbury cathedral.

See W. F. Hook, Lives of the Archbishops of Canterbury (1860-

1884;.

BOURDALOUE, LOUIS (1632-1704), French Jesuit and preacher, was born at Bourges on the 20th of August 1632. At the age of sixteen he entered the Society of Jesus, and was appointed successively professor of rhetoric, philosophy and moral theology, in various colleges of the Order. His success as a preacher in the provinces determined his superiors to call him to Paris in 1669 to occupy for a year the pulpit of the church of St 'Louis. Owing to his eloquence he was speedily ranked in popular estimation with Corneille, Racine, and the other leading figures of the most brilliant period of Louis XIV.'s reign. He preached at the court of Versailles during the Advent of 1670 and the Lent of 1672, and was subsequently called again to deliver the Lenten course of sermons in 1674, 1675, 1680 and 1682, and the Advent sermons of 1684, 1689 and 1693. This was all the more noteworthy as it was the custom never to call the same preacher more than three times to court. On the revocation of the Edict of Nantes he was sent to Languedoc to confirm the new converts in the Catholic faith, and he had extraordinary success in this delicate mission. Catholics and Protestants were unanimous in praising his fiery eloquence in the Lent sermons which he preached at Montpellier in 1686. Towards the close of his life he confined his ministry to chari- table institutions, hospitals and prisons, where his sympathetic discourses and conciliatory manners were always effective. He died in Paris on the 13th of May 1704. His peculiar strength lay in his power of adapting himself to audiences of every kind, and throughout his public career he was highly appreciated by all classes of society. His influence was due as much to his saintly character and to the

gentleness of his manners as to the force of his reasoning. Voltaire said that his sermons surpassed those of Bossuet (whose retirement in 1669, however, practically coincided with Bourdaloue's early pulpit utterances); and there is little doubt that their simplicity and coherence, and the direct appeal which they made to hearers of all classes, gave them' a superiority over the more profound sermons of Bossuet. Bourdaloue may be with justice regarded as one of the greatest French orators, and many of his sermons have been adopted as text-books in schools.

Bibliography. — The only authoritative source for the Sermons is the edition of Pere Bretonneau (14 vols., Paris, 1707-1721, followed by the Pensees, 2 vols., 1734). There has been much controversy both as to the authenticity of some of the sermons in this edition and as to the text in general. It is, however, generally agreed that the changes confessedly made by Bretonneau were merely formal. Other editions not based on Bretonneau are inferior; some, indeed, are altogether spurious (e.g. that of Abbe Sicard, 1810). Among critical works are: Anatole Feugere, Bourdaloue, sa predication et son temps (Paris, 1874) ; Adrien Lezat, Bourdaloue, theologien el orateur (Paris, 1874) ; P. M. Lauras, Bourdaloue, sa vie et ses osuvres (2 vols., Paris, 1881); Abbe Blampignon, Elude sur Bourdaloue (Paris, 1886); Henri Cherot, Bourdaloue inconnu (Paris, 1898), and Bourdaloue, sa correspondance et ses correspondans (Paris, 1898- 1904); L. Pauthe, Bourdaloue (les maitres de la chaire au XVII" sihcle) (Paris, 1900) ; E. Griselle, Bourdaloue, histoire critique de sa predication (2 vols., Paris, 1901), Sermons inedits; bibliographic, &c. (Paris, 1901), Deux sermons inedits sur le royaume de Dieu (Lille and Paris, 1904) ; Ferdinand Castets, Bourdaloue, la vie et la predi- cation d'un religieux au XVII' siecle, and La Revue Bourdaloue (Paris, 1902-1904) ; C. H. Brooke, Great French Preachers (ser- mons of Bourdaloue and Bossuet, London, 1904) ; F. Brunetiere, " L'Eloquence de Bourdaloue," in Revue des deux mondes (August 1904), a general inquiry into the authenticity of the sermons and their general characteristics.

BOURDON, FRANCOIS LOUIS (d. 1797), known as Bourdon de l'Oise, French revolutionist, was procureur at the parlement

of Paris. He ardently embraced the revolutionary doctrines and took an active part in the insurrection of the ioth of August 1792. Representing the department of the Oise in the Conven- tion, he voted for the immediate death of the king. He accused the Girondists of relations with the court, then turned against Robespierre, who had him expelled from the Jacobin

club for his conduct as commissioner of the Convention with the army of La Rochelle. On the 9th Thermidor he was one of the deputies delegated to aid Barras to repress the insurrection made by the commune of Paris in favour of Robespierre. Bourbon then be- came a violent reactionary, attacking the former members of the Mountain and supporting rigorous measures against the rioters of the 1 2th Germinal and the 1st Prairial of the year III. In the council of Five Hundred, Bourdon belonged to the party of " Clichyens," composed of disguised royalists, against whom the directors made the coup d'etat of the 18th Fructidor. Bourdon was arrested and deported to French Guiana, where he died soon after his arrival.

BOURG-EN-BRESSE, a town of eastern France, capital of the department of Ain, and formerly capital of the province of Bresse, 36 m. N.N.E. of Lyons by the Paris-Lyon railway. Pop. (1906) town, 13,916; commune, 20,045. Bourg is situated at the western base of the Jura, on the left bank of the Reys- souze, a tributary of the Saone. The chief of the older buildings is the church of Notre-Dame (16th century), of which the facade belongs to the Renaissance ; other parts of the church are Gothic. In the interior there are stalls of the 16th century. The other public buildings, including a handsome prefecture, are modern. The hotel de ville contains a library and the Lorin museum with a collection of pictures, while another museum has a collec- tion of the old costumes and ornaments characteristic of Bresse. Among the statues in the town there is one of Edgar Quinet (1803-1875), a native of Bourg. Bourg is the seat of a prefect and of a court of assizes, and has a tribunal of first instance, a tribunal and a chamber of commerce, and a branch of the Bank of France. Its educational establishments include lycees for boys and girls, and training colleges. The manufactures consist of iron goods, mineral waters, tallow, soap and earthenware, and there are flour mills and breweries; and there is considerable trade in grain, cattle and poultry. The church of Brou, a suburb of Bourg, is of great artistic interest. Marguerite of Bourbon, wife of Philibert II. of Savoy, had intended to found a monastery on the spot, but died before her intention could be carried into effect. The church was actually built early in the 1 6th century by her daughter-in-law Marguerite of Austria, wife of Philibert le Beau of Savoy, in memory of her husband. The exterior, especially the facade, is richly ornamented, but the chief interest lies in the works of art in the interior, which date from 1532. The most important are the three mausoleums with the marble effigies of Marguerite of Bourbon, Philibert le Beau, and Marguerite of Austria. All three are remarkable for perfec- tion of sculpture and richness of ornamentation. The rood loft, the oak stalls, and the reredos in the chapel of the Virgin are masterpieces in a similar style.

Roman remains have been discovered at Bourg, but little is known of its early history. Raised to the rank of a free town in 1250, it was at the

beginning of the 15th century chosen by the dukes of Savoy as the chief city of the province of Bresse. In 1535 it passed to France, but was restored to Duke Philibert Emmanuel, who later built a strong citadel, which afterwards withstood a six months' siege by the soldiers of Henry IV. The town was finally ceded to France in 1601. In 1814 the in- habitants, in spite of the defenceless condition of their town, offered resistance to the Austrians, who put the place to pillage.

BOURGEOIS, LEON VICTOR AUGUSTE (1851-), French statesman, was born at Paris on the 21st of May 1851, and was educated for the law. After holding a subordinate office (1876) in the department of public works, he became successively prefect of the Tarn (1882) and the Haute-Garonne (1885), and then returned to Paris to enter the ministry of the interior. He became prefect of police in November 1887, at the critical

moment of President Grevy's resignation. In the following year he entered the chamber, being elected deputy for the Marne, in opposition to General Boulanger, and joined the radical left. He was under-secretary for home affairs in the Floquet ministry of 1888, and resigned with it in 1889, being then returned to the chamber for Reims. In the Tirard ministry, which succeeded, he was minister of the interior, and subsequently, on the 18th of March 1890, minister of public instruction in the cabinet of M. de Freycinet, a post for which he had qualified himself by the attention he had given to educational matters. In this capacity he was responsible in 1890 for some important reforms in secondary education. He retained his office in M. Loubet's cabinet in 1892, and was minister of justice under M. Ribot at the end of that year, when the Panama scandals were making the office one of peculiar difficulty. He energetically pressed the Panama prosecution, so much so that he was accused of having put wrongful pressure on the wife of one of the defendants in order to procure evidence. To meet the charge he resigned in March 1893, but again took office, and only retired with the rest of the Freycinet ministry. In November 1895 he himself formed a cabinet of a pronouncedly radical type, the main interest of which was attached to its fall, as the result of a constitutional crisis arising from the persistent refusal of the senate to vote supply. The Bourgeois ministry appeared to consider that popular opinion would enable them to override what they claimed to be an unconstitutional action on the part of the upper house; but the public was indifferent and the senate triumphed. The blow was undoubtedly damaging to M. Bourgeois's career as an homme de gouvernement. As minister of public instruction in the Brisson cabinet of 1898 he organized courses for adults in primary education. After this short ministry he represented his country with dignity and effect at the Hague peace congress, and in 1903 was nominated a member of the permanent court of arbitration. He held somewhat aloof from the political struggles of the Waldeck-Rousseau and Combes ministries, travelling

consider- ably in foreign countries. In 1902 and 1903 he was elected president of the chamber. In 1905 he replaced the due d'Audiffret-Pasquier as senator for the department of Marne, and in May 1906 became minister of foreign affairs in the Sarrien cabinet. He was responsible for the direction of French diplomacy in the conference at Algeciras.

BOURGEOIS, a French word, properly meaning a freeman of a bourg or borough in France; later the term came to have the wider significance of the whole class lying between the ouvriers or workmen and the nobility, and is now used generally of the trading middle-class of any country. In printing, the word (pronounced burjoice') is used of a type coming in size between longprimer and brevier; the derivation is supposed to be from the name of a French printer, otherwise unknown.

BOURGES, a city of central France, chief town of the depart- ment of Cher, 144 m. S. of Paris on the Orleans railway between Vierzon and Nevers. Pop. (1906) town, 34,581; commune, 44,133. Bourges is built amidst flat and marshy country on an eminence limited on three sides by the waters of the Canal Of Berry, the Yevre, the Auron, and other smaller streams with which they unite at this point. The older part of the town with its narrow streets and old houses forms a centre, to the south and east of which lie important engineering suburbs. Flourishing nurseries and market-gardens are situated in the marshy ground to the north and north-east. Bourges preserves portions of the Roman ramparts of the 4th century, which are for the most part built into the houses of the old quarter. They measure consider- ably less in circumference than the fortifications of the 13 th century, remains of which in the shape of ruined walls and towers are still to be seen. The summit of the rise on which the city is built is crowned by the cathedral of St Etienne, one of the most important in France. Begun at the end of the 12th century, it was not completed till the 16th century, to which period belong the northernmost of the two unfinished towers flanking the facade and two of its five elaborately sculptured portals. The interior, which has double aisles, the inner aisles of remark- able height, and no transepts, contains, among many other

works of art, magnificent stained glass of the 13th century. Beneath the choir there is a crypt of Romanesque construction, where traces of the Roman fosses are to be found; the two lateral portals are also survivals of a Romanesque church. The Jardin de PArcheveche, a pleasant terrace-garden, adjoins the choir of the cathedral. Bourges has many fine old houses. The hotel Lallemant and the hotel Cujas (now occupied by the

museum) are of ttte Renaissance period. The hotel de Jacques Cceur, named after the treasurer of Charles VII. and now used as the law-court, is of still greater interest, though it has been doubted whether Jacques Cceur himself inhabited it. The man- sion is in the Renaissance style, but two towers of the Roman fortifications were utilized in the construction of the south- western facade (see House, Plate II. figs. 7 and 8). Its wings surround a courtyard into which three staircase turrets project; one of these leads to a chapel, the ceiling of which is decorated by fine frescoes.

Bourges is the seat of an archbishopric, a court of appeal, a court of assizes and a prefect; and is the headquarters of the VIII. army corps. It has tribunals of first instance and of commerce, a board of trade-arbitrators, and a chamber of commerce, and a branch of the Bank of France. Its educational institutions include an ecclesiastical seminary, a lycee for boys, and a college for girls, training colleges, and a school of industrial art. The industrial activity of Bourges depends primarily on its gunpowder and ammunition factories, its cannon-foundry and gun-carriage works. These all belong to the government, and, together with huge magazines, a school of pyrotechnics, and an artillery school, lie in the east of the town. The suburb of Mazieres has large iron and engineering works, and there are manufactories of anvils, edge-tools, biscuits, woollen goods, oil-cloth, boots and shoes, fertilizers, brick and tile works, breweries, distilleries, tanneries, saw-mills and dye-works. The town has a port on the canal of Berry, and does a considerable trade in grain, wine, vegetables, hemp and fruit.

Bourges occupies the site of the Gallic town of Avaricum, capital of the Bituriges, mentioned by Caesar as one of the most important of all Gaul. In 52 B.C., during the war with Vercin- getorix, it was completely destroyed by the Roman conqueror, but under Augustus it rose again into importance, and was made the capital of Aquitania Prima. About a.d. 250 it became the seat of a bishop, the first occupant of the see being Ursinus. Captured by the Visigoths about 47 s, it continued in their posses- sion till about 507. In the middle ages it was the capital of Berry. During the English occupation of France in the 15th century it became the residence of Charles VII., who thus acquired the popular title of " king of Bourges." In 1463 a university was founded in the city by Louis XL, which continued for centuries to be one of the most famous in France, especially in the department of jurisprudence. On many occasions Bourges was the seat of ecclesiastical councils — the most important being the council of 1438, in which the Pragmatic Sanction of the Gallican church was established, and that of 1528, in which the Lutheran doctrines were condemned.

BOURGET, PAUL CHARLES JOSEPH (1852-), French novelist and critic, was born at Amiens on the 2nd of September 1852. His father, a professor of mathematics, was afterwards appointed to a post in the college at

Clermont-Ferrand. Here Bourget received his early education. He afterwards studied at the Lycee Louis-le-Grand and at the Ecole des Hautes Etudes. In 1872-1873 he produced a volume of verse, Au bord de la mer, which was followed by others, the last, Les Aveux, appearing in 1882. Meanwhile he was making a name in literary journalism, and in 1883 he published Essais de psychologie contemporaine, studies of eminent writers first printed in the Nouvelle Revue, and now brought together. In 1884 Bourget paid a long visit to England, and there wrote his first published story (L'lrrepa- rable). Cruelle Enigme followed in 1885; and Andre' Cornells (1886) and Mensonges (1887) were received with much favour. Le Disciple (1889) showed the novelist in a graver attitude; while in i8qi Sensations d'llalie, notes of a tour in that country, revealed a fresh phase of his powers. In the same year appeared

the novel Cceur de femme, and Nouveaux Pastels, types of the characters of men, the sequel to a similar gallery of female types (Pastels, 1890) . His later novels include La Terre promise (1892) ; Cosmopolis (1892), a psychological novel, with Rome as a back- ground; Une Idylle tragique (1896); La Duchesse bleue (1897); Le Fantcme (1901) ; Les Deux Sceurs (1905) ; and some volumes of shorter stories — Complications sentimentales (1896), the powerful Dramesdefamille(i8g&), Un Homme fort (1900) , V Etape (1902), a study of the inability of a family raised too rapidly from the peasant class to adapt itself to new conditions. This powerful study of contemporary manners was followed by Un Divorce (1904), a defence of the Roman Catholic position that divorce is a violation of natural laws, any breach of which inevitably entails disaster. Etudes et portraits, first published in 1888, contains impressions of Bourget's stay in England and Ireland, especially reminiscences of the months which he spent at Oxford; and Outre-Mer (1895), a book in two volumes, is his critical journal of a visit to the United States in 1893. He was admitted to the Academy in 1894, and in 1895 was promoted to be an officer of the Legion of Honour, having received the decoration of the order ten years before.

As a writer of verse Bourget was merely trying his wings, and his poems, which were collected in two volumes (1885-1887), are chiefly interesting for the light which they throw upon his mature method and the later products of his art. It was in criticism that his genius first found its true bent. The habit of close scientific analysis which he derived from his father, the sense of style produced by a fine ear and moulded by a classical education, the innate appreciation of art in all its forms, the taste for seeing men and cities, the keen interest in the oldest not less than the newest civilizations, and the large tolerance not to be learned on the boulevard — all these combined to provide him with a most uncommon equipment for the critic's task. It is not surprising that the Sensations d'ltalie (1891), and

the various psychological studies, are in their different ways scarcely surpassed throughout the whole range of literature. Bourget's repu- tation as a novelist has long been assured. Deeply impressed by the singular art of Henry Beyle (Stendhal), he struck out on a new course at a moment when the realist school reigned without challenge in French fiction. His idealism, moreover, had a character of its own. It was constructed on a scientific basis, and aimed at an exactness, different from, yet comparable to, that of the writers who were depicting with an astonishing faithfulness the environment and the actions of a person or»a society. With Bourget observation was mainly directed to the secret springs of human character. At first his purpose seemed to be purely artistic, but when Le Disciple appeared, in 1889, the preface to that remarkable story revealed in him an unsuspected fund of moral enthusiasm. Since then he has varied between Jiis earlier and his later manner, fcut his work in general has been more seriously conceived. From first to last he has painted with a most delicate brush the intricate emotions of women, whether wronged, erring or actually vicious; and he has described not less happily the ideas, the passions and the failures of those young men of France to whom he makes special appeal.

Bourget has been charged with pessimism, and with undue delineation of one social class. The first charge can hardly be sustained. The lights in his books are usually low; there is a certain lack of gaiety, and the characters move in a world of disenchantment. But there is no despair in his own outlook upon human destiny as a whole. As regards the other indictment, the early stories sometimes dwell to excess on the mere framework of opulence; but the pathology of moral irresolution, of com-, plicated affairs of the heart, of the ironies of friendship, in which the writer revels, can be more appropriately studied in a cultured and leisured society than amid the simpler surroundings of humbler men and women. The style of all Bourget's writings is singularly graceful. His knowledge of the literature of other lands gives it a greater flexibility and a finer allusiveness than most of his contemporaries can achieve. The precision by which it is not less distinguished, though responsible for a certain over-refinement, and for some dull pages of the novels, is an*

almost unmixed merit in the critical essays. As a critic, indeed, either of art or letters, Bourget leaves little to be desired. If he is not in the very first rank of novelists, if his books display more ease of finished craftsmanship than joy in spontaneous creation, it must be remembered that the supreme writers of fiction have rarely succeeded as he has in a different field.

See also C. Lecigne, L'Evolution morale et religieuse de M. Paul Bourget (1903); Sargeret, Les Grands Convertis (1906). His CEuvres completes began to appear in a uniform edition in 1899.

BOURIGNON, ANTOINETTE (1616-1680), Flemish mystic, was born at Lille on the 13th of January 1616. From an early age she was under the influence of religion, which took in course of time a mystical turn. Undertaking the work of a reformer, she visited France, Holland, England and Scotland. Her religious enthusiasm, peculiarity of views and disregard of all sects raised both zealous persecutors and warm adherents. On her death at Franeker, Friesland, on the 30th of October 1680, she left a large number of followers, who, however, dwindled rapidly away; but in the early 18th century her influence revived in Scotland sufficiently to call forth several denunciations of her doctrines in the various Presbyterian general assemblies of 1701, 1709 and 1 7 10. So far as appears from her writings and con- temporary records, she was. a visionary of the ordinary type, distinguished only by the audacity and persistency of her pretensions.

Her writings, containing an account of her life and of her visions and opinions, were collected by her disciple, Pierre Poiret (19 vols., Amsterdam, 1679-1686), who also published her life (2 vols., 1679). For a critical account see Hauck, Realencyklopddie (Leipzig, 1897), and Elude sur Antoinette Bourignon, by M. E. S. (Paris, 1876). Three of her works at least have been translated into English: — An Abridgment of the Light of the World (London, 1786) ; A Treatise of Solid Virtue (1699) ; The Restoration of the Gospel Spirit

(1707).

BOURKE, a town of Cowper county, New South Wales, Australia, 503 m. by rail N.W. from Sydney. Pop. (1901) 2614. It is situated on the south bank, and at the head of the ordinary winter navigation, of the Darling river. Very rich copper ore exists in the district in great abundance. Bourke is the centre of a large sheep-farming area, and the annual agricultural show is one of the best in the colony. On the west side of the Darling, 3 m. distant, is the small town of North Bourke, and at Pera, 10 m. distant, is an important irrigation settlement.

BOURMONT, LOUIS AUGUSTE VICTOR, Comte de Ghaisne de (1 773-1846), marshal of France, entered the Gardes Francaises of the royal army shortly before the Revolution, emigrated in 1789, and served with Conde and the army of the Emigres in the campaigns of 1792 and 1793, subsequently serving as chief of staff to Scepeaux, the royalist leader, in the civil war in lower Anjou (1794-1796). Bburmont, excepted from the amnesty of April 1796, fled into Switzerland, but soon afterwards, having

been made by Louis XVIII. a masechal de camp and a knight of St Louis, he headed a fresh insurrection, which after some pre- liminary successes collapsed (1799-1800). He then made his submission to the First Consul, married, and lived in Paris; but his thinly veiled royalism caused his arrest a few months later, and he remained a prisoner for more than three years, finally escaping to Portugal in 1804. Three years later the French army under General Junot invaded Portugal, and Bourmont offered his. services to Junot, who made him chief of staff of a division. He returned to France with Junot after the convention of Cintra, and was promptly re-arrested. He was soon released, however, on Junot's demand, and was commissioned as an officer in the imperial army. He served in Italy for-a time, then went on the staff of the viceroy Eugene (Beauharnais), whom he accompanied in the Moscow campaign. He was taken prisoner in the retreat, but escaped after a time and rejoined the French army. His conspicuous courage at the battle of Liitzen in 1813 led Napoleon to promote him general of brigade, and in 18 14 his splendid defence of Nogent (February 13) earned him the rank of general of division. At the first Restoration Bourmont was naturally employed by the Bourbons, to whose service he had devoted his life, but he rejoined Napoleon on his return from Elba. On the eve of the campaign of 1815, and at the urgent

request of Count Gerard, he was given a divisional command in the army of the north. On the first day of the Waterloo campaign Bourmont went over to the enemy. It is not probable that he gave information of French movements to the allies, but the best that can be said in exculpation of his treachery is that his old friends and comrades, the royalists of Anjou, were again in insurrection, and that he felt that he must lead them. He made no attempt to defend his conduct, and acted as the accuser of Marshal Ney. A year later he was given command of a division of the royal guard; and in 1823 he held an important position in the army which, under the command of the due d'Angoulgme, invaded Spain. He commanded the whole army in Spain for a time in 1824, became minister of war in 1829, and in 1830 was placed in command of the Algiers expedition. The landing of the French and the capture of Algiers were directed by him with complete success, and he was rewarded with the bdton of marshal. But the revolution of 1830 put an end to his command, and, refusing to take the oath to Louis Philippe, he was forced to resign. In 1832 Marshal Bourmont took part in the rising of the duchesse de Berri, and on its failure retired to Portugal. Here, as always, on the side of absolutism, he commanded the army of Dom Miguel during the civil war of 1833-1834, and after the victory of the constitutional party he retired to Rome. At the amnesty of 1840 he returned to France. He died at the chateau of Bourmont on the 27th of October 1846.

Charles de Bourmont, a son of the marshal, wrote several pam- phlets in

vindication of his father's career.

BOURNE, VINCENT (1695-1747), English classical scholar, familiarly known as " Vinny " Bourne, was born at Westminster in 1695. In 1 7 10 he became a scholar at Westminster school, and in 17 14 entered Trinity College, Cambridge. He graduated in 1717, and obtained a fellowship three years later. Of his after- life exceedingly little is known. It is certain that he passed the greater portion of it as usher in Westminster school. He died on! the 2nd of December 1747. During his lifetime he published three editions of his Latin poems, and in 1772 there appeared a very handsome quarto volume containing all Bourne's pieces, but also some that did not belong to him. The Latin poems are remarkable not only for perfect mastery of all linguistic niceties, but for graceful expression and genuine poetic feeling. A number of them are translations of English poems, and it is not too much to say that the Latin versions almost invariably surpass the originals. Cowper, an old pupil of Bourne's, Beattie and Lamb have combined in praise of his wonderful power of Latin versification.

See an edition (1840) of his Poemata, with a memoir by John Mitford.

BOURNE, or Bourn, a market town in the S. Kesteven or Stamford parliamentary division of Lincolnshire, England; lying in a fenny district 95 m. N. by W. from London. Pop. of urban district (1901) 4361. The Stamford-Sleaford branch of the Great Northern railway here crosses the Saxby-Lynn joint line of the Great Northern and Midland companies. The church of St Peter and St Paul is Norman and Early English with later insertions; it is part of a monastic church belonging to a founda- tion of Augustinian canons of 1138, of which the other buildings have almost wholly disappeared. Trade is principally agri- cultural. Bourne is famous through its connexion with the ardent opponent of William the Conqueror, Hereward the Wake. Of his castle very slight traces remain. Bourne was also the birthplace of the Elizabethan statesman Cecil, Lord Burghley. The Red Hall, which now forms part of the railway station buildings, belonged to the family of Digby, of whom Sir Everard Digby was executed in 1606 for his connexion with the Gunpowder Plot.

BOURNE (southern form of burn, Teutonic bom, brun, burna), an intermittent stream frequent in chalk and limestone country where the rock becomes saturated with winter rain, that slowly drains away until the rock becomes dry, when the stream ceases. A heavy rainfall will cause streams to run in winter from the saturated soil. These are the winter bournes that have given name to several settlements upon Salisbury Plain, such as

Winterbourne Gunning. The " bourne " may also be a permanent " burn," but the word is usually applied to an intermittent stream. (2) (From the Fr. borne), a boundary; the first use of the word in English is in Lord Ferrers' translation of Forrest, 1523; the figurative meaning of limit, end or final destination comes from Shakespeare's Hamlet, " the undiscovered country, from whose bourne no traveller returns."

BOURNEMOUTH, a municipal and county borough and watering-place of Hampshire, England, in the parliamentary borough of Christchurch, 107J m. S.W. by W. from London by the London & South-Western railway. Pop. (1901) 59,762. It is beautifully situated on Poole Bay. Considerable sandstone cliffs rise from the sandy beach, and are scored with deep picturesque dells or chines. The town itself lies in and about the valley of the Bourne stream. Its sheltered situation and desirable winter climate began to attract notice about 1840; in 1855 a national sanatorium for consumptive patients was erected by subscription; a pier was opened in 1861, and in 1870 railway communication was afforded. The climate is remarkably equable, being relatively warm in winter and cool in summer; the average temperature in July is 61-7° F., and in January 40-3°. The town contains numerous handsome buildings, including municipal buildings, churches, various places of entertainment, sanatoria and hospitals, a public library and a science and art school. Its suburbs have greatly extended along the sea front, and the beautiful chines of Boscombe, Alum and Branksome have attracted a large number of wealthy residents. There are piers at the town itself and at Boscombe, and the bathing is excellent. The parks, gardens and drives are extensive and pleasant. A service of electric tramways is maintained, notable as being the first system installed in England with atcombination of the trolley and conduit principles of supplying current. There are golf links in Meyrick and Queen's parks, both laid out by the corporation, which has in other ways studied the entertainment of visitors. The two railway stations are the Central and West, and through communications with the north are maintained by the Somerset & Dorset and Midland, and the Great Western and Great Central railways. The town, which is of wholly modern and remarkably rapid growth (for in the middle of the 19th century the population was less than 1000), was incorporated in 1890, and became a county borough in 1900. The corporation consists of a mayor, n aldermen and 33 councillors. Area, 5769 acres.

BOURNONITE, a mineral species, a sulphantimonite of lead and copper with the formula PbCuSbS 3 . It is of some interest on account of the twinning and the beautiful development of its crystals. It was first mentioned by Philip Rashleigh in 1797 as " an ore of antimony," and was

more completely described by the comte de Bournon in 1804, after whom it was named: the name given by Bournon himself (in 1813) was endellione, since used in the form endellionite, after the locality in Cornwall where the mineral was first found. The crystals are orthorhombic, and are generally tabular in habit owing to the predominance of the basal pinacoid ©; numerous smooth bright faces are often developed on the edges and corners of the crystals. An un- twinned crystal is represented in fig. 1. Usually, however, the

Fig. 1. — Crystal of Bournonite.

Fig. 2. — Twinned Crystal of Bournonite.

crystals are twinned, the twin-plane being a face of the prism (m) ; the angle between the faces of this prism being nearly a right angle (86° 20') , the twinnitig gives rise to cruciform groups (fig. 2) ,

and when it is often repeated the group has the appearance of a cog-wheel, hence the name Radelerz (wheel-ore) of the Kapnik miners. The repeated twinning gives rise to twin-lamellae, which may be detected on the fractured surfaces, even of the massive material. The mineral is opaque, and has a brilliant metallic lustre with a lead-grey colour. The hardness is 2|, and the specific gravity 5-8.

At the original locality, Wheal Boys in the parish of Endellion in Cornwall, it was found associated with jamesonite, blende and chalybite. Later, still better crystals were found in another Cornish mine, namely, Herodsfoot mine near Liskeard, which was worked for argentiferous galena. Fine crystals of large size have been found with quartz and chalybite in the mines at Neudorf in the Harz, and with blende and tetrahedrite at Kapnik-Banya near Nagy-Banya in Hungary. A few other localities are known for this mineral. (L. J. S.)

BOURRES, a French name for a dance common in Auvergne and in Biscay in Spain; also a term for a musical composition or a dance-movement in a suite, somewhat akin to the gavotte, in quick time with two beats to the bar.

BOURRIENNE, LOUIS ANTOINE FAUVELET DE (1769- 1834), French diplomatist, was born at Sens on the 9th of July 1769. He was educated at the military school of Brienne in Champagne along with Napoleon Bonaparte; and although the solitary habits of the latter made intimacy difficult, the two youths seem to have been on friendly terms. It must, however, be 'added that the stories of their very close friendship, as told in Bourrienne's memoirs, are open to suspicion. Leaving Brienne in 1787, and

conceiving a distaste for the army, Bourrienne pro- ceeded to Vienna. He was pursuing legal and diplomatic studies there and afterwards at Leipzig, when the French Revolution broke out and went through its first phases. Not until the spring of 1792 did Bourrienne return to France; at Paris he renewed his acquaintance with Bonaparte. They led a Bohemian life together, and among other incidents of that excit- ing time, they witnessed the mobbing of the royal family in the Tuileries (June 20) and the overthrow of the Swiss Guards at the same spot (August 10). Bourrienne next obtained a diplomatic appointment at Stuttgart, and soon his name was placed on the list of political emigres, from which it was not removed until November 1797. Nevertheless, after the affair of 13th Vendemiaire (October 5, 1795) he returned to Paris and renewed his acquaintance with Bonaparte, who was then second in command of the Army of the Interior and soon received the command of the Army of Italy. Bourrienne did not proceed with him into Italy, but was called thither by the victorious general at the time of the long negotiations with Austria (May-October 1797), when his knowledge of law and diplomacy was of some service in the drafting of the terms of the treaty of Campo Formio (October 17). In the following year he accom- panied Bonaparte to Egypt as his private secretary, and left a vivid, if not very trustworthy, account of the expedition in his memoirs. He also accompanied him on the adventurous return voyage to Frejus (September-October 1799), and was of some help in the affairs which led up to the coup d'Stat of Brumaire (November) 1799. He remained by the side of the First Consul in his former capacity, but in the autumn of 1802 incurred his displeasure owing to his very questionable financial dealings. In the spring of 1805 he was sent as French envoy to the free city of Hamburg. There it was his duty to carry out the measures of commercial war against England, known as the Continental System ; but it is known that he not only viewed those tyranni- cal measures with disgust, but secretly relaxed them in favour of those merchants who plied him with douceurs. In the early spring of 1807, when directed by Napoleon to order a large number of military cloaks for the army, then in East Prussia, he found that the only means of procuring them expeditiously was to order them from England. After gaining a large fortune while at Hamburg, he was recalled to France in disgrace at the close of 1810. In 1814 he embraced the royal cause, and during the Hundred Days (1815) accompanied Louis XVIII. to Ghent. The rest of his life was uneventful; he died at Caen on

the 7th of February 1834, after suffering from a mental malady

for two years.

The fame of Bourrienne rests, not upon his achievements or his original works, which are insignificant, but upon his Memoires, edited by C. M. de Villemarest (10 vols., Paris, 1829-1831), which have been frequently republished and translated. The best English edition is that edited by Colonel R. W. Phipps (4 vols., London, 1893) ; a new French edition has been edited by D. Lacroix (5 vols., Paris, 1899-1900). See Bourrienne et ses erreurs, volontaires et in- volontaires (Paris, 1830), by Generals Belliard, Gourgaud, &c, for a discussion of the genuineness of his Memoirs ; also Napoleon et ses ditracteurs, by Prince Napoleon (Paris, 1887; Eng. trans., London, 1888). (J. Hl. R.)

BOURRIT, MARC THEODORE (1739-1819), Swiss traveller and writer, came of a family which was of French origin but -had taken refuge at Geneva for reasons connected with religion. His father was a watchmaker there, and he himself was educated in his native city. He was a good artist and etcher, and also a pastor, so that by reason of his fine voice and love of music he was made (1768) precentor of the church of St Peter (the former cathedral) at Geneva. This post enabled him to devote himself to the exploration of the. Alps, for which he had conceived a great passion ever since an ascent (1761) of the Voirons, near Geneva. In 1775 he made the first ascent of the Buet (10,201 ft.) by the now usual route from the Pierre a. Berard, on which the great fiat rock known as the Table au Chantre still preserves his memory. In 1 784-1 785 he was the first traveller to attempt the ascent of Mont Blanc (not conquered till 1786), but neither then nor later (1788) did he succeed in reaching its summit. On -the other hand he reopened (1787) the route over the Col du Geant (11,060 ft.), which had fallen into oblivion, and travelled also among the mountains of the Valais, of the Bernese Oberland, &c. He received a pension from Louis XVI., and was named the historiographe des Alpes by the emperor Joseph II., who visited him at Geneva. His last visit to Chamonix was in 181 2. His writings are composed in a naive, sentimental and rather pompous style, but breathe throughout a most passionate love for the Alps, as wonders of nature, and not as objects of scientific study. His chief works are the Description des glacieres de Savoye, 1773 (English translation, Norwich, 1775-1776), the Description des Alpes pennines et rhitiennes (2 vols., 1781) (reprinted in 1783 under the title of Nouvelle Description des vallies de glace, and in 1785, with additions, in 3 vols., under the name of Nouvelle Description des glacieres), and the Descriptions des cols ou passages des Alpes, (2 vols., 1803), while his Itiniraire de Geneve, Lausanne et Chamouni, first published in 1701, went through several editions in his lifetime. (W. A. B. C.)

BOURSAULT, EDME (1638-1701), French dramatist and miscellaneous

writer, was born at Mussy l'Eveque, now Mussy- sur-Seine (Aube), in October 1638. On his first arrival in Paris in 1 65 1 his language was limited to a Burgundian patois, but within a year he produced his first comedy, Le Mort vivant. This and some other pieces of small merit secured for him distinguished patronage in the society ridiculed by Moliere in the Ecole des femmes. Boursault was persuaded that the " Lysidas " of that play was a caricature of himself, and attacked Moliere in Le Portrait du peintre ou la contre-critique de V Ecole des femmes (1663). Moliere retaliated in L'lmpromptu de Versailles, and Boileau attacked Boursault in Satires 7 and 9. Boursault replied to Boileau in his Satire des satires (1669), but was afterwards reconciled with him, when Boileau on his side erased his name from his satires. Boursault obtained a considerable pension as editor of a rhyming gazette, which was, however, suppressed for ridiculing a Capuchin friar, and the editor was only saved from the Bastille by the interposition of Conde. In 1671 he produced a work of edification in Ad usum Delphini: la veritable itude des souverains, which so pleased the court that its author was about to be made assistant tutor to the dauphin when it was found that he was ignorant of Greek and Latin, and the post was given to Pierre Huet. Perhaps in compensation Boursault was made collector of taxes at Mont- lucon about 1672, an appointment that he retained until 1688. Among his best-known plays are Le Mercure galant, the title of which was changed to La Comtdie sans litre (1683); La Prin-

cesse de Clhes (1676), an unsuccessful play which, when refur- bished with fresh names by its author, succeeded as Germanicus; itsope d la ville (1690); and Esope & la cour (1701). His lack of dramatic instinct could hardly be better indicated than by the scheme of his Esope, which allows the fabulist to come on the stage in each scene and recite a fable. Boursault died in Paris on the 15th of September 1701.

The CEuvres choisies of Boursault were published in 1811, and a sketch of him is to be found in M. Saint- Rene Taillandier's Etudes liUeraires (1881).

BOURSE (from the Med. Lat. bursa, a purse), the French equivalent of the Stock Exchange, and so used of the Paris Exchange, or of any foreign money-market. The English form " burse," as in Sir Thomas Gresham's building, which was known as " Britain's Burse," went out of use in the 18th century. The origin of the name is doubtful; it is not derived from any connexion between purse and money, but rather from the use of a purse as a sign. At Bruges a house belonging to the family de Bursa is said to have been first used as an Exchange, and to have had three purses as a sign on the front.

BOURSSE, ESAIAS (1630-1673), Dutch painter, was born in Amsterdam. He was a follower of Pieter de Hooch, in whose manner he worked for many years in his native town; then he took service with the Dutch East India Company, and died on a sea voyage. His paintings are exceedingly rare, perhaps because, in spite of their greater freedom and breadth, many of them pass under the names of Vermeer of Delft and Pieter de Hooch. Two of the paintings ascribed to the latter (one bears the false signature) at the Ryks museum in Amsterdam, are now recognized as being the work of Boursse. His subjects are interiors with figures, painted with great precision and with exquisite quality of colour. The Wallace collection has his masterpiece, an interior with a woman and a child in a cradle, almost as brilliant as on the day it was painted, and reflecting something of the feeling of Rembrandt, by whom he was in- fluenced. Other important examples are at the Ryks museum and at Aix-la-Chapelle. Boursse's " Boy blowing Soap Bubbles," in the Berlin museum, was until lately attributed to Vermeer of Delft. More than one picture bearing the false signature of Boursse have been publicly shown of late years.

BOUSSINGAULT, JEAN BAPTISTE JOSEPH DIEUDONNE (1802-1887), French chemist, was born in Paris on the 2nd of February 1802. After studying at the school of mines at Saint- Etienne he went, when little more than twenty years old, to South America as a mining engineer on behalf of an English company. During the insurrection of the Spanish colonies he was attached to the staff of General Bolivar, and travelled widely in the northern parts of the continent. Returning to France he became professor of chemistry at Lyons, and in 1839 was appointed to the chair of agricultural and analytical chemistry at the Conservatoire des Arts et Metiers in Paris. In 1848 he was elected to the National Assembly, where he sat as a Moderate republican. Three years later he was dismissed from his professorship on account of his political opinions, but so much resentment

at this action was shown by scientific men in general, and especially by his colleagues, who threatened to resign in a body, that he was reinstated. He died in Paris on the nth of May 1887. His first papers were concerned with mining topics, and his sojourn in South America yielded a number of miscellaneous memoirs, on the cause of goitre in the Cordilleras, the gases of volcanoes, earthquakes, tropical rain, &c, which won the commendation of A. von Humboldt. From 1836 he devoted himself mainly to agricultural chemistry and animal and vegetable physiology, with occasional excursions into mineral chemistry. His work included papers on the quantity of nitrogen in different foods, the amount of gluten in different wheats, investigations on the question whether plants can assimilate free nitrogen from the atmosphere (which he answered in the negative), the respiration of plants, the function of their leaves, the action and value of manures, and other similar subjects. Through his wife he had a share in an estate at Bechebronn in Alsace, where he carried out many agricultural experiments. He

collaborated with J. B. A. Dumas in writing an Essai de slatique chimique des tires organists (1841), and was the author of Traiti d'Sconomie rurale (1844), which was remodelled as Agronomie, chimie agricole, et physiologie (5 vols., 1860-1874; 2nd ed., 1884), and of Etudes sur la transformation du fer en acier

(1875).

BOUTERWEK, FRIEDRICH (1766-1828), German philosopher and critic, was born at Oker, near Goslar in Lower Saxony, and studied law at Gottingen. From 1790, however, he became a disciple of Kant, published Aphorismen nach Kanis Lehre vorgelegt (1793), and became professor of philosophy at Got- tingen (1802), where he died on the 9th of August 1828. As a philosopher, he is interesting for his criticism of the theory of the " thing-in-itself " {Ding-an-sich) . For the pure reason, as described in the Kritik, the " thing-in-itself " can be only an inconceivable "something-in-general"; any statement about it involves the predication of Reality, Unity and Plurality, which belong not to the absolute thing but to phenomena. On the other hand, the subject is known by the fact of will, and the object by that of resistance; the cognizance of willing is the assertion of absolute reality in the domain of relative knowledge. This doctrine has since been described as absolute Virtualism. Following this train of thought, Bouterwek left the Kantian position through his opposition to its formalism. In later life he inclined to the views of F. H. Jacobi, whose

letters to him (published at Gottingen, 1868) shecl much light on the development of his thought. His chief philosophical works are Ideen zu einer allgemeinen Apodiktik (Gottingen and Halle, 1799) ; Aesthstik (Leipzig, 1806; Gottingen, 1815 and 1824); Lehrbuch der philos. Vorkenntnisse (Gottingen, 1810 and 1820); Lehrbuch der philos. Wissenschaften (Gottingen, 1813 and 1820). In these works he dissociated himself from the Kantian school. His chief critical work was the Geschichte der neuern Poesie und Beredsamkeit (Gottingen, 12 vols., 1801-1819), of which the history of Spanish literature has been published separately in French, Spanish and English. The Geschichte is a work of wide learning and generally sound criticism, but it is not of equal merit throughout. He also wrote three novels, Paulus Septimus (Halle, 1795), Graf Donamar (Gottingen, 1791) and Ramiro (Leipzig, 1804), and published a collection of poems (Gottingen, 1802).

BOUTHILLIER, CLAUDE, Sieur de Fouilletotjrte (1581- 1652), French statesman, began life as an advocate. In 1613 he was councillor in the parlement of Paris, and in 1619 became councillor of state and a secretary to the queen-mother, Marie de' Medici. The connexion of his father, Denis Bouthillier (d. 1622), with Cardinal Richelieu secured for him the title of secretary of state in 1628, and he was able to remain on good terms with both Marie de' Medici and Richelieu, in spite of their rivalry. In 1632 he became superintendent of finances. But his great role was in diplomacy. Richelieu employed him on many diplomatic missions, and the success of his foreign policy was due in no small degree to Bouthillier's ability and devotion. In 1630 he had taken part at Regensburg in arranging the abortive treaty between the emperor and France. From 1633 to 1640 he was continually busied with secret missions in Germany, sometimes alone, sometimes with Father Joseph. Following Richelieu's instructions, he negotiated the alliances which brought France into the Thirty Years' War. Meanwhile, at home, his tact and amiable disposition, as well as his reputation for straightforwardness, had secured for him a unique position of influence in a court torn by jealousies and intrigues. Trusted by the king, the confidant of Richelieu, the friend of Marie de' Medici, and through his son, Leon Bouthillier, who was appointed in 1635 chancellor to Gaston d'Orleans, able to bring his influence to bear on that prince, he was an invaluable mediator; and the personal influence thus exercised, combined with the fact that he was at the head of both the finances and the foreign policy of France, made him, next to the cardinal, the most powerful man in the kingdom. Richelieu made him executor of his will, and Louis XIII. named him a member of the council of regency which he intended should govern the kingdom after his death.

But the king's last plans were not carried out, and Bouthillier was obliged to retire into private life, giving up his office of superintendent of finances

in June 1643. He died in Paris on the 13th of March 1652.

His son, Leon Bouthillier (1608-1652), comte de Chavigny, was early associated with his father, who took him with him from 1629 to 1632 to all the great courts of Europe, instructing him in diplomacy. In 1632 he was named secretary of state and seconded his father's work, so that it is not easy always to distinguish their respective parts. After the death of Louis XIII. he had to give up his office; but was sent as plenipotentiary to the negotiations at Munster. He showed himself incapable, however, giving himself up to pleasure and fetes, and returned to France to intrigue against Mazarin. Arrested twice during the Fronde, and then for a short time in power during Mazarin's exile (April 1651), he busied himself with small intrigues which came to nothing.

BOUTS-RIMES, literally (from the French) " rhymed ends," the name given in all literatures to a kind of verses of which no better definition can be found than was made by Addison, in the Spectator, when he described them as " lists of words that rhyme to one another, drawn up by another hand, and given to a poet, who was to make a poem to the rhymes in the same order that they were placed upon the list." The more odd and perplexing the rhymes are, the more ingenuity is required to give a semblance of common-sense to the production. For instance, the rhymes breeze, elephant, squeeze, pant, scant, please, hope, pope are submitted, and the following stanza is the result: —

Escaping from the Indian breeze, The vast, sententious elephant Through groves of sandal loves to squeeze And in their fragrant shade to pant; Although the shelter there be scant, The vivid odours soothe and please, And while he yields to dreams of hope, Adoring beasts surround their Pope.

The invention of bouts-rimes is attributed to a minor French poet of the 1 7 th century, Dulot, of whom little else is remembered. According to the Menagiana, about the year 1648, Dulot was complaining one day that he had been robbed of a number of valuable papers, and, in particular, of three hundred sonnets. Surprise being expressed at his having written so many, Dulot explained that they were all " blank sonnets," that is to say, that he had put down the rhymes and nothing else. The idea struck every one as amusing, and what Dulot had done seriously was taken up as a jest. Bouts-rimes became the fashion, and in 1654 no less a person than Sarrasin composed a satire against them, entitled La Dtfaite des bouts-rimes, which enjoyed a great success. Nevertheless, they continued to be abundantly composed in France throughout the 17th century and a great part of the 18th century. In 1701 Etienne Mallemans (d. 1716) published a collection of serious sonnets, all written to rhymes selected for him by the duchess of Maine. Neither Piron, nor Marmontel, nor La Motte disdained

this ingenious exercise, and early in the 19th century the fashion was revived. The most curious incident, however, in the history of bouts-rimes is the fact that the elder Alexandre Dumas, in 1864, took them under his protection. He issued an invitation to all the poets of France to display their skill by composing to sets of rhymes selected for the purpose by the poet, Joseph Mery (1798-1866). No fewer than 350 writers responded to the appeal, and Dumas published the result, as a volume, in 1865.

W. M. Rossetti, in the memoir of his brother prefixed to D. G. Rossetti's Collected Works (1886), mentions that, especially in 1848 and 1849, he and Dante Gabriel Rossetti constantly practised their pens in writing sonnets to bouts-rimes, each giving the other the rhymes for a sonnet, and Dante Gabriel writing off these exercises in verse-making at the rate of a sonnet in five or eight minutes. Most of W. M. Rossetti's poems in The Germ were bouts-rimes experiments. Many of Dante Gabriel's, a little touched up, remained in his brother's possession, but were not included in the Collected Works. (E. G.)

BOUTWELL, GEORGE SEWALL (1818-1905), American statesman, was born in Brookline, Massachusetts, on the 28th of January 1818. He was reared on a farm, and at an early age began a mercantile career at Groton, Mass. There he studied law and in 1836 was admitted to the bar, but did not begin practice for many years. In 1842-1844 and again in 1847-1850 he served in the state house of representatives, and became the recognized leader on the Democratic side; he was thrice defeated for Congress, and was twice an unsuccessful candidate for governor. In 1851, however, by means of " Free-Soil " votes, he was chosen governor, and was re-elected by the same coalition in 1852. In the following year he took an active part in the state constitutional convention. He became a member of the Massachusetts Board of Education in 1853, and as its secretary in 1855-1861 prepared valuable reports and rendered much service to the state's school system. The passage of the Kansas-Nebraska Bill in 1854 had finally alienated him from the Democratic party, and he became one of the founders of the new Republican party in the state. He played an influential part in the Republican national convention in i860, and in 1862 after the passage of the war tax measures he was appointed by President Lincoln the first commissioner of internal revenue, which department he organized. From 1863 to 1869 he was a representative in Congress, taking an influential part in debate, and acting as one of the managers of President Johnson's impeachment. From 1869 to 1873 he was secretary of the treasury in President Grant's cabinet, and from 1873 until 1877 was a

United States senator from Massachusetts. Under an appointment by President Hayes, he prepared the second edition of the United States Revised Statutes (1878). In 1880 he represented the United States before the commission appointed in accordance with the treaty of that year, between France and the United States, to decide the claims brought by French citizens against the United States for acts of the American authorities during the Civil War, and the claims of American citizens against France for acts of French authorities during the war between France and Mexico, the Franco- German War and the Commune. He opposed the acquisition by the United States of the Philippine Islands, became president of the Anti-imperial- istic League, and was a presidential elector on the Bryan (Demo- cratic) ticket in 1900. He died at Groton, Massachusetts, on the 28th of February 1905. He published various volumes, including The Constitution of the United States at the End of the First Century (1895), and Reminiscences of Sixty Years in Public Affairs (2 vols., New York, 1902).

BOUVARDIA, a genus of handsome evergreen greenhouse shrubs, belonging to the natural order Rubiaceae, and a native of tropical America. The flowers are in terminal generally many- flowered clusters; the corolla has a large tube and a spreading four-rayed limb. The cultivated forms include a number of hybrids. The plants are best increased by cuttings taken off in April, and placed in a brisk heat in a propagating frame with a close atmosphere. When rooted they should be potted singly into 3-in. pots in fibrous peat and loam, mixed with one-fourth leaf-mould and a good sprinkling of sand, and kept in a tempera- ture of 70° by night and 80° during the day; shade when re- quired; syringe overhead in the afternoon and close the house with sun-heat. The plants should be topped to ensure a bushy habit, and as they grow must be shifted into 6-in. or 7-in. pots. After midsummer move to a cool pit, where they may remain till the middle of September, receiving plenty of air and space. They should then be removed to a house, and some of the plants put at once in a temperature of about 70 at night, with a few degrees higher in the daytime, to bring them into flower. Others are moved into heat to supply flowers in succession through the winter and spring.

BOUVET, FRANCOIS JOSEPH (1753-1832), French admiral, son of a captain in the service of the French East India Company, was born on the 23rd of April 1753. He went to sea at the age of twelve with his father. Bouvet served in the East Indies in the famous campaign of 1781-83 under the command of Suffren, but only in a subordinate rank. On the outbreak of the French

Revolution he very naturally took the anti-royalist side. Murder and exile had removed the great majority of the officers of the monarchy, and the

services of a man of Bouvet's experience were valuable. He was promoted captain and received the command of the " Audacieux " (80) in the first great fleet collected by the re- public. In the same year (1 793) he was advanced to rear-admiral, and he commanded a division in the fleet which fought the battle of the 1st of June 1794 against Lord Howe. Until the close of 1796 he continued in command of a squadron in the French Channel fleet. In the December of that year he was entrusted with the van division of the fleet which was sent from Brest to attempt to land General Hoche with an expeditionary force in the south of Ireland. The stormy weather which scattered the French as soon as they left Brest gave Bouvet a prominence which he had not been designed to enjoy. Bouvet, who found himself at daybreak on the 17th of December separated with nine sail of the line from the rest of the fleet, opened his secret orders, and found that he was to make his way to Mizen Head. He took a wide course to avoid meeting British cruisers, and on the 19th had the good luck to fall in with a considerable part of the rest of the fleet and some of the transports. On the 21st of December he arrived off Dursey Island at the entry to Bantry Bay. On the 24th he anchored near Bear Island with part of his fleet. The continued storms which blew down Bantry Bay, and the awkwardness of the French crews, made it impossible to land the troops he had with him. On the evening of the 25th the storm increased to such a pitch of violence that the frigate in which Bouvet had hoisted his flag was blown out to sea. The wind moderated by the 29th, but Bouvet, being convinced that none of the ships of his squadron could have remained at the anchorage, steered for Brest, where he arrived on the 1st of January 1797. His fortune had been very much that of his colleagues in this storm-tossed expedition, and on the whole he had shown more energy than most of them. He was wrong, however, in thinking that all his squadron had failed to keep their anchorage in Bantry Bay. The government, displeased by his precipitate return to Brest, dismissed him from command soon afterwards. He was compelled to open a school to support himself. Napoleon restored him to the service, and he commanded the squadron sent to occupy Guadaloupe during the peace of Amiens, but he had no further service, and lived in obscurity till his death on the 21st of July. 1832.

Tronde, Bataittes navales de la France, vols. ii. and iii., and James, Naval History, vols. i. and ii., give accounts of the 1st of June and the expedition to Ireland. There is a vigorous account of the expedition in Tronde's English in Ireland, and it v is dealt with in Admiral Colomb's Naval Warfare. (D. H.)

BOUVIER, JOHN (1787-1851), American jurist, was born in Codogno, France, in 1 7 8 7 . In 1 802 his family, who were Quakers (his mother was a member of the well-known Benezet family), emigrated to America and settled in Philadelphia, and after varied experiences as proprietor of a

book shop and as a country editor he was admitted to the bar in 1818, having become a citizen of the United States in 1812. He attained high standing in his profession, was recorder of Philadelphia in 1836, and from 1838 until his death was an associate justice of the court of criminal sessions in that city. He is best known for his able legal writings. His Law Dictionary Adapted to the Constitution and Laws of the United States of America and of the Several States of the American Union (1839, revised and brought up to date by Francis Rawle, under the title of Bouvier's Law Dictionary, 2 vols., 1897) has always been a standard. He published also an edition of Bacon's Abridgment of the Law (10 vols., 1842-1846), and a compendium of American law entitled The Institutes of American Law (4 vols., 1851; new ed. 2 vols., 1876).

BOUVINES, a village on the French-Belgian frontier between Lille and Toumay, the scene of one of the greatest battles of the middle ages, fought on the 27th of July 1214, between the forces of Philip Augustus, king of France, and those of the coalition formed against him, of which the principal members were the emperor and King John of England. The plan of campaign seems to have been designed by King John, who was the soul of the alliance-; his general idea was to draw the French king to

the southward against himself, while the emperor Otto IV., the princes of the Netherlands and the main army of the allies should at the right moment march upon Paris from the north. John's part in the general strategy was perfectly executed; the allies in the north moved slowly. While John, after two inroads, turned back to his Guienne possessions on the 3rd of July, it was not until three weeks later that the emperor concentrated his forces at Valenciennes, and in the interval Philip Augustus had counter- marched northward and concentrated an army at Peronne. Philip now took the offensive himself, and in manoeuvring to get a good cavalry ground upon which to fight he offered battle (July 27), on the plain east of Bouvines and the river Marque — the same plain on which in 1794 the brilliant cavalry action of Willems was fought. The imperial army accepted the challenge and drew up facing south-westward towards Bouvines, the heavy cavalry on the wings, the infantry in one great mass in the centre, supported by the cavalry corps under the emperor himself. The total force is estimated at 6500 heavy cavalry and 40,000 foot. The French army (about 7000 cavalry and 30,000 infantry) took ground exactly opposite to the enemy and in a similar formation, cavalry on the wings, infantry, including the milice des communes, in the centre, Philip with the cavalry reserve and the Oriflamme in rear of the foot. The battle opened with a

confused cavalry fight on the French right, in which individual feats of knightly gallantry were more noticeable than any attempt at combined action. The fighting was more serious between the two centres; the infantry of the Low Countries, who were at this time almost the best in existence, drove in the French; Philip led the cavalry reserve of nobles and knights to retrieve the day, and after a long and doubtful fight, in which he himself was unhorsed and narrowly escaped death, began to drive back the Flemings. In the meanwhile the French feudatories on the left wing had thoroughly defeated the imperialists opposed to them, and William Longsword, earl of Salisbury, the leader of this corps, was unhorsed and taken prisoner by the warlike bishop of Beauvais. Victory declared itself also on the other wing, where the French at last routed the Flemish cavalry and captured Count Ferdinand of Flanders, one of the leaders of the coalition. In the centre the battle was now between the two mounted reserves led respectively by the king and the emperor in person. Here too the imperial forces suffered defeat, Otto himself being saved only by the devotion of a handful of Saxon knights. The day was already decided in favour of the French when their wings began to close inwards to cut off the retreat of the imperial centre. The battle closed with the celebrated stand of Reginald of Boulogne, a revolted vassal of King Philip, who formed a ring of seven hundred Brabangon pikemen, and not only defied every attack of the French cavalry, but himself made repeated charges or sorties with his small force of knights. Eventually, and long after the imperial army had begun its retreat, the gallant schiltron was ridden down and annihilated by a charge of three thousand men-at-arms. Reginald was taken prisoner in the melee ; and the prisoners also included two other counts, Ferdinand and William Longsword, twenty-five barons and over a hundred knights. The killed amounted to about 1 70 knights of the defeated party, and many thousands of foot on either side, of whom no accurate account can be given.

See Oman, History of the Art of War, vii. pp. 457-480; also Kohler, Kriegsgeschichte, &c, i. 140, and Delpech, Tactique au XIII" Steele, 127.

BOVEY BEDS, in geology, a deposit of sands, clays and lignite, 200-300 ft. thick, which lies in a basin extending from Bovey Tracey to Newton Abbot in Devonshire, England. The deposit is evidently the result of the degradation of the neighbouring Dartmoor granite; and it was no doubt laid down in a lake. O. Heer, who examined the numerous plant remains from these beds, concluded that they belonged to the same geological horizon as the Molasse or Oligocene of Switzerland. Starkie Gardiner, however, who subsequently examined the flora, showed that it bore a close resemblance to that of the Bournemouth Beds or Lower Bagshot; in this view he is supported by C. Reid. Large excavations have been made for the

extraction of the clays, which are very valuable for pottery and similar purposes. The lignite or " Bovey Coal " has at times been burned in the local kilns, and in the engines and workmen's cottages, but it is not economical.

See S. Gardiner, Q. J. G. S, London, xxxv., 1879; W. Pengelly and O. Heer, Phil. Trans., 1862; C. Reid, Q. J. G. S. Hi., 1896, p. 490, and loc. cit. liv., 1898, p. 234. An interesting general account is given by A. W. Clayden, The History of Devonshire Scenery (London, 1906), PP. 159-168.

BOVIANUM, the name of two ancient Italian towns. (1) Undecimanorum [Boiano], the chief city of the Pentri Samnites, 9 m. N.W. of Saepinum and 18 m. S.E. of Aesernia, on the important road from Beneventum to Corfinium, which connected the Via Appia and the Via Valeria. The original city occupied the height (Civita) above the modern town, where remains of Cyclopean walls still exist, while the Roman town (probably founded after the Social War, in which Bovianum was the seat of the Samnite assembly) lay in the plain. It acquired the name Undecimanorum when Vespasian settled the veterans of the Legio XL Claudia there. Its remains have been covered by over 30 ft. of earth washed down from the mountains. Com- paratively few inscriptions have been discovered. (2) Vetus (near Pietrabbondante, 5 m. S. of Agnone and 19 m. N.W. of Campobasso), according to Th. Mommsen {Corpus Inscrip. Lat. ix. Berlin, 1883, p. 257) the chief town of the Caraceni. It lay in a remote situation among the mountains, and where Bovianum is mentioned the reference is generally to Bovianum Undecimanorum. Remains of fortifications and lower down of a temple and a theatre (cf. Romische Mitteilungen, 1903, 154) — the latter remarkable for the fine preservation of the stone seats of the three lowest rows of the auditorium — are to be seen. No less than eight Oscan inscriptions have been found. (T. As.)

BOVIDAE, the name of the family of hollow-horned ruminant mammals typified by the common ox (Bos taurus), and specially characterized by the presence on the skulls of the males or of both sexes of a pair of bony projections, or cores, covered in life with hollow sheaths of horn, which are never branched, and at all events after a very early stage of existence are permanently retained. From this, which is alone sufficient for diagnostic purposes, the group is often called the Cavicornia. For other characteristics see Pecora. The Bovidae comprise a great number of genera and species, and include the oxen, sheep, goats, antelopes and certain other kinds which come under neither of these designations. In stature they range from the size of a hare to that of a rhinoceros; and their horns vary in size and shape from the small and simple spikes of the oribi and duiker antlers to the enormous and variously shaped struc- tures borne respectively by

buffaloes, wild sheep and kudu and other large antelopes. In geographical distribution the Bovidae present a remarkable contrast to the deer tribe, or Cervidae. Both of these families are distributed over the whole of the northern hemisphere, but whereas the Cervidae are absent from Africa south of the Sahara and well represented in South America, the Bovidae are unknown in the latter area, but are extraordinarily abundant in Africa. Neither group is represented in Australasia; Celebes being the eastern limit of the Bovidae. The present family doubtless originated in the northern half of the Old World, whence it effected an entrance by way of the Bering Strait route into North America, where it has always been but poorly represented in the matter of genera and species.

The Bovidae are divided into a number of sections, or sub- families, each of which is briefly noticed in the present article, while fuller mention of some of the more important representa- tives of these is made in other articles.

The first section is that of the Bovinae, which includes buffaloes, bison and oxen. The majority of these are large and heavily- built ruminants, with horns present in both sexes, the muzzle broad, meist and naked, the nostrils lateral, no face-glands, and a large dewlap often developed in the males; while the tail is long and generally tufted, although in one instance long-haired throughout. The horns are of nearly equal size in both sexes, are placed on or near the vertex of the skull, and may be either rounded or angulated, while their direction is more or

less outwards, with an upward direction near the tips, and con- spicuous knobs or ridges are never developed on their surface. The tall upper molars have inner columns. The group is repre- sented throughout the Old World as far east as Celebes, and has one living North American representative. All the species may be included in the genus Bos, with several subgeneric divisions (see Anoa, Aurochs, Bantin, Bison, Buffalo, Gaur, Gayal, Ox and Yak).

The second group, or Caprinae, includes the sheep and goats, which are smaller animals than most of the Bovidae, generally with horns in both sexes, but those of the females small. In the males the horns are usually compressed and triangular, with transverse ridges or knobs, and either curving backwards or spiral. The muzzle is narrow and hairy; and when face- glands are present these are small and insignificant; while the tail is short and flattened. Unlike the Bovinae, there are frequently glands in the feet; and the upper molar teeth differ from those of that group in their

narrower crowns, which lack a distinct inner column. When a face-pit is present in the skull it is small. The genera are Ovis (sheep), Capra (goats) and Hemitragus (tahr). Sheep and goats are very nearly related, but the former never have a beard on the chin of the males, which are devoid of a strong odour; and their horns are typically of a different type. There are, however, several more or less transitional forms. Tahr are short-horned goats. The group is unknown in America, and in Africa is only represented in the mountains of the north, extending, however, some distance south into the Sudan and Abyssinia. All the species are moun- tain-dwellers., (See Udad, Argali, Goat, Ibex, Mouelon, Sheep and Tahr.)

The musk-ox (Ovibos mosckatus) alone represents the family Ovibovinae, which is probably most nearly related to the next" group (see Musk-ox).

Next come the Rupicaprinae, which include several genera of mountain-dwelling ruminants, typified by the European chamois (Rupicapra) ; the other genera being the Asiatic serow, goral and takin, and the North American Rocky Mountain goat. These ruminants are best described as goat-like antelopes. (See Antelope, Chamois, Goral, Rocky Mountain Goat, Serow and Takin.)

Under the indefinable term " antelope " (q.v.) may be included the seven remaining sections, namely Tragelaphinae (kudu and eland), Hippotraginae (sable antelope and oryx), Antilopinae (black-buck, gazelles, &c), Cervicaprinae (reedbuck and water- buck), Neotraginae (klipspringer and steinbok), Cephalophinae (duikers and four-horned antelopes) and Bubalinae (hartebeests and gnus). (R. L.)*

BOVILL, SIR WILLIAM (1814-1873), English judge, a younger son of Benjamin Bovill, of Wimbledon, was born at Allhallows, Barking, on the 26th of May 1814. On leaving school he was articled to a firm of solicitors, but entering the Middle Temple he practised for a short time as a special pleader below the bar. He was called in 1841 and joined the home circuit. His special training in a solicitor's office, and its resulting con-nexion, combined with a thorough knowledge of the details of engineering, acquired through his interest in a manufacturing firm in the east end of London, soon brought him a very extensive patent and commercial practice. He became Q.C. in 1855, and in 1857 was elected M.P. for Guildford. In the House of Commons he was very zealous for legal reform, and the Partnership Law Amendment Act 1865, which he helped to pass, is always referred to as Bovill's Act. In 1866 he was appointed solicitor-general, an office which he vacated on becoming chief justice of the common pleas in succession to Sir W. Erie in November of the same year. He died at Kingston, Surrey, on the is t of November 1873. As a barrister he was unsurpassed for his remarkable knowledge of commercial law; and

when promoted to the bench his painstaking labour and unswerving uprightness, as well as his great patience and courtesy, gained for him the respect and affection of the profession.

SOVILLAE, an ancient town of Latium, a station on the Via Appia (which in 293 B.C. was already paved «aj to this point),

1 1 m. S.E. of Rome. It was a colony of Alba Longa, and appears as one of the thirty cities of the Latin league; after the destruc- tion of Alba Longa the sacra were, it was held, transferred to Bovillae, including the cult of Vesta (in inscriptions virgines Vestales Albanae are mentioned, and the inhabitants of Bovillae are always spoken of as Albani Longani Bovillenses) and that of the gens lulia. The existence of this hereditary worship led to an increase in its importance when the Julian house rose to the highest power in the state. The knights met Augustus's dead body at Bovillae on its way to Rome, and in a.d. 16 the shrine of the .family worship was dedicated anew, 1 and yearly games in the circus instituted, probably under the charge of the sodales Augustales, whose official calendar has been found here. In history Bovillae appears as the scene of the quarrel between Milo and Clodius, in which the latter, whose villa lay above the town on the left of the Via Appia, was killed. The site is not naturally strong, and remains of early fortifications cannot be traced. It may be that Bovillae took the place of Alba Longa as a local centre after the destruction of the latter by Rome, which would explain the deliberate choice of a strategically weak position. Remains of buildings of the imperial period — the circus, a small theatre, and edifices probably connected with the post-station — may still be seen on the south-west edge of the Via Appia.

See L. Canina, Via Appia (Rome, 1853), i. 202 seq.; T. Ashby in Melanges de I'ecole francaise de Rome (1903), p. 395. (T. As.)

BOW (pronounced " b5 "), a common Teutonic word for anything bent 2 (O. Eng. boZa; cf. O. Sax. and O.H.G. bogo, M.H.G. boge, Mod. Ger. bogen; from O. Teut. stem bug- of beugan, Mod. Ger. biegen, to bend). Thus it is found in English compound words, e.g. " elbow," " rainbow," " bow-net," " bow- window," " bow-knot," " saddle-bow," and by itself as the designation of a great variety of objects. The Old English use of " bow," or stone-bow, for " arch," now obsolete, survives in certain names of churches and places, e.g. Bow church (St Mary-in-Arcubus) in Cheapside, and Stratford-le-Bow (the " Stratford-atte-Bowe " of Chaucer). "Bow," however, is still the designation of objects so various as an appliance for shooting arrows (see Archery), a necktie in the form of a bow-knot {i.e. a double-looped knot) , a ring or hoop forming a handle (e.g. the bow of a watch), certain instruments or tools consisting of a bent piece of wood with

the ends drawn together by a string, used for drilling, turning, &c, in various crafts, and the stick strung with horsehair by means of which the strings of instruments of the violin family are set in vibration. It is with this last that the present article is solely concerned.

Bow in Music. — The modern bow (Fr. archet; Ger. Bogen; Ital. arco) consists of five parts, i.e. the " stick," the screw or " ferrule," the " nut," the " hair " and the " head." The stick, in high-grade bowsˆ is made of Pernambuco wood (Caesalpinia brasiliensis), which alone combines the requisite lightness, elas- ticity and power of resistance; for the cheaper bows American oak is used, and for the double-bass bow beech. A billet rich in colouring matter and straight in the grain is selected, and the stick is usually cut from a templet so as to obtain the accurate taper, which begins about 4j in. from the nut, decreasing according to regular proportions from f in. at the screw to —ft- at the back of the head. The stick is cut absolutely straight and parallel along its whole length with the fibre of the wood; it is then bent by heat until it is slightly convex to the hair and has assumed the elegant cambrwe first given to it by Frangois Tourte (1747-1835). This process requires the greatest care, for if the fibres be not heated right through, they offer a continual resistance to the curve, and return after a time to the rigid

1 It is not likely that any remains of it now exist.

2 " Bow," the forepart or head of a ship, must be distinguished from this word. It is the same word, and pronounced in the same way, as " bough," an arm or limb of a tree, and represents a common Teutonic word, seen in O. Eng. bog, Ger. Bug, shoulder, and is cognate with Gr. vftxvt, forearm. The sense of " shoulder" of a ship is not found in O. Eng. bog. but was probably borrowed from Dutch or Danish. " Bow," an inclination of the head or body, though pronounced as " bough," is of the same origin as " bow." to bend.

straight line, a defect often observed in cheap bows. The sticks are now of either cylindrical or octagonal section, and are lapped or covered with gold thread or leather for some inches beyond the nut in order to afford a firm grip. The length of the stick was definitely and finally fixed by Francois Tourte at 29-34 to 29-528 in.

The centre of gravity in a well-balanced violin bow should be at 19 cm. (7 \ to 7 J in.) from the nut; 1 in the violoncello bow the hair measures from

60 to 62 cm. (24 to 25 in.), and the Centre of gravity is at from 175 to 180 mm. (7 to 71 in.) from the nut. Inconsequence of the flexure given to the stick, Tourte found it necessary to re- adjust the proportions and relative height of head and nut, in order to keep the hair at a satisfactory distance from the stick, and at the necessary angle in attacking the strings so as to avoid contact between stick and strings in bowing. In order to counterbalance the consequent increased weight of the head and to keep the centre of gravity nearer the hand, Tourte loaded the nut with metal inlays or ornamental designs.

The screw or ferrule, at the cylindrical end of the stick held by the hand, provides the means of tightening or loosening the tension of the hair. This screw, about 3! in. long, hidden within the stick,_ runs through the eye of another little screw at right angles to it, which is firmly embedded in the nut.

The nut is a wooden block at the screw end of the stick, the original purpose of which was to keep the hair at a proper distance from the stick and to provide a secure attachment for the hair. The whole nut slides up and down the stick in a groove in answer to the screw, thus tightening or relaxing the tension of the hair. In the nut is a little cavity or chamber, into which the knotted end of the hair is firmly fixed by means of a little wedge, the hair being then brought out and flattened over the front of the nut like a ribbon by the pressure of a flat ferrule. The mother-of-pearl slide which runs along a mortised groove further protects the hair on the outside of the nut. Bows having these attachments of ferrule and slide, added by Tourte at the instigation of the violinist Giovanni Battista Viotti, were known as archets a recouvrements.

The hair is chosen from the best white horsehair, and each of the 150 to 200 hairs which compose the half-inch wide ribbon of the bow must be perfectly cylindrical and smooth. It is bought by the pound, and must be very carefully sorted, for not more than one hair in ten is perfectly cylindrical and fit for use on a high-grade bow. Experience determines the right number of hairs, for if the ribbon be too thick it hinders the vibration of the strings; if too thin the friction is not strong enough to produce a good tone. Fetis gives 175 to 250 as the number used in the modern bow, 2 and Julius Ruhlmann no to 120. 3 Tourte attached the greatest importance to the hairing of the bow, and bestowed quite as much attention upon it as upon the stick. He subjected the hair to the following process of cleansing: first it was thoroughly scoured with soap and water to remove all grease, then steeped in bran-water, freed from all heterogeneous matter still adhering to it, and finally rinsed in pure water slightly blued. When passed between the fingers in the direction from root to tip, the hair glides smoothly and offers no resistance, but passed in the opposite direction it

feels rough, suggesting a regular succession of minute projections. The outer epithelium or sheath of the hair is composed of minute scales which produce a succession of infinitesimal shocks when the hair is drawn across the strings; the force and uniformity of these shocks, which produce series of vibrations of equal persistency, is considerably heightened by the application of rosin to the hair. The particles of rosin cling to the scales of the epithelium, thus accentuating the projections and the energy of the attack or " bite " upon the strings. With use, the scales of the epithelium wear off, and then no matter how much rosin is applied, the bow fails to elicit musical sounds — • it is then " played out " and must be re-haired. The organic con- struction of horsehair makes it necessary, in hairing the bow, to lay the hairs in opposite directions, so that the up and down strokes may be equal and a pure and even tone obtained. Waxed silk is wound round both ends of the hair to form a strong knot, which is afterwards covered with melted rosin and hardens with the hair into a solid mass.

The head, I in. long and -fa in. wide at the plate, is cut in one piece with the stick, an operation which requires delicate workmanship; otherwise the head is liable to snap at this point during a sforzando passage. The head has a chamber and wedge contrivance similar to that of the nut, in which the other end of the hair is immovably fixed. The hair on the face of the head is protected by a metal or ivory plate.

The model bow here described, elaborated by Francois Tourte as long ago as between 1775 and 1780 according to Fetis, 4 or between 17.85 and 1790 according to Vidal, 5 has not since been surpassed.

1 See F. J. Fetis, Antoine Stradivari, pp. 120-121 (Paris, 1856).

2 Fetis, op. cit. p. 123.

3 J. Ruhlmann, Die Geschichte der Bogeninstrumente (Brunswick, 1882), p. 143.

4 Fetis, op. cit. p. 119.

6 Antoine Vidal, Les Instruments & archet (Paris, 1876-1878), tome i. p. 269.

That the violin and the bow form one inseparable whole becomes evident when we consider the history of the forerunners of the viol family: without the bow the ancestor of the violin would have remained a guitar; the bow would not have reached its present state of perfection had it been required only for instru- ments of the rebec and vielle type. As soon as the possibilities of the violin were realized, as a solo instrument capable, through the agency of the bow, of expressing the emotions of the performer,

the perfecting of the bow was prosecuted in earnest until it was capable of responding to every shade of delicate thought and feeling. This accounts in a measure for the protracted develop- ment of the bow, which, although used long before the violin had been evolved, did not reach a state of perfection at the hands of Tourte until more than a century and a half after the Cremona master had given us the violin.*

The question of the origin of the bow still remains a matter of conjecture. Its appearance in western Europe seems to have coincided with the conquest of Spain by the Moors in the 8th century, and the consequent impetus their superior culture gave to arts and sciences in the south-west of Europe. We have, however, no well-authenticated representation of the bow before the 9th century in Europe; the earliest is the bow illustrated along with the Lyra Teutonica by Martin Gerbert, 6 the repre- sentation being taken from a MS. at the monastery of St Blaise, dating in his opinion from the 9th century. On the other hand, Byzantine art of the 9th and nth centuries 7 reveals acquaint- ance with a bow far in advance of most of the crude contemporary specimens of western Europe. The bow undoubtedly came from the East, and was obviously borrowed by the Greeks of Asia Minor and the Arabs from a common source — probably India, by way of Persia. The earliest representation of a bow yet dis- covered is to be found among the fine frescoes in one of the chapels of the monastery of Bawit 8 in Egypt. The mural paintings in question were the work of many artists, covering a considerable period of time. The only non-religious subject depicted is a picture of a youthful Orpheus, assigned by Jean Cledat to some date not later than the 8th century a.d., but more probably the work of a 6th -century artist. Orpheus is holding an instrument, which appears to be a rebab, against his chin, in the act of bowing and stopping the strings. The bow is similar in shape to one shown in the Psalter of Labeo Notker, Leipzig, 10th century, mentioned farther on. On Indian sculptures of the first centuries of our era, such as the Buddhist stupas of Amaravati, the risers of the topes of Jamal-Garhi, in the Yusafzai district of Afghanistan (both in the British Museum), on which stringed instruments abound, there is no bow. The bow has remained a primitive instrument in India to this day; a Hindu tradition assigns its invention to Ravanon, a king of Ceylon, and the instrument for which it was invented was called ravana- stron; a primitive instrument of that name is still in use in Hindustan. 9 F. J. Fetis, 10 Antoine Vidal, 11 Edward Heron- Allen, 12 and others have given the question some consideration, and readers who wish to pursue the matter farther are referred to their works.

There is thus no absolute proof of the existence of the bow in primitive times. The earliest bow known in Europe was associated with the rebab (q.v.), the most widely used bowed instrument until the 12th century. The development of this

6 De Cantu et Musica Sacra (1774), tome ii. pi. xxxii. No. 18; the MS. has since perished by fire.

7 See, for an illustration of the bowed instrument on one of the sides of a Byzantine ivory casket, 9th century, in the Carrand Collection, Florence, A. Venturi, Gallerie Nazionali Italiane, iii. (Rome, 1897), plate, p. 263; and Add. MS. zp, 352, British Museum, Greek Psalter, dated 1066.

8 See Jean Cledat, " Le Monastere et la necropole de Baouit," in Mem. de Vlnst. franc, d'archeol. orient, du Caire, vol. xii.^1904), chap, xviii. pi. lxiv. (2) ; also Fernand Cabrol, Diet. d'archSol. chretienne, s.v. " Baouit."

9 For an illustration, see Sonnerat, Voyage aux Indes orientates (Paris, 1806), vol.i. p. 182.

10 Op. cit. pp. 4-10.

11 Op. cit. vol. i. p. 3 and pi. ii.

12 Edward Heron-Allen, Violin-making as it was and is (London, 1884), pp. 37-42, figs. 5-10.

instrument can be traced with some degree of certainty, but it is quite impossible to decide at what date or in what place the use of the bow was introduced. The bow developed very slowly in Europe and remained a crude instrument as long as it was applied to the rebab and its hybrids. Its progress became marked only from the time when it was applied to the almost perfect guitar (q.v.), which then became the guitar fiddle (q.v.), the immediate forerunner of the viols.

The first improvement on the primitive arched bow was to provide some sort of handle in a straight line with the hair or string of the bow, such as is shown in the MS. translation of the Psalms by Labeo Notker, late 10th century, in the University library, Leipzig. 1 The length of the handle was often greatly exaggerated, perhaps by the fancy of the artist. Another handle (see Bod- leian Library MS., N.E.D. 2, 12th century) was in the form of a hilt with a knob, possibly a screw-nut, in which the arched stick and the hair were both fixed. The first develop- ment of importance influencing the technique of stringed instruments was the attempt to find some device for controlling the tension of the hair. The contrivance known as cremaillere, which was the first step in this direction, seems to have been foreshadowed in the bows drawn in a quaint MS. of the 14th century in the

British Museum (Sloane 3983, fol. 43 and 13) on astronomy. Form- ing an obtuse angle with the handle of the bow is a contrivance shaped tx , ,. . , like a spear-head which presumably

Drawn from the ivory cover of x c J

the Lothair Psalter, by permission Served Some Useful purpose; if it of Sir Thomas Brooke. had notches (whicn would be toQ

, Fl 5." , I ~!r? rlie ˆ Bow ° f small to show in the drawing), and

inh centoyr the hair of the bow was finished with

a loop, then we have here an early

example of a device for controlling the tension. Another bow in

the same MS. has two round knobs on the stick which may be

assumed to have served the same purpose.

A very early example of the cremaillere bow (fig. 1) occurs on

a carved ivory plate ornamenting the binding of the fine Caro-

lingian MS. Psalter of Lothair (a.d. 825), for some time known

as the Ellis and White Psalter, but now in the library of Sir

Thomas Brooke at Armitage Bridge House. The carved figure

of King David, assigned from its characteristic pose and the

treatment of the drapery to the nth century, holds a stringed

The artist has added a bow with crimailUre attachment, which is startling if the carving be accurately placed in the nth century. The earliest representation of a cremaillere bow, with this ex- ception, dates from the 1 5th century, according to Viollet-le-Duc, who merely states that it was copied from a painting. 3 Fetis {op. cit. p. 117) figures a cremaillere bow which he styles" Bassani, 1680. " Sebastian Virdung draws a bow for a tromba marina, with the hair and stick bound together with waxed cord. The hair appears to be kept more or less tense by means of a wedge of wood or other material forced in between stick and hair, the latter bulging slightly at this point like the string of an archery bow when the arrow is in position; this contrivance may be due to the fancy of the artist.

The invention of a movable nut propelled by a screw is ascribed to the elder Tourte (fig. 2) ; had we not this information on the best authority (Vuillaume and Fetis), it might be imagined that some of the bows figured by Mersenne, 4 e.g. the bass viol bow KL (p. 184), and another KLM (p. 192), had a movable nut and screw; the nut is clearly drawn astride the stick as in the modern bow. Mersenne explains (p. 178) the construction of the bow, which consists of three parts: the bois, bdton or brin, the soye, and the demi-roiie or hausse. The term "half-wheel" clearly indicates that the base of the nut was cut round so as to fit round the stick. In the absence of any allusion to such ingenious mechanism as that of screw and nut, we must infer that the drawing is misleading and that the very decided button was only meant for an ornamental finish to the stick. We are informed further that la soye was in reality hairs from the horse or some other animal, of which from 80 to 100 were used for each bow. The up-stroke of the bow was used on the weak beats, 2, 4, 6, 8, and the down-stroke on the strong beats, 1, 3, 5, 7 (p. 185). The same practice prevailed in England in 1667, when Christopher Simpson wrote the Division Viol. He gives information con- cerning the construction of the bow in these words: " the viol-bow for division should be stiff but not heavy. The length (betwixt the two places where the hairs are fastened at each end) about seven-and-twenty inches. The nut should be short, the height of it about a finger's breadth or a little more " (p. 2).

As soon as Corelli (1653-1713) formulated the principles of the technique of the violin, marked modifications in the con- struction of the bow became noticeable. Tartini, who began during the second decade of the 18th century to gauge the capabilities of the bow, introduced further improvements, such as a lighter wood for the stick, a straight contour, and a shorter head, in order to give better equilibrium. The Tourtes, father and son, accomplished the rest.

After Francois Tourte, thefollowingmakers are the most esteemed : J. B. Vuillaume, who was directly inspired by Tourte and rendered an inestimable service to violinists by working out on a scientific basis the empirical taper of the Tourte stick, which was found in all his bows to conform to strict ratio ; 6 Dominique Peccate, ap- prenticed to J. B. Vuillaume; Henry, 1812-1870, who signs his

Drawn from bows the property of William E. Hill & Sons.

Fig. 2. — A, B, Tartini

instrument, a rotta of peculiar shape, which occurs twice in other Carolingian MSS. 2 of the 9th century, but copied here without understanding, as though it were a lyre with many strings.

1 MS. 774, fol. 30. For an illustration of it see Hyacinth Abele, Vie Violine, ihre Geschichte und ihr Bau (Neuburg-a-D., 1874), pi. 5, No. 7.

2 See Crowd for fig. from the Bible of Charles le Chauve; and also King David in the Bible of St Paul extra muros, Rome (photo- graphic facsimile by J. O. Westwood, Oxford, 1876).

Bows ; C, Tourte Bow.

name and " Paris " on the stick near the nut; Jacques Lefleur, 1760-1832; Francois Lupot, 1774-1837, the first to line the angular cutting of the nut, where it slides along the stick, with a plate of

3 See Dictionnaire raisonne du mobilier franqais (Paris, 1871), vol. ii. part iv. pp. 265 D. and 266 note.

4 Marin Mersenne, L'Harmonie universelle (Paris, 1636-1637), pp. 184 and 192.

6 Vuillaume's diagram and explanation are reproduced by Fetis, op. cit. pp. 125-128.

metal; Simon, born 1808, who also signs his bows on the stick near the nut ; John Dodd of Richmond, the greatest English bow-maker, who was especially renowned for his violoncello bows, though his violin bows had the defect of being rather short.

The violoncello bow is a little shorter than those used for violin and viola, and the head and nut are deeper.

The principal models of double-bass bows in vogue at the begin- ning of the 19th century were the Dragonetti, maintaining the arch of the medieval bows, and the Bottesini, shaped and held like the violin bow; the former was held over-hand with the hair inclining towards the bridge, and was adopted by the Paris Conservatoire under Habeneck about 1830; the great artist himself sent over the model from London. Illustrations of both bows are given by Vidal (op. cit. pi. xviii.).

Messrs W. E. Hill & Sons probably possess the finest and most representative collection of bows in the world. (K. S.)

BOWDICH, THOMAS EDWARD (1790-1824), English traveller and

author, was born at Bristol in 1790. In 1 814, through his uncle, J. Hope-Smith, governor of the British Gold Coast Settlements, he obtained a writership in the service of the African Company of Merchants and was sent to Cape Coast. In 181 7 he was sent, with two companions, to Kumasi on a mission to the king of Ashanti, and chiefly through his skilful diplomacy the mission succeeded in its object of securing British control over the coast natives (see Ashanti: History). In 1818 Bowdich returned to England, and in 1819 published an account of his mission and of the study he had made of the barbaric court of Kumasi, entitled Mission from Cape Coast Castle to Ashantee, &c. (London, 1819). His African collections he presented to the British Museum. Bowdich publicly attacked the management of the African committee, and his strictures were instrumental in leading the British government to assume direct control over the Gold Coast. From 1820 to 1822 Bowdich lived in Paris, studying mathematics and the natural sciences, and was on intimate terms with Cuvier, Humboldt and other savants. During his stay in France he edited several works on Africa, and also wrote scientific works. In 1822, accompanied by his wife, he went to Lisbon, where, from a study of historic MSS., he published An Account of the Discoveries of the Portuguese in . . . Angola and Mozambique (London, 1824). In 1823 Bow- dich and his wife, after some months spent in Madeira and Cape Verde Islands, arrived at Bathurst at the mouth of the Gambia, intending to go to Sierra Leone and thence explore the interior. But at Bathurst Bowdich died on the 10th of January 1824. His widow published an account of his last journey, entitled Excursions in Madeira and Porto Santo . . . to which is added . . . A Narrative of the Continuance of the Voyage to its Completion, &c. (London, 1825). Bowdich's daughter, Mrs Hutchinson Hale, republished in 1873, with an introductory preface, her father's Mission from Cape Coast Castle to Ashantee.

BOWDITCH, NATHANIEL (1773-1838), American mathe- matician, was born at Salem, Massachusetts. He was bred to his father's business as a cooper, and afterwards apprenticed to a ship-chandler. His taste for mathematics early developed itself; and he acquired Latin that he might study Newton's Principia. As clerk (1795) and then as supercargo (1796, 1798, 1799) he made four long voyages; and, being an excellent navigator, he afterwards (1802) commanded a vessel, instructing his crews in lunar and other observations. He edited two editions of Hamilton Moore's Navigation, and in 1802 published a valuable work, New American Practical Navigator, founded on the earlier treatise by Moore. In 1804 he became president of a Salem insurance company. In the midst of his active career he undertook a translation of the MScanique celeste of P. S. Laplace, with valuable annotations (vol. i., 1829). He was offered, but declined, the professorship of mathematics and astronomy at Harvard.

Subsequently he became president of the Mechanics' Institute in-Boston, and also of the American Academy of Arts and Sciences. He died at Boston on the 16th of March 1838.

A life of Bowditch was written by his son Nathaniel Ingersoll Bowditch (1805-1861), and was prefixed to the four'th volume (1839) of the translation of Laplace. In 1865 this was elaborated into a separate biography by another son, Henry Ingersoll Bowditch (1808-1892), a famous Boston physician.

BOWDLER. THOMAS (1754-1825), editor of the '"family" Shakespeare, younger son of Thomas Bowdler, a gentleman of

independent fortune, was born at Ashley, near Bath, on the nth of July 1754. He studied medicine at the universities of St Andrews and Edinburgh, graduating M.D. in 1776. After four years spent in foreign travel, he settled in London, where he became intimate with Mrs Montague and other learned ladies. In 1800 he left London to live in the Isle of Wight, and later on he removed to South Wales. He was an energetic philanthropist, and carried on John Howard's work in the prisons and penitentiaries. In 1818 he published The Family Shakespeare " in ten volumes, in which nothing is added to the original text; but those words and expressions are omitted which cannot with propriety be read aloud in a family." Criti- cisms of this edition appeared in the British Critic of April 1822. Bowdler also expurgated Edward Gibbon's History of the Decline and Fall of the Roman Empire (published posthumously, 1826); and he issued a selection from the Old Testament for the use of children. He died at Rhyddings, near Swansea, on the 24th of February 1825.

From Bowdler's name we have the word to " bowdlerize," first known to occur in General Perronet Thompson's Letters of a Representative to his Constituents during the Session of 1836, printed in Thompson's Exercises, iv. 126. The official interpreta- tion is " to expurgate (a book or writing) by omitting or modifying words or passages considered indelicate or offensive." Both the word and its derivatives, however, are associated with false squeamishness. In the ridicule poured on the name of Bowdler it is worth noting that Swinburne in " Social Verse " (Studies in Prose and Poetry, 1894, p. 98) said of him that " no man ever did better service to Shakespeare than the man who made it possible to put him into the hands of intelligent and imaginative children," and stigmatized the talk about his expurgations as " nauseous and foolish cant."

BOWDOIN, JAMES (1726-1790), American political leader, was born of French Huguenot descent, in Boston, Massachusetts, on the 7th of August 1726. He graduated at Harvard in 1745, and was a member of the lower

house of the general court of Massachusetts in 1753-1756, and from 1757 to 1774 of the Massa- chusetts council, in which, according to Governor Thomas Hutchinson, he " was without a rival," and, on the approach of the War of Independence, was " the principal supporter of the- opposition to the government." From August 1775 until the summer of 1777 he was the president of the council, which had then become to a greater extent than formerly an executive as well as a legislative body. In 1779-1780 he was president of the constitutional convention of Massachusetts, also serving as chairman of the committee by which the draft of the constitution was prepared. Immediately afterward he was a member of a commission appointed " to revise the laws in force in the state; to select, abridge, alter and digest them, so as to be accommodated to the present government." From 1785 to 1787 he was governor of Massachusetts, suppressing with much vigour Shays' Rebellion, and failing to be re-elected largely because it was believed that he would punish the insurrectionists with more severity than would his competitor, John Hancock. Bowdoin was a member of the state convention which in February 1788 ratified for Massachusetts the Federal Constitu- tion, his son being also a member. He died in Boston on the 6th of November 1790. He took much interest in natural philosophy, and presented various papers before the American Academy of Arts and Sciences, of which he was one of the founders and, from 1 780 to 1 790, the first president. Bowdoin College was named in his honour.

His son, James Bowdoin (1752-1811), was born in Boston on the 22nd of September 1752, graduated at Harvard in 1771, and served, at various times, as a representative, senator and councillor of the state. From 1805 until 1808 he was the minister plenipotentiary of the United States in Spain. He died on Naushon Island, Dukes county, Massachusetts, on the nth of October 181 1. To Bowdoin College he gave land, money and apparatus; and he made the college his residuary legatee, bequeathing to it his collection of paintings and drawings, then considered the finest in the country.

BOWELL, SIR MACKENZIE (1823-), Canadian politician, son of John Bowell, carpenter and builder, was born at Ricking- hall, England, on the 27th of December 1823. In 1833 he moved with his family to Belleville, Canada, where he finally became editor and proprietor of the Intelligencer. He was elected grand master of the Orange Association of British America, and was long the exponent in the Canadian parliament of the claims of that order. From 1867 till 1892 he represented North Hastings in the House, after which he retired to the senate. From 1878 till 1 89 1 he was

minister of customs in the cabinet of Sir John Macdonald; then minister of militia; and under the premiership of Sir John Thompson, minister of trade and commerce. From December 1894 till April 1896 he was premier of Canada, and endeavoured to enforce remedial legislation in the question of the Manitoba schools. But his policy was unsuccessful, and he retired from the government. From 1896 till 1906 he led the Conservative party in the senate. In 1894 he presided over the colonial conference held in Ottawa, and in 1895 was created K.C.M.G.

BOWEN, CHARLES SYNGE CHRISTOPHER BOWEN, Baron (1835-1894), English judge, was born on the 1st of January 1835, at Woolaston in Gloucestershire, his father, the Rev. Christopher Bowen of Hollymount, Co. Mayo, being then curate of the parish. He was educated at Lille, Blackheath and Rugby schools, leaving the latter with a Balliol scholarship in 1853. At Oxford he made good the promise of his earlier youth, winning the principal classical scholarships and prizes of his time. He was made a fellow of Balliol in 1858. From Oxford Bowen went to London, where he was called to the bar at Lincoln's Inn in 1861, and while studying law he wrote regularly for the Saturday Review, and also later for the Spectator. For a time he had little success at the bar, and came near to exchanging it for the career of a college tutor, but he was induced by his friends, who recog- nized his talents, to persevere. Soon after he had begun to make his mark he was briefed against the claimant in the famous " Tichborne Case." Bowen's services to his leader, Sir John Coleridge, helped to procure for him the appointment of junior counsel to the treasury when Sir John had passed, as he did while the trial proceeded, from the office of solicitor-general to that of attorney-general; and from this time his practice became a very large one. The strain, however, of the Tichborne trials had been great, so that his physical health became unequal to the tasks which his zeal for work imposed upon it, and in 1879 his acceptance of a judgeship in the queen's bench division, on the retirement of Mr Justice Mellor, gave him the opportunity of comparative rest. The character of Charles Bowen's intellect hardly qualified him for some of the duties of a puisne judge; but it was otherwise when, in 1882, in succession to Lord Justice Holker, he was raised to the court of appeal. As a lord justice of appeal he was conspicuous for his learning, his industry and his courtesy to all who appeared before him; and in spite of failing health he was able to sit more or less regularly until August 1893, when, on the retirement of Lord Hannen, he was made a lord of appeal in ordinary, and a baron for life, with the title of Baron Bowen of Colwood. By this time, however, his health had finally broken down; he never sat as a law lord to hear appeals, and he gave but one vote as a peer, while his last public service consisted in presiding over the commission which sat in October 1893 to inquire into the Featherstone riots. He died on the 10th of April 1894.

Lord Bowen was regarded with great affection by all who knew him either professionally or privately. He had a polished and graceful wit, of which many instances might be given, although such anecdotes lose force in print. For example, when it was suggested on the occasion of an address to Queen Victoria, to be presented by her judges, that a passage in it, " conscious as we are of our shortcomings," suggested too great humility, he proposed the emendation "conscious as we are of one another's shortcomings"; and on another occasion he defined a jurist as "a person who knows a little about the laws of every country except his own." Lord Bowen's judicial reputation will rest upon the series of judgments delivered by him in the court of

appeal, which are remarkable for their lucid interpretation of legal principles as applied to the facts and business of life. Among good examples of his judgment may be cited that given in advising the House of Lords in Angus v. Dalton (6 App. Cas. 740), and those delivered in Abrath v. North Eastern Railway (n Q.B.D. 440); Thomas v. Quartermaine (18 Q.B.D. 685); Vagliano v. Bank of England (23 Q.B.D. 243) (in which he prepared the majority judgment of the court, which was held to be wrong in its conclusion by the majority of the House of Lords) ; and the Mogul Steamship Company v. M'Gregor (23 Q.B.D. 598). Of Lord Bowen's literary works besides those already indicated may be mentioned his translation of Virgil's Eclogues, and Aeneid, books i.-vi., and his pamphlet, The Alabama Claim and Arbitration considered from a Legal Point of View. Lord Bowen married in 1862 Emily Frances, eldest daughter of James Meadows Rendel, F.R.S., by whom he had two sons and a daughter.

See Lord Bowen, by Sir Henry Stewart Cunningham.

BOWEN, FRANCIS (1811-1890), American philosophical writer and educationalist, was born in Charlestown, Massa- chusetts, on the 8th of September 1811. He graduated at Harvard in 1833, taught for two years at Phillips Exeter Academy, and then from 1835 to 1839 was a tutor and instructor at Harvard. After several years of study in Europe, he settled in Cambridge, Massachusetts, and was editor and proprietor of the North American Review from 1843 to I 8S4- I 1 1850 he was appointed professor of history at Harvard; but his appointment was disapproved by the board of overseers on account of reactionary political opinions he had expressed in a controversy with Robert Carter (1819-1879) concerning the Hungarian revolution. In 1853 his appointment as Alford professor of natural religion, moral philosophy and civil polity was approved, and he occupied the chair until 1889. In 1876 he was a member of the Federal commission appointed to consider currency reform, and wrote (1877) the minority report, in which he opposed the restoration of the double standard and the re- monetization of silver. He died in Boston, Massachusetts, on the 22nd of January 1890. His writings include lives of Sir William Phipps,*

Baron von Steuben, James Otis and Benjamin Lincoln in Jared Sparks' " Library of American Biography"; Critical Essays on the History and Present Condition of Speculative Philosophy (1842); Lowell Lectures on the Application of Meta- physical and Ethical Science to the Evidences of Religion (1849); The Principles of Political Economy applied to the Condition, Resources and Institutions of the American People (1856);, A Treatise on Logic (1864); American Political Economy (1870); Modern Philosophy from Descartes to Schopenhauer and Hartmann (1877); and Gleanings from a Literary Life, 1838-1880 (1880).

BOWEN, SIR GEORGE FERGUSON (1821-1899), British colonial governor, eldest son of the Rev. Edward Bowen, after- wards rector of Taughboyne, Co. Donegal, was born on the 2nd of November 182 1. Educated at Charterhouse school and Trinity College, Oxford, he took a first class in classics in 1844, and was elected a fellow of Brasenose. In 1847 he was chosen president of the university of Corfu. Having served as secretary of govern- ment in the Ionian Islands, he was appointed in 1859 the first governor of Queensland, which colony had just been separated from New South Wales. He was interested in the exploration of Queensland and in the establishment of a volunteer force, but incurred some unpopularity by refusing to sanction the issue of inconvertible paper money during the financial crisis of 1866. In 1867 he was made governor of New Zealand, in which position he was successful in reconciling the Maoris to the English rule, and saw the end of the struggle between the colonists and the natives. Transferred to Victoria in 1872, Bowen endeavoured to reduce the expenses of the colony, and in 1879 became governor of Mauritius. His last official position was that of governor of Hong-Kong, which he held from 1882 to 1887. He was made a K.C.M.G. in 1856, a privy councillor in 1886, and received honorary degrees from both Oxford and Cambridge. In December 1887 he was appointed chief of the royal commission which was sent to Malta with regard to the new constitution for

the island, and all the recommendations made by him were adopted.- He died at Brighton on the 21st of February 1899, having been married twice, and having had a family of one son and four daughters. Bowen wrote Ithaca in 1850 (London, 1854), translated into Greek in 1859; and Mount Athos, Thessaly and Epirus (London, 1852); and he was the author of Murray's Handbook for Greece (London, 1854).

A selection of his letters and despatches, Thirty Years of Colonial Government (London, 1889), was edited by S. Lane-Poole.

BOWER, WALTER (1385-1449), Scottish chronicler, was born about 1385 at Haddington. He was abbot of Inchcolm (in the Firth of Forth) from 1418, was one of the commissioners for the collection of the ransom of James I., king of Scots, in 1423 and 1424, and in 1433 one of the embassy to Paris on the business of the marriage of the king's daughter to the dauphin. He played an important part at the council of Perth (1432) in the defence of Scottish rights. During his closing years he was engaged on his work the Scotichronicon, on which his reputation now chiefly rests. This work, undertaken in 1440 by desire of a neighbour, Sir David Stewart of Rosyth, was a continuation of the Chronica Gentis Scotorum of Fordun. The completed work, in its original form, consisted of sixteen books, of which the first five and a portion of the sixth (to 1163) are Fordun's — or mainly his, for Bower added to them at places. In the later books, down to the reign of Robert 1.(1371), he was aided by Fordun's Gesta A nnalia, but from that point to the close the work is original and of contemporary importance, especially for James I., with whose death it ends. The task was finished in 1447. In the two remain- ing years of his life he was engaged on a reduction or " abridg- ment " of this work, which is known as the Book of Cupar, and is preserved in the Advocates' library, Edinburgh (MS. 35. I. 7). Other abridgments, not by Bower, were made about the same time, one about 1450 (perhaps by Patrick Russell, a Carthusian of Perth) preserved in the Advocates' library (MS. 35. 6. 7) and another in 1461 by an unknown writer, also preserved in the same collection (MS. 35. 5. 2). Copies of the full text of the Scotichronicon, by different scribes, are extant. There are two in the British Museum, in The Black Book of Paisley, and in Harl. MS. 712; one in the Advocates' library, from which Walter Goodall printed his edition (Edin., 1759), and one in the library of Corpus Christi, Cambridge.

Goodall's is the only complete modern edition of Bower's text. See also W. F. Skene's edition of Fordun in the series of Historians of Scotland (1871). Personal references are to be found in the Exchequer Rolls of Scotland, iii. and iv. The best recent account is that by T. A. Archer in the Diet, of Nat. Biog.

BOWERBANK, JAMES SCOTT (1 797-1877), English naturalist and palaeontologist, was born in Bishopsgate, London, on the 14th of July 1797, and succeeded in conjunction with his brother to his father's distillery, in which he was actively engaged until 1847. In early years astronomy and natural history, especially botany, engaged much of his attention; he became an enthusi- astic worker at the microscope, studying the structure of shells, corals, moss-agates, flints, &c, and he also formed an extensive collection of fossils. The organic remains of the London Clay attracted particular attention, and about the year 1836 he and six other workers founded " The London Clay Club " — themembers comprising Dr

Bowerbank, Frederick E. Edwards (4799-1875), author of The Eocene Mollusca (Palaeontograph. Soc), Searles V. Wood, John Morris, Alfred White (zoologist), N. T. Wetherell, surgeon of Highgate (1800-18 7 5) , and James de Carle Sowerby. In 1840 Bowerbank published A History of the Fossil Fruits and Seeds of the London Clay, and two years later he was elected F.R.S. In 1847 he suggested the establishment of a society for the publica- tion of undescribed British Fossils, and thus originated the Palaeontographical Society. From 1844 until 1864 he did much to encourage a love of natural science by being " at home " every Monday evening at his residence in Park Street, Islington, and afterwards in Highbury Grove, where the treasures of his museum, his microscopes, and his personal assistance were at the service of every earnest student. In the study of sponges he became specially interested, and he was author of A Monograph

of the British Spongiadae in 4 vols., published by the Ray Society, 1864-1882. He retired in 1864 to St Leonards, where he died on the 8th of March 1877.

BOWIE, JAMES (1796-1836), American pioneer, was born in Logan county, Kentucky. He was taken to Louisiana about 1802, and in 1818-1820 was engaged with his brothers, John J. and Rezin P., in smuggling negro slaves into the United States from the headquarters of the pirates led by Jean Lafitte on Galveston Island. Bowie removed to Texas in 1828 and took a prominent part in the revolt against Mexico, being present at the battles of Nacogdoches (1832), Concepcion (1835) and the Grass Fight (1835). He was one of the defenders of the Alamo (see San Antonio) , but was ill of pneumonia at the time of the final assault on the 6th of March 1836, and was among the last to be butchered. Bowie's name is now perpetuated by a county in north-eastern Texas, and by its association with that of the famous hunting-knife, which he used, but probably did not invent.

BOW- LEG {Genu Varum), a deformity characterized by separa- tion of the knees when the ankles are in contact. Usually there is an outward curvature of both femur and tibia, with at times an interior bend of the latter bone. At birth all children are more or less bandy-legged. The child lies on its nurse's knee with the soles of the feet facing one another; the tibiae and femora are, curved outwards; and, if the limbs are extended, although the ankles are in contact, there is a distinct space between the knee-joints. During the first year of life a gradual change takes place. The knee-joints approach one another; the femora slope downwards and inwards towards the knee- joints; the tibiae become straight; and the sole of the foot faces almost directly downwards. While these changes are occurring, the bones, which at first consist principally of cartilage, are

gradually becoming ossified, and in a normal child by the time it begins to walk the lower limbs are prepared, both by their general direction and by the rigidity of the bones which form them, to support the weight of the body. If, however, the child attempts either as the result of imitation or from encouragement to walk before the normal bandy condition had passed off, the result will necessarily be either an arrest in the development of the limbs or an increase of the bandy condition. If the child is weakly, either rachitic or suffering from any ailment which prevents the due ossification of the bones, or is improperly fed, the bandy condition may remain persistent. Thus the chief cause of this deformity is rickets (q.v.). The remaining causes are occupation, especially that of a jockey, and traumatism, the condition being very likely to supervene after accidents involving the condyles of the femur. In the rickety form the most important thing is to treat the constitutional disease, at the same time instructing the mother never to place the child on its feet. In may cases this is quite sufficient in itself to effect a cure, but matters can be hastened somewhat by applying splints. When in older patients the deformity arises either from traumatism or occupation, the only treatment is that of operation.

A far commoner deformity than the preceding is that known as knock-knee (or Genu Valgum). In this condition there is close approximation of the knees with more or less separation of the feet, the patient being unable to bring the feet together when standings Occasionally only one limb may be affected, but the double form is the more common. There are two varieties of this deformity: (i.) that due to rickets and occurring in young children (the rachitic form), and (ii.) that met with in adolescents and known as the static form. In young children it is practically always due to rickets, and the constitutional disease must be most rigorously dealt with. It is, however, especially in these cases that cod-liver oil is to be avoided, since it increases the body weight and so may do harm rather than good. The child if quite young must be kept in bed, and the limbs manipulated several times a day. Where the child is a little older and it is more difficult to keep him off his feet, long splints should be applied from the axilla or waist to a point several inches below the level of the foot. It is only by making the splints sufficiently long

that a naturally active child can be kept at rest. The little patient should live in the open air as much as possible.

The static form of Genu Valgum usually occurs in young adolescents, especially in anaemic nurse-girls, young bricklayers, and young people who

have outgrown their strength, yet have to carry heavy weights. Normally in the erect posture the weight of the body is passed through the outer condyle of the femur rather than the inner, and this latter is lengthened to keep the plane of the knee-joint horizontal. This throws considerable strain on the internal lateral ligament of the knee-joint, and after standing of long duration or with undue weight the muscles of the inner side of the limb also become over-fatigued. Thus the ligament gradually becomes stretched, giving the knee undue mobility from side to side. If the condition be not attended to, the outer condyle becomes gradually atrophied, owing to the increased weight transmitted through it, and the inner condyle becomes lengthened. These changes are the direct outcome of a general law, namely, that diminished pressure results in increased growth, increased pressure in diminished growth. The best example of the former principle is the rapid growth that takes place in the child that is confined to bed during a prolonged illness. The distorted, stunted, shortened and fashionable foot of the Chinese lady is an example of the latter. Flat-foot (see Club-Foot) and lateral curvature of the spine, scoliosis, are often associated with this form of Genu Valgum, the former being due to relaxation of ligaments, the latter being compensatory where the deformity only affects one leg, though often found merely in association with the more common bilateral variety. In the early stages of the static form attention to general health, massage and change of air, will often effect a cure. But in the more aggravated forms an apparatus is needed. This usually consists of an outside iron rod, jointed at the knee, attached above to a pelvic band and below to the heel of the boot. By the gradual tightening of padded straps passing round the limbs the bones can be drawn by degrees into a more natural position. But if the patient has reached such an age that the deformity is fixed, then the only remedy is that of operation.

BOWLES, SAMUEL (1826-1878), American journalist, was born in Springfield, Massachusetts, on the oth of February 1826. He was the son of Samuel Bowles (1 779-1851) of the same city, who had established the weekly Springfield Republican in 1824. The daily issue was begun in 1844, as an evening newspaper, afterwards becoming a morning journal. To its service Samuel Bowles, junior, devoted his life (with the exception of a brief period during which he was in charge of a daily in Boston), and he gave the paper a national reputation by the vigour, incisiveness and independence of its editorial utterances, and the concise and convenient arrangement of its local and general news-matter. During the controversies affecting slavery and resulting in the Civil War, Bowles supported, in general, the Whig and Republican parties, but in the period of Reconstruction under President Grant his paper represented anti-administration or " Liberal Republican " opinions, while in the disputed elec- tion of 1876 it favoured the claims of Tilden, and subsequently

became independent in politics. Bowles died at Springfield on the 16th of January 1878. During his lifetime, and subse- quently, the Republican office was a sort of school for young journalists, especially in the matter of pungency and conciseness of style, one of his maxims being " put it all in the first para- graph." Bowles published two books of travel, Across the Continent (1865) and The Switzerland of America (1869), which were combined into one volume under the title Our New West (1869). He was succeeded as publisher and editor-in-chief of the Republican by his son Samuel Bowles (b. 1851).

A eulogistic Life and Times of Samuel Bowles (2 vols., New York, 1885), by George S. Merriam, is virtually a history of American political movements after the compromise of 1 850.

BOWLES, WILLIAM LISLE (1762-1850), English poet and critic, was born at King's Sutton, Northamptonshire, of which his father was vicar, on the 24th of September 1762. At the age of fourteen he entered Winchester school, the head-master at

the time being Dr Joseph Warton. In 1781 he left a's captain of the school, and proceeded to Trinity College, Oxford, where he had gained a scholarship. Two years later he won the chan- cellor's prize for Latin verse. In 1789 he published, in a small quarto volume, Fourteen Sonnets, which met with considerable favour at the time, and were hailed with delight by Coleridge and his young contemporaries. The Sonnets even in form were a revival, a return to- the older and purer poetic style, and by their grace of expression, melodious versification, tender tone of feeling and vivid appreciation of the life and beauty of nature, stood out in strong contrast to the elaborated commonplaces which at that time formed the bulk of English poetry. After taking his degree at Oxford he entered the Church, and was appointed in 1792 to the vicarage of Chicklade in Wiltshire. In 1797 he received the vicarage of Dumbleton in Gloucestershire, and in 1804 was presented to the vicarage of Bremhill in Wiltshire. In the same year he was collated by Bishop Douglas to a pre- bendal stall in the cathedral of Salisbury. In 181 8 he was made chaplain to the prince regent, and in 1828 he was elected residentiary canon of Salisbury. He died at Salisbury on the 7th of April 1850, aged 88.

The longer poems published by Bowles are not of a very high standard, though all are distinguished by purity of imagination, cultured and graceful diction, and great tenderness of feeling. The most extensive were The Spirit of Discovery (1 804) , which was mercilessly ridiculed by Byron; The Missionary of the Andes (1815); The Grave of the Last Saxon (1822); and' St John in Patmos (1833). Bowles is perhaps more celebrated as a critic of poetry than as a poet. In 1806 he published an edition of Pope's

works with notes and an essay on the poetical character of Pope. In this essay he laid down certain canons as to poetic imagery which, subject to some modification, have been since recognized as true and valuable, but which were received at the time with strong opposition by all admirers of Pope and his style. The " Pope and Bowles " controversy brought into sharp contrast the opposing views of poetry, which may be roughly described as the natural and the artificial. Bowles maintained that images drawn from nature are poetically finer than those drawn from art; and that in the highest kinds of poetry the themes or passions handled should be of the general or elemental kind, and not the transient manners of any society. These positions were vigorously assailed by Byron, Campbell, Roscoe and others of less note, while for a time Bowles was almost solitary. Hazlitt and the Blackwood critics, however, came to his assistance, and on the whole Bowles had reason to congratulate himself on having established certain principles which might serve as the basis of a true method of poetical criticism, and of having inaugurated, both by precept and by example, a new era in English poetry. Among other prose works from his prolific pen was a Life of Bishop Ken (2 vols.,

1830-1831).

His Poetical Works were collected in 1855, with a memoir by G. Gilfillan.

BOWLINE (a word found in most Teutonic languages, probably connected with the " bow " of a ship), a nautical term for a rope leading from the edge of a sail to the bows, for the purpose of steadying the sail when sailing close to the wind — " ona bowline."

BOWLING (Lat. bulla, a globe, through O. Fr. boule, ball), an indoor game played upon an alley with wooden balls and nine or ten wooden pins. It has been played for centuries in Germany and the Low Countries, where it is still in high favour, but attains its greatest popularity in the United States, whence it was introduced in colonial times from Holland. The Dutch inhabit- ants of New Amsterdam, now New York, were much addicted to it, and up to the year 1840 it was played on the green, the principal resort of the bowlers being the square just north of the Battery still called Bowling Green. The first covered alleys were made of hardened clay or of slate, but thos,e in vogue at present are built up of alternate strips of pine and maple wood, about 1 × 3 in. in size, set on edge, and fastened together and to the bed of the alley with the nicest art of the cabinet-maker.

The width of the alley is 41! in., and its whole length about 80 ft. From the head, or apex, pin to the foul-line, over which the player may not step in delivering the ball, the distance is 60 ft. On each side of the alley is a 9-in. " gutter " to catch any balls that are bowled wide. Originally nine pins, set up in the diamond form, were used, but during the first part of the 19th century the game of " nine-pins " was prohibited by law, on account of the excessive betting connected with it. This ordi- nance, however, was soon evaded by the addition of a tenth pin, resulting in the game of " ten-pins," the pastime in vogue to-day. The ten pins are set up at the end of the alley in the form of a right-angled triangle in four rows, four pins at the back, then three, then two and one as head pin. The back row is placed 3 in. from the alley's edge, back of which is the pin-pit, 10 in. deep and about 3 ft. wide. The back wall is heavily padded (often with a heavy, swinging cushion), and there are safety corners for the pin-boys, who set up the pins, call the scores and place the balls in the sloping " railway " which returns them to the players' end of the alley. The pins are made of hard maple and are 15 in. high, 2f in. in diameter at their base and 15 in. in circumference at the thickest point. The balls, which are made of some very hard wood, usually lignum vitae, may be of any size not exceeding 27 in. in circumference and 165 lb in weight. They are provided with holes for the thumb and middle finger. As many may play on a side as please, five being the number for championship teams, though this sometimes varies. Each player rolls three balls, called a frame, and ten frames constitute a game, unless otherwise agreed upon. In first-class matches two balls only are rolled. If all ten pins are knocked down by the first ball the player makes a strike, which counts him 10 plus whatever he may make with the first two balls of his next frame. If, however, he should then make another strike, 10 more are added to his score, making 20, to which are added the pins he may knock down with his first ball of the third frame. This may also score a strike, making 30 as the score of the first frame, and, should the player keep up this high average, he will score the maximum, 300, in his ten frames. If all the pins are knocked down with two balls it is called a spare, and the player may add the pins made by the first ball of his second frame. This seemingly complicated mode of scoring is comparatively simple when properly lined score-boards are used. Of course, if all three balls are used no strike or spare is scored, but the number of pins overturned is recorded. The tens of thousands of bowling clubs in the United States and Canada are under the jurisdiction of the American Bowling Congress, which meets once a year to revise the rules and hold contests for the national championships.

Several minor varieties of bowling are popular in America, the most in vogue being " Cocked Hat," which is played with three pins, one in the head-pin position and the others on either corner of the back row. The pins

are usually a little larger than those used in the regular game, and smaller balls are used. The maximum score is 90, and all balls, even those going into the gutter, are in play. "Cocked hat and Feather" is similar, except thatafourthpinisadded, placed in the centre. Other variations of bowling are " Quintet," in which five pins, set up like an arrow pointed towards the bowler, are used; the "Battle Game," in which 12 can be scored by knocking down all but the centre, or king, pin; " Head Pin and Four Back," in which five pins are used, one in the head-pin position and the rest on the back line; "Four Back"; "Five Back"; "Duck Pin"; "Head Pin," with nine pins set up in the old- fashioned way, and " Candle Pin," in which thin pins tapering towards the top and bottom are used, the other rules being similar to those of the regular game.

The American bowling game is played to a slight extent in Great Britain and Germany. In the latter country, however, the old- fashioned game of nine-pins (Kegelspiel) with solid balls and the pins set up diamond-fashion, obtains universally. The alleys are made with less care than the American, being of cement, asphalt, slate or marble.

BOWLING GREEN, a city and the county-seat of Warren county, Kentucky, U.S.A., on the Barren river, 113 m. S. by W. of Louisville. Pop. (1890) 7803; (1900) 8226, of whom 2593 were negroes; (1910) 9173. The city is served by the Louisville & Nashville railway (which maintains car shops here), and by steamboats navigating the river. Macadam-

ized or gravel roads also radiate from it to all parts of the surrounding country, a rich agricultural and live-stock raising region, in which there are deposits of coal, iron ore, oil, natural gas, asphalt and building stone. The city is the seat of Potter College (for girls; non-sectarian, opened 1889); of Ogden College (non-sectarian, 1877), a secondary school, endowed by the bequest of Major Robert W. Ogden (1796-1873); of the West Kentucky State Normal School, opened (as the Southern Normal School and Business College) at Glasgow in 1875 and removed to Bowling Green in 1884; and of the Bowling Green Business University, formerly a part of the Southern Normal School and Business College. Bowling Green has two parks, a large horse and mule market, and a trade in other live-stock, tobacco and lumber; among its manufactures are flour, lumber, tobacco and furniture. The municipality owns and operates the water-works and the electric lighting plant. Bowling Green was incorporated in 1812. During the early part of the Civil War Bowling Green was on the right flank of the first line of Con- federate defence in the West, and was for some time the head-quarters of General Albert Sidney Johnston. It was abandoned, however, after the capture by the Federals of Forts Henry and Donelson.

BOWLING GREEN, a city and the county-seat of Wood county, Ohio,

U.S.A., 20 m. S. by W. of Toledo, of which it is a residential suburb. Pop. (1890) 3467; (1900) 5067 (264 foreign- born); (1910) 5222. Bowling Green is served by the Cincinnati, Hamilton & Dayton and the Toledo & Ohio Central railways, and by the Toledo Urban & Interurban and the Lake Erie, Bowling Green & Napoleon electric lines, the former extending from Toledo to Dayton. It is situated in a rich agricultural region which abounds in oil and natural gas. Many of the residences and business places of Bowling Green are heated by a privately owned central hot-water heating plant. Among the manufac- tures are cut glass, stoves and ranges, kitchen furniture, guns, thread-cutting machines, brooms and agricultural implements. Bowling Green was first settled in 1832, was incorporated as a town in 1855, and became a city in 1904.

BOWLS, the oldest British outdoor pastime, next to archery, still in vogue. It has been traced certainly to the 13 th, and conjecturally to the 1 2th century. William Fitzstephen History (d. about 1 1 90), in his biography of Thomas Becket, gives a graphic sketch of the London of his day and, writing of the summer amusements of the young men, says that on holidays they were " exercised in Leaping, Shooting, Wrestling, Casting of Stones [in jactu lapidum], and Throwing of Javelins fitted with Loops for the Purpose, which they strive to fling before the Mark; they also use Bucklers, like fighting Men." It is commonly supposed that by jactus lapidum Fitzstephen meant the game of bowls, but though it is possible that round stones may sometimes have been employed in an early variety of the game— and there is a record of iron bowls being used, though at a much later date, on festive occasions at Nairn, — nevertheless the inference seems unwarranted. The jactus lapidum of which he speaks was probably more akin to the modern " putting the weight," once even called " putting the stone." It is beyond dispute, however, that the game, at any rate in a rudimentary form, was played in the 13th century. A MS. of that period in the royal library, Windsor (No. 20, E iv.), contains a drawing representing two players aiming at a small cone instead of an earthenware ball or jack. Another MS. of the same century has a picture — crude, but spirited — which brings us into close touch with the existing game. Three figures are introduced and a jack. The first player's bowl has come to rest just in front of the jack; the second has delivered his bowl and is following after it with one of those eccentric contortions still not unusual on modern greens, the first player meanwhile making a repressive gesture with his hand, as if to urge the bowl to stop short of his own; the third player is depicted as in the act of delivering his bowl. A 14th-century MS. Book of Prayers in the Francis Douce collection in the Bodleian library at Oxford contains a drawing in which two persons are shown, but they bowl to no mark. Strutt (Sports

and Pastimes) suggests that the first player's bowl may have been regarded by the second player as a species of jack; but in that case it is not clear what was the first player's target. In these three earliest illustrations of the pastime it is worth noting that each player has one bowl only, and that the attitude in delivering it was as various five or six hundred years ago as it is to-day. In the third he stands almost upright; in the first he kneels; in the second he stoops, halfway between the upright and the kneeling position.

As the game grew in popularity it came under the ban of king and parliament, both fearing it might jeopardize the practice of archery, then so important in battle; and statutes forbidding it and other sports were enacted in the reigns of Edward III., Richard II. and other monarchs. Even when, on the invention of gunpowder and firearms, the bow had fallen into disuse as a weapon of war, the prohibition was continued. The discredit attaching to bowling alleys, first established in London in 1455, probably encouraged subsequent repressive legislation, for many of the alleys were connected with taverns frequented by the dissolute and gamesters. The word " bowls " occurs for the first time in the statute of 1511 in which Henry VIII. confirmed previous enactments against unlawful games. By a further act of 1 54 1 — which was not repealed until 1845 — artificers, labourers, apprentices, servants and the like were forbidden to play bowls at any time save Christmas, and then only in their master's house and presence. It was further enjoined that any one playing bowls outside of his own garden or orchard was liable to a penalty of 6s. 8d., while those possessed of lands of the yearly value of £100 might obtain licences to play on their own private greens. But though the same statute absolutely prohibited bowling alleys, Henry VIII. had them constructed for his own pleasure at Whitehall Palace, and was wont to back himself when he played. In Mary's reign (1555) the licences were withdrawn, the queen or her advisers deeming the game an excuse for " unlawful assemblies, conventicles, seditions and conspiracies." The scandals of the bowling alleys grew rampant in Elizabethan London, and Stephen Gosson in his School of Abuse (1579) says, " Common bowling alleys are privy moths that eat up the credit of many idle citizens; whose gains at home are not able to weigh down their losses abroad ; whose shops are so far from maintain- ing their play, that their wives and children cry out for bread, and go to bed supperless often in the year."

Biased bowls were introduced in the 16th century. " A little altering of the one side," says Robert Recorde, the mathe- matician, in his Castle of Knowledge (1556), " maketh the bowl to run biasse waies." And Shakespeare (Richard II., Act. in. Sc. 4) causes the queen to remonstrate, in reply to her lady's suggestion of a game at bowls to relieve her ennui, " 'Twill make me think the world is full of rubs, and that my fortune runs

against the bias." This passage is interesting also as showing that women were accustomed to play the game in those days. It is pleasant to think that there is foundation for the familiar story of Sir Francis Drake playing bowls on Plymouth Hoe as the Armada was beating up Channel, and finishing his game before tackling the Spaniards. Bowls, at that date, was looked upon as a legitimate amusement for Sundays, — as, indeed, were many other sports. When John Knox visited Calvin at Geneva one Sunday, it is said that he discovered him engaged in a game; and John Aylmer (1521-1594), though bishop of London, en- joyed a game of a Sunday afternoon, but used such language " as justly exposed his character to reproach." The pastime found favour with the Stuarts. In the Book of Sports (1618), James I. recommended a moderate indulgence to his son, Prince Henry, and Charles I. was an enthusiastic bowler, unfortunately encouraging by example wagering and playing for high stakes, habits that ultimately brought the green into as general disrepute as the alley. It is recorded that the king occasionally visited Richard Shute, a Turkey merchant who owned a beautiful green at Barking Hall, and that after one bout his losses were £1000. He was permitted to play his favourite game to beguile the tedium of his captivity. The signboard of a wayside inn near Goring Heath in Oxfordshire long bore a portrait of the king with

couplets reciting how his majesty " drank from the bowl, and bowl'd for what he drank." During his stay at the Northampton- shire village of Holdenby or Holmby — where Sir Thomas Herbert complains the green was not well kept — Charles fre- quently rode over to Lord Vaux's place at Harrowden, or to Lord Spencer's at Althorp, for a game, and, according to one account, was actually playing on the latter green when Cornet Joyce came to Holmby to remove him to other quarters. During this period gambling had become a mania. John Aubrey, the antiquary, chronicles that the sisters of Sir John Suckling, the courtier-poet, once went to the bowling-green in 'Piccadilly, crying, " for fear he should lose all their portions." If the Puritans regarded bowls with no friendly eye, as Lord Macaulay asserts, one can hardly wonder at it. But even the Puritans could not suppress betting. So eminently respectable a person as John Evelyn thought no harm in bowling for stakes, and once played at the Durdans, near Epsom, for £10, winning match and money, as he triumphantly notes in his Diary for the 14th of August 1657. Samuel Pepys repeatedly mentions finding great people " at bowles." But in time the excesses attending the game rendered it unfashionable, and after the Revolution it became practically a pothouse recreation, nearly all the greens, like the alleys, having been constructed in the grounds and gardens attached to taverns.

After a long interval salvation came from Scotland, somewhat unexpectedly, because although, along with its winter analogue of curling, bowls may now be considered, much more than golf, the Scottish national

game, it was not until well into the 19th century that the pastime acquired popularity in that country. It had been known in Scotland since the close of the 16th century (the Glasgow kirk session fulminated an edict against Sunday bowls in 1595), but greens were few and far between. There is record of a club in Haddington in 1709, of Tom Bicket's green in Kilmarnock in 1 740, of greens in Candleriggs and Gallowgate, Glasgow, and of one in Lanark in 1750, of greens in the grounds of Heriot's hospital, Edinburgh, prior to 1768, and of one in Peebles in 1775. These are, of course, mere infants compared with the Southampton Town Bowling Club, founded in 1299,: which still uses the green on which it has played for centuries and possesses the quaint custom of describing its master, or president, as " sir," and are younger even than the Newcastle-on- Tyne club established in 1657. But the earlier clubs did nothing towards organizing the game. In 1848 and 1849, however, when many clubs had come into existence in the west and south of Scotland (the Willowbank, dating from 1816, is the oldest club in Glasgow) , meetings were held in Glasgow for the purpose of pro- moting a national association. This was regarded, by many, as impracticable, but a decision of final importance was reached when a consultative committee was appointed to draft a uniform code of laws to govern the game. This body delegated its functions to its secretary, W. W. Mitchell (1 803-1 884), who prepared a code that was immediately adopted in Scotland as the standard laws. It was in this sense that Scottish bowlers saved the game. They were, besides, pioneers in laying down level greens of superlative excellence. Not satisfied with seed-sown grass or meadow turf, they experimented with seaside turf and found it answer admirably. The 13th earl of Eglinton also set an example of active interest which many magnates emulated. Himself a keen bowler, he offered for competition, in 1854, a silver bowl and, in 1857, a gold bowl and the Eglinton Cup, all to be played for annually. These trophies excited healthy rivalry in Ayrshire and Lanarkshire, and the enthusiasm as well as the skill with which the game was conducted in Scotland at length proved contagious. Clubs in England began to consider the question of legislation, and to improve their greens. More- over, Scottish emigrants introduced the game wherever they went, and colonists in Australia and New Zealand established many clubs which, in the main, adopted Mitchell's laws; while clubs were also started in Canada and in the United States, in South Africa, India (Calcutta, Karachi), Japan (Kobe, Yoko- hama, Kumamoto) and Hong-Kong. In Ireland the game took root very gradually, but in Ulster, owing doubtless to constant

intercourse with Scotland, such clubs as have been founded are strong in

numbers and play.

On the European continent the game can scarcely be said to be played on scientific principles. It has existed in France since the 17 th century. When John Evelyn was in Paris in 1644 he saw it played in the gardens of the Luxembourg Palace. In the south of France it is rather popular with artisans, who, however, are content to pursue it on any flat surface and use round instead of biased bowls, the bowler, moreover, indulging in a preliminary run before delivering the bowl, after the fashion of a bowler in cricket. A rude variety of the game occurs in Italy, and, as we have seen, John Calvin played it in Geneva, where John Evelyn also noticed it in 1646. There is evidence of its vogue in Holland in the 17th century, for the painting by David Teniers (1610-1690), in the Scottish National Gallery at Edinburgh, is wrongly described as " Peasants playingat Skittles." In this picture three men are represented as having played a bowl, while the fourth is in the act of delivering his bowl. The game is obviously bowls, the sole difference being that an upright peg, about 4 in. high, is employed instead of a jack, — recalling, in this respect, the old English form of the game already mentioned.

Serious efforts to organize the game were made in the last quarter of the 10th century, but this time the lead came from Australia. The Bowling Associations of Victoria and New South Wales were established in 1880, and it was not until 1892 that the Scottish Bowling Association was founded. Then in rapid succession came several independent bodies — the Midland Counties (1895), the London and Southern Counties (1896), the Imperial (1899), the English (1903) and the Irish and Welsh (1904). These institutions were concerned with the task of regularizing the game within the territories indicated by their titles, but it soon appeared that the multiplicity of associations was likely to prove a hindrance rather than a help, and with a view, therefore, to reducing the number of clashing jurisdictions and bringing about the establishment of a single legislative authority, the Imperial amalgamated with the English B.A. in 1905. The visits to the United Kingdom of properly organized teams of bowlers from Australia and New Zealand in 1901 and from Canada in 1904 demonstrated that the game had gained enormously in popularity. The former visit was commemorated by the institution of the Australia Cup, presented to the Imperial Bowling Association (and now the property of the English B.A.) by Mr Charles Wood, president of the Victorian Bowling Associa- tion. An accredited team of bowlers from the mother country visited Canada in 1906, and was accorded a royal welcome. Perhaps the most interesting proof that bowls is a true Volksspiel is to be found in the fact that it has become municipalized. In Edinburgh, Glasgow, and elsewhere in Scotland, and in London (through the county council), Newcastle and other English towns, the corporations have laid down greens

in public parks and open spaces. In Scotland the public greens are self-supporting, from a charge, which includes the use of bowls, of one penny an hour for each player; in London the upkeep of the greens falls on the rates, but players must provide their own bowls.

There are two kinds of bowling green, the level and the crown. The crown has a fall which may amount to as much as 18 in. all round from the centre to the sides. This type of green is confined almost wholly to certain of the northern and midland counties of England, where it is popular for single- handed, gate-money contests. But although the crown-green game is of a sporting character, it necessitates the use of bowls of narrow bias and affords but limited scope for the display of skill and science. It is the game on the perfectly level green that constitutes the historical game of bowls. Subject to the rule as to the shortest distance to which the jack must be thrown (25 yds.), there is no prescribed size for the lawn; but 42 yds. square forms an ideal green. The Queen's Park and Titwood clubs in Glasgow have each three greens, and as they can quite comfortably play six rinks on each, it is not uncommon to see 144 players making their game simultaneously. An under- sized lawn is really a poor pitch, because it involves playing irom corner to corner instead of up and down — the orthodox

The game.

direction. For the scientific construction of a green, the whole ground must be excavated to a depth of 18 in. or so, and thoroughly drained, and layers of different materials (gravel, cinders, moulds, silver-sand) laid down before the final covering of turf, 2\ or 3 in. thick. Seaside turf is the best. It wears longest and keeps its " spring " to the last. Surrounding the green is a space called a ditch, which is nearly but not quite on a level with the green and slopes gently away from it, the side next the turf being lined with boarding, the ditch itself bottomed with wooden spars resting on the foundation. Beyond the ditch are banks generally laid with turf. A green is divided into spaces usually from 18 to 21 ft. in width, commonly styled " rinks " — a word which also designates each set of players — and these are numbered in sequence on a plate fixed in the bank at each end opposite the centre of the space.- The end ditch within the limits of the space is, according to Scottish laws, regarded as part of the green, a regulation which prejudices the general acceptance of those laws. In match play each space is further marked off from its neighbour by thin string securely fastened flush with the turf.

Every player uses four lignum vitae bowls in single-handed games and (as a rule) in friendly games, but only two in matches. Every bowl must have a certain amount of bias, which was formerly obtained by loading one side

with lead, but is now imparted by the turner making one side more convex than the other, the bulge showing the side of the bias. No bowl must have less than No. 3 bias — that is, it should draw about 6 ft. to a 30 yd. jack on a first-rate green: it follows that on an inferior green the bowler, though using the same bowl, would have to allow for a narrower draw. It is also a rule that the diameter of the bowl shall not be less than 4! in. nor more than sJ in., and that its weight must not exceed 3! lb. The jack or kitty, as the white earthenware ball to which the bowler bowls is called, is round and 2j to 2§ in. in diameter. On crown-greens it is customary to use a small biased wooden jack to give the bowler some clue to the run of the green. The bowler delivers his bowl with one foot on a mat or footer, made of india-rubber or cocoa- nut fibre, the size of which is also prescribed by rule as 24 by 16 in., though, with a view to protecting the green, Australasian clubs employ a much larger size, and require the bowler to keep both feet on the mat in the act of delivery.

In theory the game of bowls is very simple, the aim of the player being to roll his bowl so as to cause it to rest nearer to the jack than his opponent's, or to protect a well-placed bowl, or to dislodge a better bowl than his own. But in practice there is every opportunity for skill. On all good greens the game is played in rinks of four a side, there being, however, on the part of many English clubs still an adherence to the old-fashioned method of two and three a side rinks. Ordinarily a match team consists of four rinks of four players each, or sixteen men in all. The four players in a rink are known as the leader, second player, third player and skip (or driver, captain or director), and their positions, at least in matches, are unchangeable. Great responsibility is thus thrown on the skip in the choice of his players, who are selected for well-defined reasons. The leader has to place the mat, to throw the jack, to count the game, and to call the result of each end or head to the skip who is at the other end of the green. He is picked for his skill in playing to the jack. It is, therefore, his business to " be up." There is no excuse for short play on his part, and his bowls would be better off the green than obstructing the path of subsequent bowls. So he will endeavour to be "on the jack," the ideal position being a bowl at rest immediately in front of or behind it. The skip plays last, and directs his men from the end that is being played to. The weakest player in the four is invariably played in the second place (the " soft second "). Most frequently he will be required either to protect a good bowl or to rectify a possible error of the leader. His official duty is to mark the game on the scoring card when the leader announces the result. He keeps a record of the play of both sides. The third player, who does any measuring that may be necessary to determine which bowl or bowls may be nearest the jack, holds almost as responsible

a position as the captain, whose place, in fact, he takes when- ever the skip is temporarily absent. The duties of the skip will already be understood by inference. Before he leaves the jack to play, he must observe the situation of the bowls of both sides. It may be that he has to draw a shot with the utmost nicety to save the end, or even the match, or to lay a cunningly contrived block, or to " fire " — that is, to deliver his bowl almost dead straight at the object, with enough force to kill the bias for the moment. The score having been counted, the leader then places the mat, usually within a yard of the spot where the jack lay at the conclusion of the head, and throws the jack in the opposite direction for a fresh end. On small greens play, for obvious reasons, generally takes place from each ditch. The players play in couples — the first on both sides, then the second and so on. The leader having played his first bowl, the opposing leader will play his first and so on. As a rule, a match consists of 21 points, or 21 ends (or a few more, by agreement).

Certain points in the play call for notice. In throwing the jack, the leader is bound to throw (i.e. roll) a legal jack. A legal jack must travel at least 25 yds. from the footer and not come to rest within 2 yds. of either side boundary ; but it may be thrown as far beyond this as the leader chooses, provided that it does not run within 2 yds. of the end ditch or either side boundary. In English practice the leader is entitled to a second throw if he fail to roll a

On Scottish greens the game of points is frequently played, but it is rarely seen on English greens. Its main object is to perfect the proficiency of players in certain departments of bowls proper. There are four sections in the game, namely, drawing, guarding, trailing and driving. I n drawing (fig. 1) , the obj ect is to draw as near as possible to the jack, the player's bowl passing outside of two other bowls placed 5 ft. apart in a horizontal line 15 ft. from the jack, without touching either of them. Three points are scored if the bowl come to rest within 1 ft. of the jack, two points if within 2 ft., and one point if within 3 ft. Circles of these radii are usually marked around the jack for convenience' sake. In guarding (fig. 2), two jacks are laid at the far end of the green 12 ft. apart in a vertical line. A thread is then pinned down between them, and on each side of this thread three others are pinned down parallel with it and 6 in. apart from each other. A bowl that comes to rest on the central line, or within 6 in. of it, counts three points, a bowl 12 in. away two points, and a bowl 18 in. off'one point. In trailing (fig. 3), two bowls are laid on the turf 3 ft. apart, and straight lines are chalked from bowl to bowl across their back and front faces, and a jack is then deposited equidistant from each bowl and immediately before the front line. A semicircle is then drawn behind the

bowls with a radius of 9 ft. from the jack. Three points are given to the bowl that trails the jack over both lines into the semicircle and goes over them itself. If a bowl trail the jack over both lines, but only itself cross the first; or if it pass both lines, but the jack cross only the first, two points are awarded. A bowl passing between the jack and either of the station- ary bowls, and passing over the back line; or touching the jack, yet not trailing it past the first line, but itself crossing the back line;

7 Feet

•

c

k C

•

>

kkk

) 1

B

B

«L

2 Feet

_#

O j

F

F

Fig. 1. — Drawing.

Fig. 2.— Guarding. Fig. 3. — Trailing.

(In every case F is the Footer, B the Bowl, J the Jack.)

Fig. 4. — Driving.

legal jack at his first attempt; should he fail again, the right to throw passes to his opponent, but not the right of playing first. On Scottish greens the leader has only a single throw. A legal jack should not be interfered with except by the course of play. Should the jack be driven towards the side boundary, it is legitimate for a player to cause his bowl to draw outside of the dividing string, provided that when it has ceased running it shall have come to rest entirely within his own space. If it stop on the string, or outside of it, the bowl is " dead " and must be removed to the bank. A " toucher " bowl is a characteristic of the Scottish game to which great exception is taken by many English clubs. Should a bowl running jackwards touch the jack, however slightly, it is called a toucher and must be marked by the skip with a chalk cross as soon as it is at rest. Such a bowl is alive until the end is finished wherever it may lie, within the limits of the space. Even if it run into the ditch or be driven in by another bowl, it will yet count as alive. A bowl, however, that is forced on to the jack by another is not a toucher. The feat of hitting the jack is so common that it really calls for no special reward. Difference of opinion prevails as to the condition of the jack after it has been driven into the ditch. According to Scottish rules, unless it has been forced clean out of bounds, such a jack is still alive. On most English greens it is a " dead " jack and the end void. Every bowler should learn both forehand and back- hand play. In forehand play the bowl as it courses to the jack describes its segment of a circle on the right, in backhand play on the left. In both styles the biased side must always be the inner.

In the United Kingdom the regular bowling season extends from May day till the end of September or the middle of October. At its close the green must be carefully examined, weeds uprooted, worn patches re-turfed, and the whole laid under a winter blanket of silver-sand.

or trailing the jack over the front line without crossing it itself, receives one point. In no case must the stationary bowls be touched, or the semicircle crossed by the trailed jack or played bowls. In driving (fig. 4), two bowls are laid down 2 ft. apart, and then a jack is placed in front of them, 15 in. apart from each, and occupying the position of the apex of an inverted pyramid. The player who drives the jack into the ditch between the two bowls scores three. If he moves the jack, but does not carry it through to the ditch, he scores two. If he pass between the jack and either bowl he scores one, although it is not easy to see what driving he has done. The played bowl must itself run into the ditch without touching either of the stationary bowls. It is obvious that the points game demands an ideally perfect green.

See W. W. Mitchell, Manual of Bowl-playing (Glasgow, 1880); Laws of the Game issued by the Scottish B.A. (1893, et sqq.); H. J. Dingley, Touchers

and Rubs (Glasgow, 1893) ; Sam Aylwin, The Gentle Art of Bowling, with 26 diagrams (London, 1904) ; James A. Manson, The Bowler's Handbook (London, 1906). (J. A. M.)

BOWNESS-ON-WINDERMERE, an urban district in. the Appleby parliamentary division of Westmorland, England, on the east shore of Windermere, ij m. S.W. of Windermere station on the London & North-Western railway. Together with the town of Windermere it forms an urban district (pop. 5061 in 1901), but the two towns were separate until 1905. Its situation is fine, the lake-shore here rising sharply, while at this point the lake narrows and is studded with islands. The low surrounding hills are richly wooded, and a number of country seats stand upon them. Bowness lies at the head of a small bay, is served by the lake-steamers of the Furness Railway Company, and is a

favourite yachting, boating, fishing and tourist centre. The church of St Martin is ancient, and contains stained glass from Cartmel priory in Furness. (See Windermere.)

BOWRING, SIR JOHN (1792-1872), English linguist, political economist and miscellaneous writer, was born at Exeter, on the 17th of October 1792, of an old Puritan family. In early life he came under the influence of Jeremy Bentham. He did not, however, share his master's contempt for belles-lettres, but was a diligent student of literature and foreign languages, especially those of eastern Europe. As a linguist he ranked with Mezzo-fanti and von Gabelentz among the greatest of the world. The first-fruits of his study of foreign literature appeared in Specimens of the Russian Poets (1821-1823). These were speedily followed by Batavian Anthology (1824), Ancient Poetry and Romances of Spain (1824), Specimens of the Polish Poets, and Servian Popular Poetry, both in 1827. During this period he began to contribute to the newly founded Westminster Review, of which he was appointed editor in 1825. By his contributions to the Review he obtained considerable reputation as political economist and parliamentary reformer. He advocated in its pages the cause of free trade long before it was popularized by Richard Cobden and John Bright. He pleaded earnestly in behalf of parlia- mentary reform, Catholic emancipation and popular education. In 1828 he visited Holland, where the university of Groningen conferred on him the degree of doctor of laws. In the following year he was in Denmark, preparing forthe publication of a collec- tion of Scandinavian poetry. Bowring, who had been the trusted friend of Bentham during his life, was appointed his literary executor, and was charged with the task of

preparing a collected edition of his works. This appeared in eleven volumes in 1843. Meanwhile Bowring had entered parliament in 1835 as member for Kilmarnock; and in the following year he was appointed head of a government commission to be sent to France to inquire into the actual state of commerce between the two countries. He was engaged in similar investigations in Switzerland, Italy, Syria and some of the German states. The results of these missions appeared in a series of reports laid before the House of Commons. After a retirement of four years he sat in parliament from 1841 till 1849 as member for Bolton. During this busy period he found leisure for literature, and published in 1843 a translation of the Manuscript of the Queen's Court, a collection of old Bohemian lyrics, &c. In 1849 he was appointed British consul at Canton, and superintendent of trade in China, a post which he held for four years. After his return he distinguished himself as an advocate of the decimal system, and published a work entitled The Decimal System in Numbers, Coins and Accounts (1854). The introduction of the florin as a preparatory step was chiefly due to his efforts. Knighted in 1854, he was again sent the same year to Hong-Kong as governor, invested with the supreme military and naval power. It was during his governorship that a dispute broke out with the Chinese; and the irritation caused by his " spirited " or high-handed policy led to the second war with China. In 1855 he visited Siam, and negotiated with the king a treaty of commerce. After the usual five years of service he retired and received a pension. His last employment by the English government was as a commissioner to Italy in 1861, to report on British commercial relations with the new kingdom. Sir John Bowring subsequently accepted the appointment of minister plenipotentiary and envoy extra-ordinary from the Hawaiian government to the courts of Europe, and in this capacity negotiated treaties with Belgium, Holland, Italy, Spain and Switzerland. In addition to the works already named he published — Poetry of the Magyars (1830) ; Cheskian Anthology (1832); The Kingdom and People of Siam (18 57); a translation of Peter Schlemihl (1824); translations from the Hungarian poet, Alexander Petofi (1866) ; and various pamphlets. He was elected F.R.S. and F.R.G.S., and received the decora- tions of several foreign orders of knighthood. He died at Clare-mont, near Exeter, on the 23rd of November 1872. His valuable collection of coleoptera was presented to the British Museum by his second son, Lewin Bowring, a well-known Anglo-Indian administrator; and his third son, E. A. Bowring, member of

parliament for Exeter from 1868 to 1874, became known in the literary world as an able translator.

Sir John Bowring's Recollections were edited by Lewin Bowring (d. 1910) in 1877.

BOWTELL, a medieval term in architecture for a round or corniced moulding; the word is a variant of " boltel," which is probably the diminutive of " bolt," the shaft of an arrow or javelin. A " roving " bowtell is one which passes up the side of a bench end and round a finial, the term " roving " being applied to that which follows the line of a curve.

BOWYER, WILLIAM (1663-1737), English printer, was born in 1663, apprenticed to a printer in 1679, made a liveryman of the Stationers' Company in 1700, and nominated as one of the twenty printers allowed by the Star Chamber. He was burned out in the great fire of 1 7 1 2, but his loss was partly made good by the subscription of friends and fellow craftsmen, as recorded on a tablet in Stationers' Hall, and in 1713 he returned to his White- friars shop and became the leading printer of his day. He died on the 27th of December 1737.

His son, William Bowyer (1699-1777), was born in London on the 19th of December 1699. He was educated at St John's College, Cambridge, and in 1722 became a partner in his father's business. In 1729 he was appointed printer of the votes of the House of Commons, and in 1736 printer to the Society of Anti- quaries, of which he was elected a fellow in 1737. In 1737 he took as apprentice John Nichols, who was to be his successor and biographer. In 1761 Bowyer became printer to the Royal Society, and in 1767 printer of the rolls of the House of Lords and the journals of the House of Commons. He died on the 13th of November 1777, leaving unfinished a number of large works and among them the reprint of Domesday Book. He wrote a great many tracts and pamphlets, edited, arranged and published a host of books, but perhaps his principal work was an edition of the New Testament in Greek, with notes. His generous bequests in favour of his own profession are administered by the Stationers' Company, of which he became a liveryman in 1738, and in whose hall is his portrait bust and a painting of his father. He was known as " the learned printer."

BOX (Gr. irv£os, Lat. buxus, box-wood; cf. tti>£is, a pyx), the most varied of all receptacles. A box may be square, oblong, round or oval, or of an even less normal shape; it usually opens by raising, sliding or removing the lid, which may be fastened by a catch, hasp or lock. Whatever its shape or purpose or the material of which it is fashioned, it is the direct descendant of the chest, one of the most ancient articles of domestic furniture. Its uses are infinite, and the name, preceded by a qualifying adjective, has been given to many objects of artistic or anti- quarian interest.

Of the boxes which possess some attraction beyond their immediate purpose the feminine work-box is the commonest. It is usually fitted with a tray

divided into many small com- partments, for needles, reels of silk and cotton and other necessaries of stitchery. The date of its introduction is in con- siderable doubt, but 17th-century examples have come down to us, with covers of silk, stitched with beads and adorned with embroidery. In the 18th century no lady was without her work-box, and, especially in the second half of that period, much taste and elaborate pains were expended upon the case, which was often exceedingly dainty and elegant. These boxes are ordinarily portable, but sometimes form the top of a table.

But it is as a receptacle for snuff that the box has taken its most distinguished and artistic form. The snuff-box, which is now little more than a charming relic of a disagreeable practice, was throughout the larger part of the 18th century the indis- pensable companion of every man of birth and breeding. It long survived his sword, and was in frequent use until nearly the middle of the 19th century. The jeweller, the enameller and the artist bestowed infinite pains upon what was quite as often a delicate bijou as a piece of utility; fops and great personages possessed numbers of snuff-boxes, rich and more ordinary, their selection being regulated by their dress and by the relative splendour of the occasion. From the cheapest wood

that was suitable — at one time potato-pulp was extensively used — to a frame of gold encased with diamonds, a great variety of materials was employed. Tortoise-shell was a favourite, and owing to its limpid lustre it was exceedingly effective. Mother-of-pearl was also used, together with silver, in its natural state or gilded. Costly gold boxes were often enriched with enamels or set with diamonds or other precious stones, and some- times the lid was adorned with a portrait, a classical vignette, or a tiny miniature, often some choice work by an old master. After snuff-taking had ceased to be general it lingered for some time among diplomatists, either because — as Talleyrand ex- plained — they found a ceremonious pinch to be a useful aid to reflection in a business interview, or because monarchs retained the habit of bestowing snuff-boxes upon ambassadors and other intermediaries, who could not well be honoured in any other way. ‘ It is, indeed, to the cessation of the habit of snuff-taking that we may trace much of modern lavishness in the distribution of decorations. To be invited to take a pinch from a monarch’s snuff-box was a distinction almost equivalent to having one’s ear pulled by Napoleon. At the coronation of George IV. of England, Messrs Rundell & Bridge, the court jewellers, were paid £8205 for snuff-boxes for foreign ministers. Now that the snuff- box is no longer used it is collected by wealthy amateurs or de- posited in museums, and especially artistic examples command large sums. George,

duke of Cambridge (1819-1904), possessed an important collection; a Louis XV. gold box was sold by auction after his death for £2000.

A jewel-box is a receptacle for trinkets. It may take a very modest form, covered in leather and lined with satin, or it may reach the monumental proportions of the jewel cabinets which were made for Marie Antoinette, one of which is at Windsor, and another at Versailles, the work of Schwerdfeger as cabinet- maker, Degault as miniature-painter, and Thomire as chaser.

A strong-box is a receptacle for money, deeds and securities. Its place has been taken in modern life by the safe. Some of those which have survived, such as that of Sir Thomas Bodley in the Bodleian library, possess locks with an extremely elaborate mechanism contrived in the under-side of the lid.

The knife-box is one of the most charming of the minor pieces of furniture which we owe to the artistic taste and mechanical ingenuity of the English cabinet-makers of the last quarter of the 1 8th century. Some of the most elegant were the work of Adam, Hepplewhite and Sheraton. Occasionally flat-topped boxes, they were most frequently either vase-shaped, or tall and narrow with a sloping lid necessitated by a series of raised stages for exhibiting the handles of knives and the bowls of spoons. Mahogany and satinwood were the woods most frequently em- ployed, and they were occasionally inlaid with marqueterie or edged with boxwood. These graceful receptacles still exist in large numbers; they are often converted into stationery cabinets.

The Bible-box, usually of the 17 th century, but now and again more ancient, probably obtained its name from the fact that it was of a size to hold a large Bible. It often has a carved or incised lid.

The powder-box and the patch-box were respectively re- ceptacles for the powder and the patches of the 18th century; the former was the direct ancestor cif the puff-box of the modern dressing-table.

The etui is a cylindrical box or case of very various materials, often of pleasing shape or adornment, for holding sewing materials or small articles of feminine use. It was worn on the chatelaine. BOXING (M.E. box, a blow, probably from Dan. bask, a buffet), the art of attack and defence with the fists protected by padded gloves, as distinguished from pugilism, in which the bare fists, or some kind of light gloves affording little moderation of the blow, are employed. The ancient" Greeks used a sort of glove in practice, but, although far less formidable than the terrible caestus worn in serious encounters, it was by no means so mild an implement as the

modern boxing-glove, the invention of which is traditionally ascribed to Jack Broughton (1705-1789), " the father of British pugilism." In any case gloves were first used

in his time, though only in practice, all prize-fights being decided with bare fists. Broughton, who was for years champion of England, also drew up the rules by which prize-fights were for many years regulated, and no doubt, with the help of the newly invented gloves, imparted instruction in .boxing to the young aristocrats of his day. The most popular teacher of the art was, however, John Jackson (1769-1845), called " Gentleman Jackson," who was champion from 1795 to 1800, and who is credited with imparting to boxing its scientific principles, such as countering, accurate judging of distance in hitting, and agility on the feet. Tom Moore, the poet, in his Memoirs, asserted that Jackson " made more than a thousand a year by teaching sparring." Among his pupils was Lord Byron, who, when chided for keeping company with a pugilist, insisted that Jackson's manners were " infinitely superior to those of the fellows of the college whom I meet at the high table," and referred to him in the following lines in Hints from Horace: — " And men unpractised in exchanging knocks Must go to Jackson ere they dare to box."

His rooms in Bond- Street were crowded with men of birth and distinction, and when the allied monarchs visited London he was entrusted with the management of a boxing carnival with which they were vastly pleased. In 1814 the Pugilistic Club, the meeting-place of the aristocratic sporting element, was formed, but the high-water mark of the popularity of boxing had been reached, and it declined rapidly, although throughout the country considerable interest continued to be manifested in prize-fighting.

The sport of modern boxing, as distinguished from pugilism, may be said to date from the year 1866, when the public had become disgusted with the brutality and unfair practices of the professional " bruisers," and the laws against prize-fighting began to be more rigidly enforced. In that year the " Amateur Athletic Club " was founded, principally through the efforts of John G. Chambers (1843-1883), who, in conjunction with the 8 th marquess of Queensberry, drew up a code of laws (known as the Queensberry Rules) which govern all glove contests in Great Britain, and were also authoritative in America until the adoption of the boxing rules of the Amateur Athletic Union of America. In 1867 Lord Queensberry presented cups for the British amateur championships at the recognized weights.

For the history of pugilism in classic antiquity and an account of modern prize-fighting see Pugilism. At present two kinds of boxing contests are in vogue, that for a limited number of rounds (as in the amateur

championships) and that for endurance, in which the one who cannot continue the fight loses. Endurance contests, which contain the essential element of the old prize- fights, are now indulged in only by professionals. Among amateurs boxing is far less popular than it once was, owing to the importance placed upon brute strength, and the prevailing ambition of the modern boxer to " knock out " his opponent, i.e. reduce him to a state of insensibility. Even in 3-round matches between gentlemen, in which points win, and there is therefore no need to knock an opponent senseless, it is neverthe- less a common practice to strike a dazed and reeling adversary a heavy blow with a view to ending the battle at once. During the annual boxing competitions between Oxford and Cambridge more than half the bouts have been known to end in this manner. Undoubtedly the prettiest boxing is seen when two men pro- ficient in the art indulge in a practice bout — or "sparring."

Boxing is the art of hitting without getting hit. The boxers face each other just out of reach and balanced equally on both feet, the left from 10 to 20 in. in advance of the right. The left foot is planted flat on the floor, while the right heel is raised slightly from it. The left side of the body is turned a little towards the opponent and the right shoulder slightly depressed. When the hands are clenched inside the gloves the thumb is doubled over the second and third fingers to avoid a sprain when hitting. The general position of the guard is a matter of in- dividual taste. In the " crouch," affected by many American professionals, the right hip is thrust forward and the body bent over towards the right, while the left arm is kept well sketched.

out to keep the opponent at a distance. No good master, how- ever, teaches a beginner any other than the upright position. Some boxers stand with the right foot forward, a practice common in the 18th century, which gives freer play with the right hand but is rather unstable. A boxer should stand lightly on his feet, ready to advance or retreat on the instant, using short steps, advancing with the left foot first and retreating with the right. Attacks are either simple or secondary. Simple attacks consist in straight leads, i.e. blows aimed with or without pre- liminary feints, at some part of the opponent's body or head. All other attacks are either " counters " or returns after a guard or " block." A counter is a -lead carried out just as one is attacked, the object being to block (parry) the blow and land on the opponent at the same time. Counters are often carried out in connexion with a side-step, a slip or a crouch. In hitting, a boxer seeks to exert the greatest force at the instant of impact. Blows may be either straight, with or

without the weight of the body behind them (" straight from the shouder " hits); jabs, short blows (usually with the left hand when at close quarters) ; hooks, or side-blows with bent arm; upper cuts (short swinging blows from beneath to the adversary's chin) ; chops (short blows from above) ; punches (usually at close quarters, with the right hand); or swings (round-arm blows, usually delivered with a partial twist of the body to augment the force of the blow). Of the dangerous blows, which often result in a knock- out, or in seriously weakening an adversary, the following may be mentioned: — on the pit of the stomach, called the solar plexus, from the sensitive network of nerves situated there; a blow on the point of the chin, having a tendency slightly to paralyse the brain; a blow under the ear, painful and often resulting in partial helplessness; and one directly over the heart, kidney or liver. As a boxer is allowed ten seconds after being knocked down in which to rise, an experienced ring-fighter will drop on one knee when partially stunned, remaining in that position in order to recover until the referee has counted nine. Guarding is done with the arm or hand, either open or shut. If a blow is caught or stopped short it is called blocking, but a blow may also be shoved aside, or avoided altogether by slipping, i.e. moving the head quickly to one side, or by ducking and allowing the adversary's swing to pass harmlessly over the head. Still another method of avoiding a blow without guarding is to bend back the head or body so as narrowly to escape the opponent's glove.

The rules of the Amateur Boxing Association (founded 1884) contain the following provisions. " An amateur is one who has never competed for a money prize or staked bet with or against a professional for any prize, except with the express sanction of the A.B.A., and who has never taught, pursued or assisted in the practice of athletic exercises as a means of obtaining a liveli- hood." The ring shall be roped and between 1 2 and 24 ft. square. No spikes shall be worn on shoes. Boxers are divided into the following classes by weight: — Bantam, not exceeding 8 st. 4 lb (116 lb); Feather, not exceeding 9 st. (126 lb); Light, not exceeding 10 st. (140 lb); Middle, not exceeding n st. 4 lb (158 lb) ; and Heavy, any weight above. There shall be two judges, a referee and a timekeeper. The votes of the judges decide the winner of a bout, unless they disagree, in which case the referee has the deciding vote. In case of doubt he may order an extra round of two minutes' duration. Each match is for three rounds, the first two lasting three minutes and the third four, with one minute rest between the rounds. A competitor failing to come up at the call of time loses the match. When a competitor draws a bye he must box for a specified time with an opponent chosen by the judges. A competitor is allowed one assistant (second) only, and no advice or coaching during the progress of a round is permitted. Unless one competitor is unable to respond to the call of time, or is obliged to stop before the match is over, the judges decide the winner by

points, which are for attack, com- prising successful hits cleanly delivered, and defence, comprising guarding, slipping, ducking, counter-hitting and getting away in time to avoid a return. When the points are equal the decision is given in favour of the boxer who has done the most leading, i.e.

has been the more aggressive. Fouls are hitting below the belt, kicking, hitting with the open hand, the side of the hand, the wrist, elbow or shoulder, wrestling or " roughing " on the ropes, i. e. unnecessary shouldering and jostling.

The boxing rules of the American Amateur Athletic Associa- tion differ slightly from the British. The ring is roped but must be from 16 to 24 ft. square. Gloves must not be worn more than 8 oz. in weight. The recognized classes by weight are: Bantam, 105 lb and under; .Feather, 115 lb and under; Light, 135 lb and under; Welter, 145 lb and under; Middle, 158 lb and under; and Heavy, over 158 lb. The rules for officials and rounds are identical with the British, except that only in final bouts does the last round last four minutes. Two " seconds " are allowed. The rules for points and fouls coincide with the British. The amateur rules are very strict, and any one who competes in a boxing contest of more than four rounds is suspended from membership in the Athletic Association.

Glossary of terms not mentioned above : — Break away, to get away from the adversary, usually a command from the referee when the men clinch. Break ground, retire diagonally to right or left. CotoA- weight,ˆ&ny weight. Corners, the opposite angles of the square

ring," in which the boxers rest between the rounds. Cross-counter, a blow in which the right or left arm crosses that of the adversary as he leads off; the arm is slightly curved to get round that of the opponent but is straightened at the moment of impact. Clinching, grappling after an exchange of blows; when breaking from a clinch one tries to pin the adversary's hands in order to prevent his hitting at close quarters. Drawing an opponent, enticing him by leaving an apparent opening into making an attack for which a counter is prepared. _ Fiddling, forward and back movements of the arms at the beginning of a round, a part of sparring for an opening. Fool- work, the manner in which a boxer uses his feet. In-fighting, boxing at very close quarters. Mark, the pit of the stomach. Side-step, springing quickly to one side to avoid a blow, the movement being usually followed up by a counter attack. Timing, a blow delivered on the enemy's preparation of an attack of his own, but more quickly.

SeeBoxing,by R.AIlansonWinn(IsthmianLibrary, London,i8o7) ; Boxing, by Wm. Elder (Spalding's Athletic Library, New York, 1902) (these two books are excellent for' the technicalities of boxing). The article " Boxing," by B.

Jno. Angle and G. W. Barroll, in the Encyclopaedia of Sport; Boxing, by J. C. Trotter (Oval Series,' London, 1896); Fencing, Boxing and Wrestling, in the Badminton Library (London, 1892). £

French Boxing (la boxe francaise) dates from about 1830. It is more like the ancient Greek pankration (see Pugilism) than is British boxing, as not only striking with the fists, but also kicking with the feet, butting with the head and wrestling are allowed. It is a development of the old sport of savate, in which the feet, and not the hands, were used in attack. Lessons in savate, which was practised especially by roughs, were usually given in some low resort, and there were no respectable teachers. While Paris was restricted to savate, another sport, called chausson or jeu marseillais, was practised in the south of France, especially among the soldiers, in which blows of the fist as well as kicks were exchanged, and the kicks were given higher than in savate, in the stomach or even the face. It was an excellent exercise, but could hardly be reckoned a serious means of defence, for the high kicks usually fell short, and the upward blows of the fist could not be compared with the terrible sledge-hammer blows of the English boxers. Alexandre Dumas pere says that Charles Lecour first conceived the idea of combining English boxing with savate. For this purpose he went to England, and took lessons of Adams and Smith, the London boxers. He then returned to Paris, about 1852, and opened a school to teach the sport since called la boxe francaise. Around him, and two provincial instructors who came to Paris about this time with similar ideas, there grew up a large number of sportsmen, who between 1845 and 1855 brought French boxing to its highest development. Among others who gave public exhibitions was Lecour's brother Hubert, who although rather undersized, was quick as lightning, and had an English blow and a French kick that were truly terrible. Charles Ducros was another whose style of boxing, more in the English fashion, but with low kicks about his opponent's shins, made a name for himself. Later came Vigneron, a " strong man," whose style, though slow, was severe in its punishment. About 1856 the police interfered in these fights, and Lecour and Vigneron had to cease giving public

exhibitions and devote themselves to teaching. Towards 1862 a new boxer, J. Charlemont, was not only very clever with his fists and feet, but an excellent teacher, and the author of a treatise on the art. Lecour, Vigneron and Charlemont may be said to have created la boxe franqaise, which, for defence at equal weights, the French claim to be better than the English.

See L'Art de la boxe francaise et de la canne, by J. Charlemont (Paris,

1899) ; The French Method of the Noble Art of Self Defence, by Georges d'Amoric (London, 1898).

BOXWOOD, the wood obtained from the genus Buxus, the principal species being the well-known tree or shrub, B. semper- virens, the common box, in general use for borders of garden walks, ornamental parterres, &c. The other source of the ordinary boxwood of commerce is B. balearica, which yields the variety known as Turkey boxwood. The common box is grown throughout Great Britain (perhaps native in the chalk-hills of the south of England), in the southern part of the European continent generally, and extends through Persia into India, where it is found growing on the slopes of the western Himalayas. There has been much discussion as to whether it is a true native of Britain. Writing more than 200 years ago, John Ray, the author of the important Historia Plantarum, says, " The Box grows wild on Boxhill, hence the name; also at Boxwell, on the Cotteswold Hills in Gloucestershire, and at Boxley in Kent. . . . It grows plentifully on the chalk hills near Dunstable." On the other hand the box is not wild in the Channel Islands, and in the north of France, Holland and Belgium is found mainly in hedge- rows and near cultivation, and it may have been one of the many introductions owed to the Romans. Only a very small proportion of the wood suitable for industrial uses is now obtained in Great Britain. The box is a very slow-growing plant, adding not more than 15 or 2 in. to its diameter in twenty years, and on an average attaining only a height of 16 ft., with a mean diameter of io| in. The leaves of this species are small, oval, leathery in texture and of a deep glossy green colour. B. balearica is a tree of consider- able size, attaining to a height of 80 ft., with leaves three times larger than those of the common box. It is a native of the islands of the Mediterranean, and grows in Turkey, Asia Minor, and around the shores of the Black Sea, and is supposed to be the chief source of the boxwood which comes into European com- merce by way of Constantinople. The wood of both species pos- sesses a delicate yellow colour; it is very dense in structure and has a fine uniform grain, which has given it unique value for the purposes of the wood-engraver. A large amount is used in the manufacture of measuring rules, various mathematical instru- ments, flutes and other musical instruments, as well as for turning into many minor articles, and for inlaying, and it is a favourite wood for small carvings. The use of boxwood for turnery and musical instruments is mentioned by Pliny, Virgil and Ovid.

BOYACA, or Bojaca, an inland department of Colombia, bounded by the departments of Santander and Cundinamarca on the N., W. and S., and the republic of Venezuela on the E., and having an area of 33,321 sq. m., including the Casanare territory. Pop. (1899, estimate) 508,940. The department is very mountainous, heavily forested and rich in minerals. The famous Muso emerald mines are located in the western part of Boyaca. The

capital, Tunja (pop. 1902, 10,000), is situated in the Eastern Cordilleras, 9054 ft. above sea-level, and has a cool, temperate climate, though only s|° N. of the equator. It was an important place in colonial times, and occupies the site of one of the Indian towns of this region (Hunsa), which had acquired a considerable degree of civilization before the discovery of America. Other towns of note in the department are Chiquin- quira (20,000), Moniquira (18,000), Sogamoso (10,787), and Boyaca (7000), where on the 7th of August 1819 Bolivar defeated the Spanish army and secured the independence of New Granada.

BOYAR (Russ. boyarin, plur. boy are), a dignity of Old Russia conterminous with the history of the country. Originally the boyars were the intimate friends and confidential advisers of the Russian prince, the superior members of his druzhina or bodyguard, his comrades and champions. They were divided into classes according to rank, most generally determined by

personal merit and service. Thus we hear of the " oldest," " elder " and the " younger " boyars. At first the dignity seems to have been occasionally, but by no means invariably, hereditary. At a later day the boyars were the chief members of the prince's duma, or council, like the senatores of Poland and Lithuania. Their further designation of luchshie lyudi or " the best people " proves that they were generally richer than their fellow subjects. So long as the princes, in their interminabk, struggles with the barbarians of the Steppe, needed the assistance of the towns, " the best people " of the cities and of the druzhina proper mingled freely together both in war and commerce; but after Yaroslav's crushing victory over the Petchenegs in 1036 beneath the walls of Kiev, the two classes began to draw apart, and a political and economical difference between the members of the princely druzhina and the aristocracy of the towns becomes discernible. The townsmen devote themselves henceforth more exclusively to commerce, while the druzhina asserts the privileges of an exclusively military caste with a primary claim upon the land. Still later, when the courts of the northern grand dukes were established, the boyars appear as the first grade of a full- blown court aristocracy with the exclusive privilege of possessing land and serfs. Hence their title of dvoryane (courtiers) , first used in the 1 2th century. On the other hand there was no distinction, as in Germany, between the Dienst A del (nobility of service) and the simple Adel. The Russian boyardom had no corporate or class privileges, (1) because their importance was purely local (the dignity of the principality determining the degree of dignity of the boyars), (2) because of their inalienable right of transmi- gration from one prince to another at will, which prevented the formation of a settled aristocracy, and (3) because birth did not determine but only facilitated the attainment of high rank, e.g. the son of a boyar was not a boyar born, but could more easily at- tain to

boyardom, if of superior personal merit. It was reserved for Peter the Great to transform the boyarstvo or boyardom into something more nearly resembling the aristocracy of the West.

• See Alexander Markevich, The History of Rank-priority in the Realm of Muscovy in the iˆth-iSth Centuries (Russ.) (Odessa, 1888) ; V. Klyuchevsky, The Boyar Duma of Ancient Russia (Russ.) (Moscow, 1888). ‘ (R. N. B.)

BOY-BISHOP, the name given to the ” bishop of the boys ” (episcopus puerorum or innocentium, sometimes episcopus scholariorum or chorestarum) , who, according to a custom very wide-spread in the middle ages, was chosen in connexion with the festival of Holy Innocents. For the origin of the curious authority of the boy-bishop and of the rites over which he presided, see Fools, Feast of. In England the boy-bishop was elected on December 6, the feast of St Nicholas, the patron of children, and his authority lasted till Holy Innocents’ day (December 28). The election made, the lad was dressed in full bishop’s robes with mitre and crozier and, attended by comrades dressed as priests, made a circuit of the town blessing the people. At Salisbury the boy-bishop seems to have actually had ecclesi- astical patronage during his episcopate, and could make valid appointments. The boy and his colleagues took possession of the cathedral and performed all the ceremonies and offices except mass. Originally, it seems, confined to the cathedrals, the custom spread to nearly all the parishes. Several ecclesi- astical councils had attempted to abolish or to restrain the abuses of the custom, before it was prohibited by the council of Basel in 1431. It was, however, too popular to be easily suppressed. In England it was abolished by Henry VIII. in 1542, revived by Mary in 1 5 5 2 and finally abolished by Elizabeth. On the continent it survived longest in Germany, in the so-called Gregoriusfest, said to have been founded by Gregory IV. in 828 in honour of St Gregory, the patron of schools. A school-boy was elected bishop, duly vested, and, attended by two boy-deacons and the town clergy, proceeded to the parish church, where, after a hymn in honour of St Gregory had been sung, he preached. At Meiningen this custom survived till 1799.

See Brand, Pop. Antiquities of Great Britain (1905); Gasquet, Parish Life in Medieval England (1906) ; Du Cange, Glossarium (London, 1884), s.v. ” Episcopus puerorum.”

BOYCE, WILLIAM (1710-1779), English musical composer, the son of a

cabinet-maker, was born in London on the 7 th of February 17 10. As a chorister in St Paul's he received his early musical education from Charles King and Dr Maurice Greene, and he afterwards studied the theory of music under Dr Pepusch. In 1734, having become organist of Oxford chapel, Vere Street, Cavendish Square, he set Lord Lansdowne's masque of Pelens a-nd Thetis to music. In 1736 he left Oxford chapel and was appointed organist of St Michael's church, Cornhill, and in the same year he became composer to the chapel royal, and wrote 'the music for John Lockman's oratorio David's Lamentation over Saul and Jonathan. In 1737 he was appointed to conduct the meetings of the three choirs of Gloucester, Worcester and Hereford. In 1743 was written the serenata Solomon, in which occurs the favourite song " Softly rise, O southern breeze." In 1749 he received the degree of doctor of music from the university of Cambridge, as an acknowledgment of the merit of his setting of the ode performed at the installation of Henry Pelham, duke of Newcastle, as chancellor; and in this year he became organist of All- hallows the Great and Less, Thames Street. A musical setting to The Chaplet, an entertainment by Moses Mendez, was Boyce's most successful achievement in this year. In 1750 he wrote songs for Dryden's Secular Masque and in 17 51 set another piece {The Shepherd's Lottery) by Mendez. He became master of the king's band in succession to Greene in 1757, and in 1758 he was appointed principal organist to the chapel royal. As an ecclesiastical composer Boyce ranks among the best representatives of the English school. His two church services and his anthems, of which the best specimens are By the Waters of Babylon and O, Where shall Wisdom be found, are frequently performed. It should also be remembered that he wrote additional accompaniments and choruses for Purcell's Te Deum and Jubilate, which the earlier musician had composed for the St Cecilia's day of 1694. Boyce did this in his capacity of conductor at the annual festivals of the Sons of the Clergy at St Paul's cathedral, an office which he had taken in succession to Greene. His twelve trios for two violins and a bass were long popular. One of his most valuable services to musical art was his publication in three volumes quarto of a work on Cathedral Music. The collection had been begun by Greene, but it was mainly the work of Boyce. The first volume appeared in 1760 and the last in 1778. On the 7th of February 1779 Boyce died from an attack of gout. He was buried under the dome of St Paul's cathedral.*

BOYCOTT, the refusal and incitement to refusal to have commercial or social dealings with any one on whom it is wished to bring pressure. As merely a form of " sending to Coventry " or (in W. E. Gladstone's phrase) " exclusive dealing," boycotting may be, from a legal point of view, unassailable, and as such has frequently been justified by its original political inventors. But in practice it has usually taken the form of what is

un- doubtedly an illegal conspiracy to injure the person, property or business of another by unwarrantably putting pressure on all and sundry to withdraw from him their social or business inter- course. The word was first used in Ireland, and was derived from the name of Captain Charles Cunningham Boycott (1832- 1897), agent for the estates of the earl of Erne in Co. Mayo. For refusing in 1880 to receive rents at figures fixed by the tenants, Captain Boycott had his life threatened, his servants compelled to leave him, his fences torn down, his letters intercepted and his food supplies interfered with. It took a force of 900 soldiers to protect the Ulster Orangemen (" Emergency Men ") who succeeded finally in getting in his crops. He was hooted and mobbed in the streets, and hanged and burnt in effigy. The system of boycotting was an essential part of the Irish Nation- alist " Plan of Campaign," and was dealt with under the Crimes Act of 1887. The term soon came into common English use, and was speedily adopted by the French, Germans, Dutch and Russians. In the United States this method of " persuasion " was taken up by the trade unions about 1886, an employer who refused their demands being brought to terms by a combination

to refuse to buy his product or do his work, or to deal with any who did. Various cases have occurred in America in which labour organizations have pronounced such a boycott against a firm; and its illegal nature has been established in the law-courts-, notably in the case of the Bucks Stove Company v. The American Federation of Labor (1907) in the Supreme Court of the district of Columbia, and in a suit against the Hatters' Union (February 1908) in the U.S. Supreme Court. A boycott has also been held by the U.S. Supreme Court to be a violation of the Sherman Anti-Trust law.

BOYD, ANDREW KENNEDY HUTCHISON (1825-1899), Scottish author and divine, was born at Auchinleck manse :n Ayrshire on the 3rd of November 1825. He studied at King's College, London, and at the Middle Temple, with the idea of practising at the English bar. Returning to Scotland, however, he entered Glasgow University and there qualified for the Scottish ministry, being licensed as a preacher by the presbytery of Ayr. He served in succession the parishes of Newton-on-Ayr, Kirkpatrick- lrongray near Dumfries, St Bernard's, Edinburgh, and finally, in 1865, became minister of the first charge at St Andrews. Here he advocated an improved ritual in the Scottish church, his action resulting in the appointment by the general assembly of a committee, with Boyd as convener, to prepare a new hymnal. In 1890 he was appointed moderator of the general assembly, and fulfilled the duties of the position with admirable dignity and tact. He died at Bournemouth on the 1st of March 1899. Dr Boyd was a very famous preacher and talker, and his desultory essays have very much of the charm of his conversation. Among his numerous publications may be specially mentioned the two works (each in

three series), Recrea- tions of a Country Parson (1859, 1861 and 1878), and Graver Thoughts of a Country Parson (1862-1865 and 1875); he also wrote Twenty-five Years at St Andrews (1892), and St Andrews and Elsewhere (1894). He was familiarly known to the public as a writer by his initials " A.K.H.B."

BOYD, ROBERT BOYD, Lord (d.e. 1470), Scottish statesman, was a son of Sir Thomas Boyd (d. 1439), and belonged to an old and distinguished family, one member of which, Sir Robert Boyd, had fought with Wallace and Robert Bruce. Boyd, who was created a peer about 1454, was one of the regents of Scotland during the minority of James III., but, in 1466, with some associates he secured the person of the young king and was appointed his sole governor. As ruler of Scotland he was instru- mental in reforming some religious foundations; he arranged the marriage between James III. and Margaret, daughter of Christian I., king of Denmark and Norway, and secured the cession of the Orkney Islands by Norway. However, when in 1467 he obtained the offices of chamberlain and justiciary for himself, and the hand of the king's sister Mary, with the title of earl of Arran for his eldest son Thomas, his enemies became too strong for him, and he was found guilty of treason and sentenced to death. He escaped to England, and the date of his death is unknown. His brother and assistant, Sir Alexander Boyd, was beheaded on the 22nd of November 1469.

Boyd's son Thomas, earl of Arran, was in Denmark when his father was overthrown. However, he fulfilled his mission, that of bringing the king's bride, Margaret, to Scotland, and then, warned by his wife, escaped to the continent of Europe. He is mentioned very eulogistically in one of the Paston Letters, but practically nothing is known of his subsequent history.

Lord Boyd's grandson Robert (d. c. 1550), a son of Alexander Boyd, was confirmed in the possession of the estates and honours of his grandfather in 1549, and is generally regarded as the 3rd Lord Boyd. His son Robert, 4th Lord Boyd (d. 1590), took a prominent part in Scottish politics during the troubled time which followed the death of James V. in 1542- At first he favoured the reformed religion, but afterwards his views changed and he became one of the most trusted advisers of Mary, queen of Scots, whom he accompanied to the battle of Langside in 1568. During the queen's captivity he was often employed on diplomatic errands; he tried to stir up insurrections in her favour, and he was suspected of participation in the murder

of the regent Murray. He enjoyed a high and influential position under the regent James Douglas, earl of Morton, but was banished in 1583 for his share in the seizure of King James VI., a plot known as the Raid of Ruthven. He retired to France, but was soon allowed to return to Scotland. He died on the 3rd of January 1590.

William, 8th or 9th Lord Boyd (d. 1692), was created earl of Kilmarnock in 1661, and this nobleman's grandson William, the 3rd earl (d. 1717), was a partisan of the Hanoverian kings and fought for George I. during the rising of 1715. His son William, the 4th earl (1 704-1 746), was educated in the same principles, but in 1745, owing either to a personal affront or to the influence of his wife or to his straitened circumstances he deserted George II . and joined Charles Edward, the Young Pretender. The 4th earl fought at Falkirk and Culloden, where he was made prisoner, and was beheaded on the 18th of August 1746. The title of earl of Kilmarnock is now merged in that of earl of Erroll.

BOYD, ZACHARY (is8s?i653), Scottish divine, was edu cated at the universities of Glasgow and St Andrews. He was for many years a teacher in the Protestant college of Saumur in France, but returned to Scotland in 1621, to escape the Huguenot persecution. In 1623 he was appointed minister of the Barony church in Glasgow, and he was rector of the university in 1634, 1635 and 1645. He bequeathed to the university the half of his fortune, a sum amounting to £20,000 Scots, besides his library and twelve volumes of MSS. His poetical compositions, though often eccentric, have some merit. The common statement that he made the printing of his metrical version of the Gospels and other Biblical narratives a condition of the reception of his grant to the university is a mistake. In later years he was a staunch Covenanter, and though for a time opposed to Oliver Cromwell, afterwards became friendly with him. His best-known works are The Battel of the Soul in Death (1629), of which a new, edition, with a biography by G. Neil, was published in Glasgow in 183 1 ; Zion's Flowers — often called "Boyd's Bible" (1644); Four Letters of Comfort (1640, reprinted, Edinburgh, 1878).

BOYDELL, JOHN (1719-1804), English alderman and pub- lisher, was born at Dorrington, and at the age of twenty-one came to London and was apprenticed for seven years to an engraver. In 1746 he published a volume of views in England and Wales, and started in business as a print-seller. By his good taste and liberality he managed to secure the services of the best artists, and his engravings were executed with such skill that his business became extensive and lucrative. He succeeded in his plan of a Shakespeare gallery, and obtained the assistance of the most eminent painters of the day, whose contributions were exhibited publicly for many years. The engravings from these paintings form a splendid companion volume to his

large illus- trated edition of Shakespeare's works. Towards the close of his life Boydell sustained severe losses through the French Revolu- tion, and was compelled to dispose of his Shakespeare gallery by lottery. Boydell had previously become an alderman, and rose to be lord mayor of London.

BOYER, ALEXIS (1757-1833), French surgeon, was born on the 1st of March 1757 at Uzerches (Correze). The son of a tailor, he obtained his first medical knowledge in the shop of a barber-surgeon. Removing to Paris he had the good fortune to attract the notice of Antoine Louis (1723-1792) and P. J. Desault (1744-1795); and his perseverance, anatomical skill and dexterity as an operator, became so conspicuous, that at the age of thirty-seven he obtained the appointment of second surgeon to the Hotel Dieu of Paris. On the establishment of the Ecole de Sante he gained the chair of operative surgery, but soon exchanged it for the chair of clinical surgery. In 1805 Napoleon nominated him imperial family surgeon, and, after the brilliant campaigns of 1806-7, conferred on him the legion of honour, with the title of baron of the empire and a salary of 2 5,000 francs. On the fall of Napoleon the merits of Boyer secured him the favour of the succeeding sovereigns of France, and he was con- sulting surgeon to Louis XVIII. , Charles X., and Louis Philippe. In 1825 he succeeded J. F. L. Deschamps (1 740-1824) as surgeon- in-chief to the Hopital de la Charite, and was chosen a member of

the Institute. He died in Paris on the 23rd of November 1833. Perhaps no French surgeon of his time thought or wrote with greater clearness and good sense than Boyer; and while his natural modesty made him distrustful of innovation, and somewhat tenacious of established modes of treatment, he was as judicious in his diagnosis and as cool and skilful in manipulating, as he was cautious in forming his judgment on individual cases. His two great works are: — Traite complet de I'anatomie (in 4 vols., 1797-1799), of which a fourth edition appeared in 1815, and Traite des maladies chirurgicales et des operations qui leur con- viennent (in n vols., 1814-1826), of which a new edition in 7 vols. was published in 1844-1853, with additions by his son, Philippe Boyer (1801-1858).

BOYER, JEAN PIERRE (1776-1850), president of the re- public of Haiti, a mulatto, was born at Port-au-Prince on the 28th of February 1776. He received a good education in France, and, returning to St Domingo, joined the army in 1792. In 1794 he was already in command of a battalion, and fought with distinction under General Rigaud against the English. The negro insurrectionunderToussaintl'Ouverture, which was directed against the mulattoes as well as the whites, ultimately forced him to take refuge in France. He was well received by Napoleon, and in 1802 obtained a commission in Leclerc's expedition. Being opposed to the reinstitution of slavery, he turned against the French and succeeded in producing an

alliance between the negroes and mulattoes by which they were driven from the island. Dessalines, a negro, was proclaimed king, but his cruelty and despotism were such that Boyer combined with A. A. S. Petion and General Christophe to overthrow him (1806). Christophe now seized the supreme power, but Petion set up an independent republic in the southern part of the island, with Boyer as commander-in-chief. Christophe's efforts to crush this state were defeated by Boyer's gallant defence of Port-au- Prince, and a series of brilliant victories, which, on Petion's death in 1818, led to Boyer's election as president. Two years later the death of Christophe removed his only rival, and he gained almost undisputed possession of the whole island. During his presidency Boyer did much to set the finances and the administration in order, and to encourage the arts and sciences, and in 1825 obtained French recognition of the independence of Haiti, in return for a payment of 150,000 francs. The weight of this debt excited the greatest discontent in Haiti. Boyer was able to carry on his government for some years longer, but in March 1843 a violent insurrection overthrew his power and compelled him to take refuge in Jamaica. He resided there till 1848, when he removed to Paris, where he died in 1850.

See Wallez, Precis kistorique des negociations entre la France et Saint-Domingue, avec une notice biographique sur le general Boyer (Paris, 1826).

BOYLE, JOHN J. (1851-), American sculptor, was born in New York City. He studied in the Pennsylvania Academy of Fine Arts, Philadelphia, and in the Ecole des Beaux Arts, Paris. He is particularly successful in the portrayal of Indians. Among his principal works are: " Stone Age," Fairmount Park, Philadelphia; "The Alarm," Lincoln Park, Chicago; and, a third study in primitive culture, the two groups, " The Savage Age " at the Pan-American Exposition of 1901. His work also includes the seated "Franklin," in Philadelphia; and "Bacon" and "Plato" in the Congressional library, Washington, D.C.

BOYLE, ROBERT (1627-1691), English natural philosopher, seventh son and fourteenth child of Richard Boyle, the great earl of Cork, was born at Lismore Castle, in the province of Munster, Ireland, on the 25th of January 1627. While still a child he learned to speak Latin and French, and he was only eight years old when he was sent to Eton, of which his father's friend, Sir Henry Wotton, was then provost. After spending over three years at the college, he went to travel abroad with a French tutor. Nearly two years were passed in Geneva; visiting Italy in 1641, he remained during the winter of that year in Florence, studying the " paradoxes of the great star-gazer " Galileo, who died within a league of the city early in 1642. Returning to

England in 1644 he found that his father was dead and had left him the manor of Stalbridge in Dorsetshire, together with estates in Ireland. From that time he gave up his life to study and scientific research, and soon took a prominent place in the band of inquirers, known as the " Invisible College," who devoted themselves to the cultivation of the " new philosophy." They met frequently in London, often at Gresham College; some of the members also had meetings at Oxford, and in that city Boyle went to reside in 1654. Reading in 1657 of Otto von Guericke's air-pump, he set himself with the assistance of Robert Hooke to devise improvements in its construction, and with the result, the " machina Boyleana " or " Pneumatical Engine," finished in 1659, he began a series of experiments on the properties of air. An account of the work he did with this instrument was published in 1660 under the title New Experiments Physico-Mechanical touching the spring of air and its effects. Among the critics of the views put forward in this book was a Jesuit, Fran- ciscus Linus (1595-1675), and it was while answering his objec- tions that Boyle enunciated the law that the volume of a gas varies inversely as the pressvire, which among English-speaking peoples is usually called after his name, though on the continent of Europe it is attributed to E. Mariotte, who did not publish it till 1676. In 1663 the " Invisible College " became the " Royal Society of London for improving natural knowledge," and the charter of incorporation granted by Charles II. named Boyle a member of the council. In 1680 he was elected president of the society, but declined the honour from a scruple about oaths. In 1668 he left Oxford for London where he resided at the house of his sister, Lady Ranelagh, in Pall Mall. About 1689 his health, never very strong, began to fail seriously and he gradually withdrew from his public engagements, ceasing his communications to the Royal Society, and advertising his desire to be excused from receiving guests, " unless upon occa- sions very extraordinary," on Tuesday and Friday forenoon, and Wednesday and Saturday afternoon. In the leisure thus gained he wished to " recruit his spirits, range his papers," and prepare some important chemical investigations which he proposed to leave " as a kind of Hermetic legacy to the studious disciples of that art," but of which he did not make known the nature. His health became still worse in 1691, and his death occurred on the 30th of December of that year, just a week after that of the sister with whom he had lived for more than twenty years. He was buried in the churchyard of St Martin's in the Fields, his funeral sermon being preached by his friend Bishop Burnet. Boyle's great merit as a scientific investigator is that he carried out the principles which Bacon preached in the Novum Organum. Yet he would not avow himself a follower of Bacon or indeed of

any other teacher: on several occasions he mentions that in order to keep his judgment as unprepossessed as might be with any of the modern theories of philosophy, till he was " provided of experiments " to help him Judge of them, he refrained from any study of the Atomical and the Cartesian systems, and even of the Novum Organum itself, though he admits to " transiently consulting " them about a few particulars. Nothing was more alien to his mental temperament than the spinning of hypotheses. He regarded the acquisition of knowledge as an end in itself, and in consequence he gained a wider outlook on the aims of scientific inquiry than had been enjoyed by his predecessors for many centuries. This, however, did not mean that he paid no attention to the practical application of science nor that he despised knowledge which tended to use. He himself was an alchemist; and believing the transmutation of metals to be a possibility, he carried out experiments in the hope of effecting it; and he was instrumental in obtaining the repeal, in 1689, of the statute of Henry IV. against multiplying gold and silver. With all the important work he accomplished in physics — the enunciation of Boyle's law, the discovery of the part taken by air in the propagation of sound, and investigations on the ex- pansive force of freezing water, on specific gravities and refractive powers, on crystals, on electricity, on colour, on hydrostatics, &c. — chemistry was his peculiar and favourite study. His first book on the subject was The Sceptical Chemist, published in 166 1,

in which he criticized the " experiments whereby vulgar Spagy- rists are wont to endeavour to evince their Salt, Sulphur and Mercury to be the true Principles of Things." For him chemistry was the science of the composition of substances, not merely an adjunct to the arts of the alchemist or the physician. He advanced towards the modern view of elements as the undecom- posable constituents 'of material bodies; and understanding the distinction between mixtures and compounds, he made considerable progress in the technique of detecting their in- gredients, a process which he designated by the term " analysis." He further supposed that the elements were ultimately com- posed of particles of various sorts and sizes, into which, however, they were not to be resolved in any known way. Applied chemistry had to thank him for improved methods and for an extended knowledge of individual substances. He also studied the chemistry of combustion and of respiration, and made experiments in physiology, where, however, he was hampered by the " tenderness of his nature " which kept him from anatomi- cal dissections, especially of living animals, though he knew them to be " most instructing."

Besides being a busy natural philosopher, Boyle devoted much time to theology, showing a very decided leaning to the practical side and an indifference to controversial polemics. At the Restoration he was favourably received at court, and in 1665 would have received the

provostship of Eton, if he would have taken orders; but this he refused to do, on the ground that his writings on religious subjects would have greater weight coming from a layman than a paid minister of the Church. He spent large sums in promoting the spread of Christianity, con- tributing liberally to missionary societies, and to the expenses of translating the Bible or portions of it into various languages. By his will he founded the Boyle lectures, for proving the Christian religion against " notorious infidels, viz. atheists, theists, pagans, Jews and Mahommedans," with the proviso that controversies between Christians were not to be mentioned.

In person Boyle was tall, slender and of a pale countenance. His constitution was far from robust, and throughout his life he suffered from feeble health and low spirits. While his scientific work procured him an extraordinary reputation among his contemporaries, his private character and virtues, the charm of his social manners, his wit and powers of conversation, en- deared him to a large circle of personal friends. He was never married. His writings are exceedingly voluminous, and his style is clear and straightforward, though undeniably prolix.

' The following are the more important of his works in addition to the two already mentioned : — Considerations touching the Usefulness of Experimental Natural Philosophy (1663), followed by a second part in 1671 ; Experiments and Considerations upon Colours, with Observations on a Diamond that Shines in the Dark (1663); New Experiments and Observations upon Cold (1665); Hydrostalical Paradoxes (1666); Origin of Forms and Qualities according to the Corpuscular Philosophy (1666); a continuation of his work on the spring of air (1669); tracts about the Cosmical Qualities of Things, the Temperature of the Subterraneal and Submarine Regions, the Bottom of the Sea, &c. with an Introduction to the History of Particular Qualities (1670) ; Origin and Virtues of Gems (1672) ; Essays of the strange Subtilty, great Efficacy, determinate Nature of Effluviums (1673) ; two volumes of tracts on the Saltness of the Sea, the Hidden Qualities of the Air, Cold, Celestial Magnets, Ayiimadversions on Hobbes's Problemata de Vacuo (1674) ; Experiments and Notes about the Mechanical Origin or Production of Particular Qualities, including some notes on electricity and magnetism (1676); Obser- vations upon an artificial Substance that Shines without any Preceding Illustration (1678); the Aerial Noctiluca (1680); New Experiments and Observations upon the Icy Noctiluca (1682) ; a further continua- tion of his work on the air; Memoirs for the Natural History of the Human Blood (1684) ; Short Memoirs for the Natural Experimental History of Mineral Waters (1685) ; Medicina Hydrostatica (1690) ; and Experimenta et Observationes Physicae (1691). Among his religious and philosophical writings were: — Seraphic Love, written in 1648, but not published till 1660; an Essay upon the Style of the Holy Scriptures (1663) ; Occasional Reflections upon

Several Subjects (1665), which was ridiculed by Swift in A Pious Meditation upon a Broomstick, and by Butler in An Occasional Reflection on Dr Charlton's Feeling a Dog's Pulse at Gresham College; Excellence of Theology compared with Natural Philosophy (1664); Some Considerations about the Reconcileableness of Reason and Religion, with a Discourse about the Possibility of the Resurrection (1675); Discourse

nf Things above Reason (1681) ; High Veneration Man owes to God (1685); A Free Inquiry into the vulgarly received Notion of Nature (1686) ; and the Christian Virtuoso (1690). Several other works appeared after his death, among them The General History of the Air designed and begun (1692); a " collection of choice remedies," Medicinal Experiments (1692-1698); and A Free Discourse against Customary Swearing (1695). An incomplete and unauthorized edition of Boyle's works was published at Geneva in 1677, but the first complete edition was that of Thomas Birch, with a life, pub- lished in 1744, in five folio volumes, a second edition appearing in 1772 in six volumes, 4to. Boyle bequeathed his natural history collections to the Royal Society, which also possesses a portrait of him by the German painter, Friedrich Kerseboom (1632-1690).

BOYLE, a market town of Co. Roscommon, Ireland, in the north parliamentary division, on the Sligo line of the Midland Great Western railway, 106J m. N.W. by W. from Dublin and 28 m. S. by E. from Sligo. Pop. (1901) 2477. It is beautifully situated on both banks of the river Boyle, an affluent of the Shannon, between Loughs Gara and Key. Three bridges connect the two parts of the town. There is considerable trade in agricur- tural produce. To the north of the town stand the extensive ruins of a Cistercian abbey founded in 1161, including remains of a cruciform church, with a fine west front, and Norman and Transitional arcades with carving of very beautiful detail. The offices of the monastery are well preserved, and an interesting feature is seen in the names carved on the door of the lodge, attributed in Cromwell's soldier, who occupied the buildings. Neighbouring antiquities are Asselyn church near Lough Key, and a large cromlech by the road towards Lough Gara. Boyle was incorporated by James I., and returned two members to the Irish parliament.

BOYNE, a river of Ireland, which, rising in the Bog of Allen, near Carbery in Co. Kildare, and flowing in a north-easterly direction, passes Trim, Navan and Drogheda, and enters the Irish Sea, 4 m. below the town last named. It is navigable for barges to Navan, 19 m. from its mouth. Much of

the scenery on its banks is beautiful, though never grand. About 2 m. west of Drogheda, an obelisk, 1 50 ft. in height, marks the spot where the forces of William III. gained a celebrated victory over those of James II., on the 1st of July 1 1690, known as the battle of the Boyne.

BOYS' BRIGADE, an organization founded in Glasgow by Mr (afterwards Sir) W. A. Smith in 1883 to develop Christian manliness by the use of a semi-military discipline and order, gymnastics, summer camps and religious services and classes. There are about 2200 companies connected with different churches throughout the United Kingdom, the British empire and the United States, with 10,000 officers and 100,000 boys. A similar organization, confined to the Anglican communion, is the Church Lads' Brigade. Boys' and girls' life brigades are a more recent movement; they teach young people how to save life from fire and from water, and hold classes in hygiene, ambulance and elementary nursing.

BOZDAR, a Baluch tribe of Rind (Arab) extraction, usually associated with the mountain districts of the frontier near Dera Ghazi Khan. They are also to be found in Zhob, Thal-Chotiali and Las Bela, whilst the majority of the population are said to live in the Punjab. They are usually graziers, and the name Bozdar is probably derived from Buz, the Persian name for goat. Within the limits of their mountain home on the outer spurs of the Suliman hills they have always been a turbulent race, mustering about 2700 fighting men, and they were formerly constantly at feud with the neighbouring Ustarana and Sherani tribes. In 1857 their raids into the Punjab drew upon them an expedi- tion under Brigadier-General Sir N. B. Chamberlain. The Sangarh pass was captured and the Bozdars submitted. Since Baluchistan has been taken over they have given but little trouble.

1 This was the " old style " date, which in the new style (see Calendar) would be July nth (not 12th, as Lecky says, Hist, of Ireland, iii. p. 427). The 12th of July is annually celebrated by the Orangemen in the north of Ireland as the anniversary, but this is a confusion between the supposed new style for July 1st and the old style date of the battle of Aughrim, July 12th; the intention being to commemorate both.

BOZRAH. (1) A capital of Edom (Gen. xxxvi. ZZ', Amos i. 12; Is. xxxiv. 6, Ixiii. 1), doubtfully identified with el-Buseireh, S.E. of the Dead Sea, in the broken country N. of Petra; the ruins here are comparatively unimportant. It is the centre of a pastoral district, and its inhabitants, who number between 100 and 200, are all shepherds. (2) A city in the Mishor or plain country of Moab, denounced by Jeremiah (xlviii. 24) . It has been identified (also questionably) with a very extensive collection of ruins of various ages, now called Bosra (the Roman Bostra), situated in the Hauran, about 80 m. south of Damascus. The area within the walls is

about ij m. in length, and nearly 1 m. in breadth, while extensive suburbs lie to the east, north and west. The principal buildings which can still be distinguished are a temple, an aqueduct, a large theatre (enclosed by a castle of much more recent workmanship), several baths, a triumphal and other arches, three mosques, and what are known as the church and convent of the monk Boheira. In a.d. 106 the city was beautified and perhaps restored from ruin by Trajan, who made it the capital of the new province of Arabia. In the reign of Alexander Severus it was made a colony, and in 244, a native of the place, Philippus, ascended the imperial throne. By the time of Con- stantine the Great it seems to have been Christianized, and not long after it was the seat of an extensive bishopric. It was one of the first cities of Syria to be subjected to the Mahommedans, and it successfully resisted all the attempts of the Crusaders to wrest it from their hands. As late as the 14th century it was a populous city, after which it gradually fell into decay. It is now inhabited by thirty or forty families only. Another suggested identification is with Kusur el-Besheir, equidistant (2 m.) from Dibon and Aroer. This is perhaps the same as the Bezer mentioned in Deuteronomy and Joshua as a levitical city and a city of refuge.

In 1 Mace. v. 26 there is mention of Bosor and of Bosora. The latter is probably to be identified with Bosra, the former perhaps with the present Busr el-Hariri in the south-east corner of the Leja. (R. A. S. M.)

BRABANT, a duchy which existed from 11 90 to 1430, when it was united with the duchy of Burgundy, the name being derived from Brabo, a semi-mythical Frankish chief.

The history of Brabant is connected with that of the duchy of Lower Lorraine (q.v.), which became in the course of the nth century split up into a number of small feudal states. The counts of Hainaut, Namur, Luxemburg and Limburg asserted their independence, and the territory of Liege passed to the bishop9 of that city. The remnant of the duchy, united since 1100 with the margraviate of Antwerp, was conferred in 1106 by the emperor Henry V., with the title of duke of Lower Lorraine, upon Godfrey (Godefroid) I., " the Bearded," count of Louvain and Brussels. His title was disputed by Count Henry of Limburg, and for three generations the representatives of the rival houses contested the possession of the ducal dignity in Lower Lorraine. The issue was decided in favour of the house of Louvain by Duke Godfrey III. in 1159. His son, Henry I., " the Warrior " (1183- 1 23 5) , abandoned the title of duke of Lower Lorraine and assumed in 1 190 that of duke of Brabant. His successors were Henry II., " the Magnanimous " (1235-1248), Henry III., " le Debonnair " (1248-1261), and John I., "the Victorious" (1261-1294). These were all able rulers. Their usual place of residence was Louvain. John I., in 1283

bought the duchy of Limburg from Adolf of Berg, and secured his acquisition by defeat- ing and slaying his competitor, Henry of Luxemburg, at the battle of Woeringen (June 5, 1288). His own son, John II., " the Pacific " (1294-1312), bestowed liberties upon his subjects by the charter of Cortenberg. This charter laid the foundation of Brabantine freedom. By it the imposition of grants (beden) and taxes was strictly limited and regulated, and its execution was entrusted to a council appointed by the duke for life (four nobles, ten burghers) whose duty it was to consider all com- plaints and to see that the conditions laid down by the charter concerning the administration of justice and finance were not infringed. He was succeeded by his son, John III., " the Triumphant" (1312-1355), who succeeded in maintaining his position in spite of formidable risings in Louvain and Brussels,

and a league formed against him by his princely neighbours, but he had a hard struggle to face, and many ups and downs of fortune. He it was to whom Brabant owed the great charter of its liberties, called Lajoyeuse entree, because it was granted on the occasion of the marriage of his daughter Johanna (Jeanne) with Wenzel (Wenceslaus) of Luxemburg, and was proclaimed on their state entry into Brussels (1356).

Henry, the only legitimate son of John III., having died in 1349, the ducal dignity passed to his daughter and heiress, the above-named Johanna (d. 1406). She had married in first wed- lock William IV., count of Holland (d. 1345). Wenzel of Luxem- burg, her second husband, assumed in right of his wife, and by the sanction of the charter Lajoyeuse entree, the style of duke of Brabant. Johanna's title was, however, disputed by Louis II., count of Flanders (d. 1384), who had married her sister Margaret. The question had been compromised by the cession to Margaret in 1347 of the margraviate of Antwerp by John III., but a war broke out in 1356 between Wenzel supported by the gilds, and Louis, who upheld the burgher-patrician party in the Brabant cities. The democratic leaders were Everhard Tserclaes at Brussels and Peter Coutercel at Louvain. In the course of a stormy reign Wenzel was taken prisoner in 1371 by the duke of Gelderland, and had to be ransomed by his subjects. After his death (1383) his widow continued to rule over the two duchies for eighteen years, but was obliged to rely on the support of the house of Burgundy in her contests with the turbulent city gilds and with her neighbours, the dukes of Jiilich and Gelderland. In 1390 she revoked the deed which secured the succession to Brabant to the house of Luxemburg, and appointed her niece, Margaret of Flanders (d. 1405) , daughter of Louis II. and Margaret of Brabant (see Flanders), and her

husband, Philip the Bold of Burgundy, her heirs. Margaret of Flanders had married (1) Philip I. de Rouvre of Burgundy (d. 1361) and (2) Philip II., the Bold, (d. 1404), son of John II., king of France (see Burgundy). Of her three sons by her second marriage John succeeded to Burgundy, and Anthony to Brabant on the death of Johanna in 1406. Anthony was killed at the battle of Agincourt in 1415 and was succeeded by his eldest son by Jeanne of Luxemburg St Pol, John IV. (d. 1427). He is chiefly memorable for the excitement caused by his divorce from his wife Jacoba {q.v.), countess of Holland. John IV. left no issue, and the succession passed to his brother Philip I., who also died without issue in 1430.

On the extinction of the line of Anthony the duchy of Brabant became the inheritance of the elder branch of the house of Burgundy, in the person of Philip III., " the Good," of Burgundy, II. of Brabant, son of John. His grand-daughter Mary (d. 1482), daughter and heiress of Charles I., " the Bold," (d. 1477) married the archduke Maximilian of Austria (afterwards emperor) and so brought Brabant with the other Burgundian possessions to the house of Habsburg. The chief city of Brabant, Brussels, became under the Habsburg regime the residence of the court and the capital of the Netherlands. In the person of the emperor Charles V. the destinies of Brabant and the other Netherland states were linked with those of the Spanish monarchy. The attempt of Philip H. of Spain to impose despotic rule upon the Netherlands led to the outbreak of the Netherland revolt, 1 568 (see Netherlands).

In the course of the eighty years' war of independence the province of Brabant became separated into two portions. In the southern and larger part Spanish rule was maintained, and Brussels continued to be the seat of government. The northern (smaller) part was conquered by the Dutch under Maurice and Frederick Henry of Orange. The latter captured 's Hertogenbosch (1629), Maastricht (1632) and Breda (1637). At the peace of Munster this portion, which now forms the Dutch province of North Brabant, was ceded by Philip IV. to the United Provinces and was known as Generality Land, and placed under the direct government of the states-general. The southern portion, now divided into the provinces of Antwerp and South Brabant, remained under the rule of the Spanish Habsburgs until the death of Charles II., the last of his race in 1700. After the War of the Spanish Succession the southern Netherlands

passed by the treaty of Utrecht (17 13) to the Austrian branch of the Habsburgs. During the whole period of Austrian rule the province of Brabant succeeded in maintaining, to a very large extent unimpaired, the immunities and privileges to which it was entitled under the provisions of its ancient charter of liberty, the Joyous Entry. An ill-judged attempt by the emperor Joseph II., in his zeal for reform, to infringe these inherited rights

stirred up the people under the leadership of Henry van der Noot to armed resistance in the Brabancon revolt of 1 789-1 790.

Since the French conquest of 1794 the history of Brabant is merged in that of Belgium (q.v.). The revolt against Dutch rule in 1830 broke out at Brussels and was in its initial stages largely a Brabancon movement. The important part played by Brabant at this crisis of the history of the southern Nether- lands was marked in 1831 by the adoption of the ancient Brabancon colours to form the national flag, and of the lion of Brabant as the armorial bearings of Belgium. The title of duke of Brabant has been revived as the style of the eldest son of the king of the Belgians. (G. E.)

BRABANT, the central and metropolitan province of Belgium, is formed out of part of the ancient duchy. From 1815 to 1830, that is to say, during the existence of the kingdom of the Nether- lands, Belgian Brabant was distinguished from Dutch by the employment of the geographical terms South and North. The surface of Brabant is undulating, and the highest points, some 400 ft. in altitude, are to be found at and near Mont St Jean. The province is well cultivated, and the people are well known for their industry. There are valuable stone quarries, and many manufactures flourish in the smaller towns, such as Ottignies, as well as in the larger cities of Brussels and Louvain. Brabant contains 820,740 acres or 1268 sq. m. Its principal towns are Brussels, Louvain, Nivelles, Hal, Ottignies, and its three adminis- trative divisions are named after the first three of those towns. They are subdivided into 50 cantons and 344 communes. In 1904 the population of the province was 1,366,389 or a proportion of 1077 per sq.m.

BRABANT, NORTH, the largest province in Holland, bounded S. by Belgium, W. and N.W. by the Scheldt, the Eendracht, the Volkerak and the Hollandsch Diep, which separate it from Zealand and South Holland, N. and N. E. by the Merwede and Maas, which separate it from South Holland and Gelderland, and E. by the province of Limburg. It has an area of 231 sq.m. and a pop. (1900) of 553,842. The surface of the province is a gentle slope from the south-east (where it ranges between 80 and 160 ft. in height) towards the north and north? west, and the soil is composed of diluvial sand, here and there mixed with gravel, but giving place to sea-clay along the western boundary and river-clay along the banks of the Maas and smaller rivers. The watershed is formed by the north-eastern edge of the Belgian plateau of Campine, and follows a curved line drawn through Bergen-op-Zoom, Turnhout and Maastricht. The land- scape consists for the most part of waste stretches of heath, occasionally slightly overlaid with high fen. Between the valleys of the Aa and the Maas lies the long stretch of heavy high-fen called the Peel (" marshy land "). Deurne, a few miles east of Helmond, the site of a prehistoric burial-ground, was an early fen

colony. The work of reclamation was removed farther eastwards to Helena veen in the second half of the 19th century. Agriculture (potatoes, buckwheat, rye) is the main industry, generally combined with cattle-raising. On the clay lands wheat and barley are the principal products, and in the western corner of the province beetroot is largely cultivated for the beet sugar industry, factories being found at Bergen-op-Zoom, Steenbergen and Oudenbosch. There is a special cultivation of hops in the district north-west of 's Hertogenbosch. The large majority of the population is Roman Catholic. The earliest de- velopment of towns and villages took place along the river Maas and its tributaries, and the fortified Roman camps which were the origin of ma.ny such afterwards developed in the hands of feudal lords. The chief town of the province, 's Hertogenbosch, may be cited as an interesting historical example. Geertruidenberg,

Heusden, Ravestein and Grave are all similarly situated. Breda is the next town in importance to the capital. Bergen-op- Zoom had originally a more maritime importance. Rozendaal, Eindhoven and Bokstel (or Boxtel) are important railway junctions. Bokstel was formerly the seat of an independent barony which came into the possession of Philip the Good in 1439. The castle was restored in modern times. The precarious position of the province on the borders of the country doubtless militated against an earlier industrial development, but since the separation from Belgium and the construction of roads, railways and canals there has been a general improvement, Tilburg, Eindhoven and Helmond all having risen into prominence in modern times as industrial centres. Leather- tanning and shoe-making are especially associated with the district called Langstraat, which is situated between Geert- ruidenberg and 's Hertogenbosch, and consists of a series of industrial villages along the course of the Old Maas.

BRACCIANO, a town in the province of Rome, Italy, 25 m. N.W. of Rome by rail, situated on the S.W. shore of the Lake of Bracciano, 915 ft. above sea-level. Pop. (1901) 3987. It is chiefly remarkable for its fine castle (built by the Orsini in 1460, and since 1696 the property of the Odescalchi) which has pre- served its medieval character. The beautiful lake is the ancient Lacus Sabatinus, supposed to derive its name from an Etruscan city of the name of Sabate, which is wrongly thought to be mentioned in the Itineraries; the reference is really to the lake itself, which bore this name and gave it to one of the Roman Iribes, the tribus Sabatina, founded in 387 B.C. (O. Cuntz in Jahreshefte dcs Osterr. Arch. InstUuts, ii., 1899, 85). It is 22 sq.m. in area, 538 ft. above sea-level, and 530 ft. deep; it is almost circular, but is held to be, not an extinct crater, but the

result of a volcanic subsidence. The tufa deposits which radiate from it extend as far as Rome; various small craters surround it, while the existence of warm springs in the district (especially those of Vicarello, probably the ancient Aquae Apollinares) may also be noted. Many remains of ancient villas may be seen round the lake: above its west bank is the station of Forum Clodii, and on its north shore the village of Trevignano, which retains traces of the fortifications of an ancient town of unknown name. About half-a-mile east of it was a post station called Ad Novas. The site of Anguillara, on the south shore, was occupied by a Roman villa. The water of the lake partly supplies the Acqua Paola, a restoration by Paul V. of the Aqua Traiana. (T. As.)

BRACCIOLINI, FRANCESCO (1566-1645), Italian poet, was born at Pistoia, of a noble family, in 1566. On his removing to Florence he was admitted into the academy there, and devoted himself to literature. At Rome he entered the service of Cardinal Maffeo Barberini, with whom he afterwards went to France. After the death of Clement VIII. he returned to his own country; and when his patron Barberini was elected pope, under the name of Urban VIII. , Bracciolini repaired to Rome, and was made secretary to the pope's brother, Cardinal Antonio. He had also the honour conferred on him of taking a surname from the arms of the Barberini family, which were bees; whence he was after- wards known by the name of Bracciolini dell' A pi. During Urban's pontificate the poet lived at Rome in considerable reputation, though at the same time he was censured for his sordid avarice. On the death of the pontiff he returned to Pistoia, where he died in 1645. There is scarcely any species of poetry, epic, dramatic, pastoral, lyric or burlesque, which Bracciolini did not attempt; but he is principally noted for his mock-heroic poem Lo Scherno degli Dei, published in 1618, similar but confessedly inferior to the contemporary work of Tassoni, Secchia Rapita. Of his serious heroic poems the most celebrated is La Croce Racquistata.

For the Italian humanist Poggio Bracciolini see Poggio.

BRACE, CHARLES LORING (1826-1890), American philan- thropist, was born on the 19th of June 1826 in Litchfield, Con- necticut. He graduated at Yale in 1846, studied theology there in 1847-1848, and graduated from Union Theological Seminary in 1849. From this time he practically devoted his life to social

work among the poor of New York, and to Christian propaganda among the criminal classes; and he became well known as a social reformer, at home and abroad. He started in 1852 to hold " boys' meetings," and in 1853 helped to found the Children's Aid Society, establishing workshops, industrial schools and lodging-houses for newsboys. In 1872 he was a

delegate to the international prison congress which met in London. He died at Campfer, in Tirol, on the nth of August 1890. He published from time to time several volumes embodying his views on practical Christianity and its application to the improvement of social conditions.

See The Life and Letters of Charles Loring Brace (New York, 1894), edited by his daughter, Emma Brace.

BRACE, JULIA (1806-1884), American blind deaf-mute, was born at Newington, Connecticut, on the 13th of June 1806. In her fifth year she became blind and deaf, and lost the power of speech. At the age of eighteen she entered the asylum for the deaf and dumb at Hartford. The study of blind deaf-mutes and their scientific training was then in its infancy; but she learnt to sew well, was neat in her dress, and had a good memory. Dr S. G. Howe's experiments with her were interesting as leading to his success with Laura Bridgman. She died at Bloomington, Conn., on the 12th of August 1884.

BRACE (through the Fr. from the plural of the Lat. bracchium, the arm), a measure of length, being the distance between the extended arms. From the original meaning of " the two arms " comes that of something which secures, connects, tightens or strengthens, found in.numerous uses of the word, as a carpenter's tool with a crank handle and socket to hold a bit for boring; a beam of wood or metal used to strengthen any building or machine; the straps passing over the shoulders to support the trousers; the leathern thong which slides up and down the cord of a drum, and regulates the tension and the tone; a writing and printing sign ({) for uniting two or more lines of letterpress or music; a nautical term for. a rope fastened to the yard for trim- ming the sails (cf. the corresponding French term bras de vergue). As meaning " a couple " or " pair " the term was first applied to dogs, probably from the leash by which they were coupled in coursing. In architecture " brace mould " is the term for two ressaunts or ogees united together like a brace in printing, sometimes with a small bead between them.

BRACEGIRDLE, ANNE (c. 1674-1748), English actress, is said to have been placed under the care of Thomas Betterton and his wife, and to have first appeared on the stage as the page in The Orphan at its first performance at Dorset Garden in 1680. She was Lucia in Shadwell's Squire of Alsalia at the Theatre Royal in 1688, and played similar parts until, in 1693, as Araminta in The Old Bachelor, she made her first appearance in a comedy by Congreve, with whose works and life her name is most closely connected. In 1695 she went with Betterton and the other seceders to Lincoln's Inn Fields, where, on its opening with Congreve's Love for Love, she played Angelica. This part, and those of Belinda in Vanbrugh's

Provoked Wife, and Almira in Congreve's Mourning Bride, were among her best impersonations, but she also played the heroines of some of Nicholas Rowe's tragedies, and acted in the contemporary versions of Shakespeare's plays. In 1705 she followed Betterton to the Haymarket, where she found a serious competitor in Mrs Oldfield, then first coming into public favour. The story runs that it was left for the audience to determine which was the better comedy actress, the test being the part of Mrs Brittle in Betterton's Amorous Widow, which was played alternately by the two rivals on successive nights. When the popular vote was given in favour of Mrs Oldfield, Mrs Bracegirdle quitted the stage, making only one reappearance at Betterton's benefit in 1709. Her private life was the subject of much discussion. Colley Cibber remarks that she had the merit of " not being unguarded in her private character," while Macaulay does not hesitate to call her " a cold, vain and interested coquette, who perfectly understood how much the influence of her charms was increased by the fame of a severity which cost her nothing." She was certainly the object of the adoration of many men,

■*and she was the innocent cause of the killing of the actor William Mountfort (q.v.), whom Captain Hill and Lord Mohun regarded as a rival for her affections. During her lifetime she was sus- pected of being secretly married to Congreve, whose mistress she is also said to have been. He was at least always her intimate friend, and left her a legacy. Rightly or wrongly, her reputation for virtue was remarkably high, and Lord Halifax headed a subscription list of 800 guineas, presented to her as a tribute to her virtue. Her charity to the poor in Clare Market and around Drury Lane was conspicuous, " insomuch that she would not pass that neighbourhood without the thankful acclamations of people of all degrees." She died in 1748, and was buried in the cloisters of Westminster Abbey.*

See Genest, History of the Stage; Colley Cibber, Apology (edited by Bellchambers) ; Egerton, Life of Anne Oldfield; Downes, Roscius Anglicanus.

BRACELET, or Armlet, a personal ornament for the arm or wrist, made of different materials, according to the fashion of the age and the rank of the wearer. The word is the French bracelet, a diminutive of bracel, from brac©kiale, formed from the Latin bracchium, the arm, on which it was usually worn. By the Romans it was called armilla, brachiale, occabus; and in the middle ages bauga, armispatha.

In the Bible there are three different words which the authorized version renders by " bracelet." These are — (1) rnyss 'es'adah, which occurs in Num. xxxi. 50, 2 Sam. i. 10, and which being used with reference to men only, may be taken to be the armlet; (2) tbs samid, which is found in Gen. xxiv. 22, Num. xxxi. 50, Ezek. xvi. 1 1 ; — where these two words occur together (as in Num. xxxi. 50) the first is rendered by " chain," and the second by " bracelet "; (3) tme sheroth, which occurs only in Isa. iii. 19. The first probably meant armlets worn by men; the second, bracelets worn by women and sometimes by men; and the third a peculiar bracelet of chain-work worn only by women.

tfrom La Grande Encyclopedic.

Fig. 1. — Egyptian Bracelet, Louvre.

In 2 Sam. i. 10 the first word denotes the royal ornament which the Amalekite took from the arm of the dead Saul, and brought with the other regalia to David. There is little question that this was sueh a distinguishing band of jewelled metal as we still find worn as a mark of royalty from the Tigris to the Ganges. The Egyptian kings are represented with armlets, which were also worn by the Egyptian women. These, however, are not jewelled, but of plain or enamelled metal, as was in all likelihood the case among the Hebrews.

In modern times the most celebrated armlets are those which form part of the regalia of the Persian kings and formerly

belonged tO the Mogul emperors of India, From La Grande Encyclopedic

being part of the spoil carried to Persia from Delhi by Nadir Shah in 1739. These ornaments are of dazzling splendour, and the jewels in them are of such large size and immense value that the pair have been reckoned to be worth a million sterling. The principal stone of the right armlet is famous in the East under the name of the Darya-i-nur, " sea (or river) of light." It weighs 186 carats,

and is considered the diamond of finest lustre in the world. The principal jewel of the left armlet, although of somewhat inferior size (146 carats) and value, is renowned as the Taj-e-mah, "crown of the moon." The imperial armlets, generally set with jewels, may also be observed in most of the portraits of the Indian emperors.

Bracelets have at all times been much in use among barbaric nations, and the women frequently wear several on the same arm. The finer kinds are of mother-of-pearl, fine gold or silver; others of less value are made of plated steel, horn, brass, copper, beads, &c. Chinese bracelets are sometimes cut

out of single pieces of jade.

This species of personal ornament has been exceedingly common in Europe from prehistoric times onward. The bracelets of the Bronze Age were of either gold or bronze, silver being then unknown. In shape they were oval and penannular with expanding or trumpet-shaped ends, having an opening between them of about half an inch to enable them to be easily slipped over the wrist. Those of gold were generally plain, hammered rods, bent to the requisite shape, but those of bronze were often chased with decorative designs. Some forms of spiral armlets of bronze, peculiar to Germany and Scandinavia, covered the whole fore-arm, and were doubtless intended as much for defence against a sword-stroke as for ornament. Among the nations of classical antiquity, bracelets were worn by both sexes of the Etruscans; by Women only among the Greeks, except in orientalized communities. Among the Romans they were worn by women only as a rule, but they are also recorded to have been used during the empire by nouveaux riches, and by some of the emperors. It should also be mentioned that bracelets were conferred as a military decoration in the field.

The bracelets of the Greeks are of two leading types, both of which were also familiar to the Assyrians. The one class were in the form of coiled spirals, usually in the form of snakes, a term which Pol- lux gives as a syn- onym for bracelet. The other class were stiff pen- annular hoops, capable of being slightly opened. In such examples the terminals are finely finished as rams' heads, lions' heads, or (as in theaccom- panying figure from a bracelet _ T r , _, ...

- _, „ . From La Grande Encyclopedia.

tound at K.ul- FlG 2 ._ Greek Bracelet, Hermitage.

oba) as enamelled

sphinxes. In late Etruscan art the bracelet may be formed of

consecutive panels, as often in modern jewelry.

The spiral forms were common in the Iron Age of northern Europe, while silver bracelets of great elegance, formed of plaited and intertwisted strands of silver wire, and plain penannular

Fig. 3. — Etruscan Bracelet, Louvre, hoops, round or lozenge-shaped in section and tapering to the ex- tremities, became common towards the close of the pagan period. The late Celtic period in Britain was characterized by serpent- shaped bracelets and massive armlets, with projecting ornaments of solid bronze and perforations filled with enamel. In the middle ages bracelets were much less commonly used in Europe,

but the custom has continued to prevail among Eastern nations to the present time, and many of the types that were common in Europe in prehistoric times are still worn in central Asia.

A treatise, DeArmillis Veterum, by Thomas Bartholinus, was published at Amsterdam in 1676.

BRACHIOPODA, an important and well-defined but extremely isolated class of invertebrates. The group may be defined as follows: Sessile solitary Coelomata with bivalved shells usually of unequal size and arranged dorso-ventrally. The head is produced into ciliated arms bearing tentacles. They reproduce sexually, and with doubtful exceptions are of separate sexes.

The name Brachiopod (fipaxiuv, an arm, and irovs, iroSos, a foot) was proposed for the class by F. Cuvier in 1805, and by A. M. C. Dumeril in 1809, and has since been very extensively adopted. The division of the group into Ecardines (Inarticulata),

Figs. i-ii. — Various forms of Brachiopoda.

1. Magellania [Waldheimia] 7.

cranium. A, ventral, B, dorsal valve. 8.

2. Rhynchonella (Hemithyris) 9.

psittacea. 3 and 4. Thecidea. 10.

5. Spirifer. Dorsal valve, 11.

showing calcareous spiral coils.

6. Orthis calligramma.

A,

Leptaena transversalis. ventral, B, dorsal valve.

Productus horridus.

Lingula pyramidata, (after Morse).

Discinisca lamettosa.

Crania anomala. Interior of dorsal valve, showing mus- cular impressions and labial appendages.

with no hinge to the shell and with an alimentary canal open at both ends, and Testicardines (Articulata) , with a hinge between the dorsal and ventral valves and with no anus, was proposed by Owen and has been adopted by nearly all authors. In a later scheme based on bur increased knowledge of fossil forms, the Brachiopoda are divided into four primary groups (orders). This is given at the end of the article, but it must not be forgotten that the existing forms with an anus (Ecardines) differ markedly from the aproctous members of the group T (Testicardines).

The soft body of the Brachiopod is in all cases protected by a shell composed of two distinct valves; these valves are always, except in cases of malformation, equal-sided, but not equivalved. The valves are, consequently, essentially symmetrical, which is not the case with the Lamellibranchiata, — so much so, that certain Brachiopod shells were named Lampades, or lamp shells, by some early naturalists; but while such may bear a kind of

resemblance to an antique Etruscan lamp, by far the larger number in no way resemble one. The shell is likewise most beautiful in its endless shapes and variations. In some species it is thin, semi-transparent and glassy, in others massive. Genets ally the shell is from a quarter of an inch to about 4 in. in size,, but in certain species it attains nearly a foot in breadth by some., thing less in length, as is the case with Productus giganteus. The valves are also in some species very unequal in their respective thickness, as may be seen in Productus (Daviesiella) 1 llangollensis, Davidsonia verneuilii, &c, and while the space allotted to the animal is very great in many species, as in Terebratula sphaeroi- dalis, it is very small in others

belonging to Strophomena, Leptaena, Chonetes, &c. The ventral valve is usually the thickest, and in some forms is six or seven times as great as the opposite one. The outer surface of many of the species presents likewise the most exquisite sculpture, heightened by brilliant shades, or spots of green, red, yellow and bluish black. Traces of the original colour have also been preserved in some of the fossil forms; radiating bands of a reddish tint have been often seen in well- preserved examples of Terebratula (Dielasma) hastata, T, (Die- lasma) sacculus, T. communis, T. biplicata, and of several others. Some specimens of T. cornea are of a beautiful pale pink colour when first removed from their matrix, and E. Deslongchamps has described the tint of several Jurassic species.

The valves are distinguished as dorsal and ventral. The ventral valve is usually the larger, and in many genera, such as Tere- bratula and Rhynchonella, has a prominent beak or umbo, with a circular or otherwise shaped foramen at or near its extremity, partly bounded by one or two plates, termed a. deltidium. Through the foramen passes a peduncle, by which the animal is in many species attached to submarine objects during at least a portion of its existence. Other forms show no indication of ever having been attached, while some that had been moored by means of a peduncle during the early portion of their existence have become detached at a more advanced stage of life, the opening becoming gradually cicatrized, as is so often seen in Leptaena rhomboidalis, Orthisina anomala, &c. Lastly, some species adhere to submarine objects by a larger or smaller portion of their ventral valve, as is the case with many forms of Crania, Thecidium, Davidsonia, &c. Some Cranias are always attached by the whole surface of their lower or ventral valve, which models itself and fills up all the projections or depressions existing on either the rock, shell or coral to which it adhered. These irregularities are likewise, at times, reproduced on the upper or dorsal valve. Some species of Strophalosia and Pro- ductus seem also to have been moored during life to the sandy or muddy bottoms on which they lived, by the means of tubular spines often of considerable length. The interior of the shell varies very much according to families and genera. On the inner surface of both valves several well-defined muscular, vascular and ovarian impressions are observable; they form either indentations of greater or less size and depth, or occur as variously shaped projections. In the T rimer ellidae, for example, some of the muscles are attached to a massive or vaulted platform situated in the medio-longitudinal region of the pbsterior half or umbonal portion of both valves. In addition to these, there exists in the interionof the dorsal valve of some genera a variously modified, thin, calcified, ribbon-shaped skeleton for the support of the ciliated arms, and the form of this ribbon serves as one of the chief generic characters of both recent and extinct forms. This brachial skeleton is more developed in some genera than in others. In

certain forms, as in Terebratula and Terebratulina, it is short and simple, and attached to a small divided hinge- plate, the two riband-shaped lamina being bent upwards in the middle (fig. 15). The cardinal process is prominent, and on each side of the hinge-plate are situated the dental sockets; the loop in Terebratulina becomes annular in the adult by the union of its crural processes (fig. 16). In Magellania [Waldheimia] it is elongated and reflected; the hinge-plate large, with four depressions, under which originates a median septum, which extends more or less into the interior of the shell (figs. 13 and 14). . 1 Subgenera are indicated by round, synonyms by square brackets.

In Terebratdla the loop is attached to the hinge-plate and to the septum (fig. 17). In Megerlia it is three times attached, first to the hinge-plate, and then to the septum by processes from the diverging and reflected positions of the loop. In Magas the brachial skeleton is .composed of an elevated longitudinal sep- tum reaching from one valve to the other, to which are affixed two pairs of calcareous lamellae, the lower ones riband-shaped; attached first to the hinge-plate, they afterwards proceed by a gentle curve near to the anterior portion of the septum, to the sides of which they are affixed; the second pair originate on both sides of the upper edge of the septum, extending in the form of two triangular anchor-shaped lamellae (fig. 18). In Bouchardia the septum only is furnished with two short anchor-shaped lamellae. Many more modifications are observable in different groups of which the great family Terebratulidae is composed. In Thecidium (figs. 3, 4) the interior of the dorsal valve is variously furrowed to receive the lophophore folded in two or more lobes.

Figs. 12-18.

Magellania [Waldheimia] flavescens. Interior of ventral valve, /.foramen; d, deltidium; t, teeth; a, adductor impressions (= occlusors, Hancock); c, divaricator (= cardinal muscles, King, = muscles diducteurs principaux, Gratiolet) ; c', accessory divaricators (muscles diducteurs accessoires, Gratiolet) ; b, ventral adjuster (= ventral peduncular muscles, or muscles du pedoncule paire superieure, Gratiolet) ; b', peduncular muscle.

Magellania [Waldheimia\ flavescens. Interior of dorsal valve. c, c', cardinal process; b', b', hinge-plate; s, dental sockets; I, loop; a, crura; a, a', adductor impressions; c, accessory divaricator; b, peduncle muscles; s.s, septum.

Magellania [Waldheimia] flavescens. Longitudinal section of valves. A, ventral, B, dorsal valves; /, loop; q, crura; ss, septum; c, cardinal process.

Terebratula (Liothyris) vitrea. Interior of dorsal valve. /, loop ; b, hinge-plate; c, cardinal process.

16. Loop of Terebratulina caput serpentis.

17. Longitudinal section of Terebratella dorsata. (References as in

fig. 1 4-)

18. Longitudinal section of Magas pumilus.

In the family Spiriferidae there are two conical spires directed outwards, and nearly filling the cavity of the shell (fig. 5); while in A try pa the broad spirally coiled lamellae are vertical, and directed toward the centre of the dorsal valve. In the

13

14.

15

Rhynchonellidae there are two short slender curved laminae, while in many genera and even families, such as the Productidae, Slrophomenidae, Lingtdidae, Discinidae, &c, there exists no calcified support for the labial appendages. The ventral valve in many of the genera is provided with two curved hinge-teeth, which fit into corresponding sockets in the opposite valve, so that the valves cannot be separated without breaking one of the teeth.

Each valve of the shell is lined by a mantle which contains pro- longations of the body cavity. The outer surfaces of the mantle secrete- the shell, which is of the nature of a cuticle impregnated by calcareous salts. These often have the form of prisms of calcite surrounded by a cuti- cular mesh work; the whole is nourished and kept alive by processes, which in Crania are branched ; these per- forate the shell and permit the access of the coelomic fluid through- out its substance. These canals are closed ex- ternally and are absent in ‘ Rhynchonella, where the amount of calca- reous deposit is small. In Lingida the shell is composed of alternate layers of chitin and of phosphate of lime. The free edges of the mantle often bear chitinous bristles or setae which project beyond the shell. As in the case of the adult is not a direct

the larva. The young Brachiopod in all protected by an embryonic shell called the which sometimes persists in the umbones of the adult shells but is more usually worn off. In all species it has the same shape, a shape which has been retained in the adult by the Lower Cambrian genus Iphidea.

The body of the Brachiopod usually occupies about the posterior half of the space within the shell. The an- terior half of this space is lined by the inner wall of the mantle and is called the mantle cavity. This cavity lodges the arms, which are curved and coiled in differ- ent ways in different genera. The water which bears the oxygen for respiration and the minute organisms upon which the Brachiopod feeds is swept into the mantle cavity by the action of the cilia which cover the arms, and the eggs and excreta pass out into the same cavity. The mouth lies in the centre of the anterior wall of the body. Its two lips fusing together at the corners of the mouth are prolonged into the so- called arms. These arms, which together form the lophophore,

Fig. 19. — Magellania [Waldheimia] flavescens. Interior of dorsal valve, to show the position of the labial ap- pendages, v, Mouth. (A portion of the fringe of cirri is removed to show the brachial membrane and a portion of the spiral extremities of the arms.)

Lamellibranchiata, the shell of the derivative of the youngest shell of its species is " protegulum,"

Fig. 20. — Magellania [Wald heimia] flavescens. Longitudinal section with a portion of the animal.

d, h, Brachial appendages. a, Adductor.

c, c', Divaricator muscles, s, Septum. v, Mouth. 2, Extremity of alimentary tube.

The peduncular muscles have been purposely omitted.

may be, as in Cisiella, applied flat to the inner surface of the dorsal mantle fold, but more usually they are raised free from the body like a pair of moustaches, and as they are usually far too long to lie straight in the mantle cavity, they are folded or coiled up. The brachial skeleton which in many cases supports the arms has been mentioned above.

A transverse section through the arm (fig. 22) shows that it consists of a stout base, composed of a very hyaline connective tissue not uncommon in

the tissues of the Brachiopoda, which is traversed by certain canals whose nature is considered below under the section {The Body Cavity) devoted to the coelom. Anteriorly this base supports a gurrie or gutter, the pre-oral rim of which is formed by a simple lip, but the post-oral rim is composed of a closely set row of tentacles. These may number

some thousands, and they are usually bent over and tend to form a closed cylinder of the gutter. Each of these tentacles (fig. 22) is hollow, and it contains a diverticulum from the coelom, a branch of the vascular system, a nerve and some muscle- fibres. Externally on fwo sides and on the inner surface the tentacles are ciliated, and the cilia are continued across the gutter to the lip and even on the outer surface of the latter. These cilia pass on any diatoms and other minute organism which come within their range of action to the capacious oval mouth, which appears as a mere deepening of the gutter in the middle line. In Terebratulina, Rhyn- chonella, Lingida, and possibly other genera, the arms can be unrolled and protruded ‘ from the opened shell; in this case the tentacles also

„ . ,. r .v , r,. t. u straighten themselves and

Fig. 21. — A diagram of the left halt , . . ,, „„„ <.„.

of an Argiope (M?gathyris) , which has wave about m the water. been bisected in the median plane. The Body Cavity. — The

I. The ventral valve. various internal organs cf

The dorsal valve. the brachiopod body, the

The pedicle. alimentary canal and liver,

The mouth. the excretory organs, the

Lip which overhangs the mouth heart, numerous muscles and runs all round thelophophore. and the reproductive Tentacles. organs, are enclosed in a

Ovary in dorsal valve. cavity called the body

8. Liver diverticula. cavity, and since this cavity

9. Occlusor muscle— its double origin (i.) is derived from the

is shown. archicoel and is from the

10. Internal opening of left nephridium. first surrounded by mero-

11. External opening of the same. blast, (ii.) communicates

12. Ventral adjustor. ■ with the exterior through

13. Divaricator muscle. the nephridia or excretory

14. Sub-oesophageal nerve ganglion. organs, and (iii.) gives rise

15. The heart. by the proliferation of the

16. Dorsal adjustor muscle. cells which line it to _ the

ova and spermatoza, it is of the nature of a true coelom. The coelom then is a spacious chamber surrounding the alimentary canal, and is continued dorsally and ven- trally into the sinuses of the mantle (fig. 21). Some of the endothelial cells lining the coelom are ciliated, the cilia keeping the corpusculated fluid contents in movement. Others of the endothelial cells show a great tendency to form muscle fibres. Besides this main coelomic cavity there are certain other spaces which F. Blochmann regards as coelomic, but it must be rememtaered that his interpretation rests

2. 3- 4- 5-

6. 7-

largely on histological grounds, and at present embryological con- firmation is wanting. These spaces are as follows: — (i.) the great arm-sinus; (ii.) the small arm-sinus together with the central sinus and the peri-oesophageal sinus, and in Discinisca and Lingula, and, to a less extent, in Crania, the lip-sinus; (iii.) certain portions of the general body cavity which in Crania are separated off and contain muscles, &c. ; (iv.) the cavity of the stalk w"hen such exists. The great arm-sinus of each side of the lophophore lies beneath the fold or lip which together with the tentacles forms the ciliated groove in which the mouth opens. These sinuses are completely shut off from all other cavities, they do not open into the main coelomic space nor into the small arm-sinus, nor does the right sinus com- municate with the left. The small arm-sinus runs along the arms of the lophophore at the base of the tentacles, and gives off a blind diverticulum into each of these. This diverticulum contains the blood-vessel and muscle-fibres (fig. 22). In the region of the mouth where the two halves of the small arm-sinus approach one another they open into a central sinus lying beneath the oesophagus and partly walled in by the two halves of the ventral mesentery. This sinus is continued round the oesophagus as the periesophageal sinus, and thus the whole complex of the small arm-sinus has the relations of the so-called vascular system of a Sipunculid. In Crania it is completely shut off from the main coelom, but in Lingula it communicates freely with this cavity. In

Discinisca and Lingula there is further a lip-sinus or hollow system of channels which tra- verses the supporting tissue of the edge of the mantle and contains muscle-fibres. It opens into the peri- oesophageal sinus. It is better developed and more spacious in Lingula than in Discinisca. In Crania, where only indications of the lip-sinus occur, there are two other closed spaces. The posterior occlusor muscles lie in a special closed space which Blochmann also regards as coelomic. The posterior end of the intestine is similarly surrounded by a closed coelomic space known as the peri-anal sinus in which the rectum lies freely, unsupported by mesenteries. All these spaces contain a similar coagulable fluid with sparse corpuscles, and all are lined by ciliated cells. There is further a great tendency for the endothelial cells to form muscles, and this is especi- ally pronounced in the small arm-sinus, where a con- spicuous muscle is built up. The mantle-sinuses which form the chief spaces in the Fig. 22. — Diagrammatic section mantle are diverticula of the through an arm of the lophophore of main coelomic cavity. In Crania. Magnified ; after Blochmann. Discinisca they are provided l The jj

with a muscular valve placed ˆ The ba g e of a tentac l e bisected in

the middle line. Great arm-sinus. Smallarm-sinus,containingmuscle-

fibres. Tentacular canal. External tentacular muscle. Tentacular blood-vessel arising from the cut arm-vessel in the small arm-sinus.

8. Chief arm-nerve.

9. Secondary arm-nerve. 10. Under arm-nerve.

iniHciˆHˆ.ˆv ■”-•’ – - and dorsally directed oesophagus.

The latter enlarges into a spherical stomach into which open the broad ducts of the so-called liver. The stomach then passes into an intestine, which in the Testicardines (Articulata) is short, finger-shaped and closed, and in the Ecardines (Inarticulata) is longer, turned back upon its first course, and ends in an anus. In Lingula and Discina the anus lies to the right in the mantle-cavity, but in Crania it opens medianly into a posterior extension ot the same. Apart from the asymmetry of the intestine caused by the lateral position of the anus in the two genera just named, Brachio- pods are bilaterally symmetrical animals.

The liver consists of a right and left half, each opening by a broad duct into the stomach. Each half consists of many lobes which may branch, and the whole takes up a considerable proportion of

at their point of origin. They contain the same fluid as the general coelom.

The stalk is an extension of the ven- tral body-wall, and contains a portion of the coelom which, in Discinisca and Lingula, remains in com- munication with the general body cavity.

The Alimentary Canal — The mouth, which is quite devoid of armature, leads imperceptibly into a short

the space in the body cavity. The food passes into these lobes, which may be found crowded with diatoms, and without doubt a large part of the digestion is carried on inside the liver. The stomach, oesophagus and intestine are ciliated on their inner surface. The intestine is slung by a median dorsal and ventral mesentery which divides the body cavity into two symmetrically shaped halves; it is " stayed " by two transverse septa, the anterior or gastro- parietal band running from the stomach to the body wall and the posterior or ileoparietal band running from the intestine to the body wall. None of these septa is complete, and the various parts of the central body cavity freely communicate with one another. In Rhynchonella, where there are two pairs of kidneys, the internal opening of the anterior pair is supported by the gastroparietal band and that of the posterior pair by the ileoparietal band. The latter pair alone persists in all other genera.

The kidneys or nephridia open internally by wide funnel-shaped nephridiostomes and externally by small pores on each side of the mouth near the base of the arms. Each is short, gently curved and devoid of convolutions. They are lined by cells charged with a yellow or brown pigment, and besides their excretory functions they act as ducts through which the reproductive cells leave the body.

Circulatory System. — The structures formerly regarded as pseudo- hearts have been shown by Huxley to be nephridia ; the true heart was described and figured by A. Hancock, but has in many cases escaped the observation of later zoologists. F. Blochmann in 1884, however, observed this organ in the living animal in species of the following genera: — Terebratulina, Magellania [Waldheimia], Rhyn- chonella, Megathyris {Argiope), Lingula and Crania (fig. 21). It consists of a definite contractile sac or sacs lying on the dorsal side of the alimentary canal near the oesophagus, and in preparations of Terebratulina made by quickly removing the viscera and examin- ing them in sea- water under a microscope, he was able to count the

pulsations, which followed one another at intervals of 30-40 seconds.

A vessel — the dorsal vessel — runs forward from the heart along the dorsal surface of the oesophagus. This vessel is nothing but a split between the right and left folds of the dc mesentery, and its cavity is thus a remnant of the blas- tocoel. A similar primitive arrangement is thought by F. Blochmann to obtain in the genital arteries. Anteriorly the dorsal vessel splits into a right Fig. 23. — Rhynchonella (Hemi- and a left half, which enter the thyris) psittacea. Interior of dorsal small arm-sinus, and, running valve, s, Sockets; b, dental plates; along it, give off a blind branch V, mouth; de, labial appendage in to each tentacle (fig. 21). The its natural position; d, appendage right and left halves are con- extended or unrolled. nected ventrally to the oeso- phagus by a short vessel which supplies these tentacles in the immediate neighbourhood of the mouth. There is thus a vascular ring around the oesophagus. The heart gives off posteriorly a second median vessel which divides almost at once into a right and a left half, each of which again divides into two vessels which run to the dorsal and ventral mantles respectively. The dorsal branch sends a blind twig into each of the diverticula of the dorsal mantle-sinus, the ventral branch supplies the nephridia and neighbouring parts before reaching the ventral lobe of the mantle. Both dorsal and ventral branches supply the generative organs.

The blood is a coagulable fluid. Whether it contains corpuscles is not yet determined, but if so they must be few in number. It is a remarkable fact that in Discinisca, although the vessels to the lophophore are arranged as in other Brachiopods, no trace of a heart or of the posterior vessels has as yet been discovered.

Muscles. — The number and position of the muscles differ materi- ally in the two great divisions into which the Brachiopoda have been grouped, and to some extent also in the different genera of which each division is composed. Unfortunately almost every anatomist who has written on the muscles of the Brachiopoda has proposed different names for each muscle, and the confusion thence arising is much to be regretted. In the Testicr.rdines, of which the genus Terebratula may be taken as an example, five or six pairs of muscles are stated by A. Hancock, Gratiolet and others to be connected with the opening and closing of the valves, or with their attachment to or movements upon the peduncle. First of all, the adductors or occlusors consist of two muscles, which, bifurcating near the centre of the shell cavity, produce a large quadruple impression on the internal surface of the small valve (fig. 13, o, a'), and a single divided one towards the centre of the large or ventral valve (fig. 12, a). The function of this pair of muscles is the closing of the valves. Two other pairs have been termed divaricators by Hancock, or cardinal muscles (" muscles diducteurs " of Gratiolet), and have for function the opening of the valves. The divaricators proper are stated by Hancock to arise from the ventral valve,

one on each side, a little in advance of and close to the adductors, and after

rapidly diminishing in size become attached to the cardinal process, a space or prominence between the sockets in the dorsal valve. The accessory divaricators are, according to the same authority, a pair of small muscles which have their ends attached to the ventral valve, one on each side of the median line, a little behind the united basis of the adductors, and again to the extreme point of the cardinal process. Two pairs of muscles, apparently connected with the peduncle and its limited movements, have been minutely described by Hancock as having one of their extremities attached to this organ. The doi wl adjustors are fixed to the ventral surface of the peduncle, and are again inserted into the hinge-plate in the smaller valve. The vemral adjustors are considered to pass from the inner extremity

Fig. 24. — Magellania [Waldheimia] flavescens. Diagram showing the muscular system. (After Hancock.)

M, Ventral, Z, Extremity of intestine, b, Ventral adjustors.

N, Dorsal valve, a, Adductor. V ‘, Peduncular muscles.

/, Loop. c, Divaricators. J””, Dorsal adjustors.

V, Mouth. c’, Accessory divaricators. P, Peduncle.

of the peduncle, and to become attached by one pair of their ex- tremities to the ventral valve, one on each side and a little behind the expanded base of the divaricators. The function of these muscles, according to the same authority, is not only that of erecting the shell ; they serve also to attach the peduncle to the shell, and thus effect the steadying of it upon the peduncle. By alternate contracting they can cause a slight rotation of the animal in its stalk.

Such is the general arrangement of the shell muscles in the divi- sion composing the articulated Brachiopoda, making allowance for certain unimportant modifications observable in the animals com- posing the different families and genera thereof. Owing to the strong and tight interlocking of the valves by the means of curved teeth

Figs. 25, 26. Lingula anatina.

25, Interior of ventral valve.

26, Interior of dorsal valve.

g, Umbonal muscular impres- sions (open valves).

h, Central muscles (close valves).

i, Transmedial or sliding muscles.

b, Parietal band.

/, Lateral muscles (j, an- teriors; k, middles; /, outsiders), enabling the valves to move forward and backward on each other.

(After King.)

and sockets, many species of Brachiopoda could open their valves but slightly. In some species, such as Thecidea, the animal could raise its dorsal valve at right angles to the plane of the ventral one

(fig- 4)-

In the Ecardines, of which Lingula and Discina may be quoted as examples, the myology is much more complicated. Of the shell

or valvular muscles W. King makes out five pairs and an odd one, and individualizes their respective functions as follows : — Three pairs are lateral, having their members limited to the sides of the shell; one pair are transmedians, each member passing across the middle of the reverse side of the shell, while the odd muscle occupies the umbonal cavity. The central and umbonal muscles effect the direct opening and closing of the shell, the laterals enable the valves to move forward and backward on each other, and the transmedians allow the similar extremities (the rostral) of the valves to turn from each other to the right or the left on an axis subcentrically situated, that is, the medio-transverse region of the dorsal valve. It was long a matter in discussion whether the animal could displace its valves sideways when about to open its shell, but this has been actually observed by Professors K. Semper and E. S. Morse, who saw the animal perform the operation. They mention that it is never done suddenly or by jerks, as the valves are at first always pushed to one side several times and back again on each other, at the same time opening gradually in the transverse direction till they rest opposite to one another and widely apart. Those who have not seen the animal in life, or who did not believe in the possibility of the valves crossing each other with a slight obliquity, would not consent to

appropriating any of its muscles to that purpose, and consequently attributed to all the lateral muscles the simple function of keeping the valves in an opposite posi- tion, or holding them adjusted. We have not only the observa- tions of Semper and Morse, but the anatomical investigations of King, to confirm the sliding action or lateral divarication of the valves of Lingula.

In the Testicardines, where no such sliding action of the valves was necessary or possible, no muscles for such an object were required, consequently none took rise from the lateral portions of the valves as in Lingula; but in an extinct group, the Trime- rellidae, which seems to be some- what intermediate in character between the Ecardines and Testi- cardines, have been found cer- tain scars, which appear to have been produced by rudi- mentary lateral muscles, but it is doubtful (considering the shells are furnished with teeth, though but rudely developed) whether such muscles enabled the valves, as in Lingula, to move forward and backward upon each other. Crania in life opens its valves by moving upon the straight hinge, without sliding the valve.

The nervous system of Brachio-

*Diagram 'showTnlThe "muscular P ods . ha ?>. as a rule >. maintained system. (After Hancock.) The its Primitive connexion with the letters indicate the muscles as external epithelium. In a few in figs. 25 and 26. P lal r? s * has sunk lnt ° the con-*

_!? , ... nective-tissue supporting layer

A, Dorsal, a, Alimentary bene ath the ectoderm, but the

B, Ventral valve. tube. chief ceritres still remain in the p, Peduncle. z, Anal aper- ecto derm, and the fibrils form- e, Heart. ture. j n g tne nerves are for the most part at the base of the ectodermal cells. Above the oesophagus is a thin commissure which passes laterally into the chief arm- nerve. This latter includes in its course numerous ganglion cells, and forms, according to F. Blochmann, the immensely long drawn out supra-oesophageal ganglion. The chief arm-nerve traverses the lopho- phore, being situated between the great arm-sinus and the base of the lip (figs. 22 and 28) ; it gives off a branch to each tentacle, and these all anastomose at the base of the tentacles with the second nerve of the arm, the so-called secondary .irm- nerve. Like the chief arm- nerve, this strand runs through the lophophore, parallel indeed with the former except near the middle line, where it passes ventrally to the oesophagus. The lophophore is supplied by yet a third nerve, the under arm-nerve, which is less clearly defined than the others, and resembles a moderate aggregation of the nerve fibrils, which seem

everywhere to underlie the ectoderm, and which in a few cases are gathered up into nerves. The under arm-nerve, which lies between the small arm-sinus and the surface, supplies nerves to the muscles of both arm-sinuses (figs. 22 and 28). Medianly, it has its origin in the sub-oesophageal ganglion, which, like the supra-oesophageal, is drawn out laterally, though not to the same extent. In the middle line the sub-oesophageal nerve mass is small; the ganglion is in fact drawn out into two halves placed on either side of the body. From each of these sub-oesophageal ganglia numerous nerves arise.

Fig. 27. — Lingula analina.

Passing from the middle line outwards they are— (i.) the median pallial nerve to the middle of the dorsal mantle; (ii.) numerous small nerves — the circum-oesophageal commissures — which pass round the oesophagus to the chief arm-nerve or supra-oesophageal ganglion; (iii.) the under arm-nerve to the lophophore and its muscles; (iv.) the lateral pallial nerve to the sides of the dorsal mantle. Laterally, the sub-oesophageal ganglia give off (v.) nerves to the ventral mantle, and finally they supply (vi.) branches to the various muscles. There is a special marginal nerve running round the edge of the mantle, but the connexion of this with the rest of the nervous system is not clear; probably it is merely another concentration of the diffused sub-ectodermal nervous fibrils.

The above account applies more particularly to Crania, but in the main it is applicable to the other Inarticulata which have been in- vestigated. In Discinisca and Lingula, however, the sub-oesophageal ganglion is not drawn out, but lies medianly; it gives off two posteriorly directed nerves to the stalk, which in Lingula unite and form a substantial nerve. Sense organs are unknown in the adult. The larval forms are provided with eye-spots, but no very specialized sense organs are found in the adult.

The histology of Brachiopods presents some peculiar and many primitive features. As a rule the cells are minute, and this has especially stood in the way of embryological research. The plexus of nerve-fibrils which underlie the ectoderm and are in places gathered up into nerves, and the great development of connective tissue, are worthy of notice. Much of the latter takes the form of hyaline supporting tissue, embedded in which are scattered cells and fibres. The lophophore and stalk are largely composed of this tissue. The ectodermal cells are large, ciliated, and amongst the ciliated cells glandular cells are scattered. The chitinous chaetae have their origin in special ecto- dermal pits, at the base of which is one large cell which is thought to secrete the '■ chaeta, as in Chaetopods. These pits are not isolated, but are connected by an ectodermal ridge, which grows in at the margin of the mantle and forms a con- tinuous band somewhat re-*

sembling the ‘ ectodermal primordium of vertebrate teeth.

The ovary and testes are heaped-up masses of red or yellow cells due to a pro- liferation of the cells lining the coelom. There are four of such masses, two dorsal and two ventral, and as a rule they extend between the outer and inner layer of the mantle lining the shells. The ova and the spermatozoa dehisce into the body cavity and pass to the exterior through the nephridia. Fer- tilization takes place out- side ,the body, and in some species the early stages of development take place in a brood-pouch which is essentially a more or less deep depression of the body- wall median in Thecidea, while in Cistella (? Argiope) there is one such pouch on each side, just below the base of the arms, and into these the nephridia open. The developing ova are attached by little stalks to

Fig. 28. — Diagram of nervous system of Crania; from the dorsal side. The nerves running to the dorsal parts are white, with black edges; those running to the ventral parts are solid black. Magnified. (After Blochmann.)

1. Oesophagus.

2. Supra-oesophageal commissure.

3. Circum-oesophageal commissures.

4. Under arm-nerve.

5. Great arm-sinus.

6. Small arm-sinus.

7. Tentacle.

8. Lip of lophophore.

9. Infra-oesophageal commissure.

10. Chief arm-nerve.

11. Secondary arm-nerve.

12. Nerves to tentacles. Sub-oesophageal ganglion. Dorsal lateral nerve.

15. Sub-oesophageal portion of the

secondary arm-nerve.

16. Median pallial nerve of dorsal

lobe of mantle.

17. Anterior occlusor muscle.

18. Posterior occlusor muscle.

19. Obliquus superior muscle.

20. Levator brachii muscle.

13- 14.

the walls of these pouches. In spite of some assertions to the contrary, all the Brachiopods which have been carefully investigated have been found to be male or female. Hermaphrodite forms are unknown.

Embryology. — With the exception of Yatsu's article on the develop- ment of Lingula (J. Coll. Sci., Japan, xvii., 1901-1903) and E. G. Conklin's on " Terebratulina septentrionalis " (P. Amer. Phil. Soc. xli., 1902), little real advance has been made in our knowledge of the embryology of the Brachiopoda within recent years. Kovalev- sky's researches (Izv. Obshch. Moskov. xiv., 1874) on Megaihyris {Argiope) and Yatsu's just mentioned are the most complete as

regards the earlier stages. Segmentation is complete, a gastrula I lophophore has begun to appear as an outgrowth of the dorsal is formed, the blastopore closes, the archcnteron gives off two mantle lobe. The protegulum has been found in members of almost coelomic sacs which, as far as is known, are unaffected by the super- | all the families of Brachiopod, and it is thought to occur throughout

the group. It resembles the shell of the Cambrian -•■ — – -« genus Iphidea [Paterina], and the Phylembryo is

frequently referred to as the Paterina stage. In some orders the Phylembryo is succeeded by an Obolella stage with a nearly circular outline, but this is not universal. The larva now assumes specific characters and is practically adult.

Classification. — Beecher's division of the Brachiopoda into four orders is based largely on the character of the aperture through which the stalk or pedicle leaves the shell. To appreciate his diagnoses it is necessary to

understand certain terms, which unfortunately are not used in the same sense by all authors. The tri- angular pedicle-opening seen in Orthis, &c, has been named by James Hall and J. M. Clarke the delthyrium. In some less primitive genera, e.g. Terebratula, that type of opening is found in the young stages only ; later it becomes partly closed by two plates which grow out from the sides of the delthyrium. These plates are secreted by the ventral lobe of the mantle, and were named by von Buch in 1834 the " deltidium." The form of the deltidium varies in different genera. The two plates may meet in the middle line, and leave only a small oval opening near the centre for the pedicle, as in Rhynchonella ; or they may meet only near the base of the delthyrium forming the lower boundary of the circular pedicle-opening, as in Terebratula; or the right plate may remain quite distinct from the left plate, as in Terebratella. The pro-deltidium, a term introduced by Hall and Clarke, signifies a small embryonic plate originating on the dorsal side of the body. It subsequently becomes attached to the ventral valve, and

_ A

1. Anterior segment.

2. Second or mantle-

forming segment.

5. Setae.

6. Nerve mass (?).

7. Alimentary canal

A B C

Fig. 29. — Three larvae stages of Megathyris (Argiope). A, Larva which has just left brood-pouch; B, longitudinal section through a somewhat later stage ; C, the fully formed embryo just before fixing — the neo-embryo of Beecher. Highly magnified.

3. Third or stalk-forming segment.

4. Eye-spots. 8. Muscles.

ficial segmentation of the body that divides the larva into three segments. The walls of these sacs give rise at an early stage to muscles which enable the parts of the larva to move actively on one another (fig. 29, B). About this stage the larvae leave the brood- pouch, which is a lateral or median

cavity in the body of the female, and lead a free swimming life in the ocean. The anterior segment broadens and becomes umbrella-shaped; it has a powerful row of cilia round the rim and smaller cilia on the general surface. By the aid of these cilia the larva swims actively, but owing to its minute size it covers very little distance, and this probably accounts for the fact that where brachiopods occur there are, as a rule, a good many in one spot. The head bears four eye-spots, and it is continually testing the ground (fig. 29, A, C). The second segment grows down- wards like a skirt surrounding the third segment, which is destined to form the stalk. It bears at its rim four bundles of very pronounced chaetae. After a certain time the larva fixes itself by its stalk to some stone or rock, and the skirt-like second segment turns forward over the head and forms the mantle. What goes on within the mantle is unknown, but presumably the head is absorbed. The chaetae drop off, and the lophophore is believed to arise from thickenings which appear in the dorsal mantle lobe. The Plankton Expedition brought back, and H. Simroth (Ergeb. Plankton Ex- pedition, ii., 1897) has described, a few larval brachiopods of undeter- mined genera, two of which at least were pelagic, or at any rate taken

far from the coast. These

larvae, which resemble

those described by Fritz

Miiller (Arch. Naturg.,

1861-1862), have their

mantle turned over their

head and the larval shell

well developed. No stalk

has been seen by Simroth

or Fritz Miiller, but in

other respects the larva

resembles the stages in the

development of Megathyris

and Terebratulina which

immediately precede fixa-

Fig. 30.— Stages in the fixing and tion. The cirri or tentacles,

metamorphosis of Terebratulina. Highly of . which tnref ; or four

magnified. (From Morse.) Pajrs are present, are cap-

" able of being protruded,

A, Larva (neo-embryo) just come to an(j the minute larva rest. swims by means of the

B, C, D, Stages showing the turning c ili ar y ac tion they produce, forward of the second or mantle seg- It can retract the tentacles, ment. shut its shell, and sink to

E, Completion of this. the bottom.

F, Young Brachiopod. C. E. E. Beecher (Amer. 1, 2, 3, The first, second and third jour. Sci. ser. 3, xli. and

segments. xliv.) has classified with

appropriate names the various stages through which Brachio- pod larvae pass. The last stage, that in which the folds of the second segment are already reflected over the first, he calls the Typembryo. Either before or just after turning, the mantle develops a larval shell termed the protegulum, and when this is completed the larva is termed the Phylembryo. By this time the eyes have disappeared, the four bundles of chaetae have dropped off, and the

develops into the pseudo- deltidium, in the Neotre- mata and the Protremata. The pseudo-deltidium (so named by Bronn in 1862) is a single plate which grows from the apex of the delthyrium down- wards, and may com- pletely close the aperture. The pseudo- deltidium is sometimes reabsorbed in the adult. In the Telotremata neither pro-deltidium nor pseudo-deltidium is known. In the Atremata the pro-deltidium does not become fixed to the ventral valve, and does not develop into a pseudo-deltidium. The American

Fig. 31. — Shell of larval Brachiopod.

Phylembryo stage. (From Simroth.) I, Protegulum; 2, permanent shell.

use of the term deltidium for the structure which Europeans call the pseudo-deltidium makes for confusion. The development of the brachial

supports has been studied by Friele, Fischer and Oehlert. A summary of the results is given by Beecher {Trans. Connect. Acad, ix., 1893 ; reprinted in Studies in Evolution, 1901).

The orders Atremata and Neotremata are frequently grouped together, as the sub-class Inarticulata or Ecardines — the Treten- terata of Davidson — and the orders Protremata and Telotremata, as the Articulata or Testicardines — the Clistenterata of Davidson. The ?

following scheme of classification is based on Beecher's and Schubert's. Recent families are printed in italic type. Class I. Ecardines (Inarticulata}4 –

ORDER I. Atremata (Beecher).— Inarticulate Brachiopoda, with the pedicle passing out between the um- bones, the opening being shared by both valves. Pro-deltidium attached to dorsal valves. FAMILIES.— Paterinidae, Obolidae, Trime- rellidae, llngulellidae, llngu- lidae, llgulasmatidae.

ORDER II. Neotremata (Beecher).— More or less circular, cone-shaped, inarticulate Brachiopoda. The pedicle passes out at right angles to the plane of junction of the valves of the shell ; the opening is confined to the ventral valve, and may take the form of a slit, or may be closed by the development of a special plate called the listrium, or by a pseudo-deltidium. Pro-deltidium attached

Fig. 32.- — Diagram of the pedicle-opening of Rhyn- chonella. Magnified.

1. Umbo of ventral valve.

2. Deltidium.

3. Margin of delthyrium.

4. Pedicle-opening.

5. Dorsal valve.

to ventral valve. FAMILIES.— Acrotretidae, Siphonotretidae, Trematidae, Discinwae, Craniidae.

Class II. Testicardines (Articulata)

ORDER HI. Protremata (Beecher). — Articulate Brachiopoda, with pedicle-opening restricted to ventral valve, and either open at the hinge line or more or less completely closed by a pseudo-del- tidium, which may disappear in adult. The pro-deltidium originat- ing on the dorsal surface later becomes anchylosed with the ventral valve. FAMILIES.— Kutorginidae, Eichwaldiidae, Billing-

SELLIDAE,STROPHOMENIDAE,rff£C/Dm?4£,PRODUCTIDAE,RlCHTH0-

fenidae, Orthidae, Clitambonitidae, Syntrophiidae, Poram- bonitidae, pentameridae.

ORDER IV. Telotremata (Beecher).— Articulate Brachiopoda, with the pedicle-opening, confined in later life to the ventral valve, and placed at the umbo or beneath it. Deltidium present, but no pro-deltidium. Lophophore supported by calcareous loops, &c. FAMILIES.— Protorhynchidae, Rhynceonellidae, Centro-

NELLIDAE.rfiifEBitirtfi/rME.STRINGOCEPHALIDAE.MEGALANTERI-DAE, TEREBRATELLIDAE, ATRYPIDAE, SPIRIFERIDAE, AtHYRIDAE.

Affinities.— Little light has been thrown on the affinities of the Brachiopoda by recent research, though speculation has not been wanting. Brachiopods have been at various times placed with the Mollusca, the Chaetopoda, the Chaetognatha, the Phoronidea, the Polyzoa, the Hemichordata, and the Urochordata. None of these alliances has borne close scrutiny. The suggestion to place Brachio- pods with the Polyzoa, Phoronis, Rhabdopleura and Cephalodiscus, in the Phylum Podaxonia made in Ency. Brit. (vol. xix, ninth edition, pp. 440-441) has not met with acceptance, and until we have a fuller account of the embryology of some one form, preferably an In- articulate, it is wiser to regard the group as a very isolated one. It may, however, be pointed out that Brachiopods seem to belong to that class of animal which commences life as a larva with three segments, and that tri-segmented larvae have been found now in several of the larger groups. .

Distribution. — Brachiopods first appear in the Lower Cambrian, and reached their highest development in the Silurian, from which upwards of 2000 species are known, and were nearly as numerous in the Devonian period; at present they are represented by some 140 recent species. The following have been found in the British area, as defined by A. M. Norman, Terebratulina caput-serpenhs L., Terebratula (Gwynia) capsula Jeff., Magellania (Macandrevia) cranium Miill.,ikf. septigera hoven,ferebratella spitzbergenensis Dav., Megathyris decollate, Chemn., Cistella cistellula S. Wood, Cryptopora gnomon Jeff., Rhynchonella (Hemithyris) psittacea

Gmel., Crania anomala Mull., and Discinisca atlantica King. About one-half the 120 existing species are found above the 100-fathoms line. Below 150 fathoms they are rare, but a few such as Terebratulina wyvillei are found down to 2000 fathoms. Lingula is essentially a very shallow water form. As a rule the genera of the northern hemisphere differ from those of the southern. A large number of specimens of a species are usually found together, since their only mode of spreading is during the ciliated larval stage, which although it swims vigorously can only cover a few millimetres an hour; still it may be carried some little distance by currents.

Undue stress is often laid on the fact that Lingula has come down to us apparently unchanged since Cambrian times, whilst Crania, and forms very closely resembling Discina and Rhynchonella^ are found from the Ordovician strata onwards. The former statement is, however, true of animals from other classes at least as highly organized as Brachiopods, e.g. tfie Gasteropod Capulus, whilst most of the invertebrate classes were represented in the Ordovician by forms which do not differ from their existing representatives in any important respect. .

A full bibliography of Brachiopoda (recent and fossil) is to be found in Davidson's Monograph of British Fossil Brachiopods, Pal. Soc. Mon. vi., 1886. The Monograph on Recent Brachiopoda, by the same author, Tr. Linn. Soc. London, Zool. ser. li. vol. iv., 1886-1888, must on no account be omitted. (A. E. S.)

BRACHISTOCHRONE (from the Gr. /3pax«n-os, shortest, and xpovos, time), a term invented by John Bernoulli in 1694 to denote the curve along which a body passes from one fixed point to another in the shortest time. When the directive force is constant, the curve is a cycloid (q.v.) ; under other conditions, spirals and other curves are described (see Mechanics).

BRACHYCEPHALIC (Gr. for short-headed), a term invented by Andreas Retzius to denote those skulls of which the width from side to side was little less than the length from front to back, their ratio being as 80 to 100, as in those of the Mongolian type. Thus taking the length as 100, if the width exceeds 80, the skull is to be classed as brachycephalic. The prevailing form of the head of civilized races is brachycephalic. It is supposed that a brachycephalic race inhabited Europe before the Celts. Among those peoples whose heads show marked brachycephaly

are the Indo-Chinese, the Savoyards, Croatians, Bavarians, Lapps, Burmese, Armenians and Peruvians. (See Craniometry.) BRACHYLOGUS (from Gr. iSpaxw, short, and X670S, word), title applied in the middle of the 16th century to a work con- taining a systematic exposition of the Roman law, which some writers have assigned to the reign of the emperor

Justinian, and others have treated as an apocryphal work of the 16th century. The earliest extant edition of this work' was published at Lyons in 1549, under the title of Corpus Legum per modum Institutionum; and the title 'Brachylogus totius Juris Chilis appears for the first time in an edition published at Lyons in 1553. The origin of the work may be referred with great probability to the 12th century. There is internal evidence that it was composed subsequently to the reign of Louis le Debonnaire (778-840), as it contains a Lombard law of that king's, which forbids the testimony of a clerk to be received against a layman. On the other hand its style and reasoning is far superior to that of the law writers of the 10th and nth centuries; while the circumstance that the method of its author has not been in the slightest degree influenced by the school of the Gloss-writers (Glossatores) leads fairly to the conclusion that he wrote before that school became dominant at Bologna. Savigny, who traced the history of the Brachylogus With great care,' is disposed to think that it is the work of Irnerius himself (Geschichte des rom. Rechts im Mittelalter). Its value is chiefly historical, as it furnishes evidence that a knowledge of Justinian's legislation was always maintained in northern Italy. The author of the work has adopted the Institutes of Justinian as the basis of it, and draws largely on the Digest, the Code and the Novels; while certain passages, evidently taken from the Senlentiae Receptae of Julius Paulus, imply that the author was also acquainted with the Visigothic code of Roman law compiled by order of Alaric II.

An edition by E. Bocking was published at Berlin in 1829, under the title of Corpus Legum sive Brachylogus Juris Civilis. See also H. Fitting, Uber die Heimath und das Alter des sogenannten Brachy- logus (Berlin, 1880).

BRACKET, jn architecture and carpentering, a projecting feature either in wood or metal for holding things together or supporting a shelf. The same feature in stone is called a " con- sole " (q.v.). In furniture it is a small ornamental shelf for a wall or a corner, to bear knick-knacks, china or other bric-a-brac. The word has been referred to " brace," clamp, Lat. bracchium, arm, but the earliest form " bragget " (1580) points to the true derivation from the Fr. braguette, or Span, bragueta (Lat. bracae, breeches), used both of the front part of a pair of breeches and of the architectural feature. The sense development is not clear, but it has no doubt been influenced by the supposed connexion with " brace."

BRACKET-FUNGI. The term " bracket " has been given to those hard, woody fungi that grow on trees or timber in the form of semicircular brackets. They belong to the order Polyporeae, distinguished by the layer of tubes or pores on the under surface within which the spores are borne. The mycelium, or vegetable part of the fungus, burrows in the tissues of the tree, and often destroys it; the "bracket" represents the fruiting stage, and

produces innumerable spores which gain entrance to other trees by some wound or cut surface; hence the need of careful forestry. Many of these woody fungi persist for several years, and a new layer of pores is superposed on the previous season's growth.

BRACKLESHAM BEDS, in geology, a series of clays and marls, with sandy and lignitic beds, in the Middle Eocene of the Hampshire Basin, England. They are well developed in the Isle of Wight and on the mainland opposite; and receive their name from their occurrence at Bracklesham in Sussex. The thickness of the deposit is from 100 to 400 ft. Fossil mollusca are abundant, and fossil fish are to be found, as well as the Palaeophis, a sea-snake. Nummulites and other foraminifera also occur. The Bracklesham Beds lie between the Barton Clay above and the Bournemouth Beds, Lower Bagshot, below. In the London Basin these beds are represented only by thki

sandy clays In the Middle Bagshot group. In the Paris Basin the " Calcaire grossier " lies upon the same geological horizon.

See F. Dixon, Geology of Sussex (new ed., 1878); F. E. Edwards and S. V. Wood, " Monograph of Eocene Mollusca," Palaeonto- graphical Soc. vol. i. (1847-1877); " Geology of the Isle of Wight," Mem. Geol. Survey (2nd ed., 1889); C. Reid, " The Geology of the Country around Southampton," Mem. Geol. Survey (1902).

BRACKLEY, THOMAS EGERTON, Viscount (c. 1540-1617), English lord chancellor, was a natural son of Sir Richard Egerton of Ridley, Cheshire. The exact date of his birth is unrecorded, but, according to Wood, 1 when he became a commoner at Brase- nose College.Oxford, in 1556, he was about seventeen. He entered Lincoln's Inn in 1559, and was called to the bar in 1572, being chosen a governor of the society in 1580, Lent reader in 1582, and treasurer in 1 588. He early obtained legal renown and a large practice, and tradition relates that his skilful conduct of a case against the crown gained the notice of Elizabeth, who is reported to have declared: " In my troth he shall never plead against me again." Accordingly, on the 26th of June 1581, he was made solicitor-general. He represented Cheshire in the parliaments of 1585 and 1586, but in his official capacity he often attended in the House of Lords. On the 3rd of March 1589 the Commons desired that he should return to their house, the Lords refusing on the ground that he was called by the queen's writ to attend in the Lords before his election by the House of Commons. 2 He took part in the trial of Mary,

queen of Scots, in 1586, and advised that in her indictment she should only be styled " commonly called queen of Scots," to avoid scruples about judging a sovereign. He conducted several other state prosecutions. On the 2nd of June 1592 he was appointed attorney-general, and was knighted and made chamberlain of Chester in 1593. On the 10th of April 1594 he became master of the rolls, and on the 6th of May 1596 lord keeper of the great seal and a privy councillor, remaining, however, a commoner as Sir Thomas Egerton, and presiding in the Lords as such during the whole reign of Elizabeth. He kept in addition the mastership of the rolls, the whole work of the chancery during this period falling on his shoulders and sometimes causing inconvenience to suitors. 3 His promotion was welcomed from all quarters. " I think no man," wrote a contemporary to Essex, " ever came to this dignity with more applause than this worthy gentleman." 4

Egerton became one of the queen's most trusted advisers and one of the greatest and most striking figures at her court. He was a leading member of the numerous special commissions, including the ecclesiastical commission, and was the queen's interpreter in her communications to parliament. In 1 598 he was employed as a commissioner for negotiating with the Dutch, obtaining great credit by the treaty then effected, and in 1600 in the same capacity with Denmark. In 1 597, in consequence of his unlawful marriage with his second wife, in a private house without banns, the lord keeper incurred a sentence of excommunication, and was obliged to obtain absolution from the bishop of London. 6 He was a firm friend of the noble but erratic and unfortunate Essex. He sought to moderate his violence and rashness, and after the scene in the council in July 1598, when the queen struck Essex and bade him go and be hanged, he endeavoured to recon- cile him to the queen in an admirable letter which has often been printed. 6 On the arrival of Essex in London without leave from Ireland, and his consequent disgrace, he supported the queen's just authority, avoiding at the same time any undue severity to the offender. Essex was committed to his custody in York House from the 1st of October 1599 till the 5th of July 1600, when the lord keeper used his influence to recover for him the queen's favour and gave him kindly warnings concerning the necessity for caution in his conduct. On the 5th of June 1600 he presided over the court held at his house, which deprived Essex of his offices except that of master of the horse, treating him with

1 Athenae Oxon. (Bliss), ii. 197.

2 D'Ewes's Parliaments of Elizabeth, 441, 442.

3 Cal. of St. Pap., Dom., 1601-1603, p. 191.

4 Birch's Mem. of Queen Elizabeth, i. 479. 6 Hist. MSS. Comm. nth Rep.

p. 24.

6 T. Birch's Mem. of Queen Elizabeth, ii. 384.

leniency, not pressing the charge of treason but only that of disobedience, and interrupting him with kind intentions when he attempted to justify himself. After the trial he tried in vain to bring Essex to a sense of duty. On the 8th of February 1601, the day fixed for the rebellion, the lord keeper with other officers of state visited Essex at Essex House to demand the reason of the tumultuous assemblage. His efforts to persuad'e Essex to speak with him privately and explain his " griefs," and to refrain from violence, and his appeal to the company to depart peacefully on their allegiance, were ineffectual, and he was imprisoned by Essex for six hours, the mob calling out to kill him and to throw the great seal out of the window. Subsequently he abandoned all hope of saving Essex, and took an active part in his trial. On the 13 th of February he made a speech in the Star Chamber, exposing the wickedness of the rebellion, and of the plot of Thomas Lea to surprise Elizabeth at her chamber door. 7 In July 1602, a few months before her death, Elizabeth visited the lord keeper at his house at Harefield in Middlesex, and he was one of those present during her last hours who received her faltering intimation as to her successor.

On the accession of James I., Sir Thomas Egerton was re- appointed lord keeper, resigning the mastership of the rolls in May 1603, and the chamberlainship of Chester in August. On the 21st of July he was created Baron Ellesmere, and on the 24th lord chancellor. His support of the king's prerogative was too faithful and undiscriminating. He approved of the harsh penalty inflicted upon Oliver St John in i6r5 for denying the legality of benevolences, and desired that his sentencing of the prisoner "might be his last work to conclude his services." 8 In May 16 13 he caused the committal of Whitelocke to the Fleet for questioning the authority of the earl marshal's court. In 1604 he came into collision with the House of Commons. Sir Francis Goodwin, an outlaw, having been elected for Bucking- hamshire contrary to the king's proclamation, the chancellor cancelled the return when made according to custom into chancery, and issued writs for a new election. The Commons, however, considering their privileges violated, restored Goodwin to his seat, and though the matter was in the present instance compromised by the choice of a third party, they secured for the future the right of judging in their own elections. He was at one with James in desiring to effect the union between England and Scotland, and served on the commission in 1604; and the English merchants who opposed the union and com- munity of trade with the Scots were " roundly shaken by him." In 1608, in the great case of the Post Nati, he decided, with the assistance of the fourteen judges, that those born after the accession of James I. to the throne of England were English subjects

and capable of holding lands in England; and he compared the two dissentient judges to the apostle Thomas, whose doubts only confirmed the faith of the rest. He did not, however, always show obedience to the king's wishes. He op- posed the latter's Spanish policy, and in July 16 15, in spite of James's most peremptory commands and threats, refused to put the great seal to the pardon of Somerset. In May 1616 he officiated as high steward in the trial of the latter and his countess for the murder of Overbury. He was a rigid churchman, hostile to both the Puritans and the Roman Catholics. He fully ap- proved of the king's unfriendly attitude towards the former, adopted at the Hampton Court conference in 1604, and declared, in admiration of James's theological reasoning on this occasion, that he had never understood before the meaning of the legal maxim, Rex est mixta persona cum sacerdote. In 1605 he opposed the petition for the restitution of deprived Puritan ministers, and obtained an opinion from the judges that the petition was illegal. He supported the party of Abbot against Laud at Oxford, and represented to the king the unfitness of 'the latter to be president of St John's College. In 1605 he directed the judges to enforce the penal laws against the Roman Catholics.

His vigorous and active public career closed with a great victory gained over the common law and his formidable

7 Cal. of St. Pap., Dom., 1598-1601, pp. 554, 583.

8 State Trials, ii. 909.

antagonist, Sir Edward Coke. The chancellor's court of equity had originated in the necessity for a tribunal to decide cases not served by the common law, and to relax and correct the rigidity and insufficiency of the latter's procedure. The two jurisdictions had remained bitter rivals, the common-law bar complaining of the arbitrary and unrestricted powers of the chancellor, and the equity lawyers censuring and ridiculing the failures of justice in the courts of common law. The disputes between the courts, concerning which the king had already in 16 15 remon- strated with the chancellor and Sir Edward Coke, 1 the lord chief justice, came to a crisis in 1616, when .the court of chancery granted relief against judgments at common law in the cases of Heath v. Rydley and Courtney v. Gr anvil. This relief was declared by Coke and other judges sitting with him to be illegal, and a counter-attack was made by a praemunire, brought against the parties concerned in the suit in chancery. The grand jury, however, refused to bring in a true bill against them, in spite of Coke's threats and

assurances that the chancellor was dead, and the dispute was referred to the king himself, who after consulting his counsel and on Bacon's advice decided in favour of equity. The chancellor's triumph was a great one, and from this time the equitable jurisdiction of the court of chancery was unquestioned. In June 1616 he supported the king in his dispute with and dismissal of Coke in the case of the commendams, agreeing with Bacon that it was the judge's duty to communicate with the king, before giving judgments in which his interests were concerned, and in November warned the new lord chief justice against imitating the errors of his predecessor and especially his love of "popularity." 2 Writing in 1609 to Salisbury, the chancellor had described Coke (who had long been a thorn in his flesh) as a " frantic, turbulent and idle broken brayned fellow," apologizing for so often troubling Salisbury on this subject, "no fit exercise for a chancellor and a treasurer." 3 He now summoned Coke before him and communicated to him the king's dissatisfaction with his Reports, desiring, however, to be spared further service in his disgracing. After several petitions for leave to retire through failing health, he at last, on the 3rd of March 1617, delivered up to James the ' great seal, which he had held continuously for the unprecedented term of nearly twenty-one years. On the 7th of November 1616 he had been created Viscount Brackley, and his death took place on the 15th of March 1617. Half an hour before his decease James sent Bacon, then his successor as lord keeper, with the gift of an earldom, and the presidentship of the council with a pension of £3000 a year, which the dying man declined as earthly vanities with which he had no more concern. He was buried at Dodleston in Cheshire.

As Lord Chancellor Ellesmere he is a striking figure in the long line of illustrious English judges. No instance of excessive or improper use of his jurisdiction is recorded, and the famous case which precipitated the contest between the courts was a clear travesty of justice, undoubtedly fit for the chancellor's intervention. He refused to answer any communications from suitors in his court, 4 and it was doubtless to Ellesmere (as weeding out the " enormous sin " of judicial corruption) 6 that John Donne, who was his secretary, addressed his fifth satire. He gained Camden's admiration, who records an anagram on his name, " Gestat Honorem." Bacon, whose merit he had early recognized, and whose claims to the office of solicitor-general he had unavailingly supported both in 1594 and 1606, calls him " a true sage, a salvia in the garden of the state," and speaks with gratitude of his " fatherly kindness." Ben Jonson, among the poets, extolled in an epigram his " wing'd judgements," " purest hands," and constancy. Though endowed with con- siderable oratorical gifts he followed the true judicial tradition and affected to despise eloquence as " not decorum for judges, that ought to respect the Matter and not the Humours of the

1 Cat. St. Pap., Dom., 1611-1618, p. 381.

2 Cat. St. Pap., Dom., 1611-1618, p. 407.

3 Lansdowne MS. 91, f. 41.

- *Hist. MSS. Comm. app. pt. vii. p. 156. 6 Life of Donne, by E. Gosse, i. 43.*

Hearers." 6 Like others of his day he hoped to see a codification of the laws, 7 and appears to have had greater faith in judge-made law than in statutes of the realm, advising the parliament (October 27, 1601) " that laws in force might be revised and explained and no new laws made," and describing the Statute of Wills passed in Henry VIII. 's reign as the " ruin of ancient families " and " the nurse of forgeries." In the thirty-eighth year of Elizabeth he drew up rules for procedure in the Star Chamber, 8 restricting the fees, and in the eighth of James L ordinances for remedying abuses in the court of chancery. In 1609 he published his judgment in the case of the Post Nati, which appears to be the only certain work of his authorship. The following have been ascribed to him: — The Privileges and Prerogatives of the High Court of Chancery (1641); Certain Observations concerning the Office of the Lord Chancellor (1651) — denied by Lord Chancellor Hardwicke in A Discourse of the Judicial Authority of the Master of the Rolls (1728) to be Lord Ellesmere's work; Observations on Lord Coke's Reports, ed. by G. Paul (about 17 10), the only evidence of his authorship being apparently that the MS. was in his handwriting; four MSS., bequeathed to his chaplain, Bishop Williams, viz. The Pre- rogative Royal, Privileges of Parliament, Proceedings in Chancery and The Power of the Star Chamber; Notes and Observations on Magna Charta, &°c, Sept. 1615 (Harl. 4265, f. 35), and An Abridg- ment of Lord Coke's Reports (see MS. note by F. Hargrave in his copy of Certain Observations concerning the Office of Lord Chancellor, Brit. Mus. 510 a 5, also Life of Egerton, p. 80, note T, catalogue of Harleian collection, and Walpole's Royal and Noble Authors, 1806, ii. 170).

He was thrice married. By his first wife, Elizabeth, daughter of Thomas Ravenscroft of Bretton, Flintshire, he had two sons and a daughter. The elder son, Thomas, predeceased him, leaving three daughters. The younger, John, succeeded his father as 2nd Viscount Brackley, was created earl of Bridge- water, and, marrying Lady Frances Stanley (daughter of his father's third wife, widow of the 5th earl of Derby), was the ancestor of the earls and dukes of Bridgewater (q.v.), whose male line became extinct in 1829. In 1846 the titles of Ellesmere and Brackley were revived in the person of the 1st earl of Ellesmere (q.v.), descended from Lady Louisa Egerton, daughter and co-heir of the 1st duke of Bridgewater.

No adequate life of Lord Chancellor Ellesmere has been written, for which,

however, materials exist in the Bridgewater MSS., very scantily calendared in Hist. MSS. Comm. nth Rep. p. 24, and app. pt. vii. p. 126. A small selection, with the omission, however, of personal and family matters intended for a separate projected Life which was never published, was edited by J. P. Collier for the Camden Society in 1840.

BRACKLEY, a market town and municipal borough in the southern parliamentary division of Northamptonshire, England, 59 m. N.W. by W. from London by the Great Central railway; served also by a branch of the London & North- Western railway. Pop. (1901) 2467. The church of St Peter, the body of which is Decorated and Perpendicular, has a beautiful Early English tower. Magdalen College school was founded in 1447 by William of Waynflete, bishop of Winchester, bearing the name of his great college at Oxford. Of a previous foundation of the 12th century, called the Hospital of St John, the transitional Norman and Early English chapel remains. Brewing is carried on. The borough is under a mayor, 4 aldermen and 12 councillors.. Area, 3489 acres.

Brackley (Brachelai, Brackele) was held in 1086 by Earl Alberie, from whom it passed to the earl of Leicester and thence to the families of De Quinci and Holand. Brilliant tournaments were held in 1249 and 1267, and others were prohibited in 1222 and 1244. The market, formerly held on Sunday, was changed in 1 2 18 to Wednesday, and in answer to a writ of Quo Warranto Maud de Holand claimed in 1330 that her family had held a fair on St Andrew's day from time immemorial. In 1553 Mary granted two fairs to the earl of Derby. By charter of 1686

6 Judgment on the Post Nati.

7 Speech to the parliament, 24th of October 1597.

8 Harleian MS. 2310, f. i. ; Gardiner's Hist, of England, ix 56.

James II. incorporated the town under a mayor, 6 aldermen, and 26 burgesses, granted three new fairs and confirmed the old fair and market. In 1 708 Anne granted four fairs to the earl of Bridgewater, and in 1886 the borough had a new charter of incorporation under a mayor, 4 aldermen and 12 councillors under the Municipal Corporations Act of 1882. Camden {Brit. p. 430) says that Brackley was formerly a famous staple for wool. It first sent members to parliament in 1 547, and continued to send two representatives till disfranchised by the Reform Act of 1832. The town formerly had a considerable woollen and lace-making trade.

BRACQUEMOND, FELIX (1833-), French painter and etcher, was born in Paris. He was trained in early youth as a trade lithographer, until Guichard, a pupil of Ingres, took him to his studio. His portrait of his grandmother, painted by him at the age of nineteen, attracted Theophile Gautier's attention at the Salon. He applied himself to engraving and etching about 1853, and played a leading and brilliant part in the revival of the etcher's art in France. Altogether he has produced over eight hundred plates, comprising portraits, landscapes, scenes of contemporary life, and bird-studies, besides numerous inter- pretations of other artists' paintings, especially those of Meis- sonier, Gustave Moreau and Corot. After having been attached to the Sevres porcelain factory in 1870, he accepted a post as art manager of the Paris atelier of the firm of Haviland of Limoges. He was connected by a link of firm friendship with Manet, Whistler, and all the other fighters in the impressionist cause, and received all the honours that await the successful artist in France, including the grade of officer of the Legion of Honour in

1889.

BRACTON, HENRY DE (d. 1268), English judge and writer on English law. His real name was Bratton, and in all prob- ability he derived it either from Bratton Fleming or from Bratton Clovelly, both of them villages in Devonshire. It is only after his death that his name appears as " Bracton." He seems to have entered the king's service as a clerk under the patronage of William Raleigh, who after long service as a royal justice died bishop of Winchester in 1250. Bracton begins to appear as a justice in 1245, and from 1248 until his death in 1268 he was steadily employed as a justice of assize in the south- western counties, especially Somerset, Devon and Cornwall. During the earlier part of this period he was also sitting as a judge in the king's central court, and was there hearing those pleas which "followed the king"; in other words, he was a member of that section of the central tribunal which was soon to be distinguished as the king's bench. From this position he retired or was dismissed in or about the year 1257, shortly before the meeting of the Mad Parliament at Oxford in 1258. Whether his disappearance is to be connected with the political events of this turbulent time is uncertain. He continued to take the assizes in the south-west, and in 1267 he was a member of a commission of prelates, barons and judges appointed to hear the complaints of the disinherited partisans of Simon de Montf ort. In 1259 he became rector of Combe-in-Teignhead, in 1261 rector of Barnstaple, in 1264 archdeacon of Barnstaple, and, having resigned the /archdeaconry, chancellor of Exeter cathedral; he also held a prebend in the collegiate church at Bosham. Already in 1245 he enjoyed a dispensation enabling him to hold three ecclesiastical benefices. He died in 1268 and was buried in the nave of Exeter cathedral, and a chantry for his soul was endowed out of the

revenues of the manor of Thorverton.

His fame is due to a treatise on the laws and customs of England which is sufficiently described elsewhere (see English Law) . The main part of it seems to have been compiled between 1250 and 1256; but apparently it is an unfinished work. This may be due to the fact that when he ceased to be a member ef the king's central court Bracton was ordered to surrender certain judicial records which he had been using as raw material. Even though it be unfinished his book is incomparably the best work produced by any English lawyer in the middle ages.

The treatise was published in 1569 by Richard Tottel. This text was reprinted in 1640. An edition (1878-1883) with English

translation was included in the Rolls Series. Manuscript copies are numerous, and a critical edition is a desideratum. See Bracton's Note-Book (ed. Maitland, 1887); Bracton and Abo (Selden Society, 1895). (F. W. M.)

BRADAWL (from " brad," a flat nail, and " awl," a piercing tool), a small tool used for boring holes (see Tool).

BRADDOCK, EDWARD (i69s?-i7ss), British general, was born in Perthshire, Scotland, about 1695. He was the son of Major-General Edward Braddock (d. 1725), and joined the Coldstream Guards in 17 10. In 1747 as a lieutenant-colonel he served under the prince of Orange in Holland during the siege of Bergen-op-Zoom. In 1753 he was given the colonelcy of the 14th foot, and in 1754 he became a major-general. Being ap- pointed shortly afterwards to command against the French in America, he landed in Virginia in February 1755. After some months of preparation, in which he was hampered by adminis- trative confusion and want of resources, he took the field with a picked column, in which George Washington served as a volunteer officer, intended to attack Fort Duquesne (Pittsburg, Pa.). The column crossed the Monongahela river on the 9th of July and almost immediately afterwards fell into an ambuscade of French and Indians. The troops were completely surprised and routed, and Braddock, rallying his men time after time, fell at last mortally wounded. He was carried off the field with difficulty, and died on the 13th. He was buried at Great Meadows, where the remnant of the column halted on its retreat to reorganize. (See Seven Years' War.)

BRADDOCK, a borough of Allegheny county, Pennsylvania, U.S.A., on the Monongahela river, 10 m. S.E. of Pittsburg. Pop. (1890) 8561; (1900) 15,654, of whom 5111 were foreign- born; (1910 census) 19,357. Braddock is served by the Penn- sylvania, the Baltimore & Ohio, and the

Pittsburg & Lake Erie railways. Its chief industry is the manufacture of steel — especially steel rails; among its other manufactures are pig- iron, wire rods, wire nails, wire bale ties, lead pipe, brass and electric signs, cement and plaster. In 1905 the value of the borough's factory products was $4,199,079. Braddock has a Carnegie library. Kennywood Park, near by, is a popular resort. The municipality owns and operates the water-works. Braddock was named in honour of the English general Edward Braddock, who in 1755 met defeat and death near the site of the present borough at the hands of a force of French and Indians. The borough was first settled at the close of the 18th century, and was incorporated in 1867.

BRADDON, MARY ELIZABETH (1837-), English novelist, daughter of Henry Braddon, solicitor, of Skirdon Lodge, Cornwall, and sister of Sir Edward Braddon, prime minister of Tasmania, was born in London in 1837. She began at an early age to contribute to periodicals, and in 1861 produced her first novel, The Trail of the Serpent. In the same year appeared Garibaldi, accompanied by Olivia, and other poems, chiefly narrative, a volume of extremely spirited verse, deserving more notice than it has received. In 1862 her reputation as a novelist was made by a favourable review in The Times cf Lady Audley's Secret. Aurora Floyd, a novel with a strong affinity to Madame Bovary, followed, and achieved equal success. Its immediate successors, Eleanor's Victory, John Marchmont's Legacy, Henry Dunbar, remain with her former works the best- known of her novels, but all her numerous books have found a large and appreciative public. They give, indeed, the great body of readers of fiction exactly what they require; melodramatic in plot and character, conventional in their views of life, they are yet distinguished by constructive skill and opulence of invention. For a considerable time Miss Braddon conducted Belgravia, in which several of her novels appeared. In 1874 she married Mr John Maxwell, publisher, her son, W. B. Maxwell, after- wards becoming known as a clever novelist and newspaper corre- spondent.

BRADFORD, JOHN (i5io?-isss), English Protestant martyr, was born at Manchester in the early part of the reign of Henry VIII., and educated at the local grammar school. Being a good penman and accountant, he became secretary to Sir John

Harrington, paymaster of the English forces in France. Brad- ford at this time was gay and thoughtless, and to support his extravagance he seems to have appropriated some of the money entrusted to him; but he afterwards made full restitution. In April 1547 he took chambers in the Inner Temple,

and began to study law; but finding divinity more congenial, he removed, in the following year, to St Catharine's Hall, Cambridge, where he studied with such assiduity that in little more than a year he was admitted by special grace to the degree of master of arts, and was soon after made fellow of Pembroke Hall, the fellowship being " worth seven pound a year." One of his pupils was John Whitgift. Bishop Ridley, who in 1550 was translated to the see of London, sent for him and appointed him his chaplain. In 1553 he was also made chaplain to Edward VI., and became one of the …est popular preachers in the kingdom, earning high praise from John Knox. Soon after the accession of Mary he was arrested on a charge of sedition, and confined in the Tower and the king's bench prison for a year and a half. During this time he wrote several epistles which were dispersed in various parts of the kingdom. He was at last brought to trial (January 1554/5) before the court in which Bishop Gardiner sat as chief, and, refusing to retract his principles, was condemned as a heretic and burnt, with John Leaf, in Smithfield on the 1st

of July 1555-

His writings, which consist chiefly of sermons, meditations, tracts, letters and prayers, were edited by A. Townsend for the Parker Society (2 vols. 8vo, Cambridge, 1848-1853).

BRADFORD, WILLIAM (1590-1657), American colonial governor and historian, was born in Austerfield, Yorkshire, England, probably in March 1590. He became somewhat estranged from his family, which was one of considerable im- portance in the locality, when in early youth he joined the Puritan sect known as Separatists, and united in membership with the congregation at Scrooby. He prepared in 1607, with other members of the church, to migrate to Holland, but the plan was discovered and several of the leaders, among them Bradford, were imprisoned. In the year following, however, he joined the English colony at Amsterdam, where he learned the trade of silk weaving. He subsequently sold his Yorkshire property and embarked in business on his own account at Leiden, where the English refugees had removed. He became an active advocate of the proposed emigration to America, was one of the party that sailed in the " Mayflower " in September 1620, and was one of the signers of the compact on shipboard in Cape Cod Bay. After the death of Governor John Carver in April 162 1, Bradford was elected governor of Plymouth Colony, and served as such, with the exception of five years (1633,1634, 1636, 1638 and 1644) until shortly before his death. After 1624, at Bradford's suggestion, a board of five and later seven assist- ants was chosen annually to share the executive responsibility. Bradford's rule was firm and judicious, and to his guidance more than to that of any other man the prosperity of the Plymouth Colony was due. His tact and kindness in

dealing with the Indians helped to relieve the colony from the conflicts with which almost every other settlement was afflicted. In 1630 the council for New England granted to " William Bradford, his heires, associatts, and assignes," a new patent enlarging the original grant of territory made to the Plymouth settlers. This patent Bradford in the name of the trustees made over to the body corporate of the colony in 1641. Bradford died in Plymouth on the 9th of May 1657. He was the author of a very important historical work, the History of Plimouth Plantation (until 1646), first published in the Proceedings of the Massachusetts Historical Society for 1856, and later by the state of Massachusetts (Boston, 1898), and in facsimile, with an introduction by John A. Doyle, in 1896. The manuscript disappeared from Boston during the War of Independence, was discovered in the Fulham library, London, in 1855, and was returned by the bishop of London to the state of Massachusetts in 1897. This work has been of inestim- able value to writers on the history of the Pilgrims, and was freely used, in manuscript, by Morton, Hubbard, Mather, Prince and Hutchinson. Bradford was also undoubtedly part author,

with Edward Winslow, of the " Diary of Occurrences " published in Mourts' Relation, edited by Dr Ii. M. Dexter (Boston, 1865). He also wrote a series of Dialogues, on church government, published in the Massachusetts Historical Society's Publications

(1870.)

For Bradford's ancestry and early life see Joseph Hunter, Collec- tions concerning the Founders of New Plymouth, in Massachusetts Historical Society's Collections (Boston, 1852): also the quaint sketch in Cotton Mather's Magnolia (London, 1702), and a chapter in Williston Walker's Ten New England Leaders (New York, 1901).

BRADFORD, WILLIAM (1663-1752), American colonial ' printer, was born in Leicestershire, England, on the 20th of May 1663. He learned the printer's trade in London with Andrew Sowle, and in 1682 emigrated with William Penn to Pennsylvania, where in 1685 he introduced the "art and mystery" of printing into the Middle Colonies. His first imprint was an almanac, Kalendarium Pennsilvaniense or America's Messenger (1685). At the outset he was ordered " not to print anything but what shall have lycence from ye council," and in 1692, the colony then being torn by schism, he issued a tract for the minority sect of Friends, whereupon his press was seized and he was arrested. He was released, however, and his press was restored on his appeal to Governor Benjamin Fletcher. In 1690, with William Rittenhouse (1644-1708) and others, he established in Roxboro, Pennsylvania, now a part of Philadelphia, the first paper mill in America. In the spring of 1693 he removed to New York, where he was

appointed royal printer for the colony, a position which he held for more than fifty years; and on the 8th of November 1725 he issued the first number of the New York Gazette, the first paper established in New York and from 1725 to 1733 the only paper in the colony. Bradford died in New York on the 23rd of May 1752.

His son, Andrew Sowle Bradford (1686-1742), removed from New York to Philadelphia in 1712, and there on the 22nd of December 1719 issued the first number of the American Weekly Mercury, the first newspaper in the Middle Colonies. Benjamin Franklin, for a time a compositor in the office, char- acterized the paper as " a paltry thing, in no way interesting "; but it was continued for many years and was edited by Bradford until his death.

The latter's nephew, William Bradford (1722-1791), established in December 1742 the Pennsylvania Journal and Weekly Advertiser, which was for sixty years under his control or that of his son, and which in 1 7 74- 1 7 7 s bore the oft-reproduced device of a divided serpent with the motto " Unite or Die." He served in the War of American Independence, rising to the rank of colonel. ■ His son, William Bradford (i7SS- I 795), also served in the War of Independence, and afterwards was attorney-general of Pennsylvania (1791), a judge of the supreme court of the state, and in 1 794-1 795 attorney-general of the United States.

BRADFORD, WILLIAM (1827-1892), American marine painter, was born at New Bedford, Massachusetts. He was a Quaker, and was self-taught, painting the ships and the marine views he saw along the coast of Massachusetts, Labrador and Nova Scotia; he went on several Arctic expeditions with Dr Hayes, and was the first American painter to portray the frozen regions of the north. His pictures attracted much attention by reason of their novelty and gorgeous colour effects. His " Steamer ' Panther ' in Melville Bay, under the Light of the Midnight Sun " was exhibited at the Royal Academy in London in 1875. Bradford was 1 a member of the National Academy of Design, New York, and died in that city on the 25th of April 1892. His style was somewhat influenced by Albert van Beest, who worked with Bradford at Fairhaven for a time; but Bradford is minute and observant of detail where van Beest's aim is general effect.

BRADFORD, a city, and municipal, county and parliamentary borough, in the West Riding of Yorkshire, England, 192 m. N.N.W. of London and 8 m. W. of Leeds. Pop. (1891) 265,728; (1901) 279,767. It is served by the Midland and the North Eastern railways (Midland station), and by the Great Northern and the Lancashire & Yorkshire railways (Exchange station). It lies in a small valley opening southward from that of the

Aire, and extends up the hills on either side. Most of the principal streets radiate from a centre between the Midland and Exchange stations and the town hall. This last is a handsome building, opened in 1873, surmounted by a bell tower. The exterior is ornamented with statues of English monarchs. The council-chamber contains excellent wood-carving. The extension of the building was undertaken in 1905. The parish church of St Peter is Perpendicular, dating from 1485, and occupies the site of a Norman church. Its most noteworthy feature is the fine original roof of oak. There was no other church in the town until 181 5, but modern churches and chapels are numerous. Among educational institutions, the grammar school existed in the 16th century, and in 1663 received a charter of incorpora- tion from Charles II. It occupies a building erected in 1873, and is largely endowed, possessing several scholarships founded by prominent citizens. The technical college, under the corpora- tion since 1899, was opened in 1882,. A mechanics' institute was founded in 1832, and in 1871 the handsome mechanics' hall, close to the town hall, was opened. Other establishments are the Airedale College of students for the Independent ministry, and the United Independent College (1888). The general infirmary is the principal of numerous charitable institutions. The most noteworthy public buildings beside the town hall are St George's hall (1853), used for concerts and public meetings, the exchange (1867), extensive market buildings, and two court-houses. The Cartwright memorial hall, principally the gift of Lord Masham, opened in 1904 and containing an art gallery and museum, commemorates Dr Edmund Cartwright (1743-1823) as the inventor of the power-loom and the combing- machine. The hall stands in Lister Park, and was opened immediately before, and used in connexion with, the industrial exhibition held here in 1904. The Temperance hall is of interest inasmuch as the first hall of this character in England was erected at Bradford in 1837. Some of the great warehouses are of considerable architectural merit. Statues commemorate several of those who have been foremost in the development of the city, such as Sir Titus Salt, Mr S. C. Lister (Lord Masham), and W. E. Forster. Of several parks the largest are Lister, Peel, and Bowling parks, each exceeding fifty acres. In the last is an ancient and picturesque mansion, which formerly belonged to the Bowling or Boiling family. A large acreage of high-lying moorland near the city is maintained by the corporation as a public recreation ground.

As a commercial centre Bradford is advantageously placed with regard to both railway communication and connexion with the Humber and with Liverpool by canal, and through the presence in its immediate vicinity of valuable deposits of coal and iron. The principal textile manufactures in order of importance are worsted, employing some 36,000 hands, females

considerably outnumbering males; woollens, employing some 8000, silk and cotton. The corporation maintains a con- ditioning-hall for testing textile materials. A new hall was opened in 1902. Engineering and iron works (as at Bowling and Low Moor) are extensive; and the freestone of the neighbourhood is largely quarried, and in Bradford itself its use is general for building. It blackens easily under the influence of smoke, and the town has consequently a somewhat gloomy appearance. The trade of Bradford, according to an official estimate, advanced between 1836 and 1884 from a total of five to at least thirty-five millions sterling, and from not more than six to at least fifty staple articles. The annual turn-over in the staple trade is estimated at about one hundred millions sterling.

Bradford was created a city in 1897. The parliamentary borough returned two members from 1832 until 1885, when it was divided into three divisions, each returning one member. The county borough was created in 1888. Its boundaries in- clude the suburbs, formerly separate urban districts, of Eccles- hill, Idle and others. The corporation consists of a lord mayor (this dignity was conferred in 1907), 21 aldermen, and 63 councillors. One feature of municipal activity in Bradford deserves special notice — there is a municipal railway, opened is 1907, extending from Pateley Bridge to Lofthouse (6 m.)

and serving the Nidd valley, the district from which the main water-supply of the city is obtained. Area of the city, 22,879 acres.

Bradford, which is mentioned as having belonged before 1066, with several other manors in Yorkshire, to one Gamel, appears to have been almost destroyed during the conquest of the north of England and was still waste in 1086. By that time it had been granted to Ilbert de Lacy, in whose family it continued until 13 n. The inquisition taken after the death of Henry de Lacy, earl of Lincoln, in that year gives several interesting facts about the manor; the earl had there a hall or manor-house, a fulling mill, a market every Sunday, and a fair on the feast of St Andrew. There were also certain burgesses holding twenty-eight burgages. Alice, only daughter and heiress of Henry de Lacy, married Thomas Plantagenet, earl of Lancaster, and on the attainder of her husband she and Joan, widow of Henry, were obliged to release their rights in the manor to the king. The earl of Lancaster's attainder being reversed in 1327, Bradford, with his other property, was restored to his brother and heir, Henry Plantagenet, but again passed to the crown on the accession of Henry IV., through the marriage of John of Gaunt with Blanche, one of the daughters and heirs of Henry Plantagenet. Bradford was evidently a borough by pre-r scription and was not incorporated until 1847. Previous to that date the chief officer in the town had been the chief constable, who was appointed annually at the court leet of the manor. Before the 19th century Bradford was never

represented in parliament, but in 1832 it was created a parliamentary borough returning two members. A weekly market on Thursdays was granted to Edward de Lacy in 12 51 and confirmed in 1294 to Henry de Lacy, earl of Lincoln, with the additional grant of a fair on the eve and day of St Peter ad Vincula and three days following. In 1 48 1 Edward IV. granted to certain feoffees in whom he had vested his manor of Bradford a market on Thursday every week and two yearly fairs, one on the feast of the De- position of St William of York and two days preceding, the other on the feast of St Peter in Cathedra and two days preceding.

From the mention of a fulling mill in 13 n it is possible that woollen manufacture had been begun at that time. By the reign of Henry VIII. it had become an important industry and added much to the status of the town. Towards the end of the 17 th and beginning of the 18th century the woollen trade decreased and worsted manufacture began to take its place. Leland in his Itinerary says that Bradford is "a praty quik Market Toune. It standith much by clothing." In 1773 a piece hall was erected and for many years served as a market-place for the manufacturers and merchants of the district. On the introduction of steam-power and machinery the worsted trade advanced with great rapidity. The first mill in Bradford was built in 1798; there were 20 mills in the town in 1820, 34 in 1833, and 70 in 1841; and at the present time there are over 300, of much greater magnitude than the earlier factories. In 1836 Mr (afterwards Sir) Titus Salt developed the alpaca manufacture in the town; mohair was shortly afterwards introduced; and the great works at Saltaire were opened (see Shipley). Later, Mr S. C. Lister (Lord Masham) introduced the silk and velvet manufacture, having invented a process of manipulating silk waste, whereby what was previously treated as refuse is made into goods that will compete with those manufactured from the perfect cocoon.

See John James, History of Bradford (1844, new and enlarged ed., 1866); A. Holroyd, Collectanea Bradfordiana (1873); Victoria County History — Yorkshire.

BRADFORD, a city of McKean county, Pennsylvania, U.S.A., near the N. border of the state, about 80 m. E. by S. of Erie. Pop. (1890) 10,514; (1900) 15,029, of whom 2211 were foreign- born; (1910 census) ,544. It is served by the Pennsylvania,, the Erie, and the Buffalo, Rochester & Pittsburg railways, and is connected with Olean, New York, by an electric line. Bradford is situated 1427 ft. above sea-level in the valley of the Tuna, and is shut in by hills on either side. Since 1876 it has been on

of the most important oil centres of the state, and it has been connected by

pipe lines with cities along the Atlantic coast; petroleum refining is an important industry. Among the city's manufactures are boilers, machines, glass, chemicals, terra cotta, brick, iron pipes and couplings, gas engines, cutlery and silk. The place was first settled about 1827; in 1838 it was laid out as a town and named Littleton; in 1858 the present name, in honour of William Bradford (1755-1795), was substituted; and Bradford was incorporated as a borough in 1873, and was chartered as a city in 1879. Kendall borough was annexed to Bradford in 1893.

BRADFORD CLAY, in geology, a thin, rather inconstant bed of clay or marl situated in England at the base of the Forest Marble, the two together constituting the Bradfordian group in the Bathonian series of Jurassic rocks. The term " Bradford Clay " appears to have been first used by J. de. C. Sowerby in 1823 (Mineral Conchology, vol. v.) as an alternative for W. Smith's " Clay on Upper Oolite." The clay came into notice late in the 1 8th century on account of the local abundance of the crinoid Apiocrinus Parkinsoni. It takes its name from Bradford-on- Avon in Wiltshire, whence it is traceable southward to the Dorset coast and northward towards Cirencester. It may be regarded as a local phase of the basement beds of the Forest Marble, from which it cannot be separated upon either stratigraphical or palaeontological grounds. It is seldom more than 10 ft. thick, and it contains as a rule a few irregular layers of limestone and calcareous sandstone. The lowest layer is often highly fossiliferous; some of the common forms being Area minuta, Ostrea gregaria, Waldheimia digona, Terebratula coarctata, Cidaris bradfordensis, &c.

See H. B. Woodward, " Jurassic Rocks of Britain," Mem. Geol. Survey, vol. iv. (1904).

BRADFORD-ON-AVON, a market town in the Westbury parliamentary division of Wiltshire, England, on the rivers Avon and Kennet, and the Kennet & Avon Canal, 98 m. W. by S. of London by the Great Western railway. Pop. of urban district (1901) 4514. Its houses, all built of grey stone, rise in picturesque disorder up the steep sides of the Avon valley, here crossed by an ancient bridge of nine arches, with a chapel in the centre. Among many places of worship may be mentioned the restored parish church of Holy Trinity, which dates from the 12 th century and contains some interesting monuments and brasses; and the Perpendicular Hermitage or Tory chapel, with a 15th or 16th century chantry-house. But most notable is the Saxon church of St Lawrence, the foundation of which is generally attributed, according to William of Malmesbury (n 2 5), to St Aldhelm, early in the 8th century. It consists of a chancel, nave and porch, in such unchanged condition that E. A. Freeman considered it " the most perfect surviving church of its kind in England, if not in Europe." It has more lately, however, been held that the present building is not Aldhelm's,

but a restoration, dating from about 975, and attributable to the influence of Dunstan, archbishop of Canterbury. Kingston House, long the seat of the dukes of Kingston, is a beautiful example of early 17th-century domestic architecture. The local industries include the manufacture of rubber goods, brewing, quarrying and iron-founding.

Bradford (Bradauford, Bradeford) was the site of a battle in 652 between Kenwal and his kinsman Cuthred. A monastery existed here in the 8th century, of which St Aldhelm was abbot at the time of his being made bishop of Sherborne in A. D. 705. In 1001 ˆEthelred gave this monastery and the town of Bradford to the nunnery of Shaftesbury, in order that the nuns might have a safe refuge against the insults of the Danes. No mention of the monastery occurs after the Conquest, but the nunnery of Shaftesbury retained the lordship of the manor until the dissolution in the reign of Henry VIII. In a synod held here in 954, Dunstan was elected bishop of Win- chester. Bradford appears as a borough in the Domesday survey, and is there assessed at 42 hides. No charter of incorporation is recorded, however, and after returning two members to the parlia- ment of 1295 the town does not appear to have enjoyed any of the privileges of a borough. The market is of ancient origin, and was formerly held on Monday; in the survey the tolls are assessed at £5 shillings. Bradford was at one time the centre of the clothing industry in the west of England, and was especially famous for its

broadcloths and mixtures, the waters of the Avon being especially favourable to the production of good colours and superior dyes. The industry declined in the 1 8th century, and in 1740 we find the woollen merchants of Bradford petitioning for an act of parliament to improve their trade and so re-establish their credit in foreign markets.

BRADLAUGH, CHARLES (1833-1891), English free-thinker and politician, was born at Hoxton, London, on the 26th of September 1833. His father was a poor solicitor's clerk, who also had a small business as a law stationer, and his mother had been a nursemaid. At twelve years old he became office-boy to his father's employer, and at fourteen wharf-clerk and cashier to a coal merchant in the City Road. He had been baptized and brought up in the Church of England, but he now came into con- tact with a group of free-thinkers who were disciples of Richard Carlile. He was hastily labelled an " atheist," and was turned out of his situation. Thus driven into the arms of the secularists, he managed to earn a living by odd jobs, and became further immersed in the study of free-thought. At the end of 1850 he enlisted as a soldier, but 01,1853 was bought out with money pro- vided by his mother. He then found employment as a lawyer's clerk, and gradually became known as a free-thought lecturer, under the name of " Iconoclast." From i860 he conducted the National Reformer for several

years, and displayed much resource in legal defence when the paper was prosecuted by the govern- ment on account of its alleged blasphemy and sedition in 1868- 1869. Bradlaugh became notorious as a leading "infidel," and was supported by the sympathy of those who were enthusi- asts at that time for liberty of speech and thought. He was a constant figure in the law courts; and his competence to take the oath was continually being called in question, while his atheism and republican opinions were adduced as reasons why no jury should give damages for attacks on his character. In 1874 he became acquainted with Mrs Annie Besant (b. 1847), who afterwards became famous for her gifts as a lecturer on socialism and theosophy. She began by writing for the National Reformer and soon became co-editor. In 1876 the Bristol publisher of an American pamphlet on the population question, called Fruits of Philosophy, was indicted for selling a work full of indecent physiological details, and, pleading guilty, was lightly sentenced; but Bradlaugh and Mrs Besant took the matter up, in order to vindicate their ideas of liberty, and aggressively republished and ' circulated the pamphlet. The prosecution which resulted created considerable scandal. They were con- victed and sentenced to a heavy fine and imprisonment, but the sentence was stayed and the indictment ultimately quashed on a technical point. The affair, however, had several side issues in the courts- and led to much prejudice against the defendants, the distinction being ignored between a protest against the sup- pression of opinion and the championship of the particular opinions in question. Mrs Besant's close alliance with Bradlaugh eventually terminated in 1886, when she drifted from secularism, first into socialistic and labour agitation and then into theosophy as a pupil of Mme Blavatsky. Bradlaugh himself took up politics with increasing fervour. He had been unsuccessful in standing for Northampton in 1868, but in 1880 he was returned by that constituency to parliament as an advanced Radical. A long and sensational parliamentary struggle now began. He claimed to be allowed to affirm under the Parliamentary Oaths Act, and the rejection of this pretension, and the refusal to allow him to take the oath on his professing his willingness to do so, terminated in Bradlaugh's victory in 1886. But this result was not obtained without protracted scenes in the House, in which Lord Randolph Churchill took a leading part. When the long struggle was over, the public had gradually got used to Bradlaugh, and his transparent honesty and courageous contempt for mere popularity gained him increasing respect. Experience of public life in the House of Commons appeared to give him a more balanced view of things; and before he died, on the 30th of January 1891, the progress of events was such that it was beginning to be said of him that he was in a fair way to end as a Conservative. Hard, arrogant and dogmatic, with a powerful physique and a real gift for popular oratory, he was a natural

leader in causes which had society against them, but his sincerity was as unquestionable as his combativeness.

His Life was written, from a sympathetic point of view, with much interesting detail as to the history of secularism, by his daughter, Mrs Bradlaugh Bonner, and J. M. Robertson (1894).

BRADLEY, GEORGE GRANVILLE (1821-1903), English divine and scholar, was born on the nth of December 1821, his father, Charles Bradley, being at that time vicar of Glasbury, Brecon. He was educated at Rugby under Thomas Arnold, and at University College, Oxford, of which he became a fellow in 1844. He was an assistant master at Rugby from 1846 to 1858, when he succeeded G. E. L. Cotton as headmaster at Marlborough. In 1870 he was elected master of his old college at Oxford, and in August 1881 he was made dean of Westminster in succession to A. P. Stanley, whose pupil and intimate friend he had been, and whose biographer he became. Besides his Recollections of A. P. Stanley (1883) and Life of Dean Stanley (1892), he published Aids to writing Latin Prose Composition and Lectures on Job (1884) and Ecclesiastes (1885). He took part in the coronation of Edward VII., resigned the deanery in 1902, and died on the 13 th of March 1903.

Dean Bradley's family produced various other members distinguished in literature. His half-brother, Andrew Cecil Bradley (b. 1851), fellow of Balliol, Oxford, became professor of modern literature and history (1881) at University College, Liverpool, and in 1889 regius professor of English language and literature at Glasgow University; and he was professor of poetry at Oxford (1901-1906). Of Dean Bradley's own children the most distinguished in literature were his son, Arthur Granville Bradley (b. 1850), author of various historical and topographical works; and especially his daughter, Mrs Margaret Louisa Woods (b. 1856), wife of the Rev. Henry George Woods, president of Trinity, Oxford (1887-1897), and master of the Temple (1904), London. Mrs Woods became well known for her accomplished verse (Lyrics and Ballads, 1889), largely influenced by Robert Bridges, and for her novels, of which her Village Tragedy (1887) was the earliest and strongest.

BRADLEY, JAMES (1693-1762), English astronomer, was born at Sherborne in Gloucestershire in March 1693. He entered Balliol College, Oxford, on the 15th of March 1711, and took degrees of B.A. and M.A. in 1714 and 1717 respectively. His early observations were made at the

rectory of Wanstead in Essex, under the tutelage of his uncle, the Rev. James Pound (1669-1724), himself a skilled astronomer, and he was elected a fellow of the Royal Society on the 6th of November 17 18. He took orders on his presentation to the vicarage of Bridstow in the following year, and a small sinecure living in Wales was besides procured for him by his friend Samuel Molyneux (1689-1728). He, however, resigned his ecclesiastical preferments in 172 1, on his appointment to the Savilian professorship of astronomy at Oxford, while as reader on experimental philosophy (1729-1760) he delivered 79 courses of lectures in the Ashmolean museum. His memorable discovery of the aberration of light (see Aberration) was communicated to the Royal Society in January 1729 (Phil. Trans, xxxv. 637). The observations upon which it was founded were made at Molyneux's house on Kew Green. He refrained from announcing the supplementary detection of nutation (q.v.) until the 14th of February 1748 (Phil. Trans, xlv. 1), when he had tested its reality by minute observations during an entire revolution (18 -6 years) of the moon's nodes. He had meantime (in 1742) been appointed to succeed Edmund Halley as astronomer royal; his enhanced reputation enabled him to apply successfully for an instrumental outfit at a cost of £1000; and with an 8-foot quadrant completed for him in 1750 by John Bird (1709-17 76), he accumulated at Greenwich in ten years materials of inestimable value for the reform of astronomy. A crown pension of £250 a year was conferred upon him in 1752. He retired in broken health, nine years later, to Chalford in Gloucestershire, and there died on the 13th of July 1762. The printing of his observations was delayed by disputes about their ownership; but they were finally issued from the Clarendon Press, Oxford, in two folio

volumes (1798, 1805). The insight and industry of F. W. Bessel were, however, needed for the development of their fundamental importance.

Rigaud's Memoir prefixed to Miscellaneous Works and Corre- spondence of James Bradley, D.D. (Oxford, 1832), is practically exhaustive. Other sources of information are: New and General Biographical Dictionary, xii. 54 (1767); Biog. Brit. (Kippis) ; Fouchy's " Eloge," Paris Memoirs (1762), p. 231 (Histoire); Delambre's Hist, de I'astronomie au i8 me siecle, p. 413.

BRADSHAW, GEORGE (1801-1853), English printer and publisher, was born at Windsor Bridge, Pendleton, Lancashire, on the 29th of July 1801. On leaving school he was apprenticed to an engraver at Manchester, eventually setting up on his own account in that city as an engraver and printer — principally of maps. His name was already known as the publisher of Brad- skaw's Maps of Inland Navigation, when in 1839, soon after the introduction of railways, he published, at sixpence, Bradshaw's Railway Time Tables, the title being changed in 1840 to Brad- shaw's Railway Companion, and the price raised to one shilling. A new volume

was issued at occasional intervals, a supplementary monthly time-sheet serving to keep the book up to date. In December 1841, acting on a suggestion made by his London agent, Mr W. J. Adams, Bradshaw reduced the price of his time-tables to the original sixpence, and began to issue them monthly under the title Bradshaw's Monthly Railway Guide. In June 1847 was issued the first number of Bradshaw's Con- tinental Railway Guide, giving the time-tables of the Continental railways just as Bradshaw's Monthly Railway Guide gave the time-tables of the railways of the United Kingdom. Bradshaw, who was a well-known member of the Society of Friends, and gave considerable time to philanthropic work, died in 1853.

BRADSHAW, HENRY (c. 1450-1513), English poet, was born at Chester. In his boyhood he was received into the Benedictine monastery of St Werburgh, and after studying with other novices of his order at Gloucester (afterwards Worcester) College, Oxford, he returned to his monastery at Chester. He wrote a Latin treatise De anliquitate et magnificentia Urbis Cestriae, which is lost, and a life of the patron saint of his monastery in English seven-lined stanza. This work was completed in the year of its author's death, 1513, mentioned in " A balade to the auctour " printed at the close of the work. A second ballad describes him as " Harry Braddeshaa, of Chestre abbey monke." Bradshaw disclaims the merit of originality and quotes the authorities from which he translates — Bede, William of Malmesbury, Giraldus Cambrensis, Alfred of Beverley, Henry of Huntingdon, Ranulph Higden, and especially the " Passionary " or life of the saint preserved in the monastery. The poem, therefore, which is defined by its editor, Dr Carl Horstmann, as a "legendary epic," is rather a compilation than a translation. It contains a good deal of history beside the actual life of the saint. St Werburgh was the daughter of Wulfere, king of Mercia, and Bradshaw gives a description of the kingdom of Mercia, with a full account of its royal house. He relates the history of St Ermenilde and St Sexburge, mother and grandmother of Werburgh, who were successively abbesses of Ely. He does not neglect the miraculous elements of the story, but he is more attracted by historical fact than legend, and the second book narrates the Danish in- vasion of 875, and describes the history and antiquities of Chester, from its foundation by the legendary giant Leon Gaur, from which he derives the British name of Caerleon, down to the great fire which devastated the city in 1180, but was suddenly ex- tinguished when the shrine of St Werburgh was carried in pro- cession through the streets. The Holy Lyfe and History of saynt Werburge very frutefull for all Christen people to rede (printed by Richard Pynson, 1521) has been very variously estimated. Thomas Warton, who deals with Bradshaw at some length, 1 quotes as the most splendid passage of the poem the description of the feast preceding Werburgh's entry into the religious life. He considered Bradshaw's versification " infinitely inferior to

Lydgate's worst manner." Dr Horstmann, on the other hand, finds in the poem " original genius, of a truly epic tone, with a

1 History of English Poetry (ed. W. C. Hazlitt, 1871; iii. op. 140- H9)-

native simplicity of feeling which sometimes reminds the reader of Homer." Most readers will probably adopt a view between these extremes. Bradshaw expresses the humblest opinion of his own abilities, and he certainly had no delicate ear for rhythm. His sincerity is abundantly evident, and his piety is admitted even by John Bale, 1 hostile as he was to monkish writers. W. Herbert 2 thought that a Lyfe of Saynt Radegunde, also printed by Pynson, was certainly by Bradshaw. The only extant copy is in the Britwell library.

Pynson's edition of the Holy Lyfe is very rare, only five copies being known. A reprint copying the original type was edited by Mr, Edward Hawkins for the Chetham Society in 1848, and by Dr Carl Hortsmann for the Early English Text Society in 1887.

BRADSHAW, HENRY (1831-1886), British scholar and librarian, was born in London on the 2nd of February 183 1, and educated at Eton. He became a fellow of King's College, Cambridge, and after a short scholastic career in Ireland he ac- cepted an appointment in the Cambridge university library as an extra assistant. When he found that his official duties absorbed all his leisure he resigned his post, but continued to give his time to the examination of the MSS. and early printed books in the library. There was then no complete catalogue of these sections, and Bradshaw soon showed a rare faculty for investigations respecting old books and curious MSS. In addition to his achievements in black-letter bibliography he threw great light on ancient Celtic language and literature by the discovery, in 1857, of the Book of Deer, a manuscript copy of the Gospel in the Vulgate version, in which were inscribed old Gaelic charters. This was published by the Spalding Club in 1869. Bradshaw also discovered some Celtic glosses on the MS. of a metrical paraphrase of the Gospels by Juvencus. He made another find in the Cambridge library of considerable philological and historical importance. Cromwell's envoy, Sir Samuel Morland (1625-1695), had brought back from Piedmont MSS. containing the earliest known Waldensian records, consisting of translations from the Bible, religious treatises and poems. One of the poems referred the work to the beginning of the nth century, though the MSS. did not appear to be of earlier date than the 15th century. On this Morland had based his theory of the antiquity of the Waldensian doctrine, and, in the absence of the

MSS., which were supposed to be irretrievably lost, the conclusion was accepted. Bradshaw discovered the MSS. in the university library, and found in the passage indicated traces of erasure. The original date proved to be 1400. Incidentally the correct date was of great value in the study of the history of the language. He had a share in exposing the frauds of Constan- tine Simonides, who had asserted that the Codex Sinaiticus brought by Tischendorf from the Greek monastery of Mount Sinai was a modern forgery of which he was himself the author. Bradshaw exposed the absurdity of these claims in a letter to the Guardian (January 26, 1863). In 1866 he made a valuable contribution to the history of Scottish literature by the discovery of 2200 lines on the siege of Troy incorporated in a MS. of Lydgate's Troye Booke, and of the Legends of the Saints, an important work of some 40,000 lines. These poems he attributed, erroneously, as has since been proved, to Barbour (q.v.). Un- fortunately Bradshaw allowed his attention to be distracted by a multiplicity of subjects, so that he has not left any literary work commensurate with his powers. The strain upon him was increased when he was elected (1867) university Librarian, and as dean of his college (1857-1865) and praelector (1863-1868) he was involved in further routine duties. Besides his brilliant isolated discoveries in bibliography, he did much by his untiring zeal to improve the standard of library administration. He died very suddenly on the 10th of February 1886. His fugitive papers on antiquarian subjects were collected and edited by Mr F. Jenkinson in 1889.

An excellent Memoir of Henry Bradshaw, by Mr G. W. Prothero, appeared in 1888. See also C. F. Newcombe, Some Aspects of the Work of Henry Bradshaw (1905).

1 Scriptorum Illustrium, cant. ix. No. 17.

2 Ames, Typographical Antiquities (ed. W. Herbert, 1785; i. p. 294).

BRADSHAW, JOHN (1602-1659), president of the "High Court of Justice " which tried Charles I., was the second son of Henry Bradshaw, of Marple and Wibersley in Cheshire. He was baptized on the 10th of December 1602, was educated at Banbury in Cheshire and at Middleton in Lancashire, studied subsequently with an attorney at Congleton, was admitted into Gray's Inn in 1620, and was called to the bar in 1627, becoming a bencher in 1647. He was mayor 'of Congleton in 1637, and later high steward or recorder of the borough. According to Milton he was assiduous in his legal studies and acquired considerable reputation and practice at the bar. On the 21st of September 1643 he was appointed judge of the sheriff's court in London. In October 1644 he was counsel with Prynne in the prosecution of Lord Maguire and Hugh Macmahon, implicated in the Irish rebellion, in 1645 Ior John Lilburne in his appeal to

the Lords against the sentence of the Star Chamber, and in 1647 in the prosecution of Judge Jenkins. On the 8th of October 1646 he had been nominated by the Commons a commissioner of the great seal, but his appointment was not confirmed by the Lords. In 1647 he was made chief justice of Chester and a judge in Wales, and on the 12th of October 1648 he was presented to the degree of serjeant-at-law. On the 2nd of January 1649 the Lords threw out the ordinance for bringing the king to trial, and the small remnant of the House of Commons which survived Pride's Purge, consisting of 53 independents, determined to carry out the ordinance on their own authority. The leading members of the bar, on the parliamentary as well as on the royalist side, having refused to participate in proceedings not only illegal and unconstitutional, but opposed to the plainest principles of equity, Bradshaw was selected to preside, and, after some pro- testations of humility and unfitness, accepted the office. The king refused to plead before the tribunal, but Bradshaw silenced every legal objection and denied to Charles an opportunity to speak in his defence. He continued after the king's death to conduct, as lord president, the trials of the royalists, including the duke of Hamilton, Lord Capel, and Henry Rich, earl of Holland, all of whom he condemned to death, his behaviour being especially censured in the case of Eusebius Andrews, a royalist who had joined a conspiracy against the government. He received large rewards for his services. He was appointed in 1649 attorney-general of Cheshire and North Wales, and chancellor of the duchy of Lancaster, and was given a sum of £1000, together with confiscated estates worth £2000 a year. He had been nominated a member of the council of state on the 14th of February 1649, an d on the 10th of March became president. He disapproved strongly of the expulsion of the Long Parliament, and on Cromwell's coming subsequently to dismiss the council Bradshaw is said, on the authority of Ludlow, to have confronted him boldly, and denied his power to dissolve the parliament. An ardent republican, he showed himself ever afterwards an uncompromising adversary of Cromwell. He was returned for Stafford in the parliament of 1654, and spoke strongly against vesting power in a single person. He refused to sign the " en- gagement " drawn up by Cromwell, and in consequence withdrew from parliament and was subsequently suspected of complicity in plots against the government. He failed to obtain a seat in the parliament of 1656, and in August of the same year Cromwell attempted to remove him from the chief-justiceship of Cheshire. After the abdication of Richard Cromwell, Bradshaw again entered parliament,became a member of the council of state, and on the 3rd of June 1659 was appointed a commissioner of the great seal. His health, however, was bad, and his last public effort was a vehement speech, in the council, when he declared his abhorrence of the arrest of Speaker Lenthall. He died on the 3i9t of October 1659, andwas buried in Westminster Abbey. His body was disinterred at the Restoration, and

exposed on a gibbet along with those of Cromwell and Ireton. Bradshaw married Mary , daughter of Thomas Marbury of Marbury, Cheshire, but left no children.

BRADWARDINE, THOMAS (c. 1290-1349), English arch- bishop, called " the Profound Doctor," was born either at Hart- field in Sussex or at Chichester. He was educated at Merton

College, Oxford, where he took the degree of doctor of divinity, and acquired the reputation of a profound scholar, a skilful mathe- matician and an able divine. He was afterwards raised to the high offices of chancellor of the university and professor of divinity. From being chancellor of the diocese of London, he became chap- lain and confessor to Edward III., whom he attended during his wars in France. On his return to England, he was successively appointed prebendary of Lincoln, archdeacon of Lincoln (1347), and in 1349 archbishop of Canterbury. He died of the plague at Lambeth on the 26th of August 1349, forty days after his consecration. Chaucer in his Nun's Priest's Tale ranks Brad- wardine with St Augustine. His great work is a treatise against the Pelagians, entitled De causa Dei contra Pelagium et de virtute causarum, edited by Sir Henry Savile (London, 1618). He wrote also De Geometric, speculativa (Paris, 1530); De Arithmetica practica (Paris, 1502); De Proportionibus (Paris, 1495; Venice, 1505) ; De Quadratura Circuit (Paris, 149s) ; and an Ars Mentora- tiva, Sloane MSS. No. 3974 in the British Museum.

See Quetif-£chard, Script. Praedic. (1719), i. 744; W. F. Hook, Lives of the Archbishops of Canterbury, vol. iv.

BRADY, NICHOLAS (1659-1726), Anglican divine and poet, was born at Bandon, Co. Cork, on the 28th of October 1659. He received his education at Westminster school, and at Christ Church, Oxford; but he graduated at Trinity College, Dublin. He took orders, and in 1688 was made a prebendary of Cork. He was a zealous promoter of the Revolution and suffered in consequence. When the troubles broke out in Ireland in 1690, Brady, by his influence, thrice prevented the burning of the town of Bandon, after James II. had given orders for its destruction; and the same year he was employed by the people of Bandon to lay their grievances before the English parliament. He soon afterwards settled in London, where he obtained various pre- ferments. At the time of his death, on the 20th of May 1726, he held the livings of Clapham and Richmond. Brady's best-known work is his metrical version of the Psalms, in which Nahum Tate collaborated with him. It was licensed in 1696, and largely ousted the old version of T. Sternhold and J. Hopkins. He also translated Virgil's Aeneid, and wrote several smaller poems and dramas, as well as sermons.

BRAEKELEER, HENRI JEAN AUGUSTIN DE (1840-1888), Belgian painter, was born at Antwerp. He was trained by his father, a genre painter, and his uncle, Baron Henri Leys, and devoted himself to scenes of everyday Antwerp life. The first pictures he exhibited, "The Laundry" (Van Cutsem collection, Brussels), and " The Coppersmith's Workshop " (Vleeshovwer collection, Antwerp), were shown at the Antwerp exhibition in 1861. He received the gold medal at Brussels in 1872 for " The Geographer " and " The Lesson " (both in the Brussels gallery); the gold medal at Vienna in 1873 for " The Painter's Studio" and "Grandmother's Birthday"; and the medal of honour at the Exposition Universelle at Amsterdam for " The Pilot House." Among his more notable works are "A Shoemaker" (1862), "A Tailor's Workroom" (1863), " A Gardener " (1864, Antwerp gallery), " Interior of a Church " (1866), "Interior, Flanders" (1867), "Woman spinning" (1869), " Manreading " (1871), " The rue du Serment, Antwerp " (1875), "A Copperplate Printer," "The Sailor's Return," " The Man at the Window " (Couteaux collection, Brussels), ' The Horn-blower " (Couteaux collection), " Man retouching a Picture " (Couteaux collection), " The Potters " (Marlier collec- tion, Brussels), " Staircase in the Hydraulic House at Antwerp " (Marlier collection), and "The Brewer's House at Antwerp" (Marlier collection) . The last, better known as " A Man sitting," is generally regarded as his masterpiece. As a lithographer and etcher, his work resembles that of Henri Leys. Towards the end of his life de Braekeleer did some dot painting (pointillisme) , in which he achieved admirable effects of light.*

BRAEMAR, a district in S.W. Aberdeenshire, Scotland, extending from Ballater in the E. to Glen Dee in the W., a distance of 24 m. with a breadth varying from 3 to 6 m. It is drained throughout by the river Dee, both banks of which are bounded by hills varying from 1000 to nearly 3000 ft. in. height.

The whole area is distinguished by typical Highland scenery, and is a resort alike for sportsmen and tourists. The villages and clachans (Gaelic for hamlet) being situated at an altitude of from 600 to more than 1000 ft. above the sea, the air is everywhere pure and bracing. The deer forests comprise the royal forests of Balmoral and Ballochbuie, Glen Ey Forest, Mar Forest and Invercauld Forest. At various points on either side of the Dee, granite castles, mansions and lodges have been built, mostly in the Scottish baronial style, and all effectively situated with reference to the wooded hills or the river. The chief of these are Balmoral and Abergeldie Castles belonging to the crown, Inver- cauld House, Braemar Castle, Mar Lodge and Old Mar Lodge. Castleton of Braemar • is the foremost of the villages, being sometimes styled the capital of the Deeside Highlands. Its public buildings include halls erected by the duke of Fife and Colonel Farquharson of Invercauld to commemorate the Victorian jubilee of 1887.

Not far from the spot where the brawling Clunie joins the Dee the earl of Mar raised the standard of revolt in 1 71 5. His seat, Braemar Castle, reputed to be a hunting-lodge of Malcolm Canmore, was forfeit along with the estates. The new castle built by the purchasers in 1 720 was acquired at a later date by Farquharson of Invercauld, who gave government the use of it during the pacification of the Highlands after the battle of Cullodenin 1746. Population of Crathie and Braemar(i9oi)i4S2.

BRAG, a very old game of cards, probably evolved from the ancient Spanish primero, played by five or six, or more players. It is the ancestor of poker. A full pack is used, the cards ranking as at whist, with certain exceptions. There are no trumps. Each player receives three cards and puts up three stakes. The last round is dealt face upwards: the holder of the highest card irrespective of suits wins the first stake from all the players. In the case of equality the elder hand wins, but the ace of dia- monds is always a winning card. For the second stake the players. brag or bet against each other, if they hold either a pair, or a pair-royal (three cards of the same rank). Pairs and pairs-royal take precedence according to the value of the cards composing them, but any pair-royal beats any pair. The knave of clubs may be counted as any card, e.g. two twos and the knave of clubs rank as a pair-royal in twos; two aces and the knave as a pair-, royal in aces. Sometimes the knave of diamonds is allowed, the same privilege, but is inferior to the club knave; e.g. two threes and the club would beat the other two threes and the diamond. Players who accept another's brag must cover his. bet and offer another. The third stake is won by the player whose cards make 31 or are nearest to 31 by their pips, aces and court counting ten; but the ace may by arrangement count as 1 or n. Players may draw from the stock, losing if < they over-draw. If one player wins all three stakes,' he may receive the value of another stake, or of two or three stakes, all round, as arranged. The deal passes as at whist. Each player should have the same number of deals before the game is abandoned.

BRAGA, a city of northern Portugal, formerly included in the province of Entre Minho e Douro, situated on the right- bank of the small river Deste near its source, and at the head of a railway from Oporto. Pop. (1900) 24,202. Braga, which ranks after Lisbon and Oporto as the third city of the kingdom, is the capital of an administrative district, and an archiepiscopal see. Its cathedral, founded in the 12th century, was rebuilt during the 1 6th century in the blend of Moorish and florid Gothic styles known as Manoellian. It contains several tombs of considerable historical interest, some fine woodwork carved in the 15th century, and a collection of ancient vestments, plate and other objects of art. Among the other churches Santa Cruz is note- worthy for its handsome facade, which dates from 1642. There are several convents, an archiepiscopal palace, a library, con- taining many rare books and manuscripts, an orphan asylum, and a

large hospital; also the ruins of a theatre, a temple and an aqueduct of Roman workmanship, and a great variety of minor antiquities of different ages. The principal manufactures are firearms, jewelry, cutlery, cloth and felt hats. Large cattle fairs are held in June and September, for cattle-breeding and

dairy-farming are among the foremost local industries. On a hill about 3 m. E. by S. stands the celebrated sanctuary of Bom Jesus, or Bom Jesus do Monte, visited at Whitsuntide by many thousands of pilgrims, who do public penance as they ascend to the shrine; and about 1 m. beyond it is Mount Sameiro (2535 ft.), crowned by a colossal statue of the Virgin Mary, and com- manding a magnificent view of the mountainous country which culminates in the Serra do Gerez, on the north-east.

Braga is the Roman Bracara Augusta, capital of the Callaici Bracarii, or Bracarenses, a tribe who occupied what is now Galicia and northern Portugal. Early in the 5th century it was taken by the Suevi; but about 485 it passed into the hands of the Visigothic conquerors of Spain, whose renunciation of the Arian and Priscillianist heresies, at two synods held here in the 6th century, marks the origin of its ecclesiastical greatness. The archbishops of Braga retain the title of primate of Portugal, and long claimed supremacy over the Spanish church also; but their authority was never accepted throughout Spain. From the Moors, who captured Braga early in the 8th century, the city was retaken in 1040 by Ferdinand I., king of Castile and Leon; and from 1093 to 1 147 it was the residence of the Portuguese court.

The administrative district of Braga coincides with the central part of the province of Entre Minho e Douro (q.v.). Pop. (1900) aST,ˆ – Area, 1040 sq. m.

BRAGANZA (Braganqa), the capital of an administrative district formerly included in the province of Traz-os-Montes, Portugal; situated in the north-eastern extremity of the kingdom, on a branch of the river Sabor, 8 m. S. of the Spanish frontier. Pop. (1900) 5535. Braganza is an episcopal city. It consists of a walled upper town, containing the cathedral college and hospital, and of a lower or modern town. Large tracts of the surrounding country are uncultivated, partly because railway communication is lacking and the roads are bad. Except farming, the chief local industry is silkworm-rearing and the manufacture of silk. The administrative district of Braganza coincides with the eastern part of Traz-os-Montes (q.v.). Pop.

(1900) 185,162; area, 2513 sq. m.

The city gave its name to the family of Braganza, members of which were rulers of Portugal from 1640 to 1853, and emperors of Brazil from 1822 to 1889. This family is descended from Alphonso (d. 1461), a natural son of John I., king of Portugal (d. 1433), who was a natural son of King Peter I., and con- sequently belonged to the Portuguese branch of the Capetian family. Alphonso was made duke of Braganza in 1442, and in 1483 his grandson, Duke Ferdinand II., lost his life through heading an insurrection against King John II. In spite of this Ferdinand's descendants acquired great wealth, and several of them held high office under the kings of Portugal. Duke John I. (d. 1583) married into the royal family, and when King Henry II. died without direct heirs in 1580, he claimed the crown of Portugal in opposition to Philip II. of Spain. John, however, was unsuccessful, but, when the Portuguese threw off the Spanish dominion in 1640, his grandson, John II., duke of Braganza, became king as John IV. In 1807, when Napoleon declared the throne of Portugal vacant, King John VI. fled to Brazil; but he regained his inheritance after the fall of Napoleon in 1 8 14, although he did not return to Europe until 182 1, when he left his elder son Peter to govern Brazil. In 1822 a revolution established the independence of Brazil with Peter as emperor. In 1826 Peter became king of Portugal on the death of his father; but he at once resigned the crown to his young daughter Maria, and appointed his brother Miguel to act as regent. Miguel soon declared himself king, but after a stubborn struggle was driven from the country in 1833, after which Maria became queen. Maria married for her second husband Ferdinand (d. 1851), son of Francis, duke of Saxe-Coburg; and when she died in 1853 the main Portuguese branch of the family became extinct. Maria was succeeded by her son Louis I., father of Charles I., who ascended the throne of Portugal in 1889. The empire of Brazil descended on the death of Peter I. to his son Peter II., who was expelled from the country in 1889. When Peter died in 1891 this branch of the family also became extinct

in the male line. His only child, Isabella, married Louis Gaston of Orleans, count of Eu. The exiled king, Miguel, founded a branch of the family of Braganza which settled in Bavaria, and various noble families in Portugal are descended from cadets of this house. The title of duke of Braganza is now borne by the eldest son of the king of Portugal.

BRAGG, BRAXTON (1817-1876), American soldier, was born in Warren county, North Carolina, on the 22nd of March 1817. He graduated at the United States military academy in 1837, and as an artillery officer served in the Seminole wars of 1837 and 1 84 1, and under General Taylor in Mexico. For gallant conduct at Fort Brown, Monterey and Buena Vista, he received the brevets of captain, major and lieutenant-colonel. He resigned

from the regular army on the 3rd of January 1856, and retired to his plantation in Louisiana. From 1859 to 1861 he was commissioner of the board of public works of the state. When in 1861 the Civil War began, Bragg was made a brigadier- general in the Confederate service, and assigned to command at Pensacola. In February 1862, having meanwhile become major-general, he took up a command in the Army of the Mississippi, and he was present at the battle of Shiloh (April). The vacancy created by the death of Sidney Johnston at that battle was filled by the promotion of Bragg to full general's rank, and he succeeded General Beauregard when that officer retired from the Western command. In the autumn of 1862 he led a bold advance from Eastern Tennessee across Kentucky to Louisville, but after temporary successes he was forced to retire before Buell, and after the battle of Perryville (8th October) retired into Tennessee. Though the material results of his campaign were considerable, he was bitterly censured, and his removal from his command was urged. But the personal favour of Jefferson Davis kept him, as it had placed him, at the head of the central army, and on the 31st of December 1862 and 2nd of January 1863 he fought the indecisive battle of Murfreesboro (or Stone river) against Rosecrans, Buell's successor. In the cam- paign of 1863 Rosecrans constantly outmanoeuvred the Con- federates, and forced them back to the border of Georgia. Bragg, however, inflicted a crushing defeat on his opponent at Chicka- mauga (September 19-20) and for a time besieged the Union forces , in Chattanooga. But enormous forces under Grant were concen- trated upon the threatened spot, and the great battle of Chatta- nooga (November 23-25) ended in the rout of the Confederates. Bragg was now deprived of his command, but President Davis made him his military adviser, and in that capacity he served during 1864. In the autumn of that year he led an inferior force from North Carolina to Georgia to oppose Sherman's march. In February 1865 he joined Johnston, and he was thus included in the surrender of that officer to Sherman. After the war he became chief engineer to the state of Alabama, and supervised improvements in Mobile harbour. He died suddenly at Galveston, Texas, on the 27th of September 1876. General Bragg, in spite of his want of success, was unquestionably a brave and skilful officer. But he was a severe martinet, and rarely in full accord with the senior officers under his orders, the consequent friction often acting unfavourably on the conduct of the operations.

His brother, Thomas Bragg (1810-1872), was governor of North Carolina 1855-1859, U.S. senator 1859-1861, and attorney- general in the Confederate cabinet from Nov. 1861 to March 1862.

BRAGI, in Scandinavian mythology, the son of Odin, and god of wisdom, poetry and eloquence. At the Scandinavian sacrifi- cial feasts a horn consecrated to Bragi was used as a drinking- cup by the guests, who then

vowed to do some great deed which would be worthy of being immortalized in verse.

BRAHAM, JOHN (c. 1774-1856), English vocalist, was born in London about 1774, of Jewish parentage, his real name being Abraham. His father and mother died when he was quite young. Having received lessons in singing from an Italian artist named Leoni, he made his first appearance in public at Covent Garden theatre on the 21st of April r.787, when he sang " The soldier tired of war's alarms " and " Ma ch'ere arrive." On the breaking of his voice, he had to support himself by teaching the

pianoforte. In a few years, however, he recovered his voice, which proved to be a tenor of exceptionally pure and rich quality. His second debut was made in 1794 at the Bath concerts, to the conductor of which, Rauzzini, he was indebted for careful training extending over a period of more than two years. In 1796 he reappeared in London at Drury Lane in Storace's opera of Mahmoud. Such was his success that ' he obtained an engagement the next year to appear in the Italian opera house in Gretry's Azor et Zemire. He also sang in oratorios and was engaged for the Three Choir festival at Gloucester. With the view of perfecting himself in his art he set out for Italy in the autumn of 1797. On the way he gave some concerts at Paris, which proved so successful that he was induced to remain there for eight months. His career in Italy was one of continuous triumph; he appeared in all the principal opera-houses, singing in Milan, Genoa, Leghorn and Venice. His compass embraced about nineteen notes, his management of the falsetto being perfect. In 1801 he returned to his native country, and ap- peared once more at Covent Garden in the opera Chains of the Heart, by Mazzinghi and Reeve. So great was his popularity that an engagement he had made when abroad to return after a year to Vienna was renounced, and he remained henceforward in England. In 1824 he sang the part of Max in the English version of Weber's Der Freischiitz, and he was the original Sir Huon in that com- poser's Oberon in 1826. Braham made two unfortunate specula- tions on a large scale, one being the purchase of the Colosseum in the Regent's Park in 1831 for £40,000, and the other the erection of the St James's theatre at a cost of £26,000 in 1836. In 1838 he sang the part of William Tell at Drury Lane, and in 1839 the part of Don Giovanni. His last public appearance was at a concert in March 1852. He died on the 17th of February 1856. There is, perhaps, no other case upon record in which a singer of the first rank enjoyed the use of his voice so long; between Braham's first and last public appearances considerably more than sixty years intervened, during forty of which he held the

undisputed supremacy alike in opera, oratorio and the concert-room. Braham was the composer of a number of vocal pieces, which being sung by himself had great temporary popularity, though they had little intrinsic merit, and are now deservedly forgotton. A partial exception must be made in favour of "The Death of Nelson," originally written in 181 1 as a portion of the opera The American; this still keeps its place as a standard popular English song.

BRAHE, PER, Count (1602-1680), Swedish soldier and states- man, was born on the island of Rydboholm, near Stockholm, on the 18th of February 1602. He was the grandson of Per Brahe (1520-1590), one of Gustavus I.'s senators, created count of Visingsborg by Eric XIV., known also as the continuator of Peder Svart's chronicle of Gustavus I., and author of Oeconomia (1585), a manual for young noblemen. Per Brahe the younger, after completing his education by several years' travel abroad, became in 1626 chamberlain to Gustavus Adolphus, whose lasting friendship he gained. He fought with distinction in Prussia during the last three years of the Polish War (1626-1629) and also, as colonel of a regiment of horse, in 1630 in Germany. After the death of Gustavus Adolphus in 1632 his military yielded to his political activity. He had been elected president (Landstnarskalk) of the diet of 1629, and in the following year was created a senator (Riksr&d). In 1635 he conducted the negotiations for an armistice with Poland. In 1637-1640 and again in 1648-1654 he was governor-general in Finland, to which country he rendered inestimable services by his wise and provi- dent rule. He reformed the whole administration, introduced a postal system, built ten new towns, improved and developed commerce and agriculture, and very greatly promoted education. In 1640 he opened the university of Abo, of which he was the founder, and first chancellor. After the death of Charles X. in 1660, Brahe, as rikskansler or chancellor of Sweden, became one of the regents of Sweden for the second time (he had held a similar office during the minority of Christina, 1632-1644), and during the difficult year 1660 he had entire control of both foreign and domestic affairs. He died on the 2nd of September

1680, at his castle at Visingsborg, where during his lifetime ho had held more than regal pomp.

His brother, Nils Brahe (1604-1632), also served with dis- tinction under Gustavus Adolphus. He took part in the siege and capture of Riga in 162 1, served with distinction in Poland (1626-1627) and assisted in the defence of Stralsund in 1628. In 1630 he accompanied Gustavus into Germany, and in 1631 was appointed colonel of " the yellow regiment," the king's world-renowned life-guards, at the head of which he captured the castle of Wurzburg on the 8th of October 1631. He took part in the long duel

between Gustavus and Wallenstein round Nuremberg as general of infantry, and commanded the left wing at Liitzen (November 6, 1632), where he was the only Swedish general officer present. At the very beginning of the fight he was mortally wounded. The king regarded Brahe as the best general in the Swedish army after Lennart Torstensen.

A direct descendant of Nils, Magnus Brahe (1790-1844), fought in the campaign of 1813-14, under the crown prince Bernadotte, with whom, after his accession to the throne as Charles XIV., he was in high favour. He became marshal of the kingdom, and, especially from 1828 onwards, exercised a preponderant influence in public affairs.

See Martin Veibull, Sveriges Storhetstid, vol. iv. (Stockholm, 1881) ; Letters to Axel Oxenstjerna (Swed.) 1832-1851 (Stockholm, 1890); Petrus Nordmann, Per Brahe (Helsingfors, 1904). (R. N. B.)

BRAHE, TYCHO (1 546-1601), Danish astronomer, was born on the 14th of December 1546 at the family seat of Knudstrup in Scania, then a Danish province. Of noble family, he was early adopted by his uncle, Jorgen Brahe, who sent him, in April 1559, to study philosophy and rhetoric at Copenhagen. The punctual occurrence at the predicted time, August 21st, 1560, of a total solar eclipse led him to regard astronomy as " something divine "; he purchased the Ephemerides of Johann Stadius (3rd ed., 1570), and the works of Ptolemy in Latin, and gained some insight into the theory of the planets. Entered as a law-student at the university of Leipzig in 1562, he nevertheless secretly prosecuted celestial studies, and began continuous observations with a globe, a pair of compasses and a " cross-staff." He quitted Leipzig on the 17th of May 1565, but his uncle dying a month later, he repaired to Wittenberg, and thence to Rostock, where, in 1566, he lost his nose in a duel, and substituted an artificial one made of a copper alloy. In 1569 he matriculated at Augsburg, and devoted himself to chemistry for two years (1570-1572). On his return to Denmark, in 1571, he was permitted by his maternal uncle, Steno Belle, to instal a laboratory at his castle of Herritzvad, near Knudstrup; and there, on the 1 ith of November 1572, he caught sight of the famous " new star " in Cassiopeia. He diligently measured its position, and printed an account of his observations in a tract entitled De Novd Stelld (Copenhagen, 1 5 73) , a facsimile of which was produced in 1901 , as a tercentenary tribute to the author's memory.

Tycho's marriage with a peasant-girl in 1573 somewhat strained his family relations. He delivered lectures in Copen- hagen by royal command in 1574; and in 1575 travelled through Germany to Venice. The execution of his design to settle at Basel was, however, anticipated by the munificence of Frederick II., king of Denmark, who bestowed upon him for life the island

of Hveen in the Sound, together with a pension of 500 thalers, a canonry in the cathedral of Roskilde, and the income of an estate in Norway. The first stone of the magnificent ob- servatory of Uraniborg was laid on the 8th of August 1576; it received the finest procurable instrumental outfit; and was the scene, during twenty-one years, of Tycho's labours in systemati- cally collecting materials— -the first made available since the Alexandrian epoch — for the correction of astronomical theories. James VI. of Scotland, afterwards James I. of England, visited him at Uraniborg on the 20th of March 1 590. But by that time his fortunes were on the wane; for Frederick II. died in 1588, and his successor, Christian IV., was less tolerant of Tycho's arrogant and insubordinate behaviour. His pension and fief having been withdrawn, he sailed for Rostock in June 1597, and re-commenced observing before the close of the year, in the castle

of Wandsbeck near Hamburg. He spent the following winter at Wittenberg, and reached Prague in June 1599, well assured of favour and protection from the emperor Rudolph II. That monarch, accordingly, assigned him the castle of Benatky for his residence, with a pension of 3000 florins; his great instru- ments were moved thither from Hveen, and Johannes Kepler joined him there in January 1600. But this phase of renewed prosperity was brief. After eleven days' illness, Tycho Brahe died on the 24th of October 1601, at Benatky, and was buried in the Teynkirche, Prague.

Tycho's principal work, entitled Astronomiae Instauratae Progymnasmata (2 vols., Prague, 1602-1603) was edited by Kepler. The first volume treated of 'the motions of the sun and moon, and gave the places of 777 fixed stars (this number was increased to 1005 by Kepler in 1627 in£he " Rudolphine Tables ")• The second, which had been privately printed at Uraniborg in 1588 with the heading De Mundi Aetherei recentioribus Phaeno- menis, was mainly concerned with the comet of 1577, demon- strated by Tycho from its insensible parallax to be no terrestrial exhalation, as commonly supposed, but a body traversing planetary space. It included, besides, an account of the Tychonic plan of the cosmos, in which a via media was sought between the Ptolemaic and Copernican systems. The earth retained its immobility; but the five planets were made to re- volve round the sun, which, with its entire cortege, annually circuited the earth, the sphere of the fixed stars performing meanwhile, as of old, its all-inclusive diurnal rotation (see Astronomy: History). Under the heading Astronomiae In- stauratae Mechanica, Tycho published at Wandsbeck, in 1 598, a description of his instruments, together with an autobiographical account of his career and discoveries, including the memorable one of the

moon's " variation " (see Moon). The book was reprinted at Nuremberg in 1602 (cf. Hasselberg, Vierteljahrs- schrift Astr. Ges. xxxix. iii. 180). His Epistolae Astronomicae, printed at Uraniborg in 1 596 with a portrait engraved by Geyn of Amsterdam in 1 586, were embodied in a complete edition of his works issued at Frankfort in 1648. Tycho vastly improved the art of astronomical observation. He constructed a table of refractions, allowed for instrumental inaccuracies, and eliminated by averaging accidental errors. He, moreover, corrected the received value of nearly every astronomical quantity; but the theoretical purpose towards which his practical reform was directed, was foiled by his premature death.

See J. L. E. Dreyer's Tycho Brahe (Edinburgh, 1890), which gives full and authentic information regarding his life and work. Also Gassendi's Vita (Paris, 1654) ; Lebensbeschreibung, collected from various Danish sources, and translated into German by Philander von der Weistritz (Copenhagen and Leipzig, 1756); Tyge Brahe, by F. R. Friis (Copenhagen, 1871); Prager Tychoniana, collected by Dr F. I. Studnicka (Prague, 1901), a description of the scanty Tychonian relics which survived the Thirty Years' War and are still preserved at Prague. " (A. M. C.)

BRAHMAN, a Sanskrit noun-stem which, differently accented, yields in the two nominatives BrahmA (neut.) and Brahma (masc), the names of two deities which occupy prominent places in the orthodox system of Hindu belief. Brahma (n.) is the designation generally applied to the Supreme Soul {paramatman), or im- personal, all-embracing divine essence, the original source and ultimate goal of all that exists; Brahma (m.), on the other hand, is only one of the three hypostases of that divinity whose creative activity he represents, as distinguished from its preservative and destructive aspects, ever apparent in life and nature, and repre- sented by the gods Vishnu and Siva respectively. The history of the two cognate names reflects in some measure the development of Indian religious speculation generally.

The neuter term brahmi is used in the Rigveda both in the abstract sense of " devotion, worship," and in the concrete sense of " devotional rite, prayer, hymn." The spirit of Vedic worship is pervaded by a devout belief in the efficacy of invocation and sacrificial offering. The earnest and well-expressed prayer or hymn of praise cannot fail to draw the divine power to the worshipper and make it yield to his supplication; whilst offerings, so far from being mere acts of devotion calculated to give pleasure

to the god, constitute the very food and drink which render him vigorous and capable of battling with the enemies of his mortal friend. It is this intrinsic power of fervent invocation and worship which found an early expression in the term brahmd; and its independent existence as an active

moral principle in shaping the destinies of man became recognized in the Vedic pantheon in the conception of a god Brihaspati or Brahmanas- pati, " lord of prayer or devotion," the divine priest and the guardian of the pious worshipper. By a natural extension of the original meaning, the term brahmit, in the sense of sacred utter- ance, was subsequently likewise applied to the whole body of sacred writ, the tri-vidya or " triple lore " of the Veda; whilst it also came to be commonly used as the abstract designation of the priestly function and the Brahmanical order generally, in the same way as the term tshatra, " sway, rule," came to denote the aggregate of functions and individuals of the Kshatriyas or Rajanyas, the nobility or military class.

The universal belief in the efficacy of invocation as an indis- pensable adjunct to sacrifices and religious rites generally, could not fail to engender and maintain in the minds of the people feelings of profound esteem and reverence towards those who possessed the divine gift of inspired utterance, as well as for those who had acquired an intimate knowledge of the approved forms of ritual worship. A common designation of the priest is brahman (nom. brahma), originally denoting, it would seem, " one who prays, a worshipper," perhaps also " the composer of a hymn " {brahman, n.) ; and the same term came subsequently to be used not only for one of the sacerdotal order generally, but also, and more commonly, as the designation of a special class of priests who officiated as superintendents during sacrificial performances, the complicated nature of which required the co-operation of a whole staff of priests, and who accordingly were expected to possess a competent knowledge of the entire course of ritual procedure, including the correct form and mystic import of the sacred texts to be repeated or chanted by the several priests. The Brahman priest {brahma) being thus the recognized head of the sacerdotal order {brahmti), which itself is the visible embodiment of sacred writ and the devotional spirit pervading it {brahmS), the complete realization of theocratic aspirations required but a single step, which was indeed taken in the theosophic speculations of the later Vedic poets and the authors of the Brahmanas {q.v.), viz. the recog- nition of this abstract notion of the Brahma as the highest cosmic principle and its identification with the pantheistic conception of an all-pervading, self-existent spiritual substance, the primary source of the universe; and subsequently coupled therewith the personification of its creative energy in the form of Brahma, the divine representative of the earthly priest, who was made to take the place of the earlier conception of Prajapati, " the lord of creatures " (see Brahmanism). By this means the very name of this god expressed the essential oneness of hiS nature with that of the divine spirit as whose manifestation he was to be considered. In the later Vedic writings, especially the Brahmanas, however, Prajapati still maintains throughout his position as the paramount

personal deity; and Brahma, in his divine capacity, is rather identified with Brihaspati, the priest of the gods. Moreover, the exact relationship between Prajapati and the Brahma (n.) is hardly as yet defined with sufficient precision; it is rather one of simple identification: in the beginning the Brahma was the All, and Prajapati is the Brahma. It is only in the institutes of Manu, where we find the system of castes propounded in its complete development, that Brahma has his definite place assigned to him in the cosmogony. According to this work, the universe, before undiscerned, was made discernible in the beginning by the sole, self-existent lord Brahma (n.). He, desirous of producing different beings from his own self, created the waters by his own thought, and placed in them a seed which developed into a golden egg; therein was born Brahma (m.), the parent of all the worlds; and thus " that which is the undiscrete Cause, eternal, which is and is not, from it issued that male who is called in the world Brahma." Having dwelt in that egg for a year, that lord spontaneously by his own

thought split that egg in two; and from the two halves he fashioned the heaven and the earth, and in the middle, the sky,and the eight regions (the points of the compass), and the perpetual place of the waters. This theory of Brahma being born from a golden egg is, however, a mere adaptation of the Vedic conception of Hiranya-garbha (" golden embryo "), who is represented as the supreme god in a hymn of the tenth (and last) book of the Rigveda. Another still later myth, which occurs in the epic poems, makes Brahma be born from a lotus which grew out of the navel of the god Vishnu whilst floating on the primordial waters. In artistic representations, Brahma usually appears as a bearded man of red colour with four heads crowned with a pointed, tiara-like head-dress, and four hands holding his sceptre, or a sacrificial spoon, a bundle of leaves representing the Veda, a bottle of water of the Ganges, and a string of beads or his bow Parivlta. His vehicle (vdhana) is a goose or swan (hamsa), whence he is also called Hamsavdhana; and his consort is Sarasvati, the goddess of learning.

One could hardly expect that a colourless deity of this de- scription, so completely the product of priestly speculation, could ever have found a place in the hearts of the people generally. And indeed, whilst in theoretic theology Brahma has retained his traditional place and function down to our own days, his practical cult has at all times remained extremely limited, the only temple dedicated to the worship of this god being found at Pushkar (Pokhar) near Ajmir in Rajputana. On the other hand, his divine substratum, the impersonal Brahma, the world-spirit, the one and only reality, remains to this day the ultimate element of the religious belief of

intelligent India of whatever sect. Being devoid of all attributes, it can be the object only of meditation, not of practical devotional rites; and philosophy can only attempt to characterize it in general and vague terms, as in the favourite formula which makes it to be sachchiddnanda, i.e. being (sat), thinking (chit), and bliss (dnanda). (J. E.)

BRAHMANA, the Sanskrit term applied to a body of prose writings appended to the collections (samhita) of Vedic texts, the meaning and ritual application of which they are intended to elucidate, and like them regarded as divinely revealed. From a linguistic point of view, these treatises with their appendages, the more mystic and recondite Aranyakas and the speculative Upanishads, have to be considered as forming the connecting link between the Vedic and the classical Sanskrit. The exact derivation and meaning of the name is somewhat uncertain. Whilst the masculine term brahmana (nom. brahmanas), the ordinary Sanskrit designation of a man of the Brahmanical caste, is clearly a derivative of brahman (nom. brahmd), a common Vedic term for a priest (see Brahman), thus meaning the son or descendant of a Brahman, the neuter word brahmana (nom. brdhmayam) on the other hand, with which we are herˆ concerned, admits of two derivations: either it is derived from the same word brahman, and would then seem to mean a dictum or observation ascribed to, or intended for the use of, a Brahman, or superintendent priest; or it- has rather to be referred to the neuter noun brahman (nom. brahmd), in the sense of " sacred utterance or rite," in which case it might mean a comment on a sacred text, or explanation of a devotional rite, calculated to bring out its spiritual or mystic significance and its bearing on the Brahma, the world-spirit embodied in the sacred writ and ritual. This latter definition seems on the whole the more probable one, and it certainly would fit exactly the character of the writings to which the term relates. It will thus be seen that the term brahmanam applies not only to complete treatises of an exegetic nature, but also to single comments on particular texts or rites of which such a work would be made up.

The gradual elaboration of the sacrificial ceremonial, as the all-sufficient expression of religious devotion, and a constantly growing tendency towards theosophic and mystic speculation on the significance of every detail of the ritual, could not fail to create a demand for explanatory treatises of this kind, which, to enhance their practical utility, would naturally deal with the special texts and rites assigned in the ceremonial to the several

classes of officiating priests. At a subsequent period the demand for instruction in the sacrificial science called into existence a still more practical set of manuals, the so-called Kalpa-sutras, or ceremonial rules, detailing, in succinct aphorisms, the approved course of sacrificial

procedure, without reference to the supposed origin or import of the several rites. These manuals are also called Srauta-sutras, treating as they do, like the Brahmanas, of the Srauta rites — i.e. the rites based on the sruti or revelation — requiring at least three sacrificial fires and a number of priests, as distinguished from the grihya (domestic) or smarta (traditional) rites, supposed to be based on the smriti or tradition, which are performed on the house-fire and dealt with in the Grihya-sutras.

The ritual recognizes four principal priests (ritvij), each of whom is assisted by three subordinates: viz. the Brahman or superintending priest; the Hotri or reciter of hymns and verses; the Udgdtri or chanter; and the Adhvaryu or offerer, who looks after the details of the ceremonial, including the preparation of the offering-ground, the construction of fire- places and altars, the making of oblations and muttering of the prescribed formulae. Whilst the two last priests have assigned to them special liturgical collections of the texts to be used by them, the Sdmaveda-samhitd and Yajurvcda-samhita respec- tively, the Hotri has to deal entirely with hymns and verses taken from the Rigveda-samhitd, of which they would, however, form only a comparatively small portion. As regards the Brahman, he would doubtless be chosen from one of those other three classes, but would be expected to have made himself thoroughly conversant with the texts and ritual details apper- taining to all the officiating priests. It is, then, to one or other of those three collections of sacred texts and the respective class of priests, that the existing Brahmanas attach themselves. At a later period, when the Atharvan gained admission to the Vedic canon, a special connexion with the Brahman priest was sometimes claimed, though with scant success, for this fourth collection of hymns and spells, and the comparatively late and unimportant Gopatha-brahmana attached to it.

The Udgatri's duties being mainly confined to the chanting of hymns made up of detached groups of verses of the Rigveda, as collected in the Samaveda-samhita, the more important Brahmanas of this sacerdotal class deal chiefly with the various modes of chanting, and the modifications which the verses have to undergo in their musical setting. Moreover, the performance of chants being almost entirely confined to the Soma-sacrifice, it is only a portion, though no doubt the most important portion, of the sacrificial ceremonial that enters into the subject matter of the Samaveda Brahmanas.

As regards the Brahmanas of the Rigveda, two of such works have been handed down, the Aitareya and the Kaushltaki (or Sankhdy ana) - Brahmanas, which have a large amount of their material in common. But while the former work (transl. into English by M. Haug) is mainly taken up with the Soma-sacrifice, the latter has in addition thereto chapters on the other forms of sacrifice. Being intended for the Hotri's use, both these

works treat exclusively of the hymns and verses recited by that priest and his assistants, either in the form of connected litanies or in detached verses invoking the deities to whom oblations are made, or uttered in response to the solemn hymns chanted by the Udgatris.

It is, however, to the Brahmanas and Sutras of the Yajurveda, dealing with the ritual of the real offering-priest, the Adhvaryu, that we have to turn for a connected view of the sacrificial procedure in all its material details. Now, in considering the body of writings connected with this Veda, we are at once confronted by the fact that there are two different schools, an older and a younger one, in which the traditional body of ritual- istic matter has been treated in a very different way. For while the younger school, the Vdjasaneyins, have made a clear severance between the sacred texts or mantras and the exegetic discussions thereon — as collected in the Vdjasaneyi-samhila and the Satapatha- Brahmana (trans, by J. Eggeling, in Sacred Books of the East) respectively — arranged systematically in accordance with the ritual divisions, the older school on the

other hand present their materials in a hopelessly jumbled form; for not only is each type of sacrifice not dealt with continuously and in orderly fashion, but short textual sections of mantras are constantly followed immediately by their dogmatic exegesis; the term brcthmaqa thus applying in their case only to these detached comments and not to the connected series of them. Thus the most prominent subdivision of the older school, the Taittiriyas, in their Sarphita, have treated the main portion of the ceremonial in this promiscuous fashion, and to add to the confusion they have, by way of supplement, put forth a so-called Taittiriya-brahmai?a, which, so far from being a real Brahmana, merely deals with some additional rites in the same confused mixture of sacrificial formulae and dogmatic explanations. It is not without reason, therefore, that those two schools, the older and the younger, are commonly called the Black (krishita) and the White (sukla) Yajus respectively.

Although the ritualistic discussions of the Brahmanas are for the most part of a dry and uninteresting nature to an even greater degree than is often the case with exegetic theological treatises, these works are nevertheless of considerable import- ance both as regards the history of Indian institutions and as " the oldest body of Indo-European prose, of a generally free, vigorous, simple form, affording valuable glimpses backwards at the primitive condition of unfettered Indo-European talk" (Whitney). Of especial interest in this respect are the numerous myths and legends

scattered through these works. From the archaic style in which these mythological tales are usually composed, as well as from the fact that not a few of them are found in Brahmanas of different schools and Vedas, though of|en with considerable variations, it seems pretty evident that the groundwork of them must go back to times preceding the com- position or final redaction of the existing Brahmanas. In the case of some of these legends — as those of Sunah-Sepha, and the fetching of Soma from heaven — we can even see how they have grown out of germs contained in some of the Vedic hymns. If the literary style in which the exegetic discussion of the texts and rites is carried on in the Brahmanas is, as a rule, of a very bald and uninviting nature, it must be borne in mind that these treatises are of a strictly professional and esoteric character, and in no way lay claim to being considered as literary com- positions in any sense of the word. And yet, notwithstanding the general emptiness of their ritualistic discussions and mystic speculations, " there are passages in the Brahmanas full of genuine thought and feeling, and most valuable as pictures of life, and as records of early struggles, which have left no trace in the literature of other nations " (M. Müller).

The chief interest, however, attaching to the Brahmanas is doubtless their detailed description of the sacrificial system as practised in the later Vedic ages; and the information afforded by them in this respect should be all the more welcome to us, as the history of religious institutions knows of no other sacri- ficial ceremonial with the details of which we are acquainted to anything like the same extent. An even more complete and minutely detailed view of the sacrificial system is no doubt obtained from the ceremonial manuals, the Kalpa-sutras; but it is just by the speculative discussions of the Brahmanas — the mystic significance and symbolical colouring with which they invest single rites — that we gain a real insight into the nature and gradual development of this truly stupendous system of ritual worship.

The sacrificial ritual recognizes two kinds of irauta sacrifices, viz. haviryajnas (meat-offerings), consisting of oblations (ishli) of milk, butter, cereals or flesh, and somayagas or oblations of the juice of the soma plant. The setting up, by a householder, of a set of three sacrificial fires of his own constitutes the first cere- mony of the former class, the Agny-adhana (or (?) Agny-adheya). The first of the three fires laid down is the garhapatya, or house- holder's fire, so called because, though not taken from his ordinary house-fire, but as a rule specially produced by friction, it serves for cooking the sacrificial food, and thus, as it were, represents the domestic fire. From it the other two fires, the anavaniya, or offering fire, and the dakshiqagni, or southern fire,

used for certain special purposes, are taken. The principal other ceremonies

of this class are the new and full moon offerings, the oblations made at the commencement of the three seasons, the offering of first-fruits, the animal sacrifice, and the Agnihotra, or daily morning and evening oblation of milk, which, however, is also included amongst the grihya, or domestic rites, as having to be performed daily on the domestic fire by the householder who keeps no regular set of sacrificial fires.

Of a far more -complicated nature than these offerings are the Soma-sacrifices, which, besides the simpler ceremonies of this class, such as the Agnishtoma or " Praise of Agni," also include great state functions, such as the Rajasilya or consecration of a king, and the Asvamedha or horse-sacrifice, which, in addition to the sacrificial rites, have a considerable amount of extraneous, often highly interesting, ceremonial connected with them, which makes them seem to partake largely of the nature of public festivals. Whilst the oblations of Soma-juice, made thrice on each offering-day, amidst chants and recitations, constitute the central' rites of those services, their ritual also requires numerous single oblations of the ishti kind, including at least three animal offerings, and in some cases the immolation of many hecatombs of victims. Moreover, a necessary preliminary to every Soma- sacrifice is the construction, in five layers, of a special fire-altar of large dimensions, consisting of thousands of bricks, formed and baked on the spot, to each, or each group, of which a special symbolic meaning is attached. The building of this altar is spread over a whole year, during which period the sacrificer has to carry about the sacrificial fire in an earthen pan for at least some time each day, until it is finally deposited on the completed altar to serve as the offering-fire for the Soma oblations. The altar itself is constructed in the form of a bird, because Soma was supposed to have been brought down from heaven by the metre Gayatrl which had assumed the form of an eagle. Whilst the Soma-sacrifice has been thus developed by the Brahmanas in an extraordinary degree, its essential identity with the Avestan Haoma-cult shows that its origin goes back at all events to the Indo-Iranian period.

Among the symbolic conceits in which the authors of the Brahmanas so freely indulge, there is one overshadowing all others — if indeed they do not all more or less enter into it — which may be considered as the sum and substance of these speculations, and the esoteric doctrine of the sacrifice, involved by the Brahmanical ritualists. This is what may conveniently be called the Prajapati theory, by which the " Lord of Creatures," the efficient cause of the universe, is identified with both the sacrifice'(ya/«a) and the sacrificer (yajamana) . The origin of this theory goes back to the later Vedic hymns. In the so-called Purusha-sukta (Rigv. x. go) in which the supreme spirit is con- ceived of as the person or man (purusha), born in the beginning, and consisting of "whatever hath been and whatever shall be," the creation of the visible and invisible universe is

represented as originating from an " all-offered " (holocaust) sacrifice in which the Purusha himself forms the offering-material (havis), or, as we might say, the victim. In this primeval, or rather timeless because ever-proceeding, sacrifice, time itself, in the shape of its unit the year, is made to take its part, inasmuch as the three seasons — spring, summer and autumn — of which it consists, constitute the ghee (clarified butter), the offering-fuel and the oblation respectively. These speculations may be said to have formed the foundation on which the theory of the sacrifice, as propounded in the Brahmanas, has been reared. Prajapati — who (probably for practical considerations, as better representing the sacrificer, the earthly ruler, or " lord of the creatures ") here takes the place of the Purusha, the world-man or all- embracing personality — is offered up anew in every sacrifice; and inasmuch as the very dismemberment of the lord of creatures, which took place at that archtypal sacrifice, was in itself the creation of the universe, so every sacrifice is also a repetition of that first creative act. Thus the periodical sacrifice is nothing else than a microcosmic representation of the ever- proceeding destruction and renewal of all cosmic life and matter. The ritualistic theologians, however, go an important step

further by identifying Prajapati with the performer, or patron, of the sacrifice, the sacrificer; every sacrifice thus becoming invested — in addition to its cosmic significance — with the mystic power of regenerating the sacrificer by cleansing him of all guilt and securing for him a seat in the eternal abodes.

Whilst forming the central feature of the ritualistic symbolism, this triad — Prajapati, sacrifice (oblation, victim), sacrificer — is extended in various ways. An important collateral identification is that of Prajapati (and the sacrificer) with Agni, the god of fire, embodied not only in the offering-fire, but also in the sacred Soma-altar, the technical name of which is agni. For this reason the altar, as representative of the universe, is built in five layers, representing earth, air and heaven, and the intermediate regions; and in the centre of the altar-site, below the first layer, on a circular gold plate (the sun), a small golden man (purusha) is laid down with his face looking upwards. This is Prajapati, and the sacrificer, who when regenerated will pass upwards through the three worlds to the realms of light, naturally perforated bricks being for this purpose placed in the middle of the three principal altar-layers. One of the fourteen sections of the Satapatha-brahmana, the tenth, called Agni-rahasya or " the mystery of Agni (the god and altar)," is entirely devoted to this feature of the sacrificial symbolism.

Similarly the sacrificer, as the human representatiye of the Lord of Creatures, is identified with Soma (as the supreme oblation), with Time, and finally with Death: by the sacrificer thus becoming Death himself, the fell god ceases to have power over him and he is assured of everlasting life. And now we get the Supreme Lord in his last aspect; nay, his one true and real aspect, in which the sacrificer, on shuffling off this mortal coil, will himself come to share — that of pure intellect- uality, pure spirituality — he is Mind: such is the ultimate source of being, the one Self, the Purusha, the Brahman. As the sum total of the wisdom propounded in the mystery of Agni, the searcher after truth is exhorted to meditate on that Self, made up of intelligence, endowed with a body of spirit, a form of light, and of an ethereal nature; holding sway over all the regions and pervading this All, being itself speechless and devoid of mental states; and by so doing he shall gain the assurance that " even as a grain of rice, or the smallest granule of millet, so is the golden Purusha in my heart; even as a smokeless light, it is greater than the sky, greater than the ether, greater than the earth, greater than all existing things; — that Self of the Spirit is my Self; on passing away from hence, I shall obtain that Self. And, verily, whosoever has this trust, for him there is no uncertainty." (J. E.)

BRAHMANISM, a term commonly used to denote a system of religious institutions originated and elaborated by the Brahmans, the sacerdotal and, from an early period, the dominant caste of the Hindu community (see Brahman). In like manner, as the language of the Aryan Hindus has undergone continual processes of modification and dialectic division, so their religious belief has passed through various stages of development broadly distinguished from one another by certain prominent features. The earliest phases of religious thought in India of which a clear idea can now be formed are exhibited in a body of writings, looked upon by later generations in the light of sacred writ, under the collective name of Veda (" knowledge ") or Sruti (" revelation "). The Hindu scriptures consist of four separate collections, or Samhitas, of sacred texts, or mantras, in- cluding hymns, incantations and sacrificial forms of prayer, viz. the Rich (nom. sing, rik) or Rigveda, the Saman or Samaveda, the Yajus or Yajurveda, and the Atharvan or Atharvaveda. Each of these four text-books has attached to it a body of prose writings, called Brahmanas (see Brahman a), intended to explain the ceremonial application of the texts and the origin and import of the sacrificial rites for which these were supposed to have been composed. Usually attached to these works, and in some cases to the Samhitas, are two kinds of appendages, the Aranyakas and Upanishads, the former of which deal generally with the more recondite rites, while the latter are taken up chiefly with speculations on the problems of the universe and the religious aims of man —

subjects often touched upon in the earlier writings, but here dealt with in a

more mature and systematic way. Two of the Samhitas, the Saman and the Yajus, owing their existence to purely ritual purposes, and being, besides, the one almost entirely, the other partly, composed of verses taken from the Rigveda, are only of secondary importance for our present inquiry. The hymns of the Rigveda constitute the earliest lyrical effusions of the Aryan settlers in India which have been handed down to posterity. They are certainly not all equally old; on the contrary they evidently represent the literary activity of many generations of bards, though their relative age cannot as yet be determined with anything like certainty. The tenth (and last) book of the collection, however, at any rate has all the characteristics of a later appendage, and in language and spirit many of its hymns approach very nearly to the level of the contents of the Atharvan. Of the latter collection about one-sixth is found also in the Rigveda, and especially in the tenth book; the larger portion peculiar to it, though including no doubt some older pieces, appears to owe its origin to an age not long anterior to the composition of the Brahmanas.

The state of religious thought among the ancient bards, as reflected in the hymns of the Rigveda, is that of a worship of the grand and striking phenomena of nature regarded in the light of personal conscious beings, endowed with a power beyond the control of man, though not insensible to his praises and actions. It is a nature worship purer than that met with in any other polytheistic form of belief we are acquainted with — a mythology still comparatively little affected by those systematizing tendencies which, in a less simple and primitive state of thought, lead to the construction of a well-ordered pantheon and a regular organization of divine government. To the mind of the early Vedic worshipper the various departments of the surrounding nature are not as yet clearly defined, and the functions which he assigns to their divine representatives continually flow into one another. Nor has he yet learned to care to determine the relative worth and position of the objects of his adoration; but the temporary influence of the phenomenon to which he addresses his praises bears too strongly upon his mind to allow him for the' time to consider the claims of rival powers to which at other times he is wont to look up with equal feelings of awe and reverence. It is this fmmediateness of impulse under which the human mind in its infancy strives to give utterance to its emotions that imparts to many of its outpourings the ring of monotheistic fervour.

The generic name given to these impersonations, viz. deva ("the shining ones"), points to the conclusion, sufficiently justified by the nature of the more prominent objects of Vedic adoration as well as by common natural occurrences, that it was the striking phenomena of light which first and most power- fully swayed the Aryan mind. In the primitive worship of the manifold phenomena of nature it is not, of course, so much their physical

aspect that impresses the human heart as the moral and intellectual forces which are supposed to move and animate them. The attributes and relations of some of the Vedic deities, in accordance with the nature of the objects they represent, partake in a high degree of this spiritual element; but it is not improbable that in an earlier phase of Aryan worship the religious conceptions were pervaded by it to a still greater and more general extent, and that the Vedic belief, though retaining many of the primitive features, has on the whole assumed a more sensuous and anthropomorphic character. This latter element is especially predominant in the attributes and imagery applied by the Vedic poets to Indra, the god of the atmospheric region, the favourite figure in their pantheon.

While the representatives of the prominent departments of nature appear to the Vedic bard as co-existing in a state of independence of one another, their relation to the mortal wor- shipper being the chief subject of his anxiety, a simple method of classification was already resorted to at an early time, consisting in a triple division of the deities into gods residing in the sky, in the air, and on earth. It is not, however, until a later stage, — the first clear indication being conveyed in a passage of the

tenth book of the Rigveda — that this attempt at a polytheistic system is followed up by the promotion of one particular god to the dignity of chief guardian for each of these three regions. On the other hand, a tendency is clearly traceable in some of the hymns towards identifying gods whose functions present a certain degree of similarity of nature; attempts which would seem to show a certain advance of religious reflection, the first steps from polytheism towards a comprehension of the unity of the divine essence. Another feature of the old Vedic worship tended to a similar result. The great problems of the origin and existence of man and the universe had early begun to engage the Hindu mind; and in celebrating the praises of the gods the poet was frequently led by his religious, and not wholly dis- interested, zeal to attribute to them cosmical functions of the very highest order. At a later stage of thought, chiefly exhibited in the tenth book of the Rigveda and in the Alharvaveda, inquiring sages could not but perceive the inconsistency of such concessions of a supremacy among the divine rulers, and tried to solve the problem by conceptions of an independent power, endowed with all the attributes of a supreme deity, the creator of the universe, including the gods of the pantheon. The names under which this monotheistic idea is put forth are mostly of an attributive character, and indeed some of them, such as Prajapati (" lord of creatures "), Visvakarman (" all-worker "), occur in the earlier hymns as mere epithets

of particular gods. But to other minds this theory of a personal creator left many difficulties unsolved. They saw, as the poets of old had seen; that everything around them, that man himself, was directed by some inward agent; and it needed but one step to perceive the essential sameness of these spiritual units, and to recognize their being but so many individual manifestations of one universal principle or spiritual essence. Thus a pantheistic conception was arrived at. put forth under various names, such as Purusha (" soul "), Kama ("desire"), Brahman (neutr.; nom. sing, brdhma) ("devotion, prayer '■'). Metaphysical and theosophic speculations were thus fast undermining the simple belief in the old gods, until, at the time of the composition of the Brdhmanas and Upanishads, we find them in complete possession of the minds of the theologians. Whilst the theories crudely suggested in the later hymns are now further matured and elaborated, the tendency towards catholicity of formula favours the combination of the conflicting monotheistic and pantheistic conceptions; this compromise, which makes Prajapati, the personal creator of the world, the manifestation of the impersonal Brahma, the universal self-existent soul, leads to the composite pantheistic system which forms the characteristic dogma of the Brahmanical period (see Brahman).

In the Vedic hymns two classes of society, the royal (or military) and the priestly classes, were evidently recognized as being raised above the level of the Vis, or bulk of the Aryan community. These social grades seem to have been in existence even before the separation of the two Asiatic branches of the Indo-Germanic race, the Aryans of Iran and India. It is true that, although the Athrava, Rathaestdo, and VaUrya of the Zend Avesta correspond in position and occupation to the Brahman, Rdjan and Vis of the Veda, there is no similarity of names between them; but this fact only shows that the common vocabulary had not yet definitely fixed on any specific names for these classes. Even in the Veda their nomenclature is by no means limited to a single designation for each of them. More- over, Atharvan occurs not infrequently in the hymns as the personification of the priestly profession, as the proto-priest who is supposed to have obtained fire from heaven and to have instituted the rite of sacrifice; and although ratheshtha (" stand- ing on a car ") is not actually found in connexion with the Rdjan or Kshatriya, its synonym rathin is in later literature a not unusual epithet of men of the military caste. At the time of the hymns, and even during the common Indo-Persian period, the sacrificial ceremonial had already become sufficiently complicated to call for the creation of a certain number of distinct priestly offices with special duties attached to them. While this shows clearly that the position and occupation of the priest were those of a profession, the fact that the terms brdhmana

and brahmaputra, both denoting " the son of a brahman," are used in certain hymns as synonyms of brahman, seems to justify the assumption

that the profession had already, to a certain degree, become hereditary at the time when these hymns were composed. There is, however, with the exception of a solitary passage in a hymn of the last book, no trace to be found in the Rigveda of that rigid division into four castes separated from one another by insurmountable barriers, which in later times constitutes the distinctive feature of Hindu society. The idea of caste is expressed by the Sanskrit term varna, originally denoting " colour," thereby implying differences of complexion between the several classes. The word occurs in the Veda in the latter sense, but it is used there to mark the distinction, not between the three classes of the Aryan community, but between them on the one hand and a dark-coloured hostile people on the other. The latter, called Dasas or Dasyus,_consisted, no doubt, of the indigenous tribes, with whom the Aryans had to carry on a continual struggle for the possession of the land. The partial subjection of these comparatively uncivilized tribes as the rule of the superior race was gradually spreading eastward, and their submission toa state of serfdom under the name of Sudras, added to the Aryan community an element, totally separated from it by colour, by habits, by language, and by occupation. Moreover, the religious belief of these tribes being entirely different from that of the conquering people, the pious Aryas, and especially the class habitually engaged in acts of worship, could hardly fail to apprehend considerable danger to the purity of their own faith from too close and intimate a contact between the two races. What more natural, therefore, than that measures should have been early devised to limit the intercourse between them within as narrow bounds as possible ■? In course of time the difference of vocation, and the greater or less exposure to the scorching influence of the tropical sky, added, no doubt, to a certain admixture of Sudra blood, especially in the case of the common people, seem to have produced also in the Aryan population different shades of complexion, which greatly favoured a tendency to rigid class-restrictions originally awakened and continually fed by the lot of the servile race. Meanwhile the power of the sacerdotal order having been gradually enlarged in proportion to the development of the minutiae of sacrificial ceremonial and the increase of sacred lore, they began to lay claim to supreme authority in regulating and controlling the religious and social life of the people. The author of the so-called Purusha-sukta, or hymn of Purusha, above referred to, represents the four castes — the Brdhmana, Kshatriya, VaiSya and Sudra — as having severally sprung respectively from the mouth, the arms, the thighs and the feet of Purusha, a primary being, here assumed to be the source of the universe. It is very doubtful, however, whether at the time when this hymn was composed the relative position of the two upper castes could already have been settled in so decided a way as this theory might lead one to suppose. There is, on the contrary, reason to believe that some time had yet to elapse, marked by fierce and bloody struggles for supremacy, of which only imperfect ideas

can be formed from the legendary and frequently biased accounts of later generations, before the Kshatriyas finally submitted to the full measure of priestly authority.

The definitive establishment of the Brahmanical hierarchy marks the beginning of the Brahmanical period properly so called. Though the origin and gradual rise of some of the leading institutions of this era can, as has been shown, be traced in the earlier writings, the chain of their development presents a break at this juncture which no satisfactory materials as yet enable us to fill up. A considerable portion of the literature of this time has apparently been lost; and several important works, the original composition of which has probably to be assigned to the early days of Brahmanism, such as the institutes of Manu and the two great epics, the Mahdbhdrata and Ramayana, in the form in which they have been handed down to us, show manifest traces of a more modern redaction. Yet it is sufficiently clear from internal evidence that Manu's Code of Laws, though

merely a metrical recast of older materials, reproduces on the whole pretty faithfully the state of Hindu society depicted in the sources from which it was compiled. The final overthrow of the Kshatriya power was followed by a period of jealous legislation on the part of the Brahmans. For a time their chief aim would doubtless be to improve their newly gained vantage-ground by surrounding everything relating to their order with a halo of sanctity calculated to impress the lay community with feelings of awe. In the Brahmanas and even in the Purusha Hymn, and the Atharvan, divine origin had already been ascribed to the Vedic Samhitas, especially to the three older collections. The same privilege was now successfully claimed for the later Vedic literature, so imbued with Brahmanic aspira- tions and pretensions; and the authority implied in the designa- tion of Sruti or revelation removed henceforth the whole body of sacred writings from the sphere of doubt and criticism. This concession neeessarily involved an acknowledgment of the new social order as a divine institution. Its stability was, however, ' rendered still more secure by the elaboration of a system of conventional precepts, partly forming the basis of Manu's Code, which clearly defined the relative position and the duties of the several castes, and determined the penalties to be inflicted on any transgressions of the limits assigned to each of them. These laws are conceived with no sentimental scruples on the part of their authors. On the contrary, the offences committed by Brahmans against other castes are treated with remarkable clemency, whilst the punishments inflicted for trespasses on the rights of higher classes are the more severe and inhuman the lower the offender

stands in the social scale.

The three first castes, however unequal to each other in privilege and social standing, are yet united by a common bond of sacramental rites (samskdras), traditionally connected from ancient times with certain incidents and stages in the life of the Aryan Hindu, as conception, birth, name-giving, the first taking out of the child to see the sun, the first feeding with boiled rice, the rites of tonsure and hair-cutting, the youth's investiture with the sacrificial thread, and his return home on completing his studies, marriage, funeral, &c. The modes of observing these family rites are laid down in a class of writings called Grihya-siltras, or domestic rules. The most important of these observances is the upanayana, or rite of conducting the boy to a spiritual teacher. Connected with this act is the investiture with the sacred cord, ordinarily worn over the left shoulder and under the right arm, and varying in material according to the class of the wearer. This ceremony being the preliminary act to the youth's initiation into the study of the Veda, the manage- ment of the consecrated fire and the knowledge of the rites of purification, including the sdvitri, a solemn invocation to Savitri, the sun (probl. Saturnus), — as a rule the verse liigv. iii. 62. 10, also called gayatri from the metre in which it is composed — which has to be repeated every morning and evening before the rise and after the setting of that luminary, is supposed to constitute the second or spiritual birth of the Arya. It is from their participation in this rite that the three upper classes are called the twice-born. The ceremony is enjoined to take place some time between the eighth and sixteenth year of age in the case of a Brahman, between the eleventh and twenty-second year of a Kshatriya, and between the twelfth and twenty-fourth year of a Vaisya. He who has not been invested with the mark of his class within this time is for ever excluded from uttering the sacred sdvitri and becomes an outcast, unless he is absolved from his sin by a council of Brahmans, and after due performance of a purificatory rite resumes the badge of his caste. With one not duly initiated no righteous man is allowed to associate or to enter into connexions of affinity. The duty of the Sudra is to serve the twice-born classes, and above all the Brahmans. He is excluded from all sacred knowledge, and if he performs sacrificial ceremonies he must do so without using holy mantras. No Brahman must recite a Vedic text where a man of the servile caste might overhear him, nor must he even teach him the laws of expiating sin. The occupations of the Vaisya are those con- nected with trade, the cultivation of the land and the breeding

of cattle; while those of a Kshatriya consist in ruling and defending the people, administering justice, and the duties of the military profession generally. Both share with the Brahman the privilege of reading the Veda, but only so far as it is taught and explained to them by their spiritual preceptor. To the Brahman belongs the right of teaching and expounding

the sacred texts, and also that of interpreting and determining the law and the rules of caste. Only in exceptional cases, when no teacher of the sacerdotal class is within reach, the twice-born youth, rather than forego spiritual instruction altogether, may reside in the house of a non-Brahmanical preceptor; but it is specially enjoined that a pupil, who seeks the path to heaven, should not fail, as soon as circumstances permit, to resort to a Brahman well versed in the Vedas and their appendages.

Notwithstanding the barriers placed between the four castes, the practice of intermarrying appears to have been too prevalent in early times to have admitted of measures of so stringent a nature as wholly to repress it. To marry a woman of a higher caste, and especially of a caste not immediately above one's own, is, however, decidedly prohibited, the offspring resulting from such a union being excluded from the performance of the sr&ddha or obsequies to the ancestors, and thereby rendered incapable of inheriting any portion of the parents' property. On the other hand, a man is at liberty, according to the rules of Manu, to marry a girl of any or each of the castes below his own, provided he has besides a wife belonging to his own class, for only such a one should perform the duties of personal attendance and religious observance devolving upon a married woman. As regards the children born from unequal marriages of this description, they have the rights and duties of the twfce-born, if their mother belong to a twice-born caste, otherwise they, like the offspring of the former class of intermarriages, share the lot of the Sudra, and are excluded from the investiture and the sdvitri. For this last reason the marriage of a twice-born man with a Sudra woman is altogether discountenanced by some of the later law books. At the time of the code of Manu the inters mixture of the classes had already produced a considerable number of intermediate or mixed castes, which were carefully defined, and each of which had a specific occupation assigned to it as its hereditary profession.

The self-exaltation of the first class was not, it would seem, altogether due to priestly arrogance and ambition; but, like a prominent feature of the post- Vedic belief, the transmigration of souls, it was, if not the necessary, yet at least a natural consequence of the pantheistic doctrine. To the Brahmanical speculator who saw in the numberless individual existences of animate nature but so many manifestations of the one eternal spirit, to union with which they were all bound to tend as their final goal of supreme bliss, the greater or less imperfection of the material forms in which they were embodied naturally presented a continuous scale of spiritual units from the lowest degradation up to the absolute purity and perfection of the supreme spirit. To prevent one's sinking yet lower, and by degrees to raise one's self in this universal gradation, or, if possible, to attain the ultimate goal immediately from any state of corporeal existence; there was but one

way — subjection of the senses, purity of life and knowledge of the deity. " He " (thus ends the code of Manu) " who in his own soul perceives the supreme soul in all beings and acquires equanfmity toward them all, attains the highest state of bliss." Was it not natural then that the men who, if true to their sacred duties, were habitually engaged in what was most conducive to these spiritual attainments, that the Brahmanical class early learnt to look upon themselves, even as a matter of faith, as being foremost among the human species in this universal race for final beatitude? The life marked out for them by that stern theory of class duties which they them- selves had worked out, and which, no doubt, must have been practised in early times at least in some degree, was by no means one of ease and amenity. It was, on the contrary, singularly calculated to promote that complete mortification of the instincts of animal nature which they considered as indispensable to the

final deliverance from samsara, the revolution of bodily and personal existence.

The pious Brahman, longing to attain the summum bonum on the dissolution of his frail body, was enjoined to pass through a succession of four orders or stages of life, viz. those of brahma- charin, or religious student; grihastha (or grihamedhin) , or householder; vanavdsin (or vdnaprastha) , or anchorite; and sannyasin (or bhikshu), or religious mendicant. Theoretically this course of life was open and even recommended to every twice-born man, his distinctive class-occupations being in that case restricted to the second station, or that of married life. Practically, however, those belonging to the Kshatriya and Vaisya castes were, no doubt, contented, with few exceptions, to go through a term of studentship in order to obtain a certain amount of religious instruction before entering into the married state, and plying their professional duties. In the case of the sacerdotal class, the practice probably was all but universal in early times; but gradually a more and more limited proportion even of this caste seem to have carried their religious zeal to the length of self-mortification involved in the two final stages. On the youth having been invested with the badge of his caste, he was to reside for some time in the house of some religious teacher, well read in the Veda, to be instructed in the knowledge of the scriptures and the scientific or theoretic treatises attached to them, in the social duties of his caste, and in the complicated system of purificatory and sacrificial rites. According to the number of Vedas he intended to study, the duration of this period of instruction was to be, probably in the case of Brah- manical students chiefly, of from twelve

to forty-eight years; during which time the virtues of modesty, duty, temperance and self-control were to be firmly implanted in the youth's mind by his unremitting observance of the most minute rules of conduct. During all this time the student had to subsist entirely on food obtained by begging from house to house; and his behaviour towards the preceptor and his family was to be that prompted by respectful attachment and implicit obedience. In the case of gfrls no investiture takes place, but for them the nuptial ceremony is considered as an equivalent to that rite. On quitting the teacher's abode, the young man returns to his family and takes a wife. To die without leaving legitimate off- spring, and especially a son, capable of performing the periodical rite of obsequies (srdddha), consisting of offerings of water and balls of rice, to himself and his two immediate ancestors, is considered a great misfortune by the orthodox Hindu. There are three sacred " debts " which a man has to discharge in life, viz. that which is due to the gods, and of which he acquits himself by daily worship and sacrificial rites; that due to the rishis, or ancient sages and inspired seers of the Vedic texts, discharged by the daily study of the scripture; and the " final debt " which he owes to his manes, and of which he .relieves himself by leaving a son. To these three some authorities add a fourth, viz. the debt owing to humankind, which demands his continually practising kindness and hospitality. Hence the necessity of a man's entering into the married state. When the bridegroom leads the bride from her father's house to his own home, and becomes a griha-pati, or householder, the fire which has been used for the marriage ceremony accompanies the couple to serve them as their garhapatya, or domestic fire. It has to be kept up perpetually, day and night, either by them- selves or their children, or, if the man be a teacher, by his pupils. If it should at any time become extinguished by neglect or otherwise, the guilt incurred thereby must be atoned for by an act of expiation. The domestic fire serves the family for prepar- ing their food, for making the five necessary daily and other occasional offerings, and for performing the sacramental rites above alluded to. No food should ever be eaten that has not been duly consecrated by a portion of it being offered to the gods, the beings and the manes. These three daily offerings are also called by the collective name of vaisvadeva, or sacrifice " to all the deities." The remaining two are the offering to Brahma, i.e. the daily lecture of the scriptures, accompanied by certain rites, and that to men, consisting in the entertainment of guests.

The domestic observances — many of them probably ancient Aryan family customs, surrounded by the Hindus with a certain amount of adventitious ceremonial — were generally performed by the householder himself, with the assistance of his wife. There is, however, another class of sacrificial ceremonies of a more pretentious and expensive kind, called Srauta rites, or rites based on kritu, or revelation, the performance of which, though not

indispensable, were yet considered obligatory under certain circumstances (see Brahmana). They formed a very powerful weapon in the hands of the priesthood, and were one of the chief sources of their subsistence. However great the religious merit accruing from these sacrificial rites, they Were obviously a kind of luxury which only rich people could afford to indulge in. They constituted, as it were, a tax, voluntary perhaps, yet none the less compulsory, levied by the priesthood on the wealthy laity.

When the householder is advanced in years, "Vhen he per- ceives his skin become wrinkled and his hair grey, when he sees the son of his son," the time is said to have come for him to enter the third stage of life. He should now disengage himself from all family ties— except that his wife may accompany him, if she chooses — and repair to a lonely wood, taking with him his sacred fires and the implements required for the daily and periodical offerings. Clad in a deer's skin, in a single piece of cloth, or in a bark garment, with his hair and nails uncut, the hermit is to subsist exclusively on food growing wild in the forest, such as roots, green herbs, and wild rice and grain. He must not accept gifts from any one, except of what may be absolutely necessary to maintain him; but with his own little hoard he should, on the contrary, honour, to the best of his ability, those who visit his hermitage. His time must be spent in reading the metaphysical treatises of the Veda, in making oblations, and in undergoing various kinds of privation and austerities, with a view to mortifying his passions and producing in his mind an entire indifference to worldly objects. Having by these means suc- ceeded in overcoming all sensual affections and desires, and in acquiring perfect equanimity towards everything around him, the hermit has fitted himself for the final and most exalted order, that of devotee or religious mendicant. As such he has no further need of either mortifications or religious observances; but " with the sacrificial fires reposited in his mind," he may devote the remainder of his days to meditating on the divinity. Taking up his abode at the foot of a tree in total solitude, " with no com- panion but his own soul," clad in a coarse garment, he should carefully avoid injuring any creature or giving offence to any human being that may happen to come near him. Once a day, in the evening, " when the charcoal fire is extinguished and the smoke no longer issues from the fire-places, when the pestle is at rest, when the people have taken their meals and the dishes are removed," he should go near the habitations of men, in order to beg what little food may suffice to sustain his feeble frame. Ever pure of mind he should thus bide his time, " as a servant expects his wages," wishing neither for death nor for life, until at last his soul is freed from its fetters and absorbed in the eternal spirit, the impersonal self-existent Brahma.

The tendency towards a comprehension of the unity of the divine essence had resulted in some minds, as has been remarked before, in a kind of

monotheistic notion of the origin of the universe. In the literature of the Brahmana period we meet with this conception as a common element of speculation; and so far from its being considered incompatible with the existence of a universal spirit, Prajdpati, the personal creator of the world, is generally allowed a prominent place in the pantheistic theories. Yet the state of theological speculation, reflected in these writings, is one of transition. The general drift of thought is essentially pantheistic, but it is far from being reduced to a regular system, and the ancient form of belief still enters largely into it. The attributes of Prajapati, in the same way, have in them elements of a purely polytheistic nature, and some of the attempts at reconciling this new-fangled deity with the traditional belief are somewhat awkward. An ancient classification of the gods represented them as being thirty-three

in number, eleven in each of the three worlds or regions of nature. These regions being associated each with the name of one principal deity, this division gave rise at a later time to the notion of a kind of triple divine government, consisting of Agni (fire). Indra (sky) or Vdyu (wind), and Siirya (sun), as presiding respectively over the gods on earth, in the atmosphere, and in the sky. Of this Vedic triad mention is frequently made in the Brahmana writings.- On the other hand the term prajapati (lord of creatures), which in the Rigveda occurs as an epithet of the sun, is also once in the Atharvaveda applied jointly to Indra and Agni. In the Brahmanas Prajapati is several times mentioned as the thirty fourth god; whilst in one passage he is called the fourth god, and made to rule over the three worlds. More frequently, however, the writings of this period represent him as the maker of the world and the father or creator of the gods. It is clear from this dis cordance of opinion on so important a point of doctrine, that at this time no authoritative system of belief had been agreed upon by the theologians. Yet there are unmistakable signs of a strong tendency towards constructing one, and it is possible that in yielding to it the Brahmans may have been partly prompted by political considerations. The definite settlement of the caste system and the Brahmanical supremacy must probably be as- signed to somewhere about the close of the Brahmana period. Division in their own ranks was hardly favourable to the aspirations of the priests at such a time; and the want of a distinct formula of belief adapted to the general drift of theological speculation, to which they could all rally, was probably felt the more acutely, the more determined a resistance the military class was likely to oppose to their claims. Side by side with the conception of the Brahma, the universal spiritual principle, with which speculative thought had already become deeply imbued, the

notion of a supreme personal being, the author of the material creation, had come to be considered by many as a necessary complement of the pantheistic doctrine. But, owing perhaps to his polytheistic associations and the attributive nature of his name, the person of Prajapati seems to have been thought but insufficiently adapted to represent this abstract idea. The ex- pedient resorted to for solving the difficulty was as ingenious as it was characteristic of the Brahmanical aspirations. In the same way as the abstract denomination of sacerdotalism, the neuter brahmi, had come to express the divine essence, so the old designation of the individual priest, the masculine term brahmd, was raised to denote the supreme personal deity which was to take the place and attributes of the Prajapati of the Brahmanas and Upanishads (see Brahman).

However the new dogma may have answered the purposes of speculative minds, it was not one in which the people generally were likely to have been much concerned; an abstract, colourless deity like Brahma could awake no sympathies in the hearts of those accustomed to worship gods of flesh and blood. Indeed, ever since the primitive symbolical worship of nature had under- gone a process of disintegration under the influence of meta- physical speculation, the real belief of the great body of the people had probably become more and more distinct from that of the priesthood. In different localities the principal share of their affection may have been bestowed on one or another of the old gods who was thereby raised to the dignity of chief deity; or new forms and objects of belief may have sprung up with the intellectual growth of the people. In some cases even the worship of the indigenous population could hardly have remained without exercising some influence in modifying the belief of the Aryan race. In this way a number of local deities would grow up, more or less distinct in name and characteristics from the gods of the Vedic pantheon. There is, indeed, sufficient evidence to show that, at a time when, after centuries of theo- logical speculations, some little insight into the life and thought of the people is afforded by the literature handed down to us, such a diversity of worship did exist. Under these circumstances the policy which seems to have suggested itself to the priesthood, anxious to retain a firm hold on the minds of the people, was to recognize and incorporate into their system some of the most prominent objects of popular devotion, and thereby to establish IV. 13

a kind of catholic creed for the whole community' subject to the Brahmanical law. At the time of the original composition of the great epics two such deities, Siva or Mahddeva (" the great god ") and Vishtiu, seem to have been already admitted into the Brahmanical system, where they have ever since retained their place; and from the manner in which they are represented in those works, it would, indeed, appear that both, and especially the former, enjoyed an extensive worship. As several synonyms

are attributed to each of them, it is not improbable that in some of these we have to recognize special names under which the people in different localities worshipped these gods, or deities of a similar nature which, by the agency of popular poetry, or in some other way, came to be combined with them. The places assigned to them in the pantheistic system were co-ordinate with that of Brahma; the three deities, Brahma, Vishnu and Siva, were to represent a triple impersonation of the divinity, as manifesting itself respectively in the creation, preservation and destruction of the universe. Siva does not occur in the Vedic hymns as the name of a god, but only as an adjective in the sense of " kind, auspicious." One of his synonyms, however, is the name of a Vedic deity, the attributes and nature of which show a good deal of similarity to the post- Vedic god. This is Rudra, the god of the roaring storm, usually portrayed, in accordance with the element he represents, as a fierce, destruc- tive deity, " terrible as a wild beast," whose fearful arrows cause death and disease to men and cattle. He is also called kapardin (" wearing his hair spirally braided like a shell"), a word which in later times became one of the synonyms of Siva. The Atharvaveda mentions several other names of the same god, some of which appear even placed together, as in one passage Bhava, Sarva, Rudra and PaSupati. Possibly some of them were the names under which one and the same deity was already worshipped in different parts of northern India. This was certainly the case in later times, since it is expressly stated in one of the later works of the Brahmana period, that Sarva was used by the Eastern people and Bhava by a Western tribe. It is also worthy of note that in the same work (the Satapatha- brahmana), composed at a time when the Vedic triad of Agni, Indra- Vayu and Surya was still recognized, attempts are made to identify this god of many names with Agni; and that in one passage in the Mahabharata it is stated that the Brahmans said that Agni was Siva. Although such attempts at an identification of the two gods remained isolated, they would at least seem to point to the fact that, in adapting their speculations to the actual state of popular worship, the Brahmans kept the older triad distinctly in view, and by means of it endeavoured to bring their new structure into harmony with the ancient Vedic belief. It is in his character as destroyer that Siva holds his place in the triad, and that he must, no doubt, be identified with the Vedic Rudra. Another very important function appears, however, to have been early assigned to him, on which much more stress is laid in his modern worship — that of destroyer being more especially exhibited in his consort — viz. the character of a generative power, symbolized in the phallic emblem (lingo) and in the sacred bull (Nandi), the favourite attendant of the god. This feature being entirely alien from the nature of the Vedic god, it has been conjectured with some plausibility, that the linga-Vforship was originally prevalent among the non- Aryan population, and was thence introduced into the worship of Siva. On the other hand, there can, we

think, be little doubt that Siva, in his generative faculty, is the representative of another Vedic god whose nature and attributes go far to account for this particular feature of the modern deity, viz. Pushan. This god, originally, no doubt, a solar deity, is frequently invoked, as the lord of nourishment, to bestow food, wealth and other blessings. He is once, jointly with Soma, called the progenitor of heaven and earth, and is connected with the marriage ceremony, where he is asked to lead the bride to the bridegroom and make her prosperous (Sivatama). Moreover, he has the epithet kapardin (spirally braided), as have Rudr?~ and the later Siva, and is called PaSupa, or guardian of cattle, whence the latter derives his name PaSupati. But he is also a

strong, powerful, and even fierce and destructive god, who, with his goad or golden spear, smites the foes of his worshipper, and thus in this respect offers at least some points of similarity to Rudra, which may have favoured the fusion of the two gods. As regards Vishnu, this god occupies already a place in the Vedic mythology, though by no means one of such prominence as would entitle him to that degree of exaltation implied in his character as one of the three hypostases of the divinity. More- over, although in his general nature, as a benevolent, genial being, the Vedic god corresponds on the whole to the later Vishnu, the preserver of the world, the latter exhibits many important features for which we look in vain in his prototype, and which most likely resulted from sectarian worship or from an amalgamation with local deities. In one or two of them, such as his names Vasudeva and Vaikuntha, an attempt may again be traced to identify Vishnu with Indra, who, as we have seen, was one of the Vedic triad of gods. The characteristic feature of the elder Vishnu is his measuring the world with his three strides, which are explained as denoting either the three stations of the sun at the time of rising, culminating and setting, or the triple manifestation of the luminous element, as the fire on earth, the lightning in the atmosphere and the sun in the heavens.

The male nature of the triad was supposed to require to be supplemented by each of the three gods being associated with a female energy (Sakti). Thus Vach or Sarasvati, the goddess of speech and learning, came to be regarded as the sakti, or consort of Brahma; Sri or Lakshmi, "beauty, fortune," as that of Vishnu ; and Umd or Parvati, the daughter of Himavat, the god of the Himalaya mountain, as that of Siva. On the other hand, it is not improbable that Parvati — who has a variety of other names, such as

Kali ("the black one "), Durga (" the inaccess- ible, terrible one "), Maha-devi (" the great goddess ") — enjoyed already a somewhat extensive worship of her own, and that there may thus have been good reason for assigning to her a prominent place in the Brahmanical system.

A compromise was thus effected between the esoteric doctrine of the metaphysician and some of the most prevalent forms of popular worship, resulting in what was henceforth to constitute the orthodox system of belief of the Brahmanical community. Yet the Vedic pantheon could not be altogether discarded, forming part and parcel, as it did, of that sacred revelation (Sruti), which was looked upon as the divine source of all religious and social law (smriii, " tradition "), and being, moreover, the foundation of the sacrificial ceremonial on which the priestly authority so largely depended. The existence of the old gods is, therefore, likewise recognized, but recognized in a very different way from that of the triple divinity. For while the triad repre- sents the immediate manifestation of the eternal, infinite soul — while it constitutes, in fact, the Brahma itself in its active relation to mundane and seemingly material occurrences, the old tradi- tional gods are of this world, are individual spirits or portions of the Brahma like men and other creatures, only higher in degree. To them an intermediate sphere, the heaven of Indra (the svarloka or svarga), is assigned to which man may raise himself by fulfilling the holy ordinances; but they are subject to the same laws of being; they, like men, are liable to be born again in some lower state, and, therefore, like them, yearn for emancipa- tion from the necessity of future individual existence. It is a sacred duty of man to worship these superior beings by invoca- tions and sacrificial observances, as it is to honour the pitris ("the fathers"), the spirits of the departed ancestors. The spirits of the dead, on being judged by Yama, the Pluto of Hindu mythology, are supposed to be either passing through a term of enjoyment in a region midway between the earth and the heaven of the gods, or undergoing their measure of punishment in the nether world, situated somewhere in the southern region, before they return to the earth to animate new bodies. In Vedic mythology Yama was considered to have been the first mortal who died, and " espied the way to " the celestial abodes, and in virtue of precedence to have become the ruler of the departed; in some passages, however, he is already regarded as the god of

death. Although the pantheistic system allowed only a sub ordinate rank to the old gods, and the actual religious belief of the people was probably but little affected by their existence, they continued to occupy an important place in the affections of the poet, and were still represented as exercising considerable influence on the destinies of man. The most prominent of them were regarded as the appointed Lokapalas, or guardians of the world; and as such they were made to preside over the four cardinal and (according to

some authorities) the intermediate points of the compass. Thus Indra, the chief of the gods, was regarded as the regent of the east; Agni, the fire (ignis), was in the same way associated with the south-east; Yama with the south; Surya, the sun ("HXios), with the south-west; Varuna, originally the representative of the all-embracing heaven (Ovpavos) or atmosphere, now the god of the ocean, with the west; Vdyu (or Pavana), the wind, with the north-west; Kuhera, the god of wealth, with the north; and Soma (or Chandra) with the north- east. ' In the institutes of Manu the Lokapalas are represented as standing in close relation to the ruling king, who is said to be composed of particles of these his tutelary deities. The retinue of Indra consists chiefly of the Gandharvas (probably etym. connected with Kevravpos) , a class of genii, considered in the epics as the celestial musicians; and their wives, the Apsaras, lovely nymphs, who are frequently employed by the gods to make the pious devotee desist from carrying his austere practices to an extent that might render him dangerous to their power. Ndrada, an ancient sage (probably a personification of the cloud, the " water-giver"), is considered as the messenger between the gods and men, and as having sprung from the forehead of Brahma. The interesting office of the god of love is held by Kamadeva, also called Ananga, the bodyless, because, as the myth relates, having once tried by the power of his mischievous arrow to make Siva fall in love with Parvati, whilst he was engaged in devotional practices, the urchin was reduced to ashes by a glance of the angry god. Two other mythological figures of some importance are considered as sons of Siva and Parvati, viz. Karttikeya or Skanda, the leader of the heavenly armies, who was supposed to have been fostered by the six Krittikds or Pleiades; and GaneSa (" lord of troops "), the elephant-headed god of wisdom, and at the same time the leader of the dii minorum gentium.

Orthodox Brahmanical scholasticism makes the attainment of final emancipation (mukti, moksha) dependent on perfect know- ledge of the divine essence. This knowledge can only be obtained by complete abstraction of the mind from external objects and intense meditation on the divinity, which again presupposes the total extinction of all sensual instincts by means of austere practices (tapas). The chosen few who succeed in gaining complete mastery over their senses and a full knowledge of the divine nature become absorbed into the universal soul immedi- ately on the dissolution of the body. Those devotees, on the other hand, who have still a residuum, however slight, of ignor- ance and worldliness left in them at the time of their death, pass to the world of Brahma, where their souls, invested with subtile corporeal frames, await their reunion with the Eternal Being.

The pantheistic doctrine which thus forms the foundation of the Brahmanical system of belief found its most complete exposition in one of

the six orthodox darSanas, or philosophical systems, the Vedanta philosophy. These systems are considered as orthodox inasmuch as they recognize the Veda as the revealed source of religious belief, and never fail to claim the authority of the ancient seers for their own teachings, even though — as in the case of Kapila, the founder of the materialistic Sankhya system — they involve the denial of so essential a dogmatic point as the existence of a personal creator of the world. So much, indeed, had freedom of speculative thought become a matter of established habit and intellectual necessity, that no attempt seems ever to have been made by the leading theological party to put down such heretical doctrines, so long as the sacred character of the privileges of their caste was not openly called in question. Yet internal dissensions on such cardinal points of belief could not but weaken the authority of the hierarchical

body; and as they spread beyond the narrow bounds of the Brahmanical schools, it wanted but a man of moral and in- tellectual powers, and untrammelled by class prejudices, to render them fatal to priestly pretensions. Such a man arose in the person of a Sakya prince of Kapilavastu, Gotama, the founder of Buddhism (about the 6th century B.C.). Had it only been for the philosophical tenets of Buddha, they need scarcely have caused, and probably did not cause, any great uneasiness to the orthodox theologians. He did, indeed, go one step beyond Kapila, by altogether denying the existence of the soul as a substance, and admitting only certain intellectual faculties as attributes of the body, perishable with it. Yet the conception which Buddha substituted for the transmigratory soul, viz. that of karma (" work "), as the sum total of the individual's good and bad actions, being the determinative element of the form of his future existence, might have been treated like any other speculative theory, but for the practical conclusions he drew from it. Buddha recognized the institution of caste, and accounted for the social inequalities attendant thereon as being the effects of karma in former existences. But, on the other hand, he altogether denied the revealed character of the Veda and the efficacy of the Brahmanical ceremonies deduced from it, and rejected the claims of the sacerdotal class to be the repositaries and divinely appointed teachers of sacred knowledge. That Buddha never questioned the truth of the Brahmanical theory of transmigration shows that this early product of speculative thought had become firmly rooted in the Hindu mind as a tenet of belief amounting to moral conviction. To the Hindu philo- sopher this doctrine seemed alone to account satisfactorily for the apparent essential similarity of the vital element in all animate beings, no less than for what elsewhere has led honest and logical thinkers to the stern dogma

of predestination. The belief in eternal bliss or punishment, as the just recompense of man's actions during this brief term of human life, which their less reflective forefathers had at one time held, appeared to them to involve a moral impossibility. The equality of all men, which Buddha preached with regard to the final goal, the nirvana, or extinction of karma and thereby of all future existence and pain, and that goal to be reached, not by the performance of penance and sacrificial worship, but by practising virtue, could not fail to be acceptable to many people. It would be out of place here to dwell on the rapid progress and internal development of the new doctrine. Suffice it to say that, owing no doubt greatly to the sympathizing patronage of ruling princes, Buddh- ism appears to have been the state religion in most parts of India during the early centuries of our era. To what extent it became the actual creed of the body of the people it will probably be impossible ever to ascertain. One of the chief effects it produced on the worship of the old gods was the rapid decline of the authority of the orthodox Brahmanical dogma, and a considerable development of sectarianism. (See Hinduism.)

See H. H. Wilson, Essays on the Religion of the Hindus;]. Muir, Original Sanskrit Texts; M. Muller, History of Ancient Sanskrit Literature; C. Lassen, Indische Alterthumskunde; Elphinstone, 'History of India, ed. by E. B. Cowell. (J- E.)

BRAHMAPUTRA, a great river of India, with a total length of 1800 m. Its main source is in a great glacier-mass of the northernmost chain of the Himalayas, called Kubigangri, about 82° N., and receives various tributaries including one formerly regarded as the true source from the pass of MariamLa (i5,5°° ft.), which separates its basin from the eastern affluents of the Mansarowar lakes, at least 100 m. south-east of those of the Indus. It flows in a south-easterly direction for 170 m., and then adheres closely to a nearly easterly course for 500 m. more, being at the end of that distance in 29° 10′ N. lat. It then bends north-east for 150 m. before finally shaping itself southwards towards the plains of Assam. Roughly speaking, the river may be said so far to run parallel to the main chain of the Himalaya at a distance of 100 m. therefrom. Its early beginnings take their rise amidst a mighty mass of glaciers which cover the northern slopes of the watershed, separating them from the sources of the Gogra on the south; and there is evidence that

two of its great southern tributaries, the Shorta Tsanpo (which joins about 150 m. from its source), and the Nyang Chu (the river of Shigatse and Gyantse), are both also of glacial origin. From the north it receives five great tributaries, namely, the Chu Nago, the Chachu Tsanpo and the Charta Tsanpo (alj within the first 200 m. of its course), and the Raka Tsanpo ant Kyi-chu (or river of Lhasa) below. The Chachu and the Charta

are large clear streams, evidently draining from the great central, lake district. Both of them measure more than 100 yds. in width at the point of junction, and they are clearly non-glacial. The Raka Tsanpo is a lateral affluent, flowing for 200 m. parallel to the main river course and some 20 to 30 m. north of it, draining the southern slopes of a high snowy range. It is an important feature as affording foothold for the Janglam (the great high road of southern Tibet connecting Ladakh with China), which is denied by the actual valley of the Brahmaputra. The great river itself is known in Tibet by many names, being generally called the Nari Chu, Maghang Tsanpo or Yaro Tsanpo, above Lhasa; the word "tsanpo" (tsang-po) meaning (according to Waddell) the " pure one," and applying to all great rivers. Fifty miles from its source the river and the Janglam route touch each other, and from that point past Tadum (the first important place on its banks) for another 130 m., the road follows more or less closely the left bank of the river. Then it diverges north- wards into the lateral valley of the Raka, until the Raka joins the Brahmaputra below Janglache. The upper reaches are nowhere fordable between Tadum and Lhasa, but there is a ferry at Likche (opposite Tadum on the southern bank), where wooden boats covered with hide effect the necessary connexion between the two banks and ensure the passage of the Nepal trade. From Janglache (13,800 ft.) to Shigatse the river is navigable, the channel being open and wide and the course straight. This is probably the most elevated system of navigation in the world. From Shigatse, which stands near the mouth of the Nyang Chu, to the Kyi-chu, or Lhasa river, there is no direct route, the river being unnavigable below Shigatse. The Janglam takes a circuitous course southwards to Gyantse and the Yamdok Cho before dropping again over the Khambala pass to the ferry at Khamba barje near Chushul. Thence the valley of the Kyi-chu (itself navigable for small boats for about 30 m.) leads to Lhasa northwards. At Chushul there is an iron chain-and-rope suspen- sion bridge over the deepest part of the river, but it does not completely span the river, and it is too insecure for use. The remains of a similar bridge exist at Janglache; but there arc no wooden or twig suspension bridges over the Tsanpo. At Tadum the river is about one half as wide again as the Ganges at Hardwar in December, i.e. about 250 to 300 yds. At Shigatse it flows in a wide extended bed with many channels, but contracts again at Chushul, where it is no wider than it is at Janglache, i.e. from 600 to 700 yds. At Chushul (below the Kyi-chu) the discharge of the river is computed to be about 35,000 cub. ft. per second, or seven times that of the Ganges at Hardwar.

For about 250 m. below Kyi-chu to a point about 20 m. below the great southerly bend (in 94° E. long.) the course of the Brahmaputra has been traced by native surveyors. Then it is lost amidst the jungle-covered hills of the wild Mishmi and Abor tribes to the east of Bhutan for another 100 m.,

until it is again found as the Dihong emerging into the plains of Assam. About the intervening reaches of the river very little is known except that it drops through 7000 ft. of altitude, and that in one place, at least, there exist some very remarkable falls. These are placed in 29 40′ N. lat., between Kongbu and Pema- Koi. Here the river runs in a narrow precipitous defile along which no path is practicable. The falls can only be approached from below, where a monastery has been erected, the resort of countless pilgrims. Their height is estimated at 70 ft., and by Tibetan report the hills around are enveloped in perpetual mist, and the Sangdong (the " lion's face "), over which the waters rush, is demon-haunted and full of mystic import. Up to comparatively recent years it was matter for controversy whether the Tsanpo formed the upper reaches of the Dihong or of the Irrawaddy. From the north-eastern extremity of Assam

where, near Sadya, the Lohit, the Dibong and the Dihong unite to form the wide placid Brahmaputra of the plains — one of the grandest rivers of the world — its south-westerly course to the Bay of Bengal is sufficiently well known. It still retains the proud distinction of being unbridged, and still the River Flotilla Company appoints its steamers at regular intervals to visit all the chief ports on its banks as far as Dibrugarh. Here, however, a new feature has been introduced in the local railway, which extends for some 80 m. to Sadya, with a branch to the Buri Dihing river at the foot of the Patkoi range. The Patkoi border the plains of Upper Assam to the south-east, and across these hills lies the most reasonable probability of railway ex- tension to Burma.

The following are the " lowest level " discharges of the principal affluents of the Brahmaputra in Upper Assam, estimated in cubic feet per second : —

Lohit river, 9 m. above Sadya 38,800

Dibong, I m. above junction with Dihong . . 27,200 Dihong ,, ,, Dibong . . 55,400

Subansiri 16,900

The basins of the Dibong and Subansiri are as yet very imper- fectly known. That of the Lohit has been fairly well explored. Near Goalpara the discharge of the river in January 1828 was computed to be 140,000 cub. ft., or nearly double that of the Ganges. The length of the river is 700 m. to the Dihong junction, and about 1000 in Tibet and eastern Bhutan, above

the Dihong. The Brahmaputra, therefore, exceeds the Ganges in length by about 400 m. The bed of the great river maintains a fairly constant position between its extreme banks, but the channels within that bed are so constantly shifting as to require close supervision on the part of the navigation authorities; so much detritus is carried down as to form a perpetually changing series of obstructions to steamer traffic.

An enormous development of agricultural resources has taken place within the Brahmaputra basin of late years, chiefly in the direction of tea cultivation, as well as in the production of jute and silk. Gold is found in the sands of all its upper tributaries, and coal and petroleum are amongst the chief mineral products which have been brought into economic prominence. During the rains the Brahmaputra floods hundreds of square miles of country, reaching a height of 30 to 40 ft. above its usual level. This supersedes artificial irrigation, and the plains so watered yield abundantly in rice, jute and mustard.

See Reports of the native explorers of the Indian Survey, edited by Montgomery and Harman; Imperial Gazetteer of India (1908); Sir T. H. Holdich, India (" Regions of the World " series, 1903); Ryder, Geographical Journal, 190s; Rawlings, The Great Plateau (1906). (T. H. H.)*

BRAHMA SAMAJ, a religious association in India which owes its origin to (Raja) Ram Mohan Roy, who began teaching and writing in Calcutta soon after 1800. The name means literally the " Church of the One God," and the word Samaj, like the word Church, bears both a local and a universal, or an individual and a collective meaning. Impressed with the per- versions and corruptions of popular Hinduism, Ram Mohan Roy investigated the Hindu Shastras, the Koran and the Bible, repudiated the polytheistic worship of the Shastras as false, and inculcated the reformed principles of monotheism as found in the ancient Upanishads of the Vedas. In 1816 he established a society, consisting only of Hindus, in which texts from the Vedas were recited and theistic hymns chanted. This, however, soon died out through the opposition it received from the Hindu community. In 1830 he organized the society known as the Brahma Samaj.

The following extract from the trust-deed of the building dedicated to it will show the religious belief and the purposes of its founder. The building was intended to be " a place of public meeting for all sorts and descriptions of people, without distinction, who shall behave and conduct themselves in an orderly, sober, religious and devout manner, for the worship and adoration of the eternal, unsearchable and immutable Being, who is the author and preserver of the universe, but not under and by any other name, designation or title, peculiarly used

for and applied to any particular being or beings by any man or set of men whatsoever; and that no graven image, statue or sculpture, carving, painting, picture, portrait or the likeness of anything shall be admitted within the said messuage, building, land, tenements, hereditament and premises; and that no sacrifice, offering or oblation of any kind or thing shall ever be permitted therein; and that no animal or living creature shall within or on the said messuage, &c, be deprived of life either for religious purposes or food, and that no eating or drinking (except such as shall be necessary by any accident for the pre- servation of life), feasting or rioting be permitted therein or thereon; and that in conducting the said worship or adoration, no object, animate or inanimate, that has been or is or shall hereafter become or be recognized as an object of worship by any man or set of men, shall be reviled or slightingly or contemptu- ously spoken of or alluded to, either in preaching or in the hymns or other mode of worship that may be delivered or used in the said messuage or building; and that no sermon, preaching, discourse, prayer or hymns be delivered, made or used in such worship, but such as have a tendency to the contemplation of the Author and Preserver of the universe or to the pro- motion of charity, morality, piety, benevolence, virtue and the strengthening of the bonds of union between men of all religious persuasions and creeds."

The new faith at this period held to the Vedas as its basis. Ram Mohan Roy soon after left India for England, and took up his residence in Bristol, where he died in 1835. The Brahma Samaj maintained a bare existence till 1841, when Babu Debendra Nath Tagore, a member of a famous and wealthy Calcutta family, devoted himself to it. He gave a printing- press to the Samaj, and established a monthly journal called the Tattwabodhini Patrika, to which the Bengali language now owes much for its strength and elegance. About 1850 some of the followers of the new religion discovered that the greater part of the Vedas is polytheistic, and a schism took place, — the advanced party holding that nature and intuition form the basis of faith. Between 1847 and 1858 branch societies were formed in different parts of India, especially in Bengal, and the new society made rapid progress, for, which it was largely indebted to the spread of English education and the work of Christian missionaries. In fact the whole Samaj movement is as distinct a product of the contest of Hinduism with Christi- anity in the 19th century, as the Panth movement was of its contest with Islam 300 years earlier.

The Brahma creed was definitively formulated as follows: — (1) The book of nature and intuition supplies the basis of religious faith. (2) Although the Brahmas do not consider any book written by man the basis of their religion, yet they do accept with respect and pleasure any religious truth contained in any book. (3) The Brahmas believe that the religious condition of man is progressive, like the other departments of his condition

in this world. (4) They believe that the fundamental doctrines of their religion are also the basis of every true religion. (5) They believe in the existence of one Supreme God — a God endowed with a distinct personality, moral attributes worthy of His nature and an intelligence befitting the Governor of the universe, and they worship Him alone. They do not believe in any of His incarnations. (6) They believe in the immortality and progress- ive state of the soul, and declare that there is a state of conscious existence succeeding life in this world and supplementary to it as respects the action of the universal moral government. (7) They believe that repentance is the only way to salvation. They do not recognize any other mode of reconcilement to the offended but loving Father. (8) They pray for spiritual welfare and believe in the efficacy of such prayers. (9) They believe in the provi- dential care of the divine Father. (10) They avow that love towards Him and the performances of the works which He loves, constitute His worship. (11) They recognize the necessity of public worship, but do not believe that communion with the Father depends upon meeting in any fixed place at any fixed time. They maintain that they can adore Him at any time and at any place, provided that the time and the place are

calculated to compose and direct the mind towards Him. (12) They do not believe in pilgrimages and declare that holiness can only be attained by elevating and purifying the mind. (13) They put no faith in rites or ceremonies, nor do they believe in penances as instrumental in obtaining the grace of God. They declare that moral righteousness, the gaining of wisdom, divine con- templation, charity and the cultivation of devotional feelings are their rites and ceremonies. They further say, govern and regulate your feelings, discharge your duties to God and to man, and you will gain everlasting blessedness; purify your heart, cultivate devotional feelings and you will see Him who is unseen. (14) Theoretically there is no distinction of caste among the Brahmas. They declare that we are all the children of God, and therefore must consider ourselves as brothers and sisters.

For long the Brahmas did not attempt any social reforms. But about 1865 the younger section, headed by Babu Keshub Chunder Sen, who joined the Samaj in 1857, tried to carry their religious theories into practice by demanding the abandonment of the external signs of caste distinction. This, however, the older members opposed, declaring such innovations to be prema- ture. A schism resulted, Keshub Chunder Sen and his followers founding the Progressive Samaj, while the conservative stock remained as

the Adi (i.e. original) Samaj, their aim being to " fulfil " rather than to abrogate the old religion. The vitality of the movement, however, had left it, and its inconsistencies, com- bined with the lack of strong leadership, landed it in a position scarcely distinguishable from orthodox Hinduism. Debendra Nath Tagore sought refuge from the difficulty by becoming an ascetic. The " Brahma Samaj of India," as Chunder Sen's party styled itself, made considerable progress extensively and intensively until 1878, when a number of the most prominent adherents, led by Anand Mohan Bose, took umbrage at Chunder Sen's despotic rule and at his disregard of the society's regula- tions concerning child marriage. This led to the formation of the Sadharana (Universal) Brahma Samaj, now the most popular and progressive of the three sections of the movement and conspicuous for its work in the cause of literary culture, social reform and female education in India. But even when we add all sections of the Brahma Samaj together, the total number of adherents is only about 4000, mostly found in Calcutta and its neighbourhood. A small community (about 130) in Bombay, known as the Prarthna (Prayer) Samaj, was founded in 1867 through Keshub Chunder's influence; they have a similar creed to that of the Brahma Samaj, but have broken less decisively with orthodox and ceremonial Hinduism.

See the articles on Arya, Samaj, Keshub Chunder Sen, Ram Mohan Roy. Also John Robson, Hinduism, and Christianity; and the Theistic Quarterly Review (the organ of the Society since 1880).

BRAHMS, JOHANNES (1833-1897), German composer, was bom in Hamburg on the 7th of May 1833. He was the son of a double-bass player in the Hamburg city theatre and received his first musical instruction from his father. After some lessons from O. Cossel, he went to Cossel's master, Eduard Marxsen of Altona, whose experience and artistic taste directed the young man's genius into the highest paths. A couple of public appear- ances as a pianist were hardly an interruption to the course of his musical studies, and these were continued nearly up to the time when Brahms accepted an engagement as accompanist to the Hungarian violinist, Remenyi, for a concert tour in 1853. At Gottingen there occurred a famous contretemps which had a most important though indirect influence on the whole after-life of the young player. A piano on which he was to play the " Kreutzer " sonata of Beethoven with Remenyi turned out to be a semitone below the required pitch; and Brahms played the part by heart, transposing it from A to B flat, in such a way that the great violinist, Joachim, who was presenl and discerned what the feat implied, introduced himself to Brahms, and laid the foundation of a life-long friendship. Joachim gave him intro- ductions to Liszt at Weimar and to Schumann at Dusseldorf; the former hailed him for a time as a member of the advanced party in music, on the strength of his E flat minor scherzo, but the misapprehension was

not of long continuance. The intro-

duction to Schumann impelled that master, now drawing near the tragic close of his career, to write the famous article " Neue Bahnen," in which the young Brahms was proclaimed to be the great composer of the future, " he who was to come." The critical insight in Schumann's article is all the more surprising when it is remembered how small was the list of Brahms's works at the time. A string quartet, the first pianoforte sonata, the scherzo already mentioned, and the earliest group of songs, con- taining the dramatic " Liebestreu," are the works which drew forth the warm commendations of Schumann. In December 1853 Brahms gave a concert at Leipzig, as a result of which the firms of Breitkopf & Haertel and of Senff undertook to publish his compositions. In 1854 he was given the post of choir- director and music-master to the prince of Lippe-Detmold, but he resigned it after a few years, going first to Hamburg, and then to Zurich, where he enjoyed the friendship and artistic counsel of Theodor Kirchner. The unfavourable verdict of the Leipzig Gewandhaus audience upon his pianoforte concerto in D minor op. 15, and several remarkably successful appearances in Vienna, where he was appointed director of the Singakademie in 1863, were the most important external events of Brahms's life, but again he gave up the conductorship after a few months of valuable work, and for about three years had no fixed place of abode. Concert tours with Joachim or Stockhausen were undertaken, and it was not until 1867 that he returned to Vienna, or till 1872 that he chose it definitely as his home, his longest absence from the Austrian capital being between 1874 and 1878, when he lived near Heidelberg. From 1871 to 1874 he conducted the concerts of the " Gesellschaft der Musik- freunde," but after the later date he occupied no official position of any kind. With the exception of journeys to Italy in the spring, or to Switzerland in the summer, he rarely left Vienna. He refused to come to England to take the honorary degree of Mus.D. offered by the university of Cambridge; the university of Breslau made him Ph.D. in 1881; in 1886 he was created a knight of the Prussian order Pour le merite, and in 1889 was presented with the freedom of his native city. He died in Vienna on the 3rd of April 1897.

The works of Brahms may be summarized as follows: — Various sacred compositions for chorus, op. 12, 13, 22, 27, 29, 30, 37, leading up to op. 45, the " German Requiem " first performed at Bremen in 1868, and subsequently completed by a soprano solo with chorus; the " Triumphlied " in commemoration of the German victories of 1870-71; and some choral songs and motets, op. 74, 109 and no. Secular choral works, op. 17, 41, 42, 44, 50 (" Rinaldo " for tenor solo and male choir), 53 (" Rhap- sodic, " alto solo and male choir), 54 (" Schicksalslied "), 62, 82 (Schiller's Nanie), 89 (" Gesang der Parzen "), 93, 104, 113. Concerted vocal works,

op. 20, 28, 31, 52 (" Liebeslieder-Walzer ") 61, 64, 65 (" Neue Liebeslieder "), 75, 92, 103, 112. Solo songs, nearly 300. Orchestral works: four symphonies, op. 68, 73, 90 and 98; two serenades, op. n and 16; two pianoforte concertos, op. 15 and 83, one violin concerto, op. 77; concerto for violin and violoncello, op. 102; variations on a theme by Haydn, op. 56; two overtures, " Academische Festouvertiire," op. 80, and " Tragic Overture," op. 81. Chamber music: two sextets, op. 18 and 36; quintet, piano and strings, op. 34, strings, op. 88 and 111, clarinet and strings, op. 115; three string quartets, op. 51 and 67, three quartets for piano and strings, op. 25, 26 and 60. Three trios for piano and strings, op. 8, 87 and 101; trio for piano, violin and horn, op. 40; piano, clarinet and violoncello, op. 114. Duet sonatas, three for piano and violin, op. 78, 100 and 108; two for piano and violoncello, op. 38 and 99; two for piano and clarinet, op. 120. Pianoforte solos: three sonatas, op. 1, 2 and s; scherzo, op. 4; variations, op. 9, 21, 23, 24, 35;

4 ballads, op. ic • waltzes, op. 39; two rhapsodies, op. 79; caprices and intermezzi, op. 76, 116, 117, 118 and 119.

5 studies and 51 Uebungen without opus-number, and a chorale- prelude and fugue for organ, besides four books of Hungarian Dances arranged for pianoforte duet.

Brahms has often been called the last of the great classical masters, in a sense wider than that of his place in the long line of

the great composers of Germany. Though only the most super- ficial observers could deny him the possession of qualities which distinguish the masters of the romantic school, it is as a classicist that he must be ranked among modern musicians. From the beginning of his career until its close, his ideas were clothed by preference in the forms which had sufficed for Beethoven, and the instances in which he departed from structural precedent are so rare that they might be disregarded, were they not of such high value that they must be considered as the signs of a logical development of musical form, and not as indicating a spirit of rebellion against existing modes of structure. His practice, more frequent in later than in earlier life, of welding together the " working-out " and the " recapitulation " sections of his move- ments in a closer union than any of his predecessors had attempted, is an innovation which cannot fail to have important results in the future; and if the skill of younger writers is not adequate to such a display of ingenuity as occurs in the finale of the fourth

symphony, where the " passacaglia " form has been used with an effect that is almost bewildering to the ordinary listener, that at least stands as a monument of inventiveness finely subordinated to the emotional and intellectual purport of the thoughts expressed. His themes are always noble, and even from the point of view of emotional appeal their deep intensity of expression is of a kind which grows upon all who have once been awakened to their beauty, or have been at the pains to grasp the composer's characteristics of utterance. His vocal music, whether for one voice or many, is remarkable for its fidelity to natural inflection and accentuation of the words, and for its perfect reflection of the poet's mood. His songs, vocal quartets and choral works abound in passages that prove him a master of effects of sound; and throughout his chamber music, in his treat- ment of the piano, of the strings, or of the solo wind instruments he employs, there are numberless examples which sufficiently show the irrelevance of a charge sometimes brought against his music, that it is deficient in a sense of what is called "tone- colour." It is perfectly true that the mere acoustic effect of a passage was of far less importance to him than its inherent beauty, poetic import, or logical fitness in a definite scheme of develop- ment; and that often in his orchestral music the casual hearer receives an impression of complexity rather than of clearness, and is apt to imagine that the " thickness " of instrumentation is the result of clumsiness or carelessness. Such instances as the introduction to the finale of the first symphony, the close of the first movement of the second, what maybe called the epilogue of the third, or the whole of the variations on a theme of Haydn, are not only marvels of delicate workmanship in regard to structure, but are instinct with the sense of the peculiar beauty and charac- teristics of each instrument. The " Academic Festival " over- ture proves Brahms a master of musical humour, in his treatment of the student songs which serve as its themes; and the com- panion piece, the " Tragic " overture, reaches a height of sub- limity which is in no way lessened because no particular tragedy has ever been named in conjunction with the work.

As with all creative artists of supreme rank, the work of Brahms took a considerable time before it was very generally appreciated. The change in public opinion is strikingly illustrated in regard to the songs, which, once voted ineffective and unvocal, have now taken a place in every eminent singer's repertory. The outline in his greater works must be grasped with some definiteness before the separate ideas can be properly understood in their true relation to each other; and while it is his wonderful power of handling the recognized classical forms, so as to make them seem absolutely new, which stamps him as the greatest musical architect since Beethoven, the necessity for realizing in some degree what musical form signifies has undoubtedly been a bar to the rapid acceptance of his greater

works by the uneducated lovers of music. These are of course far more easily moved by effects of colour than by the subtler beauties of organic structure, and Brahms's attitude towards tone-colour was scarcely such as would endear him to the large number of musicians in whose view tone-colour is pre-eminent. His mastery of form, again, has been – attacked as formalism by superficial critics, blind to the real

inspiration and distinction of his ideas, and to their perfection in regard to style and the appropriateness of every theme to the exact emotional state to be expressed. In his larger vocal works there are some which treat of emotional conditions far removed from the usual stock of subjects taken by the average composer; to compare the ideas in the " German Requiem " with those of the " Schicksalslied " or " Nanie " is to learn a lesson in artistic style which can never be forgotten. In the songs, too, it is scarcely too much to say that the whole range of human emotion finds expression in noble lyrics that yield to none in actual musical beauty. The four " Ernste Gesange," Brahms's last composition, must be considered as his supreme achievement in dignified utterance of noble thoughts in a style that perfectly fits them. The choice of words for these as well as for the " Requiem " and others of his serious works reveals a strong sense of the vanity and emptiness of human life, but at least as strong a confidence in the divine consolations.

It has been the misfortune of the musical world in Germany that every prominent musician is ranged by critics and amateurs in one of two hostile camps, and it was probably due in the main to the misrepresentations of the followers of Wagner that the idea was so generally held that Brahms was a man of narrow sympathies and hard, not to say brutal manners. The latter impression was fostered, no doubt, by the master's natural detestation of the methods by which the average lionizer seeks to gain his object, and both alike are disproved in the Recollections of J. V. Widmann, an intimate friend for many years, which throw a new light on the master, revealing him as a man of the widest artistic sympathies, neither intolerant of excellence in a line opposed to his own, nor weakly enthusiastic over mediocre pro- ductions by composers whose views were in complete sympathy with him. His admiration for Verdi and Wagner is enough to show that the absence of any operatic work from his list of com- positions was simply due to the difficulty of finding a libretto which appealed to him, not to any antagonism to the lyric stage in its modern developments. How far he stood from the pre- judices of the typical pedant may be seen in the passionate love he showed throughout his life for national music, especially that of Hungary. Not only were his arrangements of Hungarian dances the first work by which his name was known outside his native land, but his first pianoforte quartet, op. 25 in G minor, incurred the wrath of the critics of the time by its introduction of some characteristics of Hungarian music

into the finale. His arrangement of a number of children's traditional songs was published without his name, and dedicated to the children of Robert and Clara Schumann in the earliest years of his creative life; and among the last of his publications was a collection of forty-nine German Volkslieder, arranged with the utmost skill, taste and simplicity. He had a great admiration for the waltzes of Strauss, and in many passages of his own works the entrain that is characteristic of the Viennese dance-writers is present in a striking degree.

See also W. H. Hadow, Studies in Modem Music (2nd series, 1908) ; and the articles Music, Song. (J. A. F. M.)

BRAHUI, a people of Baluchistan, inhabiting the Brahui mountains, which extend continuously from near the Bolan Pass to Cape Monze on the Arabian Sea. The khan of Kalat, the native ruler of Baluchistan, is himself a Brahui, and a lineal descendant of Kumbar, former chief of the Kumbarini, a Brahui tribe. The origin of the Brahuis is an ethnological mystery. Bishop Robert Caldwell and other authorities de- clare them Dravidians, and regard them as the western borderers of Dravidian India. Others believe them to be Scythians, 1 and others again connect them with Tatar

1 Compare Mountstuart Elphinstone's {History of India, 9th ed., 1905, p. 249) description of Scythians with physique of Brahuis. A relationship between the Jats (q.v.) and the Brahuis has been sug- gested, and it is generally held that the former were of Scythic stock. The Mengals, Bizanjos and Zehris, the three largest Brahui tribes, are called Jadgal or Jagdal, i.e. Jats, by some of their neighbours. The Zaghar Mengal, a superior division of the Mengal tribe, believe they themselves came from a district called Zughd, somewhere near Samarkand in central Asia. Gal appears to be a collective

mountaineers who early settled in southern parts of Asia. The origin of the word itself is in doubt. It is variously derived as a corruption of the Persian Ba Rohi (literally " of the hills ") ; as an eponym from Braho, otherwise Brahin or Ibrahim, a legendary hero of alleged Arab descent who led his people " out of the west," while Dr Gustav Oppert believes that the name is in some way related to, if not identical with, that of the Baluchis. He recognizes in the name of the Paratas and Paradas, who dwelt in north-eastern Baluchistan, the origin of the modern Brahui. He gives reasons for regarding the Bra as a contraction of Bara and obtains " thus in Barahui a

name whose resemblance to that of the ancient Barrhai (the modern Bhars), as well as to that of the Paratas and Paravar and their kindred the Maratha Paravari and Dravidian Parheyas of Palaman, is striking." The Brahuis declare themselves to be the aborigines of the country they now occupy, their ancestors coming from Aleppo. For this there seems little foundation, and their language, which has no affinities with Persian, Pushtu or Baluchi, must be, according to the most eminent scholars, classed among the Dravidian tongues of southern India. Probably the Brahuis are of Dravidian' stock, a branch long isolated from their kindred and much Arabized, and thus exhibiting a marked hybridism.

Whatever their origin, the Brahuis are found in a position of considerable power in Baluchistan from earliest times. Their authentic history begins with Mir Ahmad, who was their chief in the 17th century. The title of " khan " was assumed by Nasir the Great in the middle of the 18th century. The Brahuis are a confederacy of tribes possessing common lands and uniting from time to time for purposes of offence or defence. At their head is the khan, who formerly seems to have been regarded as semi-divine, it being customary for the tribesmen on visiting Kalat to make offerings at the Ahmadzai gate before entering. The Brahuis are a nomadic race, who dwell in tents made of goats' hair, black or striped, and live chiefly on the products of their herds. They are Sunnite Mahommedans, but are not fanatical. In physique they are very easily distinguished from their neighbours, the Baluchis and Pathans, being a smaller, sturdier people with rounder faces characterized by the flat, blunt and coarse features of the Dravidian races. They are of a dark brown colour, their hair and beards being often brown not black. They are an active, hardy race, and though as avaricious as the Pathans, are more trustworthy and less turbulent. Their ordinary dress is a tunic or shirt, trousers gathered in at the ankles and a cloak usually of brown felt. A few wear turbans, but generally their headgear is a round skullcap with tassel or button. Their women are not strictly veiled. Sandals of deer or goat skin are worn by all classes. Their weapons are rifles, swords and shields. They do not use the Afghan knife or any spears. Some few Brahuis are enlisted in the Bombay Native Infantry.

See Dr Bellew, Indus to Euphrates (London, 1874) ! Gustav Oppert, The Original Inhabitants of India (1893); Dr Theodore Duka, Essay on the Brahui Grammar (after the German of Dr Trumpp of Munich University).

BRAID (from the O. Eng. bregdan, to move quickly to and fro, hence to weave), a plait, especially a plait of hair, also a plaited tape woven of wool, silk, gold thread, &c, used for trim- ming or binding. A particular use is for the narrow bands, bordered with open work, used in making point lace.

BRAIDWOOD, THOMAS (17 15-1806), British teacher of the deaf and dumb, was born in Scotland in 1715, and educated at Edinburgh University. He became a school teacher, and in 1760 opened in Edinburgh, with one pupil, the first school in Great Britain for the deaf and dumb, following the system of Dr John Wallis, described in Philosophical Transactions suffix in Baluchi, and Men or Min occurs on the lists of the Behistun inscriptions as the name of one of the Scythian tribes deported by Darius, the Achaemenian, for their turbulence (see Kalat, A Memoir on the County and Family of the Ahmadzai Khans of Kalat, by G. P. Tate). Sajdi, another Brahui tribal name, is Scythian, the principal clan of which tribe is the Saga, both names being identifiable with the Sagetae and Saki of ancient writers. Thus there seems some reason for believing that the former occupants of at least some portions of the Brahui domain were of Scythianblood.

nearly a hundred years before. This school was the model for all of the early English institutions of the kind. Dr Johnson visited it in 1773, and describes it as " a subject of philosophical curiosity . . . which no other city has to show," and Braid- wood's dozen pupils as able " to hear with the eye." In 1783 Braidwood moved to Hackney, where he died on the 24th of October 1806.

BRAILA (in Rumanian Br alia, formerly Ibraila), the capital of the department of Braila, Rumania; situated amid flat and dreary country on the left bank of the river Danube, about 100 m. from its mouth at Sulina. Pop. (1900) 58,392, including 10,811 Jews. Southward, the Danube encircles a vast fen, tenanted only by waterfowl and herds of half-wild swine, while the plain which extends to the north-east and east only grows fertile at some distance inland. Braila itself is plainly built on a bank rising about 50 ft. above sea-level; but partly on a narrow strip of ground which separates this bank from the water's edge. Along, the crest of the bank a public park is laid out, com- manding a view of the desolate Dobrudja hills, across the river.

On the landward side, Braila has the shape of a crescent, the curve of its outer streets following the line of the old fortifica- tions, dismantled in 1829. Few houses, among the older quarters, exceed two storeys in height, but the main streets are paved, and there is a regular supply of filtered water. A wide avenue, the Strada Bulivardului, divides the town proper from the suburbs. The principal church, among many, is the cathedral of St Michael, a large, ungainly building of grey sandstone. Electric tramways intersect the town, and are continued for 3 m. to Lacul Sarat (Salt Lake), where there are mineral springs and mud-baths, owned by the state. The waters, which contain over 45% of salt, iodine and sulphur, are among the strongest of their kind in Europe; and are of high repute, being annually

visited by more than a thousand patients. Braila is the seat of a chamber of commerce. It is the chief port of entry for Walachia, and the headquarters of the grain trade; for, besides its advantageous position on the river, it is connected with the central Walachian railways by a line to Buzeu, and with the Russian and Moldavian systems by a line to Galatz. Quays, where ships drawing 1 5 ft. of water can discharge, line the river front; and there are large docks, grain elevators and ware- houses, besides paper mills, roperies, and soap and candle works. Over 20 steamers, maintained by the state, ply between Braila and Rotterdam. Among the vessels of all nations, the British are first in numbers and tonnage, the Greek second. Grain and timber form the chief articles of export; textiles, machinery, iron goods and coal being most largely imported.

Many events connected with the history of Walachia took place in the neighbourhood of Braila. In 1475 Stephen the Great, having dethroned the voivode Radu, burned the town. In 1573 another Moldavian prince took the city by storm, and massacred the Turkish garrison. In 1659 it was again burned by the Walachian prince Mircea, and for the time the Turks were expelled, but afterwards returned. In the latter part of the 18th century Braila was several times captured by the Russians, and in 1770 it was burned. By the peace of Bucharest (1812) the Turks retained the right of garrisoning Braila. In 1828 it was gallantly defended by Soliman Pasha, who, after holding out from the middle of May until the end of June, was allowed to march out with the honours of war. At the peace of Adrianople (1829) the place was definitely assigned to Walachia; but before giving it up, the grand-duke Michael of Russia razed the citadel, and in this ruinous condition it was handed over to the Walachians. Braila was the spot chosen by the Russian general Gorchakov for crossing the Danube with his division in 1854. On the banks of the Danube, a little above the city, are some remains of the piles of a bridge said by a very doubtful tradition to have been built by Darius (c. 500 B.C.).

BRAIN (A.S. braegen), that part of the central nervous system which in vertebrate animals is contained within the cranium or skull; it is divided into the great brain or cerebrum, the hind brain or cerebellum, and the medulla oblongata, which is the transitional part between the spinal cord and the othei

two parts already named. Except where stated, we deal here primarily with

the brain in man.

i. Anatomy

Membranes of the Human Brain.

Three membranes named the dura mater, arachnoid and pia mater cover the brain and lie between it and the cranial cavity. The most external of the three is the dura mater, which consists of a cranial and a spinal portion. The cranial part is in contact with the inner table

Fig. i. — Dura Mater and Cranial Sinuses.

1 . Falx cerebri.

2. Tentorium.

3,3. Superior longitudinal sinus.

4. Lateral sinus.

5. Internal jugular vein.

6. Occipital sinus.

6'. Torcular Herophili.

7. Inferior longitudinal sinus.

8. Veins of Galen.

and 10. Superior and inferior

petrosal sinus. Cavernous sinus. Circular sinus which connects

the two cavernous sinuses

together. Ophthalmic vein, from 15,

the eyeball. 14. Crista galli of ethmoid bone.

11. 12.

of the skull, and is adherent along the lines of the sutures and to the margins of the foramina, which transmit the nerves, more especially to the foramen magnum. If forms, therefore, for these bones an internal periosteum, and the meningeal arteries which ramify in it are the nutrient arteries of the inner table. As the growth of bone is more active in infancy and youth than in the adult, the adhesion between the dura mater and the cranial bones is greater in early life than at maturity. From the inner surface of the dura mater strong bands pass into the cranial cavity, and form partitions between certain of the subdivisions of the brain. A vertical longi- tudinal mesial band, named, from its sickle shape, falx cerebri, dips between the two hemispheres of the cerebrum. A smaller sickle- shaped vertical mesial band, the falx cerebelli, attached to the internal occipital crest, passes between the two hemispheres of the cerebellum. A large band arches forward in the horizontal plane of the cavity, from the transverse groove in the occipital bone to the clinoid

Erocesses of the sphenoid, and is attached laterally to the upper order of the petrous part of each temporal bone. It separates the cerebrum from the cerebellum, and, as it forms a tent-like covering for the latter, is named tentorium cerebelli. Along certain lines the cranial dura mater splits into two layers to form tubular passages for the transmission of venous blood. These passages are named the venous blood sinuses of the dura mater, and they are lodged in the grooves on the inner surface of the skull referred to in the description of the cranial bones. Opening into these sinuses are numerous veins which convey from the brain the blood that has been circulating through it; and two of these sinuses, called cavernous, which lie at the sides of the body of the sphenoid bone, receive the ophthalmic veins from the eyeballs situated in the orbital cavities. These blood sinuses pass usually from before backwards : a superior longitudinal along the upper border of the falx cerebri as far as the internal occi- pital protuberance; an inferior longitudinal along its lower border as far as the tentorium, where it joins the straight sinus, which passes back as far as the same protuberance. One or two small occipital sinuses, which lie in the falx cerebelli, also pass to join the straight and longitudinal sinuses opposite this protuberance ; several currents of blood meet, therefore, at this spot, and as Herophilus supposed that a sort of whirlpool was formed in the blood, the name torcular Herophili has been used to express the meeting of these sinuses. From the torcular the blood is drained away by two large sinuses, named lateral, which curve forward and downward to the jugular foramina to terminate in the internal jugular veins. In its course each lateral sinus receives two petrosal sinuses, which pass from the cavernous sinus backwards along the upper and lower borders of the petrous part of the temporal bone. The dura mater

consists of a tough, fibrous membrane, somewhat flocculent exter- nally,

but smooth, glistening, and free on its inner surface. The inner surface has the appearance of a serous membrane, and when examined microscopically is seen to consist of a layer of squamous endothelial cells. Hence the dura mater is sometimes called a fibro- serous membrane. The dura mater is well provided with lymph vessels, which in all probability open by stomata on the free inner surface. Between the dura mater and the subjacent arachnoid membrane is a fine space containing a minute quantity of limpid serum, which moistens the smooth inner surface of the dura and the corresponding smooth outer surface of the arachnoid. It is regarded as equivalent to the cavity of a serous membrane, and is named the sub-dural space.

Arachnoid Mater. — The arachnoid is a membrane of great delicacy and transparency, which loosely envelops both the brain and spinal cord. It is separated from these organs by the pia mater; but between it and the latter membrane is a distinct space, called sub- arachnoid. The sub-arachnoid space is more distinctly marked beneath the spinal than beneath the cerebral parts of the membrane, which forms a looser investment for the cord than for the brain. At the base of the brain, and opposite the fissures between the convolu- tions of the cerebrum, the interval between the arachnoid and the pia mater can, however, always be seen, for the arachnoid does not, like the pia mater, clothe the sides of the fissures, but passes directly across between the summits of adjacent convolutions. The sub- arachnoid space is subdivided into numerous freely-communicating loculi by bundles of delicate areolar tissue, which bundles are in- vested, as Key and Retzius have shown, by a layer of squamous endothelium. The space contains a limpid cerebro-spinal fluid, which varies in quantity from 2 drachms to 2 oz., and is most plentiful in the dilatations at the base of the brain known as cisternae. It should be clearly understood that there is no communication between the subdural and sub-arachnoid spaces, but that the latter com- municates with the ventricles through openings in the roof of the fourth, and in the descending cornua of the lateral ventricles.

When the skull cap is removed, clusters of granular bodies are usually to be seen imbedded in the dura mater on each side of the superior longitudinal sinus; these are named the Pacchionian bodies. When traced through the dura mater they are found to spring from the arachnoid. The observations of Luschka and Cleland have proved that villous processes invariably grow from the free surface of that membrane, and that when these villi greatly increase in size they form the bodies in question. Sometimes the Pacchionian bodies greatly hypertrophy, occasioning absorption of the bones of the cranial vault and depressions on the upper surface of the brain.

Pia Mater. — This membrane closely invests the whole outer surface of the brain. It dips into the fissures between the convolutions, and

Optic chiasma'

Optic tract

Corpus geniculatum

externum

Corpus geniculatum

internum

Locus perforatus

posticus

Middle peduncle of the cerebellum

Restiform body.

Olive.

Pyramid.

Anterior superficial

arcuate fibres'

Decussation 01 pyramids

Optic nerve

Tnfundibulum

Tuber cinereum

Corpora mammillaria

Oculo-rnotornerve(IIL)

Trochlear nerve(IV.) winding round the crus cerebri

Trigeminal nerve (V.)

Abducent nerve (VI.) Facial nerve (VII.) Auditory nerve (VIII.)

Vago-glossopharyngeal nerve (IX. and X.)

Hypoglossal (nerve XII.)

Spinal accessory nerve (XI.)

First cervical nerve

After D. J. Cunningham's Text-book oj Anatomy.

Fig. 2. — Front View of the Medulla, Pons and Mesencephalon of a full-time Human Foetus.

a wide prolongation, named velum interpositum, lies in the interior of the cerebrum. With a little care it can be stripped off the brain without causing injury to its substance. At the base of the brain the pia mater is prolonged on to the roots of the cranial nerves. This membrane consists of a delicate connective tissue, in which the arteries of the brain and spinal cord ramify and subdivide into small branches before they penetrate the nervous substance, and in which the veins conveying the blood from the nerve centres lie before they open into the blood sinuses of the cranial dura mater and the extradural venus plexus of the spinal canal.

Medulla Oblongata.

Gracile nucleus

The Medulla Oblongata rests upon the basi-occipital. It is somewhat pyramidal in form, about Ij in. long, and I in. broad in its widest part. It is a bilateral organ, and is divided into a right and a left half by shallow anterior and posterior median fissures, continuous with the corresponding fissures in the spinal cord ; the posterior fissure ends above in the fourth ventricle. Each half is subdivided into elongated tracts of nervous matter. Next to, and parallel with the anterior fissure is the anterior pyramid (see fig. 2). This pyramid is continuous below with the cord, and the place of continuity is marked by the passage across the fissure of three or four bundles of nerve fibres, . , .

from each half of the cord to the opposite anterior Spmal root of tn « emmal ■"< =■ pyramid; this crossing is called the decussation of the Substantia gelatinosa Rolandi- pyramids. To the side of the pyramid, and separated from it by a faint fissure, is the olivary fasciculus, which at its*

upper end is elevated into the projecting oval-shaped olivary body. Behind the olivary body in the lower half of the medulla are three tracts named from before backward the funiculus of Rolandp, the funiculus cuneatus and the funiculus gracilis (see fig. 3). The two funiculi graciles of opposite sides are in contact in the mid dorsal line and have between them the postero median fissure. When the fourth ventricle is reached they diverge to form the lower limit of that diamond-shaped space and are slightly swollen to form the clavae. All these three bundles appear to be continued up into the cerebellum as the restiform bodies or inferior cere- bellar peduncles, but really the continuity is very slight, as the restiform bodies are formed from the direct cerebellar tracts of the spinal cord joining with the superficial arcuate fibres which curve back just

below the olivary bodies. The upper part of the fourth „ r„™;„„i™ t , 1 1 . a .

. ,. . i_ 1 1 , ˆ.l • • l 11 rrom Cunningham, I ext-book of Anatomy.

ventricle is bounded by the superior cerebellar s ‘ “»””””•> ’•

peduncles which meet just before the inferior quadri-

geminal bodies are reached. Stretching across between

them is the superior medullary velum or valve of

Vieussens, forming the upper part of the roof, while the inferior

velum forms the lower part, and has an opening called the foramen

of Majendie, through which the sub-arachnoid space communicates

with the ventricle. The floor (see fig. 3) has two triangular

depressions on each side of a median furrow; these are the superior

and inferior fovea, the significance of which will be noticed in the

development of the rhombencephalon. Running horizontally across

the middle of the floor are the striae acusticae which are continued

into the auditory nerve. The floor of the fourth ventricle is of special

most anterior is the pyramid or motor tract, the decussation of which has been seen. Behind this is the mesial fillet or sensory tract, which has also decussated a little below the point of section, while farther back still is the

posterior longitudinal bundle which is coming

Cuneate strand'

Cuneate nucleus"

Fasciculus solitarius-

Deep arcuate fibres Hypoglossal nerve

Anterior superficial arcuate fibres

Inferior olivary nucleus.

Mesial accessory olivary nucleus- Pyramid-

Central canal

Hypoglossal nucleus

Hypoglossal nerve

Superficial anterior arcuate fibres

Fig. 4. — Transverse Section through the Human Medulla in the Lower Olivary Region.

Frenulum

Valve of Vieussens

Superior peduncle of the cerebellum

Middle peduncle of the cerebellum'

Striae acusticae- Area acusticae. Trigonum vagi

Cuneate tubercle Funiculus gracilis

Taenia thalami

■*Pineal body*

Superior quadri geminal body

Inferior quadri- geminal body

Cms cerebri

Pontine part of floor of ventricle IV.

Eminentia teres

Fovea superior

Restiform body

Trigonum hypoglossi

• *Clava*

Rolandic tubercle Funiculus cuneatus

From Cunningham, Text-book of Anatomy.

Fig. 3. — Back View of the Medulla, Pons and Mesencephalon of a full-time Human Foetus.

interest because a little way from the surface are the deep origins of all the cranial nerves from the fifth to the twelfth. (See Nerve: cranial). If a section is made transversely through the medulla about the apex of the fourth ventricle three important bundles of fibres are cut close to the mid line on each side (see fig. 4). The

up from the anterior basis bundle of the cord. External to and behind the pyramid is the crenated section of the olivary nucleus, the surface bulging of which forms the olivary body.

The grey matter of the medulla oblongata, which contains numer- ous multipolar nerve cells, is in part continuous with the grey matter of the spinal cord, and in part consists of independent masses. As the grey matter of the cord enters the medulla it loses its cres- centic arrangement. The posterior cornua are thrown outwards towards the surface, lose their pointed form, and dilate into rounded masses named the grey tubercles of Rolando. The grey matter of the anterior cornua is cut off from the rest by the decussating pyramids and finally disappears. The formatio reticularis which is feebly developed in the cord becomes well developed in the medulla. In the lower part of the medulla a central canal continuous with that of the cord exists, but when the clavae on the opposite sides of the medulla diverge from each other, the central canal loses its posterior boundary, and dilates into the cavity of the fourth ventricle. The grey matter in the interior of the medulla appears, therefore, on the floor of the ventricle and is continuous with the grey matter near the central canal of the cord. This grey matter forms collections of nerve cells, which are the centres of origin of several cranial nerves. Crossing the anterior surface of

the medulla oblongata, immediately below the pons, in the majority of mammals is a trans- verse arrangement of fibres forming the trapezium, which contains a grey nucleus, named by van der Kolk the superior olive. In the human brain the trapezium is concealed by the lower transverse fibres of the pons, but when sections are made through it, as L. Clarke pointed out, the grey matter of the superior olive can be seen. These fibres of the trapezium come from the cochlear nucleus of the auditory nerve, and run up as the lateral fillet.

The Pons Varolii or Bridge is cuboidal in form (see fig. 2): its anterior surface rests upon the dorsum sellae of the sphenoid, and is marked by a median longitudinal groove ; its inferior surface receives the pyramidal and olivary tracts of the medulla oblongata; at its superior surface are the two crura cerebri; each lateral surface is in relation to a hemisphere of the cerebellum, and a peduncle passes from the pons into the interior of each hemisphere; the posterior surface forms in part the upper portion of the floor of the fourth ventricle, and in part is in contact with the corpora quadrigemina.

The pons consists of white and grey matter: the nerve fibres of the white matter pass through the substance of the pons, in either a transverse or a longitudinal direction. The transverse fibres go from one hemisphere of the cerebellum to that of the opposite side ; some are situated on the anterior surface of the pons, and form its superficial transverse fibres, whilst others pass through its substance and form the deep transverse fibres. The longitudinal fibres ascend from the medulla oblongata and leave the pons by emerging from its upper surface as fibres of the two crura cerebri. The pons pos- sesses a median raphe continuous with that of the medulla oblongata, and formed like it by a decussation of fibres in the mesial plane.

In a horizontal section through the pons and upper part of the fourth ventricle the superficial transverse fibres are seen most anteriorly; then come the anterior pyramidal fibres, then the deep transverse

Middle peduncle of cerebellum

lobes, of which the most important are the amygdala or tonsil, which forms the lateral boundary of the anterior part of the vallecula, and the flocculus, which is situated immediately behind the middle peduncle of the cerebellum. The inferior vermiform process is subdivided into a posterior

part or pyramid ; an elevation or uvula, situated between the two tonsils; and an anterior pointed process or nodule. Stretching between the two flocculi, and attached midway to the sides of the nodule, is a thin, white, semilunar- shaped plate of nervous matter, called the inferior medullary velum.

The whole outer surface of the cere- bellum possesses a characteristic foliated or laminated appearance, due to its sub- division into multitudes of thin plates or lamellae by numerous fissures. The cerebellum consists of both grey and white matter. The grey matter forms the exterior or cortex of the lamellae, and passes from one to the other across the bottoms of the several fissures. The white matter lies in the interior of the organ, and extends into the core of each lamella. When a vertical section is made through the organ, the prolongations of white matter branching off into the in- terior of the several lamellae give to the section an arborescent appearance, known by the fanciful name of- arbor vitae (see fig. 6). Independent masses of grey matter are, however, found in the in- terior of the cerebellum. If the hemi- sphere be cut through a little to the outer side of the median lobe, a zigzag arrange- ment of grey matter, similar in appear- ance and structure to the nucleus of the olivary body in the medulla oblongata, and known as the corpus denlatum of the cerebellum, is seen; it lies in the midst of the white core of the hemisphere, and encloses white fibres, which leave the interior of the corpus at its inner and lower side. On the mesial side of this corpus denlatum lie three smaller nuclei. The white matter is more abundant in the hemispheres than in the median lobe, and is for the most part directly continuous with the fibres of the pe- duncles of the cerebellum. Thus the restiform or inferior peduncles pass from below upward through the white core, to end in the grey matter of the tentorial surface of the cerebellum, more especially in that of the central lobe ; on their way they are connected with the

Transverse fibres of pons

X 4> ‘

Foramen of 1 Septum lucidum

r

mm..

Aqueduct of Sylvius Culmen

Declive

Pyramidal bundles

Transverse fibres of pons From Cunningham, Text-book of Anatomy.

Fig. 5. — Section through the Lower Part of the Human Pons Varolii immediately above

the Medulla.

pontine fibres, then the fillet, while most posteriorly and close to the floor of the fourth ventricle the posterior longitudinal bundle is seen (see fig. 5).

The grey matter of the pons is scattered irregularly through its substance, and appears on its posterior surface; but not on the anterior surface, composed exclusively of the superficial transverse fibres.

The Cerebellum. ˆ «

The Cerebellum, Little Brain, or After Brain occupies the inferior pair of occipital fossae, and lies below the plane of the tentorium cerebelli. It consists of two hemispheres or lateral lobes, and of a median or central lobe, which in human anatomy is called the vermis. It is connected below with Genu of corpus the medulla oblongata by the two callosum

restiform bodies which form its inferior peduncles, and above with the corpora quadrigemina of the cerebrum by two bands, which form its superior pe- duncles; whilst the two hemispheres are connected together by the trans- verse fibres of the pons, which form the middle peduncles of the cerebellum. On the superior or tentorial surface of the cerebellum the median or vermiform lobe is a mere elevation, but on its inferior or occipital surface this lobe forms a well-defined process, which lies at the bottom of a deep fossa or val- lecula; this fossa is prolonged to the

posterior border of the cerebellum, _ . , _ , , , ,

and forms there a deep notch which FromCuvmnghzm, Text-book of Anatomy. ‘

separates the two hemispheres from Fig. 6. — Mesial Section through the Corpus Callosum, the Mesencephalon, the Pons, Medulla and each other; in this notch the falx Cerebellum. Showing the third and fourth ventricles joined by the aqueduct of Sylvius.

cerebelli is lodged. Extending hori-

Anterior commissure

Corpus mammillare Lamina cinerea

Optic nerve.

Pituitary body

Tuber cinereum

Third ner

Valve of Vieussens

Ventricle IV. 1 Medulla

Choroid plexus in ventricle IV.

zontally backwards from the middle cerebellar peduncle, along the outer border of each hemisphere is the great horizontal fissure, which divides the hemisphere into its tentorial and occipital surfaces. Each of these surfaces is again subdivided by fissures into smaller

grey matter of the corpus dentatum. The superior peduncles, which descend from the corpora quadrigemina of the cerebrum, form connexions mainly with the corpus dentatum. The middle peduncles form a large proportion of the white core, and their fibres terminate

in the grey matter of the foliated cortex of the hemispheres. It has been noticed that those fibres which are lowest in the pons go to the upper surface of the cerebellum and vice versa.

Histology of the Cerebellum. — The white centre of the cerebellum is composed of numbers of medullated nerve fibres coursing to and from the grey matter of the cortex. These fibres are supported in a groundwork of neuroglial tissue, their nutrition being supplied by a small number of blood vessels.

The cortex (see fig. 7) consists of a thin layer of grey material forming an outer coat of somewhat varying thickness over the whole external surface of the laminae of the organ. When examined microscopically it is found to be made up of two layers, an outer " molecular " and an inner " granular " layer. Forming a layer lying at the junction of these two are a number of cells, the cells of Purkinje, which constitute the most characteristic feature of the cerebellum. The bodies of these cells are pear-shaped. Their inner

ends taper and finally end in a nerve fibre which may be traced into the white centre. In their course through the granule layer they give off a number of branching collaterals, some turning back and passing between the cellsof Purkinje into the molecular layer. Their inner ends terminate in one or sometimes two stout processes which repeatedly branch dichotomously, thus forming a very elaborate dendron in the molecular layer. The branchings of this dendron

From Cunningham, Text-book of Anatomy.

Fig. 7. — Transverse Section through a Cerebellar Folium (after

Kolliker). Treated by the Golgi method. P. Axon of cell of Purkinje. GR 1 . Axons of granule cells in

F. Moss fibres. molecular layer cut

K and K 1 . Fibres from white core transversely.

of folium ending in molecular M 1 . Basket-cells.

layer in connexion with the ZK. Basket-work around the

dendrites of the cells of cells of Purkinje.

Purkinje. GL. Neuroglial cell.

M. Small cell of the molecular N. Axon of an association GR. Granule cell. [layer. cell.

■*are also highly characteristic in that they are approximately re- stricted to a single plane like an espalier fruit tree, and those for neighbouring cells are all parallel to one another and at right angles to the- general direction of the folium to which they belong. In the molecular layer are found two types of cells. The most abund- ant are the so-called basket cells which are distributed through the whole thickness of the layer. They have a rounded body giving off many branching dendrons to their immediate neighbourhood and one long neuraxon which runs parallel to the surface and to the long axis of the lamina. In its course, this gives off numerous collaterals which run downward to the bodies of Purkinje's cells. Their terminal branchings together with similar terminals of other collaterals form the basket-work around the bodies of these cells.*

The granular layer is sometimes termed the rust-coloured layer from its appearance to the naked eye. It contains two types of nerve cells, the small granule cells and the large granule cells. The former are the more numerous. They give off a number of short dendrites with claw-like endings, and a fine non-medullated neuraxon process. This runs upward to the cortex, where it divides into two branches in the form of a T. The branches run for some distance parallel to the axis of the folium and terminate in unbranched ends.

The large granule cells are multipolar cells, many of the branchings penetrating well into the molecular layer. The neuraxon process turns into the opposite direction and forms a richly branching system through the entire thickness of the granular layer. There is also an abundant plexus of fine medullated fibres within the granule layer.

The fibres of the white central matter are partly centrifugal, the neuraxons of the cells of Purkinje, and partly centripetal. The position of the cells of these latter fibres is not known. The fibres give rise to an abundant plexus of fibrils in the granular layer, and many reaching into the molecular layer ramify there, especially in the immediate neighbourhood of the dendrites of Purkinje's cells. From the appearance of their plexus of fibrils these are sometimes called moss fibres.

The Fourth Ventricle is the dilated upper end of the central canal of the medulla oblongata. Its shape is like an heraldic lozenge. Its floor is formed by the grey matter of the posterior surfaces of the medulla oblongata and pons, already described (see figs. 3 and 6) ; its roof partly by the inferior vermis of the cerebellum, the nodule of which projects into its cavity, and partly by a thin layer, called valve of Vieussens, or superior medullary velum; its lower lateral boundaries by the divergent clavae and restiform bodies; its upper lateral boundaries by the superior peduncles of the cerebellum. The inferior medullary velum, a reflection of the pia mater and epi- thelium from the back of the medulla to the inferior vermis, closes it in below. Above, it communicates with the aqueduct of Sylvius, which is tunnelled below the substance of the corpora quadrigemina. Along the centre of the floor is the median furrow, which terminates below in a pen-shaped form, the so-called calamus scriptorius. Situ- ated on its floor are the fasciculi teretes, striae acusticae, and deposits of grey matter described in connexion with the medulla oblongata. Its epithelial lining is continuous with that of the central canal.

The Cerebrum. The Cerebrum or Great Brain lies above the plane of the ten- torium, and forms much the largtest division of the encephalon. It is customary in human anatomy to include under the name of cere- brum, not

only the convolutions, the corpora striata, and the optic thalami, developed in the anterior cerebral vesicle, but also the corpora quadrigemina and crura cerebri developed in the mesen- cephalon or middle cerebral vesicle. The cerebrum is ovoid in shape, and presents superiorly, anteriorly and posteriorly a deep median longitudinal fissure, which subdivides it into two hemispheres. Inferiorly there is a continuity of structure between the two hemi- spheres across the mesial plane, and if the two hemispheres be drawn asunder by opening out the longitudinal fissure, a broad white band, the corpus callosum, may be seen at the bottom of the fissure passing across the mesial plane from one hemisphere to the other. The outer surface of each hemisphere is convex, and adapted in shape to the concavity of the inner table of the cranial bones; its inner surface, which bounds the longitudinal fissure, is flat and is separated from the opposite hemisphere by the falx cerebri ; its under surface, where it rests on the tentorium, is concave, and is separated by that membrane from the cerebellum and pons. From the front of the pons two strong white bands, the crura cerebri or cerebral peduncles, pass forward and upward (see fig. 2). Winding round the outer side of each crus is a flat white band, the optic tract. These tracts con- verge in front, and join to form the optic commissure, from which the two optic nerves arise. The crura cerebri, optic tracts, and optic commissure enclose a lozenge-shaped space, which includes — (a) a grey layer, which, from being perforated by several small arteries, is called locus perforatus posticus; (b) two white mammillae, the corpora albicantia ; (c) a grey nodule, the tuber cinereum, from which (d) the infundibulum projects to join the pituitary body. Immediately in front of the optic commissure is a grey layer, the lamina cinerea of the third ventricle; and between the optic commissure and the inner end of each Sylvian fissure is a grey spot perforated by small arteries, the locus perforatus anticus.

If a transverse section is made at right angles to the surface of the crura cerebri it will pass right through the mesencephalon and come out on the dorsal side through the corpora quadrigemina (see fig. 8). The ventral part of each crus forms the crusta, which is the continuation forward of the anterior pyramidal fibres of the medulla and pons, and is the great motor path from the brain to the cord. Dorsal to this is a layer of pigmented grey matter, called the sub- stantia nigra, and dorsal to this again is the tegmentum, which is a continuation upward of the formatio reticularis of the medulla, and passing through it are seen three important nerve bundles. The superior cerebellar peduncle is the most internal of these and decussates with its fellow of the opposite side so that the two teg- menta are continuous across the middle line. More externally the mesial fillet is seen, while dorsal to the cerebellar peduncle is the posterior longitudinal bundle. If the section happens to pass through the superior corpus quadrigeminum a characteristic circular area appears between the cerebellar peduncle and*

the fillet, which, from its tint, is called the red nucleus. More dorsally still the section will pass through the Sylvian aqueduct or passage from the third to the fourth ventricle, and this is surrounded by a mass of grey matter in the ventral part of which are the nuclei of the third and fourth

External geniculate body'

Inferior brachium

Internal geniculate body

Mesial fillet

Crusta

Optic tract

From Cunningham, Text-book of Anatomy.

Fig. 8. — Transverse Section through the Human Mesencephalon at the level of the superior Quadrigeminal Body.

nerves. The third nerve is seen at the level of the superior corpus quadrigeminum running from its nucleus of origin, through the red nucleus, to a groove on the inner side of the crus called the oculo- motor groove, which marks the separation between the crusta and tegmentum. Dorsal to the Sylvian aqueduct is a layer called the lamina quadrigemina and on this the corpora quadrigemina rest. The superior pair of these bodies is overlapped by the pineal body and forms part of the lower visual centres. Connexions can be traced to the optic tract, the higher visual centre on the mesial surface of the occipital lobe, the deep origin of the third or oculo-motor nerve as well as to the mesial and lateral fillet. The inferior pair of quadrigeminal bodies are more closely in touch with the organs of hearing, and are connected by the lateral fillet with the cochlear nucleus of the auditory nerve.

Surface of the Brain. The peripheral part of each hemisphere, which consists of grey matter, exhibits a characteristic folded appearance, known as gyri (or convolu- tions) of the cerebrum. These gyri are separated from each other by fissures and sulci, some of which are considered to subdivide the hemisphere into lobes, whilst others separate the gyri in each lobe from each other. In each hemisphere of the human brain five lobes are recognized : the temporo-sphenoidal, frontal, parietal, occipital, and the central lobe or Island of Reil; it should, however, be realized that these

lobes do not exactly correspond to the outlines of the bones after which they are named. Passing obliquely on the outer face of the hemisphere from before,

upward and backward, is the well marked Sylvian ….

fissure (fig. 9, s), which is the first to appear in the f 1 , Sulcus frontalis superior, development of the hemisphere. Below it lies the f, Sulcus frontalis inferior.

BRAIN [ANATOMY

Superior quadrigeminal basilaris) (A) and temporal. The frontal lobe y is separated from the parietal by the fissure

*of Rolando (fig. 9, r) which extends on the outer face of the hemisphere from the longitudinal fissure obliquely downward and forward towards the Sylvian fissure. About 2 in. from the hinder end of the hemisphere is the parieto-occipital fissure, which, commencing at the longitudinal fissure, passes down the inner surface of the hemisphere, and transversely outwards for Nucleus of third nerve * short distance on the outer surface of the hemisphere; it separates the parietal and occipital lobes from each other.*

The Temporo-Sphenoidal Lobe presents on the outer surface of the hemisphere three convolutions, arranged in parallel tiers from above downward, and named superior, middle and inferior temporal gyri. The fissure which separates the superior and middle of these convolutions is called the parallel fissure (fig. 9, t 1). The Occipital Lobe also consists from above downwards of three parallel gyri, named superior, middle and inferior occipital. The Frontal Lobe is more complex; immediately in front of the fissure of Rolando, and forming indeed its anterior boundary, is a convolu- tion named ascending frontal or pre-central, which ascends obliquely backward and upward from the Sylvian to the longitudinal fissure. Springing from the front of this gyrus, and passing forward to the anterior end of the cerebrum, are three gyri, arranged in parallel tiers from above downwards, and named superior, middle and inferior frontal gyri, which are also prolonged on to the orbital face of the frontal lobe. The Parietal Lobe is also complex; its most anterior gyrus, named ascending parietal or post-central, ascends parallel to and immediately behind the fissure of Rolando. Springing from the upper end of the back of this gyrus is the supra-parietal lobule, which, forming the boundary of the longitudinal fissure, extends as far back as the parieto-occipital fissure; springing from the lower end of the back of this gyrus is the supra-marginal, which forms the

‘ Sylvian grey matter

Sylvian aqueduct

Tegmentum

Posterior longitudinal bundle

Red nucleus

Fibres of superior cerebellar peduncle

Third nerve

Substantia nigra

orpus mammillare

K ˆU

tempofo-sphenoidal lobe, and above and in front of J.m, Sulcus frontalis medius. it, the parietal and frontal lobes. As soon as it p.m, Sulcus paramediahs. appears on the external surface of the brain the A, Pars basilaris. _

• ” • ‘ ‘ ” Pars triangularis.

Pars orbitalis.

Sylvian fissure. _ [fissure).

Anterior horizontal limb (Sylvian Ascending limb (Sylvian fissure). Posterior horizontal limb (Sylvian fissure). s.asc, Ascending terminal part of the pos-

fissure divides into three limbs, anterior hori zontal (s 1), ascending (s 2), and posterior horizontal {s 3), the latter being by far the longest. The place whence these diverge is the Sylvian point and corresponds to the pterion on the surface of the skull (see Anatomy: Superficial and Artistic). Between these three limbs and the vallecula or stem of the fissure are four triangular

tongues or opercula; these are named, accord- ing to their position, orbital (fig. 9, C), frontal (pars triangularis) (B), fronto- parietal (pars

From Cunningham, Texl-book 0] Anatomy.

Fig. 9. — Gyri and Sulci, on the outer surface of the Cerebral Hemisphere.

p.c.s, Superior praecentral sulcus, r, Fissure of Rolando. g.s, Superior genu. g.i, Inferior genu. d, Sulcus diagonalis. t 1 , Superior temporal sulcus P, Inferior temporal sulcus. p l , Inferior postcentral sulcus. p 2 , Superior postcentral sulcus. p 3 , Ramus horizontalis. p A , Ramus occipitalis. s.ot, Sulcus occipitalis transversus. occ. lat, Sulcus occipitalis lateralis sulcus lunatus of Elliot Smith) cm, Calloso-marginal sulcus. p.c.i, Inferior praecentral sulcus. c.t.r, Inferior transverse furrow,

B, C,

S, s 1 , s, s 3 ,*

terior horizontal limb of the Sylvian fissure. Inferior praecentral sulcus.

(parallel [sulcus).

(the

upper boundary of the hinder part of the Sylvian fissure; as this gyrus occupies the hollow in the parietal bone, which corresponds to the eminence, it may appropriately be named the gyrus of the parietal eminence. Above and behind the gyrus of the parietal

eminence is the angular

gyrus, which bends round

the posterior extremity of

the parallel fissure, while

arching over the hinder end

of the inferior temporo-

sphenoidal sulcus is the

post-parietal gyrus. Lying

in the parietal lobe is the

intra- parietal fissure (fig. 9,

p 3 and p l), which separates

the gyrus of the parietal

eminence from the supra- parietal lobule.

The Central Lobe of the

hemisphere, more usually

called the insula or island

of Reil, does not come to the

surface of the hemisphere,

but lies deeply within the

Sylvian fissure, the oper-

cula forming the margin of

which, conceal it. It con- sists of four or five short

gyri, which radiate from

the locus perforatus anticus,

situated at the inner end of

the fissure. This lobe is

almost entirely surrounded

by a deep sulcus called Fig. 10. — Orbital surface of the left the limiting sulcus of Reil, frontal lobe and the islandof Reil ; the which insulates it from tip of the temporo-sphenoidal lobe has the adjacent gyri. It lies been removed to display the latter. opposite the upper part of 17. Convolution of the margin of the the ali-sphenoid, where it longitudinal fissure. articulates with the parietal

0. Olfactory fissure, over which the and squamous-temporal.

olfactory peduncle and lobe are In front of the central

situated. lobe, on the base of the

TR. Orbital sulcus. [surface, brain, are the orbital gyri,

l"l"'. Convolutions on the orbital which are separated from

1, I, I, 1. Under surface of infero- one another by _ the orbital

frontal convolution. sulcus. This is usually

4. Under surface of ascending frontal; H-shaped, and the gyri

and 5, of ascending parietal con- are therefore anterior,

volutions. posterior, external and in-

C. Central lobe or insula. ternal. Bisecting the in-

ternal orbital gyrus is an antero-posterior sulcus (s. rectus), beneath which lies the olfactory lobe, bulbous in front, for the olfactory nerves to arise from.

On the mesial surface of the hemisphere, as seen when the brain is longitudinally bisected and the cerebellum and medulla removed by cutting through the crus cerebri (see fig. 11), the divided corpus callosum is the most central object, while below it are seen the fornix, septum lucidum and third ventricle, the description of which will follow. The cerebral surface, above and in front of the corpus callosum, is divided into two by a sulcus, the contour of which closely resembles that of the upper margin of the corpus callosum. This is the calloso-marginal sulcus, so called because it separates the callosal gyrus, which lies between it and the corpus callosum, from the marginal gyri nearer the margin of the brain. When the sulcus reaches a point vertically above the hind end of the corpus callosum it turns sharply upward and so forms the hinder limit of the marginal gyri, the posterior inch or two of which is more or less distinctly marked off to form the paracentral lobule, where the upper part of the central fissure of Rolando turns over the margin of the brain. The callosal gyrus, which is also called the gyrus fornicatus from its arched appearance, is continued backward round the posterior end of the corpus callosum, and so to the mesial surface of the temporal lobe. Behind the upturned end of the calloso-marginal sulcus there is a square area which is called the precuneus or quadrate From Cunningham, Tcxl-book o\ Anatomy.

lobe; it is bounded behind by the deeply cut Fig. 11. — The Gyri and Sulci on the Mesial Aspect of the Cerebral Hemisphere, internal parieto-occipital fissure and this runs r> Fissure of Rolando. r,o, Rostral sulcus. i,t,

Incisura temporalis,

from the margin of the brain downward and forward to join another fissure, the calcarine, at an acute angle, thus enclosing a wedge-shaped piece of brain called the cuneus between them. The calcarine fissure is fairly horizontal, and is joined about its middle by the internal parieto-occipital, so that the

part in front of the junction is called the pre-calcarine, and that behind the post-calcarine fissure. The internal parieto-occipital and cal- carine are real fissures, because they cause an elevation in the interior of the brain, known as the hippocampus minor. Just in front of the anterior end of the calcarine fissure the callosal gyrus is constricted to form the isthmus which connects it with the hippo- campal or uncinate gyrus. Below the calcarine fissure is a gyrus called the gyrus lingualis, and this is bounded below by another true fissure, the collateral, which runs parallel to the calcarine, but is continued much farther forward into the temporal lobe and so forms the lower boundary of the hippocampal gyrus. It will thus be seen that the hippocampal gyrus is continuous posteriorly with the callosal gyrus above by means of the isthmus, and with the gyrus lingualis below. The hippocampal gyrus is bounded above by the dentate or hippocampal fissure which causes the hippocampus major in the descending cornu and so is a complete fissure. If its lips are separated the fascia dentata or gyrus dentatus and the fimbria continued from the posterior pillar of the fornix are seen. Anteriorly the fissure is arrested by the recurved process of the upper part of the hippocampal gyrus, called the uncus, and in front of this a slight sulcus, the incisura temporalis, marks off the temporal pole or tip of the temporal lobe from the region of the uncus. It will be seen that the callosal gyrus, isthmus, and hippocampal gyrus form nearly a complete ring, and to this the name of limbic lobe is given.

Interior of the Cerebrum. If a horizontal slice be removed from the upper part of each hemisphere (see fig. 12), the peripheral grey matter of the gyri will be seen to follow their various windings, whilst the core of each gyrus consists of white matter continuous with a mass of white matter in the interior of the hemisphere. If a deeper slice be now made down to the plane of the corpus callosum, the white matter of that structure will be seen to be continuous with the white centre of each hemisphere known as the centrum ovale. The corpus callosum does not equal the hemispheres in length, but approaches nearer to their anterior than their posterior ends. It terminates behind in a free rounded end, named the splenium (see fig. 11), whilst in front it forms a knee-shaped bend, and passes downwards and backwards as far as the lamina cinerea. If the dissection be performed on a brain which has been hardened in spirit, the corpus callosum is seen to consist almost entirely of bundles of nerve fibres, passing trans- versely across the

mesial plane between the two hemispheres ; these fibres may be traced into the white cores and grey matter of the gyri, and connect the gyri, though by no means always corresponding ones, in the opposite hemispheres. Hence the corpus callosum is a con- necting or commissural structure, which brings the gyri of the two hemispheres into anatomical and physiological relation with each other. On the surface of the corpus callosum a few fibres, the striae longitudinales , run in the antero-posterior or longitudinal direction (see fig. 12, b). Their morphological interest is referred to in the section below on Comparative Anatomy. In the sulcus between the corpus callosum and the limbic lobe a narrow band of fibres called the cingulum is seen, most of its fibres only run a short distance in it and link together adjacent parts of the brain. If the corpus callosum be now cut through on each side of its mesial line, the large cavity or lateral ventricle in each hemisphere will be opened into.

The lateral ventricle is subdivided into a central space or body, and three bent prolongations or cornua; the anterior cornu extends forward, outward and downward into the frontal lobe ; the posterior cornu curves backward, outward and inward into the occipital lobe;

the descending cornu curves backward, outward, downward, forward and inward, behind and below the optic thalamus into the temporo- sphenoidal lobe. On the floor of the central space may be seen from before backward the grey upper surface of the pear-shaped caudate nucleus of the corpus striatum (figs. 12 and 13, /), and to its inner and posterior part a small portion of the optic thalamus, whilst between the two is the curved flat band, the taenia semicircularis s. 12 and 13, g). Resting on the upper surface of the thalamus

Fig. 12. — To show the Right Ventricle and the left half of the Corpus Callosum.

o, Transverse fibres, and

b, Longitudinal fibres of corpus

callosum.

c, Anterior, and [ventricle.

d, Posterior cornua of lateral

e, Septum lucidum. /, Corpus striatum.

g, Taenia semicircularis.

h, Optic thalamus.

k, Choroid plexus.

/, Taenia hippocampi.

m, Hippocampus major.

n, Hippocampus minor.

o, Eminentia collaterals.

is the vascular fringe of the velum interpositum, named choroid plexus, and immediately internal to this fringe is the free edge of the white posterior pillar of the fornix. The anterior cornu has the an- terior end of the corpus striatum projecting into it. The posterior cornu has an elevation on its floor, the hippocampus minor (fig. 12, n), and between this cornu and the descending cornu is the elevation called eminentia collateralis, formed by the collateral fissure (fig. 12,0).

Extending down the descending cornu and following its curvature is the hippocampus major, which terminates below in a nodular end, the pes hippocampi; on its inner border is the white taenia hippo- campi, continuous above with the posterior pillar of the fornix. If the taenia be drawn to one side the hippocampal fissure is exposed, at the bottom of which the grey matter of the gyrus hippocampi may be seen to form a well-defined dentated border (the so-called fascia dentata). The choroid plexus of the pia mater turns round the gyrus hippocampi, and enters the descending cornu through the lateral part of the great transverse fissure between the taenia hippo- campi and optic thalamus. The lateral ventricle is lined by a ciliated epithelium called the ependyma. This lining is continuous through the foramen of Monro with that of the third ventricle, which again is continuous with the lining of the fourth ventricle through the aqueduct of Sylvius. A little fluid is contained in the cerebral ventricles, which, under some pathological conditions, may increase greatly in quantity, so as to occasion considerable dilatation of the ventricular cavities.

If the corpus callosum be now divided about its middle by a transverse incision, and the posterior half of this structure be turned back (see fig.

13), the body of the fornix on which the corpus callosum rests is exposed. If the anterior half of the corpus callosum be now turned forward, the grey partition, or septum lucidum, between the two lateral ventricles is exposed. This septum fits into the interval between the under surface of the corpus callosum and the upper surface of the anterior part of the fornix. It consists of two layers of grey matter, between which is a narrow vertical mesial space, the fifth ventricle (fig. 13, e), and this space does not communicate with the other ventricles nor is it lined with ependyma. If the septum be now removed, the anterior part of the fornix is brought into view.

The fornix is an arch-shaped band of nerve fibres extending in the

antero-posterior direction. Its anterior end forms the anterior pillars of the arch, its posterior end the posterior pillars, whilst the intermediate body of the fornix forms the crown of the arch. It consists of two lateral halves, one belonging to each hemisphere. At the summit of the arch the two lateral halves are joined to form the body; but in front the two halves separate from each other, and form two anterior pillars, which descend in front of the third ventricle to the base of the cerebrum, where they form the corpora albicantia, and from these some white fibres called the bundle of Vicq dAzyr ascend to the optic thalamus (see fig. 11). Behind the body the two halves diverge much more from each other, and form the posterior pillars, in the triangular interval between which is a thin lamina of commissural fibres called the lyra (fig. 13, a). Each posterior pillar curves downward and outward into the descending cornu of the ventricle, and, under the name of taenia hippocampi, forms the mesial free border of the hippocampus major (fig. 13, /). Eventually it ends in the substance of the hippocampus and in the uncus of the temporal lobe. If the body of the fornix be now divided by a transverse incision, its anterior part thrown forward, and its posterior part backward, the great transverse fissure of the cerebrum is opened into, and the velum interpositum lying in that fissure is exposed.

The velum interpositum is an expanded fold of pia mater, which passes into the anterior of the hemispheres through the great trans- verse fissure. It is triangular in shape; its base is a line with the posterior end of the corpus callosum, where it is continuous with the external pia mater; its lateral margins are fringed by the choroid plexuses, which are seen in the bodies and descending cornua of the lateral ventricles, where they are invested by the endothelial lining of those cavities. Its apex, where the two choroid plexuses blend with each other, lies just behind the anterior pillars of the fornix. The interval between the apex and these pillars is the aperture of communication between the two lateral ventricles and the third, already referred to as the foramen of Monro. The choroid plexuses contain the small choroidal arteries; and the blood from these is returned by small

veins, which join to form the veins of Galen. These veins pass along the centre of the velum, and, as is shown in fig. 1, open into the straight sinus. If the velum interpositum be now carefully raised from before backward, the optic thalami, third ventricle, pineal body and corpora quadrigemina are exposed.

Fig. 13. — A deeper dissection of the Lateral Ventricle, and of the Velum Interpositum.

in de-

a, Lyra, turned back. |

b, b, Posterior pillars of the I

fornix, turned back.

c, c, Anterior pillars of the fornix.

d, Velum interpositum and

veins of Galen.

e, Fifth ventricle. /, /, Corpus striatum.

The optic thalamus is a large, somewhat ovoid body situated behind the corpus striatum, and above the crus cerebri. Its upper surface is partly seen in the floor of the body of the lateral ventricle, but is for the most part covered by the fornix and velum interpositum. Its postero-inferior surface forms the roof of the descending cornu

;, g, Taenia semicircularis. 1, h, Optic thalamus. k, Choroid plexus. /, Taenia hippocampi. m, Hippocampus major

scending cornu. n, Hippocampus minor. 0, Eminentia collateralis.

of the ventricle, whilst its inner surface forms the side wall of the third ventricle. At its outer and posterior part are two slight eleva- tions, in close relation to the optic tract, and named respectively corpus geniculatum internum and externum.

The posterior knob-like extremity of the thalamus is called the pulvinar; this, as well as the two corpora geniculata and the superior corpus quadrigeminum, is connected with the optic tract.

The third ventricle (see fig. 6) is a cavity situated in the mesial plane between the two optic thalami. Its roof is formed by the velum jnterpositum and body of the fornix; its floor by the posterior perforated space, corpora albicantia, tuber cinereum, infundibulum, and optic commissure; its anterior boundary by the anterior pillars of the fornix, anterior commissure and lamina cinerea; its posterior boundary by the corpora quadrigemina and posterior commissure. The cavity of this ventricle is of small size in the living head, for the inner surfaces of the two thalami are connected together

Genu of corpus callosum

Anterior horn of lateral ventricle

Caudate nucleus.

Anterior limb of internal

capsule

Ventricle V.

Genu of internal capsule

Anterior pillars of fornix

Globus pallidus

Bundle of Vicq d'Azyr

Posterior limb of internal

capsule

Thalamus

Retrolenticular part of

internal capsule

Hippocampus major

Splenium

Choroid plexus

Band of Vicq d'Azyr

Claustrum

Insula

— 'Putamen

Calcarine fissure

From Cunningham, Text-book of Anatomy

Fig. 14. — Horizontal Section through the Right Cerebral Hemisphere 32 oz.

at the Level of the Widest Part of the Lenticular Nucleus.

by intermediate grey matter, named the middle or soft commissure. Immediately in front of the corpora quadrigemina, the white fibres of the posterior commissure pass across between the two optic thalami. If the anterior pillars of the fornix be separated from each other, the white fibres of the anterior commissure may be seen lying in front of them.

The pineal body is a reddish cone-shaped body situated upon the anterior pair of the corpora quadrigemina (see figs. 3 and 6). From its broad anterior end two white bands, the peduncles of the pineal body, pass forward, one on the inner side of each optic thalamus. Each peduncle joins, along with the taenia semicircularis, the anterior pillar of the fornix of its own side. In its structure this body consists of tubular gland tissue containing gritty calcareous particles, constituting the brain sand. Its morphology will be referred to later.

A general idea of the internal structure of the brain is best obtained by studying a horizontal section made just below the level of the Sylvian point and just above the great transverse fissure (see fig. 14). Such a section will cut the corpus callosum anteriorly at the genu

and posteriorly at the splenium, but the body is above the plane of section. Behind the genu the fifth ventricle is cut, and behind that the two pillars of the fornix which here form the anterior boundary of the third ventricle. At the posterior end of this is the pineal body, which the section has just escaped. To the outer side of the fornix is seen the foramen of Munro, leading into the front of the body and anterior horn of the lateral ventricle. It will be seen that the lateral boundary of this horn is the cut caudate

nucleus of the corpus striatum, while the lateral boundary of the third ventricle is the cut optic thalamus, both of which bodies have been already described, but external to these is a third triangular grey mass, with its apex directed inward, which cannot be seen except in a section. This is the lenticular nucleus of the corpus striatum, the inner or apical half of which is of a light colour and is called the globus pallidus, while the basal half is reader and is known as the putamen. External to the putamen is a long narrow strip of grey matter called the claustrum, which is sometimes regarded as a third nucleus of the corpus striatum. These masses of grey matter, taken together, are the basal nuclei of the brain. Internal to the lenticular nucleus, and between it and the caudate nucleus in front and the thalamus behind, is the internal capsule, through which run most of the fibres connecting the cerebral cortex with the crus cerebri. The capsule adapts itself to the contour of the lenticular nucleus and has an anterior limb, a bend or genu, and a posterior limb. Just behind the genu of the internal capsule is a very important region, for here the great motor tract from the Rolandic region of the cortex passes on its way to the crusta and spinal cord. Besides this there are fibres passing from the cortex to the deep origins of the facial and hypo-glossal nerves. Behind the motor tracts are the sensory, including the fillet, the superior cerebellar peduncle and the inferior quadrigeminal tract, while quite at the back of the capsule are found the auditory and optic radiations linking up the higher (cortical) and lower auditory and visual centres. Between the putamen and the claustrum is the external capsule, which is smaller and of less importance than the internal, while on the lateral side of the claustrum is the white arid then the grey matter of the central lobe. As the fibres of the internal capsule run up toward the cortex they decussate with the transverse fibres of the corpus callosum and spread out to form the corona radiata. It has only been possible to deal with a few of the more important bundles of fibres here, but it should be mentioned that much of the white matter of the brain is formed of association fibres which link up different cortical areas, and which become medullated and functional after birth.

Weight of the Brain. This has been the subject of a great deal of research, but the results are not altogether conclusive; it seems, however, that, although the male brain is 4 to 5 oz. heavier than that of the female, its relative weight to that of the body is about the same in the two sexes. An average male brain weighs about 48 oz. and a female 432 oz. The greatest absolute weight is found between twenty-five and thirty-five years of age in the male and a little later in the female. At birth the brain weighs comparatively much more than it does later on, its proportion to the body weight being about I to 6. At the tenth year it is about I to 14, at the twentieth I to 30, and after that about I to 36-5. In old age there is a further slight decrease in proportion. In many men of great intellectual

eminence the brain weight has been large — Cuvier's brain weighed 64J oz., Goodsir's 57 J, for instance — but the exceptions are numerous. Brains over 60 oz. in weight are frequently found in quite undistinguished people, and even in idiots 60 oz. has been recorded. On the other hand, microcephalic idiots may have a brain as low as 10 or even 8 J oz., but it is doubtful whether normal intelligence is possible with a brain weighing less than The taller the individual the greater is his brain weight,

but short people have proportionally heavier brains than tall. The weight of the cerebellum is usually one-eighth of that of the entire brain. Attempts have been made to estimate the surface area of the grey matter by dissecting it off and measuring it, and also by covering it with gold leaf and measuring that. The results, however, have not been conclusive.

Further details of the brain, abundantly illustrated, will be found in the later editions of any of the standard text-books on anatomy, references to which will be found in the article on Anatomy : Modern Human. Das Menschenhirn, by G. Retzius (Stockholm, 1896), and numerous recent memoirs by G. Elliot Smith and D. J. Cunningham in the Journ. Anat. and Phys. and Anatomisch Anzeig., may be consulted.

Histology of Cerebral Cortex.

The cerebral cortex (see fig. 15) consists of a continuous sheet of grey matter completely enveloping the white matter of the hemi- spheres. It varies in thickness in different parts, and becomes thinner in old age, but all parts show a somewhat similar microscopic structure. Thus, in vertical section, the following layers may be made out ; —

i. The Molecular Layer {Stratum zonale). — This is made up of a large number of fine nerve branchings both medullated and non- medullated. The whole forms a close network, the fibres of which run chiefly a tangential course. The cells of this layer are the so- called cells of Cajal. They possess an irregular body, giving off 4 or 5 dendrites, which terminate within the molecular layer and a long nerve fibre process or neuraxon which runs parallel to the surface of the convolution.

2. The Layer of small Pyramidal Cells. — The typical cells of this layer are pyramid-shaped, the apices of the pyramids being directed towards the surface. The apex terminates in a dendron which reaches into the

molecular layer, giving off several collateral hori- zontal branches in its course. The final branches in the molecular layer take a direction parallel to the surface. Smaller dendrites arise from the lateral and basal surfaces of these cells, but do not extend far from the body of the cell. The neuraxon always arises from the base of the cell and passes towards the central white

INTRACORTICAU

ASSOCIATION

FIBRES

From Cunningham, Text-book 0] Anatomy.

Fig. 15. — Diagram to illustrate Minute Structure of the Cerebral Cortex.

A) ,, ,. „ E. Small pyramidal cell.

B. \ Neuroglia cells. F Large pvramida i ce n.

C. Cell with short axon (N) which breaks G. Cell of Martinotti.

up in a free arborization. H. Polymorphic cell.

D. Spindle-shaped cell in stratum zonale. K. Corticipetal fibres.

matter, thus forming one of the nerve-fibres of that substance. In its path it gives off a number of collaterals at right angles, which are distributed to the adjacent grey matter.

3. The Layer of large Pyramidal Cells. — This is characterized by the presence of numbers of cells of the same type as those of the preceding layer, but of larger size. The nerve-fibre process becomes a medullated fibre of the white matter.

4. The Layer of Polymorphous Cells. — The cells of this layer are irregular in outline, and give off several dendrites branching into the surrounding grey matter. The neuraxon gives off a number of collaterals, and then becomes a nerve-fibre of the central white matter.

Scattered through these three layers there are also a number of cells {cells of Golgi) whose neuraxon divides at once, the divisions terminating within the immediate vicinity of the cell-body. Some cells are also found in whieh the neuraxon, instead of running into

the white matter of the brain, passes toward the surface ; these are called

cells of Martinotti.

The medullated nerve-fibres of the white matter when traced into the cortex are seen to enter in bundles set vertically to the surface. These bundles taper and are resolved into isolated fibres in the upper parts of the pyramidal layers. The fibres constituting the bundles form two sets, (a) The centrifugal fibres consist as above described of the fibre processes of the pyramidal and poly- morphous cells, {b) The centripetal fibres ascend through the cortex to terminate within the molecular layer by horizontally running branches. As they pass through they give off a number of collaterals. The position of the cells from which these fibres arise is not known. In addition to the radially arranged bundles of fibres, networks are formed by the interlacement with them of large numbers of fine medullated fibres running tangentially to the surface. These are derived chiefly from the collaterals of the pyramidal cells and of the centripetal fibres. They form two specially marked bundles, one within the layer of the polymorphous cells known as the inner band of Baillarger, and another in the layer of large pyramidal cells called the outer band of Baillarger. This latter is very thick in the calcarine region, and forms the white stria of Gennin, while the inner band is best seen in the precentral gyrus. As both these strands cross the already mentioned radial bundles at riˆht angles, they are regarded as specialized parts of an interradial reticulum of fibres, but, nearer the surface than the radial bundles penetrate, tangential fibres are found, and here they are called the supraradial reticulum. In certain parts of the brain the fibres of this reticulum are more

-EPIPH.

‘0P.T.N. -GANS.HAB. – OPT. LOBE

nuc/v:

NUC.X.

From The Museum Catalogue of the Royal College of Surgeons of England.

Fig. 16-

-Brain of Petromyzon marinus (dorsal view). B, choroid plexus removed.

A, Brain;

closely set, and form the band of Bechterew in the superficial part of the small pyramidal cell zone.

For further information on the structure of the cerebral cortex, see A. W.

Campbell, Proc. R. Soc. vols, lxxii. and lxxiv.

Comparative Anatomy. A useful introduction to the study of the vertebrate brain is that of the Amphioxus, one of the lowest of the Chordata or animals having a notochord. Here the brain is a very slightly modified part of the dorsal tubular nerve-cord, and, on the surface, shows no distinction from the rest of that cord. When a section is made the central canal is seen to be enlarged into a cavity, the neurocoele, which, in the young animal, communicates by an opening, the neuropore, with the bottom of the olfactory pit, and so with the exterior. More ventrally another slight diverticulum probably represents the infundibulum. The only trace of an eye is a patch of pigment at the anterior end of the brain, and there are no signs of any auditory apparatus. There are only two pairs of cerebral nerves, both of which are sensory (Willey, Amphioxus, 1894). In the Cyclostomata, of which the lamprey (Petromyzon) is an example, the minute brain is much more complex, though it is still only a very slight enlargement of the anterior end of the cord. The single cavity seen in Amphioxus is here subdivided into three: an anterior or prosencephalon, a middle or mesencephalon, and a hinder or rhomben- cephalon. The rhombencephalon has a very slight transverse thickening in the fore-part of its roof, this is the rudimentary cere- bellum {Cer.); the rest of this part of the brain is taken up by the large medulla, the cavity of which is the fossa rhomboidalis or fourth ventricle. This fossa is roofed over by the epithelium lining the cavity of the ventricle, by pia mater and blood-vessels constituting a choroid plexus (fig. 16, B). The fourth ventricle communicates with the parts in front by means of a passage known as the aqueduct of Sylvius.

The mesencephalon or mid-brain, when looked at from the dorsal

surface, shows a pair of large hollow swellings, the optic lobes or

I corpora bigemina. Their cavities open out from the aqueduct of

Sylvius, and from the nervous tissue in their walls the optic nerves derive their fibres. From the front of the prosencephalon or anterior vesicle the olfactory nerves come off, and at the base of each of these are two hollow swellings ; the larger and more anterior is the olfac- tory bulb, the smaller

and more posterior the cerebral hemisphere. Both these swellings must be regarded as lateral outgrowths from the blind front end of the original single vesicle of the brain as seen in Amphioxus, and from the anterior subdivision or prosencephalon in the lamprey. The anterior vesicle, however, is now again sub- divided, and that part from which the cerebral hemispheres bud out, and the hemispheres themselves, is called the telencephalon, while the posterior part of the original prosencephalon is known as the thalamencephalon, or more rarely the diencephalon. On the dorsal surface of the thalamencephalon are two nervous masses called the ganglia habenulae; the right is much larger than the left, and from it a stalk runs forward and upward to end in the vestigial pineal body (or epiphysis), which contains rudiments of a pigmented retina and of a lens, and which is usually regarded as the remains of one of a pair of median eyes, though it has been suggested that it may be an organ for the appreciation of temperature. From the small left ganglion habenulae a still more rudimentary pineal stalk projects, and there are signs of a third out- growth (paraphysis) in front of these. On the floor of the thalamencephalon the blind pouch-like infundibulum is in contact with the pituitary body, an outgrowth from the combined pituitary and olfactory pouch, which in the adult opens on to the top of the head just ih front of the pineal area. The anterior closed end of the nerve-tube, in front of the foramina of Munro or openings from which the hemispheres have grown out, is known as the lamina terminalis, and in this is seen a little white commissure, connecting the hemispheres of opposite sides and belonging entirely to the telencephalon, known as the anterior commissure. The roof of the telencephalon is mainly epithelial, and contains no traces of cortical structure. In the posterior part of the roof of the thalamencephalon is the small posterior commissure (Ahlborn, Zeits. wiss. Zool. Bd. xxxix., 1883, p. 191). In the Elasmobranch Fish, such as the sharks and rays, the cerebellum (Cer. fig. 17) is very large and contains the layers found in all the higher vertebrates. In the mesencephalon fibres corresponding with those of the fillet of higher vertebrates can be seen, and there is a nucleus in the hinder part of the corpora bigemina foreshadowing the separation into corpora quadrigemina. There is only one pineal stalk in the roof of the thalamencephalon, and the ganglia habenulae — very constant structures in the vertebrate brain — are not so marked as in Petromyzon, but are, as usual, connected with the olfactory parts of the cerebrum, with the surface of the optic lobes (tectum opticum), and with the corpus interpedunculare (Meynert's bundle). They are united across the middle line by a small superior or habenular commissure. In the floor of the thalamencephalon are two masses of ganglionic tissue, the optic thalami. The infundi- bulum dilates into two rounded bodies, the lobi inferiores, while the pituitary body or hypophysis cerebri has two lateral diverticula known as sacci vasculosi. Ganglia geniculata are found for the first time in connexion with the optic

tracts in the lower part of the thalamus. The olfactory lobes (fig. 17, Olf. Bulb) are very large and often separated by long stalks from the cerebral hemispheres, which are comparatively much larger than those of the Cyclostomata; their roof or pallium is nervous, but devoid of cortical

anterior pineal organ or paraphysis is large (Saunders, Ann. and Mag. Nat. Hist. ser. 6, vol. iii., 1889, p. 157; Burkhardt, Central- nervensystem v. Protopterus, Berlin, 1892).

In the Amphibia the brain is of a low type, the most marked advances on that of the fish being that the anterior commissure is divided into a dorsal and ventral part, of which the ventral is the true anterior commissure of higher vertebrates, while the dorsal is a hippocampal commissure and coincides in its appearance with the presence of a small mass of cells in the outer layer of the median

PARAPHY MONRO FOR, \ 'DORS- SAC.

PAR. STALK MESEN. COMM. SUP./ COMM. POST. '

AREA PRECOM.

OLF. TUBER:

MEO.OBl.

INF. FASC.LCNS.

From Cat. R. C. S. England.

Fig. 17. — Section of the Brain of Porbeagle Shark (Lamna).

structure, while in the floor in some species large anterior basal ganglia or corpora striata are found (Miklucho-Maclay, Beitrdge z. vergl. Neurol., 1870; Edinger, Arch. mikr. Anat. Bd. Iviii., 1901, p. 661, " Cerebellum "). The Teleostean Fish are chiefly remarkable for the great development of the optic lobes and suppression of the olfactory apparatus. The pallium is non-nervous, and the optic tracts merely cross one another instead of forming a commissure. A process of the cerebellum called valvula cerebelli projects into the cavity of each optic lobe (Rabl. Ruckhard, Arch. Anat. u. Phys., 1898, p. 345 [Pallium]; Haller, Morph. Jahrb. Bd. xxvi., 1898, p. 632 [Histology and Bibliography]). The brain of the Dipnoi, or mud fish, shows no very important developments, except that the

COMM.V,

OPT Chi' From Col. K.C.S. England.

Fig. 18.— Section of Brain of Turtle (Chelone).

wall of the pallium, which is probably the first indication of a hippocampal cortex or cortex of any kind (Osborn, Journ. Morph. vol. ii., 1889, p. 51).

In the Reptilia the medulla has a marked flexure with a ventral convexity, and an undoubted cerebral cortex for the first time makes its appearance. The mesial wall of the cerebral hemisphere is divided into a large dorsal hippocampal area (fig. 18, Hip.) and a smaller ventral olfactory tubercle. Between these two a narrow area of ganglionic matter runs forward from the side of the lamina terminalis and is known as the paraterminal or precommissural area (Elliot Smith, Journ. Anat. and Phys. vol. xxxii. p. 411). To the upper lateral part of the hemisphere Elliot Smith has given the name of neopallium, while the lower lateral part, imperfectly separated from it, is called the pyriform lobe. In the Lacertilia the pineal eye, if it be an eye, is better developed than in any existing vertebrate, though even in them there is no evidence of its being used for sight. Behind the so-called pineal eye and its stalk is the epiphysis or pineal body, and sometimes there is a dorsal sac between them (see fig. 18). 1 The middle or soft commissure appears in certain reptiles (Crocodilia and Chelonia), as does also the corpus mammillare (Edinger, Senckenberg, Naturf. Gesell. Bd. xix., 1896, and Bd. xxii., 1899; Haller, Morph. Jahrb. Bd. xxviii., 1900, p. 252). Among the birds there is great unity of type, the cerebellum is large and, by its forward projection, presses the optic lobes down toward the ventro-lateral part of the brain. The cerebral hemispheres are also large, owing chiefly to the great size of the corpora striata, which already show a differentiation into caudate nucleus, putamen and globus pallidus. The pallium is reptilian in character, though its cortical area is more extensive. The geniculate bodies are very large (Bumm, Zeits. wiss. Zool. Bd. xxxviii., 1883, p. 430; Brandis, Arch, mikr. Anat. Bd. xli., 1893, P- 62 3. and xliii., 1894, p. 96, and xliv., 1895, p. 534; Boyce and Warrington, Phil. isiraiAT Trans, vol. cxci., 1899, p.. 293).) ' ' Amongthe Mammalia the Monotrematahaveacerebellurn

/ which shows, in addition to the central lobe of the lower

vertebrates, a flocculus on each side, and the two halves of the cerebellum are united by a ventral commissure, the pons varolii. The pallium is reptilian in its arrangement, but that part of it which Elliot Smith has named the neo- pallium is very large, both in the Ornithorynchus and us vas Echidna, a fact very difficult to account for. In the latter

animal the cortical area is so extensive as to be thrown into many and deep

sulci, and yet the Echidna is one of the lowliest of mammals in other respects. A well- marked rhinal fissure separates the pyriform lobe from the neopallium, while, on the mesial surface, the hippocampal fissure separates the neopallium from the hippocampal area. Just below the hippocampal fis sure a specially coloured tract indicates

x The literature of the pineal region is enormous. Studnicka (in Oppels Vergleichende mikrosk. Anat. Teile 4-5, 1904, 1905) gives 285 references. The present conception of the generalized arrange- ment is: (a) A single glandular median organ from the fore-brain called the paraphysis. (0) A pouch of the ependymal roof of the ventricle called the dorsal sac. (7) A right and left epiphysis, one of which may be wholly or partially suppressed. These may change their position to anterior and posterior in some animals.

the first appearance of the fascia dentata (see fig. 20). The anterior commissure is divided, as in reptiles, into dorsaland ventral parts, of which the latter is the larger (fig. 20, Comm. V. and D.), while just behind the dorsal part is the first appearance of the fimbria or fornix. In addition to the two fissures already named, there is, in the Echidna, one which in position and mode of formation corresponds with the Sylvian fissure of higher mammals. Elliot Smith, however, wisely refuses to homologize it absolutely with that fissure, and proposes the name of pseudosylvian for it. The pineal body is rudimentary, and the optic lobes are now, and throughout the Mammalia, sub- divided into four corpora quadrigemina.

Among the Marsupialia the Tasmanian devil (Sarcophilus) gives a very good idea of a generalized mammalian brain, and shows a large development of the parts concerned in the sense of smell.

-OLF.BU.LB.

CEREB.MAS.

V.M.

CER.HEM.

*FLDC**

/

TUBER. V.

From Cat. R.C.S. England.

Fig. 19. — Ventral and Dorsal Views of the Brain of Ornithorynchus.

The most important advance on the monotreme brain is that the calcarine fissure has now appeared on the posterior part of the mesial surface and causes a bulging into the ventricle, called the calcar avis or hippocampus minor, just as tne hippocampal fissure causes the hippocampus major (Gervais, Nuov. Arch. Mus. torn, v., 1869; Ziehen, Jenaische Denkschr. Bd. vi., 1897).

In the Eutheria or mammals above the marsupials, the cerebellum gradually becomes more complex, owing to the appearance of lateral lobes between the flocculus and the vermis, as well as the para- flocculus on the outer side of the flocculus. The corpus callosum now first appears as a bridge between the neopallia, and its develop- ment leads to the stretching of the hippocampal formation, so that in the higher mammals the hippocampus is only found in the lower

anterior part of the occipital lobe has a well-marked vertical sulcus, called the simian sulcus or Affenspalte; this often has a semilunar shape with its convexity forward, and is then called the sulcus

SULC. PRECRU.

-SULC. SUPRAS. “SULC. LAT.

SULC.PRECRU. SULC. PROR

SULC. SUPAA3.

rASC. DENT.

OLF. BULB

CER.HEM:

OLF.’BULB,

COMM.V.

PKR. L.

~C£HEB£L.

OLF TUBER.

POMS

floc:

From Cai. R.C.S. England.

Fig. 20. — Mesial and Lateral Views of the Brain of Ornithorynchus.

and back part of the ventricle, while the rudiments of the dorsal part remain as the striae longitudinales on the corpus callosum. The dorsal part of the original anterior commissure becomes the fornix, and the paraterminal area is modified to form the septum lucidum. The first appearance of the fissure of Rolando is probably in some of the Carnivora, in which, as the sulcus crucialis, it forms the posterior boundary of the " ursine lozenge " described by Mivart (Journ. Linn. Soc. vol. xix., 1886) (see fig. 22, Side. Cru.). In the

SULC. ORB.

OLF. BULB

HIP. F.

SULC. ORB.

From Cat. R.C.S. England.

Fig. 22. — Dorsal and Lateral Views of the Brain of a Ratel

(Mellivora indica).

lunatus. It is usually concealed in European brains by the overgrowth of the surrounding gyri, but it occasionally remains, though less frequently than in the brains of Egyptian fellaheen. Its relation to the white stria of Cennari is especially interesting, and is recorded by Elliot Smith in the Anatomischer Anzeiger, Bd. xxiv., 1904, p. 436. The rhinal fissure, which is so charac- teristic a feature of the lower mammals, almost disappears in Man, and is only represented by the incisura temporalis (see fig. II, i.t). The hippocampal fissure persists with little modification all through the mammalian class. The cal- carine fissure remains with many modifications from the marsupials to man, and in view of the famous controversy of 1864, in which Owen, Huxley and the then bishop of Oxford took part, it is interesting to note that its hip- pocampus minor can now be clearly

demonstrated, even in the Marsupialia. Another very ancient and stable sulcus is the orbital, which is a simple antero-posterior line until Man is reached (see fig. 23, Sulc. Orb.). The great point of importance, however, in the evolution of the mammalian brain is the gradual suppression of the olfactory region, and the development of the neo- pallium, a development which takes a sudden stride between the Anthropoid apes and Man. (For further particulars of this and other points in the comparative anatomy of the brain, see Catalogue of the Physiological Series of the Museum of the Royal College of Surgeons of England, vol. ii. 2nd ed., by R. H. Burne and G. Elliot Smith, London, 1902.)

SULC.CALC.

FASC

. RHJN .F.

COMM, OLF.BULB

Embryology.

-Fl.

OLF. TUBER.

‘ COMM.V

PVR.L. . DLF – TR – OLF! TUBER.” From Cat. R.C.S. England.*

Fig. 21. — Mesial and Lateral Views of the Brain of the Tasmanian Devil

{Sarcophilus).

higher apes or Anthropoidea the human fissures and sulci are largely recognizable, so that a gibbon’s brain, apart from all question of comparative anatomy, forms a useful means of demonstrating to a junior class the main gyri and sulci of Man in a simple and dia- grammatic way. The main points of difference, apart from greater simplicity, are that the central lobe or island of Reil is exposed on the surface of the brain, as it is in the human foetus, and that the

The brain, like the rest of the nervous system, is developed

from the ectoderm or outer layer of the embryo by the

formation of a groove in the mid-dorsal line. The lips of this

medullary groove unite to form a canal beginning at the place where the neck of the embryo is to be. The part of the neural canal in front of the earliest union forms the brain and very early becomes constricted into three vesicles, to which the names of prosencephalon, mesencephalon and rhombencephalon are now usually given. The simple tubular brain we have seen as a permanent arrangement in Amphioxus, but the stage of the three vesicles is a transitory one, and is not found in the adult of any existing animal. From the sides of the prosencephalon, the optic vesicles grow out before the neural tube is completely closed, and eventually form the optic nerves and retinae, while, soon after this, the cerebral hemispheres bulge from the antero-dorsal part of the first primary vesicle, their points of evagination being the foramina of Munro. From the ventral parts of these cerebral hemispheres the olfactory lobes are

constricted off, while just behind the openings of the foramina of Munro a constriction occurs which divides the prosencephalon into two secondary vesicles, the anterior of which, containing the foramina of Munro, is called the telencephalon, while the posterior is the thalamencephalon or diencephalon. A constriction also occurs in the hind vesicle or rhombencephalon, dividing it into an anterior part, the metencephalon, from which the cerebellum is developed, and a. posterior or myelencephalon, the primitive medulla oblongata. At this stage the general resemblance of the brain to that of the lamprey is striking.

Before the secondary constrictions occur three vertical flexures begin to

form. The first is known as the cephalic, and is caused by the prosencephalon bending sharply downward, below and in front of the mesencephalon. The second is the cervical, and marks the place where the brain ends and the spinal cord begins ; the concavity of this flexure is ventral. The third to appear has a ventral convexity and is known as the pontine, since it marks the site of the future pons Varolii; it resembles the permanent flexure in the reptilian brain.

It will now be seen that the original neural canal, which is lined by ciliated epithelium, forms the ventricles of the brain, while superficial to this epithelium (ependyma) the grey and white matter is subsequently formed. It has been shown by His that the whole neural tube may be divided into dorsal or alar, and ventral or basal laminae, and, as the cerebral hemispheres bud out from the dorsal part of the anterior primary vesicle, they consist entirely of alar laminae. The most characteristic feature of the human and anthro- poid brain is the rapid and great expansion of these hemispheres, especially in a backward direction, so that the mesencephalon and metencephalon are hidden by them from above at the seventh month of intra-uterine life. At first the foramina of Munro form

-suit ut ace.

SULCIKKOCC

SM.C PAR.

SYL.r.

From Cat. R.C.S. England. Fig. 23. — Lateral view of cerebral hemisphere of Gorilla (Anthropopithecus

gorilla).

a communication not only between the third and lateral ventricles, but between the two lateral ventricles, so that the cavity of each hemisphere is continuous with that of the other; soon, however, a median longitudinal fissure forms, into which the mesoderm grows to form the falx, and so the foramina of Munro are constricted into a V-shaped canal. In the floor of the hemispheres the corpora striata are developed at an early date by a multiplication of nerve cells, and on the external surface a depression, called the Sylvian fossa, marks the position of the future central lobe, which is after- wards hidden as the lips of the fossa (opercula) gradually close in on it to form the Sylvian fissure. The real fissures are complete infoldings of the whole thickness of the vesicular wall and produce swellings in the cavity. Some of them, like the choroidal 011 _ the mesial surface, are developed very early, while the vesicle is little more than

epithelial, and contain between their walls an inpushing of mesoderm to form the choroid plexus. Others, like the hippo- campal and calcarine, appear in the second and third months and correspond to invaginations of the nervous tissue, the hippocampus major and minor. The sulci appear later than the fissures and do not affect the internal cavity; they are due to the rapid growth of the cortex in certain areas. The corpus callosum and fornix appear about the third month and their development is somewhat doubtful; they are probably modifications of the lamina terminalis, but they may be secondary adhesions between the adjacent surfaces of the cerebral hemispheres where the cortical grey matter has not covered the white. They begin at their antero-ventral part near the genu of the corpus callosum and the anterior pillars of the fornix, and these are the parts which first appear in the lower mammals. The original anterior vesicle from which the hemispheres evaginate is composed, as already shown, of an anterior part or telencephalon and a posterior or thalamencephalon ; the whole forming the third ventricle in the adult. Here the alar and basal laminae are both found, but the former is the more important ; from it the optic thalami are derived, and more posteriorly the geniculate bodies. The anterior wall, of course, is the lamina terminalis, and from it are formed the lamina

cinerea, the corpus callosum, fornix and septum lucidum. The roof largely remains epithelial and is invaginated into the ventricle by the mesoderm to form the choroid plexuses of the third ventricle, but at the posterior part it develops the ganglia habenulae and the pineal body, from a structure just in front of which both a lens and retinal elements are derived in the lower forms. This is one great difference between the development of this organ and that of the true eyes; indeed it has been suggested that the pineal is an organ of thermal sense and not the remains of a median eye at all. The floor of the third ventricle is developed from the basal laminae, which here are not very important and from which the tuber cinereum and, until the fourth month, single corpus mammillare are developed. The infundibulum or stalk of the posterior part of the pituitary body at first grows down in front of the tuber cinereum and, accord- ing to Gaskel's theory, represents an ancestral mouth to which the ventricles of the brain and the central canal of the cord acted as the stomach and intestine {Quart. Journ. of Mic. Sci. 31, p. 379; and Journ. of Phys. v. 10, p. 153). The reason why the basal lamina is here small is because it contains the nuclei of no cranial nerves. The anterior and posterior commissures appear before the middle .and the middle before the corpus callosum, as they do in phylogeny. In connexion with the thalamencephalon, though not really belong- ing to it, may be mentioned the anterior lobes of the pituitary body ; these begin as an upward diverticulum from the posterior wall of the primitive pharynx or stomatodaeum about the fourth week. This pouch of Rathke, as it is called, becomes nipped off by the developing base of the skull, and its bifid blind

end meets and becomes applied to the posterior part of the body, which comes down from the brain. In the mesencephalon the alar laminae form the corpora quadri- eemina ; these at first are bigeminal and hollow as they are in the lower vertebrates. The basal laminae thicken to form the crura cerebri. In the rhombencephalon the division into basal and alar laminae is better marked than in any other part; there is a definite groove inside the fourth ven- tricle, which remains in the adult as the superior and inferior fovea and which marks the separation between the two laminae. In the basal laminae are found the deep origins of most of the motor cranial nerves, while those of the sensory are situated in the alar laminae. The roof of the fourth ventricle widens out very much and remains largely epithelial as the superior and inferior medullary vela. The cerebellum develops in the anterior part of the roof of the rhombencephalon as two lateral rudiments which unite in the mid line and so form a transverse bar similar to that seen in the adult lamprey; at the end of the second month the flocculus and paraflocculus become marked, and later on a series of transverse fissures occur dividing the various lobes. Of the cerebellar peduncles the inferior develops first (third month), then the middle forming the pons (fourth month), and lastly the superior (fifth month) (Elliot Smith, Review of Neurology and Psychiatry, October 1903 ; W. Kuithan, " Die Entwicklung des Kleinhirns bei Sauge- tieren," Munchener Med. Abhandl., 1895; B. Stroud, "Mammalian cerebellum," Journ. of Comp. Neurology, 1895). Much of our knowledge of the tracts of fibres in the brain is due to the fact that they acquire their white sheaths at different stages of development, some long after birth.

For further details and references see Quain's Anat. vol. i. (1908) ; Minot's Human Embryology (New York) ; W. His, Anat. menschlicher Embryonen (Leipzig, 1881); Marshall's Vertebrate Embryology; Kolliker, Grundriss der Entviickelungsgeschichte (Leipzig, 1880); A. Keith, Human Embryology and Morphology (London, 1904) ; O. Hertwig, Handbuch der vergleichenden und experimentellen Ent- wickelungslehre der Wirbeltiere, Bd. 2, part 3 (Jena, 1902-1906); Development of the Human Body, J. P. McMurrich (1906).

(F. G. P.)

2. Physiology The nervous system has as its function the co-ordinating of the activities of the organs one with another. It puts the organs into such mutual relation that the animal reacts as a whole with speed, accuracy and self-advantage, in response to the en- vironmental agencies which stimulate it. For this office of the nervous system there are two fundamental conditions. The system must be thrown into action by agencies at work in the environment. Light, gravity, mechanical impacts, and so on, which are conditions significant for animal existence, must find the system responsive

and through it evoke appropriate activity in the animal organs. And in fact there have been evolved in the animal a number of structures called receptive organs which are selectively excitable by different environmental agencies. Connected with these receptive organs lies that division of the nervous system which is termed afferent because it conducts impulses inwards towards the nervous centres. This division consists of elongated nerve-cells, in man some two.

million in number for each half of the body. These are living threads of microscopic tenuity, each extending from a receptive organ to a central nervous mass. These central nervous masses are in vertebrates all fused into one, of which the part which lies in the head is especially large and complex, because directly connected with particularly important and delicate receptive organs. The part of the central nervous organ which lies in the head has, in consequence of its connexion with the most important receptive organs, evolved a dominant importance in the nervous system, and this is especially true of the higher animal forms. This head part of the central nervous organ is sufficiently different from the rest, even to anatomical examina- tion, to have received a separate name, the brain. But the fact of its having received a separate name ought not to obscure the singleness and solidarity of the whole central nervous organ as one entity. The functions of the whole central nervous organ from region to region are essentially similar throughout. One of its essential functions is reception, via afferent nerves, of nervous impulses generated in the receptive organs by en- vironmental agents as stimuli. In other words, whatever the nature of the agent, its result on the receptive organs enters the central nervous organ as a nervous impulse, and all segments of the central nervous organ receive impulses so generated. Further, it is not known that nervous impulses present qualitative differences among themselves. It is with these impulses that the central nervous organ whether spinal cord or brain has to deal.

Material and Psychical Signs of Cerebral Activity. — In the central nervous organ the action resulting from entrant impulses has issue in three kinds of ways. The reaction may die out, be suppressed, and so far as discoverable lead to nothing; or the impulses may evoke effect in either or both of two forms. Just as from the receptive organs, nerves lead into the central nervous organ, so conversely from the central organ other nerves, termed efferent, lead to various organs of the body, especially glands and muscles.

The reaction of the central nervous organ to impulses poured into it commonly leads to a discharge of impulses from it into glands and muscles. These centrifugal impulses are, so far as is known, qualitatively like the centripetal impulses. On reaching the glands and muscles they influence the activity of those organs. Since those organs are therefore the mechanisms in which the ultimate effect of the nervous reaction takes place, they are often termed from this point of view effector organs. A change ensuing in effector organs is often the only sign an observer has that a nervous reaction has occurred, unless the nervous system under observation be the observer's own.

If the observer turns to his own nervous system for evidence of reaction, he meets at once in numberless instances with sensation as an outcome or sign of its reaction. This effect he cannot show to any being beside himself. He can only describe it, and in describing it he cannot strictly translate it into any term of material existence. The unbridged gulf between sensa- tion and the changes produced in effector organs necessitates a separate handling of the functions of the nervous system accord- ing as their office under consideration is sensation or material effect. This holds especially in the case of the brain, and for the following reasons.

Psychosis and the Fore-Brain. — Hippocrates wrote, " It is through the brain that we become mad, that delirium seizes us, that fears and terrors assail us." " We know that pleasure and joy on the one hand and pain and grief on the other are referable to the brain. It is in virtue of it that we think, understand, see, hear, know ugliness and beauty, evil and good, the agreeable and the disagreeable." Similarly and more precisely Descartes indicated the brain, and the brain alone, as the seat of conscious- ness. Finally, it was Flourens who perhaps first definitely insisted on the restriction of the seat of consciousness in higher animals to that part of the brain which is the fore-brain. A functional distinction between the fore-brain and the remainder of the nervous system seems, in fact, that consciousness and phy- sical reactions are adjunct to the fore-brain in a way in which they are not to the rest of the system. After transection of the

spinal cord, or of the brain behind the fore-brain, psychical phenomena do not belong to the reactions of the nervous arcs posterior to the transection, whereas they do still accompany reactions of the nervous arcs in front and still connected with the fore-brain. A man after severance of the spinal cord does not possess in the strict sense consciousness of the limbs whose afferent nerves lie behind the place of spinal severance. He can see them with his eyes, and if the severance lie between the arms and the legs, can feel the latter with his hands. He knows them to be a part of his body. But they are detached from his con- sciousness. Sensations derived from them through all other channels of sense than their own do not suffice to restore

them in any adequate measure to his consciousness. He must have the sensations so called " resident " in them, that is, referred to them, without need of any logical inference. These can be yielded only by the receptive organs resident in the part itself, its skin, its joints, its muscles, &c, and can only be yielded by those receptive organs so long as the nerve impulses from them have access to the fore-brain. Consciousness, therefore, does not seem to attach to any portion of the nervous system of higher animals from which the fore-brain has been cut off. In the dog it has been found that no sign of memory, let alone intelligence, has been forthcoming after removal of the greater part of the fore- brain.

In lower vertebrates it is not clear that consciousness in primitive form requires always the co-operation of the fore-brain. In them the fore-brain does not seem a conditio sine qua non for psychosis — so far as we may trust the rather hazardous in- ferences which study of the behaviour of fish, &c, allows. And the difference between higher and lowlier animal forms in respect of the fore-brain as a condition for psychosis becomes more marked when the Arthropoda are examined. The behaviour of some Insecta points strongly to their possessing memory, rudimentary in kind though it may be. But in them no homo- logue of the fore-brain of vertebrates can be indisputably made out. The head ganglia in these Invertebrates may, it is true, be analogous in function in certain ways to the brain of verte- brates. Some experiments, not plentiful, indicate that destruc- tion of these head ganglia induces deterioration of behaviour such as follows loss of psychical functions in cases of destruction of the fore-brain in vertebrates. Though, therefore, we cannot be clear that the head ganglia of these Invertebrates are the same structure morphologically as the brain of vertebrates, they seem to hold a similar office, exercising analogous functions, including psychosis of a rudimentary kind. We can, therefore, speak of the head ganglia of Arthropods as a brain, and in doing so must remember that we define by physiological evidence rather than by morphological.

Cerebral Control over Lower Nervous Centres. — There accrues to the brain, especially to the fore-brain of higher Vertebrates, another function besides that of grafting psychical qualities upon the reactions of the nervous system. This function is exhibited as power to control in greater or less measure the pure reflexes enacted by the system. These pure reflexes have the character of fatality, in the sense that, given a particular stimulus, a particular reaction unvaryingly follows; the same group of muscles or the same gland is invariably thrown into action in the same way. Removal of the fore-brain, i.e. of that portion of the central nervous organ to which psychosis is adjunct, renders the nervous reactions of the animal more predictable and less variable. The animal, for instance, a dog, is given over more completely to simple reflexes. Its skin is touched and it scratches the spot, its jaw is stroked and it yawns, its rump is rubbed and it shakes itself,

like a dog coming out of water; and these reactions occur fatally and inopportunely, for instance, when food is being offered to it, when the dog normally would allow no such insignificant skin stimuli as the above to defer his appropriate reaction. Goltz relates the behaviour of a dog from which almost the whole fore-brain had been removed. The animal lived healthily under the careful treatment accorded it. At feeding time a little quinine (bitter) added to its sop of meat and milk led to the morsels, after being taken into the

mouth, being at once and regularly rejected. None was ever swallowed, nor was the slightest hesitation in their rejection ever obtained by any coaxing or command, or encouragement of the animal by the attendant who constantly had charge of it. On the other hand, directly an undoctored piece had entered the mouth it was swallowed at once. Goltz threw to his own house-dog a piece of the same doctored meat. The creature wagged its tail and took it eagerly, then after receiving it into its mouth pulled a wry face and hesitated, astonished. But on encouragement to go on eating it the dog did so. Perhaps it deemed it unseemly to appear ungrateful to the giver and reject the gift. It overcame its reflex of rejection, and by its self- control gave proof of the intact cerebrum it possessed.

There seems a connexion between consciousness and the power to modify reflex action to meet the exigencies of the occasion. Pure reflexes are admirably adapted to certain ends. They are reactions which have long proved advantageous to the phylum of which the existent animal is the representative embodiment. But the reflexes have a machine-like fatality, and conscious aim does not forerun their execution. The subject as active agent does not direct them. Yet they lie under the control of higher centres. The cough, the eye-closure, the impluse to smile, all these can be suppressed. The innate respira- tory rhythm can be modified to meet the requirements of vocal utterance. In other words, the reaction of reflex arcs is con- trollable by the mechanism to whose activity consciousness is adjunct. The reflexes controlled are often reactions but slightly affecting consciousness, but consciousness is very distinctly operative with the centres which exert the control. It may be that the primary aim, object and purpose of consciousness is control. " Consciousness in a mere automaton," writes Professor Lloyd Morgan, " is a useless and unnecessary epiphenomenon." As to how this conscious control is operative on reflexes, how it intrudes its influence on the running of the reflex machinery, little is known.

The Cerebrum an Organ giving Adaptation and Readjustment of Motor Acts. — The exercise of this control and the acquirement of skilled actions have obviously elements in common. By skilled actions, we understand actions not innately given, actions acquired by training in individual experience. The controlling centres pick out from an ancestral motor action some part, and isolate and enhance that until it becomes a skilled act. The motor co-ordination ancestrally provided for the ring finger gives an extending of it only in company with extension of the fingers on either side of it. The isolated lifting of the ring finger can, however, soon be acquired by training. In such cases the higher centre with conscious effort is able to dissociate a part from an ancestral co-ordination, and in that way to add a skilled adapted act to the powers of the individual.

The nervous organs of control form, therefore, a special instru- ment of adaptation and of readjustment of reaction, for better accommodation to requirements which may be new. The attain- ment of more precision and speed in the use of a tool, or the handling of a weapon, means a process in which nervous organs of control modify activities of reflex centres themselves already perfected ancestrally for other though kindred actions. This process of learning is accompanied by conscious effort. The effort consists not so much in any course of reasoning but rather in the acquiring of new sensorimotor experience. To learn swimming or skating by simple cogitation or mere visual observa- tion is of course impossible. The new ideas requisite cannot be constructed without motor experience, and the training must include that motor experience. Hence the training for a new skilled motor manoeuvre must be simply ad hoc, and is of itself no training for another motor co-ordination.

The more complex an organism the more points of contact does it have with its environment, and the more does it need readjustment amid an environment of shifting relationships. Hence the organs of consciousness and control, being organs of adaptation and readjustment of reaction, will be more pro nounced the farther the animal scale is followed upward to its crowning species, man. The cerebrum and especially the cerebral

cortex may be regarded as the highest expression of the nervous organ of individual adaptation of reactions. Its high develop- ment in man makes him the most successful animal on earth's surface at the present epoch. The most important part of all this adjustment in his case, as he stands now, consists doubtless in that nervous activity which is intellectual. The mentality attached to his cerebrum includes reason in higher measure than is possessed by the mentality of other animals. He, therefore, more than they, can profitably forecast the future and act suitably to meet it from memory of the past. The cerebrum has proved itself by his case the most potent weapon existent for extending animal dominance over the environment.

Means and Present Aims of Physiological Study of the Brain. — The aspects of cerebral activity are therefore twofold. There is the contribution which it makes to the behaviour of the animal as seen in the creature's doings. On the other hand there is its product in the psychical life of the animal. The former of these is subject matter for physiology; the latter is especially the province of psychology. Physiology does, however, concern itself with the psychical aspect of cerebral functions. Its scope, embracing the study of the bodily organs in regard to function, includes the psychic as well as the material, because as just shown the former inextricably interlace with the latter. But the relation between the psychic phenomena and the working of the brain in regard to any data of fundamental or

intimate character connecting the two remains practically as unknown to us as to the Greek philosophers. What physiology has at present to be content with in this respect is the mere assigning of certain kinds of psychic events to certain local regions of the cerebrum. This primitive quest constitutes the greater part of the " neurology " of our day, and some advance has been made along its lines. Yet how meagre are really significant facts will be clear from the brief survey that follows. Before passing finally from these general considerations, we may note that it becomes more and more clear that the brain, although an organ than can be treated as a whole, is complex in the sense that separable functions belong in some measure to its several parts.

The means principally adopted in studying the functions of the brain — and it must be remembered that this study in its present phase is almost exclusively a mere search for localization — are four. These are the physiological, the clinico-pathological, the histological and the zoological. The first named proceeds by observing the effects of artificial excitation, chiefly electric, of various parts of the brain, and the defects produced by destruction or removal of circumscribed portions. The clinico- pathological proceeds by observing the disturbances of body and mind occurring in disease or injury, and ascertaining the extent of the disease or injury, for the most part post mortem. The histological method examines the microscopic structure of the various regions of the brain and the characters and arrange- ment of the nerve-cells composing it. The zoological follows and compares the general features of the brain, as represented in the various types of animal creation.

It is on the functions of the fore-brain that interest now mainly focuses, for the reasons mentioned above. And the interest in the fore-brain itself chiefly attaches to the functions of its cortex. This is due to several causes. In man and the animals nearest him the cortex forms by far the larger part of the whole cerebral hemisphere. More than any other part it constitutes the distinctively human feature. It lies accessible to various experimental observations, as also to traumatic lesions and to the surgeon's art. It is composed of a great unbroken sheet of grey matter; for that reason it is a structure wherein processes of peculiar interest for the investigation in view are likely to occur. To make this last inference more clear a reference to the histology of nervous tissue must be made. The whole physiological function of the nervous system may be summed up in the one word " conduction." This " con- duction " may be defined as the transmission of states of excite- ment (nerve-impulses) along the neural arcs composing the system. The whole nervous system is built up of chains of nerve- cells (neurones) which are nervous conductors, the chains often

being termed arcs. Each neurone is an elongated cell which transmits nerve-impulses from its one end to its other, without so far as is known modifying the impulses in transit, unless in that part of the nerve-cell where the nucleus lies. That part of the neurone or nerve-cell is called the perikaryon or cell- body, and from that part usually many branches of the cell (each branch being a nerve-fibre) ramify. There is no evidence that impulses are modified in transit along a branch of a nerve-cell, but there is clear evidence of manifold modification of nerve- impulses in transit along the nerve-arcs of the nervous system. These nerve-arcs are neurone-chains. In them one neurone continues the line of conduction where the immediately fore- going neurone left it. That is, the neurones are laid in conductive series, the far end of one apposed to the near end of its precursor. The place of juxtaposition of the end of one neurone against the beginning of another is called the synapse. At it the con- duction which has so far been wholly intra-neuronic is replaced by an inter-neuronic process, in which the nerve impulse passes from one neurone to the next. The process there, it is natural to think, must be physiologically different from that conductive process that serves for transmission merely within the neurone itself. It may be that to this inter-neuronic conduction are due the differences between conduction in nerve-arcs and nerve- trunks (nerve-fibres) respectively. Significant of' the former are changes in rhythm, intensity, excitability and modifications by summation and inhibition; in fact a number of the main features of nervous reaction. These characters impressed upon conduction in nerve arcs (neurone-chains) would therefore be traceable to the intercalation of perikarya and synapses, for both these structures are absent from nerve-trunks. It is therefore probably to perikarya and synapses that the greater part of the co-ordination, elaboration and differentiation of nervous reactions is due. Now, perikarya and synapses are not present in the white matter of the central nervous organ, any more than they are in nerve-trunks. They are confined exclusively to those portions of the central organ which consist of grey matter (so called from its naked-eye appearance). Hence it is to the great sheet of grey matter which enfolds the cerebrum that the physiologist turns, as to a field where he would expect to find evidences of the processes of cerebral co-ordination at work. It is therefore to items regarding the functions of the great sheet of cerebral cortex that we may now pass.

The Cerebral Cortex and its Functions. — The main question which vexed the study of the physiology of the cerebral hemi- spheres in the 19th century was whether differences of function are detectible in the different regions of the hemisphere and especially in those of its cortex. One camp of

experimenters and observers held that the cortex was identical in function throughout its extent. These authorities taught that the various faculties and senses suffer damage in proportion to the amount of cortex removed or injured, and that it is a matter of indifference what may be the particular region wherein the destruction takes place. Against this an opposed set of observers held that different regions perform different functions, and this latter " differential " view was raised in two wholly dis- similar forms in the first and last quarters of the 19th century respectively. In the first quarter of the century, a school, with which the name of Gall is prominently associated, held that each faculty of a set of particular so-called " faculties," which it assumed constituted intelligence, has in the brain a spatially separate organ proper to itself. Gall's doctrine had two funda- mental propositions. The first was that intelligence resides exclusively in the brain: the second, that intelligence consists of twenty-seven " faculties," each with a separate local seat in the brain. The first proposition was not new. It is met with in Hippocrates, and it had been elaborated by Descartes and others. But Bichat in his A natomie generate had partly wandered from the gradually established truth and referred the emotions to the visceral organs, returning to a naive view popularly prevalent. Gall's first proposition was probably raised especially in reaction against Bichat. But Gall's proposition was retro- grade from the true position of the science of his time. Flourens

and others of his contemporaries had already shown not only that intelligence was resident exclusively in the brain, but that it was resident exclusively in that part of the brain which is the fore-brain. Now Gall placed certain of his twenty-seven intellectual faculties in the cerebellum, which is part of the hind-brain.

Phrenology. — As to Gall's second proposition, the set of faculties into which he analysed intelligence shows his power of psychological analysis to have been so weak that it is matter of surprise his doctrine could obtain even the ephemeral vogue it actually did. Among his twenty-seven faculties are, for instance, " l' amour de la progtniture, V instinct carnassier, Vamitii, la ruse, la sagacite comparative, I'esprit mitaphysique, le talent pottique, la mimique," &c. Such crudity of speculation is re- markable in one who had undoubtedly considerable insight into human character. Each of the twenty-seven faculties had its seat in a part of the brain, and that part of the brain was called its " organ." The mere spatial juxtaposition or remoteness of these organs one from another in the brain had, according to Gall, an influence on the constitution of the mind. " Comme Vorgane des arts est place loin de I'organe du sens des couleurs, cette circonstance explique pourquoi les peintres d'hisloire ont ttt rarement coloristes." All these " faculty-organs " were placed by Gall at the surface of the brain. " This explains the corre- spondence which exists between craniology and the

doctrine of the functions of the brain (cerebral physiology), the single aim of my researches." Gall wrote that he found the bump of pride (la bosse de Vorgueil) as far down in the animal series as the goat. Broussais traced the " organ " of veneration as far down as the sheep. Gall found the bump of murder (bosse du meurtre) in the carnivora. Later it was traced also in herbivora. Broussais added apologetically that " the herbivora cause a real destruction of plants."

Gall's doctrine enjoyed enormous vogue. He himself had the gifts and the demerits of quackery. His doctrine possessed, apart from its falsity, certain other mischievous qualities. " Que ces hommes si glorieux, qui font egorger les nations par millions, sachent qu'ils n'agissent point de leur propre chef, que c'est la nature qui a place dans leur cceur la rage de la destruction." One of his scientific opponents rejoined, " Nay, it is not that which they should know. What they should know is that if providence has allowed to man the possibility of doing evil, it has also endowed him with the power to do good." The main cause of the success of phrenology (q.v.) has been no doubt the common desire of men to read the characters and hidden thoughts of others by external signs. Each bump or " bosse " on the cranium was supposed to indicate the existence and degree of development of one or other of the twenty-seven " faculties." One such " bosse " showed the development of the organ of " goodness," and another the development of the organ of " murder." Such an easy means to arrive at information so curious delighted many persons, and they were not willingly undeceived.

Modern Localization Doctrines. — The crude localization of the phrenologists is therefore too clumsy to possess an interest it might otherwise have had as an early expression of belief in cerebral localization, a belief which other labours have subse- quently justified, although on facts and lines quite different from these imagined by Gall'and his followers. Patient scientific toil by the hands of E. Hitzig and D. Ferrier and their followers has slowly succeeded in obtaining certain facts about the cortex cerebri which not only show that different regions of it are con- cerned with different functions, but, for some regions at least, outline to some extent the kind of function exercised. It is true that the greater part of the cortex remains still terra incognita unless we are content with'mere descriptive features concern- ing its coarse anatomy. For several scattered regions some knowledge of their function has been gained by physiological investigation. These scattered regions are the visual, the auditory, the olfactory and the precentral.

The grey matter of the cerebral cortex is broadly characterized histologically by the perikarya (nerve-cells bodies) which lie in it

possessing a special shape; they are pyramidal. The dendrite fibres of these cells — that is, their fibres which conduct towards the perikarya — are branches from the apex and corners of the pyramid. From the base often near its middle arises one large fibre — the axone fibre, which conducts impulses away from the perikaryon. The general appearance and arrangement of the neurones in a particle of cortical grey matter are shown in fig. 15, above. The apices of the pyramidal perikarya are turned towards the free surface of the cortex. The figure as interpreted in terms of functional conduction means that the cortex is beset with conductors, each of which collects nerve-impulses, from a minute but relatively wide field by its branched dendrites, and that these nerve-impulses converge through its perikaryon, issue by its axone, and are carried whithersoever the axone runs. In some few cells the axone breaks up into branches in the immediate neighbourhood of its own perikaryon in the cortex. In most cases, however, the axone runs off into the subjacent white matter, leaving the cortex altogether. On reaching the subjacent white matter it mingles with other fibres and takes one of the following courses: — (1) to the grey matter of the cortex of the same hemisphere, (2) to the grey matter of the cortex of the opposite hemisphere, (3) to the grey matter of the pons, (4) to the grey matter of the bulb or spinal cord. It is noteworthy that the dendrite fibres of these cortical neurones do not trans- gress the limits of the grey cortex and the immediate neighbour- hood of the perikaryon to which they belong; whereas the dis- charging or axone fibre does in the vast majority of cases trans- gress the limits of the grey matter wherein its perikaryon lies. The cortical neurone therefore collects impulses in the region of cortex just about its perikaryon and discharges them to other regions, some not cortical or even cerebral, but spinal, &c. One question which naturally arises is, do these cells spontaneously generate their impulses or are they stirred to activity by impulses which reach them from without? The tendency of physiology is to regard the actions of the cortex as reactions to impulses communicated to the cortical cells by nerve-channels reaching them from the sense organs. The neurone conductors in the cortex are in so far considered to resemble those of reflex centres, though their reactions are more variable and complex than in the use of the spinal. The chains of neurones passing through the cortex are more complex and connected with greater numbers of associate complex chains than are those of the spinal centres. But just as the reflex centres of the cord are each attached to afferent channels arriving from this or that receptive-organ, for instance, tactile-organs of the skin, or spindles of muscle-sense, &c, so the regions of cortex whose function is to-day with some certainty localized seem to be severally related each to some particular sense-organ. The localization, so

far as ascertained, is a localization which attaches separate areas of cortex to the several species of sense, namely the visual, the auditory, the olfactory, and so on. This being so, we should expect to find the sensual representation in the cortex especially marked for the organs of the great distance-receptors, the organs which — con- sidered as sense organs — initiate sensations having the quality of projicience into the sensible environment. The organs of distance-receptors are the olfactory, the visual and the auditory. The environmental agent which acts as stimulus in the case of the first named is chemical, in the second is radiant, and in the last is mechanical.

Olfactory Region of Cortex. — There is phylogenetic evidence that the development of the cortex cerebri first occurred in con- nexion with the distance-receptors for chemical stimuli — that is, expressed with reference to psychosis, in connexion with olfaction. The olfactory apparatus even in mammals still exhibits a neural architecture of primitive pattern. The cell which conducts impulses to the brain from the olfactory membrane in the nose resembles cells in the skin of the earthworm, in that its cell-body lies actually amid the epithelium of the skin-surface and is not deeply buried near or in the central nervous organ. Further, it has at its external end tiny hairlets such as occur in specially receptive-cells but not usually in purely nervous cells. Hence we must think that one and the same cell by its external end

receives the environmental stimulus and by its deep end excites the central nervous organ. The cell under the stimulation of the environmental agent will therefore generate in itself a nervous impulse. This is the clearest instance we have of a neurone being actually excited under natural circumstances by an agent of the environment directly, not indirectly. The deep ends of these olfactory neurones having entered the central nervous organ come into contact with the dentrites of large neurones, called, from their shape, mitral. In the dog, an animal with high olfactory sense, the axone of each olfactory neurone is connected with five or six mitral cells. In man each olfactory neurone is connected with a single mitral cell only. We may suppose that the former arrangement conduces to intensification of the central reaction by summation. At the same time it is an arrangement which could tend to smother sharp differentiation of the central reaction in respect to locality of stimulus at the receptive surface. Considering the diffuse way in which olfactory stimuli are applied in comparison, for instance, with visual, the exact localization of the former can obviously yield little information of use for locating the exact position of their source. On the other hand, in the case of visual stimuli the locus of incidence, owing to the rectilinear propagation of light, can serve with extraordinary exactitude for inferences as to the position of their source. The adaptation of the neural connexions of the two organs in this respect is therefore in

accord with expectation.

The earliest cerebral cortex is formed in connexion with the neurone-chains coming into the central nervous organ from the patch of olfactory cells on the surface of the head. The region of cerebrum thus developed is the so-called olfactory lobe and hippocampal formation. The greater part of the cerebral hemi- sphere is often termed the pallium, because as its development extends it folds cloak-wise over the older structures at the base of the brain. The olfactory lobe, from its position, is sometimes called the pallium basale, and the hippocampal formation the pallium marginale; and these two parts of the pallium form what, on account of their phylogenetic history, Elliott Smith well terms the archipallium. A fissure, the limbic fissure, marks off more or less distinctly this archipallium from the rest of the pallium, a remainder which is of later development and therefore designated by Elliott Smith the neopallium. Of the archipallium, the portion which constitutes the olfactory lobe is well formed in the selachian fish. In the reptilian cerebrum the hippocampal region, the palliutn marginale, coexists in addition. These are both of them olfactory in function. Even so high up in the animal scale as the lowest mammals they still form one half of the entire pallium. But in the higher apes and in man the olfactory portion of the pallium is but a small fraction of the pallium as a whole. It is indeed so relatively dwarfed and obscured as to be invisible when the brain is regarded from the side or above. The olfactory part of the pallium exhibits little variation in form as traced up through the higher animals. It is of course small in such animals as Cetaceans, which are anosmatic. In highly osmatic such as the dog it is large. The uncus, and subiculum cornu ammonis of the human brain, belong to it. Disease of these parts has been accompanied by disturbance of the sense of smell. When stimulated electrically (in the rabbit) the olfactory pallium occasions peculiar torsion of the nose and lips (Ferrier), and change, often slowing or arrested, of the respiratory rhythm. P. E. Flechsig has shown that the nerve- fibres of this part of the pallium attain the final stage of their growth, that is to say, acquire their sheaths of myelin, early in the ontogenetic development of the brain. In the human brain they are myelinate before birth. This is significant from the point of view of function, for reasons which have been made clear especially by the researches of Flechsig himself.

The completion of the growth of the nerve-fibres entering and leaving the cortex occurs at very various periods in the growth of the brain. Study of the development of the fibres entering and leaving the various regions of the pallium in the human brain, discovers that the regions may be conveniently grouped into those whose fibres are perfected before birth and those whose fibres are perfected during the first post-natal month,

and those whose fibres are perfected after the first but before the end of the fourth post-natal month. The regions thus marked out by completion before birth are five in number, and are each connected, as also shown by collateral evidence, with one or other particular species of sense-organ. And these regions have another character in common recognizable in the nerve-fibres entering and leaving them, namely, they possess fibres projected to or from parts of the nervous system altogether outside the cortex itself. These fibres are termed " projection " fibres. Other regions of the cortex possess fibres coming from or going to various regions of the cortex itself, but do not possess in addition, as do the five primitive cortical fields, the fibres of projection. So that the facts established by Flechsig for the regions of pallium, which other evidence already indicated as connected with the sense-organ of smell, support that evidence and bring the olfactory region of cortex into line with certain Other regions of cortex similarly primarily connected with organs of sense.

It will be noted that what has been achieved by these various means of study in regard to the region of the cortex to which olfactory functions are attributed amounts at present to little more than the bare ascertainment of the existence there of nervous mechanisms connected with olfaction, and to the de- limiting roughly of their extent and of their ability to influence certain movements, and in man sensations, habitually associated with exercise of the olfactory organ. As to what part the cortical mechanism has in the elaboration or association of mental processes to which olfaction contributes, no evidence worth the name seems as yet forthcoming. In this respect our knowledge, or rather our want of knowledge, of the functions of the olfactory region of the cortex, is fairly typical of that to which we have to confess in regard to the other regions of the cortex, even the best known.

Visual Region of the Cortex. — There is a region of the cortex especially connected with vision. The optic nerve and tract constitute the second link in the chain of neurones joining the retina to the brain. They may therefore be regarded as the equivalent of an intraspinal tract connecting the deep ends of the afferent neurones from the skin with higher nervous centres. In the bony fishes the optic tract reaches the grey matter of the optic lobe, a part of the mid-brain, to which the so-called anterior colliculus is equivalent in the mammalian brain. In the optic lobe the axones of the neurones of the optic tract meet neurones whose axones pass in turn to the motor neurones of the muscles moving the eyeballs, and also to other motor neurones. But in these fish the optic tract has no obvious connexion with the fore-brain or with any cerebral pallium. Ascending, however, to the

reptilian brain is found an additional arrangement: a small portion of the optic tract passes to grey matter in front of the optic lobe. This grey matter is the lateral geniculate body. From this geniculate body a number of neurones extend to the pallial portion of the cerebrum, for in the reptilian brain the pallium is present. The portion of pallium connected with the lateral geniculate body lies above and behind the olfactory or archipallium. It is a part of what was mentioned above as neopallium.

In the mammalian brain the portion of the optic tract which goes to the optic lobe {ant. colliculus of the mammal) is dwarfed by great development of the part which goes to the geniculate body and an adjoining grey mass, the pulvinar (part of the optic thalamus). From these latter pass large bands of fibres to the occipital region of the neopallium. In mammals this visual region of the cortex is distinguished in its microscopic features from the cortex elsewhere by a layer of myelinate nerve-fibres, many of which are the axones of neurones of the geniculate body and pulvinar. Thus, whereas in the bony fishes all the third links of the conductive chain from the retina lead exclusively to the final neurones of motor centres for muscles, in the mammal the majority of the third links conduct to grey matter of the cortex cerebri.

The application of electric stimuli to the surface of the cortex does not for the greater part of the extent of the cortex evoke

in higher mammalian brains any obvious effect; no muscular act is provoked. But from certain limited regions of the cortex such stimulation does evoke muscular acts, and one of these regions is that to which the neurones forming the third link of the conductive chain from the retina pass. The muscular acts thus provoked from that region are movements of the eyeballs and of the neck turning the head. In the monkey the movement is the turning of both eyeballs and the head away from the side stimulated. In short, the gaze is directed as to an object on the opposite side. The newer conductive chain traceable through the cortex does therefore, after all, like the older one through the optic lobe, lead ultimately to the motor neurones of the eye muscles and the neck, only it takes a longer course thither and is undoubtedly much more complex. What gain is effected by this new and as it were alternative and longer route, which takes a path up to the cerebral cortex and down again, we can only conjecture, but of one point we may rest well assured, namely, that a much richer inter-connexion with other arcs of the nervous system is obtained by the path that passes via the cortex. The functional difference between the old conductive circuit and the new can at present hardly indeed be stated even in outline. A natural inference might be that the phylogenetically older and less complex path is concerned with functions purely reflex- motor, not possessing sensation as an attribute. But fish, which possess only the older path, can be trained to

seize bait of one colour and not of another colour, even against what appeared to be an original colour-preference in them. Such discrimination individually acquired seems to involve memory, though it may be rudimentary in kind. Where motor reaction to visual stimuli appears to involve memory — and without memory the training could hardly be effective — some germ of consciousness can hardly be denied to the visual reactions, although the reactions occurred in complete absence of a cortical path and indeed of a visual cortex altogether.

Removal of the visual pallium in the tortoise produces little or no obvious defect in vision; but in the bird such a lesion greatly impairs the vision of the eye of the side opposite to the lesion. The impairment does not, however, amount to absolute blindness. Schrader's hawk, after removal of the pallium, reacted to movements of the mice with which it was caged. But the reactions were impaired: they lacked the sustained purpose of the normal reactions. The bird saw the mice; that was certain, for their movements across its field of vision made it turn its gaze towards them. But on their ceasing to move, the reaction on the part of the bird lapsed. Neither did their continuing to move excite the attack upon them which would have been the natural reaction on the part of the bird of prey towards its food. The bird apparently did not recognize them as prey, but saw them merely as moving objects. It saw them per- haps as things to which mental association gave no significance. Similarly, a dog after ablation of the occipital lobes of the cortex is able to see, for it avoids obstacles in its path; but if food is offered to it or the whip held up to it, it does not turn towards the food or away from the whip. It sees these things as if it saw them for the first time, but without curiosity, and as if it had no experience of their meaning. It gives no hint that it any longer understands the meaning of even familiar objects so long as these are presented to it through the sense of vision. Destruction of the visual cortex of one hemisphere alone produces in the dog impairment of vision, not as in the bird practically exclusively in the opposite eye, but in one lateral half of each eye, and that half the half opposite the hemisphere injured. Thus when the cortex destroyed is of the right cerebral hemisphere, the resultam visual defect is in the left half of the field of vision of both eyes. And this is so in man also.

In man disturbances of sensation can be better studied because it is possible to obtain from him his description of his condition. The relation of the cortex cerebri to human vision can be summarized briefly as follows. The visual cortex is dis- tinguishable in higher mammals by a thin white stripe, the stripe of Gennari, seen in its grey matter when that is sectioned. This stripe results from a layer of nerve-fibres, many of which aie

axones from the neurones of the lateral geniculate body and the pulvinar, the grey masses directly connected with the optic nerve-fibres. In the dog, and in such monkeys as the Macaque, the region of cortex containing this stripe traceable to optic fibres forms practically the whole occipital lobe. But in the man- like apes and in man this kind of cortex is confined to one region of the occipital lobe, namely, that of the calcarine fissure and the cuneus behind that. This region of cortex thus delimited in man is one of Flechsig's areas of earlier myelinization. It is also one of his areas possessing projection fibres; and this last fact agrees with the yielding by this area, when under electrical stimulation, of movements indicating that impulses have been discharged from it into the motor neurones of the muscles of the eyes and neck. Evidence from cases of disease show that destruction of the cortex of the upper lip of the calcarine fissure, say in the right half of the brain, causes in man impairment in the upper right-hand quadrant of both retinae: destruction of the lower lip of the fissure causes impairment in the lower right- hand quadrants. Destruction of the calcarine region of one hemisphere produces therefore "crossed hemianopia," that is, loss of the opposite half of the field of vision. But in this hemianopia the region of central vision is always spared. That is, the piece of visual field which corresponds with the yellow spot of the retina is not affected in either eye, unless the calcarine regions of both hemispheres are destroyed. This central point of vision is connected therefore not with one side of the brain only but with both.

The impairment of sight is more severe in men than in lower animals. Where the destruction of the visuo-sensory cortex in one calcarine region is complete, a candle-flame offered in the hemianopic field cannot even be perceived. It may hardly excite a reflex contraction of the pupil. In such cases the visual defect amounts to blindness. But this is a greater defect than is found in the dog even after entire removal of both occipital lobes. The dog still avoids obstacles as it walks. Its defect is rather, as said above, a complete loss of interest in the visual images of things. But a dog or monkey after loss of the visual cortex hesitates more and avoids obstacles less well in a familiar place than it does when entirely blind from loss of the peripheral organ of vision. In man extensive destruction of the visual cortex has as one of its symptoms loss of memory of localities, thus, of the paths of a garden, of the position of furniture, and of accustomed objects in the patient's own room. This loss of memory of position does not extend to spatial relations ordinarily appreciated by touch, such as parts of the patient's own person or clothing. There is nothing like this in the symptoms following blindness by loss of the eye itself. Those who lose their sight by

disease of the retina retain good memorial pictures of positions and directions appreciated primarily by vision.

Cases of disease are on record in which loss of visual memory has occurred without hemianopia. Visual hallucinations referred to the hemianopic side have been observed. This suggests that the function of visual memory in regard to certain kinds of percepts must belong to localities of cortex different from those pertaining to other visual percepts. The area of cortex characterized by the stripe of Gennari occupies in man, as mentioned, the calcarine and cuneate region. It is surrounded by a cortical field which, though intimately connected with it by manifold conducting fibres, &c, is yet on various grounds dis- tinct from it. This field of cortex surrounding the visuo-sensory of the calcarine-cuneate region is a far newer part of the neo- pallium than the region it surrounds. Both in the individual (Flechsig) and in the phylum (Bolton, Campbell, Mott) itsdevelop- ment occurs far later than that of the visuo-sensory which it surrounds. Flechsig finds that it has no " projection " fibres, that is, that it receives none of the optic radiations from the lower visual centres and gives no centrifugal fibres in the reverse direction. This field encompassing the visuo-sensory region differs from the latter in its microscopic structure by absence of the lower layer of stellate cells and by the presence in it of a third or deep layer of pyramidal cells (Mott). Its fibres are on the average smaller than are those of the visuo-sensory

(W. A. Campbell) . This zonal field is small in the lowei apes, and hardly discoverable in the dog. In the anthropoid apes it is much larger. In man it is relatively much larger still. The , impairment of visual memory and visual understanding in regard to direction and locality is said to be observed in man only when the injury of the cortex includes not only the calcarine-cuneate region but a wide area of the occipital lobe. From this it is argued that the zonal field is concerned with memories and recognitions of a kind based on visual perceptions. It has therefore been termed the visuo-psychic area. It is one of Flechsig's " association-areas " of the cortex.

Adjoining the antero-lateral border of the just-described visuo-psychic area lies another region separate from it and yet related to it. This area is even later in its course of develop- ment than is the visuo-psychic. It is one of Flechsig's " terminal fields," and its fibres are among the last to ripen in the whole cortex. This terminal field is large in man. It runs forward in the parietal lobe above and in the temporal lobe below. Its wide extent explains, in the opinion of Mott, the displacement of the visuo-sensory field from the outer aspect of the hemisphere in the lower monkeys to the median aspect in man. To this terminal field all the more interest attaches because it includes the angular gyrus, which authorities hold to be

concerned with the visual memory of words. Study of diseased conditions of speech has shown that the power to understand written words may be lost or severely impaired although the words may be perfectly distinct to the sight and although the power to under- stand heard words remains good. This condition is asserted by many physicians to be referable to destruction of part of the angular gyrus. Close beneath the cortex of the angular gyrus runs a large tract of long fibres which pass from the visual cortex (see above) to the auditory cortex (see below) in the superior temporal gyrus and to the lower part of the frontal lobe. This lower part of the frontal lobe is believed — and has long been believed — to be concerned intimately with the pro- duction of the movements of speech. A difficulty besetting the investigation of the function of the angular gyrus is the fact that lesion of the cortex there is likely to implicate the underlying tract of fibres in its damage. It cannot be considered to have been as yet clearly ascertained whether the condition of want of recognition of seen words — " word-blindness " — is due to cortical injury apart from subcortical, to the angular gyrus itself apart from the underlying tract. Word-blindness seems, in the right-handed, to resemble the aphasia believed to be connected with the lower part of the frontal lobe, in that it ensues upon lesions of the left hemisphere, not of the right. In left-handed persons, on the contrary, it seems to attach to the right hemisphere.

Auditory Region of the Cortex. — Besides the two great organs of distance-receptors, namely, the nose and eye, whose cerebral apparatus for sensation has just been mentioned, those of a third great distance-receptor have to be considered. The agents of stimulation of the two former are respectively chemical (olfactory) and radiant (visual) ; the mode of stimulation of the third is mechanical, and the sensations obtained by it are termed auditory. Their cerebral localization is very imperfectly ascer- tained. Electric stimuli applied to a part of the uppermost temporal gyrus excites movements of the ears and eyes in the dog. Destruction of the same region when executed on both hemispheres is argued by several observers to impair the sense of hearing. To this region of cortex fibres have been traced from the lower centres connected with the nerve-fibres coming from the cochlea of the ear. From each cochlear nerve a path has been traced which passes to the insulae and the above-mentioned temporal region of cortex of both the cerebral hemispheres. The insula is a deeper-seated area of cortex adjoining the upper- most temporal convolution. To it Flechsig's chronological studies also impute a connexion with the nerves of the ear. Early myelinization of fibres, presence of ascending and descend- ing "projection" tracts to and from lower centres outside the cortex, calibre of fibres, microscopic characters of its cortical cells, all those kinds of indirect items of evidence that obtain

for the visual cortex likewise mark out this insular-temporal area as connected fairly directly with a special sense-organ, as in fact a sensory field of the cortex; and the suspicion is that it is auditory. Clinical observation supports the view in a striking way, but one requiring, in the opinion of some, further confirmation. It is widely believed that destruction of the upper and middle part of the uppermost temporal convolution produces " word-deafness," that is, an inability to recognize familiar words when heard, although the words are recognized when seen.

More precise information regarding this auditory region of the cortex has recently been obtained by the experiments of Kalischer. These show that after removal of this region from both sides of the brain in the dog the animal shows great defect in answering to the call of its master. Whereas prior to the operation the animal will prick its ears and attend at once to the lightest call, it requires after the removal of the auditory regions great loudness and insistence of calling to make it attend and react as it did. This is the more striking in view of other experimental results obtained. Kalischer trained a number of his dogs not to take meat offered them except at the sound of a particular note given by an organ pipe or a harmonium. The dogs rapidly learned not to take the food on the sounding of notes of other pitch than the one taught them as the per- missive signal. This reaction on the part of the animal was not impaired by the removal of the so-called auditory regions of the cortex. Kalischer suggests that this reaction taught by training is not destroyed by the operation which so greatly impairs the common reaction to the master's call, because the former is a simpler process more allied to reflex action. In it the attention of the dog is already fastened upon the object, namely the food, and the stimulus given by the note excites a reaction which simply allows the act of seizing the food to take place, or on the other hand stops it. In the case of answering the call of the master the stimulus has to excite attention, to produce perception of the locality whence it comes, and to invoke a complicated series of movements of response. He finds that destruction of the posterior colliculi of the mid-brain, which have long been known to be in some way connected with hearing, likewise destroys the response to the call of the master, but did not destroy the trick taught to his dogs of taking meat offered at the sound of a note of one particular pitch but not at notes of other pitch given by the same instrument.

Other Senses and Localization in the Cortex Cerebri. — Turning now to the connexion between the function of the cortex and the senses other than those of the great distance-receptors just dealt with, even less is known.

Disturbance and impairment of skin sensations are observable both in experiments on the cere- brum of animals and in cases of cerebral disease in man. But the localization in the cortex of regions specially or mainly concerned with cutaneous sensation has not been made sufficiently clear to warrant statement here. Still less is there satisfactory knowledge regarding the existence of cortical areas concerned with sensa- tions originated in the alimentary canal. The least equivocal of such evidence regards the sense of taste. There is some slight evidence of a connexion between this sense and a region of the hippocampal gyrus near to but behind that related to smell.

As to the sensations excited by the numerous receptors which lie not in any of the surface membranes of the body but embedded' in the masses of the organs and between them, the proprio- ceptors, buried in muscles, tendons and joints, there is little doubt that these sensations may be disturbed or impaired by injury of the cortex cerebri. They may probably also be excited by cortical stimulation. But evidence of localization of their seat in, and their details of connexion with, the cortex, is at present uncertain. Many authorities consider it probable that sensations of touch and the sensations initiated by the proprio- ceptors of muscles and joints (the organs of the so-called muscular sense) are specially related to the post-central gyrus and perhaps to the pre-central gyrus also. The clearest items on this point are perhaps the following. Besides the regions instanced above, infthe limbic (olfactory),

occipital (visual), and temporal (auditory) lobes, as exhibiting precocity of development, there is a region showing similar precocity in the fronto-parietal portion of the hemisphere. This is the region which in the Primates includes the large central fissure (sometimes called the fissure of Rolando). To it fibres are traced which seem to continue a path of conduction that began with afferent tracts belonging to the spinal cord, and tracts which there is reason to think conduct impulses from the receptor- organs of skin and muscles. The part of the cortex immediately behind the central fissure seems to be the main cortical goal for these upward-conducting paths. That post-central strip of cortex would in this view bear to these paths a relation similar to that which the occipital and temporal regions bear to afferent tracts from the retina and the cochlea. There are observations which associate impaired tactual sense and impaired perception of posture and movement of a limb with injury of the central region of the cortex. But there are a number also which show that the motor defect which is a well-ascertained result of injury of the pre-central gyrus is sometimes unaccompanied by any obvious defect either of touch or of muscular sense. It seems then that the motor centres of this region are closely connected with the centres for cutaneous and muscular sense, yet are not so closely interwoven with them that mechanical damage inflicted on the one of necessity heavily damages the other as well. There is ' evidence that the

sensory cortex in this region lies posterior to that which has been conveniently termed the " motor." These latter in the monkey and the man-like apes and man lie in front of the central fissure: the sensory lie probably behind it. A. W. Campbell has found changes in the cortex of the post-central convolution ensuing in the essentially sensory disease, tabes dorsalis, a disease in which degeneration of sensory nerve-fibres of the muscular sense and of the skin senses is prominent. He considers that in man and the man-like apes the part of the post- central gyrus which lies next to and enters into the central fissure is concerned with simpler sensual recognitions, while the adjoin- ing part of that convolution farther back is a " psychic region " concerned with more complex psychosis connected with the senses of skin and muscle. His subdivision of the post-central gyrus is based on histological differences which he discovers between its anterior and its posterior parts and on the above- described analogous differentiation of a " sensory " from a " psychic " part in the visual region of cortex.

It will be noted that although certain regions of the cortex are found connected closely with certain of the main sense organs, there are important receptive organs which do not appear to have any special region of cortex assigned to their sensual products. Thus, there is the " vestibular labyrinth " of the ear. This great receptive organ, so closely connected in function with the movements and adjustment of the postures of the head and eyes, and indeed of the whole body, is prominent in the co- ordination necessary for the equilibrium of the body, an essential part of the fundamental acts of progression, standing, &c. Yet neither structural nor functional connexion with any special region of the cortex has been traced as yet for the labyrinthine receptors. Perceptions of the position of the head and of the body are of course part of our habitual and everyday experience. It may perhaps be that these perceptions are almost entirely obtained through sense organs which are not labyrinthine, but visual, muscular, tactual, and so on. The labyrinth may, though it controls and adjusts the muscular activities which maintain the balance of the body, operate reflexly without in its operation exciting of itself sensations. The results of the unconscious reflexes it initiated and guided would be perceptible through other organs of sense. But against this purely unconscious functioning of the labyrinth and its nervous apparatus stands the fact that galvanic stimulation of the labyrinth is accompanied by well-known distinctive sensations — including giddiness, &c. More- over, the prominent factor in sea-sickness, a disorder richly suffused with sensations, is probably the labyrinth. Yet there is marked absence of evidence of any special and direct connexion between the cortex cerebri and the labyrinth organs.

Also there is curiously little evidence of connexion of the cortex

Fingers <$ thumb..

with the nervous paths of conduction concerned with pain. As far as the present writer can find from reference to books and from the clinical experience of others, " pain " is unknown as an aura in cortical epilepsy, or at most is of equivocal occurrence.

The preceding brief exposition of some of the main features of the localization of function in the cortex cerebri, gradually- deciphered by patient inquiry, shows that the scheme of partition of function so far perceptible does not follow the quaint lines of analysis of the phrenologists with their supposed mental entities, so-called " faculties." On the contrary it is based, as some of those who early favoured a differential arrangement of function in the cerebrum had surmised, on the separateness of the incoming channels from peripheral organs of sense. These organs fall into groups separate one from another not only by reason of their spatial differentiation at the surface and in the thickness of the body, but also because each group generates sensations which introspection tells us are of a species unbridgeably separate from those generated by the other groups. Between sensations of hearing and sensations of sight there is a dissimilarity across which no intermediate series of sensual phenomena extend. The two species of sensations are wholly disparate. Simi- larly there is a total and impassable gap between sensations of touch and sensations of sight and sound. In other words the sensations fall into groups which are wholly disparate and are hence termed species. But within each species there exist multifold varieties of the specific sensation, e.g. sensations of red, of yellow, &c. We should expect, therefore, that the conducting paths from the receptive organs which in their function as sense-organs yield wholly disparate sensations would in so far as subserving sensation diverge and pass to separate neural mechanisms. That these sense-organs should in fact be found to possess in the cortex of the cerebrum separate fields for their sensual nervous apparatus is, therefore, in harmony with what would be the a priori supposition.

But, as emphasized at the beginning of this article, the receptive organs belonging to the surfaces and the depths of the body and forming the starting- points for the whole system of the afferent nerves, have two functions more or less separate. One of these functions is to excite sensations and the other is to excite movements, by reflex action, especially

in glands and muscles. In this latter function, namely the reflexifacient, all that the receptive organs effect is effected by means of the efferent nerves. They all have to use the efferent, especially the motor, nerves of the body. So rich is the connexion of the receptive organs with the efferent nerves that it is not improbable that, through the central nervous organ, each receptive organ is connected with every motor nerve of the whole nervous system, — the facts of strychnine poisoning show that if this is not literally true it is at least approximately so. Hence one of the goals to which each afferent fibre from a receptive organ leads is a number of motor nerves. Their conducting paths must, therefore, con- verge in passing to the starting-points of the motor nerves; because these latter are instruments common to the use of a number of different receptive organs in so far as they excite reflex actions. On the other hand those of their conducting paths which are concerned in the genesis of sensation, instead of converging, diverge, at least as far as the cortex cerebri, or if not divergent, remain separate. These considerations would make it appear likely that the conducting path from each receptive organ divides in the central nervous system into two main lines, one of which goes off to its own particular region of the cortex cerebri whither run conductors only of similar sensual species to itself, while the other main line passes with many others to a great motor station where, as at a telephone exchange, co- ordinate use of the outgoing lines is assured to them all. Now there is in fact a portion of the cortex in mammals the functions of which are so pre-eminently motor, as judged by our present methods, that it is commonly designated the motor cortex (see

fig. 24). This region of the cortex occupies in the Primates, including Man, the pre-central gyrus. Among the items of evi- dence which reveal its motor capabilities are the following.

The Precentral or Motor Region of the Cortex. — The application to it of electric currents excites movements in the skeletal muscles. The movements occur in the half of the body of the side crossed from that of the hemisphere excited. The " motor representa- tion," as it is termed, is in the cortex better described as a representation of definite actions than of particular muscles. The actions " represented " in the top part of the gyrus, namely next the great longitudinal fissure, move the leg; those in the lowest part of the gyrus belong to the tongue and mouth. The topical distribution along the length of the gyrus may be de- scribed in a general way as following a sequence resembling that of the motor representation in the spinal cord, the top of the gyrus being taken as corresponding with the caudal end of the spinal cord. The sequence as the gyrus is followed downwards runs: perineum, foot, knee, hip, abdomen, chest, shoulder, elbow, wrist, hand, eyelids and ear, nose, mouth and tongue. The nature of the movement is very fairly constant for separate Anus$v&gin&.

Ankˆ.. , < : \ˆˆˆˆ_ Abdomen Kne$ "'—ˆiˆˆ /ˆSZˆSˆˆ .Chest,

Opening ofja,w.

VocaJ, cords.

Sulcus centmUSh

Mastication

tu/*

Fig. 24.-

-Diagram of the Topography of the Main Groups of Foci in the Motor Field of Chimpanzee.

points of this motor cortex as observed both in the same and in similar experiments. Thus flexion of the arm will be excitable from one set of points, and extension of the arm from another set of points; opening of the jaw from one set and closure from another, and so on. These various movements if excited strongly tend to have characters like those of the movements seen in an epileptic convulsion. Strong stimulation excites in fact a con- vulsion like that of epilepsy, beginning with the movement usual for the point stimulated and spreading so as to assume the proportions of a convulsion affecting the entire skeletal mus- culature of one half or even of the whole body. The resemblance to an epileptic seizure is the closer because the movement before it subsides becomes clonic (rhythmic) as in epilepsy. The determination of the exact spots of cortex in which are repre- sented the various movements of the body has served a useful practical purpose in indicating the particular places in the cortex which are the seat of disease. These the physician can localize more exactly by reason of this knowledge. Hence the surgeon, if the nature of the disease is such as can be dealt with by surgical means, can without unnecessarily damaging the skull and brain, proceed directly to the point which is the seat of the mischief. The motor representation of certain parts of the body is much more liberal than is that of others. There is little correspondence between the mere mass of musculature involved and the area of the cortex devoted to its representation. Variety of movement

rather than force or energy of movement seems to demand extent of cortex. The cortical area for the thumb is larger than those for the whole abdomen and chest combined. The cortical area for the tongue is larger than that for the neck. Different movements of one and the same part are very unequally repre- sented in the cortex. Thus, flexion of the leg is more extensively represented than is extension, opening of the jaw has a much larger cortical area than has closure of the jaws. It is interesting that certain agents, for instance strychnine, and the poison of the bacilli which cause the disease known as tetanus or lock-jaw, upset this normal topography, and replace in the cortex flexion of the limb by extension of the limb, and opening of the jaw by closure of the jaw. There is, however, no evidence that they do this by changing in any way the cortical mechanisms themselves. It is more likely that their action is confined to the lower centres, bulbar and spinal, upon which the discharge excited from the cortex plays. The change thus induced in the movement ex- cited by the cortex does, however, show that the point of cortex which causes for instance opening of the mouth is connected with the motor nerves to the closing muscles as well as with those of the opening muscles. This is an item of evidence that the " centres " of the cortex are connected with the motor nerves of antagonistic muscles in such a way that when the " centre " excites one set of the muscles to contract, it simultaneously under normal circumstances causes inhibition of the motor neurones of the opposed set of muscles (reciprocal innervation). In the great majority of movements excited from the motor cortex of a single hemisphere of the cerebrum, the movement evoked is confined to one side of the body, namely to that opposite to the hemisphere stimulated. There are, however, important exceptions to this. Thus, adduction of both vocal cords is excited from the cortex of either hemisphere. The movement of closure of the eyelids is usually bilateral, unless the stimulation be very weak; then the movement is of the eyelids of the opposite side only. The same holds true for the movements of the jaw. It, therefore, seems clear that with many movements which are usually bilaterally performed in ordinary life, such as opening of the jaw, blinking, &c, the symmetrical areas of the motor regions of both hemispheres are simultaneously in action.

In regard to all these movements elicitable by artificial stimuli from the motor cortex it is obvious that were there clearer evi- dence that the pallial region from which they are elicitable is fairly directly connected with corticopetal paths subserving cutaneous sensation or " muscular sense," the movements might be regarded as falling into the category of higher reflexes con- nected with the organs of touch, muscular sense, &c, just as the movements of the eyeball excitable from the visual cortex may be regarded as higher reflexes connected with vision. The evi- dence of the connexion of the reactions of the motor cortex with cutaneous and muscular senses

appears, however, scarcely sufficient to countenance at present this otherwise plausible view, which has on general grounds much to commend it.

It is remarkable that movements of the eyeball itself, i.e. apart from movement of the lids, are not in the category of movements elicitable from the precentral gyrus, the " motor " cortex. They are found represented in a region farther forward, namely in front of the precentral gyrus altogether, and occupying a scattered set of points in the direction frontal from the areas for movements of arm and face. This frontal area yields on excitation conjugate movements of both eyeballs extremely like if not exactly similar to those yielded by excitation of the occipital (visual) region of the cortex. It is supposed by some that this frontal area yielding eye-movements has its function in this respect based upon afferent conductors from other parts of the eyeball than the retina, for instance upon kinaesthetic (Bastian) impressions or upon sensual impressions derived from the cornea and the coats of the eyeball including the ciliary and iris muscles. The ocular muscles are certainly a source of centripetal impulses, but their connexion with the cortex is not clear as to either their nature or their seat. The question seems for the present to allow no clearer answer. It is certain, however, that the frontal area of eye movements has corticofugal paths

descending from it to the lower motor centres of the eyeballs quite independent of those descending from the occipital (visual) area of eye-movements. Further, it seems clear that in many animals there is another cortical region, a third region, the region which we saw above might be considered auditory, where move- ments of the eyeball similar to those elicitable in the occipital and frontal cortex can be provoked. A. Tschermak is inclined to give the eyeball movements of the frontal region the significance of reflex movements which carry the visual field in various directions in answer to demands made by sensory data derived from touch, &c, as for instance from the hand. The movements of the eyeballs elicitable from the occipital region of the cortex he regards as probably concerned with directing the gaze toward something seen, for instance, in the peripheral field of vision. The occipital movement would, therefore, be excited through the retina, and would result in bringing the yellow spot region of the retinae of both eyes to bear upon the object. This view has much to justify it. The movements of the eyeballs excited from the cortex of the auditory region would in a similar way be explicable as bringing the gaze to bear upon a direction in which a sound had been located, auditory initiation replacing the visual and tactual of the occipital and the frontal regions respectively.

Turning from these still speculative matters to others less suggestive but of actual ascertainment, we find that the motor nature of the precentral

cortex as ascertained by electric stimuli is further certified by the occurrence of disturbance and impair- ment of motor power and adjustment following destruction of that region of the cortex. The movements which such a part as a limb executes are of course manifold in purpose. The hind limb of a dog is used for standing, for stepping, for scratching, for squatting, and, where a dog, for instance, has been trained to stand or walk on its hind legs alone, for skilled acts requiring a special training for their acquisition. It is found that when the motor area of the brain has been destroyed, the limb is at first paralysed for all these movements, but after a time the limb recovers the ability to execute some of them, though not all. The scratching movement suffers little, and rapid improvement after cerebral injury soon effaces the impairment, at first some- what pronounced, in the use of the limb for walking, running, &c, and ordinary movements of progression. Even when both hemispheres have been destroyed the dog can still stand and walk and run. Destruction of the motor region of the cortex renders the fore limbs of the dog unable to execute such skilled movements as the steadying of a bone for gnawing or the trained act of offering the paw in answer to the command of the master. Skilled acts of the limb, apart from conjoined movements in which it, together with all the other limbs, takes part, assume of course a larger share of the office of the limb in the Primates than in the dog; and this is especially true for the fore limb. It is when the fore-foot becomes a hand that opportunity is given for its more skilled individual use and for its training in move- ments as a tool, or for the handling of tools and weapons. It is these movements which suffer most heavily and for the longest period after injury of the motor region of the cortex. Hence the disablement ensuing upon injury to the cortex would be expected to be most apparent in the Primates; and it is so, and most of all in Man. Further, in Man there ensues a condition called " contracture," which is not so apparent or frequent a result in other animals, — indeed, does not occur at all in other animals except the monkey. In contracture the muscles of the paretic limb are not flaccid, as they are usually in paralysis, but they are tense and the limb is more or less rigidly fixed by them in a certain position, usually one of flexion at elbow and wrist. This condition does not occur at first, but gradually supervenes in the course of a number of weeks. In Man the destruction of the motor area of the cortex cripples the limb even for the part it should play in the combined limb movements of walking, &c, and cripples it to an extent markedly contrasting with the slight disturbances seen in the lower mammals, e.g. the dog.

As regards the recovery of motor power after lesions of the

motor cortex, two processes seem at work which are termed respectively restitution and compensation. By the former is understood the recovery obtained when a part of a " centre " is destroyed, and the rest of the centre, although thrown out of function at first, recovers and supplements the deficiency later. An example of restitution would be the recovery from temporary hemianopia caused by a small injury in one occipital lobe. By compensation is understood the improvement of an impaired nervous function, traceable to other centres different from those destroyed supplying means to compass the reaction originally dependent on the centres subsequently destroyed. Instances of such compensation are the recovery of taxis for equilibrium subsequent to destruction of the labyrinth of the ear, where the recovery is traceable to assistance obtained through the eye. It will be noted that these instances of recovery by restitution and by compensation respectively are taken from cases of injury inflicted on receptive rather than on motor centres. It is doubt- ful how far they really apply to the undoubted improvement that does within certain limits progress and succeed in partially effacing the paresis immediately consequent on lesions of the motor area. It has to be remembered that in all cases of trau- matic injury to the nervous system, especially where the trauma implicates the central nervous organ, the first effects and impair- ment of function resulting are due to a mixed cause, namely on the one hand the mechanical rupture of conducting paths actually broken by solution of their continuity, and on the other hand the temporary interruption of conducting paths by " shock." Shock effects are not permanent: they pass off. They are supposed to be due to a change at the synapses connecting neurone with neurone in the grey matter. They amount in effect to a long-lasting and gradually subsiding inhibition.

For diseases of the brain see Neuropathology, Insanity, Skull (Surgery), &c. (C. S. S.)

BRAINERD, DAVID (1718-1747), American missionary among the Indians, was born at Haddam, Connecticut, on the 20th of April 1 7 18. He was orphaned at fourteen, and studied for nearly three years (1 739-1 742) at Yale. He then prepared for the ministry, being licensed to preach in 1742, and early in 1743 decided to devote himself to missionary work among the Indians. Supported by the Scottish " Society for Promoting Christian Knowledge," he worked first at Kaunaumeek, an Indian settlement about 20 m. from Stockbridge, Massachusetts, and subsequently, until his death, among the Delaware Indians in Pennsylvania (near Easton) and New Jersey (near Cranbury). His heroic and self-denying labours, both for the spiritual and for the temporal welfare of the Indians, wore out a naturally feeble constitution, and on the 19th of October 1747 he died at the house of his friend, Jonathan Edwards, in Northampton, Massachusetts.

His Journal was published in two parts in 1746 by the Scottish Society for Promoting Christian Knowledge; and in 1749, at Boston, Jonathan Edwards published An Account of the Life of the Late Rev. David Brainerd, chiefly taken from his own Diary and other Private Writings, which has become a missionary classic. A new edition, with the Journal and Brainerd's letters embodied, was published by Sereno E. Dwight at New Haven in 1822; and in 1884 was published what is substantially another edition, The Memoirs of David Brainerd, edited by James M. Sherwood.

BRAINERD, a city and the county-seat of Crow Wing county, Minnesota, U.S.A., on the E. bank of the Mississippi river, about 127 m. N.W. of Minneapolis. Pop. (1890) 5703; (1900) 7524, of whom 2193 were foreign-born; (1905) 8133; (1910) 8526. It is served by the Minnesota & International and the Northern Pacific railways. The latter maintains here large car and repair shops, and a sanatorium for its employees. There are also the Sisters of St Joseph hospital, a county court house, a public library andaY.M.C.A. building. A dam across the Mississippi provides water power (about 60,000 H.P.) which is utilized extensively for manufacturing purposes. Lumbering is an important industry, and there are saw mills and planing mills, and an extensive creosote plant for treating railway ties and timber. There are also flour mills, paper and pulp mills, cigar factories, a brewery, a large foundry and a grain elevator. In

1 906. large quantities of iron ore were discovered in the vicinity, the new range, the Cuyuna, running through the city from north-east to south-west. Brainerd, named in honour of David Brainerd, was settled in 1870, and chartered as a city in 1883.

BRAINTREE, a market town in the Maldon parliamentary division of Essex, England; 45 m. N.E. of London by a branch line from Witham of the Great Eastern railway. Pop. of urban district, 5330. The parish church of St Michael is a fine edifice of Early English work with later additions. A corn exchange, mechanics' institute and public hall may also be mentioned. The bishops of London had formerly a palace in the town, but there are no remains of the building. The manu- factures of silk and crape have superseded that of woollen cloth, which was introduced by the Flemings who fled to England to escape the persecution of the duke of Alva. Matting and brushes are also made. On the north lies the large village of Booking, with the Perpendicular parish church of St Mary, similar industries, and a population of 3347.

BRAINTREE, a township of Norfolk county, Massachusetts, U.S.A., on the Monatiquot river about 10 m. S. of Boston. Pop. (1890)4848; (1900) 5081, including 1 2 50 foreign-born; (1905, state census) 6879; (1910) 8066. The New York, New Haven & Hart- ford railway crosses the town

and has stations at its villages of Braintree, South Braintree and East Braintree, which are also served by suburban electric railways. In South Braintree are the Thayer Academy (co-educational; opened 1877) and the Thayer public library, both founded by and named in honour of General Sylvanus Thayer (1785-1872), a well-known military engineer born in Braintree, who was superintendent of the United States Military Academy in 181 7-1833 and has been called the " father of West Point." There are large shoe factories and other manufactories. Bog iron was early found in Braintree, and iron-works, among the first in America, were established here in 1644. Braintree was first incorporated in 1640 from land belonging to Boston and called Mount Wollaston, and was named from the town in England. At Merry Mount, in that part of Braintree which is now Quincy, a settlement was established by Thomas Morton in 1625, but the gay life of the settlers and their selling rum and firearms to the Indians greatly offended the Pilgrims of Plymouth, who in 1627 arrested Morton; soon afterward Governor John Endecott of Massachusetts Bay visited Merry Mount, rebuked the inhabitants and cut down their Maypole. Later the place was abandoned, and in 1634 a Puritan settlement was made here. In 1708 the town was divided into the North Precinct and the South Precinct, and it was in the former, now Quincy, that John Adams, John Hancock and John Quincy Adams were born. Quincy was separated from Braintree in 1792 (there were further additions to Quincy from Braintree in 1856), and Randolph in 1793.

See D. M. Wilson, Quincy, Old Braintree and Merry Mount (Boston, 1906); C. F. Adams, Jr., Three Episodes of Massachusetts History (Boston, 1892 and 1896); W. S. Pattee, History of Old Braintree and Quincy (Quincy, 1878).

BRAKE, a town of Germany, in the grand duchy of Oldenburg, on the left bank of the Weser, about halfway between Bremen and the mouth of the river. Pop. 5000. It was for centuries the port of Bremen; and though, since the founding of Bremer- haven, it no longer possesses a monopoly of the river traffic as before, it still continues to flourish. Large docks have been constructed, and the place has a considerable import trade in English coal. Shipbuilding and weaving are carried on to some extent.

Brake in Oldenburg must be distinguished from the village of the same name in the principality of Lippe, known as Brake bei Limgo, which gave its name to the cadet line of the counts of Lippe-Brake (1621-1709).

BRAKE. (1) A term for rough-tangled undergrowth, con- nected, according to the New English Dictionary, with " break," to separate. The " brake-fern " (Pteris aquilina) is the common " bracken," and is a shortened form of that northern Eng. word, derived from a Scand. word for " fern " (cf.

Swed. braken), though often confused with " brake," undergrowth- M A term

applied to many implements and mechanical and other appli- ances, often spelled " break." Here there are probably several words, difficult to separate in origin, connected either with "break," to separate, and its derived meanings, or with the Fr. braquer (appearing in such expressions as braquer un canon, to turn or point a gun), from O. Fr. brae, modern bras, an arm, Lat. bracchium. The word is thus used of a toothed instrument for separating the fibre of flax and hemp; of the " break-rolls " employed in flour manufacture; of a heavy wheeled vehicle used for " breaking in " horses, and hence of a large carriage of the wagonette type ; of an arm or lever, and so of the winch of a crossbow and of a pump handle, cf. " brake-pump "; of a curb or bridle for a horse; and of a mechanical appliance for checking the speed of moving vehicles, &c. It is noteworthy that the two last meanings are also possessed by the Fr. jrein and the Ger. Bremse.

Brakes, in engineering, are instruments by means of which mechanical energy may be expended in overcoming friction. They are used for two main classes of purpose: (i) to limit or decrease the velocity of a moving body, or to bring it completely to rest; and (2) to measure directly the amount of frictional resistance between two bodies, or indirectly the amount of energy given out by a body or bodies in motion. Machines in which brakes are employed for purposes of the second class are com- monly known as dynamometers (q.v.). The other class is exem- plified in the brakes used on wheeled vehicles and on cranes, lifts, &c. Here a body, or system of bodies, originally at rest, has been set in motion and has received acceleration up to a certain velocity, the work which has been done in that acceleration being stored up as " actual energy " in the body itself. Before the body can be brought to rest it must part with this energy, expending it in overcoming some external resistance. If the energy be great in proportion to the usual resistance tending to stop the body, the motion will continue for a long time, or through a long distance, before the energy has been completely expended and the body brought to rest. But in certain cases considerations of safety or convenience require that this time or distance be greatly shortened, and this is done by artificially increasing the external resistance for the time being, by means of a brake.

A simple method of obtaining this increased resistance is by pressing a block or shoe of metal or wood against the rim of a moving wheel, or by

tightening a flexible strap or band on a rotating pulley or drum. In wheeled road vehicles, a wheel may be prevented from rotating by a chain passed through its spokes and attached to the body of the vehicle, when the resistance is increased by the substitution of a rubbing for a rolling action; or the same effect may be produced by fixing a slipper or skid under the wheel. Other forms of brake depend, not on the friction between two solid bodies, but on the frictional resistance of a fluid, as in " fan " and " pump " brakes. Thus the motion of revolving blades may be opposed by the resistance of the air or of a liquid in which they are made to work, or the motion of a plunger fitting tightly in a cylinder filled with a fluid may be checked by the fluid being prevented from escape except through a narrow orifice. The fly used to regulate the speed of the striking train in a clock is an example of a fan brake, while a pump brake is utilized for controlling the recoil of guns and in the hydraulic buffers sometimes fitted at terminal railway stations to stop trains that enter at excessive speed. On electric tramcars a braking effect is sometimes obtained by arranging the connexions of the motors so that they act as generators driven by the moving car. In this way a counter-torque is exerted on the axles. The current produced is expended by some means, as by being made to operate some frictional braking device, or to magnetize iron shoes carried on the car just over, but clear of, the running rails, to which they are then magnetically attracted (see Traction).

The simplest way of applying a brake is by muscular force, exerted through a hand or foot lever or through a screw, by which the brake block is pressed against the rim of the wheel or the band brake tightened on its drum. This method is sufficient in the case of most road vehicles, and is largely used on railway

vehicles. But the power thus available is limited, and becomes inadequate for heavy vehicles moving at high speeds. Moreover, on a train consisting of a number of vehicles, the hand brakes on each of which are independent of all others, either a brakesman must be carried on each, or a number of the brakes must be left unused, with consequent loss of stopping power; while even if there is a brakesman on every vehicle it is impossible to secure that all the brakes throughout the train are applied with the promptness that is necessary in case of emergency.

Considerations of this sort led to the development of power brakes for railway trains. Of these there are five main classes: —

(1) Mechanical brakes, worked by springs, friction wheels on the axle, chains wound on drums, or other mechanical devices, or by the force produced when, by reason of a sudden checking of the speed of the locomotive, the momentum Railway of the cars causes pressure on the

draw-bars or buffing brakes. devices. (2) Hydraulic brakes, worked by means of water forced through pipes into proper mechanism for transmitting its force to the brake-shoes. (3) Electric brakes. (4) Air and vacuum brakes, worked by compressed air or by air at atmospheric pressure operating on a vacuum. (5) Brakes worked by steam or water from the boiler of the engine, operating by means of a cylinder; the use of these is generally limited to the locomotive. Of this kind is the counter-pressure or water brake of L. le Chatelier. If the valve gear of a locomotive in motion be reversed and the steam regulator be left open, the cylinders act as compressors, pumping air from the exhaust pipe into the boiler against the steam pressure. A retarding effect is thus exercised, but at the cost of certain inconveniences due to the passage of hot air and cinders from the smoke box through the cylinders. To remedy these, le Chatelier arranged that a jet of hot water from the boiler should be delivered into the exhaust pipe, so that steam and not the hot flue gases should be pumped back.

Power brakes may be either continuous or independent — continuous if connected throughout the train and with the locomotive by pipes, wires, &c, as the compressed air, vacuum and electric brakes; independent if not so connected, as the buffer-brakes and hand-brakes. Continuous brakes may be divided into two other great classes — automatic and non- automatic. The former are so arranged that they are applied automatically on all the coaches of the train if any important part of the apparatus is broken, or the couplings between cars are ruptured; in an emergency they can be put on by the guard, or (in some cases) by a passenger. Non-automatic brakes can be applied only by the person (usually the engine-driver) to whom the management of them is given; they may become inoperative on all the coaches, and always on those which have become detached, if a coupling or other important and generally essential part is broken. Many mechanical and several hydraulic and electrical continuous brakes have been invented and tried; but experience has shown them so inadequate in practice that they have all practically disappeared, leaving the field to the air and the vacuum brakes. At first these were non-automatic, but in 1872 the automatic air-brake was invented by George Westing- house, and the automatic vacuum-brake was developed a few years later.

Those respects in which non-automatic brakes are inadequate will be understood from the following summary of the require- ments most important in a train-braking apparatus: (1) It must be capable of application to every wheel throughout the train. (2) It must be so prompt in action that the shortest possible time shall elapse between its first application and the moment when the full power can be exerted throughout the train. (3) It must be capable of being applied by the engine-driver or by any of the officials in charge of the train, either in concert or independently. (4) The motion of the train must be arrested in the shortest

possible distance. (5) The failure of a vital part must declare itself by causing the brake to be applied and to remain applied until the cause of failure is removed. (6) The breaking of the train in two or more parts must cause immediate ‘ automatic application of the brakes on all the coaches. (7)

BRAKE

4i5

When used in ordinary service stops it must be capable of gradual and uniform application (followed, if necessary, by a full emerg- ency application at any part of the service application) and of prompt release under all conditions of application. (8) It must be simple in operation and construction, not liable to derange- ment, and inexpensive in maintenance.

The Westinghouse non-automatic or ” straight ” air-brake, patented in 1869, consists in its simplest form of a direct-acting, steam-driven air-pump, carried on the locomotive, which 1 ht f° rces compressed air into a reservoir, usually placed air-brake. unc j er t jje foot-plate of the locomotive. From this reser- voir a pipe is led through the engine cab, where it is fitted with a three-way cock, to the rear of the locomotive tender, where it ter- minates in a flexible hose, on the end of which is a coupling. The coaches are furnished with a similar pipe, having hose and coupling at each end, which communicates with one end of a cylinder contain- ing a piston, to the rod of which the brake-rods and levers are connected. The application of the brakes is effected by the engine- driver turning the three-way cock, so that compressed air flows through the pipe and, acting against one side of the brake-cylinder piston, applies the brake-shoes to the wheels by the movement of this piston and the rods and levers connected to it. To release the brakes the three-way cock is turned to cut off communication between the main reservoir and the train-pipe, and to open a port permitting the escape of the compressed air in the train-pipe and brake-cylinders. This brake was soon found defective and inade- quate in many ways. An appreciable time was required for the air to flow through the pipes from the locomotive to the car-cylinders, and this time increased quickly with the length of the trains. Still

discharges air from the train-pipe, this equilibrium is destroyed, and the greater pressure in the auxiliary reservoir forces the triple-valve to a position which allows air from the auxiliary reser- voir to pass directly into the brake-cylinder. This air forces out the piston of the brake-cylinder and applies the brakes, connexion being made with the brake-rigging at R. The purpose of the small groove n which establishes communication between the two sides of the piston when the brakes are off, is to prevent their

unintended application through slight leakage from the train-pipe. To release the brakes, the driver, by moving the handle of his valve to the release position, admits air from the main reservoir to the train-pipe, the pressure in which thus becomes greater than that in the auxiliary reservoir; the piston and slide-valve of the triple- valve are thereby forced back to their normal position, the compressed air in the brake-cylinder is discharged, and the piston is brought back by the coiled spring, thus releasing the brakes. At the same time the auxiliary reservoir is recharged.

With this " ordinary " brake, since an appreciable time is required for the reduction of pressure to travel along the train-pipe from the engine, the brakes are applied sensibly sooner at the front than at the end of the train, and with long trains this

Fig. 1. — Westinghouse Air-Brake. Section through Triple- Valve and Brake-Cylinder.

more objectionable, however, was the fact that on detached coaches

the air-brakes could not be applied, the result being sometimes

serious collisions between the front and rear portions of the train.

In the Westinghouse " ordinary " automatic air-brake a main

air reservoir on the engine is kept charged with compressed air at

80 lb per sq. in. by means of the steam-pump, which may

; hˆt ˆe controlled by an automatic governor. On electric

air-brake. ra jl wa y S a pump, driven by an electric motor, is generally

employed; but occasionally, on trains which run short distances,

no pump is carried, the main reservoir being charged at the terminal

points with sufficient compressed air for the journey. Conveniently

E laced to the driver's hand is the driver's valve, by means of which e controls the flow of air from the main reservoir to the train-pipe, or from the train-pipe to the atmosphere. A reducing-valve is attached to the driver's valve, and in the normal or running position of the latter reduces the pressure of the air flowing from the main reservoir to the train-pipe by 10 or 15 lb per sq. in. From the engine a train-pipe runs the whole length of the train, being rendered continuous between each vehicle and between the engine and the rest of the train by flexible hose couplings. Each vehicle

is provided with a brake-cylinder H (fig. 1), containing a piston, the movement of which applies the brake blocks to the wheels, an " auxiliary air- reservoir " G, and an automatic " triple-valve " F. The auxiliary reservoir receives compressed air from the train-pipe and stores it for use in the brake-cylinder of its own vehicle, and both the auxiliary reservoir and the triple-valve are connected directly or indirectly with the train-pipe through the pipe E. The automatic action of the brake is due to the construction of the triple-valve, the principal parts of which are a piston and slide-valve, so arranged that the air in the auxiliary reservoir acts at all times on the side of the piston to which the slide-valve is attached, while the air in the train-pipe exerts its pressure on the opposite side. So long as the brakes are not in operation, the pressures in the train-pipe, triple-valve and auxiliary reservoir are all equal, and there is no compressed air in the brake-cylinder. But when, in order to apply the brake, the driver

in consequence all the brakes are applied almost simultaneously throughout the train. The same effect is produced should the train break in two, or a hose or any part of the train-pipe burst; but during ordinary or " service " stops the triple- valve acts exactly as in the ordinary brake, the quick-acting portion, that is, the vertical piston and valve seen in fig. 1, not coming into operation. When the handle Z is turned to the position X the quick-acting mechanism is rendered inoperative, and when it is at Y the brake on the vehicle concerned is wholly cut out of action.

A further improvement introduced in the Westinghouse brake in 1906 was designed to give quick action for service as well as emer- gency stops. In this the triple-valve is substantially the same as in the ordinary brake. The additional mechanism of the quick-acting portion is dispensed with, but instead, a small chamber, normally containing air at atmospheric pressure, is provided on each vehicle, and is so arranged that it is put into communication with the train- pipe by the first movement of the triple-valve. As soon, therefore, as the driver, by lowering the pressure in the train-pipe, causes the triple-valve in the foremost vehicle of the train to operate, a certain quantity of air rushes out of the train-pipe into the small chamber; a further local reduction in the pressure of the train-pipe in that vehicle is thereby effected, and this almost instantaneously actuates the triple-valve of the succeeding vehicle, and so on throughout the train. In this way, on a train 1800 ft. long, consisting of sixty 30-ft. vehicles, the brake-blocks may be applied, with equal force, on the last vehicle about 2§ seconds later than on the first.

Brake-blocks can be applied, without skidding the wheels, with greater pressure at high speeds than at low. Advantage is taken of this fact in the design of the Westinghouse " high-speed " brake, invented in 1894, which consists of &" attachments enabling the pressure in the train-pipe and sP ee

/ la,rm reservoirs to be increased at the will of the driver. The brake – increased pressure acting in the brake-cylinder increases in the same proportion the pressure of the brake-shoes against the wheels. Attached to the brake cylinder is a valve for automatically reducing

the pressure therein proportionately to the reduction in speed, until the maximum pressure under which the brakes are operated in making ordinary stops is reached, when this valve closes and the maximum safe pressure for operating the brakes at ordinary speeds is retained until a stop is made.

In the automatic vacuum-brake, the exhausting apparatus gener- ally consists of a combined large and small ejector (a form of jet- pump) worked by steam and under the control of the Automatic g r ; ver) though sometimes a mechanical air-pump, driven fcraj”””” from the crosshead of the locomotive, is substituted for ‘ the small ejector. These ejectors, of which the small

one is at work continuously while the large one is only employed when it is necessary to create vacuum quickly, e.g. to take off the brakes after a short stop, produce in the train-pipe a vacuum equal to about 20 in. of mercury, or in other words reduce the pressure within it to about one-third of an atmosphere. _ The train-pipe extends the whole length of the train and communicates under each vehicle with a cylinder, to the piston of which, by suitable rods and levers, the brake-shoes are connected. The communication between the train-pipe and the cylinder is controlled by a ball-valve, one form of which is shown in fig. 2. The release-valve is for the purpose of

Steam

unmoved; but with a sudden one the vacuum below the valvft is destroyed more quickly, and with the difference of pressure the diaphragm lifts the valve and admits air. A rapid-acting valve (fig. 3) is sometimes interposed between the train-pipe and the cylinder on each vehicle. In the normal or running position, a vacuum is maintained below the valve A and above the diaphragm

B, while the chamber below B and above A is at atmospheric pressure.’ For an emergency application of the brake, air is suddenly admitted to the train-pipe and thus to the lower side of A, and the pressure acting on the under side of B is sufficient to cause it to lift the valve A, and to admit air

from the atmosphere, both to the brake-cylinder and the train-pipe, through the clappet-valve D, which also rises because of the difference of pressure on its two sides. In a graduated application, neither D nor A rises from its seat, but air from the train-pipe finds access to the brake-cylinder by passing around the peg

C, which is so proportioned as to allow the necessary amount of air to enter the brake-cylinder, and so obtain simultaneous action of the brake throughout the train. When the handle E is turned so as to prevent the clappet D from rising, the rapid action is cut out and the brake acts as an ordinary vacuum automatic brake. A modi- fication of the device for obtaining accelerated action, described

Guardt Vacuum Gauge

Combination^] ector

Drip Trap .

Fig. 2. — Automatic Vacuum-Brake, showing its general arrangement.

withdrawing the ball from its seat when it is necessary to take off the brakes by hand; it is made air-tight by a small diaphragm, the pressure of which, when there is vacuum in the pipe, pulls in the spindle and allows the ball to fall freely into its seat. When air is exhausted through the train-pipe it travels out from below the piston direct, and from above it past the ball, which is thus forced off its seat, to roll back again when the exhaustion is complete. In this state of affairs the piston is held in equilibrium and the brake- blocks are free of the wheels. To apply them, air is admitted to the train-pipe, either purposely by the guard or driver, or accidentally by the rupture of the train-pipe or coupling-hose between the vehicles. The air passes to the lower side of the piston, but is prevented from gaining access to the upper side by the ball-valve which blocks the passage; hence the pressure becomes different on the two sides of the piston, which in consequence is forced upwards and thus applies the brakes. They are released by the re-establishment of equilibrium (by the use of the large ejector if necessary) ; when this is done the piston falls and the brakes drop off. The general arrangement of the apparatus is shown in fig. 2. To render the application of the brakes nearly simultaneous throughout a long train, the valve in the guard's van is arranged to open automatically when the driver suddenly lets in air to the train-pipe. This valve has a small hole through its stem, and is secured at the top by a diaphragm to a small dome-like chamber, which is exhausted when a vacuum is created in the train-pipe. A gradual application destroys the vacuum in the chamber as quickly as in the pipe and the diaphragm remains

above in connexion with the Westinghouse brake, is also applicable. Accelerating chambers, again containing air at atmospheric pressure, are provided on each vehicle and are connected with the train-pipe by valves which open as the vacuum in the latter begins to decrease with the operation of the driver's valve. The air thus admitted into the train-pipe effects a still further local reduction of the vacuum, which is sufficient to actuate the accelerating valve of each next succeeding vehicle and is thus rapidly propagated throughout the train.

Famous tests of railway brakes were those made by Sir Douglas Galton and Mr George Westinghouse on the London, Brighton and South Coast railway, in England, in 1878, and by _

a committee of the Master Car Builders' Association, 2J#

near Burlington, Iowa, in 1886 and 1887. The object of the former series (for accounts of which see Proc. Inst. Mech. Eng., 1878, 1879) was to determine the co-efficient of friction between the brake-shoe and the wheel, and between the wheel and rail at different velocities when the wheels were revolving and when skidded, i.e. stopped in their rotation and caused to slide. These experiments were the first of their kind ever undertaken.and for many years their results furnished most of the trustworthy data obtainable on the friction of motion. It was found that the co-efficient of friction between cast-iron shoes and steel -tired wheels increased as the speed of the train decreased, varying from o-iit at 55 m. an hour to 0-33 when the train was just moving. It also decreased with the time during which the brakes were applied; thus at 20 m. an hour the

co-efficient was at the beginning 0-182, after ten seconds 0-133, after twenty seconds 0-099. Generally speaking, especially at moderate speeds, the decrease in the co-efficient of friction due t0 time is less than the increase due to decrease of speed, although when the time is long the reverse may be true. When the wheels are skidded the retardation of the train is always reduced; therefore, for the greatest braking effect, the pressures on the brake-shoes should never be sufficient to cause the wheels to slide on the rails. The Burlington brake tests were undertaken to determine the practicability of using power brakes on long and heavy freight trains. In the 1886 tests there were five competitors — three buffer-brakes, one compressed-air brake, and one vacuum-brake. The tests comprised stops with trains of twenty-five and fifty vehicles, at 20 and

Fig. 3. — Rapid-acting Vacuum-Brake Valve.

40 m. an hour, on the level and on gradients of I in 100. They demonstrated that the buffer-brakes were inadequate for long trains, and that considerable improvements in the continuous brakes, both compressed-air and vacuum, would be needed to make them act quickly enough to avoid excessive shocks in the rear vehicles. In 1887 the trials of the year before were repeated by the same com- mittee, and at the same place. Trains of fifty vehicles, about 2000 ft. long and fitted with each brake, were again provided, and there were again five competitors, but they all entered continuous brakes — three compressed-air brakes, one vacuum and one electric. The results of the first day's test of the train equipped with Westing- house brakes are shown in Table I., the distances in which are the feet run by the train after the brakes were set, and the times the seconds that elapsed from the application of the brakes to full stop.

Table I.-

-Stops of a Train of Fifty Empty Cars, 1887 — Automatic Air-Brakes.

Speed in Miles per Hour.

Distance in Feet.

Time in Seconds.

Equivalent Distance at 20 m. and 40 m.

19J I9i

36i

186

215

588

9i

11

17

196 233

693

The remarkable shortness of these stops is the more evident when they are compared with the best results obtained in 1886, as shown in Table II.

Table II.-

-Stops of a Train of Fifty Empty Cars, 1 886— A utomatic A ir-Brakes.

Speed in Miles.

Distance in Feet.

Time in Seconds.

Equivalent Distance at 20 m. and 40 m.

23-5 20-3 , 40

40

424

354 922

927

i7i

16

225

22j

307 340

922 927

The time that elapsed between the application of the brakes on the engine and on the fiftieth vehicle was almost twice as great in 1886 as in 1887, being in the latter tests only five to six seconds, and in 1887 the stops were made in less than two-thirds the distance required in 1886. Still, violent shocks were caused by the rear vehicles running against those in front, before the brakes on the former were applied with sufficient force to hold them, and these shocks were so severe as to make the use of the brakes in practice impossible on long trains. When the triple-valves were actuated electrically, however, the stops were still further improved, as shown in Table III.

Table III. — Stops of a Train of Fifty Empty Cars — Electric Application of Air-Brakes. .

Speed in Miles.

Distance in Feet.

Time in Seconds.

Equivalent Distance at 20 m. and 40 m.

2i§

23 38

36i

160

183

475 460

7 8

Hi

14

139

138

519

545

Although the same levers, shoes, rods and other connexions were used, there were no shocks in the fiftieth car of the train on any stop, whether on the level or on a gradient. The committee in charge reported that the best type of brake for long freight trains was one operated by air, in which the valves were actuated by electricity, but they expressed doubt of the practicability of using electricity on freight trains. The Westinghouse Company then proceeded to quicken the action of the triple-valve, operated by air only, so that stops with fifty-car trains could be made without shock,

and without electrically operated valves; and they were so successful in this respect that, towards the end of the same year, 1887, with a train of fifty vehicles, stops were made without shock, fully equalling in quickness and shortness of distance run any that had been made at the trials by the electrically operated brakes.

In 1889 some further tests were made by Sir Douglas Galton with the automatic vacuum-brake, on a practically level portion of the Manchester, Sheffield & Lincolnshire railway (now the Great Central) . The train was composed of an engine, tender and forty carriages, the total length over buffers being 1464 ft., and the total weight 574 tons, of which 423 tons were braked. At a speed of about 32 m. an hour this train was brought to a standstill in twelve seconds after the application of the brakes, in a distance of 342 ft.

BRAKELOND, JOCELYN DE [fl. 1200), English monk, and author of a chronicle narrating the fortunes of the monastery of Bury St Edmunds between 11 73 and 1202. He is only known to us through his own work. He was a native of Bury St Edmunds; he served his novitiate under Samson of Tottington, who was at that time master of the novices, but afterwards sub-sacrist, and, from 1182, abbot of the house. Jocelyn took the habit of religion in 11 73, during the time of Abbot Hugo (11 57-1 180), through whose improvidence and laxity the abbey had become impoverished and the inmates dead to all respect for discipline. The fortunes of the abbey changed for the better with the election of Samson as Hugo's successor. Jocelyn, who became abbot's chaplain within four months of the election, describes the administration of Samson at consider- able length. He tells us that he was with Samson night and day for six years; the picture which he gives of his master, although coloured by enthusiastic admiration, is singularly frank and intimate. It is all the more convincing since Jocelyn is no stylist. His Latin is familiar and easy, but the reverse of classi- cal. , He thinks and writes as one whose interests are wrapped up in his hpuse; and the unique interest of his work lies in the minuteness with which it describes the policy of a monastic administrator who was in his own day considered as a model.

Jocelyn has also been credited with an extant but unprinted tract on the election of Abbot Hugo (Harleian MS. 1005, fo. 165); from internal evidence this appears to be an error. He mentions a (non-extant) work which he wrote, before the Cronica, on the miracles of St Robert, a boy whom the Jews of Bury St Edmunds were alleged to have murdered (1181). _ See the editions of the Cronica Jocelini de Brakelonda by T. Arnold (in Memorials of St Edmund's Abbey, vol. i. Rolls series', 1890), and by J. G. Rokewood (Camden Society, 1840); also Carlyle's Past and Present, book ii. A translation and notes are given in T. E. Tomlin's

Monastic and Social Life in the. Twelfth Century in the Chronicle of Jocelyn de Brakelond (1844). There is also a translation of Jocelyn by Sir E. Clarke (1907).

BRAMAH, JOSEPH (1748-1814), English engineer and in- ventor, was the son of a farmer, and was born at Stainborough, Yorkshire, on the 13th of April 1748. Incapacitated for agri- cultural labour by an accident to his ankle, on the expiry of his indentures he worked as a cabinet-maker in London, where he subsequently started business on his own account. His first patent for some improvements in the mechanism of water- closets was taken out in 1778. In 1784 he patented the lock known by his name, and in 1795 he invented the hydraulic press. For an important part of this, the collar which secured water-tightness between the plunger and the cylinder in which it

worked, he was indebted to Henry Maudslay, one of his workmen, who also helped him in designing machines for the manufacture of his locks. In 1806 he devised for the Bank of England a numerical printing machine, specially adapted for bank-notes. Other inventions of his included the beer-engine for drawing beer, machinery for making aerated waters, planing machines, and improvements in steam-engines and boilers and in paper-making machinery. In 1785 he suggested the possibility of screw propulsion for ships, and in 1802 the hydraulic transmission of power; and he constructed waterworks at Norwich in 1790 and 1793. He died in London on the 9th of December 1814.

BRAMANTE, or Bramante Lazzari (c. 1444-15 14), Italian architect and painter, whose real name was Donato d'Augnolo, was born at Monte-Asdrualdo in Urbino, in July 1444. He showed a great taste for drawing, and was at an early age placed under Fra Bartolommeo, called Fra Camavale. But though he afterwards gained some fame as a painter, his attention was soon absorbed by architecture. He appears to have studied under Scirro Scirri, an architect in his native place, and perhaps under other masters. He then set out from Urbino, and proceeded through several of the towns of Lombardy, executing works of various magnitudes, and examining patiently all remains of ancient art. At last, attracted by the fame of the great Duomo, he reached Milan, where he remained from 1476 to 1499. He seems to have left Milan for Rome about 1500. He painted some frescoes at Rome, and devoted himself to the study of the ancient buildings, both in the city and as far south as Naples. About this time the Cardinal Caraffa commissioned him to rebuild the cloister of the Convent

della Pace. Owing to the celerity and skill with which Bramante did this, the cardinal introduced him to Pope Alexander VI. He began to be consulted on nearly all the great architectural operations in Rome, and executed for the pope the palace of the Cancelleria or chancery. Under Julius II., Alexander's successor, Bramante's talents began to obtain adequate sphere of exercise. His first large work was to unite the straggling buildings of the palace and the Belvedere. This he accomplished by means of two long galleries or corridors enclosing a court. The design was only in part completed before the death of Julius and of the architect. So impatient was the pope and so eager was Bramante, that the foundations were not sufficiently well attended to; great part of it had, therefore, soon to be rebuilt, and the whole is now so much altered that it is hardly possible to decipher the original design.

Besides executing numerous smaller works at Rome and Bologna, among which is specially mentioned by older writers a round temple in the cloister of San Pietro-a-Montorio, Bramante was called upon by Pope Julius to take the first part in one of the greatest architectural enterprises ever attempted— the rebuilding of St Peter's. Bramante's designs were complete, and he pushed on the work so fast that before his death he had erected the four great piers and their arches, and com- pleted the cornice and the vaulting in of this portion. He also vaulted in the principal chapel. After his death on the nth of March 15 14, his design was much altered, in particular by Michelangelo.

See Pungileoni, Memoire intorno alia vita ed alle opere di Bramante (Rome, 1836); H. Semper, Donato Bramante (Leipzig, 1879).

BRAMPTON, HENRY HAWKINS, Baron (1817-1907), English judge, was born at Hitchin, on the 14th of September 1817. He received his education at Bedford school. The son of a solicitor, he was early familiarized with legal principles. Called to the bar at the Middle Temple in 1843, he at once joined the old home circuit, and after enjoying a lucrative practice as a junior, took silk in 1859. His name is identified with many of the famous trials of the reign of Queen Victoria. He was engaged in the Simon Bernard case (of the Orsini plot celebrity), in that of Roupell v. Waite, and in the Overend-Gurney prosecu- tions. The two causes cilibres, however, in which Hawkins attained his highest legal distinction were the Tichborne trials and the great will case of Sugden v. Lord St Leonards. In both of these he was victorious. In the first his masterly cross- examination of the witness Baigent was one of the great features

of the trial. He did a lucrative business in references and arbitrations, and acted for the royal commissioners in the purchase of the site for the new law courts. Blection petitions also formed another branch of his extensive

practice. Hawkins was raised to the bench in 1876, and was assigned to the then exchequer division of the High Court, not as baron (an appellation which was being abolished by the Judicature Act) , but with the title of Sir Henry Hawkins. He was a great advocate rather than a great lawyer. His searching voice, his manner, and the variety of his facial expression, gave him an enormous influence with juries, and as a cross-examiner he was seldom, if ever, surpassed. He was an excellent judge in chambers, where he displayed a clear and vigorous grasp of details and questions of fact. His knowledge of the criminal law was extensive and intimate, the reputation he gained as a " hanging " judge making him a terror to evil-doers; and the court for crown cases re- served was never considered complete without his assistance. In 1898 he retired from the bench, and was raised to the peerage under the title of Baron Brampton. He frequently took part in determining House of Lords appeals, and his judgments were distinguished by their lucidity and 'grasp. He held for many years the office of counsel to the Jockey Club, and as an active member of that body found relaxation from his legal and judicial duties at the leading race meetings, and was considered a capable judge of horses. In 1898 he was received into the Roman Catholic Church, and in 1903 he presented, in conjunction with Lady Brampton (his second wife), the chapel of SS. Augustine and Gregory to the Roman Catholic cathedral of Westminster, which was consecrated in that year. In 1904 he published his Reminiscences. He died in London on the 6th of October 1907, and Lady Brampton in the following year.

BRAMPTON, a market town in the Eskdale parliamentary division of Cumberland, England, 9 m. E.N.E. of Carlisle, on a branch of the North Eastern railway. Pop. (1901) 2494. It is picturesquely situated in a narrow valley opening upon that of the Irthing. The town has an agricultural trade, breweries, and manufactures of cotton and tweeds. The neighbourhood is rich in historical associations. Two miles N.E. of Brampton is the castle of Naworth, a fine example of a Border fortress. It was built in the reign of Edward III., by a member of the family of Dacre, who for many generations had had their stronghold here. Overlooking a deep wooded ravine, with streams to the east and west, the great quadrangular castle was naturally defended except on the south, where it was rendered secure by a double moat and drawbridge. By marriage in 1577 with Lady Elizabeth Dacre it passed into the hands of William Howard, afterwards lord warden of the Marches, the " Belted Will " of Sir Walter Scott and the Border ballads, who acquired great fame by his victories over the Scottish moss-troopers. The castle, the walls of which have many secret passages and hiding- places, is inhabited, and in its hall are numerous fine pictures, including a portrait of Charles I. by Van Dyck. Not far distant is Lanercost Priory, where in 1169 an Augustinian monastery was established. In 1311 Robert Bruce and his army were quartered here, and the priory was

pillaged in 1346 by David, king of Scotland. From this time its prosperity declined, and at its dissolution under Henry VIII. it consisted only of a prior and seven canons. The Early English church has a restored nave, but retains much fine carving. The chancel is ruined, but the interesting crypt is preserved.

BRAMWELL, GEORGE WILLIAM WILSHERE BRAMWELL, Baron (1808-1892), English judge, was born in London on the 12th of June 1808, being the eldest son of George Bramwell, of the banking firm of Dorrien, Magens, Dorrien & Mello. He was educated privately, and at the age of sixteen he entered Dorriens' bank. In 1830 he gave up this business for the law, being admitted as a student at Lincoln's Inn in 1830, and at the Inner Temple in 1836. At first he practised as a special pleader, but was eventually called to the bar at both Inns in 1838. He soon worked his way into a good practice both in London and the home circuit, his knowledge of law and procedure . being so well recognized that in 1850 he was appointed a member

ef the etommon Law Procedure Commission, which resulted in the Common Law Procedure Act of 1852. This act he drafted jointly with his friend Mr (afterwards Mr Justice) Willes, and thus began the abolition of the system of special pleading. In 1851 Lord Cranworth made Bramwell a queen's counsel, and the Inner Temple elected him a bencher — he had ceased to be a member of Lincoln's Inn in 1841. In 1853 he served on the royal commission to inquire into the assimilation of the mercantile laws of Scotland and England and the law of partnership, which had as its result the Companies Act of 1862. It was he who, during the sitting of this commission, suggested the addition of the word " limited " to the title of companies that sought to limit their liability, in order to prevent the obvious danger to persons trading with them in ignorance of their limitation of liability. As a queen's counsel Bramwell enjoyed a large and steadily increasing practice, and in 1856 he was raised to the bench as a baron of the court of exchequer. In .1867, with Mr Justice Blackburn and Sir John Coleridge, he was made a member of the judicature commission. In 187 1 he was one of the three judges who refused the seat on the judicial committee of the privy council to which Sir Robert Collier, in evasion of the spirit of the act creating the appointment, was appointed; and in 1876 he was raised to the court of appeal, where he sat till the autumn of 188 1. As a puisne judge he had been con- spicuous as a sound lawyer, with a strong logical mind unfettered by technicalities, but endowed with considerable respect for the common law. His rulings were always clear and decisive,

while the same quality marked his dealings with fact, and, coupled with a straightforward, unpretentious manner, gave him great influence with juries. In the court of appeal he was perhaps not so entirely in his element as at nisi prius, but the same combination of sound law, strong common sense and clear expression characterized his judgments. His decisions during the three stages of his practical career are too numerous to be referred to particularly, although Ryder v. Wombwell (L. R. 3 Ex. 95); R. v. Bradshaw (14 Cox C. C. 84); Household Fire Insurance Company v. Grant (4 Ex. Div. 216); Slonor v. Fowle (13 App. Cas. 20), The Bank of England v. Vagliano Brothers (App. Cas. 1891) are good examples. Upon his retire- ment, announced in the long vacation of 1881, twenty-six judges and a huge gathering of the bar entertained him at a banquet in the Inner Temple hall. In December of the same year he was raised to the peerage, taking the title Baron Bramwell of Hever, from his home in Kent. In private life Bramwell had simple tastes and enjoyed simple pleasures. He was musical and fond of sports. He was twice married: in 1830 to Jane (d. 1836), daughter of Bruno Silva, by whom he had one daughter, and in 1861 to Martha Sinden. He died on the 9th of May 1892.

His younger brother, Sir Frederick Bramwell (1818-1903), was a well-known consulting engineer and " expert witness."

At all times Lord Bramwell had been fond of controversy and controversial writing, and he wrote constant letters to The Times over the signature B. (he also signed himself at different times Bramwell, G. B. and L. L.). He joined in 1882 the Liberty and Property Defence League, and some of his writings after that date took the form of pamphlets published by that society.

BRAN, in Celtic legend, the name of (1) the hero of the Welsh Mabinogi of Branwen, who dies in the attempt to avenge his sister's wrongs; he is the son of Llyr (= the Irish sea-god Ler), identified with the Irish Bran mac Allait, Allait being a synonym of Ler; (2) the son of Febal, known only through the 8th-century Irish epic, The Voyage of Bran (to the world below) ; (3) the dog of Ossian's Fingal. Bran also appears as a historical name, Latinized as Brennus. See Kuno Meyer and D. Nutt, The Voyage of Bran (London, 1895).

BRAN, the ground husk of wheat, oats, barley or other cereals, used for feeding cattle, packing and other purposes (see Flour). The word occurs in French bren or bran, in the dialects of other Romanic languages, and also in Celtic, cf. Breton brenn, Gaelic bran. The New English Dictionary considers these Celtic forms to be borrowed from French or English. In modern French bren means filth, refuse, and this points to some connexion with Celtic words, e.g. Irish brean, manure. If so, the original meaning

would be refuse. " Bran-new," i.e. quite new, is now the common form of " brand-new," that which is fresh from the " brand," the branding-iron used for marking objects, &c.

BRANCH (from the Fr. branche, late Lat. branca, an animal's paw), a limb of a tree; hence any offshoot, e.g. of a river, railway, &c, of a deer's antlers, of a family or genealogical tree, and generally a subdivision or department, as in " a branch of learn- ing." The phrase, to destroy " root and branch," meaning to destroy utterly, taken originally from Malachi iv. 1, was made famous in 1641 by the so-called " Root and Branch " Bill and Petition for the abolition of episcopal government, in which petition occurred the sentence, " That the said government, with all its dependencies, roots and branches, be destroyed." Among technical senses of the word " branch " are: the certificate of proficiency given to pilots by Trinity House; and in siege-craft a length of trench forming part of a zigzag approach.

BRANCO, or Parima, a river of northern Brazil and tributary of the Rio Negro, formed by the confluence of the Takutu, or " Upper Rio Branco," and Uraricoera, about 3 N. lat. and 6o° 28′ W. long., and flowing south by west to a junction with the Negro. It has rapids in its upper course, but the greater part of its length of 348 m. is navigable for steamers of light draught. The Takutu rises in the Roraima and Co'irrit ranges on the Guiana frontier, while the Uraricoera rises in the Serra de Parima, on the Venezuelan frontier, and has a length of 360 m. before reaching the Branco. These are white water rivers, from which the Branco (white) derives its name, and at its junction with the Negro the two differently-coloured streams flow side by side for some distance before mingling.

BRANCOVAN, or Brancoveanu, the name of a family which has played an important part in the history of Rumania. It was of Servian origin and was connected with the family of Branko or Brankovich. Constantine Brancovan, the most eminent member of the family, was born in 1654, and became prince of Walachia in 1689. In consequence of his anti-Turkish policy of forming an alliance first with Austria and then with Russia, he was denounced to the Porte, deposed from his throne, brought under arrest to Constantinople and imprisoned (17 10) in the fortress of Yedi Kuleh (Seven Towers) . Here he was tortured by the Turks, who hoped thus to discover the fortune of £3,000,000, which Constantine was alleged to have amassed. He was be- headed with his four sons on the 26th of August 17 14. His faithful friend Enake Vacarescu shared his fate. Constantine Brancovan became, through his tragic death, the hero of Rumanian popular ballads. His family founded and endowed the largest hospital in Walachia, the so-called Spital Brancovanescu.

See O. G. Lecca, Familiile Boeresti Romdne (Bucharest, 1899), p. 90, sqq. (M. G.)

BRAND, JOHN (1744-1806), English antiquary, was born on the 19th of August 1744 at Washington, Durham, where his father was parish clerk. His early years were spent at Newcastle- on-Tyne with his uncle, a cordwainer, to whom he was apprentice in his fourteenth year. Showing promise, however, at Newcastle grammar school, friends interested themselves in him and assisted him to go to Oxford. It was not, however, until his twenty- eighth year that he matriculated at Lincoln College, but before this he had been ordained, holding in succession the curacies of Bolam, Northumberland, of St Andrew's, Newcastle, and of Cramlington, 8 m. from the county town. He graduated in 1775 and two years later was elected fellow of the Society of Antiquaries. Having for a short time been under-usher at the Newcastle grammar school, the duke of Northumberland, a former patron, gave him in 1784 the rectory of the combined parishes of St Mary-at-Hill and St Mary Hubbard, London. Appointed secretary to the Society of Antiquaries in the same year, he was annually re-elected until his death in 1806. He was buried in the chancel of his church. His most important work is Observations on Popular Antiquities: including the whole of Mr Bourne's " Antiquitates V ul gar es" with addenda to every chapter of that work. This was published in London in 1777, and after Brand's death, a new edition embodying the MSS. left by him, was published by Sir Henry Ellis in 1813. Brand also published

a poem entitled: On Illicit Love, written among the ruins of Godstow Nunnery, near Oxford (1775, Newcastle); The History and Antiquities of Newcastle-upon-Tyne (2 vols., London, 1789), and many papers in the Archaeologia.

BRAND, SIR JOHN HENRY (1823-1888), president of the Orange Free State, was the son of Sir Christoffel Brand, speaker of the House of Assembly of the Cape Colony. He was born at Cape Town on the 6th of December 1823, and was educated at the South African College in that city. Continuing his studies at Leiden, he took the degree of D.C.L. in 1845. He was called to the English bar from the Inner Temple in 1849, and practised as an advocate in the supreme court of the Cape of Good Hope from that year until 1863. In 1858 he was appointed professor of law in the South African College. He was elected president of the Orange Free State in 1863, and subsequently re-elected for five years in 1869, 1874, 1879 and 1884. In 1864 he resisted the pressure of the Basuto on the Free

State boundary, and after vainly endeavouring to induce Moshesh, the Basuto chief, to keep his people within bounds, he took up arms against them in 1865. This first war ended in the treaty of Thaba Bosigo, signed on the 3rd of April 1866; and a second war, caused by the treachery of the Basuto, ended in the treaty of Aliwal North, concluded on the 12th of February 1869. In 1871 Brand was solicited by a large party to become president of the Transvaal, and thus unite the two Dutch republics of South Africa; but as the project was hostile to Great Britain he declined to do so, and maintained his constant policy of friendship towards England, where his merits were recognized in 1882 by the honour of the G.C.M.G. He died on the 14th of July 1888. (See Orange Free State: History.)

BRANDE, WILLIAM THOMAS (1 788-1866), English chemist, was born in London on the nth of January 1788. After leaving Westminster school, he was apprenticed, in 1802, to his brother, an apothecary, with the view of adopting the profession of medicine, but his bent was towards chemistry, a sound know- ledge of which he acquired in his spare time. In 181 2 he was appointed professor of chemistry to the Apothecaries' Society, and delivered a course of lectures before the Board of Agriculture in place of Sir Humphry Davy, whom in the following year he succeeded in the chair of chemistry at the Royal Institution, London. His Manual of Chemistry, first published in 1819, enjoyed wide popularity, and among other works he brought out a Dictionary of Science, Literature and Art in 1842, on a new edition of which he was engaged when he died at Tunbridge Wells on the nth of February 1866.

BRANDENBURG, the name of a margraviate and electorate which played an important part in German history, and after- wards grew into the kingdom of Prussia. During the early years of the Christian era, the district was inhabited by the Semnones, and afterwards by various Slavonic tribes, who were partially subdued by Charlemagne, but soon regained their independence. The history of Brandenburg begins when the German king, Henry the Fowler, defeated the Havelli, or Hevelli, and took their capital, Brennibor, from which the name Brandenburg is derived. It soon came under the rule of Gero, margrave of the Saxon east mark, who pressed the campaign against the Slavs with vigour, while Otto the Great founded bishoprics at Havel- berg and Brandenburg. When Gero died in 965, his mark was divided into two parts, the northern portion, lying along both banks of the middle Elbe, being called the north or old mark. and forming the nucleus of the later margraviate of Branden- burg. After O + to the Great died, the Slavs regained much of their territory, Brandenburg fell again into their hands, and a succession of feeble margraves ruled only the district west of the Elbe, together with a small district east of that river.

A new era began in 1106 when Lothair, count of Supplinburg, became

*duke of Saxony. Aided by Albert the Bear, count of Ballenstadt, he renewed the attack on the Slavs, and Bear. * n lI 34 appointed Albert margrave of the north mark.*

The new margrave continued the work of Lothair, and about 1140 made a treaty with Pribislaus, the childless duke of Brandenburg, by which he was recognized as the duke's heir.

Otto III.

He took at once the title margrave of Brandenburg, but when Pribislaus died in 1150, a stubborn contest followed with Jazko, a relation of the late duke, which was terminated in n 57 in Albert's favour. Albert was the real founder of Brandenburg. Under his rule Christianity and civilization were extended, bishoprics were restored and monasteries founded. The country was colonized with settlers from the lower Rhineland, land was brought under cultivation, forts were built, German laws and customs introduced, and gradually the woods and marshes were converted into lands of comparative fertility.

When Albert died in n 70, Brandenburg fell to his eldest son, Otto I. (c. 1130-1184), who compelled the duke of Pomerania to own his supremacy, and slightly increased by conquest the area of the mark. Otto's son, Otto II., was the succeeding margrave, and having quarrelled with his powerful neighbour, Ludolf, archbishop of Magdeburg, was forced to own the archbishop's supremacy over his allodial lands. He died in 1205, and was followed by his step-brother, Albert II. (c. n 74-1 2 20), who assisted the emperor Otto IV. in various campaigns, but later transferred his allegiance to Otto's rival, Frederick of Hohen- staufen, afterwards the emperor Frederick II. His sons, John I. and Otto III., ruled Brandenburg in common until the death of John in 1266, and their reign was a period of growth and pros- perity. Districts were conquered or purchased from the surrounding dukes; the marriage of Otto with Beatrice, daughter of Wenceslaus, king of Bohemia, in 1 253, added upper Lusatia to Brandenburg; and the authority of the margraves was extended beyond the Oder. Many monasteries and towns were founded, among them Berlin; the work of Albert the Bear was continued, and the prosperity of Branden- burg formed a marked contrast to the disorder which prevailed elsewhere in Germany. Brandenburg appears about this time to have fallen into three divisions — the old mark lying west of the Elbe, the middle mark between the Elbe and the Oder, and the new mark, as the newly conquered lands beyond the Oder began to be called. When Otto died in 1267, the area of the mark had been almost doubled, and the margraves had attained to an influential position in the Empire. The Sachsenspiegel, written before 1235, mentions the margrave as one of the electors, by virtue of the office of

chamberlain, which had probably been conferred on Albert the Bear by the German king Conrad III.

In 1258 John and Otto had agreed upon a division of their lands, but the arrangement only took effect on Otto's death in 1267, when John's son, John II., received the electoral dignity, together with the southern part of the margraviate, which centred around Stendal, and Otto's son, John III., the northern or Saltzwedel portion. John II.'s brother, Otto IV., who became elector in 1281, had passed his early years in struggles with the archbishop of Magdeburg, whose lands stretched like a wedge into the heart of Brandenburg. In 1280 he was wounded in the head with a dart, and as he retained there a part of the weapon for a year, he was called " Otto with the, dart." He secured the appointment of his brother Eric as archbishop of Magdeburg in 1283, and was afterwards engaged in various feuds. Songs attributed to him are found in F. H. von der Hagen's Minnesinger. Otto was succeeded in 1309 by his nephew, Valdemar, who, assisted by other members of his family, conquered Pomerellen, which he shared with the Teutonic order in 13 10, and held his own in a struggle with the kings of Poland, Sweden and Denmark and others, over the possession of Stralsund.

In order to pay for these wars, and to meet the expenses of a splendid court, the later margraves had sold various rights to the towns and provinces of Brandenburg, and so aided the development of local government. John III. of Saltzwedel had shared his possessions with his brothers, but in 1303 they were reunited by his nephew Hermann, who purchased lower Lusatia in the same year. Hermann's daughter Agnes married the elector Valdemar, and on the death of her only brother , John VI . , in 13 1 7, the possessions of the Saltzwedel branch of the family passed to Valdemar, together with Landsberg and the Saxon Palatinate, which had been purchased from Albert the

Degenerate, landgrave of Thuringia. Valdemar thus gathered the whole of the mark under his rule, together with upper and lower Lusatia, and various outlying districts. He died childless in 1310, and was succeeded by his nephew Henry II., who died in 1320, when the Ascanian family, as the descendants of Albert the Bear were called, from the Latinized form of the name of their ancestral castle of Aschersleben, became extinct.

Brandenburg now fell into a deplorable condition, portions were seized by neighbouring princes, and the mark itself was disputed for by various claimants. In 1323 King iw«e/s- Lcmi s IV. took advantage of this condition to bestow dynasty, the mark upon his young son, Louis, and thus Branden- burg was added to the possessions of the Wittelsbach family, although Louis did not receive the extensive lands of the Ascanian margraves. Upper and lower Lusatia, Landsberg, and the Saxon Palatinate had been inherited by female members of the family, and passed into the hands of other princes, the old mark was retained by Agnes, the widow of Valdemar, who was married again to Otto II., duke of Brunswick, and the king was forced to acknowledge these claims, and to cede districts to Mecklenburg and Bohemia. During the early years of the reign of Louis, who was called the margrave Louis IV. or V., Brandenburg was administered by Bertold, count of Henneberg, who established the authority of the Wittelsbachs in the middle mark, which, centring round Berlin, was the most important part of the margraviate. The quarrel between King Louis and Pope John XXII. was inimical to the interests of Branden- burg, which was ravaged by the Poles, torn by the strife of contending clerical factions, and alternately neglected and oppressed by the margrave. Trade and commerce were at a standstill, agriculture was neglected, the privileges and estates of the margrave passed into private hands, the nobles were virtually independent, and the towns sought to defend them- selves by means of alliances. During the struggle between the families of Wittelsbach and Luxemburg, which began in 1342, there appeared in Brandenburg an old man who claimed to be the margrave Valdemar. He was gladly received by the king of Poland, and other neighbouring princes, welcomed by a large number of the people, and in 1348 invested with the margraviate by King Charles IV., who eagerly seized this opportunity to deal a blow at his enemy. This step compelled Louis to make peace with Charles, who abandoned the false Valdemar, invested Louis and his step-brothers with Brandenburg, and in return was recognized as king. Louis recovered the old mark in 1348, drove his opponent from the land, and in 1350 made a treaty with his step-brothers, Louis the younger and Otto, at Frankfort- on-Oder, by which Brandenburg was handed over to Louis the younger and Otto. Louis, who then undertook the govern- ment, made peace with his neighbours, finally defeated the false Valdemar, and was recognized by the Golden Bull of 1356 as one of the seven electors. The emperor Charles IV. took advantage of a family quarrel over the possessions of Louis the elder, who died in 1361, to obtain a promise from Louis the younger and Otto, that the margraviate should come to his own son, Wenceslaus, in case the electors died childless. Louis the younger died in 1365, and when his brother Otto, who had married a daughter of Charles IV., wished to leave Brandenburg to his own family Charles began hostilities; but in 1373 an arrangement was made, and Otto, by the treaty of Fiirstenwalde,

abandoned the margraviate for a sum of 500,000 gold gulden.

Under the Wittelsbach rule, the estates of the various provinces of Brandenburg had obtained the right to coin money, to build fortresses, to execute justice, and to form alliances control w ‘ tn Iore ig n states. Charles invested Wenceslaus with the margraviate in 1373, but undertook its administration himself, and passed much of his time at a castle which he built at Tangermiinde. He diminished the burden of taxation, suppressed the violence of the nobles, improved navigation on the Elbe and Oder, and encouraged commerce by alliances with the Hanse towns, and in other ways. He caused a Landbook to be drawn up in 1375, in which are recorded all the castles, towns and villages of the land with their estates

and incomes. When Charles died in 1378, and Wenceslaus became German and Bohemian king, Brandenburg passed to the new king’s half-brother Sigismund, then a minor, and a period of disorder ensued. Soon after Sigismund came of age, he pledged a part of Brandenburg to his cousin Jobst, margrave of Moravia, to whom in 1388 he handed over the remainder of the electorate in return for a large sum of money, and as the money was not repaid, Jobst obtained the investiture in 1397 from King Wenceslaus. Sigismund had also obtained the new mark on the death of his brother John in 1396, but sold this in 1402 to the Teutonic order. Jobst paid very little attention to Brandenburg, and the period was used by many of the noble families to enrich themselves at the expense of the poorer and weaker towns, to plunder traders, and to carry on feuds with neighbouring princes. When in 1410 Sigismund and Jobst were rivals for the German throne, Sigismund, anxious to obtain another vote in the electoral college, declared the bargain with Jobst void, and empowered Frederick VI. of Hohenzollern, burgrave of Nuremberg, to exercise the Brandenburg vote at the election. (See Frederick I., Elector oe Brandenburg.) In 141 1 Jobst died and Brandenburg reverted to Sigismund, who appointed Frederick as his representative to govern the margraviate, and a further step was taken when, on the 30th of April 1415, the king invested Frederick of Hohenzollern and his heirs with Brandenburg, together with the electoral privilege and the office of chamberlain, in return for a payment of 400,000 gold gulden, but the formal ceremony of investiture was delayed until the 18th of April 141 7, when it took place at Constance.

During the century which preceded the advent of the Hohen- zollerns in Brandenburg its internal condition had become gradually worse and worse, and had been accompanied condition by a considerable loss of territory. The central power before the had become weakened and the central organization Hohen- relaxed, while the electorate had lost most of the zo// e ™ advantages which formerly distinguished it from other German fiefs. Under the rule of the earliest margraves, it was the official side of their

position that was prominent, and it was not forgotten that they were technically only the representatives of the emperor. But in the 13th century this feeling began to disappear, and Brandenburg enjoyed an independence and carried out an independent policy in a way that was not paralleled by any other German state. The emperor was still suzerain indeed, but his relations with the mark were so insignificant that they exercised practically no influence on its development; and so the power of the Ascanian margraves was virtually unlimited. This independence was enhanced by the fact that few great nobles had followed Albert the Bear in his work of conquest, and that consequently there were few large lordships with their crowd of dependents. The towns, the village com- munities and the knights held their lands and derived their rights directly from the margraves. The towns and villages had generally been laid out by contractors or locatores, men not necessarily of noble birth, who were installed as hereditary chief magistrates of the communities, and received numerous encouragements to reclaim waste lands. This mode of coloniza- tion was especially favourable to the peasantry, who seem in Brandenburg to have retained the disposal of their persons and property at a time when villenage or serfdom was the ordinary status of their class elsewhere. The dues paid by these contractors in return for the concessions formed the main source of the revenue of the margraves. Gradually, however, the expenses of warfare, liberal donations to the clergy, and the maintenance of numerous and expensive households, compelled them to pledge these dues for sums of ready money. This proceeding gave the barons and knights an opportunity to buy out the village magis- trates and to replace them with nominees of their own. Thus the condition of the peasants grew worse, and their freedom was practi- cally destroyed when the emperor Louis IV. recognized the juris- diction of the nobles over their estates. Henceforth the power of the nobles steadily increased at the expense of the peasants, who soon sank into servitude. Instead of communicating

directly with the margrave through his burgraves and bailiffs, or vogts, the village communities came to be represented by the nobles who had obtained possession of their lands. Many of the towns were forced into the same position. Others were able to maintain their independence, and to make use of the pecuniary needs of the margraves to become practically municipal republics. Their strength, however, was perhaps more usefully shown in their ability to resist the nobles, a proceeding which saved industry and commerce from extinction at a time of unbridled lawlessness. In the pecuniary embarrassments of the margraves also originated the power of the Stande, or estates, consisting of the nobles, the clergy and the towns.

The first recorded instance of the Stande co-operating with the rulers occurred in 1170; but it was not till 1280 that the margrave solemnly bound himself not to raise a bede or special voluntary contribution without the consent of the estates. In 1355 the Stande secured the appoint- ment of a permanent councillor, without whose concurrence the decrees of the margraves were invalid. In the century which followed the extinction of the Ascanian house, liberty degenerated into licence, and the country was given over to anarchy. Only the most powerful towns were able to maintain their independence; others, together with the clergy, regularly paid blackmail to the neighbouring nobles. Under these con- ditions it is no wonder that the electorate not only completely lost its political importance, but also suffered a considerable diminution of territory. Upper and lower Lusatia, the new mark of Brandenburg, and other outlying districts had been shorn away, and the electorate now consisted of the old mark, the middle mark with Priegnitz, Uckermark and Sternberg, a total area of not more than 10,000 sq.m.

Such was the condition and extent of Brandenburg in 141 1 when Frederick of Holienzollern became the representative of Frederick Ki n 8 Sigismund therein. Entering the electorate with ofHohea- a strong force in June 141 a, his authority was quickly zoiiera, recognized in the middle mark, but the nobles of the old mark and of Priegnitz refused to follow this example. The two succeeding years were skilfully used by Frederick to make peace with the neighbouring princes, and having thus isolated his domestic enemies, he turned his arms against them early in 1414. Their strongholds were stormed, and in a few weeks their leaders were either prisoners or fugitives. A general peace was then declared at Tangermiinde which enabled Frederick to leave the mark to the rule of his wife, Elizabeth, and to turn his attention elsewhere. Returning to Brandenburg as elector in 1416, the last flickers of the insurrection were extinguished; and when Frederick was invested at Constance in April 141 7 his authority over the mark was undisputed. His next difficulty was with Pomerania, which had been nominally under the suzerainty of Brandenburg since 1181. The revival of this claim by the elector provoked an invasion of the mark by an army of Pomeranians with their allies in 1420, when Frederick inflicted a severe defeat upon them at Angermiinde; but in 1424 a temporary coolness between the elector and the emperor Sigismund led to a renewal of the attack which Frederick was unable to repulse. This reverse, together with the pressure of other business, induced him to leave Brandenburg in January 1426, after handing over its government to his eldest son, John. John, called the " Alchemist," who was born in 1403, had been disappointed in his hope of obtaining the vacant electoral duchy of Saxe-Wittenberg in 1423. Lacking the diplomatic and military qualities of his father, his difficulties were augmented by the poverty of the country, and

the evils which Frederick had sup- pressed quickly returned. The feeling of security vanished, the towns banded themselves together for defensive purposes, the rights of the margrave were again pledged to provide money, and in 1432 the land was ravaged by the Hussites. John never attained to the electoral dignity; for, in 1437, his father in arranging a division of his territories decided that Brandenburg should pass to his second and fourth sons, both of whom were named Frederick. The elder of the two took up the government at once, whereupon John left the mark for south Germany, where he remained until his death in 1464.

Frederick II., who became elector on his father's death in September 1440, was born on the 19th of November 141 3, and earned the surname of " Iron " through his sternness to his country's enemies. He had little difficulty 1L in repressing the turbulence of the nobles which had been quickened into life during the regency of his brother, but found it less easy to deal with the towns. Three strong leagues had been formed among them about 143 1, and the spirit of municipal independence was most prominently represented by the neighbouring and allied towns of Berlin and Coin. In his conflict with the towns over his refusal to ratify all their privileges the elector's task was lightened by a quarrel between the magistrates and the burghers of Berlin, which lie was called in to decide in 1442. He deposed the governing oligarchy, changed the constitution of the town, forbade all alliances and laid the foundations of a castle. The inhabitants soon chafed under these restrictions. A revolt broke out in 1447, but the power of the elector overawed the people, who submitted their case to the estates, with the result that the arrangement of 1442 was re-established. In 1447 Frederick was compelled to cede the old mark and Priegnitz to his younger brother, Frederick, under whose feeble rule they quickly fell into disorder. In 1463, however, when the younger Frederick died childless, the elector united them again with his own possessions and took measures to suppress the prevailing anarchy. In his dealings with neigh- bouring rulers Frederick pursued a peaceful and conciliatory policy. In 1442 he obtained some small additions to his territory, and the. right of succession to the duchy of Mecklenburg in' case the ducal family should die out. In 1445 an old feud with the archbishop of Magdeburg was settled, and in 1457 a treaty of mutual succession was made with the houses of Saxony and Hesse. Cottbus and Peitz in Lusatia were acquired, and retained after a quarrel with George Podiebrad, king of Bohemia, and the new mark of Brandenburg was purchased from the Teutonic order in 1454. An attempt, however, to secure the duchy of Pomerania-Stettin failed, and the concluding years of this reign were troubled by warfare with the Pomeranians.

The general success of Frederick's rule was secured by the sedulous care with which he confined himself to the work of government. He is said to have refused the thrones of Poland and Bohemia; and although he made

pilgrimages to the Holy Land and to Rome, his interest in ecclesiastical questions was mainly directed towards quickening the religious life of his people. He obtained important concessions from Pope Nicholas V. with regard to the appointment of bishops and other ecclesiastical matters in 1447, and in general maintained cordial relations with the papacy. About 1467 his only son, John, died, and increasing infirmity led him to contemplate abdication. An arrangement was made with his brother, Albert Achilles, to whom early in 1470 the mark was handed over, and Frederick retired to Plassenburg where he died on the roth of February 147 1.

Albert appeared in Brandenburg early in the same year, and after receiving the homage of his people took up the struggle with the Pomeranians, which he soon brought to a satisfactory conclusion; for in May 1472 he not only Achitt s obtained the cession of several districts, but was recognized as the suzerain of Pomerania and as its future ruler. The expenses of this war led to a quarrel with the estates. A subsidy was granted which the elector did not regard as adequate, and by a dexterous use of his power he established his right to take an excise on beer. Albert's most important contribution to the history of Brandenburg was the issue on the 24th of February 1473 of the Dispesitio Achillea. By this instrument the elector decreed that the electoral mark should pass in its entirety to his eldest son, an establishment of primogeniture which had considerable influence on the future development of the country. He then entrusted the government to his eldest son, John, and left Brandenburg. Handicapped by poverty, John had to face attacks from two quarters. The Pomeranians, inspired by the declaration of the emperor Frederick III. that their land was a direct fief of the Empire, and aided by Matthias Corvinus, king of Hungary, took up arms; and a quarrel broke

Joachim.

out with John, duke of Sagan, over the possessions of John's brother-in-law, Henry XI., duke of Glogau. To deal with these difficulties Albert returned to Brandenburg in 1478, and during his stay drove back the Pomeranians, and added Crossen and other parts of duke Henry's possessions to the electorate. Again left in charge of the country, John beat back a fresh attack made by John of Sagan in 1482 ; and he became elector on his father's death in March i486. He added the county of Zossen to his possessions in 1490, and in 1493 made a fresh treaty with the duke of Pomerania. Although he brought a certain degree of order into the finances, his poverty and the constant inroads of external enemies

prevented him from seriously improving the condition of the country. John, who was called " Cicero," either on account of his eloquence, or of his knowledge of Latin, was interested in learning, welcomed Italian scholars to the electorate, and strove to improve the education of his people. He died at Arneburg on the 9th of January 1499, and was succeeded by his son Joachim I.

When Joachim undertook the government Of Brandenburg he had to deal with an amount of disorder almost as great as that which had taxed the energies of Frederick I. a century before. Highway robbery was general, the lives and property of traders were in continual jeopardy, and the machinery for die enforcement of the laws was almost at a standstill. About 1504 an attack of unusual ferocity on some Frankfort traders aroused the elector's wrath, and during the next few years the execution of many lawbreakers and other stern measures restored some degree of order. In this and in other ways Joachim proved himself a sincere friend to the towns and a protector of industry. Following the economic tendencies of the time he issued sumptuary laws and encouraged manu- factures; while to suppress the rivalry among the towns he established an order of precedence for them. Equally important was his work in improving the administration of justice, and in this direction he was aided by scholars from the university which he had founded at Frankfort-on-Oder in 1506. He gave a new organization to the highest court of justice, the Kammergericht, secured for himself an important voice in the choice of its members, and ordered that the local law should be supplemented by the law of Rome. He did not largely increase the area of Brandenburg, but in 1524 he acquired the county of Ruppin, and in 1529 he made a treaty at Grimnitz with George and Barnim XL, dukes of Pomerania, by which he surrendered the vexatious claim to suzerainty in return for a fresh promise of the succession in case the ducal family should become extinct. Joachim's attitude towards the teaching of Martin Luther which had already won many adherents in the electorate, was one of unrelenting hostility. The Jews also felt the weight of his displeasure, and were banished in 1510.

Ignoring the Dispositio Achillea, the elector bequeathed Brandenburg to his two sons. When he died in July 1535 the elder, Joachim II., became elector, and obtained the old and middle marks,while the younger, John, received the new mark. John went definitely over to the side of the Lutherans in 1538, while Joachim allowed the reformed doctrines free entrance into his dominions in 1539. The elector, however, unlike his brother, did not break with the forms of the Church of Rome, but established an ecclesiastical organization independent of the pope, and took up a position similar to that of King Henry VIII. in England. Many of the monasteries were suppressed, a consistory was set up to take over the functions of the bishops and to act as the highest ecclesiastical court of the

country. In 1541 the new ecclesiastical system was con- firmed by the emperor Charles V. With regard to this policy the elector was probably influenced by considerations of greed. The bishoprics of Brandenburg, Havelberg and Lebus were secularized; their administration was entrusted to members of the elector's family; and their revenues formed a welcome addition to his impoverished exchequer. Nor did Joachim neglect other opportunities for adding to his wealth and posses- sions. In 1537 he had concluded a treaty with Frederick III., duke of Liegnitz, which guaranteed to the Hohenzollerns the

Joachim II.

John George.

succession to the Silesian duchies of Liegnitz, Brieg and Wohlau in the event of the ducal family becoming extinct; this arrange- ment is important as the basis of the claim made by Frederick the Great on Silesia in 1740. The treaty was declared invalid by the German king, Ferdinand I.; but the elector insisted on its legality, and in 1545 strengthened his position by arranging a double marriage between members of his own family and that of Duke Frederick. Of more immediate consequence was an arrangement made in 1569 with the representatives of Joachim's kinsman, Albert Frederick, duke of Prussia, after which the elector obtained the joint investiture of the duchy of Prussia from Sigismund II., king of Poland, and was assured of the succession if the duke's family became extinct. Joachim's luxurious habits, his partiality for adventurers, and his delight in building, led him to incur such a heavy expenditure that after pledging many of his lands and rights he was compelled in 1540 to appeal for help to the estates. Taking advantage of his difficulties, the estates voted him a sum of money as the price cf valuable con- cessions, the most important of which was that the elector should make no alliance without their consent. Fresh liabilities were soon incurred, and in spite of frequent contributions from the estates Joachim left at his death in January 1571 a heavy burden of debt to his son and successor, John George.

The elector's death was followed ten days later by that of his brother, John, and as John left no sons the whole of Brandenburg, together with the districts of Beeskow and Storkow which had been added by purchase to the new mark, were united under the rule of his nephew, John George. Born on the nth of September 1525 this prince had served in the field under Charles V., and, disliking his father's policy and associates, had absented himself from Berlin, and mainly confined his attention to administering the secularized bishopric of Brandenburg which he had obtained in 1 560. When he became elector he hastened to put his ideas into practice. His father's favourites were exiled; foreigners were ousted from public positions

and their places taken by natives; and important economies were effected, which earned for John George the surname of Oekonom, or steward. To lighten the heavy burden of debt left by Joachim the elector proposed a tax on wheat and other cereals. Some opposition was shown, but eventually the estates of both divisions of the mark assented; only, however at the price of concessions to the nobles, predominant in the diet, which thrust the peasantry into servitude. Thus the rule of John George was popular with the nobles, and to some extent with the towns. Protestant refugees from France and the Netherlands were encouraged to settle in Brandenburg, and a period of peace was beneficial to a land, the condition of which was still much inferior to that of other parts of Germany. In religion the elector was a follower of Luther, whose doctrines were prevalent among his people. He had accepted the Formula Concordiae, a Lutheran document promulgated in June 1580, and sought to prevent any departure from its tenets. His dislike of Calvinism, or his antipathy to external complications, however, prevented him from taking any serious steps to defend Protestantism from the attacks of the counter-reformation. He did indeed join the league of Torgau, which voted assistance to Henry IV. of France in 1591 ; but he refused to aid the United Provinces, or even to give assistance to his eldest son, Joachim Frederick, administrator of the archbishopric of Magdeburg, whose claim to sit and vote in the imperial diet was contested, or to his grandson, John George, whose election to the bishopric of Strassburg was opposed by a Roman Catholic minority in the chapter. This indifference to the welfare of the Protestants added to the estrangement between the elector and his eldest son, which was further accentuated when John George, ignoring the Dispositio Achillea, bequeathed the new mark to one of his younger sons. He died on the 8th of January 1598.

Joachim Frederick, who now became elector, was born on the 27th of January 1546. Since 1553 he had held the bishopric of Havelberg, since 1555 that of Lebus; he had been adminis- trator of Magdeburg since 1566, and of Brandenburg since 1571. Resigning these dignities in 1598, he contested his father's

will, and was successful in preventing a division of the electorate. An agreement with George Frederick, the childless margrave of Ansbach and Bayreuth, paved the way for an Frederick, arrangement with the elector's younger brothers, who after the margrave's death in April 1603, shared his lands in Franconia, and were compensated in other ways for surrendering

all claims on Brandenburg. This agreement, known as the Gera Bond, ratified the Disposiiio Achillea. By George Frederick's death, Joachim became administrator of the duchy of Prussia, ruled nominally by the weak-minded Albert Frederick, but he had some difficulty in asserting his position. In Brandenburg he made concessions to the nobles at the expense of the peasantry, and admitted the right of the estates to control taxation. In religious matters he was con- vinced of the necessity of a union between Lutherans and Calvinists, and took steps to bring this about. Public opinion, however, in Brandenburg was too strong for him, and he was compelled to fall back upon the Lutheran Formula and the religious policy of his father. Joachim seems to have been a wise ruler, who improved in various ways the condition of the mark. He married Catherine, daughter of John, margrave of Brandenburg-Ciistrin, and when he died, on the 18th of July 1608, was succeeded by his eldest son John Sigismund.

The new elector, born on the 8th of November 1572, had married in 1594 Anna, daughter of Albert Frederick of Prussia, a union which not only strengthened the pretensions of the electors of Brandenburg to the succession in that duchy, but gave to John Sigismund a claim on the duchies of Cleves, Julich and Berg, and other Rhenish lands should the ruling family become extinct. In March 1609 the death of Duke John William left these duchies without a ruler, and by arrangement they were occupied jointly by the elector and by his principal rival, Wolfgang, son of Philip Louis, count palatine of Neuburg. This proceeding aroused some opposition, and, complicated by religious considerations and by the excited state of European politics, almost precipitated a general war. However, in November 1614 the dispute was temporarily settled by the treaty of Xanten. Brandenburg obtained the duchy of Cleves with the counties of Mark and Ravensberg, but as the Dutch and Spanish garrisons were not withdrawn, these lands were only nominally under the elector's rule. In 1609, John Sigismund had joined the Evangelical Union, probably to win support in the Rhineland, and the same consideration was doubtless one reason why, in 1613, he forsook the Lutheran doctrines of his family, and became an adherent of the reformed, or Calvinist, faith. This step aroused grave discontent in the electorate, and, quickly abandoning his attempts to proselytize, the elector practically conceded religious liberty to his subjects. Over the Cleves- Julich succession, John Sigismund had incurred heavy expenses, and the public debt had again mounted up. He was thus obliged to seek aid from the estates, and in return for grants to make concessions to the nobles. The elector spent much of his time in Prussia striving to assert his authority in that duchy, and in August 161 8, accord- ing to the arrangement of 1569, became duke by the death of Albert Frederick. He only enjoyed this dignity for a short time, as he died on the 23rd of December 1619. He was succeeded by his eldest son, George William.

The new elector, born on the 3rd of November 1597, proved a weak and incapable ruler. He had married Elizabeth, daughter of Frederick IV., elector palatine of the Rhine, and wwuua. s ‘ ster °f the elector Frederick V., afterwards king of Bohemia, and before his accession had acted as his father’s representative in Cleves. Although a Protestant he was under the influence of Adam, count of Schwarzenberg, who was a Roman Catholic of imperialist sympathies. As a result the elector remained neutral during the early years of the Thirty Years’ War in spite of his relationship with Frederick of the Palatinate, and the obvious danger to his Rhenish lands. This attitude was not successful. Brandenburg was ravaged imparti- ally by both parties, and in 1627 George William attacked his brother-in-law, Gustavus Adolphus of Sweden, who was using

Prussia as a base of operations for his war against Poland. This campaign was short and inglorious for Brandenburg, and the elector was soon compelled to make peace. Although alarmed by the edict of restitution of 1629, George William took no steps to help the Protestants. In 1631, however, Gustavus Adolphus marched on Berlin, compelled the elector to cede the fortress of Spandau, and to aid him with men and money. The Branden- burg troops then assisted the Swedes until after the death of Gustavus in 1632, and the Swedish defeat at Nordlingen in 1634, when the elector assented to the treaty of Prague, which was made in May 1635 between the emperor Ferdinand II. and John George I., elector of Saxony. The imperialists did nothing, however, to drive the Swedes from Brandenburg, and the unfortunate land was entirely at the mercy of the enemy. This was the principal reason why the elector was unable to annex Pomerania when its last duke, Bogislaus XIV., died in 1637. In 1638 George William transferred his residence to Konigsberg, leaving Schwarzenberg to administer the electorate. Although his harsh measures aroused some irritation, the count did some- thing to rid the land of the Swedes and to mitigate its many evils; but its condition was still very deplorable when George William died at Konigsberg on the 1st of December 1640, leaving an only son, Frederick William. The most important facts in the internal history of Brandenburg during the 16th century were the increase in the power of the estates, owing chiefly to the con- tinuous pecuniary needs of the electors; the gradual decline in the political importance of the towns, due mainly to intestine feuds; and the lapse of the peasantry into servitude. These events gave a preponderance of power to the nobles, but con- currently a number of circumstances were silently preparing the way for a great increase of authority on the part of the ruler. The substitution of the elector for the pope as head of the church; the introduction of Roman law with its emphasis on a central authority and a central administration; the determined and successful efforts to avoid any partition of the electorate; and the increasing tendency of the separate

sections of the diet to act independently; all tended in this direction. This new order was heralded in 1604 by the establishment of a council of state, devoted to the interests of the elector, which strengthened his authority, and paved the way for a bureaucratic government.

*When Frederick William, the " Great Elector," became ruler of Brandenburg in 1640 he found the country in a very deplor- able condition. Trade and agriculture were almost p a ri k destroyed, and the inhabitants, compelled to support wmiam, the Swedish army of occupation, suffered also from the the disorderly conduct of the native soldiers. Although "° reat „ the young elector spent the two first years of his reign * or ' mainly in Prussia, he was by no means forgetful of Brandenburg, and began resolutely to root out the many evils which had sprung up during the feeble rule of his father. The powers of Schwarzen- berg were curtailed; the state council was restored; and the licence of the soldiers was restrained, while their numbers were reduced. Then turning his attention to the Swedes a truce was arranged, and soon afterwards, in return for an indemnity, they agreed to evacuate the electorate. Having returned to Branden- burg in 1643, Frederick William remained neutral during the concluding years of the Thirty Years' War, and set to work to organize an army and to effect financial reforms. About the same time diplomatic methods freed Cleves, Mark and Ravensberg from foreign troops, but the estates of these lands gained a temporary victory when the elector attacked their privileges. However, in 1647 his title was formally admitted by Wolfgang, count palatine of Neuburg.*

The terms of the treaty of Westphalia in 1648 are the best commentary on the general success of the elector's policy. Although he was obliged to give up his claim to the western part of Pomerania in favour of Sweden, he secured the eastern part of that duchy, together with the secularized bishoprics of Halberstadt, Minden and Kammin, and other lands, the whole forming a welcome addition to the area of Brandenburg. He was also promised the archbishopric of Magdeburg when its administrator, Augustus, duke of Saxe-Weissenfels, should die.

This event happened in 1680 when he secured the lands of the archbishopric. The elector did not, however, take possession of the newly-acquired territories at once. Fresh difficulties arose with Sweden, and it was not until 1653 that eastern Pomerania was freed from her soldiers. Meanwhile a new quarrel had broken out with Wolfgang of Neuburg. In 1650 Frederick William attacked his rival, but a variety of circum- stances,

among others a change of government in the Netherlands, and the resistance of the estates of Cleves, thwarted his plans, and he was compelled to listen to the mediating powers, and to acquiesce in the status quo.

Profiting by these reverses the elector then undertook a series of internal reforms, tending to strengthen the central authority, and to mitigate the constant lack of money, which was perhaps his chief obstacle to success; a work in which he was aided by George, count of Waldeck (1620-1692), who became his chief adviser about this time. In 1651 the powers of the state council were extended to include all the lands under the elector's rule; and a special committee was appointed to effect financial economies, and so to augment the electoral resources. In imperial politics Frederick William supported the election of Ferdinand, son of the emperor Ferdinand III., as king of the Romans in 1653; but when the emperor failed to fulfil his promises, influenced by Waldeck, he acted in opposition to the imperial interests, and even formed a plan for a great alliance against the Habsburgs. These projects were disturbed by the war which broke out in 1655 between Sweden and Poland. In this struggle the elector fought first on one side and then on the other; but the important consequences of his conduct belong rather to the history of the duchy of Prussia (q.v.). The transfer of the elector's support from Sweden to Poland in 1656 was followed by the fall from power of Waldeck, who was succeeded by Otto von Schwerin (1616-1679), under whose influence the elector's relations with the emperor became more cordial.

The increase in the prestige of Brandenburg was due chiefly to his army, which was gradually brought to a high state of efficiency. A proper organization was established to superintend the pay and maintenance of the soldiers, and they were com- manded by experienced officers, among others by Georg Derfflingen (1606-1695), and Otto von Sparr (1605-1668). The general poverty, however, made the estates reluctant to support a standing army, and after the peace of Oliva in 1660, it was reduced to about 3500 men. The continual difficulties with the estates of his different dominions had harassed and hampered the elector, and the general peace which followed the treaty of Oliva offered a favourable opportunity to curtail their powers. Undaunted by two previous rebuffs he attacked the estates of Cleves, and by a display of force gained a substantial victory. Some important privileges were annulled, and he obtained a considerable sum of money. The Landtag of Brandenburg was not cowed so easily into submission, but an increase of revenue was obtained, and the stubborn struggle which ensued in Prussia ended in a victory for the ruler. This increased income enabled the elector to take a more considerable part in European politics. In 1663 he assisted the imperialists in their struggle with the Turks; in 1666 the dispute over

Cleves, Mark and Ravensberg was finally settled, and Brandenburg were confirmed in the possession of these lands; and in the same year a reconciliation was effected with Sweden. Several disputes which threatened to disturb the peace of the Empire were settled through his mediation, and he compelled the citizens of Magdeburg to do homage to him. In religious matters he interceded with the emperor and the diet for the Protestants, and sought, but without success, to bring about a reconciliation between Lutherans and Calvinists in Brandenburg.

The elector's relations with Louis XIV. of France are full of interest. After the conclusion of the war of devolution in 1667, he allied himself with Louis, and together they agreed to support the candidature of Wolfgang of Neuburg for the vacant Polish throne. In 1668, moreover, he refused to join the triple alliance against France, but soon afterwards became aware of the danger to his country from the aggressive policy of Louis. The United

Provinces were bound to him by religious interests, political considerations, and family ties alike, and he could not be in- different when their position was threatened by France. In spite of tempting offers from Louis, he was the first to join the Dutch when they were attacked by Louis in 1672, and conducted an ineffectual campaign on the Rhine until June 1673, when he was forced to make peace. In July 1674, however, he joined the Empire, the United Provinces and Spain, and in return for a subsidy, fought against France in Alsace. Meanwhile Louis had instigated the Swedes to invade Brandenburg, which had been left to the care of John George II., prince of Anhalt-Dessau. Hastening from Franconia to defend the electorate, Frederick William gained a complete victory over a superior number of the enemy at Fehrbellin on the 28th of June 1675, a great and glorious day for the arms of Brandenburg. Aided by the imperialists and the Danes, he followed up this success, and cleared Brandenburg and Pomerania of the Swedes, capturing Stettin in 1677 and Stralsund in 1678, while an attack made by Sweden on Prussia was successfully repelled. The general peace of Nijmwegen was followed by the treaty of St Germain-en-Laye in June 1679 between Sweden and Brandenburg. Owing, however, to the insistence of Louis XIV. and the indifference, or weakness, of the emperor Leopold I., the elector was forced to restore western Pomerania to Sweden, in return for the pay- ment of 300,000 crowns by France. This'feebleness on the part of his ally induced Frederick William to listen more readily to the overtures of Louis, and in 1679, and again in 1681, he bound himself to support the interests of France. He had, moreover, a further grievance against the emperor as Leopold refused to recognize his right to the Silesian duchies of Liegnitz, Brieg and Wohlau, which had been left without a ruler in 1675. About 1684, however, the foreign policy of Brandenburg underwent another change. Disliking the harshness shown by Louis to the Protestants, the elector concluded an alliance with William, prince of Orange, in August

1685; and entered into more friendly relations with the emperor. Further incensed against France by the revocation of the edict of Nantes in 1685, he made an alliance with Leopold in January 1686, agreeing in return for a subsidy to send troops against the Turks. Soon afterwards he received Schwiebus to compensate him for abandoning his claim on the Silesian duchies, and in a secret treaty made promises of support to Leopold. The great elector died in May 1688, leaving his territories to his eldest son, Frederick.

The remarkable services of Frederick William to his country can best be judged by comparing its condition in 1640 with that in 1688. At his accession the greatter part of his territory was occupied by strangers and devastated by war, and in European politics Brandenburg was merely an appendage of the empire. Its army was useless; its soil was poor; its revenue was insignifi- cant. At his death the state of Brandenburg-Prussia was a power to be reckoned with in all European combinations. Inferior to Austria alone among the states of the Empire, it was regarded as the head of the German Protestantism; while the fact that one-third of its territory lay outside the Empire added to its importance. Its area had been increased to over 40,000 sq. m.; its revenue had multiplied sevenfold; and its small army was unsurpassed for efficiency. The elector Jiad overthrown Sweden and inherited her position on the Baltic, and had offered a steady and not ineffectual resistance to the ambition of France.

While thus winning for himself a position in the councils of Europe, Frederick William was not less active in strengthening the central authority within his own dominions. He found Brandenburg a constitutional state, in which the legislative power was shared between the elector and the diet; he left it to his successor substantially an absolute monarchy. Many circumstances assisted to bring about this change, among the chief of which were the want of harmonious action on the part of the estates, and the decline in the political power of the towns. The substitution of a permanent excise for the subsidies granted from time to time by the estates also tended to increase his independence, and the officials or Steuerrathe, appointed by him to collect this tax in the towns, gradually absorbed many bf

the administrative functions of the local authorities. The nobles and prelates generally preferred to raise their share of the revenue by the old method of a bede, or contribution, thus weakening the remaining bond between them and the burghers.

In matters of general administration Frederick William showed himself a prudent and careful ruler, and laid the foundation of the future greatness of Prussia in almost every department. The wounds inflicted by the Thirty Years' War were in a great measure healed, and the finances and credit of the state were established on a firm basis. Agriculture and commerce were improved and encouraged by a variety of useful measures, and in this connexion the settlement of a large number of Flemings, and the welcome extended to French Protestants, both before and after the revocation of the edict of Nantes, were of incalcul- able service. A small but efficient navy was founded, and strict economy, together with increasing resources, enabled a dis- ciplined army to be maintained. Education was not neglected, a trading company was established, and colonies were founded on the west coast of Africa. In religious matters Calvinists and Lutherans were placed upon an equality, but the elector was unablei to impress his own spirit of tolerance upon the clergy, who were occupied with ecclesiastical squabbles while the state of education and of public morals left much to be desired. The condition of the peasantry, however, during this reign reached its lowest point, and the " recess," or charter, of 1653 practically recognizes the existence of villenage. While the nobles had been losing power with regard to the ruler they had been increasing it at the expense of the peasants. The Thirty Years' War afforded them frequent opportunities of replacing the village Schulzen, or magistrates, with officials of their own; and the fact that their share of taxation was wholly wrung from the peasants made the burden of the latter much heavier than that of the townsmen.

The new elector, Frederick III., followed in general the policy of his father. Having persuaded his step-brothers to surrender the principalities bequeathed to them by the great Frederick e i ec t r, he assisted William of Orange to make his descent on England; then in 1688 allied himself with other German princes against Louis XIV., and afterwards fought for the Empire against both France and Turkey. Before he became elector Frederick had promised the emperor that he would restore Schwiebus, and he was now called upon to fulfil this engagement, which after some murmuring he did in 1695. This fact, however, together with some slights put upon him at the peace of 1697, led him to look with less favour upon imperial interests. Frederick's chief adviser about this time was Eberhard Danckelmann (1643-1722)", whose services in continuing the reforming work of the great elector were very valuable; but having made many enemies, the electress Sophia among them, he fell from power in 1697, and was imprisoned for several years. The most important work of the elector was to crown the labours of his father by securing the kingly title for himself and his descendants. Broached in 1692 this matter was brought up again in 1698 when the emperor and his ministers, faced with the prospect

of a fight over the Spanish succession, were anxious to conciliate Brandenburg. It was at length decided that the title should be taken from Prussia rather than from Brandenburg as the former country lay outside the Empire, and in return Frederick promised to assist Leopold with 8000 men. The coronation ceremony took place at Konigsberg on the 18th of January 1701. The territorial additions to Brandenburg during this reign were few and unimportant, but the comparative wealth and prosperity enabled the elector to do a good deal for education, and to spend some money on buildings. In 1694 the university of Halle was founded; academies for arts and sciences were established, and Berlin was greatly improved. The subsequent history of Brandenburg is merged in that of Prussia (q.v.).

Bibliography. — H. Brosien, Geschichte der Mark Brandenburg im Mittelalter (Leipzig, 1887); G- G. Kiister, Bibliotheca historica Brandenburgensis (Breslau, 1743); and Accessiones (Breslau, 1768), and Collectio opusculorum historiam marchicam illustrantium (Breslau, 1731 — 1733) ; A. Voss and G. Stimming, Vorgeschichtliche Alterthiimer aus der Mark Brandenburg (Berlin, 1886-1890); F. Voigt, Geschichte des brandenburgisch-preussischen Staats (Berlin,

1878); E. Berner, Geschichte des preussischen Staats (Berlin, 1890-1891); A. F. Riedel, Codex diplomaticus Brandenburgensis (Berlin, 1838-1865); J. Heidemann, Die Reformation in der Mark Branden- burg (Berlin, 1889) ; Forschungen zur brandenburgischen und preussischen Geschichte, edited by R. Koser (Leipzig, 1888 fol.); T. Carlyle, History of Frederick the Great, vol. i. (London, 1858); J.G.Droysen, Geschichte der preussischen Politik (Berlin, 1855-1886) ; E. Lavisse, Etude sur une des origines de la monarchic prussienne (Paris, 1875) ; B. Gebhardt, Handbuch der deutschen Geschichte, Band ii. (Leipzig, 1901). (A. W. H.)*

BRANDENBURG, the central and one of the largest provinces of Prussia, consisting of a part of the former electorate of Brandenburg from which it derives its name. With the other territories of the elector of Brandenburg, it was merged in 1701 in the kingdom of Prussia, and when the administration of Prussia was reformed in 1815, Brandenburg became one of the provinces of Prussia. The boundaries of the new province, however, differed considerably from those of the old district. The old mark, the district on the left bank of the Elbe, was added to the province of Saxony, and in return a district to the south, taken from the kingdom of Saxony, was added to the pro- vince of Brandenburg. It has an area of 15,382 sq. m., and is divided into the two governments of Potsdam and Frankfort- on-Oder; the capital, Berlin, forming a separate jurisdiction. The province is a sandy plain interspersed with numerous fertile districts and considerable stretches of woodland, mostly pine and fir. Its barrenness was formerly

much exaggerated, when it was popularly described as the " sandbox of the Holy Roman Empire." It is generally well watered by tributaries of its two principal rivers, the Elbe and the Oder, and is besides remarkable for the number of its lakes, of which it contains between 600 and 700. The mineral products comprise lignite, limestone, gypsum, alum and potter's earth; barley and rye are the usual cereals; fruits and vegetables are abundant; and considerable quantities of hemp, flax, hops and tobacco are raised. The breeding of sheep receives much attention, and the province exports wool in considerable quantity. Bees are largely kept, and there is an abundance of game. The rivers and lakes also furnish fish, particularly carp, of excellent quality. The climate is cold and raw in winter, excessively hot in summer, and there are frequently violent storms of wind. The manufacturing industry of the province is both varied and extensive, but is for the most part concentrated in the principal towns. The most important branches are the spinning and weaving of wool and cotton, the manufacturing of paper, and the distillation of brandy. Pop.

(1895) 2,821,695; (1905) 3,529,839.

BRANDENBURG, a town of Germany, capital of the district and province of same name, on the river Havel, 36 m. S.W. from Berlin, on the main line to Magdeburg and the west. Pop. (1905) 51,251, including 3643 military. The town is enclosed by walls, and is divided into three parts by the river — the old town on the right and the new town on the left bank, while on an island between them is the " cathedral town," — and is also called, from its position, " Venice." Many of the houses are built on piles in the river. There are five old churches (Protestant), all more or less noteworthy. These are the Katharinenkirche (nave 1381-1401, choir c. 1410, western tower 1583-1585), a Gothic brick church with a fine carved wooden altar and several interest- ing medieval tombs; the Petrikirche (14th century Gothic); the cathedral (Domkirche), originally a Romanesque basilica (11 70), but rebuilt in the Gothic style in the 14th century, with a good altar-piece (1465), &c, and noted for its remarkable collection of medieval vestments; the Gothardskirche, partly Romanesque (1160), partly Gothic (1348); the Nikolaikirche (12th and 13th centuries), now no longer used. There is also a Roman Catholic church. Of other buildings may be mentioned the former town hall of the " old town " (Altstadt Rathaus), built in the 13th and 14th centuries, now used as government offices; the new Real- gymnasium; and the town hall in the Neustadt, before which, in the market-place, stands a Rolandssaule, a colossal figure 18 ft. in height, hewn out of a single block of stone. A little north of the town is the Marienberg, or Harlungerberg, on which the heathen temple of Triglaff and afterwards the church and convent of St Mary were built. On the top stands a lofty monument

to the soldiers from the Mark who fell in the wars of 1864, 1866 and 1870-71. The town has a considerable trade, with manufactures of woollens, silks, linens, hosiery and paper, as well as breweries, tanneries, boat-building and bicycle factories.

Brandenburg, originally Brennaburg (Brennabor) or Brendan- burg, was originally a town of the Slavic tribe of the Hevelli, from whom it was captured (927-928) by the German king Henry I. In 948 Otto I. founded a bishopric here, which was subordinated first to the archdiocese of Mainz, but from 968 onwards to the newly created archbishopric of Magdeburg. It was, however, destroyed by the heathen Wends in 983, and was only restored when Albert the Bear recaptured the town from them in 1153. In 1539 the bishop of Brandenburg, Matthias von Jagow, embraced the Lutheran faith, and five years later the Protestant worship was established in the cathedral. The see was administered by the elector of Brandenburg until 1598 and then abolished, its territories being for the most part incorporated in the electoral domains. The cathedral chapter, however, survived, and though suppressed in 18 10, it was restored in 1824. It consists of twelve canons, of whom three only are spiritual, the other nine prebends being held by noblemen; all are in the gift of the king of Prussia.

The " old " and " new " towns of Brandenburg were for centuries separate towns, having been united under a single municipality so late as 171 7.

See Schillmann, Geschichte der Stadt Brandenburg (Brandenburg,

1874-1882).

BRANDER, GUSTAVUS (1720-1787), English naturalist, who came of a Swedish family, was born in London in 1720, and was brought up as a merchant, in which capacity he achieved success and became a director of the Bank of England. His leisure time was occupied in scientific pursuits, and at his country residence at Christchurch in Hampshire he became interested in the fossils so abundant in the clays of Hordwell and Barton. A set of these was presented by him to the British Museum, and they were described by D. C. Solander in the beautifully illustrated work entitled Fossilia Hantoniensia collecta, et in Musaeo Britan- nico deposita a Gustavo Brander (London, 1766). Brander was elected F.R.S. in 1754, and he was also a trustee of the British Museum. He died on the 21st of January 1787.

BRANDES, GEORG MORRIS COHEN (1842-), Danish critic and literary

historian, was born in Copenhagen on the 4th of February 1842. He became a student in the university in 1859, and first studied jurisprudence. From this, however, his maturer taste soon turned to philosophy and aesthetics. In 1862 he won the gold medal of the university for an essay on The Nemesis Idea among the Ancients. Before this, indeed since 1858, he had shown a remarkable gift for verse-writing, the results of which, however, were not abundant enough to justify separate publication. Brandes, indeed, did not collect his poems till so late as 1898. At the university, which he left in 1864, Brandes was much under the influence of the writings of Heiberg in criticism and Soren Kierkegaard in philosophy, influences which have continued to leave traces on his work. In 1866 he took part in the controversy raised by the works of Rasmus Nielsen in a treatise on " Dualism in our Recent Philosophy." From 1865 to 1 87 1 he travelled much in Europe, acquainting himself with the condition of literature in the principal centres of learning. His first important contribution to letters was his Aesthetic Studies (1868), in which, in several brief monographs on Danish poets, his maturer method is already foreshadowed. In 1870 he published several important volumes, The French Aesthetics of Our Days, dealing chiefly with Taine, Criticisms and Portraits, and a translation of The Subjection of Women of John Stuart Mill, whom he had met that year during a visit to England. Brandes now took his place as the leading critic of the north of Europe, applying to local conditions and habits of thought the methods of Taine. He became docent or reader in Belles Lettres at the university of Copenhagen, where his lectures were the sensation of the hour. On the professorship of Aesthetics becoming vacant in 1872, it was taken as a matter of course that Brandes would be appointed. But the young critic had offended many sus-

ceptibilities by his ardent advocacy of modern ideas; he was known to be a Jew, he was convicted of being a Radical, he was suspected of being an atheist. The authorities refused to elect him, but his fitness for the post was so obvious that the chair of Aesthetics in the university of Copenhagen remained vacant, no one else daring to place himself in comparison with Brandes. In the midst of these polemics the critic began to issue the most ambitious of his works, Main Streams in the Literature of the Nineteenth Century, of which four volumes appeared between 1872 and 1875 (English translation, 1901-1905). The brilliant novelty of this criticism of the literature of the chief countries of Europe at the beginning of the 19th century, and his descrip- tion of the general revolt against the pseudo-classicism of the 18th century, at once attracted attention outside Denmark. The tumult which gathered round the person of the critic increased the success of the work, and the reputation of Brandes grew apace, especially in Germany and Russia. Among his later writings must be mentioned the monographs on Soren Kierke- gaard (1877), on Esaias

Tegntr (1878), on Benjamin Disraeli (1878), Ferdinand Lassalle (in German, 1877), Ltidvig Holberg (1884), on Henrik Ibsen (1899) and on Anatole France (1905). Brandes has written with great fulness on the main contemporary poets and novelists of his own country and of Norway, and he and his disciples have long been the arbiters of literary fame in the north. His Danish Poets (1877), containing studies of Carsten Hauch, Ludwig Bodtcher, Christian Winther, and Paludan- Miiller, his Men of the Modern Transition (1883), and his Essays (1889), are volumes essential to the proper study of modern Scandinavian literature. He wrote an excellent book on Poland (1888; English translation, 1903), and was one of the editors of the German version of Ibsen. In 1877 Brandes left Copenhagen and settled in Berlin, taking a considerable part in the aesthetic life of that city. His political views, however, made Prussia uncomfortable for him, and he returned in 1883 to Copenhagen, where he found a whole new school of writers and thinkers eager to receive him as their leader. The most important of his recent works has been his study of Shakespeare (1897-1898), which was translated into English by William Archer, and at once took a high position. It was, perhaps, the most authoritative work on Shakespeare, not principally intended for an English-speaking audience, which had been published in any country. He was afterwards engaged on a history of modern Scandinavian litera- ture. In his critical work, which extends over a wider field than that of any other living writer, Brandes has been aided by a singularly charming style, lucid and reasonable, enthusiastic without extravagance, brilliant and coloured without affectation. His influence on the Scandinavian writers of the 'eighties was very great, but a reaction, headed by Holger Drachmann, against his " realistic " doctrines, began in 1885 (see Denmark: Litera- ture). In 1900 he collected his works for the first time in a com- plete and popular edition, and began to superintend a German complete edition in 1902.

His brother Edvard Brandes (b. 1847), also a well-known critic, was the author of a number of plays, and of two psycho- logical novels: A Politician (1889), and Young Blood (1899).

BRANDING (from Teutonic brinnan, to burn), in criminal law a mode of punishment; also a method of marking goods or animals; in either case by stamping with a hot iron. The Greeks branded their slaves with a Delta, A, for AoOXos. Robbers and runaway slaves were marked by the Romans with the letter F (fur, fugitivus) ; and the toilets in the mines, and convicts condemned to figure in gladiatorial shows, were branded on the forehead for identification. Under Constantine the face was not permitted to be so disfigured, the branding being on the hand, arm or calf. The canon law sanctioned the punishment, and in France galley-slaves could be branded " TF " (travaux force's) until 1832. In Germany, however, branding was

illegal. The punishment was adopted by the Anglo-Saxons, and the ancient law of England authorized the penalty. By the Statute of Vagabonds (1547) under Edward VI. vagabonds, gipsies and brawlers were ordered to be branded, the first two with a large V on the breast, the last with F for " fraymaker." Slaves, too,

who ran away were branded with S on cheek or forehead. This law was repealed in 1636. From the time of Henry VII. branding was inflicted for all offences which received benefit of clergy (q.v.), but it was abolished for such in 1822. In 1698 it was enacted that those convicted of petty theft or larceny, who were entitled to benefit of clergy, should be " burnt in the most visible part of the left cheek, nearest the nose." This special ordinance was repealed in 1707. James Nayler, the mad Quaker, who in the year 1655 claimed to be the Messiah, had his tongue bored through and his forehead branded B for blasphemer.

In the Lancaster criminal court a branding-iron is still pre- served in the dock. It is a long bolt with a wooden handle at one end and an M (malefactor) at the other. Close by are two iron loops for firmly securing the hands during the operation. The brander, after examination, would turn to the judge and exclaim, " A fair mark, my lord." Criminals were formerly ordered to hold up their hands before sentence to show if they had been previously convicted.

Cold branding or branding with cold irons became in the 18th century the mode of nominally inflicting the punishment on prisoners of higher rank. " When Charles Moritz, a young German, visited England in 1782 he was much surprised at this i. 11s torn, and in his diary mentioned the case of a clergyman who had fought a duel and killed his man in Hyde Park. Found guilty of manslaughter he was burnt in the hand, if that could be called burning which was done with a cold iron " (Markham's Ancient Punishments of Northants, 1886). Such cases led to branding becoming obsolete, and it was abolished in 1820 except in the case of deserters from the army. These were marked with the letter D, not with hot irons but by tattooing with ink or gunpowder. Notoriously bad soldiers were also branded with BC (bad character). By the British Mutiny Act of 1858 it was enacted that the court-martial, in addition to any other penalty, may order deserters to be marked on the left side, 2 in. below the armpit, with the letter J), such letter to be not less than 1 in. long. In 1879 this was abolished.

See W. Andrews, Old Time Punishments (Hull, 1890) ; A. M. Earle, Curious Punishments of Bygone Days (London, 1896).

BRANDIS, CHRISTIAN AUGUST (1 790-1867), German philologist and historian of philosophy, was born at Hildesheim and educated at Kiel University. In 181 2 he graduated at Copenhagen, with a thesis Commentationes Eleaticae (a collection of fragments from Xenophanes, Parmenides and Melissus) . For a time he studied at Gottingen, and in 181 5 presented as his inaugural dissertation at Berlin his essay Von dem Begriff der Geschichte der Philosophie. In 18 16 he refused an extraordinary professorship at Heidelberg in order to accompany B. G. Niebuhr to Italy as secretary to the Prussian embassy. Subsequently he assisted I. Bekker in the preparation of his edition of Aristotle. In 182 1 he became professor of philosophy in the newly founded university of Bonn, and in 1823 published his Aristotelius et Theophrasti Metaphysica. With Boeckh and Niebuhr he edited the Rheinisches Museum, to which he contributed important articles on Socrates (1827, 1829). In 1836-1839 he was tutor to the young king Otho of Greece. His great work, the Handbuch der Geschichte der griechisch-rom. Philos. (1835-1866; republished in a smaller and more systematic form, Gesch. d. Enlwickelungen d. griech. Philos., 1862-1866), is characterized by sound criticism. Brandis died on the 21st of July 1867.

See Trendelenburg, Zur Erinnerung an C. A. B. (Berlin, 1868).

BRANDON, a city and port of entry of Manitoba, Canada, on the Assiniboine river, and the Canadian Pacific and Canadian Northern railways, situated 132 m. W. of Winnipeg, 1184 ft. above the sea. Pop. (1891) 3778; (1907) 12,519. It is in one of the finest agricultural sections and contains a government experimental farm, grain elevators, saw and grist mills. It was first settled in 1881, and incorporated as a city in 1882.

BRANDON, a market town in the Stowmarket parliamentary division of Suffolk, England, on the Little Ouse or Brandon river, 865 m. N.N.E. from London by the Ely-Norwich line of the Great Eastern railway. Pop. (1901) 2327. The church of St Peter is Early English with earlier portions; there is a free

grammar school founded in 1646; and the town has some carrying trade by the Little Ouse in corn, coal and timber. Rabbit skins of fine texture are dressed and exported. Extensive deposits of flint are worked in the neighbourhood, and the work of the " flint-knappers " has had its counterpart here from the earliest eras. of man. Close to Brandon, but in Norfolk across the river, at the village of Weeting, are the so-called Grimes' Graves, which, long supposed to show the foundations of a British village,

and probably so occupied, were proved by exca- vation to have been actually neolithic flint workings. The pits, though almost completely filled up (probably as they became exhausted), were sunk through the overlying chalk to the depth of 20 to 60 ft., and numbered 254 in all. Passages branched out from them, and among other remains picks of deer-horn were discovered, one actually bearing in the chalk which coated it the print of the workman's hand.

BRANDY, an alcoholic, potable spirit, obtained by the dis- tillation of grape wine. The frequently occurring statement that the word " brandy " is derived from the High German Brannlwein is incorrect, inasmuch as the English word (as Fairley has pointed out) is quite as old as any of its continental equivalents. It is simply an abbreviation of the Old English brandewine, brand-wine or brandy wine, the word " brand " being common to all the Teutonic languages of northern Europe, mean- ing a thing burning or that has been burnt. John Fletcher's Beggar's Bush (1622) contains the passage, " Buy brand wine "; and from the Roxburgh Ballads (1650) we have " It is more fine than brandewine." The word " brandy " came into familiar use about the middle of the 17 th century, but the expression " brandywine " was retained in legal documents until 1702 (Fairley). Thus in 1697 (View Penal Laws, 173) there occurs the sentence, " No aqua vitae or brandywine shall be imported into England." The British Pharmacopoeia formerly defined French brandy, which was the only variety mentioned (officially spiritus vini gallici), as " Spirit distilled from French wine; it has a characteristic flavour, and a light sherry colour derived from the cask in which it has been kept." In the latest edition the Latin title spiritus vini gallici is retained, but the word French is dropped from the text, which now reads as follows: " A spirituous liquid distilled from wine and matured by age, and containing not less than 36! % by weight or 43 1 % by volume of ethyl hydroxide." The United States Pharmacopoeia (1905), retains the Latin expression spiritus vini gallici (English title Brandy), defined as " an alcoholic liquid obtained by the dis- tillation of the fermented, unmodified juice of fresh grapes."

Very little of the brandy of commerce corresponds exactly to the former definition of the British Pharmacopoeia as regards colouring matter, inasmuch as trade requirements necessitate the addition of a small quantity of caramel (burnt sugar) colouring to the spirit in the majority of cases. The object of this is, as a rule, not that of deceiving the consumer as to the apparent age of the brandy, but that of keeping a standard article of commerce at a standard level of colour. It is practically impossible to do this without having recourse to caramel colour- ing, as, practically speaking, the contents of any cask will always differ slightly, and often very appreciably, in colour intensity from the contents of another cask, even though the age and quality of the spirits are identical.

The finest brandies are produced in a district covering an area of rather less than three million acres, situated in the departments of Charente and Charente Inferieure, of which the centre is the town of Cognac. It is generally held that only brandies produced within this district have a right to the name " cognac." The Cognac district is separated into district zones of production, according to the quality of the spirit which each yields. In the centre of the district, on the left bank of the Charente, is the Grande Champagne, and radiating beyond it are (in order of merit of the spirit produced) the Petite Champagne, the Borderies (or Premiers Bois), the Fins Bois, the Bons Bois, the Bois Ordinaires, and finally the Bois communs dits a terroir. Many hold that the brandy produced in the two latter districts is not entitled to the name of " cognac, " but this is a matter of controversy, as

is also the question as to whether another district called the Grande Fine Champagne, namely, that in the immediate neigh- bourhood of the little village of Juillac-le-Coq, should be added to the list. The pre-eminent quality of the Cognac brandies is largely due to the character of the soil, the climate, and the scientific and systematic cultivation of the vines. For a period — from the

which increases with age, furfural, which decreases, and small quantities of other matters of which we have as yet little knowledge.

The table gives analyses, by the present author (excepting No . 3 , which is by F. Lusson) , of undoubtedly genuine commercial cognac brandies of various ages.

Genuine Cognac Brandies. (Excepting the alcohol, results are expressed in grammes per 100 litres of absolute alcohol.)

Age, &c.

Alcohol % by vol.

Total Acid.

Non-volatile Acid.

Esters.

” Higher Alcohols.”

Aldehyde.

Furfural.

New 1904 …. New, still heated by steam coil

New

Five years old, 1900 vintage 1875 vintage, pale

1.

12.

4-

5- . . . .

j 6. 1848 vintage, brown

6i-7

56-3 677

577 467

38-5

45 22

5i

92

144 254

5 4

37

37

109

82 61 158 125 177 190

125 100

.152 261

3 6

55 32

2-3

1-2

1-3

1-0 2-1

Note. — In the above table the acid is expressed in terms of acetic acid, the esters are expressed as ethyl acetate, and the aldehyde as acetaldehyde. The " Higher Alcohol " figures do not actually represent these substances, but indicate the relative coloration obtained with sulphuric acid when compared with an iso-butyl standard under certain conditions.

middle ' seventies to the 'nineties of the 19th century — the cognac industry was, owing to the inroads of the phylloxera, threatened with almost total extinction, but after a lengthy series of experi- ments, a system of replanting and hybridizing, based on the characteristics of the soils of the various districts, was evolved, which effectually put a stop to the further progress of the disease. In 1907 the area actually planted with the vine in the Cognac district proper was about 200,000 acres, and the production of cognac brandy, which, however, varies widely in different years, may be put down at about five million gallons per annum. The latter figure is based on the amount of wine produced in the two Charentes (about forty-five million gallons in 1905).

Brandy is also manufactured in numerous other districts in France, and in general order of commercial merit may be men- tioned the brandies of Armagnac, Marmande, Nantes and Anjou. The brandies commanding the lowest prices are broadly known as the Tro is-S ix de Monlpellier. In a class by themselves are the Eaux-de-vic de Marc, made from the wine pressings or from the solid residues of the stills. Some of these, particularly

those made in Burgundy, have characteristic qualities, and are considered by many to be very fine. The consumption is chiefly local. Brandy of fair quality is also made in other wine-producing countries, particularly in Spain, and of late years colonial (Australian and Cape) brandies have attracted some attention. The comsumption of brandy in the United Kingdom amounts to about two million gallons.

Brandy, in common with other potable spirits, owes its flavour and aroma to the presence of small quantities of substances termed secondary or by-products (sometimes "impurities"). These are dissolved in the ethyl alcohol and water which form over 99 % of the spirit. The nature and quantity of all of these by-products have not yet been fully ascertained, but the know-ledge in this direction is rapidly progressing. Ch. Ordonneau fractionally distilled 100 litres of 25-year-old cognac brandy, and obtained the following substances and quantities thereof: —

Grammes in 100 Litres.

Normal propyl alcohol 40-0

Normal butyl alcohol 218-6

Amyl alcohol 83-8

Hexyl alcohol 0-6

Heptyl alcohol 1-5

Ethyl acetate 35-0

Ethyl propionate, butyrate and caproate . . 3-0

Oenanthic ether (about) 4-0

Aldehyde 3'0

Acetal traces

Amines traces

Most of the above substances, in fact probably all of them, excepting the oenanthic ether, are contained in other spirits, such as whisky and rum. The oenanthic ether (ethyl pelar- gonate) is one of the main characteristics which enable us chemically to differentiate between brandy and other distilled liquors. Brandy also contains a certain quantity of free acid,

Storage and Maturation. — Brandy is stored in specially selected oak

casks, from which it extracts a certain quantity of colouring matter and tannin, &c. Commercial cognac brandies are gener- ally blends of different growths and vintages, the blending being accomplished in large vats some little time prior to bottling. The necessary colouring and sweetening matter is added in the vat. In the case of pale brandies very little colouring and sweetening are added, the usual quantity being in the neighbour- hood of I to 1 %. Old " brown brandies," which are nowadays not in great demand, require more caramel and sugar than do the pale varieties. The preparation of the "liqueur," as the mixed caramel and sugar syrup is termed, is an operation requir- ing much experience, and the methods employed are kept strictly secret. Fine " liqueur " is prepared with high-class brandy, and is stored a number of years prior to use. Brandy, as is well known, improves very much with age (for chemical aspects of maturation see Spirits), but this only holds good when the spirit is in wood, for there is no material appreciation in quality after bottling. It is a mistake to believe, however, that brandy improves indefinitely, even when kept in wood, for, as a matter of fact, after a certain time — which varies considerably according to the type of brandy, the vintage, &c. — there is so much evapora- tion of alcohol that a number of undesirable changes come about. The brandy begins to " go back," and becomes, as it is called, " worn " or " tired." It is necessary, therefore, that the bottling should not be deferred too long. Sometimes, for trade reasons, it is necessary to keep brandy in cask for a long period, and under these conditions the practice is to keep a series of casks, which are treated as follows: — The last cask is kept filled by occasionally adding some spirit from the cask next in order, the latter is filled up by spirit taken from the third cask from the end, and so on, until the first cask in the row is reached. The latter is filled up or " topped " with some relatively fresh spirit.

Brandy is much employed medicinally as a food capable of supplying energy in a particularly labile form to the body, as a stimulant, carminative, and as a hypnotic.

Adulteration. — A good deal has been written about the pre- paration of artificial brandy by means of the addition of essential oils to potato or beetroot spirit, but it is more than doubtful whether this practice was really carried on on a large scale formerly. What undoubtedly did occur was that much beet, potato or grain spirit was used for blending with genuine grape spirit. Prosecutions under the Food and Drugs Act, by certain English local authorities in the year 1904, resulted in the practical fixation of certain chemical standards which, in the opinion of the present writer, have, owing to their arbitrary and unscientific nature, resulted in much adulteration of a type previously non-existent. There is no doubt that at the present time artificial esters and higher alcohols, &c, are being used on an extensive scale for the preparation of cheap brandies, and the position, in this

respect, therefore, has not been inproved. Where formerly fraud was practically confined to the blending

of genuine brandy with spirit other than that derived from the grape, it is now enhanced by the addition of artificial essences to the blend of the two spirits. (P. S.)

BRANDYWINE, the name of a stream in Pennsylvania and Delaware, U.S.A., which runs into the Delaware river a few miles east of Wilmington, Delaware. It is famous as the scene of the battle of Brandywine in the American War of Independence, fought on the nth of September 1777 about 10 m. north-west of Wilmington, and a few miles inside the Pennsylvania border. Sir William Howe, the British commander-in-chief, while opposed to Washington's army in New Jersey, had formed the plan of capturing Philadelphia from the south side by a movement by sea to the head of Delaware Bay. But contrary winds and accidents delayed the British transports so long that Washington, who was at first puzzled, was able to divine his opponents' intentions in time; and rapidly moving to the threatened point he occupied a strong entrenched position at the fords over the Brandywine, 25 m. south-west of Philadelphia. Here on the nth of September the British attacked him. Howe's plan, which was carefully worked out and exactly executed, was to deliver an energetic feint attack against the American front, to take a strong column 12 m. up the stream, and crossing beyond Washington's right to attack his entrenchments in rear. Washington was successfully held in play during the movement, and General Sullivan, the commander of the American right wing, misled by the conflicting intelligence which reached him from up-stream, was surprised about noon by definite information as to the approach of Cornwallis on his right rear. Changing front " right back " in the dense country, he yet managed to oppose a stubborn resistance to the flanking attack, and with other troops that were hurried to the scene his division held its ground for a time near Birmingham meeting-house. But Howe pressed his attack sharply and drove back the Americans for 2 m. ; the holding attack of the British right was converted into a real one, and by nightfall Washington was in full retreat north- ward toward Chester, protected by General Greene and a steady rear-guard, which held off Howe's column for the necessary time. The British Were too exhausted to pursue, and part of Howe's force was inextricably mixed up with the advancing troops of the frontal attack. The American loss in killed, wounded and prisoners was about 1000; that of the British less than 600. Howe followed up his victory, and on the 27th of September entered Philadelphia.

BRANFORD, a township, including a borough of the same name, in New Haven county, Connecticut, U.S.A., at the mouth of the Branford river and at the head of a short arm of Long Island Sound, about 7 m. E.S.E. of New Haven. Pop. of the township (1890) 4460; (1900) 5706 (1968 foreign-born) ;(i 910) 6047; of the borough (1910) 2560. The borough is served by the New York, New Haven & Hartford railway, and by an electric line connecting with New Haven. A range of rocky hills commands fine views of the Sound, the shore is deeply indented, the harbour and bays are dotted with islands, and the harbour is deep enough for small craft, and these natural features attract many visitors during the summer season. In Branford is the James Blackstone Memorial library (1896), designed by Solon Spencer Beman (b. 1853) in the Ionic style (the details being taken from the Erechtheum at Athens). On the interior of the dome which covers the rotunda are a series of paintings by Oliver Dennett Grover (b. 1861) illustrating the evolution of book- making, and between the arches are medallion portraits, by the same artist, of New England authors — Longfellow, Emerson, Hawthorne, Lowell, Bryant, Whittier, Holmes and Mrs Stowe. The library was erected by Timothy B. Blackstone (1829-1900), a native of Branford, and president of the Chicago & Alton railway from 1864 to 1899 — as a memorial to his father, a descendant of William Blackstone (d. 1675), the New England pioneer. The principal industries of Branford are the manu- facture of malleable iron fittings, locks and general hardware, the quarrying of granite, and oyster culture.

The territory of Totoket (now the township of Branford) was purchased from the Indians by the New Haven Plantation, in

December 1638, for eleven coats of trucking cloth and one coat of English cloth, but with the reservation for a few Indians of what is still known as Indian Neck. In 1640 the general court of New Haven granted it to the Rev. Samuel Eaton (iS96?-i66s), a brother of Theophilus Eaton, on condition that he brought friends from England to settle it. As Eaton went to England and did not return, Totoket was granted in 1644 to settlers mostly from Wethersfield, Conn., on condition that they should organize a church state after the New Haven model and join the New Haven Jurisdiction. The settlement was made in the same year, and about two years later several new families came from Southampton, Long Island, under the leadership of the Rev. Abraham Pierson (c. 1608-1678), an ardent advocate of the church state, who was chosen pastor at Totoket. The present name of the township, derived from Brentford, England, was adopted about 1645. After the members of the New Haven Jurisdiction had submitted to Connecticut, Pierson, in 1666-1667, led the most prominent citizens of Branford to New Jersey, where they were leaders in founding Newark. The borough of Branford was incorporated in 1893.

See E. C. Baldwin, Branford Annals, in Papers of New Haven Colony Historical Society (New Haven, 1882 and 1888).

BRANGWYN, FRANK (1867-), English painter, was born at Bruges, and received his first instruction from his father, the owner of an establishment for church embroideries and kindred objects, who took a leading part in the Gothic revival under Pugin. When the family moved to England, Brangwyn attracted the attention of William Morris by a drawing on which he was engaged at South Kensington museum. He worked for some time in Morris's studio, and then travelled more than once to the East, whereby his sense of colour and the whole further develop- ment of his art became deeply influenced. Indeed, the impres- sions he then received, and his love of Oriental decorative art — tiles and carpets — exercised a greater influence on him than any early training or the works of any European master. His whole tendency is essentially decorative: a colour-sense of sumptuous richness is wedded to an equally strong sense of well-balanced, harmonious design. These qualities, together with a summary suppression of the details which tie a subject to time and place, give his compositions a nobly impressive and universal character, such as may be seen in his decorative panel " Modern Commerce " in the ambulatory of the Royal Exchange, London. Among other decorative schemes executed by him are those for "L'Art nouveau" in the rue de Provence, Paris; for the hall of the Skinners' Company, London; and for the British room at the Venice International Exhibition, 1905. The Luxembourg museum has his " Trade on the Beach "; the Venice municipal museum, the "St Simon Stylites"; the Stuttgart gallery, the " St John the Baptist "; the Munich Pinakothek, the " Assisi "; the Carnegie Institute in Pittsburg, his " Sweetmeat Seller "; the Prague gallery, his " Turkish Boatmen "; and the National Gallery of New South Wales, " The Scoffers." Brangwyn embarked successfully in many fields of applied art, and made admirable designs for book decoration, stained glass, furniture, tapestry, metal-work and pottery. He devoted himself exten- sively to etching, and executed many plates of astonishing vigour and dramatic intensity. He was elected associate of the Royal Academy in 1904.

BRANKS. (probably akin to Irish brancas, a halter; Ger. Pranger, fetter, pillory), or Scolding-Bridle, a contrivance formerly in use throughout England and Scotland for the punishment of scolding women. It is said to have originated in the latter country. It seems to have never been a legalized form of punishment; but corporations and lords of manors in England, town councils, kirk-sessions and barony courts in Scotland assumed a right to inflict it. While specially known as the " Gossip's or Scold's Bridle " the branks was also used for women convicted of petty offences, breaches of the peace, street-brawling and abusive language. It was the equivalent of the male punish- ments of the stocks and pillory. In

its earliest form it consisted of a hoop head-piece of iron, opening by hinges at the side so as to enclose the head, with a flat piece of iron projecting inwards

so as to fit into the mouth and press the tongue down. Later it was made, by a multiplication of hoops, more like a cage, the front forming a mask of iron with holes for mouth, nose and eyes. Sometimes the mouth-plate was armed with a short spike. With this on her head the offending woman was marched through the streets by the beadle or chained to the market-cross to be gibed at by passers. The date of origin is doubtful. It was used at Edinburgh in 1567, at Glasgow in 1574, but not before the 17th century in any English town. A brank in the church of Walton- on-Thames, Surrey, bears date 1633; while another in a private collection has the crowned cipher of William III. The Ashmolean Museum at Oxford, the Scottish National Museum of Antiquities at Edinburgh, the towns of Lichfield, Shrewsbury, Leicester and Chester have examples of the brank. As late as 1856 it was in use at Bolton-le-Moors, Lancashire.

See W. Andrews, Old Time Punishments (Hull, 1890); A. M. Earle, Curious Punishments of Bygone Days (Chicago, 1896).

BRANT, JOSEPH (1742-1807), American Indian chief of the Mohawk tribe, known also by his Indian name, Thayendanegea, was born on the banks of the Ohio river in 1742. In early youth he attracted the attention of Sir William Johnson, who sent him to be educated by Dr Eleazar Wheelock at Lebanon, Conn., in Moor's Indian charity school, in which Dartmouth College had its origin. He took part, on the side of the English, in the French and Indian War, and in 1763 fought with the Iroquois against Pontiac. Subsequently he settled at Canajoharie, or Upper Mohawk Castle (in what is now Montgomery county, New York), where, being a devout churchman, he devoted himself to missionary work, and translated the Prayer Book and St Mark's Gospel into the Mohawk tongue (1787). When Guy Johnson (1 740-1 788) succeeded his uncle, Sir William, as superintendent of Indian affairs in 1774, Brant became his secretary. At the outbreak of the War of Independence, he remained loyal, was commissioned colonel, and organized and led the Mohawks and other Indians allied to the British against the settlements on the New York frontier. He took part in the Cherry Valley Massacre, in the attack on Minisink and the expedition of General St Leger which resulted in the battle of Oriskany on the 6th of August 1777. After the war he discouraged the continuance of Indian warfare on the frontier, and aided the commissioners of the United States in securing treaties of peace with the Miamis and other western tribes. Settling in Upper Canada, he again

devoted himself to missionary work and in 1786 visited England, where he raised funds with which was erected the first Episcopal church in Upper Canada. His character was a peculiar compound of the traits of an Indian warrior — with few rivals for daring leadership — and of a civilized politician and diplomat of the more conservative type. He died on an estate granted him by the British government on the banks of Lake Ontario on the 24th of November 1807. A monument was erected to his memory at Brantford, Ontario, Canada (named in his honour) in 1886.

See W. L. Stone, Life of Joseph Brant (2 vols., New York, 1838; new ed., Albany, 1865) ; Edward Eggleston and Elizabeth E. Seelye, Brant and Red Jacket in " Famous American Indians " (New York, 1879); and a Memoir (Brantford, 1872).

BRANT, SEBASTIAN (1457-1521), German humanist and satirist, was born at Strassburg about the year 1457. He studied at Basel, took the degree of doctor of laws in 1489, and for some time held a professorship of jurisprudence there. Returning to Strassburg, he was made syndic of the town, and died on the 10th of May 1521. He first attracted attention in humanistic circles by his Latin poetry, and edited many ecclesiastical and legal works; but he is now only known by his famous satire, Das Narrenschiff '(1494), a work the popularity and influence of which were not limited to Germany. Under the form of an allegory — a ship laden with fools and steered by fools to the fools' paradise of Narragcnia — Brant here lashes with unsparing vigour the weaknesses and vices of his time. Although, like most of the German humanists, essentially conservative in his religious views, Brant's eyes were open to the abuses in the church, and the Narrenschiff was a most effective preparation for the Protestant Reformation. Alexander Barclay's Ship of Fools (1500) is a free imitation of the German poem, and a Latin version by

Jacobus Locher (1497) was hardly less popular than the German original. There is also a large quantity of other " fool literature." Nigel, called Wireker (fl. 1190), a monk of Christ Church Priory, Canterbury, wrote a satirical Speculum stultorum, in which the ambitious and discontented monk figured as the ass Brunellus, who wanted a longer tail. Brunellus, who has been educated at Paris, decides to found an order of fools, which shall combine the good points of all the existing monastic orders. Cock Lovell's Bote (printed by Wynkyn de Worde, c. 1510) is another imitation of the Narrenschiff. Cock Lovell is a fraudulent currier who gathers round him a rascally collection of tradesmen. They sail off in a riotous fashion up hill and down dale throughout England. Brant's other works, of which the chief was a version of Freidank's Bescheidenheit (1508), are of inferior

interest and importance.

Brant's Narrenschiff has been edited by F. Zarncke (1854); by K. Goedeke (1872) ; and by F. Bobertag (Kiirschner's Deutsche Nationattiteratur, vol. xvi., 1889). A modern German translation was published by K. Simrock in 1872. On the influence of Brant in England see especially C. H. Herford, The Literary Relations of England and Germany in the 16th Century (1886).

BRANTFORD, a city and port of entry of Ontario, Canada, on the Grand river, and on the Grand Trunk, and Toronto, Hamilton & Buffalo railways. The river is navigable to within 2\ m. of the town; for the remaining distance a canal has been constructed. Agricultural implements, plough, engine, bicycle and stove works, potteries and large railway shops constitute the important industrial establishments. It contains an institute for the education of the blind, maintained by the provincial government, and a women's college. The city is named in honour of the Mohawk Indian chief, Joseph Brant (Thayendanegea), who settled in the neighbourhood after the American War of Independence, in which he had led the Six Nations (Iroquois) on the British side. The amalgamated tribes of the Six Nations still make it their headquarters, and a monument to Brant has been erected in Victoria Square. Brantford is one of the most flourishing industrial towns of the province, and its population rose from 9616 in 1881 to 20,713 in 1907.

BRANTINGHAM, THOMAS DE (d. 1394), English lord treasurer and bishop of Exeter, came of a Durham family. An older relative, Ralph de Brantingham, had served Edward II. and Edward III., and Thomas was made a clerk in the treasury. Edward III-, obtained preferment for him in the church, and from 1361 to 1368 he was employed in France in responsible positions. He was closely associated with William of Wykeham, and while the latter was in power as chancellor, Brantingham was lord treasurer (1369-1371, and 1377-1381), being made bishop of Exeter in 1370. He continued to play a prominent part in public affairs under Richard II., and in 1389 was again lord treasurer for a few months. He died in 1394 and was buried in Exeter cathedral.

BRANT6ME, PIERRE DE BOURDEILLE, Seigneur and Abbe de (c. 1540-1614), French historian and biographer, was born in Perigord about 1 540. He was the third son of the baron de Bourdeille. His mother and his maternal grandmother were both attached to the court of Marguerite of Valois, and at her death in 1549 he went to Paris, and later (1555) to Poitiers, to finish his education. He was given several benefices, the most important of which was the abbey of Brantome (see below), but he had no inclination for an ecclesiastical career. At an early age he entered the

profession of arms. He showed himself a brave soldier, and was brought into contact with most of the great leaders who were seeking fame or fortune in the wars that distracted the continent. He travelled much in Italy; in Scotland, where he accompanied Mary Stuart (then the widow of Francis I.); in England, where he saw Queen Elizabeth (1561, 1579); in Morocco (1564); and in Spain and Portugal. He fought on the galleys of the order of Malta, and accompanied his great friend, the French commander Philippe Strozzi (grandson of Filippo Strozzi, the Italian general, and nephew of Piero), in his expedition against Terceira, in which Strozzi was killed (1582). During the wars of religion under Charles IX. he fought in the ranks of the Catholics, but he allowed himself to be won over temporarily by the ideas of the

reformers, and though he publicly separated himself from Protestantism it had a marked effect on his mind. A fall from his horse compelled him to retire into private life about 1589, and he spent his last years in writing his Memoirs of the illustrious men and women whom he had known. He died on the 15th of July

1614.

Brantome left distinct orders that his manuscript should be printed; a first edition appeared, however, late (1665-1666) and not very complete. Of the later editions the most valuable are: one in 15 volumes (1740); another by Louis Jean Nicolas Monmerque (1780-1860) in 8 volumes (1821-1824), reproduced in Buchan's Pantheon litteraire; that of the Bibliotheque elzi virienne, begun (1858) by P. Merimee and L. Lacour, and finished, with vol. xiii., only in 1893; and Lalanne's edition for the Societe de l'Histoire de France (12 vols., 1864-1896). Brantome can hardly be regarded as a historian proper, and his Memoirs cannot be accepted as a very trustworthy source of information. But he writes in a quaint conversational way, pouring forth his thoughts, observations or facts without order or system, and with the greatest frankness and naivete\ His works certainly gave an admirable picture of the general court-life of the time, with its unblushing and undisguised profligacy. There is not a homme ittustre or a dame galanle in all his gallery of portraits who is not stained with vice; and yet the whole is narrated with the most complete unconsciousness that there is anything objectionable in their conduct.

The edition of L. Lalanne has great merit, being the first to indicate the Spanish, Italian and French sources on which Brantome drew, but it did

not utilize all the existing MSS. It was only after Lalanne's death that the earliest were obtained for the Bibliotheque Nationale. At Paris and at Chantilly (Musee Conde) all Brant6me's original MSS., as revised by him several times, are now collected (see the Bibliotheque de I'ecole des Charles, 1904), and a new and definitive edition has therefore become possible. Brant6me's poems (which amount to more than 2200 verses) were first published in 1881 ; see Lalanne's edition.

BRANTOME, a town of south-western France, in the depart- ment of Dordogne, 20 m. N. by W. of Perigueux by steam- tramway. Pop. (1906) 1230. The town is built, in great part, on an island in the river Dronne. It is well known for the remains of an abbey founded by Charlemagne about 770 and afterwards destroyed by the Normans. The oldest existing portion is a square tower dating from the nth century, built upon a rock beside the church which it overlooks. It communicates by a staircase with the church, a rectangular building partly Roman- esque, partly Gothic, to the west of which are the remains of a cloister. The abbey buildings date from the 18th century, and now serve as hotel-de-ville, magistrature and schools. Caves in the neighbouring rocks were inhabited by the monks before the building of the abbey; one of them, used as an oratory, con- tains curious carvings, representing the Last Judgment and the Crucifixion. In the middle of the 16th century Pierre de Bour- deille came into possession of the abbey, from which he took the 'name of Brantome.

Brantome has some old houses and a church of the 15th century, which was once fortified and is now used as a market. Truffles are the chief article of commerce; and there are quarries of freestone in the neighbourhood. The dolmen which is known as Pierre-Levee, to the east of the town, is the most remarkable in Perigord.

BRANXHOLM, or Branksome, a feudal castle, now modern- ized, and an ancient seat of the Buccleuchs, on the Teviot, 3 m. S.W. of Hawick, Roxburgh, Scotland. It was at Branksome Hall that Sir Walter Scott laid the scene of The Lay of the Last Minstrel.

BRANXTON, or Brankston, a village of Northumberland, England, io| m. E. by N. of Kelso, and 2 m. E.S.E. of Coldstream, and 10 m. N.W. of Wooler. It was on Branxton Hill, immedi- ately south of the village, that the battle of Flodden (q.v.) was fought between the English and the Scots on the 9th of September 1513. During the fight the Scots centre pushed as far as Branxton church, but " the King's Stone," which lies N.W. of the church and is popularly supposed to mark the spot where James IV. fell, is some three-quarters of a mile from the scene

of the battle; it is believed in reality to mark the sepulchre of a chieftain,

whose name had already perished in the 16th century. Branxton church, dedicated to St Paul, was rebuilt in 1849 in Norman style. Of the older building nothing remains save the chancel arch.

BRAOSE, WILLIAM DE (d. 1211), lord of Brecknock, Radnor and Limerick, spent the early part of his life fighting the Welsh in Radnorshire. He was high in King John's favour, received a large number of honours, and was even given the custody of Prince Arthur. But John and he quarrelled, probably over money (1207). In 1208 John began to suspect the fidelity of the whole family, and William had to fly to Ireland. After a number of attempted reconciliations, he was outlawed (1210) and died at Corbeil (12 n). It is said that his wife and son were starved to death by John.

See Foedera, i. 107; Histoire des dues (ed. Michel), Wendover; Kate Norgate's John Lackland.

A descendant, William de Braose (d. 1326), lord of Gower, was a devoted follower of Edward I., and in 1299 was summoned to parliament as baron de Braose; and his nephew Thomas de Braose (d. 1361) also distinguished himself in the wars and was summoned as baron de Braose in 1342. This latter barony became extinct in 1399; but a claim to the barony of William de Braose, which, as he had no son, fell into abeyance between his two daughters and co-heirs, Alina (wife of Lord Mowbray) and Joan (wife of John de Bohun), or their descendants, may still be traced by careful genealogists in various noble English families.

BRASCASSAT, JACQUES RAYMOND (1804-1867), French painter, was born at Bordeaux, and studied art in Paris, where in 1825 he won a prix de Rome with a picture (" Chasse de Meleagre ") now in the Bordeaux gallery. He went to Italy and painted a number of landscapes which were exhibited between 1827 and 1835; but subsequently he devoted himself mainly to animal-painting, in which his reputation as an artist was made. His " Lutte de taureaux " (1837), in the musie at Nantes, and his " Vache attaquee par des loups " (1845), in the Leipzig museum, were perhaps the best of his pictures; but he was remarkable for his accuracy of observation and correct drawing. He was elected a member of the Institute in 1846. He died at Paris on the 28th of February 1867.

BRAS D'OR, a landlocked and tideless gulf or lake of high irregular outline, 50 m. long by 20 m. broad, almost separating Cape Breton Island (province of Nova Scotia, Canada) into two parts. A ship canal across the isthmus (about 1 m. wide) completes the severance of the island. The entrance to the gulf is on the N.E. coast of the island, and it is connected with the Atlantic by the Great and Little Bras d'Or channels, which are

divided by Boulardeire Island. One channel is 25 m. long and from J m. to 3 m. broad, but is of little depth, the other (used by shipping) is 22 m. long, 1 to if m. wide, and has a depth of 60 fathoms. The gulf or lake is itself divided into two basins, the inner waters being known as the Great Bras d'Or Lake. The waters are generally from 12 to 60 fathoms deep, but in the outer basin (known as the Little Bras d'Or Lake) are sound- ings said to reach nearly 700 ft. The shores of the gulf are very picturesque and well wooded and have attracted many tourists. Sea fishing (cod, mackerel, &c.) is the chief industry. The name is said to be a corruption of an Indian word, but it assumed its present form during the French occupation of Cape Breton Island.

BRASDOR, PIERRE (1721-1799), French surgeon, was born in the province of Maine. He took his degree in Paris as master of surgery in 1752, and was appointed regius professor of anatomy anddirector of the Academy of Surgery. He was a skilful operator, whose name was long attached to a ligature of his invention; and he was an ardent advocate of inoculation. He died in Paris on the 28th of September 1799.

BRASIDAS (d.422 B.C.), a Spartan officer during the first decade of the Peloponnesian War. He was the son of Tellis and Argileonis, and won his first laurels by the relief of Methone, which was besieged by the Athenians (431 B.C.). During the

following year he seems to have been eponymous ephor (Xen. Hell. ii. 3, 10), and in 429 he was sent out as one of the three commissioners (

In the next year, while Brasidas mustered a force at Corinth for a campaign in Thrace, he frustrated an Athenian attack on Megara (Thuc. iv. 70-73), and immediately afterwards marched through Thessaly at the head of 700 helots and 1000 Pelopon- nesian mercenaries to join the Macedonian king Perdiccas. Refusing to be made a tool for the furtherance of Perdiccas's ambitions, Brasidas set about the accomplishment of his main object, and, partly by the rapidity and boldness of his movements, partly by his personal charm and the moderation of his demands, succeeded during the course of the winter in winning over the important cities of Acanthus, Stagirus, Amphipolis and Torone as well as a number of minor towns. An attack on Eion was foiled by the arrival of Thucydides, the historian, at the head of an Athenian squadron. In the spring of 423 a truce was con- cluded between Athens and Sparta, but its operation was at once imperilled by Brasidas's refusal to give up Scione, which, the Athenian

partisans declared, revolted two days after the truce began, and by his occupation of Mende shortly afterwards. An Athenian fleet under Nicias and Nicostratus recovered Mende and blockaded Scione, which fell two years later (421 B.C.). Meanwhile Brasidas joined Perdiccas in a campaign against Arrhabaeus, king of the Lyncesti, who was severely defeated. On the approach of a body of Illyrians, who, though summoned by Perdiccas, unexpectedly declared for Arrhabaeus, the Mace- donians fled, and Brasidas's force was rescued from a critical position only by his coolness and ability. This brought to a head the quarrel between Brasidas and Perdiccas, who promptly concluded a treaty with Athens, of which some fragments have survived (I.G. i. 42).

In April 422 the truce with Sparta expired, and in the same summer Cleon was despatched to Thrace, where he stormed Torone and Galepsus and prepared for an attack on Amphipolis. But a carelessly conducted reconnaissance gave Brasidas the opportunity for a vigorous and successful sally. The Athenian army was routed with a loss of 600 men and Cleon was slain. On the Spartan side only seven men are said to have fallen, but amongst them was Brasidas. He was buried at Amphipolis with impressive pomp, and for the future was regarded as the founder (oi/aorˆs) of the city and honoured with yearly games and sacrifices (Thuc. iv. 78-v. 11). At Sparta a cenotaph was erected in his memory near the tombs of Pausanias and Leonidas, and yearly speeches were made and games celebrated in their honour, in which only Spartiates could compete (Paus. iii. 14).

Brasidas united in himself the personal courage characteristic of Sparta with those virtues in which the typical Spartan was most signally lacking. He was quick in forming his plans and carried them out without delay or hesitation. With an oratorical power rare amongst the Lacedaemonians he combined a con- ciliatory manner which everywhere won friends for himself and for Sparta (Thuc. iv. 81).

See in particular Thucydides, ii.-v. ; what Diodorus xii. adds is mainly oratorical elaboration or pure invention. A fuller account will be found in the histories of Greece (e.g. those of Grote, Beloch, Busolt, Meyer) and in G. Schimmelpfeng, De Brasidae Spartani rebus gestis atque ingenio (Marburg, 1857).

BRASS, a river, town and district of southern Nigeria, British West Africa. The Brass river is one of the deltaic branches of the Niger, lying east of the Rio Nun or main channel of the river. From the point of divergence from the main stream to the sea the Brass has a course of about 100 m., its mouth being in 6° 20′ E., 4° 35′ N. Brass town is a flourishing trading settle- ment at the mouth of the river. It is the headquarters of a dis- trict commissioner and the seat of a native court. Its most conspicuous building

is a fine church, the gift of a native chief. The capital of the Brass tribes is Nimbe, 30 m. up river.

The Brass river, called by its Portuguese discoverers the Rio Bento, is said to have received its English name from the brass

rods and other brass utensils imported by the early traders in exchange for palm-oil and slaves. The Brass natives, of the pure negro type, were noted for their savage character. In 1856 their chiefs concluded a treaty with Great Britain agreeing to give up the slave-trade in exchange for a duty on the palm-oil exported. Finding their profitable business as middlemen between the up-river producer and the exporter threatened by the appearance of European traders, they made ineffective complaints to the British authorities. The establishment of the Royal Niger Company led to further loss of trade, and on the 29th of January 1895 the natives attacked and sacked the company's station at Akassa on the Rio Nun, over forty prisoners being killed and eaten as a sacrifice to the fetish gods. In the following month a punitive expedition partially destroyed Nimbe, and a heavy fine was paid by the Brass chiefs. Since then the country has settled down under British administration. The trade regulations of which complaint had been made were removed in 1900 on the establishment of the protectorate of Southern Nigeria (see Nigeria).

Valuable information concerning the country and people will be found in the Report by Sir John Kirk on the Disturbances at Brass {Africa, No. 3, 1896).

BRASS (0. Eng. braes), an alloy consisting mainly if not exclusively of copper and zinc; in its older use the term was applied rather to alloys of copper and tin, now known as bronze (q.v.). Thus the brass of the Bible was probably bronze, and so also was much of the brass of later times, until the distinction between zinc and tin became clearly recognized. The Latin word aes signifies either pure copper or bronze, not brass, but the Romans comprehended a brass compound of copper and zinc under the term orichalcum or aurichalcum, into which Pliny states that copper was converted by the aid of cadmia (a mineral of zinc).

In England there is good evidence of the manufacture of brass with zinc at the end of the 16th century, for Queen Elizabeth by patent granted to William Humfrey and Christopher Schutz the exclusive right of working calamine and making brass. This right subsequently devolved upon a body called the " Governors, Assistants and Societies of the City of London of and for the Mineral and Battery Works," which continued to exercise its functions down to the year 1 7 10.

When a small percentage of zinc is present, the colour of brass is reddish, as in tombac or red brass, which contains about 10 %. With about 20 % the colour becomes more yellow, and a series of metals is obtained which simulate gold more or less closely; such are Dutch metal, Mannheim gold, similor and pinchbeck, the last deriving its name from a London clockmaker, Christopher Pinchbeck, who invented it in 1732. Ordinary brass contains about 30 % of zinc, and when 40 % is present, as in Muntz, yellow or patent metal (invented by G. F. Muntz in 1832), the colour becomes a full yellow. When the proportion of zinc is ■ largely increased the colour becomes silver-white and finally grey. The limit of elasticity increases with the percentage of zinc, as also does the amount of elongation before fracture, the maximum occurring with 30 %. The tenacity increases with the proportion of zinc up to a maximum with 45 ; then it decreases rapidly, and with 50 the metals are fragile. By varying the proportion between 30 and 43 % a series of alloys may be pre- pared presenting very varied properties. The most malleable of the series has an elongation of about 60 %, with a tensile strength of 17-5 tons per sq. in. Increase in the proportion of zinc gives higher tensile strength, accompanied, however, by a smaller percentage of elongation and a materially increased tendency to produce unsound castings. The quality of copper- zinc alloys is improved by the addition of a small quantity of iron, a fact of which advantage is taken in the production of Aich's metal and delta metal. Of the latter there are several varieties, modified in composition to suit different purposes. Some of them possess high tensile strength and ductility. They are remarkably resistant to corrosion by sea-water, and are well suited for screw-propellers as well as for pump-plungers, pistons and glands. Heated to a dull red delta metal becomes malleable

and can be worked under the hammer, press or stamps. By such treatment an ultimate tensile strength of 30 tons per sq. in. may be obtained, with an elongation of 32 % in 2 in. and a con- traction of area of 30%.

In the arts brass is a most important and widely used alloy. As compared with copper its superior hardness makes it wear better, while being more fusible it can be cast with greater facility. It is readily drawn into fine wire, and formed into rolled sheets and rods which are machined into a huge number of useful and ornamental articles. It is susceptible of a fine polish, but tarnishes with exposure to the air; the brilliancy of the surface can, however, be preserved if the metal is thoroughly cleansed by " dipping " in nitric acid and " lacquered " with a coating of varnish consisting of seed-lac dissolved in spirit.

BRASSES, MONUMENTAL, a species of engraved sepulchral memorials which in the early part of the 13th century began to take the place of tombs and effigies carved in stone. Made of hard latten or sheet brass, let into the pavement, and thus forming no obstruction in the space required for the services of the church, they speedily came into general use, and continued to be a favourite style of sepulchral memorial for three centuries. Besides their great value as historical monuments, they are interesting as authentic contemporary evidence of the varieties of armour and costume, or the peculiarities of palaeography and heraldic designs, and they are often the only authoritative records of the intricate details of family history. Although the intrinsic value of the metal has unfortunately contributed to the wholesale spoliation of these interesting monuments, they are still found in remarkable profusion in England, and they were at one time equally common in France, Germany and the Low Countries. In France, however, those that survived the troubles of the 1 6th century were totally swept away during the reign of terror, and almost the only evidence of their existence is now supplied by the collection of drawings bequeathed by Gough to the Bodleian library. The fine memorials of the royal house of Saxony in the cathedrals of Meissen and Freiberg are the most artistic and striking brasses in Germany. Among the 13th- century examples existing in German churches are the full-length memorials of Yso von Welpe, bishop of Verden (1231), and of Bernard, bishop of Paderborn (1340). Many fine Flemish specimens exist in Belgium, especially at Bruges. Only two or three examples, and these of late date, are known in Scotland, among which are the memorials of Alexander Cockburn (1564) at Ormiston; of the regent Murray (1569) in the collegiate church of St Giles, Edinburgh; and of the Minto family (1605) in the south aisle of the nave of Glasgow cathedral. England is the only country which now possesses an extensive series of these interesting memorials, of which it is calculated that there may be about 4000 still remaining in the various churches. They are most abundant in the eastern counties, and this fact has been frequently adduced in support of the opinion that they were of Flemish manufacture. But in the days when sepulchral brasses were most in fashion the eastern counties of England were full of commercial activity and wealth, and nowhere do the en- graved memorials of civilians and prosperous merchants more abound than in the churches of Ipswich, Norwich, Lynn and Lincoln. Flemish brasses do occur in England, but they were never numerous, and they are readily distinguished from those of native workmanship. The Flemish examples have the figures engraved in the centre of a large plate, the background filled in with diapered or scroll work, and the inscription placed round the edge of the plate. The English examples have the figures cut out to the outline and inserted in corresponding cavities in the slab, the darker colour of the stone serving as a background. This is not an invariable distinction, however, as " figure- brasses " of Flemish origin are

found both at Bruges and in England. But the character of the engraving is constant, the Flemish work being more florid in design, the lines shallower, and the broad lines cut with a chisel-pointed tool instead of the lozenge-shaped burin. The brass of Robert Hallum, bishop of Salisbury, the envoy of Henry V. to the council of Constance, who died and was interred there in 1416, precisely resembles

the brasses of England in the peculiarities which distinguish them from continental specimens. Scarcely any of the brasses which now exist in England can be confidently referred to the first half of the 13th century, though several undoubted examples of this period are on record. The full-sized brass of Sir John d'Aubernon at Stoke d'Abernon in Surrey (c. 1277) has the decorations of the shield filled in with a species of enamel. Other examples of this occur, and the probability is, that, in most cases, the lines of the engraving were filled with colouring- matter, though brass would scarcely bear the heat requisite to fuse the ordinary enamels. A well-known 13th-century example is that of Sir Roger de Trumpington (c. 1290), who accompanied Prince Edward in his expedition to Palestine and is represented cross-legged. About half a dozen instances of this peculiarity are known. The 14th-century brasses are much more numerous, and present a remarkable variety in their details. The finest specimen is that of Nicholas Lord Burnell (1315) in the church of Acton Burnell, Shropshire. In the 15th century the design and execution of monumental brasses had attained their highest excellence. The beautiful brass of Thomas Beauchamp, earl of Warwick (d. 1401) , and his wife Margaret, which formerly covered the tomb in St Mary's church, Warwick, is a striking example. One of the best specimens of plate armour is that of Sir Robert Stantoun (1458) in Castle Donnington church, Leicestershire, and one of the finest existing brasses of ecclesiastics is that of Abbot de la Mare of St Albans. It is only in the 16th century that the engraved representations become portraits. Previous to that period the features were invariably represented convention- ally, though sometimes personal peculiarities were given. A large number of brasses in England are palimpsests, the back of an ancient brass having been engraved for the more recent memorial. Thus a brass commemorative of Margaret Bulstrode (1540) at Hedgerley, on being removed from its position, was discovered to have been previously the memorial of Thomas Totyngton, abbot of St Edmunds, Bury (1312). The abbey was only surrendered to Henry VIII. in 1539, so that before the year was out the work of spoliation had begun, and the abbot's brass had been removed and re-engraved to Margaret Bulstrode. In explanation of the frequency with which ancient brasses have thus been stolen and re-erected after being engraved on the reverse, as at Berkhampstead, it may be remarked that all the sheet brass used in England previous to the establishment of a manufactory at Esher by a German in 1649, na d to be

imported from the continent.

Authorities. — (1) General : Manual for the Study of Monumental Brasses (Oxford, 1848); Boutell's Monumental Brasses of England, engravings on wood, folio (London, 1849); Manual of Monumental Brasses, by H. Haines (2 vols. 8vo, 1861) ; Waller's Series of Monu- mental Brasses in England (London and Oxford, Parkers, 1863) ; Monumental Brasses, by H. W. Macklin (8vo, 1890); The Brasses of England, by H. W. Macklin (8vo, London, 1907). (2) English Counties : Cotman's Engravings of the most Remarkable of the Sepul- chral Brasses of Norfolk (4to, London, 1813-1816; and second edition, with plates and notes by Meyrick, Albert Way and Sir Harris Nicholas (2 vols, folio, London, 1839); Illustrations of Monumental Brasses in Cambridge (4to, Camden Society, 1846); Monumental Brasses of Northamptonshire, by F. Hudson (folio, 1853) i The Monumental Brasses of Wiltshire, by G. Kite (8vo, London, i860); A rchitectural and Historical Notes of the Churches of Cambridgeshire, by A. C. Hill (8vo, 1880) ; Monumental Brasses of Cornwall, by E. H. W. Dunken (4to, London, 1882); Monumental Brasses of Worcestershire and Herefordshire, ed. by C. T. Davis (1884) ; Kentish Brasses, by W. D. Belcher (4to, London, 1888) ; List of Monumental Brasses in the County of Norfolk, by the Rev. E. Farrer (Norwich, 1 890) ; The Monumental Brasses of Lancashire and Cheshire, by James Thornby (8vo, Hull, 1893); Monumental Brasses in the Bedfordshire Churches, by Grace Isherwood (8vo, London, 1906), a large collection of rubbings of special interest and value. (3) Foreign: Monumental Brasses and Incised Slabs in Belgium (8vo, 1849); Books of Facsimiles of Monumental Brasses of the Continent of Europe, folio (1884), by the Rev. W. F. Creeny.

BRASSEUR DE BOURBOURG, CHARLES ETIENNE (1814- 1874), Belgian ethnographer, was born at Bourbourg, near Dunkirk, on the 8th of September 1814. He entered the Roman Catholic priesthood, was professor of ecclesiastical history in the Quebec seminary in 1845, vicar-general at Boston in 1846, and from 1848 to 1863 travelled as a missionary, chiefly in Mexico

BRASSES, MONUMENTAL

Plate I.

w

R a y ˆ S I R

e

6

•\~=

©

^ Afil ^

C;’

>»

tf

CD

“-.’.

a

D

j

«

gy.W /

- •

s

.^JjSShu])

m

s

to

- • ft

/TBre

IS

«

< I

3

Q

3

O

>

^

3

<

03

“3

X)

D

a

>

1S ,V ‘ffl T

57

a

<

ST

q sj; i o’ :■ u

‘-

*Iw-iarrt tows (MHjfiB (Wmrtl.fflUrelhB Urlwjgot qm otonjrtf tot3ami*H 5 *»8*

Fig.

i. — Sir John D’Abernon, 12 Stoke D’Abernon Surrey.

Fig. 2. — Margaret de Camoys. 13 10 Trotton, Sussex.

Fig. 3— Henry de Grofhurst, c. 1.330 Fig. 4. — Sir Nicholas Burnell, 1382.

Horsemonden, Kent. Acton Burnell, Shropshire.

gnp« q" pafff? ftp ji ˆ0% Citf t dlprtwtriSb »»fcsi)« (mrp W tlwnr jinr cl)«lrtf fM° but mtflnio Cf

Fig. 5. — Margaret Lady Cobham, 7385. Cobham, Kent.

Figs. 1 and 6 from Waller's Monumental Brasses.

IV. 434.

Fig. < >.— Sir John Corp and F.leanor, his grand-daughter, i3Qij 1361- Stoke Fleming, Devonshire.

Fig. 7. — Sir Symon de Felbrigge and Margaret his wife. 1400. Felbrigge, Norfolk.

Figs, 5 and 7 from Boutell's Monumental Brasses. Figs. 2, 3, and 4 by permission of the Monumental Brass Society.

PLATE II.

BRASSES, MONUMENTAL

Fig. i. — Thomas de Beauchamp, Earl of Warwick and Lady,

1406 and 1401. St. Mary's Church, Warwick.

-Thomas Cranley, Archbishop of Dublin, 1417. New College, Oxford.

ˆ

® n ˆwwLwm iˆtoWuˆMWWiMWtB ,

yˆWm&fSslWB0v er m m&mmwi&amma&M&

Fig. 3. — Sir William Vernon and Lady, 1467. Tong Church, Shropshire.

js

VNDER THIS MONVWENT EYETH THE BODY OF DAME Mar=

caret the moste deere wife of s"george chvte Kpight and davchter and sole

heyre of Thomas WeLFORDOF WlSTESTON ESQVIER DECEASED WHOSE P1ETO AND VERTVES DESERVE TO SVRV1VE IN THE MEMO RIE OF MEN VNTIU.THIS HER BOD1E SHALL LIVE AGAIN E REVNITED TO HER BLESSED SOWLE TO UVE V? HER REDEE

mer for ever. she had by her saide hv5hand 1 davchrs oneue. Anne and Trancis which FrancpsdvedYftrst daye of her birth her said mother following mer the

NEXT DAVE AFTER BBNGE THENtNTH DAYE OFJVNEˆWNlbrt

Fig 4- — John Shelley, Esq., 1526, and his wife Elizabeth, 1513. Clapham, Sussex.

Fig. 5. — Dame Margaret Chute, 1614. Mardon, Herefordshire.

Fig. 6. — Sir Edward Filmer and Lady, 1638. East Sutton, Kent.

Tigs. 1, 2, 3, and 6 from Waller's Monumental Brasses.

Figs. 4 and 5 by permission of the Monumental Brass Society.

and Central America. He gave great attention to Mexican antiquities, published in 1857-1859 a history of Aztec civilization, and from 1861 to 1864 edited a collection of documents in the indigenous languages. In 1863 he announced the discovery of a key to Mexican hieroglyphic writing, but its value is very questionable. In 1 864 he was archaeologist to theFrench military expedition in Mexico, and his Monuments anciens du Mexique was published by the French Government in 1866. Perhaps his greatest service was the publication in 1861 of a French transla- tion of the Popol Vuh, a sacred book of the Quiche Indians, together with a Quiche grammar, and an essay on Central American mythology. In 187 1 he brought out his Bibliotheque Mexico-Guatemalienne, and in 1869-1870 gave the principles of his decipherment of Indian picture-writing in his Manuscril Troano, Uudes sur le systeme graphique et la langue des Mayas. He died at Nice on the 8th of January 1874. His chief merit is his diligent collection of materials; his interpretations are generally fanciful.

BRASSEY, THOMAS (1805-1870), English railway contractor, was born at Buerton, near Chester, on the 7th of November 1805. His father, besides cultivating land of his own, held a large farm of the marquess of Westminster; his ancestors, according to family tradition, having been

settled for several centuries at Bulkeley, near Malpas, Cheshire, before they went to Buerton in 1663. Thomas Brassey received an ordinary commercial education at a Chester school. At the age of sixteen he was apprenticed to a surveyor, and on the completion of his term became the partner of his master, eventually assuming the sole management of the business. In the local surveys to which he devoted his attention during his early years he acquired the knowledge and practical experience which were the necessary foundation of his great reputation. His first engagement as railway contractor was entered upon in 1835, when he undertook the execution of a portion of the Grand Junction railway, on the invitation of the distinguished engineer Joseph Locke, who soon afterwards entrusted him with the completion of the London and Southampton railway, a task which involved contracts to the amount of £4,000,000 sterling and the employment of a body of 3000 men. At the same time he was engaged on portions of several other lines in the north of England and in Scotland. In conjunction with his partner, W. Mackenzie, Brassey undertook, in 1840, the construction of the railway from Paris to Rouen, of which Locke was engineer. He subsequently carried out the extension of the same line. A few years later he was engaged with his partner on five other French lines, and on his own account on the same number of lines in England, Wales and Scotland. Brassey was now in control of an industrial army of 75,000 men, and the capital involved in his various contracts amounted to some £36,000,000. But his energy and capacity were equal to still larger tasks. He undertook in 185 1 other works in England and Scotland; and in the following year he engaged in the construction of railways in Holland, Prussia, Spain and Italy. One of his largest undertakings was the Grand Trunk railway of Canada, 1100 m. in length, with its fine bridge over the St Lawrence. In this work he was associated with Sir M. Peto and E. L. Betts. In the following years divisions of his industrial army were found in almost every country in Europe, in India, in Australia and in South America. Besides actual railway works, he originated and maintained a great number of sub- ordinate assistant establishments, coal and iron works, dock- yards, &c, the direction of which alone would be sufficient to strain the energies of an ordinary mind. His profits were, of course, enormous, but prosperity did not intoxicate him; and when heavy losses came, as sometimes they did, he took them bravely and quietly. Among the greatest of his pecuniary disasters were those caused by the fall of the great Barentin viaduct on the Rouen and Havre railway, and by the failure of Peto and Betts. Brassey was one of the first to aim at im- proving the relations between engineers and contractors, by setting himself against the corrupt practices which were common. He resolutely resisted the "scamping" of work and the bribery of inspectors, and what he called the " smothering of

the engineer "; and he did much in this way to bring about a better state of things. Large-hearted and generous to a rare degree, modest and simple in his taste and manners, he was conscious of his power as a leader in his calling, and knew how to use it wisely and for noble ends. Honours came to him unsought. The cross of the Legion of Honour was conferred on him. From Victor Emmanuel he received the cross of the Order of St Maurice and St Lazarus; and from the emperor of Austria the decoration of the Iron Crown, which it is said had not before been given to a foreigner. He died at St Leonards on the 8th of December 1870. His life and labours are commemorated in a volume by Sir Arthur Helps (1872).

He left three sons, of whom the eldest, Thomas (b. 1836), was knighted and afterwards (1886) created Baron Brassey. Lord Brassey, who was educated at Rugby and Oxford, entered parliament as a liberal in 1865, and devoted himself largely to naval affairs. He was civil lord of the admiralty (1880-1883), and secretary to the admiralty (1883-1885); and both before and after his elevation to the peerage did important work on naval and statistical inquiries for the government. In 1893-1895 he was president of the Institution of Naval Architects. In 1894 he was a lord-in-waiting, and from 1895 to 1900 was governor of Victoria. In 1908 he was appointed lord warden of the Cinque Ports. His voyages in his yacht " Sunbeam " from 1876 onwards, with his first wife (d. 1887), who published an interesting book on the subject, took him all over the world. Lord Brassey married a second time in 1890. Among other publications, his inauguration of the Naval Annual (1886 onwards), and his volumes on The British Navy, are the most important. His eldest son Thomas, who edited the Naval Annual (1890-1904), and unsuccessfully contested several parliamentary constitu- encies, was born in 1862.

BRASSO (Ger. Kronstadt; Rumanian, Brasov), a town of Hungary, in Transylvania, 206 m. S.E. of Kolozsv&r by rail. Pop. (1900) 34,511. It is the capital of the comitat (county) of the same name, also known as Burzenland, a fertile country inhabited by an industrious population of Germans, Magyars and Rumanians. Brasso is beautifully situated on the slopes of the Transylvanian Alps, in' a narrow valley, shut in by mountains, and presenting only one opening on the north-west towards the Burzen plain. The town is entirely dominated by the Zinne of Kapellenberg, a mountain rising 1276 ft. above the town (total altitude 3153 ft.), from which a beautiful view is obtained of the lofty mountains around and of the carefully cultivated plain of the Burzenland, dotted with tastefully built and well- kept villages. On the summit of the mountain is one of the numerous monuments erected in 1896 in different parts of the country to commemorate the thousandth anniversary of the foundation of the Hungarian state. It is known as Arpad's Monument, and consists of a Doric column erected on a circular pedestal, which supports the bronze figure of

a warrior from the time of Arp&d.

Brass6 consists of the inner town, which is the commerci&J centre, and the suburbs of Blumenau, Altstadt and Obere Vor- stadt or Bolgirszeg, inhabited respectively by Germans, Magyars and Rumanians. To the east of the inner town rises the Schloss- berg, crowned by the citadel, which was erected in 1553, and constitutes the principal remaining fragment of the old fortifica- tions with which Brass6 was encircled. The most interesting building in the town is the Protestant church, popularly called the Black Church, owing to its smoke-stained walls, caused by the great fire of 1689. This church, the finest in Transylvania, is a Gothic edifice with traces of Romanesque influence, and was built in 1385-1425. In the square in front of it is the statue of Johannes Honterus (1498-1549), " the apostle of Tran- sylvania," who was born in Brass6, and established here the first printing-press in Transylvania. In the principal square of the inner town stands the town hall, built in 1420 and restored in the 18th century, with a tower 190 ft. high. Brasso is the most important commercial and manufacturing town of Tran- sylvania. Lying near the frontier of Rumania, with easy access through the Tomos pass, it developed from the earliest time an

active trade with that country and with the whole of the Balkan states. Its chief industries are iron and copper works, wool- spinning, turkey-red dyeing, leather goods, paper, cement and petroleum refineries. The timber industry in all its branches, with a speciality for the manufacture of the wooden bottles largely used by the peasantry in Hungary and in the Balkan states, as well as the dairy industry, and ham-curing are also fully developed. A peculiarity of Brasso, which constitutes a survival of the old methods of trade with the Balkan states, is the number of money-changers who ply their trade at small movable tables in the market-place and in the open street. Brasso is the most populous town of Transylvania, and its population is composed in about equal numbers of Germans, Magyars and Rumanians. The town, especially on market days, presents an animated and picturesque aspect. Here are seen Germans, Szeklers, Magyars, Rumanians, Armenians and Gipsies, each of them wearing their distinctive national costume, and talking and bargaining in their own special idiom.

Amongst the places of interest round Brasso is the watering- place Zaizon, 15 m. to the east, with ferruginous and iodine waters; while about 17 m. to the south-west lies the pretty Rumanian village of Zernest, where in 1690 the Austrian general Heussler was defeated and taken prisoner by Imre

(Emerich) Tokoly, the usurper of the Transylvanian throne.

Brasso was founded by the Teutonic Order in 1211, and soon became a flourishing town. Through the activity of Honterus it played a leading part in the introduction of the Reformation in Transylvania in the 16th century. The town was almost com- pletely destroyed by the big fire of 1689. During the revolution of 1848-1849 it was besieged by the Hungarians under General Bern from March to July 1849, and several engagements between the Austrian and the Hungarian troops took place in its neigh- bourhood.

BRATHWAIT, RICHARD (1588-1673), English poet, son of Thomas Brathwait, was born in 1588 at his father's manor of Burneshead, near Kendal, Westmorland. He entered Oriel College, Oxford, in 1604, and remained there for some years, pursuing the study of poetry and Roman history. He removed to Cambridge to study law and afterwards to London to the Inns of Court. Thomas Brathwait died in 1610, and the son went down to live on the estate he inherited from his father. In 1617 he married Frances Lawson of Nesham, near Darlington. On the death of his elder brother, Sir Thomas Brathwait, in 1618, Richard became the head of the family, and an important personage in the county, being deputy-lieutenant and justice of the peace. In 1633 his wife died, and in 1639 he married again. His only son by this second marriage, Sir Strafford Brathwait, was killed in a sea-fight against the Algerian pirates. Richard Brathwait's most famous work is Barnabae Itinerarium or Barnabees Journall [1638], by " Corymbaeus," written in English and Latin rhyme. The title-page says it is written for the " travellers' solace " and is to be chanted to the old tune of " Barnabe." The story of " drunken Barnabee's" four journeys to the north of England contains much amusing topographical information, and its gaiety is unflagging. Barnabee rarely visits a town or village without some notice of an excellent inn or a charming hostess, but he hardly deserves the epithet " drunken." At Banbury he saw the Puritan who has become proverbial, " Hanging of his cat on Monday For killing of a Mouse on Sunday."

Brathwait's identity with " Corymbaeus " was first established by Joseph Haslewood. In his later years he removed to Catterick, where he died on the 4th of May 1673. Among his other works are: The Golden Fleece (161 1), with a second title-page announ- cing " sonnets and madrigals," and a treatise on the Art of Poesy, which is not preserved; The Poets Willow; or the Passionate Shepheard (1614); The Prodigals Teares (1614); The Schollers Medley, or an intermixt Discourse upon Historicall and Poeticall relations (1614), known in later editions as a Survey of History (1638, &c); a collection of epigrams and satires entitled A Strappado for the Divell (1615), with which was published in- congruously Loves Labyrinth (edited, 1878, by J. W. Ebsworth);

Natures Embassie; or, the wildemans measures; danced naked by twelve satyr es (1621), thirty satires finding antique parallels for modern vices ; with these are bound up The Shepheards Tales (1621), a collection of pastorals, one section of which was re- printed by Sir Egerton Brydges in 181 5; two treatises on manners, The English Gentleman (1630) and The English Gentle- woman (1631); Anniversaries upon his Panarete (1634), a poem in memory of his wife; Essaies upon the Five Senses (1620); The Psalmes of David . . . and other holy Prophets, paraphras'd in English (1638); A Comment upon Two Tales of . . . Jejfray Chaucer (1665; edited for the Chaucer Soc. by C. Spurgeon, 1901). Thomas Hearne, on whose testimony (MS. collections for the year 1713, vol. 47, p. 127) the authorship of the Itine- rarium chiefly rests, not inappropriately called him " the scribler of those times," and the list just given of his works, published under various pseudonyms, is by no means complete.

A full bibliography is given in Joseph Haslewood's edition of Barnabee's Journall (ed. W. C. Hazlitt, 1876). See also J. Corser, Collectanea (Chetham Soc, 1860, &c).

BRATIANU (or Bratiano), ION C. (1821-1891), Rumanian statesman, was born at Pitesci in Walachia on the 2nd of June 1821. He entered the Walachian army in 1838, and visited Paris in 1841 for purposes of study. Returning to Walachia, he took part, with his friend C. A. Rosetti and other prominent politicians, in the Rumanian rebellion of 1848, and acted as prefect of police in the provisional government formed in that year. The restoration of Russian and Turkish authority shortly afterwards drove him into exile. He took refuge in Paris, and en- deavoured to influence French opinion in favour of the proposed union and autonomy of the Danubian principalities. In 1854, however, he was sentenced to a fine of £120 and three months' imprisonment for sedition, and later confined in a lunatic asylum; but in 1856 he returned home with his brother, Dimitrie Bratianu, afterwards one of his foremost political opponents. During the reign of Prince Cuza (1859-1866), Bratianu figured prominently as one of the Liberal leaders. He assisted in 1866 in the deposition of Cuza and the election of Prince Charles of Hohenzollern, under whom' he held several ministerial appoint- ments during the next four years. He was arrested for complicity in the revolution of 1870, but soon released. In 1876, aided by C. A. Rosetti, he formed a. Liberal cabinet, which remained in power until 1888. For an account of his work in connexion with the Russo-Turkish War of 1877, the Berlin congress, the establishment of the Rumanian kingdom, the revision of the constitution, and other reforms, see Rumania. After 1883 Bratianu acted as sole leader of the Liberals, owing to a quarrel with C. A. Rosetti, his friend and political ally for nearly forty years. His long tenure of office, without parallel in Rumanian history, rendered Bratianu extremely unpopular, and at its close his impeachment appeared

inevitable. But any proceed- ings taken against the minister would have involved charges against the king, who was largely responsible for his policy; and the impeachment was averted by a vote of parliament in February 1890. Bratianu died on the 16th of May 1891. Besides being the leading statesman of Rumania during the critical years 1876-1888, he attained some eminence as a writer. His French political pamphlets, Memoire sur I'empire d'Autriche dans la question d'Orient (1855), Reflexions sur la situation (1856), Memoire sur la situation de la Moldavie depuis le traite de Paris (1857), and La Question religieuse en Roumanie (1866), were all published in Paris.

For his other writings and speeches see Din Scrierile §i cuvintarile lui I. C. Bratianu, 1821-1891 (Bucharest, 1903, &c.), edited with a biographical introduction by D. A. Sturza. A brief anonymous biography, Ion C. Bratianu, appeared at Bucharest in 1893.

BRATLANDSDAL {i.e. Bratland valley), a gorge of southern Norway in Stavanger amt (county), formed by the Bratland river, a powerful torrent issuing into Lake Suldal. A remarkable road traverses the gorge by means of cuttings and a tunnel, and the scenery is among the most magnificent in Norway. It is usually approached from Stavanger by way of Sand and Lake Suldal, and the road divides above the gorge, branches run- ning north to Odde and south-east through Telemarken. The

junction of the roads is near Breifond, 13 m. above Naes at the mouth of the river, on the west shore of, Lake Roldal, which is fed by the snowfield to the west, north and east, and is drained by the Bratland river.

BRATTISHING, or Brandishing (from the Fr. breteche), in architecture, a sort of crest or ridge on a parapet, or species of embattlement. The term, however, is generally employed to describe the ranges of flowers which form the crests of so many parapets in the Tudor period.

BRATTLEBORO, a village of Windham county, Vermont, U.S.A., in a township (pop. 1910, 7541) of the same name, in the south-east part of the state, 60 m. N. of Springfield, Massa- chusetts, on the Connecticut river. Pop. (1890) 5467; (1900) 5297 (686 foreign-born); (1910) 6517. It is served by the Central Vermont and the Boston & Maine railways. Situated in a hilly, heavily wooded country, it is an attractive place, with a few houses dating from the 18th century. Among the manufactures are toys, furniture, overalls and organs, the Estey and the Carpenter organs

being made there. First settled about 1753, Brattleboro took its name from one of the original patentees, William Brattle (1702-1776), a Massachusetts loyalist. It was incorporated ten years later.

See H. Burnham, Brattleboro (Brattleboro, 1880), and H. M. Burt, The Attractions of Brattleboro, Glimpses of Past and Present (Brattleboro, 1866).

BRAUNAU (Czech Broumov), a town of Bohemia, Austria, 139 m. E.N.E. of Prague by rail. Pop. (1900) 7622, chiefly German. The town is built on a rocky eminence on the right bank of the Steine. It has an imposing Benedictine abbey, once a castle, but converted into a religious house in 1322, when Ottakar I. gave the district to the Benedictines. Noteworthy also is the great church of Saints Wenceslaus and Adalbert, built between 1683 and 1733. This stands on the site where, in 1618, the Protestants attempted to build a church, the forcible prevention of which by Abbot Wolfgang Solander was the immediate cause of the protest of the Bohemian estates and the " defenestration " of the ministers Martinic and Slavata, which opened the Thirty Years' War. After the battle of the White Hill, near Prague (1620), the town was deprived of all its privi- leges, which were, however, in great part restored nine years later. It is now a manufacturing centre (cloth, woollen and cotton stuffs, &c.) and has a considerable trade.

BRAUNSBERG, a town of Germany, in the kingdom of Prussia, 38 m. by rail S.W. of Konigsberg, on the Passarge, 4 m. from its mouth in the Frisches Haff. Pop. (1900) 12,497. It possesses numerous Roman Catholic institutions, of which the most important is the Lyceum Hosianum (enjoying university rank) , founded in 1564 by the cardinal bishop Stanislaus Hosius. Brewing, tanning, and the manufactures of soap, yeast, carriages and bricks are the most important industries of the town, which also carries on a certain amount of trade in corn, ship timber and yarn. The river is navigable for small vessels. The castle of Braunsberg was built by the Teutonic knights in 1241, and the town was founded ten years later. Destroyed by the Prussians in 1262, it was restored in 1279. The town, which was the seat of the bishops of Ermeland from 1255 to 1298, was granted the " law of Liibeck " by its bishop in 1284, and admitted to the Hanseatic League. After numerous vicissitudes it fell into the hands of the Poles in 1520, and in 1626 it was captured by Gustavus Adolphus. The Swedes kept possession till 1635. It fell to Prussia by the first partition of Poland in 1772.

BRAVO (Ital. for "brave"), the name for hired assassins such as were formerly common in Italy. The word had at first ho evil meaning, but was applied to the retainers of the great noble houses, or to the cavalier-type of

swashbucklers familiar in fiction. In later Italian history, especially in that of Venice, the bravi were desperate ruffians who for payment were ready to commit any crime, however foul.

BRAWLING (probably connected with Ger. bratten, to roar, shout), in law, the offence of quarrelling, or creating a dis- turbance in a church or churchyard. During the early stages of the Reformation in England religious controversy too often

became converted into actual disturbance, and the ritual law- lessness of the parochial clergy very frequently provoked popular violence. To repress these disturbances an act was passed in I SS I ; by which it was enacted " that if any person shall, by words only, quarrel, chide or brawl in any church or churchyard, it shall be lawful for the ordinary of the place where the same shall be done and proved by two lawful witnesses, to suspend any person so offending, if he be a layman, from the entrance of the church, and if he be a clerk, from the ministration of his office, for so long as the said ordinary shall think meet, ac- cording to the fault." An act of 1553 added the punishment of imprisonment until the party should repent. The act of 1551 was partly repealed in 1828 and wholly repealed as regards laymen by the Ecclesiastical Courts Jurisdiction Act i860. Under that act, which applies to Ireland as well as to England, persons guilty of riotous, violent or indecent behaviour, in churches and chapels of the Church of England or Ireland, or in any chapel of any religious denomination, or in England in any place of religious worship duly certified, or in churchyards or burial-grounds, are liable on conviction before two justices to a penalty of not more than £5, or imprisonment for any term not exceeding two months. This enactment applies to clergy as well as to laity, and a clergyman of the Church of England convicted under it may also be dealt with under the Clergy Discipline Act of 1892 (Girt v. Fillingham, 1901, L.R. Prob. 176). When Mr J. Kensit during an ordination service in St Paul's cathedral " objected " to one of the candidates for ordination, on grounds which did not constitute an impediment or notable crime within the meaning of the ordination service, he was held to have unlawfully disturbed the bishop of London in the conduct of the service, and to be liable to conviction under the act of i860 (Kensit v. Dean and Chapter of St Paul's, 1905, L.R. 2 K.B. 249). The public worship of Protestant Dissenters, Roman Catholics and Jews in England had before i860 been protectee! by a series of statutes beginning with the Toleration Act of 1689, and ending with the Liberty of Religious Worship Act 185 5- These enact- ments, though not repealed, are for practical purposes superseded by the summary remedy given by the act of i860. In Scotland disturbance of public worship is punishable as a breach of the peace (Dougall v. Dykes, 1861, 4 Irvine 101).

In British possessions abroad interference with religious wor- ship is usually dealt with by legislation, and not as a common- law offence. In India it is an offence voluntarily to cause dis- turbance to any assembly lawfully engaged in the performance of religious worship or religious ceremonies (Penal Code, s. 296). Under the Queensland Criminal Code of 1899 (s. 207) penalties are imposed on persons who wilfully and without lawful justifica- tion or excuse (the proof of which lies on them) disquiet or disturb any meeting of persons lawfully assembled for religious worship, or assault any forces lawfully officiating at such meeting, or any of the persons there assembled.

In the United States disturbance of religious worship is treated as an offence under the common law, which is in many states supplemented by legislation (see Bishop, Amer. Crim. Law, 8th ed. 1892, vol. i. s. 542, vol. ii. ss. 303-305; California Penal Code, s. 302; Revised Laws of Massachusetts, 1902, chap. 212, s. 30.).

BRAY, SIR REGINALD (d. 1503), British statesman and architect, was the second son of Sir Richard Bray, one of the privy council of Henry VI. Reginald was born in the parish of St John Bedwardine, near Worcester, but the date of his birth is uncertain. He was receiver-general and steward of the household to Sir Henry Stafford, second husband of Margaret, countess of Richmond, whose son afterwards became King Henry VII. The accession of the king Henry VII. favoured the fortunes of Reginald Bray, who was created a knight of the Bath at the coronation and afterwards a knight of the Garter. In the first year of Henry VII. 's reign he was given a grant of the constableship of Oakham Castle in Rutland, and was appointed joint chief justice with Lord Fitz Walter of all the forest south of Trent and chosen of the privy council. Subsequently he was made high treasurer and chancellor of the duchy of

Lancaster. In October 1494 he became high steward of the university of Oxford, and he was a member of the parliament summoned in the nth year of Henry VII's reign. In June 1497 he was at the battle of Blackheath, and his services in repressing the Cornish rebels were rewarded with a gift of estates and the title of knight banneret. His taste and skill in archi- tecture are attested by Henry VII. 's chapel at Westminster and St George's chapel at Windsor. He directed the building of the former, and the finishing and decoration of the latter, to which, moreover, he was a liberal contributor, building at his own expense a chapel still called by his name and ornamented with his crest, the initial letters of his name, and a device

repre- senting the hemp-bray, an instrument used by hemp manu- facturers. He died in 1503, before the Westminster chapel was completed, and was interred in St George's chapel.

BRAY, THOMAS (1656-1730), English divine, was born at Marton, Shropshire, in 1656, and educated at All Souls' College, Oxford. After leaving the university he was appointed vicar of Over-Whitacre, and rector of Sheldon in Warwickshire, where he wrote his famous Catechetical Lectures. Henry Compton, bishop of London, appointed him in 1696 as his commissary to organize the Anglican church in Maryland, and he was in that colony in 1699-1700. He took a great interest in colonial missions, especially among the American Indians, and it is to his exertions that the Society for the Propagation of the Gospel owes its existence. He also projected a successful scheme for establishing parish libraries in England and America, out of which grew the Society for Promoting Christian Knowledge. From 1706 till his death in February 1730 he was rector of St Botolph- Without, Aldgate, London, being unceasingly engaged in philanthropic and literary pursuits.

BRAY, a village in the Wokingham parliamentary division of Berkshire, England, beautifully situated on the west (right) bank of the Thames, 1 m. S. of Maidenhead Bridge. Pop. (1901) 2978. There are numerous riverside residences in the locality. The church of St Michael has portions of various dates from the Early English period onward, and is much restored. It contains a number of brasses of the 14th, 15th, 16th and 17th centuries. A well-known ballad, " The Vicar of Bray," tells how a vicar held his position by easy conversions of faith accord- ing to necessity, from the days of Charles II. until the accession of George I. and the foundation of " the illustrious house of Hanover " (1714). One Francis Carswell, who is buried in the church, was vicar for forty-two years, approximately during this period, dying in 1709; but the legend is earlier, and the name of the vicar who gave rise to it is not certainly known. That of Simon Aleyn, who held the office from c. 1 540 to 1 588, is generally accepted, as, in the reigns of Henry VIII., Edward VI., Mary and Elizabeth, he is said to have been successively Papist, Protestant, Papist and Protestant. The name of Simon Simonds is also given on the authority of the vicar of the parish in 1745; Simonds died a canon of Windsor in 1531, but had been vicar of Bray. Tradition ascribes the song to a soldier in Colonel Fuller's troop of dragoons in the reign of George I.

BRAY, a seaport and watering-place of Co. Wicklow, Ireland, 12 m. S.S.E. of Dublin on the Dublin & South-Eastern railway, situated on both sides of the river Bray. Pop. of urban district (1901) 7424. For parliamentary purposes it is divided between the eastern division of county Wicklow and the southern of county Dublin. A harbour was constructed by the urban

district council (the harbour authority) which accommodates ships of 400 tons. There is some industry in brewing, milling and fishing, but the town, which is known as the " Irish Brighton," is almost wholly dependent for its prosperity on visitors from Dublin and elsewhere. It therefore possesses all the equipments of a modern seaside resort; there is a fine sea-wall with esplanade upwards of a mile in length; the bathing is good, and race meetings are held. The town is rapidly increasing in size. The coast, especially towards the promontory of Bray Head, offers beautiful sea-views, and some of the best inland scenery in the county is readily accessible, such as the Glens of the Dargle and the Downs, the demesne of Powerscourt, the Bray river,

with its loughs, and the pass of the Scalp. The demesne oi Kilruddery, the seat of the earls of Meath, is specially beautiful. About 1 1 70 Bray was bestowed by Richard de Clare or Strong- bow, earl of Pembroke and Strigul, on Walter de Reddesford, who took the title of baron of Bray, and built a castle.

BRAYLEY, EDWARD WEDLAKE (1773-1854), English antiquary and topographer, was born at Lambeth, London, in 1773. He was apprenticed to the enamelling trade, but early developed literary tastes. He formed a close friendship with John Britton, which lasted for sixty-five years. They entered into a literary partnership, and after some small successes at song and play writing they became joint editors of The Beauties of England and Wales, themselves writing many of the volumes. Long after he had become famous as a topographer, Brayley continued his enamel work. In 1823 he was elected a fellow of the Society of Antiquaries. He died in London on the 23rd of September 1854. His other works include Sir Reginalde or the Black Tower (1803); Views in Suffolk, Norfolk and Northampton- shire, illustrative of works of Robt. Bloomfield (1806); Lambeth Palace (1806); The History of the Abbey Church of Westminster (2 vols., 1818); Topographical Sketches of Brighthelm stone (1825); Historical and Descriptive Accounts of Theatres of London (1826) ; Londiniana (1829); History of Surrey (5 vols., 1841-1848).

BRAZIER (from the Fr. brasier, which comes from braise, hot charcoal), a metal receptacle for holding burning coals or charcoal, much used in southern Europe and the East for warming rooms. Braziers are often elegant in form, and highly artistic in ornamentation, with chased or embossed feet and decorated exteriors.

BRAZIL, or Brasil, a legendary island in the Atlantic Ocean. The name connects itself with the red dye-woods so called in the middle ages, possibly also applied to other vegetable dyes, and so descending from the Insulae Purpurariae of Pliny. It first appears as the I. de Brazi in the Venetian map

of Andrea Bianco (1436), where it is found attached to one of the larger islands of the Azores. When this group became better known and was colonized, the island in question was renamed Terceira. It is probable that the familiar existence of " Brazil " as a geo- graphical name led to its bestowal upon the vast region of South America, which was found to supply dye-woods kindred to those which the name properly denoted. The older memory survived also, and the Island of Brazil retained its place in mid-ocean, some, hundred miles to the west of Ireland, both in the traditions of the forecastle and in charts. In J. Purdy's General Chart of the Atlantic, " corrected to 1830," the " Brazil Rock (high) " is marked with no indication of doubt, in 51 10′ N. and 15° 50′ W. In a chart of currents by A.G.Findlay, dated 1853, these names appear again. But in his 12th edition of Purdy's Memoir Descriptive and Explanatory of the N. Atlantic Ocean (1865), the existence of Brazil and some other legendary islands is briefly discussed and rejected. (See also Atlantis.)

BRAZIL, a republic of South America, the largest political division of that continent and the third largest of the western hemisphere. It is larger than the continental United States excluding Alaska, and slightly larger than the great bulk of Europe lying east of France. Its extreme dimensions are 2629 m. from Cape Orange (4 21′ N.) almost due south to the river Chuy (33 45′ S. lat.), and 2691 m. from Olinda (Ponta de Pedra, 8° o' 57″ S., 34 50′ W.) due west to the Peruvian frontier (about 73 50′ W.). The most northerly point, the Serra Roraima on the Venezuela and British Guiana frontier (5 10′ N.), is 56 m. farther north than Cape Orange. The area, which was augmented by more than 60,000 sq. m. in 1903 and diminished slightly in the boundary adjustment with British Guiana (1904), is estimated to have been 3,228,452 sq. m. in 190c (A. Supan, Die Bevolkerung der Erde, Gotha, 1904). A subsequent planimetric calculation, which takes into account these territorial changes, increases the area to 3,270,000 sq. m.

Boundaries. — Brazil is bounded N. by Colombia, Venezuela and the Guianas, N.E., E. and S.E. by the Atlantic, S. by Uruguay, Paraguay and Bolivia, and W. by Argentina, Para- guay, Bolivia, Peru, Ecuador and Colombia. Its territory

touches that of every South American nation, except Chile, and with each one there has been a boundary dispute at some stage in its political life.

The Spanish and Portuguese crowns attempted to define the limits between their American colonies in 1750 and 1777, and the lines adopted still serve in great part to separate Brazil from its neighbours. Lack of information regarding the geographical features of the interior, however, led to some indefinite descriptions, and these have been fruitful sources of dispute ever since. The Portuguese were persistent trespassers in early colonial times, and their land-hunger took them far beyond the limits fixed by Pope Alexander VI. In the boundary disputes which have followed, Brazil seems to have pursued this traditional policy, and generally with success.

Beginning at the mouth of the Arroyo del Chuy, at the southern extremity of a long sandbank separating Lake Mirim from the Atlantic (33°45′ S. lat.), the boundary line between Brazil and Uruguay passes up that rivulet and across to the most southerly tributary of Lake Mirim, thence down the western shore of that lake to the Jaguarao and up that river to its most southerly source. The line then crosses to the hill-range called Cuchilla de Sant' Anna, which is followed in a north-west direction to the source of the Cuareim, or Quarahy, this river becoming the boundary down to the Uruguay. This line was fixed by the treaty of 185 1, by which the control of Lake Mirim remains with Brazil. Beginning at the mouth of the Quarahy, the boundary line between Brazil and Argentina ascends the Uruguay, crosses to the source of the Santo Antonio, and descends that small stream and the Iguassu to the Parana, where it terminates. This line was defined by the treaty of 1857, and by the decision of President Cleveland in 189s with regard to the small section between the Uruguay and Iguassu rivers. The boundary with Paraguay was definitely settled in 1872. It ascends the Parana to the great falls of Guayra, or Sete Quedas, and thence westward along the water-parting of the Sierra de Maracayu to the cerro of that name, thence northerly along the Sierra d'Amambay to the source of the Estrella, a small tributary of the Apa, and thence down those two streams to the Paraguay. From this point the line ascends the Paraguay to the mouth of the Rio Negro,the outlet of the BahiaNegra, where the Bolivian boundary begins. As regards the Peruvian boundary, an agreement was reached in 1904 to submit the dispute to the arbitration of the president of Argentina in case further efforts to reach an amic- able settlement failed. The provisional line, representing the Brazilian claim, begins at the termination of the Bolivian section (the intersection of the nth parallel with the meridian of 72 26′ W. approx.) and follows a semicircular direction north-west and north to the source of the Javary (or Yavary), to include the basins of the Purus and Jurua. within Brazilian jurisdiction. The line follows the Javary to its junction with the Amazon, and runs thence north by east direct to the mouth of the Apaporis, a tributary of the Yapura, in about i c 30′ S. lat., 69 20′ W. long., where the Peruvian section ends. The whole of this line, however, was subject to

future adjustments, Peru claiming all that part of the Amazon valley extending eastward to the Madeira and lying between the Beni and the east and west boundary line agreed upon by Spain and Portugal in 1750 and 1777, which is near the 7th parallel. With regard to the section between the Amazon and the Apaporis river, already settled between Brazil and Peru, the territory has been in protracted dispute between Peru, Ecuador and Colombia; but a treaty of limits between Brazil and Ecuador was signed in 1901 and promulgated in 1905. The boundary with Colombia, fixed by treaty of April 24, 1907, follows the lower rim of the Amazon basin, as defined by Brazil. The Colombian claim included the left bank of the Amazon eastward to the Auahy or Avahy-parana channel between the Amazon and Yapura, whence the line ran northward to the Negro near the intersection of the 66th meridian. The Brazilian line ran north and north-west from the mouth of the Apaporis to the 70th meridian, which was followed to the water-parting south of the Uaupes basin, thence north-east to the Uaupes river, which was crossed close to the 69th meridian, thence easterly along the Serra Tunaji

and Isana river to Cuyari, thence northerly up the Cuyari and one of its small tributaries to the Serra Capparro, and thence east and south-east along this range to the Cucuhy rock (Pedra de Cucuhy) on the left bank of the Negro, where the Colombian section ends. Negotiations for the settlement of this controversy, which involved fully one-third of the state of Amazonas, were broken off in 1870, but were resumed in 1905. The boundary with Venezuela, which was defined by a treaty of 1859, runs south-eastward from Cucuhy across a level country intersected by rivers and channels tributary to both the Negro and Orinoco, to the Serra Cupuy watershed which separates the rivers of the Amazon and Orinoco valleys. This watershed includes the ranges running eastward and northward under the names of Imeri, Tapiira-peco, Curupira, Parima and Pacaraima, the Venezuelan section terminating at Mt. Rˆoraima. On the 9th of December 1905 protocols were signed at Caracas accepting the line between Cucuhy and the Serra Cupuy located in 1880, and referring the remainder, which had been located by a Brazilian commission in 1882 and 1884, to a mixed commission for verification.

The disputed boundary between Brazil and British Guiana, which involved the possession of a territory having an estimated area of 12,741 sq. m., was settled by arbitration in 1904 with the king of Italy as arbitrator, the award being a com- promise division by which Great Britain received about 7336 sq. m. and Brazil about 5405. The definite boundary line starts from Mt. Roraima and follows the water-parting east and south to the source of the Ireng or Mahu river, which with the Takutu forms the boundary as far south as i° N. to enclose the basin of the Essequibo and its tributaries, thence it turns east and north of east along the Serra Acaria to unite with

the unsettled boundary line of Dutch Guiana near the intersection of the 2nd parallel north with the 56th meridian. Negotiations were initiated in 1905 for the definite location of the boundary with Dutch Guiana. Running north-east and south-east to enclose the sources of the Rio Paru, it unites with the French Guiana line at 2° 10′ N., 55° W., and thence runs easterly along the water-parting of the Serra Tumuc-Humac to the source of the Oyapok, which river is the divisional line to the Atlantic coast. The boundary with French Guiana (see Guiana), which had long been a subject of dispute, was settled by arbitration in 1900, the award being rendered by the government of Switzerland. The area of the disputed territory was about 34,750 sq. m.

Physical Geography. — A relief map of Brazil shows two very irregular divisions of surface : the great river basins, or plains, of the Amazon-Tocantins and La Plata, which are practically con- nected by low elevations in Bolivia, and a huge, shapeless mass of highlands filling the eastern projection of the continent and extend- ing southward to the plains of Rio Grande do Sul and westward to the Bolivian frontier. Besides these there are a narrow coastal plain, the low plains of Rio Grande do Sul, and the Guiana highlands on the northern slope of the Amazon basin below the Rio Negro.

The coastal plain consists in great part of sandy beaches, detritus formations, and partially submerged areas caused by uplifted beaches and obstructed river channels. Mangrove swamps, p» lagoons and marshes, with inland canals following the Keller. coast line for long distances, are characteristic features of a large extent of the Brazilian coast. Parts of this coastal plain, however, have an elevation of 100 to 200 ft., are rolling and fertile in character, and terminate on the coast in a line of bluffs. In the larger de- pressions, like that of the Reconcavo of Bahia, there are large alluvial areas celebrated for their fertility. This plain is of varying width, and on some parts of the coast it disappears altogether. In Rio Grande do Sul, where two large lakes have been created by uplifted sand beaches, the coastal plain widens greatly, and is merged in an extensive open, rolling grassy plain, traversed by ridges of low hills (cuchillas), similar to the neighbouring republic of Uruguay. The western part of this plain is drained by the Uruguay and its tributaries, which places it within the river Plate (La Plata) basin.*

The two great river basins of the Amazon- r ocantins and La Plata comprise within themselves, approximately, three-fifths of the total area of Brazil. Large areas of these great river plains are annually flooded, the flood-plains of the Amazon extending nearly across the whole country and comprising thousands of square miles. The Amazon plain is heavily forested and has a slope of less than one inch to the mile within Brazilian

territory — one competent authority placing it at about one-fifth of an inch per mile. The La Plata basin

is less heavily wooded, its surface more varied, and its Brazilian part stands at a much higher elevation.

Of the two highland regions of Brazil, that of the northern slope of the Amazon basin belongs physically to the isolated mountain system extending eastward from the Negro and Orinoco to the Atlantic, the water-parting of which forms the boundary line between the Guianas and Brazil. The culminating point is near the western extremity of this chain and its altitude is estimated at 8500 ft. The ranges gradually diminish in elevation towards the east, the highest point of the Tumuc-Humac range, on the frontier of French Guiana, being about 2600 ft. The Brazilian plateau slopes south- ward and eastward, traversed by broken ranges of low mountains and deeply eroded by river courses. The table-topped hills of Almeyrin (or Almeirim) and Erere, which lie near the lower Amazon and rise to heights of 800 and 900 ft., are generally considered the southernmost margin of this plateau, though Agassiz and others describe them as remains of a great sandstone sheet which once covered the entire Amazon valley. Its general elevation has been estimated to be about 2000 ft. It is a stony, semi-arid region, thinly wooded, having good grazing campos in its extreme western section. Its semi-arid character is due to the mountain ranges on its northern frontier, which extract the moisture from the north-east trades and leave the Brazilian plateau behind them with a very limited rainfall, except near the Atlantic coast. The more arid districts offer no inducement for settlement and are inhabited only by a few roving bands of Indians, but there were settlements of whites in the grazing districts of the Rio Branco at an early date, and a few hundreds of adventurers have occupied the mining districts of the east. In general, Brazilian Guiana, as this plateau region is sometimes called, is one of the least attractive parts of the republic.

The great Brazilian plateau, which is the most important physical division of Brazil, consists of an elevated tableland 1000 to 3000 ft. above the sea-level, traversed by two great mountain systems, and deeply eroded and indented by numerous rivers. A thick sandstone sheet once covered the greater part if not all of rt, remains of which are found on the elevated chapadas of the interior and on isolated elevations extending across the

republic toward its western frontier. These chapadas and elevations, which are usually described as mountain ranges, are capped by horizontal strata of sandstone and show the original surface, which has been worn away by the rivers, leav ing here and there broad flat-topped ridges between river basins and narrower ranges of hills between river courses. From the valleys their rugged, deeply indented escarpments, stretching away to the horizon, have the appearance of a continuous chain of moun- tains. The only true mountain systems, however, so far as known, are the two parallel ranges which follow the contour of the coast, and the central, or Goyana, system. The first consists of an almost continuous range crossing the northern end of Rio Grande do Sul and following the coast northward to the vicinity of Cape Frio, and thence northward in broken ranges to the vicinity of Cape St Roque, and a second parallel range running from eastern Sao Paulo north- east and north to the eastern margin of the Sao Francisco basin in northern Bahia, where that river turns eastward to the Atlantic. The first of these is generally known as the Serra do Mar, or Coast Range, though it is locally known under many names. Its cul- minating point is in the Organ Mountains (Serra dos Orgaos), near Rio de Janeiro, which reaches an elevation of 7323 ft. The inland range, which is separated from the Coast Range in the vicinity of Rio de Janeiro by the valley of the Parahyba do Sul river, is known as the Serra da Mantiqueira, and from the point where it turns northward to form the eastern rim of the Sao Francisco basin, as the Serra do Espinhaco. This range is also known under various local names. Its culminating point is toward the western extremity of the Mantiqueira range where the Itatiaya, or Itatiaia-assu, peak rises to an elevation of 8898 ft. (other measurements give 9823 ft.), probably the highest summit in Brazil. This range forms the true backbone of the maritime mountainous belt and rises from the plateau itself, while the Coast Range rises on its eastern margin and forms a rim to the plateau. North of Cape Frio the Coast Range is much broken and less elevated, while the Serra do Espinhaco takes a more inland course and is separated from the coast by great gently-sloping, semi-barren terraces. The second system — the Central or Goyana — consists of two distinct chains of mountains converging toward the north in the elevated chapadao between the Tocantins and Sao Francisco basins. The eastern range of this central system, which crosses western Minas Geraes from the so-called Serra das Vertentes to the valley of the Paracatii, a western tributary of the Sao Francisco, is called the Serra da Canastra and Serra da Matta da Corde. Its culminating point is toward its southern ex- tremity in the Serra da Canastra, 4206 ft. above sea-level. The western range, or what is definitely known of it, runs across southern Goyaz, south-west to north-east, and forms the water-parting between the Parana and Tocantins-Araguaya basins. Its culmin- ating point is in the Montes Pyreneos, near the city of Goyaz, and is about 4500 ft. above sea-level.

The great part of this immense region consists of chapadoes, as the larger table-land areas are called, chapadas or smaller sections of the same, and broadly excavated river valleys. How extensive this work of erosion has been may be seen in the Tocantins-Araguaya basin, where a great pear-shaped depression, approximately 100 to

500 m. wide, 700 m. long, and from 1000 to 1500 ft. deep, has been excavated northward from the centre of the plateau. South- ward the Parana has excavated another great basin and eastward the Sao Francisco another. Add to these the eroded river basins of the Xingii, Tapajos and Guapore on the north and west, the Para- guay on the south-west, and the scores of smaller rivers along the Atlantic coast, and we may have some conception of the agencies that have been at work in breaking down and shaping this great table-land, perhaps the oldest part of the continent. The most southern of these chapadoes, that of the Parana basin, in which may be included the northern part of the Uruguay and eastern part of the Paraguay basins, includes the greater part of the states of Rio Grande do Sul, Santa Catharina, Parana and Sao Paulo, the south- western corner of Minas Geraes, a part of southern Goyaz, and the south-eastern corner of Matto Grosso. The greatest elevation is on its eastern or Atlantic margin where the average is about 3280 ft. above sea-level. The plateau breaks down abruptly toward the sea, and slopes gradually some hundreds of feet toward the south and west. There has been considerable denudation toward the west, the eastern tributaries of the Parana rising very near the coast. The northern and western parts of this plateau have an average elevation a little less than that of the Atlantic margin, and their slopes are toward the south and east, those of Goyaz and Matto Grosso being abrupt and deeply eroded. This great chapadao is in many respects the best part of Brazil, having a temperate climate, extensive areas of fertile soil, rich forests and a regular rainfall. Its Atlantic slopes are heavily wooded, but the western slopes exhibit grass-covered campos between the river courses. The Sac Francisco chapadao, which has a general elevation of about 2600 ft., covers the greater part of the states of Minas Geraes and Bahia, and a small part of western Pernambuco, and might also be considered con- tinuous with those of the Parnahyba and Tocantins-Araguaya basins. This region is more tropical in character, partially barren, and has an uncertain rainfall, a large part of the Sao Francisco basin and the upper Atlantic slope of its eastern rim being subject to long-continued droughts. This region is well wooded along the river courses of Minas Geraes, the lower Atlantic slopes of Bahia, which are perhaps outside the plateau proper, and on the weather side of some of the elevated ridges where the rainfall is heavy and regular. It has extensive campos and large areas of exposed rock and stony steppes, but is richly provided with mineral deposits. It breaks down less abruptly toward the Atlantic, the slopes in Bahia being long and

gradual. The Parnahyba chapadao covers the state of Piauhy, the southern part of Maranhao, and the western part of Ceara. Its general elevation is less than that of the Sao Francisco region, owing to the slope of the plateau surface toward the Amazon depression and to denudation. It resembles the Sao Francisco region in its uncertain rainfall and exposure to droughts, and in having large areas of campos suitable for grazing purposes. It is thinly wooded, except in the north, where the climatic conditions approach those of the Amazon valley. Its climate is more tropical and its development has gone forward less rapidly than inthe more temperate regions of the south. The Amazonian chapadao, which includes the remainder of the great Brazilian plateau west of the Sao Francisco and Parnahyba regions and which appears to be the continuation of these tablelands westward, is much the largest of these plateau divisions. It covers the greater part of the states of Matto Grosso and Goyaz, a large part of southern Para, the southern margin of Amazonas, and a considerable part of western Maranhao. It in- cludes the river basins of the Tocantins-Araguaya, Xingii, Tapajos, and the eastern tributaries of the Guapore-Madeira. A considerable part of it has been excavated by these rivers to a level which gives their valleys the elevation and character of lowlands, though isolated hills and ranges with the characteristic overlying horizontal sand- stone strata of the ancient plateau show that it was once a highland region. The southern margin of this plateau breaks down abruptly toward the south and overlooks the Parana and Paraguay basins from elevations of 2600 to 3000 ft. There is great diversity in the character and appearance of this extensive region. It lies wholly within the tropics, though its more elevated districts enjoy a tem- perate climate. Its chapadas are covered with extensive campos, its shallow valleys with open woodlands, and its deeper valleys with heavy forests. The rainfall is good, but not heavy. The general slope is toward the Amazon, and its rivers debouch upon the Amazonian plain through a succession of falls and rapids.

There remains only the elevated valley of the Parahyba do Sul, lying between the so-called Serra das Vertentes of southern Minas Geraes and the Serra do Mar, and extending from the Serra da Bocaina, near the city of Sao Paulo, eastward to Cape Frio and the coastal plain north of that point. It includes a small part of eastern Sao Paulo, the greater part of the state of Rio de Janeiro, a small corner of Espirito Santo, and a narrow strip along the southern border of Minas Geraes. It is traversed by two mountain chains, the Serra da Mantiqueira and Serra do Mar, and the broad, fertile valley of the Parahyba do Sul which lies between them, and which slopes gently toward the east from a general elevation exceeding 2000 ft. in Sao Paulo. This region is the smallest of the chapadao divisions of the great plateau, and might be considered either a southward extension of the Sao Francisco or an eastward extension of the Parana chapadao. It

is one of the most favoured regions oi

GK!

o

*-Ul**

Pi

%

wMS¥mm

SlSi

y%:

~ & ~~, o—~-

CO

./

St

stijj '|1

%•[<£•

.aSs^f^?

- *5 ^ v*

w

• a < : – •

a Wo ill

•Si,

, «

ft

*mtM^*

1

flfpp

K.

©re

fe§KNnl

■*~fes-ˆ*

■*»

**o*

< ˆ s m i

v jff.*

‘Z£»p:

,Sfe;

m

\,

*SF**

It/op- 1 ˆ’

*/’%***

iˆLi

(N

ˆv'i

m

fˆ

—rn

15MI

H

Q

V,

S J3 ˆ

.S “tf u

13 g “i

3 fe

c S ,5

> o ™

o r/3

jM

O

a. X

UD

<;

CD ‘

GEOGRAPHY]

BRAZIL

441

Brazil, having an abundant rainfall, extensive forests of valuable timber, and large areas of fertile soil. The mountain slopes are still masses of dense forest, though their lower elevations and neighbour- ing valleys have been cleared for cultivation and by dealers in rosewood and other valuable woods. This elevated valley is noted for its fertility and was once the principal coffee-producing district of Brazil.

Outside the two great river systems of the Amazon and river Plate (Rio de la Plata), which are treated under their respective titles, the rivers of Brazil are limited to the numerous Rivers. sma \ streams and three or four large

rivers which flow eastward from the plateau regions directly into the Atlantic. The Amazon system covers the entire north-western part of the republic, the state of Amazonas, nearly the whole of Para and the greater part of Matto Grosso being drained by this great river and its tributaries. If the Tocantins-Araguaya basin is included in the hydrographic system, the greater part of Goyaz and a small part of Maranhao should be added to this drainage area. The Tocantins is sometimes treated as a tributary of the Amazon because its outlet, called the Rio Para, is connected with that great river by a number of inland channels. It is an entirely separate river, however, and the inland communication between them is due to the slight elevation of the intervening country above their ordinary levels and to the enormous volume of water brought down by the Amazon, especially in the flood season. As the outlet of the Tocantins is so near to that of the Amazon, and their lower valleys are conterminous, it is convenient to treat them as parts of the same hydrographic basin.

In the extreme north-east corner of the republic where the Brazilian Guiana plateau slopes toward the Atlantic there is a small area lying outside the drainage basin of the Amazon. Its rivers flow easterly into the Atlantic and drain a triangular-shaped area of the plateau lying between the northern frontier and the southern and western watersheds of the Araguary, whose extreme limits are about 0° 30′ N. lat. and 53° 50′ W. long. The more important of these rivers are the Araguary, Amapa, Calgoene, Cassipore and Oyapok. The Araguary rises in the Tumuc-Humac mountains, in about 2° 30′ N. lat., 52 10′ W. long., and follows a tortuous course south and north-east to the Atlantic. Its largest tributary, the Amapary, rises still farther west. Little is known of the country through which it flows, and its channel is broken by rapids and waterfalls where it descends to the coastal plain. The Amapa is a short river rising on the eastern slopes of the same range and flowing across a low, wooded plain, filled with lagoons. The Calgoene and Cassipore enter the Atlantic farther north and have a north-east course across the same plain. All these small rivers are described as auriferous and have attracted attention for this reason. The Oyapok, or Vicente Pinzon, is the best-known of the group and forms the bound- ary line between Brazil and French Guiana under the arbitration award of 1900. It rises in about 2° 05′ N., 53° 48′ W., and flows easterly and north-easterly to the Atlantic. Its course is less tortuous than that of the Araguary.

*The rivers of the great Brazilian plateau which flow directly to the Atlantic coast may be divided into two classes: those of its north- ward slope which flow in*a northerly and north-easterly direction to the north-east coast of the republic, and those which drain its eastern slope and flow to the sea in an easterly direction. The former reach the coastal plain over long and gradual descents, and are navigable for considerable distances. The latter*

descend from the plateau much nearer the coast, and are in most cases navigable for short distances only. In both classes navigation is greatly impeded by sandbars at the mouths of these rivers, while in the districts of periodical rainfall it is greatly restricted in the dry season. The more important rivers of the first division, which are described in more detail under the titles of the Brazilian states through which they flow, are the following: the Gurupy, Tury-assii, Mearim, Itapicuru and Balsas, in the state of Maranhao; the Parnahyba and its tributaries in Piauhy; Jaguaribe in Ceara; and the Apody and Piranhas in Rio Grande do Norte. Of these the Parnahyba is the most important, having a total length of about 900 m., broken at intervals by rapids and navigable in sections. It receives only one important tributary from Maranhao — the Rio das Balsas, 447 m. long — and five from Piauhy, the Urussuhy-assu, Gurgueia, Caninde, Poty and Longa. Piauhy is wholly within its drainage basin, although the river forms the boundary line between that state and Maranhao throughout its entire length. All the rivers in this division are influenced by the periodical character of the rainfall, their navigable channels being greatly shortened in the dry season (August- January). In Ceara the smaller rivers become dry channels in the dry season, and in protracted droughts the larger ones dis- appear also.

The rivers of the second division are included in a very great extension of coast and are influenced by wide differences in climate. Their character is also determined by the distance of the Serra do Mar from the coast, the more southern rivers having short precipitous courses. The more northern rivers are subject to periodical varia- tions in volume caused by wet and dry seasons, but the greater dis- tance of the coast range and the more gradual breaking down of the plateau toward the sea, give them longer courses and a greater extent of navigable water. North of the Sao Francisco the watershed

projecting from the plateau eastward toward Cape St Roque, known as the Serra da Borborema in Parahyba and Rio Grande do Norte where its direction becomes north-east, leaves a triangular section of the easterly slope in which the river courses are short and much broken by rapids. The rainfall, also, is limited and uncertain. The largest of this group of small rivers is the Parahyba do Norte, belong- ing to the state of Parahyba, whose length is said to be less than 200 m., only 5 or 6 m. of which are navigable for small steamers. The Sao Francisco, which belongs to the inland plateau region, is the largest river of the eastern coast of Brazil and exists by virtue of climatic conditions wholly different from those of the coast where it enters the Atlantic. The tributaries of the lower half of this great river, which belong to the Atlantic coast region, are small and often dry, but the upper river where the rainfall is heavier and more regular receives several large affluents. . The river is navigable up to the Paulo

Affonso falls, 192 m. from the coast, and above the falls there is a much longer stretch of navigable water.

From the Sao Francisco to Cape Frio there are many short rivers rising on the slopes of the plateau and crossing the narrow coastal plain to the sea. There are also a few of greater length which rise far back on the plateau itself and flow down to the plain through deeply cut, precipitous courses. The navigable channels of these rivers are restricted to the coastal plain, except where a river has excavated for itself a valley back into the plateau. The more im- portant of these rivers are the Itapicuru, Paraguassii, Contas or Jussiape, Pardo or Patype, and Jequitinhonha, of Bahia; the Mucury, and Doce, of Espirito Santo; and the Parahyba do Sul of the state of Rio de Janeiro. Of the Bahia group, the Jequitinhonha, sometimes called the Belmonte on its lower course, is the longest and most important, rising near Serro in the state of Minas Geraes and flowing in a curving north-east direction for a distance of about 500 m., 84 of which are navigable inland from the sea. The Mucury and Doce also rise in Minas Geraes, and are much broken in their descent to the lower plains, the former having a navigable channel of 98 m. and the latter of 138 m. The Parahyba, or Parahyba do Sul, which enters the sea about 30 m. north of Cape S. Thome, is the largest and most important of the Atlantic coast rivers south of the Sao Francisco. It rises on an elevated tableland in the state of Sao Paulo and flows across the state of Rio de Janeiro from west to east, through a broad fertile valley producing coffee in its most elevated districts and sugar on its alluvial bottom-lands nearer the sea. It has a total length of 658 m., 57 of which are navigable between S. Fidelis and its mouth, and about 90 m. of its upper course.

South of Cape Frio there are no large rivers along the coast because of the proximity of the Serra do Mar — the coastal plain being very narrow and in places disappearing altogether. There are many short streams along this coast, fed by heavy rainfalls, but they have no geographic importance and no economic Value under existing con- ditions. The largest of these and the only one of commercial value is the Ribeira de Iguape, which has its source on the tablelands of Parana and after receiving several affluents west of the Serra do Mar breaks through a depression in that range and discharges into the Atlantic some miles below Santos on the southern boundary of the state of Sao Paulo. This river has a navigable channel of 1 18 m. below Xiririca, and communicates with an inland canal or waterway extending for many miles along this coast and known as the Iguape, or Mar Pequeno. In Rio Grande do Sul the Atlantic coastal plain extends westward more than half-way across the state, and is well watered by numerous streams flowing eastward to the Lag6a dos Patos. Of these only two are of large size — the Guayba and Cama- quam. The first is formed by the confluence of the Jacuhy, Cahy, Sinos and Gravatahy, and is known under this name only

from Porto Alegre to the Ponta de Itapua, where it enters the Lag6a dos Patos. This river system drains a large part of the northern moun- tainous region of the state, and has a considerable extension of navigable channels between the plateau margin and the lake. In the extreme southern part of the state, the Lag6a Mirim empties into the Lag6a dos Patos through a navigable channel 61J m. long, called the Rio Sao Goncalo.

The Brazilian rivers of the Rio de la Plata system are numerous and important. Those of the Paraguay drain the south-western part of Matto Grosso, and the tributaries of the Parana cover the western slopes of the Serra do Mar from Rio Grande do Sul north to the south-west part of Minas Geraes, and include the south-east part of Matto Grosso and the south part of Goyaz within their drainage basin. This is one of the most important fluvial systems of Brazil, but its economic value is impaired by the great waterfalls of Guayra, or Sete Quedas, and Uribu-punga, and by the rapids and waterfalls in the majority of its affluents near their junction with the main stream. Between the two great waterfalls of the Parana there is an open channel of 276 m., passing through a rich and healthy country, and receiving large tributaries from one of the most fertile regions of Brazil. Among the larger of these are the great falls of the Iguassii, near the j unction of that river with the Parana. Though the Uruguay plays a less important part, its relations to the country arc similar to those of the Parana, and its tributaries from the plateau region are similarly broken by falls and rapids. The Paraguay is in great part a lowland river, with a sluggish current, and is navigable by large river steamers up to Corumba, and by smaller steamers to Cuyaba and the mouth of the Jauru.

{GEOGRAPHY

Compared with the number, length and volume of its rivers, Brazil has very few lakes, only two of which are noticeable for their Lakes. size. There are a number of lakes in the lowland region of the Amazon valley, but these are mainly overflow reservoirs whose areas expand and contract with the rise and fall of the great river. The coastal plain is also intersected by lagoons, lakes and inland channels formed by uplifted beaches. These inland channels often afford many miles of sheltered navigation. The lakes formed in this manner are generally shallow, and are sometimes associated with extensive swamps, as in southern Bahia. The lakes of the Alag6as coast, however, are long, narrow and deep, occupying valleys which were deeply excavated when the land stood at a higher level, and which were transformed into lakes by the elevation of the coast. The largest of these are the LagSa do Norte, on whose margin stands the city of Maceio, and the Lagfia do Sul, a few miles south of that city. Both have outlets to the sea, and the former is salt There is a large number of these lakes along the coasts of Espirito Santo and Rio de Janeiro, some of them of considerable size. The two largest lakes of this class are on the coast of .Rio Grande do Sul and are known as the Lagoa dos Patos and Lagoa Mirim. Both of these

lakes lie nearly parallel with the coast line, are separated from the ocean by broad sand beaches filled with small lakes, and com- municate with the ocean through the same channel. The Lag6a dos Patos is about 124 m. long with a maximum width of 37 m., and Lag6a Mirim is 108 m. long with a maximum width of 15 m. Both are navigable, though comparatively shallow and filled with sand- banks. So far as known, there are no lakes of noteworthy size in the interior of the country. There are a few small lakes in Maranhao and Piauhy, some in Goyaz in the great valley of the Araguaya, and a considerable number in Matto Grosso, especially in the Para- guay basin, where the sluggish current of that river is unable to carry away the rainfall in the rainy season.

The coast of Brazil is indented with a number of almost land- locked bays, forming spacious and accessible harbours. The larger Coast. an d more important of these are Todos os Santos, on

which is located the city of Sao Salvador or Bahia, and Rio de Janeiro or Guanabara, beside which stands the capital of the republic. These two are freely accessible to the largest ships afloat, f he bays of Espirito Santo, , Paranagua and Sao Francisco have similar characteristics, but they are smaller and more difficult of access. The first is the harbour for the city of Victoria, and the other two for ports of the same name in southern Brazil. The port of Pernambuco, or Recife, is formed by a stone reef lying across the entrance to a shallow bay at the mouth of two small rivers, Beberibe and Capibaribe, and is accessible to steamers of medium draught. Santa Catharina and Maranhao have well-sheltered harbours formed by an island lying in the mouth of a large bay, but the latter is shallow and difficult of access. Para, Parnahyba, Parahyba, Santos and Rio Grande do Sul are river ports situated near the sea on rivers having the same name ; but, with the exception of Para and Santos, they are difficult of access and are of secondary importance. There are still other bays along the coast which are well adapted for com- mercial purposes but are used only in the coasting trade. Many of the Atlantic coast rivers would afford excellent port facilities if obstructions were removed from their mouths.

Geology. — Brazil is a region which has been free from violent disturbances since an early geological period. It has, indeed, been subject to oscillations, but the movements have been regional in character and have not been accompanied by the formation of any mountain chain or any belt of intense folding. From the Devonian onwards the beds lie flat or dip at low angles. They are faulted but not sharply folded. The mountain ranges of the east of Brazil, from Cape St Roque to the mouth of the river Plate, are composed chiefly of crystalline and mctamorphic rocks. Some of the metamorphic rocks may belong to the older Palaeozoic period, but the greater part of the series is probably Archaean. Similar rocks cover a large

area in the province of Goyaz and in the south of the Matto Grosso, and they form, also, the hills which border the basin of the Amazon on the confines of Venezuela and Guiana. They constitute, in fact, an incomplete rim around the basin of sedimentary beds which occupies the Amazonian depression. In a large part of this basin the covering of sedimentary deposits is comparatively thin. The crystalline floor is exposed in the valleys of the Madeira, Xingu, &c. Some of the rocks thus exposed are, however, eruptive (e.g. in the Tapajoz), and' probably do not belong to the Archaean. The crystalline rocks are succeeded by beds which have been referred to the Cambrian and Silurian systems. In the valley of the Trombetas, one of the northern tributaries of the Amazon, fossils have been found which indicate either the top of the Ordovician or the bottom of the Silurian. In the Maecuru, another northern affluent, graptolites of Ordovician age have been discovered, and Silurian fossils are said to have been found in the Maraca. Elsewhere the identification of the Silurian and older systems does not rest on palaeontological evidence. Devonian beds cover a much more extensive area. They crop out in a band some 25 to 50 m. north of the lower Amazon and in another band at a still greater distance south of that river. These bands are often concealed by more recent deposits, but it is clear that in this region the Devonian beds form a basin or synclinal with the Amazon for its axis. Devonian beds also lie upon the older rocks in the Matto Grosso and other provinces in the interior of Brazil, where they

generally form plateaux of nearly horizontal strata. Fossils have been found in many localities. They belong to either the lower or the middle division of the Devonian system. The fauna shows striking analogias with that of the Bokkeveld beds of South Africa on the one hand and of the Hamilton group of North America on the other. The Carboniferous system in Brazil presents itself under two facies, the one marine and the other terrestrial. In the basin of the Lower Amazon the Carboniferous beds lie within the Devonian synclinal and crop out on both sides of the river next to the Devonian bands. There is a lower series consisting of sandstone and an upper series of limestone. The former appears to be almost unfossiliferous, the latter has yielded a rich marine fauna, which belongs to the top of the Carboniferous or to the Permo-carboniferous. In southern Brazil, on the other hand, in Rio Grande do Sul ; Parana, &c, the beds of this period are of terrestrial origin, containing coal seams and remains of plants. Some of the plants are European forms, others belong to the Glossopteris flora characteristic of India and South Africa. The beds are homotaxial with the Karharbari series of India, and represent either the top of the Carboniferous or the base of the Permian of Europe. The only Mesozoic system which is represented in Brazil by marine beds is the Cretaceous, and the marine facies, is restricted to the coasts and the basin

of the Amazon. In the pro- vince of Sergipe, on the east coast, the beds are approximately on the horizon of the Cenomanian; in the valley of the Amazon they belong to the highest parts of the Cretaceous system, and the fauna shows Tertiary affinities. In the interior of Brazil, the Palaeozoic beds are directly overlaid by a series of red sandstones, &c, which appear to be of continental origin and of which the age is uncertain. Tertiary beds cover a considerable area, especially in the Amazonian depression. They consist chiefly of sands and clays of aeolian and freshwater origin. Of the Pleistocene and recent deposits the most interesting are the remains of extinct animals (Glyptodon, Mylodon, Megatherium, &c.) in the caves of the Sao Francisco.

From the above account it will appear that, excepting near the coast and in the basin of the Amazon, there is no evidence that any part of Brazil has been under the sea since the close of the Devonian period. During the Triassic and Jurassic periods even the basin of the Amazon appears to have been dry land. Eruptive rocks occur in the Devonian and Carboniferous beds, but there is no evidence of volcanic activity since the Palaeozoic epoch. The remarkable " stone reefs " of the north-east coast are ancient beaches hardened by the infiltration of carbonate of lime. They are quite distinct in their formation from the coral reefs of the same coast.

Climate. — Brazil lies almost wholly within the torrid zone, less than one-twelfth of its area lying south of the tropic of Capricorn. In general terms, it is a tropical country, with sub-tropical and tem- perate areas covering its three southern states and a great part of the elevated central plateau. The forest-covered, lowland valley of the Amazon is a region of high temperatures which vary little throughout the year, and of heavy rainfall. There is no appreciable change of seasons, except that produced by increased rainfall in the rainy season. The average temperature according to Castelnau is about 78°F., or 82-40° to 84-20° F. according to Agassiz. There is an increase in the rainfall from August to October, and again from November to March, the latter being the regular rainy season, but the time varies considerably between the valley of the upper Amazon and those of the upper Madeira and Negro. There is usually a short dry season on the upper Amazon in January and February, which causes two annual floods — that of November-December, and the great flood of March-June. The subsidence of the latter usually lasts until October. The average rainfall throughout the whole Amazon valley is estimated by Reclus as " probably in excess of 2.metres " (78-7 in.), and the maximum rise of the great flood is about 45 ft. The prevailing winds in the Amazon valley are easterly and westerly (or south-westerly), the former warm and charged with moisture, the latter dry and cold. The easterly winds, which are deflections of the trade winds, blow upstream with great regularity and force, more especially in the winter or dry season, and are felt as far inland as the mouths of the

Madeira and Negro. Above these they are less regular and are attracted northward by the heated llanos of Venezuela in winter, or southward by the heated campos of Matto Grosso in summer. The cold south-westerly winds are felt when the sun is north of the equator, and are most severe, for a few days, in the month of May, when a tempo da friagem (cold period) causes much discomfort throughout the upper Amazon region. There are winter winds from the Andes, but in the summer season there are cold currents of air from up-river (ventos da cima) which are usually followed by downpours of rain.

The coastal plain as far south as Santos is a region of high tem- peratures and great humidity. The year is usually divided into a winter (inverno) and summer (verao), corresponding approximately to a dry and wet season. The "dry " season, however, is a season of moderate rainfall, except on the north-east coast where arid con- ditions prevail. Another exception is tha: of the Pernambuco coast, where the rainy season comes between March and August, with the heaviest rainfall from May to July, which is the time of the southern winter. Going southward there is also a gradual decrease in the mean annual temperature, the difference between Rio de Janeiro and the Amazon being about 5°. The north-east coast, which is sandy and barren, shows an average mean annual temperature (at

Fortaleza) of nearly 8o°F., which is slightly higher than those of Maranhao and Para. At Pernambuco the mean summer temperature is 79-5° and that of winter 76-8°, which are about 3° lower than the mean temperature of Bahia in summer, and 5 higher than the Bahia mean in winter. South of Bahia there is a gradual increase in the rainfall, that of Rio de Janeiro exceeding 43 in. per annum. At Santos the rainfall is exceptionally heavy and the mean temperature high, but below that point the climatic conditions are considerably modified, the range in temperature being greater, the mean annual temperature lower, and the rainfall more evenly distributed through- out the year. The winds are more variable, and the seasons are more sharply defined. In Rio Grande do Sul the range in temperature is from 26° to 8o°, the climate being similar to that of Uruguay. At Pelotas, a sea-level port on Lag6a dos Patos, the mean annual tem- perature is about 63 ° and the annual rainfall about 42 in. Extreme variations in temperature are often produced by cold south-west storms from the Argentine pampas, which sweep across southern Brazil as far north as Cape Frio, the fall in temperature sometimes being 22 ° to 27 °.

These storms usually last from two to three days and cause much discomfort. Winter rains are more frequent in southern Brazil, and violent storms prevail in August and September. At Blumenau, on the Santa Catharina coast, the annual rainfall is

53 in-

The climatic conditions of the Brazilian plateau are widely differ- ent from those of the coast in many respects. There is less uniformity in temperature, and the elevated chapadas are generally hotter during the day and cooler at night than are localities of the same latitude on the coast. The Brazilian Guiana plateau, lying immediately north of the equator, is in great part a hot, stony desert. Geo- graphically it belongs to the Amazon basin, as its western and southern slopes are drained by tributaries of that great river. Climatically, however, it is a region apart. It lies in the north-east trade winds belt, but the mountain chain on its northern frontier robs these winds of their moisture and leaves the greater part of the Brazilian plateau rainless. Its eastern and western extremities, however, receive more rain, the former being well forested, while the latter is covered with grassy campos. South. of the Amazon valley and filling a great part of the eastern projection of the con- tinent, is another arid, semi-barren plateau, lying within the south- east trade winds belt, and extending from Piauhy southward to southern Bahia. It covers the state of Piauhy and the western or inland parts of the states of Ceara, Rio Grande do Norte, Parahyba, Pernambuco and Bahia. The year is divided into a dry and wet season, the first from June to December, when rain rarely falls, the streams dry up and the campos are burned bare, and the second from January to May when the rains are sometimes heavy and the campos are covered with luxuriant verdure. The rains are neither regular nor certain, however, and sometimes fail for a succession of years, causing destructive seccas (droughts). The interior districts of Ceara, Pernambuco and Bahia have suffered severely from these skcas. The sun temperature is high on these barren tablelands, but the nights are cool and refreshing. The prevailing winds are the south-east trades, which have lost some of their moisture in rising from the coastal plain. In summer, becoming warmed by the heated- surface of the plateau, they sweep across it without a cloud or drop of rain. In winter the plateau is less heated, and cold currents of air from the west and south-west cause precipitation over a part if not all of this region. South and south-west of this arid plateau lie the inhabited tablelands of Rio de Janeiro, Sao Paulo and Minas Geraes, where the climate is greatly modified by a luxuri- ant vegetation and southerly winds, as well as by the elevation. Minas Geraes is forested along its water courses and along its southern border only; its sun temperature, therefore, is high and the rainfall in its northern districts is comparatively light. Sao Paulo is partly covered by open campos, and these also serve to augment the maxi- mum

temperature. In both of these states, however, the nights are cool, and the mean annual temperature ranges from 68° to 77 , the northern districts of Minas Geraes being much warmer than the southern. In Sao Paulo and southern Minas Geraes there are some- times frosts. In the Parahyba valley, which extends across the state of Rio de Janeiro, the mean temperature is somewhat higher than it is in Sao Paulo and Minas Geraes, and the nights are warmer, but the higher valleys of the Serra do Mar enjoy a delightfully temperate climate. The rainfall throughout this region is abundant, except in northern Minas Geraes, where the climatic conditions are influenced to some extent by the arid eastern plateau. South of Sao Paulo the tablelands of Parana, Santa Catharina and Rio Grande do Sul enjoy a temperate climate, with an abundant rainfall. There are occasional frosts, but snow is never seen. Of Goyaz and Matto Grosso very little can be said. The lower river valleys of the Tocantins- Araguaya, Xingu, Tapajos and Paraguay are essentially tropical, their climate being hot and humid like that of the Amazon. The higher valleys of the Parana and its tributaries, and of the rivers which flow north- ward, are sub-tropical in character, having high sun temperatures and cool nights. Above these, the chapadas lie open to the sun and wind and have a cool, bracing atmosphere even where high sun temperatures prevail. _ The mean annual temperature at Goyaz (city), according to a limited number of observations, is about 77°. There is no absolutely dry season in this part of the great Brazilian plateau, though the year is customarily divided into a dry and wet

season, the latter running from September to April in Goyaz, and from November to April in Matto Grosso. The prevailing winds are from the north-west in this region, and westerly winds in the rainy season are usually accompanied by rain.

Fauna. — The indigenous fauna of Brazil is noteworthy not only for the variety and number of its genera and species, but also for its deficiency in the larger mammals. Of this, one of the best authorities on the subject (H. W. Bates in The Naturalist on the River Amazons) says: " Brazil, moreover, is throughout poor in terrestrial mammals, and the species are of small size." It is noteworthy, also, for the large number of species having arboreal habits, the density and ex- tent of the Amazon forests favouring their development rather than the development of those of terrestrial habits. Of Quadrumana there are about fifty species in Brazil, all arboreal, thirty-eight of which inhabit the Amazon region. They belong mostly to the Cebidae family, and are provided with prehensile tails. The Carnivora are represented by six species of the Felidae, the best known of which is the onca, or jaguar {F. onca, L.), and the cougar, or puma (F. concolor) ; three species of the Canidae, the South American wolf (C. jubatus), and two small jackals (C. brasiliensis and C. vetulus); and a few species of the

Mustelina including two of the otter, two Galictis and one Mephitis. Of the plantigrades, Brazil has no bears, but has the related species of raccoon (Nasua socialis and N. solitaria) , popularly called coatis. The opossum (Didelphis) is represented by three or four species, two of which are so small that they are gener- ally called wood rats. The rodents are numerous and include several peculiar species. Only one species of hare is found in Brazil, the Lepus brasiliensis, and but one also of the squirrel {Scyurus). Of the amphibious rodents, the prea (Ca.via aperea), moco (C. rupestris), paca (Coelogenys paca), cutia {Dasyprocta aguti) and capybara (Hydrochoerus capybara) are noteworthy for their size and extensive range. Their flesh is used as an article of food, that of the paca being highly esteemed. Of the Muridae there are several genera and a large number of species, some of them evidently importations from the Old World. Brazil has three groups of animals similar to the common rat — the Capromydae, Loncheridae and Psammoryctidae — the best known of which is the " tuco-tuco " (Ctenomys brasiliensis), a small burrowing animal of Rio Grande do Sul which excavates long subterranean galleries and lives on roots and bulbs. One of the characteristic orders of the Brazilian fauna is that of the Edentata, which comprises the sloth, armadillo and ant-eater. These animals are found only in the tropical regions of South America. The range of the sloth is from the Guianas south into Minas Geraes, the arma- dillo as far south as the Argentine pampas and the ant-eater from the Amazon south to Paiaguay, though it is found in the Amazon region principally. The sloth (Bradypus) is an arboreal animal which feeds almost exclusively en the foliage of the Cecropias. It includes two recognized genera and half a dozen species, the best known of which is B. didactylus. The common name in Brazil is preguica, which is equivalent to its English name. Of armadillos, commonly called tatu in Brazil, the largest species is the Dasypus eigas, but the best known is the tatu-ete (D. oclocinctus) , which is highly esteemed for its flesh. The ant-eaters {Myrmecophaga) are divided into three or four species, one of which (if. jubata) is ex- clusively terrestrial, and the others arboreal. The popular name for the animal is tamandud. The M. jubata, or tamandud bandeira, is sometimes found as far south as Paraguay. Of the ruminants, Brazil has only four or five species of Cervidae, which are likewise common to other countries of South America. The largest of these is the marsh deer (C. paludosus), which in size resembles its European congeners. The others are the C. campestris, C. nemorivagus, C. rufus and a small species or variety called C. nanus by the Danish naturalist Dr P. W. Lund. The pachyderms are represented by three species of the peccary (Dicolyles) and two of the anta, or tapir (Tapirus). The former are found over a wide range of country, extending into Bolivia and Argentina, and are noted for their impetuous pugnacity. The tapir also has an extensive range between the coast and the foothills of the Andes, and from northern Argentina to south-eastern Colombia. It is the largest of

the Brazilian mammals, and inhabits densely forested tracts near river courses. The two species are T. americanus, which is the larger and best known, and the anta chure, found in Minas Geraes, which is said to be identical with the T. Roulini of Colombia. Perhaps the most interesting mammal of Brazil is the manati, or sea-cow (Manatus americanus), which inhabits the lower Amazon and sometimes reaches a length of 15 to 20 ft. It is taken with the harpoon and its oil is one of the commercial products of the Amazon valley.

The avifauna of Brazil is rich in genera, species and individuals, especially in species with brilliantly-coloured plumage. It is esti- mated that more than half the birds of Brazil are insectivorous, and that more than one-eighth are climbers. The range in size is a wide one — from the tiny humming-bird to the ema, rhea, or American ostrich. Although the order which includes song-birds is numerous in species and individuals, it is noticeably poor in really good songsters. On the other hand it is exceptionally rich in species having strident voices and peculiar unmusical calls, like the paco (Coracina scutlata) and the araponga (Chasmorhynchus nudicollis). Two species of vultures, twenty-three of falcons and eight of owls represent the birds of prey. The best known vulture is the common urubu {Cathartesfoetens, Illig), which is the universal scavenger of the

tropics. The climbers comprise a large number of species, some of which, like those of the parrot {P sittacidae) and woodpecker (Picus), are particularly noticeable in every wooded region of the country. One of the most striking species of the former is the brilliantly- coloured arara (Macrocercus, L.), which is common throughout northern Brazil. Another interesting species is the toucan (Ram- phastos), whose enormous beak, awkward flight and raucous voice make it a conspicuous object in the great forests of northern Brazil. In strong contrast to the ungainly toucan is the tiny humming-bird, whose beautiful plumage, swiftness of flight and power of wing are sources of constant wonder and admiration. Of this smallest of birds there are fifty-nine well-known species, divided into two groups, the Phaethorninae, which prefer the forest shade and live on insects, and the Trochilinae, which frequent open sunny places where flowers are to be found. One of the Brazilian birds whose habits have attracted much interest is the Joao de Barro (Clay John) or oven bird (Furnarius rufus), which builds a house of reddish clay for its nest and attaches it to the branch of a tree, usually in a fork. The thrush is represented by a number of species,

one of which, the sabid (Mimus), has become the popular song-bird of Brazil through a poem written by Goncalves Dias. The dove and pigeon have also a number of native species, one of which, the pomba jurity (Peristera frontalis), is a highly-appreciated table luxury. The gallinaceous birds are well represented, especially in game birds. The most numerous of these are the perdiz (partridge), the best known of which is the Tinamus maculosa which frequents the compos of the south, the inhambu (Crypturus), capoeira (Odontophorus) , and several species of the penelope family popularly known as the jacutinga, jacu and jacu-assu. The common domesticated fowl is not in- digenous. Among the wading and running birds, of which the ema is the largest representative, there are many species of both de- scriptions. In the Amazon lowlands are white herons (Ardea can- didissima), egrets (A. egretla), bitterns (A. exilis), blue herons {A. herodias), scarlet ibises (Ibis rubra), roseate spoonbills (Platalea ajaja); on higher ground the beautiful peacock heron (ˆ4. helias) which is easily domesticated ; and on the dry elevated compos the ceriema (Dicholophus cristatus) which is prized for its flesh, and the jacamin (Psophia crepitans) which is frequently domesticated. Prominent among the storks is the great black-headed white crane, called the jaburu (Mycteria americana), which is found along the Amazon and down the coast and grows to a height of 4.5 ft. Of the swimmers, the number of species is smaller, but some of them are widely distributed and numerous in individuals. There are but few species of ducks, and they are apparently more numerous in southern Brazil than on the Amazon.

The reptilian fauna exhibits an exceptionally large number of interesting genera and species. A great part of the river systems of the country with their flooded areas are highly favourable to the development of reptilian life. Most prominent among these is the American alligator, of which there are, according to Netterer, two genera and eight species in Brazil. They are very numerous in the Amazon and its tributaries and in the Paraguay, and are found in all the rivers of the Atlantic coast. Three of the Brazilian species are voracious and dangerous. The largest of the Amazon species are the jacare-assii (Caiman niger), jacare (C. fissipes) and jacare- tinga (C. sclerops). The Amazon is also the home of one of the largest fresh-water turtles known, the Emys a.mazonica, locally called the jurard-assu or tartaruga grande. These turtles are so numerous that their flesh and eggs have long been a principal food supply for the Indian population of that region. Another Amazon species, the E. tracaxa, is still more highly esteemed for its flesh, but it is smaller and deposits fewer eggs in the sandy river beaches. Lagartos (Iguanas) and lizards are common everywhere. The ophidians are also numerous, especially in the wooded lowlands valleys, and the poisonous species, though less numerous than others, include some of the most dangerous known — the rattlesnake surucucu (Lachesis

rhombeatus), and jarardca (Bothrops). The Amazon region is fre quented by the giboia (boa constrictor), and the central plateau by the sucuriii (Eunectes murinus), both distinguished for their enormous size. The batrachians include a very large number of genera and species, especially in the Amazon valley.

The fauna of the rivers and coast of Brazil is richer in species and individuals than that of the land. All the rivers are richly stocked, and valuable fishing grounds are to be found along the coast, especi- ally that of southern Bahia and Espirito Santo where the garoupa (Serranus) is found in large numbers. Some of the small fish along the coast are highly esteemed for their flavour. Whales were once numerous between. Capes St Roque and Frio, but are now rarely seen. Of the edible river fish, the best known is the pirarucu (Sudis gigas), a large fish of the Amazon which is salted and dried for market during the low-water season. Fish is a staple food of the Indian tribes of the Amazon region, and their fishing season is during the period of low water. The visit of Professor Louis Agassiz to the Amazon in 1865 resulted in a list of 1 143 species, but it is believed that no less than 1800 to 2000 species are to be found in that great river and its tributaries.

In strong contrast to the poverty of Brazil in the larger mammals is the astonishing profusion of insect life in every part of the country. The Coleoptera and Lepidoptera are especially numerous, both in species and individuals. A striking illustration of this extraordinary

profusion was given by the English naturalist H. W. Bates, who found 7000 species of insects in the vicinity of only one of his collect- ing places on the Amazon (Ega), of which 550 species were of butter- flies. Within an hour's walk of Para-are to be found, he says, about 700 species of butterflies, "whilst the total number found in the British Islands does not exceed 66, and the whole of Europe supports only 321." (H. W. Bates, The Naturalist on the River Amazons.) One of the rare species of the Amazon Morphos (M. hecuba) measures 8 to 9 in. across its expanded wings. Dipterous insects are also very numerous in species, especially in those of sanguinary habits, such as the mosquito, pium, maroim, carapana, borochudo, &c. In some places these insects constitute a veritable plague, and the infested regions are practically uninhabitable. The related species of the Oestridae family, which include the widely disseminated chigoe or bicho do pe (Pulex penetrans), and the equally troublesome heme (Cutiterebra noxialis), which is so injurious to animals, are equally numerous. The most numerous of all, however, and perhaps the most harmful to civilized man, are the termites and ants, which are found everywhere in the uninhabited campo and forest regions, as well as in the cultivated districts. Nature has provided several species of animals, birds and reptiles, to feed upon these

insects, and various poisonous and suffocating compounds are used to destroy them, but with no great degree of success. It is not uncommon to find once cultivated fields abandoned because of their ravages and to see large campos completely covered with enormous ant-hills. The termites, or " white ants," are exceptionally destructive because of their habit of tunnelling through the softer woods of habitations and furniture, while some species of ants, like the sauba, are equally destructive to plantations because of the rapidity with which they strip a tree of its foliage. Spiders are represented by a very large number of species, some of which are beautifully coloured. The largest of these is the Mygale with a body 2 in. in length and out- stretched legs covering 7 in., a monster strong enough to capture and kill small birds. A large Mygale found on the island of Siriba, of the Abrolhos group, feeds upon lizards, and has been known to attack and kill young chickens. One of the most troublesome pests of the interior is a minute degenerate spider of the genus Ixodes, called carrapato, or bush-tick, which breeds on the ground and then creeps up the grass blades and bushes where it waits for some passing man or beast, its habit is to bury its head in its victim's skin and remain there until gorged with blood, when it drops off. Scorpions are common, but are considered less poisonous than some European species.

Flora. — Brazil not only is marvellously rich in botanical species, but included at the beginning of the 20th century the largest area of virgin forest on the surface of the earth. The flora falls naturally into three great divisions : that of the Amazon basin where excep- tional conditions of heat and moisture prevail; that of the coast where heat, varying rainfall, oceanic influences and changing seasons have greatly modified the general character of the vegetation ; and that of the elevated interior, or sertao, where dryer conditions, rocky surfaces, higher sun temperatures and large open spaces produce a vegetation widely different from those of the other two regions. Besides these, the flora of the Paraguay basin varies widely from that of the inland plateau, and that of the Brazilian Guiana region is essentially distinct from the Amazon. The latter region is densely forested from the Atlantic to the Andes, but with a vary- ing width of about 200 m. on the coast to about 900 m. between the Bolivian and Venezuelan llanos, and thus far civilization has made only a very slight "impression upon it. Even where settlements have been located, constant effort is required to keep the vegeta- tion down. Along the coast, much of the virgin forest has been cut away, not only for the creation of cultivated plantations, but to meet the commercial demand for Brazil-wood and furniture woods.

The chief characteristic of the Amazonian forest, aside from its magnitude, is the great diversity of genera and species. In the northern temperate zone we find forests of a single species, others of three or four species; in this great tropical forest the habit of growth is solitary and an acre of ground

will contain hundreds of species- palms, myrtles, acacias, mimosas, cecropias, euphorbias, malvaceas, laurels, cedrellas, bignonias, bombaceas, apocyneas, malpigias, lecythises, swartzias, &c. The vegetation of the lower river-margins, which are periodically flooded, differs in some particulars from that of the higher ground, and the same variation is to be found between the forests of the upper and lower Amazon, and between the Amazon and its principal tributaries. The density of the forest is greatly augmented by the cipos, or lianas, which overgrow the largest trees to their tops, and by a profusion of epiphytes which cover the highest branches. As a rule the trees of the Amazon forest are not con- spicuously high, a few species rarely reaching a height of 200 ft. The average is probably less than one-half that height. This is especially true of the flood plains where the annual inundations prevent the formation of humus and retard forest growth. The largest of the Amazon forest trees are the massaranduba (Mimusops elata), called the cow-tree because of its milky sap, the samauma (Eriodendron samauma) or silk-cotton tree, the pdu d' arco (Tecoma speciosa), pdu d' alho (Catraeva iapia), botcori (Symphonea coccinea), sapucaia (Lecythis ollaria), and castanheira or brazil-nut tree (Berthol- letia excslsa). The Amazon region has a comparatively narrow

POPULATION]

frontage on the Atlantic. In Maranhao, which belongs to the coast region, open spaces or campos appear, though the state is well wooded and its forests have the general characteristics of the lower Amazon. South-east of the Parnahyba the coast region becomes dryer and more sandy and the forests disappear. The coast and tide- water rivers are fringed with mangrove, and the sandy plain reaching back to the margin of the inland plateau is generally bare of vegetation, though the carnahuba palm {Copernicia cerifera) and some species of low-growing trees are to be found in many places. The higher levels of this plain are covered with shrubs and small trees, principally mimosas. The slopes of the plateau, which receive a better rainfall, are more heavily forested, some districts being covered with deciduous trees, forming catingas in local parlance. This dry, thinly-wooded region extends south to the states of Para- hyba, where a more regular rainfall favours forest growth nearer the coast. Between Parahyba and southern Bahia forests and open plains are intermingled ; thence southward the narrow coastal plain and bordering mountain slopes are heavily forested. The sea-coast, bays and tide-water rivers are still fringed with mangrove, and on the sandy shores above Cape Frio grow large numbers of the exotic cocoa-nut palm. Many species of indigenous

palms abound, and in places the forests are indescribably luxuriant. These are made up, as Prince Max zu Neuwied found in southern Bahia in 1817, " of the genera Cocos, Melastoma, Bignonia, Rhexia, Mimosa, Ingd, Bombax, Ilex, Laurus, Myrthus, Eugenia, Jacarandd, Jatropka, Visinia, Lecythis, Ficus, and a thousand other, for the most part, unknown species of trees." Further inland the higher country becomes more open and the forests are less luxuriant. Giant cacti and spiny scrub abound. Then come the catinga tracts, and, beyond these, the open campos of the elevated plateau, dotted with clumps of low growing bushes and broken by tracts of carrasco, a thick, matted, bushy growth 10 to 12 ft. in height. Formerly this coast region furnished large quantities of Brazil-wood (Caesalpinia echinata), and the river valleys have long been the principal source of Brazil's best cabinet- wood — rosewood (Dalbergia nigra), jacaranda (Machaeriumfirmum,Benth.),viuhatico(Plathymeniafoliosa,Benth.), perofca (Aspidosperma peroba), cedro, &c. The exotic mangabeira (mango) is found everywhere along the coast, together with the bamboo, orange, lemon, banana, cashew, &c.

Of the great inland region, which includes the arid campos of the north, the partiaUy-wooded plateaus of Minas Geraes, Goyaz and Matto Grosso, the temperate highlands of the south, and the tropical lowlands of the Paraguay basin, no adequate description can be given without taking each section in detail, which can be done to better advantage in describing the individual states. In general, the carrasco growth extends over the whole central plateau, and heavy forests are found only in the deep river valleys. Those opening northward have the characteristic flora of the Amazon basin. The Paraguay basin is covered with extensive marshy tracts and open woodlands, the palms being the conspicuous feature. The vege- tation is similar to that of Paraguay and the Chaco, and aquatic plants are specially numerous and luxuriant. On the temperate uplands of the southern states there are imposing forests of South American pine (Araucaria brasiliensis), whose bare trunks and umbrella-like tops give to them the appearance of open woodland. These forests extend from Parana into Rio Grande do Sul and smaller tracts are also found in Minas Geraes. Large tracts of Ilex Paraguay ensis , from which male, or Paraguay-tea, is gathered, are found in this same region.

The economic plants of Brazil, both indigenous and exotic, are noticeably numerous. Coffee naturally occupies first place, and is grown wherever frosts are not severe from the Amazon south to Parana. The states of Sao Paulo, Rio de Janeiro and Minas Geraes are the largest producers, but it is also grown for export in Espirito Santo, Bahia and Ceara. The export in 1905 was 10,820,604 bags of 132 lb each, with an official valuation of £21,420,330. Sugar cane, another exotic, has an equally wide distribution, and cotton is grown along the coast from Maranhao to Sao Paulo. Other

economic plants and fruits having a wide distribution are tobacco, maize, rice, beans, sweet potatoes, bananas, cacao (Theobroma cacao), mandioca or cassava (Manihot utilitissima) , aipim or sweet mandioca (M. aipi) , guavas (Fsidium guayava, Raddi), oranges, lemons, limes, grapes, pineapples, mamao (Carica papaya), bread-fruit {Artocarpus incisa), jack fruit (ˆ4. irUegrifolia) , and many others less known outside the tropics. Among the palms there are several of great economic value, not only as food producers but also for various domestic uses. The fruit of the pupunha or peach palm {Guilielma speciosa) is an im- portant food among the Indians of the Amazon valley, where the tree was cultivated by them long before the discovery of America. Humboldt found it among the native tribes of the Orinoco valley, where it is called pirijao. The ita palm, Mauritia, flexuosa (a fan- leaf palm) provides an edible fruit, medullary meal, drink, fibre, roofing and timber, but is less used on the Amazon than it is on the lower Orinoco. The assai (Euterpe oleracea) is another highly-prized palm because of a beverage made from its fruit along the lower Amazon. A closely-related species or variety (Euterpe edulis) is the well-known palmito or cabbage palm found over the greater part of Brazil, whose terminal phylophore is cooked and eaten as a vegetable. Another highly useful palm is the carnauba or carnahuba (Copernicia cerifera) which supplies fruit, medullary meal, food for

cattle, boards and timber, fibre, wax and medicine. The fibre of the piassava (Leopoldinia piassava, or Attalea funifera) is widely used for cordage, brushes and brooms. There are many other palms whose fruit, fibre and wood enter largely into the domestic economy of the natives, but the list given shows how important a service these trees rendered to the aboriginal inhabitants of tropical America, and likewise how useful they still are to the people of tropical Brazil. Another vegetable product of the Amazon region is made from the fruit of the Paullinia sorbilis, Mart., and is known by the name of guarand. It is largely consumed in Bolivia and Matto Grosso, where it is used in the preparation of a beverage which has excellent medicinal properties. The Brazilian flora is also rich in medicinal and aromatic plants, dye-woods, and a wide range of gum and resin-producing shrubs and trees. The best known of these are sarsaparilla, ipecacuanha, cinchona, jaborandi and copaiba ; vanilla, tonka beans and cloves; Brazil-wood and anatto (Bixa orellana); india-rubber and balata. India-rubber is derived principally from the Hevea guayanensis, sometimes called the Siphonia elastica, which is found on the Amazon and its tributaries as far inland as the foot- hills of the Andes. Other rubber-producing trees are the manigoba (Jatropha Glasiovii) of Ceara, and the mangabeira (Hancornia speciosa), of the central upland regions.

Population. — The first explorers of Brazil reported a numerous Indian population, but, as the sea-coast afforded a larger and more easily

acquired food supply than did the interior, the Indian population was probably numerous only in a compara- tively small part of this immense territory, along the sea-coast. Modern explorations have shown that the unsettled inland regions of Brazil are populated by Indians only where the con- ditions are favourable. They are to be found in wooded districts near rivers, and are rarely found on the elevated campos. The immediate result of European colonization was the enslavement and extermination of the Indians along the coast and in all those favoured inland localities where the whites came into contact with them. The southern districts and the Amazon and its tributaries were often raided by slave-hunting expeditions, and their Indian populations were either decimated, or driven farther into the inaccessible forests. But there is no record that the inland districts of western and north-western Brazil were treated in this manner, and their present population may be assumed to represent approximately what it was when the Europeans first came. According to the census of 1890 the Indian population was 1,295,796, but so far as the migratory tribes are concerned the figures are only guesswork. A considerable number of these Indians have been gathered together in aldeas under the charge of government tutors, but the larger part still live in their own villages or as nomads.

Down to the beginning of the 19th century the white colonists were almost exclusively Portuguese. The immigration from countries other than Portugal during the first half of that century was small, but before its close it increased rapidly, particularly from Italy. Fully nine-tenths of these immigrants, including those from the mother country, were of the Latin race. The introduction of African slaves followed closely upon the develop- ment of agricultural industries, and continued nominally until 1850, actually until 1854, and according to some authors until i860. About 1826 it was estimated that the negro population numbered 2,500,000 or three times the white population of that period. The unrestricted intermixture of these three races forms the principal basis of the Brazilian population at the be- ginning of the 20th century. Brazil has never had a " colour line," and there has never been any popular prejudice against race mixtures. According to the census of 1872 the total popula- tion was 9,930,478, of which 1,510,806 were slaves; the race enumeration gave 3,787,289 whites, 1,959,452 Africans, 386,955 Indians, and 3,801,782 mixed bloods. The Indian population certainly exceeded the total given, and the white population must have included many of mixed blood, the habit of so describ- ing themselves being common among the better classes of South American mestizos. The census of 1890 increased the total population to 14,333,915, which, according to an unofficial analysis {Statesman's Year Book, 1905), was made up of 6,302,198 whites. 4,638,495 mixed bloods, 2,097,426 Africans, and 1,295,796 Indians. This analysis, if correct, indicates that the vegetative increase of the whites has been greater than

that of the Africans and mixed races. This is not the conclusion of many observers,

but it may be due to the excessive infant mortality among the lower classes, where an observance of the simplest sanitary laws is practically unknown. The census of the 31st of December 1900 was strikingly defective; it was wholly discarded for the city of Rio de Janeiro, and had to be completed by office com- putations in the returns from several states. The compilation of the returns was not completed and published until May 1908, according to which the total population was 17,318,556, of which 8,825,636 were males and 8,492,920 females. Not including the city of Rio de Janeiro, whose population was estimated at 691,565 in conformity with a special municipal census of 1906, the total population was 16,626,991, of which 15,572,671 were Roman Catholics, 177,727 Protestants, 876,593 of other faiths. The returns also show a total of 3,038,500 domiciles outside the federal capital, which gives an average of 5-472 to the domicile. These returns will serve to correct the exaggerated estimate of 22, 315,000 for 1900 which was published in Brazil and accepted by many foreign publications.

The racial character of the people is not uniform throughout the republic, the whites predominating in the southern states, the Indians in Amazonas and, probably, Matto Grosso, and the mixed races in the central and northern coast states. The excess of whites over the coloured races in the southern

immigration, of which so much has been written for political ends, has been greatly over-estimated; trustworthy estimates in 1906 made the German contingent in the population vary from 350,000 to 500,000. They are settled chiefly in colonies in the southern states, and form a most desirable body of settlers.

Divisions and Towns. — The republic is divided into twenty states and one federal district, which are t he same as the provinces and ” municipio neutro ” of the empire. Their names also remain unchanged, except that of the federalized district in which the national capital is located, which is called the ” districto federal.” The republic has no territories, although Amazonas, Matto Grosso, Para and Goyaz cover an immense region of uninhabited and only partially explored territory. The states are subdivided

into comarcas, or judicial districts, and into municipios, or townships, which is the smallest autonomous division. The constitution provides for the autonomy of the municipalities in order to safeguard the permanence of representative institutions. The parochia, or parish, an ecclesiastical division, is often used for administrative purposes, but it has no political organization. The names, areas, and populations of the states, together with the names and populations of their capitals, are as follows: —

States.

Alagoas

Amazonas .

Bahia .

Ceara .

Espirito Santo

Federal District

Goyaz

Maranhao

Matto Grosso

Minas Geraes

Para

Parahyba .

Parana

Pernarabuco

Piauhy

Rio de Janeiro

Rio Grande do Norte

Rio Grande do Sul

Santa Catharina .

Sao Paulo .

Sergipe.

Brazil

Area, 1 Sq. miles.

22,584 742,123 164,650

40,253

17.313

538

288,549

177,569

532,370

221,961

443,922

28,855

85,455

49,575

116,529

26,635

22,196

91,337

28,633

112,312

15,093

3,228,452

states is due to their smaller slave population and to the large number of immigrants attracted to them. Slavery was not abolished until the 13th of May 1888, but a num- ber of successful colonies had already been founded in these states. Other colonies were founded in Bahia, Espirito Santo and Rio de Janeiro during the same period, but they were unsuccessful, partly because of the competition of slave labour. Since the aboli- tion of slavery immigration has poured a large number of labourers into the coiTee-pro- ducing states, and with bene- ficial results. This strengthen- ing of the white population of the South with fresh European blood must eventually divide Brazil into two distinct sections : the white states of the south, and the mixed or coloured states of the north. The introduction of European immigrants dates from 1 8 1 8 when a Swiss colony was located at Nova Friburgo, near Rio de Janeiro, and it was continued under the direction and with the aid of the imperial government down to the creation of the republic. Since then the state governments have assumed charge of immigration, and some of them are spending large sums in the acquisition of labourers. The old system of locating immigrants in colonies, or colonial nuclei, which involved an enormous outlay of money with but slight benefit to the country, has been superseded by a system of locating the immigrants on the large plantations under formal contracts. In some of the coffee districts these contracts have resulted very profitably to the Italian labourers. The total number of colonists and im- migrants entering Brazil between 1804 and 1902, inclusive, according to official returns, was 2,208,353. The arrivals fluctuate greatly in number from year to year, influenced by the prevailing economic conditions in the country. At first the Portuguese outnumbered all other nationalities in the immi- gration returns, but since the abolition of slavery the Italians have passed all competitors and number more than one-half the total arrivals. Of the 700,211 immigrants located in the state of Sao Paulo from 1827 to the end of 1896, no less than 493,535 were Italians, and their aggregate throughout the republic was estimated in 1906 at more than 1,100,000. The German

Population ”

Census

1890.

5H,440

H7,9I5

1,919,802

805,687

135,997 522,651 227,572 430,854 92,827

3,184,099 328,455 457,232 249,491

1,030,224 267,609 276,884 268,273

897,455 283,769

1,384,753 310,926

14,333,915

Census

1900.

649,273 249,756 2,117,956 849,127 209,783

691,565 255,284 499,308 118,025

3,594,471 445,356 490,784 327,136

1,178,150

334,328

■ *274,317*

1,149,070 926,035 320,289

2,282,279 356,264

17,318,556

State Capitals.

Maceio .

Manaos .

Sao Salvador 4

Fortaleza

Victoria

Rio de Janeiro

Goyaz ‘ .

S. Luiz do Maranhao 4

Cuyaba .

Ouro Preto s

Belem 4 .

Parahyba

Curityba

Recife 4 .

Therezina .

Nictheroy .

Natal . .

Porto Alegre

Desterro 6 .

Sao Paulo .

Aracajii .

Population, 3

Census

1890.

31,498 38,720

174,412 40,902 16,887

522,651 17,181 29,308 17,815 59,249 50,064 18,645

24,553

i”,556

31,523

34,269

13,725 52,421 30,687 64,934 16,336

Communications, — Railway construction in Brazil dates from 1852, when work was initiated on the Maui railway running from the head of the bay of Rio de Janeiro to the foot of the Serra where Petropolis is situated. The road is 10 m. long, and its first section was opened to traffic on April 30, 1854, and its second December 1 6, 1856. The mountain section, 5 J m. long, which uses the Riggenbach system from the terminal to Petropolis, was constructed between 1881 and 1883. The development of railway construction in Brazil has been impeded to a great extent by two unfavourable conditions — by the chain of mountains or plateau escarpments which follow the coast line and obstruct communication with the interior, and by the de- tached positions of the settlements along the Atlantic, which compel

1 The areas are reduced from the planimetrical calculations made at Gotha and used by A. Supan in Die Bevolkerung der Erde (1904). They are corrected to cover all boundary changes to 1906.

2 The census of 1890 is the last one of which complete returns are published. That of 1900 was notoriously inaccurate in many instances.

3 The census returns are for municipalities, and not for cities proper. As a municipality covers a large extent of country, the population given is larger than that of the urban parishes, and is therefore not strictly correct according to European practice.

4 The Brazilian official titles are given for the state capitals : Belem for Para; Sao Luiz for Maranhao; Sao Salvador for Bahia; and Recife for Pernambuco.

6 The capital of Minas Geraes in 1890 was Ouro Preto; it has since been transferred to Bello Horizonte, or Cidade de Minas, which has an estimated population of 25,000.

6 Since the naval revolt of 1893-1894 the name of the capital of Santa Catharina has been changed from Desterro to Florianopolis in honour of President Floriano Peixoto.

COMMUNICATIONS]

the building of lines from many widely separated points on the coast into a sparsely populated hinterland. A majority of the ports, from which these roads are built, are small and difficult of access, and the coasting trade is restricted to vessels carrying the Brazilian flag. The only ports having a rich and well-populated country behind them are Rio de Janeiro and Santos, and these are the terminals of long lines of railway which are being slowly extended farther into the interior.

The total mileage under traffic at the beginning of 1905 was 10,600 m., divided into 94 separate lines. There were also 745 m. under construction, 1740 m. under survey, and about 1600 m. projected. Of the 94 lines under traffic, 45 were operating by virtue of national and 49 by provincial and state concessions. They were grouped in the official reports of 1905 as follows: —

Government lines (21) : — ■ Miles.

Administered by the state (6) 2228

Leased to private parties (15) 2174

4402

Private lines (24) — ■

With national interest guarantees (12) . . . 1290 Without such guarantees (12) 815

2105

Private and state lines operated by virtue of state

concessions, with and without interest guarantees

(49) 4°93

10,600

The policy of the national government has been gradually to lease all its lines except the Estrada de Ferro Central do Brazil, which is retained for sentimental reasons. This great railway runs from the city of Rio de Janeiro westward to the city of Sao Paulo and northward into the interior of Minas Geraes, with a total length at the beginning of 1905 of 1002 m., and an extension of about 104 m. to Pirapora, on the Sao Francisco river. It was formerly known as the " E. de F. Dom Pedro II.," in honour of the sovereign who encouraged its construction. The main line has a gauge of 63

in. (l-6o m.) and affords an outlet for a number of inland metre-gauge lines. The first two sections of this great railway, which carry it across the coast range, were opened to traffic in 1858 and 1 864. The series of trunk lines terminating at the port of Santos are owned by private companies and are formed by the Sao Paulo, Paulista and Mogyana lines, the first owned by an English company, and the other two by Brazilian companies. The Mogyana carries the system entirely across the state of Sao Paulo into the western districts of Minas Geraes. The principal trunk lines (the Sao Paulo and Paulista) have a broad gauge, while their extensions and feeders have a narrow gauge. The comparatively short lines extending inland from the ports of Sao Salvador (Bahia), Pernambuco, Maceio, Victoria and Paranagua serve only a narrow zone along the coast. To encourage the investment of private capital in the construction of railways, the general railway law of 1853 authorized the national government to grant guarantees of interest on the capital invested. l]nder this law companies were organized in England for building the Sao Paulo railway, and the lines running fromBahia and Pernam- buco toward the Sao Francisco river. Political considerations also led to the construction of similar lines in the states of Rio Grande do Norte, Parahyba, Alag6as, Sergipe, Espirito Santo, Parana, Santa Catharina and Rio Grande do Sul. The result was that the national treasury became burdened with a heavy annual interest charge, payable abroad in gold, which did not tend to diminish, and had a long period to run before the expiration of the contracts. The government finally determined to take over these guaranteed lines from the foreign companies owning them, and a statement issued in October 1902 showed that 1335 m. had been acquired at a cost of £14,605,000 in bonds, the interest on which is £584,200 a year against an aggregate of £831,750 in interest guarantees which the govern- ment had been paying. In addition to this economy it was calcu- lated that the lines could be leased for £132,000 a year. The loan finally issued in London to cover the purchase of these railways aggregated £16,619,320. All but three of these lines had been leased in 1905.

The use of tramways for the transportation of passengers in cities dates from 1868, when the first section of the Botanical Garden line of Rio de Janeiro was opened to traffic. The line was completed with its surplus earnings and continued under the control of the American company which built it until 1882, when it was sold to a Brazilian company. Subsequently the tramways of the city have been mostly concentrated in the hands of a single Canadian com- pany. All the large cities of Brazil are liberally provided with tramways, those of the city of Sao Paulo, where electric traction is used, being noticeably good. The substitution of electricity for animal traction was begun in Sao Salvador in 1906. Mules are univer- sally employed for animal traction, and narrow gauge lines with single-

mule trams are generally used where the traffic is light.

Brazil is lamentably deficient in steamship communication considering its importance in a country where the centres of popu- lation are separated by such distances of coasts and river. Previous to the creation of the republic, the coastwise service was performed

by two national companies (now united), and partially by .foreign lines calling at two or more ports. A considerable number of foreign sailing vessels also carried on an important coasting trade. The coastwise service centres at Rio de Janeiro, from which port the Lloyd Brazileiro sends steamers regularly south to Montevideo, and north to Para and Manaos, calling at the more important inter- mediate ports. From Montevideo river steamers are sent up the Parana and Paraguay rivers to Corumba and Cuyaba, in the state of Matto Grosso. The company receives a heavy subsidy from the national government. Parts of this coastwise traffic are covered by other companies, two of which receive subsidies. There were also six lines of river steamers receiving subsidies from the national government in 1904, and the aggregate paid to these and the coast- wise lines was 2,830,061 milreis. The largest of the river lines is the Amazon Steam Navigation Co. (an English corporation), whose ser- vice covers the main river and several of its principal tributaries. Two subsidized companies maintain services on the Sao Francisco river — one below the Paulo Affonso falls, and the other above, the latter covering 854 m. of navigable channel between Joazeiro and Pirapora. Besides these there are other companies engaged in the coasting and river traffic, either with subsidies from the state govern- ments, as feeders for railway lines, or as private unsubsidized undertakings.

The telegraph lines, which date from 1852, are owned and operated by the national government, with the exception of the lines con- structed by private railway companies, and the cable lines of the Amazon and the coast. The government lines extend from Para to the Argentine and Uruguayan frontiers, where they connect with the telegraph systems of those republics, and from Rio de Janeiro westward across country, in great part unsettled, to the capitals of Goyaz and Matto Grosso. At Para connexion is made with the cable laid in the bed of the Amazon to Manaos, which is owned and operated by a subsidized English company. At Vizeu, Para, con- nexion is made with a French cable to the West Indies and the United States, and at Pernambuco with two cable lines to Europe. A coastwise cable runs from Para to Montevideo with double cables between Pernambuco and Montevideo. There were in 1903 a total of 15,150 m. of land lines, with 29,310 m. of wire and 1102 telegraph offices. The government maintains reciprocal rates with most of the private railway lines.

The Brazilian postal service is under the general supervision of the minister of communications and public works, amd is administered by a director-general. Owing to the size of the country and the sparsely-populated state of a large part of the interior, the trans- portation of the mails is attended with much difficulty and expense. Although the postal rates are high, the service is not self-sustaining, the receipts for 1904 being 7,018,344 milreis, against a total ex- penditure of 10,099,545 milreis. There were 2847 post offices {agendas), of which 2 166 were of the 4th or lowest grade. Brazil is a member of the Postal Union, and like Argentina exacts higher nominal rates of postage upon outgoing mail than those agreed upon to cover the depreciation in her own currency. The letter rate was at first 200 reis (nearly 5Jd.), but it has been increased to 300 reis, which is equivalent to 8d. at par and 4ˆd. at 1 5d. exchange. An inland parcel post was in operation long before the overthrow of the monarchy, and a similar service with Portugal has been successfully maintained for a number of years, notwithstanding the difficulties interposed by customs regulations. National and international money order systems are also in operation.

The constitution of Brazil provides that the coastwise trade shall be carried on by national vessels, but this provision did not go into effect until 1896. And even then, because of the insufficient number of Brazilian vessels it was provided in the regulations that foreign vessels could be enrolled in that trade by using the Brazilian flag and employing a certain proportion of Brazilians on the crew. One of the purposes of this restrictive provision was that of creating a national merchant marine, but the disinclination of Brazilians for maritime pursuits has been a serious obstacle to its realization. In 1901 the merchant navy included 228 steamers of 91,465 tons net, and 343 sailing vessels of 76,992 tons net. These vessels are all engaged in the coasting and river trade of the country. Efforts have been made, however, to engage in foreign trade, and subsidies were offered for a passenger and freight service to the United States. On the 23rd of February 1906 the government completed a new contract with the Lloyd Brazileiro Company for its coastwise and river service, and included clauses providing for a line to the United States. This foreign service (monthly) began in August 1906.

Although the coast of Brazil shows a large number of bays and tide-water river channels which are apparently suitable for commer- cial ports, a close examination of them reduces the number of good ports to less than a dozen. The others are either difficult of access, or are rendered practically useless by dangerous reefs, sand bars and shoals. Important improvements have been undertaken in some of these ports. Those at Santos and Manaos, for example, have produced good results. In many cases, as at Rio de Janeiro, Santos and Manaos, the cost and maintenance of the new port-works are met by an additional tax on merchandise, though the immediate

ex- penditures are met by advances from the national treasury, and at Rio de Janeiro by a foreign loan.

Commerce. -The imports, exports and domestic trade of Brazil

are by reason of their magnitude and peculiar character the most important in South America, though the per capita aggregate is less than that of Argentina. Although an agricultural country, Brazil does not produce all its own bread and meat, and the imports of wheat, wheat flour, rice, fish, jerked beef and preserved meats, lard, butter, beans, potatoes, packed fruits and vegetables, Indian corn and other food-stuffs, are surprisingly large. Since the creation of the republic, extreme protective measures have caused the creation of a large number of cotton factories and other manu- factures, but these are able to supply only a part of the consumption, and the importation of cotton and woollen fabrics, silks, ready- made clothing, boots and shoes, &c, is large. Modern industrial development in some of the states has greatly increased the im- portation of machinery, electric supplies, materials for construction, coal, &c. Kerosene oil also figures among the principal imports, and beef cattle are imported for consumption by some cities. The exports cover a wide range of agricultural, pastoral and natural pro- ductions, including coffee, rubber, sugar, cotton, cocoa, Brazil nuts, mate (Paraguay tea), hides, skins, fruits, gold, diamonds, manganese ore, cabinet woods and medicinal leaves, roots and resins. Coffee and rubber, however, represent from 80 to 90% of the official valuation of all exports. High import duties are imposed by the national government and export duties by the states. The exchange of domestic products between the states is greatly restricted through lack of cheap transportation facilities, and by the suicidal imposition of import and export duties by the states, either for revenue or for the protection of home industries.

According to a summary for the six years 1901 to 1906, derived from official sources and published in the annual Retrospecto of the Jornal do Commercio, of Rio de Janeiro, the values of the imports and exports for those years (exclusive of coin), reduced to pounds sterling at the average rate of exchange (or value of one milreis) for each year, were as follows : —

Average

Value of

Imports in

Exports in

Year.

the Milreis in Pence.

Pounds Ster.

Pounds Ster.

£•

£•

1901

n-33

21,377,270

40,621,993

1902

“•93

23,279,418

36,437.456

1903

n-99

24,207,811

36,883,175

1904

12-22

25.915,423

39,430,136

1905

15-94

29,830,050

44,643,113

1906

16-17

33,204,041

53.059,480

Nearly 76J % of the exports of 1906 were of coffee and rubber, the official valuations of these being: coffee 245,474,525 milreis gold (£27,615,884), and rubber (including manicoba and mangabeira), 124,941,433 milreis gold (£14,055,911).

Brazil is essentially an agricultural country. No other country has been able to equal Brazil in the production of coffee, and under better labour conditions the country might compete with the foremost in the production of cane sugar, cotton and tobacco. Besides these it might easily excel in producing many of the tropical fruits for which there is a commercial demand. During the colonial period sifgar cane was cultivated from Parahyba S. to the vicinity of Santos, and sugar was the principal export of the colony. Before the middle of the 19th century coffee became one of the leading exports, and its cultivation in the states of Sao Paulo, Rio de Janeiro and Minas Geraes has been so increased since that time that it repre- sents over four-fifths in value of the total export of agricultural produce. The principal sugar-producing states are Alagoas, Sergipe, Pernambuco, Bahia and Rio de Janeiro, and the production is between 200,000 and 300,000 tons, the greater part of which is con- sumed in the country. Cotton has been widely cultivated since early colonial days, principally in the northern Atlantic states. Tobacco is also widely cultivated, and the product of some states, such as Bahia, Minas Geraes and Goyaz, has a high local reputation for its excellence. Cacau (cocoa) is cultivated extensively in the Amazon Valley and along the coast as far south as southern Bahia, and forms one of the leading exports. In 1906 Sao Paulo offered premiums for its cultivation in the state. Rice has been cultivated in places, but without much success, although the quality produced compared favourably with the imported article. Indian corn grows luxuriantly everywhere, but it does not mature well in the humid regions of the Amazon region and the coast. The product of the elevated

inland regions is good, but the costs of transportation and the small profits afforded have prevented its extensive cultivation, and it is imported from the La Plata republics for consumption along the coast. Much has been said in regard to the production of wheat, and efforts have been made in various places to promote its cultiva- tion. It was once cultivated in Rio Grande do Sul with some success, and it has been grown in Minas Geraes and Sao Paulo, but in no case have the returns been sufficient to give it a permanent standing among the productions of the country. The great majority of the people are unused to wheaten bread, using the coarse flour of the mandioca root instead, consequently the demand for wheat and flour is confined to the large cities, which can obtain them from

Argentina more cheaply than they can be produced in the country. One of the most common and important productions of Brazil is mandioca {Manihot), of which there are two well-known species, M. utilissima and M. aipi. The first named, which is poisonous in its native state, is the cassava of Spanish America. From it is made far.inha de mandioca, which is the bread of the common people of Brazil, and tapioca. The poison is extracted by soaking the bruised or grated roots in water, after which the coarse flour is roasted. Mandioca was cultivated by the natives before the discovery of America, and the wide area over which it has been distributed warrants the conclusion that the discovery of its value as a food and the means of separating its poisonous properties must have occurred at a very remote period. The peanut, or ground-nut (Arachis hypogaea), is another widely-cultivated plant, dating from pre-Columbian times. Very little attention has thus far been given to the cultivation of fruit for exportation, the exceptions being bananas for the Argentine and Uruguayan markets, and oranges and pineapples for European markets. The coast region from Ceara to Rio de Janeiro is adapted to the cultivation of a great variety of fruits of a superior quality. Ceara, Bahia, and Rio de Janeiro are celebrated for their oranges,' and Pernambuco for its delicious pine- apples. Tangerines, lemons, limes, grapes, guavas, figs, cashews or cajiis (Anacardium occidentale) , mangabas (Hancornia speciosa), joboticabas (Eugenia cauliflora and E. jaboticaba,Mart.); cocoa-nuts, mangos, fruitas de conde (Anona squamosa), plantains, &c, are pro- duced in abundance and with little labour. In some parts of southern Brazil the fruits and vegetables of the temperate zone do well, but within the tropics they thrive well only at a considerable elevation above sea-level. Apples, peaches, quinces, raspberries, strawberries, &c, are produced under such conditions, but the flavour of their kind grown in colder climates is usually wanting. The vegetable productions are less numerous, but they include sweet potatoes, cabbages, cauliflower, lettuce, beans, peas, onions, garlic, tomatoes, okra, radishes, cucumbers, couve, chuchu (Sechium edule), and aipim {Manihot aipi). The white potato, known as " batata inglez "

(English potato), is grown in elevated localities, but it deteriorates so greatly after the first planting that fresh imported seed is necessary every second or third year.

The pastoral industries, which date from early colonial times, have suffered many vicissitudes, and their development has failed to keep pace with the country's growth in population. Horses are used to some extent for riding, but very little for carriage and draught purposes, consequently there has been no great incentive for their breeding. They are largely used and raised in Rio Grande do Sul, but in the warmer regions of the north only to a limited extent. The hardier mules are generally employed for draught, carriage, and saddle purposes in every part of the country, and their breeding is a lucrative industry in the southern states. Cattle-raising is the principal industry in Rio Grande do Sul, and receives considerable attention in Minas Geraes, Matto Grosso, Santa Catharina, Parana, Piauhy and Rio Grande do Norte. It was estimated that there were 30,000,000 head of cattle in the republic in 1904, but the estimate was unquestionably too large. A very large part of the jerked beef consumed in Brazil is imported from Argentina and Uruguay, and some beef cattle also are imported. These importations at Rio de Janeiro in 1906 were 12,464,170 kilograms of jerked beef and 12,575 head of cattle. In the Rio Branco region of Amazonas and in Piauhy, where the national government has long been the owner of extensive cattle ranges, the industry is in a state of decadence. This is partly due to such pests as the vampire bat and bush ticks (carrapatos), and partly to the unprogressiveness of the cattlemen. Cattle-raising was once a flourishing industry on the island of Marajo, at the mouth of the Amazon, and it is followed to some extent at Alemquer and other points along the Amazon, but the cattle are small, and commonly in bad condition. In southern Bahia the industry has been nearly extinguished through increasing aridity and droughts, but in the state of Rio de Janeiro the planters are increasing their herds. Minas Geraes produces cheese, butter and milk, as well as beef cattle for neighbouring cities. Matto Grosso classifies cattle-raising as a principal industry, but under present conditions the accessible markets are too small for any large develop- ment. In Rio Grande do Sul, where it has attained its greatest development, about 400,000 beeves are slaughtered annually for the manufacture of jerked beef {xarque), beef extract, &c. Little attention has been given to sheep in Brazil except in the southern states, and even there the flocks are small. They were to be found in Ceara and Piauhy in colonial times, and small flocks are still to be seen in the latter state, but no use is made of their wool, and the market for mutton is extremely limited because of popular prejudices. Woollen manufactures have been established in Rio de Janeiro, Sao Paulo and Rio Grande do Sul. The exportation of wool amounted to 1,130,160 lb in 1906. Goats have been found highly profitable in many of

the middle Atlantic states, where the long dry seasons render the campos unsuitable for cattle pasturage. The export ot goat skins from these states is large. Swine do well in all parts of the country, especially in Minas Geraes, Sao Paulo, Rio de Janeiro, Parana and Rio Grande do Sul, and domestic pork and lard are slowly supplanting the heavily-taxed foreign products.

Although the coast and river fisheries of Brazil are numerous and valuable, cured fish is one of the staple imports, and foreign products

INDUSTRY]

are to be found even along the Amazon. In the Amazon valley fish is a principal article of food, and large quantities of pirarucu (Sudis gigas) are caught during the season of low water and prepared for storage or market by drying in the sun. This and the collection of turtle eggs for their oil, or butter, are chiefly Indian industries, and contribute largely to the support of the native population of that region. Along the coast the best known fisheries are among the Abrolhos islands and in the shallow waters of Espirito Santo, where the garoupa, pargo and vermelho (species of Serranus) abound in great numbers.

The extractive or forest industries of Brazil were among the first to engage the attention of Europeans, and have always been con- sidered a principal source of colonial and national wealth. The varied uses of india-rubber in modern times, however, have given them a greatly enhanced importance and value. Of the exports of 1905, 36% were of this class, while those of the pastoral and mining industries combined were not quite 6J . In 1906 the per- centages were 31 and 6-67, showing a considerable loss for the former and a slight gain for the latter. The principal products of this class are india-rubber, mate, Brazil nuts, vegetable wax, palm fibre, cabinet woods, and medicinal leaves, roots, resins, &c. Before the discovery of the cheaper aniline colours, dye-woods were among the most valuable products of the countty; in fact, Brazil derives her name from that of a dye-wood (Brazil-wood — Caesalpinia echinata), known as bresill, brasilly, bresiiji, braxilis, or brasile long before the discovery of America (see Humboldt's Geographic du nouveau continent: torn. ii. p. 214), which for many generations was the most highly prized of her natural productions. Of the total exports of this group (1905) very nearly 90 was of india-rubber, which percentage was reduced to 85 in the following year. The exportation for 1906 was 69,761,123 lb of Hevea, 5,871,968 tb of manicoba, and 1,440,131 lb of mangabeira rubber, the whole valued at 124,941,433 milreis gold. The dried leaves and smaller twigs of mate (Para- guayan tea — Ilex paraguayensis) are exported to the southern Spanish American republics, where (as in Rio Grande do Sul) the beverage is exceedingly popular. Theexportin 1906 amounted to 127,417,950 lb, officially valued

at 16,502,881 milreis gold. The collection of Brazil nuts along the Amazon and its tributaries is essentially a poor man's industry, requiring no other plant than a boat. The harvest comes in January and February, in the rainy season, and the nut-gatherers often come one or two hundred miles in their boats to the best forests. The nuts are the fruit of the Bertholletia excelsa, one of the largest trees of the Amazon forest region, and are enclosed, sixteen to eighteen in number, in a hard, thick pericarp. Another nut-producing tree is the sapucaia (Lecythis ollaria), whose nuts are enclosed in a larger pericarp, and are considered to be better flavoured than those first described. The crop is a variable one, the export in 1905 having been 198,226 hectolitres, while that of 1906 was 96,770 hectolitres. It could undoubtedly be largely increased. Vegetable wax, which is an excellent substitute for beeswax, is a product of the carnahuba palm (Copernicia cerifera), and is an im- portant export from Ceara. Palm, or piassava fibre, derived from the piassava palm, is used in the manufacture of brooms, brushes, &c. It is found as far south as southern Bahia, and the export could be very largely increased. The export of cabinet woods is not large, considering the forest area of Brazil and the variety and quality of the woods. This is principally due to the cost and difficulties of transporting timbers to the coast. The export is confined princi- pally to rosewood. Of the medicinal plants, the best-known products are ipecacuanha, sarsaparilla, copaiba, jaborandi and cinchona, but this is only a part of the list. Besides these, tonka beans, anatto, vanilla, and castor-oil seeds form a part of the exports.

The mineral exports are surprisingly small. Gold was discovered by the Portuguese soon after their settlement of the coast in the 16th century, but the washings were poor and attracted little atten- tion. The richer deposits of Minas Geraes were discovered about 1693, and those of Matto Grosso early in the following century. Abandoned placer mines are to be found in every part of the unsettled interior, showing how thoroughly it had been explored by gold- hunters in those early days. Some good mines, like Morro Velho and the abandoned Gongo Soco, have been developed in Minas Geraes, but the great majority are small and not very productive. Diamonds were discovered in Minas Geraes, near the town now called Diamantina, during the first half of the 1 8th century, the dates given ranging from 1725 to 1746, but the productiveness of the district has greatly decreased. Diamonds have also been found in Bahia, Goyaz and Parana. Other precious stones found in Brazil are the topaz, ruby, aquamarine, tourmaline, chrysoberyl, garnet and amethyst. Among the minerals are silver, platinum, copper, iron, lead, manganese, chromium, quicksilver, bismuth, arsenic and antimony, of which only iron and manganese have been regularly mined. The copper deposits of Minas Geraes are said to be promising. Manganese is mined in Minas Geraes for

export. Iron ores have been found in most of the states, and are especially abundant in Minas Geraes. The Ypanema mine and ironworks, near Sorocaba, Sao Paulo, which belong to the national government, have been in operation since 1810 and small charcoal forges were in operation in colonial times and supplied the mines with a considerable part of the iron needed by them. Many of the richer deposits have never been developed because of a lack of fuel and limestone. Bituminous

coal of an inferior quality is mined to a limited extent in Rio Grande do Sul, and another mine has been opened in Santa Catharina. These coal deposits extend from Rio Grande do Sul north into the state of Sao Paulo. Salt, which does not figure in the list of exports, is produced along the coast between Pernambuco and Cape St Roque. The annual production is about 240,000 tons.

To illustrate the comparative productiveness and relationship of these sources of national wealth and industry, the following official returns of export for the years 1905 and 1906 are arranged in the four general classes previously discussed, the values being in Brazilian gold milreis, worth 2s. 3d. or 54-6 cents to the milreis: —

Coffee

Cotton

Cacau

Tobacco

Sugar

Bran 1

Cotton seed

Mandioca flour

Fruits

Castor-oil seeds

Agricultural.

1905.

Milreis, gold.

190,404,576 10,290,790 9.240,313 7,335.163 3,608,476 1,490,312 964,074 692,079 606,678 214,016

224,846,477

Natural and Forest. Rubber:

Mangabeira . . . 1,286,672

Manicoba …. 7,418,559

Hevea (Para) . . . 119,434,947

Mate (Paraguay tea) . 11,088,108

Brazil nuts …. 2,064,049

Palm wax (Carnahuba) . 1,847,273

Cabinet woods . . . 390,070

Piassava fibre . . . 336,668 Medicinal leaves, roots,

resins, &c. . . . 191,534

Salted hides

Dry hides

Skins .

Horse hair

Horns

Wool

Beef extract,

&c.

143.33m H2

Pastoral and Animal.

7,010,498 5,330,440 4.“7.590 307,505 276,172 142,414 81,607

Gold, in bars Manganese ore Monazite sand Precious stones

Old metals 2 . . Sundry products

Total, all products

17,266,226

Mineral Products.

• • 3.734.469

. . 2,958,462 . . 889,231

• • 633,916

8,216,078

Miscellaneous.

263,506 2,177,512

2,441,018 396,827,679

1906.

Milreis, gold.

245,474.525

14,726,492

12,323,922

8,283,150

5,388,596

1,128,761

1,084,742

789,913

7H,332

333,250

290,247,683

1,376,014

7,335,870

116,229,549

16,502,881

1,190,177

3,733,478

318,873

347,323

263,137 147,297,302

9,691,180

7,675,715

4,639,512

403,541

277,488

354,045 110,925

23,152,406

4,379,160

1,594,486

881,289

1,480,260

8,335,195

382,073 2,225,163

2,607,236

471,639,822

Manufactures. — Before the establishment of the republic very little attention had been given to manufacturing industries beyond what was necessary to prepare certain crude products for market. Sugar and rum were essentially plantation products down to the last ten years of the empire, when central usines using improved machinery and methods were introduced as a means of saving the sugar plantations from ruin. The crude methods of preparing jerked beef were also modified to some extent by better equipped abattoirs and establishments for preparing beef extract, preserved meats, &c. There were also mills for crushing the dried mate leaves, cigar and

1 The " bran " exported is from imported wheat and cannot be considered a national product.

2 The " old metals " consist of old iron, brass, &c, derived from railway material, machinery, &c, all imported, and should not be considered a Brazilian product.

The " sundry products ' would probably be included in the four general classes were the items given.

cigarette factories, small chocolate factories, hat factories, brick and tile yards, potteries, tanneries, saddleries, and many other small industries common to all large communities. Considerable protec- tion was afforded to many of these industries by the customs tariff of that time, but protection did not become an acknowledged national policy until after 1889. After that time the duties on imports were repeatedly and largely increased, both as a means of raising- larger revenues and as an encouragement to manufacturing enterprise. Although the protective tariffs thus imposed have resulted in a large increase in manufacturing industries, some of them have been antagonistic to the productive interests of the country, as in the case of weaving mills which use imported yarns. Other industries are carried on

entirely with imported materials, and are national only in name. Among these are flour mills, factories for the cutting of wire nails and making hollow ware from sheet iron, and factories for the manufacture of umbrellas, boots and shoes, &c. The greatest progress has been made in the manufacture of cotton fabrics, principally of the plainer and coarser grades used by the common people. There were 155 of these factories in 1895, but in 1905 only 108 were in operation, with 715,000 spindles, and about 37,000 operatives. Nearly one-half of these were weaving mills, using imported yarn. The factories are widely distributed, and some are favoured by state legislation in addition to the national tariff. The largest and best equipped of them are located in the federal states of Rio de Janeiro and Sao Paulo, though the greater part of the raw cotton used comes from the northern states and pays high freight rates. The manufacture of woollen blankets, cashmeres, flannels, &c, had also undergone noteworthy development and is carried on in fifteen factories, located principally in Rio Grande do Sul, Rio de Janeiro and Sao Paulo. Biscuit-making is represented by a large number of factories, for the most part in Rio de Janeiro and Sao Paulo, and there are a number of breweries of the most modern type in the same two states. The manufacture of boots and shoes has also received much attention, but the materials used are for the most part imported. Among other manufactures are butter and cheese, canned fruits and vegetables, glass and earthen- ware, printing and wrapping paper, furniture, matches, hats, clothing, pharmaceutical products, soaps and perfumery, ice, artificial drinks, cigars and cigarettes, fireworks and candles.

Government. — The overthrow of the monarchy by a military revolt in Rio de Janeiro on 15th November 1889, resulted in the creation of a federal republic under the name of United States of Brazil (Estados Unidos do Brazil). The constitution under which the republic is governed was drafted by a constituent assembly convened on the isth of November 1890, and was adopted on the 24th of February 1891. The supreme powers of the nation are vested in three partially independent branches of government — executive, legislative, and judicial — represented by the president and his cabinet, a national congress of two chambers, and a supreme tribunal. The states forming the federation consist of the twenty provinces and municipal district of the empire, but the number may be increased or diminished by the states concerned with the approval of the national congress. The states are self-governed, and have exclusive control of the public lands, mines, industries, and all local affairs. They have the sole right also to impose duties on exports and taxes upon real estate, industries and professions, and transfers of property. Among other things they are charged with the supervision and support of primary education, with the maintenance of order, and with the organization and support of a system of state courts.

Both the national and state govern- ments exercise the right to impose stamp and consumption taxes, and the municipalities likewise are permitted to impose licence and consumption taxes. The national government reserves for itself the exclusive right to direct the foreign affairs of the republic, to maintain an army and navy, to impose duties on imports, to regulate foreign commerce, to collect port dues, to issue money and create banks of issue, and to maintain a postal and national telegraph service. It also supervises secondary and superior education, issues patents, and provides federal courts for the trial of cases amenable to federal laws. The national government is forbidden to interfere in the peculiar affairs of the states except to repel foreign invasion, to maintain a republican form of government, to re-establish order at the request of a state, or to enforce federal laws and sentences. The states are forbidden, likewise, to tax federal property, to tax inter-state commerce, to impose duties of their own on foreign imports, or to resist the execution of judicial sentences originating in other states. The separation of church and state

is provided for by the constitution, and both the nation and the states are forbidden to establish, subsidize or restrict the exercise of any religious worship. Foreigners are eligible to Brazilian citizenship, and the right of suffrage is conferred upon all male citizens over twenty-one years of age, except beggars, illiterates, the rank and file of the armed forces, members of monastic orders, &c, bound by private vows, and all unregistered citizens.

The executive power of the nation is vested in a president, elected for a term of four years by a direct vote of the electors. He must be a native Brazilian over thirty-five years of age, in the full enjoyment of his political rights, and is ineligible for the next succeeding term. A vice-president is elected at the same time and under the same conditions, who is president of the senate ex officio, and succeeds to the presidency in case the office becomes vacant during the last two years of the presidential term. Should the vacancy occur during the first two years of the term, a new election must be held. The president receives a salary of 120,000 milreis and the vice-president of 36,000 milreis. The president is advised and assisted by a cabinet of six ministers, viz. foreign affairs; finance; agriculture, industry and com- merce; 1 communications (Viacao) and public works; 1 war; and marine. The ministers are appointed and removed by the president, take no part in the sessions of congress, and are responsible to the president alone for their advisory acts. The president sanctions and promulgates, or vetoes, or ignores the laws and resolutions voted by congress, and issues decrees and regulations for their execution. His veto may be over-ridden by a two-thirds vote in each chamber, and permitting ten days to pass without signing an act is considered as . acquiescence and it is promulgated by congress. The president is charged with the duties (among others) of*

commanding the armed forces of the republic, appointing the prefect of the national capital, designating members of the supreme tribunal and diplomatic representatives for the approval of the senate, to negotiate treaties, &c, ad referendum to congress, and maintain relations with foreign powers, to declare war in case of invasion and to declare martial law in case of grave internal disorder, and to advise congress at the opening of the annual session of the pro- gress and state of public affairs. He may be impeached before the senate for his official acts and suspended from office, or tried by the supreme tribunal for criminal offences.

The legislative power is vested in a national congress of two chambers, elected by direct suffrage, and convened on the 3rd of May each year. The regular annual sessions are of four months' duration, but they may be extended to complete necessary legislation. The senate consists of sixty-three members (three from each state and the federal district) elected for a period of nine years, one-third of each delegation being renewed every three years. The senators must be not less than thirty-five years of age, and are exempt from all legal processes not previ- ously authorized by the senate during their term of office, except in cases of arrest in flagrante delicto for a capital crime. The chamber of deputies contains 212 members, the membership being distributed among the states on a basis of one for each 70,000 of population, but with a minimum representation of four for each state. The deputies are elected by direct suffrage for the legislative session of three years, and have the same im- munities from legal process as the senators. The chamber has the right of initiative in the organization of the annual budget laws and those relative to the numerical strength of the army and navy. The members of both houses receive a per diem subsidy.

The judicial system of the republic consists of a supreme federal tribunal of fifteen judges in the national capital, and a district tribunal in the capital of each state, which forms a federal judicial district. The judges are appointed for life and can be removed only by judicial sentence and impeachment. One member of the supreme tribunal holds the position of

'Previous to 1907 these two departments were united in one under the designation of " Industry, Communications and Public Works." The division was decreed December 29, 1906.

DEFENCE, &c]

BRAZIL

solicitor-general of the republic. The judges and solicitor-general are appointed by the "president with the approval of the senate, but the tribunal chooses its own presiding officers and secretaries and, nominally, is independent of executive control. The supreme tribunal has original and appellate jurisdiction, but its power to pass on the constitutionality of federal laws and executive acts seems to fall short of that of the United States Supreme Court. It has authority, however, to review the acts and laws of state governments and to decide upon their con- stitutionality. The district federal court has but one judge (juiz de secqao) and a solicitor of the republic, and has original jurisdiction in federal causes. Each state has its own local laws and courts, independent of federal control, but subject to the review of the supreme tribunal, and with rights of appeal to that tribunal in specified cases. The federal district, which has a municipal council instead of a legislature, has a system of municipal and higher courts peculiar to itself. Limited judicial powers are exercised by chiefs of police, and by certain depart- ment commissions, or boards, of an executive character. The members of the army and navy are governed by special laws, enjoy immunities from civil process, and are subject to the jurisdiction of military courts. The civil code of the republic is based upon Roman law.

Army. — The nominal strength of the army in 1906 was 29,489, including the officers of the general and subordinate staffs and the officers and cadets of the military schools. This total represents the nominal strength of the army in times of peace. Its actual strength, however, is about 15,000 men, some of the regimental and battalion organizations being skeletons. Its organization consists of 40 battalions of infantry with one transport and one depot company, 14 regiments of cavalry of 4 squadrons each, 6 regiments of field artillery with 24 batteries and 6 battalions of heavy artillery with 24 batteries, and two battalions of engineers. Efforts to organize a national guard have been unsuccessful, although officers have been appointed and the organization perfected, on paper. The police force, however, is organized on a military footing and armed, and is available for service in case of necessity. It is credited with 20,000 men. According to law military service is obligatory, but the government has been unable to enforce it. Impressment is commonly employed to fill the ranks, and in cases of emergency the prison population is drawn upon for recruits. The president is nominally commander-in-chief of the army, but the actual command is vested in a general staff in the national capital, and in the general commanding each of the seven military districts into which the republic is divided. The most important of these districts is that of Rio Grande do Sul, where a force of 11,226 men is stationed. The principal war arsenal is in Rio de Janeiro. The rifle used by the infantry is a modified Mauser of the German 1888 model. Military instruction is given

at the Eschola Militar of Rio de Janeiro. The military organization is provided with an elaborate code and systems of military courts, which culminate in a supreme military tribunal composed of 15 judges holding office for life, of which 8 are general army officers, 4 general naval officers and 3 civil judges.

Navy. — The naval strength of the republic consisted in 1906 of 9, collection of armoured and wooden vessels of various ages and types of construction, of which three armoured vessels (including the two designed for coast defence), four protected cruisers, five destroyers and torpedo-cruisers, and half a dozen torpedo boats represented what may be termed the effective fighting force. The loss of the armoured turret ship " Aquidaban " by a magazine explosion in the bay of Jacarepagua, near Rio de Janeiro, in 1905, had left Brazil with but one fighting vessel (the " Reachuelo ") of any importance. Many of the wooden and iron vessels listed in the Naval Annual, 1906, though obsolete and of no value whatever as fighting machines, are used for river and harbour service, and in the suppression of trifling insurrections. The Annual describes 21 vessels of various types, and mentions 23 small gunboats used for river and harbour service. Besides these there are a number of practice

boats (small school-ships), transports, dispatch boats and launches. A considerable part of the armament is old, but the more modern vessels are armed with Armstrong rifled guns. The naval programme of the republic for 1905 provided for the prompt construction of 3 battleships of the largest displacement, 3 armoured cruisers, 6 destroyers, 12 torpedo boats and 3 sub- marine boats; and by 1909 the reorganization of the navy was far advanced. The principal naval arsenal is located at Rio de Janeiro. The government possesses dry docks at Rio de Janeiro. The naval school, which has always enjoyed a high reputation among Brazilians, is situated on the island of Enxadas in the bay of Rio de Janeiro. There are smaller arsenals at Para, Pernambuco, Sao Salvador and Ladario (Matto Grosso) and a shipbuilding yard of considerable importance at the Rio de Janeiro arsenal.

Education. — Education is in a backward condition, and it is estimated that 80% of the population can neither read nor write. The lowest rate of illiteracy is to be found in the southern half of the republic. Public instruction . is, by constitutional provision, under secular control, but religious denominations are permitted to have their own schools. Primary instruction is free but not compulsory, and the schools are supported and supervised by the states. An incomplete return in 1891 gave 8793 schools and 376,399 pupils. Secondary and higher educa- tion are under both federal and state control, the former being represented by lyceums in the state capitals, and by such institutions as the Gymnasio Nacional (formerly Collegio Dom Pedro II.) in Rio de Janeiro. Many of the states also

maintain normal schools of an inferior type, that of Sao Paulo being the best and most modern of the number. Higher, or superior, in- struction is confined almost exclusively to professional schools — the medical schools of Rio de Janeiro and Bahia, the law schools of Sao Paulo and Pernambuco, the polytechnic of Rio de Janeiro, and the school of mines of Ouro Preto. There are many private schools in all the large cities, from the primary schools maintained by the church and various corporations and religious associations to schools of secondary and collegiate grades, such as the Protes- tant mission schools of Petropolis, Piracicaba, Juiz de Fora, Sao Paulo and Parana, the Lyceu de Artes e Officios (night school) of Rio de Janeiro, and the Mackenzie College of Sao Paulo. Perhaps the best educational work in Brazil is done in these private schools. In addition to these there are a number of seminaries for the education of priests, where special attention is given to the classics and belles-lettres.

Religion. — The revolution of 1889 and the constitution adopted in 1891 not only effected a radical change in the form of govern- ment, but also brought about the separation of church and state. Before that time the Roman Catholic Church had been recognized and supported by the state. Not only are the national and state governments forbidden by the constitution to establish or subsidize religious worship, but its freedom is guaranteed by a prohibition against placing obstructions upon its exercise. The relations of the state with the disestablished church since

1889 have been somewhat anomalous, the government having decided to continue during their lives the stipends of the church functio.naries at the time of disestablishment. The census of

1890 divided the population into 14,179,615 Roman Catholics, J 43(743 Protestants, 3300 of all other faiths, 7257 of no religious profession, and 600,000 unchristianized Indians. The increase of population through immigration is overwhelmingly Catholic, and the nation must, therefore, continue Roman Catholic whether the church is subsidized by the state or not. The moral character of churchmen in Brazil has been severely criticized by many observers, and the ease with which disestablishment was effected is probably largely due to their failings. The church had exercised a preponderating influence in all matters relating to education and the social life of the people, and it was felt that no sweeping reforms could be secured until its domination had been broken. The immediate results of disestablishment were civil marriage, the civil registry of births and deaths, and the secularization of cemeteries; but the church retains its influence over all loyal churchmen through the confessional, the last rites

of the church, and their sentiment against the profanation of holy ground. Formerly Brazil constituted an ecclesiastical province under the metropolitan jurisdiction of an archbishop residing at Bahia, with n suffragan bishops, 12 vicars-general and about 2000 curates. In 1892 the diocese of Rio de Janeiro was made an archbishopric, and four new dioceses were created. Three more have been added since, making twenty dioceses in all. In 1905 the archbishop of Rio de Janeiro was made a cardinal. The church has eleven seminaries for the education of priests, and maintains a large number of private schools, especially for girls, which are patronized by the better classes. The church likewise exercises a far-reaching influence over the people through the beneficent work of ics lay orders, and through the hospitals and asylums under its control in every part of the country. A Misericordia hospital is to be found in almost every town of importance, and recolhimentos for orphan girls in all the large cities. In no country have these charities received more generous support than in Brazil. The Protestant contingent consists of a number of small congregations scattered throughout the country, a few Portuguese Protestants from the Azores, a part of the German colonists settled in the central and southern states, and a large percentage of the North Europeans and Americans temporarily resident in Brazil. The Positivists are few in number, but their congregations are made up of educated and influential people.

Art, Science and Literature. — The Brazilian people have the natural taste for art, music and literature so common among the Latin nations of the Old World. The emperor Dom Pedro II. did much to encourage these pursuits, and many promising young men received their education in Europe at his personal expense. Still earlier in the century (181 5) the regent Dom John VI. brought out a number of French artists to educate his subjects in the fine arts, and the Escola Real de Sciencias, Aries e Officios was founded in the following year. From this beginning resulted the Academia de Bellas Artcs of a later date, to which was added a conservatory of music in 1841. The institution is now called the Escola Nacional de Bellas Artes. Free instruction in the fine arts has been given in this school. The higher results of artistic training, however, are less marked than a widespread dilettantism. The Brazilian composer Carlos Gomes (1839-1896) is the best known of those who have adopted music as a profession, his opera // Guarani having been produced at most of the European capitals. The most prominent among Brazilian painters is Pedro Amcrico, and in sculpture Rodolpho Bernardelli has done good work. In science Brazil has accomplished very little, although many eminent foreign naturalists have spent

years of study within her borders. Joao Barbosa Rodrigues has done some good work in botany, especially in the study of the palms of the Amazon, and Joao Baptista de Lacerda has made important biological investigations at the national museum of Rio de Janeiro. There are several scientific societies and institutions in the country, but they rarely under- take original work. The most active are the geographical societies, but very little has been done in the direction of scientific exploration. Some interesting results have been obtained from the boundary surveys, from Dr E. Cruls's exploration of a section of the Goyaz plateau in 1892 in search of a site for the future capital of the republic, and from some of the river and railway surveys. In 1875 a geological commission was organized under the direction of Professor Charles Frederick Hartt, but it was disbanded two years later. In 1906 Congress resolved to under- take a national geological survey under the direction of Mr Orville A. Derby, one of Professor Hartt's assistants. The coal resources of the southern states were investigated in 1904, under the auspices of the national government, by Dr J. C. White, of the U.S. Geological Survey, who found strata of fairly good coal at depths of 100 to 200 ft. extending from Rio Grande do Sul north to Sao Paulo. The more important contributions to our present knowledge of Brazil, however, have been obtained through the labours of foreign naturalists. Beginning with the German mineralogist W. L. von Eschwege, who spent nineteen years in Brazil (1809-1828), the list includes A. de Saint-Hilaire (1816-

1820 and 1830), J. B. von Spix and C. F. von Martins (1817-1820), Prince Max zu Neuwied (1815-1817), P. W. Lund (1827-1830, and 1830 to 1880, the year of his death), George Gardner (1836— 1841), A. R. Wallace (1848-1852), H. W. Bates (1848-1859), Hermann Burmeister (1850-1852), Louis Agassiz (1865-1866), Charles Frederick Hartt (1865-1866, 1872 and 1875-1878) and Karl von den Steinen (1884-1885 and 1887-1888). These explorations cover every branch of natural science and resulted in publications of inestimable scientific value. There should also be mentioned the monumental work of C. F. P. von Martius on the Flora Braziliensis, and the explorations of Agassiz and Lund. Among other scientists of a later date who have published important works on Brazil are the American geologists O. A. Derby and J. C. Branner, the Swiss naturalist E. A. Goeldi, the German botanist J. Huber, the German ethnologist H. von Ihring, and the German geographer Fried. Katzer. The In- stitute Historico e Geographico Brazileiro, though devoted chiefly to historical research, has rendered noteworthy service in its encouragement of geographical exploration and by its publication of various scientific memoirs. The Museu Nacional at Rio de Janeiro, which has occupied the imperial palace of Sao Christovao since the overthrow of the monarchy, contains large collections of much scientific value, but

defective organization and apathetic direction have rendered them of comparatively slight service. The Observatorio Nacional at Rio de Janeiro is another prominent public institution. The botanical gardens of Brazil are develop- ing into permanent exhibitions of the flora of the regions in which they are located. That of Rio de Janeiro is widely celebrated for its avenues of royal palms, but it has also rendered an im- portant service to the country in the dissemination of exotic plants.

Brazilian literature has been seriously prejudiced by partisan politics and dilettantism. The colonial period was one of strict repression, the intellectual life of the people being jealously supervised by the church to protect itself against heresy, and their progress being restricted by the Portuguese crown to protect its monopoly of the natural resources of the country. The arrival of Dom John VI. in 1808 broke down some of these restrictions, and the first year of his residence in Rio de Janeiro saw the establishment of the first printing press in Brazil and the publication of an official gazette. There was no freedom of the press, however, until 1821, when the abolition of the censor- ship and the constitutional struggle in Portugal gave rise to a political discussion that marked the opening of a new era in the development of the nation, and aroused an intellectual activity that has been highly productive in journalistic and polemical writings. In no country, perhaps, has the press exercised a more direct and powerful influence upon government than in Brazil, and in no other country can there be found so high a percentage of journalists in official life. Some of the political writers have played an important part in moulding public opinion on certain questions, as in the case of A. C. Tavares Bastos, whose Cartas do Solitario were highly instru- mental in causing the Amazon to be thrown open to the world's commerce and also in preparing the way for the abolition of slavery; and in that of Joaquim Saldanha Marinho, whose discussions in 1874-1876 of the relations between church and state prepared the way for their separation. The personal element is conspicuous in the Brazilian journalism, and for a considerable period of its history libellous attacks on persons, signed by professional sponsors, popularly called lestas de ferro (iron heads), were admitted at so much a line in the best newspapers.

The singular adaptability of the Portuguese language to poetical expression, coupled with the imaginative temperament of the people, has led to an unusual production and appreciation of poetry. The percentage of educated men who have written little volumes of lyrics is surprisingly large, and this ma}' be accounted for by the old Portuguese custom of reciting poetry with musical accompaniment. The most popular of the Brazilian poets are Thomaz Antonio Gonzaga, Antonio Goncalves Dias and Bernardo Guimaraes. Among the dramatists and novelists

may be mentioned Joaquim Manoel de Macedo, Jos6 Martiniano de Alencar, Bernardo Guimaraes, A. de Escrangnolle Taunay and J. M. Machado de Assis. Jose M. de Alencar is usually described as the greatest of Brazilian novelists. The most popular of his romances are Iracema and O Guarany. In historical literature Brazil has produced one writer of high stand- ing — Francisco Adolpho Varnhagen (Visconde de Porto Seguro) , whose Historia Geral do Brazil is a standard authority on that subject. The two English authorities, Robert Southey's History of Brazil, covering the colonial period, and John Armitage's History of Brazil, covering the period between the arrival of the Braganza family (1808) and the abdication of Dom Pedro I. (183 1) , have been translated into Portuguese. Another Brazilian historian of recognized merit is Joao Manoel Pereira da Silva, whose historical writings cover the first years of the empire, from its foundation to 1840. Among the later writers Joao Capistrano de Abren has produced some short historical studies of great merit. In the field of philosophic speculation, Auguste Comte has had many disciples in Brazil.

Finance. — The national revenue is derived largely from the duties on imports, the duties on exports having been surrendered to the states when the republic was organized. Other sources of revenue are stamp taxes on business transactions, domestic consumption taxes (usually payable in stamps) on manufactured tobaccos, beverages, boots and shoes, textiles, matches, salt, preserved foods, hats, pharmaceutical preparations, perfumeries, candles, vinegar, walking sticks and playing cards, and taxes on lotteries, passenger tickets, salaries and dividends of joint-stock companies. Formerly import duties were payable in currency, but in 1899 it was decided to collect 10% of them in gold to provide the government with specie for its foreign remittances. The revenues and expenditures have since then been calculated in gold and currency together, to the complete mystification of the average citizen, and the gold percentage of the duties on imports has been increased to 35 and 50% (in 1907), the higher rate to apply to specified articles and rule when exchange on London is above 14 pence per milreis, and the lower when it is below. The service of the national debt absorbs a very large part of the expenditure, about 45 % of the estimates for 1907 being assigned to the department of finance. The depart- ment of industry, communications and public works takes the next highest proportion, but about half its expenditures are met by special taxes, as in the case of port works and railway inspection, and by the revenues of the state railways, telegraph lines and post office. The depreciation and

unstable character of the paper currency render it difficult to give a clear statement of receipts and expenditures for a term of years, the sterling equivalents often show- ing a decrease, through a fall in the value of the milreis, where there has been an actual increase in currency returns. This was most noticeable between 1889 and 1898, when exchange, which represents the value of the milreis, fell from a maximum of 27! pence (27d. being the par value of the milreis) to a minimum of 5§ pence. Since 1898 there has been an upward movement of exchange, the average rate for 1905 having been very nearly 16 pence. In this period the increase in the sterling equivalents would be proportion- ately greater than that of the currency values. The gold and currency receipts and expenditures for the six years 1900 to 1905, inclusive, according to official returns, were as follows : — , .

the interest obligations on its debt and railway guarantees, and an arrangement was made with its creditors in London for the issue of a 5 % funding loan to an amount not to exceed £10,000,000, and the suspension of all amortization for thirteen years. On the other hand the government agreed to withdraw currency, which had reached a total of 788,364,614 j-milreis, pari passu with the issue of the loan, the milreis being computed at 18 pence. The purpose of this condition was in order to improve the value of the paper milreis in order to increase the specie value of the revenues. The scheme came into operation in June 1898, and not only was a complete suspension of payments avoided but the financial situation was greatly improved. The government even withdrew more of its currency issues than required by the agreement, and the value of the milreis steadily improved. At the same time the government carried out the forced conversion of the national loans into lower interest- bearing issues, which greatly reduced the annual interest charges. These measures would have put the financial affairs of the nation on a solid footing in a very few years had the government been able to keep its expenditure within its income. The naval revolt of 1893-1894, however, had aroused the spirit of militarism in the ruling classes, and the effort to perfect the organization and equip- ment of the army, strengthen the fortifications of Rio de Janeiro, and increase the navy, have kept expenditures in excess of the revenues. The purchase of guaranteed railways owned by foreign companies likewise added largely to the bonded in- debtedness, though the onus was in existence in another form. The result of these measures was a large addition to the public debt, which on 31st December 1906 was approximately as follows {apolices being the name given to bonds inscribed to the holder) : —

External debt :

Loans of 1883, 1888 and 1889 Oestede Minas R. R. loan Loan of 1898

…. Funding loan of 1898 Railway rescission loan of 1901 Port works loan of 1903 .

£ s. d

26,478,500

3,388,100

7.33l.6oo

8,613,717 9 9 15,467,015 16 1

8,500,000

£69,778,933 5 10

Internal debt, funded:

5 % apolices, Law of 1827

4i % „ „ 1879

6 % „ „ 1897

‘5 % » ,. !903

Milreis” 51*

• 483,546,600

20,548,000

37,082,000

17,300,000

Total, funded …. 558,476,600 (at I5d. £34,904,787) =

Internal debt, not funded: Milreis

Paper money 664,792,960

Savings bank and other deposits:

In paper 246,812,407

In gold, 19,053,861 r (say) . . . 34,296,950 Floating indebtedness (“fcs

current, bills, &c.) ?

Total, not funded, approx. (at I5d. £59,118,895 stg.)

Approximate total indebtedness

945,902,317

£163,802,675

Year.

Average Rate of Exchange.

Revenue.

Expenditure.

Gold

Milreis.

Currency Milreis.

Gold Milreis.

Currency Milreis.

Pence.

1900 1901 1902 1903 1904 1905

9-50 11-38

n-97

12

12-28 15-89

49,955,522 44,041,302 42,904,844 45,121,815 50,566,572 64,207,004

263,687,253 239,284,702 266,584,912 327,370,063 342,782,191 243,335,396

41,892,150 40,493,241 34,574,643 48,324,642 48,476,413 51,606,272

372,753.986 261,629,212 236,458,862 291,198,960 352,292,147 265,699,281

Reducing gold to a currency basis at I5d. per milreis (the official valuation adopted in 1906), the budget for 1907 provided for a revenue of 353,590,593 milreis and an expenditure of 409,482,284 milreis, showing a deficit of 55,891,691 milreis. These deficits were common enough under the monarchy, but they have become still more prominent under the republic. According to the " Retrospecto Commercial " for 1906 of the Jornal do Commercio (Rio de Janeiro, March 5, 1907), the aggregate deficits for the eleven years 1891 to 1904 were 692,000,000 milreis, or, say, £43,250,000.

The natural result of such a regime is increasing indebtedness. In 1888, a year before the republic was proclaimed, the internal and external national debts amounted to £74,000,000 sterling, with the currency at par. Ten years later, when the currency had fallen to 5f pence per milreis, the government found itself unable to meet

In addition to these, the government was still responsible for interest guarantees on fourteen railways, or sections of existing lines, with an aggregate capital of about £4,900,000 held in Europe and 12,055,440 milreis held in Brazil, on which the national treasury paid in interest £191,324 and 1,398,493 milreis.

The paper currency of Brazil consists of both treasury issues and bank-notes, the latter issued under government supervision. Its fluctuations in value have been not only a serious inconvenience in commercial transactions, but also the cause of heavy loss to the people. Under the provisions of the funding loan of 1898 a scheme for the withdrawal of the paper money was carried into effect, and by the end of December 1906 the amount in circulation had been reduced from 788,364,614 |-milreis (the outstanding circulation 31st August 1898) to 664,792,960 J-milreis. Two funds were created for the redemption and guarantee of paper issues, the latter receiving 5 % of the import duties payable in gold. Up to 1906 the Caixa da Amortisacao (redemption bureau), which has charge of the service of the internal funded debt, superintended the redemption of the currency, but in that year (December 6, 1906) a Caixa de Conversao (conversion bureau) was created for this special service. It is modelled after the Argentine Conversion office, and is authorized to issue notes to bearer against deposits of gold at the rate of 15 pence per milreis although exchange was above I7d. when the scheme was proposed. The notes are to be redeemable in gold at

sight, the Caixa de Conversao to keep the gold paid in for that express purpose. The coffee producers of Sao Paulo and other states found that the appreciation in value of themilreis was reducing their profits, and they advocated this measure (at first with a valua- tion of 1 2d.) to check the upward movement in exchange. Metallic money is limited to nickel and bronze coins, but in 1906 the govern- ment was authorized to purchase bar silver for the coinage of pieces of the denomination of two milreis, one milreis and 500 reis (J-milreis). Gold is the nominal standard of value, the monetary unit being the gold milreis worth 2s. 2§d. at par. The 10-milreis gold piece weighs 8-9648 grammes, 916 fine, and contains 8-2178 grammes of pure gold. There is no gold in circtilation, however, and gold duties are paid with gold cheques purchased at certain banks with paper money. The banking facilities of the republic have undergone many changes under the new regime. A fruitful cause of disaster has been the practice of issuing agricultural and industrial loans under government authorization. Commercial business at the principal ports is largely transacted through foreign banks, of which there are a large number.

In addition to the indebtedness of the national government, the individual states have also incurred funded debts of their own. The aggregate of these debts in 1904 was £20,199,440, and the several loans made during the next two years, including those oi the municipalities of Rio de Janeiro, Santos, Bahia and Manaos, add fully two and a half millions more to the total. (A. J. L.)

History

Brazil was discovered in February 1499 (o.s.) by Vicente Yanez Pinzon, a companion of Columbus. He descried the land near Cape St Augustine, and sailed along the coast as The Porta- f ar as ˆg r i ver Amazon, whence he proceeded to the ftraztf! mouth of the Orinoco. He made no settlement, but took possession of the country in the name of the Spanish government, and carried home, as specimens of its natural productions, some drugs, gems and Brazil-wood. Next year the Portuguese commander, Pedro Alvares Cabral, ap- pointed by his monarch to follow the course of Vasco da Gama in the East, was driven by adverse winds so far from his track, that he reached the Brazilian coast, April 24, and anchored in Porto Seguro (16° S. lat.) on Good Friday. On Easter day an altar was erected, mass celebrated in presence of the natives, the country declared an apanage of Portugal, and a stone cross erected in commemoration of the event. Cabral despatched a small vessel to Lisbon to announce his discovery, and, without

forming any settlement, proceeded to India on the 3rd of May. On the arrival of the news in Portugal, Emanuel invited Amerigo Vespucci to enter his service, and despatched him with three vessels to explore the country. The navigator's first voyage was unsuccessful ; but, according to his own account, in a second he discovered a safe port, to which he gave the name of All- Saints and where he erected a small fort. Vespucci's narrative is, however, suspected of being apocryphal (see Vespucci, Amerigo).

The poor and barbarous tribes of Brazil, and their country, the mineral riches of which were not immediately discovered, offered but few attractions to a government into the coffers of which the wealth of India and Africa was flowing. For nearly thirty years the kings of Portugal paid no further attention to their newly-acquired territory than what consisted, in com- bating the attempts of the Spaniards to occupy it, and dispersing the private adventurers from France who sought its shores for the purposes of commerce. The colonization of Brazil was prosecuted, however, by subjects of the Portuguese monarchy, who traded thither chiefly for Brazil-wood. The government also sought to make criminals of some use to the state, by placing them in a situation where they could do little harm to society, and might help to uphold the dominion of their nation.

The first attempt on the part of a Portuguese monarch to introduce an organized government into his dominions was made First by John III. He adopted a plan which had been

organ iza- found to succeed well in Madeira and the Azores, — tioa la dividing the country into hereditary captaincies, and granting them to such persons as were willing to undertake their settlement, with unlimited powers of jurisdiction, both civil and criminal. Each captaincy extended along fifty leagues of coast. The boundaries in the interior were undefined.' The first settlement made under this new system was that of

Sao Vicente Piratininga, in the present province of Sao Paulo. Martim Alfonso de Sousa, having obtained a grant, fitted out a considerable armament and proceeded to explore the country in person. He began to survey the coast about Rio de Janeiro, to which he gave that name, because he discovered it on the 1st of January 1531. He proceeded south as far as La Plata, naming the places he surveyed on the way from the days on which the respective discoveries were made. He fixed upon an island in 245 S. lat., called by the natives Guaibe, for his settle- ment. The Goagnazes, or prevailing tribe of Indians in that neighbourhood, as soon as they discovered the intentions of the new-comers to fix themselves permanently there, collected for the purpose of expelling them. Fortunately, however, a ship- wrecked Portuguese, who had lived many years under the pro- tection of the principal chief, was successful in concluding a treaty of perpetual

alliance between his countrymen and the natives. Finding the spot chosen for the new town inconvenient, the colonists removed to the adjoining island of Sao Vicente, from which the captaincy derived its name. Cattle and the sugar-cane were at an early period introduced from Madeira, and here the other captaincies supplied themselves with both. ‘ Pero Lopes de Sousa received the grant of a captaincy, and set sail from Portugal at the same time as his brother, the founder of Sao Vicente. He chose to have his fifty leagues in two allotments. That to which he gave the name of Santo Amaro adjoined Sao Vicente, the two towns being only three leagues asunder. The other division lay much nearer to the line between Parahyba and Pernambuco. He experienced considerable diffi- culty in founding this second colony, from the strenuous oppo- sition of a neighbouring tribe, the Petiguares; at length he succeeded in clearing his lands of them, but not long afterwards he perished by shipwreck.

Rio de Janeiro was not settled till a later period; and for a considerable time the nearest captaincy to Santo Amaro, sailing along the coast northwards, was that of Espirito Santo. It was founded by Vasco Fernandes Coutinho, who having acquired a large fortune in, India, sank it in this scheme of colonization. He carried with him no less than sixty fidalgos. They named their town by anticipation, Our Lady of the Victory (Victoria) ; but it cost them some hard fighting with the Goagnazes to justify the title.

Pedro de Campo Tourinho, a nobleman and excellent navigator, received a grant of the adjoining captaincy of Porto Seguro. This, it will be remembered, is the spot where Cabral first took possession of Brazil. The Tupinoquins at first offered some opposition; but having made peace, they observed it faithfully, notwithstanding that the oppression of the Portuguese obliged them to forsake the country. Sugar-works were established, and considerable quantities of the produce exported to the mother country.

Jorge de Figueiredo, Escrivam da Fazenda, was the first dona- tory of the captaincy Ilheos, 140 m. south of Bahia. His office preventing him from taking possession in person, he deputed the task to Francisco Romeiro, a Castilian. The Tupinoquins, the most tractable of the Brazilian tribes, made peace with the settlers, and the colony was founded without a struggle.

The coast ‘from the Rio Sao Francisco to Bahia was granted to Francisco Pereira Coutinho; the bay itself, with all its creeks, was afterwards added to the grant. When Coutinho formed his establishment, where Villa Velha now stands, he found a noble Portuguese living in the neighbourhood who, having been shipwrecked, had, by means of his fire-arms, raised himself to the rank of chief among the natives. He was surrounded by a patriarchal establishment of wives and children; and to him most of the distinguished families of Bahia still trace their lineage. The regard entertained by the

natives for Caramuru (signifying man of fire) induced them to extend a hospitable welcome to his countrymen, and for a time everything went on well. Coutinho had, however, learned in India to be an oppressor, and the Tupinambas were the fiercest and most powerful of the native tribes. The Portuguese were obliged to abandon their settle- ment; but several of them returned at a later period, with

Caramuru, and thus a European community was established in the district.

Some time before the period at which these captaincies were established, a factory had been planted at Pernambuco. A ship from Marseilles took it, and left seventy men in it as a garrison; but she was captured on her return, and carried into Lisbon, and immediate measures were taken for reoccupying the place. The captaincy of Pernambuco was granted to Don Duarte Coelho Pereira as the reward of his services in India. It extended along the coast from the Rio Sao Francisco, northward to the Rio de Juraza. Duarte sailed with his wife and children, and many of 'his kinsmen, to take possession, of his new colony, and landed in the port of Pernambuco. To the town which was there founded he gave the name of Olinda. The Cabetes, who possessed the soil, were fierce and pertinacious; and, assisted by the French, who traded to that coast, Coelho had to gain by inches what was granted him by leagues. The Portuguese managed, however, to beat off their enemies; and, having entered into an alliance with the Tobayanes, followed up their success.

Attempts were made about this time to establish two other captaincies, but without success. Pedro de Goes obtained a grant of the captaincy of Parahyba between those of Sao Vicente and Espirito Santo; but his means were too feeble to enable him to make head against the aborigines, and the colony was broken up after a painful struggle of seven years. Joao de Barros, the historian, obtained the captaincy of Maranhao. For the sake of increasing his capital, he divided his grant with Fernao Alvares de Andrade and Aires da Cunha. They projected a scheme of conquest and colonization upon a large scale. Nine hundred men, of whom one hundred and thirteen were horsemen, embarked in ten ships under the command of Aires da Cunha. But the vessels were wrecked upon some shoals about one hundred leagues to the south of Maranhao; the few survivors, after suffering immense hardships, escaped to the nearest settle- ments, and the undertaking was abandoned.

By these adventures the whole line of Brazilian coast, from the mouth of La Plata to the mouth of the Amazon, had become studded at intervals with Portuguese settlements, in all of which law and justice were administered, however inadequately. It is worthy of observation, that Brazil was the first colony founded in America upon an agricultural principle, for until then the precious metals were the exclusive attraction. Sufficient capital was attracted between the year 1531 (in which De Sousa founded the first captaincy) and the year 1548 to render these colonies an object of importance to the mother country. Their organization, however, in regard to their means of defence against both external aggression and internal violence, was extremely defective. Their territories were surrounded and partly occupied by large tribes of savages. Behind them the Spaniards, who had an establishment at Asuncion, had penetrated almost to the sources of the waters of Paraguay, and had suc- ceeded in establishing communication with Peru. Orellana, on the other hand, setting out from Peru, had crossed the mountains and sailed down the Amazon. Nor had the French abandoned their hopes of effecting an establishment on the coast.

The obvious remedy for these evils was to concentrate the executive power, to render the petty chiefs amenable to one tribunal, and to confide the management of the defensive force to one hand. In order to this the powers of the several captains were revoked, whilst their property in their grants was reserved to them. A governor-general was appointed, with full powers, civil and criminal. The judicial and financial functions in each province were vested in the Ouvidor, whose authority in the college of finance was second only to that of the governor. Every colonist was enrolled either in the Milicias or Ordenanzas. The former were obliged to serve beyond the boundaries of the province, the latter only at home. The chief cities received municipal constitutions, as in Portugal. Thome de Sousa was the first person nominated to the important post of governor- general. He was instructed to build a strong city in Bahia and to establish there the seat of his government. In pursuance

of his commission he arrived at Bahia in April 1549, with a fleet of six vessels, on board of which were three hundred and twenty persons in the king's pay, four hundred convicts and about three hundred free colonists. Care had been taken for the spiritual wants of the provinces by associating six Jesuits with the expedition.

Old Caramuru, who still survived, rendered the governor essential service by gaining for his countrymen the goodwill of the natives. The new city, to which the name of Sao Salvador was given, was established on the heights above the Bay of All Saints (Todos os Santos), from which its later name of Bahia is taken. Within four months one hundred houses were built, and

surrounded by a mud wall. Sugar plantations were laid out in the vicinity. During the four years of Sousa's government there were sent out at different times supplies of all kinds. Female orphans of noble families were given in marriage to the officers, and portioned from the royal estates, and orphan' boys were sent to be educated by the Jesuits. The capital rose rapidly in importance, and the captaincies learned to regard it as a common head and centre of wealth. Meanwhile the Jesuits undertook the moral and religious culture of the natives, and of the scarcely less savage colonists. Strong opposition was at first experienced from the gross ignorance of F . ,rst H the Indians, and the depravity of the Portuguese, missions. fostered by the licentious encouragement of some abandoned priests who had found- their way to Brazil. Over these persons the Jesuits had no authority; and it was not until the arrival of the first bishop of Brazil in 1552, that anything like an efficient check was imposed upon them. Next year Sousa was succeeded by Duarte da Costa, who brought with him a reinforcement of Jesuits, at the head of whom was Luis de Gran, appointed, with Nobrega the chief of the first mission, joint provincial of Brazil.

Nobrega's first act was one which has exercised the most beneficial influence over the social system of Brazil, namely, the establishment of a college on the then unreclaimed plains of Piratininga. It was named Sao Paulo, and has been at once the source whence knowledge and civilization have been diffused through Brazil, and the nucleus of a colony of its manliest and hardiest citizens, which sent out successive swarms of hardy adventurers to people the interior. The good intentions of the Jesuits were in part frustrated by the opposition of Costa the governor; and it was not until 1558, when Mem de Sa was sent out to supersede him, that their projects were allowed free scope.

Rio de Janeiro was first occupied by French settlers. Nicholas Durand de Villegagnon, a bold and skilful seaman, having visited Brazil, saw at once the advantages which might accrue s tl . m to his country from a settlement there. In order to meat of secure the interest of Coligny, he gave out that his Mode projected colony was intended to serve as a place of Janeiro. refuge for the persecuted Huguenots. Under the patronage of that admiral, he arrived at Rio de Janeiro in 1558 with a train of numerous and respectable colonists. As soon, however, as he thought his power secure, he threw off the mask, and began to harass and oppress the Huguenots by every means he could devise. Many of them were forced by his tyranny to return to France; and ten thousand Protestants, ready to embark for the new colony, were deterred by their representations. Ville- gagnon, finding his force much diminished in consequence of his treachery, sailed for France in quest of recruits; and during his absence the Portuguese governor, by order of his court, attacked and dispersed the settlement. For some years

the French kept up a kind of bush warfare; but in 1567 the Portu- guese succeeded in establishing a settlement at Rio.

Mem de Sa continued to hold the reins of government in Brazil upon terms of the best understanding with the clergy, and to the great advantage of the colonies, for fourteen years. On the expiration of his power, which was nearly contemporary with that of his life, an attempt was made to divide Brazil into two governments; but this having failed, the territory was reunited in 1578, the year in which Diego Laurenco da Veiga was appointed governor. At this time the colonies, although not yet

independent of supplies from the mother country, were in a flourishing condition; but the usurpation of the crown of Portugal by Philip II. changed the aspect of affairs. Brazil, believed to be inferior to the Spanish possessions in mines, was consequently abandoned in comparative neglect for the period intervening between 1578 and 1640, during which it continued an apanage of Spain.

No sooner had Brazil passed under the Spanish crown, than English adventurers directed their hostile enterprises against Enziish ‘ ts snores – In 1586 Witherington plundered Bahia; and in 1 591 Cavendish made an abortive attack on Santos;

French in 1595 Lancaster attacked Olinda. These exploits, aggres- however, were transient in their effects. In 161 2 the

French attempted to found a permanent colony in the island of Marajd, where they succeeded in maintaining themselves till 1618. This attempt led to the erection of Maranhao and Para into a separate Estado. But it was on the part of the Dutch that the most skilful and pertinacious efforts were made for securing a footing in Brazil; and they alone of all the rivals of the Portuguese have left traces of their presence in the national spirit and institutions of Brazil.

The success of the Dutch East India Company led to the establishment of a similar one for the West Indies, to which a

monopoly of the trade to America and Africa was witiffhe g rante d. This body despatched in 1624 a fleet against Dutch. Bahia. The town yielded almost without a struggle.

The fleet soon after sailed, a squadron being detached against Angola, with the intention of taking possession of that colony, in order to secure a supply of slaves. The fall of Bahia for once roused the Spaniards and Portuguese to joint action, and a grea t expedition speedily sailed from Cadiz and Lisbon for Bahia. Once more, though strongly garrisoned, the town was retaken without any serious fighting in May 1625. The honours bestowed upon the Indian chiefs for their assistance in this war broke down in a great measure the barrier between the two races ; and there is at this day a greater admixture of their blood among the better classes in Bahia than is to be found elsewhere in Brazil. In 1630 the Dutch attempted again to effect a settlement; and Olinda, with its port, the Recife-Olinda, was destroyed,

but the Recife was fortified and held, reinforcements settlement an< ˆ su PP ues being sent by sea from Holland. The in Brazil. Dutch were unable, however, to extend their power

beyond the limits of the town, until the arrival of Count John Maurice of Nassau-Siegen in 1636. His first step was to introduce a regular government among his countrymen; his second, to send to the African coast one of his officers, who took possession of a Portuguese settlement, and thus secured a supply of slaves. In the course of eight years, the limited period of his government, he succeeded in asserting the Dutch supremacy along the coast of Brazil from the mouth of Sao Francisco to Maranhao. The Recife was rebuilt and adorned with splendid residences and gardens and received from its founder the name of Mauritstad. He promoted the amalgamation of the different races, and sought to conciliate the Portuguese by the confidence he reposed in them. His object was to found a great empire; but this was a project at variance with the wishes of his employers — an association of merchants, who were dissatisfied because the wealth which they expected to see flowing into their coffers was expended in promoting the permanent interests of a distant country. Count Maurice resigned his post in 1644. His suc- cessors possessed neither his political nor his military talents, and had to contend with more difficult circumstances.

In 1640 the revolution which placed the house of Braganza on the throne of Portugal restored Brazil to masters more inclined to promoteitsinterestsandassertits possession than the Spaniards. It was indeed high time that some exertion should be made. The northern provinces had fallen into the power of Holland; the southern, peopled in a great measure by the hardy descend- ants of the successive colonists who had issued on all sides from the central establishment of Sao Paulo, had learned from their habits of unaided and successful enterprise to court independence. They had ascended the waters of the Paraguay to their sources.

They had extended their limits southwards till they reached the Spanish settlements of La Plata. They had reduced to slavery numerous tribes of the natives. They were rich in cattle, and had commenced the discovery of the mines. When, there- fore, the inhabitants of Sao Paulo saw themselves about to be transferred, as a dependency of Portugal, from one master to another, they conceived the idea of erecting their country into an independent state. Their attempt, however, was frustrated by Amador Bueno, the person whom they had selected for their king. When the people shouted " Long live King Amador," he cried out " Long live John IV.," and took refuge in a convent. The multitude, left without a leader, acquiesced, – and this important province was secured to the house of Braganza.

Rio and Santos, although both evinced a desire of independ- ence, followed the example of the Paulistas. Bahia, as capital of the Brazilian states, felt that its ascendancy depended upon the union with Portugal. The government, thus left in quiet possession of the rest of Brazil, had time to concentrate its atten- tion upon the Dutch conquests. The crown of Portugal was, however, much too weak to adopt energetic measures. But the Brazilian colonists, now that the mother country had thrown off the Spanish yoke, determined even without assist- ance from the homeland to rise in revolt against foreign aza˚nst domination. . The departure of Count Maurice, more- the Dutch. over, had seriously weakened the position of the Dutch, for his successors had neither his conciliatory manners nor his capacity. Joao Fernandes Vieyra, a native of Madeira, organized the insurrection which broke out in 1645. This insurrection gave birth to one of those wars in which a whole nation, destitute of pecuniary resources, military organization and skilful leaders, but familiar with the country, is opposed to a handful of soldiers advantageously posted and well officered. But home difficulties and financial necessities prevented the West India Company from sending adequate reinforcements from Holland. In 1649 a rival company was started in Portugal known as the Brazil Company, which sent out a fleet to help the colonists in Pernam- buco. Slowly the Dutch lost ground and the outbreak of war with England sounded the knell of their dominion in Brazil. In 1654 their capital and last stronghold fell into the hands of Vieyra. It was not, however, till 1662 that Holland signed a treaty with Portugal, by which all territorial claims in Brazil were abandoned in exchange for a cash indemnity and certain commercial privileges. After this, except some inroads on the frontiers, the only foreign invasion which Brazil had p reac h to suffer was from France. In 17 10 a squadron, expedition commanded by Duclerc, disembarked 1000 men, and io Brazil, attacked Rio de Janeiro. After having lost half of his men in a battle, Duclerc and all his surviving com- panions were made prisoners. The governor treated them cruelly. A new squadron with 6000 troops was entrusted to the famous admiral Duguay Trouin to revenge this injury.

They arrived at Rio on the 12th of September 1711. After four days of hard fighting the town was taken. The governor retreated to a position out of it, and was only awaiting reinforcements from Minas to retake it; but, Duguay Trouin threatening to burn it, he was obliged on the 10th of October to sign a capitulation, and pay to the French admiral 610,000 crusados, 500 cases of sugar, and provisions for the return of the fleet to Europe. Duguay Trouin departed to Bahia to obtain fresh spoils; but having lost in a storm two of his best ships, with an important part of the money received, he renounced this plan and returned directly to France.

After this the Portuguese governed their colony undisturbed. The approach of foreign traders was prohibited, while the regalities reserved by the crown drained the country of a great proportion of its wealth.

The important part which the inhabitants of Sao Paulo have played in the history of Brazil has been already adverted to. The establishment of the Jesuit college had attracted settlers to its neighbourhood, and frequent marriages had taken place between the Indians of the district and the colonists. A hardy and enterprising race of men had sprung from this mixture,

who, first searching whether their new country were rich in metals, soon began adventurous raids into the interior, making excursions also against the remote Indian tribes with a view to obtaining slaves, and from the year 1629 onwards repeatedly attacked the Indian reductions of the Jesuits in Paraguay, although both provinces were then nominally subject to the crown of Spain. Other bands penetrated into Minas and still farther north and westward, discovering mines there and in Goyaz and Cuyaba. New colonies were thus formed round those districts in which gold had been found, and in the beginning of the 18th century five principal settlements in Minas Geraes had been elevated by royal charter to the privileges of towns. In 1720 this district was separated from Sao Paulo, to which it had previously been dependent. As early as 16 18 a code of laws for the regulation of the mining industry had been drawn up by Philip III., the executive and judicial functions in the mining districts being vested in a provedor, and the fiscal in a treasurer, who received the royal fifths and superintended the weighing of all the gold, rendering a yearly account of all discoveries and produce. For many years, however, these laws were little more than a dead letter. The same infatuated passion for mining

speculation which had characterized the Spanish settlers in South America now began to actuate the Portuguese; labourers and capital were drained off to the mining districts, and Brazil, which had hitherto in great measure supplied Europe with sugar, sank before the competition of the English and French. A new source of wealth was now opened up; some adventurers from Villa do Principe in Minas, going north to the Seria Frio, made the discovery of diamonds about the year 17 10, but it was not till 1730 that the discovery was for the first time announced to the government, which immediately declared them regalia. While the population of Brazil continued to increase, the moral and intellectual culture of its inhabitants was left in great measure to chance; they grew up with those robust and healthy senti- ments which are engendered by the absence of false teachers, but with a repugnance to legal ordinances, and encouraged in their ascendancy over the Indians to habits of violence and oppression. The Jesuits from the first moment of their landing in Brazil had constituted themselves the protectors of the natives, and though strenuously opposed by the colonists and ordinary clergy, had gathered the Indians together in many aldeas, over which officials of their order exercised spiritual and temporal authority. A more efficacious stop, however, was put to the persecution of the Indians by the importation of large numbers of negroes from the Portuguese possessions in Africa, these being found more active and serviceable than the native tribes.

The Portuguese government, under the administration of Carvalho, afterwards marquis of Pombal, attempted to extend

to Brazil the bold spirit of innovation which directed Pombal ° f a ˆ hi s e ff ° rts – The P rou d minister had been resisted

in his plans of reform at home by the Jesuits, and, determining to attack the power of the order, first deprived them of all temporal power in the state of Maranhao and Para. These ordinances soon spread to the whole of Brazil, and a pretext being found in the suspicion of Jesuit influence in some partial revolts of the Indian troops on the Rio Negro, the order was expelled from Brazil under circumstances of great severity in 1760. The Brazilian Company founded by Vieyra, which so materially contributed to preserve its South American possessions to Portugal, had been abolished in 1721 by John V.; but such an instrument being well suited to the bold spirit of Pombal, he established a chartered company again in 1755, to trade exclusively with Maranhao and Para; and in 1759, in spite of the remonstrance of the British Factory at Lisbon, formed another company for Parahyba and Pernambuco. Pom- bal's arrangements extended also to the interior of the country, where he extinguished at once the now indefinite and oppressive claims of the original donatories of the captaincies, and strengthened and enforced the regulations of the mining districts. The policy

of many of Pombal's measures is more than question- able; but his admission of all races to equal rights in the eye

of the law, his abolition of feudal privileges, and the firmer organization of the powers of the land which he introduced, powerfully co-operated towards the development of the capa- bilities of Brazil. Yet on the death of his king and patron in 1777, when court intrigue forced him from his high station, he who had done so much for his country's institutions was reviled on all hands.

The most important feature in the history of Brazil during the first thirty years following the retirement of Pombal was the conspiracy of Minas in 1789. The successful issue of the recent revolution of the English colonies in North America had filled the minds of some of the more educated youth of that province; and in imitation, a project to throw off the Portuguese yoke was formed, — a cavalry officer, Silva Xavier, nicknamed Tira-dentes (tooth-drawer), being the chief conspirator. But the plot being discovered during their inactivity, the conspirators were banished to Africa, and Tira-dentes, the leader, was hanged. Thenceforward affairs went on prosperously; the mining districts continued to be enlarged; the trading companies of the littoral provinces were abolished, but the impulse they had given to agriculture remained.

Removed from all communication with the rest of the world except through the mother country, Brazil remained unaffected by the first years of the great revolutionary war in Europe. Indirectly, however, the fate of this isolated guese ~ country was decided by the consequences of the French royal Revolution. Brazil is the only instance of a colony family la becoming the seat of the government of its own ™f ' mother country, and this was the work of Napoleon. When he resolved upon the invasion and conquest of Portugal, the prince regent, afterwards Dom John VI., having no means of resistance, decided to take refuge in Brazil. He created a regency in Lisbon, and departed for Brazil on the 29th of November 1807, accompanied by the queen Donna Maria I., the royal family, all the great officers of state, a large part of the nobility and numerous retainers. They arrived at Bahia on the 21st of January 1808, and were received with enthusiasm. The regent was requested to establish there the seat of his government, but a more secure asylum presented itself in Rio de Janeiro, where the royal fugitives arrived on the 7th of March. Before leaving Bahia, Dom John took the first step to emancipate Brazil, opening its ports to foreign commerce, and permitting the export of all Brazilian produce under any flag, the royal monopolies of diamonds and Brazil-wood excepted. Once established in Rio de Janeiro, the government of the regent was directed to the creation of an .administrative machinery for the dominions that remained to him as it existed in Portugal.

Besides the ministry which had come with the regent,

Reorgaa-

the council of state, and the departments of the four u a tion on ministries of home, finances, war and marine then Porta- existing, there were created in the course of one year suese a supreme court of justice, a board of patronage and administration of the property of the church and military orders, an inferior court of appeal, the court of exchequer and royal treasury, the royal mint, bank of Brazil, royal printing-office, powder-mills on a large scale, and a supreme military court. The maintenance of the court, and the salaries of so large a number of high officials, entailed the imposition of new taxes to meet these expenses. Notwithstanding this the expenses continued to augment, and the government had recourse to the reprehensible measure of altering the money standard, and the whole monetary system was soon thrown into the greatest confusion. The bank, in addition to its private functions, farmed many of the regalia, and was in the practice of advancing large sums to the state, transactions which gave rise to extensive corruption, and terminated some years later in the breaking of the bank.

Thus the government of the prince regent began its career in the new world with dangerous errors in the financial system; yet the increased activity which a multitude of new customers and the increase of circulating medium gave to the trade of Rio, added a new stimulus to the industry of the whole nation.

Numbers of English artisans and shipbuilders, Swedish iron- founders, German engineers and French manufacturers sought fortunes in the new country, and diffused industry by their example.

In the beginning of 1809, in retaliation for the occupation of Portugal, an expedition was sent from Para to the French colony of Guiana, and after some fighting this part of Guiana was incorporated with Brazil. This conquest was, however, of short duration; for, by the treaty of Vienna in 18 15, the colony was restored to France. Its occupation contributed to the improvement of agriculture in Brazil; it had been the policy of Portugal up to this time to separate the productions of its colonies, to reserve sugar for Brazil, and spices to the East Indies, and to prohibit the cultivation of these in the African possessions. Now, however, many plants were imported not

only from Guiana but from India and Africa, cultivated in the Royal Botanic Garden, and thence distributed. The same principle which dictated the conquest of French Guiana originated attempts to seize the Spanish colonies of Montevideo and Buenos Aires, Portugal being also at war with Spain. The chiefs of these colonies were invited to place them under the protection of the Portuguese crown, but these at first affecting loyalty to Spain declined the offer, then threw off the mask and declared them- selves independent, and the Spanish governor, Elio, was after- wards defeated by Artigas, the leader of the independents.

The inroads made on the frontiers of Rio Grande and Sao Paulo decided the court of Rio to take possession of Montevideo;

a force of 5000 troops was sent thither from Portugal, dared an together with a Brazilian corps; and the irregulars integral of Artigas, unable to withstand disciplined troops, portion w ere forced, after a total defeat, to take refuge beyond monarchy. tne " ver Uruguay. The Portuguese took possession

of the city of Montevideo in January 181 7, and the territory of Misiones was afterwards occupied. The importance which Brazil was acquiring decided the regent to give it the title of kingdom, and by decree of the 16th January 181 5, the Portu- guese sovereignty thenceforward took the title of the United Kingdom of Portugal, Brazil and Algarves. Thus the old colonial government disappeared even in name. In March 1816 the queen Donna Maria I. died, and the prince regent became king under the title of Dom John VI.

Although Brazil had now become in fact the head of its own mother country, the government was not in the hands of Brazilians, but of the Portuguese, who had followed the court. The discontent arising among Brazilians from this cause was heightened by a decree assigning a heavy tax on the chief Brazilian custom houses, to be in operation for forty years, for the benefit of the Portuguese noblemen who had suffered during the war with France. The amiable character of the king pre- served his own popularity, but the government was ignorant and profligate, justice was ill administered, negligence and disorder reigned in all its departments. Nor was the discontent less in Portugal on account of its anomalous position. These causes and the fermentation of liberal principles produced by the French Revolution originated a conspiracy in Lisbon in 1817, which was, however, discovered in time to prevent its success. A similar plot and rebellion took place in the province of Pernambuco, where the inhabitants of the important commercial city of Recife (Pernambuco) were jealous of Rio and the sacrifices they were compelled to make for the support of the luxurious court there. Another conspiracy to establish a republican

government was promptly smothered in Bahia, and the outbreak in Pernam- buco was put down after a republic had been formed there for ninety days. Still the progress of the republican spirit in Brazil caused Dom Joao to send to Portugal for bodies of picked troops, which were stationed throughout the provincial capitals. In Portugal the popular discontent produced the revolution of 1820, when representative government was proclaimed — the Spanish constitution of 181 2 being provisionally adopted. In Rio, the Portuguese troops with which the king had surrounded himself as the defence against the liberal spirit of the Brazilians, took up arms on the 26th of February 1821, to force him to accept

the system proclaimed in Portugal. The prince Dom Pedro, heir to the. crown, who now for the first time took part in public affairs, actively exerted himself as a negotiator between the king and the troops, who were joined by bodies of the people. After attempting a compromise the king finally submitted, took the oath and named a new ministry. The idea of free government filled the people with enthusiasm, and the principles of a repre- sentative legislature were freely adopted, the first care being for the election of deputies to the Cortes of Lisbon to take part in framing the new constitution. As the king could not abandon Portugal to itself he determined at first to send the prince thither as regent, but Dom Pedro had acquired such popularity by his conduct in the revolution, and had exhibited such a thirst for glory, that the king feared to trust his adventurous spirit in Europe, and decided to go himself. The Brazilian deputies on arriving in Lisbon expressed dissatisfaction with the Cortes for having begun the framing of the constitution before their arrival, for Brazil could not be treated as a secondary part of the monarchy. Sharp discussions and angry words passed between the Brazilian and Portuguese deputies, the news of which excited great discontent in Brazil. An insulting decree was passed in the Cortes, ordering the prince Dom Pedro to come to Europe, which filled the Brazilians with alarm; they foresaw that without a central authority the country would fall back to its former colonial state subject to Portugal. The provisional government of Sao Paulo, influenced by the brothers Andrada, began a move- ment for independence by asking the prince to disobey the Cortes and remain in Brazil, and the council of Rio de Janeiro followed with a similar representation, to which the prince assented. The Portuguese troops of the capital at first assumed a coercive attitude, but were forced to give way before the ardour and military preparations of the Brazilians, and submitted to embark for Portugal. These scenes were repeated in Pernambuco, where the Portuguese, after various conflicts, were obliged to leave the country; in Bahia, however, as well as in c / a ,- ms the Maranhao and Para, the Portuguese prevailed. In independ- Rio the agitation for independence continued. The ence °’ two brothers Andrada were called to the ministry; jg” ‘ and the municipal council conferred upon*

the prince regent the title of Perpetual Defender of Brazil. With great activity he set off to the central provinces of Minas and Sao Paulo to suppress disaffected movements and direct the revolution. In Sao Paulo, on the 7th of September 1822, he proclaimed the independence of Brazil. On his return to Rio de Janeiro on the 1 2th of October he was proclaimed constitutional emperor with great enthusiasm.

The Cortes at Lisbon chose Bahia as a centre for resisting the independence, and large forces were sent thither. But the city was vigorously besieged by the Brazilians by land, and finally the Portuguese were obliged to re-embark on the 2nd of July 1823. A Brazilian squadron, under command of Lord Cochrane, attacked the Portuguese vessels, embarrassed with troops, and took several of them. Taylor, another Englishman in Brazilian service, followed the vessels across the Atlantic, and even captured some of the ships in sight of the land of Portugal. The troops in Montevideo also embarked for Portugal, and the Banda Oriental remained a part of Brazil with the title of the Provincia Cisplatina. Before the end of 1823 the authority of the new emperor and the independence of Brazil were undisputed throughout the whole country.

Republican movements now began to spread, to suppress which the authorities made use of the Portuguese remaining in the country; and the disposition of the emperor to consider these as his firmest supporters much influenced the course of his government and his future destiny. The two Andradas, who imagined they could govern the young emperor as a sovereign of their own creation, encountered great opposition in the constitutional assembly, which had been opened in Rio in May 1823, to discuss the project of a new constitution. In July the emperor resolved to dismiss them and form a new ministry, but against this the brothers raised a violent opposition. In November the emperor put an end to the angry debates which

ensued in the assembly by dissolving it, exiling the Andradas to France, and convoking a new assembly to deliberate on a proposed constitution more liberal than the former project. The proclamation of a republic in the provinces of Pernambuco and Ceara, with the rebellion of the Cisplatina province, favoured by Buenos Aires and its ultimate loss to Brazil, were the result of the coup d'etat of November 1823. The Brazilians were universally discontented — on one side fearing absolutism if they supported

the emperor, on the other anarchy if he fell. Knowing the danger of an undefined position, the emperor caused the councils to dispense with their deliberations, and adopt, as the constitution of the empire, the project framed by the council ofi state. Accordingly, on the 25th of March 1824, the emperor swore to the constitution with great Coastitu- solemnity and public rejoicings. By this stroke of 1824° policy he saved himself and Brazil. Negotiations were opened in London between the Brazilian and Portuguese plenipotentiaries, treating for the recognition of the independence of Brazil; and on the 25th of August 1825 a treaty was signed by which the Portuguese king, Dom John VI., assumed the title of emperor of Brazil, and immediately abdicated in favour of his son, acknowledging Brazil as an independent empire, but the treaty obliged Brazil to take upon herself the Portuguese debt, amounting to nearly two millions sterling.

The rebellion of the Banda Oriental was followed by a declara- tion of war with Buenos Aires which had supported it, and operations by sea and land were conducted against that republic in a feeble way. Meanwhile the well-deserved popularity of the emperor began to decline. He had given himself up to the influence of the Portuguese; the most popular men who had worked for the independence were banished; and a continual change of ministry showed a disposition on the part of the sovereign to prosecute obstinately measures of which his advisers disapproved. His popularity was regained, however, to some extent, when, on the death of his father, he was unanimously acknowledged king of Portugal, and especially when he abdicated that crown in favour of his daughter, Donna Maria; but his line of policy was not altered, and commercial treaties entered into with European states conceding them favours, which were popularly considered to be injurious to Brazilian trade, met with bitter censure.

During the year 1827 the public debt was consolidated, and a department was created for the application of a sinking fund.

The year 182S was a calamitous one for Brazil. It began with the defeat of the Brazilian army by the Argentine forces, and this entirely through the incapacity of the commander-in-chief; and misunderstandings, afterwards compensated by humbling money-payments on the part of Brazil, arose with the United States, France and England on account of merchant vessels captured by the Brazilian squadron blockading Buenos Aires. Financial embarrassments increased to an alarming extent; the emperor was compelled by the British government to make peace with Buenos Aires and to renounce the Banda Oriental; and to fill the sum of disasters Dom Miguel had treacherously usurped the crown of Portugal. It was under these unlucky auspices that the elections of new deputies took place in 1829. As was expected the result was the election everywhere of ultra-

liberals opposed to the emperor, and in the succeeding year people everywhere exhibited their disaffection. During the session of 1830 the chambers adopted a criminal code in which punishment by death for political offences was abolished. It was openly suggested in the journals to reform the con- stitution by turning Brazil into independent federal provinces, governed by authorities popularly elected, as in tne United States. Alarmed at length at the ground gained by this idea in the provinces, the emperor set off to Minas to stir up the former enthusiasm in his favour from recollections of the independence, but was coldly received. On his return to Rio in March 1831 scenes of disorder occurred, and great agitation among the Liberal party. Imagining himself sure of a brilliant destiny

*in Europe if he lost his Brazilian crown, the emperor attempted to risk a decisive attack against the Liberals, and to form a new ministry composed of men favourable to absolutism. This step caused excited public meetings in the capital, A Mj c * tloa which were joined in by the troops, and deputations /.,/&?/. went to ask the emperor to dismiss the unpopular ministry. He replied by dissolving the ministry without naming another, and by abdicating the crown in favour of the heir apparent, then only five years of age. Dom Pedro immediately embarked in an English ship, leaving the new emperor Dom Pedro II. and the princesses Januaria, Francisca and Paula. The subsequent career of this unfortunate prince belongs to the history of Portugal.*

A provisional and afterwards a permanent regency", composed of three members, was now formed in Brazil, but scenes of disorder succeeded, and discussions and struggles between the republican party and the government, and a reactionary third party in favour of the restoration of Dom Pedro, occupied the succeeding years. In 1834 a reform which was well received consisted in the alteration of the regency, from that of three members elected by the legislative chambers, to one regent chosen by the whole of the electors in the same manner as the deputies; and the councils of the provinces were replaced by legislative provincial assemblies. Virtually, this was a republican government like that of the United States, for no difference existed in the mode of election of the regent from that of a president. The ex-minister Feijoo was chosen for this office. With the exception of Para, and Rio Grande the provinces were at peace, but these were in open rebellion; the former was reduced to obedience, but in the latter, though the imperial troops occupied the town, the country was ravaged by its warlike inhabitants. The regent was now accused of conniving at this rebellion, and the opposition of the chamber of deputies became so violent as to necessitate his resignation. Araujo Lima, minister of the home department, who strove to give his government the character of a monarchical reaction against the principles of democracy, was chosen by a

large majority in his stead. The experiment of republican government had proved so discreditable, and had so wearied the country of cabals, that men hitherto known for their sympathy with democratic principles became more monarchical than the regent himself; and under this influence a movement to give the regency into the hands of the princess Donna Januaria, now in her 18th year, was set on foot. It was soon perceived, however, that if the empire could be governed by a princess of eighteen it could be managed better by the emperor himself, who was then fourteen.

A bill was accordingly presented to the legislature dispensing with the age of the emperor and declaring his majority, which after a noisy discussion was carried. The majority of the emperor Dom Pedro II. was proclaimed on the ofPedro 23rd of July 1840. Several ministries, in which n.,i840. various parties predominated for a time, now governed the country till 1848, during which period the rebellious province of Rio Grande was pacified, more by negotiation than force of arms. In 1848 hostilities were roused with the British govern- ment through the neglect shown by the Brazilians in putting in force a treaty for the abolition of the slave trade, which had been concluded as far back as 1826; on the other hand the governor of Buenos Aires, General Rosas, was endeavouring to stir up revolution again in Rio Grande. The appearance of yellow fever in 1849, until then unknown in Brazil, was attributed to the importation of slaves. Public opinion declared against the traffic; severe laws were passed against it, and were so firmly enforced that in 1853 not a single disembarkation took place. The ministry of the Visconde de Olinda in 1849 entered into alliances with the governors of Montevideo, Paraguay and the states of Entre Rios and Corrientes, for the purpose of maintaining the integrity of the republics of Uruguay and Paraguay, which Rosas intended to reunite to Buenos Aires, and the troops of Rosa's which besieged Montevideo were forced to capitulate. Rosas then declared war formally against Brazil. An army of Correntine, Uruguayan and Brazilian troops, under

General Urquiza, assisted by a Brazilian naval squadron, ad- vanced on Buenos Aires, completely routed the forces of Rosas, and crushed for ever the power of that dictator. From 1844 Brazil was free from intestine commotions, and had resumed its activity. Public works and education were advanced, and the finances rose to a degree of prosperity previously unknown. In 1855 the emperor of Brazil sent a squadron of eleven men-of-war and as many transports up the Parana to adjust

several questions pending between the empire and Paraguay. tne republic of Paraguay, the most important of which

was that of the right of way by the Paraguay river to the interior Brazilian province of Matto Grosso. This right had been in dispute for several years. The expedition was not permitted to ascend the river Paraguay, and returned com- pletely foiled in its main purpose. Though the discord resulting between the states on account of this failure was subsequently allayed for a time by a treaty granting to Brazil the right to navigate the river, every obstacle was thrown in the way by the Paraguayan government, and indignities of all kinds were offered not only to Brazil but to the representatives of the Argentine and the United States. In 1 864 the ambitious dictator of Paraguay, Francisco Solano Lopez, without previous declara- tion of war, captured a Brazilian vessel in the Paraguay, and rapidly followed up this outrage by an armed invasion of the provinces of Matto Grosso and Rio Grande in Brazil, and that of Corrientes in the Argentine Republic. A triple alliance of the invaded states with Uruguay ensued, and the tide of war was soon turned from being an offensive one on the part of Paraguay to a defensive struggle within that republic against the superior number of the allies. So strong was the natural position of Paraguay, however, and so complete the subjection of its inhabit- ants to the will of the dictator, that it was not until the year

1870, after the republic had been completely drained of its man- hood and resources, that the long war was terminated by the capture and death of Lopez with his last handful of men by the pursuing Brazilians. From its duration and frequent battles and sieges this war involved an immense sacrifice of life to Brazil, the army in the field having been constantly maintained at be- tween 20,000 and 30,000 men, and the expenditure in maintaining it was very great, having been calculated at upwards of fifty millions sterling. Large deficits in the financial budgets of the state resulted, involving increased taxation and the contracting of loans from foreign countries.

■ *Notwithstanding this the sources of public wealth in Brazil were unaffected, and commerce continued steadily to increase. A grand social reform was effected in the law passed in September*

1 87 1, which enacted that from that date every child born of slave parents should be free, and also declared all the slaves belonging to the state or to the imperial household free from that time. The same law provided an emancipation fund, to be annually applied to the ransom of a certain number of slaves owned by private individuals.

Under the long reign of Dom Pedro II. progress and material prosperity

made steady advancement in Brazil. Occasional political outbreaks occurred, but none of very serious C /p'rf C

At first the revolutionary propaganda produced no personal animosity against the emperor, who continued to be treated by

his people with every mark of respect and affection, but this state of things gradually changed. In 1864 the princess Isabella, the eldest daughter of the emperor and empress, had married the Comte d'Eu, a member of the Orleans family. The marriage was never popular in the country, owing partly to the fact that the Comte d'Eu was a reserved man who made few intimate friends and never attempted to become a favourite. Princess Isabella was charitable in many ways, always ready to take her full share of the duties falling upon her as the future empress, and thoroughly realizing the responsibilities of her position; but she was greatly influenced by the clerical party and the priesthood, and she thereby incurred the hostility of the Pro- gressives. When Dom Pedro left Brazil for the purpose of making a tour through Europe and the United States he ap- pointed Princess Isabella to act as regent, and she showed her- self so swayed in political questions by Church influence that Liberal feeling became more and. more anti-dynastic. Another incident which gave strength to the opposition was the sudden abolition of slavery without any compensation to slave-owners. The planters, the principal possessors of wealth, regarded the measure as unnecessary in view of the act which had been passed in 1885 providing for the gradual freeing of all slaves. The arguments used were, however, of no avail with the regent, and the decree was promulgated on the 13th of May 1888. No active opposition was offered to this measure, but the feelings of unrest and discontent spread rapidly.

Towards the close of 1888 the emperor returned and was received by the populace with every demonstration of affection and esteem. Even among the advocates of republi- _ . . canism there was no intention of dethroning Dom meat of Pedro, excepting a few extreme members of the party, the Re- who now gained the upper hand. They argued that P abV,c < it would be much more difficult to carry out a success- ful coup d'etat when the good-natured, confiding emperor had been succeeded by his more suspicious and energetic daughter. Discontented officers in the army and navy rallied to this idea, and a conspiracy was organized to depose the emperor and declare a republic. On the 14th of November 1889 the palace was quietly surrounded, and on the following morning the emperor and his family were placed on board ship and sent off to Portugal. A provisional government was then formed and a proclamation issued to the effect that the country would henceforth be known as the United States of Brazil, and that in due time a republican constitution would be framed. The only voice raised in protest was that of the minister of war, and he was shot at and severely

wounded as a consequence. Dom Pedro, completely broken down by the ingratitude of the people whom he had loved so much and laboured for so strenuously, made no attempt at resistance. The republican government offered to compensate him for the property he had held in Brazil as emperor, but this proposal was declined. His private possessions were respected, and were afterwards still held by Princess Isabella.

The citizen named as president of the provisional government, was General Deodoro da Fonseca, who owed his advancement to the personal friendship and assistance of Dom Pedro. Second in authority was placed General Floriano Peixoto, an officer also under heavy obligations to the deposed monarch, as indeed were nearly all of those who took active part in the conspiracy.

Though the overthrow of the imperial dynasty was totally

unexpected throughout, the new regime was accepted without

any disturbances. Under the leadership of General

Deodoro da Fonseca a praetorian system of government, B ™ z ”

, . , , ... , . „ r 1 under the

in which the military element was all-powerful, came Republic.

into existence, and continued till February 1891, when a national congress assembled and formulated the constitution for the United States of Brazil. The former provinces were converted into states, the only right of the federal government to interfere in their administration being for the purposes of national defence, the maintenance of public order or the enforce- ment of the federal laws. The constitution of the United States of America was taken as a model for drawing up that of Brazil,

and the general terms were as far as possible adhered to (see above, section Government).

General da Fonseca and General Floriano Peixoto were elected to fill the offices of president and vice-president until the 15th of November 1894. This implied the continuance of praetorian methods of administration. The

older class of more conservative Brazilians, who had formerly taken part in the administration under the emperor, withdrew altogether from public life. Many left Brazil and went into voluntary exile, while others retired to their estates. In the absence of these more respectable elements, the government fell into the hands of a gang of military adventurers and unscrupulous politicians, whose only object was to exploit the national resources for their own benefit. As a consequence, deep-rooted discontent rapidly arose. A conspiracy, of which Admiral Wandenkolk was the prime instigator, was discovered, and those who had taken part in it were banished to the distant state of Amazonas. Disturb- ances then broke out in Rio Grande do Sul, in consequence of disputes between the official party and the people living in the country districts. Under the leadership of Gumercindo Saraiva the country people broke into open revolt in September 1891. This outbreak was partially suppressed, but afterwards it again burst into flame with great vigour. In view of the discon- tent, conspiracies and revolutionary movements, President da Fonseca declared himself dictator. This act, however, met with such strong opposition that he resigned office on the 23rd of November 1891, and Vice-President Floriano Peixoto assumed the presidency.

Floriano Peixoto had been accustomed all his life to use harsh measures. For the first year of his term of office he kept seditious attempts in check, but discontent grew apace. Nor was this surprising to those who knew the corruption in the administration. Concessions and subsidies were given broadcast for worthless undertakings in order to benefit the friends of the president. Brazilian credit gave way under the strain, and evidences were not wanting at the beginning of 1893 that an outburst of public opinion was not far distant. Nevertheless President Peixoto made no effort to reform the methods of administration. Mean- while, the revolution in Rio Grande do Sul had revived; and in July 1893 the federal government was forced to send most of the available regular troops to that state to hold the insurgents in check.

On the 6th of September prevailing discontent took definite shape in the form of a naval revolt in the Bay of Rio de Janeiro. Naval re- Admiral Custodio de Mello took command of the naval volt and forces, and demanded the resignation of the president. civil war, General Peixoto replied by organizing a defence ,893 ‘ . against any attack from the squadron. Admiral Mello, finding that his demands were not complied with, began a bombardment of the city, but did not effect his purpose of compelling Peixoto to resign. The foreign ministers then arranged a compromise between the contending parties, according to which President Peixoto was to place no artillery in the city, while Admiral Mello was to refrain from bom- barding the town, which was thus saved from destruction. Shortly afterwards the cruiser ” Republica ” and a transport

ran the gauntlet of the government forts at the entrance of the bay, and proceeded south to the province of Santa Catharina, taking possession of Desterro, its capital. A provisional govern- ment was proclaimed by the insurgents, with headquarters at Desterro, and communication was opened with Gumercindo Saraiva, the leader of the insurrection in Rio Grande do Sul. It was proposed that the army of some 10,000 men under his command should advance northwards towards Rio de Janeiro, while the insurgent squadron threatened the city of Rio. In November Admiral Mello left Rio de Janeiro in the armoured cruiser " Aquidaban " and went to Desterro, the naval forces in Rio Bay being left in charge of Admiral Saldanha da Gama, an ardent monarchist, who had thrown in his lot with the insurgent cause. All was, apparently, going well with the revolt, Saraiva having invaded the states of Santa Catharina and Parana, and defeated the government troops in several encounters. Mean-

while, President Peixoto had fortified the approaches to the city of Rio de Janeiro, bought vessels of war in Europe and the United States and organized the National Guard.

Early in 1894 dissensions occurred between Saraiva and Mello, which prevented any advance of the insurgent forces, and allowed Peixoto to perfect his plans. Admiral da Gama, unable to leave the Bay of Rio de Janeiro on account of lack of transport for the sick and wounded and the civilians claiming his protection, could do no more than wait for Admiral Mello to return from Desterro. In the meantime the ships bought by President Peixoto arrived off Rio de Janeiro and prevented da Gama from escaping. On the 15th of March 1894 the rebel forces evacuated their positions on the islands of Villegaignon, Cobras and Enxadas, abandoned their vessels, and were received on board two Portuguese warships then in the harbour, whence they were conveyed to Montevideo. The action of the Portuguese com- mander was prompted by a desire to save life, for had the rebels fallen into the hands of Peixoto, they would assuredly have been executed.

When the news of the surrender of Saldanha da Gama reached Gumercindo Saraiva, then at Curitiba in Parana, he proceeded to retire to Rio Grande do Sul. Government troops were despatched to intercept his retreat, and in one of the skir- mishes which followed Saraiva was killed. The rebel army then dispersed. Admiral Mello made an unsuccessful attack on the town of Rio Grande, and then sailed to Buenos Aires, there surrendering the rebel squadron to the Argentine authorities, by whom it was immediately delivered to the Brazilian govern- ment. After six months of civil war peace was once more established, but there still remained some small rebel groups in Rio Grande do Sul. These were joined by Admiral da Gama and a number of the naval officers, who had escaped from Rio de

Janeiro; but in June 1895 the admiral was killed in a fight with the government troops. After the cessation of hostilities, the greatest barbarities were practised upon those who, although they had taken no part in the insurrection, were known to have desired the overthrow of President Peixoto. The baron Cerro Azul was shot down without trial; Marshal de Gama Eza, an old imperial soldier of eighty years of age, was murdered in cold blood, and numerous executions of men of lesser note took place, among these being two Frenchmen for whose death the Brazilian government was subsequently called upon to pay heavy com- pensation.

General Peixoto was succeeded as president on the 15th of November 1894 by Dr Prudente de Moraes Barros. It was a moot question whether Peixoto, after the revolt was crushed, would not declare himself dictator; certainly many of his friends were anxious that he should follow this course, but he was broken down by the strain which had been imposed upon him and was glad to surrender his duties. He did not recover his health and died shortly afterwards.

From the first day that he assumed office, President Moraes showed that he intended to suppress praetorian systems and reduce militarism to a minimum. This policy received the approval and sympathy of the majority of Brazilians, but naturally met with bitter opposition from the military element. The president gradually drew to him some members of the better conservative class to assist in his administration, and felt confident that he had the support of public opinion. Early in 1895 murmurings and disorderly conduct against the authorities began to take place in the military school at Rio de Janeiro, which had always been a hotbed of intrigue. Some of the officers and students were promptly expelled, and the president closed the school for several months. This salutary lesson had due effect, and no more discontent was fomented from that quarter. Two great difficulties stood in the way of steering the country to prosperity. The first was the chaotic confusion of the finances resulting from the maladministration of the national resources since the deposition of Dom Pedro II., and the corrup- tion that had crept into every branch of the public service. Much was done by President Moraes to correct abuses, but the task was of too herculean a nature to allow of accomplishment

within the four years during which he was at the head of affairs. The second difficulty was the war waged by religious fanatics under the

leadership of Antonio Maciel, known as " Conselheiro," against the constituted authorities of Brazil.

The story of Conselheiro is a remarkable one. A native of Pernambuco, when a young man he married against the wishes of his mother, who took a violent dislike to the bride. Shortly after the marriage the mother assured her son that his wife held clandestine meetings with a lover, and stated that if he would go to a certain spot not far from the house that evening he would himself see that her assertion was true. The mother invented some plea to send the wife to the trysting-place, and then, dressing herself in male clothing, prepared to come suddenly on the scene as the lover, trusting to be able to make her escape before she was recognized. The three met almost simultaneously. Conselheiro, deeming his worst suspicions confirmed, shot and killed his wife and his mother before explanations could be offered. He was tried and allowed to go at liberty after some detention in prison. From that time Conselheiro was a victim of remorse, and to expiate his sin became a missionary in the sertao or interior of Brazil among the wild Jagunco people. He built places of worship in many different districts, and at length became the recognized chief of the people among whom he had thus strangely cast his lot. Eventually he formed a settlement near Canudos, situated about 400 m. inland from Bahia. Difficulty arose between the governor of Bahia and this fanatical missionary, with the result that Conselheiro was ordered to leave the settlement and take away his people. This order was met with a sturdy refusal to move. Early in 1897 a police force was sent to eject the settlers, but encountered strong resistance, and suffered heavy loss without being able to effect the purpose intended. In March 1897 a body of 1500 troops, with four guns, was despatched to bring the Jaguncoes to reason, but was totally defeated. An army comprising some 5000 officers and men was then sent to crush Conselheiro and his people at all costs. Little progress was made, the country being difficult of access and the Jaguncoes laying ambuscades at every available place. Finally strong reinforcements were sent forward, the minister of war himself proceeding to take command of the army, now numbering nearly 13,000 men. Canudos was besieged and captured in September 1897, Conselheiro being killed in the final assault. The expense of these expeditions was very heavy, and prevented President Moraes from carrying out many of the retrenchments he had planned.

Soon after the Canudos affair a conspiracy was hatched to assassinate the president. He was watching the disembarkation of some troops when a shot was fired which narrowly missed him, and killed General Bitencourt, the minister of war. The actual perpetrator of the deed, a soldier, was tried and executed, but he was apparently ignorant of the persons who procured his services. Three other men implicated in the conspiracy were subsequently sentenced to imprisonment for a term of thirty years. The remainder of the

presidency of Dr Moraes was uneventful; and on the 15th of November 1898 he was succeeded by Dr Campos Salles, who had previously been governor of the state of Sao Paulo. President Salles publicly promised political reform, economy in the administration, and absolute respect for civil rights, and speedily made efforts to fulfil these pledges.

The difficulties in the reorganization of the finances of the state, which Dr Campos Salles had to face on his accession to R forms P ower > were very great. The heavy cost involved in under the suppression of internal disorders, ■ maladministra-

presideat tion,and the hindrances placed in the way of economical Campos development by the semi-independence of trie federal states had seriously depreciated the national credit. The president-elect accordingly undertook with the full approval of Dr Moraes, who was still in office, the task of visiting Europe with the object of endeavouring to make an arrangement with the creditors of the state for a temporary suspension of payments. He was successful in his object, and an agreement was made by which bonds should be issued instead of interest payments from the 1st of July 1898, the promise being given -that every

effort should be made-for the' resumption of cash payments in 1901. President Campos Salles entered upon his tenure of office on the 15th of November 1898, and at once proceeded to initiate fiscal legislation for the purpose of reducing expenditure and increasing the revenue. He had to face opposition from sectional interests and from the jealousy of interference with their rights on the part of provincial administrations, but he was able to achieve a considerable measure of success and to lay the foundation of a sounder system under which the financial position of the republic has made steady progress. The chief feature of the administration of Dr Campos Salles was the statesmanlike ability with which various disputes with foreign powers on boundary questions were seriously taken in hand and brought to a satisfactory and pacific settlement. There had for a long period been difficulties with France with regard to the territory which lay between the mouth of the Amazon and Cayenne or French Guiana. The language of various treatises was doubtful and ambiguous, largely owing to the ignorance of the diplomatists who drew up the articles of the exact geography of the territory in question. Napoleon had forced the Portuguese government to cede to him the northernmost arm of the mouth of the Amazon as the southern boundary of French Guiana with a large slice of the unexplored interior westwards. A few years later the Portuguese had in their turn conquered French Guiana, but had been compelled to restore it at the peace of Paris. The old ambiguity attaching to the interpretation of earlier treaties, however, remained, and in April 1899 the question by an agreement between the two states was referred to the arbitration of the

president of the Swiss "confederation. The decision was given in December 1900 and was entirely in favour of the Brazilian contention. A still more interesting boundary dispute was that between Great Britain and Brazil, as to the southern frontier line of British Guiana. The dispute was of very old standing, and the settlement by arbitration in 1899 of the acute misunderstanding between Great Britain and Venezuela regarding the western boundary of British Guiana, and the reference to arbitration in that same year of the Franco- Brazilian dispute, led to an agreement being made in 1901 between Brazil and Great Britain for the submission of their differences to the arbitration of the king of Italy. The district in dispute was the site of the fabled Lake of Parima and the Golden City of Manoa, the search for which in the early days of European settlement attracted so many adventurous expedi- tions, and which fascinated the imagination of Raleigh and drew him to his doom. The question was a complicated one involving the historical survey of Dutch and Portuguese exploration and control in the far interior of Guiana during two centuries; and it was not until 1904 that the king of Italy gave his award, which was largely in favour of the British claim, and grants to British Guiana access to the northern affluents of the Amazon. Before this decision was given Senhor Rodrigues Alves had been elected president in 1902. Dr Campos Salles had signalized his administration, not only by the settlement of disputes with European powers, but by efforts to arrive at a good understanding with the neighbouring South American republics. In July 1899 President Roca had visited Rio de Janeiro accompanied by an Argentine squadron, this being the first official visit that any South American president had ever paid to one of the adjoining states. In October 1900 Dr Campos Salles isturned the visit and met v/ith an excellent reception at Buenos Aires. The result was of importance, as it was known that Brazil was on friendly terms with Chile, and this interchange of courtesies had some effect in bringing about a settlement of the controversy between Chile and Argentina over the Andean frontier question without recourse to hostilities. This was indeed a time when questions concerning boundaries were springing up on every side, for it was only through the moderation with which the high-handed action of Bolivia in regard to the Acre rubber- producing territory was met by the Brazilian government that war was avoided. Negotiations were set on foot, and finally by treating the matter in a give-and-take spirit a settlement was reached and a treaty for an amicable exchange of territories

in the district in question, accompanied by a pecuniary indemnity, was signed by President Alves at Petropolis on the 17 th of November 1903. During the remainder of the term of this president internal and financial

progress were undisturbed save by an outbreak in 1904 in the Cunani district, the very portion of disputed territory which had been assigned to Brazil by the arbitration with France. This province, being difficult of access, was able for a time to assert a practical independence. In 1906 Dr Affonso Penna, three times minister under Pedro II., and at that time governor of the state of Minas-Geraes, of which he had founded the new capital, Bello Horizonte, was elected president, a choice due to a coalition of the other states against Sao Paulo, to which all the recent presidents had belonged. Penna's presidency was distinguished by his successful efforts to place the finances on a sound basis. He died in office on the 14th of June 1909. (K. J.; C. E. A.; G. E.)

Bibliography. — History: Capistrano de Abreu, Descobrimento do Brazil e seu desenvolvimento no seculo xix. (Rio de Janeiro, 1883) ; John Armitage, History of Brazil from 1808 to 1831 (2 vols., London, 1836) ; Moreira de Azevedo, Historia do Brazil de 1831 a 1840 (Rio de Janeiro, 1841) ; V. L. Basil, L'Empire du Bresil (Paris, 1862) ; Caspar Barlaeus, Rerum per octennium in Brasilia . . . sub praefecturd Mauritii Nassovii . . . historia (Amsterdam, 1647) ; F. S. Con- stancio, Historia do Brazil (Pernambuco, 1843) ; Anfonso Fialho, Historia d ' estabelecimento da republica " Estados Unidos do Brazil " (Rio de Janeiro 1890) ; P. Gaffarel, Histoire du Bresil francais (Paris, 1878) ; E. Grosse, Dom Pedro I. (Leipzig, 1836) ; E. Levasseur, V Abolition de I'esclavage en Bresil (Paris, 1888) ; J. M. de Macedo, Anno biographico brazileiro (3 vols., Rio de Janeiro, 1876) ; A. J. Mello Moraes, Brazil historico (4 vols., Rio de Janeiro, 1839) ; Choro- graphia historica, chronographica genealogica, nobiliaria e politica do Brazil (5 vols., Rio de Janeiro, 1858-1863); A Independencia e o imperio do Brazil (Rio de Janeiro, 1877) ; B. Mosse, Dom Pedro II., empereur du Bresil (Paris, 1889); P. Netscher, Les Hollandais au Bresil (Hague, 1853); J. M. Pereira da Silva, Varaes illustres do Brazil (2 vols., Paris, 1888) ; Historia dafundacao do imperio brazileiro (Rio de Janeiro, 1877); Segundo Periodo do reinado de D. Pedro I. (Paris, 1875); Historia do Brazil de 1831 d. 1840 (Rio de Janeiro, 1888) ; J. P. Oliveira Martins, O Brazil e as colonias Portuguezo-s (Lisbon, 1888); S. da Rocha Pitta, Historia da America Portugueza (Lisbon, 1730); C. da Silva. L'Oyapock et I'Amazone (2 vols., Paris, 1861); R. Southey, History of Brazil (3 vols., London, 1810-1819); J. B. Spix and C. F. von Martius, Reise in Brasilien, 1817-1820 (3 parts, Munich, 1823-1831); F. A. de Varnhagen, Historia geral do Brazil (2 vols., Rio de Janeiro, 1877) ; Historia das luctas com os Hollandeses (Vienna, 1871); C. E. Alters, Hist, of South America, 18ˆ4-1904 (1904) ; the Revista trimensal do Instituto Historico e Geographico do Brazil (1839-1908), one or two volumes annually, is a storehouse of papers, studies and original documents bearing on the history of Brazil.

Geography, &c. : Elisee Reclus, Universal Geography (1875-1894), vol. xix. pp. 77-291; J. E. Wappaus, Geographica physica do Brazil (Rio de Janeiro, 1884); A. Moreira Pinto, Chorographia do Brazil (5th ed., Rio de Janeiro, 1895); Therese Prinzessin von Bayern, Meine Reise indenbrasilianischen Tropen (Berlin, 1897) ; M. Lamberg, Brasilien, Land und Leute (Leipzig, 1899); L. Hutchinson, Report on Trade in Brazil (Washington, 1906) ; F. Katzer, Grundziige der Geologie des unteren Amazonegebietes (Leipzig, 1903) ; J. C. Branner, A Bibliography of the Geology, Mineralogy and Paleontology of Brazil (Rio de Janeiro, 1903) ; J. W. Evans, " The Rocks of the Cataracts of the River Madeira and the adjoining Portions of the Beni and Mamore," Quart. Journ. Geol. Soc, London, vol. lxii., 1906, pp. 88- 124, pi. v.

BRAZIL, a city and the county-seat of Clay county, Indiana, U.S.A., situated in the west central part of the state, about 16 m. E. of Terre Haute and about 57 m. W.S.W. of Indianapolis. lop. (1890) 5905; (1900) 7786(723 foreign-born); (1910) 9340. It is served by the Central Indiana, the Chicago & Eastern Illinois, the Evansville & Indianapolis and the Vandalia railways, and is connected with Indianapolis, Terre Haute and other cities by an interurban electric line. The principal business thoroughfare is part of the old National Road. Brazil's chief industrial importance is due to its situation in the heart of the " Brazil block " coal (so named because it naturally breaks into almost perfect rectangular blocks) and clay and shale region; among its manufactures are mining machinery and tools, boilers, paving and enamelled building bricks, hollow bricks, tiles, conduits, sewer-pipe and pottery. The municipality owns and operates its water-works. The first settlement here was in 1844; and Brazil was incorporated as a town in 1866, and was chartered as a city in 1873.

BRAZIL NUTS, the seeds of Bertholletia excelsa, a gigantic tree belonging to the natural order Lecythidaceae, which grows in the valleys of the Amazons and generally throughout tropical America. The tree attains an average height of 130 ft., having a smooth cylindrical trunk, with a diameter of 14 ft. 50 ft. from the ground, and branching at a height of about 100 ft. The lower portion of the trunk presents a buttressed aspect, owing to the upward extension of the roots in the form of thin prop-like walls surrounding the stem. The fruit of the tree is globular, with a diameter of 5 or 6 in., and consists of a thick hard woody shell, within which are closely packed the seeds which constitute the so-called nuts of commerce. The seeds are triangular in form, having a hard woody testa enclosing the " kernel "; and of these each fruit contains from eighteen to twenty-five. The fruits as they ripen fall from their lofty position, and they are at the proper season annually collected and broken open by the Indians. Brazil nuts are largely eaten; they also yield in the proportion of about 9 oz. to each lb of kernels a fine bland fluid oil, highly valued for use

in cookery, and used by watchmakers and artists.

BRAZIL WOOD, a dye wood of commercial importance, obtained from the West Indies and South America, belonging to the genera Caesalpinia and Peltophorum of the natural order Leguminosae. There are several woods of the kind, commercially distinguished as Brazil wood, Nicaragua or Peach wood, Pernam- buco wood and Lima wood, each of which has a different com- mercial value, although the tinctorial principle theyyield is similar. Commercial Brazil wood is imported for the use of dyers in billets of large size, and is a dense compact wood of a reddish brown colour, rather bright when freshly cut, but becoming dull on exposure. The colouring-matter of Brazil wood, brazilin, C16H14O5, crystallizes with i§ H 2 0, and is freely soluble in water; it is extracted for use by simple infusion or decoction of the coarsely-powdered wood. When freshly prepared the extract is of a yellowish tint; but by contact with the air, or the addition of an alkaline solution, it develops a brick-red colour. This is due to the formation of brazilein, Ci6Hi20 5 -H 2 Q, which is the colouring matter used by the dyer. Brazilin crystallizes in hexagonal amber yellow crystals, which are soluble in water and alcohol. The solution when free of oxygen is colourless, but on the access of air it assumes first a yellow and thereafter a reddish yellow colour. With soda-ley it takes a brilliant deep carmine tint, which colour may be discharged by heating in a closed vessel with zinc dust, in which condition the solution is excessively sensitive to oxygen, the slightest exposure to air immediately giving a deep carmine. With tin mordants Brazil wood gives brilliant but fugitive steam reds in calico-printing; but on account of the loose nature of its dyes it is seldom used except as an adjunct to other colours. It is used to form lakes which are employed in tinting papers, staining paper-hangings, and for various other decorative purposes.

BRAZING AND SOLDERING, in metal work, termed respec- tively hard and soft soldering, are processes which correspond with soldering done at high and at low temperatures. The first embraces jointing effected with soldering mixtures into which copper, brass, or silver largely enter, the second those in which lead and tin are the only, or the principal, constituents. Some metals, as aluminium and cast iron, are less easily soldered than others. Aluminium, owing to its high conductivity, removes the heat from the solder rapidly. Aluminium enters into the composition of most of the solders for these metals, and the " soldering bit " is of pure nickel.

The hard solders are the spelter and the silver solders. Soft spelter solder is composed of equal parts of copper and zinc, melted and granulated and passed through a sieve. As some of the zinc volatilizes the ultimate proportions are not quite equal. The proportion of zinc is increased if the

solder is required to be softer or more fusible. A valuable property of the zinc is that its volatilization indicates the fusing of the solder. Silver solder is used for jewelry and other fine metal work, and has the advantage of high fusing points. The hardest contains frorA 4 parts of silver to 1 of copper; the softest 2 of silver to 1 of

brass wire. Borax is the flux used, with silver solder as with spelter.

The soft solders are composed mainly of tin and lead. They occur in a large range. Common tinner's solder is composed of equal parts of tin and lead, and melts at 370° Fah. Plumber's solder has 2 of lead to 1 of tin. Excess of lead in plumber's solder renders the solder difficult to work, excess of tin allows it to melt too easily. Pewterers add bismuth to render the solder more fusible, e.g. lead 4, tin 3, bismuth 2; or lead 1, tin 2, bismuth 1. Unless these are cooled quickly the bismuth separates out.

The essentials of a soldered joint are the contact of absolutely clean surfaces, free from oxide and dirt. The surfaces are there- fore scraped, filed and otherwise treated, and then, in order to cleanse and preserve them from any trace of oxide which might form during subsequent manipulation, a fluxing material is used. The soldering material is compelled to follow the areas prepared for it by the flux, and it will not adhere anywhere else. There is much similarity between soldering and welding in this respect. A weld joint must as a rule be fluxed, or metal will not adhere to metal. There is not, however, the absolute need for fluxing that there is in soldered joints, and many welds in good fibrous iron are made without a flux. But the explanation here is that the metal is brought to a temperature of semifusion, and the shapes of joints are generally such that particles of scale are squeezed out from between the joint in the act of closing the weld. But in brazing and soldering the parts to be united are generally nearly cold, and only the soldering material is fused, so that the conditions are less favourable to the removal of oxide than in welding processes.

Fluxes are either liquid or solid, but the latter are not efficient until they fuse and cover the surfaces to be united. Hydro- chloric acid (spirits of salts) is the one used chiefly for soft soldering. It is " killed " by the addition of a little zinc, the resulting chloride of zinc rendering its action quiet. Common fluxes are powdered resin, and tallow (used chiefly by plumbers for wiped joints). These, with others, are employed for soft solder joints, the temperature of which rarely exceeds about 600° Fah. The best flux for zinc is chloride of zinc. For brazed joints, spelter or powdered

brass is employed, and the flux is usually borax. The borax will not cover the joint until it has been deprived of its water of crystallization, and this is effected by raising it to a full red heat, when it swells in bulk, " boils," and afterwards sinks quietly and spreads over, or into the joint. There are differences in details of working. The borax is generally powdered and mixed with the spelter, and both with water. But sometimes they are applied separately, the borax first and over this the particles of spelter. Another flux used for copper is sal ammoniac, either alone or mixed with powdered resin.

As brazed joints often have to be very strong, other precautions are frequently taken beyond that of the mere overlapping of the joint edges. In pipes subjected to high steam pressures, and articles subjected to severe stresses, the joints are "cramped " before the solder is applied. That is, the edges are notched in a manner having somewhat the appearance of the dovetails of the carpenter; the notched portions overlap the opposite edges, and on alternate sides. Such joints when brazed are stronger than plain overlapping joints would be. Steam dome coverings are jointed thus longitudinally as cylinders, and the crown is jointed thereto, also by cramping. Another common method of union is that of flanges to copper pipes. In these the pipe passes freely within a hole bored right through the flange, and the solder is run between. The pipe is suspended vertically, flange downwards, and the spelter run in from the back of the flange. The fused borax works its way in by capillary action, and the spelter follows.

The " copper bit " is used in soft soldering. Its end is a prismatic pyramid of copper, riveted to an iron shank in a wooden handle. It is made hot, and the contained heat is sufficient to melt the solder. It has to be " tinned," by being heated to a dull red, filed, rubbed with sal ammoniac, and then rubbed upon the solder. It is wiped with tow before use. For

small brazed work the blow-pipe is commonly employed; large works are done on the brazier's hearth, or in any clear coke fire. If coal is used it must be kept away from the joint.

In " sweating on," a variation in soldering, the surfaces to be united are cleaned, and solder melted and spread over them. They are then brought together, and the temperature raised sufficiently to melt the solder.

A detail of first importance is the essential difference between the melting points of the objects to be brazed or soldered, and that of the solder used. The latter must always be lower than the former. This explains why soldering materials are used in a large range of temperatures. A few will melt at the temperature of boiling water. At the other extreme 2000 Fah. is required to melt a solder for brazing. If this point is neglected, it will often

happen that the object to be soldered will fuse before the solder melts. This accident may occur in the soft Britannia and white metals at the one extreme, and in the softer brasses at the other. It would not do, for example, to use flanges of common brass, or even ordinary gun-metal, to be brazed to copper pipe, for they would begin to fuse before the joint was made. Such flanges must be made of nearly pure copper, to withstand the temperature, usually 98 of copper to 2 of tin (brazing metal). A most valuable feature in solder is that by varying the pro- portions of the metals used a great range in hardness and fusibility is obtainable. The useful solders therefore number many scores. This is also a source of danger, unless regard be had to the relative fusing points of solders, and of the parts they unite. (J. G. H.)

BRAZZA, PIERRE PAUL FRANCOIS CAMILLE SAVORGNAN DE, Count (1852-1905), French explorer and administrator, founder of French Congo, was born on board ship in the harbour of Rio de Janeiro on the 26th of January 1852. He was of Italian parentage, the family name being de Brazza Savorgnani. Through the instrumentality of the astronomer Secchi he was sent to the Jesuit college in Paris, and in 1868 obtained author- ization to enter as a foreigner the marine college at Brest. In the Franco-Prussian War of 1870-71 he took part in the opera- tions of the French fleet. In 1874 when the warship on which he was serving was in the Gabun, Alfred Marche and the marquis de Compiegne arrived at Libreville from an expedition in the lower Ogowe district. Interested in the reports of these travellers, de Brazza conceived the idea of exploring the Ogowe, which he thought might prove to be the lower course of the Lualaba, a river then recently discovered by David Livingstone. Having meantime been naturalized as a Frenchman, de Brazza in 1875 obtained permission to undertake his African scheme, and with the naval doctor, Noel Ballay, he explored the Ogowe river. Penetrating beyond the basin of that river, he discovered the Alima and Likona, but did not descend either stream. Thence turning northwards the travellers eventually regained the coast at the end of November 1878, having left Paris in August 1875. On arrival in Paris, de Brazza learned of the navigation of the Congo by H. M. Stanley, and recognized that the rivers he had discovered were affluents of that stream.

De Brazza was anxious to obtain for France some part of the Congo. The French ministry, however, determined to utilize his energies in another quarter of Africa. Their attention had been drawn to the Niger through the formation of the United African Company by Sir George Goldie (then Mr Goldie Taub- man) in July 1879, Goldie's object being to secure Nigeria for Great Britain. A new expedition was fitted out, and de Brazza left Paris at the end of 1879 with orders to go to the Niger, make treaties, and plant French flags. When on the point of sailing; from Lisbon he received a

telegram cancelling these instructions, and altering his destination to the Congo. This was a decision of great moment. Had the Nigerian policy of France been maintained the International African Association (afterwards the Congo Free State) would have had a clear field on the Congo, while the young British Company would have been crushed out by French opposition; so that the two great basins of the Niger and the Congo would have had a vastly different history.

Acting on his new instructions, de Brazza, who was again

accompanied by Ballay, reached the Gabun early in 1880. Rapidly ascending the Ogowe he founded the station of France- ville on the upper waters of that river and pushed on to the Congo at Stanley Pool, where Brazzaville was subsequently founded. With Makoko, chief of the Bateke tribe, de Brazza concluded treaties in September and October 1880, placing the country under French protection. With these treaties in his possession Brazza proceeded down the Congo, and at Isangila on the 7th of November met Stanley, who was working his way up stream concluding treaties with the chiefs on behalf of the International African Association. De Brazza spent the next eighteen months exploring the hinterland of the Gabun, and returned to France in June 1882. The ratification by the French chambers in the following November of the treaties with Makoko (described by Stanley as worthless pieces of paper) committed France to the action of her agent.

Furnished with funds by the French government, de Brazza returned in 1883 to the Congo to open up the new colony, of which he was named commissioner-general in 1886. This post he held until January 1898, when he was recalled. During his period of office the work of exploration was systematically carried out by numerous expeditions which he organized. The incessant demands on the resources of the infant colony for these and other expeditions to the far interior greatly retarded its progress. De Brazza's administration was severely criticized; but that its comparative failure was largely due to inadequate support from the home authorities was recognized in the grant to him in 1902 of a pension by the chambers. Both as explorer and administrator his dealings with the natives were marked by consideration, kindness and patience, and he earned the title of " Father of the Slaves." His efforts to connect the upper Congo with the Atlantic by a railway through French territory showed that he understood the chief economic needs of the colony. After seven years of retirement in France de Brazza accepted, in February 1905, a mission to investigate

charges of cruelty to natives brought against officials of the Congo colony. Having concluded his inquiry he sailed for France, but died at Dakar, Senegal, on the 4th of September 1905. His body was taken to Paris for burial, but in 1908 was reinterred at Algiers.

See D. Neuville et Ch. Breard, Les Voyages de Savorgnan de Brazza, Ogooue et Congo, 1875-1882 (Paris, 1884), and Conferences et lettres de P. Savorgnan de Brazza sur ses trots explorations dans I'ouest africain de 1875 a 1886 (Paris, 1887); A. J. Wauters, " Savorgnan de Brazza et la conquete du Congo francais," in Le Mouvement geographique, vol. xxii., No. 39 (Brussels, 1905). Giacomo or Jacques de Brazza (1 859-1 883), a younger brother of Savorgnan, and one of the men he employed in the work of exploration, published in collaboration with his companion A. Pecile, Tre Anni e mezzo nella regione del Congo e dell' Ogowe (Rome, 1887). (G. T. G.)

BRAZZA (Serbo-Croatian, Brae; Lat. Brattia), an island in the Adriatic Sea, forming part of Dalmatia, Austria. Pop. (1900) 24,408. With an area of 170 sq. m. Brazza is the largest of the Dalmatian Islands; it is also the most thickly populated, and one of the most fertile. Its closely cultivated surface though ragged and mountainous yields an abundance of olives, figs, almonds and saffron, while its wines are of good quality. The corn-crop, however, barely suffices for three months' food. Other local industries are fishing and silkworm-rearing. The most important among twenty small villages on the island is Milna (pop. 2579), a steamship station, provided with shipwrights' wharves. The early history of Brazza is obscure. In the first years of the 13 th century it was ruled by the piratical counts of Almissa; but after a successful revolt and a brief period of liberty it came under the dominion of Hungary. From 1413 to 1416 it was subject to Ragusa; and in 1420 it passed, with the greater part of Dalmatia, under Venetian sovereignty.

BREACH (Mid. Eng. breche, derived from the common Teutonic root brec, which appears in " break," Ger. brechen, &c), in general, a breaking, or an opening made by breaking; in law, the infringement of a right or the violation of an obligation or duty. The word is used in various phrases: breach of close, the unlawful entry upon another person's land (see Trespass) ; breach of covenant or contract, the non-fulfilment of an agreement either to do or not to do some act (see Damages); breach of the

peace, a disturbance of the public order (see Peace, Breach of) ; breach of pound, the taking by force out of a pound things lawfully impounded (see Pound) ; breach of promise of marriage, the non-fulfilment of a contract mutually entered into by a man and a woman that they will marry each other (see Marriage) ; breach of trust, any deviation by a trustee from the

duty imposed upon him by the instrument creating the trust (q.v.).

BREAD, the name given to the staple food-product prepared by the baking of flour. The word itself, O. Eng. bread, is common in various forms to many Teutonic languages; cf. Ger. Brot, Dutch, brood, and Swed. and Dan. brot; it has been derived from the root of " brew," but more probably is connected with the root of " break," for its early uses are confined to " broken pieces, or bits " of bread, the Lat. frustum, and it was not till the 1 2th century that it took the place, as the generic name of bread, of hlaf, " loaf," which appears to be the oldest Teutonic name, cf. Old High Ger. hleib, and modern Ger. Laib.

History. — Bread-baking, or at any rate the preparation of cakes from flour or parched grain by means of heat, is one of the most ancient of human arts. At Wangen and Robenhausen have been found the calcined remains of cakes made from coarsely-ground grain in Swiss lake-dwellings that date back to the Stone Age. The cakes were made of different kinds of grain, barley and one-grained wheat (Trilicum monococcum) being among the ingredients. This bread was made, not from fine meal, but from grain crushed between some hard surfaces, and in these lake-dwellings many round-shaped stones have been found, which were evidently used for pounding or crushing grain against the surface, more or less concave, of another stone (see Flour and Flour Manufacture). Perhaps the earliest form of bread, if that word may be used, was prepared from acorns and beech nuts. To this day a sort of cake prepared from crushed acorns is eaten by the Indians of the Pacific slopes. The flour extracted from acorns is bitter and unfit to eat till it has been thoroughly soaked in boiling water. The saturated flour is squeezed into a kind of cake and dried in the sun. Pliny speaks of a similar crude process in connexion with wheat; the grain was evidently pounded, and the crushed remnant, soaked into a sort of pulp, then made into a cake and dried in the sun. Virgil (Georgics, i. 267) refers to the husband- man first torrefying and then crushing his grain between stones: — " Nunc torrele ignifruges, nunc f ran giie saxo."

The question naturally arises, how did the lake-dwellers bake their cakes of bruised grain ? Probably the dough was laid on a flat or convex-shaped stone, which was heated, while the cake was covered with hot ashes. Stones have been found among prehistoric remains which were apparently used for this purpose. In ancient Egyptian tombs cakes of durra have been found, of concave shape, suggesting the use of such baking-slabs; here the cake was evidently prepared from coarsely-cracked grain. In primitive times milling and baking were twin arts. The house- wife, and the daughters or handmaids, crushed or ground the grain and prepared the bread or cakes. When Abraham enter- tained the angels unawares (Genesis xviii.) he bade his wife Sarah " make ready quickly three measures of fine meal, knead it,

and make cakes upon the hearth." Professor Maspero says that an oven for baking bread was to be found in the courtyard of every house in Chaldaea; close by were kept the grinding stones. That bread prepared by means of leaven was known in the days of the patriarchs may be fairly inferred from the passage in Genesis iii., where it is said of Lot that he " made a feast, and did bake unleavened bread." Whether the shew- bread of the Jewish tabernacle was leavened is an open question, but it is significant that the Passover cakes eaten by Jews to-day, known as Matzos, are innocent of leaven. Made from flour and water only, they are about 1 2 in. in diameter, and have somewhat the look of water biscuits.

The ancient Egyptians carried the art of baking to high perfection. Herodotus remarks of them, " dough they knead with their feet, but clay with their hands." The practice of using the feet for dough kneading, however repulsive, long persisted in Scotland, if indeed it is yet defunct. The Egyptians

used for their bread, wheat, spelt, barley and durra (sorghum). In the opinion of Dr Wallis Budge, barley was in Egypt the grain of most primitive culture. However that may be, it is certain that even in ancient Egypt white bread made from wheat was used by the rich. The form of the bread is revealed by ancient monuments. A common shape was a small, round loaf, something like the muffin of to-day. Other loaves were elongated rolls, and curiously enough were sprinkled on the top with seeds like modern Vienna bread.

The history of baking in classical Greece and Italy can be clearly traced. Athenaeus in his Deipnosophists minutely describes many different kinds of bread, which may be assumed to have been currently used in Greece. According to Pliny (Nat. Hist, xviii. n. § 28) Rome had no public bakers till after the war with Perseus (171-168 B.C.). That long after public bakehouses came into use the Romans and other urban dwellers in Italy continued to make a great deal of bread at home is certain. In Pompeii several private houses had their own mill and bakehouse. That city must also have possessed bakers by trade, as loaves of bread have been found, round in form, and stamped with the maker's name, possibly to fix responsibility for weight and purity. In the time of the Republic, public bakehouses were under the control of the aediles. Grain was delivered to the public granaries by the Saccarii, while another body called Catabolenses distributed the grain to the bakers. The latter were known as Pistores or " pounders," a reminiscence no doubt of the primitive time when

grain was pounded by a pestle in a mortar. Slaves were largely employed in the irksome work of grinding, and when Constantine abolished slavery the staff of the pistrinae was largely recruited from criminals. The emperor Trajan incorporated about a.d. 100 the college of Pistores (millers and bakers), but its members were employers, not operatives. The work of a bakery is depicted in a set of bas-reliefs on the tomb of a master Pistor named Eurysaces, who flourished about a century before the foundation of the college. Here the grain is being brought and paid for; mills driven by horse and ass (or mule) power are busy; men are sieving out the bran from the flour by hand (bolters); bakers are moulding loaves on a board; an oven of domelike shape is being charged by means of a shovel (peel) ; and baskets of bread are being weighed on the one hand and carried off on men's backs on the other.

Regulation of Sale. — In the middle ages bakers were subjected to special regulations in all European lands. These regulations were supposed to be conceived in the interests of bread consumers, and no doubt were intended to secure fair dealing on the part of bread vendors. The legislators appear, however, to have been unduly biased against the baker, who was often beset by harass- ing restrictions. Bakers were formed into gilds, which were under the control, not only of their own officials, but of the municipality. In London the bakers formed a brotherhood as early as 1155, and were incorporated in 1307. There were two distinct corporate bodies concerned with bread-making, the Company of White Bakers and the Company of Brown Bakers; these were nominally united in 1509, but the union did not become complete till the middle of the 17th century. In Austria, bakers who offended against police regulations respecting the sale of bread were liable, until comparatively recent times, to fine, imprisonment and even corporal punishment. In Turkey the lot of the baker was very hard. Baron de Tott, writing of Con- stantinople in the 18th century, says that it was usual, when bread went to famine prices, to hang a baker or two. He would have us believe that it was the custom of master bakers to keep a second hand, who, in consideration of a small increase of his weekly wage, was willing to appear before the cadi in case a victim were wanted. A barbarous punishment, inflicted in Turkey and in Egypt on bakers who sold light or adulterated bread, consisted in nailing the culprit by his ear to the door-post of his shop. In France a decree of 1863 relieved bakers from many of the restrictions under which they previously suffered, \it it did not touch the powers of the municipalities to regulate the quality and sale of bread. It left them the right conferred

in 1 791, to enforce the taxe du pain, the object of which was to prevent bakers from increasing the price of bread beyond a point justified by the price of the raw materials ; but the right was exercised on their own responsibility, subject to appeal to higher authorities, and by a circular

issued in 1863 they were invited to abolish this taxe officielle. In places where it exists it is fixed every week or fortnight, according to the average price of grain in the local markets.

In England an act of parliament was passed in 1266 for regulating the price of bread by a public assize, and that system continued in operation till 1822 in the case of the city of London, and till 1836 for the rest of the country. The price of bread was determined by adding a certain sum to the price of every quarter of flour, to cover the baker's expenses and profit; and for the sum so arrived at tradesmen were required to bake and sell eighty quartern loaves or a like proportion of other sizes, which it was reckoned each quarter of flour ought to yield. The acts now regulating the manufacture and sale of bread in Great Britain are one of 1822 (Sale of Bread in the City of London and within 10 m. of the Royal Exchange), and the Bread Act of 1836, as to sale of bread beyond 10 m. of the Royal Exchange. The acts require that bread shall be sold by weight, and in no other manner, under a penalty not exceeding forty shillings. This does not, however, mean that a seller is bound to sell at any particular weight; the words quartern and half-quartern, though commonly used and taken to indicate a 4-lb and 2-ft> loaf respectively, nave no legal sanction. That is to say, a baker is not bound to sell a loaf weighing either 4 lb or 2; all he has to do, when a customer asks for a loaf, is to put one on the scale, weigh it, and declare the weight. When bread is sold over the counter it is usual for the vendor to cut off and tender a piece of bread to make up any deficiency in the loaf. This is known as the " overweight." There is little doubt the somewhat misty wording of the bread acts lends itself to a good deal of fraudulent dealing. For instance, when bread is sold over the counter, two loaves may be 5 or 6 oz. short, while the piece of makeweight may not reach an ounce. The customer sees the bread put on the scale, but in ninety-nine cases out of a hundred does not trouble to verify the weight, and unless he expressly asks for 2 lb or some specific weight of bread, it is very doubtful whether the seller, having satisfied the letter of the law by placing the bread on the scales, could be convicted of fraud. The provision as to selling by weight does not apply to fancy bread and rolls. No exact definition of " fancy bread " has ever been laid down, and it must be largely a question of fact in each particular case. All bakers or sellers of bread must use avoirdupois weight, and must provide, in a conspicuous place in the shop, beams, scales and weights, in order that all bread there sold may from time to time be weighed in the presence of the purchaser. The penalty for using any other weight than avoirdupois is a sum not exceeding £5 nor less than forty shillings, and for failing to provide beams and scales a sum not exceeding £5. Also every baker and seller of bread, delivering by cart or other conveyance, must be pro- vided with scales and weights for weighing bread; but since the Weights and Measures Act 1889,

no penalty is incurred by omission to weigh, unless there has been a request on the part of the purchaser. The acts also define precisely what ingredients may be employed in the manufacture of bread, and impose a penalty not exceeding £10 nor less than £5 for the adulteration of bread. (See further under Adulteration.)

Although the act of 1836 extends to the whole of the United Kingdom (Ireland excepted) out of the city of London and beyond 10 m. of the Royal Exchange, yet in many Scottish burghs this act is replaced by local acts on the sale of bread. These are in all cases of a much more stringent nature, requiring all batch or household bread to be stamped with the reputed weight. Any deficiency within a certain time from the with- drawal of the bread from the oven is an offence. The London County Council desired to introduce a similar system into the area under their jurisdiction, and promoted a bill to that effect in 1905, but it fell through. The bill was opposed not only by the National Association of Master Bakers, the London Master

Bakers' Protection Society, and by the West End metropolitan bakers in a body, but also by the Home Office, which objected to what it termed exceptional legislation.

It may be noted that the acts of 1822 and 1836 define pre- cisely what may and may not be sold as bread. It is laid down in section 2 that " it shall and may be lawful … to make and sell . . . bread made of flour or meal of wheat, barley, rye, oats, buckwheat, Indian corn, peas, beans, rice or potatoes, or any of them, and with any (common) salt, pure water, eggs, milk, barm, leaven, potato or other yeast, and mixed in such proportions as they shall think fit, and with no other ingredients or matter whatsoever."

Sanitation of Bakehouses. — The sanitary arrangements of bakehouses in England were first regulated by the Bakehouse Regulation Act 1863, which was repealed and replaced by the Factory and Workshop Act 1878; this act, with various amend- ing acts, was in turn repealed and replaced by the Factory and Workshop Act 1001. By the act of 1901 a bakehouse is defined as a place in which are baked bread, biscuits or confectionery, from the baking or selling of which a profit is derived. The act of 1863 placed the sanitary supervision of bakehouses in the hands of local authorities; from 1878 to 1883 supervision was in the hands of inspectors of factories, but in 1883 the supervision of retail bakehouses was placed in the hands of local authorities. Under the act of 1901 the supervision of

bakehouses which are " workshops " is carried out by local authorities, and for the purposes of the act every bakehouse is a workshop unless within it, or its close or curtilage or precincts, steam, water or other mechanical power is used in aid of the manufacturing process carried on there, in which case it is treated as a non-textile factory, and is under the supervision of factory inspectors.

The more important regulations laid down by the act are: (1) No water-closet, &c, must be within or communicate directly with the bakehouse; every cistern for supplying water to the bakehouse must be separate and distinct from any cistern supplying a water- closet ; no drain or pipe for carrying off sewage matter shah have an opening within the bakehouse. (2) The interior of all bakehouses must be limewashed, painted or varnished at stated periods. (3) No place on the same level with a bakehouse or forming part of the same building may be used as a sleeping place, unless specially constructed to meet the requirements of the act. (4) No under- ground bakehouse (one of which the floor is more than 3 ft. below the surface of the footway of the adjoining street) shall be used unless certified by the district council as suitable for the purpose (see Redgrave, Factory Acts; Evans Austin, Factory Acts).

Bread Stuffs. — As compared with wheat-flour, all other materials used for making bread are of secondary importance. Rye bread is largely consumed in some of the northern parts of Europe, and cakes of maize meal are eaten in the United States. In southern Europe the meal of various species of millet is used, and in India and China durra and other cereal grains are baked for food. Of non-cereal flour, the principal used for bread-making is buckwheat (Fagopyrum esculentum), extensively employed in Russia, Holland and the United States. The flour of pease, beans and other leguminous seeds is also baked into cakes, and in South America the meal of the tapioca plant, Jatropha Manihol, is employed. But, excepting rye, none of these substances is used for making vesiculated or fermented bread.

A normal sample of wheat-flour consists roughly of 10 parts of moisture, 72 of starch, 14 of nitrogenous matter, 2-25 of fatty matters, and 1-75% of mineral matter. Starch is thus four y ° tne predominating component; it is not, however, the dough-forming ingredient. By itself, starch, when saturated with water, forms a putty-like mass devoid of coherence, and it is the gluten of the nitrogenous matter which is the binding constituent in dough-making, because when wetted it forms a more or less elastic body. The proportion of gluten in wheat- flour varies from 7 to 15%, but the mere quantity of gluten is by no means the only standard of the commercial value of the flour, the quality also counting for much. One of the functions of gluten is to produce a high or well-piled loaf, and its value for this purpose depends largely on its quality. This is turn depends largely

on the variety of wheat; certain races of wheat are much richer in nitrogenous elements than others, but such wheats

usually only flourish in certain countries. Soil and climate are undoubtedly factors in modifying the character of wheat, and necessarily therefore of the flour. The same wheat grown in the same soil will show very varying degrees of strength {i.e. of gluten) in different seasons. For instance, the north-western districts of America grow a hard spring wheat which in a normal season is of almost unequalled strength. In 1904 an excess of moisture and deficiency in sun in the Red River Valley during the critical months of June and July caused a serious attack of red and black rust in these wheat fields, the disease being more virulent in the American than the Canadian side of the valley. The result was that the quality of the gluten of that season's American spring wheat was most seriously affected, its famed strength being almost gone. Wheat from the Canadian side was also affected, but not nearly to so great an extent. Flour milled from hard winter wheat in the American winter districts is sometimes nearly as strong as the spring wheat of the North-west. Hungarian flour milled from Theis wheat is also very strong, and so is the flour milled from some south Russian spring wheats. But here again the degree of strength will vary from season to season in a remarkable manner. In the main each land has its own clearly marked type of wheat. While the United States, Canada, Hungary and Russia are each capable of growing strong wheat, Great Britain, France and Germany produce wheat more or less weak. It follows that the bread baked from flour milled from wheat from British, French or German wheat alone would not make a loaf of sufficient volume, judged by present British standards. As a matter of fact, except in some country districts, British bakers either use strong foreign flour to blend with English country flour, or, more frequently, they are supplied with flour by British millers milled from a blend in which very often English wheat has a small, or no place at all. If the baker's trade calls for the making of household bread, especially of the London type, he must use a strong flour, with plenty of staple gluten in it, because it is this element which supplies the driving or lifting force, without which a high, bold loaf cannot be produced. If the demand is for tin or (as it is called in many parts of the north of England) pan bread, a weaker flour will suffice, as the tin will keep it up. A Vienna loaf should be made with at least a certain proportion of Hungarian patent flour, which is normally the highest-priced flour in the market, though probably the bulk of the Vienna rolls made in London contain no Hungarian flour. A cake of flat shape can be very well made with a rather weak flour, but any cake that is required to present a domed top cannot be prepared without a flour of some strength. It is a general opinion, though contested by some authorities, that soft, weak flours contain more flavour than strong, harsh flours. The strong wheats of the

American and Canadian North- West make less flavoury flour than //ouA soft red winter from the American South-West. It would not, however, be correct to say that all strong wheats are necessarily less full of flavour than weak wheats. Hungarian wheat, for instance, is one of the strongest wheats of the world, but has a characteristic and pleasant flavour of its own. Indian wheats, on the other hand, are not particularly strong, but are liable to give a rather harsh flavour to the bread. English, French and German wheats, when harvested in good condition, produce flour of more or less agreeable flavour. None of these wheats could be classified as strong, though from each of those lands wheat of fair strength may be obtained under favourable meteorological conditions. The Australasian continent raises white wheat of fine quality which has much affinity with British wheat — -it is the descendant in many cases of seed wheats imported from England — but it is occasionally stronger. The resultant flour is noted for its sweetness. Both millers and bakers who are concerned with the supply of high-class bread and flour make free use of what may be termed flavoury wheats. The proportion of English wheat used in London mills is very small, but millers who supply West-End bakeries with what is known as top-price flour are careful to use a certain amount of English wheat, if it is to be had in prime condition. They term this ingredient of their mixture " sugar." London bakers again,

with customers who appreciate nicely flavoured bread, will " pitch " into their trough a certain proportion of English country flour, that is, flour milled entirely or chiefly from English wheat, which under such conditions is strengthened by a blend of strong flour, a patent flour for choice. It has been objected that as English wheat contains a large proportion of starch, and as starch is admittedly destitute of flavour, there is no reason why flour milled from English wheat should possess a sweeter flavour than any other starchy wheat flour. Experience, however, has amply proved that well-ripened English wheat produces bread with an agreeable flavour, though it does not follow that all English wheat is under all conditions capable of baking bread of the highest quality. But it would be as fallacious to hold that weak flour is necessarily flavoury, as that all strong flour is insipid and harsh. Different wheats are undoubtedly possessed of different flavours, but not all these flavours are of a pleasing character. In some cases the very reverse is true. Californian and Australian wheats have occasionally aromatic odours, due to the presence of certain seeds, that will impart an objectionable flavour to the resultant bread.

While the essential character of particular wheats will account for a good

deal of the flavour that may be detected in the bread made from them, the baking process must also be responsible to some extent for flavour. The temperature of the oven and the degree of fermentation must be factors in the question. It has been asserted that the same flour will bake into bread of very different flavour according as the fermentation is carried out slowly or quickly, or as the oven is hot or the reverse. A high temperature seems to have the effect of quickly drawing out the subtle essences which go to give flavour to the bread, but it is a question whether they are not subsequently rapidly volatilized and partially or wholly lost. The rapid formation of a solid crust is no doubt likely to retain some of these flavouring essences. A moist, or " slack," sponge, or dough, appears distinctly favour- able to the retention of flavour, the theory being that under such conditions the yeast, having more room to " breathe," works more easily, and is therefore less likely to convert into food those soluble constituents of the flour which give flavour.

The colour of flour is a valuable, though not an infallible, index to its baking qualities. Thus, a flour of good colour, by which bakers mean a flour of bright appearance, white, flour. but not a dull dead white, will usually bake into a loaf

of good appearance. At the same time, a flour of pronounced white tint may bake into a dirty grey loaf. This has been particularly noted in the case of flours milled in Argen- tina. The colour of flour will vary from a rich, creamy white to a dull grey, according to its quality. The different shades are many and various, but the prevailing tints are comparatively few. Perhaps Blandy's classification of the colours as white, yellow, red, brown and grey is as serviceable as any. Each of these tints is directly caused by the presence of certain substances. White denotes the presence of a considerable proportion of starch, while a pronounced yellow tint proclaims gluten of more or less good quality. Red and brown are tints only found in flours of low grade, because they are sure proofs of an undue proportion of branny or fibrous particles. A greyish flour invariably contains impurities, such as crease dirt, from the wheat, the intensity of the tint varying in proportion to their amount. With regard to a yellow tint, though this always denotes the presence of gluten, it is difficult to estimate the baking quality of the flour by the shade of yellow. In the best Hungarian patent flour the whole sample will be suffused by an amber tint, known to Budapest and Vienna bakers as gelblicher Stick. Rolls baked from the best Hungarian flour will not infrequently cut yellow as if eggs had been used in making them up, though nothing more than flour, yeast and water has been employed. Strong flour milled from American or Canadian spring wheat is also yellowish in colour, but the tint is not so deep as with Hungarian flour. On the other hand, there are flours of no great strength, such as those from some Australian wheats, which are apt to look yellow.

When the colour of flour is not maintained in the bread, the reason is generally to be found in the baking process employed. Colour

is a fairly trustworthy, but not an absolute guide to the chemical composition of flour.

Unfortunately not all flour of good colour is sound for bread- making purposes. Wheat which has been harvested in a damp condition, or has been thoroughly soaked, by drenching showers previous to cutting, or has got wet in the stook, fl „ˆf ”” is liable, unless carefully handled, to produce flour that will only bake flat, sodden loaves. Wheat which has received too rnuch rain as it is approaching maturity, and has then been exposed to strong sunlight, is peculiarly liable to sprout. This seems to happen not infrequently to La Plata wheat, and though wheat shippers in that country are usually careful to clean off the little green spikes, this outward cleansing does not remedy the mischief wrought to the internal constitution of the berry. Such wheat makes flour lacking in strength and stability. Its gluten is immature and low in percentage, while the soluble albuminoids are in high percentage and in a more or less active diastasic state. The starch granules are liable to have weakened or fissured walls, and the proportion of moisture and of soluble extract will be high. With regard to the beneficial action of kiln or other drying on damp flour, William Jago was convinced by a series of experi- ments that the gentle artificial drying of flour increases its water- absorbing capacity to about three times the amount of water lost by evaporation. On the other hand, a damp flour dried too quickly and at too great a heat is liable to be made more instead of less susceptible to diastasic changes.

Alum. — Strictly speaking, when employed with weak and unstable flours alum is a remedial agent. The popular idea that it acts as a kind of bleacher of flour, having the faculty of converting flour that is dark-coloured through containing a sensible proportion of branny particles and woody fibre, into white-coloured loaves, is erroneous. Its action as a producer of white bread is indirect, not direct, though it is none the less effective. It seems to act as a brace to or steadier of unstable gluten. If from the same wheat a certain proportion of gluten be extracted and divided into two parts, of which one is placed in a glass of water containing a strong solution of alum, and the other in a glass of plain water, the gluten in the latter case will become spent days and perhaps weeks before the sample in the alumed water is disintegrated. The place of alum in the process of fermentation is well marked. By holding together unstable gluten, it checks the diastasic action, and the proportion of starch converted into glucose (grape sugar) is reduced, with the result that a whiter and more porous loaf is produced. It is generally admitted that by the use of alum more or less eatable bread may be baked from flour which otherwise could hardly

be made into bread at all. Strictly, therefore, this substance is not an adulterant, inasmuch as it is not a substitute in any sense for flour. But it is admittedly unwholesome, and therefore its legal interdiction for alimentary purposes is quice justifiable. Another aspect of the use of alum is that it is employed for the purpose of enabling bakers to use poor flour.

A fairly satisfactory test for alum in bread (or flour) is afforded by an alkaline solution of logwood and a saturated solution of ammonium carbonate. The presence of alum is shown by a lavender or full blue colour. The depth of the tint is said to be a rough guide to the quantity of alum present. According to Jago this test is so sensitive that it has resulted in the detection of 7 grains of alum in a 4- lb loaf.

Besides alum, small quantities of copper sulphate have been used for checking diastasis and retarding fermentation. This substance has the same effect as alum, but as all copper salts ˆare active poisons, the employment of copper sulphate is most strongly to be condemned.

Lime-water. — The object of using either alum or copper sulphate is to check over-rapid diastasis during fermentation. Baron Liebig pointed out a much less objectionable means of attaining the same end by means of lime-water, about ij oz. of fresh quicklime being dissolved in the water used for doughing one sack of flour. Bread made in this way is said to be spongy in texture, of agreeable flavour, and perfectly free from acidity. In the baked loaf the lime is trans- formed into calcium carbonate (chalk) by the carbon dioxide resulting from the panary fermentation. It is said that an increased yield of bread may be obtained by the use of lime-water; the explanation may be that lime-water, by retarding the degradation of the gluten and the diastasis of the starch, increases the water-retaining power of the flour, so that the same weight of flour yields a greater volume of bread.

Unvesiculated and Vesiculated Bread. — Wheaten bread may be divided into two main divisions, unvesiculated and vesiculated. The term vesiculated simply means provided with vesicles, or small membranous cavities, such as are found in all' bread that has been treated by yeast, leaven or any other agent for rendering it spongiform in structure by the action of carbonic acid gas. Nearly all bread eaten by civilized folk is vesiculated, though

there are different methods and processes for attaining this result. Into the category of unvesiculated bread enter such products as the Australian

damper, a flat cake prepared from flour, water and salt, and baked in the hot ashes of a wood fire. The dough is spread on a fiat stone and covered with a tin plate, while the hot ashes are heaped around and over it; the heat should not be much in excess of 212 Fahr. The scone, the bannock and other similar cakes, still much appreciated in Scotland and the north of England, are also examples of unvesiculated bread. They are baked on hot pfates or " griddles," on hearths, and sometimes in ovens. Biscuits differ from these cakes in the fact that they are baked by a high instead of a moderate heat. But they enter so far into the class of unvesiculated bread that they are generally prepared without the aid of any such aerating agent as carbon dioxide. (See Biscuit.)

Vesiculated bread is now the only article of diet made from flour to which the term bread is applied, and there are various ways of producing the spongiform texture by which it is char- acterized. The ordinary and doubtless the most satisfactory way is by developing the carbon dioxide within the dough itself by the use of yeast (q.v.) or leaven, which sets up alcoholic fer- mentation, splitting up the saccharine matters in the flour into alcohol and carbon dioxide. The latter is retained by the dough and distends it, causing the bread to "rise." Or the carbon dioxide may be artificially introduced, as in the so-called "aerated" bread (see below), or it may be produced by the agency of certain chemicals, as for instance of baking powders.

Such powders are mixtures which, under the influence of either water or heat, evolve carbon dioxide. These powders have been

divided by Jago into three groups: — (1) Tartrate powders, powders, in which the acid constituent is either free

or partly combined tartaric acid; (2) Phosphate powders, in which the acid is some form of phosphoric acid; (3) Alum powders. All these powders have a more or less aperient action on the human system. Tartrate powders have the dis- advantage that both commercial tartaric acid and cream of tartar frequently contain lead, a poisonous substance. Phos- phate powders are less open to objection, as they are more easy to obtain free from lead and other metallic impurities. Alum powders contain potassium bisulphate and alum. It is somewhat remarkable that while the presence of alum in bread is regarded by the law of England as adulteration, its use in baking powder was pronounced legal in James v. Jones, 1894, 1, Q.B. 304, on the ground that baking powder is not food within the meaning of the Sale of Food and Drugs Act 1875. In making wholemeal bread, hydrochloric acid and sodium bicarbonate are often used in such proportions that they neutralize each other. Carbon dioxide is evolved and raises the dough. In preparing wholemeal bread the use of this combination has the advantage

that the acid acting rapidly on the sodium bicarbonate soon produces enough carbon dioxide to aerate the dough, and thus hasten its entry into the oven. Wholemeal flour contains so large a proportion of cerealin that diastasis is apt to proceed rapidly, the result being a clammy, sodden loaf. For this reason, perhaps the so- called aerated process is even more suitable for making whole- meal than white bread.

Methods of dough-making differ in different countries, and even in different parts of the same land. In the of hand method

the dough is made right off, without any preliminary

fmakiae sta 8 es °f ferment or sponge. This plan is sometimes

dough. adopted for making tin bread, and occasionally for

crusty loaves. For tin bread a strong flour would be used and made into a slack dough, and about i| lb to 2 lb of distillers' yeast would be used for the sack (280 lb) of flour, occasionally with the addition of a little brewers' yeast. Salt is used in the proportion of 3 lb to 3 J lb per sack. Formerly also it was the custom to add 10-14 H> of boiled potatoes, but the use of potatoes has greatly decreased. A tin-bread dough would be made slack, with about 70 quarts of water to the sack, and after being mixed, would be fermented at a temperature of 76-80 Fahr. It should lie for about ten hours. A dough for crusty bread such as cottage loaves, would be made much tighter,

not more than 60 quarts of water being allowed to the sack. It would be fermented at a higher temperature, and would not lie more than about six hours. A slack dough is much less laborious to work (when the dough is hand-made) than a tight dough, for which a mechanical kneader is very suitable, but as a matter of fact the use of machinery (see below) is still the exception, not the rule. When a stiff dough is made by hand, it is usually made somewhat slack to begin with, and then " cut back " and " dusted " at regular intervals, that is to say, more and more flour is added till a dough of the required consistency has been obtained. (In the British baker's vocabulary " dust " means flour, and good dust stands for good flour.) This system, on the one hand, saves the labour involved for "sponging," and other operations, and the bread is produced in less time; but on the other hand more yeast is used, and bakers generally hold that the system sacrifices the colour and texture of the loaf to con- venience of working and yield. The high porportion of yeast enables the dough to carry a large quantity of water, and about 104 4-lb loaves to the sack is said by Jago to be a not unusual yield in the case of slack doughs. But such a result would only be possible with very strong flour. In an ordinary way 96 loaves to the

sack is a very high yield, unattainable except with strong flour, and probably the average yield is not more than 90 loaves to the sack. In London the manager of a " tied " shop is usually held to account for 92 loaves to the sack.

In the ferment and dough system, the ferment usually consists of 10 to 14 lb of potatoes to the sack of flour, boiled or steamed, and mashed with water, so as to yield about 3 gallons of liquor. There are several substitutes for potatoes, including raw and scalded flour, malt, malt extracts, &c. ; brewers' or distillers' yeast may also be used. A ferment should contain saccharine matters and yeast stimulants in such a form as to favour the growth and reproduction of yeast in a vigorous condition. Hence it should not be too concentrated. About ~ six hours are required for its preparation. It is added, together with 2 1 to 3 lb of salt, to the dough, which is prepared with about 56 quarts of water to the sack, and worked at a temperature of 80-84° Fahr. The dough is allowed to lie from two to five hours according to the flour used, the character of the ferment, and the working temperature. In this system the proportion of strong flour is usually reduced to 40 % of the dough, and no doubt in some cases only soft or weak flours are used. Naturally the yield of bread is not so high as in the case of an off hand dough made entirely from strong flour, and it will probably not exceed 90 loaves to the sack. This method has many advantages. After the ferment is made the labour required is not much greater than with the off hand doughs, and less yeast is required, while potatoes, which are somewhat troublesome, from the necessary cleaning, can be replaced by the substitutes already mentioned. The method produces good-looking and palatable bread, though the loaves should be eaten within some twelve hours of leaving the oven.

The sponge and dough system, which is probably in widest use in England, is adapted to almost every kind of bread, and has the advantage that any kind of flour can be employed. The stronger flours which need long fermentation can be and usually are used in the " sponge " stage, while soft flours are utilized in the dough. (The sponge is a certain proportion, varying from a quarter to one-half, of the flour necessary for making the batch.) In London the baker often uses for the sponge a bag (140 lb) of American spring wheat flour, and for the dough a sack (280 lb) of British milled flour, which, whether it be country flour milled largely from English wheat or London milled, is always softer and weaker than that used for the sponge. The sponge is made very slack, 26 to 32 quarts of water being used to say 100 lb of flour. Yeast, either distillers' or brewers', must be added, in proportions varying according to its character and strength. Of distillers' yeast 6 to 10 oz. may be used for 280 lb of flour (including sponge and dough). Salt is added to the sponge sparingly, at the rate of about \ lb to the sack of 280 lb. The object of making the sponge so slack is to quicken

the fermenta- tion. When set the sponge is allowed to ferment from six to ten

hours, according to temperature and other conditions. Some- times all the water it is intended to use is put into the sponge, which is then known as a " batter " sponge. The sponge, when ready, is incorporated with the rest of the flour to which the necessary amount of water and salt is added. The whole mass is then doughed up into the requisite consistency, the dough being allowed to lie for about two hours. Bread made by this method, always assuming that over-fermentation has been avoided, is of good appearance, presenting a bold loaf, with even texture and a nice sheen. Owing to the use of soft flours, the flavour should be agreeable, and the loaves ought to keep much longer than bread made by ferment and dough. The yield may rise as high as 96 loaves per sack, if strong flour has been used in the sponge.

A combination of the above two methods, known as the ferment, sponge and dough system, is often used with brewers' yeast. In this case the yeast is not added to the sponge direct, but goes into the ferment. This method is rather in favour with bakers who make their own yeast.

The system of bread-making generally used in Scotland is known as the flour barm, sponge and dough. The barm is a com- bination of a malt and hop yeast, with a slow, scalded flour ferment. To make the so-called " virgin " barm a Scottish baker would use a 30-gallon tub; a smaller vessel for malt-mashing; 10 lb malt; 3 oz. hops and a jar for infusing them; 40 lb flour; 2 to 3 oz. malt; 8 to 12 oz. sugar, and 18 gallons of boiling water. With these materials a powerful ferment is produced, which it is considered best to use in the sponge the fourth or fifth day after brewing. The sponges used in Scotland are " half " or " quarter." About 6 lb of malt go to the sack, one-sixth going into the sponge. As in England, strong flours are used for the sponge, but rather stronger flours are used for the dough than is usual in England. Scottish loaves are largely of the " brick" type, high and narrow. Such bread has an attractive appear- ance and keeps well. It has a rather sharp flavour, approaching acidity but avoiding sourness, while the large quantity of malt used adds a characteristic taste. The yield rises in some Glasgow bread factories to 100 loaves to the sack.

In many parts of Europe bread is still made from leaven, which, properly 1 speaking, consists of a portion of dough held over from the previous baking. This substance, known to French bakers as levain, is called in Germany

Sauerteig (anglice " sour dough "). The lump of old dough, placed aside in a uniform temperature for some eight hours, swells and acquires an alcoholic odour, becoming the levain de chef of the French bakers. It is then worked up with flour and water to a firm paste double its original volume, when it becomes the levain de premiere. Six hours later, by the addition of more flour and water its amount is again doubled, though its consistency is made rather softer, and it becomes the levain de seconde. Finally, by another addition of flour and water, the amount is again doubled, and the levain de tous points is obtained. This mass is divided into two parts; one is baked yielding rather dark sour bread, while the other is mixed with more flour and water. This second portion is in turn halved, part is baked, and part again mixed with more flour, this last batch yielding the best and whitest bread. In North Germany leaven is generally used for making rye bread, and loaves baked from a mixture of wheat and rye flour. In the bakery of the Krupp works at Essen, each batch of the so-called Paderborn bread is prepared entirely with leaven from 270 kilos of rye flour (patent quality), 100 of wheat flour (seconds), 2 of buckwheat meal, 6 of salt, 5 of leaven, and one litre of oil. In Vienna leaven is never used for making the rolls and small goods for which that city is famous. Viennese bakers use either brewers' yeast or a ferment, prepared by themselves, of which the basis is an infusion of hops. Brewers' yeast is added to the ferment, which takes the form of a very slack dough. With 100 kilos (22C46 lb) of flour about 17 litres or nearly 2 gallons of ferment are used.

In the original Dauglish process for the manufacture of aerated bread, which was brought into operation in Great Britain in 1859, carbonic, acid gas was evolved in a generating vessel by the

Leavened bread.

Aerated bread.

action of sulphuric acid on chalk, and after purification was forced at high pressure into water, which was then used for doughing the flour. In this process the flour that had to be made into bread was submitted to the action of the super-aerated water by direct transference. It was found, however, in practice that much difficulty occurred in making the gas admix readily with the flour and water, great pressure being required, and to lessen the difficulties a new process, called the " wine whey," was introduced. To carry this out, a vat placed on the upper storey of the factory is charged with a portion of malt and flour, which is mashed and allowed to ferment until a weak and slightly acid thin wine is produced ; this after passing through the coolers is stored until it is trans- formed into a vinous whey. This whey is then introduced into a strong cylinder partly filled with water, and is aerated by letting in the gas (now stored in a

highly compressed form in bottles), the pressure required being only a quarter of that necessary with the original method. The flour having been placed in the mixers, which are of globular form containing revolving arms, the aerated fluid is admitted, and in a short period the flour and fluid are completely incorporated. By means of an ingenious appliance termed a dough cock, the exact amount of dough for a single loaf of bread is forced out under the pressure of the gas, and by reversing the lever the dough, which expands as it falls into a baking tin, is cut off. Two sacks of flour can be converted with ease into 400 2-lb loaves in forty minutes, whereas the ordinary baker's process would require about ten hours. At first a difficulty was encountered in the fact that the dough became discoloured by the action of the " wine whey " on the iron, but it was overcome by Killingworth Hedges, who discovered a non-poisonous vitreous enamel for coating the interior of the mixers, &c. It has been claimed for the Dauglish process that it saves the baker risks attendant on the production of carbon dioxide by the ordinary process of fermentation, in that he is no longer liable to have his dough spoilt by variations of temperature and other incalculable factors, the results being certain and uniform. A further claim is the saving of the pro- portion of starch consumed by conversion into glucose during the process of fermentation. The original objection, that, by the absence of fermentation, those subtle changes which help to produce flavour are lost, is annulled by the use of the wine whey process. The Dauglish process is well suited for producing small goods, such as cakes and scones, where flavour can be artificially imparted by means of currants, flavouring essences, &c. An undoubted advantage of the aerating process of bread- making is adaptability for utilizing flour with unstable gluten, which can thus be made into an excellent quality of bread. For wholemeal bread, too, there is probably no more suitable process than the Dauglish. The strong diastasic action of the cerealin, inevitable in fermentation, is entirely avoided. The Aerated Bread Company have about a hundred depots in London, which are supplied from a central factory.

The essence of the bread-making process recently invented by Serge Apostolov is the combination of a flour mill and bakery. The wheat, after a preliminary cleaning, is ground into flour by a mill composed of metal disks dressed, that

Apostolov process.

is furrowed, very much like the surfaces of a pair of mill-stones. The disks are not set to grind very close, because it is desired, by minimizing friction, to keep the meal cool. From the middlings obtained by this milling process about 10 % of bran is separated, and the remainder of the middlings is treated by a peculiar process, akin to mashing, termed " lixiviation." The middlings are saturated with tepid water containing a small proportion of

yeast, which causes a certain amount of fermenta- tion. It is claimed that by this process a solution is obtained of the floury constituents of the middlings. From the vats the solution is poured on an inclined sieve which has a gentle recipro- cating motion. The floury particles pass through the meshes, while the bran tails over the sieve; the proportion of the wheat berry thus rejected is given as about 25 %. On the other hand, the milky-looking solution, called " lactus," is caught in a special vessel, and delivered by a shoot into a trough, which may be

either a mechanical kneader of art ordinary trough. This lactus takes the place of the ordinary sponge. The flour is added in the proportion necessary to make the required batch and the whole mass is doughed, either by hand or power. The resultant dough is moulded in the ordinary way into loaves, which are baked in due course. The advantages claimed for the process are that it permits of the utilization in bread-making of about 87J % of the wheat berry, that the resultant bread is fairly white in colour and is agreeable in flavour, and that it is extremely simple and provides a ready and cheap means of flour-making.

Machine Bakeries.— Bread-baking, though one of the most im- portant of human industries, was long carried out in a most primitive manner, and machinery is still practically unknown in the bulk of British bakehouses. The reasons for this apparently anomalous condition of things are not very far to seek. Bread, unlike biscuits, is a food quite unfitted for long storage, and must be consumed within a comparatively short time of being drawn from the oven. Hence the bread-baker's output is necessarily limited to a greater or lesser degree. This will be the more apparent when it is considered that the cost of distributing bread is high relatively to the profits to be realized. A baker's bread trade is therefore usually limited to local requirements, and trading on a small scale hehas less induce- ment to lay out capital on the installation of machinery than other classes of manufacturers. But there are now many machine bakeries (known in Scotland as bread factories), both in London and in other parts of Great Britain, where the manufacture of bread is carried out more or less on a large scale. The evolution of the machine bakery has been slow, and the mechanical operations of the bake- house were long limited to the mixing of the sponge and the kneading of the dough, but now the work of the bakery engineer extends over almost every operation of bread-making.

A bread-baking plant should be installed in a building of at least two storeys. .The ground floor may be used for the shop, with possibly a' bread-

cooling and delivery room at the rear. The flour may be hoisted to an attic at the top of the building, or to the top lioor; in any case there must be sufficient floor space to accommodate the flour sacks and bags. Underneath the floor of the flour store should be installed a flour sifter, a simple apparatus consisting essentially of a hopper through which the flour enters a cylinder with a soiral brush, by which it is thoroughly agitated previously to passing through one or more sieves placed under the brush. A sack of flour may be passed through this sifter in a couple of minutes, the operation freeing the flour from lumps and pieces of string or other foreign substances which may have found their way into the sack. The sifter mav also be combined with a blender or mixer, so that the baker may by its means thoroughly blend different flours in any desired proportion. The operation of blending is usually effected by a revolving blade of suitable design or by a worm con- veyor placed underneath the sieve or sleeve. From the sifter and blender the flour descends by a sleeve into the dough kneading machine on the floor below. But in cases where it is desired merely to sift and blend flour ready for future use, it may be received in a worm and elevated again to the storage floor by an ordinary belt and bucket elevator. The water required for doughing purposes is contained in an iron ank, fixed to the wall in convenient proximity to the dough kneader. This tank, known as a water attemperating and measuring tank, is provided with a gauge and thermometer, and from it the exact quantity of water needed for doughing can be rapidly drawn off at the desired temperature. The cold water supply may be let into the tank at the top, and the hot water supply at the bottom, the idea being that each supply shall permeate the whole mass by gravity, the hot water ascending and the cold descend- ing. The chief types of dough kneader will be described subse- quently, but here it should be noted that not only have machines been devised for cutting out the exact sizes of dough required for small goods, such as buns and tartlets, but that the operations of weighing and dividing dough for quartern and half-quartern loaves r a also be neatly and economically effected by machinery. Further, it least two machines have been built which successfully mould loaves (of simple shape), and the problem of moulding household bread by machinery has certainly been solved, but whether delicate twists and other fancy _ shapes could be equally well moulded mechanically is less certain.

The machine bakery, however complete, is not likely ever to be quite automatic and continuous like a modern flour mill, where the plant is connected throughout and virtually forms one machine (see Flour and Flour Manufacture), and though the engineer has at least managed to effect every operation of the bakehouse by mechanical means, it is not yet possible to shoot a sack of flour into the hopper of the sifter on the top floor, and to turn it into bread, without any human intervention whatever,

though as things are, the moulded dough can be put into the oven without undergoing actual contact with human hands. In practice, some of the machines mentioned above are often dispensed with, even in so-called machine bakeries. The flour sifter and blender is indeed found in many bakeries where mechanical kneaders are unknown, while not in all machine bakeries would be found dough weighers and dividers, still

less moulding machines. The economical side of the argument on behalf of machinery is presented in the familiar shape that a properly equipped machine bakery can turn out better work at a lower cost (by dispensing with labour) , or at any rate can carryon a bigger trade with the same staff, ihere is plausibility in this argument, but it must be admitted that innumerable bakeries of capacities varying from 10 to 20 sacks per week are carried on more or less successfully without machinery of any kind, beyond perhaps a sifter or blender. Moreover, some of these bakehouses produce bread which can hardly be improved on.

One advantage claimed for flour sifters, besides removing the impurities, is that by thoroughly aerating flour they cause it to become more " lively," in which condition it kneads more readily. It is also quite possible that the air which is thus incorporated with the dough has a stimulating effect on the yeast, causing a more energetic fermentation. A strong argument in favour of dough kneaders is their hygienic aspect. It is agreed that the operation of dough stirring by hand, since it involves severe labour conducted in a heated atmosphere, must be liable to cause contamination of the dough through emanations from the bodies of the operatives. In well-managed bakeries the utmost personal cleanliness on the part of the staff is exacted, but the unpleasant contingency alluded to is certainly possible. It is also contended that the use of machinery for dough kneading and batter whisking will ensure better work, in the sense that the mass under treatment will be more thoroughly worked by mechanically driven arms of iron or steel than by human limbs, liable to weariness and fatigue. The better worked the dough, the greater its power of expansion, and consequently the greater its bread-making value.

The most widely known machine used in connexion with bread- baking, next to the sifter, is the dough kneader. The dough kneader is no new invention. As far back as 1760, a kind of dough Dou „ fi kneader was constructed in France by one Salignac. It kaesders. is described as consisting of a trough, inside which the dough was agitated by arms shaped somewhat like harrows. This machine is said to have been tested before a committee of the Academy of Sciences, who reported that in their presence dough had been prepared in fourteen to fifteen minutes. The bread baked from this dough is said to have been most satisfactory, but for some reason the machine never came into general use. For one thing, the power problem

would have been almost insuperable to a baker in the France of those days. In general design this kneader approxi- mated to the machines which have since done good work in bakeries all the world over. Salignac was quickiy followed by another inventor, Cousin, also a Frenchman, who brought out in 1761, or thereabouts, a dough-kneading machine, which, however, had no better success than its predecessor. The first kneading machine which appears to have been in actual use in a bakery was constructed by a Paris baker of the name of Lembert, after whom it was called the Lembertine. Lembert is said to have been experimenting with this apparatus as early as 1796. Be that as it may, it was not brought out till 1810, when a prize of 1500 francs (£60) was offered by the Societe d'Encouragement pour l'lndustrie Nationale. This reward was won by Lembert, and his machine thereupon came into a certain amount of use in France. It is remarkable that France long re- mained the only country in which dough kneaders were employed, but even there their use was limited.

The Fontaine, another French kneader, called after its inventor, was first made in 1835. It had a certain success, but has long passed out of use. It appears to have been a copy to a great extent of the Lembertine. The objection against both these machines was that their blades, while exercising a mixing action, were deficient in kneading effect. Probably the first machine which achieved the task of efficiently replacing the work of human arms in sponge breaking and dough kneading was the Boland kneader. This was also a French machine, and dates back to about the middle of the 19th century. It is believed to have been first used in the Scipion bakery in Paris. It consists essentially of a trough, inside which revolve a pair of blades so arranged as to work somewhat like alternate screws: it is claimed for these blades that their action has the effect of tossing the dough backwards and forwards when it is slack, and of drawing it out when it happens to be stiff. It is further claimed that the blades are so shaped that their revolution has the effect of moving the dough from right to left and left to right in the trough: The machine is geared to give two speeds, the faster being suitable for sponge setting, while the slow and most powerful speed is intended for the doughing. The Boland machine has been widely adopted in other countries than France, and was certainly one of the first dough kneaders to be used in the United Kingdom. It was installed in the great Boland bakery in Dublin, where it proved a great success. The proprietor of this bakery, with which was also connected a flour mill, is said to have had his attention first drawn to this machine by the fact that its inventor was his namesake, though no relative.

The Deliry-Desboves dough kneader, also of French _ origin, and in general use in France, consists essentially of a cast iron trough, shaped somewhat like a basin, and turning on a vertical axis. The kneading arms inside the trough are shaped after the pattern of a lyre, and have the effect of first

working up and then dividing the dough right through the kneading process. Two helical blades,

which also form part of the mechanism, serve to draw out and aerate the dough, as effectively, it is claimed, as can be done by the most skilled operative. The force of the kneading operations can be regulated without stopping the machine. A thoroughly kneaded dough can, it is said, be made in this machine in twelve to fifteen minutes.

In Great Britain the type of machine that used to be most in favour was the trough within which the kneading arms worked on horizontal axis. The trough was either open or provided with a lid. The kneading blades were variously shaped, but generally were more or less straight, and were designed to both mix and aerate the dough. In some cases the kneading blades were worked on a single axis, in others two different sets of arms worked on two axes running parallel to one another. Generally the kneader was geared to two speeds, the fast motion being most suitable for sponge setting, and the earlier stages cf dough-making, while the slower motion was intended to draw out and thoroughly aerate the dough. To dis- charge the dough, the trough was tilted by means of a worm and worm wheel, the latter being secured to the trough. Several varia- tions of this type of kneader are still in use. The machine known as the " Universal " kneader consists of a trough set horizontally, within which rotate on horizontal axes a pair of blades lying in the same plane. These blades are curved and are geared together by means of differential spur wheels, with the object of running the two spindles at unequal speeds. The bottom of the trough is divided into two semi-cylindrical cavities, separated by a ridge. Each blade plunges into its own cavity, and the action of these arms tends, while pressing the dough against the sides and base of the trough, to bring it quickly back towards the centre. The differential speed has the advantage of effecting a more thorough mixing of the dough, as it brings together pieces of dough which have not yet been mingled, the blades pushing the dough from one cavity to the other. To hasten the kneading process it is desirable occasionally to reverse the motion by a turn of a hand wheel on the same shaft as the two pulleys. This wheel governs all the motions of the blades. The trough, which is set low, is tilted over, when the dough is ready, by an endless chain operated by a hand winch. The effort required for this operation is very slight, as the trough is balanced by two weights. The action of tilting does not interfere with the blades, which continue rotating until stopped by the hand wheel. The Universal kneader was designed to imitate as closely as possible the action of a pair of skilled human arms

and hands, but of course works at a much greater speed.

Another form of dough mixer which is extensively used consists simply of a drum made of sheet steel supported by two A-shaped standards at a sufficient height from the floor to allow a trough to be run underneath to receive the dough when ready for the moulding board. In this drum are two tight-fitting doors. The interior is fitted with no blades or knives, but presents a free cylindrical space, with the sole exception that, set not very far from the circumference, there are several fixed rods passing from one side of the drum to the other. These act as mixers of the dough. The door is opened and the flour and water poured in, whereupon the door is again fastened and the drum is made to rotate. As the rotation proceeds, the dough begins to form, and being lifted up by the revolving drum falls by its own weight. In this process, which is repeated again and again, the dough is caught by and tumbled over by the rods, which act as mixers and take the place of the revolving arms of the trough kneader. The kneading action of the rotating arms is absent, but the steady tumbling over these rods appears to have a thorough mixing effect, and the dough is discharged from the drum in good condition for moulding. The time occupied for making a dough by this apparatus varies from four to six minutes. The advantages claimed for this machine are that it consumes comparatively little power, and that there is not so much danger of " felling " or over- kneading dough as in some of the machines with revolving blades. The compactness of this rotating drum mixer, often known as the Rotary mixer, recommends it on shipboard and in other places where space is limited.

In the earlier days of machine bakeries the accurate dividing of dough, and still more the moulding of loaves by mechanical means, Doutth was cons idered an unattainable ideal. The first step in

divid-rs tn ' s direction was made by the Lewis-Pointon dough gnd " divider and weigher, which was intended for dividing and

moulders, weighing out dough ready for the moulding table. In an ordinary way a baker who wishes to bake a batch of half- quartern or 2- lb loaves scales off 2 lb 2 oz. of dough for each loaf. The 2 oz. are a sort of insurance against light weight. The evapora- tion of moisture from dough in the oven is bound to reduce to some extent the weight of the baked loaf, but with normally baked bread, 2 lb 2 oz. in the case of half-quarterns, and 4 lb 4 oz. in the case of quartern loaves, is sufficient to ensure full weight. As the accurate scaling of dough requires some pains and trouble, it would be sur- prising if hand scaling were always accurate. The Lewis-Pointon machine can, it is claimed, be set to turn out lumps of dough of the exact weight required either for i-lb, 2-lb, or 4-Ib loaves. The apparatus does not measure the dough by weight but by volume by an ingenious

piston arrangement. The machine when first put on the market was a little complicated, but its mechanism has since been simplified. It has been successfully worked on doughs of all descriptions, ranging from the tightest to those made with 20

gallons of water to the sack. The same firm which brought out this dough divider has also produced a dough-moulding machine, which has a wide range of work. In this apparatus the dough is introduced between a trough and a revolving table at a point on the outer periphery of the latter. The order of things observed in hand moulding is here reversed, as the trough, unlike the hand, is fixed, while the table revolves around a vertical axis. This table is sharply coned, and can be made to work the dough as much or as little as may be required. In working dough for tin or Coburg loaves only one trough is used, but for cottage loaves two parallel troughs are fitted, one taking the lower and the other the upper half of the loaf. In the latter case, a single piece of dough is fed into the machine and passed through an automatic splitter, the two portions being automatically carried into the troughs and simultaneously delivered at the other side of the machine ready to be put together. With doughs which require " handing-up," two machines may be used for moulding, the dough being automatically fed from the divider to the handing-up machine, and after a short proof passed through the finisher. But the moulding machine may also be used as a " hander-up."

Another ingenious dough moulder, known as the Baker-Callow, works on a rather different principle. Here the pieces of dough coming from the divider are fed into the moulder by a canvas band, and are worked between a large cylindrical roller and a vertically running canvas and leather belt. To prevent pieces from dropping through, and to assist the moulding process, a smaller roller is placed under and between the cylindrical roller and canvas belt. A wooden puncher also assists in working the loaves, which are finished by being rolled between a band and a special shaped wooden moulding. This machine delivers the dough in spherical shaped pieces. If intended for cottage bread they are at once placed on the dough table at the side, and one piece is put on the top of the other ready for the oven. It is claimed the machine will deal equally well with large and small pieces at the same time, so that the tops and bottoms can be made together. Should the machine be intended for tinned bread, a special attachment is used, into which the spherical pieces are delivered from the machine and rolled into cylindrical shapes, ready to be dropped into the pan. A capacity of sixty loaves per minute is claimed for this moulder.

Ovens. — The ordinary baker's oven is a vaulted chamber, about 10 ft. in length, by 8 ft. in width and 30 in. in height ; it is constructed of brick or stone, and has a small door in front through which the oven is charged (by

means of a " peel " or long wooden shovel) and the batch withdrawn. The furnace and fire-grate are often placed at the side of the oven door, but with the oldest ovens, which were heated by wood, there generally was only one door for the fuel and for the bread. Whether the furnace is heated by coal, as is usual in England, or by coke, as is often the case in Scotland, the oven mouth remains in the bakehouse itself; hence the stoking and scuffling must be carried out within the bakehouse. This is in many ways objectionable. For one thing, the fuel must almost of necessity be kept in the bakehouse itself, and it is obvious that the products of combustion are liable to get into the oven. In the old type of oven a flue was frequently placed on the other side of the furnace door, both furnace and flue being on the front of the oven. After firing the furnace, the oven is allowed to " lie down " for a certain time, and secure an even distribution of heat. The furnace and flue are then shut, and the oven charged, the batch being baked by the heat stored within the oven chamber. With ovens of this type, each batch of bread requires a separate firing. This kind of oven has undergone several improvements of detail, but the principle of internal heating, that is, of firing the furnace inside the bakehouse, has remained unchanged.

A new era in bakers' ovens began about the middle of the 19th century with the introduction of the " Perkins " oven, a system which, with slight modifications, has persisted till to-day. In this oven the baking chamber is heated by steam pipes. The latter consist of tubes of iron or mild steel which are partly filled with water and are hermetically sealed by welded ends. The pipes are arranged in two parallel rows, the one at the crown and the other at the sole of the oven. The pipes project at one end into the furnace, which is set at the back of the oven and is usually outside the bake- house. This is termed an externally heated oven. As the ends of the pipes get red hot the water is converted into superheated steam, which being under high pressure soon raises the chamber to baking heat, say 450° to 500° F. In an oven of this description the heat can be continuously maintained, and batch after batch can be baked without refiring. The only drawback is that a flash heat cannot be raised. In another type of externally fired oven the heat is conveyed by flues placed at the bottom and top of the oven, which discharge into a chimney. Excellent results have been attained with ovens of this kind. The distribution of the heat can be well regulated ; for instance, it is quite possible to build ovens to be cooler at the back than front, an arrangement which is useful when the bread is withdrawn by means of a hand peel. As the baker has to withdraw each loaf one at a time, it is clear that the withdrawal of the batch through the oven door must take time, probably not less than half- an-hour. Hence the bread drawn from near the oven's mouth may be underbaked as compared with that at the back of the chamber. The latter, on the other hand, may be

overbaked and deficient in weight.

By means of a draw-plate, however, an oven can be expeditiously charged. This appliance consists of a sliding plate or tray, mounted on wheels running on rails, which is drawn out of the oven loaded with bread, and then returned. The plate itself is often made of iron, but one well-knpwn oven is fitted with a withdrawable iron frame, in which are laid, edge to edge, tiles of a special make, which are cemented in place, and form a continuous baking surface. This seems an excellent arrangement, as the baker has all the advantages of a brick oven, that is to say, his bread is baked both on top and bottom by heat evolved from tiled surfaces, and the undoubted drawbacks incidental to baking bread on an iron surface are avoided. A draw-plate fitted to an oven capable of baking a batch made from a sack (280 lb) of flour can be run out, charged and run in again, in about two minutes. The draw-plate has the incidental advantage, by expediting the loading and discharge of the oven, of ensuring a more uniform baking of the batch, and therefore of minimizing the loss of weight. Some bakers have gone so far as to estimate the saving in this respect from the use of a draw-plate at half an ounce per 2-lb loaf. With decker ovens a double draw-plate may be used, the feet of the pedestal supporting the upper draw-plate running on a rail outside, but parallel to the rail on which the lower draw- plate runs. This arrangement, however, is more applicable to small than large ovens. Or the lower oven may be fitted with a draw-plate while the upper oven is served with a peel. The draw-plate being at a lower level than the sole of an ordinary oven, the upper deck may be worked with a peel without much difficulty.

The decker oven is, as its name implies, an oven built over another oven: in fact, sometimes a tier of three ovens is employed, placed •one above the other. The object is to secure a double or treble baking surface without a very much larger outlay on fuel than would be necessary for one oven. It is easy to understand that a double or three decker oven might be constructed under conditions where it would be impossible to place two or three ordinary ovens side by side. Practical bakers are somewhat divided as to the actual economy of the decker system; possibly it is a question of management. The upper oven is heated by the gases which have passed under the oven beneath. A double-decker oven on the flue principle could be heated by three flues, one beneath the lower oven, another passing between the crown of the lower and the sole of the top oven, and the third over the crown of the upper oven. If a third oven were built over the second, then a fourth flue would pass over the crown of the third and top

oven. In such an arrangement of flues the distribution of heat to the ovens would be fairly equal, but no doubt the lower oven would be the hottest. In addition to the flues, which should be straight and accessible for cleaning, there ought also to be auxiliary flues by which heat may be allowed to pass dampers to the upper portions of the series of ovens. In this way the heat of the upper oven or ovens can be regulated independently to a great extent of the bottom oven. The power of regulating the heat of the ovens is very necessary, because a baker doing what is called a mixed trade, that is to say, producing cakes and pastry in addition to bread, must work his ovens at varying temperatures. Cakes cannot be baked at the heat (about 450 F.) required by a batch of household bread. The richest fancy goods, such as wedding and Christmas cakes, require the coolest ovens. Flue ovens are best worked with coke, as coal is apt to choke the flues; retort coke is recommended in place of oven coke. An oven should be fitted with some kind of thermal register, and both high-temperature thermometers and pyrometers are used for this purpose. (G. F. Z.)

BREADALBANE, JOHN CAMPBELL, ist Earl of (c. 1636- 1717), son of Sir John Campbell of Glenorchy, Bart., and of the Lady Mary Graham, daughter of William, earl of Airth and Menteith, was born about 1636. He took part in the abortive royalist rising under Glencairn in 1654, and was one of those who urged Monk to declare a free parliament in England to facilitate the restoration. He sat in the Scottish parliament as member for Argyllshire from 1669 to 1674. As principal creditor he obtained in October 1672, from George, 6th earl of Caithness, a conveyance of his dignities, lands and heritable jurisdictions; and after the Iatter's death he was created on the 28th of June 1677 earl of Caithness and viscount of Breadalbane. In 1678 he married the widowed countess of Caithness, an economical step which saved him the alimentary provision of 12,000 merks a year he had covenanted to pay. In 1680 he invaded Caithness with a band of 700 men and defeated and dispossessed the earl's heir male. The latter, however, was subsequently confirmed in his lands and titles, and Campbell on the 13th of August 168 1 obtained a new patent with the precedency of the former one, creating him earl of Breadalbane and Holland, viscount of Tay and Paintland, Lord Glenorchy, Benederaloch, Ormelie and Weick in the peerage of Scotland, with special power to nominate his successor from among the sons of his first wife. In 1685 he was a member of the Scottish privy council. Though nomin- ally a Presbyterian he had assisted the intolerant and despotic

government of Lauderdale in 1678 with 1700 men. He is described as having " neither honour nor religion but where they are mixed with interest," as of " fair complexion, of the gravity of the Spaniard, cunning as a Fox, wise as a Serpent and supple as an Eel." : He was reputed the best headpiece in Scot- land. 2 His influence, owing to his position and abilities,

was greater than that of any man in Scotland after Argyll, and it was of high moment to King William to gain him and obtain his services in conciliating the Highlanders. Breadalbane at first carried on communications with Dundee and was implicated in the royalist intrigue called the " Montgomery plot," but after the battle of Killiecrankie in July 1689 he made overtures to the government, subsequently took the oath of allegiance, and was entrusted with a large sum of money by the government to secure the submission of the clans. On the 30th of June 1691 he met the Jacobite chiefs and concluded with them secret articles by which they undertook to refrain from acts of hostility till October, gaining their consent by threats and promises rather than by the distribution of the money entrusted to him, the greater part of which, it was believed, he retained himself. When asked to give an account of the expenditure he replied: " The money is spent, the Highlands are quiet, and this is the only way of accounting between friends." 3

On the 27th of August a proclamation was issued offering indemnity to all those who should submit and take the oath of allegiance before the ist of January 1692, and threatening all those who should refuse with a military execution and the penalties of treason. All the chiefs took the oath except Maclan, the chief of the MacDonalds of Glencoe, who postponed his submission till the 31st of December, and was then prevented from taking the oath till the 6th of January 1692 through the absence of a magistrate at Fort William, whither he had repaired for the purpose. This irregularity gave Breadalbane an immediate opportunity of destroying the clan of thieves which had for generations lived by plundering his lands and those of his neighbours. Accordingly, together with Argyll and Sir John Dalrymple (afterwards Lord Stair), Breadalbane organized the atrocious crime known as the " Massacre of Glencoe," when the unfortunate MacDonalds, deceived by assurances of friendship, and at the moment when they were lavishing their hospitality upon their murderers, were butchered in cold blood on the 13th of February 1692. Breadalbane's astuteness, however, prevented the disclosure of any evidence against him in the inquiry after- wards instituted in 1695, beyond the deposition of a person who professed to have been sent on Breadalbane's behalf to obtain a declaration of his innocence from Maclan's sons, who had escaped. The discovery of his former negotiations with the Jacobite chiefs caused his imprisonment in Edinburgh .Castle in September, but he was released when it was known that he had been acting with William's knowledge.

Breadalbane did not vote for the Union in 1707, but was chosen a representative peer in the parliament of Great Britain of 1713- 1 7 1 5 . His co-operation with the English governmen t i n securing the temporary submission .of the Highlands was inspired by no real loyalty or allegiance, and he encouraged the attempted French descent in 1708, refusing,

however, to commit himself to paper. On the occasion of the Jacobite rising in 1715 he excused himself on the 19th of September from obeying the summons to appear at Edinburgh on the ground of his age and infirmities; but nevertheless the next day visited Mar's camp at Logierait and afterwards the camp at Perth, his real business being, according to the Master of Sinclair, " to trick others, not to be trickt," and to obtain a share of the French subsidies. He had taken money for the whole 1 200 men he had promised and only sent 300. His 300 men were withdrawn after the battle of Sheriff muir, and his death, which took place on the 19th of March 171 7, rendered unnecessary any inquiry into his conduct. He married (1) Mary, daughter of Henry Rich, ist earl of Holland,

1 Memoirs of John Macky (Roxburghe Club, 1895), 121.

2 Corr. of Col. N. Hooke (Roxburghe Club, 1870), i. 49.

3 Note by Sir W. Scott in Sinclair's Mem. of Insurrection in Scotland (Abbotsford Club, 1858), 185.

by whom he had two sons, Duncan, styled Lord Ormelie, who was passed over in the succession, and John, 2nd earl of Breadalbane; (2) Mary, daughter of Archibald, marquis of Argyll, and widow of George, 6th earl of Caithness, by whom he had one son, Colin. By Mrs Mildred Littler, who has sometimes but probably in error been named as his third wife, he had a daughter, Mary. John Campbell, 2nd earl of Breadalbane (1662-1752), an eccentric nobleman, who was known as " Old Rag," was suc- ceeded by his only son, John (c. 1696-1782). This earl was a diplomatist, being British ambassador to Denmark and to Russia, and a politician, being for a long time a member of the House of Commons and a supporter of Sir Robert Walpole, in addition to holding several official positions. All his sons having predeceased their father, the title passed on his death, on the 26th of January 1782, to a cousin, John (1762-1834), who became 4th earl and was created a British peer as marquess of Breadalbane in 1831. His son John, the 2nd marquess (1796- 1862), a prominent leader of the Free Church during the ecclesi- asticahdisputes in Scotland, died without sons in November 1862. The marquessate now became extinct, but the Scottish earldom passed to a cousin John Alexander (1824-1871), whose son and successor, Gavin (b. 1851), was created marquess of Breadalbane in 1885.

BREADALBANE, a large district of Perthshire, Scotland, bordered N. by

Atholl, E. by Strathtay, S. by Strathearn and W. by the districts of Argyll and Lome, and occupying some 1020 sq. m. Most of the surface is mountainous, Ben Lawers (3984 ft.), Ben More (3843), and Ben Lui (3708), being the prin- cipal hills. Loch Tay is the chief lake, and among the rivers are the Orchy, Dochart, Lochay, Lyon, Almond and the Tay (during the early part of its course). Population mostly centres in Aberfeldy, Fortingal, Kenmore and Killin. The soil is not cultivable excepting in some of the glens and straths. Game is plentiful, the lakes and rivers afford good sport, and the deer forests and shootings are valuable. The district has given the titles of earl and marquess to the Campbells of Glenorchy.

BREAD-FRUIT. This most important food staple of the tropical islands in the Pacific Ocean is the fruit of Artocarpus incisa (nat. ord. Moraceae) . The tree attains a moderate height, has very large, acutely lobed, glossy leaves, the male flowers in spikes, and the female flowers in a dense head, which by con- solidation of their fleshy carpels and receptacles form the fruit. The fruit is globular in shape, about the size of a melon, with a tuberculated or (in some varieties) nearly smooth surface. Many varieties of the tree are cultivated, the fruits of some ripening numerous seeds, which are eaten as chestnuts; but in the best kinds the seeds are aborted, and it is only these that are highly prized as vegetables. The tree is a native of the South Sea Islands, where its fruit occupies the important position that is held by cereals in temperate latitudes. The fruit, which on dis- tinct varieties ripens at different periods, affording a nearly constant supply throughout the year, is gathered for use just before it ripens, when it is found to be gorged with starchy matter, to which its esculent value is due. It may be cooked and prepared for use in a great variety of ways, the common practice in the South Sea Islands being to bake it entire in hot embers, and scoop out the interior, which when properly cooked should have a soft smooth consistence, fibrous only towards the heart, with a taste which has been compared to that of boiled potatoes and sweet milk. Of this fruit A. R. Wallace, in his Malay Archipelago, says: " With meat and gravy it is a vegetable superior to anything I know either in temperate or tropical countries. With sugar, milk, butter or treacle it is a delicious pudding, having a very slight and delicate but char- acteristic flavour, which, like that of good bread and potatoes, one never gets tired of." In the Pacific Islands the fruit is preserved for use by storing in pits, where the fruits ferment and resolve themselves into a mass similar in consistency to new cheese, in which state they emit an offensive odour; but after baking under hot stones they yield a pleasant and nutritious food. Another and more common method of preserving the fruit for use consists in cutting it into thin slices, which are dried

in the sun. From such dried slices a flour is prepared which fs useful for the

preparation of puddings, bread and biscuits, or the slices are baked and eaten without grinding. The tree yields other products of economic value, such as native cloth from the fibrous inner bark of young trees; the wood is used for canoes and articles of furniture; and a kind of glue and caulking material are obtained from the viscid milky juice which exudes from incisions made in the stem.

The bread-fruit is found throughout the tropical regions of both hemispheres, and its first introduction into the West Indies is connected with the famous mutiny of the " Bounty," and the remarkable history of a small company of the mutineers at Pitcairn Island. Attention was directed to the fruit in 1688 by

Artocarpus incisa, the Bread-fruit tree. Fig. I. Branch reduced about a 6th Fig. 5. Female flowers.

natural size, with cuneate-ovate Fig. 6. Single female flower pinnatifid leaves, male flowers in a separated, with ovary,

club-shaped deciduous catkin, and style and bifid stigma,

female flowers in rounded clusters. Fig. 7. Ovary. Fig. 2. Transverse section of the Fig. 8. Ovary laid open to

male spike with numerous flowers. show the ovule.

Fig. 3. Male flowers. Fig. 9. A variety of the ovary

Fig. 4. Single male flower separated, with 2 loculaments.

with a perianth in 2 segments and Fig. 10. Transverse section of a single stamen. a bilocular ovary.

Captain Dampier, and later by Captain Cook, who recommended its transplantation to the West Indian colonies. In 1787 the " Bounty " was fitted out under command of Lieutenant William Bligh {q.v.) to proceed to Tahiti to carry plants thence to the West Indian Islands; and it was after the cargo had been secured and the vessel was on her way that the mutiny broke out, and Lieutenant Bligh and some of his crew were turned adrift in a small boat in the open sea. The mutineers returned with the vessel to Tahiti, whence a number of them, with a few native men and women, sailed to the desolate and lone islet of Pitcairn. Lieutenant Bligh ultimately reached England, and was again commissioned to undertake the work of transplanting the plants, which in the year 1 79 2-1 793 he successfully accomplished.

A somewhat similar but inferior fruit is produced by an allied species, the Jack or Jak, Artocarpus integrifolia, growing in India, Ceylon and the Eastern Archipelago. The large fruit

is from 12 to 18 in. long by 6 to 8 in. in diameter, and is much eaten by the natives in India. This tree is chiefly valuable on account of its timber, which has a grain very similar to mahogany, and although at first light-coloured it gradually assumes much of the appearance of that wood.

BREAKING BULK, a nautical term for the taking out of a portion of the cargo of a ship, or the beginning to unload; and used in a legal sense for taking anything out of a package or parcel, or in any way destroying its entirety. It was thus important in connexion with the subject of bailment, involving as it did the curious distinction that where a bailee received possession of goods in a box or package, and then sold them as a whole, he was guilty only of a breach of trust, but if he " broke bulk " or caused a separation of the goods, and sold a part or all, he was guilty of felony. This distinction was abolished by the Larceny Act 1861, which enacted that whoever, being a bailee of any chattel, money or valuable security, should

fraudu- lently take or convert the same to his own use, or the use of any person other than the owner, although he should not break bulk or otherwise determine the bailment, should be guilty of larceny

(s- 3).

BREAKWATER. When a harbour (g.v.) is proposed to be established on an exposed coast, whether for naval or commercial purposes, to provide a protected approach to a port or river, or to serve as a refuge for vessels from storms, the necessary shelter, so far as it is not naturally furnished by a bay or project- ing headlands, has to be secured by the construction of one or more " breakwaters." These breakwaters, having to prevent the waves that beat upon the coast from reaching the site which they are designed to protect, must be made sufficiently strong to withstand the shocks of the waves during the worst storms to which they are exposed. It is therefore essential, before constructing a breakwater, to investigate most carefully the force, periods and duration of the winds from the quarters to which the work will be exposed, the distance of any sheltering land from the site in the most stormy direction, the slope of the beach and the depth of the sea in the neighbourhood of the shore, and the protection, if any, afforded by outlying shoals or sandbanks. In a tidal sea, the height required for a break- water is affected by the amount of tidal range; and the extent of breakwater exposed to breaking waves depends upon the difference in level between low and high water. The existence, also, of any drift of sand or shingle along the shore must be ascertained, and its extent; for the projection of a solid break- water out from the shore is certain to affect this littoral drift, which, if large in amount, may necessitate important modifica- tions in the design for the harbour.

Observations of the force and prevalence of the winds from the different quarters at the various periods of the year, and the instruments by which they are recorded, belong to the science of meteorology ; but such records are very valuable to the maritime engineer in indicating from which directions, open to the sea, the worst storms, and, consequently, the greatest waves, may be expected, and against which the most efficient shelter has to be provided. Moreover, it is necessary, .for constructing or repairing a breakwater, to know the period of the year when the calmest weather may be safely anticipated, and also the stormy season during which no work should be attempted, and in preparation for which unfinished works have to be guarded by protective measures. In the parts of the world subject to periodical winds, such as the monsoons, the direction and force of the winds vary with remarkable regularity according to the seasons; and even such uncertain occurrences as hurricanes and cyclones generally visit the regions in their track at definite periods of the year, according to the locality. Even in western Europe, where the winds are

extremely variable, violent gales are much more liable to beat upon the western and northern coasts in the winter months than at any other period of the year; whilst the calmest weather may be expected between May and August.

The size of waves depends upon the force of the wind, and the distance along which it blows continuously, in approximately

Winds.

Waves.

the same direction, over a large expanse of ocean. The greatest waves are, accordingly, encountered where the maximum distance in a certain direction from the nearest land, or, as it is termed, the " fetch," coincides with the line travelled by the strongest gales. The dimensions, indeed, of waves in the worst storms depend primarily on the extent of the sea in which they are raised; though in certain seas they are occasion- ally greatly increased by the exceptional velocities attained by hurricanes and typhoons, which, however, are fortunately restricted to fairly well defined and limited regions. Waves have been found to attain a maximum height of about 10 ft. in the Lake of Geneva, 17 ft. in the Mediterranean Sea, 23 ft. in the Bay of Biscay, and 40 ft. in the Atlantic Ocean; whilst waves of 50 to 60 ft. in height have been observed in the Pacific Ocean off the Cape of Good Hope, where the expanse of sea reaches a maximum, and the exposure to gales is complete. The length of large waves bears no definite relation to their height, and is apparently due, in the long waves often observed in exposed situations, to the combination of several shorter waves in their onward course, which is naturally dependent on the extent of the exposure. Thus waves about 560 ft. in length have been met with during severe gales in the Atlantic Ocean; whilst waves from 600 to 1000 ft. long are regarded as of common occurrence in the Pacific Ocean during storms.

The rate of transmission of the undulation also varies with the exposure; for the ordinary velocity of the apparent travel of waves in storms has been found to amount to about 22 m. an hour in the Atlantic Ocean, and to attain about 27 m. an hour off Cape Horn. The large waves, however, observed in mid-ocean do not reach the coast, because their progress is checked, and their height and length reduced, by encountering the shelving sea-bottom, which diminishes the depth of water on approaching the shore; and the actual waves which have to be arrested by breakwaters depend on the exposure of the site, the existence of continuous deep water close up to the shore, and the depth in which the breakwater is situated. On the other hand, the height, and, consequently, the destructive force of waves, is increased on running up a funnel-shaped bay, by the increasing

concentration of the waves in the narrowing width, just as the tidal range of a moderate tidal current is much augmented by its passage up the Bay of Fundy, or up the Bristol Channel into the Severn estuary, or by filling the shallow enclosed bay of St Malo. This effect is intensified when the bay faces the direction of the strongest winds. Thus at Wick a mass of masonry weighing 1350 tons, placed at the head of the break- water projecting half-way across the bay and facing the entrance, was moved by the waves during a violent storm; and a portion of Peterhead breakwater, weighing 3300 tons, was shifted 2 in. in 1898, indicating a wave-stroke of 2 tons per sq. ft. South- westerly gales, blowing up the Gulf of Genoa, cause large waves to roll into the bay, reaching a height of about 21 ft. in the worst storms.

Where outlying sandbanks stretch in front of a coast, as for instance the Stroombank in front of Ostend and the adjacent shore, and the sandbanks opposite Yarmouth sheltering Yar- mouth Roads, large waves cannot approach the land, for they break on the sandbanks outside. Waves, indeed, always break when, on running up a shoaling beach, they reach a depth approximately equal to their height; and the largest waves which can reach a shore protected by intervening sandbanks, are those which are low enough to pass over the banks without breaking.

The force of the wind, as transmitted by degrees to the sea, is manifested as a series of progressing undulations without any material displacement of the body of water, each undulation transmitting its accumulated force to the next in the direction the wind is blowing, till at last, on encountering an obstacle to its onward course, each wave, no longer finding any water to which to communicate its energy, deals a blow against the obstacle proportionate to its size and rate of transmission; or on reaching shoal water near the shore, the undulation is finally transformed into a breaking wave rushing up the sloping beach,

till, on its energy being spent, it recoils back to the sea down the beach. A breaking wave concentrates its transmitted force on a portion of the water forming the undulation, which, conse- quently, strikes a more powerful blow over a limited area against any structure than the more distributed shock of a simple undulation beating against a vertical wall. Moreover, the recoil of broken waves down a sloping beach or rubble mound produces a greater scour than the simple reflection of an undulation from a vertical wall, especially where the depth is sufficient to provide a cushion of water below the undulation, protecting the toe of the wall from the wash of recoil.

Types of Breakwaters. — There are three distinct types of breakwaters: — (i) A simple rubble or concrete-block mound; (2) a mound for the bottom portion, surmounted on the top by a solid superstructure of masonry or concrete; and (3) an upright-wall breakwater, built up solid from the sea-bottom to the top. The second type forms a sort of combination of the first and third types; and each type presents several varieties. In a few harbours, two different types have been adopted for different situations at the same place; but generally the choice of type is determined by the materials available at the site for the construction of the breakwater, the nature of the sea-bottom and the depth into which the breakwater has to be carried.

I. Rubble and Concrete-Block Mound Breakwaters. — A rubble mound consists merely of a mass of rubble stone, just as it is obtained R hhl from a neighbouring quarry, tipped into the sea along a

" e . predetermined line, till the mound emerges out of water. moun . rj.ˆ e ruD ble stone is deposited, either from barges, as adopted for the construction of the detached breakwater sheltering Plymouth Bay, or from wagons, having hinged opening flaps at the bottom for dropping their load, run out from the shore along staging erected in the proposed line, according to the method employed for the outer breakwater enclosing Portland Harbour, and the north-east breakwater at Colombo Harbour. The mound thus deposited is gradually consolidated under the action of the sea ; and a tolerably stable form is by degrees attained by continued deposits of stone. This system of construction is very wasteful of materials, and can only be resorted to where extensive quarries close at hand are able to furnish readily and cheaply very large quantities of stone, especi- ally where, as at Portland and Table Bay, convict labour has been advantageously utilized in quarrying. When the site is very exposed, the large waves in storms, dashing over a rubble-mound breakwater, carry the stones on the top, if unprotected, over on to the harbour slope, and in recoiling down the outer slope, draw down the stones on the face, so that the top and sea slope of the mound need re- plenishing with a fresh deposit of stones after severe storms.

Under the action of the breaking and recoiling waves, the mound assumes a very flat slope on the sea side, from a few feet above high- water down to several feet below low- wafer level (fig. 1). The flatness

H.W.O.S.T

Concrete

blocks

with

rubble

mound.

Practically the chief point of importance is to cover the outer slope and the top of the mound with the largest stones that can be pro- cured, and where large stones are not readily obtainable concrete blocks furnish a very convenient substitute. These blocks are generally deposited as the outer covering on the top and sea slope of a rubble mound, as for example at the mound breakwaters in deep water sheltering Algiers harbour, and at the French perts of Cette and Bona on the Mediterranean; whilst they furnish the protection of the top and upper part of the sea slope of the rubble-mound extension of Marseilles breakwater down to 20 ft. below sea-level. At Alexandria, concrete blocks compose the outer half of the mound, sheltering the inner half consisting of small rubble (fig. 2) ; at Biarritz the mound breakwater is formed mainly of con- crete blocks, with rubble stone filling the inter- stices and on the top; whereas at the outer end of the western break- water at Port Said, pro- tecting the entrance to the Suez Canal, a bottom layer of rubble is sur- mounted by concrete blocks. These blocks are generally deposited at random; but at Cette (fig. 3), and at the breakwater in deep water at Civita Vecchia, the concrete blocks covering the rubble have been laid in stepped, horizontal courses. This arrangement necessitates more care and better appliances in construction; but, in compensation, the blocks so placed are less exposed to disturbance and injury by the waves.

Concrete blocks' possess the great advantages for breakwaters that they can be made wherever sand and shingle can be procured, and of a size only limited by the appliances which are available for

Fig. 2. — Alexandria Breakwater.

Fig. 1. — Table Bay Breakwater.

of the sea slope depends on the exposure of the site, and the limited size of the stones covering the outer portion of the mound; and its extent increases with the range of tide, as a large tidal rise exposes a greater length of slope to the action of the waves. This flattening of the sea slope greatly increases the amount of stone required for a rubble-mound breakwater, in proportion to the exposure and the range of tide; and the amount is also affected, but in a proportion- ately minor degree, by the depth in which the breakwater is situated. In order to avoid the injuries to which an ordinary rubble mound is subjected by waves, certain methods have been devised for

protecting the top and sea slope of the mound. For instance, the upper portion of Plymouth breakwater has been covered over by granite paving set in cement, to diminish the displacement of the stones by the waves. Frequently, on the continent of Europe, rubble mounds have been formed of materials so sorted that the smallest stones are placed in the centre of the lower part of the mound, and covered over along the slopes and top by layers of larger stones, increasing in size towards the outer part of the mound, so that the largest stones obtainable are deposited on the outside, and especially on the top and sea slope of the mound. This is, no doubt, theoretically the correct method of construction of rubble mounds exposed to the sea ; but it involves a considerable amount of trouble and expense.

Fig. 3. — Cette Breakwater.

handling them. In fact, in places where stone of any kind is difficult to procure at a reasonable cost, as for instance at Port Said, concrete blocks are indispensable for the construction of breakwaters. Large concrete blocks, moreover, by enabling a comparatively steep slope to be formed with them on the sea side of a mound breakwater, reduce considerably the amount of materials required, especially at exposed sites, and also for breakwaters extended into deep water, such as those of Algiers and Marseilles.

Occasionally, in the absence of suitable rubble stone, a mound

breakwater has been formed entirely with concrete blocks; and of this the main portion of the western breakwater at Port Said furnishes a notable example (fig. 4). Some- times, in exposed situations, the mounds of the composite type of breakwaters have been con- structed exclusively with con- crete blocks, such, for instance, as in the curved breakwater

Concrete

block

mound.

protecting the outer harbour at Leghorn, and in the central break- water in deep water sheltering the harbour of St Jean de Luz, and directly facing the Bay of Biscay. These large concrete blocks are deposited by cranes from staging, tipped into the sea from a sloping platform on barges, or floated out between pontoons, or slung out from floating derricks. This last method proved so expeditious for the upper blocks at Alexandria, that, in con- junction with the tipping of the lower blocks from the inclined planes on the decks of barges and the

deposit of the rubble from ”’ •••••■•’ ‘v— •■’■:■’•■;• .’•’.■. •■-■v..—.-

hopper barges, provided

*W°w th ˆ flaps f° r * he Fig. 4 .Port Said Western Breakwater, higher portions, the de ˆ*

tached breakwater, nearly 2 m. long, sheltering a very spacious

harbour, was constructed in two years (1870-1872). Sometimes,

when a mound breakwater has been raised out of water, advantage

is taken of a calm period of the year and a low tide to form large

blocks of concrete within timber framing on the top of the mound,

so as to provide a very efficient protection.

The large masses composing mound breakwaters give them great stability against the attacks of the sea; and, moreover, the wide base of the mounds enables them to be deposited on a sandy or silty sea-bottom, without any fear of settlement or undermining. A mound breakwater, however, has the disadvantages of requiring a large amount of material, and of occupying a wide space on the bed of the sea, more especially where the mound consists of rubble stone and is in deep water, so that the system, though simple, is costly, and is unsuited for harbours where the available space to be sheltered is limited. Nevertheless, a mound breakwater can be rapidly constructed by the employment of a large number of barges ; and by the adoption of large concrete blocks, the quantity of materials and the space occupied by the mound can be considerably reduced. This form of breakwater, with its long outer slope exposed to breaking waves, particularly where the tidal range is considerable, is, indeed, more subject to frequent small injuries than the other types, but they are readily repaired ; and a mound is not generally liable to the serious breaches which occasionally are formed in solid superstructures and upright walls in exceptional storms.

2. Breakwaters formed of a Mound surmounted by a Superstructure. —The second type of breakwater consists of a mound, composed of rubble or concrete blocks, or generally a combination of the two, carried up from the sea-bottom, on the top of which some form of solid superstructure is

erected. This superstructure reduces con- siderably the amount of materials required (which, on account of the slopes of the mound, increases rapidly with the height) in pro- portion to the depth at which the superstructure is founded; and the solid capping on the mound serves also to protect the top of the mound from the action of the waves. In the case, however, of a mound breakwater, portions of the highest waves generally pass over the top of the mound, and also to some extent expend their force in passing through the interstices between the blocks ; whereas a superstructure presents a solid face to the impact of the waves. A superstructure, accordingly, must be very strongly built in proportion to the exposure, and also to the size of the waves liable to reach it, which depends upon the height andflatness of the slope of the mound just in front of it on the sea side. Special care, more- over, has to be taken to prevent the superstructure from being undermined ; for the waves in storms, dashing up against this nearly vertical, solid obstacle, tend in their recoil down the face to scour out the materials of the mound at the outer toe of the superstructure, and thereby undermine it, especially where the superstructure is founded on the mound near low-water level, and there is, therefore, no adequate cushion of water above the mound to diminish the effect of the recoil on the foundation.

The mound constituting the lower portion of the composite type of breakwater has been formed in the same varied way as simple mound breakwaters, namely, of rubble, sorted rubble, rubble protected by concrete blocks, and wholly of concrete blocks. The only differences introduced in the mound in this case are, that it is not carried up so high, that the top portion covered by the super- structure needs no further protection, and that special protection has to be provided on the slope of the mound adjacent to the outer toe of the super- structure.

The forms of the superstructures exhibit consider- able variations, ranging from a few concrete blocks laid in courses on the top of the mound, or t cT a P avm S furnishing a quay protected by a structures. narrow p ara p et wa n on the sea side, up to

a large, solid structure, only differing from an upright- wall breakwater in being founded upon a mound, instead of on the sea-bottom. Notwithstanding, however, this great variety in design, these break- waters may be divided into two distinct classes, namely, breakwaters having their superstructures founded at or near low-water level, and breakwaters with superstructures founded some depth below low water. The object in the first case is to lay the foun- dations of the superstructure on the mound at the lowest level consistent with building a solid struc- ture with blocks set in mortar, out of water, in the ordinary manner; and, in the second case, to stop the raising of the mound at such a depth under water as to secure it

from dis- placement by the waves. In fact, the solidity and facility of construction of the superstructure were the primary considerations in the older form of breakwater ; whereas the stability of the mound and the avoidance of the undermining of the superstructure have been regarded as the most important provisions in the more modern form.

Well-known examples of breakwaters formed of a rubble mound surmounted by a superstructure founded at or near low water or sea-level, are furnished by Cherbourg and Holyhead breakwaters, the inner breakwater at Portland, and the breakwaters at Marseilles, Genoa, Civita Vecchia, Naples, Trieste and other Mediterranean ports. The very ex- posed breakwater at Alderney was commenced on this principle about the middle of the 19th century; and the outer breakwaters at Leghorn and St Jean de Luz have super- structures founded at low water on concrete-block mounds.

The long, detached breakwater sheltering the series of basins formed by wide projecting jetties along the sea coast at Marseilles (see Dock), is a typical instance of a breakwater where a quay has been formed on the top of a sorted rubble mound, sheltered on the sea side by a high wall, or narrow superstructure, founded at sea- level, and protected on the sea slope of the mound from under- mining by large concrete blocks deposited at random (fig. 5). In this case the quay has been rendered accessible for vessels on the harbour side by a quay wall, formed of concrete blocks deposited

Fig. 5. — Marseilles Breakwater, central portion.

one above the other, providing a vertical face to a depth of about 22 § ft. below sea-level; and a similar arrangement has been adopted at Trieste, and in a less effective manner at Civita Vecchia and Naples. At Marseilles, however, when the breakwater reached great depths, the quay was abandoned on account of the increased ex- posure, and the extension made of a simple rubble mound, protected on the sea side, from the top down to 20 ft. below sea-level, by large concrete blocks deposited at random.

The superstructures at Holyhead and Portland, being built on the old weak system of a sea wall and a harbour wall, with rubble filling between, are protected on the sea side by raising the rubble against them from low water up to high water of spring tides; whereas the superstructure of Cherbourg breakwater, being built solid and less exposed, is only protected on the sea side by large rubble and some concrete blocks, forming an apron raised slightly above low water. These three breakwaters are provided with a quay sheltered by a raised wall or promenade on the sea side; but as the mound on the harbour side is raised up to, or a little above low water, the quay is only accessible for vessels near high water. This, however, is of

comparatively little importance, since these quays, though very useful for access to the end of the breakwater in fairly calm weather, are inaccessible in exposed situations with a rough sea; and quays for the accommodation of vessels are better provided well within the sheltered harbour.

The outer portions of the main breakwaters at Genoa and at Naples (fig. 6), extending into depths of about 75 ft. and no ft. respectively, have been provided with superstructures, similar in type, but more solid than the superstructure at Marseilles; and the sorted rubble mounds upon which the superstructures rest are

Super- structures at low- water level

Fig. 6. — San Vincenzo Breakwater, Naples.

protected on the sea slope by stepped courses of concrete blocks from a depth of 26 ft. below sea-level, covered over at the top by a masonry apron forming a prolongation of the superstructure. The outer extension of the main breakwater at Civita Vecchia furnishes an interesting example of a composite form of breakwater, in which the rubble mound has been protected, and greatly reduced in volume and extent in deep water, by stepped courses of concrete blocks carried up from near the bottom of the mound (fig. 7).

The breakwaters in front of Havre, constructed in 1 896-1 907, for sheltering the altered entrance to the port, were formed of a sorted rubble mound, protected on the sea slope by concrete blocks, and raised a little above low water of spring tides, upon which large blocks of masonry, built on land, were deposited with their upper surfaces about 18 in. above low water of neap tides. As soon as settlement of the mound under the action of the sea appeared to have ceased, these masonry blocks were connected together by filling the spaces between them with masonry; and a solid masonry superstructure was built during low tide on this foundation layer, as shown in fig. 8.

The breakwaters constructed for forming harbours on the sea coast of the United States are almost all rubble-mound breakwaters. The two old detached breakwaters sheltering Delaware Harbour near the south-eastern extremity of Delaware Bay, were formed of simple rubble mounds raised about 13 ft. above low water; but in closing the gap between them towards the close of the 19th century, the rubble mound was stopped at low water, and a sort of superstructure, consisting of stepped courses of large

rectangular blocks of stone on the sea and harbour sides, with tightly packed rubble between them and capped across the top for a width of 20 ft. with a course of large blocks, was raised to 14 ft. above low water, resembling, on a

Fig. 7.— Civita Vecchia Outer Breakwater.

small scale, the upper part of the Civita Vecchia mound (fig. 7). A similar construction was adopted for the new breakwater formed in 1897-1901 forprovidinga harbour of refuge at the mouth of Delaware Bay ; but in this instance the mound was made considerably wider at the top, and had to be protected along the toe of the superstructure on the sea side by large stones. The same form of superstructure., also, on a narrower base, was resorted to for a breakwater in deeper water at San Pedro in California with satisfactory results. When, however, a breakwater of the Delaware type was in progress for forming a harbour of refuge in Sandy Bay, Massachusetts, in front of Rockport to the north of Boston, the upper 13 ft. of the 600 ft. of completed superstructure were carried away during a severe storm in 1898, leaving only a portion about 5 ft. in height above low water, the average rise of tide there being 8| ft. The design was, accordingly, modified in 1902, by commencing the stepped courses of large stones at 12 ft. below mean low water on each slope, instead of at low water, raising this kind of superstructure to 22 ft. above low water in place of 18 ft., and capping the stepped courses at the top by large blocks of stone, 20 ft. long and 5 ft. deep, laid across the breakwater, which thus presented a marked resemblance to the upper section of the mound at Civita Vecchia.

*The breakwater at Sandy Bay just referred to, and the one at Civita Vecchia, which it somewhat resembles, approximate to that class of breakwater which has a superstructure founded * Pe Jt" below low-water level, so far as stepped courses of blocks structure can bg regarc j e d a s forming part of a superstructure; beiow low- faut ag the protect j on a ff or ded by these courses differs w , only in the arrangement of the blocks from that ob-*

eve ' tained by blocks deposited at random.it appears expedient

to restrict this class to the more solid structures, resembling upright- wall breakwaters, founded on a mound at some depth below low water. As the main object of this class of breakwater is to keep the mound below the zone of disturbance by waves in severe storms, it is evident that the depth at which the superstructure is founded

should vary directly with the exposure of the site, h.w.o.s.t. anc j inversely with the size of the materials form- ing the mound.

The depth at which waves striking against a superstructure may affect a rubble mound near its toe by the recoil, has been only very gradually realized. Thus, in 1847, the Alderney breakwater.

Fig. 8. — Havre Breakwater.

though fully exposed to the Atlantic Ocean, was begun with a super- structure founded at low water of spring tides upon a rubble mound ; but within two years the foundations had to be carried down 12 ft. below low water, and this was adhered to till close to the head, though the breakwater, completed in 1864, extended 4700 ft. from the shore into a depth of 130 ft. at low tide, the rise of springs being 17 ft. The great recoil of the waves in storms from the promenade wall on the sea side of the superstructure, raised 33 ft. above low water, disturbed the sea slope of the mound along the outer portion, situated in depths of 80 to 130 ft. at low water, out to a distance of 90 ft. from the superstructure and to a depth of 20 ft. ; whilst the

outer toe of the superstructure was only preserved from being undermined by frequent deposits of stone along the sea face.

The south-west breakwater at Colombo Harbour, constructed in 1876-1884, facing the seas raised by the south-west monsoon, ex- tends into a depth of 39 ft. at low water, where the rise of tide is only 2 ft. at springs, and was built with a superstructure founded upon a rubble mound at a depth of 20 ft. below low water, but raised only 12 ft. above this level without any parapet, and protected along its sea face by an apron of concrete in bags. In this case, not only was the depth of the sea much less than at Alderney, but the small elevation of the superstructure above low water enabled a portion of the waves in storms to pass over it without materially impairing the shelter inside. These circumstances reduced the shock and recoil of the waves; and the greater depth of the foundations and the protection of the toe of the superstructure greatly diminished the danger of under- mining. Consequently, the Colombo breakwater has been preserved from the injuries to which the outer part of the Alderney breakwater succumbed. Nevertheless, in subse- quently constructing the north-west detached breakwater, less exposed to the south-west monsoon, but in somewhat deeper water (see Colombo), the experience of the action of the sea on the south-west breakwater led to the laying of the foundations of the superstructure on the rubble mound at 30I ft. below low water (fig. 9).

The breakwater for sheltering Peterhead Bay, where the rise of springs is n| ft., was begun in 1888, and designed to extend into a depth of 9J fathoms at low water (see Harbour). It was built as an upright wall upon the rocky

bottom for 1000 ft. from the shore; but owing to the increase in depth it was decided to construct the outer portion with a rubble base, surmounted by a super- structure originally designed to be founded 30 ft. below low water. As, however, during a storm in October 1898, the recoil of the waves from the breakwater, which is provided with a promenade wall rising about 35 ft. above low water, disturbed rubble to a depth of 365 ft., the superstructure has been founded 43 ft. below low water on the rubble base; and its outer toe is protected from being undermined by two rows of concrete blocks on the rubble mound.

Formerly, in constructing a large superstructure upon a rubble mound, it was a common practice to build a sea wall and a harbour wall several feet apart, and to fill up the intermediate space between them with rubble, so as economically to form a wide structure on the top of the mound,and provide an adequate width for a quay along the top. A sheltering wall was also generally erected on the sea side. This, for instance, was the system of construction adopted for the super- structures, founded at low water, of Holyhead breakwater, Portland inner breakwater, and St Catherine's, Jersey, breakwater. Alderney breakwater, the Tyne breakwaters and Colombo south-west break- water were also com- menced with a precisely similar method of con- struction. The system, however, possesses a Very serious defect for exposed situations, namely, that if once Fig. 9. — Colombo North- West Breakwater, the sea can force a small

opening through the sea wall, the scooping out of the rubble filling, and the overthrow of the thinner harbour wall are rapidly accomplished if the storm continues or recurs before repairs can be effected. Experience soon proved at Alderney and Tyne- mouth the unsuitability of the system for very exposed situations; and the intermediate rubble filling was replaced by solid hearting down to a certain depth. At Colombo, after the first 1326 ft. of the south-west breakwater had been built with two walls and intermediate rubble for the superstructure, as the exposure proved greater than had been anticipated, and a slight displacement of part of the sea wall, 24 ft. wide, had occurred, the rubble filling was dis- continued, and the two walls were united into a solid superstructure 34 ft. in width.

A difficulty experienced in constructing a solid superstructure on the top of a rubble mound consists in the settlement of the mound which takes place when the weight of the super- sioping- structure comes on it, in spite of the consolidation of the block rubble under the action of the sea for one or two years system. before the erection of the superstructure on it is under- taken. When the superstructure is carried out in long stepped- forward courses, irregular settlement is particularly liable to occur, as the weight is progressively imposed in an uneven manner on the yielding rubble, in proportion to the height of the rubble base and its deficiency in

compactness. The open joints between the blocks laid below low water enable the air to penetrate, on the recoil of the waves at low tide, into any internal fissures resulting from settlement ; and the following wave, on striking the superstructure,

Construc- tion of the super- structure.

compresses the air inside, which, on its expansion when the wave recedes, forces out any unconnected face stones. The hole thus formed is rapidly enlarged by the sea if the storm continues ; and a breach is eventually formed. The sloping-block system was, accord- ingly, devised to provide against the dislocation of superstructures by the inevitable irregular settlement, by forming them of a series of sloping sections, composed of concrete blocks laid at an angle, free to settle independently on the mound, as shown in fig. 10. In the first superstructure thus constructed, in 1869-1874, at the entrance to Karachi harbour, founded 15 ft. below low water on a rubble mound and 24 ft. high, the blocks in each section, consisting of two rows of three superposed blocks laid at an inclination of 76 shorewards, were entirely unconnected; and, consequently, though the superstructure offered as little opposition as practicable to the waves by having its top slightly below high water, the waves in a storm, forcing their way into the vertical joint between the two rows, threw some of the top 27-ton blocks of the inner row down on the harbour slope of the mound. This cause of damage was obviated in effecting the repairs, by connecting the top blocks with the next ones by stone dowels. The superstructures of the breakwaters forming Madras harbour, commenced in 1876, were similarly con- structed in sloping, independent sections, i\ ft. thick, composed of two distinct rows of four tiers of blocks founded upon a rubble mound 22 ft. below low water (the rise of tide at springs being 3J ft.), and raised 32 ft. above high water. The blocks in each row were connected by a tenon, projecting at the top of each block, fitting into a mortise in the block above it. The retention of the vertical joint, however, between the two rows led to the overthrow of the greater part of the superstructures of the outer arms at Madras, situated in a depth of 45 ft. and facing the Indian Ocean, during a cyclone of 1881. In the reconstruction of these superstructures, bond was introduced in the successive tiers of each sloping section ; and the blocks of the two upper tiers were cramped together. After

settlement on the mound had ceased, a thick capping of mass concrete was laid all along the top of the superstructure; and, finally, a mound of concrete blocks was deposited at random on the mound in front of the sea

face of the superstructure to break the force of the waves and pre- vent undermining. A similar wave-breaker, with blocks somewhat specially arranged, was deposited in front of the sloping concrete-block superstructure of the breakwater shelter- ing the Portuguese harbour of Marmagao on the west coast of India, more particularly with the object of preventing the undermining of the superstructure founded only 18 ft. below low water of spring tides, on a layer of rubble spread on the muddy sea-bottom, the settlement in this case being occasioned by the yielding of the soft clay bed. This breakwater having been commenced in 1884, sub-sequently to the failure at Madras, the superstructure, formed of concrete blocks weighing 285 to 37! tons, was built in accordance with the design adopted for the re- constructed outer arms at Madras, with the ex- ceptions that the separate sections were given a slope of 70 ° instead of 76 ° shorewards to ensure greater stability, that the superstructure was made 30 ft. in width instead of 24 ft., that the top tier of blocks in each section was secured to the next tier by two dowels, each formed of a bundle of four rails, penetrating 3I ft. into each tier, so as to enable the top courses to be more correctly aligned than with tenons and mortises, and that the outer side of the continuous concrete-in-mass capping was raised about 22 ft. above low water (fig. 11). The rise of spring tides at Marmagao is 6 ft.

At Colombo the superstructures of both the south-west and north-west breakwaters were built on the sloping-block system in sections 5i ft. thick, and built at an angle of 68° shorewards (fig. 10) ; and the blocks, from i6i to 31 tons in weight, were laid in bonded courses across each section, with four tiers of blocks in the south-west breakwater founded 20 ft. below low water on the rubble mound, and six tiers of blocks in the north-west breakwater, founded 30! ft. below low water. Five oblong grooves, moreover, were formed in moulding the blocks, in the adjacent faces of each sloping section, extending from top to bottom of the sections. These, when settlement on the mound had ceased, were filled with concrete in bags, which not only connected the tiers of blocks in each section together, but also joined the several sections to one another, and

RUBBLE MOUND.

Fig. 10. — Colombo North-West Break- water with Titan Crane.

Fig. 11. — Marmagao Breakwater.

effectually closed the transverse joints between the successive sections, which were further connected together by a continuous capping of concrete-in-mass along the whole length of the breakwater. These sloping blocks are laid by powerful overhanging, block- setting cranes, called Titans (see Cranes), which travel along the completed portion of the breakwater, and

lay the blocks in advance on the mound levelled by divers, as shown in fig. 10. The earlier Titans, employed for the sloping-block superstructures at Karachi and Madras, were constructed to travel only backwards and forwards on the completed work, with sufficient sideways movement of the little trolley travelling along the overhanging arm, from which the block is suspended at

the proper angle, to lay the blocks for each side of the superstructure. In later forms, how- ever, such for instance as the Titan laying the 14-ton blocks at Peter- head breakwater in horizontal courses, the overhanging arm is supported centrally on a ring of rollers, placed on the top of the truck on which the Titan travels, so that it can revolve and deposit blocks at the side of the superstructure for protecting the mound, as well as in advance of the finished work. These Titans possess the important advantage over the timber staging formerly employed for such breakwaters, that, in exposed situations, they can be moved back into shelter on the approach of a storm, or for the winter or stormy months, instead of, as in the case of staging, remaining out exposed to the danger of being carried away during stormy weather, or necessitating loss of time in erection at the beginning of the working season.

Though composite breakwaters are still occasionally constructed with a superstructure founded on a rubble mound at, or above, low- water level, these breakwaters are now almost always constructed with the superstructure founded at some depth below low water, even at harbours on the continent of Europe, where formerly broad quays founded at sea-level, protected by a parapet wall and outer concrete blocks, were the regular form of superstructure adopted. The breakwater for the extension of the harbour at Naples provides an interesting example of this change of design. A solid super- structure, formed of large concrete blocks capped with masonry, about 50 ft. wide at the base, is laid on a high rubble mound at a depth of 31 ft. below mean sea-level, and provides a quay on the top, 24J ft. wide, protected on the sea side by a promenade wall, 10 ft. high and I2jft. wide at the top, raised 19! ft. above sea-level (fig. 12). In view of the increased depth at which superstructures are now founded upon rubble mounds, causing the breakwaters to approxi- mate more and more to the upright-wall type, it might seem at first sight that the rubble base might be dispensed with, and the superstructure founded directly on the bed of the sea. Two cir- cumstances, however, still render the composite form of break- water indispensable in certain cases: (1) the great depth into which breakwaters have sometimes to extend, reaching about 56 ft. below low water at Peterhead, and 102 ft. below mean sea-level at Naples; and (2) the necessity, where the sea-bottom is soft or liable : to be eroded by scour, of interposing a wide base between the upright superstructure and the bed of the sea.

Fig. 12. — Naples Harbor Extension Breakwater.

The injuries to which composite breakwaters appear to have been specially subject must be attributed to the greater exposure and depth of the sites in which they have been frequently constructed, as compared with rubble mounds or upright walls. The latter types, indeed, are not well suited for erection in deep water, in the first case, on account of the very large quantity of materials required

for a high mound with flat slopes, and in the second, owing to the increased pressure of air under which divers have to work in laying blocks for an upright wall in deep water. The ample depth in which superstructures are founded, the due protection afforded to their outer toe, the adoption of the sloping-block system for their con- struction, and the dispensing in most cases with a high sheltering wall on the sea side of the superstructure, render modern super- structures as stable as upright-wall breakwaters of similar height. Nevertheless, superstructures require to be given a greater thickness than similar upright walls, because the greater depth of water in which such composite breakwaters are built causes them to be exposed to larger waves under similar conditions.

The superstructures of composite breakwaters erected by the United States for harbours on the shores of Lake Superior were formerly in some cases composed of timber cribs floated into position and sunk by filling them with rubble stone. On account of the cheap- ness of timber several years ago in those regions, this simple mode of construction was also economical, even though the rapid decay of the timber in the portions of the cribs where it was alternately wet and dry involved its renewal about every fifteen years on the average. Owing, however, to the fact that the price of timber has increased considerably, whilst that of Portland cement has been reduced, durable concrete superstructures are beginning to be substituted for the rapidly decaying cribwork structures.

With the exception perhaps of the Alderney breakwater, which, owing to its exceptional exposure and the unparalleled depth into which it extended, had its superstructure so often breached by the sea that, owing to the cost of maintenance, the inner portion only has been kept in repair, the composite breakwater of Bilbao harbour has probably proved the most difficult to construct on account of its great exposure. The original design consisted of a wide rubble mound up to about i6§ ft. below low water, a mound of large concrete blocks up to low water of equinoctial spring tides,

and a solid masonry superstructure well protected at its outer toe by a projection of masonry, and raised several feet above high water, forming a quay sheltered by a promenade wall. The rise of equinoctial spring tides at the mouth of the river Nervion is 14J ft. In carrying out the work, however, the superstructure built in the summer months was for the most part destroyed by the following winter storms; and, accord- ingly, the superstructure was eventually constructed on a widened rubble base, so as to be sheltered to some extent by the outlying concrete-block mound already deposited, a system subsequently adopted in rebuilding the damaged portion of the North Pier at Tynemouth under shelter of the ruins of the previous work. The modified superstructure of the Bilbao breakwater was founded on the extended rubble mound at a depth of 16} ft. below low water, and formed of iron caissons partially filled with concrete and floated out, sunk in position, and filled up with concrete blocks and concrete. It thus consists of a continuous row of concrete blocks, each of them being 42! ft. in width across the breakwater, 23 ft. in length along the line of the breakwater, 23 ft. high, and weighing 1400 tons. These caisson blocks, raised 6| ft. above low water, form the base of the superstructure, upon which the upper part was built of concrete blocks on each face with mass concrete filling between them, forming a continuous quay, 24 ft. wide, raised 8 ft. above high tide, and slightly sheltered by a curved parapet block only 5 ft. high. The outer toe of the caisson blocks is protected from being undermined by two tiers of large concrete blocks laid flat on the rubble mound. This superstructure has successfully resisted the attacks of the Atlantic waves rolling into the bay. At this breakwater and at Tynemouth advantage has been taken of the protection unin- tentionally provided by previous failures, by which the waves are broken before reaching the superstructure and pier respectively; but instead of introducing a wave-breaker of concrete blocks, for a protection to the superstructure, as arranged at Marmagao (fig. 11) and the outer arms at Madras, it would appear preferable to increase the width of the solid superstructure, if necessary, as carried out at Naples (fig. 12), and to dispense with a parapet and keep the super- structure low, as being unsuitable for a quay in exposed situations, according to the plan adopted at Colombo (fig. 9).

3. Upright-Wall Breakwaters. — The third type of breakwater consists of a solid structure founded directly on the sea-bottom, in the form of an upright wall, with only a moderate batter on each face. This form of breakwater is strictly limited to sites where the bed of the sea consists of rock, chalk, boulders, or other hard bottom not subject to erosion by scour, and where the depth does not exceed about 40 to 50 ft. If a solid breakwater were erected on a soft yield- ing bottom, it would be exposed to dislocation from irregular settle- ment ; and such a structure, by obstructing or diverting the existing currents, tends to create a scour along its base ;

whilst the waves in recoiling from its sea face are very liable to produce erosion of the sea-bottom along its outer toe. Moreover, when the foundations for an upright-wall breakwater have to be levelled by divers, and the blocks laid under water by their help, the extension of such a breakwater into a considerable depth is undesirable on account of the increased pressure imposed upon diving operations.

The Admiralty pier at Dover was begun about the middle of the 19th century, and furnishes an early and notable example of an upright-wall breakwater resting upon a hard chalk bottom; and it was subsequently extended to a depth of about 42 ft. at low tide, in

connexion with the works for forming a closed naval harbour at Dover. This breakwater, the Prince of Wales pier of the commercial harbour, and the eastern breakwater and detached south breakwater for the naval harbour, were all founded on a levelled bottom, carried down to the hard chalk underlying the surface layer, by means of men in diving-bells. The extension of the Admiralty pier and the other breakwaters of Dover harbour consist of bonded courses of concrete blocks, from 26 to 40 tons in weight, as shown in figs. 13 and 14, the outer blocks above low water being formed on their exposed side with a facing of granite rubble. The blocks, composed of six parts of sand and stones to one part of Portland cement, moulded in frames, and left to set thoroughly in the block- yard before being used, are all joggled together, and above low-water level are bedded in cement and the joints filled with cement grout. The blocks were laid by Goliath travelling cranes running on temporary staging supported at intervals of 5oJ ft. by clusters of iron piles carried down into the chalk bottom. On each line of staging there were four Goliaths, preceded by a stage-erecting machine. The front Goliath was used for working a grab for ex- cavating the surface layer of chalk, which was finally levelled by divers, the second for carrying the diving-bell, the third for laying the blocks below low water, and the fourth for setting the blocks above low water. This succession of Goliaths enabled more rapid progress to be made than with a single Titan at the end of a break- water; but it involved a considerable increase in the cost of the plant, owing to the temporary staging required. The foundations were carried down from 4 to 6 ft. into the chalk bottom, the deepest being 53 ft. below low water of spring tides, and the average 47 ft. With a rise of tide at springs of 18 J ft., the average depth is thus approxi- mately 66 ft. at high tide, necessitating a pressure of 29 lb on the square inch, which is the limit at which men can work without in- convenience in the diving-bells. The breakwaters are raised about 1 1 ft. above high water of springs. The detached southern breakwater

^%a

H.W.O.

L.W.O.

'WW^'

Fig. 13. South Breakwater.

Dover Breakwater.

Fig. 14. Admiralty Pier Extension. was finished off at this level ; but the extended western breakwater, or Admiralty pier, is provided with a promenade parapet on its exposed side, rising 13 ft. above the quay; and the eastern break- water also has a parapet on its exposed eastern side, raised, however, only 9 ft. above its quay. The breakwaters are protected from scour along their outer toe by an apron of concrete blocks, extending 25 ft. out from their sea face.

The levelling of the foundations for laying the courses of an upright- wall breakwater is costly and tedious, even in chalk; and the expense and delay are considerably enhanced where c t the bottom is hard rock. Accordingly, in constructing T?" two breakwaters at the entrance to Aberdeen harbour / „ n< j a . on a bottom of granite in 1 870-1 877, concrete bags were tlons. laid on the sea-bed; and these bags, by adapting them- selves to the rocky irregularities, obviated levelling the bottom. They formed the foundation for the concrete blocks in the south break- water; and by the deposit of successive layers of 50-ton concrete bags till they rose above low water, they constituted the whole of the submerged portion of the north breakwater. The 50-ton bags were deposited from hopper barges towed out to the site ; and the portions of both breakwaters above low water were carried up with mass concrete. Subsequently, the breakwater at Newhaven was con- structed on a foundation of chalk, with 100-ton concrete bags up to low water, and mass concrete above. Still later, the two break- waters sheltering the approach to the river Wear (see Harbour) and the Sunderland docks were built with a foundation mound of concrete in bags, 56 to 116 tons in weight, on the uneven sea- bottom, raised slightly above low water of spring tides, on which a solid upright wall was erected, formed of concrete blocks on each side faced with granite, filled in the centre and capped on the top with mass concrete. The most exposed northern Roker breakwater, raised about 11 ft. above high water of springs where the rise is 14 ft. 5 in., is devoid of a parapet; but a subway formed near the top in each breakwater gives access to the light on the pierhead in stormy weather (fig. 15). These concrete bags are made by lining the hopper of the barge with jute canvas, which receives the concrete and is

sewn up to form a bag whilst the barge is being towed to the site. The concrete is thus deposited unset, and readily accommodates itself to the irregularities of the bottom or of the mound of bags; and sufficient liquid grout oozes out of the canvas when the bag is compressed, to unite the bags into a solid mass, so that with the

mass concrete on the top, the breakwater forms a monolith. This system has been extended to the portion of the super- structure of the eastern, little- exposed breakwater of Bilbao harbour below low water, where the rubble mound is of moderate height; but this application of the system appears less satisfac- tory, as settlement of the super- structure on the mound would produce cracks in the set con- crete in the bags.

Foundation blocks of 2500 to 3000 tons have been deposited for raising the walls on each side of the wide portion of the Zeebrugge breakwater (fig. 16) from the sea-bottom to above low water, and also 4400-ton Foanda- blocks along the narrow outer portion (see Harbour), tions with ˆ building iron caissons, open at the top, in the dry blnck ed ° tne Bruges ship-canal, lining them with concrete,

s ‘ and after the canal was filled with water, floating them out one by one in calm weather, sinking them in position by admitting water, and then rilling them with concrete under water from closed skips which open at the bottom directly they begin to be raised. The firm sea-bed is levelled by small rubble for receiving the large blocks, whose outer toe is protected from undermining by a layer of big blocks of stone extending out for a width of 50 ft. ; and then the breakwater walls are raised above high waˆer by 55-ton concrete blocks, set in cement at low tide; and the upper portions are completed by concrete-in-mass within framing.

Sometimes funds are not available for a large plant ; and in such cases small upright-wall breakwaters may be constructed in a moderate depth of water on a hard bottom of rock, chalk or boulders, by erecting timber framing in suitable lengths, lining it inside with jute cloth, and then depositing concrete below low water in closed hopper skips lowered to the bottom before releasing the concrete, which must be effected with great care to avoid allowing the concrete to fall through the water. The portion of the breakwater above low water is then raised

Fig. 15. — Sunderland Southern Breakwater.

Concrete monoliths.

Fig. 16. — Zeebrugge Harbour Breakwater with Quay.

by tide-work with mass concrete within frames, in which large blocks of stone may be bedded, provided they do not touch one another and are kept away from the face, which should be formed with concrete containing a larger proportion of cement. As long continuous lengths of concrete crack across under variations in temperature, it is advisable to form fine straight divisions across the upper part of a concrete breakwater in construction, as sub- stitutes for irregular cracks.

Upright-wall breakwaters should not be formed with two narrow walls and intermediate filling, as the safety of such a breakwater depends entirely on the sea-wall being maintained intact. A warning of the danger of this system of construction, combined with a high parapet, was furnished by the south breakwater of Newcastle harbour in Dundrum Bay, Ireland, which was breached by a storm in 1868, and eventually almost wholly destroyed; whilst its ruins for many years filled up the harbour which it had been erected to protect. In designing its reconstruction in 1897, it was found possible to provide a solid upright wall of suitable strength with the materials scattered over the harbour, together with an extension needed for providing proper protection at the entrance. This work was completed in 1906.

Upright-wall breakwaters and superstructures are generally made of the same thickness throughout, irrespective of the differences in depth and exposure which are often met with in different parts of the same breakwater. This may be accounted for by the general custom of regarding the top of an upright wall or superstructure as a quay, which should naturally be given a uniform width; and this view has also led to the very general practice of sheltering the top of these structures with a parapet. Generally the width is proportioned to the rnost exposed part, so that the only result is

an excess of expenditure in the inner portion to secure uniformity. When, however, as at Madras, the width of the structure is reduced to a minimum, the action of the sea demonstrates that the strength of the structure must be proportioned to the depth and exposure. In small fishery piers, where great economy is essential to obtain the maximum shelter at limited expense, it appears expedient to make the width of the breakwater proportionate to the depth. This was done in Babbacombe Bay; and in reconstructing the southern breakwater at Newcastle, Ireland, advantage was taken of a change in direction of the outer half to introduce an addition to the width, so as to make the strength of the breakwater proportionate to the increase

in depth and exposure. In large structures, however, uniformity of design may be desirable for each straight length oi breakwater ; though where two or more breakwaters or outer arms enclose a harbour, the design should obviously be modified to suit the depth and exposure. At Colombo harbour, the superstructure of the less exposed north-west breakwater has been made slightly narrower than that of the south-west breakwater; and a simple rubble mound shelters the harbour from the moderate north-east monsoon. In special cases, where a breakwater has to serve as a quay, like the Admiralty pier at Dover, a high parapet wall is essential; but in most cases, where a parapet merely enables the breakwater to be more readily accessible in moderate weather, it would be advisable to keep it very low, or to dispense with it altogether, as at the southern Dover breakwater, the northern breakwater at Sunderland, and the Colombo western breakwaters. This course is particularly expedient in very exposed sites, as a high parapet intensifies the shock of the waves against a breakwater and their erosive recoil. Moreover, when a light has to be attended to at the end of a breakwater, sheltered access can be provided by a subway, as at Sunderland.

Structures in the sea almost always require works of maintenance; and when a severe storm has caused any injury, it is most important to carry out the repairs at the earliest available moment, as the waves rapidly enlarge any holes that they may have formed in weak places. (L. F. V.-H.)

BREAL, MICHEL JULES ALFRED (1832-), French philologist, was born on the 26th of March 1832, at Landau in Rhenish Bavaria, of French parents. After studying at Weissenburg, Metz and Paris, he entered the Ecole Normale in 1852. In 1857 he went to Berlin, where he studied Sanskrit under Bopp and Weber. On his return to France he obtained an appointment in the department of oriental MSS. at the Bibliotheque Imperiale. In 1864 he became professor of com- parative grammar at the College de France, in 1875 member of the Academie des Inscriptions et Belles-lettres, in 1879 inspecteur- ge.ne.ral of public instruction for higher schools until the abolition of the office in 1888. In 1890 he was made commander of the Legion of Honour. Among his works, which deal mainly with mythological and philological subjects, may be mentioned: L' Etude des origines de la religion Zoroastrienne (1862), for which a prize was awarded him by the Academie des Inscriptions; Hercule et Cacus (1863), in which he disputes the principles of the symbolic school in the interpretation of myths; Le Mylhe d'(Edipe (1864); Les Tables Eugubines (1875); Melanges de mythologie et de linguistique (2nd. cd., 1882) ; Lecons de mots (1882, 1886), Dictionnaire elymologique latin (1885) and Grammaire laline (1890). His Essai de Semantique (1897), on the signification of words, has been translated into English by Mrs H. Cust with preface by J. P. Postgate. His translation of Bopp's Comparative Grammar

(1866-1874), with introductions, is highly valued. He has also written pamphlets on education in France, the teaching of ancient languages, and the reform of French orthography. In 1906 he published Pour mieux connaitre Homere.

BREAM (Abramis), a fish of the Cyprinid family, characterized by a deep, strongly compressed body, with short dorsal and long anal fins, the latter with more than sixteen branched rays, and the small inferior mouth. There are two species in the British Isles, the common bream, A. brama, reaching a length of 2 ft. and a weight of 12 lb, and the white bream or bream flat, A. blicca, a smaller and, in most places, rarer species. . Both occur in slow-running rivers, canals, ponds and reservoirs. Bream are usually despised for the table in England, but fish from large lakes, if well prepared, are by no means deserving of ostracism. In the days of medieval abbeys, when the provident Cistercian monks attached great importance to pond culture, they gave the first place to the tench and bream, the carp still being un- known in the greater part of Europe. At the present day, the poorer Jews in large English cities make a great consumption

of bream- and other Cyprinids, most of them being imported alive from Holland and sold in the Jewish fish markets. In America the name bream is commonly given to the golden shiner minnow (Abramis chrysoleucus) , to the pumpkin-seed sunfish (Eupomotis gibbosus), and to some kinds of porgy {Sparidae).

BREAST (a word common to Teutonic languages, cf. the Ger. Brust, possibly connected with an O. Sax. brustian, to bud), the term properly confined to the external projecting parts of the thorax in females, which contain the mammary glands (for anatomy, and diseases, see Mammary Gland); more generally it is used of the external part of the thorax in animals, including man, lying between the neck and the abdomen.

BREAUTE, FALKES DE (d. 1226), one of the foreign mercen- aries of King John of England, from whom he received in marriage the heiress of the earldom of Devon. On the outbreak of the Barons' War (121 5) the king gave him the sheriffdoms of six midland shires and the custody of many castles. He fulfilled his military duties with as much skill as cruelty. The royalists owed to his daring the decisive victory of Lincoln (12 17). But after the death of William Marshal, earl of Pembroke, Falkes joined the feudal opposition in conspiring against Hubert de Burgh. Deprived in 1223 of most of his honours, he was drawn into a rebellion by the imprudence of

his brother, who captured a royal justice and threw him into prison (1224). Falkes was allowed to go into exile after his submission, and endeavoured to obtain a pardon through the mediation of Pope Honorius III. But this was refused, and Falkes died at St Cyriac in 1226.

See Shirjey, Royal Letters, vol. i.; the Patent and Close Rolls; Pauli, Geschichte von England, vol. i. pp. 540-545. (H. W. C. D.)

BRECCIA, in petrology, the name given to rocks consisting of angular fragments embedded in a matrix. They may be composed of volcanic rocks, limestones, siliceous charts, sand- stones, in fact of any kind of material, and the matrix, which usually corresponds to some extent to the fragments it encloses, may be siliceous, calcareous, argillaceous, &c. The distinctive character of the group is the sharp-edged and unworn shapes of the fragments; in conglomerates the pebbles are rounded and water-worn, having been transported by waves and currents from some distance. There are many ways in which breccias may originate. Some are formed by ordinary processes of atmo- spheric erosion; frost, rain and gravity break up exposed surfaces of rock and detach pieces of all sizes; in this way screes are formed at the bases of cliffs, and barren mountain-tops are covered with broken debris. If such accumulations gather and are changed into hard rock by pressure and other indurating agencies they make typical breccias. Conglomerates often pass into rocks of this type, the difference being merely that the fragments are of purely local origin, and are unworn because they have not been transported. In caves breccias of limestone are produced by the collapse of part of the roof, covering the floor with broken masses. Coral reefs often contain extensive areas of limestone breccia, formed of detached pieces of rock which have been dislodged from the surface and have been carried down the steep external slopes of the reef. Volcanic breccias are very common near active or extinct craters, as sudden outbursts of steam bear fragments from the older rocks and scatter them over the ground.

Another group of breccias is due to crushing; these are produced in fissures, faults and veins, below the surface, and maybe described as " crush-breccias " and " friction- breccias." Very important and well-known examples of this class occur as veinstones, which may be metalliferous or not. A fissure is formed, probably by slight crustal movements, and is subse- quently filled with material deposited from solution (quartz, calcite, barytes, &c). Very often displacement of the walls again takes place, and the infilling or " veinstone " is torn apart and brecciated. It may then be cemented together by a further introduction of mineral matter, which may be the same as that first deposited or quite different. In important veins this process is often repeated several times: detached pieces of the countrv rock are mingled with the shattered veinstone, and generally

experience alteration by the percolating mineral solutions. Other crush-breccias occurring on a much larger scale are due to the folding of strata which have unequal plasticities. If, for example, shales and sandstones are bent into a series of arches, the sandstones being harder and more resistant will tend to crack, while the shales, which are. soft and flow under great pressures, are injected into the crevices and separate the broken pieces from one another. Continued movement will give the brecciated fragments of sandstone a rounded form by rubbing them against one another, and, in this way, a crush-conglomerate is produced. Great masses of limestone in the Alps, Scottish Highlands, and all regions of intense folding are thus converted into breccias. Cherts frequently also show this structure; igneous rocks less commonly do so; but it is perhaps most common where there have been thin bedded alternations of rocks of different character, such as limestone and dolerite, limestone and quartzite, shale or phyllite and sandstone. Fault-breccias closely resemble vein-breccias, except that usually their frag- ments consist principally of the rocks which adjoin the fault and not of mineral deposits introduced in solution; but many veins occupy faults, and hence no hard and fast line can be drawn between these types of breccia.

A third group of breccias is due to movement in a partly consolidated igneous rock, and may be called " fluxion-breccias." Lava streams, especially when they consist of rhyolite, dacite and some kinds of andesite, may rapidly solidify, and then become exceedingly brittle. If any part of the mass is still liquid, it may break up the solid crust by pressure from within and the angular fragments are enveloped by the fluid lava. When the whole comes to rest and cools, it forms a typical " volcanic-fluxion-breccia." The same phenomena are some- times exemplified in intrusive sills and sheets. The fissures which are occupied by igneous dikes may be the seat of repeated injections following one another at longer or shorter intervals; and the latter may shatter the earlier dike rocks, catching up the fragments. Among the older formations, especially when decomposition has gone on extensively, these fluxion and injection-breccias are often very hard to distinguish from the commoner volcanic-breccias and ash-beds, which have been produced by weathering, or by the explosive power of super- heated steam. (J. S. F.)

BRECHIN, a royal, municipal and police burgh of Forfarshire, Scotland. Pop. (1901) 8941. It lies on the left bank of the South Esk, 7J m. west of Montrose, and has a station on the loop line of the Caledonian railway from Forfar to Bridge of Dun. Brechin is a prosperous town, of great antiquity, having been the site of a Culdee abbey. The Danes are said to have burned the town in 1012. David I. erected it into a bishopric in n 50, and it is still a see of the Episcopal Church of Scotland. In 1452 the earl of Huntly crushed the insurrection led by the earl of Crawford at the battle of

Brechin Muir, and in 1645 the town and castle were harried by the marquis of Montrose. James VI. gave a grant for founding a hospital in the burgh, which yet supplies the council with funds for charity. No trace remains of the old walls and gates of the town, but the river is crossed by a two- arched stone bridge of very early date. The cathedral church of the Holy Trinity belongs to the 13th century. It is in the Pointed style, but suffered maltreatment in 1806 at the hands of restorers, whose work, however, disappeared during the restoration completed in 1902. The western gable with its flamboyant window and Gothic door and the massive square tower are all that is left of the original edifice. The modern stained glass in the chancel is reckoned amongst the finest in Scotland. Immediately adjoining the cathedral to the south- west stands the Round Tower, built about 1000. It is 86f ft. high, has at the base a circumference of 50 ft. and a diameter of 16 ft., and is capped with a hexagonal spire of 18 ft., which was added in the 15th century. This type of structure is somewhat common in Ireland, but the only Scottish examples are those at Brechin, Abernethy in Perthshire, and Egilshay in the Orkneys. Brechin Castle played a piominent part in the Scottish War of Independence. In 1303 it withstood for twenty days a siege in

force by the English under Edward I., surrendering only when its governor, Sir Thomas Maule, had been slain. From the Maule family it descended to the Dalhousies. Its library contains many important MSS., among them Burns's correspondence with George Thomson, and several cartularies including those of St Andrews and Brechin. In the Vennel (alley or small street) some ruins remain of the maison dieu, or hospitium, founded in 1256 by William of Brechin. Besides these historical buildings the principal public structures include Smith's school, the municipal buildings, the free library, the episcopal library (founded by Bishop Forbes, who, as well as Bishop Abernethy- Drummond, presented a large number of volumes). The principal industries include manufactures of linen and sailcloth, bleaching, rope-making, brewing, distilling, paper-making, in addition to nurseries and freestone quarries. Brechin — which is controlled by a provost, bailies and council- — unites with Arbroath, Forfar, Inverbervie and Montrose to return one member to parliament.

Edzell (pronounced Edyell, and, locally, Aigle) lies about 6 m. north of Brechin, with which it is connected by rail. It is situated on the North Esk and near the West Water^ which falls into the Esk 2 m. south-west. Edzell is on the threshold of romantic Highland scenery. The picturesque ruins of Edzell Castle lie a mile to the west of the town. Once the seat of the

Lindsays the estate now belongs to the earl of Dalhousie. The church of the parish of Farnell, 35 m. south-east of Brechin, was erected in 1806 after the model, so it is stated,of the famous Holy House (Casa Santa) of Loreto in Italy. It was here that the old sculptured stone giving a version of the Fall was found. Between Farnell and Brechin lies Kinnaird Castle, the seat of the earl of Southesk.

BRECKINRIDGE, JOHN CABELL (1821-1875), American soldier and political leader, was born near Lexington, Kentucky, on the 21st of January 182 1. He was a member of a family prominent in the public life of Kentucky and the nation. His grandfather, John Breckinridge (1760-1806), who revised Jefferson's draft of the " Kentucky Resolutions " of 1798, was a United States senator from Kentucky in 1801-1805 and attorney-general in President Jefferson's cabinet in 1 805-1 806. His uncles, John Breckinridge (1797-1841), professor of pastoral theology in the Princeton Theological Seminary in 1836-1838 and for many years after secretary of the Presbyterian Board of Foreign Missions, and Robert Jefferson Breckinridge (1800-1871), for several years superintendent of public instruction in Kentucky, an important factor in the organization of the public school system of the state, a professor from 1853 to 1871 in the Danville Presbyterian Theological Seminary at Danville, Kentucky, and the temporary chairman of the national Republican convention of 1864, were both prominent clergymen of the Presbyterian Church. His cousin, William Campbell Preston Breckinridge (1837-1904), was a Democratic representative in Congress from 1885 to 1893. Another cousin, Joseph Cabell Breckinridge (1842-), served on the Union side in the Civil War, was a major-general of volunteers during the Spanish-American War (1898), became a major-general in the regular United States army in 1903, and was inspector-general of the United States army from 1899 until his retirement from active service in 1904.

John Cabell Breckinridge graduated in 1838 at Centre College, Danville, Kentucky, continued his studies at Princeton, and then studied law at Transylvania University, Lexington, Ken- tucky. He practised law in Frankfort, Kentucky, in 1 840-1 841 and in Burlington, Iowa, from 1841 to 1843, and then returned to Kentucky and followed his profession at Lexington. In 1847 he went to Mexico as major in a volunteer regiment, but arrived too late for service in the field. In 1849 he was elected a Democratic member of the Kentucky legislature, and in 1851-1855 he served in the national House of Representatives. President Pierce offered him the position of minister to Spain, but he declined it. In 1856 he was chosen vice-president of the United States on the Buchanan ticket, and although a strong pro-slavery and states rights man, he presided over the Senate with con- spicuous fairness and impartiality during the trying years before

the Civil War. In i860 he was nominated for the presidency by the pro-slavery seceders from the Democratic national conven- tion, and received a total of 72 electoral votes, including those of every Southern state except Virginia, Kentucky, Tennessee and Missouri. As vice-president and presiding officer of the Senate, it was his duty to make the official announcement of the election of his opponent, Lincoln. He succeeded John J. Crittenden as United States senator from Kentucky in March 1 86 1, but having subsequently entered the Confederate service he was expelled from the Senate in December 1861. As brigadier- general he commanded the Confederate reserve at Shiloh, and in August 1862 he became major-general. On the 5th of this month he was repulsed in his attack on Baton Rouge, but he won distinction at Stone River (December 31, 186 2-January 2, 1863), where his division lost nearly a third of its number. He took part in the battle of Chickamauga, defeated General Franz Sigel at Newmarket, Virginia, on the 15th of May 1864, and then joined Lee and took part in the battles of Cold Harbor on the 1st and on the 3rd of June. In the autumn he operated in the Shenandoah Valley, and with Early was defeated by Sheridan at Winchester on the 19th of September. Being transferred to the department of South-west Virginia, he fought a number of minor engagements in eastern Tennessee, and in January 1865 became secretary of war for the Confederate States. At the close of the war he escaped to Cuba, and from there went to Europe. In 1868 he returned to the United States and resumed the practice of law at Lexington, Kentucky, where he died on the 17th of May 1875.

BRECON, or Brecknock, a market town and municipal borough, the capital of Breconshire, Wales, 183 m. from London by rail, picturesquely situated nearly in the centre of the county, at the confluence of the Honddu with the Usk. Half a mile higher up the Tarell also falls into the Usk from the south. The ecclesiastical parish of Brecon consists of the two civil parishes of St John the Evangelist and St Mary, both on the left bank of the Usk, while St David's in Llanfaes is on the other side of the river, and was wholly outside the town walls. Pop. (1901) 5875. There is only one line of railway, over which several companies, however, have running powers, so that the town may be reached by the Brecon & Merthyr railway from Merthyr, Cardiff and Newport, by the Cambrian from Builth Wells, or by the Midland from Hereford and Swansea respectively. The Great Western railway has also a service of road motors between Abergavenny and Brecon. A canal running past Abergavenny connects Brecon with Merthyr.

The Priory church of St John, a massive cruciform building, originally Norman with Early English and Decorated additions, is the finest parish church in Wales, and even taking into account the cathedrals it is according to E. A. Freeman " indisputably the third church not in a state of ruin in the principality," its choir furnishing " one of the choicest examples

of the Early English style." Previous to the dissolution, a rood-screen bearing a gigantic rood, the object of many pilgrimages, stood to the west of the tower. The church was restored under Sir Gilbert Scott between 1861 and 1875. St Mary's, in the centre of the town, and St David's, beyond the Usk, are now mainly modern, though the former has some of the Norman arches of the original church. There is also a Roman Catholic church (St Michael's) opened in 1851, and chapels belonging to the Baptists, Calvinistic and Wesleyan Methodists, and to the Congregationalists. In Llanfaes there was formerly a Dominican priory, but in 1 542 Henry VIII. granted it with all its possessions to a collegiate church, which was transferred thither from Abergwili, and was given the name of Christ College. Many of the bishops of St David's during the 17th century occasionally resided here, and several are also buried here. A small part of the revenues went to the maintenance of a grammar-school, but in 1 84 1 the collegiate body was dissolved, and its revenues, then amounting to about £8006 a year, were transferred to the ecclesiastical commissioners. In 1853 Henry VIII. 's charter was repealed, and under a chancery scheme adopted two years later, £1200 a year was appropriated for the school. New school

buildings were erected at a cost of about £10,000 in 1862, and these were enlarged at a cost of about £5000 in 1880. The chancel of the old Dominican chapel, dating from the 13th century, was restored in 1864, and is now the school chapel. There is also a Congregationalist theological college, built in 1869 at a cost of £12,000, and now affiliated with the university of Wales. The other chief buildings of the town are the shire hall built in 1842 in the Doric style from designs by T. H. Wyatt; the Guildhall; the barracks, which are the headquarters of two battalions of the South Wales Borderers; the county infirmary founded in 1832; and the prison (in Llanfaes) for the counties of Brecon and Radnor. There is a bronze statue of the duke of Wellington (erected in 1854) by John Evan Thomas, a native of the town. The town commands a magnificent view of the Brecknock Beacons, and is noted for its promenades on the banks of the Usk, and in the priory groves. Brecon is favourably known as a fishing centre, and there is also boating on the Usk and the canal. There are several houses of interest, notably the Priory and Dr Awbrey's residence (now called Buckingham House), both built about the middle of the 16th century, but the finest specimen is Newton (about a mile out, near Llanfaes) built in 1582 by Sir John Games (a descendant of Sir David Gam), but now a farmhouse. The " Shoulder of Mutton " Inn, now known as the " Siddons Wine Vaults," was the birthplace in 1755 of Mrs Siddons.

The name Brecknock is an anglicized form of Brycheiniog, the Welsh name of the territory of Brychan (whence the alter- native form of Brecon), a Goidelic chieftain, who gained posses- sion of the Usk valley in the 5th century. The Welsh name of the town, on the other hand, has always been Aber-Honddu (the estuary of the Honddu). There is no evidence of any settlement on the site of the present town prior to about 1092, when Bernard Newmarch, after defeating Bleddin ab Maenarch, built here a castle which he made his residence and the chief stronghold of his new lordship. For this purpose he utilized what remained of the materials of the Roman fort, 3 m. to the west, at Y Gaer, which some identify as Bannium. He subsequently founded, near the castle, the Benedictine priory of St John, which he endowed and constituted a cell of Battle Abbey. In time a town grew up outside the castle, and its inhabitants received a series of charters from the de Bohuns, into which family the castle and lordship passed, the earliest recorded charter being granted by Humphrey, 3rd earl of Hereford. Under the patronage of his great-grandson, the last earl of Hereford (who lived in great splendour at the castle), the town became one of the chief centres of trade in South Wales, and a sixteen days' fair, which he granted, still survives as a hiring fair held in November. Further charters were granted by Henry IV. (who married Hereford's co-heiress), by Henry V., who gave the town two more fairs, and by the Stafford family, to which the castle and lordship were allotted on the partition of the Bohun estates in 1421. Henry Stafford, 2nd duke of Buckingham, resided a good deal at the castle, and Morton, bishop of Ely, whose custody as a prisoner was entrusted to him, plotted with him there for the dethrone- ment of Richard III., for which Stafford was executed in 1483. His son, Edward, the 3rd duke, who was born in the castle in 1478, had the estates restored to him, but, in 1521, suffered a like fate with his father, and the lordship and castle then vested in the crown. Both were acquired in the next century by the ancestors of Viscount Tredegar, to whom they now belong. By a statute of 1535 Brecon was made the county town of the new shire of Brecknock, and was granted the right of electing one burgess to represent it in parliament, a right which it retained till it was merged in the county representation in 1885. A chancery and exchequer for the counties of Brecknock and Radnor were also established at Brecon Castle, and from 1542 till 1830 the great sessions, and since then the assizes, and at all times the quarter sessions for the county, have been held at Brecon. The borough had also a separate court of quarter sessions till 1835. The town was incorporated by a charter granted by Philip and Mary in 1556 and confirmed by Elizabeth in the nineteenth year of her reign. A charter granted by James II. was never acted upon.

The borough was placed under the Municipal Corporations Act 1835, and until then the town of Llywel, which is 10 m. off, formed a ward of the

borough. There were formerly five trade gilds in the town, the chief industries being cloth and leather manufactures. There are five ancient fairs for stock, and formerly each of them was preceded by a leather fair. The fairs held in May and November w T ere also for hiring, much of the hiring being now done at the Guildhall, and not in the streets as used to be the case.

During the Civil War the greater part of the castle and of the town walls (which with their four gates were until then well preserved) were demolished by the inhabitants in order to prevent the town being either garrisoned or besieged. Charles I., however, stayed a night at the priory house shortly after the battle of Naseby. The chief ruins of the castle are now enclosed in the grounds of the Castle Hotel, the principal object being Ely tower, where Bishop Morton was imprisoned.

Besides those already mentioned the persons of note born in the town include Henry Stafford, duke of Buckingham; Dr Hugh Price, founder of Jesus College, Oxford; Dr Thomas Coke, the first Wesleyan missionary bishop in America; and Theophilus Jones, the historian of the county. Henry Vaughan, the Silurist, at one time practised here as a doctor of medicine. (D. Ll. T.)

BRECONSHIRE, or Brecknockshire, an inland county in South Wales, and the fourth largest in all Wales, bounded N.W. by Cardigan, N. and N.E. by Radnor, E. and S.E. by Monmouth, S. by Glamorgan and W. by Carmarthen. The general aspect of the county is mountainous, and the scenery is marked by beauty and grandeur. The climate is moist but temperate and healthy, and the soil of the valleys, often consisting of rich alluvial deposits, is very fertile. The loftiest mountains in South Wales, extending from Herefordshire and Monmouthshire (where their eastern spurs form the Hatteral Hills) in a south- easterly direction into Carmarthenshire, completely encircle the county on the east and south except for the break formed by the Vale of Usk at Crickhowell. Their highest summit north of the Usk, on the eastern side, where they are known as the Black Mountains, or sometimes the Black Forest Mountains, is Pen y Gader (2624 ft.) between Talgarth and Llanthony, and on the south-west the twin peaks of the Mynydd Du (" Black Mountain ") or the so-called Carmarthenshire Vans or Beacons, only the higher of which, Fan Brycheiniog (2632 ft.), is, however, in Breconshire; while the centre of the crescent is occupied by the masses of the Brecknockshire Beacons or Vans (often called the Beacons simply), the highest point of which, Pen y Fan, formerly also known as Cadair Arthur, or Arthur's Chair, attains an altitude of 2910 ft. In the north, a range of barren hills, which goes by the general designation of Mynydd Eppynt (a name more properly limited to its central portion), stretches right across the county in a north-easterly

direction, beginning with Mynydd Bwlch-y-Groes on the boundary to the east of Llandovery, and terminating near Builth. In the dreary country still farther north there is a series of rounded hills covered with peat and mosses, the chief feature being Drygarn Fawr (2115 ft.) on the confines of Cardiganshire.

Of the valleys, the most distinguished for beauty is that of the Usk, stretching from east to west and dividing the county into two nearly equal portions. The Wye is the chief river, and forms the boundary between the county and Radnorshire on the north and north-east, from Rhayader to Hay, a distance of upwards of 20 m.; its tributary, the Elan, till it receives the Claerwen, and then the latter river, continue the boundary between the two counties on the north, while the Towy separates the county from Cardigan on the north-west. The hilly country to the north of the Eppynt is mainly drained by the Irfon, which falls into the Wye near Builth. The Usk rises in the Carmarthen- shire Van on the west, and flowing in a direction nearly due east through the centre of the county, collects the water from the range of the Beacons in the south, and from the Eppynt range in the north by means of numerous smaller streams, of which the Tarell and the Honddu (which join it at Brecon) are the most important, and it enters Monmouthshire near Abergavenny.

The Taff, the Nedd (with its tributaries the Hepste and the Mellte) and the Tawe, all rise on the south of the Beacon range, and passing through Glamorganshire, flow into the Bristol Channel, the upper reaches of the Nedd and its tributaries in the Vale of Neath being deservedly famous for its scenery. The mountains of the county constitute one of the best water-pro- ducing areas in Wales. Recognizing this, the corporation of Birmingham, under an act of 1892, acquired the watershed of the Elan and Claerwen, and constructed on the Elan three impound- ing reservoirs whence the water is conducted through an aqueduct to Birmingham (q.v.). Swansea obtains its chief supply from a reservoir of one thousand million gallons constructed in 1898-1006 on the Cray, a tributary of the Usk. A large industrial area around Neath is supplied from Ystradfellte. Merthyr Tydfil draws its supply from the lesser Taff, while Cardiff's main supply comes from the Great Taff valley, where, under acts of 1884 and 1894, two reservoirs with a capacity of 668 million gallons have been constructed and a third authorized.

In the east of the county, at the foot of the Black Forest Mountains, is Llyn Safaddan, or Brecknock Mere, now more generally known as Llangorse

Lake (from being partly situated in the parish of that name). It is about 3 m. long by 1 m. broad, being the largest lake in South Wales. Upon an artificial island in the lake traces of lake-dwellings were discovered in 1869, together with the bones of red deer, wild boar and Bos longifrons.

Geology. — The oldest rocks in Brecknockshire are the Llandeilo shales and intrusive diabases of pre-Llandovery age which near Builth extend across the Wye from Radnorshire; another patch with volcanic outflows comes up at Llanwrtyd, and at both places they give rise to mineral springs. Next follow the Bala Beds, which, with the succeeding Lower and Upper Llandovery shales, sandstones and conglomerates, form the sparsely populated sheepwalks and valleys which occupy most of the north-western part of the county. These rocks are much folded and the shales are locally cleaved into slates, while the sandstones and conglomerates form scarps and ridges. To the south-east of this region a narrow outcrop of Upper Llandovery, Wenlock and Ludlow sandstones and mudstones follows, uncomformably overlying the Llandeilo and Bala rocks, and dipping conformably under the Old Red Sandstone; they extend from Newbridge-on-Wye and Builth through Llangammarch (where there are mineral springs) towards Llandovery, while a tongue of Ludlow rocks brought up by faulting extends from Erwood on the Wye for 8 m. south-westwards into the Old Red Sandstone. The remainder and greater part of the county is occupied chiefly by the gently inclined Old Red Sandstone; in the dissected plateau of the Black Mountains north of Crickhowell the lower marls and cornstones are laid open, while south of Brecon the conglomeratic upper beds form the escarpment and plateaus of the Beacons. The southern edge of the county is formed by the scarps and moorlands of the Carboniferous Limestone and Millstone Grit (both of which form also the outlier of Pen-ceryg-calch north of Crickhowell), while the lowest beds of the Coal Measures of the South Wales coalfield are reached in the Tawe and Neath valleys (where the beds are much folded) and near Tredegar and Brynmawr. Glacial deposits spread over the lower grounds and striae occur at great heights on the Black Mountains.

Industries. — Agriculture is the chief industry, and the Agri- cultural Society of the county, dating from 1755, is the oldest in Wales. About one-fourth only of the area of the county is under cultivation, and the chief crops grown are wheat and barley, but above all, turnips and oats. The acreage devoted to any other crop is practically infinitesimal, though in the eastern part more attention is paid to fruit-growing than perhaps in any other part of South Wales. The farming is, however, chiefly pastoral, nearly one-third of the county is common or waste land, and its number of sheep (mainly of the Radnor Forest breed) far exceeds that of any other county in Wales. The" breeding of cobs and ponies comes next in importance, and thirdly that of cattle, now mostly Herefords, though Speed mentions a

native breed, long since extinct, all white with red ears. These, together with pigs, wool, butter, and (in small quantities) cheese, form the staple of a considerable trade with the Midlands and the industrial districts to the south and south- west. The farms are of comparatively small size, the average cultivated area of the holdings in 1894 being 63 acres, and the hired labour averages about two men for each farm. A large share of the work, especially on the highland farms, is done by the occupiers and members of their own families, with the aid,

where required, of an indoor servant or two. Few hands are employed in manufactures, but the mining industry is more important, coal being extensively worked — chiefly anthracite in the upper reaches of the Swansea and Neath valleys, and bituminous in the south-eastern corner of the county. There are also limestone and fireclay, firebrick and cement works, chiefly on the northern outcrop of the carboniferous limestone, as at Abernant in the Vale of Neath and at Penwyllt.

The Central Wales section of the London & North- Western railway from Craven Arms to Swansea crosses the north-west corner of the county, and is intersected at Builth Road by a branch of the Cambrian, which, running for the most part on the Radnorshire side of the Wye, follows that river from Rhayader to Three Cocks; the Midland railway from Hereford to Swansea runs through the centre of the county, effecting junctions at Three Cocks with the Cambrian, at Talyllyn with the Brecon & Merthyr railway (which connects the county with the industrial areas of East Glamorgan and West Monmouthshire), and at Capel Colbren with the Neath and Brecon line. The North- Western and Rhymney joint line skirts the south-eastern boundary of the county. Brecon is also connected with Newport by means of the Brecknock and Abergavenny Canal, which was completed in 1801 and is 35 m. in length. The Swansea Canal and that of the Vale of Neath have also their northern terminal within the county, at Ystradgynlais and Abernant respectively. The main roads of the county are probably the best in South Wales.

Population and Administration. — The area of the ancient county is 475,224 acres, with a population in 1891 of 57,031 and in 1901 of 59,907. The area of the administrative county is 469,301 acres. The only municipal borough is Brecon, which is the county town, and had in 1901 a population of 5741. The other urban districts are Brynmawr, Builth Wells and Hay, with populations of 6833, of 1805 and of 1680 respectively in 1901. Crickhowell and Talgarth are market towns, while Llanwrtyd Wells is a rapidly developing health resort. The county forms part of the South Wales circuit, and the assizes are held at Brecon. It had one court of quarter sessions, and is divided into ten petty sessional divisions. The borough of Brecon has a separate commission of the peace, but no separate

court of quarter sessions. There arc 94 civil parishes, while the ecclesiastical parishes or districts wholly or in part within the county number 70, of which 67 are in the diocese of St David's and the archdeaconry of Brecon, the remaining 3 being in the diocese of Llandaff . The county is not divided for parliamentary purposes, and returns one member to parliament. It contains a small part of the parliamentary borough of Merthyr Tydfil.

In the eastern parts and along the Wye valley, English has become the predominant language, but in the rest of the county, especially north of the Eppynt range, Welsh occupies that position. In 1901 about 51% of the population above three years could speak both English and Welsh, 38% could speak English only and 1 1 % Welsh only. The majority of the popula- tion is Nonconformist in religion, the chief denominations being the Baptists, Calvinistic Methodists and Congregationalists. Besides an endowed grammar-school (Christ College) at Brecon, there are in the county four secondary schools, established under the Welsh Intermediate Education Act 1899, viz. separate schools for boys and girls at Brecon, and dual schools at Builth and Brynmawr. Most of the county institutions are in the town of Brecon, but the joint asylum for the counties of Brecon and Radnor is at Talgarth. It was opened in February 1903. At Trevecca, near the same town, was a theological college for ministerial students attached to the Calvinistic Methodist body, but in October 1906 the institution was removed to Aberystwyth, and the buildings have since been utilized for a preparatory school belonging to the same body.

History. — There are no traces or record of Breconshire being inhabited before the Neolithic period, but to that period may be ascribed a number of cairns, menhirs and one cromlech (near Glanusk) . In Roman times the eastern half of the county formed part of the territory of the Silures, a pre-Celtic race, whose governing class at that time probably consisted of Brythonic

Celts. But an earlier wave of Celtic invasion represented by the Goidels had passed westwards along the valleys of the Usk and Wye, leaving traces in place-names (e.g. llwch, lake), and in the Ogham inscribed stones found at Glanusk, Trallwng and Tre- castle, and probably surviving into historic times around the Beacon range and farther south even to Gower and Kidwelly. The conquest of the district by the Romans was effected between about a.d. 75 and 80, and they established a frontier fort (which some have called Caer Bannau, identifying it as Bannium) some 3 m. out of the

present town of Brecon, with smaller stations on roads leading thereto at Y Gaer near Crickhowell, and at Capel Colbren in the direction of Neath. On the departure of the Romans, the Goidelic hill-tribes, probably with help from Gower and Ireland, seem to have regained possession of the Usk valley under the leadership of a chieftain of their own race, Brychan, who became the ancestor of one of the three chief tribes of hereditary Welsh saints. His territory (named after him Brycheiniog, whence Brecknock) lay wholly east of the Eppynt range, for the lordship of Buallt, corresponding to the modern hundred of Builth, to the west, remained independent, probably till the Norman invasion. Most of the older churches of central Brecknockshire and east Carmarthenshire were founded by or dedicated to members of Brychan's family.

From the middle of the 8th century to the 10th, Brycheiniog proper often bore the brunt of Mercian attacks, and many of the castles on its eastern border had their origin in that period. Subsequently, when Bernard de Newmarch and his Norman followers obtained possession of the country in the last quarter of the nth century, these were converted into regular fortresses. Bernard himself initiated this policy by building a castle at Talgarth on the Upper Wye, but in 1001 he moved southwards, defeated the regulus of Brycheiniog, Bleddyn ab Maenarch, and his brother-in-law Rhys ap Tewdwr, the prince of south-west Wales, and with materials obtained from the Roman fort of Caer Bannau, built a castle at Brecon, which he made his caput baroniae. Brycheiniog was then converted into a lordship marcher and passed to the Fitzwalter, de Breos, the Bohun and the Stafford families in succession, remaining unaffected by the Statute of Rhuddlan (1282), as it formed part of the marches, and not of the principality of Wales.

The Irfon valley, near Builth, was, however, the scene of the last struggle between the English and Llewelyn, who in 1282 fell in a petty skirmish in that district. The old spirit of inde- pendence flickered once again when Owen Glendower marched to Brecon in 1403. Upon the attainder of Edward, duke of Buckingham, in 1521, the lordship of Brecon with its depend- encies became vested in the crown. In 1536 it was grouped with a whole series of petty lordships marcher- and the lordship of Builth' to form the county of Brecknock with Brecon as the county town, and the place for holding the county court. The county returns one member to parliament, and has done so since 1536; the borough of Brecon, with the town of Llywel, had also a separate representative from the same date till 1885, when it became merged in the county.

BREDA, a fortified town in the province of North Brabant, Holland, at the confluence of the canalized rivers Merk and Aa, 15 m. by rail E.N.E. of Roozendaal. Pop. (1900) 26,296. It is connected by steam tramway with

Antwerp (30 m. S.S.W.), and with Geertruidenberg in the north, and the island of Duiveland on the west. The fortress of Breda, which was once considered impregnable, has been dismantled, but the town is still protected by extensive lines of fortification and lies in the midst of a district which can be readily laid under water. It has a fine quay, town- hall and park. There are several Roman Catholic and Protestant churches. The principal Protestant church is a Gothic building dating from the end of the 13th century, with a fine tower, and a choir of later date (1410). Among the many interesting monu- ments is the imposing tomb of the stadtholder Count Engelbert II. of Nassau and his wife. This is the work of Tomasino Vijicenz of Bologna, who, though a pupil of Raphael in painting, in sculpture followed Michelangelo, to whom the work is some- times ascribed. Since 1828 Breda has been the seat of a royal

military academy for all arms of the service. It also possesses a Latin school, an arsenal, and a modern prison built on the isolated-cell principle. The prison is in the form of a rotunda, 58 yds. in diameter, and covered by a high dome. In the middle is the office of the administration, and on the top of this a small watch-tower. Round the walls of the rotunda are the cells, 208 in number, and arranged in four tiers with balconies reached by iron staircases. Each cell measures 35 cub. yds., is provided with an electric bell communicating with the warder in the tower, heated by hot-air pipes, and lighted by day through a window on the outer wall of the rotunda, and from sunset till ten o'clock by electric light. The industries of Breda comprise the manufacture of linen and woollen goods, carpets, hats, beer and musical instruments. In the neighbourhood of the town are the villages of Ginneken and Prinsenhage, situated in the midst of pretty pine woods. They form favourite places of excursion, and in the woods at Ginneken is a Kneipp sanatorium.

History. — Breda was in the nth century a direct fief of the Holy Roman Empire, its earliest known lord being Henry I. (1098- 11 25), in whose family it continued, though, from the latter part of the 13th century, in the female line, until Alix, heiress of Philip (d. 1323), sold it to Brabant. In 1350 the fief was resold to John (Jan) of Polanen (d. 1377), the heiress of whose line, Joanna (d. 1445), married Engelbert of Nassau-Dillenburg (d. 1442). Henceforth it remained in the house of Nassau, passing ultimately to William I. (1533-1584), the first stadtholder of the Netherlands. Breda obtained municipal rights in 1252, but was first surrounded with walls in 1534 by Count Henry of Nassau, who also restored the old castle, originally built by John of Polanen in 1350. From this period until late in the 19th century it remained the most important of the line of fortresses along the Meuse. Breda was captured by surprise by the Spaniards in 1 581; but in 1590 it fell again into the hands of Maurice of Nassau, 68 picked men contriving to get into the town concealed under the turf in a

peat-boat. The so-called " Spaniard's Hole " still marks the spot where the peat-boat lay. Its surrender in 1625, after a ten months' siege, to the Spaniards under Spinola is the subject of the famous picture by Velasquez in the Museo del Prado in Madrid. In 1637 Breda was recaptured by Frederick Henry of Orange after a four months' siege, and in 1648 it was finally ceded to Holland by the treaty of Westphalia. During the wars of the French Revolution, it was taken by Dumouriez in 1793, evacuated soon after and retaken by Pichegru in 1795, after the whole of Holland had already succumbed to the French. In 1813, a sally being made by the French garrison on an advance- guard of the Russians under Benckendorff, the citizens of Breda again made themselves masters of the town.

Breda was the residence, during his exile, of Charles II., who, by the declaration of Breda (1660), made known the conditions of his acceptance of the crown of England. In 1696 William, prince of Orange and king of England, built the new castle, one of the finest buildings of the period, which now serves as the military academy. Breda also derives some celebrity from the various political congresses of which it has been the scene. In 1575 a conference was held here between the ambassadors of Spain and those of the United Provinces; in 1667 a peace was signed between England, Holland, France and Denmark; and in 1 746-1 747 the representatives of the same powers met in the town to discuss the terms of another treaty.

BREDAEL, JAN FRANS VAN (1683-1750), Flemish painter, son of Alexander van Bredael (d. 1720), who was also an artist, was born in Antwerp. He imitated the style of Wouverman and Breughel with such dexterity that even connoisseurs are often unable to distinguish his copies of their pictures from the originals. He visited England, where he was so well employed that in a few years he was able to retire to his native country with a competency. The earl of Derwentwater was one of his chief patrons. There were several other van Bredaels, who won honour as artists — notably Pieter (1622-1719), Alexander's father, and Jozef (1688-1739). They were formerly known as " Breda," but this apparently is incorrect, though it occurs as a signature on a picture by Jan Frans in the Amsterdam gallery.

BREDERODE, HENRY, Count of (1531-1568), was born at Brussels in 153 1. He was the descendant of an ancient race, which had for some centuries been settled in Holland, and had taken an active part in the affairs of war and peace. Count Henry became a convert to the Reformed

faith and placed him- self at the side of the prince of Orange and Count Egmont in resisting the introduction of the Spanish Inquisition and Spanish despotism into the Netherlands. In 1566 he was one of the founders cf the confederacy of nobles who bound themselves to maintain the rights and liberties of the country by signing a document known as " the Compromise." On the 5th of April of that year Brederode accompanied to the palace a body of 250 confederates, of whom he acted as the spokesman, to present to the regent, Margaret of Parma, a petition setting forth their grievances, called " the Request." It was at a banquet at the Hotel Culemburg on the 8th of April, presided over by Brederode, that the sobriquet of les Gueux, or " the Beggars," was first given to the opponents of Spanish rule. Brederode was banished from the Netherlands by Alva, and died in exile shortly afterwards at the early age of thirty-six.

BREDOW, GOTTFRIED GABRIEL (1773-1814), German historian, was born at Berlin on the 14th of December 1773, and became successively professor at the universities of Helmstadt, Frankfort-on-Oder and Breslau. He died at Breslau on the 5th of September 1814. Bredow's principal works are Handbuch der alten Geschichte, Geographic und Chronologie (Eutin, 1799; English trans., London, 1827); Chronik des ig. Jahrhunderts (Altona, 1801); Entwurf der Weltkunde der Alten (Altona, 1816); Weltgeschichte in Tabellen (Altona, 1801; English trans, by J. Bell, London, 1820); Grundriss einer Geschichte der merk- wiirdigsten Welthdndel von 1796-1810 (Hamburg, 1810).

Bredow's posthumous writings were edited by J. G. Kunisch (Breslau, 1S23), who added a biography of the author.

BREDOW, a village of Germany, in the kingdom of Prussia, immediately north of Stettin, of which it forms a suburb. Here are the Vulcan iron-works and shipbuilding yards, where the liners " Deutschland " (1900), the " Kaiserin Augusta Victoria " (1906), and the " George Washington " (1908), the largest vessel (722 ft. long, 27,000 tons) in the German mercantile marine, were built; and also sugar, cement and other factories.

BREECH (common in early forms to Teutonic languages), a covering for the lower part of the body and legs. The Latin braca or bracca is a Celtic word, probably cognate with the Teutonic. The word in its proper meaning is used in the plural, and, strictly, is confined to a garment reaching to the knees only. The meaning of " the hinder part of the body " is later than, and derived from, its first meaning; this sense appears in the " breech " or hinder part of a gun. The word is also found in " breeches buoy," a sling life-saving apparatus, consisting of a support of canvas breeches. The " Breeches Bible," a name for the Geneva Bible of 1560, is so called because " breeches " is used fo.r the aprons of fig-leaves made by Adam and Eve.

On the stage the phrase a " breeches " part is used when a woman plays in male costume. " Breeching " is a strap passed round the breech of a harnessed horse and joined to the shafts to allow a vehicle to be backed.

BREEDS AND BREEDING. Breeds may be defined as domestic varieties of animals or plants which man has been able to bring into existence and to maintain in existence. The process of breeding includes all the modifying influences which man may bring to bear on a wild stock for the purpose, conscious or unconscious, of establishing and maintaining breeds. Charles Darwin's Variation of Animals and Plants under Domestication (1868) was the starting-point of exact knowledge on this subject; when it appeared, it contained not only the best collection of empirical facts, but the only rational theory of the facts. The first relations between man and domesticated animals and plants were due to unconscious or accidental selection of wild stocks that tolerated the vicinity of man and that were useful or attractive to him. The new conditions must have produced modifications in these stocks, whether these were caused by a survival in each generation of individuals with the power of

response to the new environment, or were due to a conscious selection of individuals capable of such favourable response. The essence of the process, however, came to be a conscious selection in each generation of the best individuals, that is to say, of those individuals that seemed to man to be most adapted to his wants. The possibility of establishing a breed depended, there- fore, in the first place on the natural variability of wild animals and plants, then on the variations induced in animals and plants under subjection to the new conditions brought about by man's interference, next on the extent to which these variations, natural or artificial, persisted through the series of generations, and finally on man's intelligence in altering or maintaining the conditions of the environment, and in selective mating. The theory of breeds and breeding depends, in fact, on knowledge of variation, of modification by the environment, and of heredity. Any attempt to give an account of what actually has been done by man in establishing breeds would be little more than an imperfect summary of Darwin's work. The articles Heredity, Mendelism and Variation' and Selection show that what may be called the theoretical and experimental knowledge of variation and heredity is far in advance of the practical art of breeding. Even horticulturists, who have been much more successful than those who deal with animals, are still far from being able to predict the result of their selections and crossings. None the less it may be stated definitely that such prediction is already so nearly within the power of the practical breeder that it would be a waste of time to give a summary of the existing rule-of-thumb methods. The art of breeding is so immediately destined to become a science of breeding that existing knowledge and conceptions must be dismissed as of no more than historical interest. (P. C.

M.)

BREEZE. (1) A current of air generally taken as somewhat less than a " wind," which in turn is less than a " gale." The term is particularly applied to the light wind blowing landwards by day, " sea-breeze," and the counter wind, blowing off the land at night, " land-breeze." The word appears in Fr. brise (admitted by the Academy in 1762). The Span, brisa, Port. briza, and Ital. brezza are used for a wind blowing from the north or north-east. According to Cotgrave, Rabelais uses brize in the sense of bise, the name of a dry north or north-east wind prevalent in Switzerland and the bordering parts of France, Italy and Germany. The word is first used in English as applied to the cool sea-breeze blowing usually from the east or north-east in the West Indies and Atlantic sea-coast of Central America. It was then applied to sea-breezes from any quarter, and also to the land-breeze, and so to any light wind or current of air. (2) Fine ashes or cinders, the refuse of coal, coke and charcoal burning. This is probably from the O. Fr. brese, modern braise, a word connected with braser, whence Eng. brazier, a pan for burning coals, charcoal, &c.

BREGENZ (anc. Brigantium), the capital of the Austrian, province of Vorarlberg, as well as of the administrative district of Bregenz. In 1900 its population was 7595, German-speaking and Roman Catholic. It is situated at the south-east angle of the Lake ef Constance, and, besides communications by water with the other towns on the shores of that lake, is connected by : rail with Feldkirch on the Arlberg line (24 m.) and with Munich. The old town is on a hillock, crowned by the ancient castle, while the new town is built on the level ground at the foot of the hill. The fine parish church (dedicated "to St Gall) stands on another mound more to the south. In the local museum are collections of various kinds, especially of the Roman antiquities which have been dug up on the site of the old town. The position of the town on the lake has always made it an important port and commercial centre. Nowadays the main trade is in grain, but much is done also in cattle and in the products of the cotton-spinning factories of Vorarlberg.

We hear of counts of Bregenz as early as the 10th century, their heirs in the early 13 th century being the counts of Montfort (a castle north of Feldkirch), who gradually acquired most of the surrounding country (including Feldkirch and Bludenz). But little by little the Habsburgers, counts of Tirol since 1363

bought from them most of their domains — first Feldkirch in 1375, next Bludenz and the Montafon valley in 1394, finally the county of Bregenz in two parts, acquired in 1451 and 1523. In 1408 the Appenzellers were defeated before Bregenz, while in 1647, during the Thirty Years' War, the town was sacked by the Swedes under Wrangel. (W. A. B. C.)

BREHON LAWS, the English but incorrect appellation of the ancient laws of Ireland, the proper name for which is Fein- eachas, meaning the laws of the Feine or Feini (fainyeh), who were the free Gaelic farmers. Dlighthe Feine is another name for the laws, with the same meaning. Laws of universal applica- tion which could be administered only by duly qualified judges were called Cdin law, while minor laws administered by nobles and magistrates were called Urradhus law. Regular courts and judges existed in Ireland from prehistoric times. The Anglo- Irish word " Brehon " is derived from the Gaelic word Brethem (= judge).

The extant remains of these laws are manuscript transcripts from earlier copies made on vellum from the 8th to the 13th century, now preserved with other Gaelic manuscripts in Trinity College and the Royal Irish Academy, Dublin, the British Museum, Oxford University, some private collections and several libraries on the continent of Europe. The largest and most important of these documents is the Senchus Mdr or " Great Old Law Book." No copy of it now existing is complete, and some portions are missing from all. What remains of it occupies the first, second, and a portion of the third of the volumes produced by the Brehon Law Commission, which was appointed in 1852.

In the Annals of the Four Masters it is said: " The age of Christ 438, the tenth year of King Laeghaire (Lairy), the Senchus M6r and Feineachas of Ireland were purified and written." This entry has ample historical corroboration. Of many separate treatises dealing with special branches of the law, the Book of Aicill, composed of opinions or placita of King Cormac Mac Art, otherwise Cormac ua Quim, Ard-Rig of Erinn from a.d. 227 until 266, and Cennfaeladh the Learned, who lived in the first part of the 7th century, is the most important.

The text and earlier commentaries are in the Bearla Feini — the most archaic form of the Celtic or Gaelic language. From gradual changes in the living tongue through a long expanse of time many words, phrases and idioms in the Bearla Feini became obsolete, and are so difficult to translate that the official transla- tions are to some extent confessedly conjectural. In many cases only opening words of the original text remain. Wherever the text is whole, it is curt, elliptical, and yet rhythmical to a degree attainable only through long use. The rigorously authentic character of these laws, relating to, and dealing with, the actual realities of life, and with

institutions and a state of society nowhere else revealed to the same extent, the extreme antiquity both of the provisions and of the language, and the meagreness of continental material illustrative of the same things, endow them with exceptional archaic, archaeological and philological interest.

In the earliest times all learned men, whether specially learned in law or not, appear to have acted as judges. Gradually as literature and learning increased, judgments delivered by men without special legal training fell into disfavour. In the 1st century of the Christian era, when Conchobhar or Conor Mac Nessa was king of Ulster, a crisis was reached, the result of which was that no man was allowed to act as Brehon until he had studied the full law course, which occupied twenty years, and had passed a rigorous public examination. The course of study for Brehon and Ollamh, advocate and law-agent respectively, is carefully laid down in the law itself. The Brehonship was not an office of state like that of the modern judge, but a profession in which success depended upon ability and judgment. The Brehon was an arbitrator, umpire, and expounder of the law, rather than a judge in the modern acceptation. It appears, without being expressly stated, that the facts of a case were investigated and ascertained by laymen, probably by the Aireachtas — a local assembly or jury — before submission to a Brehon for legal decision. A Brehon whose decision was reversed

upon appeal was liable to damages, loss of position and of free lands, if any, disgrace, and a consequent loss of his profession. No Brehon had any fixed territorial jurisdiction. A party initiating proceedings could select any Brehon he pleased, if there were more than one in his district. Every king or chief of sufficient territory retained an official Brehon, who was pro- vided with free land for his maintenance. In ordinary cases the Brehon's fee was said to have been one-twelfth of the amount at stake.

Assemblies, national, provincial and local, were a marked characteristic of ancient Irish life. They all, without exception, discharged some legal functions, legislative or administrative, and even in those in which amusement predominated, the Cdin law was publicly rehearsed. Most of the assemblies were annual, some triennial, some lasted only a day or two, others a week and occasionally longer. All originated in pagan funeral or com- memorative rites, and continued to be held, even in Christian times, in very ancient cemeteries. They were called by different names — Feis, Aenach, Aireachtas, Dal, &c.

The Feis of Tara, in Meath, was from its origin seven centuries before Christ down to a.d. 560, mainly national and political, being convened by the Ard-Rig, held at his residence, presided over by him, and consisting of the provincial kings, tanists, flaiths, Brehons, warriors, historians, poets

and other distin- guished men from the whole of Ireland. It was due to be held every third year for the purpose of " preserving the laws and rules," and it might be called specially on any urgent occasion. After the statesmen had consulted, the laws were proclaimed, with any modifications agreed upon. Then the proceedings became festive, queens and great ladies taking part. The Feis of a.d. 560 was the last regular one held at Tara because the monarch ceased to reside there. One national assembly of an exceptional character was held at Tara in a.d. 697, by a decree of which women were emancipated from liability to military service.

The Aenach held annually at Tailltenn, also in Meath, was a general assembly of the people without restriction of rank, clan or country, and became the most celebrated for athletic sports, games and contests. Yet even here the laws were read aloud, and it is not without significance that the last national assembly held at Tailltenn under King Rhoderic O'Connor in n 68 was a political one.

The Ddl-Criche (= territorial assembly), held at Uisneach in Westmeath, was a gathering for political and quasi-legislative purposes. At one assembly there about a century before Christ, a uniform law of distraint for the whole of Ireland was adopted on the motion of Sen, son of Aige. This did not prevent the gatherings at Uisneach from being for ages celebrated for gaiety and amusement.

Each provincial kingdom and each tuath had assemblies of its own. Every flaith and flaith-fine was a member of a local assembly, the clan system conferring the qualification, and there being no other election.

An assembly when convened by the Bruigh-fer for the special purpose of electing a tanist or successor to the king was called a Tocomra.

Very careful provision is made for the preparation of the sites of great assemblies, and the preservation of peace and order at them is sanctioned by the severest penalties of the law. The operation of every legal process calculated to occasion friction, such as seizure of property, was suspended during the time the assemblies lasted.

The term Rig (reeh=rex, king) was applied to four classes or grades of rulers, the lower grades being grouped, each group being subject to one of their number, and all being subject to, and owing tribute and allegiance to the Ard-Rig (= supreme king of Erinn). The Ard-Rig had an official residence at Tara and the kingdom of Meath for his special use. The provincial king, Rig Cuicidh, also had an official residence and kingdom of his own, together with allegiance and tribute from each Rig-mor-Tuatha in his province, who in his turn received tribute and allegiance from each Rig-

Tuatha under subjection to him. The Rig-Tuatha received

tribute and allegiance from the flaiths or nobles in his tuath. The tuath was the political unit, and the ruler of it was the lowest to whom the term " king " was applied. For each payment of tribute a king always made some return. Every king was obliged, on his inauguration, to swear that he would govern justly and according to law, to which he remained always subject. The Ard-Rig was selected by the sub-kings and other leading men who legally constituted the Feis of Tara, the sub-kings by those under them in their respective spheres. No person not of full age, imperfectly educated, stupid, blind, deaf, deformed or other- wise defective in mind or body, or for any reason whatsoever unfit to discharge the duties or unworthy to represent the man- hood of the nation, could be king, even though he were the eldest son of the preceding king. "It is a forbidden thing for one with a blemish to be king at Tara."

Tuath, Cinel and Clann were synonyms meaning a small tribe or nation descended from a common ancestor. A king and clan being able, subject to certain limitations, to adopt new members or families, or amalgamate with another clan, the theory of common origin was not rigidly adhered to. Kinship with the clan was an essential qualification for holding any office or property. The rules of kinship largely determined status with its correlative rights and obligations, supplied the place of contract and of laws affecting the ownership, disposition and devolution of property, constituting the clan an organic, self- contained entity, a political, social and mutual insurance co- partnership. The solidarity of the clan was its most important and all-pervading characteristic. The entire territory occupied by a clan was the common and absolute property of that clan. Subject to this permanent and fundamental ownership, part of the land was set apart for the maintenance of the king as such. Warriors, statesmen, Brehons, Ollamhs, physicians, poets, and even eminent workers in the more important arts, were, in different degrees, rewarded with free lands for their respective public services. On the death of any person so rewarded, the land in theory reverted to the clan; but if like services continued to be rendered by the son'or other successor, and accepted by the clan, the land was not withdrawn. The successors of statesmen, for whom the largest provision was made, became a permanent nobility. Flaith (flah = noble chief) was a term applied to a man of this rank. Rank, with the accompanying privileges, juris- diction and responsibility, was based upon a qualification of kinship and of property, held by a family for a specified number of generations, together with certain concurrent conditions; and it

could be lost by loss of property, crime, cowardice or other dis- graceful conduct. The flaiths in every tuath and all ranks of society were organized on the same hierarchical pattern as royalty. A portion of land called the Cumhal Senorba was devoted to the support of widows, orphans and old childless people.

Fine (finna), originally meaning family, came in course of time to be applied to a group of kindred families or to a whole clan. From differences between incidental accounts written in different ages, it appears that the social system underwent some change. For the purpose of conveying some idea, one theory may be taken, according to which the fine was made up of seventeen clansmen, with their families, viz. the Geilfine consisting of the flaith-fine and four others in the same or nearest degree of kinship to the centre, and the Deirbhfine, Tarfine and Innfine, each consisting of four heads of families, forming widening concentric circles of kinship to which the rights and liabilities of the fine extended with certainty, but in diminishing degrees.

In course of time a large and increasing proportion of the good land became, under the titles so far described, limited private property. The area of arable land available for the common use of the clansmen was gradually diminished by these encroachments, but was still always substantial. A share of this was the birth- right of every law-abiding member of the Feini who needed it. To satisfy this title and give a start in life to some young men who would otherwise have got none, this land was subject to Gabhailcine (= clan- resumption), meaning that the clan resumed the whole area at intervals of a few years for a fresh distribution after some occupants had died, and young men by attaining

manhood had become entitled. Hence the Anglo-Irish word gavelkind. Anciently this re-distribution extended throughout the clan at the same time. Later it extended only to the land of a fine, each fine making its own distribution at its own time and in its own way as determined by the seventeen men above specified. In this distribution men might or might not receive again their former portions. In the latter case compensation was made for unexhausted improvements. This land could not be sold, nor evea let except for a season in case of domestic necessity. The Feini who used it had no landlord and no rent to pay for this land, and could not be deprived of it except by the clan for a crime. They were subject only to public tributes and the ordinary obligations of free men. Presumably their homesteads were not on this land and were not subject to Gabhailcine. Neither were the unfenced and unappropriated common lands — waste, bog, forest and mountain — which all clansmen were free to use promiscuously at will.

There was hardly any selling and little letting of land in ancient times. Flaiths and other persons holding large areas let to clansmen, who then became Ceiles, not land, but the privilege of feeding upon land a number of cattle specified by agreement. Flaiths and Bo-aires also let cattle to a ceile who had none or not enough, and this was the most prevalent practice. There were two distinct methods of letting and hiring — saer (= free) and daer (= base), the conditions being fundamentally different. The conditions of saer-tenure were largely settled by the law, were comparatively easy, did not require any security to be given, left the ceile free within the limits of justice to end the connexion, left him competent in case of dispute to give evidence against that of the flaith, and did not impose any liability on the fine of the ceile. By continued user of the same land for some years and discharge of the public obligations in respect of it in addition to the ciss or payment as tenant, a ceile became a sub- owner or permanent tenant and could not be evicted. There is no provision in these laws for evicting any one. For the hire of cattle a usual payment was one beast in seven per annum for seven years; after which the cattle that remained became the property of the hirer. A saer-ceile on growing wealthy might become a bo-aire. Daer-tenure, whether of cattle or of the right to graze cattle upon land, was subject to a ciss-ninsciss (= wearisome tribute), for the payment of which security had to be given. A man not in the enjoyment of full civil rights, if able to find security, could become a daer-ceile. A free clansman by becoming a daer-ceile lowered his own status and that of his fine, became incompetent to give evidence against that of a flaith, and could not end the connexion until the end of the term except by a large payment. The members of his fine were liable, in the degree of their relationship, to make good out of their own property any default in the payments. Hence this tenure could not be legally entered into by a free clansman without the permis- sion of his fine. Daer-ceiles were also exposed to casual burdens, like that of lodging and feeding soldiers when in their district. All payments were made in kind. When the particular kind was not specified by the law or by agreement, the payments were made according to convenience in horses, cattle, sheep, pigs, wool, butter, bacon, corn, vegetables, yarn, dye-plants, leather, cloth, articles of use or ornament, &c. As the clan system relaxed, and the fine lost its legal power of fixing the amounts of public tributes, which were similarly payable to the flaith, and neglected its duty of seeing that those tributes were duly applied, the flaith became able to increase these tributes with little check, to confuse them with rent, to confuse jurisdiction with ownership, and to exalt himself at the expense of his fellow- clansmen. A flaith by arranging that his tenants should make their payments at different periods of the year, secured a constant and copious supply without an inconvenient surplus.

People who did not belong to the clan and were not citizens were in a base condition and incompetent to appear in court in suit or defence except through a freeman. The Bothach (= cottier) and the Sen-cleithe (= old dependent) were people who, though living for successive generations attached to the families of flaiths, did not belong to the clan and had no rights of

citizenship. Fuidhirs, or manual labourers without property, were the lowest section of the population. Some were born in this condition, some clansmen were depressed into it by crime, con- sequences of war or other misfortune; and strangers of a low class coming into the territory found their level in it. The fuidhirs also were divided into saer and daer; the former being free by industry and thrift to acquire some property, after which five of them could club together to acquire rights corresponding to those of one freeman. The daer-fuidhirs were«tramps, fugitives, captives, &c.

Fosterage, the custom of sending children to be reared and educated in the families of fellow-clansmen, was so prevalent, especially among the wealthy classes, and the laws governing it are so elaborate and occupied such a large space, that some mention of it here is inevitable. Beyond mention, there is little to be said, owing to the absence of general principles in an infinity of specific details, mostly domestic and apparently trivial. A child in fosterage was reared and educated suitably for the position it was destined to fill in life. There was fosterage for affection, for payment and for a literary education. Fosterage began when the child was a year old and ended when the marriageable age was reached, unless previously terminated by death or crime. Every fostered person was under an obligation to provide, if necessary, for the old age of foster-parents. The affection arising from this relationship was usually greater, and was regarded as more sacred than that of blood relationship.

The solidarity of clan and fine in their respective spheres, the provisions of the system, the simple rural life, and the prevalence of barter and payments in kind, left comparatively little occa- sion for contracts between individuals. Consequently the rules relating to contract are not very numerous. They are, however, sufficiently solemn. No contract affecting land was valid unless made with the consent of the fine and in the presence of the Aire-Forgaill. Contracts relating to other kinds of property are more numerous. When important or involving a consider- able amount, they had to be made in the presence of a flaith or magistrate. The A irc-Coisring presided over most of the contracts of the common people. The parties to a

contract should be free citizens, of full age, sound mind, free to contract or not, and under no legal disability. " The world would be in a state of confusion if express contracts were not binding." From the repeated correlative dicta that " nothing is due without deserv- ing," and that a thing done " for God's sake," i.e. gratis, imposed little obligation, it is clear that the importance of valuable con- sideration was fully recognized. So also was the importance of time. " To be asleep avails no one "; " Sloth takes away a man's welfare." Contracts made by the following persons were invalid: (i) a servant without his master's authority; (2) a monk without authority from his abbot or manager of tempor- alities; (3) a son subject to his father without the father's authority; (4) an infant, lunatic, or " one who had not the full vigilance of reason "; (5) a wife in relation to her husband's property without his authority. She was free to hold and deal with property of her own and bind it by contract. If a son living with his father entered into a contract with his father's knowledge, the father was held to have ratified the contract unless he promptly repudiated it. " One is held to adopt what he does not repudiate after knowledge, having the power." Contract of sale or barter with warranty could be dissolved for fraud, provided action was taken within a limited time after the fraud had become known. Treaties and occasional very im- portant contracts were made " blood-covenants " and inviolable by drawing a drop of blood from the little finger of each of the contracting parties, blending this with water, and both drinking the mixture out of the same cup. The forms of legal evidence were pledges, documents, witnesses and oaths. In cases of special importance the pledges were human beings, " hostage sureties." These were treated as in their own homes accord- ing to the rank to which they belonged, and were discharged on the performance of the contract. If the contract was broken, they became prisoners and might be fettered or made to work as slaves until the obligation was satisfied. Authentic documents

were considered good evidence. A witness was in all cases important, and in some essential to the validity of a contract. His status affected the force of the contract as well as the value of his evidence; and the laws appear to imply that by becoming a witness, a man incurred liabilities as a surety. The pre- Christian oath might be by one or more of the elements, powers or phenomena of nature, as the sun, moon, water, night, day, sea, land. The Christian oath might be on a copy of the Gospels, a saint's crozier, relic or other holy thing.

These laws recognized crime, but in the same calm and deliberate way in which they recognized contract and other things seriously affecting the people. Although we find in the poems of Dubh- thach, written in the 5th century and prefixed to the Senchus Mor, the sentences, " Let every one die who kills a human being," and " Every living person that inflicts death shall suffer death," capital punishment did not prevail in Ireland before or

after. The laws uniformly discountenanced revenge, retaliation, the punishment of one crime by another, and permitted capital punishment only in the last resort and in ultimate default of every other form of redress. They contain elaborate provision for dealing with crime, but the standpoint from which it is regarded and treated is essentially different from ours. The state, for all its elaborate structure, did not assume jurisdiction in relation to any crimes except political ones, such as treason or the disturbance of a large assembly. For these it inflicted the severest penalties known to the law — banishment, confisca- tion of property, death or putting out of eyes. A crime against the person, character or property of an individual or family was regarded as a thing for which reparation should be made, but the individual or family had to seek the reparation by a personal action. This differed from a civil action only in the terms employed and the elements used in calculating the amount of the reparation. The function of a judge in a criminal as in a civil action was to see that the facts, with modifying circum- stances, were fully and truly submitted to him, and then by applying the law to these facts to ascertain and declare the amount of compensation that would make a legal adjustment. For this amount the guilty person, and in his default his kindred, became legally debtor, and the injured person or family became entitled to recover the amount like a civil debt by distraint, if not paid voluntarily. There were no police, sheriffs or public prisons. The decisions of the law were executed by the persons concerned, supported by a highly organized and disciplined public opinion springing from honour and interest and inherent in the solidarity of the clan. There is good reason to believe that the system was as effectual in the prevention and punish- ment of crime and in the redress of wrongs as any other human contrivance has ever been.

In calculating the amount of compensation the most char- acteristic and important element was Einechlan (= honour-price, honour- value), a value attaching to every free person, varying in amount from one cow to thirty cows according to rank. It was the assessed value of status or caput. It was frequently of con- sequence in relation to contracts and other clan affairs; but it emerges most clearly in connexion with crime. By the commis- sion of crime, breach of contract, or other disgraceful or injurious conduct, Einechlan was diminished or destroyed, a capitis diminulio occurred, apart from any other punishment. Though existing apart from fine, Einechlan was the first element in almost every fine. Dire was the commonest word for fine, whether great or small. Eric (= reparation, redemption) was the fine for "separating body from soul"; but the term was used in lighter cases also. In capital cases the word sometimes meant Einechlan, sometimes coirp-dire (= body-fine) , but most correctly the sum of these two. It may be taken that, subject to modifying cir-

cumstances, a person guilty of homicide had to pay (1) coirp-dire for the destruction of life, irrespective of rank; (2) the honour- value of the victim; (3) his own honour-value if the deed was unintentional; and (4) double his own honour- value if committed with malice aforethought. The sum of these was in all cases heavy; heaviest when the parties were wealthy. The amount was recoverable as a debt from the criminal to the extent of his

property, and in his default from the members of his fine in sums determined by the degree of relationship; and it was distribut- able among the members of the fine of a murdered person in the same proportions, like a distribution among the next of kin. The fine of a murderer could free themselves from liability by giving up the murderer and his goods, or if he escaped, by giving up any goods he had left, depriving him of clanship, and lodging a pledge against his future misdeeds. In these circumstances the law held the criminal's life forfeit, and he might be slain or taken as a prisoner or slave. He could escape only by becoming a daer-fuidhir in some distant territory. When the effect of a crime did not go beyond an individual, if that individual's fine did not make good their claim while the criminal lived, it lapsed on his death. " The crime dies with the criminal." If an un-known stranger or person without property caught red-handed in the commission of a crime refused to submit to arrest, it was lawful to maim or slay him according to the magnitude of the attempted crime. " A person who came to inflict a wound on the body may be safely killed when unknown and without a name, and when there is no power to arrest him at the time of committing the trespass." For crimes against property the usual penalty, as in breach of contract, was generic restitution, the quantity, subject to modifying circumstances, being twice the amount taken or destroyed.

Distress of seizure of property being the universal mode of obtaining satisfaction, whether for crime, breach of contract, non-payment of debt, or any other cause, the law of distress came into operation as the solvent of almost every dispute. Hence it is the most extensive and important branch, if not more than a branch, of these ancient laws. Of several words meaning distress, athgabail was the most frequently used. A person having a liquidated claim might either sue a debtor or proceed at his peril to seize without this preliminary. In the latter case the defendant could stop the progress of the seizure by paying the debt, giving a pledge, or demanding a trial; and he then could choose a Brehon. Distress was of two kinds — (i) athgabal ar jut (= distress on length, i.e. with time, with delays); and (2) athgabail tulla (= immediate distress). Which method was pursued

depended partly upon the facts of the case and partly upon the respective ranks of the parties. A person entitled to seize property had to do it himself, accompanied, if the amount was large, by a law agent and witnesses. No man was entitled to seize unless he owned, or had a surety who owned, sufficient property for indemnity or adjustment in case the seizure should be found to have been wrongful. The formalities varied in different circumstances and also at different times in the long ages in which these laws prevailed. Some forms may, in the Irish as in other legal systems, have become merely cere- monial and fictitious.

Tellach (= seizure of immovable property) was made in three periods or delays of ten days each (= 30 days) . The first step was a notice that unless the debt was paid immediately seizure would be made. Ten days later, the plaintiff crossed the fence in upon the land, with a law agent, a witness and a pair of horses yoked or harnessed, and in a loud voice stated the amount of the debt and called upon the defendant to pay it according to law. On receiving no answer, or an unsatisfactory one, he withdrew. After an interval of ten days more, the creditor entered with his law agent, two witnesses and four horses, went farther in upon the land, repeated his demand, and if refused withdrew. Finally, after a further interval of ten days, he entered once more with his law agent, three witnesses and eight horses, drove up to the debtor's house, repeated his demand, and if not satisfied drove a herd of cattle or a flock of sheep in upon the farm and left men to care for them.

Athgabail ordinarily meant the seizure of movable property. The following technical terms will indicate the procedure in distress with time: — Aurfocre (= demand of payment, stating the amount in presence of witnesses) ; apad (= delay) ; athgabail (= the actual seizure) ; anad (= delay after seizure, the thing remaining in the debtor's possession) ; loxal (= the taking away of the thing seized) ; fasc (= notice to the debtor of the amount

due, the mainder or pound in which the thing seized is impounded, and the name of the law agent) ; dithim (= delay during which the thing is in pound) ; lo bad (= destruction or forfeiture of the debtor's ownership and substitution of the creditor's ownership). There was no sale, because sale for money was little known. The property in the thing seized, to the amount of the debt and expenses, became legally transferred from the debtor to the creditor, not all at once but in stages fixed by law. A creditor was not at liberty to seize household goods, farming utensils, or any goods the loss of which would prevent the debtor recover- ing from embarrassment, so long as there was other property which could be seized. A seizure could be made only between- sunrise and sunset. " If a man who is sued evades justice, knowing the debt to be due of him, double the debt is payable by him and a

fine of five seds." When a large debt was clearly due, and there was no property to seize, the debtor himself could: be seized and compelled to work as a prisoner or slave until the debt was paid.

When a defendant was of rank superior to that of the plaintiff, distress had to be preceded by troscad (= fasting). This is a, legal process unknown elsewhere except in parts cf India. The plaintiff having made his demand and waited a certain time without result, went and sat without food before the door of the defendant. To refuse to submit to fasting was considered indelibly disgraceful, and was one of the things which legally degraded a man by reducing or destroying his honour-value. The law said " he who does not give a pledge to fasting is an evader of all; he who disregards all things shall not be paid by God or man." If a plaintiff having duly fasted did not receive within a certain time the satisfaction of his claim, he was entitled to distrain as in the case of an ordinary defendant, and to seize double the amount that would have satisfied him in the first instance. If a person fasting in accordance with law died during or in consequence of the fast, the person fasted upon was held guilty of murder. Fasting could be stopped by paying the debt, giving a pledge, or submitting to the decision of a Brehon. A creditor fasting after a reasonable offer of settlement had been made to him forfeited his claim. " He who fasts notwithstanding the offer of what should be accorded to him, forfeits his legal right according to the decision of the Feini."

Authorities. — Since Sir Samuel Ferguson wrote his article on "BrehonLaws" in the 9th editionof this Encyclopaedia ,much research has been done on the subject, and Ferguson's account is no longer accepted by scholars, either as regards the language or the substance of the laws. Pending the work of a second Brehon Law Commission, the Laws are best studied in the six imperfect volumes {Ancient Laws of Ireland, 1865-1901) produced by the first Commission (ignoring their long and worthless introductions), together with , Dr. Whitley Stokes's Criticism (London, Nutt, 1903) of Atkinson's Glossary (Dublin, 1901). The following are important references (kindly supplied by Dr Whitley Stokes) for detailed research : — ■ R. Dareste, tttudes d'histoire de droit, pp. 356-381 (Paris, 1889); Arbois de Jubainville and Paul Collinet, Etudes sur le droit celtique (2 vols., Paris, 1895); Joyce, Social History of Ancient Ireland, vol. i. pp. 168-214 (2 vols., London, 1903); Zeitschrift fur celtische Philologie, iv. 221, the Copenhagen fragments of the Laws (Halle, : 903) ; important letters in The Academy, Nos. 699, 700, 701, 702, 703, 704, 706, 707 (substantially covered by Stokes's Criticism) ; Revue Celtique, xxv. 344; Erin, i. 209-315 (collation by Kuno Meyer of the Law-tract Crith Gablach) ; Maine's Early Hist, of Institutions (1875) and Early Law and Custom, pp. 162, 180 (1883); Hearn's Aryan Household (1879), and Maclennan's Studies in Ancient History, pp. 453-507 (1876), contain interesting

general reference, but the writers were not themselves original students of the laws. L. Ginnell's Brehon Laws (1894) may also be consulted. See further the article Celt, sections Language and Literature. (L. G.)

BREISACH, or Altbreisach, a town of Germany, in the grand duchy of Baden, on the left bank of the Rhine, standing on a basalt rock 250 ft. above the river, 10 m. W. of Freiburg-im- Breisgau, and on the railway connecting that city with Colmar. Pop. (1900) 3537. It has a fine minster, partly Romanesque, partly Gothic, dating from the 10th to the 15th centuries; of its two principal towers one is 13th century Gothic, the other Romanesque. The interior is remarkable for its rich decorations, especially the wood-carving of the high altar, and for many interesting tombs and pictures. There is little industry, but a considerable trade is done in wines and other agricultural

produce. On the opposite bank of the Rhine, here crossed by a railway bridge, lies the little town of Neubreisach and the fort Mortier.

Breisach (Brisiacum), formerly an imperial city and until the middle of the 18th century one of the chief fortresses of the Empire, is of great antiquity. A stronghold of the Sequani (a Gallic tribe, which occupied the country of the Doubs and Burgundy), it was captured in the time of Julius Caesar by Ariovistus and became known as the Mons Brisiacus. Fortified by the emperor Valentian in 369 to defend the Rhine against the Germans, it retained its position throughout the middle ages as one of the chief bulwarks of Germany and was called the "cushion and key (Kissen und Schlttssel) of the German empire." Its importance was such that it gave its name to the district Breisgau, in which it is situated. In 939 it was taken by the emperor Otto I., and after remaining in the exclusive possession of the emperors for two centuries, was strengthened and shared for a while between them and the bishops of Basel. In 1 254 and 1 262 the bishops obtained full control over it; but in 1275 it was jnade an imperial city by King Rudolph I., and at the beginning of the 14th century his son brought it definitively into the posses- sion of the Habsburg monarchs, leaving the bishops but few privileges. In the Thirty Years' War Breisach successfully resisted the Swedes, but after a memorable siege and a defence by General von Reisach, one of the most famous in military annals, it was forced to capitulate to Duke Bernhard of Saxe- Weimar on the 18th of December 1638. The endeavours of the emperor Ferdinand III. to retake it were fruitless, and by the peace of Westphalia (1648) Breisach was annexed to France. By the peace of Ryswick (1697) it was restored to Austria, when

Louis XIV. built the town and fortress of Neubreisach on the left bank of the Rhine. Again in 1703 it fell into the hands of the French, owing to treachery, but was ceded to Austria by the peace of Rastatt (1714). Yet again, in the War of the Austrian Succession, it was captured (1 744) by the French, who dismantled the fortifications. They refortined it in 1796, and after passing, by the peace of Luneville (1801), together with the Breisgau to the duke of Modena, Breisach was by the peace of Pressburg (1805) finally incorporated with Baden, when the fortifications were razed. During the Franco-German War (1870) Breisach suffered severely from bombardment directed against it from Neubreisach.

BREISGAU, a district of Germany, in the grand duchy of Baden. It extends along the right bank of the Rhine from Basel to Kehl, and includes the principal peaks of the southern Black Forest and the Freiburg valley. The Breisgau, originally a pagus • or gau of the Frankish empire, was ruled during the middle ages by hereditary counts. Of these the earliest recorded is Birtilo (962-995), ancestor of the counts and dukes of Zahringen. On the death of Berchthold V. of Zahringen in 1218, his co- heiresses brought parts of the Breisgau to the counts of Urach and Kyburg, while part went to the margraves of Baden. At the close of the 13th century the Kyburg part of the Breisgau passed to the Habsburgs, who in 1368 acquired also the town and countship of Freiburg, which had been sold by the counts of Urach to the Freiburgers and given in pledge by them to the house of Austria in exchange for a loan of the purchase price, which they were unable to repay. The male Urach line becoming extinct in 1457, an heiress carried what remained of their posses- sions in the Breisgau to the house of Baden. In the struggle between France and Austria from the 17th century onwards the Breisgau frequently changed masters. In 1801 Austria was forced to cede it to Ercole III., duke of Modena, in compensation for the duchy of which Napoleon had deprived him. His suc- cessor Ferdinand took the title of duke of Modena-Breisgau, but on his death in 1805 the Breisgau was divided between Baden and Wurttemberg. The latter ceded its portion to Baden in 1810. . See Stokvis, Manuel d'histoire, &c. (Leiden, 1890-1893).

BREISLAK, SCIPIONE (1748-1826), Italian geologist of German parentage, was born at Rome in 1748. He early dis- tinguished himself as professor of mathematical and mechanical philosophy in the college of Ragusa; but after residing there for

several years he returned to his native city, where he became a professor in the Collegio Nazareno, and began to form the fine mineralogical cabinet in that institution. His leisure was dedicated to geological researches in the papal states. His account of the aluminous district of Tolfa and adjacent hills, published in 1786, gained for him the notice of the king of Naples,

who invited him to inspect the. mines and similar works in that kingdom, and appointed him professor of mineralogy to the royal artillery. The vast works for the refining of sulphur in the volcanic district of Solfatara were erected under his direction. He afterwards made many journeys through the ancient Cam- pania to illustrate its geology, and published in 1798 his Topo- grafia fisica delta Campania, which contains the results of much accurate observation. Breislak also published an essay on the physical condition of the seven hills of Rome, which he regarded as the remains of a local volcano, — an opinion shown to be erroneous by the later researches of G. B. Brocchi. The political convulsions of Italy in 1799 brought Breislak to Paris, where he remained until 1802, when, being appointed inspector of the saltpetre and powder manufactories near Milan, he removed to that city. The mineral Breislakite was named after him. He died on the 15th of February 1826. His other publications include: — Introduzione alia geologia (1811, French ed. 1819); Traite sur la structure exterieure du globe, 3 vols, and atlas (Milan, 1818, 1822); Descrizione geologica delta provincia di Milano (1822).

BREITENFELD, a village of Germany in the kingdom of Saxony, 5§ m. N.N.W. of Leipzig, noted in military history. The first battle of Breitenfeld was fought on the 17th of Sep- tember 1 63 1, between the allied Swedish and Saxon armies under Gustavus Adolphus and the imperial forces under Count Tilly. The battlefield is a low ridge running east and west between the villages of Gobschelwitz and Breitenfeld, the position of the Imperialists lying along the crest from Gobschel- witz on the right to a point about 1 m. short of Breitenfeld on the left; opposite this position, and behind a group of villages on the Loberbach stream, lay the Swedish forces, flanked on their left by the Saxon contingent under the elector, who was assisted by Arnim. The villages formed the only obstacle on the gentle slope lying between the Loberbach and Tilly's line; through these villages the Swedes defiled slowly, and formed up on the open ground beyond them. Tilly's army was drawn up in a continuous line, the infantry ranged in heavy battalions in the centre, the cavalry on the wings, and the heavy artillery in a mass in front of the infantry. Gustavus arrayed the Swedes in two lines and a reserve, infantry in the centre, cavalry on the flanks, and the Saxons were drawn up in a similar formation on the left of the Swedish left-wing cavalry. So far as can be gauged the respective numbers were at least 32,000 Imperialists, 22,000 Swedes and 15,000 Saxons. The Swedish infantry was drawn up on an entirely novel system; each brigade of infantry, com- posed of several battalions, was formed in many small and handy corps of pikemen and musketeers, and parties of musketeers were also detached to support the cavalry. The guns were scattered along the front. The Saxons were ranged, like Ti'ly's army, in heavy masses of foot and horse preceded by a great battery of guns. At 2 p.m. Pappenheim,

commanding Tilly's left wing, led forward the whole of his cavalry in a furious charge. Feeling the fire of the musketeers who were intercalated amongst the Swedish horse, Pappenheim swung round to his left and charged the Swedish right wing in flank. The Swedes of both lines promptly wheeled up, and after a prolonged conflict the Imperial horse were driven completely off the field. The attack of Tilly's right wing under Fiirstenberg directed against the Saxons was more successful. The Saxons were at once broken and routed, only a handful under Arnim maintaining the ground. Fiirsten- berg pursued the fugitives for many miles, and Tilly with the centre of infantry (which, considering the depth of its formations, must have possessed great manoeuvring power) rapidly followed him and formed up opposite the now exposed left of the Swedes. Thereupon the Swedes, in their light and handy formation, changed position rapidly and easily to meet him. Tilly's attack

was strenuously opposed, and at this moment the decisive stroke of the battle was delivered by the Swedish right wing, which, having disposed of Pappenheim, swung round and occupied the ground originally held by the Imperial infantry, seized Tilly's guns, and with them enfiladed the enemy's new line. This put an end to the attack of the Imperial foot, and before sunset Tilly was in full retreat, hotly pursued and losing heavily in prisoners. His losses on the field have been estimated at 7000 killed and wounded and almost as many prisoners; the Swedes lost about 2000 and the Saxons over 4000 men.

The village of Breitenfeld also gives its name to another great battle in the Thirty Years' War (November 2, 1642), in which the Swedes under Torstensson defeated the Imperialists under the archduke Leopold and Prince Piccolomini, who were seeking to relieve Leipzig. The Swedish cavalry decided the day on this occasion also.

BREMEN, a free state in the German empire, bearing the title Freie Hansestadt Bremen. It falls into three distinct parts: (1) the largest portion, with the city of Bremen, lying on both banks, but chiefly on the right, of the lower course of the Weser, surrounded by the Prussian province of Hanover and the grand- duchy of Oldenburg, and consisting in the main of lowland country intersected by canals and dykes; (2) the town and district of Vegesack, lying separate from, but immediately north of the main portion, on the right bank of the river; (3) the port of Bremerhaven, 46 m. down the Weser, at its mouth. Of the whole territory, which has an area of 99 sq. m., about one-half is meadow and grazing land, one-quarter under tillage,

and the remainder occupied by a little woodland, some unprofitable sandy wastes, the bed of the Weser and the towns. Market gardening, the rearing of cattle, for which the district is widely famed, and fishing, form the chief occupations of the rural population. The climate is mild, but the rainfall (26-9 in. annually on the average) is relatively considerable. The population is shown as follows: —

1900.

1905.

Bremen, city ….

Bremerhaven …. Rural districts

186,822

3.943 20,315

37.327

214.953

4,130

24.159

20,431

Total ….

248,407

263,673

Of the inhabitants, who belong to the Lower Saxon (Nieder- Sachsen) race and in daily intercourse mostly speak the Low German (Plattdeutsch) dialect, about two-thirds are natives of the state and one-third immigrants from other parts of Germany, chiefly from Hanover and Oldenburg. About 93 % are Protest-

ants, 6 % Roman Catholics, and only

Jews. The form

of government is that of a republic, under a constitution pro claimed on the 8th of March 1849, revised on the 21st of February 1854, the 17th of

November 1875, and the 1st of January 1894. The sovereignty resides jointly in the senate and the Burgerschaft, or Convent of Burgesses. The senate, which is the executive power, is composed of sixteen life members, elected by the convent, on presentation by the senate. Of these ten at least must be lawyers and three merchants. Two of the number are nominated by their colleagues as burgomasters, who preside in succession for a year at a time and hold office four years, one retiring every two years. The Burgerschaft consists of 150 (formerly 300) representatives, chosen by the citizens for six years, and forms the legislative body. Fourteen members are elected by such citizens of Bremen (city) as have enjoyed a university education, forty by the merchants, twenty by the manufacturers and artisans, and forty-eight by the other citizens. Of the remaining representatives, twelve are furnished by Bremer- haven and Vegesack and sixteen by the rural districts. As a member of the German empire, the state of Bremen has one voice in the Bundesrat and returns one member to the Imperial diet (Reichstag). Formerly Bremen was a free port, but from the 1st of October 1888 the whole of the state, with the exception of two small free districts in Bremen and Bremerhaven respectively,

joined the German customs union. The state has two Amts- gerichte (courts of first instance) at Bremen and Bremerhaven respectively, and a superior court, Landgericht, at Bremen, whence appeals lie to the Oberlandesgericht for the Hanseatic towns in Hamburg. The judges of the Bremen courts are appointed by a committee of members of the senate, the Burger- schaft and the bench of judges. By the convention with Prussia of the 27th of June 1867, the free state surrendered its right to furnish its own contingent to the army, the recruits being after that time drafted into the Hanseatic infantry regiment, forming a portion of the Prussian IX. army corps.

BREMEN, a city of Germany, capital of the free state of Bremen, and one of the Hanseatic towns. It lies on a sandy plain on both banks of the Weser, 46 m. from the North Sea and 71 m. S.W. from Hamburg by rail, on the mainline to Cologne. Pop. (1905) 214,953. It has also direct railway communication with Berlin via Uelzen, Hanover and Bremerhaven. The city consists of four quarters, — the old town (Altstadt) and its suburban extensions (Vorstadt) being on the right bank of the river, and the new town (Neustadt) with its southern suburb (Siidervorstadt) on the left bank. The river is crossed by three bridges, the old, the new (1872-1875) Kaiserbriicke, and the railway bridge, with a gangway for foot passengers. The ramparts of the old town have long been converted into beautiful promenades and gardens, the moats forming a chain of lakes.

The romantic old town, with its winding streets and lanes, flanked by massive gabled houses, dates from the medieval days of Hanseatic prosperity. On the market square stands the fine town hall (Rathaus),

dating from the 15th century, with a hand- some Renaissance facade of a somewhat later date, and before it a stone statue of Roland, the emblem of civic power. Its cele- brated underground wine cellar has been immortalized by Wilhelm Hauff in his Phantasien im Bremer Ratskeller. The town hall is internally richly embellished and has a gallery of interesting paintings. In an upper hall a model of an old Hanseatic frigate, with the device Navigare necesse est, vivere non est necesse, hangs from the ceiling. Among other ancient buildings, situated chiefly in the old town, are the following: — the cathedral of St Peter (formerly the archiepiscopal and now the Lutheran parish church), erected in the 12th century on the site of Charle- magne's wooden church, and famous for its Bleikeller, or lead vault, in which bodies can be preserved for a long time without suffering decomposition; the church of St Ansgarius, built about 1243, with a spire 400 ft. high; the church of Our Lady, dating from the 12th and 13th centuries; the 12th century Romanesque church of St Stephen; the Schutting, or merchants' hall, origin- ally built in 1619 for the cloth-traders' gild; the Stadthaus (town house), formerly the archiepiscopal palace, and converted to its present uses only in 181 9. The most important and imposing among the more modern architectural additions to the city are the handsome Gothic exchange, completed in 1867, the municipal theatre, the municipal library, the post office (1878), the law courts (1891-1895), the wool exchange, the German bank, the municipal museum for natural science, ethnology and commerce, and the fine railway station (1888). The principal memorials embrace, besides the Roland, the Willehad fountain (1883), the monument of the Franco-German War (erected 1875), the centaur fountain (1891), an equestrian statue of the emperor William I. (1893), and a statue of the poet Theodor Korner. A beautiful park, Burgerpark, has been laid out in the Burgerweide, or meadows, lying beyond the railway station to the north-east of the city. It is a peculiarity of the domestic accommodation of Bremen that the majority of the houses, unlike the custom in most other German towns, where flats prevail, are occupied by a single family only.

The industries and manufactures of Bremen are of considerable variety and extent, but are more particularly developed in such branches as are closely allied to navigation, such as shipbuilding, founding, engine-building and rope-making. Next in importance come those of tobacco, snuff, cigars, the making of cigar boxes, jute-spinning, distilling, sugar refining and the shelling of rice. Bremen owes its fame almost exclusively to its transmaritime

trade, mainly imports. By the completion of the engineering works on the Weser in 1887-1899, whereby, among other im- provements, the river was straightened and deepened, to 18 ft., large ocean-going vessels are able to steam right up to the city itself. It has excellent railway connexions with the chief industrial districts of Germany. Like Hamburg, it does pre- dominantly a transit trade; it is especially important as the importer of raw products from America. In two articles, tobacco and rice, Bremen is the greatest market in the world; in cotton and indigo it takes the first place on the continent, and it is a serious rival of Hamburg and Antwerp in the import of wool and petroleum. The value of the total imports (both sea- borne and by river and rail) increased from £22,721,700 in 1883 to about £60,000,000 in 1905; the imports from the United States, from . £9,755,000 in 1883 to about £25,000,000 in 1905. The countries from which imports principally come are the United States, England, Germany, Russia, the republics of South America, the Far East and Australia. The exports rose from a total of £26,096,500 in 1883 to £62,000,000 in 1905. The number of vessels which entered the ports of the free state (i.e. Bremen city, Bremerhaven and Vegesack) increased from 2869 of 1,258,529 aggregate tonnage in 1883, to 4024 of 2,716,633 tons in 1900. Bremen is the centre for some of the more important of the German shipping companies, especially of the North German Lloyd (founded in 1856), which, on the 1st of January 1905, possessed a fleet of 382 steamers of 693,892 tons, besides lighters and similar craft. Bremen also shares with Hamburg the position of being one of the two chief emigration ports of Germany. There are three docks, all to the north-west of the city — namely, the free harbour (which was opened in 1888), the winter harbour, and the timber and industrial harbour. Internal communication is served by an excellent system of electric tramways, and there is also a local steamboat service with neighbouring villages on the Weser.

History. — According to Brandes, quoting Martin Luther in the Lexicon Philologicum, the name is derived from Bram, Bram, i.e. hem = the river- bank, or confine of the land on which it was built. In 787 Bremen was chosen by St Willehad, whom Charle- magne had established as bishop in the pagi of the lower Weser, as his see. In 848 the destruction of Hamburg by the Normans led to the transference of the archiepiscopal see of Hamburg to Bremen, which became the seat of the archbishops of Hamburg – Bremen. In 965 the emperor Otto I. granted to Archbishop Adaldag " in the place called Bremen " (in loco Bremun nuncu- pate) the right to establish a market, and the full administrative, fiscal and judicial powers of a count, no one but the bishop or his advocatus being allowed to exercise authority in the city. This privilege, by which the archbishop was lord of the city and his Vogt its judge, was frequently confirmed by subsequent emperors, ending under Frederick I. in 1 1 58. Though, however, there is

no direct evidence of the existence of any communal organization during this period, it is clear from the vigorous part taken by the burghers in the struggle of the emperor Frederick with Henry the Lion of Saxony that some such organization very early existed. Yet in the privilegium granted to the townspeople by Frederick I. in 11 86 the emperor had done no more than guarantee them their personal liberties. The earliest recognition of any civic organization they may have possessed they owed to Archbishop Hartwig II. (1 184-1207), who had succeeded in uniting against him his chapter, the nobles and the citizens; and the first mention of the city council occurs in a charter of Arch- bishop Gerhard II. in 1225, though the consules here named doubtless represented a considerably older institution. In the 13 th century, however, whatever the civic organization of the townsfolk may have been, it was still strictly subordinate to the archbishop and his Vogt; the council could issue regulations only with the consent of the former, while in the judicial work of the latter, save. in small questions of commercial dishonesty, its sole function was advisory. By the middle of the 14th century this situation was exactly reversed; the elected town council was the supreme legislative power in all criminal and civil causes, and in the court of the advocatus two Ratsmanner sat as assessors.

The victory had been won over the archbishop; but a fresh peril had developed in the course of the 13 th century in the growth of a patrician class, which, as in so many other cities, threatened to absorb all power into the hands of a close oligarchy. In 1304 the commonalty rose against the patricians and drove them from the city, and in the following year gained a victory over the exiles and their allies, the knights, which was long celebrated by an annual service of thanksgiving. This was the beginning of troubles that lasted intermittently throughout the century. Bremen had been admitted to the Hanseatic league in 1283, but was excluded in 1285, and not readmitted until 1358. Owing to the continued civic unrest it was again excluded in 1427, and only readmitted in 1433 when the old aristocratic constitution was definitively restored. But though in Bremen the efforts of the craftsmen's " arts " to secure a share of power had been held in check and the gilds never gained any importance, the city government did not, as at Cologne and elsewhere, develop into a close patrician oligarchy. Power was in the hands of the wealthy, but the avenues to power were open to those who knew how to acquire the necessary qualification. There was thus no artificial restraint put upon individual enterprise, and the question of the government having been settled, Bremen rapidly developed in wealth and influence.

The Reformation was introduced into Bremen in 1522 by Heinrich von Ziitphen. Archbishop Christopher of Brunswick- Wolfenbiittel (1487-1558), a brutal libertine, hated for his lusts and avarice, looked on the reforming movement as a revolt against himself. He succeeded in getting

the reformer burned; but found himself involved in a life and death struggle with the city. In 1532 Bremen joined the league of Schmalkalden, and twice endured a siege by the imperial forces. In 1 547 it was only saved by Mansfeld's victory at Drakenburg. Archbishop Christopher was succeeded in 1558 by his brother Georg, bishop of Minden (d. 1566), who, though he himself was instrumental in introducing the reformed model into his other diocese of Verden, is reckoned as the last Roman Catholic archbishop of Bremen. His successor, Henry III. (1550-1585), a son of Duke Francis I. of Lauenburg, who had been bishop of Osnabriick and Paderborn, was a Lutheran and married. Protestantism was not, however, definitively proclaimed as the state religion in Bremen until 16 18. The last archbishop, Frederick II. (of Denmark), was deposed by the Swedes in 1644. In 1646 Bremen received the privileges of a free imperial city from the emperor Ferdinand III.; but Sweden, whose possession of the archbishopric was recognized two years later, refused to consent to this, and in 1666 attempted vainly to assert her claims over the city by arms — in the so-called Bremen War. When, however, in 1720 the elector of Hanover (George I. of Great Britain) acquired the archbishopric, he recognized Bremen as a free city. In 1803 this was again recognized and the territory of the city was even extended. In 1806 it was taken by the French, was subsequently annexed by Napoleon to his empire, and from 1810 to 1813 was the capital of the department of the Mouths of the Weser. Restored to independence by the congress of Vienna in 1815, it subsequently became a member of the German Confederation, and in 1867 joined the new North German Confederation, with which it was merged in the new German empire.

See Buchenau, Die freie Hansestadt Bremen (3rd ed., Bremen, 1900, 5 vols.) ; Bremisches Vrkundenbuch, edited by R. Ehmck and W. von Bippen (1863, fol.) ; W. von Bippen, Geschichte der Stadt Bremen (Bremen, 1892-1898); F. Donandt, Versuch einer Geschichte des bremischen Stadtrechts (Bremen, 1830, 2 vols.); Bremisches Jahrbuch (historical, 19 vols., 1864-1900); and Karl Hegel, Stadte und Gilden, vol. ii. p. 461 (Leipzig, 1891).

BREMER, FREDRIKA (1801-1865), Swedish novelist, was born near Abo, in Finland, on the 17 th of August 1801. Her father, a descendant of an old German family, a wealthy iron master and merchant, left Finland when Fredrika was three years old, and after a year's residence in Stockholm, purchased an estate at Arsta, about 20 m. from the capital. There, with occa- sional visits to Stockholm and to a neighbouring estate, which belonged for a time to her father, Fredrika passed her time till 1820. The education to which she and her sisters were subjected

was unusually strict; Fredrika's health began to give way; and in 1821 the family set out for the south of France. They travelled slowly by way of Germany and Switzerland, and returned by Paris and the Netherlands. It was shortly after this time that Miss Bremer became acquainted with Schiller's works, which made a very deep impression on her. She had begun to write verses from the age of eight, and in 1828 she succeeded in finding a publisher for the first volume of her Teckningar ur hvardagslifvet (1828), which at once attracted attention. The second volume (1831), containing one of her best tales, Familjen H., gave decisive evidence that a real novelist had been found in Sweden. The Swedish Academy awarded her their smaller gold medal, and she increased her reputation by Presidentens dottrar (1834), Grannarne (1837) and others. Her father had died in 1830, and her life was thereafter regulated in accordance with her own wishes and tastes. She lived for some years in Norway with a friend, after whose death she travelled in the autumn of 1849 to America, and after spending nearly two years there returned through England. The admirable translations (1846, &c.) of her works by Mary Howitt, which had been received with even greater eagerness in America and England than in Sweden, secured for her a warm and kindly reception. Her impressions of America, Hemmen i nya verlden, were published in 1853-1854, and at once translated into English. After her return Miss Bremer devoted herself to her scheme for the advancement and emancipa- tion of women. Her views on these questions were expounded in her later novels — Hertha (1856) and Far och dolter (1858). Miss Bremer organized a society of ladies in Stockholm for the purpose of visiting the prisons, and during the cholera started a society, the object of which was the care of children left orphans by the epidemic. She devoted herself to other philanthropic and social schemes, and gradually abandoned her earlier simple and charm- ing type of story for novels directed to the furtherance of her views. In these she was less successful. In 1856 she again travelled, and spent five years on the continent and in Palestine. Her reminiscences of these countries have all been translated into English. On her return she settled at Arsta, where, with the exception of a visit to Germany, she spent the remaining years of her life. She died on the 31st of December 1865.

See Life, Letters and Posthumous Works of F. Bremer, by her sister, Charlotte Bremer, translated by F. Milow, London, 1868. A selection of her works in 6 vols, appeared at Orebro, 1868-1872.

BREMERHAVEN, a seaport town of Germany, in the free state of Bremen, on the right bank and estuary of the Weser, at the confluence of the Geeste, 38 m. N. of the city of Bremen by rail. Pop. (1895) 18,366; (1905) 24,159. It is built on a tract of territory ceded to Bremen by Hanover in

1826, and further increased by treaty with Prussia in 1869. It forms practically a single town with Geestemunde (Prussia), which lies across the Geeste and with which it is connected by a drawbridge. The port was opened in 1830, and besides an excellent harbour, there are three large wet docks, including the Kaiserhafen, enlarged in 1897-1899 at a cost of £900,000. This, together with the north portion of the Neuerhafen, constitutes the free harbour. Here are the workshops and dry docks of the North German Lloyd steamship company. The whole internal harbour system is furnished with powerful hydraulic cranes and lines of railway running alongside the quays. The entrance to the port is free from ice nearly all the year round, is excellently buoyed, and lighted by two lightships and eight lighthouses, among the latter the remarkable Rothesand Leuchtturm, erected 1 884-1885. The Hanoverian fort and batteries, which formerly protected the town, have been removed, and their place is supplied by four modern forts, with revolving turtleback turrets, lower down. The town possesses two Protestant and a Roman Catholic church, a technical institute, a natural history museum, a library, a theatre, a monument to the emperor William I. and one to Johann Smidt (1773-1859), the burgomaster of Bremen to whose enter- prise the harbour of Bremerhaven is due. Shipbuilding and kindred industries are carried on.

BRENDAN, Brandon, or Brandan (c. 484-578), Irish saint and hero of a legendary voyage in the Atlantic, is said to have

been born at Tralee in Kerry in a.d. 484. The Irish form of his name is Brennain, the Latin Brendanus. Medieval historians usually call him Brendan of Clonfert, or Brendan son of Finnloga, to distinguish him from his contemporary, St Brendan of Birr (573). Little is known of the historical Brendan, who died in 578 as abbot of a Benedictine monastery which he had founded twenty years previously at Clonfert in eastern Galway. The story of his voyage across the Atlantic to the " Promised Land of the Saints," afterwards designated " St Brendan's Island," 1 ranks among the most celebrated of the medieval sagas of western Europe. Its traditional date is 565-573. The legend is found, in prose or verse and with many variations, in Latin, French, English, Saxon, Flemish, Irish, Welsh, Breton and Scottish Gaelic. Although it does not occur in the writings of any Arabian geographer, several of its incidents — such as the landing on a whale in mistake for an island — belong also to Arabic folk- literature. Many of Brendan's fabulous adventures seem to be borrowed from the half-pagan Irish saga of Maelduin or Maeldune, and others belong also to Scandinavian mythology. The oldest extant version of the legend is the nth century Navigatic Brendani.

St Brendan's island was long accepted as a reality by geo- graphers. In a Venetian map dated 1367, in the anonymous Weimar map of 1424, and in

B. Beccario's map of 1435, it is identified with Madeira. Columbus, in his journal for the 9th of August 1492, states that the inhabitants of Hierro, Gomera and Madeira had seen the island in the west; and Martin Behaim, in the globe he made at Nuremberg in the same year, places it west of the Canaries and near the equator. During the 16th century the progress of exploration in these latitudes compelled many cartographers to locate the island elsewhere; and it was marked about 100 m. west of Ireland, or afterwards among the West Indies. But in Spain and Portugal the older belief as to its situation was maintained. In 1526 an expedition under Fernando Alvarez left Grand Canary in search of St Brendan's island, which had again been reported as seen by many trust- worthy witnesses. In 1570 an official inquiry was held, and a second expedition undertaken, by Fernando de Villalobos, governor of Palma. Similar voyages of discovery were made by the Canarians in 1604 and 1721; and only in 1759 was the apparition of St Brendan's island explained as an effect of mirage.

Among the numerous books which deal with the legend, the following are important : Die altfranzbsische ProsaUbersetzung von Brendans Meerfahrt, by C. Wahlund (Upsala, 1900) ; La " Navigatio Sancti Brendani " in antico Veneziano, by F. Novati (Bergamo, 1892) ; Zur Brendanus-Legende, &c, by G. Schirmer (Leipzig, 1888); Les Voyages merveitteux de St. Brendan, &c, by F. Michel (Paris, 1878); and Acta Sancti Brendani …. Original Latin Documents connected with the Life of St Brendan, by P. F. Moran (Dublin, 1872).

BRENHAM, a city and the county-seat of Washington county, Texas, U.S.A., situated in the S.E. part of the state, about 68 m, N.W. of Houston. Pop. (1890) 5209; (1900) 5968, including 2701 negroes and 531 foreign-born; (1910) 4718. Brenhara is served by the Gulf, Colorado & Santa Fe (controlled by the Atchison, Topeka & Santa Fe) and the Houston & Texas Central railways. It is the seat of Blinn Memorial College (German Methodist Episcopal), opened as " Mission Institute " in 1883, and renamed in 1889 in honour of the Rev. Christian Blinn, of New York, a liberal benefactor; of Brenham Evangelical Lutheran College, and of a German-American institute (1898). The municipality owns and operates the waterworks. The city is situated in an agricultural and cotton-raising region, and has cotton compresses and gins, cotton mills, cotton-seed oil re-fineries, foundries and machine shops, and furniture and wagon factories. Brenham was settled about 1844, was incorporated in 1866, and was chartered as a city in 1873.

BRENNER PASS, the lowest (4495 ft.) and one of the most frequented passes across the Alps in all ages, though the name itself rarely occurs in the middle ages, the route over it being said to lie through " the valley of Trent." It may be described as the great gate of Italy, and by it most of the

Teutonic tribes made their way to Italy. One reason of its importance is that

many side passes in the end join this great thoroughfare. It was crossed no fewer than 66 times by various emperors, between 793 and 1402. A carriage road was constructed over it as far back as 1772, while the railway over it was built in 1864-1867. From Innsbruck to the summit of the pass is a distance by rail of 25 m. The line then descends through the Eisack valley past Brixen (34 m.) to Botzen (24 m.). Thence it follows the valley of the Adige to Trent (35 m.) and on to Verona (565 m.) — in all 1 745 m. by rail from Innsbruck to Verona. (W. A. B. C.)

BRENNUS, the name, or perhaps the official title, of two chiefs of the Celtic Gauls.

(1) The first Brennus crossed the Apennines in 391 B.C., ravaged Etruria, and annihilated a Roman army of about 40,000 men on the Allia some 12 m. from Clusium (July 16, 390). Rome thus lay at his mercy, but he wasted time, and the Romans were able to occupy and provision the Capitol (though they had not sufficient forces to defend their walls) and to send their women and children to Veii. When on the third day the Gauls took possession, they found the city occupied only by those aged patricians who had held high office in the state. For a while the Gauls withheld their hands out of awe and reverence, but the ruder passions soon prevailed. The city was sacked and burnt; but the Capitol itself withstood a siege of more than six months, saved from surprise on one occasion only by the wakefulness of the sacred geese and the courage of Marcus Manlius. At last the Gauls consented to accept a ransom of a thousand pounds of gold. As it was being weighed out, the Roman tribune com- plained of some unfairness. Brennus at once threw his heavy sword into the scale; and when asked the meaning of the act, replied that it meant Vae victis (" woe to the conquered "). The Gauls returned home with their plunder, leaving Rome in a condition from which she took long to recover. A later legend, probably an invention, represents M. Furius Camillus as suddenly appearing with an avenging army at the moment when the gold was being weighed, and defeating Brennus and all his host.

See Liyy v. 33-49; Plutarch, Camillus, 17, 22, 28; Polybius i. 6, ii. 18; Dion. Halic. xiii. 7.

(2) The second Brennus is said to have been one of the leaders of an

inroad made by the Gauls from the east of the Adriatic into Thrace and Macedonia (280), when they defeated and slew Ptolemy Ceraunus, then king of Macedonia. Whether Brennus took part in this first invasion or not is uncertain; but its success led him to urge his countrymen to a second expedition, when he marched with a large army through Macedonia and Thessaly until he reached Thermopylae. To this point the united forces of the northern Greeks — Athenians, Phocians, Boeotians and Aetolians — had fallen back; and here the Greeks a second time held their foreign invaders in check for many days, and a second time had their rear turned, owing to the treachery of some of the natives, by the same path which had been discovered to the Persians two hundred years before. Brennus and his Gauls marched on to Delphi, of whose sacred treasures they had heard much. But the little force which the Delphians and their neighbours had collected — about 4000 men — favoured by the strength of their position, made a successful defence. They rolled down rocks upon their enemies as they crowded into the defile, and showered missiles on them from above. A thunder- storm, with hail and intense cold, increased their confusion, and on Brennus himself being wounded they took to flight, pursued by the Greeks all the way back to Thermopylae. Brennus killed himself, " unable to endure the pain of his wounds," says Justin; more probably determined not to return home defeated.

See Justin xxiv. 6; Diod. Sic. xxii. n; Pausanias x. 19-23; L. Contzen, Die Wanderungen der Kelten (Leipzig, 1861).

BRENTANO, KLEMENS (1778-1842), German poet and novelist, was born at Ehrenbreitstein on the 8th of September 1778. His sister was the well-known Bettina von Arnim (q.v.), Goethe's correspondent. He studied at Jena, and afterwards resided at Heidelberg, Vienna and Berlin. In 1818, weary of his somewhat restless and unsettled life, he joined the Roman Catholic Church and withdrew to the monastery of Diilmen,

where he lived for some years in strict seclusion. The latter part of his life he spent in Regensburg,Frankfort and Munich, actively engaged in Catholic propaganda. He died at Aschaffenburg on the 28th of July 1842. Brentano, whose early writings were published under the pseudonym Maria, belonged to the Heidelberg group of German romantic writers, and his works are marked by excess of fantastic imagery and by abrupt, bizarre modes of expression. His first published writings were Satiren und poetische Spiele (1800), and a romance Godwi (1801-1802); of his dramas the best are Ponce de Lion (1804), Victoria (1817) and Die Grilndung Prags (181 5). On the whole his finest work is the collection of Romanzen vom Rosenkranz (published posthumously in 1852); his short stories, and more especially the charming Geschichte vom braven Kasperl und dem schonen Annerl (1838), which has been translated into English, are still

popular. Brentano also assisted Ludwig Achim von Arnim, his brother- in-law, in the collection of folk-songs forming Des'Knaben W under- horn (1806-1808).

Brentano's collected works, edited by his brother Christian, appeared at Frankfort in 9 vols. (1851-1855). Selections have been edited by J. B. Diel (1873), M. Koch (1892), and J. Dohmke (1893). See J. B. Diel and W. Kreiten, Klemens Brentano (2 vols., 1877-1878), the introduction to Koch's edition, and R. Steig, A. von Arnim und K. Brentano (1894).

BRENTANO, LUDWIG JOSEPH [called Lujo] (1844-), German economist, a member of the same family as the preced- ing, was born at Aschaffenburg on the 18th of December 1844. He received some of his academical education in Dublin. In 1 868 he made a thorough study of trade-unionism in England, which resulted in his principal work, Die Arbeitergilden der Gegenwart (Leipzig, 1871-1872; Eng. trans, by L. T. Smith). The book was assailed by B amberger and other economists, but is important not only as an authority on modern associations of workmen, but for having given an impetus to the study of the gilds of the middle ages, and the examination of the great stores of neglected information bearing upon the condition of the people in olden days. Brentano's other works are of a more theoretical character, and chiefly relate to political economy, of which he was professor at Breslau from 1872 to 1882, at Strassburg from 1882 to 1888, at Vienna 1888-1889, at Leipzig 1889-1891, and at Munich since 1 89 1 . We may mention Das A rbeitsverhdltnis gemdss dem heutigen Recht (1877); Die christlich-soziale Bewegung in England (1883); Uber das Verhdllnis von Arbeit slohn und Arbeitszeit zur Arbeits- leistung (1893); Agrarpolitik (1897).

BRENTFORD, a market town in the Brentford parliamentary division of Middlesex, England, 10-J m. W. of Waterloo terminus, London, by the London & South-Western railway, at the junction of the river Brent with the Thames. Pop. of urban district (1901) 15,171. The Grand Junction Canal joins the Brent, affording ample water-communications to the town, which has consider- able industries in brewing, soap-making, saw-milling, market- gardening, &c. The Grand Junction waterworks are situated here. Brentford has been the county-town for elections since

1 701.

In 1016 Brentford, or, as it was often called Braynford, was the scene of a great defeat inflicted on the Danes by Edmund Ironside. In 1280 a toll was granted by Edward I., who granted the town a market, for the construction of a bridge across the river, and in the reign of Henry VI. a hospital of the Nine Orders of Angels was founded near its western side. In 1642 a battle

was fought here in which the royalists defeated the parliamentary forces. For his services on this occasion the Scotsman Ruthven, earl of Forth, was made earl of Brentford, a title afterwards conferred by William III. on Marshal Schomberg. Brentford was during the 16th and 17th centuries a favourite resort of London citizens; and its inn of the Three Pigeons, which was kept for a time by John Lowin, one of the first actors of Shake-speare's plays, is frequently alluded to by the dramatists of the period. Falstaff is disguised as the " Fat Woman of Brentford " in Shakespeare's Merry Wives of Windsor, and numerous other references to the town in literature point, in most cases, to its reputation for excessive dirt. The " two kings of Brentford " mentioned in Cowper's Task, and elsewhere, seem to owe their

mythical existence to the play, The Rehearsal, by George Villiers, second duke of Buckingham, produced in 167 1.

South of Brentford, towards Isleworth, is Sion House, a man- sion founded by Lord Protector Somerset in 1547, and rebuilt and enlarged by the 10th earl of Northumberland and Sir Hugh Smithson, afterwards duke of Northumberland, the architects being Inigo Jones and Robert Adam. The gardens are very beautiful. The site of Sion or Syon House was previously occupied by a convent of Bridgetine nuns established at Twicken- ham by Henry V. in 1415 and removed here in 1431.

BRENTON, SIR JAHLEEL (1770-1844), British admiral, was born in Rhode Island, U.S.A., on the 22nd of August 1770. He was the son of Rear-Admiral Jahleel Brenton (1720-1802), who belonged to a loyalist family which suffered the loss of most of its property in the insurrection of the American colonies. He was a lieutenant in the British navy when the war began, and emigrated with his family to the mother country. Three of the sons entered the navy — Jahleel (the eldest), Captain Edward Pelham Brenton (1774-1839), and James Wallace Brenton, who was killed young in 1799 when attacking a Spanish privateer near Barcelona in the boats of the " Petrel," of which he was lieutenant. Jahleel went to sea first with his father in 1781, and on the return of peace was sent to the "maritime school " at Chelsea. He served in the peace before the beginning of the war in 1793, and passed his examination as lieutenant, but seeing no chance of employment went with other English naval officers to serve in the Swedish navy against the Russians. In 1790 he received his commission and returned home. Till 1799 he served as lieutenant, or acting commander, mostly under Earl St Vincent, and was present in the battle from which the

admiral received his title. As commander of the " Speedy " brig he won much distinction in actions with Spanish gunboats in the Straits of Gibraltar. In 1800 he reached the rank of post-captain, and had the good fortune to serve as flag-captain to Sir James (afterwards Lord) Saumarez in the action at Algeciras, and in the Straits in 1801. During the peace of Amiens he married Miss Stewart, a lady belonging to a loyalist family of Nova Scotia. After the renewal of the war he commanded a succession of frigates. In 1803 he had the misfortune to be wrecked on the coast of France, and remained for a time in prison, where his wife joined him. Having been exchanged he was named to another ship. His most brilliant action was fought with a flotilla of Franco- Neapolitan vessels outside of Naples in May 1801. He was severely wounded, and Murat, then king of Naples, praised him effusively. He was made a baronet in 1812 and K.C.B. in 1815. After his recovery from his wound he was unable to bear sea service, but was made commissioner of the dockyard at Port Mahon, and then at the Cape, and was afterwards lieutenant- governor of Greenwich hospital till 1840. He reached flag rank in 1830. In his later years he took an active part in philanthropic work, in association with his brother, Captain E. P. Brenton, who had seen much service but is best remembered by his writings on naval and military history, — Naval History of Great Britain from the Year 1783 to 1822 (1823), and The Life and Correspondence of John, Earl of St Vincent (1838).

A Memoir of the Life and Services of Vice-Admiral Sir Jahleel Brenton, based on his own papers, was published in 1846 by the Rev. Henry Raikes, and reissued by the admiral's son, Sir L. C. L. Brenton, in 1855. (D. H.)

BRENTWOOD, a market town in the mid or Chelmsford parliamentary division of Essex, England; 18 m. E.N.E. of London by the Great Eastern railway (Brentwood and Worley station). Pop. of urban district (1901) 4932. The neighbouring country is pleasantly undulating and well wooded. The church of St Thomas the Martyr, with several chapels, is modern. The old assize house, an Elizabethan structure, remains. A free grammar school was founded in 1557. The county asylum is in the vicinity. There are breweries and brick works. To the south lies the fine upland of Worley Common, with large barracks. Adjoining Brentwood to the north-east is Shenfield, with the church of St Mary the Virgin, Early English and later. Brent- wood was formerly an important posting station on the main

road to the eastern counties, which follows the line of the railway to Colchester. The name (Burntwood) is supposed to record an original settlement made in a clearing of the forest. The district is largely residential.

BRENZ, JOHANN (1499-1570), Lutheran divine, eldest son of Martin

Brenz, was born at Weil, Wurttemberg, on the 24th of June 1499. In 15 14 he entered the university of Heidelberg, where Oecolampadius was one of his teachers, and where in 15 18 he heard Luther discuss. Ordained priest in 1 520, and appointed preacher (1522) at Hall in Swabia, he gave himself to biblical exposition. He ceased to celebrate mass in 1523, and re-organized his church in 1524. Successful in resisting the peasant insurrection (1525), his fortunes were affected by the Schmal- kaldic War. From Hall, when taken by the imperial forces, he fled on his birthday in 1548. Protected by Duke Ulrich of Wurttemberg, he was appointed (January 1553) provost of the collegiate church of Stuttgart. As organizer of the reformation in Wurttemberg he did much fruitful work. A strong advocate of Lutheran doctrine, and author of the Syngramma Suevicum (October 21, ˆ525), which set forth Luther's doctrine of the Eucharist, he was free from the persecuting tendencies of the age. He is praised and quoted (as Joannes Witlingius) for his judg- ment against applying the death penalty to anabaptists or other heretics in the De Haereticis, an sint persequendi (1554), issued by Sebastian Castellio under the pseudonym of Martinus Bellius. An incomplete edition of his works (largely expository) appeared at Tubingen, 1 576-1 590. Several of his sermons were reproduced in contemporary English versions. A volume of Anecdota Brentiana was edited by Pressel in 1868. He died on the nth of September 1570, and was buried in his church at Stuttgart; his grave was subsequently violated. He was twice married, and his eldest son, Johann Brenz, was appointed (1562) professor of theology in Tubingen at the early age of twenty-two.

See Hartmann and Jager, Johann Brenz (1840-1842); Bossert, in Hauck's Realencyklop. (1897). (A. Go.)*

BREQUIGNY, LOUIS GEORGES OUDARD FEUDRIX DE

(1714-1795), French scholar, was born at Gainneville near Havre, on the 22nd of February 17 14, and died at Paris on the 3rd of July 1795. His first publications were anonymous: an Histoire des revolutions de Genes jusqu'd la paix de 1748 (1750), and a series of Vies des orateurs grecs (1752). Elected a member of the Academie des Inscriptions et Belles-lettres in 1 7 59, he contribu ted an Histoire de Posthume empereur des Gaules (vol. xxx., 1760) to the collected works of that illustrious society, and also a Memoire sur I'etablissement de la religion et de I'empire de Mahomet (vol. xxxii., 1761-1763). After the close of the Seven Years' War he was sent to search in the archives of England for documents bearing upon the history of France, more particularly upon that of the French provinces which once belonged to England. This mission (1 764-1 766) was very fruitful in results; Brequigny brought back from it copies of about 7000 documents, which are now in the Bibliotheque Nationale. A useful selection

of these documents was published (unfortunately without adequate critical treatment) by Jean Jacques Champollion-Figeac, under the title Lettres de rois, reines et autres personnages des cours de France et d' Angleterre, depuis Louis VII. jusqu'd, Henri IV., tirees des archives de Londres par Brequigny (collection of Docu- ments inedits relatifs a I'histoire de France, 2 vols., 1839, 1847). Brequigny himself drew the material for many important studies from the rich mine which he had thus exploited. These were included in the collection of the Academie des Inscriptions: MSmoire sur les differ ends entre la France et V Angleterre sous le regne de Charles le Bel (vol. xli.); Memoire sur la vie de Marie, reine de France, sceur de Henri VIII., roi d' Angleterre (vol. xlii.); four Memoires pour servir A I'histoire de Calais (vols, xliii. and 1.); and Mimoire sur les nigociations touchant les projets de mariage d'Elizabeth, reine d' Angleterre, d'abord avec le due d'Anjou, ensuite avec le due d' Alencon, tous deux freres de Charles IX. (vol. 1.). This last was read to the Academy on the 22nd of January 1793, the morrow of Louis XVI. 's execution. Mean- while, Brequigny had taken part in three great and erudite works. For the Recueil des ordonnances des rois de France he had prepared

volumes x.xiv., the preface to vol. xi. containing important researches into the French communes. To the Table chrono logique des diplomes, diaries, lettres, et actes imprimis concernant I'histoire de France he contributed three volumes in collaboration with Mouchet (1769-1783). Charged with the supervision of a large collection of documents bearing on French history, analogous to Rymer's Foedera, he published the first volume {Diplomatat. Chartae, &c, 1791). The Revolution interrupted him in his collection of Mimoires concernant I'histoire, les sciences, les lettres, et les arts des Chinois, begun in 1776 at the instance of the minister Bertin, when fifteen volumes had appeared.

See the note on Brequigny at the end of vol. i. of 'the Memoires de VAcademie des Inscriptions (1808); the Introduction to vol. iv. of the Table chronologique des diplomes (1836) ; Champollion-Figeac's preface to the Lettres des rois et reines; the Comite des travaux historiques, by X. Charmes, vol. i. passim; ■ N. Oursel, Nouvelle biographie normande (1886); and the Catalogue des manuscrits des collections Duchesne et Brequigny (in the Bibliotheque Nationale), by Rene Poupardin (1905). (C. B.)*

BRESCIA (anc. Brixia) , a city and episcopal see of Lombardy, Italy, the capital of the province of Brescia, finely situated at the foot of the Alps, 52

m. E. of Milan and 40 m. W, of Verona by rail. Pop. (1901) town, 42,495; commune, 72,731. The plan of the city is rectangular, and the streets intersect at right angles, a peculiarity handed down from Roman times, though the area enclosed by the medieval walls is larger than that of the Roman town, which occupied the eastern portion of the present one. The Piazza del Museo marks the site of the forum, and the museum on its north side is ensconced in a Corinthian temple with three cellae, by some attributed to Hercules, but more probably the Capitolium of the city, erected by Vespasian in A.D. 73 (if the inscription really belongs to the building; cf. Th. Mommsen in Corp. Inscrip. Lat. v. No. 4312, Berlin, 1872), and excavated in 1823. It contains a famous bronze statue of Victory, found in 1826. Scanty remains of a building on the south side of the forum, called the curia, but which may be a basilica, and of the theatre, on the east of the temple, still exist.

Brescia contains many interesting medieval buildings. The castle, at the north-east angle of the town, commands a fine view. It is now a military prison. The old cathedral is a round domed structure of the 10th (?) century erected over an early Christian basilica, which has forty-two ancient columns; and the Broletto, adjoining the new cathedral (a building of 1604) on the north, is a massive building of the 12th and 13th centuries (the original town hall, now the prefecture and law courts), with a lofty tower. There are also remains of the convent of S. Salvatore, founded by Desiderius, king of Lombardy, including three churches, two of which now contain the fine medieval museum, which possesses good ivories. The church of S. Francesco has a Gothic facade and cloisters. There are also some good Renaissance palaces and other buildings, including the Municipio, begun in 1492 and completed by Jacopo Sansovino in 1 5 54-1 5 74. This is a magnificent structure, with fine orna- mentation. The church of S. Maria dei Miracoli (1488-1523) is also noteworthy for its general effect and for the richness of its details, especially of the reliefs on the facade. Many other churches, and the picture gallery (Galleria Martinengo), contain fine works of the painters of the Brescian school, Alessandro Bonvicino (generally known as Moretto), Girolamo Romanino and Moretto's pupil, Giovanni Battista Moroni. The Biblioteca Queriniana contains early MSS., a r'4th-century MS. of Dante, &c, and some rare incunabula. The city is well supplied with water, and has no less than seventy-two public fountains. Brescia has considerable factories of iron ware, particularly fire-arms and weapons (one of the government small arms factories being situated here), also of woollens, linens and silks, matches, candles, &c. The stone quarries of Mazzano, 8 m. east of Brescia, supplied material for the monument to Victor Emmanuel II. and other buildings in Rome. Brescia is situated on the main railway line between Milan and Verona, and has branch railways to Iseo, Parma, Cremona and

(via Rovato) to Bergamo, and steam tramways to Mantua, Soncino, Ponte Toscolano and Cardone Valtrompia.

The ancient Celtic Brixia, a town of the Cenomani, became Roman in 225 B.C., when the Cenomani submitted to Rome. Augustus founded a civil (not a military) colony here in 27 B.C., and he and Tiberius constructed an aqueduct to supply it. In 452 it was plundered by Attila, but was the seat of a duchy in the Lombard period. From 1167 it was one of the most active members of the Lombard League. In 1 2 58 it fell into the hands of Eccelino of Verona, and belonged to the Scaligers (della Scala) until 1421, when it came under the Visconti of Milan, and in r426 under Venice. Early in the 16th century it was one of the wealthiest cities of Lombardy, but has never recovered from its sack by the French under Gaston de Foix in 1512. It belonged to Venice until 1797, when it came under Austrian dominion; it revolted in 1848, and again in 1849, being the only Lombard town to rally to Charles Albert in the latter year, but was taken after ten days' obstinate street fighting by the Austrians under Haynau.

See Museo Bresciano Illustrato (Brescia, 1838). (T. As.)

BRESLAU (Polish Wraclaw), a city of Germany, capital of the Prussian province of Silesia, and an episcopal see, situated in a wide and fertile plain on both banks of the navigable Oder, 350 m. from its mouth, at the influx of the Ohle, and 202 m. from Berlin on the railway to Vienna. Pop. (1867) 171,926; (1880) 272,912; (1885) 299,640; (1890) 335, 186; (1905) 47o,75i, about 60% being Protestants, 35% Roman Catholics and nearly 5% Jews. The Oder, which here breaks into several arms, divides the city into two unequal halves, crossed by numerous bridges. The larger portion, on the left bank, includes the old or inner town, surrounded by beautiful promenades, on the site of the ramparts, dismantled after 18 13, from an eminence within which, the Liebichs Hohe, a fine view is obtained of the surrounding country. Outside, as well as across the Oder, lies the new town with extensive suburbs, containing, especially in the Schweidnitz quarter in the south, and the Oder quarter in the north, many handsome streets and spacious squares. . The inner town, in contrast to the suburbs, still retains with its narrow streets much of its ancient characters, and contains several medieval buildings, both religious and secular, of great beauty and interest. The cathedral, dedicated to St John the Baptist, was begun in 1148 and completed at the close of the 15th century, enlarged in the 17th and 18th centuries, and restored between 1873 and 1875; it is rich in notable treasures, especially the high altar of beaten silver, and in beautiful paintings and sculptures. The Kreuzkirche (church of the Holy Cross), dating from the 13th and 14th centuries, is an interesting brick building, remarkable for its stained glass and its historical monuments, among which is the tomb of Henry IV., duke of Silesia. The Sandkirche, so

called from its dedication to Our Lady on the Sand, dates from the 14th century, and was until 1 8 10 the church of the Augustinian canons. The Dorotheen- or Minoritenkirche, remarkable for its high-pitched roof, was founded by the emperor Charles I V. in 1 3 5 1 . These are the most notable of the Roman Catholic churches. Of the Evangelical churches the most important is that of St Elizabeth, founded about 1250, rebuilt in the 14th and 15th centuries, and restored in 1857. Its lofty tower contains the largest bell in Silesia, and the church possesses a celebrated organ, fine stained glass, a magnificent stone pyx (erected in 1455) over 52 ft. high, and portraits of Luther and Melanchthon by Lucas Cranach. The church of St Mary Magdalen, built in the 14th century on the model of the cathedral, has two lofty Gothic towers connected by a bridge, and is interesting as having been the church in which, in 1523, the reformation in Silesia was first proclaimed. Other noteworthy ecclesiastical buildings are the graceful Gothic church of St Michael built in 1871, the bishop's palace and the Jewish synagogue, the finest in Germany after that in Berlin.

The business streets of the city converge upon the Ring, the market square, in which is the town-hall, a fine Gothic building, begun in the middle of the 14th and completed in the 16th century. Within is the Fiirstensaal, in which the diets of Silesia were formerly held, while beneath is the famous Schweidnitzer Keller, used continuously since 1355 as a beer and wine house.

The university, a spacious Gothic building facing the Oder, is a striking edifice. It was built (1728-1736) as a college by the Jesuits, on the site of the former imperial castle presented to them by the emperor Leopold I., and contains a magnificent hall (Aula Leopoldina) , richly ornamented with frescoes and capable of holding 1200 persons. Breslau possesses a large number of other important public buildings: the Stadthaus (civic hall), the royal palace, the government offices (a handsome pile erected in 1887), the provincial House of Assembly, the municipal archives, the courts of law, the Silesian museum of arts and crafts and antiquities, stored in the former assembly hall of the estates (Standehaus) , which was rebuilt for the purpose, the museum of fine arts, the exchange, the Stadt and Lobe theatres, the post office and central railway station. There are also numerous hospitals and schools. Breslau is exceedingly rich in fine monuments; the most noteworthy being the equestrian statues of Frederick the Great and Frederick William III., both by Kiss; the statue of B Richer by Rauch; a marble sta'tue of General Tauentzien by Langhans and Schadow; a bronze statue of Karl Gottlieb Svarez (1 746-1 798), the Prussian jurist, a monu- ment to Schleiermacher, born here in 1768, and statues of the emperor William I. , Bismarck and Moltke. There are also several handsome fountains. Foremost among the educational estab- lishments stands the university, founded in 1702 by the emperor Leopold I. as a Jesuit college, and greatly extended by the in- corporation of the university of Frankfort-on-Oder in 181 1. Its library contains 306,000 volumes and 4000 MSS., and has in the so-called Bibliotheca Habichtiana a valuable collection of oriental literature. Among its auxiliary establishments are botanical gardens, an observatory, and anatomical, physiological and kindred institutions. There are eight classical and four modern schools, two higher girls' schools, a Roman Catholic normal school, a Jewish theological seminary, a school of arts and crafts, and numerous literary and charitable foundations. It is, however, as a commercial and industrial city that Breslau is most widely known. Its situation, close to the extensive coal and iron fields of Upper Silesia, in proximity to the Austrian and Russian frontiers, at the centre of a network of railways directly com- municating both with these countries and with the chief towns of northern and central Germany, and on a deep waterway connecting with the Elbe and the Vistula, facilitates its very considerable transit and export trade in the products of the province and of the neighbouring countries. These embrace coal, sugar, cereals, spirits, petroleum and timber. The local industries comprise machinery and tools, railway and tramway carriages, furniture, cast-iron goods, gold and silver work, carpets, furs, cloth and cottons, paper, musical instruments, glass and china. Breslau is the headquarters of the VI. German army corps and contains a large garrison of troops of all arms.

History. — Breslau (Lat. Vratislavia) is first mentioned by the chronicler Thietmar, bishop of Merseburg, in a.d. iooo, and was probably founded some years before this date. Early in the nth century it was made the seat of a bishop, and after having formed part of Poland, became the capital of an independent duchy in 1163. Destroyed by the Mongols in 1241, it soon recovered its ' former prosperity and received a large influx of German colonists. The bishop obtained the title of a prince of the Empire in 1290. 1 When Henry VI., the last duke of Breslau, died in 1335, the city came by purchase to John, king of Bohemia, whose successors retained it until about 1460. The Bohemian kings bestowed various privileges on Breslau, which soon began to extend its commerce in all directions, while owing to increasing wealth the citizens took up a more independent attitude. Disliking the Hussites, Breslau placed itself under the protection of Pope Pius II. in 1463, and a few years afterwards came under the rule of the Hungarian king, Matthias Corvinus. After his death in 1490 it again became subject to Bohemia, passing with the rest

1 In 119S Jaroslaw, son of Boleslaus I. of Lower Silesia, who became bishop of Breslau in 1 198, inherited the duchy of Neisse, which at his death (1201) he bequeathed to his successors in the see. The Austrian part of Neisse still belongs to the bishop of Breslau, who also still bears the title of prince bishop.

of Silesia to the Habsburgs when in 1526 Ferdinand, afterwards emperor, was chosen king of Bohemia. Having passed almost undisturbed through the periods of the Reformation and the Thirty Years' War, Breslau was compelled to own the authority of Frederick the Great in 1741. It was, however, recoverd by the Austrians in 1757, but was regained by Frederick after his victory at Leuthen in the same year, and has since belonged to Prussia, although it was held for a few days by the French in 1807 after the battle of Jena, and again in 1813 after the battle of Bautzen. The sites of the fortifications, dismantled by the French in 1807, were given to the civic authorities by King Frederick William III., and converted into promenades. In March 1813 this monarch issued from Breslau his stirring appeals to the Prussians, An mein Volk and An mein Kriegesheer, and the city was the centre of the Prussian preparations for the campaign which ended at Leipzig. After the Prussian victory at Sadowa in 1866, William I. made a triumphant and complimentary entry into the city, which since the days of Frederick the Great has been only less loyal to the royal house than Berlin itself.

See Biirkner and Stein, Geschichte der Stadt Breslau (Bresl. 1851- !853); J- Stein, Geschichte der Stadt Breslau im igten Jahrhundert (1884); O Frenzel, Breslauer Stadtbuch ("Codex dipl. Silisiae," vol. ii. 1882); Luchs, Breslau, ein Fiihrer durch die Stadt (12th ed., Bresl. 1904).

BRESSANT, JEAN BAPTISTE PROSPER (1815-1886), French actor, was bornat Chalon-sur-Saone on the 23rd of October 1815, and began his stage career at the Varietes in Paris in 1833. In 1838 he went to the French theatre at St Petersburg, where for eight years he played important parts with ever-increasing reputation. His success was confirmed at the Gymnase when he returned to Paris in 1846, and he made his dibut at the Comedie Francaise as a full-fledged societaire in 1854. From playing the ardent young lover, he turned to leading roles both in modern plays and in the classical repertoire. His Richelieu in Mile de Belle-Isle, his Octave in Alfred de Musset's Les Caprices de Marianne, and his appearance in de Musset's II faut gu'une porte soit ouverle ou fermie and Un caprice were followed by Tartujfe, Le Misanthrope and Don Juan. Bressant retired in 1875, and died on the 23rd of January 1886. During his professorship at the Conservatoire, Mounet-Sully was one of his pupils.

BRESSE, a district of eastern France embracing portions of the departments of Ain, Saone-et-Loire and Jura. The Bresse extends from the Dombes on the south to the river Doubs on the north, and from the Saone eastwards to the Jura, measuring some 60 m. in the former, and 20 m. in the latter direction. It is a plain varying from 600 to 800 ft. above the sea, with few eminences and a slight inclination westwards. Heaths and coppice alternate with pastures and arable land; pools and marshes are numerous, especially in the north. Its chief rivers are the Veyle, the Reyssouze and the Seille, all tributaries of the Saone. The soil is a gravelly clay but moderately fertile, and cattle-raising is largely carried on. The region is, however, more especially celebrated for its table poultry. The inhabitants pre- serve a distinctive but almost obsolete costume, with a curious head-dress. The Bresse proper, called the Bresse Bressane, comprises the northern portion of the department of Ain. The greater part of the district belonged in the middle ages to the lords of Bage, from whom it passed in 1272 to the house of Savoy. It was not till the first half of the 15th century that the province, with Bourg as its capital, was founded as such. In 1601 it was ceded to France by the treaty of Lyons, after which it formed (together with the province of Bugey) first a separate government and afterwards part of the government of Burgundy.

BRESSUIRE, a town of western France, capital of an arron- dissement in the department of Deux-Sevres, 48 m. N. of Niort by rail. Pop. (1906) 4561. The town is situated on an eminence overlooking the Dolo, a tributary of the Argenton. It is the centre of a cattle-rearing and agricultural region, and has important markets; the manufacture of wooden type and woollen goods is carried on. Bressuire has two buildings of interest: the church of Notre-Dame, which, dating chiefly from the 12th and 15th centuries, has an imposing tower of the Renaissance period; and the .castle, built by the lords of

Beaumont, vassals of the viscount of Thouars. The latter is now in ruins, and a portion of the site is occupied by a modern chateau, but an inner and outer line of fortifications are still to be seen. The whole forms the finest assemblage of feudal ruins in Poitou. Bressuire is the seat of a sub-prefect and has a tribunal of first instance. Among the disasters suffered at various times by the town, its capture from the English and subsequent pillage by French troops under du Guesclin in 1370 is the most memorable.

BREST, a fortified seaport of western France, capital of an arrondissement in the department of Finistere, 155 m. W.N.W. of Rennes by rail. Population (1906) town, 71,163; commune, 85,294. It is situated to the north of a magnificent land- locked bay, and occupies the slopes of two hills divided by the river Penfeld, — the part of the town on the left bank being regarded as Brest proper, while the part on the right is known as Recouvrance. There are also extensive suburbs to the east of the town. The hill-sides are in some places so steep that the ascent from the lower to the upper town has to be effected by flights of steps and the second or third storey of one house is often on a level with the ground storey of the next. The chief street of Brest bears the name of rue de Siam, in honour of the Siamese embassy sent to Louis XIV., and terminates at the remarkable swing-bridge, constructed in 1861, which crosses the mouth of the Penfeld. Running along the shore to the south of the town is the Cours d'Ajot, one of the finest promenades of its kind in France, named after the engineer who constructed it. It is planted with trees and adorned with marble statues of Neptune and Abundance by Antoine Coysevox. The castle with its donjon and seven towers (12th to the 16th centuries), com- manding the entrance to the river, is the only interesting building in the town. Brest is the capital of one of the five naval arron- dissements of France. The naval port, which is in great part excavated in the rock, extends along both banks of the Penfeld; it comprises gun-foundries and workshops, magazines, ship-building yards and repairing docks, and employs about 7000 workmen. There are also large naval barracks, training ships and naval schools of various kinds, and an important naval hospital. Brest is the seat of a sub-prefect and has tribunals of first instance and of commerce, a chamber of commerce, a board of trade-arbitrators, two naval tribunals, and a tribunal of maritime commerce. There are also lycees for boys and girls and a school of commerce and industry. The commercial port, which is separated from the town itself by the Cours d'Ajot, comprises a tidal port with docks and an outer harbour; it is protected by jetties to the east and west and by a breakwater on the south. In 1905 the number of vessels entered was 202 with a tonnage of 67,755, and cleared 160 with a tonnage of 61,012. The

total value of the imports in 1905 was £244,000. The chief were wine, coal, timber, mineral tar, fertilizers and lobsters and crayfish. Exports, of which the chief were wheat- Hour, fruit and superphosphates, were valued at £40,000. Besides its sardine and mackerel fishing industry, the town has Hour- mills, breweries, foundries, forges, engineering works, and manu-factures of blocks, candles, chemicals (from sea- weed), boots, shoes and linen. Brest communicates by submarine cable with America and French West Africa. The roadstead consists of a deep indentation with a maximum length of 14 m. and an average width of 4 m., the mouth being barred by the peninsula of Quelern, leaving a passage from 1 to 2 m. broad, known as the Goulet. The outline of the bay is broken by numerous smaller bays or arms, formed by the embouchures of streams, the most important being the Anse de Quelern, the Anse de Poulmie, and the mouths of the Chateaulin and the Landerneau. Brest is a fortress of the first class. The fortifications of the town and the harbour fall into four groups: (1) the very numerous forts and batteries guarding the approaches to and the channel of the Goulet; (2) the batteries and forts directed upon the roads; (3) a group of works preventing access to the peninsula of Quelern and commanding the ground to the south of the peninsula from which many of the works of group (2) could be taken in reverse; (4) the defences of Brest itself, consisting of an old-fashioned

enceinte possessing little military value and a chain of detached forts to the west of the town.

Nothing definite is known of Brest till about 1 240, when it was ceded by a count of Leon to John I., duke of Brittany. In 1342 John of Montfort gave it up to the English, and it did not finally leave their hands till 1397. Its medieval importance was great enough to give rise to the saying, " He is not duke of Brittany who is not lord of Brest." By the marriage of Francis I. with Claude, daughter of Anne of Brittany, Brest with the rest of the duchy definitely passed to the French crown. The advant- ages of the situation for a seaport town were first recognized by Richelieu, who in 1631 constructed a harbour with wooden wharves, which soon became a station of the French navy. Colbert changed the wooden wharves for masonry and otherwise improved the post, and Vauban's fortifications followed in 1680-1688. During the 18th century the fortifications and the naval importance of the town continued to develop. In 1694 an English squadron under John, 3rd Lord Berkeley, was miserably defeated in attempting a landing; but in 1794, during the revolutionary war, the French fleet, under Villaret de Joyeuse, was as thoroughly beaten in the same place by the English admiral Howe.

BREST-LITOVSK (Polish Brzesc-Litevski; and in the Chron. Bereslie and Berestov) , a strongly fortified town of Russia, in the government of

Grodno, 137 m. by rail S. from the city of Grodno, in 52° 5′ N. lat. and 23° 39′ E. long., at the junction of the navigable river Mukhovets with the Bug, and at the intersection of railways from Warsaw, Kiev, Moscow and East Prussia. Pop. (1867) 22,493; (1901) 42,812, of whom more than one-half were Jews. It contains a Jewish synagogue, which was regarded in the 16th century as the first in Europe, and is the seat of an Armenian and of a Greek Catholic bishop; the former has authority over the Armenians throughout the whole country. The town carries on an extensive trade in grain, flax, hemp, wood, tar and leather. First mentioned in the beginning of the nth century, Brest-Litovsk was in 1241 laid waste by the Mongols and was not rebuilt till 1275; its suburbs were burned by the Teutonic Knights in 1379; and in the end of the 15th century the whole town met a similar fate at the hands of the khan of the Crimea. In the reign of the Polish king Sigismund III. diets were held there; and in 1594 and 1596 it was the meeting-place of two remarkable councils of the bishops of western Russia. In 1657, and again in 1706, the town was captured by the Swedes; in 1794 it was the scene of Suvarov's victory over the Polish general Sierakowski; in 1795 it was added to the Russian empire. The Brest-Litovsk or King's canal (50 m. long), utilizing the Mukhovets-Bug rivers, forms a link in the waterways that connect the Dnieper with the Vistula.

BRETEUIL, LOUIS CHARLES AUGUSTE LE TONNELIER, Baron de (1730-1807), French diplomatist, was born at the chateau of Azay-le-Feron (Indre) on the 7th of March 1730. He was only twenty-eight when he was appointed by Louis XV. ambassador to the elector of Cologne, and two years later he was sent to St Petersburg. He arranged to be temporarily absent from his post at the time of the palace revolution by which Catherine II. was placed on the throne. In 1769 he was sent to Stockholm, and subsequently represented his government at Vienna, Naples, and again at Vienna until 1783, when he was recalled to become minister of the king's household. In this capacity he introduced considerable reforms in prison administra- tion. A close friend of Marie Antoinette, he presently came into collision with Calonne, who demanded his dismissal in 1787. His influence with the king and queen, especially with the latter, remained unshaken, and on Necker's dismissal on the nth of July 1789, Breteuil succeeded him as chief minister. The fall of the Bastille three days later put an end to the new ministry, and Breteuil made his way to Switzerland with the first party of imigres. At Soleure, in November 1790, he received from Louis XVI. exclusive powers to negotiate with the European courts, and in his efforts to check the ill-advised diplomacy of the emigri princes, he soon brought himself into opposition with his old rival Calonne, who held a chief place in their councils.

After the failure of the flight to Varennes, in the arrangement of which he had a share, Breteuil received instructions from Louis XVI., designed to restore amicable relations with the princes. His distrust of the king's brothers and his defence of Louis XVI. 's prerogative were to some extent justified, but his intransigeant attitude towards these princes emphasized the dissensions of the royal family in the eyes of foreign sovereigns, who looked on the comte de Provence as the natural representa- tive of his brother and found a pretext for non-interference on Louis's behalf in the contradictory statements of the negotiators. Breteuil himself was the object of violent attacks from the party of the princes, who asserted that he persisted in exercising powers which had been revoked by Louis XVI. After the execution of Marie Antoinette he retired into private life near Hamburg, only returning to France in 1802. He died in Paris on the 2nd of November 1807.

See the memoirs of Bertrand de Molleville (2 vols., Paris, 18 16) and of the marquis de Bouille (2 vols., Paris, 1884) ; and E. Daudet, Cobkntz, 1789-1793 (1889), forming part of his Hist, de I' emigration.

BRETIGNY, a French town (dept. Eure-et-Loir, arrondisse- ment and canton of Chartres, commune of Sours), which gave its name to a celebrated treaty concluded there on the 8th of May 1360, between Edward III. of England and John II., surnamed the Good, of France. The exactions of the English, who wished to yield as few as possible of the advantages claimed by them in the treaty of London, made negotiations difficult, and the discussion of terms begun early in April lasted more than a month. By virtue of this treaty Edward III. obtained, besides Guienne and Gascony, Poitou, Saintonge and Aunis, Agenais, Pe.rigord, Limousin, Quercy, Bigorre, the countship of Gaure, Angoumois, Rouergue, Montreuil-sur-mer, Ponthieu, Calais, Sangatte, Ham and the countship of Guines. John II. had, moreover, to pay three millions of gold crowns for his ransom. On his side the king of England gave up the duchies of Normandy and Touraine, the countships of Anjou and Maine, and the suzerainty of Brittany and of Flanders. As a guarantee for the payment of his ransom, John the Good gave as hostages two of his sons, several princes and nobles, four inhabitants of Paris, and two citizens from each of the nineteen principal towns of France. This treaty was ratified and sworn to by the two kings and by their eldest sons on the 24th of October 1360, at Calais. At the same time were signed the special conditions relating to each important article of the treaty, and the renuncia- tory clauses in which the kings abandoned their rights over the territory they had yielded to one another.

See Rymer's Foedera, vol. iii. ; Dumont, Corps diplomatique, vol. ii. •

Froissart, ed. Luce, vol. vi. ; Les Grandes Chroniques de France, ed. P. Paris, vol. vi. ; E. Cosneau, Les Grands Traites de la guerre de cent ans (1889).

BRETON, JULES ADOLPHE AIME LOUIS (1827-), French painter, was born on the 1st of May 1827, at Courrieres, Pas de Calais, France. His artistic gifts being manifest at an early age, he was sent in 1843 to Ghent, to study under the historical painter de Vigne, and in 1846 to Baron Wappers at Antwerp. Finally he worked in Paris under Drolling. His first efforts were in historical subjects: " Saint Piat preaching in Gaul "; then, under the influence of the revolution of 1848, he represented " Misery and Despair." But Breton soon dis- covered that he was not born to be a historical painter, and he returned to the memories of nature and of the country which were impressed on him in early youth. In 1853 he exhibited the " Return of the Harvesters " at the Paris Salon, and the " Little Gleaner " at Brussels. Thenceforward he was essentially a painter of rustic life, especially in the province of Artois, which he quitted only three times for short excursions: in 1864 to Provence, and in 1865 and 1873 to Brittany, whence he derived some of his happiest studies of religious scenes. His numerous subjects may be divided generally into four classes: labour, rest, rural festivals and religious festivals. Among his more important works may be named " Women Gleaning," and " The Day after St Sebastian's Day " (1855), which gained him a third-class medal; " Blessing the Fields " (1857), a second-class medal; " Erecting a Calvary " (1859), now in the Lille gallery;

" The Return of the Gleaners " (1859), now in the Luxembourg " Evening " and " Women Weeding " (1861), a first-class medal " Grandfather's Birthday" (1862); "The Close of Day " (1865) " Harvest " (1867); " Potato Gatherers " (1868); " A Pardon Brittany" (1869); "The Fountain" (1872), medal of honour " The Bonfires of St John " (1875); " Women mending Nets ' (1876), in the Douai museum; "A Gleaner "(1877), Luxembourg " Evening, Finistere " (1881) ; " The Song of the Lark " (1884) " The Last Sunbeam " (1885); " The Shepherd's Star " (1888) "The Call Home" (1889); "The Last Gleanings" (1895) "Gathering Poppies" (1897); "The Alarm Cry" (1899) " Twilight Glory " (1900). Breton was elected to the Institut in 1886 on the death of Baudry. In 1889 he was made commander of the Legion of Honour, and in 1899 foreign member of the Royal Academy of London. He also wrote several books, among them Les Champs et la mer (1876), Nos peintres du siecle (1900), " Jeanne," a poem, Delphine Bernard (1902), and La Peinture

(1904).

See Jules Breton, Vie d'un artiste, art et nature (autobiographical), (Paris,

1890); Marius Vachon, Jules Breton (1899).

BRETON, Britton or Brittaine, NICHOLAS (iS4S?-i626), English poet, belonged to an old family settled at Layer-Breton, Essex. His father, William Breton, who had made a considerable fortune by trade, died in 1559, and the widow {nee Elizabeth Bacon) married the poet George Gascoigne before her sons had attained their majority. Nicholas Breton wasprobably born at the " capitall mansion house " in Red Cross Street, in the parish of St Giles without Cripplegate, mentioned in his father's will. There is no official record of his residence at the university, but the diary of the Rev. Richard Madox tells us that he was at Antwerp in 1583 and was " once of Oriel College." He married Ann Sutton in 1593, and had a family. He is supposed to have died shortly after the publication of his last work, Fantastickes (1626). Breton found a patron in Mary, countess of Pembroke, and wrote much in her honour until 1601, when she seems to have withdrawn her favour. It is probably safe to supplement the meagre record of his life by accepting as autobiographical some of the letters signed N.B. in A Poste with a Packet of Mad Letters (1603, enlarged 1637); the 19th letter of the second part contains a general complaint of many griefs, and proceeds as follows: " hath another been wounded in the warres, fared hard, lain in a cold bed many a bitter storme, and beene at many a hard banquet? all these have I; another imprisoned? so have I; another long been sicke? so have I; another plagued with an unquiet life? so have I; another indebted to his hearts griefe, and faine would pay and cannot? so am I." Breton was a facile writer, popular with his contemporaries, and for- gotten by the next generation. His work consists of religious and pastoral poems, satires, and a number of miscellaneous prose tracts. His religious poems are sometimes wearisome by their excess of fluency and sweetness, but they are evidently the expression of a devout and earnest mind. His praise of the Virgin and his references to Mary Magdalene have suggested that he was a Catholic, but his prose writings abundantly prove that he was an ardent Protestant. Breton had little gift for satire, and his best work is to be found in his pastoral poetry. His Passionate Skepheard (1604) is full of sunshine and fresh air, and of unaffected gaiety. The third pastoral in this book — " Who can live in heart so glad As the merrie country lad "— is well known; with some other of Breton's daintiest poems, among them the lullaby, " Come little babe, come silly soule," 1 — it is incorporated in A. H. Bullen's Lyrics from Elizabethan Romances (1890). His keen observation of country life appears also in his prose idyll, Wits Trenchmour, " a conference betwixt a scholler and an angler," and in his Fantastickes, a series of short prose pictures of the months, the Christian festivals and the hours, which throw much light on the customs of the times. Most of Breton's books are very rare and have great biblio- graphical value. His works, with the exception of some belong- ing to private owners, were

collected by Dr A. B. Grosart in the

1 This poem, however, comes from The Arbor of Amorous Devises^ which is only in part Breton's work.

Chertsey Worthies Library in 1879, with an elaborate introduction quoting the documents for the poet's history.

Breton's poetical works, the titles of which are here somewhat abbreviated, include The Workes of a Young Wit (1577); A Floorish upon Fancie (1577); The Pilgrimage to Paradise (1592); The Countess of Penbrook's Passion (MS.), first printed by J. O. Halliwell Phillipps in 1853; Pasquil's Fooles cappe, entered at Stationers' Hall in 1600; Pasquil's Mistresse (1600); Pasquil's Passe and Passeth Not (1600); Melancholike Humours (1600); Marie Mag- dalen's Love: a Solemne Passion of the Soules Love (1595), the first part of which, a prose treatise, is probably by another hand; the second part, a poem in six-lined stanza, is certainly by Breton; A Divine Poem, including " The Ravisht Soul " and " The Blessed Weeper " (1601); An Excellent Poem, upon the Longing of a Blessed Heart (1601); The Soules Heavenly Exercise (1601); The Souies Harmony (1602); Olde Madcappe newe Gaily mawfrey (1602); The Mother's Blessing (1602); A True Description of Unthankfulnesse (1602); The Passionate Shepheard (1604); The Soules Immortall Crowne (1605); The Honour of Valour (1605); An Invective against Treason; I would and I would not (1614) ; Bryton's Bowre of Delights (1591), edited by Dr Grosart in 1893, an unauthorized publication which contained some poems disclaimed by Breton; The Arbor of Amorous Devises (entered at Stationers' Hall, 1594), only in part Breton's; and contributions to England's Helicon and other mis- cellanies of verse. Of his twenty-two prose tracts may be mentioned Wit's Trenchmour (1597), The Wil of Wit (1599), A Poste with a Packet of Mad Letters (1603). Sir Philip Sidney's Ourania by N. B. (1606); Mary Magdalen's Lamentations (1604), and The Passion of a Discontented Mind (1601), are sometimes, but erroneously, ascribed to Breton.

BRETON DE LOS HERREROS, MANUEL (1796-1873), Spanish dramatist, was born at Quel (Logrofio) on the 19II1 of December 1796 and was educated at Madrid. Enlisting on the 24th of May 1812, he served against the French in Valencia and Catalonia, and retired with the rank of corporal on the 8th of March 1822. He obtained a minor post in the civil service under the liberal government, and on his discharge determined to earn his living by writing for the stage. His first piece, A la vcjez viruelas,

was produced on the 14th of October 1824, and proved the writer to be the legitimate successor of the younger Moratfn. His industry was astonishing: between October 1824 and November 1828, he composed thirty-nine plays, six of them original, the rest being translations or recasts of classic master- pieces. In 1831 he published a translation of Tibullus, and acquired by it an unmerited reputation for scholarship which secured for him an appointment as sub-librarian at the national library. But the theatre claimed him for its own, and with the exception of Elena and a few other pieces in the fashionable romantic vein, his plays were a long series of successes. His only serious check occurred in 1840; the former liberal had grown conservative with age, and in La Ponchada he ridiculed the National Guard. He was dismissed from the national library, and for a short time was so unpopular that he seriously thought of emigrating to America; but the storm blew over, and within two years Breton de los Herreros had regained his supremacy on the stage. He became secretary to the Spanish Academy, quarrelled with his fellow-members, and died at Madrid on the 8th of November 1873. He is the author of some three hundred and sixty original plays, twenty-three of which are in prose. No Spanish dramatist of the nineteenth century approaches him in comic power, in festive invention, and in the humorous pre- sentation of character, while his metrical dexterity is unique. Marcela a cual de los Ires? (1831), Muerete; y verds! C1837) and La Escuela del matrimonio (1852) still hold the stage, and are likely to hold it so long as Spanish is spoken.

See Marques de Molins, Breton de los Herreros, recuerdos de su vida y de sus obras (Madrid, 1883); Obras de Breton de Herreros (5 vols., Madrid, 1883); E. Pifieyro, El Romanticismo en Espana (Paris, 1904). (J. F.-K.)

BRETSCHNEIDER, KARL GOTTLIEB (1 776-1848), German scholar and theologian, was born at Gersdorf in Saxony. In 1 794 he entered the university of Leipzig, where he studied theology for four years. After some years of hesitation he resolved to be ordained, and in 1802 he passed with great distinction the examination for candidatus theologiae, and attracted the regard of F. V. Reinhard, author of the System der christlichen Moral ˆ1788-1815), then court-preacher at Dresden, who became his

warm friend and patron during the remainder of his life. In 1804-1806 Bretschneider was Privat-docent at the university of Wittenberg, where he lectured on philosophy and theology. During this time he wrote his work on the development of dogma, Systematische Entwickelung alter in der Dogmatik vorkommenden Begriffe nach den symbolischen Schriften der evangelisch-luthe- rischen und reformirten Kirche (1805, 4th ed. 1841), which was followed by others, including an edition of Ecclesiasticus with a Latin commentary. On the advance of the French army under Napoleon into Prussia, he determined to leave Wittenberg and abandon his university

career. Through the good offices of Reinhard, he became pastor of Schneeberg in Saxony (1807). In 1808 he was promoted to the office of superintendent of the church of Annaberg, in which capacity he had to decide, in accordance with the canon law of Saxony, many matters belonging to the department of ecclesiastical law. But the climate did not agree with him, and his official duties interfered with his theological studies. With a view to a change he took the degree of doctor of theology in Wittenberg in August 1812. In 1816 he was appointed general superintendent at Gotha, where he remained until his death in 1848. This was the great period of his literary activity.

In 1820 was published his treatise on the gospel of St John, entitled Probabilia de Evangelii ei Epistolarum Joannis Apostoli indole et origine, which attracted much attention. In it he collected with great fulness and discussed with marked modera- tion the arguments against Johannine authorship. This called forth a number of replies. To the astonishment of every one, Bretschneider announced in the preface to the second edition of his Dogmatik in 1822, that he had never doubted the authen- ticity of the gospel, and had published his Probabilia only to draw attention to the subject, and to call forth a more complete defence of its genuineness. Bretschneider remarks in his auto- biography that the publication of this work had the effect of preventing his appointment as successor to Karl C. Tittmann in Dresden, the minister Detlev von Einsiedel (1773-1861) denouncing him as the " slanderer of John " (J ' ohannisschdnder) . His greatest contribution to the science of exegesis was his Lexicon Manuale Graeco-Latinum in libros Novi Testamenti (1824, 3rd ed. 1840). This work was valuable for the use which its author made of the Greek of the Septuagint, of the Old and New Testament Apocrypha, of Josephus, and of the apostolic fathers, in illustration of the language of the New Testament. In 1826 he published Apologieder neuern Theologie des evangeli- schen Deutschlands. Hugh James Rose had published in England (1825) a volume of sermons on the rationalist movement (The State of the Protestant Religion in Germany) , in which he classed Bretschneider with the rationalists; and Bretschneider contended that he himself was not a rationalist in the ordinary sense of the term, but a " rational supernaturalist." Some of his numerous dogmatic writings passed through several editions. An English translation of his Manual of the Religion and History of the Christian Church appeared in 1857. His dogmatic position seems to be intermediate between the extreme school of natural- ists, such as Heinrich Paulus, J. F. Rbhr and Julius Wegscheider on the one hand, and D. F. Strauss and F. C. Baur on the other. Recognizing a supernatural element in the Bible, he nevertheless allowed to the full the critical exercise of reason in the interpreta- tion of its dogmas (cp. Otto Pffciderer, Development of Theology, pp. 89 ff.).

See his autobiography, Aus meinem Leben: Selbstbiographie von K. G. Bretschneider (Gotha, 1851), of which a translation, with notes, by Professor George E. Day, appeared in the Bibliotheca Sacra and American Biblical Repository, Nos. 36 and 38 (1852, 1853); Neu- decker in Die allgemeine Kirchenzeitung (1848), No. 38 ; Wiistemann, Bretschneideri Memoria (1848) ; A. G. Farrar, Critical History of Free Thought (Bampton Lectures, 1862); Herzog-Hauck, Real- encyklopddie (ed. 1897).

BRETTEN, a town of Germany, in the grand duchy of Baden, on the Saalbach, 9 m. S.E. of Bruchsal by rail. Pop. (1900) 4781. It has some manufactories of machinery and japanned goods, and a considerable trade in timber and live stock. Bretten was the birthplace of Melanchthon (1497), and in addition to a

statue of him by Drake, a memorial hall, containing a collection of his writings and busts and pictures of his famous contem- poraries, has been erected.

BRETWALDA, a word used in the Anglo-Saxon Chronicle under the date 827, and also in a charter of /Ethelstan, king of the English. It appears in several variant forms (brytenwalda, bretenanwealda, &c), and means most probably " lord of the Britons" or "lord of Britain"; for although the derivation of the word is uncertain, its earlier syllable seems to be cognate with the words Briton and Britannia. In the Chronicle the title is given to Ecgbert, king of the English, " the eighth king that was Bretwalda," and retrospectively to seven kings who ruled over one or other of the English kingdoms. The seven names are copied from Bede's Historia Ecclesiastica, and it is interesting to note that the last king named, Oswiu of Northumbria, lived 150 years before Ecgbert. It has been assumed that these seven kings exercised a certain superiority over a large part of England, but if such superiority existed it is certain that it was extremely vague and was unaccompanied by any unity of organization. Another theory is that Bretwalda refers to a war-leadership, or imperium, over the English south of the Humber, and has nothing to do with Britons or Britannia. In support of this explanation it is urged that the title is given in the Chronicle to Ecgbert in the year in which he " conquered the kingdom of the Mercians and all that was south of the Humber." Less likely is the theory of Palgrave that the Bretwaldas were the successors of the pseudo-emperors, Maximus and Carausius, and claimed to share the imperial dignity of Rome; or that of Kemble, who derives Bretwalda from the British word breotan, to distribute, and translates it " widely ruling." With regard

to Ecgbert the word is doubtless given as a title in imitation of its earlier use, and the same remark applies to its use in ˆEthelstan's charter.

See E. A. Freeman, History of the Norman Conquest, vol. i. (Oxford, 1877); W. Stubbs, Constitutional History, vol. i. (Oxford, 1897); J. R. Green, The Making of England, vol. ii. (London, 1897); F. Palgrave, The Rise and Progress of the English Commonwealth (London, 1832) ; J. M. Kemble, The Saxons in England (London, 1876); J. Rhys, Celtic Britain (London, 1884).

BREUGHEL (or Brueghel), PIETER, Flemish painter, was the son of a peasant residing in the village of Breughel near Breda. After receiving instruction in painting from Koek, whose daughter he married, he spent some time in France and Italy, and then went to Antwerp, where he was elected into the Academy in 1 551. He finally settled at Brussels and died there. The subjects of his pictures are chiefly humorous figures, like those of D. Teniers; and if he wants the delicate touch and silvery clearness of that master, he has abundant spirit and comic power. He is said to have died about the year 1570 at the age of sixty; other accounts give 1590 as the date of his death.

His son Pieter, the younger (1564-1637), known as " Hell " Breughel, was born in Brussels and died at Antwerp, where his " Christ bearing the Cross " is in the museum.

Another son Jan (c. 1569-1642), known as " Velvet " Breughel, was born at Brussels. He first applied himself to painting flowers and fruits, and afterwards acquired considerable reputation by his landscapes and sea-pieces. After residing long at Cologne he travelled into Italy, where his landscapes, adorned with small figures, were greatly admired. He left a large number of pictures, chiefly landscapes, which are executed with great skill. Rubens made use of Breughel's hand in the landscape part of several of his small pictures — such as his " Vertumnus and Pomona," the " Satyr viewing the Sleeping Nymph," and the " Terrestrial Paradise."

BREVET (a diminutive of the Fr. href), a short writing, originally an official writing or letter, with the particular meaning of a papal indulgence. The use of the word is mainly confined to a commission, or official document, giving to an officer in the army a permanent, as opposed to a local and temporary, rank in the service higher than that he holds substantively in his corps. In the British army " brevet rank " exists only above the rank of captain, but in the United States army it is possible to obtain a brevet as first lieutenant. In France the term

brevets is particularly used with respect to the General Staff, to express the

equivalent of the English " passed Staff College " (p.s.c).

BREVIARY (Lat. breviarium, abridgment, epitome), the book which contains the offices for the canonical hours, i.e. the daily service of the Roman Catholic Church. As compared with the Anglican Book of Common Prayer it is both more and less com- prehensive; more, in that it includes lessons and hymns for every day in the year; less, because it excludes the Eucharistic office (contained in the Missal), and the special offices connected with baptism, marriage, burial, ordination, &c, which are found in the Ritual or the Pontifical. In the early days of Christian worship, when Jewish custom was followed, the Bible furnished all that was thought necessary, containing as it did the books from which the lessons were read and the psalms that were recited. The first step in the evolution of the Breviary was the separation of the Psalter into a choir-book. At first the president of the local church (bishop) or the leader of the choir chose a particular psalm as he thought appropriate. From about the 4th century certain psalms began to be grouped together, a process that was furthered by the monastic practice of daily reciting the 150 psalms. This took so much time that the monks began to spread it over a week, dividing each day into hours, and allotting to each hour its portion of the Psalter. St Benedict in the 6th century drew up such an arrangement, probably, though not certainly, on the basis of an older Roman division which, though not so skilful, is the one in general use. Gradually there were added to these psalter choir-books additions in the form of antiphons, responses, collects or short prayers, for the use of those not skilful at improvisation and metrical compositions. Jean Beleth, a 12th-century liturgical author, gives the following:' list of books necessary for the right conduct of the canonical office: — the Antiphonarium, the Old and New Testaments, the Passionarius {liber) and the Legendarius (dealing respectively, with martyrs and saints), the Homiliarius (homilies on the Gospels), the Sermologus (collection of sermons) and the works of the Fathers, besides, of course, the Psalterium and the Collec- tarium. To overcome the inconvenience of using such a library the Breviary came into existence and use. Already in the 8th century Prudentius, bishop of Troyes, had in a Breviarium Psalterii made an abridgment of the Psalter for the laity, giving a few psalms for each day, and Alcuin had rendered a similar service by including a prayer for each day and some other prayers, but no lessons or homilies. The Breviary rightly so called, however, only dates from the nth century; the earliest MS. containing the whole canonical office is of the year 1099 and is in the Mazarin library. Gregory VII. (pope 1073-1085), too, simplified the liturgy as performed at the Roman court, and gave his abridgment the name of Breviary, which thus came to denote a work which from another point of view might be called a Plenary, involving as it did the collection of several works into one. There are several extant specimens

of 12th-century Brevi- aries, all Benedictine, but under Innocent III. (pope 1198-1216) their use was extended, especially by the newly founded and active Franciscan order. These preaching friars, with the author- ization of Gregory IX., adopted (with some modifications, e.g. the substitution of the " Gallican " for the " Roman " version of the Psalter) the Breviary hitherto used exclusively by the Roman court, and with it gradually swept out of Europe all the earlier partial books (Legendaries, Responsories), &c, and to some extent the local Breviaries, like that of Sarum. Finally, Nicholas III. (pope 1277-1280) adopted this version both for the curia and for the basilicas of Rome, and thus made its position secure. The Benedictines and Dominicans have Breviaries of their own. The only other types that merit notice are: — (1) the Mozarabic Breviary, once in use throughout all Spain, but now confined to a single foundation at Toledo; it is remarkable for the number and length of its hymns, and for the fact that the majority of its collects are addressed to God the Son; (2) the Ambrosian, now confined to Milan, where it owes its retention to the attachment of the clergy and people to their traditionary rites, which they derive from St Ambrose (see Liturgy).

5°4

BREVIARY

Till the council of Trent every bishop had full power to regulate the Breviary of his own diocese; and this was acted upon almost everywhere. Each monastic community, also, had one of its own. Pius V. (pope 1566-1572), however, while sanctioning those which could show at least 200 years of existence, made the Roman obligatory in all other places. But the influence of the court of Rome has gradually gone much beyond this, and has superseded almost all the local " uses." The Roman has thus become nearly universal, with the allowance only of additional offices for saints specially venerated in each particular diocese. The Roman Breviary has undergone several revisions: The most remarkable of these is that by Francis Quignonez, cardinal of Santa Croce in Gerusalemme (1536), which, though not accepted by Rome, 1 formed the model for the still more thorough reform made in 1549 by the Church of England, whose daily morning and evening services are but a condensation and simplification of the Breviary offices. Some parts of the prefaces at the beginning of the English Prayer-Book are free translations of those of Quignonez. The Pian Breviary was again altered by Sixtus V. in 1588, who introduced the revised Vulgate text; by Clement VIII. in 1602 (through Baronius and Bellarmine), especially as concerns the rubrics; and by Urban VIII. (1623-1644), a purist who unfortunately tampered with the text of the hymns, injuring both their literary charm and their historic worth.

In the 17th and 18th centuries a movement of revision took place in France, and succeeded in modifying about half the Breviaries of that country. Historically, this proceeded from the labours of Jean de Launoy (1603-1678), " le denicheur des saints," and Louis Sebastien le Nain de Tillemont, who had shown the falsity of numerous lives of the saints; while theo- logically it was produced by the Port Royal school, which led men to dwell more on communion with God as contrasted with the invocation of the saints. This was mainly carried out by the adoption of a rule that all antiphons and responses should be in the exact words of Scripture, which, of course, cut out the whole class of appeals to created beings. The services were at the same time simplified and shortened, and the use of the whole Psalter every week (which had become a mere theory in the Roman Breviary, owing to its frequent supersession by saints' day services) was made a reality. These reformed French Brevi- aries — e.g. the Paris Breviary of 1680 by Archbishop Francois de Harlay (1625-1693) and that of 1736 by Archbishop Charles Gaspard Guillaume de Vintimille (1655-1746) — show a deep knowledge of Holy Scripture, and much careful adaptation of different texts; but during the pontificate of Pius IX. a strong Ultramontane movement arose against them. This v/as inau- gurated by Montalembert, but its literary advocates were chiefly Dom Gueranger, a learned Benedictine monk, abbot of Solesmes, and Louis Francois Veuillot (1813-1883) of the Univers; and it succeeded in suppressing them everywhere, the last diocese to surrender being Orleans in 1875. The Jansenist and Gallican influence was also strongly felt in Italy and in Germany, where Breviaries based on the French models were published at Cologne, Munster, Mainz and other towns. Meanwhile, under the direction of Benedict XIV. (pope 1740-17 58), a special congregation col- lected many materials for an official revision, but nothing was published. Subsequent changes have been very few and minute. In 1902, under Leo XIII., a commission under the presidency of Monsignor Louis Duchesne was appointed to consider the Breviary, the Missal, the Pontifical and the Ritual.

The beauty and value of many of the Latin Breviaries were brought to the notice of English churchmen by one of the numbers of the Oxford Tracts for the Times, since which time they have been much more studied, both for their own sake and for the light they throw upon the English Prayer-Book.

From a bibliographical point of view some of the early printed Breviaries are among the rarest of literary curiosities, being merely local. The copies were not spread far, and were soon

1 It was approved by Clement VII. and Paul III., and permitted as a substitute for the unrevised Breviary, until Pius V. in 1568 excluded it as too short and too modern, and issued a reformed edition {Breviarium

Planum, Pian Breviary) of the old Breviary.

worn out by the daily use made of them. Doubtless many editions have perished without leaving a trace of their existence, while others are known by unique copies. In Scotland the only one which has survived the convulsions of the 16th century is that of Aberdeen, a Scottish form of the Sarum Office, 2 revised by William Elphinstone (bishop 1483-1514), and printed at Edinburgh by Walter Chapman and Andrew Myllar in 1 509-1 510. Four copies have been preserved of it, of which only one is com- plete; but it was reprinted in facsimile in 1854 for the Bannatyne Club by the munificence of the duke of Buccleuch. It is par- ticularly valuable for the trustworthy notices of the early history of Scotland which are embedded in the lives of the national saints. Though enjoined by royal mandate in 1501 for general use within the realm of Scotland, it was probably never widely adopted. The new Scottish Proprium sanctioned for the Roman Catholic province of St Andrews in 1903 contains many of the old Aberdeen collects and antiphons.

The Sarum or Salisbury Breviary itself was very widely used. The first edition was printed at Venice in 1483 by Raynald de Novimagio in folio; the latest at Paris, 1556, 1557. While modern Breviaries are nearly always printed in four volumes, one for each season of the year, the editions of the Sarum never exceeded two parts.

Contents of the Roman Breviary. — At the beginning stands the usual introductory matter, such as the tables for determining the date of Easter, the calendar, and the general rubrics. The Breviary itself is divided into four seasonal parts— winter, spring, summer, autumn — and comprises under each part (1) the Psalter; (2) Proprium de Tempore (the special office of the season); (3) Proprium Sanctorum (special offices of saints); (4) Commune Sanctorum (general offices for saints); (5) Extra Services. These parts are often published separately.

1. The Psalter. — This is the very backbone of the Breviary, the groundwork of the Catholic prayer-book ; out of it have grown the antiphons, responsorics and versicles. In the Breviary the psalms are arranged according to a disposition dating from the 8th century, as follows. Psalms i.-cviii., with some omissions, are recited at Matins, twelve each day from Monday to Saturday, and eighteen on Sunday. _ The omissions are said at Lauds, Prime and Compline. Psalms cix.-cxlvii. (except cxvii., cxviii. and cxlii.) are said at Vespers, five each day. Psalms cxlviii.-cl. are always used at Lauds, and give that hour its name. The text of this Psalter is that commonly known as the Gallican. The name is misleading, for it is simply the second revision (a.d. 392) made by Jerome of the old Itala version originally used in Rome. Jerome's first revision of the Itala (a.d.

383), known as the Roman, is still used at St Peter's in Rome, but the " Gallican," thanks especially to St Gregory of Tours, who introduced it into Gaul in the 6th century, has ousted it everywhere else. The Antiphonary of Bangor proves that Ireland accepted the Gallican version in the 7th century, and the English Church did so in the 10th.

2. The Proprium de Tempore contains the office of the seasons of the Christian year (Advent to Trinity), a conception that only gradually grew up. There is here given the whole service for every Sunday and week-day, the proper antiphons, responsories, hymns, and especially the course of daily Scripture-reading, averaging about twenty verses a day, and (roughly) arranged thus: for Advent, Isaiah; Epiphany to Septuagesima, Pauline Epistles; Lent, patristic homilies (Genesis on Sundays); Passion-tide, Jeremiah; Easter to Whitsun, Acts, Catholic epistles and Apocalypse ; Whitsun to August, Samuel and Kings; August to Advent, Wisdom books, Maccabees, Prophets. The extracts are often scrappy and torn out of their context.

3. The Proprium Sanctorum contains the lessons, psalms and liturgical formularies for saints' festivals, and depends on the days of the secular month. Most of the material here is hagiological biography, occasionally revised as by Leo XIII. in view of archaeo- logical and other discoveries, but still largely uncritical. Covering a great stretch of time and space, they do for the worshipper in the field of church history what the Scripture readings do in that of biblical history. As something like 90 % of the days in the year have, during the course of centuries, been allotted to some saint or other, it is easy to see how this section of the Breviary has encroached upon the Proprium de Tempore, and this is the chief problem that confronts any who are concerned for a revision of the Breviary.

4. The Commune Sanctorum comprises psalms, antiphons, lessons, &c. , for feasts of various groups or classes (twelve in all) ; e.g. apostles, martyrs, confessors, virgins, and the Blessed Virgin Mary. These offices are of very ancient date, and many of them were probably

2 The Sarum Rite was much favoured in Scotland as a kind of protest against the jurisdiction claimed by the church of York.

in origin proper to individual saints. They contain passages of great literary beauty. The lessons read at the third nocturn are patristic homilies on the Gospels, and together form a rough summary of theological instruction.

5. Extra Services. — Here are found the Little Office of the Blessed Virgin Mary, the Office of the Dead (obligatory on All Souls' Day), and offices peculiar to each diocese.

It has already been indicated, by reference to Matins, Lauds, &c, that not only each day, but each part of the day, has its own office, the day being divided into liturgical " hours." A detailed account of these will be found in the article Hours, Canonical. Each of the hours of the office is composed of the same elements, and something must be said now of the nature of these constituent parts, of which mention has here and there been already made. They are : psalms (including canticles), antiphons, responsories, hymns, lessons, little chapters, versicles and collects.

The psalms have already been dealt with, but it may be noted again how the multiplication of saints' festivals, with practically the same special psalms, tends in practice to constant repetition of about one-third of the Psalter, and correspondingly rare recital of the remaining two-thirds, whereas the Proprium de Tempore, could it be adhered to, would provide equal opportunities for every psalm. As in the Greek usage and in the Benedictine, certain canticles like the Song of Moses (Exodus xv.), the Song of Hannah (1 Sam. ii.), the prayer of Habakkuk (iii.), the prayer of Hezekiah (Isaiah xxxviii.) and other similar Old Testament passages, and, from the New Testament, the Magnificat, the Benedictus and the Nunc dimittis, are admitted as psalms.

The antiphons are short liturgical forms, sometimes of biblical, sometimes of patristic origin, used to introduce a psalm. The term originally signified a chant by alternate choirs, but has quite lost this meaning in the Breviary.

The responsories are similar in form to the antiphons, but come at the end of the psalm, being originally the reply of the choir or congregation to the precentor who recited the psalm.

The hymns are short poems going back in part to the days of Prudentius, Synesius, Gregory of Nazianzus and Ambrose (4th and 5th centuries), but mainly the work of medieval authors. Together they make a fine collection, and it is a pity that Urban VIII. in his mistaken humanistic zeal tried to improve them.

The lessons, as has been seen, are drawn variously from the Bible, the Acts of the Saints and the Fathers of the Church. In the primi- tive church, books afterwards excluded from the canon were often read, e.g. the letters of Clement of Rome and the Shepherd of Hernias. In later days the churches of Africa, having rich memorials of martyrdom, used them to supplement the reading of Scripture. Monastic influence accounts for the

practice of adding to the reading of a biblical passage some patristic commentary or exposition. Books of homilies were compiled from the writings of SS. Augustine, Hilary, Athanasius, Isidore, Gregory the Great and others, and formed part of the library of which the Breviary was the ultimate compendium. In the lessons, as in the psalms, the order for special days breaks in upon the normal order of ferial offices and dislocates the scheme for consecutive reading. The lessons are read at Matins (which is subdivided into three nocturns).

The little chapters are very short lessons read at the other " hours." The versicles are short responsories used after the little chapters. The collects come at the close of the office and are short prayers summing up the supplications of the congregation. They arise out of a primitive practice on the part of the bishop (local president), examples of which are found in the Didache (Teaching of the Apostles) and in the letters of Clement of Rome and Cyprian. With the crystallization of church order improvisation in prayer largely gave place to set forms, and collections of prayers were made which later developed into Sacramentaries and Orationals. The collects of the Breviary are largely drawn from the Gelasian and other Sacra- mentaries, and they are used to sum up the dominant idea of the festival in connexion with which they happen to be used.

The difficulty of harmonizing the Proprium de Tempore and the Proprium Sanctorum,ˆ to which reference has been made, is only partly met in the thirty-seven chapters of general rubrics. Addi- tional help is given by a kind of Catholic Churchman's Almanack, called the Ordo Recitandi Divini Officii, published in different coun- tries and dioceses, and giving, under every day, minute directions for proper reading.

Every clerk in orders and every member of a religious order must publicly join in or privately read aloud (i.e. using the lips as well as the eyes — it takes about two hours in this way) the whole of the Breviary services allotted for each day. In large churches the services are usually grouped; e.g. Matins and Lauds (about 7.30 a.m.); Prime, Terce (High Mass), Sext, and None (about 10 a.m.); Vespers and Compline (4 p.m.) ; and from four to eight hours (depend- ing on the amount of music and the number of high masses) are thus spent in choir. Laymen do not use the Breviary as a manual of devotion to any great extent.

The Roman Breviary has been translated into English (by the marquess of Bute in 1879; new ed. with a trans, of the Martyr- ology, 1908), French and German. The English version is note- worthy for its inclusion of the skilful renderings of the ancient hymns by J. H. Newman, J. M. Neale and others.

Authorities. — F. Cabrol, Introduction aux etudes liturgiques; Probst, Kirchenlex. ii., s.v. " Brevier " ; Baumer, Geschichte des Breviers (Freiburg, 1895) ; P. Batiffol, L'Histoire du breviaire remain (Paris, 1893; Eng. ti\); Baudot, Le Breviaire romain (1907). A complete bibliography is appended to the article by F. Cabrol in the Catholic Encyclopaedia, vol. ii. (1908).

BREVIARY OF ALARIC (Breviarium Alaricanum) , a collection of Roman law, compiled by order of Alaric II., king of the Visigoths, with the advice of his bishops and nobles, in the twenty-second year of his reign (a.d. 506). It comprises sixteen books of the Theodosian code; the Novels of Theodosius II., Valcrrtinian III., Marcian, Majorianus and Severus; the Institutes of Gaius; five books of the Sententiae Receptae of Julius Paulus; thirteen titles of the Gregorian code; two titles of the Hermogenian code; and a fragment of the first book of the Responsa Papiniani. It is termed a code (codex), in the certificate of Anianus, the king's referendary, but unlike the code of Justinian, from which the writings of jurists were excluded, it comprises both imperial constitutions (leges) and juridical treatises (jura). From the circumstance that the Breviarium has prefixed to it a royal rescript (commonitorium) directing that copies of it, certified under the hand of Anianus, should be received exclusively as law throughout the kingdom of the Visigoths, the compilation of the code has been attributed to Anianus by many writers, and it is frequently designated the Breviary of Anianus (Breviarium Aniani). The code, however, appears to have been known amongst the Visigoths by the title of " Lex Romana," or " Lex Theodosii," and it was not until the 16th century that the title of " Breviarium " was introduced to distinguish it from a recast of the code, which was introduced into northern Italy in the 9th century for the use of the Romans in Lombardy. This recast of the Visigothic code has been preserved in a MS. known as the Codex Utinensis, which was formerly kept in the archives of the cathedral of Udine, but is now lost; and it was published in the 18th century for the first time by P. Canciani in his collection of ancient laws entitled Barbarorum Leges Antiquae. Another MS. of this Lombard recast of the Visigothic code was discovered by Hanel in the library of St Gall. The chief value of the Visigothic code consists in the fact that it is the only collection of Roman Law in which the five first books of the Theodosian code and five books of the Sententiae Receptae of Julius Paulus have been preserved, and until the discovery of a MS. in the chapter library in Verona, which contained the greater part of the Institutes of Gaius, it was the only work in which any portion of the institutional writings of that great jurist had come down to us.

The most complete edition of the Breviarium will be found in the collection of Roman law published under the title of Jus Civile Ante- Jus tinianum. (Berlin, 1815). See also G. Hanel's Lex Romana Visigothorum (Berlin, 1847-1849).

BREWER, JOHN SHERREN (i8io-t879), English historian, was born in Norwich in 1810, the son of a Baptist schoolmaster. He was educated at Queen's College, Oxford, was ordained in the Church of England in 1837, and became chaplain to a central London workhouse. In 1839 he was appointed lecturer in classical literature at King's College, London, and in 1855 he became professor of English language and literature and lecturer in modern history, succeeding F. D. Maurice. Meanwhile from 1854 onwards he was also engaged in journalistic work on the Morning Herald, Morning Post and Standard. In 1856 he was commissioned by the master of the rolls to prepare a calendar of the state papers of Henry VIII., a work demanding a vast amount of research. He was also made reader at the Rolls, and subsequently preacher. In 1877 Disraeli secured for him the crown living of Toppesfield, Essex. There he had time to continue his task of preparing his Letters and Papers of the Reign of King Henry VIII., the Introductions to which (published separately, under the title The Reign of Henry VIII., in 1884) form a scholarly and authoritative history of Henry VIII. 's reign. New editions of several standard historical works were also produced under Brewer's direction. He died at Toppesfield in February 1879.

BREWING, in the modern acceptation of the term, a series of operations the object of which is to prepare an alcoholic beverage of a certain kind — to wit, beer — mainly from cereals (chiefly malted barley), hops and water. Although the art of preparing beer (q.v.) or ale is a very ancient one, there is very little information in the literature of the subject as to the apparatus and methods employed in early times. It seems fairly certain, however, that up to the 18th century these were of the most primitive kind. With regard to materials, we know that prior to the general introduction of the hop (see Ale) as a preservative and astringent, a number of other bitter and aromatic plants had been employed with this end in view. Thus J. L. Baker (The Brewing Industry) points out that the Cimbri used the Tamarix germanica, the Scandinavians the fruit of the sweet gale (Myrica gale), the Cauchi the fruit and the twigs of the chaste tree (Vitex agrius castus), and the Icelanders the yarrow (Achilloea millefolium).

The preparation of beer on anything approaching to a manu- facturing scale appears, until about the 12th or 13th century, to have been carried on. in England chiefly in the monasteries; but as the brewers of London combined to form an association in the reign of Henry IV., and were granted a charter in 1445, it is evident that brewing as a special trade or industry must have developed with some rapidity. After the Reformation

the ranks of the trade brewers were swelled by numbers of monks from the expropriated monasteries. Until the 18th century the professional brewers, or brewers for sale, as they are now called, brewed chiefly for the masses, the wealthier classes pre- paring their own beer, but it then became gradually apparent to the latter (owing no doubt to improved methods of brewing, and for others reasons) that it was more economical and less troublesome to have their beer brewed for them at a regular brewery. The usual charge was 30s. per barrel for bitter ale, and 8s. or so for small beer. This tendency to centralize brewing operations became more and more marked with each succeeding decade. Thus during 1895-1905 the number of private brewers declined from 17,041 to 9930. Of the private brewers still exist- ing, about four-fifths were in the class exempted from beer duty, i.e. farmers occupying houses not exceeding £10 annual value who brew for their labourers, and other persons occupying houses not exceeding £15 annual value. The private houses subject to both beer and licence duty produced less than 20,000 barrels annually. There are no official figures as to the number of " cottage brewers," that is, occupiers of dwellings not exceeding £8 annual value; but taking everything into consideration it is probable that more than 99 % of the beer produced in the United Kingdom is brewed by public brewers (brewers for sale) . The disappearance of the smaller public brewers or their absorp- tion by the larger concerns has gone hand-in-hand with the gradual extinction of the private brewer. In the year 1894-189 5 8863 licences were issued to brewers for sale, and by 1904-1905 this number had been reduced to 5164. There are numerous reasons for these changes in the constitution of the brewing industry, chief among them being (a) the increasing, difficulty, owing partly to lincensing legislation and its administration, and partly to the competition of the great breweries, of obtaining an adequate outlet for retail sale in the shape of licensed houses; and (b) the fact that brewing has continuously become a more scientific and specialized industry, requiring costly and com- plicated plant and expert manipulation. It is only by employing the most up-to-date machinery and expert knowledge that the modern brewer can hope to produce good beer in the short time which competition and high taxation, &c, have forced upon him. Under these conditions the small brewer tends to extinction, and the public are ultimately the gainers. The relatively non-alcoholic, lightly hopped and bright modern beers, which the small brewer has not the means of producing, are a great advance on the muddy, highly hopped and alcoholized beverages to which our ancestors were accustomed.

The brewing trade has reached vast proportions in the United Kingdom. The maximum production was 37,090,986 barrels in 1900, and while there has been a steady decline since that

year, the figures for 1905-1906 — 34,109,263 barrels — were in excess of those for any year preceding 1897. It is interesting in this connexion to

note that the writer of the article on Brewing in the 9th edition of the Encyclopaedia Britannica was of the opinion that the brewing industry — which was then (1875) producing, roughly, 25,000,000 barrels — had attained its maxi- mum development. In the year ending 30th September 190.5 the beer duty received by the exchequer amounted to £13, 1 56,053. The number of brewers for sale was 5180. Of these one firm, namely,Messrs Guinness, owning the largest brewery in the world, brewed upwards of two million barrels, paying a sum of, roughly, one million sterling to the revenue. Three other firms brewed close on a million barrels or upwards. The quantity of malt used was 51,818,697 bushels; of unmalted corn, 125,671 bushels; of rice, flaked maize and similar materials, 1,348,558 cwt.; of sugar, 2,746,615 cwt.; of hops, 62,360,817 lb; and of hop sub- stitutes, 49,202 lb. The average specific gravity of the beer produced in 1905-1906 was 1053-24. The quantity of beer exported was 520,826; of beer imported, 57,194 barrels. It is curious to note that the figures for exports and imports had remained almost stationary for the last thirty years. By far the greater part of the beer brewed is consumed in England. Thus of the total quantity retained for consumption in 1905-1906, 28,590,563 barrels were consumed in England, 1,648,463 in Scotland, and 3,265,084 in Ireland. In 1871 it was calculated by Professor Leone Levi that the capital invested in the liquor trade in the United Kingdom was £117,000,000. In 1908 this figure might be safely doubled. A writer in the Brewers' Almanack for 1906 placed the capital invested in limited liability breweries alone at £185,000,000. If we allow for over-capitaliza- tion, it seems fairly safe to say that, prior to the introduction of the Licensing Bill of 1908, the market value of the breweries in the United Kingdom, together with their licensed property, was in the neighbourhood of £120,000,000, to which might be added another £20,000,000 for the value of licences not included in the above calculation; the total capital actually sunk in the whole liquor trade (including the wine and spirit industries and trades) being probably not far short of £250,000,000, and the number of persons directly engaged in or dependent on the liquor trade being under-estimated at 2,000,000. (For compara- tive production and consumption see Beer.)

Taxation and Regulations. — The development of the brewing industry in England is intimately interwoven with the history of its taxation, and the regulations which have from time to time been formed for the safeguarding of the revenue. The first duty on beer in the United Kingdom was imposed in the reign of Charles II. (1660), namely 2S. 6d. per barrel on strong and 6d. per barrel on weak beer. This was gradually increased, amounting to 4s. 9d. on strong and is. 3d. on weak beer in the last decade of the 17th century, and to 8s. to 10s. in the year 1800, at which rate it continued until the repeal of the beer duty in 1830. A duty on malt was first imposed

in the reign of William III. (1697), and from that date until 1830 both beer duty and malt tax were charged. The rate at first was under 7d. per bushel, but this was increased up to 2s. 7d. prior to the first repeal of the beer duty (1830), and to 4s. 6d. after the repeal. In 1829 the joint beer and malt taxes amounted to no less than 13s. 8d. per barrel, or 4|d. per gallon, as against 2jd. at the present day. From 1856 until the abolition of the malt tax, the latter remained constant at a fraction under 2s. 8Jd. A hop duty varying from id. to 2jd. per pound was in existence between 1 71 1 and 1862. One of the main reasons for the abolition of the hop duty was the fact that, owing to the uncertainty of the crop, the amount paid to the revenue was subject to wide fluctuations. Thus in 1855 the revenue from this source amounted to £728,183, in 1861 to only £149,700.

It was not until 1847 that the use of sugar in brewing was per- mitted, and in 1850 the first sugar tax, amounting to Is. 4d. per cwt., was imposed. It varied from this figure up to 6s. 6d. in 1854, an d in 1874, when the general duty on sugar was repealed, it was raised to lis. 6d., at which rate it remained until 1880, when it was repealed simultaneously with the malt duty. In 1901 a general sugar tax of 4s. 2d. and under (according to the percentage of actual sugar con- tained) was imposed, but no drawback was allowed to brewers using sugar, and therefore — and this obtains at the present day — sugar used in brewing pays the general tax and also the beer duty.

By the Free Mash-Tun Act of 1880, the duty was taken off the malt and placed on the beer, or, more properly speaking, on the wort ; maltsters' and brewers' licences were repealed, and in lieu thereof an annual licence duty of £1 payable by every brewer for sale was

imposed. The chief feature of this act was that, on and after the 1st of October 1880, a beer duty was imposed in lieu of the old malt tax, at the rate of 6s. 3d. per barrel of 36 gallons, at a specific gravity of 1-057, an d the regulations for charging the duty were so framed as to leave the brewer practically unrestricted as to the description of malt or corn and sugar, or other description of sac- charine substitutes (other than deleterious articles or drugs), which he might use in the manufacture or colouring of beer. This freedom in the choice of materials has continued down to the present time, except that the use of " saccharin " (a product derived from coal-tar) was prohibited in 1888, the reason being that this substance gives an apparent palate-fulness to beer equal to roughly 4° in excess of its real gravity, the revenue suffering thereby. In 1889 the duty on beer was increased by a

reduction in the standard of gravity from 1-057 to 1-055, an d in 1894 a further 6d. per barrel was added. The duty thus became 6s. 9d. per barrel, at a gravity of 1-055, which was further increased to 7s. 9d. per barrel by the war budget of 1900, at which figure it stood in 1909. (See also Liquor Laws.)

Prior to 1896, rice, flaked maize (see below), and other similar preparations had been classed as malt or corn in reference to their wort-producing powers, but after that date they were deemed sugar ' in that regard. By the new act (1880) 42 lb weight of corn, or 28 lb weight of sugar, were to be deemed the equivalent of a bushel of malt, and a brewer was expected by one of the modes of charge to have brewed at least a barrel (36 gallons) of worts (less 4 % allowed for wastage) at the standard gravity for every two bushels of malt (or its equivalents) used by him in brewing; but where, owing to lack of skill or inferior machinery, a brewer cannot obtain the standard quantity of wort from the standard equivalent of material, the charge is made not on the wort, but directly on the material. By the new act, licences at the annual duty of £1 on brewers for sale, and of 6s. (subsequently modified by 44 Vict. c. 12, and 48 and 49 Vict. c. 5, &c, to 4s.) or 9s., as the case might be, on any other brewers, were required. The regulations dealing with the mashing operations are very stringent. Twenty-four hours at least before mashing the brewer must enter in his brewing book (provided by the Inland Revenue) the day and hour for commencing to mash malt, corn, &c, or to dissolve sugar; and the date of making such entry; and also, two hours at least before the notice hour for mashing, the quantity of malt, corn, &c, and sugar to be used, and the day and hour when all the worts will be drawn off the grains in the mash-tun. The worts of each brewing much be collected within twelve hours of the commencement of the collection, and the brewer must within a given time enter in his book the quantity and gravity of the worts before fermentation, the number and name of the vessel, and the date of the entry. The worts must remain in the same vessel undisturbed for twelve hours after being collected, unless previously taken account of by the officer. There are other regulations, e.g. those prohibiting the mixing of worts of different brewings unless account has been taken of each separately, the alteration of the size or shape of any gauged vessel without notice, and so on.

Taxation of Beer in Foreign Countries. — The following table shows the nature of the tax and the amount of the same calculated to English barrels.

ing a certain proportion of chlorides is required. The presence or absence of certain mineral substances as such in the finished beer is not, apparently, a matter of any moment as regards flavour or appearance, but the importance of the role played by these substances in the brewing process is

due to the influence which they exert on the solvent action of the water on the various constituents of the malt, and possibly of the hops. The excellent quality of the Burton ales was long ago surmised to be due mainly to the well water obtainable in that town. On analysing Burton water it was found to contain a considerable quantity of calcium sulphate — gypsum — and of other calcium and magnesium salts, and it is now a well-known fact that good bitter ales cannot be brewed except with waters containing these substances in sufficient quantities. Similarly, good mild ale waters should contain a certain quantity of sodium chloride, and waters for stout very little mineral matter, excepting perhaps the carbonates of the alkaline earths, which are pre- cipitated on boiling.

The following analyses (from W. J. Sykes, The Principles and Practice of Brewing) are fairly illustrative of typical brewing waters.

Burton Water (Pale Ale).

Grains per Gallon. • 3-90

Sodium Chloride . Potassium Sulphate Sodium Nitrate Calcium Sulphate . Calcium Carbonate Magnesium Carbonate Silica and Alumina

Dublin Water (Stout) Sodium Chloride . Calcium Sulphate . Calcium Carbonate Magnesium Carbonate Iron Oxide and Alumina Silica

Mild Ale Water. Sodium Chloride …. Calcium Chloride …. Calcium Sulphate …. Calcium Carbonate Iron Oxide and Alumina Silica

1-59 1-97

77-87 7-62

21-31 0-98

1-83 4-45 14-21 0-90 0-24 0-26

35-H

3-88 6-23 4-01 0-24

0-22

Amount per English Barrel

Country.

Nature of Tax.

(round numbers).

United States .

Beer Tax

5s. 9d.

Germany —

N. German Customs Union

Malt Tax

is. 6d.

Bavaria

Malt Tax

3s. 5d. to 4s. 8d., according to quantity produced

Belgium

Malt Tax

2s. c)d.

France

On Wort

4s. id.

Holland .

On cubic contents of

About is. 9d. to 3s. 3d.,

Mash-Tun or on Malt

according to quality

Austro-Hungarian Empire

On Wort

6s. 8d.

Russia

Malt Tax

5s. to 6s. 8d.

Materials used in Brewing. — These are water, malt (q.v.), hops (q.v.), various substitutes for the two latter, and preservatives.

Water. — A satisfactory supply of water — which, it may here be mentioned, is always called liquor in the brewery — is a matter of great importance to the brewer. Certain waters, for instance, those contaminated to any extent with organic matter, cannot be used at all in brewing, as they give rise to unsatisfactory fermentation, cloudiness and abnormal flavour. Others again, although suited to the production of one type of beer, are quite unfit for the brewing of another. For black beers a soft water is a desideratum, for ales of the Burton type a hard water is a necessity. For the brewing of mild ales, again, a water contain-

1 They were classified at 28ft in 1896, but since 1897 the standard has been at the rate of 32 lb to the bushel.

Our knowledge of the essential chemical constituents of brewing waters enables brewers in many cases to treat an unsatisfactory supply artificially in such a manner as to modify its character in a favourable sense. Thus, if a soft water only is to hand, and it is desired to brew a bitter ale, all that is neces- sary is to add a sufficiency of gypsum, mag- nesium sulphate and calcium chloride. If it is desired to convert a soft water lacking in chlorides into a satisfactory mild ale liquor, the addition of 30-40 grains of sodium chloride will be necessary. On the other hand, to convert a hard water into a soft supply is scarcely feasible for brewing pur- poses. To the substances used for treating brewing liquors already mentioned we may add kainite, a naturally deposited composite salt containing potassium and magnesium sulphates and magnesium chloride.

Malt Substitutes. — Prior to the repeal of the Malt Acts, the only substitute for malt allowed in the United Kingdom was sugar. The quantity of the latter employed was 295,865 cwt. in 1870, 1,136,434 cwt. in 1880, and 2,746,615 cwt. in 1905; that is to say, that the quantity used had been practically trebled during the last twenty-five years, although the quantity of malt employed had not materially increased. At the same time other substitutes, such as unmalted corn and preparations of rice and maize, had come into favour, the quantity of these substances used being in 1905 125,671 bushels of unmalted corn and 1,348,558 cwt. of rice, maize, &c.

The following statistics with regard to the use of malt substitutes in the United Kingdom are not without interest.

5 o8

BREWING

Year.

Quantities of

Malt and Corn

used in Brewing.

Quantities of Sugar, Rice, Maize, &c. used in Brewing.

Percentage of Substitutes to Total Material.

1878 1883 1890 1895 1905

Bushels.

59,388,905 51,331,451 ‘ 55.359,964′ 53.731.177 51,942,368

Bushels.

3.825,148

4,503,680 2

7,904,70s 2

io,754,5io

15,706,413

6-05

8-06

12-48

16-66

23-22

The causes which have led to the largely increased use of substitutes in the

United Kingdom are of a somewhat complex nature. In the first place, it was not until the malt tax was repealed that the brewer was able to avail himself of the surplus diastatic energy present in malt, for the purpose of transforming starch (other than that in malted grain) into sugar. The diastatic enzyme or ferment (see below, under Mashing) of malted barley is present in that material in great excess, and a part of this surplus energy may be usefully employed in converting the starch of unmalted grain into sugar. The brewer has found also that brewing operations are simplified and accelerated by the use of a certain proportion of substitutes, and that he is thereby enabled appreciably to increase his turn-over, i.e. he can make more beer in a given time from the same plant. Certain classes of substitutes, too, are somewhat cheaper than malt, and in view of the keenness of modern competition it is not to be wondered at that the brewer should resort to every legitimate means at his disposal to keep down costs. It has been contended, and apparently with much reason, that if the use of substitutes were prohibited this would not lead to an increased use of domestic barley, inasmuch as the supply of home barley suitable for malting purposes is of a limited nature. A return to the policy of " malt and hops only " would therefore lead to an increased use of foreign barley, and to a diminution in the demand for home barley, inasmuch as sugar and prepared cereals, containing as they do less nitrogen, &c. than even the well-cured, sun-dried foreign barleys, are better diluents than the latter. At the same time, it is an undoubted fact that an excessive use of substitutes leads to the production of beer of poor quality. The better class of brewer rarely uses more than 15-20%, knowing that beyond that point the loss of flavour and quality will in the long run become a more serious item than any increased profits which he might temporarily gain.

With regard to the nature of the substitutes or adjuncts for barley malt more generally employed, raw grain (unmalted barley, wheat, rice, maize, &c.) is not used extensively in Great Britain, but in America brewers employ as much as 50%, and even more, of maize, rice or similar materials. The maize and rice preparations mostly used in England are practically starch pure and simple, substantially the whole of the oil, water, and other subsidiary constituents of the grain being removed. The germ of maize contains a considerable proportion of an oil of somewhat unpleasant flavour, which has to be eliminated before the material is fit for use in the mash-tun. After degerming, the maize is unhusked, wetted, submitted to a temperature sufficient to rupture the starch cells, dried, and finally rolled out in a flaky condition. Rice is similarly treated.

The sugars used are chiefly cane sugar, glucose and invert sugar — the latter commonly known as " saccharum." Cane sugar is mostly used for the preparation of heavy mild ales and stouts, as it gives a peculiarly sweet and full flavour to the beer, to which, no doubt, the popularity of this class of

beverage is largely due. Invert sugar is prepared by the action either of acid or of yeast on cane sugar. The chemical equation representing the conversion (or inversion) of cane sugar is: —

Ci 2 H 22 0n + H 2 = C H 12 O 6 + C 6 H 12 6 . cane sugar water glucose fructose

invert sugar

Invert sugar is so called because the mixture of glucose and fructose which forms the "invert" is laevo-rotatory, whereas 1 Inclusive of rice and maize. 2 Exclusive of rice and maize.

cane sugar is dextro-rotatory to the plane of polarized light. The preparation of invert sugar by the' acid process consists in treating the cane sugar in solution with a little mineral acid, removing the excess of the latter by means of chalk, and con- centrating to a thick syrup. The yeast process (Tompson's), which makes use of the inverting power of one of the enzymes (invcrtase) contained in ordinary yeast, is interesting. The cane sugar solution is pitched with yeast at about 55 C, and at this comparatively high temperature the inversion proceeds rapidly, and fermentation is practically impossible. When this operation is completed, the whole liquid (including the yeast) is run into the boiling contents of the copper. This method is more suited to the preparation of invert in the brewery itself than the acid process, which is almost exclusively used in special sugar works. Glucose, which is one of the constituents of invert sugar, is largely used by itself in brewing. It is, however, never prepared from invert sugar for this purpose, but directly from starch by means of acid. By the action of dilute boiling acid on starch the latter is rapidly converted first into a mixture of dextrine and maltose and then into glucose. The proportions of glucose, dextrine and maltose present in a commercial glucose depend very much on the duration of the boiling, the strength of the acid, and the extent of the pressure at which the starch is converted. In England the materials from which glucose is manufactured are generally sago, rice and purified maize. In Germany potatoes form the most common raw material, and in America purified Indian corn is ordinarily employed.

Hop substitutes, as a rule, are very little used. They mostly consist of quassia, gentian and camomile, and these substitutes are quite harmless per se, but impart an unpleasantly rough and bitter taste to the beer.

Preservatives. — These are generally, in fact almost universally, employed nowadays for draught ales; to a smaller extent for stock ales. The light beers in vogue to-day are less alcoholic, more lightly hopped, and more

quickly brewed than the beers of the last generation, and in this respect are somewhat less stable and more likely to deteriorate than the latter were. The preservative in part replaces the alcohol and the hop extract, and shortens the brewing time. The preservatives mostly used are the bisulphites of lime and potash, and these, when employed in small quantities, are generally held to be harmless.

Brewing Operations. — The general scheme of operations in an English brewery will be readily understood if reference be made to fig. 1, which represents an 8-quarter brewery on the gravitation system, the principle of which is that all materials to be employed are pumped or hoisted to the highest point required, to start with, and that subsequently no further pumping or hoisting is required, the materials (in the shape of water, malt, wort or hops, &c.) being conveyed from one point to another by the force of gravity.

The malt, which is hoisted to the top floor, after cleaning and grading is conveyed to the Malt Mill, where it is crushed. Thence the ground malt, or " grist " as it is now called, passes to the Grist Hopper, and from the latter to the Mashing Machine, in which it is intimately mixed with hot water from the Hot Liquor Vessel. From the mashing machine the mixed grist and " liquor " pass to the Mash-Tun, where the starch of the malt is rendered soluble. From the mash-tun the clear wort passes to the Copper, where it is boiled with hops. From the copper the boiled wort passes to the Hop Back, where the insoluble hop constituents are separated from the wort. From the hop back the wort passes to the Cooler, from the latter to the Refrigerator, thence (for the purpose of enabling the revenue officers to assess the duty) to the Collecting Vessel? and finally to the Fermenting Vessels, in which the wort is transformed into " green " beer. The latter is then cleansed, and finally racked and stored.

_ It will be seen from the above that brewing consists of seven distinct main processes, which may be classed as follows: (1) Grinding; (2) Mashing; (3) Boiling; (4) Cooling; (5) Fermenting; (6) Cleansing; (7) Racking and Storing.

Grinding. — In most modern breweries the malt passes, on its way

3 As a rule there is no separate assessed in the fermenting vessels.

collecting vessel," duty being

from the bins to the mill, through a cleaning and grading apparatus, and then through an automatic measuring machine. The mills, which exist in a variety of designs, are of the smooth roller type, and are so arranged that the malt is crushed rather than ground. If the

malt is ground too fine, difficulties arise in regard to efficient drain- age in the mash-tun and subse- quent clarification. On the other hand, if the crushing istoo coarse the subsequent extraction of sol- uble matter in the mash-tun is incomplete, and an inadequate yield results.

Mashing is a process which

consists mainly in extracting, by

means of water at an adequate

temperature, the soluble matters

pre-existent in

and

Cooler

*f * » K 1- *

t-j Longitudinal Section.

Fig. 1. — An 8-quarter Brewery (Messrs L. Lumley & Co., Ltd.).

the insoluble starch and a great part of the insoluble nitro- genous compounds into soluble and partly fermentable products. Mashing is, without a doubt, the most important of the brewing processes, for it is largely in the mash-tun that the character

Fig. 2.ˆMash-tun with mashing machine.

of the beer to be brewed is determined. In modern practice the malt and the mashing " liquor " (i.e. water) are introduced into the mash-tun simultaneously, by means of the mashing machine (fig. 2, A). This is generally a cylindrical metal vessel, commanding the mash-tun and provided with a central shaft md screw. The grist (as the crushed malt is called) enters the mashing machine from the grist case above, and the liquor is intro- duced at the back. The screw is rotated rapidly, and so a thorough mixture of the grist and liquor takes place as they travel along the mashing machine. The mash-tun (fig. 2) is a large metal or wooden vessel, fitted with a false bottom composed of plates perforated with numerous

small holes or slits ©. This arrangement is necessary in order to obtain a proper separation of the " wort " (as the liquid portion of the finished mash is called) from the spent grains. The mash-tun is also provided with a stirring apparatus (the rakes) so that the grist and liquor may be intimately mixed (D), and an auto- matic sprinkler, the sparger (fig. 2, B, and fig. 3), which is employed

in order to wash out the wort remaining in the grains. The sparger consists of a number of hollow arms radiating from a common centre and pierced by a number of small perforations. The common central vessel from which the sparge-arms radiate is mounted in such a manner that it rotates automatically when a- stream of water is admitted, so that a constant fine spray covers the whole tun when the sparger is in operation. There are also pipes for admitting " liquor " to the bottom of the tun, and for carrying the wort from the latter to the " underback " or " copper."

The grist and liquor having been introduced into the tun (either by means of the mashing machine or separately), the rakes are set going, so that the mash may become thoroughly homogeneous, and after a short time the rakes are stopped and the mash allowed to rest, usually for a period of about two hours. After this, " taps are set " — i.e. communication is established between the mash-tun and the vessel into which the wort runs — and the sparger is started. In this manner the whole of the wort or extract is separated from the grains. The quantity of water employed is, in all, from two to three barrels to the quarter (336 lb) of malt.

In considering the process of mashing, one might almost say the process of brewing, it is essential to remember that the type and quality of the beer to be produced (see Malt) depends almost entirely (a) on the kind of malt employed, and (6) on the mashing temperature. In other words, quality may be controlled on the kiln or in the mash-tun, or both. Viewed in this light, the following theoretical methods for preparing different types of beer are possible: — (1) high kiln heats and high mashing temperatures; (2) high kiln heats and low mashing temperatures; (3) low kiln heats and high mashing tempera- tures; and (4) low kiln heats and low mashing temperatures. In practice all these combina- tions, together with many intermediate ones, are met with, and it is not too much to say that the whole science of modern brewing is based upon them. It is plain, then, that the mashing temperature will depend on the kind of beer that is to be produced, and on the kind of malt employed. For stouts and black beers generally, a mashing temperature of 148 to 150° F. is most usual; for pale or stock ales, 150° to 154° F. ; and for mild running beers, 154 to 149 F. The range of temperatures employed in brewing English beers is a very limited one as compared with foreign mashing methods, and does not range further, practically speaking, than from 140 to 160 F. The effect of higher

tempera- tures is chiefly to cripple the enzyme or " ferment " diastase, which, as already said, is the agent which converts the insoluble starch into soluble dextrin, sugar and intermediate products. The higher the mashing temperature, the more the diastase will be crippled in its action, and the more dextrinous (non-fermentable) matter as com- pared with maltose (fermentable sugar) will be formed. A pale or stock ale, which is a type of beer that must be " dry " and that will keep, requires to contain a relatively high proportion of dextrin and little maltose, and, in its preparation, therefore, a high mashing temperature will be employed. On the other hand, a mild running ale, which is a full, sweet beer, intended for rapid consumption,

will be obtained by means of low mashing temperatures, which pro- duce relatively little dextrin, but a good deal of maltose, i.e. sweet and readily fermentable matter.

Diastase is not the only enzyme present in malt. There is also a ferment which renders a part of the nitrogenous matter soluble. This again is affected by temperature in much the same way as diastase. Low heats tend to produce much non-coagulable

nitrogenous matter, which is undesirable in a stock beer, as it tends to produce fret and side fermentations. With regard to the kind of malt and other materials employed in producing various types of beer, pale ales are made either from pale malt (generally a mixture of English and fine foreign, such as Smyrna, California) only, or from pale malt and a little flaked maize, rice, invert sugar or glucose. Running beers (mild ale) are made from a mixture of pale and amber malts, sugar and" flaked goods; stout, from a mixture of pale, amber and roasted (black) malts only, or with the addition of a little sugar or flaked maize.

When raw grain is employed, the process of mashing is slightly modified. The maize, rice or other grain is usually gelatinized in a vessel (called a converter or cooker) entirely separated from the mash-tun, by means of steam at a relatively high temperature, mostly with, but occasionally without, the addition of some malt meal. After about half an hour the gelatinized mass is mixed with the main mash, and this takes place shortly before taps are set. This is possible inasmuch as the starch, being already in

a highly disintegrated condition, is very rapidly converted. By working on the limited-decoction system (see below), it is possible to make use of a fair percentage of raw grain in the mash-tun proper, thus doing away with the " converter " entirely.

The Filter Press Process. — The ordinary mash-tun process, as described above, possesses the disadvantage that only coarse grists can be employed. This entails loss of extract in several ways. To begin with, the sparging process is at best a somewhat inefficient method for washing out the last portions of the wort, and again, when the malt is at all hard or " steely," starch conversion is by no means complete. These disadvantages are overcome by the filter press process, which was first introduced into Great Britain by the Belgian engineer P. Meura. The malt, in this method of brewing, is ground quite fine, and although an ordinary mash-tun may be used for mashing, the separation of the clear wort from the solid matter takes place in the filter press, which retains the very finest particles with ease. It is also a simple matter to wash out the wort from the filter cake in the presses, and experience has shown that markedly increased yields are thus obtained. In the writer's opinion, there is little doubt that in the future this, or a similar process, will find a very wide application.

Boiling. — From the mash-tun the wort passes to the copper. If it is not possible to arrange the plant so that the coppers are situated beneath the mash-tuns (as is the case in breweries arranged on the gravitation system), an intermediate collecting vessel (the underback) is interposed, and from this the wort is pumped into the copper. The latter is a large copper vessel heated by direct fire or steam. Modern coppers are generally closed in with a dome-shaped head, but many old-fashioned open coppers are still to be met with, in fact pale-ale brewers prefer open coppers. In the closed type the wort is frequently boiled under slight pressure. When the wort has been raised to the boil, the hops or a part thereof are added, and the boiling is continued generally from an hour to three hours, according to the type of beer. The objects of boiling, briefly put, are: (i) sterilization of the wort; (2) extraction from the hops of substances that give flavour and aroma to the beer; (3) the coagulation and precipitation of a part of the nitrogenous matter (the coagulable albuminoids), which, if left in, would cause cloudiness and fret, &c, in the finished beer; (4) the concentration of the wort. At least three distinct substances are extracted from the hops in boiling. First, the hop tannin, which, combining with a part of the proteids derived from the malt, precipitates them; second, the hop resin, which acts as a preservative and bitter; third, the hop oil, to which much of the fine aroma of beer is due. The latter is volatile, and it is customary, therefore, not to add the whole of the hops to the wort when it commences to boil, but to reserve about a third until near the end of the copper stage. The quantity of hops employed varies according to the type of beer, from about 3 lb to

15 lb per quarter (336 lb) of malt. For mild ales and porters about 3 to 4 lb, for light pale ales and light stouts 6 to 10 lb, and for strong ales and stouts 9 to 15 lb of hops are employed.

Cooling. — When the wort has boiled the necessary time, it is turned into the hop back to settle. A hop back is a wooden or metal vessel, fitted with a false bottom of perforated plates; the latter retain the spent hops, the wort being drawn off into the coolers. After resting for a brief period in the hop back, the bright wort is run into the coolers. The cooler is a very shallow vessel of great area, and the result of the exposure of the hot wort to a comparatively large volume of air is that a part of the hop constituents and other substances contained in the wort are rendered insoluble and are precipitated. It was formerly considered absolutely essential that this hot aeration should take place, but in many breweries nowadays coolers are not used, the wort being run 'direct from the hop back to the refrigerator. There is much to be said for this procedure, as the exposure of hot wort in the cooler is attended with much danger of bacterial and wild yeast infection, but it is still a moot point whether the cooler or its equivalent can be entirely dispensed with for all classes of beers. A rational alteration would appear to be to place the cooler in an air-tight chamber supplied with purified and sterilized air. This principle has already been applied to the re- frigerator, and apparently with success. In America the cooler is frequently replaced by a cooling tank, an enclosed vessel of some

depth, capable of artificial aeration. It is not practicable, in any case, to cool the wort sufficiently on the cooler to bring it to the proper temperature for the fermentation stage, and for this purpose, therefore, the refrigerator is employed. There are several kinds of refrigerators, the main distinction being that some are vertical, others horizontal ; but the principle in each case is much the same, and consists in allowing a thin film or stream of wort to trickle over a series of pipes through which cold water circulates. Fig. 5, Plate I., shows refrigerators, employed in Messrs Allsopp's lager beer brewery, at work.

Fermenting. — By the process of fermentation the wort is converted into beer. By the action of living yeast cells (see Fermentation) the sugar contained in the wort is split up into alcohol and carbonic acid, and a number of subsidiary reactions occur. There are two main systems of fermentation, the top fermentation system, which is that employed in the United Kingdom, and the bottom fermentation system, which is that used for the production of beers of the conti- nental (" lager ") type. The wort, generally at a temperature of about 6o° F. (this applies to all the systems excepting B [see below], in which the temperature is higher), is " pitched " with liquid yeast (or " barm," as it is often called) at the rate of, according to the type and strength of the beer to be made, 1 to 4 lb to the barrel.

After a few hours a slight froth or scum makes its appearance on the surface of the liquid. At the end of a further short period this develops into a light curly mass (cauliflower or curly head), which gradually becomes lighter and more solid in appearance, and is then known as rocky head. This in its turn shrinks to a compact mass — the yeasty head — which emits great bubbles of gas with a hissing sound. At this point the cleansing of the beer — i.e. the separation of the yeast from the liquid — has fairly commenced, and it is let down (except in tjie skimming and Yorkshire systems [see below]) into the pontos or unions, as the case may be. During fermentation the temperature rises considerably, and in order to prevent an excessive temperature being obtained (70-75 ° F. should be the maximum) the fermenting vessels are fitted with " attemperators," i.e. a system of pipes through which cold water may be run.

Cleansing. — In England the methods of applying the top fermenta- tion system may be classified as follows : (A) The Cleansing System : (a) Skimming System, (b) Dropping System (pontos or ordinary dropping system), (c) Burton Union System. (B) The Yorkshire Stone Square System.

(A) In (a) the Skimming System the fermentation from start to finish takes place in wooden vessels (termed " squares " or " rounds "), fitted with an attemperator and a parachute or other similar skimming device for removing or " skimming " the yeast at the end of the fermentation (fig. 4). The principle of (b) the Dropping System is that the beer undergoes only the main fermenta- tion in the " round " or "square," and is then dropped down into a second vessel ' or vessels, in which fermentation and cleansing are com- pleted. The ponto system of dropping, which is now some- what old-fashioned, consists in discharg- ing the beer into a series of vat-like vessels, fitted with a peculiarly-shaped overflow lip. The yeast works its way out of the vessel over the lip, and then flows into a gutter and is col- lected. The pontos are kept filled with beer by means of a vessel placed at a higher level. In the' ordinary dropping system the partly fermented beer is let down from the " squares " and " rounds " into large vessels, termed dropping or skim- ming " backs." These are fitted with attemperators, and parachutes for the removal of yeast, in much the same way as in the skimming system. As a rule the parachute covers the whole width of the back, (c) The Burton Union System is really an improved ponto system. A series of casks, supplied with beer at the cleansing stage from a feed vessel, are mounted so that they may rotate axially. Each cask is fitted with an attemperator, a pipe and cock at the base for the removal of the finished beer and " bottoms," and lastly with a swan neck fitting through a bung- hole and commanding a common gutter. This system yields excellent results for certain classes of beers, and many Burton brewers think it is essential for obtaining

Fig. 4. — Fermenting Round. A, Skimmer; B, Parachute; C, Attemperator.

the Burton character. Fig. 6 (Plate II.) shows the process in opera- tion in Messrs Allsopp's brewery.

(B) The Stone Square System, which is only used to a certain extent (exclusively in the north of England), practically consists in pumping the fermenting wort from one to the other of two super- imposed square vessels, connected with one another by means of a man-hole and a valve. These squares are built of stone and kept very cool. At the end of the fermentation the yeast (after closing the man-hole) is removed from the top square.

Racking, &c. — After the fermentation and cleansing operations are completed, the beer is racked off (sometimes after passing a few hours in a settling tank) into storage vessels or trade casks. The finest " stock " and " pale " ales are stored from ,six weeks to three months prior to going out, but " running " beers (mild ales, &c.) are frequently sent out of the brewery within a week or ten days of mashing. It is usual to add some hops in cask (this is called dry hopping) in the case of many of the better beers. Running beers, which must be put into condition rapidly, or beers that have become flat, are generally primed. Priming consists in adding a small quantity of sugar solution to the beer in cask. This rapidly ferments and so produces " condition."

Fining. — As a very light article is desired nowadays, and this has to be provided in a short time, artificial means must be resorted to, in order to replace the natural fining or brightening which storage brings about. Finings generally consist of a solution or semi- solution of isinglass in sour beer, or in a solution of tartaric acid or of sulphurous acid. After the finings are added to the beer and the barrels have been well rolled, the finings slowly precipitate (or work out through the bung-hole) and carry with them the matter which would otherwise render the beer turbid.

Bottling. — Formerly it was the general custom to brew a special beer for bottling, and this practice is still continued by some brewers. It is generally admitted that the special brew, matured by storage and an adequate secondary fermentation, produces the best beer for bottling, but the modern taste for a very light and bright bottled beer at a low cost has necessitated the introduction of new methods. The most interesting among these is the " chilling " and " carbonat- ing " system. In this the beer, when it is ripe for

racking, is first " chilled," that is, cooled to a very low temperature. As a result, there is an immediate deposition of much matter which otherwise would require prolonged time to settle. The beer is then filtered and so rendered quite blight, and finally, in order to produce im- mediate " condition," is " carbonated," i.e. impregnated under pressure with carbon dioxide (carbonic acid gas).

Foreign Brewing and Beers. — The system of brewing which differs most widely from the English infusion and top fermentation method is the decoction and bottom fermentation system, so widely employed, chiefly on the continent of Europe, for the production of beers of the " lager " type.

*The method pursued in the decoction system is broadly as follows : — After the grist has been mashed with cold water until a homogeneous mixture ensues, sufficient hot water is introduced into the mash-tun to raise the temperature to 85-100 F., accord- ing to circumstances. Thereupon, about one-third of the mash (including the " goods ") is transferred to the Maisch Kessel (mash copper), in which it is gradually brought to a temperature of (about) 165 F., and this heat is maintained until the mash becomes transparent. The Dickmaische, as this portion is called, is then raised to the boil, and the ebullition sustained between a quarter and three-quarters of an hour. Just sufficient of the Dickmaische is returned to the mash-tun proper to raise the temperature of the whole to 111-125° F., an d a f ter a * ew minutes a third is again withdrawn and treated as before, to form the second " thick mash." When the latter has been returned to the mash-tun the whole is thoroughly worked up, allowed to stand in order that the solids may deposit, and then another third (called the Lautermaische or " clear mash ") is withdrawn, boiled until the coagulable albuminoids are precipitated, and finally reconveyed to the mash-tun, where the mashing is con- tinued for some time, the final heat being rather over 160° F. The wort, after boiling with hops and cooling, much as in the English system, is subjected to the peculiar system of fermenta- tion called bottom fermentation. In this system the " pitching " and fermentation take place at a very low temperature and, compared with the English system, in very small vessels. The fermenting cellars are maintained at a temperature of about 37-38° F., and the temperature of the fermenting wort does not rise above 50° F. The yeast, which is of a different type from that employed in the English system, remains at the bottom of the fermenting tun, and hence is derived the name of " bottom*

fermentation " (see Fermentation). The primary fermentation lasts about eleven to twelve days (as compared with three days on the English system) , and the beer is then run into store (lager) casks where it remains at a temperature approaching the freezing- point of water for six weeks to six months, according to the time of the year and the class of the beer. As to

the relative character and stability of decoction and infusion beers, the latter are, as a rule, more alcoholic; but the former contain more unfermented malt extract, and are therefore, broadly speaking, more nutritive. Beers of the German type are less heavily hopped and more peptonized than English beers, and more highly charged with carbonic acid, which, owing to the low fermentation and storing temperatures, is retained for a comparatively long time and keeps the beer in condition. On the other hand, infusion beers are of a more stable and stimulating character. It is impossible to keep " lager " beer on draught in the ordinary sense of the term in England. It will not keep unless placed on ice, and, as a matter of fact, the " condition " of lager is dependent to a far greater extent on the methods of distribution and storage than is the case with infusion beers. If a cask is opened it must be rapidly consumed; indeed it becomes undrinkable within a very few hours. The gas escapes rapidly when the pressure is released, the temperature rises, and the beer becomes flat and mawkish. In Germany every publican is bound to have an efficient supply of Ice, the latter frequently being delivered by the brewery together with the beer.

In America the common system of brewing is one of infusion mashing combined with bottom fermentation. The method of mashing, however, though on infusion lines, differs appreciably from the English process. A very low initial heat — about 100° F. — at which the mash remains for about an hour, is employed. After this the temperature is rapidly raised to 153-156° F. by running in the boiling " cooker mash," i.e. raw grain wort from the converter. After a period the temperature is gradually- increased to about 165° F. The very low initial heat, and the employment of relatively large quantities of readily transform- able malt adjuncts, enable the American brewer to make use of a class of malt which would be considered quite unfit for brewing in an English brewery. The system of fermentation is very similar to the continental " lager " system, and the beer obtained bears some resemblance to the German product. To the English' palate it is somewhat flavourless, but it is always retailed in exceedingly brilliant condition and at a proper temperature. There can be little doubt that every nation evolves a type of beer most suited to its climate and the temperament of the people, and in this respect the modern American beer is no exception. In regard to plant and mechanical arrangements generally, the modern American breweries may serve as an object-lesson to the European brewer, although there are certainly a number of breweries in the United Kingdom which need not fear comparison with the best American plants.

It is a sign of the times and further evidence as to the growing taste for a lighter type of beer, that lager brewing in its most modern form has now fairly taken root in Great Britain, and in this connexion the process

introduced by Messrs Allsopp exhibits many features of interest. The following is a brief description of the plant and the methods employed: — The wort is prepared on infusion lines, and is then cooled by means of refrigerated brine before passing to a temporary store tank, which serves as a gauging vessel. From the latter the wort passes directly to the fermenting tuns, huge closed cylindrical vessels made of sheet-steel and coated with glass enamel. There the wort ferments under reduced pressure, the carbonic acid generated being removed by means of a vacuum pump, and the gas thus withdrawn is replaced by the introduction of cool sterilized air. The fermenting cellars are kept at 40° F. The yeast employed is a pure culture (see Fermentation) bottom yeast, but the withdrawal of the products of yeast metabolism and the constant supply of pure fresh air cause the fermentation to proceed far more rapidly than is the case with lager beer brewed on ordinary lines. It is, in fact, finished in about six days. Thereupon the air-supply is cut off, the green beer again cooled to 40° F. and

then conveyed by means of filtered air pressure to the store tanks, where secondary fermentation, lasting three weeks, takes place. The gases evolved are allowed to collect under pressure, so that the beer is thoroughly charged with the carbonic acid necessary to give it condition. Finally the beer is again cooled, filtered, racked and bottled, the whole of these operations taking place under counter pressure, so that no gas can escape; indeed, from the time the wort leaves the copper to the moment when it is bottled in the shape of beer, it does not come into contact with the outer air.

The preparation of the Japanese beer sake (q.v.) is of interest. The first stage consists in the preparation of Koji, which is obtained by treating steamed rice with a culture of Aspergillus oryzae. This micro-organism converts the starch into sugar. The Koji is converted into moto by adding it to a thin paste of fresh-boiled starch in a vat. Fermentation is set up and lasts for 30 to 40 days. The third stage consists in adding more rice and Koji to the moto, together with some water. A secondary fermentation, lasting from 8 to 10 days, ensues. Subsequently the whole is filtered, heated and run into casks, and is then known as sake. The interest of this process consists in the fact that a single micro-organism — a mould — is able to exercise the com- bined functions of saccharification and fermentation. It replaces the diastase of malted grain and also the yeast of a European brewery. Another liquid of interest is Weissbier. This, which is largely produced in Berlin (and in some respects resembles the wheat-beer produced in parts of England), is generally prepared from a mash of three

parts of wheat malt and one part of barley malt. The fermentation is of a symbiotic nature, two organisms, namely a yeast and a fission fungus (the lactic acid bacillus) taking part in it. The preparation of this peculiar double fer- ment is assisted by the addition of a certain quantity of white wine to the yeast prior to fermentation.

Brewing Chemistry. — The principles of brewing technology belong for the most part to physiological chemistry, whilst those of the cognate industry, malting, are governed exclusively by that branch of knowledge. Alike in following the growth of barley in field, its harvesting, maturing and conversion into malt, as well as the operations of mashing malt, fermenting wort, and conditioning beer, physiological chemistry is needed. On the other hand, the consideration of the saline matter in waters, the composition of the extract of worts and beers, and the analysis of brewing materials and products generally, belong to the domain of pure chemistry. Since the extractive matters contained in wort and beer consist for the most part of the transformation products of starch, it is only natural that these should have received special attention at the hands of scientific men associated with the brewing industry. It was formerly believed that by the action of diastase on starch the latter is first converted into a gummy substance termed dextrin, which is then subsequently transformed into a sugar — glucose. F. A. Musculus, however, in i860, showed that sugar and dextrin are simultaneously produced, and between the years 1872 and 1876 Cornelius O'Sullivan definitely proved that the sugar pro- duced was maltose. When starch-paste, the jelly formed by treating starch with boiling water, is mixed with iodine solution, a deep blue coloration results. The first product of starch degradation by either acids or diastase, namely soluble starch, also exhibits the same coloration when treated with iodine. As degradation proceeds, and the products become more and more soluble and diffusible, the blue reaction with iodine gives place first to a purple, then to a reddish colour, and finally the coloration ceases altogether. In the same way, the optical rotating power decreases, and the cupric reducing power (towards Fehling's solution) increases, as the process of hydrolysis proceeds. C. O'Sullivan was the first to point out definitely the influence of the temperature of the mash on the character of the products. The work of Horace T. Brown (with J. Heron) extended that of O'Sullivan, and (with G. H. Morris) established the presence of an intermediate product between the higher dextrins and maltose. This product was termed maltodextrin, and Brown and Morris were led to, believe that a large number of these sub-

stances existed in malt wort. They proposed for these substances the generic name " amyloins." Although according to their view they were compounds of maltose and dextrin, they had the properties of mixtures of these two substances. On the assump- tion of the existence of these compounds,

Brown and his colleagues formulated what is known as the maltodextrin or amyloin hypothesis of starch degradation. C. J. Lintner, in 1891 , claimed to have separated a sugar, isomeric with maltose, which is termed isomaltose, from the products of starch hydrolysis. A. R. Ling and J. L. Baker, as well as Brown and Morris, in 1895, proved that this isomaltose was not a homogeneous substance, and evi- dence tending to the same conclusion was subsequently brought forward by continental workers. Ling and Baker, in 1897, isolated the following compounds from the products of starch hydrolysis — maltodextrin-a, C36H62O31, and maltodextrin-|3, C24H42O21 (previously named by Prior, achroodextrin III.) . They also separated a substance, C12H22O11, isomeric with maltose, which had, however, the characteristics of a dextrin. This is probably identical with the so-called dextrinose isolated by V. Syniewski in 1902, which yields a phenylosazone melting at 82-83° C. It has been proved by H. Ost that the so-called isomaltose of Lintner is a mixture of maltose and another substance, maltodextrin, isomeric with Ling and Baker's malto- dextrin-/?.

The theory of Brown and Morris of the degradation of starch, although based on experimental evidence of some weight, is by no means universally accepted. Nevertheless it is of considerable interest, as it offers a rational and consistent explanation of the phenomena known to accompany the transformation of starch by diastase, and even if not strictly correct it has, at any rate, proved itself to be a practical working hypothesis, by which the mashing and fermenting operations may be regulated and controlled. Accord- ing to Brown and Morris, the starch molecule consists of five amylin groups, each of which corresponds to the molecular formula (Cr2H 20 Oio)2o. Four of these amylin radicles are grouped centrally round the fifth, thus : —

(Ci2H2 Oi) 20 ˆ,,, „ ~ ˆ (Cl 2 H 2 oOlo)20

*(C 12 H 2 „O 10) 2 „ -> H-u*l»Oio)» < (Cl2 H 20 O 1 „) 20*

By the action of diastase, this complex molecule is split up, undergoing hydrolysis into four groups of amyloins, the fifth or central group remaining unchanged (and under brewing conditions unchangeable), forming the substance known as stable dextrin. When diastase acts on starch-paste, hydrolysis proceeds as far as the reaction represented by the following equation : —

5(Ci2H 20 O I0) 2 „-j-8o H 2 = 8o CˆHbOh+CChHmO,,,),, starch. water. maltose. stable dextrin.*

The amyloins are substances containing varying numbers of amylin (original starch or dextrin) groups in conjunction with a proportional

number of maltose groups. They are not separable into maltose and dextrin by any of the ordinary means, but exhibit the properties of mixtures of these substances. As the process of hydro- lysis proceeds, the amyloins become gradually poorer in amylin- and relatively richer in maltose-groups. The final products ofj transformation, according to Brown and J. H. Millar, are maltose 1 and glucose, which latter is derived from the hydrolysis of the stable dextrin. This theory may be applied in practical brewing in the following manner. If it is desired to obtain a beer of a stable char- acter — that is to say, one containing a considerable proportion of high-type amyloins — it is necessary to restrict the action of the diastase in the mash-tun accordingly. On the other hand, for mild running ales, which are to "condition" rapidly, it is necessary to provide for the presence of sufficient maltodextrin of a low type. Investigation has shown that the type of maltodextrin can be regulated, not only jn the mash-tun but also on the malt-kiln. A higher type is obtained by low kiln and high mashing temperatures than by high kiln and low mashing heats, and it is possible therefore to regulate, on scientific lines, not only the quality but also the type of amyloins which are suitable for a particular beer.

The chemistry of the nitrogenous constituents of malt is equally important with that of starch and its transformations. Without nitrogenous compounds of the proper type, vigorous fermentations are not possible. It may be remembered that yeast assimilates nitrogenous compounds in some of their simpler forms — amides and the like. One of the aims of the maltster is, therefore, to break down the protein substances present in barley to such a degree that the wort has a maximum nutritive value for the yeast. Further, it is necessary for the production of stable beer to eliminate a large proportion of nitrogenous matter, and this is only done by the yeast when the proteins are degraded. There is also some evidence that the presence of albumoses assists in producing the foaming properties of beer. It has now been established definitely, by the work ot

Fig. 5.— REFRIGERATORS IN "LAGER" BREWERY OF MESSRS. ALLSOPP

The hot wort trickles over the outside of the series of pipes, and is cooled by the cold water which circulates in them

f rom the shallow collecting trays the cooled wort is conducted to the fermenting backs.

Plate II.

BREWING

o

en ►J _ >

<

o

*<7 **

S3

O 0>”

PS M

D °

C

BREWSTER, SIR D.

5i3

A. Fernbach, W. Windisch, F.Weiss and P. Schidrowitz, that finished malt contains at least two proteolytic enzymes (a peptic and a pancreatic enzyme).

The presence of different types of phosphates in malt, and the important influence which, according to their nature, they exercise in the brewing process by way of the enzymes affected by them, have been made the subject of research mainly by Fernbach and A. Hubert, and by P. E. Petit and G. Labourasse. The number of enzymes which are now known to take part in the brewing process is very large. They may with utility be grouped as follows: —

Name. Cytase

In the malt or mash-tun.

Diastase A . . . Diastase B . . .

Proteolytic Enzymes

Catalase ….

In ferment- f Invertase ing wort and

Role or Nature. Dissolves cell walls of starch

granules. Liquefies starch. Saccharifies starch.

(1) Peptic.

(2) Pancreatic. Splits peroxides. Inverts cane sugar. Splits maltose into glucose. Splits sugar into alcohol

and carbonic acid. Bibliography. — W. J. Sykes, Principles and Practice of Brewing (London, 1897); Moritz and Morris, A Text-book of the Science of Brewing (London, 1891); H. E. Wright, A Handy Book for Brewers (London, 1897); Frank Thatcher, Brewing and Malting (London, 1898); Julian L. Baker, The Brewing Industry (London, 1905); E. J. Lintner, Grundriss der Bierbrauerei (Berlin, 1904); J. E. Thausing, Die Theorie und Praxis der Malzbereitung und Bier- fo.brika.tion (Leipzig, 1898) ; E. Michel, Lehrbuch der Bierbrauerei (Augsburg, 1900) ; E. Prior, Chemie u. Physiologie des Maizes und des Bieres (Leipzig, 1896). Technical journals: The Journal of the Institute of Brewing (London) ; The Brewing Trade Review (London) ; The Brewers' Journal (London) ; The Brewers' Journal (New York) ; Wochenschrift fiir Brauerei (Berlin) ; Zeitsckrift fur das gesammte Brauwesen (Munich). (P. S.)

BREWSTER, SIR DAVID (1 781-1868), Scottish natural philosopher, was born on the 1 ith of December 1 781 at Jedburgh, where his father, a teacher of high reputation, was rector of the grammar school. At the early age of twelve he was sent to the university of Edinburgh, being intended for the clerical profession. Even before this, however, he had shown a strong inclination for natural science, and this had been fostered by his intimacy with a " self-taught philosopher, astronomer and mathematician," as Sir Walter Scott called him, of great local fame — James Veitch of Inchbonny, who was particularly skilful in making telescopes. Though he duly finished his theological course and was licensed to preach, Brewster's preference for other pursuits prevented him from engaging in the active duties. of his profession. In 1799 he was induced by his fellow-student, Henry Brougham, to study the diffraction of light. The results of his investigations were communicated from time to time in papers to the Philosophical Transactions of London and other scientific journals, and were admirably and impartially summarized by James D. Forbes in his preliminary dissertation to the eighth edition of the Encyclopaedia Britannica. The fact that other philosophers, notably Etienne Louis Malus and Augustin Fresnel,

were pursuing the same investigations contemporaneously in France does not invalidate Brewster's claim to independent discovery, even though in one or two cases the priority must be assigned to others.

The most important subjects of his inquiries are enumerated by Forbes under the following five heads: — (1) The laws of polarization by reflection and refraction, and other quantitative laws of phenomena; (2) The discovery of the polarizing structure induced by heat and pressure; (3) The discovery of crystals with two axes of double refraction, and many of the laws of their phenomena, including the connexion of optical structure and crystalline forms; (4) The laws of metallic reflection; (5) Experiments on the absorption of light. In this line of investigation the prime importance belongs to the discovery (1) of the con- nexion between the refractive index and the polarizing angle, (2) of biaxial crystals, and (3) of the production of double refraction by irregular heating. These discoveries were promptly recognized. So early as the year 1807 the degree of LL.D. was conferred upon Brewster by Marischal College, Aberdeen; in 18 1 5 he was made a member of the Royal Society of London, and received the Copley medal; in 1818 he received the Rumford IV. 17

medal of the society; and in 1816 the French Institute awarded him one-half of the prize of three thousand francs for the two most important discoveries in physical science made in Europe during the two preceding years. Among the non-scientific public his fame was spread more effectually by his rediscovery about 181 5 of the kaleidoscope, for which there was a great demand in both England and America. An instrument of higher interest, the stereoscope, which, though of much later date (1849-1850), may be mentioned here, since along with the kaleidoscope it did more than anything else to popularize his name, was not, as has often been asserted, the invention of Brewster. Sir Charles Wheatstone discovered its principle and applied it as early as 1838 to the construction of a cumbrous but effective instrument, in which the binocular pictures were made to combine by means of mirrors. To Brewster is due the merit of suggesting the use of lenses for the purpose of uniting the dissimilar pictures; and accordingly the lenticular stereo- scope may fairly be said to be his invention. A much more valuable practical result of Brewster's optical researches was the improvement of the British lighthouse system. It is true that the dioptric apparatus was perfected independently by Fresnel, who had also the satisfaction of being the first to put it into operation. But it is indisputable that Brewster was earlier in the field than Fresnel; that he described the dioptric apparatus in 1812; that he pressed its adoption on those in authority at least as early as 1820, two years before Fresnel suggested it; and that it was finally introduced into British lighthouses mainly by his persistent efforts.

Brewster's own discoveries, important though they were, were not his only, perhaps not even his chief, service to science. He began literary work in 1799 as a regular contributor to the Edinburgh Magazine, of which he acted as editor at the age of twenty. In 1807 he undertook the editorship of the newly projected Edinburgh Encyclopaedia, of which the first part appeared in 1808, and the last not until 1830. The work was strongest in the scientific department, and many of its most valuable articles were from the pen of the editor. At a later period he was one of the leading contributors to the Encyclo- paedia Britannica (seventh and eighth editions), the articles on Electricity, Hydrodynamics, Magnetism, Microscope, Optics, Stereoscope, Voltaic Electricity, &c, being from his pen. In 1819 Brewster undertook further editorial work by establishing, in conjunction with Robert Jameson (1774-1854), the Edinburgh Philosophical Journal, which took the place of the Edinburgh Magazine. The first ten volumes (1810-1824) were published under the joint editorship of Brewster and Jameson, the remain- ing four volumes (1825-1826) being edited by Jameson alone. After parting company with Jameson, Brewster started the Edinburgh Journal of Science in 1824, sixteen volumes of which appeared under his editorship during the years 1824-1832, with very many articles from his own pen. To the transactions of various learned societies he contributed from first to last between three and four hundred papers, and few of his contemporaries wrote so much for the various reviews. In the North British Review alone seventy-five articles of his appeared. A list of his larger separate works will be found below. Special mention, however, must be made of the most important of them all — his biography of Sir Isaac Newton. In 183 1 he published a short popular account of the philosopher's life in. Murray's Family Library; but it was not until 1855 that he was able to issue the much fuller Memoirs of the Life, Writings and Discoveries of Sir Isaac Newton, a work which embodied the results of more than twenty years' patient investigation of original manuscripts and all other available sources.

Brewster's relations as editor brought him into frequent communication with the most eminent scientific men, and he was naturally among the first to recognize the benefit that would accrue from regular intercourse among workers in the field of science. In an article in the Quarterly Review he threw out a suggestion for " an association of our nobility, clergy, gentry and philosophers," which was taken up by others and found speedy realization in the British Association for the Advancement of

Science. Its first meeting was held at York in 183 1 ; and Brewster, along

with Charles Babbage and Sir John F. W. Herschel, had the chief part in shaping its constitution. In the same year in which the British Association held its first meeting, Brewster received the honour of knighthood and the decoration of the Guelphic order of Hanover. In 1838 he was appointed principal of the united colleges of St Salvator and St Leonard, St Andrews. In 1849 he acted as president of the British Association and was elected one of the eight foreign associates of the Institute of France in succession to J. J. Berzelius; and ten years later he accepted the office of principal of the university of Edinburgh, the duties of which he discharged until within a few months of his death, which took place at Allerly, Melrose, on the 10th of February 1868.

In estimating Brewster's place among scientific discoverers the chief thing to be borne in mind is that the bent of his genius was not characteristically mathematical. His method was empirical, and the laws which he established were generally the result of repeated experiment. To the ultimate explanation of the phenomena with which he dealt he contributed nothing, and it is noteworthy in this connexion that if he did not maintain to the end of his life the corpuscular theory he never explicitly adopted the undulatory theory of light. Few will be inclined to dispute the verdict of Forbes: — " His scientific glory is different in kind from that of Young and Fresnel; but the dis- coverer of the law of polarization of biaxial crystals, of optical mineralogy, and of double refraction by compression, will always occupy a foremost rank in the intellectual history of the age." In addition to the various works of Brewster already noticed, the following may be mentioned: — Notes and Introduction to Carlyle's translation of Legendre's Elements of Geometry (1824); Treatise on Optics (1831); Letters on Natural Magic, addressed to Sir Walter Scott (1831); The Martyrs of Science, or the Lives of Galileo, Tycho Brake, and Kepler (1841); More Worlds than Owe (1854).

See The Home Life of Sir David Brewster, by his daughter Mrs Gordon.

BREWSTER, WILLIAM (c. 1 566-1644), American colonist, one of the leaders of the " Pilgrims," was born at Scrooby, in Nottinghamshire, England, about 1566. After studying for a short time at Cambridge, he was from 1584 to 1587 in the service of William Davison (? 1541-1608), who in 1585 went to the Low Countries to negotiate an alliance with the states-general and in 1586 became assistant to Walsingham, Queen Elizabeth's secretary of state. Upon the disgrace of Davison, Brewster removed to Scrooby, where from 1590 until September 1607 he held the position of " Post," or postmaster responsible for the relays of horses on the post road, having previously, for a short time, assisted his father in that office. About 1602 his neighbours began to assemble for worship at his home, the Scrooby manor house, and in 1606 he joined them in organizing the

Separatist church of Scrooby. After an unsuccessful attempt in 1607 (for which he was imprisoned for a short time), he, with other Separatists, removed to Holland in 1608 to obtain greater freedom of worship. At Leiden in 1609 he was chosen ruling elder of the Congregation. In Holland he supported himself first by teaching English and afterwards in 1616-1619, as the partner of one Thomas Brewer, by secretly printing, for sale in England, books proscribed by the English government, thus, says Bradford, having " imploymente inough." In 1619 their types were seized and Brewer was arrested by the authorities of the university of Leiden, acting on the instance of the British ambassador, Sir Dudley Carleton. Brewster, however, escaped, and in the same year, with Robert Cushman (c. 1580-1625), obtained in London, on behalf of his associates, a land patent from the Virginia Company. In i62oheemigratedto Americaonthe "Mayflower," and was one of the founders of the Plymouth Colony. Here besides continuing until his death to act as ruling elder, he was also — regularly until the arrival of the first pastor, Ralph Smith (d. 1661), in 1629 and irregularly afterward — a "teacher," preaching " both powerfully and profitably to ye great con- tentment of ye hearers and their comfortable edification."

By many he is regarded as pre-eminently the leader of the " Pilgrims." He died, probably on the 10th of April 1644.

See Ashbel Steele's Chief of the Pilgrims; or the Life and Time of William Brewster (Philadelphia, 1857); and a sketch in William Bradiord'sHistory of the Plimouth Plantation (newed., Boston, 1898).

BREZ£, the name of a noble Angevin family, the most famous member of which was Pierre de Breze (c. 1410-1465), one of the trusted soldiers and statesmen of Charles VII. He had made his name as a soldier in the English wars when in 1433 he joined with Yolande, queen of Sicily, the constable Rich- mond and others, in chasing from power Charles VII. 's minister La Tremoille. He was knighted by Charles of Anjou in 1434, and presently entered the royal council. In 1437 he became seneschal of Anjou, and in 1440 of Poitou. During the Praguerie he rendered great service to the royal cause against the dauphin Louis and the revolted nobles, a service which was remembered against him after Louis's accession to the throne. He fought against the English in Normandy in 1440-1441, and in Guienne in 1442. In the next year he became chamberlain to Charles VII., and gained the chief power in the state through the influence of Agnes Sorel, superseding his early allies Richmond and Charles of Anjou. The six years (1444-1450) of his ascendancy were the most prosperous period of the reign of Charles VII. His most dangerous opponent was the dauphin Louis, who in 1448 brought against him accusations which led to a formal trial resulting in a complete exoneration of Breze and his restoration to favour.

He fought in Normandy in 1450-1451, and became seneschal of the province after the death of Agnes Sorel and the consequent decline of his influence at court. He made an ineffective descent on the English coast at Sandwich in 1457, and was preparing an expedition in favour of Margaret of Anjou when the accession of Louis XL brought him disgrace and a short imprisonment. In 1462, however, his son Jacques married Louis's half-sister, Charlotte de Valois, daughter of Agnes Sorel. In 1462 he accompanied Margaret to Scotland with a force of 2000 men, and after the battle of Hexham he brought her back to Flanders. On his return he was reappointed seneschal of Normandy, and fell in the battle of Montlhery on the 16th of July 1465. He was succeeded as seneschal of Normandy by his eldest son Jacques de Breze (c. 1440-1490), count of Maulevrier; and by his grandson, husband of the famous Diane de Poitiers, Louis de Breze (d. 1531), whose tomb in Rouen cathedral, attributed to Jean Goujon and Jean Cousin, is a splendid example of French Renaissance work.

The lordship of Breze passed eventually to Claire Clemence de Maill6, princess of Conde, by whom it was sold to Thomas Dreux, who took the name of Dreux Breze, when it was erected into a marquisate. Henri Evrard, marquis de Dreux-Breze (1762-1829), succeeded his father as master of the ceremonies to Louis XVI. in 1781. On the meeting of the states-general in 1789 it fell to him to regulate the questions of etiquette and precedence between the three estates. That as the immediate representative of the crown he should wound the susceptibilities of the deputies was perhaps inevitable, but little attempt was made to adapt traditional etiquette to changed circumstances. Breze did not formally intimate to President Bailly the pro- clamation of the royal seance until the 20th of June, when the carpenters were about to enter the hall to prepare for the event, thus provoking the session in the tennis court. After the royal seance Breze was sent to reiterate Louis's orders that the estates should meet separately, when Mirabeau replied that the hall could not be cleared except by force. After the fall of the Tuileries Breze emigrated for a short time, but though he returned to France he was spared during the Terror. At the Restoration he was made a peer of France, and resumed his functions as guardian of an antiquated ceremonial. He died on the 27th of January 1829, when he was succeeded in the peerage and at. court by his son Scipion (1793-1845).

The best contemporary account of Pierre de Breze is given in the Chroniques of the Burgundian chronicler, Georges Chastellain, whu had been his secretary. Chastellain addressed a Deprecation v. Louis XI. on his behalf at the time of his disgrace.

BRIALMONT^-BRIAND

BRIALMONT, HENRI ALEXIS (1821-1903), Belgian general and military engineer, son of General Laurent Mathieu Brialmont (d. 1885), was born at Venlo in Limburg on the 25th of May 1821. Educated at the Brussels military school, he entered the army as sub-lieutenant of engineers in 1843, and became lieutenant in 1847. From 1847 to 1850 he was private secretary to the war minister, General Baron Chazal. In 1855 he entered the staff corps, became major in 1861, lieutenant-colonel 1864, colonel in 1868 and major-general 1874. In this rank he held at first the position of director of fortifications in the Antwerp district (December 1874), and nine months later he became inspector- general of fortifications and of the corps of engineers. In 1877 he became lieutenant-general. His far-reaching schemes for the fortification of the Belgian places met with no little opposition, and Brialmont seems to have felt much disappointment in this; at any rate he went in 1883 to Rumania to advise as to the fortification works required for the defence of the country, and presided over the elaboration of the scheme by which Bucharest was to be made a first-class fortress. He was thereupon placed en disponibUite in his own service, as having undertaken the Bucharest works without the authorization of his sovereign. This was due in part to the suggestion of Austria, which power regarded the Bucharest works as a menace to herself. His services were, however, too valuable to be lost, and on his return to Belgium in 1884 he resumed his command of the Antwerp military district. He had, further, while in eastern Europe, prepared at the request of the Hellenic government, a scheme for the defence of Greece. He retired in 1886, but continued to supervise the Rumanian defences. He died on the 21st of September 1903.

In the first stage of his career as an engineer Brialmont's plans followed with but slight modification the ideas of Vauban; and his original scheme for fortifying Antwerp provided for both enceinte and forts being on a bastioned trace. But in 1859, when the great entrenched camp at Antwerp was finally taken in hand, he had already gone over to the school of polygonal fortification and the ideas of Montalembert. About twenty years later Brialmont's own types and plans began to stand out amidst the general confusion of ideas on fortification which naturally resulted from the introduction of long-range guns, and from the events of 1870-71. The extreme detached forts of the Antwerp region and the fortifications on the Meuse at Liege and Namur were constructed in accordance with Brialmont's final principles, viz. the lavish use of armour to protect the artillery inside the forts, the suppression of all artillery positions open to overhead fire, and the multiplication of intermediate batteries (see Fortification and Siegecraet). In h'is capacity of inspector-general Brialmont drafted and carried out the whole scheme for the defences of Belgium. He was an inde- fatigable writer, and produced, besides essays,

reviews and other papers in the journals, twenty-three important works and forty-nine pamphlets. In 1850 he originated the Journal de I'armee Beige. His most important publications were La Fortification du temps present (Brussels, 1885); Influence du tir plongeant et des obus-torpilles sur la fortification (Brussels, 1888) ; Les Rigions fortifiees (Brussels, 1890); La Defense des etats et la fortification a la fin du XIX C siecle (Brussels, 1895); Progres de la dlfense des Stats et de la fortification permanente depuis Vauban (Brussels, 1898).

BRIAN (926-1014), king of Ireland, known as Brian Boru, Boroma, or Boroimhe (from boroma, an Irish word for tribute), was a son of a certain Kennedy or Cenneide (d. 951)- He passed his youth in fighting against the Danes, who were con- stantly ravaging Munster, the northern part of which district was the home of Brian's tribe, and won much fame in these encounters. In 976 his brother, Mathgamhain or Mahon, who had become king of Thomond about 951 and afterwards king of Munster, was murdered; Brian avenged this deed, became himself king of Munster in 978, and set out upon his career of conquest. He forced the tribes of Munster and then those of Leinster to own his sovereignty, defeated the Danes, who were established around Dublin, in Wicklow, and marched into

Dublin, and after several reverses compelled Malachy (Maelsech- lainn), the chief king of Ireland, who ruled in Meath, to bow before him in 1002. Connaught was his next objective. Here and also in Ulster he was successful, everywhere he received hostages and tribute, and he was generally recognized as the ardri, or chief king of Ireland. After a period of comparative quiet Brian was again at war with the Danes of Dublin, and on the 23rd of April 1014 his forces gained a great victory over them at Clontarf. After this battle, however, the old king was slain in his tent, and was buried at Armagh. Brian has enjoyed a great and not undeserved reputation. One of his charters is still preserved in Trinity College, Dublin.

See E. A. D'Alton, History of Ireland, vol. i. (1903).

BRIANˆON, a strongly fortified town in the department of Hautes-Alpes in S.E. France. It is built at a height of 4334 ft. on a plateau which dominates the junction of the Durance with the Guisane. The town itself is formed of very steep and narrow, though picturesque streets. As it lies at the foot of the descent from the Mont Genevre Pass, giving access to Turin, a great number of fortifications have been constructed on the heights around Briancon, especially towards the east. The Fort Janus is no less than 4000 ft. above the town. The parish church, with its two towers, was built 1703-17 26, and occupies a very conspicuous position. The Pont d'Asfeld, E. of the town, was built in 1734, and forms an arch of 131 ft. span, thrown at a height of 184 ft. across the Durance. The modern town extends

in the plain at the S.W. foot of the plateau on which the old town is built and forms the suburb of Ste Catherine, with the railway station, and an important silk-weaving factory. Briancon is 51ˆ m. by rail from Gap. The commune had a civil population in 1906 of 4883 (urban population 3130), while the permanent garrison was 2641 — in all 7524 inhabitants.

Briancon was the Brigantium of the Romans and formed part of the kingdom of King Cottius. About 1040 it came into the hands of the counts of Albon (later dauphins of the Viennois) and thenceforth shared the fate of the Dauphine. The Brian- connais included not merely the upper valley of the Durance (with those of its affluents, the Gyronde and the Guil), but also the valley of the Dora Riparia (Cesanne, Oulx, Bardonneche and Exilles), and that of the Chisone (Fenestrelles, Perouse> Pragelas) — these glens all lying on the eastern slope of the chain of the Alps. But by the treaty of Utrecht (1713) all these valleys were handed over to Savoy in exchange for that of Barcelonnette, on the west slope of the Alps. In 1815 Briancon successfully withstood a siege of three months at the hands of the Allies, a feat which is commemorated by an inscription on one of its gates, Le passe repond de I'avenir. (W. A. B. C.)

BRIAND, ARISTIDE (1862-), French statesman, was born at Nantes, of a bourgeois family. He studied law, and while still young took to politics, associating himself with the most advanced movements, writing articles for the anarchist journal Le Peuple, and directing the Lanterne for some time. From this he passed to the Petite Ripublique, leaving it to found, with Jean Jaures, L'Humanite. At the same time he was pro- minent in the movement for the formation of labour unions, and at the congress of working men at Nantes in 1894 he secured the adoption of the labour union idea against the adherents of Jules Guesde. From that time, Briand became one of the leaders of the French Socialist party. In 1902, after several unsuccessful attempts, he was elected deputy. He declared himself a strong partisan of the union of the Left in what is known as the Bloc, in order to check the reactionary deputies of the Right. From the beginning of his career in the chamber of deputies, Briand was occupied with the question of the separation of church and state. He was appointed reporter of the commission charged with the preparation of the law, and his masterly report at once marked him out as one of the coming leaders. He succeeded in carrying his project through with but slight modifications, and without dividing the parties upon whose support he relied. He was the principal author of the law of separation, but, not content with preparing it, he wished to apply it as well, especially as the existing Rouvier

ministry allowed disturbances to occur during the taking of inventories of church property, a clause of the law for which Briand was not responsible. Consequently he accepted the portfolio of public instruction and worship in the Sarrien ministry (1906). So far as the chamber was concerned his success was complete. But the acceptance of a portfolio in a bourgeois ministry led to his exclusion from the Unified Socialist party (March 1906). As opposed to Jaures, he contended that the Socialists should co-operate actively with the Radicals in all matters of reform, and not stand aloof to await the complete fulfilment of their ideals.

BRIANZA, a district of Lombardy, Italy, forming the south part of the province of Como, between the two southern arms of the lake of that name. . It is thickly populated and remark- able for its fertility; and being hilly is a favourite summer resort of the Milanese.

BRIARE, a town of north-central France in the department of Loiret on the right bank of the Loire, 45ˆ m. S.E. of Orleans on the railway to Nevers. Pop. (1906) 4613. Briare, the Brivodorum of the Romans, is situated at the extremity of the Canal of Briare, which unites the Loire and its lateral canal with the Loing and so with the Seine. The canal of Briare was con- structed from 1605 to 1642 and is about 36 m. long. The indus- tries include the manufacture of fine pottery, and of so-called porcelain buttons made of felspar and milk by a special process; its inventor, Bapterosses, has a bust in the town. The canal traffic is in wood, iron, coal, building materials, &c. A modern hospital and church, and the hotel de ville installed in an old moated chateau, are the chief buildings. The lateral canal of the Loire crosses the Loire near Briare by a fine canal-bridge 720 yds. in length.

BRIAREUS, or Aegaeon, in Greek mythology, one of the three hundred-armed, fifty-headed Hecatoncheires, brother of Cottus and Gyges (or Gyes). According to Homer {Iliad i. 403) he was called Aegaeon by men, and Briareus by the gods. He was the son of Poseidon (or Uranus) and Gaea. The legends regarding him and his brothers' are various and somewhat contradictory. According to the most widely spread myth, Briareus and his brothers were called by Zeus to his assistance when the Titans were making war upon Olympus. The gigantic enemies were defeated and consigned to Tartarus, at the gates of which the three brothers were placed (Hesiod, Theog. 624, 639, 714). Other accounts make Briareus one of the assailants of Olympus, who, after his defeat, was buried under Mount Aetna (Callimachus, Hymn to Delos, 141). Homer mentions him as assisting Zeus when the other Olympian deities were plotting against the king of gods and men (Iliad i. 398). Another tradition makes him a giant of the sea, ruler of the fabulous Aegaea in Euboea, an enemy of Poseidon and the inventor of warships (Schol. on Apoll. Rhod. i.

1165). It would be difficult to determine exactly what natural phenomena are symbolized by the Hecatoncheires. They may represent the gigantic forces of nature which appear in earthquakes and other convulsions, or the multitudinous motion of the sea waves (Mayer, Die Giganten und Titanen, 1887).

BRIBERY (from the O. Fr. briberie, begging or vagrancy, bribe, Mid. Lat. briba, signifying a piece of bread given to beggars; the Eng. " bribe " has passed through the meanings of alms, blackmail and extortion, to gifts received or given in order to influence corruptly). The public offence of bribery may be defined as the offering or giving of payment in some shape or form that it may be a motive in the performance of functions for which the proper motive ought to be a conscientious sense of duty. When this is superseded by the sordid impulses created by the bribe, a person is said to be corrupted, and thus corruption is a term sometimes keld equivalent to bribery. The offence may be divided into two great classes — the one where a person in- vested with power is induced by payment to use it unjustly; the other, where power is obtained by purchasing the suffrages of those who can impart it. It is a natural propensity, removable only by civilization or some powerful counteracting influence, to feel that every element of power is to be employed as much as

possible for the owner's own behoof, and that its benefits should be conferred not on those who best deserve them, but on those who will pay most for them. Hence judicial corruption is an inveterate vice of imperfect civilization. There is, perhaps no other crime on which the force of law, if unaided by public opinion and morals, can have so little influence; for in other crimes, such as violence or fraud, there is generally some person immedi- ately injured by the act, who can give his aid in the detection of the offender, but in the perpetration of the offence of bribery all the immediate parties obtain what they desire, and are satisfied.

The purification of the bench from judicial bribery has been gradual in most of the European countries. In France it received an impulse in the 16th century from the high-minded chancellor, Michel de L'H6pital. In England judicial corruption has been a crime of remarkable rarity. Indeed, with the exception of a statute of 1384 (repealed by the Statute Law Revision Act 188 1) there has been no legislation relating to judicial bribery. The earliest recorded case was that of Sir William Thorpe, who in 13 5 1 was fined and removed from office for accepting bribes. Other celebrated cases were those of Michael de la Pole, chancellor of England, in 1387; Lord Chancellor Bacon in 1621; Lionel Cranfield, earl of Middlesex, in 1624; and Sir Thomas Parker, 1st earl of Macclesfield, in 1725. In Scotland for some years after the Revolution the bench was not without a suspicion of interested partiality; but since the beginning of the 19th

century, at least, there has been in all parts of the empire a perfect reliance on its purity. The same may be said of the higher class of ministerial officers. There is no doubt that in the period from the Revolution to the end of Queen Anne's reign, when a speaker of the House of Commons was expelled for bribery, and the great Marlborough could not clear his character from pecuniary dishonesty, there was much corruption in the highest official quarters. The level of the offence of official bribery has gradually descended, until it has become an extremely rare thing for the humbler officers connected with the revenue to be charged with it. It has had a more lingering existence with those who, because their power is more of a constitutional than an official character, have been deemed less responsible to the public. During Walpole's administration there is no doubt that members of parliament were paid in cash for votes; and the memorable saying, that every man has his price, has been preserved as a characteristic indication of his method of government. One of the forms in which administrative corruption is most difficult of eradication is the appointment to office. It is sometimes maintained that the purity which characterizes the administra- tion of justice is here unattainable, because in giving a judgment there is but one form in which it can be justly given, but when an office has to be filled many people may be equally fitted for it, and personal motives must influence a choice. It very rarely happens, however, that direct bribery is supposed to influence such appointments. It does not appear that bribery was con- spicuous in England until, in the early part of the 18th century, constituencies had thrown off the feudal dependence which lingered among them; and, indeed, it is often said, that bribery is essentially the defect of a free people, since it is the sale of that which is taken from others without payment.

In English law bribery of a privy councillor or a juryman (see Embracery) is punishable as a misdemeanour, as is the taking of a bribe by any judicial or ministerial officer. The buying and selling of public offices is also regarded at common law as a form of bribery. B y the Customs Consolidation Act 1876, any officer in the customs service is liable to instant dismissal and a penalty of £500 for taking a bribe, and any person offering or promising a bribe or reward to an officer to neglect his duty or conceal or connive at any act by which the customs may be evaded shall forfeit the sum of £200. Under the Inland Revenue Regulations Act 1890, the bribery of commissioners, collectors, officers or other persons employed in relation to the Inland Revenue involves a fine of £500. The Merchant Shipping Act 1894, ss. 112 and 398, makes provision for certain offences in the nature of bribery. Bribery is, by the Extradition Act 1906,

an extraditable offence Administrative corruption was dealt with in the Public Bodies' Corrupt Practices Act 1889. The public bodies concerned are county councils, town or borough councils, boards, commissioners, select vestries and other bodies having local government, public health or poor law powers, and having for those purposes, to administer rates raised under public general acts. The giving or receiving, promising, offering, soliciting or agreeing to receive any gift, fee, loan or advantage by any person as an inducement for any act or for- bearance by a member, officer or servant of a public body in regard to the affairs of that body is made a misdemeanour in England and Ireland and a crime and offence in Scotland. Pro- secution under the act requires the consent of the attorney- or solicitor-general in England or Ireland and of the lord advocate in Scotland. Conviction renders liable to imprisonment with or without hard labour for a term not exceeding two years, and to a fine not exceeding £500, in addition to or in lieu of imprison- ment. The offender may also be ordered to pay to the public body concerned any bribe received by him; he may be adjudged incapable for seven years of holding public office, i.e. the position of member, officer or servant of a public body; and if already an officer or servant, besides forfeiting his place, he is liable at the discretion of the court to forfeit his right to compensation or pension. On a second conviction he may be adjudged forever incapable of holding public office, and for seven years incapable of being registered or of voting as a parliamentary elector, or as an elector of members of a public body. An offence under the act may be prosecuted and punished under any other act applicable thereto, or at common law; but no person is to be punished twice for the same offence. Bribery at political elections was at common law punishable by indictment or information, but numerous statutes have been passed deal- ing with it as a " corrupt practice." In this sense, the word is elastic in meaning and may embrace any method of corruptly influencing another for the purpose of securing his vote (see Corrupt Practices). Bribery at elections of fellows, scholars, officers and other persons in colleges, cathedral and collegiate churches, hospitals and other societies was prohibited ini 588-1 589 by statute (31 Eliz. c. 6). If a member receives any money, fee, reward or other profit for giving his vote in favour of any candidate, he forfeits his own place; if for any such consideration he resigns to make room for a candidate, he forfeits double the amount of the bribe, and the candidate by or on whose behalf a bribe is given or promised is incapable of being elected on that occasion. The act is to be read at every election of fellows, &c, under a penalty of £40 in case of default. By the same act any person for corrupt consideration presenting, instituting or inducting to an ecclesiastical benefice or dignity forfeits two years' value of the benefice or dignity; the corrupt presentation is void, and the right to present lapses for that tum to the crown, and the corrupt presentee is disabled from there- after holding the same benefice or dignity; a corrupt*

institution or induction is void, and the patron may present. For a corrupt resignation or exchange of a benefice the giver and taker of a bribe forfeit each double the amount of the bribe. Any person corruptly procuring the ordaining of ministers or granting of licenses to preach forfeits £40, and the person so ordained forfeits £10 and for seven years is incapacitated from holding any ecclesiastical benefice or promotion.

In the United States the offence of bribery is very severely dealt with. In many states, bribery or the attempt to bribe is made a felony, and is punishable with varying terms of imprison- ment, in some jurisdictions it may be with a period not exceeding ten years. The offence of bribery at elections is dealt with on much the same lines as in England, voiding the election and dis- qualifying the offender from holding any office.

Bribery may also take the form of a secret commission (q.v.), a profit made by an agent, in the course of his employment, without the knowledge of his principal.

BRIC A BRAC (a French word, formed by a kind of onomato- poeia, meaning a heterogeneous collection of odds and ends; cf. \de brie et de broc, corresponding to our " by hook or by crook ";

or by reduplication from brack, refuse), objects of " virtu," a collection of old furniture, china, plate and curiosities.

BRICK (derived according to some etymologists from the Teutonic bricke, a disk or plate; but more authoritatively, through the French brique, originally a " broken piece," applied especially to bread, and so to clay, from the Teutonic brikan, to break) , a kind of artificial stone generally made of burnt clay, and largely used as a building material.

History. — The art of making bricks dates from very early times, and was practised by all the civilized nations of antiquity. The earliest burnt bricks known are those found on the sites of the ancient cities of Babylonia, and it seems probable that the method of making strong and durable bricks, by burning blocks of dried clay, was discovered in this corner of Asia. We know at least that well-burnt bricks were made by the Babylonians more than 6000 years ago, and that they were extensively used in the time of Sargon of Akkad (c. 3800 B.C.). The site of the ancient city of Babylon is still marked by huge mounds of bricks, the ruins of its great walls, towers and palaces, although it has been the custom for centuries to carry away from these heaps the bricks required for the building of the modern towns in the surrounding country. The Babylonians and Assyrians attained to a high degree of proficiency in brickmaking, notably in the manufacture of bricks having a coating of coloured glaze or enamel, which they largely

used for wall decoration. The Chinese claim great antiquity for their clay industries, but it is not improbable that the knowledge of brickmaking travelled eastwards from Babylonia across the whole of Asia. It is believed that the art of making glazed bricks, so highly developed afterwards by the Chinese, found its way across Asia from the west, through Persia and northern India, to China. The great wall of China was con- structed partly of brick, both burnt and unbumt; but this was built at a comparatively late period (c. 210 B.C.), and there is nothing to show that the Chinese had any knowledge of burnt bricks when the art flourished in Babylonia.

Brickmaking formed the chief occupation of the Israelites during their bondage in Egypt, but in this case the bricks were probably sun-dried only, and not burnt. These bricks were made of a mixture of clay and chopped straw or reeds, worked into a stiff paste with water. The clay was the river mud from the banks of the Nile, and as this had not sufficient cohesion in itself, the chopped straw (or reeds) was added as a binding material. The addition of such substances increases the plasticity of wet clay, especially if the mixture is allowed to stand for some days before use; so that the action of the chopped straw was twofold; a fact possibly known to the Egyptians. These sun-dried bricks, or " adobes," are still made, as of old, on the banks of the Nile by the following method: — A shallow pit or bed is prepared, into which are thrown the mud, chopped straw and water in suitable proportions, and the whole mass is tramped on until it is thoroughly mixed and of the proper consistence. This mixture is removed in lumps and shaped into bricks, in moulds or by hand, the bricks being simply sun-dried.

Pliny mentions that three kinds of bricks were made by the Greeks, but there is no indication that they were used to any great extent, and probably the walls of Athens on the side towards Mount Hymettus were the most important brick-structures in ancient Greece. The Romans became masters of the brick- maker's art, though they probably acquired much of their know- ledge in the East, during their occupation of Egypt and Greece. In any case they revived and extended the manufacture of bricks about the beginning of the Christian era; exercising great care in the selection and preparation of their clay, and introducing the method of burning bricks in kilns. They carried their knowledge and their methods throughout western Europe, and there is abundant evidence that they made bricks extensively in Germany and in Britain.

Although brickmaking was thus introduced into Britain nearly 2000 years ago, the art seems to have been lost when the Romans withdrew from the country, and it is doubtful whether any burnt bricks were made in England from that time until the 13th century. Such bricks as were us^d during this long

period were generally taken from the remains of Roman buildings, as at Colchester and St Albans Abbey. One of the earliest exist- ing brick buildings, erected after the revival of brickmaking in England, is Little Wenham Hall, in Suffolk, built about a. d. i 210; but it was not until the 15th century that bricks came into general use again, and then only for important edifices. During the reign of Henry VIII. brickmaking was brought to great perfection, probably by workmen brought from Flanders, and the older portions of St James's Palace and Hampton Court Palace remain to testify to the skill then attained. In the 16th century bricks were increasingly used, but down to the Great Fire of London, in 1666, the smaller buildings, shops and dwelling- houses, were constructed of timber framework filled in with lath and plaster. In the rebuilding of London after the fire, bricks were largely used, and from the end of the 17th century to the present day they have been almost exclusively used in all ordi- nary buildings throughout the country, except in those districts where building stone is plentiful and good brick-clay is not readily procurable. The bricks made in England before 1625 were of many sizes, there being no recognized standard; but in that year the sizes were regulated by statute, and the present standard size was adopted, viz. 9X41X3 in. In 1784 a tax was levied on bricks, which was not repealed until 1850. The tax averaged ahout 4s. 7d. per thousand on ordinary bricks, and special bricks were still more heavily taxed.

The first brick buildings in America were erected on Manhattan Island in the year 1633 by a governor of the Dutch West India Company. These bricks were made in Holland, where the industry had long reached great excellence; and for many years bricks were imported into America from Holland and from England. In America burnt bricks were first made at New Haven about 1650, and the manufacture slowly spread through the New England states; but for many years the home- made article was inferior to that imported from Europe.

The Dutch and the Germans were the great brickmakers of Europe during the middle ages, although the Italians, from the 14th to the 15th century, revived and developed the art of decorative brick-work or terra-cotta, and discovered the method of applying coloured enamels to these materials. Under the Delia Robbias, in the 15th century, some of the finest work of this class that the world has seen was executed, but it can scarcely be included under brickwork.

Brick Clays. — All clays are the result of the denudation and

decomposition of felspathic and siliceous rocks, and consist of the fine insoluble particles which have been carried in suspension in water and deposited in geologic basins according to their specific gravity and degree of fineness (see Clay) . These deposits have been formed in all geologic epochs from the " Recent " to the " Cambrian," and they vary in hardness from the soft and plastic " alluvial " clays to the hard and rock-like shales and slates of the older formations. The alluvial and drift clays (which were alone used for brickmaking until modern times) are found near the surface, are readily worked and require little preparation, whereas the older sedimentary deposits are often difficult to work and necessitate the use of heavy machinery. These older shales, or rocky clays, may be brought into plastic condition by long weathering {i.e. by exposure to rain, frost and sun) or by crushing and grinding in water, and they then resemble ordinary alluvial clays in every respect.

The clays or earths from which burnt bricks are made may be divided into two principal types, according to chemical com- position: (1) Clays or shales containing only a small percentage of carbonate of lime and consisting chiefly of hydrated aluminium silicates (the " true clay substance ") with more or less sand, undecomposed grains of felspar, and oxide or carbonate of iron; these clays usually burn to a buff, salmon or red colour; (2) Clays containing a considerable percentage of carbonate of lime in addition to the substances above mentioned. These latter clay deposits are known as "marls," 1 and may contain as much

1 The term " marl " has been wrongly applied to many fire-clays. It should be restricted to natural mixtures of clay and chalk such as those of the Paris ahd London basins.

as 40% of chalk. They burn to a sulphur-yellow colour which is quite distinctive.

Brick clays of class (1) are very widely distributed, and have a more extensive geological range than the marls, which are found in connexion with chalk or limestone formations only. These ordinary brick clays vary considerably in composition, and many clays, as they are found in nature, are unsuitable for brickmaking without the addition of some other kind of clay or sand. The strongest brick clays, i.e. those possessing the greatest plasticity and tensile strength, are usually those which contain the highest percentage of the hydrated aluminium silicates, although the exact relation of plasticity to chemical composition has not yet been determined. This statement cannot be applied indiscriminately to all clays, but may be taken as fairly applicable to clays of one general type (see Clay) . All clays contain more or less free silica in the form of sand, and usually a small percent- age of undecomposed felspar. The most important ingredient, after the clay-substance and the sand, is oxide of iron; for the colour, and, to a less extent, the hardness and durability of the burnt bricks depend on its presence. The amount of oxide of iron in these clays varies from about 2 to 10%, and the colour of the bricks varies accordingly from light buff to chocolate; although the colour developed by a given percentage of oxide of iron is influenced by the other substances present and also by the method of firing. A clay containing from s to 8 % of oxide of iron will, under ordinary conditions of firing, produce a red brick; but if the clay contains 3 to 4% of alkalis, or the brick is fired too hard, the colour will be darker and more purple. The actions of the alkalis and of increased temperature are probably closely related, for in either case the clay is brought nearer to its fusion point, and ferruginous clays generally become darker in colour as they approach to fusion. Alumina acts in the opposite direction, an excess of this com- pound tending to make the colour lighter and brighter. It is impossible to give a typical composition for such clays, as the percentages of the different constituents vary through such wide ranges. The clay substance may vary from 1 5 to 80 , the free silica or sand from 5 to 80, the oxide of iron from 1 to 10%, the carbonates of lime and magnesia together, from 1 to 5%, and the alkalis from 1 to 4%. Organic matter is always present, and other impurities which frequently occur are the sulphates of lime and magnesia, the chlorides and nitrates of soda and potash, and iron-pyrites. The presence of organic matter gives the wet clay a greater plasticity, probably because it forms a kind of mucilage which adds a certain viscosity and adhesiveness to the natural plasticity of the clay. In some of the coal- measure shales the amount of organic matter is very considerable, and may render the clay useless for brickmaking. The other impurities, all of which, except the pyrites, are soluble in water, are undesirable, as they give rise to " scum," which produces patchy colour and pitted faces on the bricks. The commonest soluble impurity is calcium sulphate, which produces a whitish scum on the face of the brick in drying,

and as the sCum becomes permanently fixed in burning, such bricks are of little use except for common work. This question of "scumming" is very important to the maker of high-class facing and moulded bricks, and where a clay containing calcium sulphate must be used, a certain percentage of barium carbonate is nowadays added to the wet clay. By this means the calcium sulphate is converted into calcium carbonate which is insoluble in water, so that it remains distributed throughout the mass of the brick instead of being deposited on the surface. The presence of magnesium salts is also very objectionable, as these generally remain in the burnt brick as magnesium sulphate, which gives rise to an efflorescence of fine white crystals after the bricks are built into position. Clays which are strong or plastic are known as " fat " clays, and they always contain a high percentage of true " clay substance," and, consequently, a low percentage of sand. Such clays take up a considerable amount of water in "tempering"; they dry slowly, shrink greatly, and so become liable to lose their shape and develop cracks in drying and firing. " Fat " clays are greatly improved by the addition of coarse sharp sand,

which reduces the time of drying and the shrinkage, and makes the brick more rigid during the firing. Coarse sand, unlike clay-substance, is practically unaffected during the drying and firing, and is a desirable if not a necessary ingredient of all brick clays. The best brick-clays feel gritty between the fingers; they should, of course, be free from pebbles, sufficiently plastic to be moulded into shape and strong enough when dry to be safely handled. All clays are greatly improved by being turned over and exposed to the weather, or by standing for some months in a wet condition. This "weathering" and "ageing" of clay is par- ticularly important where bricks are made from tempered clay , i.e. clay in the wet or plastic state; where bricks are made from shale, in the semi-plastic condition, weathering is still of importance.

The lime clays or "marls" of class (2), which contain essentially a high percentage of chalk or limestone, are not so widely distributed as the ordinary brick-clays, and in England the natural deposits of these clays have been largely exhausted. A very fine chalk-clay, or " malm " as it was locally called, was formerly obtained from the alluvium in the vicinity of London; but the available supply of this has been used up, and at the present time an artificial " malm " is prepared by mixing an ordinary brick-clay with ground chalk. For the best London facing-bricks the clay and chalk are mixed in water. The chalk is ground on grinding-pans, and the clay is mixed with water and worked about until the mixture has the

consistence of cream. The mixture of these " pulps " is run through a grating or coarse sieve on to a drying-kiln or " bed," where it is allowed to stand until stiff enough to walk on. A layer of fine ashes is then spread over the clay, and the mass is turned over and mixed by spade, and tempered by the addition of water. In other districts, where clays containing limestone are used, the marl is mixed with water on a wash-pan and the resulting creamy fluid passed through coarse sieves on to a drying-bed. If necessary, coarse sand is added to the clay in the wash-pan, and such addition is often advisable because the washed clays are generally very fine in grain. Another method of treating these marls, when they are in the plastic condition, is to squeeze them by machinery through iron gratings, which arrest and remove the pebbles. In other cases the marl is passed through a grinding-mill having a solid bottom and heavy iron rollers, by which means the limestone pebbles are crushed sufficiently and mixed through the whole mass. The removal of limestone pebbles from the clay is of great importance, as during the firing they would be converted into quicklime, which has a tendency to shatter the brick on exposure to the weather. As before stated, these marls (which usually contain from 1 5 to 30 % of calcium carbonate) burn to a yellow colour which is quite distinctive, although in some cases, where the percentage of limestone is very high, over 40%, the colour is grey or a very pale buff. The action of lime in bleaching the ferric oxide and producing a yellow instead of a red brick, has not been thoroughly investigated, but it seems probable that some compound is produced, between the lime and the oxide of iron, or between these two oxides and the free silica, entirely different from that produced by oxide of iron in the absence of lime. Such marls require a harder fire than the ordinary brick-clays in order to bring about the reaction between the lime and the other ingredients. Magnesia may replace lime to some extent in such marls, but the firing tempera- ture must be higher when magnesia is present. Marls usually contract very little, if at all, in the burning, and generally produce a strong, square brick of fine texture and good colour. When under-fired, marl bricks are very liable to disintegrate under the action of the weather, and great care must be exercised in burning them at a sufficiently high temperature.

Brick-making. — Bricks made of tempered clay may be made by hand or by machine, and the machines may be worked by hand or by mechanical power. Bricks made of semi-plastic clay {i.e. ground clay or shale sufficiently damp to adhere under pressure) are generally machine-made throughout. The method of making bricks by hand is the same, with slight variation, the world over. The tempered clay is pressed by hand into a wooden or metal mould or four-sided case (without top or

I bottom) Which is of the desired shape and size, allowance being I made for the shrinkage of the brick in drying and firing. The moulder stands at

the bench or table, dips the mould in water, or water and then sand, to prevent the clay from sticking, takes a rudely shaped piece of clay from an assistant, and dashes this into the mould which rests on the moulding bench. He then presses the clay into the corners of the mould with his fingers, scrapes off any surplus clay and levels the top by means of a strip of wood called a " strike," and then turns the brick out of the mould on to a board, to be carried away by another assistant to the drying-ground. The mould may be placed on a special piece, of wood, called the stock-board, provided with an elevated tongue of wood in the centre, which produces the hollow or " frog " in the bottom of the brick.

Machine-made bricks may be diyided into two kinds, plastic and semi-plastic, although the same type of machine is often used for both kinds.

The machine-made plastic bricks are made of tempered clay, but generally the. tempering and working of the clay are effected by the use of machinery, especially when the harder clays and shales are used. The. machines used in the preparation of such clays are grinding-mills and pug-mills. The grinding-mills are either a series of rollers with graduated spaces between, through which the clay or shale is passed, or are of the ordinary " mortar pan " type, having a solid or perforated iron bottom on which the clay or shale is crushed by heavy rollers. Shales are sometimes passed through a gnnding-mill before they are exposed to the action of the weather, as the disintegration of the hard lumps of shale greatly accelerates the weathering." In the case of ordinary brick-clay, in the plastic condition, grinding-mills are only used when pebbles more than a quarter of an inch in diameter are present, as otherwise the clay may be passed directly through the pug-mill, a process which may be repeated if necessary. The pug-mill consists of a box or trough having a feed hole at one end and a delivery hole or nose at the other end, and provided with a central shaft which carries knives and cutters so arranged that when the shaft revolves they cut and knead the clay, and at the same time force it towards and through the delivery nose. The cross section of this nose of the pug-mill is approximately the same as that of the required brick (9 in. X 4j in. plus contraction, for ordinary bricks), so that the pug delivers a solid or continuous mass of clay from which bricks may be made by merely making a series of square cuts at the proper distances apart. In practice, the clay is pushed from the pug along a smooth iron plate, which is provided with a wire cutting frame having a number of tightly stretched wires placed at certain distances apart, arranged so that they can be brought down upon, and through, the clay and so many bricks cut off at intervals. The frame is sometimes in the form of a skeleton cylinder, the wires being arranged radially (or the wires may be replaced by metal disks) ; but in all cases bricks thus made are known as " wire-cuts." In order to obtain a better-shaped and more compact brick, these wire-cuts may be placed under a

brick press and there squeezed into iron moulds under great pressure. These two processes are now generally performed by one machine, consisting of pug-mill and brick press combined. The pug delivers the clay, downwards, into the mould ; the proper amount of clay is cut off ; and the mould is made to travel into position under the ram of the press, which squeezes the clay into a solid mass.

There are many forms of brick press, a few for hand power, but the most adapted for belt-driving; although in recent years hydraulic presses have come more and more into use, especially in Germany and America. The essential parts of a brick press are: (1) a box or frame in which the clay is moulded; (2) a plunger or die carried on the end of a ram, which gives the necessary pressure ; (3) an arrangement for pushing the pressed brick out of the moulding box. Such presses are generally made of iron throughout, although other metals are used, occasionally, for the moulds and dies. The greatest variations found in brick presses are in the means adopted for actuat- ing the ram; and many ingenious mechanical devices have been, applied to this end, each claiming some particular advantage over its predecessors. In many recent presses, especially where semi- plastic clay is used, the brick is pressed simultaneously from top and; bottom, a second ram, working upwards from beneath, giving the additional pressure.

Although the best bricks are still pressed from tempered or plastic clay, there has recently been a great development in the manufacture of semi-plastic or dust-made bricks, especially in those districts where shales are used for brickmaking. These semi-plastic bricks are stamped out of ground shale that has been sufficiently moistened with water to enable it to bind together. The hard-clay, or shale, is crushed under heavy rollers in an iron grinding-pan having a perforated bottom through which the crushed clay passes, when sufficiently fine, into a small compartment underneath. This clay powder is then delivered, by an elevator, into a sieve or screen, which retains the coarser particles for regrinding. Sets of rollers may also be used for crushing shales that are only moderately hard, the ground material being sifted as before. The material, as fed

into the mould of the press, is a coarse, damp powder which becomes adhesive under pressure, producing a so-called ” semi-plastic” brick. The presses used are similar to those employed for plastic clay, but they are generally more strongly and heavily built, and are capable of applying a greater pressure.

The semi-plastic method has many advantages where shales are used, although the bricks are not as strong nor as perfect as the best " plastic " bricks. The method, however, enables the brickmaker to make use of certain kinds of clay-rock, or shale, that would be impracticable for plastic bricks; and the weathering, tempering and " ageing " may be largely or entirely dispensed with. The plant required is heavier and more costly, but the brickyard becomes more compact, and the processes are simpler than with the " plastic " method.

The drying of bricks, which was formerly done in the open, is now, in most cases, conducted in a special shed heated by flues along which the heated gases from the kilns pass on their way to the chimney. It is important that the atmosphere of the drying-shed should be fairly dry, to which end suitable means of ventilation must be arranged (by fans or otherwise). If the atmosphere is too moist the surface of the brick remains damp for a considerable time, and the moisture from the interior passes to the surface as Water, carrying with it the soluble salts, which are deposited on the surface as the water slowly evaporates. This deposit produces the " scum " already referred to. When the drying is done in a dry atmosphere the surface quickly dries and hardens, and the moisture from the interior passes to the surface as vapour, the soluble salts being left distributed through the whole mass, and consequently no " scum " is produced. Plastic bricks take much longer to dry than semi-plastic ; they shrink more and have a greater tendency to warp or twist.

The burning or firing of bricks is the most important factor in their production; for their strength and durability depend very largely on the character and degree of the firing to which they have been subjected. The action of the heat brings about certain chemical decompositions and re-combinations which entirely alter the physical character of the dry clay. It is important, therefore, that the firing should be carefully conducted and that it should be under proper control. For ordinary bricks the firing atmosphere should be oxidizing, and the finishing temperature should be adjusted to the nature of the clay, the object being to produce a hard strong brick, of good shape, that will not be too porous and will withstand the action of frost. The finishing temperature ranges from 900° C. to 1250° C, the usual temperature being about 1050° C. for ordinary bricks. As before mentioned, lime-clays require a higher firing temperature (usually about 1 150° C. to 1200 C.) in order to bring the lime into chemical combination with the other substances present.

It is evident that the best method of firing bricks is to place them in permanent kilns, but although such kilns were used by the Romans some 2000 years ago, the older method of firing in " clamps " is still employed in the smaller brickfields, in every country where bricks are made. These

clamps are formed by arranging the unfired bricks in a series of rows or walls, placed fairly closely together, so as to form a rectangular stack. A certain number of channels, or fire- mouths, are formed in the bottom of the clamp; and fine coal is spread in horizontal layers between the bricks during the building up of the stack. F'res are kindled in the fire-mouths, and the clamp is allowed to go on burning until the fuel is consumed throughout. The clamp is then allowed to cool, after which it is taken down, and the bricks sorted; those that are under-fired being built up again in the next clamp for refiring. Sometimes the clamp takes the form of a temporary kiln, the outside being built of burnt bricks which are plastered over with clay, and the fire-mouths being larger and more carefully formed. There are many other local modifica- tions in the manner of building up the clamps, all with the object of producing a large percentage of well-fired bricks. Clarrfp-flring is slow, and also uneconomical, because irregular and not sufficiently under control ; and it is now only employed where bricks are made on a small scale.

Brick-kilns are of many forms, but they can all be grouped undet two main types — Intermittent kilns and Continuous kilns. The intermittent kiln is usually circular in plan, being in the form of a vertical cylinder with a domed top. It consists of a single firing- chamber in which the unfired bricks are placed, and in the walls of which are contrived a number of fire-mouths where wood or coal is burned. In the older forms known as up-draught kilns, the products of combustion pass from the fire-mouth, through flues, into the bottom of the firing-chamber, and thence directly upwards and out at the top. The modern plan is to introduce the products of com- bustion near the top, or crown, of the kiln, and to draw them down- wards through holes in the bottom which lead to flues connected with an independent chimney. • These down-draught kilns have short chimneys or " bags " built round the inside 'wall in connexion with the fire-mouths, which conduct the flames to the upper part of the firing-chamber, where they are reverberated and passed down through the bricks in obedience to the pull of the chimney. The " bags " may be joined together, forming an inner circular wall entirely round the firing-chamber, except at the doorway; and a number of kilns may be built in a row or group having their bottom flues connected with the same tall chimney. Down-draught kilns usually give a more regular fire and a higher percentage of well-fired bricks ;

and they are more economical in fuel consumption than up-draught kilns, while the hot gases, as they pass from the kiln, may be utilized for drying purposes, being conducted through flues under the fl6or of the drying-shed, on their way to the chimney. The method of using one tall chimney to work a group of down-draught kilns naturally led to the invention of the " continuous " kiln, which is really made up of a number of separate kilns or

firing-chambers, built in series and connected up to the main flue of the chimney in such a manner that the products of combustion from one kiln may be made to pass through a number of other kilns before entering the flue. The earliest form of continuous kiln was invented by Friedrich Hoffman, and all kilns of this type are built on the Hoffman principle, although there are a great number of modifications of the original Hoffman construction. The great principle of" continuous "firing is the utilization of the waste heat from one kiln or section of a kiln in heating up another kiln or section, direct firing being applied only to finish the burning. In practice a number of kilns or firing- chambers, usually rectangular in plan, are built side by side in two parallel lines, which are connected at the ends by other kilns so as to make a complete circuit. The original form of the complete series was elliptical in plan, but the tendency in recent years has been to flatten the sides of the ellipse and bring them together, thus giving two parallel rows joined at the ends by a chamber or passage at right angles. Coal or gas is burnt in the chamber or section that is being fired-up, the air necessary for the combustion being heated on its passage through the kilns that are cooling down, and the products of combustion, before entering the chimney flue, are drawn through a number of other kilns or chambers containing unfired bricks, which are thus gradually heated up by the otherwise waste-heat from the sections being fired. Continuous kilns produce a more evenly fired product than the intermittent kilns usually do, and, of course, at much less cost for fuel. Gas firing is now being extensively applied to continuous kilns, natural gas in some instances being used in the United States of America; and the methods of construction and of firing are carried out with greater care and intelligence, the prime objects being economy of fuel and perfect control of firing. Pyro- meters are coming into use for the control of the firing temperature, with the result that a constant and trustworthy product is turned out. The introduction of machinery greatly helped the brickmaking industry in opening up new sources of supply of raw material in the shales and hardened clays of the sedimentary deposits of the older geologic formations, and, with the extended use of continuous firing plants, it has led to the establishment of large concerns where every- thing is co-ordinated for the production of enormous quantities of bricks at a minimum cost. In the United Kingdom, and still more in Germany and the United States of America, great improvements have been made in machinery, firing-plant and organization, so that the whole manufacture is now being conducted on more Scientific lines, to the great advantage of the industry.

Blue Brick is a very strong vitreous brick of dark, slaty-blue colour, used in engineering works where great strength or imperme- ability is desirable. These bricks are made of clay containing from 7 to 10% of oxide of iron, and their manufacture is carried out in the ordinary way until the later

stages of the firing process, when they are subjected to the strongly reducing action of a smoky atmosphere, which is produced by throwing small bituminous coal upon the fire-mouths and damping down the admission of air. ; The smoke thus produced reduces the red ferric oxide to blue-green ferrous oxide, or to metallic iron, which combines with the silica present to form a fusible ferrous silicate. This fusible "slag" partly combines with the other silicates present, and partly fills up the pores, and so produces a vitreous impermeable layer varying in thickness according to the duration and character of the smoking, the finishing temperature of the kiln and the texture of the brick. Particles of carbon penetrate the surface during the early stages of the smoking, and a small quantity of carbon probably enters into combination, tending to produce a harder surface and darker colour.

Floating Bricks were first mentioned by Strabo, the Greek geo- grapher, and afterwards by Pliny as being made at Pitane in the Troad. The secret of their manufacture was lost for many centuries, but was rediscovered in 1791 by Fabroni, an Italian, who made them from the fossil meal (diatomaceous earth) found in Tuscany. These bricks are very light, fairly strong, and being poor conductors of heat, have been employed for the construction of powder-magazines on board ship, &c.

Mortar Bricks belong to the class of unburnt bricks, and are, strictly speaking, blocks of artificial stone made in brick moulds. These bricks have been made for many years by moulding a mixture of sand and slaked lime and allowing the blocks thus made to harden in the air. This hardening is brought about partly by evaporation of the water, but chiefly by the conversion of the calcium hydrate, or slaked lime, into calcium carbonate by the action of the carbonic acid in the atmosphere. A sraall proportion of the lime enters into combination with the silica and water present to form hydrated calcium silicate, and probably a little hydrated basic carbonate of lime is also formed, both of which substances are in the nature of cement. This process of natural hardening by exposure to the air was a very long one, occupying from six to eighteen months, and many improve- ments were introduced during the latter half of the 19th century to improve the strength of the bricks and to hasten the hardening.

Mixtures of sand, lime and cement (and of certain ground blast- furnace slags and lime) were introduced; the moulding was done under hydraulic presses and the bricks afterwards treated with carbon dioxide under pressure, with or without the application of mild heat. Some of these mixtures and methods are still in use, but a new type of mortar brick has

come into use during recent years which has practically superseded the old mortar brick.

Sand-lime Bricks. — In the early 'eighties of the 19th century, Dr Michaelis of Berlin patented a new process for hardening blocks made of a mixture of sand and lime by treating them with high-' pressure steam for a few hours, and the so-called sand-lime bricks are now made On a very extensive scale in many countries. There are many differences of detail in the manufacture, but the general method is in all cases the same. Dry sand is intimately mixed with about one-tenth of its weight of powdered slaked lime, the mixture is then slightly moistened with water and afterwards moulded into bricks under powerful presses, capable of exerting a pressure of about 60 tons per sq. in. After removal from the press the bricks are immediately placed in huge steel cylinders usually 60 to 80 ft. long and about 7 ft. in diameter, and are there subjected to the action of high-pressure steam (120 lb to 150 lb per sq. in.) for from ten to fifteen hours. The proportion of slaked lime to sand varies according to the nature of the lime and the purity and character of the sand, one of lime to ten of sand being a fair average. The following is an analysis of a typical German sand-lime brick: silica (Si0 2), 84%; lime (CaO), 7%; alumina andoxide of iron, 2%; water, magnesia and alkalis, 7 %• Under the action of the high-pressure steam the lime attacks the particles of sand, and a chemical compound of water, lime and silica is produced which forms a strong bond between the larger particles of sand. This bond of hydrated calcium silicate is evidently different from, and of better type than, the filling of calcium carbonate produced in the mortar-brick, and the sand-lime brick is consequently much stronger than the ordinary mortar-brick, however the latter may be made. The sand-lime brick is simple in manufacture, and with reasonable care is of constant quality. It is usually of a light-grey colour, but may be stained by the addition of suitable colouring oxides or pigments unaffected by lime and the conditions of manufacture.

Strength of Brick. — The following figures indicate the crushing load for bricks of various types in tons per sq. in. : —

Common hand-made. . . . . from 04 to 0-9 ,, machine-made . . . . „ 0-9 ,, 1-2

London stock „ 0-7,, 1-3

Staffordshire blue 2-8,, 3-3

Sand-lime ,, 2-9 ,, 3-4

See also Brickwork. (J. B.; ***W. B.****)*

BRICKFIELDER, a term used in Australia for a hot scorching wind blowing from the interior, where the sandy wastes, bare of vegetation in summer, are intensely heated by the sun. This hot wind blows strongly, often for several days at a time, defying all attempts to keep the dust down, and parching all vegetation. It is in one sense a healthy wind, as, being exceedingly dry and hot, it destroys many injurious germs of disease. The northern brickfielder is almost invariably followed by a strong " southerly buster," cloudy and cool from the ocean. The two winds are due to the same cause, viz. a cyclonic system over the Australian Bight. 'These systems frequently extend inland as a narrow V-shaped depression (the apex northward), bringing the winds from the north on their eastern sides and from the south on their western. Hence as the narrow system passes eastward the wind suddenly changes from north to south, and the thermometer has been known to fall fifteen degrees in twenty minutes.

BRICKWORK, in building, the term applied to constructions made of bricks. The tools and implements employed by the bricklayer are: — the trowel for spreading the mortar; the plumb- rule to keep the work perpendicular, or in the case of an inclined or battering wall, to a regular batter, for the plumb-rule may be made to suit any required inclination; the spirit-level to keep the work horizontal, often used in conjunction with a straight- edge in order to test a greater length; and the gauge-rod with the brick-courses marked on it. The quoins or angles are first built up with the aid of the gauge-rod, and the intermediate work is kept regular by means of the line and line pins fixed in the joints. The raker, jointer, pointing rule and Frenchman are used in pointing joints, the pointing staff being held on a small board called the hawk. For roughly cutting bricks the large trowel is used; for neater work such as facings, the bolster and club-hammer; the cold chisel is for general cutting away, and for chases and holes. When bricks require to be cut, the work is set out with the square, bevel and compasses, If the

brick to be shaped is a > hard one it is placed on a V-shaped cutting block, an incision made where desired with the tin saw, and after the' bolster and club-hammer have removed the portion of the brick, the scutch, really a small axe, is used to hack off the rough parts'. For cutting soft bricks, such as rubbers and malms, a frame saw with a blade of soft iron wire is used, and the face is brought to a true surfaceon the rubbing' stone, a slab of Yorkshire stone.

In ordinary practice a scaffold is carried up with the walls and made to rest on them. Having built up as high as he can reach from the ground, the scaff older erects a scaffold with standards, ledgers and putlogs to carry the : scaffold boards (see Scaffold, Scaffolding). Bricks are carried to the scaffold on a hod which holds twenty, bricks, or they may be hoisted in

baskets or boxes by means of a pulley and fall, or may be raised in larger numbers by a crane. The mortar is taken up in a hod or hoisted in pails and deposited on ledged boards about 3 ft. square, placed on the scaffold at convenient distances apart along the line of work. The bricks are piled on the scaffold between the mortar boards, leaving a clear way against the wall for the bricklayers to move along. The workman, beginning at the extreme left of his section, or at a quoin, advances to the right, carefully keeping to his line and frequently testing his work with the plumb-rule, spirit-level and straight-edge, until he reaches another angle, or the end of his section. The pointing is sometimes finished off as the work proceeds, but in other cases the joints are left open until the completion, when the work is pointed down; perhaps in a different mortar. When the wall has reached a height from the scaffold beyond which the work- man cannot conveniently reach, the scaffolding is raised and the work continued in this manner from the new level.

It is most important that the brickwork be kept perfectly plumb, and that every course be perfectly horizontal or level, both longitudinally and transversely. Strictest attention should be paid to the levelling of the lowest course of footings of a wall, for any irregularity will necessitate the inequality being made up with mortar in the courses above, thus inducing a liability for the wall to settle unequally, and so perpetuate the infirmity. To save the trouble of keeping the plumb-rule and level con- stantly in his hands and yet ensure correct work, the bricklayer, on clearing the footings of a wall, builds up six or eight courses of bricks' at the external angles (see fig. 1), which he carefully plumbs and levels across. These form a gauge for the intervening

Fig. 1.

work, a line being tightly strained between and fixed with steel pins to each angle at a level with the top of the next course to be laid, and with this he makes his work range. If /however, the length between the quoins be great, the line will of course sag, and it must, therefore, be carefully supported at intervals to the proper level. Care must be taken to keep the "perpends," or vertical joints, one immediately over the other. Having been carried up three or four courses to a level with the guidance of the line which is raised course by course, the work should be proved with the level and plumb-rule, particularly with the latter at the quoins and reveals, as well as over the face. A smart tap with the end of the handle of the trowel will suffice to make a brick yield what little it may be out of truth, while the work is green, and not injure it. The work of an efficient craftsman, however, will need but little adjustment.

For every Wall of more than one brick (9 in.) thick, two men should be

employed at the same time, one on the outside and the

other inside; one man cannot do justice from one side to even a 14-in. wall. When the wall can be approached from one side only, the work is said to be executed " overhand." In work circular on plan, besides the level and plumb-rule, a gauge mould or template, or a ranging trammel — a rod working on a pivot at the centre of the curve, and in length equalling the radius— > must be used for every course, as it is evident that the line and pins cannot be applied to this in the manner just described.

Bricks should not be merely laid, but each should be placed frog upwards, and rubbed and pressed firmly down in such a manner as to secure absolute adhesion, and force the mortar into joints. Every brick should be well wetted before it is laid, especially in hot dry weather, in order to wash off the dust from its surface, and to obtain more complete adhesion, and prevent it from absorbing water from the mortar in which it is bedded. The bricks are wetted either by the bricklayer dipping them in water as he uses them, or by water being thrown or sprinkled on them as they lie piled on the scaffold. In bricklaying with quick-setting cements an ample use of water is of even more importance.

AH the walls of a building that are to sustain the same floors and the same roof, should be carried up simultaneously; in no circumstances should more be done in one part than can be reached from the same scaffold, until all the walls are brought up to the same height. Where it is necessary for any reason to leave a portion of the wall at a certain level while carrying up the adjoining work the latter should be racked back, i.e. left in steps as shown in fig. 7, and not carried up vertically with merely the toothing necessary for the bond.

Buildings in exposed situations are frequently built with cavity- walls, consisting of 'the inside or main walls with an outer skin h lino, usually half a brick thick, separated from the former by a walls cavit y of 2 or 3 in. (fig. 2) . The two walls are tied together

at frequent intervals by iron or stoneware ties, each having a bend or twist in the centre, which prevents the transmission of water to the inner wall. All water, therefore, which penetrates the outer wall drops to the base of the cavity, and trickles out through gratings provided for the purpose a few inches above the ground level. The base of the cavity should be taken down a course or two below the level of the damp-proof course. The ties are

placed about 3 ft. apart horizontally, with 12 or 18 in. vertical intervals; they are about 8 in. long and | in. wide. It is considered preferable by some architects and builders to place the thicker wall on the outside. This course, however, allows the main wall to be attacked by the Weather, whereas the former method provides for its protection by a screen of brickwork. Where door and window frames occur in hollow walls, it is of the utmost importance that a proper lead or other flashing be built in, shaped so as to throw off on each side, clear of the frames and main wall, the water which may penetrate the outer shell. While building the wall it is very essential to ensure that the cavity and ties be kept clean and free from rubbish or mortar, and for this purpose a wisp of straw or a narrow board, is laid on the ties where the bricklayer is working, to catch any material that may be inadvertently dropped, this protection being raised as the work proceeds. A hollow wall tends to keep the building dry internally and the temperature equable, but it has the disadvantage of harbour- ing vermin, unless care be taken to ensure their exclusion. The top of the wall is usually sealed with brickwork to prevent vermin or rubbish finding its way into the cavity. Air gratings should be intro- duced here to allow of air circulating through the cavity ; they also facilitate drying out after rain.

Hollow walls are not much used in London for two reasons, the first being that, owing to the protection from the weather afforded by surrounding buildings, one of the main reasons for their use is gone, and the other that the expense is greatly increased, owing to the authorities ignoring the outer shell and requiring the main wall to be of the full thickness stipulated in schedule I. of LondonBuilding Act 1894. Many English provincial authorities in determining the thickness of a cavity-wall, take the outer portion into consideration.

In London and the surrounding counties, brickwork is measured by the rod of 16 i ft. square, i| bricks in thickness. A rod of brick- Matertals work gauged four courses to a foot with bricks 8J in. long, and 4 in – wide – and 2 i m thick . a,ld joints \ in. in thickness,*

labour. w ’” require 4356 bricks, and the number will vary as the bricks are above or below the average size, and as the joints are made thinner or thicker. The quantity of mortar, also, will evidently be affected by the latter consideration, but in London it is generally reckoned at 50 cub. ft. for a f- in. joint, to 72 cub. ft. for a joint f in. thick. To these figures must be added an allowance of about II cub. ft. if the bricks are formed with frogs or hollows. Bricks weigh about 7 lb each ; they are bought and sold by the thousand, which quantity weighs about 62 cwt. The weight of a rod of brickwork is 13 J— 15 tons, work in cement mortar being heavier

than that executed in lime. Seven bricks are required to face a sq. ft.; I ft.

of reduced brickwork — I J bricks thick — will require 16 bricks. The number of bricks laid by a workman in a day of eight hours varies considerably with the description of work, but on straight walling a man will lay an average of 500 in a day.

The absorbent properties of bricks vary considerably with the kind of brick. The ordinary London stock of good quality should not have absorbed, after twenty-four hours' soaking, more varieties than one-fifth of its bulk. Inferior bricks will absorb as ot bricks. much as a third. The Romans were great users of bricks, both burnt and sun-dried. At the decline of the Roman empire, the art of brickmaking fell into disuse, but after the lapse of some centuries it was re- vived, and the ancient architecture of Italy shows many fine examples of brick and terra- cotta work. The scarcity of stone in the Netherlands led to the development of a brick archi- tecture, and fine examples of brick- work abound in the Low Countries. The Romans seem to have introduced brickmaking into England, and speci- mens of the large thin bricks, which they used chiefly as a bond for rubble masonry, may be seen in the many remains of Roman buildings scattered about that country. During the reigns of the early Tudor kings the art of brickmaking arrived at great perfection, and some of the finest known specimens of ornamental brick work are tobefound among the work of this period. The rebuilding of Lon- don after the Great Fire of 1666 gave considerable im- petus to brickmak- ing, most of the new buildings being of brick, and a statute was passed regulating the num- ber of bricks in the thickness of the walls of the several rates of dwelling- houses.

The many names given to the differ- ent qualities of bricks in various parts of Great Britain are most confusing, but the following are those generally in use:—

Stocks, hard, sound, well-burnt bricks, used for all ordinary purposes.

Hard Stocks, sound but over-burnt, used in footings to walls and other positions where good appearance is not required.

Skippers, sound, hard-burnt bricks of imperfect shape. Obtain their name from being much used as ballast for ships.

Rubbers or Cutlers, sandy in composition and suitable for cutting with a wire saw and rubbing to shape on the sfone slab.

Grkzles, sound and of fair shape, but under-burnt; used for inferior work, and in cases where they arc not liable to be heavily loaded.

Place-bricks, under-burnt and defective; used for temporary work.

Chuffs, cracked and defective in shape and badly burnt.

ofbrick- work.

Burrs, lumps which have vitrified or run together in the burning; used for rough walling, garden work, &c.

Pressed bricks, moulded under hydraulic pressure, and much used for facing work. They usually have a deep frog or hollow on one or both horizontal faces, which reduces the weight of the brick and forms an excellent key for the mortar.

Blue bricks, chiefly made in South Staffordshire and North Wales. They are used in engineering work, and where great compressional resistance is needed, as they are vitrified throughout, hard, heavy, impervious and very durable. Blue bricks of special shape may be had for paving, channelling and coping.

Fire-bricks, withstanding great heat, used in connexion with furnaces. They should always be laid with fire-clay in place of lime or cement mortar.

Glazed bricks, either salt-glazed or enamelled. The former, brown in colour, are glazed by throwing salt on the bricks in the kiln. The latter are dipped into a slip of the required colour before being burnt, and are used for decorative and sanitary purposes, and where reflected light is required.

Moulded bricks, for cornices, string courses, plinths, labels and copings. They are made in the different classes to many patterns; and on account of their greater durability, and the saving of the labour of cutting, are preferable in many cases to rubbers. For sewer work and arches, bricks shaped as voussoirs are supplied.

The strength of brickwork varies very considerably according to the kind of brick used, the position in Which it is used, the kind and quality of the lime or cement mortar, and above all the Strength q Ua ljty of the workmanship. The results of experiments with short walls carried out in 1 896-1 897 by the Royal Institute of British Architects to determine the average loads per sq. ft. at which crushing took place, may be briefly summarized as follows : Stock brickwork in lime mortar crushed Under a pressure of 18-63 tons per sq. ft., and in cement mortar under 39-29 tons per sq. ft: Gault brickwork in lime mortar crushed at 31-14 tons, and in cement mortar at 51-34 tons. Fletton brickwork in lime crushed under a

load of 30-68 tons, in cement under 56-25 tons. Leicester red brickwork in lime mortar crushed at 45-36 tons per sq. ft., in cement mortar at 83-36 tons. Staffordshire blue brick work in lime mortar crushed at 114-34 tons, and in cement mortar at 135-43. tons. _

The height of a brick pier should not exceed twelve times its least width. The London Building Act in the first schedule prescribes that in buildings not public, or of the warehouse class, in no storey shall any external or party walls exceed in height sixteen times the thickness. In buildings of the warehouse class, the height of these walls shall not exceed fourteen times the thickness.

In exposed situations it is necessary to strengthen the buildings by increasing the thickness of walls and parapets, and to provide heavier copings and flashings. Special precautions, too, must be observed in the fixing of copings, chimney pots, ridges and hips. The greatest wind pressure experienced in England may be taken at 56 lb on a sq. ft., but this is only in the most exposed positions in the country or on a sea front. Forty pounds is a sufficient allowance in most cases, and where there is protection by surrounding trees or buildings 28 lb per sq. ft. is all that needs to be provided against.

In mixing mortar, particular attention must be paid to the sand with which. the lime or cement is mixed. The best sand is that Mortar. obtained from the pit, being sharp and angular. It is, however, liable to be mixed with clay or earth, which must be washed away before the sand is used. Gravel found mixed with it must be removed by screening or sifting. River sand is frequently used, but is not so good as pit sand on account of the particles being rubbed smooth by attrition. Sea sand is objection- able for two reasons; it cannot be altogether freed from a saline taint, and if it is used the salt attracts moisture and is liable to keep the brickwork permanently damp. The particles, moreover, are generally rounded by attrition, caused by the movement of the sea, which makes it less efficient for mortar than if they retained their original angular forms. Blue or black mortar, often used for pointing the joints of external brickwork on account of its greater durability, is made by using foundry sand or smith's ashes instead of ordinary sand. There are many other substitutes for the ordinary sand. As an example, fine stone grit may be used with advantage. Thoroughly burnt clay or ballast, old bricks, clinkers and cinders, ground to a uniform size and screened from dust, also make excellent substitutes.

Fat limes (that is, limes which are pure, as opposed to " hydraulic" limes which arc burnt from limestone containing some clay) should not be used for mortar; they are slow-setting, and there is a liability for- some of the mortar, where there is not a free access of air to assist the setting,

remaining soft for some considerable period, often months, thus causing unequal settlement and possibly failure. Grey stone lime is feebly hydraulic, and makes a good mortar for ordinary work. It, however, decays under the influence of the weather, and it is, therefore, advisable to point the external face of the work in blue ash or cement mortar, in order to obtain greater durability. It should never be used in foundation work, or where exposed to wet. Lias lime is hydraulic, that is, it will set firm. under water. It should be used in all good class work, where Portland cement is not desired.

Of the various cements used in building, it is necessary only to

mention three as being applicable to use for mortar. The first of these is Portland -cement, which has sprung into very general use, not only for work where extra strength and durability are required, and for underground work, but also in general building where a small extra cost is not objected to. Ordinary lime mortar may have its strength considerably enhanced by the addition of a small proportion of Portland cement. Roman cement is rarely used for mortar, but is useful in some cases on account of the rapidity with which it sets, usually becoming hard about fifteen minutes after mixing. It is useful in tidal work and embankments, and constructions under water. It has about one-third of the strength of Portland cement, by which it is now almost entirely supplanted. Selenitic cement or lime, invented by Major-General H. Y. D. Scott (i822-'i883), is lias lime, to Which a small proportion of plaster of Paris has been added with the object of suppressing the action of slaking and inducing quicker setting. If carefully mixed in accordance with the in- structions issued by the manufacturers, it will take a much larger proportion of sand than ordinary lime.

Lime should be slaked before being made into mortar. The lime is measured out, deposited in a heap on a wooden " bank " or platform, and after being well watered is covered with the correct proportion of sand. This retains the heat and moisture necessary to thorough slaking ; the time required for this operation depends on the variety of the lime, but usually it is from a few hours to one and a half days. If the mixing is to be done by hand the materials must be screened to remove any unslaked lumps of lime. The occurrence of these may be prevented by grinding the lime shortly before use. The mass should then be well " larried," i.e. mixed together with the aid of«a long-handled rake called the " larry." Lime mortar should be tempered for at least two days, roughly covered up with sacks or other material. Before being used it must be again turned over and well mixed together. Portland and Roman cement mortars must be mixed as required on account of their quick- setting properties. In the case of Portland cement mortar, a quantity sufficient only for the day's use should be " knocked up," but with Roman cement fresh mixtures must be made several times a

day, as near as possible to the place of using. Cement mortars should never be worked up after setting has taken place. Care should be taken to obtain the proper consistency, which is a stiff paste. If the mortar be too thick, extra labour is involved in its use, and much time wasted. If it be so thin as to run easily from the trowel, a longer time is taken in setting, and the wall is liable to settle ; also there is danger that the lime or cement will be killed by the excess of water, or at least have its binding power affected. It is not advisable to carry out work when the temperature is below freezing point, but in urgent cases bricklaying may be successfully done by using unslaked lime mortar. The mortar must be prepared in small quantities immediately before being used, so that binding action takes place before it cools. When the wall is left at night time the top course should be covered up to prevent the penetration of rain into the work, which would then be destroyed by the action of frost. Bricks used during frosty weather should be quite dry, and those that have been exposed to rain or frost should never be employed. The question whether there is any limit to bricklayers' work in frost is still an open one. Among the members of the Norwegian Society of Engineers and Architects, at'whose meetings the subject has been frequently discussed, that limit is variously estimated at between -6° to -8° Reaumur (i8i° to 14 Fahr.) and -12° to -15 Reaumur (5° above to 1 1° below zero Fahr.). It has been proved by hydraulic tests that good bricklayers' work can be executed at the latter minimum. The conviction is held that the variations in the opinions held on this subject are attributable to the degree of care bestowed on the preparation of the mortar. It is generally agreed, however, that from a practical point of view, bricklaying should not be carried on at temperatures lower than -8° to -io° Reaumur (14 to 9;-° Fahr.), for as the thermometer falls the expense of building is greatly increased, owing to a larger proportion of lime being required.

For grey lime mortar the usual proportion is one part of lime to two or three parts of sand ; lias lime mortar is mixed in similar proportions, except for work below ground, when equal quantities of lime and sand should be used. Portland cement mortar is usually in the proportions of one to three, or five, of sand ; good results are obtained with lime mortar fortified with cement as follows : — one part slaked lime, one part Portland cement, and seven parts sand, Roman cement mortar should consist of one or one and a half parts of cement to one part of sand. Selenitic lime mortar is usually in the proportions of one to four or five, and must be mixed in a particular manner, the lime being first ground in water in the mortar- mill, and the sand gradually added. Blue or black mortar contains equal parts of foundry ashes and lime; but is improved by the addition of a proportion of cement. For setting fire-bricks fire-clay is always used. Pargetting for rendering inside chimney flues is made of one part of lime with three parts of cow dung free from straw or litter. No efficient substitute has been found

for this mixture, which should be used fresh. A mortar that has found approval for tall chimney shafts is composed by grinding in a mortar-mill one part of blue lias lime with one part each of sand and foundry ashes. In the external walls of the Albert Hall the mortar used was one part Portland cement, one part grey Burham lime and six parts pit sand. The lime was slaked twenty-four hours, and after being mixed

with the sand for ten minutes the cement was added and the whole ground for one minute; the stuff was prepared in quantities only sufficient for immediate use. The by-laws dated 1891, made by the London County Council under section 16 of the Metropolis Manage- ment and Building Acts Amendment Act 1878, require the pro- portions of lime mortar to be one to three of sand or grit, and for cement mortar one to four. Clean soft water only should be used for the purpose of/ making mortar.

Grotd is thin liquid mortar, and is legitimately used in gauged arches and other work when fine joints are desired. In ordinary work it is sometimes used every four or five courses to fill up any spaces that may have been inadvertently left between the bricks. This a,t the best is but doing with grout what should be done with mortar in the operation of laying the bricks; and filling or flushing up every course with mortar requires but little additional exertion and is far preferable. The use of grout is, therefore, a sign of in- efficient workmanship, • and should not be countenanced in good work. It is liable, moreover, to ooze out and stain the face of the brickwork.

Lime putty is pure slaked lime. It is prepared or " run," as it is termed, in a wooden tub or bin, and should be made as long a time as possible before being used; at least three weeks should elapse between preparation and use.

,The pointing of a wall, as previously mentioned, is done either with the bricklaying or at the completion of the work. If the Pplntlpg. pointing is to be of the same mortar as the rest of the work, it would i probably greatly facilitate matters to finish off the work at. one operation with the bricklaying, but where, as in many cases, the pointing is required to be executed in a more durable mortar, this would be done as the scaffold is taken down at the completion of the building, the joints being raked out by the brick- ; layer to a depth of } or f in.

By the latter method the whole face of the work is kept uniform in appearance. The different forms of joints in general use are clearly shown

in fig. 3. Flat or flush joints (A) are formed by pressing the protruding mortar back flush with the face of the brickwork, This joint is commonly used for walls intended to be coated with distemper or limewhite. The flat joint jointed (two forms, B and C) is a develop- ment of the flush joint. In order to increase the density and thereby enhance the dura- bility of the mortar, a semi- circular groove is formed along the centre, or one on each side of the joint, with an iron jointer and straight-edge. Another form, rarely used, is the keyed joint shown at D, the whole width of the joint in this case being treated with the curved key. Struck or bevelled, or weathered, joints have the upper portion pressed back with the trowel to form a sloping surface, which throws off the wet. The lower edge is cut off with the trowel to a straight edge. This joint is in very common use for new work. Ignorant workmen frequently make the slope in the opposite direction (F), thus forming a ledge on the brick; this catches the water, which on being frozen rapidly causes the disintegration of the upper portion of the brick and of the joint itself. With recessed jointing, not much used, a deep shadow may be obtained. This form of joint, illustrated in G, is open to very serious objections, for it encourages the soaking of the brick with rain instead of throwing off the wet, as it seems the natural function of good pointing, and this, besides causing undue dampness in the wall, renders it liable to damage by frost. It also leaves the arrises of the bricks unprotected and liable to be damaged, and from its deep recessed form does not make for stability in the work. Gauged work has very thin joints, as shown at H, formed by dipping the side of the brick in white lime putty. The sketch I shows a joint raked out and filled in with pointing mortar to form a flush joint, or it may be finished in any of the preceding forms. Where the wall is to be plastered the joints are either left open or raked out, or the superfluous mortar may be left protruding as shown at J. By either method an excellent key is obtained, to which the rendering firmly adheres. In tuck pointing (K) the joints are raked out and stopped, i.e. filled in flush with mortar coloured to match the brickwork. The face of the wall is then rubbed over with a soft brick of the same colour, or the work may be coloured with pigment. A narrow groove is then cut in the joints, and the mortar allowed to set. White lime putty is next filled into the groove, being pressed on with a jointing tool, leaving a white joint i to J in. wide, and with a projection of about ˆ in. beyond the face of the work. This method is not a good or a durable one, and should onky be adopted in old work when the

Fig. 3. — Forms of Joints.

edges of the bricks are broken or irregular. In bastard tuck point- ing (L), the ridge, instead of being in white lime putty, is formed of the stopping mortar itself.

*Footings, as will be seen on reference to fig. I, are the wide courses of brickwork at the base or foot of a wall. They serve to spread the pressure over a larger area of ground, offsets 2\ in. _ wide being made on each side of the wall until a width FooW *WS- equal to double the thickness of the wall is reached. Thus in a wall 131 in. (ii bricks) thick, this bottom course would be 2 ft. 3 in, (3 bricks) wide. It is preferable for greater strength to double the lowest course. The foundation bed of concrete then spreading out an additional 6 in. on each side brings the width of the surface bearing on the ground to 3 ft. 3 in. The London Building Act- requires the projection of concrete on each side of the brickwork to be only 4 in., but a projection of 6 in. is generally made to allow*

Fig. 4. — Diagram of Bonding., for easy working. Footings should be built with hard bricks laid principally as headers; stretchers, if necessary, should be placed in the middle of the wall.

Bond in brickwork is the arrangement by which the bricks of every course cover the joints of those in the course below it, and so tend to make the whole mass or combination of bricks act as much together, or as dependently one upon another, Boad > n &- as possible. The workmen should be strictly supervised as they proceed with the work, for many failures are due to their ignorance or carelessness in this particular. The object of bonding will be understood by reference to fig. 4. Here it is evident from the arrangement of the bricks that any weight placed on the topmost brick (a) is carried down and borne alike in every course; in this way the weight on each brick is distributed over an area increasing with every course. But this forms a longitudinal bond only, which cannot extend its influence beyond the width of the brick; and a wall of one brick and a half, or two bricks, thick, built in this manner, would in effect consist of three or four half brick thick walls acting independently of each other. If the bricks were turned so as to show their short sides or ends in front instead of their long ones, certainly a compact wall of a whole brick thick, instead of half a brick, would be produced, and while the thickness of the wall would be double, the longitudinal bond would be shortened by one-half: a wall of any great thickness built in this manner would necessarily be composed of so many independent one-brick walls. To produce a transverse and yet preserve a true longitudinal bond, the bricks are laid in a definite arrangement of stretchers and headers. In English bond " (fig. 5), rightly considered the most perfect in use, the bricks are laid in alternate courses of headers and stretchers, thus combining the advantages of the two previous modes of arrange- ment. A reference to fig. 5 will show how the process of bonding is pursued in a wall one and a half bricks in thickness, and how the quoins are formed. In walls which are a multiple of a whole brick, the appearance of the same course is similar on the elevations of the front and back faces, but in walls where an odd half brick must be, used to

make up the thickness, as] is the case in the illustration, the appearance of the opposite sides of a course is inverted. The ex- ample illustrates the principle of English bond; thicker walls are constructed in the same manner by an extension of the same methods. It will be observed that portions of a brick have to be inserted near a vertical end or a quoin, in order to start the regular bond. These portions equal a half header in width, and are called queen closers; they are placed next to the first header. A three-quarter brick is obviously as available for this purpose as a header and closer combined, but the latter method is preferred because by the use of it uniformity of appearance is preserved, and whole bricks are retained on the returns. King closers are used at rebated openings formed in walls in Flemish bond, and by reason of the greater width of the back or " tail," add strength to the work. They are cut on the splay so that the front end is half the width of a header and one side half the length of the brick. An example of their use will be seen in fig. 15. In walls of almost all thicknesses above 9 in., except in the

-headers

In this and following illustrations of bond in brickwork the position of bricks in the second course is indicated by dotted lines.

Fig. 5. — English Bond.

Fig. 6. — Flemish Bond.

English bond, to preserve the transverse and yet not destroy the longitudinal bond, it is frequently necessary to use half bricks. It may be taken as a general rule that a brick should never be cut if it can be worked in whole, for a new joint is thereby created in a construction, the difficulty of which consists in obvkting the debility arising from the constant recurrence of joints. Great insistence must be laid on this point, especially at the junctions of walls,

where the admission of closers, already constitutes a weakness which would only be increased by the use of other bats or frag- ments of bricks.

Another method of bonding brickwork, in- stead of placing the bricks in alternate courses of headers and stretchers, places them alternately as headers and stretchers in the same course, the ap-

Eearance of the course eing the same on each face. This is called " Flemish

bond." Closers are necessary to this variety of bond. From fig. 6 it will be seen that, owing to the compara- tive weakness of the transverse tie, and the numbers of half bricks required to be used and the thereby increased number of joints, this bond is not so perfect nor so strong as English. The arrangements of the face joints, however, presenting in Flemish bond a neater appearance than in English bond, it is generally selected for the external walls of domestic and other buildings where good effect is desirable. In buildings erected for manufacturing and similar purposes, and in engineering works where the greatest degree of strength and compact- ness is considered of the highest importance, English bond should have the preference.

A compromise is sometimes made between the two above-men- tioned bonds. For the sake of appearance the bricks are laid td form Flemish bond on the face, while the backing is of English bond, the object being to combine the best features oi the two bonds. Undoubtedly the result is an improvement on Flemish bond, obviat- ing as it does the use of bats in the interior of the wall. This method of bonding is termed " single Flemish bond," and is shown in fig. 7. In stretching bond, which should only be used for walls half a brick in thickness, all the bricks are laid as stretchers, a half brick being used in alternate courses to start the bond. In work curved too sharply on plan to admit of the use of stretchers, and for footings., projecting mouldings and corbels, the bricks are all laid as headers, ue. with their ends to the front, and their length across the thickness of the wall. This is termed "heading bond."

In thick walls, three bricks thick and upwards, a saving of labour is effected without loss of strength, by the adoption of "herring bone " or " diagonal bond " in the interior of the wall, the outer faces of the wall being built in English and Flemish bond. This mode should not be had recourse to for walls of a less thickness

tackmg IwcH

Fig. 7. — Single Flemish Bond.

than 27 in., even that being almost too thin to admit of any great advantage from it.

Hoop-iron, about 1ˆ in, wide and -ˆ in. thick, either galvanized or well tarred and sanded to retard rusting, is used in order to obtain additional longitudinal tie. The customary practice is to use one strip of iron for each half-brick in thickness of the wall. Joints at the angles, and where necessary in the length, are formed by

bending the ends of the strips so as to hook together. A patent stabbed iron now on the market is perforated to provide a key for the mortar.

A difficulty often arises in bonding when facing work with bricks of a slightly different size from those used in " backing," as it is technically termed. As it is, of course, necessary to keep all brickwork in properly levelled courses, a difference has to be made in the thick- ness of the mortar joints. Apart from the extra labour involved, this obviously is detrimental to the stability of the wall, and is apt to produce unequal settlement and cracking. Too muchcare cannot be taken to obtain both facing and backing bricks of equal size.

Dishonest bricklayers do not hesitate, when using for the face of a wall bricks of a quality superior to those used for the interior, to use " snapped headers," that is cutting the heading bricks; in halves, one brick thus serving the purposes of two as regards outward appearance. This is a most pernicious practice, un- worthy of adoption by any craftsman of repute, for a skin of brickwork 4I in. thick is thus carried up with a straight mortar joint behind it, the proper bonding with the back of the wall by means of headers being destroyed.

American building acts de- scribe the kind of bond to be used for ordinary walls, and the kind for faced walls. Tie courses also require an extra thickness where walls are perforated with oyer 30 % of flues.

The importance for sanitary and other reasons of keeping walls dry is admitted by all who have observed the deleterious action of damp upon a building.

Walls are liable to become damp, (1) by wet rising up the wall from the earth ; (2) by water soaking down from the top of the wall; (3) by rain being driven on to the face by wind. ftvveoflon Dampness from the first cause may be prevented by the otdam ~ introduction of damp-proof courses or the construction of dry areas; from the second by means of a coping of stone, cement or other non-porous material; and from the third by covering the exterior with impervious materials or by the adoption of hollow walls.

After the footings have been laid and the wall has been brought up to not less than 6 in. above the finished surface of the ground, and previous to fixing the plate carrying the ground floor, there should always be introduced a course of some damp-proof material to prevent the rise of mois- ture from the soil. There are several forms of damp- proof course. A very usual one is a double layer of roofing slates laid in neat Portland cement (fig. 8), the joints being well lapped. A course or two of Stafford-

shire blue bricks in cement is excellent where heavy weights have to be considered. Glazed stoneware perforated slabs about 2 in. thick are specially made for ˆ use as damp-proof courses. Asphalt (fig. 9) recently has come into great favour with architects ; a layer J or f in. thick is a good protection against damp, and not likely to crack should a settlement occur,

■*ffoor of wood btecVsAc&din. dcunp DK3PririCB > bC*

Fig. 9.

but in hot weather it is liable to squeeze out at the joints under heavy weights. Felt covered with bitumen is an excellent substitute for asphalt, and is not liable to crack or squeeze out. Sheet lead is efficient, but very costly and also somewhat liable to squeezing. A damp- proof course has been introduced consisting of a thin sheet of lead sandwiched between layers of asphalt. Basement storeys to be kept dry require, besides the damp-proof course horizontally in the wall, a horizontal course, usually of asphalt, in the thickness of the floor, and also a Vertical damp-proof course from a level below that of the floor to about 6 in. above the level of the ground, either built in the thickness of the wall or rendered on the outside between the wall and the surrounding earth (fig. 10).

By means of dry areas or air drains (figs. 11 and 12), a hollow

Fig. io.

made by the London County Metropolis Management and

space 9 in. or more in width is formed around those portions of the walls situated below the ground, the object being to prevent them from coming into contact with the brickwork of the main walls and so imparting its moisture to the building. Arrangements should be made for keeping the area clear of vermin and for ventilating and draining it. Dry areas, being far from sanitary, are seldom adopted

now, and are being super- seded by asphalt or cement applied to the fare of the wall. Moisture is prevented from soaking down from the top of the wall by using a covering of some impervious material in the form of a coping. This may consist of ordinary bricks set on edge in cement with a double course of tiles im- mediately below, called a ” creasing,” or of specially made non-porous coping bricks, or of stone, cast- iron, or cement sloped or ” weathered ” in order to throw the rain off.

The exterior of walls above the ground line may be pro- tected by coating the surface' with cement or rough cast; or covering with slates or tiles fixed on battens in a similar manner to those on a roof

(%• i3)- , , ■ ■;,-.■

The use of hollow walls in exposed positions has already been referred to.

The by-laws dated 1891, Council under section 16 of the Buildings Acts Amendment Act 1878, require that" every wall of a house or building shall have a damp course composed of materials impervious to moisture approved by the district surveyor, extending throughout its whole thickness at the level of not less than 6 in. below the level of the lowest floor. Every external wall or enclosing wall of habitable rooms or their appurtenances or cellars which abuts against the earth shall be protected by materials impervious to moisture to the satisfaction of the district surveyor. . .'." The top ot every party-wall and parapet-wall shall be finished with one course ot hard, well-burnt bricks set on edge, in cement, or by a coping of any other waterproof and fire-resisting material, properly secured.

Arches are constructions built of wedge-shaped blocks, which by reason of their shape give support one to another, and to the super- A„h» imposed weight, the resulting load being transmitted through the blocks to the abutments upon which the ends of the arch rest. An arch should be composed of such materials and designed of such dimensions as to enable it to retain, its proper shape and resist the crushing strain imposed upon it. 1 he abutments v also must be strong*

enough to take safely the thrust of the weighted arch, as the slightest movement in these supports will cause deflection and failure. The outward thrust of an arch decreases as it approaches the semi- circular form, but the somewhat prevalent idea that in the latter form no thrusting takes place is at variance with fact.

Arches in brickwork may be classed under three heads: plain arches, rough-cut and gauged. Plain arches are built of uncut bricks, and since the difference between the outer and inner peri-

air h-r-r

grating LL

Fig.

phery of the arch requires the parts of which an arch is made up to be wedge-formed, which an ordinary brick is not, the difference must be made

in mortar, with the result that the joints become wedge- shaped. This obviously gives an objectionable inconsistency of material in the arch, and for this reason to obtain greatest strength it is advisable to build these arches in independent rings of half-brick thickness. The undermost rings should have thin joints, those of each succeeding ring being slightly thickened. This prevents the lowest ring from settling while those above remain in position,

'errtilertiittl .cpocnsie

Fig. 12.

which would cause an ugly fissure. In work of large span bonding blocks or " lacing courses " should be built into the arch, set in cement and running through its thickness at intervals, care being taken to introduce the lacing course at a place where the joints of the various rings coincide. Stone blocks in the shape of a voussoir (fig. 14) may ; be used instead. Except for these lacing courses, hydraulic lime mortar should be. used for large arches, on account of its slightly accommodating nature.

Rough cut arches are those in which the bricks are roughly cut with an axe to a wedge form ; they are used over openings such as doors and win dows, where a strong arch of neat appear- ance is desired. The joints are usually made equal in width to those of the ordinary brickwork. Gauged arches are composed of specially made soft bricks, which are cut and rubbed to gauges or templates so as to form perfectly fitting voussoirs. Gauging is, of course, equally applicable to arches and walling, as it means no more than bringing every brick exactly to a certain form by cutting and rubbin'g. Gauged brickwork is set in lime putty instead of common mortar; the finished joints should not be more than gV in. wide. To give stability the sides of the voussoirs are gauged out hollow and grouted in Portland cement, thus connecting each brick with the next by a joggle joint. Gauged arches, being for the most part but a half- brick in thickness on the soffit and not being tied by a bond to any- thing behind them — for behind them is the lintel with rough dis- charging arch over, supporting the remaining width of the wall- require to be executed with great care and nicety. It is a common fault with workmen to rub the bricks thinner behind than before to lessen the labour required to obtain a very fine face joint. This practice tends to make the work bulge outwards; it should rather be inverted if it be done at all, though the best work is that in which the bricks are gauged to exactly the same thickness at the back as at the front. The same fault occurs when a gauged arch is inserted in an old wall, on account of the difficulty of filling up with cement the space behind the bricks.

The bond of an arch obtains its name from the arrangement of headers and

stretchers on its soffit. The under side of an arch built in English bond, therefore, will show the same arrangement as the face of a wall built in English bond. If the arch is in Flemish the scffit presents the same ap- pearance as the elevation of a wall built in that bond.

It is generally held that the building of wood into brickwork should as far as is possible be avoided. Wall plates of wood Plates. are ‘ however, necessary where wood joists are used, and where these plates may not be supported on corbels of projecting brickwork or iron they must be let flush into the wall, taking the place of a course of bricks. They form a uniform bed for the joists, to which easy fixing is obtained. The various modes adopted for resting and fixing the ends of joists on walls are treated in the article Carpentry.

Lintels, which may be of iron, steel, plain or reinforced concrete, or stone, are used over square- headed openings instead of or in conjunction with arches. They are useful to preserve the square form and receive the joiners’ fittings, but except when made of steel or of concrete reinforced with steel bars, they should have relieving arches turned im- mediately over them (fig.. 15).

” Fixing bricks ” were formerly of wood of the same size as the ordinary brick, and built into the wall as required for fixing joinery. Owing to their liability to shrinkage and decay, their use is now practically abandoned, their place being taken by bricks of coke- breeze concrete, which do not shrink or rot and hold, fjfet nails or screws driven into them. Another method often adopted for

Fig. 13.

providing a fixing for joinery is to build in wood slips the thickness of a joint and 4J in. wide. When suitable provision for fixing has not been made, wood plugs are driven into the joints of the bricks. Great care must be talcen in driving these in the joints of reveals or at the corners of walls, or damage may be done.

The name ” brick-ashlar ” is given to walls faced with ashlar stonework backed in with brickwork. Such constructions are liable

in an aggravated de- gree to the unequal settling and its attendant evils pointed out as ex- isting in walls built with different quali- ties of bricks. The outer face is com- posed of unyielding stone with few and very thin

joints, which perhaps do not occupy more than a hundredth part of its height, while the back is built up of bricks with about one- eighth its height composed of mortar joints, that is, of a material that by its nature and manner of application must both shrink in drying and yield to pressure. To obviate this tendency to settle and thus cause the bulging of the face or failure of the wall, the mortar used should be composed of Portland cement and sand with a large proportion of the former, and worked as stiff as it conveniently can be. In building such work the stones should be in height equal to an exact number of brick courses. It is a common practice in erecting buildings with a facing of Kentish rag rubble to back up the stonework with bricks. Owing to the great irregu- larity of the stones, great difficulty is experienced in obtaining proper bond between the two materials. Through bonding stones or

‘■King closer \ j cjueer/clcsei

HI

WfMl,

WII/IIMMi,

‘iMi

jijjjj

i

‘{IH/IIII//,,

I

i

... -.

SECTION

\ !

Fig. 15.

headers should be frequently built in, and the whole of the work executed in cement mortar to ensure stability.

Not the least important part of the bricklayer’s art is the formation of chimney and other flues. Considerable skill is required in gather- _. . ing-

over properly above the fireplace so as to conduct

'??. eys the smoke into the smaller flue, which itself requires to be an ues. ˆuilt with precision, so that its capacity may not vary in different parts. Bends must be made in gradual curves so as to offer the least possible resistance to the up-draught, and at least one bend of not less than 6o° should be formed in each flue to intercept down-draughts. Every fireplace must have a separate flue. The collection of a number of flues into a " stack " is economical, and tends to increase the efficiency of the flues, the heat from one flue assisting the up-draught in those adjoining it. It is also desirable from an aesthetic point of view, for a number of single flue chimneys sticking up from various parts of the roof would appear most un-sightly. The architects of the Elizabethan and later periods were masters of this difficult art of treating a stack or stacks as an archi- tectural feature. The shaft should be carried well above the roof,

higher, if possible, than adjacent buildings, which are apt to cause down-draught and make the chimney smoke. When this is found impossible, one of the many forms of patent chimney-pots or revolving cowls must be adopted. Each flue must be separated by smoke-proof " withes " or divisions, usually half a brick in thickness; connexion between them causes smoky chimneys. The size of the flue for an ordinary grate is 14X9 in.; for a kitchen stove 14X14 in. The outer wall of a chimney stack may with advantage be made

9 in. thick. Fireclay tubes, rectangular or circular in transverse section, are largely used in place of the pargetting; although more expensive than the latter they have the advantage in point of cleanliness and durability. Fireplaces generally require more depth than can be provided in the thickness of the wall, and therefore necessitate a projection to contain the fireplace and flues, called the " chimney breast." Sometimes, especially when the wall is an external one, the projection may be made on the back, thus allowing a flush wall in the room and giving more space and a more con- veniently-shaped room. The projection on the outside face of the wall may be treated as an ornamental feature. The fireplace opening is covered by a brick relieving arch, which is fortified by wrought- iron bar from § to | in. thick and 2 to 3 in. wide. It is usually bent to a " camber," and the brick arch built upon it naturally takes the same curve. Each end is " caulked," that is, split longi- tudinally and turned up and down. The interior of a chimney breast behind the stove should always be filled in solid with concrete or brickwork. The flooring in the chimney opening is called the " hearth "; the back hearth covers the space between the jambs of the chimney breast, and the front hearth rests upon the brick " trimmer arch " designed to support it. The hearth is now often formed in solid concrete, supported on the brick wall and fillets fixed to the floor joists,

without any trimmer arch and finished in neat cement or glazed tiles instead of stone slabs.

Tall furnace chimneys should stand as separate constructions, unconnected with other buildings. If it is necessary to bring other work close up, a straight joint should be used. The shaft of the chimney will be built " overhand," the men working from the inside. Lime mortar is used, cement being too rigid to allow the chimney to rock in the wind. Not more than 3 ft. in height should be erected in one day, the work of necessity being done in small portions to allow the mortar to set before it is required to sustain much weight. The bond usually adopted is one course of headers to four of stretchers. Scaffolding is sometimes erected outside for a height of 25 or 30 ft., to facilitate better pointing, especially where the chimney is in a prominent position. The brickwork at the top must, according to the London Building Act, be 9 in. thick (it is better 14 in. in shafts over 100 ft. high), increasing half a brick in thickness for every additional 20 ft. measured downwards. " The shaft shall taper gradually from the base to the top at the rate of at least 2§ in. in

10 ft. of height. The width of the base of the shaft if square shall be at least one-tenth of the proposed height of the shaft, or if round or any other shape, then one-twelfth of the height. Firebricks built inside the lower portion of the shaft shall be provided, as additional to and independent of the prescribed thickness of brickwork, and shall not be bonded therewith." The firebrick lining should be carried up from about 25 ft. for ordinary temperatures to double that height for very great ones, a space of I J to 3 in. being kept between the lining and the main wall. The lining itself is usually 4§ in.thick. The cap is usually of cast iron or terra-cotta strengthened with iron bolts and straps, and sometimes of stone, but the difficulty of properly fixing this latter material causes it to be neglected in favour of one of the former. (See a paper by F. J. Bancroft on

Chimney Construction," which contains a tabulated description of nearly sixty shafts, Proc. Civ. and Mech. Eng. Soc, December

1883.)

The work of laying bricks or tiles as paving falls to the lot of the bricklayer. Paving formed of ordinary bricks laid flat or on their edges was once in general use, but is now almost abandoned in favour of floors of special tiles or cement paving, the Brkk latter being practically non-porous and therefore more P avIa Z- sanitary and cleaner. Special bricks of extremely hard texture are made for stable and similar paving, having grooves worked on the face to assist drainage and afford good foothold. A bed of concrete 6 in. thick is usually provided under paving, or when the bricks

are placed on edge the concrete for external paving may be omitted and the bricks bedded in sand, the ground being previously well rammed. The side joints of the bricks are grouted in with lime or cement. Dutch clinkers are small, hard paving bricks burned at a high temperature and of a light yellow colour; they are 6 in. long, 3 in. wide, i| in. thick. A variety of paving tile called " oven tiles " is of similar material to the ordinary red brick, and in size is 10 or 12 in. square and I to 2 in. thick. An immense variety of ornamental paving and walling tiles is now manufactured of different colours, sizes and shapes, and the use of these for lining sculleries, lavatories, bathrooms, provision shops, &c, makes for cleanliness and improved sanitary conditions. Besides, however, being put to these uses, tiles are often used in the ornamentation of buildings, externally as well as internally.

Mosaic work is composed of small pieces of marble, stone, glass or pottery, laid as paving or wall lining, usually in some ornamental pattern or design. A firm bed of concrete is required, the pieces of

material being fixed in a float of cement about half or three-quarters of an inch thick. Roman mosaic is formed with cubes of marble of various colours pressed into the float. A less costly paving may be obtained by strewing irregularly-shaped marble chips over the floated surface: these are pressed into the cement with a plasterer's hand float, and the whole is then rolled with an iron roller. This is called " terazzo mosaic." In either the Roman or terazzo method any patterns or designs that are introduced are first worked in position, the ground-work being filled in afterwards. For the use of cement for paving see Plaster.

The principal publications on brickwork are as follows: — Rivington, Notes on Building Construction, vols. i. ii. iii. ; Col. H. E. Seddon, Aide Memoir, vol. ii.; Specification; J. P. Allen, Building Construction ; F. E. Kidder, Building Construction and Superintendence, part i. (1903); Longmans & Green, Building Construction; E. Dobson, Bricks and Tiles; Henry Adams, Building Construction; C. F. Mitchell, Building Construction, vols. i. ii.; E. Street, Brick and Marble Architecture in Italy. (J. Bt.)

BRICOLE (a French word of unknown origin), a military engine for casting heavy stones; also a term in tennis for a side- stroke rebounding off the wall of the court, corrupted into " brick- wall "from a supposed reference to the wall, and in billiards for a stroke off the cushion to make a cannon or hazard.

BRIDAINE (or Brydayne), JACQUES (1701-1767), French Roman Catholic preacher, was born at Chuslan in the department of Gard on the 2 1st of March 1 701 . He was educated at Avignon, first in the Jesuit college and afterwards at the Sulpician seminary of St Charles. Soon after his ordination to the priesthood in 1725, he joined the Missions Roy ales, organized to bring back to the Catholic faith the Protestants of France. He gained their good- will and made many converts; and for over forty years he visited as a missionary preacher almost every town of central and southern- France. In Paris, in 1744, his sermons created a deep impression by their eloquence and sincerity. He died at Roquemaure, near Avignon, on the 22nd of December 1767. He was the author of Cantiques spirituels (Montpelier, 1748, frequently reprinted, in use in most French churches) ; his ser- mons were published in 5 vols, at Avignon in 1823 (ed. Paris,

1861).

See Abbe G. Carron, Le Modele des pritres (1803).

BRIDE (a common Teutonic word, e.g. Goth, bruths, 0. Eng. bryd, O. H. Ger. prut, Mod. Ger. Braut, Dut. bruid, possibly derived from the root bru-, cook, brew; from the med. latinized form bruta, in the sense of daughter-in-law, is derived the Fr. bru), the term used of a woman on her wedding-day, and applicable during the first year of wifehood. It appears in combination with many words, some of them obsolete. Thus " bridegroom " is the newly married man, and " bride-bell," " bride-banquet " are old equivalents of wedding-bells, wedding-breakfast. " Bridal " (from Bride-ale), originally the wedding-feast itself, has grown into a general descriptive adjective, e.g. the bridal party, the bridal ceremony. The bride-cake had its origin in the Roman confarreatio, a form of marriage, the essential features of which were the eating by the couple of a cake made of salt, water and flour, and the holding by the bride of three wheat- ears, symbolical of plenty. Under Tiberius the cake-eating fell into disuse, but the wheat ears survived. In the middle ages they were either worn or carried by the bride. Eventually it became the custom for the young girls to assemble outside the church porch and throw grains of wheat over the bride, and afterwards a scramble for the grains took place. In time the wheat-grains came to be cooked into thin dry biscuits, which were broken over the bride's head, as is the custom in Scotland to-day, an oatmeal cake being used. In Elizabeth's reign these biscuits began to take the form of small rectangular cakes made of eggs, milk, sugar, currants and spices. Every wedding guest had one at least, and the whole collection were thrown at the bride the instant she crossed the threshold. Those which lighted on her head or shoulders were most prized by the scramblers. At last these cakes became amalgamated into a large one which took on its full glories of almond paste and ornaments during Charles II. 's time. But even to-day in rural parishes, e.g. north Notts,

wheat is thrown over the bridal couple with the cry " Bread for life and pudding for ever," expressive of a wish that the newly wed may be always affluent. The throwing of rice, a very ancient

custom but one later than the wheat, is symbolical of the wish that the bridal may be fruitful. The bride-cup was the bowl or loving-cup in which the bridegroom pledged the bride, and she him. The custom of breaking this wine-cup, after the bridal couple had drained its contents, is common to both the Jews and the members of the Greek Church. The former dash it against the wall or on the ground, the latter tread it under foot. The phrase " bride-cup " was also sometimes used of the bowl of spiced wine prepared at night for the bridal couple. Bride- favours, anciently called bride-lace, were at first pieces of gold, silk or other lace, used to bind up the sprigs of rosemary formerly worn at weddings. These took later the form of bunches of ribbons, which were at last metamorphosed into rosettes. Bridegroom-men and bridesmaids had formerly important duties. The men were called bride-knights, and represented a survival of the primitive days of marriage by capture, when a man called his friends in to assist to " lift " the bride. Brides- maids were usual in Saxon England. The senior of them had personally to attend the bride for some days before the wedding. The making of the bridal wreath, the decoration of the tables for the wedding feast, the dressing of the bride, were among her special tasks. In the same way the senior groomsman (the best man) was the personal attendant of the husband. The bride-wain, the wagon in which the bride was driven to her new home, gave its name to the weddings of any poor deserving couple, who drove a " wain " round the village, collecting small surris of money or articles of furniture towards their housekeeping. These were called bidding-weddings, or bid-ales, which were in the nature of " benefit " feasts. So general is still the custom of " bidding- weddings " in Wales, that printers usually keep the form of invitation in type. Sometimes as many as six hundred couples will walk in the bridal procession. The bride's wreath is a Christian substitute for the gilt coronet all Jewish brides wore. The crowning of the bride is still observed by the Russians, and the Calvinists of Holland and Switzerland. The wearing of orange blossoms is said to have started with the Saracens, who regarded them as emblems of fecundity. It was introduced into Europe by the Crusaders. The bride's veil is the modern form of the flammeum or large yellow veil which completely enveloped the Greek and Roman brides during the ceremony. Such a coverin; is still in use among the Jews and the Persians.

See Brand, Antiquities of Great Britain (Hazlitt's ed., 1905); Rev J. Edward Vaux, Church Folklore (1894).

BRIDEWELL, a district of London between Fleet Street and the Thames, so called from the well of St Bride or St Bridget close by. From William the

Conqueror's time, a castle or Norman tower, long the occasional residence of the kings of England, stood there by the Fleet ditch. Henry VIII., Stow says, built there " a stately and beautiful house," specially for the housing of the emperor Charles V. and his suite in 1525. During the hearing of the divorce suit by the Cardinals at Blackfriars, Henry and Catharine of Aragon lived there. In 1553 Edward VI. made it over to the city as a penitentiary, a house of correction for vagabonds and loose women; and it was formally taken possession of by the lord mayor and corpora- tion in 1555. The greater part of the building was destroyed in the Great Fire of 1666. New Bridewell, built in 1829, was pulled down in 1864. The term has become a synonym for any reformatory.

BRIDGE, a game of cards, developed out of the game of whist. The country of its origin is unknown. A similar game is said to have been played in Denmark in the middle of the 19th century. A game in all respects the same as bridge, except that in " no trumps " each trick counted ten instead of twelve, was played in England about 1884 under the name of Dutch whist. Some connect it with Turkey and Egypt under the name of " Khedive," or with a Russian game called " Yeralash." It was in Turkey that it first won a share of popular favour. Under the synonyms of " Biritch," " Bridge," or " Russian whist," it found its way to the London clubs about 1894, from which date its popularity rapidly increased.

Ordinary Bridge. — Bridge, in its ordinary form, differs from

whist in the following respects: — Although there are four players, yet in each hand the partner of the dealer takes no part in the play of that particular hand. After the first lead his cards are placed on the table exposed, and are played by the dealer as at dummy whist; nevertheless the dealer's partner is interested in the result of the hand equally with the dealer. The trump suit is not determined by the last card dealt, but is selected by the dealer or his partner without consultation, the former having the first option. It is further open to them to play without a trump suit. The value of tricks and honours varies with the suit declared as trumps. Honours are reckoned differently from whist, and on a scale which is somewhat involved. The score for honours does not count towards winning or losing the rubber, but is added afterwards to the trick score in order to determine the value of the rubber. There are also scores for holding no trumps (" chicane "), and for winning all the tricks or all but one (" slam ")■

The score has to be kept on paper. It is usual for the scoring block to have two vertical columns divided halfway by a hori- zontal line. The left column is for the scorers' side, and the right for the opponents'. Honours are scored above the horizontal line, and tricks below. The drawback to this arrangement is that, since the scores for each hand are not kept separately, it is generally impossible to trace an error in the score without going through the whole series of hands. A better plan, it seems, is to have four columns ruled, the inner two being assigned to tricks, the outer ones to honours. By this method a line can be reserved for each hand, and any discrepancy in the scores at once rectified.

The Portland Club, London, drew up a code of laws in 189s, and this code, with a few amendments, was in July 1895 adopted by a joint committee of the Turf and Portland Clubs. A revised code came into force in January 1905, the provisions of which are here summarized.

Each trick above 6 counts 2 points in a spade declaration, 4 in a club, 6 in a diamond, 8 in a heart, 12 in a no-trump declara- tion. The game consists of 30 points made by tricks alone. When one side has won two games the rubber is ended. The winners are entitled to add 100 points to their score. Honours consist of ace, king, queen, knave, ten, in a suit declaration. If a player and his partner conjointly hold 3 (or " simple ") honours they score twice the value of a trick; if 4 honours, 4 times; if 5 honours, 5 times. If a player in his own hand hold 4 honours he is entitled to score 4 honours in addition to the score for conjoint honours; thus, if one player hold 4 honours and his partner the other their total score is 9 by honours. Similarly if a player hold 5 honours in his own hand he is entitled to score 10 by honours. If in a no-trump hand the partners conjointly hold 3 aces, they score 30 for honours; if 4 aces, 40 for honours. 4 aces in 1 hand count 100. On the same footing as the score for honours are the following: chicane, if a player hold no trump, in amount equal to simple honours; grand slam, if one side win all the tricks, 40 points; little slam, if they win 12 tricks, 20 points. At the end of the rubber the total scores, whether made by tricks, honours, chicane, slam, or rubber points, are added together, and the difference between the two totals is the number of points won.

At the opening of play, partners are arranged and the cards are shuffled, cut and dealt (the last card not being turned) as at whist; but the dealer cannot lose the deal by misdealing. After the deal is completed, the dealer makes the trump or no- trump (sans atout) declaration, or passes the choice to his partner without remark. If the dealer's partner make the declaration out of his turn, the adversary on the dealer's left may, without consultation, claim a fresh deal. If an adversary make a declara- tion, the dealer may claim a fresh deal or disregard the declara- tion. Then after the

declaration, either adversary may double, the leader having first option. The effect of doubling is that each trick is worth twice as many points as before; but the scores for honours, chicane and slam are unaltered. If a declara- tion is doubled, the dealer and his partner have the right of redoubling, thus making each trick worth four times as much as at first. The declarer has the first option. The other side

can again redouble, and so on; but the value of a trick is limited to 100 points. In the play of the hand the laws are nearly the same as the laws of whist, except that the dealer may expose his cards and lead out of turn without penalty; after the second hand has played, however, he can only correct this lead out of turn with the permission of the adversaries. Dummy cannot revoke. The dealer's partner may take no part in the play of the hand beyond guarding the dealer against revoking.

Advice to Players.— In the choice of a suit two objects are to be aimed at: first, to select the suit in which the combined forces have the best chance of making tricks; secondly, to select the trump so that the value of the suit agrees with the character of the hand, i.e. a suit of high value when the hands are strong and of low value when very weak. As the deal is a great advantage it generally happens that a high value is to be aimed at, but occasionally a low value is desirable. The task of selection should fall to the hand which has the most distinctive features, that is, either the longest suit or unusual strength or weakness. No consultation being allowed, the dealer must assume only an average amount of variation from the normal in his partner's hand. If his own hand has distinctive features beyond the average, he should name the trump suit himself, otherwise pass it to his partner. It may here be stated what is the average in these respects.

As regards the length of a suit, a player's long suit is rather more likely to be fewer than five than over five. If the dealer has in his hand a suit of five cards including two honours, it is probable that he has a better suit to make trumps than dummy; if the suit is in hearts, and the dealer has a fair hand, he ought to name the trump. As regards strength, the average hand would contain ace, king, queen, knave and ten, or equivalent strength. Hands stronger or weaker than this by the value of a king or less may be described as feature- less. If the dealer's hand is a king over the average, it is more likely than not that his partner will either hold a stronger hand, or will hold such a weak hand as will counteract the player's strength. The dealer would not generally with such a hand declare no trump, especially as by making a no-trump declaration the dealer forfeits the advantage of holding the long trumps.

Declarations by Dealerˆ — In calculating the strength of a hand a knave is worth two tens, a queen is worth two knaves, a king is worth a queen and

knave together, and an ace is worth a king and queen together. A king unguarded is worth less than a queen quarded; a queen is not fully guarded unless accompanied by three more cards; if guarded by one small card it is worth a knave guarded. An ace also loses in value by being sole.

A hand to be strong enough for a no-trump declaration should be a king and ten above the average with all the honours guarded arid all the suits protected. It must be a king and knave or two queens above the average if there is protection in three suits. It must be an ace or a king and queen above the average if only two suits are protected. An established black suit of six or more cards with a guarded king as card of entry is good enough for no trumps. With three aces no trumps can be declared. Without an ace, four kings, two queens and a knave are required in order to justify the declara- tion. When the dealer has a choice of declarations, a sound heart make is to be preferred to a doubtful no-trump. Four honours in hearts are to be preferred to any but a very strong no-trump declara- tion; but four aces counting 100 points constitute a no-trump declaration without exception.

Six hearts should be made trumps and five with two honours unless the hand is very weak; five hearts with one honour or four hearts with three honours should be declared if the hand is nearly strong enough for no trumps, also if the hand is very irregular with one suit missing or five of a black suit. Six diamonds with one honour, five with three honours or four all honours should be declared; weaker diamonds should be declared if the suits are irregular, especially if blank in hearts. Six clubs with three honours or five with four honours should be declared. Spades are practically only declared with a weak hand ; with only a king in the hand a suit of five spades should be declared as a defensive measure. With nothing above a ten a suit of two or three spades can be declared, though even with the weakest hands a suit 01 five clubs or of six red cards will probably prove less expensive.

Declarations by Dummy. — From the fact that the call has been passed, the dealer's partner must credit the dealer with less thaai average strength as regards the rank of his cards, and probably a slightly increased number of black cards ; he must therefore be more backward in making a high declaration whenever he can make a sound declaration of less value. On the other hand, he has not the option of passing the declaration, and may be driven to declare on less strength because the only alternative is a short suit of spades. For example, with the hand: Hearts, ace, kv. 2; diamonds, qn. 9, 7, 6, 3 ; clubs, kg. 10, 4; spades, 9, 2, the chances are in the dealer's favour with five trumps, but decidedly against with only two, and the diamond declaration is to be preferred to the spade. Still, a hand may be so weak that spades should be declared with two or less, but five clubs

or six diamonds would be preferable with the weakest of hands.

Declarations t» the Score. — When one's score is over twenty, club declarations should be made more frequently by the dealer. Spades should be declared with six at the score of twenty-six and with five at twenty-eight. When much behind in the score a risky no-trumper such as one with an established suit of seven or eight cards without a card of entry, may be declared.

Declaring to the score is often overdone; an ordinary weak no- trump declaration carries with it small chances of three by tricks unless dummy holds a no-trump hand.

Doubling.— Practically the leader only doubles a no-trump de- claration when he holds what is probably an established suit of seven cards or a suit which can be established with the loss of one trick and he has good cards of re-entry. Seven cards of a suit including the ace, king and queen make a sound double without any other card of value in the hand, or six cards including king, queen and knave with two aces in other suits.

Doubling by the third hand is universally understood to mean that the player has a very strong suit which he can establish. In response to the double his partner, according to different conventions, leads either a heart or his own shortest suit as the one most likely to be the third player's strongest. Under the short suit convention, if the daubler holds six of a suit headed by the ace, king and queen, it is about an even chance that his suit will be selected; he should not double with less strength. Under the heart convention it is not necessary to have such great strength; with a strong suit of six hearts and good cards of reentry, enough tricks will be saved to compensate for the doubled value. A player should ascertain the convention followed before beginning to play.

Before doubling a suit declaration a player should feel almost certain that he is as strong as the declarer. The minimum strength to justify the declaration is generally five trumps, but it may have been made on six. If, then, a player holds six trumps with an average hand as regards the rank of his cards, or five trumps with a hand of no-trump strength, it is highly probable that he is as strong as the declarer. It must be further taken into account that the act of doubling gives much valuable information to the dealer, who would otherwise play with the expectation of finding the trumps evenly distributed ; this is counterbalanced when the doubler is on

the left of the declaring hand by the intimation given to his partner to lead trumps through the strong hand. In this position, then, the player should double with the strength stated above. When on the declarer's right, the player should hold much greater strength unless his hand is free from tenaces. When a spade declaration has been made by dummy, one trump less is necessary and the doubler need not be on the declarer's left. A spade declaration by the dealer can be doubled with even less strength. A declaration can be rather more freely doubled when a single trick undoubled will take the dealer out, but even in this position the player must be cautious of informing the dealer that there is a strong hand against him.

Redoubling. — When a declaration has been doubled, the declarer knows the minimum that he will find against him ; he must be pre- pared to find occasionally strength against him considerably exceed- ing this minimum. Except in the case of a spade declaration, cases in which redoubling is justifiable are very rare.

The Play of the Hand. — In a no-trump declaration the main object is to bring in a long suit. In selecting the suit to establish, the following are favourable conditions: — One hand should hold at least five cards of the suit. The two hands, unless with a sequence of high cards, should hold between them eight cards of the suit, so as to render it probable that the suit will be established in three rounds. The hand which contains the strong suit should be sufficiently strong in cards of re-entry. The suit should not be so full of possible tenaces as to make it disadvantageous to open it. As regards the play of the cards in a suit, it is not the object to make tricks early, but to make all possible tricks. Deep finesses should be made when there is no other way of stealing a trick. Tricks may be given away, if by so doing a favourable opening can be made for a finesse. When, how- ever, it is doubtful with which hand the finesse should be made, it is better to leave it as late as possible, since the card to be finessed against may fall, or an adversary may fail, thus disclosing the suit. It is in general unsound to finesse against a card that must be un- guarded. From a hand short in cards of re-entry, winning cards should not be led out so as to exhaust the suit from the partner's hand. E\en a trick should sometimes be given away. For instance, if one hand holds seven cards headed by ace, king, and the other hand holds only two of the suit, although there is a fair chance of making seven tricks in the suit, it would often be right to give the first trick to the adversaries. When one of the adversaries has shown a long suit, it is frequently possible to prevent, its being brought in by a device, such as holding up a winning card, until the suit is exhausted from his partner's hand, or playing in other suits so as to give the player the lead whilst his partner has a card of his suit to return, and to give the latter the lead when he has no card to return. The dealer should give as little information as possible as to what lie holds in his own hand, playing frequent false cards.

Usually he should play the higher or highest of a sequence; still, there are positions in which playing the higher gives more information than the lower; a strict adherence to a rule in itself assists the adversaries.

With a suit declaration, if there is no chance of letting the weak hand make a trump by ruffing, it will generally be the dealer's aim

to discard the losing cards in the declaring hand either to high cards or to the cards of an established suit in the other hand, sometimes after the adverse trumps have been taken out, but often before there being no time for drawing trumps. With no card of any value in a suit in one hand, the lead should come from that hand, but it is better, if possible, to let the adversaries open.the suit. It is generally- useless to lead a moderately high card from the weaker hand in order to finesse it, when holding no cards In sequence with it in either hand. Sometimes (especially in no-trumps) it is the better play to make the weak hand third player. For instance, with king, 8, 7, 5, 2 in one hand, knave, 4 in the other, the best way of opening is from the hand that holds five cards.

In a no-trump declaration the opponents of the dealer should endeavour to find the longest suit in the two hands, or the one most easily established. With this object the leader should open his best suit. If his partner next obtains the lead he ought to return the suit, unless he himself has a suit which he considers better, having due regard to the fact that the first suit is already partially estab- lished. The opponents should employ the same tactics as the dealer to prevent the latter from bringing in a long suit; they can use them with special effect when the long suit is in the exposed hand.

Against no-trumps the leader should not play his winning cards unless he has a good chance of clearing the suit without help from his partner; in most cases it is advisable to give away the first trick, especially if he has no card of re-entry, in order that his partner on gaining the lead may have a card of the suit to return ; but holding ace, king and queen, or ace, king with seven in the suit, or ace, king, knave, ten with six, the player may lead out his best. With three honours any two of which are in sequence (not to the ace) the player should lead the higher of the sequence. He should lead his highest card from queen, knave, ten ; from queen, knave, nine ; from knave, ten, nine; knave, ten, eight, and ten, nine, eight. In other cases the player should lead a small card; according to the usual convention, the fourth best. His partner, and also the dealer, can credit him with three cards higher than the card led, and can often place the cards of the suit: for instance, the seven is led, dummy holds queen and eight, playing the queen, the third player holds the nine and smaller cards; the unseen cards higher than the seven are ace, king, knave and ten of which the leader must hold three ; he cannot hold both knave and ten or he would have led the

knave ; he must therefore hold the ace, king and either knave or ten. The " eleven " rule is as follows: the number of pips in the card led subtracted from eleven (11-7=4 > n the case stated) gives the number of cards higher than the one led not in the leader's hand; the three cards seen (queen, nine and eight) leave one for the dealer to hold. The mental process is no shorter than assigning three out of the unseen cards to the leader, and by not noting the unseen cards much valuable information may be missed, as in the illustrative case given.

With a suit declared the best opening lead is a singleton, failing which a lead from a strong sequence. A lead from a tenace or a guarded king or queen is to be avoided. Two small cards may be led from, though the lead is objected to by some. A suit of ihree small cards of no great strength should not be opened. In cases of doubt preference should be given to hearts and to a less extent to diamonds.

To lead up to dummy's weak suits is a valuable rule. The con- verse, to lead through strength, must be used with caution, and does not apply to no-trump declarations. It is not advisable to adopt any of the recent whist methods of giving information. It is clear that, if the adversaries signal, the dealer's hand alone is a secret, and he, in addition to his natural advantage, has the further advantage of better information than either of the adversaries. The following signals are, however, used, and are of great trick- making value : playing an unnecessarily high card, whether to one's partner's suit or in discarding in a no-trump declaration, indicates strength in the suit; in a suit declaration a similar method of play indicates two only of the suit and a desire to ruff, — it is best used in the case of a king led by one's partner.

The highest of a sequence led through dummy will frequently tell the third player that he has a good finesse. The lowest of a sequenceled through the dealer will sometimes explain the position to the third player, at the same time keeping the dealer in the dark.

When on dummy's left it is futile to finesse against a card not in dummy's hand. But with ace and knave, if dummy has either king or queen, the knave should usually be played, partly because the other high card may be in the leader's hand, partly because, if the finesse fails, the player may still hold a tenace over dummy. When a player is with any chance of success trying to establish his long suit, he should keep every card of it if possible, whether it is a suit already opened or a suit which he wishes his partner to lead ; when, however, the main object of the hand is to establish one's partner's suit, it is not necessary for a player to keep his own long suit, and he should pay attention to guarding the other suits. In some circles a discard from a suit is always understood to indicate strength in the suit ;

this convention, while it makes the game easier for inferior players, frequently causes the player to throw away one of his most valuable cards.

Playing to the Score. — At the beginning of the hand the chances are so great against any particular result, that at the score of love-al! the advantage of getting to any particular score has no appreciable

effect in determining the choice of suit. In the play of the hand, the advantage of getting to certain points should be borne in mind. The principal points to be aimed at are 6, 18, and, in a less degree, 22. The reason is that the scores 24, 12 and 8, which will just take the dealer out from the respective points, can each be made in a variety of ways, and are the most common for the dealer to make. The 2 points that take the score from 4 to 6 are worth 4, or perhaps 5, average points; and the 2 points that take the score from 6 to 8 are worth I point. When approaching game it is an advantage to make a declaration that may just take the player out, and, in a smaller degree, one that will not exactly take the adversaries out. When the score is 24 to 22 against the dealer, hearts and clubs are half a trick better relatively to diamonds than at the score of love-all. In the first and second games of the rubber the value of each point scored for honours is probably about a half of a point scored for tricks — in a close game rather less, in a one-sided game rather more. In the deciding game of the rubber, on account of the importance of winning the game, the value of each point scored for honours sinks to one-third of a point scored for tricks.

Other Forms of Bridge. — The following varieties of the game are also played : —

Three-handed Bridge.— The three players cut ; the one that cuts the lowest card deals, and takes dummy for one deal: each takes dummy in turn. Dummy's cards are dealt face downwards, and the dealer declares without seeing them. If the dealer declares trumps, both adversaries may look at their hands ; doubling and redoubling proceeds as at ordinary bridge, but dummy's hand is not exposed till the first card has been led. If the dealer passes the declaration to dummy, his right-hand adversary, who must not have looked at his own hand, examines dummy's, and declares trumps, not, however, exposing the hand. The declaration is forced: with three or four aces sans atout (no trumps) must be declared: in other cases the longest suit: if suits are equal in length, the strongest, i.e. the suit containing most pips, ace counting eleven, king, queen and knave counting ten each. If suits are equal in both length and strength, the one in which the trick has the higher value must be trumps. On the dummy's declaration the third

player can only double before seeing his own cards. When the first card has been led, dummy's hand is exposed, never before the lead. The game is 30 : the player wins the rubber who is the first to win two games. Fifty points are scored for each game won, and fifty more for the rubber. Sometimes three games are played without reference to a rubber, fifty points being scored for a game won. No tricks score towards game except those which a player wins in his own deal ; the value of tricks won in other deals is scored above the line with honours, slam and chicane. At the end of the rubber the totals are added up, and the points won or lost are adjusted thus. Suppose A is credited with 212, B with 290, and C with 312, then A owes 78 to B and 100 to C ; B owes 22 to C.

Dummy Bridge. — The player who cuts the "lowest card takes dummy. Dummy deals the first hand of all. The player who takes dummy always looks at his own hand first, when he deals for himself or for dummy ; he can either declare trumps or " leave it " to dummy. Dummy's declaration is compulsory, as in three-handed bridge. When the dealer deals for dummy, the player on the dealer's left must not look at his cards till either the dealer has declared trumps or, the declaration having been left to dummy, his own partner has led a card. The latter can double, but his partner can only double without seeing his hand. The dealer can only redouble on his own hand. When the player of dummy deals for himself, the player on his right hand looks at dummy's hand if the declaration is passed, the positions and restrictions of his partner and himself being reversed. If the player of dummy declares from his own hand, the game proceeds as in ordinary bridge, except that dummy's hand is not looked at till permission to play has been given. When the player on dummy's right deals, dummy's partner may look at dummy's hand to decide if he will double, but he may not look at his own till a card has been led by dummy. In another form of dummy bridge two hands are exposed whenever dummy's adversaries deal, but the game is unsuited for many players, as in every other hand the game is one of double-dummy.

Misery Bridge. — This is a form of bridge adapted for two players. The non-dealer has the dummy, whilst the dealer is allowed to strengthen his hand by discarding four or fewer cards and taking an equal number from the fourth packet dealt; the rest of the cards in that packet are unused and remain unseen. A novel and interest- ing addition to the game is that the three of clubs (called " Cato ") does not rank as a club but can be played to any trick and win it. The dealer, in addition to his other calls, may declare " misery " when he has to make less than two tricks.

Draw- or Two-handed Bridge.— This is the best form of bridge for two players. Each player has a dummy, which is placed opposite to him; but the cards are so arranged that they cannot be seen by his opponent, a special

stand being required for the purpose. The dealer makes the declaration or passes it to his dummy to make by the same rules as in three-handed or dummy bridge. The objec- tion to this is that, since the opponent does not see the dealer's dummy, he has no chance of checking an erroneous declaration. This could be avoided by not allowing the dealer the option of passing.

Auction Bridge. — This variety of the game for four players, which adds an element characteristic of poker, appears to have been suggested about 1904, but was really introduced at the Bath Club, London, in 1907, and then was gradually taken up by a wider circle. The laws were settled in August 1908 by a joint committee of the Bath and Portland clubs. The scoring (except as below), value of suits, and play are as at ordinary bridge, but the variety consists in the method of declaration, the declaration not being confined in auction bridge to the dealer or his partner, and the deal being a disadvantage rather than otherwise. The dealer, having examined his hand, must declare to win at least one " odd " trick, and then each player in turn, beginning with the one on the dealer's left, has the right to pass the previous declaration, or double, or redouble, or overcall by making a declaration of higher value,, any number of times till all are satisfied, the actual play of the combined hands (or what in ordinary bridge would be dealer and dummy) resting eventu- ally with the partners making the final declaration; the partner who made the first call (however small) in the suit finally con- stituting the trump (or no-trump) plays the hands, the other being dummy. A declaration of a greater number of tricks in a suit of lower value, which equals a previous call in value of points (e.g. two in spades as against one in clubs) is " of higher value "; but doubling and redoubling only affect the score and not the declaration, so that a call of two diamonds overcalls one no-trump even though this has been doubled. The scoring in auction bridge has the additional element that when the eventual player of the two hands wins what was ultimately declared or more, his side score the full value below the line (as tricks), but if he fails the opponents score 50 points above the line (as honours) for each under- trick (i.e. trick short of the declaration), or 100 or 200 if doubled or redoubled, nothing being scored by either side below the line; the loss on a declaration of one spade is limited, however, to a maximum of 100 points. A player whose declaration has been doubled and who fulfils his contract, scores a bonus of 50 points above the line and a further 50 points for each additional trick beyond his declaration; if there was a redouble and he wins, he scores double the bonus. The penalty for a revoke (unaffected by a double) is (1) in the case of the declarer, that his adversaries add 150 above the line; (2) in the case of one of his adversaries, that the declarer may either add 150 points above the line or may take three tricks from his opponents and add them to his own; in the

latter case such tricks may assist him to fulfil his contract, but shall not entitle him to any bonus for a double or redouble. A revoking side may score nothing either above or below the line except for honours or chicane. As regards the essential feature of auction bridge, the competitive declaration, it is impossible here to discuss the intricacies involved. It entails, clearly, much reliance on a good partner, since the various rounds of bidding enable good players to draw inferences as .to where the cards lie. The game opens the door to much larger scores than ordinary bridge, and since the end only comes from scores made below the line, there are obvious ways of prolonging it at the cost of scores above the line which involve much more of the gambling element. It by no means follows that the winner of the rubber is the winner by points, and many players prefer to go for points (i.e. above the line) extorted from their opponents rather than for fulfilling a declaration made by themselves.

Authorities. — " Hellespont," Laws and Principles of Bridge; W. Dalton, Saturday Bridge, containing full bibliography (London, 1906); J. B. Elwell, Advanced Bridge: R. F. Foster, Bridge Tactics; " Badsworth," Laws and Principles of Bridge ; E. Bergholt, Double- Dummy Bridge; Biritch, or Russian Whist, pamphlet in Brit. Mus. ; W. Dalton, Auction Bridge (1908). (W. H. W.)*

BRIDGEBUILDING BROTHERHOOD, a confraternity (Fratres Pontifices) that arose in the south of France during the latter part of the 12th century, and maintained hospices at the chief fords of the principal rivers, besides building bridges and looking after ferries. The brotherhood was recognized by Pope Clement III. in 1 1 89.

BRIDGE-HEAD (Fr. tUe-du-pont) , in fortification, a work de- signed to cover the passage of a river by means of fortifications

on one or both banks. As the process of moving an army over bridges is slow and complicated, it is usually necessary to secure it from hostile interruption, and the works constituting the bridge-head must therefore be sufficiently far advanced to keep the enemy's artillery out of range of the bridges. In addition, room is required for the troops to form up on the farther bank. In former days, with short-range weapons, a bridge-head was often little more than a screen for the bridge itself, but modern conditions have rendered necessary far greater extension of bridge defences.

6BID6END, a market town in the southern parliamentary division of

Glamorganshire, Wales, on both sides of the river Ogwr (whence its Welsh name Penybont-ar-Ogwr) . Pop. of urban district (iooi) 6062. It has a station 165 m. from London on the South Wales trunk line of the Great Western railway, and is the junction of the Barry Company's railway to Barry via Llantwit Major. Bridgend has a good market for agricultural produce, and is an important centre owing to its being the natural outlet for the mining valleys of the Llynvi, Garw and the two Ogwr rivers, which converge about 3 m. north of the town and are connected with it by branch lines of the Great Western railway. Though without large manufacturing indus- tries, the town has joinery works, a brass and iron foundry, a tannery and brewery. There are brick- works and stone quarries, and much lime is burnt in the neighbourhood. Just outside the town at Angelton and Pare Gwyllt are the Glamorgan county lunatic asylums.

There was no civil parish of Bridgend previous to 1905, when one was formed out of portions of the parishes of Newcastle and Coity. Of the castle of Newcastle, built on the edge of a cliff above the church of that parish, there remain a courtyard with flanking towers and a fine Norman gateway. At Coity, about 2 m. distant, there are more extensive ruins of its castle, originally the seat of the Turbervilles, lords of Coity, but now belonging to the earls of Dunraven. Coity church, dating from the 14th century, is a fine cruciform building with central embattled tower in Early Decorated style.

BRIDGE OF ALLAN, a police burgh of Stirlingshire, Scotland. Pop. (1001) 3240. It lies on the Allan, a left-hand tributary of the Forth, 3 m. N. of Stirling by the Caledonian railway and by tramway. Built largely on the well-wooded slopes of Westerton and Airthrey Hill, sheltered by the Ochils from the north and east winds, and environed by charming scenery, it has a great reputation as a health resort and watering-place, especially in winter and spring. There is a pump-room. The chief buildings are the hydropathic and the Macfarlane museum of fine art and natural history. The industries include bleaching, dyeing and paper-making. The Strathallan Gathering, usually held in the neighbourhood, is the most popular athletic meeting in mid- Scotland. Airthrey Castle, standing in a fine park with a lake, adjoins the town on the south-east, and just beyond it are the old church and burying-ground of Logie, beautifully situated at the foot of a granite spur of the Ochil range.

BRIDGEPORT, a city, a port of entry, and one of the county- seats of Fairfield county, Connecticut, U.S.A., co-extensive with the town of Bridgeport, in the S.W. part of the state, on Long Island Sound, at the mouth of the Pequonnock river; about 18 m. S.W. of New Haven. Pop. (1880) 27ˆ643; (1890) 48,866; (1900) 70,996, of whom 22,281 were foreign-born, including 5974 from Ireland, 3172 from Hungary, 2854 from Germany, 2755 from England, and 1436 from Italy; (1910)

102,054. Bridgeport is served by the New York, New Haven & Hartford railway, by lines of coast steamers, and by steamers to New York City and to Port Jefferson, directly across Long Island Sound. The harbour, formed by the estuary of the river and Yellow Mill Pond, an inlet, is excellent. Between the estuary and the pond is a peninsula, East Bridgeport, in which are some of the largest manufacturing establishments, and west of the harbour and the river is the main portion of the city, the wholesale section extending along the bank, the retail section farther back, and numerous factories along the line of the railway far to the westward. There are two large parks,

Beardsley, in the extreme north part of the city, and Seaside, west of the harbour entrance and along the Sound; in the latter are statues of Elias Howe, who built a large sewing-machine factory here in 1863, and of P. T. Barnum, the showman, who lived in Bridgeport after 1846 and did much for the city, especially for East Bridgeport. In Seaside Park there is also a soldiers' and sailors' monument, and in the vicinity are many fine residences. The principal buildings are the St Vincent's and Bridgeport hospitals, the Protestant orphan asylum, the Barnum Institute, occupied by the Bridgeport Scientific and Historical Society and the Bridgeport Medical Society; and the United States govern- ment building, which contains the post-office and the customs house.

In 1905 Bridgeport was the principal manufacturing centre in Connecticut, the capital invested in manufacturing being $49,381,348, and the products being, valued at $44,586,519. The largest industries were the manufacture of corsets — the product of Bridgeport was 19-9% of the total for the United States in 1905, Bridgeport being the leading city in this industry — sewing machines (one of the factories of the Singer Manufacturing Co. is here), steam-fitting and heating apparatus, cartridges (the factory of the Union Metallic Cartridge Co. is here), automobiles, brass goods, phonographs and gramophones, and typewriters. There are also large foundry and machine shops. Here, too, are the winter headquarters of " Barnum and Bailey's circus " and of " Buffalo Bill's Wild West Show." Bridgeport is a port of entry; its imports in 1908 were valued at $656,271. Bridge- port was originally a part of the township of Stratford. The first settlement here was made in 1659. It was called Pequonnock until 1695, when its name was changed to Stratfield. During the War of Independence it was a centre of privateering. In 1800 the borough of Bridgeport was chartered, and in 1821 the township was incorporated. The city was not chartered until

1836.

See S. Orcutt's History of the Township of Stratford and the City of

Bridgeport (New Haven, 1886).

BRIDGES, ROBERT (1844-), English poet, born on the 23rd of October 1844, was educated at Eton and at Corpus Christi College, Oxford, and studied medicine in London at St Bartholo- mew's hospital. He was afterwards assistant physician at the Children's hospital, Great Ormond Street, and physician at the Great Northern hospital, retiring in 1882. Two years later he married Mary, daughter of Alfred Waterhouse, R.A. As a poet Robert Bridges stands rather apart from the current of modern English verse, but his work has had great influence in a select circle, by its restraint, purity, precision, and delicacy yet strength of expression; and it embodies a distinct theory of prosody. His chief critical works are Milton's Prosody (1893), a volume made up of two earlier essays (1887 and 1889), and John Keats, a Critical Essay (1895). He maintained that English prosody depended on the number of " stresses " in a line, not on the number of syllables, and that poetry should follow the rules of natural speech. His, poetry was privately printed in the first instance, and was slow in makilig its way beyond a comparatively small circle of his admirers. His best work is to be found in his Shorter Poems (1890), and a complete edition of his Poetical Works (6 vols.) was published in 1898- 1905. His chief volumes are Prometheus (Oxford, 1883, privately printed), a " mask in the Greek Manner"; Eros and Psyche (1885), a version of Apuleius; The Growth of Love, a series of sixty-nine sonnets printed for private circulation in 1876 and 1889; Shorter Poems (1890); Nero (1885), a historical tragedy, the second part of which appeared in 1894; Achilles in Scyros (1890), a drama; Palicio (1890), a romantic drama in the Elizabethan manner; The Return of Ulysses (1890), a drama inˆfive acts; The Christian Captives (1890), a tragedy on the same subject as Calderon's El Principe Constanie; The Humours of the Court (1893), a comedy founded on the same dramatist's El secreto a voces and on Lope de Vega's El Perro del hortelano; The Feast of Bacchus (1889), partly translated from the Heauton- Timoroumenos of Terence; Hymns from the Yattendon Hymnal (Oxford, 1899); and Demeler, a Mask (Oxford, 1905).

BRIDGES, i. Definitions and General Considerations. — Bridges (old forms, brig, brygge, brudge; Dutch, brug; German, Briicke; a common Teutonic word) are structures carrying roadways, waterways or railways across streams, valleys or other roads or railways, leaving a passage way below. Long bridges of several spans are often termed " viaducts," and bridges carrying canals are termed " aqueducts," though this term is sometimes used for waterways which have no bridge structure. A " culvert

" is a bridge of small span giving passage to drainage. In railway work an " overbridge " is a bridge over the railway, and an " underbridge " is a bridge carrying the railway. In all countries there are legal regulations fixing the minimum span and height of such bridges and the width of road-way to be provided. Ordinarily bridges are fixed bridges, but there are also movable bridges with machinery for opening a clear and unobstructed passage way for navigation. Most commonly these are " swing " or " turning " bridges. " Float- ing " bridges are roadways carried on pontoons moored in a stream.

In classical and medieval times bridges were constructed of timber or masonry, and later of brick or concrete. Then late in the 18th century wrought iron began to be used, at first in combination with timber or cast iron. Cast iron was about the same time used for arches, and some of the early railway bridges were built with cast iron girders. Cast iron is now only used for arched bridges of moderate span. Wrought iron was used on a large scale in the suspension road bridges of the early part of the 19th century. The great girder bridges over the Menai Strait and at Saltash near Plymouth, erected in the middle of the 1 9th century, were entirely of wrought iron, and subsequently wrought iron girder bridges were extensively used on railways. Since the introduction of mild steel of greater tenacity and tough- ness than wrought iron (i.e. from 1880 onwards) it has wholly superseded the latter except for girders of less than 100 ft. span. The latest change in the material of bridges has been the introduc- tion of f erro-concrete, armoured concrete, or concrete strengthened with steel bars for arched bridges. The present article relates chiefly to metallic bridges. It is only since metal has been used that the great spans of 500 to 1800 ft. now accomplished have been made possible.

2. In a bridge there may be distinguished the superstructure and the substructure. In the former the main supporting member or members may be an arch ring or arched ribs, suspension chains or ropes, or a pair of girders, beams or trusses. The bridge flooring rests on the supporting members, and is of very various types according to the purpose of the bridge. There is also in large bridges wind-bracing to stiffen the structure against horizontal forces. The substructure consists of © the piers and end piers or abutments, the former sustaining a vertical load, and the latter having to resist, in addition, the oblique thrust of an arch, the pull of a suspension chain, or the thrust of an embankment; and (b) the foundations below the ground level, which are often difficult and costly parts of the structure, because the position of a bridge may be fixed by considerations which preclude the selection of a site naturally adapted for carrying a heavy structure.

3. Types of Bridges. — Bridges may be classed as arched bridges, in which

the principal members are in compression; suspension bridges, in which the principal members are in tension; and girder bridges, in which half the components of the principal members are in compression and half in tension. But there are cases of bridges of mixed type. The choice of the type to be adopted depends on many and complex considerations: — (1) The cost, having regard to the materials available. For moderate spans brick, masonry or concrete can be used without excessive cost, but for longer spans steel is more economical, and for very long spans its use is imperative. (2) The importance of securing permanence and small cost of maintenance and repairs has to be considered. Masonry and concrete are more durable than metal, and metal than timber. (3) Aesthetic considerations sometimes have great weight, especially in towns. Masonry bridges are preferable in appearance to any others, and

metal arch bridges are less objectionable than most forms of girder.

Most commonly the engineer has to attach great importance to the question of cost, and to design his structure to secure the greatest economy consistent with the provision of adequate strength. So long as bridge building was an empirical art, great waste of material was unavoidable. The developmenc of tne theory of structures has been largely directed to determining the arrangements of material which are most economical, especially in the superstructure. In the case of bridges of large span the cost and difficulty of erection are serious, and in such cases facility of erection becomes a governing consideration in the choice of the type to be adopted. In many cases the span is fixed by local conditions, such as the convenient sites for piers, or the requirements of waterway or navigation. But here also the question of economy must be taken into the reckoning. The cost of the superstructure increases very much as the span increases, but the greater the cost of the substructure, the larger the span which is economical. Broadly, the least costly arrange- ment is that in which the cost of the superstructure of a span is equal to that of a pier and foundation.

For masonry, brick or concrete the arch subjected throughout to compression is the most natural form. The arch ring can be treated as a blockwork structure composed of rigid voussoirs. The stability of such structures depends on the position of the line of pressure in relation to the extrados and intrados of the arch ring. Generally the line of pressure lies within the middle half of the depth of the arch ring. In finding the line of pressure some principle such as the principle of least action must be used in determining the reactions at the crown and springings, and some assumptions must be made of not certain validity. Hence to give a margin of safety to cover contingencies not calculable, an excess of material must be provided. By the introduction of hinges the position of the line of resistance can be fixed and the stress in the arch ring determined with less

uncertainty. In some recent masonry arched bridges of spans up to 1 50 ft. built with hinges considerable economy has been obtained.

For an elastic arch of metal there is a more complete theory, but it is difficult of application, and there remains some un- certainty unless (as is now commonly done) hinges are intro- duced at the crown and springings.

In suspension bridges the principal members are in tension, and the introduction of iron link chains about the end of the 1 8th century, and later of wire ropes of still greater tenacity, permitted the construction of road bridges of this type with spans at that time impossible with any other system of con- struction. The suspension bridge dispenses with the compression member required in girders and with a good deal of the stiffening required in metal arches. On the other hand, suspension bridges require lofty towers and massive anchorages. The defect of the suspension bridge is its flexibility. It can be stiffened by girders and bracing and is then of mixed type, when it loses much of its advantage in economy. Nevertheless, the stiffened suspension bridge will probably be the type adopted in future for very great spans. A bridge on this system has been projected at New York of 3 200 ft. span.

The immense extension of railways since 1830 has involved the construction of an enormous number of bridges, and most of these are girder bridges, in which about half the superstructure is in tension and half in compression. The use of wrought iron and later of mild steel has made the construction of such bridges very convenient and economical. So far as superstructure is concerned, more material must be used than for an arch or chain, for the girder is in a sense a combination of arch and chain On the other hand, a girder imposes only a vertical load on its piers and abutments, and not a horizontal thrust, as in the case of an arch or suspension chain. It is also easier to erect.

A fundamental difference in girder bridges arises from the mode of support. In the simplest case the main girders are supported at the ends only, and if there are several spans they are discontinuous or independent. But a main girder may be supported at two or more points so as to be continuous over two

or more spans. The continuity permits economy of weight. In a three-span bridge the theoretical advantage of continuity is about 49% for a dead load and 16% for a live load. The objection to continuity is that very small

alterations of level of the supports due to settlement of the piers may very greatly alter the distribution of stress, and render the bridge unsafe. Hence many multiple-span bridges such as the Hawkesbury, Benares and Chittravatti bridges have been built with inde- pendent spans.

Lastly, some bridges are composed of cantilevers and suspended girders. The main girder is then virtually a continuous girder hinged at the points of contrary flexure, so that no ambiguity can arise as to the stresses.

Whatever type of bridge is adopted, the engineer has to ascertain the loads to be carried, and to proportion the parts so that the stresses due to the loads do not exceed limits found by experience to be safe. In many countries the limits of working stress in public and railway bridges are prescribed by law. The

Fig. i. — Trajan's Bridge.

development of theory has advanced pari passu with the demand for bridges of greater strength and span and of more complex design, and there is now little uncertainty in calculating the stresses in any of the types of structure now adopted. In the modern metal bridge every member has a definite function and is subjected to a calculated straining action. Theory has been the guide in the development of bridge design, and its trust-worthiness is completely recognized. The margin of uncertainty which must be met by empirical allowances on the side of safety has been steadily diminished.

The larger the bridge, the more important is economy of material, not only because the total expenditure is more serious, but because as the span increases the dead weight of the structure becomes a greater fraction of the whole load to be supported. In fact, as the span increases a point is reached at which the dead weight of the superstructure becomes so large that a limit is imposed to any further increase of span.

History of Bridge Building 4. Roman Bridges. — The first bridge known to have been constructed at Rome over the Tiber was the timber Pons Sub-

Quattro Capi), of about 62 B.C., is practically intact; and the Pons Cestius, built probably in 46 B.C., retains much of the original masonry. The Pons Aelius, built by Hadrian a.d. 134 and repaired by Pope Nicholas II. and Clement IX., is now the bridge of St Angelo. It had eight arches, the greatest span

Fig. 3. — Ponte Salario.

being 62 ft. 1 Dio Cassius mentions a bridge, possibly 3000 to 4000 ft. in

length, built by Trajan over the Danube in a.d. 104. Some piers are said still to exist. A bas-relief on the Trajan column shows this bridge with masonry piers and timber arches, but the representation is probably conventional (fig. 1). Trajan also constructed the bridge of Alcantara in Spain (fig. 2), of a total length of 670 ft., at 210 ft. above the stream. This had six arches and was built of stone blocks without cement. The bridge of Narses, built in the 6th century (fig. 3), carried the Via Salaria over the Anio. It was destroyed in 1867, during the approach of Garibaldi to Rome. It had a fortification such as became usual in later bridges for defence or for the enforcement of tolls. The great lines of aqueducts built by Roman engineers, and dating from 300 B.C. onwards, where they are carried above

Fig. 4. — First Span of Schaffhausen Bridge.

ground, are arched bridge structures of remarkable magnitude (see Aqueducts, § Roman). They are generally of brick and concrete.

5. Medieval and other Early Bridges. — Bridges with stone- piers and timber superstructures were no doubt constructed from Roman times onward, but they have perished. Fig. 4 shows a timber bridge erected by the brothers Grubenmann at Schaffhausen about the middle of the 18th century. It had spans of 172 and 193 ft., and may be taken as a representative

Fig. 2. — Bridge of Alcantara.

licius, the bridge defended by Horatius. The Pons Milvius, now Ponte Molle, was reconstructed in stone by M. Aemilius Scaurus in 109 B.C., and some portions of the old bridge are believed to exist in the present structure. The arches vary f-rom 51 to 79 ft. span. The Pons Fabricius (mod. Ponte dei

type of bridges of this kind. The Wittingen bridge by the same engineers had a span of 390 ft., probably the longest timber

1 For the ancient bridges in Rome see further Rome: Archaeology, and such works as R. Lanciani, Ruins and Excavations of Ancient Rome (Eng. trans., 1897), pp. 16 foil.

span ever constructed. Of stone bridges in Great Britain, the earliest were the cyclopean bridges still existing on Dartmoor, consisting of stone piers

bridged by stone slabs. The bridge over the East Dart near Tavistock had three piers, with slabs

Fig. 5. — Crowland Bridge.

It is

15 ft. by 6 ft. (Smiles, Lives of the Engineers, ii. 43), reputed to have lasted for 2000 years.

The curious bridge at Crowland near Peterborough (fig. 5) which now spans roadways, the streams which formerly flowed under it having been diverted, is one of the earliest known stone bridges in England. It is referred to in a charter of the year 943. It was probably built by the abbots. The first bridges over the Thames at London were no doubt of timber. William of Malmesbury mentions the existence of a bridge in 994. J. Stow (Survey of the Cities of London and Westminster) describes

was destroyed for military reasons by Carmagnola in 141 6. The Rialto bridge at Venice, with a span of 91 ft., was built in 1588 by Antonio da Ponte. Fig. 7 shows the beautiful Ponte della Trinita erected at Florence in 1566 from the design of B. Ammanati.

6. Modern Bridges. — (a) Timber. — In England timber bridges of considerable span, either braced trusses or laminated arches (i.e. arches cf planks bolted together), were built for some of the earlier railways, particularly the Great Western and the Manchester, Sheffield & Lincolnshire. They have mostly been replaced, decay having taken place at the joints. Timber bridges of large span were constructed in America between the end of the 18th and the middle of the 19th century. The Amos-keag bridge over the Merrimac at Manchester, N.H., U.S.A., built in 1792, had 6 spans of 92 ft. The Bellows Falls bridge over the Connecticut (built 1 785-1 792) had 2 spans of 184 ft. The singular Colossus bridge, built in 181 2 over the Schuylkill, a kind of flat arched truss, had a span of 340 ft. Some of these timber bridges are said to have lasted ninety years with ordinary repairs, but they were road bridges not heavily loaded. From 1840, trusses, chiefly of timber but with wrought-iron .tension- rods and cast-iron shoes, were adopted in America. The Howe truss of 1830 and the Pratt truss of 1844 are examples. The Howe truss had timber chords and a lattice of timber struts, with vertical iron ties. In the Pratt truss the struts were vertical and the ties inclined. Down to 1850 such bridges were generally limited to 150 ft. span. The timber was white pine. As railway loads increased and greater spans were demanded, the Howe truss was stiffened by timber arches on each side of each girder. Such a composite structure is, however, funda- mentally defective, the distribution of loading

to the two independent systems being indeterminate. Remarkably high timber piers were built. The Genesee viaduct, 800 ft. in length, built in 1851-1852 in 10 spans, had timber trestle piers 190 ft. in

From J. R. Green's A Short History of the English People, by permission of Macmillan& Co.. Ltd. [

Fig. 6. — Old London Bridge, A.D. 1600. From a Drawing in the Pepysian Library ; Magdalene College, Cambridge.

the building of the first stone bridge commonly called Old London Bridge: '" About the year n 76, the stone bridge was begun to be founded by Peter of Colechurch, near unto the bridge of timber, but more towards the west." It carried timber houses (fig. 6) which were frequently burned down, yet the main structure existed till the beginning of the 19th century. The span of the arches ranged from 10 to 33 ft., and the total waterway was only 33 7 ft. The waterway of the present London Bridge is 690 ft., and the removal of the obstruction caused by the old bridge caused a lowering of the low-water level by 5 ft.,

- 88:0——

Fig. 7.— Ponte della Trinita, Florence.

and a considerable deepening of the river-bed. (See Smiles, Lives of the Engineers, " Rennie.")

The architects of the Renaissance showed great boldness in their designs. A granite arch built in 1377 over the Adda at Trezzo had a span at low water of 251 ft. This noble bridge

height. (See Mosse, " American Timber Bridges," Proc. Inst. C.E. xxii. p. 305, and for more modern examples, cxlii. p. 409; and civ. p. 382; Cooper, "American Railroad Bridges," Trans. Am. Soc. C.E. vol. xxi. pp. 1-28.) These timber framed structures served as models for the earlier metal trusses which began to be used soon after 1850, and which, except in a few localities where iron is costly, have quite superseded them.

7. (b) Masonry. — The present London Bridge, begun in 1824 and completed in 183 1, is as fine an example of a masonry arch structure as can be found (figs. 8 and 9). The design was made

by John Rennie the elder,

and

the acting engineer was his son, Sir John Rennie. The semi-ellip- tical shape of the arches the variation of span, the slight curvature of the

7S~~- – roadway, and the simple

yet bold architectural details, combine to make

it a singularly beautiful bridge. The centre arch has a span of 152 ft., and rises 29 ft. 6 in. above Trinity high-water mark; the arches on each side of the centre have a span of 140 ft., and the abutment arches 130 ft. The total length of the bridge is 1005 ft., its width from outside to outside 56 ft., and height above low

—se'o- 1

water 60 ft. The two centre piers are 24 ft. thick, the exterior stones are granite, the interior, half Bramley Fall and half from Painshaw, Derbyshire. The voussoirs of the centre arch (all of granite) are 4 ft. 9 in. deep at the crown, and increase to not less than 9 ft. at the springing. The general depth at which the foundations are laid is about 29 ft. 6 in. below low water. The total cost was £1,458,311, but the contractor's tender for the bridge alone was £425,081.

Since 1867 it had been recognized that London Bridge was inadequate to carry the traffic passing over it, and a scheme for widening it was adopted in 1900. This was carried out in 1902-

paper by H. M. Martin (Proc. Inst. C. E. vol. xciii. p. 462); and for that of the elastic arch, to a paper by A. E. Young (Proc. Inst. C.E. vol. cxxxi. p. 323).

In Germany and America two- and three-hinged arches of masonry and concrete have been built, up to 150 ft. span, with much economy, and the calculations being simple, an engineer can venture to work closely to the dimensions required by theory. For hinges, Leibbrand, of Stuttgart, uses sheets of lead about I in. thick extending over the middle third of the depth of the voussoir joints, the rest of the joints being left open. As the lead is plastic this construction is virtually an articulation. If the pressure on the lead is uniformly varying, the centre of pressure must be within the middle third of the width of the lead; that is, it cannot deviate from the centre of the voussoir

Scale of Feet

100 200

JOO

Fig. 8. — London New Bridge.

1904, the footways being carried on granite corbels, on which are mounted cornices and open parapets. The width between parapets is now 65 ft., giving a roadway of 35 ft. and two foot- ways of 15 ft. each. The architect was Andrew Murray and the engineer, G. E. W. Cruttwell. (Cole, Proc. Inst. C.E. clxi. p. 290.)

The largest masonry arch is the Adolphe bridge in Luxemburg, erected in 1900-1903. This has a span of 278 ft., 138 ft. rise above the river, and 102 ft. from foundation to crown. The thickness of the arch is 4 ft. 8 in. at the crown and 7 ft. 2 in. where it joins the spandrel masonry. The roadway is 52 ft. 6 in. wide. The bridge is not continuous in width, there are arch rings on each face, each 16-4 ft. wide with a space between of 19- 7 ft. This space is filled with a flooring of reinforced concrete, resting on the two arches, and carrying the central roadway. By the method adopted the total masonry has been reduced one-third. One centering was used for the two arch rings, supported on dwarf walls which formed a slipway, along which it was moved after the first arch was built.

Till near the end of the 19th century bridges of masonry or brickwork were so constructed that they had to be treated as rigid blockwork structures. The stability of such structures depends on the position of the line of pressure relatively to the intrados and extrados of the arch ring. Generally, so far as

Fig. 9. — Half Elevation and Half Section of Arch of London Bridge.

could be ascertained, the line of pressure lies within the middle half of the depth of the voussoirs. In finding the abutment reactions some principle such as the principle of least action must be used, and some assumptions of doubtful validity made. But if hinges are introduced at crown and springings, the calculation of the stresses in the arch ring becomes simple, as the line of pressures must pass through the hinges. Such hinges have been used not only for metal arches, but in a modified form for masonry and concrete arches. Three cases therefore arise: (a) The arch is rigid at crown and springings; (b) the arch is two-hinged (hinges at springings) ; (c) the arch is three-hinged (hinges at crown and springings). For an elementary account of the theory of arches, hinged or not, reference may be made to a

joint by more than one-eighteenth of its depth. In any case the position of the line of pressures is confined at the lead articulations within very narrow limits, and ambiguity as to the stresses is greatly diminished. The restricted area on which the pressure acts at the lead joints involves greater intensity of stress than has been usual in arched bridges. In the Wiirttemberg hinged arches a limit of stress of 1 10 tons per sq. ft. was allowed, while in the unhinged arches at Cologne and Coblentz the limit was 50 to 60 tons per sq. ft. (Annates des Fonts et ChaussSes, 1891). At Rechtenstein a bridge of two concrete arches has been constructed, span 75 J ft., with lead articulations : width of arch 11 ft. ; depth of arch at crown and springing 2-1 and 2-96 ft. respectively. The stresses were calculated to be 15, 17 and 12 tons per sq. ft. at crown, joint of rupture, and springing respectively. At Cincinnati a concrete arch of 70 ft. span has been built, with a rise of 10 ft. The concrete is reinforced by eleven 9-in. steel-rolled joists, spaced 3 ft. apart and supported by a cross-channel joist at each springing. The arch is 15 in. thick at the crown and 4 ft. at the abutments. The concrete consisted of 1 cement, 2 sand and 3 to 4 broken stone. An important series of experiments on the strength of masonry, brick and concrete structures will be found in the Zeitschr. des bsterreichen Ing. und Arch. Vereines

(1895)-

The thermal coefficient of expansion of steel and concrete is nearly the same, otherwise changes of temperature would cause shearing stress at the junction of the two materials. If the two materials are disposed symmetrically, the amount of load carried by each would be in direct proportion to the coefficient of elasticity and inversely as the moment of inertia of the cross section. But. it is usual in many cases to provide a sufficient section of steel to carry all the tension. For concrete the coefficient of elasticity E varies with the amount of stress and diminishes as the ratio of sand and stone to cement increases. Its value is generally taken at 1,500,000 to 3,000,000 lb per sq. in. For steel E = 28,000,000 to 30,000,000, or an 1 the average about twelve times its value for concrete. Themaxjmum' compressive working stress on the concrete may be 500 lb ppr sq. in., the tensile working stress 50 lb per sq. in., and the working shearing stress 75 lb per sq. in. The tensile stress on the steel may be 1 6,ood ffi per sq. in. The amount of steel in the structure may vary from o-75 to 1-5%. The concrete not only affords much of the strength to resist compression, but effectively protects the steel from corrosion,

8. (c) Suspension Bridges. — A suspension bridge consists of two or more chains, constructed of links connected by pins, or of twisted wire strands, or of wires laid parallel. The chains pass over lofty piers on which they usually rest on saddles carried by rollers, and are led down on either side to anchorages in rpck chambers. A level platform is hung from the chains

by sus- pension rods. In the suspension bridge iron or steel can be used in its strongest form, namely hard-drawn wire. Iron suspension bridges iegan to be used at the end of the 18th century for road bridges with spans unattainable at that time in any other system. In 181 9 T. Telford began the construction of the Menai bridge (fig. 10), the span being 570 ft. and the dip 43 ft. This bridge suffered some injury in a storm, but it is still in good condition and one of the most graceful of bridges. Other bridges built soon after were the Fribourg bridge of 870 ft. span, the Hammersmith bridge of 422 ft. span, and the Pest bridge of 666 ft, span. The merit of the simple suspension bridge is its cheapness, and its defect is its flexibility. This last becomes less

serious as the dead weight of the structure becomes large in proportion to the live or temporary load. It is, therefore, a type specially suited for great spans. Some suspension bridges have broken down in consequence of the oscillations produced by bodies of men marching in step. In 1850 a suspension bridge

cable was carried on a separate saddle on rollers on each pier. The stiffening girder, constructed chiefly of timber, was a box-shaped braced girder 18 ft. deep and 25 ft. wide, carrying the railway on top and a roadway within. After various repairs and strengthenings, including the replacement of the timber girder by an iron one in 1880, this bridge in 1896-1897 was taken down and a steel arch built

s7&-«ifrcrtoCc-

Fig. 10.— Menai Suspension Bridge.

at Angers gave way when 487 soldiers were marching over it, and 226 were killed.

To obtain greater stiffness various plans have been adopted. In the Ordish system a certain number of intermediate points in the span are supported by oblique chains, on which girders rest. The Ordish bridge built at Prague in 1868 had oblique chains supporting the stiffening girders at intermediate points of the span. A curved chain supported the obique chains and kept them straight. In i860 a bridge was erected over the Danube canal at Vienna, of 264 ft. span which had two parallel chains one above the other and 4 ft. apart on each side of the bridge. The chains of each pair were connected by bracing so that they formed a stiff inverted arch resisting deformation

in its place. It was not strong enough to deal with the increasing weight of railway traffic. In 1836 I. K. Brunei constructed the towers and abutments for a suspension bridge of 702 ft. span at Clifton over the Avon, but the project was not then carried further ; in i860, however, the link chains of the Hungerford suspension bridge which was being taken down were available at small cost, and these were used to complete the bridge. There are three chains on each side, of one and two links alternately, and these support wrought iron stiffening girders. There are wrought iron saddles and steel rollers on the piers. At 196 ft. on either side from the towers the chains are carried over similar saddles without rollers, and thence at 45° with the horizontal down to the anchorages. Each chain has an anchor plate 5 ft. by 6 ft. The links are 24 ft. long at the centre of the bridge, and longer as they are more inclined, so that their horizontal projection is 24 ft. The chains are so arranged that there is a suspending rod at each 8 ft., attached at the joint of one of the

Fig. 11. — Niagara

under unequal loading. The bridge carried a railway, but it proved weak owing to errors of calculation, and it was taken down in 1884. The principle was sound and has been proposed at various times. About 1850 it was perceived that a bridge stiff enough to carry railway trains could be constructed by combining supporting chains with stiffening girders suspended from them. W. J. M. Rankine proved {Applied Mechanics, p. 370) that the necessary strength of a stiffening girder would be only one-seventh part of that of an independent girder of the same span as the bridge, suited to carry the same moving load (not including the dead weight of the girder which is sup- ported by the chain). (See " Suspension Bridge with Stiffened Roadway," by Sir G. Airy, and the discussion, Proc. Inst. C.E.,

Suspension Bridge.

three chains. For erection a suspended platform was constructed on eight wire ropes, on which the chains were laid out and connected. Another wire rope with a travelling carriage took out the links. The sectional area of the chains is 481 s(j. in. at the piers and 440 sq. in. at the centre. The two stiffening girders are plate girders 3 ft. deep with flanges of II sq. in. area. In addition, the hand railing on each side forms a girder 4 ft. 9 in. deep, with flanges 4! sq. in. area.

Of later bridges of great span, perhaps the bridges over the East river at New York are the most remarkable. The Brooklyn bridge, begun in 1872, has a centre span of 15955 and side spans of 930 ft. The Brooklyn approach being 971 ft., and the New York approach 1 562 J ft., the total

length of the bridge is 5989 ft. There are four cables which carry a promenade, a roadway and an electric railway. The stiffening girders of the main span are 40 ft. deep and 67 ft. apart. The saddles for the chains are 329 ft. above high water.

Fig. 12. — Williamsburg Bridge, New York.

1867, xxvi. p. 258; also " Suspension Bridges with Stiffening Girders," by Max am Ende, Proc. Inst. C.E. cxxxvii. p. 306.)

The most remarkable bridge constructed on this system was the Niagara bridge built by J. A. Roebling in 1852-1855 (fig. 11). The span was 821 ft., much the largest of any railway bridge at that time, and the height above the river 245 ft. There were four suspension cables, each 10 in. in diameter; each was composed of seven strands, containing 520 parallel wires, or 3640 wires in each cable. Each

The cables are 15! in. in diameter. Each cable has 19 strands of 278 parallel steel wires, 7 B.W.G. Each wire is taken separately across the river and its length adjusted. Roebling preferred parallel wires as 10 % stronger than twisted wires. Each strand when made up and clamped was lowered to its position. The Williamsburg bridge (fig. 12), begun in 1897 and opened for traffic in 1903, has a span of 1600 ft., a versed sine of 176 ft., and a width of 118 ft. It has two decks, and carries two elevated railway tracks, four electric tramcar lines, two carriageways, two footways and two

bicycle paths. There are four cables, one on each side of the two main trusses or stiffening girders. These girders are supported by the cables over the centre span but not in the side spans. Inter- mediate piers support the trusses in the side spans. The cables are l8f in. in diameter; each weighs about 1116 tons, and has a nominal breaking strength of 22,320 tons, the actual breaking strength being

the floor into rectangles 3 ft. by 3I ft. covered with buckled plates. The roadway is of pine blocks dowelled. The bascules rotate through an angle of 82°, and their rear ends in the bascule chambers of the piers carry 365 tons of counterweight, the total weight of each being 1070 tons. They rotate on steel shafts 21 in. in diameter and 48 ft. long, and the bascules can be lifted or lowered in one minute,

Xttct MQurOrdnartrtDatum £> r I-:i££ c

£ :- – 1&fi~z$ 3

*mm**

HALF ELEVATION

HALF LONGITUDINAL SECTION

probably greater. The saddles are 332 ft. above the water. The four cables support a dead load of 7140 tons and a live load of 4017 tons. Each cable is composed of 37 strands of 208 wires, or 7696 parallel steel wires, No. 8 B.W.G., or about j 3 g in. in diameter. The wire was required to have a tensile strength of 89 tons per sq. in., and 2\% elongation in 5 ft. and 5% in 8 in. Cast steel clamps hold the cable together, and to these the suspending rods are attached. The cables are wrapped in cotton duck soaked in oxidized oil and varnish, and are sheathed in sheet iron. A later bridge, the Man- hattan, is designed to carry four railway tracks and four tramway lines, with a wide roadway and footpaths, supported by cables 2i| in. in diameter, each composed of 9472 galvanized steel wires ft in. in diameter.

The Tower Bridge, London (fig. 13), is a suspension bridge with a secondary bascule bridge in the centre span to permit the passage of ships. Two main towers in the river and two towers on the shore abutments carry the suspension chains. The opening t>ridge between the river towers consists of two leaves or bascules, pivoted near the faces of the piers and rotating in a vertical plane. When raised, the width of 200 ft. between the main river piers is unobstructed up to the high-level foot-bridge, which is 141 ft. above Trinity H.W. The clear width of the two shore spans is 270 ft. The total length of the bridge is 940 ft., and that of the approaches 1260 ft. on the north and 780 ft. on the south. The width of the bridge between parapets is 60 ft., except across the centre span, where it is 49 ft. The main towers consist of a skeleton of steel, enclosed in a facing of granite and Portland stone, backed with brickwork. There are two high-level footways for use when the bascules are raised, the main girders of which are of the cantilever and suspended girder type. The canti- levers are fixed to the shore side of the towers. The middle girders are 120 ft. in length and attached to the cantilevers by links. The main suspension chains are carried across the centre span in the form of horizontal ties resting on the high-level footway girders. These ties are jointed to the hanging chains by pins 20 in. in diameter with a ring in halves surrounding it 5 in. thick. One half ring is rigidly attached to the tie and one to the hanging chain, so that the wear due to any movement is distributed over the length of the pin. A rocker bearing under these pins transmits the load at the joint to the steel columns of the towers. The abutment towers are similar to the river towers.

On the abutment towers the chains are connected by horizontal links, carried on rockers, to anchor ties. The suspension chains are constructed in the form of braced girders, so that they are stiff against un- sym metrical loading. Each chain over

a shore span consists of two segments, the longer attached to the tie at the top of the river tower, the shorter to the link at the top of the abutment tower, and the two jointed together at the lowest point. Transverse girders are hung from the chains at distances of 18 ft. There are fifteen main transverse girders to each shore span, with nine longitudinal girders between each pair. The trough flooring, | in. thick and 6 in. deep, is riveted to the longitudinals. The anchor ties are connected to girders embedded in large concrete blocks in the foundations of the approach viaducts.

The two bascules are each constructed with four main girders. Over the river these are lattice girders, with transverse girders 12 ft. apart, and longitudinal and subsidiary transverse girders dividing

Fig. 13.— Tower Bridge, London.

but usually the time taken is one and a half minutes, worked by hydraulic machinery.

They are

9. (d) Iron and Steel Girder Bridges. — The main supporting members are two or more horizontal beams, girders or trusses. The girders carry a floor or platform either on top (deck bridges) or near the bottom (through bridges). The platform is variously constructed. For railway bridges it commonly consists of cross girders, attached to or resting on the main girders, and longi- tudinal rail girders or stringers carried by the cross girders and directly supporting the sleepers and rails. For spans over 75 ft., expansion due to change of temperature is provided for by carry- ing one end of each chain girder on rollers placed between the bearing-plate on the girder and the bed-plate on the pier or abutment.

Fig. 14 shows the roller bed of a girder of the Kuilenburg bridge of 490 ft. span. It will be seen that the girder directly rests on a cylindrical pin or rocker so placed as to distribute the load uniformly to all the rollers. The pressure on the rollers is limited to about p = 6oo d in lb per in. length of roller, where d is the diameter of the roller in inches.

In the girders of bridges the horizontal girder is almost exclusively subjected to vertical loading forces. Investigation

Fig. 14. — Roller Bed of a Girder. •

of the internal stresses, which balance the external forces, shows that most of the material should be arranged in a top flange, boom or chord, subjected to compression, and a bottom flange or chord, subjected to tension. (See Strength of Materials.) Connecting the flanges is a vertical web which may be a solid plate or a system of bracing bars. In any case, though the exact form of cross section of girders varies very much, it is virtually an I section (fig. 15). The function of the flanges is to resist a horizontal tension and compression distributed practically urii : formly on their cross sections. The web resists forces equivalent

Fig. 15. — Flanged Girder.

to a shear on vertical and horizontal planes. The inclined tensions and compressions in the bars of a braced web are equivalent to this shear. The horizontal stresses in the flanges are greatest at the centre of a span. The stresses in the web are

greatest at the ends of the span. In the most numerous cases the flanges or chords are parallel. But girders may have curved chords and then the stresses in the web are diminished. At first girders had solid or plate webs, but for spans over 100 ft. the web always now consists of bracing bars. In some girder bridges the members are connected entirely by riveting, in others the principal members are con- nected by pin joints. The pin system of connexion used in the Chepstow, Salt- ash, Newark Dyke and other early English bridges is now rarely used in Europe. But it is so commonly used in America as to be regarded as a distinctive American feature. With pin connexions some weight is saved in the girders, and erection is a little easier. In early pin bridges insufficient bearing area was allowed between the pins and parts connected, and they worked loose. In some cases riveted covers had to be substituted for the pins. The proportions are now better understood. Nevertheless the tend- ency is to use riveted connexions in preference to pins, and in any case to use pins for tension members only.

On the first English railways cast iron girder bridges for spans of 20 to 66 ft. were used, and in some cases these were trussed with wrought iron. When in 1845 the plans for carrying the Chester and Holyhead railway over the Menai Straits were considered, the conditions imposed by the admiralty in the interests of navigation involved the adoption of a new type of bridge. There was an idea of using suspension chains combined with a girder, and in fact the tower piers were built so as to accommodate chains. But the theory of such a combined structure could not be formulated at

that time, and it was proved, partly by experiment, that a simple tubular girder of wrought iron was strong enough to carry the railway. The Britannia bridge (fig. 16) has two spans of 460 and two of 230 ft. at 104 ft. above high water. It consists of a pair of tubular girders with solid or plate sides stiffened by angle irons, one line of rails passing through each tube. Each girder is 1511 ft. long and weighs 4680 tons. In cross section (fig. 17), it is 15 ft. wide and varies in depth from 23 ft. at the ends to 30 ft. at the centre. Partly to counteract any tendency to buckling under compression and partly for convenience in assembling a great mass of plates, the top and bottom were made cellular, the cells being just large enough to permit passage for painting. The total

Eaton Hodgkinson, who assisted in the experimental tests and in formulating the imperfect theory then available. The Conway bridge was first completed, and the first train passed through the Britannia bridge in 1850. Though each girder has been made continuous over the four spans it has not quite the pro- portions over the piers which a continuous girder should have,

Fig. 17. — Britannia Bridge (Cross Section of Tubular Girder).

and must be regarded as an imperfectly continuous girder. The spans were in fact designed as independent girders, the advantage of continuity being at that time imperfectly known. The vertical sides of the girders are stiffened so that they amount to 40% of the whole weight. This was partly necessary to meet the uncertain conditions in floating when the distribution of support- ing forces was unknown and there were chances of distortion. Wrought iron and, later, steel plate web girders were largely

Britannia Bridge.

area of the cellular top flange of the large-span girders is 648 sq. in., and of the bottom 585 sq. in. As no scaffolding could be used for the centre spans, the girders were built on shore, floated out and raised by hydraulic presses. The credit for the success of the Conway and Britannia bridges must be divided between the engineers. Robert Stephenson and William Fairbairn, and

used for railway bridges in England after the construction of the Conway and Menai bridges, and it was in the discussions arising during their design that the proper function of the vertical web between the top and bottom flanges of a girder first came to be understood. The proportion of depth to span in the Britannia bridge was T V But so far as the flanges are concerned the stress

to be resisted varies inversely as the depth of the girder. It would be economical, therefore, to make the girder very deep. This, however, involves a much heavier web, and therefore for any type of girder there must be a ratio of depth to span which is most economical. In the case of the plate web there must be a considerable excess of material, partly to stiffen it against buckling and partly because an excess of thickness must be provided to reduce the effect of corrosion. It was soon found that with plate webs the ratio of depth to span could not be economically increased beyond tV t0 t 1 ?. On the other hand a framed or braced web afforded opportunity for much better arrangement of material, and it very soon became apparent that open web or lattice or braced girders were more econo- mical of material than solid web girders, except for small spans. In America such girders were used from the first and naturally followed the general design of the earlier timber bridges. Now plate web girders are only used for spans of less than ioo ft.

Three types of bracing for the web very early developed —

the Warren type in which the bracing bars form equilateral triangles, the Whipple Murphy in which the struts are vertical and the ties inclined, and the lattice in which both struts and ties are inclined at equal angles, usually 45° with the horizontal. The earliest published theoretical investigations of the stresses in bracing bars were perhaps those in the paper by W. T. Doyne and W. B. Blood (Proc. Inst. C.E., 1851, xi. p. 1), and the paper by J. Barton, " On the economic distribution of material in the sides of wrought iron beams" (Proc. Inst. C.E., 1855, xiv.

P-443)- The Boyne bridge, constructed by Barton in Ireland, in

culated position of one of the points of contrary flexure all the rivets of the top boom were cut out, and by lowering the end of the girder over the side span one inch, the joint was opened

Newark Dyke Bridge.

Fig. 18. — Span of Saltash Bridge.

1854-1855, was a remarkable example of the confidence with which engineers began to apply theory in design. It was a bridge for two lines of railway with lattice girders continuous over three spans. The centre span was 264 ft., and the side spans 138 ft. 8 in.; depth 22 ft. 6 in. Not only were the bracing bars designed to calculated stresses, and the continuity of

the girders taken into account, but the validity of the calculations was tested by a verification on the actual bridge of the position of the points of contrary flexure of the centre span. At the cal-

Fig. 19.

Section of Newark Dyke Bridge.

■fa in. Then the rivets were cut out similarly at the other point of contrary flexure and the joint opened. The girder held its position with both joints severed, proving that, as should be the case, there was no stress in the boom where the bending moment changes sign.

By curving the top boom of a girder to form an arch and the bottom boom to form a suspension chain, the need of web except for non-uniform loading is obviated. I. K. Brunei adopted this principle for the Saltash bridge near Plymouth, built soon after the Britannia bridge. It has two spans of 455 ft. and seventeen smaller spans, the roadway being 100 ft. above high water. The top boom of each girder is an elliptical wrought iron tube 17 ft. wide by 12 ft. deep. The lower boom is a pair of chains, of wrought-iron links, 14 in each chain, of 7 in. by 1 in. section, the links being connected by pins. The suspending rods and cross bracing are very light. The depth of the girder at the centre is about one-eighth of the span.

In both England and America in early braced bridges cast iron, generally in the form of tubes circular or octagonal in section, was used for compression members, and wrought iron for the tension members. Fig. 19 shows the Newark Dyke bridge on the Great Northern railway over the Trent. It was a pin-jointed Warren girder bridge erected from designs by C. M. Wild in 1851-1853. The span between supports was 259 ft., the clear span 240! ft.; depth between joint pins 16 ft. There were four girders, two to each line of way. The top flange consisted of cast iron hollow castings butted end to end, and the struts were of cast iron. The lower flange and ties were flat wrought iron links. This bridge has now been replaced by a stronger bridge to carry the greater loads imposed by modern traffic. Fig. 20 shows a Fink truss, a characteristic early American type, with cast iron compression and wrought iron tension members. The bridge is a deck bridge, the railway being carried on top. The transfer of the loads to the ends of the bridge by

Fig. 20.— Fink Truss.

long ties is uneconomical, and this type has disappeared. The Warren type,

either with two sets of bracing bars or with inter- mediate verticals, affords convenient means of supporting the floor girders. In 1869 a bridge of 390 ft. span was built on this system at Louisville.

Amongst remarkable American girder bridges may be men- tioned the Ohio bridge on the Cincinnati & Covington railway, which is probably the largest girder span constructed. The

girders after erection. Fig. 22 shows girders erected in this way, the dotted lines being temporary members during erection, which are removed afterwards. The side spans are erected first on staging and anchored to the piers. From these, by the aid of the temporary members, the centre span is built out from both sides. The most important cantilever bridges so far erected or projected are as follows: —

(1) The Forth bridge (fig. 23). The original design was for a

-Typical

centre span is 550 ft. and the side spans 490 ft. — centre to centre of piers. The girders are independent polygonal girders. The centre girder has a length of 545 ft. and a depth of 84 ft. between pin centres. It is 67 ft. between parapets, and carries two lines of railway, two carriageways, and two footways. The cross girders, stringers and wind-bracing are wrought iron, the rest of mild steel. The bridge was constructed in 1888 by the Phoenix Bridge Company, and was erected on staging. The total weight of iron and steel in three spans was about 5000 tons. 10. (e) Cantilever Bridges. — It has been stated that if in a girder bridge of three or more spans, the girders were made continuous there would be an important economy of material, but that the danger of settlement of the supports, which would seriously alter the points of contrary flexure or points where

Fig. 22.

the bending moment changes sign, and therefore the magnitude and distribution of the stresses, generally prevents the adoption of continuity. If, however, hinges or joints are introduced at the points of contrary flexure, they become necessarily points where the bending moment is zero and ambiguity as to the stresses vanishes. The exceptional local conditions at the site of the Forth bridge led to the adoption there of the cantilever system, till then little considered. Now it is well understood that in many positions this system is the simplest and most economical method of bridging. It is available for spans greater than those practicable with independent girders; in fact, on this system the spans are virtually reduced to smaller spans so far as the stresses are concerned. There is another

advantage which in many cases is of the highest importance. The cantilevers can

stiffened suspension bridge, but alter the fall of the Tay bridge in 1879 this was abandoned. The bridge, which was begun in 1882 and completed in 1889, is at the only narrowing of the Forth in a distance of 50 m., at a point where the channel, about a mile in width, is divided by the island of Inchgarvie. The length of the cantilever bridge is 5330 ft., made up thus: central tower on Inch- garvie 260 ft. ; Fife and Queensferry piers each 145 ft. ; two central girders between cantilevers each 350 ft. ; and six cantilevers each 680 ft. The two main spans are each 17 10 ft. The clear headway is 157 ft., and the extreme height of the towers above high water 361 ft. The outer ends of the shore cantilevers are loaded to balance half the weight of the central girder, the rolling load, and 200 tons in addition. An internal viaduct of lattice girders carries a double line of rails. Provision is made for longitudinal expansion due to change of temperature, for distortion due to the sun acting on one side of the structure, and for the wind acting on one side of the bridge. The amount of steel used was 38,000 tons exclusive of approach viaducts. (See The Forth Bridge, by W. Westhofen ; Reports of the British Association (1884 and 1885); Die Forth Briicke, von G. Barkhausen (Berlin, 1889) ; The Forth Bridge, by Philip Phillips (1890) : Vernon Harcourt, Proc. Inst. C.E. cxxi. p. 309.)

(2) The Niagara bridge of a total length of 910 ft., for two lines of railway. Clear span between towers 495 ft. Completed in 1883, and more recently strengthened (Proc. Inst. C.E. cvii. p. 18, and cxliv. p. 331).

(3) The Lansdowne bridge (completed 1889) at Sukkur, over the Indus. The clear span is 790 ft., and the suspended girder 200 ft. in length. The span to the centres of the end uprights is 820 ft.; width between centres of main uprights at bed-plate 100 ft., and between centres of main members at end of centilevers 20 ft. The bridge is for a single line of railway of 5 ft. 6 in. gauge. The back guys are the most heavily strained part of the structure, the stress provided for being 1200 tons. This is due to the half weight of centre girder, the weight of the cantilever itself, the rolling load on half the bridge, and the wind pressure. The anchors are built up of steel plates and angle, bars, and are buried in a large mass of concrete. The area of each anchor plate, normal to the line of stress, is 32 ft. by 12 ft. The bridge was designed by Sir A. Rendel, the consulting engineer to the Indian government (Proc. Inst. C.E. ciii. p. 123),

(4) The Red Rock cantilever bridge over the Colorado river, with a centre span of 660 ft.

/€ –

be built out from the piers, member by member, without any temporary scaffolding below, so that navigation is not interrupted, the cost of scaffolding is saved, and the difficulty of building in deep water is obviated. The centre girder may be built on the cantilevers and rolled into place or lifted from the water-level. Fig. 21 shows a typical cantilever bridge of American design. In this case the shore ends of the cantilevers are anchored to the abutments. J. A. L. Waddell has shown that, in some cases, it is convenient to erect simple independent spans, by building them out as cantilevers and converting them into independent

*1710′ **

Fig. 23. — Forth Bridge.

(5) The Poughkeepsie bridge over the Hudson, built 1886-1887. There are five river and two shore spans. The girders over the second and fourth spans are extended as cantilevers oyer the adjoining spans. The shore piers carry cantilevers projecting one way over the river openings and the other way over a shore span where it is secured to an anchorage. The girder spans are 525 ft., the cantilever spans 547 ft., and the shore spans 201 ft.

(6) The Quebec bridge (fig. 25) over the St Lawrence, which collapsed while in course of construction in 1907. This bridge, connecting very important railway systems, was designed to carry two lines of rails, a highway and electric railway on each side, all between the main trusses. Length between abutments 3240 ft.;

542

BRIDGES

channel span 1800 ft.; suspended span 675 ft.; shore spans 562ˆ ft. Total weight of metal about 32,000 tons.

(7) The Jubilee bridge over the Hugh, designed by Sir Bradford Leslie, is a cantilever bridge of another type (fig. 26). The girders are of the Whipple Murphy type, but with curved top booms. The

bridges. Such a bridge was the Wearmouth bridge, designed by Rowland Burdon and erected in 1 793-1 796, with a span of 235 ft. South wark bridge over the Thames, designed by John Rennie with cast iron ribs and erected in 1814-1819, has a centre

ROCK

Fig. 24. — Lansdowne Bridge bridge carries a double line of railway,

between the main girders, span of 240 ft. and a rise of 24 ft

The~central double cantilever is 360 "ft. long. The two side span girders are 420 ft. long. The cantilever rests on two river piers 120 ft. apart, centre to centre. The side girders rest on the cantilevers on 15-in. pins, in pendulum links suspended from similar pins in saddles 9 ft. high.

11. (J) Metal Arch Bridges. — The first iron bridge erected was constructed by John Wilkinson (1728-1808) and Abraham Darby

In Paris the Austerlitz (1800- 1806) and Carrousel (1834-1836) bridges had cast iron arches. In 1858 an aqueduct bridge was erected at Washington by M. C. Meigs (1816-1892). This had two arched ribs formed by the cast iron pipes through which the water passed. The pipes were 4 ft. in diameter inside, 15 in. thick, and were lined with staves of pine 3 in. thick to prevent freezing. The span was 200 ft.

Fig. 25. — Quebec Bridge (original design).

(1750-1791) in 1773-1779 at Coalbrookdale over the Severn (fig. 27). It had five cast iron arched ribs with a centre span of 100 ft. This curious bridge is still in use. Sir B. Baker stated that it had required patching for ninety years, because the arch and the high side arches would not work together. Expansion and contraction broke the high arch and the connexions between the arches. When it broke they fished it. Then the bolts sheared or the ironwork broke in a new place. He advised that

Fig. 28 shows one of the wrought iron arches of a bridge over thf Rhine at Coblenz. The bridge consists of three spans of about 315 ft. each.

Of large-span bridges with steel arches, one of the most important is the St Louis bridge over the Mississippi, completed in 1874 (%• 2 9)- The river at St Louis is confined to a single channel, 1600 ft. wide, and in a freshet in 1870 the scour reached a depth of 51 ft. Captain J. B. Eads, the engineer, determined to establish the piers and abutments on rock at a depth for the east pier and east abutment of 136 ft. below high water. This was effected by caissons with air

*^^^ro^T^^^^W^^^^^^^^^^^*

M

a

Fig. 26. — Jubilee Bridge over the Hugli.

there was nothing unsafe; it was perfectly strong and the stress in vital parts moderate. All that needed to be done was to fish the fractured ribs of the high arches, put oval holes in the fishes, and not screw up the bolts too tight.

Cast iron arches of considerable span were constructed late

Fig. 27. — Coalbrookdale Bridge.

in the 18th and early in the 19th century. The difficulty of casting heavy arch ribs led to the construction of cast iron arches of cast voussoirs, somewhat like the voussoirs of masonry

chambers a»d air locks, a feat unprecedented in the annals of engineering. The bridge has three spans, each formed of arches of cast steel. The centre span is 520 ft. and the side spans 502 ft. in the clear. The rise of the centre arch is 475 ft., and that of the side arches 46 ft. Each span has four steel double ribs of steel tubes butted and clasped by wrought iron couplings. The vertical bracing between the upper and lower members of each rib, which are 12 ft. apart, centre to centre, consolidates them into a single arch. The arches carry a double railway track and above this a roadway 54 ft. wide.

The St Louis bridge is not hinged, but later bridges have been constructed with hinges at the springings and sometimes with hinges at the crown also.

The Alexander III. bridge over the Seine has fifteen steel ribs hinged at crown and springings with a span of 353 ft. between centres of hinges and 358 ft. between abutments. The rise from side to centre hinges is 20 ft. 7 in. The roadway is 65! ft. wide and footways 33 ft. (Proc. Inst. C.E. cxxx. p. 335).

The largest three-hinged-arch bridge constructed is the Viaur viaduct in the south of France (fig. 30). The central span is 721 ft. 9 in. and the height of the rails above the valley 380 ft. It has a very fine appearance, especially when seen in perspective and not merely in elevation.

Fig. 31 shows the Douro viaduct of a total length of 1158 ft. carrying a railway 200 ft. above the water. The span of the central opening is 525 ft. The principal rib is crescent-shaped 32-8 ft. deep

at the crown. Rolling load taken at I -2 ton per ft. Weight of centre span 727 tons. The Luiz I. bridge is another arched bridge over the Douro, also

designed by T. Seyrig. This has a span of 566 ft. There are an upper and a lower roadway, 164 ft. apart vertically. The arch rests on rollers and is narrowest at the crown. The reason given for this change of form was that it more conveniently allowed the lower

W TOHBf finritiMnfr

the lattice girders above. The total weight of ironwork was 320c tons and the cost £124,000 (Annates des travaux publiques, 1884).

The Victoria Falls bridge over the Zambezi, designed by Sir Douglas Fox, and completed in 1905, is a combination of girder and arch having a total length of 650 ft. The centre arch is 500 ft. span, the rise of the crown 90 ft., and depth at crown 15 ft. The width

Fig. 28. — Arch of Bridge at Coblenz.

road to pass between the springings and ensured the transmission of the wind stresses to the abutments without interrupting the cross- bracing. Wire cables were used in the erection, by which the members were lifted from barges and assembled, the operations being conducted from the side piers.

The Niagara Falls and Clifton steel arch (fig. 32) replaces the older Roebling suspension bridge. The centre span is a two-hinged para- bolic braced rib arch, and there are side spans of 190 and 210 ft. The bridge carries two electric-car tracks, two roadways and two footways. The main span weighed 1629 tons, the side spans 154 and 166 tons (Buck, Proc. Inst. C.E. cxliv. p. 70). Prof. Claxton Fidler, speaking of the arrangement adopted for putting initial stress on the top chord, stated that this bridge marked the furthest

between centres of ribs of main arch is 27! ft. at crown and 53 ft. 9 in. at springings. The curve of the main arch is a parabola. The bridge has a roadway of 30 ft. for two lines of rails. Each half arch was supported by cables till joined at the centre. An electric cable- way of 900 ft. span capable of carrying 10 tons was used in erection.

12. (g) Movable Bridges can be closed to carry a road or railway or in some cases an aqueduct, but can be opened to give free passage to navigation. They are of several types : —

(1) Lifting Bridges. — The bridge with its platform is suspended from girders above by chains and counterweights at the four corners (fig. 33 a). It is lifted vertically to the required height

Fig. 29.— St advance yet made in this type of construction. When such a rib is erected on centering without initial stress, the subsequent compression of the arch under its weight inflicts a bending stress and excess of compression in the upper member at the crown. But the bold expedients adopted by the engineer annulled the bending action. The Garabit viaduct carries the railway near St Flour, in the Cantal department, France, at 420 ft. above low water. The deepest part of the valley is crossed by an arch of 541 ft. span, and 213 ft. rise. The bridge is similar to that at Oporto, also designed by Seyrig. It is formed by a crescent-shaped arch, continued on one side by four, on the other side by two lattice girder spans, on iron piers. The arch is formed by two lattice ribs hinged at the abutments. Its depth at the crown is 33 ft., and its centre line

Louis Bridge.

when opened. Bridges of this type are not very numerous or important.

(2) Rolling Bridges. — The girders are longer than the span and the part overhanging the abutment is counter-weighted so that the centre of gravity is over the abutment when the bridge is rolled forward (fig. 33′ b). To fill the gap in the approaches when the bridge is rolled forward a frame carrying that part of the road is moved into place sideways. At Sunderland, the bridge is first lifted by a hydraulic press so as to clear the roadway behind, and is then rolled back.

Fig. 30. — Viaur Viaduct.

follows nearly the parabolic line of pressures. The two arch ribs are 65$ ft. apart at the springings and 2o| ft. at the crown. The roadway girders are lattice, 17 it. deep, supported from the arch ribs at four points. The total length of the viaduct is 1715 ft. The lattice girders of the side spans were first rolled into place, so as to project some distance beyond the piers, and then the arch

(3) Draw or Bascule Bridges. — The fortress draw-bridge is the original type, in which a single leaf, or bascule, turns round a horizontal hinge at one abutment. The bridge when closed is supported on abutments at each end. It is raised by chains and counterweights. A more common type is a bridge with two

ribs were built out, being partly supported by wire-rope cables from leaves or bascules, one hinged at each abutment. When closed

the bascules are locked at the centre (see fig. 13). In these bridges each bascule is prolonged backwards beyond the hinge so as to balance at the hinge, the prolongation sinking into the piers when the bridge is opened.

(4) Swing or Turning Bridges. — The largest movable bridges

i!6x > ˆixMxi >

ixˆˆbˆxixlxlxtˆˆ

Fig. 31. — Douro Viaduct, revolve about a vertical axis. The bridge is carried on a circular base plate with a central pivot and a circular track for a live ring and conical rollers. A circular revolving platform rests on the pivot and rollers. A toothed arc fixed to the revolving platform or to the live ring serves to give motion to the bridge.

the span. The counterweight is a depressed cantilever arm 12 ft. long, overlapped by the fixed platform which sinks into a recess in the masonry when the bridge opens. In closed position the main girders rest on a bed plate on the face of the pier 4 ft. 3 in. beyond the shaft bearings. The bridge is worked by hydraulic power, an accumulator with a load of 34 tons supplying pressure water

at 630 lb per sq. in. The bridge opens in 15 seconds and closes in 25 seconds.

At the opening span of the Tower bridge (fig. 13) there are four main girders in each bascule. They project 100 ft. be- yond and 62 ft. 6 in. within the face of the piers. Transverse girders and bracings are inserted between the main girders at 12 ft. intervals. The floor is of buckled plates paved with wood blocks. The arc of rotation is 82°, and the axis of rotation is 13 ft. 3 in. inside the face of the piers, and 5 ft. 7 in. below the roadway. The weight of ballast in the short arms of the bascules is 365 tons. The weight of each leaf including ballast is about 1070 tons. The axis is of forged steel 21 in. in diameter and 48 ft. long. The axis has eight bearings, consisting of rings of live rollers 4 T ‘ S in. in diameter and 22 in. long. The bascules

**/ai — — — — ■ anˆ — — ˆ » ˆPPP ■” ”” “■”■ ™~ *

1 ᶜ_ ”” ■ ■”— “ˆ Cupˆˆ ˆˆmˆT? »«Br ■■ •■■■ J

1 v.ˆ§_. ” fv J ˆˆC 7rˆ mmm jSˆ

I iy £___ _ _ Jjfcap ˆ

*W—zio *•■*

8f0 — ■ —

‘^■ — ■tao’ — -A

Fig. 32. — Niagara Falls and Clifton Bridge.

The main girders rest on the revolving platform, and the ends of the bridge are circular arcs fitting the fixed roadway. Three arrangements are found: (a) the axis of rotation is on a pier at the centre of the river and the bridge is equal armed (fig. 33 c), so that two navigation passages are opened simultaneously, (b) The

axis of rotation is on one abutment, and the bridge is then usually unequal armed(fig. 33d) , the shorter arm being over the land, (c) In some small bridges the shorter arm is vertical and the bridge turns on a kind of vertical crane post at the abutment (fig. 3$e). (5) Floating Bridges, the roadway being carried on pontoons moored in the

stream.

The movable bridge in its closed position must be proportioned like a fixed bridge, but it has also other conditions to fulfil. If it re- volves about a vertical axis its centre of gravity must always lie in that axis; if it rolls the centre of gravity must always lie over ‘ the abutment. It must have strength to support safely its own overhanging weight when moving. At Konigsberg there is a road bridge of two fixed spans of 39 ft., and a central span of 60 ft. between bearings, or 41 ft. clear, with balanced bascules over the centre span. Each bascule consists of two main girders with cross girders and stringers. The main girders are hung at each side on a horizontal shaft 84 in. in diameter, and are 6 ft. deep at the hinge, diminishing to 1 ft. 7 in. at the centre of

Fig. 33.

are rotated by pinions driven by hydraulic engines working in steel sectors 42 ft. radius (Proc. Inst. C.E. cxxvii. p. 35).

As an example of a swing bridge, that between Duluth and Superior at the head of Lake Superior over the St Louis river may be described. The centre opening is 500 ft., spanned by a turning bridge, 58 ft. wide. The girders weighing 2000 tons carry a double track for trains between the girders and on each side on cantilevers a trolley track, roadway and footway. The bridge can be opened in 2 minutes, and is operated by two large electric motors. These have a speed reduction from armature shaft to bridge

column of 1500 to 1, through four intermediate spur gears and a worm gear. The end lifts which transfer the weight of the bridge to the piers when the span is closed consist of massive eccentrics having a throw of 4 in. The clearance is 2 in., so that the ends are lifted 2 in. This gives a load of 50 tons per eccentric. One motor is placed at each end of the span to operate the eccentrics and also to release the latches and raise the rails of the steam track.

At Riga there is a floating pontoon bridge over the Diina. It consists of fourteen rafts, 105 ft. in length, each supported by two pontoons placed 64 ft; apart. The pairs of rafts are joined by three baulks 15 ft. long laid in parallel grooves in the framing. Two spans are arranged for opening easily. The total length is 1720 ft. and the width 46 ft. The pontoons are of iron, 85! ft. in length, and their section is elliptical, I0j ft. horizontal and 12 ft. vertical. The dis- placement of each pontoon is 180 tons and its weight 22 tons. The mooring chains, weighing 22 lb per ft., are taken from the upstream end of each pontoon to a downstream screw pile mooring and from the downstream end to an upstream screw pile.

13. Transporter Bridges. — This new type of bridge consists of a high level bridge from which is suspended a car at a low level. The car receives the traffic and conveys it across the river, being caused to travel by electric machinery on the high level bridge. Bridges of this type have been erected at Portugalete, Bizerta, Rouen, Rochefort and more recently across the Mersey between the towns of Widnes and Runcorn.

The Runcorn bridge crosses the Manchester Ship Canal and the Mersey in one span of 1000 ft., and four approach spans of 55J ft. on one side and one span on the other. The ‘ low-level approach roadways are 35 ft. wide with footpaths 6 ft. wide on each side. The supporting structure is a cable suspension bridge with stiffening girders. A car is suspended from the bridge, carried by a trolley running on the underside of the stiffening girders, the car being

propelled electrically from one side to the other. The underside of the stiffening girder is 82 ft. above the river. The car is 55 ft. long by 24ˆ ft. wide. The electric motors are under the control of the driver in a cabin on the car. The trolley is an articulated frame 77 ft. long in five sections coupled together with pins. To this are fixed the bearings of the running wheels, fourteen on each side. There are two steel-clad series-wound motors of 36 b.h.p. For a test load of 120 tons the tractive force is 70 lb per ton,

which is sufficient for acceleration, and maintaining speed against wind pres- sure. The brakes are magnetic, with auxiliary handbrakes. Elec- tricity is obtained by two gas engines (one spare) each of 75 b.h.p.

by dredging, or some form of mechanical excavator, until the formation is reached which is to support the pier; the concrete is then shot into the enclosed space from a height of about 10 ft., and rammed down in layers about 1 ft. thick ; it soon consolidates into a permanent artificial stone.

Piles are used as foundations in compressible or loose soil. The heads of the piles are sawn off, and a platform of timber or concrete rests on them. Cast iron and concrete reinforced piles are now used. Screw piles are cast iron piles which are screwed

SANOSTONE ROCI

Fig. 34. — Widnes and Runcorn Transporter Bridge.

On the opening day passengers were taken across at the rate of more than 2000 per hour in addition to a number of vehicles. The time of crossing is 3 or 4 minutes. The total cost of the structure was £133,000.

14. In the United States few railway companies design or build their own bridges. General specifications as to span, loading, &c, are furnished to bridge-building companies, which make the design under the direction of engineers who are experts in this kind of work. The design, with strain sheets and detail drawings, is submitted to the railway engineer with estimates. The result is that American bridges are generally of well-settled types and their members of uniform design, carefully considered with reference to convenient and accurate manufacture. Stand- ard patterns of details are largely adopted, and more system is introduced in the workshop than is possible where the designs are more varied. Riveted plate girders are used up to 50 ft. span, riveted braced girders for spans of 50 ft. to 75 ft., and pin- connected girders for longer spans. Since the erection of the Forth bridge, cantilever bridges have been extensively used, and some remarkable steel arch and suspension bridges have also been constructed. Overhead railways are virtually continuous bridge constructions, and much attention has been given to a study of the special conditions appertaining to that case.

Substructure.

15. The substructure of a bridge comprises the piers, abut- ments and foundations. These portions usually consist of masonry in some form, including under that general head stone masonry, brickwork and concrete. Occasionally metal work or woodwork is used for intermediate piers.

When girders form the superstructure, the resultant pressure on the piers or abutments is vertical, and the dimensions of these are simply regulated by the sufficiency to bear this vertical load.

When arches form the superstructure, the abutment must be so designed as to transmit the resultant thrust to the foundation in a safe direction, and so distributed that no part may be unduly compressed. The intermediate piers should also have consider- able stability, so as to counterbalance the thrust arising when one -arch is loaded while the other is free from load.

For suspension bridges the abutment forming the anchorage must be so designed as to be thoroughly stable under the greatest pull which the chains can exert. The piers require to be carried above the platform, and their design must be modified according to the type of suspension bridge adopted. When the resultant pressure is not vertical on the piers these must be constructed to meet the inclined pressure. In any stiffened suspension bridge the action of the pier will be analogous to that of a pier between two arches.

Concrete in a shell is a name which might be applied to all the methods of founding a pier which depend on the very valuable property which strong hydraulic concrete possesses of setting into a solid mass under water. The required space is enclosed by a wooden or iron shell; the soil inside the shell is removed

IV. 18

into the soil instead of being driven in. At their end is fixed a blade of cast iron from two to eight times the diameter of the shaft of the pile; the pitch of the screw varies from one-half to one- fourth of the external diameter of the blade.

Disk piles have been used in sand. These piles have a flat flange at the bottom, and water is pumped in at the top of the pile, which is weighted to prevent it from rising. Sand is thus blown or pumped from below the piles, which are thus easily lowered in ground which baffles all attempts to drive in piles by blows. In ground which is of the nature of quicksand, piles will often slowly rise to their original position after each blow.

Wells. — In some soils foundations may be obtained by the device of building a masonry casing like that of a well and excavating the soil inside; the casing gradually sinks and the masonry is continued at the surface. This method is applicable in running sands. The interior of the well is generally filled up with concrete or brick when the required depth has been reached.

Piers and Abutments. — Piers and abutments are of masonry, brick- work, or cast or wrought iron. In the last case they consist of any number of hollow cylindrical pillars, vertical or raking, turned and planed at the ends and united by a projection or socket and by flanges and bolts. The pillars are strength- ened against lateral yielding by horizontal and diagonal bracing. In some cases the piers are cast iron cylinders 10 ft. or more in diameter filled with concrete.

Cylinder Foundations. — Formerly when bridge piers had to be placed where a firm bearing stratum could only be reached at a considerable y^j depth, a timber cofferdam was used j in which piles were driven down to the firm stratum. On the piles the masonry piers were built. Many bridges so constructed have stood for centuries. A great change of

method arose when iron cylinders p IG . 35. Cylinder, Charing

and in some cases brick cylinders Cross Bridge,

or wells were adopted for founda- tions. These can be sunk to almost any depth or brought up to any height, and are filled with Portland cement con- crete. They are sometimes excavated by grabs. Sometimes they are closed in and kept free of water by compressed air so that excavation work can be carried on inside them (fig. 35). Sometimes in silty river beds they are sunk 100 ft. or more, for

security against deep scouring of the river-bed in floods. In the case of the Empress bridge over the Sutlej each pier consisted of three brick wells, 19 ft. in diameter, sunk no ft. The piers of the Benares bridge were single iron caissons, 65 ft. by 28 ft., sunk about 100 ft., lined with brick and filled with concrete. At the Forth bridge iron caissons 70 ft. in diameter were sunk about 40 ft. into the bed of the Forth. In this case the compressed air process was used.

16. Erection. — Consideration of the local conditions affecting the erection of bridges is always important, and sometimes becomes a controlling factor in the determination of the design. The methods of erection may be classed as — (1) erection on staging or falsework; (2) floating to the site and raising; (3) rolling out from one abutment; (4) building out member by member, the completed part forming the stage from which additions are handled.

(1) In erection on staging, the materials available determine the character

of the staging; stacks of timber, earth banks, or built- up staging of piles and trestles have all been employed, also iron staging, which can be rapidly erected and moved from site to site. The most ordinary type of staging consists of timber piles at nearly equal distances of 20 ft. to 30 ft., carrying a timber platform, on which the bridge is erected. Sometimes a wide space is left for navigation, and the platform at this part is carried by a timber and iron truss. When the headway is great or the river deep, timber- braced piers or clusters of piles at distances of 50 ft. to 100 ft. may be used. These carry temporary trusses of timber or steel. The Kuilenburg bridge in Holland, which has a span of 492 ft., was erected on a timber staging of this kind, containing 81,000 cub. ft. of timber and 5 tons of bolts. The bridge superstructure weighed 2150 tons, 80 that 38 cub. ft. of timber were used per ton of superstructure.

(2) The Britannia and Conway bridges were built on staging on shore, lifted by pontoons, floated out to their position between the

Ciers, and lastly lifted into place by hydraulic presses. The Moerdyk ridge in Holland, with 14 spans of 328 ft., was erected in a similar way. The convenience of erecting girders on shore is very great, but there is some risk in the floating operations and a good deal of hauling plant is required.

(3) If a bridge consists of girders continuous over two or more spans, it may be put together on the embankment at one end and rolled over the piers. In some cases hauling tackle is used, in others power is applied by levers and ratchets to the rollers on which the girders travel. In such rolling operations the girder is subjected to straining actions different from those which it is intended to resist, and parts intended for tension may be in compression; hence it may need to be stiffened by timber during rolling. The bending action on the bottom boom, in passing over the rollers is also severe. Modifications of the system have been adopted for bridges with discontinuous spans. In narrow ravines a bridge of one span may be rolled out, if the projecting end is supported on a temporary suspension cable anchored on each side. The free end is slung to a block running on the cable. If the bridge is erected when the riˆer is nearly dry a travelling stage may be constructed to carry the projecting end of the girder while it is hauled across, the other end resting on one abutment. Sometimes a girder is rolled out about one-third of its length, and then supported on a floating pontoon.

(4) Some types of bridge can be built out from the abutments, the completed part forming an erecting stage on which lifting appliances are fixed. Generally, in addition, wire cables are stretched across the span, from which lifting tackle is suspended. In bridges so erected the straining action during erection must be studied, and material must be added to

resist erecting stresses. In the case of the St Louis bridge, half arches were built out on either side of each pier, so that the load balanced. Skeleton towers on the piers supported chains attached to the arched ribs at suitable points. In spite of careful provision, much difficulty was experienced in making the connexion at the crown, from the expansion due to temperature changes. The Douro bridge was similarly erected. The girders of the side spans were rolled out so as to overhang the great span by 105 ft., and formed a platform from which parts of the arch could be suspended. Dwarf towers, built on the arch ring at the fifth panel from either side, helped to support the girder above, in erecting the centre part of the arch (Seyrig, Proc. Inst. C.E. lxiii. p. 177). The great cantilever bridges have been erected in the same way, and they are specially adapted for erection by building out.

Straining Actions and Working Stresses.

17. In metal bridges wrought iron has been replaced by mild steel — a stronger, tougher and better material. Ingot metal or mild steel was sometimes treacherous when first introduced, and accidents occurred, the causes of which were obscure. In fact, small differences of composition or variations in thermal treat- ment during manufacture involve relatively large differences of

quality. Now it is understood that care must be taker! in specifying the exact quality and in testing the material supplied. Structural wrought iron has a tenacity of 20 to 22ˆ tons per sq. in. in the direction of rolling, and an ultimate elongation of 8 or 10 % in 8 in. Across the direction of rolling the tenacity is about 18 tons per sq. in., and the elongation 3 % in 8 in. Steel has only a small difference of quality in different directions. There is still controversy as to what degree of hardness, or (which is nearly the same thing) what percentage of carbon, can be permitted with safety in steel for structures.

The qualities of steel used may be classified as follows: — (a) Soft steel, having a tenacity of 22 J to 26 tons per sq. in., and an elongation of 32 to 24% in 8 in. (b) Medium steel, having a tenacity of 26 to 34 tons per sq. in., and 28 to 25% elongation, (c) Moderately hard steel, having a tenacity of 34 to 37 tons per sq. in., and 17% elonga- tion, (d) Hard steel, having a tenacity of 37 to 40 tons per sq. in., and 10% elongation. Soft steel is used for rivets always, and sometimes for the whole superstructure of a bridge, but medium steel more generally for the plates, angle bars, &c, the weight of the bridge being then reduced by about 7% for a given factor of safety. Moderately hard steel has been used for the larger members of long- span bridges. Hard steel, if used at all, is used only for compression members, in which there is less risk of flaws extending than in tension

members. With medium or moderately hard steel all rivet holes should be drilled, or punched | in. less in diameter than the rivet and reamed out, so as to remove the ring of material strained by the punch.

In the specification for bridge material, drawn up by the British Engineering Standards Committee, it is provided that the steel shall be acid or basic open-hearth steel, containing not more than 0-06% of sulphur or phosphorus. Plates, angles and bats, other than rivet bars, must have a tensile strength of 28 to 32 tons per sq. in., with an elevation of 20% in 8 in. Rivet bars tested on a gauge length eight times the diameter must have a tensile strength of 26 to 30 tons per sq. in. and an elongation of 25%.

18. Straining Actions. — The external forces acting on a bridge may be classified as follows: —

(1) The live or temporary load, for road bridges the weight of a dense crowd uniformly distributed, or the weight of a heavy wagon or traction engine ; for railway bridges the weight of the heaviest train likely to come on the bridge. (2) An allowance is sometimes made for impact, that is the dynamical action of the live load due to want of vertical balance in the moving parts of locomotives, to irregularities of the permanent way, or to yielding of the structure. (3) The dead load comprises the weight of the main girders, flooring and wind bracing, or the total weight of the superstructure exclusive of any part directly carried by the piers. This is usually treated as uniformly distributed over the span. (4) The horizontal pressure due to a wind blowing transversely to the span, which becomes of im- portance in long and high bridges. (5) The longitudinal drag due to the friction of a train when braked, about one-seventh of the weight of the train. (6) On a curved bridge the centrifugal load due to the radical acceleration of the train. If w is the weight of a locomotive in tons, r the radius of curvature of the track, v the velocity in feet per sec; then the horizontal force exerted on the bridge is w&jgr tons. (7) In some cases, especially in arch and suspension bridges, changes of temperature set up stresses equivalent to those produced by an external load. In Europe a variation of temperature of 70 C. or 126° F. is com- monly assumed. For this the expansion is about 1 in. in 100 ft. Generally a structure should be anchored at one point and free to move if possible in other directions. Roughly, if expansion is prevented, a stress of one ton per sq. in. is set up in steel structures for each 12° change of temperature.

i. Live Load on Road Bridges. — A dense crowd of people may be taken as a uniform load of 80 to 120 lb per sq. ft. But in recent times the weight of traction engines and wagons which pass over bridges has increased, and this kind of load generally produces greater straining action than a crowd of people. In manufacturing districts and near large towns loads of 30 tons

may come on road bridges, and county and borough authorities insist on provision being made for such loads. In Switzerland roads are divided into three classes according to their importance, and the following loads are prescribed, the designer having to provide sufficient strength either for a uniformly distributed crowd, or for a heavy wagon anywhere on the roadway : —

Crowd, lb per sq. ft.

Wagon, tons per axle.

Main Roads …. Secondary Roads . Other Roads

92

72 51

10 with 13 ft. wheel base 6 ,, 10 „ „ 3.. 8 „

In England still larger loads are now provided for. J. C. Inglis (ProCi Inst. C.E. cxli. p. 35) has considered two cases — (a) a traction engine and boiler trolley, and (b) a traction engine and trucks loaded with granite. He has calculated the equivalent load per foot of span which would produce the same maximum bending moments. The following are some of the results : —

Span Ft.

10.

20.

30.

40.

50.

Equivalent load in tons per ft. run,

Case a

Do. Case b

1-75 3-25

o-95

i-7

o-75 i-3

o-73

1-2

0-72

I- 15

Large as these loads are on short spans, they are not more than must often be provided for.

Live Load on Railway Bridges. — The live load is the weight of the heaviest train which can come on the bridge. In the earlier girder bridges the live load was taken to be equivalent to a uniform load of I ton per foot run for each line of way. At that time locomotives on railways of 4 ft. Si in. gauge weighed at most 35 to 45 tons, and their length between buffers was such that the average load did not exceed 1 ton per foot run. Trains of wagons did not weigh more than three-quarters of a ton per foot run when most heavily loaded. The weights of engines and wagons are now greater, and in addition it is recognized that the concentration of the loading at the axles gives rise to greater straining action, especially in short bridges, than the same load uniformly distributed along the span. Hence many of th earlier bridges have had to be strengthened to carry modern traffic.. The following examples of some of the heaviest locomotives on English railways is given by W. B. Farr (Proc. Inst. C. E. cxli. p. I?).:—*

Passenger Engines.

Total weights, tons ….

84-35

98-90

91-90

85-48

Tons per ft. over all .

1-58

171

1-62

i-6i

Tons per ft. of wheel base .

1-92

2-04

1-97

1-95

Maximum axle load, tons.

19-00

16-00

18-70

18-50

Goods Engines.

Total weight, tons ….

77-90

78-80

7646

75-65

Tons per ft. over all .

1-54

1-50

1-54

i-5i

Tons per ft. of wheel base .

2-02

2-02

2-03

2-00

Maximum axle load, tons .

I5-90

16-00

13-65

15-50

Tank Engines.

Total weight, tons ….

53-80

58-61 6o-8o

47-00

Tons per ft. over all .

i-6o

i-68

1-70

i-55

Tons per ft. of wheel base.

2-45

2-52

2-23

3-03

Maximum axle load, tons.

17-54

15-29

17-10

15-77

Farr has drawn diagrams of bending moment for forty different very heavy locomotives on different spans, and has determined for each case a uniform load which at every point would produce as great a bending moment as the actual wheel loads. The following short abstract gives the equivalent uniform load which produces bending moments as great as those of any of the engines calculated : —

Load per ft. run equivalent to actual Wheel Loads in Tons,

Span in Ft.

for each Track.

5

76

IO-0

4-85

20-0

3-20

30-0

2-63

50-O

2-24

100-0

1-97

Fig. 36 gives the loads per axle and the distribution of loads in some exceptionally heavy modern British locomotives.

4W

eJA'_4---“>j*— el;c7 ‘*

e'-ar

._»:-£ _J«_ «-«:*

i--- \ Wsˆ L°yer_ iBuffet'S. L___L.

6-6

. + -&£

T.lc. Tic. r.\a. rlc. r.ic. r.ic.

IG-I3 18-0 18-0 12-17 11-10 14-10

Express Passenger Engine, G.N. Ry.

T .1 C.

14-18

5-3′ ‘ 5'&” ! 5-3″ J 5'-10V

....···ˆˆM + Ai.,). ˆˆ___ˆ_5-3 • 5-3″ – ˆˆa-??*

l 1 . J saˆitfover Buffers, ‘if

;$

T-

12-13

T.

14-08

I”” x1

TA

14-14-

“fl iX

f2-+S 10-4-6

Goods Engine, L. & Y. Ry.

iX

10-46

if

10-46

■<£■

TA S-65

*76-6**

1Z-dS

/8-0 17-ta

Passenger Engine, Cal. Ry.

Fig. 36.

In Austria the official regulations require that railway bridges shall be designed for at least the following live loads per foot run and per track :-

Span.

Live Load in Tons.

Metres. i

2

5

20

3°

Ft.

3-3

6-6

i6 > 4

65-6

9»-4

Per metre run.

20

15

io

5 4

Per ft. run.

6-1 4-6 3-1

i-5

1-2

It would be simpler and more convenient in designing short bridges if, instead of assuming an equivalent uniform rolling load, agreement could be come to as to a typical heavy locomotive which would produce stresses as great as any existing locomotive on each class of railway. Bridges would then be designed for these selected loads, and the process, would be safer in dealing with flooring girders and shearing forces than the assumption of a uniform load.

Some American locomotives are very heavy. Thus a consolida- tion engine may weigh 126 tons with a length over buffers of 57 ft., corresponding to an average load of 2-55 tons per ft. run. Also long ore wagons are used

which weigh loaded two tons per ft. run. J.A.L. Waddell (De Pontibus, New York, 1898) proposes to arrange railways in seven classes, according to the live loads which may be expected from the character of their traffic, and to construct bridges in accordance with this classification. For the lightest class; he takes a locomotive and tender of 93-5 tons, 52 ft. between buffers (average load 1-8 tons per ft. run), and for the heaviest a locomotive and tender weighing 144-5 tons, 52 ft. between buffers (average load 2-77 tons per ft. run). Wagons he assumes to weigh for the lightest class 1-3 tons per ft. run and for the heaviest 1-9 tons. He takes as the live load for a bridge two such engines, followed by a train of wagons covering the span. Waddell's tons are short tons of 2000 lb.

ii. Impact.— If a vertical load is imposed suddenly, but without velocity, work is done during deflection, and the deformation and stress are .momentarily double those due to the same load at rest on the structure. No load of exactly this kind is ever applied to a bridge. But if a load is so applied that the deflection increases with speed, the stress is greater than that due to a very gradually applied load, and vibrations about a mean position are set up. The rails not being absolutely straight and smooth, centrifugal and lurching actions occur which alter the distribution of the loading. Again, rapidly changing forces-, due to the moving parts of the engine which are unbalanced vertically, act on the bridge; and, lastly, inequalities of level at the rail ends give rise to shocks. For all these reasons the stresses due to the live load are greater than those due to the same load resting quietly on the bridge. This increment is larger on the flooring girders than on the main ones, anˆd on short main girders than On long ones. The impact stresses depend so much on lcxˆal conditions that it is difficult to fix what allowance should be made. E. H. Stone '(Trans. Am. Soc. of C. B. xli. p. 467) collated some measurements of deflection taken during official trials of Indian bridges, and found the increment of deflection due to impact to depend on the ratio of dead to live load. By plotting and averaging he obtained the following results : —

Excess of Deflection and straining Action of a moving Load over that due to a resting Load.

Dead load in per cent of total load.

10

20

3°

40

50

70

90

Live load in per cent of total load . . ‘ .

90

80

7″

(■n i-5

r)°

30

10

Ratio of ; live to dead load. .■■

9

4

2-3

I-O

o-43

O-IO

Excess of deflection and stress due to moving load per cent

23

13

8

5-5

4-0

These results are for the centre deflections of main girders, but Storie infers : that the augmentation of stress for any member, due to causes included in impact allowance, will be the same per- centage for the same ratios of live to dead load stresses. Valuable measurements of the deformations of girders and tension members due ta moving, trains have been made by S. W. Robinson {Trans. Am. Soc. C. E. xvi.) and by F. E. Turneaure (Trans. Am. Soc. C. E. xli.). The latter used a recording, defiectometer and two recording extenso- meters. The observations are difficult, and the inertia of the instru- ment is liable to cause error, but much care was taken. The most striking conclusions from the results are that the locomotive balance weights have a large effect in causing vibration, and next, that in certain cases the vibrations are cumulative, reaching a value greater than that due to any single impact action. Generally : (1) At speeds less than 25 m. an hour there is not much vibration. _ (2) The increase of deflection due to impact at 40 or 50 m. an hour is likely to reach

40 to 50% for girder spans of less than 50 ft. (3) This percentage decreases rapidly for longer spans, becoming about 25 % for 75-ft. spans. (4) The increase per cent of boom stresses due to impact is about the same as that of deflection; that in web bracing bars is rather greater. (5) Speed of train produces no effect on the mean deflection, but only on the magnitude of the vibrations.

A purely empirical allowance for impact stresses has been proposed, amounting to 20% of the live load stresses for floor stringers; 15% for floor cross girders; and for main girders, 10% for 40-ft. spans, and 5% for 100-ft. spans. These percentages are added to the live load stresses.

iii. Dead Load. — The dead load consists of the weight of main girders, flooring and wind-bracing. It is generally reckoned to be uniformly distributed, but in large spans the distribution of weight in the main girders should be calculated and taken into account. The weight of the bridge flooring depends on the type adopted. Road bridges, vary so much in the character of the flooring that no general rule can be given. In railway bridges the weight 6f sleepers, rails, &c, is o-2 to 0-25 tons per ft. run for each line of way, while the rail girders, cross girders, &c, weigh 0-15 to 0‘2 tons. If a foot- way is added about 0-4 ton per ft. run may be allowed for this. The weight of main girders increases with the span, and there is for any type of bridge a limiting span beyond which the dead load stresses exceed the assigned limit of working stress.

Let Wi be the total live load, W/ the total flooring load on a bridge of span I, both being considered for the present purpose to be uniform per ft. run. Let &(W;+W/) be the weight of main girders designed to carry Wr+W/, but not their own weight in addition. Then

w =(m+w,){k+k+k 3 . . .)*

will be the weight of main girders to carry Wi+W/ and their own weight (Buck, Proc. Inst. C. E. lxvii. p. 331). Hence,

W„ = (W,+W /)/(i-ife).*

Since in designing a bridge Wi+W/ is known, £(Wj+W/) can be found from a provisional design in which the weight W, is neglected. The actual bridge must have the section of all members greater than those in the provisional design in the ratio k/(i—k).

Waddell {De Pontibus) gives the following convenient empirical relations. Let Wi, wˆ be the weights of main girders per ft. run for a live load p per ft. run and spans h, Z 2 . Then

«»/% = §&/! + &/«']■*

Now let wi', Wi be the girder weights per ft. run for spans l u h, and live loads p' per ft. run. Then

A partially rational approximate formula for the weight of main girders is the following (Unwin, Wrought Iron Bridgis and Roofs, 1869, p. 40):— ...

Let w = total live load per ft. run of girder; wi the weight of platform per ft. run; w s the weight of main girders per ft. run, all in tons; Z = span in ft.; s = average stress in tons per sq. in. on gross section of metal; d = depth of girder at centre in ft.; r = ratio of span to depth of girder so that r = l/d. Then

W3 = (wi+W2)P/{Cds— h) = {wi--Wi)lrl (Cs —Ir) ,

where C is a constant for any type of girder. It is not easy to fix the average stress s per sq. in. of gross section. Hence the formula is more useful in the form

w = (wi+w 2)Pl(Kd-P) = (w>i+aij)/r/(K-Zr)

where k = (wi--Wi--Ws)lr/w3 is to be deduced from the data of some bridge previously designed with the same working stresses. From some known examples, C varies from 1500 to 1800 for iron braced parallel or

bowstring girders, and from 1200 to 1500 for similar girders of steel. K = 6ooo to 7200 for iron and =7200 to 9000 for steel bridges.

iv. Wind Pressure. — Much attention has been given to wind action since the disaster to the Tay bridge in 1879. As to the maximum wind pressure on small plates normal to the wind, there is not much doubt. Anemometer observations show that pressures of 30 lb per sq. ft. occur in storms annually in many localities, and that occasionally higher pressures are recorded in exposed positions. Thus at Bidstone, Liverpool, where the gauge has an exceptional exposure, a pressure of 80 lb per sq. ft. has been observed. In tornadoes, such as that at St Louis in 1896, it has been calculated, from the stability of structures overturned, that pressures of 45 to 90 lb per sq. ft. must have been reached. As to anemometer pressures, it should be observed that the recorded pressure is made up of a positive front and negative (vacuum) back pressure, but in structures the latter must be absent or only partially developed. Great difference of opinion exists as to whether on large surfaces the average pressure per sq. ft. is as great as on small, surf aces, such as anemometer plates. The experiments of Sir B. Baker at the Forth bridge showed that on a surface 30 ft. X 15 ft- the intensity of pressure was less than on a similarly exposed anemometer plate. In the case of bridges there is the further difficulty that some surfaces partially

shield other surfaces; one girder, for instance, shields the girder behind it (see Brit. Assoc. Report, 1884). In J 88l a committee of the Board of Trade decided that the maximum wind pressure on a vertical surface in Great Britain should be assumed in designing structures to be 56 lb per sq. ft. For a plate girder bridge of less height than the train, the wind is to be taken to act on a surface equal to the projected area of one girder and the exposed part of a train covering the bridge. In the case of braced girder bridges, the wind pressure is taken as acting on a continuous surface extending from the rails to the top of the carriages, plus the vertical projected area of so much of one girder as is exposed above the train or below the rails. In addition, an allowance is made for pressure on the lee-ward girder according to a scale. The committee recommended that a factor of safety of 4 should be taken for wind stresses. For safety against overturning they considered a factor of 2 sufficient. In the case of bridges not subject to Board of Trade inspection, the allow- ance for wind pressure varies in different cases. C. Shaler Smith allows 300 lb per ft. run for the pressure on the side of a train, and in addition 30 lb per sq. ft. on twice the vertical projected area of one girder, treating the pressure on the train as a

travelling load. In the case of bridges of less than 50 ft. span he also provides strength to resist a pressure of 5° tt> per sq. ft. on twice the vertical projection of one truss, no train being supposed to be on the bridge.

19. Stresses Permitted. — For a long time engineers held the convenient opinion that, if the total dead and live load stress on any section of a structure (of iron) did not exceed 5 tons per sq. in., ample safety was secured. It is no longer possible to design by so simple a rule. In an interesting address to. the British Association in 1885, Sir B.Baker described the condition of opinion as to the safe limits of stress as chaotic. " The old foundations," he said, " are shaken, and engineers have not come to an agreement respecting the rebuilding of the structure. The variance in the strength of existing bridges is such as to be apparent to the educated eye without any calculation. In the present day engineers are in accord as to the principles of estimat- ing the magnitude of the stresses on the members of a structure, but not so in proportioning the members to resist those stresses. The practical result is that a bridge which would be passed by the English Board of Trade would require to be strengthened 5% in some parts and 60% in others, before it would be ac- cepted by the German government, or by any of the leading rail- way companies in America." Sir B. Baker then described the results of experiments on repetition of stress, and added that " hundreds of existing bridges which carry twenty trains a day with perfect safety would break down quickly under twenty trains an hour. This fact was forced on my attention nearly twenty-five years ago by the fracture of a' number of girders of ordinary strength under a five-minutes' train service."

Practical experience taught engineers that though 5 tons per sq. in. for iron, or 6| tons per sq. in. for steel, was safe or more than safe for long bridges with large ratio of dead to live load, it was not safe for short ones in which the stresses are mainly due to live load, the weight of the bridge being small. The experiments of A. Wohler, repeated by Johann Bauschinger, Sir B. Baker and others, show that the breaking stress of a bar is not a fixed quantity, but depends on the range of variation of stress to which it is sub- jected, if that variation is repeated a very large number of times. Let K be the breaking strength of a bar per unit of section, when it is loaded once gradually to breaking. This may be termed the statical breaking strength. Let fcˆ x . be the breaking strength of the same bar when subjected to stresses varying from &„„• to kmin. alternately and repeated an indefinitely great number of times; kmin' is to be reckoned + if of the same kind as kmax- and — if of tie opposite kind (tension or thrust). The range of stress is there- fore kmax.—k m i„., if the stresses are both of the same kind, and kmax- +k„in; if they are of opposite kinds. Let A = kma*. + k m i n – = the range of stress, where A is always positive. Then Wohler's results agree closely with the rule,*

■»•. = JA+ V(K 2 -raAK), where n is a constant which varies from 1-3 to 2 in various qualities of iron and steel. For ductile iron or mild steel it may be taken as 1-5. For a statical load, range of stress nil, A = o, k max . = Vi., the statical breaking stress. For a bar so placed that it is alternately loaded and the load removed, A = £„<.». and kma X . =o-6 K. For a bar subjected to alternate tension and compression of equal amount, A = 2 fmax- and&mai. = 0-33 K. The safe working stress in these dif- ferent cases is &»„*. divided by the factor of safety. It is sometimes said that a bar is ' ' fatigued ' ' by repeated straining. The real nature of the action is not well understood, but the word fatigue may be used, if it is not considered to imply more than that the breaking stress under repetition of loading diminishes as the range of variation increases.

It was pointed out as early as 1869 (Unwin, Wrought Iron Bridges and Roofs) that a rational method of fixing the working stress, so far as knowledge went at that time, would be to make it depend on the ratio of live to dead load, and in such a way that the factor of safety for the live load stresses was double that for the dead load stresses. Let A be the dead load and B the live load, producing stress in a bar; p = B/A the ratio of live to dead load; f\ the safe working limit of stress for a bar subjected to a dead load only and / the safe working stress in any other case. Then

fi(A+B)/(A+2B) =/,(i+p)/(i +2 P). The following table gives values of / so computed on the assumption that /1 = 7 J tons per sq. in. for iron and 9 tons per sq. in. for steel.

Working Stress for combined Dead and Live Load. Factor of Safety twice as great for Live Load as for Dead Load.

Ratio P

I+P I+2p

Values of /, tons per sq. in.

Iron.

Mild Steel.

All dead load . .

1-00

7-5

9P

Live load = Dead load

•25 ■33 •50 •66

I-OO

0-8 3 0-78

o-75

0-71

o-66

6-2

5-8 5-6 53 4-9

7-5 7-0 6-8 64 59

All live load . .

2-00

4-O0

00

o-6o

0-56 0-50

4-5 4-2

37

5-4 50

4‘5

Bridge sections designed by this rule differ little from those designed by formulae based directly on Wohler’s experiments. This rule has been revived in America, and appears to be increasingly relied on in bridge-designing. (See Trans. Am. Soc. C.E. xli. p. 156.)

The method of J. J. Weyrauch and W. Launhardt, based on an empirical expression for Wohler’s law, has been much used in bridge designing (see Proc. Inst. C.E. lxiii. p. 275). Let t be the statical breaking strength ef a

bar, loaded once gradually up to fracture (t = breaking load divided by original area of section) ; u the breaking strength of a bar loaded and unloaded an indefinitely great number of times, the stress varying from u to o alternately (this is termed the primitive strength); and, lastly, let s be the breaking strength of a bar subjected to an indefinitely great number of repetitions of stresses equal and opposite in sign (tension and thrust), so that the stress ranges alternately from s to — «. This is termed the vibration strength. Wohler's and Bauschinger's experiments give values of/, u, and s, for some materials. If a bar is subjected to alternations of stress having the range A =/«,. /«, <».., then, by Wohler's law, the bar will ultimately break, if

fmax-— FA, ... (i)

where F is some unknown function. Launhardt found that, for stresses always of the same kind, F = ((»)/((/„,.) approximately agreed with experiment. For stresses of different kinds Weyrauch found F = (u—s)f) (2u~s—fmax-) to be similarly approximate. Now let /«„.//„•„. = , where

fmax-=u(i + (t — u)/u) [Stresses of same sign.] fmax- = u(i + (u—s) /u) [Stresses of opposite sign.]

The working stress in any case is f max . divided by a factor of safety. Let that factor be 3. Then Wohler's results for iron and Bauschinger's for steel give the following equations for tension or thrust:—

Iron, working stress, /=4'4 {l--\) Steel, „ „ =5-87 (1-H0).

In these equations is to have its + or — value according to the case considered. For shearing stresses the working stress may have 0-8 of its value for tension. The following table gives values of the working stress calculated by these equations : —

Working Stress for Tension or Thrust by Launhardt and Weyrauch Formula.

Working Stress /,

i+~

2

tons per sq. in.

• *Iron.*

Steel.

All dead load ….

i-o

i-5

6-6o

8-8o

o-75

!-375

6-05

8-07

0-50

1 25

550

7‘34

025

1 -125

4-95

6-60

All live load ….

o-oo

I-OO

4-40

5-87

-0-25

0-875

3-85

5-14

-0-50

o-75

3-30

4-40

-o-75

0-625

2-75 ■-

3‘67

Equal stresses + and — .

— I -00

0-500

2-20

2-93

55°

BRIDGES

To compare this with the previous table, c£ = (A+B)/A = l+p. Except when the limiting stresses are of opposite sign, the two tables agree very well. In bridge work this occurs only in some of the bracing bars.

It is a matter of discussion whether, if fatigue is allowed for by the Weyrauch method, an additional allowance should be made for impact. There was no impact in Wohler’s experiments, and there- fore it would seem rational to add the impact allowance to that for fatigue ; but in that case the bridge sections become larger than ‘.xperience shows to be necessary. Some engineers escape this difficulty by asserting that Wohler’s

results are not applicable to bridge work. They reject the allowance for fatigue (that is, the effect of repetition) and design bridge members for the total dead and live load, plus a large allowance for impact varied according to some purely empirical rule. (See Waddell, De Pontibus, p. 7.) Now in applying Wohler's law, f max . for any bridge member is found for the maximum possible live load, a live load which though it may sometimes come on the bridge and must therefore be provided for, is not the usual live load to which the bridge is subjected. Hence the range of stress, /„„. -/ m , „., from which the working stress is deduced, is not the ordinary range of stress which is repeated a practically infinite number of times, but is a range of stress to which the bridge is subjected only at comparatively long intervals. Hence practically it appears probable that the allowance for fatigue made in either of the tables above is sufficient to cover the ordinary effects of impact also.

English bridge-builders are somewhat hampered in adopting rational limits of working stress by the rules of the Board of Trade. ,Nor do they all accept the guidance of Wohler's law. The following are some examples of limits adopted. For the Dufferin bridge (steel) the working stress was taken at 6-5 tons per sq. in. in bottom booms and diagonals, 6-o tons in top booms, 5-0 tons in verticals and long compression members. For the Stanley bridge at Brisbane the limits were 6-5 tons per sq. in. in compression boom, 7-0 tons in tension boom, 5-0 tons in vertical struts, 6-5 tons in diagonal ties, 8-o tons in wind bracing, and 6-5 tons in cross and rail girders. In the new Tay bridge the limit of stress is generally 5 tons per sq. in., but in members in which the stress changes sign 4 tons per sq. in. In the Forth bridge for members in which the stress varied from o to a maximum frequently, the limit was 5-0 tons per sq. in., or if the stress varied rarely 5-6 tons per sq. in.; for members subjected to alternations of tension and thrust frequently 3-3 tons per sq. in. or 5 tons per sq. in. if the alternations were infrequent. The shearing area of rivets in tension members was made ij times the useful section of plate in tension. For compression members the shearing area of rivets in butt-joints was made half the useful section of plate in compression.

20. Determination of Stresses in the Members of Bridges. — It is convenient to consider beam girder or truss bridges, and it is the stresses in the main girders which primarily require to be determined. A main girder consists of an upper and lower flange, boom or chord and a vertical web. The loading forces to be considered are vertical, the horizontal forces due to wind pressure are treated separately and provided for by a horizontal system of bracing. For practical purposes it is accurate enough to consider the booms or chords as carrying exclusively the horizontal tension and compression and the web as resisting the whole of the vertical and, in a plate web, the equal horizontal shearing forces. Let fig. 37 represent a beam with any

system of loads Wi, W 2 , . . . W».

R,

*-^*

*t-X,-**

lb.

$

-&

) I

V

Fig. 37. The reaction at the right abutment is

Ri = 'W 1 × 1 /l+V^ 2 Xi/l-r . . . That at the left abutment is

Ri = W,+W 2 4-...-R 2 . Consider any section a b. The total shear at a 6 is

S = R-2(Wi+W 2 ...) where the summation extends to all the loads to the left of the sec- tion. Let p u p, . . . be the distances of the loads from a b, and p the distance of Ri from a b; then the bending moment at a b is

M=R 1 p-2(W 1 p 1 +VJ 1 p t . . .) where the summation extends to all the loads to the left of a b. If the loads on the right of the section are considered the expressions are similar and give the same results.

If Ai A c are the cross sections of the tension and compression flanges or chords, and h the distance between their mass centres, then on the assumption that they resist all the direct horizontal forces the total stress on each flange is

H, = H„ = M/ft

and the intensity of stress of tension or compression is

f, = M/A,h,

/„ = M/A e A. If A is the area of the plate web in a vertical section, the intensity of shearing stress is

/. = S/A and the intensity on horizontal sections is the same. If the web is a braced web, then the vertical component of the stress in the web bars cut by the section must be equal to S.

21. Method of Sections. A. Ritter's Method.— In the case of braced structures the following method is convenient : When a section of a girder can be taken cutting only three bars, the stresses in the bars can be found by taking moments. In fig. 38 m n cuts three bars, and the forces in the three bars cut by the section are C, S and T. There are to the left of the section the external forces, R, W t , W 2 .

0-'"

Fig. 38. Let j be the perpendicular from O, the join of C and T on the direction of S ; t the perpendicular from A, the join of C and S on the direction of T; and c the perpendicular from B, the join of S and T on the direction of C. Taking moments about O, R-Wi(+ +**2a) =Si; taking moments about A,***

R3a-Wi2o-W 2 a=T/; and taking moments about B,

R2a-Wia = Cc. Or generally, if Mi M 2 M 3 are the moments of the external forces to the left of O, A, and B respectively, and 5, t and c the perpendiculars from O, A and B on the directions of the forces cut by the section, then ■ ' »

Si = M i; T/ = M 2 andCc = M 3 . Still more generally if H is the stress on any bar, h the perpendicular distance from the join of the other two bars cut by the section, and M is the moment of the forces on one side of that join,

HA = M.

22. Distribution of Bending Moment and Shearing Force. — Let a

girder of span /, fig. 39, supported at the ends, carry a fixed load

W at m from the right abutment. The reactions at the abutments

are Ri -Wm/l and R 2 = W(/— m)/l. The shears on vertical sections

; Bending Moment.

Fig. 39. Fig. 40.

to the left and right of the load are R l and -R 2 , and the distribution of shearing force is given by two rectangles. Bending moment

increases uniformly from either abutment to the load, at which the bending moment is M = R 2 m = Ri(i— m). The distribution of bending moment is given by the ordinates of a triangle. Next let the girder carry a uniform load w per ft. run (fig. 40). The total load

is wl; the reactions at abutments, Ri = R 2 = |wZ. The distribution of shear on vertical sections is given by the ordinates of a sloping line. The greatest bending moment is at the centre and = M c = \wV. At any point x from the abutment, the bending moment is M = \wx(l— x), an equation to a parabola.

23. Shear due to Travelling Loads. — Let a uniform train weighing w per ft. run advance over a girder of span 2C, from the left abutment. _ _ When it covers the girder to a dis-

tance x from the centre (fig. 41) the total load is w(c+x); the reaction at B is

R 2 = w(c+x)X c -±? = -(c+xy, 4c 4ˆ

which is also the shearing force at C for that position of the load. As the load travels, the shear at the head of the train will be given -by the ordinates of a parabola having its vertex at A, and a maximum F m „. =-iwl at B. If the load FlG. 41. travels the reverse way, the shearing*

force at the head of the train is given by the ordinates of the dotted parabola. The greatest shear at C for any position of the load occurs when the head of the train is at C. For any load p between C and B will increase the reaction at B and therefore the shear at C by part of p, but at the same time will diminish the shear at C by the whole

**v*

ˆ t

Fig. 42.

of p. The web of a girder must resist the maximum shear, and, with a travelling load like a railway train, this is greater for partial than for complete loading. Generally a girder supports both a dead and a live load. The distribution of total shear, due to a dead load wi per ft.

run and a travelling load Wi per ft. run, is shown in fig. 42, arranged so that the dead load shear is added to the maximum

travelling load shear of the same sign.

24. Counterbracing. — In the case of girders with braced webs, the tension bars of which are not adapted to resist a thrust, another circumstance due to the position of the live load must be considered. For a train ad- vancing from the left, the travelling load shear in the left half of the span is of a different sign from that due to the dead load. Fig. 43 shows the maximum shear at vertical sections due to a dead and travelling load, the latter advancing (fig. 43, a) from the left and (fig. 43, b) from the right abutment. Comparing the figures it will be seen that over a distance x near the middle of the girder the shear changes sign, according as the load advances from the left or the right. The bracing bars, therefore, for this part of the girder must be adapted to resist either tension or thrust. Further, the range of stress to which thev are subjected is the sum of the stresses due to the load advancing from the left or the right.

25. Greatest Shear when concentrated Loads travel over the Bridge. —

To find the greatest shear

_, „ R 9 with a set of concentrated

loads at fixed distances, let the loads advance from the left abutment, and let C be the section at which the shear is required (fig. 44). The greatest shear at C may occur with Wi at C. If W t passes beyond C, the shear at C will probably be greatest

Fig. 43.

Wi

W2

\9 9

k— a — »;

I i — «i < — lm

- L—

Fig. 44.

when Wj is at C. Let R be the resultant of the loads on the bridge when Wi' is at C. Then the reaction at B and shear at C is Rnjl. Next let the loads advance a distance a so that W 2 comes to C. Then the shear at C is R(»+o)//— Wi, plus any reaction d at B, due to any additional load which has come on the

girder during the movement. The shear will therefore be increased by bringing W 2 to C, if Ra//+d>Wi and d is generally small and negligible. This result is modified if the action of the load near the section is distributed to the bracing intersections by rail -and cross girders. In fig. 45 the action of W is distributed to A and B by the flooring. Then the loads at A and B are W(p-x)/p and Wx/p. Now let C (fig. 46) be the section at

which the greatest shear is required, _

and let the loads advance from the Aw— or-'-— ♦" IB

left till Wi is at C. If R is the re- <_ p J

sultant of the loads then on the

girder, the reaction at B and shear

at C is Rn/l. But the shear may

be greater when W 2 is at C. In that case the shear at C becomes

R(n+a)/l+d-W u if a>p, and R{n+a)/l+d-W 1 alp, if a

we neglect d, then the shear increases by moving W 2 to C , if Ra/l > Wi

in the first case, and if Ra/l>Wialp in the second case.

26. Greatest Bending Moment due to travelling concentrated Loads. — For the greatest bending moment due to a travelling live load, let a load of w per ft. run advance from the left abutment (fig. 47), and let its centre be at x from the left abutment. The reaction at B is 2wx 2 /l and the bending moment at any section C, at m from the left abutment, is. 2wx](l—m)/l, which increases as x increases till the span is covered. Hence, for uniform travelling loads, the bending moments*

Fig. 45.

Fig. 46.

are greatest when the loading is complete. In that case the loads on either side of C are proportional to m and l — m. In the case of a series of travelling loads at fixed distances apart passing over the girder from the left, let Wi, W 2 (fig. 48), at distances x and x+a from the left abutment, be their resultants on either side of C. Then the reaction at B is Wiz//-fW 2 (x-)-a)//. The bending moment

M=Wi(/-m)/7+W,m{i-(*+a)//|.*

If the loads are moved a distance Ax to the right, the bending moment becomes

M+AM =Wi(+Ax)(Z-w)/Z+W 2 m(l -(x+Ax+a)fl*

Am = WiA(/ — m)/l — W^Axm/l,*

and this is positive or the bending moment increases, if

Wi(Z — w)>W 2 m, or_ if m >

D AQQQQQiQQQO ^ B

Wi/m>W 2 /(/-w). But these are the average loads per ft. run to the left and right of C. Hence, if the average load to the left of a section is greater than that to the right, the bending moment at the section will be increased by moving the loads to the right, and vice versa. Hence the maximum

1

I

W-— _.

x- — >U 1-x 1—

1

~M

-1-2C

Fig. 47.

bending moment at C for a series of travelling loads will occur when the average load is the same on either side of C. If one of the loads is at C, spread over a very small distance in the neighbourhood of C,

then a very small displacement of the loads will permit the fulfilment of the condition. Hence the criterion for the position of the loads which makes the moment at C greatest is this: one load must be at C, and the other loads must be dis- tributed, so that the average loads per ft. on either side of C (the load at C being neglected) are nearly equal. If the loads are very unequal in magnitude or distance this condition may be satisfied for more than one position

of the loads, but it is not difficult to ascertain which position gives the maxi- mum moment. Generally one of the largest of the leads must be at C with as many others to right and left as is consistent with that condition.

This criterion may be stated in another way. The greatest bending

Wi

a o

W2

CQ;QB

•— x— – A a

I

4

—j..b..,j

-l-m >{

U-

-•1-2 C

Fig. 48.

moment will occur with one of the greatest loads at the section, and when this further condition is satisfied. Let fig. 49 represent a beam with the series of loads travelling from the right. Let a b be

the section considered, and let W» bei the load at a b when the bending moment there is greatest, and W,, the last load to the right then on the bridge. Then the position of the loads must be that which satisfies the- condition

Wi+W 2 + . ■ ■ W t .

: greater than

less than

Wi+W 2 +

w,+w 2 +

w,

I l “° u ” a ” Wi+W,+ . Fig. 50 shows the curve of bending moment under one of a series of travelling loads at fixed distances. Let Wi, W 2 , W 3 traverse the girder from the left at fixed distances o, 6. For the position shown the distribution of bending moment due to Wi is given by ordinates

*of the triangle A’CB’; that due to W 2 by ordin- ates of A’DB’; and that due to 3_Ws by ordinates fof A’EB’. The j total moment at *l Wi, due to three ‘ loads, is the sum mC+mn+mo of the intercepts*

W,

Ml

a

-4—

x —-

4

represented by this parabola. Then w, may be termed the uniform load per ft. equivalent to any assumed set of concentrated loads. Waddell has calculated tables of such equivalent uniform loads. But it is not difficult to find w e , approximately enough for practical purposes, very simply. Experience shows that (a) a parabola having the same ordinate at the centre of the span, or (b) a parabola having

5 tons

10 tons

Fig. 49.

which the triangle sides cut off from the vertical under Wi. As the loads move over the girder, the points C, D, E describe the parabolas Mi, M 2 , M(, the middle ordinates of which are |Wi/, |W 2 J, and iW 3 /. If these are first drawn it is easy, for any position of the loads, to draw the lines B'C, B'D, B'E, and to find the sum of the intercepts which is the total bending moment under a load. • The lower portion of the figure is the curve of bending moments under the leading load. Till Wi has advanced a distance a only one load is on the girder, and the curve A"F gives bending moments due to Wi only; as Wi advances to a distance a +6, two loads are on the girder, and the curve FG gives moments due to Wi and W 2 . GB" is the curve of moments for all three loads Wi+W 2 -|-W».

Fig. 51 shows maximum bending moment curves for an extreme case of a short bridge with very unequal loads. The three lightly

dotted parabolas are the curves of maximum moment for each of the loads taken separately. The three heavily dotted curves are curves of maximum moment under each of the loads, for the three loads passing over the bridge, at the given distances, from left to right. As might be expected, the moments are greatest in this case at the sections under the 15-ton load. The heavy continuous line gives the last- mentioned curve for the reverse direction of passage of the loads.

With short bridges it is best to draw the curve of maximum bending moments for some assumed typical set of loads in the way just described, and to design the girder accordingly. For longer bridges the funicular polygon affords a method of determining maximum bending moments which is perhaps more convenient. But very great accuracy in drawing this curve is unnecessary, because the rolling stock of railways varies so much that the precise magnitude and distribution of the loads which will pass over a bridge cannot be known. All that can be done is to assume a set of loads likely to produce somewhat severer straining than any probable actual rolling loads. Now, except for very short bridges and very unequal loads, a parabola can be found which includes the curve of maximum moments. This parabola is the curve of maximum moments for a travelling load uniform per ft. run. Let w. be the load per ft. run

which would produce the maximum moments

Fig. 51.

the same ordinate at one-quarter span as the curve of maximum moments, agrees with it closely enough for practical designing. A criterion already given shows the position of any set of loads which will produce the greatest bending moment at the centre of the bridge, or at one-quarter span. Let M c and M,, be those moments. At a section distant x from the centre of a girder of span 2c, the bend- ing moment due to a uniform load w e per ft run is

M = \w e (c-x){c+x). Putting x = o, for the centre section

and putting x = §c, for section at quarter span

M, = §w e cK From these equations a value of w, can be obtained. Then the bridge is designed, so far as the direct stresses are concerned, for bending moments due to a uniform dead load and the uniform equivalent load w e .

27. Influence Lines. — In dealing with the action of travelling loads much assistance may be obtained by using a line termed an influence line. Such a line has for abscissa the distance of a load from one end of a girder, and for ordinate the bending moment or shear at any given section, or on any member, due to that load. Generally the influence line is drawn for unit load. In fig. 52 let A'B' be a girder supported at the ends and let it be required to investigate the bending moment at C' due to unit load in any position on the girder. When the load is at F', the reaction at B' is m/l and the moment at C' is m(l~x)/l, which will be reckoned positive, when it resists a tendency of the right-hand part of the girder to turn counter-clockwise. Projecting A'F'C'B' on to the horizontal AB, take Ff=m(l-x)tl, the moment at Cof unit load at F. If this process is repeated for all positions of the load, we get the influence line AGB for the bending moment at C. The area AGB is termed the influence area. The greatest moment CG at C is x(l-x)/l. To use this line to investigate the maximum moment at C due to a series

Fig. 52.

of travelling loads at fixed distances, let Pi, P 2 , P 3 , . . . be the loads which at the moment considered are at distances mi, mi, . . . from the left abutment. Set off these distances along AB and let yi, yt, ■ . . be the corresponding ordinates of the influence curve (y = F/) on the verticals under the loads. Then the moment at C due to all

the loads is

M = Piy,-(-P 2 y2 + ...

BRIDGES

553

The position of the loads which gives the greatest moment at C may be settled by the criterion given above. For a uniform travel- ling load w per ft. of span, consider a small interval Fk = Am on .which the load is wAm. The moment due to this, at C, is wti (l-xj Am/l.

But m(l-x)Am/l is the area of the strip Ffhk, that is yAm. Hence the moment of the load on Am at C is ivy Am, and the moment of a uniform load over any portion of the girder is w X the area of the influence curve under that portioi. If the scales are so chosen that a inch represents I in. ton of moment, and b inch represents I ft. of

*span, and w is in tons per p . ^ ^^ ^^^ ^ . s t ^ e ^^.^*

p IG ,, of area in measuring the

' influence curve.

If the load is carried by a rail girder (stringer) with cross girders at the intersections of bracing and boom, its effect is distributed to the bracing intersections D'E' (fig. 53), and the part of the influence line for that bay (panel) is altered. With unit load in the position shown, the load at D' is (p-n)/p, and that at E' is nip. The moment of the load at C is m(l-x)/l-n(p-n)/p. This is the equation to the dotted line RS (fig. 52).

If the unit load is at F', the reaction at B' and the shear at C is mil, positive if the shearing stress resists a tendency of the part of the girder on the right to move upwards; set up Ff = m/l (fig. 54)

H Fig. 54.

on the vertical under the load. Repeating the process for other positions, we get the influence line AGHB, for the shear at C due to unit load anywhere on the girder. GC—x/l and CH =-(/-)//. The lines AG, HB are parallel. If the load is in the bay D'E' and is carried by a rail girder which distributes it to cross girders at D'E', the part of the influence line under this bay is altered. Let n (Fig. 55) be the distance of the load from D', Xi the distance of D' from the left*

abutment, and p the length of a bay. The loads at D', E, due to unit weight on the rail girder are (p-n)/p and nip. The reaction at B' is {(p-n)xi+n(xi+p)\ /pi. The shear at C' is the

reaction at B' less the load at E', that is,

*(P(*i +»)-»/)/#, y! which is the equation to*

A \ the line DH (fig. 54).

\d& l\ / Clearly, the distribution ' ; \ '/ of the load by the rail

_ J _ girder considerably alters ID 1 1 p 1 ;E' the distribution of shear

i j j ! due to a load in the bay

Xt «— n J 1 ! jn which the section con-

^ ! . ,. j ! sidered lies. The total

!• p '-— «(shear due to a series of

j • i ' loads Pi, P 2 , . . . at dis-

x 1— 1 »i tances mi, m?., . . . from

Fig. 55. the left abutment, y\,y%, . . .

being the ordinates of the influence curve under the loads, is S = Pr>>i-(-P2y2 + . . . Generally, the greatest shear S at C will occur when the longer of the segments into which C divides the girder is fully loaded and the other is unloaded, the leading load being at C. If the loads are very unequal or unequally spaced, a trial or two will determine which position gives the greatest value of S. The greatest shear at C' of the opposite sign to that due to the loading of the longer segment

occurs with the shorter segment loaded. For a uniformly distributed load w per ft. run the shear at C is w X the area of the influence curve under the segment covered by the load, attention being paid to the sign of the area of the curve. If the load rests directly on the main girder, the greatest + and – shears at C will be wXAGC and wXCHB. But if the load is distributed to the bracing inter sections by rail and cross girders, then the shear at C will be greatest when the load extends to N, and will have the values ojXADN and ˆfXNEB.

An interesting paper by F. C. Lea, dealing with the determination of stress due to concentrated loads, by the method of influence lines will be found in Proc. Inst. C.E. clxi. p. 261.

Influence lines were described by Frankel, Der Civilingenieur t 1876. See also Handbuch der Ingenieur-wissenschaften, vol. ii. ch. x. (1882), and Levy, La Statique graphigue (1886). There is a useful paper by Prof. G. F. Swain (Trans. Am. Soc. C.E. xvii., 1887), and another by L. M. Hoskins (Proc. Am. Soc. C.E. xxv., 1899)

28. Eddy's Method. — Another method of investigating the maximum shear at a section due to any distribution of a travelling load has been given by Prof. H. T. Eddy (Trans. Am. Soc. C.E. xxii., 1890). Let hk (fig. 56) represent in magnitude and position a load W, at x from the left abutment, on a girder A B of span /. Lay off kf, hg, horizontal and equal to /. Join/and g to h and k. Draw verticals at A, B, and join no. Obviously no is horizontal and equal to /. Also mn/mf=hk/kf or mn-W(l-x)/l, which. is the reaction at A due to the load at C, and is the shear at any point cf AC. Similarly, po is the reaction at B and shear at any point of CB. The shaded rectangles represent the distribution of shear due to the load at C, while no may be termed the datum line of shear. Let the load move to D, so that its distance from the left abutment is x+a. Draw a vertical at D, intersecting fh, kg, in s and q. Then qrlro = hk]hg or ro — 'W(l-x-

a)/l, which is the reaction at A and shear at any point of AD, for the new position of the load. Similarly, « = W(x+o)// is the shear on DB. The distribution of shear is given by the partially shaded rectangles. For the application of this method to a series of loads Prof. Eddy's paper must be referred to.

29. Economic Span.— In the case of a bridge of many spans, there is a length of span which makes the cost of the bridge least. The cost of abutments and bridge flooring is practically independent of the length of span adopted. Let P be the cost of one pier ; G the cost of the main girders for one span, erected; n the number of spans; I the length of one span, and L the length of the bridge between abutments. Then, n = L/l nearly. Cost of piers (»-i)P. Cost of main girders nO. The cost of a pier will not vary materially with the span adopted. It depends mainly on the character of the foundations and height at which the bridge is carried. The cost of the main girders for one span will vary nearly as the square' of the span for any given type of girder and intensity of live load. That is, G = aP : whereo is a constant. Hence the total cost of that part of the bridge which varies with the span adopted is —

C = (n-l)P+naP = LP//-P+La/.

Differentiating and equating to zero, the cost is least when

dC LP . T . :s = lr 4-La = o,

P=a^ = G; that is, when the cost of one pier is equal to the cost erected of the main girders of one span. Sir Guilford Molesworth puts this in a convenient but less exact form. Let G be the cost of superstructure

of a 100-ft. span erected, and P the cost of one pier with its protection. Then the economic span is / = 100V P/ V G.

30. Limiting Span. — If the weight of the main girders of a bridge, per ft. run in tons, is — ■

W3 = (iVi+Wi)lrl(K-lt) according to a formula already given, then w t becomes infinite if k-lr = o, or if

l-Kfr, ■

where I is the span in feet and r is the ratio of span to depth of girder at centre. Taking K for steel girders as 7200 to 9000, Limiting Span in Ft. r = l2 / = 6ooto 750

= 10 =720 to 900

= 8 =900 to 1 120

The practical limit of span would be less than this. Professor Claxton Fidier (Treatise on Bridge Construction, 1887) has made a very careful theoretical analysis of the weights of bridges of different types, and has obtained the following values for the limiting spans. For parallel girders when r = lo, the limiting span is 1070 ft. For parabolic or bowstring girders, when r = 8, the limiting span is 1280 ft. For flexible suspension bridges with wrought iron link chains, and dip =i 1 oth of the span, the limiting span is 2800 ft. For stiffened suspension bridges with wire cables, if the dip is -j'dth of the span the limiting span is 2700 to 3600 ft., and if the dip is |th of the span, 3250 to 4250 ft., according to the factor of safety allowed.

31. Braced Girders. — A frame is a rigid structure composed of straight struts and ties. The struts and ties are called bracing bars. The frame as a whole may be subject to a bending moment, but each member is simply extended or compressed so that the total stress on a given member is the same at all its cross sections, while the intensity of stress is uniform for all the parts of any one cross section. This result must follow in any frame, the members of which are so connected that the joints offer little or no resistance to change in the relative angular position of the members. Thus if the members are pinned together, the joint consisting of a single circular pin, the centre of which lies in the axis of the piece, it is clear that the direction of the only stress which can be transmitted from pin to pin will coincide with this axis. The axis becomes, therefore, a line of resistance, and in reasoning of the stresses on frames we may treat the frame as consisting of simple straight lines from joint to joint. It is found in practice that the stresses on the several members do not differ sensibly whether these members are pinned together with a single pin or more rigidly jointed by several bolts or rivets. Frames are much used as girders, and they also give useful designs for suspension and arched bridges. A frame used to support a weight is often called a truss; the stresses on the various members of a truss can be computed for any given load with greater accuracy than the intensity of stress on the various parts of a continuous structure such as a tubular girder, or the rib of an arch. Many assumptions are made in treating of the flexure of a continuous structure which are

not strictly true; no assumption is made in determining the stresses on a frame except that the joints are flexible, and that the frame shall be so stiff as not sensibly to alter in form under the load. Frames used as bridge trusses should never be designed so that the elongation or compression of one member can elongate or compress any other member. An example will serve to make the meaning of this limitation clearer. Let a frame consist of the five members AB, BD, DC, CA, CB (fig. 57), jointed at the

A n points A, B, C and D, and all capable of

resisting tension and compression. This frame will be rigid, i.e. it cannot be distorted without causing an alteration in the length of one or more of the members; but if from a change of temperature or any other cause one or all of the members change their length, this will not produce a stress on any member, but will merely cause a change in the form of the frame. Such a frame as this cannot be self - strained. A workman, for instance, cannot produce a stress on one member by making some other member of a wrong length. Any error of this kind will merely affect the form of the frame; if, however, another member be introduced between A and D, then if BC be shortened AD will be strained so as to extend it, and the four other members will be compressed; if CB is lengthened AD will thereby be compressed, and the four other members extended; if the workman does not make CB and AD of exactly the right length they and all the members will be permanently strained. These stresses will be unknown quantities, which the designer cannot take into account, and such a combination should if possible be avoided. A frame of this second type is said to have one redundant member.

32. Types of Braced Girder Bridges. — Figs. 58, 59 and 60 show an independent girder, a cantilever, and a cantilever and suspended girder bridge.

In a three-span bridge continuous girders are lighter than dis-continuous ones by about 45% for the dead load and 15% for the live load, if no allowance is made for ambiguity due to uncertainty as to the level of the sup- ports. The cantilever and suspended girder types are as economical and free from uncertainty as to the stresses. In long-span bridges the cantilever system permits erection FlG. 58.

by building out, which is economical and sometimes necessary. It is, however, unstable unless rigidly fixed at the piers. In the Forth bridge stability is obtained partly by the great excess of dead over live load, partly by the great width of the river piers. The majority of bridges

not of great span have girders with parallel booms. This involves the fewest difficulties of workmanship and perhaps permits

Fig. 59,

the closest approximation of actual to theoretical dimensions of the parts. In spans over 200 ft. it is economical to have one horizontal boom and one polygonal (approximately parabolic) boom. The hog-backed girder is a compromise between the two types, avoiding some difficulties of construction near the ends of the girder.

Most braced girders may be considered as built up of two simple

Fig. 60.

forms of truss, the king-post truss (fig. 61, a), or the queen-post truss (fig. 61, b). These may be used in either the upright or the inverted position. A multiple truss consists of a number of simple trusses, e.g. Bollman truss. Some timber bridges consist of queen- post trusses in the upright position, as shown diagrammatically in fig. 62, where the circles indicate points at which the flooring girders

\

\

^

k

9

A

i

9 f >

™*Wv*

yw f

\

/

/r

Fig. 61.

transmit load to the main girders. Compound trusses consist of simple trusses used as primary, secondary and tertiary trusses, the secondary supported on the primary, and the tertiary on the secondary. Thus, the Fink truss consists of king-post trusses; the Pratt truss (fig. 63) and the Whipple truss (fig. 64) of queen-post trusses alternately upright and inverted.

A combination bridge is built partly of timber, partly of steel,

the compression members being generally of timber and the tension members of steel. On the Pacific coast, where excellent timber is obtainable and steel works are distant, combination bridges are still largely used (Ottewell, Trans. Am. Soc. C.E. xxvii. p. 467). The combination bridge at Roseburgh, Oregon, is a cantilever bridge.

The shore arms are 147 ft. span, the river arms 105 ft., and the suspended girder 80 ft., the total distance between anchor piers being 584 ft. The floor beams, floor and railing are of timber. The compression members are of timber, except the struts and bottom chord panels next the river piers, which are of steel. The tension members are of iron and the pins of steel. The chord blocks and post shoes are of cast-iron.

33. Graphic Method of finding the Stresses in Braced Structures. — Fig. 65 shows a common form of bridge truss known as a Warren girder, with lines indicating external forces applied to the joints;

Fig. 63. half the load carried between the two lower joints next the piers on either side is directly carried by the abutments. The sum of the two upward vertical reactions must clearly be equal to the sum of the loads. The lines in the diagram represent the directions of a series of forces which must alL be in equilibrium; these lines may, for an object to be explained in the next paragraph, be conveniently named by the letters in the spaces which they separate instead of by the method usually employed in geometry. Thus we shall call the first inclined line on the left hand the line AG, the line represent- ing the first force on the top left-hand joint AB, the first horizontal member at the top left hand the line BH, &c; similarly each point requires at least three letters to denote it; the top first left-hand "joint may be called ABHG, being the point where these four spaces meet. In this

method of lettering, every enclosed space must be designated by a letter; all external forces must be represented by lines outside the frame, and each space between any two forces must receive a distinctive letter; this method of lettering was first pro- posed by O. Henrici and R. H. Bow (Economics of Construction), and is convenient in applying the theory of reciprocal figures to the computation of stresses on frames.

34. Reciprocal Figures. — J. Clerk Maxwell gave (Phil. Mag. 1864)

Fig. 64. the following definition of reciprocal figures: — •" Two plane figures are reciprocal when they consist of an equal number of lines so that corresponding lines in the two figures are parallel, and corresponding lines which converge to a point in one figure form a closed polygon in the other."

Let a frame (without redundant members), and the external forces which keep it in equilibrium, be represented by a diagram constituting one of these two plane figures, then the lines in the other plane figure or the reciprocal will represent in direction and magni- tude the forces between the joints of the frame, and, consequently, the stress on each member, as will now be explained.

Reciprocal figures are easily drawn by following definite rules, and afford therefore a simple method of computing the stresses on members of a frame.

The external forces on a frame or bridge in equilibrium under those forces may, by a well-known proposition in statics, be repre- sented by a closed polygon, each side of which is parallel to one force, and represents the force in magnitude as well as in direction. The sides of the polygon may be arranged in any order, provided care is taken so to draw them that in passing round the polygon in

■ *A* /\

JI

cr / \

z.

/ \ *2V* / >

yF

/ G

2

\ / K

‘ at\ /

X’

X>

i -S

S I -r

Fig. 65. one direction this direction may for each side correspond to the direction of the force which it represents.

This polygon of forces may, by a slight extension of the above definition, be called the reciprocal figure of the external forces, if the sides are arranged in the same order as that of the joints on which they act, so that if the joints and forces be numbered 1, 2, 3, 4, &c, passing round the outside of the frame in one direction, and returning at last to joint 1, then in the polygon the side represent- ing the force 2 will be next the side representing the force I, and will be followed by the side representing the force 3, and so forth.

This polygon falls under the definition of a reciprocal figure given by Clerk Maxwell, if we consider the frame as a point in equilibrium under the external forces.

Fig. 66 shows a frame supported at the two end joints, and loaded at each top joint. The loads and the supporting forces are indicated by arrows. Fig. 67 a shows the reciprocal figure or polygon for the external forces on the assumption that the reactions are slightly in- clined. The lines in fig. 67 a, lettered in the usual manner, correspond to the forces indicated by arrows in fig. 66, and lettered according to Bow’s method. When all the forces are vertical, as will be the case in girders, the polygon of external forces will be reduced to two straight lines, fig. 67 b, superimposed and divided so that the length AX represents the load AX, the length AB the load AB, the length YX the reaction YX, and so forth. The line XZ consists of a series of lengths, as XA, AB . . . DZ, representing the loads taken in their order. In subsequent diagrams the two reaction lines will, for

the sake of clearness, be drawn as if slightly inclined to the vertical.

If there are no redundant members in the frame there will be only two. members abutting at the point of support, for these two members will be sufficient to balance the reaction, whatever its direction may be; we can therefore draw two triangles, each having as one side the reaction YX, and having the two other sides parallel to these two members; each of these triangles will represent a polygon of forces in equilibrium at the point of support. Of these two triangles, shown in fig. 67 c, select that in which the letters X and Y are so placed that (naming the apex of the triangle E) the lines XE and YE are the lines parallel to the two members of the same name in the frame (fig. 66). Then the triangle YXE is the reciprocal

Fig. 66.

Fig. 67.

figure of the three lines YX, XE, EY in the frame, and represents the three forces in equilibrium at the point YXE of the frame. The direction of YX, being a thrust upwards, shows the direction in which we must go round the triangle YXE to find the direction of the two other forces ; doing this we find that the force XE must act down towards the point YXE, and the force EY away from the same point. Putting arrows on the frame diagram to indicate the direction of the forces, we see that the member EY must pull and therefore act as a tie, and that the member XE must push and act as a strut. Passing to the point XEFA we find two known forces, the load XA acting downwards, and a push from the strut XE, which, being in compression, must push at both ends, as indicated by the arrow, fig. 66. The directions and magnitudes of these two forces are already drawn (fig. 67 a) in a fitting position to represent part of the polygon of forces at XEFA; beginning with the upward thrust EX, continuing down XA, and drawing AF parallel to AF in the frame we complete the polygon by drawing EF parallel to EF in the frame. The point F is determined by the intersection of the two lines, one beginning at A, and the other at E. We then have the polygon of forces EXAF, the reciprocal figure of the lines meeting at that point in the frame, and representing the forces at the point EXAF ; the direction of the forces on EH and XA being known determines the direction of the forces due to the elastic reaction of the members AF and EF, showing AF to push as a strut, while EF is a tie. We have, been guided in the selection of the particular quadrilateral adopted by the rule of arranging the order of the sides so that the same letters indicate corresponding sides in the diagram of the frame and its reciprocal.

Continuing the construction of the diagram in the same way, we arrive at fig. 67 d as the complete reciprocal figure of the frame and forces upon it, and we see that each line in the reciprocal figure measures the stress on the corresponding member in the frame, and that the polygon of forces acting at any point, as IJKY, in the frame is represented by a polygon of the same name in the reciprocal

figure. The direction of the force in each member is easily ascertained by proceeding in the manner above described. A single known force in a polygon determines the direction of all the others, as these must all correspond with arrows pointing the same way round the polygon. Let the arrows be placed on the frame round each joint, and so as to indicate the direction of each force on that joint; then when two arrows point to one another on the same piece, that piece is a tie; when they point from one another the piece is a strut. It is hardly necessary to say that the forces exerted by the two ends of any one member must be equal and opposite. This method is universally applicable where there are no redundant members. The reciprocal figure for any loaded frame is a complete formula for the stress on every member of a frame of that particular class with loads on given joints. <

Consider a Warren girder (fig. 68), loaded at the top and bottom joints. Fig. 69 b is the polygon of external forces, and 69 c is half the reciprocal figure. The complete reciprocal figure is shown in fig. 69 a.

The method of sections already described is often more convenient than the method of reciprocal figures, and the method of influence lines is also often the readiest way of dealing with braced girders.

Fig. 69.

35. Chain Loaded uniformly along a Horizontal Line. — If the lengths of the links be assumed indefinitely short, the chain under given simple distributions of load will take the form of comparatively simple mathematical curves known as catenaries. The true catenary is that assumed by a chain of uniform weight per unit of length, but the form generally adopted for suspension bridges is that assumed by a chain under a weight uniformly distributed relatively to a horizontal line. This curve is a parabola.

Remembering that in this case the centre bending moment 'Zwl will be equal to wU/S, we see that the horizontal tension H at the vertex for a span L (the points of support being at equal heights) is given by the expression

1. . . . . H=roLV8y,

or, calling x the distance from the vertex to the point of support, H=wx i /2y.

The value of H is equal to the maximum tension on the bottom flange, or compression on the top flange, of a girder of equal span, equally and similarly loaded, and having a depth equal to the dip of the suspension bridge.

*Consider any other point F of the curve, fig. 70, at a distance **

from the vertex, the horizontal component of the resultant (tangent to the curve) will be unaltered ; the vertical component V will be simply the sum of the loads between O and F, or vix. In the triangle FDC, let FD be tangent to the curve, FC vertical, and DC horizontal ; these three sides will necessarily be proportional respectively to the

Fig. 70.

resultant tension along the chain at F, the vertical force V passing through the point D, and the horizontal tension at O ; hence

H : V = DC : FC = wx 2 /2y : wx = x/2 : y,

hence DC is the half of OC, proving the curve to be a parabola.

The value of R, the tension at any point at a distance x from the vertex, is obtained from the equation

or,

R 2 = H 2 + V 2 = v?x"\f + m¥,

*2 R=w*V(i+» 2 /43' 2)-*

Let i be the angle between the tangent at any point having the co-ordinates x and y measured from the vertex, then

3 tan i — 2yjx.

Let the length of half the parabolic chain be called s, then 4 . . s=x

+2y i /$x.

The following is the approximate expression for the relation between a change As in the length of the half chain and the corre- sponding change Ay in the dip : —

*s+As = x+(2/3x) {y 1 +2yAy + {Ay) i } =x+2y*l3x+4yAy/3x +2Ay 1 l3x, or, neglecting the last term,*

5 As = 4yAy/3x,

and

6 Ay-3xAs/4y.

From these equations the deflection produced by any given stress on the chains or by a changeˆ of temperature can be calculated.

36. Deflection of Girders.— Let fig. 71 represent a beam bent by external loads. Let the origin O be-taken at the lowest point of the bent beam. Then the deviation y ~ DE of the neutral axis of the beat beam at any point D from the axis OX is given by the relation ,

d 2 y M 1

dx 2 ~EV where M is the bending moment and I the amount of inertia of the beam at D, and E is the coefficient of elasticity. It is usually accurate enough in deflection calculations to take for I the moment of inertia at the centre of the beam and to consider it constant for the length of the beam. Then

dx~

Mdx

■m

Mdx.*

*The integration can be performed when M is expressed in terms of *. Thus for a beam supported at the ends and loaded with w per inch length M =w (a 2 — x 2), where a is the half span. Then the deflection at the centre is the value of y for x = a, and is*

5 o'O 4 a= i4"ET

The radius of curvature of the beam at D is given by the relation

R = EI/M. 37. Graphic Method of finding Deflection. — Divide the span L into any con- venient number n of equal parts of length /, so that «/ = L; compute the radii of curvature Ri, R 2 , R3 for the several sections. Let measurements along the beam be represented according to any convenient scale, so that calling Li and h the lengths to be drawn on paper ,we have L = 0L1 ; now let n, ri, r z be a series of radii such that 7i = Ri/a&, ra = Rj/o6, &c, where b is any convenient constant chosen of such magnitude as will allow arcs with the radii, r\, r±, &c., to be drawn with the means at the draughtsman's disposal. Draw a curve

Fig. 71.

*as shown in fig. 72 with arcs of the length h, h, h, &c, and with the radii n, ri, &c. (note, for a length \h at each end the radius will be infinite, and the curve must end with a straight line tangent to the last arc), then let v be the measured deflection of this curve from the straight line, and V the actual deflection of the bridge; we have V=*av/b, approximately. This method distorts the curve, so that vertical ordinates of the curve are drawn to a scale b times greater than that of the horizontal ordinates. Thus if the horizontal scale be one-tenth of an inch to the foot, a = 120, and a beam 100 ft. in length would be drawn equal to 10 in.; then if the true radius at the centre were 10,000 ft., this radius, if the curve were undistorted,*

would be on paper 1000 in., but making b = 50 we can draw the curve with a radius of 20 in. The vertical distortion of the curve must not be so great that there is a very sensible difference between the length of the arc and its chord. This can be regulated by altering the value of b. In fig. 72 distortion is carried too far ; this figure is merely used as an illustration.

*38. Camber. — In order that a girder may become straight under its working loa*l it should be constructed with a camber or upward convexity equal to the calculated deflection. Owing to the yielding of joints when a beam is first loaded a smaller modulus of elasticity should be taken than for a solid bar. For riveted girders E is about 17,500,000 lb per sq. in. for first loading. W. J. M. Rankine gives the approximate rule f Working deflection = S = Plio,oooh,*

where I is the span and h the depth of the beam, the stresses being

those usual in bridgework, due to the total dead and live load. (W. C. U.)

BRIDGET, SAINT, more properly Brigid (c. 452-523), one of the patron saints of Ireland, was born at Faughart in county Louth, her father being a prince of Ulster. Refusing to marry, she chose a life of seclusion, making her cell, the first in Ireland, under a large oak tree, whence the place was called Kil-dara, " the church of the oak." The city cf Kildare is supposed to derive its name from St Brigid's cell. The year of her death is generally placed in 523. She was buried at Kildare, but her remains were afterwards translated to Downpatrick, where they were laid beside the bodies of St Patrick and St Columba. Her feast is celebrated on the 1st of February. A large collection of miraculous stories clustered round her name, and her reputation was not confined to Ireland, for, under the name of St Bride, she became a favourite saint in England, and numerous churches were dedicated to her in Scotland.

See the five lives given in the Bollandist Ada Sanctorum, Feb. 1, i. 99, 119, 950. Cf. Whitley-Stokes, Three Middle-Irish Homilies on the Lives of Saint Patrick, Brigit and Columba (Calcutta, 1874) ; Colgan, Acta SS. Hiberniae; D. O'Hanlon, Lives of Irish Saints, vol. ii.; Knowles, Life of St Bfigid (1907); further bibliography in Ulysse Chevalier, Repertoire aes sources hist. Bio.-Bibl. (2nd ed., Paris, 1905), s.v.

BRIDGET, Brigitta, Birgitta, OF SWEDEN, SAINT (c. 1302- i373) > the most celebrated saint of the northern kingdoms, was the daughter of Birger Persson, governor and lagman (provincial judge) of Uppland, and one of the richest landowners of the country. In 13 16 she was married to Ulf Gudmarson, lord of Nericia,' to whom she bore eight children, one of whom was

afterwards honoured as St Catherine of Sweden. Bridget's saintly and charitable life soon made her known far and wide; she gained, too, great religious influence over her husband, with whom (1341-1343) she went on pilgrimage to St James of Compostella. In 1344, shortly after their return, Ulf died in the Cistercian monastery of Alvastra in East Gothland, and Bridget now devoted herself wholly to religion. As a child she had already believed herself to have visions; these now became more frequent, and her records of these " revelations," which were tanslated into Latin by Matthias, canon of Linkoping, and by her confessor, Peter, prior of Alvastra, obtained a great vogue during the middle ages. It was about this time that she founded the order of St Saviour, or Bridgittines (q.v.), of which the

principal house, at Vadstena, was richly endowed by King Magnus II. and his queen. About 1350 she went to Rome; partly to obtain from the pope the authorization of the new order, partly in pursuance of her self-imposed mission to elevate the moral tone of the age. It was not till 1370 that Pope Urban V. confirmed the rule of her order; but meanwhile Bridget had made herself universally beloved in Rome by her kindness and good works. Save for occasional pilgrimages, including one to Jerusalem in 1373, she remained in Rome till her death on the 23rd of July 1373. She was canonized in 1391 by Pope Boniface IX., and her feast is celebrated on the 9th of October.

Bibliography. — Cf. the Bollandist Acta Sanctorum, Oct. 8, iv. 368-560; the Vita Sanctae Brigittae, edited by C. Annerstedt in Scriptores rerum Suedicarum medii aevi, iii. 185-244 (Upsala, 1871). The best modern work on the subject is by the comtesse Catherine de Flavigny, entitled Sainte Brigitte de Suede, sa vie, ses revSlalions et son muvre (Paris, 1892), which contains an exhaustive bibliography. The Revelations are contained in the critical edition of St Bridget's works published by the Swedish Historical Society and edited by G. E. Klemming (Stockholm, 1857-1884, 11 vols.). For full biblio- graphy (to 1904) see Ulysse Chevalier, Repertoire des sources hist. Bio.-Bibl., s.v. " Brigitte.

BRIDGETON, a city, port of entry, and the county-seat of Cumberland county, New Jersey, U.S.A., in the south part of the state, on Cohansey creek, 38 m. S. of Philadelphia. Pop. (1890) 11,424; (1900) 13,913, of whom 653 were foreign-born and 701 were negroes; (1905) 13,624; (1910) 14,209. It is served by the West Jersey & Sea Shore and the Central of New Jersey railways', by electric railways connecting with adjacent towns, and by Delaware river steamboats on Cohansey creek, which is navigable to this point. It is an attractive residential city, has a park of 650 acres and a fine public library, and is the seat of West Jersey academy and of Ivy Hall, a school for girls. It is an important market town and distributing centre for a rich agricultural region; among its manufactures are glass (the product, chiefly glass bottles, being valued in 1905 at $1,252,795 — 42-3% of the value of all the city's factory products — and Bridgeton ranking eighth among the cities of the United States in ; this industry), machinery, clothing, and canned fruits and vegetables; it also has dyeing and finishing works. Though Bridgeton is a port of entry, its foreign commerce is relatively unimportant. The first settlement in what is now Bridgeton was made toward the close of the 18th century. A pioneer iron- works was estab- lished here in 1814. The city of Bridgeton, formed by the union of the township of Bridgeton and the township of Cohansey

(incorporated in 1845 and 1848 respectively), was chartered in 1864.

BRIDGETT, THOMAS EDWARD (1829- 1899), Roman Catholic priest and historical writer, was born at Derby on the 20th of January 1829. He was brought up a Baptist, but in his sixteenth year joined the Church of England. In 1847 he entered St John's College, Cambridge, with the intention of taking orders. Being unable to subscribe to the Thirty-Nine Articles he could not take his degree, and in 1850 became a Roman Catholic, soon afterwards joining the Congregation of the Redemptorists. He went through his novitiate at St Trond in Belgium, and after a course of five years of theological study at Wittem, in Holland, was ordained priest. He returned to England in 1856, and for over forty years led an active life as a missioned in England and Ireland, preaching in over 80 missions and 140 retreats to the

clergy and to nuns. His stay' in Limerick was particularly successful, and he founded a religious confraternity of laymen which numbered 5000 members. Despite his arduous life as a priest, Bridgett found time to produce literary works of value, chiefly dealing with the history of the Reformation in England; among these are The Life of Blessed John Fisher, Bishop of Rochester (18S8); The Life and Writings of Sir Thomas More (1890); History of the Eucharist in Great Britain (2 vols., 1881); Our Lady's Dowry (1875, 3rd ed. 1890). He died at Clapham on the 17 th of February 1899.

For a complete list of Bridgett's works see The Life of Father Bridgett, by C. Ryder (London, 1906).

BRIDGEWATER, FRANCIS EGERTON, 3 rp Duke of (1736- 1803), the originator of British inland navigation, younger son of the 1st duke, was born on the 21st of May 1736. Scroop, 1st duke of Bridgewater (1681-1745), was the son of the 3rd earl of Bridgewater, and was created a duke in 1720; he was the great-grandson of John Egerton, 1st earl of Bridgewater (d. 1649; cr. 1617), whose name is associated with the production of Milton's Comus; and the latter was the son of Sir Thomas Egerton (1540-1617), Queen Elizabeth's lord keeper and James I.'s lord chancellor, who was created baron of Ellesmere in 1603, and in 1616 Viscount Brackley (q.v.).

Francis Egerton succeeded to the dukedom at the age of twelve on the death of his brother, the 2nd duke. As a child he was sickly and of such unpromising intellectual capacity that at one time the idea of cutting the entail was seriously entertained. Shortly after attaining his majority he became engaged to the beautiful duchess of Hamilton, but her refusal to give up the acquaintance of her sister, Lady Coventry, led to the breaking off of the match. Thereupon the duke broke up his London establishment, and retiring to his estate at Worsley, devoted himself to the making of canals. The navigable canal from Worsley to Manchester which he projected for the transport of the coal obtained on his estates was (with the exception of the Sankey canal) the first great undertaking of the kind executed in Great Britain in modern times. The construction of this remarkable work, with its famous aqueduct across the Irwell, was carried out by James Brindley, the celebrated engineer. The completion of this canal led the duke to undertake a still more ambitious work. In 1762 he obtained parliamentary powers to provide an improved waterway between Liverpool and Manchester by means of a canal. The difficulties encountered in the execution of the latter work were still more formidable than those of the Worsley canal, involving, as they did, the carrying of the canal over Sale Moor Moss. But the genius of Brindley, his engineer, proved superior to all obstacles, and though at one period of the undertaking the financial re- sources of the duke were almost exhausted, the work was carried to a triumphant conclusion. The untiring perseverance displayed by the duke in surmounting the various difficulties that retarded the accomplishment of his projects, together with the pecuniary restrictions he imposed on himself in order to supply the necessary capital (at one time he reduced his personal expenses to £400 a year), affords an instructive example of that energy and self-denial on which the success of great undertakings so much depends. Both these canals were completed when the duke was only thirty-six years of age, and the remainder of his life was spent in extending them and in improving his estates ; and during the latter years of his life he derived a princely income from the success of his enterprise. Though a steady supporter of Pitt's administration, he never took any prominent part in politics.

He died unmarried on the 8th of March 1803, when the ducal title became extinct, but the earldom of Bridgewater passed to a cousin, John William Egerton, who became 7th earl. By his will he devised his canals and estates on trust, under which his nephew, the marquess of Stafford (afterwards first duke of Sutherland) , became the first beneficiary, and next his son Francis Leveson Gower

(afterwards first earl of Ellesmere) and his issue. In order that the trust should last as long as possible, an extra- ordinary use was made of the legal rule that property may be

settled for the duration of lives in being and twenty-one years after, by choosing a great number of persons connected with the duke and their living issue and adding to them the peers who had taken their seats in the House of Lords on or before the duke's decease. Though the last of the peers died in 1857, one of the commoners survived till the 19th of October 1883, and consequently the trust did not expire till the 19th of October 1903, when the whole property passed under the undivided control of the earl of Ellesmere. The capals, however, had in 1872 been transferred to the Bridgewater Navigation Company, by whom they were sold in 1887 to the Manchester Ship Canal Company.

BRIDGEWATER, FRANCIS HENRY EGERTON, 8th Earl of (1756-182Q), was educated at Eton and Christ Church, Oxford, and became fellow of All Souls in 1780, and F.R.S. in 1781. He held the rectories of Middle and Whitchurch in Shropshire, but the duties were performed by a proxy. He succeeded his brother (see above) in the earldom in 1823, and spent the latter part of his life in Paris. He was a fair scholar, and a zealous naturalist and antiquarian. When he died in February 1829 the earldom became extinct. He bequeathed to the British Museum the valuable Egerton MSS. dealing with the literature of France and Italy, and also £1 2,000. He also left £8000 at the disposal of the president of the Royal Society, to be paid to the author or authors who might be selected to write and publish 1000 copies of a treatise " On the Power, Wisdom and Goodness ' of God, as manifested in the Creation." Mr Davies Gilbert, who then filled the office, selected eight persons, each to under- take a branch of this subject, and each to receive £1000 as his reward, together with any benefit that might accrue from the sale of his work, according to the will of the testator.

The Bridgewater treatises were published as follows: — 1. The Adaptation of External Nature to the Moral and Intellectual Condition of Man, by Thomas Chalmers, D. D. 2. The Adaptation of External Nature to the Physical Condition of Man, by John Kidd, M. D. 3. Astronomy and General Physics considered with reference to Natural Theology, by William Whewell, D. D. 4. The Hand, its Mechanism and Vital Endowments as evincing Design, by Sir Charles Bell. 5. Animal and Vegetable Physiology considered with reference to Natural Theology, by Peter Mark Roget. 6. Geology and Mineralogy con- sidered with reference to Natural Theology, by

William Buckland, D.D. 7. The Habits and Instincts of Animals with reference to Natural Theology, by William Kirby. 8. Chemistry, Meteorology, and the Function of Digestion, considered with reference to Natural Theology, by William Prout, M.D. The works are of unequal merit; several of them took a high rank in apologetic literature. They first appeared during the years 1833 to r 840, and afterwards in Bohn's Scientific Library.

BRIDGITTINES, an order of Augustinian canonesses founded by St Bridget of Sweden (q.v.) c. 1350, and approved by Urban V. in 1370. It was a " double order," each convent having attached to it a small community of canons to act as chaplains, but under the government of the abbess. The order spread widely in Sweden and Norway, and played a remarkable part in promoting culture and literature in Scandinavia; to this is to be attributed the fact that the head house at Vastein, by Lake Vetter, was not suppressed till 1595. There were houses also in other lands, so that the total number amounted to 80. In England, the famous Bridgittine convent of Syon at Isleworth, Middlesex, was founded and royally endowed by Henry V. in 1415, and became one of the richest and most fashionable and influential nunneries in the country. It was among the few religious houses restored in Mary's reign, when nearly twenty of the old community were re-established at Syon. On Elizabeth's accession they migrated to the Low Countries, and thence, after many vicissitudes, to Rouen, and finally in 1 594 to Lisbon. Here they remained, always recruiting their numbers from England, till 1 861, when they returned to England. Syon House is now established at Chudleigh in Devon, the only English community that can boast an unbroken conventual existence since pre- Reformation times. Some six other Bridgittine convents exist on the Continent, but the order is now composed only of women.

See Helyot, Histoire des ordres religieux (171 5), iv. c. 4; Max Heimbucher, Orden u. Kongregationen (1907), ii. § 83; Herzog-Hauck, Realencyklopadie (ed. 3), art. " Birgitta "; A. Hamilton in Dublin Review, 1888, " The Nuns of Syon." (E. C. B.)

BRIDGMAN, FREDERICK ARTHUR (1847- •), American artist, was born at Tuskegee, Alabama, on the 10th of November 1847. He began as a draughtsman in New York for the American Bank Note Company in 1864-1865, and studied art in the same years at the

Brooklyn Art School and at the National Academy of Design; but he went to Paris in 1866 and became a pupil of J. L. Ger6me. Paris then became his headquarters. A trip to Egypt in 1873-1874 resulted in pictures of the East that attracted immediate attention, and his large and important composition, " The Funeral Procession of a Mummy on the Nile," in the Paris Salon (1877), bought by James Gordon Bennett, brought him the cross of the Legion of Honour. Other paintings by him were "An American Circus in Normandy," "Procession of the Bull Apis " (now in the Corcoran Art Gallery, Washington), and a " Rumanian Lady " (in the Temple collection, Philadelphia).

BRIDGMAN, LAURA DEWEY (1829-1889), American blind deaf-mute, was born on the 21st of December 1829 at Hanover, New Hampshire, U.S.A., being the third daughter of Daniel Bridgman (d. 1868), a substantial Baptist farmer, and his wife Harmony, daughter of Cushman Downer, and grand-daughter of Joseph Downer, one of the five first settlers (1761) of Thetford, Vermont. Laura was a delicate infant, puny and rickety, and was subject to fits up to twenty months old, but otherwise seemed to have normal senses; at two years, however, she had a very bad attack of scarlet fever, which destroyed sight and hearing, blunted the sense of smell, and left her system a wreck. Though she gradually recovered health she remained a blind deaf-mute, but was kindly treated and was in particular made a sort of playmate by an eccentric bachelor friend of the Bridgmans, Mr Asa Tenney, who as soon as she could walk used to take her for rambles a-field. In 1837 Mr James Barrett, of Dartmouth College, saw her and mentioned her case to Dr Mussey, the head of the medical department, who wrote an account which attracted the attention of Dr S. G. Howe (q.v.), the head of the Perkins Institution for the Blind at Boston. He determined to try to get the child into the Institution and to attempt to educate her; her parents assented, and in October 1837 Laura entered the school. Though the loss of her eye-balls occasioned some deformity, she was otherwise a comely child and of a sensitive and affectionate nature; she had become familiar with the world about her, and was imitative in so far as she could follow the actions of others; but she was limited in her communication with others to the narrower uses of touch — patting her head meant approval, rubbing her hand disapproval, pushing one way meant to go, drawing another to come. Her mother, preoccupied with house-work, had already ceased to be able to control her, and her father's authority was due to fear of superior force, not to reason. Dr Howe at once set himself to teach her the alphabet by touch. It is impossible, for reasons of space, to

*describe his efforts in detail. He taught words before the individual letters, and his first experiment consisting in pasting upon several common articles such as keys, spoons, knives, &c, little paper labels with the names of the articles printed in raised letters, which he got her to feel and differentiate; then he gave her the same labels by themselves, which she learnt to associate with the articles they referred to, until, with the spoon or knife alone before her she could find the right label for each from a mixed heap. The next stage was to give her the component letters and teach her to combine them in the words she knew, and gradually in this way she learnt all the alphabet and the ten digits, &c. The whole process depended, of course, on her having a human intelligence, which only, required stimulation, and her own interest in learning became keener as she progressed. On the 24th of July 1830 she first wrote her own name legibly. Dr Howe devoted himself with the utmost patience and assiduity to her education and was rewarded by increasing success. On the 20th of June 1840 she had her first arithmetic lesson, by the aid of a metallic case perforated with square holes, square types Deing used; and in nineteen days she could add a column of ngures amounting to thirty. She was in good health and happy, *nd was treated by Dr Howe as his daughter. Her case already began to interest the public, and others were brought to Dr Howe*

for treatment. In 1841 Laura began to keep a journal, in which she recorded her own day's work and thoughts. In January 1842 Charles Dickens visited the Institution, and afterwards wrote enthusiastically in American' Notes of Dr Howe's success with Laura. In 1843 funds were obtained for devoting a special teacher to her, and first Miss Swift, then Miss Wight, and then Miss Paddock, were appointed; Laura by this time was learning geography and elementary astronomy. By degrees she v is given religious instruction, but Dr Howe was intent upon not inculcating dogma before she had grasped the essential moral truths of Christianity and the story of the Bible. She grew up a gay, cheerful girl, loving, optimistic, but with a nervous system inclining to irritability, and requiring careful education in self- control. In i860 her eldest sister Mary's death helped to bring on a religious crisis, and through the influence of some of her family she was received into the Baptist church; she became for some years after this more self-conscious and rather pietistic. In 1867 she began writing compositions which she called poems; the best-known is called " Holy Home." In 1872, Dr Howe having been enabled to build some separate cottages (each under a matron) for the blind girls, Laura was moved from the larger house of the Institution into one of them, and there she continued her quiet

life. The death of Dr Howe in 1876 was a great grief to her; but before he died he had made arrangements by which she would be financially provided for in her home at the Institu- tion for the rest of her life. In 1887 her jubilee was celebrated there, but in 1889 she was taken ill, and she died on the 24th of May. She was buried at Hanover. Her name has become familiar everywhere as an example of the education of a blind deaf-mute, leading to even greater results in Helen Keller.

See Laura Bridgman, by Maud Howe and Florence Howe Hal! (1903), which contains a bibliography; and Life and Education of Laura Dewey Bridgman (1878), by Mary S. Lamson. (H. Ch.)

BRIDGNORTH, a market town and municipal borough in the Ludlow parliamentary division of Shropshire, England, 150 m. N.W. by W. from London by the Great Western railway, on the Worcester-Shrewsbury line. Pop. (1901) 6052. The river Severn separates the upper town on the right bank from the lower on the left. A steep line of rail connects them. The upper town is built on the acclivities and summit of a rock which rises abruptly from the river to the height of 180 ft., and gives the town a very picturesque appearance. The railway passes under by a long tunnel. On the summit is the tower of the old castle, leaning about 17 from the perpendicular. There are also two parish churches. That of St Leonard, formerly collegiate, was practically rebuilt in 1862. This parish was held by Richard Baxter, the famous divine, in 1640. St Mary's church is in classic style of the late 18th century. The picturesque half-timbered style of domestic building is frequently seen in the streets. In this style are the town hall (1652), and a house dated 1580, in which was born in 1729 Thomas Percy, bishop of Dromore, the editor of the Reliques of Ancient English Poetry. The grammar school, founded in 1503, occupies an Elizabethan building; there are also a college of divinity, a blue-coat school, and a literary institute with library and school of art. There are large charities. Near the town is a curious ancient hermitage cave, in the sandstone. At Quatford, 1 m. south-east, the site of a castle dating from 1085 may be traced. This dominated the ancient Forest of Morf. Here Robert de Belesme originally founded the college which was afterwards moved to Bridgnorth. Bridgnorth manufactures carpets; brewing is carried on, and there is trade in agricultural produce. The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 3018 acres.

The early history of Bridgnorth is connected with ˆEthelfleda, lady of the Mercians, who raised a mound there in 912 as part of her offensive policy against the Danes of the five boroughs. After the

Conquest William I. granted the manor of Bridgnorth to Earl Roger of Shrewsbury, whose son Robert de Belesme transferred his castle and borough from Quatford to Bridgnorth, but on Robert's attainder in 1 102 the town became a royal borough. It is probable that Henry I. granted the burgesses certain privileges, for Henry II. confirmed to them all the franchises and customs which they had in the time of Henry I. King John in 1215 granted them freedom from toll throughout England except the city of London, and in

1227 Henry III. conferred several new rights and liberties, among which were a gild merchant with a hanse. These early charters were confirmed by several succeeding kings, Henry VI. granting in addition assize of bread and ale and other privileges. Bridgnorth was incorporated by James I. in 1546. The burgesses returned two members to parliament in 1295, an d continued to do so until 1867, when they were assigned only one member. The town was disfranchised in 1885. A yearly fair on the feast of the Translation of St Leonard and three following days was granted to the burgesses in 1359, and in 1630 Charles I. granted them licence to hold another fair on the Thursday before the first week in Lent and two following days.

BRIDGWATER, a market town, port and municipal borough in the Bridgwater parliamentary division of Somerset, England, on the river Parret, 10 m. from its mouth, and 151J m. by the Great Western railway W. by S. of London. Pop. (1901) 15,209. It is pleasantly situated in a level and well-wooded country, having on the east the Mendip range and on the west the Quantock hills. The town lies along both sides of the river, here crossed by a handsome iron bridge. Among several places of worship the chief is St Mary Magdalene's church; this has a north porch and windows dating from the 14th century, besides a lofty and slender spire; but it has been much altered by restoration. It possesses a fine painted reredos. A house in Blake Street, largely restored, was the birthplace of Admiral Blake in 1598. Near the town are the three fine old churches of Weston Zoyland, Chedzoy and Middlezoy, containing some good brasses and carved woodwork. The battlefield of Sedge- moor, where the Monmouth rebellion was finally crushed in 1685, is within 3 m.; while not far off is Charlinch, the home of the Agapemonites (?.».). Bridgwater has a considerable coasting trade, importing grain, coal, wine, hemp, tallow and timber, and exporting Bath brick, farm

produce, earthenware, cement and plaster of Paris. The river is navigable by vessels of 700 tons, though liable, when spring- tides are flowing, to a bore which rises, in rough weather, to a height of 9 ft. Bath brick, manufactured only here, and made of the mingled sand and clay deposited by every tide, is the staple article of commerce; iron-founding is also carried on. The town is governed by a mayor, 6 aldermen and 18 councillors. Area, 926 acres.

A settlement probably grew up in Saxon times at Bridgwater {Briges, Briggewalteri, Brigewauter) , owing its origin as a trade centre to its position at the mouth of the chief river in Somerset. It became a mesne borough by the charter granted by John in 1201, which provided that the town should be a free borough, the burgesses to be free and quit of all tolls, and made William de Briwere overlord. Other charters were granted by Henry III. in 1227 (confirmed in 1318, 1370, 1380), which gave Bridgwater a gild merchant. It was incorporated by charter of Edward IV. (1468), confirmed in 1554, 1586, 1629 and 1684. Parliamentary representation began in 1295 and continued until the Reform Act of 1870. A Saturday market and a fair on the 24th of June were granted by the charter of 1201. Another fair at the beginning of Lent was added in 1468, and a second market on Thursday, and fairs at Midsummer and on the 21st of September were added in 1554. Charles II. granted another fair on the 29th of December. The medieval importance of these markets and fairs for the sale of wool and wine and later of cloth has gone. The shipping trade of the port revived after the con- struction of the new dock in 1841, and corn and timber have been imported for centuries.

See S. G. Jarman, " History of Bridgwater," Historical MSS. Commission, Report 9, Appendix; Victoria County History: Somerset, vol. ii.

BRIDLINGTON, a market town, municipal borough and seaside resort in the Buckrose parliamentary division of the East Riding of Yorkshire, England, 31 m. N.N.E. from Hull by a branch of the North Eastern railway. Pop. (1891) 8919; (1901) 12,482. It is divided into two parts, the ancient market town lying about 1 m. from the coast, while the modern houses of Bridlington Quay, the watering-place, fringe the shore of Bridlington Bay. Southward the coast becomes low, but northward it is steep and very fine, where the great spur of Flambprough Head (q.v.) projects eastward. In the old town of Bridlington the church of St Mary and St Nicholas consists of the fine Decorated and Perpendicular nave, with Early English portions, of the priory church of an Augustinian founda- tion of the

time of Henry I. There remains also the Perpen- dicular gateway, serving as the town-hall. The founder of the priory was Walter de Gaunt, about n 14, and the institution

flourished until 1537, when the last prior was executed; for. taking part in the Pilgrimage of Grace. A Congregational society was founded in 1662, and its old church, dating from 1702, stood until 1906. At Bridlington Quay there is excellent sea-bathing, and the parade and ornamental gardens provide pleasant promenades. Extensive works have been carried out along the sea front. There is a chalybeate spring. The harbour is enclosed by two stone piers, and there is good anchorage in the bay. The municipal borough is under a mayor, 6 aldermen and 18 coun- cillors, and has an area of 2751 acres.

The mention of four burgesses at Bridlington (Brellington, Burling- ton) in the Domesday survey shows it to have been a borough before the Conquest. With the rest of the north of England, Bridlington suffered from the ravages of the Normans, and decreased in value from £32 in the reign of Edward the Confessor, when it formed part of the possessions of Earl Morcar, to 8s. at the time of the Domesday survey. By that time it was in the hands of the king by the forfeiture of Earl Morcar. It was granted by William II. to Gilbert de Gaunt, whose son and heir Walter founded the priory and endowed it with the manor of Bridlington and other lands. From this date the importance of the town steadily increased. Henry I. and several succeeding kings confirmed Walter de Gaunt's gift, Stephen granting in addition the right to have a port. In 1546 Henry IV. granted the prior and convent exemption from fifteenths, tenths and subsidies, in return for prayer for himself and his queen in every mass sung at the high altar. After the Dissolution the manor remained with the crown until 1624, when Charles I. granted it to Sir John Ramsey, whose brother and heir, Sir George Ramsey, sold it in 1633 to thirteen inhabitants of the town on behalf of all the tenants of the manor. The thirteen lords were assisted by twelve other inhabitants chosen by the freeholders, and when the number of lords was reduced to six, seven others were chosen from the assistants. A chief lord was chosen every year. This system still holds good. It is evident from the fact of thirteen inhabitants being allowed to hold the manor that the town had some kind of incorporation in the 17th century, although its incorporation charter was not granted until 1899, when it was created a municipal borough. In 1200 King John granted the prior of Bridlington a weekly market on Saturday and ah annual fair on the vigil, feast and morrow of the Assumption of the Virgin Mary. Henry VI. in 1446 granted the prior three new fairs yearly on the vigil, day

and morrow of the Nativity of the Virgin Mary, the Deposition of St John, late prior of Bridlington, and the Translation of the same St John. All fairs and markets were sold with the manor to the inhabitants of the town.

See J. Thompson, Historical Sketches of Bridlington (1821); Victoria County History: Yorkshire.

BRIDPORT, ALEXANDER HOOD, Viscount (1727-1814), British admiral, was the younger brother of Samuel, Lord Hood; and cousin of Sir Samuel and Captain Alexander Hood. Entering the navy in January 1741, he was appointed lieutenant of the " Bridgewater " six years later, and in that rank served for ten years in various ships. He was then posted to the " Prince," the flag-ship of Rear- Admiral Saunders (under whom Hood had served as a lieutenant) and in this command served in the Mediterranean for some time. 'Returning home, he was appointed to the " Minerva " frigate, in which he was present at Hawke's great victory in Quiberon Bay (20th November 1750) •■ In 1 761 the " Minerva " recaptured, after a long struggle, the " Warwick " of equal force, and later in the same year Captain Alexander Hood went in the " Africa " to the Mediterranean, where he served until the conclusion of peace. From this time forward he was in continuous employment afloat and ashore, and in the " Robust " was present at the battle of Ushant in 1778. Hood was involved in the court-martial on Admiral (afterwards Viscount) Keppel which followed this action, and although adverse popular feeling was aroused by the course which he took in Keppel's defence, his conduct does not seem to have injured his prof essional career. Two years later he was made rear-admiral of the white, and succeeded Kempenfeldt as one of Howe's flag-officers, and in the "Queen" (90) he was present at the relief of Gibraltar in 1782. For a time he sat in the House of Commons. Promoted vice-admiral in ˆ87, he became K.B. in the following year, and on the occasion of the Spanish armament in 1790 flew his flag again for a short time. On the outbreak of the war with France in 1793 Sir Alexander Hood once more went to sea, this time as Howe's second in command, and he had. his share in the operations which cul- minated in the " Glorious First of June," and for his services was made Baron Bridport of Cricket St Thomas in Somerset

in the Irish peerage. Henceforth Bridport was practically in

independent command. In 1795 he fought the much-criticized partial action of the 23rd of June off Belle-Ile, which, however unfavourably it was regarded in some quarters, was counted as a great victory by the public. Bridport's peerage was made English, and he became vice-admiral of England. In 1706-1707 he practically directed the war from London, rarely hoisting his flag afloat save at such critical times as that of the Irish expedition in 1797. In the following year he was about to put to sea when the Spithead fleet mutinied. He succeeded at first in pacifying the crew of his flag-ship, who had no personal grudge against their admiral, but a few days later the mutiny broke out afresh, and this time was uncontrollable. For a whole week the mutineers were supreme, and it was only by the greatest exertions of the old Lord Howe that order was then restored and the men returned to duty. After the mutiny had been suppressed, Bridport took the fleet to sea as commander-in-chief in name as well as in fact, and from 1798 to 1800 personally directed the blockade of Brest, which grew stricter and stricter as time went on. In 1800 he was relieved by St Vincent, and retired from active duty after fifty-nine years' service. In reward for his fine record his peerage was made a viscounty. He spent the remaining years of his life in retirement. He died on the 2nd of May 18 14. The viscounty in the English peerage died with him; the Irish barony passed to the younger branch of his brother's family, for whom the viscounty was recreated in 1868.

See Charnock, Biographia Navalis, vi. 153; Naval Chronicle, i. 265 ; Ralfe, Nav. Biog. i. 202.

BRIDPORT, a market town and municipal borough in the Western parliamentary division of Dorsetshire, England, 18 m. N.W. of Dorchester, on a branch of the Great Western railway. Pop. (1901) 5710. It is pleasantly situated in a hilly district on the river Brit, from which it takes its name. The main part of the town is about a mile from the sea, with which it is connected by a winding street, ending at a quay surrounded by the fishing village of West Bay, where the railway terminates. The church of St Mary is a handsome cruciform Perpendicular building. The harbour is accessible only to small vessels. There is some import trade in flax, timber and coal. The principal articles of manufacture have long been sailcloth, cordage, linen and fishing-nets. The municipal borough is under a mayor, 6 aldermen and 18 councillors. Area, 593 acres.

Bridport was evidently of some importance before the Conquest, when it consisted of 120 houses rated for all the king's services and paying geld for five hides. By 1086 the number of houses had

decreased to 100, and of these 20 were in such a wretched condition that they could not pay geld. The town is first mentioned as a borough in the Pipe Roll of 1 189, which states that William de Bendenges owed fy: 10s. for the ancient farm of Bridport, and that the men of the town owed tallage to the amount of 53s. iod. Henry III. granted the first charter in 1252-1253, making the town a free borough and granting the burgesses the right to hold it at the ancient fee farm with an increase of 40s., and to choose two bailiffs to answer at the exchequer for the farm. A deed of 1381 shows that Henry III. also granted the burgesses freedom from toll. Bridport was incorporated by James I. in 1619, but Charles II. granted a new charter in 1667, and by this the town was governed until 1835. The first existing grant of a market and fairs to Bridport is dated 1593, but it appears from the Quo Warranto Rolls that Edward I. possessed a market there. The town was noted for the manufacture of ropes and cables as early as 12 13, and an act of parliament (21 Henry VIII.) shows that the inhabitants had " from time out of mind made the cables, ropes and hawsers for the royal navy and for most of the other ships. Bridport was represented in parliament by two members from 1395 to 1867. In the latter year the number was reduced to one, and in 1885 the town was disfranchised.

BRIE (Briegus saltus, from Celtic briek, clay), an agricultural district of northern France, to the E. of Paris, bounded W. and S. by the Seine, N. by the Marne. It has an area of 2400 sq. m., comprising the greater part of the department of Seine-et-Marne, together with portions of the departments of Seine, Seine-et-Oise, Aisne, Marne and Aube. The western portion was known as the Brie franc.aise, the eastern portion as the Brie champenoise. The Brie forms a plateau with few eminences, varying in altitude between 300 and 500 ft. in the west, and between 500 and 650 ft. in the east. Its scenery is varied by forests of some size — the

chief being the ForSt de Senart, the ForSt de Cr6cy and the Foret d'Armainvilliers. The surface soil is clay in which are embedded fragments of siliceous sandstone, used for millstones and constructional purposes; the subsoil is limestone. The Yeres, a tributary of the Seine, and the Grand Morin and Petit Morin, tributaries of the Marne, are the chief rivers, but the region is not abundantly watered and the rainfall is only between 20 and 24 in. The Brie is famous for its grain and its dairy products, especially cheeses.

BRIEF (Lat. brevis, short) , in English legal practice, the written statement given to a barrister to form the basis of his case. It was probably so called from its at first being only a copy of the original

writ. Upon a barrister devolves the duty of taking charge of a case when it comes into court, but all the preliminary work, such as the drawing up of the case, serving papers, mar- shalling evidence, &c, is performed by a solicitor, so that a brief contains a concise summary for the information of counsel of the case which he has to plead, with all material facts in chronological order, and frequently such observations thereon as the solicitor may think fit to make, the names of witnesses, with the " proofs," that is, the nature of the evidence which each witness is ready to give, if called upon. The brief may also contain suggestions for the use of counsel when cross-examining witnesses called by the other side. Accompanying the brief may be copies of the pleadings (see Pleading), and of all documents material to the case. The brief is always endorsed with the title of the court in which the action is to be tried, with the title of the action, and the names of the counsel and of the solicitor who delivers the brief. Counsel's fee is also marked. The delivery of a brief to counsel gives him authority to act for his client in all matters which the litigation involves. The result of the action is noted on the brief by counsel, or if the action is compromised, the terms of the compromise are endorsed on each brief and signed by the leading counsel on the opposite side. In Scotland a brief is called a memorial.

In the United States the word has, to a certain extent, a different meaning, a brief in its English sense not being required, for the American attorney exercises all the functions distributed in England between barristers and solicitors. A lawyer sometimes prepares for his own use what is called a " trial brief " for use at the trial. This corresponds in all essential particulars with the " brief " prepared by the solicitor in England for the use of counsel. But the more distinctive use of the term in America is in the case of the brief " in error or appeal," before an. appellate court. This is a written or printed document, varying according to circumstances, but embodying the argument on the question affected. Most of the appellate courts require the filing of printed briefs for the use of the court and opposing counsel at a time designated for each side before hearing. In the rules of the United States Supreme Court and circuit courts of appeals the brief is required to contain a concise statement of the case, a specification of errors relied on, including the substance of evidence, the admission or rejection of which is to be reviewed, or any extract from a charge excepted to, and an argument exhibiting clearly the points of law or fact to be discussed. This form of brief, it may be added, is also adopted for use at the trial in certain states of the Union which require printed briefs to be delivered to the court.

In English ecclesiastical law a brief meant letters patent issued out of chancery to churchwardens or other officers for the collection of money for church purposes. Such briefs were regulated by a statute of 1704, but are now obsolete, though they are still to be found named in one of the rubrics in the Communion service of the Book of Common Prayer.

The brief-bag, in which counsel's papers are carried to and from court, now forms an integral part of a barrister's outfit, but in the early part of the 19th century the possession of a brief-bag was strictly confined to those who had received one from a king's counsel. King's counsel were then few in number, were considered officers of the court, and had a salary of £40 a year, with a supply of paper, pens and purple bags. These bags they distributed among rising juniors of their acquaintance.

whose bundles of briefs were getting inconveniently large to be carried in their hands. These perquisites were abolished in 1830. English brief -bags are now either blue or red. Blue bags are those with which barristers provide themselves when first called, and it is a breach of etiquette to let this bag be visible in court. The only brief-bag allowed to be placed on the desks is the red bag, which by English legal etiquette is given by a leading counsel to a junior who has been useful to him in some important case.

BRIEG, a town of Germany, in the Prussian province of Silesia, on the left bank of the Oder, and on the Breslau and Beuthen railway, 27 m. S.E. of the former city. Pop. (1900) 24,090. It has a castle (the residence of the old counts of Brieg) , a lunatic asylum, a gymnasium with a good library, several churches and hospitals, and a theatre. Its fortifications were destroyed by the French in 1807, and are now replaced by beautiful promenades. Brieg carries on a considerable trade, its chief manufactures being linen, embroideries, cotton and woollen goods, ribbons, leather, machinery, hats, pasteboard and cigars. Important cattle-markets are held here. Brieg, or, as it is called in early documents, Civitas Altae Ripae, obtained municipal rights in 1250 from Duke Henry III. of Breslau, and was fortified in 1297; its name is derived from the Polish Brzeg (shore). Burned by the Hussites in 1428, the town was soon afterwards rebuilt, and in 1595 it was again fortified by Joachim Frederick, duke of Brieg. In the Thirty Years' War it suffered greatly; in that of

the Austrian succession it was heavily bombarded by the Prussian forces; and in 1807 it was captured by the French and Bavarians. From 1311 to 1675 Brieg was the capital of an independent line of dukes, a cadet branch of the Polish dukes of Lower Silesia, by one of whom the castle was built in 1341. In 1537 Frederick II., duke of Liegnitz, Brieg and Wohlau, concluded with Joachim II., elector of Branden- burg, a treaty according to which his duchy was to pass to the house of Brandenburg in the event of the extinction of his line. On the death of George William the last duke in 1675, however, Austria refused to acknowledge the validity of the treaty and annexed the duchies. It was the determination of Frederick H. of Prussia to assert his claim that led in 1740 to the war that ended two years later in the cession of Silesia to Prussia.*

See Stokvis, Manuel d'histoire, iii. pp. 54, 64.

BRIEG, often now spelt Brig (Fr. Brigue, Ital. Briga), a picturesque small town in the Swiss canton of the Valais, situated at the foot of the northern slope of the Simplon Pass, on the right bank of the Saltine stream, and a little above its junction with the Rhone. Its older houses are very Italian in appearance, while its most prominent buildings (castle, former Jesuits' college and Ursuline convent) all date from the 17th century, and are due to the generosity of a single member of the local Stockalper family. The prosperity of Brieg is bound up with the Simplon Pass (?.».), so that it gradually supplanted the more ancient village of Naters opposite, becoming a separate parish (the church is at Glis, a few minutes from the town) in 1517. Its medieval name was Briga dives. The opening of the carriage road across the Simplon (1807) and of the tunnel beneath the pass (1906), as well as the fact that above Brieg is the steeper and less fertile portion of the Upper Valais (now much frequented by tourists), have greatly increased the importance and size of the town. The opening of the railway tunnel beneath the Lotschen Pass, affording direct communication with Bern and the Bernese Oberland, is calculated still further to contribute to its prosperity. The new town extends below the old one and is closer to the right bank of the Rhone. In 1900 the population was 2182, almost all Romanists, while 1316 were German-speaking, 719 Italian-speaking (the Simplon tunnel workmen), and 142 French-speaking, one person only speaking Romonsch. (W. A. B. C.)

BRIELLE (Briel or Bril), a seaport in the province of South Holland, Holland, on the north side of the island of Voorne, at the mouth of the New Maas, 5ˆ m. N. of Hellevoetsluis. Pop. (1900) 4107. It is a fortified place and has a good harbour, arsenal, magazine and

barracks. It also possesses a quaint town hall, and an orphanage dating from 1 533. The tower of the Groote

Kerk of St Catherine serves as a lighthouse. Most of the trade of Brielle was diverted to Hellevoetsluis by the cutting of the Voornsche Canal in 1829, but it still has some business in corn and fodder, as well as a few factories. A large number of the inhabitants are also engaged in the fisheries and as pilots.

The chief event in the history of Brielle is its capture by the Gueux sur Mer, a squadron of privateers which raided the Dutch coast under commission of the prince of Orange. This event, which took place on the 1st of April 1572, was the first blow in the long war of Dutch independence, and was followed by a general outbreak of the patriotic party (Motley, Rise of the Dutch Re- public, part iii. chapter vi.). " The Brill " was one of the four Dutch towns handed over to Queen Elizabeth in 1 584 as security for English expenses incurred in aiding the Dutch. Brielle is the birthplace of the famous admiral Martin van Tromp, and also of Admiral van Almonde, a distinguished commander of the early 18th century.

BRIENNE-LE-CHATEAU, a town of north-eastern France, in the department of Aube, 1 m. from the right bank of the Aube and 26 m. N.E. of Troyes on the Eastern railway. Pop. (1906) 1761. The chateau, which overlooks the town, is an imposing building of the latter half of the 18th century, built by the cardinal de Brienne (see below). It possesses an important collection of pictures, many of them historical portraits of the 17th and 1 8th centuries. The church dates from the 16th century and contains good stained glass. A statue of Napoleon commemorates his sojourn at Brienne from 1779 to 1784, when he was studying at the military school suppressed in 1790. In 1814 Brienne was the scene of fighting between Napoleon and the Allies (see Napoleonic Campaigns). Brewing is carried on in the town. Brienne-la-Vieille, a village if m. south of Brienne-le-Chateau, has a church of the 12th and 1 6th centuries with fine stained windows. The portal once belonged to the ancient abbey of Bassefontaine, the ruins of which are situated near the village.

Counts of Brienne. — Under the Carolingian dynasty Brienne- le-Chateau was the capital town of a French countship. In the 10th century it was captured by two adventurers named Engelbert and Gobert, and from the first of these sprang the noble house of Brienne. In 1210 John of Brienne (1148-1237) became king of Jerusalem, through his marriage with Mary of Montferrat, heiress of the kingdom of Jerusalem. He led a crusade in Egypt which had no

lasting success; and when in 1229 he was elected emperor of the East, for the period of Baldwin II. 's minority, he fought and conquered the Greek emperor John III. (Batatzes or Vatatzes). Walter V., count of Brienne and of Lecce (Apulia) and duke of Athens, fought against the Greeks and at first drove them from Thessaly, but was eventually defeated and killed near Lake Copais in 131 1. His son, Walter VI., after having vainly attempted to reconquer Athens in 1331, served under Philip of Valois against the English. Having defended Florence against the Pisans he succeeded in obtaining dictatorial powers for himself in the republic; but his tyrannical conduct brought about his expulsion. He was appointed constable of France by John the Good, and was killed at the battle of Poitiers in 1356. His sister and heiress Isabelle married Walter of Enghien, and so brought Brienne to the house of Enghien, and, by his marriage with Margaret of Enghien, John of Luxemburg-St Pol (d. about 1397) became count of Brienne. The house of Luxemburg retained the countship until Margaret Charlotte of Luxemburg sold it to a certain Marpon, who ceded it to Henri Auguste de Lomenie (whose wife, Louise de Beon, descended from the house of Luxemburg-Brienne) in 1640. The Limousin house of Lomenie (the genealogies which trace this family to the 15th century are untrustworthy) produced many well-known statesmen, among others the celebrated cardinal Etienne Charles de Lomenie de Brienne (1727-1794), minister of Louis XV.; and the last lords of Brienne were members of this family. (M. P.)*

BRIENZ, LAKE OF, in the Swiss canton of Bern, the first lake into which the river Aar expands. It lies in a deep hollow between the village of Brienz on the east (2580 inhabitants, the

chief centre of the Swiss wood-carving industry) and, on the west, Bonigen (1515 inhabitants), close to Interlaken. Its length is about 9 m., its width i| m., and its maximum depth 856 ft., while its area is 115 sq. m., and the surface is 1857 ft. above the sea-level. On the south shore are the Giessbach Falls and the hamlet of Iseltwald. On the north shore are a few small villages. The character of the lake is gloomy and sad as compared with its neighbour, that of Thun. Its chief affluent is the Liitschine (flowing from the valleys of Grindelwald and Lauterbrunnen). The first steamer was placed on the lake in 1839. (W. A. B. C.)

BRIERLEY, BENJAMIN (1825-1896), English weaver and writer in Lancashire dialect, was born near Manchester., the son of humble parents, and started life in a textile factory, educating himself in his spare time. At about the age of thirty he began to contribute articles to local papers, and the republication of some of his sketches of Lancashire character in A Summer Day in Daisy Nook (1859) attracted attention. In 1863 he definitely took to journalism and literature as his work, publishing in 1863 his Chronicles of Waverlow, and in 1864 a long story called The Layrock of Langley Side (afterwards dramatized), followed by others. He started in 1869 Ben Brierley's Journal, a weekly, which continued till 1891, and he gave public readings from his own writings, visiting America in 1880 and 1884. His various Ab-o'-th'-Yate sketches (about America, London, &c), and his pictures of Lancashire common life, were very popular, and were collected after his death. In 1884 he lost his savings by the failure of a building society, and a fund was raised for his support. He died on the 18th of January 1896, and two years later a statue was erected to him in Queen's Park, Manchester.

BRIERLY, SIR OSWALD WALTERS (1817-1894), English marine painter, who came of an old Cheshire family, was born at Chester. He entered Sass's art-school in London, and after studying naval architecture at Plymouth he exhibited some drawings of ships at the Royal Academy in 1839. He had a passion for the sea, and in 1841 started round the world with Benjamin Boyd (1796-1851), afterwards well known as a great Australian squatter, in the latter's ship " Wanderer," and having got to New South Wales, made his home at Auckland for ten years. Brierly Point is called after him. He added to his sea experiences by voyages on H.M.S. " Rattlesnake " in 1848, and with Sir Henry Keppel on the " Meander " in 1850; he returned to England in 1851 on this ship, and illustrated Keppel's book about his cruise (1853). He was again with Keppel during the Crimean War, and published in 1855 a series of lithographs illustrating " The English and French fleets in the Baltic." He was now taken up by Queen Victoria and other members of the royal family, and was attached to the suites of the duke of Edinburgh and the prince of Wales on their tours by sea, the results being seen in further marine pictures by him; and in 1874 he was made marine-painter to the queen. He exhibited at the Academy, but more largely at the Royal Water-colour Society, his more important works including the historical pictures, " The Retreat of the Spanish Armada" (1871) and " The Loss of the Revenge " (1877). In 1885 he was knighted, and he died on the 14th of December 1894. He was twice married and had an active and prosperous life, but was no

great artist; his best pictures are at Melbourne and Sydney.

BRIEUX, EUGENE (1858-), French dramatist, was born in Paris of poor parents on the 19th of January 1858. A one-act play, Bernard Palissy, written in collaboration with M. Gaston Salandri, was produced in 1879, but he had to wait eleven years before he obtained another hearing, his Menage d' artistes being produced by Antoine at the Theatre Libre in 1890. His plays are essentially didactic, being aimed at some weakness or iniquity of the social system. Blanchette (1892) pointed out the evil results of education of girls of the working classes; M. de Reboval (1892) was directed against pharisaism; L' Engrenage (1894) against corruption in politics ; Les Bienfaiteurs (1896) against the frivolity of fashionable charity; and L' Evasion (1896) satirized an indis- criminate belief in the doctrine of heredity. Les Trots Filles de M. Dupont (1897) is a powerful, somewhat brutal, study of the miseries imposed on Door middle-class girls by the French

system of dowry; Le Resultat des courses (1898) shows the evil results of betting among the Parisian workmen; La Robe rouge (1900) was directed against the injustices of the law; Les Remplacantes (1901) against the practice of putting children out to nurse. Les Avariis (1901), forbidden by the censor, on account of its medical details, was read privately by the author at the Theatre Antoine; and Petite amie (1902) describes the life of a Parisian shop-girl. Later plays are La Couvte (1903, acted privately at Rouen in 1893), MaterniU (1904), La Dtserteuse (1904), in collaboration with M. Jean Sigaux, and Les Hannetons, a comedy in three acts (1906).

BRIGADE (Fr. and Ger. brigade, Ital. brigata, Span, brigada; the English use of the word dates from the early 17th century), a unit in military organization commanded by a major-general, brigadier-general or colonel, and composed of two or more regiments of infantry, cavalry or artillery. The British infantry brigade consists as a rule of four battalions (or about 4000 bayonets) with supply, transport and medical units attached; the cavalry brigade of two or three regiments of cavalry. An artillery " brigade " (field, horse, and heavy) is in Great Britain a smaller unit, forming a lieut. -colonel's command and consisting of two or three batteries. (See Army, Artillery, Infantry, and Cavalry.) The staff of an infantry or cavalry brigade usually consists of the brigadier commanding, his aide-de-camp, and the brigade-major, a staff officer whose duties are inter-mediate between those of an adjutant and those of a general staff officer.

BRIGANDAGE. The brigand is supposed to derive his name from the O. Fr. brigan, which is a form of the Ital. brigante, an irregular or partisan soldier. There can be no doubt as to the origin of the word " bandit," which has the same meaning. In Italy, which is not unjustly considered the home of the most accomplished European brigands, a bandito was a man declared outlaw by proclamation, or bando, called in Scotland " a decree of horning " because it was delivered by a blast of a horn at the town cross. The brigand, therefore, is the outlaw who conducts warfare after the manner of an irregular or partisan soldier by skirmishes and surprises, who makes the war support itself by plunder, by extorting blackmail, by capturing prisoners and holding them to ransom, who enforces his demands by violence, and kills the prisoners who cannot pay. In certain conditions the brigand has not been a mere malefactor. " It is you who are the thieves " — " / Ladroni, siete voi," — was the defence of the Calabrian who was tried as a brigand by a French court-martial during the reign of Murat in Naples. Brigandage may be, and not infrequently has been, the last resource of a people subject to invasion. The Calabrians who fought for Ferdinand of Naples, and the Spanish irregukir levies, which maintained the national resistance against the French from 1808 to 1814, were called brigands by their enemies. In the Balkan peninsula, under Turkish rule, the brigands (called klephts by the Greeksand hayduks or haydutzi by the Slavs) had some claim to believe themselves the representatives of their people against oppressors. The only approach to an attempt to maintain order was the permission given to part of the population to carry arms in order to repress the klephts. They were hence called " armatoli." As a matter of fact the armatole were rather the allies than the enemies of the klephts. The invader who reduces a nation to anarchy, and then x suffers from the disorder he creates, always calls his opponents brigands. It is a natural consequence of such a war, but a very disastrous one, for the people who have to have recourse to these methods of defence, that the brigand acquires some measure of honourable prestige from his temporary associa- tion with patriotism and honest men. The patriot band attracts the brigand proper, who is not averse to continue his old courses under an honourable pretext. " Viva Fernando yvamosrobando" (Long life to Ferdinand, and let us go robbing) has been said by not unfair critics to have been the maxim of many Spanish gucrrilleros. Italy and Spain suffered for a long time from the disorder developed out of the popular resistance to the French. Numbers of the guerrilleros of both countries, who in normal conditi3ns might have been honest, had acquired a preference

for living on the country, and for occasional booty, which they could not resign when the enemy had retired. Their countrymen had to work for a second deliverance from their late defenders. In the East the brigand has had a freer scope, and has even founded kingdoms. David's following in the cave of Adullam was such material as brigands are made of. " And every one that was in distress, and every one that was in debt, and every one that was discontented, gathered themselves unto him, and he became a captain over them: and there were with him about four hundred men." Nadir Shah of Persia began in just such a cave of Adullam, and lived to plunder Delhi with a host of Persians and Afghans.

The conditions which favour the development of brigandage may be easily summed up. They are first bad administration, and then, in a less degree, the possession cf convenient hiding- places. A country of mountain and forest is favourable to the brigand. The highlands of Scotland supplied a safe refuge to the " gentlemen reavers," who carried off the cattle of the Sassenach landlords. The Apennines, the mountains of Calabria, the Sierras of Spain, were the homes of the Italian " banditos " and the Spanish " bandoleros " (banished men) and " saltea- dores " (raiders). The forests of England gave cover to the out- laws, whose very much flattered portrait is to be found in the ballads of Robin Hood. The" maquis,"».e. the bush of Corsica, and its hills, have helped the Corsican brigand, as the bush of Australia covered the bushranger. But neither forest thicket nor mountain is a lasting protection against a good police, used with intelligence by the government, and supported by the law-abiding part of the community. The great haunts of brigands in Europe have been central and southern Italy and the worst-administered parts of Spain, except those which fell into the hands of the Turks. " Whenever numerous troops of banditti, multiplied by success and impunity, publicly defy, instead of eluding, the justice of their country, we may safely infer that the excessive weakness of the government is felt and abused by the lowest ranks of the community;" is the judg- ment passed by Gibbon on the disorders of Sicily in the reign of the emperor Gallienus. This weakness has not always been a sign of real feebleness in the government. England was vigor- ously ruled in the reign of William III., when " a fraternity of plunderers, thirty in number according to the lowest estimate, squatted near Waltham Cross under the shades of Epping Forest, and built themselves huts, from which they sallied forth with sword and pistol to bid passengers

stand." It was not because the state was weak that the Cubbings (so called in contempt from the trimmings and refuse of fish) infested Devonshire for a generation from their headquarters near Brent Tor, on the edge of Dartmoor. It was because England had not provided herself with a competent rural police. In relatively unsettled parts of the United States there has been a considerable amount of a certain kind of brigandage. In early days the travel routes to the far West were infested by highwaymen, who, however, seldom united into bands, and such outlaws, when captured, were often dealt with in an extra-legal manner, e.g. by " vigilance com- mittees." The Mexican brigand Cortina made incursions into Texas before the Civil War. In Canada the mounted police have kept brigandage down, and in Mexico the " Rurales " have made an end of the brigands. Such curable evils as the highwaymen of England, and their like in the States, are not to be compared with the " Ecorcheurs," or Skinners, of France in the 15th century, or the " Chauffeurs " of the revolutionary epoch. The first were large bands of discharged mercenary soldiers who pillaged the country. The second were ruffians who forced their victims to pay ransom by holding their feet in fires. Both flourished because the government was for the time disorganized by foreign invasion or by revolution. These were far more terrible evils than the licence of criminals, who are encouraged by a fair prospect of impunity because there is no permanent force always at hand to check them, and to bring them promptly to justice. At the same time it would be going much too far to say that the absence of an efficient police is the sole cause of brigandage in countries not subject to foreign invasion, or where

the state is not very feeble. The Sicilian peasants of whom Gibbon wrote were not only encouraged by the hope of impunity, but were also maddened by an oppressive System of taxation and a cruel system of land tenure. So were the Gauls and Spaniards who throughout the 3rd and 4th centuries were a constant cause of trouble to the empire, under the name of Bagaudae, a word of uncertain origin. In the years preceding the French Revolution, the royal government commanded the services of a strong army, and a numerous marechaussle or gendarmerie. Yet it was defied by the troops of smugglers and brigands known as faux saulniers, unauthorized salt-sellers, and gangs of poachers haunted the king's preserves round Paris. The salt monopoly and the excessive preservation of the game were so oppressive that the peasantry were provoked to violent resistance and to brigandage. They were constantly suppressed, but as the cause of the disorder survived, so its effects were con- tinually renewed. The offenders enjoyed a large

measure of public sympathy, and were warned or concealed by the population, even when they were not actively supported. The traditional outlaw who spared the poor and levied tribute on the rich was, no doubt, always a creature of fiction. The ballad which tells us how " Rich, wealthy misers were abhorred, By brave, free-hearted Bliss " (a rascal hanged for highway robbery at Salisbury in 1695) must have been a mere echo of the Robin Hood songs. But there have been times and countries in which the law and its administration have been so far regarded as enemies by people who were not themselves criminals, that all who defied them have been sure of a measure of sympathy. Then and there it was that brigandage has flourished, and has been difficult to extirpate. Schinder-Hannes, Jack the Skinner, whose real name was Johann Buckler, and who was born at Muklen on the Rhine, flourished from 1797 to 1802 because there was no proper police to stop him; it is also true that as he chiefly plundered the Jews he had a good deal of Christian sympathy. When caught and beheaded he had no successors.

The brigandage of Greece, southern Italy, Corsica and Spain had deeper roots, and has never been quite suppressed. All four countries are well provided with hiding-places in forest and mountain. In all the administration has been bad, the law and its officers have been regarded as dangers, if not as deliberate enemies, so that they have found little native help, and, what is not the least important cause cf the persistence of brigandage, there have generally been local potentates who found it to their interest to protect the brigand. The case of Greece under Turkish rule need not be dealt with. Whoever was not a klepht was the victim of some official extortioner. It would be grossly unfair to apply the name brigand to the Mainotes and similar clans, who had to choose between being flayed by the Turks or living by the sword under their own law. When it became independent Greece was extremely ill administered under a nominal parliamentary government by politicians who made use of the brigands for their own purposes. The result was the state of things described with only pardonable exaggeration in Edmond About's amusing Roi de la montagne. An authentic and most interesting picture of the Greek brigands will be found in the story of the captivity of S. Soteropoulos, an ex-minister who fell into their hands. It was translated into English under the title of The Brigands of the Morea, by the Rev. J. 0. Bagdon (London, 1868). The misfortunes of Soteropoulos led to the adoption of strong measures which cleared the Morea, where the peasantry gave active support to the troops when they saw that the government was in earnest. But brigandage was not yet extinct in Greece. In 1870 an English party, consisting of

Lord and Lady Muncaster, Mr Vyner, Mr Lloyd, Mr Herbert, and Count de Boyl, was captured at Oropos, near Marathon, and a ransom of £25,000 was demanded. Lord and Lady Muncaster were set at liberty to seek for the ransom, but the Greek government sent troops in pursuit of the brigands, and the other prisoners were then murdered. The scoundrels were hunted down, caught, and executed, and Greece has since then been tolerably free from this reproach. In the Balkan peninsula, under Turkish rule, brigandage continued to exist in connexion

with Christian revolt against the Turk, and the race conflicts of Albanians, Walachians, Pomuks, Bulgarians and Greeks. In Corsica the " maquis " has never been without its brigand hero, because industry has been stagnant, family feuds persist, and the government has never quite succeeded in persuading the people to support the law. The brigand is always a hero to at least one faction of Corsicans.

The conditions which favour brigandage have been more prevalent, and for longer, in Italy than elsewhere in western Europe, with the standing exception of Corsica, which is Italian in all but political allegiance. Until the middle of the 19th century Italy was divided into small states, so that the brigand who was closely pursued in one could flee to another. Thus it was that Marco Sciarra of the Abruzzi, when hard pressed by the Spanish viceroy of Naples — just before and after 1600 — could cross the border of the papal states and return on a favourable opportunity. When pope and viceroy combined against him he took service with Venice, from whence he could communicate with his friends at home, and pay them occasional visits. On one such visit he was led into a trap and slain. Marco Sciarra had terrorized the country far and wide at the head of 600 men. He was the follower and imitator of Benedetto Mangone, of whom it is recorded that, having stopped a party of travellers which included Torquato Tasso, he allowed them to pass unharmed out of his reverence for poets and poetry. Mangone was finally taken, and beaten to death with hammers at Naples. He and his like are the heroes of much popular verse, written in ottava rima, and beginning with the traditional epic invocation to the muse. A fine example is " The most beautiful history of the life and death of Pietro Mancino, chief of Banditti," which has remained popular with the people of southern Italy. It begins : — " Io canto li ricatti, e il fiero ardire Del gran Pietro Mancino fuoruscito " (Pietro Mancino that great outlawed man I sing, and all his rage.)

In Naples the number of competing codes and jurisdictions, the survival of the feudal power of the nobles, who sheltered banditti, just as a Highland' chief gave refuge to "caterans" in Scotland, and the helplessness of the peasantry, made brigand- age chronic, and the same conditions obtained in Sicily. The Bourbon dynasty reduced brigandage very much, and secured order on the main high-roads. But it was not extinguished, and it revived during the French invasion. This was the flourishing time of the notorious Fra Diavolo, who began as brigand and blossomed into a patriot. Fra Diavolo was captured and executed by the French. When Ferdinand was restored on the fall of Napoleon he employed an English officer, General Sir Richard Church, to suppress the brigands. General Church, who kept good order among his soldiers, and who made them pay for everything, gained the confidence of the peasantry, and re- stored a fair measure of security. It was he who finally brought to justice the villainous Don Ciro Anicchiarico — priest and brigand— who declared at his trial with offhand indifference that he supposed he had murdered about seventy people first and last. When a brother priest was sent to give him the consolations of religion, Ciro cut him short, saying, " Stop that chatter, we are two of a trade: we need not play the fool to one another " (Lasciate queste chiacchiere, siamo dell' istessa professione: non ci burliamo fra noi). Every successive revolutionary disturb ance in Naples saw a recrudescence of brigandage down to the unification of 1860-1861, and then it was years before the Italian government rooted it out. The source of the trouble was the support the brigands received from various kinds of " manu- tingoli " (maintainers) — great men, corrupt officials, political parties, and the peasants who were terrorized, or who profited by selling the brigands food and clothes. In Sicily brigandage has been endemic. In 1866 two English travellers, Mr E. J. C. Moens and the Rev. J. C. Murray Aynesley, were captured and held to ransom. Mr Moens found that the " manutengoli " of the brigands among the peasants charged famine prices for food, and extortionate prices for clothes and cartridges. What is true of Naples and Sicily is true of other parts of Italy mutatis

mutandis. In Tu'scany, Piedmont and Lombardy the open country has been Orderly, but the borders infested with brigands. The worst district outside Calabria has been the papal states. The Austrian general, Frimont, did, however, partly clear the Romagna about 1820, though at a heavy cost of life to- his soldiers — mostly Bohemian Jagers — from the malaria.

The history of brigandage in Spain is very similar. It may be said to have been endemic in and south of the Sierra Morena. In the north it

has flourished when government was weak,, and after foreign invasion and civil wars. But it has always been put down easily by a capable administration. It reached its greatest heights in Catalonia, where it began in the strife of the peasants against the feudal exactions of the landlords. It had its traditional hero, Roque Guinart, who figures in the. second part of Don Quixote. The revolt against the house of Austria in 1640, and the War of the Succession (i7oo-i7i4),gaveagreat stimulus to Catalan brigandage. But it was then put down in a way for which Italy offers no precedent. A country gentle- man named Pedro Veciana, hereditary balio (military and civil lieutenant) of the archbishop of Tarragona in the town of Vails, armed his farm-servants, and resisted the attacks of the brigands. With the help of neighbouring country gentlemen he formed a strong band, known as the Mozos (Boys) of Veciana. The brigands combined to get rid of him by making an attack on the town of Vails, but were repulsed with great loss. The government of Philip V. then commissioned Veciana to raise a special corps of police, the " escuadra de Cataluna," which still exists. For five generations the colonel of the escuadra was always a Veciana. At all times in central and northern Spain the country population has supported the police when the government would act firmly. Since the organization of the excellent constabulary called ." La Guardia Civil " by the duke of Ahumada, about 1844, brigandage has been well kept down. At the close of the Carlist War in 1874 a few bands infested Catalonia, but one of the worst was surprised, and all its members battered to death with boxwood cudgels by a gang of charcoal- burners on the ruins of the castle of San Martin de Centellas. In such conditions as these brigandage cannot last. More sym- pathy is felt for " bandoleros " in the south, and there also they find Spanish equivalents for the " manutengoli " of Italy. The tobacco smuggling from Gibraltar keeps alive a lawless class which sinks easily into pure brigandage. Perhaps the influence of the Berber blood in the population helps to prolong this barbarism. The Sierra Morena, and the Serrania de Ronda, have produced the bandits whose achievements form the subject of popular ballads, such as Francisco Esteban El Guapo (Francis Stephen, the Buck or Dandy) , Don Juan de Serralonga, Pedranza, &c. The name of Jose Maria has been made familiar to all the world by Merimee's story, Carmen, and by Bizet's opera. Jose Maria, called El Tempranillo (the early bird) was a historical personage, a liberal in the rising against Ferdinand VII., 1820- 1823, then a smuggler, then a " bandolero." He was finally bought off by the government, and took a commission to suppress the other brigands. Jose Maria was at last shot by one of them, whom he was endeavouring to arrest. The civil guard prevents brigandage from reaching any great height in*

normal times, but in 1905 a bandit of the old stamp, popularly known as "El Vivillo " (the Vital Spark), haunted the Serrania de Ronda.

The brigand life has been made the subject of much romance. But when stripped of fiction it appears that the bands have been mostly recruited by men who had been guilty of homicide, out of jealousy or in a gambling quarrel, and who remained in them not from love of the life, but from fear of the gallows. A reformed brigand, known as Passo di Lupo (Wolf's Step), confessed to Mr McFarlane about 1820 that the weaker members of the band were terrorized and robbed by the bullies, and that murderous conflicts were constant among them.

The " dacoits " or brigands of India were of the same stamp as their European colleagues. The Pindaris were more than brigands, and the Thugs were a religious sect.

Authorities. — The literature of brigandage, apart from pure romances, or official reports of trials, is naturally extensive. Mr

McFarlane's Lives and Exploits of Banditti and Robbers (London, 1837) is a useful introduction to the subject. The author saw a part of what he wrote about, and gives many references, particularly for Italy. A good bibliography of Spanish brigandage will be found in the Resena Historica de la Guardia Civil of Eugenio de la Iglesia (Madrid, 1898). For actual pictures of the life, nothing is better than the English Travellers and Italian Brigands of W. J. C. Moens (London, 1866), and The Brigands of the Morea, by S. Soteropoulos, translated by the Rev. J. O. Bagdon (London, 1868). (D. H.)

BRIGANDINE, a French word meaning the armour for the brigandi or brigantes, light-armed foot soldiers; part of the armour of a foot soldier in the middle ages, consisting of a padded tunic of canvas, leather, &c, and lined with closely sewn scales or rings of iron.

BRIGANTES (Celtic for " mountaineers " or " free, privi- leged "), a people of northern Britain, who inhabited the country from the mouth of the Abus (Humber) on the east and the Belisama (Mersey; according to others, Ribble) on the west as far northwards as the Wall of Antoninus. Their territory thus included most of Yorkshire, the whole of Lanca- shire, Durham, Westmorland, Cumberland and part of Northum- berland. Their chief town was Eburacum (or

Eboracum ; York) . They first came into contact with the Romans during the reign of Claudius, when they were defeated by Publius Ostorius Scapula. Under Vespasian they submitted to Petillius Cerealis, but were not finally subdued till the time of Antoninus Pius (Tac. Agricola, 17; Pausan. viii. 43. 4). The name of their eponymous goddess Brigantia is found on inscriptions {Corp. Inscr. Lat. vii. 200, 875, 1062; F. Haverfield in Archaeological Journal, xlix., 1892), and also that of a god Bergans = Brigans {Ephemeris Epigraphica, vii. Nfi. 920). A branch of the Brigantes also settled in the south-east corner of Ireland, near the river Birgus (Barrow).

See A. Holder, Altceltischer Sprachschatz, i. (1896), for ancient authorities; J. Rhys, Celtic Britain (3rd ed., 1904); Pauly-Wissowa, Realencyclopddie, iii. pt. i. (1897).

BRIGG (properly Glanford Briggs or Glamford Bridge), a market town in the North Lindsey or Brigg parliamentary division of Lincolnshire, England, situated on the river Ancholme, which affords water communication with the Humber. Pop. of urban district (1901) 3137. It is 23 m. by road north of Lincoln, and is served by the Grimsby line of the Great Central railway. Trade is principally agricultural. In 1885 a remarkable boat, assigned to early British workmanship, was unearthed near the river; it is hollowed out of the trunk of an oak, and measures 48 ft. 6 in. by about 5 ft. Other prehistoric relics have also been discovered.

BRIGGS, CHARLES AUGUSTUS (1841-), American Hebrew scholar and theologian, was born in New York City on the 1 5th of January 1841. He was educated at the university of Virginia (1857-1860), graduated at the Union Theological Seminary in 1863, and studied further at the university of Berlin. He was pastor of the Presbyterian church of Roselle, New Jersey, 1869-1874, and professor of Hebrew and cognate languages in Union Theological Seminary 1874-1891, and of Biblical theology there from 1891 to 1904, when he became professor of theological encyclopaedia and symbolics. From 1880 to 1890 he was an editor of the Presbyterian Review. In 1892 he was tried for heresy by the presbytery of New York and acquitted. The charges were based upon his inaugural address of the preceding year. In brief they were as follows: that he had taught that reason and the Church are each a " fountain of divine authority which apart from Holy Scripture may and does savingly enlighten men "; that " errors may have existed in the original text of the Holy Scripture "; that " many of the Old Testament predictions have been reversed by history " and that " the great body of Messianic prediction has not and can- not be fulfilled "; that " Moses is not the author of the Penta- teuch,"

and that " Isaiah is not the author of half of the book which bears his name "; that " the processes of redemption extend to the world to come " — he had considered it a fault of Protestant theology that it limits redemption to this world— and that " sanctification is not complete at death." The general assembly, to which the case was appealed, suspended Dr Briggs

in 1893, being influenced, it would seem, in part, by the manner and tone of his expressions — by what his own colleagues in the Union Theological Seminary called the " dogmatic and irritating " nature of his inaugural address. He was ordained a priest of the Protestant Episcopal Church in 1899. His scholarship procured for him the honorary degree of D.D. from Edinburgh (1884) and from Glasgow (1901), and that of Litt. D, from Oxford (1901). With S. R. Driver and Francis Brown he prepared, a revised Hebrew and English Lexicon (1891-1905), and with Driver edited the " International Commentary Series." His publications include Biblical Study: Its Principles, Methods and History (1883); Hebrew Poems of the Creation (1884); American Prcsbyterianism: Its Origin and Early History (1885); Messianic Prophecy (1886); Whither? A Theological Question for the Times (1889); The Authority of the Holy Scripture (1891); The Bible, the Church and the Reason (1892) ; The Higher Criticism of the Hcxateuch (1893); The Messiah of the Gospels (18.94),' The Messiah of the Apostles (1894); New Light on the Life of Jesus (1904); The Ethical Teaching of Jesus (1904); A Critical and Exegetical Commentary on the Book of Psalms (2 vols., 1906-1907), in which he was assisted by his daughter:; and The Virgin Birth of Our Lord (1909).

BRIGGS, HENRY (1556-1630), English mathematician, was born at Warley Wood, near Halifax, in Yorkshire, He graduated at St John's College, Cambridge, in 1581, and obtained, a fellow- ship in 1588. In 1592 he was made reader of the physical lecture founded by Dr Thomas Linacre, and in 1596 first professor of geometry in Gresham House (afterwards College), London. In his lectures at Gresham House he proposed the alteration of the scale of logarithms from the hyperbolic form which John Napier had given them, to that in which unity is assumed as the logarithm of the ratio of ten to one; and soon afterwards he wrote to the inventor on the subject. In 1616 he paid a visit to Napier at Edinburgh in order to discuss the suggested change; and next year he repeated his visit for a similar purpose. During these conferences the alteration proposed by Briggs was agreed upon; and on his return from his second visit to Edinburgh in 1617 he accordingly published the first chiliad of his logarithms. (See Napier, John.) In 1619 he was appointed Savilian professor of geometry at

Oxford, and resigned his professorship of Gresham College on the 25th of July 1620. Soon after his settlement at Oxford he was incorporated master of arts. In 1622 he pub- lished a small tract on the N orth-W est Passage to the South Seas, through the Continent of Virginia and Hudson's Bay; and in 1624 his Arithmetica Logarithmica, in folio, a work containing the logarithms of thirty thousand natural numbers to fourteen places of figures besides the index. He also completed a table of logarithmic sines and tangents for the hundredth part of every degree to fourteen places of figures besides the index, with a table of natural sines to fifteen places, and the tangents and secants for the same to ten places; all of which were printed at Gouda in 1631 and published in 1633 under the title of Trigono- metric Britannica (see Table, Mathematical). Briggs died on the 26th of January 1630, and was buried in Merton College chapel, Oxford. Dr Smith, in his Lives of the Gresham Professors, characterizes him as a man of great probity, a contemner of riches, and contented with his own station, preferring a studious retirement to all the splendid circumstances of life.

His works are : A Table to find the Height of the Pole, the Magnetical Declination being given (London, 1602, 4to) ; " Tables for the Improvement of Navigation," printed in the second edition of Edward Wright's treatise entitled Certain Errors in Navigation detected and corrected (London, 1610, 4to) ; A Description of an Instrumental Table to find the part proportional, devised by Mr Edward Wright (London, 1616 and 1618, i2mo); Logarithmorum Chilias prima (London, 1617, 8vo); Lucubrationes et Annotationes in opera posthuma J. Neperi (Edinburgh, 1619, 4to) ; Euclidis Elementorum VI. libri priores (London, 1620, folio) ; A Treatise on the_ North-West Passage to the South Sea (London, 1622, 4to), reprinted in Purchas's Pilgrims, vol. iii. p. 852; Arithmetica Logarithmica (London, 1624, folio); Trigonometria Britannica (Goudae, 1663, folio); two Letters to Archbishop Usher; Mathematica ab Antiquis minus cognita. Some other works, as his Commentaries on the Geometry of Peter Ramus, and Remarks on the Treatise of Longomontanus respecting the Quadrature of the Circle, have not been published.

BRIGHOUSE— BRIGHT

BRIGHOUSE, a municipal borough in the Elland parliamentary division of the West Riding of Yorkshire, England, 5! m. N. of Huddersfield by the Lancashire & Yorkshire railway, on the river Calder. Pop. (1901) 21,735. It is i n the heart of the manufacturing district of the West Riding, and has large woollen and worsted

factories; carpets, machinery and soap are also produced. The town was incorporated in 1893, and is governed by a mayor, 8 aldermen and 24 councillors. Area, 2231 acres.

BRIGHT, SIR CHARLES TILSTON (1832-1888), English telegraph engineer, who came of an old Yorkshire family, was born on the 8th of June 1832, at Wanstead, Essex. At the age of fifteen he became a clerk under the Electric Telegraph Com- pany, His talent for electrical engineering was soon shown, and his progress was rapid; so that in 1852 he was appointed engineer to the Magnetic Telegraph Company, and in that capacity superintended the laying of lines in various parts of the British Isles, including in 1853 the first cable between Great Britain and Ireland, from Portpatrick to Donaghadee. His experiments convinced him of the practicability of an electric submarine cable connexion between Ireland and America; and having in 1855 already discussed the question with Cyrus Field, who with J. W. Brett controlled the Newfoundland Telegraph Company on the other side of the ocean, Bright organized with them the Atlantic Telegraph Company in 1856 for the purpose of carrying out the idea, himself becoming engineer-in-chief. The story of the first Atlantic cable is told elsewhere (see Telegraph), and it must suffice here to say that in 1858, after two disappointments, Bright successfully accom- plished what to many had seemed an impossible feat, and within a few days of landing the Irish end of the line at Valentia he was knighted in Dublin. Subsequently Sir Charles Bright super- vised the laying of submarine cables in various regions of the world, and took a leading part as pioneer in other developments of the electrical industry. In conjunction with Josiah Latimer Clark, with whom he entered into partnership in 1861, he invented improved methods of insulating submarine cables, and a paper on electrical standards read by them before the British Association in the same year led to the establishment of the British Associa- tion committee on that subject, whose work formed the founda- tions of the system still in use. From 1865 to 1868 he was Liberal M.P. for Greenwich. He died on the 3rd of May 1888, at Abbey Wood, near London.

See Life Story of Sir C. T. Bright, by his son Charles Bright (revised ed. 1908).

BRIGHT, JOHN (1811-1889), British statesman, was born at Rochdale on the 16th of November 1811. His father, Jacob Bright, was a much-respected Quaker, who had started a cotton- mill at Rochdale in 1809. The family had reached Lancashire by two migrations Abraham Bright was a Wiltshire yeoman, who, early in

the 18th century, removed to Coventry, where his descendants remained, and where, in 1775, Jacob Bright was born. Jacob Bright was educated at the Ackworth school of the Society of Friends, and was apprenticed to a fustian manu- facturer at New Mills. He married his employer's daughter, and settled with his two brothers-in-law at Rochdale in 1802, going into business for himself seven years later. His first wife died without children, and in 1809 he married Martha Wood, daughter of a tradesman of Bolton-le-Moors. She had been educated at Ackworth school, and was a woman of great strength of character and refined taste. There were eleven children of this marriage, of whom John Bright was the second, but the death of his elder brother in childhood made him the eldest son. He was a delicate child, and was sent as a day-scholar to a boarding-school near his home, kept by Mr William Littlewood. A year at the Ackworth school, two years at a school at York, and a year and a half at Newton, near Clitheroe, completed his education. He learned, he himself said, but little Latin and Greek, but acquired a great love of English literature, which his mother fostered, and a love of outdoor pursuits. In his sixteenth year he entered his father's mill, and in due time became a partner in the business. Two agitations were then going on in Rochdale — the first (in which Jacob Bright was a leader) in opposition to a local church-

rate, and the second for parliamentary reform, by which Rochdale successfully claimed to have a member allotted to it under the Reform Bill. In both these movements John Bright took part. He was an ardent Nonconformist, proud to number among his ancestors John Gratton, a friend of George Fox, and one of the persecuted and imprisoned preachers of the Society of Friends. His political interest was probably first kindled by the Preston election in 1830, in which Lord Stanley, after a long struggle, was defeated by " Orator" Hunt. But it was as a member of the Rochdale Juvenile Temperance Band that he first learned public speaking. These young men went out into the villages, borrowed a chair of a cottager, and spoke from it at open-air meetings. In Mrs John Mills's life of her husband is an account of John Bright's first extempore speech. It was at a temperance meeting. Bright got his notes muddled, and broke down. The chairman gave out a temperance song, and during the singing told Bright to put his notes aside and say what came into his mind. Bright obeyed, began with much hesitancy, but found his tongue and made an excellent address. On some early occasions, however, he committed his speech to memory. In 1832 he called on the Rev. John Aldis, an eminent Baptist minister, to accom- pany him to a local Bible meeting. Mr Aldis described him as a slender, modest young

gentleman, who surprised him by his intelligence and thoughtfulness, but who seemed nervous as they walked to the meeting together. At the meeting he made a stimulating speech, and on the way home asked for advice. Mr Aldis counselled him not to learn his speeches, but to write out and commit to memory certain passages and the peroration. Bright took the advice, and acted on it all his life.

This " first lesson in public speaking," as Bright called it, was given in his twenty-first year, but he had not then contemplated entering on a public career. He was a fairly prosperous man of business, very happy in his home, and always ready to take part in the social, educational and political life of his native town. He was one of the founders of the Rochdale Literary and Philo- sophical Society, took a leading part in its debates, and on returning from a holiday journey in the East, gave the society a lecture on his travels. He first met Richard Cobden in 1836 or 1837. Cobden was an alderman of the newly formed Man- chester corporation, and Bright went to ask him to speak at an education meeting in Rochdale. " I found him," said Bright, " in his office in Mosley Street, introduced myself to him, and told him what I wanted." Cobden consented, and at the meeting was much struck by Bright's short speech, and urged him to speak against the Corn Laws. His first speech on the Corn Laws was made at Rochdale in 1838, and in the same year he joined the Manchester provisional committee which in 1839 founded the Anti- Corn Law League He was still only the local public man, taking part in all public movements, especially in opposi- tion to John Feilden's proposed factory legislation, and to the Rochdale church-rate. In 1839 he built the house which he called " One Ash," and married Elizabeth, daughter of Jonathan Priestman of Newcastle-on-Tyne. In November of the same year there was a dinner at Bolton to Abraham Paulton, who had just returned from a successful Anti-Corn Law tour in Scotland. Among the speakers were Cobden and Bright, and the dinner is memorable as the first occasion on which the two future leaders appeared together on a Free Trade platform. Bright is described by the historian of the League as " a young man then appearing for the first time in any meeting out of his own town, and giving evidence, by his energy and by his grasp of the subject, of his capacity soon to take a leading part in the great agitation." But his call had not yet come. In 1840 he led a movement against the Rochdale church-rate, speaking from a tombstone in the churchyard, where it looks down on the town in the valley below. A very happy married life at home contented him, and at the opening of the Free Trade hall in January 1840 he sat with the Rochdale deputation, undistinguished in the body of the meeting. A daughter, Helen, was

born to him; but his young wife, after a long illness, died of consumption in September 1841. Three days after her death at Leamington, Cobden called to see him. " I was in the depths of grief," said Bright, when unveiling

the statue of his friend at Bradford in 1877, " I mignt almost say of despair, for the life and sunshine of my house had been extinguished." Cobden spoke some words of condolence, but " after a time he looked up and said, ' There are thousands of homes in England at this moment where wives, mothers and children are dying of hunger. Now, when the first paroxysm of your grief is past, I would advise you to come with me, and we will never rest till the Corn Laws are repealed.' I accepted his invitation," added Bright, " and from that time we never ceased to labour hard on behalf of the resolution which we had made." At the general election in 1841 Cobden was returned for Stock-? port, and in 1843 Bright was the Free Trade candidate at a by-election at Durham. He was defeated, but his successful competitor was unseated on petition, and at the second contest Bright was returned. He was already known in the country as Cobden 's chief ally, and was received in the House of Commons with a suspicion and hostility even greater than had met Cobden himself. In the Anti-Corn Law movement the two speakers were the complements and correlatives of each other. Cobden had the calmness and confidence of the political philosopher, Bright had the passion and the fervour of the popular orator. Cobden did the reasoning, Bright supplied the declamation, but like Demosthenes he mingled argument with appeal. No orator of modern times rose more rapidly to a foremost place. He was not known beyond his own borough when Cobden called him to his side in 1841, and he entered parliament towards the end of the session of 1843 with a formidable reputation as an agitato. He had been all over England and Scotland addressing vast meetings and, as a rule; carrying them with him; he had taken a leading part in a conference held by the Anti-Corn Law League in London, had led deputations to the duke of Sussex, to Sir jairies Graham, then home secretary, and to Lord Ripon and Mr Gladstone, the secretary and under secretary of the Board of Trade ; and he was universally recognized as the chief orator of the Free Trade movement. Wherever " John Bright of Rochdale " was announced to speak, vast crowds assembled. He had been so announced, for the last time; at the first great meeting in Drury Lane theatre on 15th March 1843; henceforth his name was*

enough. He took his seat in the House of Commons as one of the members for Durham on 28th July 1843, and on 7th August delivered his maiden speech in support of a motion by Mr Ewart for reduction of import duties. He was there, he said, " not only as one of the representatives of the city of Durham, but also as one of the representatives of that benevolent organization, the Anti-Corn Law League." A member who heard the speech described Bright as " about the middle size, rather firmly and squarely built, with a fair, clear complexion, and an intelligent and pleasing expression of countenance. His voice is good, his enunciation distinct, and his delivery free from any unpleasant peculiarity or mannerism." He wore the usual Friend's coat, and was regarded with much interest and hostile curiosity on both sides of the House.

Mr Ewart's motion was defeated, but the movement of which Cobden and Bright were the leaders continued to spread. In the autumn the League resolved to raise £100,000; an appeal was made to the agricultural interest by great meetings in the farming counties, and in November The Time's startled the world by declaring, in a leading article, " The League is a great fact. It would be foolish, nay, rash, to deny its importance." In London great meetings were held in Covent Garden theatre, at which William Johnson Fox was the chief orator, but Bright and Cobden were the leaders of the movement. Bright publicly deprecated the popular tendency to regard Cobden and himself as the chief movers in the agitation, and Cobden told a Rochdale audience that he always stipulated that he should speak first, and Bright should follow. His " more stately genius," as Mr John Morley calls it, was already making him the undisputed master of the feelings of his audiences. In the House of Commons his progress was slower. Cobden's argumentative speeches were regarded more sympathetically than Bright's more rhetorical appeals, and in a debate on Villiers's annual motion against the Corn Laws Bright was heard with so much impatience that

he was obliged to sit down. In the next session (1845) h& moved for an inquiry into the operation of the Game Laws. At a meeting of county members earlier in the day Peel had advised them not to be led into discussion by a violent speech from the member for Durham, but to let the committee be granted without debate; Bright was not violent, and Cobden said that he did his work admirably, and won golden opinions from all men. The speech established his position in the House of Commons. In this session Bright and Cobden came into opposition, Cobdeo voting for the Maynooth Grant and Bright against it. On only one other occasion — a vote for South Kensington — did they go into opposite lobbies, during twenty-five years of

parliamentary life. In the autumn of 1845 Bright retained Cobden in the public career to which Cobden had invited him four years before. Bright was in Scotland when a letter came from Cobden announ- cing his determination, forced on him by business difficulties, to retire from public work. Bright replied that if Cobden retired the mainspring of the League was gone. " I can in no degree take your place," he wrote. " As a second I can fight, but there are' incapacities about me, of which I am fully conscious, which prevent my being more than second in such a work as we have laboured in." A few days later he set off for Manchester, posting in that wettest of autumns through "the rain that rained away the Corn Laws," and on his arrival got his friends together, and raised the money which tided Cobden over the emergency. The crisis of the struggle had come. Peel's budget in 1845 was a first step towards Free Trade. The bad harvest and the potato disease drove him to the repeal of the Corn Laws, and at a meeting in Manchester on 2nd July 1 846 Cobden moved and B right seconded a motion dissolving the league. A library of twelve hundred volumes was presented to Bright as a memorial of the struggle. Bright married, in June 1847, Miss Margaret Elizabeth Leatham, of Wakefield, by whom he had seven children, Mr John Albert Bright being the eldest: In the succeeding July he was elected for Manchester, with Mr Milner Gibson, without a contest. In the new parliament, as in the previous session, he opposed legislation restricting the hours of labour, and, as a Noncon- formist, spoke against clerical control of national education. In 1848 he voted for Hume's household suffrage motion, and introduced a bill for the repeal of the Game Laws. When Lord John Russell brought forward his Ecclesiastical Titles Bill, Bright opposed it as "a little, paltry, miserable measure," and foretold its failure. In this parliament he spoke much on Irish questions. In a speech in favour of the government bill for a rate in aid in 1849, he won loud cheers from both sides, and was complimented by Disraeli for having sustained the reputation of that assembly. From this time forward he had the ear of the House, and took effective part in the debates. He spoke against capital punishment, against church-rates, against flogging in the army, and against the Irish Established Church. He supported Cobden's motion for the reduction of public expenditure, and in and out of parliament pleaded for peace. In the election of 1852 he was again returned for Manchester on the principles of free trade, electoral reform and religious freedom. But war was in the air, and the most impassioned speeches he ever delivered were addressed to this parliament in fruitless opposition to the Crimean War. Neither the House nor the country would listen. " I went to the House on Monday, " wrote Macaulay in March 1854, " and heard Bright say

every- thing I thought." His most memorable speech, the greatest he ever made, was delivered on the 23rd of February 1855. " The angel of death has been abroad throughout the land. You may almost hear the beating of his wings," he said, and concluded with an appeal to the prime minister that moved the House as it had never been moved within living memory. There was a tremor in Bright's voice in the touching parts of his great speeches which stirred the feelings even of hostile listeners. It was noted for the first time in this February speech, but the most striking instance was in a speech on Mr Osborne Morgan's Burials Bill in April 1875, in which he described a Quaker funeral, and protested against the " miserable superstition of the phrase 'buried like a dog.'" "In that sense," he said,

" I shall be buried like a dog, and all those with whom I am best acquainted, whom I best love and esteem, will be ' buried like a dog.' Nay mole, my own ancestors, who in past time suffered persecution for what is now held to be a righteous cause, have all been buried like dogs, if that phrase is true." The tender, half-broken tones in which these words were said, the inexpress- ible pathos of his voice and manner, were never forgotten by those who heard that Wednesday morning speech.

Bright was disqualified by illness during the whole of 1856 and 1857. In Palmerston's penal dissolution in the latter year, Bright was rejected by Manchester, but in August, while ill and absent, Birmingham elected him without a contest. He returned to parliament in 1858, and in February seconded the motion which threw out Lord Palmerston's government. Lord Derby thereupon came into office for the second time, and Bright had the satisfac- tion of assisting in the passing of two measures which he had long advocated — the admission of Jews to parliament and the transfer of the government of India from the East India Company to the crown. He was now restored to full political activity, and in October addressed his new constituents, and started a movement for parliamentary reform. He spoke at great gatherings at Edinburgh, Glasgow, Bradford, and Manchester, and his speeches filled the papers. For the next nine years he was the protagonist of Reform. Towards the close of the struggle he told the House of Commons that a thousand meetings had been held, that at every one the doors were open for any man to enter, yet that an almost unanimous vote for reform had been taken. In the debates on the Reform Bills submitted

to the House of Commons from 1859 to 1867, Bright's was the most influential voice Ho rebuked Lowe's "Botany Bay view," and described Horsman as retiring to his "cave of Adullam," and hooking in Lowe. "The party of two," he said, "reminds me of the Scotch terrier, which was so covered with hair that you could not tell which was the head and which was the tail." These and similar phrases, such as the excuse for withdrawing the Reform Bill in the year of the great budget of i860—" you cannot get twenty wagons at once through Temple Bar "—were in all men's mouths. It was one of the triumphs of Bright's oratory that it constantly produced these popular cries. The phrase " a free breakfast table " was his; and on the rejection of Forster's Compensation for Dis turbance Bill he used the phrase as to Irish discontent, " Force is not a remedy."*

During his great reform agitation Bright had vigorously supported Cobden in the negotiations for the treaty of commerce with France, and had taken, with his usual vehemence, the side of the North in the discussions in England on the American Civil War. In March 1865 Cobden died, and Bright told the House of Commons he dared not even attempt to express the feelings which oppressed him, and sat down overwhelmed' with grief. Their friendship was one of the most characteristic features of the public life of their time. " After twenty years of intimate and almost brotherly friendship with him," said Bright, " I little knew how much I loved him till I had lost him." In June 1865 parliament was dissolved, and Bright was returned for Birmingham without opposition. Palmerston's death in the early autumn brought Lord John Russell into power, and for the first time Bright gave his support to the government. Russell's fourth Reform Bill was introduced, was defeated by the Adul- lamites, and the Derby-Disraeli ministry was installed. Bright declared Lord Derby's accession to be adeclaration of war against the working classes, and roused the great towns in the demand for reform. Bright was the popular hero of the time. As a political leader the winter of 1866-1867 was the culminating point in his career. The Reform Bill was carried with a clause for minority representation, and in the autumn of 1868 Bright, with two Liberal colleagues, was again returned for Birmingham. Mr Gladstone came into power with a programme of Irish reform in church and land such as Bright had long urged, and he accepted the post of president of the Board of Trade. He thus became a member of the privy council, with the title of Right Honourable, and from this time forth was a recognized leader of the Liberal party in parliament and in the country. He made a great speech

on the second reading of the Irish Church Bill, and wrote a letter on

the House of Lords, in which he said, " In harmony with the nation they may go on for a long time, but throwing themselves athwart its course they may meet with accidents not pleasant for them to think of." He also spoke strongly in the same session in favour of the bill permitting marriage with a deceased wife's sister. The next session found him disqualified by a severe illness, which caused his retirement from office at the end of the year, and kept him out of public life for four years. In August 1873 Mr Gladstone reconstructed his cabinet, and Bright returned to it as chancellor of the duchy of Lancaster. But his hair had become white, and though he spoke again with much of his former vigour, he was now an old man. In the election in January 1874 Bright and his colleagues were returned for Birmingham without opposition. When Mr Gladstone resigned the leadership .of his party in 1875, Bright was chairman of the party meeting which chose Lord Harrington as his successor. He took a less prominent part in political' discussion,till the Eastern Question brought Great Britain to the verge of war with Russia, and his old energy flamed up afresh. In the debate on the vote of credit in February 1878, he made one of his impressive speeches, urging the govern- ment not to increase the difficulties manufacturers had in finding employment for their workpeople by any single word or act which could shake confidence in business. The debate lasted five days. On the fifth day a telegram from Mr, Layard was published announcing that the Russians were nearing Constanti- nople. The day, said The Times, " was crowded with rumours, alarms, contradictions, fears, hopes, resolves, uncertainties." In both Houses Mr Layard's despatch was read, and in the excited Commons Mr Forster's resolution opposing the vote of credit was withdrawn. Bright, however, distrusted the am- bassador at the Porte, and gave reasons for doubting the alarming telegram. While he was speaking a note was put into the hands of Sir Stafford Nprthcote, and when Bright sat down he read it to the House. It Was a confirmation from the Russian prime minister of Bright's doubts: " There is not a word of truth in the rumours which have reached you." At the general election in 1 880 he was re-elected at Birmingham, and joined Mr Gladstone's new government as. chancellor of. the duchy of Lancaster. For two sessions he spoke and voted with his colleagues, but after the bombardment. of the Alexandria forts he left the ministry and never held office again. He felt most painfully the severance from his old and trusted leader, but it was forced on him by his conviction of the danger and impolicy of foreign entanglements. He, however, gave a general support to Mr Gladstone's govern- ment. In 1883 he took the chair at a meeting of the Liberation Society in Mr Spurgeon's chapel; and in June of that

year was the object of an unparalleled demonstration at Birmingham to celebrate his twenty-five years of service as its representative. At this celebration he spoke strongly of " the Irish rebel party," and accused the Conservatives of " alliance " with them, but withdrew the imputation when Sir Stafford NortEcote moved that such language was a breach of the privileges of the House of Commons. At a banquet to Lord' Spencer he accused the Irish members of having " exhibited a boundless sympathy for criminals and murderers." He refused in the House of Commons to apologise for these words, and was supported in his refusal by both sides of the House. At the Birmingham election in 1885 he stood for the central division of the redistributed constituency; he was opposed by Lord Randolph Churchill, but was elected by a large majority. In the new parliament he voted against the Home Rule Bill, and it was generally felt that in the election of 1886 which followed its defeat, when he was re-elected without opposition, his letters told with fatal effect against the Home Rule Liberals. His contribution to the discussion was a suggestion that the Irish members should form a grand committee to which every Irish bill should go after first reading. The break-up of the Liberal party filled him with gloom. His last speech at Birmingham was on 29th March 1888, at a banquet to celebrate Mr Chamberlain's return from his peace mission to the United States. He spoke, of imperial federation as a " dream and an absurdity." In May his illness returned, he took to his bed in

October, and died on the 27 th of March 1889. He was buried in the graveyard of the meeting-house of the Society of Friends in Rochdale.

Bright had much literary and social recognition in his later years. In 1882 he was elected lord rector of the university of Glasgow, and Dr Dale wrote of his rectorial address : " It was not the old Bright." " I am weary of public speaking," he had told Dr Dale; " my mind is almost a blank." He was given an honorary degree of the university of Oxford in 1886, and in 1888 a statue of him was erected at Birmingham. The 3rd marquess of Salisbury said of him, and it sums up his character as a public man: " He was the greatest master of English oratory that this generation — I may say several generations — has seen. . . . At a time when much speaking has depressed, has almost exter- minated eloquence, he maintained that robust, powerful and vigorous style in which he gave fitting expression to the

burning and noble thoughts he desired to utter."

See The Life and Speeches of the Right Hon. John Bright, M.P., by George Barnett Smith, 2 vols. 8vo (1881); The Life of John Bright, M.P., by John M'Gilchrist, in Cassell's Representative Biographies (1868); John Bright, by C. A. Vince (1898); Speeches on Parliamentary Reform by John Bright, M.P., revised by Himself (1866); Speeches on Questions of Public Policy, by John Bright, M.P., edited by J. E. Thorold Rogers, 2 vols. 8vo (1868); Public Addresses, edited by J. E. Thorold Rogers, 8vo (1879); Public Letters of the Right Hon. John Bright, M.P., collected by H. T- Leech (1885). • (P. W. C.)

BRIGHTLINGSEA (pronounced Brittlesea), a port and fish- ing station in the Harwich parliamentary division of Essex, England, on a creek opening from the east shore of the Colnc estuary, the terminus of a branch from Colchester of the Great Eastern railway, 625 m. E.N.E. of London. Pop. of urban district (1901) 4501. The Colchester oyster beds are mainly in this part of the Colne, and the oyster fishery is the chief industry. Boat-building is carried on. This is also a favourite yachting centre. The church, of All Saints, principally Per- pendicular, has interesting monuments and brasses, and a fine lofty tower and west front. Brightlingsea, which appears in Domesday, is a member of the Cinque Port of Sandwich in Kent. Near the opposite shore of the creek is St Osyth's priory, which originated as a nunnery founded by Osyth, a grand-daughter of Penda, king of Mercia, martyred (c. 653) by Norse invaders. A foundation for Augustinian canons followed on the site early in the 12th century. The remains, incorporated with a modern residence, include a late Perpendicular gateway, abbots' tower, clock tower and crypt. The gateway, an embattled structure with flanking turrets, is particularly fine, the entire front being panelled and ornamented with canopied niches. The church of St Osyth, also Perpendicular in the main, is of interest.

BRIGHTON, a watering-place of Bourke county, Victoria, Australia, 7§ m. by rail S.E. of Melbourne, of which it is practi- cally a suburb. It stands on the east shore of Port Phillip, and has two piers, a great extent of sandy beach and numerous beautiful villas. Pop. (1901) 10,029.

BRIGHTON, a municipal, county and parliamentary borough of Sussex, England, one of the best-known seaside resorts in the United Kingdom, 51 m. S. from London by the London, Brighton & South Coast railway. Pop. (1901) 123,478. Its ready access- ibility from

the metropolis is the chief factor in its popularity. It is situated on the seaward slope of the South Downs; the position is sheltered from inclement winds, and the climate is generally mild. The sea-front, overlooking the English Channel, stretches nearly 4 m. from Kemp Town on the east to Hove (a separate municipal borough) on the west. Inland, including the suburb of Preston, the town extends some 2 m. The tendency of the currents in the Channel opposite Brighton is to drive the shingle eastward, and encroachments of the sea were frequent and serious until the erection of a massive sea-wall, begun about 1830, 60 ft. high, 23 ft. thick at the base, and 3 ft. at the summit. There are numerous modern churches and chapels, many of them very handsome; and the former parish church of St Nicholas remains, a Decorated structure containing a Norman font and a memorial to the great duke of Wellington. The incumbency of Trinity Chapel was held by the famous

preacher Frederick William Robertson (1847-1853). The town hall and the parochial offices are the principal administrative buildings. Numerous institutions contribute to the entertain- ment of visitors. Of these the most remarkable is the Pavilion, built as a residence for the prince regent (afterwards George IV.) and remodelled in 1819 by the architect, John Nash, in a grotesque Eastern style of architecture. In 1849 it was purchased by the town for £53,000, and is devoted to various public uses, containing a museum, assembly-rooms and picture-galleries. The detached building, formerly the stables, is converted into a fine concert hall; it is lighted by a vast glazed dome approach- ing that of St Paul's cathedral, London, in dimensions. There are several theatres and music-halls. The aquarium, the property of the corporation, contains an excellent marine collection, but is also used as a concert hall and winter garden, and a garden is laid out on its roof. The Booth collection of British birds, bequeathed to the corporation by E. T. Booth, was opened in 1893. There are two piers, of which the Palace pier, near the site of the old chain pier (1823), which was washed away in 1896, is near the centre of the town, while the West pier is towards Hove. Preston and Queen's parks are the principal of several public recreation grounds; and the racecourse at Kemp Town is also the property of the town. Educational establishments are numerous, and include Brighton College, which ranks high among English public schools. There are municipal schools of science, technology and art. St Mary's Hall (1836) is devoted to the education of poor clergymen's daughters. Among many hospitals, the county hospital (1828), " open to the sick and lame poor of every country and nation," may be mentioned. There are an extensive mackerel and herring fishery, and motor

engineering works. The parliamentary borough, which includes the parish of Hove, returns two members. The county borough was created in 1888. The municipal borough is under a mayor, 14 aldermen and 42 councillors. Area, 2536 acres.

Although there is evidence of Roman and Saxon occupation of the site, the earliest mention of Brighton (Bristelmeston, Brichelmestone, Brighthelmston) is the Domesday Book record that it? three manors belonged to Earl Godwin and were held by William de Watenne. Of these, two passed to the priories of Lewes and Michelham respectively, and after the dissolution of the monasteries were subject to frequent sale and division. The third descended to the earls of Arundel, falling to the share of the duke of Norfolk in 141 5, and being divided in 1502 between the families of Howard and Berkeley. That Brighton was a large fishing village in 1086 is evident from the rent of 4000 herrings; in 1285 it had a separate constable, and in 1333 it was assessed for a tenth, and fifteenth at £5:4:6!, half the assess- ment of Shoreham. In 1340 there were no merchants there, only tenants of lands, but its prosperity increased during the 15th- and 1 6th centuries, and it was assessed at £6:12:8 in 1534. There is, however, no indication that it was a borough. In 1580 commissioners sent to decide disputes between the fishermen and landsmen found that from time immemorial Brighton had been governed by two head boroughs sitting in the borough court, and assisted by a council called the Twelve. This con- stitution disappeared before 1772, when commissioners .were appointed. Brighton refused a charter offered by George,' prince of Wales, but was incorporated in 1854. It had become a parliamentary borough in 1832. From a fishingtown in 1656 it became a fashionable resort in 1756; its popularity increased after the visit of the prince of Wales (see Georce IV.) to the duke of Cumberland in 1783, and was ensured by his building the Pavilion in 1784-1787, and his adoption of it as his principal residence; and his association with Mrs Fitzherbcrt at Brighton was the starting-point of its fashionable repute.

See Victoria County History-ˆ-Sussex; Sussex Archaeological Society Transactions, vol. ii. ; L. Melville, Brightonˆ its History, its Follies and, its Fashions (London, 1909).

BRIGHT'S DISEASE, a term in medicine applied to a class of diseases of the kidneys (acute and chronic nephritis) which have as their most prominent symptom the presence of albumen in the urine, and frequently also the coexistence of dropsy.

These associated symptoms in connexion with kidney disease were first described in 1827 by Dr Richard Bright (1 789-1858). Since that period it has been established that the symptoms, instead of being, as was formerly supposed, the result of one form of disease of the kidneys, may be dependent on various morbid conditions of those organs (see Kidney Diseases) . Hence the term Bright's disease, which is retained in medical nomenclature in honour of Dr Bright, must be understood as having a generic application.

The symptoms are usually of a severe character. Pain in the back, vomiting and febrile disturbance commonly usher in the attack. Dropsy, varying in degree from slight puffiness of the face to an accumulation of fluid sufficient to distend the whole body, and to occasion serious embarrassment to respiration, is a very common accompaniment. The urine is reduced in quantity, is of dark, smoky or bloody colour, and exhibits to chemical reaction the presence of a large amount of albumen, while, under the microscope, blood corpuscles and casts, as above mentioned, are found in abundance.

This state of acute inflammation may by its severity destroy life, or, short of this, may by continuance result in the establish- ment of one of the chronic forms of Bright's disease. On the other hand an arrest of the inflammatory action frequently occurs, and this is marked by the increased amount of the urine, and the gradual disappearance of its albumen and other abnormal constituents; as also by the subsidence of the dropsy and the rapid recovery of strength.

In the treatment of acute Bright's disease, good results are often obtained from local depletion, from warm baths and from the careful employment of diuretics and purgatives. Chronic Bright's disease is much less amenable to treatment, but by efforts to maintain the strength and improve the quality of the blood by strong nourishment, and at the same time by guarding against the risks of complications, life may often be prolonged in comparative comfort, and even a certain measure of improve- ment be experienced.

BRIGNOLES, a town in the department of Var in the S.E. of France, 36 m. by rail N. of Toulon. Pop. (1906) 3639. It is built at a height of 754 ft. above the sea-level, in a fertile valley, and on the right bank of the Carami river. It contains the old summer palace of the counts of Provence, and has an active trade, especially in prunes,

known as prunes de Brignoles. Its old name was Villa Puerorum, as the children of the counts of Provence were often brought up here. It was sacked on several occasions during the religious wars in the 16th century. Twelve miles to the N.W. is St Maximin (with a fine medieval church), which is one of the best starting-points for the most famous pilgrimage resort in Provence, the SainteBaume, wherein St Mary Magdalene is said to have taken refuge. This is 20 m. distant by road. (W. A. B. C.)

BRIHASPATI, or Brahmanaspati (" god of strength "), a deity of importance in early Hindu mythology. In the Rig- veda he is represented as the god of prayer, aiding Indra in his conquest of the cloud-demon, and at times appears to be identified with Agni, god of fire. He is the offspring of Heaven and Earth, the two worlds; is the inspirer of prayer and the guide and protector of the pious. He is pictured as having seven mouths, a hundred wings and horns and is armed with bow and arrows and an axe. He rides in a chariot drawn by red horses. In the later scriptures he is represented as a Rishi or seer.

See A. A. Macdonell, Vedic Mythology (Strassburg, 1897).

BRIL, PAUL (1554-1626), Flemish painter, was born at Antwerp. The success of his elder brother Matthew (1 550-1584) in the Vatican induced him to go to Rome to live. On the death of Matthew, Paul, who far surpassed him as an artist, succeeded to his pensions and employments. He painted landscapes with a depth of chiaroscuro then little practised in Italy, and intro- duced into them figures well drawn and finely coloured. One of his best compositions is the " Martyrdom of St Clement," in the Sala Clementina of the Vatican.

BRILL, the name given to a flat-fish (Psetta laevis, or Rhombus laevis) which is a species closely related to the turbot, differing

from it in having very small scales, being smaller in size, having no bony tubercules in the skin, and being reddish in colour. It abounds on parts of the British coast, and is only less favoured for the table than the turbot itself.

BRILLAT-SAVARIN, ANTHELME (1755-1826), French gas- tronomist, was born at Belley, France, on the 1st of April 1755. In 1789 he was a deputy, in 1793 mayor of Belley. To escape proscription he fled from France to Switzerland, and went thence to the United States, where he played in the orchestra of a New York theatre. On the fall of Robespierre he returned to France, and in 1

797 became a member of the court of cassation. He wrote various volumes on political economy and law, but his name is famous for his Physiologic du gout, a compendium of the art of dining. Many editions of this work have been published. Brillat-Savarin died in Paris on the 2nd of February 1826.

BRIMSTONE, the popular name of sulphur (

BRIN, BENEDETTO (1833-1898), Italian naval administrator, was born at Turin on the 17th of May 1833, and until the age of forty worked with distinction as a naval engineer. In 1873 Admiral Saint-Bon, minister of marine, appointed him under- secretary of state. The two men completed each other; Saint- Bon conceived a type of ship, Brin made the plans and directed its construction. On the advent of the Left to power in 1876, Brin was appointed minister of marine by Depretis, a capacity in which he continued the programme of Saint-Bon, while en- larging and completing it in such way as to form the first organic scheme for the development of the Italian fleet. The huge warships " Italia " and " Dandolo " were his work, though he afterwards abandoned their type in favour of smaller and faster vessels of the " Varese " and the " Garibaldi " class. By his initiative Italian naval industry, almost non-existent in 1873, made rapid progress. During his eleven years' ministry (1876- 1878 with Depretis, 1884-1891 with Depretis and Crispi, 1896- 1898 with Rudini), he succeeded in creating large private ship- yards, engine works and metallurgical works for the production of armour, steel plates and guns. In 1892 he entered the Giolitti cabinet as minister for foreign affairs, accompanying, in that capacity, the king and queen of Italy to Potsdam, but showed weakness towards France on the occasion of the massacre of Italian workmen at Aigues-Mortes. He died on the 24th of May 1898, while minister of marine in the Rudini cabinet. He, more than any other man, must be regarded as the practical creator of the Italian navy.

BRINDABAN, a town of British India, in the Muttra district of the United Provinces, on the right bank of the Jumna, 6 m. N.of Muttra. Pop. (1901) 22,717. Brindabanisoneof themost popular places of pilgrimage in India, being associated with the cult of Krishna as a shepherd. It contains bathing-stairs, tanks and wells, and a great number of handsome temples, of which the finest is that of Govind Deva, a cruciform vaulted building of red sandstone, dating from 1590. The town was founded earlier in the same century.

BRINDISI (anc. Brundisium, q.v.), a seaport town and archiepiscopal see of Apulia, Italy, in the province of Lecce, 24 m.

N.W. by rail from the town of Lecce, and 346 m. from Ancona. Pop. (1861) 8000; (1871) 13,75s; (1001) 25,317. The chief importance of Brindisi is due to its position as a starting-point for the East. The inner harbour, admirably sheltered and 27 to 30 ft. in depth, allows ocean steamers to lie at the quays. Brindisi has, however, been abandoned by the large steamers of the Peninsular & Oriental Steam Navigation Company, which had called there since 1870, but since 1898 call at Marseilles instead; small express boats, carrying the mails, still leave every week, connecting with the larger steamers at Port Said; but the number of passengers leaving the port, which for the years 1893-1897 averaged 14,728, was only 7608 in 1905, and only 943 of these were carried by the P. & O. boats. The harbour railway station was not completed until 1905 (Consular

Report, No. 3672, 1906, pp. 13 sqq.). The port was cleared in 1905 by 1492 vessels of 1,486,269 tons. The imports represented a value of £629,892 and the exports a value of £663,201— an increase of £84,077 and £57,807 respectively on the figures of the previous year, while in 1899 the amounts, which were below the average, were only £298,400 and £253,000. The main imports are coal, flour, sulphur, timber and metals; and the ‘ main exports, wine and spirits, oil and dried fruits.

Frederick II. erected a castle, with huge round towers, to guard the inner harbour; it is now a convict prison. The cathedral, ruined by earthquakes, was restored in 1 743-1 749, but has some remains of its mosaic pavement (1 1 7 8) . The baptismal church of S. Giovanni al Sepolcro (nth century) is now a museum. The town was captured in 836 by the Saracens, and destroyed by them; but was rebuilt in the nth century by Lupus the proto- spatharius, Byzantine governor. In 107 1 it fell into the hands of the Normans, and frequently appears in the history of the Crusades, Early in the 14th century the inner port was blocked by Giovanni Orsini, prince of Taranto; the town was devastated by pestilence in 1348, and was plundered in 1352 and 1383; but even greater damage was done by the earthquake of 1456: (T. As,)

BRINDLEY, JAMES (1716-1772), English engineer, was born at Thornsett, Derbyshire, in 1716. His parents were in very humble circumstances, and he received little or no education, At the age of seventeen he was apprenticed to a millwright near Macclesfield, and

soon after completing his apprenticeship he set up in business for himself as a wheelwright at Leek, quickly becoming known for his ingenuity and skill in repairing all kinds of machinery. In 1752 he designed and set up an engine for draining some coal-pits at Clifton in Lancashire. Three years later he extended his reputation by completing the machinery for a silk-mill at Colleton. In 1759, when the duke of Bridge- water was anxious to improve the outlets for the coal on his estates, Brindley advised the construction of a canal from Worsley to Manchester. The difficulties in the Way were great, but all were surmounted by his genius, and his crowning triumph was the construction of an aqueduct to carry the canal at ah elevation of 39 ft. over the river Irwell at Barton. The great success of this canal encouraged similar projects, and Brindley was soon engaged in extending his first work to the Mersey, at Runcorn. He then designed and nearly completed what he called the Grand Trunk Canal, connecting the Trent and Humber with the Mersey. The Staffordshire andWorcestershire, the Oxford and the Chester- field Canals were also planned by him, and altogether he laid out over 360 m. of canals. He died at Turnhurst, Staffordshire, on the 30th of September 1772. Brindley retained to the last a peculiar roughness of character and demeanour; but his innate power of thought more than compensated for his lack of training. It is told of him that when in any difficulty he used to retire to bed, and there remain thinking out his problem until the solution became clear to him. His mechanical ingenuity and fertility of resource were very remarkable, and he undoubtedly possessed the engineering faculty in a very high degree. He was ' an enthusiastic believer in canals, and his reported answer, when asked the use of navigable rivers, " To feed canals," is character- istic, if not altogether authentic.

BRINTON, DANIEL GARRISON (1837-1899), American archaeologist and ethnologist, was born at Thorhbury, Pehn+ sylvania, on the 13th of May 1837. He graduated at Yale in 1858, studied for two years in the Jefferson Medical College, and then for one year travelled in Europe and continued his studies at Paris and Heidelberg. From 1862 to 1865, during the Civil War in America, he was a surgeon in the Union army, acting for one year, 1864-1865, as surgeon in charge of the U.S. Army general hospital at Quincy, Illinois. After the war he practised medicine at Westchester, Pennsylvania, for several years; was 5 the editor of a weekly periodical, the Medical and Surgical Reporter, in Philadelphia, from 1874 to 1887; became professor of ethnology and archaeology in the Academy of Natural Sciences in Philadelphia in 1884, and was professor of American lin- guistics and archaeology in the university

of Pennsylvania from 1886 until his death at Philadelphia on the 31st of July 1899.

He was a member of numerous learned societies in the United States and in Europe) and was president at different times of the Numismatic and Antiquarian Society of Philadelphia, < of the American Folk-Lore Society and of the American Association for the Advancement of Science. During the period from 1859 (when he published hfe first book) to 1899, he wrote a score of books, several of them of great value, and a large number of pamphlets, brochures; addresses and magazine articles. His principal works are: — The Myths of the New World (1868), the first attempt to analyse and correlate, according to true scientific principles, the mythology of the American Indians; The ■Religious Sentiment: Its Sources and Aim: A Contribution to the Science and Philosophy of Religion (1876); American Hero Myths (1882); Essays of an Americanist (1890); Races and Peoples (1890); The American Race (1891); The Pursuit of Happiness (1893); and Religions of Primitive People (1897). In addition, he- edited and published a Library of American Aboriginal Literature (8 vols. 1882-1890), a valuable contribution to the science of anthropology in America. Of the eight volumes; six were edited by Brinton himself, one by Horatio Hale and one by A. S. Gatschet. ■

BRINVILLIERS, MARIE MADELEINE MARGUERITE D'AUBRAY, Marquise de (c. 1630-1676), French poisoner, daughter of Dreux d'Aubray, civil lieutenant of Paris, was born in Paris about 1630. In 1651 she married the marquis de Brinvilliers, then serving in the regiment of Normandy. Con- temporary evidence describes the marquise at this time as a pretty and much-courted little woman, with a fascinating air of childlike innocence. In 1659 her husband introduced her to his friend Godin de Sainte-Croix, a handsome young cavalry officer of extravagant tastes and bad reputation, whose mistress she became Their relations soon created a public scandal, arid as the marquis de Brinvilliers, who had left France to avoid his creditors, made no effort to terminate them, M. d'Aubray secured the arrest of Sainte-Croix on a Uttrede cachet. For a year Sainte-Croix remained a prisoner in the Bastille, where he is popularly supposed to have acquired' a knowledge of poisons from his fellow-prisoner, the Italian poisoner Exili. When he left the Bastille, he plotted with his willing mistress his revenge upon her father. She cheerfully undertook to experiment with the poisons which Sainte-Croix,possibly with the help of a chemist, Christopher Glaser, prepared, and found subjects ready to hand in the poor who sought her charity, and the sick whom she visited in the hospitals.*

Meanwhile Sainte-Croix, completely ruined financially, enlarged his original idea, and determined that not only M. Dreux d'Aubray but also the latter's two sons and other daughter should be poisoned, so that the marquise de Brinvilliers and: himself might come into possession of the large family fortune. In February 1666, satisfied with the efficiency of Sainte- Croix's preparations and with the ease with which they could be administered without detection, the marquise poisoned her father, and in 1670, with the connivance of their valet La CKaussee, her two brothers. A post-mortem examination suggested the real cause of death, but no suspicion Was directed to the murderers. Before any attempt could be made on' the life of Mile Therese d'Aubray, Sainte-Croix suddenly died. As he left no heirs the police' were called in, and discovered among his: belongings documents seriously incriminating the marquise and La Ciiaiissee.: The latter was arrested, tortured into a complete confession, and broken alive on the wheel (1673), but the marquise escaped, taking refuge first probably in England, then in Germany, and finally in a convent at Liege, whence she was decoyed by a police emissary disguised as a priest. A full account of her life and crimes was found among her papers. Her attempt to commit suicide was frustrated, and she was taken to Paris, where she was beheaded and her body burned on the 16th. of July 1676.

See G. Roullier.La Marquise de Brinvilliers (Paris, 1883) ; Toiseleur, Trois enigmes historiques (Paris, 1882).

BRIONIAN ISLANDS, a group of small islands, in the Adriatic Sea, off the west coast of Istria, from which they are separated by the narrow Canale di Fasana. They belong to Austria and

are twelve in number. Up to a recent period they were chiefly noted for their quarries, which have been worked for centuries and have supplied material not only for the palaces and bridges of Venice and the whole Adriatic coast, but latterly for Vienna and Berlin also. As they command the entrance to the naval harbour of Pola, a strong fortress, ■"■ Fort Tegctthoff;" has been erected on the largest of them (Brioni), together with minor fortifications on some of the others. The islands are inhabited by about 100 Italian quarrymen.

BRIOSCO, ANDREA (c. 1470-1532), Italian sculptor and architect,known as Riccio (" curly-headed "), was born at Padua. In

architecture he is known by the church of Sta Giustina in his native city, but he is most famous as a worker in metal. His masterpieces are the bronze Paschal candelabrum (n ft. high) in the choir of the Santo (S. Antonio) at Padua (1515), and the two bronze reliefs (1507) of " Da'vid dancing before the Ark " and " Judith and Holofernes " in the same church. His bronze and marble tomb of the physician Girolamo della Torre in San Fermo at Verona was beautifully decorated with reliefs, which were taken away by the French and are now in the Louvre. A number of other works which emanated from his workshop are attributed to him; and he has been suggested, but doubtfully, as the author of a fine bronze relief, a " Dance of Nymphs," in the Wallace collection at Hertford House, London.

BRIOUDE, a town of central France, capital of an arrondisse- ment in the department of Haute-Loire, on the left bank of the Allier, 1467 ft. above the sea, 47 m. N.W. of Le Puy on the Paris- Lyon railway. Pop. (1906) 4581. Brioude has to a great extent escaped modernization and still has many old' houses and fountains. Its streets are narrow and irregular, but the town is surrounded by wide boulevards lined with trees. The only building of consequence is the church of St Julian (12th and 13th centuries) in the Romanesque style of Auvergne, of which the choir, with its apse and radiating chapels and the mosaic orna- mentation of the exterior, is a fine example. Brioude is the seat of a sub-prefect, and of tribunals of first instance and of com- merce. The plain in which it is situated is of great fertility; the grain trade of the town is considerable, and market-gardening is carried on in the outskirts. The industries include brewing, saw-milling, lace-making and antimony mining and founding.

Brioude, the ancient Brivas, was formerly a place of consider- able importance. It was in turn besieged and captured by the Goths (532), the Burgundians, the Saracens (733) and the Normans. In 1181 the viscount of Polignac, who had sacked the town two years previously, made public apology in front of the church, and established a body of twenty-five knights to defend the relics of St Julian. For some time after 1361 the town was the headquarters of Berenger, lord of Castelnau, who was at the head of one of the bands of military adventurers which then devastated France. The knights (or canons, as they afterwards became) of St Julian bore the title of counts of Brioude, and for a long time opposed themselves to the civic liberties of the inhabitants.

BRIQUEMAULT (or Briquemattt), FRANCOIS DE BEAU- VAIS,

Seigneur de (c. 1502-1572), leader of the Huguenots during the first religious wars, was the son of Adrien de Brique- mault and Alexane de Sainte Ville, and was born about 1502. His first campaign was under the count of Brissac in the Pied- montese wars. On his return to France in 1554 he joined Admiral Coligny. Charged with the defence of Rouen, in 1562, he resigned in favour of Montgomery, to -whom the prince of Conde had entrusted the task, and went over to England, where he concluded the treaty of Hampton Court on the 20th of September. He then returned to France, and took Dieppe from the Catholics before the conclusion of peace. If his share in the second religious war was less important, he played a very active part in the third. He fought at Jarnac, Roche-Abeille and Montcontour, assisted in the siege of Poitiers, was nearly captured by the Catholics at Bourg-Dieu, re-victualled Vezelay, and almost surprised Bourges. In 1570, being charged by Coligny to stop the army of the princes in its ascent of the Rhone valley, he crossed Burgundy and effected his junction

with the admiral at St'Etienne in May. On the 21st of the following June he assisted in achieving the victory of Arnay- le-Duc, and was then employed to negotiate a marriage between the prince of Navarre and Elizabeth of England. Being in Paris on the night of St Bartholomew he took refuge in the house of the English ambassador, but was arrested there. With his friend Arnaud de Cavagnes he was delivered over to the parle- ment, and failed in courage when confronted with his judges, seeking to escape death by unworthy means. He was con- demned, nevertheless, on the 27th of October 1572, to the last penalty and to the confiscation of his property, and on the 20th of October he and Cavagnes were executed.

See Histoire eccUsiaslique des Ugliscs rfformSes au royaume de France , (new edition, 1884), vol. ii. ; La France protestante (2nd edition), vol. ii., article " Beauvais."

BRIQUETTE (diminutive of Fr. brique, brick), a form of fuel, known also as " patent fuel," consisting of small coal compressed into solid blocks by the aid of some binding material. For making briquettes the small coal, if previously washed, is dried to reduce the moisture to at most 4% , and if necessary crushed in a disintegrator. It is then incorporated in a pug mill with from 8 to 10% of gas pitch, and softened by heating to between 70° and 90° C. to a plastic mass, which is moulded into blocks and compacted by a pressure of f to 2 tons per sq. in. in a machine with a rotating die-plate somewhat like that used in making semi-plastic clay bricks. When cold, the briquettes, which usually weigh from 7 to 20 lb each, although

smaller sizes are made for domestic use, become quite hard, and can be handled with less breakage than the original coal. Their principal use is as fuel for marine and locomotive boilers, the evaporative value being about the same as, or somewhat greater than, that of coal. The principal seat of the manufacture in Great Britain is in South Wales, where the dust and smalls resulting from the handling of the best steam coals (which are very brittle) are obtainable in large quantities and find no other use. Some varieties of lignite, when crushed and pressed at a steam heat, soften sufficiently to furnish compact briquettes without requiring any cementing material. Briquettes of this kind are made to a large extent from the tertiary lignites in the vicinity of Cologne; they are used mainly for house fuel on the lower Rhine and in Holland, and occasionally come to London.

BRISBANE, SIR THOMAS MAKDOTJGALL (1773-1860), Scottish soldier and astronomer, was born on the 23rd of July 1773 at Brisbane House, near Largs, in Ayrshire. He entered the army ini789 ; , and served in Flanders, the West Indies and the Peninsula. In 1814′ he was sent to North America; on the return of Napoleon from Elba he was recalled, but did not arrive in time to take part in the battle of Waterloo. In 182 1 he was appointed governor of New South Wales. During the four years for ; which he held that office, although he allowed the finances of the colony to get into confusion, he endeavoured to improve its condition by introducing the vine, sugar-cane and tobacco plant, and by encouraging the breeding of horses and the re- clamation of land. At his instigation exploring parties were sent out, and one of these discovered the Brisbane river which was named after him. He established an astronomical observatory at Paramatta in 1822, and the Brisbane Catalogue, which was printed in 1835 and contained 7385 stars, was the result of observations made there in 1822-1826. The observatory was discontinued in 1855. After his return to Scotland he resided chiefly at Makerstoun in Roxburghshire, where, as at Brisbane House, he had a large and admirably equipped observatory. Important magnetic observations were begun at Makerstoun in 1841, and the results gained him in 1848 the Keith prize of the Royal Society of Edinburgh, in whose Transactions they were published. In 1836 he was made a baronet, and G.C.B. in 1837; and in 1841 he became general. He was elected president of the Royal Society of Edinburgh after the death of Sir Walter Scott in 1833, and in the following year acted as president of the British Association. He died at Brisbane House on the 27th of January i860. He founded two gold medals for the encouragement of scientific research, one in the

award of the Royal Society of Edinburgh, and the other in that of the Scottish Society of Arts.

BRISBANE, the capital of Queensland, Australia. It is situ- ated in Stanley county, on the banks of the river Brisbane, 25 m. from its mouth in Moreton Bay. It is built on a series of hills rising from the river-banks, but some parts of it, such as Wool- longabba and South Brisbane, occupy low-lying flats, which have sometimes been the scene of disastrous floods. The main streets and principal buildings of the city are situated on a tongue of land formed by a southward bend of the river. The extremity of the tongue, however, is open. Here, adjoining one another, are the botanical gardens, the grounds surrounding Government House, the official residence of the governor of the colony, and the Houses of Parliament, and Queen's Park, which is used as a recreation ground. From this park Albert Street runs for about three-quarters of a mile through the heart of the city, leading to Albert Park, in which is the observatory. Queen's Street, the main thoroughfare of Brisbane, crosses Albert Street midway between the two parks and leads across the Victoria Bridge to the separate city of South Brisbane on the other side of the river. The Victoria Bridge is a fine steel structure, which replaced the bridge swept away by floods in February 1893. Brisbane has a large number of buildings of architectural merit, though in some cases their effect is marred by the narrowness of the streets in which they stand. Among the most prominent are the Houses of Parliament, the great domed custom-house on the river-bank, the lands office, the general post-office, the town halls of Brisbane and South Brisbane, and the opera house. The Roman Catholic cathedral of St Stephen (Elizabeth Street) is an imposing building, having a detached campanile containing the largest bell in Australia. The foundatten- stone of the Angli- can cathedral, on an elevated site in Ann Street, was laid by the prince of Wales (as duke of York) in 1901. The city is the seat of a Roman Catholic archbishop and of an Anglican bishop.. Many of the commercial and private buildings are also worthy of notice, especially the Queensland National Bank, a classic Italian struc- ture, the massive treasury buildings, one of the largest erections in Australia, the Queensland Club with its wide colonnades in Italian Renaissance style, and the great buildings of the Brisbane Newspaper Company. Brisbane is well provided with parks and open spaces; the Victoria Park and Bowen Park are the largest; the high- lying Mount Coot-tha commands fine views, and there are other

parks and numerous recreation grounds in various parts of the city, besides the admirable botanical gardens and the gardens of the Acclimatization Society. Electric tramways and omnibuses serve all parts of the city, and numerous ferries ply across the river. There is railway communication to north, south and west. By careful dredging, the broad river is navig- able as far as Brisbane for ocean-going vessels, and the port is the terminal port for the Queensland mail steamers to Europe, and is visited by steamers to China, Japan and America, and for various inter-colonial lines. There is wharf accommodation on both banks of the river, a graving dock which can be used by vessels up to 5000 tons, and two patent slips which can take up ships of 1000 and 400 tons respectively. The exports are chiefly coal, sheep, tallow, wool, frozen meat and hides. The annual value of imports and exports exceeds seven and nine millions' sterling respectively. There are boot factories, soap works, breweries, tanneries, tobacco works, &c. The climate is on the whole dry and healthy, but during summer the temperature is high, the mean shade temperature being about 70 F.

Brisbane was founded in 1825 as a penal settlement, taking its name from Sir Thomas Brisbane, then governor of Australia; in 1842 it became a free settlement and in 1859 the capital of Queensland, the town up to that time having belonged to: New South Wales. It was incorporated in the same year. South Brisbane became a separate city in 1 003 . The municipal govern- ment of the city, and also of South Brisbane, is in the hands of a mayor and ten aldermen; the suburbs are controlled by shire councils and divisional boards. The chief suburbs are Kangaroo Point, Fortitude Valley, New Farm, Red Hill, Paddington, Milton, Toowong, Breakfast Creek, Bulimba, Woollongabba,

Highgate and Indooroopilly. The population of the metropolitan area in 1901 was 119,907; of the city proper, 28,953; 0I South Brisbane, 25,481.

BRISEUX, CHARLES ETIENNE (c. 1680-1754), French architect. He was especially successful as a designer of internal decorations — mantelpieces, mirrors, doors and overdoors, ceilings, consoles, candelabra, wall panellings and other fittings, chiefly in the Louis Quinze mode. He was also an industrious writer on architectural subjects. His principal works are: — L'Archu tecture moderne (2 vols., 1728); L'Art de bdlir les maisons de campagne (2 vols., 1743); Traiti du beau essentiel dans les arts, appliqui particulierement a I' architecture (1752); and Traits des proportions harmoniques.

BRISSAC, DUKES OF. The fief of Brissac in Anjou was acquired at the end of the 15 th century by a noble French family named Cosse belonging to th'e same province. Rene de Cosse married into the Gouffier family, just then very powerful at court, and became premier panelier (chief pantler) to Louis XII. Two of his sons were marshals of France. Brissac was made a countship in 1560 for Charles, the eldest, who was grandmaster of artillery, and governor of Piedmont and of Picardy. The second, Artus, who held the offices of grand panetier of France and superintendent of finance, distinguished himself in the religious wars. Charles II. de Cosse fought for the League, and as governor of Paris opened the gates of that town to Henry IV., who created him marshal of France in 1594. Brissac was raised to a duchy in the peerage of France in 161 1. Louis Hercule Timoleon de Coss6, due de Brissac, and commandant of the con- stitutional guard of Louis XVI., was killed at Versailles on the 9th of September 1792 for his devotion to the king. (M. P.)*

BRISSON, EUGENE HENRI (1835-), French statesman, was born at Bourges on the 31st of July 1835. He followed his father's profession of advocate, and having made himself con- spicuous in opposition during the last days of the empire, was appointed deputy-mayor of Paris after its overthrow. He was elected to the Assembly on the 8th of February 1 87 1 , as a member of the extreme Left. While not approving of the Commune, he was the first to propose amnesty for the condemned (on the 13th of September 1871), but the proposal was voted down. He strongly supported obligatory primary education, and was a firm anti-clerical. He was president of the chamber from 1881 — replacing Gambetta— to March 1885, when he became prime minister upon the resignation of Jules Ferry; but he resigned when, after the general elections of that year, he only just obtained a majority for the vote of credit for the Tongking expedition. He remained conspicuous as a public man, took a prominent part in exposing the Panama scandals, was a powerful candidate for the presidency after the murder of President Carnot in 1894, and was again president of the chamber from December 1894 to 1898. In June of the latter year he formed a cabinet when the country was violently excited over the Dreyfus affairˆ his firmness and honesty increased the respect in which he was already held by good citizens, but a chance vote on an occasion of especial excitement overthrew his ministry in October. As one of the leaders of the radicals he actively supported, the ministries of Waldeck-Rousseau and Combes, especially con- cerning the laws on the religious orders and the separation of church and state. Ini899hewas a candidate for the presidency. In May 1906 he was elected

president of the chamber of deputies by 500 out of 581 votes.

BRISSON, MATHURIN JACQUES (1 723-1806), French zoologist and natural philosopher, was born at Fontenay le Comte on the 30th of April 1723. The earlier part of his life was spent in the pursuit of natural history, his published works in this department including Le Regne animal (1756) and Ornitho- logie (1760). After the death of R. A. F. Reaumur (1683-1757), whose assistant he was, he abandoned natural history, and was appointed professor of natural philosophy at Navarre and later at Paris. His most important work in this department was his Poids specifiques des corps (1787), but he published several other books on physical subjects which were in considerable repute for a time. He died at Croissy near Paris, on the 23rd of June 1806.

BRISSOT, JACQUES PIERRE (1734-1793), who assumed the name of de Warville, a celebrated French Girondist, was born at Chartres, where his father was an inn-keeper, in January 1754. Brissot received a good education and entered the office of a lawyer at Paris. His first works, Th&orie dfs lois criminelles (1781) and Bibliotheque philosophique du Mgislateur (1782), were on the philosophy of law, and showed how thoroughly Brissot was imbued with the ethical precepts of Rousseau. The first work was dedicated to Voltaire, and was received by the old philosophe with much favour. Brissot became known as a facile and able writer, and was engaged on the Mercure, on the Courrier de I'Europe, and on other papers. Ardently devoted to the service of humanity, he projected a scheme for a general con- course of all the savants in Europe, and started in London a paper, Journal du Lycee de Londres, which was to be the organ of their views. The plan was unsuccessful, and soon after his return to Paris Brissot was lodged in the Bastille on the charge of having published a work against the government. He obtained his release after four months, and again devoted himself to pamphleteering, but had speedily to retire for a time to London. On this second visit he became acquainted with some of the leading Abolitionists, and founded later in Paris a Societ6 des Amis des Noirs, of which he was president during 1790 and 1791. As an agent of this society he paid a visit to the United States in 1788, and in 1791 published his Nouveau Voyage dans les Etats-Unis de V Amerique Seplentrionale (3 vols.).

From the first, Brissot threw himself heart and soul into the Revolution. He edited the Patriote francais from 1789 to 1793, and

being a well-informed and capable man took a prominent part in affairs. Upon the demolition of the Bastille the keys were presented to him. Famous for his speeches at the Jacobin club, he was elected a member of the municipality of Paris, then of the Legislative Assembly, and later of the National Convention. During the Legislative Assembly his knowledge of foreign affairs enabled him as member of the diplomatic committee practically to direct the foreign policy of France, and the declaration of war against the emperor on the 20th of April 1792, and that against England on the 1st of July 1793, were largely due to him. It was also Brissot who gave these wars the character of revolutionary propaganda. He was in many ways the leading spirit of the Girondists, who were also known as Brissotins. Vergniaud certainly was far superior to him in oratory, but Brissot was quick, eager, impetuous, and a man of wide knowledge. But he was at the same time vacillating, and not qualified to struggle against the fierce energies roused by the events of the Revolution. His party fell before the Mountain; sentence of arrest was passed against the leading members of it on the 2nd of June 1793. Brissot attempted to escape in disguise, but was arrested at Moulins. His demeanour at the trial was quiet and dignified; and on the 31st of October 1793 he died bravely with several other Girondists.

See Memoires de Brissot, sur ses contemporains et la Revolution francaise, published by his sons, with notes by F. de Montrol (Paris, 1830); Helena Williams, Souvenirs de la Revolution francaise (Paris, 1827) ; F. A. Aulard, Les Orateurs de la Legislative et de la Convention 2nd ed., Paris, 1905); F. A. Aulard, Les Portraits litteraires a la fin du XVIII' siecle, pendant la Revolution (Paris, 1883).

BRISTOL, EARLS AND MARQUESSES OF. This English title has been held in the Hervey family since 17 14, though previously an earldom of Bristol, in the Digby family, is associated with two especially famous representatives, of whom separate biographies are given. The Herveys are mentioned during the 13th century as seated in Bedfordshire, and afterwards in Suffolk, where they have held the estate of Ickworth since the 15th century. John Hervey (1616-1679) was the eldest son of Sir William Hervey (d. 1660), and was born on the 18th of August 1616. He held a high position in the household of Catherine, wife of Charles II., and was for many years member of parliament for Hythe. He married Elizabeth, the only surviving child of his kinsman, William, Lord Hervey of Kidbrooke (d. 1642), but left no children when he died on the 18th of January 1679, and his estates passed to his brother, Sir Thomas Hervey. Sir Thomas, who

was member of parliament for Bury St Edmunds,

died on the 27th of May 1694, and was succeeded by his sou, John, who became the 1st earl of Bristol.

John Hervey, 1st earl of Bristol (1665-1751), born on the 27th of August 1665, was educated at Clare Hall, Cambridge, and became member of parliament for Bury St Edmunds in March 1694. In March 1703 he was created Baron Hervey of Ickworth, and in October 1714 was made earl of Bristol as a reward for his zeal in promoting the principles of the revolution and supporting the Hanoverian succession. He died on the 20th of January 1751. By his first wife, Isabella (d. 1693), daughter of Sir Robert Carr, Bart., of Sleaford, he had one son, Carr, Lord Hervey (1691-1723), who was educated at Clare Hall, Cambridge, and was member for Bury St Edmunds from 17 13 to 1722. (It has been suggested that Carr, who died unmarried on the 14th of November 1723, was the father of Horace Walpole.) He married secondly Elizabeth (d. 1741), daughter and co-heiress of Sir Thomas Felton, Bart., of Playford, Suffolk, by whom he had ten sons and six daughters. His eldest son, John (1696- 1743), took the courtesy title of Lord Hervey on the death of his half-brother, Carr, in 1723, and gained some renown both as a writer and a politician (see Hervey or Ickworth). Another son, Thomas (1699-1775), was one of the members for Bury from 1733 to 1747; held various offices at court; and eloped with Elizabeth, wife of Sir Thomas Hanmer. He had very poor health, and his reckless life frequently brought him into pecuniary and other difficulties. He wrote numerous pamphlets, and when he died Dr Johnson said of him, " Tom Hervey, though a vicious man, was one of the genteelest men who ever lived." Another of the 1st earl's sons, Felton (1712-1773), was also member for the family borough of Bury St Edmunds. Having assumed the additional name of Bathurst, Felton's grandson, Felton Elwell Hervey-Bathurst (1782-1819), was created a baronet in 1818, and on his death a year later the title descended to his brother, Frederick Anne (1783-1824), the direct ancestor of the present baronet. The 1st earl died in January 1751, the title and estates descending to his grandson.

George William Hervey, 2nd earl of Bristol (1721-1775), the eldest son of John, Lord Hervey of Ickworth, by his marriage with Mary (1 700-1 768), daughter of Nicholas Lepell, was born on the 31st of August 1721. He served for some years in the army, and in 1755 was sent to Turin as envoy extraordinary. He was ambassador atMadridfromi758toi76i, filling a difficult position with credit and dignity, and ranked among the followers of Pitt. Appointed lord-

lieutenant of Ireland in 1766, he never visited that country during his short tenure of this office, and, after having served for a short time as keeper of the privy seal, became groom of the stole to George III. in January 1770. He died unmarried on the 18th or 20th of March 1775, and was succeeded by his brother.

Augustus John Hervey, 3rd earl of Bristol (1724-1779), was born on the 19th of May 1724, and entered the navy, where his promotion was rapid. He distinguished himself in several encounters with the' French, and was of great assistance to Admiral Hawke in 1759, although he had returned to England before the battle of Quiberon Bay in November 1759. Having served with distinction in the West Indies under Rodney, his active life at sea ceased when the peace of Paris was concluded in February 1763. He was, however, nominally commander-in- chief in the Mediterranean in this year, and was made vice- admiral of the blue in January 1778. Hervey was member of parliament for Bury from 1757 to 1763, and after being for a short time member for Saltash, again represented Bury from 1768 until he succeeded his brother in the peerage in 1775. He often took part in debates in parliament, and was a frequent contributor to periodical literature. Having served as a lord of the admiralty from 1771 to 1775 he won some notoriety as an opponent of the Rockingham ministry and a defender of Admiral Keppel. In August 1 744 he had been secretly married to Elizabeth Chudleigh (1720-1788), afterwards duchess of Kingston (q.v.), but this union was dissolved in 1769. The earl died in London on the 23rd of December 1779, leaving no legitimate issue, and having, as far as possible, alienated his property from the

title. He Was succeeded by his brother. Many of his letters are in the Record Office, and his journals in the British Museum. Other letters are printed in the Grenville Papers, vols. iii. and iv. (Londun, 1852-1853), and the Life of Admiral Keppel, by the Hun. T. Keppel (London, 1852).

Frederick Augustus Hervey, bishop of Derry (1730-1803), who now became 4th earl of Bristol, was bom on the 1st of August 1 730, and educated at Westminster school and Corpus Christi College, Cambridge, graduating in 1754. Entering the church he became a royal chaplain; and while waiting for other preferment spent some time in Italy, whither he was led by his great interest in art. In

February 1767, while his brother, the 2nd earl, was lord-lieutenant of Ireland, he was made bishop of Cloyne, and having improved the property of the see he was translated to the rich bishopric of Derry a year later. Here again he was active and philanthropic. While not neglecting his luxurious personal tastes he spent large sums of money on making roads and assisting agriculture, and his munificence was shared by the city of Londonderry. He built splendid residences at Downhill and Ballyscullion, which he adorned with rare works of art. As a bishop, Hervey was in- dustrious and vigilant; he favoured complete religious equality, and was opposed to the system of tithes. In December 1779 he became earl of Bristol, and in spite of his brother's will succeeded to a considerable property. Having again passed some time in Italy, he returned to Ireland and in 1782 threw himself ardently into the Irish volunteer movement, quickly attaining a prominent position among the volunteers, and in great state attending the convention held in Dublin in November 1783. Carried away by his position and his popularity he talked loudly of rebellion, and his violent language led the government to contemplate his arrest. Subsequently he took no part in politics, spending his later years mainly on the continent of Europe. In 1798 he was imprisoned by the French at Milan, remaining in custody for eighteen months. He died at Albano on the 8th of July 1803, and was buried in Ickworth church. Varying estimates have been found of his character, including favourable ones by John Wesley and Jeremy Bentham. He was undoubtedly clever and cultured, but licentious and eccentric. In later life he openly professed materialistic opinions; he fell in love with the countess Lichtenau, mistress of Frederick William II., king of Prussia; and by his bearing he gave fresh point to the saying that " God created men, women and Herveys." In 1752 he had married Elizabeth (d. 1800), daughter of Sir Jermyn Davers, Bart., by whom he had two sons and three daughters. His elder son, Augustus John, Lord Hervey (1757-1796), had predeceased his father, and he was succeeded in the title by his younger son.

Frederick William Hervey, 5th earl and 1st marquess of Bristol (1769-1859), was born on the 2nd of October 1769. He married Elizabeth Albana (d. 1844), daughter of Clotworthy, 1st Baron Templetown, by whom he had six sons and three daughters. In 1826 he was created marquess of Bristol and Earl Jermyn, and died on the 15 th of February 1859. He was succeeded by his son Frederick William (1800-1864), M.P. for Bury St Edmunds 1830-1859, as 2nd marquess; and by the latter's son Frederick William John (1834-1007), M.P. for West Suffolk 1859-1864, as 3rd marquess. The latter's nephew, Frederick William Fane Hervey (b. 1863), who

succeeded as 4th marquess, served with distinction in the royal navy, and was M.P. for Bury St Edmunds from 1906 to 1907.

See John, Lord Hervey, Memoirs of the Reign of George II., edited by J. W. Croker (London, 1884); John Hervey, 1st earl of Bristol, Diary (Wells, 1894); and Letter Books of Bristol; with Sir T. Hervey's Letters during Courtship and Poems during Widowhood (Wells, 1894). Also the articles in the Dictionary of National Biography, vol. xxvi. (London, 1891).

BRISTOL, GEORGE DIGBY, 2ND Earl of 1 (1612-1677), eldest son of the 1st earl (see below), was born in October 161 2. At the age of twelve he appeared at the bar of the House of Commons and pleaded for his father, then in the Tower, when his youth, graceful person and well-delivered speech made a great 1 I. e. in the Digby line ; for the Herveys see above.

impression. He was admitted to Magdalen College, Oxford, on the 15th of August 1626, where he was a favourite pupil of Peter Heylin, and became M.A. in 1636. He spent the following years in study and in travel, from which he returned, according to Clarendon, " the most accomplished person of our nation or perhaps any other nation," and distinguished by a remarkably handsome person. In 1638 and 1639 were written the Letters between Lord George Digby and Sir Kenelm Digby, Knt. concerning Religion (publ. 1651), in which Digby attacked Roman Catholi- cism. In June 1634 Digby was committed to the Fleet till July for striking Crofts, a gentleman of the court, in Spring Gardens; and possibly his severe treatment and the disfavour shown to his father were the causes of his hostility to the court. He was elected member for Dorsetshire in both the Short and Long parliaments in 1640, and in conjunction with Pym and Hampden he took an active part in the opposition to Charles. He moved on the 9th of November for a committee to consider the " deplor- able state " of the kingdom, and on the nth was included in the committee for the impeachment of Strafford, against whom he at first showed great zeal. He, however, opposed the attainder, made an eloquent speech on the 21st of April 1641, accentuating the weakness of Vane's evidence against the prisoner, and showing the injustice of ex post facto legislation. He was regarded in consequence with great hostility by the parliamentary party, and was accused of having stolen from Pym's table Vane's notes on which the prosecution mainly depended. On the 15th of July his speech was burnt by the hangman by the order of the House of Commons. Meanwhile on the 8th of February he had made an important speech in the Commons advocating the reformation and opposing the

abolition of episcopacy. On the 8th of June, during the angry discussion on the army plot, he narrowly escaped assault in the House; and the following day, in order to save him from further attacks, the king called him up to the Lords in his father's barony of Digby.

He now became the evil genius of Charles, who had the incredible folly to follow his advice in preference to such men as Hyde and Falkland. In November he is recorded as perform- ing " singular good service," and " doing beyond admiration," in speaking in the Lords against the instruction concerning evil counsellors. He suggested to Charles the impeachment of the five members, and urged upon him the fatal attempt to arrest them on the 4th of January 1642; but he failed to play his part in the Lords in securing the arrest of Lord Mandeville, to whom on the contrary he declared that " the king was very mischievously advised " ; and according to Clarendon his imprudence was responsible for the betrayal of the king's plan. Next day he advised the attempt to seize them in the city by force. The same month he was ordered to appear in the Lords to answer a charge of high treason for a supposed armed attempt at Kingston, but fled to Holland, where he joined the queen, and on the 26th of February was impeached. Subsequently he visited Charles at York disguised as a Frenchman, but oh the return voyage to Holland he was captured and taken to Hull, where he for some time escaped detection; and at last he cajoled Sir John Hotham, after discovering himself, into permitting his escape. Later he ventured on a second visit to Hull to persuade Hotham to surrender the place to Charles, but this project failed. He was present at Edgehill, and greatly distinguished himself at Lich- field, where he was wounded while leading the assault. He soon, however, threw down his commission in consequence of a quarrel with Prince Rupert, and returned to the king at Oxford, over whom he obtained more influence as the prospect became more gloomy. On the 28th of September 1643 he was appointed secretary of state and a privy councillor, and on the 31st of October high steward of Oxford University. He now supported the queen's disastrous policy of foreign alliances and help from Ireland, and engaged in a series of imprudent and ill-conducted negotiations which greatly injured the king's affairs, while his fierce disputes with Rupert and his party further embarrassed them. On the 14th of October 1645 he was made lieutenant general of the royal forces north of the Trent, with the object of pushing through to join Montrose, but he was defeated or

BRISTOL, ist EARL. OF

the 15th at Sherburn, where his correspondence was captured, disclosing the king's expectations from abroad and from Ireland and his intrigues with the Scots; and after reaching Dumfries, he found his way barred. He escaped on the 24th to the Isle of Man, thence crossing to Ireland, where he caused Glamorgan to be arrested. Here, on this new stage, he believed he was going to achieve wonders. " Have I not carried my body swimmingly," he wrote to Hyde in irrepressible good spirits, " who beingbefore so irreconcilably hated by the Puritan party, have thus seasonably made myself as odious to the Papists?" 1 His project now was to bring over Prince Charles to head a royalist movement in the island; and having joined Charles at Jersey in April 1646, he intended to entrap him on board, but was dissuaded by Hyde. He then travelled to Paris to gain the queen's consent to his scheme, but returned to persuade Charles to go to Paris, and accompanied him thither, revisiting Ireland on the 29th of June once more, and finally escaping to France on the surrender of the island to the parliament. At Paris amongst the royalists he found himself in a nest of enemies eager to pay off old scores. Prince Rupert challenged him, and he fought a duel with Lord Wilmot. He continued his adventures by serving in Louis XIV. 's troops in the war of the Fronde, in which he greatly distinguished himself. He was appointed in 1651 lieutenant-general in the French army, and commander of the forces in Flanders. These new honours, however, were soon lost. During Mazarin's enforced absence from the court Digby aspired to become his successor; and the cardinal, who had from the first penetrated his character and regarded him as a mere adventurer, 2 on his restoration to power sent Digby away on an expedition in Italy; and on his return informed him that he was included in the list of those expelled from France, in accordance with the new treaty with Cromwell. In August 1656 he joined Charles II. at Bruges, and desirous of avenging himself upon the cardinal offered his services to Don John of Austria in the Netherlands, being instrumental in effecting the surrender of the garrison of St Ghislain to Spain in 1657. On the ist of January 1657 he was appointed by Charles II. secretary of state, but shortly afterwards, having become a Roman Catholic — probably with the view of adapting himself better to his new Spanish friends — he was compelled to resign office. Charles, however, on account of his " jollity " and Spanish experience took him with him to Spain in 1659, though his presence was especially deprecated by the Spanish; but he succeeded in ingratiating himself, and was welcomed by the king of Spain subsequently at Madrid.

By the death of his father Digby had succeeded in January 1659 to the peerage as 2nd earl of Bristol, and had been made K.G. the same month. He returned to England at the restora- tion, when he found himself excluded from office on account of his religion, and relegated to only secondary importance. His desire to make a brilliant figure induced a restless and ambitious activity in parliament. He adopted an attitude of violent hostility to Clarendon. In foreign affairs he inclined strongly to the side of Spain, and opposed the king's marriage with Catherine of Portugal. He persuaded Charles to despatch him to Italy to view the Medici princesses, but the royal marriage and treaty with Portugal were settled in his absence. In June 1663 he made an attempt to upset Clarendon's management of the House of Commons, but his intrigue was exposed to the parliament by Charles, and Bristol was obliged to attend the House to exonerate himself, when he confessed that he had " taken the liberty of enlarging," and his" comedian-like speech " excited general amusement. Exasperated by these failures, in a violent scene with the king early in July, he broke out into fierce and disrespectful reproaches, ending with a threat that unless Charles granted his requests within twenty-four hours " he would do somewhat that should awaken him out of his slumbers, and make him look better to his own business." Accordingly on the 10th he impeached Clarendon in the Lords of high treason, and on the charge being dismissed renewed

1 Clarendon Stale Papers, ii. 201. ■ M&moires du Cardinal de Retz (1859), app. iii. 437, 442.

his accusation, and was expelled from the court, only avoiding the warrant issued for his apprehension by a concealment of two years. In January 1664 he caused a new sensation by his appearance at his house at Wimbledon, where he publicly renounced before witnesses his Roman Catholicism, and declared himself a Protestant, his motive being probably to secure immunity from the charge of recusancy preferred against him. 3 When, however, the fall of Clarendon was desired, Bristol was again welcomed at court. He took his seat in the Lords on the 29th of July 1667. " The king," wrote Pepys in November, " who not long ago did say of Bristoll that he was a man able in three years to get himself a fortune in any kingdom in the world and lose all again in three months, do now hug him and commend his parts everywhere above all the world." 4 He pressed eagerly for Clarendon's commital, and on the refusal of the Lords accused them of mutiny and rebellion, and entered his dissent

with "great fury." 5 In March 1668 he attended prayers in the Lords. On the 15th of March 1673 though still ostensibly a Roman Catholic, he spoke in favour of the Test Act, describing himself as " a Catholic of the church of Rome, not a Catholic of the court of Rome," and asserting the unfitness of Romanists for public office. His adventurous and erratic career closed by death on the 20th of March 1677.

Bristol was one of the most striking and conspicuous figures of his time, a man of brilliant abilities, a great orator, one who distinguished himself without effort in any sphere of activity he chose to enter, but whose natural gifts were marred by a restless ambition and instability of character fatal to real great- ness. Clarendon describes him as " the only man I ever knew of such incomparable parts that was none the wiser for any experience or misfortune that befell him," and records his extra- ordinary facility in making friends and making enemies. Horace Walpole characterized him in a scries of his smartest antitheses as "a singular person whose life was one contradiction." "He wrote against popery and embraced it ; he was a zealous opposer of the court and a sacrifice for it ; was conscientiously converted in the midst of his prosecution of Lord Strafford and was most unconscientiously a persecutor of Lord Clarendon. With great parts, he always hurt himself and his friends; with romantic bravery, he was always an unsuccessful commander. He spoke for the Test Act, though a Roman Catholic; and addicted him- self to astrology on the birthday of true philosophy." Besides his youthful correspondence with Sir K. Digby on the subject of religion already mentioned, he was the author of an Apologie (1643, Thomason Tracts, E. 34 (32)), justifying his support of the king's cause; of Elvira . . . a comedy (1667), printed in R. Dodsley's Select Collect, of Old English Plays (Hazlitt, 1876), vol. xv., and of Worse and Worse, an adaptation from the Spanish, acted but not printed. Other writings are also ascribed to him, including the authorship with Sir Samuel Tuke of The Adventures of Five Hours (1663). His eloquent and pointed speeches, many of which were printed, are included in the article in the Biog. Brit, and among the Thomason Tracts; see also the general catalogue in the British Museum. The catalogue of his library was published in 1680. He married Lady Anne Russell, daughter of Francis, 4th earl of Bedford, by whom, besides two daughters, he had two sons, Francis, who predeceased him unmarried, and John, who succeeded him as 3rd earl of Bristol, at whose death without issue the peerage became extinct.

Authorities. — See the article in Did. Nat. Biog.; Wood's Ath. Oxon. (Bliss), iii. 1100-1105; Biograpkia Brit. (Kippis), v. 210-238; H.

Walpole's Royal and Noble Authors (Park, 1806), iii. 191 ; Roscius Anglicanus, by J. Downes, pp. 31, 36 (1789) ; Cunningham's Lives of Eminent Englishmen (1837), iii. 29; Somers Tracts (1750), iii. (1809), iv. ; Harleian Miscellany (1808), v., vi. ; Life by T. H. Lister (1838) ; State Papers. (P. C, Y.)

BRISTOL, JOHN DIGBY, ist Earl of 8 (1580-1653) English diplomatist, son of Sir George Digby of Coleshill, Warwickshire, and of Abigail, daughter of Sir Arthur Henningham, was, born in

3 Pepys's Diary, iv. 51. lb. vii. 199.

6 lb. 207; Protests of the Lords, by J. E. T. Rogers, i. 36.

6 I.e. in the Digby line; for the Herveys see above-

1580, and entered Magdalen College, Oxford, in 1595 (M.A. 1605), becoming a member of the Inner Temple in 1598. In 1605 he was sent to James to inform him of the safety of the princess Elizabeth at the time of the Gunpowder Plot. He gained his favour, was made a gentleman of the privy chamber and one of the king's carvers, and was knighted in 1607. From 1610 to 161 1 he was member of parliament for Heydon. In 16 n he was sent as ambassador to Spain to negotiate a marriage between Prince Henry and the infanta Anne, and to champion the cause of the English merchants, for whom he obtained substantial concessions, and arranged the appointment of consuls at Lisbon and Seville. He also discovered a list of the English pensioners of the Spanish court, which included some of the ministers, and came home in 1613 to communicate this important intelligence to the king. In 1614 he again went to Spain to effect a union between the infanta Maria and Charles, though he himself was in favour of a Protestant marriage, and desired a political and not a matrimonial treaty. In 16 16, on the disgrace of Somerset, he was recalled home to give evidence concerning the latter's connexions with Spain, was made vice-chamberlain and a privy councillor, and obtained from James the manor of Sherborne forfeited by the late favourite.. In 16 18 he went once more to Spain to reopen the negotiations, returning in May, and being created Baron Digby on the 25 th of November. He endeavoured to avoid a breach with Spain on the election of the elector palatine, the king's son-in-law, to the Bohemian throne; and in March 162 1, after the latter's expulsion from Bohemia, Digby was sent to Brussels to obtain a suspension of hostilities in the Palatinate. On the 4th of July he went to Vienna and drew up a scheme of pacification with the emperor, by which Frederick was to abandon Bohemia and be secured in his hereditary territories, but the agreement could never be enforced. After raising money for the defence of Heidelberg he returned home in October, and on the 21st of November explained his policy to the parliament, and asked for money and forces for its execution. The sudden dissolution of parliament, however, prevented " the adoption of any measure of support, and entirely ruined Digby's plans. In 1622 he returned to Spain with nothing on which to rely but the goodwill of Philip IV., and nothing to offer but entreaties.

On the 1 5th of September he was created earl of Bristol. He urged on the marriage treaty, believing it would include favour- able

conditions for Frederick, but the negotiations were taken out of his control, and finally wrecked by the arrival of Charles himself and Buckingham in March 1623. He incurred their resentment, of which the real inspiration was Buckingham's implacable jealousy, by a letter written to James informing him of Buckingham's unpopularity among the Spanish ministers, and by his endeavouring to maintain the peace with Spain after their departure. In January 1624 he left Spain, and on arriving at Dover in March, Buckingham and Charles having now com- plete ascendancy over the king, he was forbidden to appear at court and ordered to confine himself at Sherborne. He was required by Buckingham to answer a series of interrogatories, but he refused to inculpate himself and demanded a trial by parliament. On the death of James he was removed by Charles I. from the privy council, and ordered to absent himself from his first parliament. On his demand in January 1626 to be present at the coronation Charles angrily refused, and accused him of having tried to pervert his religion in Spain. In March 1626, after the assembling of the second parliament, Digby applied to the Lords, who supported his rights, and Charles sent him his writ accompanied by a letter from Lord Keeper Coventry desiring him not to use it. Bristol, however, took his seat and demanded justice against Buckingham (Thomason Tracts, E. 126 (20)). The king endeavoured to obstruct his attack by causing Bristol on the ist of May to be himself brought to the bar, on an accusa- tion of high treason by the attorney-general. The Lords, how- ever, ordered that both charges should be investigated simul- taneously. Further proceedings were stopped by the dissolution of parliament on the 15th of June; a prosecution was ordered by Charles in the Star Chamber, and Bristol was sent to the

Tower, where he remained till the 17th of March 1628, when the peers, on the assembling of Charles's third parliament, insisted on his liberation and restoration to his seat in the' Lords.

In the discussions upon the Petition of Right, Bristol supported the use of the king's prerogative in emergencies, and asserted that the king besides his legal had a regal power, but joined in the demand for a full acceptance of the petition by the king after the first unsatisfactory answer. He was now restored to favour, but took no part in politics till the outbreak of the Scottish rebellion, when he warned Charles of the danger of attacking with inadequate forces. He was the leader in the Great Council held at York, was a commissioner to treat with the Scots in September 1640 at Ripon, and advised strongly the summoning of the parliament. In February 1641 he was one of the peers who advocated reforms in the administration and were given seats in the council. Though no friend

to Strafford, he endeavoured to save his life, desiring only to see him excluded from office, and as a witness was excused from voting on the attainder. He was appointed gentleman of the bedchamber on the king's departure for Scotland, and on the 27th of December he was declared an evil counsellor by the House of Commons, Cromwell on the 28th moving an address to the king to dismiss him from his councils, on the plea that he had advocated the bringing up of the northern army to overawe parliament in the preceding spring. There is no evidence to support the charge, but Digby was regarded by the parliamentary party with special hatred and distrust, of which the chief causes were probably his Spanish proclivities and his indifference on the great matter of religion, to which was added the unpopularity reflected from his mis- guided son. On the 28th of March 1642 he was sent to the Tower for having failed to disclose to parliament the Kentish petition. Liberated in April, he spoke in the Lords on the 20th of May in favour of an accommodation, and again in June in vindication of the king; but finding his efforts ineffectual, and believing all armed rebellion against the king a wicked violation of the most solemn oaths, he joined Charles at York, was present at Edgehill – and accompanied him to Oxford. On the ist of February 1643 he was named with Lord Herbert of Raglan for removal from the court and public office for ever, and in the propositions of November 1644 was one of those excepted from pardon. In January he had endeavoured to instigate a breach of the Inde- pendents with the Scots. Bristol, however, was not in favour of continuing the war, and withdrew to Sherborne, removing in the spring of 1644 to Exeter, and after the surrender of the city retiring abroad on the nth of July by order of the Houses, which rejected his petition to compound for his estate. He took up his residence at Caen, passing the rest of his life in exile and poverty, find occasionally attending the young king. In 1647 he printed at Caen An Apology, defending his suppprt of the royal cause. This was reprinted in 1656 (Thomason Tracts, E. 897, 6). He died at Paris on the 16th of January 1653..

He is described by Clarendon as " a man of grave aspect, of a. presence that drew respect, and of great parts and ability, but passionate and supercilious and too voluminous a discourser in council." His aim was to effect a political union between England and Spain apart from the religious or marriage questions — a policy which would probably have benefited both English and European interests; but it was one understood neither ir_ Spain -nor in England, and proved impracticable. He was a man of high character, who refused to compound with falsehood and injustice, whose misfortune

it was to serve two Stuart sovereigns, and whose firm resistance to the king's tyranny led the way to the great movement which finally destroyed it. Besides his Apology, he was the author of several printed speeches and poems, and translated A Defence of the Catholic Faith by Peter du Moulin (1610). He married Beatrix, daughter of Charles Walcot, and widow of Sir John Dyve, and besides two daughters left two sons, George, who succeeded him as 2nd earl of Bristol, and John, who died unmarried.

Bibliography.— The best account of Bristol will be found in the scattered notices of him in the Hist, of England and of the Civil War, by S. R. Gardiner, who also wrote the short sketch of his career in

the Diet, of Nat. Biog., and who highly eulogizes his character and diplomacy. For lives, see Biographia Britannica (Kippis), v. 199; Wood's Ath. Oxon. (Bliss), iii. 338; D. Lloyd's Memoires (1668), 579; Collins's Peerage (Brydges, 1812), v. 362; Fuller's Worthies (Nichols, 1811), ii. 412; H. Walpole's Royal and Noble Authors (Park, 1806), iii. 49 ; also Clarendon's Hist, of the Rebellion, esp. vi. 388 ; Clarendon State Papers and Cal. of CI. State Papers ; Old Parliamentary History ; Cabala (1691; letters); Camden Soc, Miscellany, vol. vi. (1871); Defence of his Spanish Negotiations, ed. by S. R. Gardiner ; Somers Tracts (1809), ii. 501; Thomason Tracts in Brit. Museum; Hard- wicke State Papers, i. 494. The MSS. at Sherborne Castle, of which a selection was transcribed and deposited in the Public Record Office, were calendared by the Hist. MSS. Commission in Rep. viii. app. i. p. 213 and 10th Rep. app. i. p. 520; there are numerous references to Bristol in various collections calendared in the same publication and in the Cal. of State Papers, Dom. Series; see also Harleian MSS., Brit. Mus. 1580, art. 31-48, and Add. MSS. indexes and calendars. (P. C. Y.)

BRISTOL, a township of Hartford county, Connecticut, U.S.A., in the central part of the state, about 16 m. S.W. of Hartford. It has an area of 27 sq. m., and contains the village of Forestville and the borough of Bristol (incorporated in 1893). Both are situated on the Pequabuck river, and are served by the western branch of the midland division of the New York, New Haven & Hartford railway, and by electric railway to Hartford, New Britain and Terryville. Pop. (1890) 7382; (1900) 9643, in- cluding that of the borough, 6268 (1910) 13,502 (borough, 9527). Among the manufactures of the

borough of Bristol are clocks, woollen goods, iron castings, hardware, brass ware, silverplate and bells. Bristol clocks, first manufactured soon after the War of Independence, have long been widely known. Bristol, originally a part of the township of Farmington, was first settled about 1727, but did not become an independent corporation until the formation, in 1742, of the first church, known after 1744 as the New Cambridge Society. In 1748 a Protestant Episcopal Church was organized, and before and during the War of Independence its members belonged to the Loyalist party; their rector, Rev. James Nichols, was tarred and feathered by the Whigs, and Moses Dunbar, a member of the church, was hanged for treason by the Connecticut authorities. Chippen's Hill (about 3 m. from the centre of the township) was a favourite rendezvous of the local Loyalists; and a cave there, known as "The Tories' Den," is a well-known landmark. In 1785 New Cambridge and West Britain, another ecclesiastical society of Farmington, were incorporated as the township of Bristol, but in 1806 they were divided into the present townships of Bristol and Burlington.

BRISTOL, a city, county of a city, municipal, county and parliamentary borough, and seaport of England, chiefly in Gloucestershire but partly in Somersetshire, 1185 m. W. of London. Pop. (1901) 328,945. The Avon, here forming the boundary between Gloucestershire and Somerset, though entering the estuary of the Severn (Bristol Channel) only 8 m. below the city, is here confined between considerable hills, with a narrow valley-floor on which the nucleus of the city rests. Between Bristol and the Channel the valley becomes a gorge, crossed at a single stride by the famous Clifton Suspension Bridge. Above Bristol the hills again close in at Keynsham, so that the city lies in a basin-like hollow some 4 m. in diameter, and extends up the heights to the north. The Great Western railway, striking into the Avon valley near Bath, serves Bristol from London, connects it with South Wales by the Severn tunnel, and with the southern and south-western counties of England. Local lines of this company encircle the city on the north and the south, serving the outports of Avonmouth and Portishead on the Bristol Channel. A trunk line of the Midland railway connects Bristol with the north of England by way of Gloucester, Worcester, Birmingham and Derby. Both companies use the central station, Temple Meads.

The nucleus of Bristol lies to the north of the river. The business centre is in the district traversed by Broad Street, High Street, Wine Street and Corn Street, which radiate from a centre close to the Floating Harbour. To the south of this centre, connected with it by Bristol Bridge, an island is formed between the Floating Harbour and

the New Course of the Avon,

and here are Temple Meads station, above Victoria Street, two of the finest churches (the Temple and St Mary Redcliffe) the general hospital and other public buildings. Immediately above the bridge the little river Frome joins the Avon. Owing to the nature of the site the streets are irregular; in the inner part of the city they are generally narrow, and sometimes, with their ancient gabled houses, extremely picturesque. The prin- cipal suburbs surround the city to the west, north and east.

*Churches, &*c.— In the centre of Bristol a remarkable collection of architectural antiquities is found, principally ecclesiastical. This the city owes mainly to a few great baronial families, such as the earls of Gloucester and the Berkeleys, in its early history, and to a few great merchants, the Canyngs, Shipwards and Framptons, in its later career. The see of Bristol, founded by Henry VIII. in 1542, was united to that of Gloucester in 1836; but again separated in 1896. The diocese includes parts of Gloucestershire and Wiltshire, and a small but populous portion of Somerset. The cathedral, standing above the so- called Canons' Marsh which borders the Floating cathedral Harbour, is pleasantly situated on the south side of College Green. It has two western towers and a central tower, n,ave, short transepts, choir with aisles, an eastern Lady chapel and other chapels; and on the south, a chapter-house and cloister court. The nave is modern (by Street, 1877), imitating the choir of the 14th century, with its curious skeleton-vaulting in the aisles. Besides the canopied tombs of the Berkeleys with their effigies in chain mail, and similarly fine tombs of the crosiered abbots, there are memorials to Bishop Butler, to " Sterne's Eliza (Elizabeth Draper), and to Lady Hesketh (the friend of Cowper), who are all interred here. There is also here William Mason's fine epitaph to his wife (d. 1767), beginning "Take, holy earth, all that my soul holds dear." Of Fitz-Harding's abbey of St Augustine, founded in 1142 (of which the present cathedral was the church), the stately entrance gateway, with its sculptured mouldings, remains hardly injured. The abbot's gateway, the vestibule to the chapter-house, and the chapter-house itself, which is carved with Byzantine exuberance of decoration, and acknowledged to be one of the finest Norman chambers in Europe, are also perfect. On the north side of College Green is the small but ornate Mayor's chapel (originally St Mark's), devoted to the services of the mayor and corporation. It is mainly Decorated and Perpendicular. Of the churches within the centre of the city, the following are found within a radius of half-a-mile from Bristol Bridge. St Stephen's church, built between 1450 and 1490, is a*

dignified structure, chiefly interesting for its fan-traceried porch and stately tower. It was built entirely by the munificence of John Shipward, a wealthy merchant. The tower and spire of St John's (15th century) stand on one of the gateways of the city. This church is a parallelogram, without east or west windows or aisles, and is built upon a fine groined crypt. St James's church, the burial place of its founder, Robert, earl of Gloucester, dates from 1 130, and fine Norman work remains in the nave. The tower is of the 14th century. St Philip's has an Early English tower, but its external walls and windows are for the most part debased Perpendicular. Robert FitzHamon's Norman tower of St Peter, the oldest church tower in Bristol, still presents its massive square to the eye. This church stands in Castle Street, which commemorates the castle of Robert, earl of Gloucester, the walls of which were 25 ft. thick at the base. Nothing remains of this foundation, but there still exist some walls and vaults of the later stronghold, including a fine Early English cell. Adjacent to the church is St Peter's hospital, a picturesque gabled building of Jacobean and earlier date, with a fine court room. St Mary le Port and St Augustine the Less are churches of the Perpendicular era, and not the richest specimens of their kind. St Nicholas church is modern, on a crypt of the date 1503, and earlier. On the island south of the Floating Harbour are two of the most interesting churches in the city. Temple church, with its leaning tower, 5 ft. off the perpendicular, retains nothing of the Templars' period, but is a fine building of the Decorated and Perpendicular periods. The church of

St Mary Redcliffe, for grandeur of proportion and elaboration of design and finish, is the first ecclesiastical building in Bristol, and takes high rank among the parish churches of England. It was built for the most part in the latter part of the 14th century by William Canyng or Canynges (q.v.), but the sculptured north porch is externally Decorated, and internally Early English. The fine tower is also Decorated, on an Early English base. The spire, Decorated in style, is modem. Among numerous monuments is that of Admiral Penn (d. 17 18), the father of the founder of Pennsylvania. The church exhibits the rare feature of transeptal aisles. Of St Thomas's, in the vicinity, only the' tower (15th century) remains of the old structures. All Hallows church has a modern Italian campanile, but is in the main of the 15th century, with the retention of four Norman piers in the nave; and ii interesting from its connexion with the

ancient gild of calendars, whose office it was " to convert Jews, instruct youths," and keep the archives of the town. Theirs was the first free library in the city, possibly in England. The records of the church contain a singularly picturesque repre- sentation of the ancient customs of the fraternity.

Among conventual remains, besides those already mentioned, there exist of the Dominican priory the Early English refectory and dormitory, the latter comprising a row of fifteen original windows and an oak roof of the same date; and of St Bar- tholomew's hospital there is a double arch, with intervening arcades, also Early English. These, with the small chapel of the Three Kings of Cologne, Holy Trinity Hospital, both Perpendicular, and the remains of the house of the Augustinian canons attached to the cathedral, comprise the whole of the monastic relics.

There are many good specimens of ancient domestic archi- tecture— notably some arches of a grand Norman hall and some Tudor windows of Colston's house, Small Street; and Canyng's house, with good Perpendicular oak roof. Of buildings to which historic interest attaches, there are the Merchant Venturers' almshouses (1699), adjoining their hall. This gild was established in the 16th century. A small house near St Mary Redcliffe was the school where the poet Chatterton received his education. His memorial is in the churchyard of St Mary, and in the church a chest contains the records among which he claimed to have discovered some of the manuscripts which were in reality his own. A house in Wine Street was the birthplace of the poet laureate Robert Southey (1744).

Public Buildings, &c— The public buildings are somewhat overshadowed in interest by the ecclesiastical. The council house, at the " Cross " of the four main thoroughfares, dates from 1827, was enlarged in 1894, and contains the city archives and many portraits, including a Van Dyck and a Kneller. The Guildhall is close by — a modern Gothic building. The exchange (used as a corn-market) is a noteworthy building by the famous architect of Bath, John Wood (1743). Edward Colston, a revered citizen and benefactor of the city (d. 17 21), is com- memorated by name in several buildings and institutions, notably in Colston Hall, which is used for concerts and meetings. A bank close by St Stephen's church claims to have originated in the first savings-bank established in England (181 2). Similarly, the city free library (1613) is considered to be the original of its kind. The Bristol museum and reference library were transferred to the corporation in 1893. Vincent Stuckey Lean (d. 1899) bequeathed to the corporation of Bristol the sum of £50,000

for the further development of the free libraries of the city, and with especial regard to the formation and sustenance of a general reference library of a standard and scientific character. The central library was opened in 1906. An art gallery, presented by Sir William Henry Wills, was opened in 1905.

Among educational establishments, the technical college of the Company of Merchant Venturers (1885) supplies scientific, technical and commercial education. The extensive buildings of this institution were destroyed by fire in 1906. University College (1876) forms the nucleus of the university of Bristol(char^ tered 1909). Clifton College, opened m 1862 and incorporated in 1877, includes a physical science school, with laboratories,

a museum and observatory. 1 Colston's girls' day school (1891) includes domestic economy and calisthenics. Among the many charitable institutions are the general hospital, opened in 1858, and since repeatedly enlarged; royal hospital for sick children and women, Royal Victoria home, and the Queen Victoria jubilee convalescent home.

Of the open spaces jn and near Bristol the most extensive are those bordering the river in the neighbourhood of the gorge, Durdham and Clifton Downs, on the Gloucestershire side (see Clifton). Others are Victoria Park, south of the river, near the Bedminster station, Eastville Park by the Frome, on the north-east of the city beyond Stapleton Road station, St Andrew's Park near Montpelier station to the north, and Brandon Hill, west of the cathedral, an abrupt eminence commanding a fine view over the city, and crowned with a modern tower commemorating the "fourth centenary of the discovery of America by John Cabot, and sons Lewis, Sebastian and Sanctus." Other memorials in the city are the High Cross on College Green (1850), and statues of Queen Victoria (1888), Samuel Morley (1888), Edmund Burke (1894), and Edward Colston (1895), in whose memory are held annual Colston banquets.

Harbour and Trade. — Bristol harbour was formed in 1809 by the conversion of the Avon and a branch of the Frome into " the Float," by the cutting of a new channel for the Avon and the formation of two basins. Altogether the water area, at fixed level, is about 85 acres. Four dry docks open into the floating harbour. In 1884 the Avonmouth and Portishead docks at the river entrance were bought up by the city; and the port extends from Hanham Mills on the Avon to the mouth of the river, and for some distance down the estuary of the Severn. The city docks have a depth of 22 ft., while those at

Avonmouth are accessible to the largest vessels. In 1902 the construction of the extensive Royal Edward dock at Avonmouth wLs put in hand by the corporation, and the dock was opened by King Edward VII. in 1908. It is entered by a lock 875 ft. long and 100 ft. wide, with a depth of water on the sill of 46 ft. at ordinary spring, and 36 ft. at ordinary neap tides. The dock itself has a mean length of n 20 ft. and a breadth of 1000 ft., and there is a branch and passage connecting with the old dock. The water area is about 30 acres, and the dock is so constructed as to be easily capable of extension. Portishead dock, on the Somerset shore, has an area of 12 acres. The port has a large trade with America, the West Indies and elsewhere, the principal imports being grain, fruit, oils, ore, timber, hides, cattle and general merchandise; while the exports include machinery, manu- factured oils, cotton goods, tin and salt. The Elder Dempster, Dominion and other large steamship companies trade at the port. The principal industries are shipbuilding, ropewalks, chocolate factories, sugar refineries, tobacco mills and pipe-making, glass works, potteries, soaperies, shoe factories, leather works and' tanneries, chemical works, saw mills, breweries, copper, lead and shot works, iron works, machine works, stained-paper works, anchors, chain cables, sail-cloth, buttons. A coalfield extending 16 m. south-east to Radstock avails much for Bristol manu- factures.

The parliamentary borough is divided into four divisions, each returning one member. The government of the city is in the hands of a lord mayor, 22 aldermen and 66 councillor The area in 1901 was 11,705 acres; but in 1904 it was increased to 17,004 acres.

History. — Bristol (Brigstow, Bristou, Bristow, Bristole) is one of the best examples of a town that has owed its greatness entirely to trade. It was never a shire town or the site of a great religious house, and it owed little to its position as the head of a feudal lordship, or as a military post. Though it is near both British and Roman camps, there is no evidence of a British or Roman settlement. It was the western limit of the Saxon invasion of Britain, and about the year 1000 a Saxon settlement began to grow up at the junction of the rivers Frome and Avon, the natural advantages of the situation favouring the growth of the township. Bristol owed much to Danish rule, and during, the reign of Canute, when the wool trade with

Ireland began, it became the market for English slaves. In the reign

of Edward the Confessor the town was included in the earldom of Sweyn Godwinsson, and at the date of the Domesday survey it was already a royal borough governed by a reeve appointed by the king as overlord, the king's geld being assessed at no marks. There was a mint at the time of the Conquest, which proves that Bristol must have been already a place of some size, though the fact that the town was a member of the royal manor of Baston shows that its importance was still of recent growth. One-third of the geld was paid to Geoffrey de Coutances, bishop of Exeter, who threw up the earthworks of the castle. He joined in a rebellion against William II., and after his death the king granted the town and castle, as part of the honour of Gloucester, to Robert FitzHamon, whose daughter Mabel, marryihg Earl Robert of Gloucester in 11 19, brought him Bristol as her dowry. Earl Robert still further strengthened the castle, probably with masonry, and involved Bristol in the rebellion against Stephen. From the castle he harried the whole neighbourhood, threatened Bath, and sold his prisoners as slaves to Ireland. A contemporary chronicler deseribes Bristol castle as " seated on a mighty mound, and garrisoned with knights and foot soldiers or rather robbers and raiders," and he calls Bristol the stepmother of England.

The history of the charters granted to Bristol begins about this time. A charter granted by Henry II. in 1 1 7 2 exempted the burgesses of Bristol from certain tolls throughout the kingdom, and confirmed existing liberties. Another charter of the same year granted the city of Dublin to the men of Bristol as a colony with the same liberties as their own town.

As a result probably of the close connexion between Bristol and Ireland the growth of the wool trade was maintained. Many Bristol men settled in Dublin, which for a long time was a Bristol beyond the seas, its charters being almost duplicates of those granted to Bristol. About this time Bristol began to export wool to the Baltic, and had developed a wine trade with the south of France, while soap-making and tanning were flourishing industries. Bristol was still organized manorially rather than municipally. Its chief courts were the "weekly hundred court and the court leet held three times a year, and presided over by the reeve appointed by the earl of Gloucester. By the marriage of Earl John with the heiress of Earl William of Gloucester, Bristol became part of the royal demesne, the rent payable to the king being fixed, and the town shook off the feudal yoke. The charter granted by John in 1100 was an epoch in the history of the borough. It provided that no burgess should be impleaded without the walls, that no non- burgess should sell wine, cloth, wool, leather or corn in Bristol, that all should hold by burgage tenure, that corn need not be

ground at the lord's mill, and that the burgesses should have all their reasonable gilds. At some uncertain date soon after this a commune was established in Bristol on the French model, Robert FitzNichol, the first mayor of Bristol, taking the oath in 1 200. The mayor was chosen, not, like the reeve whom he had displaced, by the overlord, but by the merchants of Bristol who were members of the merchant gild. The first documentary evidence of the existence of the merchant gild appears in 1242. In addition, there were many craft gilds (later at least twenty- six were known to exist), the most important being the gilds of the weavers, tuckers and fullers, and the Gild of the Kalendars of Bristol, which devoted itself to religious, educational and social work. The mayor of Bristol was helped by two assistants, who were called provosts until 1267, and from 1267 to 13 n were known as stewards, and after that date as bailiffs. Before this time many religious houses had been founded. Earl Robert of Gloucester established the Benedictine priory of St James; there wereDominican and Franciscan priories,amonastery of Carmelites, and an abbey of St Augustine founded by Robert FitzHardinge.

In the reign of John, Bristol began the struggle to absorb the neighbouring manor of Bedminster, the eastern half of which was held by the Templars by gift of Earl Robert of Gloucester, and the western half, known as Redcliffe, was sold by the same earl to Robert FitzHardinge, afterwards Lord Berkeley. The

Templars acquiesced without much difficulty, but the wealthy owners of the manor of Redcliffe, who had their own manorial courts, market, fair and quay, resisted the union for nearly one hundred years. In 1247 a new course was cut for the river Frome which vastly improved the harbour, and in the same year a stone bridge was built over the Avon, bringing Temple and Redcliffe into closer touch with the city. The charter granted by Henry III. in 1256 was important. It gave the burgesses the right to choose coroners, and as they already farmed the geld payable to the king, Bristol must have been practically inde- pendent of the king. The growing exclusiveness of the merchant gild led to the great insurrection of 13 12. The oligarchical party was supported by the Berkeleys, but the opposition con- tinued their rebellion until 13 13, when the town was besieged and taken by the royal forces. During the reign of Edward III. cloth manufacture developed in Bristol. Thomas Blanket set up looms in 1337, employing many foreign workmen, and in J 353 Bristol was made one of the Staple towns, the office of mayor of the staple being held by the mayor of the town.

The charter of 1373 extended the boundaries of the town to include

Redcliffe (thus settling the long-standing dispute) and the waters of the Avon and Severn up to the Steep and Flat Holmes; and made Bristol a county in itself, independent of the county courts, with an elected sheriff, and a council of forty to be chosen by the mayor and sheriff. The town was divided into five wards, each represented by an alderman, the aldermen alone being eligible for the mayoralty. This charter (confirmed in 1377 and 1488) was followed by the period of Bristol's greatest prosperity, the era of William Canyng, of the foundation of the Society of Merchant Venturers, and of the voyages of John and Sebastian Cabot. William Canyng (1399-1474) was five times mayor and twice represented Bristol in parliament; he carried on a huge cloth trade with the Baltic and rebuilt St Mary Red- cliffe. At the same time cloth was exported by Bristol merchants to France, Spain and the Levant. The records of the Society of Merchant Venturers began in 1467, and the society increased in influence so rapidly that in 1500 it directed all the foreign trade of the city and had a lease of the port dues. It was in- corporated in 1552, and received other charters in 1638 and 1662. Henry VII. granted Bristol a charter in 1499 (confirmed in 1510) which removed the theoretically popular basis of the corporation by the provision that the aldermen were to be elected by the mayor and council. At the dissolution of the monasteries the diocese of Bristol was founded, which included the counties of Bristol and Dorset. The voyages of discovery in which Bristol had played a conspicuous part led to a further trade development. In the 16th century Bristol traded with Spain, the Canaries and the Spanish colonies in America, shared in . the attempt to colonize Newfoundland, and began the trade in African slaves which flourished during the 17th century. Bristol took a great share in the Civil War and was three times besieged. Charles II. granted a formal charter of incorporation in 1664, the governing body being the mayor, 12 aldermen, 30 common councilmen, 2 sheriffs, 2 coroners, a town clerk, clerk of the peace and 39 minor officials, the governing body itself filling up all vacancies in its number. In the 1 8th century the cloth trade declined owing to the com- petition of Ireland and to the general migration of manufactures to the northern coalfields, but the prosperity of the city was maintained by the introduction of manufactures of iron, brass, tin and copper, and by the flourishing West Indian trade, sugar being taken in exchange for African slaves.

The hot wells became fashionable in the reign of Anne (who granted a charter in 1710), and a little later Bristol was the centre of the Methodist revival of Whitefield and Wesley. The city was small, densely populated and dirty, with dark, narrow streets, and the mob

gained an unenviable notoriety for violence in the riots of 1708, 1753, 1767 and 1831. At the beginning of the 19th century it was obvious that the prosperity of Bristol was diminishing, comparatively if not actually, owing to (1) the rise of Liverpool, which had more natural facilities as a port than Bristol could offer, (2) the abolition of the slave trade,

which ruined the West Indian sugar trade, and (3) the extor- tionate rates levied by the Bristol Dock Company, incorporated in 1803. These rates made competition with Liverpool and London impossible, while other tolls were levied by the Merchant Venturers and the corporation. The decline was checked by the efforts of the Bristol chamber of commerce (founded in 1823) and by the Municipal Reform Act of 1 83 5. The new corporation, consisting of 48 councillors and 16 aldermen who elected the mayor, being themselves chosen by the burgesses of each ward, bought the docks in 1848 and reduced the fees. In 1877-1880 the docks at the mouth of the river at Avonmouth and Portishead were made, and these were bought by the corporation in 1884. A revival of trade, rapid increase of population and enlargement of the boundaries of the city followed. The chief magistrate became a lord mayor in 1899.

See J. Corry, History of Bristol (Bristol, 1816); J. Wallaway, Antiquities (1834) ; J. Evans, Chronological History of Bristol (1824) ; Bristol vol. of Brit. Archaeol. Inst.; J. F. Nicholl and J. Taylor, Bristol Past and Present (Bristol and London, 1882); W. Hunt, Bristol, in " Historic Towns " series (London, 1887) ; J. Latimer, Annals of Bristol (various periods) ; G. E. Weare, Collectanea relating to the Bristol Friars (Bristol, 1893) ; Samuel Seyer, History of Bristol and Bristol Charters (1812); The Little Red Book of Bristol (1900); The Maior's Kalendar (Camden Soc, 1872) ; Victoria County History, Gloucester.

BRISTOL, a borough of Bucks county, Pennsylvania, U.S.A., on the Delaware river, opposite Burlington, New Jersey, 20 m. N.E. of Philadelphia. Pop. (1890) 6553; (1900) 7104 ("34 foreign-born); (1910) 9256. It is served by the Pennsylvania railway. The borough is built on level ground elevated several feet above the river, and in the midst of an attractive farming country. The principal business houses are on Mill Street; while Radcliffe Street extends along the river. Among Bristol's manufacturing establishments are machine

shops, rolling mills, a planing mill, yarn, hosiery and worsted mills, and factories for making carpets, wall paper and patent leather. Bath Springs are located just outside the borough limits; though not so famous as they were early in the 18th century, these springs are still well known for the medicinal properties of their chaly- beate waters. Bristol was one of the first places to be settled in Pennsylvania after William Penn received his charter for the province in 1681, and from its settlement until 1725 it was the seat of government of the county. It was laid out in 1697 and was incorporated as a borough in 1720; the present charter, however, dates only from 1851.

BRISTOL, the shire-township of Bristol county, Rhode Island, U.S.A., about 15 m. S.S.E. of Providence, between Narragansett Bay on the W. and Mount Hope Bay on the E., thus being a neninsula. Pop. (1900) 6901, of whom 1923 were foreign-born; (1905; state census) 7512; (1910) 8565; area 12 sq. m. It is served by the New York, New Haven & Hartford, and the Rhode Island Suburban railways, and is connected with the island of Rhode Island by ferry. Mount Hope (216 ft.), on the eastern side, commands delightful views of landscape, bay and river scenery. Elsewhere in the township the surface is gently undulating and generally well adapted to agriculture, especially to the growing of onions. A small island, Hog Island, is included in the township. The principal village, also known as Bristol, is a port of entry with a capacious and deep harbour, has manu- factories of rubber and woollen goods, and is well known as a yacht-building centre, several defenders of the America's Cup, including the " Columbia " and the " Reliance," having been built in the Herreshoff yards here. At the close of King Philip's War in 1676, Mount Hope Neck (which had been the seat of the vanquished sachem), with most of what is now the township of Bristol, was awarded to Plymouth Colony. In 1680, immediately after Plymouth had conveyed the " Neck " to a company of four, the village was laid out; the following year, in anticipation of future commercial importance, the township and the village were named Bristol, from the town in England. The town- ship became the shire-township in 1685, passed under the juris- diction of Massachusetts in 1692, and in 1747 was annexed to Rhode Island. During the War of Independence the village was bombarded by the British on the 7th of October 1775, but

suffered little damage; on the 25th of May 1778 it was visited and partially destroyed by a British force.

BRISTOL, a city of Sullivan county, Tennessee, and Wash- ington county, Virginia, U.S.A., 130 m. N.E. of Knoxville, Tennessee, at an

altitude of about 1700 ft. Pop. (1880) 3209; (1890) 6226; (1900) 9850 (including 1981 negroes) ; (1910) 13,395, of whom 7 148 were in Tennessee and 6 247 were in Virginia. Bristol is served by the Holston Valley, the Southern, the Virginia & South- Western, and the Norfolk & Western railways, and is a railway centre of some importance. It is near the great mineral deposits of Virginia, Tennessee, West Virginia, Kentucky and North Carolina; an important distributing point for iron, coal and coke; and has tanneries and lumber mills, iron furnaces, tobacco factories, furniture factories and packing houses. It is the seat of Sullins College (Methodist Episcopal, South; 1870) for women, and Of the Virginia Institute for Women (Baptist, 1884), both in the state of Virginia, and of a normal college for negroes, on the Tennessee side of the state line. The Tennessee- Virginia boundary line runs through the principal street, dividing the place into two separate corporations, the Virginia part, which before 1890 (when it was chartered as a city) was known as Goodson, being administratively independent of the county in which it is situated. Bristol was settled about 1835, and the town of Bristol, Tennessee, was first incorporated in 1856.

BRISTOW, BENJAMIN HELM (1832-1896), American lawyer and politician, was born in Elkton, Kentucky, on the 20th of June 1832, the son of Francis Marion Bristow (1804-1864), a Whig member of Congress in 1854-1855 and 1859-1861. He graduated at Jefferson College, Canonsburg, Pennsylvania, in 1851, studied law under his father, and was admitted to the Kentucky bar in 1853. At the beginning of the Civil War he became lieutenant-colonel of the 25th Kentucky Infantry; was severely wounded at Sliiloh; helped to recruit the 8th Kentucky Cavalry, of which he was lieutenant-colonel and later colonel; and assisted at the capture of John H. Morgan in July 1863. In 1863-1865 he was state senator; in 1865-1866 assistant United States district-attorney, and in 1866-1870 district- attorney for the Louisville district; and in 1870-1872, after a few months' practice of law with John M. Harlan, was the (first appointed) solicitor-general of the United States. In 1873 President Grant nominated him attorney-general of the United States in case George H. Williams were confirmed as chief justice of the United States, — a contingency which did not arise. As secretary of the treasury (1874-1876) he prosecuted with vigour the so-called " Whisky Ring," the headquarters of which was at St Louis, and which, beginning in 1870 or 1871, had defrauded the Federal government out of a large part of its rightful revenue from the distillation of whisky. Distillers and revenue officers in St Louis, Milwaukee,

Cincinnati and other cities were implicated, and the illicit gains — which in St Louis alone probably amounted to more than $2,500,000 in the six years 1870-1876 — were divided between the distillers and the revenue officers, who levied assess- ments on distillers ostensibly for a Republican campaign fund to be used in furthering Grant's re-election. Prominent among the ring's alleged accomplices at Washington was Orville E. Babcock, private secretary to President Grant, whose personal friendship for Babcock led him to indiscreet interference in the prosecution. Through Bristow's efforts more than 200 men were indicted, a number of whom were convicted, but after some months' imprisonment were pardoned. Largely owing to friction between himself and the president, Bristow resigned his portfolio in June 1876; as secretary of the treasury he advocated the resumption of specie payments and at least a partial retirement of "greenbacks"; and he was also an advocate of civil service reform. He was a prominent candidate for the Republican presidential nomination in 1876. After 1878 he practised law in New York City, where he died on the 22nd of June 1896.

See Memorial of Benjamin Helm Bristow, largely prepared by David Willcox (Cambridge, Mass., privately printed, 1897) ;Whishey Frauds, 44th Cong., 1st Sess., Mis. Doc. No. 186; Secrets of the Great Whiskey Ring (Chicago, 1880), by John McDonald, who for nearly six years had been supervisor of internal revenue at St Louis, — a book by one concerned and to be considered in that light.

BRISTOW, HENRY WILLIAM (1817-1889), English geologist, son of Major-General H. Bristow, who served in the Peninsular War, was born on the 17th of May 1817. He was educated at King's College, London, under John Phillips, then professor of geology. In 1842 he was appointed assistant geologist on the Geological Survey, and in that service he remained for forty-six years, becoming director for England and Wales in 1872, and retiring in 1888. He was elected F.R.S. in 1862. He died in London on the 14th of June 1889. His publications (see Geol. Mag., 1889, p. 384) include A Glossary of Mineralogy (i86r) and The Geology of the Isle of Wight (1862).

BRITAIN (Gr. HperavumL vqooi, Bperravia; Lat. Britannia, rarely Brittania), the anglicized form of the classical name of England, Wales and Scotland, sometimes extended to the British Isles as a whole (Britannicae Insulae). The Greek and Roman forms are

doubtless attempts to reproduce a Celtic original, the exact form of which is still matter of dispute. Brittany (Fr. Bretagne) in western France derived its name from Britain owing to migrations in the 5th and 6th century a.d. The personi- fication of Britannia as a female figure may be traced back as far as the coins of Hadrian and Antoninus Pius (early 2nd century a.d.); its first appearance on modern coins is on the copper of Charles II. (see Numismatics).

In what follows, the archaeological interest of early Britain is dealt with, in connexion with the history of Britain in Pre- Roman, Roman, and Anglo-Saxon days; this account being supplementary to the articles England; English History; Scotland, &c.

Pre-Roman Britain

Geologists are not yet agreed when and by whom Britain was first peopled. Probably the island was invaded by a succession of races. The first, the Paleolithic men, may have died out or retired before successors arrived. During the Neolithic and Bronze Ages we can dimly trace further immigrations. Real knowledge begins with two Celtic invasions, that of the Goidels in the later part of the Bronze Age, and that of the Brythons and Belgae in the Iron Age. These invaders brought Celtic civiliza- tion and dialects. It is uncertain how far they were themselves Celtic in blood and how far they were numerous enough to absorb or obliterate the races which they found in Britain. But it is not unreasonable to think that they were no mere conquering caste, and that they were of the same race as the Celtic-speaking peoples of the western continent. By the age of Julius Caesar all the inhabitants of Britain, except perhaps some tribes of the far north, were Celts in speech and customs. Politically they were divided into separate and generally warring tribes, each under its own princes. They dwelt in hill forts with walls of earth or rude stone, or in villages of round huts sunk into the ground and resembling those found in parts of northern Gaul, or in sub-terranean chambered houses, or in hamlets of pile-dwellings con-structed among the marshes. But, at least in the south, market centres had sprung up, town life was beginning, houses of a better type were perhaps coming into use, and the southern tribes employed a gold coinage and also a currency of iron bars or ingots, attested by Caesar and by surviving examples, which weigh roughly, some two-thirds of a pound, some 2§ lb, but mostly 1 J lb. In religion, the chief feature was the priesthood of Druids, who here, as in Gaul, practised magical arts and barbarous rites of human sacrifice, taught a secret lore, wielded great influence, but, at least as Druids, took ordinarily no part in politics. In art, these tribes possessed a native Late Celtic

fashion, descended from far-off Mediterranean antecedents and more directly connected with the La-Tene culture of the continental Celts. Its characteristics were a flamboyant and fantastic treatment of plant and animal (though not of human) forms, a free use of the geometrical device called the " returning spiral," and much skill in enamelling. Its finest products were in bronze, but the artistic impulse spread to humbler work in wood and pottery. The late Celtic age was one which genuinely delighted in beauty of form and detail. In this it resembled the middle ages rather than the Roman empire or the present day, and it resembled

them all the more in that its love of beauty, like theirs, was mixed with a feeling for the fantastic and the grotesque. The Roman conquest of northern Gaul ($7-50 B.C.) brought Britain into definite relation with the Mediterranean. It was already closely connected with Gaul, and when Roman civilization and its products invaded Gallia Belgica, they passed on easily to Britain. The British coinage now begins to bear Roman legends, and after Caesar's two raids (55, 54 b.c.) the southern tribes were regarded at Rome, though they do not seem to have regarded themselves, as vassals. Actual conquest was, however, delayed. Augustus planned it. But both he and his successor Tiberius realized that the greater need was to consolidate the existing empire, and absorb the vast additions recently made to it by Pompey, Caesar and Augustus.

Roman Britain

I. The Roman Conquest. — The conquest of Britain was under- taken by Claudius in a.d. 43. Two causes coincided to produce the step. On the one hand a forward policy then ruled at Rome, leading to annexations in various lands. On the other hand, a probably philo-Roman prince, Cunobelin (known to literature as Cymbeline), had just been succeeded by two sons, Caractacus (q.v.) and Togodumnus, who were hostile to Rome. Caligula, the half-insane predecessor of Claudius, had made in respect to this event some blunder which we know only through a sensational exaggeration, but which doubtless had to be made good. An immediate reason . for action was the appeal of a fugitive British prince, presumably a Roman partisan and victim of Cunobelin's sons. So Aulus Plautius with a singularly well equipped army of some 40,000 men landed in Kent and advanced on London. Here Claudius himself appeared — the one reigning emperor of the 1st century who crossed the waves of ocean, — and the army, crossing the Thames, moved forward through Essex and captured the native capital, Camulodunum, now Colchester. From the base of London and Colchester three corps continued the conquest. The left

wing, the Second Legion (under Vespasian, afterwards emperor), subdued the south; the centre, the Four- teenth and Twentieth Legions, subdued the midlands, while the right wing, the Ninth Legion, advanced through the eastern part of the island. This strategy was at fifst triumphant. The lowlands of Britain, with their partly Romanized and partly scanty population and their easy physical features, presented no obstacle. Within three or four years everything south of the Humber and east of the Severn had been either directly annexed or entrusted, as protectorates, to native client-princes.

A more difficult task remained. The wild hills and wilder tribes of Wales and Yorkshire offered far fiercer resistance. There followed thirty years of intermittent hill fighting (a.d. 47-79). The precise steps of the conquest are not known. Legionary fortresses were established at Wroxeter (for a time only), Chester and Caerleon, facing the Welsh hills, and at Lincoln in the north- east. Monmouthshire, and Flintshire with its lead mines, were early overrun; in 60 Suetonius Paulinus reached Anglesea. The method of conquest was the establishment of small detached forts in strategic positions, each garrisoned by 500 or 1000 men, and it was accompanied by a full share of those disasters which vigorous barbarians always inflict on civilized invaders. Pro- gress was delayed too by the great revolt of Boadicea (q.v.) and a large part of the nominally conquered Lowlands. Her rising was soon crushed, but the government was obviously afraid for a while to move its garrisons forward. Indeed, other needs of the empire caused the withdrawal of the Fourteenth Legion about 67. But the decade a.d. 70-80 was decisive. A series of three able generals commanded an army restored to its proper strength by the addition of Legio II. Adiutrix, and achieved the final subjugation of Wales and the first conquest of Yorkshire, where a legionary fortress at York was substituted for that at Lincoln.

The third and best-known, if not the ablest, of these generals, Julius Agricola, moved on in a.d. 80 to the conquest of the farther north. He established between the Clyde and Forth a frontier meant to be permanent, guarded by a line of forts,

two of which are still traceable at Camelon near Falkirk, and at Bar Hill. He then advanced into Caledonia and won a ” famous victory ”

at Mons Graupius (sometimes, but incorrectly, spelt Grampius), probably near the confluence of the Tay and the Isla, where a Roman encampment of his date, Inchtuthill, has been partly examined (see Galgacus). He dreamt even of invading Ireland, and thought it an easy task. The home government judged otherwise. Jealous possibly of a too brilliant general, certainly averse from costly and fruitless campaigns and needing the Legio II. Adiutrix for work elsewhere, it recalled both governor and legion, and gave up the more northerly of his nominal conquests. The most solid result of his campaigns is that his battlefield, misspelt Grampius, has provided to anti- quaries, and through them to the world, the modern name of the Grampian Hills.

What frontier was adopted after Agricola's departure, whether Tweed or Cheviot or other, is unknown. For thirty years (a.d. 85-115) the military history of Britain is a blank. When we recover knowledge we are in an altered world. About 1 1 5 or 1 20 the northern Britons rose in revolt and destroyed the Ninth Legion, posted at York, which would bear the brunt of any northern trouble. In 122 the second reigning emperor who crossed the ocean, Hadrian, came himself to Britain, brought the Sixth Legion to replace the Ninth, and introduced the frontier policy of his age. For over 70 m. from Tyne to Solway, more exactly from Wallsend to Bowness, he built a continuous rampart, more probably of turf than of stone, with a ditch in front of it, a number of small forts along it, one or two outposts a few miles to the north of it, and some detached forts (the best-known is on the hill above Maryport) guarding the Cumberland coast beyond its western end. The details of his work are imperfectly known, for though many remains survive, it is hard to separate those of Hadrian's date from others that are later. But that Hadrian built a wall here is proved alike by literature and by inscriptions. The meaning of the scheme is equally Certain. It was to be, as it were, a Chinese wall, marking the definite limit of the Roman world. It was now declared, not by the secret resolutions of cabinets, but by the work of the spade marking the solid earth for ever, that the era of conquest was ended.

But empires move, though rulers bid them stand still. Whether the land beyond Hadrian's wall became temptingly peaceful or remained in vexing disorder, our authorities do not say. We know only that about 142 Hadrian's successor, Antoninus Pius, acting through his general Lollius Urbicus, advanced from the Tyne and Solway frontier to the narrower isthmus between Forth and Clyde, 36 m. across, which Agricola had fortified before him. Here he reared a continuous rampart with a ditch in front of it, fair-sized forts, probably a dozen in number, built either close behind it or actually abutting on it, and

a connecting road running from end to end. An ancient writer states that the rampart was built of regularly laid sods (the same method which had probably been employed by Hadrian), and excavations in 1 891- 1893 have verified the statement. The work still survives visibly, though in varying preservation, except in the agricultural districts near its two ends. Occasionally, as on Croyhill (near Kilsyth), at Wester- wood, and in the covers of Bonnyside (3 m. west of Falkirk), wall and ditch and even road can be distinctly traced, and the sites of many of the forts are plain to practised eyes. Three of these forts have been excavated. All three show the ordinary features of Roman castella, though they differ more than one would expect in forts built at one time by one general. Bar Hill, the most completely explored, covers three acres — nearly five times as much as the earlier fort of Agricola on the same site. It had ramparts of turf, barrack-rooms of wood, and a head- quarters building, storehouse and bath in stone: it stands a few yards back from the wall. Castle Cary covers nearly four acres: its ramparts contain massive and well-dressed masonry- its interior buildings, though they agree in material, do not altogether agree in plan with those of Bar Hill, and its north face falls in line with the frontier wall. Rough Castle, near Falkirk, is very much smaller; it is remarkable for the astonishing

strength of its turf built and earthen rampaftsi and raveliriBj'fcnd for a remarkable series of defensive pits, reminiscent of Caesar's lilia at Alesia, plainly intended to break an enemy's charge, and either provided with stakes to impale the assailant or covered over with hurdles or the like to deceive him. Besides the dozen forts on the wall, one or two outposts may have been held at Ardoch and Abernethy along the natural route which runs by Stirling and Perth to the lowlands of the east coast. This frontier was reached from the south by two roads. One, known in medieval times as Dere Street and misnamed Watling Street by modern antiquaries, ran from Corbridge on the Tyne past Otter burn, crossed Cheviot near Makendon Camps, and passed by'an important fort at Newstead near Melrose, and another at Inveresk (outside of Edinburgh) , to the eastern end of the wall. The other, starting from Carlisle, ran to Birrens, a Roman fort near Eccle fechan, and thence, by a line not yet explored and indeed not at all certain, to Carstairs and the west end of the wall. This wall was in addition to, and not instead of , the wall of Hadrian. Both barriers were held together, and the district between them was regarded as a military area, outside the range of civilization. '*

The work of Pius brought no long peace. Sixteen years liater disorder

broke, out in north Britain, apparently in the district between the Cheviots and the Derbyshire hills, and was repressed with difficulty after four or five years' fighting. Eighteen or twenty years later (180-185) a new war broke out with' a dif- ferent issue. The Romans lost everything beyond Cheviot, and perhaps even more. The government of Commodus, feeble in itself and vexed by many troubles, could not repair the loss, and the civil wars which soon raged in Europe (193-197) gave the Caledonians further chance. It was not till 208 that Septimius Severus, the ablest emperor of his age, could turn his attention to the island. He came thither in person, invaded Caledonia, commenced the reconstruction of the wall of Hadrian, rebuilding it from end to end in stone, and then in the fourth year of his operations died at York. Amid much that is un- certain and even legendary about his work in Britain, this is plain, that he fixed on the line of Hadrian's wall as his substan- tive 'frontier. His successors, Caracalla and Severus Alexander (211-235), accepted the position, and many inscriptions refer to building or rebuilding executed by them for the greater efficiency of the frontier defences. The conquest of Britain was at last over. The wall of Hadrian remained for nearly two hundred years more the northern limit of Roman power in the extreme west.

II. The Province of Britain and its Military System.— Geo- graphically, Britain consists of two parts: (1) the comparatively flat lowlands of the south, east and midlands, suitable to agricul- ture and open to easy intercourse with the continent, i.e. with the rest of the Roman empire; (2) the district consisting of the hills of Devon and Cornwall, of Wales and of northern England, regions lying more, and often very much more, than 600 ft. above the sea, scarred with gorges and deep valleys, mountainous in character, difficult for armies to traverse, ill fitted to the peaceful pursuits in agriculture. These two parts of the province differ also in their history. The lowlands, as we have seen, were con- quered easily and quickly. The uplands were hardly subdued completely till the end of the 2nd century. They differ, thirdly, in the character of their Roman occupation. 1 The lowlands were the scene of civil life. Towns, villages and country houses were their prominent features; troops were hardly seen in them save in some fortresses on the edge of the hills and in a chain of forts built in the 4th century to defend the south-east coast, the so-called Saxon Shore. The uplands of Wales and the north presented another spectacle. Here civil life was almost wholly absent. No country town or country house has been found more than 20 m. north of York or west of Monmouthshire. The hills were one extensive military frontier, covered with forts and strategic

roads connecting them, and devoid of town life, country houses, farms or peaceful civilized industry. This geographical division was not reproduced by Rome in any administrative partitions of the province. At first the whole was governed by one legatus Augusti of consular standing.

ROMAN BRITAIN

Scale, 1:3,000,000

J3 Longitude West 2 of Greenwich

EmtryWalker jc

BRITAIN

585

Septimius Severus made it two provinces, Superior and Inferior, with a boundary which probably ran from Humber to Mersey, but we do not know how long this arrangement lasted. In the 5th century there were five provinces, Britannia Prima and Secunda, Flavia and Maxima Caesariensis and (for a while) Valentia, ruled by praesides and consulares under a vicarius, but the only thing known of them is that Britannia Prima included Cirencester. •

The army which guarded or coerced the—pro vin.ce Con- sisted, from the time of Hadrian onwards, of (1) three legions, the Second at Isca Silurum (Caerleon-on-Usk, q.v.), the Ninth at Eburacum {q.v.; now York), the Twentieth at Deva (q.v.; now Chester), a total of some 15,000 heavy infantry; and (2) a large but uncertain number of auxiliaries, troops of the second grade, organized in infantry cohorts or cavalry aloe, each 500 or 1000 strong, and posted in castella nearer the frontiers than the legions. The legionary fortresses were large rectangular

GREAT WALL

others; principally (it seems) forts built before 150, wood is used freely and only the few principal buildings seem to have been constructed throughout of stone.

We may illustrate their character from Ho«£ifcteads, which, in the form in which we know it, perhaps dates from Septimius Severus; This fort measures about 360 by 600 ft. and covers a trifle less than 5 acres. . Its ramparts are of stone, and its north rampart coincides

with the great wall of Hadrian. Its interior is filled with stone buildings. Chief among these (see fig. 1), and in the centre of the whole fort, is the Headquarters, in Lat. Principia or, as it is often (though perhaps less correctly) styled by moderns, Praetorium. This is a rectangular structure with only one entrance which gives access, first, to a small cloistered court (x. 4), then to a second open court (x. 7), and finally to a row of five rooms (x. 8-12) containing the shrine for official worship, the treasury and other offices. Close by were officers' quarters, generally built round a tiny cloistered court £ix., xi., xii.),

NORTH GATE f

ffTTTCTHn

WEST GATE

IV.

b r

i:::::n::"

H JJUI I Hff J

SCALE It FEET 20 40 60 .80 100 ISO*

BORCOVICIUM (homesteads)

Fig. i . — Plan of Housesteads (BorcGvicium) on Hadrian's Wall.

enclosures of 50 or 60 acres, surrounded by strong walls of which traces can still be seen in the lower courses of the north and east town- walls of Chester, in the abbey gardens at York, and on; the south side of Caerleon. The auxiliary castella were hardly a tenth of the size, varying generally from three to six acres according to the size of the regiment and the need for stabling. Of these upwards of 70 are known in England and some 20 more in Scotland. Of the English examples a few have been carefully excavated, notably Gellygaer between Cardiff and Brecon, one of the most perfect specimens to be found anywhere in the Roman empire of a Roman fort dating from the end of the 1st century a.d.; Hardknott, on a Cumberland moor over- hanging Upper Eskdale; and Housesteads on Hadrian's wall. In Scotland excavation has been more active, in particular at the forts of Birrens, Newstead near Melrose, Lyne near Peebles, Ardoch between Stirling and Perth, and Castle Cary, Rough

Castle and Bar Hill on the wall of Pius. The internal arrangements of all these forts follow one general plan. But in some, of them the internal buildings are all of stone, while in

and substantially built storehouses with buttresses and dry base- ments (viii.). These filled the middle third of the fort. At the two ends were barracks for the soldiers (i.-vi., xiii.-xviii.). No space was allotted to private religion or domestic life. The shrines which voluntary worshippers might visit, the public bath-house, and the cottages of the soldiers' wives, camp followers, &c, lay outside the walls. Such were nearly all the Roman forts in Britain. They differ somewhat from Roman forts in Germany or other provinces, though most of the differ- ences arise from the different usage of wood and of stone in various places.

Forts of this kind were dotted all along the military roads of the Welsh and northern hill-districts. In Wales a road ran from Chester past a fort at Caer-hyn (near Conway) to a fort at Carnarvon (Segontium). A similar road ran along the south coast from Caerleon-on-Usk past a fort at Cardiff and perhaps others, to Carmarthen. A third, roughly parallel to the shore of Cardigan Bay, with forts at Llanio and Tommen-y-mur (near Festiniog), connected the northern and southern roads, while

the interior was held by a system of roads and forts not yet well understood but discernible at such points as Caer-gai on Bala Lake, Castle Collen near Llandrindod Wells, the Gaer near Brecon, Mertbyx and Gellygaer. In the north of Britain we find three principal roads. One led due north from York past forts at Catterick Bridge, Piers Bridge, Binchester, Lanchester, Ebchester to the wall and to Scotland, while branches through Chester-le-Street reached the Tyne Bridge (Pons Aelius) at Newcastle and the Tyne mouth at South Shields. Asecondroad, turning north-west from Catterick Bridge, mounted the Pennine Chain by way of forts at Rokeby, Bowes and Brough-under- Stainmoor, descended into the Eden valley, reached Hadrian's wall near Carlisle (Luguvallium) , and passed on to Birrens. The third route, starting from Chester and passing up the western coast, is more complex, and exists in duplicate, the result perhaps of two different schemes of road-making. Forts in plenty can be detected along it, notably Manchester (Mancunium or Mamucium), Ribchester (Bremetennacum), Brougham Castle

(Brocavum), Old Penrith (Voreda), and on a western branch, Watercrook near Kendal, Waterhead near the hotel of that name on Ambleside, Hardknott above Eskdale, Maryport (Uxello- dunum), and Old Carlisle (possibly Petriana). In addition, two or three cross roads, not yet sufficiently explored, maintained communication between the troops in Yorkshire and those in Cheshire and Lancashire. This road system bears plain marks of having been made at different times, and with different objec- tives, but we have no evidence that any one part was abandoned when any other was built. There are signs, however, that various forts were dismantled as the country grew quieter. Thus, Gellygaer in South Wales and Hardknott in Cumberland have yielded nothing later than the opening of the 2nd century.

Besides these detached forts and their connecting roads, the north of Britain was defended by Hadrian's wall (figs. 2 and 3). The history of this wall has been given above. The actual works are threefold. First, there is that which to-day forms the most striking feature in the whole, the wall of stone 6-8 ft. thick, and originally perhaps 14 ft. high, with a deep ditch in front, and forts and " mile castles " and turrets and a connecting road behind it. On the high moors between Chollerford andGilsland its traces are still plain, as it climbs from hill to hill and winds along perilous precipices. Secondly, there is the so-called " Vallum," in reality no vallum at all, but a broad flat-bottomed ditch out of which the earth has been cast up on either side into

turf and Severus reconstructed it in stone. The reconstruction probably followed in general the line of Hadrian's wall in order to utilize the existing ditch, and this explains why the turf wall itself survives only at special points. In general it was destroyed to make way for the new wall in stone. Occasionally (as at Birdoswald) there was a deviation, and the older work survived.

SOUTH

Fig. 3. — Section of Hadrian's Wall.

From Social England, by permission of Casselt & Co., Ltd.

Fig. 2. — Hadrian's Wall.

regular and continuous mounds that resemble ramparts. Thirdly, nowhere very clear on the surface and as yet detected only at a few points, there are the remains of the " turf wall," constructed of sods

laid in regular courses, with a ditch in front. This turf wall is certainly older than the stone wall, and, as our ancient writers mention two wall-builders, Hadrian and Septimius Severus, the natural inference is that Hadrian built his wall of

This conversion of earthwork into stone in the age of Severus can be paralleled from other parts of the Roman empire.

The meaning of the vallum is much more doubtful. John Hodgson and Bruce, the local authorities of the 19th century, supposed that it was erected to defend the wall from southern insurgents. Others have ascribed it to Agricola, or have thought it to be the wall of Hadrian, or even assigned it to pre-Roman natives. The two facts that are clear about it are, that it is a Roman work, no older than Hadrian (if so old), and that it was not intended, like the wall, for military defence. Probably it is contemporaneous with either the turf wall or the stone wall, and marked some limit of the civil province of Britain. Beyond this we cannot at present go.

III. The Civilization of Roman Britain. — Behind these formidable garrisons, sheltered from barbarians and in easy con- tact with the Roman empire, stretched the lowlands of southern and eastern Britain. Here a civilized life grew up, and Roman culture spread. This part of Britain became Romanized. In the lands looking on to the Thames estuary (Kent, Essex, Middle- sex) the process had perhaps begun before the Roman conquest. It was continued after that event, and in two ways. To some extent it was definitely encouraged by the Roman government, which here, as elsewhere, founded towns peopled with Roman citizens — generally discharged legionaries — and endowed them with franchise and constitution like those of the Italian munici- palities. It developed still more by its own automatic growth. The coherent civilization of the Romans was accepted by the Britons, as it was by the Gauls, with something like enthusiasm. Encouraged perhaps by sympathetic Romans, spurred on still more by their own instincts, and led no doubt by their nobles, they began to speak Latin, to use the material resources of Roman civilized life, and in time to consider themselves not the unwilling subjects of a foreign empire, but the British members of the Roman state. The steps by which these results were reached can to some extent be dated. Within a few years of the Claudian invasion a colonia, or muni- cipality of time-expired soldiers, had been planted in the old native capital of Colchester (Camulodunum), and though it served at first mainly as a fortress and thus provoked British hatred, it came soon to exercise a civilizing in- fluence. At the same time the British town of Verulamium (St Albans) was thought sufficiently

Romanized to deserve the municipal status of a municipium, which at this period differed little from that of a colonia. Romanized Britons must now have begun to be numerous. In the great revolt of Boadicea (60) the nationalist party seem to have mas- sacred many thousands of them along with actual Romans. Fifteen or twenty years later, the movement increases. Towns spring up, such as Silchester, laid out in Roman fashion, furnished with public buildings of Roman type, and filled with houses which are Roman in fittings if not in plan. The baths of Bath (Aquae Sulis) are exploited. Another colonia is planted at Lincoln (Lindum), and a third at Gloucester (Glevum) in 96. A new " chief judge " is appointed for increasing civil business. The tax-gatherer and recruit- ing officer begin to make their way into the hills. During the 2nd century progress was perhaps slower, hindered doubt- less by the repeated risings in the north. It was not till the 3rd century that country houses and farms became common in most parts of the civilized area. In the beginning of the

4th century the skilled artisans and builders, and the cloth and corn of Britain were equally famous on the continent. This probably was the age when the prosperity and Romanization of the province reached its height. By this time the town popula- tions and the educated among the country-folk spoke Latin, and Britain regarded itself as a Roman land, inhabited by Romans and distinct from outer barbarians.

The civilization which had thus spread over half the island was genuinely Roman, identical in kind with that of the other western provinces of the empire, and in particular with that of northern Gaul. But it was defective in quantity. The elements which compose it are marked by smaller size, less wealth and less splendour than the same elements elsewhere. It was also uneven in its distribution. Large tracts, in particular Warwickshire and the adjoining midlands, were very thinly inhabited. Even densely peopled areas like north Kent, the Sussex coast, west Gloucestershire and east Somerset, immediately adjoin areas like the Weald of Kent and Sussex where Romano-British remains hardly occur.

The administration of the civilized part of the province, while subject to the governor of all Britain, was practically entrusted to local authorities. Each Roman municipality ruled itself . and a territory perhaps as large as a small county which belonged to it. Some

districts belonged to the Imperial Domains, and were administered by agents of the emperor. The rest, by far the larger part of the country, was divided up among the old native tribes or cantons, some ten or twelve in number, each grouped round some country town where its council (ordo) met for cantonal business. This cantonal system closely resembles that which we find in Gaul. It is an old native element recast in Roman form, and well illustrates the Roman principle of local government west by devolution.

In the general framework of Romano-British life the two chief features were the town, and the villa. The towns of the province, as we have already implied, fall into two classes. Five modern cities, Colchester, Lincoln, York, Gloucester CATe and St Albans, stand on the sites, and in some fragmentary fashion bear the names of five Roman municipalities, founded by the Roman government with special charters and constitutions. All of these reached a considerable measure of prosperity. None of them rivals the greater municipalities of other provinces. Besides them we trace a larger number of country towns, varying much in size, but all possessing in some degree the characteristics of a town. The chief of these seem to be cantonal capitals, probably developed out of the market centres or capitals of the Celtic tribes before the Roman conquest. Such are Isurium Brigantum, capital of the Brigantes, 12 m. north-west of York and the most northerly Romano-British town; Ratae, now Leicester, capital of the Coritani; Viroconium, now Wroxeter, near Shrewsbury, capital of the Cornovii; Venta Silurum, now Caerwent, near Chepstow; Corinium, now Cirencester, capital of the Dobuni; Isca Dumnoniorum, now Exeter, the most westerly of these towns; Durnovaria, now Dor- chester, in Dorset, capital of the Durotriges; Venta Belgarum, now Winchester; Calleva Atrebatum, now Silchester, 10 m. south of Reading; Durovernum Cantiacorum, now Canter- bury; and Venta Icenorum, now Caistor-by-Norwich. Besides these country towns, Londinium (London) was a rich and important trading town, centre of the road system, and the seat of the finance officials of the province, as the re- markable objects discovered in it abundantly prove, while Aquae Sulis (Bath) was a spa provided with splendid baths, and a richly adorned temple of the native patron deity, Sul or Sulis, whom the Romans called Minerva. Many smaller places, too, for example, Magna or Kenchester near Hereford, Durobrivae or Rochester in Kent, another Durobrivae near Peterborough, a site of uncertain name near Cambridge, another of uncertain name near Chesterford, exhibited some measure of town life.

As a specimen we may take Silchester, remarkable as the one town in

the whole Roman empire which has been completely

and systematically uncovered. As we see it to-day, it is an open space of 100 acres, set on a hill with a wide prospect east and south and west, in shape an irregular hexagon, silchester enclosed in a circuit of a mile and a half by the massive ruins of a city wall which still stands here and there some 20 ft. high (fig. 4). Outside, on the north-east, is the grassy hollow of a tiny amphitheatre; on the west a line of earthworks runs in wider circuit than the walls. The area within the walls is a vast expanse of cultivated land, unbroken by any vestige of antiquity; yet the soil is thick with tile and potsherd, and in hot summers the unevenly growing corn reveals the remains of streets beneath the surface. Casual excavations were made here in 1744 and 1833 ; more systematic ones intermittently between 1864 and 1884 by the Rev. J. G. Joyce and others; finally, in May 189c, the complete uncovering of the whole site was begun by Mr G. E. Fox and others. The work was carried on with splendid perseverance, and the uncovering of the interior was completed in 1908.

The chief results concern the buildings. Though these have vanished wholly from the surface, the foundations and lowest courses of their walls survive fairly perfect below ground : thus the plan of

Fig. 4. — General Plan of Silchester (Calleva Atrebatum).

the town can be minutely recovered, and both the character of thfc buildings which make up a place like Calleva, and the character of Roma no- British buildings generally, become plainer. Of the buildings the chief are : —

1. Forum. — Near the middle of the town was a rectangular block covering two acres. It comprised a central open court, 132 ft. by 140 ft. in size, surrounded on three sides by a corridor or cloister, with rooms opening on the cloister (fig. 5). On the fourth side was a great hall, with rooms opening into it from behind. This hall was 270 ft. long and 58 ft. wide; two rows of Corinthian columns ran down the middle, and the clerestory roof may have stood 50 ft. above the floor; the walls were frescoed or lined with marble, and for ornament there were probably statues. Finally, a corridor ran round outside the whole block. Here the local authorities had their offices, justice was administered, traders trafficked, citizens and idlers gathered. Though we cannot apportion the rooms to their precise uses, the great hall was plainly the basilica, for meetings and business ; the rooms behind it were perhaps law courts, and some of the rooms on the other three sides of the quadrangle may have been shops. Similar

municipal buildings existed in most towns of the western Empire, whether they were full municipalities or (as probably Calleva was) of lower rank. The Callevan Forum seems in general simpler than others, but its basilica is remarkably large. Probably the British climate compelled more indoor life than the sunnier south.

*2. Temples. — Two small square temples, of a common western-provincial type, were in the east of the town; the cella of the larger measured 42 ft. sq., and was lined with Purbeck marble. A third, circular temple stood between the forum and the south gate. A fourth, a smaller square shrine found in too? a Uttle past «>f *J>»*

forum, yielded some interesting inscriptions, which relate to a gild (collegium) and incidentally confirm the name Calleya.

3. Christian Church. — Close outside the south-east angle of the forum was a small edifice, 42 ft. by 27 ft., consisting of a nave and two aisles which ended at the east in a porch as wide as the building, and at the west in an apse and two flanking chambers. The nave and porch were floored with plain red tesserae: in the apse was a simple mosaic panel in red, black and white. Round the building

30 100 ˆ ‘ 7.00 300

t , ,_> — 1 1 — 1

Fig. 5.— Plan of Forum, Basilica and surroundings, Silchester.

was a yard, fenced with wooden palings; in it were a well itear the apse, and a small structure of tile with a pit near the east end. No direct proof of date or use was discovered. But the ground plan is that of an early Christian church of the ” basilican ” type. This type comprised nave and aisles, ending at one end in an apse and two chambers resembling rudimentary transepts, and at the other end in a porch (narthex). Previous to about a.d. 420 the porch was often at the east end and the apse at the west, and the altar, often movable, stood in the apse — as at Silchester, perhaps, on the mosaic panel. A court enclosed the whole ; near the porch was a laver for the ablutions of intending worshippers. Many such churches have been found in other countries, especially in Roman Africa; no other satisfactory

instance is known in Britain.

4. Town Baths. — A suite of public baths stood a little east of the forum. At the entrance were a peristyle court for loungers and a latrine: hence the bather passed into the Apodyterium (dressing-room), the Frigidarium (cold room) fitted with a cold bath for use at the end of the bathing ceremony, and a series of hot rooms — the whole resembling manyjmodern Turkish baths. In their first form the baths of Silchester were about 160 ft. by 80 ft., but they were later considerably extended.

5. Private Houses. — The private houses of Silchester are of two types. They consist either of a row of rooms, with a corridor along them, and perhaps one or two additional rooms at one or both ends, or of three such corridors and rows of rooms, forming three sides of a large square open yard. They are detached houses, standing each in its own garden, and not forming terraces or rows. The country houses of Roman Britain have long been recognized as embodying these (or allied) types ; now it becomes plain that they were the normal types throughout Britain. They differ widely from the town houses of Rome and Pompeii : they are less unlike some of the country houses of Italy and Roman Africa ; but their real . parallels occur in Gaul, and they may be Celtic types modified to Roman use — like Indian bungalows. Their internal fittings— hypocausts, frescoes, mosaics — are everywhere Roman; those at Silchester are average specimens, and, except for one mosaic, not individually striking. The largest Silchester house, with a special annexe for baths, is usually taken to be a guest-house or inn for travellers between London and the west (fig. 6). Altogether, the town probably did not contain more than seventy or eighty houses of any size, and large spaces were not built over at all. This fact and the peculiar character of the houses must have given to Silchester rather the appearance of a village with scattered cottages, each in its own plot facing its own way, than a town with regular and continuous streets. ‘,■...

6. Industries. ˆ-Shops are conjectured in the forum and elsewhere,

but were not numerous. Many dyers’ furnaces, a little silver refinery, and perhaps a bakery have also been noticed.

7. Streets, Roads, 6”c— The streets were paved with gravel: they varied in width up to 28J ft. They intersect regularly at right angles, dividing the town into square blocks, like modern Mannheim or Turin, according to a Roman system usual in both Italy and the

provinces: plainly they were laid out all at once, possibly by Agricola (TaC. Agr. 21) and most probably about his time. There were four chief gates, not quite symmetrically placed. The town- walls are built of flint and concrete bonded with ironstone, and are backed with earth. In the plans, though not in the reports, of the excavations, they are shown as built later than the streets. No traces of meat-market, theatre or aqueduct have come to light; water Was got from wells lined with wooden tubs, and must have been scanty in dry summers. Smaller objects abound — coins, pottery, window and bottle and cup glass, bronze ornaments, iron tools, &c. — and many belong to the beginnings of Calleva, but few pieces are individually notable. Traces of late Celtic art are singu- larly absent; Roman fashions rule supreme, and inscriptions show that even the lower classes here spoke and wrote Latin. Outside the walls were the cemeteries, not yet explored. Of suburbs we have as yet no- hint. Nor indeed is the neighbourhood of Calleva at all rich in Roman remains. In fact, as well as in Celtic etymology, it was " the town in the forest." A similar absence of remains may be noticed outside other Romano-British towns, and is significant of their economic position. Such doubtless were most of the towns of Roman Britain — thoroughly Romanized, peopled with Roman- speaking citizens, furnished with Roman appurtenances, living in Roman ways, but not very large, not very rich, a humble witness to the assimilating power of the Roman civilization in Britain.

The country, as opposed to the towns, of Roman Britain seems to have been divided into estates, commonly (though perhaps incorrectly) known as " villas." Many examples sur- vive, some of them large and luxurious country-houses, some mere farms, constructed usually on one of the two patterns described in the account of Silchester above. The inhabitants were plainly as various — a few of them great nobles and wealthy landowners, others small farmers or possibly bailiffs. Some of these estates were worked on the true " villa " system, by which the lord occupied the " great house," and cultivated the land close round it by slaves, while he let the rest to half-free co'loni. But other systems may have prevailed as well. Among the most important country-houses are those of Bignor in west Sussex, and Woodchester and Chedworth in Gloucestershire.

The wealth of the country was principally agrarian. Wheat and wool were exported in the 4th century, when, as we have said, Britain was especially prosperous. But the details of the trade are unrecorded. More is known of the lead and iron mines which, at least in the first two centuries, were worked in many

STREET

*SC*ALE ?o 100 I i 1*

IN

FEET loo

500

Fig. 6. — Plan of supposed Inn and Baths at Silchester.

districts— leˆd in Somerset, Shropshire, Flintshire and Derby- shire; iron in the west Sussex Weald, the Forest of Dean, and (to a slight extent) elsewhere. Other minerals were less notable. The gold mentioned by Tacitus proved scanty. The Cornish tin, according to present evidence, was worked comparatively little, and perhaps most in the later Empire.

Lastly, the roads. Here we must put aside all idea of ” Four Great Roads.” That category is probably the invention of

antiquaries, and certainly unconnected with Roman Britain (see Ermine Street). Instead, we may distinguish four main groups of roads radiating from London, and a fifth which runs obliquely. One road ran south-east to Canterbury and the Kentish ports, of which Richborough (Rutupiae) was the most frequented. A second ran west to Silchester, and thence by various branches to Winchester, Exeter, Bath, Gloucester and South Wales. – A third, known afterwards to the English as Watling Street, ran by St Albans Wall near Lichfield (Letocetum) , to Wroxeter and Chester. It also gave access by a branch to Leicester and Lincoln. A fourth served Colchester, the eastern counties, Lincoln and York. The fifth is that known to the English as the Fosse, which joins Lincoln and Leicester with Cirencester, Bath and Exeter. Besides these five groups, an obscure road, called by the Saxons Akeman Street, gave alterna- tive access from London through Alchester (outside of Bicester) to Bath, while another obscure road winds south from near Sheffield, past Derby and Birmingham, and connects the lower Severn with the Humber. By these roads and their various branches the Romans provided adequate communications throughout the lowlands of Britain.

IV. The End of Roman Britain.— Early in the 4th century it was necessary to establish a special coast defence, reaching from the Wash to Spithead, against Saxon pirates: there were forts at Brancaster, Borough Castle (near Yarmouth), Bradwell (at the mouth of the Colne and Blackwater), Reculver, Rich- borough, Dover and Lymme (all in Kent), Pevensey in Sussex, Porchester near Portsmouth, and perhaps also at Felixstowe in Suffolk. After about 350, barbarian assaults, not only of Saxons but also of Irish (Scoti) and Picts, became commoner and more terrible. At the end of the century Magnus Maximus, claiming to be emperor, withdrew many troops from Britain and a later pretender did the same. Early in the 5th century the Teutonic conquest of Gaul cut the island off from Rome. This does not mean that there was any great " departure of Romans." The central government simply ceased to send the usual governors and high officers. The Romano-British were left to themselves. Their position was weak. Their fortresses lay in the north and west, while the Saxons attacked the east and south. Their trained troops, and even their own numbers, must have been few. It is intelligible that they followed a precedent set by Rome in that age, and hired Saxons to repel Saxons, But they could not command the fidelity of their mercenaries, and the Saxon peril only grew greater. It would seem as if the Romano-Britons were speedily driven from the east of the island. Even Wroxeter on the Welsh border may have been finally destroyed before the end of the 5th century. It seems that the Saxons though apparently unable to maintain their hold so far to the west, were able to prevent the natives from recovering the lowlands. Thus driven from the centres of Romanized life, from the region of walled cities and civilized houses, into the hills of Wales and the north-west, the provincials underwent an intelligible change. The Celtic element, never quite extinct in those hills and, like most forms of barbarism, reasserting itself in this wild age — not without reinforcement from Ireland— challenged the remnants of Roman civilization and in the end absorbed them. The Celtic language reappeared; the Celtic art emerged from its shelters in the west to develop in. new and medieval fashions.*

Authorities. — The principalreferences to early Britain in classical writers occur in Strabo, Diodorus, Julius Caesar, the elder Pliny, Tacitus, Ptolemy and Cassius Dio, and in the lists of the Antonine Itinerary (probably about a.d. 210-230; ed. Parthey, 1848), the Notitia Dignitatum (about a.d. 400; ed. Seeck, 1876), and the Ravennas (7th-century rechauffe; ed. Parthey i860). The chief passages are collected, in Petrie's Monumenta Hist. Britann. (1848), and (alphabetically)in Holder's Altkeltische

Sprachschatz(i8c)6~i<)0$) . The Roman inscriptions have been collected by Hiibner, Corpus Inscriptionum Latin, vii. (1873), and in supplements by Hiibner and Haverfield in the periodical Ephemeris epigraphica ; see also Hiibner, Inscript. Britann. Christianae(\8-j6, now out of date), and J. Rhys on Pictish, &c, inscriptions, Proceedings Soc.Antiq. Scotland, xxvi., xxxii. Of modern works the best summary for Roman Britain and for Caesar's invasions is T. R. Holmes, Ancient Britain {1907), who cites numerous authorities. See also Sir John Evans, Stone Implements,

Bronze Implements, and Ancient British Coins (with suppl.) ; Boyd Dawkins, Early Man in Britain (1880) ; J. Rhys, Celtic Britain (3rd ed., 1904). For late Celtic art see' J. M. Kemble and A. W. Franks' Horae Ferales (1863), and Arthur J. Evans in Archaeologia, vols, lii.-lv. Celtic ethnology and philology (see Celt) are still in the " age of discussion." For ancient earthworks see A. Hadrian Allcroft, Earthwork of England (1909).

For Roman Britain see, in general, Prof. F. Haverfield, The Romanization of Roman Britain (Oxford, 1906), and his articles in the Victoria County History ; clso the chapter in Mommsen's Roman Provinces; and an article 'in the Edinburgh Review, 1899. For the wall of Hadrian see John Hodgson, History of Northumberland (1840); J. C. Bruce, Roman Walliyd ed., 1867); reports of excavations by Haverfield in the Cumberland Archaeological Society Transac- tions (1894-1904) ; and R. C. Bosanquet, Roman Camp at Housesteads (Newcastle, 1904). For the Scottish Excavations see Proceedings of the Society of Antiquaries of Scotland, xx.-xl., and especially J. Macdonald, Bar Hill (reprint, Glasgow, 1906). For other forts see R. S. Ferguson, Cumberland Arch. Soc. Trans, xii., on Hardknott; and J. Ward, Roman Fort of Gellygaer (London, 1903). For the Roman occupation of Scotland see Haverfield in Antonine Wall Report (1899J; J. Macdonald, Roman' Stones in Hunterian Mus. (1897); and, though an older work, Stuart's Caledonia Romana (1852). For Silchester, Archaeologia (1890-1908) ; for Caerwent (ib. 1901- 1908); for London, Charles Roach Smith, Roman London (1859); for Christianity in Roman Britain, Engl. Hist. Rev. {1896); for the villages, Gen. Pitt- Rivers' Excavations in Cranborne Chase, &c. (4 vols., 1887-1908), and Proc. Soc. of Ant. xviii. For the end of Roman Britain see Engl. Hist. Rev. (1904) ; Prof. Bury's Life of St Patrick (1905); Haverfield's Rom.anization (cited above); and P. Vinogradoff, Growth of the Manor (1905), bk. i. (F. J. H.)

Anglo-Saxon Britain

1. History. — The history of Britain after the withdrawal of. the Roman troops is extremely obscure, but there can be little doubt that for many years the inhabitants of the provinces were exposed to devastating raids by the Picts and Scots. ‘ According to Gildas it was for protection against these incursions that the Britons decided to call in the Saxons. Their allies soon obtained a decisive victory; but subsequently they turned their arms against the Britons themselves, alleging that they had not received sufficient payment for their services. A somewhat different account, probably of English origin, may be traced in the Historia Brittonum, according to which the first leaders of the Saxons, Hengest and Horsa, came as exiles, seeking the protection of the British king, Vortigern. Having embraced his service they quickly succeeded in expelling the northern invaders. Eventually, however, they overcame the Britons through treachery, by inducing the king to allow them to send for large bodies of their own countrymen. It was to these adventurers, according to tradition, that the kingdom of Kent owed its origin. The story is in itself by no means improbable, while the dates assigned to the first invasion by various Welsh, Gaulish and English authorities, with one exception all fall within about a quarter of a century, viz. between the year 428 and the joint reign of Martian and Valentinian III. (450-455).

For the subsequent course of the invasion our information is of the most meagre and unsatisfactory character. According to the Anglo-Saxon Chronicle the kingdom of Sussex was founded by a certain Ella or ˆElle, who landed in 477, while Wessex owed its origin to Cerdic, who arrived some eighteen years later. No value, however, can be attached to these dates; indeed, in the latter case the story itself is open to suspicion on several grounds (see Wessex). For the movements which led to the foundation of the more northern kingdoms we have no evidence worth consideration, nor do we know even approximately when they took place. But the view that the invasion was effected through- out by small bodies of adventurers acting independently of one another, and that each of the various kingdoms owes its origin to a separate enterprise, has little probability in its favour. Bede states that the invaders belonged to three different nations, Kent and southern Hampshire being occupied by Jutes (q.v.), while Essex, Sussex and Wessex were founded by the Saxons, and the remaining kingdoms by the Angli (q.v.). The peculiari- ties of social organization in Kent certainly tend to show that this kingdom had a different origin from the rest; but the evidence for the distinction between the Saxons and the Angli is of a much less satisfactory character (see Anglo-Saxons).

The royal family of Essex may really have been of Saxon origin (see Essex), but on the other hand the West Saxon royal family claimed to be of the same stock as that of Bernicia, and their connexions in the past seem to have lain with the Angli.

We need not doubt that the first invasion was followed by a long period of warfare between the natives and the invaders, in which the latter gradually strengthened their hold on the conquered territories. It is very probable that by the end of the 5th century all the eastern part of Britain, at least as far as the Humber, was in their hands. The first important check was received at the siege of " Mons Badonicus " in the year 517 (Ann. Cambr.), or perhaps rather some fifteen or twenty years earlier. According to Gildas this event was followed by a period of peace for at least forty-four years. In the latter part of the 6th century, however, the territories occupied by the invaders seem to have been greatly extended. In the south the West Saxons are said to have conquered first Wiltshire and then all the upper part of the Thames valley, together with the country beyond as far as the Severn. The northern frontier also seems to have been pushed considerably farther forward, perhaps into what is now Scotland, and it is very probable that the basin of the Trent, together with the central districts between the Trent and the Thames, was conquered about the same time, though of this we have no record. Again, the destruction of Chester about 61 S was soon followed by the overthrow of the British kingdom of Elmet in south-west Yorkshire, and the occupation of Shropshire and the Lothians took place perhaps about the same period, that of Herefordshire probably somewhat later. In the south, Somerset is said to have been conquered by the West Saxons shortly after the middle of the 7 th century. Dorset had probably been acquired by them before this time, while part of Devon seems to have come into their hands soon afterwards.

The area thus conquered was occupied by a number of separate kingdoms, each with a royal family of its own. The districts north of the Humber contained two kingdoms, Bernicia (q.v.) and Deira (q.v.), which were eventually united in Northumbria. South of the Humber, Lindsey seems to have had a dynasty of its own, though in historical times it was apparently always subject to the kings of Northumbria or Mercia. The upper basin of the Trent formed the nucleus of the kingdom of Mercia (q.v.), while farther down the east coast was the kingdom of East Anglia (q.v.). Between these two lay a territory called Middle Anglia, which is sometimes described as a

kingdom, though we do not know whether it ever had a separate dynasty. Essex, Kent and Sussex (see articles on these kingdoms) preserve the names of ancient kingdoms, while the old diocese of Worcester grew out of the kingdom of the Hwicce (q.v.), with which it probably coincided in area. The south of England, between Sussex and " West Wales " (eventually reduced to Cornwall), was occupied by Wessex, which originally also possessed some territory to the north of the Thames. Lastly, even the Isle of Wight appears to have had a dynasty of its own. But it must not be supposed that all these kingdoms were always, or even normally, inde- pendent. When history begins, ˆEthelberht, king of Kent, was supreme over all the kings south of the Humber. He was followed by the East Anglian king Raedwald, and the latter again by a series of Northumbrian kings with an even wider supremacy. Before ˆEthelberht a similar position had been held by the West Saxon king Ceawlin, and at a much earlier period, according to tradition, by Ella or jElle, the first king of Sussex. The nature of this supremacy has been much discussed, but the true explana- tion seems to be furnished by that principle of personal allegiance which formed such an important element in Anglo-Saxon society.

2. Government. — Internally the various states seem to have been organized on very similar lines. In every case we find kingly government from the time of our earliest records, and there is no doubt that the institution goes back to a date anterior to the invasion of Britain (see Offa; Wermtjnd). The royal title, however, was frequently borne by more than one person. Sometimes we find one supreme king together with a number of under-kings (subreguli); sometimes again, especially in the smaller kingdoms, Essex, Sussex and Hwicce, we meet with two

or more kings, generally brothers, reigning together apparently on equal terms. During the greater part of the 8th century Kent seems to have been divided into two kingdoms; but as a rule such divisions did not last beyond the lifetime of the kings between whom the arrangement had been made. The kings were, with very rare exceptions, chosen from one particular family in each state, the ancestry of which was traced back not only to the founder of the kingdom but also, in a remoter degree, to a god. The members of such families were entitled to special wergilds, apparently six times as great as those of the higher class of nobles (see below).

The only other central authority in the state was the king's council or court (peod, witan, plebs, concilium). This body con- sisted partly of young warriors in constant attendance on the king, and partly of

senior officials whom he called together from time to time. The terms used for the two classes by Bede are milites (ministri) and comites, for which the Anglo-Saxon version has pegnas and gesiSas respectively. Both classes alike consisted in part of members of the royal family. But they were by no means confined to such persons or even to born subjects of the king. Indeed, we are told that popular kings like Oswine attracted young nobles to their service from all quarters. The functions of the council have been much discussed, and it has been claimed that they had the right of electing and deposing kings. This view, however, seems to involve the existence of a greater feeling for constitutionalism than is warranted by the information at our disposal. The incidents which have been brought forward as evidence to this effect may with at least equal probability be interpreted as cases of profession or trans- ference of personal allegiance. In other respects the functions of the council seem to have been of a deliberative character. It was certainly customary for the king to seek their advice and moral support on important questions, but there is nothing to show that he had to abide by the opinion of the majority.

For administrative purposes each of the various kingdoms was divided into a number of districts under the charge of royal reeves (cyninges gerefa, praefectus, praepositus). These officials seem to have been located in royal villages (cyninges tun, villa regalis) or fortresses (cyninges burg, urbs regis), which served as centres and meeting-places (markets, &c.) for the inhabitants of the district, and to which their dues, both in payments and services had to be rendered. The usual size of such districts in early times seems to have been 300, 600 or 1200 hides. 1 In addition to these districts we find mention also of much larger divisions containing 2000, 3000, 5000 or 7000 hides. To this category belong the shires of Wessex (Hampshire, Wiltshire, Berkshire, &c), each of which had an earl (aldormon, princeps, dux) of its own, at all events from the 8th century onwards. Many, if not all, of these persons were members of the royal family, and it is not unlikely that they originally bore the kingly title. At all events they are sometimes described as subreguli.

3. Social Organization. — The officials mentioned above, whether of royal birth or not, were probably drawn from the king's personal retinue. In Anglo-Saxon society, as in that of all Teutonic nations in early times, the two most important principles were those of kinship and personal allegiance. Tf a man suffered injury it was to his relatives and his lord, rather than to any public official, that he applied first for protection and redress. If he was slain, a fixed sum (wergild), varying according to his station, had to be paid to his

relatives, while a further but smaller sum (manbot) was due to his lord. These principles applied to all classes of society alike, and though strife within the family was by no means unknown, at all events in royal families, the actual slaying of a kinsman was regarded as the most heinous of all offences. Much the same feeling applied to the slaying of a lord— an offence for which no compensation could be rendered. How far the armed followers of a lord were entitled to compensation when the latter was slain

1 The hide (hid, kitvisc, familia, tributarius, cassatus, manens, &c.) was in later times a measure of land, usually 120 acres. In early times, however, it seems to have meant (1) household, (2) normal amount of land appertaining to a household.

is uncertain, but in the case of a king they received an amount equal to the wergild. Another important development of the principle of allegiance is to be found in the custom of heriots. In later times this custom amounted practically to a system of death-duties, payable in horses and arms or in money to the lord of the deceased. There can be little doubt, however, that originally it was a restoration to the lord of, the military outfit with which he had presented his man when he entered his service. The institution of thegnhood, i.e. membership of the comitatus or retinue of a prince, offered the only opening by which public life could be entered. Hence it was probably adopted almost universally by young men of the highest classes. The thegn was expected to fight for his lord, and generally to place his services at his disposal in both war and peace. The lord, on the other hand, had to keep his thegns and reward them from time to time with arms and treasure. When they were of an age to marry he was expected to provide them with the means of doing so. If the lord was a king this provision took the form of a grant, perhaps normally ten hides, from the royal lands. Such estates were not strictly hereditary, though as a mark of favour they were not unfrequently re-granted to the sons of deceased holders.

The structure of society in England was of a somewhat peculiar type. In addition to slaves, who in early times seem to have been numerous, we find in Wessex and apparently also in Mercia three classes, described as twelfhynde, sixhynde and twihynde from the amount of their wergilds, viz. 1200, 600 and 200 shillings respectively. It is probable that similar classes existed also in

Northumbria, though not under the same names. Besides these terms there were others which were probably in use every- where, viz. gesv&cund for the two higher classes and ceorlisc for the lowest. Indeed, we find these terms even in Kent, though the social system of that kingdom seems to have been of an essentially different character. Here the wergild of the ceorlisc class amounted to 100 shillings, each containing twenty silver coins (sceattas), as against 200 shillings of four (in Wessex five) silver coins, and was thus very much greater than the latter. Again, there was apparently but one gesitScund class in Kent, with a wergild of 300 shillings, while, on the other hand, below the ceorlisc class we find three classes of persons described as laetas, who corresponded in all probability to the liti or freedmen of the continental laws, and who possessed wergilds of 80, 60 and 40 shillings respectively. To these we find nothing analogous in the other kingdoms, though the poorer classes of Welsh freemen had wergilds varying from 1 20 to 60 shillings. It should be added that the differential treatment of the various classes was by no means confined to the case of wergilds. We find it also in the compensations to which they were entitled for various injuries, in the fines to which they were liable, and in the value attached to their oaths. Generally, though not always, the pro- portions observed were the same as in the wergilds.

The nature of the distinction between the gesfficund and ceorlisc classes is nowhere clearly explained; but it was certainly hereditary and probably of considerable antiquity. In general we may perhaps define them as nobles and commons, though in view of the numbers of the higher classes it would probably be more correct to speak of gentry and peasants. The distinction between the twelfhynde and sixhynde classes was also in part at least hereditary, but there is good reason for believing that it arose out of the possession of land. The former consisted of persons who possessed, whether as individuals or families, at least five hides of land — which practically means a village — while the latter were landless, i.e. probably without this amount of land. Within the ceorlisc class we find similar subdivisions, though they were not marked by a difference in wergild. The gafolgelda or Iributarius (tribute-payer) seems to have been a ceorl who possessed at least a hide, while the gebur was without land of his own, and received his outfit as a loan from his lord.

4. Payments and Services. — We have already had occasion to refer to the dues which were rendered by different classes of the population, and which the reeves in royal villages had to collect and superintend. The payments seem to have varied ^!<:atly according to

the class from which they were due. Those

rendered by landowners seem to have been known as feorm or fostor, and consisted of a fixed quantity of articles paid in kind. In Ine's Laws (cap. 70) we find a list of payments specified for a unit of ten hides, perhaps the normal holding of a twelfhynde man — though on the other hand it may be nothing more than a mere fiscal unit in an aggregate of estates. The list consists of oxen, sheep, geese, hens, honey, ale, loaves, cheese, butter, fodder, salmon and eels. Very similar specifications are found elsewhere. The payments rendered by the gafolgelda {Iributarius) were known as gafol (tributum), as his name implies. In Ine's Laws we hear only of the hwitel or white cloak, which was to be of the value of six pence per household (hide), and of barley, which »vas to be six pounds in weight for each worker. In later times we meet with many other payments both in money and in kind, some of which were doubtless in accordance with ancient custom. On the other hand the gebur seems not to have been liable to payments of this kind, presumably because the land which he cultivated formed part of the demesne {inland) of his lord. The term gafol, however, may have been applied to the payments which he rendered to the latter.

The services required of landowners were very manifold in character. Probably the most important were military service (fird, expeditio) and the repairing of fortifications and bridges — the trinoda necessitas of later times. Besides these we find reference in charters of the 9th century to the keeping of the king's hunters, horses, dogs and hawks, and the entertaining of messengers and other persons in the king's service. The duties of men of the sixhynde class, if they are to be identified with the radcnihtas {radmanni) of later times, probably consisted chiefly in riding on the king's (or their lord's) business. The services of the peasantry can only be conjectured from what we find in later times. Presumably their chief duty was to undertake a share in the cultivation of the demesne land. We need scarcely doubt also that the labour of repairing fortifications and bridges, though it is charged against the landowners, was in reality delegated by them to their dependents.

5. Warfare.— All classes are said to have been liable to the duty of military service. Hence, since the ceorls doubtless formed the bulk of the population, it has been thought that the Anglo-Saxon armies of early times were essentially peasant forces. The evidence at our disposal, however, gives little justi- fication for such a view. The regulation that every five or six hides should supply a warrior was not a product of the Danish invasions, as is sometimes stated, but

goes back at least to the beginning of the 9th century. Had the fighting material been drawn from the ceorlisc class a warrior would surely have been required from each hide, but for military service no such regula- tion is found. Again, the fird (fyrd) was composed of mounted warriors during the 9th century, though apparently they fought on foot, and there are indications that such was the case also in the 7th century. No doubt ceorls took part in military expedi- tions, but they may have gone as attendants and camp-followers rather than as warriors, their chief business being to make stockades and bridges, and especially to carry provisions. The serious fighting, however, was probably left to the gesiScund classes, who possessed horses and more or less effective weapons. Indeed, there is good reason for regarding these classes as essentially military.

The chief weapons were the sword and spear. The former were two-edged and on the average about 3 ft. long. The hilts were often elaborately ornamented and sometimes these weapons were of considerable value. No definite line can be drawn between the spear proper and the javelin. The spear-heads which have been found in graves vary considerably in both form and size. They were fitted on to the shaft by a socket which was open on one side. Other weapons appear to have been quite rare. Bows and arrows were certainly in use for sporting purposes, but there is no reason for believing that they were much used in warfare before the Danish invasions. They are very seldom met with in graves. The most common article of defensive armour was the shield, which was small and circular and apparently of quite thin lime-wood, the edge being formed

probably by a thin bana of iron. In the centre of the shield, in order to protect the hand which held it, was a strong iron boss, some 7 in. in diameter and projecting about 3 in. It is clear from literary evidence that the helmet (helm) and eoat of chain mail (byrne) were also in common use. They are seldom found in graves, however, whether owing to the custom of heriots or to the fact that, on account of their relatively high value, they were frequently handed on from generation to generation as heirlooms. Greaves are not often mentioned. It is worth noting that in later times the heriot of an " ordinary thegn " (medema pegn) — by which is meant apparently not a king's thegn but a man of the tivelfhynde class — consisted of his horse with its saddle, &c. and his arms, or two pounds of silver as an equivalent of the whole. The arms required were probably a sword,

helmet, coat of mail and one or two. spears and shields. There are distinct indications that a similar outfit was fairly common in Ine's time, and that its value was much the same. One would scarcely be justified, however, in supposing that it was anything like universal; for the purchasing power of such a sum was at that time considerable, representing as it did about 16-20 oxen or 100-120 sheep. It would hardly be safe to credit men of the sixhynde class in general with more than a horse, spear and shield.

6. Agriculture and Village Life. — There is no doubt that a fairly advanced system of agriculture must have been known to the Anglo-Saxons before they settled in Britain. This is made clear above all by the representation of a plough drawn by two oxen in one of the very ancient rock-carvings at Tegneby in Bohuslan. In Domesday Book - the heavy plough with eight oxen seems to be universal, and it can be traced back in Kent to; the beginning of the 9th century. In this kingdom the system of agricultural terminology was based on it. The unit was the suiting (aratrum) or ploughland (from sulh, "plough"), the fourth part of which was the geocled or geoc (jugum), originally a yoke of oxen. An analogy is supplied by the carucata of the Danelagh, the eighth part of which was the bouata or " ox-land." In the 10th century the sulung seems to have been identified with the hide, but in earlier times it contained apparently two hides. The hide itself, which was the regular unit in the other kingdoms, usually contained 120 acres in later times and was divided into four girda (virgatae) or yardlands. But originally it seems to have meant simply the land pertaining to a household, and its area in early times is quite uncertain, though probably far less. For the acre also there was in later times a standard length and breadth, the former being called furklang (furlong) and reckoned at one-eighth of a mile, while the aecerbraedu or " acre-breadth " (chain) was also a definite measure. We need not doubt, however, that in practice the form of the acre was largely conditioned by the nature of the ground. Originally it is thought to have been the measure of a day's ploughing, in which case the dimensions given above would scarcely be reached. Account must also be taken of the possibility that in early times lighter teams were in general use. If so the normal dimensions of the acre may very well have been quite different.

The husbandry was of a co-operative character. In the nth century it was distinctly unusual for a peasant to possess a whole team of his own, and there is no reason for supposing the case to have been otherwise in early times; for though the peasant might then hold a hide, the hide itself was doubtless smaller and not commensurate in any way with the ploughland. The holdings were probably not

compact but consisted of scattered strips in common fields, changed perhaps from year to year, the choice being determined by lot or otherwise. As for the method of cultivation itself there is little or no evidence. Both the " two-course system " and the " three-course system " may have been in use; but on the other hand it is quite possible that in many cases the same ground was not sown more than once in three years. The prevalence of the co-operative principle, it may be observed, was doubtless due in large measure to the fact that the greater part of England, especially towards the east, was settled not in scattered farms or hamlets but in compact villages with the cultivated lands lying round them.

The mill was another element which tended to promote the same principle. There can be little doubt that before the Anglo- Saxons came to Britain they possessed no instrument for grinding corn except the quern (cweorn), and in remote districts this continued in use until quite late times. The grinding seems to have been performed chiefly by female slaves, but occasionally, we hear also of a donkey-mill (esokweorn) . The mill proper, however, which was derived from the Romans, as its name (mylen, from Lat. molina) indicates, must have come into use fairly early. In the nth century every village of any size seems to have possessed one, while the earliest references go back to the 8th century. It is not unlikely that they were in use during the Roman occupation of Britain, and consequently that they became known to the invaders almost from the first. The mills were presumably driven for the most part by water, though we have a reference to a windmill as early as the year 833.

All the ordinary domestic animals were known. Cattle and sheep were pastured on the common lands appertaining to the village, while pigs, which (especially in Kent) seem to have been very numerous, were kept in the woods. Bee-keeping was also practised. In all these matters the invasion of Britain had brought about no change. The cultivation of fruit and vegetables on the other hand was probably almost entirely new. The names are almost all derived from Latin, though most of them seem to have been known soon after the invasion, at all events by the 7th century.

From the considerations pointed out above we can hardly doubt that the village possessed a certain amount of corporate life, centred perhaps in an ale-house where its affairs were dis- cussed by the inhabitants. There is no evidence, however) which would justify us in crediting such gatherings with any substantial degree of local authority. So far as the limited information at our disposal enables us to form an opinion, the responsibility both for the internal peace

of the village, and for its obligations to the outside world, seems to have lain with the lord or his steward (gerefa, villicus) from the beginning. A quite opposite view has, it is true, found favour with many scholars, viz. that the villages were orginally settlements of free kindreds, and that the lord's authority was superimposed on them at a later date. This view is based mainly on the numerous place-names ending in -ing, -ingham, -ington, &c, in which the syllable ing is thought to refer to kindreds of cultivators. It is more probable, however, that these names are derived from persons of the twelfhynde class to whom the land had been granted. In many cases in deed there is good reason for doubting whether the name is a patronymic at all.

The question how far the villages were really new settlements is difficult to answer, for the terminations -ham, -ton, &c. cannot be regarded as conclusive evidence. Thus according to the Anglo-Saxon Chronicle (ann. 571) Bensington and Eynsham were formerly British villages. Even if the first part of Egones- ham is English — which is by no means certain — it is hardly sufficient reason for discrediting this statement, for Canterbury (Cantwaraburg) and Rochester (Hrofes ceaster) were without doubt Roman places in spite of their English names. On the whole it seems likely that the cultivation of the land was not generally interrupted for more than a very few years; hence the convenience of utilizing existing sites of villages would be obvious, even if the buildings themselves had been burnt.

7. Towns. — Gildas states that in the time of the Romans Britain contained twenty-eight cities (civitates), besides a numbei of fortresses (castella). Most of these were situated within the territories eventually occupied by the invaders, and reappear as towns in later times. Their history in the intervening period, however, is wrapped in obscurity. Chester appears to have been deserted for three centuries after its destruction early in the 7th century, and in most of the other cases there are features observable in the situation and plan of the medieval town which suggest that its occupation had not been continuous. Yet London and Canterbury must have recovered a certain amount of importance quite early, at all events within two centuries after the invasion, and the same is probably true of York,

Lincoln and a few other places. The term applied to both the cities

and the fortresses of the Romans was ceaster (Lat. castra), less frequently the English word burg. There is little or no evidence for the existence of towns other than Roman in early times, for the word urbs is merely a translation of burg, which was used for any fortified dwelling-place, and it is improbable that anything which could properly be called a town was known to the invaders before their arrival in Britain. The Danish settlements at the end of the 9th century and the defensive system initiated by King Alfred gave birth to a new series of fortified towns, from which the boroughs of the middle ages are mainly descended.

8. Houses. — Owing to the fact that houses were built entirely of perishable materials, wood and wattle, we are necessarily dependent almost wholly upon literary evidence for knowledge of this subject. Stone seems to have been used first for churches, but this was not before the 7th century, and we are told that at first masons were imported from Gaul. Indeed wood was used for many churches, as well as for most secular buildings, until a much later period. The walls were formed either of stout planks laid together vertically or horizontally, or else of posts at a short distance from one another, the interstices being filled up with wattlework daubed with clay. It is not unlikely that the houses of wealthy persons were distinguished by a good deal of ornamentation in carving and painting. The roof was high- pitched and covered with straw, hay, reeds or tiles. The regular form of the buildings was rectangular, the gable sides prob- ably being shorter than the others. There is little evidence for partitions inside, and in wealthy establishments the place of rooms seems to have been supplied by separate buildings within the same enclosure. The windows must have been mere openings in the walls or roof, for glass was not used for this purpose before the latter part of the 7th century. Stoves were known, but most commonly heat was obtained from an open fire in the centre of the building. Of the various buildings in a wealthy establish- ment the chief were the hall (heall), which was both a dining and reception room, and the " lady's bower " (brydbur), which served also as a bedroom for the master and mistress. To these we have to add buildings for the attendants, kitchen, bakehouse, &c, and farm buildings. There is little or no evidence for the use of two-storeyed houses in early times, though in the 10th and 1 ith centuries they were common. The whole group of buildings stood in an enclosure (tun) surrounded by a stockade (burg), which perhaps rested on an earthwork, though this is disputed. Similarly the homestead of the peasant was surrounded by a fence (edor).

9. Clothes. — The chief material for clothing was at first no doubt

wool, though linen must also have been used and later became fairly common. The chief garments were the coat (roc), the trousers (brec), and the cloak, for which there seem to have been a number of names (lofta, hacele, sciccing, pad, kwitel). To these we may add the hat (haet), belt (gyrdel), stockings (hosa), shoes (scoh, gescy, rifeling) and gloves (glof). The crusene was a fur coat, while the sere or smoc seems to have been an under- garment and probably sleeveless. The whole attire was of national origin and had probably been in use long before the invasion of Britain. In the great bog-deposit at Thorsbjaerg in Angel, which dates from about the 4th century, there were found a coat with long sleeves, in a fair state of preservation, a pair of long trousers with remains of socks attached, several shoes and portions of square cloaks, one of which had obviously been dyed green. The dress of the upper classes must have been of a somewhat gorgeous character, especially when account is taken of the brooches and other ornaments which they wore. It is worth noting that according to Jordanes the Swedes in the 6th century were splendidly dressed.

10. Trade. — The few notices of tins subject which occur in the early laws seem to refer primarily to cattle-dealing. Hut there can be no doubt that a considerable import and export trade with the continent had sprung up quite early. In Bede's time, if not before, London was resorted to by many merchants both by land and by sea. At first the chief export trade was

probably in slaves. English slaves were to be obtained in Rome even before the end of the 6th century, as appears from the well-known story of Gregory the Great. Since the standard price of slaves on the continent was in general three or four times as great as it was in England, the trade must have been very profitable. After the adoption of Christianity it was gradually prohibited by the laws. The nature of the imports during the heathen period may be learned chiefly from the graves, which contain many brooches and other ornaments of continental origin, and also a certain number of silver, bronze and glass vessels. With the introduction of Christianity the ecclesiastical connexion between England and the continent without doubt brought about a large increase in the imports of secular as well as religious objects, and the frequency of pilgrim- ages by, persons of high rank must have had the same effect. The use of silk (seoluc) and the adoption of the mancus (see below) point to communication, direct or indirect, with more distant countries. In the 8th century we hear frequently of tolls on merchant ships at various ports, especially London.

11, Coinage. — The earliest coins which can be identified with certainty are some silver pieces which bear in Runic letters the name of the Mercian kingvEthelred (675-704). There are others, however, of the same type and standard (about 21 grains) which may be attributed with probability to his father Penda (d. 655). But it is clear from the laws of ˆEthelberht that a regular silver coinage was in use at least half a century before this time, and it is not unlikely that many unidentified coins may go back to the 6th century. These are fairly numerous, and are either without inscriptions or, if they do bear letters at all, they seem to be mere corruptions of Roman legends. Their designs are derived from Roman or Frankish coins, especially the former, and their weight varies from about 10 to 21 grains, though the very light coins are rare. Anonymous gold coins, resembling Frankish trientes in type and standard (21 grains), are also fairly common, though they must have passed out of use very early, as the laws give no hint of their existence. Larger gold coins (solidi) are very rare. In the early laws the money actually in use appears to have been entirely silver. In Offa's time a new gold coin, the mancus, resembling in standard the Roman solidus (about 70 grains), was introduced from Mahommedan countries. The oldest extant specimen bears a faithfully copied Arabic inscription. In the same reign the silver coins underwent a considerable change in type, being made larger and thinner, while from this time onwards they always bore the name of the king (or queen or archbishop) for whom they were issued. The design and execution also became remarkably good. Their weight was at first unaffected, but probably towards the close of Offa's reign it was raised to about 23 grains, at which standard it seems to have remained, nominally at least, until the time of Alfred. It is to be observed that with the exception of Burgred's coins and a few anonymous pieces the silver was never adul- terated. No bronze coins were current except in Northumbria, where they were extremely common in the 9th century.

Originally settling (" shilling ") and sceatt seem to have been the terms for gold and silver coins respectively. By the time of Ine, however, pending, pen(n)ing (" penny "), had already come into use for the latter, while, owing to the temporary disappearance of a gold Coinage, settling had come to denote a mere unit of account. It was, however, a variable unit, for the Kentish shilling contained twenty sceattas (pence), while the Mercian contained only four. The West Saxon shilling seems originally to have been identical with the Mercian, but later it contained five pence. Large payments were generally made by weight, 240-250 pence being reckoned to the pound, perhaps from the 7th century onwards. The mancus was

equated with thirty pence, probably from the time of its introduction. This means that the value of gold relatively to silver was 10: 1 from the end of Offa's reign. There is reason, however, for thinking that in earlier times it was as low as 6: 1, or even 5:1. In Northumbria a totally different monetary system prevailed, the unit being the tryms, which contained three sceattas or pence. As to the value of the bronze coins we are without information

The purchasing power of money was very great. The sheep was valued at a shilling in both Wessex and Mercia, from early times till the nth century. One pound was the normal price of a slave and half a pound that of. a horse. The price of a pig was twice, and that of an ox six times as great as that of a sheep. Regarding the prices of commodities other than live-stock we have little definite information, though an approximate estimate may be made of the value of arms. It is worth noticing that we often hear of payments in gold and silver vessels in place of money. In the former case the mancus was the usual unit of calculation.

12. Ornaments. — Of these the most interesting are the brooches which were worn by- both sexes and of which large numbers have been found in heathen cemeteries. They may be classed under eight leading types: (i) circular or ring-shaped, (2) cruciform, (3) square-headed, (4) radiated, (5) S-shaped, (6) bird-shaped, (7) disk-shaped, (8) cupelliform or saucer-shaped. Of these Nos. 5 and 6 appear to be of continental origin, and this is probably the case also with No. 4 and in part with No. 7. But the last-mentioned type varies greatly, from rude and almost plain disks of bronze to magnificent gold specimens studded with gems. No. 8 is believed to be peculiar to England, and occurs chiefly in the southern Midlands, specimens being usually found in pairs. The interiors are gilt, often furnished with detachable plates and sometimes set with brilliants. The remaining types were probably brought over by the Anglo- Saxons at the time of the invasion. Nos. 1 and 3 are widespread outside England, but No. 2, though common in Scandinavian countries, is hardly to be met with south of the Elbe. It is worth noting that a number of specimens were found in the cremation cemetery at Borgstedterfeld near Rendsburg. In England it occurs chiefly in the more northern counties. Nos. 2 and 3 vary greatly in size, from i\ to 7 in. or more. The smaller specimens are quite plain, but the larger ones are gilt and generally of a highly ornamental character. In later

times we hear of brooches worth as much as six mancusas, i.e. equivalent to six oxen.

Among other ornaments we may mention hairpins, rings and earrings, and especially buckles which are often of elaborate workmanship. Bracelets and necklets are not very common, a fact which is rather surprising, as in early times, before the issuing of a coinage, these articles (beagas) took the place of money to a large extent. The glass vessels are finely made and of somewhat striking appearance, though they closely resemble contemporary continental types. Since the art of glass-working was unknown, according to Bede, until nearly the end of the 7 th century, it is probable that these were all of continental or Roman-British origin.

13. Amusements. — It is clear from the frequent references to dogs and hawks in the charters that hunting and falconry were keenly pursued by the kings and their retinues. Games, whether indoor or outdoor, are much less frequently mentioned, but there is no doubt that the use of dice (taefl) was widespread. At court much time was given to poetic recitation, often accom- panied by music, and accomplished poets received liberal rewards. The chief musical instrument was the harp (hearpe), which is often mentioned. Less frequently we hear of the flute (pipe) and later also of the fiddle (JiSele). Trumpets (horn, swegelhorn, bytne) appear to have been used chiefly as signals.

14. Writing. — The Runic alphabet seems to have been the only form of writing known to the Anglo-Saxons before the invasion of Britain, and indeed until the adoption of Christianity. In its earliest form, as it appears in inscriptions on various articles found in Schleswig and in Scandinavian countries, it consisted of twenty-four letters, all of which occur in abecedaria in England. In actual use, however, two letters soon became obsolete, but a number of others were added from time to time, some of which are found also on the continent, while others are peculiar to certain parts of England. Originally the Runic alphabet seems to have been used for writing on wooden boards, though none of these have survived. The inscriptions which have come down to us are engraved partly on memorial stones,

which are not uncommon in the north of England, and partly on various metal objects, ranging from swords to brooches. The adoption of Christianity brought about the introduction of the Roman alphabet; but the older form of writing did not immediately pass out of use, for almost all the inscriptions which we possess date from the 7th or following centuries. Coins with Runic legends were

issued at least until the middle of the 8 th century, and some of the memorial stones date probably even from the 9th. The most important of the latter are the column at Bewcastle, Cumberland, believed to commemorate Alhfrith, the son of Oswio, who died about 670, and the cross at Ruthwell, Dumfriesshire, which is probably about a century later. The Roman alphabet was very soon applied to the purpose of writing the native language, e.g. in the publication of the laws of /Ethelberht. Yet the type of character in which even the earliest surviving MSS. are written is believed to be of Celtic origin. Most probably it was introduced by the Irish missionaries who evangelized the north of England, though Welsh influence is scarcely impossible. Eventually this alphabet was enlarged (probably before the end of the 7 th century) by the inclusion of two Runic letters for th and w.

15. Marriage. — This is perhaps the subject on which our information is most inadequate. It is evident that the rela- tionships which prohibited marriage were different from those recognized by the Church; but the only fact which we know definitely is that it was customary, at least in Kent, for a man to marry his stepmother. In the Kentish laws marriage is repre- sented as hardly more than a matter of purchase; but whether this was the case in the other kingdoms also the evidence at our disposal is insufficient to decide. We know, however, that in addition to the sum paid to the bride's guardian, it was customary for the bridegroom to make a present (morgengifu) to the bride herself, which, in the case of queens, often consisted of a residence and considerable estates. Such persons also had retinues and fortified residences of their own. In the Kentish laws provision is made for widows to receive a proportionate share in their husbands' property.

16. Funeral Rites. — Both inhumation and cremation were practised in heathen times. The former seems to have prevailed everywhere; the latter, however, was much more common in the more northern counties than in the south, though cases are fairly numerous throughout the valley of the Thames. In Beowulf cremation is represented as the prevailing custom. There is no evidence that it was still practised when the Roman and Celtic missionaries arrived, but it is worth noting that according to the tradition given in the Anglo-Saxon Chronicle, Oxfordshire, where the custom seems to have been fairly common, was not conquered before the latter part of the 6th century. The burnt remains were generally, if not always, enclosed in urns and then buried. The urns themselves are of clay, somewhat badly baked, and bear geometrical patterns applied with a punch. They vary considerably in size (from 4 to 1 2 in. or more in

diameter) and closely resemble those found in northern Germany. Inhumation graves are sometimes richly furnished. The skeleton is laid out at full length, generally with the head towards the west or north, a spear at one side and a sword and shield obliquely across the middle. Valuable brooches and other ornaments are often found. In many other cases, however, the grave contained nothing except a small knife and a simple brooch or a few beads. Usually both classes of graves lie below the natural surface of the ground without any perceptible trace of a barrow.

17. Religion. — Here again the information at our disposal is very limited. There can be little doubt that the heathen Angli worshipped certain gods, among them Ti (Tig), Woden, Thunor and a goddess Frigg, from whom the names Tuesday, Wednesday, Thursday and Friday are derived. Ti was probably the same god of whom early Roman writers speak under the name Mars (see Tyr) , while Thunor was doubtless the thunder-god (see Thor). From Woden (q.v.) most of the royal families traced their descent. Seaxneat, the ancestor of the East Saxon dynasty, was also in all probability a god (see Essex, Kingdom of),

Of anthropomorphic representations of the gods we have no clear evidence, though we do hear of shrines in sacred enclosures, at which sacrifices were offered. It is clear also that there were persons specially set apart for the priesthood, who were not allowed to bear arms or to ride except on mares. Notices of sacred trees and groves, springs, stones, &c, are much more frequent than those referring to the gods. We hear also a good deal of witches and valkyries, and of charms and magic; as an instance we may cite the fact that certain (Runic) letters were credited, as in the North, with the power of loosening bonds. It is probable also that the belief in the spirit world and in a future life was of a somewhat similar kind to what we find in Scandinavian'religion. (See Teutonic Peoples, §6.)

The chief primary authorities are Gildas, De Excidio Britanniae, and Nennius, Historia Brilonum (ed. San-Marte, Berlin, 1844) ; Th. Mommsen in Mon. Germ. Hist., Aucl. Antiquiss., torn. xiii. (Berlin, 1898); Bede, Hist. Eccl. (ed. C. Plummer, Oxford, 1896); the Saxon Chronicle (ed. C. Plummer, Oxford, 1892-1899); and the Anglo-Saxon Laws (ed. F. Liebermann, Halle, 1903), and Charters (W. de G. Birch, Cartidarium Saxonicum, London, 1885-1893). Modern

authorities: Sh. Turner, History of the Anglo-Saxons (London, 1799-1805; 7th ed., 1852); Sir F. Palgrave, Rise and Progress of the English Commonwealth (London, 1831-1832); J. M. Kemble, The Saxons in England (London, 1849; 2nd ed., 1876); K. Maurer, Kritische Oberschau d. deutschen Geselzgebung u. Rechts-wissenschaft, vols, i.-iii. (Munich, 1853-1855); J. M. Lappenberg, Geschichte von England (Hamburg, 1834); History of England under the Anglo-Saxon Kings (London, 1845; 2nd ed., 1881); J. R. Green, The Making of England (London, 1881); T. Hodgkin, History of England from the Earliest Times to the Norman Conquest (vol. i. of The Political History of England) (London, 1906) ; F. Seebohm, The English Village Community (London, 1883); A. Meitzen, Siedelung und Agrarwesen d. Westgermanen,u. Ostgermanen, &,c. (Berlin, 1895) ; Sir F.Pollockand F.W. Maitland, History of English Law (Cambridge, 1895; 2nd ed., 1898); F. W. Maitland, Domesday Book and Beyond (Cambridge, 1897) ; F. Seebohm, Tribal Custom in Anglo-Saxon Law (London, 1903) ; P. VinogradofF, The Growth of the Manor (London, 1905) ; H. M. Chadwick, Studies on Anglo-Saxon Institutions (Cam- bridge, 1905) ; The Origin of the English Nation (ib., 1907) ; M. Heyne, liber die Lage und Construction der Halle Heorot (Paderborn, 1864) ; R. Henning, Das deutsche Haus {Quellen u. Forschungen, 47) (Strass- burg, 1882) ; M. Heyne, Deutsche Hausaltertiimer, i., ii., iii. (Leipzig, 1900-1903) ; G. Baldwin Brown, The Arts in Early England (London, 1903) ; C. F. Keary, Catalogue of Anglo-Saxon Coins in the British Museum, vol. i. (London, 1887); C. Roach Smith, Collectanea Antiqua (London, 1848-1868); R. C. Neville, Saxon Obsequies (London, 1852); J. Y. Akerman, Remains of Pagan Saxondom (London, 1855); Baron J. de Baye, Industrie anglo-saxonne (Paris, 1889); The Industrial Arts of the Anglo-Saxons (London, 1893); G. Stephens, The Old Northern Runic Monuments (London and Copenhagen, 1866-1901); W. Vietor, Die northumbrischen Runen- steme (Marburg, 1895). Reference must also be made to the articles on Anglo-Saxon antiquities in the Victoria County Histories, and to various papers in Archaeologia, the Archaeological Journal, the Journal of the British Archaeological Society, the Proceedings of the Society of Antiquaries, the Associated Architectural Societies' Reports, and other antiquarian journals. (H. M. C.)

BRITANNICUS, son of the Roman emperor Claudius by his third wife Messallina, was born probably a.d. 41. He was originally called Claudius Tiberius Germanicus, and received the name Britannicus from the senate on account of the conquest made in Britain about the time of his birth. Till 48, the date of his mother's execution, he was

looked upon as the heir presump- tive; but Agrippina, the new wife of Claudius, soon persuaded the feeble emperor to adopt Lucius Domitius, known later as Nero, her son by a previous marriage. After the accession of Nero, Agrippina, by playing on his fears, induced him to poison Britannicus at a banquet (a.d. 55). A golden statue of the young prince was set up by the emperor Titus. Britannicus is the subject of a tragedy by Racine.

Tacitus, Annals, xii. 25, 41, xiii. 14-16; Suetonius, Nero, 33; Dio Cassius lx. 32, 34; works quoted under Nero.

BRITISH CENTRAL AFRICA, the general name given to the British protectorates in South Central Africa north of the Zambezi river, but more particularly to a large territory lying between 8° 25′ S. on Lake Tanganyika and 17 6′ S. on the river Shire, near its confluence with the Zambezi, and between 36 10′ E. (district of Mlanje) and 26 30′ E. (river Luengwe- Kafukwe). Originally the term ” British Central Africa ” was applied by Sir H, H, Johnston to all the territories under British

influence north of the Zambezi which were formerly intended to be under one administration; but the course of events having prevented the connexion of Barotseland (see Barotse) and the other Rhodesian territories with the more direct British administration north of the Zambezi, the name of British Central Africa was confined officially (in 1893) to the British protectorate on the Shire and about Lake Nyasa. In 1907 the official title of the protectorate was changed to that of Nyasaland Protectorate, while the titles ” North Eastern Rhodesia ” and ” North Western Rhodesia ” (Barotseland) have been given to the two divisions of the British South Africa Company’s territory north of the Zambezi. The western boundary, however, of the territory here described has been taken to be a line drawn from near the source of the Lualaba on the southern boundary of Belgian Congo to the western source of the Luanga river, and thence the course of the Luanga to its junction with the Luengwer Kafukwe, after which the main course of the Kafukwe delimits the territory down to the Zambezi. Thus, besides the Nyasaland Protectorate and North Eastern Rhodesia, part of North Western Rhodesia is included, and for the whole of this region British Central Africa is the most convenient designation.

Physical Features.— Within these limits we have a territory of about 250,000 sq. m., which includes two-thirds of Lake Nyasa, the south end of Lake Tanganyika, more than half Lake Mweru, and the whole of Lake Bangweulu, nearly the whole courses of the rivers Shire and

Luangwa (or Loangwa), the whole of the river Chambezi (the most remote of the headwaters of the river Congo), the right or east bank of the Luapula (or upper Congo) from its exit from Lake Bangweulu to its issue from the north end of Lake Mweru; also the river Luanga and the whole course of the Kafue or Kafukwe. 1 Other lesser sheets of water included within the limits of this territory are the Great Mweru Swamp, between Tanganyika

and Mweru, Moir's Lake (a small mountain tarn possibly a crater

lake — lying between the Luangwa and the Luapula), Lake Malombe (on the upper Shire), and the salt lake Chilwa (wrongly styled Shirwa, being the Bantu word Kilwa), which lies on the borders of the Portuguese province of Mocambique. The southern border of this territory is the north bank of the Zambezi from the confluence of the Kafukwe to that of the Luangwa at Zumbo. Eastwards of Zumbo, British Central Africa is separated from the river Zambezi by the Portuguese possessions; nevertheless, considerably more than two-thirds of the country lies within the Zambezi basin, and is included within the subordinate basins of Lake Nyasa and of the rivers Luangwa and Luengwe-Kafukwe. The remaining portions drain into the basins of the river Congo and of Lake Tanganyika, and also into the small lake or half-dried swamp called Chilwa, which at the present time has no outlet, though in past ages it probably emptied itself into the Lujenda river, and thence into the Indian Ocean.

As regards orographical features, much of the country is high plateau, with an average altitude of 3500 ft. above sea-level. Only a very minute portion of its area — the country along the banks of the river Shire — lies at anything like a low elevation; though the Luangwa valley may not be more than about 900 ft. above sea-level. Lake Nyasa lies at an elevation of 1700 ft. above the sea, is about 350 m. long, with a breadth varying from 15 to 40 m. Lake Tanganyika is about 2600 ft. above sea-level, with a length of about 400 m. and an average breadth of nearly 40 m. Lake Mweru and Lake Bangweulu are respectively 3000 and 3760 ft. above sea-level ; Lake Chilwa is 1946 ft. in altitude. The highest mountain found within the limits previously laid down is Mount Mlanje, in the ex- treme south-eastern corner of the protectorate. This remarkable and picturesque mass is an isolated " chunk " of the Archean plateau, through which at a later date there has been a volcanic outburst of basalt. The summit and sides of this mass exhibit several craters. The highest peak of Mlanje reaches an altitude of 9683 ft. (In German territory, near the north end of Lake Nyasa, and close to the British frontier, is Mount Rungwe, the altitude of which exceeds 10,000 ft.) Other high

mountains are Mounts Chongone and Dedza, in Angoniland, which reach an altitude of 7000 ft., and points on the Nyika Plateau and in the Konde Mountains to the north-west of Lake Nyasa, which probably exceed a height of 8000 ft. There are also Mounts Zomba (6900 ft.) and Chiradzulu (5500 ft.) in the Shire Highlands. The principal plateaus or high ridges are (1) the Shire Highlands, a clump of mountainous country lying between the river Shir6, the river Ruo, Lake Chilwa and the south end of Lake Nyasa; (2) Angoniland— a stretch of elevated country to the west of Lake Nyasa and the north-west of the river

1 The nomenclature of several of these rivers is perplexing. It should be borne in mind that the Luanga (also known as the Lunga) is a tributary of the Luengwe-Kafukwe, itself often called Kafue, and that the Luangwa (or Loangwa) is an independent affluent of the Zambezi {o-V.),

Shire; (3) the Nyika, Plateau, which lies to the north of Angoniland ; and (4) the Nyasa-Tanganyika Plateau, between the basin of the river Luangwa, the vicinity of Tanganyika and the vicinity of Lake Mweru (highest point, 7000-8000 ft.). Finally may be men- tioned the tract of elevated country between Lake Bangweulu and the river Luapula, and between Lake Bangweulu and the basin of the Luangwa; and also the Lukinga (Mushinga) or Ugwara Moun- tains of North Western Rhodesia, which attain perhaps to altitudes of 6000 ft.*

The whole of this part of Africa is practically without any stretch of desert country, being on the whole favoured with an abundant rainfall. The nearest approach to a desert is the rather dry land to the east afnd north-east of Lake Mweru. Here, and in parts of the lower Shire district, the annual rainfall probably does 1 not exceed an average of 35 in. Elsewhere, in the vicinity of the highest mountains, the rainfall may attain an average of 75 in., in parts of Mount Mlanje possibly often reaching to 100 in. in the year. The average may be put at 50 in. per annum, which is also about the average rainfall of the Shire Highlands, that part of British Central Africa which at present attracts the greatest number of. European settlers.

Geology. -~ The whole formation is Archean and Primary (with a

few modern plutonic outbursts), and chiefly consists of granite, felspar, quartz, gneiss, schists, amphibolite and other Archean rocks, with Primary sandstones and limestones in the basin of Lake Nyasa (a great rift depression), the river Shire, and the regions within the northern watershed of the Zambezi river. Sandstones of Karroo age occur in the basin of the Luangwa (N.E. Rhodesia). . There are evidences of recent volcanic activity on the summit of the small Mlanje plateau (S.E. corner of the protectorate: here there are two extinct craters with a basaltic outflow) , and at the north end of Lake Nyasa and the eastern edge of the Tanganyika plateau. Here there are many craters and much basalt, or even lava; also hot springs.

Metals and Minerals. — Gold has been found in the Shire Highlands, in the hills along the Nyasa-Zambezi waterparting, and in the mountainous region west of Lake Nyasa; silver (galena, silver-lead) in the hills of the Nyasa-Zambezi waterparting ; lead in the same district ; graphite in the western basin of Lake Nyasa ; copper (pyrites and pure ore) in the west Nyasa region and in the hills of North Western and North Eastern Rhodesia; iron ore almost universally ; mica almost universally ; coal occurs in the north and west Nyasa districts (especially in the Karroo sandstones of the Rukuru valley), and perhaps along the Zambezi-Nyasa waterparting; limestone in the Shire basin; malachite in south-west Angoniland and North Western Rhodesia; and perhaps petroleum in places along the Nyasa-Zambezi waterparting. (See also Rhodesia.)

Flora. — No part of the country comes within the forest region of West Africa. The whole of it may be said to lie within the savannah or park-like division of the continent. As a general rule, the landscape is of a pleasing and attractive character, well covered with vegetation and fairly well watered. Actual forests of lofty trees, forests of a West African, type, are few in number, and are chiefly limited to portions of the Nyika, Angoniland and Shire Highlands plateaus, and to a few nooks in valleys near the south end of Tangan- yika. Patches of forest of tropical luxuriance may still be seen on the slopes of Mounts Mlanje and Chiradzulu. On the upper plateaus of Mount Mlanje there are forests of a remarkable conifer (Widdring- tonia whytei), a relation of the cypress, which in appearance resembles much more the cedar, and is therefore wrongly styled the "Mlanje cedar." This tree is remarkable as being the most northern form of a group of yew-like conifers confined otherwise to South Africa (Cape Colony). Immense areas in the lower-lying plains are covered by long, coarse grass, sometimes reaching lo ft. in height. Most of the West African forest trees are represented in British

Central Africa. A full list of the known flora has been compiled by Sir W. Thiselton- Dyer and his assistants at Kew, and is given in the first and second editions of Sir H. H. Johnston's work on British Central Africa. Amongst the principal vegetable products of the country interesting for commercial purposes may be mentioned tobacco (partly native varieties and partly introduced) ; coffee (wild coffee is said to grow in some of the mountainous districts, but the actual coffee cultivated by the European settlers h&s been introduced from abroad) ; rubber —derived chiefly from the various species of Landolphia, Ficus, Clitandra, Carpodinus and Conopharygia, and from other apoey- naceous plants; the Strophanthus pod (furnishing a valuable drug); ground-nuts (Arachis and Voandzeia) ; the cotton plant; all African cultivated cereals (Sorghum,' Pennisetum, maize, rice, wheat —cultivated chiefly by Europeans — and Eleusine) ; and 3ix species of palms— the oil palm on the n6rth-west (near Lake Nyasa, at the south end of Tanganyika and on the Luapula), the Borassus and Hyphaene, Phoenix (or wild date), Raphia and the coco-nut palm. The last named was introduced by Arabs and Europeans, and is found on Lake Nyasa and on the lower Shire. Most of the European vegetables have been introduced, and thrive exceedingly well, especially the potato. The mango has also been introduced from India, and has taken to the Shire Highlands as to a second home. Oranges, lemons and limes have been planted by Europeans and Arabs in a few districts. European fruit threes do not ordinarily flourish, though apples are grown to some extent at Blantyre. The vine hitherto has proved a failure. Pineapples give the best result

among cultivated fruit, and strawberries do well in the higher districts. In the mountains the native wild brambles give black-berries of large size and excellent flavour. The vegetable product through which this protectorate first attracted trade was coffee, the export of which, however, has passed through very disheartening fluctuations. In 19,05-1906, 773,919 lb of coffee (value £16,123) were exported ; but during this twelve months the crop of cotton — quite a newly developed product, rose to 776,621 lb, from 285,185 lb in 1904ˆ1905. An equally marked increase in tobacco and ground- nuts (Arachis) has taken place. Beeswax is a rising export.

Fattna. — The fauna is on the whole very rich. It has affinities in a few respects with the West African forest region, but differs slightly from the countries to the north and south by the absena of such animals as prefer drier climates, as for instance the oryx antelopes, gazelles and the ostrich. There is a complete blank in the distribution of this last between the districts to the south of the Zambezi and

those of East Africa between Victoria Nyanza and the Indian Ocean. The giraffe is found in the Luanga Valley ; it is also met with in the extreme north-east of the country. The ordinary African rhinoceros is still occasionally, but very rarely, seen in the Shire Highlands, The African elephant is fairly common throughout the whole territory. Lions and leopards are very abundant.; the zebra is still found in great numbers, and belongs to the Central African variety of Burchell's zebra, which is completely striped down to the hoofs, and is intermediate in many particulars between the true zebra of the mountains and Burchell's zebra of the plains. The principal antelopes found are the sable and the roan (Hippo- tragus), five species Of Cobus or waterbuck (the puku, the Senga puku, the lechwe, Crawshay's waterbuck and the common water- buck); the pallah, tsessebe (Damdliscus), hartebeest, brindled gnu (perhaps two species) ,several duykers(including the large Cephalophus sylvicultrix)',khpspringer , oribi, steinbok and reedbuck. Among tragelaphs are two or more bushbucks, the inyala, the water tragelaph (Limnotragus selousi) ,,the kudu and Livingstone's eland. The only buffalo is the common Cape species. The hyaena is the spotted kind. The hunting dog is present. There are some seven species of monkeys, including two baboons and one colobus. The hippopotamus is found in the lakes and rivers, and all these sheets of water are infested with crocodiles, apparently belonging to but one species, the common Nile crocodile.

Inhabitants. — The human race is represented by only one indigenous native type — the Negro. No trace is anywhere found of a Hamitic intermixture (unless perhaps at the north end of Lake Nyasa, where the physique of the native Awankonde recalls that of the Nilotic negro). Arabs from Zanzibar have settled in the country, but not, as far as is known, earlier than the beginning of the 19th century. As the present writer takes the general term " Negro " to include equally the Bantu, Hottentot, Bushman and Congo Pygmy, this designation, will cover all the natives of British Central Africa. The Bantu races, however, exhibit in some parts signs of Hottentot or Bushman intermixture, and there are legends in some mountain districts, especially Mount Mlanje, of the former existence of unmixed Bushman tribes, while Bushman stone implements are found at the south end of Tanganyika. At the present day the popula- tion is, as a rule, of a black or chocolate-coloured Negro type, and belongs, linguistically, entirely and exclusively to the Bantu family. The languages spoken offer several very interesting forms of Bantu speech, notably in the districts between the north end of Lake Nyasa, the south end of Lake Tanganyika, and the river Luapula. In the

more or less plateau country included within these geographical limits, the Bantu dialects are of an archaic type, and to the present writer it has seemed as though one of them, Kibemba or Kiwemba, came near to the original form of the Bantu mother-language, though not nearer than the interesting Subiya of southern Barotseland. Through dialects spoken on the west and north of Tanganyika, these languages of North Eastern Rhodesia and northern Nyasaland and of the Kafukwe basin are connected with the Bantu languages of Uganda. They also offer a slight resemblance to Zulu-Kaffir, and it would seem as though the Zulu-Kaffir race must have come straight down from the countries to the north-east of Tanganyika, across the Zambezi, to their present home. Curiously enough, some hundreds of years after this southward migration, intestine wars and conflicts actually determined a north-eastward return migration of Zulus. From Matabeleland, Zulu tribes crossed the Zambezi at various periods (commencing from about 1820), and gradually extended their ravages and dominion over the plateaus to the west, north and north-east of Lake Nyasa. The Zulu language is still spoken by the dominating caste in West

Nyasaland (see further Zultjland: Ethnology; Rhodesia: Ethnology; and Yaos). As regards foreign settlers in this part of Africa, the Arabs may be mentioned first, though they are now met with only in very small numbers. The Arabs un- doubtedly first heard of this rich country — rich not alone in natural products such as ivory, but also in slaves of good quality — from their settlements near the delta of the river Zambezi, and these settlements may date back to an early period, and might be coeval with the suggested pre-Islamite Arab settlements in the gold-bearing regions of South East Africa. But the Arabs do not seem to have made much progress in their penetration of the country in the days before firearms; and when firearms came into use they were for a long time forestalled by the Portuguese, who ousted them from the Zamr bezi. But about the beginning of the 19th century the increasing power and commercial enterprise of the Arab sultanate of Zanzibar caused the Arabs of Maskat and Zanzibar to inarch inland from the east coast. They gradually founded strong slave-trading settlements on the east and west coasts of Lake Nyasa, and thence westwards to Tanganyika and the Luapula. They never came in great numbers, however, and, except here and there on the coast of Lake Nyasa, have left no mixed de- scendants hi the population. The total native population of all British Central Africa

is about 2,000,000, that of the Nyasaland Protectorate being officially estimated in 1907 at 927,355. Of Europeans the protectorate possesses about 600 to 700 settlers, including some 100 officials. (For the European population of the other territories, see Rhodesia.) The Europeans of British Central Africa are chiefly natives of the United Kingdom or South Africa, but there are a few Germans, Dutchmen, French, Italians and Portuguese. . The protectorate has also attracted a number of Indian traders (over 400), besides whom about 150 British Indian soldiers (Sikhs) are employed as the nucleus of an armed force. 1

Trade and Communications. — The total value of the trade of the protectorate in the year 1899-1900 was £255,384, showing an increase of 75 % on the figures for the previous year, 1898-1899. Imports were valued at £176,035, an increase of 62 %, and exports at £79,449, an increase 01109 %. In 1905-1906 the imports reached £222,581 and the exports £56,778. The value of imports into the Rhodesian provinces during the same period was about £50,000, excluding railway material, and the exports £18,000. The principal exports are (besides minerals) coffee, cotton, tobacco, rubber and ivory. A number of Englishmen and Scotsmen (perhaps 200) are settled, mainly in the Shire Highlands, as coffee planters.

From the Chinde mouth of the Zambezi to Port Herald on the lower Shire communication is maintained by light-draught steamers, though in the dry season (April-November) steamers cannot always ascend as far as Port Herald, and barges have to be used to complete the voyage. A railway runs from Port Herald to Blantyre, the commercial capital of the Shire Highlands. The " Cape to Cairo " railway, which crossed the Zambezi in 1905 and the Kafukwe in 1906, reached the Broken Hill mine in 1907, and in 1909 was ˆcontinued to the frontier of Belgian Congo. There are regular services by steamer between the ports on Lakes Nyasa and Tanganyika. The African trans-continental telegraph line (founded by Cecil Rhodes) runs through the protectorate, and a branch line has been established from Lake Nyasa to Fort Jameson, the present head- quarters of the Chartered Company in North Eastern Rhodesia.

Towns. — The principal European settlement or town is Blantyre (?.».), at a height of about 3000 ft. above the sea, in the Shire Highlands. This place was named after Livingstone's birthplace, and was founded in 1876 by the Church of Scotland mission. The government capital of the protectorate, however, is Zomba, at the base of the mountain of that name. Other townships or sites of European settlements are Port Herald (on the lower Shire), Chiromo (at the

junction of the Ruo and the Shire), Fort Anderson (on. Mount Mlanje), Fort Johnston (near the outlet of the river Shire from the south end of Lake Nyasa), Kotakota and Bandawe (on the west coast of Lake Nyasa), Likoma (on an island off the east coast of Lake Nyasa), Karonga (on the north-west coast of Lake Nyasa), Fife (on the Nyasa-Tanganyika plateau), Fort Jameson (capital of N.E. Rhodesia, near the river Luangwa), Abercorn (on the south end of Lake Tanganyika), Kalungwisi (on the east coast of Lake Mweru) and Fort Rosebery (near the Johnston Falls on the Luapula [upper Congo]).

Administration. — The present political divisions of the country

1 The organized armed forces and police are under the direction of the imperial government throughout British Central Africa, and number about 880 (150 Sikhs, 730 negroes and 14 British officers).

are as follows r— The Nyasaland Protectorate, i.e. the district surrounding Lake Nyasa and the Shire province, are administered directly under the imperial government by a governor, who acts under the orders of the colonial office. The governor is assisted by an executive council and by a nominated legislative council, which consists of at least three members. The districts to the westward, forming the provinces of North Eastern and North Western Rhodesia, are governed by two administrators of the British South Africa Chartered Company, in consultation with the governor of Nyasaland and the colonial office.*

History.— The history of the territory dealt with above is recent and slight. Apart from the vague Portuguese wanderings during the 16th and 17th centuries, the first European explorer of any education who penetrated into this country was the celebrated Portuguese official, Dr F. J. M. de Lacerda e Almeida, who journeyed from Tete on the Zambezi to the vicinity of Lake Mweru. But the real history of the country begins with the advent of David Livingstone, who in 1859 penetrated up the ShirS river and discovered Lake Nyasa. Livingstone's subse- quent journeys, to the sotlth end of Tanganyika, to Lake Mweru and to Lake Bangweulu (where he died in 1873), opened up this important part of South Central Africa and centred in it British interests in a very particular . manner. Livingstone's death was soon followed by the entry of various missionary societies, who commenced the evangelization of the country; and these missionaries, together with a few Scottish settlers, steadily opposed the attempts of the Portuguese to extend their sway in this direction from the adjoining provinces of Mozambique and of the Zambezi.

From Out of the missionary societies grew a trading company, the African Lakes Trading Corporation. This body came into conflict with a number of Arabs who had established themselves on the north end of Lake Nyasa. About 1885 a struggle began between Araband Briton for the possession of the country, which was not terminated until the year 1896. The African Lakes Corporation in its unofficial war enlisted volunteers, amongst whom were Captain (afterwards Sir F. D.) Lugard and Mr (afterwards Sir) Alfred Sharpe. Both these gentlemen were wounded, and the operations they undertook were not crowned with complete success. In 1 889 Mr (afterwards Sir) H. H. Johnston was sent out to endeavour to effect a possible arrangement of the dispute between the Arabs and the African Lakes Corporation, and also to ensure the protection of friendly native chiefs from Portuguese aggression beyond a certain point. The outcome of these efforts and the treaties made was the creation of the British protectorate and sphere of influence north of the Zambezi (see Africa; § 5). In 1891 Johnston returned to the country as imperial commissioner and consul-general. In the interval between 1889 and 1891 Mr Alfred Sharpe, on behalf of Cecil Rhodes, had brought a large part of the country into treaty with the British South Africa Company. These territories (Northern Rhodesia) were administered for four years by Sir Harry Johnston in connexion with the British Central Africa protectorate. Between 1891 and 1895 a long struggle continued, between the British authorities on the one hand and the Arabs and Mahommedan Yaos on the other, regarding the suppression of the slave trade. By the beginning of 1896 the last Arab stronghold was taken and the Yaos were completely reduced to submission. Then followed, during 1896-1898, wars with the Zulu (Angoni) tribes, who claimed to dominate and harass the native populations to the west of Lake Nyasa. The Angoni having been subdued, and the British South Africa Company having also quelled the turbulent Awemba and Bashu- kulumbwe, there is a reasonable hope of the country enjoying a settled peace and considerable prosperity. This prospect has been, indeed, already realized to a considerable extent, though the increase of commerce has scarcely been as rapid as was anticipated. In 1897, on the transference of Sir Harry Johnston to Tunis, the commissionership was conferred on Mr Alfred Sharpe, who was created a K.C.M.G. in 1903. In 1904 the administration of the protectorate, originally directed by the foreign office, was transferred to the coloriial office. In 1907, on the change in the title of the protectorate, the designation of the chief official was altered from commissioner to governor, and executive and legislative councils were established. The mineral

surveys and railway construction commenced under the foreign office were carried on vigorously under the colonial office. The increased revenue, from £51,000 in 1001-1002 to £76,000 in 1905-1906, for the protectorate alone (see also Rhodesia), is an evidence of increasing prosperity. Expenditure in excess of revenue is met by grants in aid from the imperial exchequer, so far as the Nyasaland Protectorate is concerned. The British South Africa Company finances the remainder. The native population is well disposed towards European rule, having, indeed, at all times furnished the principal contingent of the armed force with which the African Lakes Company, British South Africa Company or the British government endeavoured to oppose Arab, Zulu or Awemba aggression. The protectorate government maintains three gunboats on Lake Nyasa, and the British South Africa Company an armed steamer on Lake Tanganyika.

Unfortunately, though so rich and fertile, the land is not as a rule very healthy for Europeans, though there are signs of improvement in this respect. The principal scourges are black- water fever and dysentery, besides ordinary malarial fever, malarial ulcers, pneumonia and bronchitis. The climate is agreeable, and except in the low-lying districts is never unbear- ably hot; while on the high mountain plateaus frost frequently occurs during the dry season.

See Narrative of an Expedition to the Zambezi, &c, by David and Charles Livingstone (1865) ; Last Journals of David Livingstone, edited by the Rev. Horace Waller (1874); L. Monteith Fotheringham, Adventures in Nyasaland (1891); Henry Drummond, Tropical Africa (4th ed., 1891) ; Rev. D. C. Scott, An Encyclopaedic Dictionary of the Mang'anja Language, as spoken in British Central Africa (1891) ; Sir H. H. Johnston, British Central Africa (2nd ed., 1898) ; Miss A. Werner, The Natives of British Central Africa (1906); John Buchanan, The Shire Highlands (1885) ; Lionel Decle, Three Years in Savage Africa (1898); H. L. Duff, Nyasaland under the Foreign Office (1903) ; J. E. S. Moore, The Tanganyika Problem (1904) ; articles on North Eastern and North Western Rhodesia (chiefly by Frank Melland) in the Journal of the African Society (1902-1906) ; annual Reports on British Central Africa published by the Colonial Office; various linguistic works by Miss A. Werner, the Rev. Govan Robertson, Dr R. Laws, A. C. Madan, Father Torrend and Monsieur E. Jacottet. (H. H. J.)

BRITISH COLUMBIA, the western province of the Dominion of Canada. It is bounded on the east by the continental water- shed in the Rocky Mountains, until this, in its north-westerly course, intersects 120 W., which is followed north to 60° N., thus including within the province a part of the Peace river country to the east of the mountains. The southern boundary is formed by 49° N. and the strait separating Vancouver Island from the state of Washington. The northern boundary is 60° N., the western the Pacific Ocean, upon which the province fronts for about 600 m., and the coast strip of Alaska for a further distarice of 400 m. Vancouver Island and the Queen Charlotte Islands, as well as the smaller islands lying off the western coast of Canada, belong to the province of British Columbia.

Physical Features. — British Columbia is essentially a mountainous country, for the Rocky Mountains which in the United States lie to the east of the Great Basin, on running to the north bear toward the west and approach the ranges which border the Pacific coast. Thus British Columbia comprises practically the entire width of what has been termed the Cordillera or Cordilleran belt of North America, between the parallels of latitude above indicated. There are two ruling mountain systems in this belt — the Rocky Mountains proper on the north-east side, and the Coast Range on the south-west or Pacific side. Between these are subordinate ranges to which various local names have been given, as well as the " Interior Plateau " — an elevated tract of hilly country, the hill summits having an accordant altitude, which lies to the east of the Coast Range. The several ranges, having been produced by successive foldings of the earth's crust in a direction parallel to the border of the Pacific Ocean, have a common trend which is south-east and north-west. Vancouver Island and the Queen Charlotte Islands are remnants of still another mountain range, which runs parallel to the coast but is now almost Entirely submerged beneath the waters of the Pacific. The province might be said to consist of a series of parallel mountain ranges with long narrow valleys lying between them.

The Rocky Mountains are composed chiefly of palaeozoic sediments ranging in age from the Cambrian to the Carboniferous, with sub-ordinate infolded areas of Cretaceous which hold coal. The average height of the range along the United States boundary is 8000 ft., hut the range culminates between the latitudes of 51° and 53°, the Mghest peak in the Canadian Rockies being Mount Robson, 13,700

ft., although the highest peak in British Columbia is Mount Fair-weather on the International Boundary, which rises to 15,287 ft. Other high peaks in the Rocky Mountains of Canada are Columbia,

12,740 ft.; Forbes, 12,075; Assiniboine, 11,860; Bryce. 11,686; Temple, 11,626; Lyell, 11,463. There are a number of passes over the Rocky Mountains, among which may be mentioned, beginning from the south, the South Kootenay or Boundary Pass, 7100 ft.; the Crow's Nest Pass, 5500 (this is traversed by the southern branch of the Canadian Pacific railway and crosses great coal fields) ; the Kicking Horse or Wapta Pass, 5300 (which is traversed by the main line of the Canadian Pacific railway) ; the Athabasca Pass, 6025 ; the Yellow Head Pass, 3733 (which will probably be used by the Grand Trunk Pacific railway); the Pine River Pass, 2850; and the Peace River Pass, 2000, through which the Peace river flows.

The Coast Range, sometimes called the Cascade Range, borders the Pacific coast for 900 m. and gives to it its remarkable character. To its partially submerged transverse valleys are due the excellent harbours on the coast, the deep sounds and inlets which penetrate far inland at many points, as well as the profound and gloomy fjords and the stupendous precipices which render the coast line an exaggerated reproduction of that of Norway. The coast is, in fact, one of the most remarkable in the world, measuring with all its indentations 7000 m. in the aggregate, and being fringed with an archipelago of innumerable islands, of which Vancouver Island and the Queen Charlotte Islands are the largest.

Along the south-western side of the Rocky Mountains is a very remarkable valley of considerable geological antiquity, in which some seven of the great rivers of the Pacific slope, among them the Kootenay, Columbia, Fraser and Finlay, flow for portions of their upper courses. This valley, which is from I to 6 m. in width, can be traced continuously for a length of at least 800 m. One of the most important rivers of the province is the Fraser, which, rising in the Rocky Mountains, flows for a long distance to the north-west, and then turning south eventually crosses the Coast Range by a deep canton-like valley and empties into the Strait of Georgia, a few miles south of the city of Vancouver. The Columbia, which rises farther south in the same range, flows north for about 150 m., crossing the main line of the Canadian Pacific railway at Donald, and then bending abruptly back upon its former course, flows south, recrossing the Canadian Pacific railway at Revelstoke, and on through the Arrow Lakes in the Kootenay country into the United States, emptying into the Pacific Ocean at Astoria in the state of Oregon. These lakes, as well as the other large lakes in southern British Columbia, remain open throughout the winter. In the north-western part of the province the Skeena flows south-west into the Pacific, and still farther to the north the Stikine rises in British

Columbia, but before entering the Pacific crosses the coast strip of Alaska. The Liard, rising in the same district, flows east and falls into the Mackenzie, which empties into the Arctic Ocean. The headwaters of the Yukon are also situated in the northern part of the province. All these rivers are swift and are frequently interrupted by rapids, so that, as means of communication for com- mercial purposes, they are of indifferent value. Wherever lines of railway are constructed, they lose whatever importance they may have held in this respect previously.

At an early stage in the Glacial period British Columbia was covered by the Cordilleran glacier, which moved south-eastwards and north-westwards, in correspondence with the ruling features of the country, from a gathering-ground situated in the vicinity of the 57th parallel. Ice from this glacier poured through passes in the coast ranges, and to a lesser extent debouched upon the edge of the great plains, beyond the Rocky Mountain range. The great valley between the coast ranges and Vancouver Island was also occupied by a glacier that moved in both directions from a central point in the vicinity of Valdez Island. The effects of this glacial action and of the long periods of erosion preceding it and of other physiographic changes connected with its passing away, have most important bear- ings on the distribution and character of the gold-bearing alluviums of the province.

Climate. — The subjoined figures relating to temperature and pre-cipitation are from a table prepared by Mr R. F. Stupart, director of the meteorological service. The station at Victoria may be taken as representing the conditions of the southern part of the coast of British Columbia, although the rainfall is much greater on exposed parts of the outer coast. Agassiz represents the Fraser delta and Kamloops the southern interior district. The mean temperature naturally decreases to the northward of these selected stations, both along the coast and in the interior, while the precipitation increases. The figures given for Port Simpson are of interest, as the Pacific terminus of the Grand Trunk Pacific railway will be in this vicinity.

Fauna. — Among the larger mammals are the big-horn or mountain sheep (Ons canadensis) , the Rocky Mountain goat (Mazama montana), the grizzly bear, moose, woodland caribou, black- tailed or mule deer, white-tailed deer, and coyote. All these are to be found only on the mainland. The black bear, wolf, puma, lynx, wapiti, and Columbian or coast deer are common to parts of both mainland and islands. Of marine mammals the most characteristic are the sea-lion, fur- seal, sea-otter and harbour-seal. About 340 species of birds are

known to occur in the province, among which, as of special interest, may be mentioned the burrowing owl of the dry, interior region, the

Mean Temp., Fahr.

Absolute Temperature.

Rainfall — Inches.

Coldest Month.

Warmest Month.

Average Annual.

Highest.

Lowest.

Wettest Month.

Driest Month.

Average Annual.

Victoria ‘ . . ’ . Agassiz s . . . . Kamloops 3 . . . Port Simpson 4 .

Jan. 37-5° Jan. 33-0° Jan. 24-2° Jan. 34-9°

July 6o-3°

Aug. 64-7° Aug. 68-5° Aug. 56-9°

48-8° 48-9° 47-1° 45-i°

9 °o K

IOI°

88°

-l°

~ <

-10°

Dec. 7-98 Dec. 9-43 July i-6i Oct. 12-42

July -4 July 1-55 April -37 June 4-37

37-77 66-85 11-46 94-63

American magpie, Steller's jay and a true nut-cracker, Clark's crow (Picicorvus columbianus) . True jays and orioles are also well represented. The gallinaceous birds include the large blue grouse of the coast, replaced in the Rocky Mountains by the dusky grouse. The western form of the " spruce partridge " of eastern Canada is also abundant, together with several forms referred to the genus Bonasa, generally known as " partridges " or ruffed grouse. Ptarmigans also abound in many of the higher mountain regions. Of the Anatidae only passing mention need be made. During the spring and autumn migrations many species are found in great abundance, but in the summer a smaller number remain to breed, chief among which are the teal, mallard, wood duck, spoon-bill, pin-tail, buffle-head, red-head, canvas-back, scaup-duck, &c.

Area and Population. — The area of British Columbia is 357,600 sq. m., and its population by the census of 1901 was 190,000. Since that date this has been largely increased by the influx of miners and others, consequent upon the discovery of precious metals in the Kootenay, Boundary and Atlin districts. Much of this is a floating population, but the opening up of the valleys by railway and new lines of steamboats, together with the settlements made in the vicinity of the Canadian Pacific railway, has resulted in a considerable increase of the permanent population. The white population comprises men of many nationalities. There is a large Chinese population, the census of 1901 returning 14,201. The influx of Chinamen has, however, practically ceased, owing to the tax of $500 per head imposed by the government of the dominion. Many Japanese have also come in. The Japanese are engaged chiefly in lumbering and fishing, but the Chinese are found everywhere in the province. Great objection is taken by the white population to the increasing number of " Mongolians," owing to their competition with whites in the labour markets. The Japanese do not appear to be so much disliked, as they adapt themselves to the ways of white men, but they are equally objected to on the score of cheap labour; and in 1907-1908 considerable friction occurred with the Dominion government over the Anti- Japanese attitude of British Columbia, which was shown in some rather serious riots. In the census of 1901

the Indian population is returned at 25,488; of these 20,351 are professing Christians and 5137 are pagans. The Indians are divided into very many tribes, under local names, but fall naturally on linguistic grounds into a few large groups. Thus the southern part of the interior is occupied by the Salish and Kootenay, and the northern interior by the Tinneh or Athapackan people. On the coast are the Haida, Tsimshian, Kwakiatl, Nootka, and about the Gulf of Georgia various tribes related to the Salish proper. There is no treaty with the Indians of British Columbia, as with those of the plains, for the relinquishment of their title to the land, but the govern- ment otherwise assists them. There is an Indian superintendent at Victoria, and under him are nine agencies throughout the province to attend to the Indians — relieving their sick and destitute, supplying them with seed and implements, settling their disputes and administering justice. The Indian fishing stations and burial grounds are reserved, and other land has been set apart for them for agricultural and pastoral purposes. A number of schools have been established for their education. They were at one time a dangerous element, but are now quiet and peaceable.

The chief cities are Victoria, the capital, on Vancouver Island; and Vancouver on the mainland, New Westminster on the Fraser and Nanaimo on Vancouver Island. Rossland and

1 48°24'N., 123'

2 49 14' N., 121'

*3 50° 41' N., 120' * 54° 34' N., 130'*

19' W., height 85 ft. 31' W., height 52 ft. 29' W., height 1 193 ft. 26' W., height 26 ft.

Nelson in West Kootenay, as well as Fernie in East Kootenay, and Grand Forks in the Boundary district, are also places of importance.

Mining. — Mining is the principal industry of British Columbia. The country is rich in gold, silver, copper, lead and coal, and has also iron deposits. From 1894 to 1904 the mining output increased from $4,225,717 to $18,977,359. In 1905 it had reached $22,460,295. The principal minerals, in order of value of output, are gold, copper, coal, lead and silver. Between 1858 — the year of the placer discoveries on the Fraser river and in the Cariboo district — and 1882, the placer yields were much heavier than in subsequent years, running from one to nearly four million dollars annually, but there

was no quartz mining. Since 1899 placer mining has increased considerably, although tSe greater part of the return has been from lode mining. The Rossland, the Boundary and the Kootenay districts are the chief centres of vein-mining, yielding auriferous and cupriferous sulphide ores, as well as large quantities of silver-bearing lead ores. Ores of copper and the precious metals are being prospected and worked also, in several places along the coast and on Vancouver Island. The mining laws are liberal, and being based on the experience gained in the adjacent mining centres of the Western States, are convenient and effective. The most important smelting and reducing plants are those at Trail and Nelson in the West Kootenay country, and at Grand Forks and Greenwood in the Boundary district. There are also numerous concentrating plants. Mining machinery of the most modern types is employed wherever machinery is required.

The province contains enormous supplies of excellent coal, most of which are as yet untouched. It is chiefly of Cretaceous age. The producing collieries are chiefly on Vancouver Island and on the western slope of the Rockies near the Crow's Nest Pass in the extreme south-eastern portion of the provinces. Immense beds of high grade bituminous coal and semi-anthracite are exposed in the Bulkley Valley, south of the Skeena river, not far from the projected line of the Grand Trunk Pacific railway. About one-h'alf the coal mined is exported to the United States.*

Fisheries. — A large percentage of the commerce is derived from the sea, the chief product being salmon. Halibut, cod (several varieties), oolachan, sturgeon, herring, shad and many other fishes are also plentiful, but with the exception of the halibut these have not yet become the objects of extensive industries. There are several kinds of salmon, and they run in British Columbia waters at different seasons of the year. The quinnat or spring salmon is the largest and best table fish, and is followed in the latter part of the summer by the sockeye, which runs in enormous numbers up the Fraser and Skeena rivers. This is the fish preferred for canning. It is of brighter colour, more uniform in size, and comes in such quantities that a constant supply can be reckoned upon by the canneries. About the mouth of the Fraser river from 1800 to 2600 boats are occupied during the run. There is an especially large run of sockeye salmon in the Fraser river every fourth year, while in the year immediately following there is a poor run. The silver salmon or cohoe arrives a little later than the sockeye, but is not much used for packing except when required to make up deficiencies. The dog-salmon is not canned, but large numbers are caught by the Japanese, who salt them for export to the

Orient. The other varieties are of but little commercial importance at present, although with the increasing demand for British Columbia salmon, the fishing season is being extended to cover the runs of all the varieties of this fish found in the waters of the province.

Great Britain is the largest but not the only market for British Columbia salmon. The years vary in productiveness, 1901 having been unusually large and 1903 the smallest in eleven years, but the average'pack is about 700,000 cases of forty-eight i-lb tins, the greater part of all returns being from the Fraser river canneries, the Skeena river and the Rivers Inlet coming next in order. There are between 60 and 70 canneries, of which about 40 are on the banks of

the Fraser river. There is urgent need for the enactment of laws restricting the catch of salmon, as the industry is now seriously threatened. The fish oils are extracted chiefly from several species of dog-fish; and sometimes from the basking shark, as well as from the oolachan, which is also an edible fish. , . ' ; i

The fur-seal fishery is an important industry, though apparently a declining one. Owing to the scarcity of seals and international difficulties concerning pelagic sealing in Bering Sea,where the greatest number have been taken, the business of seal-hunting is losing favour. Salmon fish-hatcheries have been established on the chief rivers frequented by these fish. Oysters and lobsters from the Atlantic coast have been planted in British Columbia waters.

Timber.'— The province is rich in forest growth, and there is a steady demand for its lumber in the other parts of Canada as well as in South America, Africa, Australia and China. The following is a list of some of the more important trees — large leaved maple (Acer macrophyUum) , red alder (Alnus rubra), western larch {Larix occidenthUs), white spruce (Picea alba), Engellmann's spruce (Picea Engelmanii) , Menzies's spruce (Picea sitchensis) , white mountain pine (Pinus monticola), 'black pine (Pinus murrayana), yellow pine (Pinus ponderosa), Douglas fir (Pseudotsuga Douglasiil, western white oak (Quercusgarryana), giant cedar (Thuya gigantea), yellow cypress or cedar (Thuya excelsa), western hemlock (Tsuga mertensiana). The principal timber of commerce is the Douglas fir. The tree is often found 300 ft. high and from 8 to 10 ft. in diameter. The wood is tough and strong and highly valued for ships' spars as

well as for building purposes. Red or giant cedar, which rivals the Douglas fih in girth, is plentiful, and is used for shingles as well as for interior work. The western white spruce is also much employed for various purposes. There are about eighty sawmills, large and small, in the province. The amount of timber cut on Dominion government lands in 1904 was 22,760,222 ft., and the amount cut on provincial lands was 325,271,568 ft., giving a total of 348,031,790 ft. In 1905 the cut on dominion lands exceeded that in 1904, while the amount cut on provincial lands reached 45°.3 8 5.554 ft- The cargo shipments of lumber for the years 1904 and 1905 were as follows :—

1904- I9°5-

Ft. /Ft.

United Kingdom . . . 7,498,301 13,690,869

South America .... 15,647,808 13.332,993 .

Australia 10,045,094 11,596,482

South Africa 2,517,154 7,093,681

China and Japan . . . 4,802,426 4,787,784

Germany 983.342

Fiji Islands 308,332 29,949

France 1,308,662

42.199.777

51,515,100

There is a very large market for British Columbia lumber in the western provinces of Canada.

Agriculture.— Although mountainous in character the province contains many tracts of good farming land. These lie in the long valleys between the mountain ranges of the interior, as well as on the lower slopes of the mountains and on the deltas of the rivers running out to the coast. On Vancouver Island also there is much good farming land. The conditions are in most places Best suited to mixed farming; the chief crops raised are wheat, oats, potatoes and hay. Some areas are especially suited for cattle and sheep raising, among

which may be mentioned the Yale district and the country about Kamloops. Much attention has been given to fruit raising, especially in the Okanagan valley. Apples, plums and cherries are grown, as well as peaches, apricots grapes and various small fruits, notably strawberries. All these are of excellent quality. Hops are also cultivated. A large market for this fruit is opening up in the rapidly growing provinces of Alberta and Saskatchewan.*

Imports and Exports. — For the year ending June 30th 1905 the total exports and imports (showing a slight gradual increase on the two preceding years) were valued at $16,677,882 and $12,565,019 respectively. The exports were classified as follows: — Mines, $9,777,423; fisheries, $2,101,533; forests, $1,046,718; animals, $471,231; agriculture, $119,426; manufactures, $1,883,777; miscellaneous, $1,106,643; coin and bullion, $171,131.

Railways. — The Pacific division of the Canadian Pacific railway enters British Columbia through the Rocky Mountains on the east and runs for about 500 m. across the province before reaching the terminus at Vancouver, A branch of the same railway leaves the main line at Medicine Hat, and running to the south-west, crosses the Rocky Mountains through the Crow's Nest Pass,_ and thus enters British Columbia a short distance north of the United States boundary. This continues across the province, running approximately parallel to the boundary as far as Midway in what is known as the Boundary district. The line has opened up extensive coal fields and crosses a productive mining district. On Vancouver Island there are two railways, the Esquimalt & Nanaimo railway (78 jn.) connecting the coal fields with the southern ports, and the Victoria & Sydney railway, about 16 m. in length. The Great Northern has also a number of short lines in the southern portion of the province, connecting with its system in the United States. In 1905 there were

1627 m. of railway in the province, of which 1 187 were owned or controlled by the Canadian Pacific railway.

Shipping. — The Canadian Pacific Railway Company has two lines of mail steamer running from Vancouver and Victoria: (l) the Ernpress line, which runs to Japan and China once in three weeks, and (2) the Australian line to Honolulu, Fiji and Sydney, once a month. The same company also has a line of steamers running to Alaska, as well as a fleet of coasting steamers.

Government: — The province is governed by a lieutenant-governor, appointed by the governor-general in council for five years, but

subject to removal, for cause, an executive council of five ministers, and a single legislative chamber. The executive council is appointed by the lieutenant-governor on the advice of the first minister, and retains office so long as it enjoys the support of a majority of the legislature. The powers of the lieutenant-governor in regard to the provincial government are analogous to those of governor-general in respect of the dominion government.

The British North America Act (1867) confederating the colonies,, defines the jurisdiction of the provincial legislature as distinguished: from that of the federal parliament, but within its own jurisdiction the province makes the laws for its own governance. The act of the legislature may be disallowed, within one year of its passage, by the governor-general in council, and is also subject to challenge as to its legality in the supreme court of Canada or on appeal to the juridical committee of the privy council of the United Kingdom. British Columbia sends three senators and seven members to the lower house of the federal parliament, which sits at Ottawa.

Justice. — There is a supreme court of British Columbia presided over by a chief justice and five puisne judges, and there are also a number of county courts. In British Columbia the supreme court has jurisdiction in divorce cases, this right having been invested in the ,- colony before confederation.

Religion and Education. — In 1901 the population was divided by creeds as follows: Church of England, 40,687; Methodist, 25,047; Presbyterian, 34,081; Roman Catholic, 33,639; others, 40,197; not stated, 5003; total, 178,654. The educational system of British Columbia differs slightly from that of other provinces of Canada. There are three classes of schools — common, graded and high — all maintained by the government and all free and undenominational. There is only one college in the province, the " McGill University College of British Columbia " at Vancouver, which is one of the colleges of McGill University, whose chief seat is at Montreal. The schools are controlled by trustees selected by the ratepayers of each school district, and there is a superintendent of education acting under the provincial secretary.

Finance. — Under the terms of union with Canada, British Columbia receives from the dominion government annually a certain contribution, which in 1905 amounted to $307,076. This, with provincial taxes on real property, personal property, income tax, sales of public land, timber dues, &c, amounted in the year 1905 to $2,920,461. The expenditure for the year was $2,302,417. The gross debt of the

province in 1905 was $13,252,097, with assets of $4,463,869, or a net debt of $8,788,228. These assets do not include new legislative buildings or other public works. , The income tax is on a sliding scale. In 1899 a fairly close estimate was made of the capital invested in the province, which amounted to $307,385,000, including timber, $100,000,000; railways and telegraphs, $47,500,000; mining plant and smelters, $10,500,000; municipal assessments, $45,000,000; provincial assessments, $51,500,000; in addition to private wealth, $280,000,000. There are branch offices of one or more of the Canadian banks in each of the larger towns.

History. — The discovery of British Columbia was made by the Spaniard Perez in 1774. With Cook's visit the geographical exploration of the coast began in 1778. Vancouver,in 1792-1794, surveyed almost the entire coast of British Columbia with much of that to the north and south, for the British government. The interior, about the same time, was entered by Mackenzie and traders of the N.W. Company, which in 182 1 became amalgamated with the Hudson's Bay Company. For the next twenty-eight years the Hudson's Bay Company ruled this immense territory with beneficent despotism. In 1849 Vancouver Island was proclaimed a British colony. In 1858, consequent on the discovery of gold and the large influx of miners, the mainland territory was erected into a colony under the name of British Columbia, and in 1866 this was united with the colony of Vancouver Island, under the same name. In 1 87 1 British Columbia entered the confederation and became part of the Dominion of Canada, sending three senators and six (now seven) members to the House of Commons of the federal parliament. One of the conditions under which the colony entered the dominion was the speedy construction of the Canadian Pacific railway, and in 1876 the non-fulfilment of this promise and the apparent indifference of the government at Ottawa to the representations of British Columbia created

I '" : VNVM3H0XVSSy.?-

,,ˆV— >

strained relations, which were only ameliorated when the construction of a transcontinental road was begun. In sub- sequent years the founding of the city of Vancouver by the G.P.R., the

establishment of the first Canadian steamship line to China and Japan, and that to Australia, together with the disputes with the United States on the subject of pelagic sealing, and the discovery of the Kootenay and Boundary mining districts, have been the chief events in the history of the province. Authorities. — Cook's Voyage to the Pacific Ocean (London, 1784) ; Vancouver, Voyage of Discovery to the Pacific Ocean (London, 1798); H. H. Bancroft's works, vol. xxxii., History of British Columbia (San Francisco, 1887); Begg's History of British Columbia (Toronto, 1894) ; Gosnell, Year Book (Victoria, British Columbia, 1897 and 1903) ; Annual Reports British Columbia Board of Trade (Victoria) ; A nnual Reports of Minister of Mines and other Depart- mental Reports of the Provincial and Dominion Governments; Catalogue of Provincial Museum (Victoria) ; Reports Geological Survey of Canada (from 1 87 1 to date) ; Reports of Canadian Pacific (Government) Surveys (1872-1880) ; Reports of Committee of Brit. Assn. Adv. Science on N.W. Tribes (1884-1895); Lord, Naturalist in Vancouver Island (London, 1866); Bering Sea Arbitration (re- print of letters to Times), (London, 1893); Report of Bering Sea Commission (London, Government, 1892); A. Metin, La Colombie Britannique (Paris, 1908). See also various works of reference under Canada. (G. M. D.; M. St J.; F. D. A.)

BRITISH EAST AFRICA, a term, in its widest sense, including all the territory under British influence on the eastern side of Africa between German East Africa on the south and Abyssinia and the Anglo-Egyptian Sudan on the north. It comprises the protectorates of Zanzibar, Uganda and East Africa. Apart from a narrow belt of coastland, the continental area belongs almost entirely to the great plateau of East Africa, rarely falling below an elevation of 2000 ft., while extensive sections rise to a height of 6000 to 8000 ft. From the coast lowlands a series of

steps with intervening plateaus leads to a broad zone of high ground remarkable for the abundant traces of volcanic action. This broad upland is furrowed by the eastern " rift-valley," formed by the subsidence of its floor and occupied in parts by lakes without outlet. Towards the west a basin of lower eleva- tion is partially occupied by Victoria Nyanza, drained north to the Nile, while still farther inland the ground again rises to a second volcanic belt, culminating in the Ruwenzori range. (See Zanzibar, and for Uganda protectorate see Uganda.) The present article treats of the East Africa protectorate only.

Topography. — The southern frontier, coterminous with the northern

frontier of German East Africa, runs north-west from the mouth of the Umba river in 4 40′ S. to Victoria Nyanza, which it strikes at 1° S., deviating, however, so as to leave Mount Kilimanjaro wholly in German territory. The eastern boundary is the Indian Ocean, the coast line being about 400 m : . On the north the protectorate is bounded by Abyssinia arid Italian Somaliland; on the west by Uganda. It has an area of about 240,000 sq. m., and a population estimated at from 2,000,000 to 4,000,000, including some 25,000 Indians and 3006 Europeans. Of the Europeans many are emigrants frorn South Africa; they include some hundreds .of Boer families.

The first of the parallel zones— the coast plain or ” Temborari “— is generally of insignificant width, varying from 2 to 10 m., except in the valleys of the main rivers. The shore line is broken by bays and branching creeks, often cutting off islands from the main- land. Such are Mvita or Mombasa in 4 = 4′ S., and the larger islands of Lamu, Manda and Patta (the Lamu archipelago), between 2° 20′ and 2°S. Farther north the coast becomes straighter, with the one indentation of Port Durnford in 1° 10′ S., but skirted sea- wards by a row of small islands. Beyond the coast plain the country rises in a generally well defined step or steps to an alti- tude of some 800 ft., forming the wide level plain called ” Nyika ” (uplands), largely composed of quartz. It con- tains large waterless areas, such as the Taru desert in the Mombasa district. The next stage in the ascent is marked by an intermittent line of mountains — gneissose or schistose — running generally north-north-west, sometimes in parallel chains, and representing the primitive axis of the continent. Their height varies from 5600 to 8000 ft. Farther inland grassy uplands extend to the eastern edge of the rift-valley, though varied with cultivated ground and forest, the former especially in Kikuyu, the latter between 0° and o” 40′ S. The most extensive grassy plains are those of Kapte or Kapote and Athi, between 1° and 2° S. The general altitude of these uplands, the surface of which is’ largely composed of lava, varies from 5000 to 8000 ft. This_ zone contains the highest elevations in British East Africa, including the volcanic pile of Kenya (q.v.) (17,007 ft.), Sattima (13,214 ft.) ‘arid Nandarua (about 12,900 ft.). The Sattima (Settima) range, or Aberdare Mountains, has a general elevation of fully 10,000 ft. To the west the fall to the rift-valley is marked by a line of cliffs, of which the best-defined portions are the Kikuyu escarpment (8000 ft.), just south of 1° S., and the Laikipia escarpment, on the equator. One of the main watersheds of East Africa runs close to the eastern wall of the rift-valley, separating the basins of inland drainage froni the rivers of the east coast, of which the two largest wholly within British East Africa are the

Sabaki and Tana, both separately noticed. The Guaso Nyiro rises in the hills north-west of Kenya and flows in a north-east direction. After a course of over 350 m. the river in about 1° N., 39 30′ E. is lost in a marshy expanse known as the Lorian Swamp.

The rift-valley, though with a generally level floor, is divided by transverse ridges into a series of basins, each containing a lake without outlet. The southernmost section within British East Africa is formed by the arid Dogilani plains, drained south towards German territory. At their north end rise the extinct volcanoes of Suswa (7800 ft.) and Longonot (8700), the latter on the ridge dividing off the next basin — that of Lake t>Iaivasha. This is a small fresh-water lake, 6135 ft. above the sea, measuring some 13 m. each way. Its basin is closed to the north by the ridge of Mount BurU, beyond which is the basin of the

still smaller Lakes Nakuro(5845ft.)andElmenteita (5860 ft.),followed in turn by that of Lakes Hannington and Baringo (q.v.). Beyond Baringo the valley is drained north into Lake Sugota, in 2 N., some 35 m. long, while north of this lies the much larger Lake Rudolf (q.v.), the valley becoming here somewhat less defined.

On the west of the rift-valley the wall of cliffs is best marked between the equator and i°S., where it is known as the Mau Escarp- ment, and about 1° N., where the Elgeyo Escarpment falls to a longitudinal valley separated from Lake Baringo by the ridge of Kamasia. Opposite Lake Naivasha the Mau Escarpment is over 8000 ft. high. Its crest is covered with a vast forest. To the south the woods become more open, and the plateau falls to anopen country drained towards the Dogilani plains. On the west the cultivated districts of Sotik and Lumbwa, broken by wooded heights, fall towards Victoria Nyanza. The Mau plateau reaches a height of 9000 ft. on the equator, north of which is the somewhat lower Nandi country, well watered and partly forested. In the treeless plateau of Uasin Gishu, west of Elgeyo, the land again rises to a height of over 8000 ft., and to the west of this is the great mountain mass of Elgon (q.v.). East of Lake Rudolf and south of Lake Stefanie is a large waterless steppe, mainly volcanic in character, from which rise mountain ranges. The highest peak is Mount Kanjora, 6900 ft. high. South of this arid region, strewn with great lava stones, are tha Rendile uplands, affording pasturage for thousands of camels. Running north-west and south-

east between Lake Stefanie and the Daua tributary of the Tuba is a mountain range with a steep escarp- ment towards the south. It is known as the Goro Escarpment, and at its eastern end it forms the boundary between the protectorate and Abyssinia. South-east of it the country is largely level bush covered plain, mainly waterless.

[Geology. — The geological formations of British East Africa occur in four regions possessing distinct physiographical features. The coast plain, narrow in the south and rising somewhat steeply, consists of recent rocks. The foot plateau which succeeds is composed of sedimentary rocks dating from Trias to Jurassic. The ancient plateau commencing at Taru extends to the borders of Kikuyu and is composed of ancient crystalline rocks on which immense quantities of volcanic rocks — post- Jurassic to Recent — have accumulated to form the volcanic plateau of Central East Africa.

The formations recognized are given in the following table : — Sedimentary. (1. Alluvium and superficial sands.

Recent . . -j 2. Modern lake deposits, living coral rock.

(3. Raised coral rock, conglomerate of Mom- basa Island.

di • <.,,,,,,..,, (4- Gravels with flint implements.

*Pleistocene . } * G , adal bgds of Keny ˆ*

Jurassic . . 6. Shales and limestones of Changamwe.

Karroo . Carboniferous ?

(7. Flags and sandstones. • ■ } B. ~

Grits and shales of Masara and Taru. 9. Shales of the Sabaki river.

. , (10. Schists and quartzites of Nandi.

Archaean . . J u. Gneisses, schists, granites. Igneous and Volcanic.

Recent . . Active, dormant and extinct volcanoes.

Post-Jurassic J Kibo and volcanoes of the rift-valley, to Pleistocene (Kimawenzi, Kenya and plateau eruptions.

Archaean. — These rocks prevail in the districts of Taru, Nandi and throughout Ukamba. A course gneiss is the predominant rock, but is associated with garnetiferous mica-schists and much intrusive granite. Hornblende schists and beds of metamorphic limestone are rare. Cherty q uartzites interbedded with mylonites occur on the flanks of the Nandi hills, but their age is not known.

Carboniferous? — From shales on the Sabaki river Dr Gregory obtained fish-scales and specimens of Palaeanodonla Fischeri.

Karroo. — The grits of Masara, near Rabai mission station and Mombasa, have yielded specimens of Glossopteris browniana var. indica, thus indicating their Karroo age.

Jurassic. — Shales and limestones of this age are well seen along the railway near Changamwe. They contain gigantic ammonites. According to Dr Waagen the ammonites show a striking analogy to forms from the Acanthicus zone of East India. Belemnites are plentiful.

Pleistocene. — These are feebly represented by some boulder beds on the higher slopes of Kilimanjaro and Kenya. They show that in Pleistocene times the glaciers of Kilimanjaro and Kenya extended much farther down the mountain slopes.

Recent. — The ancient and more modern lake deposits have so far yielded no mammalian or other organic remains of interest.

Igneous and Volcanic. — A belt of volcanic rocks, over 150,000 sq.

m. in area, extends from beyond the southern to beyond the northern lerritorial limits. They belong to an older and a newer set. The older group commenced with a series of fissure eruptions along the site of the present rift-valley and parallel with it. From these fissures immense and repeated flows of lava spread over the Kapte nd Laikipia plateaus. At about the same time, or a little later,

Kenya and Kimawenzi, Elgon and Chibcharagnani were in eruption. The age of these volcanic outbursts cannot be more definitely stated than that they are post-Jurassic, and probably extended through Cretaceous into early Tertiary times. This great volcanic period was followed by the eruptions of Kibo and some of the larger vol- canoes of the rift-valley. The flows from Kibo include nepheline and leucite basanite lavas rich in soda felspars. They bear a close resemblance to the Norwegian " Rhombenporphyrs." The chain of volcanic cones along the northern lower slopes of Kilimanjaro, those of the Kyulu mountains, Donyo Longonot and numerous craters in the rift-valley region, are of a slightly more recent date. A few of the volcanoes in the latter region have only recently become extinct; a few may be only dormant. Donyo Buru still emits small quantities of steam, while Mount Teleki, in the neighbourhood of Lake Rudolf, was in eruption at the close of the 19th century.]

Climate, Flora and Fauna. — In its climate and vegetation British East Africa again shows an arrangement of zones parallel to the coast. The coast region is hot but is generally more healthy than the coast lands of other tropical countries, this being due to the constant beeeze from the Indian Ocean and to the dryness of the soil. The rainfall on the coast is about 35 in. a year, the temperature tropical. The succeeding plains and the outer plateaus are more arid. Farther inland the highlands — in which term may be included all districts over 5000 ft. high — are very healthy, fever being almost unknown. The average temperature is about 66° F. in the cool season and 73° F. in the hot season. Over 7000 ft. the climate becomes distinctly colder and frosts are experienced. The average rainfall in the highlands is between 40 and 50 in. The country bordering Victoria Nyanza is typically tropical; the rainfall exceeds 60 in. in the year, and this region is quite unsuitable to Europeans. The hottest period throughout the protectorate is December to April, the coolest, July to September. The " greater rains " fall from March to June, the " smaller rains " in November and December. The rainfall is not, however, as regular as is usual in countries within the tropics, and severe droughts are occasionally experienced.

In the districts bordering Victoria Nyanza the flora resembles that of

Uganda (q.v.). The characteristic trees of the coast regions are the mangrove and coco-nut palm. Ebony grows in the scrtib- jungle. Vast forests of olives and junipers are found on the Mau escarpment ; the cotton, fig and bamboo on the Kikuyu escarpment ; and in several regions are dense forests of great trees whose lowest branches are 50 ft. from the ground. Two varieties of the valuable rubber-vine, Landolphia florida and Landolphia Kirkii, are found near the coast and in the forests. The higher mountains preserve distinct species, the surviving remnants of the flora of a cooler period.

The fauna is not abundant except in large mammals, which are very numerous on the drier steppes. They include the camel (confined to the arid northern regions}, elephant (more and more restricted to unfrequented districts), rhinoceros, buffalo, many kinds of antelope, zebra, giraffe, hippopotamus, lion and other carnivora, and numerous monkeys. In many parts the rhinoceros is particu- larly abundant and dangerous. Crocodiles are common in the larger rivers and in Victoria Nyanza. Snakes are somewhat rare, the most dangerous being the puff-adder. Centipedes and scorpions, as well as mosquitoes and other insects, are also less common than in most tropical countries. In some districts bees are exceedingly numerous. The birds include the ostrich, stork, bustard and secretary-bird among the larger varieties, the guinea fowl, various kinds of spur fowl, and the lesser bustard, the wild pigeon, weaver and hornbill. By the banks of lakes and rivers are to be seen thousands of cranes, pelicans and flamingoes.

Inhabitants. — The white population is chiefly in the Kikuyu uplands, the rift-valley, and in the Kenya region. The whites are mostly agriculturists. There are also numbers of Indian settlers in the same districts. The African races include repre- sentatives of various stocks, as the country forms a borderland between the Negro and Hamitic peoples, and contains many tribes of doubtful affinities. The Bantu division of the negroes is represented chiefly in the south, the principal tribes being the Wakamba, Wakikuyu and Wanyika. By the north-east shores of Victoria Nyanza dwell the Kavirondo (q.v.), a race remarkable among the tribes of the protectorate for their nudity. Nilotic tribes, including the Nandi (q.v.), Lumbwa, Suk and Turkana, are found in the north-west. Of Hamitic strain are the Masai (q.v.), a race of cattle-rearers speaking a Nilotic language, who occupy part of the uplands bordering on the eastern rift-valley. A branch of the Masai which has adopted the settled life of agriculturists is known as the Wakuafi. The Galla section of the Hamites is represented, among others, by Borani living

south of the Goro Escarpment (though the true Boran countries are Liban and Dirri in Abyssinian territory), while Somali occupy the country between the Tana and Juba rivers. Of the Somali tribes the Herti dwell near the coast and are more or less station- ary. Further inland is the nomadic tribe of Ogaden Somali. The Gurre, another Somali tribe, occupy the country south of the lower Daua. Primitive hunting tribes are the Wandorobo in Masailand, and scattered tribes of small stature in various parts. The coast-land contains a mixed population of Swahili, Arab and Indian immigrants, and representatives of numerous interior tribes.

Provinces and Towns. — The protectorate has been divided into the provinces of Seyyidie (the south coast province, capital Mombasa); Ukamba, which occupies the centre of the pro- tectorate (capital Nairobi); Kenya, the district of Mt. Kenya (capital Fort Hall) ; Tanaland, to the north of the two provinces first named (capital Lamu); Jubaland, the northern region (capital Kismayu); Naivasha (capital Naivasha); and Kisumu (capital Kisumu) ; each being in turn divided into districts and sub-districts. Naivasha and Kisumu, which adjoin the Victoria Nyanza, formed at first the eastern province of Uganda, but were transferred to the East Africa protectorate on the 1st of April 1902. The chief port of the protectorate is Mombasa (q.v.) with a population of about 30,000. The harbour on the south-west side of Mombasa island is known as Kilindini, the terminus of the Uganda railway. On the mainland, nearly oppositeMombasa town, is the settlement of freed slaves named Freretown, after Sir Bartle Frere. Freretown (called by the natives Kisaoni) is the headquarters in East Africa of the Church Missionary Society. It is the residence of the bishop of the diocese of Mombasa and possesses a fine church and mission house . Lamu, on the island of the same name, 150 m. north-east of Mombasa, is an ancient settlement and the headquarters of the coast Arabs. Here are some Portuguese ruins, and a large Arab city is buried beneath the sands. The other towns of note on the coast are Malindi, Patta, Kipini and Kismayu. At Malindi, the " Melind " of Paradise Lost, is the pillar erected by Vasco da Gama when he visited the port in 1498. The harbour is very shallow. Kismayu, the northernmost port of the protectorate, 320 m. north-east of Mombasa, is the last sheltered anchorage on the east coast and is invaluable as a harbour of refuge. Flourishing towns have grown up along the Uganda railway. The most important, Nairobi (q.v.), 327 m. from Mombasa,

257 from Port Florence, was chosen in 1907 as the administrative capital of the protec- torate. Naivasha, 64 m. north-north-west of Nairobi, lies in the rift-valley close to Lake Naivasha, and is 6230 ft. above the sea. It enjoys an excellent climate and is the centre of a European agricultural settlement. Kisumu or Port Florence (a term confined to the harbour) is a flourishing town built on a hill overlooking Victoria Nyanza. It is the entrepot for the trade of Uganda.

Communications. — Much has been done to open up the country by means of roads, including a trunk road from Mombasa, by Kibwezi in the upper Sabaki basin, and Lake Naivasha, to Berkeley Bay on Victoria Nyanza. But the most important engineering work under- taken in the protectorate was the construction of a railway from Mombasa to Victoria Nyanza, for which a preliminary survey was executed in 1892, and on which work was begun in 1896. The line chosen roughly coincides with that of the road, until the equator is reached, after which it strikes by a more direct route across the Mau plateau to the lake, which it reaches at Port Florence on Kavirondo Gulf. The railway is 584 m. long and is of metre (3-28 ft.) gauge, the Sudan, and South and Central African lines being of 3 ft. 6 in. gauge. The Uganda railway is essentially a mountain line, with gradients of one in fifty and one in sixty. From Mombasa it crosses to the mainland by a bridge half a mile long, and ascends the plateau till it reaches the edge of the rift-valley, 346 m. from its starting point, at the Kikuyu Escarpment, where it is 7600 ft. above the sea. It then descends across ravines bridged by viaducts to the valley floor, dropping to a level of 601 1 ft., and next ascending the opposite (Mau) escarpment to the summit, 8321 ft. above sea- level — the highest point on the line. In the remaining 100 m. of its course the level sinks to 3738 ft., the altitude of the station at Port Florence. The railway was built by the British government at a cost of £ˆ,331,000, or about £9500 per mile. The first locomotive reached Victoria Nyanza on the 26th of December 1901 ; and the liermanervt way was r>ractically completed by M?-vcH IQOJ, wV.ea Sir

George Whitehouse, the engineer who had been in charge of the con- struction from the beginning, resigned his post. The railway, by doing away with the carriage of goods by men, gave the final death- blow to the slave trade in that part of East Africa. It also facilitated the continued occupation and development of Uganda, which was, previous to its construction, an almost impossible task, owing to the prohibitive cost of the carriage of goods from the coast — £60 per ton. The two avowed objects of the railway— the destruction of the

slave trade and the securing of the British position in Uganda — have been attained; moreover, the railway by opening up land suitable for European settlement has also done much towards making a prosperous colony of the protectorate, which was regarded before the advent of the line as little better than a desert (see below, History). The railway also shows a fair return on the capital expenditure, the surplus after defraying all working expenses being £56,000 in 1905- 1906 and £76,000 in 1906-1907.

Mombasa is visited by the boats of several steamship companies, the German East Africa line maintaining a fortnightly service from Hamburg. There is also a regular service to and from India. A cable connecting Mombasa with Zanzibar puts the protectorate in direct telegraphic communication with the rest of the world. There is also an inland system of telegraphs connecting the chief towns with one another and with Uganda.

Agriculture and other Industries. — In the coast region and by the shores of Victoria Nyanza the products are tropical, and cultivation is mainly in the hands of the natives or of Indian immigrants. There are, however, numerous plantations owned by Europeans. Rice, maize and other grains are raised in large quantities; cotton and tobacco are cultivated. The coco-nut palm plantations yield copra of excellent quality, and the bark of the mangrove trees is exported for tanning purposes. In some inland districts beans of the castor oil plant, which grows in great abundance, are a lucrative article of trade. The sugar-cane, which grows freely in various places, is cultivated by the natives. The collection of rubber likewise employs numbers of people.

Among the European settlers in the higher regions much attention is devoted to the production of vegetables, and very large crops of potatoes are raised. Oats, barley, wheat and coffee are also grown. The uplands are peculiarly adapted for the raising of stock, and many of the white settlers possess large flocks and herds. Merino sheep have been introduced from Australia. Ostrich farms have also been established. Clover, lucerne, ryegrass and similar grasses have been introduced to improve and vary the fodder. Other vegetable products of economic value are many varieties of timber trees, and fibre-producing plants, which are abundant in the scrub regions between the coast and the higher land bordering the rift- valley. Over the greater part of the country the soil is light reddish loam; in the eastern plains it is a heavy black loam. As a rule it is easily cultivated. While the majority of the African tribes in the territory are not averse from agricultural labour, the number of men available

for work on European holdings is small. Moreover, on some of the land most suited for cultivation by white men there is no native population.

In addition to the fibre industry and cotton ginning there are factories for the curing of bacon. Native industries include the weaving of cloth and the making of mats and baskets. Stone and lime quarries are worked, and copper is found in the Tsavo district. Diamonds have been discovered in the Thika river, one of the head-streams of the Tana.

Trade. — The imports consist largely of textiles, hardware and manufactured goods from India and Europe; Great Britain and India between them supplying over 50% of the total imports. Of other countries Germany has the leading share in the trade. The exports, which include the larger part of the external trade of Uganda, are chiefly copra, hides and skins, grains, potatoes, rubber, ivory, chillies, beeswax, cotton and fibre. The retail trade is largely in the hands of Indians. The value of the exports rose from £89,858 in 1900-1901 to £234,664 in 1904-1905, in which year the value of the imports for the first time exceeded £500,000. In 1906-1907 the volume of trade was £1,194,352, imports being valued at £753,647 and exports at £440,705. The United States takes 33% of the exports, Great Britain coming next with 15%.

Government. — The system of government resembles that of a British crown colony. At the head of the administration is a governor, who has a deputy styled lieutenant-governor, provincial commissioners presiding over each province. There are also execu- tive and legislative councils, unofficial nominated members serving on the last-named council. In the " ten-mile strip " (see below, History), the sultan of Zanzibar being territorial sovereign, the laws of Islam apply to the native and Arab population. The extra- territorial jurisdiction granted by the sultan to various Powers was in 1907 transferred to Great Britain. Domestic slavery formerly existed; but on the advice of the British government a decree was issued by the sultan on the 1st of August 1890, enacting that no one born after that date could be a slave, and this was followed in 1907 by a decree abolishing the legal status of slavery. In the rest of the protectorate slavery is not recognized in any form. Legislation is by ordinances made by the governor, with the assent of the legislative council. The judicial system is based on Indian models, though in cases in which Africans are concerned regard is had to

native sustains, Europeans have the right totrial by jury in serious cases. , There is a police force of about 2000 men, and two battalions of, the King'$ African Rifles are stationed in the protectorate. Revenue is derived chiefly from customs, licences and excise, railway earnings, and posts and telegraphs. Natives pay a hut tax. Since the completion of the Uganda railway, trade, and consequently revenue,, has increased greatly. In 19007-1901 the revenue was £64,275 and the expenditure £193,438; in 1904-1905. the figures were: revenue £154,756, expenditure £302,559; in 1905-1906 the totals were £270,362 and £418, 839,. and in 1906-1907 (when the railway figures were included for the first time) £461,362 and £616,088. The deficiencies were made good by grants-in-aid from the imperial exchequer. The standard coin used is the rupee (i6d.). Education is chiefly in the hands of the missionary societies, which maintain mahy schools where instruction is given in handi- crafts, as well as in the ordinary branches of elementary education. There are Arab schools in Mombasa, and government schools for Europeans and Indians at Nairobi.

History.— From the 8th century to the 1 1 th Arabs and Persians made settlements along the coast and gained political supremacy at many places, leading to the formation of the so-called Zenj empire. The history of the coast towns from that time until the establishment of British rule is identified with that of Zanzibar (q. v.). The interior of what is now British East Africa was first made known in the middle of the 19th century by the German missionaries Ludwig Krapf and Johannes Rebmann, and by Baron Karl von der Decken (1833-1865) and others. Von der Decken and three other Europeans were murdered by Somali at a town called Bardera in October 1865, whilst exploring the Juba river. The countries east of Victoria Nyanza (Masailand, &c.) were, however, first traversed throughout their whole extent by the Scottish traveller Joseph Thomson (q.v.) in 1883-1884. In 1888 Count S. Teleki (a Hungarian) discovered Lakes Rudolf and Stefanie.

The growth of British interests in the country now forming the protectorate arises from its connexion with the sultanate of Zanzibar. At Zanzibar British influence was very strong in the last quarter of the 19th century, and the seyyid or sultan, Bargash, depended greatly on the advice of the British repre- sentative, Sir John Kirk. In 1877 Bargash offered to Mr (afterwards Sir) William Mackinnon (1823-1893), chairman of the British India Steam Navigation Company, a merchant in whom he had great confidence,

or to a company to be formed by him, a lease for 70 years of the customs and administration of the whole of the mainland dominions of Zanzibar including, with certain reservations, rights of sovereignty. This was declined owing to a lack of support by the foreign office, and concessions obtained in 1884 by Mr (afterwards Sir) H. H. Johnston in the Kilimanjaro district were, at the time, disregarded. The large number of 'concessions acquired by Germans in 1884-1885 on the East African coast aroused, however, the interest of those who recognized the paramount importance of the maintenance of British influence in those regions. A British claim, ratified by an agreement with Germany in 1886, was made to the districts behind Mombasa; and in May 1887 Bargash granted to an association formed by Mackinnon a concession for the administration of so much of his mainland territory as lay outside the region which the' British government had recognized as the German sphere of operations. By, international agreement the mainland territories of the sultan were defined as extending 10 m. inland from the coast. Mackinnon's association, whose object A char- was t0 °P en U P the hinterland as well' as this ten-mile tend strip, became the Imperial British East Africa Company

company by a founder's agreement of April 1888, and received formed, a royal charter in September of the same year. To this company the sultan made a further concession dated October 188$. On the faith of these concessions and the charters a sum of £240,000 was subscribed, and the company received formal charge of 'their concessions. The path of the company vvas speedily beset with difficulties, which in the first instance arose out of the aggressions of the German East African Company. This company had also received^ grant from the sultan in October 188S, and its appearance on' the coast was followed by grave .disturbances among the tribes which ha^, welcomed the British. This, outbreak led to a joint British -aiad .German

blockade, which seriously hampered trade operations. It had also been anticipated, in reliance on certain assurances of Prince Bismarck, emphasized by Lord Salisbury, that German enterprise in the interior of the country would be confined to the south of Victoria Nyanea. Unfortunately this expectation was not realized. Moreover German subjects put forward claims to coast districts, notably Lamu, within the company's sphere and in many ways obstructed the company's operations. In all these disputes the German government countenanced its own subjects, while the British foreign office did little or nothing to assist the company, sometimes directly discouraging its activity. Moreover, the company had agreed by the

concession of October 1888 to pay a high revenue to the sultan— Bargash had died in the preceding March and the Germans were pressing his successor to give them a grant of Lamu — in lieu of the customs collected at the ports they took over. The disturbance caused by the German claims had a detrimental effect on trade and put a considerable strain on the resources of the company. The action of the company in agreeing to onerous financial burdens was dictated partly by regard for imperial interests, which would have been seriously weakened had Lamu gone to the Germans.

By the hinterland doctrine, accepted both by Great Britain and Germany in the . diplomatic correspondence of July 1887, Uganda would fall within Great Britain's " sphere of influence "; but German public opinion did not so regard the matter. German maps assigned the territory to Germany, while in England public opinion as strongly expected British influence to be paramount. In 1889 Karl Peters, a German official, led what was practically a raiding expedition into that country, after running a blockade of the ports. An expedition under F. J Jackson had been sent by the company in the same year tc Victoria Nyanza, but with instructions to avoid Uganda. In consequence of representations from Uganda, and of tidings he received of Peters's doings, Jackson, however, determined to go to that country. Peters retired at Jackson's approach, claiming, nevertheless, to have made certain treaties which constituted " effective occupation." Peters's treaty was dated the 1st of March 1890: Jackson concluded another in April. Meantime negotiations were proceeding in Europe; and by the Anglo- German agreement of the 1st of July 1890 Uganda was assigned to the British sphere. To consolidate their position in Uganda— the French missionaries there were hostile to Great Britain — the company sent thither Captain F. D. Lugard, who reached Mengo, the capital, in December 1890 and established the authority of the company despite French intrigues. In July 1890 representatives of the powers assembled at Brussels had agreed on common efforts for the suppression of the slave trade. The interference of the company in Uganda had been a material step towards that object, which they sought to further and at the same time to open up the country by the construction of a railway from Mombasa to Victoria Nyanza. But their resources being inadequate for such an undertaking they sought imperial aid. Although Lord Salisbury, then prime minister, paid the highest tribute to the company's labours, and a preliminary grant for the survey had been practically agreed upon, the scheme was wrecked in parliament. At a later date, however, the railway was built entirely at government cost (supra, § Communications) . Owing to the financial Strain im-

posed upon it the company decided to withdraw Captain Lugard and his forces in August 1891 ; and eventually the British govern- ment assumed a protectorate over the country (see Uganda).

Further difficulties now arose which led finally to the extinction of the company. Its pecuniary interests sustained a severe blow owing to the British government — which had taken Zanzibar under its protection in November „ qQm d 1890— declaring (June 1892) the dominions of the thecrown. sultan within the free trade zone. This act extinguished the treaties regulating all tariffs and duties with foreign powers, and gave free trade all along the coast. The result for the company was that dues were now swept away without com- pensation, and the company was left saddled with the payment of the rent, and with the cost, in addition, of administration,

the necessary revenue for which had been derived from the dues thus abolished. Moreover, a scheme of taxation which it drew up failed to gain the approval of the foreign office.

In every direction the company's affairs had drifted into an impasse. Plantations had been taken over on the coast and worked at a loss, money had been advanced to native traders and lost, and expectations of trade had been disappointed. At this crisis Sir William Mackinnon, the guiding spirit of the company, died (June 1893). At a meeting of shareholders on the 8th of May 1894 an offer to surrender the charter to the government was approved, though not without strong pretests. Negotiations dragged on for over two years, and ultimately the terms of settlement were that the government should purchase the property, rights and assets of the company in East Africa for £250,000. Although the company had proved unprofitable for the shareholders (when its accounts were wound up they disclosed a total deficit of £193,757) it had accomplished a great deal of good work and had brought under British sway not only the head waters of the upper Nile, but a rich and healthy upland region admirably adapted for European coloniza- tion. To the judgment, foresight and patriotism of Sir William Mackinnon British East Africa practically owes its foundation. Sir William and his colleagues of the company were largely animated by humanitarian motives — the desire to suppress slavery and to improve the condition of the natives. With this aim they prohibited the drink traffic, started industrial missions, built roads, and administered

impartial justice. In the opinion of a later administrator (Sir C. Eliot), their work and that of their immediate successors was the greatest philanthropic achievement of the latter part of the 19th century.

On the 1st of July 1895 the formal transfer to the British crown of the territory administered by the company took place at Mombasa, the foreign office assuming responsibility for its administration. The territory, hitherto known as " Ibea," from the initials of the company, was now styled the East Africa protectorate. The small sultanate of Witu (q.v.) on the mainland opposite Lamu, from 1885 to 1890 a German pro- tectorate, was included in the British protectorate. Coincident with the transfer of the administration to the imperial government a dispute as to the succession to a chieftainship in the Mazrui, the most important Arab family on the coast, led to a revolt which lasted ten months and involved much hard fighting. It ended in April 1896 in the flight of the rebel leaders to German territory, where they were interned. The rebellion marks an important epoch in the history of the protectorate as its sup- pression definitely substituted European for Arab influence. " Before the rebellion," says Sir C. Eliot, " the coast was a protected Arab state; since its suppression it has been growing into a British colony."
. . .

From 1896, when the building of the Mombasa- Victoria Nyanza railway was begun, until 1903, when the line was practically completed, the energies of the administra- A white t j on were largely absorbed in that great work, and in 'country. establishing effective control over the Masai, Somali, and other tribes. The coast lands apart, the pro- tectorate was regarded as valuable chiefly as being the high road to Uganda. But as the railway reached the high plateaus the discovery was made that there were large areas of land — very sparsely peopled — where the climate was excellent and where the conditions were favourable to European colonization. The completion of the railway, by affording transport facilities, made it practicable to open the country to settlers. The first application for land was made in April 1902 by the East Africa Syndicate — a company in which financiers belonging to the Chartered Company of ˆ South Africa were interested — which sought a grant of 500 sq. m.; and this was followed by other applications for considerable areas, a scheme being also pro- pounded for a large Jewish settlement.

During 1903 the arrival of hundreds of prospective settlers, chiefly from South Africa, led to the decision to entertain no more applications for large areas of land, especially as questions were

raised concerning the preservation for the Masai of their

rights of pasturage. In the carrying out of this policy a dispute arose between Lord Lansdowne, foreign secretary, and Sir

Charles Eliot, who had been commissioner since 1900. The foreign secretary, believing himself bound by pledges given to the syndicate, decided that they should be granted the lease of the 500 sq. m. they had applied for; but after consulting officials of the protectorate then in London, he refused Sir

Charles Eliot permission to conclude leases for 50 sq. m. each to two applicants from South Africa. Sir Charles thereupon resigned his post, and in a public telegram to the prime minister, dated Mombasa, the 21st of June 1904, gave as his reason:— " Lord Lansdowne ordered me to refuse grants of land to certain private persons while giving a monopoly of land on unduly advantageous terms to the East Africa Syndicate. I have refused to execute these instructions, which I consider unjust and impolitic." 1

On the day Sir Charles sent this telegram the appointment of Sir Donald W. Stewart, the chief commissioner of Ashanti, to succeed him was announced. Sir Donald induced the Masai whose grazing rights were threatened to remove to another district, and a settlement of the land claims was arranged. An offer to the Zionist Association of land for colonization by Jews was declined in August 1905 by that body, after the receipt of a report by a commissioner sent to examine the land (6000 sq. m.) offered. Sir Donald Stewart died on the rst of October 1905, and was succeeded by Colonel Hayes Sadler, the commissioner of Uganda. Meantime, in April 1905, the administration of the protectorate had been transferred from the foreign.to the colonial office. By the close of 1905 considerably over a million acres of land had been leased or sold by the protectorate authorities — about half of it for grazing purposes. In 1907, to meet the demands of the increasing number of white inhabitants, who had formeda Colonists' Association 2 for the promotion of their interests, a legislative council was established, and on this council representatives of the settlers were given seats. The style of the chief official Was also altered, "governor" being substituted for " commissioner." In the same year a scheme was drawn up for assisting the immigration of British Indians to the regions adjacent to the coast and to Victoria Nyanza, districts not suitable for settlement by Europeans.

In general the relations of the British with the tribes of the interior

have been satisfactory. The Somali in Jubaland have given some trouble, but the Masai, notwithstanding their warlike reputation, accepted peaceably the control of the whites. This was due, in great measure, to the fact that at the period in question plague carried off their cattle wholesale and reduced them for years to a state of want and weakness which destroyed i heir warlike habits. One of the most' troublesome tribes proved to ; b'e the Nandi, who occupied the southern part of the plateau west of the Mau escarpment. They repeatedly raided their less warlike neighbours and committed wholesale thefts from the railway and telegraph lines. In September 1905 an expedition was sent against them which reduced the tribe to submission in the following November; and early in 1906 the Nandi were removed into a reserve. The majority of the natives, unaccustomed to regular work, showed themselves averse from taking service under the white farmers. The inadequacy of the labour supply was an early cause of trouble to the settlers, while the labour regulations enforced led, during 1 907-1 908, to considerable friction between the colonists and the administration.

' For several years after the establishment of the protectorate the northern region remained very little known and no attempt was made to administer the district. The natives' were fre- quently raided by parties of Gallas and Abyssinians, and in the absence of a defined frontier Abyssinian government posts were pushed south to Lake Rudolf. The Abyssinians also made themselves masters of the Boran country. After long negotia- tions an agreement as to the boundary line between the lake and

1 See Correspondence relating to the Resignation of Sir C. Eliot, Africa, No. 8 (1904). _ ,_

2 The Planters and Farmers' Association, as this organization was originally called, dates from 1903.

the river Juba was signed at Adis Ababa on the 6th of December

1907, and in 1908-1909 the frontier was delimited by an Anglo-Abyssinian commission, Major C. W. Gwynn being the chief British representative. Save for its north-eastern extremity Lake Rudolf was assigned to the British, Lake Stefanie falling to Abyssinia, while from about 4° 20′ N. the Daua to its junction with the Juba became the

frontier.

Bibliography. — The most comprehensive account of the protectorate to the close of 1904, especially of its economic resources, is The East Africa Protectorate, by Sir Charles Eliot (London, 1905). The progress of the protectorate is detailed in the Reports by the governor issued annually by the British government since 1896, and in Drumkey's Year Book for East Africa (Bombay), first issued in

1908. The Precis of Information concerning the British East Africa Protectorate (issued by the War Office, London, 1901) is chiefly valuable for its historical information. The work of the Imperial British East Africa Company is concisely and authoritatively told from official documents in British East Africa or Ibea, by P. L. McDermont (new ed., London, 1895). Another book, valuable for its historical perspective, is The Foundation of British East Africa, by J. W. Gregory (London, 1901). Bishop A. R. Tucker's Eighteen Years in Uganda and East Africa (London, 1908) contains a summary of missionary labours. Of the works of explorers Through Masai Land, by Joseph Thomson (London, 1886), is specially valuable. For the northern frontier see Capt. P. Maud's report in Africa No. 13 (1904). For geology see, besides Thomson's book, The Great Rift Valley, by J. W. Gregory (London, 1896) ; Across an East African Glacier, by Hans Meyer (London and Leipzig, 1890) ; and Report relating to the Geology of the East Africa Protectorate, by H. B. Muff (Colonial Office, London, 1908). For big game and ornithology see On Safari, by A. Chapman (London, 1908). The story of the building of the Uganda railway is summarized in the Final Report of the Uganda Railway Committee, Africa, No. 11 (1904), published by the British government. (F. R. C.)

BRITISH EMPIRE, the name now loosely given to the whole aggregate of territory, the inhabitants of which, under various forms of government, ultimately look to the British crown as the supreme head. The term " empire " is in this connexion obviously used rather for convenience than in any sense equiva- lent to that of the older or despotic empires of history.

The land surface of the earth is estimated to extend over about 52,500,000 sq. m. Of this area the British empire occupies Extent nearly one-quarter, extending over an area of about 12,000,000 sq. m. By far the greater portion lies within the temperate zones, and is suitable for white settlement. The notable exceptions are the southern half of India and Burma; East, West and Central Africa; the West Indian colonies; the northern portion of Australia; New Guinea,

British Borneo and that portion of North America which extends into Arctic regions. The area of the territory of the empire is divided almost equally between the southern and the northern hemispheres, the great divisions of Australasia and South Africa covering between them in the southern hemisphere 5,308,506 sq. m., while the United Kingdom, Canada and India, including the native states, cover between them in the northern hemisphere 5,271,375 sq. m. The alternation of the seasons is thus complete, one-half of the empire enjoying summer, while one-half is in winter. The division of territory between the eastern and western hemispheres is less equal, Canada occupying alone in the western hemisphere 3,653,946 sq. m., while Australasia, South Africa, India and the United Kingdom occupy together in the eastern hemisphere 6,925,975 sq. m. As a matter of fact, however, the eastern portions of Australasia border so nearly upon the western hemisphere that the distribution of day and night throughout the empire is, like the alternations of the seasons, almost complete, one-half enjoying daylight, while the other half is in darkness. These alternations of time and of seasons, combined with the variety of soils and climates, are calculated to have an increasingly important effect upon the material and industrial, as well as upon the social and political developments of the empire. This will become evident in con- sidering the industrial productions of the different divisions, and the harvest seasons which permit the summer produce of one portion of the empire to supply the winter requirements of its other markets, and conversely.

The empire contains or is bounded by some of the highest mountains, the greatest lakes, and the most important rivers

of the world. Its climates may be said to include all the kno-«ai climates of the world; its soils are no less various. In the prairies of central Canada it possesses some of the most valuable wheat-producing land; in the grass lands of the interior of Australia the best pasture country; and in the uplands of South Africa the most valuable gold- and diamond-bearing beds which exist. The United Kingdom at present produces more coal ihan any other single country except the United States. The effect of climate throughout the empire in modifying the type of the Anglo-Saxon race has as yet received only partial attention, and conclusions regarding it are of a somewhat empiric nature. The general tendency in Canada is held to be towards somewhat smaller size, and a hardy active habit; in Australia to a tall, slight, pale development locally known as " cornstalkers," characterized by considerable nervous and intellectual activity. In New Zealand the type preserves almost exactly the char-acteristics of the British Isles. The South African, both Dutch and

British, is readily recognized by an apparently sun-dried, lank and hard habit of body. In the tropical possessions of the empire, where white settlement does not take place to any considerable extent, the individual alone is affected. The type undergoes no modification. It is to be observed in reference to this interesting aspect of imperial development, that the multi- plication and cheapening of channels of communication and means of travel throughout the empire will tend to modify the future accentuation of race difference, while the variety of elements in the vast area occupied should have an important, though as yet not scientifically traced, effect upon the British imperial type.

*The white population of the empire 1 reached in 1901 a total of over 53,000,000, or something over one-eighth of its entire population, which, including native races, is estimated at about 400,000,000. The white population includes tfo * # some French, Dutch and Spanish peoples, but is mainly of Anglo-Saxon race. It is distributed roughly as follows: —*

United Kingdom and home dependencies . 41,608,791

Australasia 4,662,000

British North America 5,500,000

*Africa (Dutch and British) 1,000,000**

India 169,677

West Indies and Bermuda 100,000

53,040,468

The native population of the empire includes types of the principal black, yellow and brown races, classing with these the high-type races of the East, which may almost be called white. The native population of India, mainly high type, brown, was returned at the census of 1901 as 294,191,379. The population of India is divided into 118 groups on the basis of language. These may, however, be collected into the following principal groups: —

(A) Malayo-Polynesian.

(B) Indo-Chinese:

i. Mon-Khmer. ii. Tibeto-Burman. iii. Siamese-Chinese.

(C) Dravido-Murida:

i. Muijda (Kolarian). ii. Dravidian.

(D) Indo-European. Indo-Aryan sub-family.

(E) Semitic.

(F) Hamitic.

(G) Unclassed, e.g. Gipsy.

Eastern Colonies

Ceylon, high type, brown and mixed ‘ . . 3,568,824

Straits Settlements, brown, mixed and Chinese 570,000

Hong-Kong, Chinese and brown. . . 306,130

North Borneo, mixed brown and Sarawak . 700,000

5,144.954

1 The census returns for 1901 from the various parts of the empire were condensed for the first time in 1906 into a blue-book under the title of Census of the British Empire, Report with Summary.

2 The white population of British South Africa according to the census of 1904 was 1,132,226.

Of the various races which inhabit these Eastern dependencies the most important are the 2,000,000 Sinhalese and the 954,000 Tamil that make up the greater part of the population of Ceylon. The rest is made up of Arabs, Malays, Chinese (in the Straits Settlements and Hong-Kong), Dyaks, Eurasians and others.

West Indies. The West Indies, including the continental colonies of British Guiana and Honduras, and seventeen islands or groups of islands, have a total coloured population of about 1,912,655. The colonies of this group which have the largest coloured popula- tions are : —

Jamaica — Chiefly black, some brown and yellow 790,000 Trinidad and Tobago — Black and brown . 250,000

British Guiana — Black and brown . . . 286,000

1,326,000

The populations of the West Indies are very various, being made up largely of imported African negroes. In Jamaica these contribute four-fifths of the population. There are also in the islands a considerable number of imported East Indian coolies and some Chinese. The aboriginal races include American Indians of the mainland and Caribs. With these there has been intermixture of Spanish and Portuguese blood, and many mixed types have appeared. The total European population of this group of colonies amounts to upwards of 80,000, to which 15,000 on account of Bermuda may be added.

*Africa. Central (Chiefly black, estimated { ■ ■ ;f£$**

The aborig'inal races of South Africa were the Bushmen and Hottentots. Both these races are rapidly diminishing in numbers, and in British South Africa it is expected that they will in the course of the twentieth century become extinct. Besides these primitive races there are the dark-skinned negroids of Bantu stock, commonly known in their tribal groups as Kaffirs, Zulu, Bechuana and Damara, which are again subdivided into many lesser groups. The Bantu compose the greater part of the native population. There are also in South Africa Malays and Indians and others, who during the last two hundred years have been introduced from Java, Ceylon, Madagascar, Mozam- bique and British India, and by intermarriage with each other and with the natives have produced a hybrid population generally classed together under the heading of the Mixed Races. These are of all colours, varying from yellow to dark brown. The tribes of Central Africa are as yet less known. Many of them exhibit racial characteristics allied to those of the tribes of South Africa, but with in some cases an admixture of Arab blood.

East Africa. Protectorate — Black and brown :

SffiSHˆi: : : : : 4 '™Z

Zanzibar — Black and brown .... 200,000 Uganda 3,200,000

Total 7,425,000

West Africa.

Estimated. Nigeria (including Lagos) — Black and brown 15,000,000 Gold Coast and hinterland— Chiefly black . 2,700,000 Sierra Leone „ „ • 1,000,000

Gambia „ „ • 163,000

18,863,000

From east to west across Africa the aboriginal nations are mostly of the black negroid type, their varieties being only imperfectly known. The tendency of some of the lower negroid types has been to drift towards the west coast, where they still practise cannibalistic and fetish rites. On the east coast are found much higher types approaching to the Christian races of Abyssinia, and from east to west there has been a wide admixture of Arab blood producing a light-brown type. In

Uganda and Nigeria a large proportion of the population is Arab and relatively light-skinned.

Australasia.

Australia — Black, very low type ....

Chinese and half castes, yellow . New Zealand — Maoris, brown, Chinese and half

castes

Fiji — Polynesian, black and brown Papua — Polynesian, black and brown .

200,000 50,000

53.ooo

121,000 400,000

824,000

The native races of Australia and the Polynesian groups of islands are divided into two main types known as the dark and light Polynesian. The dark type, which is black, is of a very low order, and in some of the islands still retains its cannibal habits. The aboriginal tribes of Australia are of a low-class black race, but

generally peaceful and inoffensive in their habits. The white Polynesian races are of a very superior type, and exhibit, as in the Maoris of New Zealand, characteristics of a high order. The natives of Papua (New Guinea) are in a very low state of civilization. The estimate given of their numbers is approximate, as no census has been taken.

Canada. Indians — Brown 100,000

The only coloured native races of Canada are the Red Indians, many in tribal variety, but few in number.

Summary.

Native Populations:

India 294,191,379

Ceylon and Eastern Colonies . . 5,144,954

West Indies 1,912,655

South Africa 5,211,329

British Central Africa 2,000,000

East Africa 7,425,000

West Africa 18,863,000

Australasia and Islands 824,000

Canada 100,000

335.672,317

White populations 53,040,468

Total . 388,712,785

This is without taking into account the population of the lesser crown colonies or allowing for the increase likely to be shown by later censuses. Throughout the empire, and notably in the United Kingdom, there is among the white races a considerable sprinkling of Jewish blood.

The latest calculation of the entire population of the world, including

a liberal estimate of 650,000,000 for peoples not brought' under any census, gives a total of something over 1,500,000,000. The population of the empire may therefore be calculated as amounting to something more than one-fourth of the population of the world.

It is a matter of first importance in the geographical distri- bution of the empire that the five principal divisions, the United Kingdom, South Africa, India, Australia and Canada B / v y s / ons . are separated from each other by the three great oceans of the world. The distance as usually calculated in nautical miles: from an English port to the Cape of Good Hope is 5840 m.? from the Cape of Good Hope to Bombay is 4610; from Bom,bay to Melbourne is 5630; from Melbourne to Auck- land is 1830; from Auckland to Vancouver is 6210; from Halifax to Liverpool is 2744. From a British port direct to Bombay by way of the Mediterranean it is 6272; from a British port by the same route to Sydney 11,548 m. These great distances have necessitated the acquisition of intermediate ports suitable for coaling stations on the trade routes, and have determined the position of many of the lesser crown colonies which are held cimply for military and commercial purposes. Such are the Bermudas, Gibraltar, Malta, Aden, Ceylon, the Straits Settlements, Labuan, Hong-Kong, whic.lf complete the

chain of oonnexion on the eastern route, and such on other routes are the lesser West African stations, Ascension; St. Helena, the Mauritius and Seychelles, the Falklands, Tristan da Cunha, and the groups of the western Pacific. Other annexations of the British empire have been rocky islets of the northern Pacific required for the purpose of telegraph stations in connexion with an all-British cable.

For purposes of political administration the empire falls into the three sections of the United Kingdom of Great Britain and Ireland, with the dependencies of the Channel Islands and the Isle of Man; the Indian empire, consisting of British India and the feudatory native. states; and the colonial empire, comprising all other colonies and dependencies.

In the modern sense of extension beyond the limits of the United Kingdom the growth of the empire is of comparatively Orowtb. recen t date. ' The Channel Islands became British as a part of the Norman inheritance of William the Conqueror. The Isle of Man, which was

for a short time held in conquest by Edward I. and restored, was sold by its titular sovereign to Sir William Scrope, earl of Wiltshire, in 1393,, and by his subsequent attainder for high treason and the confiscation of his estates, became a fief of the English crown. It was granted by Henry TV. in 1406 to Sir John Stanley, K.C., ancestor of the earls of Derby, by whom it was held till 1736, when it passed to James Murray, 2nd duke of Atholl, as heir-general of the loth earl. It was inherited by his daughter Charlotte, wife of the 3rd duke of Atholl, who sold, it to the crown for £70,000 and an annuity of £2000. With these exceptions and the nominal possession taken of Newfoundland by Sir Humphrey Gilbert in 1583, all the territorial acquisitions of the empire have been made in the 17 th and subsequent centuries.

The following is a list of the British colonies and dependencies (other than those belonging to the Indian empire) together with a summary statement of the date and method of their acquisition. Arranged in chronological order they give some idea of the rate of growth of the empire. The dates are not, however, in all cases those in which British sovereignty was established. They indicate in some instances only the first definite step, such as the building of a fort, the opening of a trading station, or other act, which led later to the incorporation in the empire of the country indicated. In the case of Australian states or Canadian provinces originally part of other states or provinces the date is that, approximately, of the first settlement of British in the district named; e.g. there were British colonists in Saskatchewan in the last half of the 1 8th century, but the province was not constituted until 1905. Save where otherwise stated, British authority has been continuous from the first date mentioned in the table. Reference should be made to the articles on the various colonies.

Name. Newfoundland

Barbados Bermudas Gambia

Date. Method of Acquisition.

1583 Possession taken by Sir H.

Gilbert for the crown.

17th Century.

1605-1625

1609

c. 1618

Settlement.

St Christopher Novia Scotia

Nevis Montserrat Antigua Honduras . St Lucia

Gold Coast

1623 1628

1628 1632 1632 1638 1638 .

c. 1650

A second time in

1816.

Did not become . wholly British until 1713- Ceded to France 1632; recovered

1:713-

,, Finally passed to

Great Britain in

1803.

Settlement. Danish forts

bought l8£0, Dutch forts

1871. Northern Territories

added 1897.

Name. St Helena .

Jamaica Bahamas Virgin Islands . N. W. Territories Canada

of

Turks and Caicos Is.

Gibraltar New Brunswick Prince Edward Is. Ontario Quebec ...

Dominica St ■ Vincent Grenada Tobago .

Date. Method of Acquisition.

ifth Century (contd.).

1651 Settled by East India Co. Government vested in British cr6wn 1833.

1655 Conquest.

1666 Settlement. . 1666-1672 Settlement and conquest.

1669 Settlement under royal charter of Hudson's Bay Co. Purchased from imp. gov. 1869, and transferred to Canada

1870.

1678 Settlement.

18th Century. 1704 Capitulation. 1 7 13 Cession. 1758 Conquest. I 759 _I 79° With New Brunswick and Nova I 759 _I 79° Scotia constituted Dominion of Canada 1867. Prince Edward Is. enters the con- federation 1873. In 1880 all British possessions (other than Newfoundland) in North America annexed to the Dominion. ■ ■ ■*

'

Conquest. Capitulation. i

1761 1762 1762 1763

Falkland Is. Saskatchewan

Pitcairn I. . Straits Settlements

Sierra Leone Alberta .

New South Wales Ceylon . . . Trinidad Malta . . .

1765 1766

1780 1786

to

1824

1787

c. 1788

1788

1795 1797

1800

Cession. Afterwards in French

possession. Reconquered 1803. Settlement. Reoccupied 1832. Settlement. Separated from

N.W. Territories of Canada

1905.

Settlement.

Settlement and cession. Vested (1858) in crowh by E. I. Co.

Transferred from Indian to

colonial possessions 1867.

Malacca in British occupation

I795-i8i8. Settlement. Separated from N.W. Territories

of Canada 1905. Settlement. Capitulation.

British Guiana

Tasmania .

Cape of Good Hope

Seychelles . Mauritius . Manitoba .

Ascension and Tristan da Cunha

B. Columbia and Van- couver Island

Natal . . .

Queensland

West Australia Victoria

South Australia New Zealand . Hong-Kong.

jQih Century. 1803 Capitulation. 1803 Settlement.

1806 Capitulation. Present limits not attained until 1895. First British occupation 1 795-1803. Capitulation.

Settlement by Red River or Selkirk colony. Created

province of Canada 1870.

Military occupation.

1806 1810 1811

Labuan Lagos

Basutoland Fiji .

1815 1821

1824

1824

1826 1834

1836 1840 1841

1846 1 861

1868 1874

Settlement under Hudson's Bay Co. Entered Canadian con-federation 1871.

Settlement. Natal Boers sub- mit 1843.

Separated from New South Wales 1859.

Settlement.

Separated from New South Wales 1 85 1.

Settlement.

Settlement and treaty.

Treaties. Kowloon on the mainland added in i860; additional area leased 1898.

Cession. Incorporated in Straits Settlements 1906.

Cession. South Nigeria amal- gamated with Lagos, under style of Colony and Pro- tectorate of Southern Nigeria

1906.

Annexation.

Cession.

BRITISH EMPIRE

609

Name.

Date.

Method of Acquisition.

igth Century (contd.). W. Pacific Islands, in- 1877 High commission created by

eluding Union, Ellice, order in council, giving juris-

Gilbert, Southern diction over islands not in-

Solomon, and other eluded in other colonial

groups governments, nor within

jurisdiction of other civilized

powers. Protectorates declared

over all these islands by 1900.

Federated Malay States 1 874-1 895 Treaty.

Cyprus . . . . . 1878 Occupied by treaty.

North Borneo

Papua 1884

Nigeria 1884-18.

Sotnaliland . Beehuanaland

Zululand

Sarawak

Brunei ....

British East Africa

Rhodesia

Treaty and settlement under royal charter. Protectorate assumed 1888.

Protectorate declared.

Treaty, conquest and settlement under royal charter. Char- tered Co.'s territory trans- ferred to crown, and whole divided into North and South Nigeria 1900. 1884-1886 Occupation and cession. Pro- tectorate declared 1887. 1885-1891 Protectorate declared. Southern portion annexed to. Cape Colony 1895.

Annexation. Incorporated in Natal 1897.

Protectorate declared.

1887

Zanzibar

Uganda .

Nyasaland .

Ashanti .

Wei-hai-wei

Pacific Islands — Christmas, Fanning, Penrhyn, Suvarov Choiseul and Isabel Is.

(Solomon Group) Tonga and Niue .

Orange Free State .

Transvaal and Swazi- land

Kelantan, Trengganu, &c.

18S

1888

1888 Treaty, conquest and settlement under royal charter. Transferred to crown 1895. 1888-1893 Treaty, conquest and settlement under royal charter. 1890 Protectorate declared. 1890-1896 Treaty and protectorate.

1891 Protectorate declared. 1896; Military occupation. 1898 Lease from China.

1898 Annexed for purposes of pro-

jected Pacific cable.

1899 Cession.

1900 Protectorate declared.

1900 Annexation. Formerly British

1 848-1 854.

1900 Annexation. Formerly British

1877-1881.

20th Century. 1909 Cession from Siam.

In the Pacific are also Bird Island, Bramble Cay, Cato Island, Cook Islands, Danger Islands, Ducie Island, Dudosa, Rowland Island, Jarvis Island, Kermadec Islands, Macquarie Island, Manihiki Islands, Nassau Island, Palmerston Island, Palmyra Island, Phoenix Group, Purdy Group, Raine Island, Rakaanga Island, Rotumah Island, Surprise Island, Washington or New York Island, Willis Group and Wreck Reef.

In the Indian Ocean there are, besides the colonies already mentioned, Rodriguez, the Chagos Islands, St Brandon Islands, Amirante Islands, Aldabra, Kuria Muria Islands, Maldive Islands

and some other small groups.

In certain dependencies the sovereignty of Great Britain is not absolute. The island of Cyprus is nominally still part of the Turkish empire, but in 1878 was handed over to Great Britain for occupation and administration; Great Britain now making to the Porte on account of the island an annual payment of £5000. The administration is in the hands of an official styled high commissioner, who is invested with the powers usually conferred on a colonial governor. In Zanzibar and other regions of equatorial Africa the native rulers retain con- siderable powers; in the Far East certain areas are held on lease from China.

Egypt, without forming part of the British empire, came under the military occupation of Great Britain in 1882. " By right of conquest " Great Britain subsequently claimed a share in the administration of the former Sudan provinces of Egypt, and an agreement of the 19th of January 1899 established the IV. 20

joint sovereignty of Great Britain and Egypt over what is now known as the Anglo-Egyptian Sudan.

The Indian section of the empire was acquired during the i7th-i9th centuries under a royal charter granted to the East India Company by Queen Elizabeth in 1600. It was transferred to the imperial government in 1858, and Queen Victoria was proclaimed empress under the Royal Titles Act in 1877. The following list gives the dates and method of acquisition of the centres of the main divisions of the Indian empire. 'They have, in most instances, grown by general process of extension to their present dimensions.

Name.

Madras

Date.

1639

to

1748

Bombay

Bengal

United Provinces of Agra and Oudh

1608

to

1685

1633

to

1765

1764

to

1856

Central Provinces Eastern Bengal Assam

Burma Punjab

and

1802-1817 1825-1826

. 1824-1852 1849

N.-W. Frontier Province 1901 Ajmere and Merwgra . 1818

Coorg ..... 1834 ,

British Baluchistan . 1854-1876 Andaman Islands . . 1858

Method of Acquisition.

By treaty and subsequent con- quest. Fort St George, the foundation of Madras, was the first territorial possession of the E.I. Co. in India. It was acquired by treaty with its Indian ruler. Madras was raised into a presidency in 1683; ceded to France 1746; recovered 1748.

Treaty and cession. Trade first established 1608. Ceded to British crown by Portgaul 1 66 1. Transferred to E.I. Co. 1668. Presidency re- moved from Surat 1687.

Treaty and subsequent con- quests. First trade settle- ment established by treaty at' Pipli in Orissa 1633. Erected into presidency by separation from Madras 1681. .Virtual sovereignty announced by E.I. Co., as result of conquests of Clive, 1765.

By conquests and treaty through successive stages, of which the principal dates were 1801-3 -14-15. In 1832 the nominal sovereignty of Delhi, till then retained by the Great Mogul, was resigned into the hands of the E.I. Co. Oudh, of which the conquest may be said to have begun with the battle of Baxar in 1764, was finally annexed in 1856.

By conquest and treaty.

Conquest and cession: The Bengal portion of the province by separation from Bengal in

1905.

Conquest and cession.

Conq uest and annexation. Made into distinct province 1 859.

Subdivision.

By conquest and cession.

Conquest and annexation.

Conquest and treaty.

Annexation.

The following is a list of some of the principal Indian states which are more or less under the control of the British government: —

1. In direct political relations with the governbr-general in council. Hyderabad. ‘ Mysofe.

Baroda. Kashmiri •„.,._.*

2. Under the Raj putana agency. ‘. Udaipur. ‘ Bharatpur. Jodhpur, Dholpur. Bikanir. Alwar. Jaipur (and feudatories). Tonk.

3. Under the Central Indian agency. Indore. Bhopal. Rewa. Gwalior.

4. Under the Bombay government.

Cutch. Khairpur (Sind).

Kolhapur (and dependencies). Bhaunagar.

11

6jo

BRITISH EMPIRE

5. Under the Madras government. Travancore. Cochin.

6. Under the Central Provinces government. Bastar.

7. Under the Bengal government. Kuch Behar. Sikkim.

8. Under United Provinces government. Rampur. Garhwal.

9. Under the Punjab government. Patiala. Mandi.

Bahawalpur. Sirmur (Nahan).

Jind. Faridkot.

Nabha. Chamba.

Kapurthala.

10. Under the government of Burma. Shan states. Karen states.

In addition to these there are British tracts known as the Upper

Burma frontier and the Burma frontier. There is also a sphere of British influence in the border of Afghanistan. The state of Nepal, though independent as regards its internal administration, has been since the campaign of 1814-15 in close relations with Great Britain. It is bound to receive a British resident, and its political relations with other states are controlled by the government of India. All these native states have come into relative dependency upon Great Britain as a result of con- quest or of treaty consequent upon the annexation of the neigh- bouring provinces. The settlement of Aden, with its dependencies of Perim and Sokotra Island, forms part of the government of Bombay.

This vast congeries of states, widely different in character, and acquired by many different methods, holds together under the supreme headship of the crown on a generally Irafion?" acknowledged triple principle of self-government, self-support and self-defence. The principle is more fully applied in some parts of the empire than in others; there are some parts which have not yet completed their political evolution; some others in which the principle is temporarily or for special reasons in abeyance; others, again — chiefly those of very small extent, which are held for purposes of the defence or advantage of the whole — to which it is not applicable; but the principle is generally acknowledged as the structural basis upon which the constitution of the empire exists.

In its relation to the empire the home section of the British Isles is distinguished from the others as the place of origin of the British race and the residence of the crown. The history and constitutional development of this portion of the empire will be found fully treated under separate headings. (See England; Wales; Ireland; Scotland; United Kingdom; English History; India; Africa; Australia; Canada; &c.)

It is enough to say that for purposes of administration the Indian empire is divided into nine great provinces and four minor commissionerships. The nine great provinces are presided over by two governors (Bombay and Madras), five lieut. -governors (Bengal, Eastern Bengal and Assam, United Provinces [Agra and Oudh], the Punjab and Burma), a chief commissioner (the Central Provinces) and an agent to the governor-general (the N.W. Frontier Province) . The four minor commissionerships are presided over each by a chief commis sioner. Above these the supreme executive authority in India is vested in the viceroy in council. The council consists of six ordinary members besides the existing commander-in-chief. For legislative purposes the governor-general's council is increased by the

addition of fifteen members nominated by the crown, and has power under certain restrictions to make laws for British' India, for British subjects in the native states, and for native Indian subjects of the crown in any part of the world. The administration of the Indian empire in England is carried on by a secretary of state for India assisted by a council of not less than ten members. The expenditure of the revenues is under the control of the secretary in council.

The colonial empire comprises over fifty distinct governments. It is divided into colonies of three classes and dependencies; these, again, are in some instances associated for administrative purposes in federated groups. The three classes of colonies are crown colonies, colonies possessing representative institutions but not responsible government, and colonies possessing repre- sentative institutions and responsible government. In crown colonies the crown has entire control of legislation, and the public officers are under the control of the home government. In representative colonies the crown has only a veto on legislation, but the home government retains control of the public officers. In responsible colonies the crown retains a veto upon legislation, but the home government has no control of any public officer except the governor.

In crown colonies — with the exception of Gibraltar and St Helena, where laws may be made by the governor alone — laws are made by the governor with the concurrence of a council nominated by the crown. In some crown colonies, chiefly those acquired by conquest or cession, the authority of this council rests wholly on the crown; in others, chiefly those acquired by settlement, the council is created by the crown under the authority of local or imperial laws. The crown council of Ceylon may be cited as an example of the first kind, and the crown council of Jamaica of the second.

In colonies possessing representative institutions without responsible government, the crown cannot (generally) legislate by order in council, and laws are made by the governor with the concurrence of the legislative body or bodies, one at least of these bodies in cases where a second chamber exists possessing a preponderance of elected representatives. The Bahamas, Barbados, and Bermuda have two legislative bodies — one elected and one nominated by the crown; Malta and the Leeward Islands have but one, which is partly elected and partly nominated.

Under responsible government legislation is carried on by parliamentary means exactly as at home, with a cabinet responsible to parliament, the crown reserving only a right of veto, which is

exercised at the discretion of the governor in the case of certain bills. The executive councils in those colonies, designated as at home by parliamentary choice, are appointed by the governor alone, and the other public officers only nomin- ally by the governor on the advice of his executive council.

Colonial governors are classed as governors-general; gover- nors; lieut.-governors; administrators; high commissioners; and commissioners, according to the status of the colony and dependency, or group of colonies and dependencies, over which they preside. Their powers vary according to the position which they occupy. In all cases they represent the crown.

As a consequence of this organization the finance of crown colonies is under the direct control of the imperial government; the finance of representative colonies, though not directly controlled, is usually influenced in important departures by the opinion of the imperial government. In responsible colonies the finance is entirely under local control, and the imperial government is dissociated from either moral or material responsi- bility for colonial debts.

In federated groups of colonies and dependencies matters which are of common interest to a given number of separate governments are by mutual consent of the federating com- munities adjudged to the authority of a common government, which, in the case of self-governing colonies, is voluntarily created for the purpose. The associated states form under the federal government one federal body, but the parts retain control of local matters, and exercise all their original rights of govern- ment in regard to these. The two great self-governing groups of federated colonies within the empire are the Dominion of Canada and the Commonwealth of Australia. In South Africa unification was preferred to federation, the then self-governing colonies being united in 1910 into one state — the Union of South Africa. India, of which the associated provinces are under the control of the central government, may be given as an example of the practical federation of dependencies. Examples

of federated crown colonies and lesser dependencies are to be found in the Leeward Island group of the West Indies and the federated Malay States.

This rough system of self-government for the empire has been evolved not without some strain and friction, by the recognition through the vicissitudes of three hundred years of the value of independent initiative in the development of young countries. Queen Elizabeth's first patent to Sir Walter Raleigh permitted British subjects to accompany him to America, " with guarantee of a continuance of the enjoyment of all the rights which her subjects enjoyed at home."

This guarantee may presumably have been intended at the time only to assure the intending settlers that they should lose no rights of British citizenship at home by taking up their residence in America. Its mutual interpretation in a wider sense, serving at once to establish in the colony rights of citizen- ship equivalent to those enjoyed in England, and to preserve for the colonist the status of British subject at home and abroad, has formed in application to all succeeding systems of British colonization the unconscious charter of union of the empire.

The first American colonies were settled under royal grants, each with its own constitution. The immense distance in time which in those days separated America from Great Britain secured them from interference by the home authorities. They paid their own most moderate governing expenses, and they contributed largely to their own defence. From the middle of the 17th century their trade was not free, but this was the only restriction from which they suffered. The great war with France in the middle of the 18th century temporarily destroyed this system. That war, which resulted in the conquest of Canada and the delivery of the North American colonies from French antagonism, cost the imperial exchequer £90,000,000ˆ The attempt to avert the repetition of such expenditure by the assertion of a right to tax the colonies through the British parliament led to the one great rupture which has marked the history of the empire. It has to be noted that at home during the latter half of the 17th century and the earlier part of the 1 8th century parliamentary power had to a great extent taken the place of the divine right of kings. But parliamentary power meant the power of the English people and taxpayers. The struggle which developed itself between the American colonies and the British parliament was in fact a struggle on the part of the people and taxpayers of one portion of the empire to resist the domination of the people and taxpayers of another portion. In this light it may be accepted as having historically established the fundamental axiom of the constitution of the empire, that the crown is the supreme head from which the parts take equal dependence.

The crown requiring advice in the ordinary and constitutional manner receives it in matters of colonial administration from the secretaries of state for the colonies and for India. After the great rupture separate provision in the home government for the administration of colonial affairs was at first judged to be unnecessary, and the "Council 1 of Trade and Plantations," which up to that date had supplied the place now taken by the two offices of the colonies and India, was suppressed in 1782. There was a reaction from the liberal system of colonial self- government, and an attempt was made to govern the colonies simply as dependencies.

In 1 791, not long after the extension of the range of parlia- mentary authority in another portion of the empire, by the creation in 1784 of the Board of Control for India, Pitt made the step forward of granting to Canada representative institu- tions, of which the home government kept the responsible control. Similar institutions were also given at a later period to Australia and South Africa. But the long peace of the early part of the 19th century was marked by great colonial develop- ments; Australia, Canada and South Africa became important communities. Representative institutions controlled by the home government were insufficient, and they reasserted the claim for liberty to manage their own affairs.

'Or "Board," as it became in 160s.

Fully responsible government was granted to Canada in 1840, and gradually extended to the other colonies. In 1854 a separate secretary of state for the colonies was appointed at home, and the colonial office was established on its present footing. In India, as in the colonies, there came with the growing needs of empire a recognition of the true relations of the parts to each other and of the whole to the crown. In 1858, on the complete transference of the territories of the East India Company to the crown, the board of control was abolished, and the India Council, under the presidency of a secretary of state for India, was created. It was especially provided that the members of the council may not sit in parliament.

Thus, although it has not been found practicable in the working of the British constitution to carry out the full theory of the direct and exclusive dependence of colonial possessions on the crown, the theory is recognized as far as possible. It is understood that the principal sections of the empire enjoy equal rights under the crown, and that none is subordinate to another. The intervention of the imperial parliament in colonial affairs is only admitted theoretically in so far as the support of parlia- ment is required by the

constitutional advisers of the crown. To bring the practice of the empire into complete harmony with the theory it would be necessary to constitute, for the purpose of advising the crown on imperial affairs, -■ council in which all important parts of the empire should be represented.

The gradual recognition of the constitutional theory of the British empire, and the assumption by the principal colonies of full self-governing responsibilities, has /sm> cleared the way for a movement in favour of a further development which should bring the supreme headship of the empire more into accord with modern ideas.

It was during the period of domination of the " Manchester school," of which the most effective influence in public affairs was exerted for about thirty years, extending from 1845 to 1875, that the fullest development of colonial self-government was attained, the view being generally accepted at that time that self-governing institutions were to be regarded as the preliminary to inevitable separation. A general inclination to withdraw from the acceptance of imperial responsibilities throughout the world gave to foreign nations at the same time an opportunity by which they were not slow to profit, and contributed to the force of a reaction of which the part played by Great Britain in the scramble for Africa marked the culmination. Under ttie increasing pressure of foreign enterprise, the value of a federation of the empire for purposes of common interest began to be discussed. Imperial federation was openly spoken of in New Zealand as early as 1852. A similar suggestion was officially put forward by the general association of the Australian colonies in London in 1857. The Royal Colonial Institution, of which the motto " United Empire " illustrates its aims, was founded in 1868. First among leading British statesmen to repudiate the old interpretation of colonial self-government as a preliminary to separation, Lord Beaconsfield, in 1872, spoke of the constitutions accorded to the colonies as " part of a great policy of imperial consolidation." In 1875 W. E. Forster, afterwards a member of the Liberal government, made a speech in which he advocated imperial federation as a means by which it might become practicable to " replace dependence by association." The founda- tion of the Imperial Federation League — in 1884, with Forster for its first president, shortly to be succeeded by Lord Rosebery — marked a distinct step forward. The Colonial Conferences of 1887 and subsequent years (the title being changed to Imperial Conference in 1907), in which colonial opinion was sought and accepted in respect of important questions of imperial organization and defence, and the enthusiastic loyalty displayed by the colonies towards the crown on the occasion of the jubilee

manifestations of Queen Victoria's reign, were further indications of progress in the same direction. Coincidently with this develop- ment, the achievements of Sir George Goldie and Cecil Rhodes, who, the one in West Africa and the other in South Africa, added between them to the empire in a space of less than twenty years a dominion of greater extent than the whole of British

India, followed by the action of a host of distinguished disciples in other parts of the world, effectually stemmed the movement initiated by Cobden and Bright. A tendency which had seemed temporarily to point towards a complacent dissolution of the empire was arrested, and the closing years of the 19th century were marked by a growing disposition to appreciate the value and importance of the unique position which the British empire has created for itself in the world. No stronger demonstration of the reality of imperial union could be needed than that which was afforded by the support given to the imperial forces by the colonies and India in the South African War. It remained only to be seen by what process of evolution the further con- solidation of the empire would find expression in the machinery of government. A step in this direction was taken in 1907, when at the Colonial Conference held in London that year it was decided to form a permanent secretariat to deal with the common interests of the self-governing colonies and the mother- country. It was further decided that conferences, to be called in future Imperial Conferences, between the home government and the governments of the self-governing dominions, should be held every four years, and that the prime minister of Great Britain should be ex officio president of the conference. No executive power was, however, conferred upon the conference.

The movement in favour of tariff reform initiated by Mr Chamberlain (q.v.) in 1903 with the double object of giving a preference to colonial goods and of protecting imperial trade by the imposition in certain cases of retaliative duties on foreign goods, was a natural evolution of the imperialist idea, and of the fact that by this time the trade-statistics of the United Kingdom had proved that trade with the colonies was forming an increas- ingly large proportion of the whole. In spite of the defeat of the Unionist party in England in 1906, and the accession to power of a Liberal government opposed to anything which appeared to be inconsistent with free trade, the movement for colonial preference, based on tariff reform, continued to make

headway in the United Kingdom, and was definitely adopted by the Unionist party. And at the Imperial Conference of 1907 it was advocated by all the colonial premiers, who could point to the progress made in their own states towards giving a tariff preference to British goods and to those of one another.

The question of self-government is closely associated with the question of self-support. Plenty of good land and the liberty to manage their own affairs were the causes assigned by Adam Smith for the marked prosperity of the British colonies towards the end of the 18th century. The same causes are still observed to produce the same effects, and it may be pointed out that, since the date of the latest of Adam Smith's writings, upwards of 6,000,000 sq. m. of virgin soil, rich with possibilities of agri- cultural, pastoral and mineral wealth, have been added to the empire. In the same period the white population has grown from about 12,000,000 to 53,000,000, and the developments of agricultural and industrial machinery have multiplied, almost beyond computation, the powers of productive labour.*

It is scarcely possible within this article to deal with so widely varied a subject as that of the productions and industry of the Thelm- empire. For the purposes of a general statement, periai it is interesting to observe that concurrently with the factor in acquisition of the vast continental areas during the 19th century, the progress of industrial science in application to means of transport and communica- tion brought about a revolution of the most radical character in the accepted laws of economic development. Railways did away with the old law that the spread of civilization is necessarily governed by facilities for water carriage and is consequently confined to river valleys and sea-shores. Steam and electricity opened to industry the interior of continents previously regarded as unapproachable. The resources of these vast inland spaces which have lain untouched since history began became available to individual enterprise, and over a great portion of the earth's surface were brought within the possessions of the British empire. The production of raw material within the empire increased at a rate which can only be appreciated

Industry and trade.

by a careful study of figures, and by a comparison of the total of these figures with the total figures of the world. The tropical and temperate possessions of the empire include every field of production which can be required for the use of man. There is no main staple of

human food which is not grown; there is no material of textile industry which is not produced. The British empire gives occupation to more than one-third of the persons employed in mining and quarrying in the world. It may be interesting, as an indication of the relative position in this respect of the British empire to the world, to state that at present it produces one- third of the coal supply of the world, one-sixth of the wheat supply, and very nearly two-thirds of the gold supply. But while these figures may be taken as in them-selves satisfactory, it is far more important to remember that as yet the potential resources of the new lands opened to enterprise have been barely conceived, and their wealth has been little more than scratched. Population as yet has been only very sparsely sprinkled over the surface of many of the areas most suitable for white settlement. In the wheat lands of Canada, the pastoral country of Australasia, and the mineral fields of South Africa and western Canada alone, the undeveloped resources are such as to ensure employment to the labour and satisfaction to the needs of at least as many millions as they now contain thousands of the British race. In respect of this promise of the future the position of the British empire is unique.

It is not too much to say that trade has been at once the most active cause of expansion and the most potent bond of union in the development of the empire. Trade with the tropical and settlement in the temperate regions of the world formed the basis upon which the foundations of the empire were laid. Trading companies founded most of the American and West Indian colonies; a trading company won India; a trading company colonized the north-western districts of Canada; commercial wars during the greater part of the 18th century established the British command of the sea, which rendered the settlement of Australasia possible. The same wars gave Great Britain South Africa, and chartered companies in the 19th century carried the British flag into the interior of the African continent from south and east and west. Trading companies developed Borneo and Fiji. The bonds of prosperous trade have kept the Australasian colonies within the empire. The protection of colonial commerce by the imperial navy is one of the strongest of material links which connect the crown with the outlying possessions of the empire.

The trade of the empire, like the other developments of imperial public life, has been profoundly influenced by the variety of local conditions under which it has flourished. In the early settlement of the North American colonies their trade trade was left practically free; but by the famous policy. Navigation Act of 1660 the importation and exporta- tion of goods from British colonies were

restricted to British ships, of which the master and three-fourths of the mariners were English. This act, of which the intention was to encourage British shipping and to keep the monopoly of British colonial trade for the benefit of British merchants, was followed by many others of a similar nature up to the time of the repeal of the Corn Laws in 1846 and the introduction of free trade into Great Britain. The Navigation Acts were repealed in 1849. Thus for very nearly two hundred years British trade was subject to restrictions, of which the avowed intention was to curtail the commercial intercourse of the empire with the world. During this period the commercial or mercantile system, of which the fallacies were exposed by the economists of the latter half of the 18th century, continued to govern the principles of British trade. Under this system monopolies were common, and among them few were more important than that of the East India Company. In 1813 the trade of India was, however, thrown open to competition, and in 1846, after the introduction of free trade at home, the principal British colonies which had not yet at that date received the grant of responsible government were specially empowered to abolish differential duties upon foreign trade. A first result of the commercial emancipation of the

colonies was the not altogether unnatural rise in the manufactur- ing centres of the political school known as the Manchester school, which was disposed to question the value to Great Britain of the, retention of colonies which were no longer bound to give her the monopoly of their commercial markets. An equally natural desire on the part of the larger colonies to profit by the opportunity which was opened to them of establishing local manufactures of their own, combined with the convenience in new countries of using the customs as an instrument of taxation, led to something like a reciprocal feeling of resentment, and there followed a period during which the policy of Great Britain was to show no consideration for colonial trade, and the policy of the principal colonies was to impose heavy duties upon British trade. By a gradual process of better understanding, largely helped by the development of means of communication, the antagonistic extreme was abandoned, and a tendency towards a system of preferential duties- within the empire displayed

itself. At the Colonial Conference held in London in Coon/a jggˆ a p

r0 p 0sa i was formally submitted by the South tereuce. African delegate for the establishment within the

empire of a preferential system, imposing a duty of 2% upon all foreign goods, the proceeds to be directed to the maintenance of the imperial navy. To this end it was requested that certain treaties with foreign nations which imposed restric- • tions on the trade of various parts of the empire with each other should be denounced. Some years later, a strong feeling having been manifested in England against any foreign engagement standing in the way of new domestic trade arrangements between a colony and the mother-country, the German and Belgian treaties in question were denounced (1897). Meanwhile, simul- taneously with the movement in favour of reciprocal fiscal advantages to be granted within the empire by the many local governments to each other, there was a growth of the perception that an increase of the foreign trade of Great Britain, carried on chiefly in manufactured goods, was accompanied by a corre- sponding enlargement of the home markets for colonial raw material, and consequently that injury to the foreign trade of Great Britain, while as yet it so largely outweighed the trade between the United Kingdom and the colonies, must necessarily react upon the colonies. This view was definitely expressed at the Colonial Conference at Ottawa in 1894, and was one of the factors which led to the relinquishment of the demand that in return for colonial concessions there should be an imposition on the part of Great Britain of a differential duty upon foreign goods. Canada was the first important British colony to give substantial expression to the new imperial sentiment in com- mercial matters by the introduction in 1897 of an imperial tariff, granting without any reciprocal advantage a deduction of 25% upon customs duties imposed upon British goods. The same advantage was offered to all British colonies trading with her upon equal terms. In later years the South African states, Australia and New Zealand also granted preferential treatment to British goods. Meanwhile in Great Britain the system of free imports, regarded as" free trade " (though only one-sided free trade) , had become the established policy, customs duties being only imposed for purposes of revenue on a few selected articles, and about half the national income was derived from customs and excise. In most of the colonies customs form of necessity one of the important sources of revenue. It is, however, worthy of remark that in the self-governing colonies, even those which are avowedly protectionist, a smaller proportion of the public revenue was derived from customs and excise than was derived from these sources in the United Kingdom. The proportion in Australasia before federation was about one quarter. In Canada it is more

difficult to estimate it, as customs and excise form the principal provision made for federal finance, and note must therefore be taken of the separate sources of revenue in the provinces. With these reservations it will still be seen that customs, or, in other words, a tax upon the movements of trade, forms one of the chief sources of imperial revenue.

The development of steam shipping and electricity gave to the movements of trade a stimulus no less remarkable than that

given by the introduction of railroads and industrial machinery to production and manufactures. Whereas at the beginning of the 19th century "the journey to Australia occupied eight months, and business communications between Sydney and London could not receive answers within the year, at the beginning of the 20th century the journey could be accomplished in thirty-one days, and telegraphic despatches enabled the most important business to be transacted within twenty-four hours. For one cargo carried in the year at the beginning of the 19th century at least six could now be carried by the same ship, and from the point of view of trade the difference of a venture which realizes its profits in two months, as compared with one which occupied a whole year, does not need to be insisted on. The increased rapidity of the voyage and the power of daily com- munication by telegraph with the most distant markets have introduced a wholly new element into the national trade of the empire, and commercial intercourse between the southern and the northern hemispheres has received a development from the natural alternation of the seasons, of which until quite recent years the value was not even conceived. Fruit, eggs, butter, meat, poultry and other perishable commodities pass in daily increasing quantities between the northern and the southern hemispheres with an alternate flow which contributes to raise in no inconsiderable degree the volume of profitable trade. Thus the butter season of Australasia is from October to March, while the butter season of Ireland and northern Europe is from March to October. In three years after the introduction of ice-chambers into the steamers of the great shipping lines, Victoria and New South Wales built up a yearly butter trade of £1,000,000 with Great Britain without seriously affecting the Irish and Danish markets whence the summer supply is drawn. These facilities, combined with the enormous additions made to the public stock of land and labour, contributed to raise the volume of trade of the empire from a total of less than £100,000,000 in the year 1800 to a total of nearly £1,500,000,000 in 1900. The declared volume of British exports to all parts of the world in 1800 was £38,120,120, and the value of British imports from all parts of the world was

£30,570,605; total, £68,690,725. As in those days the colonies were not allowed to trade with any other country this must be taken as representing imperial trade. The exact figures of the trade of India, the colonies, and the United Kingdom for 1900 were: imports, £809,178,209; exports, £657,899,363; total, £1,467,077,572.

A question of sovereign importance to the continued existence of the empire is the question of defence. A country of which the main thoroughfares are the oceans of the world demands in the first instance a strong navy. It has defence of late years been accepted as a fundamental axiom of defence that the British navy should exceed in strength any reasonable combination of foreign navies which could be brought against it, the accepted formula being the " two-power standard," i.e. a 10% margin over the joint strength of the two next powers. The expense of maintaining such a floating armament must be colossal, and until within the decade 1890-1900 it was borne exclusively by the taxpayers of the United Kingdom. As the benefits of united empire have become more consciously appreciated in the colonies, and the value of the fleet as an insurance for British commerce has been recognized, a desire has manifested itself on the part of the self-governing colonies to contribute towards the formation of a truly imperial navy. In 1895 the Australasian colonies voted a subsidy of £126,000 per annum for the maintenance of an Australasian squadron, and in 1897 the Cape Colony also offered a contribution of £30,000 a year to be used at the discretion of the imperial government for naval purposes. The Australian contribution was in 1902 increased to £240,000, and that of the Cape to £50,000, while Natal voted £35,000 a year and Newfoundland £3000. But apart from these comparatively slight contributions, and the local up-keep of colonial fortifications,— and the beginning in 1908- 1909 of an Australian torpedo-boat flotilla provided by the Commonwealth,— -the whole cost of the imperial navy, on which ultimately the security of the empire rested, remained to be*

borne by the taxpayers in the British islands. The extent of this burden was emphasized in 1909 by the revelations as to the increase of the German (and the allied Austrian) fleet. At this crisis in the history of the two-power standard a wave of enthusiasm started in the colonies, resulting in the offer of " Dreadnoughts " from New Zealand and elsewhere; and the British government called an

Imperial Conference to consider the whole question afresh.

Land defence, though a secondary branch of the great question of imperial defence, has been intimately connected with the development and internal growth of the empire. In the case of the first settlement of the American colonies they were expected to provide for their own land defence. To some extent in the early part of their career they carried out this expectation, and even on occasion, as in the taking of Louisburg, which was sub- sequently given back at the peace of Aix-la-Chapelle as the price of the French evacuation of Madras, rendered public service to the empire at large. In India the principle of local self-defence was from the beginning carried into practice by the East India Company. But in America the claim of the French wars proved too heavy for local resources. In 1755 Great Britain intervened with troops sent from home under General Braddock, and up to the outbreak of the American War the cost of the defence of the North American colonies was borne by the imperial exchequer. To meet this expense the imperial parliament took upon itself the right to tax the American colonies. In 1765 a Quartering Act was passed by which 10,000 imperial troops were quartered in the colonies. As a result of the American War which followed and led to the loss of the colonies affected, the imperial authorities accepted the charge of the land defences of the empire, and with the exception of India and the Hudson Bay territories, where the trading companies determined to pay their own expenses, the whole cost of imperial defence was borne, like the cost of the navy, by the taxpayers of the United Kingdom. This condition of affairs lasted till the end of the Napoleonic Wars. During the thirty years' peace which followed there came time for considera- tion. The fiscal changes which towards the middle of the 19th century gave to the self-governing colonies the command of their own resources very naturally carried with them the consequence that a call should be made on colonial exchequers to provide for their own governing expenses. Of these defence is obviously one of the most essential. Coincidently, therefore, with the move- ments of free trade at home, the renunciation of what was known as the mercantile system and the accompanying grants of con- stitutional freedom to the colonies, a movement for the re- organization of imperial defence was set on foot. In the decade which elapsed between 1846 and 1856 the movement as regards the colonies was confined chiefly to calls made upon them to contribute to their own defence by providing barracks, fortifica- tions, &c, for the accommodation of imperial troops, and in some cases paying for the use of troops not strictly required for imperial purposes. In 1857 the Australian colonies agreed to pay the

expenses of the imperial garrison quartered in Australia. This was a very wide step from the imperial attempt to tax the American colonies for a similar purpose in the preceding century. Nevertheless, in evidence given before a departmental committee in 1859, it was shown that at that time the colonies of Great Britain were free from almost every obligation of contributing either by personal service or money payment towards their own defence, and that the cost of military expenditure in the colonies in the preceding year had amounted in round figures to £4,000,000. A committee of the House of Commons sat in 1861 to consider the question, and in 1862 it was resolved, without a division, that " colonies exercising the right of self-government ought to under- take the main responsibility of providing for their own internal order and security, and ought to assist in their own external defence." The decision was accepted as the basis of imperial policy. The first effect was the gradual withdrawing of imperial troops from the self-governing colonies, together with, the encouragement of the development of local military systems by the loan, when desired, of imperial military experts. A call was also made for larger military contributions from some of

the crown colonies. The committee of 1859 na(i emphasized in its report the fact that the principal dependence of the colonies for defence is necessarily upon the British navy, and in 1865, exactly 100 years after the Quartering Act, which had been the cause of the troubles that led to the independence of the United States, a Colonial Naval Defence Act was passed which gave power to the colonies to provide ships of war, steamers, and volunteers for their own defence, and in case of necessity to place them at the disposal of the crown. In 1868 the Canadian Militia Act gave the fully organized nucleus of a local army to Canada. In the same year the imperial troops were withdrawn from New Zealand, leaving the colonial militia to deal with the native war still in progress. In 1870 the last imperial troops were withdrawn from Australia, and in 1873 it was officially announced that military expenditure in the colonies was almost " wholly for imperial purposes." In 1875 an imperial officer went to Australia to report for the Australian government upon Australian defence. The appointment in 1879 of a royal commission to consider the question of imperial defence, which presented its report in 1882, led to a considerable development and reorganization of the system of imperial fortifications. Coaling stations were also selected with reference to the trade routes. In 1885 rumours of war roused a very strong feeling in • connexion with the still unfinished and in many cases unarmed condition of the fortifications recommended by the

commission of 1879. Military activity was stimulated throughout the empire, and the Colonial Defence Committee was created to supply a much-felt need for organized direction and advice to colonial administrations acting necessarily in independence of each other. The question of colonial defence was among the most important of the subjects discussed at the colonial conference held in London in 1887, and it was at this conference that the Australasian colonies first agreed to contribute to the expense of their own naval defence. From this date the principle of local responsibility for self-defence has been fully accepted. India has its own native army, and pays for the maintenance within its frontiers of an imperial garrison. Early in the summer of 1899, when hostilities in South Africa appeared to be imminent, the governments of the principal colonies took occasion to express their approval of the South African policy pursued by the imperial government, and offers Vere made by the governments of India, the Australasian colonies, Canada, Hong-Kong, the Federal Malay states, some of the West African and other colonies, to send contingents for active service in the event of war. On the outbreak of hostilities these offers, on the part of the self-governing colonies, were accepted, and colonial contin- gents upwards of 30,000 strong were among the most efficient sections of the British fighting force. The manner in which these colonial contingents were raised, their admirable fighting qualities, and the service rendered by them in the field, disclosed altogether new possibilities of military organization within the empire, and in subsequent years the subject continued to engage the attention of the statesmen of the empire. Progress in this field lay chiefly in the increased support given in the colonial states to the separate local movements for self-defence; but in 1909 a scheme was arranged by Mr Haldane, by which the British War Office should co-operate with the colonial govern- ments in providing for the training of officers and an interchange of views on a common military policy.

The important questions of justice, religion and instruction will be found dealt with in detail under the headings of separate sections of the empire. Systems of justice throughout the empire have a close resemblance to each other, Ac _ ‘ and the judicial committee of the privy council, on which the self-governing colonies and India are represented, con- stitutes a supreme court of appeal (q.v.) for the entire empire. In the matter of religion, while no imperial organization in the strict sense is possible, the progress made by the Lambeth Conferences and otherwise (see Anglican Communion) has done much to bring the work of the Church of England in different parts of the world into a co-operative system. Religion, of which the

forms are infinitely varied, is however everywhere free,

except in cases where the exercise of religious rites leads to practices foreign to accepted laws of humanity. It is perhaps interesting to state that the number of persons in the empire nominally professing the Christian religion is 58,000,000, of Mahommedans 94,000,000, of Buddhists 12,000,000, of Hindus 208,000,000, of pagans and others 25,000,000. Systems of instruction, of which the aim is generally similar in the white portions of the empire and is directed towards giving to every individual the basis of a liberal education, are governed wholly by local requirements. Native schools are established in all settled communities under British rule.

Literature. — In recent years the subject of British imperialism has inspired a growing literature, and it is only possible here to name a selected number of the more important works which may usefully be consulted on different topics: Sir C. P. Lucas, Historical Geography of the British Colonies (1888, et seq.) ; H. E. Egerton, Short History of British Colonial Policy (1897); H. J. Mackinder, Britain and the British Seas (1902); Sir J. R. Seeley, Expansion of England (1883); Growth of British Policy (1895); Sir Charles Dilke, Greater Britain (1869), Problems of Greater Britain (1890), The British Empire (1899) ; G. R. Parkin, Imperial Federation (1892) ; Sir John Colomb, Imperial Federation, Naval and Military (1886); Sir G. S. Clarke, Imperial Defence (1897); Sidney Goldmann and others, The Empire and the Century (1905); J. L. Garvin, Imperial Reciprocity (1903); J. W. Welsford, The Strength of a Nation (1907); Compatriots Club Essays (1906); Sir H. Jenkyns, British Rule and Jurisdiction beyond the Seas (1902); Bernard Holland, Imperium et libertas (1901); (for an anti-imperialist view) J. A. Hobson, Imperialism (1902). See also the Reports of the various colonial conferences, especially that of the Imperial Conference of 1907; and for trade statistics, J. Holt Schooling s British Trade Book. For the tariff reform movement in England see the articles Free Trade and Protection. (F. L. L.)

BRITISH HONDURAS, formerly called Balize, or Belize, a British crown colony in Central America; bounded on the N. and N.W. by the Mexican province of Yucatan, N.E. and E. by the Bay of Honduras, an inlet of the Caribbean Sea, and S. and W. by Guatemala. (For map, see Central America.) Pop. (1905) 40,372;

area, 7562 sq. m. The frontier of British Honduras, as defined by the conventions of 1859 an d J 893 between Great Britain and Guatemala, begins at the mouth of the river Sarstoon or Sarstun, in the Bay of Honduras; ascends that river as far as the rapids of Gracias a Dios; and thence, turning to the right, runs in a straight line to Garbutt's Rapids, on the Belize river. From this point it proceeds due north to the Mexican frontier, where it follows the river Hondo to its ' mouth in Chetumal Bay.

British Honduras differs little from the rest of the Yucatan peninsula. The approach to the coast is through the islets known as cays, and through coral reefs. It is both difficult and dangerous. For some miles inland the ground is low and swampy, thickly covered with mangroves and tropical jungle. Next succeeds a narrow belt of rich alluvial land, not exceeding a mile in width, beyond which, and parallel to the rivers, are vast tracts of sandy, arid land, called " pine ridges," from the red pines with which they are covered. Farther inland these give place, first, to the less elevated " broken ridges," and then to what are called " cahoon ridges," with a deep rich soil covered with myriads of palm trees. Next come broad savannas, studded with clumps of, trees, through which the streams descending from the mountains wind in every direction. The mountains themselves rise in a succession of ridges parallel to the coast. The first are the Manatee Hills, from 800 to 1000 ft. high; and beyond these are the Cockscomb Mountains, which are about 4000 ft. high. No less than sixteen streams, large enough to be called rivers, descend from these mountains to the sea, between the Hondo and Sarstoon. The uninhabited country between Garbutt's Rapids and the coast south of Deep river was first explored in 1879, by Henry Fowler, the colonial secretary of British Honduras; it was then found to consist of open and undulating grasslands, affording fine pasturage in the west and of forests full of valuable timber in the east. Its elevation varies from 1200 to 3300 ft. Auriferous quartz and traces of other minerals have been discovered, but not in sufficient quantity to repay the cost of mining. The geology, fauna and flora of British Honduras do not materially differ from those of the neighbouring regions (see Central America).

Although the colony is in the tropics, its climate is subtropical. The highest shade temperature recorded is 98° F., the lowest 50 . Easterly sea- winds prevail during the greater part of the year. The dry season lasts from the middle of February to the middle of May; rain occurs at intervals during the other months, and almost continuously in October, November and December. The annual rainfall averages about 815 in., but rises in some districts to 150 in. or more. Cholera,

yellow fever and other tropical diseases occur sporadically, but, on the whole, the country is not unhealthy by comparison with the West Indies or Central American states.

Inhabitants. — British Honduras is a little larger than Wales, and has a population smaller than that of Chester (England). In 1904 the inhabitants of European descent numbered 1500, the Europeans 253, and the white Americans 118. The majority belong to the hybrid race descended from negro slaves, aboriginal Indians and white settlers. At least six distinct racial groups can be traced. These consist of (1) native Indians, to be found chiefly in forest villages in the west and north of the colony away from the sea coast; (2) descendants of the English buccaneers, mixed with Scottish and German traders; (3) the woodcutting class known as " Belize Creoles," of more or less pure descent from African negroes imported, as slaves or as labourers, from the West Indies; (4) the Caribs of the southern districts, descend- ants of the population deported in 1796 from St Vincent, who were of mixed African and Carib origin; (5) a mixed population in the south, of Spanish-Indian origin, from Guatemala and Honduras; and (6) in the north another Spanish-Indian group which came from Yucatan in 1848. The population tends slowly to increase; about 45 % of the births are illegitimate, and males are more numerous than females. Many tracts of fallow land and forest were once thickly populated, for British Honduras has its ruined cities, and other traces of a lost Indian civilization, in common with the rest of Central America.

Natural Products. — -For more than two centuries British Honduras has been supported by its trade in timber, especially in mahogany, logwood, cedar and other dye-woods and cabinet-woods, such as lignum-vitae, fustic, bullet-wood, santa-maria, ironwood, rosewood, &c. The coloured inhabitants are unsurpassed as woodmen, and averse from agriculture; so that there are only about 90 sq. m. of tilled land. Sugar-cane, bananas, cocoanut-palms, plantains, and various other fruits are cultivated ; vanilla, sarsaparilla, sapodilla or chewing-gum, rubber, and the cahoon or coyol palm, valuable for its oil, grow wild in large quantities. In September 1903 all the pine trees on crown lands were sold to Mr B. Chipley, a citizen of the United States, at one cent ($-d.) per tree; the object of the sale being to secure the opening up of undeveloped territory. Unsuccessful attempts have been made to establish sponge fisheries on a large scale.

Chief Towns and Communications. — Belize (pop. in 1904, 9969), the capital and principal seaport, is described in a separate article.

Other towns are Stann Creek (2459), Corosal (1696), Orange Walk (1244), Punta Gorda (706), the Cayo (421), Monkey River (384) and Mullins River (243). All these are administered by local boards, whose aggregate revenue amounts to some £7000. Tele- graph and telephone lines connect the capital with Corosal in the north, and Punta Gorda in the south; but there are no railways, and few good roads beyond municipal limits. Thus the principal means of communication are the steamers which ply along the coast. Mail steamers from New Orleans, Liverpool, Colon and Puerto Cortes in Honduras, regularly visit Belize.

Commerce and Finance. — Between 1901 and 1905 the tonnage of vessels accommodated at the ports of British Honduras rose from 300,000 to 496,465; the imports rose from £252,500 to £386,123; the exports from £285,500 to £377,623. The exports consist of the timber, fruit and other vegetable products already mentioned, besides rum, deerskins, tortoiseshell, turtles and sponges, while the principal imports are cotton goods, hardware, beer, wine, spirits, groceries and specie. The sea-borne trade is mainly shared by Great Britain and the United States. On the 14th of October 1 894, the American gold dollar was adopted as the standard coin, in place of the Guatemalan dollar; and the silver of North, South and Central America ceased to be legal tender. Government notes are issued to the value of I, 2, 5, 10, 50 and 100 dollars, and there is a local currency of one cent bronze pieces, and of 5, 10, 25 and 50 cent silver pieces. The British sovereign and half sovereign are legal tender. In 1846 the government savings bank was founded in Belize; branches were afterwards opened in the principal towns; and in 1903 the British Bank of Honduras was established at Belize. The revenue, chiefly derived from customs, rose from £60,150 in 1901 to £68,335 in 1905. The expenditure, in which the cost of police

and education are important items, rose, during the same period, from £51,210 to £(5i,8po. Jhe public debt, amounting in 1905 to £34,736, represents the balance due oh three loans which were raised in 1885, 1887, and 1891, for public works in Belize. The loans are repayable between 1916 and 1923.

. Constitution and Administration. — From 1638 to 1786 the colonists were completely independent, a,nd elected their own magistrates, who performed all judicial and executive functions. The

customs and precedents thus established were codified and published under the name of " Burnaby's Laws," after the visit of Admiral Sir W. Burnaby, in 1756, and were recognized as valid by the crown. In 1786 a superintendent was appointed by the home government, and although this office was vacant from 1790 to 1797, it was revived until 1862. An executive council was established in 1839, and A legislative assembly, of three nominated and eighteen elected members, in 1853. British Honduras was declared a colony in 1862; with a lieutenant governor, subject to the governor of Jamaica, as its chief magistrate. In 1870 the legislative assembly was abolished, and a' legislative council substituted— the constitution of this body beingfixed, in 1892, at three official and five unofficial members; In 1884 the lieutenant governor was created governor and commander-in-chief, and rendered independent of Jamaica. He is assisted by an executive council of three official and three unofficial members. For administrative purposes the colony is divided into six districts— Belize, Corosal, Orange Walk, the Cayo, Stann Creek and Toledo. The capital of the last named is Punta Gorda ; the other districts take the names of their chief towns. English common law is valid throughout British Honduras, subject to modification by local enactments, and to the operation of the Consolidated Laips of British Honduras, This collection of ordinances, customs, &c.; was officially revised and published between 1884 and 1888. Appeals may be carried before the privy council or the supreme court of Jamaica,

Religion and Education. — The churches represented are Roman Catholic, Anglican, Wesleyan, Baptist and Presbyterian; But rione of them receives assistance from public funds. The bishopric of British Honduras is part of the West Indian province of the Church of - England. Almost all the schools, secondary as well as primary, are denominational. School fees are charged, and grants-in-aid are made to elementary schools. Most of these, since r8g4, have been under the control of a : board, on which the religious bodies managing the schools are represented.

Defence. — The Belize volunteer light infantry corps, raised, in 1897, consists of, about 200 officers and men; a mounted section, rriirribering' about 40, was created in 1904. For the whole colony, the police' dumber about 120. There is also a volunteer fire brigade Of 335 officers and men.

; History. — " His Majesty's Settlement in the Bay of Honduras, as, the territory was formerly styled in official documents, owes its origin, in 1638, to log-wood cutters who had formerly been buccaneers. These were afterwards joined by agents of the Chartered

Company which exploited the pearl fisheries of the Mosquito coast. Although thus industriously; occupied, the settlers so far retained their old habits as to make frequent descents on the logwood establishments of the Spaniards, 'whose attempts to expel them were generally successfully resisted, The most formidable of these was made by the Spaniards in April 1734, when, in consequence of the difficulty of approaching the position from the sea, an expedition, consisting of 1500 men, Was organized inland at the town of Peten. As it neared tie coast, it was met by 250 British, and-completely routed. The log-wood cutters were not again disturbed for a number of years, and their position had become so well established that, in the treaty of 1763 with Spain, Great Britain, while agreeing to demolish "all fortifications which English subjects had erected in the Bay of Honduras," insisted oh a clause in favour of the fritters of logwood, that " they or their Workmen were not 'to be disturbed or molested, under any pretext whatever, in theii said places of cutting and loading logwood," Strengthened by the recognition of the crown, the British settlers made fresh encroachments on Spanish territory. The Spaniards, asserting thit they were engaged, in smuggling and other illicit practices, organized a large force, and on the 15th of September, 17 79ˆ suddenly attacked and destroyed the establishment at Belizeˆ taking the inhabitants prisoners to Merida in Yucatan, arid afterwards to Havana, where most of them died, The survivors were liberated in 1782, and allowed to go to Jamaica. la 1783; they returned with many new adventurers, and were soon engaged in cutting woods. On the 3rd of September in that year a new treaty was signed between Great Britain and Spain, in which ji wasexpressly agreed that his Britannic Majesty's subjects should have " the right of cutting, loading, and carrying away logwood

in tHe district lying between the river Wallis or Belize and Rio Hondo, taking the course of these two rivers for unalterable boundaries." These concessions " were not to be considered as derogating from the rights of sovereignty of the king of Spain " over the district in question, where all the English dispersed in the Spanish territories were to concentrate themselves within eighteen months. This did not prove a satisfactory arrangement; for in 1786 a 'new treaty was concluded, in which the king of Spain made an additional grant of territory, embracing the area between the rivers Sibun or Jabon and Belize. But these extended limits were coupled with still more rigid restrictions. It is not to be supposed that a population composed of so lawless a set of men was remarkably exact in its observance of the treaty. They seem to have greatly annoyed their Spanish neighbours, who eagerly availed themselves of the breaking

out of war between the two countries in 1 796 to concert a formidable attack on Belize. They concentrated a force of 2000 men at Campeachy, winch, under the command of General O'Neill, set sail in thirteen vessels for Belize, and ar-rived on the 10th of July, 1798. The settlers, aided by the British sloop of war " Merlin," had strongly fortified a small island in the harbour, called St George's Cay. They maintained a determined resistance against the Spanish forces, Which were obliged to retire to Campeachy. This was the last attempt to dislodge the British.

The defeat of the Spanish attempt

Bibliography— For a ll statistical matter relating to the colony, see the annual reports to the British Colonial Office (London). ' For the 'progress of exploration; see A Narrative of a Journey across the unexplored Portion of British Honduras, by H. Fowler (Belize, 1879); and . An Expedition to {he Cockscomb Mountains,"by f, Bellamy, in Proceedings of the Rffyal, Geographical Society, vol. xf. (London, 1889). A good general 'description is given in the Handbook of British Honduras, by L : W. Bristowe and P. B; Wright (Edinburgh, i89?);:and the local; history is recounted in the History of British Honduras, by A. R- Gibbs (London, 1883) ; (n Notes on Central America, by E. J. Squier (New York, 1855) ; and in Belize or British Honduras, a paper read before the Society of Arts by Chief Justice Temple (London, 1847). (K. G. J.)*

• BRITOMARTIS ("sweet maiden"), an old Cretan goddess, later identified with Artemis. According to Callimachus : (Hymn to Diana, tˆo), She was a nymph, the daughter of Zeus and Garmej ' and" a r favourite companion of Artemis. Being ptirstted by Miftosy king-' of Crete, who Was enariwJured' of her, she sprang from a rock into 'the sea, but was saved from drowning by foiling into' stone fishermen's nets. She was afterWards made a goddess by Artemis under the name of Bictyrina'CCkTiw," a

net "). She was the patroness of hunters, fishermen and sailors, and also a goddess of birth and health. The centre of her worship was Cydonia, whence it extended to Sparta and Aegina (where she was known as Aphaea) and the islands of the Mediterranean. By some she is considered to have been a moon-goddess, her flight from Minos and her leap into the sea signifying the revolution and disappearance

of the moon (Pausanias ii. 30, iii. 14; Antoninus Liberalis 40).

BRITON-FERRY, a seaport in the mid-parliamentary division of Glamorganshire, Wales, on the eastern bank of the estuary of the Neath river in Swansea Bay, with stations on the Great Western and the Rhondda & Swansea Bay railways, being 174 m. by rail from London. Pop. of urban district (1901) 6973. A tram-line connects it with Neath, 2 m. distant, and the Vale of Neath Canal (made in 1797) has its terminus here. The district was formerly celebrated for its scenery, but this has been con- siderably marred by industrial development which received its chief impetus from the construction in 1861 of a dock of 13 acres, the property of the Great Western Railway Company, and the opening up about the same time of the mining districts of Glyncorrwg and Maesteg by means of the South Wales mineral railway, which connects them with the dock and supplies it with its chief export, coal. Steel and tinplates are manufactured here on a large scale. There are also iron- works and a foundry.

The name La Brittone was given by the Norman settlers of the 12th century to its ferry across the estuary of the Neath (where Archbishop Baldwin and Giraldus crossed in 1188, and which is still used), but the Welsh name of the town from at least the 16th century has been Llansawel.

BRITTANY, or Britanny (Fr. Bretagne), known as Armorica (q.v.) until the influx of Celts from Britain, an ancient province and duchy of France, consisting of the north-west peninsula, and nearly corresponding to the departments of Finistere, C6tes-du- Nord, Morbihan, Ille-et-Vilaine and Lower Loire. It is popularly divided into Upper or Western, and Lower or Eastern Brittany. Its greatest length between the English Channel and the Atlantic Ocean is 250 kilometres (about 155 English miles), and its super- ficial extent is 30,000 sq. kilometres (about 18,630 English sq. m.). It comprises two distinct zones, a maritime zone and an inland zone. In the centre there are two plateaus, partly covered with landes, unproductive moorland : the southern plateau is continued by the Montagnes Noires, and the northern is dominated by the Monts d'Arree. These ranges nowhere exceed 1 1 50 ft. in height, but from their wild nature they recall the aspect of high mountains. The waterways of Brittany are for the most part of little value owing to their torrent-like character. The only river basin of any importance is that of the Vilaine, which flows through Rennes. The coast is very much indented, especially along the English Channel, and is rocky and lined with reefs and islets. The mouths of the rivers form deep

estuaries. Thus nature itself condemned Brittany to remain for a long time shut out from civilization. But in the 19th century the development of railways and other means of communication drew Brittany from its isolation. In the 1 9th century also agriculture developed in a remarkable manner. Many of the landes were cleared and converted into excellent pasturage, and on the coast market-gardening made great progress. In the fertile districts cereals too are cultivated. Industrial pursuits, except in a few seaport towns, which are rather French than Breton, have hitherto received but little attention.

The Bretons are by nature conservative. They cling with almost equal attachment to their local customs and their religious superstitions. It was not till the 17 th century that paganism was even nominally abolished in some parts, and there is probably no district in Europe where the popular Christianity has assimi- lated more from earlier creeds. Witchcraft and the influence of fairies are still often believed in. The costume of both sexes is very peculiar both in cut and colour, but varies considerably in different districts. Bright red, violet and blue are much used, not only by the women, but in the coats and waistcoats of the men. The reader will find full illustrations of the different styles in Bouet's Breiz-izel, ou vie des Brewns de V Armorique (1844)!

The Celtic language is still spoken in lower Brittany. Four dia- lects are pretty clearly marked (see the article Celt: Language, "Breton" p. 328). Nowhere has the taste for marvellous legends been kept so green as in Brittany; and an entire folk- literature still flourishes there, as is manifested by the large number of folk-tales and folk-songs which have been collected of late years.

The whole duchy was formerly divided into nine bishoprics :— – Rennes, Dol, Nantes, St Malo and St Brieuc, in Upper Brittany and Treguier, Vannes, Quimper and St Pol de Leon in Lower.

History. — Of Brittany before the coming of the Romans we have no exact knowledge. The only traces left by the primitive populations are the megalithic monuments (dolmens, menhirs and cromlechs) , which remain to this day in great numbers (see Stone Monuments). In 56 b.c. the Romans destroyed the fleet of the Veneti, and in 52 the inhabitants of Armorica took part in the great insurrection of the Gauls against Caesar, but were subdued finally by him in 51. Roman civilization was then established for several centuries in Brittany.

In the 5th century numbers of the Celtic inhabitants of Britain, flying

from the Angles and Saxons, emigrated to Armorica, ana populated a great part of the peninsula. Converted to Chris- tianity, the new-comers founded' monasteries which helped to clear the land, the greater part of which was barren and wild. The Celtic immigrants formed the counties of Vannes, Cornou- aille, Leon and Domnonee. A powerful aristocracy was con- stituted, which owned estates and had them cultivated by serfs or villeins. The Celts sustained a long struggle against the Frankish kings, who only nominally occupied Brittany. Louis the Pious placed a native chief Nomenoe at the head of Brittany. There was then a fairly long period of peace; but Nomenoe" rebelled against Charles the Bald, defeated him, and forced him, in 846, to recognize the independence of Brittany. The end of the 9th century and the beginning of the 10th were remarkable for the invasions of the Northmen. On several occasions they were driven back — by Salomon (d. 874) and afterwards by Alain, count of Vannes (d. 907)— but it was Alain Barbetorte (d. 952) who gained the decisive victory over them.

In the second half of the 10th century and in the nth century the counts of Rennes were predominant in Brittany. Geoffrey, son of Conan, took the title of duke of Brittany in 992. Conan II., Geoffrey's grandson, threatened by the revolts of the nobles, was attacked also by the duke of Normandy (afterwards William I. of England). Alain Fergent, one of his successors, defeated William in 1085, and forced him to make peace. But in the following century the Plantagenets succeeded in establishing themselves in Brittany. Conan IV., defeated by the revolted Breton nobles, appealed to Henry II; of England, who, in reward for his help, forced Conan to give his daughter in marriage to his Son Geoffrey. Thus Henry II. became master of Brittany, and Geoffrey was recognized as duke of Brittany. But this new dynasty was not destined to last long. Geoffrey's pos- thumous son, Arthur, was assassinated by John of England in 1203, and Arthur's sister Alix, who succeeded to his rights, was married in 1 2 1 2 to Pierre de Dreux, who became duke. This was the beginning of a ducal dynasty of French origin, which lasted till the end of the 15 th century.

From that moment the ducal power gained strength in Brittany and succeeded in curbing the feudal nobles. Under French influence civilization made notable progress. For more than a centtiry peace reigned undisturbed in Brittany. But in 1341 the death of John III., without direct heir, provoked a war of succession between the houses of Blois and Montfort, which lasted till 1364. This war of succession was, in reality, an incident of the Hundred Years' War, the partisans of Blois and Montfort supporting respectively the kings of France and

England. In 1364 John of Montfort (d. 1399) was recognized as duke of Brittany under the style of John IV., 1 but his reign

1 Certain authorities count the father of this duke, another John of Montfort (d. 1345), among the dukes of Brittaay, and according to this enumeration the younger John becomes John V., not John IV.. and his successor John VI. and not John V.

was constantly troubled, notably by his struggle with Olivier de Clisson (1336-1407). John V. (d. 1442), on the other hand, distinguished himself by his able and pacific policy. During his reign and the reigns of his successors, Francis I., Peter II. and Arthur III., the ducal authority developed in a remarkable manner. The dukes formed a standing army, and succeeded in levying hearth taxes (fouages) throughout Brittany. Francis II. (1435-1488) fought against Louis XI., notably during the War of the Public Weal, and afterwards engaged in the struggle against Charles VIII., known as " The Mad War " (La Guerre Felle). After the death of Francis II. the king of France invaded Brittany, and forced Francis's daughter, Anne of Brittany, to marry him in 1491. Thus the reunion of Brittany and France was prepared. After the death of Charles VIII. Anne married Louis XII. Francis I., who married Claude, the daughter of Louis XII. and Anne, settled the definitive annexation of the duchy by the contract of 1532, by which the maintenance of the privileges and liberties of Brittany was guaranteed. Until the Revolution Brittany retained its own estates. The royal power, however, was exerted to reduce the privileges of the province as much as possible. It often met with vigorous resistance, notably in the 18th century. The struggle was particularly keen between 1760 and 1769, when E. A. de V. du Plessis Richelieu, due d'Aiguillon, had to fight simultaneously the estates and the parliament, and had a formidable adversary in L. R. de C. de la Chalotais. But under the monarchy the only civil war in Brittany in which blood was shed was the revolt of the due de Mercceur (d. 1602) against the crown at the time of the troubles of the League, a revolt which lasted from 1 589 to 1 598. Mention, however, must also be made of a serious popular revolt which broke out in 1675 — " the revolt of the stamped paper."

See Bertrand d'Argentre, Histoire de Bretagne (Paris, 1586); Dom Lobineau, Histoire de Bretagne (Paris, 1702); Dom Morice, Histoire de Bretagne (1 742-1 756); T. A. Trollope, A Summer in Brittany

(1840) ; A. du Chatellier, V 'Agriculture et Us classes agricoles de la Bretagne (1862) ; F. M. Luzel, Legendes chretiennes de la Basse-Bretagne (Paris, 1881), and Veillees bretonnes (Paris, 1879) ; A. Dupuy, La Reunion de la Bretagne a la France (Paris, 1880), and Etudes sur V administration municipale en Bretagne au XVIII' siecle d89i); J. Loth, L 'Emigration bretonne en Armorique du V" au VII" siecle (Rennes, 1883); H. du Cleuziou, Bretagne artistique et pittoresque (Paris, 1886); Arthur de la Borderie, Histoire de Bretagne (Rennes, 1896 seq.); J. Lemoine, La Revolte du papier timbre ou des bonnets rouges en Bretagne en 167$ (1898) ; M. Marion, La Bretagne et le due dAiguillon (Paris, 1898); B. Pocquet, Le Due d'Aiguillon et la Chalotais (Paris, 1900-1902) ; Anatole le Braz, Vieilles Histoires du pays breton (1897), and La Legende de la mort (Paris, 1902) ; Ernest Lavisse, Histoire de France, vol. i. (Paris, 1903) ; Henri See, Etude sur les classes rurales en Bretagne au moyen Age (1896), and Les Classes rurales en Bretagne du XVI" siecle a la Revolution (1906).

BRITTON, JOHN (1771-1857), English antiquary, was born on the 7 th of July 1771 at Kington-St-Michael, near Chippenham. His parents were in humble circumstances, and he was left an orphan at an early age. At sixteen he went to London and was apprenticed to a wine merchant. Prevented by ill-health from serving his full term, he found himself adrift in the world, without money or friends. In his fight with poverty he was put to strange shifts, becoming cellarman at a tavern and clerk to a lawyer, reciting and singing at a small theatre, and compiling a collection of common songs. After some slight successes as a writer, a Salisbury publisher commissioned him to compile an account of Wiltshire and, in conjunction with his friend Edward Wedlake Brayley, Britton produced The Beauties of Wiltshire (1801 ; 2 vols., a third added in 1825), the first of the series The Beauties of England and Wales, nine volumes of which Britton and his friend wrote. Britton was the originator of a new class of literary works. " Before his time," says Digby Wyatt, " popular topography was unknown." In 1805 Britton published the first part of his Architectural Antiquities of Great Britain (9 vols., 1805-18 14); and this was followed by Cathedral Antiquities of England (14 vols., 1814-1835). In 1845 a Britton Club was formed, and a sum of £1000 was subscribed and given to Britton, who was subsequently granted a civil list pension by Disraeli, then chancellor of the exchequer. Britton was an earnest advocate of the preservation of national monuments, proposing

in 1837 the formation of a society such as the modern Society for the Preservation of Ancient Monuments. Britton himself supervised the

reparation of Waltham Cross and Stratford-on- Avon church. He died in London on the 1st of January 1857.

Among other works with which Britton was associated either as author or editor are Historical Account of Redcliffe Church, Bristol (1813); Illustrations of Fonthill Abbey (1823); Architectural Antiquities of Normandy, with illustrations by Pugin (1825-1827); Picturesque Antiquities of English Cities (1830); and History of the Palace and Houses of Parliament at Westminster (1 834-1 836), the joint work of Britton and Brayley. He contributed much to the Gentleman 's Magazine and other periodicals.

His Autobiography was published in 1850. A Descriptive Account of his Literary Works was published by his assistant T. E. Jones.

*BRITTON, the title of the earliest summary of the law of England in the French tongue, which purports to have been written by command of King Edward I. The origin and author- ship of the work have been much disputed. It has been attri- buted to John le Breton, bishop of Hereford, on the authority of a passage found in some MSS. of the history of Matthew of West- minster; there are difficulties, however, involved in this theory, inasmuch as the bishop of Hereford died in 1275, whereas allusions are made in Britton to several statutes passed after that time, and more particularly to the well-known statute Quia emptores lerrarum, which was passed in 1 290. It was the opinion of Selden that the book derived its title from Henry de Bracton, the last of the chief justiciaries, whose name is sometimes spelled in the fine Rolls " Bratton " and " Bretton," and that it v/as a royal abridgment of Bracton's great work on the customs and laws of England, with the addition of certain subsequent statutes. The arrangement, however, of the two works is different, and but a small proportion of Bracton's work is in- corporated in Britton. The work is entitled in an early MS. of the 14th century, which was once in the possession of Selden, and is now in the Cambridge university library, Summa de legibus Anglie que vocatur Bretone; and it is described as "a book called Bretoun " in the will of Andrew Horn, the learned chamber- lain of the city of London, who bequeathed it to the chamber * of the Guildhall in 1329, together with another book called Mirroir des Justices.*

Britton was first printed in London by Robert Redman, without a date, probably about the year 1530. Another edition of it was printed in 1640, corrected by E. Wingate. A third edition of it, with an English translation, was published at the University Press, Oxford, 1865, by F. M. Nichol. An English translation of the work

without the Latin text had been previously published by R. Kelham in 1762.

BRITZSKA, or Britska (from the Polish bryczka; a diminu- tive of hryka, a goods- wagon) , a form of carriage, copied in England from Austria early in the 19th century; as used in Poland and Russia it had four wheels, with a long wicker-work body constructed for reclining and a calash (hooded) top.

BRIVE, or Brives-la-Gaillarde, a town of south-central France, capital of an arrondissement in the department of Correze, 62 m. S.S.E. of Limoges on the main line of the Orleans railway from Paris to Montauban. Pop. (1906) town 14,954; commune 20,636. It lies on the left bank of the Correze in an ample and fertile plain, which is the meeting-place of important roads and railways. The enceinte which formerly surrounded the town has been replaced by shady boulevards, and a few wide thoroughfares have been made, but many narrow winding streets and ancient houses still remain. Outside the boulevards lie the modern quarters, also the fine promenade planted with plane trees which stretches to the Correze and contains the chief restaurants and the theatre. Here also is the statue of Marshal Guillaume Marie Anne Brune, who was a native of Brive. A fine bridge leads over the river to suburbs on its right bank. The public buildings are of little interest apart from the church of St Martin, which stands in the heart of the old town. It is a building of the 12 th century in the Romanesque style of Limousin, with three narrow naves of almost equal height. The ecclesiastical seminary occupies a graceful mansion of the 16th century, with a fafade, a staircase and fireplaces of fine Renaissance workmanship. Brive is the seat of a sub-prefeel

and has a tribunal of first instance, a tribunal of commerce, a communal college and a school of industry. Its position makes it a market of importance, and it has a very large trade in the early vegetables and fruit of the valley of the Correze, and in grain, live-stock and truffles. Table-delicacies, paper, wooden shoes, hats, wax and earthenware are manufactured, and there are slate and millstone workings and dye-works.

In the vicinity are numerous rock caves, many of them having been used as dwellings in prehistoric times. The best known are those of

Lamouroux, excavated in stages in a vertical wall of rock, and four grotto-chapels resorted to by pilgrims in memory of St Anthony of Padua, who founded a Franciscan monastery at Brive in 1226. Under the Romans Brive was known as Briva Curretiae (bridge of the Correze). In the middle ages it was the capital of lower Limousin.

BRIXEN (Ital. Bressanone) , a small city in the Austrian province of Tirol, and the chief town of the administrative district of Brixen. Pop. (1000) 5767. It is situated in the valley of the Eisack, at the confluence of that stream with the Rienz, and is a station on the Brenner railway, being 34 m. south-east of that pass, and 24 m. north-east of Botzen. The aspect of the city is very ecclesiastical; it is still the see of a bishop, and contains an 18th-century cathedral church, an episcopal palace and seminary, twelve churches and five monasteries. The see was founded at the end of the 8th century (possibly of the 6th century) at Saben on the rocky heights above the towni of Klausen (some way to the south of Brixen), but in 992 was transferred to Brixen, which, perhaps a Roman station, became later a royal estate, under the name of Prichsna, and in 901 was given by Louis the Child to the bishop. In 1027 the bishop received from the emperor Conrad II. very extensive temporal powers, which he only lost to Austria in 1803. The town was surrounded in 1030 by walls. In 1525 it was the scene of the first outbreak of the great peasants' revolt. About s§ m. north of Brixen is the great fortress of Franzensfeste, built 1833-1838, to guard the route over the Brenner and the way to the east up the Pusterthal. (W. A. B. C.)

BRIXHAM, a seaport and market town in the Torquay parliamentary division of Devonshire, England, 33 m. S. of Exeter, on a branch of the Great Western railway. Pop. of urban district (1901) 8092. The town is irregularly built on the cliffs to the south of Torbay, and its harbour is sheltered by a breakwater. Early in the 19th century it was an important military post, with fortified barracks on Berry Head. It is the headquarters of the Devonshire sea-fisheries, having also a large coasting trade. Shipbuilding and the manufacture of ropes, paint and sails are industries. There is excellent bathing, and Brixham is in favour as a seaside resort. St Mary's, the ancieat parish church, has an elaborate 14th-century font and somennonuments of interest. At the British Seamen's Orphans' home boys are fed, clothed and trained as apprentices for the merchant service. A statue commemorates the landing, in 1 681, of William of Orange.

Brixham Cave, called also Windmill Hill Cavern, is a well- known ossiferous cave situated near Brixham, on the brow of a hill

composed of Devonian limestone. It was discovered by chance in 1858, having been until then hermetically sealed by a mass of limestone breccia. Dr Hugh Falconer with the assistance of a committee of geologists excavated it. The succession of beds in descending order is as follows: — (1) Shingle consisting of pebbles of limestone, slate and other local rocks, with fragments of stalagmite and containing a few bones and worked flints. The thickness varies from five to sixteen feet. (2) Red cave earth with angular fragments of limestone, bones and worked flints, and having a thickness of 3 to 4 ft. (3) Remnants {in situ) of an old stalagmitic floor about nine inches thick. (4) Black peaty soil varying in thickness, the maximum being about a foot. (5) Angular debris fallen from above varying in thickness from one to ten feet. (6) Stalagmite with a few bones and antlers of reindeer, the thickness varying from one to fifteen inches. Of particular interest is the presence of patches or ledges of an old stalagmitic floor, three to four feet above the present floor.

On the under-side, there are found attached fragments of lime- stone and quartz, showing that the shingle bed once extended up to it, and that it then formed the original floor. The shingle therefore stood some feet higher than it does now, and it is supposed that a shock or jar, such as that of an earthquake, broke up the stalagmite, and the pebbles and sand composing the shingle sunk deeper into the fissures in the limestone. This addition to the size of the cave was partially filled up by the cave earth. At a later period the fall of angular fragments at the entrance finally closed the cave, and it ceased to be accessible except to a few burrowing animals, whose remains are found above the second and newer stalagmite floor.

The fauna of Brixham cavern closely resembles that of Kent's Hole. The bones of the bear, horse, rhinoceros, lion, elephant, hyena and of many birds and small rodents were unearthed. Altogether 1621 bones, nearly all broken and gnawed, were found; of these 691 belonged to birds and small rodents of more recent times. The implements are of a roughly-chipped type resembling those of the Mousterian period. From these structural and palaeontological evidences, geologists suppose that the formation of the cave was carried on simultaneously with the excavation of the valley; that the small streams, flowing down the upper ramifications of the valley, entered the western opening of the cave, and traversing the fissures in the limestone, escaped by the lower openings in the chief valley; and that the rounded pebbles found in the shingle bed were carried in by these streams. It would be only at times of drought that the cave was frequented by animals, a theory which explains the small quantity of animal remains in the shingle. The implements of man

are relatively more common, seventeen chipped flints' having been found. As the excavation of the valley proceeded, the level of the stream was lowered and its course diverted; the cave consequently became drier and was far more frequently inhabited by predatory animals. It was now essentially an animal den, the occasional visits of man being indicated by the rare occurrence of flint- implements. Finally, the cave became a resort of bears; the remains of 354 specimens, in all stages of growth, including even sucking cubs, being discovered.

See Sir Joseph Prestwich, Geology (1888) ; Sir John Evans, Ancient Stone Implements of Great Britain, p. 512; Report on the Cave, Phil. Trans. (Royal Society, 1873).

BRIXTON, a district in the south of London, England, included in the metropolitan borough of Lambeth (q.v.).

BRIZEUX, JULIEN AUGUSTE PELAGE (1803-1858), French poet, was born at Lorient (Morbihan) on the 12th of September 1803. He belonged to a family of Irish origin, long settled in Brittany, and was educated for the law, but in 1827 he pro- duced at the Theatre Francais a one-act verse comedy, Racine, in collaboration with Philippe Busoni. A journey to Italy in company with Auguste Barbier made a great impression on him, and a second visit (1834) resulted in 1841 in the publication of a complete translation of the Divina Commedia in terza ritna. With Primel el Nola (1852) he included poems written under Italian influence, entitled Les Ternaires (1841), but in the rustic idyl of Marie (1836) turned to Breton country life; in Les Bretons (1845) he found his inspiration in the folklore and legends of his native province, and in Telen-Aroor (1844) he used the Breton dialect. His Histoires poitiques (1855) was crowned by the French Academy. His work is small in bulk, but is charac- terized by simplicity and sincerity. Brizeux was an ardent student of the philology and archaeology of Brittany, and had collected materials for a dictionary of Breton place-names He died at Montpellier on the 3rd of May 1858.

His GEuvres completes (2 vols., i860) were edited with a notice of the author by Saint-Rene Taillandier. Another edition appeared in 1880-1884 (4 vols.). A long list of articles on his work may be con- sulted in an exhaustive monograph, Brizeux; sa vie et ses auvres (1898), by the abbe C. Lecigne.

BRIZO, an ancient goddess worshipped in Delos. She delivered oracles in dreams to those who consulted her about fishery and

seafaring. The women of Delos offered her presents consisting of little boats filled with all kinds of eatables (with the exception of

fish) in order to obtain her protection for those engaged on the sea (Athenaeus viii. p. 335).

BROACH, or Bharuch, an ancient city and modern district of British India, in the northern division of Bombay. The city is on the right bank of the Nerbudda, about 30 m. from the sea, and 203 m. N. of Bombay. The area, including suburbs^ occupies 25 sq. m. Pop. (1901) 42,806. The sea-borne trade is confined to a few coasting vessels. Handloom-weaving is almost extinct, but several cotton mills have been opened. There" are also large flour-mills. Broach is the Barakacheva of the Chinese traveller Hsiian Tsang and the Barygaza of Ptolemy and Arrian. Upon the conquest of Gujarat by the Mahommedans, and the formation of the state of that name, Broach formed part of the new kingdom. On its overthrow by Akbar in 1572, it was annexed to the Mogul empire and governed by a Nawab. The Mahrattas became its masters in 1685, from which period it was held in subordination to the peshwa until 1772, when it was captured by a force under General Wedderburn (brother to Lord Loughs borough), who was killed in the assault. In 1783 it was ceded by the British to Sindhia in acknowledgment of certain services. It was stormed in 1803 by a detachment commanded by Colonel Woodington, and was finally ceded to the East India Company by Sindhia under the treaty of Sarji Anjangaom.

The District or Broach contains an area of 1467 sq. m. Consisting chiefly of the alluvial plain at the mouth of the river Nerbudda, the land is rich and highly cultivated, and though it is without forests it is not wanting in trees. The district is well supplied with rivers, having in addition to the Nerbudda the Mahi in the north and the Kim in the south. The population comprises several distinct races or castes, who, while speaking a common dialect, Gujarati, inhabit separate villages. Thus there are Koli, Kunbi or Voro (Bora) villages, and others whose lands are almost entirely held and cultivated by high castes, such as Rajputs, Brahmans or Parsees. In 1901 the population was 291,763, showing a decrease of 15%, compared with an increase of s % in the preceding decade. The principal crops are cotton, millet, wheat and pulse. Dealing in cotton is the chief industry, the dealers being organized in a gild. Besides the cotton

mills in Broach city there are several factories for ginning and pressing cotton, some of them on a very large scale. The district is traversed throughout its length by the Bombay & Baroda railway, which crosses the Nerbudda opposite Broach city on an iron- girder bridge of 67 spans. The district suffered severely from the famine of 1899-1900.

BROACH (Fr. broche, a pointed instrument, Med. Lat. brocca, cf. the Latin adjective brochus or broecus, projecting, used of teeth), a word, of which the doublet " brooch " (q.v.) has a special meaning, for many forms of pointed instruments, such as a bodkin, a wooden needle used in tapestry-making, a spit for roasting meat, and a tool, also called a " rimer," used with a wrench for enlarging or smoothing holes (see Tool) . From the use of a similar instrument to tap casks, comes " to broach " or " tap " a cask. A particular use in architecture is that of " broach-spire," a term employed to designate a particular form of spire, found only in England, which takes its name from the stone roof of the lower portion. The stone spire being octagonal and the tower square on plan, there remained four angles to be covered over. This was done with a stone roof of slight pitch, compared with that of the spire, and it is the intersection of this roof with the octagonal Places of the spire which forms the broach.

BROADSIDE, sometimes termed .Broadsheet, a single sheet of paper containing printed matter on one side only. The broad- side seems to have been employed from the very beginning of printing for royal proclamations, papal indulgences and similar documents. England appears to have been its chief home, where it was used chiefly for ballads, particularly in the 16th century, but also as a means of political agitation and for personal statements of all kinds, especially for the dissemination of the dying speeches and confessions of criminals. It is prominent in the history of literature because, particularly during the later part of the 17th century, several important poems, by Dryden,

Butler and others, originally appeared printed on the "broad side " of a sheet. The term is also used of the simultaneous discharge of the guns on one side of a ship of war.

BROADSTAIRS, a watering-place, in the Isle of Thanet parliamentary division of Kent, England, 3 m. S.E. of Margate, on the South-Eastern & Chatham railway. Pop. of urban district, Broadstairs and St Peter's (1901) 6466. From 1837 to 1851 Broadstairs was a favourite summer resort of Charles Dickens, who, in a sketch called " Our English Watering-Place," described it as a

place " left high and dry by the tide of years." This seaside village, with its " semicircular sweep of houses," grew into a considerable town owing to the influx of summer visitors, for whose entertainment there are, besides the " Albion " mentioned by Dickens, numerous hotels and boarding-houses, libraries, a bathing establishment and a fine promenade. Dickens' residence was called Fort House, but it became known as Bleak House, through association with his novel of that name, though this was written after his last visit to Broadstairs in 1851. Broadstairs has a small pier for fishing-boats, first built in the reign of Henry VIII. An archway leading down to the shore bears an inscription showing that it was erected by George Culmer in 1540, and not far off is the site of a chapel of the Virgin, to which ships were accustomed to lower their top-sails as they passed. St Peter's parish, lying on the landward side of Broadstairs, and included in the urban district, has a church dating from the 12th to the end of the 16th century. Kingsgate, on the North Foreland, north of Broadstairs on the coast, changed its name from St Bartholomew's Gate in honour of Charles II. 's landing here with the duke of York in 1683 on his way from London to Dover. Stonehouse, close by, now a preparatory school for boys, was the residence of Archbishop Tait, whose wife established the orphanage here.

BROCA, PAUL (1824-1880), French surgeon and anthro- pologist, was born at Sainte-Foy la Grande, Gironde, on the 28th of June 1824. He early developed a taste for higher mathematics, but circumstances decided him in adopting medicine as his profession. Beginning his studies at Paris in 1841, he made rapid progress, becoming house-surgeon in 1844, assistant anatomical lecturer in 1846, and three years later professor of surgical anatomy. He had already gained a reputa- tion by his pathological researches. In 1853 he was named fellow of the Faculty of Medicine, and in 1867 became member of the Academy of Medicine and professor of surgical pathology to the Faculty. During the years occupied in winning his way to the head of his profession he had published treatises of much value on cancer, aneurism and other subjects. It was in 1861 that he announced his discovery of the seat of articulate speech in the left side of the frontal region of the brain, since known as the convolution of Broca. But famous as he was as a suigeon, his name is associated most closely with the modern school of anthropology. Establishing the Anthropological Society of Paris in 1859, of which he was secretary till his death, he was practically the inventor of the modern science of craniofegy. He rendered distinguished service in the Franco- German War, and during the Commune by his organization and administration of the public hospitals. He founded

La Revue a" Anthropologic in 1872, and it was in its pages that the larger portion of his writings appeared. In his last years Broca turned from his labours in the region of craniology to the exclusive study of the brain, in which his greatest triumphs were achieved (see Aphasia). He was decorated with the Legion of Honour in 1868, and was honorary fellow of the leading ana- tomical, biological and anthropological societies of the world. He died on the 9th of July 1880. A statue of him by Choppin was erected in 1887 in front of the Faculty of Medicine in Paris. BROCADE, the name usually given to a class of richly decora- tive shuttle-woven fabrics, often made in coloured silks and with or without gold and silver threads. Ornamental features in brocade are emphasized and wrought as additions to the main fabric, sometimes stiffening it, though more frequently producing on its face the effect of low relief. These additions present a distinctive appearance on the back of the stuff, where

the weft or floating threads of the brocaded or broached parts hang in loose groups or are clipped away. The Latin word broccus is related equally to the Italian

Fig. 1. — Brocade woven in red and olive green silks and gold thread on a cream-coloured ground. Along the top is the Kufic inscription " Arrahman " (The Merciful) several times repeated in olive green on a gold-thread ground. Pairs of seated animals, addorsed regardant, and geese vis-a-vis are worked within the lozenge- shaped compartments of the trellis framework which regulates the pattern. Both animals and birds are separated by conventional trees, and the latter are enclosed in inscriptions of Kufic characters. Siculo-Saracenic; nth or 12th century. 55 in. sq.

brocato, the Spanish brocar and the French brocarts and brocher, and implies a form of stitching or broaching, so that textile fabrics woven with an appearance of stitching or broaching have consequently come to be termed " brocades." A Spanish docu-

Fig. 2. — Part of-a Siculo-Saracenic brocade woven in the 12th century. 16 j in. wide.

ment dated 1375 distinguishes, bet ween &vdnjˆvdV ed'argento

de seda and brocats d'or e d'argent, a difference which is readily

perceived, upon comparing for instance cloths of gold, Indian

kincobs, with Lyons silks that are brocket with threads of gold, silk or other material. Notwithstanding this, many Indian kincobs'and dainty gold and coloured silk-weavings of Persian workmanship, both without floating threads, are often called brocades, although in neither .„„..„„

is the ornamentation really IVˆ. TI. 2?ˆ ar Sˆfˆt flfc. JSSˆ brochS or brocaded. Con- temporary in use with the Spanish brocats is the word brocado. In addition to bro- carts the French now use the word brocher in connexion with certain silk stuffs which however are not brocades in the same sense as the bro- carts. A wardrobe account of King Edward IV. (1480) has an entry of " satyn broched with gold "—a de- scription that fairly applies to such an enriched satin as that for instance shown in £ fig. 4. But some three cen- jj» turies earlier than the date of that specimen, decorative stuffs were partly broches with gold threads by oriental weavers, especially those of Persia, Syria and parts of FlG . 3 ._ Piece of stuff woven southern Europe and northern or brocaded with red silk and Africa under the domination gold thread, with an ogival fram of the Saracens, to whom the in S enclosing alternately, pairs of earlier germs, so to speak, of £E&ˆˆTl2ˆ brocading may be traced. i ea f -shaped fruit device. Probably Of such is the nth or of Rhenish-Byzantine manufacture 12th century Siculo-Saracenic inthe12thor13thcentury.9in.long. specimen in fig. 1, in which the heads only of the pairs of animals and birds are broched. with gold thread. Another sort of brocaded material is indicated in fig. 2, taken from a part of a sumptuous Siculo-Saracenic weaving ' produced in coloured silks and gold threads at the famous Hotel des Tiraz in Palermo for an official robe of Henry IV. (1165-1197) as emperor of the Holy Roman Empire, and still preserved in the cathedral of Regensburg. Fig. 3 is a further variety of textile that would be classed as brocat. This is of the 12th or 13th century manufacture, possibly by German or Rhenish-Byzan- tine weavers, or even by Spanish weavers, i many of whom at Almeria, Malaga, Grenada and Seville rivalled those at Palermo. In the 14th century the making of satins heavily brocaded with gold threads was associated conspicuously with such Italian towns as Lucca, Genoa, Venice and Florence. Fig. 4 is from a piece of 14th-century dark-blue, satin broached in relief with gold thread in a design the like of which appears in the background of Orcagna's "Coronation of the Virgin," now in the ; National Gallery, London. During the 17 th century Genoa, Florence and Lyons vied with each other in making brocades in which the enrichments were as frequently of coloured

silks as of gold inter- mixed with silken threads. Fig. 5 is from a piece of crimson silk damask flatly brocaded with flowers, scroll forms, fruit and birds in gold. This is probably of Florentine workmanship. Rather more closely allied to modern brocades is the Lyons specimen given in fig. 6, in which the brocading is done not only with silver but also with coloured silks. Early in the 18th century Spitalfields was busy as a competitor with Lyons in manufacturing many sorts of brocades, specified in a collection of designs pre- served in the national art library of the Victoria and

Albert Museum, under such trade titles as " brocade lut- string, brocade tabby, brocade tissue, brocade damask, brocade

Fig. 4. — Piece of blue satin brocaded with gold threads. The unit of the pattern is a symmetrical arrangement of fantastic birds, vine leaves and curving stems. The bird shapes are remotely related to, if not derived from, the Chinese mystical " fonghoang." North Italian weaving of the 14th century; about n in. square.

Siitin, Venetian brocade, and India figured brocade." Brocading in China seems to be of considerable antiquity, and Dr Bushell in his valuable handbook on Chinese art cites a notice of five

Fig. 5. — Piece of crimson silk damask brocaded in gold thread with symmetrically arranged flowers, scrolls, birds, &c. Italian (? Florentine). Late 17th century; about 2 ft. 6 in. long.

rolls of brocade with dragons woven upon a crimson ground, presented by the emperor Ming Ti of the Wei dynasty, in the

year a.d. 238, to the reigning empress of Japan; and varieties of brocade patterns are recorded as being in use during the Sung dynasty (960-1279). The first edition of an illustrated work upon tillage and weaving was published in China in 12 10, and contains an engraving of a loom constructed to weave flowered- silk brocades such as are woven at the present time at Suchow and Hangchow and elsewhere. On the other hand, although they are described usually as brocades, certain specimens of imperial Chinese robes sumptuous in ornament, sheen of coloured silks and the glisten of golden threads, are woven in the tapestry- weaving manner and without any floating threads. It seems reasonable to infer that Persians and Syrians derived the art of

Fig. 6. — Piece of pink silk brocaded in silver and white and coloured silks. French middle 18th century; about 15 in. square.

weaving brocades from the Chinese, and as has been indicated, passed it on to Saracens as well as Europeans. (A. S. C.)

BROCCHI, GIOVANNI BATTISTA (1772-1826), Italian mineralogist and geologist, was born at Bassano on the 18th of February 1772. He studied at the university of Pisa, where his attention was turned to mineralogy and botany. In 1802 he was appointed professor of botany in the new lyceum of Brescia; but he more especially devoted himself to geological researches in the adjacent districts. The fruits of these labours appeared in different publications, particularly in his Trattato mineralogico e chemico sidle miniere di ferro del dipartimento del Mella (1808) — treatise on the iron mines of Mella. These researches procured him the office of inspector of mines in the recently established kingdom of Italy, and enabled him to extend his investigations over great part of the country. In 181 1 he produced a valuable essay entitled Memoria mineralogica sulla Voile di Fassa in Tirolo; but his most important work is the Conchiologia fossile subapennina con osservazioni geologiche sugli Apennini, e sul suolo adiacente (2 vols., 4to, Milan, 1814), containing accurate details of the structure of the Apennine range, and an account of the fossils of the Italian Tertiary strata compared with existing species. These subjects were further illustrated by his geognostic map, and his Catalogo ragionato di una raccolta di rocce, disposto con ordine geografico, per servire alia geognosia dell' Italia (Milan, 1817). His work Dello stato fisico del suolo di Roma (1820), with its accompanying map, is likewise noteworthy. In it he corrected the erroneous views of Breislak, who conceived that Rome occupies the site of a volcano, to which he ascribed the volcanic materials that cover the seven hills. Brocchi pointed out that these materials were derived either from Mont Albano,

an extinct volcano, 12 m. from the city, or from Mont Cimini, still farther to the north. Several papers by him, on minera- logical subjects, appeared in the Biblioteca Italiana from 1816 to 1823. In the latter year Brocchi sailed for Egypt, in order to explore the geology of that country and report on its mineral resources. Every facility was granted by Mehemet Ali, who in 1823 appointed him one

of a commission to examine the district of Sennaar; but Brocchi, unfortunately for science, fell a victim to the climate, and died at Khartum on the 25th of September

1826.

BROCHANT DE VILLIERS, ANDRE JEAN FRANCOIS MARIE (1772-1840), French mineralogist and geologist, was born at Villiers, near Nantes, on the 6th of August 1772. After studying at the Ecole Polvtechnique, he was in 1794 the first pupil admitted to the Ecole des Mines. In 1804 he was appointed professor of geology and mineralogy in the Ecole des Mines, which had been temporarily transferred to Pezay in Savoy, and he returned with the school to Paris in 1815. Later on he became inspector general of mines and a member of the Academy of Sciences. He investigated the transition strata of the Tarantaise, wrote on the position of the granite rocks of Mont Blanc, and on the lead minerals of Derbyshire and Cumberland. He was charged with the superintendence of the construction of the geological map of France, undertaken by his pupils Dufrenoy and Elie de Beaumont. He died in Paris on the 16th of May 1840. His publications include Traite elementaire de minSralogie (2 vols., 1801-1802; 2nd ed., 1808), and Traite abrtge' de cristal- lographie (Paris, 1818).

BROCHANTITE, a mineral species consisting of a basic copper sulphate Cu 4 (OH) 6 S0 4 , crystallizing in the orthorhombic system. The crystals are usually small and are prismatic or acicular in habit; they have a perfect cleavage parallel to the face lettered a in the adjoining figure. They are trans parent to translucent, with a vitreous lustre, and are of an emerald-green to blackish – green colour. Specific gravity 3-907; hardness 35-4. The mineral was first found associated with malachite and native copper in the copper mines of the Urals, and was named by A. Levy in 1824 after A. J. M. Brochant de Villiers. Several varieties, differing somewhat in crystalline form, have been distinguished, some of them having originally been described as distinct species, but afterwards proved to be essentially identical with brochan- tite; these are konigine from the Urals, brongniartine from Mexico, krisuvigite from Iceland, and warringtonite from Cornwall. Of other localities, mention may be made of Rough- ten Gill, Caldbeck Fells, Cumberland, where small brilliant crystals are associated with malachite and chrysocolla in a quartzose rock; Rezbanya in the Bihar Mountains, Hungary; Atacama in Chile, with atacamite, which closely resembles brochantite in general appearance; the Tintic district in Utah. A microscopical examination of the green copper ores of second- ary

origin in the Clifton and Morenci district of Arizona proves brochantite to be of extremely common occurrence mostly intergrown with malachite which effectually masks its presence: it is not unlikely that the malachite of other localities will on examination be found to be intergrown with brochantite.

Mention may be here made of another orthorhombic basic copper sulphate not unlike brochantite in general characters, but differing from it in containing water of crystallization and in its fine blue colour; this is the Cornish mineral langite, whichhasthecompositionCuS0 4 -3Cu(OH) 2 4-H 2 0. (L. J. S.)

BROCK, SIR ISAAC (1769-1812), British soldier and administrator, was born at St Peter Port, Guernsey, on the 6th of October 1769. Joining the army at the age of fifteen as an ensign of the 8th regiment, he became a lieutenant-colonel in 1797, after less than thirteen years' service. He commanded the 49th regiment in the expedition to North Holland in 1799,

was wounded at the battle of Egmont-op-Zee, and subsequently served on board the British fleet at the battle of Copenhagen. From 1802 to 1805 he was with his regiment in Canada, returning thither in 1806 in view of the imminence of war between Great Britain and the United States. From September 1806 till August 18 10 he was in charge of the garrison at Quebec; in the latter year he assumed the command of the troops in Upper Canada, and soon afterwards took over the civil administration of that province as provisional lieutenant-governor. On the outbreak of the war of 181 2 Brock had to defend Upper Canada against invasion by the United States. In the face of many difficulties and not a little disaffection, he organized the militia of the province, drove back the invaders, and on the 16th of August 181 2, with about 730 men and 600 Indians commanded by their chief Tecumseh, compelled the American force of 2500 men under General William Hull (1753-1825) to surrender at Detroit, an achievement which gained him a knighthood of the Bath and the popular title of " the hero of Upper Canada." From Detroit he hurried to the Niagara frontier, but on the 13th of October in the same year was killed at the battle of Queenston Heights. The House of Commons voted a public monument to his memory, which was erected in Saint Paul's cathedral, London. On the 13th of October 1824, the twelfth anniversary of his death, his remains were removed from the bastions of Fort George, where they had been originally interred, and placed beneath a monument on Queenston Heights, erected by the provincial legislature. This was blown up by a fanatic in 1840, but as the result of a mass-meeting of over 8000

citizens held on the spot, a new and more stately monument was erected.

His Life and Correspondence by his nephew, Ferdinand Brock Tupper (2nd edition, London, 1847), still remains the best; later lives are by D. R.Read (Toronto, 1894), and by Lady Edgar (Toronto and London, 1905). (W. L. G.)

BROCK, THOMAS (1847-), English sculptor, was the chief pupil of Foley, and later became influenced by the new romantic movement. His group " The Moment of Peril " was followed by " The Genius of Poetry," " Eve," and other ideal works that mark his development. His busts, such as those of Lord Leighton and Queen Victoria; his statues, such as " Sir Richard Owen " and "Dr Philpott, bishop of Worcester "; his sepulchral monuments, such as that to Lord Leighton in St Paul's cathedral, a work of singular significance, refinement and beauty; and his memorial statues of Queen Victoria, at Hove and elsewhere, are examples of his power as a portraitist, sympathetic in feeling, sound and restrained in execution, and dignified and decorative in arrangement. The colossal equestrian statue of " Edward the Black Prince " was set up in the City Square in Leeds in 1901, the year in which the sculptor was awarded the commission to execute the vast Imperial Memorial to Queen Victoria in front of Buckingham Palace. Brock was elected an associate of the Royal Academy in 1883 and full member in 1891.

BROCKEN, a mountain of Germany, in Prussian Saxony, the highest point (3733 ft.) of the Harz. It is a huge, bare, granite- strewn, dome-shaped mass and, owing to its being the greatest elevation in north Germany, commands magnificent views in all directions. From it Magdeburg and the Elbe, the towers of Leipzig and the Thuringian forest are distinctly visible in clear weather. Access to the summit is attained by a mountain railway (12 m.) from Dreiannen-Hohne, a station on the normal gauge line Wernigerode-Nordhausen, and by two carriage roads from the Bodetal and Usenburg respectively. In the folk- lore of north Germany the Brocken holds an important place, and to it cling many legends. Long after Christianity had penetrated to these regions, the Brocken remained a place of heathen worship. Annually, on Walpurgis night (1st of May), curious rites were here enacted, which, condemned by the priests of the Christian church, led to the belief that the devil and witches here held their orgies. Even to this day, this super- stition possesses the ininds of many country people around, who believe the mountain to be haunted on this night. In literature

it is represented by the famous " Brocken scene " in Goethe's Faust.

See Jacobs, Der Brocken in Geschichte und Sage (Halle, 1878); and Prohle, Brockensagen (Magdeburg, 1888).

BROCKEN, SPECTRE OF THE (so named from having been first observed in 1780 on the Brocken), an enormously magnified shadow of an observer cast upon a bank of cloud when the sun is low in high mountain regions, reproducing every motion of the observer in the form of a gigantic but misty image of himself.

BROCKES, BARTHOLD HEINRICH (1680-1747), German poet, was born at Hamburg on the 22nd of September 1680. He studied jurisprudence at Halle, and after extensive travels in Italy, France and Holland, settled in his native town in 1704. In 1720 he was appointed a member of the Hamburg senate, and entrusted with several important offices. Six years (from 1735 to 1741) he spent as Amtmann (magistrate) at Ritzebiittel. He died in Hamburg on the 16th of January 1747. Brockes' poetic works were published in a series of nine volumes under the fantastic title Irdisches Vergniigen in Gott (1721-1748); he also translated Marini's La Strage degli innocenti (1715), Pope's Essay on Man (1740) and Thomson's Seasons (1745). His poetry has small intrinsic value, but it is symptomatic of the change which came over German literature at the beginning of the 18th century. He was one of the first German poets to substitute for the bombastic imitations of Marini, to which he himself had begun by contributing, a clear and simple diction. He was also a pioneer in directing the attention of his countrymen to the new poetry of nature which originated in England. His verses, artificial and crude as they often are, express a reverential attitude towards nature and a religious interpretation of natural phenomena which was new to German poetry and prepared the way for Klopstock.

Brockes' autobiography was published by J. M. Lappenberg in the Zeitschrift des Vereins fur Hamburger Geschichte, ii. pp. 167 ff. (1847). See also A. Brandl, B. H. Brockes (1878), and D. F. Strauss, Brockes und H. S. Reimarus (Gesammelte Schriften, ii.). A short selection of his poetry will be found in vol. 39 (1883) of Kurschner's Deutsche Nationalliteratur.

BROCKHAUS, FRIEDRICH ARNOLD (1772-1823), German publisher, was bom at Dortmund, on the 4th of May 1772. He was educated at the gymnasium of his native place, and from 1788 to 1793 served an apprenticeship in a mercantile house at Diisseldorf. He then devoted two years at Leipzig to the study of modern languages and literature, after which he set up at Dortmund an emporium for English goods. In 1801 he transferred this business to Arnheim, and in the following year to Amsterdam. In 1805, having given up his first line of trade, he began business as a publisher. Two journals projected by him were not allowed by the government to survive for any length of time, and in 1810 the complications in the affairs of Holland induced him to return homewards. In 181 1 he settled at Altenburg. About three years previously he had purchased the copyright of the Konversations-Lexikon, started in 1796, and in 1810-1811 he completed the first edition of this celebrated work (14th ed. 1901-4). A second edition under his own editor- ship was begun in 181 2, and was received with universal favour. His business extended rapidly, and in 181 8 Brockhaus removed to Leipzig, where he established a large printing-house. Among the more extensive of his many literary undertakings were the critical periodicals — Hermes, the Literarisches Konversationsblatt (afterwards the Blatter filr liter arische Unterhaltung), and the Zeitgenossen, and some large historical and bibliographical works, such as Raumer's Geschichte der Hohenstaitfen, and EbeTt's Allgemeines bibliographisches Lexikon. F. A. Brockhaus died at Leipzig on the 20th of August 1823. The business was carried on by his sons, Friedrich Brockhaus (1800-1865) who retired in 1850, and Heinrich Brockhaus (1804-1874), under whom it was considerably extended. The latter especially rendered great services to literature and science, which the university of Jena recognized by making him, in 1858, honorary doctor of philosophy. In the years 1842-1848, Heinrich Brockhaus was member of the Saxon second chamber, as repre-

sentative for Leipzig, was made honorary citizen of that city in 1872, and died there on the 15th of November 1874.

See H. E. Brockhaus, Friedrich A. Brockhaus, sein Leben und Wirken nach Brief en und andern Aufzeichnungen (3 vols., Leipzig, 1872-1881); also by the, same author, Die Firma F. A. Brockhaus von der Begriindung bis zum hundertjdhrigen Jubildum (1805-1905, Leipzig, 1905).

Another of Friedrich's sons, Hermann Brockhaus (1806- 1877), German Orientalist, was born at Amsterdam on the 28th of January 1806. While his two brothers carried on the business he devoted

himself to an academic career. He was appointed extraordinary professor in Jena in 1838, and in 1841 received a call in a similar capacity to Leipzig, where in 1848 he was made ordinary professor of ancient Semitic. He died at Leipzig on the 5th of January 1877. Brockhaus was an Oriental scholar in the old sense of the word, devoting his attention, not to one language only, but to acquiring a familiarity with the principal languages and literature of the East. He studied Hebrew, Arabic and Persian, and was able to lecture on Sanskrit, after- wards his specialty, Pali, Zend and even on Chinese. His most important work was the editio princeps of the Katha-sarit-sdgara, " The Ocean of the Streams of Story," the large collection of Sanskrit stories made by Soma Deva in the 12th century. By this publication he gave the first impetus to a really scientific study of the origin and spreading of popular tales, and enabled Prof. Benfey and others to trace the great bulk of Eastern and Western stories to an Indian, ■and more especially to a Budd- histic source. Among Prof. Brockhaus's other publications were his edition of the curious philosophical play Prabodha- chandrodaya, " The Rise of the Moon of Intelligence," his critical edition of the " Songs of Hafiz," and his publication in Latin letters of the text of the "Zend-Avesta."

BROCKLESBY, RICHARD (1722-1797), English physician, was born at Minehead, Somersetshire, on the nth of August 1722. He was educated at Ballitore, in Ireland, where Edmund Burke was one of his schoolfellows, Studied medicine at Edin- burgh, and finally graduated at Leiden in 1745- Appointed physician to the army in 1758, he served in Germany during part of the Seven Years' War, and on his return settled down to practise in London. In 1764 he published Economical and Medical Observations, which contained suggestions for improving the hygiene of army hospitals. In his latter years he withdrew altogether into private life. The circle of his friends included some of the most distinguished literary men of the age. He was warmly attached to Dr Johnson, to whom about 1784 he offered an annuity of £100 for life, and whom he attended on his death- bed, while in 1788 he presented Burke, of whom he was an intimate friend, with £1000, and offered to repeat the gift " every year until your merit is rewarded as it ought to be at court." He died on the nth of December 1797, leaving his house and part of his fortune to his grand-nephew, Dr Thomas Young.

BROCKTON, a city of Plymouth county, Massachusetts, U.S.A., about 20 m. S. of Boston, and containing an area of 21 sq. m. of rolling surface. Pop. (1870) 8007; (1880)13,608; (1890) 27,294; (1900) 40,063, of whom 9484 were foreign-born, . including 2667 Irish, 2199 English Canadians and 1973 Swedes; (1910, census)

56,878. It is served by the New York, New Haven & Hartford railway. Brockton has a public library, with 54,000 volumes, in 1908. By popular vote, beginning in 1886 (except in 1898), the liquor traffic was prohibited annually. The death-rate, 13-18 in 1907, is very low for a manufacturing city of its size. Brockton is the industrial centre of a large population surrounding it (East and West Bridgewater, North Easton, Avon, Randolph, Holbrook and Whitman), and is an important manufacturing place. Both in 1900 and in 1905 it ranked first among the cities of the United States in the manu- facture of boots and shoes. The city's total factory product in 1900 was valued at $24,855,362, and in 1905 at $37,790,982, an increase during the five years of 52 %. The boot and shoe pro- duct in 1905 was valued at $30,073,014 (9-4 % of the value of the total boot and shoe product of the United States), the boot

and shoe cut stock at $1,344,977, and the boot and shoe findings at $2,435,137 — the three combined representing 89.6% of the city's total manufactured product. In 1908 there were 35 shoe factories, including the W. L. Douglas, the Ralston, the Walkover, the Eaton, the Keith and the Packard establishments, and, in 1905, 14,000,000 (in 1907 about 17,000,000) pairs of shoes were produced in the city. Among the other products are lasts, blacking, paper and wooden packing boxes, nails and spikes, and shoe fittings and tools. The assessed valuation of the city rose from $6,876,427 in 1881 to $37,408,332 in 1907. Brockton was a part of firidgewater until 1821, when it was incorporated as the township of North Bridgewater. Its present name was adopted in 1874, and it was chartered as a city in 1881. Brockton was the first city in Massachusetts to abolish all grade crossings (1896) within its limits.

BROCKVILLE, a town and port of entry of Ontario, Canada, and capital of Leeds county, named after General Sir Isaac Brock, situtated 119 m. S. W. of Montreal, on the left bank of the St Lawrence, and on the Grand Trunk, and Brockville & Westport railways. A branch line connects it with the Canadian Pacific. It has steamer communication with the St Lawrence and Lake Ontario ports, and is a summer resort. The principal manufactures are hardware, furnaces, agricultural implements, carriages and chemicals. It is the centre of one of the chief dairy districts of Canada, and ships large quantities of cheese and butter. Pop. (1881) 7609; (1901) 8940.

BROD, a town of Croatia-Slavonia, in the county of Pozega, on the left bank of the river Save, 124 m. by rail S. E. by E. of Agram. Pop. (1900) 7310. The principal Bosnian railway here crosses the river, to meet the Hungarian system. Brod has thus a considerable transit trade, especially in cereals, wine, spirits, prunes and wood. It is sometimes called Slavonisch-Brod, to distinguish it from Bosna-Brod, or Bosnisch-Brod, across the river. The town owes its name to a ford (Servian brod) of the Save, and dates at least from the 15th century. Brod was fre- quently captured and recaptured in the wars between Turkey and Austria; and it was here that the Austrian army mustered, in 1879, for the occupation of Bosnia.

BRODERIP, WILLIAM JOHN (1789-1859), English naturalist, was born in Bristol on the 21st of November 1789. After graduating at Oxford he was called to the bar in 181 7, and for some years was engaged in law-reporting. In 1822 he was appointed a metropolitan police magistrate, and filled that office until 1856, first at the Thames police court and then at West- minster. His leisure was devoted to natural history, and his writings did much to further the study of zoology in England. The zoological articles in the Penny Cyclopaedia were written by him, and a series of articles contributed to Fraser's Magazine were reprinted in 1848 as Zoological Recreations, and were followed in 1852 by Leaves from the Note-book of a Naturalist. He was one of the founders of the Zoological Society of London, and a large collection of shells which he formed was ultimately bought by the British Museum. He died in London on the 27th of February 1859.

BRODHEAD, JOHN ROMEYN (1814-1873), American his- torical scholar, was born in Philadelphia, Pennsylvania, on the 2nd of January 1814, the son of Jacob Brodhead (1782-1855), a prominent clergyman of the Dutch Reformed Church. He graduated at Rutgers College in 1831, and in 1835 was admitted to the bar in New York City. After 1837, however, he devoted himself principally to the study of American colonial history, and in order to have access to the records of the early Dutch settlements in America he obtained in 1839 an appointment as attache of the American legation at the Hague. His investiga- tions here soon proved that the Dutch archives were rich in material on the early history of New York, and led the state legislature to appropriate funds for the systematic gathering from various European archives of transcripts of documents relating to New York. Brodhead was appointed (1841) by Governor William H. Seward to undertake the work, and within several years gathered from England, France and Holland some eighty manuscript volumes of transcriptions, largely of

documents which had not hitherto been used by historians. These transcriptions were subsequently edited by Edward O'Callaghan (vols, i.-xi., incl.) and by Berthold Fernow (vols, xii.xv., incl.), and published by the state under the title Docu ments relating to the Colonial History of New York (15 vols., 1853-1883). From 1846 to 1849, while George Bancroft was minister to Great Britain, Brodhead held under him the post of secretary of legation. In 1853-1857 he was, naval officer of the port of New York. He published several addresses and a scholarly History of the State of New York (2 vols., 1853-187 1), generally considered the best for the brief period covered (1600- 1690). He died in New York City on the 6th of May 1873.

BRODIE, SIR BENJAMIN COLLINS, 1st Bart. (1 783-1862), English physiologist and surgeon, was born in 1783 at Winter- slow, Wiltshire. He received his early education from his father; then choosing medicine as his profession he went to London in 1801, and attended the lectures of John Abernethy. Two years later he became a pupil of Sir Everard Home at St George's hospital, and in 1808 was appointed assistant surgeon at that institution, on the staff of which he served for over thirty years. In 1810 he was elected a fellow of the Royal Society, to which in the next four or five years he contributed several papers describing original investigations in physiology. At this period also he rapidly obtained a large and lucrative practice, and from time to time he wrote on surgical questions, contribut- ing numerous papers to the Medical and Chirufgical Society, and to the medical journals. Probably his most important work is that entitled Pathological and Surgical Observations on the Diseases of the Joints, in which he attempts to trace the beginnings of disease in the different tissues that form a joint, and to give an exact value to the symptom of pain as evidence of organic disease. This volume led to the adoption by surgeons of measures of a conservative nature in the treatment of diseases of the joints, with consequent reduction in the number of amputations and the saving of many limbs and lives. He also wrote on diseases of the urinary organs, and on local nervous affections of a surgical character. In 1854 he published anonymously a volume of Psychological Inquiries; to a second volume which appeared in 1862 his name was attached. He received many honours during his career. He attended George IV., was sergeant- surgeon to William IV. and Queen Victoria, and was made a baronet in 1834. He became a corresponding member of the French Institute in 1844, D.C.L. of Oxford in 1855, and president of the Royal Society in 1858, and he was the first president of the general medical council. He died at Broome Park, Surrey, on the 21st of

October 1862. His collected works, with auto- biography, were published in 1865 under the editorship of Charles Hawkins.

His eldest son, Sir Benjamin Collins Brodie, 2nd Bart. (1817- 1880), was appointed professor of chemistry at Oxford in 1865, and is chiefly known for his investigations on the allotropic states of carbon and for his discovery of graphitic acid.

BRODIE, PETER BELLINGER (1815-1897), English geologist, son of P. B. Brodie, barrister, and nephew of Sir Benjamin C. Brodie, was born in London in 1815. While still residing with his father at Lincoln's Inn Fields, he gained some knowledge of natural history and an interest in fossils from visits to the museum of the Royal College of Surgeons, at a time when W. Clif t was curator. Through the influence of Clif | he was elected a fellow of the Geological Society early in 1834. Proceeding afterwards to Emmanuel College, Cambridge, he came under the spell of Sedgwick, and henceforth devoted all his leisure time to geology. Entering the church in 1838, he was curate at Wylye in Wiltshire, and for a short time at Steeple Claydon in Buckinghamshire, becoming later rector of Down Hatherley in Gloucestershire, and finally (1855) vicar of Rowington in Warwickshire, and rural dean. Records of geological observa- tions in all these districts were published by him. At Cambridge he obtained fossil shells from the Pleistocene deposit at Barnwell; in the Vale of Wardour he discovered in Purbeck Beds the isopod named by Milne-Edwards Archaeoniscus Brodiei; in Buckinghamshire he described the outliers of Purbeck and

Portland Beds; and in the Vale of Gloucester the Lias and Oolites claimed his attention. Fossil insects, however, formed the subject of his special studies (History of the Fossil Insects of the Secondary Rocks of England, 1845), and many of his pub- lished papers relate to them. He was an active member of the Cotteswold Naturalists' Club and of the Warwickshire Natural History and Archaeological Society, and in 1854 he was chief founder of the Warwickshire Naturalists' and Archaeologists' Field Club. In 1887 the Murchison medal was awarded to him by the Geological Society of London. He died at Rowington, on the 1st of November 1897.

See Memoir by H. B. Woodward in Geological Magazine, 1897, p. 481 (with portrait).

BRODY, a town of Austria, in Galicia, 62 m. E. of Lemberg b v rail. Pop. (1900) 17,360, of which about two-thirds are Jews. It is situated near the Russian frontier, and has been one of the most important commercial centres in Galicia, especially for the trade with Russia. But since 1879, when its charter as a free commercial city was withdrawn, its trade has also greatly diminished. Brody was created a town in 1684, and was raised to the rank of a free commercial city in 1779.

BROEKHUIZEN, JAN VAN [Janxjs Beoukhusius], (1649- 1707), Dutch classical scholar and poet, was born on the 20th of November 1649, at Amsterdam. Having lost his father when very young, he was placed with an apothecary, with whom he lived several years. Not liking this employment, he entered the army, and in 1674 was sent with his regiment to America, in the fleet under Admiral de Ruyter, but returned to Holland the same year. In 1678 he was sent to the garrison at Utrecht, where he contracted a friendship with the celebrated Graevius; here he had the misfortune to be so deeply implicated in a duel that, according to the laws of Holland, his life was forfeited. Graevius, however, wrote immediately to Nicholas Heinsius, who obtained his pardon. Not long afterwards he became a captain of one of the companies then at Amsterdam. After the peace of Ryswick, 1697, his company was disbanded, and he retired on a pension to a country house near Amsterdam and pursued his classical and literary studies at leisure. His Dutch poems, in which he followed the model of Pieter Hooft, were first published in 1677; a later edition, with a biography by D. van Hoogstraten, appeared in 1712, the last edition, 1883, was edited by R. A. Kollewijn. His classical reputation rests on his editions of Propertius (1702) and Tibullus (1707). His Latin poems (Carmina) appeared in 1684; a later edition(Poemata) by D. van Hoogstraten appeared in 1711. The Select Letters (Jani Browkhusii Epistolae Selectae, 1889 and 1893) were edited by J. A. Worp, who also wrote his biography, 1891. Broekhuizen died on the 15th of December 1707.

BROGGER, WALDEMAR CHRISTOFER (1851-), Nor- wegian geologist, was born in Christiania on the 10th of November 1851, and educated in that city. In 1876 he was appointed curator of the geological museum in his native city, and assistant on the Geological Survey. He was professor of mineralogy and geology from 188 1 to 1890 in the university of Stockholm, and from 1890 in the university of Christiania. He also became rector and president of the senate of the royal uni- versity of Christiania. His observations on the igneous rocks of south Tirol compared with those of Christiania afford much information oa the relations of the granitic and basic rocks. The

subject of the differentiation of rock-types in the process of solidification as plutonic or volcanic rocks from a particular magma received much attention from him. He dealt also with the Palaeozoic rocks of Norway, and with the late glacial and post-glacial changes of level in the Christiania region. The honorary degree of Ph.D. was conferred upon him by the uni- versity of Heidelberg and that of LL.D. by the university of Glasgow. The Murchison medal of the Geological Society of London was awarded to him in 1891.

BROGLIE, DE, the name of a noble French family which, originally Piedmontese, emigrated to France in the year 1643. The head of the family, Francois Marie (1611-1656), then took the title of comte de Broglie. He had already distinguished

himself as a soldier, and died, as a lieutenant-general, at the siege of Valenza on the 2nd of July 1656. His son, Victor Maurice, Comte de Broglie (1647-1727), served under Conde, Turenne and other great commanders of the age of Louis XIV., becoming marSchal de camp in 1676, lieutenant-general in 1688, and finally marshal of France in 1724.

The eldest son of Victor Marie, Francois Marie, afterwards Due de Broglie (1671-1745), entered the army at an early age, and had a varied career of active service before he was made, at the age of twenty-three, lieutenant-colonel of the king's regiment of cavalry. He served continuously in the War of the Spanish Succession and was present at Malplaquet. He was made lieutenant-general in 17 10, and served with Villars in the last campaign of the war and at the battle of Denain. During the peace he continued in military employment, and in 17 19 he was made director-general of cavalry and dragoons. He was also employed in diplomatic missions, and was ambassador in England in 1724. The war in Italy called him into the field again in 1733, and in the following year he was made marshal of France. In the campaign of 1734 he was one of the chief commanders on the French side, and he fought the battles of Parma and Guastalla. A famous episode was his narrow personal escape when his quarters on the Secchia were raided by the enemy on the night of the 14th of September 1734. In 1735 he directed a war of positions with credit, but he was soon replaced by Marshal de Noailles. He was governor-general of Alsace when Frederick the Great paid a secret visit to Strassburg (1740). In 1742 de Broglie was appointed to command the French army in Germany, but such powers as he had possessed were failing him, and he had always been the " man of small means," safe and cautious, but lacking in elasticity and daring. The only success obtained was in the action of

Sahay (25th May 1742), for which he was made a duke. He returned to France in 1743, and died two years later.

His son, Victor Francois, Due de Broglie (1718-1804), served with his father at Parma and Guastalla, and in 1734 obtained a colonelcy. In the German War he took part in the storming of Prague in 1742, and was made a brigadier. In 1744 and 1745 he saw further service on the Rhine, and in 1756 he was made marechal de camp. He subsequently served with Marshal Saxe in the low countries, and was present at Roucoux, Val and Maastricht. At the end of the war he was made a lieutenant-general. During the Seven Years' War he served successively under d'Estrees, Soubise and Contades, being present at all the battles from Hastenbeck onwards. His victory over Prince Ferdinand at Bergen (1759) won him the rank of marshal of France from his own sovereign and that of prince of the empire from the emperor Francis I. In 1760 he won an action at Corbach, but was defeated at Vellinghausen in 1761. After the war he fell into disgrace and was not recalled to active employment until 1778, when he was given command of the troops designed to operate against England. He played a prominent part in the Revolution, which he opposed with deter- mination. After his emigration, de Broglie commanded the " army of the princes " for a short time (1792). He died at Minister in 1804.

Another son of the first duke, Charles Francois, Comte de Broglie (1719-1781), served for some years in the army, and afterwards became one of the foremost diplomatists in the service of Louis XV. He is chiefly remembered in connexion with the Secret du Roi, the private, as distinct from the official, diplomatic service of Louis, of which he was the ablest and most important member.

The son of Victor Francois, Victor Claude, Prince de Brogue (1757-1794), served in the army, attaining the rank of marechal de camp. He adopted revolutionary opinions, served with Lafayette and Rochambeau in America, was a member of the Jacobin Club, and satin the Constituent Assembly, constantly voting on the Liberal side. He served as chief of the staff to the Republican army on the Rhine; but in the Terror he was denounced, arrested and executed at Paris on the 27th of June 1794. His dying admonition to his little son was to remain

faithful to the principles of the Revolution, however unjust and ungrateful.

Achille Charles Leonce Victor, duc de Broglie (1785- 1870), statesman and diplomatist, son of the last-named, was born at Paris on the 28th of November 1785. His mother had shared her husband's imprisonment, but managed to escape to Switzerland, where she remained till the fall of Robespierre. She now returned to Paris with her children and lived there quietly until 1 796, when she married a M. d'Argenson, grandson of Louis XV. 's minister of war. Under the care of his step-father young de Broglie received a careful and liberal education and made his entree into the aristocratic and literary society of Paris under the Empire. In 1809, he was appointed a member of the council of state, over which Napoleon presided in person; and was sent by the emperor on diplomatic missions, as attache, to various countries. Though he had never been in sympathy with the principles of the Empire, de Broglie was not one of those who rejoiced at its downfall. In common with all men of ex- perience and sense he realized the danger to France of the rise to power of the forces of violent reaction. With Decazes and Richelieu he saw that the only hope for a calm future lay in " the reconciliation of the Restoration with the Revolution." By the influence of his uncle, Prince Amedee de Broglie, his right to a peerage had been recognized; and to his own great surprise he received, in June 1814, a summons from Louis XVIII. to the Chamber of Peers. "There, after the Hundred Days, he distin- guished himself by his courageous defence of Marshal Ney, for whose acquittal he, alone of all the peers, both spoke and voted. After this defiant act of opposition it was perhaps fortunate that his impending marriage gave him an excuse for leaving the country. On the 15th of February 1816, he was married at Leghorn to the daughter of Madame de Stael. He returned to Paris at the end of the year, but took no part in politics until the elections of September 1817 broke the power of the " ultra-royalists " and substituted for the Chambre inlrouvable a moderate assembly. De Broglie's political attitude during the years that followed is best summed up in his own words: " From 1812 to 1822 all the efforts of men of sense and character were directed to reconciling the Restoration and the Revolution, the old regime and the new France. From 1822 to 1827 all their efforts were directed to resisting the growing power of the counter-revolution. From 1827 to 1830 all their efforts aimed at moderating and regulating the reaction in a contrary sense." During the last critical years of Charles X.'s reign, de Broglie identified himself with the doctrinaires, among whom Royer- Collard and Guizot were the most prominent.

The July revolu- tion placed him in a difficult position; he knew nothing of the intrigues which placed Louis Philippe on the throne; but, the revolution once accomplished, he was ready to uphold the fait accompli with characteristic loyalty, and on the 9th of August took office in the new government as minister of public worship and education. As he had foreseen, the ministry was short-lived, and on the 2nd of November he was once more out of office. During the critical time that followed he con- sistently supported the principles which triumphed with the fall of Laffitte and the accession to power of Casimir Perier in March 1832. After the death of the latter and the insurrection of June 1832, de Broglie took office once more as minister for foreign affairs (October nth). His tenure of the foreign office was coincident with a very critical period in international relations. But for the sympathy of Great Britain under Palmerston, the July monarchy would have been completely isolated in Europe; and this sympathy the aggressive policy of France in Belgium and on the Mediterranean coast of Africa had been in danger of alienating. The Belgian crisis had been settled, so far as the two powers were concerned, before de Broglie took office; but the concerted military and naval action for the coercion of the Dutch, which led to the French occupation of Antwerp, was carried out under his auspices. The good understanding of which this was the symbol characterized also the relations of de Broglie and Palmerston during the crisis of the first war of Mehemet Ali (if .v.) with the Porte, and in the affairs of the Spanish peninsula

their common sympathy with constitutional liberty led to an agreement for common action, which took shape in the treaty of alliance between Great Britain, France, Spain and Portugal, signed at London on the 22nd of April 1834. De Broglie had retired from office in the March preceding, and did not return to power till March of the following year, when he became head of the cabinet. In 1836, the government having been defeated on a proposal to reduce the five per cents, he once more resigned, and never returned to official life. He had remained in power long enough to prove what honesty of purpose, experience of affairs, and common sense can accomplish when allied with authority. The debt that France and Europe owed him may be measured by comparing the results of his policy with that of his successors under not dissimilar circumstances. He had found France isolated and Europe full of the rumours of war; he left her strong in the English alliance and the respect of Liberal Europe, and Europe freed from the restless apprehen- sions which were to be stirred into life again by the attitude of Thiers in the Eastern Question and of Guizot in the affair of the " Spanish marriages."

From 1836 to 1848 de Broglie held almost completely aloof from politics, to which his scholarly temperament little inclined him, a disinclination strengthened by the death of his wife on the 22nd of September 1838. His friendship for Guizot, however, induced him to accept a tem- porary mission in 1845, and in 1847 to go as French ambassador to London. The revolution of 1848 was a great blow to him, for he realized that it meant the final ruin of the Liberal monarchy — in his view the political system best suited to France. He took his seat, however, in the republican National Assembly and in the Convention of 1848, and, as a member of the section known as the " Burgraves," did his best to stem the tide of socialism and to avert the reaction in favour of autocracy which he foresaw. He shared with his colleagues the indignity of the coup d'etat of the 2nd of December 1851, and remained for the remainder of his life one of the bitterest enemies of the imperial regime, though he was heard to remark, with that caustic wit for which he was famous, that the empire was " the government which the poorer classes in France desired and the rich deserved." The last twenty years of his life were devoted chiefly to philo- sophical and literary pursuits. Having been brought up by his step-father in the sceptical opinions of the time, he gradually arrived at a sincere belief in the Christian religion. " I shall die," said he, "a penitent Christian and an impenitent Liberal." His literary works, though few of them have been published, were rewarded in 1856 by a seat in the French Academy, and he was also a member of another branch of the French Institute, the Academy of Moral and Political Science. In the labours of those learned bodies he took an active and assiduous part. He died on the 25th of January 1870.

Besides his Souvenirs, in 4 vols. (Paris, 1885-1888), the duc de Broglie left numerous works, of which only some have been published. Of these may be mentioned Ecrits el discpurs (3 vols., Paris, 1863); Le Libre Echange et Vimpol (Paris, 1879) ; Vues sur le gouvernement de la France (Paris, 1861). This last was confiscated before publication by the imperial government. See Guizot, Le Duc de Broglie (Paris, 1870), and Memoires (Paris, 1858-1867) ; and the histories of Thureau-Dangin and Duvergier de Hauranne.

Jacques Victor Albert, duc de Broglie (1821-1901), his eldest son, was born at Paris on the 13th of June 1821. After a brief diplomatic career at Madrid and Rome, the revolution of 1848 caused him to withdraw from public life and devote himself to literature. He had already published a translation of the religious system of Leibnitz (1846). He now at once made his mark by his contributions to the Revue des deux Mondcs and the Orleanist and clerical organ Le

Correspondant, which were afterwards collected under the titles of Etudes morales et lilteraires (1853) and Questions de religion et d'histoire (i860). These were supplemented in 1869 by a volume of Nouvelles eludes de litterature et de morale. His L'Eglise et Vempire romain au IV' siecle (1856-1866) brought him the succession to Lacordaire's seat in the Academy in 1862. In 1870 he succeeded his father in the dukedom, having previously been known as the prince de Broglie. In the following year he was elected to the National

Assembly for the department of the Eure, and a few days later (on the 19th of February) was appointed ambassador in London; but in March 1872, in consequence of criticisms upon his negotia- tions concerning the commercial treaties between England and France, he resigned his post and took his seat in the National Assembly, where he became the leading spirit of the monarchical campaign against Thiers. On the replacement of the latter by Marshal MacMahon, the due de Broglie became president of the council and minister for foreign affairs (May 1873), but in the reconstruction of the ministry on the 26th of November, after the passing of the septennate, transferred himself to the ministry of the interior. His tenure of office was marked by an extreme conservatism, which roused the bitter hatred of the Republicans, while he alienated the Legitimist party by his friendly relations with the Bonapartists, and the Bonapartists by an attempt to effect a compromise between the rival claimants to the monarchy. The result was the fall of the cabinet on the 16th of May 1874. Three years later (on the 16th of May 1877) he was entrusted with the formation of a new cabinet, with the object of appealing to the country and securing a new chamber more favourable to the reactionaries than its predecessor had been. The result, however, was a decisive Republican majority. The due de Broglie was defeated in his own district, and resigned office on the 20th of November. Not being re-elected in 1885, he abandoned politics and reverted to his historical work, publishing a series of historical studies and biographies written in a most pleasing style, and especially valuable for their extensive documentation. He died in Paris on the 19th of

January 1901.

Besides editing the Souvenirs of his father (1886, &c), the Memoires of Talleyrand (1891, &c.), and the Letters of the Duchess Albertine de Broglie (1896), he published Le Secret du rot, Correspondance

secrete de Louis XV avec ses agents diplomatiques , 1752-1774 (1878) ; Frederic II et Marie ThSrhe (1883); Frederic II et Louis XV (1885); Marie Therese Imperatrice (1888); Le Pere Lacordaire (1889); Maurice de Saxe et le marquis d'Argenspn (1891); La Paix d'Aix-la-Chapelle (1892); L' Alliance autrichienne (1895); La Mission de M. de Gontaut-Biron & Berlin (1896) ; Voltaire avant et pendant.la Guerre de Sept Ans (1898) ; Saint Ambroise, translated by Margaret Maitland in the series of " The Saints " (1899).

BROGUE. (1) A rough shoe of raw leather (from the Gael. brog, a shoe) worn in the wilder parts of Ireland and the Scottish Highlands. (2) A dialectical accent or pronunciation (of uncertain origin), especially used of the Irish accent in speaking English.

BROHAN, AUGUSTINE SUSANNE (1807-1887), French actress, was born in Paris on the 22nd of January 1807. She entered the Conservatoire at the age of eleven, and took the second prize for comedy in 1820, and the first in 1821. She served her apprenticeship in the provinces, making her first Paris appearance at the Odeon in 1832 as Dorine in Tartuffe. Her success there and elsewhere brought her a summons to the ComSdie Francaise, where she made her debut on the 15th of February 1834, as Madelon in Les Pricieuses ridicules, and Suzanne in Le Manage de Figaro. She retired in 1842, and died on the 16th of August 1887.

Her elder daughter, Josephine Felictte Augustine Brohan (1824-1893), was admitted to the Conservatoire when very young, twice taking the second prize for comedy. The soubrette part, entrusted for more than 1 50 years at the Comedie Francaise to a succession of artists of the first rank, was at the moment without a representative, and Mdlle Augustine Brohan made tier debut there on the 19th of May 1841, as Dorine in Tartuffe, and Lise in Rivaux d 'eux-m&mes. She was immediately admitted pensionnaire, and at the end of eighteen months unanimously elected soeiitaire. She soon became a great favourite, not only in the plays Of Moliere and de Regnard, but also in those of Marivaux. On her retirement from the stage in 1866, she made an unhappy marriage with Edmond David de Gheest (d. 1885), secretary to the Belgian legation in Paris.

Susanne Brohan's second daughter, Emilie Madeleine Brohan (1833-1900), also took first prize for comedy at the Conservatoire (1850). She was engaged at once by the Comedie Francaise, but instead of making her dibul in some play of the

repertoire of the theatre, the management put on for her benefit a

new comedy by Scribe and Legouve, Les Contes de la reine de Navarre, in which she created the part of Marguerite on the 1st of September 1850. Her talents and beauty made her a success from the first, and in less than two years from her debut she was elected societaire. In 1853 she married Mario Uchard, from whom she was soon separated, and in 1858 she returned to the Comedie Francaise in leading parts, until her retirement in 1886. Her name is associated with a great number of plays, besides those in the classical repertoire, notably Le Monde oil Von s'ennuie, Par droit de conquete, Les Deux Veuves, and Le Lion amour eux, in which, as the " marquise de Maupas," she had one of her greatest successes.

BROKE, or Brooke, ARTHUR (d. 1563), English author, wrote the first English version of the story of Romeo and Juliet. The Tragicall Historye of Romeus and Julieit (1562) is a rhymed account of the story, taken, not directly from Bandello's collec- tion of novels (1554), but from the French translation (Histoires tragiques) of Pierre Boaistuau or Boisteau, surnamed Launay, and Francois de Belleforest. Broke adds some detail to the story as told by Boisteau. As the poem contains many scenes which are not known to exist elsewhere, but which were adopted by Shakespeare in Romeo and Juliet, there is no reasonable doubt that it may be regarded as the main source of the play. Broke perished by shipwreck in 1 563, on his way from Newhaven to join the English troops fighting on the Huguenot side in France.

The genesis of the Juliet story, and a close comparison of. Shake- speare's play with Broke's version, are to be found in a reprint of the poem and of William Paynter's prose translation from the Palace of Pleasure, edited by Mr P. A. Daniel for the New Shakespere Society

(1875)-

BROKE, SIR PHILIP BOWES VERE, Bart. (1776-1841), British rear-admiral, was born at Broke Hall, near Ipswich, oh the 9th of September 1776, a member of an old Suffolk family. Entering the navy in June 1792, he saw active service in the Mediterranean from 1793 to 1795, and was with the British fleet at the battle of Cape St Vincent, 1797. In 1798 he was present at the defeat and capture of the French squadron off the north coast of Ireland. From 1799 to 1801 he served with the North Sea fleet, and in the latter year was made captain. Unemployed for the next four years, he commanded in 1805 a frigate in the English and Irish Channels. In 1806 he was appointed to the command of the " Shannon," 38-gun frigate, remaining afloat, principally in the Bay of Biscay, till 1811. The "

Shannon " was then ordered to Halifax, Nova Scotia. For a year after the declaration of war between Great Britain and the United States in 18 12, the frigate saw no important service, though she captured several prizes. Broke utilized this period of comparative inactivity to train his men thoroughly. He paid particular attention to gunnery, and the" Shannon " ere long gained a unique reputation for excellence of shooting. Broke's opportunity came in 1813. In May of that year the " Shannon " was cruising off Boston, watching the" Chesapeake," an American frigate of the same nominal force but heavier armament. On the 1st of June Broke, finding his water supply getting low, wrote to Lawrence, the commander of the " Chesa'- peake," asking for a meeting between the two ships, stating the " Shannon's " force, and guaranteeing that no other British ship should take part in the engagement. Before this letter could be delivered, however, the " Chesapeake," under full sail, ran out of Boston harbour, crowds of pleasure-boats accom- panying her to witness the engagement. Broke briefly addressed his men. " Don't cheer," he concluded, " go quietly to your quarters. I feel sure you will all do your duty." As the " Chesa- peake " rounded to on the " Shannon's " weather quarter, at a distance of about fifty yards, the British frigate received her with a broadside. A hundred of the " Chesapeake's " crew were struck down at once, Lawrence himself being mortally wounded. A second broadside, equally well-aimed, increased the confusion, and, her tiller-ropes being shot away, the American frigate drifted foul of the " Shannon." Broke sprang on board with some sixty of his men following him. After a brief struggle

the fight was over. Within fifteen minutes of the firing of the first shot, the " Chesapeake " struck her flag, but Broke himself was seriously wounded. For his services he was rewarded with a baronetcy, and subsequently was made a K.C.B. His exploit captivated the public fancy, and his popular title of " Brave Broke " gives the standard by which his action was judged. Its true significance, however, lies deeper. Broke's victory was due not so much to courage as to forethought. " The ' Shannon,'" said Admiral Jurien de La Graviere, " captured the ' Chesa- peake ' on the 1st of June 1813; but on the 14th of September 1806, when he took command of his frigate, Captain Broke had begun to prepare the glorious termination to this bloody affair." Broke's wound incapacitated him from further service, and for the rest of his life caused him serious suffering. He died in London on the 2nd of

January 1841.

BROKEN HILL, a silver-mining town of Yancowinna county, New South Wales, Australia, 925 m. directly W. by N. of Sydney, and connected with Adelaide by rail. Pop. (1901) 27,518. One of the neighbouring mines, the Proprietary, is the richest in the world; gold is associated with the silver; large quantities of lead, good copper lodes, zinc and tin are also found. The problem of the profitable treatment of the sulphide ores has been practically solved here. In addition Broken Hill is the centre of one of the largest pastoral districts in Australia. The town is the seat of the Roman Catholic bishop of Wilcannia.

BROKER (according to the New English Dictionary, from Lat. brocca, spit, spike, broccare, to "■ broach " — another Eng. form of the same word; hence O. Fr. vendre d broche, to retail, e.g. wine, from the tap, and thus the general sense of dealing; see also for a discussion of the etymology and early history of the use of the word, J. R. Dos Passos, Law of Stockbrokers, chap, i., New York, 1905). In the primary sense of the word, a broker is a mercantile agent, of the class known as general agents, whose office is to bring together intending buyers and sellers and make a contract between them, for a remuneration called brokerage or commission; e.g. cotton brokers, wool brokers or produce brokers. Originally the only contracts negotiated by brokers were for the sale or purchase of commodities; but the word in its present use includes other classes of mercantile agents, such as stockbrokers, insurance-brokers, ship-brokers or bill-brokers. Pawnbrokers are not brokers in any proper sense of the word; they deal as principals and do not act as agents. In discussing the chief questions of modern legal interest in connexion with brokers, we shall deal with them, firstly, in the original sense of agents for the purchase and sale of goods.

Relations between Broker and Principal. — A broker has not, like a factor, possession of his principal's goods, and, unless expressly authorized, cannot buy or sell in his own name; his business is to bring into privity of contract his principal and the third party. When the contract is made, ordinarily he drops out altogether. Brokers very frequently act as factors also, but, when they do so, their rights and duties as factors must be distinguished from their rights and duties as brokers. It is a broker's duty to carry out his principal's instructions with diligence, skill and perfect good faith. He must see that the terms of the bargain accord with his principal's orders from a commercial point of view, e.g. as to quality, quantity and price; he must ensure that the contract of sale effected by him be legally

enforceable by his principal against the third party; and he must not accept any commission from the third party, or put himself in any position in which his own interest may become opposed to his principal's. As soon as he has made the contract which he was employed to make, in most respects his duty to, and his authority from, his principal alike cease; and conse- quently the law of brokers relates principally to the formation of contracts by them.

The most important formality in English law, in making contracts for the sale of goods, with which a broker must comply, in order to make the contract legally enforceable by his principal against the third party, is contained in section 4 of the Sale of Goods Act 1893, which (in substance re-enacting section 17 of the Statute of Frauds) provides as follows: — " A contract for the

sale of any goods of the value of ten pounds or upwards shall not be enforceable by action unless the buyer shall accept part of the goods as sold, and actually receive the same, or give something in earnest to bind the contract, or in part payment, or unless some note or memorandum in writing of the contract be made and signed by the party to be charged or his agent in that behalf."

From the reign of James I. till 1884 brokers in London were admitted and licensed by the corporation, and regulated by statute; and it was common to employ one broker only, who acted as intermediary between, and was the agent of both buyer and seller. When the Statute of Frauds was passed in the reign of Charles II., it became the practice for the broker, acting for both parties, to insert in a formal book, kept for the purpose, a memorandum of each contract effected by him, and to sign such memorandum on behalf of both parties, in order that there might be a written memorandum of the contract of sale, signed by the agent of the parties as required by the statute. He would then send to the buyer a copy of this memorandum, called the " bought note," and to the seller a " sold note," which would run as follows: —

" I have this day bought for you from A B [or " my principal "] " [signed] " M, Broker."

" I have this day sold for you to A B [or " my principal ':]

[signed] " M, Broker."

There was in the earlier part of the 19th century considerable discussion in the courts as to whether the entry in a broker's book, or

the bought and sold notes (singly or together), constituted the statutory memorandum; and judicial opinion was not unanimous on the point. But at the present day brokers are no longer regulated by statute, either in London or elsewhere, and keep no formal book; and as an entry made in a private book kept by the broker for another purpose, even if signed, would probably not be regarded as a memorandum signed by the agent of the parties in that behalf, the old discussion is now of little practical interest.

Under modern conditions of business the written memorandum of the contract of sale effected by the broker is usually to be found in a " contract note "; but the question whether, in the particular circumstances of each case, the contract note affords a sufficient memorandum in writing, depends upon a variety of con- siderations — e.g. whether the transaction is effected through one or through two brokers; whether the contract notes are rendered by one broker only, or by both; and, if the latter, whether ex- changed between the brokers, or rendered by each broker to his own client; for under present practice any one of these methods may obtain, according to the trade in which the transaction is effected, and the nature of the particular transaction

Where one and the same broker is employed by both seller and buyer, bought and sold notes rendered in the old form provide the necessary memorandum of the contract. Where two brokers are employed, one by the seller and one by the buyer, sometimes one drops out as soon as the terms are negotiated, and the other makes out, signs and sends to the parties the bought and sold notes. The latter then becomes the agent of both parties for the purpose of signing the statutory memorandum, and the position is the same as if one broker only had been employed. Oil the other hand, if one broker does not drop out of the transaction, each broker remains to the end the agent of his own principal only, and neither becomes the agent of the other party for the purpose of signing the memorandum. In such a case it is the usual practice for the buyer's broker to send to the seller's broker a note of the contract, — " I, acting on account of A. B. [or, " of my principal,"], have this day bought/row you, acting on account of C. D. [or, " of your principal "],"— and to receive acorrespond- ing note from the seller's broker. Thus each of the parties receives through his own agent a memorandum signed by the other party's agent. These contract notes are usually known as, and serve the purpose of, " bought " and " sold " notes. In all the above three cases the broker's duty of compliance with all formalities neces- sary to make the contract of sale legally enforceable is performed,

and both parties obtain a written memorandum of the contract upon which they can sue.

The broker, on performing his duty in accordance with the terms upon which he is employed, is entitled to be paid his " brokerage." This usually takes the form of a percentage, varying according to the nature and conditions of the business, upon the total price of the goods bought or sold through him. When he guarantees the solvency of the other party, he is said to be employed upon del credere terms, and is entitled to a higher rate of remuneration.' In some trades it is the custom for the selling broker to receive payment from the buyer or his broker; and in such case it is his duty to account to his principal for the purchase money. A broker who properly expends money or incurs liability on his principal's behalf in the course of his employment, is entitled to be reimbursed the money, and indemnified against the liability. Not having, like a factor,' possession of the goods, a broker has no lien by which to enforce his rights against his principal. If he fails to perform his duty, he loses his right to remuneration, reimbursement and indemnity, and further becomes liable to an action for damages for breach of his contract of employment, at the suit of his principal.

Relations between Broker and Third Party. — A broker who signs a contract note as broker on behalf of a principal, whether named or not, is not personally liable on the contract to the third party. But if he makes the contract in such a way as to make himself a party to it, the third party may sue either the broker or his principal, subject to the limitation that the third party, by his election to treat one as the party to the contract, may preclude himself from suing the other. In this respect the ordinary rules of the law of agency apply to a broker. Generally, a broker has not authority to receive payment, but in trades in which it is customary for him to do so, if the buyer pays the seller's broker, and is then sued by the seller for the price by reason of the broker having become insolvent or absconded, he may set up the payment to the broker as a defence to the action by the broker's principal. Brokers may render themselves liable for damages in tort for the conversion of the goods at the suit of the true owner if they negotiate a sale of the goods for a selling principal who has no title to the goods.

The Influence of Exchanges. — The relations between brokers and

their principals, and also between brokers and third parties as above defined, have been to some extent modified in practice by the institution since the middle of the 19th century in im- portant commercial centres of " Exchanges," where persons interested in a particular trade, whether as merchants or as brokers, meet for the transaction of business. By the contract of membership of the association in whose hands is vested the control of the exchange, every person on becoming a member agrees to be bound by the rules of the association, and to make his contracts on the market in accordance with them. A governing body or committee elected by the members enforces observance of the rules, and members who fail to meet their engagements on the market, or to conform to the rules, are liable to suspension or expulsion by the committee. All disputes between members on their contracts are submitted to an arbitra- tion tribunal composed of members; and the arbitrators in deciding the questions submitted to them are guided by the rules. A printed book of rules is available for reference; and various printed forms of contract suited to the various requirements of the business are specified by the rules and supplied by the association for the use of members. In order to simplify the settlement of accounts between members, particularly in respect of " futures," i.e. contracts for future delivery, a weekly or other periodical settlement is effected by means of a clearing-house; each member paying or receiving in respect of all his contracts which are still open, the balance of his weekly " differences," i.e. the difference between the contract price and the market price fixed for the settlement, or between the last and the present settlement prices.

As all contracts on the market are made subject to the rules, it follows that so far as the rules alter the rights and liabilities attached by law, the ordinary law is modified. The most

important modification in the position of brokers effected by membership of such an exchange is due to the rule that as, between themselves, all members are principals, on the market no agents are recognized; a broker employed by a non-member to buy for him on the market is treated by the rules as buying for himself, and is, therefore, personally liable on the contract. If it be a contract in futures, he is required to conform to the weekly settlement rules. If his principal fails to take delivery, the engagement is his and he is required to make good to the member who sold to him any difference between the contract and market price at the date of delivery. But whilst this practice alters directly the relations of the broker to the third party, it also affects or tends to affect indirectly the relations of the broker to his own principal. The terms of the contract of

employment being a matter of negotiation and agreement between them, it is open to a broker, if he chooses, to stipulate for particular terms; and it is the usual practice of exchanges to supply printed contract forms for the use of members in their dealings with non-members who employ them as brokers, containing a stipulation that the contract is made subject to the rules of the exchange; and frequently also a clause that the contract is made with the broker as principal. In addition to these express terms, there is in the contract of employment the term, implied by law in all trade contracts, that the parties consent to be bound by such trade usages as are consistent with the express terms of the contract, and reasonable. On executing an order the broker sends to his client a contract-note either in

the form of the old bought and sold notes " I have this day bou S ht

for you," or, when the principal clause is inserted, " I have this

day bought frdm you '" These are not bou S nt and sold – notes proper, for the broker is not the agent of the third party for the purpose of signing them as statutory memoranda of the sale. But they purport to record the terms of the contract of employ- ment, and the principal may treat himself as bound by their provisions. Sometimes Lhey are accompanied by a detachable form, known as the " client's return contract note," to be filled in, signed and returned by the client; but even the " client's return contract note " is retained by the client's own broker, and is only a memorandum of the terms of employment. The following is a form of contract note rendered by a broker to his client for American cotton, bought on the Liverpool Cotton Exchange for future delivery. The client's contract note is attached to it, and is in precisely corresponding form.

American Cotton, Delivery Contract Note.

M.

Liverpool,

Dear Sirs,

We have this day , to you

; ft American Cotton, net weight, to be contained

in American Bales, more or less, to be delivered in

Liverpool, during on the basis of per lb

for on the terms of the rules, bye-laws, and Clearing

House regulations of the Liverpool Cotton Association, Limited, whether endorsed hereon or not.

The contract, of which this is a note, is made between ourselves and yourselves, and not by or with any person, whether disclosed or not, on whose instructions or for whose benefit the same may have been entered into. Yours faithfully,

The contract, of which the above is a note, was made on the date specified, within the business hours fixed by the Liverpool Cotton Association, Limited. per cent to us.

Please confirm by signing and returning the contract attached.

The above form of contract note illustrates the tendency of exchanges to alter the relations between the broker and his principal. The object of inserting in the printed form the pro- vision that the contract is made subject to the rules of the

Liverpool Cotton Association is to make those rules binding upon the principal, and if he employs his broker upon the basis of the printed form, he does bind himself to any modification of the relations between himself and his broker which those rules may effect. The object of the principal clause in the above and similar printed forms is apparently to entitle the broker to sell to or buy from his principal on his own account and not as agent at all, thus disregarding the duty incumbent upon him as broker of making for his principal a contract with a third party.

It is not possible, except very generally, to state how far .exchanges have succeeded in imposing their own rules and usages •>n non-members, but it is probably correct to say that in most cases if the question came before the courts, the outside client would be held to have accepted the rules of the exchange so far as they did not alter the fundamental duties to him of his broker. On the other hand, provisions purporting to entitle the broker in disregard of his duties as broker himself to act as principal, would be rejected by the courts as radically inconsistent with the primary object of the contract of

brokerage and, therefore, meaningless. But it is undoubtedly too often the practice of brokers who are members of exchanges to consider themselves entitled to act as principals and sell on their own account to their own clients, particularly in futures. The causes of this opinion, erroneously, though quite honestly held, are probably to be looked for partly in the habit of acting as principal on the market in accordance with the rules, partly in the forms of contract notes containing " principal clauses " which they send to their clients, and perhaps, also, in the occasional difficulty of effecting actual contracts on the market at the time when they are instructed so to do.

A stockbroker is a broker who contracts for the sale of stocks and shares. Stockbrokers differ from brokers proper chiefly in that stocks and shares are not " goods," and the requirement of a memorandum in writing, enacted by the Sale of Goods Act 1893, does not apply. Hence actions may be brought by the principals to a contract for the sale of stocks and shares although no memo- randum in writing exists. For instance, the jobber, on failing to recover from the buyer's broker the price of shares sold, by reason of the broker having failed and been declared a defaulter, may sue the buyer whose " name was passed " by the broker. The employ- ment of a stockbroker is subject to the rules and customs of the Stock Exchange, in accordance with the principles discussed above, which apply to the employment of brokers proper. A custom which is illegal, such as the Stock Exchange practice of disregarding Leeman'sAct (1867), which enacts that contracts for the sale of joint- stock bank shares shall be void unless the registered numbers of the shares are stated therein, is not binding on the client to the extent of making the contract of sale valid. But if a client choose to instruct his broker to buy bank shares in accordance with that practice, the broker is entitled to be indemnified by his client for money which he pays on his behalf, even though the contract of sale so made is unenforceable. For further information the reader is referred to the article Stock Exchange and to the treatises on stock exchange law.

An insurance broker is an agent whose business is to effect policies of marine insurance. He is employed by the person who has an interest to insure, pays the premiums to the underwriter, takes up the policy, and receives from the underwriter payment in the event of a loss under the policy. By the custom of the trade the underwriter looks solely to the broker for payment of premiums, and has no right of action against the assured ; and, on the other hand, the broker is paid his commission by the underwriter, although he is employed by the assured. Usually the broker keeps a current account with the

underwriter, and premiums and losses are dealt with in account. It is only in the event of the underwriter refusing to pay on a loss, that the broker drops out and the assured sues the underwriter direct. Agents who effect life, fire or other policies, are not known as insurance brokers.

Ship-brokers are, firstly, " commission agents," and, secondly, very often also ships' managers. Their office is to act as agents for owners of ships to procure purchasers for ships, or ships for intending purchasers, in precisely the same manner as house-agents act in respect of houses. They also act as agents for ship-owners in finding charterers for their ships, or for charterers in finding ships available for charter, and in either case they effect the charter-party (see Affreightment).

Chartering brokers are customarily paid by the ship-owner, when the charter-party is effected, whether originally employed by him or by the charterer. Charter-parties effected through brokers often contain a provision — " 2\ % on estimated amount of freight to be paid to A B, broker, on the signing of this charter-party, and the ship

to be consigned to hint for ship's business at the port of X [inserting the name ofthe port where A B carries on business]." The brokercannot sue on the charter-party contract because he is not a party to it, but the insertion of the clause practically prevents his right from being disputed by the ship-owner. When the broker does the ship's business in port, it is his duty to clear her at the customs and generally to act as " ship's husband.".

A bill-broker was originally an agent who, for a commission, procured for country bankers the discounting of their bills in London. But the practice arose of the broker guaranteeing the London banker or financier; and finally the brokers ceased to deposit with the London bankers the bills they received, and at the present day a bill-broker, as a rule, buys bills on his own account at a discount, borrows money on his own account and upon his own security at interest, and makes his profit out of the difference between the discount and the interest. When acting thus the bill-broker is not a broker at all, as he deals as principal and does not act as agent.

Authorities. — Story, Commentaries on the Law of Agency (Boston, 1882); Brodhurst, Law and Practice of the Stock Exchange (London, 1897); Gow, Handbook of Marine Insurance (London, 1900); Arnould, On Marine Insurance, edited by Messrs Hart & Simey (1901) ; J. R. Dos Passos, Law of Stock-Brokers and Stock

Exchanges (New York, 1905). » (L, F. S.)

BROMBERG, a town of Germany, in the Prussian province of Posen, 32 m. by rail W.N.W. from the fortress of Thorn, 7 m. W. from the bank of the Vistula, and at the centre of an im- portant network of railways, connecting it with the strategical points on the Prusso-Russian frontier. Pop. (1900) 52,082; (1905) 54,229. Its public buildings comprise two Roman Catholic and three Protestant churches, a Jewish synagogue, a seminary, high grade schools and a theatre. The town also possesses a bronze statue of the emperor William I., a monument of the war of 1870-71 , and a statue of Benkenhoff , the constructor of the.Bromberg Canal. This engineering work, constructed in i773 1 774, by command of Frederick II., connects the Brahe with the Netze, and thus establishes communication between the Vistula, the Oder and the Elbe. The principal industrial works are iron foundries and machine shops, paper factories and flour mills; the town has, moreover, an active trade in agricultural and other products. In view of its strategical position, a large garrison is concentrated in and about the town. Bromberg is mentioned as early as 1252. It fell soon afterwards into the hands of the Poles, from whom it was taken in 1327 by the Teutonic Order, which held it till 1343, when the Poles re captured it. Destroyed in the course of these struggles, it was restored by Casimir of Poland in 1346, and down to the close of the 16th century it continued to be a flourishing commercial city. It afterwards suffered so much from war and pestilence that about 1772, when the Prussians took possession, it contained only from five to six hundred inhabitants. By the treaty of Tilsit it was transferred to the duchy of Warsaw; in 18 13 it was occupied by the Russians, and in 181 5 was restored to Prussia.

BROME, ALEXANDER (1620-1666), English poet, was by profession an attorney, and was the author of many drinking songs and of satirical verses in favour of the Royalists and against the Rump. He published in 1661 Songs and other Poems, con- taining songs on various subjects, followed by a series of political songs; ballads, epistles, elegies and epitaphs; epigrams and translations. Izaak Walton wrote an introductory eclogue for this volume in praise of the wri'ter, and his gaiety and wit won for him the title of the " English Anacreon " in Edward Phillips's Theatrum Poetarum. Brome published in 1666 a translation of Horace by himself and others, and was the author of a comedy entitled The Cunning Lovers (1654). He also edited two volumes of Richard Brome's plays.

BROME, RICHARD (d. 1652), English dramatist, was originally a

servant of Ben Jonson, and owed much to his master. The development of his plots, the strongly marked characters and the amount of curious information to be found in his work, all show Jonson's influence. The relation of master and servant developed into friendship, and our knowledge of Brome's personal character is chiefly drawn from Ben Jonson's lines to him, prefixed to The Northern Lasse (1632), the play which made Brome's reputation. Brome's genius lay entirely in comedy. He has left fifteen pieces. Five New Playes (ed. by Alex. Brome, 1652?) contained Madd Couple Well Matcht (acted 1639?);

Novella (acted 1632); Court Begger (acted 1632); City Witt; The Damoiselle or the New Ordinary. Five New Playes (1659) included The English Moor, or The Mock Marriage; The Love- sick Court, or The Ambitious Politique; Covent Garden Weeded; The New Academy, or The New Exchange; and The Queen and Concubine. The Antipodes (acted 1638, pr. 1640); The Sparagus Garden (acted 1635, pr. 1640); A Joviall Crew, or the Merry Beggars (acted 1641, pr. 1652, revised in 1731 as an " opera "), and The Queenes Exchange (pr. 1657), were published separately. He collaborated with Thomas Hey wood in The late Lancashire Witches (pr. 1634).

See A. W. Ward, History of English Dramatic Literature, vol. iii. pp. 125-131 (1899). The Dramatic Works of Richard Brome . . . were published in 1873.

BROMELIACEAE, in botany, a natural order oi Monocoty- ledons, confined to tropical and sub-tropical America. It includes the pine-apple (fig. 1) and the so-called Spanish moss (fig. 2); a rootless plant, which hangs in long grey lichen-like festoons from the branches of trees, a native of Mexico and the southern United States; the water required for food is absorbed from the moisture in the air by peculiar hairs which cover the*

Fig. 1. — Fruitofthe pine-apple (Ananas sativa), consisting of numerous flowers and bracts united together so as to form a collec- tive or anthocarpous fruit. The crown of the pine-apple, c, con- sists of a series of empty bracts pro- longed beyond the fruit.

(From The Botanical Magazine, by permission of Lovell, Reeve & Co.)

Fig. 2. — Tillandsia usneoides, Spanish moss, 'slightly reduced. 1, Small branch with flower; 2, flower cut vertically; 3, section of seed of Bromelia.

surface of the shoots. The plants are generally herbs with a much shortened stem bearing a rosette of leaves and a spike or panicle of flowers. They are eminently dry-country plants (xerophytes) ; the narrow leaves are protected from loss of water by a thick cuticle, and have a well-developed sheath which embraces the stem and forms, with the sheaths of the other leaves of the rosette, a basin in which water collects, with frag- ments of rotting leaves and the like. Peculiar hairs are developed On the inner surface of the sheath by which the water and dis- solved substances are absorbed, thus helping to feed the plant. The leaf-margins are often spiny, and the leaf-spines of Puya chUensis are used by the natives as fish-hooks. Several species are grown as hot-house plants for the bright colour of their flowers or flower-bracts, e.g. species of Tillandsia, Billbergia, Aechmea and others. '

BROMINE (symbol Br, atomic weight 79-96), a chemical element of the halogen group, which takes its name from its pungent unpleasant smell (f}po>nos, a stench). It was first isolated by A. J. Balard in 1826 from the salts in the waters of the Mediterranean. He established its elementary character, and his researches were amplified by K. J. Lowig (1803-1890) in Das Brom und seine chemischen Verhaltnisse (1829). Bromine does not occur in nature in the uncombined condition, but in combination with various metals is very widely but sparingly distributed. Potassium, sodium and magnesium bromides are found in mineral waters, in river and sea-water, and occasionally in marine plants and animals. Its chief commercial sources are the salt deposits at Stassfurt in Prussian Saxony, in which magnesium bromide is found associated with various chlorides, and the brines of Michigan, Ohio, Pennsylvania and West Virginia, U.S.A.; small quantities are obtained from the mother liquors of Chile saltpetre and kelp. In combination with silver it is found as the mineral bromargyrite (bromite).

Manufacture. — The chief centres of the bromine industry are Stassfurt and the central district of Michigan. It is manufac- tured from the magnesium bromide contained in " bittern " (the mother liquor of the salt industry), by two processes, the continuous and the periodic. The continuous process depends upon the de- composition of the bromide by chlorine, which is generated in special stills. A regular current of chlorine mixed with steam is led in at the bottom of a tall tower filled with broken bricks, and there meets a

descending stream of hot bittern: bromine is liberated and is swept out of the tower together with some chlorine, by the current of steam, and then condensed in a worm. Any uncondensed bromine vapour is absorbed by moist iron borings, and the resulting iron bromide is used for the manufacture of potassium bromide. The periodic process depends on the interaction between manganese dioxide (pyrolusite) , sulphuric acid, and a bromide, and the operation is carried out in sandstone stills heated to 60° C, the product being condensed as in the continuous process. The substitution of potassium chlorateˆ for pyrolusite is recommended when calcium chloride is present in the bittern. The crude bromine is purified by repeated shaking with potassium, sodium or ferrous bromide and subsequent redistillation. Commercial bromine is rarely pure, the chief im- purities present in it being chlorine, hydrobromic acid, and bromo- form (M. Hermann, Annalen, 1855, 95, p. 21 1). E. Gessner (Berichte, 1876, 9, p. 1507) removes chlorine by repeated shaking with water, followed by distillation over sulphuric acid; hydrobromic acid is removed by distillation with pure manganese dioxide, or mercuric oxide, and the product dried over sulphuric acid. J. S. Stas, in his stoichiometric researches, prepared chemically pure bromine from potassium bromide, by converting it into the bromate which was purified by repeated crystallization. By heating the bromate it was partially converted into the bromide, and the resulting mixture was distilled with sulphuric acid. The distillate was further purified by digestion with milk of lime, precipitation with water, and further digestion with calcium bromide and barium oxide, and was finally redistilled.

Characters. — Bromine at ordinary temperatures is a mobile liquid of fine red colour, which appears almost black in thick layers. It boils at 59 C. According to Sir W. Ramsay and S. Young, bromine, when dried over sulphuric acid, boils at 57-65° C, and when dried over phosphorus pentoxide, boils at 58-85° C. (under a pressure of 755-8 mm.), forming a deep red vapour, which exerts an irritating and directly poisonous action on the respiratory organs. It solidifies at —21° C. (Quincke) to a dark brown solid. Its specific gravity is 3-18828 (f°), latent heat of fusion 16-185 calories, latent heat of vaporization 45-6 calories, specific heat 0-1071. The specific heat of bromine vapour, at constant pressure, is 0-05504 and at constant volume is 0-04251 (K. Strecker). Bromine is soluble in water, to the extent of 3-226 grammes of bromine per 100 grammes of solution at 15° C, the solubility being slightly increased by the presence of potassium bromide. The solution is of an orange-red colour, and is quite permanent in the dark, but on exposure to light, gradually becomes colourless, owing to decomposition Mnto hydrobromic acid

and oxygen. By cooling the aqueous solution, hyacinth-red octahedra of a crystalline hydrate of composition Br-4H 2 or Br 2 -8H 2 are obtained (Bakhuis Roozeboom, Zeits. phys. Chem., 1888, 2. p. 449). Bromine is readily soluble in chloroform, alcohol and ether.

Its chemical properties are in general intermediate between those of chlorine and iodine; thus it requires the presence of a catalytic agent, or a fairly high temperature, to bring about its union with hydrogen. It does not combine directly with oxygen, nitrogen or carbon. With the other elements it unites to form bromides, often with explosive violence; phosphorus detonates in liquid bromine and inflames in the vapour; iron is occasionally used to absorb bromine vapour, potassium reacts energetically, but sodium requires to be heated to 200° C; The chief use of bromine in analytical chemistry is based upon the oxidizing action of bromine water. Bromine and bromine water both bleach organic colouring matters.

BROMLEY, SIR TˆBRQMLEY

633

, : The use of bromine in the extraction of gold (q.v.) was proposed by 'R."Wagrier'(2)tngfcrY/0Mrradi,.2i8, p. 253) and others, butitscost has restricted its general application. Bromine is used extensively in organic chemistry as a substituting and oxidizing agent and also for the preparation of addition compounds. Reactions in which it is used in the liquid form, in. vapour, in solution, and in the presence of the so-called "bromine carriers," have been studied. Sunlight affects the action of bromine-vapour on organic compounds in various iways, sometimes retarding or accelerating the reaction, while in some cases the products are different (J. Schramm, Monatshefte fur Chemie, 1887, 8, p.. 101).. Some reactions, which are only possible by the aid of nascent bromine, are carried out by using solutions of sodium ! bromide and bromate, with the amount of sulphuric acid calculated according to the equation 5NaBr +NaBr03+6H 2 S04'= 6NaHS0 4 +3H ? 0+6Br. (German Patent, 26642.) The diluents in which bromine is employed are usually ether, chloroform, acetic acid, hydrochloric acid, carbon bisulphide and water, and, less commonly, alcohol, potassium bromide and hydrobromic acid; the excessof bromine being removed by heating, by sulphurous acid or by shaking with mercury. The choice of solvent is important, for the velocity of the reaction and the nature of the product may vary according to the solvent used, thus A. Baeyer and F. Blom found that on brominating orthoacetamido-acetophenone in presence of water or acetic acid, the bromine goes into the benzene

nucleus, whilst in chloroform or sulphuric acid or by use of bromine vapour it goes into the side chain as well. The action of bromine is sometimes accelerated by the use of compounds which behave catalytically, the more important of these substances being iodine, iron, ferric chloride, ferric bromide, aluminium bromide and phosphorus. For oxidizing purposes bromine is.generally employed in aqueous and in alkaline solutions, one of its most important applications being by Emil Fischer {Berichte, 1889, 22, p. 362) in his researches on the Sugars. The atomic Weight of bromine has been determined by J. S. Stas and C. Marignac from the analysis of potassium bromide, and of silver bromide. G. P. Baxter {Zeit. anorg. Chem. 1906, 50, p. 389) determined the ratios Ag: AgBr, and AgCl: Ag Br.

Hydrobromic Acid. — This acid, HBr, the only compound of hydrogen and bromine, is in many respects similar to hydrochloric acid, but is rather less stable. It may be prepared by passing hydrogen gas and bromine vapour through a tube containing a heated platinum spiral. It cannot be prepared with any degree of purity by the action of concentrated sulphuric acid on bromides, since secondary reactions take place, leading to the liberation of free bromine and formation of sulphur dioxide. The usual method employed for the preparation of the gas consists in dropping bromine on to a mixture of amorphous phosphorus and water, when a violent reaction takes place and the gas is rapidly liberated. It can be obtained also, although in a somewhat impure condition, by the direct action of bromine on various saturated hydrocarbons {e.g. paraffin-wax), while an aqueous solution may be obtained by passing sulphuretted hydrogen through bromine water. Alexander Scott {Journal of Chem. Soc, 1900, 77, p. 648) prepares pure hydrobromic acid by covering bromine, which is contained in a large flask, with a layer of water, and passing sulphur dioxide into the water above the surface of the bromine, until the whole is of a pale yellow colour ; the resulting solution is then distilled in a slow current of air and finally purified by distillation over byium bromide. At ordinary temperatures hydrobromic acid is a colourless gas which fumes strongly in moist air, and has an acid taste and reaction. It can be condensed to a liquid, which boils at -64-9°C. (under a pressure of 738-2 mm.), and, by still further cooling, gives colourless crystals which melt at -88-5° C. It is readily soluble in water, forming the aqueous acid, which when saturated at o" C. has a specific gravity of 1 78. When boiled, the aqueous acid loses either acid or water until a solution of constant boiling point is obtained, containing 48 % of the, acid and boiling at 126 C. under

atmospheric pressure ; should the pressure, however, vary, the strength of the solution boiling at a constant temperature varies also. Hydrobromic acid is one of the ” strong “acids, being ionized to a very large extent even in con- centrated solution, as shown by the molecular conductivity increasing by only a small amount over a wide range of lilution.

Bromides.— Hydrobromic acid reacts with metallic oxides, hydroxides and carbonates to form bromides, which can in many cases be obtained also by the direct union of the metals with bromine. As a class, the metallic bromides are solids at ordinary temperatures, which fuse readily and volatilize on heating. The majority are soluble in water, the chief exceptions being silver bromide, mercurous bromide, palladious bromide and lead bromide ; the last is, however, soluble in hot water. They are decomposed by chlorine, with liberation of , bromine and formation of metallic chlorides; con- centrated sulphuric acid also decomposes them, with formation of a metallic sulphate and liberation of bromine and sulphur dioxide. The non-metallic bromides are usually liquids, which are readily decomposed by water. Hydrobromic acid and its salts can be readily detected by the addition of chlorine water to their aqueous solutions, when bromine is liberated; or by warming with con- centrated sulphuric acid and manganese dioxide, the same result being obtained. Silver nitrate in the presence of nitric acid gives with bromides a pale yellow precipitate of silver bromide, AgBr, which is sparingly soluble in ammonia. For their quantitative

determination ;they are precipitated in nitric acid solution by means of silver nitratei and the silver bromide well washed, dried and weighed.

No oxides of bromine have as yet been isolated, but three oxy-acids are known, namely hypobromous acid, HBrO, bromousacid, HBrOj, and bromic acid, HBrOs. Hypobromous acid is obtained by shaking together bromine water and precipitated mercuric oxide, followed by distillation of the ‘dilute solution in vacuo at low temperature (about 40°C). It is a very Unstable compound, breaking up, on heating, into bromine and oxygen. The aqueous solution is light yellow in colour, and possesses strong bleaching properties. Bromous acid is formed by adding bromine to a saturated solution of silver nitrate (A. H. Richards, J. Soc. Chem. Ind., 1906, 25, p. 4). Bromic acid is obtained by the addition of the calculated amount of sulphuric acid (previously diluted with water) to the barium salt ; by the action of bromine on the silver salt, in. the presence of water, 5AgBr0 3 -f 3Br2 + 3H 2 = 5AgBr + 6HBr03, or bypassing chlorine through a

solution of brornine in water. The acid is only known in the form of its aqueous solution ; this is, however, very unstable, decomposing on being heated to ioo° C. into water, oxygen and bromine. By reducing agents such, for example, as sulphuretted hydrogen and sulphur-dioxide, it is rapidly converted into hydrobromic acid. Hydrobromic acid de- composes it according to the equation HBr03-)-5HBr = 3H20-f SBrˆ. Its salts are known as bromates, and are as a general rule difficultly soluble in water, and decomposed by heat, with evolution pf oxygen.*

Applications. — The salts of bromine, are widely used in photo-graphy, especially bromide of silver. For antiseptic purposes it has been prepared as " bromum solidificatum," which consists of kieselguhr or similar substance impregnated with about 75 % of its weight of bromine. In medicine it is largely employed in the form of bromides of potassium, sodium and ammonium, as well as in com-bination with alkaloids and other substances.

Medicinal Use. — Bromide of potassium is the safest and most generally applicable sedative of the nervous system. Whilst very weak, its action is perfectly balanced throughout all nervous tissue, so much so that Sir Thomas Lauder Brunton has suggested its action to be due to its replacement of sodium chloride (common salt) in the fluids of the nervous system. Hence bromide of potassium — or bromide of sodium, which is possibly somewhat safer still though not quite so certain in its action — is used as a hypnotic, as the standard anaphrodisiac, as a sedative in mania and all forms of morhid mental excitement, and in hyperaesthesia of all kinds. Its most striking success is in epilepsy, for which it is the specific remedy. It may be given in doses of from ten to fifty grains or more, and may be continued without ill effect for long periods in grave cases of epilepsy {grand mal). Of the three bromides in common use the potassium salt is the most rapid and certain in its action, but may depress the heart in morbid states of that organ ; in such cases the sodium salt — of which the base is inert — may be employed. In whooping-cough, when a sedative is required but a stimulant is also indicated, ammonium bromide is often invaluable. The conditions in which bromides are most frequently used are insomnia, epilepsy, whooping-cough, delirium tremens, asthma, migraine, laryngismus stridulus, the symptoms often attendant upon the climacteric in women, hysteria, neuralgia, certain nervous disorders of the hearts strychnine poisoning, nymphomania and spermatorrhoea. Hydro-bromic acid is often used to relieve or prevent the headache and singing in the ears that may follow the administration of quinine and of salicylic acid or salicylates.

BROMLEY, SIR THOMAS (1530-1587), English lord chan- cellor, was born in Staffordshire in 1 530. He was educated at Oxford University and called to the bar at the Middle Temple. Through family influence as well as the patronage of Sir Nicholas Bacon, the lord keeper, he quickly made progress in his profession. In 1566 he was appointed recorder of London, and in 1569 he became solicitor-general. He sat in parliament successively for Bridgnorth, Wigan and Guildford. On the death of Sir Nicholas Bacon in 1579 he was appointed lord chancellor. As an 'equity judge he showed- great and profound knowledge, and Ms judg- ment in Shelley's case (q."v.) is a landmark in the history of English real property law. He presided over the commission which tried Mary, queen of Scots, in 1 586, but the strain : of the trialy coupled with the responsibility which her execution' involved '.upon him, proved too much for his strength, and he died oh 1 the tithof April 1587. He was buried' in Westminster Abbey. '

See Foss, Lives of the Judges; Campbell, Lives of the Lord Chancellors.

BROMLEY, a municipal borough in the Sevenoaks parlia- mentary division of Kent, England, io| m. S.E. by S. of London by the South Eastern & Chatham railway. Pop. (1901) 27,354. It lies on high ground north of the small river Ravensbourne, in a well- wooded district, and has become a favourite residential locality for those whose business lies in London. The former palace of the bishops of Rochester was erected in 1777 in room

of an older structure. The manor belonged to this see as early as the reign of Ethelbert. In the gardens is a chalybeate spring known as St Blaize's Well, which was in high repute before the Reformation. The church of St Peter and St Paul, mainly Perpendicular, retains a Norman font and other remains of an earlier building. Here is the gravestone of, the wife of Dr Johnson. Bromley College, founded by Bishop Warner in 1666 for " twenty poor widows of loyal and orthodox clergymen," has been much enlarged, and forty widows are in receipt of support. Sheppard College (1840) is an affiliated foundation for unmarried daughters of these widows. In the vicinity of Bromley, Bickley is a similar residential township, Hayes Common is a favourite place of excursion, and at Holwood Hill near Keston are remains of a large encampment known as Caesar's Camp.

Bromley was incorporated in 1903, and is governed by a mayor, 6 aldermen and 18 councillors. Area, 4703 acres.

BROMLITE, a member of the aragonite group of minerals. It consists of an isomorphous mixture of calcium and barium carbonates in various proportions, (Ca, Ba) C0 3 , and thus differs chemically from barytocalcite (q.v.) which is a double salt of these carbonates in equal molecular proportions. Being isomorphous with aragonite, it crystallizes in the orthorhombic system, but simple "crystals are not known. The crystals are invariably complex twins, and have the form of doubly terminated pseudo-hexagonal pyramids, like those of witherite but more acute; the faces are horizontally striated and are divided down their centre by a twin- suture, as represented in the adjoining figure. The examination in polarized light of a transverse section shows that each compound crystal is built up of six differently orientated individuals arranged in twelve segments. The crystals are translucent and white, sometimes with a shade of pink. Sp. gr. 3-706; hardness 4-45. The mineral has been found at only two localities, both of which are in the north of England. At the Fallowfield lead mine, near Hexham in Northumberland, it is associated with witherite; and at Bromley Hill, near Alston in Cumberland, it occurs in veins with galena. The species was named bromlite by T. Thomson in 1837, and alstonite by A. Breithaupt in 1841, both of which names, derived from the locality, have been in common use. (L. J. S.)

BROMPTON, a western district of London, England, in the south-east of the metropolitan borough of Kensington. Bromp- ton Road, leading south-west from Knightsbridge, is continued as Old Brompton Road and Richmond Road, to join Lillie Road, at which point are the District and West London railway stations of West Brompton. The Oratory of St Philip Neri, commonly called Brompton Oratory, close by the Victoria and Albert Museum, the Brompton consumption hospital and the West London or Brompton cemetery are included in this district, which is mainly occupied by residences of the better class. (See Kensington.)

BROMSGROVE, a market town in the Eastern parliamentary division of Worcestershire, England, 12 m. N.N.E. of Worcester, with a station 1 m. from the town on the Bristol-Birmingham line of the Midland railway. Pop. of urban district (1001) 8418. It lies in a pleasant undulating district near the foot of the Lickey Hills, to surmount which the railway towards Birmingham here ascends for 2 m. one of the steepest gradients in England over such a distance. There remain several pictur- esque half-timbered houses, dating from

1572 and later. The church of St John is a fine building, Perpendicular and earlier in date, picturesquely placed on an elevation above the town, with a lofty tower and spire. There are a well-known grammar- school, founded by Edward VI., with university scholarships; a college school, a literary'jnstitute, and a school of art. Birming- ham Sanatorium stands in the parish. Cloth was formerly a staple of trade, but manufactures of nails and buttons are now pre-eminent, while the river Salwarpe works a number of mills

in the neighbourhood, and near the town are carriage works belonging to the Midland railway.

BRONCHIECTASIS (Gr. Pp6yxia, bronchial tubes, and eKTaais, extension), dilatation of the bronchi, a condition occurring in connexion with many diseases of the lungs. Bronchitis both acute and chronic, chronic pneumonia and phthisis, acute pneumonia and broncho-pneumonia, may all leave after them a bronchiectasis whose position is determined by the primary lesion. Other causes, acting mechanically, are tracheal and bronchial obstruction, as from the pressure of an aneurism, new growth, &c. It used to be considered a disease of middle age, but of late years Dr Walter Carr has shown that the condition is a fairly common one among debilitated children after measles, whooping cough, &c. The dilatation is commonly cylindrical, more rarely saccular, and it is the medium and smaller sized tubes that are generally affected, except where the cause is mechanical. The affection is usually of one lung only. Emphysema is a very common accompaniment. Though at first the symptoms somewhat resemble those of bronchitis, later they are quite distinctive. Cough is very markedly par- oxysmal in character, and though severe is intermittent, the patient being entirely free for many hours at the time. The effect of posture is very maiked. If the patient lie on the affected side, he may be free from cough the whole night, but if he turn to the sound side, or if he rises and bends forward, he brings up large quantities of bronchial secretion. The expectoration is characterized by its abundance and manner of expulsion. Where the dilatation is of the saccular variety, it may come up in such quantities and with so much suddenness as to gush from the mouth. It is very commonly foetid, as it is retained and decomposed in situ. Dyspnoea and haemoptysis occasionally occur, but are by no means the rule. If pyrexia is present, it is a serious symptom, as it is a sign of septic absorp- tion in the bronchi, and may be the forerunner of gangrene. If gangrene does set in, it will be accompanied by severe attacks of shivering and sweating. Where the disease has lasted long, clubbing of fingers and toes is very common. The diagnosis from

putrid bronchitis is usually fairly easily made, but at times it may be a matter of extreme difficulty to distinguish between this condition and a tuberculous cavity in the lung. Nothing can be done directly to cure this disease, but the patient's condition can be greatly alleviated. Creosote vapour baths are eminently satisfactory. A mechanical treatment much recommended by some of the German physicians is that of forced expiration.

BRONCHITIS, the name'|iven to inflammation of the mucous membrane of the bronchial tubes (see Respiratory System: Pathology). Two main varieties are described, specific and non-specific bronchitis. The bronchitis which occurs in infectious or specific disorders, as diphtheria, influenza, measles, pneumonia, &c, due to the micro-organisms observed in these diseases, is known as specific; whereas that which results from extension from above, or from chemical or mechanical irritation, is known as non-specific. It is convenient to describe it, however, under the chemical divisions of acute and chronic bronchitis.

Acute bronchitis, like other inflammatory affections of the chest, generally arises as the result of exposure to cold, particularly if accompanied with damp, or of sudden change from a heated to a cool atmosphere. The symptoms vary according to the severity of the attack, and more especially according to the extent to which the inflammatory action spreads in the bronchial tubes. The disease usually manifests itself at first in the form of a catarrh, or common cold; but the accompanying feverishness and general constitutional disturbance proclaim the attack to be something more severe, and symptoms denoting the onset of bronchitis soon present themselves. A short, painful, dry jcough, accompanied with rapid and wheezing respiration, a feeling of rawness and pain in the throat and behind the breast bone, and of oppression or tightness throughout the chest, mark the early stages of the disease. In some cases, from the first, symptoms of the form of asthma (q.v.) known as the bronchitic are superadded, and greatly aggravate the Datient's suffering.

After a few days expectoration begins to come with the cough, at first scanty and viscid or frothy, but soon becoming copious and of purulent character. In general, after free expectoration has been established the more urgent and painful symptoms abate; and while the cough may persist for a length of time, often extending to three or four weeks, in the majority of instances convalescence advances, and the patient is ultimately restored to health, although there is not unfrequently left a tendency to a recurrence of the disease on exposure to its exciting causes.

When the ear or the stethoscope is applied to the chest of a person suffering from such an attack as that now described, there are heard

in the earlier stages snoring or cooing sounds, mixed up with others of wheezing or fine whistling quality, accompanying respiration. These are denominated dry sounds, and they are occasionally so abundant and distinct, as to convey their vibrations to the hand applied to the chest, as well as to be audible to a bystander at some distance. As the disease progresses these sounds become to a large extent replaced by others of crackling or bubbling character, which are termed moist sounds or rales. Both these kinds of abnormal sounds are readily explained by a reference to the pathological condition of the parts. One of the first effects of inflammation upon the bronchial mucous membrane is to cause some degree of swelling, which, together with the presence of a tough secretion closely adhering to it, tends to diminish the calibre of the tubes. The respired air as it passes over this surface gives rise to the dry or sonorous breath sounds, the coarser being generated in the large, and the finer or wheezing sounds in the small divisions of the bronchi. Before long, however, the discharge from the bronchial mucous membrane becomes more abundant and less glutinous, and accumulates in the tubes till dislodged by coughing. The re- spired air, as it passes through this fluid, causes the moist rales above described. In most instances both moist and dry sounds are heard abundantly in the same case, since different portions of the bronchial tubes are affected at different times in the course of the disease.

Such are briefly the main characteristics presented by an ordinary attack of acute bronchitis running a favourable course. The case is, however, very different when the inflammation spreads into, or when it primarily affects, the minute ramifica- tions of the bronchial tubes which are in immediate relation to the air-cells of the lungs, giving rise to that form of the disease known as capillary bronchitis or broncho-pneumonia (see Respiratory System: Pathology; and Pneumonia). When this takes place all the symptoms already detailed become greatly intensified, and the patient's life is placed in imminent peril in consequence of the interruption to the entrance of air into the lungs, and thus to the due aeration of the blood. The feverishness and restlessness increase, the cough becomes in- cessant, the respiration extremely rapid and laboured, the nostrils dilating with each effort, and evidence of impending suffocation appears. The surface of the body is pale or dusky, the lips are livid, while breathing becomes increasingly difficult, and is attended with suffocative paroxysms which render the recumbent posture impossible. Unless speedy relief is obtained by successful efforts to clear the chest by coughing and expectoration, the patient's strength gives way, somnolence and delirium set in and death ensues. All this

may be brought about in the space of a few days, and such cases, particularly among the very young, sometimes prove fatal within forty-eight hours.

Acute bronchitis must at all times be looked upon as a severe and even serious ailment, but there are certain circumstances under which its occurrence is a matter of special anxiety to the physician. It is pre-eminently dangerous at the extremes of life, and mortality statistics show it to be one of the most fatal of the diseases of those periods. This is to be explained not only by the well-recognized fact that all acute diseases tell with great severity on the feeble frames alike of infants and aged people, but more particularly by the tendency which bronchitis undoubtedly has in attacking them to assume the capillary form, and when it does so to prove quickly fatal. The importance, therefore,

of early attention to the slightest evidence of bronchitis among the very young or the aged can scarcely be overrated.

Bronchitis is also apt to be very severe when it occurs in persons who are addicted to intemperance. Again, in those who suffer from any disease affecting directly or indirectly the re- spiratory functions, such as consumption or heart disease, the supervention of an attack of acute bronchitis is an alarming complication, increasing, as it necessarily does, the embarass- ment of breathing. The same remark is applicable to those numerous instances of its occurrence in children who are or have been suffering from such diseases as have always associated with them a certain degree of bronchial irritation, such as measles and whooping-cough.

One other source of danger of a special character in bronchitis remains to be mentioned, viz. collapse of the lung. Occasionally a branch of a bronchial tube becomes plugged up with secretion, so that the area of the lung to which this branch conducts ceases to be inflated on inspiration. The small quanti ty of air imprisoned in the portion of lung gradually escapes, but no fresh air enters, and the part collapses and becomes of solid consistence. Increased difficulty of breathing is the result, and where a large portion of lung is affected by the plugging up of a large bronchus, a fatal result may rapidly follow, the danger being specially great in the case of children. Fortunately, the obstruction may some- times be removed by vigorous coughing, and relief is then obtained.

With respect to the treatment of acute bronchitis, in those mild cases which are more of the nature of a simple catarrh, little else will be

found necessary than confinement in a warm room, or in bed, for a few days, and the use of light diet, together with warm diluent drinks. Additional measures are however called for when the disease is more markedly developed. Medicines to allay fever and promote perspiration are highly serviceable in the earlier stages. Later, with the view of soothing the pain of the cough, and favouring expectoration, mixtures of tolu, with the addition of some opiate, stfth as the ordinary paregorics, may be advantageously employed. The use of opium, however., in any form should not be resorted to in the case of young children without medical advice, since its action on them is much more potent and less under control than it is in adults. Not a few of the so-called " soothing mixtures " have been found to contain opium in quantity sufficient to prove dangerous when administered to children, and caution is necessary in using them.

From the outset of the attack the employment of fomentations, or especially a turpentine stupe, gives great relief, and occasion- ally in the non-specific form this treatment, combined with a good dose of calomel and salts, may render the attack abortive. Some relief is always obtained by inhalations, and theoretically, an acute specific bronchitis should be successfully treated by inhalation of antiseptic and soothing remedies. In practice, however, it is found that the strength cannot be sufficiently strong to destroy the bacteria in the bronchial tubes. However, much relief is obtained from the use of steam atomizers filled with an aqueous solution of compound tincture of benzoin, creo- sote or guaiacol. A still more practicable means of introducing volatile antiseptic oils is the globe nebulizer, which throws oleaginous solutions in the form of a fine fog, that can be deeply inhaled. Menthol, eucalyptol and white pine extract are some of the remedies that may be tried dissolved in benzoinol, to which cocaine or opium may be added if the cough is troublesome.

When the bronchitis is of the capillary form, the great object is to maintain the patient's strength, and to endeavour to secure the expulsion of the morbid secretion from the fine bronchi. In additon to the remedies already alluded to, stimulants are called for from the first; and should the cough be ineffectual in relieving the bronchial tubes, the administration of an emetic dose of sulphate of zinc may produce a good effect.

During the whole course of any attack of bronchitis attention must be paid to the due nourishment of the patient; and during the subsequent convalescence, which, particularly in elderly persons, is apt to be slow, tonics and stimulants may have to be prescribed.

Chronic bronchitis may arise as the' result of repeated attacks of the acute form, or it may exist altogether independently. It occurs more frequently among persons advanced in life than among the young, although no age is exempt from it. The usual history of this- form, of bronchitis is that of a cough recurring during the colder seasons of the year, and in its earlier stages, departing entirely in summer, so that it is frequently called " winter cough." In many persons subject to it, however, attacks are apt to be excited at any time by very slight causes, such as, changes in the weather; and in advanced cases of the disease the cough is seldom altogether absent. The symptoms and auscultatory signs of chronic bronchitis are on the whole similar to those pertaining to the acute form,, except that the febrile disturbance and pain are much Jess marked. The cough is usually more troublesome in the morning than during the day. There is usually free and copious expectoration, and occasionally this is so abundant as to constitute what is termed bronchorrhoea.

Chronic bronchitis leads to alterations of structure in the affected bronchial tubes, their mucous membrane becoming thickened or even ulcerated, while occasionally permanent dilatation of the bronchi. takes place, often accompanied with profuse foetid expectoration. In long-standing cases of chronic bronchitis the nutrition of the lungs becomes impaired, and dilatation of the air-tubes (emphysema) and other complications result, giving rise to more or less constant breathlessness.

Chronic bronchitis may arise secondarily to some other ailment. This is especially the case in Bright's disease of the kidneys and in heart disease, of both of which maladies it often proves a serious complication, also in gout and syphilis. The influence of occupation is seen in the frequency in which persons following certain employments suffer from chronic bronchitis. Hirt has shown that the inhalation of vegetable dust is very liable to produce bronchitis through the irritation produced by the dust particles and the growth of organisms carried in with the dust. Consequently, millers and grain-shovellers are especially liable to it, while next in order come- weavers and workers in cotton factories.

. The treatment tobe adopted in chronicbronchitis depends upon the severity of the case, the age of the patient and the presence or absence of complications. Attention to the general health is a matter;

of prime importance in all cases of the disease, more particularly among persons whose avocations entail exposure, and tonics with cod-liver oil will be found highly advantageous. The use of a respirator in very cold or damp weather is a valuable means of protection. In those aggravated forms of chronic bronchitis, where the slightest exposure to cold air brings on fresh attacks, it may become necessary, where circumstances permit, to enjoin confinement to a warm room or removal to a more genial climate during the winter months.

BRONCHOTOMY (Gr. Ppbyx™, wind-pipe, and rkfiveiv, to cut), a medical term used to describe a surgical incision into the throat; now largely superseded by the terms laryngotomy, thyrotomy and tracheotomy, which indicate more accurately the place of incision.

BRONCO, usually incorrectly spelt Broncho (a Spanish word meaning rough, rude), an unbroken or untamed horse, especially in the United States, a mustang; the word entered America by way of Mexico.

BRONDSTED, PETER OLUF (1780-1842), Danish archaeo- logist and traveller, was born at Fruering in Jutland on the 17th of November 1780. After studying at the university of Copen- hagen he visited Paris in 1806 with his friend Georg Koes. After remaining there two years, they went together to Italy. Both were zealously attached to the study of antiquities; and con- geniality of tastes and pursuits induced them, in 18 10, to join an expedition to Greece, where they excavated the temples of Zeus in Aegina and of Apollo at Bassae in Arcadia. After three years of active researches in Greece, Brondsted returned to Copenhagen, where, as a reward for his labours, he was appointed professor of Greek in the university. He then began to arrange and prepare for publication the vast materials he had collected during his travels; but finding that Copenhagen

did not afford him the desired facilities, he exchanged his pro- fessorship for the office of Danish envoy at the papal court in 1818, and took up his abode at Rome. In 1820 and 1821 he visited Sicily and the Ionian Isles to collect additional materials for his great work. In 1826 he went to London, chiefly with a view of studying the Elgin marbles and other remains of antiquity in the British Museum, and became acquainted with the prin- cipal archaeologists of England. From 1828-1832 he resided in Paris, to superintend the publication of his Travels, and then returned to Copenhagen on being appointed director of the museum of antiquities and the collection of coins and medals. In. 1842 he became rector of the university; but a

fall from his horse caused his death on the 26th of June. His principal work was the' Travels, and Archaeological Researches in Greece (in German and French, 1 8.26-1 830), of which only two volumes were published, dealing with the island of Ceos and the metopes of the Parthenon.

BRONGNIART, ADOtPHE THEODORE (1801-1876), French botanist, son of the geologist Alexandre Brongniart, was born in Paris on the 14th of January 1801. He soon showed an inclina- tion towards the study of natural science, devoting himself at first more particularly to geology, and later to botany, thus equipping himself for what was to be the main occupation of his life— the investigation of fossil plants. In 1826 he graduated as doctor of medicine with a dissertation on the Rhamnaceae; but the career which he adopted was botanical, not medical. In 1 83 1 he became assistant to R. L. Desfontaines at tlje Musee d'Histoire "Naturelle, and two years later succeeded him as professor, a position which he continued to hold until his death in Paris on the 18th of February 1876.

Brongniart was an indefatigable investigator and a prolific writer,; so that he left behind him, as the fruit of his labours, a large number of books and memoirs. As early as 1822 he published a paper on the classification and distribution of fossil plants (Mem. Mus. Hist. Nat. viii.). This was followed by several papers chiefly bearing upon the relation between extinct and existing forms — a line of research which culminated in the publication of the Histoire des vigStauxfossiles, which has earned for him the title of " father of paleobotany." This great work was heralded by a small but most important " Prodrome " (contributed to the Grand Dictionnaire d'Hist. Nat., 1828, t. lvii.) which brought order into chaos by a classification in which the fossil plants were arranged, with remarkably correct insight, along with their nearest living allies, and which forms the basis of all subsequent progress in this direction. It is of especial botanical interest, because, in accordance with Robert Brown's discoveries, the Cycadeae and Coniferae were placed in the new group Fhan&rogames gymnospermes. In this book attention was also directed to the succession of forms in the various geological periods, with the important result (stated in modern terms) that in the Palaeozoic period the Pteridophyta are found to predominate; in the Mesozoic, the Gymnosperms; in the Cainozoic, the Angiosperms, a result subsequently more fully stated in his "Tableau des genres de vegetaux fossiles" (D'Orbigny, Diet. Univ. d'Hist. Nat., 1849). But the great Histoire itself was not destined to be more than a colossal fragment; the publication of successive parts proceeded regularly from 1828 to 1837, when the first volume was completed, but after

that only three parts of the second volume appeared. Brongniart, no doubt, was overwhelmed with the continually increasing magnitude of the task that he had undertaken. Apart from his more comprehensive works, his most important palaeontological contributions are perhaps his observations on the structure of Sigillaria (Arch. Mus. Hist. Nat. i., 1839) and his researches (almost the last he undertook) on fossil seeds, of which a full account was published posthumously in 1880. His activity was by no means confined to palaeobotany, but extended into all branches of botany, more particularly ˆanatomy and phanerogamic taxonomy. Among his achievements in these directions the most notable is the memoir " Sur la generation et le developpement de 1'embryon des Phanerogames " (Ann. Sci. Nat. xii., 1827); This is remarkable in that it contains the

first account of any value of the development of the pollen; as also a description of the structure of the pollen-grain, the confirmation of G. B. Amici's (1823) discovery of the pollen-tube, the confirmation of R. Brown's views as to the structure of the unimpregnated ovule (with the introduction of the term " sac embryonnaire "); and in that it shows how nearly Brongniart anticipated Amici's subsequent (1846) discovery of the entrance of the pollen-tube into the micropyle, fertilizing the female cell which then develops into the embryo. Of his anatomical works, those of the greatest value are probably the " Recherches sur la structure et les fonctions des feullles " (Ann, Sci, Nat. xxi., 1830), and the " Nouvelles Recherches sur l'Epiderme " {Ann. Sci. Nat. i., 1834), in which, among other important obser- vations, the discovery of the cuticle is recorded; and, further, the " Recherches sur l'organisation des tiges des Cycadees " {Ann. Sci. Nat. xvi., 1829), giving the results of the first investigation of the anatomy of those plants. His systematic work is represented by a large number of papers and monographs, many of which relate to the flora of New Caledonia; and by his Enumeration des genres de plantes cultivees au Musee d'Histaire Naturelle de Paris (1843), which is an interesting landmark in the history of classification in that it forms the starting-point of the system, modified successively by A. Braun, A. W. Eichler and A. Engler, which is now adopted in Germany. In addition to his scientific and professorial labours, Brongniart held various important official posts in connexion with the department of education, and interested himself greatly in agricultural and horticultural matters. With J. V. Audouin and J. B. A. Dumas, his future brothers-in-law, he

established the Annates des Sciences Naturelles in 1824; he also founded the Societe Botanique de France in 1854, and was its first president.

For accounts of his life and work see Bull, de la Soc. Geol. de France, 1876, and La Nature, 1876; the Bulletin de la Soc. Bot. de France for 1876, vol. xxiii., contains a list of his works and the orations pronounced at his funeral. (S. H. V.)*

BRONGNIART, ALEXANDRE (1770-1847), French miner- alogist and geologist, son of the eminent architect who designed the Bourse and other public buildings of Paris, was born in that city on the 5th of February 1770. At an early age he studied chemistry, under Lavoisier, and after passing through the Ecole des Mines he took honours at the Ecole de Medecine; subsequently he joined the army of the Pyrenees as pharmacien; but having committed some slight political offence, he was thrown into prison and detained there for some time. Soon after his release he was appointed professor of natural history in the College des Quatre Nations. In 1 800 he was made director of the Sevres porcelain factory, a post which he retained to his death, and in which he achieved his greatest work. In his hands Sevres became the leading porcelain factory in Europe, and the researches of an able band of assistants enabled him to lay the foundations of ceramic chemistry. In addition to his work at Sevres, quite enough to engross the entire energy of any ordinary man, he continued his more purely scientific work. He succeeded Hauy as professor of mineralogy in the Museum of Natural History; but he did not confine himself to mineralogy, for it is to him that we owe the division of Reptiles into the four orders of Saurians, Batrachians, Chelonians and Ophidians. Fossil as well as living animals engaged his attention, and in his studies of the strata around Paris he was instrumental in estab- lishing the Tertiary formations. In 1816 he was elected to the Academy; and in the following year he visited the Alps of Switzerland and Italy, and afterwards Sweden and Norway. The result of his observations was published from time to time in the Journal des Mines and other scientific journals. Wide as was the range of his interests his most famous work was accomplished at Sevres, and his most enduring monument is his classic. Traite des arts cer antiques (1844). He died in Paris on the 7 th of October 1847.

His other principal works are:- — Traite elementaire de mineralogie, avec des applications aux arts (2 vols.,. Paris, 1807) ; Histoire naturelle des crustaces fossiles (Paris, 1822); Classification et caracteres mineralogiques des roch.es homogenes et heterogenes

(Paris, 1827); the Tableau des terrains, qui composent I' ecorce du globe, ou Essai sur.

la structure de la partie connue de la terre (Paris, 1829) ; and the TraitS des arts ceramiques (1 844) . Brongniart was also the coadj utor of Cuvier in the admirable Essai sur la geographic mineralogique des environs de Paris (Paris, 1811); originally published in Ann. Mus. Hist. Nat. (Paris, xi. 1808).

BRONN, HEINRICH GEORG (1800-1862), German geologist, was born on the 3rd of March 1800 at Ziegelhausen near Heidel- berg. Studying at the university at Heidelberg he took his doctor's degree in the faculty of medicine in 1821, and in the following year was appointed professor of natural history. He now devoted himself to palaeontological studies, and to field- work in various parts of Germany, Italy and France. From its commencement in 1830 to 1862 he 1 assisted in' editing the Jahrbuch fiir Miner alogie, &c, continued as Neues Jahrbuch. His principal work, Lethaea Geognostica (2 vols., Stuttgart, 1834-1838; 3rd ed. with F. Romer, 3 vols., 1851-1856), has been regarded as one of the foundations of German stratigraphical geology. His Handbuch einer Geschichteder Natur,oi which the first part was issued in 1841, gave a general account of the physical history of the earth, while the second part dealt with the life-history, species being regarded as direct acts of creation. The third part included his famous Index Palaeontologicus, and was issued in 3 vols., 1848-1849, with the assistance of H. von Meyer and H. R. Goppert. This record of fossils has proved of inestimable value to all palaeontologists. An important work on recent and fossil zoology, Die Klassen und Ordnungen des Thier-Reichs, was commenced by Bronn. He wrote the volumes dealing with Amorphozoa, Actinozoa, and Malacozoa, published 1859-1862; the work was continued by other natural- ists. In 1 86 1 Bronn was awarded the Wollaston medal by the Geological Society of London. He died at Heidelberg on the 5th of July 1862.

BRONSART VON SCHELLENDORF, PAUL (1832-1891), Prussian general, was born at Danzig in 1832. He entered the Prussian Guards in 1849, and was appointed to the general staff in 1861 as a captain; after three years of staff service he returned to regimental duty, but was soon reappointed to the staff, and lectured at the war academy, becoming major in 1865 and lieut.-colonel in 1869. During the war of 1870 he was chief of a section on the Great General Staff, and conducted the preliminary negotiations for the surrender of the French at Sedan. After the war Bronsart was made a colonel and chief of staff of the Guard army corps, becoming major-

general in 1876 and lieut.-general (with a division command) in 1881. Two years later he became war minister, and during his tenure of the post (1883-1889) many important reforms were carried out in the Prussian army, in particular the introduction of the magazine rifle. He was appointed in 1889 to command the I. army Corps at Konigsberg. He died on the 23rd of June 1891 at his estate near Braunsberg. Bronsart's military writings include two works of great importance — Ein Ruckblick auf die taklischen Ruckblicke (2nd ed., Berlin, 1870), a pamphlet written in reply to Captain May's Tactical Retrospect of 1866; and Der Dienst des Generalstabes (1st ed., Berlin, 1876; 3rd ed. revised by General Meckel, 1893; new ed. by the author's son, Major Bronsart von Schellendorf, Berlin, 1904, a comprehensive treatise on the duties of the general staff. The third edition of this work was soon after its publication translated into English and issued officially to the British army as The Duties of the General Staff. Major Bronsart's new edition of 1904 was re- issued in English by the General Staff, under the same title, in 1905.
■··■:■,■

BRONTE, CHARLOTTE (1816-1855), EMILY (1818-1848), and ANNE (1820ˆ1849), English novelists, were three of the six children of Patrick Bronte, a clergyman Of the Church of England, who for the last forty-one years of his' life was perpetual incum- bent of the parish of Ha worth in the West Riding of Yorkshire. Patrick Bronte was born at Emsdale, Co. Down, Ireland; on the 17th of March 1777. His parents were ! of the peasant class, their original name of Brunty apparently having been changed by their son on his entry at St John's College, Cambridge, in 1802. In the intervening years he had been successively a weaver and schoolmaster in his native Country. From Cambridge

he became a curate, first at Wethersfield in Essex, in 1806, then for a few months at Wellington, Salop, in 1809. At the end of 1809 he accepted a curacy at Dewsbury, Yorkshire, following up this by one at Hartshead-cum-Clifton in the same county. At Hartshead Patrick Bronte married in 181 2 Maria Branwell, a Cornishwoman, and there two children were born to him, Maria (1813-1825) and Elizabeth (1814-1825). Thence Patrick Bronte removed to Thornton, some 3 m. from Bradford, and -here his wife gave birth to four children, Charlotte, Patrick Branwell (181 7-1848), Emily Jane, and Anne, three of whom were to attain literary distinction.

In April 1820, three months after the birth of Anne Bronte, her father accepted the living of Ha worth, a village near Keighley in Yorkshire, which will always be associated with the romantic story of the Brontes. In September of the following year his wife died. Maria Bronte lives for us in her daughter's biography only as the writer of certain letters to her " dear saucy Pat," as she calls her lover, and as the author of a recently published manuscript, an essay entitled The Advantages of Poverty in Religious Concerns, full of a sententiousness much affected at the time.

Upon the death of Mrs Bronte her husband invited his sister- in-law, Elizabeth Branwell, to leave Penzance and to take up her residence with his family at Haworth. Miss Branwell accepted the trust and would seem to have watched over her nephew and five nieces with conscientious care. The two eldest of those nieces were not long in following their mother. Maria and Elizabeth, Charlotte and Emily, were all sent to the Clergy Daughters' school at Cowan Bridge in 1824, and Maria and Elizabeth returned home in the following year to die. How far the bad food and drastic discipline were responsible cannot be accurately demonstrated. Charlotte gibbeted the school long years afterwards in Jane Eyre, under the thin disguise of " Lowood," and the principal, the Rev. William Carus Wilson (1792-1859), has been universally accepted as the counterpart of Mr Naomi Brocklehurst in the same novel. But congenital disease more probably accounts for the tragedy from which happily Charlotte and Emily escaped, both returning in 1825 to a prolonged home life at Haworth. Here the four surviving children amused themselves in intervals of study under their aunt's guidance with precocious literary aspirations. The many tiny booklets upon which they laboured in the succeeding years have been happily preserved. We find stories, verses and essays, all in the minutest handwriting, none giving any indication of the genius which in the case of two of the four children was to add to the indisputably permanent in literature.

At sixteen years of age — in 1831 — Charlotte Bronte became a pupil at the school of Miss Margaret Wooler (1792-1885) at Roe Head, Dewsbury. She left in the following year to assist in the education of the younger sisters, bringing with her much additional proficiency in drawing, French and composition; she took with her also the devoted friendship of two out of her ten fellow-pupils — Mary Taylor (1817-1893) and Ellen Nussey (1817-1897). With Miss Taylor and Miss Nussey she corre- sponded for the remainder of her life, and her letters to the xatter make up no small part of what has been revealed to us of her life story. Her next three years at Haworth were varied by occasional visits to one or other of these

friends. In 1835 she returned to Miss Wooler's school at Roe Hea.d as a governess, her sister Emily accompanying her as a pupil, but remaining only three months, and Anne then taking her place. The year following the school was removed to Dewsbury. In 1838 Charlotte went back to Haworth and soon afterwards received her first offer of marriage — from a clergyman, Henry Nussey, the brother of her friend Ellen. This was followed a little later by a second offer from a curate named Bryce. She refused both and took a situation as nursery governess, first with the Sidgwicks of Stonegappe, Yorkshire, and later with the Whites at Rawdon in the same county. A few months of this, however, filled her with an ambition to try and secure greater independence as the possessor of a school of her own, and she planned to acquire more proficiency in " languages " on the continent, as a pre- I

liminary step. The aunt advanced some money, and accom- panied by her sister Emily she became in February 1842 a pupil at the Pensionnat Heger, Brussels. Here both girls worked hard, and won the goodwill and indeed admiration of the principal teacher, M. Heger, whose wife was at the head of the establish- ment. But the two girls were hastily called back to England before the year had expired by the announcement of the critical illness of their aunt. Miss Branwell died on the 29th of October 1842. She bequeathed sufficient money to her pieces to enable them to reconsider their plan of life. Instead of a school at Bridlington which had been talked of, they could now remain with their father, utilize their aunt's room as a classroom, and take pupils. But Charlotte was not yet satisfied with what the few months on Belgian soil had done for her, and determined to accept M. Heger's offer that she should return to Brussels as a governess. Hence the year 1843 was passed by her at the Pensionnat Heger in that capacity, and in this period she undoubtedly widened her intellectual sphere by reading the many books in French literature that her friend M. Heger lent her. But life took on a very sombre shade in the lonely environ- ment in which she found herself. She became so depressed that on one occasion she took refuge in the confessional precisely as did her heroine Lucy Snowe in Villette. In 1844 she returned to her father's house at Haworth, and the three sisters began immediately to discuss the possibilities of converting the vicarage into a school. Prospectuses were issued, but no pupils were forthcoming.

Matters were complicated by the fact that the only brother, Patrick Branwell, had about this time become a confirmed drunkard. Branwell had been the idol of his aunt and of his sisters. Educated under his father's care, he had early shown artistic leanings, and the

slender resources of the family had been strained to provide him with the means of entering at the Royal Academy as a pupil. This was in 1835. Branwell, it would seem, indulged in a glorious month of extravagance in London and then returned home. His art studies were continued for a time at Leeds, but it may be assumed that no commissions came to him, and at last he became tutor to the son of a Mr Postlethwaite at Barrow-in-Furness. Ten months later he was a booking-clerk at Sowerby Bridge station on the Leeds & Manchester railway, and later at Luddenden Foot. Then he became tutor in the family of a clergyman named Robinson at Thorp Green, where his sister Anne was governess. Finally he returned to Haworth to loaf at the village inn, shock his sisters by his excesses, and to fritter his life away in painful sottishness. He died in September 1848, having achieved nothing reputable, and having disappointed all the hopes that had been centred in him. " My poor father naturally thought more of his only son than of his daughters," is one of Charlotte's dreary comments on the tragedy. In early years he had himself written both prose and verse; and a foolish story invented long afterwards attributed to him some share in his sisters' novels, particularly In Emily Bronte's Wuthering Heights. But Charlotte distinctly tells us that her brother never knew that his sisters had published a line. He was too much under the effects of drink, too besotted and muddled in that last year or two of life, to have any share in their intellectual enthusiasms.

The literary life had, however, opened bravely for the three girls during those years. In 1846 a volume of verse appeared from the shop of Aylott & Jones of Paternoster Row; " Poems, by Currer, Ellis and Acton Bell," was on the title-page. These names disguised the identity of Charlotte, Emily and Anne Bronte. The venture cost the sisters about £50 in all, but only two copies were sold. There were nineteen poems by Charlotte, twenty-one by Emily, and the same number by Anne. A consensus of criticism has accepted the fact that Emily's verse alone revealed true poetic genius. This was unrecognized then except by her sister Charlotte. It is obvious now to all.

The failure of the poems did not deter the authors from further effort. They had each a novel to dispose of. Charlotte Bronte's was called The Master, which before it was sent off to London was retitled The Professor. Emily's story was entitled

Wuthering Heights, and Anne's Agnes Gray. All these stories travelled from publisher to publisher. At last The Professor reached the firm of Smith, Elder & Co., of Cornhill. The " reader" for that firm, R. Smith Williams (1800-1875), was impressed, as were also his employers. Charlotte Bronte received in August 1847 a letter informing her that whatever the merits of The Professor — and it was hinted that it lacked " varied interest " — it was too short for the three-volume form then counted imperative. The author was further told that a longer novel would be gladly considered. She replied in the same month with this longer novel, and Jane Eyre appeared in October 1847, to be wildly acclaimed on every hand, although enthusiasm was to receive a counterblast when more than a year later, in December 1848, Miss Rigby, afterwards Lady Eastlake (1809- 1893), reviewed it in the Quarterly.

Meanwhile the novels of Emily and Anne had been accepted by T. C. Newby. They were published together in three volumes in December 1847, two months later than Jane Eyre, although the proof sheets had been passed by the authors before their sister's novel had been sent to the publishers. The dilatoriness of Mr Newby was followed up by considerable energy when he saw the possibility of the novels by Ellis and Acton Bell sailing on the wave of Currer Bell's popularity, and he would seem very quickly to have accepted another manuscript by Anne Bronte, for The Tenant of Wildfell Hall was published by Newby in three volumes in June 1 848. It was Newby 's clever efforts to persuade the public that the books he published were by the author of Jane Eyre that led Charlotte and Anne to visit London this summer and interview Charlotte's publishers in Cornhill with a view to establishing their separate identity. Soon after their return home Branwell died (the 24th of September 1848), and less than three months later Emily died also at Ha worth (the 19th December 1 848) . Then Anne became ill and on the 24th of May 1849 Charlotte accompanied her to Scarborough in the hope that the sea air would revive her. Anne died there on the 28th of May, and was buried in Scarborough churchyard. Thus in exactly eight months Charlotte Bronte lost all the three companions of her youth, and returned to sustain her father, fast becoming blind, in the now desolate home at Haworth.

In the interval between the death of Branwell and of Emily, Charlotte had been engaged upon a new novel — Shirley. Two- thirds were written, but the story was then laid aside while its author was nursing her sister Anne. She completed the book after Anne's death, and it was published in October 1849. The following winter she visited London as the guest of her publisher, Mr George Smith, and

was introduced to Thackeray, to whom she had dedicated Jane Eyre. The following year she repeated the visit, sat for her portrait to George Richmond, and was considerably lionized by a host of admirers. In August 1850 she visited the English lakes as the guest of Sir James Kay- Shuttleworth, and met Mrs Gaskell, Miss Martineau, Matthew Arnold and other interesting men and women. During this period her publishers assiduously lent her books, and her criti- cisms of them contained in many letters to Mr George Smith and Mr Smith Williams make very interesting reading. In 18 51 she received a third offer of marriage, this time from Mr James Taylor, who was in the employment of her publishers. A visit to Miss Martineau at Ambleside and also to London to the Great Exhibition made up the events of this year. On her way home she visited Manchester and spent two days with Mrs Gaskell. During the year 1852 she worked hard with a new novel, Villette, which was published in January of 1853. In September of that year she received a visit from Mrs Gaskell at Haworth; in May 1854 she returned it, remaining three days at Manchester, and planning with her hostess the details of her marriage, for at this time she had promised to unite herself with her father's curate, Arthur Bell Nicholls (1817-1906), who had long been a per- tinacious suitor for her hand but had been discouraged by Mr Bronte. The marriage took place in Haworth church on the 29th of June 1854, the ceremony being performed by the Rev. Sutcliffe Sowden, Miss Wooler and Miss Nussey acting as wit- nesses. The wedded pair spent their honeymoon in Ireland,

returning to Haworth, where they made their home with Mr Bronte, Mr Nicholls having pledged himself to continue in his position as curate to his father-in-law. After less than a year of married life, however, Charlotte Nicholls died of an illness incidental to childbirth, on the 31st of March 1855. She was buried in Haworth church by the side of her mother, Branwell and Emily. The father followed in 1861, and then her husband returned to Ireland, where he remained some years afterwards, dying in 1906.

The bare recital of the Bronte story can give no idea of its undying interest, its exceeding pathos. Their life as told by their biographer Mrs Gaskell is as interesting as any novel. Their achievement, however, will stand on its own merits. Anne Bronte's two novels, it is true, though constantly reprinted, survive principally through the exceeding vitality of the Bronte tradition. As a hymn writer she still has a place in most religious communities. Emily is great alike as a novelist and as a poet. Her " Old Stoic " and " Last Lines " are probably the finest achievement of poetry that any woman has given to English literature. Her novel Wuthering Heights stands alone as a

monument of intensity owing nothing to tradition, nothing to the achievement of earlier writers. It was a thing apart, pas- sionate, unforgettable, haunting in its grimness, its grey melancholy. Among women writers Emily Bronte has a sure and certain place for all time. As a poet or maker of verse Charlotte Bronte is undistinguished, but there are passages of pure poetry of great magnificence in her four novels, and par- ticularly in Villette. The novels Jane Eyre and Villette will always command attention whatever the future of English fiction, by virtue of their intensity, their independence, their rough individuality.

The Life of Charlotte Bronte, by Mrs Gaskell, was first published in 1857. Owing to the many controversial questions it aroused, as to the identity of Lowood in Jane Eyre with Cowan Bridge school, as to the relations of Branwell Bronte with his employer's wife, as to the supposed peculiarities of Mr Bronte, and certain other minor points, the third edition was considerably changed. The Life has been many times reprinted, but may be read in its most satisfactory form in the Haworth edition (1902), issued by the original publishers, Smith, Elder & Co. To this edition are attached a great number of letters written by Miss Bronte to her publisher, George Smith. The first new material supplied to supplement Mrs Gaskell's Life was contained in Charlotte Bronte: a Monograph, by T. Wemyss Reid (1877). This book inspired Mr A. C. Swinburne to issue separately a forcible essay on Charlotte and Emily Bronte, under the title of A Note on Charlotte Bronte (1877). A further collection of letters written by Miss Bronte was contained in Charlotte Bronte and her Circle, by Clement Shorter (1896), and interesting details can be gathered from the Life of Charlotte Bronte, by Augustine Birrell (1887), The Brontes in Ireland, by William Wright, D.D. (1893), Charlotte Bronte and her Sisters, by Clement Shorter (1906), and the Bronte Society publications, edited by Butler Wood (1895-1907). Miss A. Mary F. Robinson (Madame Duclaux) wrote a separate biography of Emily Bronte in 1883, and an essay in her Grands Ecrivains d'outre-Manche. The Brontes: Life and Letters, by Clement Shorter (1907), contains the whole of C. Bronte's letters in chrono- logical order. (C. K. S.)

BRONTE, a town of the province of Catania, Sicily, on the western slopes of Mt. Etna, 24 m. N.N.W. of Catania direct, and 34 m. by rail. Pop. (1901) 20,366. It was founded by the emperor Charles V. The town, with an extensive estate which originally belonged to the monastery of Maniacium (Maniace), was granted, as a dukedom, to Nelson by Ferdinand IV. of Naples in 1799.

BRONX, THE, formerly a district comprising several towns in Westchester county, New York, U.S.A., now (since 1898) the northernmost of the five boroughs of New York City (q.v.). Several settlements in the Bronx were made by the English and the Dutch between 1640 and 1650.

BRONZE, an alloy formed wholly or chiefly of copper and tin in variable proportions. The word has been etymologically connected with the same root as appears in " brown," but according to M. P. E. Berthelot (La Chimie au moyen dge) it is a place-name derived from aes Brundusianum (cf. Pliny, Nat. Hist, xxxiii. ch. ix. § 45, " specula optima apud majores fuerunt Brundusiana, stanno et aere mixtis "). A Greek MS. of about the nth century in the library of St Mark's, Venice, contains

the form Ppovrycnov, and gives the composition of the alloy as 1 lb of copper with 2 oz. of tin. The product obtained by adding tin to copper is more fusible than copper and thus better suited for casting; it is also harder and less malleable. A soft bronze or gun-metal is formed with 16 parts of copper to 1 of tin, and a harder gun-metal,, such as was used for bronze ordnance, when the proportion of tin is about doubled. The steel bronze of Colonel Franz Uchatius (1811-1881) consisted of copper alloyed with 8% of tin, the tenacity and hardness being in- creased by cold-rolling. Bronze containing about 7 parts of copper to 1 Of tin is hard, brittle and sonorous, and can be tempered to take a fine edge. Bell-metal varies considerably in composition, from about 3 to 5 parts of copper to 1 of tin. In speculum metal there are 2 to 2§ parts of copper to 1 of tin. Statuary bronze may contain from 80 to 00 % of copper, the residue being tin, or tin with zinc and lead in various proportions. The bronze used for the British and French copper coinage consists of 95 % copper, 4 % tin and 1 % zinc. Many copper-tin alloys employed for machinery-bearings contain a small pro- portion of zinc, which gives increased hardness. " Anti-friction metals," also used in bearings, are copper-tin alloys in which the amount of copper is small and there is antimony in addition. Of this class an example is "Babbitt's metal," invented by Isaac Babbitt (1799-1862); it originally consisted of .24 parts of tin, 8 parts of antimony and 4 parts of copper, but in later compositions for the same purpose the proportion of tin is often considerably higher. Bronze is improved in quality and strength when fluxed with phosphorus. Alloys prepared in this way, and known as

*phosphor bronze, may contain only about 1 % of phosphorus in the ingot, reduced to a mere trace after casting, but their value is nevertheless enhanced for purposes in which a hard strong metal is required, as for pump plungers, valves, the bushes of bearings, &c. Bronze again is improved by the presence of manganese in small quantity, and various grades of manganese bronze, in some of which there is little or no tin but a considerable percentage of zinc, are extensively used in mechanical engineering. Alloys of copper with aluminium, though often nearly or completely destitute of tin, are known as aluminium bronze, and are valuable for their strength and the resistance they offer to corrosion. By the addition of a small quantity of silicon the tensile strength of copper is much in- creased; a sample of such silicon bronze, used for telegraph wires, on analysis was found to consist of 99*94 % of copper, 0-03 % of tin, and traces of iron and silicon.*

*The bronze (Gr. xˆ*ˆ Lat. aes) of classical antiquity consisted chiefly of copper, alloyed with one or more of the metals, zinc, tin, lead and silver, in proportions that varied as times changed, or according to the purposes for which the alloy was required. Among bronze remains the copper is found to vary from 67 to 95 %. From the analysis of coins it appears that for their bronze coins the Greeks adhered to an alloy of copper and tin till 400 B.C., after which time they used also lead with increasing frequency. Silver is rare in their bronze coins. The Romans also used lead as an alloy in their bronze coins, but gradually reduced the quantity, and under Caligula, Nero, Vespasian and Domitian, coined pure copper coins; afterwards they reverted to the mixture of lead. So far the words xˆkos and aes may be translated as bronze. Originally, no doubt, XaX/cos was the name for pure copper. It is so employed by Homer, who calls it epvdpos (red), aWd)*// (glittering), ˆaevvos (shining), terms which apply only to copper. But instead of its following from this that the process of alloying copper with other metals was not practised in the time of the poet, or was unknown to him, the contrary would seem to be the case from the passage {Iliad xviii. 474) where he describes Hephaestus as throwing into his furnace copper, tin, silver and gold to make the shield of Achilles, so that it is not always possible to know whether when he uses the word x< *\k6s he means copper pure or alloyed. Still more difficult is it to make this distinction when we read of the mythical Dactyls of Ida in Crete or the Telchines or Cyclopes being acquainted with the smelting of xaA/cos. It is not, however, likely that later Greek writers, who knew bronze*

*in its true sense, and called it x< *Xkos, would have employed this word without qualification for objects which they had seen unless*

they had meant it to be taken as bronze. When Pausanias (iii. 17. 6) speaks of a statue, one of the oldest figures he had seen of this material, made of separate pieces fastened together with nails, we understand him to mean literally bronze, the more I readily since there exist very early figures and utensils of bronze so made.

For the use of bronze in art, see Metal- work.

BRONZE AGE, the name given by archaeologists to that stage in human culture, intermediate between the Stone and Iron Ages, when weapons, utensils and implements were, as a general rule, made of bronze. The term has no absolute chrono- logical value, but marks a period of civilization through which it is believed that most races passed at one time or another. The " finds " of stone and bronze, of bronze and iron, and even of stone and iron implements together in tumuli and sepulchral mounds, suggest that in many countries the three stages, in man's progress overlapped. From the similarity of types of weapons and implements of the period found throughout Europe a relatively synchronous commencement has been inferred for the Bronze Age in Europe, fixed by most authorities at between 2000 B.C. to 1800 B.C. But it must have been earlier in some

' countries, and is certainly known to have been later in others; while the Mexicans and Peruvians were still in their bronze age in recent times. Not a few archaeologists have denied that there ever was a distinct Bronze Age. They have found their chief argument in the fact that weapons of these ages have been found side by side in prehistoric burial-places. But when it is admitted that the ages must have overlapped, it is fairly easy to undertand the mixed " finds." The beginning, the prevalence and duration of the Bronze Age in each country would have been ordered by the accessibility of the metals which form the alloy. Thus in some lands bronze may have continued to be a substance of extreme value until the Iron Age was reached, and in tumuli in which more than one body was interred, as was frequently the case, it would only be with the remains of the richer tenants of the tomb that the more valuable objects would be placed. There is, moreover, much reason to believe that sepulchral mounds were opened from age to age and fresh inter- ments made, and in such a practice would be found a simple explanation of the mixing of implements. Another curious fact has been seized on by those who argue against the existence of a Bronze Age. Among all the " finds " examined in Europe there is a most remarkable absence of copper implements. The sources of tin in Europe are practically restricted to Cornwall and Saxony. How then are we to explain on the one hand the apparent stride made by primitive man when from a

Stone Age civilization he passed to a comparatively advanced metallurgical skill? On the other, how account for a comparatively syn- chronous commencement of bronze civilization when one at least of the metals needed for the alloy would have been naturally difficult of access, if not unknown to many races? The answer is that there can be but little doubt that the knowledge of bronze came to the races of Europe from outside. Either by the Phoenicians or by the Greeks metallurgy was taught to men who no sooner recognized the nature and malleable properties of copper than they learnt that by application of heat a substance could be manufactured with tin far better suited to their purposes. 1 Copper would thus have been but seldom used unalloyed; and the relatively synchronous appearance of bronze in Europe, and the scanty " finds " of copper implements, are explained. We may conclude then that there was a Bronze Age in most countries; that it was the direct result of increasing intercommunication of races' and the spread of commerce; and that the discovery of metals was due to information brought to Stone-Age man in Europe by races which were already skilful metallurgists.

The Bronze «Age in Europe is characterized by weapons, utensils and implements, distinct in design and size from those in use in the preceding or succeeding stage of man's civilization.

: Moreover — and this has been employed as an argument in favour of the foreign origin of the knowledge of bronze — all the

objects in one part of Europe are identical in pattern and size with those found in another part. The implements of the Bronze Age include swords, awls, knives, gouges, hammers, daggers and arrow-heads. A remarkable confirmation of the theory that the Bronze Age culture came from the East is to be found in the patterns of the arms, which are distinctly oriental; while the handles of swords and daggers are so narrow and short as to make it unlikely that they would be made for use by the large-handed races of Europe. The Bronze Age is also char- acterized by the fact that cremation was the mode of disposal of the dead, whereas in the Stone Age burial was the rule. Barrows and sepulchral mounds strictly of the Bronze Age are smaller and less imposing than those of the Stone Age. Besides varied and beautiful weapons, frequently exhibiting high workmanship, amulets, coronets, diadems of solid gold, and vases of elegant form and ornamentation in gold and bronze are found in the

barrows. These latter appear to have been used as tribal or family cemeteries. In Denmark as many as seventy deposits of burnt bones have been found in a single mound, indicating its use through a long succession of years. The ornamentation of the period is as a rule confined to spirals, bosses and concentric circles. What is remarkable is that the iwords not only show the design of the cross in the shape of the handle, but also in tracery what is believed to be an imitation of the Svastika, that ancient Aryan symbol which was probably the first to be made with a definite intention and a consecutive meaning. The pottery is all " hand-made," and the bulk of the objects excavated are cinerary urns, usually found full of burnt bones. These vary from 12 to 18 in. in height. Their decoration is confined to a band round the upper part of the pot, or often only a projecting flange lapped round the whole rim. A few have small handles, formed of pierced knobs of clay and sometimes projecting rolls of clay, looped, as it were, all round the urn. The ornamentation consists of dots, zigzags, chevrons or crosses. The lines were frequently made by pressing a twisted thong of skin against the moist clay; the patterns in all cases being stamped into the pot before it was hardened by fire.

See Archaeology, &c. Also Lord Avebury, Prehistoric Times (1900); Sir J. Evans, Ancient Bronze Implements of Great Britain (1881) ; Chartre's Age du bronze en France.

BRONZING, a process by which a bronze-like surface is imparted to objects of metal, plaster, wood, &c. On metals a green bronze colour is sometimes produced by the action of such substances as vinegar, dilute nitric acid and sal-ammoniac. An antique appearance may be given to new bronze articles by brushing over the clean bright metal with a solution of sal- ammoniac and salt of sorrel in vinegar, and rubbing the surface dry, the operation being repeated as often as necessary. Another solution for the same purpose is made with sal-ammoniac, cream of tartar, common salt and silver nitrate. With a solution of platinic chloride almost any colour can be produced on copper, iron, brass or new bronze, according to the dilution and the number of applications. Articles of plaster and wood may be brdnzed by coating them with size and then covering them with a bronze powder, such as Dutch metal, beaten into fine leaves and powdered. The bronzing of gun-barrels may be effected by the use of a strong solution of antimony trichloride.

BRONZINO, IL, the name given to Angelo Alloei (1502- 1572), the Florentine painter. He became the favourite pupil of J. da Pontormo. He painted the portraits of some of the most famous men of his day,

such as Dante, Petrarch and Boccaccio. Most of his best works are in Florence, but examples are in the National Gallery, London, and elsewhere.

BRONZITE, a member of the pyroxene group of minerals, belonging with enstatite and hypersthene to the orthorhombic series of the group. Rather than a distinct species, it is really a ferriferous variety of enstatite, which owing to partial altera- tion has acquired a bronze-like sub-metallic lustre on the cleavage surfaces. Enstatite is magnesium metasilicate, MgSiOs, with the magnesia partly replaced by small amounts (up to about 5%) of ferrous oxide; in the bronzite variety, (Mg,Fe)Si03, the ferrous oxide ranges from about 5 to 14%, and with still more

iron there is a passage to hypersthene. The ferriferous varieties are liable to a particular kind of alteration, known as " schilleriza ; tion," which results in the separation of the iron as very fine films of oxide and hydroxides along the cleavage cracks of the mineral. The cleavage surfaces therefore exhibit a metallic sheen or " schiller," which is even more pronounced in hyper- sthene than in bronzite. The colour of bronzite is green or brown; its specific gravity is about 3ˆ1-3-3, varying with the amount of iron present. Like enstatite, bronzite is a constituent of many basic igneous rocks, such as norites, gabbros, and especially peridotites, and of the serpentines which have been derived from them. It also occurs in some crystalline schists.

Bronzite is sometimes cut and polished, usually in convex forms, for small ornamental objects, but its use for this purpose is less extensive than that of hypersthene. It often has a more or less distinct fibrous structure, and when this is pronounced the sheen has a certain resemblance to that of cat's-eye. Masses sufficiently large for cutting are found in the norite of the Kupferbergin the Fichtelgebirge, and in the serpentine of Kraubat near Leoben in Styria. In this connexion mention may be made of an altered form of enstatite or bronzite known as bastite or schiller-spar. Here, in addition to schillerization, the original enstatite has been altered by hydration and the product has approximately the composition of serpentine. In colour fetstite is brown or green with the same metallic sheen as bronzite. The typical locality is Baste in the Radauthal, Harz, where patches of pale greyish-green bastite are embedded in a darker- coloured serpentine. This rock when cut and polished makes an effective decorative stone, although little used for that purpose. (L. J. S.)

BROOCH, or Broach (from the Fr. broche, originally an awl or bodkin; a spit is sometimes called a broach, and hence the phrase " to broach a barrel "; see Broker), a term now used to denote a clasp or fastener for the dress, provided with a pin, haying a hinge or spring at one end, and a catch or loop at the other.

Brooches of the safety-pin type (fibulae) were extensively used in antiquity, but only within definite limits of time and place. They seem to have been unknown to the Egyptians, and to the oriental nations untouched by Greek influence. In lands adjacent to Greece, they do not occur in Crete or at His- sarlik. The place of origin cannot as yet be exactly determined, but it would seem to have been in central Europe, towards the close of the Bronze Age, somewhat before 1000 B.C. The earliest form is little more than a pin, bent round for security, with the point caught against the head. One such actual pin has been found. In its next simplest form, very similar to that of the modern safety-pin (in which the coiled spring forces the point against the catch), it occurs in the lower city of Mycenae, and in late deposits of the Mycenaean Age, such as at Enkomi in Cyprus. It occur 1 -, also (though rarely) in the " terramare " deposits of the Po valley, in the Swiss lake-dwellings of the later Bronze Age, in central Italy, in Hungary and in Bosnia (fig. i). 1

; From the comparatively Fig. 1.— Early type from Peschiera. simple initial form, the fibula

developed in different lines of descent, into different shapes, varying according to the structural feature which was emphasized. On account of the number of local variations, the subject is extremely complex, but the main lines pf development were approximately as follows.

Towards the end of the Bronze Age the safety-pin was arched into a bow, so as to include a greater amount of stuff in its compass. '

In the older Iron Age or " Hallstatt period " the bow and its accessories are thickened and modified in various directions, $o as to give greater rigidity, and prominences or surfaces for decoration. The chief types have been conveniently classed by

1 The illustrations of this article are from Dr Robert Former's ReaUexikan, by permission of W. Spemann, Berlin and Stuttgart.

Fig. 2. — Type I. with disk for catch-plate.

Montelius in four main groups, according to the characteristic lorms: —

I. The wire of the catch-plate is hammered into a flat disk, on which the pin rests (fig. 2).

II. The bow is thickened towards the middle, so as to assume the " leech " shape, or it is hollowed out underneath, into the " boat " form. The catch-plate is only slightly turned up, but it becomes elongated, in order to mask the end of a long pin (fig. 3).

III. The catch-plate is flattened out as in group I., but additional convolutions are added to the bow (fig. 4) .

IV. The bow is convoluted (but the convolutions are some- times represented by knobs); the catch-plate develops as in group II. (fig. 5). For further examples of the four types, see Antiquities of Early Iron Age in British. Museum, p. 32.

Among the special variations of the early form, mention should be made of the fibulae of the geometric age of Greece, with an exaggerated development of the vertical portion of the catch- plate (fig. 6).

The example shown in fig. 7 is an ornate development of type II. above.

In the later Iron Age (or early La Tene period) the prolongation of the catch-plate described in the second and fourth groups above has a terminal knob ornament, which is reflexed upwards, at first slightly (fig. 8), and then to a marked extent, turning back towards the bow.

A far-reaching change in the design was at the same time brought about by a simple im- provement in principle, apparently c introduced within the area of the

Fig. 3.-Type II. with La , T ˆ culture. Instead of a turned-up and elongated unilateral spring— that is, of one catch-plate, a, " Leech " coiled on one side only of the bow fibula; b, " Boat " fibula; as commonly in the modern safety- pin — the brooch became bilateral. The spring was coiled on one side of the axis of the bow, and thence the wire was taken to the other side of the axis, and again coiled in a corresponding manner before starting in a straight line to form the

pin. Once invented, the bilateral spring became almost universal, and its introduction serves to divide the whole mass of ancient fibulae into an older and a younger group.

With the progress of the La Tene period (300-1 B.C.) the reflection of the catch-plate terminal became yet more marked, until it became practically merged in the bow (fig. 9). Mean- while, the bilateral spring described above was developing into two marked projections on each side of the axis. In order to give the double spring strength and protection it was given a metal core, and a containing tube. When the core had been provided the pin was no Fig. 4.— Type III. j onger neC essarily a continuation of the with disk for catch , ° , . . J , , _ ·

plate and convol- bow, and it became in tact a separate uted bow. member, as in a modern brooch of a non-

safety-pin type, and was no longer actuated by its own spring.

The T- s h a P e d or " cross-bow " fibula was thus developed. During the first centuries of the Empire it attained great size and importance (figs. 10-1 2) . The form is conveniently dated at its highest development by its occurrence on the ivory diptych of Stilicho at Monza (c. a.d. 400).

In the tombs of the Frankish and kindred Teutonic tribes between the 3th and 9th centuries the crossbar of the T becomes

c, variation fibula.

of " Boat

a yet more elaborately decorated semicircle, often surrounded by radial knobs and a chased surface. The base of the shaft is flattened out, and is no less ornate (fig. 13). At the beginning of this period the fibula of King Childeric (a.d. 481) has ;> singularly complicated pin-fastening.

So far we have traced the history of the safety-pin form 0/

Fig. 5. — Type IV. with turned-up catch-plate and convoluted bow.

Fig. 6. — Greek geometric fibula.

brooch. Concurrently with it, other forms of brooch were developed in which the safety-pin principle is either absent or effectually

disguised. One such form is that of the circular medallion brooch. It is found in Etruscan deposits of a fully developed style, and is commonly represented in Greek and Roman sculptures as a stud to fasten the cloak on the shoulder.

Fig. 7. — Gold fibula from Naples.

In the Roman provinces the circular brooches are very numerous, and are frequently decorated with inlaid stone, paste or enamel. Another kind of brooch, also known from early times, is in the form of an animal. In the early types the animal is a decorative appendage, but in later examples it forms the body of the brooch, to which a pin like the modern brooch-pin is attached under- neath. Both of these shapes, namely the medallion and the animal form, are found in Frankish cemeteries, together with the later variations of the J- shaped brooch described above. Such

brooches were made in gold, silver or J ene . P e . riod – Rˆxed

, , . , . . terminal ornament,

bronze, adorned with precious stones,

filigree work, or enamel; but whatever the richness of the

material, the pin was nearly always of iron.

The Scandinavian or northern group of T-shaped brooches

are in their early forms indistinguishable from those of the

Frankish tombs, but as time went on they became more massive,

and richly decorated with intricate devices (perhaps brought

Fig. 8.— Early La

F1G.9, a-d . — Fibula of the La Tene period, showing the development of the reflexed terminal, and the bilateral spring.

in by Irish missionary influence), into which animal forms were introduced. The period covered is from the 5th to the 8th centuries.

The T-form, the medallion-form, and (occasionally) the animal forms occur in Anglo-Saxon graves in England. In Kent the medallion-form predominates. The Anglo-Saxon brooches

were exquisite works of art, ingeniously and tastefully con- structed. They are often of gold, with a central boss, exquisitely decorated, the fiat part of the brooch being a mosaic of tur- quoises, garnets on gold foil, mother of pearl, &c. arranged in

Fig. 10. — Military Fibula. 3rd century a.d.

Fig. 11. — Fibula with niello work. 3rd century A.D. _

Fig. 12. — Gold Fibula. 4th century a.d.

geometric patterns, and the gold work enriched with filigree or decorated with dragonesque engravings.

The Scandinavian brooches of the Viking period (a.d. 800- 1050) were oval and convex, somewhat in the form of a tortoise. In their earliest form they occur in the form of a frog-like animal, itself developed from the previous Teutonic T-shaped type. With the introduction of the intricate system of ornament described above, the frog-like animal is gradually superseded by purely decorative lines. The convex bowls are then worked a jour with a perforated upper shell of chased work over an under shell of impure bronze, gilt on the convex side. These outer cases are at last decorated with open crown-like ornament and massive projecting bosses. The geographical distribution of

these peculiar brooches indicates the extent of the conquests of the Northmen. They occur in northern Scotland, England, Ireland, Ice- land, Normandy and Livonia.

The Celtic group is characterized by the penannular form of the ring of the brooch and the greater length of the pin. The penannular ring, inserted through a hole at the head of the long pin, could be partially turned when the pin had been thrust through the material in such a way that the brooch became in effect a buckle. These brooches are usually of bronze or silver, chased or engraved with intricate designs of interlaced or dragonesque work in the style of the illuminated Celtic manu- scripts of the 7th, 8th and 9th centuries. The Hunterston brooch, which was found at Hawking Craig in Ayrshire, is a well-known example of this style. Silver brooches of immense size, some having pins 15 in. in length, and the penannular ring of the brooch terminating in large knobs resembling thistle heads, are

occasionally found in Viking hoards of this period, consisting of bullion, brooches and Cufic and Anglo-Saxon coins buried

on Scottish soil. In medieval times the form of the brooch was usually a simple, flat circular disk, with open centre, the pin being equal in length to the diameter of the brooch. They were often inscribed with religious and talis- manic formulae. The Highland brooches were commonly of this form, but the disk was broader, and the central opening smaller in proportion to the size of the brooch. They were ornamented in the style so common on Highland powder-horns, with engraved patterns of interlacing work and foliage, arranged in geometrical spaces, and sometimes mingled with figures of animals. (A. H. Sm.)

Fig. 13. — Fibula of the Frankish period.

BROOKE, FRANCES (1724-1789), English novelist and dramatist, whose maiden name was Moore, was born in 1724. Of her novels, some of which enjoyed considerable popularity in their day, the most important were The History of Lady Julia Mandeville (1763), Emily Montague (1769) and The Excursion (1777). Her dramatic pieces and translations from the French are now forgotten. She died in January 1789.

BROOKE, FULKE GREVILLE, ist Baron (1554-1628), English poet, only son of Sir Fulke Greville, was born at Beau- champ Court, Warwickshire. He was sent in 1564, on the same day as his life-long friend, Philip Sidney, to Shrewsbury school. He matriculated at Jesus College, Cambridge, in 1568. Sir Henry Sidney, president of Wales, gave him in 1576 a post connected with the court of the Marches, but he resigned it in 1577 to go to court with Philip Sidney. Young Greville became a great favourite with Queen Elizabeth, who treated him with less than her usual caprice, but he was more than once disgraced for leaving the country against her wishes. Philip Sidney, Sir Edward Dyer and Greville were members of the "Areopagus," the literary clique which, under the leadership of Gabriel Harvey, supported the introduction of classical metres into English verse. Sidney and Greville arranged to sail with Sir Francis Drake in 1585 in his expedition against the Spanish West Indies, but Elizabeth peremptorily forbade Drake to take them with him, and also refused Greville's request to be allowed to join Leicester's army in the Netherlands. Philip Sidney, who took part in the campaign, was killed on the 17th of October 1586, and Greville shared with Dyer the legacy of his books, while in his Life of the Renowned Sir Philip Sidney he raised an enduring monument to his friend's memory.

About 1591 Greville served for a short time in Normandy under Henry of Navarre. This was his last experience of war. In 1583 he became secretary to the principality of Wales, and he represented Warwickshire in parliament in 1 592-1 593, 1597, 1601 and 1620. In 1598 he was made treasurer of the navy, and he retained the office through the early years of the reign of James I. In 1614 he became chancellor and under-treasurer of the exchequer, and throughout the reign he was a valued supporter of the king's party, although in 161 5 he advocated the summoning of a parliament. In 1618 he became commissioner of the treasury, and in 1621 he was raised to the peerage with the title of Baron Brooke, a title which had belonged to the family of his paternal grandmother, Elizabeth Willoughby. He received from James I. the grant of Warwick Castle, in the restoration of which he is said to have spent £20,000. He died on the 30th of September 1628 in consequence of a wound inflicted by a servant who was disappointed at not being named in his master's will. Brooke was buried in St Mary's church, Warwick, and on his tomb was inscribed the epitaph he had composed for himself: " Folk Grevill Servant to Queene Elizabeth Conceller to King James Frend to Sir Philip Sidney. Trophaeum Peccati."

A rhyming elegy on Brooke, published in Huth's Inedited Poetical Miscellanies, brings charges of extreme penuriousness against him, but of his generous treatment of contemporary writers there is abundant testimony. His only works published during his lifetime were four poems, one of which is the elegy on Sidney which appeared in The Phoenix Nest (1593), and the Tragedy of Mustapha. A volume of his works appeared in 1633, another of Remains in 1670, and his biography of Sidney in 1652. He wrote two tragedies on the Senecan model, Alaham and Mustapha. The scene of Alaham is laid in Ormuz. The development of the piece fully bears out the gloom of the prologue, in which the ghost of a former king of Ormuz reveals the magnitude of the curse about to descend on the doomed family. The theme of Mustapha is borrowed from Madeleine de Scudery's Ibrahim ou I'illustre Bassa, and turns on the am- bition of the sultana Rossa. The choruses of these plays are really philosophical dissertations, and the connexion with the rest of the drama is often very slight. In Mustapha, for instance^ the third chorus is a dialogue between Time and Eternity, while the fifth consists of an invective against the evils of super- stition, followed by a chorus of priests that does nothing to dispel

the impression of scepticism contained- in the first part. He tells us himself that the tragedies were not intended for the stage. Charles Lamb says they should rather be called political treatises. Of Brooke Lamb says, " He is nine parts Machiavel and Tacitus, for one of Sophocles and Seneca. . . . Whether we look into his plays or his most passionate love-poems, we shall find all frozen and made rigid with intellect." He goes on to speak of the obscurity of expression that runs through all Brooke's poetry, an obscurity which is, however, due more to the intensity and subtlety of the thought than to any lack of mere verbal lucidity.

It is by his biography of Sidney that Fulke Greville is best known. The full title expresses the scope of the work. It runs: The Life of the Renowned Sr. Philip Sidney. With the true Interest of England as it then stood in relation to all Forrain Princes: And particularly for suppressing the power of Spain Stated by Him.' His principall Actions, Counsels, Designes, and Death. Together with a short account of the Maximes and Policies used by Queen Elizabeth in her Government. He includes some autobiographical matter in what amounts to a treatise on government. He had intended to write a history of England under the Tudors, but Robert Cecil refused him access to the necessary state papers.

Brooke left no sons, and his barony passed to his cousin, Robert Greville (c. 1608-1643), who thus became 2nd Lord Brooke. This nobleman was imprisoned by Charles I. at York in 1639 for refusing to take the oath to fight for the king, and soon became an active member of the parliamentary party; taking part in the Civil War he defeated the Royalists in a skirmish at Kineton in August 1642. He was soon given a command in the midland counties, and having seized Lichfield he was killed there on the 2nd of March 1643. Brooke, who is eulogized as a friend of toleration by Milton, wrote on philo- sophical, theological and current political topics. In 1746 his descendant, Francis Greville, the 8th baron (1719-1773), was created earl of Warwick, a title still in his family.

Dr A. B. Grosart edited the complete works of Fulke Greville for the Fuller Worthies Library in 1870, and made a small selection, published in the Elizabethan Library (1 894) . Besides the works above mentioned, the volumes include Poems of Monarchy, A Treatise of Religion, A Treatie of Humane Learning, An Inquisition upon Fame and Honour, A Treatie of Wanes, Caelica in CX Sonnets, a collection of lyrics in various forms, a letter to an " Honourable Lady," a letter to Grevill Varney in France, and a short speech delivered onbehalf of Francis Bacon, some minor poems, and an

introduction includ- ing some of the author's letters. The life of Sidney was reprinted by Sir S. Egerton Brydges in 18 16; and with an introduction by N. Smith in the "Tudor and Stuart Library" in 1907; Caelica was reprinted in M.F. Crow's" Elizabethan Sonnet Cycles " in 1898. See also an essay in Mrs. C. C. Stopes's Shakespeare s Warwickshire Contemporaries (1907).

BROOKE, HENRY (c. 1 703-1 783), Irish author, son of William Brooke, rector of Killmkere r Co. Cavan, was born at Rantavan in the same county, about 1703. His mother was a daughter of Simon Digby, bishop of Elphin. Dr Thomas Sheridan was one of his schoolmasters, and he was entered at Trinity College, Dublin, in 1720; in 1724 he was sent to London to study law. He married his cousin and ward, Catherine Meares, before she was fourteen. Returning to London he published a philosophical poem in six books entitled Universal Beauty (1735). He attached himself to the party of the prince of Wales, and took a small house at Twickenham near to Alexander Pope. In 1738 he translated the first and second books of Tasso's Gerusalemme tiberata, and in the next year he produced a tragedy, Gustavas Vasa, the Deliverer of his Country. This play had been rehearsed for five weeks at Drury Lane, but at the last moment the per- formance was forbidden. The reason of this prohibition was a supposed portrait of Sir Robert Walpole in the part of Trollio. In any case the spirit of fervent patriotism which pervaded the play was probably disliked by the government. The piece was printed and sold largely, being afterwards put on the Irish stage under the title of The Patriot. This affair provoked a satirical pamphlet from. Samuel Johnson, entitled " A Complete Vindication of the Licensers of the Stage from the malicious and

scandalous Aspersions of Mr Brooke " (1739). His wife fearecf that his connexion with the opposition was imprudent, and induced him to return to Ireland. He interested himself in Irish history and literature, but a projected collection of Irish stories and a history of Ireland from the earliest times were abandoned in consequence of disputes about the ownership of the materials. During the Jacobite rebellion of 1745 Brooke issued his Farmer's Six Letters to the Protestants of Ireland (collected 1746) the form of which was suggested by Swift's Drapier's Letters. For this service he received from the govern- ment the post of barrack-master at Mullingar, which he held till his death. He wrote other pamphlets on the Protestant side, and was secretary to an association for promoting projects of national utility. About 1760 he entered into negotiations with leading Roman Catholics, and in 1761 he wrote a pamphlet advocating alleviation of the penal laws against them. He is said to

have been the first editor of the Freeman's Journal, established at Dublin in 1763. Meanwhile he had been obliged to mortgage his property in Cavan, and had removed to Co. Kildare. Subsequently a bequest from Colonel Robert Brooke enabled him to purchase an estate near his old home, and he spent large sums in attempting to reclaim the waste-land. His best-known work is the novel entitled The Fool of Quality; or the History of Henry Earl of Moreland, the first part of which was published in 1765; and the fifth and last in 1770. The characters of this book, which relates the education of an ideal nobleman by an ideal merchant-prince, are gifted with a " passionate and tearful sensibility," and reflect the real humour and tenderness of the writer. Brooke's religious and philanthropic temper recommended the book to John Wesley, who edited (1780) an abridged edition, and to Charles Kingsley, who pub- lished it with a eulogistic notice in 1859. Brooke had a large family, but only two children survived him. His wife's death seriously affected him, and he died at Dublin in a state of mental infirmity on the 10th of October 1783.

His daughter, Charlotte Brooke, published The Poetical Works of Henry Brooke in 1792, but was able to supply very little biographical material. Other sources for Brooke's biography are C. H. Wilson, Brookiana (2 vols., 1804), and a biographical preface by E. A. Baker prefixed to a new edition (1906) of The Fool of Quality. Brooke's other works include several tragedies, only some of which were actually staged. He also wrote: Jack the Giant Queller (1748), an operatic satire, the repetition of which was forbidden on account of its political allusions; " Constantia, or the Man of Lawe's Tale " (1741), contributed to George Ogle's Canterbury Tales modernized; Juliet Grenville; or the History of the Human Heart (1773), a novel; and some fables contributed to Edward Moore's Fables for the Female Sex (1744).

BROOKE, SIR JAMES (1803-1868), English soldier, traveller and raja of Sarawak, was born at Coombe Grove near Bath, on the 29th of April 1803. His father, a member of the civil service of the East India Company, had long lived in Bengal. His mother was a woman of superior mind, and to her care he owed his careful early training. He received the ordinary school education, entered the service of the East India Company, and was sent out to India about 1825. On the outbreak of the Burmese War he was despatched with his regiment to the valley of the Brahmaputra; and, being dangerously wounded in an engagement near Rungpore,was compelled to return home (1826). After his recovery he travelled on the continent before going to India, and circumstances led him soon after to leave the service of

the company. In 1830 he made a voyage to China, and during his passage among the islands of the Indian Archipelago, so rich in natural beauty, magnificence and fertility, but occupied by a population of savage tribes, continually at war with each other, and carrying on a system of piracy on a vast scale and with relentless ferocity, he conceived the great design of rescuing them from barbarism and bringing them within the pale of civilization. His purpose was confirmed by observations made during a second visit to China, and on his return to England he applied him- self in earnest to making the necessary preparations. Having succeeded on the death of his father to a large property, he bought and equipped a yacht, the " Royalist," of 140 tons burden, and for three years tested its capacities and trained his crew of

twenty men, chiefly in the Mediterranean. At length, on the 27th of October 1838, he sailed from the Thames on his great adventure. On reaching Borneo, after various delays, he found the raja Muda Hassim, uncle of the reigning sultan, engaged in war in the province of Sarawak with several of the Dyak tribes, who had revolted against the sultan. He offered his aid to the raja; and with his crew, and some Javanese who had joined them, he took part in a battle with the insurgents, and they were defeated. For his services the title of raja of Sarawak was conferred on him by Muda Hassim , the former raja being deprived in his favour. It was, however, some time before the sultan could be induced to confirm his title (September 1841). During the next five years Raja Brooke was engaged in establishing his power, in making just reforms in administration, preparing a code of laws and introducing just and humane modes of dealing with the degraded subjects of his rule. But»this was not all. He looked forward to the development of commerce as the most effective means of putting an end to the worst evils that afflicted the archipelago; and in order to make this possible, the way must first be cleared by the suppression, or a considerable diminution, of the prevailing piracy, which was not only a curse to the savage tribes engaged in it, but a standing danger to European and American traders in those seas. Various expedi- tions were therefore organized and sent out against the marauders, Dyaks and Malays, and sometimes even Arabs. Captain (after- wards Admiral Sir Harry) Keppel, and other commanders of British ships of war, received permission to co-operate with Raja Brooke in these expeditions. The pirates were attacked in their strongholds, they fought desperately, and the

slaughter was immense. Negotiations with the chiefs had been tried, and tried in vain. The capital of the sultan of Borneo was bombarded and stormed, and the sultan with his army routed. He was, however, soon after restored to his dominion. So large was the number of natives, pirates and others, slain in these expeditions, that the " head-money " awarded by the British government to those who had taken part in them amounted to no less than £20,000. In October 1847 Raja Brooke returned to England, where he was well received by the government; and the corporation of London conferred on him the freedom of the city. The island of Labuan, with its dependencies, having been acquired by purchase from the sultan of Borneo, was erected into a British colony, and Raja Brooke was appointed governor and commander-in-chief. He was also named consul-general in Borneo. These appointments had been made before his arrival in England. The university of Oxford conferred on him the honorary degree of D.C.L., and in 1848 he was created K.C.B. He soon after returned to Sarawak, and was carried thither by a British man-of-war. In the summer of 1849 he led an expedi- tion against the Seribas and Sakuran Dyaks, who still persisted in their piratical practices and refused to submit to British authority. Their defeat and wholesale slaughter was a matter of course. At the time of this engagement Sir James Brooke was lying ill with dysentery. He visited twice the capital of the sultan of Sala, and concluded a treaty with him, which had for one of its objects the expulsion of the sea-gypsies and other tribes from his dominions. In 1851 grave charges with respect to the operations in Borneo were brought against Sir James Brooke in the House of Commons by Joseph Hume and other members, especially as to the " head-money " received. To meet these accusations, and to vindicate his proceedings, he came to England. The evidence adduced was so conflicting that the matter was at length referred to a royal commission, to sit at Singapore. As the result of its investigation the charges were declared to be " not proven." Sir James, however, was soon after deprived of the governorship of Labuan, and the head-money was abolished. In 1867 his house in Sarawak was attacked and burnt by Chinese pirates, and he had to fly from the capital, Kuching. With a small force he attacked the Chinese, recovered the town, made a great slaughter, of them, and drove away the rest. In the following year he came to England, and remained there for three years. During this time he was attacked by paralysis, a public subscription was raised, and an estate

in Devonshire was bought and presented to him. He made two more visits to Sarawak, and on each occasion had a rebellion to suppress, He spent his last days on his estate at Burrator in Devonshire, and

died there, on the nth of June 1868, being succeeded as raja of Sarawak by his nephew. Sir James Brooke was a man of the highest personal character, and he displayed rare courage both in his conflicts in the East and under the charges advanced against him in England.

His Private Letters (1838 to 1853) were published in 1853. Portions of his Journal were edited by Captains Munday and Keppel. (See also Sarawak.)

BROOKE, STOPFORD AUGUSTUS (1832-), English divine and man of letters, born at Letterkenny, Donegal, Ireland, in 1832, was educated at Trinity College, Dublin. He was ordained in the Church of England in 1857, and held various charges in London. From 1863 to 1865 he was chaplain to the empress Frederick in Berlin, and in 1872 he became chaplain' in ordinary to Queen Victoria. But in 1880 he seceded from the Church, being no longer able to accept its leading dogmas, and officiated as a Unitarian minister for some years at Bedford chapel, Bloomsbury. Bedford chapel was pulled down about 1894, and from that time he had no church of his own, but his eloquence and powerful religious personality continued to make themselves felt among a wide circle. A man of independent means, he was always keenly interested in literature and art, and a fine critic of both. He published in 1865 his Life and Letters of F. W. Robertson (of Brighton), and in 1876 wrote ah admirable primer of English Literature (new and revised ed., 1900), followed in 1892 by The History of Early English Literature (2 vols., 1892) down to the accession of Alfred, and English Literature from the Beginnings to the Norman Conquest (1898). His other works include various volumes of sermons; Poems (1888); Dove Cottage (1890); Theolegy in the English Poets — • Cowper, Coleridge, Wordsworth, Burns (1874); Tennyson, his Art and Relation to Modem Life (1894); The Poetry of Robert Browning (1902); On Ten Plays of Shakespeare (1905ˆ; and The Life Superlative (1906).

BROOK FARM, the name applied to a tract of land in West Roxbury, Massachusetts, on which in 1841-1847ˆ communistic experiment was unsuccessfully tried. The experiment was one of the practical manifestations of the spirit of " Trans cendentalism," in New England, though many df the more prominent transcendentalists took no direct part in it. The project was originated by George Ripley, who also virtually directed it throughout. In his words it was intended "to insure a more natural union between intellectual and manual labour than now exists ; to combine the thinker and the worker* as far as possible, in the same individual; to guarantee the highest mental*

freedom by providing all with labour adapted to their tastes and talents, and securing to them the fruits of their industry; to do away with the necessity of menial services by opening the benefits of education and the profits of labour to all; and thus to prepare a society of liberal, intelligent and cultivated persons whose relations with each other would permit a more simple and wholesome life than can be led amidst the pressure of our competitive institutions." In short, its aim was to bring about the best conditions for an ideal civilization, reducing to a minimum the labour necessary for mere existence, and by this and by the simplicity of its social machinery saving the 'maximum of time for mental and spiritual education and development. At a time when Ralph Waldo Emerson could write to Thomas Carlyle, " We are all a little wild here with numberless projects of social reform; not a reading man but has a draft of a new community in his waistcoat pocket," — the Brook Farm project certainly did not appear as impossible a scheme as many others that were in the air. At all events it enlisted the co-operation of men whose subsequent careers show them to have been something more than visionaries. The association bought a tract of land about 10 m. from Boston, and' in the summer of 1841 began its enterprise with about twenty members. In September the " Brook Farm Institute of Agri- culture and Education " was formally organized, the members

signing the Articles of Association and forming an unincorporated joint-stock company. The farm was assiduously, if not very skilfully, cultivated, and other industries were established — most of the members paying by labour for their board — but nearly all of the income, and sometimes all of it, was derived from the school, which deservedly took high rank and attracted many pupils. Among these were included George William Curtis and his brother James Burrill Curtis, Father Isaac Thomas Hecker (1810-1888), General Francis C. Barlow (1834-1806), who as attorney-general of New York in 1871-1873 took a leading part in the prosecution of the " Tweed Ring." For three years the undertaking went on quietly and simply, subject to few outward troubles other than financial, the number of associates increasing to seventy or eighty. It was during this period that Nathaniel Hawthorne had his short experience of Brook Farm, of which so many suggestions appear in the Blithe- dale Romance, though his preface to later editions effectually disposed of the idea — which gave him great pain — that he had either drawn his characters from persons there, or had meant to give any actual description of

the colony. Emerson refused, in a kind and characteristic letter, to join the undertaking, and though he afterwards wrote of Brook Farm with not uncharitable humour as " a perpetual picnic, a French Revolution in small, an age of reason in a patty-pan," among its founders were many of his near friends. In 1844 the growing need of a more scientific organization, and the influence which F. M. C. Fourier's doctrines, as modified by Albert Brisbane (1800-1800), had gained in the minds of Ripley and many of his associates, combined to change the whole plan of the community. It was transformed, with the strong approval of all its chief members and the consent of the rest, into a Fourierist "phalanx " in 1845. There was an accession of new members, a momentary increase of prosperity, a brilliant new undertaking in the publication of a Weekly journal, the Harbinger, in which Ripley, Charles A. Dana, Francis G. Shaw and John S. Dwight were the chief writers, and to which James Russell Lowell, J. G. Whittier, George William Curtis, Parke Godwin, T. W. Higginson, Horace Greeley and many more now and then contributed. But the individuality of the old Brook Farm was gone. The association was not rescued even from financial troubles by the change. With increasing difficulty it kept on till the spring of 1846, when a fire which destroyed its nearly completed " phalanstery " brought losses which caused, or certainly gave the final ostensible reason for, its dissolution. The experiment was abandoned in the autumn of 1847. Besides Ripley and Hawthorne, the principal members of the community were Charles A. Dana, John S. Dwight, Minot Pratt (c. 1805-1878), the head farmer, who, like George Partridge Bradford (1808-1890), left in 1845, an d Warren Burton (1810-1866) a preacher and, later, a writer on educational subjects. Indirectly connected with the experiment, also, as visitors for longer or shorter periods but never as regular members, were Emerson, Amos Bronson Alcott, Orestes A. Brownson, Theodore Parker and William Henry Channing, Margaret Fuller and Elizabeth Palmer Peabody. The estate itself, after passing through various hands, came in 1870 into the possession of the " Association of the Evangelical Lutheran Church for Works of Mercy," which established here an orphan- age, known as the " Martin Luther Orphan Home."

The best account of Brook Farm is Lindsay Swift's Brook Farm, Its Members, Scholars and Visitors (New York, 1900). Brook Farm: Historic and Personal Memoirs (Boston, 1894), is by Dr J. T. Codman, one of the pupils in the school. See also Morris Hillquit's History of Socialism in the United States (New York, 1903). (E. L. B.)

BROOKITE, one of the three modifications in which titanium dioxide

(Ti0 2) occurs in nature; the other minerals with the same chemical composition, but with different physical and crystallographic characters, being rutile (q.v.) and anatase (q.v.). The two latter are tetragonal in crystallization, whilst brookite is orthorhombic. The name was given by A. Levy in 1825 in honour of the English mineralogist H. J. Brooke (1 771-1857). Two types of brookite crystals may be distinguished. The commoner type of crystals are thin and tabular, and often terminated by numerous small .and brilliant faces (fig. 1) ; the faces of the

orthopinacoid (a) and of the prisms (m, I) are vertically striated. These crystals are of a rich reddish-brown colour and are often translucent. Crystals of the second type have the appearance of six-sided bipyramids (fig. 2) owing to the equal development of the prism m {110} and the pyramid e {122} ; these crystals are black and opaque, and constitute the variety known as arkansite. The lustre of brookite is metallic-adamantine. There is no distinct cleavage (rutile and anatase have cleavages); hardness ; sp. gr. 4-0. The optical characters are interesting: the

Fig. 1.

Fig. 2.

optic axes for red and for blue light lie in planes at right angles to each other, whilst for yellow-green light the crystals are uniaxial. The acute bisectrix of the optic axes is perpendicular to the orthopinacoid (a) for all colours, so that this phenomenon of the crossing of the optic axial planes may be readily observed in the thin tabular crystals of the first-mentioned type.

Brookite occurs only as crystals, never in compact masses, and is usually associated with either anatase or rutile. The crystals are found attached to the walls of cavities in decom- posed igneous rocks and crystalline schists; it is also found as minute isolated crystals in many sedimentary rocks. The best- known locality is Fronolen near Tremadoc in North Wales, where crystals of the thin tabular habit occur with crystallized quartz, albite and anatase on the walls of crevices in diabase. Similar crystals of relatively large size are found attached to gneiss at several places in the Swiss and Tirolese Alps. Thicker crystals of prismatic, rather than tabular, habit and of a rich red colour combined with considerable transparency and brill- iancy are found in the gold-washings of the Sanarka river in the southern Urals. The arkansite variety occurs with rutile in the elaeolite-syenite of Magnet Cove in Hot Spring county, Arkansas. Minute crystals of

brookite have been detected with anatase and rutile in the iron-ore of Cleveland in Yorkshire.

Crystals of brookite, as well as of anatase and rutile, have been prepared artificially by the interaction of steam and titanium fluoride, the particular modification of titanium dioxide which results depending on the temperature at which the reaction takes place. Brookite is liable to become altered to rutile : aggregates of rutile needles with the form of brookite (arkansite) are not uncommon at Magnet Cove, Arkansas. (L. J. S.)

BROOKLIME, known botanically as Veronica Beccabunga (natural order Scrophulariaceae), a succulent herb growing on margins of brooks and ditches in the British Isles, and a native of Europe, north Africa and north and western Asia. It has smooth spreading branches, blunt oblong leaves and small bright blue or pink flowers.

BROOKLINE, a township of Norfolk county, Massachusetts, U.S.A., about 3 m. S.W. of Boston, lying immediately S. of the Back Bay district. Pop. (1890) 12,103; (1900) JQˆS, of whom 6536 were foreign-born; (1910, census) 27,792. The area of the township in 1906 was 6-75 sq. m. It is served by the Boston & Albany railway, and is connected with Boston by an electric line. Brookline is the wealthiest of the residential suburbs of Boston; and contains a number of beautiful estates and homes. Within its limits are the villages of Cottage Farm, Longwood, and Reservoir Station,or Chestnut Hill — the Chestnut Hill reservoir is just beyond the township. Brookline has an excellent public library. At Clyde Park are the grounds and club-house of the Boston Country Club. Brookline has long been regarded as a model city suburb. It is connected with

Boston Common by boulevards of the Metropolitan Park System. The first settlement was probably made about 1635, and it was called Muddy River until 1705, when it was created a township under the name of Brookline. Up to 1 793 it belonged to Suffolk county, of which Boston is a part, and since that time it has belonged to Norfolk county; but Boston has in its growth almost surrounded it, and because of its great wealth there has been a long struggle for and against its merger in Boston. Frederick Law Olmsted, the famous landscape gardener, had his home in Brookline, where there are

various examples of his work.

See H. F. Woods, Historical Sketches of Brookline (Boston, 1874) ; C. K. Bolton, Brookline, The History of a Favored Town (Brookline, 1897) ; and J. W. Denehy, History of Brookline, 1630-1906 (Allston, Mass., 1907).

BROOKLYN, formerly a city of New York state, U.S.A., but since 1898 a borough of New York City (?.».), situated at the S.W. extremity of Long Island. It is conterminous with Kings county, and is bounded N. by the borough of Queens, from which it is in part separated by Newtown Creek; E. by the borough of Queens and Jamaica Bay; S. by the Atlantic Ocean; W. by Gravesend Bay, the Narrows, Upper New York Bay and East river, which separate it from Staten Island, Jersey City and the borough of Manhattan. It has a water- front of 33 m. and extends over an area of 77-62 sq. m. Pop. (i860) 279,122; (1870) 419,921; (1880) 599,495; (189°, then Kings county) 838,547; (1900) 1,166,582; (1905, state census) 1,358,686; (1910) 1,634,351. In 1900 only 310,501, or 26-6%, were native-born of native white parents; 355, 697 were foreign-born, 18,367 were negroes, and 1206 were Chinese. Out of 332,715 males of voting age (21 years and over), 15,415 were illiterate (unable to write), and of these 14,159 were foreign- born.

Brooklyn is connected with Manhattan by three bridges across the East river — the lowest, known as the Brooklyn, opened in 1883; another, known as the Williamsburg or East River bridge, opened in 1903; and a third, the Manhattan, was opened in 1909. And a tunnel directly across from the south terminus of Manhattan was completed in 1907. Ferries ply at frequent intervals between numerous points on its west water- front and points in Manhattan; there is also ferry connexion with Jersey City. Brooklyn is served directly by the Long Island railway; by about fifty regular coast- wise and trans- Atlantic steamship lines; and by elevated or surface car lines on a large number of its streets. Subway lines, begun in 1904, connect Brooklyn with the subway system of Manhattan.

Streets and Buildings. — The surface of Brooklyn in the west section, from the lower course of the East river to Gravesend Bay, varies in elevation from a few inches to nearly 200 ft. above sea-level, the highest points being in Prospect Park; but steep street grades even in this section are rare, and elsewhere the surface is either only slightly undulating or, as in the east and south, flat. Most of the streets are from 60 to 100 ft. wide. The principal business thoroughfare is Fulton Street, which begins at Fulton ferry nearly under the Brooklyn

bridge, runs to City Hall Park, and thence across the north central section of the borough. In the City Hall Park are the old city hall (now the borough hall), the hall of records, and the county court-house. Two blocks to the north (on Washington Street) is the post-office, a fine granite Romanesque building. The manufacturing and shipping districts are mostly along the west water-front. Here, on Wallabout Bay at the bend of the East river to the westward, is the New York navy yard, the principal navy yard of the United States, established in 1801, and commonly but in- correctly called the Brooklyn navy yard. It occupies altogether about 144 acres, contains a trophy park, parade grounds, the United States Naval Lyceum (founded 1833), officers' quarters, barracks, and three large dry docks (respectively 564, 465 and 307 ft. long), foundries and machine shops. A naval hospital (having accommodation for about 500 patients) to the east is separated from the navy yard by the largest and most interesting of Brooklyn's markets, the Wallabout (about 45 acres). The

buildings of this market are Dutch in style and have a quaint clock tower. A little to the north of the navy yard are immense refineries of sugar. About 2 m. to the south, opposite Governor's Island, is the Atlantic Basin of 40 acres, with a wharfage of about 3 m. and brick and granite warehouses used largely for the storage of grain. A little farther south, on Gowanus Bay, is another basin, the Erie, of 161 acres, protected by a breakwater 1 m. in length, occupied by piers, warehouses, lumber depots and some of the largest dry docks in the United States; it also pro- vides protection during winter to hundreds of canal boats. In this vicinity, too, are several yards for building yachts, launches and other boats. At the lower end of the west water-front, facing the Narrows, are a United States reservation and the harbour defences of Fort Hamilton.

For a considerable portion of its inhabitants Brooklyn is only a place of residence, their business interests being in the borough of Manhattan; hence Brooklyn has been called the " city of homes " and the " dormitory of New York." Residential districts with social lines more or less distinctly drawn are numerous. The oldest is that on Brooklyn (or Columbia) Heights, west of City Hall Park, rising abruptly from the river to a height of from 70 to 100 ft., and commanding a delightful view of the harbour. Here are hotels, large apartment-houses, many private residences and a number of clubs, including the Brooklyn, the Crescent, the Hamilton, the Jefferson and the Germania. On Park Slope, immediately west of Prospect Park, and St Mark's Avenue, in another part of the borough, are also attractive residential districts. The south shore of the borough has

various summer pleasure resorts, of which Coney Island is the most popular.

Parks and Cemeteries. — One of the most attractive features of Brooklyn is Prospect Park, occupying about 516 acres of high ground in the west central part of the borough, on a site made memorable by the battle of Long Island. Its large variety of trees and shrubs, including oak, hickory, elm, maple, chestnut, birch, ash, cedar, pine, larch and sumach, its flower gardens, a palm house, ponds, a lake of 61 acres for boating, skating and curling, a parade ground of 40 acres for other athletic sports, a menagerie, and numerous pieces of statuary, are among its objects of interest or beauty. From the southern entrance to this park, Ocean Parkway, a fine boulevard, 210 ft. wide and planted with six rows of trees, extends 55 m. south to Seaside Park (15 acres), on Brighton Beach, Coney Island. From the same entrance Fort Hamilton Parkway extends 4% m. south-east to Fort Hamilton, and to D}'ker Beach Park (144 acres) which face the lower end of the Narrows; and from Fort Hamilton, Shore Road and Bay Ridge Parkway extend north 4j m. to Bay Ridge Park overlooking Upper New York Bay. From the northern entrance to Prospect Park, Eastern Parkway, another fine boulevard, 200 ft. wide, extends east 25 m. to a point from which Rockaway Parkway runs 3 m. south-east to Canarsie Beach Park (40 acres), on Jamaica Bay; and extensions of Eastern Parkway run north-east through Highland Park (55 acres), to Brooklyn Forest Park (535 acres, on the border of the borough of Queens), abounding in beautiful trees and delight- ful views. Half a mile east of the borough hall is Washington or Fort Greene Park (30 acres), laid out on the site of earth- works (known as Fort Greene) constructed during the War of Independence, and commanding good views.

Greenwood cemetery, one of the most beautiful cemeteries in the United States, § m. east of Prospect Park, occupies about 478 acres. Among the principal monuments are those erected to Roger Williams, S.F.B. Morse, Elias Howe, De Witt Clinton (colossal bronze statue by Henry Kirke Brown), Henry Ward Beecher, Peter Cooper, Horace Greeley, Henry Bergh, Henry George and James Gordon Bennett. At the main entrance is a beautiful gateway (of elaborately wrought brown stone), 142 ft. wide and having a central tower 100 ft. in height. Along the north-east border of the borough are Cypress Hills cemetery (400 acres), adjoining Brooklyn Forest Park, and the cemetery of the Evergreens (about 375 acres), adjoining Highland Park and partly in the borough of Queens.

In the plaza at the northern entrance to Prospect Park is a soldiers' and sailors' memorial arch (80 ft. in width and 71 ft. in height), adorned with high-reliefs of Lincoln and Grant on horseback (by O'Donovan and Eakins) and with three large bronze groups (by Frederick MacMonnies). Immediately within the park there is a statue (also by MacMonnies) of J. S. T. Stranahan (1808-1898), who did more than any other man for the develop- ment of Brooklyn's system of parks and boulevards. On the slope of Lookout Hill (185 ft.) within the park is a shaft erected in 1895 to the memory of the Maryland soldiers who valiantly defended the rear of the American army at the battle of Long Island. A bronze statue of Abraham Lincoln overlooks the lake. In Fort Greene Park is a monument to the memory of the soldiers who died in the British prison ships during the War of Independence, many of them having been buried in a vault below. Facing the borough hall is a statue in bronze (by J. Q. A. Ward) of Henry Ward Beecher, mounted on a granite pedestal with a figure at one side to commemorate Beecher's sympathy for the slave. A fine bronze statue of Alexander Hamilton (by W. O. Partridge, b. 1861) stands at the entrance of the Hamilton Club in Clinton Street and one of U. S. Grant (also by Partridge) stands at the entrance of the Union League Club in Bedford Avenue.

Education. — The Brooklyn Institute of Arts and Sciences embraces twenty-six departments, of which those of music, philology and the fine arts have each more than 1000 members; the total membership of all departments in 1906 was 5894. The museum building of this institution is in Institute Park, which is separated from Prospect Park on the north-.east by Flatbush Avenue. It contains, besides paintings and statuary, special collections for service in nearly all of the departments; among its purely art collections the most notable is that of J. J. J. Tissot's water-colour drawings, to illustrate the life of Christ. Since 1890 the Institute has received appropriations from the city, but it is maintained chiefly by private contribu- tions. It is the outgrowth of the Apprentices' Library Association, founded in 1824, of which General Lafayette laid the corner-stone on the 4th of July of that year. In 1888 Franklin W. Hooper (b. 185 1), who did much to increase the efficiency of the work Of the Institute, became director. Pratt Institute, founded in 1887 by Charles Pratt (1830-1891), and the residuary legatee of his wife, who died in 1907, is one of the most successful manual and industrial training schools in the country, and its kinder- garten normal is one of the best known in the United States. The Polytechnic Institute, opened in 1855, is a high-grade school of science and liberal arts. Tt has two

general departments, the college of arts and engineering and the preparatory school, Which are conducted independently of one another. In connexion with the college there is provision for graduate study and for night courses, and there are teachers' courses to which women are admitted. The Packer Collegiate Institute, opened as the successor of the Brooklyn Female Academy, in 1854, and en- dowed by Mrs Harriet L. Packer, an institution for women, has primary, preparatory, academic and collegiate departments. Adelphi College, opened in 1896, is for both sexes and gives special attention to normal training; it is the outgrowth of Adelphi Academy, founded in 1869, now the preparatory depart- ment. St Francis' College, opened in 1858, and St John's College, opened in 1870, are institutions maintained by Roman Catholics. Here, too, are the law school of St Lawrence •University, the Long Island Hospital Medical College, with a training school for nurses, the Brooklyn College of Pharmacy and several schools of music. Brooklyn's public schools rank especially high; among them there is a commercial high school and a manual training high school. Among the larger libraries of the borough are the Brooklyn public library, those of the Long Island Historical Society, on Brooklyn Heights, of Pratt ■Institute, and of the King's County Medical Society, and a good law library. The Brooklyn Daily Eagle, which occupies an attractive building near the borough hall, has been a newspaper of strong influence in the community. It was established in 1841 as a Democratic organ, and Walt Whitman was its editor for about a year during its early history.

Brooklyn is well provided with charitable institutions, and has long been known as the " city of churches," probably from the famous clergymen who have lived there. Among them were Henry Ward Beecher, pastor of Plymouth church (Con- gregational) from 1847 to 1887; Lyman Abbott, pastor of the same .church from 1887 to 1898; Thomas De Witt Talmage, pastor of the Brooklyn Tabernacle (Presbyterian) from 1869 to 1894; Richard Salter Storrs (1821-1900), pastor of the church of the Pilgrims (Congregational) from 1846 to 1899; and Theodore L. Cuyler (182 2-1 909), pastor of the Lafayette Avenue Presby- terian church from i860 to 1890.

Manufactures and Commerce. — The borough of Brooklyn is one of the most important manufacturing centres in the United States, most of the factories being located along or near the East river north of the Brooklyn bridge. The total value of the manufactured products in 1890 was $270,823,754 and in 1900, $342,127,124, an increase during the decade of 26-3%. In 1905 the total value of the borough's manufactured product (under the factory system) was $373,462,930, or 15% of the total manufactured product of the

state of New York. Brooklyn's largest manufacturing industry is the refining of sugar, about one-half of the sugar consumed in the United States being refined here; in 1900 the product of the sugar and molasses refining establishments was valued at $77,942,997. Brooklyn is also an important place for the milling of coffee and spices (the 1905 product was valued at $15,274,092), the building of small boats, and the manufacture of foundry and machine shop products, malt liquors, barrels, shoes, chemicals, paints, cordage, twine, and hosiery and other knitted goods. Of its large com- merce, grain is the chief commodity; it is estimated that about four-fifths of that exported from the port of New York is shipped from here, and the borough's grain elevators have an estimated storage capacity of about 20,000,000 bushels.

The water-supply system is owned and operated by the borough; the water is derived from streams flowing southward in the sparsely settled area east of the borough, and also from driven wells in the same region; it is pumped by ten engines at Ridgewood to a reservoir having a capacity of about 300,000,000 gallons, while a part of it is re-pumped to a high service reservoir near the north entrance to Prospect Park for the service of the most elevated part of the borough. Besides this system some towns in the south section recently annexed have their own water-supply.

History. — The first settlement within the present limits of Brooklyn was made in 1636, when some Dutch farmers took up their residence along the shore of Gowanus Bay. About the same time other Dutch farmers founded Flatlands (at first called Amersfoort), on Jamaica Bay, and a few Walloons founded Wallabout, where the navy yard now is. In 1642 a ferry was established across East river from the present foot of Fulton Street, and a settlement grew up here which was known as The Ferry. The next year Lady Deborah Moody with some followers from New England founded Gravesend near the southern extremity of the borough. Finally, in the year 1645, a settlement was established near the site of the present borough hall, and was called Breuckelen (also spelled Breucklyn, Breuck- land, Brucklyn, Broucklyn, Brookland and Brookline) until about the close of the 18th century, when its orthography became fixed as Brooklyn. The name, Breuckelen, meaning marsh land, seems to have been suggested by the resemblance of the situation of the settlement to that of Breuckelen, Holland. Of the other towns which were later united to form the borough, New Utrecht was settled about 1650, Flatbush (at first called. Medwoud, Midwout or Midwood) about 1651, Bushwick and Williamsburg in 1660. All of the settlements were for a long time chiefly agricultural communities. Flatbush was for a few

years immedi- ately preceding 1675 the largest; but Brooklyn was the first (1646) to have a township organization, and within a few years Wallabout, Gowanus, The Ferry, and Bedford — a new settlement to the south-east of Wallabout, established in 1662 — were in- cluded within its jurisdiction. In 1654 the municipal privileges of Brooklyn as well as of two of the other towns were enlarged.

but with Dutch rule there was general discontent, and when, in 1664, Colonel Richard Nicolls came to overthrow it and establish English rule these towns offered no resistance. Nicolls erected the region composed of Long Island, Staten Island and Westchester into a county under the name of Yorkshire, and divided it into three ridings, of which Staten Island, the present county of Kings, and the town of Newtown in Queens, formed one. In 1683 the present county of Kings was organized by the first : jcolonial legislature. During the War of Independence the chief event was the battle of Long Island, fought on the 27th of August 1776. In 1 816, when the population of the town of Brooklyn was about 4500, its most populous section was in- corporated as a village; and in 1834, when its population had increased to 23,310, the whole town was incorporated as a city. By 1850 its population had increased to 138,882. In 1855 Williamsburg, which had been incorporated as a city in 1851, and the town of Bushwick were annexed. Other annexations followed until the city of Brooklyn was conterminous with Kings county; and finally, on the 1st of January 1898, the city of Brooklyn became a borough of New York City.

See S. M. Ostrander, A History of Brooklyn and Kings County (Brooklyn, 1894); H. W. B. Howard (ed.), History of the City of Brooklyn (Brooklyn, 1893) ; and H. Putnam, Brooklyn, in L. P. Powell's Historic Towns of the Middle States (New York, 1899).

BROOKS, CHARLES WILLIAM SHIRLEY (1816-1874), English novelist, playwright and journalist, was born on the 29th of April 1816. He was the son of a London architect, and was articled in 1832 to a solicitor for five years. He became parliamentary reporter for the Morning Chronicle, and in 1853 was sent by that paper as special commissioner to investigate the subject of labour and the poor in southern Russia, Egypt and Syria; the result of his inquiries appearing first in the form of letters to the editor, and afterwards in a separate volume, ; under the title of The Russians of the South

(1856). He wrote, sometimes alone, sometimes in conjunction with others, slight dramatic pieces of the burlesque kind, among which- may be mentioned Anything for a Change (1848), The Daughter of the Stars (1850). Brooks was for many years on the staff of the Illustrated London News, contributing the weekly article on the politics of the day, and the two series entitled " Nothing in the ! Papers " and " By the Way." In 185 1 he joined the staff of Punch, and noteworthy among his numerous contributions were the weekly satirical summaries of the parliamentary debates, entitled " The Essence of Parliament." His long service as ! newspaper reporter gave him special aptitude for this playful parody. In 1870, on the death of Mark Lemon, " dear old Shirley," as his friends used to call him, was chosen to succeed to the editorial chair. His first novel, Aspen Court, was published in 1 8 5 s . It was followed by The Gordian Knot (1 860) , The Silver Cord (1861) and Sooner or Later (1868). Brooks was a great letter-writer, deliberately cultivating the practice as an art, and imitating the style in vogue before newspapers and telegraphs suppressed private letters. He had an astonishing memory, was brilliant as an epigrammatist, was a great reader and a most genial companion. He was in his element with a group of children, reading to them, sharing their fun and always remembering the birthdays. He died in London, on the 23rd of February 1874, and was buried near his friends Leech and Thackeray, in Kensal Green cemetery.

See G. S. Layard, A Great " Punch " Editor: Being the Life, Letters and Diaries of Shirley Brooks (1907.)

BROOKS, PHILLIPS (1835-1893), American clergyman and author, was born in Boston, Mass., on the 13th of December 1835. Through his father, William Gray Brooks, he was de- scended from the Rev. John Cotton; through his mother, Mary Ann Phillips, a woman of rare force of character and religious faith, he was a great-grandson of the founder of Phillips Academy, Andover, Mass. Of the six sons, four — Phillips, Frederic, Arthur and John Cotton — entered the ministry of the Protestant Episcopal Church. Phillips Brooks prepared for college at the Boston Latin school and graduated at Harvard in 1S55. After a short and unsuccessful experience as a teacher

in the Boston Latin school, he began in 1856 to study for the ministry of the Protestant Episcopal Church in the theological seminary at Alexandria, Virginia. In 1859 he graduated, was ordained deacon by Bishop William Meade of Virginia, and became rector of the church of the Advent, Philadelphia. In i860 he was

ordained priest, and in 1862 became rector of the church of the Holy Trinity, Philadelphia, where he remained seven years, gaining an increasing name as preacher and patriot. Endowed by inheritance with a rich religious character, evangelical traditions, ethical temper and strong intellect, he developed, by wide reading in ancient and modern literature, a personality and attitude of mind which appealed to the character- istic thought and life of the period. With Tennyson, Coleridge, Frederic D. Maurice and F. W. Robertson he was in strong sympathy. During the Civil War he upheld with power the cause of the North and the negro, and his sermon on the death of President Lincoln was an eloquent expression of the character of both men. In 1869 he became rector of Trinity church, Boston. In 1877 the present church was finished, the architect being his friend H. H. Richardson. Here Phillips Brooks preached Sunday after Sunday to great congregations, until he was consecrated bishop of Massachusetts in 1891. In 1886 he declined an election as assistant bishop of Pennsylvania. He was for many years an overseer and preacher of Harvard University, his influence upon the religious life of the university being deep and wide. In 1881 he declined an invitation to be the sole preacher to the university and professor of Christian ethics. On the 30th of April 1891 he was elected sixth bishop of Massachusetts, and on the 14th of October was consecrated to that office in Trinity church, Boston. After a brief but great episcopate of fifteen months, he died, unmarried, on the 23rd of January 1893. Phillips Brooks was a tall, well-proportioned man of fine physique, his height being six feet four inches. In character he was pure, simple, endowed with excellent judgment and a keen sense Of humour, and quick to respond to any call for sympathy. When kindled by his subject it seemed to take possession of him and pour itself out with overwhelming speed .of utterance, with heat and power. Plis sympathy with men of other ways and thought, and with the truth in other ecclesiastical systems gained for him the confidence and affection of men of varied habits of mind and religious traditions, and was thus a great factor in gaining increasing support for the Episcopal Church. As years^went by his influence as a religious leader became unique. The degree of S.T.D. had been conferred upon him by the universities of Harvard (1877), and of Columbia (1887), and the degree of D.D. by the university of Oxford, England (1885). In 1877 he published a course of lectures upon preaching, which he had delivered at the theological school of Yale University, and which are an expression of his own ex- perience. In 1879 appeared the Bohlen Lectures on " The Influence of Jesus." In 1878 he published his first volume of sermons, and from time to time issued other volumes, including Sermons Preached

in English Churches (1883).

In 1001, at New York, was published, in two volumes, Phillips Brooks, Life and Letters, by the Rev. A. V. G. Allen, D. D., professor of ecclesiastical history, Episcopal Theological school, Cambridge, Mass., who in 1907 published at New York, in a single volume, Phillips Brooks, an abbreviation and revision of the earlier biography. (W. L.)

BROOKS'S, a London club in St James's Street. It was founded in 1764 by the dukes of Roxburghe and Portland^ The building had been previously opened as a gaming-house by William Macall (Almack), and afterwards by Brooks, a wine merchant and money-lender, whose name it retained.

BROOM, known botanically as Cytisus, or Sarothamnus, scoparius, a member of the natural order Leguminosae, a shrub found on heaths and commons in the British Isles, and also in Europe (except the north) and temperate Asia. The leaves are small, and the function of carbon-assimilating is shared by the green stems. The bright yellow flowers scatter their pollen by an explosive mechanism; the weight of a bee alighting on the flower causes the keel to split and the pollen to be shot out on to the insect's body. When ripe the black pods explode with a

sudden twisting of the valves and scatter the seeds. The twigs have a bitter and nauseous taste and have long had a popular reputation as a diuretic; the seeds have similar properties.

" Butcher's broom," a very different plant, known botanically as Ruscus aculeatus, is a member of the natural order Liliaceae. It is a small evergreen shrub found in copses and woods, but rare

Cytisus scoparius, Common Broom.

4-

Two-lipped calyx.

Broadly ovate vexillum or

standard. One of the alae or wings of the

corolla. Carina or keel.

5. MonadeLphous stamens.

6. Hairy ovary with the long

style, thickened upwards, and spirally curved.

7. Legume or pod.

in the southern half of England. The stout angular stems bear leaves reduced to small scales, which subtend flattened leaf-like branches (cladodes) with a sharp apex. The small whitish flowers are borne on the face of the cladodes, and are succeeded by a bright red berry.

BROOME, WILLIAM (1680-1745), English scholar and poet, the son of a farmer, was born at Haslington, Cheshire, where he was baptized on the 3rd of May 1689. He was educated at Eton, where he became captain of the school, and at St John's College, Cambridge. He collaborated with John Ozell and William Oldisworth in a translation (17 12) of the Iliad from the French version of Madame Dacier, and he contributed in the same year some verses to Lintot's Miscellany. He was introduced to Pope, who was at that time engaged on his translation of the Iliad . Pope asked Broome to make a digest for him of the notes of Eustathius, the 1 2th-century annotator of Homer. This task Broome executed to Pope's entire satisfaction, refusing any payment. He was rector of Sturston, Norfolk, and his prosperity was further assured by his marriage in 17 16 with a rich widow, Mrs Elizabeth Clarke. When Pope undertook the translation of the Odyssey, he engaged Elijah Fenton and Broome to assist him. Broome's facility in verse had gained for him at college the nickname of " the poet," and he adapted his style very closely to Pope's, He translated the 2nd, 6th, 8th, nth, 12th,

16th, 18th and 23rd books, and practically provided all the notes. He was a vain, talkative man, and did not fail to make known his real share in the translation, of which Pope had given a very misleading account in the " proposals " issued to subscribers. He casually mentioned Broome as his coadjutor, as though his assistance was of an entirely subsidiary character. His influence over Broome was so strong that the latter was induced to write a note at the end of the translation minimizing his own share and implicating Fenton, who, moreover, had not wished his name to appear, in the deception. " If my performance," he said, " has merit either in these [the notes] or in any part of the trans- lation, namely the 6th, nth

and 18th books, it is but just to attribute it to the judgment and care of Mr Pope, by whose hand every sheet was corrected." For the Odyssey Pope received £4500, of which Broome, who had provided a third of the text and the notes, received £570. He had hoped to secure fame from his connexion with Pope, and when he found that Pope had no intention of praising him he complained bitterly of being under- paid. Pope thought that Broome's garrulity had caused the reports which were being circulated to his disadvantage, and un-generously made satirical allusions to him in the Dunciad 1 and the Bathos. After these insults Broome's patience gave way, and there is a gap in his correspondence with Pope, but in 1730 the intercourse was renewed on friendly terms. In 1728 the degree of LL.D. was conferred on him by the university of Cambridge, and he was presented to the rectory of Pulham, Norfolk, and sub- sequently by Charles, 1st Earl Cornwallis, who had been his friend at Cambridge, to two livings, Oakley Magna in Essex, and Eye in Suffolk. He died at Bath on the 16th of November 1745.

Broome was also the author of some translations from Anacreon printed in the Gentleman' s Magazine, and of Poems on Several Occasions (1727). His poems are included in Johnson's and other collections of the British poets. His connexion with Pope is ex-haustively discussed in Elwin and Courthope's edition of Pope's Works (viii. pp. 30-186), where the correspondence between the two is reproduced.

BROOM-RAPE, known botanically as Orobanche, a genus of brown leafless herbs growing attached to the roots of other plants from which they derive their nourishment. The usually stout stem bears brownish scales, and ends in a spike of yellow, reddish-brown or purplish flowers, with a gaping two-lipped corolla. Several species occur in the British Isles; the largest, Orobanche major, is parasitic on roots of shrubby leguminous plants, and has a stout stem 1 to 2 ft. high.

BROSCH, MORITZ (1829-1907), German historian, was born at Prague on the 7th of April 1829, was educated at Prague and Vienna, and became a journalist. Later he devoted himself to historical study, and he died on the 14th of July 1907 at Venice, where he had resided for over thirty years. To the series Geschichte der europaischen Staaten Brosch contributed England 1509-1850 (6 vols., Gotha, 1884-1899), a continuation of the work of J. M. Lappenberg and R. Pauli, and Der Kirchenstaat (Gotha, 1880-1882). He gave further proof of his interest in English history by writing Lord Bolingbroke und die Whigs und Tories seiner Zeit (Frankfort,

1883), and Oliver Cromwell und die puritanische Revolution (Frankfort, 1886). He also wrote Julius II. und die Griindung des Kirchenstaats (Gotha, 1878), while one of his last pieces of work was to contribute a chapter on " The height of the Ottoman power " to vol. iii. of the Cambridge Modern History.

See A. W. Ward in the English Historical Review, vol. xxii. (1907).

BROSELEY, a market town in the municipal borough of Wenlock (q.v.) and the Wellington (Mid) parliamentary division of Shropshire, England, on the right bank of the Severn. It has a station (Ironbridge and Broseley) on the Great Western railway, 158 m. N.W. from London. There is trade in coal, but

1 i. 146, " worthy Settle Banks and Broome." A footnote (1743) explained away the allusion by making it apply to Richard Brome, the disciple of Ben Jonson. Also iii. 332, of which the original rendering was : —

" Hibernian politics, O Swift, thy doom, And Pope's, translating ten whole years with Broome." In the Bathos he was classed with the parrots and the tortoises.

the town is most famous for the manufacture of tobacco-pipes, a long-established industry. Pottery and bricks are also pro- duced, and at Benthall, 1 m. W., are large encaustic tile works. The early name of the town was Burwardesley.

BROSSES, CHARLES DE (1709-1777), French magistrate and scholar, was born at Dijon and studied law with a view to the magistracy. The bent of his mind, however, was towards litera- ture and science, and, after a visit to Italy in 1739 in company with his friend Jean Baptiste de Lacurne de Sainte-Palaye, he published his Leitres sur Vital acluel de la ville souterraine d'Herculee (Dijon, 1750), the first work upon the ruins of Her- culaneum. It was during this Italian tour that he wrote his famous letters on Italy, which remained in MS. till long after his death. In 1760 he published a dissertation, Du culte des dieux fetiches, which was afterwards inserted in the Encyclopidie methodique. At the solicitation of his friend Buffon, he under- took his Histoire des navigations aux terres australes, which was published in 1756, in two vols. 4to, with maps. It was in this work that de Brosses first laid down the geographical

divisions of Australasia and Polynesia, which were afterwards adopted by John Pinkerton and succeeding geographers. He also contri- buted to the EncyclopSdie the articles " Langues," " Musique," " Etymologic." In 1765 appeared his work on the origin of language, Traite de la formation mecanique des langues, the merits of which are recognized by E. B. Tylor in Primitive Culture. De Brosses had been occupied, during a great part of his life, on a translation of Sallust, and in attempting to supply the lost chapters in that celebrated historian. At length in 1777 he published L'Histoire du septieme siecle de la ripublique romaine, 3 vols. 4to, to which is prefixed a learned life of Sallust, reprinted at the commencement of the translation of that historian by Jean Baptiste Dureau de La Malle. These literary occupations did not prevent the author from discharging with ability his official duties as first president of the parliament of Burgundy, nor from carrying on a constant and extensive corre- spondence with the most distinguished literary characters of his time. In 1758 he succeeded the marquis de Caumont in the Academie des Belles-lettres; but when in 1770 he presented himself at the French Academy, his candidature was rejected owing to Voltaire's opposition on personal grounds. Besides the works already mentioned, he wrote several memoirs and dissertations in the collections of the Academy of Inscriptions, and in those of the Academy of Dijon, and he left behind him several MSS., which were unfortunately lost during the Revolu- tion. His letters on Italy were, however, found in MS. in the confiscated library by his son, the emigrS officer Rene de Brosses, and were first published in 1799, in the uncritical edition of Antoine Serieys, under the title of Letlres historiques et critiques. A fresh edition, freed from errors and interpolations, by R. Colomb, with the title L'ltalie il y a cent ans, was issued in 1836; and two subsequent reprints appeared, one edited by Poulet- Malassis, under the title Lettres familieres (1858); the other, a re-impression of Colomb's edition, under that of Le Prisidenl de Brosses en Ilalie (1858).

See H. Mamet, Le President de Brosses, sa vie et ses ouvrages^ (Lille, 1874) ; also Cunisset-Carnot, " La Querelle de Voltaire et du president de Brosses," in the Revue des Deux Mondes (February 15, i"""" v

BROTHER, a male person in his relation to the other children of the same father and mother. " Brother " represents in English the Teutonic branch of a word common to the Indo- European languages, cf. Ger. Bruder, Dutch broeder, Dan. and Swed. broder, &c. In Celtic languages, Gaelic and Irish have brathair, and Welsh brawd; in Greek the word is cbparrip, in Lat. frater, from which come the

Romanic forms, Fr. frere, Ital. fratello; the Span, fray, Port, frei, like the Ital. frate, fra, are only used of " friars." The Span, hermamo and the Port, irmao, the regular words for brother, are from Lat. germanus, born of the same father and mother. The Sanskrit word is bhrdtir, and the ultimate Indo-European root is generally taken to be bhar, to bear (cf. M. H. Ger. barn, Scot, bairn, child, and such words as "birth," "burden"). "Brother" has often been loosely used of kinsmen generally, or for members of the same

tribe; also for quite fictitious relationships, e.g. " blood- brothers," through a sacramental rite of mutual blood-tasting, " foster-brothers," because suckled by the same nurse. Chris- tianity, through the idea of the universal fatherhood of God, conceives all men as brothers; but in a narrower sense " the brethren " are the members of the Church, or, in a narrower still, of a confraternity or " brotherhood " within the Church. This latter idea is reproduced in those fraternal societies, e.g. the Freemasons, the members of which become " brothers "by initia- tion. " Brother " is also used symbolically, as implying equality, by sovereigns in addressing one another, and also by bishops.

BROTHERS, RICHARD (1757-1824), British religious fanatic, was born in Newfoundland on Christmas day, 1757, and educated at Woolwich. He entered the navy and served under Keppel and Rodney. In 1783 he became lieutenant, and was discharged on half-pay. He travelled on the continent, made an unhappy marriage in 1786, and again went to sea. But he felt that the military calling and Christianity were incompatible and aban- doned the former (1 789) . Further scruples as to the oath required on the receipt of his half-pay reduced him to serious pecuniary straits (1791), and he divided his time between the open air and the workhouse, where he developed the idea that he had a special divine commission, and wrote to the king and the parlia- ment to that effect. In 1793 he declared himself the apostle of a new religion, " the nephew of the Almighty, and prince of the Hebrews, appointed to lead them to the land of Canaan." At the end of 1794 he began to print his interpretations of prophecy, his first book being A Revealed Knowledge of the Prophecies and Times. In consequence of prophesying the death of the king and the end of the monarchy, he was arrested for treason in 1795, and confined as a criminal lunatic. His case was, however, brought before parliament by his ardent disciple, Nathaniel Halhed, the orientalist, a member of the House of Commons, and he was removed to a private asylum in Islington. Here he wrote a variety of prophetic pamphlets, which gained him many believers, amongst them William Sharp, the engraver, who afterwards deserted him for

Joanna Southcott. Brothers, how- ever, had announced that on the 19th of November 1795 he was to be" revealed " as prince of the Hebrews and ruler of the world; and when this date passed without any such manifestation, what enthusiasm he had aroused rapidly dwindled, despite the fact that some of his earlier political predictions (e.g. the violent death of Louis XVI.) had been fulfilled. He died in London on the 25th of January 1824, in the house of John Finlayson, who had secured his release, and who afterwards pestered the govern- ment with an enormous claim for Brothers's maintenance. The supporters of the Anglo-Israelite theory claim him as the first writer on their side.

BROTHERS OF COMMON LIFE, a religious community formerly existing in the Catholic Church. Towards the end of his career Gerhard Groot (q.v.) retired to his native town of Deventer, in the province of Overyssel and the diocese of Utrecht, and gathered around him a number of those who had been " converted " by his preaching or wished to place them- selves under his spiritual guidance. With the assistance of Florentius Radewyn, who resigned for the purpose a canonry at Utrecht, he was able to carry out a long-cherished idea of estab- lishing a house wherein devout men might live in community without the monastic vows. The first such community was established at Deventer in the house of Florentius himself (c. 1380); and Thomas a. Kempis, who lived in it from 1392 to 1399, has left a description of the manner of life pursued: —

" They humbly imitated the manner of the Apostolic life, and having one heart and mind in God, brought every man what was his own into the common stock, and receiving simple food and clothing avoided taking thought for the morrow. Of their own will they devoted themselves to God, and all busied them- selves in obeying their rector or his vicar. . . . They laboured care- fully in copying books, being instant continually in sacred study and devout meditation. In the morning having said Matins, they went to the church (for Mass). . . . Some who were priests and were learned in the divine law preached earnestly in the church."

Other houses of the Brothers of Common Life, otherwise called the " Modern Devotion," were in rapid succession established in the chief cities of the Low Countries and north and central Germany, so that there were in all upwards of forty houses of men; while those of

women doubled that figure, the first having been founded by Groot himself at Deventer.

The ground-idea was to reproduce the life of the first Christians as described in Acts iv. The members took no vows and were free to leave when they chose; but so long as they remained they were bound to observe chastity, to practise personal poverty, putting all their money and earnings into the common fund, to obey the rules of the house and the commands of the rector, and to exercise themselves in self-denial, humility and piety. The rector was chosen by the community and was not necessarily a priest, though in each house there were a few priests and clerics. The majority, however, were laymen, of all kinds and degrees — nobles, artisans, scholars, students, labouring men. The clerics preached and instructed the people, working chiefly among the poor; they also devoted themselves to the copying of manuscripts, in order thereby to earn something for the common fund; and some of them taught in the schools. Of the laymen, the educated copied manuscripts, the others worked at various handicrafts or at agriculture. After the religious services of the morning the Brothers scattered for the day's work, the artisans going to the workshops in the city, — for the idea was to live and work in the world, and not separated from it, like the monks. Their rule was that they had to earn their livelihood, and must not beg. This feature seemed a re- flection on the mendicant orders, and the idea of a community life without vows and not in isolation from everyday life, was looked upon as something new and strange, and even as bearing affinities to the Beghards and other sects, at that time causing trouble to both Church and state. And so opposition arose to the Modern Devotion, and the controversy was carried to the legal faculty at Cologne University, which gave a judgment strongly in their favour. The question, for all that, was not finally settled until the council of Constance (1414), when their cause was triumphantly defended by Pierre d'Ailly and Gerson. For a century after this the Modern Devotion flourished exceed- ingly, and its influence on the revival of religion in the Nether- lands and north Germany in the 15 th century was wide and deep. It has been the fashion to treat Groot and the Brothers of Common Life as " Reformers before the Reformation "; but Schujze, in the Protestant Realencyklopadie, is surely right in pronouncing this view quite unhistorical — except on the theory that all interior spiritual religion is Protestant: he shows that at the Reformation hardly any of the Brothers embraced Lutheranism, only a single community going over as a body to the new religion. During the second half of the 16th century the institute gradually declined, and by the middle of the 17

th all its houses had ceased to exist.

; Authorities. — The chief authorities are Thomas k Kempis, Lives of Groot and his Disciples and Chronicle of Mount St Agnes (both works translated by J. P. Arthur, the former under the title Founders of the New Devotion, 1905) ; Busch, Chronicle of Windes- heim (ed. Grube, 1887). Much has been written on the subject in Dutch and German; in English, S. Kettlewell, Thomas & Kempis and the Brothers'of Common Life (1882) (but see Arthur in the Prefaces to above-named books) ; for a shorter sketch, F. R. Cruise, Thomas a Kempis (1887). An excellent article in Herzog-Hauck, Real- encyklopddie (3rd ed.), " Briider des gemeinsamen Lebens," supplies copious information with references to all the literature; see also Max Heimbucher, Orden und Kongregationen (1897), ii. § 123. The part played by the Brothers of Common Life in the religious and educational movements of the time may be studied in Ludwig Pastor's History of the Popes from the close of the Middle Ages, or J. Janssen's History of the German People. (E. C. B.)

BROUGH, ROBERT (1872-1905), British painter, was born at Invergordon, Ross-shire. He was educated at Aberdeen, and, whilst apprenticed for over six years as lithographer to Messrs Gibb & Co., attended the night classes at the local art school. He then entered the Royal Scottish Academy, and in the first year took the Stuart prize for figure painting, the Chalmers painting bursary, and the Maclaine-Walters medal for com-

position^ After two years in Paris under J. P. Laurens and Benjamin-Constant at Julian's atelier, he settled in Aberdeen in 1894 as a portrait painter and political cartoonist. A portrait of Mr W. D. Ross first drew attention to his talent in 1896, and in the following year he scored a marked success at the Royal Academy with his " Fantaisie en Folie," now at the National Gallery of British Art (Tate Gallery). Two of his paintings, " 'Twixt Sun and Moon " and " Childhood of St Anne of Brittany," are at the Venice municipal gallery. Brough's art is influenced by Raeburn and by modern French training, but it strikes a very personal note. Robert Brough met his death from injuries received in a railway disaster in 1905, his early death being a notable loss to British art.

BROUGHAM, JOHN (1814-1880), British actor, was born at Dublin on the 9th of May 1814, and was educated for a surgeon. Owing to family misfortunes he was thrown upon his own re- sources and made his first appearance on the London stage in 1830, at the Tottenham Street theatre in Tom and Jerry, in which he played six

characters. In 183 1 he was a member of Madame Vestris's company, and wrote his. first play, a burlesque. He remained with Madame Vestris as long as she and Charles Mathews retained Covent Garden, and he collaborated with Dion Boucicault in writing London Assurance, Dazzle being one of his best parts. In 1840 he managed the Lyceum theatre, for which he wrote several light burlesques, but in 1842 he moved tp the United States, where he became a member of W. E. Burton's company, for which he wrote several comedies. Later he was the manager of Niblo's Garden, and in 1850 opened Brougham's Lyceum, which, like his next speculation, the lease of the Bowery theatre, was not financially a success. He was later connected with Wallack's and Daly's theatres, and wrote plays for both. In i860 he returned to London, where he adapted or wrote several plays, including The Duke's Motto for Fechter. After the Civil War he returned to New York. Brougham's theatre was opened in 1869 with his comedy Better Late than Never, but this managerial experience was also un- fortunate, and he took to playing with various stock companies. His last appearance was in 1879 as O'Reilly, the detective, in Boucicault's Rescued, and he died in New York on the 7th of June 1880. Brougham was the author of nearly 100 plays, most, of them now forgotten. He was the founder of the Lotus Club in New York, and for a time its president. He also edited there in 18.52 a comic paper called The Lantern, and published two collections of miscellaneous writings, A Basket of Chips and The Bunsby Papers. Brougham is said to, have been the original of Harry Lorrequer in Charles Lever's novel. He was twice married, in 1838 to Emma Williams (d. 1865), and in 1844 to Mrs Annette Hawley (d. 1870), both actresses.

BROUGHAM, a four-wheeled closed carriage, seating two or more persons, and drawn by a single horse or pair, or propelled by motor. The modern " brougham " has developed and taken its name from the " odd little kind of garden-chair " described by Thomas Moore, which the first Lord Brougham had made by a coachmaker to his own design.

BROUGHAM and VAUX, HENRY PETER BROUGHAM, ist Baron (1778-1868), lord chancellor of England, was born at Edinburgh on the 1 9th of September 1778. He was the eldest son of Henry Brougham and Eleanora, daughter of the Rev. James Syme. In his later years he was wont to trace his paternal descent to Uduardus de Broham, in the reign of Henry II., but no real connexion has been established between the ancient lords of Brougham castle, whose inheritance passed by marriage from the Viponts into the family of the De Cliffords, and the Broughams of Scales Hall, from whom the

chancellor was really descended. Entering the high school of Edinburgh when barely seven, he left, having risen to be head of the school, in 1791. He entered the university of Edinburgh in 1792, and devoted himself chiefly to the study of natural science and mathematics, contributing in 1795 a paper to the Royal Society on some new phenomenon of light and colours, which was printed in the Transactions of that body. A paper on porisms was published in the same manner in 1798, and in 1803 his scientific

reputation was so far established that he was elected F.R.S. But in spite of his taste for mathematical reasoning, Brougham's mind was not an accurate or exact one; and his pursuit of physical science was rather a favourite recreation than a solid advantage to him.

For two years of his university career he had attended lectures- in civil law, and having adopted law as a profession he was admitted to the faculty of advocates in 1800. It does not appear that he ever held a brief in the court of session, but he went a circuit or two, where he defended or prosecuted a few prisoners, and played a series of tricks on the presiding judge, Lord Esk- grove, which almost drove that learned person to distraction. The Scottish bar, however, as he soon perceived, offered no field sufficiently ample for his talents and his ambition. He resolved to go to London, where he had already appeared as junior counsel in a Scottish appeal to the House of Lords. In 1803 he entered at Lincoln's Inn, and in 1808 he was called to the English bar. In the meantime he had turned to literature as a means of subsistence. When in 1802 the Edinburgh Review was founded by the young and aspiring lights of the northern metropolis, Brougham was the most ready, the most versatile and the most satirical of all its contributors. To the first twenty numbers he contributed eighty articles, wandering through every imaginable subject, — science, politics, colonial policy, literature, poetry, surgery, mathematics and the fine arts. The prodigious success of the Review, and the power he was known to wield in it, made him a man of mark from his first arrival in London. He obtained the friendship of Lord Grey and the leading Whig politicians. His wit and gaiety made him an ornament of society, and he sought to extend his literary and political reputa- tion by the publication of an elaborate work on the colonial policy of the empire. In 1806, Fox being then in office, he was appointed secretary to a mission of Lord Rosslyn and Lord St Vincent to the court of Lisbon, with a view to counteract the

anticipated French invasion of Portugal. The mission lasted two or three months; Brougham came home out of humour and out of pocket; and meantime the death of Fox put an end to the hopes of the Whigs.

Brougham was disappointed by the abrupt fall of the ministry, and piqued that his Whig friends had not provided him with a seat in parliament. Nevertheless, he exerted his pen with prodigious activity during the election of 1809; and Lord Holland declared that he had filled the booksellers' shops with articles and pamphlets. The result was small. No seat was placed at his disposal, and he was too poor to contest a borough. He was fortunate at this time to ally himself with the movement for the abolition of the slave-trade, and he remained through life not only faithful, but passionately attached to the cause. Indeed, one of the first measures he carried in the House of Commons was a bill to make the slave-trade felony, and he had the happiness, as chancellor of England, to take a part in the final measure of negro emancipation throughout the colonies.

Previous to his entering on practice at the English bar, Brougham had acquired some knowledge of international law, and some experience of the prize courts. This circumstance probably led to his being retained as counsel for the Liverpool merchants who had petitioned both Houses of Parliament against the Orders in Council. Brougham conducted the lengthened inquiry which took place at the bar of the House, and he displayed on this occasion a mastery over the principles of political economy and international law which at that time was rare. Nevertheless, he was unsuccessful, and it was not until 181 2, when he was himself in parliament, that he resumed his attack on the Orders in Council, and ultimately conquered. It was considered in- expedient and impossible that a man so gifted, and so popular as Brougham had now become, should remain out of parliament, and by the influence of Lord Holland the duke of Bedford was induced to return him to the House of Commons for the borough of Camelford. He took his seat early in 1810, having made a vow that he would not open his mouth for a month. The vow was kept, but ktpt for that month only. He spoke in March in condemnation of the conduct of Lord Chatham at Walcheren,

and he went on speaking for the rest of his life. In four months> such was the position he had acquired in the House that he was regarded as a candidate for the leadership of the Liberal party, then in the feeble hands of George Ponsonby. However, the Tories continued in power. Parliament was dissolved. Camel- ford passed into other hands. Brougham was induced to stand for Liverpool, with

Thomas Creevey against Canning and General Gascoyne. The Liberals were defeated by a large majority, and what made the sting of defeat more keen was that Creevey retained his old seat for Thetford, while Brougham was left out in the cold.

He remained out of parliament during the four eventful years from 1812 to 1816, which witnessed the termination of the war, and he did not conceal his resentment against the Whigs. But in the years he spent out of parliament occurrences took place which gave ample employment to his bustling activity, and led the way to one of the most important passages of his life. He had been introduced in 1809 to the princess of Wales (afterwards Queen Caroline). But it was not till 18 12 that the princess consulted him on her private affairs, after the rupture between the prince regent and the Whigs had become more decided. From that time, Brougham, in conjunction with Samuel Whit- bread, became one of the princess's chief advisers; he was attached to her service, not so much from any great liking or respect for herself, as from an indignant sense of the wrongs and insults inflicted upon her by her husband. Brougham strongly opposed her departure from England in 1814, as well as her return in 1820 on the accession of George IV.

In 181 6 he had again been returned to parliament for Winchel- sea, a borough of the earl of Darlington, and he instantly resumed a commanding position in the House of Commons. He succeeded in defeating the continuance of the income-tax ; he distinguished himself as an advocate for the education of the people; and on the death of Romilly he took up with ardour the great work of the reform of the law. Nothing exasperated the Tory party more than the select committee which sat, with Brougham in the chair, in 18 16 and the three following years, to investigate the state of education of the poor in the metropolis. But he was as far as ever from obtaining the leadership of the party to which he aspired. Indeed, as was pointed out by Lord Lansdowne in 1 8 1 7 , the opposi tion had no recogn ized efficient leaders ; their war- fare was carried on in separate courses, indulging their own tastes and tempers, without combined action. Nor was Brougham much more successful at the bar. The death of George III. suddenly changed this state of things. Queen Caroline at once, in April 1820, appointed Brougham her attorney - general, and Denman her solicitor-general; and they immediately took their rank in court accordingly; this was indeed the sole act of royal authority on the part of the unhappy queen. In July Queen Caroline came from St Omer to England; ministers sent down to both Houses of Parliament the secret evidence which they had long been collecting against her; and a bill was brought into the House of Lords

for the deposition of the queen, and the dissolu- tion of the king's marriage. The defence of the queen was conducted by Brougham, assisted by Denman, Lushington and Wilde, with equal courage and ability. His conduct of the defence was most able, and he wound up the proceedings with a speech of extraordinary power and effect. The peroration was said to have been written and rewritten by him seventeen times. At moments of great excitement such declamation may be of value, and in 1820 it was both heard and read with enthusiasm. But to the calmer judgment of later generations this celebrated oration seems turgid and overstrained. Such immense popular sympathy prevailed on the queen's behalf, that the ministry did not proceed with the bill in the Commons, and the result was a virtual triumph for the queen.

This victory over the court and the ministry raised Henry Brougham at once to the pinnacle of fame. He shared the triumph of the queen. His portrait was in every shop window. A piece of plate was presented to him, paid for by a penny subscription of peasants and mechanics. He refused to acxept a sum of £4000 which the queen herself placed at his disposal;

he took no more than the usual fees of counsel, while his salary as Her Majesty's attorney-general remained unpaid, until it was discharged by the treasury after her death. But from that moment his fortune was made at the bar. His practice on the northern circuit quintupled. One of his finest speeches was a defence of a Durham newspaper which had attacked the clergy for refusing to allow the bells of churches to be tolled on the queen's death; and by the admission of Lord Campbell, a rival advocate and an unfriendly critic, he rose suddenly to a position unexampled in the profession. The meanness of George IV. and of Lord Eldon refused him the silk gown to which his position at the bar entitled him, and for some years he led the circuit as an outer barrister, to the great loss of the senior members of the circuit, who could only be employed against him. His practice rose to about £7000 a year, but it was again falling off before he became chancellor.

It may here be mentioned that in 1825 the first steps were taken, under the auspices of Brougham, for the establishment of a university in London, absolutely free from all religious or sectarian distinctions. In 1827 he contributed to found the " Society for the Diffusion of

Useful Knowledge " — an associa- tion which gave an immense impulse to sound popular literature. Its first publication was an essay on the " Pleasures and Advant- ages of Science " written by himself. In the following year (1828) he delivered his great speech on law reform, which lasted six hours, in a thin and exhausted House, — a marvellous effort, embracing every part of the existing system of judicature.

The death of Canning, the failure of Lord Goderich, and the accession of the duke of Wellington to power, again changed the aspect of affairs. The progress of the movement for parlia- mentary reform had numbered the days of the Tory government. At the general election of 1830 the county of York spontaneously returned Brougham to the new House of Commons as their representative. The parliament met in November. Brougham's first act was , to move for leave to bring in a bill to amend the representation of the people; but before the debate came on the government was defeated on another question; the duke re- signed, and Earl Grey was commanded by William IV. to form an administration.

Amongst the difficulties of the new premier and the Whig party were the position and attitude of Brougham. He was not the leader of any party, and'had no personal following in the House of Commons. Moreover, he himself had repeatedly declared that nothing would induce him to exchange his position as an inde- pendent member of parliament for any office, however great. On the day following the resignation of the Tory government, he reluctantly consented to postpone for one week his motion on parliamentary reform. The attorney-generalship was offered to him and indignantly refused. He himself affirms that he desired to be master of the rolls, which would have left him free to sit in the House of Commons. But this was positively interdicted by the king, and objected to by Lord Althorp, who declared that he could not undertake to lead the House with so insubordinate a follower behind him. But as it was impossible to leave Brougham out of the ministry, it was determined to offer Km the chancellor- ship. Brougham himself hesitated, or affected'.' to hesitate, but finally yielded to the representations of Lord Grey and Lord Althorp. On the 22nd of November the great seal was delivered to him by the king, and he was raised to the peerage as Baron Brougham and Vaux. His chancellorship lasted exactly four years.

Lord Brougham took a most active and prominent part in all the great measures promoted by Grey's government, and the passing of the Reform Bill was due in a great measure to the vigour with which he defended it. But success developed traits which had hitherto been

kept in the background. His manner became dictatorial and he exhibited a restless eccentricity, and a passion for interfering with every department of state, which alarmed the king. By his insatiable activity he had contrived to monopolize the authority and popularity of the government, and notwithstanding the immense majority by which it was supported in the reformed parliament, a crisis was not long in arriving. Lord Grey resigned, but very much by Brougham's

exertions the cabinet was reconstructed under Lord Melbourne, and he appeared to think that his own influence in it would be increased. But the irritability of his temper and the egotism of his character made it impossible for his colleagues to work with him, and the extreme mental excitement under which he laboured at this time culminated during a journey to Scotland in a behaviour so extravagant, that it gave the final stroke to the confidence of the king. At Lancaster he joined the bar-mess, and spent the night in an orgy. In a country house he lost the great seal, and found it again in a game of blindman's-buff. At Edinburgh, in spite of the coldness which had sprung up between himself and the Grey family, he was present at a banquet given to the late premier, and delivered a harangue on his own services and his public virtue. All this time he continued to correspond with the king in a strain which created the utmost irritation and amaze- ment at Windsor.

Shortly after the meeting of parliament in November the king dismissed his ministers. The chancellor, who had dined at Holland House, called on Lord Melbourne on his way home, and learned the intelligence. Melbourne made him promise that he would keep it a secret until the morrow, but the moment he quitted the ex-premier he sent a paragraph to The Times relating the occurrence, and adding that " the queen had done it all." That statement, which was totally unfounded, was the last act of his official life. The Peel ministry, prematurely and rashly summoned to power, was of no long duration, and Brougham naturally took an active part in overthrowing it. Lord Melbourne was called upon in April 1835 to reconstruct the Whig government with his former colleagues. But, formidable as he might be as an opponent, the Whigs had learned by experience that Brougham was even more dangerous to them as an ally, and with one accord they resolved that he should not hold the great seal or any other office. The great seal was put in commission, to divert for a time his resentment, and leave him, if he chose, to entertain hopes of recovering it. These hopes, however, were soon dissipated; and although the late chancellor assumed an independent position in the House of Lords, and even affected to protect the govern- ment, his resentment against his " noble friends " soon broke

out with uncontrolled vehemence. Throughout the session of 1835 his activity was undiminished. . Bills for every imaginable purpose were thrown by him on the table of the House, and it stands recorded in Hansard that he made no less than 221 re- ported speeches in parliament in that year. But in the course of the vacation a heavier blow was struck: Lord Cottenham was made lord chancellor. Brougham's daring and arrogant spirit sank for a time under the shock, and during the year 1836 he never spoke in parliament. Among the numerous expedients resorted to in order to keep his name before the public, was a false report of his death by a carriage accident, sent up from Westmorland in 1839. He was accused, with great probability, of being himself the author of the report. Such credence did it obtain that all the newspapers of October 22, excepting The Times, had obituary notices. However,for more than thirty years after his fall he continued to take an active part in the judicial business of the House of Lords, and in its debates; but it would have been better for his reputation if he had died earlier. His reappearance in parliament on the accession of Queen Victoria was marked by sneers at the court, and violent attacks on the Whigs for their loyal and enthusiastic attachment to their young sovereign; and upon the outbreak of the insurrection in Canada, and the miscarriage of Lord Durham's mission, he overwhelmed his former colleagues, and especially Lord Glenelg, with a torrent of invective and sarcasm, equal in point of oratory to the greatest of his earlier speeches. Indeed, without avowedly relinquishing his political principles, Brougham estranged himself from the whole party by which those principles were defended; and his conduct in general during the years following his loss of office revealed his character in a very unfavourable light. He con- tinued, however, to render judicial services in the privy council, and the House of Lords. The privy council, especially when hearing appeals from the colonies, India, and the courts maritime and ecclesiastical was his favourite tribunal; its vast range of

jurisdiction, varied by questions of foreign and international law, suited his discursive genius. He had remodelled the judicial committee in 1833, and it still remains one of the most useful of his creations.

In the year i860 a second patent was conferred upon him by Queen Victoria, with a reversion of his peerage to his youngest brother,

William Brougham (d. 1886). The preamble of this patent stated that this unusual mark of honour was conferred upon him by the crown as an acknowledgment of the great services he had rendered, more especially in promoting the abolition of slavery, and the emancipation of the negro race. The peerage was thus perpetuated in a junior branch of the family, Lord Brougham himself being without an heir. He had married in 1821 Mrs Spalding (d. 1865), daughter of Thomas Eden, and had two daughters, the survivor of whom died in 1839. Brougham's last days were passed at Cannes, in the south of France. An accident having attracted his attention to the spot about the year 1838, when it was little more than a fishing village on a picturesque coast, he bought there a tract of land and built on it. His choice and his example made it the sanatorium of Europe. He died there on the 7th of May 1868, in the ninetieth year of his age.

The verdict of the time has proved that there was nothing of permanence, and little of originality in the prodigious efforts of Brougham's genius. He filled the office of chancellor during times burning with excitement, and he himself embodied and expressed the fervour of the times. He affected at first to treat the business of the court of chancery as a light affair, though in truth he had to work hard to master the principles of equity, of which he had no experience. His manner in court was desultory and dictatorial. Sometimes he would crouch in his chair, muffled in his wig and robes, like a man asleep; at other times he would burst into restless activity, writing letters, working problems, interrupting counsel. But upon the whole Brougham was a just and able judge, though few of his decisions are cited as landmarks of the law.

As a parliamentary figure Brougham's personality excited for many years an immense amount of public interest, now somewhat hard to comprehend. His boundless command of language, his animal spirits and social powers, his audacity and well-stored memory enabled him to dominate the situation. His striking and almost grotesque personal appearance, added to the effect of his voice and manner — a tall disjointed frame, with strong bony limbs and hands, that seemed to interpret the power of his address; strange angular motions of the arms; the incessant jerk of his harsh but expressive features; the modulations of his voice, now thundering in the loudest tones of indignation, now subdued to a whisper — all contributed to give him the magical influence such as is excited by a great actor. But his eccentricity rose at times to the verge of insanity; and with all his powers he lacked the moral elevation which inspires confidence and wins respect..

The activity of Lord Brougham's pen was only second to the volubility of his tongue. He carried on a vast and incessant correspondence of incredible extent. For thirty years he con- tributed largely to the Edinburgh Review, and he continued to write in that journal even after he held the great seal. The best of his writings, entitled " Sketches of the Statesmen of the time of George III.", first appeared in the Review. These were followed by the " Lives of Men of Letters and Science, " of the same period. Later in life he edited Paley's Natural Theology; and he published a work on political philosophy, besides in- numerable pamphlets and letters to public men on the events of the day. He published an incorrect translation of Demosthenes' Be Corona. A novel entitled Albert Lunel was attributed to him. A fragment of the History of England under the House of Lancaster employed his retirement. In 1838 was published an edition of his speeches in four volumes, elaborately corrected by himself. The last of his works was his posthumous Autobiography. Am- bitious as he was of literary fame, and jealous of the success of other authors, he has failed to obtain any lasting place in English literature. His style was slovenly, involved and in-

correct; and his composition bore marks of haste and careless- ness, and nowhere shows any genuine originality of thought. The collected edition of his works and speeches carefully revised by himself (Edinburgh, 1857 and 1872) is the best. His Auto- biography is of some value from the original letters with which it is interspersed. But Lord Brougham's memory was so much impaired when he began to write his recollections that no reliance can be placed on hjs statements, and the work abounds in manifest errors. Nor was his regard for truth at any time unimpeachable, and the accounts which he gave of more than one transaction in which he played a prominent part were found on investigation to be unfounded.

The best modern account of Brougham is J. B. Atlay's, in his Victorian Chancellors (1906) ; Lord Campbell's, in Lives of the Chancellors, is spiteful, and by an unfriendly though well-informed critic; the Rev. W. Hunt's judicious and careful biography in the V.N.B. is somewhat lacking in colour; Henry Reeve's article in the gth ed. of the Ency. Brit., which is frequently drawn upon above, now requires a good many corrections in points of fact and per- spective, but gives a brilliant picture by an appreciative critic, much " behind the scenes." See also references in the Greville Memoirs and Creevey Papers; S. Walpole, History of England (1890); J. A. Roebuck, History of the Whig Ministry (1852); Lord Holland, Memoirs of the Whig Party (1854) ; Brougham and his Early Friends; Letters to James Loch, 1798-1809 (3 vols., London, 1908,

privately printed).

BROUGHTON, HUGH (1549-1612), English scholar and divine, was born at Owlbury, Bishop's Castle, Shropshire, in 1549. He was educated by Bernard Gilpin at Houghton-le-Spring and at Cambridge, where he became fellow of St John's and then of Christ's, and took orders. Here he laid the foundation of the Hebrew scholarship for which he was afterwards so distinguished. From Cambridge he went to London, where his eloquence gained him many and powerful friends, In 1588 he published his first work, " a little book of great pains," entitled A Concent of Scripture. This work, dealing with biblical chronology and textual criticism, was attacked at both universities, and the author was obliged to defend it in a series of lectures. In 1589 he went to Germany, where he frequently engaged in discussions both with Romanists and with the learned Jews whom he met at Frankfort and elsewhere. In 1591 he returned to England, but his Puritan leanings incurred the hostility of Whitgif t. Accordingly in 1592 he once more went abroad, and cultivated the acquaintance of the principal scholars of Europe, including Scaligeri and Rabbi Elias. Such was the esteem in which he was held, even by his opponents, that he might have had a cardinal's hat if he had been willing to change his faith. In 1599 he pub- lished his " Explication " of the article " He descended into hell," in which he maintained that Hades means simply the abode of departed spirits, not the place of torment. On the accession of James he returned to England; but not being engaged to co-operate in the new translation of the Bible (though he had for some years planned a similar work), he retired to Middleburg in Holland, where he preached to the English congregation. In 1611 he returned to England, where he died on the 4th of August

1612.

Some of his works were collected and published in a large folio volume in 1662, with a sketch of his life by John Lightfoot, but many of his theological MSS. remain still unedited in the British Museum.

BROUGHTON, JOHN CAM HOBHOUSE, Baron (1 786-1869), English writer and politician, was the eldest son of Sir Benjamin Hobhouse, Bart., by his wife Charlotte, daughter of Samuel Cam of Chantry House, Bradford, Wiltshire. Born at Bristol on the 27th of June 1786, he was educated at Westminster school and Trinity College, Cambridge, where he graduated in 1808. He took the Hulsean prize in 1808 for his Essay on the Origin and Intention of Sacrifices. At Cambridge he founded the " Whig Club," and the "

Amicable Society," and became very intimate with Byron, who accompanied him on a tour in Spain, Greece and Turkey in 1809. Hobhouse was present at the battle of Dresden in August 1813, and, following the allied army into France, saw Louis XVIII. enter Paris in May 1814. He was again in Paris after the return of Napoleon from Elba, and showed his dislike of the Bourbons and his sympathy with

Bonaparte by writing in 1816 a pamphlet entitled The substance of some lettet s written by an Englishman resident in Paris during the last reign of the emperor Napoleon. This caused some offence in England and more' in France, and the French translation was seized by the government and both translator and printer were imprisoned. A further period of travel with Byron followed, and at this time Hobhouse wrote some notes to the fourth canto x>f Childe Harold. This canto was afterwards dedicated to him, and a revised edition of a part of his notes entitled Historical illustrations of the fourth canto of " Childe Harold " containing dissertations on the ruins of Rome and an essay on Italian literature, was published in 1818. In February 1819 Hobhouse was the Radical candidate at a by-election for the representation of the city of Westminster, but he failed to secure election. He had already gained some popularity by writing in favour of reform, and in 1819 he issued A defence of the People in reply to Lord Erskine's " Two Defences of the Whigs," followed by A trifling mistake in Thomas, Lord Erskine's recent preface. The House of Commons declared this latter pamphlet a breach of privilege; its author was arrested on the 14th of December 1819, and in spite of an appeal to the court of king's bench he remained in custody until the end of the following February. But this proceeding only increased his' popularity, and at the general election of 1820 he was returned for Westminster. Hobhouse shared Byron's enthusiasm for the liberation of Greece; after the poet's death in 1824 he proved his will, and superintended the arrangements for his funeral. In parliament he proved a valuable recruit to the party of reform; and having succeeded his father as 2nd baronet in 1831, was appointed secretary at war in the ministry of Earl Grey in February 1832, and was made a privy councillor. He effected some reforms and economies during his tenure of this office, but, unable to carry out all his wishes, became chief secretary for Ireland in March 1833. He had only held this post for a few weeks when, in consequence of his refusal to vote with the government against the abolition of the house and window tax, he resigned both his office and his seat in

parliament. At the subsequent election he was defeated, but joined the cabinet as first commissioner of woods and forests when Lord Melbourne took office in July 1834, and about the same time was returned at a by-election as one of the members for Nottingham. In Melbourne's government of 1835 ne was president of the board of control, in which position he strongly supported the Indian policy of Lord Auckland; he returned to the same office in July 1846 as a member of Lord John Russell's cabinet; and in February 1851 he went to the House of Lords as Baron Broughton of Broughton Gyfford. He left office when Russell resigned in February 1852, and took little part in political life, being mainly occupied in literary pursuits and in correspond- ence. He died in London on the 3rd of June 1869.

He had married in July 1828 Lady Julia Tomlinson Hay, daughter of George, 7th marquess of Tweeddale, by whom he had three daughters, but being without heir male the barony lapsed on his death, the baronetcy passing to his nephew, Charles Parry Hobhouse. Lord Broughton was a partner in Whi thread's brewery, a fellow of the Royal Society, and one of the founders of the Royal Geographical Society. He was responsible for the passing of the Vestry Act of 1831, and is said to have first used the phrase " his majesty's opposition." He was a good classical scholar, and although not eloquent, an able debater. In addition to the works already enumerated he wrote 4 journey through Albania and other provinces of Turkey in Europe and Asia to Constantinople during the years i8oq and 1810 (London, 1813), revised edition (London, 1855); and Italy: Remarks made in Several Visits from the Year 1816 to 1854 (London, 1859). A collection of his diaries, correspondence and memoranda is in the British Museum.

See T. Moore, Life of Lord Byron (London, 1837-1840); Greville Memoirs (London, 1896); Dictionary of National Biography, vol. iticvii. (London, 1891); The Times, June 4, 1869; Spencer Walpole, History of England (London, 1890). Broughton also wrote Recollec- tions of a Long Life, printed privately in r865, and in 1909 published with additions in 2 vols, edited by his daughter, Lady, Dorchester, with a preface by the earl of Rosebery.

BROUGHTY FERRY, a municipal and police burgh, seaport and watering-place of Forfarshire, Scotland, on the Firth of Tay, 4 m. E. of Dundee by the North British railway. Pop. (1901) 10,484. The name is a corruption of Brugh or Burgh Tay, in allusion to the fortress standing on the rock that juts into the Firth. It is believed that a stronghold has occupied this site since Pictish times. The later

castle, built in 1498, fell into the hands of the English in 1547 and was held by them for three years. Gradually growing more or less ruinous it was acquired by government in 1855, repaired, strengthened and converted into a Tay defence, mounting several heavy guns. Owing to its healthy and convenient situation, Broughty Ferry has become a favourite residence of Dundee merchants. Fishery and shipping are carried on to a limited extent. Before the erection of the Tay Bridge the town was the scene of much traffic, as the railway ferry from Tayport was then the customary access to Dundee from the south. Monifieth (pop. 2134), 2j m. north-east of Broughty Ferry, with a station on the North British railway, is noted for its golf links. About 2 m. north rises the conical hill of Laws (400 ft. high) , on the top of which are the remains of a vitrified fort, 390 ft. long by 198 ft. in breadth.

BROUSSAIS, FRANCOIS JOSEPH VICTOR (1772-1838), French physician, was borri at St Malo on the 1 7th of December 1772. From his father, who was also a physician, he received his first instructions in medicine, and he studied for some years at the college of Dinan. At the age of seventeen he entered one of the newly-rformed republican regiments, but ill-health com- pelled him to withdraw after two years. He resumed his medical studies, and then obtained an appointment as surgeon in the navy. In 1799 he proceeded to Paris, wherein 1803 he graduated as M.D. In 1805 he again joined the army in a professional capacity, and served in Germany and Holland. Returning to Paris in 1808 he published his Histoire des phlegmasies ou inflammations chroniques; then left again for active service in Spain. In 1814 he returned to Paris, and was appointed assistant-professor to the military hospital of the Val-de-Grace, where he first pro- mulgated his peculiar doctrines on the relation between " life " and " stimulus," and on the physiological interdependence and sympathies of the various organs. His lectures were attended by great numbers of students, who received with the utmost enthusiasm the new theories which he propounded. In 1816 he published his Examen de la doctrine medicate gSniralement adoptee, which drew down upon its author the hatred of the whole medical faculty of Paris; but by degrees his doctrines triumphed, and in 183 1 he was appointed professor of general pathology in the academy of medicine. In 1828 he published a work De I'irrita- lion et de la folie, and towards the end of his life he attracted large audiences by his lectures on phrenology. He died at Vitry-sur-Seine on the 17th of November 1838.

BROUSSONET, PIERRE MARIE AUGUSTE (1761-1807), French naturalist,was born at Montpellier on the 28th of February 1 76 1,

and was educated for the medical profession. Visiting England, he was admitted in 1872 an honorary member of the Royal Society, and in the same year published at London the first part of his work on fishes, Ichthyologiae Decas I, material for which was communicated to him by Sir Joseph Banks. On his return to Paris he was appointed perpetual secretary to the Society of Agriculture, and in 1789 became a member of the National Assembly. Under the convention he had to leave Paris, and after some dangers he made his way to Madrid. The enmity of the French emigrants, however, drove him from Spain, and afterwards from Lisbon, but at last he found a refuge in Morocco as physician to an embassy sent out by the United States. Later he obtained permission from the Directory to return to France, and in 1805 was appointed professor of botany at Montpellier, where he died on the 17th of January 1807.

BROUWER, or Brauwer, ADRIAN (1608-1640), Dutch painter, was born at Haarlem, of very humble parents, who bound him apprentice to the painter Frans Hals. Brouwer had an admirable eye for colour, and much spirit in design; and these gifts his master appears to have turned to his own profit, while his pupil was half starved. As the result of this ungenerous

treatment, Brouwer was frequently brought intD low company and dissipated scenes, which he delineated with great spirit and vivid colouring in his pictures. The unfortunate artist died in a hospital at Antwerp at the early age of thirty-two, consequently his works are few and rarely met with. The largest collection cf his masterpieces is in the Pinakothek at Munich.

BROWN, CHARLES BROCKDEN (1771-1810), American novelist, was born of Quaker parents in Philadelphia, on the 17th of January 1771. Of delicate constitution and retiring habits, he early devoted himself to study; his principal amuse- ment was the invention of ideal architectural designs, devised on the most extensive and elaborate scale. This characteristic talent for construction subsequently assumed the shape of Utopian projects for perfect commonwealths, and at a later period of a series of novels distinguished by the ingenuity and consistent evolution of the plot. The transition between these intellectual phases is marked by a juvenile romance entitled Carsol, not published until after the author's death, which professes to depict an imaginary community, and shows how thoroughly the

young American was inspired by Godwin and Mary Wollstonecraft, whose principal writings had recently made their appearance. From the latter he derived the idea of his next work, The Dialogue of Alcuin (1797), an enthusiastic but inexperienced essay on the question of woman's rights and liberties. From Godwin he learned his terse style, condensed to a fault, but too laconic for eloquence or modulation, and the art of developing a plot from a single psychological problem or mysterious circumstance. The novels which he now rapidly produced offer the strongest affinity to Caleb Williams, and if inferior to that remarkable work in subtlety of mental analysis, greatly surpass it in affluence of invention and intensity of poetical feeling. All are wild and weird in conception, with incidents bordering on the preternatural, yet the limit of possibility is never transgressed. In Wieland; or the Transformation (1798), the first and most striking, a seemingly inexplicable mystery is resolved into a case of ventriloquism. Arthur Mervyn; or Memoirs of the Year 1793 (1798-1800), is remarkable for the description of the epidemic of yellow fever in Philadelphia. Edgar Huntly (Philadelphia, 1801), a romance rich in local colouring, is remarkable for the effective use made of somnambulism, and anticipates Cooper's introduction of the American Indian into fiction. Ormond (1799) is less powerful, but contains one character, Constantia Dudley, which excited the enthusiastic admiration of Shelley. Two subsequent novels, Clara Howard (1801) and Jane Talbot (1804) , dealing with ordinary life, proved failures, and Brown betook himself to compiling a general system of geography, editing a periodical, and an annual register, and writing political pamphlets. He died of consumption on the 22nd of February 1810. He is depicted by his biographer as the purest and most amiable of men, and in spite of a certain formality, due perhaps to his Quaker education, the statement is borne out by his correspondence.

The life of Charles Brockden Brown was written by his friend William Dunlap (Philadelphia, 1815). See also William H. Prescott, Biographical and Critical Miscellanies (New York, 1845). His works in 6 vols, were published at Philadelphia in 1857 with a " life," and in a limited and more elaborate edition (1887).

BROWN, FORD MADOX (1821-1893), English painter, was born at Calais on the 16th of April 182 1. His father was Ford Brown, a retired purser in the navy; his mother, Caroline Madox, of an old Kentish family. His paternal grandfather was Dr John Brown, who established the Brunonian Theory of Medicine. Ford Madox Brown was the only child of his parents, save for a daughter who died young. In childhood he was shifted about a good deal between France

and England; and having shown from the age of six or seven a turn for drawing he was taken, when fourteen years old, and with meagre acquire- ments in the way of general tuition, to Bruges, and placed under the instruction of Gregorius, a pupil of David. His principal instructor, however, from about 1837, was Baron Wappers, of Antwerp, then regarded as a great light of the Belgian school. From him the youth learned the technique not only of oil painting but of various other branches of art. At a very early age Brown

attained a remarkable degree of force in drawing and painting, as attested by an extant oil-portrait of his father, done at an age •not exceeding fifteen. His first composition, towards 1836, represented a blind beggar and his child; his first exhibited work, 1837, was "Job on the Ash-heap"; the first exhibited work in London (at the Royal Academy, 1840), " The Giaour's Confession," from Byron's poem. Both his parents died before 1840, leaving to the young painter a moderate competence, which soon was materially reduced. In 1840 Brown completed a large picture, " The Execution of Mary, queen of Scots," strong in dramatic effect and in handling, with rather sombre colour; from this time forth he must be regarded as a proficient artist, independent in his point of view and strenuous in execu- tion. He contributed to the cartoon competitions, 1844 and 1845, for the Houses of Parliament — " Adam and Eve after the Fall," "The Body of Harold brought to William the Conqueror," and " The Spirit of Justice." These highly remarkable cartoons passed not wholly unobserved, but not one of them obtained a prize. The years 1840 10-1845 were passed in Paris, London and Rome: towards the middle of 1846 Brown settled perman- ently in London. In 1841 he had married his cousin Elizabeth Bromley, who died of consumption in 1846, leaving a daughter, Lucy, who in 1874 became the wife of William M. Rossetti. Not long after being left a widower, Brown took a second wife, Emma Hill, who figures in many of his pictures. She had two children who grew up: Catherine, who married Dr Franz Hueffer, the musical scholar and critic, and Oliver, who died in 1874 in his twentieth year. All three children showed considerable ability in painting, and Oliver in romance as well. The second Mrs Brown died in 1890.

The most marked distinction of Brown as an artist may be defined as vigorous invention of historic or dramatic scenes, carried out with a great regard to individuality in the personages, expressions and accessories of incident and detail, not excluding the familiar, the peculiar and the semi-grotesque, when these seem to subserve the general intent. Owing, however, to his association with artists of the so-called " pre-Raphaelite " movement, (which began late in 1848),

and especially with Dante Gabriel Rossetti, who received some training in his studio in the spring of that year, he has been regarded sometimes as the precursor or initiator of this movement, and sometimes as a direct co-operator in it. His claim to be regarded as a precursor or initiator is not strong; though it is true that even before 1 841 he had pondered the theory (not then much in vogue) that a picture ought to present the veritable light and shade proper to some one moment in the day, and his " Manfred on the Jungfrau " (1841) exemplifies this principle to some extent; it reappears in his very large picture of " Chaucer at the Court of Edward III." (now in the public gallery of Sydney, Australia), which, although projected in 1845, was not brought to com- pletion until 1851. As to becoming a direct co-operator in the pre-Raphaelite movement, he did not join the " Brotherhood," though it would have been open to him to do so; but for some years bis works exhibited a marked influence derived from the movement, not on the whole to their clear advantage. The principal pictures of this class are: " The Pretty Baa-lambs "; "Work" (a street scene at Hampstead); and "The Last of England " (an emigration subject, one of his most excellent achievements): dating between 185 1 and 1863. "Christ Washing Peter's Feet " (now in the National Gallery of British Art) comes within the same range of dates, and is a masterly work; here the pre-Raphaelite influence is less manifest. Altogether it may be averred that the conception and introduc- tion of the pre-Raphaelite scheme, such as it appeared to the public eye in 1849 and 1850, belong to Millais, Holman Hunt and Rossetti, rather than to Brown.

Other leading pictures by Brown are the following:— "Cor- delia at the Bedside of Lear "; " Shakespeare "; "Jacob and Joseph's Coat "; " Elijah and the Widow's Son "; "Cordelia's Portion"; "The Entombment"; "Romeo and Juliet" (the parting on the balcony); "Don Juan and Haidee "; "Cromwell on his Farm"; "Cromwell, Protector of the

Vaudois ": — covering the period from 1849 to 1877. " Sardan- apalus and Myrrha." begun within the same period, was finished later. He produced, moreover, a great number of excellent cartoons for stained glass, being up to 1874 a member of the firm of decorative art, Morris, Marshall, Faulkner and Co. He also executed, in colours or in crayons, various portraits, including his own. From 1878 he was almost engrossed by work which he undertook for the

town hall of Manchester, and which entailed his living for some few years in that city — twelve large wall paintings, some of them done in a modified form of the Gambier- Parry process, and others in oils on canvas applied to the wall surface. They present a compendium of the history of Manchester and its district, from the building of the Roman camp at Man- cunium to the experimental work of Dalton in elaborating the atomic theory. This is an extremely fine series, though with some diversity of individual merit in the paintings, and is certainly the chief representative, in the United Kingdom, of any such form of artistic effort — if we leave out of count the works (by various painters) in the Houses of Parliament.

Madox Brown was never a popular or highly remunerated artist. Up' to near middle age he went through trying straits in money matters; afterwards his circumstances improved, but he was not really well off at any time. In youth he followed the usual course as an exhibiting painter, but after some mortifications and heart-burnings he did little in this way after 1852. He held, however, in 1865, an exhibition of his own then numerous paintings and designs. He also delivered a few lectures on fine art from time to time. From 1868 he suffered from gout; and this led to an attack of apoplexy, from which he died in London on the 6th of October 1893. He was a man of upright, independent and honourable character, of warm affections, a steady and self-sacrificing friend; but he took offence rather readily, and viewed various persons and institu- tions with a degree of suspicion which may be pronounced excessive. He felt interest in many questions outside the range of his art, and, being a good and varied talker, had often some- thing apposite and suggestive to say about them. On more than one occasion he exerted himself very zealously for the benefit of the working classes. In politics he was a consistent Democrat, and on religious questions an Agnostic.

The life of this artist has been well written by his grandson, Ford M. Hueffer, in a handsomely illustrated volume entitled Ford Madox Brown (London, 1896). This volume contains some extracts from Brown's diary, extending in the whole from 1847 to 1865; and other lengthier extracts appear in two books edited by William M. Rossetti — Ruskin, Rossetti, Pre-Raphaelitism (1899), and Pre- Raphaelite Diaries and Letters (1899). See also the Preferences in Art, &c, by Harry Quilter (1892), and a pamphlet, Ford Madox Brown (1901), by Helen Rossetti (Angeli), applicable to a collection of his works exhibited in the Whitechapel Art Gallery. (W. M. R.)

BROWN, FRANCIS (1849-), American Semitic scholar, was born in Hanover, New Hampshire, on the 26th of December 1849, the son of

Samuel Gilman Brown (1813-1885), president of Hamilton College from 1867 to 1881, and the grandson of Francis Brown (1784-1820), whose removal from the presidency of Dartmouth College and later restoration were incidental to the famous " Dartmouth College case." The younger Francis graduated from Dartmouth in 1870 and from the Union Theo- logical Seminary in 1877, and then studied in Berlin. In 1879 he became instructor in biblical philology at the Union Theo- logical Seminary, in 1881 an associate professor of the same subject, and in 1890 professor of Hebrew and cognate languages. 1 Dr Brown's published works have won him honorary degrees from the universities of Glasgow and Oxford, as well as from Dartmouth and Yale; they are, with the exception of The Christian Point of View (1902; with Profs. A. C. McGiffert and G. W. Knox), almost purely linguistic and lexical, and include Assyriology: its Use and Abuse in Old Testament Study (1885), and the important revision of Gesenius, undertaken with S. R. Driver and C. A. Briggs, A Hebrew and English Lexicon of the Old Testament (1891-1905).

1 In 1908 he succeeded Charles Cuthbert Hall (1852-1908) as president of the seminary.

BROWN, SIR GEORGE (1790-1865), British soldier, was born and educated in Elgin, Scotland. He obtained a commission in the 43rd (now 1st Bn. Oxfordshire) Light Infantry in 1806, was promoted lieutenant a few months later, and saw active service for the first time in the Mediterranean and at Copenhagen, 1806 and 1807. The 43rd was one of the earliest arrivals in Spain when the Peninsular War broke out, and Brown was with his regiment at Vimeiro, and in the Corunna retreat. Later in 1809 the famous Light Division was formed, and with Crau- furd he was present at all the actions of 1810-1811, being severely wounded at Talavera; he was then promoted captain and attended the Staff College at Great Marlow until (late in 181 2) he returned to the Peninsula as a captain in the 85th. With this regiment he served under Major- General Lord Aylmer at the Nivelle and Nive, his conduct winning for him the rank of major. The 85th was next employed under General Robert Ross in America, and Brown, who received a severe wound at the action of Bladensburg, was promoted to a lieut.-colonelcy. At the age of twenty-five, with a brilliant warrecord, he received an appointment at the Horse Guards, and remained in London for over twenty- five years in various staff positions. He was made a colonel and K.H. in 1831, and by 1852 had arrived at the rank of lieut.- general and the dignity of K.C.B. At this time he was adjutant- general, but on the appointment of Lord Hardinge to the post of commander-in-chief,

Brown left the Horse Guards. In 1854, on the despatch of a British force to the East, Sir George Brown was appointed to command the Light Division. This he led in action, and administered in camp, on Peninsular principles, and, whilst preserving the strictest discipline to a degree which came in for criticism, he made himself beloved by his men. At Alma he had a horse shot under him. At Inkerman he was wounded whilst leading the French Zouaves into action. In the following year, when an expedition against Kertch and the Russian communications was decided upon, Brown went in command of the British contingent. He was invalided home on the day of Lord Raglan's death. From March i860 to March 1865 he was commander-in-chief in Ireland. At the time of his death in 1865 he was general and G.C.B., colonel of the 32nd Regiment and colonel-in-chief of the Rifle Brigade.

BROWN, GEORGE (1818-1880), Canadian journalist and statesman, was born in Edinburgh on the 29th of November 1818, and was educated in his native city. With his father, Peter Brown (d. 1863), he emigrated to New York in 1838; and in 1843 they removed to Toronto, and began the publication of The Banner, a politico-religious paper in support of the newly formed Free Church of Scotland. In 1844 he began, independ- ently of his father, the issue of the Toronto Globe. This paper, at first weekly, became in 1853 a daily, and through the ability and energy of Brown, came to possess an almost tyrannical influence over the political opinion of Ontario. In 1851 he entered the Canadian parliament as member for Kent county. Though giving at first a modified support to the Reform govern- ment, he soon broke with it and became leader of the Radical or " Clear Grit " party. His attacks upon the Roman Catholic church and on the supposed domination in parliament of the French Canadian section made him very unpopular in Lower Canada, but in Upper Canada his power was great. Largely owing to his attacks, the Clergy Reserves were secularized in 1854. He championed the complete laicization of the schools in Ontario, but unsuccessfully, the Roman Catholic church maintaining its right to separate schools. He also fought for the repre- sentation by population of the two provinces in parliament, the Act of Union (1841) having granted an equal number of representatives to each. This principle of "Rep. by Pop." was conceded by the British North America Act (1867). In 1858 Brown became premier of "The Short Administration," which was defeated and compelled to resign after an existence of two days.

He was one of the earliest advocates of a federation of the British colonies in North America, and in 1864, to accomplish this end, entered into a coalition with his bitter personal and political

opponent, Mr (afterwards Sir) John A. Macdonald.

Largely owing to Brown's efforts, Federation was carried through the House, but on the 21st of December 1865 he resigned from the Coalition government, though continuing to support its Federation policy, and in 1867 he was defeated in South Ontario and never again sat in the House. In great measure owing to his energy, and in spite of much concealed opposition from the French-Canadians, the North- West Territories were purchased by the new Dominion. In December 1873 he was called to the Canadian senate, and in 1874 was appointed by the imperial government joint plenipotentiary with Sir Edward Thornton to negotiate a reciprocity treaty between Canada and the United States. The negotiations were successful, but the draft treaty failed to pass the United -States Senate. Soon afterwards Brown refused the lieutenant-governorship of Ontario, and on two subsequent occasions the offer of knighthood, devoting himself to the Globe and to a model farm at Bow Park near Brantford. On the 25th of March 1880 he was shot by a dis- charged employe, and died on the 9th of May.

His candour, enthusiasm and open tolerance of the opinions of others made him many warm friends and many fierce enemies. He was at his best in his generous protests against all privileges, social, political and religious, and in the self-sacrificing patriot- ism which enabled him to fling aside his personal prejudices, and so to make Federation possible.

See J. C. Dent, Canadian Portrait Gallery (Toronto, 1800). The official Life, by the Hon. Alexander Mackenzie, is decidedly partisan. A life by John Lewis is included in the Makers of Canada series (Toronto). (W. L. G.)

BROWN, HENRY KIRKE (1814-1886), American sculptor, was born in Leyden, Massachusetts, on the 24th of February 1814. He began to paint portraits while quite a boy, studied painting in Boston under Chester Harding, learned a little about modelling, and in 1836-1839 spent his summers working as a railroad engineer to earn enough to enable him to study further. He spent four years (1842-1846) in Italy; but returning to New York he remained distinctively American, and was never dominated, as were so many of the early American sculptors, by Italian influence. He died on the 10th of July 1886 at

New- burgh, New York. His equestrian statues are excellent, notably that of General Winfield Scott (1874) in Washington, D.C., and one of George Washington (1856) in Union Square, New York City, which was the second equestrian statue made in the United States, following by three years that of Andrew Jackson in Washington by Clark Mills (1815-1883). Brown was one of the first in America to cast his own bronzes. Among his other works are: Abraham Lincoln (Union Square, New York City); Nathanael Greene, George Clinton, Philip Kearny, and Richard Stockton (all in the National Statuary Hall, Capitol, Washington, D.C.); De Witt Clinton and "The Angel of the Resurrection," both in Greenwood cemetery, New York City; and an " Aboriginal Hunter."

His nephew and pupil, Henry Kirke Bush-Brown (b. 1857), also became prominent among American sculptors, his " Buffalo Hunt," equestrian statues of Generals Meade and Reynolds at Gettysburg, and " Justinian " in the New York appellate court-house, being his chief works.

BROWN, JACOB (1775-1828), American soldier, was born of Quaker ancestry, in Bucks county, Pennsylvania, on the 9th of May 1775. From 1796 to 1798 he was engaged in surveying public lands in Ohio; in 1798 he settled in New York City, and during the period (1798-1800) when war with France seemed imminent he acted as military secretary to Alexander Hamilton, then inspector-general of the United States army. Subsequently he purchased a large tract of land in Jefferson county, New York, where he founded the town of Brownville. There he served as county judge, and attained the rank (1810) of brigadier-general in the state militia. On the outbreak of the second war with Great Britain (1812) he was placed in command of the New York state frontier from Oswego to Lake St Francis (near Cornwall, Ontario) and repelled the British attacks on Ogdensburg (October 4, 181 2) and Sackett's Harbor (May 29, 1813). In July 1813 he was commissioned brigadier-general in the regular army, and

in January 1814 he was promoted major-general and succeeded General James Wilkinson in command of the forces at Niagara. Early in the summer of 18 14 he undertook offensive operations, and his forces occupied Fort Erie, and, on the 5th of July, at Chippawa, Ontario, defeated the British under General Phineas Riall (c. 1769-1851). On the 25th of July, with General Winfield Scott, he fought a hotly contested, but indecisive, battle with the British under General Gordon Drummond(i 771-1854) atLundy's Lane, where he was twice wounded. After the war he remained in the army, of which

he was the commanding general from March 1821 until his death at Washington, D.C., on the 24th of February 1828.

BROWN, JOHN (1715-1766), British divine and author, was born at Rothbury, Northumberland, on the 5th of November 1715. His father, a descendant of the Browns of Coalston, near Haddington, became vicar of Wigton in that year. Young Brown was educated at St John's College, Cambridge; and after graduating at the head of the list of wranglers in 1735, he took holy orders, and was appointed minor canon and lecturer at Carlisle. In 1745 he distinguished himself in the defence of Carlisle as a volunteer, and in 1747 was appointed chaplain to Dr Osbaldiston, on his admission to the bishopric of Carlisle. His poem, entitled "Honour" (1743), was followed by the " Essay on Satire." This gained for him the friendship of William Warburton, who introduced him to Ralph Allen, of Prior Park, near Bath. In 1751 Brown dedicated to Allen his Essay on the Characteristics of Lord Shaftesbury, containing an able defence of the utilitarian philosophy, praised later by John Stuart Mill {Westminster Review, vol. xxix. p. 477). In 1756 he was promoted by the earl of Hardwicke to the living of Great Horkesley in Essex, and in the following year he took the degree of D.D. at Cambridge. He was the author of two plays, Bar- barossa (1754) and Athelstane (1756); Garrick played in both, and the first was a success. The most popular of his works was the Estimate of the Manners and Principles of the Times (2 vols., 1757-1758), a bitter satire which pleased a public depressed by the ill-success in the conduct of the war, and ready to welcome an attack on luxury and kindred evils. Other works are the Additional Dialogue of the Dead between Pericles and Cosmo . . . (1760), in vindication of Chatham's policy; and the Dissertation on the Rise, Union and Power, &°c, of Poetry and Music (1763). He was consulted in connexion with a scheme of education which Catherine II. of Russia desired to introduce into her dominions. A memorandum on the subject by Dr Brown led to an offer on her part to entertain him at St Petersburg as her adviser on the subject. He had bought a postchaise and various other things for the journey, when he was persuaded to relinquish the design on account of his gout. He had been subject to fits of melan- choly, and, influenced perhaps by disappointment, he committed suicide on the 23rd of September 1 766.

There is a detailed account of John Brown by Andrew Kippis in Biographia Britannica (1780), containing the text of the negotiations for his journey to Russia, and of a long letter in which he outlines the principles of the scheme he would have proposed. See also T. Da vies, Memoirs of . . . David Garrick (1780), chap. xix.

BROWN, JOHN (1722-1787), Scottish divine, was bom at Carpow, in Perthshire. He was almost entirely self-educated, having acquired a knowledge of Latin, Greek and Hebrew while employed as a shepherd. His early career was varied, and he was in succession a packman, a soldier in the Edinburgh garrison in 1745, and a school-master. He was, from 1750 till his death, minister of the Burgher branch of the Secession church (see United Presbyterian Church) in Haddington. From 1 786 he was professor of divinity for his denomination, and was mainly responsible for the training of its ministry. He gained a just reputation for learning and piety. The best of his many works are his Self-Interpreting Bible and Dictionary of the Bible, works that were long very popular. The former was translated into Welsh. He also wrote an Explication of the Westminster Confession, and a number of biographical and historical sketches.

BROWN, JOHN (1735-1788), Scottish physician, was born in 1 73 5 at Lintlaws or at Preston, Berwickshire. After attending the parish school at Duns, he went to Edinburgh and entered

the divinity classes at the university, supporting himself by private tuition. In 1759 he seems to have discontinued his theological studies, and to have begun the study of medicine. He soon attracted the notice of William Cullen, who engaged him as private tutor to his family, and treated him in some respects as an assistant professor. In time, however, he quarrelled with Cullen, as with the professors of the university in general, and from about 1778 his public lectures contained vigorous attacks on all preceding systems of medicine and Cullen's in particular. In 1780 he published his Elementa Medicinae, expounding his own, or as it was then called the Brunonian, theory of medicine, which for a time had a great vogue. In 1786 he set out for London in the vain hope of bettering his fortunes, and died there of apoplexv on the 17th of October 1788.

An edition of his works, with notice of his life by his son, William Cullen Brown, appeared in 1804.

BROWN, JOHN (1784-1858), Scottish divine, grandson of the last-named, was born at Whitburn, Linlithgowshire, on the 12th of July 1784. He studied at Glasgow university, and afterwards at the divinity hall of the " Burgher " branch of the " Secession " church at

Selkirk, under the celebrated George Lawson. In 1806 he was ordained minister of the Burgher congregation at Biggar, Lanarkshire, where he laboured for sixteen years. While there he had an interesting controversy with Robert Owen the socialist. Transferred in 1822 to the charge of Rose Street church, Edinburgh, he at once took a high rank as a preacher. In 1829 he succeeded James Hall at Broughton Place church, Edinburgh. In 1835 he was appointed one of the professors in the theological hall of the Secession church, and, great as was his ability as a preacher and pastor, it was probably in this sphere that he rendered his most valuable service. He had been the first in Scotland to use in the pulpit the exegetical method of exposition of Scripture, and as a pro- fessor he illustrated the method and extended its use. To him chiefly is due the abandonment of the principle of interpretation according to the " analogy of faith," which practically sub- ordinated the Bible to the creed. Brown's exegesis was marked by rare critical sagacity, exact and extensive scholarship, unswerving honesty, and a clear, logical style; and his expository works have thus a permanent value. He had a considerable share in the Apocrypha controversy, and he was throughout life a vigorous and consistent upholder of anti-state-church or " voluntary " views. His two sermons on The Law of Christ respecting civil obedience, especially in the payment of tribute, called forth by a local grievance from which he had personally suffered, were afterwards published with extensive additions and notes, and are still regarded as an admirable statement and defence of the voluntary principle. The part he took in the discussion on the Atonement, which agitated all the Scottish churches, led to a formal charge of heresy against him by those who held the doctrine of a limited atonement. In 1845, after a protracted trial, he was acquitted by the synod, From that time he enjoyed the thorough confidence of his denomination (after 1847 merged in " the United Presbyterian church "), of which in his later years he was generally regarded as the leading representative. He died on the 13th of October 1858. His chief works were: Expository Discourses on First Peter (1848); Exposition of the Discourses and Sayings of our Lord (1850); Exposition of our Lord's Intercessory Prayer (185c); The Resurrection of Life (185 1); Expository Discourses on Galatians (1853); and Analytical Exposition of the Epistle to the Romans (1857).

See Memoir of John Brown, D.D., by John Cairns (i860).

BROWN, JOHN (1800-1859), American abolitionist, leader of the famous attack upon Harper's Ferry, in 1859, was born on the 9th of May 1800, at Torrington, Connecticut. He is said to have been

descended from Peter Brown, who went to America in the Mayflower, and he was the grandson of Captain John Brown, who served iu the War of Independence. He was taken by his father, Owen Brown, to Hudson, Ohio, in 1805. At the age of eighteen he began to prepare himself for the Congregational ministry, but soon changed his mind and turned his attention

to land surveying. He engaged successively in the tanning business, in sheep-raising, and in the wool trade, but met with little success and in 1842, at Akron, Ohio, became bankrupt. In 1849, after having lived in Ohio, Pennsylvania, and Massa- chusetts, he removed to North Elba, N.Y., where he engaged in farming on part of the land which was being given in small tracts, by its owner Gerrit Smith, to negro settlers. Long before this he had conceived a strong hatred for the institution of slavery, and had determined to do what he could to bring about its destruction. In 1854 five of his sons removed to Kansas, where the violent conflict was beginning between the "free-state" and the pro-slavery settlers, and in the following year Brown, leaving the rest of his family at North Elba, joined them, settling near Osawatomie and immediately becoming a conspicuous figure in the border warfare. His name became particularly well known in connexion with the so-called " Pottawatomie massacre," the killing in cold blood, on the 25th of May 1856, by men under his orders, of five pro-slavery settlers in retaliation for the murder a short time previously of five " free-state " settlers. He also on the 2nd: of June, at the head of about thirty men, captured Captain H. C. Pate and twenty-two pro- slavery men at Black Jack, and on the 30th of August 1856, with a small body of supporters, vigorously resisted an attack of a superior pro-slavery force upon Osawatomie. Brown then visited the Eastern states for the purpose of raising money to be used in the Kansas struggle and of arousing the people against slavery. After spending a short time in Kansas, in 1858-1859 he proceeded to carry out a long-cherished scheme for facilitating the escape of fugitive slaves by establishing in the mountains of Virginia a stronghold in which such fugitives could take refuge and defend themselves against their pursuers. At Chatham, Canada; with eleven white and thirty-five negro associates, he adopted a " Provisional Constitution and Ordinance for the People of the United States." Brown was elected com- mander-in-chief, and from among this group a secretary of state, a secretary of war, a secretary of the treasury, and members of Congress were chosen. Later, with only twenty-two men supplied with arms furnished by the Massachusetts-Kansas committee, and with funds contributed (in ignorance of Brown's plans) by his intimate associates, Theodore Parker, George L.

Stearns, T. W. Higginson, and F. B. Sanborn, all of Boston, and Gerrit Smith, of Peterboro, New York, he removed to a farm near Harper's Ferry, the site of a Federal arsenal, which he intended to capture as a preliminary to the carrying out of the main part of his plan. On the night of the 16th of October 1859, with only eighteen men, five of whom were negroes, he made the attack, easily capturing the arsenal and taking about sixty of the leading citizens prisoners to be used as hostages. On the following morning Brown and his followers were vigorously attacked, and on the 18th — a small force of United States marines under Colonel Robert E. Lee having arrived — were overpowered, Brown being seriously wounded after he had surrendered. Of the twenty-two men who had participated in the raid, ten were killed, seven were taken prisoners, and five escaped. On the other side five were killed and nine wounded. Brown was committed to the Charles- town, Virginia (now West Virginia), gaol on the 19th of October; on the 27th his trial began; on the 31st he was convicted of " treason, and conspiring and advising with slaves and other rebels, and murder in the first degree "; and on the 2nd of December he Was hanged at Charlestown. His fellow-prisoners were likewise hanged soon afterwards. Brown was buried at North Elba, New York. The attack upon Harper's Ferry created widespread excitement, particularly in the Southern states; and among the abolitionists in the North Brown was looked upon as a martyr to their cause. Shortly after his death a famous popular song became widely current in the North, beginning: — ■

John Brown's body lies a-mouldering in the grave,

But his soul goes marching on.

Intensely religious in his nature, Brown possessed something of the gloomy fanaticism of his Puritan ancestors. The secret of his whole career liesin his emphatic conviction, to use the

words of Wendell Phillips, that he had "letters of marque from God"; that he had a divine commission to destroy slavery by violent means. He scouted the "milk and water principles" of the milder abolitionists, advocated vigorous resistance to the slave power, and expressed his ideas by actions rather than by words. It now seems that this policy aided very little in making Kansas a free state, and that the attack on Harper's Ferry, while creating much feeling at the

moment, had very little effect on the subsequent course of events. It is safe to assume that secession and civil war would have followed the election of Lincoln if there had been no such raid into Virginia.

Brown was twice married and was the father of twenty children, eight of whom died in early childhood. His sons aided him in all his undertakings, two of them being killed at Harper's Ferry; and Owen Brown, who died in 1889, was long the only survivor of the attack.

See the life (1910) by O. G. Villard, and F. B. Sanborn's Life and Letters of John Brown (Boston, 1885) ; R. J. Hinton's John Brown and His Men (New York, 1894) ; James Redpath's Public Life of Captain John Brown (Boston, i860) ; Von Hoist's essay, John Brown (Boston, 1889) ; and J. F. Rhodes, History of the United States from the Compromise of 1850 (New York, 1890-1906).

BROWN, JOHN (1810-1882), Scottish physician and author, son of John Brown (1784-1858), was born at Biggar, Scotland, on the 22nd of September 1810. He graduated as«M.D. at the university of Edinburgh in 1833, and practised as a physician in that city. His reputation, however, is based on the two volumes of essays, Horae Subsecivae (i.e. "leisure hours") (1858, 1861), John Leech and other Papers (1882), Rab and His Friends (1859), and Marjorie Fleming: a Sketch (1863). The first volume of Horae Subsecivae deals chiefly with the equipment and duties of a, physician, the second with subjects outside his profession. He was emphatic in his belief that an author should publish nothing "unless he has something to say, and has done his best to say it aright." Acting on this principle, he published little himself, and only after subjecting it to the severest criticism. His work is invariably characterized by humour and tenderness. He suffered during the latter years of his life from pronounced attacks of melancholy, and died on the iith of May 1882.

See also E. T. M'Laren, Dr John Brown and his Sister Isabella (4th ed., 1890); and Letters of Dr John Brown, edited by his son and D. W. Forrest, with biography by E. T. M'Laren (1907).

BROWN, SIR JOHN (1816-1896), English armour plate manufacturer, was born at Sheffield on the 6th of December 1816, the son of a slater. He was apprenticed when fourteen years old to a Sheffield firm who manufactured files and table cutlery. Impressed with Brown's ability, the senior partner offered him the control of the business (Earl Horton and Co.) and advanced some of the necessary capital. Brown invented in 1848 the conical steel spring buffer for

railway wagons, and in i860, after seeing the French ship "La Gloire" armoured with hammered plate, he determined to attempt the production of armour for the British navy by a rolling process. The experiment was successful, and led to admiralty orders for armour plate sufficient to protect about three-quarters of the navy. In 1856 Brown had started the Atlas Works in Sheffield, which soon produced, beside armour plates and railway buffers, ordnance forgings, steel rails, railway carriage axles and tires. The works covered thirty acres and employed eventually more than four thousand workmen. Resides, supplying iron to the Sheffield steel trade, Brown himself successfully developed the Bessemer process. In 1864, after his business had been converted into a limited company, he retired. He died at Bromley, Kent, on the 27th of December 1896. Among the honours conferred upon him was a knighthood in 1867, the office of mayor of Sheffield in 1862 and 1863, and that of Master Cutler in 1865 and 1866.

BROWN, JOHN GEORGE (1831-), American painter, was born in Durham, England, on the nth of November 1831. He studied at Newcastle-on-Tyne, in the Edinburgh Academy, and after removing to New York City in 1853, at the schools of the National Academy of Design,, of which he afterwards became a member. In 1866 he became one- of the charter members of the Water-Colour Society, of which he. was president from 1887

to 1904. He generally confined himself to representations of street child life, bootblacks, newsboys, &c. ; his- "Passing Show" (Paris, Salon, 1877) and "Street Boys at Play" (Paris Exhibition, 1900) are good examples of his popular talent.

BROWN, ROBERT (1773-1858), British botanist, was born on the 21st of December 1773 at Montrose, and was educated at the grammar school of his native town, where he had as contemporaries Joseph Hume and James Mill. In 1787 he entered Marischal College, Aberdeen, but two years afterwards removed to Edinburgh University, where his taste for botany attracted the attention of John Walker (1731-1803), then pro- fessor of natural history in the university. In 1795 he obtained a commission in the Forfarshire regiment of Fencible Infantry as " ensign and assistant surgeon," and served in the north of Ireland. In 1798 he made the acquaintance of Sir Joseph Banks, by whom in 1801 he was offered the post of naturalist to the expedition fitted out under Captain Matthew Flinders for the survey of the then almost unknown coasts of Australia. Ferdinand Bauer, afterwards familiarly associated with Brown in his botanical discoveries, was draughtsman; William WeStall was landscape painter; and among the midshipmen was one ; afterwards destined to rise into fame as Sir John Franklin. In 1805 the expedition returned to England, having obtained, among other acquisitions, nearly 4000 species of plants, many of which were new. Brown was almost immediately appointed librarian of the Linnean Society. In this position, though one of no great emolument, he had abundant opportunities of pursuing his studies; but it was not until 18 10 that he pub- lished the first volume of his great work, in Latin, the Prodromus Florae Novae Hollandiae et Insulae Van Diemen, which did much to further the general adoption of A. L. de Jussieu'S: natural system of plant classification. Its merits were immediately recognized, and it gave its author an international reputation among botanists. It is rare in its original edition, the author having suppressed it, hurt at the Edinburgh Review having fallen foul of its Latinity. With the exception of a supplement published in 1830, no more of the work appeared. In 1810 Brown became librarian to Sir

Joseph Banks, who on his death in 1820 bequeathed to him the use and enjoyment of his library and collections for life. In 1827 an arrangement was made by which these were transferred to the British Museum, with Brown's consent and in accordance with Sir Joseph's will. Brown then became keeper of this new botanical department, an office which he held until his death. Soon after Banks's decease he resigned the librarianship of the Linnean Society, and from 1849 to 1853 he served as its president. He received many honours. Elected a fellow of the Royal Society in 181 1, he received its Copley medal in 1839, for his " discoveries on the subject of vegetable impregnation," and in 1833 he was' elected one of the five foreign associates of the Institute of France. Among his other distinctions was membership of the order "pour le Merite " of Prussia. In the Academia Caesarea Naturae Curiosorum he sat under the cognomen of Ray. He died on the 10th of June 1858, in the house in Soho Square, London, bequeathed to him by Sir Joseph Banks. His works, which embrace not only systematic botany, but also plant anatomy and physiology, are distinguished by their thoroughness and conscientious accuracy, and display powers at once of minute detail and of broad generalization. The continual movements observed by the microscope among minute particles suspended in a liquid were noticed by him in 1827, and hence are known as "Brownian movements."

In 1 825-1 834 his works up to that date were collected and published, in four divisions by Nees von Esenbeck, in German, under the title of Vermischte botanische Schriften (Leipzig and Nuremberg),. In 1866 the Ray Society reprinted, under the editorship of his friend and successor in the keepership oi the Botanical Department of the British Museum, J. J. Bennet, his complete writings, the Prodromus alone excepted. In these Miscellaneous Works (2 vols., with atlas of plates) the history of his discoveries can be best followed.

*BROWN, SAMUEL MORISON (1817-1856), Scottish chemist, poet and essayist, born at Haddington on the 2*rd of February. 1817, was the fourth son of Samuel Brown, the founder of*

itinerating libraries, and grandson of John Brown, author of the Self-Interpreting Bible. In 1 83 2 he entered the university of Edin- burgh, where, after studying in Berlin and St Petersburg, he graduated as M.D. in 1839. About 1840 he was engaged in ex- periments by which he sought to prove that " carbon in certain states of combination is

susceptible of conversion into silicon," and his failure to establish this proposition had much to do with his want of success as a candidate for the chair of chemistry at Edinburgh in 1843. He held the doctrine that the chemical elements are compounds of equal and similar atoms, and might therefore possibly be all derived from one generic atom. In 1850 he published a tragedy, Galileo Galilei, and two volumes of his Lectures on the Atomic Theory and Essays Scientific and Literary appeared in 1858, with a preface by his kinsman Dr John Brown, the author of Horae Subsecivae. He died at Edinburgh on the 20th of September 1856.

BROWN, THOMAS (1663-1704), English satirist, of " facetious memory " as Addison designates him, was the son of a farmer at Shifnal, in Shropshire, and was born in 1663. He was entered in 1678 atChrist Church, Oxford, where he is said to have escaped expulsion by the famous lines beginning, " I do not love thee, Dr Fell." He was for three years schoolmaster at Kingston-on- Thames, and afterwards settled in London. Under the pseu- donym of Dudly Tomkinson he wrote a satire on Dryden, The Reasons of Mr Bays changing his Religion: considered in a Dialogue between Crites, Eugenius and Mr Bays, with two other parts having separate titles (1688-1600, republished with additions in 1691). He was the author of a great variety of poems, letters, dialogues and lampoons, full of humour and erudition, but coarse and scurrilous. His writings have a certain value for the knowledge they display of low life in London. He died on the 16th of June 1704, and was buried in the cloister of Westminster Abbey.

His collected works were published in 1707-1708. The second volume contains a collection of Letters from the Dead to the Living, some of which are translated from the French. His Comical Romance done into English (1772, theRoman Comique of Scarron) was reprinted in 1892.

BROWK, THOMAS (1778-1820), Scottish philosopher, was born at Kirkmabreck, Kirkcudbright, where his father was parish clergyman. He was a boy of a refined nature, a wide reader and an eager student. Educated at several schools in London, he went to Edinburgh University in 1792, where he attended Dugald Stewart's moral philosophy class. His attend- ance was desultory, and he does not appear to have completed his arts course. After studying law for a time he took up medicine; his graduation thesis 'De Somno was well received. But his great strength lay in metaphysical analysis, as was shown in his answer to the objections raised against the appointment of Sir John Leslie to the mathematical professorship (1805). Leslie, a

follower of Hume, was attacked by the clerical party as a sceptic and an infidel, and Brown took the opportunity to defend Hume's doctrine of causality as in no way inimical to religion. His defence, at first only a pamphlet, became in its third edition a lengthy treatise entitled Inquiry into the Relation of Cause and Effect, and is a fine specimen of Brown's analytical faculty. In 1806 he became a medical practitioner in partner- ship with James Gregory, but, though successful in his profession, preferred literature and philosophy. After twice failing in the attempt to gain a professorship in the university, he was invited, during an illness of Dugald Stewart in the session of 1808-1809, to act as his substitute, and during the following session he undertook a great part of Stewart's work. The students received him with enthusiasm, due partly to his splendid rhetoric and partly to the novelty and ingenuity of his views. In 1810 he was appointed as colleague to Stewart, a position which he held for the rest of his life. He wrote his lectures at high pressure, and devoted much time to the editing and publication of the numerous poems which he had written at various times during his life. He was also engaged in preparing an abstract of his lectures as a handbook for his class. His health, never strong, gave way under the strain of his work. He was advised to take a voyage to London, where he died on the 2nd of April 1820.

His friend and biographer, David Welsh (1 793-1 845), super- intended the publication of his text-book, the Physiology of the Human Mind, and his Lectures on the Philosophy of the Human Mind was published by his successors, John Stewart and the Rev. E. Milroy. The latter was received with great enthusiasm both in England (where it reached its 19th edition) and in America; but recent criticism has lessened its popularity and it is now almost forgotten.

Brown's philosophy occupies an intermediate place between the earlier Scottish school and the later analytical or associational psychology. To the latter Brown really belonged, but he had preserved certain doctrines of the older school which were out of harmony with his fundamental view. He still retained a small quantum of intuitive beliefs, and did not appear to see that the very existence of these could not be explained by his theory of mental action. This intermediate or wavering position accounts for the comparative neglect into which his works have now fallen. They did much to excite thinking, and advanced many problems by more than one step, but they did not furnish a coherent system, and the doctrines which were then new have since been worked out with greater consistency and clearness.

Brown wrote a criticism of Darwin's Zoonomia (1798), and was one of the first contributors to the Edinburgh Review, in the second number of which he published a criticism of the Kantian philosophy, based entirely on Villers's French account of it. Among his poems, which are modelled on Pope and Akenside and rather commonplace, may be mentioned: Paradise of Coquettes (18 14); Wanderer in Norway (181 5); War fiend (18 16); Bower of Spring (1817); Agnes (1818); Emily (1819); a collected edition in 4 vols, appeared in 1820.

For a severe criticism of Brown's philosophy, see Sir W. Hamilton's Discussions and Lectures on Metaphysics; and for a high estimate of his merits, see J. S. Mill's Examination of Hamilton. Sec also D. Welsh's Account of the Life and Writings, &c. (1825) ; M'Cosh's Scottish Philosophy, pp. 317-337. The only German writer who seems to have known anything of Brown is Beneke, who found in him anticipations of some of his own doctrines. See Die neue Psychologie, pp. 320-330.

BROWN, THOMAS EDWARD (1830-1897), British poet, scholar and divine, was born on the 5th of May 1830, at Douglas, Isle of Man. His father, the Rev. Robert Brown, held the living of St Matthew's — a homely church in a poor district. His mother came of Scottish parentage, though born in the island. Thomas, the sixth of ten children, was but two years old when the family removed to Kirk Braddan vicarage, a short distance from Douglas, where his father (a scholar of no univer- sity, but so fastidious about composition that he would have some sentences of an English classic read to him before answering an invitation) took share with the parish schoolmaster in tutoring the clever boy until, at the age of fifteen, he was entered at King William's College. Here his abilities soon declared them- selves, and hence he proceeded to Christ Church, Oxford, where his position (as a servitor) cost him much humiliation, which he remembered to the end of his life. He won a double first, however, and was elected a fellow of Oriel in April 1854, Dean Gaisford having refused to promote him to a senior studentship of his own college, on the ground that no servitor had ever before attained to that honour. Although at that time an Oriel fellow- ship conferred a deserved distinction, Brown never took kindly to the life, but, after a few terms of private pupils, returned to the Isle of Man as vice-principal of his old school. He had been ordained deacon, but did not proceed to priest's orders for many years. In 1857 he married his cousin, Miss Stowell, daughter of Dr Stowell of Ramsey, and soon afterwards left the island once more to become headmaster of the Crypt school, Gloucester — a position which in no long time he found

intolerable. From Gloucester he was summoned by the Rev. John Percival (after- wards bishop of Hereford), who had recently been appointed to the struggling young foundation of Clifton College, which he soon raised to be one of the great public schools. Percival wanted a master for the modern side, and made an appointment to meet Brown at Oxford; " and there," he writes, " as chance would have it, I met him standing at the corner of St Mary's

Entry, in a somewhat Johnsonian attitude, four-square, his hands deep in his pockets to keep himself still, and looking decidedly volcanic. We very soon came to terms, and I left him there under promise to come to Clifton as my colleague at the beginning of the following term." At Clifton Brown remained from September 1863 to July 1892, when he retired — to the great regTet of boys and masters alike, who had long since come to regard " T.E.B.'s " genius, and even his eccentricities, with a peculiar pride — to spend the rest of his days upon the island he had worshipped from childhood and often celebrated in song. His poem " Betsy Lee " appeared in Macmillan's Magazine (April and May 1873), and was published separately in the same year. It was included in Fo'c's'le Yarns (1881), which reached a second edition in 1889. This volume included at least three other notable poems — " Tommy Big-eyes," " Christmas Rose," and " Captain Tom and Captain Hugh." It was followed by The Doctor and other Poems (1887), The Manx Witch and other Poems (1889), and Old John and other Poems — a volume mainly lyrical (1893). Since his death all these and a few additional lyrics and fragments have been published in one volume by Messrs Macmillan under the title of The Collected Poems of T. E. Brown (1900). His familiar letters (edited in two volumes by an old friend, Mr S. T. Irwin, in 1900) bear witness to the zest he carried back to his native country, although his thoughts often reverted to Clifton. In October 1897 he returned to the school on a visit. He was the guest of one of the house-masters, and on Friday evening, 29th October, he gave an address to the boys of the house. He had spoken for some minutes with his usual vivacity, when his voice grew thick and he was seen to stagger. He died in less than two hours. Brown's more im- portant poems are narrative, and written in the Manx dialect, with a free use of pauses, and sometimes with daring irregularity of rhythm. A rugged tenderness is their most characteristic note; but the emotion, while almost equally explosive in mirth and in tears, remains an educated emotion, disciplined by a scholar's sense of

language. They breathe the fervour of an island patriotism (humorously aware of its limits) and of a simple natural piety. In his lyrics he is happiest when yoking one or the other of these emotions to serve a philosophy of life, often audacious, but always genial. (A. T. Q.-C.)

BROWN, SIR WILLIAM, Bart. (1784-1864), British merchant and banker, founder of the banking-house of Brown, Shipley & Co., was born at Ballymena, Ireland, on the 30th of May 1 784, the son of an Irish linen-merchant. At the age of sixteen he accompanied his father and brothers to Baltimore, Maryland, U.S.A., whither it had been decided to transfer the family business, but in 1809 left America for Liverpool. Here he estab- lished a branch of the firm, which had now begun to deal largely in raw cotton as well as linen and soon afterwards developed into one of general merchants and finally bankers. Brown became one of the leaders in Liverpool commerce, and in 1832 took a principal share in the reform of the system of dock-management then in vogue at that port. The great financial crisis of 1837 seriously threatened the ruin of the firm, but on Brown's urgent representations as to the multiplicity of interests involved the Bank of England agreed to advance him £2,000,000 to tide matters over. Actually Brown only found it necessary to apply for £1,000,000, which he repaid within six months. His business, both mercantile and banking, continued to increase, and in 1844 he was in possession of a sixth of the trade between Great Britain and the United States. " There is hardly," declared Richard Cobden at this period, " a wind that blows, or a tide that flows in the Mersey, that does not bring a ship freighted with cotton or some other costly commodity for Mr Brown's house." In 1856 the friction between the British and American governments due to the enlistment by British consuls of recruits for the Crimean War was largely allayed by the action of Brown, who in an interview with Lord Palmerston, then prime-minister, explained the objections taken in America. From 1846 to 1859 he was Liberal M.P. for South Lancashire. In i860 he presented Liver- pool with a public library and museum, and in 1863 was made a baronet. He died at Liverpool in 1864.

BROWN, WILLIAM LAURENCE (1755-1830), Scottish divine, was born on the 7th of January 1 755 at Utrecht, where his father was minister of the English church. The father, having been appointed professor of ecclesiastical history at St Andrews, returned to Scotland in 1757, and his son went to the grammar school of that city, and then to the university." After passing through the divinity classes, he went in 1774 to the university of Utrecht, where he studied theology and civil law. In 1 7 7 7 he was appointed to the

English church in Utrecht, and about 1 788 to the professorship of moral philosophy and ecclesiastical history in the university, to which was soon added the professorship of the law of nature. The war which followed the French Revolution finally drove Brown in January 1795 to London, where he was cordially welcomed. In 1795 the magistrates of Aberdeen ap- pointed him to the chair of divinity, and soon after he was made principal of Marischal College. In the year 1 800 he was appointed chaplain in ordinary to the king, and in 1804 dean of the chapel royal, and of the order of the Thistle. He died on the nth of May 1830. His most widely-known works were an Essay on the Natural Equality of Men (1793), which gained the Teyler Society's prize; a treatise On the Existence of the Supreme Creator (1816), to which was awarded the first Burnet prize of £1250; and A Comparative View of Christianity, and of the other Forms of Religion with regard to their Moral Tendency (2 vols.,

1826).

BROWN BESS, a name given in the British army to the flint- lock musket with which the infantry were formerly armed. The term is applied generally to the weapon of the 18th and early 19th centuries, and became obsolete on the introduction of the rifle. The first part of the name derives from the colour of the wooden stock, for the name is found much earlier than the intro- duction of " browning " the barrel of muskets; " Bess " may be either a humorous feminine equivalent of the " brown-bill," the old weapon, of the British infantry, or a corruption of the " buss," i.e. box, in " blunderbuss."

BROWNE, EDWARD HAROLD (1811-1891), English bishop, was born at Aylesbury and educated at Eton and Cambridge. He was ordained in 1836, and two years later was elected senior tutor of Emmanuel College, Cambridge. From 1843 to 1849 he was vice-principal of St David's College, Lampeter, and in 1854 was appointed Norrisian professor of divinity at Cambridge. His best-known book is the Exposition of the Thirty-nine Articles (vol. i., Cambridge, 1850; vol. ii., London, 1853), which remained for many years a standard work on the subject. In 1864 he was consecrated bishop of Ely, and proceeded to reorganize his diocese. He maintained that the deposition of Bishop Colenso endangered the independence of bishops. Nevertheless, he was opposed to Colenso's criticism of the Bible, and replied to it in The Pentateuch and the Elohistic Psalms (1863), written from a conservative standpoint. In 1869 he was one of the consecrating prelates when Temple became bishop of Exeter, and endeavoured to remove the prejudice against his appointment by showing that Temple was not responsible for the

views of other writers in the famous Essays and Reviews (i860). He was bishop of Winchester from 1873 till 1890, when ill-health compelled him to resign.

BROWNE, HABLOT KNIGHT (1815-1882), English artist, famous as " Phiz," the illustrator of the best-known bpoks by Charles Dickens, Charles Lever and Harrison Ainsworth in their original editions. His talents in other directions of art were of a very ordinary kind. As an interpreter and illustrator of Dickens's characters, " Phiz," as he always signed his drawings, was in some respects the equal of his rivals Cruikshank and Leech, while, in his own way, he excelled them both. Of Hugue- not extraction, he was born in Lambeth on the nth of June 1815. His father died early and left the family badly off. Browne was apprenticed to Finden, the eminent engraver on steel, in whose studio he obtained his only artistic education. TO engraving, however, he was entirely unsuited, and having in 1833 secured an important prize from the Society of Arts for a drawing of " John Gilpin," he abandoned engraving in the following year and took to other artistic work, with the ultimate object of becoming a painter. In the spring of 1836 he met Charles

Dickens. It was at the moment when the serial publication of Pickwick was in danger from the want of a capable inter- preter for the illustrations. Dickens knew Browne slightly as the illustrator of his little pamphlet Sunday under Three Heads, and probably this slight knowledge of his work stood the draughts- man in good stead. In the original edition of Pickwick, issued in shilling monthly parts from early in 1836 until the end of 1837, the first seven plates were drawn by Robert Seymour, a clever illustrator who committed suicide in April 1836. The next two plates were by R. W. Buss, an otherwise successful portrait- painter and lecturer, but they were so poor that a change was imperative. Browne and W. M. Thackeray called independently at the publishers' office with specimens of their powers for Dickens's inspection. The novelist preferred Browne. Browne's first two etched plates for Pickwick were signed " Nemo," but the third was signed " Phiz," a pseudonym which was retained in future. When asked to explain why he chose this name he answered that the change from " Nemo " to " Phiz " was made " to harmonize better with Dickens's Boz." Possibly Browne adopted it to conceal his identity, hoping one day to become famous as a painter. It is to be noted, however, that " Phiz " is usually attached to his hetter work

and H. K. B. to his less successful drawings. ” Phiz ” undoubtedly created Sam Weller, so far as his well-known figure is concerned, as Seymour had created Pickwick. Dickens and ” Phiz ” were personally good friends in early days, and in 1838 travelled together to Yorkshire to see the schools of which Nicholas Nickleby became the hero; afterwards they made several journeys of this nature in company to facilitate the illustrator’s work. The other Dickens characters which ” Phiz ” realized most successfully are perhaps Squeers, Micawber, Guppy, Major Bagstock, Mrs Gamp, Tom Pinch and, above all, David Copper- field. Of the books by Dickens which ” Phiz ” illustrated the best are David Copperfield, Pickwick, Dombey and Son, Martin Chuzzlewit and Bleak House. Browne made several drawings for Punch in early days and also towards the end of his life; his /;hief work in this direction being the clever design for the wrapper which was used for eighteen months from January 1842. He also contributed to Punch’s Pocket Books. In addition to his work for Dickens, ” Phiz ” illustrated over twenty of Lever’s novels (the most successful being Harry Lorrequer, Charles O’M alley, Jack Hinton and the Knight of Gwynne). He also illustrated Harrison Ainsworth’s and Frank Smedley’s novels. Mervyn Clitheroe by Ainsworth is one of the most admirable of the artist’s Works. Browne was in continual employment by publishers until 1867, when he had a stroke of paralysis. Although he recovered slightly and made many illustrations on wood, they were by comparison inferior productions which the draughtsman’s admirers would willingly ignore. In 1878 he was awarded an annuity by the Royal Academy. He gradually became worse in health, until he died on the 8th of July 1882.

Most of B rowne’s work was etched on steel plates because these yielded a far larger edition than copper. Browne was annoyed at some of his etchings being transferred to stone by the publishers and printed as lithographic reproductions. Partly with the view to prevent this treatment of his work he employed a machine to rule a series of lines over the plate in order to obtain what appeared to be a tint; when manipulated with acid this tint gave an effect somewhat resembling mezzotint, which at that time it was found practically impossible to transfer to stone. The illustrations executed by Browne are particularly noteworthy because they realized exactly what the reader most desired to see represented. So skilful was he in drawing and composition that no part of the story was avoided by reason of the elaborate- ness of the subject. Whatever was the best incident for illustra- tion was always the one selected.

See D. Croal Thomson, Habldt Knight Browne, “Phiz”: Life and Letters (London, 1884); John Forster, Life of Charles Dickens

(London, 1871-1874); F. 6. Kitton, " Phiz ": A Memoir (London, 1882) ; Charles Dickens and his Illustrators (London, 1899) ; M. H. Spielmahn, The History of Punch (London, 1895). (D. C. T.)

BROWNE, ISAAC HAWKINS (1705-1760), English poet, was born on the 21st of January 1705 at Burton-upon-Trent, of

1 which place his father was vicar. He was educated at Lichfield, at Westminster school, and at Trinity College, Cambridge. After taking his M.A. degree he removed to Lincoln's Inn, and was called to the bar, but never practised. He was the author of " Design and Beauty," a poem addressed to his friend Joseph Highmore the painter; and of " The Pipe of Tobacco " which parodied Cibber, Ambrose Philips, Thomson, Young, Pope and Swift, who were then all living. He was elected to Parlia- ment through private interest in 1744 and again in 1747 for the borough of Wenlock in Shropshire. In 1754 he published his chief work, De Animi Immortalitate, a Latin poem much admired by the scholars of his time. The best of the many translations of these verses is by Soame Jenyns. Browne is said by Johnson to have been " one of the first wits of this country." He was a brilliant talker in private life, especially when his tongue was loosed by wine; but he made no mark in public life. He died in London on the 14th of February 1760.

Two editions of his Poems on Various Subjects, Latin and English, were published in 1767 by his son Isaac Hawkins Browne (1745-1818), the author of two volumes of essays on religion and morals. One of these was printed for private circulation, and is said to have contained a memoir. A full account by Andrew Kippis in Biographia Brit- annica (1780) includes large extracts from his poems.

BROWNE, JAMES (1793-1841), Scottish man of letters, was born at Whitefield, Perthshire, in 1793. He was educated at Edinburgh and at the university of St Andrews, where he studied for the church. He wrote a " Sketch of the History of Edinburgh," for Ewbank's Picturesque Views of that city, 1823-1825. In 1826 he became a member of the Faculty of Advocates, and obtained the degree of LL.D. from King's College, Aberdeen. His works include a Critical Examination of Macculloch's Work on the Highlands and Islands of Scotland (1826), Apercu sur les Hiiroglyphes d'£gypte (Paris, 1827), a Vindication of the Scottish Bar from the Attacks of Mr Broughton, and History of the Highlands and Highland Clans (1834-1836). He was appointed editor of the Caledonian Mercury in 1827; and two years later he became sub-editor of the seventh edition of the

Encyclopaedia Britannica, to which he contributed a large number of articles. He died in April 1841.

BROWNE, SIR JAMES (1839-1896), Anglo-Indian engineer and administrator, was the son of Robert Browne of Falkirk in Scotland. He was educated at the military college, Addis- combe, and received a commission in the Bengal engineers in 1857. He served in the expedition against the Mahsud Waziris in i860, being mentioned in despatches, and in 1863 in the Umbeyla campaign, when he was three times mentioned. In January 1875 he became superintendent of works for the building of the Indus bridge. In 1877 he was promoted lieutenant- colonel, and in 1878-1879 accompanied Sir Donald Stewart as political officer during the Afghan War. He took part in several engagements, was mentioned in despatches, and received the C.B. In 1881 he became colonel, and in 1882 commanded the Indian engineer contingent sent to Egypt, being present at the battle of Tell-el-Kebir. For his services in Egypt he received the 3rd class of the Osmanieh Order and the khedive's star. In 1884 he was appointed engineer in chief of the Sind-Pishin railway. In 1888 he was made a K. C.S.I, and in 1889 quarter- master-general for India. In 1892 he was appointed agent to the governor-general in Baluchistan, in succession to Sir Robert Sandeman, his intimate experience of the Baluchis, gained during his railway work, having specially fitted him for this post. He died suddenly on the 13th of June 1896. Sir James Browne was a man of splendid courage and physique, and many tales are told of the personal prowess which, together with his sym- pathetic knowledge of the natives, made him a popular hero among the frontier tribesmen.

See General McLeod Innes, The Life and Times of Sir James Browne (1905).

BROWNE, MAXIMILIAN ULYSSES, Count von, Baron de Camus and Mountany (1705-1757), Austrian field marshal, was born at Basel on the 23rd of October 1705. His father (Ulysses Freiherr v. Browne, d. 1731) was an Irish exile of 1690, who entered the imperial service and in 17 16 was made a count

of the Empire {Reichsgraf) by the emperor Charles VI. His uncle Gebrg, Reichsgraf von Browne (1698-1792), was a distin- guished soldier, who rose to the rank of field marshal in the Russian army,

and was made Reichsgraf by the emperor Joseph II. in 1779. The powerful influence which he commanded, through his father and his wife (nee Countess Marie Philippine v. Martinitz) , advanced the young officer through the subordinate grades so rapidly that at the age of twenty-nine he was colonel of an infantry regiment. But he justified his early promotion in the field, and in the Italian campaign of 1 734 he greatly distinguished himself. In the Tirolese fighting of 1 735, and in the unfortunate Turkish war, he won further distinction as a general officer. He was a lieutenant field marshal in command of the Silesian garrisons when in 1740 Frederick II. and the Prussian army overran the province. His careful employment of such resources as he possessed materially hindered the king in his conquest and gave time for Austria to collect a field army (see Austrian Succession, War of the). He was present at Mollwitz, where he received a severe wound. His vehement opposition to all half-hearted measures brought him frequently into conflict with his superiors, but contributed materially to the unusual energy displayed by the Austrian armies in 1742 and 1743. In the following campaigns Browne exhibited the same qualities of generalship and the same impatience of control. In 1745 he served under Count Traun, and was promoted to the rank of Feldzeugmeister. In 1746 he was present in the Italian campaign and the battles of Piacenza and Rottofredo. Browne himself with the advanced guard forced his way across the Apennines and entered Genoa. He was thereafter placed in command of the army intended for the invasion of France, and early in 1 747 of all the imperial forces in Italy. At the end of the war Browne was engaged in the negotiations which led to the convention of NiceQanuary 21st, 1749)- He became commander- in-chief in Bohemia in 1751, and field marshal two years later. He was still in Bohemia when the Seven Years' War opened with Frederick's invasion of Saxony (1756). Browne's army, advancing to the relief of Pima (see Seven Years' War), was met, and, after a hard struggle, defeated by the king at Lobositz, but he drew off in excellent order, and soon made another attempt with a picked force to reach Pima, by wild mountain tracks. The field marshal never spared himself, bivouacking in the snow with his men, and Carlyle records that private soldiers made rough shelters over him as he slept. He actually reached the Elbe at Schandau, but as the Saxons were unable to break out Browne retired, having succeeded, however, in delaying the development of Frederick's operations for a whole campaign. In the campaign of 1757 he voluntarily served under Prince Charles of Lorraine (q.v.) who was made commander- in-chief, and on the 6th of May in that year, while leading a bayonet charge at the battle of Prague, Browne, like Schwerin on the same day, met his death. He was carried

mortally wounded into Prague, and there died on the 26th of June, his last days embittered by the knowledge that he was unjustly held responsible for the failure of the campaign. His name has been borne, since 1888, by the 36th Austrian infantry.

See Zuverlassige Lebensbeschreibung U.M. Reichsgrafen, v. B. . K.-K. Gen.-Feldmarschall (Frankfurt and Leipzig, 1757); Baron O'Cahill, Gesch. der grosslen Herrfiihrer (Rastadt, 1785, v. ii. pp.

264-316).

BROWNE, PETER (?i66s-i73s), Irish divine and bishop of Cork and Ross, was born in Co. Dublin, not long after the Restoration. He entered Trinity College, Dublin, in 1682, and after ten years' residence obtained a fellowship. In 1699 he was made provost of the college, and in the same year published his Letter in answer to a Book entitled " Christianity not Mysterious," which was recognized as the ablest reply yet written to Toland. It expounds in germ the whole of his later theory of analogy. In 1 7 10 he was made bishop of Cork and Ross, which post he held till his death in 1733. In 17 13 he had become somewhat notorious from his vigorous pamphleteering attack on the fashion of drinking healths, especially " to the glorious and immortal memory." His two most important works are the

Procedure, Extent, and Limits ojthe HumanUnderstanding (1728), an able though sometimes captious critique of Locke's essay, and Things Divine and Supernatural conceived by Analogy with Things Natural and Human, more briefly referred to as the Divine Analogy (1733). The doctrine of analogy was intended as a reply to the deistical conclusions that had been drawn from Locke's theory of knowledge. Browne holds that not only God's essence, but his attributes are inexpressible by our ideas, and can only be conceived analogically. This view was vigorously assailed as leading to atheism by Berkeley in his Alciphron (Dialogue iv.), and a great part of the Divine Analogy is occupied with a defence against that criticism. The bishop emphasizes the distinction between metaphor and analogy; though the conceived attributes are not thought as they are in themselves, yet there is a reality corresponding in some way to our ideas of them. His analogical arguments resemble those found in the Bampton Lectures of Dean Mansel. Browne was a man of abstemious habits, charitable disposition, and impressive eloquence. He died on the 27th of August 1735.

BROWNE, ROBERT (1550-1633), a leader among the early Separatist Puritans (hence sometimes called Brownists), was born

about 1550 at Tolethorpe, near Stamford. He was of an ancient family, several members of which had been distinguished as merchants, county magnates and local benefactors. He was educated at Corpus Christi College, Cambridge, "com- mencing B;A;" in 1572. For some years he was a schoolmaster, but in what place is uncertain. In 1579, on a brother's applica- tion and without his own consent, he was licensed to preach, arid actually preached for some six months in Cambridge, where he gained considerable popularity; but impugning the episcopal order of the Established Church, he had his licence revoked early in the following year. He then went, on the invitation of Robert Harrison, " Maister in the Hospitall," to Norwich, where he soon gathered a numerous congregation, the members of which became associated in a religious " covenant," to the refusing of " all ungodlie communion with wicked persons." He seems also to have preached in various parts of Norfolk and Suffolk, especially at Bury St Edmunds, and vigorously denounced the form of government existing in the Church, which at this time he held incompatible with true ," preaching of the word." Dr Freake, bishop of Norwich, caused him to be imprisoned early in 1581, but he was ere long released through the influence of his remote kinsman, the Lord Treasurer Burghley. Before the end of 158 1, however, he incurred two more imprison- ments, and, apparently in January 1582, migrated with his whole company to Middelburg in Zealand. There they organized a church on what they conceived to be the New Testament model, but the community broke up within two years owing to internal dissensions.

Meanwhile, Browne issued two most important works, A Treatise of Reformation without Tarying for Anie, in which he asserts the inalienable right of the church to effect necessary reforms without the authorization or permission of the civil magistrate; and A Booke which sheweth the life and manners oj all True Christians, in which he enunciates the theory of Con- gregational independency (see Congregationalism). These, with a third tract {A Treatise upon the 23. of Matthew; see C. Burrage, as below, pp. 21-25), making together a thin quarto, were published at Middelburg in 1582. The following year two men were hanged at Bury St Edmunds for circulating them. In January 1 584 l Browne and some of his company came to Edinburgh, after visiting Dundee and St Andrews. He remained some months in Scotland, endeavouring to commend his ec- clesiastical theories, but had no success. He then returned to Stamford, in which town or neighbourhood he seems to have resided chiefly for the next two years, his residence being broken by visits to London and probably to the continent (early in. 1.585),, and by at

least one imprisonment (summer, 1585). His attitude to the lawfulness of occasional attendance at services ir> parish churches seems to have been changing about this time; on the

**. Probably after writing A True and Short Declaration, the main source of our knowledge of his life hitherto.*

7th of Octgber 1585 he was induced to make a qualified submission to the established order. The story that this result was brought about by excommunication, actual or threatened, is very doubtful, and rests on late and questionable authority. A further submission prepared the way for his appointment, in November 1586, to the mastership of St Olave's grammar school, Southwark, which he held for more than two years. During part of this time he was much engaged in controversy, on the one N hand with Stephen Bredwell, an uncompromising advocate of the established order, and on the other with some of those who more or less occupied his own earlier position, and now looked upon him as a renegade. In particular he several times replied to Barrowe and Greenwood; one of his replies, entitled A Reproofe of certaine schismatical persons and their doctrine touching the hearing and preaching of the word of God (1 587-1 588) , has recently been recovered, and sheds a flood of light upon the development of Browne's later views (see Burrage, pp. 45-° 2 > for this whole period).

Before the 20th of June 1589 his mastership of St Olave's seems to have terminated, and after being rector of Little Casterton (in the gift of his eldest brother) for a month or two, he finally, in September 1591, accepted episcopal ordination and the rectory of Achurch-cum-Thorpe Waterville, in Northamp- tonshire. There he ministered for forty-two years, with one lengthy interval, 161 7-1626, which is only partly accounted for (see Burrage, pp. 68-71). There is reason to believe that he never entirely abandoned his early ideal, but latterly thought it possible to maintain a spiritual fellowship within the frame- Work of the Established Church. The closing years of his life seem to have been clouded, due partly to separation among his own flock, and partly to growing irritability in himself, a lonely and disappointed man. When over eighty years old he had a dispute with the parish constable about a rate, blows were struck, and before a magistrate he behaved so stubbornly that he was sent to Northampton gaol, where he died in October 1633. He was buried in

St Giles's churchyard, Northampton. In spite of his later attitude of compromise with expediency, which he felt forced on him by external conditions too strong to defy or ignore, Robert Browne remains a pioneer in ecclesiastical theory in England, the first formulator of an ideal which subsequently became known as Congregationalism (q.v.). He rediscovered certain forgotten aspects of primitive church life, and did not shrink from suffering for the sake of what he held to be the truth. In addition to the works above-mentioned, Browne wrote several controversial and apologetic treatises, of which some remained in MS. until quite recently, and some are still missing.

' See H. M. Dexter, The Congregationalism of the Last Three Hundred Years (1880); C. Burrage, The True Story of Robert Browne (Oxford, 1906); Congregational Historical Society's Transactions, passim

(1901-1906).

BROWNE, SIR THOMAS (1605-1682), English author and physician, was born in London, on the 19th of October 1605. He was admitted as a scholar of Winchester school in 1616, and matriculated at Broadgates Hall (Pembroke College), Oxford, in 1623, where he graduated B.A. in January 1626. He took the further degree of M.A. in 1629, studied medicine, and practised for seme time in Oxfordshire. Between 1630 and 1633 he left England, travelled in Ireland, France and Italy, and on his way home received the degree of M.D. at the university of Leiden. He returned to London in 1634, and, after a short residence at Shipden Hall, near Halifax, settled in practice at Norwich in 1637. He married in 1641 Dorothy Mileham. Their eldest son, Edward, became president of the Royal College of Physicians, and glimpses of their happy family life are obtainable in the fragmentary correspondence contained in Simon Wilkin's edition. In 1642 a copy of his Religio Medici, which he describes as " a private exercise directed to myself," was printed from one of his MSS. without his knowledge, and reviewed by Sir Kenelm Digby in Observations . . . (1643). The interest aroused by this edition compelled Browne to put forth a correct version (1643) of the work, in which letters between Digby and Browne

were included. The book was probably written as early as 1635, for he describes himself as still under thirty. In 1646 he pub- lished Pseudodoxia Epidemica; Enquiries into very many commonly received Tenents and commonly presumed Truths (1646)ˆ and in 1658 Hydriotaphia, Urne-Buriall; or, a discourse of the sepulchrall urnes lately found in Norfolk. Together with the Garden of Cyrus, or

the quincunciall, lozenge, or net-work planta- tions of the ancients, artificially, naturally, and mystically con- sidered. With Sundry observations (1658). These four works were all that he published, though several tracts, notably the Christian Morals 1 intended as a continuation of Religio Medici, were prepared for publication, and appeared posthumously. In 1671 he received the honour of knighthood from Charles II. on his visit to Norwich. He began a correspondence with John Evelyn in 1658. Very few of the letters are extant, but the diarist has left an account of a visit to Browne {Diary, 17th of October 167 1). He died in 1682 on his seventy-seventh birthday, and was buried at St Peter's, Mancroft, Norwich. His coffin was accidentally broken in 1840, and his skull is preserved in the museum of the Norwich hospital.

Browne's writings are among the few specimens of purely literary work produced during a period of great political excite- ment and discord. He remained to all appearance placidly indifferent to the struggle going on around him. His first book, appeared in the year of the outbreak of the Civil War; Pseudo- doxia Epidemica in the critical year of 1646; and Hydriotaphia, the reflections on the shortness of human life inspired by the unearthing of some funeral urns, on the eve of the Restoration. A mind as aloof as his is a psychological curiosity, and its peculiarities are faithfully reflected in the form and matter of his works. His display of erudition, his copious citations from authorities, his constant use of metaphor and analogy, and his elaborate diction, are common qualities of the writers of the 17th century, but Browne stands apart from his contemporaries by reason of the peculiar cast of his mind. Imbued with the Platonic mysticism which taught him to look on this world as only the image, the shadow of an invisible system, he regarded the whole of experience as only food for contemplation. Nothing is too great or too small for him ; all finds a place in the universe of being, which he seems to regard almost from the position of an outsider. He did not speculate systematically on the problems of existence, but he meditates repeatedly on the outward and visible signs of mortality, and on what lies beyond death. Of Browne, as of the greatest writers, it is true that the style is the man. The form of his thought is as peculiar and remarkable as the matter; the two, indeed, react on one another. Much of the'quaintness of his style, no doubt, depends on the excessive employment of latinized words, many of which have failed to justify their existence; but the peculiarities of his vocabulary do not explain the unique character of his writing, which is appreciated to-day as much as ever.

The Religio Medici was a puzzle to his contemporaries, and it is still

hard to reconcile its contradictions. A Latin trans- lation appeared at Leiden in 1644, and it was widely read on the continent, being translated subsequently into Dutch, French and German. In Paris it was issued in the belief that Browne was really a Roman Catholic, but in Rome the authorities thought otherwise, and the book was placed on the Index Expurgatorius. It is the confession of a mind keen and sceptical in some aspects, and credulous in others. Browne professes to be absolutely free from heretical opinions, but asserts the right to be guided by his own reason in cases where no precise guidance is given either by Scripture or by Church teaching. " I love," he says, " to lose myself in a mystery, to pursue my reason to an 0, Altitudo!" The Pseudodoxia Epidemica, written in a more direct and simple style than is usual with Browne, is a wonder- ful storehouse of out-of-the-way facts and scraps of erudition,

1 Ed. John Jeffery, archdeacon of Norwich, 1716. The dignified " Letter to a Friend, upon the occasion of the Death of his Intimate Friend " (written about 1672, pr. 1690) has been generally supposed to be a preliminary sketch for Christian Morals, but Dr \V. A. Greenhill thinks it was written later.

exhibiting a singular mixture of credulity and shrewdness. Sir Thomas evidently takes delight in discussing the wildest fables. That he himself was by no means free from superstition is proved by the fact that the condemnation of two unfortunate women, Amy Duny and Rose Cullender, for witchcraft at Norwich in 1664 was aided by his professional evidence. The Garden of Cyrus is a continued illustration of one quaint conceit. The whole universe is ransacked for examples of the Quincunx, and he discovers, as Coleridge says, " quincunxes in heaven above, quincunxes in earth below, quincunxes in the mind of man, quincunxes in tones, in optic nerves, in roots of trees, in leaves, in everything!" But the whole strength of his genius and the wonderful charm of his style are to be sought in the Urnburial, the concluding chapter of which, for richness of imagery and majestic pomp of diction, can hardly be paralleled in the English language. For anything at all resembling it we must turn to the finest passages of Jeremy Taylor or of Milton's prose writings.

In 1684 appeared a collection of Certain Miscellany Tracts (ed. Tenison), and in 1712 Posthumous Works of the learned Sir Thomas Browne. The first collected edition of Browne's works appeared in

1686. It is said to have been edited by Dr, afterwards Archbishop Tenison. Sir Thomas Browne's Works, including his Life and Correspondence, were carefully edited by Simon Wilkin in 1835-1836. Among modern reprints may be mentioned Dr VV. A Greenhill's editions in the " Golden Treasury " series of the Religio Medici, Letter to a friend and Christian Morals (1881), with an admirable bibliographical note on the complicated subject of the numerous editions of the Religio Medici; of the Hydriotaphia and the Garden of Cyrus (1896), completed by Mr E. H. Marshall; a complete edition for the English Library, edited by Mr Charles Sayle (1904, &c). Browne's interest in bird-lore is noted by Evelyn, and some Notes and Letters on the Natural History of Norfolk were collected from his MSS. in the Sloane Collection, and edited by Thomas Southwell in 1902.

BROWNE, WILLIAM (1501-1643), English pastoral poet, was born at Tavistock, Devonshire, in 1591, of a branch of the family of Browne of Betchworth Castle, Surrey. He received his early education at the grammar school of his native town, and is said to have proceeded to Oxford about 1603. After a short residence at Clifford's Inn he entered the Inner Temple in 161 1. His elegy on the death of Henry, prince of Wales, and the first book of Britannia's Pastorals appeared in 1613; the Shep- herd's Pipe, which contained some eclogues by other poets, in 1614. The second book of the pastorals (1616) is dedicated to William Herbert, earl of Pembroke, whose seat at Wilton was Browne's home for some time. In 1624 he returned to Oxford as tutor to Robert Dormer, afterwards earl of Carnarvon, matriculating at Exeter College in April and receiving his M.A. degree in November of the same year. Nearly all Browne's poetic work dates from his early manhood, before his marriage in 1628 with Timothy, daughter of Sir Thomas Eversham cf Horsham, Essex. In the fourth eclogue of George Wither's Shepherd's Hunting, written as early as 1613-1614, Philarete (Wither) asks Willy (Browne) why he is silent, and the reply is that some " my music do contemne." The times were un- favourable to his tranquil talent, and the second half of his life was spent in retirement. He died some time before 1645, when letters of administration were granted to his widow, and he may have been the William Browne whose burial is recorded in the Tavistock registers under the date of the 27 th of March 1643.

Browne was the pupil and friend of Michael Drayton, who associates " my Browne " in the " Epistle to Henry Reynolds " with the two Beaumonts as " my dear companions whom I freely chose, My bosom friends." But directly indebted as Browne is for the form of his

poems, for the slight story and the rather wearisome allegory, to Spenser, Sidney, Drayton and especially to Fletcher's Faithful Shepherdess, his poetry is no mere copy of any of these models. His Arcadia is localized in his native Devonshire. He was untiring in his praises of " Tavy's voiceful stream (to whom I owe more strains than from my pipe can ever flow)." He knew local history and traditions, and he celebrates the gallant sailors who " by their power made the Devonian shore Mock the proud Tagus." (Brit. Past. bk. ii., song 3). It is for his truthful, affectionate pictures of his country

life and its surroundings that the stories of Marina and Celandine, Doridon and the rest are still read. A copy of Browne's pastorals with annotations in Milton's handwriting is preserved in the Huth library, and there are many points of likeness between Lycidas and the elegy on Philarete (Thomas Manwood) in the fourth eclogue of the Shepherd's Pipe. Keats was a student of Browne, and Herrick's fairy fantasies are thought to owe something to the third book of the pastorals.

The first two books of Britannia's Pastorals were re-issued in 1625. The third, though it had no doubt circulated in the author's lifetime, remained unknown until Beriah Botfield discovered a copy of it in the library of Salisbury cathedral, bound up with the 1613 and 1616 editions of the first and second books. This MS. was edited for the Percy Society by T. C. Croker in 1852. A collected edition of Browne's works was published in 1772 by John Da vies. It is nof known whether The Inner Temple Masque on the story of Ulysses and Circe, which was written for performance on the 13th of January 1615, was ever actually represented. A series of sonnets to Caelist, some epistles, elegies and epitaphs, with some other miscellaneous poems, complete the list of Browne's works. These have been collected from various sources, the most important being Lansdowne MS. 777 (British Museum), and they were printed for the first time by Sir S. E. Brydges in 1815. Excellent modern complete editions of Browne and Mr W. C. Hazlitt's (1 868-1 869) for the Roxburghe library, and a more compact one (1894) by Mr Gordon Goodwin, with an introduction by Air A. H. B.ullen, for the " Muse's Library." For an elaborate analysis of Browne's obligations to earlier pastoral writers see F. W. Moorman, " William Browne " (Quellen und Fof-schungen zur Sprack- und Culturge.schichte der Germanischen Vblker Strassburg, 1897). A translation of Marin le Roy de Gomberville's Polexandre, by William Browne (1647), may be a posthumous work of the poet's. ■ '

BROWNE, WILLIAM GEORGE (1768-1813), English traveller, was

born at Great Tower Hill, London, on the 25th of July 1768. At seventeen he was sent to Oriel College, Oxford. Having had a moderate competence left him by his father, on quitting the university he applied himself entirely to literary pursuits. But the fame of James Bruce's travels, and of the first discoveries made by the African Association, determined him to become an explorer of Central Africa. He went first to Egypt, arriving at Alexandria in January 1792. He spent some time in visiting the oasis of Siwa or Jupiter Ammon, and employed the remainder of the year in studying Arabic and in examining the ruins of ancient Egypt. In the spring of 1793 he visited Sinai, and in May set out for Darfur, joining the great caravan which every year went by the desert route from Egypt to that country. This was his most important journey, in which he acquired a great variety of original information. He was forcibly detained by the sultan of Darfur and endured much hardship, being unable to effect his purpose of returning by Abyssinia. He was, however, allowed to return to Egypt with the caravan in 1796; after this he spent a year in Syria, and did not arrive in London till September 1798. In 1799 he published his Travels in Africa, Egypt and Syria, from the year ijq2 to 1798. The work was full of valuable information; but, from the abruptness and dryness of the style, it never became popular. In 1800 Browne again left England, and spent three years in visiting Greece, some parts of Asia Minor and Sicily. In 181 2 he once more set out for the East, proposing to penetrate to Samarkand and survey the most interesting regions of central Asia. He spent the winter in Smyrna, and in the spring of 1813 travelled through Asia Minor and Armenia, made a short stay at Erzerum, and arrived on the 1st of June at Tabriz. About the end of the summer of 1813 he left Tabriz for Teheran, intending to proceed thence into Tartary, but was shortly afterwards murdered. Some bones, believed to be his, were afterwards found and interred near the grave of Jean de Thevenot, the French traveller.

Robert Walpole published, in the second volume of his Memoirs relating to European and Asiatic Turkey (1820), from papers left by Browne, the account of his journey in 1802 through Asia Minor to Antioch and Cyprus; also Remarks written at Constantinople

(1802).

BROWNHILLS, an urban district in the Lichfield parlia- mentary division of Staffordshire, England, 6 m. W. of Lichfield, on branch lines of the London & North- Western and Midland railways, and near the Essington Canal. Pop. (1891) 11,820; (iqoi) 15,252. There are extensive coal-mines in the district,

forming part of the Cannock Chase deposit. The town lies on the Roman Watling Street, and remains of earthworks are seen at Knave's Castle, on the Street, and at Castle Old Fort, 2 m. S.E. Ogley Hay, the parish of which partly covers Brownhills, is a large adjoining village; there are also Great Wyrley and Norton-under-Cannock or Norton Canes to the N.W. and N., with collieries, and at Church Bridge are brick, tile, and edge-tool works. Wyrley Grove is a picturesque mansion of the 17th century.

BROWNING, ELIZABETH BARRETT (1806-1861), English poet, wife of the poet Robert Browning, was born probably at Coxhoe Hall, Durham, for this was the home of her father and mother for some time after their marriage in 1805. Her bap- tismal register gives the date of her birth as the 6th of March 1806, and that of her christening as the 10th of February 1808. The long misunderstanding as to her age, whereby she was supposed to have been born three years later, was shared by her contemporaries and even for a time by her husband. She was the daughter and eldest child of Edward Barrett Moulton, who added the surname of Barrett on the death of his maternal grandfather, whose estates in Jamaica he inherited. His wife was Mary Grahair-CIarke, daughter of J. Graham-Clarke of Fenham Hall, Newcastle-on-Tyne. She died when her illustrious daughter was twenty-two years old. Elizabeth's childhood was passed in the country, chiefly at Hope End, a house bought by her father in the beautiful country in sight of the Malvern Hills. " They seem to me," she wrote, " my native hills; for though I was born in the county of Durham, I was an infant when I went first into their neighbourhood, and lived there until I had passed twenty by several years." Her country poems, such as " The Lost Bower," " Hector in the Garden," and " The Deserted Garden," refer to the woods and gardens of Hope End. Elizabeth Barrett was much the companion of her father, who pleased himself with printing fifty copies of what she calls her " great epic of eleven or twelve years old, in four books "— The Battle of Marathon (sent to the printer in 1810). She owns this to have been " a curious production for a child," but disclaims for it anything more than " an imitative faculty." The love of Pope's Homer, she adds, led her to the study of Greek, and of Latin as a help to Greek, " and the influence of all those tendencies is manifest so long afterwards as in my Essay on Mind [Essay on Mind and other Poems, 1826], a didactic poem written when I was seventeen or eighteen, and long repented of." She was a keen student, and it is

told of her that when her health failed she had her Greek books bound so as to look like novels, for fear her doctor should forbid her continuous study. At this time began her friendship with the blind scholar Hugh Stuart Boyd, with whom she read Greek authors, and especially the Greek Christian Fathers and Poets. To him she addressed later three of her sonnets, and he was one of her chief friends untft-his death in 1848. In 1832 Mr Barrett sold his house of Hope End, and brought his family to Sidmouth, Devon, for some three years. There Elizabeth made a transla- tion of the Prometheus Bound of Aeschylus, published with some original poems (1833). After that time London became the home of the Barretts until the children married and the father died. The temporary dwelling was at 74 Gloucester Place, Portnian Square, and in 1838 the lease was taken of the final house, 50 Wimpole Street.

It is in the middle of the year 1836 that Elizabeth Barrett's active literary life began. She then made the acquaintance of R. H. Home, afterwards famous for a tirhe as the author of Orion, . but perhaps best remembered as her correspondent {Letters to R. H. Home, 2 vols. 1877), and this acquaintance led to the appearance of rather frequent poems by Miss Barrett in the New Monthly Magazine, edited by Bulwer (Lord Lytton), and in other magazines or annuals. But the publication of The Seraphim and other Poems (1838) was a graver step. " My present attempt," she writes in this year, " is actually, and will be considered by others, more a trial of strength than either of my preceding ones;" There was at that date a lull in the pro- duction of conspicuous books of poetry. Wordsworth had

ceased, Browning and Tennyson had hardly begun to write their best. Miss Barrett's volume was well reviewed, but not popular, and no second edition was required; of the poems afterwards famous it contained three, " Cowper's Grave," " My Doves," and " The Sea-Mew," the first impassioned and the other two very quiet, which a fine taste must rank high among all her works. The Quarterly Review (September 1840), in an article on " Modern English Poetesses," criticizes The Seraphim with Prometheus, and treats the former with respect, but does not lift the author out of the quite unequal company of Mrs Norton, " V," and other contemporary women. In the previous year Elizabeth had made the memorable acquaintance of Wordsworth. " No," she writes, " I was not at all disap- pointed in Wordsworth, although perhaps I should not have singled him from the multitude as a great man. There is a reserve even in his countenance; ... his eyes have more meekness than brilliancy; and in his slow, even articulation there is rather the solemnity and calmness of truth itself than the animation and energy of those who seek for it

. . . He was very kind, and sate near me and talked to me as long as he was in the room, and recited a translation by Cary of a sonnet of Dante's — and altogether it was a dream." With Landor, at the same date, a meeting took place that had long results. At this time, too, 'began another of Elizabeth's valued friendships — that with Miss Mitford, author of Our Village and other works less well remembered. Mr John Kenyon also became at about this time a dear and intimate friend. He was a distant cousin of the Barretts, had published some verse, and was a warm and generous friend to men of letters. From the date of the birth of their child (1849) he gave the Brownings a hundred pounds a year, and when he died in 1856 he bequeathed to them eleven thousand pounds. To him a great number of Elizabeth's letters are addressed, and to him in later years was Aurora Leigh dedicated. Elizabeth Barrett began also in London an acquaintance with Harriet Martineau.

Full of the interest of friendship and literature, the residence in London was unfavourable to Elizabeth's health. In early girlhood she had a spinal affection, and her lungs became delicate. She broke a blood-vessel in the beginning of the Barretts' life in town, and was thereafter an invalid — by no means entirely confined to her room, but often imprisoned there, and generally a recluse, until her marriage. Her state was so threatening that in 1838 it was found necessary to remove her to Torquay, where she spent three years, accompanied by her brother Edward, the dearest of her eight brothers, the only one, she said many years later, who ever comprehended her, and for a time by her father and sisters. During this time of physical suffering she underwent the greatest grief of her life by the drowning of her beloved brother, who with two friends went sailing in a small boat and was lost in Babbacombe Bay. Rumours of the foundering reached the unhappy sister, who was assured of the worst after three days, when the bodies were found. The accident of Edward Barrett's meeting with his death through her residence at Torquay, and the minor accident of her having parted from him on the day of his death, as she said, " with pettish words," increased her anguish of heart to horror. A few days before she had written, " There are so many mercies close around me that God's being seems proved to me, demonstrated to me, by His manifested love." When the blow came, its heavy weight and closeness to her heart convinced her, she wrote, through an awful experience of suffering, of divine action. But many years later the mention of her brother's death was intolerable to her. At the time she only did not die. She had to remain for nearly a year day and night within hearing of the sea, of which the sound seemed to her the moan of a

dying man.

There is here an interval of silence in the correspondence which busied her secluded life at all ages; but with an impulse of self-protection she went to work as soon as her strength sufficed. One of her tasks was a part taken in the Chaucer Modernized (1841), a work suggested by Wordsworth, to which he, Leigh Hunt, Home and others contributed. In 1S41 she returned to Wimpole Street, and in that and the

following year she was at work on two series of articles on the Greek Christian poets and on the English poets, written for the Athenaeum under the editorship of Mr C. W. Dilke. In work she found some interest and even some delight: " Once I wished not to live, but the faculty of life seems to have sprung up in me again from under the crushing foot of heavy grief. Be it all as God wills."

It is in 1842 that we notice the name of Robert Browning in her letters: " Mr Home the poet and Mr Browning the poet were not behind in approbation," she says in regard to her work on the poets. " Mr Browning is said to be learned in Greek, especially the dramatists." In this year also she declares her love for Tennyson. To Kenyon she writes, " I ought to be thank- ing you for your great kindness about this divine Tennyson." In 1842, moreover, she had the pleasure of a letter from Words- worth, who had twice asked Kenyon for permission to visit her. The visit was not permitted on account of Miss Barrett's ill- health. Now Haydon sent her his unfinished painting of the great poet musing upon Helvellyn; she wrote her sonnet on the portrait, and Haydon sent it to Rydal Mount. Wordsworth's com- mendation is rather cool. In August 1843 " The Cry of the Children " appeared in Blackwood's Magazine, and during the year she was associated with her friend Home in a critical work, The New Spirit of the Age, rather by advice than by direct contribution. Her two volumes of poems (1844) appeared, six years after her former book, under the title of Poems, by Elizabeth Barrett Barrett. The warmest praises that greeted the new poems were H. F. Chorley's in the Athenaeum, John Forster's in the Examiner, and those conveyed in Blackwood, the Dublin Review, the New Quarterly and the Atlas. Letters came from Carlyle and others. Both he and Miss Martineau selected as their favourite poem " Lady Geraldine's Court- ship," a violent piece of work. In the beginning of the

following year came the letter from a stranger that was to be so momentous to both. " I had a letter from Browning the poet last night," she writes to her old friend Mrs Martin, " which threw me into ecstasies — Browning, the author of Paracelsus, the king of the mystics." She is flattered, though not to " ecstasies," at about the same time by a letter from E. A. Poe, and by the dedication to her, as " the noblest of her sex," of his own work. " What is to be said, I wonder, when a man calls you the ' noblest of your sex ' ? ' Sir, you are the most discerning of yours.' " America was at least as quick as England to appreciate her poetry; among other messages thence came in the spring letters from Lowell and from Mrs Sigoumey. " She says that the sound of my poetry is stirring the ' deep green forests of the New World '; which sounds pleasantly, does it not?" It is in the same year that the letters first speak of the hope of a journey to Italy. The winters in London, with the imprisonment which — according to the medical practice of that day — they entailed, were lowering Elizabeth's strength of resistance against disease. She longed for the change of light, scene, manners and language, and the longing became a hope, until her father's prohibition put an end to it, and doomed her, as she and others thought, to death, without any perceptible reason for the denial of so reasonable a desire.

Meanwhile the friendship with Browning had become the chief thing in Elizabeth Barrett's life. The correspondence, once begun, had not flagged. In the early summer they met. The allusion to his poetry in " Lady Geraldine's Court- ship " had doubtless put an edge to his already keen wish to know her. He became her frequent visitor and kept her room fragrant with flowers. He never lagged, whether in friendship or in love. We have the strange privilege, since the publication of the letters between the two, of following the whole course of this noble love-story from beginning to end, and day by day. Browning was six years younger than the woman he so passionately admired, and he at first believed her to be confined by some hopeless physical injury to her sofa. But of his own wish and resolution he never doubted. Her hesitation, in her regard for his liberty and strength, to burden him with an ailing wife, she has recorded in the Sonnets after-

wards published under a slight disguise as Sonnets front the Portuguese. She refused him once " with all her will, but much against her heart," and yielded at last for his sake rather than her own. Her father's will was that his children should not marry, and, kind and affectionate father though he was, the prohibition took a violent form and. struck terror into the hearts of the three dutiful and sensitive girls. Robert Browning's addresses were, therefore, kept

secret, for fear of scenes of anger which the most fragile of the three could not face. Browning was reluctant to practise the deception; Elizabeth alone knew hbw impossible it was to avoid it. When she was persuaded to marry, it was she who insisted, in mental and physical terror, upon a secret wedding. Throughout the summer of 1846 her health improved, and on the 12th of September the two poets were married in St Marylebone parish church. Browning visited it on his subsequent journeys to England to give thanks for what had taken place at its altar. Elizabeth's two sisters had been permitted to know of the engagement, but not of the wedding, so that their father's anger might not fall on them too heavily. For a week Mrs Browning remained in her father's house. On the 19th of September she left it, taking her maid and her little dog, joined her husband, and crossed to the Continent. She never entered that home again, nor did her father ever forgive her. Her letters, written with tears to entreat his pardon, were never answered. They were all subsequently returned to her unopened. Among them was one she had written, in the prospect of danger, before the birth of her child. With her sisters her relations were, as before, most affectionate. Her brothers, one at least of whom disapproved of her action, held for a time aloof. All others were taken entirely by surprise. Mrs Jameson, who had been one of the few intimate visitors to Miss Barrett's room, had offered to take her to Italy that year, but met her instead on her way thither with a newly-married husband. The poets' journey was full of delight. Where she could not walk, up long staircases or across the waters of the stream at Vaucluse, Browning carried her. In October they reached Pisa, and there they wintered; Mrs Jameson keeping them company for a time lest ignorance of practical things should bring them, in their poverty, to trouble. She soon found that they were both admirable economists; not that they gave time and thought to husbandry, but that they knew how to enjoy life without luxuries. So they remained to the end, frugal and content with little.*

For climate and cheapness they settled in Italy, choosing Florence in the spring of 1847, and remaining there, with the interruptions of a change to places in Italy such as Siena and Rome, and to Paris and England, until Mrs Browning's death. It was at Pisa that Robert Browning first saw the Sonnets from the Portuguese, poems which his wife had written in secret and had no thought of publishing. He, however, resolved to give them to the world. " I dared not," he said, " reserve to myself the finest sonnets written in any language since Shakespeare's." The judgment, which the existence of Wordsworth's sonnets renders obviously absurd, may be pardoned. The sonnets were sent to Miss Mitford and published at Reading, as Sonnets by

E.B.B., in 1847. In 1850 they were included, under their final title, in a new issue of poems. During the Pisan autumn appeared in Blackwood's Magazine seven poems by Mrs Browning which she had sent some time before, and the publication of which at that moment disturbed her as likely to hurt her father by an apparent reference to her otto story. At Pisa also she wrote and sent to America a poem, " The Runaway Slave at Pilgrim Point," which was published in Boston, in The Liberty Bell, in 1848, and separately in England in 1849. In the summer of 1847 the Brownings left their temporary dwelling in Florence and took the apartment in Casa Guidi, near the Pitti Palace, which waˆ thenceforth their chief home. Early in their residence 'began that excited interest in Italian affairs which made so great 'a part of Mrs Browning's emotional life. The Florentines, under the government of the grand duke, were prosperous but disturbed by national aspirations. Mrs Browning, by degrees, ' wrote Casa Guidi Windows on their behalf and as an appeal -to the always impulsive sympathies of England. In 1849 was borii

the Brownings' only child, their beloved son Robert Wiedemann Barrett. After this event Mrs Browning resumed her literary activities, preparing a new issue, with some additions, of her poems (1850). A poem on the death of a friend's child ap- peared in the Athenaeum (1849), and there the new volumes were warmly praised. Casa Guidi Windows followed in 185 1. Visiting England in that year, the Brownings saw much of the Procters, and something of Florence Nightingale, Kingsley, Ruskin, Rogers, Patmore and Tennyson, and also of Carlyle, with whom they went to Paris, where they saw George Sand, and where they passed the December days of the coup d'Slat. Mrs Browning happened to take a political fancy to Napoleon III., whom she would probably have denounced if a tithe of his tyrannies had occurred in Italy, and the fancy became more emotional in after years.

A new edition of Mrs Browning's poems was called for in 1853, and at about this time, in Florence, she began to work on Aurora Leigh. She was still writing this poem when the Brownings were again in England, in 1855. Tennyson there read to them his newly-written Maud. After another interval in Paris they were in London again — Mrs Browning for the last time. She was with her dear cousin Kenyon during the last months of his life. In October 1856 the Brownings returned to their Florentine home, Mrs Browning leaving her

completed Aurora Leigh for publication. The book had an immediate success; a second edition was required in a fortnight, a third a few months later. In the fourth edition (1859) several corrections were made. The review in Blackwood was written by W. E. Aytoun, that in the North British by Coventry Patmore.

In 1857 Mrs Browning addressed a petition, in the form of a letter, to the emperor Napoleon begging him to remit the sentence of exile upon Victor Hugo. We do not hear of any reply. In 1857 Mrs Browning's father died, unreconciled. Henrietta Barrett had married, like her sister, and like her was unforgiven. In 1858 occurred another visit to Paris, and another to '. Rome, where Hawthorne and his iamily were among the Brownings' friends. In 1859 came the Italian war in which Mrs Browning's hasty sympathies were hotly engaged. Her admiration of Italy's champion, Napoleon III., knew no bounds, and did not give way when, by the peace of Villafranca, Venice and Rome were left unannexed to the kingdom of Italy, and the French frontiers were " rectified " by the withdrawal from that kingdom of Savoy and Nice. That peace, however, was a bitter disappointment, and her fragile health suffered. At Siena and Florence this year the Brownings were very kind to Landor, old, solitary, and ill. Mrs Browning's poem, " A Tale of Villafranca," was published in the Athenaeum in September, and afterwards included in Poems before Congress (i860). Then followed another long visit to Rome, and there Mrs Browning prepared for the press this, her last volume. The little book was judged with some impatience, A Curse for a Nation being mistaken for a denuncia- tion of England, whereas it was aimed at America and her slavery. The Athenaeum, amongst others, committed this error. The Saturday Review was hard on the volume, so was Blackwood; the A Has and Daily News favourable. In July 1 860 was published " A Musical Instrument " in the young Cornhill Magazine, edited by the author's friend W. M. Thackeray. The last blow she had to endure was the death of her sister Henrietta, in the same year.

On the 30th of June 1861 Elizabeth Barrett Browning died. Her husband, who tended her alone on the night of her decease, wrote to Miss Blagden: " Then came what my heart will keep till I see her again and longer — the most perfect expression of her love to me within my whole knowledge of her. Always smilingly, happily, and with a face like a girl's, and in a few minutes she died in my arms, her head on my cheek. . . . There was no lingering, nor acute pain, nor consciousness of separation, but God took her to himself as you would lift a sleeping child from a dark uneasy bed into your arms and the light. Thank God." Her married life had been supremely

happy. Something has been said of the difference between husband and wife in regard to " spiritualism," in which Mrs Browning had interest and faith, but no division ever interrupted their entirely perfect affection

and happiness. Of her husband's love for her she wrote at the time of her marriage, " He preferred … of free and deliberate choice, to be allowed to sit only an hour a day by my side, to the fulfilment of the brightest dream which should exclude me in any possible world." "I am still doubtful whether all the brightness can be meant for me. It is just as if the sun rose again at 7 o'clock p.m." " I take it for pure magic, this life of mine. Surely nobody was ever so happy before." " I must say to you [Mrs Jameson] who saw the beginning with us, that this end of fifteen months is just fifteen times better and brighter; the mystical ' moon ' growing larger and larger till scarcely room is left for any stars at all: the only differences which have touched me being the more and more happiness." Browning buried his wife in Florence, under a tomb designed by their friend Frederick Leighton. On the wall of Casa Guidi is placed the inscription: " Qui scrisse e mori Elisabetta Barrett Browning, che in cuore di donna concilia va scienza di dotto e spirito di poeta, e face del suo verso aureo annello fra Italia e Inghilterra. Pone questa lapide Firenze grata 1861." In 1866 Robert Browning published a volume of selections from his wife's works.

The place of Elizabeth Barrett Browning in English literature is high, if not upon the summits. She had an original genius, a fervent heart, and an intellect that was, if not great, exceedingly active. She seldom has composure or repose, but it is not true that her poetry is purely emotional. It is full of abundant, and even over-abundant, thoughts It is intellectually restless. The impassioned peace of the greatest poetry, such as Words- worth's, is not hers. Nor did she apparently seek to attain those heights. Her Greek training taught her little of the economy that such a poetic education is held to impose; she " dashed," not by reason of feminine weakness, but as it were to prove her possession of masculine strength. Her gentler work, as in the Sonnets from the Portuguese, is beyond praise. There is in her poetic personality a glory of righteousness, of spirituality, and of ardour that makes her name a splendid one in the history of an incomparable literature.

See the Letters of Elizabeth Barrett Browning addressed to R. H. Home, with Comments on Contemporaries, edited by S. R. Town-shend Mayer (2 vols., 1877) ;. The Poetical Works of Elizabeth Barrett Browning from 1826 to 1844, edited with memoir by J. H.

Ingram (1887); Elizabeth Barrett Browning (Eminent Women series), by J. H. Ingram, 1888) ; Records of Tennyson, Ruskin and the Brownings, by Anne Ritchie (1892); The Letters of Elizabeth Barrett Browning, edited with biographical additions by Frederick G. Kenyon (2 vols., 1897); The Letters of Robert Browning and Elizabeth Barrett Barrett (2 vols., 1899); La Vie et V ozuvre a" Elizabeth Browning, by Mdlle. Germaine- Marie Merlette (Paris, 1906). (A. Me.)

BROWNING, OSCAR (1837-), English writer, was born in London on the 17th of January 1837, the son of a merchant, William Shipton Browning. He was educated at Eton and at King's College, Cambridge, of which he became fellow and tutor, graduating fourth in the classical tripos of 1 860. He was for fifteen years a master at Eton College, resuming residence in 1876 at Cambridge, where he became university lecturer in history. He soon became a prominent figure in college and university life, encouraging especially the study of political science and modern political history, the extension of university teaching and the movement for the training of teachers. He is well known to Dante students by his Dante; Life and Works (1891), and to the study of Italian history he has contributed Guelphs and Ghibel- lines (1903). His works on modern history include England and Napoleon in 1803 (1887), History of England (4 vols. 1890), Wars of the Nineteenth Century (1899), History of Europe 18 14-1843 (1901), Napoleon, the first Phase (1905).

BROWNING, ROBERT (181 2-1889), English poet, was born at Camberwell, London, on the 7th of May 181 2. He was the son of Robert Browning (1781-1866), who for fifty years was employed in the Bank of England. Earlier Brownings had been settled in Wiltshire and Dorsetshire, and there is no ground for the statement that the family was partly of Jewish origin. The poet's mother was a daughter of William Wiedemann, a German who had settled in Dundee and married a Scottish wife. His parents had one other child, a daughter, Sarianna, born in 1814. They lived quietly in Camberwell. The elder Browning

had a sufficient income and was indifferent to money-making. He had strong literary and artistic tastes. He was an ardent book collector, and so good a draughtsman that paternal authority alone had prevented him from adopting an artistic career. He had, like his

son, a singular faculty for versifying, and helped the boy's early lessons by twisting the Latin grammar into grotesque rhymes. He lived, as his father had done, to be 84, with unbroken health. The younger Robert inherited, along with other characteristics, much of his father's vigour of con- stitution. From the mother, who had delicate health, he prob- ably derived his excessive nervous irritability ; and from her, too, came his passion for music. The family was united by the strongest mutual affection, and the parents erred, if anything, on the side of indulgence. Browning was sent to a school in the neighbourhood, but left it when fourteen, and had little other teaching. He had a French tutor for the next two years, and in his eighteenth year he attended some Greek lectures at the London University. At school he never won a prize, though it was more difficult to avoid than to win prizes. He was more conspicuous for the love of birds and beasts, which he always retained, than for any interest in his lessons. He rather despised his companions and made few friends. A precocious poetical capacity, however, showed itself in extra-scholastic ways. He made his schoolfellows act plays, partly written by himself. He had composed verses before he could write, and when twelve years old completed a volume of poems called Incondita. His parents tried unsuccessfully to find a publisher; but his verses were admired by Sarah Flower, afterwards Mrs Adams, a well- known hymn-writer of the day, and by W. J. Fox, both of whom became valuable friends. A copy made by Miss Flower was in existence in 187 1, but afterwards destroyed by the author. Browning had the run of his father's library, and acquired a very unusual amount of miscellaneous reading. Quarles' Emblems was an especial favourite; and besides the Elizabethan dramatists and standard English books, he had read all the works of Voltaire. Byron was his first master in poetry, but about the age of four- teen he fell in accidentally with Shelley and Keats. For Shelley in particular he conceived an enthusiatic admiration which lasted for many years, though it was qualified in his later life.

The more aggressive side of Browning's character was as yet the most prominent; and a self-willed lad, conscious of a grow- ing ability, found himself cramped in Camberwell circles. He rejected the ordinary careers. He declined the offer of a clerkship in the Bank of England; and his father, who had found the occupation uncongenial, not only approved the refusal but cordially accepted the son's decision to take poetry for his pro- fession. For good or evil, Browning had been left very much to his own guidance, and if his intellectual training suffered in some directions, the liberty permitted the development of his marked originality. The parental yoke,

however, was too light to pro- voke rebellion. Browning's mental growth led to no violent breach with the creeds of his childhood. His parents became Dissenters in middle life, but often attended Anglican services; and Browning, though he abandoned the dogmas, continued to sympathize with the spirit of their creed. He never took a keen interest in the politics of the day, but cordially accepted the general position of contemporary Liberalism. His worship of Shelley did not mean an acceptance of his master's hostile attitude towards Christianity, still less did he revolt against the moral discipline under which he had been educated. He fre- quented literary and artistic circles, and was passionately fond of the theatre; but he was entirely free from a coarse Bohemian- ism, and never went to bed, we are told, without kissing his mother. He lived with his parents until his marriage. His mother lived till 1849, and his father till 1866, and his affectionate relations to both remained unaltered. Browning's first published poem, Pauline, appeared anonymously in 1833. He always regarded it as crude, and destroyed all the copies of this edition that came within his reach. It was only to avoid unauthorized reprints that he consented with reluctance to republishing it in the collected works of 1868. The indication of genius was recog- nized by W. J. Fox, who hailed it in the Monthly Repository as

marking the advent of a true poet. Pauline contains an en- thusiastic invocation of Shelley, whose influence, upon its style and conception is strongly marked. It is the only one of Brown- ing's works which can be regarded as imitative. In the winter of 1833 he went to St Petersburg on a visit to the Russian consul-general, Mr Benckhausen. There he wrote the earliest of his dramatic lyrics, " Porphyria's Lover " and " Johannes Agricola." In the spring of 1834 he visited Italy for the first time, going to Venice and Asolo.

Browning's personality was fully revealed in his next consider- able poems, Paracelsus (1835) and Sordello(1840). With Pauline, however, they form a group. In an essay (prefixed to the spurious Shelley letters of 1851), Browning describes Shelley's poetry " as a sublime fragmentary essay towards a presentment of the correspondency of the universe to Deity." The phrase describes his own view of the true functions of a poet, and Browning, having accepted the vocation, was meditating the qualifications which should fit him for his task. The hero of Pauline is in a morbid state of mind which endangers his fidelity to his duty. Paracelsus and Sordello are studies in the psychology of genius, illustrating its besetting temptations. Paracelsus fails from intellectual pride, not balanced by love of his kind, and from excessive ambition, which leads him to seek success by unworthy means. Sordello is a poet

distracted between the demands of a dreamy imagination and the desire to utter the thoughts of man- kind. He finally gives up poetry for practical politics, and gets into perplexities only to be solved by his death. Pauline might in some indefinite degree reflect Browning's own feelings, but in the later poems he adopts his characteristic method of speaking in a quasi-dramatic mood. They are, as he gave notice, " poems, not dramas." The interest is not in the external events, but in the " development of a soul "; but they are observations of other men's souls, not direct revelations of his own. Paracelsus was based upon a study of the original narrative, and Sordello was a historical though a very indefinite person. The background of history is intentionally vague in both cases. There is one remarkable difference between them. The Paracelsus, though full of noble passages, is certainly diffuse. Browning heard that John Sterling had complained of its " verbosity," and tried to remedy this failing by the surgical expedient of cutting out the usual connecting words. Relative pronouns henceforth become scarce in his poetry, and the grammatical construction often a matter of conjecture. Words are forcibly jammed together instead of being articulately combined. To the ordinary reader many passages in his later work are both crabbed and obscure, but the " obscurity " never afterwards reached the pitch of Sordello. It is due to the vagueness with which the story is rather hinted than told, as well as to the subtlety and intricacy of the psychological expositions. The subtlety and vigour of the thought are indeed surprising, and may justify the frequent comparisons to Shakespeare; and it abounds in descriptive passages of genuine poetry.

Still, Browning seems to have been misled by a fallacy. It was quite legitimate to subordinate the external incidents to the psychological development in which he was really interested, but to secure the subordination by making the incidents barely intelligible was not a logical consequence. We should not understand Hamlet's psychological peculiarities the better if we had to infer his family troubles from indirect hints. Brown- ing gave more time to Sordello than to any other work, and perhaps had become so familiar with the story which he professed to tell that he failed to make allowance for his readers' diffi- culties. In any case it was not surprising that the ordinary reader should be puzzled and repelled, and the general recognition of his genius long delayed, by his reputation for obscurity. It might, however, be expected that he would make a more success- ful appeal to the public by purely dramatic work, in which he would have to limit his psychological speculation and to place his characters in plain situations. Paracelsus and Sordello show so great

a power of reading character and appreciating subtler springs of conduct that its author clearly had one, at least, of the essential qualifications of a dramatist.

Before Sordello appeared Browning had tried his hand in this direction. He was encouraged by outward circumstances as well as by his natural bent. He was making friends and gaining some real appreciative admirers. John Forster had been greatly impressed by Paracelsus. Browning's love of the theatre had led to an introduction to Macready in the winter of 1835-1836; and Macready, who had been also impressed by Paracelsus, asked him for a play. Browning consented and wrote Strafford, which was produced at Covent Garden in May 1837, Macready taking the principal part. Later dramas were King Victor and King Charles, published in 1842; The Return of the Druses and A Blot onthe' Scutcheon (both in 1843), Colombe's Birthday (1844), Luria and A Soul's Tragedy (both in 1846), and the fragmentary In a Balcony (1853). Strafford succeeded fairly, though the defection of Vandenhoff, who took the part of Pym, stopped its run after the fifth performance. The Blot on the 'Scutcheon, produced by Macready as manager of Drury Lane on the 1 ith of February 1 843, led to an unfortunate quarrel. Browning thought that Macready had felt unworthy jealousy of another actor, and had gratified his spite by an inadequate presentation of the play! He remonstrated indignantly and the friendship was broken off for years. Browning was disgusted by his experience of the annoyances of practical play-writing, though he was not altogether discouraged. The play had apparently such a moderate success as was possible under the conditions, and a similar modest result was attained by Colombe's Birthday, pro- duced at Covent Garden on the 25th of April 1853. Browning, like other eminent writers of the day, failed to achieve the feat of attracting the British public by dramas of high literary aims, and soon gave up the attempt. It has been said by competent critics that some of the plays could be fitted for the stage by judicious adaptation. The Blot on the 'Scutcheon has a very clear and forcibly treated situation; and all the plays abound in passages of high poetic power. Like the poems, they deal with situations involving a moral probation of the characters, and often suggesting the ethical problems which always interested him. The speeches tend to become elaborate analyses of motive by the persons concerned, and try the patience of an average audience. For whatever reason, Browning, though he had given sufficient proofs of genius, had not

found in these works the most appropriate mode of utterance.

The dramas, after Strafford, formed the greatest part of a series of pamphlets called Bells and Pomegranates, eight of which were issued from 1841 to 1846. The name, he explained, was intended to indicate an " alternation of poetry and thought." The first number contained the fanciful and characteristic Pippa Passes. The seventh, significantly named Dramatic Romances and Lyrics, contained some of his most striking shorter poems. In 1844 he contributed six poems, among which were " The Flight of the Duchess " and " The Bishop orders his Tomb at St Praxed's Church," to Hood's Magazine, in order to help Hood, then in his last illness. These poems take the special form in which Browning is unrivalled. He wrote very few lyrical poems of the ordinary kind purporting to give a direct expression of his own personal emotions. But, in the lyric which gives the essential sentiment of some impressive dramatic situation, he has rarely been approached. There is scarcely one of the poems published at this time which can be read without fixing itself at once in the memory as a forcible and pungent presentation of a characteristic mood. Their vigour and originality failed to overcome at once the presumption against the author of Sordello. Yet Browning was already known to and appreciated by such literary celebrities of the day as Talfourd, Leigh Hunt, Procter, Monckton Milnes, Carlyle and Landor. His fame began to spread among sympathetic readers. The Bells and Pome- granates attracted the rising school of " pre-Raphaelites," especially D. G. Rossetti, who guessed the authorship of the anonymous Pauline and made a transcript from the copy in the British Museum. But his audience was still select.

Another recognition of his genius was of incomparably more personal importance and vitally affected his history. In 1844 Miss Barrett (see Browning, Elizabeth Barrett) published

a volume of poems containing "Lady Geraldine's Courtship," with a striking phrase about Browning's ; poems. He ' was naturally gratified, and her special friend and cousin, John Kenyon, encouraged him to write to her. She admitted him to a personal interview after a little diffidence, and a hearty ap- preciation of literary genius on both sides was speedily ripened into genuine and most devoted love. Miss Barrett was six years older than Browning and a confirmed invalid with shaken nerves'. She was tenderly attached to an autocratic father who objected on principle to the marriage of his children. The correspondence of the lovers (published in 1899) shows not only their mutual devotion, but the chivalrous delicacy with Which Browning behaved in a most trying situation.

Miss Barrett was gradu- ally encouraged to disobey the utterly unreasonable despotism. They made a clandestine marriage on the 1 2th of September 1846. The state of Miss Barrett's health suggested misgivings which made Browning's parents as well as his bride's disapprove of the match. She, however, appears to have become stronger for some time, though always fragile and incapable of much active exertion. She had already been recommended to pass a winter in Italy. Browning had made three previous tours there, and his impressions had been turned to account in Sordello and Pippa Passes, in The Englishman in Italy and Home Thoughts from Abroad. For the next fifteen years the Brown- ings lived mainly in Italy, making their headquarters at Florence in the Casa Guidi. A couple, of winters were passed in Rome. In the summer of 1849 they were at Siena, where Browning was helpful to Landor, then in his last domestic troubles. They also visited England and twice spent some months in Paris. Their only child, Robert Wiedemann Browning, was born at Florence in 1849. Browning's literary activity during his marriage seems to have been comparatively small; Christmas Eve and Easter Day appeared in 1850, While the two volumes called Men and Women (1855), containing some of his best work, showed that his power was still growing. His position involved some sacrifice and imposed limitations upon his energies. Mrs Browning's health required a secluded life; and Browning, it is said, never dined out during his marriage, though he enjoyed society and made many and very warm friendships. Among their Florence friends were Margaret Fuller Ossoli, Isa Blagden, Charles Lever and others. The only breach of complete sympathy with his wife was due to his contempt for " spiritualists " and " mediums," in whom she fully believed. His portrait of Daniel Dunglas Home as " Sludge the Medium " only appeared after her death. This domestic happiness, however, remained essentially unbroken until she died on 29th June 1861. The whole love-story had revealed the singular nobility of his character, and, though crushed for a time by the blow, he bore it manfully. Browning determined to return to England and superintend his boy's education at home. He took a house at 19 Warwick Crescent,' Paddington, and became gradually acclimatized in London. He resumed his work and published the Dramatis Personae in 1864. The publication was well enough received to mark the growing recognition of his genius, which was confirmed by The Ring and the Book, published in four volumes in the winter of 1868-1869. In 1867 the university of Oxford gave him the degree of M.A. " by diploma," and Balliol College elected him as an honorary fellow. In 1868 he declined a virtual offer of the rectorship of St Andrews. He repeated the refusal on a later occasion (1884) from a dislike to the delivery

of a public address. The rising generation was now beginning to buy his books; and he shared the homage of thoughtful readers with Tennyson, though in general popularity he could not approach his friendly rival. The Ring and the Book has been generally accepted as Browning's masterpiece. It was based on a copy of the precis verbal of Guido Franceschini's case discovered by him at Florence. The audacity of the scheme is surprising. To tell the- story of a hideous murder twelve times over, to versify the arguments of counsel and the gossip of quidnuncs, and to insist upon every detail with the minuteness of a law report, could have occurred to no one else. The poem is so far at the opposite pole from Sor- dello. Vagueness of environment is replaced by a photographic

distinctness, though the psychological interest is dominant in both. Particular phrases may be crabbed, but nothing can be more distinct and vivid in thought and conception. If some of those " dramatic monologues " of which the book is formed fail to be poetry at all, some of them— that of Pompilia the victim, her champion Caponsacchi, and the pope who gives judgment — are in Browning's highest mood, and are as im- pressive from the ethical as from the poetical point of view. Pompilia was no doubt in some respects an idealized portrait of Mrs Browning. Other pieces may be accepted as a background of commonplace to throw the heroic into the stronger ■ relief . The Ring and the Book is as powerful as its method is unique.

Browning became gentler and more urbane as he grew older. His growing fame made him welcome in all cultivated circles, and he accepted the homage of his admirers with dignity and simplicity. He exerted himself to be agreeable in private society, though his nervousness made him invariably decline ever to make public speeches. He was an admirable talker, and took pains to talk his best. A strong memory supplied him with abundant anecdotes; and though occasionally pugnacious, he allowed a fair share of the conversation to his companions. Superficial observers sometimes fancied that the poet was too much sunk in the man of the world; but the appearance was due to his characteristic reluctance to lay bare his deeper feelings. When due occasion offered, the underlying tenderness of his affections was abundantly manifest. No one could show more delicate sympathy. He made many warm personal friendships in his later years, especially with women, to whom he

could most easily confide his feelings. In the early years of this period he paid visits to country houses, but afterwards preferred to retire farther from the London atmosphere into secluded regions. He passed some holidays in remote French villages, Pornic, Le Croisic and St Aubyn, which have left traces in his poetry. Gold Hair is a legend of Pornic, and Herve Riel was written at Le Croisic. At St Aubyn he had the society of Joseph Milsand, who had shown his warm appreciation of Brown- ing 's poetry by an article in the Revue des Deux Mondes, which in 1852 had led to a personal friendship lasting till Milsand's death in 1886. Browning sent to him the proof-sheets of all his later works for revision. In 1877 Browning was at La Saisiaz on the Saleve, near Geneva, where an old friend, Miss Egerton Smith, was staying. She died suddenly almost in his presence. She had constantly accompanied him to concerts during his London life. After her death he almost ceased to care for music. The shock of her loss produced the singular poem called La Saisiaz, in which he argues the problem of personal immortality with a rather indefinite conclusion. In later years Browning returned to Italy, and passed several autumns at Venice. He never visited Florence after his wife's death there.

Browning's literary activity continued till almost the end of his life. He wrote constantly, though he composed more slowly. He considered twenty-five or thirty lines to be a good day's work. His later writings covered a very great variety of subjects, and were cast in many different forms. They show the old characteristics and often the old genius. Browning's marked peculiarity, the union of great speculative acuteness with intense poetical insight, involved difficulties which he did not always surmount. He does not seem to know whether he is writing poetry or when he is versifying logic ; and when the speculative impulse gets the upper hand, his work suggests the doubt whether an imaginary dialogue in prose would not have been a more effective medium. He is analysing at length when he ought to be presenting a concrete type, while the necessities of verse complicate and obscure the reasoning. A curious example is the Prince Hohenstiel-Schwangau (1871),. an alias for Louis Napoleon. The attempt to show how a questionable hero apologizes to himself recalls the very powerful " Bishop Blougram," and " Sludge, the medium," of earlier works, but becomes prolix and obscure. Fifine at the Fair (1872) is another curious speculation containing a defence of versatility in love- making by an imaginary Don Juan. Its occasionally cynical tone rather scandalized admirers, who scarcely made due iv 22

allowance for its dramatic character. Browning's profound

appreciation of high moral qualities is, however, always one main source of his power. In later years he became especially interested in stories of real life, which show character passing through some sharp ordeal. The Red Cotton Nightcap Country (1873), describing a strange tragedy which had recently taken place in France, and especially The Inn Album (1875), founded on an event in modern English society, are powerful applications of the methods already exemplified in The Ring and the Book. The Dramatic Idyls (1879 and 1880) are a collection of direct narratives, with less analytical disquisition, which surprised his readers by their sustained vigour. In the last volumes, Jocoseria (1883), Ferishtah's Fancies (1884), Parleyings with Certain People (1887) and Asolando (1880), the old power is still apparent but the hand is beginning to fail. They contain discussions of metaphysical problems, such as the origin of evil, which are interesting as indications of his creed, but can scarcely be regarded as successful either poetically or philosophically.

Another group of poems showed Browning's interest in Greek literature. Balaustion's Adventure (1871) includes a " transcript from Euripides," a translation, that is, of part of the Alcestis. Aristophanes' Apology (1875) included another translation from the Heracles, and in 1877 he published a very literal translation of the Agamemnon. This, it seems, was meant to disprove the doctrine that /Eschylus was a model of literary style. Brown- ing shared his wife's admiration for Euripides, and takes a phrase from one of her poems as a motto for Balaustion's Adventure. In the Aristophanes' Apology this leads characteristically to a long exposition by Aristophanes of his unsatisfactory reasons for ridiculing Euripides. It recalls the apologies of "Blougram" and Louis Napoleon, and contains some interesting indications of his poetical theory. Browning was to many readers as much prophet as poet. His religious position is most explicitly, though still not very clearly, set forth in the Christmas Eve and Easter Day (1850). Like many eminent contemporaries, he combined a disbelief in orthodox dogma with a profound conviction of the importance to the religious instincts of the symbols incorporated in accepted creeds. Saul (1845), A Death in the Desert (1864), and similar poems, show his strong sympathy with the spirit of the old belief, though his argumentative works have a more or less sceptical turn. It was scarcely possible, if desirable, to be original on such topics. His admirers hold that he shows an affinity to German metaphysicians, though he had never read their works nor made any express study of metaphysical ques- tions. His distinctive tendency is to be found rather in the doctrine of life and conduct which both suggests and is illustrated by his psychological analyses. A very

characteristic thought emphatically set forth in the Rabbi Ben Ezra (1864). and the Grammarian's Funeral (1855) is that a man's value is to be measured, not by the work done, but by the character which has been moulded. He delights in exhibiting the high moral instinct which dares to override ordinary convictions, or which is content with discharge of obscure duties, or superior to vulgar ambition and capable of self-sacrifice, because founded upon pure love and sympathy for human suffering. Browning's limitations are characteristic of the poetry of strong ethical preoccupations. His strong idiosyncrasy, his sympathy with the heroic .and hatred of the base, was hardly to be combined with the Shakespearian capacity for sympathizing with the most varied types of character. Though he deals with a great variety of motive with singularly keen analysis, he takes almost exclus- ively the moral point of view. That point of view, however, has its importance, and his morality is often embodied in poetry of surpassing force. Browning's love of the grotesque, somei times even of the horrible, creates many most graphic and inf delible portraits. The absence of an exquisite sense for t% right word is compensated by the singular power of striking the most brilliant flashes out of obviously wrong words, and forcing comic rhymes to express the deepest and most serious thoughts. Though he professed to care little for motive as apart from human interest, his incidental touches of description are un- surpassably vivid.

The appreciation of Browning's genius became general in his later years, and zeal was perhaps a little heightened by the com- placency of disciples able to penetrate a supposed mist of obscurity. The Browning Society, founded in 1881 by Dr F. J. Furnivall and Miss E. H. Hickey, was a product of this apprecia- tion, and helped to extend the study of the poems. Browning accepted the homage in a simple and friendly way, though he avoided any action which would make him responsible for the publications. He received various honours: LL.D. degree from Cambridge in 1879, the D.C.L. from Oxford in 1882, and LL.D. from Edinburgh in 1884. He became foreign correspondent to the Royal Academy in 1886. His sen, who had settled at Venice, married in 1887, and Browning moved to De Vere Gardens. In the autumn of 1889 he went with his sister to visit his son, and stayed on the way at Asolo, which he had first seen in

1838, when it supplied the scenery of Pippa Passes. He was charmed with the place, and proposed to buy a piece of ground and to build upon it a house to be called " Pippa's Tower" — in memory of his early heroine. While his proposal was under con- sideration he went to his son at Venice. His health had been breaking for some time, and a cold, aggravated by weakness of the heart, brought on a fatal attack. He died on the 12th of December 1889. He was buried in Westminster Abbey on 31st December. It was suggested that his wife's body should be removed from Florence to be placed beside him; but their son rightly decided that her grave should not be disturbed.

Browning's personal characteristics are so strongly stamped upon all his works that it is difficult to assign his place in con- temporary thought. He is unique and outside of all schools. His style is so peculiar that he is the easiest of all poets to parody and the most dangerous to imitate. In spite of his early Shelley worship he is in certain respects more closely related to Words- worth. Both of them started by accepting the poet's mission as quasi-prophetical or ethical. In other respects they are dia- metrically contrasted. Wordsworth expounded his philosophy by writing a poetical autobiography. Browning adheres to the dramatic method of which Wordsworth was utterly incapable. He often protested against the supposition that he put himself into his books. Yet there is no writer whose books seem to readers to be clearer revelations of himself. Nothing, in fact, is more characteristic of a man than his judgments of other men, and Browning's are keen and unequivocal. The revolutionary impulse had died out, and Browning has little to say either of the political questions which had moved Shelley and Byron, or of the social problems which have lately become more pro- minent. He represents the thought of a quieter epoch. He was little interested, too, in the historical or " romantic " aspect of life. He takes his subjects from a great variety of scenes and places — from ancient Greece, medieval Italy and modern France and England; but the interest for him is not in the picturesque surroundings, but in the human being who is to be found in all periods. Like Balzac, whom he always greatly admired, he is interested in the eternal tragedy and comedy of life. His problem is always to show what are the really noble elements which are eternally valuable in spite of failure to achieve tangible results. He gives, so far, another version of Words- worth's doctrine of the cultivation of the " moral being." The psychological acuteness and the subtle analysis of character are, indeed, peculiar to himself. Like Carlyle, with whom he had certain points of affinity, he protests, though rather by impli- cation than

direct denunciation, against the utilitarian or materialistic view of life, and finds the divine element in the instincts which guide and animate every noble character. When he is really inspired by sympathy for such emotions he can make his most grotesque fancies and his most far-fetched analyses subservient to poetry of the highest order. It can hardly be denied that his intellectual ingenuity often tempts him to deviate from his true function, and that his observations are not to be excused because they result from an excess, instead of a de- ficiency, of intellectual acuteness. But the variety of his interests — aesthetic, philosophical and ethical — is astonishing,

and his successes are poems which stand out as unique and unsurpassable in the literature of his time.

The Life and Letters of Browning, by Mrs Sutherland Orr (1891), one of his most intimate friends in later years, and The Love Letters of Robert Browning and Elizabeth Barrett Barrett, 1845-1846, published by his son in 1899, are the main authorities. A collection of Browning's poems in 2 vols, appeared in 1849, another in 3 vols, in 1863, another in 6 vols, in 1868, and a revised edition in 16 vols, in 1888-1889; in 1896 Mr Augustine Birrell and Mr F. G. Kenyon edited a complete edition in 2 vols. ; another two-volume edition was issued by Messrs Smith, Elder in 1900. Among commentaries on Browning's works, Mrs Sutherland Orr's Handbook to the Works of Browning was approved by the poet himself. See also the Browning Society's Papers; and Mr T. J. Wise's Materials for a Bibliography of the Writings of Robert Browning, included in the Literary Anecdotes of the Nineteenth Century (1895), by W. Robertson Nicoll and T. J. Wise; Mr. Edmund Gosse's Robert Browning: Personalia (1890), from notes supplied by Browning himself. Among biographical and critical authorities may be mentioned: J. T. Nettleship, Essays (1868); Arthur Symons, An Introduction to the Study of Browning (1886); Stopford Brooke, The Poetry of Robert Browning (1902); G. K. Chesterton, Browning (1908) in the " English Men of Letters " series. (L. S.)

BROWN – SEQUARD, CHARLES EDWARD (181 7-1894), British physiologist and neurologist, was born at Port Louis, Mauritius, on the 8th of April 181 7. His father was an American and his mother a Frenchwoman, but he himself always desired to be looked upon as a British subject, though in the restlessness of his life and the enthusiasm of his disposition, characteristics of his mother's nation were plainly visible. After graduating in medicine at Paris in 1846 he returned to Mauritius with the intention of practising there, but in

1852 he went to America. Subsequently he returned to Paris, and in 1859 he migrated to London, becoming physician to the national hospital for the paralysed and epileptic. There he stayed for about five years, expounding his views on the pathology of the nervous system in numerous lectures which attracted considerable attention. In 1864 he again crossed the Atlantic, and was appointed professor of physiology and neuro-pathology at Harvard. This position he relinquished in 1867, and in 1869 became professor at the Ecole de Medecine in Paris, but in 1873 he again returned to America and began to practise in New York. Finally, he went back to Paris to succeed Claude Bernard in 1878 as professor of experimental medicine in the College de France, and he remained there till his death, which occurred on the 2nd of April 1894 at Sceaux. Brown-Sequard was a keen observer and experi- mentalist. He contributed largely to our knowledge of the blood and animal heat, as well as many facts of the highest importance on the nervous system. He was the first scientist to work out the physiology of the spinal cord, demonstrating that the decussation of the sensory fibres is in the cord itself. He also did valuable work on the internal secretion of organs, the results of which have been applied with the most satisfactory results in the treatment of myxoedema. Unfortunately in his extreme old age, he advocated the hypodermic injection of a fluid prepared from the testicles of sheep, as a means of prolonging human life. It was known, among scientists, derisively, as the Brown- Sequard Elixir. His researches, published in about 500 essays and papers, especially in the Archives de Physiclogie, which he helped to found in 1868, cover a very wide range of physiological and pathological subjects.

BROWNSON, ORESTES AUGUSTUS (1803-1876), American theological, philosophical and sociological writer, was born in Stockbridge, Vermont, on the 16th of September 1803. Having spent some time in active religious, reformatory and political (Democratic) work in the interior of New York state, and at Walpole, New Hampshire, and Canton, Massachusetts, Brownson removed in 1839 to Chelsea, Mass. He at once began to take an independent part in the movements then agitating New England, which between 1830 and 1850 was stirred by discus- sions pertaining to Unitarianism, transcendentalism, spiritual- ism, abolitionism and various schemes for communistic living. He was one of the founders, in New York, of the short-lived Workingman's party in 1828, and established the BostonQuarterly Review, mainly written by himself, in 1838. This periodical was merged in the U.S. Democratic Review of New York in 1842.

In religion he first became a Prebysterian (1822); was a Universalis! minister from 1826 to 183 1, editing for sometime the chief journal of this church, the Gospel Advocate ; was an independent preacher at Ithaca, N.Y., in 1831; became a Unitarian minister in 1832, and in 1836 organized in Boston the Society for Christian Union and Progress, of which he was the pastor for seven years. In 1844 he became a Roman Catholic and so remained, though the question of the orthodoxy of his writings was at one time submitted by the pope to Cardinal Franzelin, who recommended Brownson, to little purpose, to express his views with more moderation. In his philosophy Brownson was a more or less independent follower of Comte for a short time, and of Victor Cousin, who, in his Fragmens philosophiques, praised him; he may be said to have taught a modified intuitionalism. In his schemes for social reform he was at first a student of Robert Owen, until his later views led him to accept Roman Catholicism. His first quarterly was followed, in 1844, by Brownson' s Quarterly Review (first published in Boston and after 1855 in New York), in which he expressed his opinions on many themes until its suspension in 1864, and after its revival for a brief period in 1873-1875. Of his numerous publications in book form, the chief during his lifetime were Charles Elwood, or the Infidel Converted (1840, autobiographical), in which he strongly favoured the Roman Catholic Church; and The American Republic: its Constitution, Tendencies and Destiny (1865), in which he based government on ethics, declaring the national existence to be a moral and even a theocratic entity, not depending for validity upon the sovereignty of the people. Brownson died in Detroit, Michigan, on the 17th of April 1876.

After his death, his son, Henry F. Brownson, collected and published his various political, religious, philosophical, scientific and literary writings, in twenty octavo volumes (Detroit, 1883-1887), of which a condensed summary appeared in a single volume, also prepared by his son, entitled Literary and Political Views (New York, 1893). The son also published a biography in three volumes (Detroit, 1898-1900).

His daughter, Sarah M. Brownson (1839-1876), who married in 1873 William J. Tenney, was the author of several novels, and wrote a Life of Demetrius Augustine Gallitzin, Prince and Priest (1873).

*BROWNSVILLE, a city and the county-seat of Cameron county, Texas, U.S.A., situated near the S. extremity of the state, on the Rio Grande river about 22 m. above its mouth, and opposite Matamoras, Mexico. Pop. (1890) 6134; (1900) 6305, including 2462 foreign-born and 18 negroes; (1910) 10,517. It is served by the St Louis, Brownsville & Mexico, and the Rio Grande railways, being connected by the former with Houston and Galveston and by the latter with Point Isabel on the Gulf coast. Its chief importance lies in its being the com- mercial and distributing centre for a rich and extensive agri- cultural region in southern Texas and northern Mexico, and an important market for rice, sugar-cane, fruit, vegetables a*nd live-stock. It has a United States custom house, the Cameron county court house, a Roman Catholic cathedral, St Joseph's College (Roman Catholic), and the Incarnate Word Academy (Roman Catholic). Before the Mexican War there was a small Mexican settlement on the site of Brownsville. In March 1846 General Zachary Taylor erected fortifications here, and upon his withdrawal to Point Isabel, left a small garrison in command of Major Jacob Brown. The fort was assaulted by General Arista and shelled by batteries from the Mexican shore, and at last on the 10th of May was relieved by General Taylor, who in advancing to its aid had won the battles of Palo Alto (8th of May) and Resaca de la Palma (9th of May). The fort, originally named Fort Taylor, was renamed Fort Brown, by order of General Taylor, in memory of Major Brown, who was mortally wounded during the bombardment. In 1859 Brownsville was captured by a band of Mexican raiders under Juan Nepomuceno Cortina. During the Civil War, until its temporary occupation by Federal forces in 1863, and subsequent effective blockade, it was an active centre of operations of Confederate blockade runners. At Palmetto Ranch, near the battlefield of Palo Alto, took place (13th of May 1865), more than a month after General Lee's surrender,the last engagement between Federal and Confederate*

troops in the Civil War. In Brownsville, on the night of the 13th of August 1906, certain persons unknown fired into houses and at citizens on the streets, killing on« man and injuring two. Suspicion pointed to negro soldiers of Companies B, C and D of the 25th Infantry, stationed at Fort Brown, and as it appeared that the culprits were being shielded by their comrades by a " conspiracy of silence," President Roosevelt dismissed the 170 men of the three companies " without honor." Both in Congress and in the press a bitter attack was made on the president for his action. In 1907 the military reservation of Fort Brown was transferred to the Department

of Agriculture. In March 1909 Congress provided for a commission of army officers to report as to the eligibility of members of the negro regiments for re-enlistment.

BRUAY, a town of northern France, in the department of Pas-de-Calais, on the Lawe, 19 m. N.N.W. of Arras by road. Pop. (1906) 16,169. The town is situated in a rich coal-mining district. Brewing is also a leading industry.

BRUCE, the name of an old Scottish family of Norman descent, taken from Bruis between Cherbourg and Vallonges. Variations of the name are Braose, Breaux and Brus. The first Robert de Brus, a follower of William the Conqueror, was rewarded by the gift of many manors, chiefly in Yorkshire, of which Skelton was the principal. His son, the second Robert, received from David I., his comrade at the court of Henry I., a grant of the lordship of Annandale. The fourth Robert married Isabel, natural daughter of William the Lion, and their son, the fifth .Robert, married Isabel, second daughter of David, earl of Huntingdon, niece of the same Scottish king. The most famous member of the family is the eighth Robert, " the Bruce," who became king of Scotland in 1306. (See Robert the Bruce.)

BRUCE, ALEXANDER BALMAIN (1831-1899), Scottish divine, was born at Aberargie near Perth on the 31st of January 1 83 1 . His father suffered for his adherence to the Free Church at the Disruption in 1843, and removed to Edinburgh, where the son was educated, showing exceptional ability from the first. His early religious doubts, awakened especially by Strauss's Life of Jesus, made him throughout life sympathetic with those who underwent a similar stress. After serving as assistant first at Ancrum, then at Lochwinnoch, he was called to Cardross in Dumbartonshire in 1859, and to Broughty Ferry in 1868. There he published his first considerable exegetieal work, the Training of the Twelve. In 1874 he delivered his Cunningham Lectures, afterwards published as The Humiliation of Christ, and in the following year was appointed to the chair of Apologetics and New Testament exegesis at the Free Church College, Glasgow. This post he held for twenty-four years. He was one of the first British New Testament students whose work was received with consideration by German scholars of repute. The character and work of Christ were, he held, the ultimate proof and the best defence of Christianity; and his tendency was to concentrate attention somewhat narrowly on the historic Jesus. In The Kingdom of God (1889), which first encountered serious hostile criticism in his own communion, he accounted for some of the differences between the first and third evangelists on the principle of accommodation —

maintaining that Luke had altered both the text and the spirit of his sources to suit the needs of those for whom he wrote. It was held that these admissions were not consistent with the views of inspiration professed by the Free Church. When the case was tried, the assembly held that the charge of heresy was based on a misunderstanding, but that " by want of due care in his mode of statement he had given some ground for the painful impressions which had existed."

Bruce rendered signal service to his own communion in connexion with its service of praise. He was convener of the committee which issued the Free Church hymn book, and he threw into this work the same energy and catholicity of mind which marked the rest of his activities. He died on the 7th of August 1899, and was buried at Broughty Ferry. His chief works, beside the above, are : The Chief End of Revelation (Lond., 1881); The Parabolic Teaching of Christ (Lond., 1882); F. C. Baur and his Theory of the Origin of Christianity and of the

New Testament Writings in " Present Day Tracts " (Lond., 1885) ; Apologetics, or Christianity Defensively Stated (Edin., 1892); St Paul's Conception of Christianity (Lond., 1894); Expos. Gk. Test, (the Synoptic Gospels, Lond., 1897). With Open Face (Lond., 1896); The Epistle to the Hebrews (Edin., 1899); The Providential Order of the World, and the Moral Order of the World in Ancient and Modern Thought (Gilford Lectures, 1896-1897; Lond., 1897, 1899). (D. Mn.)

BRUCE, JAMES (1730-1794), Scottish explorer in Africa, was born at Kinnaird House, Stirlingshire, on the 14th of December 1730. He was educated at Harrow and Edinburgh University, and began to study for the bar; but his marriage to the daughter of a wine merchant resulted in his entering that business. His wife died in October 1754, within nine months of marriage, and Bruce thereafter travelled in Portugal and Spain. The examination of oriental MSS. at the Escurial led him to the study of Arabic and Geez and determined his future career. In 1758 his father's death placed him in possession of the estate of Kinnaird. On the outbreak of war with Spain in 1762 he submitted to the British government a plan for an attack on Ferrol. His suggestion was not adopted, but it led to his selection by the 2nd earl of Halifax for the post of British consul at Algiers, with a commission to study the ancient ruins in that country, in which

interest had been excited by ithe descriptions sent home by Thomas Shaw 1 (1694-1751), consular chaplain atAlgiers, 1719-1731. Having spent six months in Italy studying antiquities, Bruce reached Algiers in March 1763. The whole of his time was taken up with his consular duties at the piratical court of the dey, and he was kept without the assistance promised. But in August 1765, a successor in the consulate having arrived, Bruce began his exploration of the Roman ruins in Barbary. Having examined many ruins in eastern Algeria, he travelled by land from Tunis to Tripoli, and at Ptolemeta took passage for Candia; but was shipwrecked near Bengazi and had to swim ashore. He eventually reached Crete, and sailing thence to Sidon, travelled through Syria, visiting Palmyra and Baalbek. Throughout his journeyings in Barbary and the Levant, Bruce made careful drawings of the many ruins he examined. He also acquired a sufficient knowledge of medicine to enable him to pass in the East as a physician.

In June 1768 he arrived at Alexandria, having resolved to endeavour to discover the source of the Nile, which he believed to rise in Abyssinia. At Cairo he gained the support of the Mameluke ruler, Ali Bey; after visiting Thebes he crossed the desert to Kosseir, where he embarked in the dress of a Turkish sailor. He reached Jidda in May 1769, and after some stay in Arabia he recrossed the Red Sea and landed at Massawa, then in possession of the Turks, on the 19th of September. He reached Gondar, then the capital of Abyssinia, on the 14th of February 1770, where he was well received by the negus Tekla Haimanot II., by Ras Michael, the real ruler of the country, by the ras's wife, Ozoro Esther, and by the Abyssinians generally. His fine presence (he was 6 ft. 4 in. high), his knowledge of Geez, his excellence in sports, his courage, resource and self-esteem, all told in his favour among a people who were in general dis- trustful of all foreigners. He stayed in Abyssinia for two years, gaining knowledge which enabled him subsequently to present a perfect picture of Abyssinian life. On the 14th of November 1 7 70 he reached' the long-sought source of the Blue Nile. Though admitting that the White Nile was the larger stream, Bruce claimed that the Blue Nile was the Nile of the ancients and that he was thus the discoverer of its source. The claim, however, was not well founded (see Nile : Story of Exploration) . Setting out from Gondar in December 1771, Bruce made his way, in spite of enormous difficulties, by Sennar to Nubia, being the first to trace the Blue Nile to its confluence with the White Nile. On the 29th of November 1772 he reached Assuan, presently re- turning to the desert to recover his journals and his baggage, which had been abandoned in consequence of the death of all his

camels. Cairo was reached in January 1773, and in March

1 Dr Shaw's Travels . . . relating to Several Parts of Barbary . . . was first printed at Oxford (1738).

Bruce arrived in France, where he was welcomed by Buffon and other savants. He came to London in 1774, but, offended by the incredulity with which his story was received, retired to his home at Kinnaird. It was not until 1790 that, urged by his friend Daines Barrington, he published his Travels to Discover the Source of the Nile in the Years 1768-73, in five octavo volumes, lavishly illustrated. The work was very popular, but was assailed by other travellers as being unworthy of credence. The manner in which the book was written— twelve years after Bruce's return from Africa and without reference to his journals — gave some handle to his critics, but the substantial accuracy of every statement concerning his Abyssinian travels has since been amply demonstrated. He died on the 27th of April 1794.

Bruce wrote an autobiography, part of which is printed in editions of his Travels, published in 1805 and 1813, accompanied by a biographical notice by the editor, Alexander Murray. The best edition of the Travels is the third (Edinburgh, 1813, 8 vols.). Of the abridgments the best is that of Major (afterwards Sir Francis) Head, the author of a well-informed Life of Bruce (London, 1830). The best account of Bruce's travels in Barbary is contained in Sir R. Lambert Playfair's Travels in the Footsteps of Bruce (London, 1877), in which a selection of his drawings was published for the first time. Several of Bruce's drawings were presented to George III. and are in the royal collection at Windsor.

BRUCE, MICHAEL (1746-1767), Scottish poet, was born at Kinnesswood in the parish of Portmoak, Kinross-shire, on the 27th of March 1746. His father, Alexander Bruce, was a weaver, and a man of exceptional ability. Michael was taught to read before he was four years old, and one of his favourite books was a copy of Sir David Lyndsay's works. He was early sent to school, but his attendance was often interrupted. He had frequently to herd cattle on the Lomond Hills in summer, and this early companionship with nature greatly influenced his poetic genius. He was a delicate child, and grew up contem- plative, devotional and humorous, the pet of his family and his friends. His parents gave him an education superior to their position; he studied Latin and Greek, and at fifteen, when his school education was completed, a small legacy left to his mother, with some additions from kindly neighbours, provided means to send

Michael to Edinburgh University, which he attended during the four winter sessions 1 762-1 765. In 1765 he taught during the summer months at Gairney Bridge, receiving about £1 1 a year in fees and free board in one or other of the homes of his pupils. He became a divinity student at Kinross of a Scottish sect known as the Burghers, and in the first summer (1766) of his divinity course accepted the charge of a new school at Forest Hill, near Clackmannan, where he led a melancholy life. Poverty, disease and want of companions depressed his spirits, but there he wrote " Lochleven," a poem inspired by the memories of his childhood. He had before been threatened with consumption, and now became seriously ill. During the winter he returned on foot to his father's house, where he wrote his last and finest poem, " Elegy written in Spring," and died on the 5th of July

1767.

As a poet his reputation has been spread, first, through symˆ pa thy for his early death; and secondly, through the alleged theft by John Logan (q.v.) of several of his poems. Logan, who had been a fellow-student of Bruce, obtained Bruce's MSS. from his father, shortly after the poet's death. For the letters, poems, &c. , that he allowed to pass out of his hands, Alexander Bruce took no receipt, nor did he keep any list of the titles. Logan edited in 1770 Poems on Several Occasions, by Michael Bruce, in which the "Ode to the Cuckoo " appeared. In the preface he stated that " to make up a miscellany, some poems written by different authors are inserted." In a collection of his own poems in 1781, Logan printed the " Ode to the Cuckoo " as his own; of this the friends of Bruce were aware, but did not challenge its appropria- tion publicly. In a MS. Pious Memorials of Portmoak, drawn up by Bruce's friend, David Pearson, Bruce's authorship of the " Ode to the Cuckoo " is emphatically asserted. This book was in the possession of the Birrell family, and John Birrell, another friend of the poet, adds a testimony to the same effect. Pearson and Birrell also wrote to Dr Robert Anderson while he was publishing his British Poets, pointing out Bruce's claims. Their

communications were used by Anderson in the " Life " prefixed to Logan's works in the British Poets (vol. ii. p. 1029). The volume of 1770 had struck Bruce's friends as being incomplete, and his father missed his son's " Gospel Sonnets," which are supposed by the

partisans of Bruce against Logan to have been the hymns printed in the 1781 edition of Logan's poems. Logan tried to prevent by law the reprinting of Bruce's poems (see James Mackenzie's Life of Michael Bruce, 1905, chap, xii.), but the book was printed in 1782, 1784, 1796 and 1807. Dr William M'Kelvie revived Bruce's claims in Lochleven and Other Poems, by Michael Bruce, with a Life of the Author from Original Sources (1837). Logan's authorship rests on the publication of the poems under his own name, and his reputation as author during his lifetime. His failure to produce the " poem book " of Bruce entrusted to him, and the fact that no copy of the " Ode to the Cuckoo " in his handwriting was known to exist during Bruce's lifetime, make it difficult to relieve him of the charge of plagiarism. Prof. John Veitch, in The Feeling for Nature in Scottish Poetry (1887, vol. ii. pp. 89-91), points out that the stanza known to be Logan's addition to this ode is out of keeping with the rest of the poem, and is in the manner of Logan's established compositions, in which there is nothing to suggest the direct simplicity of the little poem on the cuckoo.

Bibliography. — Additions to Poems on Several Occasions (1770) were made by Dr M'Kelvie in his 1837 edition. He gives (p. 97) a list of the poems not printed in Logan's selection, and of those that are lost. See the " Lives " of Bruce and of Logan in Anderson's British Poets (1795); an admirable paper on Bruce in The Mirror (No. 36, 1779), said to be by William Craig, one of the lords of session ; The Poetical Works of Michael Bruce, with Life and Writings (1895), by William Stephen, who, like Dr A. B. Grosart in his edition (1865) of The Works of Michael Bruce, adopts M'Kelvie's view. A restatement of the case for Bruce's authorship, coupled with a rather violent attack on Logan, is to be found in the Life of Michael Bruce, Poet of Loch Leven, with Vindication of his Authorship of the " Ode to the Cuckoo "and other Poems, also Copies of Letters written by John Logan now first published (1905), by James Mackenzie.

BRUCH, MAX (1838-), German musical composer, son of a city official and grandson of the famous Evangelical cleric, Dr Christian Bruch, was born at Cologne on the 6th of January 1838. From his mother {nee Almenrader), a well-known musician of her time, he learnt the elements of music, but under Breiden- stein he made his first serious effort at composition at the age of fourteen by the production of a symphony. In 1853 Bruch gained the Mozart Stipendium of 400 gulden per annum for four years at Frankfort-on-Main, and for the following few years studied under Hiller, Reinecke and Breunung. Subsequently he lived from 1858 to 1861 as pianoforte teacher at Cologne, in which city his first opera (in one

act), Scherz, List und Rache, was produced in 1858. On his father's death in 1861, Bruch began a tour of study at Berlin, Leipzig, Vienna, Munich, Dresden and Mannheim, where his opera Lorelei was brought out in 1863. At Mannheim he lived till 1864, and there he wrote some of his best-known works, including the beautiful Frithjof. After a further period of travel he became musical-director at Coblenz (1865-1867), Hofkapellmeister at Sondershausen (1867-1870), and lived in Berlin (1871-1873), where he wrote his Odysseus, his first violin concerto and two symphonies being composed at Sondershausen. After five years at Bonn (1873-1878), during which he made two visits to England, Bruch, in 1878, became conductor of the Stern Choral Union; and in 1880 of the Liver- pool Philharmonic. In 1892 he was appointed director of the Berlin Hochschule. In 1893 he was given the honorary degree of Mus. Doc. by Cambridge University. Max Bruch has written in almost every conceivable musical form, invariably with straight- forward honest simplicity of design. He has a gift of refined melody beyond the common, his melodies being broad and suave and often exceptionally beautiful. – .

BRUCHSAL, a town of Germany, in the grand-duchy of Baden, prettily situated on the Saalbach, 14 m. N. from Karlsruhe, and an important junction on the main railway from Mannheim to Constance. Pop. (1900), including a small garrison, 13,555. There are an Evangelical and four Roman Catholic churches, among the latter that of St Peter, the burial-place of the bishops

of Spires, whose princely residence (now used as a prison) lies in the vicinity. Bruchsal has a fine palace, with beautiful grounds attached, a town hall, a classical, a modern and a commercial school, and manufactures of machinery, paper, tobacco, soap and beer, and does a considerable trade in wine. Bruchsal (mentioned in 937 as Bruxolegum) was originally a royal villa (Konigshof) belonging to the emperors and German kings. Given in 1002 to Otto, duke of Franconia, it was inherited by the cadet line of Spires, the head of which, the emperor Henry III., gave it to the see of Spires in 1095. From 1105 onward it became the summer residence of the bishops, who in n 90 bought the Vogtei (advocateship) from the counts of Calw, and the place rapidly developed into a town. It remained in the possession of the bishops till 1802, when by the treaty of Luneville it was ceded, with other lands of the bishopric on the right bank of the Rhine, to Baden. The Peasants' War during the Reformation period first broke out in Bruchsal. In 1609 it was captured by the elector palatine, and in 1676 and 1698 it was burnt down by the French. In 1849 it was the scene of an engagement between the Prussians and

the Baden revolutionists.

See Rossler, Geschichte der Siadt Bruchsal (2nd ed., Bruchsal, 1894).

BRUCINE, C 2 3H 26 N 2 04, an alkaloid isolated in 1819 by J. Pelletier and J. B. Caventou from " false Angustura bark." It crystallizes in prisms with four molecules of water; when anhydrous it melts at 1 78°. It is very similar to strychnine (q.v.), both chemically and physiologically.

BRUCITE, a mineral consisting of magnesium hydroxide, Mg(OH) 2 , and crystallizing in the rhombohedral system. It was first described in 1814 as " native magnesia " from New Jersey by A. Bruce, an American mineralogist, after whom the species was named by F. S. Beudant in 1824; the same name had, however, been earlier applied to the mineral now known as chondrodite. Brucite is usually found as platy masses, some- times of considerable size, which have a perfect cleavage parallel to the surface of the plates. It is white, sometimes with a tinge of grey, blue or green, varies from transparent to translucent, and on the cleavage surfaces has a pronounced pearly lustre. In general appearance and softness (H= 25) it is thus not unlike gypsum or talc, but it may be readily distinguished from these by its optical character, being uniaxial with positive birefringence, whilst gypsum is biaxial and talc has negative birefringence. The specific gravity is 2 -38-2 -40. In the variety known as nemalite the structure is finely fibrous and the lustre silky: this variety contains 5 to 8 % of ferrous oxide replacing magnesia, and has consequently a rather higher specific gravity, viz. 2-45. Another variety, manganbrucite, has the magnesia partly replaced by manganous oxide (14%), and thus forms a passage to the isomorphous mineral pyrochroite, Mn(OH) 2 .

Brucite is generally associated with other magnesian minerals, such as magnesite and dolomite, and is commonly found in serpentine, or sometimes as small scales in phyllites and crystal- line schists; it has also been observed in metamorphosed magnesian limestone, such as the rock known as predazzite from Predazzo in Tirol. The best crystals and foliated masses are from Texas in Pennsylvania, U.S.A., and from Swinaness in Unst, one of the Shetland Isles. Nemalite is from Hoboken, New Jersey, and from Afghanistan. At all these localities the mineral forms veins in serpentine. (L. J. S.)

BRUCKENAU, a town and fashionable watering-place of Germany, in the kingdom of Bavaria, on the Sinn, 16 m. N.W. of Kissingen.

The mineral springs, five in number, situated in the pleasant valley of the Sinn, 2 m. from the town, were a favourite resort of Louis I. of Bavaria. Pop. 1700.

BRUCKER, JOHANN JAKOB (1696-1770), German historian of philosophy, was born at Augsburg. He was destined for the church, and graduated at the university of Jena in 17 18. He returned to Augsburg in 1720, but became parish minister of Kaufbeuren in 1723. In 1731 he was elected a member of the Academy of Sciences at Berlin, and was invited to Augsburg as pastor and senior minister of the church of St Ulrich. His chief work, Historia Critica Philosophiae, appeared at Leipzig (5 vols., 1742-1744). Its success was such that a new edition

was published in six volumes (1766-1767; English translation by W. Enfield, 1701). It is' by this work alone that Brucker is now known. Its merit consists entirely in the ample collection of materials. 'He also wrote Tentamen Introductionis in His- toriam Doclrinae de Ideis, afterwards completed and republished under the title of Historia Philosophicae Doctrinae de Ideis (Augsburg, 1723); Olium Vindelicum (1731); Kurze Fragen aus der philosophischen Historie (7 vols., Ulm, 1731-1736), a history of philosophy in question and answer, containing many details, especially in the department of literary history, which he omitted in his chief work; Pinacotheca Scriptorum nostra aetate Uteris illustrium, &c. (Augsburg, 1741-1755); Ehrentempel der deutschen Gelehrsamkeit (Augsburg, 1747-1749); Instilutiones Historiae Philosophicae (Leipzig, 1747 and 1756; 3rd ed. with a continuation by F. G. B. Born (1743-1807) of Leipzig, in 1790); Miscellanea Historiae Philosophicae Literariae Crilicae olim sparsim edita (Augsburg, 1748); Erste Anfangsgrunde der philosophischen Geschichte (Ulm, 1751). He superintended an edition of Luther's translation of the Old and New Testament, with a commentary extracted from the writings of the English theologians (Leipzig, 1758-1770, completed by W. A. Teller). He died at Augsburg in 1770.

BRUCKMANN, FRANZ ERNST (1697-1753), German miner- alogist, was born on the 27 th of September 1697 at Marienthal near Helmstadt. Having qualified as a medical man in 1721, he practised at Brunswick and afterwards at Wolfenbiittel. His leisure time was given up to natural history, and especially to mineralogy and botany.

He appears to have been the first to introduce the term oolithus to rocks that resemble in structure the roe of a fish; whence the terms oolite and oolitic. He died at Wolfenbiittel on the 21st of March 1753. He published Magnalia Dei in locis subterrancis (Brunswick, 1727), Historia naturalis curiosa lapidis (1727), and Thesaurus subterraneus Ducaius Brunsvigii (1728).

BRUCKNER, ANTON (1824-1896), Austrian musical composer, was born on the 4th of September 1824 at Ansfelden in upper Austria. He successfully competed for the organistship for Linz Cathedral in 1855. In 1867 he succeeded his former master of counterpoint, Sechter, as organist of the Hofkapelle in Vienna, and also became professor in the conservatorium. In 1875 he was appointed to a lectureship in the university. His most striking talent .was shown in his extemporizations on the organ. His success in an organ competition at Nancy in 1869 led to his play- ing in Paris and London (six recitals at the Albert Hall, 1871). His permanent reputation, however, rests on his compositions, especially his nine symphonies. In these gigantic efforts the influence of Wagner is paramount in almost every feature of harmony and orchestration; and if sustained seriousness of pur- pose and style were all that was necessary to give coherence to works in which these influences are stultified by the rhythmic uniformities of an experienced improvisator e and the impressions of classical form as taught in schools, then Bruckner would certainly have been what the extreme Wagnerian party called him, the symphonic successor of Beethoven, or the Wagner of the symphony. But their lack of organization and proportion, to say nothing of humour, will always make their revival a somewhat severe task. No composer has ever been more con- sistent to lofty ideals, though few who have ever had an ideal have shown less adroitness in their methods of embodying it. The most poetic and admired feature of his style is a slow growth to a gigantic climax, slow enough and gigantic enough for any situa- tion in Wagner's Nibelungen tetralogy. The symphonies in which these climaxes occur are in obviously unskilful classical form, with only an outward appearance of freedom; and the Great Pyramid would hardly be more out of place in an Oxford quadrangle than Bruckner's climaxes in his four-movement symphonies with their " second subjects " and recapitulations. Nor is it likely that Bruckner would have been much more successful in handling these gigantic things in their legitimate Wagnerian dramatic environment, for even in his last three symphonies he hardly ever frees himself from the trammels of square rhythm; and, as he accepts the classical sonata-forms

without inquiry into their meaning or relevance, so he accepts the Wagnerian stage orchestra in its minutest details, without inquiry as to its relevance for the purposes and acoustics of the concert-room, and with the same lack of sense of relief that ruins the balance of his rhythmic periods. So unsophisticated a tem- perament may be not unpoetical, but it is eminently undramatic, as well as unsymphonic. Of Bruckner's choral works, which include three masses and several psalms and motets, the most famous is the Te Deum (1885?), 1 which shows his characteristic power in massive effect. Bruckner wished this to be appended to the three complete movements of his 9th symphony, which his last illness (ending in his death at Vienna on the nth of October 1896) prevented him from finishing. This 9th symphony is designed, with characteristic tactlessness and simplicity, to follow Beethoven's 9th symphony in every possible point which could challenge comparison; in key (D minor), opening (mysterious tremolo leading to tremendous unison lulti), contrasts (return in first movement) and choral finale. The three complete move- ments were first performed in Vienna in 1903, and have done more for Bruckner's fame than anything since the production in 1884 of his 7 th symphony (of which the slow movement is an elegy on the death of Wagner). It is probable that the impression pro- duced by this 9th symphony is the deeper as owing little or nothing to the musical politics which had gone far to prevent the 7th symphony from standing on its own unmistakable merits. It does not, however, seem likely that Bruckner's work will have much influence on musical progress; for the modern character- istics in which its strength lies are obviously better realized in other forms which have often been handled successfully by composers greatly Bruckner's inferiors both in invention and sincerity. (D. F. T.)

BRUGES (Flemish Brugge, a name signifying the bridge or place of bridges), the capital of West Flanders, Belgium. Pop. (1904) 53,728. The city contains some of the finest monuments of the great period of the Flemish communes, while its medieval appearance is better preserved, as a whole, than in the case of any other Belgian city. The cathedral of St Sauveur and the church of Notre-Dame, both specimens of early Pointed Gothic, date from the 13th and 14th centuries. Both are full of interest, but the cathedral was much injured by fire in 1839. The interior, however, is finely proportioned and exhibits beautiful modern polychrome decorations, numerous pictures and interesting monumental brasses. The church of Notre-Dame contains a fine De Crayer (The Adoration of the Magi), Michelangelo's marble group of the Virgin and Child, and the fine monuments with gilded copper effigies of Charles the Bold and his

daughter, Mary of Burgundy. The hospital of St Jean, where the sick have been cared for since the 12 th century, contains the chief works of Memling, including the famous reliquary of St Ursula. The market-hall was built in 1 561-1 566 on the site of an older building, some portions of which were utilized in its successor. The belfry which rises in the centre of the facade dates from the end of the 13th century; it has long been famous for its chime of bells, but the civic fathers have caused modern airs to be substituted for the old hymn. The hdtel de ville, the Chapelle du Saint-Sang and the church of St Jacques are all of interest. The first is Gothic and was begun about 13 76. The second is a chapel of two storeys, the lower dating from n 50, while the upper was rebuilt in the 15th century, and there is a rich Flamboyant entrance with a stairway (1533). St Jacques' church is a foundation of the 13th century, but has extensive additions of the close of the 15th and 17th centuries. The Palais de Justice, of the 18th century, on the site of the House of the Franc — the outside burghers of the Franc district admitted to the full privileges of citizenship — contains a fine carved chimney-piece (1 530) . The house is supposed to have formed part of the residence of the counts of Flanders. There are numerous other buildings of minor antiquarian interest; the fine museum contains a representative gallery of early Flemish paintings; and of the old fortifications three gates remain. The

1 This date is given in Grove (new ed.), but the style of the work is far earlier than that of the 7th symphony (1884) which quotes it in the slow movement.

manufacture of lace now gives employment to at least 6000 persons in the town, and horticulture is carried on extensively in the suburbs.- Commercial activity has been assisted by the new ship-canal to Zeebrugge, and by direct steamship service from Hull to Bruges. The steady growth of the population is evidence of increased prosperity. In 1880 the population was only 44,500, but it had risen in 1900 to 51,657 and in 1904 it was 53,728.

Bruges is said to have been a city in the 7th century, and the name Flanders was originally applied to it and not to the district. Baldwin II., count of Flanders, who married Elstrud, daughter of Alfred the Great, first fortified it, and made it his chief residence. Before the year 1 180 Bruges was the recognized capital of Flanders, and the formality of proclaiming the new counts was always performed on the marche du vendredi, where the railway station is to-day. After 11 80 the premier position was assumed by Ghent, but until access by sea was stopped by the silting up of the Zwyn, which was complete by the year 1490, Bruges was the equal in wealth and power of its neighbour. Proof of this is supplied by the marriage festivities in 1430, when Philip the Good, duke of Burgundy, wedded Isabel of Portugal, and founded the famous order of the Golden Fleece out of compli- ment to the staple industry of Bruges. Bruges was at the height of its prosperity in the 14th century, when it was the northern counterpart of Venice and its Bourse regulated the rate of ex- change in Europe. (D. C. B.)

BRUGSCH, HEINRICH KARL (1827-1894), German Egypto- logist, was the son of a Prussian cavalry officer, and was born in the barracks at Berlin, on the 18th of February 1827. He early manifested a great inclination to Egyptian studies, in which, though encouraged by Humboldt, he was almost entirely self- taught. After completing his university course and visiting foreign museums he was sent to Egypt by the Prussian govern- ment in 1853, and contracted an intimate friendship with Mariette. On his return he received an appointment in the Berlin museum. In i860 he was sent to Persia on a special mission under Baron Minutoli, travelled over the country, and after Minutoli's death discharged the functions of ambassador. In 1864 he was consul at Cairo, in 1868 professor at Gottingen, and in 1870 director of the school of Egyptology, founded at Cairo by the khedive. From this post he was unceremoniously dismissed in 1879 by the European controllers of the public revenues, determined to economize at all hazards; and French influence prevented his

succeeding his friend Mariette at the Bulaq Museum in 1883. He afterwards resided principally in Germany until his death on the 9th of September 1894, but frequently visited Egypt, took part in another official mission to Persia, and organized an Egyptian exhibit at the Philadelphia Exposition in 1876. He had been made a pasha by the khedive in 1 88 1. He published his autobiography in 1894, concluding with a warm panegyric upon British rule in Egypt. Brugsch's services to Egyptology are most important, particularly in the decipherment of demotic and the making of a vast hieroglyphic-demotic dictionary (1867-1882).

See H. Brugsch, Mein Leben und mein Wandern; also art. Egypt, section Language and Writing.

BRUHL, HEINRICH, Count von (i 700-1 763), German states- man at the court of Saxony, was born on the 13th of August 1700. He was the son of Johann Moritz von Briihl, a noble who held the office of Oberhofmarschall at the small court of Sachsen- Weissenfels. The father was ruined and compelled to part with his family estate, which passed into the hands of the prince. The son was first placed as page with the dowager duchess of Weissenfels, and was then received at her recommendation into the court of the elector of Saxony as Silberpage on the 16th of April 1 7 19. He rapidly acquired the favour of the elector Frederick Augustus, surnamed the Strong, who had been elected to the throne of Poland in 1697. Briihl, who began as page and chamberlain, was largely employed in procuring money for his profuse master. He made himself useful in muzzling the Saxon states and was successively chief receiver of taxes and minister for the interior in 1731. He was at Warsaw when his master

died in 1733, and he secured a hold on the confidence of the electoral prince, Frederick Augustus, who was at Dresden, by laying hands on the papers and jewels of the late ruler and bringing them promptly to his successor. During the whole of the thirty years of the reign of Frederick Augustus II. he was the real inspirer of his master and the practical chief of the Saxon court. He had for a time to put up with the presence of old servants of the electoral house, but after 1738 he was in effect sole minister. The title of prime minister was created for him in 1746, but he was not only a prime minister — he filled all the offices. His titles spread over several lines of print, and he drew the combined pay of the places besides securing huge grants of land. Briihl must therefore be held wholly responsible for the ruinous policy which destroyed the position of Saxony in Germany between 1733 and 1763; for the mistaken ambition which led Frederick Augustus II. to become a candidate for the throne of

Poland; for the engagements into which he entered in order to secure the support of the emperor Charles VI. ; for the shameless and ill-timed tergiversations of Saxony during the wars of the Austrian Succession; for the intrigues which entangled the electorate in the alliance against Frederick the Great, which led to the Seven Years' War; and for the waste and want of fore- sight which left the country utterly unprepared to resist the attack of the king of Prussia. He was not only without political or military capacity, but was so garrulous that he could not keep a secret. His indiscretion was repeatedly responsible for the king of Prussia's discoveries of the plans laid against him. Nothing could shake the confidence of his master, which survived the ignominious flight into Bohemia, into which he was trapped by Briihl at the time of the battle of Kesseldorf, and all the miseries of the Seven Years' War. The favourite abused the confidence of his master shamelessly. Not content with the 67,000 talers a month which he drew as salary for his innumer- able offices, he was found when an inquiry was held in the next reign to have abstracted more than five million talers of public money for his private use. He left the work of the government offices to be done by his lackeys, whom he did not even supervise. His profusion was boundless. Twelve tailors, it is said, were continually employed in making clothes for him, and he wore a new suit every day. His library of 70,000 volumes was one of his forms of ostentation, and so was his gallery of pictures. He died on the 28th of October 1763, having survived his master only for a few weeks. The new elector, Frederick Christian, dismissed him from office and caused an inquiry to be held into his administration. His fortune was found to amount to a million and a half of talers, and was sequestered but afterwards restored to his family. In 1736 he had been made a count of the Empire and had married the countess Franziska von Kolowrat-Kradowska, a favourite of the wife of Frederick Augustus. Four sons and a daughter survived him.

His youngest son, Hans Moritz von Briihl (d. 181 1), was before the Revolution of 1789 a colonel in the French service, and afterwards general inspector of roads in Brandenburg and Pomerania. By his wife Margarethe Schleierweber, the daughter of a French corporal, but renowned for her beauty and intellectual gifts, he was the father of Karl Friedrich Moritz Paul von Briihl (1 772-1837), the friend of Goethe, who as intendant-general of the Prussian royal theatres was of some importance in the history of the development of the drama in Germany. In 1830 he was appointed intendant-general of the royal museums.

See J. G. H. von Justi, Leben und Charakter des Grafen von Briihl

(Gottingen, 1760-1761).

BRUHL, a town of Germany, in the Prussian Rhine province, 8 m. S.W. from Cologne on the main railway to Coblenz. Pop. (1900) 5000. Its pleasant situation at the foot of one of the spurs of the Eifel range and the beautiful grounds surrounding the royal palace render it a favourite resort of the inhabitants of Cologne. The palace, in Renaissance style, built in 1728 by Clement Augustus, elector of Cologne (1 700-1 761), was from 1809 until 1813 in the possession of the French marshal Davout, and in 1842 was restored by King Frederick William IV. of Prussia.

6.8 o

BRUMAIRE— BRUNE

BRUMAIRE, the name of the second month in the repub- lican calendar which was established in France by a decree of the National Convention on the 5 th of October in the year II. (1793), completed with regard to nomenclature by Fabre d'Eglantine, and promulgated in its new form on the 4th of Frimaire in the year II. (the 24th of November 1793). The month of Brumaire began on the day which corresponded, according to the year, to the 22nd or to the 23rd of October of the old calendar, and ended on the 20th or 21st of November. It was divided into "decades" like the other months of the republican calendar. Its name alludes to the fogs and mists frequent at that time of the year. The most important event in French history which took place during that month was the coup d'etat of the 18th Brumaire in the year VIII. (the 9th of November 1799), by which General Bonaparte overthrew the government of the Directory to replace it by the Consulate.

On the republican calendar, see G. Villain, " Le Calendrier re- publicain," in La Revolution francaise for 1884-1885.

BRUHATH, or Brumpt, a town of Germany, in the imperial territory of Alsace-Lorraine, on the Zorn and the Strassburg- Avricourt railway. Pop. 55°°- It has a Roman Catholic and a Protestant church, and occupies the site of the Roman Broco- magus. Its industries comprise tanning and saw-milling, and it has some trade in wine and tobacco and hops.

BRUMMAGEM (an old local form of " Birmingham "), a name first applied to a counterfeit coin made in the city of Birmingham, England, in the 17th century, and later to the plated and imitation

articles made there; hence cheap, showy or tawdry. The name was particularly used of the supporters of the Exclusion Bill in 1680, with the meaning of " sham Protestant." Similarly the Tory opponents of the Bill were nicknamed " Anti-Birminghams " or " Brummagems."

BRUMMELL, GEORGE BRYAN (1778-1840), English man of fashion, known as " Beau Brummell," was born in London on the 7th of June 1778. His father was private secretary to Lord North from 1770 to 1782, and subsequently high sheriff of Berkshire; his grandfather was a shopkeeper in the parish of St James, who supplemented his income by letting lodgings to the aristocracy. From his early years George Brummell paid great attention to his dress. At Eton, where he was sent to school in 1790, and was extremely popular, he was known as Buck Brummell, and at Oxford, where he spent a brief period as an undergraduate of Oriel College, he preserved this reputation, and added to it that of a wit and good story-teller, while the fact that he was second for the Newdigate prize is evidence of his literary capacity. Before he was sixteen, however, he left Oxford, for London, where the prince of Wales (afterwards George IV.), to whom he bad been presented at Eton, and who had been told that Brummell was a highly amusing fellow, gave him a commission in his own regiment (1794). Brummell soon became intimate with his patron— indeed he was so constantly in the prince's company that he is reported not to have known his own regimental troop. In 1798, having then reached the rank of captain, he left the service, and next year succeeded to a fortune of about £30,000. Setting up a bachelor establish- ment in Mayfair, he became, thanks to the prince of Wales's friendship and his own good taste in dress, the recognized arbiter elegantiarum. His social success was instant and complete, his repartees were the talk of the town, and, if not accurately speaking a wit, he had a remarkable talent for presenting the most ordinary circumstances in an amusing light. Though he always dressed well, he was no mere fop — Lord Byron is credited with the remark that there was nothing remarkable about his dress save "a certain exquisite propriety." Fora time Brummell's sway was undisputed. But eventually gambling and extravagance exhausted his fortune, while his tongue proved too sharp for his royal patron. They quarrelled, and though for a time Brummell continued to hold his place in society, his popularity began to decline. In 1816 he fled to Calais to avoid his creditors. Here he struggled on for fourteen years, receiving help from time to time from his friends in England, but always hopelessly in debt. In 1830 the interest of these friends secured him the post of

British consul at Caen, to which a moderate salary was attached, but two years later the office was abolished. In 183 5 Brummell's French creditors in Calais and Caen lost patience and he was imprisoned, but his friends once more came to the rescue, paid his debts and provided him with a small income. He had now lost all his interest in dress; his personal appearance was slovenly and dirty. In 1837, after two attacks of paralysis, shelter was found for him in the charitable asylum of Bon Sauveur, Caen, where he died on the 30th of March 1840.

See Captain William Jesse, Life of Brummell (London, 1844, revised edition 1886) ; Percy H. Fitzgerald, Life of George IV. (London, 1881) ; R. Boutet de Monvel, Beau Brummel (trans. 1908).

BRUNCK, RICHARD FRANCOIS PHILIPPE (1720-1803), French classical scholar, was born at Strassburg on the 30th of December 1729. He was educated at the Jesuits' College at Paris, and took part in the Seven Years' War as military commissary. At the age of thirty he returned to his native town and resumed his studies, paying special attention to Greek. He spent considerable sums of money in publishing editions of the Greek classics. The first work which he edited was the Anihologia Graeca or Analecta veterum Poetarum Graecorum (1772-1776), in which his innovations on the established mode of criticism startled European scholars; for wherever it seemed to him that an obscure or difficult passage might be made intelligible and easy by a change of text, he did not scruple to make the necessary alterations, whether the new reading were sup- ported by manuscript authority or not. Other works by him are:— Editions of Anacreon (1778), several plays of the Greek tragedians, Apollonius Rhodius (1780), Aristophanes, with an excellent Latin translation (1781-1783), Gnomici poetae Graeci (1784), Sophocles (1786), with Latin translation, his best work, for which he received a pension of 2000 francs from the king. He also published editions of Virgil (1785), Plautus (1788) and Terence (1797)- At the outbreak of the French Revolution, in which he took an active part, he was imprisoned at Besancon, and lost his pension, being reduced to such extremities that hq was obliged to sell a portion of his library. In 1802 his pension was restored to him, but too late to prevent the sale of the remainder of his books. He died on the 12th of June 1803.

BRUNDISIUM (Gr. TSpevrkaiov, mod. Brifidisi), an important harbour town of Calabria (in the ancient sense), Italy, on the E.S.E. coast. The name is said to mean " stag's head " in the Messapian dialect, in allusion to the shape of the harbour. Tradition varies as to its founders; but we find it hostile to Tarentum, and in friendly

relations with Thurii. With a fertile territory round it, it became the most important city of the Messapians, but it was developed by the Romans, into whose hands it only came after the conquest of the Sallentini in 266 B.C. They founded a colony there in 245 B.C., and the Via Appia was perhaps extended through Tarentum as far as Brundisium at this period. Pacuvius was born here about 220 B.C. After the Punic Wars it became the chief point of embarkation for Greece and the East, via Dyrrachium or Corcyra. In the Social War it received Roman citizenship, and was made a free port by Sulla. It suffered, however, from a siege conducted by Caesar in 49 B.C. {Bell. Civ. i.) and was again attacked in 42 and 4.0 B.C. Virgil died here in 19 B.C. on his return from Greece. Trajan constructed the Via Trajana, a more direct route from Beneventum to Brundisium. The remains of ancient buildings are unimportant, though a considerable number of antiquities, especially inscriptions, have been discovered here: one column 62 ft. in height, with an ornate capital, still stands, and near it is the base of another, the column itself having been removed to Lecce. They are said to have marked the termination of the Via Appia.

See Ch. Hiilsen in Pauly-Wissowa, Realencyclopadie, iii. (1899), 902 ; Notizie degli Scavi, passim. Also Brindisi. (T. As.)

BRUNE, GUILLAUME MARIE ANNE (1763-1815), marshal of France, the son of an advocate, was born at Brives-la-Gaillarde (Correze), on the 13th of March 1763. Before the Revolution he went to Paris to study law, and here he became a political journalist, a Jacobin and a friend of Danton. He was appointed

in 1793 to a superior command in the army direct from civil life, and as a general of brigade he took part in the fighting of the 13th Vendemiaire. In 1796 he fought under Bonaparte in Italy, and was promoted general of division for good service in the field. In 1708 he commanded the French army which occupied Switzer- land, and in the following year he was in command of the French troops in Holland. His defence of Amsterdam against the Anglo- Russian expedition under the duke of York was completely successful; the invaders were defeated, and compelled, after a miserable retreat, to re-embark. He rendered further good service in Vendee and in Italy, and was made a marshal by Napoleon on the assumption by the latter of the imperial title in 1804. In 1807 Brune held a command

in North Germany, but he was not afterwards employed during the First Empire. It is said that he was accused of venality, and on that account dis- graced, but of this there is no proof. He was recalled to active service during the Hundred Days, and as commander of the army of the Var he defended the south of France against the Austrians. He was murdered by royalists during the White Terror at Avignon on the 2nd of August 1815.

See Notice hislorique sur la vie politique et tnililaire du marechal Brune (Paris, 1821), and Vermeil de Conchard, L'Assassinat du marechal Brune (Paris, 1887).

BRUNEAU, ALFRED (1857-), French musical composer, was born in Paris. His parents were devoted to music, and he was brought up to play the 'cello, being educated at the Paris Conservatoire. He played in Pasdeloup's orchestra, and soon began to compose, writing a cantata, Genevieve de Paris, at an early age. In 1884 his Ouverture heroique was performed, followed by the choral symphonies, Leda (1884), La Belle au bois dormant (1886) and PentMsiUe. But he is best known as a dramatic composer. In 1887 his first opera, Kirim, was produced; and in 1891 his successful opera Le Reve, with a libretto founded on Zola's story. Another subject from Zola resulted in the opera L'Attaque du moulin (1893), and libretti by Zola himself were written for his next operas Messidor (1897) and L'Ouragan (1901). Among Bruneau's other works may be mentioned his Requiem (1896), and his two collections of songs, Lieds de France and Chansons a danser. He was decorated with the Legion of Honour in 1895. His musical criticisms, published in several volumes, are remarkable for literary quality and vigour.

See Arthur Hervey's volume on Bruneau (1907).

BRUNEI, a state situated in the north-west of Borneo. It has been so diminished in area since the beginning of the 19th century as to have become in comparison with the other states of Borneo territorially insignificant. It formerly included the whole of northern Borneo and southern Palawan, and stretched down the west coast as far as Sambas. What remains of this once powerful sultanate is a triangular-shaped territory, the base of the triangle being represented by 80 m. of coast-line, and the two sides by the frontiers of Sarawak. The area is calculated to be about 1700 sq. m. This great reduction of the extent of the territory has been brought about by the cession on successive occasions of strips of territory to Sarawak and to the British North Borneo Company on condition of annual payments of money. In 1 888 the state was placed under British protection. On

the 2nd of January 1906 a treaty was made whereby the sultan of Brunei agreed to hand over the general administration of his state to a British resident. The sultan Mahommed Jomal-ul-alam, born in 1889, succeeded his father in May 1906. He receives an allowance of 12,000 dollars a year from state funds, and his two principal ministers receive allowances of 6000 dollars a year each. The interior people have for centuries been subject to petty oppression, and there is too much of the old spirit left among the Malays to avoid acrimonious dispute and rebellion.

The bulk of the inhabitants, who consist of Malays, Kadayans, Orang Bukits and a few Muruts, are to be found in and about the capital — also called Brunei — the population of the city being estimated at about 15,000, and the population of the whole territory being about 25,000. The city is prettily situated on the river, with a background of cleared hills, and in the distance heights clothed with magnificent forest. The dwelling-houses are

built over the river on slender piles obtained from the Nibong palm which resists the action of the water for several years. Though there are practically no exports and imports, there is a certain amount of inland commerce, the Brunei Malay usually earning a living by trading with the interior tribes of Sarawak and British North Borneo. Some of them are skilled workers of brass, and the Brunei women make very beautiful cloth, interwoven and embroidered with gold thread. Sago is worked in the important river-valleys of the Tutong and the Balait, but only a small quantity of rice is cultivated.

The history of this ancient and decaying sultanate is of some interest. Brunei, or, as it is called by the natives Bruni or Dar- ul-Salam (city of peace), possesses a historic tablet of stone upon which, in a.h. 1221 (1804), was engraved in Malay characters the genealogy of the sovereigns who have ruled over the country. The engraving was the work of Datu Imaum Yakub, the high priest at the time, who received the genealogy from the lips of Merhoum Bongsu, otherwise Sultan Muadin, and Sultan Kemal- Udin, who ordered this record of their forefathers to be written. This stone tablet now stands on the tomb of Sultan Mahommed Jemal-ul-Alam at the foot of Panggal hill, in the city of Brunei. The Selesilah, or book of descent, is kept in the palace by the sultan. The other heirlooms, which are also kept in the sultan's palace, and which descend to each sultan in turn, are the " Nobab Nagara " (two royal drums) from Johore and Menang-Kabau, and the " Gunta Alamat " (bells), the gift of Sultan Bahkei of Johore or Malacca. The first sultan of Brunei was Alak-ber- Tata, who was probably of Bisaya stock, and governed the country before the

introduction of Islam, in the 15th century. He assumed the name of Mahommed on his conversion to Islam, which was brought about during a visit to the Malay peninsula. Brunei, at this time, was a dependency of Majapahit (Java), and paid a yearly tribute of a jar of areca juice obtained from the young green nuts of the areca palm, and of no monetary value. The Hindu kingdom of Menjapahit was destroyed by the Mahom- medans in 1478, and Brunei is mentioned in the history of Java as one of the countries conquered by Adaya Mingrat, the general of Angka Wijaya. Sultan Mahommed's only child was a daughter. His brother Akhmed married the daughter of Ong Chum Ping, a Chinese officer said to have been sent by his emperor to obtain a jewel from Mount Kinabalu in North Borneo,and was the successor of Sultan Mahommed in the sovereignty of Brunei. He was succeeded by Sultan Berkat, an Arab sherif of high rank, from the country of Taif in Arabia, who had married Sultan Akhmed's only child. Sultan Berkat built a mosque and enforced Mahom- medan law, and with the assistance of the Chinese built the stone wall, which is still in existence between the islands of Kaya Orang and Chermin, by sinking forty junks filled with rock across the mouth of the Brunei river. This work was completed before the arrival of Pigafetta in 1 521. In the reign of Sultan Bulkeiah Magellan's squadron anchored off the mouth of Brunei river in August 1 52 1, and Pigafetta makes mention of the splendid court and the imperial magnificence of the Borneo capital. Sultan Bulkeiah was otherwise known as Nakoda Ragam; he was the greatest warrior of Brunei and made military expeditions to Java, Malacca, Luzon and all the coasts of Borneo. His tomb, which is handsomely built of stone, is still to be seen in Brunei, and is constantly visited by Malays, who leave money and various articles on the tomb as offerings to his memory. Others, again, come and take away anything they can find, which they keep as charms and mementoes. The Spaniards captured Brunei in 1580, the reigning sultan and his court retiring to Suai in the Baram district. The invaders were compelled to evacuate the place, however, in consequence of the heavy losses they sustained in the numerous attempts made for its recovery. The golden age of Brunei was nevertheless at an end, and there is little more of importance to record. Disputed successions and civil war, maladministration and the untrustworthiness of the Malay character, caused a steady decline in prosperity. The East India Company started a factory in the town in the 18th century, but commerce had already decayed and the establishment was abandoned. In the early part of the 19th centuiy Brunei was but

a resort for pirates and a market for the slave trade. During the 'forties Admiral (then Captain) Keppel and other officers of the British navy suppressed piracy in the neighbourhood. Sarawak was handed over to Raja Brooke, and, after the capture and temporary occupation of Brunei by Sir Thomas Cochrane, Labuan was ceded to the British empire. From this island it was possible to exercise a certain control over the townspeople, and a consul was stationed there to watch affairs. Nowadays the political consequence of Brunei largely arises from the exist- ence there of valuable seams of coal, leaded to the Sarawak government. (C. H.)

BRUNEL, ISAMBARD KINGDOM (1806-1859), English engineer, only son of Sir M. I. Brunei, was born at Portsmouth on the 9th of April 1806. He displayed in childhood singular powers of mental calculation, great skill and rapidity as a draughtsman, and a true feeling for art. At the age of fourteen he was sent to Paris, to study at the College Henri Quatre. In 1823 he entered his father's office as assistant-engineer, just at the time when the project of the Thames Tunnel was beginning to take shape; and during the later portion of the time, from 1825, when the work was begun, till 1828, when it was stopped by an irruption of the river, he was both nominal and actual resident engineer. In November 1829 he sent in designs and plans for the projected suspension bridge over the Avon at Clifton, but in consequence of objections raised by Thomas Telford, the referee of the bridge committee, his plans were rejected. But a new design which he sent in on a second com- petition in 183 1 was accepted, and he was appointed engineer. The works were begun in 1836, but owing to lack of funds were not completed until 1864, after Brunei's death; his design, however, vyas closely adhered to, and the chains employed came from the old Hungerford suspension bridge (London), which he had built in 1841-1845, but which was displaced in 1862 by the Charing Cross railway bridge.

In March 1833 Brunei, at the age of twenty-seven, was ap- pointed engineer of the newly-projected Great Western railway. For several years his energies were taxed to the utmost by the conflict with obstructive landowners and short-sighted critics; but he showed himself equal to the occasion, not only as a professional man, but as a persuasive negotiator. Among the engineering triumphs on that railway are the Hanwell viaduct, the Maidenhead bridge and the Box tunnel, at the time the longest in the world. The famous " battle ofthe gauges " took its rise from his introduction of the broad (7 ft.) gauge on that line. In 1846 he resigned his office as engineer of the Great

Western railway. In 1844 he had recommended the adoption of the atmospheric system on the South Devon railway, but after a year's trial the system was abandoned. The last and greatest of Brunei's railway works was the Royal Albert bridge over the river Tamar at Saltash. This work, sanctioned by parliament in 1845, was constructed between 1853 and 1859.

In addition to the arduous labours of railway engineering Brunei took a leading part in the systematic development of ocean steam navigation. As early as October 1835 he had sug- gested to the directors of the Great Western railway, that they should " make it longer, and have a steamboat to go from Bristol to New York, and call it the ' Great Western.' " The project was taken up, and the " Great Western " steamship was designed by Brunei, and built at Bristol under his super- intendence. It was much longer than any steamer of the day, and was the first steamship built to make regular voyages across the Atlantic. While the vessel was building a controversy was raised about the practicability of Brunei's scheme, Dr D. Lardner asserting dogmatically that the voyage could not be made, and backing his assertion with an array of figures. His view was widely accepted, but the work went on, and the voyage was accomplished in 1838. Brunei at once undertook a still larger design in the " Great Britain," which was the first large iron steamship, the largest ship afloat at that time, and the first large ship in which the screw-propeller was used. She made her first voyage from Liverpool to New York in August and September 1845; but in the following year was carelessly run

upon the rocks in Dundrum Bay on the coast of Ireland. After lying there nearly a year without material damage she was got off and was employed in the Australian trade. Brunei soon after began to meditate a still vaster project, the construction of a vessel large enough to carry all the coal required for a long voyage out, and if coal could not be had at the out port, then to carry enough also for the return voyage. It seemed to hmi, further, that a great increase of size would give many advantages for navigation. During his connexion as engineer with the Australian Mail Company he worked out into a practical shape his conception of a "great ship"; and in 1852 his scheme was laid before the directors of the Eastern Steam Navigation Company. It was adopted, the projector being appointed engineer, and after much time occupied about contracts and specifications the work was begun in December 1853. Immense difficulties in the progress of construction caused delays from time to time. The operation of launching was several times attempted in vain; but at length the gigantic vessel, the " Great Eastern," was got

afloat on the 31st of January 1858. Much remained to be done to complete the ship; and her engineer, overworked and worn out with worry, broke down and did not see her begin her first voyage on the 7th of September 1859. On the 5th he was brought home from the ship suffering from a paralytic stroke, and on the 15 th he died at his house in Westminster.

In addition to the great works already described, Brunei was employed in the construction of many docks and piers, as at Monkwearmouth, Bristol, Plymouth, Briton Ferry, Brentford and Milford Haven. He was a zealous promoter of the Great Exhibition of 1851, and was a member of the committee on the section of machinery and of the building committee. He paid much attention to the improvement of large guns, and designed a floating gun-carriage for the attack on Kronstadt in the Russian War (1854); he also designed and superintended the construc- tion of the hospital buildings at Erenkeni on the Dardanelles (1855). He was elected a fellow of the Royal Society in 1830, and in 1858 declined the presidency of the Institution of Civil Engineers through ill-health. He received the degree of D.C.L. from Oxford in 1857. In his work he was singularly free from professional jealousy, and was always ready to commend and help others, though, himself a man of remarkable industry and energy, he demanded a high standard of faithful service from his subordinates.

See TheLifeof I.K .Brunei, C.E. (1870) , by his son, Isambard Brunei.

BRUNEL, SIR MARC ISAMBARD (1769-1849), British in- ventor and engineer, was born at Hacqueville in Normandy on the 25th of April 1769. His father, a small landowner and farmer, intended him for the church, but his taste for mathe- matics and mechanics inclined him to another career, and he obtained a nomination for the navy, in which he served for six years. When his ship was paid off in 1792 and he returned to France, he found the Revolution at its height, and owing to his pronounced royalist opinions he was obliged to leave the country. Reaching New York in September 1793 he began to practise as an architect and civil engineer. His first employment was in land-surveying and canal-engineering. Later he submitted a highly ornamental design for the National Capitol at Wash- ington, which, however, was not accepted, and was engaged to design and superintend the construction of the Bowery theatre, New York, burnt down in 182 1. He fitted novel and ingenious machinery in the arsenal and cannon factory which he was commissioned to erect in New York, and he was asked to supply plans for the defences of the Narrows between the upper and lower

bays of that port. Early in 1799 he sailed for England in order to submit to the British government his plans for the mechanical production of ships' blocks, in substitution for the manual processes then employed. After the usual difficulties and delays his proposals were adopted, largely through the recommendation of Sir Samuel Bentham, and about 1803 the erection of his machines was begun at Portsmouth dockyard. They were constructed by Henry Maudslay, and formed one of the earliest examples of a complete range of machine tools, each

performing its part in a long series of operations. Not only was the quality of the product much improved but the cost was greatly diminished, and the saving effected in the first year in which the machines were in full work was estimated at £24,000, of which about two-thirds was awarded to Brunei. A little later he was occupied in devising improved machines for sawing and bending timber, and in 181 1 and 181 2 he was employed by the government in erecting saw-mills at Woolwich and Chatham, carrying out at the latter dockyard a complete reorganization of the system for handling timber. About 181 2 he devised machinery for making boots which was adopted for the purposes of the army, but abandoned a few years later when, owing to the cessation of war, the demand became less and the supply of manual labour cheaper. At the same time he interested himself in the establishment of steam navigation on the Thames between London and Ramsgate. In 1814 he succeeded in persuading the admiralty to try steam-tugs for towing warships out to sea. The experiments were made at his own expense, for a few months after undertaking to contribute to the cost the admiralty re-voked its promise on the ground that the attempt was " too chimerical to be seriously entertained." Another vain enter- prise on which he wasted much time and money was an attempt to use liquefied gases as a source of motive power. His round stocking-frame or tricoteur was patented in 1816, and among his other inventions were machines for winding cotton-thread into balls, for copying drawings, for making small wooden boxes such as are used by druggists, and for the manufacture of nails, together with processes of preparing tinfoil for decorative pur- poses and improvements in stereotype plates for printing.

In 1821, partly as the result of the damage done by fire in 1814 to the saw-mills he owned at Battersea, and partly because his

commercial abilities were far from equal to his mechanical genius, he got into financial difficulties and was thrown into prison for debt, only regaining his freedom through a grant of £5000 which his friends obtained for him from the government. Subsequently his attention was mainly devoted to projects of civil engineering, the most noteworthy being the Thames Tunnel. In 1820 he had prepared plans of bridges for erection in Rouen and St Petersburg and in the island of Bourbon. In 1823 he designed swing-bridges, and in 1826 floating landing-stages, for the port of Liverpool. A company, which was supported by the duke of Wellington, was formed in 1824 to carry out his scheme for boring a tunnel under the Thames between Wapping and Rotherhithe. The work was begun at the beginning of 1825, the excavation being accomplished by the aid of a "shield," which he had patented in 1818. Many difficulties were encountered. The river broke through the roof of the tunnel in 1827, and after a second irruption in 1828 work was discontinued for lack of funds. Seven years later it was resumed with the aid of money advanced by the government, and after three more irruptions the tunnel was completed and opened in 1843. Aided by his son, Brunei displayed extraordinary skill and resource in the various emergencies with which he had to deal, but the anxiety broke down his health. He recovered sufficiently from one paralytic stroke to attend the opening ceremony, but he was able to undertake little more professional work. A second stroke followed in 1845, anc > Iour years later he died in London on the 1 2th of December 1849. He received the order of the Legion of Honour in 1829 and was knighted in 1841.

See Richard Beamish, Memoirs of Sir Marc Isambard Brunei

(1862).

BRUNELLESCHI (or Brunellesco), FILIPPO (1379-1446), Italian architect, the reviver in Italy of the Roman or Classic style, was born at Florence in 1379. His father, a notary, had destined him for his own profession, but observing the boy's talent for all sorts of mechanism, placed him in the gild of goldsmiths. Filippo quickly became a skilled workman, and perfected himself in the knowledge of sculpture, perspective and geometry. He designed some portions of houses in Florence, and in 1401 he was one of the competitors for the design of the gates of the baptistery of San Giovanni. He was unsuccessful, though his work obtained praise, and he soon afterwards set out

for Rome. He studied hard, and resolved to do what he could to

revive the older classical style, which had died out in Italy. Moreover, he was one of the first to apply the scientific laws of perspective to his work. In 1407 he returned to Florence, just at the time when it was resolved to attempt the completion of the cathedral church of Santa Maria del Fiore. Brunelleschi's plan for effecting this by a cupola was approved, but it was not till 14 1 9, and after innumerable disputes, that the work was finally entrusted to him. At first he was hampered by his colleague Ghiberti, of whom he skilfully got rid. He did not live to see the completion of his great work, and the lantern on the summit was put up not altogether in accordance with the instructions and plans left by him. The great cupola, one of the triumphs of architecture, exceeds in some measurements that of St Peter's at Rome, and has a more massive and striking appearance. Besides this masterpiece Brunelleschi executed numerous other works, among the most remarkable of which are the Pitti palace at Florence, on the pattern of which are based the Tuscan palaces of the 15th century, the churches of San Lorenzo and Spirito Santo, and the still more elegant Capella del Pazza. The beautiful carved crucifix in the church of Santa Maria Novella in Florence is also the work of Brunel- leschi. He died in Florence on the 16th of April 1446, and was buried in the cathedral church of his native city.

See Manetti, Vita di Brunelleschi (Florence, 1812) ; Guasti, La cupola di Santa Maria del Fiore (Florence, 1857) ; von Fabriczy, Filippo Brunelleschi (Stuttgart, 1892).

BRUNET, JACQUES CHARLES (1780-1867), French biblio- grapher, was born in Paris on the 2nd of November 1780. He was the son of a bookseller, and in 1802 he printed a supple- ment to the Dictionnaire bibliographique de livres rares (1790) of Duclos and Cailleau. In 18 10 there appeared the first edition of his Manuel du libraire et de I' amateur des livres (3 vols.). Brunet published successive editions of his great bibliographical dictionary, which rapidly came to be recognized as the first book of its class in European literature. He died on the 14th of November 1867. Among his other works are Nouvelles Recherches bibliographiques (1834), Recherches . . . sur les editions originates . . . de Rabelais (1852), and an edition of the French poems of J. G. Alione d'Asti, dating from the beginning of the 16th century (1836).

See also a notice by Le Roux de Lincy, prefixed to the catalogue (1868) of his own valuable library. A supplement to the 5th edition (1860-1865) of the Manuel du libraire was published (1878-1880) by P. Deschamps and G. Brunet.

BRUNETIERE, FERDINAND (1840-1906), French critic and manofletters, was born at Toulon on the 19th of July 1849. After attending a school at Marseilles, he studied in Paris at the Lycee Louis-le- Grand. Desiring to follow the profession of teaching, he entered for examination at the Ecole Normale Supfirieure, but failed, and the outbreak of war in 1870 debarred him from a second attempt. He turned to private tuition and to literary criticism. After the publication of successful articles in the Revue Bleue, he became connected with the Revue des Deux Mondes, first as contributor, then as secretary and sub-editor, and finally, in 1893, as principal editor. In 1886 he was ap- pointed professor of French language and literature at the Ecole Normale, a singular honour for one who had not passed through the academic mill; and later he presided with distinction over various conferences at the Sorbonne and elsewhere. He was decorated with the Legion of Honour in 1887, and became a member of the Academy in 1893. The published works of M. Brunetiere consist largely of reprinted papers and lectures. They include six series of Etudes critiques (1880- 1898) on French history and literature; Le Roman naturaliste (1883); Histoire et Litter ature, three series (1884- 1886); Questions de critique (1888; second series, 1890). The first volume of L'£volution de genres dans I'histoire de la literature, lectures in which a formal classi- fication, founded on the Darwinian theory, is applied to the phenomena of literature, appeared in 1890; and his later works include a series of studies (2 vols., 1894) on the evolution of French lyrical poetry during the 19th century, a history of

French classic literature begun in 1904, a monograph on Balzac (1906), and various pamphlets of a polemical nature dealing with questions of education, science and religion. Among these may be mentioned Discours acadimiques (1901), Discours de combat (1900, 1903), L' Action sociale du christianisme (1904), Sur les chemins de la croyance (1905). M. Brunetiere was an orthodox Roman Catholic, and his political sympathies were in the main reactionary. He possessed two prime qualifications of a great critic, vast erudition and unflinching courage. He was never afraid to diverge from the established critical view, his mind was closely logical and intensely accurate, and he rarely made a trip in the wide field of study over which it ranged. The most honest, if not the most impartial, of magisterial writers, he had a hatred of the unreal, and a contempt for the trivial ; nobody was more merciless towards those who

affected effete and decadent literary forms, or maintained a vicious standard of art. On the other hand, his intolerance, his sledge-hammer methods of attack and a certain dry pedantry alienated the sympathies of many who recognized the remarkable qualities of his mind. The application of universal principles to every question of letters is a check to dilettante habits of thought, but it is apt to detain the critic in a somewhat narrow and dusty path. M.Brunetiere's influence, however, cannot be disputed, and it was in the main thoroughly sound and wholesome. He died on the 9th of December 1906.

His Manual of the History of French Literature was translated into English in 1898 by R. Derechef. Among critics of Brunetiere see J. Lemaitre, Les Contemporains (1887, &c), and J. Sargeret, Les Grands Convertis (1906).

BRUNHILD (M.H.Ger. Brunhilt or Prunhilt, Nor. Brynhildr), the name of a mythical heroine of various versions of the legend of the Nibelungs. The name means " the warrior woman in armour " (from 0. H. Ger. brunjd, brunja, M. H. Ger. brunige, brilnje, briinne, a cuirass or coat of mail, 0. Eng. byrnie, and 0. H. Ger. hiltja, hilta, war), and in the Norse versions of the Nibelung myth, which preserves more of the primitive traditions than the Nibelungenlied, Brunhild is a valkyrie, the daughter of Odin, by whom, as a punishment for having against his orders helped a warrior to victory, she has been cast under a spell of sleep on Hindarfjell, a lonely rock summit, until the destined hero shall penetrate the wall of fire by which she is surrounded, and wake her. This is a variant of the widespread myth which survives in the popular fairy-story of "the sleeping beauty." The ingenuity of some German scholars has made of Brunhild a personification of the day, held prisoner upon the hill-tops till in the morning the sun-god comes to her rescue, then triumphing with him awhile, only to pass once more under the spell of the powers of mist and darkness. 'She is thus by some commentators contrasted with " the masked warrior woman " Kriemhild (

is only mentioned four times and takes no active part in the story. (See further under Nibelungenlied.) (W. A. P.)

BRUNHILDA (Brunechildis), queen of Austrasia (d. 613), was a daughter of Athanagild, king of the Visigoths. In 567 she was asked in marriage by Sigebert, who was reigning at Metz. She now abjured Arianism and was converted to the orthodox faith, and the union was celebrated at Metz; on which occasion Fortunatus, an Italian

poet, who was then at the Frankish court, composed the epithalamium. Chilperic, brother of Sigebert, and king of the west Frankish kingdom, jealous of the renown which this marriage brought to his elder brother, hastened to ask the hand of Galswintha, sister of Brunhilda; but at the instigation of his mistress Fredegond, he assassinated his wife. Sigebert was anxious to avenge his sister-in-law, but on the intervention of Guntram, he accepted the compensation offered by Chilperic, namely the cities of Bordeaux, Cahors and Limoges, with Beam and Bigorre.

This treaty did not prevent war soon again breaking out between Sigebert and Chilperic. So long as her husband lived, Brunhilda played asecondary part, but having been made captive byChilperic after her husband's assassination (575), she succeeded in escaping from her prison at Rouen, after a series of extra- ordinary adventures, by means of a marriage with Merovech, the son of her conqueror. From this time on, she took the lead; in Austrasia she engaged in a desperate struggle against the nobles, who wished to govern in the name of her son Childebert II.; but she was worsted in the conflict and for some time had to seek refuge in Burgundy. After the death of Childebert II. (597) she aspired to govern Austrasia and Burgundy in the name of her grandsons Theudebert and Theuderich II. She was expelled from Austrasia, and then stirred up Theuderich II. against his brother, whom he defeated at Toul and Tolbiac, and put to death. Theuderich II. died shortly after this victory, and Brunhilda caused one of her great-grandchildren to be proclaimed king. The nobles of Austrasia and Burgundy, however, now summoned Clotaire II., son of Fredegond, and king of Neustria, to help them against the queen. Brunhilda was given up to him, and died a terrible death, being dragged at the heels of a wild horse (613).

Brunhilda seems to have had political ideas, and to have wished to attain to the royal power. She was a protectress of the Church, and Pope Gregory I. (590-604) addressed a series of letters to her, in which he showered praises upon her. She took it upon herself, however, to supervise the bishoprics and monasteries, and came into conflict with Columban (Colum- banus), abbot of Luxeuil. As Brunhilda was a great queen, tradition ascribes to her the construction of many old castles, and a number of old Roman roads are also known by the name of Chausstes de Brunehaut.

Authorities. — Gregory of Tours, Historia Francorum, bks. iv.-x. ; the so-called Chronicle of Fredegarius ; Aug. Thierry, Recits des temps merovingiens (2 vols., Paris, 8th ed., 1864) ; G. Kurth, " La

Reine Brunehaut," in the Revue des questions historiques, vol. xxvi. (1891). (C. Pf.)

BRUNI, LEONARDO (1369-1444), Italian scholar, author of the History of Florence, was born at Arezzo, and is generally known as Leonardo Aretino. He was secretary to the papal chancery under Innocent VII. and John XXII. From 1427 to his death in 1444 he was chancellor to the republic of Florence. He was buried at the expense of the state in Sta Croce, where his laurelled statue is still to be seen. He was the first to free the history of Florence from its fabulous elements, but his book, though not unintelligent, only repays very laborious study. The only Latin edition is Hisloriarum Florentinarum libri xii . . . exempto in lucent edit. stud, el op. Sixti Brunonis (Argentor. 1610, fol.). A translation into Tuscan was published by Donato Acciajuoli in 1476 at Venice, was republished at Florence in 1492, and again, with Sansovino's continuation, at Venice in 1561.

BRUNN (Czech Brno), the capital of the Austrian margraviate and crownland of Moravia, 89 m. N. of Vienna by rail. Pop. (1900) 108,944, of whom 70% are Germans and 30% are Czechs. Briinn is situated for the most part between two hills at the con- fluence of the Schwarzawa and the Zwittawa, and consists o"f

the old town and extensive suburbs. On one of the hills, known as the Spielberg (945 ft.), stands a castle which has long been used as a prison, famous for its connexion with Silvio Pellico, who was confined within its walls from 1822 to 1830. The fortifications of the old town have now been entirely removed, giving place to handsome gardens and well-built streets, which put it in communication with its adjoining suburbs. The old town, although comparatively small, with narrow and crooked but well- paved streets, contains the most important buildings in the city. The Rathaus, which dates from 1511, has a fine Gothic portal, and contains several interesting antiquities. The ecclesiastical buildings comprise the cathedral of St Peter, situated on the lower hill; the fine Gothic church of St Jacob, built in the 15th century, with its iron tower added in 1845, and a remarkable collection of early prints; the church of the Augustinia'n friars, dating from the 14th century; and that of the Minorites, with its frescoes, its holy stair and its Loretto-house. Amongst the new buildings are the hall of the provincial diet, opened in 1881; a handsome new synagogue; the national museum of Moravia and

Silesia and several high educational establishments, including a technical academy and a theological seminary, which are the remnants of the former university of Briinn. It is the seat of a Roman Catholic bishop and of a Protestant consistory. Briinn, which is sometimes styled "the Austrian Manchester," is one of the most industrial towns of Austria and the chief seat of the cloth industry in the whole empire. Other important branches of industry are: the manufacture of various woollen, cotton and silk goods, leather, the machinery required in the textile factories, brewing, distilling and milling, and the production of sugar, oil, gloves and hardware. It is also an important railway junction and carries on a very active trade.

Briinn probably dates from the oth century. In the nth century it was bestowed by Duke Wratislas II. on his son Otto. A place of great strength, it held out successfully against sieges — in 1428 by the Hussites, in 1467 by King George of Bohemia, in 1645 by the Swedish general Torstenson, and in 1742 by the Prussians. In 1805 it was the headquarters of Napoleon before the battle of Austerlitz.

See Trautenberger, Die Chronik der Landeshauptstadt Briinn (Briinn, 1893-1897, 5 vols.).

BRUNNER, HENRY (1840-), German historian, was born at Wels in Upper Austria on the 22nd of June 1840. After studying at the universities of Vienna, Gottingen and Berlin, he became professor at the university of Lemberg in 1866, and in quick succession held similar positions at Prague, Strassburg and Berlin. From 1872 Brunner devoted himself especially to studying the early laws and institutions of the Franks and kindred peoples of western Europe, and on these subjects his researches have been of supreme value. He also became a leading authority on modern German law. He became a member of the Berlin Academy of Sciences in 1884, and in 1886, after the death of G. Waitz, undertook the supervision of the Leges section of the Monumenta Germaniae historica. His chief works are: Die Entstehung der Schwurgerichte (Berlin, 1872); Zeugen und Tnquisilionsbeiveis der karolingischen Zeit (Vienna, 1866); Das anglonormannische Erbfolgesystem, nebst einem Excurs iiber die Slteren norm&nnischen Coutumes (Leipzig, 1869); Zur Rechts-geschichle der romischen und germanischen Urkunde (Berlin, 1880); Deutsche Rechtsgeschichte (Leipzig, 1887-1892); Mithio und Speranles (Berlin, 1885); Die Landschenkungen der Mero- winger und Agilolfinger (Berlin, 1885); Das Gerichtszeugnis und die frankische Konigsurkunde (Berlin, 1873); Forschungen zur Geschichte des deutschen und franzosischen Rechts (Stuttgart,

1894); Grundziige der deutschen Rechtsgeschichte (Leipzig, 1901).

BRtfNNOW, FRANZ FRIEDRICH ERNST (1821-1891), German astronomer, was born in Berlin on the 18th of November 1821. Between the ages of eight and eighteen he attended the Friedrich-Wilhelm gymnasium. In 1839 he entered the univer- sity of Berlin, where he studied mathematics, astronomy and physics, as well as chemistry, philosophy and philology. After graduating as Ph.D. in 1843, he took an active part in

astronomical work at the Berlin observatory, under the direction of J. F. Encke, contributing numerous important papers on the orbits of comets and minor planets to the Astronomische Nach- richten. In 1847 he was appointed director of the Bilk obser- vatory, near Dusseldorf, and in the following year published the well-known Mimoire sur la comete elliptique de De Vico, for which he received the gold medal of the Amsterdam Academy. In 1851 he succeeded J. G. Galle as first assistant at the Berlin observatory, and accepted in 1854 the post of director of the new observatory at Ann Arbor, Michigan, U.S.A. Here he published, 1858-1862, a journal entitled Astronomical Notices, while his tables of the minor planets Flora, Victoria and Iris were severally issued in 1857, 1859 and 1869. In i860 he went, as associate director of the observatory, to Albany, N. Y. ; but returned in 1861 to Michigan, and threw himself with vigour into the work of studying the astronomical and physical con- stants of the observatory and its instruments. In 1863 he resigned its direction and returned to Germany; then, on the death of Sir W. R. Hamilton in 1865, he accepted the post of Andrews professor of astronomy in the university of Dublin and astronomer-royal of Ireland. His first undertaking at the Dublin observatory was the erection of an equatorial telescope to carry the fine object-glass presented to the university by Sir James South; and on its completion he began an import- ant series of researches on stellar parallax. The first, second and third parts of the Astronomical Observations and Researches made at Dunsink contain the results of these labours, and include discussions of the distances of the stars a Lyrae,

See Month. Notices Roy. Astr. Society, Hi. 230; J. C. Poggendorff's Biog. Lit. Handworterbuch, Bd. iii. ; Nature, xliv. 449.

BRUNO, SAINT, founder of the Carthusians, was born in Cologne about 1030; he was educated there and afterwards at Reims and Tours, where he studied under Berengar. He was ordained at Cologne, and thence, in 1057, he was recalled to Reims to become scholasticus, or head of the cathedral school, and overseer of the

schools of the diocese. He was made also canon and diocesan chancellor. Having protested against the misdoings of a new archbishop, he was deprived of all his offices and had to fly for safety (1076). On the deposition of the arch- bishop in 1080, Bruno was presented by the ecclesiastical authorities to the pope for the see, but Philip I. of France successfully opposed the appointment. After this Bruno left Reims and retired, with six companions, to a desert among the mountains near Grenoble, and there founded the Carthusian order (1084). After six years Urban II. called him to Rome and offered him the archbishopric of Reggio; but he refused it, and withdrew to a desert in Calabria, where he established two other monasteries, and died in 1101. He wrote Commentaries on the Psalms and the Pauline Epistles, to be found in Migne, Pair. Lat. clii. and cliii. ; some works by namesakes have been attributed to him.

His Life will be found in the Bollandists' Acta Sanctorum (6th of October). The best study on St Bruno's life and works is Hermann Lobbel, Der Stifter des Kartliauser-Ordens, 1899 (vol. v. No. 1 of " Kirchengeschichtliche Studien," Munster). (E. C. B.)

BRUNO, or Brun (925-965), archbishop of Cologne, third son of the German king, Henry I., the Fowler, by his second wife Matilda, was educated for the church at Utrecht, where he

distinguished himself by his studious zeal. In 940 his brother, King Otto, afterwards the emperor Otto the Great, appointed him chancellor, and some years later arch-chaplain, and under his leadership the chancery was reformed and became a training ground for capable administrators. He rendered valuable assist- ance to his brother Otto in his efforts to suppress the risings which marked the earlier part of his reign, services which were rewarded in 953 when Bruno was made archbishop of Cologne, and about the same time duke of Lorraine. Bruno is chiefly renowned as a scholar and a patron of learning. He consorted eagerly with learned foreigners, tried to secure a better education for the clergy, and was mainly instrumental in making his brother's court a centre of intellectual life. He built many churches, and, aided by the tendency of the time, sought to purify monastic life. He died at Reims on the nth of October 965, and was buried in the church of St Pantaleon at Cologne.

See Ruotger, "Vita Brunonis archiepiscopi Coloniensis," in the Monumenla Germaniae Historica, Scriptores, Band iv. (Hanover and Berlin, 1826-1892) ; E. Meyer, DeBrunonel. Archiepiscopo ColoniensL (Berlin, 1867); J. P. Pfeiffer, Historisch-Kritische Beitrage zur Geschichte Bruns I. (Cologne, 1870) ; K. Martin, Beitrage zur Geschichte Briinos I. von Koln (Jena, 1878).

BRUNO, GIORDANO (c. 1548-1600), Italian philosopher of the Renaissance, was born near Nola in the village of Cicala. Little is known of his life. He was christened Filippo, and took the name Giordano only on entering a religious order. In his fifteenth year he entered the order of the Dominicans at Naples, and is said to have composed a treatise on the ark of Noah. Why he submitted to a discipline palpably unsuited to his fiery spirit we cannot tell. In consequence of his views on transub- stantiation and the immaculate conception he was accused of impiety, and after enduring persecution for some years, he fled from Rome about 1576, and wandered through various cities, reaching Geneva in 1 5 79. The home of Calvinism was no resting- place for him (T. Dufour, Giordano Bruno a Geneve, Geneva, 1884), and he travelled on through Lyons, Toulouse and Mont- pellier, arriving at Paris in 1 58 1 . Everywhere he bent his energies to the exposition of the new thoughts which were beginning to effect a revolution in the thinking world. He had drunk deeply of the spirit of the Renaissance, the determination to see for himself the noble universe, unclouded by the mists of authori- tative philosophy and church tradition. The discoveries of Copernicus were eagerly accepted by him, and he used them as the lever by which to push aside the antiquated system that had come down from Aristotle, for whom, indeed, he had a perfect hatred. Like Bacon and Telesio he preferred the older Greek philosophers, who had looked at nature for themselves, and whose speculations had more of reality in them. He had read widely and deeply, and in his own writings we come across many expressions familiar to us in earlier systems. Yet his philosophy is no eclecti- cism. He owed something to Lucretius, something to the Stoic nature- pantheism, something to Anaxagoras, to Heraclitus, to the Pythagoreans, and to the Neoplatonists, who were partially known to him; above all, he was a profound student of Nicolas of Cusa, who was indeed a speculative Copernicus. But his own system has a distinct unity and originality; it breathes through- out the fiery spirit of Bruno himself.

Bruno had been well received at Toulouse, where he had lectured on astronomy; even better fortune awaited him at Paris, especially at the hands of Henry III. He was offered a chair of philosophy,

provided he would receive the Mass. He at once refused, but was permitted to deliver lectures. These seem to have been altogether devoted to expositions of a certain logical system which Bruno had taken up with great eagerness, the Ars Magna of Raimon Lull. With the exception of a satiric comedy, II Candelajo, all the works of this period are devoted to this logic — De Utnbris Idearum, A rs Memoriae, Be compendiosa architectura et complemento artis Lullii, and Canlus Circaeus. To many it has seemed a curious freak of Bruno's that he should have so eagerly adopted a view of thought like that of Lull, but in reality it is in strict accordance with the principles of his philosophy. Like the Arabian logicians, and some of the scholastics, who held that ideas existed in a threefold form — ante res, in rebus

and post res — he laid down the principle that the archetypal ideas existed metaphysically in the ultimate unity or intelli- gence, physically in the world of things, and logically in signs, symbols or notions. These notions were shadows of the ideas, and the Ars Magna furnished him with a general scheme, according to which their relations and correspondences should be exhibited. It supplied not only a memoria technica, but an organon, or method by which the genesis of all ideas from unity might be represented intelligibly and easily. It provided also a substitute for either the Aristotelian or the Ramist logic, which was an additional element in its favour.

Under the protection' of the French ambassador, Michel de Castelnau, sieur de Mauvissiere, Bruno passed over in 1583 to England, where he resided for about two years. He was dis- gusted with the brutality of English manners, which he paints in no flattering colours, and he found pedantry and superstition as rampant in Oxford as in Geneva. Indeed, there still existed on the statute a provision that " Masters and Bachelors who did not follow Aristotle faithfully were liable to a fine of five shillings for every point of divergence, and for every fault committed against the logic of the Organon." But he indulges in extravagant eulogies of Elizabeth. He is generally said to have formed the acquaintance of Sir Philip Sidney, Fulke Greville and other eminent Englishmen, but there has been much controversy as to the facts of his life in London. It seems probable that he lived in the French embassy in some secretarial or tutorial position. He may conceivably have met Bacon, but it is quite incredible that he met Shakespeare in the printing shop of Thomas Vau- trollier. In Oxford he was allowed to hold a disputation with some learned doctors on the rival merits of the Copernican and so-called Aristotelian systems of the universe, and, according to his own report, had an easy victory. The best of his

works were written in the freedom of English social life. The Cena de le Ceneri, or Ash Wednesday conversation, devoted to an exposition of the Copernican theory, was printed in 1584. In the same year appeared his two great metaphysical works, De la Causa, Prin- cipio, ed Uno, and De I' Infinito, Universo, e Mondi; in the year following the Eroici Furori and Cabala del Cavallo Pegaseo. In 1 584 also appeared the strange dialogue, Spaccio della Bcstia Trionfante (Expulsion of the Triumphant Beast), an allegory treating chiefly of moral philosophy, but giving the essence of Bruno's philosophy. The gods are represented as resolving to banish from the heavens the constellations, which served to remind them of their evil deeds. In their places are put the moral virtues. The first of the three dialogues contains the substance of the allegory, which, under the disguise of an assault on heathen mythology, is a direct attack on all forms of anthropomorphic religion. But in a philosophical point of view the first part of the second dialogue is the most important. Among the moral virtues which take the place of the beasts are Truth, Prudence, Wisdom, Law and Universal Judgment, and in the explanation of what these mean Bruno unfolds the inner essence of his system. Truth is the unity and substance which underlies all things; Prudence or Providence is the regulating power of truth, and comprehends both liberty and necessity; Wisdom is providence itself in its supersensible aspect — in man it is reason which grasps the truth of things; Law results from wisdom, for no good law is irrational, and its sole end and aim is the good of mankind; Universal Judgment is the principle whereby men are judged according to their deeds, and not according to their belief in this or that catechism. Mingled with his allegorical philosophy are the most vehement attacks upon the established religion. The monks are stigmatized as pedants who would destroy the joy of life on earth, who are avaricious, dissolute and the breeders of eternal dis- sensions and squabbles. The mysteries of faith are scoffed at. The Jewish records are put on a level with the Greek myths, and miracles are laughed at as magical tricks. Through all this runs the train of thought resulting naturally from Bruno's fundamental principles, and familiar in modern philosophy as Spinozism, the denial of particular providence, the doctrine of the uselessness of prayer, the identification in a sense of liberty and necessity, and the peculiar definition of good and evil.

BRUNO OF QUERFURT, ST— BRUNSWICK, DUKE OF 687

In 1585-1586 he returned with Castelnau to Paris, where his anti-Aristotelian views were taken up by the college of Cambrai, but was soon driven from his refuge, and we next find him at Marburg and Wittenberg, the headquarters of Lutheranism. There is a tradition

that here or in England he embraced the Protestant faith; nothing in his writings would lead one to suppose so. Several works, chiefly logical, appeared during his stay at Wittenberg {De Lampade combinatoria Lulliana, 1587, and De Progressu et Lampade venatoria logicorum, 1587). In 1588 he went to Prague, then to Helmstadt. In 1501 he was at Frankfort, and published three important metaphysical works, De Triplici Minimo et Mensura; De Monade, Numero, et Figura; De Immenso et Innumerabilibus. He did not stay long at Prague, and we find him next at Zurich, whence he accepted an invitation to Venice from a young patrician, Giovanni Mocenigo. It was a rash step. The emissaries of the Inquisition were on his track; he was thrown into prison, and in 1593 was brought to Rome. Seven years were spent in confinement. On the 9th of February 1600 he was excommunicated, and on the 17th was burned at the stake. '

For more than two centuries Bruno received scarcely the consideration he deserved. On the 9th of June 1889, however, as a result of a strong popular movement, a statue to him was unveiled in Rome in the Campo dei Fiori, the place of his execution.

To Bruno, as to all great thinkers, philosophy is the search for unity. Amid all the varying and contradictory phenomena of the universe there is something which gives coherence and intelligibility to them. Nor can this unity be something apart from the things ; it must contain in itself the universe, which develops from it; it must be at once all and one. This unity is God, the universal sub- stance, — the one and only principle, or causa immanens, — that which is in things and yet is distinct from them as the universal is distinct from the particular. He is the efficient and final cause of all, the beginning, middle, and end, eternal and infinite. By his action the world is produced, and his action is the law of his nature, his necessity is true freedom. He is living, active intelligence, the principle of motion and creation, realizing himself in the infinitely various forms of activity that constitute individual things. To the infinitely actual there is necessary the possible; that which deter- mines involves somewhat in which its determinations can have existence. This other of God, which is in truth one with him, is matter. The universe, then, is a living cosmos, an infinitely animated system, whose end is the perfect realization of the variously graduated forms. The unity which sunders itself into the multiplicity of things may be called the monas monadum, each thing being a monas or self -existent, living being, a universe in itself. Of these monads the number is infinite. The soul of man is a thinking monad, and stands mid-way between the divine intelligence and the world of external things. As a portion of the

divine life, the soul is immortal. Its highest function is the contemplation of the divine unity, discoverable under the manifold of objects.

Such is a brief summary of the principal positions of Bruno's philosophy. It seems quite clear that in the earlier works.particularly the two Italian dialogues, he approached more nearly to the pan-theistic view of things than in his later Latin treatises. The unity expounded at first is simply an anima mundi, a living universe, but not intelligent. There is a distinct development traceable towards the later and final form of his doctrine, in which the universe appears as the realization of the divine mind.

Bruno's writings had been much neglected when Tacobi brought therri into notice in his Briefe uber die Lehre Spinozas (2nd ed., 1879). Since then many have held that Descartes, Spinoza and Leibnitz were indebted to him for their main principles. So far as Descartes is concerned, it is highly improbable that he had seen any of Bruno's works. Schelling, however, called one of his works after him, Bruno.

Bibliography. — The chief edition of the Latin works is that published at the public expense by F. Fiorentino, F. Tocco and H. Vitelli (Naples, 1879-1891), which superseded that of A. F. Gfrorer (Stuttgart, 1834, incomplete). The Italian works were collected by A. Wagner (Leipzig, 1830), and a new edition was published by P. de Lagarde (Gottingen, 1888-1889) ; also Opere Italiane, ed. Croce and G. Gentile (1907 foil.), with notes by the latter. In Germany, Gesammelte Werke, trans. L. Kuhlenbeck (1904 foil.). English translations : — The Spaccio, by Morehead, not' as has been supposed by J. Toland (dated 1713, but probably printed earlier and very rare) ; of the preface to De V Infinite (J. Toland in posthumous works); Eroici Furores, L. Williams (1888). There are also French and German translations.

The chief English work on Giordano Bruno is that of J. Lewis M'Intyre (London, 1903), containing life, commentary and biblio-graphy. See also C. Bartholmess, /. Bruno (Paris, 1846-1847) ; Domenico Berti, Giordano Bruno da Nola (2nd ed., 1889) ; H.

Brunnhofer, Giordano Brunos Weltanschauung (Leipzig, 1883); M. Carricre, Philosophische Weltanschauung der Reformationszeit, pp. 411-494 (2nd ed.,. 1887); F. J. Clemens, Giordano Bruno und Nicolaus von Cusa (Bonn, 1847); Miss I. Frith, Life of Giordano Bruno the Nolan (London, 1887) ; C. E. Plumptre, Life and Works of

Giordano Bruno (London, 1884) ; Chr. Sigwart, in Kleine Schriften, 1st series, pp. 49-124, 293-304; A. Riehl, G. Bruno (1889, ed. 1900; Eng. trans. Agnes Fry, 1905); Landsbeck, Bruno, der Marlyrer der neuen Weltanschauung (1890); Owen, in Sceptics of the Italian Renaissance (London, 1893); C. H. von Stein, G. Bruno (1900); R. Adamson, Development of Modern Philosophy (Edinburgh and London, 1903) ; G. Louis, G. Bruno, seine Weltanschauung und Lebensauffassung (1900); 0. Juliusberger, G. Bruno und die Gegenwart (1902); J. Reiner, G. Bruno und seine Weltanschauung (1907). The most important critical works are perhaps those of Felice Tocco, Le Opere Latine di Giordano Bruno (Florence, 1 889), Le Opere Inedite di Giordano Bruno (Naples, 1891), Le Fonti piu recenti dellafilos. del Bruno (Rome, 1892). See also H. Hoffding, History of Modern Philosophy (Eng. trans., 1900) ; J. M. Robertson, Short History of Freethought (London, 1906) ; G. Gentile, Giordano Bruno nella Storia delta cultura (1907). For other works see G. Graziano, Bibliografia Bruniana (1900). (R. Ad.; J. M. M.)

BRUNO (Brun, Bruns) OF QUERFURT, SAINT (c. 975- 1009), German missionary bishop and martyr, belonged to the family of the lords of Querfurt in Saxony. He was educated at the famous cathedral school at Magdeburg, and at the age of twenty was attached to the clerical household of the emperoi Otto III. In 996 he accompanied the emperor to Rome, and there gave up his post and entered the monastery of SS. Alexius and Bonifacius on the Aventine, taking " in religion " the name of Bonifacius. When the news reached Rome of the martyr- dom of Adalbert, bishop of Prague (997), Bruno determined to take his place, and in 1004, after being consecrated by the pope as archbishop of the eastern heathen, he set out for Ger- many to seek aid of the emperor Henry II. The emperor, how- ever, being at war with Boleslaus of Poland, opposed his enterprise, and he went first to the court of St Stephen of Hungary, and, finding but slight encouragement there, to that of the grand prince Vladimir at Kiev. He made no effort to win over Vladimir to the Roman obedience, but devoted himself to the conversion of the pagan Pechenegs who inhabited the country between the Don and the Danube. In this he was so far success- ful that they made peace with the grand prince and were for a while nominally Christians. In 1008 Bruno went to the court of Boleslaus, and, after a vain effort to persuade the emperor to end the war between Germans and Poles, determined at all hazards to proceed with his mission to the Prussians. With eighteen companions he set out; but on the borders of the Russian (Lithuanian) country he and all his company were massacred by the heathens (February 14, 1009).

During his stay in Hungary (1004) Bruno wrote a life of St Adalbert, the best of the three extant biographies of the saint (in Pertz, Mon. Germ. Hist. Scriptores, iv. pp. 577, 596-612), described by A. Potthast (Bibliotheca hist. med. aev.) as " in the highest degree attractive both in manner and matter."

A life of St Bruno was written by Dietmar, bishop of Merseburg (976-1019). This, with additions from the life of St Romuald, is published in the Bollandist Ada Sanctorum (June 19), vi. I, pp. 223-225. See further U. Chevalier, Repertoire ales sources historiques, Bio-Bibliographie (Paris, 1904), s.v. " Brunon de Querfurt."

BRUNSBUTTEL, a seaport town of Germany, in the Prussian province of Schleswig-Holstein, on the N. bank of the Elbe, 60 m. N.W. from Hamburg. Pop. (1905) 2500. Bruns- biittel is the west terminus of the Kaiser Wilhelm Canal, which is closed there by double locks. Here also are an inner harbour, 1640 ft. long and 656 ft. wide, a coaling station, and a small harbour for the tugs and other vessels belonging to the canal company.

BRUNSWICK, KARL WILHELM FERDINAND, Duke of (173 5-1 806), German general, was born on the 9th of October 1735 at Wolfenbuttel. He received an unusually wide and thorough education, and travelled in his youth in Holland, France and various parts of Germany. His first military ex- perience was in the North German campaign of 1757, under the duke of Cumberland. At the battle of Hastenbeck he won great renown by a gallant charge at the head of an infantry brigade;

and upon the capitulation of Kloster Zeven he was easily per- suaded by his uncle Ferdinand of Brunswick, who succeeded Cumberland, to continue in the war as a general officer. The exploits of the hereditary prince, as he was called, soon gained him further reputation, and he became an acknowledged master of irregular warfare. In pitched battles, and in particular at Minden and Warburg, he proved himself an excellent subordinate. After the close of the Seven Years' War, the prince visited England with his bride, the daughter of Frederick, prince of Wales, and in 1766 he went to France, being received both by his allies and his late enemies with every token of respect. In Paris he made the acquaintance of

Marmontel; in Switzerland, whither he continued his tour, that of Voltaire; and in Rome, where he remained for a long time, he explored the antiquities of the city under the guidance of Winckelmann. After a visit to Naples he returned to Paris, and thence, with his wife, to Bruns- wick. His services to the dukedom during the next few years were of the greatest value; with the assistance of the minister Feronce von Rotenkreuz he rescued the state from the bank- ruptcy into which the war had brought it. His popularity was unbounded, and when he succeeded his father, Duke Karl L, in 1780, he soon became known as a model to sovereigns. He was perhaps the best representative of the benevolent despot of the 1 8th century — wise, economical, prudent and kindly. His habitual caution, if it induced him on some occasions to leave reforms uncompleted, at any rate saved him from the failures which marred the efforts of so many liberal princes of his time. He strove to keep his duchy from all foreign entanglements. At the same time he continued to render important services to the king of Prussia, for whom he had fought in the Seven Years' War; he was a Prussian field marshal, and was at pains to make the regiment of which he was colonel a model one, and he was frequently engaged in diplomatic and other state affairs. He resembled his uncle Frederick the Great in many ways, but he lacked the supreme resolution of the king, and in civil as in military affairs was prone to excessive caution. As an enthusiastic adherent of the Germanic and anti-Austrian policy of Prussia he joined the Ftirstenbund, in which, as he now had the reputation of being the best soldier of his time, he was the destined commander-in-chief of the federal army.

Between 1763 and 1787 his only military service had been in the brief War of the Bavarian Succession; in the latter year, however, the duke, as a Prussian field marshal, led the army which invaded Holland. His success was rapid, complete and almost bloodless, and in the eyes of contemporaries the cam- paign appeared as an .example of perfect generalship. Five years later Brunswick was appointed to the command of the allied Austrian and German army assembled to invade France and crush the Revolution. In this task he knew that he must encounter more than a formal resistance. He was so far in acknowledged sympathy with French hopes of reform, that when he gave an asylum in his duchy to the " comte de Lille " (Louis XVIII.) the revolutionary government made no protest. Indeed, earlier in this year (1792) he had been offered supreme command of the French army. As the king of Prussia took the field with Brunswick's army, the duke felt bound as a soldier to treat his wishes as actual orders. (For the events of the Valmy campaign see French

Revolutionary Wars.) The result of Brunswick's cautious advance on Paris was the cannonade of Valmy followed by the retreat of the allies. The following campaign of 1703 showed him perhaps at his best as a careful and exact general; even the fiery Hoche, with the " nation in arms " behind him, failed to make any impression on the veteran leader of the allies. But difficulties and disagreements at headquarters multiplied, and when Brunswick found himself unable to move or direct his army without interference from the king, he laid down his command and returned to govern his duchy. He did not, however, withdraw entirely from Prussian service, and in 1803 he carried out a successful and diplomatic mission to Russia. In 1806, at the personal request of Queen Louise of Prussia, he consented to command the Prussian army, but here again the presence of the king of Prussia

and the conflicting views of numerous advisers of high rank proved fatal. At the battle of Auerstadt the old duke was mortally wounded. Carried for nearly a month in the midst of the routed Prussian army he died at last on the 10th of Novem- ber 1806 at Ottensen near Hamburg.

His son and successor, Friedrich Wilhelm (1771-1815), who was one of the bitterest opponents of Napoleonic domination in Germany, took part in the war of 1809 at the head of a corps of partisans; fled to England after the battle of Wagram, and returned to Brunswick in 1813, where he raised fresh troops. He was killed at the battle of Quatre Bras on the 16th of June

1815.

See Lord Fitzmaurice, Charles W. F., duke of Brunswick (London, 1901); memoir in Allgemeine deutsche Biographie, vol. ii. (Leipzig, 1882); and, for an interesting sketch of his military character. A. Chuquet, Les Guerres de la Revolution — La Premiere Invasion prussienne (Paris, n.d.).

BRUNSWICK, a city and the county-seat of Glynn county, Georgia, U.S.A., and a port of entry, on St Simon Sound, about 12 m. from the Atlantic Ocean, and about 100 m. S. of Savannah. Pop. (1890) 8459; (1900) 9081, of whom 5184 we're of negro descent; (191° U.S. census) 10,182. It is one of the seaports of Georgia, the Federal government having dredged a channel in the inner harbour 21 ft. deep at mean low water and a channel across the outer bar 119-3 ft. deep at mean low water — there is a rise of 7-2 ft. at high tide. St Simon Island and Jekyl Island (a winter resort of wealthy men),

lying between the ocean and the mainland, protect the harbour. The city is served by the Southern, the Atlanta, Birmingham & Atlantic, and the Atlantic Coast Line railways; it is also connected by lines of steamboats with various ports along the coast, including New York and Boston. Brunswick's growth has been retarded by the successful rivalry of other cities,?notably Savannah; but it has a consider- able export trade, principally in lumber, cross-ties and naval stores — its exports were valued at $13,387,838 in 1908 — and various manufactories, including planing mills, cooperage works and oyster canneries. It was settled about 1772, and received a city charter in 1856.

BRUNSWICK (Ger. Braunschweig), a sovereign duchy of northern Germany, and a constituent state of the German empire, comprising three larger and six smaller portions of territory. The principal or northern part, containing the towns of Brunswick, Wolfenbiittel and Helmstedt, is situated between the Prussian provincesof Hanover and Saxony to the south-east of the former. The western part, containing Holzminden and Gandersheim, extends eastward from the river Weser to Goslar. The Blankenburg, or eastern portion, lies to the south-east of the two former, between Prussia, the duchy of Anhalt and the Prussian province of Hanover. The six small enclaves, lying in the Prussian provinces of Hanover and Saxony, are the districts Thedinghausen, Harzburg and Kalvorde, and the three demesnes of Bodenburg, Olsburg and Ostharingen. A portion of the Harz mountains was, down to 1874, common to Brunswick and Prussia (Hanover) and known as the Communion Harz. In 1874 a partition was effected, but the mines are still worked in common, four-sevenths of the revenues derived from them falling to Prussia and the remaining three-sevenths to Brunswick.

The northern portion of the duchy has its surface diversified by hill and plain; it is mostly arable and has little forest. The other two principal portions are intersected by the Harz moun- tains, and its spurs and the higher parts are covered with forests of fir, oak and beech. The greatest elevations are the Wurmberg (3230 ft.), and the Achtermannshohe (3100 ft), lying south of the Brocken. Brunswick belongs almost entirely to the basin of the river Weser, into which the Oker, the Aller and the Leine, having their sources.in the Harz, discharge their waters. The climate is mild in the north, but in the hilly country raw and cold in winter, and in autumn and spring damp. The area of the duchy is 1424 sq. m., and of this total fully one-half is arable land, 10% meadow and pasture, and 33% under forest. The population in 1905 was 485,655. The religion is, in the main; that of the Lutheran Evangelical church; but there is a large

Roman Catholic community centred in and round Hildesheim,

the seat of the bishopric of North Germany. The Jews have several synagogues, with a rabbinate in Brunswick. The birth- rate is 35-3, and the death-rate 21-6 per thousand inhabitants. In the rural districts, broad Low German is spoken; but the language of the upper and educated classes is distinguished by its purity of style and pronunciation.

The land devoted to agriculture is excellently farmed, and cereals, beet (for sugar), potatoes and garden produce of all kinds, particularly fruit, obtain the best market prices. The pasture land rears cattle and sheep of first-rate quality, and great attention is paid to the breeding of horses, in which the famous stud farm at Harzburg has of late years been eminently conspicuous. Timber cutting, in the forests of the Harz, employs a large number of hands. But agriculture, which, until recently, formed the chief wealth of the duchy, has now given way to the mining industry, both in point of the numbers of inhabitants employed and in the general prosperity distributed by it. The chief seat of the mining industry is the Harz, and its development annually increases in extent and importance. Coal (bituminous) , iron, lead, copper, sulphur, alum, marble, alabaster, lime and salt are produced in large quantities, and the by-products of some of these, particularly chemicals and asphalt, constitute a great source of revenue. The manufactures embrace sugar (from beet), spinning, tobacco, paper, soap machines, glass, china, beer and sausages. The last are famous throughout Germany. The principal articles of export are thread, dyes, cement, chicory, beer, timber, preserves, chemicals and sausages. The railways, formerly belonging to the state, were, in 1870, leased to private companies and in 1884 purchased by Prussiaˆ and have a length of about 320 m. The roads, of which one quarter are in the hands of the state, are excellently kept, and vie with those of any European country.

The constitution is that of a limited monarchy, and dates from a revision of the fundamental law on the 12th of October 1832. The throne is hereditary in the house of Brunswick- Luneburg, according to the law of primogeniture, and in the male line of succession, but the rightful heir, Ernest, duke of Cumberland, was not allowed to take possession. The parliament of the duchy. (Landes- or

Standeversamndung) is an assembly of estates forming one house of 48 deputies, of whom 30 are elected by municipal and rural communities, while the remainder repre- sent the Evangelical church, the large landed proprietors, manu- facturers and the professions. The house, however, has little power in initiating legislation, but it can refuse taxation, im- peach ministers and receive petitions. The executive functions of the administration and government reside in the ministry (Staatsministerium) consisting of three responsible ministers, assisted by a council of the holders of the other chief offices of state. The public debt amounts to about 3 J millions sterling, and the civil list to about £56,000 a year, mostly derived from the revenues of the state domains. By virtue of a convention with Prussia, of March 1886, the Brunswick contingent to the imperial forces forms a part of the Prussian army and is attached to the X. army corps. The convention can be rescinded only after a two years' notice.

History. — The lands which comprise the modern duchy of Brunswick belonged in the 10th century to the family of the Brunos, whence the name Brunswick is derived, of the counts of Nordheim, and the counts of Supplinburg. Inherited during the 12th century by Henry the Proud, duke of Saxony and Bavaria, and a member of the family of Welf , they subsequently formed part of the extensive Saxon duchy ruled by his son, Henry the Lion.

When Henry was placed under the imperial ban and his duchy dismembered in 1181, he was allowed to retain his hereditary possessions, which consisted of a large part of Brunswick and Luneburg. The bulk of these lands came subsequently to Henry's grandson, Otto, and in 1235 the emperor Frederick II., anxious to be reconciled with the Welfs, recognized Otto's title and created him duke of Brunswick and Luneburg. Otto added several counties and the town of Hanover to his possessions, and when he died in 1252 was succeeded by his sons Albert and

John. In 1267 these princes divided the duchy, Albert becoming duke of Brunswick, and John duke of Luneburg. The dukes of Luneburg increased the area of their duchy, and when the family died out in 1369 a stubborn contest took place for its possession. Claimed by Magnus II., duke of Brunswick-Wolfenbuttel, this prince was forced by the emperor Charles IV. to abandon his pretensions, but in 1388 his sons succeeded in incorporating Luneburg with Brunswick-Wolfenbuttel. In 1285 the duchy of Brunswick had been divided between Duke Albert's three sons, whose relations with each other were far from harmonious, and the lines of Wolfenbuttel, Gottingen

and Grubenhagen had been established. The Wolfenbuttel branch died out in 1 292, but was refounded in 1345 by Magnus I., a younger member of the Gottingen family; the elder Gottingen branch died out in !463, and the Grubenhagen branch in 1596. Magnus I., duke of Brunswick-Wolfenbuttel from 1345 to 1369, was the ancestor of the later dukes of Brunswick. His grandsons, Frederick, Bernard and Henry, secured Luneburg in 1388, but in 1428 Bernard, the only survivor of the three, was forced to make a division of the duchy, by which he received Luneburg, while his nephews, William and Henry, obtained Brunswick, which in 1432 they divided into Calenberg and Wolfenbuttel. In 1473, however, William, who had added Gottingen to his possessions in 1463, united these lands; but they were again divided from 1495 to 1584. In 1584 Brunswick was united by Duke Julius, and in 1596 Grubenhagen was added to it. Duke Frederick Ulrich, however, was Obliged to cede this territory to Luneburg in 1617, and when he died in 1634 his family became , extinct, and Brunswick was divided between the two branches of the Luneburg family.

The duchy of Luneburg, founded by Bernard in 1428, remained undivided until 1520, when Duke Henry abdicated and his three sons divided the duchy. Two of the branches founded at this time soon died out; and in 1569, after the death of Ernest I., the representative of the third branch, his two sons agreed upon a partition which is of considerable importance in the history of Brunswick, since it established the lines of Dannenberg and of Liineburg-Celle, and these two families divided the duchy of Brunswick-Wolfenbuttel in 1635. The dukes of Liineburg-Celle subsequently took the name of Hanover, and were the ancestors of the later kings of Hanover (q.v.). After the acquisition of 1635 the family of Dannenberg took the title of Brunswick-Wolfen- buttel, and ruled in the direct line until 1735. It was then followed by the family of Brunswick-Bevern, which had split off from the parent line in 1666 and ruled until 1884.

Brunswick has not played a very important part in German politics. Many counties were added to its area, but it was weakened by constant divisions of territory, and during the period of the Reformation some of the princes took one side and some the other. The treaty of Westphalia in 1648 made little difference to its prestige, but its subsequent position was greatly affected by the growth of Prussia. During the Seven Years' War Brunswick supported Frederick the Great, and in return was severely ravaged by the French. Duke Charles I., who accumulated a large amount of debt, sought to discharge his liabilities by sending his soldiers as mercenaries to assist England during the American War of

Independence. The suc- ceeding duke, Charles William Ferdinand, brought order into the finances, led the Prussian troops against Napoleon, and died in 1806 from wounds received at the battle of Auerstadt. Napoleon then declared the ducal family deposed and included Brunswick in the kingdom of Westphalia. In 1813 it was restored to Duke Frederick William, who was killed in 181 5 at the battle of Quatre Bras. His son, Charles II., while a minor, was under the regency of George, afterwards the English king George IV., who ruled the duchy through Ernest, Count Munster-Ledenburg (1766-1839), assisted by Justus von Schmidt-Phiseldeck (1769-1851). A new constitution was granted in 1820, but after Charles came of age in 1823 a period of disorder ensued. The duke, who was very unpopular with his subjects,' quarrelled with his relatives, and in 1830 a revolution drove him from the country. The government was undertaken by his brother William, and in

1 83 1 Charles was declared incapable of ruling, and William was appointed as his successor. The ex-duke, who made a fine collection of diamonds, died childless at Geneva in August 1873. William's long reign witnessed many excellent and necessary reforms. A new constitution was granted in 1832, and in 1844 Brunswick joined the Prussian Zollverein. Trial by jury and freedom of the press were established, many religious disabilities were removed, and measures were taken towards the freedom of trade.

Brunswick took very little part in the war between Prussia and Austria in 1866, but her troops fought for Prussia during the Franco-German War of 1870-71. The duchy joined the German Confederation in 1815, the North German Confederation in 1866, and became a state of the German empire in 1871.

In 1866 the question of the succession to Brunswick became acute. Duke William was unmarried, and according to the exist- ing conventions it would pass to George, king of Hanover, who had just been deprived of his kingdom by the king of Prussia. In 1879, however, the duke and the estates, with the active support of Prussia, concluded an arrangement for a temporary council cf regency to take over the government on William's death. Moreover, if in this event the rightful heir was unable to take possession of the duchy, the council was empowered to appoint a regent. William died on the 18th of October 1884, and George's son, Ernest, duke of

Cumberland, claimed Bruns- wick and promised to respect the German constitution. This claim was disregarded by the council of regency, and the Bundesrat declared that the accession of the duke of Cumberland would be inimical to the peace and security of the empire on account of his attitude towards Prussia. In the following year the council chose Albert, prince of Prussia, as regent, a step which brought Brunswick still more under the influence of her powerful neigh- bour. Albert died in September 1906, and after some futile negotiations with the duke of Cumberland, the Brunswick diet chose Duke John Albert of Mecklenburg-Schwerin (b. 1857) as regent in May 1907.

See O. von Heinemann, Geschichle Braunschweigs und Hannovers (Gotha, 1882-1892) ; W. Havemann, Geschichte der Lande Braun- schweig und Liineburg (Gottingen, 1853-1857J; H. Sudendorf, Ur- kundenbuch zur Geschichte der Herzoge von Braunschweig und Liineburg und ihrer Lande (Hanover, 1859-1883) ; H. Guthe, Die Lande Braunschweig und Hannover (Hanover, 1890); J. Beste, Geschichte der braunschweigischen Landeskirche von der Reformation bis auf unsere Tage (Wolfenbuttel, 1889) ; A. Kocher, Geschichte von Hannover und Braunschweig 1648-1714 (Leipzig, 1884).

BRUNSWICK, a city of Germany, capital of the duchy of that name, situated in a fertile and undulating country, on the Oker, 37 m. S.E. from Hanover and 53 N.W. from Magdeburg, on the main line of railway from Berlin. Pop. (1900) 128,226; (1905) 136,423, of which number about 9000 were Roman Catholics and 1000 Jews. Brunswick is an interesting place and retains much of its medieval character. The fortifications which formerly environed it were dismantled in 1797, and have given place to a regular circle of gardens and promenades, which rank among the finest in Germany. Within them lies the old town, with some- what narrow and crooked streets, remarkable for its numerous ancient houses, with high gables and quaintly Carved exteriors. In picturesqueness it vies with Liibeck and Liineburg among North German towns. Among its churches, the cathedral, St Blasius, or Burgkirche, a Romanesque structure begun by Henry the Lion about n 73 and finished in 1194, is of interest. The chmcel is decorated with 12th-century frescoes by Johannes Gallicus, and contains the tombs of the founder and his consort, with beautiful effigies in relief, and also that of the emperor Otto IV. In the vault beneath rest the remains of the Guelphs of the Brunswick line (since 1681). Remarkable among other churches are the Magnikirche (consecrated in 103 1; the present edifice being built between the 13 th and 15th centuries and restored in 1877); the

Martinikirche, with Romanesque towers, originally a Romanesque basilica (1180-1190), enlarged in the 13th cen- tury in early Gothic by the addition of vaulted aisles and a choir (1490-1500), and remarkable further for the splendid late Gothic Annenkapelle (1434) and three magnificent portals; the

Katharinenkirche, with a fine tower, begun by Henry the Lion in 1172, added to in 1252 and finished (choir) in 1500; the Briiderkirche (1361-1451, restored 1869-1870), formerly the church of a Franciscan house, the refectory of which (i486) is now used for military stores; the Andreaskirche (1200, 1360-1420), partly transitional, partly late Gothic, with a tower 318 ft. high; and the Aegidienkirche (1278-1434), now used for exhibitions and concerts.

In secular buildings, both ancient and modern, Brunswick is also rich. The most noticeable of these is the town hall (14th and 15th centuries), a gem of Gothic architecture. In front of it is a beautiful Gothic leaden fountain of the early 15th century. Close by the cathedral is the Dankwarderode, a two-storeyed Romanesque building, erected in 1884 on the site of the ancient citadel of the same name which was destroyed by fire in 1873; the cloth merchants' hall (Gewandhaus) of the 13th century, with a richly ornamented facade in Renaissance style, now occupied by the chamber of commerce; the restored Huneborstelsche Haus with its curious and beautiful oak carving of the 16th century. The ducal palace is a fine modern structure, erected since 1865, when most of the previous building, which dated only from 1831, was destroyed by fire. The famous Quadriga of Rietschel, which perished at the same time, has been replaced by a copy by Georg Howaldt (1802-1883). The theatre lies on a spacious square close to the ducal gardens, and immediately outside the promenades; to the south is the handsome railway station. Among other numerous buildings of modern erection may be mentioned the new town hall (1893-1900) and the ministry of finance, both in early Gothic style. The scientific and art collections of Brunswick are numerous. The ducal museum contains a rich collection of antique and medieval curiosities, engravings and pictures. There are also a municipal museum, a museum of natural history, a mineralogical collection, a botanical garden and two libraries. The educational and charitable institutions of Brunswick are many. Of the former may be mentioned the Collegium Carolinum, founded in 1745, the technical high school, two gymnasia and an academy of forestry. Among the latter are a deaf and dumb institution, a blind asylum, an orphanage and various hospitals and infirmaries. A monument, 60 ft. high, to Duke Frederick William, who was slain at Quatre Bras, gives its name to the Monumentsplatz.

Another to the south-east of the town perpetuates the memory of Schill Ferdinand (1776-1809) and his companions. There are also statues of Franz Abt, the composer, of Lessing and of the astronomer K. F. Gauss.

The industries of the town are considerable. Especially im- portant are the manufacture of machinery, boilers, gasometers, pianos, preserves, chemicals, beer and sausages. Brunswick is also a leading centre of the book trade. The communications between the inner town and the extensive suburbs are maintained by an excellent service of electric tramways.

Brunswick is said to have been founded about 861 by Bruno, son of Duke Ludolf of Saxony, from whom it was named Bruns- wick (from the Old High German Wick, hamlet). Afterwards fortified and improved by Henry the Lion, it became one of the most important cities of northern Germany. For a long time its constitution was rather peculiar, as it consisted of five separate townlets, each with its own walls and gates, its own council and Rathaus — a condition traces of which are still evident. In the 13th century it ranked among the first cities of the Hanseatic League. After this era, however, it declined in prosperity, in consequence of the divisions of territory among the branches of the reigning house, the jealousy of the neighbouring states, the Thirty Years' War, and more recently the French occupation, under which it was assigned to the kingdom of Westphalia. During the time of the Reformation the sympathies of the citizens were with the new teaching, and the city was a member of the League of Schmalkalden. In 1830 it was the scene of a violent revolu- tion, which led to the removal of the reigning duke. In 1834 it attained municipal self-government.

See F. Knoll, Braunschweig und Vmgebung (1882); Sack, Kurze Geschichte der Stadt Braunschweig (1861); and H. Diirre, Geschichte der Stadt Braunschweig im Mittelalter (1875).

BRUNSWICK, a village of Cumberland county, Maine,U.S.A., in the township of Brunswick, on the Androscoggin river, 9 m. W. of Bath, and 27 m. N.N. E. of Portland. Pop. of the township (1900) 6806; (1910) 6621; of the village (1900) 5210 (1704 foreign-born); (1910) 5341. Brunswick is served by the Maine Central railway, and by the Lewiston, Brunswick & Bath, and the Portland & Brunswick

electric railways. Opposite Bruns- wick and connected with it by a bridge is the township of Topsham (pop. in 1910, 2016). The village of Brunswick lies only 63 ft. above sea-level, shut within rather narrow bounds by hills or bluffs, from which good views may be obtained of the island-dotted sea and deeply-indented coast to the south and east and of the White Mountains to' the west. The river falls in three successive stages for a total distance of 41 ft., furnishing good water-power for paper and cotton mills and other manu- factories; the first cotton-mill in Maine was built here about 1809. The settlement of the site of Brunswick was begun by fishermen in 1628 and the place was called Pejepscot; in 1717 Brunswick was constituted a township under its present name by the Massachusetts general court, and in 1 739 the township was regularly incorporated. The village was incorporated in 1836.

Brunswick is best known as the seat of Bowdoin College, a small institution of high educational rank. There are eleven buildings on a campus of about 40 acres, 1 m. from the river- bank at the end of the principal village thoroughfare. The chapel (King Chapel, named in honour of William King, the first governor of Maine), built of undressed granite, is of Romanesque style, and has twin towers and spires rising to a height of 120 ft.; the interior walls are beautifully decorated with frescoes and mural paintings. The Walker Art Building (built as a memorial to Theophilus W. Walker) is of Italian Renaissance style, has mural decorations by John la Farge, Elihu Vedder, Abbott H. Thayer and Kenyon Cox, and contains a good collection of paintings and other works of art. Among the paintings, many of which were given by the younger James Bowdoin, are examples of van Dyck, Titian, Poussin and Rembrandt. The library building is of Gothic style, and in 1908 contained 88,000 volumes (including the private library of the younger James Bowdoin). Among the other buildings are an astronomical observatory, a science building, a memorial hall, a gymnasium and three dormitories. The building of the Medical School of Maine (1820), which is a department of the college, is on the same campus. Bowdoin was incorporated by the general court of Massachusetts in 1794, but was not opened until 1802. It was named in honour of James Bowdoin (1726-1790), whose son was a liberal bene- factor. The college has been maintained as a non-sectarian institution largely by Congregationalists, and is governed by a board of trustees and a board of overseers. Among the dis- tinguished alumni have been Nathaniel Hawthorne, Franklin Pierce, Henry W. Longfellow, John P. Hale, William P. Fessenden, Melville W. Fuller, and Thomas B. Reed.

BRUNSWICK-BEVERN, AUGUST WILHELM, Duke of (1715-1781), Prussian soldier, son of Ernst Ferdinand, duke of Brunswick-Bevem, was born at Brunswick in 1715, and entered the Prussian army in 1731, becoming colonel of an infantry regiment in 1739. He won great distinction at Hohenfriedeberg as a major-general, and was promoted lieutenant-general in 1750. He was one of the most experienced and exact soldiers in the army of Frederick the Great. He commanded a wing in the battle of Lobositz in 1756, and defeated the Austrians under Marshal Konigsegg in a well-fought battle at Reichenberg on the 2 1 st of April 1757. He took part in the battles of Prague and Kolin and the retreat to Gorlitz, andsubsequently commanded the Prussians left behind by Frederick in the autumn of 1757 when he marched against the French. Bevern conducted a defensive campaign against overwhelming numbers with great skill, but he soon lost the valuable assistance of General Winter- feld, who was killed in a skirmish at Moys; and he was eventually brought to battle and suffered a heavy defeat at Breslau on the 22nd of November. He fell into the hands of the Austrians on the following morning, and remained prisoner for a year. He was made general of infantry in 1759, and on the nth of August

1762 inflicted a severe defeat at Reichenbach on an Austrian army endeavouring to relieve Schweidnitz. Bevern retired, after the peace of Hubertusburg, to his government of Stettin, where he died in 1781.

BRUNTON, MARY (1778-1818), Scottish novelist, was born on the 1st of November 1778 in the island of Varra, Orkney. She was the daughter of Captain Thomas Balfour of Elwick. At the age of twenty she married Alexander Brunton, minister of Bolton in Haddingtonshire, and afterwards professor of oriental languages at Edinburgh. Mrs Brunton died on the 19th of December 1818. She was the author of two novels, popular in their day, Self-control (18 10), and Discipline (1814; 1832 edition with memoir) ; and of a posthumous fragment, Emmeline

(1819).

BRUSA, or Broussa (anc. Prusa), the capital of the Brusa (Khudavendikiar) vilayet of Asia Minor, which includes parts of ancient Mysia, Bithynia, and Phrygia, and extends in a south-easterly direction from Mudania, on the Sea of Marmora, to Afium-Kara-Hissar on the Smyrna-Konia railway. The vilayet is one of the most important in Asiatic Turkey, has great mineral and agricultural wealth, many mineral springs, large forests, and valuable industries.

It exports cereals, silk, cotton, opium, tobacco, olive-oil, meerschaum, boracite, &c. The Ismid- Angora and Eskishehr-Konia railways pass through the province. Population of the province,, 1,600,000 (Moslems, 1,280,000; Christians, 317,000; Jews, 3000).

The city stretches along the lower slopes of the Mysian Olympus or Kechish Dagh, occupying a position above the valley of the Nilufer (Odrysses) not unlike that of Great Malvern above the vale of the Severn. It is divided by ravines into three quarters, and in the centre, on a bold terrace of rock, stood the ancient Prusa. The modern town has clean streets and good roads made by Ahmed Vefyk Pasha when Vali, and it contains mosques and tombs of great historic and architectural interest; the more important are those of the sultans Murad I., Bayezid (Bajazet) I., Mahommed I., and Murad II., 1403-1451, and the Ulu Jami'. The mosques show traces of Byzantine, Persian and Arab influence in their plan, architecture and decorative details. The circular church of St Elias, in which the first two sultans, Osman and Orkhan, were buried, was destroyed by fire and earthquake, and rebuilt by Ahmed Vefyk Pasha. There are in the town an American mission and school, and a British orphanage. Silk-spinning is an important industry, the export of silk in 1902 being valued at £620,000. There are also manufactories of silk stuffs, towels, burnus, carpets, felt prayer-carpets embroidered in silk and gold. The hot iron and sulphur springs near Brusa, varying in temperature from 112 to 178° F., are still much used. The town is connected with its port, Mudania, by a railway and a road. There is a British vice-consul. Pop. 75,000 (Moslems, 40,000; Christians, 33,000; Jews, 2000).

Prusa, founded, it is said, at the suggestion of Hannibal, was for a long time the seat of the Bithynian kings. It continued to flourish under the Roman and Byzantine emperors till the 10th century, when it was captured and destroyed by Saif-addaula of Aleppo. Restored by the Byzantines, it was again taken in 1327 by the Ottomans after a siege of ten years, and continued to be their capital till Murad I. removed to Adrianople. In 1402 it was pillaged by the Tatars; in 1413 it resisted an attack of the Karamanians; in 151 2 it fell into the power of Ala ed-Din; and in 1607 it was burnt by the rebellious Kalenderogli. In 1S83 it was occupied by the Egyptians under Ibrahim Pasha, and from 1852-1855 afforded an asylum to Abd-el-Kader.

See L.de Laborde, Voyage de VAsie Mineure (Paris, 1838); C. Texier, Asie Mineure (Paris, 1839).

BRUSH, GEORGE DE FOREST (1855-), American painter, was born at Shelbyville, Tennessee, on the 28th of September 1855. He was a pupil of J. L. Ger6me at Paris, and became a member of the National Academy of Design, New York. From 1883 onwards, he attracted much attention by his paintings of North American Indians, his " Moose Hunt," " Aztec King " and " Mourning her Brave " achieving great popularity and showing the strong influence of Gerdme. These

were followed by picture portraits, particularly of mother and child, largely suggestive of the work of the Dutch, Flemish and German masters, carefully arranged as to line and mass, and worked out in great detail with consummate technical skill. Several of his paintings have for subject his own children and his wife; one of these is in the Boston Museum of Fine Arts.

BRUSH (from Fr. brosse, which, like the English word, means both the undergrowth of a wood and the instrument; if the word in both these meanings is ultimately the same, then the origin is from a bundle of brushwood used as a brush or broom, but this is historically doubtful, and others connect it with the Ger. Borsle, bristle), an instrument for removing dust or dirt from surfaces or for applying paint, whitewash, &c, composed of a tuft or cufts of some fibrous or flexible material secured to a solid basis or stock. Brushes made of the twigs of trees like the birch and provided with long handles are often called brooms, and the same term is applied to some brushes used in the house- hold for removing dust (e.g. carpet-broom, whisk-broom) but not to those used for applying paint. Among the numerous materials employed for the manufacture of brushes of various kinds are feathers, pig's bristles, the hair of certain animals, whalebone, rubber, split-cane, broom-corn (a variety of sorghum) and Coir.

Brushes are of two kinds, simple and compound. The former consist of but one tuft, as hair pencils and painters' tools. The latter have more than one tuft. Brushes with the tufts placed side by side on flat boards, as plasterers' brushes, are called stock- brushes. The single tuft brushes, or pencils for artists, are made of the hair of the camel, badger, goat and other animals for the smaller kind, and pig's bristles for the larger. The hairs for pencils are carefully arranged so as to form a point in the centre, and, when tied together, are passed into the wide end of the quill or metal tube and drawn out at the

other end to the extent required. The small ends of the quills, having been pre- viously moistened, contract as they dry and bind the hair. A similar effect is produced with metal tubes by compression. Compound brushes are — first, set or pan-work; second, drawn-work. Of the former, an example is the. common house-broom, into the stock of which holes are drilled of the size wanted. The necessary quantity of bristles, hair, or fibre to fill each hole being collected together, the thick ends are dipped into molten cement chiefly composed of pitch, bound round with thread, dipped again, and then set into a hole of the stock with a peculiar twist- ing motion. In drawn-brushes, of which those for shoes, teeth, nails and clothes are examples,: the holes are more neatly bored, and have smaller on.es at the top communicating with the back of the brush, through which a bight or loop of wire passes from the back of the stock. Half the number of hairs of fibres needed for the tufts to fill the holes are passed into the bight of the wire, which is then pulled smartly so as to double the hairs and force them into the loop-hole as far as possible. With all brushes, when the holes have been properly filled, the ends of the fibres outside are cut with shears, either to an even length or such form as may be desired. The backs are then covered with veneer or other material to conceal the wire and other crudities of the work. In trepanned brushes the bristles are inserted in holes that do not pass right through the stock, and are secured by threads or wires running in drawholes which are drilled through the stock at right angles to them. The ends of these drawholes are plugged So as to be as inconspicuous as possible, and the method avoids the necessity of a veneer on the back. The Woodbury machine, one of the earliest mechanical devices for the manufacture of brushes, which was invented in America about 1870, produced brushes of this kind. One of the most important purposes to which brushes have been applied is that of sweeping chimneys, and so far back as 1 789 John Elin patented an arrangement of brushes for this purpose. Revolving brushes for sweeping rooms were patented in 1811, and the first patent in which they were applied to hair-dressing appears in 1862. Many inventions for sweeping and cleaning roads by means of revolving brushes and other contrivances have been introduced,

one of the first being that of Edmund Henning in 1699′ for ” a new engine for sweeping the streets of London, or any city or town.”

Brushes with tufts formed of steel wire are used for cleaning tubes and flues of steam boilers, for the purpose of removing the scale formed by the products of combustion. Steel-wire brushes are also used for cleaning scale from the interior surfaces of a boiler, and for removing the sand from the surface of a casting. Occasionally such

brushes are revolved in a machine, for more convenient use on the article to be cleaned or polished. Snyer's patent elastic clutch or Coupling, used for such purposes as coupling up or disconnecting a steam-engine from a line of shafting or dynamo, consists essentially of two disks, the adjacent faces of which are provided, one with a ring of brushes made of flat steel wire, the other with a number of finely serrated teeth. One of the disks is movable longitudinally on its shaft, and with the brushes clear of the serrations the clutch is free. On bring- ing the disks together, which may be done with the engine run- ning at speed, the elasticity of the brush permits the motion t6 be imparted gradually and without shock to the standing part, until both rotate and are locked together. These clutches are very powerful, and are capable of transmitting as much as 3000 horse-power.

In dynamo-electric machinery the device used to conduct current into or out of the rotating armature is termed a " brush." There are usually two brushes to each dynamo or motor, and they are placed diametrically opposite, lightly touching the commutator of the armature. It is important that there should be good metallic contact between the brushes and the com- mutator, and at the same time the frictional resistance resulting from the contact must be a minimum. To effect this result brushes are variously made. A kind of brush frequently used consists of a number of copper wires laid side by side and soldered together at one end, where the brush is held. Brushes are also made of strips of spongy copper cut like a comb, which give a number of bearing points on the commutator. Very good results are obtained from brushes made of copper gauze wound closely until it takes the exterior form of a rectangular block, which is held radially in a spring holder, and bears at the end on the commutator. In place of the gauze block " brushes " of hard carbon blocks are frequently used (see Dynamo).

BRUSSELS (Fr. Bruxelles, Flem. Brussel), the capital of the kingdom of Belgium, and of the province of Brabant, situated in 50 51′ N., 4 22′ E., about 70 m. from the sea at Ostend. It occupies the plain or valley of the Senne, and the sides and crest of the hill lying to the east and south-east of that valley. It is now extending over the hills west of the valley, and to the north is the town or commune of Laeken, which is practically part of the city.

Brussels suffered severely in 1695 from the bombardment of the French under Villeroi, who fired into the town with red-hot shot. Sixteen churches and 4000 houses were burnt down, and the historic buildings on the Grand Place were seriously injured, the houses of

the Nine Nations on the eastern side being com- pletely destroyed. In 1 73 1 the famous palace of the Netherlands was destroyed by fire, and the only remains of this edifice are some ruined arches and walls in a remote comer of the grounds of the king's palace. The Porte de Hal is the only one of the eight gates in the old wall left standing. It dates from 1381ˆ and is well worth more careful examination than it receives. In the latter half of the 18th century it served as a kind of bastille for political prisoners, and is now used as a museum in which a rather nondescript collection of articles, some from Mexico, has been allowed to accumulate. With regard to the fine boulevards of the Upper Town, it may be mentioned that about 1765 they were planted with the double row of lime trees which still constitute their chief ornament by Prince Charles of Lor- raine while governing the Netherlands for his sister-in-law, the empress Maria Theresa. The residence of this prince was the palace of William the Silent, before he declared against Spain, and it is now used partly for the royal library, which contains the famous librairpe de Bowgogne, and partly for the museum

of modern pictures. The only other " hotel " or palace in Brussels is that of the duke d'Arenberg. In the 16th century this was the residence of Count Egmont, but very little of the building of his day remains. In the same street, the rue des Petits Carmes, was the H6tel Culembourg in which the famous oath of the beggars was taken. It has long been demolished and the new barracks of the Grenadier regiment have been erected on the site.

The only other buildings of importance dating from medieval times are the three churches of Ste Gudule (often erroneously railed the cathedral), Notre-Dame des Victoires or Church of the Sablon, and Notre-Dame de la Chapelle, or simply la Chapelle, and the hotel de ville and the Maison du Roi on the Grand Place. The church of Ste Gudule, also dedicated to St Michael, is built on the side of the hill originally called St Michael's Mount, and now covered by the fashionable quarters which are included under the comprehensive description of the Upper Town. It was begun about the year 1220, and is considered one of the finest specimens left of pointed Gothic. It is said to have been completed in 1273, with the exception of the two towers which were added in the 14th or 15th century. Some of the stained glass is very rich, dating from the 13th to the 15th century. In many of the windows there are figures of leading

members of the houses of Burgundy and Habsburg. The curious oak pulpit representing Adam and Eve expelled from the Garden of Eden came originally from the Jesuit church at Louvain, and is considered the masterpiece of Verbruggen. The church of the Sablon is said to have been founded in 1304 by the gild of Crossbowmen to celebrate the battle of Woeringen. In a side chapel is a fine monument to the princely family of Thurn and Taxis, which had the monoply of the postal service in the old empire. La Chapelle is still older, dating nominally from 1210, the choir and transept being considered to date from about fifty years later. There are some fine monuments, especially one to the duke de Croy who died in 1624. The two churches last named have undergone much renovation both outside and inside.

The Grand Place is by its associations one of the most interest- ing public squares in Europe. On its flags were fought out many feuds between rival gilds; Egmont and Horn, and many other gallant men whose names have been forgotten, were executed here under the shadow of its ancient buildings, and in more recent times Dumouriez proclaimed the French Republic where the dukes of Brabant and Burgundy were wont to hold their jousts. Apart from its associations the Grand Place contains two of the finest and most ornate buildings not merely in the capital but in Belgium. Of these the hotel de ville, which is far the larger of the two, occupies the greater part of the south side of the square. Its facade has the disadvantage of having had one half begun about half a century before the other. The older, which is the richer in design, forms the left side of the building and dates from 1410, while the right, less rich and shorter, was begun in 1443. The fine tower, 360 ft. in height, is crowned by the golden copper figure of St Michael, 16 ft. in height, erected here as early as 1454. This tower lies behind the extremity of the left wing of the building. Opposite the town-hall is the smaller but extremely ornate Maison du Roi. This was never a royal residence as the name would seem to imply, but its descrip- tion appears to have been derived from the fact that it was usually in this building that the royal address was read to the states-general. As this building was almost destroyed by Villeroi's bombardment it possesses no claim to antiquity, indeed the existing building was only completed in 1877. Egmont and Horn were sentenced in the hotel de ville, and passed their last night in the Maison du Roi.

Among the principal buildings erected in the city during the 18th century are the king's palace and the house of parliament or Palais de la Nation, which face the south and north sides of the park respectively. The palace occupies part of the site covered by the old

palace burnt down in 1731, and it was built In the reign of the empress Maria Theresa. It originally consisted of two detached buildings, but in 1826-1827 King William I.

of the Netherlands caused them to be connected. The palace contains two fine rooms used for court ceremonies, and a con- siderable number of pictures. In 1904 a bill was passed in the chambers for the enlargement and embellishment of the palace. The adjacent buildings, viz. the department of the civil list, formerly the residence of the marquis d'Assche, and the Hotel de Bellevue, held under a kind of perpetual lease granted by the empress Maria Theresa, were absorbed in the palace, and a new facade was constructed which occupies the entire length of the Place du Palais. At the same time a piece was cut off the park to prevent the undue contraction of the Place by the necessary bringing forward of the palace, and the pits which played a certain part in the revolution of 1830 when the Dutch defended the park for a few days against the Belgians were filled up. The Palais de la Nation was constructed between 1779 and 1783, also during the Austrian period. It was intended for the states-general and government offices. During the French occupation the law courts sat there, and from 181 7 to 1830 it was assigned for the sittings of the states-general. It is now divided between the senate and the chamber of representatives. In 1833 the part assigned to the latter was burnt out, and has since been recon- structed. The buildings flanking the chambers and nearer the park are government offices with residences for the ministers attached.

The improvements effected in Brussels during the 19th century were enormous, and completely transformed the city. The removal of the old wall was followed by the creation of the quartier Leopold, and at a later period of the quartier Louis in the Upper Town. In the lower, under the energetic direction of two burgomasters, De Brouckere and Anspach, not less sweeping changes were effected. The Senne was bricked in, and the fine boulevards du Nord, Anspach, Hainaut and Midi took the place of slums. The Bourse and the post-office are two fine modern buildings in this quarter of the city. The Column of the Congress — i.e. of the Belgian representatives who founded the kingdom of Belgium— surmounted by a statue of .King Leopold I., was erected in 1859, and in 1866 the foundation-stone was laid of the Palais de Justice, which was not finished till 1883, at a cost of sixty million francs. This edifice, the design of the architect Poelaert, is in the style of Karnak and Nineveh, but surmounted with a dome, and impresses by its grandiose pro- portions (see Architecture, Plate XL fig. 121). It is well placed on the brow of the hill at the southern extremity of the rue de la Regence (the prolongation of the rue

Royale), and can be seen from great distances. In the rue de la Regence are the new picture gallery, a fine building with an exceedingly good collection of pictures, the palace of the count of Flanders, and the garden of the Petit Sablon, which contains statues of Egmont and Horn, and a large number of statuettes representing the various gilds and handicrafts. Immediately above this garden is the Palais d'Arenberg. Perhaps the memorial that attracts the greatest amount of public interest in Brussels is that to the Belgians who were killed during the fighting with the Dutch in September 1830. This has been erected in a little square called the Place des Martyrs, not far from the Monnaie theatre. Outside Brussels at Evere is the chief cemetery, with fine monuments to the British officers killed at Waterloo (removed from the church in that village), to the French soldiers who died on Belgian soil in 1870-71, and another to the Prussians.

Many as were the changes in Brussels during the 19th century, those in progress at its close and at the beginning of the 20th have effected a marked alteration in the town. These have been rendered possible only by the excellent system of electric tram- ways' which have brought districts formerly classed as pure country within reach of the citizens. The construction of the fine Avenue de Louise (i|m. long) from the Boulevard de Waterloo to the Bois de la Cambre was the first of these efforts to bring the remote suburbs within easy reach, at the same time furnish- ing an approach to the " bois " of Brussels that might in some degree be compared with the Champs Elysees in Paris. Another avenue of later construction (6£ m. in length) connects the park of the Cinquantenaire with Tervueren. This route is extremely

picturesque, traverses part of the forest of Soignies, and is lined by many fashionable villas and country houses. Other improve- ments projected in 1908 on the slope of the hill. immediately below the Place Royale included the removal of the old tortuous and steep street called the " Montagne de la Cour " to give place to a Mont des Arts. A little lower down and not far from the university (which occupies the house of the famous cardinal Granvelle of the 16th century) a central railway terminus was designed on a vast scale. These improvements connote the obliteration of the insanitary and overcrowded courts and alleys which were to be found between all the main streets, few in number, connecting the upper and the lower towns. The ridge on the west and north-west of the Senne valley never formed part of the town, and it was from it that Villeroi bombarded the city. The suburbs on this ridge, from south to north, are Anderlecht, Molenbeek and Koekelberg, and Laeken with its royal chateau and park forms the northern part of the Brussels conglomeration. Brussels has been growing at such a rapid rate that the inclusion of this ridge, and more particularly at Koekelberg, within the town limits, was contemplated in 1908.

The completion of the harbour works, making Brussels a sea- port by giving sea-going vessels access thereto, was taken in hand in 1897. The completed work provides for a waterway for steamers drawing 24 ft. by the Willibroek Canal into the Ruppel and the Scheldt. There are steamers plying direct from Brussels to London, and 372 vessels of a total tonnage of 76,000 entered and left the port in 1905. The Willibroek Canal was made in the 16th century, and William I. of the Netherlands is entitled to the credit of having first thought of converting it into a ship canal from Brussels to the Scheldt. Nothing was done, however, in his time to carry out the scheme. The distance from Brussels to the Ruppel is only 20 m., and thus Brussels is only about 33 m. farther from the sea than Antwerp.

In addition to the advantages it enjoys from being the seat of the court and the government, Brussels is the centre of many prosperous industries. The manufactures of lace, carpets and curtains, furniture and carriages may be particularly mentioned, but it is chiefly as a place of residence for the well-to-do that the city has increased in size and population. Schools of all kinds are abundant. At the Ecole Militaire youths are trained nomin- ally for the army, but many go there who intend to enter one of the professions or the public service. This school used to occupy part of the old abbey of the Cambre, situated in a hollow near the bois and the avenue Louise, but owing to its insanitary position it has been removed to a new building near

the Cinquantenaire. There is a university, to which admission is easy and where the fees are moderate, and the Conservatoire provides as good musical teaching as can be found in Europe. Music can be enjoyed every day in the year either out of doors or under cover. During the winter and spring the opera continues without a break at the Theatre de la Monnaie, which may be called the national theatre. Concerts are held frequently, as the Belgians are a musical people. Of late years sport has taken a prominent part in Belgian life. There are athletic institutions, and football is quite a popular game. Horse-racing has also come into vogue, and Boitsfort, in the bois, and Groenendael, farther off in the Foret de Soignies, are fashionable places of reunion for society.

The town of Brussels has a separate administration, which is directed by a burgomaster and sheriffs at the head of a town council, whose headquarters are in the hotel de ville. In the Brussels agglomeration are nine suburbs or communes, each self-governing with burgomaster and sheriffs located in a Maison Communale. These suburbs (beginning on the north and following the circumference eastward) are Schaerbeek, St Josse-ten-Noode, Etterbeek, Ixelles, St Gilles, Cureghem, Ander- lecht, Molenbeek and Koekelberg. Laeken, which is really a tenth suburb, is classified as a town. In 1856 the population of Brussels alone was 152,828, and by 1880 it had only increased to 162,498. In 1890 the figures were 176,138; in 1900, 183,686; and in December 1904, 194,196. The great increase has been in the suburbs, amounting to nearly 80 % in twenty-five years. In 1880 the population of the ten suburbs including Laeken

was 248,079. In 1904 the total was 436,453, thus giving for the whole of Brussels a grand total of 630,649.

History. — The name Brussel seems to have been derived from Broeksele, the village on the marsh or brook, and probably it was the most used point for crossing the Senne on the main Roman and Frank road between Tournai and Cologne. The Senne, a small tributary of the Scheldt, flows through the lower town, but since 1868 it has been covered in, and some of the finest boulevards in the lower town have been constructed over the course of the little river. The name Broeksele is mentioned by the chroniclers in the 8th century, and in the 10th the church of Ste Gudule is said to have been endowed by the emperor Otto I. In the next two centuries Brussels grew in size and importance, and its trade gilds were formed on lines similar to those of Ghent. In 13 12 Duke John II. of Brabant granted the citizens their charter, distinguished from others as that of Cortenberg. In 1 3 56 Duke Wenceslas confirmed this charter and

also the Golden Bull of the emperor Charles IV. of 1349 by his famous " Joyous Entry " into Louvain, the capital of the duchy. These three deeds or enactments constituted the early con- stitution of the South Netherlands, which, with one important modification in the time of Charles V., remained intact till the Brabant revolution in the reign of Joseph II. In 1357 Wenceslas ordered a new wall embracing a greater area than the earlier one to be constructed round Brussels, and this was practically intact until after the Belgian revolution in 1 830-1 831. It took twelve, or, according to others, twenty-two years to build. • In 1383 the dukes of Brabant transferred their capital from Louvain to Brussels, although for some time they did not trust themselves out of the strong castle which they had erected at Vilvorde, half-way between the two turbulent cities. During this period the population of Brussels is supposed to have been 50,000, or one-fifth of that of Ghent. In 1420 the gilds of Brussels obtained a further charter recognizing their status as the Nine Nations, a division still existing. Having fixed their seat of government at Brussels the dukes of Brabant proceeded to build a castle and place of residence on the Caudenberg hill, which is practically the site of the Place Royale and the king's palace to-day. This ducal residence, enlarged and embellished by its subsequent occupants, became eventually the famous palace of the Nether- lands which witnessed the abdication of Charles V. in 1555, and was destroyed by fire in 1731. In 1430 died Philip, last duke of Brabant as a separate ruler, and the duchy was merged in the possessions of the duke of Burgundy.

In the 17th century Brussels was described (Comte de Segur, quoting the memoirs of M. de la Serre) as " one of the finest, largest and best-situated cities not only of Brabant but of the whole of Europe. The old quarters which preserve in our time an aspect so singularly picturesque with their sloping and tortuous streets, the fine hotels of darkened stone sculptured in the Spanish fashion, and the magnificence of the Place of the hotel de ville were buried behind an enceinte of walls pierced by eight lofty gates flanked with one hundred and twenty-seven round towers at almost equal distance from each other like the balls of a crown. At a distance of less than a mile was the forest of Soignies with great numbers of stags, red and roe deer, that were hunted on horseback even under the ramparts of the town. On the promenade of the court there circulated in a long file ceaselessly during fashionable hours five or six hundred carriages, the servants in showy liveries. In the numerous churches the music was renowned, the archduke Leopold being passionately given to the art, maintaining at his own cost forty or fifty musicians,

the best of Italy and Germany. Under the windows of the palace stretched the same park that we admire to-day, open all the year to privileged persons and twice a year to the public, a park filled with trees of rare essences and the most delicious flowers so artistically disposed, and so refreshing to the eyes, that M. de la Serre declared that if he had seen there an apple tree he would assuredly have taken it for an earthly Paradise." (D. C. B.)

BRUT, Brute, or Brutus the Trojan, a legendary British character, who, according to Geoffrey of Monmouth and others.

Was the eponymous hero of Britain. He was reputed to be grandson of Aeneas, and the legend was that he was banished from Italy and made his way to Britain, where he founded New Troy (London). The name is an obvious confusion between Bry t (a Briton) and the classical name Brutus. For the romance literature of the subject see Wace ; and Barbour. BRUTE, SIMON WILLIAM GABRIEL (1779-1839), American prelate, first Roman Catholic bishop of the diocese of Vincennes, Indiana, U.S.A., was born at Rennes, France, on the 20th of March 1779, his father, Simon Gabriel Guillaume Brute de Remur (1729-1786), being superintendent of the crown lands in Brittany. He was educated for the medical profession, but entered the Sulpician Seminary of Paris in November 1803, was ordained priest in 1808, refused the post of chaplain to Napoleon, was professor of theology in the Diocesan Seminary at Rennes in 1808-1810, and in August 1810 settled in Baltimore, Maryland, whither his long general interest in missions, and particularly his acquaintance with Bishop Flaget of Kentucky, had drawn him. After teaching for two years (1810-1812) in Baltimore, he was sent to Mount St Mary's College, Emmitsburg, Maryland, where he remained until 181 5, acting both as teacher and as pastor. He next visited France in the interest of American missions, and on his return in November 1815, became president of St Mary's College, Baltimore. In 1818 he resumed his labours at Emmits- burg, and from this time until 1834 he held an almost unparalleled place in the American church, being constantly consulted by clergy throughout the country, besides lecturing, teaching, preaching and caring for his parish. The see of Vincennes was created in 1834; and Brute, nominated its first bishop and consecrated in the same year, went to France for financial aid, with which he built his cathedral and several useful institutions. Here, too, he was professor of theology in his seminary,

teacher in one of his academies, as well as pastor and bishop. Interesting stories are told of the high respect in which he was held by the neighbouring Indians, who called him " chief of the Black robes " and " man of the true prayer." He died in Vincennes, Indiana, on the 26th of June 1839. His great influence on the entire church, his wonderful success in planning, financing, and carrying out necessary ecclesiastical reforms, and the constructive and executive ability he displayed in his diocese, make him one of the foremost Catholic emigrants to the United States. He wrote Brief Notes on his experiences in France in 1793, in which he describes state persecution of Catholic priests.

See James Roosevelt Bayley, The Memoirs of the Rt. Rev. Simon William Gabriel Brute, First Bishop of Vincennes (New York, 1 861), containing much autobiographical matter.

BRUTTII, an ancient tribe of lower Italy. This tribe, called Bruttii and Brittii in Latin inscriptions, and Bpemoi on Greek coins and by Greek authors, occupied the south-western peninsula of Italy in historical times, the ager Bruttius (wrongly called Bruttium) corresponding almost exactly to the modern Calabria. It was separated from Lucania on the north by a line drawn from the mouth of the river Laus on the west to a point a little south of the river Crathis on the east. To part or the whole of this peninsula the name Italia was first applied. In alliance with the Lucanians the Bruttii made war on the Greek colonies of the coast and seized on Vibo in 356 B.C., and, though for a time over- come by the Greeks who were aided by Alexander of Epirus and Agathocles of Syracuse, they reasserted their mastery of the town from about the beginning of the 3rd century B.C., and held it until it became a Latin colony at the end of the same century (see Corp. Inscr. Lat. x. p. 7, and the references there given). At this time they were speaking Oscan as well as Greek, and two of three Oscan inscriptions in Greek alphabet still testify to the language spoken in the town in the 3rd century B.C. We know, however, that the Bruttians, though at this date speaking the same language (Oscan) as the Samnite tribe of the Lucani, were not actually akin to them. The name Bruttii was used by the Lucanians to mean " runaway slaves," but it is considerably more likely that this signification was attached to the tribal name of the Bruttii from the historical fact that they had been conquered and expelled by the Samnite invaders (cf. the use of

SxiWai to mean " policemen " at Athens, and still more closely the German, French and English word " slave " derived from " Slav "), than that the tribe when living in territory it could call its own

should have adopted an opprobrious name taken from the language of hostile neighbours (see Strabo vi. 1, 4; Diod. Sic. xvi. r 5). Mommsen pointed out (Unterital. Dialekte, p. 97) the evidence of tradition (especially Aristotle, Pol. 4 [7] 10) showing that the customs of the Bruttii had a certain affinity with those of the pre-Hellenic inhabitants of Greece, and it has been argued (Ridge way apud Conway, Ital. Dialects, p. 16) that a tradition (preserved in Stephanus of Byzantium, s.v. XT01) made it probable that they were called HeKao-yoi. This evidence points to the conjecture that they were part of what is now generally called the Mediterranean race (see, e.g. G. Sergi, The Mediterranean Race, Eng. trans., 1901; W. Z. Ripley, Races of Europe, p. 128). Many Indo-European elements appear in their place-names (e.g. Sila= Latin silva, Greek v\rj; Temesa, cf. Gr. Te/ievos or Sanskrit tamas, darkness, shadow), and none that suggest a non-Indo-European origin. A priori considerations suggest that they may have been akin to the Siceli, but of this at present no positive evidence can be given.

As we have seen, the Bruttii were at the height of their power during the 3rd' century B.C. Their chief towns were Consentia (Cosenza), Petelia (near Strongoli), and Clampetia (Amantea). To this period (about the time of the Roman War against Pyrrhus) is to be assigned the series of their coins, and they appear to have retained the right of coinage even after their final subjugation by the Romans (see B. V. Head, Historia Numorum, p. 77). The influence of Hellenism over them is shown by finds in the tombs and the fact that they spoke the Greek language as well as their own (bilingues in Ennius). The mountainous country, ill-suited for agricultural purposes, was well adapted for these hardy warriors, whose training was Spartan in its simplicity and severity. The Bruttii first came into collision with the Romans during the war with Pyrrhus, to whom they sent auxiliaries; after his defeat, they submitted, and were deprived of half their territory in the Sila forest, which was declared state property. In the war with Hannibal, they were among the first to declare in his favour after the battle of Cannae, and it was in their country that Hanni-bal held his ground during the last stage of the war (at Castrum Hannibalis on the gulf of Scylacium). (R. S. C.)

The Bruttii entirely lost their freedom at the end of the Hanni- balic war; in 194 colonies of Roman citizens were founded at Tempsa and Croton, and a colony with Latin rights at Hipponium called henceforward Vibo Valentia. In 132 the consul P. Popillius built the great inland road from Capua through Vibo and Consentia to Rhegium, while the date of the construction of the east and west coast roads is uncertain. Neither in the Social War, nor in the rising

of Spartacus, who held out a long time in the Sila (7 1 B.C.) , do the Bruttii play a part as a people. Vibo was the naval base of Octavian in the conflict with Sextus Pompeius (42-36 B.C.).

The most important product of the district was the wood from the forests of the Sila, and the pitch produced from it. The Sila also contained minerals, which were worked out in very early times. The coast plains were in parts very fertile, especially the (now malarious) lower valley of the Crathis.- Under the empire, however, the whole district remained backward and was remarkable for the absence of important towns, as the scarcity of ancient inscriptions, both Greek and Latin, shows: the Sila was state domain, and most of the rest in the hands of large proprietors. Augustus joined it with Lucania (from which it was divided by the rivers Laus and Crathis) to form the third region of Italy. In the 2nd and 3rd centuries, for administrative and juridical purposes, it was sometimes (with Lucania) joined to Apulia and Calabria. Diocletian placed Lucania and Brittii (as the name was then spelt) under a cor- rector, whose residence was at Rhegium. The boundaries of the original third Augustan region had by that time become some- what altered, Metapontum belonging to Calabria, and Salernum and the territory of the Picentini to the third region instead of the first (Campania). From the 6th century, after the fall of

the Ostrogothic power, and the establishment of that of ByZani tium in its place in south Italy, the name Calabria was applied to the whole of the south Italian possessions of the Eastern empire, and the name of the Brittii entirely disappeared; and after the eastern peninsula (the ancient Calabria) had been taken by the Lombards about a.d. 668, the western retained the name, and has kept it till the present day. (T. As.)

See Strabo vi. p. 253-265; Dion. Halic. xx. I, 4, 15; Pliny, Nat. Hist. iii. 71-74; Justin xii. 2, xxiii. 1; F. Lenormant, La Grande-Grece, i. (1881-1884); H. Nissen, Italische Landeskunde (1883-1902); C. Hiilsen in Pauly-Wissowa's Realencyclopddie, iii. pt. i. (1897) ; E. H. Bunbury in Smith's Dictionary of Greek and Roman Geography; R. S. Conway, The Italic Dialects (1897), for Bruttian inscriptions and local and personal names; P. Orsi in Atti del congresso storico (Rome, 1904), v. 193 seq.; M. Schipa, La Migrazione del nome Calabria (1895), whose conclusions are summar- ized in J. B. Bury's

edition of Gibbon's Decline and Fall, v. p. 24, note; other authorities in J. Jung, " Geographie von Italien ' (1897) in I. Miiller's Handbuch der klassischen Altertumswissenschaft, iii, Abteilung 3.

BRUTUS (originally an adjective meaning "heavy," "stupid," kindred with Gr. fiapvs, cf. Eng. "brute," " brutal"), the surname of several distinguished Romans belonging to the Junian gens.

I. Lucius Junius Brutus, one of the first two consuls, 509 B.C. According to the legends, his mother was the sister of Tarquinius Superbus, the last of the Roman kings, and his father and his elder brother had been put to death by the reigning family in order to get possession of his wealth. Junius, the younger, owed his safety to his reputed dullness of intellect (whence his surname), which character', however, he had only assumed for prudential reasons (Dion., Halic. iv. 67, 77). The story is probably an invention to account for his name; in any case his dullness did not prevent his appointment as master of the horse. When Lucretia, wife of Collations', was outraged by Sextus Tarquinius (the incident which inspired Shakespeare's Rape of Lucrece), Brutus, together with her husband and father, took a leading part in expelling the Tarquinii from Rome. He and Collatinus were therefore elected consuls — or rather praetors, which was the original title '(Livy i. 59). In a conspiracy formed for the restoration of the dynasty, the two sons of Brutus Were deeply implicated, and were executed by sentence of their father, and in his sight (Livy ii. 3) . The Etruscans of Veii and Tarquinii making an attempt to restore Tarquinius, a battle took place between them and the Romans, in which Junius Brutus engaged Aruns, son of the deposed king, in single combat on horseback, and each fell by the other's hand (Livy ii. 6; Dion. Halic. v. 14). The" Roman matrons mourned a year for him, as " the avenger of woman's honour," and a statue was erected to him On the Capitol. The conspiracy of his sons is the subject of a tragedy by Voltaire.

The patrician branch of the family appears to have become extinct with L. Junius Brutus; the chief representatives of the plebeian branch in later times are dealt with below.

II. Decimus Junius Brutus, consul 138, surnamed Gallaecus from his victory over the Gallaeci (136) in the north-west of Spain (Plutarch, Tib. Gracchus, 21). He was a highly educated man, a patron of literature, and a friend of the poet Accius (Livy, Epit.' $$; Appian, Hisp. 71-73; Veil. Pat. ii. 5; Cicero, Brutus, 28).

III. Marcus Junius Brutus, a jurist of high authority, was considered

as one of the founders of Roman civil law (Cicero, De Oratore, ii. 33, 55).

IV. His son, of the same name, made a great reputation at the bar, and from the vehemence and bitterness of his speeches became known as " the Accuser " (Cicero, De Officiis, ii. 15).

V. Decimus Junius Brutus (Albinus), born about 84 B.C., first served under Caesar in Gaul, and afterwards commanded his fleet. Caesar, who esteemed him very highly, made him his master of the horse and governor of Gaul, and, in case of Octavian's death, nominated him as one of his heirs. Neverthe- less he joined in the conspiracy against his patron, and, like his relative Marcus Junius Brutus (see below), was one of his as- sassins. He afterwards resisted the attempt of Antony to obtain

absolute power; and after heading the republican armies against him for some time with success, was deserted by his soldiers in Gaul, betrayed by one of the native chiefs, and put to death by order of Antony (43), while attempting to escape to Brutus and Cassius in Macedonia. He figures in Cicero's correspondence: (See Appian, B.C. iii. 97; Dio Cassius xlvi. 53; Caesar, B.G. iii. n, B.C. i. 36, 45.)

VI. Marcus Junius Brutus (85, according to some, 79 or 78-42 B.C.), spn of a father of the same name and of Servilia, half-sister of Cato of Utica, is the most famous of the name, and is the real hero of Shakespeare's Julius Caesar. His father had been treacherously put to death by order of Pompey during the civil wars. At that time young Marcus was only eight years oid, and was educated with great care by his mother and uncles. He at first practised as an advocate. In spite of his father's fate, he supported the cause of Pompey against Caesar, but was pardoned by the latter after the victory of Pharsalus, and subse- quently appointed by him to the government of Cisalpine Gaul (46). .His justice and moderation won him great honour from the provincials under his rule. In 44 he was city praetor, and Caesar promised him the governorship of Macedonia at the expiration of his term of office. Influenced probably by his friend Gaius Cassius, he afterwards joined in the conspiracy against the great dictator, and was one of the foremost in his assassination. He maintained the cause of the republic by seizing and holding against Antony's forces the province of Macedonia, where he was joined by Cassius. But at Philippi (42) they were defeated by Antony and Octavian, and, rather than be taken prisoner, he fell on his sword. His wife Porcia, daughter of Cato of Utica, afterwards committed suicide, it is said, by swallowing red-hot coals (Dio Cassius xlvii. 20-49; Plutarch,

Brutus; Appian, B.C. iv.; Veil. Paterculus ii. 72).

Brutus was an earnest student through all his active life, and is said to have been working on an abridgment of Pausanias the night before Pharsalus. He was generally friendly with Cicero, who dedicated several of his works to him (amongst them his Orator), and gave the name of Brutus to his dialogue on famous orators; but there were frequent disagreements between them, and Cicero frequently speaks of his coldness and lack of enthusiasm. It is difficult to understand his great influence over the Romans (he was only forty-three when he died); probably they admired him for his respectability, the old-fashioned gravitas. He was slow in decision, amazingly obstinate, lacking in sympathy save towards his womenkind — who unduly influenced him — and in his financial dealings with the provincials both extortionate and cruel (Cic. ad Alt. vi. 1.7). Shakespeare's portrait of him is far too flattering. It has been held that he was really an illegitimate son of Julius Caesar. If so we may find an explanation of his joining the conspirators by the fact that in 45 Caesar had appointed Octavian as his heir. He wrote several philosophical treatises (de Virtute, de Officiis, de Patientia) and some poetry, but nothing has survived. On the other hand, we possess part of his correspondence with Cicero (two books out of an original nine), the authenticity of which, though formerly disputed, is now regarded as firmly established, with the possible exception of two of the letters. The letters of Brutus written in Greek are probably the composition of some rhetorician. ■ See E. T. Bynum, Das Leben des M. J. Brutus (Halle a/S., 1898); Tyrrell and Purser's edition of Cicero's Letters (refs. in index vol. s.v., " Iunius Brutus," especially introductions to vols. iii. and v.); G. Boissier, Cicero and his Friends (Eng. trans. 1897) ; J. L. Strachan- Bavidson, Cicero (1894); other authorities under Caesar; Cicero. BRUX, a town of Bohemia, Austria, 93 m. N.N.W. of Prague by rail. Pop. (1000) 21,525. It is dominated by the Schlossberg (1307 ft.), on which is situated the ruins of an old castle, demolished in 165 1, and possesses a very interesting church, in late-Gothic style, built in 151 7. Briix is situated in the centre of a region very rich in lignite deposits and has, besides, important sugar, iron and hardware, distilling, brewing and milling industries. To the south of Briix are the villages of Piillna, Seidlitz and Seidschutz with well-known saline springs. Briix is mentioned in documents of the early nth century. It fell to the crown under Pfemysll. or Wenceslaus II.

and was made a royal city by Ottakar II. in the 13th century. In 1421 the Hussites were defeated here by King Sigismund and the Saxons, and in 1426 besieged the town in vain. In 1456 George of Podebrad captured the town and castle, which had for some time been occupied by the Saxon princes.

BRY, THEODORUS [Dirk] DE (1528-1598), German engraver and publisher, was born at Liege in 1528. In the earlier years of his career he worked at Strassburg. Later he established an engraving and publishing business at Frankfort-on-Main, and also visited London in or before 1587. Here he became acquainted with the geographer Richard Hakluyt, with whose assistance he collected materials for a finely illustrated collection of voyages and travels, Collectiones Peregrinationum in Indiam Orientalem et Indiam Occidentalem (25 parts, 1 590-1634). Among other works he engraved a set of 12 plates illustrating the Pro- cession of the Knights of the Garter in 1576, and a set of 34 plates illustrating the Procession at the Obsequies of Sir Philip Sidney; plates for T. Hariot's Briefe and True Report of the new found Land of Virginia (Frankfort, 1595); the plates for the first four volumes of J. J. Boissard's Romanae Urbis Topo- graphia et Antiquitates (1 597-1 598), and a series of portraits entitled Icones Virorum Illustrium (1 597-1 599). De Bry died at Frankfort on the 27th of March 1598. He had been assisted by his eldest son Johannes Theodorus de Bry (1561-1623), who after his father's death . carried on the Collectiones and the illustration of Boissard's work, and also added to the Icones. His brother Johannes Israel de Bry (d. 161 1) collaborated with him.

BRYAN, WILLIAM JENNINGS (i860-), American political leader, son of Silas Lillard Bryan, a native of Culpeper county, Virginia, who was a lawyer and from i860 to 1897 a state circuit judge, was born at Salem, Marion county,. Illinois, on the 19th of March i860. He graduated from Illinois College as valedictorian in 1881, and from the Union College of Law, Chicago, in 1883; during his course he studied in the law office of Lyman Trumbull. He practised law at Jacksonville from 1883 to 1887, when he removed to Lincoln, Nebraska. There he soon became conspicuous both as a lawyer and as a politician, attracting particular attention by his speeches during the presidential campaign of 1888 on behalf of the candidates of the Democratic party. From 1891 to 1895 he represented the First Congressional District of Nebraska, normally Republican, in the national House of Representatives, and received the unusual honour of being placed on the important Committee on Ways and Means during his first term. He was a hard and conscientious worker and

became widely known for his ability in debate. Two of his speeches in particular attracted attention, one against the policy of protection (16th of March 1892), and the other against the repeal of the silver purchase clause of the Sherman Act (16th of August 1893). In the latter he advocated the unlimited coinage of silver, irrespective of international agreement, at a ratio of 16 to 1, a policy with which his name was afterwards most prominently associated. In a campaign largely restricted to the question of free-silver coinage he was defeated for re-election in 1894, and subsequently was also defeated as the Democratic candidate for the United States Senate. As editor of the Omaha World-Herald he then cham- pioned the cause of bimetallism in the press as vigorously as he had in Congress and on the platform, his articles being widely quoted and discussed.

The Democratic party was even more radically divided on the question of monetary policy than the Republican; and President Cleveland, by securing the repeal of the silver purchase clause in the Sherman Act by Republican votes, had alienated a great majority of his party. In the Democratic national convention at Chicago in 1896, during a long and heated debate with regard to the party platform, Bryan, in advocating the " plank " declaring for the free coinage of silver, of which he was the author, delivered a celebrated speech containing the passage, " You shall not press down upon the brow of labour this crown of thorns; you shall not crucify mankind upon a cross of gold." This speech made him the idol of the " silver " majority of the

convention and brought him the Democratic nomination for the presidency on the following day. Subsequently he received the nominations of the People's and National Silver parties, In the ensuing presidential campaign he travelled over 18,000 m. and made altogether 600 speeches in 27 different states— an unprecedented number. In the election, however, he was defeated by William McKinley, the Republican candidate, receiving 176 electoral votes to 271. But though defeated, he remained the leader of his party. Between 1896 and 1900, except during the Spanish-American War when he was colonel of the 3rd Nebraska Volunteers, though he saw no active service, he devoted his time to the interest of his party. His ability, sincerity of character, and wide information, and his attitude towards the new issues arising from the war, in which he took the side opposed to "imperialism," increased his following. Although he had advised the ratification of the Peace Treaty, he opposed the permanent acquisition of the Philippine Islands. In 1900 he was nominated for the presidency by the Democratic, Silver Republican, and Populist party conventions; but although " imperialism " was

declared to be the paramount issue, he had insisted that the " platforms " should contain explicit advocacy of free-coinage, and this declaration, combined with the popu- larity of President McKinley, the Republican candidate for re-election, again turned the scales against him. In the November election after a canvass that almost equalled in activity that of 1896 he was again defeated, receiving only 155 electoral votes to 292.

After the 1900 election he established and edited at Lincoln a weekly political journal, The Commoner, which attained a wide circulation. In 1904 although not actively a candidate for the Democratic nomination (which eventually went to Judge Parker), he was to the very last considered a possible nominee; and he strenuously opposed in the convention the repudiation by the conservative element of the stand taken in the two : previous campaigns. The decisive defeat of Parker by President Roosevelt did much to bring back the Democrats to Mr Bryan's banner. In 1 905-1906 he made a trip round the world, and in London was cordially received as a great American orator. He was again nominated for the presidency by the Democratic party in 1908. The free-silver theory was now dead, and while the main question was that of the attitude to be taken towards the Trusts it was much confused by personal issues, Mr Roosevelt himself intervening strongly in favour of the Republican nominee, Mr Taft. After a heated contest Mr Bryan again suffered a decisive defeat, President Taft securing 321 electoral votes to Mr .Bryan's 162.

BRYANSK, a town of Russia, in the government of Orel, 83 m. by rail W.N.W. of the city of that name, in 53 15′ N. and 34 10′ E. on the river Desna. It is mentioned in 1 146, being then also known as Debryansk. It afterwards formed a separate principality, which came to an end in 1356 with the death of the prince. After the Mongol invasion of 1241, Bryansk fell into the power of the Lithuanians; and finally became incor- porated with the Russian empire in the beginning of the 17th century. Bryansk was taken by the followers of the first false Demetrius, but it successfully resisted the attacks of the second impostor of that name. Under the empress Anne a dock was constructed for the building of ships, but it was closed in 1739. In 1783 an arsenal was established for the founding of cannon. The cathedral was built in 1526, and restored in the end of the 17th century. There are two high schools; and the industrial establishments include iron, rope, brick and tallow-boiling works, saw-mills and flour-mills, tobacco-factories and a brewery. Some distance north of the town are the Maltsov iron-works, with glass factories and rope-walks, employing 20,000 men. A considerable trade is carried on, especially in wood, tar, hemp, pitch, hemp-seed-

oil and cattle. In 1867 the population num- bered 13,881, and in 1897 23,520.

BRYANT, JACOB (1715-1804), English antiquarian and writer on mythological subjects, was born at Plymouth. His father had a place in the customs there, but was afterwards stationed at Chatham. The son was first sent to a school near

Rochester, whence he was removed to Eton. In 1736 he was elected to a scholarship at King's College, Cambridge, where he took his degrees of B.A. (1740) and M.A. (1744), subsequently being elected a fellow. He returned to Eton as private tutor to the duke of Marlborough, then marquess of Blandford; and in 1756 he accompanied the duke, then master-general of ordnance and commander-in-chief of the forces in Germany, to the continent as private secretary. He was rewarded by a lucrative appointment in the ordnance department, which allowed him ample leisure to indulge his literary tastes. He twice refused the mastership of the Charterhouse. Bryant died on the 14th of November 1804 at Cippenham near Windsor. He left his library to King's College, having, however, previously made some valuable presents from it to the king arid the duke of Marlborough. He bequeathed £2000 to the Society for the Propagation of the Gospel, and £1000 for the use of the super- annuated collegers of Eton.

His principal works are: Observations and Inquiries relating to various Parts of Ancient History (1767); A New System, or an Analysis, of Ancient Mythology, wherein an attempt is made to divest Tradition of Fable, and to reduce Truth to its original Purity (1774- 1776), which is fantastic and now wholly valueless; Vindication of the Apamean Medal (1775), which obtained the support of the great numismatist Eckhel; An Address to Dr Priestley upon his Doctrine of Philosophical Necessity (1780); Vindiciae Flavianae, a Vindication of the Testimony of Josephus concerning Jesus Christ (1780) ; Observa- tions on the Poems of Thomas Rowley, in which the Authenticity of those Poems is ascertained (1781); Treatise upon the Authenticity of the Scriptures, and the Truth of the Christian Religion (1792) ; Observa- tions upon the Plagues inflicted upon the Egyptians (1794) ; Observa- tions on a Treatise, entitled Description of the Plain of Troy, by Mr de Chevalier (1795); A Dissertation concerning the War of Troy, and

the Expedition of the Grecians, as described by Homer, with the view of showing that no such expedition was ever undertaken, and that no such city as Phrygia existed (1796); The Sentiments of Philo Judaeus concerning the \6yos or Word of God (1797).

BRYANT, WILLIAM CULLEN (1794-1878), American poet and journalist, was born at Cummington, a farming village in the Hampshire hills of western Massachusetts, on the 3rd of November 1794. He was the second son of Peter Bryant, a physician and surgeon of no mean scholarship, refined in all his tastes, and a public-spirited citizen. Peter Bryant was the great- grandson of Stephen Bryant, an English Puritan emigrant to Massachusetts Bay about the year 1632. The poet's mother, Sarah Snell, was a descendant of " Mayflower " pilgrims. He was born in the log farmhouse built by his father two years before, at the edge of the pioneer settlement among those boundless forests, the deep stamp of whose beauty and majesty he carried on his own mind and reprinted upon the emotions of others throughout a long life spent mainly amid the activities of his country's growing metropolis. By parentage, by religious and political faith, and by hardness of fortune, the earliest of important American poets was appointed to a life typical of the first century of American national existence, and of the strongest single racial element by which that nation's social order has been moulded and promoted. Rated by the amount of time given to school books and college classes, Bryant's early education was limited. After the village school he received a year of exceptionally good training in Latin under his mother's brother, the Rev. Dr Thomas Snell, of Brookfield, followed by a year of Greek under the Rev. Moses Hallock, of Plainfield, and at sixteen entered the sophomore class of Williams College. Here he was an apt and diligent student through two sessions, and then, owing to the straitness of his father's means, he withdrew without graduating, and studied classics and mathematics for a year, in the vain hope that his father might yet be able to send him to Yale College. But the length of his school and college days would be a very misleading measure of his training. He was endowed by nature with many of those traits which 'it is often only the final triumph of books and institutional regimen to establish in character, and a double impulse toward scholarship and citizenship showed its ruling influence with a precocity and an ardour which gave every day of systematic schooling many times its ordinary value. It is his own word that, two months after beginning with the Greek alphabet, he had read the New Testament through. On

abandoning his hope to enter Yale, the poet turned to and pur- sued, under private guidance at Worthington and at Bridgewater, the study

of law. At twenty-one he was admitted to the bar, opened an office in Plainfield, presently withdrew from there, and at Great Barrington settled for nine years in the attorney's calling, with an aversion for it which he never lost. His first book of verse, The Embargo, or Sketches of the Times; A Satire by a Youth of thirteen, had been printed at Boston in 1808.

At the age of twenty-six Bryant married, at Great Barrington, Miss Frances Fairchild, with whom he enjoyed a happy union until her death nearly half a century later. In the year of his marriage he suffered the bereavement of his father's death. In 1825 he ventured to lay aside the practice of law, and removed to New York City to assume a literary editorship. Here for some months his fortunes were precarious, until in the next year he became one of the editors of the Evening Post, In the third year following, 1829, he came into undivided editorial control, and became also chief owner. He enjoyed his occupation, fulfilling its duties with an unflagging devotion to every worthy public interest till he died in 1878, in the month of his choice,' as indicated in his beautiful poem entitled " June."

Though Bryant's retiring and contemplative nature could not overpower his warm human sympathies, it yet dominated them to an extent that made him always, even in his journalistic capacity and in the strenuous prose of daily debate, a councillor rather than a leader. It was after the manner of the poet, the seer, that he was a patriot, standing for principles much more than for measures, and, with an exquisite correctness which belonged to every phase of his being, never prevailing by the accommodation of himself to inferiors in foresight, insight or rectitude. His vigorous and stately mind found voice in one of the most admirable models of journalistic style known in America. He was founder of a distinct school of American journalism, characterized by an equal fidelity and temperance, energy and dignity. Though it is as a poet that he most emphatically belongs to history, hisyerse was the expression of only the gentler motions of his mind; and it gathers influence, if not lustre, when behind it is seen a life intrepid, upright, glad, and ever potent for the nobler choice in all the largest affairs of his time. His renown as a poet antedated the appearance of his first volume by some four or five years. " American poetry," says Richard Henry Stoddard, " may be said to have commenced in 181 7 with . . . (Bryant's) ' Thanatopsis ' and ' Inscription for the entrance of a wood.' " " Thanatopsis," which revealed a voice at once as new and as old as the wilderness out of which it reverberated, had been written at Cummington in the poet's eighteenth year, and was printed in 1817

in the North American Review; the " Inscription " was written in his nineteenth, and in his twenty- first, while a student of law at Bridgewater, he had composed his lines " To a Water-fowl," whose exquisite beauty and exalted faith his own pen rarely, if ever, surpassed. The poet's gift for language made him a frequent translator, and among his works of this sort his rendering of Homer is the most noted and most valuable. But the muse of Bryant, at her very best, is always brief -spoken and an interpreter initially of his own spirit. Much of the charm of his poems lies in the equal purity of their artistic and their moral beauty. On the ethical side they are more than pure, they are — it may be said without derogation — Puritan. He never commerces with unloveliness for any loveliness that may be plucked out of it, and rarely or never discovers moral beauty under any sort of mask. As free from effeminacy as from indelicacy, his highest and his deepest emotions are so dominated by a perfect self-restraint that they never rise (or stoop) to transports. There is scarcely a distempered utterance in the whole body of his poetical works, scarcely one passionate exaggeration. He faces life with an invincible courage, an inextinguishable hope and heavenward trust, and the dignity of a benevolent will which no compulsion can break or bend. The billows of his soul are not waves, but hills which tempests ruffle but can never heave. Even when he essays to speak for spirits unlike his own — characters of history or conceptions of his own imagination — he never with signal success portrays

them in the bonds, however transient, of any overmastering passion. For merriment he has a generous smile, for sorrow a royal one; but the nearest he ever comes to mirth is in his dainty rhyme, " Robert of Lincoln," and the nearest to a wail in those exquisite notes of grief for the loss of his young sister, " The Death of the Flowers," which only draw the tear to fill it with the light of a perfect resignation. As a seer of large and noble contemplation, in whose pictures of earth and sky the presence and care of the Divine mind, and every tender and beautiful relation of man to his Creator and to his fellow, are melodiously celebrated, his rank is among the master poets of America, of whom he is historically the first.

Bryant published volumes of Poems in 1821 (Cambridge) and 1832 (New York), and many other collections were issued under his supervision, the last being the Poetical Works (New York, 1876).

Among his volumes of verse were " The Fountain " and other poems (New York, 1842) ; The White-Footed Deer and Other Poems (New York, 1844); Thirty Poems (New York, 1864); and blank-verse translations of The Iliad of Homer (Boston, 1870) and of The Odyssey of Homer (Boston, 1871). His Poetical Works and his Complete Prose Writings (New York, 1883 and 1884) were edited by Parke Godwin, who also wrote A Biography of William Cullen Bryant, with Extracts from his private Correspondence (New York, 1883). See also J. Grant Wilson, Bryant and his Friends (New York, 1886) ; John Bigelow, William Cullen Bryant (Boston, 1890), in the "American Men of Letters " series; W. A. Bradley, Bryant, in the " English Men of Letters " series (1905) ; E. C. Stedman, Poets of America (1885); and biographical and bibliographical introductions by Henry C. Sturges and Richard Henry Stoddard to the " Roslyn edition " of his Poetical Works (New York, 1903). (G. W. Ca.)

BRYAXIS, one of the four great sculptors who worked on the mausoleum at Halicarnassus, about 350 B.C. His work on that monument cannot be separated from that of his companions, but a basis has been discovered at Athens bearing bis signature, and adorned with figures of horsemen in relief. He is said to have made a great statue of Serapis for Sinope, but as to this there are grave historic difficulties. He also made a great statue of Apollo, set up at Daphne near Antioch (see E. A. Gardner, Handbook of Greek Sculpture, ii. 374).

BRYCE, JAMES (1838-), British jurist, historian and politician, son of James Bryce (LL.D. of Glasgow, who had a school in Belfast for many years), was born at Belfast, Ireland, on the 10th of May 1838. After going through the high school and university courses at Glasgow, he went to Trinity College, Oxford, and in 1862 was elected a fellow of Oriel. He went to the bar and practised in London for a few years, but he was soon called back to Oxford as regius professor of civil law (1870-1893). His reputation as a historian had been made as early as 1864 by his Holy Roman Empire. He was an ardent Liberal in politics, and in 1880 he was elected to parliament for the Tower Hamlets division. of London; in 1885 he was returned for South Aberdeen, where he was re- elected on succeeding occasions. His intellectual distinction and political industry made him a valuable member of the Liberal party. In 1886 he was made under secretary for foreign affairs; in 1892 he joined the cabinet as chancellor of the duchy of Lancaster; in 1894 he was president of the Board of Trade, and acted as chairman of the royal commission on secondary education; and in Sir Henry Campbell-Bannerman's cabinet (1905) he was made chief secretary for Ireland; but in

February 1907 he was appointed British ambassador at Washington, and took leave of party politics, his last political act being a speech outlining what was then the government scheme for university reform in Dublin — a scheme which was promptly discarded by his successor Mr Birrell. As a man of letters Mr Bryce was already well known in America. His great work The American Commonwealth (1888; revised edition, 1910) was the first in which the institutions of the United States had been thoroughly discussed from the point of view of a historian and a constitutional lawyer, and it at once became a classic. His Studies in History and Jurisprudence (1901) and Studies in Contemporary Biography (1903) were republications of essays, and in 1897, after a visit to South Africa, he published a volume of Impressions of that country, which had considerable weight in Liberal circles when the Boer War was being discussed.

Meanwhile his academic honours from home and foreign universities multiplied, and he became a fellow of the Royal Society in 1894. In earlier life he was a notable mountain-climber, ascending Mount Ararat in 1876, and publishing a volume on Transcaucasia and Ararat in 1877; in 1899-1901 he was president of the Alpine Club.

BRYDGES, SIR SAMUEL EGERTON (1762-1837), English genealogist and miscellaneous writer, was born on the 30th of November 1762. He studied at Queens' College, Cambridge, and was entered at the Middle Temple in 1782, being called to the bar in 1787. In 1789 he persuaded his elder brother that their family were the heirs to the barony of Chandos, being descended from a younger branch of the Brydges who first held the title. The case was tried and lost, but Brydges never gave up his claim, and used to sign himself Per legem terrae B. C. of S. {i.e. Baron Chandos of Sudeley). He re-edited Collins 's Peerage, inserting a statement about his supposed right. In 18 14 he was made a baronet, and in 1818 he left England. He died at Geneva on the 8th of September 1837. Sir Egerton was a most prolific author; he is said to have written 2000 sonnets in one year. His numerous works include Poems (1785); Censura Liter aria (1805-1809); The British Bibliographer (4 vols., 1810-1814), with J. Haslewood; Restituta (4 vols., 1814-1816), containing accounts of old books; and Autobiography, Times, Opinions and Contemporaries of Sir S. E. Brydges (1834). In 1813 Brydges began to supply material to a private printing press established at Lee Priory, Kent, by a compositor and a pressman, who were to receive any profits which might arise from the sale of the works published. In this way Brydges published various Elizabethan texts, at considerable expense to himself, which increased the services he had

already rendered to the study of Elizabethan literature by his bibliographical works.

For a full list of his works see W. T. Lowndes, Bibliographer's Manual (ed. H. G. Bohn, 1857-1864).

BRYENNIUS, NICEPHORUS (1062-1137), Byzantine soldier, statesman and historian, was born at Orestias (Adrianople). His father, of the same name, had revolted against the feeble Michael VII., but had been defeated and deprived of his eyesight. The son, who was distinguished for his learning, personal beauty and engaging qualities, gained the favour of Alexius I. (Comnenus) and the hand of his daughter Anna, with the titles of Caesar (then ranking third) and Panhypersebastos (one of the new dignities introduced by Alexius). Bryennius successfully de- fended the walls of Constantinople against the attacks of Godfrey of Bouillon (1097); conducted the peace negotiations between Alexius and Bohemund, prince of Antioch (1108); and played an important part in the defeat of Malik-Shah, the Seljuk sultan of Iconium (1116). After the death of Alexius, he refused to enter into the conspiracy set on foot by his mother-in-law and wife to depose John, the son of Alexius, and raise himself to the throne. His wife attributed his refusal to cowardice, but it seems from certain passages in his own work that he really re- garded it as a crime to revolt against the rightful heir; the only reproach that can be brought against him is that he did not nip the conspiracy in the bud. He was on very friendly terms with the new emperor John, whom he accompanied on his Syrian campaign (113 7), but was forced by illness to return to Byzantium, where he died in the same year. At the suggestion of his mother- in-law he wrote a history (called by him "TXrj 'Iaroptas, materials for a history) of the period from 1057 to 1081, from the victory of Isaac I. (Comnenus) over Michael VI. to the dethronement of Nicephorus Botaneiates by Alexius. The work has been described as rather a family chronicle than a history, the object of which was the glorification of the house of Comnenus. Part of the introduction is probably a later addition. In addition to information derived from older contemporaries (such as his father and father-in-law) Bryennius made use of the works of Michael Psellus, John Scylitza and Michael Attaliota. As might be expected, his views are biased by personal considera- tions and his intimacy with the royal family, which at the same time, however, afforded him unusual facilities for obtaining material. His model was Xenophon, whom he has imitated with

a tolerable measure of Success; he abstains from an excessive use of simile and metaphor, and his style is concise arid simple.

Editio princeps, P. Possinus, 1661 ; in Bonn Corpus Scriptorum Hist. Byz., by E. Meineke (1836), with du Cange's valuable com- mentary; JVhgne, Patrologia Graeca, cxxvii.; see also J. Seger, Byzantinische Historiker des 10. und 11. Jahrhunderts (1888), and C. Krumbacher, Geschichte der byzantinischen Litteratur (1897). The estimate of his work in R. Nicolai, Griechische LiteratUrgeschichte, iii. p. 76 (1878), is too unfavourable.

BRYNMAWR, a market town of Brecknockshire, Wales, 143 m – S.E. of Brecknock and 156 m. from London by rail. Pop. of urban district (1901) 6833. It is on the London & North- Western and Rhymney joint railway connecting Rhymney and Abergavenny, being also a junction for a branch line to Pontypool via Blaenavon, and the terminus of the Great Western line from Newport via Nantyglo. The town owes its origin to the development during the first half of the 19th century of iron- works at the upper ends of the valleys that converge in its neighbourhood, its site being previously known as Waun Helygen (Willow-tree Common) . The Nantyglo ironworks afford occupa- tion to large numbers of the inhabitants of Brynmawr. Both coal and iron ore were formerly worked, but the coal is exhausted and the ore unsuitable for modern processes. Brynmawr was formed into an ecclesiastical parish in 1875 out of portions of the civil parishes of Llanelly and Llangattock. In 1894 this was formed into an urban district, which was enlarged in 1900 by the addition of a portion of the parish of Aberystruth in Mon- mouthshire, the whole being at the same time consolidated into a civil parish.

BRYN MAWR COLLEGE, an institution of advanced learning for women, at Bryn Mawr, Pennsylvania, U.S.A., 5 m. W. of Philadelphia. The site occupies 52 acres and overlooks a broad expanse of rolling country. The buildings are of grey stone in the Jacobean Gothic style, and consist of an administration and lecture hall, a science hall, a library containing in 1908 about 55,000 volumes mostly for special study, a gymnasium; a hospital and six halls of residence. The requirements for matriculation are high; students are required to choose their studies according to the " group system," which permits them to specialize in two or more subjects; and instruction is given largely by means of lectures. The college is open to " hearers " who are not required to matriculate, to

undergraduate matriculated students who are not studying for a degree, to undergraduate matriculated students who are candidates for the degree of B.A., and to graduate students who are candidates for the degree of M.A. or Ph.D. The government rests in a board of thirteen trustees and sixteen directors, all the trustees being members of the board of directors. The president of the college is a trustee and director. The institution was founded by Dr Joseph W. Taylor (18 10-1880), a member of the Society of Orthodox Friends, and he provided that the trustees also should be members, but otherwise Bryn Mawr College is non-sectarian. It was incor- porated in j 880, and was opened for instruction in 1885. In 1908 it had 419 students.

BRYOPHYTA, the botanical name of the second great sub- division of the vegetable kingdom, which includes the mosses and liverworts. They are all plants of small, often minute, size, and, as the absence of popular names indicates, the different kinds are not commonly recognized. Even the distinction between liverworts and mosses is not clearly made, not only the former but other small plants of higher groups being popularly called mosses. A little careful observation soon shows, however, that the Bryophytes form a well-defined class., including several subordinate groups. Though their study necessarily involves minute observation they possess many features of interest. The adaptations they show to their conditions of life are often very perfect and present interesting analogies with the adaptive characters of the higher plants. They are of great scientific interest not only as representing a special type of life-history and organization, but because in several of the subordinate groups series of forms can be traced, which enable the general course, of their evolution to be inferred even in the practical absence of fossil remains of any antiquity.

Bryophytes are very generally distributed over the earth, and those of a single country, such as Britain, afford examples of all the chief natural groups. Sometimes, as is the case with the bog-mosses and some arctic mosses, they may cover considerable tracts. As a rule, however, they occupy a subordinate place in the vegetation, and the different kinds require to be carefully looked for. Covering, as they often do, what would otherwise be bare ground, they are of value in assisting to retain moisture in the soil and in preparing the way for its colonization by higher plants. Although many forms are capable of withstanding periods of drought they succeed best in relatively moist climates and localities. This is shown both by their unequal abundance in different localities of one country and in their scarcity in certain geographical regions as compared with their luxuriance in

others.

The external appearance and general organization show great variety. In all mosses and many liverworts (figs. 8, 11) the plant consists of a stem bearing small leaves. In a number of liverworts (figs. 2, 7), on the other hand, it presents no distinction of stem and leaf, but is a flat, dorsiventral body usually closely applied to the substratum on which it grows. This, in contradistinction to the leafy shoot, is termed a thallus. True roots are never present, the plants being attached to the soil by rhizoids, which resemble the root-hairs of higher plants.

The reproductive organs borne by the thallus or plant are called antheridia and archegonia, and serve for sexual reproduction. The antheridium (figs. 5, 15) has a longer or shorter stalk and consists of a wall formed of a single layer of flat cells enclosing a mass of minute cells from which the spermatozoids are developed. In the cases which have been most carefully investigated two spermatozoids have been found to arise from each of the small cubical cells of the central tissue. When mature the antheridium opens on being moistened and the spermatozoids become free in the water by the dissolution of the mucilaginous cell-walls enclosing them. Each has the form (fig. 5, D) of a more or less spirally twisted, club-shaped body, bearihg at the pointed anterior end two long cilia by means of which it moves through the water. The archegonium (fig. 1) has

Fig. 1. — Archegonia of Marchantia polymorpha. (After Sachs.)

1. Mature but unopened arche-

gonium. e, Ovum ; b, ven- tral-canal cell; d, lid-cells of 3. neck.

2. Archegonium ready for fer-

tilization; a passage leads

down to the rounded ovum e. Archegonium after fertiliza- tion; the fertilized ovum is developing into a sporo- gonium/; d, perianth.

the form of a narrow flask with a long neck. It usually has a short stalk and consists of a central row of cells enclosed by a layer of cells forming the wall. The egg-cell or ovum lies within the wider basal region or venter, and above it come the ventral canal-cell and canal- cells within the neck of the archegonium. When the archegonium opens by the separation of the cells at the tip, the disorganized canal-cells escape, leaving a narrow tubular passage

leading down to the ovum. Each antheridium or archegonium arises from a single cell, and while the mature structure is similar in the two groups, the development presents differences in liverworts and mosses. Without entering into details it may be mentioned that in the mosses it proceeds both in the archegonium and antheridium by the segmentation of an apical cell, while this is not the case in the liverworts. Fertilization is effected by the passage of a spermatozoid, attracted probably by means of a chemical stimulus, down the passage of the archegonial neck and its fusion with the ovum. It thus, as in other cases of sexual reproduction, involves the union of

two cells, and the vegetative plant; since it bears the sexual organs, is called the sexual generation or gametophyte.

From the fertilized ovum another and very different stage arises, which remains attached to the sexual plant and has thus the appearance of a fruit borne on it. It consists of a capsule usually borne on a longer or shorter stalk or seta, the base of which is inserted into the tissues of the gametophyte. This basal region, which serves to absorb nourishment, is called the foot. Within the capsule numerous reproductive cells, the spores, are developed. In contrast to the sexual generation this stage is called the spore-bearing genera- tion (sporogonium, sporophyte). The examination of any moss " in fruit " (fig. 11, B) will show the readily detachable sporogonium borne on the leafy sexual plant, and the relation existing between the two generations will be evident from figs. 2, 3, 9, and 16. In liverworts (with one or two exceptions) the mature capsule is filled with spores mingled with sterile cells or elaters and opens by splitting into valves. In mosses (fig. 11, C) the sporogonium is more highly organized; a central column of sterile tissue (the columella) is found in the capsule, which opens by the removal of a lid or oper- culum, and there are no elaters among the spores. By the opening of the capsule the spores are set free, and under suitable conditions germinate and give rise to the sexual generation. In mosses (fig. 12) a filamentous growth, the protonema, is first formed, and the leafy plants arise upon this. In liverworts this preliminary phase of the sexual generation is as a rule ill-marked or absent, and the plant may be said to develop directly from the spore.

It will be evident that the two generations exhibit a regular succession or alternation in the life-history of all Bryophytes. The

gametophyte is developed from the spore and bears the sexual organs ; the sporogonium is developed from the fertilized egg and produces spores. An important cytological difference between the two generations can only be mentioned here. By the union of the nuclei of the spermatozoid and ovum in fertilization the number of chromo- somes in the resulting nucleus is doubled, and this double number is maintained throughout all the cell-divisions of the sporogonium. On the development of the spores, which takes place by the division of each spore-mother-cell into four, the number of chromosomes becomes one half of what it has been in all the nuclei of the sporogonium. This reduced number is maintained throughout the development of the sexual generation. Thus in Pellia the nuclei of the gametophyte have eight chromosomes and those of the sporophyte sixteen. The relation in which the two generations stand to one another is the most important common characteristic of the Bryophyta. The gametophyte is always the independently living individual upon which the spore-bearing generation is through- out its life dependent. In all plants higher than the Bryophyta the sporophyte becomes an independently rooted plant and is the conspicuous stage in the life-history. Thus in the fern the sexual generation is the small prothallus developed from the spore, while the familiar fern-plant is the spore-bearing generation (see Pterido- ph yta) . On the other hand a corresponding alternation of generations is only indicated in the lower plants (Thallophyta).

The Bryophyta are divided into the Hepaticae (liverworts) and Musci (mosses). In the Hepaticae we can recognize three subordinate groups — the Marchantiales, Jungermanniales and Anthocerotales; and in the Musci also three groups — the Sphag- nales, Andreaeales and Bryales. Since these series of forms differ considerably among themselves, it is difficult to express in a definition the distinction between a liverwort and a moss which is readily made in practice. We may therefore leave it to the description of the several groups of Hepaticae and Musci to supplement the differences mentioned above and to bring out the exceptions which exist.

Hepaticae (Liverworts) .

The range of form and structure of both generations in the liverworts is so great that no one form can be taken as a satis- factory type. It will, however, be of use to preface the more general description by a brief account of a particular example, and we may take for this purpose a very common and easily recognized thalloid liverwort belonging to the Junger- manniales.

Pellia epiphylla (fig. 2) can be found at any season growing in large patches on the damp soil of woods, banks, &c. The broad flat thallus is green and may be a couple of inches long. It is sparingly branched, the branching being apparently dichoto- mous; the growing point is situated in a depression at the anterior end of each branch. The wing-like lateral portions of the thallus gradually thin out from the midrib; from the projecting lower surface of this numerous rhizoids spring. These are elongated superficial cells, and serve to fix the thallus to the soil and obtain water and salts from it. No leaf-like

appendages are borne on the thallus, but short glandular hairs occur behind the apex. The plant is composed throughout of very similar living cells, the more superficial ones contain- ing numerous chlorophyll grains, while starch is stored in the internal cells of the midrib. The cells contain a number of oil- bodies the function of which is imperfectly understood. The growth of the thallus proceeds by the regular segmentation of a single apical cell. The sexual organs are borne on the upper surface, and both antheridia and archegonia occur on the same branch (fig. 3, A). The antheridia (an) are scattered over the middle region of the thallus, and each is surrounded by a tubular upgrowth from the surface. The archegonia (ar) are developed in a group behind the apex, and the latter continues to grow for a time after their forma- tion, so that they come to be seated in a depression of the upper surface. They are further protected by

the growth of the hinder margin of the depression to form a scale-like involucre (in) . Fertilization takes place about June, and the sporogonium is fully developed by the winter. The embryo developed from the fertilized ovum consists at first of a number of tiers of cells. Its terminal tier gives rise to the capsule, the first divisions in the four cells of the tier marking off the wall of the capsule from the cells destined to produce the spores. In fig-. 4, C, which represents a longitudinal section of a young embryo of Pellia, these archesporial cells are shaded. The tiers below give rise to the seta and foot. The mature sporogonium (fig. 3, B) consists of the foot embedded in the tissue of the thallus, the seta, which remains short until just before the shedding of the spores, and the spherical capsule. It remains for long enclosed within the calyptra formed by the further development of the archegonial wall and surmounted by the neck of the archegonium. The calyptra is ultimately burst through, and in early spring the seta elongates rapidly, raising the dark-coloured capsule (fig. 2). In the young con- dition the wall of the capsule, which consists of two layers of cells, encloses a mass of similar cells developed from the arche- sporium. Some of these become spore-

mother-cells and give rise by cell division to four spores, while others remain undivided and become the elaters. The latter are elongated spindle-shaped

From Cooke, Handbook oj British Hepaticae..

Fig. 2. — Pellia epiphylla. Group of plants bearing mature sporogonia.

Fig. 3. — Pellia epiphylla,

A, Longitudinal section of thallus

at the time of fertilization. an, Antheridia; ar, arche- gonia; in, involucre.

B, Longitudinal section of almost

mature sporogonium at- tached to the thallus. in, Involucre; col, calyptra; /, foot; s, seta; caps, cap- sule (semi-diagrammatic).

cells with thick brown spiral bands on the inside of their thin walls. They radiate out from a small plug of sterile cells pro- jecting into the base of the capsule, and some are attached to this, while others lie free among the spores. The latter are large, and at first are unicellular; but in Pellia, which in this respect is exceptional, they commence their further development within the capsule, and thus consist of several cells when shed.

The cells of the capsule wall have incomplete, brown, thickened rings on their walls, and the capsule opens by splitting into four valves, which bend away from one another, allowing the loose spores to be readily dispersed by the wind, assisted by the hygro- scopic movements of the elaters. On falling upon damp soil the spores germinate, growing into a thallus, which gradually attains its full size and bears sexual organs.

While the general course of the life-history of all liverworts re- sembles that of Pellia, the three great groups into which they are divided differ from one another in the characters of both genera- tions. Each group exhibits a series leading from more simple to more highly organized forms, and the differentiation has proceeded on

distinct and to some extent divergent lines in the three groups. The Marchantiales are a series of thalloid forms, in which the structure of the thallus is specialized to enable them to live in more exposed situations. The lowest members of the series (Riccia) possess the simplest sporogonia known, consisting of a wall of one layer of cells enclosing the spores. In the higher forms a sterile foot and seta is present, and sterile cells or elaters occur with the spores. The lower members of the Jungermanniales are also thalloid, but the thallus never has the complicated structure characteristic of theMarchantiales,and progress is in the direction of the differentiation of the plant into stem and leaf. Indications

of how this may have come about are afforded by the lower group of the Anacrogynous Jun- germanniaceae, and throughout the Acrogynous Junger- manniacae the plant has well- marked stem and leaves. The sporo- gonium even in the simplest forms has a sterile foot, but in this series also the origin of elaters from sterile cells can be traced. The Anthocerotales are a small and very distinct group, in which the gameto- phyte is a thallus, while the sporo- and is capable of The mode of

Fig. 4. — Semi-diagrammatic figures of young embryos of Liverworts in longitudinal section. The cells which will produce the sporogenous tissue are shaded. (After Kienitz- Gerloff and Leitgeb.)

A, Riccia. D, Anthoceros laevis.

B, Marchantia poly- E, Cephalozia bicus-

morpha. pidata.

C, Pellia epiphylla. F, Radula complanata.

gonium possesses a sterile columella long-continued growth and spore production development of the sporogonium presents important differences in the three series that may be briefly referred to here. In fig. 4 young sporogonia of a number of liverworts are shown in longitudinal section, and the archesporial cells from which the spores and elaters will arise are shaded. In Riccia (fig. 4, A) the whole mass of cells derived from the ovum forms a spherical capsule, the only sterile tissue being the single layer of peripheral cells forming the wall. In other Marchantiales (fig. 4, B) the lower half of the embryo separated by the first transverse wall (1,1) forms the sterile foot and seta, while in the upper half (ka) the peripheral layer forms the wall of the capsule, enclosing the archesporial cells from which spores

and elaters arise. In the Jungermanniales (fig. 4, C, E, F) the embryo is formed of a number of tiers of cells, and the archesporium is defined by the first divisions parallel to the surface in the cells of one or more of the upper tiers; a number of tiers go to form the seta and foot, while the lowest segment (a) usually forms a small appendage of the latter. In the Anthocerotales (fig. 4, D) the lowest tiers form the foot, and the terminal tier the capsule. The first periclinal divisions in the cells of the terminal tier separate a central group of cells which form the sterile columella (col) . The archesporium arises by the next divisions in the outer layer of

cells, and thus extends over the summit of the columella. In none of the liverworts does the sporogonium develop by means of an apical cell, as is the rule in mosses.

Leaving details of form and structure to be considered under the several groups, some general features of the Hepaticae may be looked at here in relation to the conditions under which the plants live. The organization of the gametophyte stands in the closest relation to the factors of light and moisture in the environment. With hardly an exception the liverworts are dorsiventral, and usually one side is turned to the substratum and the other exposed to the light. In thalloid forms a thinner marginal expansion or a definite wing increasing the surface exposed to the light can be distinguished' from a thicker midrib serving for storage and conduction. The leaves and stem of the foliose forms effect the same division of labour in another way. The relation of the plant to its water supply varies within the group. In the Marchantiales the chief supply is obtained from the soil by the rhizoids, and its loss in transpiration is regulated and controlled. In most liver- worts, on the other hand, water is absorbed directly by the whole general surface, and the rhizoids are of subordinate importance. Many forms only succeed in a constantly humid atmosphere, while others sustain drying for a period, though their powers of assimilation and growth are suspended in the dry state. The cell-walls are capable of imbibing water rapidly, and their thick- ness stands in relation to this rather than to the prevention of loss of water from the plant. The large surface presented by the leafy forms facilitates the retention and absorption of water. The importance of prolonging the moistened condition as long as possible is further shown by special adaptations to retain water either between the appressed lobes of the leaves or in special pitcher-like sacs. In thalloid forms fimbriate or lobed margins or outgrowths from the surface lead to the same result. Sometimes adaptations to protect the plant during seasons of drought, such as the rolling up of the thallus in many xerophytic Marchantiales, can be recognized, but

more often a prolonged dry season is survived in some resting state. The formation of sub- terranean tubers, which persist when the rest of the plant is killed by drought, is an interesting adaptation to this end, and is found in all three groups (e.g. in species of Riccia, Fossombronia and Anthoceros). No examples of total saprophytism or of parasitism are known, but two interesting cases of a symbiosis with other organisms which is probably a mutually beneficial one, though the nature of the physiological relation between the organisms is not clearly established, may be mentioned. Fungal hyphae occur in the rhizoids and in the cells of the lower region of the thallus of many liverworts, as in the endotrophic mycorhiza of higher plants. Colonies of Nostoc are constantly found in the Anthocerotaceae and in Blasia. In the latter they are protected by special concave scales, while in the Anthocerotaceae they occupy some of the mucilage slits between the cells of the lower surface of the thallus.

Other adaptations concern the protection of the sexual organs and sporogonia, and the retention of water in the neighbourhood of the archegonia to enable the spermatozoid to reach the ovum. In thalloid forms the sexual organs are often sunk in depressions, while in the foliose forms protection is afforded by the surrounding leaves. In addition special involucres around the archegonia have arisen independently in several series. The characters of the sporogonium have as their object the nutrition and effective distribution of the spores, and only exceptionally, as in the Anthocerotaceae, are concerned with independent assimilation. In most forms the capsule is raised above the general surface at the time of opening, usually by the rapid growth of the seta, but in the Marchantiaceae by the sporogonia being raised on a special archegoniophore. The elaters serve as lines of conduction of plastic material to the developing spores, and later usually assist in their dispersal. The spores, with few exceptions, are unicellular when shed, and may develop at once or after a resting period. In their germination a short filament of a few cells is usually developed, and the apical cell of the plant is established in the terminal cell. In other cases a small plate or mass of cells is formed. With one or two exceptions, however, this preliminary

phase, which may be compared with the protonema of mosses, is of short duration.

The power of vegetative propagation is widely spread. When artificially divided small fragments of the gametophyte are found to be capable of growing into new individuals. Apart from the separation of branches by the decay of older portions, special gemmae are found in many species. In Aneura the contents of superficial cells, after becoming surrounded by a new wall and dividing, escape as bi-cellular gemmae. Usually the gemmae arise by the outgrowth of superficial cells, and become free by breaking away from their stalk. When separated they may be single cells or consist of two or numerous cells. In Blasia and Marchantia the gemmae are formed within tubular or cup-shaped receptacles, out of which they are forced by the swelling of mucilage secreted by special hairs.

Marchantiales. — The plants of this group are most abundant in warm sunny localities, and grow for the most part on soil or rocks often in exposed situations. Nine genera are represented in Britain. Targionia is found on exposed rocks, but the other forms are less strikingly xerophytic; Marchantia, polymorphs, and Lunularia spread largely by the gemmae formed in the special gemma-cups on the thallus, and occur commonly in greenhouses. The large thallus of Conocephalus covers stones by the waterside, while Dumortiera is a hygrophyte confined to damp and shady situations. Among the Ricciaceae, most of which grow on soil; Ricciocarpus and Riccia nutans occur floating on still water. The dorsiventral thallus is constructed on the same plan throughout the group, and shows a lower region composed of cells containing little chlorophyll and an upper stratum specialized for assimilation and transpiration. The lower region usually forms a more or less clearly marked midrib, and consists of parenchymatous cells, some of which may contain oil-bodies or be differentiated as mucilage cells or sclerenchyma fibres. Behind the apex, which has a number of initial cells, a series of amphigastria or ventral scales is formed. These consist of a single layer of cells, and their terminal appendages often fold over the apex and protect it. Usually they stand in two rows, but sometimes accessory rows occur, and in Riccia only a single median row is present. The thallus bears two sorts of rhizoids, wider ones with smooth walls which grow directly down into the soil, and longer, narrower ones, with peg-like thickenings of the wall projecting into the cell-cavity. The peg-rhizoids, which are peculiar to the group, converge under shelter of the amphigastria to the midrib, berjeath which they form a wick-like strand. Through this water is conducted by capillarity as well as in the cell cavities. The upper stratum of the thallus is constructed to regulate the giving off of the water thus absorbed. It consists of a series of air-chambers (fig. 6, B) formed by

certain lines of the superficial cells growing up from the surface, and as the thallus increases in area continuing to divide so as to roof in the chamber. The layer forming the roof is called the " epi- dermis," and the small opening left leading into the chamber is bounded by a special ring of cells and forms the " stoma " or air-pore. In most species of Riccia the air-chambers are only narrow passages, but in the other Marchantiales they are more extended. In the

Fig. 5. — Marchantia polymorpha. (After Sachs.)

A. Portion of thallus (/) bearing surface (o) ; b, scales; h,

twostalkedantheridiophores rhizoids.

(hu). C. Longitudinalsectionofanther-

B. Longitudinal section through idium; st, stalk; w,

a young antheridiophore. wall.

The antheridia (a) are seated D. Twospermatozoids.

in depressions of the upper

simplest cases the sides and base of the chambers perform the work of assimilation (e.g. Corsinia). Usually the surface is extended by the development of partitions in the chambers (Reboulia), or by the growth from the floor of the chamber of short filaments of chloro-phyllous cells (Targionia. Marchantia, fig. 6). The stomata may be simply surrounded by one or more series of narrower cells, or, as in the thallus of Marchantia and on the archegoniophores of other

forms, may become barrel-shaped structures by the division of the ring of cells bounding the pore. In some cases the lowermost circle of cells can be approximated so as to close the pore. In Dumortiera the air-chambers are absent, their formation being only indicated at the apex.

The sexual organs are always situated on the morphologically upper surface of the thallus. In Riccia they are scattered singly and protected by the air-chamber layer. The scattered position of the antheridia is also found in some of the higher forms, but usually

From Strasburger's Text-book oj Botany.

Fig. 6. — Marchantia polymorpha. A, Stoma in surface view. B, Air-

chamber with the filaments of assimilating cells and stoma in vertical section.

they are grouped on special antheridiophores which in Marchantia are stalked, disk-shaped branch-systems (fig. 5). The individual antheridia are sunk in depressions from which the spermatozoids are in some cases forcibly ejected. The archegonial groups in Corsinia are sunk in a depression of the upper surface, while in Targionia they are displaced to the lower side of the anterior end of a branch. In all the other forms they are borne on special arche- goniophores which have the form of a disk-shaped head borne on a stalk. The archegoniophore may be an upgrowth from the dorsal surface of the thallus (e.g. Plagiochasma) , or the apex of the branch may take part in its formation. When the disk, around which archegonia are developed at intervals, is simply raised on a stalk-like continuation of the branch, a single groove protecting a strand of peg-rhizoids is found on the ventral face of the stalk {Reboulia). In the highest forms {e.g. Marchantia) the archegoniophore corre- sponds to the repeatedly branched continuation of the thallus, and the archegonia arise in relation to the growing points which are displaced to the lower surface of the disk. In this case two grooves are found in the stalk. The archegonia are protected by being sunk in depressions of the disk or by a special two-lipped involucre. In Marchantia and Fimbriaria an additional investment termed in descriptive works the perianth, grows up around each fertilized archegonium (fig. 1, 3, d). The simple sporogonium found in the Ricciaceae (fig. 4, A) has been described above; as the spores develop, the wall of the spherical capsule is absorbed and the spores lie free in the calyptra, by the decay of which they are set free. In Corsinia the capsule has a well-developed foot, but the sterile cells found among the spore-mother-cells do not become elaters, but remain thin-walled and simply contribute to the nutrition of the spores. In all other forms elaters with spirally thickened walls are found. The seta is short, the capsule being usually raised upon the archegoniophore. Dehiscence takes place either by the upper portion of the capsule splitting into short teeth or falling away as a whole or in fragments as a sort of operculum. The spores on germina- tion form a short germ-tube, in the terminal cell of which the apical cell is established, but the direction of growth of the young thallus is usually not in the same straight line as the germ-tube. The Marchantiales are divided into a number of groups which represent distinct lines of advance from forms like the Ricciaceae, but the details of their classification cannot be entered upon here. The general nature of the progression exhibited by the group as a whole will, however, be evident from the

above account.

Jungermanniales. — This large series of liverworts, which presents great variety in the organization of the sexual generation, is divided into two main groups according to whether the formation of archegonia terminates the growth of the branch or does not utilize the apex. The latter condition is characteristic of the more primitive group of the Anacrogynous Jungermanniaceae, in which the branch continues its growth after the formation of archegonia so that they (and later the sporogonia) stand on the dorsal surface of the thallus or leafy plant. In the Acrogynous JungermanniaceSe the plant is throughout foliose, and the archegonia occupy the ends of the main shoot or of its branches. The antheridia are usually globular and long-stalked. The capsule opens by splitting into four halves.

Jungermanniaceae Anacrogynae. — The great range of form in the sexual plant is well illustrated by the nine genera of this group

which occur in Britain. One thalloid form has already been described in Pellia (fig. 2). Sphaerocarpus, which occurs rarely in stubble fields, is in many respects one of the simplest of the liverworts. The small thallus bears the antheridia and archegonia, each of which is surrounded by a tubular involucre, on the upper surface of distinct individuals. The sporogonium has a small foot, but the sterile cells among the spores do not develop into elaters. The same is true of the capsule of Riella. The plants of this genus, none of the species of which are British, grow in shallow water rooted in the mud, and are unlike all other liverworts in appearance. The usually erect thallus has a broad wing-like outgrowth from the dorsal surface and two rows of rather large scales below. No provision for the opening of the capsule exists in either of these genera. In Anetira the form of the plant may be complicated by a division of labour between root-like, stem-like and assimilating branches of the thallus. The sexual organs are borne on short lateral branches, while in the related genus Metzgeria, which occurs on rocks and tree trunks, the small sexual branches spring from the lower surface of the midrib of the narrow thallus. In these two genera the elaters are attached to a sterile group of cells projecting into the upper end of the Capsule, and on dehiscence remain connected with the_ tips of the valves. Pallavicinia and some related genera have a definite midrib and broad wings formed of one layer of cells, and are of interest owing to the presence

of a special water-conducting strand in the midrib. This consists of elongated lignified cells with pitted walls. Blasia pusilla, which occurs commonly by ditches and streams, affords a transition to the foliose types. Its thallus (fig. 7) has thin marginal lobes of limited growth, which are comparable to the more definite leaves of other anacrogynous forms. The ventral surface bears flat scales in addition to the concave scales which, as mentioned above, are in- habited by Nostoc. This interesting liverwort produces two kinds of

gemmae, and in the localities in which it grows is largely reproduced by their means. In Fossombronia, of which there are a number of British species, the plant consists of a flattened stem creeping on muddy soil and bearing two rows of large obliquely-placed leaves. The sexual organs are borne on the upper surface of the midrib, and the sporogonium is surrounded by a bell- shaped involucre which grows up after fertilization. Treubia, which grows on rotting wood in the moun- tain forests of Java, is similarly differentiated into stem and leaf, and is the largest liverwort known, reaching a length of thirty centi- metres. Lastly Haplomitrium, a rare British genus, forms with the exotic Calobryum, an isolated group which is most naturally placed among the anacrogynous forms although the archegonia are in terminal groups. The erect branches bear three rows of leaves, and spring from a creeping axis from which root-like branches destitute of rhizoids extend into the substratum.

Jungermanniaceae Acrogynae.- — The plant consists of leafy shoots, the origin of which can be understood in the light of the foliose forms described above. The great majority of existing liverworts belong to this group, the general plan of construction of which is throughout very similar. In Britain thirty-nine genera with numerous species are found. With few exceptions the stem grows by means of a pyramidal apical cell cutting off three rows of segments. Each segment gives rise to a leaf, but usually the leaves of the ventral row (amphigastria) are smaller and differently shaped from those of the two lateral rows; in a number of genera they are wanting altogether. Sometimes the leaves retain their transverse insertion on the stem, and the two lobes of which they consist are developed equally. More often they come to be obliquely inserted, the anterior edge of each leaf lying Under or over the edge of the leaf in front. The two lobes are often unequally developed. In Scapania the upper lobe is the smaller, while in Radula, Porella and the Lejeuneae this is the case with the lower lobe. The folding of one lobe against another assists in the retention of water. Pitcher-like structures have arisen in different ways in a number of genera, and are especially common in epiphytic forms (Frullania, Lepidolaena, Pleurozia). In some forms the leaves are

finely divided, and along with the hair- like paraphyllia form a loose weft around the stem (Trichocolea). The rhizoids spring from the lower surface of the stem, and sometimes from the bases of the leaves. The branches arise below and by the side of the leaves.

The sexual organs may occur on the same or on distinct individuals! The antheridia are protected by leaves which are often modified in shape. The archegonia are borne at the apex of the main stem or of a lateral branch. A single archegonium may arise from the apical cell (Lejeunea); more commonly a number of others are formed from the surrounding segments. The leaves below the archegonial group are frequently modified in size and shape, but the chief pro-

From Strasburger's Text-book 0} Bo- tany.

Fig. 7. — Blasia pusilla. The margin of the thallus bears leaf-like lobes. 7, Rhi- zoids; s, sporogonium.

tection is afforded by a tubular perianth, which corresponds to a coherent whorl of leaves and grows up independently of fertilization. The perianth serves also to enclose and protect the sporogonium during its development. In a number of forms belonging to different groups the end of the stem on which the sporogonium is borne grows

Fig. 8. — Chiloscyphus polyanthos. The plant bears three mature sporogonia which show the elongation of the seta. One of the sporogonia has opened. B, The " perianth " with the small peri-chaetial leaves below it. (After Goebel.)

downwards so as to form a hollow tubular sac enclosing the sporo-gonium ; in other cases this marsupial sac is formed by the base of the sporogonium boring into the thickened end of the stem. The sac usually penetrates into the soil and bears rhizoids on its outer surface. Kantia, Calypogeia and Saccogyna are British forms, which have their sporogonia protected in this way. The sporogonium is ve.ry similar throughout the group (figs. 8, 9). At maturity the seta elongates rapidly, and the wall of the capsule splits more or less completely into four valves, allowing the elaters and spores to escape. In the lubuloideae, which in other respects form a well-marked group, the seta is short and the elaters extend from the upper part of the capsule to the base; at dehiscence they remain fixed to the valves into which the capsule splits. The germinating spore usually forms a short filament, but in other cases a flat plate of cells growing by a two- sided apical cell is first formed {Radula, Lejeunea). In one or two tropical forms the pro-embryonic stage is prolonged, and leafy

shoots only arise in connexion with the sexual organs. In Protocephalozia, which grows on bare earth in South America, this pro- embryo is filamentous, while in Lejeunea Metzgeriopsis, which grows on the leaves of living plants, it is a flat branched thalius closely applied to the substratum. Other cases of the plant being, with the exception of the sexual branches, apparently thalloid, are on the other hand to be ex- Fig. 9. — Cephalozia bicuspidata. plained as due to the re- Longitudinal section of the summit of a duction of the leaves and shoot bearing a nearly mature sporo- flattening of the stem of a gonium, sg, still enclosed in the cal- shoot (Pteropsiella,Zoopsis). yptra; or , archegonia which have re-

The Acrogynous Junger- mained unfertilized; st, stem; ft, leaf, manniaceae fall into a p, perianth. (After Hofmeister.) number of natural groups,

which cannot, however, be followed out here. They occur in very various situations, on the ground, on rocks and stones, on tree trunks, and, in the damp tropics, on leaves. Usually they form larger or smaller tufts of a green colour, but some forms have a reddish tint.

Anthocerotales. — This small and very natural group includes the three genera Anthoceros, Dendroceros and Notothyias, and stands in

many respects in an isolated position among the Bryophyta. Three species of Anthoceros occur in Britain, growing on the damp soil of fields, ditches, &c. The dark green thallus has an ill-defined midrib, and is composed of parenchymatous cells. In each assimilating cell there is usually a single large chloroplast. The apical region, which has a single initial cell, is protected by mucilage secreted by the mucilage slits, which are small pit-like depressions between superficial cells of the lower surface. Mucilage is also often formed in inter- cellular spaces within the thallus. Colonies of Nostoc are constantly found living in some of the mucilage slits which then become enlarged. The sexual organs are scattered over the upper surface. The stalked globular antheridia are exceptional in being formed endogenously, and are situated in groups in special intercellular spaces. The superficial layer of cells bounding the cavity does not break down until the antheridia are nearly mature. Occasion- ally antheridia develop on the surface of shaded portions

of the thallus. The necks of the archegonia hardly project above the general surface of the thallus. In structure and development they agree with other Hepaticae, though differ- ences of detail exist. The young sporo- gonium is protected by a thick calyptra derived from the tissue of the thallus around the archegonium. The sporo- From strasburger's Text-book of gonium consists of a large bulbous foot, Botany. the superficial cells of which grow out

Fig. 10. — Anthoceros into processes, and a long capsule, laevis. sp, Sporogonium ; which continues to grow for months by c columella. the activity of a zone of cells be-

' tween it and the foot, and may attain

the length of an inch and a half. The wall of the capsule is several layers of cells thick, and since the epidermis contains functional stomata and the underlying cells possess chlorophyll it is capable of assimilation. In the centre of the capsule is a strand of narrow elongated cells forming the columella, and between this and the wall spores mixed with elaters are formed from the dome- shaped archesporium, the origin of which has already been described (fig. 4, D). The capsule opens by splitting into two valves from the apex downwards, and the mature spores escape while others are developing in succession below. In Dendroceros, which grows as an epiphyte in the tropics, the thallus has a well-defined midrib and broad wings composed of a single layer of cells. The capsule is similar to that of Anthoceros, but has no stomata, and the elaters have spirally thickened walls. Some species of Anthoceros agree with it in these respects. Nolothylas resembles Anthoceros in its thallus, but the sporogonium is much smaller. In some species, although the columella and archesporium arise in the usual way, both give rise to mingled spores and elaters, and no sterile columella is developed.

Musci (Mosses).

Though the number of species of mosses is far greater than of liverworts, the group offers much less diversity of form. The sexual generation is always a leafy plant, which is not developed directly from the spore but is borne on a well-marked and usually filamentous protonema. The general course of the life-history and the main features of form and structure will be best under- stood by a brief account of a particular example.

Funaria hygrometrica is a moss of very common occurrence even in towns on the soil of paths, at the foot of walls and in similar places.

The small plants grow closely crowded in tufts, and consist of short leafy shoots attached to the soil by numerous fine rhizoids. The latter, in contrast to the rhizoids of liverworts, are composed of rows of elongated cells and are branched. The leaves are simple, and except for the midrib are only one layer of cells thick. The structure of the stem though simple is more complicated than in any liverwort. The superficial cells are thick-walled, and there is a central strand of narrow cells forming a water-conducting tissue. The small strand of elongated cells in the midrib of the leaf runs down into the stem, but is not usually connected with the central strand. The sexual organs are developed in groups at the apices, the antheridial group usually terminating the main axis while the archegonia are borne on a lateral branch. The brown tint of the hair-like paraphyses mixed with antheridia (fig. 15) makes the male branch con- spicuous, while the archegonia have to be carefully looked for enclosed by the surrounding leaves (fig. 16, B). The sporogonium developed from the fertilized ovum grows by means of a two- sided apical cell (fig. 16 A), and is at first of uniform thickness. After a time the upper region increases in diameter and forms

rV. »j

the capsule, while the lower portion forms the long seta and the foot which is embedded in the end of the stem. With the growth of the sporogonium the archegonial wall, which for a time kept pace with it, is broken through, the larger upperpart terminated by the neck being carried up on the capsule as the calyptra., while the basal portion remains as a tubular sheath round the lower end of the seta (cf. figs. 16, C, and fig. 11, A, B). The seta widens out at the base of the capsule into a region known as the apophysis. The peri- pheral cells of the seta are thick-walled, and it has a central strand of elongated conducting cells. In the epi- dermis of the apophysis func- tional stomata, similar to those of the higher plants, are present and, since cells containing chlorophyll are present below the superficial layers of the apophysis and capsule, the sporogonium is capable of inde- pendent assimilation. The con- struction of the capsule will be best understood from the median longitudinal section (fig. 1 1 , C) . The central region extending between the apo- physis and the operculum is composed of sterile tissue and forms the columella {c) . Im- mediately around this is the layer of cells from which the spores will be developed (s), and the layers of cells on either side of this form the walls of the spore-sac, which will contain the spores. Between the wall of the capsule, which is composed of several layers of cells, and the spore-sac is a wide intercellular space (k) bridged across by trabeculae consisting of rows of chlorophyll-containing cells. At the

junction of the operculum (d) with the rest of the capsule is a circle of cells forming the

(From Goebei's Pflanzenmorphologie, permission of W. Engelmann.)

Fig. 11. — Funaria hygrometrica- A, Leafy shoot (g) bearing a young sporogonium enclosed in the calyptra ©. Similar plant with an almost mature sporogonium ; s.seta; /, capsule ; c, calyptra. Median longitudinal section of a capsule, with the seta gradually widening into the apophysis at its base; d, operculum; p, peristome; a, annulus; c, columella; s, archesporium; h, air- space between the spore-sac and the wall of the capsule.

B

C,

Fig. 12. — Funaria hygrometrica. (After Goebel.)

with brown walls from which the filaments of chlorophyll- containing cells (6) arise; .k, young moss-plant; w, its first rhizoid.

A, Germinating spores, s, Wall

of spore; v, vacuole; w, rhizoid.

B, Part of a developed proto-

nema. h, Creeping filament

annulus (a), by help of which the operculum is detached at maturity as a small lid. Its removal does not, however, leave the mouth of the capsule wide open, for around the margin are two circles of pointed teeth forming the peristome. These are the thickened cell-walls of a definite layer of cells (p), and appear

as separate teeth owing to the breaking down of the unthickened cell-walls. The numerous spores which have been developed in the spore sac can thus only escape from the pendulous capsule through narrow slits between the teeth, and these are closed in damp air. The unicellular spores when supplied with moisture germinate (fig. 12)

and give rise to the sexual generation. A filamentous protonema is first developed, some of the branches of which are exposed to the light and contain abundant chlorophyll, while others penetrate the substratum as brown or colourless rhizoids. The moss-plants arise from single project- ing cells, and numerous plants may spring from the protonema developed from a single spore.

The majority of the mosses belong to the same great group as Funaria, the Bryales. The other two subdivisions of the Musci are each represented by a single genus. In the Andreaeales the columella does not extend to the upper end of the capsule, and the latter opens by a number of lateral slits. The Sphagnales also have a dome-shaped spore-sac continued over the columella, and, though their capsule opens by an operculum, they differ widely from other mosses in the development of the sporogonium as well as in the characters of the sexual generation. The three groups are described separately below, but some more general features of the mosses may be considered here.

On the whole mosses grow in drier situations than the liver- worts, and the arrangements they present for the conduction of water in the plant are also more complete and suggest in some cases comparisons with the higher plants. In spite of this, however, they are in great part dependent on the absorption of water through the general surface of the shoot, and the power of rapid imbibition possessed by their cell-walls, the crowded position of the small leaves on the stem, and special adaptations for the retention of water on the surface, have the same signifi- cance as in the foliose liverworts. The different appearance of exposed mosses in dry weather and after a shower illustrates this relation to the water supply. The protonema is always a well-marked stage in the life-history. Not only does a moss- plant never arise directly from the spore, but in all cases of vegetative reproduction, apart from the separation of branches by decay of older regions of the plant, a protonema is found. Usually the protonema is filamentous and ceases to be evident after the plants have developed. But in some small mosses (e.g. Ephemerum) it plays the chief part in assimilation and lives on from year to year. In Sphagnum, Andreaea and some genera of the Bryales the protonema or some of its branches have the form of fiat plates or masses of cells. The formation of the moss-plant on the protonema is always from a single cell and is similar in all mosses. The first three walls in this cell intersect one another, and define the three-sided pyramidal apical cell by means of which the shoot continues to grow. In Fissidens and a few other mosses the apical cell is two-sided. The leaves formed by the successive segments gradually attain their

normal size and structure. Each segment of the initial cell gives rise to a leaf and a portion of the stem; the branches arise from the lower portion of a segment and stand immediately below a leaf. The leaves may form three vertical rows, but usually their arrangement, owing to the direction of the segment walls at the apex, becomes more complicated. Their growth proceeds by means of a two-sided apical cell, and the midrib does not become more than one cell thick until later. In addition to the leaves the stem often bears hair-like structures of different kinds, some of which correspond to modified branches of protonema. The branched filamentous rhizoids which spring from the lower region of the stem also correspond to protonemal branches. The structure of both stem and leaf reaches a high grade of organization in some mosses. Not only are thick-walled scleren- chymatous cells developed to give rigidity to the periphery of the stem and the midrib of the leaf, but in many cases a special water-conducting tissue, consisting of elongated cells, the end walls of which are thin and oblique, forms a definite central strand in the stem. In the forms in which it is most highly developed (Polytrichaceae) this tissue, which is comparable with the xylem of higher plants, is surrounded by a zone of

tissue physiologically comparable to phloem, and in the rhizome may be limited by an endodermis. The conducting strands in the leaves show the same tissues as in the central strand of the stem, and in the Polytrichaceae and some other mosses are in continuity with it. The independent origin of this conducting system is of great interest for comparison with the vascular system of the sporophyte of the higher plants.

The sexual organs, with the exception of the antheridia of Sphagnum, are borne at the apices of the main shoot or of branches. Their general similarity to the mature antheridia and archegonia of liverworts and the main difference in their development have been referred to. The antheridia open by means of a cap cell or groups of cells with mucilaginous contents. The details of construction of the sporogonium are referred to below. In all cases (except Archidium) a columella is present, and all the cells derived from the archesporium produce spores, no elaters being formed. In a few cases the germination of the spore commences within the capsule. The development of the sporogonium proceeds in all cases (except in Sphagnum) by means of an apical cell cutting off two rows of segments. The first periclinal division in the region forming the capsule separates an inner group of cells (the endothecium) form the peripheral layer (amphithecium) . In Sphagnum, as in Anthoceros, the archesporium is derived from the amphithecium; in all other

mosses it is the outermost layer of the endothecium.

Vegetative propagation is widely spread in the mosses, and, as mentioned above, a protonema is always formed in the development of the new plant. The social growth of the plants characteristic of many mosses is a result of the formation of numerous plants on the original protonema and on developments from the rhizoids. Besides this, gemmae may be formed on the protonema, on the leaves or at the apex, and some mosses have specialized shoots for their better protection or distribution. Thus in Georgia the stalked, multicellular gemmae are borne at the ends of shoots surrounded by a rosette of larger leaves, and in Aulacomnium androgynum they are raised on an elongated leafless region of the shoot. In other cases detached leaves or shoots may give rise to new plants, and when a moss is artificially divided almost any fragment may serve for reproduction.

Even in those rare cases in which the sexual generation can be developed without the intervention of spore production from the tissues of the sporogonium, a protonema is formed from cut pieces of the seta or in some cases from intact sporogonia still attached to the plant. This phenomenon of apospory was first discovered in mosses, but is now also known in a number of ferns (see Ptekidophyta).

Sphagnales. — The single genus Sphagnum occupies a very distinct and isolated position among mosses. The numerous species, which are familiar as the bog-mosses, are so similar that minute structural characters have to be relied on in their identification. The plants occur in large patches of a pale green or reddish colour on moors, and, when filling up small lakes or pools, may attain a length of some feet. Their growth has played a large part in the formation of peat. The species are distributed in temperate and arctic climates, but in the tropics only occur at high levels. The protonema forms a flat, lobed, thalloid structure attached to the soil by rhizoids, and the plants arise from marginal cells. The main shoot bears numerous branches which appear to stand in whorls; some of them bend down and become applied to the surface of the main axis. The structure of the stem and leaves is peculiar. The former shows on cross-section a thin-walled central tissue surrounded by a zone of thick-walled cells. Outside this come one to five layers of large clear cells, which when mature are dead and empty; their walls are strengthened with a spiral thickening and perforated with round pores. They serve to absorb and conduct water by capillarity. The leaves have no midrib and similar empty cells occur regularly among the narrow chlorophyll-containing cells, which thus appear as a green network. The antheridia are globular and have long stalks. They stand by the

side of leaves of special club-shaped branches. The archegonial groups occupy the apices of short branches (fig. 13, A.). The mature sporogonium consists of a wide foot separated by a constriction from the globular capsule (B). There is no distinct seta, but the capsule is raised on a leafless outgrowth of the end of the branch called a pseudo- podium (C, qs). The capsule, the wall of which bears rudimentary , stomata, has a small operculum but no peristome. There is a short, wide columella, over which the dome-shaped spore-sac extends, and no air-space is present between the spore-sac and the wall. In the embryo a number of tiers of cells are first formed. The lower tiers

form the foot, while in the upper part the Crst divisions mark off the columella, around which the archesppriuro, derived from the amphi-thecium, extends. The sporogonium when nearly mature bursts the calyptra irregularly. The capsule opens explosively in dry weather, the operculum and spores being thrown to a distance. The spore on germination forms a short filament which soon broadens out into

the thalloid protonema. Some twelve species of Sphagnum are found in Britain.

A ndreaeales. — The species of A the single genus Andreaea (fig. 14) are small, dark-coloured mosses growing for the most part in tufts on bare rocks in alpine and arctic regions. Four species occur on alpine rocks in Britain. The spore on germination gives rise to a small mass of cells from which one or more short fila- ments grow. The filament soon broadens into a ribbon-shaped thallus, several cells thick, which is closely applied to the rock. Erect branches may arise from the protonema, and gemmae may be developed on it. The stem of the plant, which arises in the usual way, has no conducting strand and the leaves may or may not have midribs. The leaf grows by a dome-shaped instead of by the usual two-sided initial cell. The antheridia are long-stalked. The upper portion of the archegonial wall is carried up as a calyptra on the sporo- gonium, which, as in Sphagnum, has no seta and is raised on a Fig. 13. — Sphagnum acutifolium. pseudopodium. The development (After Schimper.) of the sporogonium proceeds as

. T . ,. . , in the Bryales, but the dome-

A. Longitudinal section of apex shaped a rchesporium extends

of a bud bearing archegoma over the summit of the colu- (or), enclosed by the large me lla and an air-space is wanting, leaves (y) ; ch, small pen- The capsu le does not open by an chaetial leaves, operculum but by four or six

B. Longitudinal section of the longitudinal slits, which do not sporogonium borne on the reach either the base or apex, pseudopodium (ps) ; c, calyp tra; ar, neck of archegon- ium; sg, foot; sg, capsule.

C. S. squarrosum. Ripe sporo

From GoebePs Pfianzennwrphologie.

In one exotic species the splits occur only at the upper part of the capsule, and the terminal cap breaks away. This isolated

gonium raised on the pseudo- e £ am P le ˆ us . a PPf rs to approach podium (55) above the enclos- the Bryales in its mode of de- ing leaves (ch) ; c, the rup- nls cence.

tured calyptra ; sg, capsule ; Bryales.— In contrast to the d, operculum. preceding two tms group includes

a very large number 01 genera and species. Thus even in Britain between five and six hundred species belonging to more than one hundred genera are found. They occur in the most varied situations, on soil, on rocks and trees, and, in a few instances (Fontinalis), in water. Although exhibiting a wide range in size and in the struc- tural complexity of both generations, they all conform to a general type, so that Funaria, described above, will serve as a fair example of the group. The protonema is usually filamentous, and in some of the simplest forms is long-lived, while the small plants borne on it serve mainly to protect the sexual organs and sporogonia. This is the case in Ephemerum, which grows on the damp soil of clayey fields, and the plants are even more simply constructed in Bux- baumia, which occurs on soil rich in humus and is possibly partially saprophytic. In this moss the filamentous protonema is capable of assimilation, but the leaves of the small plants are destitute of chlorophyll, so that they are dependent on the protonema. The male plant has no definite stem, and consists of a single concave leaf protecting the antheridium. The female plant is rather more highly organized, consisting of a short stem bearing a few leaves around the group of archegonia. The sporogonium is of large size and highly

organized, though it presents peculiar features in the peri- stome. Buxbaumia has been regarded by Goebel as representing a stage which other mosses have passed, and has been described by him as the simplest type of moss. In Ephemerum also we may prob- ably regard the relation of the small plants to the protonema as a primitive one. On the other hand, in the case of Ephemeropsis, which grows on the leaves of living plants in Java, the high organiza- tion of the sporogonium makes it probable that the persistent protonema is an adaptation to the peculiar conditions of life. A highly developed protonema provided with leaf-like assimilating organs is found in Georgia, Diphyscium and Oedipodium, all of which show peculiarities in the sporogonium as well. The cells of the

protonema of Schistostega, which lives in the shade of caves, are so constructed as to concentrate the feeble available light on the chloroplasts.

We may perhaps regard the persistent protonema bearing small leafy plants as a primitive condition, and look upon those larger plants which remain unbranched and bear the sexual organs at the apex (e.g. Schistostega) as representing the next stage. From this condition different lines of specialization in the form and structure of the plant can be recognized. A large number of mosses stand at about the same grade as Funaria, in that the plants are small, sparingly branched, usually radial, and do not show a very highly differentiated internal structure. In others the form of the plant becomes more complex by copious branching and the differentiation of shoots of different orders. In these cases the shoot system is often more or less dorsiventral, and the sexual organs are borne on short lateral branches (e.g. Thuidium tamariscinum) . The Polytri- chaceae, on the other hand, show a specialization in structure rather than in form. The high organization of their conducting system has been referred to above, but though many species are able to exist in relatively dry situations, the plants are still dependent on the absorption of water by the general surface. The parallel lamellae of assimilating cells which grow from the upper surface of the leaf in these and some other mosses probably serve to retain water in the neighbourhood of the assimilating cells and so prolong their activity. As common adaptive features in the leaves the occurrence of papillae or outgrowths of the cell-walls to retain water, and the white hair-like leaf tips, which assist in protecting the young parts at the apex of many xerophytic mosses, may be mentioned. The leaves of Leucobryum, which occurs in pale green tufts in shaded woods, show a parallel adaptation to that found in Sphagnum. They are several cells thick, and the small assimilating cells lie between two layers of

empty water-storage cells, the walls of which are perforated by pores.

With the possible exception of Archidium, the sporogonium is throughout the Bryales constructed on one plan. Archidium is a small moss occurring occasionally on the soil of wet fields. The protonema is not persistent, and the plants are well developed, resembling those of Pleuridium. The sporogonium has a small foot and practically no seta, and differs in the development and structure of its capsule from all other mosses. The spores are derived from the endothecium, but no distinction of a sterile columella and an archesporium is established in this, a variable number of its cells becoming spore-mother-cells, while the rest serve to nourish the spores. The layer of cells immediately around the endothecium becomes the spore-sac, and an air-space forms between this and the wall of the capsule. The very large, thin-walled spores escape on the decay of the capsule, which ruptures the archegonial wall irregularly. On account of the absence of a columella Archidium is sometimes placed in a distinct group, but since its peculiarities have possibly arisen by reduction it seems at present best retained among the Bryales. In all other Bryales there is a definite columella extending from the base to the apex of the capsule, the arche- sporium is derived from the outermost layer of cells of the endothecium, and an air space is formed between the spore-sac and the wall. In the Polytrichaceae another air space separates the spore-sac from the col- umella. There is great variety in the length of the seta, which is sometimes practically absent. The apophysis, which may be a more or less distinct region, usually bears stomata and is the main organ of assimilation. In the Splachnaceae it is expanded for this pur- pose, while in Oedipodium it constitutes most of the long pale stalk which supports the capsule. A distinct operculum is usually detached by the help of the annulus, and its removal may leave the mouth of the capsule widely open. More usually there is a peri- stome, consisting of one or two series of teeth, which serves to narrow the opening and in From Strasburge , various ways to ensure the gradual shedding book «/ Botany. of the spores in dry weather. In most

rger's Text

Fig.

. — An-

*mosses the teeth are portions of thickened , rlu – 14- cell-walls, but in the Polytrichaceae they are d ' me \ * t^phila formed of a number*

of sclerenchymatous Plant bearing opened cells. In Polytrichum a membranous epi- ca P sule – phragm stretches across the wide mouth of (&) the capsule between the tips of the short peristome teeth, and closes the opening except for the interspaces of the peristome.

In a number of forms, which were for- merly grouped together, the capsule does

not open to liberate the spores. These cleistocarpous forms are now recognized as related to various natural groups, in which the majority of the species possess an operculum. In such forms as Phascum the columella persists, and the only peculiarity is in the absence of arrangements for dehiscence. In Ephemerum

ps, Pseudopo- dium.

c, Calyptra.

spf, Foot of gonium.

sporo-

(and the closely related Nanomitrium which has a small operculum) the columella becomes absorbed during the development of the spores. Stomata are present on the wall of the small capsule. Such facts as these suggest that in many cases the cleistocarpous condition is the result of reduction rather than primitive, and that possibly the same holds for Archidium.

The former subdivision of the Bryales into Musci Cleistocarpi and Musci Stegocarpi according to the absence or presence of an operculum is thus clearly artificial. The same holds even more obviously for the grouping of the stegocarpous forms into those in which the archegonial group terminates a main axis (acrocarpi) and those in which it is borne on a more or less developed lateral branch (pleurocarpi). Modern classifications of the Bryales depend mainly on the construction of the peristome.

It remains to be considered to what extent the several natural groups of plants classed together in the Bryophyta can be placed in a phylogenetic relation to one another. Practically no help is afforded by palaeobotany, and only the comparison of existing forms can be

depended on. The indications of probable lines of evolution are clearest in the Hepaticae. The Marchantiales

Fig. 15. — Funaria hygrometrica. Longitudinal section through

the summit of a male branch. (After Sachs.) e, Leaves. [ribs. c, Paraphyses.

d, Leaves cut through the mid- b, Antheridia,

form an obviously natural evolutionary group, and the same is probably true of the Jungermanniales, although in neither case can the partial lines of progression within the main groups be said to be quite clear. Such a form as Spkaerocarpus, which has features in common with the lower Marchantiales, enables us to form an idea of the divergence of the two groups from a common ancestry. The Anthocerotales, on the other hand, stand in an isolated position, and recent researches have served to emphasize this rather than to confirm the relationship with the Jungermanniales suggested by Leitgeb. The indications of a serial progression are not so clear in the mosses, but the majority of the forms may be regarded as forming a great phylogenetic group in the evolution of which the elaboration of the moss-plant has proceeded until the protonema appears as a mere preliminary stage to the formation of the plants. Parallel with the evolu- tion of the gametophyte in form and structure, a progression can be traced in the sporogonium, although the simplest sporogonia available for study may owe much of their simplicity to reduction. The Andreaeales may perhaps be looked on as a divergent primitive branch of the same stock. On the other

hand, the Sphagnales show such considerable and important differences from the rest of the mosses, that like the Anthocero- tales among the liverworts, they may be regarded as a group, the relationship of which to the main stem is at least problematical. Between the Hepaticae, Anthocerotales, Sphagnales and Musci, there are no connecting forms known, and it must be left as an open question whether the Bryophyta are a monophyletic Oi polyphyletic group.

The question of the relationship of the Bryophyta on the one hand to the Thallophyta and on the other to the Pteridophyta lies even more in the region of speculation, on slender grounds without much hope of decisive evidence. In a general sense we may regard the Bryo- phyta as derived from an algal ancestry, with- out being able to suggest the nature of the an- cestral forms or the geo- logical period

at which they arose. Recent re- searches on those Algae such as Coleochaete which appeared to afford a close comparison in their alter- nation of generations with Riccia, have shown that the body resulting from the segmentation of the fertilized ovum is not so strictly comparable in the two cases as had been supposed. The series of increasingly complex sporogonia among Bryo- Fig. 16.— Funaria hygrometrica. phytes appears to be (After Goebel.)

most naturally explained a. Longitudinal section of the very on an hypothesis of pro- young sporogonium (/, /') enclosed gressive sterilization of in the archegonial wall (b, h). tnnmwnnnq ti

as has been advanced by tne calyptra formed from the arche- Bower. On the other gonial wall © and still bearing the hand there are not neck W- The foot of the s P oro wanting indications of SSftˆWSKA Z reduction in the Bryo- moss-plant,

phyte sporogonium which

make an alternative view of its origin at least possible. With regard to the relationship of the Bryophyta and Pteridophyta the article on the latter group should be consulted. It will be sufficient to say in conclusion that while the alternating generations in the two groups are strictly comparable, no evidence of actual relationship is yet forthcoming.

For further information consult: Campbell, Mosses and Ferns (London, 1906) ; Engler and Prantl, Die natiirlichen Pflanzen-familien, Teil i. Abt. 3 (Leipzig, .1893-1907) ; Goebel, Organography of Plants (Oxford, 1905). Full references to the literature of the subject will be found in these works. For the identification of the British species of liverworts and mosses the following recent works will be of use : Pearson, The Hepaticae of the British Isles (London, 1902) ; Dixon and Jameson, The Student's Handbook of British Mosses (London, 1896) ; Braithwaite, British Moss Flora (London, 1887-1905). (W. H. L.)

BRZOZOWSKI, THADDEUS (d. 1820), nineteenth general of the Jesuits, was appointed in succession to Gabriel Gruber on the 2nd of September 1805. In 1801 Pius VII. had given the Jesuits liberty to reconstitute themselves in north Russia (see Jesuits : History) , and in 1 8 1 2 Brzozowski secured the recognition of the Jesuit college of Polotsk as a university, though he could not obtain permission to go to Spain to agitate for the recognition

of the Spanish Jesuits. In 1814 Pius VII., In accordance with the bull SoUicitudo omnium ecclesiarum, gave to Brzozowski among others full authority to receive those who desired to enter the society. The Russian government, however, soon began to be alarmed at the growth of the Jesuits, and on the 20th of December 1815 published an edict expelling them from St Petersburg. Brzozowski, having vainly requested to be allowed to retire to Rome, died on the 5th of February 1820. He is interesting mainly from the fact that he was general of the Society at the time of its restoration throughout Europe.

BUBASTIS, the Graecized name of the Egyptian goddess Ubasti, meaning "she of [the city] Bast" (Bls-t), a city better known by its later name, P-ubasti, " place of Ubasti "; thus the goddess derived her name Ubasti from her city (Bast), and in turn the city derived its name P-ubasti from that of the goddess; the Greeks, confusing the name of the city with that of the goddess, called the latter Bubastis, and the former also Bubastis (later Bubastos). Bubastis, capital of the 19th nome of Lower Egypt, is now represented by a great mound of ruins called Tell Basta, near Zagazig, including the site of a large temple (described by Herodotus) strewn with blocks of granite. The monuments discovered there, although only those in hard stone have survived, are more important than at any other site in the Delta except Tanis and cover a wider range, commencing with Khufu (Cheops) and continuing to the thirtieth dynasty.

Ubasti was one of many feline goddesses, figured with the head of a lioness. In the great development of reverence for sacred animals which took place after the New Kingdom, the domestic cat was especially the animal of Bubastis, although it had also to serve for all the other feline goddesses, owing no doubt to the scarcity and intractability of its congeners. Her hieratic and most general form was still lioness-headed, but a popular form, especially in bronze, was a cat-headed women, often holding in her right hand a lion aegis, i.e. a broad semicircular pectoral surmounted by the head of a lioness, and on the left arm a basket. The cat cemetery on the west side of the town consisted of numbers of large brick chambers, crammed with burnt and decayed mummies, many of which had been enclosed in cat-shaped cases of wood and bronze. Herodotus describes the festival of Bubastis, which was attended by thousands from all parts of Egypt and was a very riotous affair; it has its

modern equivalent in the Mo-lem festival of the sheikh Said el Badawi at Tanta. The tablet of Canopus shows that there were two festivals of Bubastis, the great and the lesser: perhaps the lesser festival was held at Memphis, where the quarter called Ankhto contained a temple to this goddess. Her name is found on monuments from the third dynasty onwards, but a great stimulus was given to her worship by the twenty-second (Bubastite) dynasty and generally by the increased importance of Lower Egypt in later times. Her character seems to have been essentially mild and playful, in contrast to Sokhmi and other feline goddesses. The Greeks equated Ubasti with their Artemis, confusing her with the leonine Tafne, sister of Shoou (Apollo). The Egyptians themselves delighted in identifying together goddesses of the most diverse forms and attributes; but Ubasti was almost indistinguishable in form from Tafne. The name of her son Iphthimis (Nfr-tm), pronounced Eftem, may mean " All-good," and, in the absence of other information about him, suggests a reason why he was identified with Prometheus.

See K. Sethe in Pauly-Wissowa's Realencyclopadie; E. Naville, Bubastis, and Festival Hall of Osorkon II.; Herodotus ii. 67, 137-156; Grenfell and Hunt, Hibeh Papyri, i. (F. Ll. G.)

BUCARAMANGA, a city of Colombia, capital of the depart- ment of Santander, about 185 m. N.N.E. of Bogota. Pop. (estimate, 1902) 25,000. It is situated on the Lebrija river, 3248 ft. above sea-level, in a mountainous country rich in gold, silver and iron mines, and having superior coffee-pro- ducing lands in the valleys and on the lower slopes. The city is laid out with wide, straight streets, is well built, and has many public buildings of a substantial character.

BUCCANEERS, the name given to piratical adventurers of different nationalities united in their opposition to Spain, who

maintained themselves chiefly in the Caribbean Sea during the 17 th century.

The island of Santo Domingo was one of several in the West Indies which had early in the 16th century been almost depopu- lated by the oppressive colonial policy of Spain. Along its coast there were several isolated establishments presided over by Spaniards, who were deprived of a convenient market for the produce of the soil by the monopolies imposed by the mother country. Accordingly English, Dutch and French vessels were welcomed and their cargoes readily bought. The island, thinned of its former inhabitants, had become the home of immense herds of wild cattle; and it became the habit of

smugglers to provision at Santo Domingo. The natives still left were skilled in pre- serving flesh at their little establishments called boucans. The adventurers learned " boucanning " from the natives; and gradually Hispaniola became the scene of an extensive and illicit butcher trade. Spanish monopolies filled the seamen who sailed the Caribbean with a natural hate of everything Spanish. The pleasures of a roving life, enlivened by occasional skirmishes with forces organized and led by Spanish officials, gained upon them. Out of such conditions arose the buccaneer, alternately sailor and hunter, even occasionally a planter — roving, bold, unscrupulous, often savage, with an intense detestation of Spain. As the Spaniards would not recognize the right of other races to make settlements, or even to trade in the West Indies, the governments of France, England and Holland would do nothing to control their subjects who invaded the islands. They left them free to make settlements at their own risk. Each nation contributed a band of colonists, who selected the island of St Kitts or St Christopher, in the West Indies, where the settlers of both nations were simultaneously planted. The English andFrench were, however, not very friendly; and in 1629, after the retirement of several of the former to an adjoining island, the remaining colonists were surprised and partly dispersed by the arrival of a Spanish fleet of thirty-nine sail. But on the departure of the fleet the scattered bands returned, and encouragement was given to their country- men in Santo Domingo. For buccaneering had now become a most profitable employment, operations were extended, and a storehouse secure from the attacks of the Spaniards was required. The small island of Tortuga (north-west of Hispaniola) was seized for this purpose in 1630, converted into a magazine for the goods of the rivals, and made their headquarters, Santo Domingo itself still continuing their hunting ground. A purely English settlement directed by a company in London was made at Old Providence, an island in the Caribbean Sea, now belonging to Colombia. It began a little before 1630, and was suppressed by the Spaniards in 1641.

Spain was unable to take immediate action. Eight years later, however, watching their opportunity when many buccaneers were absent in the larger island, the Spaniards attacked Tortuga, and massacred every settler they could seize. But the others returned; and the buccaneers, now in open hostility to the Spanish arms, began to receive recruits from every European tradir g nation, and for three-quarters of a century became the scourge of the Spanish-American trade and dominions.

France, throughout ail this, had not been idle. She had named the governor of St Kitts " Governor-General for the French West India

Islands," and in 1641 he took possession of Tortuga, expelled all English from the island, and attempted the same with less success in Santo Domingo. England was absorbed in the Civil War, and the buccaneers had to maintain themselves as best they could, — now mainly on the sea.

In 1654 the Spaniards regained Tortuga from the French, into whose hands it again, however, fell after six years. But this state of affairs was too insecure even for these rovers, and they would speedily have succumbed had not a refuge been found for them by the fortunate conquest of Jamaica in 1655 by the navy of the English Commonwealth. These conquests were not made without the aid of the buccaneers themselves. The taking and re-taking of Tortuga by the French was always with the assist- ance of the roving community; and at the conquest of Jamaica the English navy had the same influence in its favour. The

buccaneers, in fact, constituted a mercenary navy, ready for em- ployment against the power of Spain by any other nation, on condition of sharing the plunder; and they were noted for their daring, their cruelty and their extraordinary skill in seamanship.

Their history now divides itself into three epochs. The first of these extends from the period of their rise to the capture of Panama by Morgan in 167 1, during which time they were hampered neither by government aid nor, till near its close, by government restriction. The second, from 1671 to the time of their greatest power, 1685, when the scene of their operations was no longer merely the Caribbean, but principally the whole range of the Pacific from California to Chile. The third and last period extends from that year onwards; it was a time of disunion and disintegration, when the independence and rude honour of the previous periods had degenerated into unmitigated vice and brutality.

It is chiefly during the first period that those leaders flourished whose names and doings have been associated with all that was really influential in the exploits of the buccaneers — the most prominent being Mansfield and Morgan. The floating commerce of Spain had by the middle of the 17 th century become utterly insignificant. But Spanish settlements remained; and in 1654 the first great expedition on land made by the buccaneers, though

attended by considerable difficulties, was completed by the capture and sack of New Segovia, on the mainland of America. The Gulf of Venezuela, with its towns of Maracaiboand Gibraltar, were attacked and plundered under the command of a Frenchman named L'Ollonois, who performed, it is said, the office of execu- tioner upon the whole crew of a Spanish vessel manned with ninety seamen. Such successes removed the buccaneers further and further from the pale of civilized society, fed their revenge, and inspired them with an avarice almost equal to that of the original settlers from Spain. Mansfield indeed, in 1664, conceived the idea of a permanent settlement upon a small island of the Bahamas, named New Providence, and Henry Morgan, a Welsh- man, intrepid and unscrupulous, joined him. But the untimely death of Mansfield nipped in the bud the only rational scheme of settlement which seems at any time to have animated this wild community; and Morgan, now elected commander, swept the whole Caribbean, and from his headquarters in Jamaica led triumphant expeditions to Cuba and the mainland. He was leader of the expedition wherein Porto Bello, one of the best- fortified ports in the West Indies, was surprised and plundered.

This was too much for even the adverse European powers; and in 1670 a treaty was concluded between England and Spain, proclaiming peace and friendship among the subjects of the two sovereigns in the New World, formally renouncing hostilities of every kind. Great Britain was to hold all her possessions in the New World as her own property (a remarkable concession on the part of Spain) , and consented, on behalf of her subjects, to forbear trading with any Spanish port without licence obtained.

The treaty was very ill observed in Jamaica, where the governor, Thomas Modyford (1620-1670), was in close alliance with the " privateers," which was the official title of the buc- caneers. He had already granted commissions to Morgan and others for a great attack on the Isthmus of Panama, the route by which the bullion of the South American mines was carried to Porto Bello, to be shipped to Spain. The buccaneers to the number of 2000 began by seizing Chagres, and then marched to Panama in 167 1 . After a difficult journey on foot and in canoes, they found themselves nearing the shores of the South Sea and in view of the city. On the morning of the tenth day they com- menced an engagement which ended in the rout of the defenders of the town. It was taken, and, accidentally or not, it was burnt. The sack of Panama was accompanied by great barbarities. The Spaniards had, however, removed the treasure before the city was taken. When the booty was divided, Morgan is

accused of having defrauded his followers. It is certain that the share per man was small, and that many of the buccaneers died of starvation while trying to return to Jamaica. Modyford was recalled, and in 167 2 Morgan was called home and imprisoned in the Tower. In 1674 he was allowed to come back to the island as lieutenant-

governor with Lord Vaughan. He had become so unpopular after the expedition of 167 1 that he was followed in the streets and threatened by the relations of those who had perished. During his later years he was active in suppressing the buccaneers who had now inconvenient claims on him.

From 1671 to 1685 is the time of the greatest daring, prosperity and power of. the buccaneers. The expedition against Panama had not been without its influence. Notwithstanding their many successes in the Caribbean and on la,nd, including a second plunder Of Porto Bello, their thoughts ran frequently on the great expedition across the isthmus, and they pictured the South Sea as a far wider and more lucrative field for the display of their united power.

In 1680 a body of marauders over 300 strong, well armed and provisioned, landed on the shore of Darien and struck across the country; and the cruelty and mismanagement displayed in the policy of the Spaniards towards the Indians were now revenged by the assistance which the natives eagerly rendered to the adventurers. They acted as guides during a difficult journey of nine days, kept the invaders well supplied with food, provided them with canoes, and only left them after the taking of the fort of Santa Maria, when the buccaneers were fairly embarked on a broad and safe river which emptied itself into the South Sea. With John Coxon as commander they entered the Bay of Panama, where rumour had been before them, and where the Spaniards had hastily prepared a small fleet to meet them. But the valour of the buccaneers won for them another victory; within a week they took possession of four Spanish ships, and now successes flowed upon them. The Pacific, hitherto free from their intrusion, showed many sail of merchant vessels, while on land opposition south of the Bay of Panama was of little avail, since few were acquainted with the use of fire-arms. Coxon and seventy men returned as they had gone, but the others, under Sawkins, Sharp and Watling, roamed north and south on islands and mainland, and remained for long ravaging the coast of Peru. Never short of silver and gold, but often in want of the necessaries of life, they continued their practices for a little longer; then, evading the risk of recrossing the isthmus, they boldly cleared Cape Horn, and arrived in the Indies. Again, in 1683, numbers of them under John Cook departed

for the South Sea by way of Cape Horn. On Cook's death his successor, Edward Davis, undoubtedly the greatest and most prudent commander who ever led the forces of the buccaneers at sea, met with a certain Captain Swan from England, and the two captains began a cruise which was disastrous to the Spanish trade in the Pacific.

In 1685 they were joined in the Bay of Panama by large numbers of buccaneers who had crossed the isthmus under Townley and others. This increased body of men required an enlarged measure of adventure, and this in a few months was supplied by the viceroy of Peru. That officer, seeing the trade of the colony cut off, supplies stopped, towns burned and raided, and property harassed by continual raids, resolved by vigorous means to put an end to it. But his aim was not easily accom- plished. In this same year a Spanish fleet of fourteen sail met, but did not engage, ten buccaneer vessels which were found in the Bay of Panama.

At this period the power of the buccaneers was at its height. But the combination was too extensive for its work, and the different nationality of those who composed it was a source of growing discord. Nor was the dream of equality ever realized for any length of time. The immense spoil obtained on the capture of wealthy cities was indeed divided equally. But in the gambling and debauchery which followed, nothing was more common than that one-half of the conquerors should find them- selves on the morrow in most pressing want; and while those who had retained or increased their share would willingly have gone home, the others clamoured for renewed attacks. The separation of the English and French buccaneers, who together presented a united front to the Spanish fleet in 1685, marks the, beginning of the third and last epoch in their history.

The brilliant exploits begun by the sack of Leon and Realejo

"by the English under Davis have, even in their variety and daring, a sameness which deprives them of interest, and the wonderful confederacy is now seen to be falling gradually to pieces. The skill of Davis at sea was on one occasion displayed in a seven day$' engagement with two large Spanish vessels, and the interest undoutedly centres in him. Townley and Swan had, however, by this time left him, and after cruising together for some time, they, too,

parted. In 1688 Davis cleared Cape Horn and arrived in the West Indies, while Swan's ship, the " Cygnet," was abandoned as unseaworthy, after sailing as far as Madagascar. Townley had hardly joined the French buccaneers remaining in the South Sea ere he died, and the Frenchmen with their companions crossed New Spain to the West Indies. And thus the Pacific, ravaged so long by this powerful and mysterious band of corsairs, was at length at peace.

The West Indies had by this time become hot enough even for the banded pirates. They hung doggedly along the coasts of Jamaica and Santo Domingo, but their day was nearly over. Only once again — at the siege of Carthagena — did they appear great; but even then the expedition was not of their making, and they were mere auxiliaries of the French regular forces. After the treachery of the French commander of this expedition a spirit of unity and despairing energy seemed reawakened in them; but this could not avert and scarcely delayed the rapidly approaching extinction of the community.

The French and English buccaneers could not but take sides in the war which had arisen between their respective countries in 1689. Thus was broken the bond of unity which had for three-quarters of a century kept the subjects of the two nations together in schemes of aggression upon a common foe. In the short peace of 1 697-1 700 England and France were using all their influence, both in the Old World and in the New, to in- gratiate themselves into the favour of the king of Spain. With the resumption of hostilities in 1700 and the rise of Spain consequent upon the accession of the French claimant to the throne the career of the buccaneers was effectually closed.

But the fall of the buccaneers is no more accounted for fully by these circumstances than is their rise by the massacre of the islanders of Santo Domingo. There was that in the very nature of the community which, from its birth, marked it as liable to speedy decline.

The principles which bound the buccaneers together were, first the desire for adventure and gain, and, in the second place, hatred of the Spaniard. The first was hardly a sufficient bond of union, among men of different nationalities, when booty could be had nearly always by private venture under the colours of the separate European-powers. Of greater validity was their second and great principle of union, namely, that they warred not with one another, nor with every one, but with a single and a common foe. For while the buccaneer forces included English, French and Dutch sailors, and were complemented occasionally by bands of native Indians, there

are few instances during the time of their prosperity and growth of their falling upon one another, and treating their fellows with the savagery which they exulted in displaying against the subjects of Spain. The exigencies, moreover, of their perilous career readily wasted their suddenly acquired gains.

Settled labour, the warrant of real wealth, was unacceptable to those who lived by promoting its insecurity. Regular trade — though rendered attractive by smuggling — and pearl gathering and similar operations which were spiced with risk, were open in vain to them, and in the absence of any domestic life, a hand-to- mouth system of supply and demand rooted out gradually the prudence which accompanies any mode of settled existence. In everything the policy of the buccaneers, from the beginning to the end of their career, was one of pure destruction, and was, therefore, ultimately suicidal.

Their great importance in history lies in the fact that they opened the eyes of the world, and specially of the nations from whom these buccaneers had sprung, to the whole system of Spanish-American government and commerce — the former in its rottenness, and the latter in its possibilities in other hands.

From this, then, along with other causes, dating primarily from the helplessness and presumption of Spain, there arose the West Indian possessions of Holland, England and France.

A work published at Amsterdam in 1678, entitled De Americaensche Zee Roovers, from the pen of a buccaneer named Exquemelin, was translated into several European languages, receiving additions at the hands of the different translators. The French translation by Fron- tignieres is named Histoire des avanturiers qui se sont signalez dans les Indes; the English edition is entitled The Bucaniers of America. Other works are Raynal's History of the Settlements and Trade of the Europeans in the East and West Indies, book x., English translation 1782; Dampier's Voyages; Geo. W. Thornbury's Monarchs of the Main, &c. (1855) ' Lionel Wafer's Voyage and Description of the Isthmus of America (1699) ; and the Histoire de Visle Espagnole, &c, and Histoire et description generate de la Nouvelle France of Pere Charlevoix. The statements in these works are to be received with caution. A really authentic narrative, however, is Captain James Burney's History of the Buccaneers of America (London, 1816). The Calendar of State Papers, Colonial Series (London, i860 et seq.), contains much evidence for the history of the buccaneers in the West Indies. (D. H.)

BUCCARI (Serbo-Croatian Bakar), a royal free town of Croatia-Slavonia, Hungary; situated in the county of Modrus- Fiume, 7 m. S.E. of Fiume, on a small bay of the Adriatic Sea. Pop. (1900) 1870. The Hungarian state railway from Zakany and Agram terminates 25 m. from Buccari. The harbour, though sometimes dangerous to approach, affords good anchorage to small vessels. Owing to competition from Fiume, Buccari lost the greater part of its trade during the 19th century. The staple industry is boatbuilding, and there is an active coasting trade in fish, wine, wood and coal. The tunny-fishery is of some importance. In the neighbourhood of the town is the old castle of Buccarica, and farther south the flourishing little port of Porto Re or Kraljevica.

BUCCINA (more correctly BUcina, Gr. fHvnavr], connected with bucca, cheek, and Gr. /3i>f w) , a brass wind instrument extensively used in the ancient Roman army. The Roman instrument consisted of a brass tube measuring some n to 12 ft. in length, of narrow cylindrical bore, and played by means of a cup-shaped mouthpiece. The tube is bent round upon itself from the mouthpiece to the bell in the shape of a broad C and is strength- ened by means of a bar across the curve, which the performer grasps while playing, in order to steady the instrument; the bell curves over his head or shoulder as in the modern helicon. Three Roman buccinas were found among the ruins of Pompeii and are now deposited in the museum at Naples. V. C. Mahillon, of Brussels l has made a facsimile of one of these instruments; it is in G and has almost the same harmonic series

From a photo by Brogi.

; Fig. 1. — Buccina in the National Museum, Naples.

the French horn and the

trumpet. The buccina, the cornu (see Horn), and the tuba were used as signal instruments in the Roman army and camp to sound the four night watches (hence known as buccina prima, secunda, &c), to summon them by means of the special signal known as classicum, and to give orders. 2 Frontinus relates 3 that a Roman general, who had been surrounded by the enemy, escaped during the night by means of the stratagem of leaving behind him a buccinator (trumpeter), who sounded

1 See Catalogue descriplif (Ghent, 1880), p. 330, and illustration, vol. ii. (1896), p. 30.

2 Livy vii. 35, xxvi. 15; Prop. v. 4, 63 _; Tac. Ann. xv. 30; Vegetius, De re militari, ii. 22, iii. 5; Polyb. vi. 365, xiv. 3, 7.

3 Stratagematicon, i. 5, § 17.

the watches throughout the night. 1 Vegetius gives brief descrip- tions of the three instruments, which suffice to establish their identity; the tuba, he says, is straight; the buccina is of bronze bent in the form of a circle. 2

The buccina, in respect of its technical construction and acoustic properties, was the ancestor of both trumpet and trombone; the connexion is further established by the deriva- tion of the words Sackbut and Posaune (the German for trombone) from buccina. The relation was fully recognized in Germany

during the 15th and 16th centuries, as two trans- lations of Vegetius, pub- lished at Ulm in 1470, and at Augsburg in 1534, clearly demonstrate: " Bucinadas ist die trumet oder pusan" 3 (" thebucina is the trumpet or trom- bone "), and " Bucina ist die trummet die wirt ausz und eingezogen" 4 ("the bucina is the trumpet which is drawn out and in ")• A Fig. 2.— Busine, 14th century. French translation by Jean (From MS. R. 10 E. IV. Brit. Mus.) de Meung (PariSj I4 g 8))6

renders the passage (chap. iii. 5) thus: " Trompe est longue et droite; buisine est courte et rerlechist en li meisme si comme partie de cercle." On Trajan's column 6 the tuba, the cornu and the buccina are distinguishable. Other illustra- tions of the buccina may be seen in Francois Mazois' Les Ruines de Pompii (Paris, 1824-1838), pt. iv, pi. xlviii. fig. 1, and in J. N. von Wilmowsky's Eine romische Villa zu Nennig (Bonn, 1865), pi. xii. (mosaics), where the buccinator is accom- panied on the hydraulus. The military buccina described is a much more advanced instrument than its prototype the buccina marina, a primitive trumpet in the shape of a conical shell, often having a spiral twist, which in poetry is often called concha. The buccina marina is frequently depicted in the hands of Tritons (Macrobius i. 8), or of sailors, as for instance on terra-cotta lamp shown by G. P. Bellori (Lucernae veterum

sepulcrales iconicae, 1702, iii. 12). The highly im- aginative writer of the apocryphal letter of St Jerome to Dardanus also has a word to

say con- cerning the buccina among the Semitic races: " Bucca vocatur tuba apud Hebreos : deinde per diminutionem buccina dicitur." After the fall of the Roman empire the art of bending metal tubes was gradually lost, and although the buccina survived in Europe both in name and in principle of construction during the

Fig. 3. — Busine, 14th century. (From MS. R. 10 E. IV. Brit. Mus.)

middle ages, it lost for ever the characteristic curve like a " C " which it possessed in common with the cornu, an in- strument having a conical bore of wider calibre. Although we regard the buccina as essentially Roman, an instrument

1 For another instance see Caesar, Comm. Bell. Civ. ii. 35.

2 Vegetius, op. cit. iii. 5.

3 Idem, ii. 7. « Idem, iii. 5.

6 A reprint edited by Ulysse Robert has been published by the Soc. des Anciens Textes Francak (Paris, 1897).

6 See Conrad Cichorius, Die Reliefs der Traiansdule, 3 vols, of text and 2 portfolios of heliogravures (Berlin, 1896, &c), Bd. i. pi. x. buccina and tubae; pi. viii. buccina; pi. lxxvi. buccina and two cornua; pi. xx. cornu, &c. ; or W. Froehner, La Colonne de Trajan (Paris, 1872), vol. i. pi. xxxii., xxxvi., Ii., tome ii. pi. lxvi., tome iii. pi. cxxxiv., &c.

of the same type, but probably straight and of kindred name, was widely known and used in the East, in Persia, Arabia and among the Semitic races. After a lapse of years during which records are almost wanting, the buccina reappeared all over Europe as the busine, buisine, pusin, busaun, pusun, posaun, busna (Slav), &c. ; whether it was a Roman survival or a re-introduction through the Moors of Spain in the West and the Byzantine empire in the East, we have no records to show. An 11th-century mural painting representing the Last Judgment in the cathedral of S. Angelo in Formis (near Capua), shows the angels blowing the last trump on busines. 7

There are two distinct forms of the busine which may be traced during the middle ages: — (1) a long straight tube (fig. 2) con- sisting of 3 to 5 joints of narrow cylindrical bore, the last joint alone being conical and ending in a pommel-shaped bell, precisely as in the curved buccina (fig. 1); (2) a long straight cylindrical tube of somewhat wider bore than the busine, ending in a wide bell curving

out abruptly from the cylindrical tube (fig. 3).

The history of the development of the trumpet, the sackbut and the trombone from the buccina will be found more fully treated under those headings; for the part played by the buccina in the evolution of the French horn see Horn. (K. S.)

BUCCLEUCH, DUKES OF. The substantial origin of the ducal house of the Scotts of Buccleuch- dates back to the large grants of lands in Scotland to Sir Walter Scott of Kirkurd and Buccleuch, a border chiefj by James II., in consequence of the fall of the 8th earl of Douglas (1452); but the family traced their descent back to a Sir Richard le Scott (1 240-1 285). The estate of Buccleuch is in Selkirkshire. Sir Walter Scott of Branxholm and Buccleuch (d. 1552) distinguished himself at the battle of Pinkie (1547), and furnished material for his later namesake's famous poem; The Lay of the Last Minstrel; and his great-grandson Sir Walter (1565-1611) was created Lord Scott of Buccleuch in 1606. An earldom followed in 1619. The second earl's daughter Anne (1651-1732), who succeeded him as a countess in her own right, married in 1663 the famous duke of Monmouth (q.v.), who was then created ist duke of Buccleuch; and her grandson Francis became 2nd duke. The latter's son Henry (1746-1812) became 3rd duke, and in 1810 succeeded also, on the death of William Douglas, 4th duke of Queensberry, to that dukedom as well as its estates and other honours, accord- ing to the entail executed by his own great-grandfather, the 2nd duke of Queensberry, in 1706; he married the duke of Montagu's daughter, and was famous for his generosity and benefactions. His son Charles William Henry (d. 1819), grandson Walter Francis Scott (1806-1884), and great-grandson William Henry Walter Montagu Douglas Scott (b. 1831), succeeded in turn as 4th, 5th and 6th dukes of Buccleuch and 6th, 7th, and 8th dukes of Queensberry. The 5th duke was lord privy seal 1842- 1846, and president of the council 1846. It was he who at a cost of over £500,000 made the harbour at Granton, near Edin- burgh. He was president of the Highland and Agricultural Society, the Society of Antiquaries and of the British Association. The 6th duke sat in the House of Commons as Conservative M.P. for Midlothian, 1853-1868 and 1874-1880; his wife, a daughter of the ist duke of Abercorn, held the office of mistress of the robes.

See Sir W. Fraser, The Scotts of Buccleuch (1878).

BUCENTAUR (Ital. bucintoro), the state gallery of the doges of Venice, on which, every year on Ascension day up to 1789, they put into the Adriatic in order to perform the ceremony of " wedding the

sea." The name bucintoro is derived from the Ital. buzino d' oro, " golden bark," latinized in the middle ages as bucentaurus on the analogy of a supposed Gr. fiovKtVTavpos, ox-centaur (from fiovs and Kkvravpos). This led to the explanation of the name as derived from the head of an ox having served as the galley's figurehead. This derivation is, however, fanciful; the name bucentaurus is unknown in ancient mythology, and the figurehead of the bucentaurs, of which representations have come down to us, is the lion of St Mark.

7 See F. X. Kraus, ' ' Die Wandgemalde von San Angelo in Formis," in Jahrbuch der kgl. preuss. Kunstsamml. (1893), pi. i.

The name bucentaur seems, indeed, to have been given to any great and sumptuous Venetian galley. Du Cange (Gloss., s.v. " Bucentaurus ") quotes from the chronicle of the doge Andrea Dandolo (d. 1354): cum uno artificioso et solemni Bucentauro, super quo venit usque ad S. Clementem, quo jam pervenerat principalior et solemnior Bucentaurus cum consiliariis, &c. The last and most magnificent of the bucentaurs, built in 1729, was destroyed by the French in 1798 for the sake of its golden decorations. Remains of it are preserved at Venice in the Museo Civico Correr and in the Arsenal; in the latter there is also a fine model of it.

The " Marriage of the Adriatic," or more correctly " of the sea " (Sposalizio del Mar) was a ceremony symbolizing the maritime dominion of Venice. The ceremony, established about a.d. 1000 to commemorate the doge Orseolo II. 's conquest of Dalmatia, was originally one of supplication and placation, Ascension day being chosen as that on which the doge had set out on his expedition. The form it took was a solemn procession of boats, headed by the doge's maesta nave, afterwards the Bucentaur (from 13 11) out to sea by the Lido port. A prayer was offered that " for us and all who sail thereon the sea may be calm and quiet," whereupon the doge and the others were solemnly aspersed with holy water, the rest of which was thrown mto the sea while the priests chanted " Purge me with hyssop and I shall be clean." To this ancient ceremony a sacramental character was given by Pope Alexander III. in 1177, in return for the services rendered by Venice in the struggle against the emperor Frederick I. The pope drew a ring from his finger and, giving it to the doge, bade him cast such a one into the sea each year on Ascension day, and so wed the sea. Henceforth the ceremonial, instead of*

placatory and expiatory, became nuptial. Every year the doge dropped a consecrated ring into the sea, and with the words Desponsamus te, mare (We wed thee, sea) declared Venice and the sea to be indissolubly one (see H. F. Brown, Venice, London, 1893, pp. 69, no).

BUCEPHALUS (Gr. |9ouKeaAos), the favourite Thracian horse of Alexander the Great, which died in 326 B.C., either of wounds received in the battle on the Hydaspes, or of old age. In commemoration Alexander built the city of Bucephala (Boukephala) , the site of which is almost certainly to be identified with a mound on the bank of the river opposite the modern Jhelum.

See especially Arrian v. 20; other stories in Plutarch, Alex. 6; Curtius vi. 8. For the identification of Bucephala, Vincent A. Smith, Early Hist, of India (2nd ed., 1908), pp. 65, 66 note.

BUCER (or Butzer), MARTIN (1491-1 551), German Protestant reformer, was born in 1491 at Schlettstadt in Alsace. In 1506 he entered the Dominican order, and was sent to study at Heidelberg. There he became acquainted with the works of Erasmus and Luther, and was present at a disputation of the latter with some of the Romanist doctors. He became a convert to the reformed opinions, abandoned his order by papal dispensa- tion in 1 52 1, and soon afterwards married a nun. In 1522 he was pastor at Landstuhl in the palatinate, and travelled hither and thither propagating the reformed doctrine. After his ex- communication in 1523 he made his headquarters at Strassburg, where he succeeded Matthew Zell. Henry VIII. of England asked his advice in connexion with the divorce from Catherine of Aragon. On the question of the sacrament of the Lord's Supper, Bucer's opinions were decidedly Zwinglian, but he was anxious to maintain church unity with the Lutheran party, and constantly endeavoured, especially after Zwingli's death, to formulate a statement of belief that would unite Lutheran, south German and Swiss reformers. Hence the charge of ambiguity and obscurity which has been laid against him. In 1548 he was sent for to Augsburg to sign the agreement, called the Interim, between the Catholics and Protestants. His stout opposition to this project exposed him to many difficulties, and he was glad to accept Cranmer's invitation to make his home in England. On his arrival in 1549 he was appointed regius professor of divinity at Cambridge. Edward VI. and the protector Somerset showed him much favour and he was con-

sulted as to the revision of the Book of Common Prayer. But on the

27th of February 1551 he died, and was buried in the university church, with great state. In 1557, by Mary's com- missioners, his body was dug up and burnt, and his tomb demolished; it was subsequently reconstructed by order of Elizabeth. Bucer is said to have written ninety-six treatises, among them a translation and exposition of the Psalms and a work De regno Christi. His name is familiar in English literature from the use made of his doctrines by Milton in his divorce treatises.

A collected edition of his writings has never been published. A volume known as the Tomus Anglicanus (Basel, 1577) contains those written in England. See J. W. Baum, Capito and Butzer (Strassburg, i860); A. Erichson, • Martin Butzer (1891); and the articles in the Diet. Nat. Biog. (by A. W. Ward), and in Herzog-Hauck's Real-encyklopddie (by Paul Griinberg).

BUCH, CHRISTIAN LEOPOLD VON, Baron (1774-1853), German geologist and geographer, a member of an ancient and noble Prussian family, was born at Stolpe in Pomerania on the 26th of April 1774. In 1 790-1 793 he studied at the mining school of Freiberg under Werner, one of his fellow-students there being Alexander von Humboldt. He afterwards completed his education at the universities of Halle and Gottingen. His Versuch einer mineralogischen Beschreibung von Landeck (Breslau, 1797) was translated into French (Paris, 1805), and into English as Attempt, at a Mineralogical Description of Landeck (Edinburgh, 1 8 10); he also published in 1802 Entwurf einer geognostischen Beschreibung von Schlesien (Geognostische Beobachlungen auf Reisen durch Deutschland und Italien, Band i.). He was at this time a zealous upholder of the Neptunian theory of his illustrious master. In 1797 he met Humboldt at Salzburg, and with him explored the geological formations of Styria, and the adjoining Alps. In the spring of the following year, von Buch extended his excursions into Italy, where his faith in the Neptunian theory was shaken. In his previous works he had advocated the aqueous origin of basaltic and other formations. In 1799 he paid his first visit to Vesuvius, and again in 1805 he returned to study the volcano, accompanied by Humboldt and Gay Lussac. They had the good fortune to witness a remarkable eruption, which supplied von Buch with data for refuting many erroneous ideas then entertained regarding volcanoes. In 1802 he had explored the extinct volcanoes of Auvergne. The aspect of the Puy de Dome, with its cone of trachyte and its strata of basaltic lava, induced him to abandon as untenable the doctrines of Werner on the formation of these rocks. The scientific results of his investigations he embodied in his Geognostische Beobach- lungen auf Reisen durch

Deutschland und Italien (Berlin, 1802- 1809). From the south of Europe von Buch repaired to the north, and spent two years among the Scandinavian islands, making many important observations on the geography of plants, on climatology and on geology. He showed that many of the erratic blocks on the North German plains must have come from Scandinavia. He also established the fact that the whole of Sweden is slowly but continuously rising above the level of the sea from Frederikshald to Abo. The details of these discoveries are given in his Reise durch Norwegen und Lappland (Berlin, 1810). In i8i5hevisitedtheCanaryIslandsincompany with Christian Smith, the Norwegian botanist. His observations here convinced him that these and other islands of the Atlantic owed their existence to volcanic action of the most intense kind, and that the groups of islands in the South Sea are the remains of a pre-existing continent. The physical description of the Canary Islands was published at Berlin in 1825, and this work alone is regarded as an enduring monument of his labours. After leaving the Canaries von Buch proceeded to the Hebrides and the coasts of Scotland and Ireland. Palaeontology also claimed his attention, and he described in 183 1 and later years a number of Cephalopods, Brachiopods and Cystidea, and pointed out their stratigraphical importance. In addition to the works already mentioned von Buch published in 1832 the magnificent Geological Map of Germany (42 sheets, Berlin). His geological excursions were continued without interruption till his 78th year. Eight months before his death he visited

the mountains of Auvergne; and on returning home he read a paper on the Jurassic formation before the Academy of Berlin. He died at Berlin on the 4th of March 1853. Von Buch had inherited from his father a fortune more than sufficient for his wants. He was never married, and was unembarrassed by family ties. His excursions were always taken on foot, with a staff in his hand, and the large pockets of his overcoat filled with papers and geological instruments. Under this guise, the passer-by would not easily have recognized the man whom Humboldt pronounced the greatest geologist of his time.

A complete edition of his works was published at Berlin (1867-

1885).

BUCHAN, EARLS OF. The earldom of Mar and Buchan was one of

the seven original Scottish earldoms; later, Buchan was separated from Mar, and among the early earls of Buchan were Alexander Comyn (d. 1289), John Comyn (d. c. 1313), both constables of Scotland, and Henry Beaumont (d. 1340), who had married a Comyn. John Comyn's wife, Isabel, was the countess of Buchan who crowned Robert the Bruce king at Scone in 1306, and was afterwards imprisoned at Berwick; not, however, in a cage hung on the wall of the castle. About 1382 Sir Alexander Stewart (d. c. 1404), the " wolf of Badenoch," a son of King Robert II., became earl of Buchan, and the Stewarts appear to have held the earldom for about a century and a half, although not in a direct line from Sir Alexander. 1 Among the most celebrated of the Stewart earls were the Scottish regent, Robert, duke of Albany, and his son John, who was made constable of France and was killed at the battle of Verneuil in 1424. In 1617 the earldom came to James Erskine (d. 1640), a son of John Erskine, 2nd (or 7th) earl of Mar, whose wife Mary had inherited it from her father, James Douglas (d. 1601), and from that time it has been retained by the Erskines.

Perhaps the most celebrated of the later earls of Buchan was the eccentric David Steuart Erskine, nth earl (1742-1829), a son of Henry David, 10th earl (d. 1767), and brother of Henry Erskine (q.v.), and of Thomas, Lord Erskine (q.v.). His per- tinacity was instrumental in effecting a change in the method of electing Scottish representative peers, and in 1780 he succeeded in founding the Scottish Society of Antiquaries. Among his correspondents was Horace Walpole, and he wrote an Essay on the Lives 0} Fletcher of Saltoun and the Poet Thomson (1792), and other writings. He died at his residence at Dryburgh in April 1829, leaving no legitimate children, and was followed as 12th earl by his nephew Henry David (i783-i8'S7), the ancestor of the present peer. The nth earl's natural son, Sir David Erskine (1772-1837), who inherited his father's unentailed estates, was an antiquary and a dramatist.

BUCHAN, ELSPETH (1738-1791), founder of a Scottish re- ligious sect known as the Buchanites, was the daughter of John Simpson, proprietor of an inn near Banff. Having quarrelled with her husband, Robert Buchan, a potter of Greenock, she settled with her children in Glasgow, where she was deeply impressed by a sermon preached by Hugh White, minister of the Relief church at Irvine. She persuaded White and others that she was a saint with a special mission, that in fact she was the woman, and White the man-child, described in Revelation xii. White was condemned by the presbytery, and the sect, which ultimately numbered forty-six adherents, was expelled by the magistrates in 1784 and settled in a farm, consisting of one room

and a loft, known as New Cample in Dumfriesshire. Mrs Buchan claimed prophetic inspiration and pretended to confer the Holy Ghost upon her followers by breathing upon them; they believed that the millennium was near, and that they would not die, but be translated. It appears that they had community of wives and lived on funds provided by the richer members. Robert Burns, the poet, in a letter dated August 1784, describes the sect as idle and immoral. In 1785 White and Mrs Buchan published a Divine Dictionary, but the sect broke up on the death of its founder in spite of White's attempts

1 In August 1908, during some excavations at Dunkeld, remains were found which are supposed to be those of Alexander Stewart, the "wolf of Badenoch."

to prove that she was only in a trance. Even White was eventu- ally undeceived. Andrew Innes, the last survivor, died in 1848. See J. Train, The Buchanites from First to Last (Edinburgh, 1846).

BUCHAN, PETER (1790-1854), Scottish editor, was born at Peterhead, Aberdeenshire, in 1790. In 1816 he started in business as a printer at Peterhead, and was successful enough to be able eventually to retire and devote himself to the collection and editing of Scottish ballads. His Ancient Ballads and Songs of the North of Scotland (1828) contained a large number of hitherto unpublished ballads, and newly discovered versions of existing ones. Another collection made by him was published by the Percy Society, under the title Scottish Traditional Versions of Ancient Ballads (1845). Two unpublished volumes of Buchan's ballad collections are in the British Museum. He died on the 19th of September 1854.

BUCHANAN, CLAUDIUS (.1766-1815), English divine, was born at Cambuslang, near Glasgow, and educated at the univer- sities of Glasgow and Cambridge. He was ordained in 1795, and after holding a chaplaincy in India at Barrackpur (1797- 1799) was appointed Calcutta chaplain and vice-principal of the college of Fort William. In this capacity he did much to advance Christianity and native education in India, especially by organizing systematic translations of the Scriptures. An account of his travels in the south and west of India, which added considerably to our knowledge of nature life, is given in his Christian Researches in A sia (Cambridge, 1 8 1 1) . After his return to England in 1808, he still took an active part in matters con- nected with India, and by his book entitled Colonial Ecclesiastical Establishment (London, 1813), he assisted in settling the contro- versy of 1 8 1 3, which ended in the establishment of the Indian episcopate.

BUCHANAN, GEORGE (1506-1582), Scottish humanist, was born in February 1506. His father, a younger son of an old family, was the possessor of the farm of Moss, in the parish of Killearn, Stirlingshire, but he died at an early age, leaving his widow and children in poverty. His mother, Agnes Heriot, was of the family of the Heriots of Trabroun, Haddingtonshire, of which George Heriot, founder of Heriot's hospital, was also a member. Buchanan is said to have attended Killearn school, but not much is known of his early education. In 1520 he was sent by his uncle, James Heriot, to the university of Paris, where, as he tells us in an autobiographical sketch, he devoted himself to the writing of verses " partly by liking, partly by compulsion (that being then the one task prescribed to youth)." In 1522 his uncle died, and Buchanan being thus unable to continue longer in Paris, returned to Scotland. After recovering from a severe illness, he joined the French auxiliaries who had been brought over by John Stewart, duke of Albany, and took part in an unsuccessful inroad into England (see the account in his Hist, of Scotland) . In the following year he entered the university of St Andrews, where he graduated B.A. in 1525. He had gone there chiefly for the purpose of attending the celebrated John Major's lectures on logic; and when that teacher removed to Paris, Buchanan followed him in 1526. In 1527 he graduated B.A., and in 1528 M.A. at Paris. Next year he was appointed regent, or professor, in the college of Sainte-Barbe, and taught there for upwards of three years. In 1529 he was elected Pro- curator of the " German Nation " in the university of Paris, and was re-elected four times in four successive months. He resigned his regentship in 1531, and in 1532 became tutor to Gilbert Kennedy, 3rd earl of Cassilis, with whom he returned to Scotland about the beginning of 1537.

At this period Buchanan was content to assume the same attitude towards the Church of Rome that Erasmus maintained. He did not repudiate its doctrines, but considered himself free to criticize its practice. Though he listened with interest to the arguments of the Reformers, he did not join their ranks before 1553. His first production in Scotland, when he was in Lord Cassilis's household in the west country, was the poem Somnium, a satirical attack upon the Franciscan friars and monastic life generally. This assault on the monks was not displeasing to James V., who engaged Buchanan as tutor to one of his natural

sons, Lord James Stewart (not the son who was afterwards the regent Murray), and encouraged him to a still more daring effort. In these circumstances the poems Palinodia and Fran- ciscanus &° Fratres were written, and, although they remained unpublished for many years, it is not surprising that the author became an object of bitterest hatred to the order and their friends. Nor was it yet a safe matter to assail the church. In 1539 there was a bitter persecution of the Lutherans, and Buchanan among others was arrested. He managed to effect his escape and with considerable difficulty made his way to London and thence to Paris. In Paris, however, he found his enemy, Cardinal David Beaton, who was there as an ambassador, and on the invitation of Andre de Gouvea, proceeded to Bor- deaux. Gouvea was then principal of the newly founded college of Guienne at Bordeaux, and by his exertions Buchanan was appointed professor of Latin. During his residence here several of his best works, the translations of Medea and Alcestis, and the two dramas, Jephthes {sive Votum) and Baptistes {sive Calumnia) , were completed. Montaigne was Buchanan's pupil at Bordeaux and acted in his tragedies. In the essay Of Presumption he classes Buchanan with Aurat, Beza, de L'H6pital, Montdore and Turnebus, as one of the foremost Latin poets of his time. Here also Buchanan formed a lasting friendship with Julius Caesar Scaliger; in later life he won the admiration of Joseph Scaliger, who wrote an epigram on Buchanan which contains the couplet, famous in its day: —

" Imperii fuerat Romani Scotia limes; Romani eloquii Scotia limes erit?"

In 1542 or 1543 he returned to Paris, and in 1544 was appointed regent in the college of Cardinal le Moine. Among his colleagues were the renowned Muretus and Tumebus.

In 1547 Buchanan joined the band of French and Portuguese humanists who had been invited by Andre de Gouvea to lecture in the Portuguese university of Coimbra. The French mathe- matician Elie Vinet, and the Portuguese historian, Jeronimo de Osorio, were among his colleagues; Gouvea, called by Montaigne le plus grand principal de France, was rector of the university, which had reached the summit of its prosperity under the patronage of King John III. But the rectorship had been coveted by Diogo de Gouvea, uncle of Andre and formerly head of Sainte-Barbe. It is probable that before Andre's death at the end of 1547 Diogo had urged the Inquisition to attack him and his staff; up to 1906, when the records of the trial were first published in full, Buchanan's biographers generally attri- buted the attack to the influence of Cardinal Beaton, the Fran- ciscans, or the

Jesuits, and the whole history of Buchanan's residence in Portugal was extremely obscure.

A commission of inquiry was appointed in October 1549 and reported in June 1550. Buchanan and two Portuguese, Diogo de Teive and Joao da Costa (who had succeeded to the rector- ship), were committed for trial. Teive and Costa were found guilty of various offences against public order, and the evidence shows that there was ample reason for a judicial inquiry. Buchanan was accused of Lutheran and Judaistic practices. He defended himself with conspicuous ability, courage and frankness, admitting that some of the charges were true. About June 1 551 he was sentenced to abjure his errors, and to be im- prisoned in the monastery of Sao Bento in Lisbon. Here he was compelled to listen to edifying discourses from the monks, whom he found " not unkind but ignorant." In his leisure he began to translate the Psalms into Latin verse. After seven months he was released, on condition that he remained in Lisbon; and on the 28th of February 1552 this restriction was annulled. Buchanan at once sailed for England, but soon made his way to Paris, where in 1553 he was appointed regent in the college of Boncourt. He remained in that post for two years, and then accepted the office of tutor to the son of the Marechal de Brissac. It was almost certainly during this last stay in France, where Protestantism was being repressed with great severity by Francis I., that Buchanan ranged himself on the side of the Calvinists.

In 1560 or 1561 he returned to Scotland, and in April 1562

we find him installed as tutor to the young queen Mary, who was accustomed to read Livy with him daily. Buchanan now openly joined the Protestant, or Reformed Church, and in 1566 was appointed by the earl of Murray principal of St Leonard's College, St Andrews. Two years before he had received from the queen the valuable gift of the revenues of Crossraguel Abbey. He was thus in good circumstances, and his fame was steadily increasing. So great, indeed, was his reputation for learning and administrative capacity that, though a layman, he was made moderator of the general assembly in 1567. He had sat in the assemblies from 1563.

Buchanan accompanied the regent Murray into England, and his Detectio (published in 1572) was produced to the com- missioners at Westminster. In 1570, after the assassination of Murray, he was appointed one of the preceptors of the young king, and it was through his tuition that James VI. acquired his scholarship. While discharging the functions of royal tutor he also held other important

offices. He was for a short time director of chancery, and then became lord privy seal, a post which entitled him to a seat in the parliament. He appears to have continued in this office for some years, at least till 1579. He died on the 28th of September 1582.

His last years had been occupied with two of his most im- portant works. The first was the treatise De Jure Regni apud Scotos, published in 1579. In this famous work, composed in the form of a dialogue, and evidently intended to instil sound political principles into the mind of his pupil, Buchanan lays down the doctrine that the source of all political power is the people, that the king is bound- by those conditions under which the supreme power was first committed to his hands, and that it is lawful to resist, even to punish, tyrants. The importance of the work is proved by the persistent efforts of the legislature to suppress it during the century following its publication. It was condemned by act of parliament in 1584, and again in 1664; and in 1683 it was burned by the university of Oxford. The second of his larger works is the history of Scotland, Rerum Scolicarum Historia, completed shortly before his death (1579), and published in 1 582. It is of great value for the period person- ally known to the author, which occupies the greater portion of the book. The earlier part is based, to a considerable extent, on the legendary history of Boece. Buchanan's purpose was to " purge " the national history " of sum Inglis lyis and Scottis vanite " {Letter to Randolph), but he exaggerated his freedom from partisanship and unconsciously criticized his work when he said that it would "content few and displease many."

Buchanan is one of Scotland's greatest scholars. For mastery over the Latin language he has seldom been surpassed by any modern writer. His style is not rigidly modelled upon that of any classical author, but has a certain freshness and elasticity of its own. He wrote Latin as if it had been his mother tongue. But in addition to this perfect command over the language, Buchanan had a rich vein of poetical feeling, and much originality of thought. His translations of the Psalms and of the Greek plays are more than mere versions; the smaller satirical poems abound in wit and in happy phrase; his two tragedies, Baptistes and Jephthes, have enjoyed from the first an undiminished European reputation for academic excellence. In addition to the works already named, Buchanan wrote in prose Chamaeleon, a satire in the vernacular against Maitland of Lethington, first printed in 171 1; a Latin translation of Linacre's Grammar (Paris, 1533); Libellus de Prosodia (Edinburgh, 1640); and Vita ab ipso scripta biennio ante mortem (1608), edited by R. Sibbald (1702). His other poems are Fratres Fraterrimi, Elegiae,

Silvae, two sets of verses entitled Hendecasyllabon Liber and Iambon Liber; three books of Epigrammata; a book of miscellaneous verse; De Sphaera (in five books), suggested by the poem of Joannes de Sacrobosco, and intended as a defence of the Ptolemaic theory against the new Copernican view.

There are two editions of Buchanan's works: — (a) Georgii Buchanani Scoti, Poetarum sui seculi facile principis, Opera Omnia, in two vols, fol., edited by Ruddiman (Edinburgh, Freebairn, I 7 I 5); (b) edited by Burman, 4to, 1725. The Vernacular Writings,

consisting of the Chamaeleon (u.s.),a tract on the Reformation of St Andrews University, Ane Admonitioun to the Trew Lordis, and two letters, were edited for the Scottish Text Society by P. Hume Brown. The principal biographies are : — David Irving, Memoirs of the Life and Writings of George Buchanan (Edinburgh, 1807 and 1817) ; P. Hume Brown, George Buchanan, Humanist and Reformer (Edinburgh, 1890), George Buchanan and his Times (Edinburgh, 1906); Rev. D. Macmillan, George Buchanan, a Biography (Edinburgh, 1906). Buchanan's quatercentenary was celebrated at different centres in Scotland in 1906, and was the occasion of several encomia and studies. The most important of these are: George Buchanan: Glasgow Quatercentenary Studies (Glasgow, 1 906), and George Buchanan, a Memoir, edited by D. A. Millar (St Andrews, 1907). A verse translation of the Baptistes, entitled Tyrannicall-Government Anatomized (1642), has been attributed to Milton; its authorship is discussed in the Glasgow Quatercentenary Studies. The records of Buchanan's trial, discovered by the Portuguese historian, G. J. C. Henriques, were published by him under the title George Buchanan in the Lisbon Inquisition. The Records of his Trial, with a Transla- tion thereof into English, Facsimiles of some of the Papers, and an Introduction (Lisbon, 1906).

BUCHANAN, JAMES (1791-1868), fifteenth president of the United States, was born near Foltz, Franklin county, Pennsyl- vania, on the 23rd of April 1791. Both parents were of Scottish- Irish Presbyterian descent. He graduated at Dickinson College, Carlisle, Pennsylvania, in 1809, studied law at Lancaster in 1809- 1812, and was admitted to the bar in 1812. He served in the lower house of the state legislature in 1814-1816, and as a repre- sentative in Congress from 1821 to 1831. As chairman of the judiciary committee he conducted

the impeachment trial (1830) of Judge James H. Peck, led an unsuccessful movement to increase the number of Supreme Court judges and to relieve them of their circuit duties, and succeeded in defeating an attempt to repeal the twenty-fifth section of'the Judiciary Act of 1789, which gave the Supreme Court appellate jurisdiction by writ of error to the state courts in cases where federal laws and treaties are in question. After the dissolution of the Federalist party, of which he had been a member, he supported the Jackson- Van Buren faction, and soon came to be definitely associated with the Democrats. He represented the United States at the court of St Petersburg in 1832-1833, and there negotiated an important commercial treaty. . He was a Democratic member of the United States Senate from December 1834 until March 1845, ardently supporting President Jackson, and was secretary of state in the cabinet of President Polk from 1845 to 1849 — a period marked by the annexation of Texas, the Mexican War, and negotiations with Great Britain relative to the Oregon question. After four years of retirement spent in the practice of his profession, he was appointed by President Pierce minister to Great Britain in 1853. Up to this time Buchanan's attitude on the slavery question had been that held by the conservative element among Northern Democrats. He felt that the institution was morally wrong, but held that Congress could not interfere with it in the states in which it existed, and ought not to hinder the natural tendency toward territorial expansion through a fear that the evil would spread. He voted for the bill to exclude anti-slavery literature from the mails, approved of the annexation of Texas, the war with Mexico, and the Compromise of 1850, and disapproved of the Wilmot Proviso. Fortunately for his career he was abroad during the Kansas-Nebraska debates, and hence did not share in the unpopularity which attached to Stephen A. Douglas as the author of the bill, and to President Pierce as the executive who was called upon to enforce it. At the same time, by joining with J. Y. Mason and Pierre Soule in issuing the Ostend Mani- festo in 1854, he retained the good-will of the South. 1 Accord- 1 This " manifesto," which was bitterly attacked in the North, was agreed upon (October 18, 1854) by the three ministers after several meetings at Ostend and at Aix-la-Chapelle, arranged in pursuance of instructions to therr. from President Pierce to " com- pare opinions, and to adopt measures for perfect concert of action in aid of the negotiations at Madrid " on the subject of reparations demanded from Spain by the United States for alleged injuries to American commerce with Cuba. In the manifesto the three ministers asserted that " from the peculiarity of its geographical position, and the considerations attendant upon it, Cuba is as necessary to the North American

republic as any of its present members"; spoke of the danger to the United States of an insurrection in Cuba ; asserted that " we should be recreant to our duty, be unworthy

ingly on his return from England in 1856 he was nominated by the Democrats as a compromise candidate for president, and was elected, receiving 174 electoral votes to 114 for John C. Fremont, Republican, and 8 for Millard Fillmore, American or " Know-Nothing. "

His high moral character, the breadth of his legal knowledge, and his experience as congressman, cabinet member and diplo- mat, would have made Buchanan an excellent president in ordinary times; but he lacked the soundness of judgment, the self-reliance and the moral courage needed to face a crisis. At the beginning of his administration he appointed Robert J. Walker of Mississippi, territorial governor of Kansas, and Frederick P. Stanton of Tennessee, secretary, and assured them of his determination to adhere to the popular sovereignty prin- ciple. He soon began to use his influence, however, to force the admission of Kansas into the Union under the pro-slavery Lecompton Constitution, contrary to the wishes of the majority of the settlers. Stanton was removed from office for opposing the scheme, and Walker resigned in disgust. This change of policy was doubtless the result of timidity rather than of a desire to secure re-election by gaining the favour of the Southern Demo- cracy. Under the influence of Howell Cobb of Georgia, secretary of the treasury, and Jacob Thompson of Mississippi, secretary of the interior, the president was convinced that it was the only way to avoid civil war. Federal patronage was freely used to advance the Lecompton measure and the compromise English Bill, and to prevent Douglas's election to the Senate in 1858. Some of these facts were brought out in the famous Covode Investigation conducted by a committee of the House of Re- presentatives in i860. The investigations, however, were very partisan in character, and there is reason to doubt the con- stitutional power of the House to make it, except as the basis for an impeachment trial.

The call issued by the South Carolina legislature just after the election of Lincoln for a state convention to decide upon the advisability of secession brought forward the most serious question of Buchanan's administration. The part of his annual message of the 4th of December i860 dealing with it is based upon a report prepared by Attorney-General Jeremiah S. Black of Pennsylvania. He argued that a state had no legal right to secede, but denied that the federal government had any power forcibly to prevent it. At the same time it

was the duty of the president to call out the army and navy of the United States to protect federal property or to enforce federal laws. Soon after the secession movement began the Southern members of the cabinet resigned, and the president gradually came under the influence of Black, Stanton, Dix, and other Northern leaders. He continued, however, to work for a peaceful settlement, supporting the Crittenden Compromise and the work of the Peace Congress. He disapproved of Major Anderson's removal of his troops from Fort Moultrie to Fort Sumter in December i860; but there is probably no basis for the charge made by Southern writers that the removal itself was in violation of a pledge given by the president to preserve the status quo in Charleston harbour until the arrival of the South Carolina commissioners in Washington. Equally unfounded is the assertion first made by Thurlow Weed in the London Observer (9th of February 1862) that the president was prevented from ordering Anderson back to Fort Moultrie only by the threat of four members of the cabinet to resign.

of our gallant forefathers, and commit base treason against our posterity, should we permit Cuba to be Africanized and become a second Santo Domingo, with all its attendant horrors to the white race, and suffer the flames to extend to our own neighboring shores, seriously to endanger or actually destroy the fair fabric of our Union"; and recommended that "the United States ought, if practicable, to purchase Cuba as soon as possible." To Spain, they argued, the sale of thei island would be a great advantage. The most startling declaration of the manifesto was that if Spain should refuse to sell " after we shall have offered a price for Cuba far beyond its present value," and if Cuba, in the possession of Spain, should seriously endanger " our internal peace and the existence of our cherished Union," then " by every law, human and divine, we shall be justified in wresting it from Spain if we have the power."

BUCHANAN, R. W.— BUCHAREST

*7*7*

On the expiration of his term of office(March 4, 1861) Buchanan retired to his home at Wheatland, near Lancaster, Pennsylvania, where he died on the 1st of June 1868. His mistakes as president have been so emphasized as to obscure the fact that he was a man of unimpeachable honesty, of the highest patriotism, and of considerable ability. He never married.

See George Ticknor Curtis, The Life of James Buchanan (2 vols., New York, 1883), the standard biography; Curtis, however, was a close personal and political friend, and his work is too eulogistic. More trustworthy, but at times unduly severe, is the account given by James Ford Rhodes in the first two volumes of his History of the United States since the Compromise of 1850 (New York, new edition, .1902-1907). John Bassett Moore has edited The Works of James Buchanan, comprising his Speeches, State Papers, and Private Correspondence (Philadelphia, 1908-1910).

BUCHANAN, ROBERT WILLIAMS (1841-1901), British poet, novelist and dramatist, son of Robert Buchanan (1813-1866), Owenite lecturer and journalist, was born at Caverswall, Staffordshire, on the 18th of August 1841. His father, a native of Ayr, after living for some years in Manchester, removed to Glasgow, where Buchanan was educated, at the high school and the univer- sity, one of his fellow-students being the poet David Gray. His essay on Gray, originally contributed to the Cornhill Magazine, tells the story of their close friendship, and of their journey to London in i860 in search of fame. After a period of struggle and disappointment Buchanan published Undertones in 1863. This " tentative " volume was followed by Idyls and Legends of Inverbum (1865), London Poems (1866), and North Coast and other Poems (1868), wherein he displayed a faculty for poetic narrative, and a sympathetic insight into the humbler conditions of life. On the whole, Buchanan is at his best in these narrative poems, though he essayed a more ambitious flight in The Book of Orm: A Prelude to the Epic, a study in mysticism, which appeared in 1870. He was a frequent contributor to periodical literature, and obtained notoriety by an article which, under the nom de plume of Thomas Maitland, he contributed to the Contem- porary Review for October 187 1, entitled " The Fleshly School of Poetry." This article was expanded into a pamphlet (1872), but he subsequently withdrew from the criticisms it contained, and it is chiefly remembered by the replies it evoked from D. G. Rossetti in a letter to the Athenaeum (16th December 1871), entitled " The Stealthy School of Criticism," and from Mr Swinburne in Under the Microscope (1872). Buchanan himself afterwards regretted the violence of his attack, and the " old enemy " to whom Cod and the Man is dedicated was Rossetti. In 1876 appeared The Shadow of the Sword, the first and one of the best of a long series of novels. Buchanan was also the author of many successful plays, among which may be mentioned Lady Clare, produced in 1883; Sophia (1886), an adaptation of Tom Jones; A Man's Shadow (1890); and The Chatlatan (1894). He also wrote, in collaboration

with Harriett Jay, the melodrama Alone in London. In 1896 he became, so far as some of his work was concerned, his own publisher. In the autumn of 1900 he had a paralytic seizure, from which he never recovered. He died at Streatham on the 10th of June 1901.

Buchanan's poems were collected into three volumes in 1874, into one volume in 1884; and as Complete Poetical Works (2 vols., 1901). Among his poems should also be mentioned: " The Drama of Kings" (1871); "St Abe and his Seven Wives," a lively tale of Salt Lake City, published anonymously in 1872; and "Balder the Beautiful" (1877); "The City of Dream" (1888); " The Outcast: a Rhyme for the Time " (1891); and " The Wandering Jew " (1893). His earlier novels, The Shadow of the Sword, and God and the Man (1881), a striking tale of a family feud, are distinguished by a certain breadth and simplicity of treatment which is not so noticeable in their successors, among which may be mentioned The Martyrdom of Madeline (1882); Foxglove Manor (1885); Effie Hetherington (1896); and Father Anthony (1898). David Gray and other Essays, chiefly on Poetry (1868); Master Spirits (1873); A Poet's Sketch Book (1883), in which the interesting essay on Gray is reprinted; and A Look round Literature (1887), contain Buchanan's chief contributions to periodical literature. More

valuable is The Land of Lome (2 vols., 1871), a vivid record of yachting experiences on the west coast of Scotland.

See also Harriett Jay, Robert Buchanan; some Account of his Life

(1903)-

BUCHAREST (Bucuresci), also written Bucarest, Bukarest, Bukharest, Bukorest and Bukhorest, the capital of Rumania, and chief town of the department of Ilfov. Although Bucharest is the conventional English spelling, the forms Bucarest and Bukarest more nearly represent the correct pronunciation. The population in 1900 was 282,071, including 43,274 Jews, and 53,056 aliens, mostly Austro-Hungarian subjects. With its outlying parts, Bucharest covers more than 20 sq. m. It lies in a hollow, traversed from north-west to south-east by the river Dimbovitza (Ddmbovita or Dtmbovita), and is built mainly on the left bank. A range of low hills affords shelter on the west and south-west; but on every other side there are drained, though still unhealthy, marshes, stretching away to meet the central Walachian plains. From a distance, the multitude of its gardens, and the turrets and metal-plated or gilded cupolas of its many churches

give Bucharest a certain picturesqueness. In a few of the older districts, too, where land is least valuable, there are antique one-storeyed houses, surrounded by poplars and acacias; while the gipsies and Rumans, wearing their brightly coloured native costumes, the Russian coachmen, or sleigh- drivers, of the banished Lipovan sect, and the pedlars, with their doleful street cries, render Bucharest unlike any western capital. Nevertheless, the city is modern. Until about i860, indeed, the dimly lit lanes were paved with rough stone blocks, imbedded in the clay soil, which often subsided, so as to leave the surface undulating like a sea. Drains were rare, epidemics common. Owing to the frequency of earthquakes, many houses were built of wood, and in 1847 fully a quarter of the city was laid waste by fire. The plague visited Bucharest in 17 18, 1738, 1793, when an earthquake destroyed a number of old buildings, and in 1813, when 70,000 of the inhabitants died in six weeks. From the accession of Prince Charles, in 1866, a gradual reform began. The river was enclosed between stone embankments; .sewerage and pure water were supplied, gas and electric light installed; and horse or electric tramways laid down in the principal thoroughfares, which were paved with granite or wood. The older houses are of brick, overlaid with white or tinted plaster, and ornamented with figures or foliage in terra-cotta; but owing to the great changes of temperature in Rumania, the plaster soon cracks and peels off, giving a dilapidated appearance to many streets. The chief modern buildings, such as the Athenaeum, with its Ionic facade and Byzantine dome, are principally on the quays and boulevards, and are constructed of stone.

Bucharest is often called " The Paris of the East," partly from a supposed social resemblance, partly from the number of its boulevards and avenues. Three main thoroughfares, the Plevna, Lipscani, and Vacaresci, skirt the left bank of the river; the Elizabeth Boulevard, and the Calea Victoriel, or " Avenue of Victory," which commemorates the Rumanian success at Plevna, in 1877, radiate east and north, respectively, from the Lipscani, and meet a broad road which surrounds all sides of Bucharest, except the north-west. The Lipscani was originally the street of merchants who obtained their wares from the annual fair at Leipzig; for almost ail crafts or gilds, other than the bakers and tavern-keepers, were long confined to separate quarters; and the old names have survived, as in the musicians', furriers', and money-changers' quarters. Continuous with the Calea Victoriel, on the north, is the Kisilev Park, traversed by the Chausee, a favourite drive, leading to the pretty Baneasa race-course, where spring and autumn meetings are held. The Cismegiu or

Cismigiu Park, which has a circumference of about 1 m., is laid out between the Plevna road and the Calea Victoriel; and there are botanical and zoological gardens.

The Orthodox Greek churches are generally small, with very narrow windows, and are built of brick in a modified Byzantine style. They are usually surmounted by two or three towers, but the bells are hung in a kind of wooden porch, resembling a

lych-gate, and standing about twenty paces from the church. The cathedral, or metropolitan church, where the metropolitan primate of Rumania officiates, was built between 1656 and 1665. It has the shape of a Greek cross, surrounded by a broad cloister, with four main entrances, each surmounted by a turret. The whole culminates in three brick towers. Standing on high ground, the cathedral overlooks all Bucharest, and commands a view of the Carpathians. Other interesting churches are St Spiridion the New (1768), the loftiest and most beautiful of all; the Doamna Balasa (1751), noteworthy for its rich carved work without, and frescoes within; and the ancient Biserica Bucur, said, in local traditions, to derive its name from Bucur, a shepherd whom legend makes the founder of Bucharest. The real founder and date of this church, and of many others, are unknown, thanks to the frequent obliteration of Slavonic inscriptions by the Greek clergy. The Protestants, Armenians and Lipovans worship in their own churches, and the Jews have several synagogues. Bucharest is also the seat of a Roman Catholic archbishop; but the Roman Catholics, though numbering nearly 37,000 in 1899, possess only three churches, including the cathedral of St Joseph.

Bucharest is a great educational centre. Besides the ordinary ecclesiastical seminaries, lyceums, gymnasia and elementary schools, it possesses schools of commerce, science and art institutes, and training colleges, for engineers and veterinary surgeons; while the university, founded in 1864, has faculties of theology, philosophy, literature, law, science, medicine and pharmacy. Students pay no fees except for board. The national library, containing many precious Oriental documents, and the meeting-hall of the Rumanian senate, are both included in the university buildings, which, with the Athenaeum (used for literary conferences and for music), and the central girls' school, are regarded as the best example of modern

Rumanian architecture. Other libraries are those of the Nifon seminary, of the Charles University Foundation (Funda{iunea universitara Carol), which endows research, and rewards literary or scientific merit; the central library, and the library of the Academy, which also contains a museum of natural history and antiquities. Among philanthropic institutions may be mentioned the Coltei, BrancoVan, Maternitate, Philantropia and Pantelimon hospitals; the Marcutza lunatic asylum; and the Princess Elena refuge (Asilul Elena Doamna), founded by Princess Elena Couza in 1862, to provide for 230 orphan girls. The summer home of these girls is a convent in the Transylvanian Alps. Hotels and restaurants are numerous. There are two theatres, the National and the Lyric, which is mainly patronized by foreign players; but minor places of amusement abound; as also do clubs — political, social and sporting. Socially, indeed, the progress of Bucharest is remarkable, its political, literary and scientific circles being on a level with those of most European capitals.

Bucharest is the winter residence of the royal family, the meeting-place of parliament, and the seat of an appeal court (Curtea de A pel), of the supreme court {Curtea de Casatie), of the ministries, the national bank, the bank of Rumania, many lesser credit establishments, and a chamber of commerce. The railway lines which meet on the western limit of the city give access to all parts, and the telephone system, besides being internally complete, communicates with Braila, Galatz, Jassy and Sinaia. Bucharest has a very large transit trade in petroleum, timber and agricultural produce; above all, in wheat and maize. Its industries include petroleum-refining, extraction of vegetable oils, cabinet-making, brandy-distilling, tanning, and the manu- facture of machinery, wire, nails, metal-ware, cement, soap, candles, paste, starch, paper, cardboard, pearl buttons, textiles, leather goods, ropes, glucose, army supplies, preserved meat and vegetables, and confectionery. An important fair is held for seven days in each year. The mercantile community is largely composed of Austrians, Frenchmen, Germans, Greeks and Swiss, who form exclusive colonies. Bucharest is the headquarters of the II. army corps, and a fortress of the first rank. The fortifications were constructed in 1885-1896 on a project drafted by the Belgian engineer, Genewl Brialmont, in 1883. The mean

distance of the forts from the city is 4 m., and the perimeter of the defences (which are technically of special importance as em- bodying the system of Brialmont) is about 48 m., this perimeter being defended by 36 armoured forts and batteries. There are barracks for over 30,000 cavalry and infantry, ah arsenal, a military hospital

and three military academies.

The legend of Bucur is plainly unhistorical, and the meaning of Bucharest has been much disputed. One account derives it from an Albanian word Bukur, meaning joy, in memory of a victory won by Prince Mircea of Walachia (c. 1383-1419) over the Turks. For this reason Bucharest is often called " The City of Joy." Like most ancient cities of Rumania, its foundation has also been ascribed to the first Walachian prince, the half-mythical Radu Negru (c. 1290-1314). More modern historians declare that it was originally a fortress, erected on the site of the Daco- Roman Thyanus, to command the approaches to Tirgovishtea, formerly the capital of Walachia. It soon became the summer residence of the court. In 1595 it was burned by the Turks; but, after its restoration, continued to grow in size and prosperity, until, in 1698, Prince Constantine Brancovan chose it for his capital. During the 18th century the possession of Bucharest was frequently disputed by the Turks, Austrians and Russians. In 181 2 it gave its name to the treaty by which Bessarabia and a third of Moldavia were ceded to Russia. In the war of 1828 it was occupied by the Russians, who made it over to the prince of Walachia in the following year. A rebellion against Prince Bibescu in 1848 brought both Turkish and Russian interference, and the city was again held by Russian troops in 1853-1854. On their departure an Austrian garrison took possession and remained till March 1857. In 1858 the international congress for the organization of the Danubian principalities was held in the city; and when, in 1861, the union of Walachia and Moldavia was proclaimed, Bucharest became the Rumanian capital. Prince Cuza, the first ruler of the united provinces, was driven from his throne by an insurrection in Bucharest in 1866. For the subsequent history of the city see Rumania: History.

BUCHELER, FRANZ (183 7-1 908), German classical scholar, was born in Rheinberg on the 3rd of June 1837, and edu- cated at Bonn. He held professorships successively at Freiburg (1858), Greifswald (1866), and Bonn (1870), and in 1878 became joint-editor of the Rheinisches Museum fiir Philologie. Both as a teacher and as a commentator he was extremely successful. Among his editions are: Frontini de aquis urbis Romae (Leipzig, 1858); Pervigilium Veneris (Leipzig, 1859); Petronii satirarum reliquiae (Berlin, 1862; 3rd ed., 1882); Hymnus Cereris Homericus (Leipzig, 1869); Q. Ciceronis reliquiae (1869); Herondae mimiambi (Bonn, 1892). He wrote also Grundriss der lateinischen Deklination (1866); Das RechtvonGortyn (Frankfort, 1885, with Zitelmann); and supervised the third edition (1893) of O. Jahn's Persii, Juvenalis, Sulpiciae saturae.

*BUCHER, LOTHAR (1817-1892), German publicist, was born on the 25th of October 1817 at Neu Stettin, in Pomerania, his father being master at a gymnasium. After studying at the university of Berlin he adopted the legal profession. Elected a member of the National Assembly in Berlin in 1848, he was an active leader of the extreme democratic party. With others of his colleagues he was in 1850 brought to trial for having taken part in organizing a movement for refusal to pay taxes; he was condemned to fifteen months' imprisonment in a fortress, but left the country before the sentence was executed. For ten years he lived in exile, chiefly in London; he acted as special corre- spondent of the National Zeitung, and gained a great knowledge of English life; and he published a work, Der Parliamentarisms wie er ist, a criticism of parliamentary government, which shows a marked change in his political*opinions. In i860 he returned to Germany, and became intimate with Lassalle, who made him his literary executor. In 1864 he was offered by Bismarck, and accepted, a high position in the Prussian foreign office. The reasons that led him to a step which involved so complete a break with his earlier friends and associations are not clearly known. From this time till his death he acted as Bismarck's secretary, and was the man who probably enjoyed the greatest*

amount of his confidence. It was he who drew up the text of the constitution of the North German Confederation; in 1870 he was sent on a very confidential mission to Spain in connexion with the Hohenzollern candidature for the Spanish crown; he assisted Bismarck at the final negotiations for the treaty of Frankfort, and was one of the secretaries to the congress of Berlin; he also assisted Bismarck in the composition of his memoirs. Bucher, who was a man of great ability, had considerable influence, which was especially directed against the economic doctrines of the Liberals; in 1881 he published a pamphlet criticizing the influence and principles of the Cobden Club. He identified him- self completely with Bismarck's later commercial and colonial policy, and probably had much to do with introducing it, and he did much to encourage anti-British feeling in Germany. He died at Glion, in Switzerland, on the 12th of October 1892.

See Heinrich v. Poschinger, Ein 48er: Loikar Buchers Leben und Werke (3 vols., Berlin, 1890); Busch, Bismarck: some Secret Pages of his History (London, 1898). (J. W. He.)

BUCHEZ, PHILIPPE JOSEPH BENJAMIN (1796-1865), French author and politician, was born on the 31st of March 1796 at Matagne-la-Petite, now in Belgium, then in the French depart- ment of the Ardennes. He finished his general education in Paris, and afterwards applied himself to the study of natural science and medicine. In 1821 he co-operated with Saint- Amand Bazard and others in founding a secret association, modelled on that of the Italian Carbonari, with the object of organizing a general armed rising against the government. The organization spread rapidly and widely, and displayed itself in repeated attempts at revolution. In one of these attempts, the affair at Belfort, Buchez was gravely compromised, although the jury which tried him did not find the evidence sufficient to warrant his condemnation. In 1825 he graduated in medicine, and soon after he published with Uiisse Trelat a Precis Sttmentaire d'hygiene. About the same time he became a member of the Saint-Simonian Society, presided over by Bazard, Barthelemy Prosper Enfantin, and Olinde Rodrigues, and contributed to its organ, the Producteur. He left it in consequence of aversion to the strange religious ideas developed by its " Supreme Father," Enfantin, and began to elaborate what he regarded as a Christian socialism. For the exposition and advocacy of his principles he founded a periodical called L' Europeen. In 1833 he published an Introduction a la science de I'histoire, which was received with considerable favour (2nd ed., improved and enlarged, 2 vols., 1842). Notwithstanding its prolixity, this is an interesting work. The part which treats of the aim, foundation and methods of the science of history is valuable; but what is most distinctive in Buchez's theory — the division of historical development into four great epochs originated by four universal revelations, of each epoch into three periods corresponding to desire, reasoning and performance, and of each of these periods into a theoretical and practical age — is merely ingenious (see Flint's Philosophy of History in Europe,!. 242-252). Buchez next edited, along with M. Roux-Lavergne (1802-1874), the Histoire parlementaire de la Revolution francaise (1833-1838; 40 vols.). This vast and conscientious publication is a valuable store of material for the early periods of the first French Revolution. There is a review of it by Carlyle (Miscellanies), the first two parts of whose own history of the French Revolution are mainly drawn from it. The editors worked under the inspiration of a strong admiration of the principles of Robespierre and the Jacobins, and in the belief that the French Revolution was an attempt to realize Christianity. In the Essai d'un traite complet de philosophie au point de vue du Catholicisme et du progres (1839-1840) Buchez endeavoured to co-ordinate in a single system the political, moral, religious and natural

phenomena of existence. Denying the possibility of innate ideas, he asserted that morality comes by revelation, and is therefore not only certain, but the only real certainty.

It was partly owing to the reputation which he had acquired by these publications, but still more owing to his connexion with the National newspaper, and with the secret societies hostile to the government of Louis Philippe, that he was raised, by the Revolution of 1848, to the presidency of the Constituent

Assembly. He speedily showed that he was not possessed of the qualities needed in a situation so difficult and in days so tempestuous. He retained the position only for a very short time. After the dissolution of the assembly he was not re-elected. Thrown back into private life, he resumed his studies, and added several works to those which have been already mentioned. A Traiti de, politique (published 1866), which may be considered as the completion of his Traite de philosophie, was the most im- portant of the productions of the last period of his life. His brochures are very numerous and on a great variety of subjects, medical, historical, political, philosophical, &c. He died on the 1 2th of August 1865. He found a disciple of considerable ability in M. A. Ott, who advocated and applied his principles in various writings.

See also A. Ott, " P. B. J. Buchez," in Journal des economistes for 1865.

BUCHHOLZ, a town of Germany, in the kingdom of Saxony, 1700 ft. above the sea, on the Sehma, 18 m. S. by E. of Chemnitz by rail. Pop. (1905) 9307. It has a Gothic Evangelical church and monuments of Frederick the Wise of Saxony, and Bismarck. There is a school for instruction in lace-making, an industry dating from 1 589, which still forms the chief employment of the inhabitants.

BUCHNER, FRIEDRICH KARL CHRISTIAN LUDWIG (1824- 1899), German philosopher and physician, was born at Darm- stadt. He studied at Giessen, Strassburg, Wiirzburg and Vienna. In 1852 he became lecturer in medicine at the university of Tubingen, where he published his great work Kraft und StoJ (1855). In this work, the product, according to Lange, of a fanatical enthusiasm for humanity, he sought to demonstrate the indestructibility of matter and force, and the finality of physical force. The extreme materialism of this work excited so much opposition that he was compelled to give up his post at Tubingen. He retired to Darmstadt, where he practised as a physician and contributed regularly to pathological and

physiological magazines. He continued his philosophical work in defence of materialism, and published Natur und Geist (1857), Aus Natur und Wissenschaft (vol. i., 1862; vol. ii., 1884), Fremdes und Eigenes aus dem geisligen Leben der Gegenwart (1890), Darwinismus und Socialismus (1894), Im Dienste der Wahrheit (1899). He died at Darmstadt on the 1st of May 1899. In estimating Biichner's philosophy it must be remembered that he was primarily a physiologist, not a metaphysician. Matter and force (or energy) are infinite; the conservation of force follows from the imperishability of matter, the ultimate basis of all science. Biichner is not always clear in his theory of the relation between matter and force. At one time he refuses to explain it, but generally he assumes that all natural and spiritual forces are indwelling in matter. " Just as a steam- engine," he says in Kraft und Stojf (7th ed., p. 130), " produces motion, so the intricate organic complex of force-bearing sub- stance in an animal organism produces a total sum of certain effects, which, when bound together in a unity, are called by us mind, soul, thought." Here he postulates force and mind as emanating from original matter — a materialistic monism. But in other parts of his works he suggests that mind and matter are two different aspects of that which is the basis of all things— a monism which is not necessarily materialistic, and which, in the absence of further explanation, constitutes a confession of failure. Biichner was much less concerned to establish a scien- tific metaphysic than to protest against the romantic idealism of his predecessors and the theological interpretations of the universe. Nature according to him is purely physical; it has no purpose, no will, no laws imposed by extraneous authority, no supernatural ethical sanction.

See Frauenstadt, Der Materialismus (Leipzig, 1856); Janet, The Materialism of the Present Day: A Criticism of Dr Biichner' s System, trans. Masson (London, 1867).

BUCHON, JEAN ALEXANDRE (1 791-1849), French scholar, was born on the 21st of May 1791 at Menetou-Salon (Cher), and died on the 29th of August 1849. An ardent Liberal, he took an active part in party struggles under the Restoration, while

throwing himself with equal vigour into the great work of his- torical regeneration which was going on at that period. During 1822 and the succeeding years he travelled about Europe on the search for

materials for his Collection des chroniques nationales fran- caises icrites en langue vulgaire du XIII s au XV I e Steele (47 vols., 1824-1829). After the revolution of 1830 he founded the Panthion litteraire, in which he published a Choix d'ouvrages mystiques (1843), a Choix de monuments primitifs de I'eglise chrMenne (1837), a Choix des historiens grecs (1837), a collection of Chroniques Urangeres relatives aux expeditions francaises pendant le XIII s siecle (1840), and, most important of all, a Choix de chroniques et memoires sur I'histoire de France (1836- 1841). His travels in southern Italy and in the East had put him upon the track of the medieval French settlements in those regions, and to this subject he devoted several important works: Recherches et materiaux pour servir a une histoire de la domination francaise dans les provinces dimembr&es de V empire grec (1840); Nouvelles recherches historiques sur la principauU francaise de Morie et ses hautes baronnies (2 vols., 1843-1844) ; Histoire des conqutles et de V Uablissement des Francais dans les Stats de I'ancienne Grece sous es Villehardouin (1846, unfinished). None of the numerous publications which we owe to Buchon can be described as thoroughly scholarly; but they have been of great service to history, and those concerning the East have in especial the value of original research.

BUCHU, or Buka Leaves, the produce of several shrubby plants belonging to the genus Barosma (nat. order Rutaceae), natives of the Cape of Good Hope. The principal species, B. crenulata, has leaves of a smooth leathery texture, oblong- ovate in shape, from an inch to an inch and a half in length, with serrulate or crenulate margins, on which as well as on the under side are conspicuous oil-glands. The other species which yield buchu are B. serratifolia, having linear-lanceolate sharply serrulate leaves, and B. betulina, the leaves of which are cuneate- obovate, with denticulate margins. They are all, as found in commerce, of a pale yellow-green colour; they emit a peculiar aromatic odour, and have a slightly astringent bitter taste. Buchu leaves contain a volatile oil, which is of a dark yellow colour, and deposits a form of camphor on exposure to air, a liquid hydro-carbon being the solvent of the camphor within the oil-glands. There is also present a minute quantity of a bitter principle. The leaves of a closely allied plant, Empleurum serratulum, are employed as a substitute or adulterant for buchu. As these possess no glands they are a worthless substitute. The British Pharmacopoeia contains an infusion and tincture of buchu. The former may be given in doses of an ounce and the latter in doses of a drachm. The drug has the properties common to all substances that contain a volatile oil. The infusion con- tains very little of the oil and is of very slight value.

Until the advent of the modern synthetic products buchu was valued in diseases of the urinary tract, but its use is now practically obsolete.

BUCK, CARL DARLING (1866-), American philologist, was born on the 2nd of October 1866, at Bucksport, Maine. He graduated at Yale in 1886, was a graduate student there for three years, and studied at the American School of Classical Studies in Athens (1887-1889) and in Leipzig (1880-1892). In 1892 he became professor of Sanskrit and Indo-European com- parative philology in the University of Chicago; but it is in the narrower field of the Italic dialects that his important work lies, including Der Vocalismus der oskischen Sprache (1892), The Oscan-U mbrian Verb-System (1895), and Grammar of scan and Umbrian (1904), as well as an excellent prScis of the Italic languages in Johnson's Universal Cyclopaedia. He collaborated with W. G. Hale (q.v.) in the preparation of A Latin Grammar (1903). Of his contributions to reviews on phonological topics, perhaps the most important is his discussion of " Brugmann's Law."

BUCK, DUDLEY (1839-1909), American musical composer, was born in Hartford, Connecticut, on the 10th of March 1839, the son of a merchant who gave him every opportunity for culti- vating his musical talents; and for four years (1858-1862) he

studied at Leipzig, Dresden and Paris. On returning to America he held the position of organist at Hartford, Chicago (1869), and Boston (1871). In 1875 he went to New York to assist Theodore Thomas as conductor of the orchestral concerts, and from 1877 to 1903 was organist at Holy Trinity church! Meanwhile he had become well known as a composer of church music, a number of cantatas {Columbus, 1876; Golden Legend,.! 880; Light of Asia, 1885, &c), a grand opera, Serapis, a comic opera, Deseret (1880), a symphonic overture, Marmion, a symphony in E flat, and other orchestral and vocal works. He died on the 6th of October 1909.

BUCK. (1) (From the O. Eng. buc, a he-goat, and bucca, a male deer), the male of several animals, of goats, hares and rabbits, and particularly of the fallow-deer. During the 18th century the word was used of a spirited, reckless young man of fashion, and later, with particular reference to extravagance in dress, of a dandy. (2) (From a root common to Teutonic and Romance languages, cf. the Ger. Bauch, Fr. buee, and Ital. bucata), the bleaching of clothes in lye, also the lye itself, and the clothes to be bleached, so a " buck-basket " means a basket of clothes ready for the wash. (3) Either from an obsolete word meaning " body," or from the sense of bouncing or

jumping, derived from (1), a word now only found in compound words, as " buck- board," a light four-wheeled vehicle, the primitive form of which has one or more seats on a springy board, joining the front and rear axles and serving both as springs and body; a " buck-wagon " (Dutch, bok-wagen) is a South African cart with a frame projecting over the wheels, used for the transport of heavy loads. (4) (Either from " buck " a he-goat, or from a common Teutonic root, to bend, as seen in the Ger. bilcken, and Eng. " bow "), a verb meaning "to leap"; seen especially in the compound " buck-jumper," a horse which leaps clear off the ground, with feet tucked together and arched back, descending with fore-feet rigid and head down and drawn inwards.

BUCK-BEAN, or Bog-Bean (Menyanthes trifoliata, a member of the Gentian family), a bog-plant with a creeping stem, alternately arranged large leaves each with three leaflets, and spikes of white or pink flowers. The stout stem is bitter and has tonic and febrifuge properties. The plant is widely distributed through the north temperate zone.

BUCKEBURG, a town of Germany, capital of the principality of Schaumburg-Lippe, pleasantly situated at the foot of the Harrelberg on the river Aue, 6 m. from Minden, on the main railway from Cologne to Berlin. Pop. 6000. It has a palace standing in extensive grounds, a gymnasium, a normal seminary, a library, a synagogue, and three churches, one of which has the appropriate inscription, Religionis non structurae exemplum. The first houses of Biickeburg began to gather round the castle about 1365; and it was not till the 17th century that the town was surrounded with walls, which have given place to a ring of pretty promenades. The poet J. G. von Herder was court preacher here from 1771 to 1776.

BUCKERIDGE, JOHN (c. 1562-1631), English divine, was a son of William Buckeridge, and was educated at the Merchant Taylors school and at St John's College, Oxford. He became a fellow of his college, and acted as tutor to William Laud, whose opinions were perhaps shaped by him. Leaving Oxford, Bucke- ridge held several livings, and was highly esteemed by King James I., whose chaplain he became. In 1605 he was elected president of St John's College, a position which he vacated on being made bishop of Rochester in 161 1. He was transferred to the bishopric of Ely in 1628, and died on the 23rd of May 1631. The bishop won some fame as a theologian and a controversialist. Among his intimate friends was Bishop Lancelot Andrewes, whose " Ninety-one Sermons " were published by Laud and Buckeridge in 1629.

BUCKETSHOP, a slang financial term for the office or business of an inferior class of stockbroker, who is not a member of an official exchange and conducts speculative operations for his clients, who deposit a margin or cover. The operations consist, as a rule, of a simple bet or wager between the broker and client, no pretence of an actual purchase or sale being attempted. The term is sometimes, though loosely and wrongfully, applied to

all stockbrokers who are not members of the recognized local exchange. The origin of the word is American. According to the New English Dictionary it is supposed to have arisen in Chicago. The Board of Trade there forbade dealings in " options " in grain of less than 5000 bushels. An " Open Board of Trade " or unauthorized exchange was opened, for the purpose of small gamblers, in a neighbouring street below the rooms of the Board of Trade. The lift used by members of the Board of Trade would be sent down to bring up from the open Board what was known as a " bucketful " of the smaller speculators, when business was slack.

BUCKHOLDT [properly BeukElsz, or Bockelszoon], JOHANN (c. 1 508-1 535), Dutch Anabaptist fanatic, better known as John of Leiden, from his place of birth, was the illegitimate son of Bockel, burgomaster of Soevenhagen, who afterwards married his mother. He was born about 1508, apprenticed to a tailor, became infected with the opinions of Thomas Miinzer, travelled in pursuit of his trade (being four years in London), married a widow, became bankrupt, and in September 1533 joined the Anabaptist movement under Johann Matthysz (Matthyszoon), baker of Haarlem. He had little education, but some literary faculty, and had written plays. On the 13th of January 1534 he appeared in Munster as an apostle of Matthysz. Good-looking and fluent, he fascinated women, and won the confidence of Bernard Knipperdollinck, a revolutionary cloth merchant, who gave him his daughter in marriage. The Munster Anabaptists took up arms on the 9th of February 1534 (see Anabaptists). On the death of Matthysz (1534), Buckholdt succeeded him as prophet, added his widow to the number of his wives, and organized a new constitution for Munster, with twelve elders (suggested by the tribes of Israel) and other officers of a theocracy, but soon superseded these, making himself king of the new Zion. His arbitrary rule was marked by pomp and severity. Munster was retaken (June 25, 1535) by its prince- bishop, Franz von Waldeck.

Buckholdt, after many indignities, was cruelly executed on the 22nd of January 1536; his body, and those of his companions, were hung in cages to the tower of the Lamberti church. His portrait is in Grouwelen der Hooft- ketieren (Leiden, 1607; an English edition is appended to Alexander Ross's Pansebeia, 2nd ed., 1655) ; a better example of the same is given by Arend.

See Arend, Algemeene Geschiedenis desVaderlands (1846), ii.,iii., 629; Van der Aa, Biographisch Woordenboek der Nederlanden (1853); E. Belfort Bax, Rise and Fall of the Anabaptists (1903). (A. Go.)*

BUCKIE, a fishing town and police burgh of Banffshire, Scotland, on the Moray Firth, at the mouth of Buckie burn, about 17 m. W. of Banff, with a station on the Great North of Scotland railway. Pop. (1891) 5849; (1901) 6549. Its public buildings include a hall and literary institute with library and recreation rooms. It attracts one of the largest Scottish fleets in the herring season, and is also the chief seat of line fishing in Scotland. The harbour, with an outer and an inner basin, covers an area of 9 acres and has half a mile of quayage. Besides the fisheries, there are engineering works, distilleries, and works for the making of ropes, sails and oil. The burn, which divides the town into Nether Buckie and Eastern Buckie, rises near the Hill of Clashmadin, about 5 m. to the south-west. Portgordon, 1 J m. west of Buckie, is a thriving fishing village, and Rathven, some 2 m. east, lies in a fertile district, where there are several interesting Danish cairns and other relics of the remote past.

BUCKINGHAM, EARLS, MARQUESSES AND DUKES OF. The origin of the earldom of Buckingham (to be distinguished from that of Buckinghamshire, q.v.) is obscure. According to Mr J. H. Round (in G. E. C.'s Peerage, s.v.) there is some charter evidence for its existence under William Rufus; but the main evidence for reckoning Walter Giffard, lord of Longueville in Normandy, who held forty-eight lordships in the county, as the first earl, is that of Odericus Vitalis, who twice describes Walter as " Comes Bucchingehamensis," once in 1097, and again at his death in 1102. After the death of Walter Giffard,

2nd earl in 1164, the title was assumed by Richard de Clare, earl of Pembroke (" Strongbow "), in right of his wife, Rohais, sister of Walter Giffard I.; and it died with him in 11 76. In 1377 Thomas of " Woodstock " (duke of Gloucester) was created earl of Buckingham at the coronation of Richard II. (15th of July), and the title of Gloucester having after his death been given to Thomas le Despenser,

his son Humphrey bore that of earl of Buckingham only. On Humphrey's death, his sister Anne became countess of Buckingham in her own right. She married Edmund Stafford, earl of Stafford, and on her death (1438) the title of Buckingham passed to her son Humphrey Stafford, earl of Stafford, who in 1444 was created duke of Buckingham. This title remained in the Stafford family until the attainder and execution of Edward, 3rd duke, in 1521 (see Buckingham, Henry Stafford, 2nd duke of).

In 1617 King James I. created George Villiers earl, in 1618 marquess, and in 1623 duke of Buckingham (see Buckingham, George Villiers, 1st duke of) . The marquessate and dukedom became extinct with the death of the 2nd (Villiers) duke (q.v.) in 1687; but the earldom was claimed, under the special remainder in the patent of 16 17, by a collateral line of doubtful legitimacy claiming descent from John Villiers, 1st Viscount Purbeck. The title was not actually borne after the death of John Villiers, styling himself earl of Buckingham, in 1723. The claim was extinguished by the death of George Villiers, a clergy- man, in 1774.

In 1703 John Sheffield, marquess of Normanby, was created " duke of the county of Buckingham and of Normanby " (see below). He was succeeded by his son Edmund who died in October 1735 when the titles became extinct,

The title of marquess and duke of Buckingham in the Grenville family (to the holders of which the remainder of this article applies) was derived, not from the county, but from the town of Buckingham. It originated in 1784, when the 2nd Earl Temple was created marquess of Buckingham " in the county of Bucking- ham," this title being elevated into the dukedom of Buckingham and Chandos for his son in 1822.

George Nugent Temple Grenville, 1st marquess of Buck- ingham (i753"i 8l 3)) w as the second son of George Grenville, and was born on the 17th of June 1753. Educated at Eton and Christ Church, Oxford, he was appointed a teller of the ex- chequer in 1764, and ten years later was returned to parliament as one of the members for Buckinghamshire. In the House of Commons he was a sharp critic of the American policy of Lord North. In September 1779 he succeeded his uncle as 2nd Earl Temple; in 1782 was appointed lord-lieutenant of Buckingham- shire; and in July of the same year became a member of the privy council and lord-lieutenant of Ireland in the ministry of the earl of Shelburne. On his advice the Renunciation Act of 1783 was passed, which supplemented the legislative independ-

ence granted to Ireland in 1782. By royal warrant he created the order of St Patrick in February 1783, with himself as the first grand master. Temple left Ireland in 1 7 83 , and again turned his attention to English politics. He enjoyed the confidence of George III., and having opposed Fox's East India Bill, he was authorized by the king to say that " whoever voted for the India Bill was not only not his friend, but would be considered by him as an enemy," a message which ensured the defeat of the bill. He was appointed a secretary of state when the younger Pitt formed his ministry in December 1783, but resigned two days later. In December 1784 he was created marquess of Buckingham " in the county of Buckingham." In November 1787 he was appointed lord-lieutenant of Ireland under Pitt, but his second tenure of this office was hardly as successful as the first. He was denounced by Grattan for extravagance; was censured by the Irish Houses of parliament for refusing to transmit to England in address calling upon the prince of Wales to assume the regency; and he could only maintain his position by resort- ing to bribery on a large scale. Having become very unpopular he resigned his office in September 1789, and subsequently took very little part in politics, although he spoke in favour of the union with Ireland. He died at his residence, Stowe House,

**]22*

BUCKINGHAM, ist DUKE OF

Buckingham, on the nth of February 1813, and was buried at Wotton. In 1775 he had married Mary Elizabeth (d. 181 2), daughter of Robert, Earl Nugent.

His elder son, Richard Grenville, ist duke of Buckingham and Chandos (1 776-1839), was one of the members of parliament for Buckinghamshire from 1797 to 1813, and, as Earl Temple, took an active part in politics. In February 1813 he succeeded his father as marquess of Buckingham; and having married the only child of the 3rd duke of Chandos, he was created duke of Buckingham and Chandos in 1822. He died in 1839. Owing to financial embarrassments, the duke lived out of England for some time, and in 1862 an account of his travels was published, as The Private Diary of Richard, Duke of Buckingham and Chandos.

He was succeeded by his only child, Richard Grenville, 2nd duke of Buckingham and Chandos (1797-1861). Educated at Eton and Oriel College, Oxford, he was known as Earl Temple and subsequently as marquess of Chandos. He was member of parliament for

Buckinghamshire from 1818 to 1839, and was responsible for the " Chandos clause " in the Reform Bill of 1832. He was lord privy seal from September 1841 to January 1842, and partly owing to his opposition to the repeal of the corn laws was known as the "Farmers' Friend." He found the estates heavily encumbered when he succeeded to the dukedom in 1839, and his own generous and luxurious tastes brought matters to a climax. In 1847 his residences were seized by his creditors, and the duke left England. His personal property and many of his landed estates were sold, and returning to England he devoted himself to literature. He died in London, on the 29th of July 1861. His wife, whom he married in 1819, was Mary (d. 1862), daughter of John, ist marquess of Breadal- bane, and she obtained a divorce from him in 1850. Bucking- ham's chief publications are, Memoirs of the Court and Cabinets of George III. (London, 1853-1853); Memoirs of the Court of England, 1811-1820 (London, 1856); Memoirs of the Court of George IV. (London, 1859); and Memoirs of the Court and Cabinets of William IV. and Victoria (London, 1861).

Richard Grenville, 3rd duke of Buckingham and Chandos (1823-1889), the only son of the 2nd duke, was educated at Eton and Christ Church, Oxford, and, as marquess of Chandos, represented the borough of Buckingham in parliament from 1 846 to 1 8 5 7 . He was chairman of the London & North-Western railway from 1853 to 1861. After succeeding to the dukedom he became lord president of the council, and subsequently secretary for the colonies in the Conservative government of 1866-1868. From 1875 to 1880 he was governor of Madras, and in 1886 was chosen chairman of committees in the House of Lords. He was twice married and left three daughters. As he left no son the dukedom became extinct on his death; but the Scottish barony of Kinloss (to which he established his title in 1868) passed to his eldest daughter, Mary, the wife of Captain L. F. H. C. Morgan; the earldom of Temple to his nephew, William Stephen Gore-Langton; and the viscounty of Cobham to his kinsman, Charles George, 5th Baron Lyttelton. His widow married the ist Earl Egerton of Tatton in 1894.

BUCKINGHAM, GEORGE VILLIERS, ist Duke of 1 (1592- 1628), English statesman, born in August 1592, 2 was a_ younger son of Sir George Villiers of Brooksby. His mother, Mary, daughter of Anthony Beaumont of Glenfield, Leicestershire, who was left a widow early, educated him for a courtier's life, sending him to France with Sir John Eliot; and the lad, being " by nature contemplative," took kindly to the training. He could dance well, fence well, and talk a little French, when in August 1614 he was brought before the king's

notice, in the hope that he would take a fancy to him.

The moment was favourable. Since Salisbury's death James had taken the business of government upon himself. But he

1 i.e. in the Villiers line; see above.

2 The Life, by Sir Henry Wotton, gives August 28th as the date of his birth, but, when relating his death on August 23rd, adds, " thus died the great peer in the 36th year of his age compleat and three days over." August 28th was therefore probably a misprint for August 20th.

wanted some one who would chat with him, and amuse him, and would also fill the office of private secretary, and save him from the trouble of saying no to importunate suitors. It would be an additional satisfaction if he could train the youth whom he might select in those arts of statesmanship of which he believed himself to be a perfect master. His first choice had not proved a happy one. Robert Carr, who had lately become earl of Somerset, had had his head turned by his elevation. He had grown peevish toward his master, and had placed himself at the head of the party which was working for a close alliance with Spain.

The appearance of Villiers, beaming with animal spirits and good humour, was therefore welcomed by all who had an interest in opposing the designs of Spain, and he was appointed cup- bearer the same year. For some little time still Somerset's pre-eminence was maintained. But on the 23rd of April 1615, Villiers, in spite of Somerset, was promoted to be gentleman of the bedchamber, and was knighted on the 24th; the charge of murdering Overbury, brought against Somerset in September, completed his downfall, and Villiers at once stepped into the place which he had vacated. On the 3rd of January 1616 he became master of the horse, on the 24th of April he received the order of the Garter, and on the 27th o-f August 1616 was created Viscount Villiers and Baron Waddon, receiving a grant of land valued at £80,000, while on the 5th of January 16 17 he was made earl, and on the ist of January 1618 marquess of Buckingham. With the exception of the earl of Pembroke he was the richest nobleman in England.

Those who expected him to give his support to the anti- Spanish party were at first doomed to disappointment. As yet he was no politician, and he contented himself with carrying out his, master's orders, whatever they were. In his personal re- lations he was kindly and

jovial towards all who did not thwart his wishes. But James had taught him to consider that the patronage of England was in his hands, and he took good care that no man should receive promotion of any kind who did not in one way or another pay court to him. As far as can be as- certained, he cared less for money than for the gratification of his vanity. But he had not merely himself to consider. His numerous kinsfolk were to be enriched by marriage, if in no other way, and Bacon, the great philosopher and statesman, was all but thrust from office because he had opposed a marriage suggested for one of Buckingham's brothers, while Cranfield, the first financier of the day, was kept from the treasury till he would forsake the woman whom he loved, to marry a penniless cousin of the favourite. On the 19th of January 16 19 James made him lord high admiral of England, hoping that the ardent, energetic youth would impart something of his own fire to those who were entrusted with the oversight of that fleet which had been almost ruined by the peculation and carelessness of the officials. Something of this, no doubt, was realized under Buckingham's eye. But he himself never pretended to the virtues of an administrator, and he was too ready to fill up appointments with men who flattered him, and too reluctant to dismiss them, if they served their country ill, to effect any permanent change for the better.

It was about this time that he first took an independent part in politics. All England was talking of the revolution in Bohemia in the year before, and men's sympathy with the continental Protestants was increased when it was known that James's son-in-law had accepted the crown of Bohemia, and that in the summer of 1620 a Spanish force was preparing to invade the Palatinate. Buckingham at first had thrown himself into the popular movement. Before the summer of 1620 was at end, incensed by injuries inflicted on English sailors by the Dutch in the East Indies, he had swung round, and was in close agree- ment with Gondomar, the Spanish ambassador. He had now married Lady Katherine Manners, the daughter of the earl of Rutland, who was at heart a Roman Catholic, though she out- wardly conformed to the English Church, and this alliance may have had something to do with the change.

Buckingham's mistakes were owing mainly to his levity. If he passed briskly from one camp to the other, an impartial

observer might usually detect some personal motive at the bottom. But it is hardly probable that he was himself conscious of anything of the sort. When he was in reality acting under the influence of vanity or passion it was easy for him to persuade himself that he was doing his duty to his country.

The parliament which met in 162 1, angry at discovering that no help was to be sent to the Palatinate, broke out into a loud outcry against the system of monopolies, from which Buck- ingham's brothers and dependants had drawn a profit, which was believed to be greater than it really was. At first he pleaded for a dissolution. But he was persuaded by Bishop Williams that it would be a wiser course to put himself at the head of the movement, and at a conference of the Commons with the Lords acknowledged that his two brothers had been implicated, but declared that his father had begotten a third who would aid in punishing them. In the impeachment of Bacon which soon followed, Buckingham, who owed much to his wise counsels, gave him that assistance which was possible without imperilling his own position and influence. He at first demanded the immediate dissolution of parliament, but afterwards, when the cry roee louder against the chancellor, joined in the attack, making however some attempt to mitigate the severity of the charges against him during the hearing of his case before the House of Lords. Notwithstanding, he took advantage of Bacon's need of assistance to wring from him the possession of York House.

In the winter of 1621, and the succeeding year, Buckingham was entirely in Gondomar's hands; and it was only with some difficulty that in May 1622 Laud argued him out of a resolution to declare himself a Roman Catholic. In December 162 1 he actively supported the dissolution of parliament, and there can be little doubt that when the Spanish ambassador left England the following May, he had come to an understanding with Buckingham that the prince of Wales should visit Madrid the next year, on which occasion the Spanish court hoped to effect his conversion to the Roman Catholic Church before giving him the hand of the infanta Maria. They set out on their adventurous expedition on the 17th of February 1623, arriving at Madrid, after passing through Paris on the 7th of March. Each party had been the dupe of the other. Charles and Buckingham were sanguine in hoping for the restitution of the Palatinate to James's son-in-law, as a marriage gift to Charles; while the Spaniards counted on the conversion of Charles to Roman Catholicism and other extreme concessions (see Charles I.). The political differences were soon accentuated by personal disputes between Buckingham and Olivares and the grandees, and when the two young men sailed

together from Santander in September, it was with the final resolution to break entirely with Spain.

James had gratified his favourite in his absence by raising him to a dukedom. But the splendour which now gathered round Buckingham was owing to another source than James's f avo ur. He had put himself at the head of the popular movement against Spain, and when James, acknowledging sorely against his will that the Palatinate could only be recovered by force, summoned the parliament which met in February 1624, Buck- ingham, with the help of the heir apparent, took up an independent political position. James was half driven, half persuaded to declare all negotiations with Spain at an end. For the moment Buckingham was the most popular man in England.

It was easier to overthrow one policy than to construct another. The Commons would have been content with sending some assistance to the Dutch, and with entering upon a privateering war with Spain. James, whose object was to regain the Palatinate, believed this could only be accomplished by a continental alliance, in which France took part. As soon as parliament was prorogued, negotiations were opened for a marriage between Charles and the sister of Louis XIII. , Henrietta Maria. But a difficulty arose. James and Charles had engaged to the Commons that there should be no concessions to the English Roman Catholics, and Louis would not hear of the marriage unless very large conces- sions were made. Buckingham, impatient to begin the war as soon as possible, persuaded Charles, and the two together persuaded James to throw over the promises to the Commons,

and to accept the French terms. It was no longer possible to summon parliament to vote supplies for the war till the marriage had been completed, when remonstrances to its conditions would be useless.

Buckingham, for Buckingham was now virtually the ruler of England, had thus to commence war without money. He prepared to throw 12,000 Englishmen, under a German adventurer, Count Mansf eld, through France into the Palatinate. The French insisted that he should marah through Holland. It mattered little which way he took. Without provisions, and without money to buy them, the wretched troops sickened and died in the winter frosts. Buckingham's first military enterprise ended in disastrous failure.

Buckingham had many other schemes in his teeming brain. He had offered to send aid to Christian IV., king of Denmark, who was

proposing to make war in Germany, and had also a plan for sending an English fleet to attack Genoa, the ally of Spain, and a plan for sending an English fleet to attack Spain itself.

Before these schemes could be carried into operation James died on the 27th of March 1625. The new king and Buckingham were at one in their aims and objects. Both were anxious to distinguish themselves by the chastisement of Spain, and the recovery of the Palatinate. Both were young and inexperienced. But Charles, obstinate when his mind was made up, was sluggish in action and without fertility in ideas, and he had long submitted his mind to the versatile and brilliant favourite, who was never at a loss what to do next, and who unrolled before his eyes visions of endless possibilities in the future. Buckingham was sent over to Paris to urge upon the French court the importance of converting its alliance into active co-operation. '

There was a difficulty in the way. The Huguenots of La Rochelle were in rebellion, and James had promised the aid of English ships to suppress that rebellion. Buckingham, who seems at first to have consented to the scheme, was anxious to mediate peace between the king of France and his subjects, and to save Charles from compromising himself with his parlia- ment by the appearance of English ships in an attack upon Protestants. When he returned his main demands were refused, but hopes were given him that peace would be made with the Huguenots. On his way through France he had the insolence to make love to the queen of France.

Soon after his return parliament was opened. It would have been hard for Charles to pass through the session with credit. Under Buckingham's guidance he had entered into engagements involving an enormous expenditure, and these engagements involved a war on the continent, which had never been popular in the House of Commons. The Commons, too, suspected the marriage treaty contained engagements of which they dis- approved. They asked for the full execution of the laws against the Roman Catholics, and voted but little money in return. Before they reassembled at Oxford on the ist of August, the English ships had found their way into the hands of the French, to be used against La Rochelle. The Commons met in an ill- humour. They had no confidence in Buckingham, and they asked that persons" whom they could trust should be admitted to the king's council before they would vote a penny. Charles stood by his minister, and on the 12th of August he dissolved his first parliament.

Buckingham and his master set themselves to work to conquer public

opinion. On the one hand, they threw over their engage- ments to France on behalf of the English Roman Catholics. On the other hand they sent out a large fleet to attack Cadiz, and to seize the Spanish treasure-ships. Buckingham went to the Hague to raise an immediate supply by pawning the crown jewels, to place England at the head of a great Protestant alliance, and to enter into fresh obligations to furnish money to the king of Denmark. It all ended in failure. The fleet returned from Cadiz, having effected nothing. The crown jewels produced but a small sum, and the money for the king of Denmark could only be raised by an appeal to parliament. In the meanwhile the king of France was deeply offended by the treatment of

the Roman Catholics, and by the seizure of French vessels on the ground that they were engaged in carrying goods for Spain.

When Charles's second parliament met on the 6th of February 1626, it was not long before, under Eliot's guidance, it asked for Buckingham's punishment. He was impeached before the House of Lords on a long string of charges. Many of these charges were exaggerated, and some were untrue. His real crime was his complete failure as the leader of the administration. But as long as Charles refused to listen to the complaints of his minister's incompetency, the only way in which the Commons could reach him was by bringing criminal charges against him. Charles dissolved his second parliament as he had dissolved his first. Subsequently the Star Chamber declared the duke innocent of the charges, and on the 1st of June Buckingham was elected chancellor of Cambridge University.

To find money was the great difficulty. Recourse was had to a forced loan, and men were thrown into prison for refusing to pay it. Disasters had occurred to Charles's allies in Germany. The fleet sent out under Lord Willoughby (earl of Lindsey) against the Spaniards returned home shattered by a storm, and a French war was impending in addition to the Spanish one. The French were roused to reprisals by Charles's persistence in seizing French vessels. Unwilling to leave La Rochelle open to the entrance of an English fleet, Richelieu laid siege to that stronghold of the French Huguenots. On the 27th of June 1627 Buckingham sailed from Portsmouth at the head of a numerous fleet, and a considerable land force, to relieve the besieged city.

His first enterprise was the siege of the fort of St Martin's, on the Isle of Re. The ground was hard, and the siege operations were converted into a blockade. On the 27 th of September the defenders of the fort announced their readiness to surrender the next morning. In the night a fresh gale brought over a flotilla of French provision boats, which dashed through the English blockading squadron. The fort was provisioned for two months more. Buckingham resolved to struggle on, and sent for reinforcements from England. Charles would gladly have answered to his call. But England had long since ceased to care for the war. There was no money in the exchequer, no enthusiasm in the nation to supply the want. Before the rein- forcements could arrive the French had thrown a superior force upon the island, and Buckingham was driven to retreat on the 29th of October with heavy loss, only 2989 troops out of nearly 7000 returning to England.

His spirits were as buoyant as ever. Ill luck, or the misconduct of others, was the cause of his failure. He had new plans for carrying on the war. But the parliament which met on the 17th of March 1628 was resolved to exact from the king an obligation to refrain from encroaching for the future on the liberties of his subjects.

In the parliamentary battle, which ended in the concession of the Petition of Right, Buckingham took an active share as a member of the House of Lords. He resisted as long as it was possible to resist the demand of the Commons, that the king should abandon his claim to imprison without showing cause. When the first unsatisfactory answer to the petition was made by the king on the 2nd of June, the Commons suspected, probably with truth, that it had been dictated by Buckingham. They prepared a remonstrance on the state of the nation, and Coke at last named the duke as the cause of all the misfortunes that had occurred. " The duke of Bucks is the cause of all our miseries . . . that man is the grievance of grievances." Though on the 7th of June the king granted a satisfactory answer to the petition, the Commons proceeded with their remonstrance, and on the nth demanded that he might no longer continue in office.

Once more Charles refused to surrender Buckingham, and a few days later he prorogued parliament in anger. The popular feeling was greatly excited. Lampoons circulated freely from hand to hand, and Dr Lambe. a quack doctor, who dabbled in astrology, and was believed to exercise influence over Bucking- ham, was murdered in the streets of London. Rude doggerel

lines announced that the duke should share the doctor's fate.

With the clouds gathering round him, Buckingham went down to Portsmouth to take the command of one final expedition for the relief of La Rochelle. For the first time even he was beginning to acknowledge that he had undertaken a task beyond his powers. There was a force of inertia in the officials which resisted his efforts to spur them on to an enterprise which they believed to be doomed to failure. He entered gladly into a scheme of pacification proposed by the Venetian ambassador. But before he could know whether there was to be peace or war, the knife of an assassin put an end to his career. John Felton, who had served at Re, had been disappointed of promotion, and had not been paid that which was due to him for his services, read the declaration of the Commons that Buckingham was a public enemy, and eagerly caught at the excuse for revenging his private wrongs under cover of those of his country. Waiting, on the morning of the 23rd of August, beside the door of the room in which Buckingham was breakfasting, he stabbed him to the heart as he came out.

Buckingham married Lady Katherine Manners, daughter of Francis, 6th earl of Rutland, by whom he left three sons and one daughter, of whom George, the second son (1628-1687), succeeded to the dukedom.

Bibliography. — Article in the Diet, of Nat. Biography, by S. R. Gardiner; Life of Buckingham, by Sir Henry Wotton (1642), re-printed in Harleian Miscellany, viii. 613; A Parallel between Rober' Earl of Essex and George late Duke of Buckingham, by the same writer (1641), in the Thomason Tracts, 164 (20); Characters of the same by Edward, Earl of Clarendon (1706); Life of George Villiers, Duke of Buckingham, &c. (London, 1740); Historical and Biographical Memoirs of George Villiers, "Duke of Buckingham (London, 1 8 19); Letters of the Duke and Duchess of Buckingham (Edinburgh, 1834); Historia Vitae . . . Ricardi II., &c, by Thos. Hearne (1729); Documents illustrating the Impeachment of Buckingham published by the Camden Society and edited by S. R. Gardiner (1889); Epistolae Hoelianae (James Howell), 187, 189, 203; Poems and Songs relating to George Villiers, Duke of Buckingham, ed. by R. W. Fairholt for the Percy Society (1850) ; Rous's Diary (Camden Soc, 1856), p. 27; Gent. Mag. (1845), ii. 137-144 (portrait of Buckingham dead) ; Cal. of State Papers, and MSS. in the British Museum (various collections). Hist. MSS. Comm. Series. See also P. Gibbs, The Romance of George Villiers, 1st Duke of Buckingham (1908). (S. R. G.; P. C. Y.)*

BUCKINGHAM, GEORGE VILLIERS, 2nd Duke or 1 (1628- 1687),

English statesman, son of the 1st duke, was born on the 30th of January 1628. He was brought up, together with his younger brother Francis, by King Charles I. with his own children, and was educated at Trinity College, Cambridge, where he obtained the degree of M.A. in 1642. He fought for the king in the Civil War, and took part in the attack on Lichfield Close in April 1643. Subsequently, under the care of the earl of Northumberland, the two brothers travelled abroad and lived at Florence and Rome. When the Second Civil War broke out they joined the earl of Holland in Surrey, in July 1648. Lord Francis was killed near Kingston, and Buckingham and Holland were surprised at St Neots on the 10th, the duke succeeding in escaping to Holland. In consequence of his participation in the rebellion, his lands, which had been restored to him in 1647 on account of his youth, were now again confiscated, a consider- able portion passing into the possession of Fairfax; and he refused to compound. Charles II. conferred on him the Garter on the 19th of September 1649, and admitted him to the privy, council on the 6th of April 1650. In opposition to Hyde he supported the alliance with the Scottish presbyterians, accom- panied Charles to Scotland in June, and allied himself with Argyll, dissuading Charles from joining the royalist plot of October 1650, and being suspected of betraying the plan to the convenanting leaders. In May he had been appointed general of the eastern association in England, and was commissioned to raise forces abroad; and in the following year he was chosen to lead the projected movement in Lancashire and to command the Scottish royalists. He was present with Charles at the battle of Worcester on the 3rd of September 1651, and escaped safely

1 i.e. in the Villiers line ; see above.

BUCKINGHAM, 2nd DUKE OF

72b

alone to Rotterdam in October. His subsequent negotiations with Cromwell's government, and his readiness to sacrifice the interests of the church, separated him from the rest of Charles's advisers and diminished his influence; while his estrangement from the royal family was completed by his audacious courtship of the king's sister, the widowed princess of Orange, and by a money dispute with Charles. In 1657 he returned to England, and on the 15th of September married Mary, daughter of Lord Fairfax, who had fallen in love with him although the banns of her intended marriage with the earl of Chesterfield had been twice called in church. Buckingham was soon suspected of organizing a presbyterian plot against the

government, and in spite of Fairfax's interest with Cromwell an order was issued for his arrest on the gth of October. He was confined at York House about April 1658, and having broken bounds was rearrested on the 18th of August and imprisoned in the Tower, where he remained till the 23rd of February 1659, being then liberated on his promise not to abet the enemies of the government, and on Fairfax's security of £20,000. He joined the latter in his march against Lambert in January 1660, and afterwards claimed to have gained Fairfax to the cause of the Restoration.

On the king's return Buckingham, who met him at his landing at Dover, was at first received coldly; but he was soon again in favour, was appointed a gentleman of the bedchamber, carried the orb. at the coronation on the 23rd of April 1661, and was made lord-lieutenant of the West Riding of Yorkshire on the 2 1 st of September. The same year he accompanied the princess Henrietta to Paris on her marriage with the duke of Orleans, but made love to her himself with such imprudence that he was recalled. On the 28th of April 1662 he was admitted to the privy council. His confiscated estates amounting to £26,000 a year were restored to him, and he was reputed the king's richest subject. He took part in the suppression of the projected insurrection in Yorkshire in 1663, went to sea in the first Dutch war in 1665, and was employed in taking measures to resist the Dutch or French invasion in June 1666.

He was, however, debarred from high office by Clarendon's influence. Accordingly Buckingham's intrigues were now directed to effect the chancellor's ruin. He organized parties in both houses of parliament in support of the bill of 1666 prohibiting the import of Irish cattle, partly to oppose Clarendon and partly to thwart the duke of Ormonde. Having asserted during the debates that " whoever was against the bill had either an Irish interest or an Irish understanding," he was challenged by Lord Ossory. Buckingham avoided the encounter, and Ossory was sent to the Tower. A short time afterwards, during a conference between the two houses on the 19th of December, he came to blows with the marquess of Dorchester, pulling off the latter's periwig, while Dorchester at the close of the scuffle " had much of the duke's hair in his hand." l Accord- ing to Clarendon no misdemeanour so flagrant had ever before offended the dignity of the House of Lords. The offending peers were both sent to the Tower, but were released after apologizing; and Buckingham vented his spite by raising a claim to the title of Lord Roos held by Dorchester's son-in-law. His opposition to the government had forfeited the king's favour, and he was now accused of treasonable intrigues, and of having cast the king's

horoscope. His arrest was ordered on the 25th of February 1667, and he was dismissed from all his offices. He avoided capture till the 27th of June, when he gave himself up and was imprisoned in the Tower. He was released, however, by July 17th, was restored to favour and to his appoint- ments on the 15th of September, and took an active part in the prosecution of Clarendon. On the latter's fall he became the chief minister, though holding no high office except that of master of the horse, bought from the duke of Albermarle in 1668. In 1671 he was elected chancellor of Cambridge, and in 1672 high steward of Oxford university. He favoured religious toleration, and earned the praise of Richard Baxter; he supported a scheme of comprehension in 1668, and advised the declaration of indulgence in 1672. He upheld the original jurisdiction of the 1 Clarendon, Life and Continuation, 979.

Lords in Skinner's case. With these exceptions Buckingham's tenure of office was chiefly marked by scandals and intrigues. His illicit connexion with the countess of Shrewsbury led to a duel with her husband at Barn Elms on the 16th of January 1668, in which Shrewsbury was fatally wounded. The tale that the countess, disguised as a page, witnessed the encounter, appears to have no foundation; but Buckingham, by installing the "widow of his own creation" in his own and his wife's house, outraged even the lax opinion of that day. He was thought to have originated the project of obtaining the divorce of the childless queen. He intrigued against James, against Sir William Coventry — one of the ablest statesmen of the time, whose fall he procured by provoking him to send him a challenge — and against the great duke of Ormonde, who was dismissed in 1669. He was even suspected of having instigated Thomas Blood's attempt to kidnap and murder Ormonde, and was charged with the crime in the king's presence by Ormonde's son, Lord Ossory, who threatened to shoot him dead in the event of his father's meeting with a violent end. Arlington, next to Buckingham himself the most powerful member of the cabal and a favourite of the king, was a rival less easy to overcome; and he derived considerable influence from the control of foreign affairs entrusted to him. Buckingham had from the first been an adherent of the French alliance, while Arlington concluded through Sir William Temple in 1668 the Triple Alliance. But on the complete volte-face and surrender made by Charles to France in 1670, Arlington as a Roman Catholic was entrusted with the first treaty of Dover of the 20th of May — which besides providing for the united attack on Holland, included Charles's undertaking to proclaim himself a Romanist and to reintroduce the Roman Catholic faith into England, — While

Buckingham was sent to France to carry on the sham negotiations which led to the public treaties of the 31st of December 1670 and the 2nd of February 1672. He was much pleased with his reception by Louis XIV., declared that he had " more honours done him than ever were given to any subject," and was presented with a pension of 10,000 livres a year for Lady Shrewsbury. In June 1672 he accompanied Arlington to the Hague to impose terms on the prince of Orange, and with Arlington arranged the new treaty with Louis. After all this activity he suffered a keen disappointment in being passed over for the command of the English forces in favour of Schomberg. He now knew of the secret treaty of Dover, and towards the end of 1673 his jealousy of Arlington became open hostility. He threatened to impeach him, and endeavoured with the help of Louis to stir up a faction against him in parliament. This, however, was unsuccess- ful, and in January 1674 an attack was made upon Buckingham himself simultaneously in both houses. In the Lords the trustees of the young earl of Shrewsbury complained that Buckingham continued publicly his intimacy with the countess, and that a son of theirs had been buried in Westminster Abbey with the title of earl of Coventry; and Buckingham, after presenting an apology, was required, as was the countess, to give security for £10,000 not to cohabit together again. In the Commons he was attacked as the promoter of the French alliance, of " popery " and arbitrary government. He defended himself chiefly by endeavouring to throw the blame upon Arlington; but an address was voted petitioning the king to remove him from his councils, presence and from employment for ever. Charles, who had only been waiting for a favourable opportunity, and who was enraged at Buckingham's disclosures, consented with alacrity. Buckingham retired into private life, reformed his ways, attended church with his wife, began to pay his debts, became a " patriot," and was claimed by the country or opposition party as one of their leaders. In the spring of 1675 he was conspicuous for his opposition to the Test oath and for his abuse of the bishops, and on the 16th of November he introduced a bill for the relief of the nonconformists. On the 15th of February 1677 he was one of the four lords who en- deavoured to embarrass the government by raising the question whether the parliament, not having assembled according to the act of Edward III. once in the year, had not been dissolved by

the recent prorogation. The motion was rejected and the four lords

were ordered to apologize. On their refusing, they were sent to the Tower, Buckingham in particular exasperating the House by ridiculing its censure. He was released in July, and immediately entered into intrigues with Barillon, the French ambassador, with the object of hindering the grant of supplies to the king; and in 1678 he visited Paris to get the assistance of Louis XIV. for the cause of the opposition. He took an active part in the prosecution of those implicated in the supposed Popish Plot, and accused the lord chief justice (Sir William Scroggs) in his own court while on circuit of favouring the Roman Catholics. In consequence of his conduct a writ was issued for his apprehension, but it was never served. He promoted the return of Whig candidates to parliament, constituted himself the champion of the dissenters, and was admitted a freeman of the city of London. He, however, separated himself from the Whigs on the exclusion question, probably on account of his dislike of Monmouth and Shaftesbury, was absent from the great debate in the Lords on the 15th of November 1680, and was restored to the king's favour in 1684.

He took no part in public life after James's accession, but returned to his manor of Helmsley in Yorkshire, the cause of his withdrawal being probably exhausted health and exhausted finances. In 1685 he published a pamphlet, entitled A short Discourse on the Reasonableness of Man's having a Religion (re- printed in Somers Tracts (1813, ix. 13), in which after discussing the main subject he returned to his favourite topic, religious toleration. The tract provoked some rejoinders and was de- fended, amongst others, by William Penn, and by the author himself in The Duke of Buckingham's Letter to the unknown author of a short answer to the Duke of Buckingham's Paper (1685). In hopes of converting him to Roman Catholicism James sent him a priest, but Buckingham turned his arguments into ridicule. He died on the 16th of April 1687, from a chill caught while hunting, in the house of a tenant at Kirkby Moorside in York- shire, expressing great repentance and feeling himself "despised by my country and I fear forsaken by my God." 1 The miserable picture of his end drawn by Pope, however, is greatly exaggerated. He was buried on the 7th of June 1687 in Henry VII. 's chapel in Westminster Abbey, in greater state, it was said, than the late king, and with greater splendour. With his death the family founded by the extraordinary rise to power and influence of the first duke ended. As he left no legitimate children the title became extinct, and his great estate had been completely dissipated; of the enormous mansion constructed by him at Cliveden in Buckinghamshire not a stone remains.

The ostentatious licence and the unscrupulous conduct of the Alcibiades of the 17 th century have been deservedly censured. But even his critics agree that he was good-humoured, good- natured, generous, an unsurpassed mimic and the leader of fashion; and with his good looks, in spite of his moral faults and even crimes, he was irresistible to his contemporaries. Many examples of his amusing wit have survived. His portrait has been drawn by Burnet, Count Hamilton in the M&moires de Grammont, Dryden, Pope in the Epistle to Lord Balhurst, and Sir Walter Scott in Peveril of the Peak. He is described by Reresby as " the first gentleman of person and wit I think I ever saw," and Burnet bears the same testimony. Dean Lockier, after alluding to his unrivalled skill in riding, dancing and fencing, adds, " When he came into the presence-chamber it was impossible for you not to follow him with your eye as he went along, he moved so gracefully." Racing and hunting were his favourite sports, and his name long survived in the hunting songs of Yorkshire. He was the patron of Cowley, Sprat, Matthew Clifford and Wycherley. He dabbled in chemistry, and for some years, according to Burnet, " he thought he was very near the finding of the philosopher's stone." He set up glass works at Lambeth the productions of which were praised by Evelyn; and he spent much money, according to his bio- grapher Brian Fairfax, in building insanae substructions. Dryden described him under the character of Zimri in the 1 Quarterly Review, January 1898, p. no.

celebrated lines in Absalom and Achilophel (to which Buckingham replied in Poetical Reflections on a late Poem . . . by a Person of Honour, 1682): —

" A man so various, that he seemed to be Not one, but all mankind's epitome; Stiff in opinions, always in the wrong, Was everything by starts and nothing long ; But in the course of one revolving moon, Was chymist, fiddler, statesman and buffoon. .... Beggar'd by fools, whom still he found too late, He had his jest, but they had his estate."

Buckingham, however, cannot with any truth be called the " epitome of mankind." On the contrary, the distinguishing features of his life are its incompleteness, aimlessness, imper- fection, insignificance, neglect of talents and waste of oppor- tunities. " He saw and approved the best," says Brian Fairfax, " but did too often dcteriora sequi." He is more severely but more justly judged by himself. In gay moments indeed he had written —

" Methinks, I see the wanton houres flee, And as they passe, turne

back and laugh at me," 2 —

but his last recorded words on the approach of death, " O! what a prodigal have I been of that most valuable of all possessions — Time! " express with exact truth the fundamental flaw of his character and career, of which he had at last become conscious.

Buckingham wrote occasional verses and satires showing undoubted but undeveloped poetical gifts, a collection of which, containing however many pieces not from his pen, was first published by Tom Brown in 1704; while a few extracts from a commonplace book of Buckingham of some interest are given in an article in the Quarterly Review of January 1898. He was the author of The Rehearsal, an amusing and clever satire on the heroic drama and especially on Dryden (first performed on the 7th of December 1671, at the Theatre Royal, and first pub- lished in 1672), a deservedly popular play which was imitated by Fielding in Tom Thumb the Great, and by Sheridan in the Critic. Buckingham also published two adapted plays, The Chances, altered from Fletcher's play of the same name (1682) and The Restoration or Right will take place, from Beaumont and Fletcher's Philaster (publ. 17 14); and also The Battle of Sedg-moor and The Militant Couple (publ. 1704). The latest edition of his works is that by T. Evans (2 vols. 8vo, 1775). Another work is named by Wood A Demonstration of the Deity, of which there is now no trace.

Bibliography. — The life of Buckingham has been well and accurately traced and the chief authorities collected in the article in the Diet, of Nat. Biography (1899) by C.H. Firth, and in GeorgeVilliers, 2ndDukeofBuckingham,byha.dyBurghc\ere(igo^). Otherbiographies are in Wood's Athenae Oxon. (Bliss), iv. 207 ; in Biographia Britannica ; by Brian Fairfax, printedinH.Walpole's Catalogue of Pictures of George Duke of Buckingham (1758); in Arber's edition of the Rehearsal (1 868) ; and by the author of Hudibras in The Genuine Remains of Mr Samuel Butler, by R. Thyer (1759), ii. 72. The following may also be mentioned : — -Quarterly Review, Jan. i8q8 (commonplace book) ; A Conference on the Doctrine of Transubstantiation between . . . the Duke of Buckingham and Father FitzGerald (17 14); A Narrative of the Cause and Manner of the Imprisonment ef the Lords (1677) ; The Declaration of the . . . Duke of Buckingham and the Earls of Holland and Peterborough . . . associated for the King(i6^8) ; S.R.Gardiner's Hist, of the Commonwealth (1 894-1901); Hist, of Eng. Poetry, by W. J. Courthope (1903), iii. 460; Horace Walpole's Royal and Noble Authors, iii. 304; Miscellania Aulica, by T. Brown (1702); and the

Fairfax Correspondence (1848-1849). For the correspondence see Charles II. and Scotland in 1650 (Scottish History Soc, vol. xvii., 1894); Calendars of St. Pap. Dom.; Hist. MSS. Comm. Series, MSS. of Duke of Buccleuch at Montagu House, of Mrs Frankland-Russell-Astley, of Marq. of Ormonde, and Various Collections; and English Hist. Rev. (April 1905), xx. 373. (P. C. Y.)

BUCKINGHAM, HENRY STAFFORD, 2ND Duke of 3 (1454- 1483), was the son of Humphrey Stafford, killed at the first battle of St Albans in 1455, an d grandson of Humphrey the 1st duke (cr. 1444), killed at Northampton in 1460, both fighting for Lancaster. The 1st duke, who bore the title of earl of Buckingham in right of his mother, was the son of Edmund, 5th earl of Stafford, and of Anne, daughter of Thomas, duke

2 From his Common place Book {Quarterly Rev. vol. 187, p. 87).

3 i.e. in the Stafford line; see above.

of Gloucester, youngest son of Edward III.; Henry's mother was Margaret, daughter of Edmund Beaufort, 2nd duke of Somerset, grandson of John of Gaunt. Thus he came on both sides of the blood royal, and this, coupled with the vastness of his inheritance, made the young duke's future of importance to Edward IV. He was recognized as duke in 1465, and next year was married to Catherine Woodville, the queen's sister. On reaching manhood he was made a knight of the Garter in 1474, and in 1478 was high steward at the trial of George, duke of Clarence. He had not otherwise filled any position of import- ance, but his fidelity might seem to have been secured by his marriage. However, after Edward's death, Buckingham was one of the first persons worked upon by Richard, duke of Glou- cester. It was through his help that Richard obtained possession of the young king, and he was at once rewarded with the offices of justiciar and chamberlain of North and South Wales, and constable of all the royal castles in the principality and Welsh Marches. In the proceedings which led to the deposition of Edward V. he took a prominent part, and on the 24th of June 1483 he urged the citizens at the Guildhall to take Richard as king, in a speech of much eloquence, " for he was neither unlearned and of nature marvellously well spoken " (More). At Richard's coronation he served as chamberlain, and immedi- ately afterwards was made constable of England and confirmed in his powers in Wales. Richard might well have believed that the duke's support was secured. But

early in August Bucking- ham withdrew from the court to Brecon. He may have thought that he deserved an even greater reward, or possibly had dreams of establishing his own claims to the crown. At all events, at Brecon he fell somewhat easily under the influence of his prisoner, John Morton (q.v.), who induced him to give his support to his cousin Henry Tudor, earl of Richmond. A widespread plot was soon formed, but Richard had early warning, and on the 15th of October, issued a proclamation against Buckingham. Buckingham, as arranged, prepared to enter England with a large force of Welshmen. His advance was stopped by an extraordinary flood on the Severn, his army melted away without striking a blow, and he himself took refuge with a follower, Ralph Bannister, at Lacon Hall, near Wem. The man betrayed him for a large reward, and on the 1st of November, Buckingham was brought to the king at Salisbury. Richard refused to see him, and after a summary trial had him executed next day (2nd of November 1483), though it was a Sunday.

Buckingham's eldest son, Edward (1478-1521), eventually succeeded him as 3rd duke, the attainder being removed in 1485; the second son, Henry, was afterwards earl of Wiltshire. The 3rd duke played an important part as lord high constable at the opening of the reign of Henry VIII., and is introduced into Shakespeare's play of that king, but he fell through his opposition to Wolsey, and in 1 5 2 1 was condemned for treason and executed (17th of May); the title was then forfeited with his attainder, his only son Henry (1 501-1563), who in his father's lifetime was styled earl of Stafford, being, however, given back his estates in 1522, and in 1547 restored in blood by parliament with the title of Baron Stafford, which became extinct in this line with Roger, 5th Baron in 1640. In that year the barony of Stafford was granted to William Howard (1614-1680), who after two months was created Viscount Stafford; he was beheaded in 1680, and his son was created earl of Stafford in 1688, a title which became extinct in 1762; but in 1825 the descent to the barony of 1640 was established, to the satisfaction of the House of Lords, in the person of Sir G. W. Jerningham, in whose family it then continued.

The chief original authorities for the life of the 2nd duke of Buck- ingham are the Continuation of the Croyland Chronicle ; Sir Thomas More's Richard III.; and Fabyan's Chronicle. Amongst modern authorities consult J. Gairdner's Richard III. ; and Sir. J. Ramsay's Lancaster and York. (C. L. K.)

BUCKINGHAM, JAMES SILK (1786-1855), English author and

traveller, was born near Falmouth on the 25th of August 1786, the son of a farmer. His youth was spent at sea. After years of wandering he established in 181 8 the Calcutta Journal. This venture at first proved highly successful, but in 1823 the

paper's outspoken criticisms of the East India Company led to the expulsion of Buckingham from India and to the suppres- sion of the paper by John Adam, the acting governor-general. His case was brought before parliament, and a pension of £200 a year was subsequently awarded him by the East India Com- pany as compensation. Buckingham continued his journalistic ventures on his return to England, and started the Oriental Herald (1824) and the Athenaeum (1828) which was not a success in his hands. In parliament, where he sat as member for Shef- field from 1 83 2-1 83 7, he was a strong advocate of social reform. He was a most voluminous writer. He had travelled much in Europe, America and the East, and wrote a great number of useful books of travel. In 1851 the value of these and of his other literary work was recognized by the grant of a civil list pension of £200 a year. At the time of his death in London, on the 30th of June 1855, Buckingham was at work on his autobiography, two volumes of the intended four being completed and published (1855).

His youngest son, Leicester Silk Buckingham (1825-1867), achieved no little popularity as a playwright, several of his free adaptations of French comedies being produced in London between i860 and 1867..

BUCKINGHAM, a market town and municipal borough and the county town of Buckinghamshire, England, in the Bucking- ham parliamentary division, 61 m. N.W. of London by a branch of the London & North-Western railway. Pop. (1901) 3152. It lies in an open valley on the upper part of the river Ouse, which encircles the main portion of the town on three sides. The church of St Peter and St Paul, which was extensively, restored by Sir Gilbert Scott, a native of this neighbourhood, is of the 18th century, and stands on the site of the old castle; the town hall dates from the close of the previous century; and the grammar school was founded by Edward VI., in part occupy- ing buildings of earlier date, which retain Perpendicular and Decorated windows, and a Norman door. A chantry, founded in 1268 by Matthew Stratton, archdeacon of Buckingham, previously occupied the site; the Norman work may be a remnant of the chapel of a gild of the Holy Trinity. The manor house is of the early part of the 17th century, and other old houses remain. The adjacent mansion of Stowe, approached from the town by a magnificent avenue of elms, and surrounded by gardens very beautifully laid out,

was the seat of the dukes of Buckingham until the extinction of the title in 1889. Bucking- ham is served by a branch of- the Grand Junction Canal, and has agricultural trade, manufactures of condensed milk and artificial manure, mal tings and flour-mills; while an old industry survives to a modified extent in the manufacture of pillow-lace. The borough is under a mayor, 4 aldermen and 12 councillors. Area, 5006 acres.

Buckingham (Bochingeham, Bukyngham) was an important stronghold in pre-Conquest times, and in 918 Edward the Elder encamped there with his army for four weeks, and threw up two forts on either side of the water. At the time of the Domesday survey there were twenty-six burgesses in Buckingham, which, together with the hamlet of Bourton, was assessed at one hide. Although it appears as a borough thus early, the town received no charter until 1554, when Queen Mary created it a free borough corporate with a bailiff, twelve principal burgesses and a steward, and defined the boundaries as extending in width from Dudley bridge to Thornborowe bridge and in length from Chackmore bridge to Padbury Mill bridge. A charter from Charles II. in 1684 was very shortly abandoned in favour of the original grant, which held force until the Municipal Corporations Act of 1835. In 1529 and from 1545 onwards Buckingham returned two members to parliament, until deprived by the Representation of the People Act of 1867 of one member, and by the Redistribution of Seats Act of 1885 of the other. Early mentions occur of markets and fairs, and from 1522, when Henry VIII, granted to Sir Henry Marney the borough of Bucking- ham with a Saturday market and two annual fairs, grants of fairs by various sovereigns were numerous. Buckingham was formerly an important agricultural centre, and Edward III. fixed here one of the staples for wool, but after the removal of these to Calais the trade suffered such decay that in an act of 32 Henry VIII. Buckingham is mentioned among thirty-six impoverished towns.

BUCKINGHAM AND NORMANBY, JOHN SHEFFIELD, ist

Duke cm? (1648-1721), English statesman and poet, was born on

the 7th of April 1648. He was the son of Edmund, 2nd earl of Mulgrave, and succeeded to that title on his father's death in 1658. At the age of eighteen he joined the fleet, to serve in the first Dutch war; on the renewal of hostilities in 1672 he was present at the battle of Southwold Bay, and in the next year received the command of a

ship. He was also made a colonel of infantry, and served for some time under Turenne. In 1680 he was put in charge of an expedition sent to relieve the town of Tangier. It was said that he was provided with a rotten ship in the hope that he would not return, but the reason of this abortive plot, if plot there was, is not exactly ascertained. At court he took the side of the duke of York, and helped to bring about Monmouth's disgrace. . In 1682 he was dismissed from the court, apparently for putting himself forward as a suitor for the princess Anne, but on the accession of King James he received a seat in the privy council, and was made lord chamberlain. He supported James i n his most unpopular measures, and stayed with him in London during the time of his flight. He also protected the Spanish ambassador from the dangerous anger of the mob. He acquiesced, however, in the Revolution, and in 1694 was made marquess of Normanby. In 1696 he refused in company with other Tory peers to sign an agreement to support William as their " rightful and lawful king " against Jacobite attempts, and was conse- quently dismissed from the privy council. On the accession of Anne, with whom he was a personal favourite, he became lord privy seal and lord-lieutenant of the North Riding of Yorkshire, and in 1703 duke of Buckingham and Normanby. During the predominance of the Whigs between 1705 and 17 10, Buckingham was deprived of his office as lord privy seal, but in 17 10 he was made lord steward, and in 1711 lord president of the council. After the death of Anne he held no state appointment. He died on the 24th of February 1721 at his house in St James's Park, which stood on the site of the present Buckingham Palace. Buckingham was succeeded by his son, Edmund (1 716-1735) on whose death the titles became extinct.

Buckingham, who is better known by his inherited titles as Lord Mulgrave, was the author of " An Account of the Revolution " and some other essays, and of numerous poems, among them the Essay on Poetry and the Essay on Satire. It is probable that the Essay on Satire, which attacked many notable persons, " saunter- ing Charles " amongst others, was circulated in MS. It was often attributed at the time to Dryden, who accordingly suffered a thrashing at the hands of Rochester's bravoes for the reflections it contained upon the earl. Mulgrave was a patron of Dryden, who may possibly have revised it, but was certainly not responsible, although it is commonly printed with his works. Mulgrave adapted Shakespeare's Julius Caesar, breaking it up into two plays, Julius Caesar and Marcus Brutus. He introduced choruses between the acts, two of these being written by Pope, and an incongruous love scene between Brutus and Portia. He was a constant friend and patron of Pope, who expressed a flattering

opinion of his Essay on Poetry. This, although smoothly enough written, deals chiefly with commonplaces.

In 1721 Edmund Curll published a pirated edition of his works, and was brought before the bar of the House of Lords for breach of privilege accordingly. An authorized edition under the super-intendence of Pope appeared in 1723, but the authorities cut out the " Account of the Revolution " and " The Feast of the Gods " on account of their alleged Jacobite tendencies. These were printed at the Hague in 1727. Pope disingenuously repudiated any knowledge of the contents. Other editions reappeared in 1723, 1726, 1729, 1740 and 1753. His Poems were included in Johnson's and other editions of the British poets.

BUCKINGHAMSHIRE, EARLS OF. The first earl of Bucking-hamshire (to be distinguished from the earls of Buckingham, q.v.) was John Hobart (c. 1694-17 56), a descendant of Sir Henry Hobart (d. 1625), attorney-general and chief justice of the common pleas under James I., who was made a baronet in 1611, and who was the great-grandson of Sir James Hobart (d. 1507), attorney-general to Henry VII. The Hobarts had been settled in Norfolk and Suffolk for many years, when in 1728 John Hobart, who was a son of Sir Henry Hobart, the 4th baronet (d. 1698) , was created Baron Hobart of Blickling. In 1 740 Hobart became lord- lieutenant of Norfolk and in 1746 earl of Buckinghamshire, his

sister, Henrietta Howard, countess of Suffolk, being the mistress of George II. He died on the 22nd of September 1756, and was succeeded as 2nd earl 1 by his eldest son John (1723-1793), who was member of parliament for Norwich and comptroller of the royal household before his accession to the title. From 1762 to 1766 he was ambassador to Russia, and from 1776 to 1780 lord- lieutenant of Ireland, but he was hardly equal to the exceptional difficulties with which he had to deal in the latter position. He died without sons at Blickling Hall, Norfolk, on the 3rd of August 1793, when his half-brother George (c. 1730-1804), became 3rd earl. Blickling Hall and his Norfolk estates, however, passed to his daughter, Henrietta (1762-1805), the wife of William Kerr, afterwards 6th marquess of Lothian.

Robert Hobart, 4th earl of Buckinghamshire (1760-1816), the eldest son of the 3rd earl, was born on the 6th of May 1 760. He was a soldier, and then a member of both the English and the Irish Houses of Commons; from 1789 to 1793 he was chief secre- tary to the lord-lieutenant of Ireland, exerting his influence in this country to prevent

any concessions to the Roman Catholics. In 1793, being known by the courtesy title of Lord Hobart, be was sent to Madras as governor, but in 1798, after serious 1 differ- ences between himself and the governor-general of India, Sir John Shore, afterwards Lord Teignmouth, he was recalled. Returning to British politics, Hobart was called up to the House of Lords in 1798 (succeeding to the earldom of Buckinghamshire in 1804); he favoured the union between England and Ireland; from March 1801 to May 1804 he was secretary for war and the colonies (his family name being taken for Hobart Town in Tasmania), and in 1805 he became chancellor of the duchy of Lancaster under Pitt. For a short time he was joint postmaster- general, and from 181 2 until his death on the 4th of February 1816 he was president of the Board of Control, a post for which his Indian experience had fitted him.

The 4th earl left no sons, and his titles passed to his nephew, George Robert Hobart (1 789-1849), a son of George Vere Hobart (1761-1802), lieutenant-governor of Grenada. In 1824 the 5th earl inherited the Buckinghamshire estates of the Hampden family and took the name of Hampden, his ancestor, Sir John Hobart, 3rd baronet, having married Mary Hampden about 1655. On his death in February 1849 hi s brother, Augustus Edward Hobart (1 793-1 884), who took the name of Hobart-Hampden in 1878, became 6th earl. His two sons, Vere Henry, Lord Hobart (1818-1875), governor of Madras from 1872, and Frederick John Hobart (1821-1875), predeceased him, and when the 6th earl died he was succeeded by his grandson, Sidney Carr Hobart-Hampden (b. i860), who became 7th earl of Buckinghamshire, and who added to his name that of Mercer-Henderson. Another of the 6th earl's sons was Augustus Charles Hobart-Hampden, generally known as Hobart Pasha (q.v.).

See Lord Hobart's Essays and Miscellaneous Writings, edited with biography by Lady Hobart (1885).

BUCKINGHAMSHIRE (abbreviated Bucks) a south midland county of England, bounded N. by Northamptonshire, E. by Bedfordshire, Hertfordshire and Middlesex, SL for a short dis- tance by Surrey, and by Berkshire, and W. by Oxfordshire. Its area is 743ˆ2 sq. m. The county is divided between the basins of the rivers Ouse and Thames. The first in its uppermost course forms part of the north-western boundary, passes the towns of Buckingham, Stony Stratford, Wolverton, Newport Pagnell and Olney, and before quitting the county forms a short stretch of the north-eastern boundary. The principal tributary it receives within the county is the Ouzel. The Thames forms the entire southern boundary; and of its tributaries

Buckinghamshire includes the upper part of the Thames. To the north-west of Buckingham, and both east and west of the Ouzel, the land rises in gentle undulations to a height of nearly 500 ft., and north of the Thames valley a few nearly isolated hills stand boldly, such as Brill Hill and Muswell Hill, each over 600 ft., but the hilliest

1 Until 1784, when George Grenville, Earl Temple, was created marquess of Buckingham, the 2nd earl of Buckinghamshire always signed himself " Buckingham " ; his contemporaries knew him by this name, and hence a certain amount of confusion has arisen.

part of the county is the south, which is occupied by part of the Chiltern system, the general direction of which is from south- west to north-east. The crest-line of these hills crosses the county at its narrowest point, along a line, above the towns of Prince's Risborough and Wendover, not exceeding n m. in length. This line divides the county into two parts of quite different physical character; for to the south almost the whole land is hilly (the longer slope of the Chiltern system lying in this direction), well wooded, and pleasantly diversified with narrow vales. The chief of these are watered by the Wye, Misbourne and Chess streams. The beech tree is predominant in the woods, in so much that William Camden, writing c. 1585, supposed the county to take name from this feature (A.S. hoc, beech). In the south a remnant of ancient forest is preserved as public ground under the name of Burnham Beeches. The Chilterns reach a height of nearly 900 ft. within the county.

Geology. — The northern half of the county is occupied by Jurassic strata, in the southern half Cretaceous rocks predominate except in the south-eastern corner, where they are covered by Tertiary beds. Thus the oldest rocks are in the north, succeeded continuously by younger strata to the south ; the general dip of all the rocks is south-easterly. A few patches of Upper Lias Clay appear near the northern boundary near Grafton Regis and Castle Thorpe, and again in the valley of the Ouse near Stoke Goldington and Weston Underwood. The Oolitic series is represented by the Great Oolite, with limestones in the upper part, much quarried for building stones at Westbury, Thornborough, Brock, Whittlewood Forest, &c. ; the lower portions are more argillaceous. The Forest Marble is seen about Thornton as a thin bed of clay with an oyster-bearing limestone at the base. Next above is the Cornbrash, a series of rubbly and occasionally hard

limestones and thin clays. The outcrop runs by Tingwick, Buckingham, Berehampton and Newport Pagnell, it is quarried at Wolverton and elsewhere for road metal, lnliers of these rocks occur at Marsh Gibbon and Stan Hill. The Oxford Clay and Kimmeridge Clay, with the Gault, lie in the vale of Aylesbury. The clay is covered by numerous outliers of Portland, Purbeck and Lower Greensand beds. The Portland beds are sandy below, calcareous above; the outcrop follows the normal direction in the county, from south-west to north-east, from Thame through Ayles- bury; they are quarried at several places for building stone and fossils are abundant. The Hartwell Clay is in the Lower Portland. Freshwater Purbeck beds lie below the Portland and Lower Green- sand beds; they cap the ridge between Oving and Whitchurch. Glass-making sands have been worked from the Lower Greensand at Hartwell, and phosphatic nodules from the same beds at Brickhill as well as from the Gault at Towersey. A broad band of Gault, a bluish clay, extends from Towersey across the county in a north- easterly direction. Resting upon the Gault is the Upper Greensand; at the junction of the two formations numerous springs arise, a circumstance which has no doubt determined the site of several villages. The Chalk rises abruptly from the low lying argillaceous plain to form the Chiltern Hills. The form of the whole of the hilly district round Chesham, High Wycombe and the Chalfonts is determined by the Chalk. Reading beds, mottled clays and sands, repose upon the Chalk at Woburn, Barnham, Fulmer and Denham, and these are in turn covered by the London Clay, which is exposed on the slopes about Stoke Common and Iver. Between the Tertiary- capped Chalk plateau and the Thames, a gentler slope, covered with alluvial gravel and brick earth, reaches down to the river. Thick deposits of plateau gravel cover most of the high ground in the southern corner of the county, while much of the northern part is obscured by glacial clays and gravels.

Industries. — The agricultural capacities of the soil vary greatly in different localities. On the lower lands, especially in the Vale of Aylesbury, about the headwaters of the Thame, it is extremely fertile ; while on the hills it is usually poor and thin. The pro- portion of cultivated land is high, being about 83 % of the whole. Of this a large and growing portion is in permanent pasture; cattle and sheep being reared in great numbers for the London markets, to which also are sent quantities of ducks, for which the district round Aylesbury is famous. Wheat and oats are the principal grain crops, though both decrease in importance. Turnips and swedes for the cattle are the chief green crops; and dairy-farming is largely practised. There is no

general manufacturing industry, but a considerable amount of lace-making and straw-plaiting is carried on locally; and at High Wycombe and in its neighbourhood there is a thriving trade in various articles of turnery, such as chairs and bowls, from beech and other hard woods. The introduction of lace-making in this and neighbouring counties is attributed to Flemish, and later to

French immigrants, but alsoto Catharine of Aragon during her residence (c. 1532) at Ampthill. Down to the later part of the 19th century a general holiday celebrated by lace-makers on the 25th of November was known as " Cattarn's Day."

Communications. — The main line of the London & North- western railway crosses the north-east part of the county. Bletchley is an important junction on this system, branches diverging east to Fenny Stratford, Bedford and Cambridge, and west to Oxford and Banbury, Buckingham being served by the western branch. There is also a branch from Cheddington to Aylesbury. The Metropolitan-Great Central joint line serves Amersham, Chesham (by a branch), and Aylesbury, joining the North- Western Oxford branch at Verney Junction; this line is used by the Great Central railway, the main line of which con- tinues north-westward from Quainton Road. A light railway connects this station with the large village of Brill to the south- west. The Great Central and the Great Western companies jointly own a line passing through Beaconsfield, High Wycombe, and Prince's Risborough, which is connected northward with the Great Central system. Before the opening of this line in 1906 the Great Western branch from Maidenhead to Oxford was the only line serving High Wycombe and Prince's Ris- borough, from which there are branches to Watlington and Aylesbury. The main line of this company crosses the extreme south of the county by Slough and Taplow. The Grand Junction Canal, reaching the valley of the Ouse by way of the Ouzel valley from the south, has branches to Aylesbury and to Buckingham. Except the Thames none of the rivers in the county is con- tinuously navigable.

Population and Administration. — The area of the ancient county is 475,682 acres, with a population in 1891 of 185,284, and in 1901 of 195,764. The area of the administrative county is 479,358 acres. The county contains eight hundreds, of which- three, namely Stoke, Burnham and Desborough, form the " Chiltern Hundreds " (g.v.) . The hundred of Aylesbury retains its ancient designation of the " three hundreds of Aylesbury." The municipal boroughs are Buckingham, the county town (pop. 3152), and Wycombe, officially Chepping Wycombe, also Chipping or High Wycombe (1 5,542) . The

other urban districts are Aylesbury (9243), Beaconsfield (1570), Chesham (7245), Eton (3301), Fenny Stratford (4799), Linslade, on the Ouzel opposite to Leighton Buzzard in Bedfordshire (2157), Marlow (4526), Newport Pagnell (4028), Slough (11,453). Among the lesser market towns may be mentioned Amersham (2674), Ivinghoe (808), Olney (2684), Prince's Risborough (2189), Stony Stratford (2353), Wendover (2009) and Winslow (1703). At Wolverton (5323) are the carriage works of the London & North-Western railway. Several of the villages on and near the banks of the Thames have become centres of residence, such as Taplow, Cookham and Bourne End, Burnham and Wooburn. Bucking- hamshire is in the midland circuit, and assizes are held at Ayles- bury. It has one court of quarter sessions, and is divided into thirteen petty sessional divisions. The boroughs of Bucking- ham and Wycombe have separate commissions of the peace. The administrative county contains 230 civil parishes. Buck- inghamshire is almost entirely within the diocese of Oxford, and 215 ecclesiastical parishes are situated wholly or in part within it. There are three parliamentary divisions, Northern or Buckingham, Mid or Aylesbury, and Southern or Wycombe, each returning one member; and the county contains a small part of the parliamentary borough of Windsor (chiefly in Berk-shire). The most notable institution within the county is Eton College, the famous public school founded by Henry VI.

History. — The district which was to become Buckinghamshire was reached by the West Saxons in 571, as by a series of victories they pushed their way north along the Thames valley. With the grouping of the settlements into kingdoms and the con- solidation of Mercia under Offa, Buckinghamshire was included in Mercia until, with the submission of that kingdom to the Northmen, it became part of the Danelaw. In the 10th century Buckinghamshire suffered frequently from the ravages of the Danes, and numerous barrows and earthworks mark the scenes

of struggles against the invaders.. These relics are especially-abundant in the vale of Aylesbury, probably at this time one of the richest and best protected of the Saxon settlements. The Chiltern district, on the other hand, is said to have been an impassable forest infested by hordes of robbers and wild beasts. In the reign of Edward the Confessor, Lcofstan, 12th abbot of St Albans, cut down large tracts of wood in this district and granted the manor of Hamstcad

(Herts) to a valiant knight and two fellow-soldiers on condition that they should check the depredations of the robbers. The same reason led at an early period to the appointment of a steward of the Chiltern Hundreds, and this office being continued long after the necessity for it had ceased to exist, gradually became the sinecure it is to-day. The district was not finally disforested until the reign of James I.

At the time of the Norman invasion Buckinghamshire was probably included in the earldom of Leofwine, son of Godwin, and the support which it lent him at the battle of Hastings was punished by sweeping confiscations after the Conquest. The proximity of Buckinghamshire to London caused it to be involved in most of the great national events of the ensuing centuries. During the war between King John and his barons William Mauduit held Hanslape Castle against the king, until in 1216 it was captured and demolished by Falkes de Breaute. The county was visited severely by the Black Death, and Winslow was one of many districts which were almost entirely depopulated. In the civil war Buckinghamshire was one of the first counties to join in an association for mutual defence on the side of the parlia- ment, which had important garrisons at Aylesbury, Brill and elsewhere. Newport Pagnell was for a short time garrisoned by the royalist troops, and in 1644 the king fixed his headquarters at Buckingham.

The shire of Buckingham originated with the division of Mercia in the reign of Edward the Elder, and was probably formed by the aggregation of pre-existing hundreds round the county town, a fact which explains the curious irregularities of the boundary line. The eighteen hundreds of the Domesday survey have now been reduced to eight, of which the three Chiltern hundreds, Desborough, Burnham and Stoke, are un- altered in extent as well as in name. The remainder have been formed each by the union of three of the ancient hundreds, and Aylesbury is still designated " the three hundreds of Aylesbury." All, except Newport and Buckingham, retain the names of Domesday hundreds, and the shire has altered little on its outer lines since the survey. Until the time of Queen Elizabeth Buckinghamshire and Bedfordshire had a common sheriff. The shire court of the former county was held at Aylesbury.

The ecclesiastical history of Buckinghamshire is not easy to trace, as there is no local chronicler, but the earliest churches were probably subject to the West Saxon see of Dorchester, and when after the Conquest the bishop's stool was transferred to Lincoln no change of jurisdiction ensued. After the dissolu- tion of the monasteries it was proposed to form a new diocese to include Bedfordshire and

Buckinghamshire, but the project was abandoned, and both remained in the Lincoln diocese until 1837, when the latter was transferred to Oxford. The arch- deaconry was probably founded towards the close of the nth century by Bishop Remy, and the subdivision into rural deaneries followed shortly after. A dean of Thornborough is mentioned in the 12th century, and in the taxation of Nicholas IV. eight deaneries are given, comprising 186 parishes. In 1855 the deaneries were reconstructed and made eighteen in number.

On the redistribution of estates after the Conquest only two Englishmen continued to retain estates of any importance, and the chief landowners at this date were Walter Giffard, first earl of Buckingham, and Odo, bishop of Bayeux. Few of the great Buckinghamshire estates, however, remained with the same proprietors for any length of time. Many became annexed by religious establishments, while others reverted to the crown and were disposed of by various grants. The family of Hampden alone claim to have held the estate from which the name is derived in an unbroken line from Saxon times.

Buckinghamshire has always ranked as an agricultural rather than a manufacturing county, and has long been famed for its corn and cattle. Fuller mentions the vale of Aylesbury as pro- ducing the biggest bodied sheep in England, and " Buckingham- shire bread and beef " is an old proverb. Lace-making, first introduced into this county by the Fleming refugees from the Alva persecution, became a very profitable industry. The monopolies of James I. considerably injured this trade, and in 1623 a petition was addressed to the high sheriff of Buckingham- shire representing the distress of the people owing to the decay of bone lace-making. Newport Pagnell and Olney were especi- ally famous for their lace, and the parish of Hanslape is said to have made an annual profit of £8000 to £9000 from lace manu- facture. The straw-plait industry was introduced in the reign of George L, and formerly gave employment to a large number of the population.

The county was first represented in parliament by two members in 1290. The representation increased as the towns acquired representative rights, until in 1603 the county with its boroughs made a total return of fourteen members. By the Reform Act of 1832 this was reduced to eleven, and by the Redis- tribution of Seats Act of 1885 the boroughs were deprived of representation and the county returned three members for three divisions.

Antiquities. — Buckinghamshire contains no ecclesiastical buildings

of the first rank. Monastic remains are scanty, but two former abbeys may be noted. At Medmenham, on the Thames above Marlow, there are fragments, incorporated into a residence, of a Cistercian abbey founded in 1201; which became notorious in the middle of the 18th century as the meeting-place of a convivial club called the " Franciscans " after its founder, Sir Francis Dashwood, afterwards Lord le Despencer (1 708-1 781), and also known as the " Hell-Fire Club," of which John Wilkes, Bubb Dodington and other political notorieties were members. The motto of the club, fay ce que voudras (do what you will), inscribed on a doorway at the abbey, was borrowed from Rabelais' description of the abbey of Thelema in Gargantua. The remains of the Augustinian Notley Abbey (1162), incorporated with a farm-house, deserve mention rather for their picturesque situation by the river Thame than for their architectural value. Turning to churches, there is workmanship considered to be of pre-Norman date in Wing church, in the neighbourhood of Leighton Buzzard, including a polygonal apse and crypt. Stewkley church, in the same locality, shows the finest Norman work in the county; the building is almost wholly of the later part of this period, and the ornamentation is very rich. The Early English work of Chetwode and Haddenham churches, both in the west of the county, is noteworthy; especi- ally in the first, which, as it stands, is the eastern part of a priory church of Augustinians (1244). Good specimens of the Decorated style are not wanting, though none is of special note; but the county contains three fine examples of Perpendicular architecture in Eton College chapel and the churches of Maids More ton to the north, and Hillesden to the south, of Buckingham. Ancient domestic architecture is chiefly confined to a few country houses, of which Chequers Court, dating from the close of the 16th century, is of interest not only from the architectural stand- point but from its beautiful situation high among the Chiltern Hills between Prince's Risborough and Wendover, and from a remarkable collection of relics of Oliver Cromwell, preserved here as a consequence of the marriage, in 1664, of John Russell, a grandson of the Protector, into the family to which the house then belonged. The manor-house of Hampden, among the hills east of Prince's Risborough, was for many generations the abode of the family of that name, and is still in the possession of descendants of John Hampden, who fell at the battle of Chalgrove in 1643, and is buried in Hampden church. Fine county seats are numerous — there may be mentioned Stowe (Buckingham), formerly the seat of the dukes of Buckingham; Cliveden and Hedsor, two among the many beautifully situated mansions by the bank of the Thames; and Claydon House in the west of the county. Among the Chiltern Hills, also, there are several

splendid domains. Associations with eminent men have given a high fame to several towns or villages of Buckinghamshire. Such are the connexion of Beaconsfield with Edmund Waller and Edmund Burke, that of Hughenden near Wycombe with Benjamin Disraeli, Lord Beaconsfield, whose father's residence was at Bradenham; of Olney and Stoke Pogis with the poets Cowper and Gray respectively. At Chalfont St Giles a cottage still stands in which Milton completed Paradise Lost and began Paradise Regained. In earlier life he had lived and worked at Horton, near the Thames below Windsor.

Authorities. — The original standard history is the laborious work of G. Lipscomb, History and Antiquities of the County of Buckingham (London, 1831-1847). Other works are: Browne Willis, History and Antiquities of the Town, Hundred, and Deanery of Buckingham (London, 1755); D. and S. Lysons, Magna Britannia, vol. i. ; R. Gibbs, Buckingham (Aylesbury, 1878-1882); Worthies of Buckingham (Aylesbury, 1886); and Buckingham Miscellany (Aylesbury, 1891); G. S. Roscoe, Bu&kingham Sketches (London, 1891); P. H. Ditchfield, Memorials of Old Buckinghamshire (London, 1901); Victoria County History, " Buckinghamshire."

BUCKLAND, FRANCIS TREVELYAN (1826-1880), English zoolpgist, son of Dean William Buckland the geologist, was born at Oxford on the 17th of December 1826. He was educated at Winchester and Christ Church, taking his degree in 1848, and then adopted the medical profession, studying at St George's hospital, London, where he became house-surgeon in 1852. The pursuit of anatomy led him to a good deal of out-of-the-way research in zoology, and in 1856 he became a regular writer on natural history for the newly established Field, particularly on the subject of fish. In 1866 he started Land and Water on similar lines. In 1867 he was appointed government inspector of fisheries, and in the course of his work travelled constantly about the country, being largely responsible for the increased attention paid to the scientific side of pisciculture. Among his publications, besides articles and official reports, were Fish Hatching (1863), Curiosities of Natural History (4 vols., 1857-1872), Logbook of a Fisherman (1875), Natural History of British Fishes (1881). He died on the 19th of December 1880.

See Life by G. C. Bompas (1885).

BUCKLAND, WILLIAM (1784-1856), English divine and geologist, eldest son of the Rev. Charles Buckland, rector of Templeton and Trusham, in Devon, was born at Axminster on the 1 2th of March 1 784. He was educated at the grammar school of Tiverton, and at Winchester, and in 1801 was elected a scholar of Corpus Christi College, Oxford, becoming B. A. in 1804. In 1809 he was elected a fellow of his college, and was admitted into holy orders. From early boyhood he had exhibited a strong taste for natural science, which was subsequently stimulated by the lectures of Dr John Kidd on mineralogy and chemistry; and his attention was especially drawn to the then infant science of geology. He also attended the lectures of Sir Christopher Pegge (1765-1822) on anatomy. He now devoted himself systematically to an examination of the geological structure of. Great Britain, making excursions, and investigating the order of superposition of the strata and the characters of the organic remains which they contained. In 1813, on the resignation of Dr Kidd, he was appointed reader in mineralogy in Oxford; and the interest excited by his lectures was so great that in 1819 a readership in geology was founded and especially endowed by the treasury, Dr Buckland being the first holder of the new appointment. In 1818 Dr Buckland was elected a fellow of the Royal Society, and in 1824 and again in 1840 he was chosen president of the Geological Society of London. In 1825 he was presented by his college to the living of Stoke Charity, near Whitchurch, Hants, and in the same year he was appointed by Lord Liverpool to a canonry of the cathedral of Christ Church, Oxford, when the degree of D.D. was conferred upon him. In 1825, also, he married Mary, the eldest daughter of Mr Benjamin Morland of Sheepstead House, near Abingdon, Berks, by whose abilities and excellent judgment he was materially assisted in his literary labours. In 1832 he presided over the second meeting of the British Association, which was then held at Oxford. In 1845 he was appointed by Sir Robert Peel to the vacant deanery

of Westminster, and was soon after inducted to the living of Islip, near Oxford, a preferment attached to the deanery. In 1847 he was appointed a trustee in the British Museum; and in 1848 he was awarded the Wollaston medal by the Geological Society of London. In 1849 his health began to give way under the increasing pressure of his multifarious duties ; and the later years of his life were overshadowed by a serious illness, which compelled him to live in retirement. He died on the 24th of August 1856, and was buried in a spot which he had himself chosen, in Islip churchyard.

Buckland was a man many-sided in his abilities, and of a singularly wide range of attainments. Apart from his published works and

memoirs in connexion with the special department of geology, and in addition to the work entailed upon him by the positions which he at different times held in the Church of England, he entered with great enthusiasm into many practical questions connected with agricultural and sanitary science, and various social and even medical problems. As a teacher he possessed powers of the highest order ; and the university of Oxford is enriched by the large and valuable private collections, illustrative of geology and mineralogy, which he amassed in the course of his active life. It is, however, upon his published scien- tific works that Dr Buckland's great reputation is mainly based. His first great work was the well-known Reliquiae Diluvianae, or Observations on the Organic Remains contained in caves, fissures, and diluvial gravel attesting the Action of a Universal Deluge, published in 1823 (2nd cd. 1824), in which he supplemented his former observations on the remains of extinct animals discovered in the cavern of Kirkdale in Yorkshire, and expounded his views as to the bearing of these and similar cases on the Biblical account of the Deluge. Thirteen years after the publication of the Reliquiae, Dr Buckland was called upon, in accordance with the will of the earl of Bridgewater, to write one of the series of works known as the Bridgewater Treatises. The design of these treatises was to exhibit the " power, wisdom, and goodness of God, as manifested in the Creation," and none of them was of greater value, as evinced by its vitality, than that on " Geology and Mineralogy." Originally published in 1836, it has gone through three editions, and though not a " manual " of geo- logical science, it still possesses high value as a storehouse of geological and palaeontological facts bearing upon the particular argument which it was designed to illustrate. The third edition, issued in 1858, was edited by his son Francis T. Buckland, and is accompanied by a memoir of the author and a list of his publications.

Of Dr Buckland's numerous original contributions to the sciences of Geology and Palaeontology, the following may be mentioned: — (1) " On the Structure of the Alps and adjoining parts of the Continent, and their relation to the Secondary and Transition Rocks of England" {Annals of Phil., 1821); (2) " Account of an Assemblage of Fossil Teeth and Bones of Elephant, Rhinoceros, Hippopotamus, &c, discovered in a cave at Kirkdale in Yorkshire in the year 1821 " (Phil. Trans.); (3) " On the Quartz Rock of the Lickey Hill in Worcestershire " (Trans. Geol. Soc); (4) " On the Megalosaurus or Great Fossil Lizard of Stonesfield " (Ibid.); (5) "On the Cycadeoideae, a Family of Plants found in the Oolite Quarries of the Isle of Portland" (Ibid.); (6) "On the Discovery of a New Species of

Pterodactyle in the Lias of Lyme Regis " (Ibid.); (7) " On the Discovery of Coprolites or Fossil Faeces in the Lias of Lyme Regis, and in other Formations " (Ibid.) ; (8) " On the Evidences of Glaciers in Scotland and the North of England " (Proc. Geol. Soc. Lond.); (9) " On the South- Western Coal District of Eng- land " (joint paper with the Rev. W. D. Conybeare, Trans. Geol. Soc. Lond.); (10) "On the Geology of the neighbourhood of Weymouth, and the adjacent parts of the Coast of Dorset " (joint paper with Sir H. De la Beche, Trans. Geol. Soc. Lond.).

With regard to the Glacial theory propounded by Agassiz, no one welcomed it with greater ardour than Buckland, and he zealously sought to trace out evidences of former glaciation in Britain. A record of the interesting discussion which took place at the Geological Society's meeting in London in November 1840,

after the reading of a paper by Buckland, was printed in the Midland Naturalist, October 1883.

BUCKLE, HENRY THOMAS (1821-1862), English historian, author of the History of Civilization, the son of Thomas Henry Buckle, a wealthy London merchant, was born at Lee, in Kent, on the 24th of November 1821. Owing to his delicate health he was only a very short time at school, and never at college, but the love of reading having been early awakened in him, he was allowed ample means of gratifying it. He gained his first distinctions not in literature but in chess, being reputed, before he was twenty, one of the first players in the world. After his father's death in January 1840 he spent some time with his mother on the continent (1840-1844). He had by that time formed the resolution to direct all his reading and to devote all his energies to the preparation of some great historical work, and during the next seventeen years he bestowed ten hours each day in working out his purpose. At first he contemplated a history of the middle ages, but by 185 1 he had decided in favour of a history of civilization. The six years which followed were occupied in writing and rewriting, altering and revising the first volume, which appeared in June 1857. It at once made its author a literary and even social celebrity, — the lion of a London season. On the 19th of March 1858 he delivered at the Royal Institution a public lecture (the only one he ever gave) on the Influence of Women on the Progress of Knowledge, which was published in Fraser's Magazine for April 1858, and

reprinted in the first volume of the Miscellaneous and Posthumous Works. On the 1st of April 1859 a crushing and desolating affliction fell upon him in the death of his mother. It was under the immediate impression of his loss that he concluded a review he was writing of J. S. Mill's Essay on Liberty with an argument for immortality, based on the yearning of the affections to regain communion with the beloved dead, — on the impossibility of standing up and living, if we believed the separation were final. The argument is a strange one to have been used by a man who had maintained so strongly that " we have the testimony of all history to prove the extreme fallibility of consciousness." The review appeared in Fraser's Magazine, May 1859, and is to be found also in the Miscellaneous and Posthumous Works (1872). The second volume of his history was published in May 1861. Soon after he left England for the East, in order to recruit his spirits and restore his health. From the end of October 1861 to the beginning of March 1862 was spent by him in Egypt, from which he went over the desert of Sinai and of Edom to Syria, reaching Jerusalem on the 19th of April 1862. After staying there eleven days, he set out for Europe by Beyrout, but at Nazareth he was attacked by fever; and he died at Damascus on the 29th of May 1862.

Buckle's fame, which must rest wholly on his History of Civilization in England, is no longer what it was in the decade following his death. His History is a gigantic unfinished introduction, of which the plan was, first to state the general principles of the author's method and the general laws which govern the course of human progress; and secondly, to exemplify these principles and laws through the histories of certain nations characterized by prominent and peculiar features, — Spain and Scotland, the United States and Germany. Its chief ideas are — (1) That, owing partly to the want of ability in historians, and partly to the complexity of social phenomena, extremely little had as yet been done towards discovering the principles which govern the character and destiny of nations, or, in other words, towards establishing a science of history; (2) That, while the theological dogma of predestination is a barren hypothesis beyond the province of knowledge, and the metaphysical dogma of free will rests on an erroneous belief in the infallibility of consciousness, it is proved by science, and especially by statistics, that human actions are governed by laws as fixed and regular as those which rule in the physical world; (3) That climate, soil, food, and the aspects of nature are the primary causes of intel- lectual progress, — the first three indirectly, through determining the accumulation and distribution of wealth, and the last by directly influencing the accumulation and distribution of thought,

the imagination being stimulated and the understanding sub- dued when the phenomena of the external world are sublime and terrible, the understanding being emboldened and the imagination curbed when they are small and feeble; (4) That the great division between European and non-European civiliza- tion turns on the fact that in Europe man is stronger than nature, and that elsewhere nature is stronger than man, the consequence of which is that in Europe alone has man subdued nature to his service; (5) That the advance of European civiliza- tion is characterized by a continually diminishing influence of physical laws, and a continually increasing influence of mental laws; (6) That the mental laws which regulate the progress of society cannot be discovered by the metaphysical method, that is, by the introspective study of the individual mind, but only by such a comprehensive survey of facts as will enable us to eliminate disturbances, that is, by the method of averages; (7) That human progress has been due, not to moral agencies, which are stationary, and which balance one another in such a manner that their influence is unfelt over any long period, but to intellectual activity, which has been constantly varying and advancing: — " The actions of individuals are greatly affected by their moral feelings and passions; but these being antagonistic to the passions and feelings of other individuals, are balanced by them, so that their effect is, in the great average of human affairs, nowhere to be seen, and the total actions of man- kind, considered as a whole, are left to be regulated by the total knowledge of which mankind is possessed "; (8) That individual efforts are insignificant in the great mass of human affairs, and that great men, although they exist, and must " at present " be looked upon as disturbing forces, are merely the creatures of the age to which they belong; (9) That religion, literature and government are, at the best, the products arid not the causes of civilization; (10) That the progress of civilization varies directly as " scepticism," the disposition to doubt and to investigate, and inversely as " credulity " or " the protective spirit," a disposi- tion to maintain, without examination, established beliefs and practices.

Unfortunately Buckle either could not define, or cared not to define, the general conceptions with which he worked, such as those denoted by the terms " civilization," " history," " science," " law," " scepticism," and " protective spirit"; the consequence is that his arguments are often fallacies. Moreover, the looseness of his statements and the rashness of his inferences regarding statistical averages make him, as a great authority has remarked, the enfant terrible of moral statisticians. He brought a vast amount of information from the most varied and distant sources to confirm his

opinions, and the abundance of his materials never perplexed or burdened him in his argumentation, but examples of well-conducted historical argument are rare in his pages. He sometimes altered and contorted the facts; he very often unduly simplified his problems; he was very apt when he had proved a favourite opinion true to infer it to be the whole truth. On the other hand, many of his ideas have passed into the common literary stock, and have been more precisely elaborated by later writers on sociology and history; and though his own work is now somewhat neglected, its influence was immensely valuable in provoking further research and speculation.

See his Life by A. W. Huth (1880).

BUCKNER, SIMON BOLIVAR (1823-), American soldier and political leader, Was born in Hart county, Kentucky, on the 1st of April 1823. He graduated at West Point in 1844, and was assistant professor of geography, history and ethics there in 1845-1846. He fought in several battles of the Mexican War, received the brevet of first lieutenant for gallantry at Churubusco, where he was wounded, and later, after the storming of Chapul- tepec, received the brevet of captain. In 1848-1850 he was assistant instructor of infantry tactics at West Point. During the succeeding five years he was in the recruiting service, on frontier duty, and finally in the subsistence department. He resigned from the army in March 1855. During the futile attempt of Governor Beriah Magoffin to maintain Kentucky in a position of neutrality, he was commander of the state

guard; but in September 1861, after the entry of Union forces into the state, he openly espoused the Confederate cause and was commissioned brigadier-general, later becoming lieutenant- general. He was third in command of Fort Donelson at the time of General Grant's attack (February 1862), and it fell to him, after the escape of Generals Floyd and Pillow, to surrender the post with its large garrison and valuable supplies. General Buckner was exchanged in August of the same year, and subse- quently served under General Bragg in the invasion of Kentucky and the campaign of Chickamauga. He was governor of Ken- tucky in 1 88 7- 1 89 1, was a member of the Kentucky consti- tutional convention of 1890, and in 1896 was the candidate of the National or " Gold " Democrats for vice-president of the United States.

BUCKRAM (a word common, in various early forms, to many European languages, as in the Fr. bouqueran or Ital. bucherame, the derivation of which is unknown), in early usage the name of a fine linen or cotton cloth, but now only of a coarse fabric of linen or cotton stiffened with glue or other substances, used for linings of clothes and in bookbinding. Falstaff's " men in buckram " (Shakespeare, Henry I V., pt. i. II. 4) has become a proverbial phrase for any imaginary persons.

*BUCKSTONE, JOHN BALDWIN (1802-1879), English actor and dramatic writer, was born at Hoxton on the 14th of September 1802. He was articled to a solicitor, but soon ex- changed the law for the stage. After some years as a provincial actor he made his first London appearance, on the 30th of January 1823, at the Surrey theatre, as Ramsay in the Fortunes of Nigel. His success led to his engagement in 1827 at the Adelphi, where he remained as leading low comedian until 1833. At the Haymarket, which he joined for summer seasons in 1833, and of which he was lessee from 1853 to *&78, ne appeared as Bobby Trot in his own Luke the Labourer; and here were pro- duced a number of his plays and farces, Ellen Wareham, Uncle Tom and others. After his return from a visit to the United States in 1840 he played at several London theatres, among them the Lyceum, where he was Box at the first representation of Box and Cox. As manager of the Haymarket he surrounded himself with an admirable company, including Sothern and the Kendals. He produced the plays of Gilbert, Planche, Tom Taylor and Robertson, as well as his own, and in most of these he acted. He died on the 31st of October 1879. He was the author of 150 plays, some of which have been very popular. His daughter, Lucy Isabella Buckstone (1858-1893), was an actress, who made her first London appearance at the Haymarket theatre as Ada Ingot in David Garrick in 1875.*

BUCKTHORN, known botanically as Rhamnus cathartica (natural order Rhamnaceae), a much-branched shrub reach- ing 10 ft. in height, with a blackish bark, spinous branchlets, and ovate, sharply-serrated leaves, 1 to 2 in. long, arranged several together at the ends of the shoots. The small green flowers are regular and have the parts in fours; male and female flowers are borne on different plants. The fruit is succulent, black and globose, and contains four stones. The plant is a native of England, occurring in woods and thickets chiefly on the chalk; it is rare in Ireland and not wild in Scotland. It is native in Europe, north Africa and north Asia, and naturalized in some parts of eastern North America. The fruit has strong purgative properties, and the bark yields a yellow dye.

An allied species, Rhamnus Frangula, is also common in England, and is known as berry-bearing or black alder. It is distinguished from buckthorn by the absence of spiny branchlets, its non-serrated leaves, and bisexual flowers with parts in fives. The fruits are purgative and yield a green dye when unripe. The soft porous wood, called black dogwood, is used for gun- powder. Dyes are obtained from fruits and bark of other species of Rhamnus, such as R. infecloria, R. tinctoria and R. davurica — the two latter yielding the China green of commerce. Several varieties of R. Alaternus, a Mediterranean species, are grown in shrubberies.

Sea-buckthorn is Hippophae rhamnoides, a willow-like shrub, r to 8 ft. in height, with narrow leaves silvery on the under-

side, and globose orange-yellow fruits one-third of an inch in diameter. It occurs on sandy seashores from York to Kent and Sussex, but is not common.

American buckthorns are: Rhamnus purshiana or Cascara sagrada, of the Pacific coast, producing cascara bark, and R. Caroliniana, the alder-buckthorn. Bumelia lycioides (or lanu- ginosa) is popularly called " southern buckthorn."

BUCKWHEAT, the fruit (so-called seeds) of Fagopyrum escu- lentum (natural order Polygonaceae), a herbaceous plant, native of central Asia, but cultivated in Europe and North America; also extensively cultivated in the Himalaya, as well as an allied species F. tataricum. The fruit has a dark brown tough rind enclosing the kernel or seed, and is three-sided in form, with sharp angles, similar in shape to beech-mast, whence the name from the Ger. Buchweizen, beechwheat. Buckwheat is grown in Great Britain only to supply food for pheasants and to feed poultry, which devour the seeds with avidity. In the northern countries of Europe, however, the seeds are employed as human food, chiefly in the form of cakes, which when baked thin have an agreeable taste, with a darkish somewhat violet colour. The meal of buckwheat is also baked into crumpets, as a favourite dainty among Dutch children, and in the Russian army buck- wheat groats are served out as part of the soldiers' rations, which they cook with butter, tallow or hemp-seed oil. Buckwheat is also used as food in the United States, where " buckwheat cakes " are a national dish; and by the Hindus it is eaten on " bart " or fast days, being one of the phalahas or lawful foods for such occasions. When it is used as food for cattle the hard sharp angular rind must first be removed. As compared with the principal cereal grains, buckwheat is poor in nitrogenous sub- stances and fat; but the

rapidity and ease with which it can be grown render it a fit crop for very poor, badly tilled land. An immense quantity of buckwheat honey is collected in Russia, bees showing a marked preference for the flowers of the plant. The plant is also used as a green fodder.

In the United States buckwheat is sown at the end of June or beginning of July, the amount of seed varying from 3 to 5 pecks to the acre. The crop matures rapidly and continues blooming till frosts set in, so that at harvest, which is usually set to occur just before this period, the grain is in various stages of ripeness. It is cut by hand or with the self-delivery reaper, and allowed to lie in the swath for a few days and then set up in shocks. The stalks are not tied into bundles as in the case of other grain crops, the tops of the shocks being bound round and held together by twisting stems round them. The threshing is done on the field in most cases.

BUCOLICS (from the Gr. fiovnoXucos, " pertaining to a herds- man "), a term occasionally used for rural or pastoral poetry. The expression has been traced back in English to the beginning of the 14th century, being used to describe the " Eclogues " of Virgil. The most celebrated collection of bucolics in antiquity is that of Theocritus, of which about thirty, in the Doric dialect, and mainly written in hexameter verse, have been preserved. This was the name, as is believed, originally given by Virgil to his pastoral poems, with the direct object of challenging com- parison with the writings of Theocritus. In modern times the term " bucolics " has not often been specifically given by the poets to their pastorals; the main exception being that of Ronsard, who collected his eclogues under the title of " Les Bucoliques." In general practice the word is almost a synonym for pastoral poetry, but has come to bear a slightly more agri- cultural than shepherd signification, so that the " Georgics " of Virgil has grown to seem almost more " bucolic " than his " Eclogues." (See also Pastoral.) (E. G.)

BUCYRUS, a city and the county-seat of Crawford county, Ohio, U.S.A., on the Sandusky river, 62 m. N. of Columbus. Pop. (1890) 5974; (1900) 6560 (756 foreign-born); (1910) 8122. It is served by the Pennsylvania, the Toledo, Walhonding Valley & Ohio (Pennsylvania system), and the Ohio Central railways, and by interurban electric lines. The Ohio Central, of which Bucyrus is a division terminal, has shops here. The city lies at an elevation of about 1000 ft. above sea-level, and is surrounded

by a country well adapted to agriculture and stock-raising. Among its manufactures are machinery, structural steel, ven- tilating and heating apparatus, furniture, interior woodwork, ploughs, wagons, carriages, copper products and clay-working machines. Bucyrus was first settled in 1817; it was laid out as a town in 1822, was incorporated as a village in 1830, and became a city in 1885. The county-seat was permanently established here in 1830.

BUDAPEST, the capital and largest town of the kingdom of Hungary, and the second town of the Austro-Hungarian mon- archy, 163 m. S.E. of Vienna by rail. Budapest is situated on both banks of the Danube, and is formed of the former towns of Buda (Ger. Of en) together with O-Buda (Ger. Alt-Ofen) on the right bank, and of Pest together with Kobanya (Ger. Stein- bruch) on the left bank, which were all incorporated into one municipality in 1872. It lies at a point where the Danube has definitely taken its southward course, and just where the out- lying spurs of the outer ramifications of the Alps, namely, the Bakony Mountains, meet the Carpathians. Budapest is situated nearly in the centre of Hungary, and dominates by its strategical position the approach from the west to the great Hungarian plain. The imposing size of the Danube, 300 to 650 yds. broad, and the sharp contrast of the two banks, place Budapest among the most finely situated of the larger towns of Europe. On the one side is a flat sandy plain, in which lies Pest, modern of aspect, regularly laid out, and presenting a long frontage of handsome buildings to the river. On the other the ancient town of Buda straggles capriciously over a series of small and steep hills, commanded by the fortress and the Blocksberg (770 ft. high, 390 ft. above the Danube), and backed beyond by spurs of mountains, which rise in the form of terraces one above the other. The hills are generally devoid of forests, while those near the towns were formerly covered with vineyards, which produced a good red wine. The vineyards have been almost completely destroyed by the phylloxera.

Budapest covers an area of 78 sq. m., and is divided into ten municipal districts, namely Var (Festung), Vizivaros (Wasser- stadt), O-Buda (Alt-Ofen), all on the right bank, belonging to Buda, and Belvaros (Inner City), Lipotvaros (Leopoldstadt), Terezvaros (Theresienstadt), Erzsebetvaros (Elisabethstadt), Jozsefvaros (Josephstadt), Ferenczvaros (Franzstadt), and Kobanya (Steinbruch), all on the left bank, belonging to Pest. Buda, with its royal palace, the various ministries, and other government offices, is the official centre, while Pest is the com- mercial and industrial part,

as well as the centre of the national- istic and intellectual life of the town. The two banks of the Danube are united by six bridges, including two fine suspension bridges; the first of them, generally known as the Ketten-Briicke, constructed by the brothers Tiernay and Adam Clark in 1842- 1849, is one of the largest in Europe. It is 410 yds. long, 39 ft. broad, 36 ft. high above the mean level of the water, and its chains rest on two pillars 160 ft. high; its ends are ornamented with four colossal stone lions. At one end is a tunnel, 383 yds. long, constructed by Adam Clark in 1854, which pierces the castle hill and connects the quarter known as the Christinenstadt with the Danube. The other suspension bridge is the Schwurplatz bridge, completed in 1903, 56 ft. broad, with a span of 317 yds. The other bridges are the Margaret bridge, with a junction bridge towards the Margaret island, the Franz Joseph bridge, and two railway bridges.

Perhaps the most attractive part of Budapest is the line of broad quays on the left bank of the Danube, which extend for a distance of i\ m. from the Margaret bridge to the custom-house, and are lined with imposing buildings. The most important of these is the Franz Joseph Quai, 1 m. long, which contains the most fashionable cafes and hotels, and is the favourite promenade. The inner town is surrounded by the Innere Ring- Strasse, a circle of wide boulevards on the site of the old wall. Wide tree-shaded streets, like the Kiraly Utcza, the Kerrepesi Ut, and the Ulloi Ut, also form the lines of demarcation between the different districts. The inner ring is connected by the Vaczi Korut (Waitzner-Ring) with the Grosse Ring-Strasse, a succession

of boulevards, describing a semicircle beginning at the Margaret bridge and ending at the Boraros Platz, near the custom-house quay, through about the middle of the town. One of the most beautiful streets in the town is the Andrassy Ut, 1 \ m. long, connecting Vaczi Korut with Varosliget (Stadtwaldchen), the favourite public park of Budapest. It is a busy thoroughfare, lined in its first half with magnificent new buildings, and in its second half, where it attains a width of 150 ft., with handsome villas standing in their own gardens, which give the impression rather of a fashionable summer resort than the centre of a great city. Budapest possesses numerous squares, generally orna- mented with monuments of prominent Hungarians, usually the work of Hungarian artists.

Buildings. — Though of ancient origin, neither Buda nor Pest has much to show in the way of venerable buildings. • The oldest church is the Matthias church in Buda, begun by King Bela IV. in the 13th

century, completed in the 15th century, and restored in 1 890-1 896. It was used as a mosque during the Turkish occupation, and here took place the coronation of Franz Joseph as king of Hungary in 1867. The garrison church, a Gothic building of the 13th century, and the Reformed church, finished in 1898, are the other ecclesiastical buildings in Buda worth mentioning. The oldest church in Pest is the parish church situated in the Esku-Ter (Schwur- Platz) in the inner town; it was built in 1500, in the Gothic style, and restored in 1890. The most magnificent church in Pest is the Leopoldstadt Basilica, a Romanesque building with a dome 315 ft. in height, begun in 1851; next comes the Franzstadt church, also a Romanesque building, erected in 1874. Besides several modern churches, Budapest possesses a beautiful synagogue, in the Moorish style, erected in 1861, and another, in the Moorish-Byzantine style, built in 1872, while in 1901 the construction of a much larger synagogue was begun. In Buda, near the Kaiserbad, and not far from the Margaret bridge, is a small octagonal Turkish mosque, with a dome 25 ft. high, beneath which is the grave of a Turkish monk. By a special article in the treaty of Karlowitz of 1699 the emperor of Austria undertook to preserve this monument.

Among the secular buildings the first place is taken by the royal palace in Buda, which, together with the old fortress, crowns the summit of a hill, and forms the nucleus of the town. The palace erected by Maria Theresa in 1748-1771 was partly burned in 1849, but has been restored and largely extended since 1894. In the court chapel are preserved the regalia of Hungary, namely, the crown of St Stephen, the sceptre, orb, sword and the coronation robes. It is surrounded by a magnificent garden, which descends in steep terraces to the Danube, and which offers a splendid view of the town lying on the opposite bank. New and palatial buildings of the various ministries, several high and middle schools, a few big hospitals, and the residences of several Hungarian magnates, are among the principal edifices in this part of the town.

The long range of substantial buildings fronting the left bank of the Danube includes the Houses of Parliament (see Archi- tecture, Plate IX. fig. 115), a huge limestone edifice in the late Gothic style, covering an area of 3 J acres, erected in 1883-1902; the Academy, in Renaissance style, erected in 1862-1864, con- taining a lofty reception room, a library, a historic picture gallery, and a botanic collection; the Redoute buildings, a large structure in a mixed Romanesque and Moorish style, erected for balls and other social purposes; the extensive custom-house at the lower end of the quays, and several fine hotels and insurance offices. In the beautiful

Andrassy Ut are the opera-house (1875-1884), in the Italian Renaissance .style; the academy of music; the old and new exhibition building; the national drawing school; and the museum of fine arts (1900-1905), in which was installed in 1905 the national gallery, formed by Prince Esterhazy, bought by the government in 1865 for £130,000, and formerly housed in the academy, and the collection of modern pictures from the national museum. At the end of the street is one of the numerous monuments erected in various parts of the country to com- memorate the thousandth anniversary of the foundation of the kingdom of Hungary. Other buildings remarkable for their

size and interest are: the national museum (1836-1844); the town-hall (1869-1875), in the early Renaissance style; the uni- versity, with a baroque facade (rebuilt 1900), and the university library (opened in 1875), a handsome Renaissance building; the palace of justice (1896), a magnificent edifice situated not far from the Houses of Parliament. In its neighbourhood also are the palatial buildings of the ministries of justice and of agri- culture. There are also the exchange (1905); the Austro- Hungarian bank (1904); the central post and telegraph office; the art-industrial museum (1893-1897), in oriental style, with some characteristically Hungarian ornamentations; several handsome theatres; large barracks; technical and secondary schools; two great railway termini and a central market (1897) to be mentioned. To the south-east of the town lies the vast slaughter-house (1870-1872), which, with the adjacent cattle- market, covers nearly 30 acres of ground. The building activity of Budapest since 1867 has been extraordinary, and the town has undergone a thorough transformation. The removal of slums and the regulation of the older parts of the town, in connexion with the construction of the two new bridges across the Danube and of the railway termini, went hand-in-hand with the extension of the town, new quarters springing up on both banks of the Danube. This process is still going on, and Budapest has become one of the handsomest capitals of Europe.

Education. — Budapest is the intellectual capital of Hungary. At the head of its educational institutions stands the university, which was attended in 1900 by 4983 students — only about 2000 in 1880 — and has a staff of nearly 200 professors and lecturers. It has been completely transformed into a national Hungarian seat of learning

since 1867, and great efforts have been made to keep at home the Hungarian students, who before then fre- quented other universities and specially that of Vienna. It is well provided with scientific laboratories, botanic garden, and various collections, and possesses a library with nearly a quarter of a million volumes. The university of Budapest, the only one in Hungary proper, was established at Tyrnau in 163s, removed to Buda in 1777, and transferred to Pest in 1783. Next to it comes the polytechnic, attended by 1816 students in 1900, which is also thoroughly equipped for a scientific training. Other high schools are a veterinary academy, a Roman Catholic seminary, a Protestant theological college, a rabbinical institute, a com- mercial academy, to which has been added in 1899 an academy for the study of oriental languages, and military academies for the training of Hungarian officers. Budapest possesses an adequate number of elementary and secondary schools, as well as a great number of special and technical schools. At the head of the scientific societies stands the academy of sciences, founded in 1825, for the encouragement of the study of the Hungarian language and the various sciences except theology. Next to it comes the national museum, founded in 1807 through the donations of Count Stephan Szechenyi, which contains ex- tensive collections of antiquities, natural history and ethnology, and a rich library which, in its manuscript department of over 20,000 MSS., contains the oldest specimens of the Hungarian language. Another society which has done great service for the cultivation of the Hungarian language is the Kisfaludy society, founded in 1836. It began by distributing prizes for the best literary productions of the year, then it started the collection and publication of the Hungarian folklore, and lastly undertook the translation into the Hungarian language of the masterpieces of foreign literatures. The influence exercised by this society is very great, and it has attracted within its circle the best writers of Hungary. Another society similar in aim with this one is the Petofi society, founded in 1875. Amongst the numerous scien- tific associations are the central statistical department, and the Budapest communal bureau of statistics, which under the directorship of Dr Joseph de Korosy has gained a European reputation.

The artistic life in Budapest is fostered by the academy of music, which once had Franz Liszt as its director, a conservatoire of music, a dramatic school, and a school for painting and for drawing, all maintained by the government. Budapest possesses,

besides an opera house, eight theatres, of which two are sub- sidized by the government and one by the municipality. The performances

are almost exclusively in Hungarian, the exceptions being the occasional appearance of French, Italian and other foreign artists. Performances in German are under a popular taboo, and they are never given in a theatre at Budapest.

Trade.- — In commerce and industry Budapest is by far the most important town in Hungary, and in the former, if not also in the latter, it is second to Vienna alone in the Austro-Hungarian monarchy. The principal industries are steam flour-milling, distilling, and the manufacture of machinery, railway plant, carriages, cutlery, gold and silver wares, chemicals, bricks, jute, and the usual articles produced in large towns for home con- sumption. The trade of Budapest is mainly in corn, flour, cattle, horses, pigs, wines, spirits, wool, wood, hides, and in the articles manufactured in the town. The efforts of the Hungarian govern- ment to establish a great home industry, and the measures taken to that effect, have benefited Budapest to a greater degree than any other Hungarian town, and the progress made is remarkable The increase in the number of joint-stock companies, and the capital thus invested in industrial undertakings, furnish a valuable indication. In 1873 there were 28 such companies with a total capital of £2,224,900; in 1890, 75 with a capital of £9,352,000; and in 1899 no fewer than 242 with a total capital of £31,378,655, Budapest owes its great commercial importance to its situation on the Danube, on which the greater part of its trade is carried. The introduction of steamboats on the Danube in 1830 was one of the earliest material causes of the progress of Budapest, and gave a great stimulus to its corn trade. This still continues to operate, having been promoted by the flour-milling industry,' which was revolutionized by certain local inventions. Budapest is actually one of the greatest milling centres in the world, pos- sessing a number of magnificent establishments, fitted with machinery invented and manufactured in the city. Budapest is, besides, connected with all the principal places in Austria and Hungary by a well-developed net of railways, which all radiate from here.

Population. — Few European towns grew so rapidly as Buda- pest generally, and Pest particularly, during the 19th century, and probably none has witnessed such a thorough transformation since 1867. In 1799 the joint population of Buda and Pest was 54,179, of which 24,306 belonged to Buda, and 29,870 belonged to Pest, being the first time that the population of Pest exceeded that of Buda. By 1840, however, Buda had added but 14,000 to its population, while that of Pest had more than doubled; and of the joint population of 270,685 in 1869, fully 200,000 fell to the share of Pest. In 1880 the

civil population of Budapest was 360,551, an increase since 1869 of 32 %; and in 1890 it was 491,938, an increase of 36-57 % in the decade. In the matter of the increase of its population alone, Budapest has only been slightly surpassed by one European town, namely, Berlin. Both capitals multiplied their population by nine in the first nine decades of the century. According to an interesting and in- structive comparison of the growth of twenty-eight European cities made by Dr Joseph de Korosy, Berlin in 1890 showed an increase, as compared with the beginning of the century, of 818 % and Budapest of 809 %. Within the same period the increase of Paris was 343 %, and of London 340 %. In 1900 the civil popu- lation of Budapest was 716,476 inhabitants, showing an increase of 44-82 % in the decade. To this must be added a garrison of 15,846 men, making a total population of 732,322. Of the total population, civil and military, 578,458 were Magyars, 104,520 Were Germans, 25,168 were Slovaks, and the remainder was composed of Croatians, Servians, Rumanians, Russians, Greeks, Armenians, Gypsies, &c. According to religion, there were 445,023 Roman Catholics, 5806 Greek Catholics, 4422 Greek Orthodox; 67,319 were Protestants of the Helvetic, and 38,811 were Protestants of the Augsburg Confessions; 168,985 were Jews, and the remainder belonged to various other creeds. A striking feature in the progress of Budapest is the decline in the death-rate, which sank from 43-4 per thousand in 1874 to ao-6 per thousand in 1900. In addition to the increased influx of

persons in the prime of b'fe, this is due largely to the improved water-supply and better sanitary conditions generally, including increased hospital accommodation.

Social Position. — Budapest is the seat of the government of Hungary, of the parliament, and of all the highest official authorities — civil, military, judicial and financial. It is the meeting-place, alternately with Vienna, of the Austro-Hungarian delegations, and it was elected to an equality with Vienna as a royal residence in 1892. It is the see of a Roman Catholic archbishop. The town is administered by an elected municipal council, which consists of 400 members. As Paris is sometimes said to be France, so may Budapest with almost greater truth be said to be Hungary. Its composite population is a faithful reflection of the heterogeneous elements in the dominions of the Habsburgs, while the trade and industry of

Hungary are central- ized at Budapest in a way that can scarcely be affirmed of any other European capital. In virtue of its cultural institutions, it is also the intellectual and artistic centre of Hungary. The movement in favour of Magyarizing all institutions has found its strongest development in Budapest, where the German names have all been removed from the buildings and streets. The wonderful progress of Budapest is undoubtedly due to the revival of the Hungarian national spirit in the first half of the 19th cen- tury, and to the energetic and systematic efforts of thegovernment and people of Hungary since the restoration of the constitution. So far as Hungary was concerned, Budapest in 1867 at once became the favoured rival of Vienna, with the important addi- tional advantage that it had no such competitors within its own sphere as Vienna had in the Austrian provincial capitals. The political, intellectual, and social life of Hungary was centred in Budapest, and had largely been so since 1848, when it became the seat of the legislature, as it was that of the Austrian central administration which followed the revolution. The ideal of a prosperous, brilliant and attractive Magyar capital, which would keep the nobles and the intellectual flower of the country at home, uniting them in the service of the Fatherland, had received a powerful impetus from Count Stephan Szechenyi, the great Hungarian reformer of the pre-Revolutionary period. His work, continued by patriotic and able successors, was now taken up as the common task of the government and the nation. Thus the promotion of the interests of the capital and the centralization of the public and commercial life of the country have formed an integral part of the policy of the state since the restoration of the constitution. Budapest has profited largely by the encouragement of agriculture, trade and industry, by the nationalization of the railways, by the development of inland navigation, and also by the neglect of similar measures in favour of Vienna.

From that time to the present day the record of the Hungarian capital has been one of uninterrupted advance, not merely in externals, such as the removal of slums, the reconstruction of the town, the development of communications, industry and trade, and the erection of important public buildings, but also in the mental, moral and physical elevation of the inhabitants; besides another important gain from the point of view of the Hungarian statesman, namely, the progressive increase and improvement of status of the Magyar element of the population. When it is remembered that the ideal of both the authorities and the people is the ultimate monopoly of the home market by Hungarian industry and trade, and the strengthening of the Magyar influence by centralization, it is easy to

understand the progress of Budapest.

Politically, this ambitious and progressive capital is the creation of the Magyar upper classes. Commercially and indus- trially, it may be said to be the work of the Jews. The sound judgment of the former led them to welcome and appreciate the co-operation of the latter. Indeed, a readiness to assimilate foreign elements is characteristic of Magyar patriotism, which has, particularly within the last generation, made numerous converts among the other nationalities of Hungary, and — for •uational purposes — may be considered to have quite absorbed ther Hungarian Jews. It has thus come tb'pass that there is no

anti-Semitism in Budapest, although the Hebrew element is. proportionately much larger (21 % as compared with 9 %) than it is in Vienna, the Mecca of the Jew-baiter.

Budapest has long been celebrated for its mineral springs and baths, some of them having been already used during the Roman period. They rise at the foot of the Blocksberg, and are powerful chalybeate and sulphureous hot springs, with a tempera- ture of 8o°-i5o° Fahr. The principal baths are the Bruckbad and the Kaiserbad, both dating from the Turkish period; the St Lucasbad; and the Raitzenbad, rebuilt in i860, one of the most magnificent establishments of its kind, which was connected through a gallery with the royal palace in the time of Matthias Corvin. There is an artesian well of sulphureous water with a temperature of 153° Fahr. in the Stadtwaldchen; and another, yielding sulphureous water with a temperature of no° Fahr., which is used for both drinking and bathing, in the Margaret island. The mineral springs, which yield bitter alkaline waters, are situated in the plain south of the Blocksberg, and are over 40 in number. The principal are the Hunyadi-Janos spring, of which about 1,000,000 bottles are exported annually, the Arpad spring, and the Apenta spring.

The largest and most popular of the parks in Budapest is the Varosliget, on the north-east side of the town. It has an area of 286 acres, and contains the zoological garden. On an island in its large pond are situated the agricultural (1902-1904) and the ethnographical museums. It was in this park that the millennium exhibition of 1 896 .took place. A still more delightful resort is the Margaret island, a long narrow island in the Danube, the property of the archduke Joseph, which has been laid out in the style of an English park, with fine trees, velvety turf and a group of villas and bath-houses. The name of the island is derived from St Margaret, the

daughter of King Bela IV. (13th century), who built here a convent, the ruins of which are still in existence. To the west of Buda extends the hill (1463 ft.) of Svab-Hegy (Schwabenberg) , with extensive view and numerous villas; it is ascended by a rack-and-pinion railway. A favourite spot is the Zugliget (Auwinkel), a wooded dale on the northern slope of the hill. To the north of O-Buda, about 4 m. from the Margaret island, on the right bank of the Danube, are the remains of the Roman colony of Aquincum. They include the foundations of an amphitheatre, of a temple, of an aqueduct, of baths and of a castrum. The objects found here are preserved in a small museum. To the north of Pest lies the historic Rakos field, where the Hungarian diets were held in the open air from the 10th to the 14th century; and 23 m. to the north lies the royal castle of Godollo, with its beautiful park.

History. — The history of Budapest consists of the separate history of the two sister towns, Buda and Pest. The Romans founded, in the 2nd century a.d., on the right bank of the Danube, on the site of the actual O-Buda, a colony, on the place of a former Celtic settlement. This colony was named Aquincum, a transformation from the former Celtic name of Ak-ink, meaning " rich waters." The Roman occupation lasted till a.d. 376, and then the place was invaded by Huns, Ostrogoths, and later by Avars and Slavs. When the Magyars came into the country, at the end of the 10th century, they preserved the names of Buda and Pest, which they found for these two places. The origin of Pest proper is obscure, but the name, apparently derived from the old Slavonic pestj, a stove (like Ofen, the German name of Buda), seems to point to an early Slavonic settlement. The Romans never gained a foothold on this side of the river.

When it first appears in history Pest was essentially a German settlement, and a chronicler of the 13th century describes it as " Villa Teutonica ditissima." Christianity was introduced early in the nth century. In 1241 Pest was destroyed by the Tatarsˆ after whose departure in 1 244 it was created a royal free city by Bela IV., and repeopled with colonists of various nationalities. The succeeding period seems to have been one of considerable prosperity, though Pest was completely eclipsed by the sister town of Buda with its fortress and palace. This fortress and palace were built by King Bela IV. in 1247, and were the nucleus round which the town of Buda was burlt, which soon gained

great importance, and became in 1361 the capital of Hungary. In 1526 Pest was taken and pillaged by the Turks, and from 1541 to 1686 Buda was the seat of a Turkish pasha. Pest in the mean- time entirely lost its importance, and on the departure of the Turks was left little more than a heap of ruins. Its favourable situation and the renewal of former privileges helped it to revive, and in 1723 it became the seat of the highest Hungarian officials. Maria Theresa and Joseph II. did much to increase its importance, but the rapid growth which enabled it completely to outstrip Buda belongs entirely to the 19th century. A signal proof of its vitality was given in 1838 by the speed and ease with which it recovered from a disastrous inundation that destroyed 3000 houses. In 1848 Pest became the seat of the revolutionary diet, but in the following year the insurgents had to retire before the Austrians under Windischgratz. A little later the Austrians had to retire in their turn, leaving a garrison in the fortress of Buda, and, while the Hungarians endeavoured to capture this position, General Hentzi retaliated by bombarding Pest, doing great damage to the town. In 1872 both towns were united into' one municipality. In 1896 took place here the millennium exhibition, in celebration of the thousandth anniversary of the foundation of the kingdom of Hungary.

Bibliography. — The official publications of the Budapest Communal Bureau of Statistics have acquired a European repute for their completeness, and their fearless exposure of shortcomings has been an element in the progress of the town. Reference should also be made to separate works of the director of that institution, Dr Joseph de Korosy, known in England for his discovery of the law of marital fertility, published by the Royal Society, and by his labours in the development of comparative international statistics. His Statistique Internationale des grandes villes and Bulletin annuel des finances des grandes villes give valuable comparative data. See also Die Osterreichisch-Ungarische Monarchie in Wort und Bild (Wien, 1886-1902, 24 vols.); volume xii., published in 1893, is devoted to Budapest. (O. Br.)

BUDAUN, a town and district of British India, in the Rohil- khand division of the United Provinces. The town is near the left bank of the river Sot. Pop. (1901) 39,031. There are ruins of an immense fort and a very handsome mosque of imposing size, crowned with a dome, and built in 1223 in great part from the materials of an ancient Hindu temple. The American Methodist mission maintains several girls' schools, and there is a high school for boys. According to tradition Budaun was founded about a.d. 905, and an inscription, probably of the 12th century, gives a list of twelve Rathor kings

reigning at Budaun (called Vodama- yuta). The first authentic historical event connected with it, however, is its capture by Kutb-ud-din in 1196, after which it became a very important post on the northern frontier of the Delhi empire. In the 13th century two of its governors, Shams- ud-din Altamsh, the builder of the great mosque referred to above, and his son Rukn-ud-din Firoz, attained the imperial throne. In 1 57 1 the town was burnt, and about a hundred years later, under Shah Jahan, the seat of the governorship was transferred to Bareilly; after which the importance of Budaun declined. It ultimately came into the power of the Rohillas, and in 1838 was made the headquarters of a British district. In 1857 the people of Budaun sided with the mutineers, and a native government was set up, which lasted until General Penny's victory at Kakrala (April 1858) led to the restoration of British authority.

The District of Budaun has an area of 1987 sq. m. Pop. (1901) 1,025,753. The country is low, level, and is generally fertile, and watered by the Ganges, the Ramganga, the Sot or Yarwafadar, and the Mahawa. Budaun district was ceded to the British government in 1801 by the nawab of Oudh. There are several indigo factories. The district is crossed by two lines of the Oudh & Rohilkhand railway, and by a narrow-gauge line from Bareilly. The chief centre of trade is Bilsi.

BUDDEUS, JOHANN FRANZ (1667-17 29), German Lutheran divine, was born at Anklam, a town of Pomerania, where his father was pastor. He studied with great distinction at Greifs- wald and at Wittenberg, and having made a special study of languages, theology and history, was appointed professor of Greek and Latin at Coburg in 1692, professor of moral philosophy iv. 24

in the university of Halle in 1693, and in 1705 professor of theology at Jena. Here he was held in high esteem, and in 17 15 became Primarius of his faculty and member of the Consistory. His principal works are: Leipzig, ailgemeines historisches Lexikon (Leipzig, 1709 ff.); Historia Ecclesiastica Veteris Testamenti (4 vols., Halle, 1709); Elementa PhUosophiae Practical, Inslrumenl- alis, et Theoreticae (3 vols., 1697); Selecla Juris Naturae el Gentium (Halle, 1704); Miscellanea Sacra (3 vols., Jena, 1727); and Isagoge Historico-Theologica ad Theologiam Universam, singulasque ejus partes (2 vols., 1727).

BUDDHA. According to the Buddhist theory (see Buddhism), a " Buddha " appears from time to time in the world and preaches the true doctrine. After a certain lapse of time this teaching is corrupted

and lost, and is not restored till a new Buddha appears. In Europe, Buddha is used to designate the last historical Buddha, whose family name was Gotama, and who was the son of Sudd- hodana, one of the chiefs of the tribe of the Sakiyas, one of the republican clans then still existent in India.

We are accustomed to find the legendary and the miraculous gathering, like a halo, around the early history of religious leaders, until the sober truth runs the risk of being altogether neglected for the glittering and edifying falsehood. The Buddha has not escaped the fate which has befallen the founders of other religions; and as late as the year 1854 Professor Wilson of Oxford read a paper before the Royal Asiatic Society of London in which he maintained that the supposed life of Buddha was a myth, and " Buddha himself merely an imaginary being." No one, however, would now support this view; and it is admitted that, under the mass of miraculous tales which have been handed down regarding him, there is a basis of truth already sufficiently clear to render possible an intelligent history.

The circumstances under which the future Buddha was_ born were somewhat as follows. 1 In the 6th century B.C. the Aryan tribes had long been settled far down the valley of the Ganges. The old child-like joy in life so manifest in the Vedas had died away; the worship of nature had developed or degenerated into the worship of new and less pure divinities; and the Vedic songs themselves, whose freedom was little compatible with the spirit of the age, had faded into an obscurity which did not lessen their value to the priests. The country was politically split up into little principalities, most of them governed by some petty despot, whose interests were not often the same as those of the com- munity. There were still, however, about a dozen free republics, most of them with aristocratic government, and it was in these that reforming movements met with most approval and support. A convenient belief in the doctrine of the transmigration of souls satisfied the unfortunate that their woes were the natural result of their own deeds in a former birth, and, though unavoidable now, might be escaped in a future state of existence by present good conduct. While hoping for a better fate in their next birth, the poor turned for succour and advice in this to the aid of astrology, witchcraft and animism — -a belief in which seems to underlie all

1 Note on the Date of the Buddha. — The now generally accepted date of the Buddha is arrived at by adding together two numbers, one being the date of the accession of Asoka to the throne, the second

being the length of the interval between that date and that of the death of the Buddha. The first figure, that of the date of Asoka, is arrived at by the mention in one of his edicts of certain Greek kings, as then living. The dates of these last are approxi- mately known; and arguing from these dates the date of Asoka's accession has been fixed by various scholars (at dates varying only by a difference of five years more or less) at about 270 B.C. The second figure, the total interval between Asoka's accession and the Buddha's death, is given in the Ceylon Chronicles as 218 years. Adding these two together, the date of the Buddha's death would be 488 B.C., and, as he was eighty years old at the time of his death, the date of his birth would be 568 B.C. The dates for his death and birth accepted in Burma, Siam and Ceylon are about half a century earlier, namely, 543 and 623 B.C., the difference being in the date of Asoka's accession. It will be seen that the dates as adopted in Europe are approximate only, and liable to correction if better data are obtainable. The details of this chronological question ara discussed at length in Professor Rhys Davids' Ancient Coins and Measures of Ceylon (London, 1877), where the previous discussions are referred to.

11

religions, and still survives even in England. 1 The inspiriting wars against the enemies of the Aryan people, the infidel deniers of the Aryan gods, had given place to a succession of internecine feuds between the chiefs of neighbouring clans. In literature an age of poets had long since made way for an age of commentators and grammarians, who thought that the old poems must have been the work of gods. But the darkest period was succeeded by the dawn of a reformation; travelling logicians were willing to maintain these against all the world; whilst here and there ascetics strove to raise themselves above the gods, and hermits earnestly sought for some satisfactory solution of the mysteries of life. These were the teachers whom the people chiefly delighted to honour. Though the ranks of the priesthood were for ever firmly closed against intruders, a man of lay birth, a Kshatriya or Vaisya, whose mind revolted against the orthodox creed, and whose heart was stirred by mingled zeal and ambition, might find through these irregular orders an entrance to the career of a religious teacher and reformer.

The Sakiya clan was then seated in a tract of country probably two or three thousand square miles in extent, the chief town of which was Kapilavastu, situate about 27 37′ N. by 83° n' E., some days' journey north of Benares. Their territory stretched up into the lower slopes of the mountains, and was mostly in what is now Nepal, but it included territory now on the British side of the frontier. It is in this part of the Sakiya country that the interesting discovery was made of the monument they erected to their famous clansman. From their well-watered rice-fields, the main source of their wealth, they could see the giant Himalayas looming up against the clear blue of the Indian sky. Their supplies of water were drawn from the river Rohini, the modern Kohana; and though the use of the river was in times of drought the cause of disputes between the Sakiyas and the neighbouring Koliyans, the two clans were then at peace; and two daughters of a chieftain of Koli, which was only n m. east of Kapilavastu, were the principal wives of Suddhodana. Both were childless, and great was the rejoicing when, in about the forty-fifth year of her age, the elder sister, Maha Maya, promised her husband a son. In due time she started with the intention of being confined at her parents' home, but the party halting on the way under the shade of some lofty satin-trees, in a pleasant garden called Lumbini on the river-side, her son, the future Buddha, was there unexpectedly born. The exact site of this garden has been recently rediscovered, marked by an inscribed pillar put up by Asoka (see J.R.A.S., 1898).

He was in after years more generally known by his family name of Gotama, but bis individual name was Siddhattha. When he was nineteen years old he was married to his cousin Yasodhara, daughter of a Koliyan chief, and gave himself up to a life of luxury. This is the solitary record of his youth; we hear nothing more till, in his twenty-ninth year, it is related that, driving to his pleasure-grounds one day, he was struck by the sight of a man utterly broken down by age, on another occasion by the sight of a man suffering from a loathsome disease, and some months after by the horrible sight of a decomposing corpse. Each time his charioteer, whose name was Channa, told him that such was the fate of all living beings. Soon after he saw an ascetic walking in a calm and dignified manner, and asking who that was, was told by his charioteer the character and aims of the Wanderers, the travelling teachers, who played so great a part in the intellectual life of the time. The different accounts of these visions vary so much as to cast great doubts on their accuracy; and the oldest one of all (Anguttara, i. 145) speaks of ideas only, not of actual visions. It is, however, clear from what follows, that about this time the mind of the young Rajput must, from some cause

or other, have been deeply stirred. Many an earnest heart full of disappointment or enthusiasm has gone through a similar struggle, has learnt to look upon all earthly gains and hopes as worse than vanity, has envied the calm life of the cloister, troubled by none of these things, and has longed for an opportunity of entire self- surrender to abstinence and meditation.

1 See report of Rex. v. Neuhaus, Clerkenwell Sessions, September 15,

1906.

Subjectively, though not objectively, these visions may be supposed to have appeared to Gotama. After seeing the last of them, he is said, in the later accounts , to have spent the afternoon in his pleasure-grounds by the river-side; and having bathed, to have entered his chariot in order to return home. Just then a messenger arrived with the news that his wife Yasodhara had given birth to a son, his only child. " This/' said Gotama quietly, " is a new and strong tie I shall have to break." But the people of Kapilavastu were greatly delighted at the birth of the young heir, the raja's only grandson. Gotama's return became an ovation; musicians preceded and followed his chariot, while shouts of joy and triumph fell on his ear. Among these sounds one especially attracted his attention. It was the voice of a young girl, his cousin, who sang a stanza, saying, " Happy the father, happy the mother, happy the wife of such a son and husband." In the word " happy " lay a double meaning; it meant also freed from the chains of rebirth, delivered, saved. Grateful to one who, at such a time, reminded him of his highest hopes, Gotama, to whom such things had no longer any value, took off his collar of pearls and sent it to her. She imagined that this was the beginning of a courtship, and began to build day- dreams about becoming his principal wife, but he took no further notice of her and passed on. That evening the dancing-girls came to go through the Natch dances, then as now so common on festive occasions in many parts of India; but he paid them no attention, and gradually fell into an uneasy slumber. At mid- night he awoke; the dancing-girls were lying in the ante-room; an overpowering loathing filled his soul. He arose instantly with a mind fully made up — " roused into activity," says the Sinhalese chronicle, " like a man who is told that his house is on fire." He called out to know who was on guard, and finding it was his charioteer Channa, he told him to saddle his horse. While Channa was gone Siddhattha gently opened the door of the room where Yasodhara was sleeping, surrounded by flowers, with one hand on the head of their child. He had hoped to take the babe in his arms for the last time before he went, but now he stood for a few

moments irresolute on the threshold looking at them. At last the fear of awakening Yasodhara prevailed; he tore himself away, promising himself to return to them as soon as his mind had become clear, as soon as he had become a Buddha, — i.e. Enlightened, — and then he could return to them not only as husband and father, but as teacher and saviour. It is said to have been broad moonlight on the full moon of the month of July, when the young chief, with Channa as his sole companion, leaving his father's home, his wealth and social position, his wife and child behind him, went out into the wilderness to become a penniless and despised student, and a homeless wanderer. This is the circumstance which has given its name to a Sanskrit work, the Mahabhinishkramana Sutra, or Sutra of the Great Renunciation.

Next is related an event in which we may again see a sub- jective experience given under the form of an objective reality. Mara, the great tempter, appears in the sky, and urges Gotama to stop, promising him, in seven days, a universal kingdom over the four great continents if he will but give up his enterprise. 2 When his words fail to have any effect, the tempter consoles himself by the confident hope that he will still overcome his enemy, saying, " Sooner or later some lustful or malicious or angry thought must arise in his mind; in that moment I shall be his master"; and from that hour, adds the legend, "as a shadow always follows the body, so he too from that day always followed the Blessed One, striving to throw every obstacle in his way towards the Buddhahood." Gotama rides a long distance that night, only stopping at the banks of the Anoma beyond the Koliyan territory. There, on the sandy bank of the river, at a spot where later piety erected a dagaba (a solid dome-shaped relic shrine), he cuts off with his sword his long flowing locks, and, taking off his ornaments, sends them and the horse back in charge of the unwilling Channa to Kapilavastu. The next seven days were spent alone in a grove of mango trees

- The various legends of Mara are the subject of an exhaustive critical analysis in Windisch's Mara und Buddha (Leipzig, 1895).

near by, whence the recluse walks on to Rajagriha, the capital of Magadha, and residence of Bimbisara, one of the then most powerful rulers in the valley of the Ganges. He was favourably received by the raja; but though asked to do so, he would not as yet assume the responsibilities of a teacher. He attached himself first to a brahmin

sophist named Alara, and afterwards to another named Udraka, from whom he learnt all that Indian philosophy had then to teach. Still unsatisfied, he next retired to the jungle of Uruvela, on the most northerly spur of the Vindhya range of mountains, and there for six years, attended by five faithful disciples, he gave himself up to the severest penance and self-torture, till his fame as an ascetic spread in all the country round about " like the sound," says the Burmese chronicle, " of a great bell hung in the canopy of the skies." l At last one day, when he was walking in a much enfeebled state, he felt on a sudden an extreme weakness, like that caused by dire starvation, and unable to stand any longer he fell to the ground. Some thought he was dead, but he recovered, and from that time took regular food and gave up his severe penance, so much so that his five disciples soon ceased to respect him, and leaving him went to Benares.

There now ensued a second struggle in Gotama's mind, described with all the wealth of poetry and imagination of which the Indian mind is master. The crisis culminated on a day, each event of which is surrounded in the Buddhist accounts with the wildest legends, on which the very thoughts passing through the mind of Buddha appear in gorgeous descriptions as angels of darkness or of light. To us, now taught by the experiences of centuries how weak such exaggerations are compared with the effect of a plain unvarnished tale, these legends may appear childish or absurd, but they have a depth of meaning to those who strive to read between the lines of such rude and inarticulate attempts to describe the indescribable. That which (the previous and subsequent career of the teacher being borne in mind) seems to be possible and even probable, appears to be somewhat as follows.

Disenchanted and dissatisfied, Gotama had given up all that most men value, to seek peace in secluded study and self-denial. Failing to attain his object by learning the wisdom of others, and living the simple life of a student, he had devoted himself to that intense meditation and penance which all philosophers then said would raise men above the gods. Still unsatisfied, longing always for a certainty that seemed ever just beyond his grasp, he had added vigil to vigil, and penance to penance, until at last, when to the wondering view of others he had become more than a saint, his bodily strength and his indomitable resolu- tion and faith had together suddenly and completely broken down. Then, when the sympathy of others would have been most welcome, he found his friends falling away from him, and his disciples leaving him for other teachers. Soon after, if not on the very day when his followers had left him, he wandered out towards the banks of the Neranjara, receiving his morning meal from

the hands of Sujata, the daughter of a neighbouring villager, and set himself down to eat it under the shade of a large tree (a Ficus religiosa), to be known from that time as the sacred Bo tree or tree of wisdom There he remained through the long hours of that day debating with himself what next to do. All his old temptations came back upon him with renewed force. For years he had looked at all earthly good through the medium of a philosophy which taught htm that it, without exception, contained within itself the seeds of bitterness, and was altogether worthless and impermanent; but now to his wavering faith the sweet delights of home and love, the charms of wealth and power, began to show themselves in a different light, and glow again with attractive colours. He doubted, and agonized in his doubt; but as the sun set, the religious side of his nature had won the victory, and seems to have come out even purified from the struggle. He had attained to Nirvana, had become clear in his mind, a Buddha, an Enlightened One. From that night he not only did not claim any merit on account of his self-mortification, but took every opportunity of declaring that from such penances 1 Bigandet, p. 49 ; and compare JSlaka, p. 67, line 27.

no advantage at all would be derived. All that night he is said to have remained in deep meditation under the Bo tree; and the orthodox Buddhists believe that for seven times seven nights and days he continued fasting near the spot, when the archangel Brahma came and ministered to him. As for himself, his heart was now fixed, — his mind was made up, — but he realized more than he had ever done before the power of temptation, and the difficulty, the almost impossibility, of understanding and holding to the truth. For others subject to the same tempta- tions, but without that earnestness and insight which he felt himself to possess, faith might be quite impossible, and it would only be waste of time and trouble to try to show to them " the only path of peace." To one in his position this thought would be so very natural, that we need not hesitate to accept the fact of its occurrence as related in the oldest records. It is quite consistent with his whole career that it was love and pity for others — otherwise, as it seemed to him, helplessly doomed and lost — - which at last overcame every other consideration, and made Gotama resolve to announce his doctrine to the world.

The teacher, now 35 years of age, intended to proclaim his new gospel first to his old teachers Alara and Udraka, but finding that they were dead, he determined to address himself to his former five disciples, and accordingly went to the Deer- forest near Benares where they were then living. An old gdlha, or hymn (translated in Vinaya Texts, i. 90) tells us how the Buddha, rapt with the idea of

his great mission, meets an acquaintance, one Upaka, a wandering sophist, on the way. The latter, struck with his expression, asks him whose religion it is that makes him so glad, and yet so calm. The reply is striking. " I am now on my way," says the Buddha, " to the city of Benares, to beat the drum of the Ambrosia (to set up the light of the doctrine of Nirvana) in the darkness of the world! " and he proclaims himself the Buddha who alone knows, and knows no teacher. Upaka says: "You profess yourself, then, friend, to be an Arahat and a conqueror?" The Buddha says: " Those indeed are conquerors who, as I have now, have con- quered the intoxications (the mental intoxication arising from ignorance, sensuality or craving after future life). Evil dis- positions have ceased in me; therefore is it that I am con- queror ! " His acquaintance rejoins: " In that case, venerable Gotama, your way lies yonder ! " and he himself, shaking his head, turns in the opposite direction.

Nothing daunted, the new prophet walked on to Benares, and in the cool of the evening went on to the Deer-forest where the five ascetics were living. Seeing him coming, they resolved not to recognize as a superior one who had broken his vows; to address him by his name, and not as " master " or " teacher "; only, he being a Kshatriya, to offer him a seat. He understands their change of manner, calmly tells them not to mock him by calling him " the venerable Gotama "; that he has found the ambrosia of truth and can lead them to it. They object, natur- ally enough, from the ascetic point of view, that he had failed before while he was keeping his body under, and how can his mind have won the victory now, when he serves and yields to his body. Buddha replies by explaining to them the principles of his new gospel, in the form of noble truths, and the Noble Eightfold Path (see Buddhism).

It is nearly certain that Buddha had a commanding presence, and one of those deep, rich, thrilling voices which so many of the successful leaders of men have possessed. We know his deep earnestness, and his thorough conviction of the truth of his new gospel. When we further remember the relation which the five students mentioned above had long borne to him, and that they had passed through a similar culture, it is not difficult to under- stand that his persuasions were successful, and that his. old disciples were the first to acknowledge him in his new character. The later books say that they were all converted at once; but, according to the most ancient Pali record — though their old love and reverence had been so rekindled when the Buddha came near that their cold resolutions quite broke down, and they vied with each other in such acts of personal attention as an

Indian disciple loves to pay to his teacher,ˆyet it was only after the Buddha had for five days talked to them, sometimes separ- ately, sometimes together, that they accepted in its entirety his plan of salvation. 1

The Buddha then remained at the Deer-forest near Benares until the number of his personal followers was about threescore, and that of the outside believers somewhat greater. The prin- cipal among the former was a rich young man named Yasa, who had first come to him at night out of fear of his relations, and afterwards shaved his head, put on the yellow robe, and succeeded in bringing many of his former friends and companions to the teacher, his mother and his wife being the first female disciples, and his father the first lay devotee. It should be noticed in passing that the idea of a priesthood with mystical powers is altogether repugnant to Buddhism; every one's salvation is entirely dependent on the modification or growth of his own inner nature, resulting from his own exertions. The life of a recluse is held to be the most conducive to that state of sweet serenity at which the moTe ardent disciples aim; but that of a layman, of a believing householder, is held in high honour; and a believer who does not as yet feel himself able or willing to cast off the ties of home or of business, may yet " enter the paths," and by a life of rectitude and kindness ensure for himself a rebirth under more favourable conditions for his growth in holiness.

After the rainy season Gotama called together those of his disciples who had devoted themselves to the higher life, and said to them: " I am free from the five hindrances which, like an immense net, hold men and angels in their power; you too (owing to my teaching) are set free. Go ye now, brethren, and wander for the gain and welfare of the many, out of compassion for the world, to the benefit of gods and men. Preach the doctrine, beauteous in inception, beauteous in continuation, beauteous in its end. Proclaim the pure and perfect life. Let no two go to- gether. I also go, brethren, to the General's village in the wilds of Uruvela." 2 Throughout his career, Gotama yearly adopted the same plan, collecting his disciples round him in the rainy season, and after it was over travelling about as an itinerant preacher; but in subsequent years he was always accompanied by some of his most attached disciples.

In the solitudes of Uruvela there were at this time three brothers,

fire-worshippers and hermit philosophers, who had gathered round them a number of scholars, and enjoyed a con- siderable reputation as teachers. Gotama settled among them, and after a time they became believers in his system,— the elder brother, Kassapa, taking henceforth a principal place among his followers. His first set sermon to his new disciples is called by Bishop Bigandet the Sermon on the Mount. Its subject was a jungle-fire which broke out on the opposite hillside. He warned his hearers against the fires of concupiscence, anger, ignorance, birth, death, decay and anxiety; and taking each of the senses in order he compared all human sensations to a burning flame which seems to be something it is not, which produces pleasure and pain, but passes rapidly away, and ends only in destruction. 3

*Accompanied by his new disciples, the Buddha walked on to Rajagaha, the capital of King Bimbisara, who, not unmindful of their former interview, came out to welcome him. Seeing Kassapa, who as the chronicle puts it, was as well known to them as the banner of *the city, the people at first doubted who was the teacher and who the disciple, but Kassapa put an end to their hesitation by stating that he had now given up his belief in the efficacy of sacrifices either great or small; that Nirvana was a state of rest to be attained only by a change of heart; and that he had become a disciple of the Buddha. Gotama then spoke to the king on the miseries of the world which arise from passion, and on the possibility of release by following the*

1 Vinaya Texts, i. 97-99; cf. Jataka, vol. i. p. 82, lines 11-19.

2 Samyutta, i. 105.

3 Cf . Big. p. 99, with Hardy, M.B, p. 191. The Pali name is aditta-pariyaya : the sermon on the lessons to be drawn from burning. The text is Vinaya, i. 34 = Samyutta, iv. 19. A literal translation will be found in Vinaya Texts, i. 134, 135.

way of salvation. The raja invited him and his disciples to eat their simple mid-day meal at his house on the following morning; and then presented the Buddha with a garden called Veluvana or Bamboo-grove, afterwards celebrated as the place where the Buddha spent many rainy seasons, and preached many of his most complete discourses. There he taught for some time, attracting large numbers of hearers, among whom two, Sariputta and Moggallana, who afterwards became conspicuous leaders in the new crusade, then joined the Sangha or Society, as the Buddha's order of mendicants was called.

Meanwhile the prophet's father, Suddhodana, who had anxiously watched his son's career, heard that he had given up his asceticism, and had appeared as a Wanderer, an itinerant preacher and teacher. He sent therefore to him, urging him to come home, that he might see him once more before he died. The Buddha accordingly started for Kapilavastu, and stopped according to his custom in a grove outside the town. His fathei and uncles and others came to see him there, but the latter were angry, and would pay him no reverence. It was the custom to invite such teachers and their disciples for the next day's meal, but they all left without doing so. The next day, therefore, Gotama set out at the usual hour, carrying his bowl to beg for a meal. As he entered the city, he hesitated whether he should not go straight to his father's house, but determined to adhere to his custom. It soon reached his father's ears that his son was walking through the streets begging. Startled at such news he rose up, seizing the end of his outer robe, and hastened to the place where Gotama was, exclaiming, " Illustrious Buddha, why do you expose us all to such shame ? Is it necessary to go from door to door begging your food? Do you imagine that I am not able to supply the wants of so many mendicants? " " My noble father," was the reply, " this is the custom of all our race." " How so ? " said his father. " Are you not descended from an illustrious line ? no single person of our race has ever acted so indecorously." " My noble father," said Gotama, " you and your family may claim the privileges of Kshatriya descent; my descent is from the prophets (Buddhas) of old, and they have always acted so; the customs of the law (Dharma) are gooa both for this world and the world that is to come. But, my father, when a man has found a treasure, it is his duty to offer the most precious of the jewels to his father first. Do not delay, let me share with you the treasure I have found." Suddhodana, abashed, took his son's bowl and led him to his house.

Eighteen months had now elapsed since the turning-point of Gotama's career — his great struggle under the Bo tree. Thus far all the accounts follow chronological order. From this time they simply narrate disconnected stories about the Buddha, or the persons with whom he was brought into contact, — the same story being usually found in more than one account, but not often in the same order. It is not as yet possible, except very partially, to arrange chronologically the snatches of biography to be gleaned from these stories. They are mostly told to show the Occasion on which some memorable act of the Buddha took place, or some memorable saying was uttered, and are as exact as to place as they are indistinct as to time. It would be impossible within the limits of this article to give

any large number of them, but space may be found for one or two.

A merchant from Sunaparanta having joined the Society was desirous of preaching to his relations, and is said to have asked Gotama's permission to do so. " The people of Suna- paranta," said the teacher, " are exceedingly violent. If they revile you what will you do ?" "I will make no reply," said the mendicant. " And if they strike you?" " I will not strike in return," was the reply. " And if they try to kill you ?" " Death is no evil in itself; many even desire it, to escape from the vanities of life, but I shall take no steps either, to hasten or to delay the time of my departure." These answers were held satisfactory, and the monk started on his mission.

At another time a rich farmer held a harvest home, and the Buddha, wishing to preach to him, is said to have taken his alms- bowl and stood by the side of the field and begged. The farmer, a wealthy brahmin, said to him, "Why do you come and beg?

I plough and sow and earn my food; you should do the same." " I too, brahmin," said the beggar, " plough and sow; and having ploughed and sown I eat." " You profess only to be a farmer; no one sees your ploughing, what do you mean?" said the brahmin. " For my cultivation," said the beggar, " faith is the seed, self-combat is the fertilizing rain, the weeds I destroy are the cleaving to existence, wisdom is my plough, and its guiding- shaft is modesty; perseverance draws my plough, and I guide it with the rein of my mind; the field I work is in the law, and the harvest that I reap is the never-dying nectar of Nirvana, Those who reap this harvest destroy all the weeds of sorrow."

On another occasion he is said to have brought back to her right mind a young mother whom sorrow had for a time deprived of reason. Her name was Kisagotaml. She had been married early, as is the custom in the East, and had a child when she was still a girl. When the beautiful boy could run alone he died. Tne young girl in her love for it carried the dead child clasped to her bosom, and went from house to house of her pitying friends asking them to give her medicine for it. But a Buddhist convert thinking " she does not understand," said to her, " My good girl, I myself have no such medicine as you ask for, but I think I know of one who has." " Oh, tell me who that is?" said Kisagotaml. " The Buddha can give you

medicine; go to him," was the answer. She went to Gotama; and doing homage to him said, " Lord and master, do you know any medicine that will be good for my child?" "Yes, I know of some," said the teacher. Now it was the custom for patients or their friends to provide the herbs which the doctors required; so she asked what herbs he would want. " I want some mustard-seed," he said; and when the poor girl eagerly promised to bring some of so common a drug, he added, " you must get it from some house where no son, or husband, or parent or slave has died." " Very good," she said; and went to ask for it, still carrying her dead child with her. The people said, " Here is mustard-seed, take it "; but when she asked, " In my friend's house has any son died, or a husband, or a parent or slave?" They answered, " Lady! what is this that you say? the living are few, but the dead are many." Then she went to other houses, but one said " I have lost a son," another " We have lost our parents," another " I have lost my slave." At last, not being able to find a single house where no one had died, her mind began to clear, and summoning up resolution she left the dead body of her child in a forest, and returning to the Buddha paid him homage. He said to her, " Have you the mustard-seed?" " My lord," she replied, " I have not; the people tell me that the living are few, but the dead are many." Then he talked to her on that essential part of his system, the impermanency of all things, till her doubts were cleared away, she accepted her lot, became a disciple, and entered the " first path."

For forty-five years after entering on his mission Gotama itinerated in the valley of the Ganges, not going farther than about 2 50 m. from Benares, and always spending the rainy months at one spot — usually at one of the viharas, 1 or homes, which had been given to the society. In the twentieth year his cousin Ananda became a mendicant, and from that time seems to have attended on the Buddha, being constantly near him, and delight- ing to render him all the personal service which love and reverence could suggest. Another cousin, Devadatta, the son of the raja of Koli, also joined the society, but became envious of the teacher, and stirred up Ajatasattu (who, having killed his fatherBimbisara, had become king of Rajagaha) to persecute Gotama. The ac- count of the manner in which the Buddha is said to have over- come the wicked devices of this apostate cousin and his parricide protector is quite legendary; but the general fact of Ajatasattu's opposition to the new sect and of his subsequent conversion may be accepted.

The confused and legendary notices of the journeyings of

1 These were at first simple huts, built for the mendicants in some

grove of palm-trees as a retreat during the rainy season; but they gradually increased in splendour and magnificence till the decay of Buddhism set in. See the authorities quoted in Buddhist India, pp. J41, 142.

Gotama are succeeded by tolerably clear accounts of the last few days of his life. 2 On a journey towards Kusinara, a town about 1 20 m. north-north-east of Benares, and about 80 m. due east of Kapilavastu, the teacher, being then eighty years of age, had rested for a short time in a grove at Pawa, presented to the society by a goldsmith of that place named Chunda. Chunda prepared for the mendicants a mid-day meal, and after the meal the Buddha started for Kusinara. He had not gone far when he was obliged to rest, and soon afterwards he said, " Ananda, I am thirsty," and they gave him water to drink. Half-way between the two towns flows the river Kukushta. There Gotama rested again, and bathed for the last time. Feeling that he was dying, and careful lest Chunda should be reproached by himself or others, he said to Ananda, " After I am gone tell Chunda that he will receive in a future birth very great reward; for, having eaten of the food he gave me, I am about to die ; and if he should still doubt, say that it was from my own mouth that you heard this. There are two gifts which will be blest above all others, namely, Sujata's gift before I attained wisdom under the Bo tree, and this gift of Chunda's before I pass away." After halting again and again the party at length reached the river Hiranyavati, close by Kusinara, and there for the last time the teacher rested. Lying down under some Sal trees, with his face towards the south, he talked long and earnestly with Ananda about his burial, and about certain rules which were to be observed by the society after his death. Towards the end of this conversation, when it was evening, Ananda broke down and went aside to weep, but the Buddha missed him, and sending for him comforted him with the promise of Nirvana, and repeated what he had so often said before about the impermanence of all things, ; — " O Ananda! do not weep; do not let yourself be troubled. You known what I have said; sooner or later we must part from all we hold most dear. This body of ours contains within itself the power which renews its strength for a time, but also the causes which lead to its destruction. Is there anything put together which shall not dissolve? But you, too, shall be free from this delusion, this world of sense, this law of change. Beloved," added he, speaking to the rest of the disciples, " Ananda for long years has served me with devoted affection." And he spoke to them at some length on the kindness of Ananda.

About midnight Subhadra, a brahmin philosopher of Kusinara, came

to ask some questions of the Buddha, but Ananda, fearing that this might lead to a longer discussion than the sick teacher could bear, would not admit him. Gotama heard the sound of their talk, and asking what it was, told them to let Subhadra come. The latter began by asking whether the six great teachers knew all laws, or whether there were some that they did not know, or knew only partially. " This is not the time," was the answer, " for such discussions. To true wisdom there is only one way, the path that is laid down in my system. Many have already followed it, and conquering the lust and pride and anger of their own hearts, have become free from ignorance and doubt and wrong belief, have entered the calm state of universal kindliness, and have reached Nirvana even in this life. O Subhadra! I do not speak to you of things I have not experienced. Since I was twenty-nine years old till now I have striven after pure and perfect wisdom, and following the good path, have found Nirvana." A rule had been made that no follower of a rival system should be admitted to the society without four months' probation. So deeply did the words or the impressive manner of the dying teacher work upon Subhadra that he asked to be ad- mitted at once, and Gotama granted his request. Then turning to his disciples he said, " When I have passed away and am no longer with you, do not think that the Buddha has left you, and is not still in your midst. You have my words, my explanations of the deep things of truth, the laws I have laid down for the society; let them be your guide; the Buddha has not left you." Soon afterwards he again spoke to them, urging them to rever- ence one another, and rebuked one of the disciples who spoke

8 The text of the account of this last journey is the Mahaparinib- bana Suttanta, vol. ii. of the Digha (ed. Rhys Davids and Carpenter), The translation is in? Rhys Davids' Buddhist Suttas.

indiscriminately all that occurred to him. Towards the morning he asked whether any one had any doubt about the Buddha, the law or the society; if so, he would clear them up. No one answered, and Ananda expressed his surprise that amongst so many none should doubt, and all be firmly attached to the law. But the Buddha laid stress on the final perseverance of the saints, saying that even the least among the disciples who had entered the first path only, still had his heart fixed on the way to perfection, and constantly strove after the three higher paths. " No doubt," he said, " can be found in

the mind of a true disciple." After another pause he said: " Behold now, brethren, this is my exhortation to you. Decay is inherent in all component things. Work out, therefore, your emancipation with diligence ! " These were the last words the Buddha spoke; shortly afterwards he became unconscious, and in that state passed away.

Authorities on the Life of the Buddha. — Canonical Pali (reached their present shape before the 4th century B.C.) ; episodes only, three of them long: (1) Birth; text in Majjhima Nikaya, ed. Trenckner and Chalmers (London, Pali Text Society, 1888-1899), vol. iii. pp. 118-124; also in Anguttara Nikaya, ed. Morris and Hardy (Pali Text Society, 1888-1900), vol. ii. pp. 130-132. (2) Adoration of the babe; old ballad; text in Sutta Nipata, ed. Fausboll (Pali Text Society, 1884), pp. 128-131 ; translation by the same in Sacred Books of the East (Oxford, 1881), vol. x. pp. 124-131. (3) Youth at

home; text in Anguttara Nikaya, i. 145. (4) The going forth; old ballad; text in Sutta Nipata, pp. 70-74 (London, 1896), pp. 99-101 ; prose account in Dlgha Nikaya, ed. Rhys Davids and Carpenter

(Pali Text Society, 1890-1893), vol. i. p. 115, translated by Rhys Davids in Dialogues of the Buddha (Oxford, 1899), pp. 147-149. (5) First long episode; the going forth, years of study and penance, attainment of Nirvana and Buddhahood, and conversion of first five converts; text in Majjhima, all together at ii. 93; parts repeated at i. 163-175, 240-249; ii. 212; Vinaya, ed. Oldenberg (London, 1879-1883), vol. i. pp. 1-13. (6) Second long episode; from the conversation of the five down to the end of the first year of the teaching; text in Vinaya, i. 13-44, translated by Oldenberg in Vinaya Texts, i. 73-151. (7) Visit to Kapilavastu; text in Vinaya, i. 82; translation by Oldenberg in Vinaya Texts (Oxford, 1881- 1885), vol. i. pp. 207-210. (8) Third long episode; the last days; text in Dlgha Nikaya (the Mahdparinibbana Sutlanta), vol. ii. pp. 72-168, translated by Rhys Davids in Buddhist Suttas (Oxford, 1881), pp. 1-136. Buddhist Sanskrit Texts: (1) Mahavastu (probably 2nd century B.C.); edited by Senart (3 vols., Paris, 1882-1897), summary in French prefixed to each volume; down to the end of first year of the teaching. (2) Lalita Vistara (probably 1st century B.C.); edited by Mitra (Calcutta, 1877); translated into French by Foucaux (Paris, 1884); down to the first sermon. (3) Buddha Carita, by Asvaghosha, probably 2nd century A.D. edited by Cowell (Oxford, 1892); translated by Cowell (Oxford, 1894, S.B.E. vol. xlix.) ; an elegant poem; stops just before the attainment of Buddhahood. (These three works reproduce and amplify the above episodes Nos. 1-6; they retain here and there a very old tradition as to

arrangement of clauses or turns of expression.) Later Pali: The commentary on the Jalaka, written probably in the 5th century A.D., gives a consecutive narrative, from the birth to the end of the second year of the teaching, based on the canonical texts, but much altered and amplified; edited by Fausboll in Jataka, vol. i. (London, 1877), pp. 1-94; translated by Rhys Davids in Buddhist Birth Stories (London, 1880), pp. 1-133. Modern Works: (1) Tibetan; Life of the Buddha ; episodes collected and translated by W. Wood- ville Rockhill (London, 1884), from Tibetan texts of the 9th and 10th centuries A.D. (2) Sinhalese ; episodes collected and translated by Spence Hardy from Sinhalese texts of the 12th and later centuries, in Manual of Buddhism (London, 1897, 2n d edition), pp. 138-359. (3) Burmese: The Life or Legend of Caudama (3rd edition, London, 1880), by the Right Rev. P. Bigandet, translated from a Burmese work of A.D. 1773. (The Burmese is, in its turn, a translation from a Pali work of unknown date; it gives the whole life, and is the only consecutive biography we have.) (4) Kambojian: Pathama Sambodhian; translated into French by A. Leclere in Livres sacres du Cambodge (Paris, 1906). (T. W. R. D.)

BUDDHAGHOSA, p, celebrated Buddhist writer. He was a Brahmin by birth and was born near the great Bodhi tree at Budh Gaya in north India about A.D. 390, his father's name being Kesl. His teacher, Revata, induced him to go to Ceylon, where the commentaries on the scriptures had been preserved in the Sinhalese language, with the object of translating them into Pali. He went accordingly to Anuradhapura, studied there under Sanghapala, and asked leave of the fraternity there to translate the commentaries. With their consent he then did so, having first shown his ability by writing the work Visuddhi Magga (the Path of Purity, a kind of summary of Buddhist doctrine). When he had completed his many years' labours he returned to

the neighbourhood of the Bodhi tree in north India. Before he came to Ceylon he had already written a book entitled Ndnodaya (the Rise of Knowledge), and had commenced a commentary on the principal psychological manual contained in the Pitakas. This latter work he afterwards rewrote in Ceylon, as the present text (now published by the Pah Text Society) shows. One volume of the Sumangala Vildsini (a portion of the commentaries mentioned above) has been edited, and extracts from his comment on the Buddhist canon law. This last work has been discovered in a nearly comtemporaneous Chinese translation (an edition in Pali is based on a comparison with that translation). The works here mentioned form, however, only a small portion of what Buddhaghosa wrote. His industry must have been

prodigious. He is known to have written books that would fill about 20 octavo volumes of about 400 pages each; and there are other writings ascribed to him which may or may not be really his work. It is too early therefore to attempt a criticism of it. But it is already clear that, when made acceptable, it will be of the greatest value for the history of Indian literature and of Indian ideas. So much is uncertain at present in that history for want of definite dates that the voluminous writings of an author whose date is approxi- mately certain will afford a standard by which the age of other writings can be tested. And as the original commentaries in Sinhalese are now lost his works are the only evidence we have of the traditions then handed down in the Buddhist community. The main source of our information about Buddhaghosa is the Mahavamsa, written in Anuradhapura about fifty years after he was working there. But there are numerous references to him in Pali books on Pali literature; and a Burmese author of un- known date, but possibly of the 15th century, has compiled a biography of him, the Buddhaghos' Uppatti, of little value and no critical judgment.

See Mahavamsa, ch. xxxvii. (ed. Tumour, Colombo, 1837); " Gandhavamsa," p. 59, in Journal of the Pali Text Society (1886) ; Buddhghosuppatti (text and translation, ed. by E. Gray, London, 1893) ; Sumangala Vildsini, edited by T. W. Rhys Davids and J. E. Carpenter, vol. i. (London, Pali Text Society, 1886). (T. W. R. D.)

BUDDHISM, the religion held by the followers of the Buddha (q.v.), and covering a large area in India and east and central Asia.

Essential Doctrines. — We are fortunate in having preserved for us the official report of the Buddha's discourse, in which he ex- pounded what he considered the main features of his system to the five men he first tried to win over to his new-found faith. There is no reason to doubt its substantial accuracy, not as to words, but as to purport. In any case it is what the compilers of, the oldest extant documents believed their teacher to have regarded as the most important points in his teaching. Such a summary must be better than any that could now be made. It is incorporated into two divisions of their sacred books, first among the suttas containing the doctrine, and again in the rules of the society or order he founded (Samyutta, v. 421 = Vinaya, i. 10) The gist of it, omitting a few repetitions, is as follows: —

" There are two aims which he who has given up the world ought not to follow after — devotion, on the one hand, to those things whose attractions depend upon the passions, a low and pagan ideal, fit only

for the worldly-minded, ignoble, unprofitable, and the practice on the other hand of asceticism, which is painful, ignoble, unprofitable. There is a Middle Path discovered by the Tathagata 1 — a path which opens the eyes, and bestows understanding, which leads to peace, to insight, to the higher wisdom, to Nirvana. Verily! it is this Noble Eightfold Path; that is to say, Right Views, Right Aspirations, Right Speech, Right Conduct, Right Mode of Livelihood, Right Effort, Right Mindfulness, and Right Rapture.

" Now this is the Noble Truth as to suffering. Birth is attended with pain, decay is painful, disease is painful, death is painful. Union with the unpleasant is painful, painful is separation from the pleasant; and any craving unsatisfied, that too is painful. In brief, the five aggregates of clinging (that is, the conditions of individuality) are painful.

" Now this is the Noble Truth as to the origin of suffering. Verily! it is the craving thirst that causes the renewal of becomings, that is accompanied by sensual delights, and seeks satisfaction now here, now there — that is to say, the craving for the gratification of the senses, or the craving for a future life, or the craving for prosperity.

1 That is by the Arahat, the title the Buddha always uses of himself. He does not call himself the Buddha, and his followers never address him as such.

" Now this is the Noble Truth as to the passing away of pain. Verily! it is the passing away so that no passion remains, the giving up, the getting rid of, the being emancipated from, the harbouring no longer of this craving thirst.

" Now this is the Noble Truth as to the way that leads to the passing away of pain. Verily ! it is this Noble Eightfold Path, that is to say, Right Views, Right Aspirations, Right speech, conduct and mode of livelihood, Right Effort, Right Mindfulness and Right Rapture."

A few words follow as to the threefold way in which the speaker claimed to have grasped each of these Four Truths. That is all. There is not a word about God or the soul, not a word about the Buddha or Buddhism. It seems simple, almost jejune; so thin and weak that one wonders how it can have formed the foundation for a system so mighty in its historical results. But the simple words are pregnant

with meaning. Their implications were clear enough to the hearers to whom they were addressed. They Were not intended, however, to answer the questionings of a 20th- century European questioner, and are liable now to be misunder- stood. Fortunatefy each word, each clause, each idea in the discourse is repeated, commented on, enlarged upon, almost ad nauseam, in the suttas, and a short comment in the light of those explanations may bring out the meaning that was meant. 1

The passing away of pain or suffering is said to depend on an emancipation. And the Buddha is elsewhere (Vinaya ii. 239) made to declare: " Just as the great ocean has one taste only, the taste of salt, just so have this doctrine and discipline but one flavour only, the flavour of emancipation "; and again, " When a brother has, by himself, known and realized, and continues to abide, here in this visible world, in that emancipation of mind, in that emancipation of heart, which is Arahatship; that is a condition higher still and sweeter still, for the sake of which the brethren lead the religious life under me." 2 The emancipation is found in a habit of mind, in the being free from a specified sort of craving that is said to be the origin of certain specified sorts of pain. In some European books this is completely spoiled by being represented as the doctrine that existence is misery, and that desire is to be suppressed. Nothing of the kind is said in the text. The description of suffering or pain is, in fact, a string of truisms, quite plain and indisputable until the last clause. That clause declares that the Upddana Skandhas, the five groups of the constituent parts of every individual, involve pain. Put into modern language this is that the conditions necessary to make an individual are also the conditions that necessarily give rise to sorrow. No sooner has an individual become separate, become an individual, than disease and decay begin to act upon it. In- dividuality involves limitation, limitation in its turn involves ignorance, and ignorance is the source of sorrow. Union with the unpleasant, separation from the pleasant, unsatisfied craving, are each a result of individuality. This is a deeper generalization than that which says, " A man is born to trouble as the sparks fly upward." But it is put forward as a mere statement of fact. And the previous history of religious belief in India would tend to show that emphasis was laid on the fact, less as an explanation of the origin of evil, than as a protest against a then current pessimistic idea that salvation could not be reached on earth, and must therefore be sought for in a rebirth in heaven, in the Brahma- loka. For if the fact — the fact that the conditions of individu- ality are the conditions, also, of pain — were admitted, then the individual there would still

not have escaped from sorrow. If the five ascetics to whom the words were addressed once admitted this implication, logic would drive them also to admit all that followed.

The threefold division of craving at the end of the second truth might be rendered " the lust of the flesh, the lust of life and the love of this present world." The two last are said else- where to be directed against two sets of thinkers called the Eternalists and the Annihilationists, who held respectively

1 One very ancient commentary on the Path has been preserved in three places in the canon: Dlgha, ii. 305-307 and 311-313. Majjhima, iii. 251, and Samyutta, v. 8.

2 Mahali Suttanta; translated in Rhys Davids' Dialogues of the Buddha, vol. i. p. 201 (cf. p. 204).

the everlasting-life-heresy and the let-us-eat-and-drink-for-to-morrow-we-die-heresy. 3 This may be so, but in any case the division of craving would have appealed to the five hearers as correct.

The word translated " noble " in Noble Path, Noble Truth, is ariya, which also means Aryan. 4 The negative, un-Aryan, is used of each of the two low aims. It is possible that this render- ing should have been introduced into the translation; but the ethical meaning, though still associated with the tribal meaning, had probably already become predominant in the language of the time.

The details of the Path include several terms whose meaning and implication are by no means apparent at first sight. Right Views, for instance, means mainly right views as to the Four Truths and the Three Signs. Of the latter, one is identical, or nearly so, with the First Truth. The others are Impermanence and Non-soul (the absence of a soul) — both declared to be " signs " of every individual, whether god, animal or man. Of these two again the Impermanence has become an Indian rather than a Buddhist idea, and we are to a certain extent familiar with it also in the West. There is no Being, there is only a Becoming. The state of every individual is unstable, temporary, sure to pass away. Even in the lowest class of things, we find, in each individual, form and material qualities. In the higher classes there is a continually rising series of mental qualities also. It is the union of these that makes the individual. Every person, or thing, or god, is therefore a putting together, a com- pound ; and in each individual, without any exception, the relation of its component parts is ever changing, is never the same for two consecutive

moments. It follows that no sooner has separateness, individuality, begun, than dissolution, disintegration, also begins. There can be no individuality without a putting together: there can be no putting together without a becoming: there can be no becoming without a becoming different: and there can be no becoming different without a dissolution, a passing away, which sooner or later will inevitably be complete.

Heracleitus, who was a generation or two later than the Buddha, had very similar ideas; 5 and similar ideas arefound in post-Buddhistic Indian works. 6 But in neither case are they worked out in the same uncompromising way. Both in Europe, and in all Indian thought except the Buddhist, souls, and the gods who are made in imitation of souls, are considered as exceptions. To these spirits is attributed a Being without Becoming, an individuality without change, a beginning with- out an end. To hold any such view would, according to the doctrine of the Noble (or Aryan) Path, be erroneous, and the error would block the way against the very entrance on the Path.

So important is this position in Buddhism that it is put in the forefront of Buddhist expositions of Buddhism. The Buddha himself is stated in the books to have devoted to it the very first discourse he addressed to the first converts. 7 The first in the collection of the Dialogues of Gotama discusses, and com- pletely, categorically, and systematically rejects, all the current theories about " souls." Later books follow these precedents. Thus the Katha Vatihu, the latest book included in the canon, discusses points of disagreement that had arisen in the community. It places this question of " soul " at the head of all the points it deals with, and devotes to it an amount of space quite over- shadowing all the rest. 8 So also in the earliest Buddhist book later than the canon — the very interesting and suggestive series of conversations between the Greek king Menander and the Buddhist teacher Nagasena. It is precisely this question of the " soul " that the unknown author takes up first, describing how Nagasena convinces the king that there is no such thing as the

3 See Iti-vuttaka, p. 44 ; Samyutta, iii. 57.

4 See Digha, ii. 28 ; Jat. v. 48, ii. 80.

5 Burnett, Early Greek Philosophy, p. 149.

6 Katha Up. 2, 10; Bhag. Gita, 2, 14; 9, 33.

' The Anatta-lakkhana Sutta {Vinaya, i. 13 = Samyutta, iii. 66 and

iv. 34), translated in Vinaya Texts, i. 100-102. I 8 See article on " Buddhist Schools of Thought," by Rhys Davids, I in the J.R.A.S. for 1892.

" soul " in the ordinary sense, and he returns to the subject again and again. 1

After Right Views come Right Aspirations. It is evil desires, low ideals, useless cravings, idle excitements, that are to be sup- pressed by the cultivation of the opposite — of right desires, lofty aspirations. In one of the Dialogues 2 instances are given — the desire for emancipation from sensuality, aspirations towards the attainment of love to others, the wish not to injure any living thing, the desire for the eradication of wrong and for the pro- motion of right dispositions in one's own heart, and so on. This portion of the Path is indeed quite simple, and would require no commentary were it not for the still constantly repeated blunder that Buddhism teaches the suppression of all desire.

Of the remaining stages of the Path it is only necessary to mention two. The one is Right Effort. A constant intellectual alertness is required. This is not only insisted upon elsewhere in countless passages, but of the three cardinal sins in Buddhism {raga, dosa, moha) the last and worst is stupidity or dullness, the others being sensuality and ill-will. Right Effort is closely connected with the seventh stage, Right Mindfulness. Two of the dialogues are devoted to this subject, and it is constantly referred to elsewhere. 3 The disciple, whatsoever he does — whether going forth or coming back, standing or walking, speaking or silent, eating or drinking— is to keep clearly in mind all that it means, the temporary character of the act, its ethical significance, and above all that behind the act there is no actor (goer, seer, eater, speaker) that is an eternally persistent unity. It is the Buddhist analogue to the Christian precept : " Whether therefore ye eat or drink, or whatsoever ye do, do all to the glory of God."

Under the head of Right Conduct the two most important points are Love and Joy. Love is in Pali Mettd, and the Metta Sutta 1 says (no doubt with reference to the Right Mindfulness just described) : " As a mother, even at the risk of her own life, protects her son, her only son, so let him cultivate love without measure towards all beings. Let

him cultivate towards the whole world — above, below, around — a heart of love unstinted, un- mixed with the sense of differing or opposing interests. Let a man maintain this mindfulness all the while he is awake, whether he be standing, walking, sitting or lying down. This state of heart is the best in the world."

Often elsewhere four such states are described, the Brahma Viharas or Sublime Conditions. They are Love, Sorrow at the sorrows of others, Joy in the joys of others, and Equanimity as regards one's own joys and sorrows. 6 Each of these feelings was to be deliberately practised, beginning with a single object, and gradually increasing till the whole world was suffused with the feeling. " Our mind shall not waver. No evil speech will we utter. Tender and compassionate will we abide, loving in heart, void of malice within. And we will be ever suffusing such a one with the rays of our loving thought. And with that feeling as a basis we will ever be suffusing the whole wide world with thought of love far-reaching, grown great, beyond measure, void of anger or ill-will." 6

The relative importance of love, as compared with other habits, is thus described. " All the means that can be used as bases for doing right are not worth the sixteenth part of the emancipation of the heart through love. That takes all those up into itself, outshining them in radiance and glory. Just as what- soever stars there be, their radiance avails not the sixteenth part of the radiance of the moon. That takes all those up into itself, outshining them in radiance and glory — just as in the last month of the rains, at harvest time, the sun, mounting up on high into the clear and cloudless sky, overwhelms all darkness in the realms

1 Questions of King Milinda, translated by Rhys Davids (Oxford, 1890-1894), vol. i. pp. 40, 41. 85-87; vol. ii. pp. 21-25, 86-89.

2 Majjhima, iii. 251, cf. Samyutta, v. 8.

3 Dlgha, ii. 290-315. Majjhima, i. 55 et seq. Cf. Rhys Davids' Dialogues of the Buddha, i. 81. .

4 No. 8 in the Sutta Nipata (p. 26 of Fausboll's edition). It is translated by Fausboll in vol. x. of the S.B.E.. and bv Rhys Davids, Buddhism, p. 109.

6 Dlgha, ii. 186-187. ' Majjhima, i. 129.

of space, and shines forth in radiance and glory — just as in the night, when the dawn is breaking, the morning star shines out in

radiance and glory — just so all the means that can be used as helps towards doing right avail not the sixteenth part of the emancipation of the heart through love." 7

The above is the positive side; the qualities (dkamma) that have to be acquired. The negative side, the qualities that have to be suppressed by the cultivation of the opposite virtues, are the Ten Bonds (S amy oj anas), the Four Intoxications (Asava) and the Five Hindrances (Nivarayas).

The Ten Bonds are: (1) Delusion about the soul; (2) Doubt; (3) Dependence on good works; (4) Sensuality; (5) Hatred, ill- feeling; (6) Love of life on earth; (7) Desire for life in heaven; (8) Pride; (9) Self -righteousness; (10) Ignorance. The Four Intoxications are the mental intoxication arising respectively from (1) Bodily passions, (2) Becoming, (3) Delusion, (4) Ignorance. The Five Hindrances are (1) Hankering after worldly advantages, (2) The corruption arising out of the wish to injure, (3) Torpor of mind, (4) Fretfulness and worry, (5) Wavering of mind. ? " When these five hindrances have been cut away from within him, he looks upon himself as freed from debt, rid of disease, out of jail, a free man and secure. And gladness springs up within him on his realizing that, and joy arises to him thus gladdened, and so rejoicing all his frame becomes at ease, and being thus at ease he is filled with a sense of peace, and in that peace his heart is stayed." 9

To have realized the Truths, and traversed the Path; to have broken the Bonds, put an end to the Intoxications, and got rid of the Hindrances, is to have attained the ideal, the Fruit, as it is called, of Arahatship. One might fill columns with the praises, many of them among the most beautiful passages in Pali poetry and prose, lavished on this condition of mind, the state of the man made perfect according to the Buddhist faith. Many are the pet names, the poetic epithets bestowed upon it — the harbour of refuge, the cool cave, the island amidst the floods, the place of bliss, emancipation, liberation, safety, the supreme, the trans- cendent, the uncreated, the tranquil, the home of peace, the calm, the end of suffering, the medicine for all evil, the unshaken, the ambrosia, the immaterial, the imperishable, the abiding, the farther shore, the unending, the bliss of effort, the supreme joy, the ineffable, the detachment, the holy city, and many others. Perhaps the most frequent in the Buddhist text is Arahatship, " the state of him who is worthy "; and the one exclusively used in Europe is Nirvana, the " dying out "; that is, the dying out in the heart of the fell fire of the three cardinal sins — sensu- ality, ill-will and stupidity. 10

The choice of this term by European writers, a choice made long before anyof the Buddhist canonical texts had been published or translated, has had a most unfortunate result. Those writers did not share, could not be expected to share, the exuberant optimism of the early Buddhists. Themselves giving up this world as hopeless, and looking for salvation in the next, they naturally thought the Buddhists must do the same, and in the absence of any authentic scriptures, to correct the mistake, they interpreted Nirvana, in terms of their own belief, as a state to be reached after death. As such they supposed the " dying out " must mean the dying out of a " soul "; and endless were the discussions as to whether this meant eternal trance, or absolute annihilation, of the " soul." It is now thirty years since the right interpretation, founded on the canonical texts, has been given, but outside the ranks of Pali scholars the old blunder is still often repeated. It should be added that the belief in salvation in this world, in this life, has appealed so strongly to Indian sympathies that from the time of the rise of Buddhism down to the present day it has been adopted as a part of general Indian belief, and Jivanmukti, salvation during this life, has become a commonplace in the religious language of India.

Adopted Doctrines. — The above are the essential doctrines of

7 Iti-vultaka, pp. 19-21.

8 On the details of these see Dlgha, i. 71-73, translated by Rhys Davids in Dialogues of the Buddha, i. 82-84.

9 Dlgha, i. 74. 10 Samyutta, iv. 251, 261.

the original Buddhism. They are at the same time its distinctive doctrines; that is to say, the doctrines that distinguish it from all previous teaching in India. But the Buddha, while rejecting the sacrifices and the ritualistic magic of the brahmin schools, the animistic superstitions of the people, the asceticism and soul- theory of the Jains, and the pantheistic speculations of the poets of the pre-Buddhistic Upanishads, still retained the belief in transmigration. This belief— the transmigration of the soul, after the death of the body, into other bodies, either of men, beasts or gods — is part of the animistic creed so widely found throughout the world that it was probably universal. In India it had already, before the rise of Buddhism, been raised into an ethical conception by theassociated doctrine of Karma, according to which a man's socialpositioninlife and hisphysicaladvantages, or the reverse, were the result of his actions in a previous birth. The doctrine thus afforded an explanation, quite complete to those who believed it, of the apparent anomalies and wrongs in the distribution here of happiness or woe. A mail, for instance, is blind. This is owing to his lust of the eye in a previous birth. But he has also unusual powers of hearing. This is because he loved, in a previous birth, to listen to the preaching of the law. The explanation could always be exact, for it was scarcely more than a repetition of the point to be explained. It fits the facts because it is derived from them. And it cannot be disproved, for it lies in a sphere beyond the reach of human inquiry.

It was because it thus provided a moral cause that it was retained in Buddhism. But as the Buddha did not acknowledge a soul, the link of connexion between one life and the next had to be found somewhere else. The Buddha found it (as Plato also found it) 1 in the influence exercised upon one life by a desire felt in the previous life. When two thinkers of such eminence (pro- bably the two greatest ethical thinkers of antiquity) have arrived independently at this strange conclusion, have agreed in ascribing to cravings, felt in this life, so great, and to us so inconceivable, a power over the future life, we may well hesitate before we con- demn the idea as intrinsically absurd, and we may take note of the important fact that, given similar conditions, similar stages in the development of religious belief, men's thoughts, even in spite of the most unquestioned individual originality, tend though they may never produce exactly the same results, to work in similar ways.

In India, before Buddhism, conflicting and contradictory views

prevailed as to the precise mode of action of Karma; and we find this confusion reflected in Buddhist theory. The pre- vailing views are tacked on, as it were, to the essential doctrines of Buddhism, without being thoroughly assimilated to them, or logically incorporated with them. Thus in the story of the good layman Citta, it is an aspiration expressed on the death- bed; 2 in the dialogue on the subject, it is a thought dwelt on during life, 3 in the numerous stories in the Peta and Vimana Vatthus it is usually some isolated act, in the discussions in the Dhamma Sangani it is some mental disposition, which is the Karma (doing or action) in the one life determining the position of the individual in the next. These are really conflicting pro- positions. They are only alike in the fact that in each case a moral cause is given for the position in which the individual finds himself now; and the moral cause is his own act.

In the popular belief, followed also in the brahmin theology, the bridge between the two lives was a minute and subtle entity called the soul, which left the one body at death, through a hole at the top of the head, and entered into the new body. The new body happened to be there, ready, with no soul in it. The soul did not make the body. In the Buddhist adaptation of this theory no soul, no consciousness, no memory, goes over from one body to the other. It is the grasping, the craving, still existing at the death of the one body that causes the new set of Skandhas, that is, the new body with its mental tendencies and capacities, to arise. How this takes place is nowhere explained.

The Indian theory of Karma has been worked out with many

*1 Phaedo, 69 et seq. The idea is there also put forward in con- nexion with a belief in transmigration. * Samyutta, iv. 302. 3 Majjhima, iii. 99 et seq.*

points of great beauty and ethical value. And the Buddhist adaptation of it, avoiding some of the difficulties common to it and to the allied European theories of fate and predestination, tries to explain the weight of the universe in its action on the individual, the heavy hand of the immeasurable past we cannot escape, the close connexion between all forms of life, and the mysteries of inherited character. Incidentally it held out the hope, to those who believed in it, of a mode of escape from the miseries of transmigration. For as the Arahat had conquered the cravings that were supposed to produce the new body, his actions were no longer Karma, but only Kiriya, that led to no rebirth. 4

Another point of Buddhist teaching adopted from previous belief was

the practice of ecstatic meditation. In the very earliest times of the most remote animism we find the belief that a person, rapt from all sense of the outside world, possessed by a spirit, acquired from that state a degree of sanctity, was supposed to have a degree of insight, denied to ordinary mortals. In India from the soma frenzy in the Vedas, through the mystic reveries of the Upanishads, and the hypnotic trances of the ancient Yoga, allied beliefs and practices had never lost their importance and their charm. It is clear from the Dialogues, and other of the most ancient Buddhist records, 5 that the belief was in full force when Buddhism arose, and that the practice was followed by the Buddha's teachers. It was quite impossible for him to ignore the question; and the practice was admitted as a part of the training of the Buddhist Bhikshu. But it was not the highest or the most important part, and might be omitted altogether. The states of Rapture are called Conditions of Bliss, and they are regarded as useful for the help they give towards the removal of the mental obstacles to the attainment of Arahatship. 6 Of the thirty-seven constituent parts of Arahatship they enter into one group of four. To seek for Arahatship in the practice of the ecstasy alone is considered a deadly heresy. 7 So these practices are both pleasant in themselves, and useful as one of the means to the end proposed. But they are not the end, and the end can be reached without them. The most ancient form these exercises took is recorded in the often recurring paragraphs translated in Rhys Davids' Dialogues of the Buddha (i. 84-92). More modern, and much more elaborate, forms are given in the Y ogdvacaras Manual of Indian Mysticism as practised by Buddhists, edited by Rhys Davids from a unique MS. for the Pali Text Society in 1896. In the Introduction to this last work the various phases of the question are discussed at length.

Buddhist Texts. The Canonical Books.- — It is necessary to remember that the Buddha, like other Indian teachersof hisperiod, taught by conversation only. A highly-educated man (according to the education current at the time), speaking constantly to men of similar education, he followed the literary habit of his day by embodying his doctrines in set phrases (sutras), on which he enlarged, on different occasions, in different ways. Writing was then widely known. But the lack of suitable writing materials made any lengthy books impossible. Such sutras were therefore the recognized form of preserving and com- municating opinion. They were catchwords, as it were, memoria technica, which could easily be remembered, and would recall the fuller expositions that had been based upon them. Shortly after the Buddha's time the Brahmins had their sutras in Sanskrit, already a dead language. He purposely put

his into the ordinary conversational idiom of the day, that is to say, into Pali. When the Buddha died these sayings were collected together by his disciples into what they call the Four Nikayas, or " collections." These cannot have reached their final form till about fifty or sixty years afterwards. Other sayings and verses, most of them ascribed, not to the Buddha, but to the disciples themselves, were put into a supplementary Nikaya. We know

4 The history of the Indian doctrine of Karma has yet to be written. On the Buddhist side see Rhys Davids' Hibbert Lectures, PP- 73- I2 o, and Dahlke, Aufsdtze zum Verstandnis des Buddhismus (Berlin, 1903), i. 92-106, and ii. 1-11.

6 For instance, Majjhima, i. 163-166 ■ w 6 Angvtlara, iii. 1 19. ' Digha, i. 38.

of slight additions made to this Nikaya as late as the time of Asoka, 3rd century B.C. And the developed doctrine, found in certain portions of it, shows that these are later than the four old Nikayas. For a generation or two the books so put together were handed down by memory, though probably written memoranda were also used. And they were doubtless accom- panied from the first, as they were being taught, by a running commentary. About one hundred years after the Buddha's death there was a schism in the community. Each of the two schools kept an arrangement of the canon — still in Pali, or some allied dialect. Sanskrit was not used for any Buddhist works till long afterwards, and never used at all, so far as is known, for the canonical books. Each of these two schools broke up in the following centuries, into others. Several of them had their different arrangements of the canonical books, differing also in minor details. These books remained the only authorities for about five centuries, but they all, except only our extant Pali Nikayas, have been lost in India. These then are our authorities for the earliest period of Buddhism. Now what are these books ?

We talk necessarily of Pali books. They are not books in the modern sense. They are memorial sentences or verses intended to be learnt by heart. And the whole style and method of arrange- ment is entirely subordinated to this primary necessity. Each sutra (Pali, sutla) is very short; usually occupying only a page, or perhaps two, and containing a single proposition. When several of these, almost

always those that contain propositions of a similar kind, are collected together in the framework of one dialogue, it is called a suttanta. The usual length of such a suttanta is about a dozen pages; only a few of them are longer, and a collection of such suttantas might be called a book. But it is as yet neither narrative nor essay. It is at most a string of passages, drawn up in similar form to assist the memory, and intended, not to be read, but to be learnt by heart. The first of the four Nikayas is a collection of the longest of these suttantas, and it is called accordingly the Digha Nikaya, that is " the Collection of Long Ones " {sci. Suttantas). The next is the Majjhima Nikaya, the " Collection of the suttantas of Medium Length " — medium, that is, as being shorter than the suttantas in the Digha, and longer than the ordinary suttas preserved in the two following collections. Between them these first two collec- tions contain 186 dialogues, in which the Buddha, or in a few cases one of his leading disciples, is represented as engaged in con- versation on some one of the religious, or philosophic, or ethical points in that system which we now call Buddhism. In depth of philosophic insight, in the method of Socratic questioning often adopted, in the earnest and elevated tone of the whole, in the evidence they afford of the most cultured thought of the day, these dialogues constantly remind the reader of the dialogues of Plato. But not in style. They have indeed a style of their own; always dignified, and occasionally rising into eloquence. But for the reasons already given, it is entirely different from the style of Western writings which are always intended to be read. Historical scholars will, however, revere this collection of dialogues as one of the most priceless of the treasures of antiquity still preserved to us. It is to it, above all, that we shall always have to go for our knowledge of the most ancient Buddhism. Of the 186, 175 had by 1907 been edited for the Pali Text Society, and the remainder were either in the press or in preparation.

A disadvantage of the arrangement in dialogues, more especi- ally as they follow one another according to length and not according to subject, is that it is not easy to find the statement of doctrine on any particular point which is interesting one at the moment. It is very likely just this consideration which led to the compilation of the two following Nikayas. In the first of these, called the Anguttara Nikaya, all those points of Buddhist doctrine capable of expression in classes are set out in order. This practically includes most of the psychology and ethics of Buddhism. For it is a distinguishing mark of the dialogues themselves that the results arrived at are arranged in carefully systematized groups. We are familiar enough in the West with

similar classifications, summed up in such expressions as the Seven Deadly Sins, the Ten Commandments, the Thirty-nine Articles, the Four Cardinal Virtues, the Seven Sacraments and a host of others. These numbered lists (it is true) are going out of fashion. The aid which they afford to memory is no longer required in an age in which books of reference abound. It was precisely as a help to memory that they were found so useful in the early Buddhist times, when the books were all learnt by heart, and had never as yet been written. And in the Anguttara we find set out in order first of all the units, then all the pairs, then all the trios, and so on. It is the longest book in the Buddhist Bible, and fills 1840 pages 8vo. The whole of the Pali text has been published by the Pali Text Society, but only portions have been translated into English. The next, and last, of these four collections contains again the whole, or nearly the whole, of the Buddhist doctrine; but arranged this time in order of subjects. It consists of 55 Samyuttas or groups. In each of these the suttas on the same subject, or in one or two cases the suttas addressed to the same sort of people, are grouped together. The whole of it has been published in five volumes by the Pali Text Society. Only a few fragments have been translated.

Many hundreds of the short suttas and verses in these two collections are found, word for word, in the dialogues. And there are numerous instances of the introductory story stating how, and when, and to whom the sutta was enunciated — a sort of narrative framework in which the sutta is set — recurring also. This is very suggestive as to the way in which the earliest Buddhist records were gradually built up. The suttas came first embody- ing, in set phrases, the doctrine that had to be handed down. Those episodes, found in two or three different places, and always embodying several suttas, came next. Then several of these were woven together to form a suttanta. And finally the suttantas were grouped together into the two Nikayas, and the suttas and episodes separately into the two others. Parallel with this evolution, so to say, of the suttas, the short statements of doctrine, in prose, ran the treatment of the verses. There was a great love of poetry in the communities in which Buddhism arose. Verses were helpful to the memory. And they were adopted not only for this reason. The adherents of the new view of life found pleasure in putting into appropriate verse the feelings of enthusiasm and of ecstasy which the reforming doctrines inspired. When particularly happy in literary finish, or peculiarly rich in religious feeling, such verses were not lost. These were handed on, from mouth to mouth, in the small companies of the brethren or sisters. The oldest verses are all lyrics, expressions either of emotion, or of some deep saying,

some pregnant thought. Very few of them have been preserved alone. And even then they are so difficult to understand, so much like puzzles, that they were probably accompanied from the first by a sort of comment in prose, stating when, and why, and by whom they were supposed to have been uttered. As a general rule such a framework in prose is actually preserved in the old Buddhist literature. It is only in the very latest books included in the canon that the narrative part is also regularly in verse, so that a whole work consists of a collection of ballads. The last step, that of combining such ballads into one long epic poem, was not taken till after the canon was closed. The whole process, from the simple anecdote in mixed prose and verse, the so-called akhyana, to the complete epic, comes out with striking clearness in the history of the Buddhist canon. It is typical, one may notice in passing, of the evolution of the epic elsewhere; in Iceland, for instance, in Persia and in Greece. And we may safely draw the conclusion that if the great Indian epics, the Maha-bharata and the Ramayana, had been in existence when the formation of the Buddhist canon began, the course of its development would have been very different from what it was.

As will easily be understood, the same reasons which led to literary activity of this kind, in the earliest period, continued to hold good afterwards. A number of such efforts, after the Nikayas had been closed, were included in a supplementary Nikaya called the Khuddaka Nikaya. It will throw very useful light upon the intellectual level in the Buddhist community just

after the earliest period, and upon literary life in the valley of the Ganges in the 4th or 5th century B.C., if we briefly explain what the tractates in this collection contain. The first, the Khuddaka Pdtha, is a little tract of only a few pages. After a profession of faith in the Buddha, the doctrine and the order, there follows a paragraph setting out the thirty-four constituents of the human body — bones, blood, nerves and so on— strangely incongruous with what follows. For that is simply a few of the most beautiful poems to be found in the Buddhist scriptures. , There is no apparent reason, except their exquisite versification, why these particular pieces should have been here brought together. It is most probable that this tiny volume was simply a sort of first lesson book for young neophytes when they joined the order. In any case that is one of the uses to which it is put at present. The text book is the Dhammapada. Here are brought

together from ten to twenty stanzas on each of twenty-six selected points of Buddhist self-training or ethics. There are altogether 423 verses, gathered from various older sources, and strung together without any other internal connexion than that they relate more or less to the same subject. And the collector has not thought it necessary to choose stanzas written in the same metre, or in the same number of lines. We know that the early Christians were accustomed to sing hymns, both in their homes and on the occasions of their meeting together. These . hymns are now irretrievably lost. Had some one made a collection of about twenty isolated stanzas, chosen from these hymns, on each of about twenty subjects — such as Faith, Hope, Love, the Converted Man, Times of Trouble, Quiet Days, the Saviour, the Tree of Life, the Sweet Name, the Dove, the King, the Land of Peace, the Joy Unspeakable — we should have a Christian Dhammapada, and very precious such a collection would be. The Buddhist Dhammapada has been edited by Professor Fausboll (2nd ed., 1900), and has been frequently translated. Where the verses deal with thoseideas that are common to Christians and Buddhists, the versions are easily intelligible, and some of the stanzas appeal very strongly to the Western sense of religious beauty. Where the stanzas are full of the technical terms of the Buddhist system of self-culture and self-control, it is often impossible, without expansions that spoil the poetry, or learned notes that distract the attention, to convey the full sense of the original. In all these distinctively Buddhist verses the existing translations (of which Professor Max Miiller's is the best known, and Dr Karl Neumann's the best) are inadequate and sometimes quite erroneous. The connexion in which they were spoken is often apparent in the more ancient books from which these verses have been taken, and has been preserved in the commentary on the work itself.

In the next little work the framework, the whole paraphernalia of the ancient akhyana, is included in the work itself, which is called Uddna, or " ecstatic utterances." The Buddha is repre- sented, on various occasions during his long career, to have been so much moved by some event, or speech, or action, that he gave vent, as it were, to his pent-up feelings in a short, ecstatic utter- ance, couched, for the most part, in one or two lines of poetry. These outbursts, very terse and enigmatic, are charged with religious emotion, and turn often on some subtle point of Arahat- ship, that is, of the Buddhist ideal of life. The original text has been published by the Pali Text Society. The little book, a garland of fifty of these gems, has been translated by General Strong. The next work is called the Iti Vuttaka. This contains 1 20 short passages, each of them leading up to a terse

deep saying of the Buddha's, and introduced, in each case, with the words Iti vuttam Bhagavald — " thus was it spoken by the Exalted One." These anecdotes may or may not be historically accurate. It is quite possible that the memory of the early disciples, highly trained as it was, enabled them to preserve a substantially true record of some of these speeches, and of the circumstances in which they were uttered. Some or all of them may also have been invented. In either case they are excellent evidence of the sort of questions on which discussions among the earliest Buddhists must have turned. These ecstatic utterances and deep sayings are attributed to the Buddha himself, and accompanied by the prose framework. There has also been preserved a collection of

stanzasascribedtohisleadingfollowers. Of these 107 are brethren, and 73 sisters, in the order. The prose framework is in this case preserved only in the commentary, which also gives biographies of the authors. This work is called the Thera-theri-gdthd.

Another interesting collection is the Jdtaka book, a set of verses supposed to have been uttered by the Buddha in some of his previous births. These are really 550 of the folk-tales current in India when the canon was being formed, the only thing Budd- hist about them being that the Buddha, in a previous birth, is identified in each case with the hero in the little story. Here again the prose is preserved only in the commentary. And it is a most fortunate chance that this — the oldest, the most complete, and the most authentic collection of folklore extant — has thus been preserved intact to the present day. Many of these stories and fables have wandered to Europe, and are found in medieval homilies, poems and story-books. A full account of this curious migration will be found in the introduction to the present writer's Buddhist Birth Stories. A translation of the whole book is now published, under the editorship of Professor Cowell, at the Cambridge University Press. The last of these poetical works which it is necessary to mention is the Sutta Nipdta, containing fifty-five poems, all except the last merely short lyrics,' many of great beauty. A very ancient commentary on the bulk of these poems has been included in the canon as a separate work. The poems themselves have been translated by Professor Fausboll in the Sacred Books of the, East. The above works are our authority for the philosophy and ethics of the earliest Buddhists. We have also a complete statement of the rules of the order in the Vinaya, edited, in five volumes, by Professor Oldenberg. Three volumes of translations of these rules, by him and by the present writer, have also appeared in the Sacred Books of the East.

There have also been added to the canonical books seven works on Abhidhamma,. more elaborate and more classified exposition of the Dhamma or doctrine as set out in the Nikdyas. All these works are later. Only one of them has been translated, the so- called Dhamma Sangani. The introduction to this translation, published under the title of Buddhist Psychology, contains the fullest account that has yet appeared of the psychological con- ceptions on which Buddhist ethics are throughout based. The translator, Mrs Caroline Rhys Davids, estimates the date of this ancient manual for Buddhist students as the 4th century B.C.*

Later Works. — So far the canon, almost all of which is now accessible to readers of Pali. But a good deal of work is still required before the harvest of historical data contained in these texts shall have been made acceptable to students of philosophy and sociology. These works of the oldest period, the two centuries and a half, between the Buddha's time and that of Asoka, were followed by a voluminous literature in the following periods — from Asoka to Kanishka, and from Kanishka to Buddhaghosa, — each of about three centuries. Many of these works are extant in MS.; but only five or six of the more im- portant have so far been published. Of these the most interesting is the Milinda, one of the earliest historical novels preserved to us. It is mainly religious and philosophical, and purports to give the discussion, extending over several days, in which a Buddhist elder named Nagasena succeeds in converting Milinda, that is Menander, the famous Greek king of Bactria, to Buddhism. The Pali text has been edited and the work translated into English. More important historically, though greatly inferior in style and ability, is the Mahavastu or Sublime Story, in Sanskrit. The story is the one of chief importance to the Buddhists — the story, namely, of how the Buddha won, under the Bo Tree, the victory over ignorance, and attained to the Sambodhi, " the higher wisdom," of Nirvana. The story begins with his previous births, in which also he was accumulating the Buddha qualities. And as the Mahavastu was a standard work of a particular sect, or rather school, called the Maha-sanghikas, it has thus preserved for us the theory of the Buddha as held outside the followers of the canon, by those whose views developed, in after centuries, into the Mahayana or modern form of Buddhism in India. But this book, like all the ancient books, was composed, not in the north, in Nepal, but in the valley of the Ganges, and it is partly

in prose, partly in verse. Two other works, the Lalita Vistara and the Buddha Carita, give us — but this, of course, is later- Sanskrit poems, epics, on the same subject. Of these, the former may be as old as the Christian era; the latter belongs to the 2nd century after Christ. Both of them have been edited and translated. The older one contains still a good deal of prose, the gist of it being often repeated in the verses. The later one is entirely in verse, and shows off the author's mastery of the artificial rules of prosody and poetics, according to which a poem, a maha-kavya, ought, according to the later writers on the Ars poetica, to be composed.

These three works deal only quite briefly and incidentally with any point of Buddhism outside of the Buddha legend. Of greater importance for the history of Buddhism are two later works, the Netti Pakarana and the Saddharma Pundarika. The former, in Pali, discusses a number of questions then of importance in the Buddhist community; and it relies throughout, as does the Milinda, on the canonical works, which it quotes largely. The latter, in Sanskrit, is the earliest exposition we have of the later Mahayana doctrine. Both these books may be dated in the 2nd or 3rd century of our era. The latter has been translated into English. We have now also the text of the Prajna Pqramita, a later treatise on the Mahayana system, which in time entirely replaced in India the original doctrines. To about the same age belongs also the Divyavadana, a collection of legends about the leading disciples of the Buddha, and important members of the order, through the subsequent three centuries. These legends are, however, of different dates, and in spite of the comparatively late period at which it was put into its present form, it contains some very ancient fragments.

The whole of the above works were composed in the north of India; that is to say, either north or a few miles south of the Ganges. The record is at present full of gaps. ˆ But we can even now obtain a full and accurate idea of the earliest Buddhism, and are able to trace the main lines of its development through the first eight or nine centuries of its career. The Pali Text Society is still publishing two volumes a year; and the Russian Academy has inaugurated a series to contain the most important of the Sanskrit works still buried in MS. We have also now accessible in Pali fourteen volumes of the commentaries of the great 5th- century scholars in south India and Ceylon, most of them the works either of Buddhaghosa of Budh Gaya, or of Dhammapala of Kancipura (the ancient name of Conjeeveram) . These are full of important historical data on the social, as well as the religious, life of India during the periods of which they treat.

Modern Research. — The striking archaeological discoveries of recent years have both confirmed and added to our knowledge of the earliest period. Pre-eminent among these is the discovery, by Mr William Peppe, on the Birdpur estate, adjoining the boundary between English and Nepalese territory, of the stupa, or cairn, erected by the Sakiya clan over their share of the ashes from the cremation pyre of the Buddha. About 12 m. to the north-east of this spot has been found an inscribed pillar, put up by Asoka as a record of his visit to the Lumbini Garden, as the place where the future Buddha had been born. Although more than two centuries later than the event to which it refers, this inscription is good evidence of the site of the garden. There had been no interruption of the tradition; and it is probable that the place was then still occupied by the descendants of the possessors in the Buddha's time. North-west of this another Asoka pillar has been discovered, recording his visit to the cairn erected by the Sakyas over the remains of Konagamana, one of the previous Puddhas or teachers, whose follower Gotama the Buddha had claimed to be. These discoveries definitely determine the district occupied by the Sakiya republic in the 6th and 7th centuries B.C. The boundaries, of course, are not known; but the clan must have spread 30 m. or more along the lower slopes of the Himalayas and 30 m. or more southwards over the plains. It has been abandoned jungle since the 3rd century a.d., or perhaps earlier, so that the ruined sites, numerous through the whole district, have remained undisturbed, and further discoveries may be confidently expected.

The principal points on which this large number of older and better authorities has modified our knowledge are as follows : —

1. We have learnt that the division of Buddhism, originating with Burnouf, into northern and southern, is misleading. He found that the Buddhism in his Pali MSS., which came frorr, Ceylon, differed from that in his Sanskrit MSS., which came front Nepal. Now that the works he used have been made accessible in printed editions, we find that, wherever the existing MSS. cam from, the original works themselves were all composed in tht same stretch of country, that is, in the valley of the Ganges. The difference of the opinions expressed in the MSS. is due, not to the place where they are now found, but to the difference 0} time at which they were originally composed. Not one of the boot.s mentioned above is either northern or southern. They all claim, and rightly claim, to belong, so far as their place of origin is concerned, to the Majjhima Desa, the middle country. It is undesirable to base the main division of our subject on an ad-ventitious circumstance, and especially so when the nomenclature*

thus introduced (it is not found in the books themselves) cuts right across the true line of division. The use of the terms northern and southern as applied, not to the existing MSS., but to the original books, or to the Buddhism they teach, not only does not help us, it is the source of serious misunderstanding. It inevitably leads careless writers to take for granted that we have, historically, two Buddhisms — one manufactured in Ceylon, the other in Nepal. Now this is admittedly wrong. What we have to consider is Buddhism varying through slight degrees, as the centuries pass by, in almost every book. We may call it one, or we may call it many. What is quite certain is that it is not two. And the most useful distinction to emphasize is, not the ambiguous and misleading geographical one — derived from the places where the modern copies of the MSS. are found; nor even, though that would be better, the linguistic one — but the chronological one. The use, therefore, of the inaccurate and misleading terms northern and southern ought no longer to be followed in scholarly works on Buddhism.

2. Our ideas as to the social conditions that prevailed, during the Buddha's lifetime, in the eastern valley of the Ganges have been modified. The people were divided into clans, many of them governed as republics, more or less aristocratic. In a few cases several of such republics had formed confederations, and in four cases such confederations had already become hereditary monarchies. The right historical analogy is not the state of Germany in the middle ages, but the state of Greece in the time of Socrates. The Sakiyas were still a republic. They had republics for their neighbours on the east and south, but on the western boundary was the kingdom of Kosala, the modern Oudh, which they acknowledged as a suzerain power. The Buddha's father was not a king. There were rajas in the clan, but the word meant at most something like consul or archon. All the four real kings were called Maha-raja. And Suddhodana, the teacher's father, was not even raja. One of his cousins, named Bhaddiya, is styled a raja; but Suddhodana is spoken of, like other citizens, as Suddhodana the Sakiyan. As the ancient books are very particular on this question of titles, this is decisive.

3. There was no caste — no caste, that is, in the modern sense of the term. We have long known that the connubium was the cause of a long and determined struggle between the patricians and the plebeians in Rome. Evidence has been yearly accumulat- ing on the existence of restrictions as to intermarriage, and as to the right of eating together (commensality) among other Aryan tribes, Greeks, Germans, Russians and so on. Even without the fact of the existence now of such restrictions among the modern successors of the ancient

Aryans in India, it would have been probable that they also were addicted to similar customs. It is certain that the notion of such usages was familiar enough to some at least of the tribes that preceded the Aryans in India. Rules of endogamy and exogamy; privileges, restricted to certain classes, of eating together, are not only Indian or Aryan, but world-wide phenomena. Both the spirit, and to a large degree the actual details, of modern Indian caste-usages are identical

with these ancient, and no doubt universal, customs. It is in them that we have the key to the origin of caste.

At any moment in the history of a nation such customs seem, to a superficial observer, to be fixed and immutable. As a matter of fact they are never quite the same in successive centuries, or even generations. The numerous and complicated details which we sum up under the convenient, but often misleading, single name of caste, are solely dependent for their sanction on public opinion. That opinion seems stable. But it is always tending to vary as to the degree of importance attached to some particular one of the details, as to the size and complexity of the particular groups in which each detail ought to be observed.

Owing to the fact that the particular group that in India worked its way to the top, based its claims on religious grounds, not on political power, nor on wealth, the system has, no doubt, lasted longer in India than in Europe. But public opinion still insists, in considerable circles even in Europe, on restrictions of a more or less defined kind, both as to marriage and as to eating together. And in India the problem still remains to trace, in the literature, the gradual growth of the system — the gradual forma- tion of new sections among the people, the gradual extension of the institution to the families of people engaged in certain trades, belonging to the same group, or sect, or tribe, tracing their ancestry, whether rightly or wrongly, to the same source. All these factors, and others besides, are real factors. But they are phases of the extension and growth, not explanations of the origin of the system.

There is no evidence to show that at the time of the rise of Buddhism there was any substantial difference, as regards the barriers in question, between the peoples dwelling in the valley of the Ganges

and their contemporaries, Greek orRoman, dwelling on the shores of the Mediterranean Sea. The point of greatest weight in the establishment of the subsequent development, the supremacy in India of the priests, was still being hotly debated. All the new evidence tends to show that the struggle was being decided rather against than for the Brahmins. What we find in the Buddha's time is caste in the making. The great mass of the people were distinguished quite roughly into four classes, social strata, of which the boundary lines were vague and uncertain. At one end of the scale were certain outlying tribes and certain hereditary crafts of a dirty or despised kind. At the other end the nobles claimed the superiority. But Brahmins by birth (not necessarily sacrificial priests, for they followed all sorts of occupa- tions) were trying to oust the nobles from the highest grade. They only succeeded, long afterwards, when the power of Buddhism had declined.

4. It had been supposed on the authority of late priestly texts, where boasts of persecution are put forth, that the cause of the decline of Buddhism in India had been Brahmin persecution. The now accessible older authorities, with one doubtful excep- tion, 1 make no mention of persecution. On the other hand, the comparison we are now able to make between the canonical books of the older Buddhism and the later texts of the following centuries, shows a continual decline from the old standpoint, a continual approximation of the Buddhist views to those of the other philosophies and religions of India. We can see now that the very event which seemed, in the eyes of the world, to be the most striking proof of the success of the new movement, the con- version and strenuous support, in the 3rd century B.C., of Asoka, the most powerful ruler India had had, only hastened the decline. The adhesion of large numbers of nominal converts, more especi- ally from the newly incorporated and less advanced provinces, produced weakness rather than strength in the movement for reform. The day of compromise had come. Every relaxation of the old thoroughgoing position was welcomed and supported by converts only half converted. And so the margin of difference between the Buddhists and their opponents gradually faded almost entirely away. The soul theory, step by step, gained again the upper hand. The popular gods and the popular super- stitions are once more favoured by Buddhists themselves. The philosophical basis of the old ethics is overshadowed by new 1 See Journal of the Pali Text Society, 1896, pp. 87-92.

speculations. And even the old ideal of life, the salvation of the Arahat to be won in this world and in this world only, by self-culture and self-mastery, is forgotten, or mentioned only to be

condemned. The end was inevitable. The need of a separate organization became less and less apparent. The whole pantheon of the Vedic gods, with the ceremonies and the sacrifices associated with them, passed indeed away. But the ancient Buddhism, the party of reform, was overwhelmed also in its fall; and modern Hinduism arose on the ruins of both.

Authorities. — The attention of the few scholars at work on the subject being directed to the necessary first step of publishing the ancient authorities, the work of exploring them, of analysing and classifying the data they contain, has as yet been very imperfectly done. The annexed list contains only the most important works.

Texts. — Pali Text Society, 57 vols.; Jataka, 7 vols., ed. Fausboll, 1877-1897; Vinaya, 5 vols., ed. Oldenberg, 1879-1883; Dhammapada, ed. Fausboll, 2nd ed., 1900; Divyavadana, ed. Cowell and Neil, 1882; Mahavastu, ed. Senart, 3 vols., 1882-1897; Buddha Carita, ed. Cowell, 1892; Milinda-panho, ed. Trenckner, 1880.

Translations. — Vinaya Texts, by Rhys Davids and Oldenberg, 3 vols., 1881-1885 ; Dhammapada, by Max Miiller, and Sutta Nipata, by Fausboll, 1881; Questions of King Milinda, by Rhys Davids, 2 vols., 1890- 1894; Buddhist Suttas, by Rhys Davids, 1881 ; Saddharma Pundarlka, by Kern, 1884; Buddhist Mahayana Texts, by Cowell and Max Miiller, 1894 — all the above in the " Sacred Books of the East " ; Jataka, vol. i., by Rhys Davids, under the title Buddhist Birth Stories, 1880; vols, i.-vi., by Chalmers, Neil, Francis, and Rouse, 1895-1897; Buddhism in Translations, by Warren, 1896; Buddhistische Anthologie, by Neumann, 1892. Lieder der Monche und Nonnen, 1899, by the same; Dialogues of the Buddha, by Rhys Davids, 1899; Die Reden Gotamo Buddhas, by Neumann, 3 vols., 1899-1903; Buddhist Psychology, by Mrs Rhys Davids, 1900.

Manuals, Monographs, &c. — Buddhism, by Rhys Davids, i2mo, 20th thousand, 1903; Buddha, sein Leben, seine Lehre und seine Gemeinde, by Oldenberg, 5th edition, 1906; Der Buddhismus und seine Geschichte in Indien, by Kern, 1882; Der Buddhismus, by Edmund Hardy, 1890; American Lectures, Buddhism, by Rhy9 Davids, 1896; Inscriptions de Piyadasi, by Senart, 2 vols., 1881-1886; Mara und Buddha, by Windisch, 1895; Buddhist India, by Rhys Davids, 1963. (T. W. R. D.)

BUDE [Budaeus], GUILLAUME (1467-1540), French scholar, was born at Paris. He went to the university of Orleans to study law, but for several years, being possessed of ample means, he led an idle and

dissipated life. When about twenty-four years of age he was seized with a sudden passion for study, and made rapid progress, particularly in the Latin and Greek languages. The work which gained him greatest reputation was his De Asse et Partibus (1514), a treatise on ancient coins and measures. He was held in high esteem by Francis I., who was persuaded by him, and by Jean du Bellay, bishop of Narbonne, to found the Col- legium Trilingue, afterwards the College de France, and the, library at Fontainebleau, which was removed to Paris and was the origin of the Bibliotheque Nationale. He also induced Francis to refrain from prohibiting printing in France, which had been advised by the Sorbonne in 1533. He was sent by Louis XII. to Rome as ambassador to Leo X., and in 1522 was appointed matlre des requites and was several times prevdt des marchands. He died in Paris on the 23rd of August

1540.

Bude was also the author of Annolationes in XXIV. libros Pandectarum (1508), which, by the application of philology and history, had a great influence on the study of Roman law, and of Commentarii linguae Graecae (1529), an extensive collection of lexicographical notes, which contributed greatly to the study of Greek literature in France. Bude corresponded with the most learned men of his time, amongst them Erasmus, who called him the marvel of France, and Thomas More. He wrote with equal facility in Greek and Latin, although his Latin is inferior to his Greek, being somewhat harsh and full of Greek constructions. His request that he should be buried at night, and his widow's open profession of Protestantism at Geneva (where she retired after his death), caused him to be suspected of leanings towards Calvinism. At the time of the massacre of St Bartholomew, the members of his family were obliged to flee from France. Some took refuge in Switzerland, where they worthily upheld the traditions of their house, while others settled in Pomerania , under the name Budde or Buddeus.

See Le Roy, Vita G. Budaei (1540) ; Rebitte, G. Bude, restaurateur 4es etudes grecques en France (1846) ; E. de Bude, Vie de G. BudS (1884), who refutes the idea of his ancestor's Protestant views; D'Hozier, La Maison de Bude; L. Delaruelle, Etudes sur I'humanisme francais (1907).

BUDE, a small seaport and watering-place in the Launceston parliamentary division of Cornwall,.England,on the north coast at the mouth of the river Bude. With the market town of Stratton, ii m. inland to the east, it forms the urban district of Stratton and Bude, with a population (1901) of 2308. Bude is served by a branch of the London & South-Western railway. Its only notable building is the Early English parish church of St Michael and All Angels. The climate is healthy and the coast scenery in the neighbourhood fine, especially towards the south. There the gigantic cliffs, with their banded strata, have been broken into fantastic forms by the waves. Many ships have been wrecked on the jagged reefs which fringe their base. The figure-head of one of these, the " Bencellon," lost in 1862, is preserved in the churchyard. The harbour, sheltered by a breakwater, will admit vessels of 300 tons at high water; and the river has been dammed to form a basin for the canal which runs to Launceston. Some fishing is carried on : but the staple trade is the export of sand, which, being highly charged with carbonate of lime, is much used for manure. There are golf links near the town. The currents in the bay make bathing dangerous.

BUDGELL, EUSTACE (1686-1737), English man of letters, the son of Dr. Gilbert Budgell, was born on the 19th of August 1686 at St Thomas, near Exeter. He matriculated in 1705 at Trinity College, Oxford, and afterwards joined the Inner Temple, London; but instead of studying law he devoted his whole attention to literature. Addison, who was first cousin to his mother, befriended him, and, on being appointed secretary to Lord Wharton, lord-lieutenant of Ireland in 17 10, took Budgell with him as one of the clerks of his office. Budgell took part with Steele and Addison in writing the Taller. He was also a con- tributor to the Spectator and the Guardian, — his papers being marked with an X in the former, and with an asterisk in the latter. He was subsequently made under-secretary to Addison, chief secretary to the lords justices of Ireland, and deputy-clerk of the council, and became a member of the Irish parliament. In 1 7 1 7 , when Addison became principal secretary of state in England, he procured for Budgell the place of accountant and comptroller-general of the revenue in Ireland. But the next year, the duke of Bolton being appointed lord-lieutenant, Budgell wrote a lampoon against E. Webster, his secretary. This led to his being removed from his post of accountant-general, upon which he returned to England, and, contrary to the advice of Addison, published his case in a pamphlet. In the year 1720 he lost £20,000 by the South Sea scheme, and afterwards spent £5000 more in unsuccessful attempts to get into parliament. He began to write pamphlets against the

ministry, and published many papers in the Craftsman. In 1733 he started a weekly periodical called the Bee, which he continued for more than a hundred numbers. By the will of Matthew Tindal, the deist, who died in 1733, a legacy of 2000 guineas was left to Budgell; but the bequest (which had, it was alleged, been inserted in the will by Budgell himself) was successfully disputed by Tindal's nephew and nearest heir, Nicholas Tindal, who translated and wrote a Continuation of the History of England of Paul de Rapin-Thoyras. Hence Pope's lines —

" Let Budgell charge low Grub Street on his quill, And write whate'er he pleased — except his will." 1

Budgell is said to have sold the second volume of Tindal's Christi- anity as Old as the Creation to Bishop Gibson, by whom it was destroyed. The scandal caused by these transactions ruined him. On the 4th of May 1737, after filling his pockets with stones, he took a boat at Somerset-stairs, and while the boat was passing under the bridge threw himself into the river. On his desk was found a slip of paper with the words — " What Cato did, and Addison approved, cannot be wrong." Besides the works mentioned above, he wrote a translation (17 14) of the Characters 1 Epistle to Dr Arbuthnot, lines 378-379.

of Theophrastus. He never married, but left a natural daughter, Anne Eustace, who became an actress at Drury Lane.

See Cibber's Lives of the Poets, vol. v.

BUDGET (originally from a Gallic word meaning sack, latin- ized as bulga, leather wallet or bag, thence in O. Fr. bougette, from which the Eng. form is derived), the name applied to an account of the ways and means by which the income and ex- penditure for a definite period are to be balanced, generally by a finance minister for his state, or by analogy for smaller bodies. 2 The term first came into use in England about 1760. In the United Kingdom the chancellor of the exchequer, usually in April, lays before the House of Commons a statement of the actual results of revenue and expenditure in the past finance year (now ending March 31), showing how far his estimates have been realized, and what surplus or deficit there has been in the income as compared with the expenditure. This is accompanied by another statement in which the chancellor gives an estimate of what the produce of the revenue may be in the year just entered upon, supposing the taxes and duties to remain as they were in the past year, and also an estimate of what

the ex- penditure will be in the current year. If the estimated revenue, after allowing for normal increase of the principal sources of income, be less than the estimated expenditure, this is deemed a case for the imposition of some new, or the increase of some existing, tax or taxes. On the other hand, if the estimated revenue shows a large surplus over the estimated expenditure, there is room for remitting or reducing some tax or taxes, and the extent of this relief is generally limited to the amount of surplus realized in the previous year. The chancellor of the exchequer has to take parliament into confidence on his estimates, both as regards revenue and expenditure; and these estimates are prepared by the various departments of the administration. They are divided into two parts, the consolidated fund services and the supply services, the first comprising the civil list, debt charge, pensions and courts of justice, while the "supply" includes the remaining expenditure of the country, as the army, the navy, the civil service and revenue departments, the post- office and telegraph services. The consolidated fund services are an annual charge, fixed by statute, and alterable only by statute, but the supply services may be gone through in detail, item by item, by the House of Commons, which forms itself into a committee of supply for the purpose. These items can be criticized, and reduced (but not increased) by amendments proposed by private members. The committee of ways and means (also a committee of the whole House) votes the supplies when granted and originates all taxes. The resolutions of these committees are reported to the House, and when the taxation and expenditure obtain the assent of parliament, the results as thus adjusted become the final budget estimate for the year, and are passed as the Finance Act. This system of annual review and adjustment of the public finances obtains not only in the British colonies, but in British India. The Indian budget, giving the results of income and expenditure in the year ending 31st of December, and the prospective estimates, is laid before the imperial parliament in the course of the ensuing session.

The budget, though modified by different forms, has also long been practised in France, the United States, and other constitu- tional countries, and has in some cases been adopted by autocratic Powers. Russia began the publication of annual budgets in 1866; Egypt has followed the example; so also has Turkey, by an imperial decree of 1875. All countries agree in taking a yearly period, but the actual date of commencement varies considerably. The German and Danish financial year, like that of the United Kingdom, begins on the 1st of April; in France, Belgium and Austria, it begins on the 1st of

January; in Italy, Spain, the United States and Canada, on the 1st of July.

2 It was a name applied also to a leather-covered case or small coffer. Cotgrave translates bougette " a little coffer or trunk . . . covered with leather." It became a common word for a despatch box in which official papers were kept. The chancellor of the exchequer thus was said to " open his budget " when he made his annual statement.

Previously to 1832, however, the English financial year ran from the 1st of January to the 3 1st of December.

It may be mentioned that Disraeli introduced a budget (on which he was defeated) in the autumn of 1852; and in i860, owing to the ratification of the commercial treaty with France, the budget was introduced on the 10th of February. In 1859, through a change of administration, the budget was not introduced until the 18th of July, while in 1880 there were two budgets, one introduced in March under Disraeli's administration, and the other in June, under Gladstone's administration.

National budgetsare to be discriminated (1) as budgets passing under parliamentary scrutiny and debate from year to year, and (2) budgets emitted on executive authority. In most con- stitutional countries the procedure is somewhat of a mean between the extremes of the United Kingdom and the United States. In the United Kingdom the budget is placed by the executive before the whole House, without any previous examina- tion except by the cabinet, and it is scrutinized by the House sitting as a committee; in the majority of countries, however, the budget undergoes a preliminary examination by a specially selected committee, which has the power to make drastic changes in the proposals of the executive. In the United States, on the other hand, the budget practically emanates from Congress, for there is no connexion between the executive and the legis- lative departments. The estimates prepared by the various executive departments are submitted to the House of Representa- tives by the secretary of the treasury. With these estimates two separate committees deal. The committee on ways and means deals with taxation, and the committee on appropriations with expenditure. The latter committee is divided into various sub-

committees, each of which brings in an appropriation bill for the department or subject with which it is charged.

There are also, in all the greater countries, local and municipal taxations and expenditures of only less account than the national. In federal governments such as the United States, the German empire, or the Argentine republic, the budgets of the several states of the federation have to be consulted, as well as the federal budgets, for a knowledge of the finances.

Authorities. — Stourm, Le Budget, son histoire et son mecanisme (1889), which gives a comparative study of the budgets of different countries, is the best book upon the subject. See also Siedler, Budget und Budgetrecht (1885); Sendel, Uber Budgetrecht (1890); Besson, Le Controle des budgets en France et b. I'etranger (1899); Bastable, Public Finance (3rd ed., 1903); Eugene E. Agger, The Budget in American Commonwealths (New York, 1907).

BUDINI, an ancient nation in the N.E. of the Scythia (q.v.) of Herodotus (iv. 21, 108, 109), probably on the middle course of the Volga about Samara. They're described as light-eyed and red-haired, and lived by hunting in their thick forests. They were probably Finns of the branch now represented by the Votiaks and Permiaks, forced northwards by later immigrants. In their country was a wooden city inhabited by a distinct race, the Geloni, who seem to have spoken an Indo-European tongue. Later writers add nothing to our knowledge, and are chiefly interested in the tarandus, an animal which dwelt in the woods of the Budini and seems to have been the reindeer (Aristotle ap. Aelian, Hist. Anim. xv. 33). (E. H. M.)

BUDWKIS (Czech Budfjovice), a town of Bohemia, Austria, 80 m. S.S.W. of Prague by rail. Pop. (1900) 39,630. It is situated at the junction of the Maltsch with the Moldau, which here becomes navigable, and possesses a beautiful square, lined with fine arcaded buildings, the principal one being the town-hall, built in 1730 in Renaissance style. Other interesting buildings are the cathedral with its detached tower, dating from 1500, and the Marien-Kirche with fine cloisters. Budweis has a large, varied and growing industry, which comprises the manufacture of chemicals, matches, paper, machinery, bricks and tiles, corn and saw mills, boat-building, bell-founding and black-lead pencils. It is the principal commercial centre of South Bohemia, being an important lailway junction, as well as a river port, and carries on a large trade in corn, timber, lignite, salt, industrial products and beer, the latter mostly exported to America. It is the see of a bishop since 1 783, and is the centre of a German

enclave in Czech

Bohemia. But the Czech element is steadily increasing, and the population of the town was in 1908 60% Czech. The railway from Budweis to Linz, laid in 1827 for horse-cars, was the first line constructed in Austria. A little to the north, in the Moldau valley, stands the beautiful castle of Frauenberg, belonging to Prince Schwarzenberg. It stands on the site formerly occupied by a 13th-century castle, and was built in the middle of the 19th century, after the model of Windsor Castle.

The old town of Budweis was founded in the 13th century by Budivoj Vitkovec, father of Zavis of Falkenstein. In 1265 Ottokar II. founded the new town, which was soon afterwards created a royal city. Charles IV. and his son Wenceslaus granted the town many privileges. Although mainly Catholic, Budweis declared for King George Podebrad, and in 1468 was taken by the crusaders under Zdenko of Stenberg. From this time the town remained faithful to the royal cause, and in 1 547 was granted by the emperor Ferdinand the privilege of ranking at the diet next to Prague and Pilsen. After the outbreak of the Thirty Years' War Budweis was confirmed in all its privileges.

BUELL, DON CARLOS (1818-1898), American soldier, was born near Marietta, Ohio, on the 23rd of March 1818. He gradu- ated at West Point in 1841, and as a company officer of infantry took part in the Seminole War of 1841-42 and the Mexican War, during which he was present at almost all the battles fought by Generals Taylor and Scott, winning the brevet of captain at Monterey, and that of major at Contreras-Churubusco, where he was wounded. From 1848 to 1861 he performed various staff duties, chiefly as assistant-adjutant-general. On the outbreak of the Civil War he was appointed lieutenant-colonel on the nth of May 1861, brigadier-general of volunteers a few days later, and major-general of volunteers in March 1862. He aided efficiently in organizing the Army of the Potomac, and, at the instance of General McClellan, was sent, in November 1861, to Kentucky to succeed General William T. Sherman in command. Here he employed himself in the organization and training of the Army of the Ohio (subsequently of the Cumberland), which to the end of its career retained a standard of discipline and efficiency only surpassed by that of the Army of the Potomac. In the spring of 1862 Buell followed the retiring Confederates under Sidney Johnston, and appeared on the field of Shiloh (q.v.) at the end of the first day's fighting. On the following day, aided by BuelPs fresh and well-trained army, Grant carried all

before him. Buell subsequently served under Halleck in the advance on Corinth, and in the autumn commanded in the campaign in Kentucky against Bragg. After a period of manoeuvring in which Buell scarcely held his own, this virtually ended in the indecisive battle of Perryville. The alleged tardiness of his pursuit, and his objection to a plan of campaign ordered by the Washington authorities, brought about Buell's removal from command. With all his gifts as an organizer and disciplinarian, he was haughty in his dealings with the civil authorities, and, in high command, he showed, on the whole, unnecessary tardiness of movement and an utter disregard for the requirements of the political situation. Moreover, as McClellan's friend, holding similar views, adverse politically to the administration, he suffered by McClellan's displacement. The complaints made against him were investigated in 1862-1863, but the result of the investiga- tion was not published. Subsequently he was offered military employment, which he declined. He resigned his volunteer commission in May, and his regular commission in June 1864. He was president of Green River ironworks (1865-1870), and subsequently engaged in various mining enterprises; he served (1885-1889) as pension agent at Louisville. He died near Rock- port, Kentucky, on the 19th of November 1898.

BUENAVENTURA, a Pacific port of Colombia, in the depart- ment of Cauca, about 210 m. W.S.W. of Bogota. Pop. about 1200. The town is situated on a small island, called Cascajal, at the head of a broad estuary or bay projecting inland from the Bay of Choc6 and 10 m. from its mouth. Its geographical posi- tion is lat. 3° 48′ N., long. 7 7 1 2′ W. The estuary is deep enough for vessels of 24 ft. draught and affords an excellent harbour. Buenaventura is a port of call for two lines of steamers (English

and German) , and is the Colombian landing-place -of the West Coast cable. The town is mean in appearance, and has a very unhealthy climate, oppressively hot and humid. It is the port for the upper basin of the Cauca, an elevated and fertile region, with two large commercial centres, Popayan and Cali. In 1907 a railway was under construction to the latter, and an extension to Bogota was also projected.

BUENOS AIRES, a maritime province of Argentina, South America, bounded N. by the province of Santa Fe and Entre Rios, E. by the

latter, the La Plata estuary, and the Atlantic^ S. by the Atlantic, and W. by the territories (gobernaciones) of Rio Negro and Las Pampas, and the provinces of C6rdoba and Santa Fe. Its area is 117,812 sq. m., making it the largest province of the republic. It is also the most populous, even ex- cluding the federal district, an official estimate of 1903 giving it a population of 1 , 2 5 1 ,000. Although it has a frontage of over 900 m. on the La Plata and the Atlantic, the province has but few good natural ports, the best being Bahia Blanca, where the Argentine government has constructed a naval port, and Ensenada (La Plata), where extensive artificial basins have been constructed for the reception of ocean-going steamers. San Nicolas in the extreme north has a fairly good river port, while at Buenos Aires a costly artificial port has been constructed.

In its general aspect the province forms a part of the great treeless plain extending from the Atlantic and La Plata estuary westward to the Andes. A fringe of small tangled wood covers the low river banks and delta region of the Parana between San Nicolas and Buenos Aires; thence southward to Bahia Blanca the sea-shore is low and sandy, with a zone of lagoons and partially submerged lands immediately behind. The south-eastern and central parts of the province are low and marshy, and their effective drainage has long been an urgent problem. Two ranges of low mountains extend partly across the southern part of the province — the first from Mar del Plata, on the coast, in a north- east direction, known at different points as the Sierra del Volcan (885 ft.), Sierra de Tandil (1476 ft.), and Sierra Baya, and the second and shorter range nearer Bahia Blanca, having the same general direction, known at different points as the Sierra Pillahuinco and Sierra de la Ventana (3543 ft.). The country is well watered with numerous lakes and small rivers, the largest river being the Rio Salado del Sud, which rises near the north-western boundary and flows entirely across the province in a south-easterly direction with a course of about 360 m. The Rio Colorado crosses the extreme southern extension of the province, a distance of about 80 m., but its mouth is obstructed, and its lower course is subject to occasional disastrous inundations.

Cattle-raising naturally became the principal industry of this region soon after its settlement by the Spaniards, and sheep- raising on a profitable basis was developed about the middle of the 19th century. Toward the end of that century the exports of wool, live-stock and dressed meats reached enormous pro- portions. There is a large export of jerked beef (tasajo) to Brazil and Cuba, and of live-stock to Europe, South Africa and neighbouring South American republics. Much attention also has been given to raising horses, asses, mules,

swine and goats, all of which thrive on these grassy plains. Butter and cheese- making have gained considerable prominence in the province since 1890, and butter has become an article of export. Little attention had been given to cereals up to 1875, but subsequently energetic efforts were made to increase the production of wheat, Indian corn, linseed, barley, oats and alfalfa, so that by the end of the century the exports of wheat and flour had reached a considerable value. In 1895 there were 3,400,000 acres under cultivation in the province, and in 1900 the area devoted to wheat alone aggregated 1,960,000 acres. Fruit-growing also has made good progress, especially on the islands of the Parana, delta, and Argentine peaches, pears, strawberries, grapes and figs are highly appreciated.

The navigation of the Parana is at all times difficult, and is impossible for the larger ocean-going steamers. The greater part of the trade of the northern and western provinces, therefore, must pass through the ports of Buenos Aires and Ensenada, at

which an immense volume of business is concentrated. All the great trunk railways of the republic pass through the province and converge at these ports, and from them a number of trans- atlantic steamship lines carry away the products of its fertile soil. The province is also liberally supplied with branch rail- ways. In the far south the new port of Bahia Blanca has become prominent in the export of wool and wheat.

The principal cities and towns of the province (apart from Buenos Aires and its suburbs of Belgrano and Flores) are its capital La Plata; Bahia Blanca, San Nicolas, a river port on the Parana 150 m. by rail north-west of Buenos Aires, with a population (1901) of 13,000; Campana (pop. 5419 in 1895), the former river port of Buenos Aires on one of the channels of the Parana, 51 m. by rail north-west of that city, and the site of the first factory in Argentina (1883) for freezing mutton for export; Chivilcoy, an important interior town, with a population (1901) of t5,ooo; Pergamino (9540 in 1895), a northern inland railway centre; Mar del Plata, a popular seaside resort 250 m. by rail south of Buenos Aires; Azul (9494), Tandil (7088), Chascormis (5667), Mercedes (9269), and Barracasal Sud (10, 185), once the centre of the jerked beef industries.

The early history of the province of Buenos Aires was a struggle for supremacy over the other provinces for a period of two generations. Its large extent of territory was secured through successive additions by conquest of adjoining Indian territories south and west, the last

additions being as late as 1879. Buenos Aires became a province of the Confederation in 1820, and adopted a constitution in 1854, which provides for its administra- tion by a governor and legislature of two chambers, both chosen by popular vote. An unsuccessful revolt in 1880 against the national government led to the federalization of the city of Buenos Aires, and the selection of La Plata as the provincial capital, the republic assuming the public indebtedness of the provinces at that time as an indemnification. Before the new capital was finished, however, the province had incurred further liabilities of ten millions sterling, and has since then been greatly handicapped in its development in consequence. (A. J. L.)

BUENOS AIRES, a city and port of Argentina, and capital of the republic, in 34 36′ 21″ S. lat. and 58° 21′ 33″ W. long., on the west shore of the La Plata estuary, about 1 55 m. above its mouth, and 127 m. W. by N. from Montevideo. The estuary at this point is 34 m. wide, and so shallow that vessels can enter the docks only through artificial channels kept open by constant dredging. Previously to the construction of the new port, ocean- going vessels of over 1 5 ft. draught were compelled to anchor in the outer roads some 12 m. from the city, and -communication with the shore was effected by rrfcans of steam tenders and small boats, connecting with long landing piers, or with carts driven out from the beach. The city is built upon an open grassy plain extending inland from the banks of the estuary, and north from the Riachuelo or Matanzas river where the " Boca " port is located. Its average elevation is about 65 ft. above sea-level. The federal district, which includes the city and its suburbs and covers an area of 72 sq. m., was detached from the province of Buenos Aires by an act of congress in 1880. With the construc- tion of the new port and reclamation of considerable areas of the shallow water frontage, the area of the city has been greatly extended below the line of the original estuary banks. The streets of the old city, which are narrow and laid out to enclose rectangular blocks of uniform size, run nearly parallel with the cardinal points of the compass, but this plan is not closely followed in the new additions and suburbs. This uniformity in plan, combined with the level ground and the style of buildings first erected, gave to the city an extremely monotonous and un- interesting appearance, but with its growth in wealth and popula- tion, greater diversity and better taste in architecture have resuPed.

The prevailing style of domestic architecture is that introduced from Spain and used throughout all the Spanish colonies — the grouping of one-storey buildings round one or two patios, which open on the

street through a wide doorway. These residences have heavily barred windows on the street, and flat roofs with

parapets admirably adapted for defence. The domiciliation of wealthy foreigners, and the introduction of foreign customs and foreign culture, have gradually modified the style of archi- tecture, both public and domestic, and modern Buenos Aires is adorned with many costly and attractive public edifices and residences. French renaissance, lavishly decorated, has become the prevailing style. The Avenida Alvear is particularly noted for the elegance of its private residences, and the new Avenida de Mayo for its display of elaborately ornamented public and business edifices, while the suburban districts of Belgrano and Flores are distinguished for the attractiveness of their country- houses and gardens. A part of the population is greatly over- crowded, one-fifth living in conventillos, or tenement-houses.

Among the city's many plazas, or squares, twelve are especially worthy of mention, viz.: 25 de Mayo (formerly Victoria) on which face the Government-House and Cathedral, San Martin (or Retiro), Lavalle, Libertad, Lorea, Belgrano, 6 de Junio, Once de Setiembre, Independencia (formerly Conception), Constitution, Caridad and 29 de Deciembre. These vary in size from one to three squares, or 4 to 1 2 acres each, and are hand- somely laid out with flowers, shrubbery, walks and shade trees. There are also two elaborately laid out alamedas, the Recoleta and the Paseo de Julio, the latter on the river front and partially absorbed by the new port works, and the great park at Palermo, officially called 3 de Febrero, which contains 840 acres, beauti- fully laid out in drives, footpaths, lawns, gardens and artificial lakes. In all, the plazas and parks of Buenos Aires cover an area of 960 acres.

The cathedral, which is one of the largest in South America, dating from 1752, resembles the Madeleine of Paris in design, and its classical portico facing the Plaza 25 de Mayo has twelve stately Corinthian columns supporting an elaborately sculptured pediment. The archbishop's palace (Buenos Aires became an archiepiscopal see in 1866) adjoins the cathedral. There are about twenty-five Roman Catholic churches in the city, one of the richest and most popular of which is the Merced on Calle Reconquista, and four Protestant churches — English, Scottish Presbyterian, American Methodist and

German Lutheran. Twenty asylums for orphans and indigent persons and one for lunatics are maintained at public expense and by private religious associations, while the demand for organized medical and surgical treatment is met by fifteen well-appointed hospitals, having an aggregate of 2600 beds, and treating 17,000 patients annually. Of these, five belong to foreign nationalities. The city has six cemeteries covering 230 acres.

Among the more noteworthy public buirtiings are the Casa Rosada (government-house), facing the Plaza 25 de Mayo and occupying in part the site of the fort built by Garay in 1580; the new congress hall on Calle Callao and Avenida de Mayo, finished in 1906 at a cost of about £1,300,000; the new municipal hall on Avenida de Mayo; the bolsa or exchange, distributing reservoir, mint, and some of the more modern educational buildings. Higher education is represented by the university of Buenos Aires, with its several faculties, including law and medicine, and 3562 students (1901), four national colleges, three normal schools and various technical schools. There are, also, a national library, a national museum, a zoological garden and an aquarium. The people are fond of music, the drama and amusements, and devote much time and expense to diver- sions of a widely varied character, from Italian opera to horse- racing and pelota. They have two or three large public baths, and a large number of social, sporting and athletic clubs. The Portenos, as the residents of Buenos Aires are called, are accustomed to call their city the " Paris of America," and not without reason. Buenos Aires has become the principal manu- facturing centre of the republic, and its industrial establishments are numbered by thousands and their capital by hundreds of millions of dollars.

The growth of Buenos Aires since settled conditions have prevailed, and especially since its federalization, has been very rapid, and the city has finally outstripped all rivals and become the largest city of South America. At the time of its first

authentic census in 1869, it had a population of 177,767. In 1887, when the suburbs of Belgrano and Flores with an aggregate population of 28,000 were annexed, its population without this increment was estimated at 404,000. In 1895 the national census gave the population as 663,854, and in 1904 a municipal census increased it to 950,891. At the close of 1905 the national statistical office estimated it at 1,025,653. The excess of births over deaths is unusually large (about 14 per thousand in 1905). The city has about one-fifth of the population of the whole republic. The government is vested in an intendente municipal (mayor) appointed by the national

executive with the approval of the senate, and a concejo deliberante (legislative council) elected by the people and composed of two councillors from each parish. The police force is a military organization under the control of the national executive, and the higher municipal courts are subject to the same authority. Every ratepayer, whether foreigner or native, has the right to vote in municipal elections and to serve in the municipal council.

The water-supply is drawn from the estuary at Belgrano and conducted 32 m. to the Recoleta, where three great settling basins, with an aggregate capacity of 12,000,000 gallons, and six acres of covered filters, are located. It is then pumped to the great distributing reservoir at Calles Cordoba and Viamonte, which covers four acres and has a capacity of 13,500,000 gallons. These works were begun in 1873. Up to 1873, when the water and drainage works were initiated by English engineers' and con- tractors, there were no public sewers, and the sanitary state of the city was indescribably bad. The cholera epidemic of 1867-1868, with 15,000 victims, and the yellow fever epidemic of 1871, with 26,000 victims, were greatly intensified by these insanitary con- ditions. The construction of the sewers lasted about 19 years, when in 1892 the water and drainage works were taken over by the government, and are now administered at public expense and at a profit. The main sewer is 16 m. long and extends southward beyond Quilmes. The total cost of the two systems exceeded six millions sterling. Buenos Aires is now provided with a good water-supply, and its sanitary condition compares favourably with that of other great cities, the annual death- rate being about 18 per thousand, against 27 per thousand in 1887. Its mean annual temperature is 64 Fahr., and its annual rainfall 34 in.

The lighting includes both gas and electricity, the former dating from 1856. Previously to that time street lighting had been effected at first with lamps burning mares' grease, and then with tallow candles. The streets were at first paved with cobble-stones, then with dressed granite paving-stones (parallel- epipedons), and finally with wood and asphalt. The tram service is in the hands of nine private companies, operating 313 m. of track (31st of December 1905), on almost five-sevenths of which electric traction is employed. The city is the principal terminus and port for nearly all the trunk railway lines of the republic, which have large passenger stations at the Retiro, Once de Setiembre, and Constituci6n plazas, and are connected with the central produce market and the new Madero port. The great central produce market at Barracas al Sud (M ercado Central de Frutos), whose lands, buildings, railway sidings, machinery and mole cost £750,000, is designed to handle the

pastoral and agricultural products of the country on a large scale, while 20 markets in the city meet the needs of local consumers.

The most important feature of the port of Buenos Aires is the " Madero docks," constructed to enlarge and improve its shipping facilities. Improvements had been begun in i872atthe" Boca," as the port on the Riachuelo is called, and nearly £1,500,000 was spent there in landing facilities and dredging a channel 12 m. in length, to deep water. These improvements were found in- sufficient, and in 1887 work was begun on plans executed by Sir John Hawkshaw for a series of four docks and two basins in front of the city, occupying 3 m. of reclaimed shore-line, and connected with deep water by two dredged channels. The north basin is provided with two dry docks, and the new quays are equipped with 24 warehouses, hydraulic cranes, and 28 m. of railway sidings and connexions. The total cost of the new port works

up to 1908 was about £8,000,000 sterling ($40,000,000 gold). In September of that year it was decided by congress to borrow £5,000,000 for still further extensions which were found to be required. The channels to deep water require constant dredging because of the great quantity of silt deposited by the river, and on this and allied purposes an expenditure of £560,000 was voted in 1908. In 1907 there were 29,178 shipping entries in the port, with an aggregate of 13,335,737 tons, the merchandise movement being 4,360,000 tons imports and 2,900,000 tons of produce exports. The revenues for 1907 were $5,452,000 gold, and working expenses, $2,213,000 gold, the profit ($3,229,000) being equal to about 8 % on the cost of construction.

History. — Three attempts were made to establish a colony where the city of Buenos Aires stands. The first was in 1 535 by Don Pedro de Mendoza with a large and well-equipped expedition from Spain, which, through mismanagement and the hostility of the Indians, resulted in complete failure. An expedition sent up the river by Mendoza founded Asuncion, and thither went the colonists from his " Santa Maria de Buenos Ayres " when that settlement was abandoned. The second was in 1542 by a part of the expedition from Spain under Cabeza de Vaca, but with as little success. The third was in 1580 by Don Juan de Garay, governor of Paraguay, who had already established a half-way post at Santa Fe in 1 573, and from

this attempt dates the founda- tion of the city. The need of a port near the sea, where sup- plies from Spain could be received and ships provisioned, was keenly felt by the Spanish colonists at Asuncion, and Garay's expedition down the Parana in 1580 had that special object in view. Garay built a fort and laid out a town in the prescribed Spanish style above Mendoza's abandoned settlement, giving it the name of " Ciudad de la Santissima Trinidad," but retaining Mendoza's descriptive name for the port in appreciation of the agreeable and invigorating atmosphere of that locality. Buenos Aires remained a dependency of Asuncion until 1620, when the Spanish settlements of the La Plata region were divided into three provinces, Paraguay, Tucuman and Buenos Aires, and Garay's " city " became the capital of the latter and also the seat of a new bishopric. The increasing population and trade of the La Plata settlements naturally contributed to the importance and prosperity of Buenos Aires, but Spain seems to have taken very little interest in the town at that time. Peru still dazzled the imagination with her stores of gold and silver, and the king and his councillors and merchants had no thought for the little trading station on the La Plata, for which one small shipment of supplies each year was at first thought sufficient. The proximity of the Portuguese settlements of Brazil and the unprotected state of the coast, however, made smuggling easy, and the colonists soon learned to supply their own needs in that way. The heavy seigniorage tax on gold and silver, and the costs of transportation by way of Panama, also sent a stream of contraband metal from Charcas to Buenos Aires, where it found eager buyers among the Portuguese traders from Brazil, who even founded the town of Colonia on the opposite bank of the estuary to facilitate their hazardous traffic. In time the magnitude of these operations attracted attention at Madrid and efforts were made to suppress them, but without complete success until more liberal provisions were made to promote trade between Spain and her colonies. In 1776 the Rio de la Plata provinces were erected into a vice- royalty, and Buenos Aires became its capital. Two years later the old commercial restrictions were abolished and a new code was promulgated, so liberal in character compared with the old that it was called the " free trade regulations." Under the old system all intercourse with foreign countries had been prohibited, with the exception of Great Britain and Portugal — the former having a contract (1715 to 1739) to introduce African slaves, and permission to send one shipload of merchandise each year to certain colonial ports, and the latter's Brazilian colonies having permission to import from Buenos Aires each year 2000 fanegas of wheat, 500 quintals of jerked beef and 500 of tallow. The African slaves introduced into Buenos Aires in

this way were limited to 800 a year, and were the only slaves of that character ever received except some from Brazil after 1778, when greater

commercial activity in the port created a sudden demand for labourers. Under the new regulations 9 ports in Spain and 24 in the colonies were declared puertos habilitados, or ports of entry, and trade between them was permitted, though under many restrictions. The effect of this change may be seen in the ex- portation of hides to the mother country, which had been only 150,000 a year before 1778, but rose to 700,000 and 800,000 a year after that date. (For the later history of the city see Argentina.) (A. J. L.)

BUFF (from Fr. buffle, a buffalo), a leather originally made from the skin of the buffalo, now also from the skins of other animals, of a dull pale yellow colour, used for making the buff- coat or jerkin, a leathern military coat. The old 3rd Foot regiment of the line in the British army (now ;he East Kent Regiment), and the old 78th Foot (now 2nd battalion Seaforth Highlanders) , are called the " Buffs "and the" Ross-shire Buffs " respectively, from the yellow or buff-colour of their facings. The term is commonly used now of the colour alont.

BUFFALO, a city and port of entry, and the county-seat of Erie county, New York, U.S.A., the second city in population in the state, and the eighth in the United States, at the E. extremity of Lake Erie, and at the upper end of the Niagara river; distant by rail from New York City 423 m., from Boston 499 m., and from Chicago 540 m.

The site of the city, which has an area of 42 sq. m., is a broad, undulating tract, rising gradually from the lake to an elevation of from 50 to 80 ft., its altitude averaging somewhac less than 600 ft. above sea-level. The high land and temperate climate, and the excellent drainage and water-supply systems, make Buffalo one of the most healthy cities in the United States, its death-rate in 1900 being 14-8 per thousand, and in 1907 15-58. As originally platted by Joseph Ellicott, the plan of Buffalo somewhat resembled that of Washington, but the plan was much altered and even then not adhered to. Buffalo to-day has broad and spacious streets, most of which are lined by trees, and many small parks and squares. The municipal park system is one of unusual beauty, consisting of a chain of parks with a total area of about 1030 acres, encircling the city and connected by boulevards and driveways. The largest is Delaware Park, about 365 acres, including a lake of 465 acres, in the north part of the city; the north part of the park was enclosed in

the grounds of the Pan-American Exposition of 1901. Adjoining it is the Forest Lawn cemetery, in which are monuments to President Millard Fillmore, and to the famous Seneca chief Red Jacket (1751-1830), a friend of the whites, who was faithful when approached by Tecumseh and the Prophet, and warned the Americans of their danger; by many he has been considered the greatest orator of his race. Among the other parks are Cazenovia Park, Humboldt Park, South Park on the Lake Shore, and " The Front " on a bluff overlooking the source of the Niagara river; in the last is Fort Porter (named in honour of Peter B. Porter), where the United States government main- tains a garrison.

Principal Buildings. — Buffalo is widely known for the beauty of its residential sections, the houses being for the most part de- tached, set well back from the street, and surrounded by attractive lawns. Among the principal buildings are the Federal building, erected at a cost of $2,000,000; the city and county hall, costing $1,500,000, with a clock tower 245 ft. high; the city convention hall, the chamber of commerce, the builders' exchange, the Masonic temple, two state armouries, the Prudential, Fidelity Trust, White and Mutual Life buildings, the Teck, Star and Shea's Park theatres, and the Ellicott Square building, one of the largest office structures in the world; and, in Delaware Park, the Albright art gallery, and the Buffalo Historical Society build- ing, which was originally the New York state building erected for the Pan-American Exposition held in 1901. Among the social clubs the Buffalo, the University, the Park, the Saturn and the Country clubs, and among the hotels the Iroquois, Lafayette, Niagara and Genesee, may be especially mentioned. There are many handsome churches, including St Joseph's (Roman Catholic) and St Paul's (Protestant Episcopal) cathedrals,

and Trinity (Protestant Episcopal), the Westminster Presby- terian, the Delaware Avenue Baptist, and the First Presbyterian churches.

Education. — In addition to the usual high and grammar schools, the city itself supports a city training school for teachers, and a system of night schools and kindergartens. Here, too, is a state normal school. The university of Buffalo (organized in 1845) comprises schools of medicine (1845), law (l8 87), dentistry (1892), and pharmacy (1886). Canisius College is a Roman Catholic (Jesuit) institution for men (established in 1870 and chartered in 18S3),

having in 1907 a college department and an academic (or high school) department, and a library of about 26,000 volumes. Martin Luther Seminary, established in 1854, is a theological seminary of the Evangelical Lutheran Church. Among the best-known schools are the Academy of the Sacred Heart, Buffalo Seminary, the Franklin and the Heathcote schools, Holy Angels and St Mary's academies, St Joseph's Collegiate Institute, and St Margaret's school for girls. The Buffalo public library, founded in 1837, is housed in a fine building erected in 1887 (valued at $1,000,000), and contains about 300,000 books and pamphlets. Other important libraries, with the approximate number of their books, are the Grosvenor (founded in 1859), for reference (75,000 volumes and 7000 pamphlets); the John C. Lord, housed in the building of the Historical Society (10,620) ; the Law (8th judicial district) (17,000); the Catholic Institute (12,000); and the library of the Buffalo Historical Society (founded 1862) (26,600), now in the handsome building in Delaware Park used as the New York state building during the Pan-American Exposition of 1901. The Buffalo Society of Natural Sciences has a museum in the public library building.

Public Institutions. — The hospitals and the charitable and correctional institutions are numerous and are well administered. Many private institutions are richly endowed. Among the hospitals are a state hospital for the insane, the Erie county, the Buffalo general, the Children's, the United States marine (maintained by the Federal government), the German, the Homeopathic, the Women's, the German Deaconess and the Riverside hospitals, and the Buffalo hospital of the Sisters of Charity. Nurses' training schools are connected with most of these. Among the charitable institutions are the Home for the Friendless, the Buffalo, St Vincent's and St Joseph's orphan asylums, St John's orphan home, St Mary's asylum for widows and foundlings, and the Ingleside home for erring women. One of the most noteworthy institutions in the city is the Charity Organisation Society, with headquarters in Fitch Institute. Founded in 1877, it was the first in the United States, and its manifold activities have not only contributed much to the amelioration of social conditions in Buffalo, but have caused it to be looked to as a model upon which similar institutions have been founded elsewhere.

The first newspaper, the Gazette (a weekly), was established in 181 1 and became the Commercial, a daily, in 1835. The first daily was the Courier, established in 1831. There were in 1908 eleven daily papers published, three of which were in German and two in Polish. The weekly papers include several in German, three in Polish, and one in Italian.

Government and Population. — Buffalo is governed under an amended city charter of 1896 by which the government is vested in a bicameral city council, and a mayor elected for a term of four years. The mayor appoints the heads of the principal executive departments (health, civil service, parks, police and fire). The city clerk is elected by the city council. The municipality maintains several well-equipped public baths, and owns its water-supply system, the water being obtained from Lake Erie. The city is lighted by electricity generated by the water power of Niagara Falls, and by manufactured gas. Gas, obtained by pipe lines from the Ohio-Pennsylvania and the Canadian (Welland) natural gas fields, is also used extensively for lighting and heating purposes.

From the first census enumeration in 1820 the population has steadily and rapidly increased from about 2000 till it reached 352,387 inhabitants in 1900, and 423,715 (20 % increase) in 1910.

In 1900 there were 248,135 native-born and 104,252 foreign- born; 350,586 were white and only 1801 coloured, of whom 1698 were negroes. Of the native-born whites, 155,716 had either one or both parents foreign-born; and of the total popula- tion 93,256 were of unmixed German parentage. Of the foreign- born population 36,720 were German, the other large elements in their order of importance being Polish, Canadian, Irish, the British (other than Irish). Various sections of the poorer part of the city are occupied almost exclusively by the immigrants from Poland, Hungary and Italy.

Communications and Commerce. — Situated almost equidistant from Chicago, Boston and New York, Buffalo, by reason of its favourable location in respect to lake transportation and its position on the principal northern trade route between the East and West, has become one of the most important commercial and industrial centres in the Union. Some fourteen trunk lines have terminals at, or pass through, Buffalo. Tracks of a belt line transfer company encircle the city, and altogether there are more than 500 m. of track within the limits of Buffalo. Of great importance also is the lake commerce. Almost all the great steamship transportation lines of the Great Lakes have an eastern terminus at Buffalo, which thus has direct passenger and freight connexion with Cleveland, Detroit, Chicago, Milwaukee and the " Head of the Lakes " (Duluth-Superior). With the latter port it is connected by the Great Northern Steamship Company, a subsidiary line of the Great Northern railway, the passenger service of which is carried on by what are probably the largest and finest inland passenger steamships in existence. The tonnage of the port of Buffalo is considerably more than 5,000,000

tons annually. With a water front of approximately 20 rri. and with 8 to 10 m. of wharfs, the shipping facilities have been greatly increased by the extensive harbour improvements undertaken by the Federal government. These improvements comprise a series of inner breakwaters and piers and an outer breakwater of stone and cement, 4 m. in length, constructed at a cost of more than $2,000,000. Another artery of trade of great importance is the Erie Canal, which here has its western terminus, and whose completion (1825) gave the first impetus to Buffalo's commercial growth. With the Canadian shore Buffalo is connected by ferry, and by the International bridge (from Squaw Island), which cost $1,500,000 and was completed in 1873.

It is as a distributing centre for the manufactured products of the East to the West, and for the raw products of the West to the East, and for the trans-shipment from lake to rail and vice versa, that Buffalo occupies a position of greatest importance. It is one of the principal grain and flour markets in the world. Here in 1843 Joseph Dart erected the first grain elevator ever constructed. In 1906 the grain elevators had a capacity of between twenty and thirty millions of bushels, and annual receipts of more than 200,000,000 bushels. The receipts of flour approximate 10,000,000 barrels yearly. More than 10,000,000 head of live stock are handled in a year in extensive stock-yards (75 acres) at East Buffalo; and the horse market is the largest in America. Other important articles of commerce are lumber, the receipts of which average 200,000,000 ft. per annum; fish (15,000,000 lb annually); and iron ore and coal, part of which, however, is handled at Tonawanda, really a part of the port of Buffalo. Buffalo is the port of entry of Buffalo Creek customs district; in 1908 its imports were valued at $6,708,919, and its exports at $26,192,563.

Manufactures. — As a manufacturing centre Buffalo ranks next to New York among the cities of the state. The manufactures were valued in 1900 at $122,230,061 (of which $105,627,182 was the value of the factory product) , an increase of 2 2 • 2 % over 1 890 ; value of factory product in 1905, $147,377,873. The value of the principal products in 1900 was as follows: slaughtering and meat packing, $9,631,187 (in 1905 slaughtering and meat-packing $12,216,433, an d slaughtering, not including meat-packing, $3,919,940); foundry and machine shop products, $6,816,057 (1905, $11,402,855); linseed oil, $6,271,170; cars and shop construction, $4,513,333(1905, $3,609,471); malt liquors, $4,269,973 (1905, $5,187,216); soap and candles, $3,818,571 (in 1905, soap

$4,792,915); flour and grist mill products, $3,263,697 (1905, $9,807,906); lumber and planing mill products, $3,095,760 (1905, $4,186,668); clothing, $3,246,723 (1905, $4,231,126); iron and steel products, $2,624,547. Other industrial establish- ments of importance include petroleum refineries, ship-yards, brick, stone and lime works, saddlery and harness factories, lithographing establishments, patent medicine works, chemical works, and copper smelters and refineries. Some of the plants are among the largest in existence, notably the Union and the Wagner Palace car works, the Union dry docks, the steel plants of the Lackawanna Iron and Steel Company, and the Larkin soap factory.

History. — The first white men to visit the site of Buffalo were undoubtedly the adventurous French trappers and various Jesuit missionaries. Near here, on the east bank of the Niagara river at the mouth of Cayuga Creek, La Salle in 1679 built his ship the " Griffin," and at the mouth of the river built Fort Conti, which, however, was burned in the same year. In 1687 marquis de Denonville built at the mouth of the river a fort which was named in his honour and was the predecessor of the fortifications on or near the same site successively called Fort Niagara; and the neighbourhood was the scene of military operations up to the close of the War of Independence. As early as 1784 the present site of the city of Buffalo came to be known as " the Buffalo Creek region " either from the herds of buffalo or bison which, according to Indian tradition, had frequented the salt licks of the creek, or more probably from an Indian chief. A little later, possibly in 1 788-1 789, Cornelius Winney, an Indian trader, built a cabin near the mouth of the creek and thus be- came the first permanent white resident. Slowly other settlers gathered. The land was a part of the original Phelps-Gorham Purchase, and subsequently (about 1 793) came into the possession of the Holland Land Company, being part of the tract known as the Holland Purchase. Joseph Ellicott, the agent of the , company, who has been called the " Father of Buffalo," laid out a town in 1801-1802, calling it New Amsterdam, and by this name it was known on the company's books until about 1810. The name of Buffalo Creek or Buffalo, however, proved more popular; the village became the county-seat of Niagara county in 1808, and two years later the town of Buffalo was erected. Upon the outbreak of the second war with Great Britain, Buffalo and the region about Niagara Falls became a centre of active military operations; directly across

the Niagara river was the British Fort Erie. It was from Buffalo that Lieutenant Jesse D. Elliott (1782-1845) made his brilliant capture of the " Detroit " and " Caledonia " in October 1812; and on the 30th and 31st of December 18 13 the settlement was attacked, captured, sacked, and almost completely destroyed by a force of British, Canadians and Indians under General Sir Phineas Riall (c. 1769-1851). After the cessation of hostilities, however, Buffalo, which had been incorporated as a village in 1813, was rapidly rebuilt. Its advan- tages as a commercial centre were early recognized, and its importance was enhanced on the opening up of the middle West to settlement, when Buffalo became the principal gateway for the lake routes. Here in 18 18 was rebuilt the " Walk-in-the- Water," the first steamboat upon the Great Lakes, named in honour of a famous Wyandot Indian chief. In 1825 the com- pletion of the Erie Canal with its western terminus at Buffalo greatly increased the importance of the place, which now rapidly outstripped and soon absorbed Black Rock, a village adjoining it on the N., which had at one time threatened to be a dangerous rival. In 1832 Buffalo obtained a city charter, and Dr Ebenezer Johnson (1786-1849) was chosen the first mayor. In that year, and again in 1834, a cholera epidemic caused considerable loss of life. At Buffalo in 1848 met the Free-Soil convention that nominated Martin van Buren for the presidency and Charles Francis Adams for the vice-presidency. Grover Cleveland lived in Buffalo from 1855 until 1884, when he was elected president, and was mayor of Buffalo in 1882, when he was elected governor of New York state. The Pan-American Exposition, in celebration of the progress of the Western hemisphere in the nineteenth century, was held there (May i-November 2, 1901). It was

during a reception in the Temple of Music on the Exposition grounds that President McKinley was assassinated (September 6th) ; he died at the home of John G. Milburn, the president of the Exposition. In the house of Ansley Wilcox here Vice- President Theodore Roosevelt took the oath of office as president. A marble shaft 80 ft. high, in memory of McKinley, has been erected in Niagara Square.

See William Ketchum, History of Buffalo (2 vols., Buffalo, 1864-1865); H. P. Smith, History of Buffalo and Erie County (Syracuse, 1884); Publications of the Buffalo Historical Society (Buffalo, 1879 et seq.) ; O. Turner, History of the Holland Purchase (Buffalo, 1850) ; T. H. Hotchkin, History of Western New York (New York, 1845) ; and the sketch in Lyman P. Powell's Historic Towns of the Middle States (New York, 1901).

BUFFALO, a name properly pertaining to an aberrant species of cattle which has been kept in a state of domestication in India and Egypt from time immemorial, and had been introduced from the latter country into southern Europe. It is now taken, however, to include not only this species, whose native home is India, but all more or less nearly related animals. 1 Buffaloes are heavily built oxen, with sparsely haired skin, large ears, long, tufted tails, broad muzzles and massive angulated horns. In having only 13 pairs of ribs they resemble the typical oxen. African buffaloes all have the hair of the back directed backwards.

In the Cape buffalo, Bos {Bubalus) coffer, the horns do not attain an excessive length, but in old bulls are so expanded and thickened at the base as to form a helmet-like mass protecting the whole forehead. Several more or less nearly allied local races have been named; and in Eastern Africa the buffaloes (B. coffer aequinoctialis) have smaller horns, which do not meet in the middle line. From this animal, which is brown instead of black, there seems to be a transition towards the red dwarf buffalo (B. nanus) of West Africa, an animal scarcely more than two-thirds the size of its gigantic southern cousin, with relatively small, much flattened, upwardly curved horns. In South Africa buffaloes frequent reedy swamps, where they associate in herds of from fifty to a hundred or more individuals. Old bulls may be met with either alone or in small parties of from two or three to eight or ten. This buffalo formerly roamed in herds over the plains of Central and Southern Africa, always in the near vicinity of water, but the numbers are greatly diminished. In Cape Colony some herds are protected by the government in the eastern forest-districts. This species has never been domesticated, nor does there appear to have been any attempt to reduce it to service. Like its Indian ally it is fond of water, which it visits at regular intervals during the twenty-four hours; it also plasters itself with mud, which, when hardened by the sun, protects it from the bite of the gadflies which in spite of its thick hide seem to cause it considerable annoyance. It is relieved of a portion of the parasitic ticks, so common on the hides of thick-skinned animals, by means of the red-beaked rhinoceros birds, Buphaga erythrorhynca, a dozen or more of which may be seen partly perched on its horns and partly moving about on its back, and picking up the ticks on which they feed. The hunter is often guided by these birds in his search for the buffalo, but oftener still they give timely warning to their host of the dangerous proximity of the hunter, and have thus earned the title of " the buffalo's guardian birds."

In a wild state the typical Indian buffalo, Bos {Bubalus) bubalis,

seems to be restricted to India and Ceylon, although some of the buffaloes found in the Malay Peninsula and Islands probably represent local races. The species has been introduced into Asia Minor, Egypt, Italy and elsewhere. The large size and wide separation of the horns, as well as the less thickly fringed ears, and the more elongated and narrow head, form marked points of distinction between the Asiatic and South African species. Moreover, all Asiatic buffaloes are distinguished from the African forms by having the hair on the fore-part of the back directed forwards; and these go far to support the views of those who would make them the types of a distinct subgenus,

1 In America, it is worth noting, the term " buffalo " is almost universally taken, at all events in popular parlance, to designate the American bison, for which see Bison.

or genus, Buffelus. In Assam there formerly existed a local race, B. bubalis macrocercus, characterized by the horns, which are of immense size, being directed mainly outwards, instead of curving upwards in a circular form. Another Assam race (B. bubalis fulvus) is characterized by the tawny, in place of black, colour of its hair and hide. The haunts of the Indian buffalo are the grass-jungles near swamps, in which the grass exceeds 20 ft. in height. Here the buffaloes — like the Indian rhinoceros — form covered pathways, in which they are com- pletely concealed. The herds frequently include fifty or more individuals. These animals are fond of passing the day in marshes, where they love to wallow in the mud; they are by no means shy, and do much harm to the crops. The rutting-season occurs in autumn, when several females follow a single male, forming for the time a small herd. The period of gestation lasts for ten months, and the female produces one or two calves at a birth. The bull is capable, it is said, of overthrowing an elephant, and generally more than a match even for the tiger, which usually declines the combat when not impelled by hunger. The Indian driver of a herd of tame buffaloes does not shrink from entering a tiger-frequented jungle, his cattle, with their massive horns, making short work of any tiger that may come in their way. Buffalo fights and fights between buffaloes and tigers were recognized Indian sports in the old days. Domesti- cated buffaloes differ from their wild brethren merely by their inferior size and smaller horns; some of the latter being of the circular and others of the straight type. The milk is good

and nourishing, but of a ropy consistency and a peculiar flavour.

The tamarao, or Philippine buffalo, Bos (Bubalus) mindorensis , is a smaller animal, in many respects intermediate between the Indian buffalo and the dwarf anoa, or Celebes buffalo (B. depressicornis). (R. L.)*

BUFFET, LOUIS JOSEPH (1818-1808), French statesman, was born at Mirecourt. After the revolution of February 1848 he was elected deputy for the department of the Vosges, and in the Assembly sat on the right, pronouncing for the" repression of the insurrection of June 1848 and for Louis Napoleon Bonaparte. He was minister of agriculture from August to December 1849 and from August to October 1851. Re-elected deputy in 1863, he was one of the supporters of the " Liberal Empire " of Emile Ollivier, being finance minister in Ollivier's cabinet from January to the 10th of April 1870. He was president of the National Assembly from the 4th of April 1872 to the 10th of March 1875, and minister of the interior in 1875. Then, elected senator for life (1876), he pronounced himself in favour of the coup d'etat of the 16th of May 1877. Buffet had some oratorical talent, but shone most in opposition.

BUFFET, a piece of furniture which may be open or closed, or partly open and partly closed, for the reception of dishes, china, glass and plate. The word may also signify a long counter at which one stands to eat and drink, as at a restaurant, or — which would appear to be the original meaning — the room in which the counter stands. The word, like the thing it represents, is French. The buffet is the descendant of the credence, and the ancestor of the sideboard, and consequently has a close affinity to the dresser. Few articles of furniture, while pre- serving their original purpose, have varied more widely in form. In the beginning the buffet was a tiny apartment, or recess, little larger than a cupboard, separated from the room which it served either by a breast-high balustrade or by pillars. It developed into a definite piece of furniture, varying from simplicity to splendour, but always provided with one or more' flat spaces, or broad shelves, for the reception of such necessaries of the dining-room as were not placed upon the table. The early buffets were sometimes carved with the utmost elabora- tion; the Renaissance did much to vary their form and refine their ornament. Often the lower part contained receptacles as in the characteristic English court-cupboard. The rage for collecting china in the middle of the 18th century was responsible for a new form — the high glazed back, fitted with shelves, for the display of fine pieces of crockery-ware. This, however, w#s hardly a true buffet, and was the very antithesis

of the

primary arrangement, in which the huge goblets and beakers and fantastic pieces of plate, of which so extremely few examples are left, were displayed upon the open " gradines." The tiers of shelves, with or without a glass front, which are still often found in Georgian houses, were sometimes called buffets — in short, any dining-room receptacle for articles that were not immediately wanted came at last to bear the name. In France the variations of type were even more numerous than in England, and it is sometimes difficult to distinguish a commode from a buffet. In the latter part of the 1 8th century the buffet occasion- ally took the form of a console table.

BUFFIER, CLAUDE (1661-1737), French philosopher, his- torian and educationalist, was born in Poland, on the 25th of May 1661, of French parents, who returned to France, and settled at Rouen, soon after his birth. He was educated at the Jesuit college there, and was received into the order at the age of nineteen. A dispute with the archbishop compelled him to leave Rouen, and after a short stay in Rome he returned to Paris to the college of the Jesuits, where he spent the rest of his life. He seems to have been an admirable teacher, with a great power of lucid exposition. His object in the Traits des veritis premieres (1717), his best-known work, is to discover the ultimate principle of knowledge. This he finds in the sense we have of our own existence and of what we feel within ourselves. He thus takes substantially the same ground as Descartes, but he rejected the a priori method. In order to know what exists distinct from the self, " common sense " is necessary. Common sense he defined as " that disposition which nature has placed in all or most men, in order to enable them, when they have arrived at the age and use of reason, to form a common and uniform judgment with respect to objects different from the internal sentiment of their own perception, which judgment is not the consequence of any anterior judgment." The truths which this " disposition of nature " obliges us to accept can be neither proved nor disproved; they are practically followed even by those who reject them speculatively. But Buffier does not claim for these truths of " common sense " the absolute certainty which characterizes the knowledge we have of our own existence or the logical deductions we make from our thoughts; they possess merely the highest probability, and the man who rejects them is to be considered a fool, though he is not guilty of a contradiction. Buffier's aversion to scholastic refinements has given to his writings an appearance of shallowness and want of metaphysical insight, and unquestionably he failed entirely even to indicate the nature of that universality and necessity which he ascribed to his " eternal verities

"; he was, however, one of the earliest to recognize the psychological as distinguished from the metaphysical side of Descartes's principle, and to use it, with no inconsiderable skill, as the basis of an analysis of the human mind, similar to that enjoined by Locke. In this he has anticipated the spirit and method as well as many of the results of Reid and the Scottish school. Voltaire described him as " the only Jesuit who has given a reasonable system of philosophy."

He wrote also Elements de metaphysique (1724), a "French Grammar on a new plan," and a number of historical essays. Most of his works appeared in a collected form in 1732, and an English translation of the Traite was published in 1780.

BUFFON, GEORGE LOUIS LECLERC, Comte de (1 707-1 788), French naturalist, was born on the 7th of September 1707, at Montbard (Cote d'Or), his father, Benjamin Francois Leclerc de Buffon (1683-1775), being councillor of the Burgundian parlemeht. He studied law at the college of Jesuits at Dijon; but he soon exhibited a marked predilection for the study of the physical sciences, and more particularly for mathematics. Whilst at Dijon he made the acquaintance of a young Englishman, Lord Kingston, and with him travelled through Italy and then went to England. He published a French translation of Stephen Hales's Vegetable Statics in 1735, and of Sir I. Newton's Fluxions in 1740. At twenty-five years of age he succeeded to a consider- able property, inherited from his mother, and from this time onward his life was devoted to regular scientific labour. At first he directed his attention more especially to mathematics, physics,

and agriculture, and his chief original papers are connected with these subjects. In the spring of 1739 he was elected an associate of the Academy of Sciences; and at a later period of the same year he was appointed keeper of the Jardin du Roi and of the Royal Museum. This appears to have finally determined him to devote himself to the biological sciences in particular, and he began to collect materials for his Natural History. In the preparation of this voluminous work he associated with himself L. J. M. Daubenton, to whom the descriptive and anatomical portions of the treaties were entrusted, and the first three volumes made their appearance in the year 1749. In 1752 (not in 1743 or 1760, as sometimes stated) he married Marie Francoise de Saint-Belin. He seems to have been fondly

attached to her, and felt deeply her death at Montbard in 1769. The remainder of Button's life as a private individual presents nothing of special interest. He belonged to a very long-lived race, his father having attained the age of ninety-three, and his grandfather eighty-seven. He himself died at Paris on the 15th of April 1788, at the age of eighty-one, of vesical calculus, having refused to allow any operation for his relief. He left one son, George Louis Marie Leclerc Buffon, who was an officer in the French army, and who died by the guillotine, at the age of thirty, on the 10th of July 1793 (22 Messidor, Anil.), having espoused the party of the duke of Orleans.

Buffon was a member of the French Academy (his inaugural address being the celebrated Discours sur le style, 1753), perpetual treasurer of the Academy of Sciences, fellow of the Royal Society of London, and member of the Academies of Berlin, St Peters- burg, Dijon, and of most of the learned societies then existing in Europe. Of handsome person and noble presence, endowed with many of the external gifts of nature, and rejoicing in the social advantages of high rank and large possessions, he is mainly known by his published scientific writings. Without being a profound original investigator, he possessed the art of expressing his ideas in a clear and generally attractive form. His chief defects as a scientific writer are that he was given to excessive and hasty generalization, so that his hypotheses, however seemingly brilliant; are often destitute of any sufficient basis in observed facts, whilst his literary style is not unfrequently theatrical and turgid, and a great want of method and order is commonly observable in his writings.

His great work is the Histoire naturelle, genSrale et particuliere; and it can undoubtedly claim the merit of having been the first work to present the previously isolated and apparently discon- nected facts of natural history in a popular and generally in- telligible form. The sensation which was made by its appearance in successive parts was very great, and it certainly effected much good in its time by generally diffusing a taste for the study of nature. For a work so vast, however — aiming, as it did, at being little less than a general encyclopaedia of the sciences — Buffon's capacities may, without disparagement, be said to have been insufficient, as is shown by the great weakness of parts of the work (such as those relating to mineralogy). The Histoire naturelle passed through several editions, and was translated into various languages. The edition most highly prized by col- lectors, on account of the beauty of its plates, is the first, which was published in Paris (1749-1804) in forty-four quarto volumes, the publication extending over more than fifty years. In the preparation of the first fifteen volumes of this edition (1 749-1 767)

Buffon was assisted by Daubenton, and subsequently by P. Gueneau de Montbeliard, the abbe G. L. C. A. Bexon, and C. N. S. Sonnini de Manoncourt. The following seven volumes form a supplement to the preceding, and appeared in 1774-1789, the famous Upoques de la nature (1779) being the fifth of them. They were succeeded by nine volumes on the birds (1770-1783), and these again by five volumes on minerals (1 783-1 788). The remaining eight volumes, which complete this edition, appeared after Buffon's death, and comprise reptiles, fishes and cetaceans. They were executed by B. G. E. de Lacepede, and were published in successive volumes between 1788 and 1804. A second edition begun in 1774 and completed in 1804, in thirty-six volumes quarto, is in most respects similar to the first, except that the

anatomical descriptions are suppressed and the supplement recast.

See Humbert-Bazile, Buffon, sa famille, &c. (1863); M. J. P. Flourens, Hist, des trava-ux et des ide.es de Buffon (1844, 3rd ed., 1870) ; H. Nadault de Buffon, Correspondance de Buffon (i860); A. S. Packard, Lamarck (1901).

BUG, the name of two rivers of Europe. (1) A stream of European Russia, distinguished sometimes as the Southern Bug, which rises in the S. of the government of Volhynia, and flows generally S.E. through the governments of Podolia and Kherson, and after picking up the Ingul from the left at Nikolayev, enters the liman or lagoon into which the Dnieper also discharges. Its length is 470 m. Its upper part is beset with rapids, and its lower is of little value for navigation on account of the numerous sandbanks and blocks of rock which choke its bed. (2) A river distinguished as the Western Don, which rises in the E. of Austrian Galicia between Tarnopol and Brody, and flows N.N. W. as far as Brest-Litovsk, separating the Polish provinces of Lublin and Siedlce from the Russian governments of Volhynia and Grodno; it then swings away almost due W., between the provinces of Warsaw and Lomza, and joins the Vistula, 23 m. below the city of Warsaw. Length, 470 m. It is navigable from Brest-Litovsk downwards.

BUG, the common name for hemipterous insects of the family Cimicidae, of which the best-known example is the house bug or bed bug {Cimcx lectularius) . This disgusting insect is of an oval shape, of a rusty red colour, and, in common with the whole tribe to which it belongs, gives off an offensive odour when touched; unlike the others, however, it is wingless. The bug is provided with a proboscis, which when at rest lies along the inferior side of the thorax, and

through which it sucks the blood of man, the sole food of this species. It is nocturnal in its habits, remaining concealed by day in crevices of bed furniture, among the hangings, or behind the wall paper, and shows considerable activity in its nightly raids in search of food. The female deposits her eggs at the beginning of summer in crevices of wood and other retired situations, and in three weeks the young emerge as small, white, and almost transparent larvae. These change their skin very frequently during growth, and attain full development in about eleven weeks. Two centuries ago the bed bug was a rare insect in Britain, and probably owes its name, which is derived from a Celtic word signifying " ghost " or " goblin," to the terror which its attacks at first inspired. An allied species, the dove-cote bug {Cimex columbaria), attacks domestic fowls and pigeons.

BUGEAUD DE LA PICONNERIE, THOMAS ROBERT, duke or Isly (1784-1849), marshal of France, was born at Limoges on the 15th of October 1784. He came of a noble family of Perigord, and was the youngest of his parents' thirteen children. Harsh treatment led to his flight from home, and for some years about 1800 he lived in the country, engaged in agriculture, to which he was ever afterwards devoted. At the age of twenty he became a private soldier in the V elites of the Imperial Guard (1804), with which he took part in the Austerlitz campaign of the following year. Early in 1806 he was given a commission, and as a sub-lieutenant he served in the Jena and Eylau campaigns, winning his promotion to the rank of lieutenant at Pultusk (December 1806). In 1808 he was in the first French corps which entered Spain, and was stationed in Madrid during the revolt of the Dos Mayo. At the second siege of Saragossa he won further promotion to the rank of captain, and in 1809-1810 found opportunities for winning distinction under General (Marshal) Suchet in the eastern theatre of the Peninsular War, in which he rose to the rank of major and the command of a full regiment. At the first restoration he was made a colonel, but he rejoined Napoleon during the Hundred Days, and under his old chief Suchet distinguished himself greatly in the war in the Alps. For fifteen years after the fall of Napoleon he was not re-employed, and during this time he displayed great activity in agriculture and in the 'general development of his district of Perigord. The July revolution of 1830 reopened his military career, and after a short tenure of a regimental com- mand he was in 1 83 1 made a marechal de camp. In the chamber

of deputies, to which he was elected in the same year, he showed himself to be an inflexible opponent of democracy, and in his military capacity he was noted for his severity in police work and the suppression of Smeutes. His conduct as gaoler of the duchesse de Berry led to a duel between Bugeaud and the deputy Dulong, in which the latter was killed (1834) ; this affair and the incidents of another Smeute exposed Bugeaud to ceaseless attacks in the Chamber and in the press, but his opinion was sought by all parties in matters connected with agriculture and industrial development. He was re-elected in 1834, 1837 and 1839.

About this time Bugeaud became much interested in the question of Algeria. At first he appears to have disapproved of the conquest, but his undeviating adherence to Louis Philippe brought him into agreement with the government, and with his customary decision he proposed to employ at once whatever forces were necessary for the swift, complete and lasting sub- jugation of Algeria. Later events proved the soundness of his views; in the meantime Bugeaud was sent to Africa in a sub- ordinate capacity, and proceeded without delay to initiate his war of flying columns. He won his first victory on the 7th of July 1836, made a brilliant campaign of six weeks' duration, and returned home with the rank of lieutenant-general. In the following year he signed the treaty of Tafna (June 1st, 1837), with Abd-el-Kader, an act which, though justified by the military and political situation, led to a renewal of the attacks upon him in the chamber, to the refutation of which Bugeaud devoted himself in 1839. Finally, in 1840, he was nominated governor-general of Algeria, and early in 1841 he put into force his system of flying columns. His swiftness and energy drove back the forces of Abd-el-Kader from place to place, while the devotion of the rank and file to " Pere Bugeaud " enabled him to carry all before him in action. In 1842 he secured the French positions by ˆundertaking the construction of roads. In 1843 Bugeaud was made marshal of France, and in this and the following year he continued his operations with unvarying success. His great victory of Isly on the 14th of August 1844 won for him the title of duke. In 1845, however, he had to take the field again in consequence of the disaster of Sidi Brahim (22nd of September 1845), and up to his final retirement from Algeria (July 1846) he was almost constantly employed in the field. His resignation was due to differences with the home government on the question of the future government of the province. Amidst his other activities he had found time to study the agricultural characteristics of the conquered country, and under his regime the number of French colonists had grown from 17,000 to 100,000. In 1848 the marshal was in Paris

during the revolution, but his orders prevented him from acting effectu- ally to suppress it. He was asked, but eventually refused, to be a candidate for the presidency in opposition to Louis Napoleon. His last public service was the command of the army of the Alps, formed in 1848- 1849 to observe events in Italy. He died in Paris on the 10th of June 1849.

Bugeaud's writings were numerous, including his CEuvres militaires, collected by Weil (Paris, 1883), many official reports _ on Algeria and the war there, and some works on economics and political science. See Comte d'ldeville, Le Marechal Bugeaud (Paris, 1881-

1882).

BUGENHAGEN, JOHANN (1485-1558), surnamed Pomeranus, German Protestant reformer, was born at Wollin near Stettin on the 24th of June 1485. At the university of Greifswald he gained much distinction as a humanist, and in 1 504 was appointed by the abbot of the Praemonstratensian monastery at Belbuck rector of the town school at Treptow. In 1509 he was ordained priest and became a vicar in the collegiate Marienkircke at Treptow; in 151 7 he was appointed lecturer on the Bible and Church Fathers at the abbey school at Belbuck. In 1520 Luther's De Captivitate Babylonica converted him into a zealous supporter of the Reformer's views, to which he won over the abbot among others. In 15 21 he went to Wittenberg, where he formed a close friendship with Luther and Melanchthon, and in 1522 he married. He preached -and lectured in the university, but his zeal and organizing skill soon spread his reforming I

influence far beyond its limits. In 1528 he arranged the church affairs of Brunswick and Hamburg; in 1530 those of Liibeck and Pomerania. In 153 7 he was invited to Denmark by Christian III., and remained five years in that country, organizing the church (though only a presbyter, he consecrated the new Danish bishops) and schools. He passed the remainder of his life at Wittenberg, braving the perils of war and persecution rather than desert the place dear to him as the home of the Reformation. He died on the 20th of April 1558. Among his numerous works is a history of Pomerania, which remained unpublished till 1728. Perhaps his best book is the Inter pretatio in Librum Psalmorum (1523), and he is also remembered as having helped Luther in his translation of the Bible.

See Life by H. Hering (Halle, 1888); Emil Gorigk, Bugenhagen und

die Protestantisierung Pommerns (1895). O. Vogt published a collection of Bugenhagen's correspondence in 1888, and a supplement in 1890.

BUGGE, SOPHUS (1833-1907), Norwegian philologist, was born at Laurvik, Norway, on the 5th of January 1833. He was educated at Christiania, Copenhagen and Berlin, and in 1866 he became professor of comparative philology and Old Norse at Christiania University. In addition to collecting Norwegian folk-songs and traditions, and writing on Runic inscriptions, he made considerable contributions to the study of the Celtic, Romance, Oscan, Umbrian and Etruscan languages. He was the author of a very large number of books on philology and folklore. His principal work, a critical edition of the elder Edda (Norroen Fornkvoedi) , was published at Christiania in 1867. He maintained that the songs of the Edda and the earlier sagas were largely founded on Christian and Latin tradition imported into Scandi- navian literature by way of England. His writings also include Gamle Norske Folkeviser (1858), a collection of Old Norse folk- songs; Bidrag til den aeldste skaldedigtnings historie (Christiania, 1894); Helge-digtene i den Aeldre Edda (Copenhagen, 1896, Eng. trans., The Home of the Eddie Poems, 1899); Norsk Saga- fortaelling op Sagaskrivning i Island (Christiania, 1901), and various books on Runic inscriptions. He died on the 8th of July

1907.

For a further list of his works see J. B. Halvorsen, Norsk Forfatter-Lexikon, vol. i. (Christiania, 1885).

BUGGY, a vehicle with either two (in England and India) or four wheels (in America). English buggies are generally hooded and for one horse. American buggies are for one horse or two, and either covered with a hood or open; among the varieties are the " Goddard " (the name of the inventor), the " box," so called from the shape of the body, the " cut under," i.e. cut out for the front wheels to cramp beneath and so turn in a narrow space, the " end-spring " and " side-bar," names referring to the style of hanging. A skeleton buggy, lightly con- structed, is used on the American " speedways," built and main- tained" for fast driving. The word is of unknown origin; it may be connected with " bogie " (q.v.) a truck. The supposed Hindu-stani baggi, a gig, often given as the source, appears to be an in-vention or an adaptation into the vernacular of the English word.

BUGIS, or Bughis, a people of Malayan stock, originally occupying

only the kingdom of Bom in the south-western peninsula of the island of Celebes. From this district they spread over the whole island, and founded settlements throughout the whole Malay Archipelago. They are of middle size and robust, of very active, enterprising nature and of a complexion slightly lighter than the average Malay. In disposition they are brave, haughty and fierce, and are said to be more predisposed towards " running amuck " than any other Malayans. They speak a language allied to that of the Macassars, and write it with similar characters. It has been studied, and its letters reproduced in type by Dr B. F. Mathes of the Netherlands Bible Society. The Bugis are industrious and ingenious; they practise agriculture more than the neighbouring tribes, and manufacture cotton-cloth not only for their own use but for export. They also carry on a considerable trade in the mineral and vegetable products of Boni, such as gold-dust, tortoise-shell, pearls, nut-megs and camphor. Their love of the sea has given them almost a monopoly of trade around Celebes. Their towns

are well built and they have schools of their own. The king is elected generally for life, and always from their own number, by the chiefs of the eight petty states that compose the confederation of Boni, and he cannot "decide on any public measure without their consent. In some of the states the office of chief is hereditary; in others any member of the privileged classes may aspire to the dignity, and it not infrequently happens that the state is governed by a woman. The Bugis have been Mahommedans since the 17th century. Their original form of nature-worship had been much affected by Hindu influences, and even now they retain rites connected with the worship of Siva. See further Boni; Celebes.

BUGLE, Bugle-horn, Keyed Bugle, Kent Bugle or Regent's Bugle (Fr. Bugle, Clairon, Cor a clefs, Bugle a clefs; Ger. Flugelhorn, Signalhorn, Bugelhorn, Klappenhorn, Kenthorn; Ital. Coma cromatica), a treble brass wind instrument with cup-shaped mouthpiece and conical bore, used as a military duty and signal instrument. The bugle was originally, as its name denotes, a bull's horn, 1 of which it has preserved the characteristic conical bore of rapidly increasing diameter.

Those members of the brass wind such as the horns, bugle, trumpet and tubas, which, in their simplest form, consist of tubes without

lateral openings, de- pend for their scale on the harmonic series obtained by overblowing, i.e. by greater pressure of breath and by the increased tension of the lips, acting as reeds, across the mouth-piece. The harmonic series thus produced, which depends on the Fig. i.— Modern Service acoustic principles of the tube

Malln'lonf 1811 Army(Char ' eS itSeH ' and is absolute1 ^ uninfluenced by the manner in which the tube

is bent, forms a natural subdivision in classifying these instru- ments: — (1) Those in which the lower harmonics from the second to the sixth or eighth are employed, such as the bugle, post-horn, the cornet a pistons, the trombone. (2) Those in which the higher harmonics from the third or fourth to the twelfth or sixteenth are mostly used, such as the French horn and trumpet. (3) Those which give out the fundamental tone and harmonics up to the eighth, such as the tubas and ophicleide.

Harmonic Series —

m

3

mm

w

**£*

Trumpet.

m

£

=M£

>■

£"=

4567

Bugle an 8ve higher.

11 12 13 14 is 16

We thus find a fundamental difference between the trumpet and the bugle as regards the harmonic series. But although, to the casual beholder, these instruments may present a general similarity, there are other important structural distinctions. The tube of the trumpet is cylindrical, widening only at the bell, whereas that of the bugle, as stated above, is conical. Both instruments have cup-shaped mouthpieces outwardly similar. The peculiar shape of the basins, however, at the place where they open into the tube, angular in the trumpet and bevelled in the bugle, taken in conjunction with the bore of the main tube, gives to the trumpet its brilliant blaring tone, and to the bugle its more veiled but penetrating quality, characteristic of the whole family. 2 Only five notes are required for the various bugle-calls, although the actual compass of the instrument consists of eight, of which the first or fundamental, however, being of poor quality, is never used. There are bugles in C and in E flat, but the bugle in B flat is most generally used; the key of C is used in notation.

1 The word is derived from Lat. buculus, a young bull. " Bugle," meaning a long jet or black glass bead, used in trimming ladies' dresses, is possibly connected with the Ger. Biigel, a bent piece of metal. The English name "bugle" is also given to a common labiate plant, the Ajuga reptans, not to be confused with the " Bugloss " or Anchusa officinalis.

1 For diagrams of these mouthpieces see V. C. Mahillon, Elements d'acouslique (Brussels, 1874), p. 96.

In order to increase the compass and musical possibilities of the bugle, two methods have been adopted, the use of (1) keys and (2) valves. The application of keys to the bugle produced the Kent bugle, and later the ophicleide. The application of valves produced the family of saxhorns. The use of keys for wood wind instruments was known early in the 15th century, 3 perhaps before. In 1438, the duke of Burgundy paid Hennequin Haulx, instrument-maker of Brussels, 4 ridres a piece for three tenor bombards with keys. In the 16th century we find a key applied to the bass fhlte-a-bec 4 and later to the large tenor cornetto. 6 In 1770 a horn-player named KQlbel, belonging to the imperial Russian band, experimented with keys on the trumpet, and in 1795 Weidinger of Vienna produced a trumpet with five keys. In 1810 Joseph Halliday, the bandmaster of the Cavan militia, patented the keyed bugle, with five keys and a compass of twenty-five notes, calling it the " Royal Kent Bugle " out of compliment to the duke of Kent, who was at the time commander-in-chief, and encouraged the introduction of the instrument into the

regimental bands. A Royal Kent bugle in C, stamped with Halliday's name as inventor, and made by P. Turton, 5 Wormwood Gate, Dublin, was exhibited by Col. Shaw-Hellier at the Royal Military Exhibition in 1890. 6 The instrument measures 17 in., and the total length of the tubing, including the mouthpiece, 50ˆ in. The diameter at the mouthpiece is J in. and at the bell 5I in. The instrument has a chromatic compass of two octaves,

=&: §= the / > I > — — p -t – ˆ ˆ

gp=p»o±EE opennotes ˆJE feEEggE gE£ˆEˆE=f= =

"" being 0) ˆ T 3 4 5 6 7 8*

Mahillon {op. cit. p. 117) points out that the tonality of the key-bugle and kindred ins f ruments is determined by the second harmonic given out by the open tube, the first key remaining open. To the original instrument specified in the patent, Halliday added a sixth key, which became the first and was in the normal position open; this key when closed gave B flat, with the same series of harmonics as the open tube. The series, however, becomes shorter with each successive key. Thus, on*

being opened, the second key gives

%ˆm

•

*i*chi*

the third key sS3Ez3

,E=EgE»Efe

— , the fourth key

*= 1=*S*

the fifth key]

&=!~=

the sixth key

m

The bore of the instrument is just wide enough in proportion to its length to make possible the playing of the fundamental tones in the first two series, but these notes are never used, and the harmonics above the sixth are also avoided, being of doubtful intonation. In the ophicleide, the bass of the key-bugle, the bore is sufficiently wide to produce the fundamentals of a satisfactory quality.

The keyed bugle was chiefly used in B fiat, a crook for B flat being frequently added to the bugle in C; the soprano bugle in E flat was also much used in military bands.

The origin of the bugle, in common with that of the hunting horn, is of the highest antiquity. During the middle ages, the word " bugle " was applied to the ox and also to its horns, whether used as musical instruments or for drinking. The New English Dictionary quotes a definition of bugle dating from c. 1398: " The Bugle ... is lyke to an oxe and is a fyers

3 See E. van der Straeten, La Musique aux Pays-bas, vol. vii.

£. 38, where the instrument is not mentioned as a novelty; also eon, comte de Laborde, Les Dues de Bourgogne, pt. ii. (Preuves), (Paris, 1849), torn. i. p. 365, No. 1266.

4 Martin Agricola, Musica Instrumentalis deudsch (Wittenberg, 1528), f. viii 6 .

5 Michael Praetorius, Syntagma Musicum (Wolfenbiittel, 1618), pi. viii. No. 5.

6 See Captain C. R. Day, Descripl. Catalogue (London, 1891), pp. 168-169, and pi. xi. fig. D.

beest." 1 In 1300 a romance 2 contains the word used in both acceptations, " A thousand bugles of Ynde," and " tweye bugle-hornes and a bowe." F. Godefroy 3 gives quotations from early French which show that, as in England, the word bugle was frequently used as an adjective, and as a verb: — " IIII cors buglieres fist soner de randon " (Quatrefils Aymon, ed. P. Tarbe, p. 32), and " I grant cor buglerenc fit en sa tor soner " (Aiol, 7457, Soctftt des anciens textes frariQais) . Tubas, horns, cornets and bugles have as common archetype the horn of ram, bull or other animal, whose

form was copied and modified in bronze, wood, brass, ivory, silver, &c. Of all these instruments, the bugle has in the highest degree retained the acoustic properties and the characteristic scale of the prototype, and is still put to the original use for giving military signals. The shofar of the ancient Hebrews, used at the siege of Jericho, was a cow's horn (Josh. vi. 4, 5, 8, 13, &c), translated in the Vulgate buccina, in the para- phrase of the Chaldee buccina ex cornu. The directions given for sounding the trumpets of beaten silver described in Numbers x. form the earliest code of signals yet known; the narrative shows that the Israelites had metal wind instruments; if, therefore, they retained the more primitive cow's horn and ram's horn (shofar), it was from choice, because they attached special significance to them in connexion with their ritual. The trumpet of silver mentioned above was the Khatsotsrah, probably the long straight trumpet or tuba which also occurs among the instruments in the musical scenes of the ancient Egyptians and Assyrians. Gideon's use of a massed band of three hundred shofars to terrify and defeat the Midianites (Judges vii. 16), and Saul's call to arms (1 Sam. xiii. 3) show that the value of the shofar as a military instrument was well under- stood by the Jews. The cornu was used by the Roman infantry to sound the military calls, and Vegetius 4 states that the tuba and buccina were also used for the same purpose. Mahillon possesses a facsimile of an ancient Etruscan cornu, the length of which is 1-40 m.; he gives its scale, 6 pitched one tone below that of the bugle in E flat, as that of D flat, of which the harmonics

from the second to the sixth are available. The same department of the British Museum was enriched in 1904 with a terra-cotta model (fig. 2) of a late Roman bugle (c. 4th century a.d.), bent completely round upon itself to form a coil between the mouth- piece and the bell-end (the latter has been broken off). This

precious relic was found at Ventoux in France and has been acquired from the col- lection of M. Morel. This is precisely the form of bugle now used as a badge by the first battalion of the King's Own Light Infantry. 6 Dur- ing the middle ages the use of the bugle-horn by knights Fig. 2.-Terra Cotta Model of a f d huntsmen, and perhaps Roman Bugle, 4th cent. (British also in na val warfare, was Museum). general in Europe, as the

following additional quota- tions will show: "XXX cors bugleres, fait l'amirax soner" (Conq. de Jerusalem, 6811, Hippeau); "Two squyers blewe . . . with ij grete bugles homes" (Caxton, Chron. Engl.

1 Barthol. Trevisa, De Propr. Rebus, xviii., xv., 149?, 774.

2 King Alisaunder, 51 12 and 5282.

- *Didionnaire de Vancienne langue irancaise du IX' au XV , c n , j >Dere milita ™, bk. iii. ch.v.*

bee Latal. descriptif du musee instrumental du conservatoire de 3ruxeUes, vol. 1. (Ghent, 1880), p. 331. There are, in the department of Greek and Roman antiquities at the British Museum, two bronze htruscan cornua, No. 2734, resembling the hunting horns of the middle ages and bent in a semicircular shape. They measure from end to end respectively 2 ft. I in. and 2 ft. 2 in.

6 Maj. J. H. L. Archer, Th". British Army Records (London, 1888), p. 402. "

ccix. 192). The oliphant was a glorified bugle-horn made of rich material, such as ivory, carved and inlaid with designs in gold and silver.

The history of the bugle as a military instrument is in England closely connected with the creation of the light infantry, in which it gradually superseded the drum 7 as a duty and signal instru- ment. It was during the 17th century that the change was inaugurated; improvements in firearms brought about the gradual abandonment of armour by the infantry, and the forma- tion of the light infantry and the adoption of the bugle followed by degrees. One of the oldest light infantry regiments, Prince Albert's 1st Somerset Light Infantry, formed in 1685 by the earl of Huntingdon, employed a drummer at that date at a shilling per day. 8 At the end of the 18th century we find the bugle the recognized signal instrument in the light infantry, while the trumpet remained that of the cavalry. The general order introducing the bugle as a minor badge for the light infantry is under date 28th of December 1814. In 1856 the popularity of the keyed or Royal Kent bugle in the army had reached its height. A bugle-band was formed in the Royal Artillery as a substitute for the drum and fife band. 9 The organization and training of this bugle-band were entrusted to Trumpet-major James Lawson, who raised it to a very high standard of excellence. Major Lawson was a fine cornet player, and finding the scale of the service bugle too restricted he obtained permission to add to it a valve attachment, which made the bugle a chromatic instrument like the cornet, in fact practically a saxhorn. Before long, horns in E flat, tenor horns in B flat, euphoniums and bass tubas were added, all made of copper, and in 1869 the name of " bugle band " was changed to R.A. Brass Band, and in 1877 it was merged in the Mounted Band. The bugle with its double development

by means of keys into Royal Kent bugle and ophicleide, and by means of valves into saxhorns and tubas, formed the nucleus of brass bands of all countries during the greater part of the 19th century. The Flugelhorn, as its name denotes, became the signal instrument of the infantry in Germany as in England, and still holds it own with the keyed bugle in the fine military bands of Austro-Hungary.

There is in the department of prehistoric antiquities at the British Museum a fine bugle-horn belonging to the Bronze Age in Denmark; the tube, which has an accentuated conical bore, is bent in a semi-circle, and has on the inner bend a series of little rings from which were probably suspended ornaments or cords. An engraved design runs spirally round the whole length of the tube, which is in an excellent state of preservation.

Meyerbeer introduced the bugle in B flat in his opera Roberl-le-Diable in the scene of the resurrection of the nuns, and a bugle in A in the fifth act.

See.for further information on the technique of the instrument, Logier s Introduction to the Art of Playing on the Royal Kent Bugle (London. Clementi, 1820); and for the use of the bugle in the trench a rmy> G. Kastner, Le Manuel general de musique militaire (with illustrations, Paris, 1848). (K. S.)

BUGTI, a Baluch tribe of Rind (Arab) origin, numbering about 15,500, who occupy the hills to the east of the Sind-Peshin railway, between Jacobabad and Sibi, with the Marris (a cognate tribe) to the north of them. Like the Marris, the Bugtis are physically a magnificent race of people, fine horsemen, good swordsmen and hereditary robbers. An expedition against them was organized by Sir C. Napier in 1845, but they were never brought under control till Sir Robert Sandeman ruled Baluchistan, Since the construction of the railway, which com- pletely outflanks their country, they have been fairly orderly

BUHLE, JOHANN GOTTLIEB (1763-1821), German scholar and philosopher, was born at Brunswick, and educated at Gottingen. He became professor of philosophy at Gbttingen, Moscow (1840) and Brunswick. Of his numerous publications,

7 For the use of the drum in the 16th century, see Sir John Smyth, Instructions and Observations for all Chieflaines, Captaines &c (London, 1595), pp. 158-159.

8 See Richard Cannon, Historical Records of the regiment (London 1848), P. 3-

9 See H. G. Farmer, Memoirs of the Royal Artillery Band (London 1904), p. 183.

the most important are the Handbuch der Geschichte der Philo- sophic (8 vols., 1796-1804), and Geschichte der neueren Philosophic (6 vols., 1800-1805). The latter, elaborate and well written, is lacking in critical appreciation and proportion; there are French and Italian translations. He edited Aratus (2 vols., 1703, 1801) and part of Aristotle (Bipontine edition, vols, i.-v.,

1701-1004).

BUHTURI [al-Walld ibn 'Ubaid Allah] (820-897), Arabian poet, was born at Manbij (Hierapolis) in Syria, between Aleppo and the Euphrates. Like Abu Tammam, he was of the tribe of Tai. While still young, he went to visit Abu Tammam at Homs, and by him was commended to the authorities at Ma'arrat un- Nu'man, who gave him a pension of 4000 dirhems (about £90) yearly. Later he went to Bagdad, where he wrote verses in praise of the caliph Motawakkil and of the members of his court. Although long resident in Bagdad he devoted much of his poetry to the praise of Aleppo, and much of his love-poetry is dedicated to Aiwa, a maiden of that city. He died at Manbij Hierapolis in 897. His poetry was collected and edited twice in the 10th century, arranged in one edition alphabetically {i.e. according to the last consonant in each line); in the other according to subjects. It was published in Constantinople (a.d. 1883). Like Abu Tammam he made a collection of early poems, known as the Hamasa (index of the poems contained in it, in the Journal of the German Oriental Society, vol. 47, pp. 418 ff., cf. vol. 45, pp. 470 ff.).

Biography in M'G. de Slane's translation of Ibn Khallikan's Biographical Dictionary (Paris and London, 1842), vol. iii. pp. 657 ff. ; and in the Book of Songs (see Abulfarat), vol. xviii. pp. 167-175.

(G. W. T.)

BUILDERS' RITES. Many people familiar with the cere- monies attendant on the laying of foundation stones, whether ecclesiastical,

masonic or otherwise, may be at a loss to account for the actual origin of the custom in placing within a cavity beneath the stone, a few coins of the realm, newspapers, &c. The ordinary view that by such means particulars may be found of the event on the removal of the stone hereafter, may suffice as respects latter-day motives, but such memorials are deposited in the hope that they will never be disturbed, and so another reason must be found for such an ancient survival. Whilst old customs continue, the reasons for them are ever changing, and certainly this fact applies to laying foundation stones. Originally, it appears that living victims were selected as " a sacrifice to the gods," and especially to ensure the stability of the building. Grimm 1 remarks "It was often thought necessary to immure live animals and even men in the foundation, on which the structure was to be raised, to secure immovable stability." There is no lack of evidence as to this gruesome practice, both in savage and civilized communities. " The old pagan laid the foundation of his house and fortress in blood." 2 Under the walls of two round towers in Ireland (the only ones examined) human skeletons have been discovered. In the 15 th century, the wall of Holsworthy church was built over a living human being, and when this became unlawful, images of living beings were sub- stituted {Folk-Lore Journal, i. 23-24).

The best succinct account of these rites is to be obtained in G. W. Speth's Builders' Rites and Ceremonies (1893). (W. J. H.)*

BUILDING. 3 The art of building comprises the practice of civil architecture, or the mechanical operations necessary to Relation carry the designs of the architect into effect. It is not of building infrequently called " practical architecture," but the to arch i- adoption of this form would lead only to confusion, by lecture. rendering it difficult to make the distinction generally understood between architecture {q.v.) as a fine or liberal art, and architecture as a mechanical art. The execution of works of architecture necessarily includes building, but building is frequently employed when the result is not archi-

1 Teutonic Mythology (1883-1884), (trans. Stalley brass).

2 Baring-Gould on " Foundations," Murray's Mag. (1887).

3 The verb " to build " (O.E.byldan) is apparently connected with O.E. bold, a dwelling, of Scandinavian origin; cf. Danish bol, a farm, Icelandic bol, farm, abode. Skeat traces it eventually to Sanskrit bhu, to be, build meaning " to construct a place in which to be or dwell."

tectural; a man may be a competent builder without being an architect, but no one can be an accomplished architect unless he be competent to specify and direct all the operations of building. An architect should have a scientific knowledge of the various soils he may meet with, such as clay, earth, silt, rock, gravel, chalk, &c, so that when the trial holes are dug out on the site, he can see the nature of the soil, and at once know what kind of a foundation to put to the building, and the depth to which he must go to get a good bottom. He should also have a good knowledge of chemistry, so that he may understand the effects of the various acids, gases, &c, that are contained in the materials he uses, and the objections to their presence. He must be acquainted with the principles of timbering in trenches, and excavations, shoring, brickwork, fireproof construction, stone- work, carpentry and joinery, smiths' work, plumbing, heating, ventilation, bells, electric and gas lighting, water-supply, drainage, plastering, tiling to internal walls or pavings and roofs, slating of roofs, glazing, painting and decoration. He should be able to calculate the various strengths and strains to be placed on any portion of the structure, and have a general knowledge of the building trade, enabling him to deal with any difficulty or defects that may arise.

An important feature in the qualification of the architect is that he should be thoroughly conversant with the by-laws of the different towns or districts, as to the requirements for the various classes of buildings, and the special features of portions of the different buildings. The following are examples of the various buildings which he may have to design, and the erec- tion of which he may have to superintend: — dwelling-houses, domestic buildings, shops, dwellings for the working class, public buildings such as churches, schools, hospitals, libraries and hotels, factories of all kinds for all general trades, studios, electric power stations, cold storage buildings, stables and slaughter- houses. With regard to factories, places for the storage or making of different patent foods, and for slaughter of beasts intended for human consumption, stringent by-laws are in most countries laid down and enforced by the public health authorities. In England, the Public Health Acts and By-laws are carried out by the various borough or district authorities, who appoint inspectors especially to study the health of the public with regard to sanitary arrangements. The inspectors have special powers to deal with all improper or defective food, or with any defects in buildings that may affect its cleanly preparation.

In addition to meeting the requirements of the clients, the various buildings have to be constructed and planned on clearly defined

lines, according to the rules of the various p easons authorities that control their erection; thus the tor special construction and planning of public schools are && ot governed in England by the board of education, and p aaa ‘ churches are governed by the various societies that assist in financing the erection of these edifices; of these the Incorporated Church Building Society exercises the strongest control. Factories both in England and France must be planned and erected to meet the separate acts that deal with these buildings. The fire insurance companies lay down certain requirements according to the size of the building, and the special trade for which it is erected, and fix their rate of premium accordingly. Dwelling-houses in London must be erected in accordance with the many building acts which govern the materials to be used, and the methods by which they shall be employed, the thickness of walls, rates of inclination of roofs, means of escape from fire, drainage, space at rear, &c. &c; these laws especially forbid the use of timber framed buildings. In sundry districts in England where the model by-laws are not in force, notably at Letchworth, Herts, it is possible to erect buildings with sound materials untrammelled by by-laws. With regard to premises used in a combined way, as shop and dwelling-house, if in London, and the building exceeds 10 squares, or 1000 sq. ft. super in area, the stairs and a large portion of the building must be built of fire-resisting materials. In the erection of London flats under certain conditions the stairs and corridors

must be of fire-resisting materials, while in parts of New York timber buildings are allowed; for illustrations of these see the article Caepentry. In public buildings and theatres in London, Paris and New York not only the construction, but also the exits and seating accommodation and stage, including the scenery dock and flies, must conform to certain regulations.

The conditions necessary for planning a successful building may be summarized as follows: — (i) Ease of access; (2) Good Conditions li 8 hv > fo) Good service; (4) Pleasing environment necessary and approaches; (5) Minimum cost with true economy; for a in the case of office buildings, also ease of rearrange-

a”/m/ S/U7 ment t0 su ˆ tenants. An architect should also be “’ practically acquainted with all the modes of operation in all the trades or arts employed in building, and be able minutely to estimate*

beforehand the absolute cost involved in the execu- tion of a proposed structure. The power to do this necessarily involves that of measuring work (usually done by the quantity surveyor at an advanced stage of the work), and of ascertaining the quantities to be done. In ordinary practice the architect usually cubes a building at a price per foot cube, as will be described hereafter, but an architect should know how to measure and prepare quantities, or he cannot be said to be master of his profession.

Building includes what is called construction, which is the

branch of the science of architecture relating to the practical

execution of the works required to produce any struc-

tion ri ” > ture; it will therefore be necessary to explain the

subject in a general manner before entering upon

building in detail.

Although the styles of architecture have varied at different periods, buildings, wherever similar materials are employed, must be constructed on much the same principles. Scientific knowledge of the natures and properties of materials has, however, given to the modern workman immense advantages over his medieval brother-craftsman, and caused many changes in the details of the trade, or art of building, although stones, bricks, mortar, &c, then as now, formed the element of the more solid parts of all edifices.

The object of constructions is to adapt, combine and fit materials in such a manner that they shall retain in use the forms and dispositions assigned to them. If an principles, upright wall be properly constructed upon a sufficient foundation, the combined mass will retain its position and bear pressure acting in the direction of gravity to any extent that the ground on which it stands, and the compound materials of the wall, can sustain. But pressure acting laterally has a necessary tendency to overthrow a wall, and therefore it will be the aim of the constructor to compel, as far as possible, all forces that can act upon an upright wall, to act in the direction of gravity, or else to give it permanent means of resistance in the direction opposite to that in which a disturbing force may act. Thus when an arch is built to bear against an upright wall, a buttress or other counterfort is applied in a direction opposed to the pressure of the arch. In like manner the inclined roof of a building spanning from wall to wall tends to thrust out the walls, and hence a tie is

applied to hold the opposite sides of the roof together at its base, where alone a tie can be fully efficient, and thus the roof is made to act upon the walls wholly in the direction of gravity; or where an efficient tie is inapplic- able, as in the case of a hammer beam roof, buttresses or counter- forts are added to the walls, to enable them to resist the pressure outwards. A beam laid horizontally from wall to wall, as a girder to carry a floor and its load, may sag or bend downwards, and tend thereby to force out the walls, or the beam itself may break. Both these contingencies are obviated by trussing, which renders the beam stiff enough to place its load on the walls in the direction of gravity, and strong enough to carry it safely. Or if the beam be rigid in its nature, or uncertain in its structure, or both (as cast-iron is), and will break without bending, the constructor by the smiths' art will supply a check and ensure it against the possible contingency.

Perfect stability, however, is not to be obtained with materials

Stone.

Bricks.

which are subject to influences beyond the control of man, and all matter is subject to certain influences of that nature. The influences mostly to be contended against are heat Materials and humidity, the former of which produces movement of some kind or to some extent in all bodies, the latter, in many kinds of matter; whilst the two acting together contribute to the disintegration or decay of materials available for the purposes of construction. These pervading influences the constructor seeks to counteract, by proper selection and disposition of his materials.

Stone and brick, the principal materials in general construction, keep their places in combination by means of gravity. They may be merely packed together, but in general they are compacted by means of mortar or cement, so that although the main constituent materials are wholly incom- pressible, masses of either, or of both, combined in structures are compressible, until the setting medium has indurated to a like condition of hardness. That kind of stone is best fitted for the purposes of general construction which is least absorbent of moisture, and at the same time free to work. Absorbent stone exposed to the weather rapidly disintegrates, and for the most part non-absorbent stone is so hard that it cannot always be used with a due regard to economy. When, therefore, suitable stone of both qualities can be obtained, the harder stone can be exposed to the

weather, or to the action which the softer stone cannot resist, and made to form the main body of the structure of the latter so protected. The hard and the soft should be made to bear alike, and should therefore be coursed and bonded together by the mason's art, whether the work be of stone wrought into blocks and gauged to thickness, or of rough dressed or otherwise unshaped rubble compacted with mortar.

Good bricks are less absorbent of moisture than any stone of the same degree of hardness, and are better non-conductors of heat than stone. As the basis of a stable structure, brickwork is more to be relied upon than stone in the form of rubble, when the constituents bear the relation to one another last above referred to, the setting material being the same in both; because the brick by its shaped form seats itself truly, and produces by bonding a more perfectly combined mass, whilst the imperfectly shaped and variously sized stone as dressed rubble can neither bed nor bond truly, the inequalities of the form having to be compensated for with mortar, and the irregularity of size of the main constituent accounted for by the introduction of larger and smaller stones. The most perfect stability is to be obtained, nevertheless, from truly wrought and accurately seated and bonded blocks of stone, mortar being used to no greater extent than may be necessary to exclude wind and water and prevent the disintegrating action of these agents upon even the most durable stone. When water alone is to be dealt with, and especially when it is liable to act with force, mortar is necessary for securing to every block in the structure its own full weight, and the aid of every other collateral and superimposed stone, in order to resist the loosening effect which water in powerful action is bound to produce.

In the application of construction to any particular object, the nature of the object will naturally affect the character of the constructions and the materials of which they particular are to be formed. Every piece of construction should objects of be complete in itself, and independent as such of every- construe- thing beyond it. A door or a gate serves its purpose by an application wholly foreign to itself, but it is a good and effective, or a bad and ineffective, piece of construction, in- dependently of the posts to which it may be hung, whilst the wheel of a wheelbarrow, comprising felloes, spokes and axletree, is a piece of construction complete in itself, and independent as such of everything beyond it. An arch of masonry, however large it may be, is not necessarily a piece of construction complete in itself, for it would fall to pieces without abutments. Thus a bridge consisting of a series of arches, however extensive, may be but one piece of construction, no arch being complete in itself

without the collateral arches in the series to serve as its abutments, and the whole series being dependent thereby upon

Founda- tions.

the ultimate abutments of the bridge, without which the structure would not stand. This illustration is not intended to apply to the older bridges with widely distended masses, which render each pier sufficient to abut the arches springing from it, but tend, in providing for a way over the river, to choke up the way by the river itself, or to compel the river either to throw down the structure or else to destroy its own banks.

Some soils are liable to change in form, expanding and con- tracting under meteorological influences; such are clays which swell when wetted and shrink when dried. Concrete foundations are commonly interposed upon such soils to protect the building from derangement from this cause; or walls of the cheaper material, concrete, instead of the more expensive brick or stone structure, are brought up from a level sufficiently below the ordinary surface of the ground. When concrete is used to obviate the tendency of the soil to yield to pressure, expanse or extent of base is required, and the concrete being widely spread should therefore be deep or thick as a layer, only with reference to its own power of transmitting to the ground the weight of the wall to be built upon it, without breaking across or being crushed. But when concrete is used as a substitute for a wall, in carrying a wall down to a low level, it is in fact a wall in itself, wide only in proportion to its comparative weakness in the absence of manipulated bond in its construction, and encased by the soil within which it is placed. When a concrete wall is used in place of brick the London Building Act requires an extra thickness of one-third; on the question of reinforced concrete no regulations as to thickness have at present been made. The foundation of a building of ordinary weight is for the most part sufficiently provided for by applying what are technically termed " footings " to the walls. The reason for a to˚walfs. footing is, that the wall obtains thereby a bearing upon a breadth of ground so much greater than its own width or thickness above the footing as to compensate for the difference between the power of resisting pressure of the wall, and of the ground or ultimate foundation upon which the wall is to rest. It will be clear from this that if a building is to be erected upon rock as hard

as the main constituent of the walls theoretically no expanded footings will be necessary; if upon chalk, upon strong or upon weak gravel, upon sand or upon clay, the footing must be expanded with reference to the power of resistance of the structure to be used as a foundation; whilst in or upon made ground or other loose and badly combined or imperfectly resisting soil, a solid platform bearing evenly over the ground, and wide enough not to sink into it, becomes necessary under the constructed footing. For this purpose the easiest, the most familiar, and for most purposes the most effectual and durable is a layer of concrete.

The English government, when it has legislated upon building matters, has generally confined itself to making provision that the enclosing walls of buildings should be formed of incombustible materials. In provisions regarding the least thicknesses of such walls, these were generally determined with reference to the height and length of the building.

In the general and usual practice of developing land at the present day, the owner or freeholder of the land first consults an Procedure architect and states his intentions of building, the tor an size of what he requires, what it is to be used for, if for intended trade how many hands he intends to employ, and the ” “’ sub-buildings and departments, &c, that will be wanted. The architect gathers as much information as he can as to his client’s requirements, and from this information prepares his sketches. This first step is usually done with rough sketches or outlines only, and when approved by the client as regards the planning and situation of rooms, &C, the architect prepares the plans, elevations, and sections on the lines of the approved rough sketches; at the same time he strictly observes the building acts, and makes every portion of the building comply with these acts as regards the thickness of walls, open spaces, light and air, distances from surrounding property, frontage lines, and a host of other points too numerous to mention, as far as he can interpret the meaning of the enactments. (The London*

and New York Building Acts are very extensive, with numerous amendments made as occasion requires.) An architect, whilst preparing the working drawings from the rough approved sketches, and endeavouring to conform with the Building Act requirements, often finds after consultation with the district surveyor, or the London County Council, or other local authorities, that the plans have to be altered; and when so altered the client may disapprove of them, and thus delay often occurs in settling them.

Another important point is that after the architect has obtained the consent of the building authorities, and also the approval of the client, then he may have to fight the adjoining owners with regard to ancient lights, or air space, or party walls. In the city of London these last difficulties often mean the suspension of the work for a long time, and a great loss to the client.

If the site is a large one, or the nature of the soil uncertain, trial holes should be sunk directly the sketch plans are approved. (See Foundations.)

Where the property is leasehold there are always at this stage negotiations as to obtaining the approval of the senior lessors and the freeholders; these having been obtained, the architect is then free to serve the various notices that may be required re party walls, &c.

The contract plans should be very carefully prepared, and sections, plans and elevations of all parts of the buildings and the levels from a datum line be given. In addition to the general set of drawings, larger scale details of the principal portions of the building should be given.

If there are any existing buildings on the site these should be carefully surveyed and accurate detail plans be made for re- ference; this is especially necessary with regard to easements and rights of adjoining owners. Also in the preparation of the site plan the various levels of the ground should be shown.

The plans having been approved by all parties concerned; the next operation is the preparation of the specification. This is a document which describes the materials to be used in the building, states how they are to be mixed, and how the various works are to be executed, and specifies every trade, and every portion of work in the building. The specification is necessary to enable the builder to erect the structure according to the architect's requirements, and is written by the architect; usually two copies of this document are made, one for the builder, the other for the architect, and the latter is signed as the contract copy in the same manner as the drawings.

From the specification and drawings usually an approximate estimate of the cost of the proposed building is prepared by the architect, and the most general method adopted is to cube the building by a multiplication of the length, breadth and height of the building, and to multiply the product or cubic contents by a price ranging from fivepence to three shillings per cubic foot. In the case of

churches, chapels and schools, the cost may be roughly computed by taking the number of seats at a price per seat. In the case of churches and chapels, taking a minimum area of 8 ft. each, the cost varies from £10 upwards, the difference being due to the amount of architectural embellishment or the addition of a tower. Schools may be estimated as averaging £9 per scholar; we find that, taking schools of various sizes erected by the late London School Board, their cost varied from £7:12:4 to £10:1:10 per scholar. Hospitals vary from £100 per bed upwards, the lowest cost being taken from a cottage hospital type; while in the case of St Thomas's hospital, London, the cost per bed, including the proportion of the administrative block, was £650, and without this portion the wards alone cost £2 50. The Herbert hospital at Woolwich cost only £320 per bed.

The bills of quantities are prepared by the quantity surveyor, and are generally made to form part of the contract, and so mentioned in " the contract." The work of the quantity surveyor is to measure from the drawings the whole of the materials required for the structure, and state the amounts or quantities of the respective materials in the form of a bill usually made out on foolscap paper specially ruled, so that

the builders can price each item, together with the labour required to work and fix it, thus forming the building. The idea is to be able to arrive at a lump sum for which the builders will undertake to erect the building. It is of frequent occurrence, in fact it occurs in four-fifths of building contracts, that when a building is commenced, the client, or other interested person, will alter some portion, thereby causing deviations from the bills of quantities. By having the prices of the different materials before him, it is easy for the quantity surveyor to remeasure the portion altered, adding or deducting as the case may be, and thus to ascertain what difference the alteration makes. This method of bills of quantities and prices is absolutely necessary to any one about to build, and means a considerable saving to the client in the end. For example: — Suppose that bills of quantities are not prepared for a certain job by a quantity surveyor, and, as is often done, the drawings and specification are sent to several builders asking them for a quotation to build the house or factory or whatever it may be, according to the drawings and specifica- tion. The prices are duly sent in to the architect, and

probably the lowest price is accepted and the successful builder starts the job. During the progress of the works certain alterations take place by the owner's instructions, and when the day of settlement comes, the builder puts in his claim for " extras," then owing to the alterations and to the architect having no prices to work upon, litigation often ensues.

Before the work of erecting a structure is entrusted to a builder he has to sign a contract in the same manner as the drawings and specification. This contract is an important document wherein the builder agrees to carry out the work for a stated sum of money, in accordance with the drawings and specification, and bills of quantities, and instructions of the architect, and to his entire satisfaction; and it also states the description of the materials and workmanship, and the manner of carrying out the work, responsibilities of the builder, particularly clauses indemnifying the employer against accidents to employees, and against numerous other risks, the time of completion of works under a penalty for non-completion (the usual allowance being made for bad weather, fire or strikes), and also how pay- ments will be made to the builder as he proceeds with the building. This form of contract is generally prepared by the architect, and varies in part as may be necessary to meet the requirements of the case.

When the drawings have been approved by the owner or client, also by the district surveyor or local authorities, and by adjoining owners, one copy of them, made on linen, is usually deposited (in London) either with the district surveyor, or with the London County Council, another is prepared for the freeholder if a lease of the land is granted, and a third is given to the builder. In addition, in complicated cases such as occur in the city of London, when a building is erected on land which has four or five distinct owners, an architect may have to prepare a large number of complete copies to be deposited with the various parties interested.

The duties of the builder are very similar to those of the architect, except that he is not expected to be able to plan and design, but to carry out the plans and designs of ladder's tne arc hitect in the actual work of building. The sphere. builder should also know the various acts, and in particular the acts specially relating to the erection of scaffoldings, hoardings, gantries, shoring and pulling down of old buildings. He should have a thorough knowledge of all materials, their qualifying marks or brands, and the special features of good and bad in each class, their uses and method of use. He should be able to control and manage both the men and materials ;

and briefly, in a builder, as opposed to an architect, the constructive knowledge should predominate.

On large or important works it is usual to have a clerk of works or delegate from the architect; his duties are to be on the works while they are in progress and endeavour by constant attention to secure the use of the best materials and construction, and to report to the architect for his instruction any difficulties that may arise. He should be a thoroughly practical man as opposed to

the architectural draughtsman. His salary is paid by the client, and is not included in the architect's remuneration.

American building acts agree in a general manner with those enforced in London. But whereas New York allows the erection of frame or wood structures, while defining a certain portion of the city inside which no new frame or wood practice. structures shall be erected, in London and the large cities of Great Britain the erection of wood frame buildings as dwellings is prohibited. In New York City provision is made for a space at the rear of domestic buildings at least 10 ft. deep, but such depth is increased when the building is over 60 ft. high, and is varied under special circumstances. In London this depth is the same, but the height of the building in relation to the space required in the rear thereof shall be constructed to keep within an angle of 63J degrees, inclining from the rear boundary towards the building from the level of pavement in front of building; the position from which the angle is taken is varied under special circumstances. In the smaller English towns the building regulations are framed on the model by-laws, and these increase the depth of the yard or garden according to the height of the building.

With regard to the strength and proportion of materials, these are not dealt with in the London Building Act to the same extent as in the New York; for example, in the New York acts (parts 4 and 5) 1 it is prescribed that the bricks used shall be good, hard, well-burned bricks. The sand used for mortar shall be clean, sharp, grit sand, free from loam or dirt, and shall not be finer than the standard samples kept in the office of the department of buildings ; also the quality of lime and mortar is fully described, and the strengths of steel and cast-iron, and tests of new materials. Also it is required that all excavations for buildings shall be properly guarded and protected so as to prevent them from becoming dangerous to life or limb, and shall be sheath-piled where necessary by the person or persons causing the excavations to be made, to prevent the adjoining earth from caving in. Plans filed in the department of buildings shall be

accompanied by a statement of the character of the soil at the level of the footings. There are also requirements as to protecting adjoining property. The bearing capacity of soils, pressure under footings of founda- tions, and in part 6 the materials of walls and the methods to be observed in building them are defined. Part 23 deals with floor loads, and the strength of floors constructed of various materials, and requires that the temporary support shall be strong enough to carry the load placed upon them during the progress of any works to buildings. Part 24 deals with the calculations and strength of materials, and wind pressure. Parts 4 and 5 of the New York Building Code are not dealt with by the London Building Act, but the local by-laws of the various districts deal with these. Part 6 of the New York code is dealt with partly by the London Building Act, and partly by the local by-laws. Parts 23 and 24 of the New York code are not dealt with in the English acts at all. In America the standard quality for all materials is set out, but in no English acts do we find the definition of the quality of timber, new materials, steel, &c. Iron and steel construction is in its infancy in England as compared with America, and probably this accounts for no special regulations being in force; but part 22 of the New York Building Code, section no to 129 inclusive, deals very fully with iron and steel construction, and this is further supplemented by sections 137 to 140 inclusive.

Sanitary work is dealt with in London by section 39 of the Public Health (London) Act, and the drainage by-laws of the London County Council, in which every detail is very fully gone into with regard to the laying of drains, and fitting up of soil pipes, w.c.'s, &c, all of which is to be carried out and tested to the satisfaction of the local borough's sanitary inspector. The general requirements of New York with regard to sanitary work are very similar with a few more restrictions, and are carried out under " the rules and regulations for plumbing, drainage,

1 Building and Health Laws and Regulations affecting the City of New York, including the Building Code of New York City as amended to 1st May 1903.

water-supply, and ventilation of buildings." The noticeable feature of the New York regulations is that all master plumbers have to be registered, which is not so in England. The New York regulations

have 183 sections relating to sanitary work, and the English regulations have 96 sections. Also by part 16 of the Amendments to Plumbing Rules 1903, the New York laws require that, before any construction of, or alterations to, any gas piping or fittings are commenced, permits must be obtained from the superintendent of buildings; these are only issued to a registered plumber. The application must be accompanied by plans of the different floors showing each outlet, and the number of burners to each outlet; a statement must also be made of the quality of the pipes and fittings, all of which are to be tested by the inspector. In London there are no such laws; the gas companies control a small portion of the work as regards the connexion to meters, while the insurance companies require gas jets to be covered with a wire guard where liable to come in contact with inflammable goods. As to water, the various water companies in England have each their own set of regulations as to the kind of fittings and thickness and quality of pipe to be used, whether for service, wastes or main.

The importance of fire-resisting construction is being more fully recognized now by all countries. In France the regulations Fire- for factories, shops and workshops relating to " exits "

resisting require that all doors should open outwardly when construe- they open on to courts, vestibules, staircases or oa ' interior passages. When they give access to the open

air, outward opening is not obligatory unless it has been judged necessary in the interests of safety. If the doors open on to a passage or staircase they must be fixed in such a manner as not to project into the passage or staircase when open. The exits must be numerous, and signs indicating the quickest way out are to be placed in conspicuous positions. The windows are to open outwardly. Staircases in offices or other buildings serving as places for work shall be constructed in incombustible materials, or shall be walled in fully in plaster. The number of staircases shall be in proportion to the number of employees, &c. It is prohibited to use any liquid emitting vapours inflammable under 35 C. for the purpose of lighting or heating, unless the apparatus containing the liquid is solidly closed during work, that part of the apparatus containing the liquid being so closed as to avoid any oozing out of the liquid, &c. &c. Instructions are added as to precautions to be taken in case of fire.

In London fire-resisting construction is dealt with in the London Building Act, and its second schedule, and in London County Council Theatre and Factory Acts, &c. In New York the building code (parts

19, 20 and 21) deals with fire appliances, escapes, and fire-proof shutters and doors, fire-proof buildings and fire-proof floors, and requires that all tenement houses shall have an iron ladder for escape. A section somewhat similar to the last came into force in London in 1907 under the London Building Act, being framed with a view to require all existing projecting one-storey shops to have a fire-resisting roof, and all existing buildings over 50 ft. in height to have means of escape to and from the roof in case of fire.

There are several patents now in use with which it would be possible to erect a fire-proof dwelling at small cost with walls 3 to s in. in thickness. One of these has been used where the building act does not apply, as in the case of the Newgate prison cells, London, where the outside walls were from 3 to 4 in. thick only, and were absolutely fire and burglar proof. This method consists in using steel dovetailed sheets fixed between small steel stanchions and plastered in cement on both sides. This form of construction was also used at the British pavilion, Paris Exhibition 1900, and has been employed in numerous other buildings in England, and also in South Africa, Venezuela, and India (Delhi durbar). The use of many of these convenient and sound forms of building construction for ordinary buildings in London, and in districts of England where the model by-laws are in force, is prohibited because they do not comply with some one or other of the various clauses relating to materials, or to the thickness of a wall.

The various details of construction are described and illustrated under separate headings. See Brickwork, Carpentry, Foun- dations, Glazing, Joinery, Masonry, Painter-Work, Plastering, Roofs, Scaffold, Shoring, Staircase, Steel Construction, Stone, Timber, Wall- Coverings, &c.

The principal publications for reference in connexion with this subject are : The Building and Health Laws of the City of New York, Brooklyn Eagle Library, No. 85 ; Rides and Regulations affecting Building Operations in the administrative County of London, compiled by Ellis Marsland; Annotated By-Laws as to House Drainage, 6”c, by Jensen; Metropolitan Sanitation, by Herbert Daw. (J. Bt.)

BUILDING SOCIETIES, the name given to societies ” for the purpose of raising, by the subscriptions of the members, a stock or fund for making advances to members out of the funds of the society upon freehold, copyhold, or leasehold estate by way of mortgage,” may be ” either terminating or permanent ” (Building Societies Act 1874, § 13). A “terminating” society is one ” which by its rules is to

terminate at a fixed date, or when a result specified in its rules is attained "; a " permanent " society is one " which has not by its rules any such fixed date or specified result, at which it shall terminate " (§ 5). A more popular description of these societies would be — societies by means of which every man may become " his own landlord," their main purpose being to collect together the small periodical subscriptions of a number of members, until each in his turn has been able to receive a sum sufficient to aid him materially in buying his dwelling-house. The origin and early history of these societies is not very clearly traceable. A mention of " building clubs " in Birmingham occurs in 1795; one is known to have been established by deed in the year 1809 at Greenwich; another is said to have been founded in 1825, under the auspices of the earl of Selkirk at Kirkcudbright in Scotland, and we learn (Scratchley, On Building Societies, p. 3) that similar societies in that kingdom adopted the title of " menages."

United Kingdom. — When the Friendly Societies Act of 1834 gave effect to the wise and liberal policy of extending its benefits to societies for frugal investment, and generally to all associations having a similar legal object, several building societies were certified under it, — so many, indeed, that in 1836 a short act was passed confirming to them the privileges granted by the Friendly Societies Act, and according to them the additional privileges (very valuable at that time) of exemption from the usury laws, simplicity in forms of conveyance, power to reconvey by a mere endorsement under the hands of the trustees for the time being, and exemption from stamp duty. This act remained unaltered until 1874, when an act was passed at the instance of the building societies conferring upon them several other privileges, and relieving them of some disabilities and doubts, which had grown up from the judicial expositions of the act of 1836. It made future building societies incorporated bodies, and extended the privilege of incorporation to existing societies upon application, so that members and all who derive title through them were relieved from having to trace that title through the successive trustees of a society. It .also gave a distinct declaration to the members of entire freedom from liability to pay anything beyond the arrears due from them at the time of winding up, or the amount actually secured by their mortgage deeds. Power to borrow money was also expressly given to the societies by the act, but upon two conditions: that the limitation of liability must be made known to the lender, by being printed on the acknowledgment for the loan, and that the borrowed money must not exceed two-thirds of the amount secured by mortgage from the members, or, in a terminating society,

one year's income from subscriptions. Previous to the passing of the act (or rather to the judicial decision in Laing v. Read, which the clause of the act made statutory) there had been, on the one hand, grave doubts on high legal authority whether a society could borrow money at all; while, on the other hand, many societies in order to raise funds carried on the business of deposit banks to an extent far exceeding the amounts used by them for their legitimate purpose of investment on mortgage. It enacted, that if a society borrowed more than the statute authorizes, the directors accepting the loan should be personally

responsible for the excess. By an act passed in 1894 all the Benefit Building Societies established under the act of 1836 after the year 1856 were required to become incorporated under the act of 1874.

There are, therefore, three categories of building societies: — (1) Those established before 1856, which have not been in- corporated under the act of 1874 and remain under the act of 1836. (2) Those established before 1874 under the act of 1836, which have been incorporated under the act of 1874. (3) Those which have been established since the act of 1874 was passed. The first class still act by means of trustees. Of these societies there are only 62 remaining in existence, and their number cannot be increased. The second and third classes exceed 2000 in number.

The early societies were all " terminating, " — consisting of a limited number of members, and coming to an end as soon as every member had received the amount agreed upon as the value of his shares. Take, as a simple typical example of the working of such a society, one the shares of which are £120 each, realizable by subscriptions of 10s. a month during 14 years. Fourteen years happens to be nearly the time in which, at 5 % compound interest, a sum of money becomes doubled. Hence the present value, at the commencement of the society, of the £120 to be realized at its conclusion, or (what is the same thing) of the subscriptions of 10s. a month by which that £120 is to be raised, is £60. If such a society had issued 120 shares, the aggregate subscriptions for the first month of its existence would amount to exactly the sum required to pay one member the present value of one share. One member would accordingly receive a sum down of £60, and in order to protect the other members from loss, would execute a mortgage of his dwelling- house for ensuring the

payment of the future subscription of 10s. per month until every member had in like manner obtained an advance upon his shares, or accumulated the £120 per share. As £60 is not of itself enough to buy a house, even of the most modest kind, every member desirous of using the society for its original purpose of obtaining a dwelling-house by its means would require to take more than one share. The act of 1836 limited the amount of each share to £150, and the amount of the monthly contributions on each share to £1 , but did not limit the number of shares a member might hold.

The earlier formed societies (in London at least) did not usually adopt the title " Building Society "; or they added to it some further descriptive title, as " Accumulating Fund," " Savings Fund," or "Investment Association." Several are described as " Societies for obtaining freehold property," or simply as " Mutual Associations," or " Societies of Equality." The building societies in Scotland are mostly called " Property Investment," or "Economic." Although the term "Benefit Building Society" occurs in the title to the act of 1836, it was not till 1849 that it became in England the sole distinctive name of these societies; and it cannot be said to be a happy description of them, for as ordinarily constituted they undertake no building operations whatever, and merely advance money to their members to enable them to build or to buy dwelling-houses or land.

The name " Building Society," too, leaves wholly out of sight the important functions these societies fulfil as means of in- vestment of small savings. The act of 1836 defined them as societies to enable every member to receive the amount or value of a share or shares to erect or purchase a dwelling-house, &c, but a member who did not desire to erect or purchase a dwelling- house might still receive out of the funds of the society the amount or value of his shares, improved by the payments of interest made by those to whom shares had been advanced.

About 1846 an important modification of the system of these societies was introduced, by the invention of the " permanent " plan, which was adopted by a great number of the societies established after that date. It was seen that these societies really consist of two classes of members; that those who do not care to have, or have not yet received, an advance upon mortgage security aie mere investors, and that it matters little when they

commence investing, or to what amount; while those to whom advances have been made are really debtors to the society, and arrangements for enabling them to pay off their debt in various terms

of years, according to their convenience, would be of advantage both to themselves and the society. By permitting members to enter at any time without back-payment, and by granting advances for any term of years agreed upon, a continuous inflow of funds, and a continuous means of profitable investment of them, would be secured. The interest of each member in the society would terminate when his share was realized, or his advance paid off, but the society would continue with the accruing subscriptions of other members employed in making other advances.

Under this system building societies largely increased and developed. The royal commissioners who inquired into the subject in 1872 estimated the total assets of the societies in 1870 at 17 millions, and their annual income at 11 millions. The more complete returns, afterwards obtained, indicate that this was an under-estimate.

A variety of the terminating class of societies met at one time with considerable favour under the name of " Starr Bowkett " or " mutual " societies, of which more than a thousand were established. They differed from the typical society above described, in the contribution of a member who had not received an advance being much smaller, while the amount of the advance was much larger, and it was made without any calculation of interest. Thus a society issued, say, 500 shares, on which the contributions were to be is. 3d. per week, and, as soon as a sum of £300 accumulated allotted it by ballot to one of the shareholders, on condition that he was to repay it without interest by instalments in 10 or 125 years, and at the same time to keep up his share-contributions. The fortunate recipient of the appropriation was at liberty to sell it, and frequently did so at a profit; but (except from fines) no profit whatever was earned by those who did not succeed in getting an appropriation, and as the number of members successful in the ballot must necessarily be small in the earlier years of the society, the others frequently became discontented and retired. These societies could not borrow money, for as they received no interest they could not pay any. The plan was afterwards modified by grant- ing the appropriations alternately by ballot and sale, so that by the premiums paid on the sales (which are the same in effect as payments of interest on the amount actually advanced) profits might be earned for the investing members. The formation of societies of this class ceased on the passing of the act of 1894, by which balloting for advances was prohibited in societies thereafter established. A further modification of the " mutual " plan was to make all the appropriations by sale. The effect of this was to bring the mutual society back to the ordinary form; for it amounts to precisely the same thing for a man to pay 10s. a month on a loan of

£60 for 14 years, as for him to borrow a nominal sum of £84 for the same period, repayable in the same manner, but to allow £24 off the loan as a " bidding " at the sale. The only difference between the two classes of societies is that the interest which the member pays who bids for his advance depends on the amount of competition at the bidding, and is not fixed by a rule of the society.

For several years the progress of building societies in general was steady, but there were not wanting signs that their prosperity was unsubstantial. A practice of receiving deposits repayable at call had sprung up, which must lead to embarrassment where the funds are invested in loans repayable during a long term of years. It was surmised, if not actually known, that many societies had large amounts of property on their hands, which had been reduced into possession in consequence of the default of borrowers in paying their instalments. A practice had also grown up of establishing mushroom societies, which did little more than pay fees to the promoters. The vicious system of trafficking in advances that had been awarded by ballot, near akin to gambling, prevailed in many societies. These signs of weakness had been observed by the well-informed, and the disastrous failure of a large society incorporated under

the act of 1874, the Liberator, which had in fact long ceased to do any genuine building society business, hastened the crisis. The This society, had drawn funds to the amount of

"Liber- more than a million sterling from provident people in ator – " all classes of the population and all parts of the country by specious representations, and had applied those funds not to the legitimate purpose of a building society, but to the support of other undertakings in which the same persons were concerned who were the active managers of the society. The consequence was that the whole group of concerns became insolvent (Oct. 1892), and the Liberator depositors and shareholders were defrauded of every penny of their investments. Many of them suffered great distress from the loss of their savings, and some were absolutely ruined. The result was to weaken confidence in building societies generally, and this was very marked in the rapid decline of the amount of the capital of the incorporated building societies. From its highest point (nearly 54 millions) reached in 1887, it fell to below 43 millions in 1895. On some societies, which had adopted the deposit system, a run was

made, and several were unable to stand it. The Birkbeck Society was for two days besieged by an anxious crowd of depositors clamouring to withdraw their money; but luckily for that society, and for the building societies generally, a very large portion of its funds was invested in easily convertible securities, and it was enabled by that means to get sufficient assistance from the Bank of England to pay without a moment's hesitation every depositor who asked for his money. Its credit was so firmly established by this means that many persons sought to pay money in. Had this very large society succumbed, the results would have been disastrous to the whole body of building societies. As the case stood, the energetic means it adopted to save its own credit reacted in favour of the societies generally. The Liberator disaster convinced everybody that something must be done towards avoiding such calamities in future. The government of the day brought in a bill for that purpose, and several private members also prepared measures — most of them more stringent than the government bill. All the bills were referred to a select committee, of which Mr Herbert Gladstone was the chairman. As the result of the deliberations of the committee, the Building Societies Act of 1804 was passed. Meanwhile the Rt. Hon. W. L. Jackson (afterwards Lord Allerton), a member of the committee, moved for an address to the crown for a return of the property held in possession by building societies. This was the first time such a return had been called for, and the managers of the societies much resented it; there were no means of enforcing the return, and the consequence was that many large societies failed to make it, notwithstanding frequent applications by the registrar. The act provided that henceforth all incorporated societies should furnish returns in a prescribed form, including schedules showing respectively the mortgages for amounts exceeding £5000; the properties of which the societies had taken possession for more than twelve months through default of the mortgagors; and the mortgages which were more than twelve months in arrear of repayment subscription. The act did not come into operation till the 1st of January 1895, and the first complete return under it was not due till 1896, when it appeared that the properties in possession at the time of Mr Jackson's return must have been counted for at least seven and a half millions in the assets of the societies. In a few years after the passing of the act the societies reduced their properties in possession from 14% of the whole of the mortgages to 5 %, or, in other words, reduced them to one-third of the original amount, from 7ˆ millions to 2§ millions. Though this operation must have been attended with some sacrifice in many societies, upon the whole the balance of profit has increased rather than diminished. Thus this provision of

the act, though it greatly alarmed the managers of societies, was really a blessing in disguise. The act also gave power to the registrar, upon the application of ten members, to order an inspection of the books of a society, but it did not confer upon individual members the right to inspect the books, which would have been more effective. It empowered the registrar, upon the

application of one-fifth of the members, to order an inspection upon oath into the affairs of a society, or to investigate its affairs with a view to dissolution, and even in certain cases to proceed without an application from members. It gave him ample powers to deal with a society which upon such investiga- tion proved to be insolvent, and these were exercised so as to procure the cheap and speedy dissolution of such societies. It also prohibited the future establishment of societies making advances by ballot, or dependent on any chance or lot, and provided an easy method by which existing societies could discontinue the practice of balloting. This method has been adopted in a few instances only. The act, or the circumstances which led to it, has greatly diminished the number of new societies applying for registry.

The statistics of building societies belonging to all the three classes mentioned show that there were on the 31st of December 1904, 2118 societies in existence in the United Kingdom. Of these, 2075, having 609,785 members, made returns. Their gross receipts for the financial year were £38,729,009, and the amount advanced on mortgage during the year was £9,589,864. The capital belonging to their members was £39,408,430, and the undivided balance of profit £4,004,547. Their liabilities to depositors and other creditors were £24,838,290. To meet this they had mortgages on which £53,196,112 was due, but of this £2,443,255 was on properties which had been in possession more than a year, and £222,444 on mortgages which had fallen into arrear more than a year. Their other assets were £14,952,485, and certain societies showed a deficit balance which in the aggregate was £102,670. As compared with 1895, when first returns were obtained from unincorporated societies, these figures show an increase in income of 30 %, in assets of 23 %, and in profit balances of 46 , and a diminution of the properties in possession and mortgages in arrear of 14 in the nine years. The total assets and income are more than three times the amount of the conjectural estimate made for 1870 by the royal commission. It is not too much to say that a quarter of a million persons have been enabled by means of building societies to become the proprietors of their own homes.

In recent years, several rivals to building societies have sprung up. Friendly societies have largely taken to investing their surplus funds in loans to members on the building society principle. Industrial and provident land and building societies have been formed. The legislature has authorized local authorities to lend money to the working classes to enable them to buy their dwelling-houses. Bond and investment companies have been formed under the Companies Acts, and are under no restriction as to balloting for appropriation. All these have not yet had any perceptible effect in checking the growth of the building society movement, and it is not thought that they will permanently do so.

British Colonies. — In several of the British colonies, legislation similar to that of the mother country has been adopted. In Victoria, Australia, a crisis occurred, in which many building societies suffered severely. In the other Australian colonies the building society movement has made progress, but not to a very large extent. In the Dominion of Canada these societies are sometimes called " loan companies " and are not restricted in their investments to loans on real estates, but about 90 % of their advances are oh that security. At the close of the year 1904. their liabilities to stockholders exceeded £13,000,000, and to the public £21,000,000. The uncalled capital was £5,000,000. The balance of current loans was £28,000,000, and the property owned by the societies exceeded £7,000,000.

Belgium, &c. — In Belgium, the Government Savings Bank has power to make advances of money to societies of credit or of con- struction to enable their members to become owners of dwelling- houses. The advance is made to the society at 3 or sometimes at 2 \ % interest, and the borrower pays 4 %. In the great majority of cases the borrower effects an insurance with the savings bank so that his repayments terminate at his death. On the 31st of December 1903 nearly 25,000 advances were in course of repayment. In Germany, building societies are recognized as a form of societies for self-help, but are not many in number, being overshadowed by the great organization of credit societies founded by Schulze-Delitzsch. In other countries there has been no special legislation for building societies similar to that of the United Kingdom, and though societies with the same special object probably exist, separate information with regard to them is not available. (E. W. B.)

United States. — " Building and loan association " is a general term applied in the United States to such institutions as mutual loan associations, homestead aid associations, savings fund and loan

associations, co-operative banks, co-operative savings and loan associations, &c. They are private corporations, for the accumulation of savings, and for the loaning of money to build homes. The first association of this kind in the United States of which there is any record was organized at Frankford, a suburb

of Philadelphia, on the 3rd of January 1831, under the title of the Oxford Provident Building Association. Their permanent inception took place between 1840 and 1850. The receipts or capital of the building and loan association consists of periodical payments by the members, interest and premiums paid by borrowing members or others, fixed periodical instalments by borrowing members, fines for failures to pay such fixed instal- ments, forfeitures, fees for transferring stock, entrance fees, and any other revenues or payments, — all of which go into the common treasury. When the instalment payments and profits of all kinds equal the face value of all the shares issued, the assets, over and above expenses and losses, are apportioned among members, and this apportionment cancels the borrower's debt, while the non-borrower is given the amount of his stock. A man who wishes to borrow, let us say, $1000 for the erection of a house ordinarily takes five shares in an association, each of which, when he has paid all the successive instalments on it, will be worth $200, and he must offer suitable security for his loan, Usually the lot on which he is to build. The money is not lent to him at regular rates of interest, as in the case of a savings bank or other financial institution, but is put up at auction usually in open meeting at the time of the payment of dues, and is awarded to the member bidding the highest premium. To secure the $1000 borrowed, the member gives the association a mortgage on his property and pledges his five shares of stock. Seme associations, when the demand for money from the shareholders does not exhaust the surplus, lend their funds to persons not shareholders, upon such terms and conditions as may be approved by their directors. Herein lies a danger, for such loans are some- times made in a speculative way, or on insufficient land value. Some associations make stock loans, or loans on the shares held by a stockholder without real estate security; these vary in different associations, some applying the same rules as to real estate loans. To cancel his debt the stockholder is constantly paying his monthly or semi-monthly dues, until such time as these payments, plus the accumulation of profits through compound interest, mature the shares at $200 each, when he surrenders his shares, and the debt

upon his property is cancelled.

Every member of a building and loan association must be a stockholder, and the amount of interest which a member has in a Shares building and loan association is indicated by the number of shares he holds, the age of the shares, and their maturing value. The difference between a stockholder in such an association and one in an ordinary corporation for usual business purposes lies in the fact that in the latter the member or stockholder buys his stock and pays for it at once, and as a rule is not called upon for further payment; all profits on such stocks are received through dividends, the value of shares depending upon the successful opera- tion of the business. In the former the stockholder or member pays a stipulated minimum sum, say $1, when he takes his member- ship and buys a share of stock. He continues to pay a like sum each month until the aggregate of sums paid, increased by the profits and all other sources of- income, amounts to the maturing value of the stock, usually $200, when the stockholder is entitled to the full maturing value of the share and surrenders the same. Shares are usually issued in series. When a second series is issued the issue of the stock of the first series ceases. Profits are distributed and losses apportioned before a new series can be issued. The term during which a series is open for subscription differs, but it usually extends over three or six months, and sometimes a year. Some associations, usually known as perpetual associations, issue a new series of stock without regard to the time of maturity of previous issues. It is the practice in such associations to issue a new series of stock every year. Instead of shares that are paid in instalments, some associations issue prepaid shares and paid-up shares. Prepaid shares, known also as partly paid-up shares, are issued at a fixed price per share in advance. They usually participate as fully in the profits as the regular instalment shares, and when the amount originally paid for such shares, together with the dividends accrued thereon, reaches the maturing or par value, they are disposed of in the same manner as regular instalment shares. Some associations, instead of crediting all the profits made on this class of shares, allow a fixed rate of interest on the amount paid therefor at each dividend period, which is paid in cash to the holder thereof. This interest is then deducted from the profits to which the shares are entitled, and the remainder is credited to the shares until such unpaid portion of the profits, added to the amount originally paid, equals the maturing or par value. Paid-up shares are issued upon the payment of the full maturity or par value, when a certificate of paid-up stock is issued, the owners being entitled to receive in cash the amount

of all dividends declared thereon, subject to such conditions or limitations as may be agreed upon. These shares sometimes participate as fully in the profits as the regular instalment shares, but in most cases a fixed rate of interest only is allowed, the holders of the shares usually assigning to the association all right to profits above that amount. Certificates of matured shares are also issued to holders of regular instalment shares, who prefer to leave their money with the association as an investment.

Prior to the maturing of a share it has two values, the holding or book value and the withdrawal value. The book value is ascer- tained by adding all the dues that have been paid to the profits that have accrued; that is to say, it is the actual value of a share at any particular time. The withdrawal value is that amount of the book value which the association is willing to pay to a shareholder who desires to sever his connexion with the association before his share is matured. Some associations do not permit their members to withdraw prior to the maturing of their shares. Then the only way a shareholder can realize upon his shares is by selling them to some other person at whatever price he can obtain. There are twelve or more plans for the withdrawal of funds. Every association has full regulations on all such matters.

The purchase of a share binds the shareholder to the necessity of keeping up his dues, and thus secures to him not only the benefits of a savings bank, but the benefit of constantly accruing y . _ compound interest. This accomplishes the first feature .. a .” of the motive of a building and loan association. The methods second is accomplished by enabling a man to borrow money for building purposes. It is a moot question whether this method of obtaining money for the building of homes is more or less economical than that of obtaining it from the ordinary savings banks or from other sources. Sometimes the premium which must be paid to secure a loan increases the regular interest to such an amount as to make the building and loan method more expensive than the ordinary method of borrowing money, but a building and loan association has a moral influence upon its members, in that it encourages a regular payment of instalments. Some associations have a fixed or established premium rate, and under such circum- stances loans are awarded to the members in the order of their applications or by lot. The premium may consist of the amount which the borrower pays in excess of the legal interest, or it may consist of a certain number of payments of dues or of interest to be made in advance. There are very many plans for the payment oi premiums, nearly seventy relating to real estate loans being in vogue in different associations in different parts of the

United States; but in nearly all cases the borrower makes his regular payments of dues and interest until the shares pledged have reached maturing value. There is also a great variety of plans for the distribution of profits, something like twenty-five such plans being in existence. The methods of calculating interest and profits are somewhat compli- cated, but they are all found in the books to which reference will be made. The various plans for the payment of premiums, distribu tion of profits, and withdrawals, and the calculations under each, are given in full in the ninth annual report of the U.S. commissioner of labour.

Most building and loan associations confine their operations to a small community, usually to the county in which they are situated; but some of them operate on a large scale, extending their business enterprises even beyond the borders of their own state. These national associations are ready to make loans on property anywhere, and sell their shares to any person without reference to his residence. In local' associations the total amount of dues paid in by the share-holders forms the basis for the distribution of profits, while in most national associations only a portion of the dues paid in by the share-holders is considered in the distribution. For instance, in a national association the dues' are generally 60 cents a share per month, out of which either 8 or 10 cents are carried to an expense fund, the remainder being credited on the loan fund. The expense fund thus created is lost to the shareholders, except in the case of a few associa- tions which carry the unexpended balances to the profit and loss account, and whatever profits are made are apportioned on the amount of dues credited to the loan fund only. The creation of an expense fund in the nationals has sometimes been the source of disaster. Safety or security in both local and national associations depends principally upon the integrity with which their affairs are conducted, and not so much upon the form of organization or the method of distribution. Some of the states — New York, Massa-chusetts, New Jersey, Ohio, Illinois, California and others — bring building and loan associations under the same general supervision of law thrown around savings banks. In some states nothing is officially known of them beyond the formalities of their incorporation. Though the business of the associations is conducted by men not trained as bankers, it yet meets with rare success. Associations dis- band when not successful, but when they disband great loss does not occur because the whole business of the association consists of its loans, and these loans are to its own shareholders, as a rule, who hold the securities in their associated forms. The amount of money on hand is always small, because it is sold or lent as fast as paid in. A

disbanded association, therefore, simply returns to its own members their own property, and but few real losses occur. In- vestment in a building and loan association is as nearly absolutely

safe as it can be, for the monthly dues and the accumulated profits, which give the actual capital of the association, are lent or sold, as it is termed, by the association as fast as they accumulate, and upon real estate or upon the stock of the association itself. The opportunities for embezzlement, therefore, or for shrinkage of securities, are reduced to the minimum, and an almost absolute safety of the investment is secured.

The growth of these associations has been very rapid since 1840, and at the opening of the 20th century they numbered nearly 6000. The Federal government, through the department of labour, made an investigation of building and loan associations, and published its report in 1893. The total dues paid in on instalment shares amounted then to $450,667,594. The business represented by this great sum, conducted quietly, with little or no advertising, and without the experienced banker in charge, shows that the common people, in their own ways, are quite competent to take care of their savings, especially when it was shown that but thirty-five of the associations then in existence met with a net loss at the end of their latest fiscal year, and that this loss amounted to only a little over $23,000. Bulletin No. 10 (May 1897) of the U. S. department of labour contained a calculation of the business at that date, based upon such states' reports as were available. That calculation showed a growth in almost every item. During the years of depression ending with 1899 the growth of building and loan associations was naturally slower than in prosperous periods.

See Ninth A nnual Report of U.S.A . Commissioner of Labour (1 893) ; Bulletin, No. 10 (May 1897), of the Department of Labour; Edmund Rigley, How to manage Building Associations (1873); Seymour Dexter, A Treatise on Co-operation Savings and Loan Associations (New York, 1891); Charles N. Thompson, A Treatise on Building Associations (Chicago, 1892). (C. D. W.)

BUILTH, or Builth Wells, a market town of Brecknockshire, Wales. Pop. of urban district (1901), 1805. It has a station on the Cambrian line between Moat Lane and Brecon, and two others (high

and low levels) at Builth Road about if m. distant where the London & North-Western and the Cambrian cross one another. It is pleasantly situated in the upper valley of the Wye, in a bend of the river on its right bank below the confluence of its tributary the Irfon. During the summer it is a place of con- siderable resort for the sake of its waters— saline, chalybeate and sulphur — and it possesses the usual accessories of pump-rooms, baths and a recreation ground. The scenery of the Wye valley, including a succession of rapids just above the town, also attracts many tourists. The town is an important agricultural centre, its fairs for sheep and ponies in particular being well attended.

The town, called in Welsh Llanfair (yn) Muallt, i.e. St Mary's in Builth, took its name from the ancient territorial division of Buallt in which it is situated, which was, according to Nennius, an independent principality in the beginning of the 9th century, and later a cantrev, corresponding to the modern hundred of Builth. Towards the end of the nth century, when the tide of Norman invasion swept upwards along the Wye valley, the district became a lordship marcher annexed to that of Brecknock, but was again severed from it on the death of William de Breos, when his daughter Matilda brought it to her husband, Roger Mortimer of Wigmore. Its castle, built probably in Newmarch's time, or shortly after, was the most advanced outpost of the invaders in a wild part of Wales where the tendency to revolt was always strong. It was destroyed in 1260 by Llewellyn ab Gruffydd, prince of Wales, with the supposed connivance of Mortimer, but its site was reoccupied by the earl of Lincoln in 1277, and a new castle at once erected. It was with the expecta- tion that he might, with local aid, seize the castle, that Llewellyn invaded this district in December 1282, when he was surprised and killed by Stephen de Frankton in a ravine called Cwm Llewellyn on the left bank of the Irfon, 25 m. from the town. According to local tradition he was buried at Cefn-y-bedd (" the ridge of the grave ") close by, but it is more likely that his headless trunk was taken to Abbey Cwmhir. No other important event was associated with the castle, of which not a stone is now standing. The lordship remained in the marches till the Act of Union 1 536, when it was grouped with a number of others so as to form the shire of Brecknock. The town was governed by a local board from 1866 until the establishment of an urban district council in 1894; the urban district was then made conterminous with the civil parish, and in 1898 it was re-named Builth Wells.

BUISSON, FERDINAND (1841-), French educationalist, was born at Paris on the 20th of December 1841. In 1868, when

attached to the teaching staff of the Academy of Geneva, he obtained a philosophical fellowship. In 1870 he settled in Paris, and in the following year was nominated an inspector of primary education. His appointment was, however, strongly opposed by the bishop of Orleans (who saw danger to clerical influence over the schools), and the nomination was cancelled. But the bishop's action only served to draw attention to Buisson's abilities. He was appointed secretary of the statistical com- mission on primary education, and sent as a delegate to the Vienna exhibition of 1873, and the Philadelphia exhibition of 1876. In 1878 he was instructed to report on the educational section of the Paris exhibition, and in the same year was appointed inspector-general of primary education. In 1879 ne was promoted to the directorship of primary education, a post which he occupied until 1896, when he became professor of education at the Sorbonne. At the general election of 1902 he was returned to the chamber of deputies as a radical socialist by the XIII me arrondissement of Paris. He supported the policy of M. Combes, and presided over the commission for the separa- tion of church and state.

BUITENZORG, a hill station in the residency of Batavia, island of Java, Dutch East Indies. It is beautifully situated among the hills at the foot of the Salak volcano, about 860 ft. above sea-level, and has a cool and healthy climate. Buitenzorg is the usual residence of the governor-general of the Dutch East Indies, and is further remarkable on account of its splendid botanical garden and for its popularity as a health resort. The botanic gardens are among the finest in the world; they origin- ally formed a part of the park attached to the palace of the governor-general, and were established in 1817. Under J. S. Teysmann, who became hortulanus in 1830, the collection was extended, and in 1868 was recognized as a government institution with a director. Between this and 1880 a museum, a school of agriculture, and a culture garden Were added, and since then library, botanical, chemical, and pharmacological laboratories, and a herbarium have been established. The palace of the governor-general was founded by Governor-General van Imhoff in 1744, and rebuilt after being destroyed by an earthquake in 1834. Buitenzorg is also the seat of the general secretary of the state railway and of the department of mines. Buitenzorg, which is called Bogor by the natives, was once the capital of the princess of Pajajaram. Close by, at Bata Tulis (" inscribed stone "), are some Hindu remains. The district of Buitenzorg (till 1866 an assistant residency) forms the southern part of the residency of Batavia, with an area of 1447 sq. m. It occupies the northern slopes of a range of hills separating it

from Preanger, and has a fertile soil. Tea, coffee, cinchona, sugar-cane, rice, nutmegs, cloves and pepper are cultivated.

BUJNURp, a town of Persia, in the province of Khorasan, in a fertile plain encompassed by hills, in 37° 29′ N., 57° 21′ E., at an elevation of 3600 ft. Pop. about 8000. Its old name was Buzinjird, and thus it still appears in official registers. It is the chief place of the district of same name, which extends in the west to the borders of Shahrud and Astarabad; in the north it is bounded by Russian Transcaspia, in the east by Kuchan, and in the south by Jovain. The greater part of the population consists of Shadillu Kurds, the remainder being Zafranlu Kurds, Garaili Turks, Goklan Turkomans and Persians.

BUKHARI [Mahommed ibn Isma'il al-Bukhari] (810-872), Arabic author of the most generally accepted collection of tradi- tions (hadith) from Mahomet, was born at Bokhara (Bukhara), of an Iranian family, in a.h. 194 (a.d. 810). He early distin- guished himself in the learning of traditions by heart, and when, in his sixteenth year, his family made the pilgrimage to Mecca, he gathered additions to his store from the authorities along the route. Already, in his eighteenth year, he had devoted himself to the collecting, sifting, testing and arranging of tradi- tions. For that purpose he travelled over the Moslem world, from Egypt to Samarkand, and learned (as the story goes) from over a thousand men three hundred thousand traditions, true and false. He certainly became the acknowledged authority on the subject, and developed a power and speed of memory

which seemed miraculous, even to his contemporaries. His theological position was conservative and anti-rationalistic; he enjoyed the friendship and respect of Ahmad Ibn Hanbal. In law, he appears to have been a Shafi'ite. After sixteen years' absence he returned to Bokhara, and there drew up his Sahih, a collection of 7275 tested traditions, arranged in chapters so as to afford bases for a complete system of jurisprudence without the use of speculative law, the first book of its kind (see Mahom- medan Law). He died in a.h. 256, in banishment at Kartank, a suburb of Samarkand. His book has attained a quasi-canoni- city in Islam, being treated almost like the Koran, and to his grave solemn pilgrimages are made, and prayers are believed to be heard there.

See F. Wiistenfeld, Schafi'iten, 78 ff.; M°G. de Slane's transl. of Ibn Khallikan, i. 594 ff. ; I. Goldziher, Mohammedanische Studien, ii. 157 ff. ; Nawawi, Biogr. Did. 86 ff. (D. B. Ma.)

BUKOVINA, a duchy and crownland of Austria, bounded E. by Russia and Rumania, S. by Rumania, W. by Transylvania and Hungary, and N. by Galicia. Area, 4035 sq. m. The country, especially in its southern parts, is occupied by the offshoots of the Carpathians, which attain in the Giumaleu an altitude of 6100 ft. The principal passes are the Radna Pass and the Borgo Pass. With the exception of the Dniester, which skirts its northern border, Bukovina belongs to the watershed of the Danube. The principal rivers are the Pruth, and the Sereth with its affluents the Suczawa, the Moldava and the Bistritza. The climate of Bukovina is healthy but severe, especially in winter; but it is generally milder than that of Galicia, the mean annual temperature at Czernowitz being 46-9° F. No less than 43-17% of the total area is occupied by woodland, and the very name of the country is derived from the abundance of beech trees. Of the remainder 27- 59 % is occupied by arable land, 12-68% by meadows, 10-09% by pastures and 0-78% by gardens. The soil of Bukovina is fertile, and agricul- ture has made great progress, the principal products being wheat, maize, rye, oats, barley, potatoes, flax and hemp. Cattle- rearing constitutes another important source of revenue. The principal mineral is salt, which is extracted at the mine of Kaczyka, belonging to the government. Brewing, distilling and milling are the chief industries. Commerce is mostly in the hands of the Jews and Armenians, and chiefly confined to raw products, such as agricultural produce, cattle, wool and wood. Bukovina had in 1900 a population of 729,921, which is equiva- lent to t8i inhabitants per sq. m. According to nationality, over 40% were Ruthenians, 35% Rumanians, 13% Jews, and the remainder was composed of Germans, Poles, Hungarians, Russians and Armenians. The official language of the administra- tion, of the law-courts, and of instruction in the university is German. Nearly 70% of the population belong to the Greek Orthodox Church, and stand under the ecclesiastical jurisdiction of the archbishop or metropolitan of Czernowitz. To the Roman Catholic Church belong 11%, to the Greek United Church 3-25%, while 2-5% are Protestants. Elementary education is improving, but, after Dalmatia, Bukovina still shows the largest number of illiterates in Austria. The local diet, of which the archbishop of Czernowitz and the rector of the university are members ex officio, is composed of 31 members, and Bukovina sends 14 deputies to the Reichsrat at Vienna. For administrative purposes, the country is divided into 9 districts and

an autonomous municipality, Czernowitz (pop. 69,619), the capital. Other towns are Radautz (14,343), Suczawa (10,946), Kuczurmare (9417), Kimpolung(8o24)andSereth(76io).

Bukovina was originally a part of the principality of Moldavia, whose ancient capital Suczawa was situated in this province. It was occupied by the Russians in 1769, and by the Austrians in r 7 74. In 1777 the Porte, under whose suzerainty Moldavia was, ceded this province to Austria. It was incorporated with Galicia in a single province in 1786, but was separated from it in 1849, and made a separate crownland.

See Bidermann, Die Bukowina unter der osterreichischen Verwaltung, 1775-1875 (Lemberg, 1876).

BULACAN, a town of the province of Bulacan, Luzon, Philip- pine Islands, on an arm of the Pampanga delta, 22 m. N.N.W.

of Manila. Pop. (1903) 11,589; after the census enumeration, the town of Guiguint6 (pop. 3948) was annexed. Bulacan is served by the Manila-Dagupan railway. Sugar, rice, indigo and tropical fruits are the chief products of the fertile district in which the town lies; it is widely known for its fish-ponds and its excellent fish, and its principal manufactures are jusi, pifia, ilang ilang perfume and sugar. With the exception of the churches and a few stone buildings, Bulacan was completely destroyed by fire in 1898.

BULANDSHAHR, a town and district of British India in the Meerut division of the United Provinces. The town is situated on a height on the right bank of the Kali-Nadi, whence the substitution of the names Unchanagar and Bulandshahr (high town) for its earlier name of Baran, by which it is still sometimes called. The population in 1901 was 18,959. Its present hand- some appearance is due to several successive collectors, notably F. S. Growse, who was active in erecting public buildings, and in encouraging the local gentry to beautify their own houses. In particular, it boasts a fine bathing-ghat, a town-hall, a market- place, a tank to supply water, and a public garden.

The District of Bulandshahr has an area of 1899 sq. m. The district stretches out in a level plain, with a gentle slope from N.W. to S.E., and a gradual but very slight elevation about midway between the Ganges and Jumna. Principal rivers are the Ganges and Jumna — the former navigable all the year round, the latter only during the rains. The Ganges canal intersects the district, and serves both for

irrigation and navi- gation. The Lower Ganges canal has its headworks at Narora. The climate of the district is liable to extremes, being very cold in the winter and excessively hot in the summer. In 1901 the population was 1,138,101, showing an increase of 20% in the decade. The district is very highly cultivated and thickly populated. There are several indigo factories, and mills for pressing and cleaning cotton, but the former have greatly suffered by the decline in indigo of recent years. The main line of the East Indian railway and the Oudh and Rohilkhand railway cross the district. The chief centre of trade is Khurja.

Nothing certain is known of the history of the district before a.d. 1018, when Mahmud of Ghazni appeared before Baran and received the submission of the Hindu raja and his followers to Islam. In n 93 the city was captured by Kutb-ud-din. In the 14th century the district was subject to invasions of Rajput and Mongol clans who left permanent settlements in the country. With the firm establishment of the Mogul empire peace was restored, the most permanent effect of this period being the large proportion of Mussulmans among the population, due to the zeal of Aurangzeb. The decline of the Mogul empire gave free play to the turbulent spirit of the Jats and Gujars, many of whose chieftains succeeded in carving out petty principalities for themselves at the expense of their neighbours. During this period, however, Baran had properly no separate history, being a dependency of Koil, whence it continued to be administered under the Mahratta domination. After Koil and the fort of Aligarh had been captured by the British in 1803, Bulandshahr and the surrounding country were at first incorporated in the newly created district of Aligarh (1805). Bulandshahr enjoyed an evil reputation in the Mutiny of 1857, when the Gujar peasantry plundered the towns. The Jats took the side of the government, while the Gujars and Mussulman Rajputs were most actively hostile.

See Imperial Gazetteer of India (Oxford, ed. 1908) ; F. S. Growse, Bulandshahr (Benares, 1884).

BULAWAYO, the capital of Matabeleland, the western province of southern Rhodesia, South Africa. White population (1904) 3840. It occupies a central position on the tableland between the Limpopo and Zambezi rivers, is 4469 ft. above the sea and 1362 m. north-east of Cape Town by rail. Beira, the nearest port, is 398 m. east in a direct line, but distant 675 m. by railway. Another railway, part of the Cape to Cairo connexion, runs north-west from Bulawayo, crossing the Zambezi just below the Victoria Falls. In the centre of the town is a large market square to which roads lead in regular lines

north, south, east and

west. Those going east and west are called avenues and are numbered, those running north and south are called streets and are named. Through the centre of Market Square runs Rhodes Street. There are many handsome public and private buildings. In front of the stock exchange is a monument in memory of the 257 settlers killed in the Matabele rebellion of 1896, and at the junction of two of the principal streets is a colossal bronze statue of Cecil Rhodes. East of the town is a large park and botanical gardens, beyond which is a residential suburb. The railway station and water and electric supply works are in the south- west quarter. An avenue 130 ft. broad and nearly i| m. long, planted throughout its length with trees, leads from the town to Government House, which is built on the site of Lobengula's royal kraal. The tree under which that chieftain sat when giving judgment has been preserved. A number of gold reefs intersect the surrounding district and in some of the reefs gold is mined. South-south-east of the town are the Matoppo Hills. In a grave in one of these hills, 33 m. from Bulawayo, Rhodes is buried.

The " Place of Slaughter," as the Zulu word Bulawayo is interpreted, was founded about 1838 by Lobengula's father, Mosilikatze, some distance south of the present town, and continued to be the royal residence till its occupation by the British South Africa Company's forces in November 1893, when a new town was founded. Four years later the railway connect- ing it with Cape Town was completed (see Rhodesia).

BULDANA, a town and district of India, in Berar. The town had a population in 1901 of 4137. The district has an area of 3662 sq. m. The southern part forms a portion of Berar Balaghat or Berar — above the Ghats. Here the general contour of the country may be described as a succession of small plateaus decreasing in elevation to the extreme south. Towards the eastern side of the district the country assumes more the character of undulating high lands, favoured with soil of a good quality. A succession of plateaus descends from the highest ridges on the north to the south, where a series of small ghats march with the nizam's territory. The small fertile valleys between the plateaus are watered by streams during the greater portion of the year, while wells of particularly good and pure water are numerous. These valleys are favourite village sites.

The north portion of the district occupies the rich valley of the Puma. The district is rich in agricultural produce; in a seasonable year a many- coloured sheet of cultivation, almost without a break, covers the valley of the Purna. In the Balaghat also the crops are very fine. Situated as the district is in the neighbourhood of the great cotton market of Khamgaon, and nearer to Bombay than the other Berar districts, markets for its agricultural produce on favourable terms are easily found. In 1901 the population was 423,616, showing a decrease of 12% in the decade due to the effects of famine. The district was reconstituted, and given an additional area of 853 sq. m. in 1905; the population on the enlarged area in 1901 was 613,756. The only manufacture is cotton cloth. Cotton, wheat and oil-seeds are largely exported. The Nagpur line of the Great Indian Peninsula railway runs through the north of the district. The most important place of trade is Malkapur — pop. (1901) 13,112 — with several factories for ginning and pressing cotton.

BULDUR, or Burdur, chief town of a sanjak of the Konia vilayet in Asia Minor. It is called by the Christians Polydorion. Its altitude is 3150 ft. and it is situated in the midst of gardens, about 2 m. from the brackish lake, Buldur Geul (anc. Ascania Limne). Linen-weaving and leather-tanning are the principal industries. There is a good carriage road to Dineir, by which much grain is sent from the Buldur plain, and a railway connects it with Dineir and Egirdir. Pop. 12,000.

BULFINCH, CHARLES (1763-1844), American architect, was born in Boston, Massachusetts, on the 8th of August 1763, the son of Thomas Bulfinch, a prominent and wealthy physician. He was educated at the Boston Latin school and at Harvard, where he graduated in 1781, and after several years of travel and study in Europe, settled in 1787 in Boston, where he was the 6 rst to practise as a professional architect. Among his early

Works were the old Federal Street theatre (1793), the first play-house in New England, and the "new" State House (1798). For more than twenty-five years he was the most active architect in Boston, and at the same time took a leading part in the public life of the city. As chairman of the board of selectmen for twenty-one years (1797-1818), an important position which made him practically chieL magistrate, he exerted a strong influence in modernizing Boston; in providing for new systems of drainage and street-lighting, in reorganizing the police and fire departments, and in straightening and widening the streets. He was one of the promoters in 1787 of the voyage of the ship " Columbia," which under command of Captain*

Robert Gray (1755-1806) was the first to carry the American flag round the world. In 1818 Bulfinch succeeded B. H. Latrobe - (1764-1820) as architect of the National Capitol at Washington. He com- pleted the unfinished wings and central portion,, constructing the rotunda from plans of his own after suggestions of his pre- decessor, and designed the new western approach and portico. In 1830 he returned to Boston, where he died on the 15th of April 1844. Bulfmch's work was marked by sincerity, simplicity, refinement of taste and an entire freedom from affectation, and it greatly influenced American architecture in the early formative period. His son, Stephen Greenleaf Bulfinch (1809-1870), was a well-known Unitarian clergyman and author.

See The Life and Letters of Charles Bulfinch (Boston, 1-896), edited by his grand-daughter, and " The Architects of .the American Capitol," by James Q. Howard, in The International Review, vol. t. (New York, 1874). . •

BULGARIA, a kingdom of south-eastern Europe, situated in the north-east of the Balkan Peninsula, and on the Black Sea; From 1878 until the 5th of October 1908, Bulgaria was an autonomous and tributary principality, under the suzerainty of the sultan of Turkey. The area of the kingdom amounts td 37,240 sq. m., and comprises the territories between the Balkan chain and the river Danube; the province of Eastern Rumelia, lying south of the Balkans; and the western highlands of Kiustendil, Samakov, Sofia and Trn. Bulgaria is bounded oil the N. by the Danube, from its confluence with the Timok to the eastern suburbs of Silistria whence a line, forming the Rumanian frontier, is drawn to a point on the Black Sea coast 10 m. S. of Mangalia. On the E; it is washed by the Black Sea; on the S. the Turkish frontier, starting from a point on the coast about 12 m. S. of Sozopolis, runs in a south-westerly direction, crossing the river Maritza at Mustafa Pasha, and reaching the Arda at Adakali. The line laid down by the Berlin Treaty (1878) ascended the Arda to Ishiklar, thence following the crest of Rhodope to the westwards, but the cantons of Krjali and Rupchus included in this boundary were restored to Turkey in 1886. The present frontier, passing to the north of these districts; reaches the watershed of Rhodope a little north of the Dospat valley, and then follows the crest of the Rilska Planina to the summit of Tchmi Vrkh, where the Servian,' Turkish and Bul- garian territories meet. From this point the western or Servian frontier passes northwards, leaving Trn to the east and Pirot to the west, reaching the Timok near Kula, and following the course of that river to its junction with the Danube. The Berlin Treaty boundary was far from corresponding with the

ethnological limits of the Bulgarian race, which were more accurately defined by the abrogated treaty of San Stefano (see below, under History) . A considerable portion of Macedonia, the districts of Pirot and Vranya belonging to Servia, the northern half of the Vilayet of Adrianople, and large tracts of the Dobrudja, are, according to the best and most impartial authorities, mainly inhabited by a Bulgarian population.

Physical Features. — The most striking physical features are two mountain-chains; the Balkans, which run east and west through the heart of the country; and Rhodope, which, for a considerable distance, forms its southern boundary. The Balkans constitute, the southern half of the great semicircular range known as the anti-Dacian system, of which the Carpathians fornrthe northern portion. This great chain is sundered at the Iron Gates by the passage of the Danube; its two component parts present many points of resemblance in their aspect and outline, geological formation and flora. The Balkans (ancient Haemus) run almost parallel to the Danube,

English Miles 20 30 40 SP Gp

ti_. . =. . =.

Capitals of Provinces^.. ., ,,,©

Capitals Of ni^trirtn , Q

*Boundaries of Districts *» •••*

Longitude East 26 of Greenwich'

BmctyWdfccr 6C.

the mean interval being 60 m. ; the summits are, as a rule, rounded, and the slopes gentle. The culminating points are in the centre of the range: Yumrukehal (7835 ft.), Maraguduk (7808 ft.), and Kadimlfa (7464 ft,). The Balkans are known to the people of the country as the Stara Planina or " Old Mountain," the adjective denoting their greater size as compared with that of the adjacent ranges: " Balkan " is not a distinctive term, being applied by the Bulgarians, as well as

the Turks, to all mountains. Closely parallel, on the south, are the minor ranges of the Sredna Gora or " Middle Mountains" (highest summit 5167 ft.) and the Karaja Dagh, en- closing respectively the sheltered valleys of Karlovo and Kazanlyk. At its eastern extremity the Balkan chain divides into three ridges, the central terminating in the Black Sea at Cape Emine (" Haemus"), the northern forming the watershed between the tributaries of the Danube and the rivers falling directly into the Black Sea. The Rhodope, or southern group, is altogether distinct from the Balkans, with which, however, it is connected by the Malka Planina and the Ikhtiman hills, respectively west and east of Sofia ; it may be regarded as a continuation of the great Alpine system which traverses the Peninsula from the Dinaric Alps and the Shar Planina on the west to the Shabkhana Dagh near the Aegean coast; its sharper outlines and pine-clad steeps reproduce the scenery of the Alps rather than that of the Balkans. The imposing summit of Musalla (9631 ft.), next to Olympus, the highest in the Peninsula, forms the centre-point of the group; it stands within the Bulgarian frontier at the head of the Mesta valley, on either side of which the Perin Dagh and the Despoto Dagh descend south and south-east respectively towards the A e g ean – The chain of Rhodope proper radiates to the east; owing to the retrocession of territory already mentioned, its central ridge no longer completely coincides with the Bulgarian boundary, but two of its principal summits, Sytke (7179 ft.) and Karlyk (6828 ft.), are within the frontier. From Musalla in a westerly direction extends the majestic range of the Rilska Planina, enclosing in a picturesque valley the celebrated monastery of Rila; many summits of this chain attain 7000 ft. Farther west, beyond the Struma valley, is the Osogovska Planina, culminating in Ruyen (7392 ft.). To the north of the Rilska Planina the almost isolated mass of Vitosha (7517 ft.) overhangs Sofia. Snow and ice remain in the sheltered crevices of Rhodope and the Balkans throughout the summer. The fertile slope trending northwards from the Balkans to the Danube is for the most part gradual and broken by hills; the eastern portion known as the Dell Orman, or " Wild Wood," is covered by forest, and thinly inhabited. The abrupt and sometimes precipitous character of the Bulgarian bank of the Danube contrasts with the swampy lowlands and lagoons of the Rumanian side. Northern Bulgaria is watered by the Lom, Ogust, Iskr, Vid, Osem, Yantra and Eastern Lom, all, except the Iskr, rising in the Balkans, and all flowing into the Danube. The channels of these rivers are deeply furrowed and the fall is rapid; irrigation is consequently

difficult and navigation impossible. The course of the Iskr is remarkable: rising in the Rilska Planina, the river descends into the

basin of Samakov, passing thence through a serpentine defile into the plateau of Sofia, where in ancient times it formed a lake; it now forces its way through the Balkans by the picturesque gorge of Iskretz. Somewhat similarly the Deli, or " Wild," Kamchik breaks the central chain of the Balkans near their eastern extremity and, uniting with the Great Kamchik, falls into the Black Sea. The Maritza, the ancient Hebrus, springs from the slopes of Musalla, and, with its tributaries, the Tunja and Arda, waters the wide plain of Eastern Rumelia. The Struma (ancient and modern Greek Strymon) drains the valley of Kiustendil, and, like the Maritza, flows into the Aegean. The elevated basins of Samakov (lowest altitude 3050 ft.), Trn (2525 ft.), Breznik (2460 ft.), Radomir (2065 ft.), Sofia (1640 ft.), and Kiustendil (1540 ft.), are a peculiar feature of the western highlands.

Geology. — The stratified formation presents a remarkable variety, almost all the systems being exemplified. The Archean, composed of gneiss and crystalline schists, and traversed by eruptive veins, extends over the greater part of the Eastern Rumelian plain, the Rilska Planina, Rhodope, and the adjacent ranges. North of the Balkans it appears only in the neighbourhood of Berkovitza. The other earlier Palaeozoic systems are wanting, but the Carboniferous appears in the western Balkans with a continental fades (Kulm), Here anthracitiferous coal is found in beds of argillite and sandstone. Red sandstone and conglomerate, representing the Permian system, appear especially around the basin of Sofia. Above these, in the western Balkans, are Mesozoic deposits, from the Trias to the upper Jurassic, also occurring in the central part of the range. The Cretaceous system, from the infra-Cretaceous Hauterivien to the Senonian, appears throughout the whole extent of Northern Bulgaria, from the summits of the Balkans to the Danube. Gosau beds are found on the southern declivity of the chain. Flysch, representing both the Cretaceous and Eocene systems, is widely distributed. The Eocene, or older Tertiary, further appears with nummulitic formations on both sides of the eastern Balkans; the Oligocene only near the Black Sea coast at Burgas. Of the Neogene, or younger Tertiary, the Mediterranean, or earlier, stage appears near Pleven (Plevna) in the Leithakalk and Tegel forms, and between Varna and Burgas with beds of spaniodons, as in the Crimea; the Sarmatian stage in the plain of the Danube and in the districts of Silistria and Varna. A rich mammaliferous deposit (Hipparion, Rhinoceros, Dinotherium, Mastodon, &c.) of this period has been found near Mesemvria. Other Neogene strata occupy a more limited space. The Quaternary era is represented by the typical loess, which

covers most of the Danubian plain; to its later epochs belong the alluvial deposits of the riparian districts with remains of the Ursus, Equus, &c. t found in bone-caverns. Eruptive masses intrude in the Balkans and Sredna Gora, as well as in the Archean formation of the southern

ranges, presenting granite, syenite, diorite, diabase, quartz-porphyry, melaphyre, liparite, trachyte, andesite, basalt, &c.

Minerals. — The mineral woalth of Bulgaria is considerable, although, with the exception of coal, it remains largely unexploited. The minerals which are commercially valuable include gold (found in small quantities), silver, graphite, galena, pyrite, marcasite, chalcosine, sphalerite, chalcopyrite, bornite, cuprite, hematite, limonite, ochre, chromite, magnetite, azurite, manganese, malachite, gypsum, &c. The combustibles are anthracitif erous coal, coal," brown coal " and lignite. The lignite mines opened by the government at Pernik in 1891 yielded in 1904 142,000 tons. Coal beds have been discovered at Trevna and elsewhere. Thermal springs, mostly sulphureous, exist in forty-three localities along the southern slope of the Balkans, in Rhodope, and in the districts of Sofia and Kiustendil; maximum temperature at Zaparevo, near Dupnitza, 180-5° (Fahrenheit), at Sofia 118-4°. Many of these are frequented now, as in Roman times, owing to their valuable therapeutic qualities. The mineral springs on the north of the Balkans are, with one exception (Vrshetz, near Berkovitza), cold.

Climate. — The severity of the climate of Bulgaria in comparison with that of other European regions of the same latitude is attributable in part to the number and extent of its mountain ranges, in part to the general configuration of the Balkan Peninsula. Extreme heat in summer and cold in winter, great local contrasts, and rapid transitions of temperature occur here as in the adjoining countries. The local contrasts are remarkable. In the districts extending from the Balkans to the Danube, which are exposed to the bitter north wind, the winter cold is intense, and the river, notwith- standing the volume and rapidity of its current, is frequently frozen over; the temperature has been known to fall to 24 below zero. Owing to the shelter afforded by the Balkans against hot southerly winds, the summer heat in this region is not unbearable; its maximum is 99°. The high tableland of Sofia is generally covered with snow in the

winter months;

Fauna. — Few special features are noticeable in the Bulgarian fauna. Bears are still abundant in the higher mountain districts, especially in the Rilska Planina and Rhodope; the Bulgarian bear is small and of brown colour, like that of the Carpathians. Wolves are very numerous, and in winter commit great depredations even in the larger country towns and villages; in hard weather they have been known to approach the outskirts of Sofia. The govern- ment offers a reward for the destruction of both these animals. The roe deer is found in all the forests, the red deer is less common ; the chamois haunts the higher regions of the Rilska Planina, Rhodope and the Balkans. The jackal {Canis aureus) appears in the district of Burgas; the lynx is said to exist in the Sredna Gora; the wild boar, otter, fox, badger, hare, wild cat, marten, polecat {Foetorius putorius; the rare tiger polecat, Foetorius sarmaticus, is also found), weasel and shrewmouse (Spermophilus citillus) are common. The beaver (Bulg. bebr) appears 1 to have been abundant in certain localities, e.g. Bebrovo, Bebresh, &c, but it is now apparently extinct. Snakes {Coluber natrix and other species), vipers '(Viper a berus and V. ammodytes), and land and water tortoises arc numerous. The domestic animals are the same as in the other countries of south-eastern Europe ; the fierce shaggy grey sheep-dog leaves a lasting impression on most travellers in the interior. Fowls, especially turkeys, are everywhere abundant, and great numbers of geese may be seen in the Moslem villages. The ornithology of Bulgaria is especially interesting. Eagles (Aquila imperialis and the rarer Aquila fulva), vultures {Vultur monachus, Gyps fulvus, Neophron percnopterus), owls, kites, and the smaller birds of prey are extra-ordinarily abundant; singing birds are consequently rare. The lammergeier (Gypaetus barbatus) is not uncommon. Immense flocks of wild swans, geese, pelicans, herons and other waterfowl haunt the Danube and the lagoons of the Black Sea coast. The cock of the woods (Tetrao urogallus) is found in the Balkan and Rhodope forests, the wild pheasant in the Tunja valley, the bustard {Otis tarda) in the Eastern Rumelian plain. Among the migratory birds are the crane, which hibernates in the Maritza valley, woodcock, snipe and quail; the great spotted cuckoo {Coccystes glandarius) is

an occasional visitant. The red starling {Pastor roseus) sometime? appears in large flights. The stork, which is never molested, adds a picturesque feature to the Bulgarian village. Of fresh-water fish, the sturgeon {Acipenser sturio and A. huso), sterlet, salmon {Salmo hucho), and carp are found in the Danube; the mountain streams abound in trout. The Black Sea supplies turbot, mackerel, &c. ;

dolphins and flying fish may sometimes be seen.

Flora. — In regard to its flora the country may be divided into (1) the northern plain sloping from the Balkans to the Danube, (2) the southern plain between the Balkans and Rhodope, (3) the districts adjoining the Black Sea, (4ˆ) the elevated basins of Sofia, Samakov and Kiustendil, (5) the Alpine and sub- Alpine regions of the Balkans and the southern mountain group. In the first-mentioned region the vegetation resembles that of the Russian and Rumanian steppes; in the spring the country is adorned with the flowers of the crocus, orchis, iris, tulip and other bulbous plants, which in summer give way to tall grasses, umbelliferous growths, dianthi, astragali, &c. In the more sheltered district south of the Balkans the richer vegetation recalls that of the neighbourhood of Constantinople and the adjacent parts of Asia Minor. On the Black Sea coast many types of the Crimean, Transcaucasian and even the Mediterranean flora present themselves. The plateaus of Sofia and Samakov furnish specimens of sub-alpine plants, while the vine disappears; the hollow of Kiustendil, owing to its southerly aspect, affords the vegetation of the Macedonian valleys. The flora of the Balkans corresponds with that of the Carpathians; the Rila and Rhodope group is rich in purely indigenous types combined with those of the central European Alps and the mountains of Asia Minor. The Alpine types are often represented by variants : e.g. the Campanula alpina by the Campanula orbelica, the Primula farinosa by the Primula frondosa and P. exigua, the Gentiana germanica by the Gentiana bulgarica, &c. The southern mountain group, in common, perhaps, with the unexplored highlands of Macedonia, presents many isolated types, unknown elsewhere in Europe, and in some cases corresponding with those of the Caucasus. Among the more characteristic genera of the Bulgarian flora are the following: — Centaurea, Cirsium, Linaria, Scrophularia, Verbascum, Dianlhus, Silene, Trifolium, Euphorbia, Cytisus, Astragalus, Ornithogalum, Allium, Crocus, Iris, Thymus, Umbellifera, Sedum, Hypericum, Scabiosa, Ranunculus, Orchis, Ophrys.

Forests. — The principal forest trees are the oak, beech, ash, elm, walnut, cornel, poplar, pine and juniper. The oak is universal in the thickets, but large specimens are now rarely found. Magnifi- cent forests of beech clothe the valleys of the higher Balkans and the Rilska Planina ; the northern declivity of the Balkans is, in general, well wooded, but the southern slope is bare. The walnut and chestnut are mainly confined to eastern Rumelia. Conifers {Pinus silvestris, Picea excelsa, Pinus laricis, Pinus mughus) are rare in the Balkans, but abundant in the higher regions of the southern

mountain group, where the Pinus peuce, otherwise peculiar to the Himalayas, also flourishes. The wild lilac forms a beautiful feature in the spring landscape. Wild fruit trees, such as the apple, pear and plum, are common. The vast forests of the middle ages disappeared under the supine Turkish administration, which took no measures for their protection, and even destroyed the woods in the neighbourhood of towns and highways in order to deprive brigands of shelter. A law passed in 1889 prohibits disforesting, limits the right of cutting timber, and places the state forests under the control of inspectors. Accord- ing to official statistics, 11,640 sq. m. or about 30% of the whole superficies of the kingdom, are under forest, but the greater portion of this area is covered only by brushwood and scrub. The beautiful forests of the Rila district are rapidly disappearing under exploitation.

Agriculture. — Agriculture, the main source of wealth to the country, is still in an extremely primitive condition. The ignor- ance and conservatism of the peasantry, the habits engendered by widespread insecurity and the fear of official rapacity under Turkish rule, insufficiency of communications, want of capital, and in some districts sparsity of population, have all tended to retard the development of this most important industry. The peasants cling to traditional usage, and look with suspicion on modern implements and new-fangled modes of production. The plough is of a primeval type, rotation of crops is only partially practised, and the use of manure is almost unknown. The government has sedulously endeavoured to introduce more enlightened methods and ideas by the establishment of agricul- tural schools, the appointment of itinerant professors and in- spectors, the distribution of better kinds of seeds, improved implements, &c. Efforts have been made to improve the breeds of native cattle and horses, and stallions have been introduced from Hungary and distributed throughout the country. Oxen and buffaloes are the principal animals of draught; the buffalo, which was apparently introduced from Asia in remote times, is much prized by the peasants for its patience and strength; it is, however, somewhat delicate and requires much care. In

the eastern districts camels are also employed. The Bulgarian horses are small, but remarkably hardy, wiry and intelligent; they are as a rule unfitted for draught and cavalry purposes. The best sheep are found in the district of Karnobat in Eastern Rumelia. The number of

goats in the country tends to decline, a relatively high tax being imposed on these animals owing to the injury they inflict on young trees. The average price of oxen is £5 each, draught oxen £12 the pair, buffaloes £14 the pair, cows £2, horses £6, sheep, 7s., goats 5s., each. The principal cereals are wheat, maize, rye, barley, oats and millet. The cultivation of maize is increasing in the Danubian and eastern districts. Rice-fields are found in the neighbourhood of Philippo- polis. Cereals represent about 80 % of the total exports. Besides grain, Bulgaria produces wine, tobacco, attar of roses, silk and cotton. The quality of the grape is excellent, and could the peasants be induced to abandon their highly primitive mode of wine-making the Bulgarian vintages would rank among the best European growths. The tobacco, which is not of the highest quality, is grown in considerable quantities for home consumption and only an insignificant amount is exported. The best tobacco- fields in Bulgaria are on the northern slopes of Rhodope, but the southern declivity, which produces the famous Kavala growth, is more adapted to the cultivation of the plant. The rose-fields of Kazanlyk and Karlovo lie in the sheltered valleys between the Balkans and the parallel chains of the Sredna Gora and Karaja Dagh. About 6000 lb of the rose-essence is annually exported, being valued from £12 to £14 per lb. Beetroot is cultivated in the neighbourhood of Sofia Sericulture, formerly an im- portant industry, has declined owing to disease among the silkworms, but efforts are being made to revive it with promise of success. Cotton is grown in the southern districts of Eastern Rumelia.

Peasant proprietorship is universal, the small freeholds averag- ing about 18 acres each. There are scarcely any large estates owned by individuals, but some of the monasteries possess considerable domains. The large tchifliks, or farms, formerly belonging to Turkish landowners, have been divided among the peasants. The rural proprietors enjoy the right of pasturing their cattle on the common lands belonging to each village, and of cutting wood in the state forests. They live in a condition of rude comfort, and poverty is practically unknown, except in the towns. A peculiarly interesting feature in Bulgarian agricul- tural life is the zadruga, or nouse-community, a patriarchal institution apparently dating from prehistoric times. Family groups, sometimes nu.aibering several dozen persons, dwell together on a farm in the observance of strictly communistic principles. The association is ruled by a house-father (domakin, stareishina). and a house-mother (domakinia), who assign to the members their respective tasks. In addition to the farm work the members often practise various trades, the proceeds of

which are paid into the general treasury. The community sometimes includes a priest, whose fees for baptisms, &c, augment the common fund. The national aptitude for combination is also displayed in the associations of market gardeners (gradinarski druzhini, laifi), who in the spring leave their native districts for the purpose of cultivating gardens in the neighbourhood of some town, either in Bulgaria or abroad, returning in the autumn, when they divide the profits of the enterprise; the number of persons annually thus engaged probably exceeds 10,000. Associa- tions for various agricultural, mining and industrial undertakings and provident societies are numerous: the handicraftsmen in the towns are organized in esnafs or gilds.

Manufactures. — The development of manufacturing enterprise on a large scale has been retarded by want of capital. The principal establishments for the native manufactures of aba and shay a k (rough and fine homespuns), and of gaitan (braided embroidery) are at Sliven and Gabrovo respectively. The Bulgarian homespuns, which are made of pure wool, are of admirable quality. The exportation of textiles is almost ex- clusively to Turkey: value in 1806, £104,046; in 1898, £144,726; m 1004, £108,685. Unfortunately the home demand for native fabrics is diminishing owing to foreign competition; the smaller

textile industries are declining, and the picturesque, durable, and comfortable costume of the country is giving way to cheap ready-made clothing imported from Austria. The government has endeavoured to stimulate the home industry by ordering all persons in its employment to wear the native cloth, and the army is supplied almost exclusively by the factories at Sliven. A great number of small distilleries exist throughout the country; there are breweries in all the principal towns, tanneries at Sevlievo, Varna, &c, numerous corn-mills worked by water and steam, and sawmills, turned by the mountain torrents, in the Balkans and Rhodope. A certain amount of foreign capital has been invested in industrial enterprises; the most notable are sugar-refineries in the neighbourhood of Sofia and Philippopolis, and a cotton-spinning mill at Varna, on which an English company has expended about £60,000

Commerce. — The usages of internal commerce have been considerably modified by the development of communications. The primitive system of barter in kind still exists in the rural districts, but is gradually disappearing. The great fairs (panairi, ■rravqyvpus) held at Eski-Jumaia, Dobritch and other towns, which formerly attracted multitudes of foreigners as well as natives, have lost much of their importance; a considerable amount of business, however, is

still transacted at these gather- ings, of which ninety-seven were held in 1898. The principal seats of the export trade are Varna, Burgas and Baltchik on the Black Sea, and Svishtov, Rustchuk, Nikopolis, Silistria, Rakhovo, and Vidin on the Danube. The chief centres of distribution for imports are Varna, Sofia, Rustchuk, Philippopolis and Burgas. About 10 % of the exports passes over the Turkish frontier, but the government is making great efforts to divert the trade to Varna and Burgas, and important harbour works have been carried out at both these ports. The new port of Burgas was formally opened in 1904, that of Varna in 1906.

In ~ 1887 the total value of Bulgarian foreign commerce was £4,419,589. The following table gives the values for the six years ending 1904. The great fluctuations in the exports are due to the variations of the harvest, on which the prosperity of the country practically depends: — •

Year.

Exports.

Imports.

Total.

£

£

i

1899

2,138,684

2,407,123

4,545.807

1900

2.159,305

1,853.684

4,012,989

1901

3.310,790

2,801,762

6,112,552

1902

4.!47.38i

2,849,059

7,996,440

1903

4.322,945

3,272,103

7,595,048

1904

6,304756

5.187,583

n,492,339

The principal exports are cereals, live stock, homespuns, hides, cheese, eggs, attar of roses. Exports to the United Kingdom in 1900 were valued at £239,665; in 1904 at £989,127. The principal imports are textiles metal goods, colonial goods, implements, furniture, leather, petroleum. Imports from the United Kingdom in 1900, £301,150; in 1904, £793,972.

The National Bank, a state institution with a capital of £400,000, has its central establishment at Sofia, and branches at Philippopolis, Rustchuk, Varna, Trnovo and Burgas. Besides conducting the ordinary banking operations, it issues loans on mortgage. Four other banks have been founded at Sofia by groups of foreign and native capitalists. There are several private banks in the country The Imperial Ottoman Bank and the Industrial Bank of Kiev have branches at Philippopolis and Sofia respectively. The agricultural

chests, founded by Midhat Pasha in 1863, and reorganized in 1894, have done much to rescue the peasantry from the hands of usurers. They serve as treasuries for the local administration, accept deposits at interest, and make loans to the peasants on mortgage or the security of two solvent landowners at 8%. Their capital in 1887 was £569,260; in 1904, £1,440,000. Since 1893 they have been constituted as the "Bulgarian Agricultural Bank"; the central direction is at Sofia The> post-office savings bank, established 1896, had in 1905 a capital of £1,360,560.

There are over 200 registered provident societies in the country. The legal rate of interest is 10 %, but much higher rates are not uncommon.

Bulgaria, like the neighbouring states of the Peninsula, has adopted the metric system. Turkish weights and measures, however, are still largely employed in local commerce. The monetary unit is the lev, or " lion " (pi. leva), nominally equal to the franc, with its submultiple the slotinka (pl.-ki), or centime. The coinage consists of nickel and bronze coins (25, 5, 10 and 20 stotinki) and silver coins

(SO stolinki; I, 2 and 5 leva). A gold coinage was struck in 1893 with pieces corresponding to those of the Latin Union. The Turkish pound and foreign gold coins are also in general circulation. The National Bank issues notes for 5, io, 20, 50 and 100 leva, payable in gold. Notes payable in silver are also issued.

Finance.— It is only possible here to deal with Bulgarian finance prior to the declaration of independence in 1908. At the outset of its career the principality was practically unencumbered with any debt, external or internal. The stipulations of the Berlin Treaty (Art. ix.) with regard to the payment of a tribute to the sultan and the assumption of an " equitable proportion " of the Ottoman Debt were never carried into effect. In 1883 the claim of Russia for the expenses of the, occupation (under Art. xx. of the treaty) Was fixed at 26,545,625 fr. (£1,061,820) payable in annual instalments of 2,100,000 fr. (£84,000). The union with Eastern Rumelia in 1885 entailed liability for the obligations of that province consisting of an annual tribute to Turkey of 2,951,000 fr. (£118,040) and a loan of 3.375. 000 Ir – (£l35>° 00) contracted with the Imperial Ottoman Bank. In 1888 the purchase of the Varna-Rustchuk railway was

effected by the issue of treasury bonds at 6% to the vendors. In 1889 a loan of 30,000,000 fr. (£1,200,000) bearing 6% interest was contracted with the Vienna Landerbank and Bankverein at 85J. In 1892 a further 6% loan of 142,780,000 fr. (£5,711,200) was contracted with the Landerbank at 83, 86 and 89. In 1902 a 5% loan of 106,000,000 fr. (£4,240,000), secured on the tobacco dues and the stamp-tax, was contracted with the Banque de l'fitat de Russie and the Banque de Paris et des Pays Bas at 8i|, for the purpose of consolidating the floating debt, and in 1904 a 5% loan of 99,980,000 fr. (£3,999,200) at 82, with the same guarantees, was contracted with the last-named bank mainly for the purchase of war material in France and the construction of railways. In January 1906 the national debt stood as follows: — Outstanding amount of the con- solidated loans, . 363,070,500 fr. (£14,522,820); internal debt, 15,603,774 fr. (£624,151); Eastern Rumelian debt, 1,910,208 (£76,408). In February 1907 a 4i% loan of 145,000,000 fr. at 85, secured on the surplus proceeds of the revenues already pledged to the loans of 1902 and 1 904, was contracted with the Banque de Paris et des Pays Bas associated with some German and Austrian banks for the conversion of the loans of 1888 and 1889 (requiring about 53,000,000 fr.) and for railway construction and other purposes. The total external debt was thus raised to upwards of 450,000,000 fr. The Eastern Rumelian tribute and the rent of the Sarambey- Belovo railway, if capitalized at 6%, would represent a further sum of 50,919,100 fr. (£2,036,765). The national debt was not dis- proportionately great in comparison with annual revenue. After the union with Eastern Rumelia the budget receipts increased from 40,803,262 leva (£1,635,730) in 1886 to 119,655,507 leva (£4,786,220) in 1904; the estimated revenue for 1905 was 111,920,000 leva (£4,476,800), of which 41,179,000 (£1,647,160) were derived from direct and 38,610,000 (£1,544,400) from indirect taxation; the estimated expenditure was ill ,903,28 1 leva(£4,476, 1 3 1) , the principal items being: public debt, 31,317,346 (£1,252,693); army, 26,540,720 (£1,061,628); education, 10,402,470 (£416,098); public works, 14,461,171 (£578,446); interior, 7,559.517 (£302,380). The actual receipts in 1905 were 127,011,393 leva. In 1895 direct taxation, which pressed heavily on the agricultural class, was diminished and indirect taxation (import duties and excise) considerably increased. In 1906 direct taxation amounted to 9 fr. 92 c, indirect to 8 fr. 58 c, per head of the population. The financial difficulties in which the country was involved at the close of the 19th century were 'attribut- able not to excessive indebtedness but to heavy outlay on public works, the army, and education, and to the maintenance of an

unnecessary number of officials, the economic situation being aggravated by a succession of bad harvests. The war budget during ten years (1888-1897) absorbed the large sum of 275,822,017 leva (£11,033,300) or 35-77% of the whole national income within that period. In subsequent years military expenditure continued to increase; the total during the period since the union with Eastern Rumelia amounting to 599,520,698 leva (£23,980,800).

Communications. — In 1878 the only railway in Bulgaria was the Rustchuk- Varna line (137 m.), constructed by an English company in 1867. In Eastern Rumelia the line from Sarambey to Philip-popolis and the Turkish frontier (122 m.), with a branch to Yamboli (66 m.), had been built by Baron Hirsch in 1873, and leased by the Turkish government to the Oriental Railways Company until 1958. It was taken over by the Bulgarian government in 1908 (see History, below). The construction of a railway from the Servian frontier at Tzaribrod to the Eastern Rumelian frontier at Vakarel was imposed on the principality by the Berlin Treaty, but political difficulties intervened, and the line, which touches Sofia, was not completed till 1888. In that year the Bulgarian government seized the short connecting line Belovo-Sarambey belonging to Turkey, and railway communication between Constantinople and the western capitals was established. Since that time great progress has been made in railway construction. In 1888, 240 m. of state railways were open to traffic; in 1899, 777 m. ; in 1902, 880 m. Up to October 1908 all these lines were worked by the state, and, with the exception of the Belovo-Sarambey line (29 m.), which was worked under a convention with Turkey, were its property. The completion of the important line Radomir-Sofia-Shumen (November

1899) opened up the rich agricultural district between the, Balkan? and the Danube and Connected Varna with the capital. Branches to Samovit and Rustchuk establish connexion with the Rumanian railway system on the opposite side of the river. It was hoped, with the consent of the Turkish government, to extend, the line Sofia-Radomirˆ Kiustendil to Uskub, and thus to secure ,a direct route to Salonica and the Aegean. Road communication is still in an unsatisfactory condition. Roads are divided into three classes: ” state roads,” Or main highways, maintained by the government; ” district roads “. maintained by the district councils; and ‘ ! inters village roads ” (mezha)-u,selski shosseta), maintained by the communes. Repairs are effected by the corvee system with requisitions of material . There are nbcanals, and inland navigation is confined to the Danube. The Austrian Donaudampschiffahrtsgesellschaft and the Russian Gagarine steamship company compete for the river traffic ;

the grain trade is largely served by steamers belonging to Greek merchants. The coasting trade on the Black Sea is carried on by a Bulgarian steamship company; the steamers of the Austrian Lloyd, and other foreign companies call at Varna, and occasionally at Burgas.

The development of postal and telegraphic communication has been rapid. In 1 886, 1,468,494 letters were posted, in 1903,29,063,043. Receipts of posts and telegraphs in .1886 were £40,975, in 1903 £134,942. In 1903 there were 3261 m. of telegraph lines and 531 m. of telephones.

Towns. — The principal towns of Bulgaria are Sofia, the capital (Bulgarian Sredelz, a name now little used), pop. in January 1906, 82,187; Philippopolis, the. capital of Eastern Rumelia (Bulg. Plovdiv), pop. 45,572; Varna, 37,155; Rustchuk (Bulg. Russe), 33,552; Sliven, 25,049; Shumla (Bulg. Shumen), 2.2,290; Plevna (Bulg. Pleven), 21,208; Stara-Zagora, 20,647; Tatar-Pazarjik, 17,549; Vidin, 16,168;, Yamboli (Greek Hyampolis), 15,708; Dobritch (Turkish Hajiolu-Pazar.jik), 15,369; Haskovo, 15,061; Vratza, 14,832; Stanimaka (Greek Stenimachos) , 14,120; Razgrad, 13,783; Sistova (Bulg. Svishton), 13,408; Burgas, 12,846; Kiustendil, 12,353; Trnovo, the ancient capital, 12,171. All these are described in separate articles.

Population. — The area of northern Bulgaria is 24,535 sq. m.; of Eastern Rumelia 12,705 sq. m.; of united Bulgaria, 37,240 sq. m. According to the census of the 12th of January 1906, the population of northern Bulgaria was 2,853,704; of Eastern Rumelia, 1,174,535; of united Bulgaria, 4,028,239 or 88 per sq. m. Bulgaria thus ranks between Rumania and Portugal in regard to area; between the Netherlands and Switzerland in regard to population: in density of population it may be compared with Spain and Greece.

The first census of united Bulgaria was taken in 1888: it gave the total population as 3,154,375. In January 1893 the population was 3,310,713; in January 1901, 3,744,283.

The movement of the population at intervals of five years has been as follows : — ,

Year.

1882 1887 1892 1897 1902

Marriages.

19-795 20,089

27.553 29,227 36,041

Births (living).

74,642

83.179

117,883

H9.63I

149.542

Still- born.

300 144 321 858 823

Deaths.

38,884 39.396 103.550 90,134 91,093

Natural Increase. 1

35.758 43,783 14.333 59.497 58,449

The death-rate shows a tendency to rise. In the five years 1882-1886 the mean death-rate was 18-0 per 1000; in 1887-1891, 20-4; in 1892-1896, 27-0; in 1897-1902, 23-92. Infant mortality is high, especially among the peasants. As the less healthy infants rarely survive, the adult population is in general robust, hardy and long-lived. The census of January 1901 gives 2719 persons of ioo years and upwards. Young men, as a rule, marry before the age of twenty-five, girls before eighteen. The number of illegitimate births is inconsiderable, averaging only 0-12 of the total. The population according to sex in 1901 is given as 1,909,567 males and 1,834,716 females, or 51 males to 49 females. A somewhat similar disparity may be observed in the other countries of the Peninsula. Classified according to occupation, 2,802,603 persons, or 74-85% of the popula- tion, are engaged in agriculture; 360,834 in various productive industries; 118,824 in the service of the government or the exercise of liberal professions, and 148,899 in commerce. The population according to race cannot be stated with absolute accuracy, but it is approximately shown by the census of 1901, which gives the various nationalities according to language as

follows: — Bulgars, 2,888,2 K>". Turks, 531,240; Rumans, 71,063; Greeks, 66,635; Gipsies (Tziganes), 89,549; Jews (Spanish speaking), 33,661; Tatars,

1 Excess of births over deaths.

1,8,884; . Armenians, 14,581; other nationalities, 30,451. The Bulgarian inhabitants of the Peninsula beyond the limits of the principality may, perhaps, be estimated at 1,500,000 or 1,600,000, and the grand total of the race possibly reaches 5,500,000.

Ethnology.— The Bulgarians, who constitute 77 – i4% of the inhabitants of the kingdom, are found in their purest type in the mountain districts, the Ottoman conquest and subsequent colonization haying introduced a mixed population into the plains.

The devastation of the country which followed the Turkish invasion resulted in the extirpation or flight of a large proportion of the Bulgarian inhabitants of the lowlands, who were replaced by Turkish colonists. The mountainous districts, however, retained their original population and sheltered large numbers of the fugitives. The passage of the Turkish armies during the wars with Austria, Poland and Russia led to further Bulgarian emigrations. The flight to the Banat, where 22,000 Bulgarians still remain, took place in 1730. At the beginning of the 19th century the majority of the population of the Eastern Rumelian plain was Turkish. The Turkish colony, however, declined, partly in consequence of the drain caused by military service, while the Bulgarian remnant increased, notwithstanding a considerable emigration to Bessarabia before and after the Russo-Turkish campaign of 1828. Efforts were made by the Porte to strengthen the Moslem element by planting colonies of Tatars in 1861 and Circassians in 1864. The advance of the Russian army in 1877-1878 caused an enormous exodus of the Turkish population, of which only a small proportion returned to settle permanently. The emigration continued after the conclusion of peace, and is still in progress, notwithstanding the efforts of the Bulgarian government to arrest it. In twenty years (1879-1899), at least 150,000 Turkish peasants left Bulgaria. Much of the land thus abandoned still remains unoccupied. On the other hand, a considerable influx of Bulgarians from Macedonia, the vilayet of Adrianople, Bessarabia, and the Dobrudja took place within the same period, and the

inhabitants of the mountain villages show a tendency to migrate into the richer districts of the plains.

The northern slopes of the Balkans from Belogradchik to Elena are inhabited almost exclusively by Bulgarians; in Eastern Rumelia the national element is strongest in the Sredna Gora and Rhodope. Possibly the most genuine representatives of the race are the Pomaks or Mahommedan Bulgarians, whose conversion to Islam preserved their women from the licence of the Turkish conqueror; they inhabit the highlands of Rhodope and certain districts in the neighbourhood of Lovtcha (Lovetch) and Plevna. Retaining their Bulgarian speech and many ancient national usages, they may be compared with the in- digenous Cretan, Bosnian and Albanian Moslems. The Pomaks in the principality are estimated at 26,000, but their numbers are declining. In the north-eastern district between the Yantra and the Black Sea the Bulgarian race is as yet thinly represented; most of the inhabitants are Turks, a quiet, submissive, agricultural population, which unfortunately shows a tendency to emigrate. The Black Sea coast is inhabited by a variety of races. The Greek element is strong in the maritime towns, and displays its natural aptitude for navigation and commerce. The Gagauzi, a peculiar race of Turkish-speaking Christians, inhabit the littoral from Cape Emine to Cape Kaliakra: they are of Turanian origin and descend from the ancient Kumani. The valleys of the Maritza and Arda are occupied by a mixed population consisting of Bulgarians, Greeks and Turks; the principal Greek colonies are in Stanimaka, Kavakly and Philippopolis. The origin of the peculiar Shop tribe which inhabits the mountain tracts of Sofia, Breznik and Radomir is a mystery. The Sh6ps are conceivably a remnant of the aboriginal race which remained undisturbed in its mountain home during the Slavonic and Bulgarian incursions: they cling with much tenacity to their distinctive customs, apparel and dialect. The considerable Vlach or Ruman colony in the Danubian districts dates from the 18th century, when large numbers of Walachian peasants sought a refuge on Turkish soil from the tyranny of the boyars or nobles: the department

of Vidin alone contains 36 Ruman villages with a population of 30,550. Especially interesting is the race of nomad shepherds from the Macedonian and the Aegean coast who come in thousands every summer to pasture their flocks on the Bulgarian mountains ; they are divided into two tribes — the Kutzovlachs, or " lame Vlachs," who speak Rumanian, and the Hellenized Karakatchans or " black shepherds " (compare the Morlachs, or Mavro- vlachs, fiavpoi | 8\ax«, of Dalmatia), who speak Greek. The Tatars, a peaceable, industrious race, are chiefly found in the neighbourhood of Varna

and Silistria ; they were introduced as colonists by the Turkish government in 1861. They may be reckoned at 1 2,000. The gipsies, who are scattered in considerable numbers throughout the country, came into Bulgaria in the 14th century. They are for the most part Moslems, and retain their ancient Indian speech. They live in the utmost poverty, occupy separate cantonments in the villages, and are treated as outcasts by the rest of the population. The Bulgarians, being of mixed origin, possess few salient physical characteristics. The Slavonic type is far less pronounced than among the kindred races; the Ugrian or Finnish cast of features occasionally asserts itself in the central Balkans. The face is generally oval, the nose straight, the jaw somewhat heavy. The men, as a rule, are rather below middle height, compactly built, and, among the peasantry, very muscular; the women are generally deficient in beauty and rapidly grow old. The upper class, the so-called intelligenzia, is physically very inferior to the rural population.

National Character. — The character of the Bulgarians presents a singular contrast to that of the neighbouring nations. Less quick-witted than the Greeks, less prone to idealism than the Servians, less apt to assimilate the externals of civilization than the Rumanians, they possess in a remarkable degree the qualities of patience, perseverance and endurance, with the capacity for laborious effort peculiar to an agricultural race. The tenacity and determination with which they pursue their national aims may eventually enable them to vanquish their more brilliant competitors in the struggle for hegemony in the Peninsula. Unlike most southern races, the Bulgarians are reserved, taciturn, phlegmatic, unresponsive, and extremely suspicious of foreigners. The peasants are industrious, peaceable and orderly; the ven- detta, as it exists in Albania, Montenegro and Macedonia, and the use of the knife in quarrels, so common in southern Europe, are alike unknown. The tranquillity of rural life has, unfortunately, been invaded by the intrigues of political agitators, and bloodshed is not uncommon at elections. All classes practise thrift bordering on parsimony, and any display of wealth is generally resented. The standard of sexual morality is high, especially in the rural districts; the unfaithful wife is an object of public contempt, and in former times was punished with death. Marriage ceremonies are elaborate and protracted, as is the case in most primitive communities; elopements are frequent, but usually take place with the consent of the parents on both sides, in order to avoid the expense of a regular wedding. The principal amusement on Sundays and holidays is the chord (xopos), which is danced on the village green to the strains of the ga'ida or bagpipe, and the gtisla, a

rudimentary fiddle. The Bulgarians are religious in a simple way, but not fanatical, and the influence of the priesthood is limited. Many ancient superstitions linger among the peasantry, such as the belief in the vampire and the evil eye; witches and necromancers are numerous and are much consulted.

Government. — Bulgaria is a constitutional monarchy; by Art. iii. of the Berlin Treaty it was declared hereditary in the family of a prince " freely elected by the population and con- firmed by the Sublime Porte with the assent of the powers." According to the constitution of Trnovo, voted by the Assembly of Notables on the 29th of April 1879, revised by the Grand Sobranye on the 27th of May 1893, and modified by the pro- clamation of a Bulgarian kingdom on the 5th of October 1908, the royal dignity descends in the direct male line. The king must profess the Orthodox faith, only the first elected sovereign and his immediate heir being released from this obligation. The legislative power is vested in the king in conjunction with the

national assembly; he is supreme head of the army, supervises the executive power, and represents the country in its foreign relations. In case of a minority or an interregnum, a regency of three persons is appointed. The national representation is embodied in the Sobranye, or ordinary assembly (Bulgarian, Subranie, the Russian form Sobranye being usually employed by foreign writers), and the Grand Sobranye, which is convoked in extraordinary circumstances. The Sobranye is elected by manhood suffrage, in the proportion of i to 20,000 of the population, for a term of five years. Every Bulgarian citizen who can read and write and has completed his thirtieth year is eligible as a deputy. Annual sessions are held from the 27 th of October to the 2 7th of December. All legislative and financial measures must first be discussed and voted by the Sobranye and then sanctioned and promulgated by the king. The govern- ment is responsible to the Sobranye, and the ministers, whether deputies or not, attend its sittings. The Grand Sobranye, which is elected in the proportion of 2 to every 20,000 inhabitants, is convoked to elect a new king, to appoint a regency, to sanction a change .in the constitution, or to ratify an alteration in the boundaries of the kingdom. The executive is entrusted to a cabinet of eight members — the ministers of foreign affairs and religion, finance, justice, public works, the interior, commerce and agriculture, education and war. Local administration, which is organized on the Belgian model, is

under the control of the minister of the interior. The country is divided into twenty-two departments (okrug, pi. okr&zi), each administered by a prefect (upravitel) , assisted by a departmental council, and eighty-four sub-prefectures (okolia), each under a sub-prefect (okoliiski natckdlnik) . The number of these functionaries is excessive. The four principal towns have each in addition a prefect of police (gradonatchalnik) and one or more commissaries (pristav). The gendarmery numbers about 4000 men, or 1 to 825 of the inhabitants. The prefects and sub-prefects have replaced the Turkish mutessarifs and kaimakams; but the system of municipal government, left untouched by the Turks, descends from primitive times. Every commune (obshtina), urban or rural, has its kmet, or mayor, and council; the commune is bound to maintain its primary schools, a public library or reading-room, &c; the kmet possesses certain magisterial powers, and in the rural districts he collects the taxes. Each village, as a rule, forms a separate commune, but occasionally two or more villages are grouped together.

Justice. — The civil and penal codes are, for the most part, based on the Ottoman law. While the principality formed a portion of the Turkish empire, the privileges of the capitulations were guaranteed to foreign subjects (Berlin Treaty, Art. viii.). The lowest civil and criminal court is that of the village kmet, whose jurisdiction is confined to the limits of the commune; no corresponding tribunal exists in the towns. Each sub-prefecture and town has a justice of the peace — in some cases two or more; the number of these officials is 130. Next follows the depart- mental tribunal or court of first instance, which is competent to pronounce sentences of death, penal servitude and deprivation of civil rights; in specified criminal cases the judges are aided by three assessors chosen by lot from an annually prepared panel of forty-eight persons. Three courts of appeal sit respectively at Sofia, Rustchuk and Philippopolis. The highest tribunal is the court of cassation, sitting at Sofia, and composed of a president, two vice-presidents and nine judges. There is also a high court of audit (vrkhovna smetna palata), similar to the French cour des comptcs. The judges are poorly paid and are removable by the government. In regard to questions of marriage, divorce and inheritance the Greek, Mahommedan and Jewish communities enjoy their own spiritual jurisdiction.

Army and Navy. — The organization of the military forces of the principality was undertaken by Russian officers, who for a period of six years (1870-1885) occupied all the higher posts in the army. In Eastern Rumelia during the same period the " militia " was instructed by foreign officers; after the union it was merged in the

Bulgarian army. The present organization .isbasedonthelawof thejt&tiif January 1904. Ihe.axmy .consists

of: (1) the active or field army (deislvuyushta armia), divided into (i.) the active army, (ii.) the active army reserve; (2) the reserve army (reservna armia); (3) the opltchenie or militia; the two former may operate outside the kingdom, the latter only within the frontier for purposes of defence. In time of peace the active army (i.) alone is on a permanent footing.

The peace strength in 1005 was 2500 officers, 48,200 men and 8000 horses, the active army being composed of 9 divisions of infantry, each of 4 regiments, 5 regiments of cavalry together with 1 2 squadrons attached to the infantry divisions, 9 regiments of artillery each of 3 groups of 3 batteries, together with 2 groups of mountain artillery, each of 3 batteries, and 3 battalions of siege artillery; 9 battalions of engineers with 1 railway and balloon section and 1 bridging section. At the same date the army was locally distributed in nine divisional areas with headquarters at Sofia, Philippopolis, Sliven, Shumla, Rustchuk, Vratza, Plevna, Stara-Zagora and Dupnitza, the divisional area being subdivided into four districts, from each of which one regiment of four battalions was recruited and completed with reservists. In case of mobilization each of the nine areas would furnish 20,106 men(i6,ooo infantry, 1 200 artillery, 1000 engineers, 300 divisional cavalry and 1606 transport and hospital services, &c). The war strength thus amounted to 180,954 of the active army and its reserve, exclusive of the five regiments of cavalry. In addition the 36 districts each furnished 3 battalions of the reserve army and one battalion of opltchenie, or 144,000 infantry, which with the cavalry regiments (3000 men) and the reserves of artillery, engineers, divisional cavalry, &c. (about 10,000), would .bring the grand total in time of war to about 338,000 officers and men with 18,000 horses. The men of the reserve battalions are drafted into the active army as occasion requires, but the militia serves as a separate force. Military service is obligatory, but Moslems may claim exemption on payment of £20; the age of recruitment in time of peace is nineteen, in time of war eighteen. Each conscript serves two years in the infantry and subsequently eight years in the active reserve, or three years in the other corps and six years in the active reserve; he is then liable to seven years' service in the reserve army and finally passes into the opltchenie. The Bulgarian peasant makes an admirable soldier — courageous, obedient, persevering, and inured to hardship ; the officers are painstaking and devoted to their duties. The active army and reserve, with the exception of the engineer regiments, are

furnished with the -31 5″ Mannlicher magazine rifle, the engineer and militia with the Berdan; the artillery in 1905 mainly consisted of 8-7- and 7‘5-cm. Krupp guns (field) and 6-5 cm. Krupp (mountain), 12 cm. Krupp and 15 cm. Creuzot (Schneider) howitzers, 15 cm. Krupp and 12 cm. Creuzot siege guns, and 7-5 cm. Creuzot quick-firing guns; total of all description, n 54. Defensive works were constructed at various strategical points near the frontier and elsewhere, and at Varna and Burgas. The naval force consisted of a flotilla stationed at Rustchuk and Varna, where a canal connects Lake Devno with the sea. It was composed in 1905 of 1 prince's yacht, 1 armoured cruiser, 3 gunboats, 3 torpedo boats and 10 other small vessels, with a complement of 107 officers and 1231 men.

Religion. — The Orthodox Bulgarian National Church claims to be an indivisible member of the Eastern Orthodox communion, and asserts historic continuity with the autocephalous Bulgarian church of the middle ages. It was, however, declared schismatic by the Greek patriarch of Constantinople in 1872, although differing in no point of doctrine from the Greek Church. The Exarch, or supreme head of the Bulgarian Church, resides at Constantinople; he enjoys the title of "Beatitude" (negovo Blazhenstvo) , receives an annual subvention of about £6000 from the kingdom, and exercises jurisdiction over the Bulgarian hierarchy in all parts of the Ottoman empire. The exarch is elected by the Bulgarian episcopate, the Holy Synod, and a general assembly (obshli sbor), in which the laity is represented; their choice, before the declaration of Bulgarian independence, was subject to the sultan's approval. The occupant of the dignity is titular metropolitan of a Bulgarian diocese. The organization of the chmck within the principality was regulated

by statute in 1883. There are eleven eparchies or dioceses in the country, each administered by a metropolitan with a diocesan council; one diocese has also a suffragan bishop. Church government is vested in the Holy Synod, consisting of four metropolitans, which assembles once a year. The laity take part in the election of metropolitans and parish priests, only the " black clergy," or monks, being eligible for the episcopate. All ecclesiastical appointments are subject to the approval of the government. There are 2106 parishes (eporii) in the kingdom with 9 archimandrites, 1936 parish priests and 21 deacons, 78 monasteries with 184 monks, and 12 convents with 346 nuns. The celebrated monastery of Rila possesses a vast

estate in the Rilska Planina ; its abbot or hegumen owns no spiritual superior but the exarch. Ecclesiastical affairs are under the control of the minister of public worship; the clergy of all denominations are paid by the state, being free, however, to accept fees for baptisms, marriages, burials, the administering of oaths, &c. The census of January 1901 gives 3,019,999 persons of the Orthodox faith (including 66,635 Patriarchist Greeks), 643,300 Mahommedans, 33,663 Jews, 28,569 Catholics, 13,809 Gregorian Armenians, 4524 Protestants and 419 whose religion is not stated. The Greek Orthodox community hasfourmetropoli tans dependent on the patriarchate. The Mahommedan community is rapidly diminishing; it is organized under 16 muftis who with their assistants receive a subvention from the government. The Catholics, who have two bishops, are for the most part the descendants of the medieval Paulicians; they are especially numerous in the neighbourhood of Philippopolis and Sistova. The Armenians have one bishop. The Protestants are mostly Methodists; since 1857 Bulgaria has been a special field of activity for American Methodist missionaries, who have estab- lished an important school at Samakov. The Berlin Treaty (Art. V.) forbade religious disabilities in regard to the enjoyment of civil and political rights, and guaranteed the free exercise of all religions.

Education. — No educational system existed in many of the rural districts before 1878; the peasantry was sunk in ignorance, and the older generation remained totally illiterate. In the towns the schools were under the superintendence of the Greek clergy, and Greek was the language of instruction. The first Bulgarian school was opened at Gabrovo in 1835 by the patriots Aprilov and Neophyt Rilski. After the Crimean War, Bulgarian schools began to appear in the villages of the Balkans and the south-eastern districts. The children of the wealthier class were generally educated abroad. The American institution of Robert College on the Bosporus rendered an invaluable service to the newly created state by providing it with a number of well- educated young men fitted for positions of responsibility. In 1878, after the liberation of the country, there were 1658 schools in the towns and villages. Primary education was declared obligatory from the first, but the scarcity of properly qualified teachers and the lack of all requisites proved serious impediments to educational organization. The government has made great efforts and incurred heavy expenditure for the spread of educa- tion; the satisfactory results obtained are largely due to the keen desire for learning which exists among the people. The present educational system dates from 1891. Almost all the villages now possess " national " (narodni)

primary schools, maintained by the communes with the aid of a state subvention and supervised by departmental and district inspectors. The state also assists a large number of Turkish primary schools. The penalties for non-attendance are not very rigidly enforced, and it has been found necessary to close the schools in the rural districts during the summer, the children being required for labour in the fields.

The age for primary instruction is six to ten years; in 1890, 47′ 01 % ˚f the boys and 16-11 % of the girls attended the primary schools; in 1898, 85 % of the boys and 40 % of the girls. In 1904 there were 4344 primary schools, of which 3060 were ” national,” or communal, and 1284 denominational (Turkish, Greek, Jewish, &c.), attended by 340,668 pupils, representing a proportion of 9-1 per hundred inhabitants. In addition to the primary schools, 40 infant schools for children of 3 to 6 years of age were attended

by 2707 pupils. In 1888 only 327,766 persons, or 1 1 % of the popula- tion, were literate; in 1893 the proportion rose to 19-88 %; in 1901 to 23 9 %.

In the system of secondary education the distinction between the classical and ” real ” or special course of study is maintained as in most European countries; in 1904 there were 175 secondary schools and 18 gymnasia (10 for boys and 8 for girls). In addition to these there are 6 technical and 3 agricultural schools; 5 of pedagogy, I theological, 1 commercial, I of forestry, I of design, I for surgeons' assistants, and a large military school at Sofia. Government aid is given to students of limited means, both for secondary education and the completion of their studies abroad. The university of Sofia, formerly known as the "high school," was reorganized in 1904; it comprises 3 faculties (philology, mathematics and law), and possesses a staff of 17 professors and 25 lecturers. The number of students in 1905 was 943.

Political History

The ancient Thraco-Illyrian race which inhabited the district between the Danube and the Aegean was expelled, or more probably absorbed, by the great Slavonic immigration which took place at various intervals between the end of the 3rd century after Christ and the beginning of the 6th. The numerous tumuli which are found in all parts of the country (see Herodotus v. 8) and some stone tablets with bas-reliefs remain as monuments of the aboriginal population; and certain structural peculiarities, which are common to the Bulgarian and Rumanian languages, may conceivably be traced to the influence

of the primitive Illyrian speech, now probably represented by the Albanian. The Slavs, an agricultural people, were governed, even in those remote times, by the democratic local institutions to which they are still attached; they possessed no national leaders or central organization, and their only political unit was the pleme, or tribe. They were considerably influenced by contact with Roman civilization. It was reserved for a foreign race, altogether distinct in origin, religion and customs, to give unity and co- herence to the scattered Slavonic groups, and to weld them into a compact and powerful state which for some centuries played an important part in the history of eastern Europe and threatened the existence of the Byzantine empire.

The Bulgars. — The Bulgars, a Turanian race akin to the Tatars, Huns, Avars, Petchenegs and Finns, made their appearance on the banks of the Pruth in the latter part of the 7th century. They were a horde of wild horsemen, fierce and barbarous, practising polygamy, and governed despotically by their khans (chiefs) and boyars or bolyars (nobles). Their original abode was the tract between the Ural mountains and the Volga, where the kingdom of Great (or Black) Bolgary existed down to the 13th century. In 679, under their khan Asparukh (or Isperikh), they crossed the Danube, and, after subjugating the Slavonic population of Moesia, advanced to the gates of Constantinople and Salonica. The East Roman emperors were compelled to cede to them the province of Moesia and to pay them an annual tribute. The invading horde was not numerous, and during the next two centuries it became gradually merged in the Slavonic population. Like the Franks in Gaul the Bulgars gave their name and a political organization to the more civilized race which they conquered, but adopted its language, customs and local institutions. Not a trace of the Ugrian or Finnish element is to be found in the Bulgarian speech. This complete assimilation of a conquering race may be illustrated by many parallels.

Early Dynasties. — The history of the early Bulgarian dynasties is little else than a record of continuous conflicts with the Byzantine emperors. The tribute first imposed on the Greeks by Asparukh was again exacted by Kardam (791-797) and Krum (802-815), a sovereign noted alike for his cruelty and his military and political capacity. Under his rule the Bulgarian realm extended from the Carpathians to the neighbourhood of Adrianople; Serdica (the present Sofia) was taken, and the valley of the Struma conquered. Preslav, the Bulgarian capital, was attacked and burned by the emperor Nicephorus, but the Greek army on its return was annihilated in one of the Balkan passes; the emperor was slain, and

his skull was converted by Krum into a goblet. The reign of Boris (852-884) : & m«anorable

for the introduction of Christianity into Bulgaria. Two monks of Salonica, SS. Cyril and Methodius, are generally reverenced as the national apostles; the scene of their labours, however, was among the Slavs of Moravia, and the Bulgars were evangelized by their disciples. Boris, finding himself surrounded by Christian states, decided from political motives to abandon paganism. He was baptized in 864, the emperor Michael III. acting as his sponsor. It was at this time that the controversies broke out which ended in the schism between the Churches of the East and West. Boris long wavered between Constantinople and Rome, but the refusal of the pope to recognize an autocephalous Bulgarian church determined him to offer his allegiance to the Greek patriarch. The decision was fraught with momentous consequences for the future of the race. The nation altered its religion in obedience to its sovereign, and some of the boyars who resisted the change paid with their lives for their fidelity to the ancient belief. The independence of the Bulgarian church was recognized by the patriarchate, a fact much dwelt upon in recent controversies. The Bulgarian primates subsequently received the title of patriarch; their see was transferred from Preslav to Sofia, Voden and Prespa successively, and finally to Ochrida.

The First Empire. — The national power reached its zenith under Simeon (893-927), a monarch distinguished in the arts of war and peace. In his reign, says Gibbon, "Bulgaria assumed a rank among the civilized powers of the earth." His dominions extended from the Black Sea to the Adriatic, and from the borders of Thessaly to the Save and the Carpathians. Having become the most powerful monarch in eastern Europe, Simeon assumed the style of "Emperor and Autocrat of all the Bulgars and Greeks" {tsar i samodrzhetz vsim Blgarom i Grkom), a title which was recognized by Pope Formosus. During the latter years of his reign, which were spent in peace, his people made great progress in civilization, literature flourished, and Preslav, according to contemporary chroniclers, rivalled Constantinople in magnificence. After the death of Simeon the Bulgarian power declined owing to internal dissensions; the land was distracted by the Bogomil heresy (see Bogomils), and a separate or western empire, including Albania and Macedonia, was founded at Ochrida by Shishman, a boyar from Trnovo. A notable event took place in 967, when the Russians, under Sviatoslav, made their first appearance in Bulgaria. The Bulgarian tsar, Boris II., with the aid of the emperor John Zimisces, expelled the invaders, but the Greeks took advantage of their victory to dethrone Boris, and the first Bulgarian empire thus came to an end after an existence of three centuries. The empire at Ochrida, however, rose to considerable

importance under Samuel, the son of Shish- man (976-1014), who conquered the greater part of the Peninsula, and ruled from the Danube to the Morea. After a series of campaigns this redoubtable warrior was defeated at Belasitza by the emperor Basil II., surnamed Bulgaroktonos, who put out the eyes of 15,000 prisoners taken in the fight, and sent them into the camp of his adversary. The Bulgarian tsar was so overpowered by the spectacle that he died of grief. A few years later his dynasty finally disappeared, and for more than a century and a half (1018-1186) the Bulgarian race remained subject to the Byzantine emperors.

The Second Empire. — In n 86, after a general insurrection of Vlachs and Bulgars under the brothers Ivan and Peter As£n of Trnovo, who claimed descent from the dynasty of the Shish- manovtzi, the nation recovered its independence, and Ivan Asein assumed the title of " Tsar of the Bulgars and Greeks." The seat of the second, or " Bulgaro-Vlach " empire was at Trnovo, which the Bulgarians regard as the historic capital of their race. Kaloyan, the third of the AsSn monarchs, extended his dominions to Belgrade, Nish and Skopi'e (Uskub); he acknowledged the spiritual supremacy of the pope, and received the royal crown from a papal legate. The greatest of all Bulgarian rulers was Ivan Asen II. (i2i8-r24i), a man of humane and enlightened character. After a series of victorious campaigns he established his sway over Albania, Epirus, Macedonia and Thrace, and governed his wide dominions with justice, wisdom and modera- tion. In his time the nation attained a prosperity hitherto

unknown: commerce, the arts and ; literature flourished; Trnovo, the capital, was enlarged and embellishedˆ and great numbers of churches and monasteries were founded or endowed. The dynasty of the Asens became extinct in 1257, and a period of decadence began. Two other dynasties, both of Kuman origin, followed — the Terterovtzi, who ruled at Trnovo, and the Shish- manovtzi, who founded an independent state at Vidin, but after- wards reigned in the national capital. Eventually, on the 28th June 1330, a day commemorated with sorrow in Bulgaria, Tsar Michael Shishman was defeated and slain by the Servians, under Stephen Urosh HI., at the battle of Velbuzhd (Riustendil). Bulgaria, though still retaining its native rulers, now became subject to Servia, and formed part of the short-lived empire of Stephen Dushan (1331-1355). The Servian hegemony vanished after the death of Dushan, and the Christian races of the Penin sula, distracted by the quarrels of their petty princes, fell an easy prey to the advancing might of the Moslem invader.*

The Turkish Conquest. — In 1340 the Turks had begun to ravage the valley of the Maritza; in 1362 they captured Philippopolis, and in 1382 Sofia. In 1366 Ivan Shishman III., the last Bul- garian fsar, was compelled to declare himself the vassal of the sultan Murad I., and to send his sister to the harem of the conqueror. In 1389 the rout of the Servians, Bosnians and Croats on the famous field of Kossovo decided the fate of the Peninsula. Shortly afterwards Ivan Shishman was attacked by the Turks; and Trnovo, after a siege of three months, was cap tured, sacked and burnt in 1393. The fate of the last Bulgarian sovereign is unknown: the national legend represents him as perishing in a battle near Samakov. Vidin, where Ivan's brother, Strazhimir, had established himself, was taken in 1396, and with its fall the last remnant of Bulgarian independence disappeared.*

The five centuries of Turkish rule (1396-1878) form a dark epoch in Bulgarian history. The invaders carried fire and sword through the land; towns, villages and monasteries were sacked and destroyed, and whole districts were converted into desolate wastes. The inhabitants of the plains fled to the mountains, where they founded new settlements. Many of the nobles em- braced the creed of Islam, and were liberally rewarded for their apostasy; others, together with numbers of the priests and people, took refuge across the Danube. All the regions formerly ruled by the Bulgarian tsars, including Macedonia and Thrace, were placed under the administration of a governor-general, styled the beylerbey of Rum-ili, residing at Sofia; Bulgaria proper was divided into the sanjaks of Sofia, Nikopolis', Vidin, Silistria and Kiustendil. Only a small proportion of the people followed the example of the boyars in abandoning Christianity; the conversion of the isolated communities now represented by the Pomaks took place at various intervals during the next three centuries. A new kind of feudal system replaced that of the boyars, and fiefs or spahiliks were conferred on the Ottoman chiefs and the renegade Bulgarian nobles. The Christian popu- lation was subjected to heavy imposts, the principal being the haratch, or capitation-tax, paid to the imperial treasury, and the tithe on agricultural produce, which was collected by the feudal lord. Among the most cruel forms of oppression was the re- quisitioning of young boys between the ages of ten and twelve, who were sent to Constantinople as recruits for the corps of janissaries. Notwithstanding the horrors which attended the Ottoman conquest, the condition of the peasantry during the first three centuries of Turkish government was scarcely worse than it had been under the tyrannical rule of the boyars. The contemptuous indifference with which the Turks regarded the Christian rayas was not altogether to the disadvantage of the subject race. Military

service was not exacted from the Chris- tians, no systematic effort was made to extinguish either their religion or their language, and within certain limits they were allowed to retain their ancient local administration and the jurisdiction of their clergy in regard to inheritances and family affairs. At the time of the conquest certain towns and villages, known as the voinitchki sela, obtained important privileges which were not infringed till the 18th century; on condition of

furnishing contingents to the Turkish army or grooms for the sultan's horses they obtained exemption from most of the taxes and complete self-government under their voivodi or chiefs. Some of them, such as Koprivshtitza in the Sredna Gora, attained great prosperity, 'which has somewhat declined since the establishment of the principality. While the Ottoman power was at its height the lot of the subject-races was far less intolerable than during the period of decadence, which began with the un- successful siege of Vienna in 1683. Their rights and privileges were respected, the law was enforced, commerce prospered, good roads were constructed, and the great caravans of the Ragusan merchants traversed the country. Down to the end of the 1 8th century there appears to have been only one serious attempt at revolt — that occasioned by the advance of Prince Sigismund Bathory into Walachia in 1595. A kind of guerilla warfare was, however, maintained in the mountains by the haiduti, or outlaws, whose exploits, like those of the Greek klepkts, have been highly idealized in the popular folk-lore. As the power of the sultans declined anarchy spread through the Peninsula. In the earlier decades of the 18th century the Bul- garians suffered terribly from the ravages of the Turkish armies passing through the land during the wars with Austria. Towards its close their condition became even worse owing to the horrors perpetrated by the Krjalis, or troops of disbanded soldiers and desperadoes, who, in defiance of the Turkish authorities, roamed through the country, supporting themselves by plunder and committing every conceivable atrocity. After the peace of Bel- grade (1737), by which Austria lost her conquests in the Penin- sula, the Servians and Bulgarians began to look to Russia for deliverance, their hopes being encouraged by the treaty of Kuchuk Ka'inarji (1774), which foreshadowed the claim of Russia to protect the Orthodox Christians in the Turkish empire. In 1794 Pasvanoglu, one Of the chiefs of the Krjalis", established himself as an independent sovereign at Vidin, putting to flight three large Turkish

armies which were despatched against him. This adventurer possessed many remarkable qualities. He adorned Vidin with handsome buildings, maintained order, levied taxes and issued a separate coinage. He died in 1807. The memoirs of Sofronii, bishop of Vratza, present a vivid picture of the condition of Bulgaria at this time. " My diocese," he writes, " was laid desolate; the villages disappeared— they had been burnt by the Krjalis and Pasvan's brigands; the inhabitants were scattered far and wide over Walachia and other lands."

The National Revival. — At the beginning of the 19th century the existence of the Bulgarian race was almost unknown in Europe, even to students of Slavonic literature. Disheartened by ages of oppression, isolated from Christendom by their geographical position, and cowed by the proximity of Constanti- nople, the Bulgarians took no collective part in the insurrection- ary movement which resulted in the liberation of Servia and Greece. The Russian invasions of 1810 and 1828 only added to their sufferings, and great numbers of fugitives took refuge in Bessarabia, annexed by Russia under the treaty of Bucharest. But the long-dormant national spirit now began to awake under the influence of a literary revival. The precursors of the move- ment were Paisii, a monk of Mount Athos, who wrote a history of the Bulgarian tsars and saints (1762), and Bishop Sofronii, whose memoirs have been already mentioned. After 1824 several works written in modern Bulgarian began to appear, but the most important step was the foundation, in 1835, of the first Bulgarian school at Gabrovo. Within ten years at least 53 Bulgarian schools came into existence, and five Bulgarian printing-presses were at work. The literary movement led the way to a reaction against the influence and authority of the Greek clergy. The spiritual domination of the Greek patriarch' ate had tended more effectually than the temporal power of the Turks to the effacement of Bulgarian nationality. After the conquest of the Peninsula the Greek patriarch became the representative at the Sublime Porte of the Rum-millet, the Roman nation, in which all the Christian nationalities were comprised. The independent patriarchate of Trnovo was

suppressed; that of Ochrida was subsequently Hellenized. The Phanariot clergy — unscrupulous, rapacious and corrupt — succeeded in monopolizing the higher ecclesiastical appointments and filled the parishes with Greek priests, whose schools, in which Greek was exclusively taught, were the only means of instruction open to the population. By degrees Greek became the language of the upper classes in all the Bulgarian towns, the Bulgarian language was written in Greek characters, and the illiterate peasants, though

speaking the vernacular, called themselves Greeks. The Slavonic liturgy was suppressed in favour of the Greek, and in many places the old Bulgarian manuscripts, images, testaments and missals were committed to the flames. The patriots of the literary movement, recognizing in the patriarchate the most determined foe to a national revival, directed all their efforts to the abolition of Greek ecclesiastical ascendancy and the restoration of the Bulgarian autonomous church. Some of the leaders went so far as to open negotiations with Rome, and an archbishop of the Uniate Bulgarian church was nominated by the pope. The struggle was prosecuted with the utmost tenacity for forty years. Incessant protests and memorials were addressed to the Porte, and every effort was made to undermine the position of the Greek bishops, some of whom were compelled to abandon their sees. At the same time no pains were spared to diffuse education and to stimulate the national sentiment. Various insurrectionary movements were attempted by the patriots Rakovski, Panayot Khitoff, Haji Dimitr, Stephen Karaja and others, but received little support from the mass of the people. The recognition of Bul- garian nationality was won by the pen, not the sword. The patriarchate at length found it necessary to offer some conces- sions, but these appeared illusory to the Bulgarians, and long and acrimonious discussions followed. Eventually the Turkish government intervened, and on the 28th of February 1870 a firman was issued establishing the Bulgarian exarchate, with jurisdiction over fifteen dioceses, including Nish, Pirot and Veles; the other dioceses in dispute were to be added to these in case two-thirds of the Christian population so desired. The election of the first exarch was delayed till February 1872, owing to the opposition of the patriarch, who immediately afterwards excommunicated the new head of the Bulgarian church and all his followers. The official recognition now acquired tended to consolidate the Bulgarian nation and to prepare it for the political developments which were soon to follow. A great educational activity at once displayed itself in all the districts subjected to the new ecclesiastical power.

The Revolt of 1&76. — Under the enlightened administration of Midhat Pasha (1864-1868) Bulgaria enjoyed comparative prosperity, but that remarkable man is not remembered with gratitude by the people owing to the severity with which he repressed insurrectionary movements. Ini86i, 12,000 Crimean Tatars, and in 1864 a still larger number of Circassians from the Caucasus, were settled by the Turkish government on lands taken without compensation from the Bulgarian peasants. The Circassians, a lawless race of mountaineers, proved a veritable scourge to the

population in their neighbourhood. In 1875 the insurrection in Bosnia and Herzegovina produced immense excitement throughout the Peninsula. The fanaticism of the Moslems was aroused, and the Bulgarians, fearing a general massacre of Christians, endeavoured to anticipate the blow by organizing a general revolt. The rising, which broke out pre- maturely at Koprivshtitza and Panagurishte in May 1876, was mainly confined to the sanjak of Philippopolis. Bands of bashi-bazouks were let loose throughout the district by the Turkish authorities, the Pomaks, or Moslem Bulgarians, and the Circassian colonists were called to arms, and a succession of horrors followed to which a parallel can scarcely be found in the history of the middle ages. The principal scenes of massacre were Panagurisht.fi, Perushtitza, Bratzigovo and Batak; at the last-named town, according to an official British report, 5000 men, women and children were put to the sword by the Pomaks under Achmet Aga, who was decorated by the sultan for this exploit. Altogether some 15,000 persons were massacred in the

district of Philippopolis, and fifty-eight villages and five monas- teries were destroyed. Isolated risings which took place on the northern side of the Balkans were crushed with similar barbarity. These atrocities, which were first made known by an English journalist and an American consular official, were denounced by Gladstone in a celebrated pamphlet which aroused the indignation of Europe. The great powers remained inactive, but Servia declared war in the following month, and her army was joined by 2000 Bulgarian volunteers. A conference of the representatives of the powers, held at Constantinople towards the end of the year, proposed, among other reforms, the organiza- tion of the Bulgarian provinces, including the greater part of Macedonia, in two vilayets under Christian governors, with popular representation. These recommendations were practically set aside by the Porte, and in April 1877 Russia declared war (see Russo-Turkish Wars, and Plevna). In the campaign which followed the Bulgarian volunteer contingent in the Russian army played an honourable part; it accompanied Gourko's advance over the Balkans, behaved with great bravery at Stara Zagora, where it lost heavily, and rendered valuable services in the defence of Shipka.

Treaties of San Stefano and Berlin. — The victorious advance of the Russian army to Constantinople was followed by the treaty of San

Stefano (3rd March 1878), which realized almost to the full the national aspirations of the Bulgarian race. All the provinces of European Turkey in which the Bulgarian element predominated were now included in an autonomous principality, which extended from the Black Sea to the Albanian mountains, and from the Danube to the Aegean, enclosing Ochrida, the ancient capital of the Shishmans, Dibra and Kastoria, as well as the districts of Vranya and Pirot, and possessing a Mediter- ranean port at Kavala. The Dobrudja, notwithstanding its Bulgarian population, was not included in the new state, being reserved as compensation to Rumania for the Russian annexation of Bessarabia; Adrianople, Salonica and the Chalcidian peninsula were left to Turkey. The area thus de- limited constituted three-fifths of the Balkan Peninsula, with a population of 4,000,000 inhabitants. The great powers, how- ever, anticipating that this extensive territory would become a Russian dependency, intervened; and on the 13th of July of the same year was signed the treaty of Berlin, which in effect divided the " Big Bulgaria " of the treaty of San Stefano into three portions. The limits of the principality of Bulgaria, as then defined, and the autonomous province of Eastern Rumelia, have been already described; the remaining portion, including almost the whole of Macedonia and part of the vilayet of Adrianople, was left under Turkish administration. No special organization was provided for the districts thus abandoned; it was stipulated that laws similar to the organic law of Crete should be introduced into the various parts of Turkey in Europe, but this engagement was never carried out by the Porte. Vranya, Pirot and Nish were given to Servia, and the transference of the Dobrudja to Rumania was sanctioned. This artificial division of the Bulgarian nation could scarcely be regarded as possessing elements of permanence. It was provided that the prince of Bulgaria should be freely elected by the population, and confirmed by the Sublime Porte with the assent of the powers, and that, before his election, an assembly of Bulgarian notables, convoked at Trnovo, should draw up the organic law of the principality. The drafting of a constitution for Eastern Rumelia was assigned to a European commission.

The Constitution of Trnovo. — Pending the completion of their political organization, Bulgaria and Eastern Rumelia were occupied by Russian troops and administered by Russian officials. The assembly of notables, which met at Trnovo in 1879, was mainly composed of half-educated peasants, who from the first displayed an extremely democratic spirit, in which they pro- ceeded to manipulate the very liberal constitution submitted to them by Prince Dondukov-

Korsakov, the Russian governor- general. The long period of Turkish domination had effectually obliterated all social distinctions, and the radical element,

which now formed into a party under Tzankoff and Karaveloff, soon gave evidence of its predominance. Manhood suffrage, a single chamber, payment of deputies, the absence of property qualification for candidates, and the prohibition of all titles and distinctions, formed salient features in the constitution now elaborated. The organic statute of Eastern Rumelia was largely modelled on the Belgian constitution. The governor-general, nominated for five years by the sultan with the approbation of the powers, was assisted by an assembly, partly repre- sentative, partly composed of ex-officio members; a permanent committee was entrusted with the preparation of legislative measures and the general supervision of the administration, while a council of six " directors " fulfilled the duties of a ministry.

Prince Alexander. — On the 29th of April 1879 the assembly at Trnovo, on the proposal of Russia, elected as first sovereign of Bulgaria Prince Alexander of Battenberg, a member of the grand ducal house of Hesse and a nephew of the tsar Alexander II. Arriving in Bulgaria on the 7th of July, Prince Alexander, then in his twenty-third year, found all the authority, military and civil, in Russian hands. The history of the earlier portion of his reign is marked by two principal features — a strong Bulgarian reaction against Russian tutelage and a vehement struggle against the autocratic institutions which the young ruler, under Russian guidance, endeavoured to inaugurate. Both movements were symptomatic of the determination of a strong-willed and egoistic race, suddenly liberated from secular oppression, to enjoy to the full the moral and material privileges of liberty. In the assembly at Trnovo the popular party had adopted the watchword " Bulgaria for the Bulgarians," and a considerable anti-Russian contingent was included in its ranks. Young and inexperienced, Prince Alexander, at the suggestion of the Russian consul-general, selected his first ministry from a small group of " Conservative " politicians whose views were in conflict with those of the parliamentary majority, but he was soon compelled to form a " Liberal " administration under Tzankoff and Karaveloff. The Liberals, once in power, initiated a violent campaign against foreigners in general and the Russians in particular; they passed an alien law, and ejected foreigners from every lucrative position. The Russians made a vigorous resistance, and a state of chaos ensued. Eventually the prince, finding good government impossible, obtained the consent of the tsar to a change of the constitution, and assumed

absolute authority on the 9th of May 1881. The Russian general Ernroth was appointed sole minister, and charged with the duty of holding elections for the Grand Sobranye, to which the right of revising the constitution appertained. So successfully did he discharge his mission that the national representatives, almost without debate, suspended the constitution and invested the prince with absolute powers for a term of seven years (July 1881). A period of Russian government followed under Generals Skobelev and Kaulbars, who were specially despatched from St Petersburg to enhance the authority of the prince. Their administration, however, tended to a contrary result, and the prince, finding himself reduced to impotence, opened negotiations with the Bulgarian leaders and effected a coalition of all parties on the basis of a restoration of the constitution. The generals, who had made an unsuccessful attempt to remove the prince, withdrew; the constitution of Trnovo was restored by proclamation (19th September 1883), and a coalition ministry was formed under Tzankoff. Prince Alexander, whose relations with the court of St Petersburg had become less cordial since the death of his uncle, the tsar Alexander II., in 1881, now incurred the serious displeasure of Russia, and the breach was soon widened by the part which he played in encouraging the national aspirations of the Bulgarians.

Union with Eastern Rumelia. — In Eastern Rumelia, where the Bulgarian population never ceased to protest against the division of the race, political life had developed on the same lines as in the principality. Among the politicians two parties had come into existence — the Conservatives or self-styled " Union- ists," and the Radicals, derisively called by their opponents

" Kazioni " or treasury-seekers; both were equally desirous of bringing about the union with the principality. Neither party, however, while in power would risk the sweets of office by embarking in a hazardous adventure. It was reserved for the Kazioni, under their famous leader Zakharia Stoyanoff, who in early life had been a shepherd, to realize the national pro- gramme. In 1885 the Unionists were in office, and their oppon- ents lost no time in organizing a conspiracy for the overthrow of the governor-general, Krstovitch Pasha. Their designs were facilitated by the circumstance that Turkey had abstained from sending troops into the province. Having previously assured themselves of Prince Alexander's acquiescence,

they seized the governor-general and proclaimed the union with Bulgaria (18th September). The revolution took place without bloodshed, and a few days later Prince Alexander entered Philippopolis amid immense enthusiasm. His position now became precarious. The powers were scandalized at the infraction of the Berlin Treaty; Great Britain alone showed sympathy, while Russia denounced the union and urged the Porte to reconquer the revolted province — both powers thus reversing their respective attitudes at the congress of Berlin.

War with Servia. — The Turkish troops were massed at the frontier, and Servia, hoping to profit by the difficulties of her neighbour, suddenly declared war (14th November). At the moment of danger the Russian officers, who filled all the higher posts in the Bulgarian army, were withdrawn by order of the tsar. In these critical circumstances Prince Alexander displayed considerable ability and resource, and the nation gave evidence of hitherto unsuspected qualities. Contrary to general expecta- tion, the Bulgarian army, imperfectly equipped and led by subaltern officers, successfully resisted the Servian invasion. After brilliant victories at Slivnitza (19th November) and Tsari- brod, Prince Alexander crossed the frontier and captured Pirot (27th November), but his farther progress was arrested by the intervention of Austria (see Servo-Bulgarian War). The treaty of Bucharest followed (3rd of March 1886), declaring, in a single clause, the restoration of peace. Servia, notwith- standing her aggression, escaped a war indemnity, but the union with Eastern Rumelia was practically secured. By the con- vention of Top-Khane (5th April) Prince Alexander was recog- nized by the sultan as governor-general of eastern Rumelia; a personal union only was sanctioned, but in effect the organic statute disappeared and the countries were administratively united. These military and diplomatic successes, which in- vested the prince with the attributes of a national hero, quickened the decision of Russia to effect his removal. An instrument was found in the discontent of several of his officers, who considered themselves slighted in the distribution of rewards, and a con- spiracy was formed in which Tzankoff, Karaveloff (the prime minister), Archbishop Clement, and other prominent persons were implicated. On the night of the 21st of August the prince was seized in his palace by several officers and compelled, under menace of death, to sign his abdication; he was then hurried to the Danube at Rakhovo and transported to Russian soil at Reni. This violent act met with instant disapproval on the part of the great majority of the nation. Stamboloff, the president of the assembly, and Colonel Mutkuroff, commandant of the troops at

Philippopolis, initiated a counter-revolution; the provisional government set up by the conspirators immediately fell, and a few days later the prince, who had been liberated by the Russian authorities, returned to the country amid every demonstration of popular sympathy and affection. His arrival forestalled that of a Russian imperial commissioner, who had been appointed to proceed to Bulgaria. He now committed the error of addressing a telegram to the tsar in which he offered to resign his crown into the hands of Russia. This unfortunate step, by which he ignored the suzerainty of Turkey, and repre- sented Bulgaria as a Russian dependency, exposed him to a stern rebuff, and fatally compromised his position. The national leaders, after obtaining a promise from the Russian representative at Sofia that Russia would abstain from interference in the internal affairs of the country, consented to his departure; on

the 8th of September he announced his abdication, and on the following day he left Bulgaria.

The Regency. — A regency was now formed, in which the prominent figure was Stamboloff, the most remarkable man whom modern Bulgaria has produced. A series of attempts to throw the country into anarchy were firmly dealt with, and the Grand Sobranye was summoned to elect a new prince. The candidature of the prince of Mingrelia was now set up by Russia, and General Kaulbars was despatched to Bulgaria to make known to the people the wishes of the tsar. He vainly en- deavoured to postpone the convocation of the Grand Sobranye in order to gain time for the restoration of Russian influence, and proceeded on an electoral tour through the country. The failure of his mission was followed by the withdrawal of the Russian representatives from Bulgaria. The Grand Sobranye, which assembled at Trnovo, offered the crown to Prince Valdemar of Denmark, brother-in-law of the tsar, but the honour was declined, and an anxious period ensued, during which a deputa- tion visited the principal capitals of Europe with the twofold object of winning sympathy for the cause of Bulgarian inde- pendence and discovering a suitable candidate for the throne.

Prince Ferdinand. — On the 7th of July 1887, the Grand Sobranye unanimously elected Prince Ferdinand of Saxe- Coburg-Gotha, a grandson, maternally, of King Louis Philippe. The new prince, who was twenty-six years of age, was at this time a lieutenant in the Austrian army. Undeterred by the difficulties of the international situation and the distracted condition of the country, he accepted the crown, and took over the government on the 14th of August at Trnovo. His arrival, which was welcomed with enthusiasm, put an

end to a long and critical interregnum, but the dangers which menaced Bulgarian independence were far from disappearing. Russia declared the newly-elected sovereign a usurper; the other powers, in deference to her susceptibilities, declined to recognize him, and the grand vizier informed him that his presence in Bulgaria was illegal. Numerous efforts were made by the partisans of Russia to disturb internal tranquillity, and Stamboloff, who became prime minister on the 1st of September, found it neces- sary to govern with a strong hand. A raid led by the Russian captain Nabokov was repulsed; brigandage, maintained for political purposes, was exterminated; the bishops of the Holy Synod, who, at the instigation of Clement, refused to pay homage to the prince, were forcibly removed from Sofia; a military conspiracy organized by Major Panitza was crushed, and its leader executed. An attempt to murder the energetic prime minister resulted in the death of his colleague, Beltcheff, and shortly afterwards Dr Vlkovitch, the Bulgarian represen- tative at Constantinople, was assassinated. While contending with unscrupulous enemies at home, Stamboloff pursued a successful policy abroad. Excellent relations were established with Turkey and Rumania, valuable concessions were twice extracted from the Porte in regard to the Bulgarian episcopate in Macedonia, and loans were concluded with foreign financiers on comparatively favourable terms. His overbearing character, however, increased the number of his opponents, and alienated the goodwill of the prince.

In the spring of 1893 Prince Ferdinand married Princess Marie-Louise of Bourbon-Parma, whose family insisted on the condition that the issue of the marriage should be brought up in the Roman Catholic faith. In view of the importance of establishing a dynasty, Stamboloff resolved on the unpopular course of altering the clause of the constitution which required that the heir to the throne should belong to the Orthodox Church, and the Grand Sobranye, which was convoked at Trnovo in the summer, gave effect to this decision. The death of Prince Alexander, which took place in the autumn, and the birth of an heir, tended to strengthen the position of Prince Ferdinand, who now assumed a less compliant attitude towards the prime minister. In 1894 Stamboloff resigned office; a ministry was formed under Dr Sto'iloff, and Prince Ferdinand inaugurated a policy of conciliation towards Russia with a view to obtaining his recognition by the powers. A Russophil

reaction followed, large numbers of political refugees returned to Bulgaria, and Stamboloff, exposed to the vengeance of his enemies, was assassinated in the streets of Sofia (15th July 1895). The prince's plans were favoured by the death of the tsar Alexander III. in November 1894, and the reconciliation was practically effected by the conversion of his eldest son, Prince Boris, to the Orthodox faith (14th February 1896). The powers having signified their assent, he was nominated by the sultan prince of Bulgaria and governor-general of Eastern Rumelia (14th March). Russian influence now became predominant in Bulgaria, but the cabinet of St Petersburg wisely abstained from interfering in the internal affairs of the principality. In February 1896 Russia proposed the reconciliation of the Greek and Bulgarian churches and the removal of the exarch to Sofia. The project, which involved a renunciation of the exarch's jurisdiction in Macedonia, excited strong opposition in Bulgaria, and was eventually dropped. The death of Princess Marie- Louise (30th January 1899), caused universal regret in the country. , In the same month the Sto'iloff government, which had weakly tampered with the Macedonian movement (see Macedonia) and had thrown the finances into disorder, resigned, and a ministry under Grekoff succeeded, which endeavoured to mend the economic situation by means of a foreign loan. The loan, however, fell through, and in October a new government was formed under Ivanchoff and Radoslavoff. This, in its turn, was replaced by a cabinet d'affaires under General Petroff (January 1 901).

In the following March Karaveloff for the third time became prime minister. His efforts to improve the financial situation, which now became alarming, proved abortive, and in January 1902 a Tzankovist cabinet was formed under Daneff, who succeeded in obtaining a foreign loan. Russian influence now became predominant, and in the autumn the grand-duke Nicholas, General Ignatiev, and a great number of Russian officers were present at the consecration of a Russian church and monastery in the Shipka pass. But the appointment of Mgr. Firmilian, a Servian prelate, to the important see of Uskub at the instance of Russia, the suspected designs of that power on the ports of Varna and Burgas, and her unsympathetic attitude in regard to the Macedonian Question, tended to diminish her popularity and that of the government. A cabinet crisis was brought about in May 1903, by the efforts of the Russian party to obtain control of the army, and the Stam- bolovists returned to power under General Petroff. A violent recrudescence of the Macedonian agitation took place in the autumn of 1902; at the suggestion of Russia the leaders were imprisoned, but the movement

nevertheless gained force, and in August 1903 a revolt broke out in the vilayet of Monastir, subsequently spreading to the districts of northern Macedonia and Adrianople (see Macedonia). The barbarities committed by the Turks in repressing the insurrection caused great exaspera- tion in the principality; the reserves were partially mobilized, and the country was brought to the brink of war. In pursuance of the policy of Stamboloff, the Petroff government endeavoured to inaugurate friendly relations with Turkey, and a Turco- Bulgarian convention was signed (8th April 1904) which, however, proved of little practical value.

The outrages committed by numerous Greek bands in Macedonia led to reprisals on the Greek population in Bulgaria in the summer of 1906, and the town of Anchialo was partially destroyed. On the 6th of November in that year Petroff resigned, and Petkoff, the leader of the Stambolovist party, formed a ministry. The prime minister, a statesman of undoubted patriotism but of overbearing character, was assassinated on the nth of March 1907 by a youth who had been dismissed from a post in one of the agricultural banks, and the cabinet was reconstituted under Gudeff , a member of the same party.

Declaration of Independence. — During the thirty years of its existence the principality had made rapid and striking progress. Its inhabitants, among whom a strong sense of nationality had grown up, were naturally anxious to escape from the restrictions imposed by the treaty of Berlin. That Servia should be an

independent state, while Bulgaria, with its greater economic and military resources, remained tributary to the Sultan, was an anomaly which all classes resented; and although the Ottoman suzerainty was little more than a constitutional fiction, and the tribute imposed in 1878 was never paid, the Bulgarians were almost unanimous in their desire to end a system which made their country the vassal of a Moslem state notorious, for its maladministration and corruption. This desire was strengthened by the favourable reception accorded to Prince Ferdinand when he visited Vienna in February 1908, and by the so-called" Geshoff incident," i.e. the exclusion of M.. Geshoff, the Bulgarian agent, from a dinner given by Tewfik Pasha, the Ottoman minister for foreign affairs, to the ministers of all the sovereign states represented at Constantinople (12th of September 1908). This was interpreted as an insult to the Bulgarian nation, and as the explanation offered by the grand vizier was unsatisfactory, M. Geshoff was recalled to Sofia. At this time the bloodless revolution in Turkey seemed likely to bring about a

fundamental change in the settled policy of Bulgaria. For many years past Bulgarians had hoped that their own orderly and progressive government, which had contrasted so strongly with the . evils of Turkish rule, would entitle them to consideration, and perhaps to an accession of territory, when the time arrived for a definite settlement of the Macedonian Question. Now, however, the reforms introduced or foreshadowed by the Young Turkish party threatened to deprive Bulgaria of any pretext for future intervention; there was nothing to be gained by further acqui- escence in the conditions laid down at Berlin. An opportunity for effective action occurred within a fortnight of M. Geshoff 's recall, when a strike broke out on those sections of the Eastern Rumelian railways which were owned by Turkey and leased to the Oriental Railways Company. The Bulgarians alleged that during the strike Turkish troops were able to travel on the lines which were closed to all other traffic, and that this fact constituted a danger to their own autonomy. The government therefore seized the railway, in defiance of European opinion, and in spite of the protests of the suzerain power and the Oriental Railways Com- pany. The bulk of the Turkish army was then in Asia, and the new regime was not yet firmly established, while the Bulgarian government were probably aware that Russia would not inter- vene, and that Austria-Hungary intended to annex Bosnia arid Herzegovina, and thus incidentally to divert attention from their own violation of the treaty of Berlin. On the 5th of October Prince Ferdinand publicly proclaimed Bulgaria, united since the 6th of September 1885 (i.e. including Eastern Rumelia), an independent kingdom. This declaration was read aloud by the king in the church of the Forty Martyrs at Trnovo, the ancient capital of the Bulgarian tsars. The Porte immediately protested to the powers, but agreed to accept an indemnity. In February 1909 the Russian government proposed to advance to Bulgaria the difference between the £4,800,000 claimed by Turkey and the £1,520,000 which Bulgaria undertook to pay. A preliminary Russo-Turkish protocol was signed on the 16th of March, and in April, after the final agreement had been concluded, the inde- pendence of Bulgaria was recognized by the powers. Of the indemnity, £1,680,000 was paid on account of the Eastern Rumelian railways; the allocation of this sum between Turkey and the Oriental railways was submitted to arbitration. (See Turkey: History.)

Language and Literature Language. — The Bulgarian is at once the most ancient and the most modern of the languages which constitute the Slavonic group. In its groundwork it presents the nearest approach to the old ecclesiastical Slavonic, the liturgical language

common to all the Orthodox Slavs, but it has undergone more important modifications than any of the sister dialects in the simplification of its grammatical forms; and the analytical character of its development may be compared with that of the neo-Latin and Germanic languages. The introduction of the definite article, which appears in the form of a suffix, and the almost total disappearance of the ancient declensions, for which the use of

prepositions has been substituted, distinguish the Bulgarian from all the other members of the Slavonic family. Notwith- standing these changes, which give the language an essentially modern aspect, its close affinity with the ecclesiastical Slavonic, the oldest written dialect, is regarded as established by several eminent scholars, such as Safafik, Schleicher, Leskien and Brugman, and by many Russian philologists. These authorities agree in describing the liturgical language as " Old Bulgarian." A different view, however, is maintained by Miklosich, Kopitar and some others, who regard it as " Old Slovene." According to the more generally accepted theory, the dialect spoken by the Bulgarian population in the neighbourhood of Salonica, the birthplace of SS. Cyril and Methodius, was employed by the Slavonic apostles in their translations from the Greek, which formed the model for subsequent ecclesiastical literature. This view receives support from the fact that the two nasal vowels of the Church-Slavonic (the greater and lesser us), which have been modified in all the cognate languages except Polish, retain their original pronunciation locally in the neighbourhood of Salonica and Castoria; in modern literary Bulgarian the rhines- mus has disappeared, but the old nasal vowels preserve a peculiar pronunciation, the greater 4s changing to u, as in English " but," the lesser to e, as in " bet," while in Servian, Russian and Slovene the greater us becomes U or d, the lesser e or ya. The remnants of the declensions still existing in Bulgarian (mainly in pro- nominal and adverbial forms) show a close analogy to those of the old ecclesiastical language.

The Slavonic apostles wrote in the 9th century (St Cyril died in 869, St Methodius in 885), but the original manuscripts have not been preserved. The oldest existing copies, which date from the loth century, already betray the influence of the contempor- ary vernacular speech, but as the alterations introduced by the copyists are neither constant nor regular, it is possible to recon- struct the

original language with tolerable certainty. The " Old Bulgarian," or archaic Slavonic, was an inflexional language of the synthetic type, containing few foreign elements in its vocabulary. The Christian terminology was, of course, mainly Greek; the Latin or German words which occasionally occur were derived from Moravia and Pannonia, where the two saints pursued their mission- ary labours. In course of time it underwent considerable modi- fications, both phonetic and structural, in the various Slavonic countries in which it became the liturgical language, and the various MSS. are consequently classified as " Servian-Slavonic," " Croatian-Slavonic," " Russian-Slavonic," &c, according to the different recensions. The " Russian-Slavonic " is the liturgical language now in general use among the Orthodox Slavs of the Balkan Penin- sula owing to the great number of ecclesiastical books introduced from Russia in the 17th and 1 8th centuries; until comparatively recent times it was believed to be the genuine language of the Slavonic apostles. Among the Bulgarians the spoken language of the 9th century underwent important changes during the next three hundred years. The influence of these changes gradually asserts itself in the written language; in the period extending from the I2th to the 15'th century the writers still endeavoured to follow the archaic model, but it is evident that the vernacular had already become widely different from the speech of SS. Cyril and Methodius. The language of the MSS. of this period is known as the 'Middle Bulgarian" ; it stands midway between the old ecclesiastical Slavonic and the modern speech.

In the first half of the 16th century the characteristic features of the modern language became apparent in the literary monuments. These features undoubtedly displayed themselves at a much earlier period in the oral speech ; but the progress of their development has not yet been completely investigated. Much light may be thrown on this subject by the examination of many hitherto little-known manuscripts and by the scientific study of the folk-songs. In addition to the employment of the article, the loss of the noun- declensions, and the modification of the nasal vowels above alluded to, the disappearance in pronunciation of the final vowels yer-golem and yer-maluk, the loss of the infinitive, and the increased variety of the conjugations, distinguish the modern from the ancient lan- guage. The suffix-article, which is derived from the demonstrative pronoun, is a feature peculiar to the Bulgarian among Slavonic and to the Rumanian among Latin languages. This and other points of resemblance between these remotely related members of the Indo-European group are shared by the Albanian, probably the represen,-

tatiye of the old Illyrian language, and have consequently been attributed to the influence of the aboriginal speech of the Peninsula. A demonstrative suffix, however, is sometimes found in Russian and Polish, and traces of the article in an embryonic state occur in the "Old Bulgarian" MSS. of the 10th and nth centuries. In some Bulgarian dialects it assumes different forms according to the proximity or remoteness of the object mentioned. Thus zhena-ta is " the woman "; zhena-va or zhena-sa, " the woman close by ";

zhena-na, " the woman yonder." In the borderland between the Servian and Bulgarian nationalities the local use of the article supplies the means of drawing an ethnological frontier; it is nowhere more marked than in the immediate neighbourhood of the Servian population, as, for instance, at Dibra and Prilep. The modern Bulgarian has admitted many foreign elements. It contains about 2000 Turkish and 1000 Greek words dispersed in the various dialects; some Persian and Arabic words have entered through the Turkish medium, and a few Rumanian and Albanian words are found. Most of these are rejected by the purism of the literary language, which, however, has been compelled to borrow the phraseology of modern civilization from the Russian, French and other European languages. The dialects spoken in the kingdom may be classed in two groups — the eastern and the western. The main point of difference is the pronunciation of the letter yedvoino, which in the eastern has fre- quently the sound of ya, in the western invariably that of e in " pet." The literary language began in the western dialect under the twofold influence of Servian literature and the Church Slavonic. In a short time, however, the eastern dialect prevailed, and the influence of Russian literature became predominant. An anti-Russian reaction was initiated by Borgoroff (18 1 8-1 892), and has been maintained by numerous writers educated in the German and Austrian universities. Since the foundation of the university of Sofia the literary language has taken a middle course between the ultra-Russian models of the past generation and the dialectic Bulgarian. Little uniformity, however, has yet been attained in regard to diction, orthography or pronunciation.

The Bulgarians of pagan times are stated by the monk Khrabr, a contemporary of Tsar Simeon, to have employed a peculiar writing, of which inscriptions recently found near Kaspitchan may possibly be specimens. The earliest manuscripts of the " Old Bulgarian " are written in one or other of the two alphabets known as the glago- litic and Cyrillic (see Slavs). The former was used by Bulgarian writers concurrently with the Cyrillic down to the 12th century. Among the

orthodox Slavs the Cyrillic finally superseded the glago- litic; as modified by Peter the Great it became the Russian alphabet, which, with the revival of literature, was introduced into Servia and Bulgaria. Some Russian letters which are superfluous in Bulgarian have been abandoned by the native writers, and a few characters have been restored from the ancient alphabet.

Literature. — The ancient Bulgarian literature, originating in the works of SS. Cyril and Methodius and their disciples, con- sisted for the most part of theological works translated from the Greek. From the conversion of Boris down to the Turkish conquest the religious character predominates, and the influence of Byzantine literature is supreme. Translations of the gospels and epistles, lives of the saints, collections of sermons, exegetic religious works, translations of Greek chronicles, and miscellanies such as the Sbornik of St Sviatoslav, formed the staple of the national literature. In the time of Tsar Simeon, himself an author, considerable literary activity prevailed; among the more remarkable works of this period was the Shestodnev, or Hexameron, of John the exarch, an account of the creation. A little later the heresy of the Bogomils gave an impulse to contro- versial writing. The principal champions of orthodoxy were St Kosmas and the monk Athanas of Jerusalem; among the Bogomils the Questions of St Ivan Bogosloff, a work containing a description of the beginning and the end of the world, was held in high esteem. Contemporaneously with the spread of this sect a number of apocryphal works, based on the Scripture narrative, but embellished with Oriental legends of a highly imaginative character, obtained great popularity. Together with these religious writings works of fiction, also of Oriental origin, made their appearance, such as the life of Alexander the Great, the story of Troy, the tales of Stephanit and Ichnilat and Barlaam and Josaphat, the latter founded on the biography of Buddha. These were for the most part reproductions or varia- tions of the fantastical romances which circulated through Europe in the middle ages, and many of them have left traces in the national legends and folk-songs. In the 13th century, under the Asen dynasty, numerous historical works or chronicles (letopisi) were composed. State records appear to have existed, but none of them have been preserved. With the Ottoman con- quest literature disappeared; the manuscripts became the food of moths and worms, or fell a prey to the fanaticism of the Phanariot clergy. The library of the patriarchs of Trnovo was committed to the flames by the Greek metropolitan Hilarion in 1825.

The monk Pai'sii (born about 1720) and Bishop Sofronii (1739-1815) have already been mentioned as the precursors of the literary

revival. The Istoria Slaveno-Bolgarska (1762) of Pa'isii, written in the solitude of Mount Athos, was a work of little historical value, but its influence upon the Bulgarian race was immense. An ardent patriot, Pai'sii recalls the glories of the Bulgarian tsars and saints, rebukes his fellow-countrymen for allowing themselves to be called Greeks, and denounces the arbitrary proceedings of the Ph'anariot prelates. The Life and Sufferings of sinful Sofronii (1804) describes in simple and touching language the condition of Bulgaria at the beginning of the 19th century. Both works were written in a modified form of the church Slavonic. The first printed work in the vernacular appears to have been the Kyriakodromion, a translation of sermons, also by Sofronii, published in 1806. The Servian and Greek insurrections quickened the patriotic sentiments of the Bulgarian refugees and merchants in Rumania, Bessarabia and southern Russia, and Bucharest became the centre of their political and literary activity. A modest bukvar, or primer, published at Kronstadt by Berovitch in 1824, was the first product of the new movement. Translations of the Gospels, school reading-books, short histories and various elementary treatises now appeared. With the multiplication of books came the movement for establishing Bulgarian schools, in which the monk Neophyt Rilski (1793-1881) played a leading part. He was the author of the first Bulgarian grammar (1835) and other educational works, and translated the New Testament into the modern language. Among the writers of the literary renaissance were George Rakovski (1818-1867), a fantastic writer of the patriotic type, whose works did much to stimulate the national zeal, Liuben Karaveloff (1 837-1879), journalist and novelist, Christo Boteff (1847-1876), lyric poet, whose ode on the death of his friend Haji Dimitr, an insurgent leader, is one of the best in the language, and Petko Slavei'koff (died 1895), whose poems, patriotic, satirical and erotic, moulded the modern poetical language and exercised a great influence over the people. Gavril Krstovitch, formerly governor-general of eastern Rumelia, and Marin Drinoff, a Slavist of high repute, have written historical works. Stamboloff, the states- man, was the author of revolutionary and satirical ballads; his friend Zacharia Stoyanoff (d.1889), who began life as a shepherd, has left some interesting memoirs. The most distinguished Bulgarian man of letters is Ivan Vazoff (b. 1850), whose epic and lyric poems and prose works form the best specimens of the modern literary language. His novel Pod Igoto (Under the Yoke) has been trans- lated into several European languages. The best dramatic work

is Ivanko, a historical play by Archbishop Clement, who also wrote some novels. With the exception of Zlatarski's and Boncheff's geological treatises and contributions by Georgieff, Petkoff, Tosheff and Urumoff to Velnovski's Flora Bulgarica, no original works on natural science have as yet been produced ; a like dearth is apparent in the fields of philosophy, criticism and fine art, but it must be remembered that the literature is still in its infancy. The ancient folk-songs have been preserved in several valuable collections; though inferior to the Servian in poetic merit, they deserve scientific attention. Several periodicals and reviews have been founded in modern times. Of these the most important are the Periodicheskoe Spisanie, issued since 1869 by the Bulgarian Literary Society, and the Sbornik, a literary and scientific miscellany, formerly edited by Dr Shishmanoff, latterly by the Literary Society, and published by the government at irregular intervals.

Authorities. — C. J. Jirecek, Das Fiirstenihum Bulgarien (Prague, 1891), and Cesty po Bulharsku (Travels in Bulgaria), (Prague, 1888), both works of the first importance; Leon Lamouche, La Bulgarie dans le passe et le present (Paris, 1892); Prince Francis Joseph of Battenberg, Die Volkswirthschaftliche Entwicklung Bulgarians (Leipzig, 1891); F. Kanitz, Donau-Bulgarien und der Balkan (Leipzig, 1882); A. G. Drander, tenements politiques en Bulgarie (Paris, 1896); and Le Prince Alexandre de Battenberg (Paris, 1884); A. Strausz, Die Bulgaren (Leipzig, 1898); A. Tuma, Die ostliche Balkanhalbinsel (Vienna, 1886) ; A. de Gubernatis, La Bulgarie et les Bulgares (Florence, 1899) ; E. Blech, Consular Report on Bulgaria in 1889 (London, 1890); La Bulgarie contemporaine (issued by the Bulgarian Ministry of Commerce and Agriculture), (Brussels, 1905). Geology: F. Toula, Reisen und geologische Untersuchungen in Bulgarien (Vienna, 1890) ; J. Cvijic, " Die Tektonik der Balkanhalb- insel," in C.R. IX. Cong. geol. intern, de Vienne, pp. 348-370, with map, 1904. History : C.J. Jirecek, Geschichte der Bulgaren (Prague, 1876); (a summary in The Balkans, by William Miller, London, 1896); Sokolov, Iz drevnei istorii Bolgar (Petersburg, 1879); Uspenski, Obrazovanie vtorago Bolgarskago tsarstva (Odessa, 1879) ; Acta Bulgarian ecclesiastica, published by the South Slavonic Academy (Agram, 1887). Language: F. Miklosich, Vergleichende Grammatik (Vienna, 1879); an d Geschichte d. Lautbezcichnung im Bulgarischen (Vienna, 1883) ; A. Leskien, Handbuchd. altbulgarischen Sprache (with a glossary), (Wiemar, 1886); L. Miletich, Staro- blgarska Gramatika (Sofia, 1896) ; Das Ostbulgarische (Vienna, 1903) ; Labrov, Obzor zvulkovikh i formalnikh osobenostei Bolgar- skago yezika (Moscow,

1893); W. R. Morfill, A Short Grammar of the Bulgarian Language (London, 1897); F. Vymazal, Die Kunst die bulgarische Sprache leicht und schnell zu erlernen (Vienna, 1888). Literature: L. A. H. Dozon, Chansons populaires oulgares inedites (with French translations), (Paris, 1875); A. Strausz, Bulgarische Volksdichtungen (translations with a preface and notes), (Vienna and Leipzig, 1895) ; Lydia Shishmanov, Legendes religieuses bulgares

(Paris, 1896) ; Pypin and Spasovich, History of the Slavonic Literature (in Russian, St Petersburg, 1879), (French translation, Paris, 1 88 1) ; Vazov and Velitchkov, Bulgarian Chrestomathy (Philippopolis, 1884); Teodorov, Blgarska Literatura (Philippopolis, 1896); Collections of folk-songs, proverbs, &c, by the brothers Mila- dinov (Agram, 1861), Bezsonov (Moscow, 1855), Kachanovskiy (Petersburg, 1882), Shapkarev (Philippopolis, 1885), Iliev (Sofia, 1889), P. Slavei'kov (Sofia, 1899). See also The Shade of the Balkans, by Pencho Slavei'kov, H. Bernard and E. J. Dillon (London, 1904)- (J- D. B.)

BULGARIA, EASTERN, formerly a powerful kingdom which existed from the 5th to the 15th century on the middle Volga, in the present territory of the provinces of Samara, Simbirsk, Saratov and N. Astrakhan, perhaps extending also into Perm. The village Bolgari near Kanzafl, surrounded by numerous graves in which most interesting archaeological finds have been made, occupies the site of one of the cities — perhaps the capital — of that extinct kingdom. The history, Tarikh Bulgar, said to have been written in the 12th century by an Arabian cadi of the city Bolgari, has not yet been discovered; but the Arabian historians, Ibn Foslan, Ibn Haukal, Abul Hamid Andalusi, Abu Abdallah Harnati, and several others, who had visited the kingdom, begin- ning with the 10th century, have left descriptions of it. The Bulgars of the Volga were of Turkish origin, but may have assimilated Finnish and, later, Slavonian elements. In the 5th century they attacked the Russians in the Black Sea prairies, and afterwards made raids upon the Greeks. In 922, when they were converted to Islam, Ibn Foslan found them not quite nomadic, and already having some permanent settlements and houses in wood. Stone houses were built soon after that by Arabian architects. Ibn Dasta found amongst them agriculture besides cattle breeding. Trade with Persia and India, as also with the Khazars and the Russians, and undoubtedly with Biarmia (Urals), was, however, their chief occupation, their main riches being furs, leather, wool, nuts, wax and so on. After their conversion to Islam they began building forts, several of which are mentioned in Russian annals. Their chief town,

Bolgari or Velikij Gorod (Great Town) of the Russian annals, was often raided by the Russians. In the 13 th century it was conquered by the Mongols, and became for a time the seat of the kharjs of. the Golden Horde. In the second half of the 15th century Bolgari became part of the Kazan kingdom, lost its commercial and political importance, and was annexed to Russia after the fall of Kazan. (P. A. K.)

BULGARUS, an Italian jurist of the 12th century, born at Bologna, sometimes erroneously called Bulgarinus, which was properly the name of a jurist of the 15th century. He was the most celebrated of the famous " Four Doctors " of the law school of that university, and was regarded as the Chrysostom of the Gloss- writers, being frequently designated by the title of the " Golden Mouth " (os aureum). He died in 1166 a.d., at a very advanced age. Popular tradition represents all the Four Doctors (Bulgarus, Martinus Gosia, Hugo de Porta Ravennate and Jacobus de Boragine) as pupils of Irnerius (q.v.), but while there is no insuperable difficulty in point of time in accepting this tradition as far as regards Bulgarus, Savigny considers the general tradition inadmissible as regards the others. Martinus Gosia and Bulgarus were the chiefs of two opposite schools at Bologna, corresponding in many respects to the Proculians and Sabinians of Imperial Rome, Martinus being at the head of a school which accommodated the law to what his opponents styled the equity of " the purse " (aequitas bursalis), whilst Bulgarus adhered more closely to the letter of the law. The school of Bulgarus ultimately prevailed, and it numbered amongst its adherents Joannes Bassianus, Azo and Accursius, each of whom in his turn exercised a commanding influence over the course of legal studies at Bologna. Bulgarus took the leading part amongst the Four Doctors at the diet of Roncaglia in n 58, and was one of the most trusted advisers of the emperor Frederick I. His most celebrated work is his commentary De Regulis Juris, which was at one time printed amongst the writings of Placentius, but has been properly reassigned to its true author by Cujacius, upon the internal evidence contained in the additions annexed to it, which are undoubtedly from the pen of Placentinus. This

Commentary, which is the earliest extant work of its kind emanating from the school of the Gloss-writers, is, according to Savigny, a model specimen of the excellence of the method introduced by

Irnerius, and a striking example of the brilliant results which had been obtained in a short space of time by a constant and exclusive study of the sources of law.

BULL, GEORGE (1634-1710), English divine, was born at Wells on the 25th of March 1634, and educated at Tiverton school, Devonshire. He entered Exeter College, Oxford, in 1647, but had to leave in 1649 in consequence of his refusal to take the oath of allegiance to the Commonwealth. He was ordained privately by Bishop Skinner in 1655. His first benefice held was that of St George's near Bristol, from which he rose successively to be rector of Suddington in Gloucestershire (1658), prebendary of Gloucester (1678), archdeacon of Llandaff (1686), and in 1705 bishop of St David's. He died on the 17th of February 17 10. During the time of the Commonwealth he adhered to the forms of the Church of England, and under James II. preached strenuously against Roman Catholicism. His works display great erudition and powerful thinking. The Harmonia A postolica (1670) is an attempt to show the fundamental agreement between the doctrines of Paul and James with regard to justification. The Defensio Fidei Nicenae (1685), his greatest work, tries to show that the doctrine of the Trinity was held by the ante- Nicene fathers of the church, and retains its value as a thorough- going examination of all the pertinent passages in early church literature. The Judicium Ecclesiae Catholicae (1694) and Primiliva et A postolica Traditio (17 10) won high praise from Bossuet and other French divines. Following on Bossuet's criticisms of the Judicium, Bull wrote .a treatise on The Corrup- tions of the Church of Rome, which became very popular.

The best edition of Bull's works is that in 7 vols., published at Oxford by the Clarendon Press, under the superintendence of E. Burton, in 1827. This edition contains the Life by Robert Nelson. The Harmonia, Defensio and Judicium are translated in the Library of Anglo-Catholic Theology (Oxford, 1842-1855).

BULL, JOHN (c. 1562-1628), English composer and organist, was born in Somersetshire about 1562. After being organist in Hereford cathedral, he joined the Chapel Royal in 1585, and in the next year became a Mus. Bac. of Oxford. In 1591 he was appointed organist in Queen Elizabeth's chapel in succession to Blitheman, from whom he had received his musical education. In 1592 he received the degree of doctor of music at Cambridge University; and in 1596 he was made music professor at Gresham College, London. As he was unable to lecture in Latin according to the foundation-rules of that college, the executors of Sir Thomas Gresham made a dispensation in his

favour by permitting him to lecture in English. He gave his first lecture on the 6th of October 1597. In 1601 Bull went abroad. He visited France and Germany, and was everywhere received with the respect due to his talents. Anthony Wood tells an impossible story of how at St Omer Dr Bull performed the feat of adding, within a few hours, forty parts to a composition already written in forty parts. Honourable employments were offered to him by various continental princes; but he declined them, and returned to England, where he was given the freedom of the Merchant Taylors' Company in 1606. He played upon a small pair of organs before King James I. on the 16th of July 1607, in the hall of the Company, and he seems to have been appointed one of the king's organists in that year. In the same year he resigned his Gresham professorship and married Elizabeth Walter. In 16 13 he again went to the continent on account of his health, obtaining a post as one of the organists in the arch- duke's chapel at Brussels. In 161 7 he was appointed organist to the cathedral of Notre Dame at Antwerp, and he died in that city on the 12th or 13th of March 1628. Little of his music has been published, and the opinions of critics differ much as to its merits (see Dr Willibald Nagel's Geschichte der Musik in England, ii. (1897), p. 155, &c. ; and Dr Seiffert's Geschichte der Klavier- musik (1899), p. 54, &c). Contemporary writers speak in the highest terms of Bull's skill as a performer on the organ and the virginals, and there is no doubt that he contributed much to the development of harpsichord music. Jan Swielinck (1562-

162 1), the great organist of Amsterdam, did not regard his work on composition as complete without placing in it a. canon by John Bull, and the latter wrote a fantasia upon a fugue of Swielinck. For the ascription to Bull of the composition of the British national anthem, see National Anthems. Good modern reprints, e.g. of the Fitzwilliam Virginal-Book, " The King's Hunting Jig," and one or two other pieces, are in the repertories of modern pianists from Rubinstein onwards.

BULL, OLE BORNEMANN (1810-1880), Norwegian violinist, was born in Bergen, Norway, on the 5th of February 1810. At first a pupil of the violinist Paulsen, and subsequently self-taught, he was intended for the church, but failed in his examinations in 1828 and became a musician, directing the philharmonic and dramatic societies at Bergen. In 1829 he went to Cassel, on a visit to Spohr, who gave him no encouragement. He now began to study law, but on going to Paris he came under the influence of Paganini, and definitely adopted the career of a violin virtuoso. He made his first appearance in company with Ernst and Chopin at a concert of his

own in Paris in 1832. Successful tours in Italy and England followed soon afterwards, and he was not long in obtaining European celebrity by his brilliant playing of his own pieces and arrangements. His first visit to the United States lasted from 1843 to J845, and on his return to Norway he formed a scheme for the establishment of a Norse theatre in Bergen; this became an accomplished fact in 1850; but in consequence of harassing business complications he went again to America. During this visit (1852-1857) he bought 125,000 acres in Potter county, Pennsylvania^ for a Norwegian colony, which was to have been called Oleana after his name; but his title turned out to be fraudulent, and the troubles he went through in connexion with the undertaking were enough to affect his health very seriously, though not to hinder him for long from the exercise of his profession. Another attempt to found an academy of music in Christiania had no permanent result. In 1836 he had married Alexandrine Felicie Villeminot, the grand-daughter of a lady to whom he owed much at the beginning of his musical career in Paris; she died in 1862. In 1870 he married Sara C. Thorpe of Wisconsin; henceforth he confined himself to the career of a violinist. He died at Lyso, near Bergen, on the 17th of August i88ol Ole Bull's " polacca guerriera " and many of his other violin pieces, among them two concertos, are interesting to the virtuoso, and his fame rests upon his prodigious technique. The memoir published by his widow in 1886 contains many illustrations of a career that was exceptionally brilliant; it gives a picture of a strong individuality, which often found expression in a somewhat boisterous form of practical humour.

There is a fountain and portrait statue to his memory in the Ole Bulls Plads in Bergen.

BULL. (1) The male of animals belonging to the section Bovina of the family Bovidae (q.v.), particularly the uncastrated male of the domestic ox (Bostaurus). (See Cattle.) The word, which is found in M.E. as bole i bolle (cf. Ger. Bulle, and Dutch bul or bol), is also used of the males of other animals of large size, e.g. the elephant, whale, &c. The O.E. diminutive form bulluc, meaning originally a young bull, or bull calf, survives in bullock, now confined to a young castrated male ox kept for slaughter for beef.

On the London and New York stock exchanges " bull " and " bear " are correlative technical slang terms. A " bull " is one who " buys for a rise," i.e. he buys stocks or securities, grain or other commodities (which, however, he never intends to take up), in the hope that before the date on which he must take delivery he will be able to sell the stocks, &c, at a higher price, taking as a profit the difference

between the buying and selling price. A ” bear ” is the reverse of a ” bull.” He is one who ” sells for a fall,” i.e. he sells stock, &c, which he does not actually possess, in the hope of buying it at a lower price before the time at which he has contracted to deliver (see Account; Stock Exchange). The word ” bull,” according to the New English Dictionary, was used in this sense as early as the beginning of the 18th century. The origin of the use is not known, though it is tempting to connect it with the fable of the frost and the buIL

The term ” bull’s eye ” is applied to many circular objects, and particularly to the boss or protuberance left in the centre of a sheet of blown glass. This when cut off was formerly used for Windows in small leaded panes. The French term ceil de bceuf is used of a circular window. Other circular objects to which the word is applied are the centre of a target or a shot that hits the central division of the target, a plano-convex lens in a microscope, a lantern with a convex glass in it, a thick circular piece of glass let into the deck or side of a ship, &c, for lighting the interior, a ring-shaped block grooved round the outer edge, and with a hole through the centre through which a rope can be passed, and also a small lurid cloud which in certain latitudes presages a hurricane.

(2) The use of the word ” bull,” for a verbal blunder, involving a contradiction in terms, is of doubtful origin. In this sense it is used with a possible punning reference to papal bulls in Milton’s True Religion, ” and whereas the Papist boasts himself to be a Roman Catholick, it is a mere contradiction, one of the Pope’s Bulls, as if he should say a universal particular, a Catho- lick schismatick.” Probably this use may be traced to a M.E. word but, first found in the Cursor Mundi, c, 1300, in the sense of falsehood, trickery, deceit; the New English Dictionary com- pares an O. Fr. boul, boule or bole, in the same sense. Although modern associations connect this type of blunder with the Irish, possibly owing to the many famous ” bulls ” attributed to Sir Boyle Roche (?.».), the early quotations show that in the 17th century, when the meaning now attached to the word begins, no special country was credited with them.

(3) Bulla (Lat for ” bubble “), which gives us another ” bull ” in English, was the term used by the Romans for any boss or stud, such as those on doors, sword-belts, shields and boxes. It was applied,

however, more particularly to an ornament, generally of gold, a round or heart-shaped box containing an amulet, worn suspended from the neck by childern of noble birth until they assumed the toga virilis, when it was hung up and dedicated to the household gods. The custom of wearing the bulla, which was regarded as a charm against sickness and the evil eye, was of Etruscan origin. After the Second Punic War all children of free birth were permitted to wear it; but those who did not belong to a noble or wealthy family were satisfied with a bulla of leather. Its use was only permitted to grown-up men in the case of generals who celebrated a triumph. Young girls (probably till the time of their marriage), and even favourite animals, also wore it (see Ficoroni, La Bolla d' Oro, 1732; Yates, Archaeological Journal, vi., 1849; viii., 1851). In ecclesiastical and medieval Latin, bulla denotes the seal of oval or circular form, bearing the name and generally the image of its owner, which was attached to official documents. A metal was used instead of wax in the warm countries of southern Europe. The best- known instances are the papal bullae, which have given their name to the documents (bulls) to which they are attached. (See Diplomatic; Seals; Curia Romana; Golden Bull.)

BULLER, CHARLES (1 806-1 848), English politician, son of Charles Buller (d. 1848), a member of a well-known Cornish family (see below), was born in Calcutta on the 6th of August 1806; his mother, a daughter of General William Kirkpatrick, was an exceptionally talented woman. He was educated at Harrow, then privately in Edinburgh by Thomas Garlyle, and afterwards at Trinity College, Cambridge, becoming a barrister in 1831. Before this date, however, he had succeeded his father as member of parliament for West Looe; after the passing of the Reform Bill of 1832 and the consequent disenfranchisement of this borough, he was returned to parliament by the voters of Liskeard. He retained this seat until he died in London on the 29th of November 1848, leaving behind him, so Charles Greville says, " a memory cherished for his delightful social qualities and a vast credit for undeveloped powers." An eager reformer and a friend of John Stuart Mill, Buller voted for the great Reform Bill, favoured other progressive measures, and presided over the committee on the state of the records and the one ap- pointed to inquire into the state of election law in Ireland in 1836. In 1838 he went to Canada with Lord Durham as private

secretary, and after rendering conspicuous service to his chief, returned with him to England in the same year. After practising as a barrister, Buller was made judge-advocate-general in 1846, and became chief commissioner of the poor law about a yea? before his

death. For a long time it was believed that Buller wrote Lord Durham's famous " Report on the affairs of British North America." However, this is now denied by several authorities, among them being Durham's biographer, Stuart J. Reid, who mentions that Buller described this statement as a "groundless assertion" in an article which he wrote for the Edinburgh Review. Nevertheless it is quite possible that the " Report " was largely drafted by Buller, and it almost certainly bears traces of his influence. Buller Was a very talented man, witty, popular and generous, and is described by Carlyle as " the genialest radical I have ever met." Among his intimate friends were Grote, Thackeray, Monckton Milnes and Lady Ashburton. A bust of Buller is in Westminster Abbey, and another was unveiled at Liskeard in 1905. He wrote " A Sketch of Lord Durham's mission to Canada," which has not been printed.

See T. Carlyle, Reminiscences (1881); and S. J. Reid, Life and Letters of the 1st earl of Durham (1906).

BULLER, SIR REDVERS HENRY (1839-1908), British general, son of James Wentworth Buller, M.P., of Crediton, Devonshire, and the descendant of an old Cornish family, long established in Devonshire, tracing its ancestry in the female line to Edward I., was born in 1830, and educated at Eton. He entered the army in 1858, and served with the 60th (King's Royal Rifles) in the China campaign of i860. In 1870 he became captain, and went on the Red River expedition, where he was first associated with Colonel (afterwards Lord) Wolseley. In 1873-74 he accompanied the latter in the Ashantee campaign as head of the Intelligence Department, and was slightly wounded at the battle of Ordabai; he was mentioned in des- patches, made a C.B., and raised to the rank of major. In 1874 he inherited the family estates, In the Kaffir War of 1878ˆ79 and the Zulu War of 1879 he was conspicuous as an intrepid and popular leader, and acquired a reputation for courage land dogged determination. In particular his conduct of the retreat at Inhlobane (March 28, 1879) drew attention to these qualities, and on that occasion he earned the V.C.; he was also created C.M.G. and made lieutenant-colonel and A.D.C. to the queen; In the Boer War of 188 1 he was Sir Evelyn Wood's chief of staff; and thus added to his experience of South African conditions of warfare. In 1882 he was head of the field intelligence depart- ment in the Egyptian campaign, and was knighted for his ser- vices. Two years later he commanded an infantry brigade in the Sudan under Sir Gerald Graham, and was at the battles of El Teb and Tamai, being promoted major-general for distin- guished service. In the Sudan campaign of 1884-85 he was Lord Wolseley's chief of staff, and he was given command of the

desert column when Sir Herbert Stewart was wounded; He distinguished himself by his conduct of the retreat from Gubat to Gakdul, and by his victory at Abu Klea (February 16-17), and he was created K.C.B. In 1886 he was sent to Ireland to inquire into the " moonlighting " outrages, and for a short time he acted as under-secretary for Ireland; but in 1887 he was appointed quartermaster-general at the war office. From 1890 to 1897 he held the office of adjutant-general, attaining the rank of lieutenant-general in 1891. At the war office his energy and ability inspired the belief that he was fitted for the highest command, and in 1895, when the duke of Cambridge was about to retire, it was well known that Lord Rosebery's cabinet in- tended to appoint Sir Redvers as chief of the staff under a scheme of reorganization recommended by Lord Harrington's commission. On the eve of this change, however, the govern- ment was defeated, and its successors appointed Lord Wolseley to the command under the old title of commander-in-chief. In 1896 he was made a full general.

In 1898 he took command of the troops at Aldershot, and when the Boer War broke out in 1899 he was selected to command the South African Field Force (see Traksvaal), and landed

at Cape Town on the 31st of October. Owing to the Boer investment of Ladysmith and the consequent gravity of the military situation in Natal, he unexpectedly hurried thither in order to supervise personally the operations, but on the 15th of December his first attempt to cross the Tugela at Colenso (see Ladysmith) was repulsed. The government, alarmed at the situation and the pessimistic tone of Buller's messages, sent out Lord Roberts to supersede him in the chief command, Sir Redvers being left in subordinate command of the Natal force. His second attempt to relieve Ladysmith (January 10-27) proved another failure, the result of the operations at Spion Kop (January 24) causing consternation in England. A third attempt (Vaalkrantz, February 5-7) was unsuccessful, but the Natal army finally accomplished its task in the series of actions which culminated in the victory of Pieter's Hill and the relief of Ladysmith on the 27th of February. Sir Redvers Buller remained in command of the Natal army till October 1900, when he returned to England (being created G.C.M.G.), having in the meanwhile slowly done a great deal of hard work in driving the Boers from the Biggarsberg (May 15), forcing Lang's Nek (June 12), and occupying Lydenburg

(September 6). But though these latter operations had done much to re-establish his reputation for dogged determination, and he had never lost the confidence of his own men, his capacity for an important command in delicate and difficult operations was now seriously questioned. The continuance, therefore, in 1901 of his appoint- ment to the important AJdershot command met with a vigorous press criticism, in which the detailed objections taken to his conduct of the operations before Ladysmith (and particularly to a message to Sir George White in which he seriously contem- plated and provided for the contingency of surrender) were given new prominence. On the 10th of October 1901, at a luncheon in London, Sir Redvers Buller made a speech in answer to these criticisms in terms which were held to be a breach of discipline, and he was placed on half-pay a few days later. For the remaining years of his life he played an active part as a country gentleman, accepting in dignified silence the prolonged attacks on his failures in South Africa; among the public generally, and particularly in his own county, he never lost his popularity. He died on the 2nd of June 1908. He had married in 1882 Lady Audrey, daughter of the 4th Marquess Townshend, who survived him with one daughter.

A Memoir, by Lewis Butler, was published in 1909.

BULLET (Fr. boulet, diminutive of boule, ball). The original meaning (a " small ball ") has, since the end of the 16th century, been narrowed down to the special case of the projectile used with small arms of all kinds, irrespective of its size or shape. (For details see Ammunition; Gun; Rifle, &c.)

BULL-FIGHTING, the national Spanish sport. The Spanish name is tauromaquia (Gr. ravpos, bull, and paxo, combat). Combats with bulls were common in ancient Thessaly as well as in the amphitheatres of imperial Rome, but probably partook more of the nature of worrying than fighting, like the bull-baiting formerly common in England. The Moors of Africa also possessed a sport of this kind, and it is probable that they introduced it into Andalusia when they conquered that province. It is certain that they held bull-fights in the half-ruined Roman amphitheatres of Merida, Cordova, Tarragona, Toledo and other places, and that these constituted the favourite sport of the Moorish chieftains. Although patriotic tradition names the great Cid himself as the original Spanish bull-fighter, it is probable that the first Spaniard to kill a bull in the arena was Don Rodrigo Diaz de Vivar, who about 1040, employing the lance, which remained for centuries the chief weapon used in the sport, proved himself superior to the flower of the Moorish knights. A

spirited rivalry in the art between the Christian and Moorish warriors resulted, in which even the kings of Castile and other Spanish princes took an ardent interest. After the Moors were driven from Spain by Ferdinand II., bull-fighting continued to be the favourite sport of the aristocracy, the method of fighting being on horseback with the lance. At the time of the accession of the house of Austria it had become an

indispensable accessory of every court function, and Charles V. ensured his popularity with the people by killing a bull with his own lance on the birthday of his son, Philip II. Philip IV. is also known to have taken a personal part in bull-fights. During this period the lance was discarded in favour of the short spear (rejoncillo), and the leg armour still worn by the picadores was introduced. The accession of the house of Bourbon witnessed a radical transformation in the character of the bull- fight, which the aristocracy began gradually to neglect, admitting to the combats professional subordinates who, by the end of the 17 th century, had become the only active participants in the bull-ring. The first great professional espada (i.e. swordsman, the chief bull-fighter, who actually kills the bull) was Francisco Romero, of Ronda in Andalusia (about 1700), who introduced the estoque, the sword still used to kill the bull, and the muleta, the red flag carried by the espada (iee below), the spear falling into complete disuse.

For the past two centuries the ait of bull-fighting has developed gradually into the spectacle of to-day. Imitations of the Spanish bull-fights have been repeatedly introduced into France and Italy, but the cruelty of the sport has prevented its taking firm root. In Portugal a kind of bull-baiting is practised, in which neither man nor beast is much hurt, the bulls having their horns truncated and padded and never being killed. In Spain many vain attempts have been made to abolish the sport, by Ferdinand II. himself, instigated by his wife Isabella, by Charles III., by Ferdinand VI., and by Charles IV.; and several popes placed its devotees under the ban of excommunication with no perceptible effect upon its popularity. Before the introduction of railways there were comparatively few bull- rings {plazas de toros) in Spain, but these have largely multiplied in recent years, in both Spain and Spanish America. At the present day nearly every larger town and city in Spain has its plaza de toros (about 225 altogether), built in the form of the Roman circuses with an oval open arena covered with sand, surrounded by a stout fence about 6 ft. high. Between this and the seats of the spectators is a narrow passage-way, where those bull-fighters who are not at the moment engaged take their stations. The plazas de toros are of all sizes, from

that of Madrid, which holds more than 12,000 spectators, down to those seating only two or three thousand. Every bull-ring has its hospital for the wounded, and its chapel where the toreros (bull-fighters) receive the Holy Eucharist.

The bulls used for fighting are invariably of well-known lineage and are reared in special establishments (vacddas), the most celebrated of which is now that of the duke of Veragua in Andalusia. When quite young they are branded with the emblems of their owners, and later are put to a test of their courage, only those that show a fighting spirit being trained further. When full grown, the health, colour, weight, character of horns, and action in attack are all objects of the keenest observation and study. The best bulls are worth from £40 to £60. About 1300 bulls are killed annually in Spain. Bull- fighters proper, most of whom are Andalusians, consist of espadas (or matadores) , banderilleros and picadores, in addition to whom there are numbers of assistants (chulos), drivers and other servants. For each bull-fight two or three espadas are engaged, each providing his own quadrille (cuadrilla), composed of several banderilleros and picadores. Six bulls are usually killed during one corrida (bull-fight), the espadas engaged taking them in turn. The espada must have passed through a trying novitiate in the art at the royal school of bull-fighting, after which he is given his alternativa, or licence.

The bull-fight begins with a grand entry of all the bull-fighters with alguaciles, municipal officers in ancient costume, at the head, followed, in three rows, by the espadas, banderilleros, picadores, chulos and the richly caparisoned triple mule-team used to drag from the arena the carcasses of the slain bulls and horses. The greatest possible brilliance of costume and accoutre- ments is aimed at, and the picture presented is one of dazzling colour. The espadas and banderilleros wear short jackets and small-clothes of satin richly embroidered in gold and ; silver, with

light silk stockings and heelless shoes; the picadores (pikemeri on horseback) usually wear yellow, and their legs are enclosed in steel armour covered with leather as a protection against the horns of the bull.

The fight is divided into thi je divisions (suertes) . When the opening

procession has passed round the arena the president of the corrida, usually some person of rank, throws down to one of the alguaciles the key to the toril, or bull-cells. As soon as the supernumeraries have left the ring, and the picadores, mounted upon blindfolded horses in Wretched condition, have taken their places against the barrier, the door of the toril is opened, and the bull, which has been goaded into fury by the affixing to his shoulder of an iron pin with streamers of the colours of his breeder attached, enters the ring. Then begins the suerte de picar, or division of lancing. The bull at once attacks the mounted picadores, ripping up and wounding the horses, often to the point of complete disembowelment. As the bull attacks the horse, the picador, who is armed with a short-pointed, stout pike (garrocha), thrusts this into the bull's back with all his force, with the usual result that the bull turns its attention to another picador. Not infrequently, however, the rush of the bull and the blow dealt to the horse is of such force as to overthrow both animal and rider, but the latter is usually rescued from danger by the chulos and banderilleros, who, by means of their red cloaks (capas), divert the bull from the fallen picador, who either escapes from the ring or mounts a fresh horse, The number of horses killed in this manner is one of the chief features of the fight, a bull's prowess being reckoned accordingly. About 6000 horses are killed every year in Spain. At the sound of a trumpet the picadores retire from the ring, the dead horses are dragged out, and the second division of the fight, the suerte de handerillear, or planting the darts, begins. The banderillas are barbed darts about 18 in. long, ornamented with coloured paper, one being held in each hand of the bull-fighter, who, standing 20 or 30 yds. from the bull, draws its attention to him by means of violent gestures. As the bull charges, the banderillera steps towards him, dexterously plants both darts in the beast's neck, and draws aside in the nick of time to avoid its horns. Four pairs of banderillas are planted in this way, rendering the bull mad with rage and pain. Should the animal prove of a cowardly nature and refuse to attack repeatedly, banderillas de fuego (fire) are used. These are furnished with fulminating crackers, which explode with terrific noise as the bull careers about the ring. During this division numerous manoeuvres are sometimes in- dulged in for the purpose of tiring the bull out, such as leaping between his horns, vaulting over his back with the garrocha as he charges, and inviting His rushes by means of elaborate flaunt- ings of the cloak (floreos, flourishes).

Another trumpet-call gives the signal for the final division of the fight, the suerte de matdr (killing). This is carried out by the espada alone, his assistants being present only in the case of emergency or to

get the bull back to the proper part of the ring, should he bolt to a distance. The espada, taking his stand before the box of the president, holds aloft in his left hand sword and muleta and in his right his hat, and in set phrases formally dedicates ibrinde) the death of the bull to the president or some other personage of rank, finishing by tossing his hat behind his back and proceeding bareheaded to the work of killing the bull. This is a process accompanied by much formality. The espada, armed with the estoque, a sword with a heavy flat blade, brings the bull into the proper position by means of passes with the muleta, a small red silk flag mounted on a short staff, and then essays to kill him with a single thrust, delivered through the back of the neck close to the head and downward into the heart. This stroke is a most difficult one, requiring long practice as ; well as great natural dexterity, and very frequently fails of its object, the killing of the bull often requiring repeated thrusts. The stroke (estocada) is usually given d wlapti (half running), the espada delivering the thrust while stepping forward, the bull usually standing still. Another method is recibiSndo (receiving), the espada receiving the onset of the bull upon the point of his sword. Should the bull need a coup de grace, it is given by a

ckulo, called puntilliro, with a dagger which pierces the spinal marrow. The dead beast is then dragged out of the ring by the triple mule- team, while the espada makes a tour of honour, being acclaimed, in the case of a favourite, with the most extravagant enthusiasm. The ring is then raked over, a second bull is intro-duced, and the spectacle begins anew. Upon great occasions, such as a coronation, a corrida in the ancient style is given by amateurs, who are clad in gala costumes without armour of any kind, and mounted upon steeds of good breed and condition. They are armed with sharp lances, with which they essay to kill the bull while protecting themselves and their steeds from his horns. As the bulls in these encounters have not been weakened by many wounds and tired out by much running, the perform- ances of the gentlemen fighters are remarkable for pluck and dexterity.

See Moratin, Origen y Progeso de las Fiestas de Toros; Bedoya's Historia del Toreo ; J . S. Lozano, Manual de Tauromaquia (Seville, 1882) ; A. Chapman and W. T. Buck, Wild Spain (London, 1893).

BULLFINCH (Pyrrhula vulgaris), the ancient English name given to a bird belonging to the family Fringillidae (see Finch), of a bluish-grey and black colour above, and generally of a bright tile-red beneath, the female differing chiefly in having its under •■ parts chocolate-brown. It is a shy bird, not associating with other species, and

frequents well-wooded districts, being very rarely seen on moors or other waste lands. It builds a shallow nest composed of twigs lined with fibrous roots, on low trees or thick underwood, only a few feet from the ground, and lays four or five eggs of a bluish-white colour speckled and streaked with purple. The young remain with their parents during autumn and winter, and pair in spring, not building their nests, however, till May. In spring and summer they feed on the buds of trees and bushes, choosing, it is said, such only as contain the incipient blossom, and thus doing immense injury to orchards and gardens. In autumn and winter they feed principally on wild fruits and on seeds. The note of the bullfinch; in the wild state, is soft and pleasant, but so low as scarcely to be audible; it- possesses, however, great powers of imitation, and considerable memory, and can thus be taught to whistle a variety of tunes. Bullfinches are very abundant in the forests of Germany, and it is there that most of the piping bullfinches are trained. They are taught continuously for nine months, and the lesson is repeated through- out the first moulting, as during that change the young birds are apt to forget all that they have previously acquired. The bull- finch is a native of the northern countries of Europe, occurring in Italy and other southern parts only as a winter visitor. White and black varieties are occasionally met with; the latter are often produced by feeding the bullfinch exclusively on hemp- seed, when its plumage gradually changes to black. It rarely breeds in confinement, and hybrids between it and the canary have been produced on but few occasions.

BULLI, a town of Camden county, New South Wales, Aus- tralia, 59 m. by rail S. of Sydney. Pop. (1901) 2500. It is the headquarters of the Bulli Mining Company, whose coal-mine on the flank of the Ulawarra Mountains is worked by a tunnel, 2 m. long, driven into the heart of the mountain. From this tunnel the coal is conveyed by rail for ij m. to a pier, whence it is shipped to Sydney, Melbourne and Brisbane by a fleet of steam colliers. The beautiful Bulli Pass, 1000 ft. above the sea, over the Illawarra range, is one of the most attractive tourist resorts in Australia.

BULLINGER, HEINRICH (1504-1575), Swiss reformer, son of Dean Heinrich Bullinger by his wife Anna (Wiederkehr), was born at Bremgarten, Aargau, on the 18th of July 1504. He studied at Emmerich and Cologne, where the teaching of Peter Lombard led him, through Augustine and Chrysostom, to first- hand study of the Bible. Next the writings of Luther and Melanchthon appealed to him. Appointed teacher (1522) in the cloister school of Cappel, he lectured on Melanchthon's Loci Communes (1521). He heard Zwingli at Zurich in 1527, and next year accompanied him to the disputation

at Berne. He was made pastor of Bremgarten in 1529, and married Anna Adlisch- weiler, a nun, by whom he had eleven children. After the battle

of Cappel (nth of October 1531), in which Zwingli fell, he left Bremgarten. On the 9th of December 1531 he was chosen to succeed Zwingli as chief pastor of Zurich. A strong writer and thinker, his spirit was essentially unifying and sympathetic, in an age when these qualities won little sympathy. His contro- versies on the Lord's Supper with Luther, and his correspondence with Lelio Sozini (see Socinus), exhibit, in different connexions, his admirable mixture of dignity and tenderness. With Calvin he concluded (1549) the Consensus Tigurinus on the Lord's Supper. The (second) Helvetic Confession (1566) adopted in Switzerland, Hungary, Bohemia and elsewhere, was his work. The volumes of the Zurich Letters, published by the Parker Society, testify to his influence on the English reformation in later stages. Many of his sermons were translated into English (reprinted, 4 vols., 1849). His works, mainly expository and polemical, have not been collected. He died at Zurich on the 17th of September 1575.

See Carl Pestalozzi, Leben (1858); Raget Christoffel, H. Bullinger (1875) ; Justus Heer, in Hauck's Realencyklopddie (1897). (A. Go.)*

BULLION, a term applied to the gold and silver of the mines brought to a standard of purity. The word appears in an English act of 1336 in the French form " puissent sauvement porter a les exchanges ou bullion . . . argent en plate, vessel d'argent, &c"; and apparently it is connected with bouillon, the sense of " boiling " being transferred in English to the melt- ing of metal, so that bullion in the passage quoted meant " melting-house " or " mint." The first recorded instance of the use of the word for precious metal as such in the mass is in an act of 1451. From the use of gold and silver as a medium of exchange, it followed that they should approximate in all nations to a common degree of fineness; and though this is not uniform even in coins, yet the proportion of alloy in silver, and of carats alloy to carats fine in gold, has been reduced to in- finitesimal differences in the bullion of commerce, and is a prime element of value even in gold and silver plate, jewelry, and other articles of manufacture. Bullion, whether in the form of coins, or of bars and ingots stamped, is

subject, as a general rule of the London market, not only to weight but to assay, and receives a corresponding value.

BULLOCK, WILLIAM (c. 1657-c. 1740), English actor, "of great glee and much comic vivacity," was the original Clincher in Farquhar's Constant Couple (1699), Boniface in The Beaux' Stratagem (1707), and Sir Francis Courtall in Pavener's Artful- Wife (1717). He played at all the London theatres of his time, and in the summer at a booth at Bartholomew Fair. He had three sons, all actors, of whom the eldest was Christopher Bullock (c. 1690-1724), who at Drury Lane, the Haymarket and Lincoln's Inn Fields displayed " a considerable versatility of talent." Christopher created a few original parts in comedies and farces of which he was the author or adapter: — A Woman's Revenge (1715); Slip; Adventures of Half an Hour (1716); The Cobbler of Preston; Woman's a Riddle; The Perjurer (1717); and The Traitor (1718).

BULLROARER, the English name for an instrument made of a small flat slip of wood, through a hole in one end of which a string is passed; swung round rapidly it makes a booming, humming noise. Though treated as a toy by Europeans, the bullroarer has had the highest mystic significance and sanctity among primitive people. This is notably the case in Australia, where it figures in the initiation ceremonies and is regarded with the utmost awe by the " blackfellows." Their bullroarers, or sacred " tunduns," are of two types, the " grandfather " or " man tundun," distinguished by its deep tone, and the " woman tundun," which, being smaller, gives forth a weaker, shriller note. Women or girls, and boys before initiation, are never allowed to see the tundun. At the Bora, or initiation ceremonies, the bullroarer's hum is believed to be the voice of the " Great Spirit," and on hearing it the women hide in terror. A Maori bullroarer is preserved in the British Museum, and travellers in Africa state that it is known and held sacred there. Thus among the Egba tribe of the Yoruba race the supposed " Voice of Oro," their god of vengeance, is produced by a bullroarer, which is

actually worshipped as the god himself. The sanctity of the bullroarer has been shown to be very widespread. There is no doubt that the rhombus (Gr. A6/U|3° s) which was whirled at the Greek mysteries was one. Among North American Indians it was common. At certain Moqui ceremonies the procession of dancers was led by a priest who whirled a bullroarer. The instrument has been traced among the Tusayan, Apache and Navaho Indians (J. G. Bourke, Ninth Annual Report of Bureau of Amer. Ethnoh, 1892), among the Koskimo of British Columbia (Fr. Boas, " Social Organization, &c, of

the Kwakiutl Indians," Report of the U.S. National Museum for 18Q5), and in Central Brazil. In New Guinea, in some of the islands of the Torres Straits (where it is swung as a fishing-charm), in Ceylon (where it is used as a toy and figures as a sacred instrument at Buddhist festivals), and in Sumatra (where it is used to induce the demons to carry off the soul of a woman, and so drive her mad), the bullroarer is also found. Sometimes, as among the Minangkabos of Sumatra, it is made of the frontal bone of a man-renowned for his bravery.

See A. Lang, Custom and Myth (1884) ; J. D. E7 Schmeltz, Das Schwirrholz (Hamburg, 1896); A. C. Haddon, The Study of Man, and in the Journ. Anthrop. Instit. xix., 1890; G. M. C. Theal, Kaffir Folk-Lore; A. B. Ellis, Yoruba-Speaking Peoples (1894); R. C. Codrington, The Melanesians (1891).

BULL RUN, a small stream of Virginia, U.S.A., which gave the name to two famous battles in the American Civil War.

(1) The first battle of Bull Run (called by the Confederates Manassas) was fought on the 21st of July 1861 between the Union forces under Brigadier- General Irvin McDowell and the Confederates under General Joseph E. Johnston. Both armies were newly raised and almost untrained. After a slight action on the 18th at Blackburn's Ford, the two armies prepared for a battle. The Confederates were posted along Bull Run, guarding all the passages from the Stone Bridge down to the railway bridge. McDowell's forces rendezvoused around Centreville, and both commanders, sensible of the temper of their troops, planned a battle for the 21st. On his part McDowell ordered one of his four divisions to attack the Stone Bridge, two to make

*Era cry Walker sc**

a turning movement via Sudley Springs, the remaining division (partly composed of regular troops) was to be in reserve and to watch the lower fords. The local Confederate commander, Brigadier-General P. G. T. Beauregard, had also intended to advance, and General Johnston, who arrived by rail on the evening of the 20th with the greater part of a fresh army, and now assumed command of the whole force, approved an offensive movement against Centreville for the 21st; but orders mis- carried, and the Federal attack opened before the movement had begun. Johnston and Beauregard then decided to fight a defensive battle, and hurried up troops to support the single brigade of Evans which held the Stone Bridge. Thus there

was no serious fighting at the lower fords of Bull Run throughout the day. The Federal staff was equally inexperienced, and the divisions

engaged in the turning movement met with many unnecessary-checks. At 6 a.m., when the troops told off for the frontal attack appeared before the Stone Bridge, the turning movement was by no means well advanced. Evans had time to change position so as to command both the Stone Bridge and Sudley Springs and he Was promptly supported by the brigades of Bee, Bartow and T. J. Jackson. About 9.30 the leading Federal brigade from Sudley Springs came into action, and two hours later Evans, Bee and Bartow had been driven off the Matthews hill in con- siderable confusion. But on the Henry House hill Jackson's brigade stood, as General Bee said to his men, " like a stone wall," and the defenders rallied, though the Federals were continually reinforced. The fighting on the Henry House hill was very severe, but McDowell, who dared not halt to re-form his enthusi- astic volunteers, continued to attack. About 1.30 p.m. he brought up two regular batteries to the fighting line; but a Confederate regiment, being mistaken for friendly troops and allowed to approach, silenced the guns by close rifle fire, and from that time, though the hill was taken and retaken several times, the Federal attack made no further headway. At 2.45 more of Beauregard's troops had come up; Jackson's brigade charged with the bayonet, and at the same time the Federals were assailed in flank by the last brigades of Johnston's army, which arrived at the critical moment from the railway. They gave way at once, tired out, and conscious that the day was lost, and after one rally melted away slowly to the rear, the handful of regulars alone keeping, their order. But when, at the defile of the Cub Run, they came under shell fire the retreat became a panic flight to the Potomac. The victors were too much ex- hausted to pursue, and the U.S. regulars of the reserve division formed a strong and steady rearguard. The losses were — Federals, 2896 men out of about 18,500 engaged; Confederates, 1982 men out of 18,000.*

(2) The operations of the last days of August 1862, which include the second battle of Bull Run (second Manassas), are amongst the most complicated of the war. At the outset the Confederate general Lee's army (Longstreet's and Jackson's corps) lay on the Rappahannock, faced by the Federal Army of Virginia under Major-General John Pope, which was to be reinforced by troops from

McClellan's army to a total strength of 1 50,000 men as against Lee's 60,000. Want of supplies soon forced Lee to move, though not to retreat, and his plan for attacking Pope was one of the most daring in all military history. Jackson with half the army was despatched on a wide turning niovement which was to bring him via Salem and Thoroughfare Gap to Manassas Junction in Pope's rear; when Jackson's task was accomplished Lee and Longstreet were to follow him by the same route. Early on the 25th of August Jackson began his march round the right of Pope's army; on the 26th the column passed Thoroughfare Gap, and Bristoe Station, directly in Pope's rear, was reached on the same evening, while a detach- ment drove a Federal post from Manassas Junction. Qn the 27 th the immense magazines at the Junction were destroyed. On his side Pope had soon discovered Jackson's departure, and had arranged for an immediate attack on Longstreet. When, however, the direction of Jackson's march on Thoroughfare Gap became clear. Pope fell back in order to engage him, at the same time ordering his army to concentrate on Warrenton, Greenwich and Gainesville. He was now largely reinforced. On the evening of the 27 th one of his divisions, marching to its point of concentration, met a division of Jackson's corps, near Bristoe Station; after a sharp fight the Confederate general, Ewell, retired on Manassas. Pope now realized that he had Jackson's corps in front of him at the Junction, and at once took steps to attack Manassas with all his forces. He drew off even the corps at Gainesville for his intended battle of the 28th; McDowell, however, its commander, on his own responsibility, left Ricketts's division at Thoroughfare Gap. But Pope's blow was struck in the air. When he arrived at Manassas on the 28th he found nothing but the ruins of his magazines, and one of McDowell's divisions (King's) marching from Gainesville on Manassas Junction met Jackson's infantry near Groveton. The situation

had again changed completely. Jackson had no intention of awaiting Pope at Manassas, and after several feints made with a view to misleading the Federal scouts he finally withdrew to a hidden position between Groveton and Sudley Springs, to await the arrival of Longstreet, who, taking the same route as Jackson had done, arrived on the 28th at Thoroughfare Gap and, engaging Ricketts's division, finally drove it back to Gainesville. On the evening of this day Jackson's corps held the line Sudley Springs-Groveton, his right wing near Groveton opposing King's division; and Longstreet held Thoroughfare Gap, facing Ricketts at Gainesville. On Ricketts's right was King near Groveton, and the line was continued thence by McDowell's remaining division and by Sigel's corps to the Stone

Bridge. At Centreville, 7 m. away, was Pope with three divisions, a fourth was north-east of Manassas Junction, and Porter's corps at Bristoe Station. Thus, while Ricketts continued at Gaines- ville to mask Longstreet, Pope could concentrate a superior force against Jackson, whom he now believed to be meditating a retreat to the Gap. But a series of misunderstandings resulted in the withdrawal of Ricketts and King, so that nothing how intervened between Longstreet and Jackson; while Sigel and McDowell's other division alone remained to face Jackson until such time as Pope could bring up the rest of his scattered forces. Jackson now closed on his left and prepared for battle, and on the morning of the 29th the Confederates, posted behind a high railway embankment, repelled two sharp attacks made by Sigel. Pope arrived at noon with the divisions from Centreville, which, led by the general himself and by Reno and Hooker, two of the bravest officers in the Union army, made a third and most desperate attack on Jackson's line. The latter, repulsing it with difficulty, carried its counter-stroke too far and was in turn repulsed by Grover's brigade of Hooker's division. Grover then made a fourth assault, but was driven back with terrible loss. The last assault, gallantly delivered by two divisions under Kearny and Stevens, drove the Confederate left out of its position; but a Confederate counter-attack, led by the brave Jubal Early, dislodged the assailants with the bayonet.

In the meanwhile events had taken place near Groveton which were, for twenty years after the war, the subject of controversy and recrimination (see Porter, Fitz-John). When Porter's and part of McDowell's corps, acting on various orders sent by Pope, approached Gainesville from the south-east, Longstreet had already reached that place, and the Federals thus encountered a force of unknown strength at the moment when Sigel's guns to the northward showed him to be closely engaged with Jackson. The two generals consulted, and : McDowell marched off to join Sigel, while Porter remained to hold the new enemy in check. In this he succeeded; Longstreet, though far superior in numbers, made no forward move, and his advanced guard alone came into action. On the night of the 29th Lee reunited the wings of his army on the field of battle. He had forced Pope back many miles from the Rappahannock, and expecting that the Federals would retire to the line of Bull Run before giving battle, he now decided to wait for the last divisions of Longstreet's corps, which were still distant. But Pope, still sanguine, ordered a " general pursuit " of Jackson for the 30th. There was some ground for his suppositions, for Jackson had retired a short distance and Longstreet's advanced guard had also fallen back. McDowell,

however, who was in general charge of the Federal right on the 30th, soon saw that Jackson was not retreating and stopped the " pursuit," and the attack on Jackson's right, which Pope had ordered Porter to make, was repulsed by Longstreet's overwhelming forces. Then Lee's whole line, 4 m. long, made its grand counter-stroke (4 p.m.). There was now no hesitation in Longstreet's attack; the Federal left was driven successively from every position it took up, and Longstreet finally captured Bald Hill. Jackson, though opposed by the greater part of Pope's forces, advanced to the Matthews hill, and his artillery threatened the Stone Bridge. The Federals, driven back to the banks of Bull Run, were only saved by the gallant defence of the Henry House hill by the Pennsylvanian division of Reynolds and the regulars

under Sykes. Pope withdrew under cover of night to Centre- ville. Here he received fresh reinforcements, but Jackson was already marching round his new right, and after the action of Chantilly (ist of September) the whole Federal army fell back to Washington. The Union forces present on the field on the 29th and 30th numbered about 63,000, the strength of Lee's army being on the same dates about 54,000. Besides their killed and wounded the Federals lost very heavily in prisoners.

BULLY (of uncertain origin, but possibly connected with a Teutonic word seen in many compounds, as the Low Ger. bullerjaan, meaning " noisy "; the word has also, with less probability, been derived from the Dutch boel, and Ger. Buhle, a lover), originally a fine, swaggering fellow, as in "Bully Bottom " in A Midsummer Night's Dream, later an overbearing ruffian, especially a coward who abuses his strength by ill- treating the weak; more technically a souteneur, a man who lives on the earnings of a prostitute. The term in its early use of " fine " or "splendid" survives in American slang.

BULOW, BERNHARD ERNST VON (1815-1879), Danish and German statesman, was the son of Adolf von Bulow, a Danish official, and was born at Cismar in Holstein on the 2nd of August 181 5. He studied law at the universities of Berlin, Gottingen and Kiel, and began his political career in the service of Denmark, in the chancery of Schleswig-Holstein-Lauenburg at Copenhagen, and afterwards in the foreign office. In 1842 he became councillor of legation, and in 1847 Danish charge d'affaires in the Hanse towns,

where his intercourse with the merchant princes led to his marriage in 1848 with a wealthy heiress, Louise Victorine Riicker. When the insurrection broke out in the Elbe duchies (1848) he left the Danish service, and offered his services to the provisional government of Kiel, an offer that was not accepted. In 1849, accordingly, he re-entered the service of Denmark, was appointed a royal chamberlain and in 1850 sent to represent the duchies of Schleswig and Holstein at the restored federal diet of Frankfort. Here he came into intimate touch with Bismarck who admired his statesmanlike handling of the growing com- plications of the Schleswig-Holstein Question. With the radical "Eider-Dane" party he was utterly out of sympathy; and when, in 1862, this party gained the upper hand, he was recalled from Frankfort. He now entered the service of the grand-duke of Mecklenburg-Strelitz, and remained at the head of the grand-ducal government until 1867, when he became plenipotentiary for the two Mecklenburg duchies in the council of the German Confederation (Bundesrat), where he distinguished himself by his successful defence of the medieval constitution of the duchies against Liberal attacks. In 1873 Bismarck, who was in thorough sympathy with his views, persuaded him to enter the service of Prussia as secretary of state for foreign affairs, and from this time till his death he was the chancellor's most faithful henchman. In 1875 he was appointed Prussian plenipotentiary in the Bundesrat; in 1877 he became Bismarck's lieutenant in the secretaryship for foreign affairs of the Empire; and in 1878 he was, with Bismarck and Hohenlohe, Prussian plenipotentiary at the congress of Berlin. He died at Frankfort on the 20th of October 1879, his end being hastened by his exertions in connexion with the political crisis of that year. Of his six sons the eldest, Bernhard Heinrich Karl (see below), became chancellor of the Empire.*

See the biography of H. von Petersdorff in Allgemeine deutsche Biographie, Band 47, p. 350.

BULOW, BERNHARD HEINRICH KARL MARTIN, Prince von (1849-), German statesman, was born on the 3rd of May 1849, at Klein-Flottbeck, in Holstein. The Bulow family is one very widely extended in north Germany, and many members have attained distinction in the civil and military service of Prussia, Denmark and Mecklenburg. Prince Billow's great-uncle, Heinrich von Bulow, who was distinguished for his admiration of England and English institutions, was Prussian ambas- sador in England from 1827 to 1840, and married a daughter of Wilhelm von Humboldt (see the letters of Gabrielle von Biilow). His father, Bernhard Ernst von Billow, is separately noticed above.

Prince Biilow must not be confused with his contemporary Otto v. Biilow (1827-1901), an official in the Prussian foreign office, who in 1882 was appointed German envoy at Bern, from 1892 to 1898 was Prussian envoy to the Vatican, and died at Rome on the 22nd of November 1901.

Bernhard von Biilow, after serving in the Franco-Prussian War, entered the Prussian civil service, and was then transferred to the diplomatic service. In 1876 he was appointed attache to the German embassy in Paris, and after returning for a while to the foreign office at Berlin, became second secretary to the embassy in Paris in 1880. From 1884 he was first secretary to the embassy at St Petersburg, and acted as charge d'affaires; in 1888 he was appointed envoy at Bucharest, and in 1893 to the post of German ambassador at Rome. In 1897, on the retirement of Baron Marshall von Bieberstein, he was appointed secretary of state for foreign affairs (the same office which his father had held) under Prince Hohenlohe, with a seat in the Prussian ministry. The appointment caused much surprise at the time, as Biilow was little known outside diplomatic circles. The explanations suggested were that he had made himself very popular at Rome and that his appointment was therefore calculated to strengthen the loosening bonds of the Triple Alliance, and also that his early close association with Bismarck would ensure the maintenance of the Bismarckian tradition. As foreign secretary Herr von Biilow was chiefly responsible for carrying out the policy of colonial expansion with which the emperor had identified himself, and in 1899, on bringing to a successful conclusion the negotiations by which the Caroline Islands were acquired by Germany, he was raised to the rank of count. On the resignation of Hohenlohe in 1900 he was chosen to succeed him as chancellor of the empire and president of the Prussian ministry.

The Berliner Neueste Nachrichten, commenting on this appointment, very aptly characterized the relations of the new chancellor to the emperor, in contrast to the position occupied by Bismarck. " The Germany of William II.," it said, " does not admit a Titan in the position of the highest official of the Empire. A cautious and versatile diplomatist like Bernhard von Biilow appears to be best adapted to the personal and political necessities of the present situation." Count Biilow, indeed, though, like Bismarck, a " realist," utilitarian and opportunist in his policy, made no effort to emulate the masterful independence of the great chancellor. He was accused, indeed, of being little more than the complacent executor of the emperor's will, and defended himself in the Reichstag against the charge. The substance of the relations between the emperor and himself, he

declared, rested on mutual good-will, and added: " I must lay it down most emphatically that the prerogative of the emperor's personal initiative must not be curtailed, and will not be curtailedj by any chancellor. . . .As regards the chancellor, however, I say that no imperial chancellor worthy of the name . . . would take up any position which in his conscience he did not regard as justifiable." It is clear that the position of a chancellor holding these views in relation to a ruler so masterful and so impulsive as the emperor William II. could be no easy one; and Billow's long continuance in office is the best proof of his genius. His first conspicuous act as chancellor was a masterly defence in the Reichstag of German action in China, a defence which was, indeed, rendered easier by the fact that Prince Hohenlohe had — ■ to use his own words — " dug a canal " for the flood of imperial ambition of which warning had been given in the famous " mailed fist " speech. Such incidents as this, however, though they served to exhibit consummate tact and diplomatic skill, give little index to the fundamental character of his work as chancellor. Of this it may be said, in general, that it carried on the best traditions of the Prussian service in whole-hearted devotion to the interests of the state. The accusation that he was an " agrarian " he thought it necessary to rebut in a speech delivered on the 1 8th of February 1906 to the German Handelstag. He was an agrarian, he declared, in so far as he came of a land- owning family, and was interested in the prosperity of agriculture; but as chancellor, whose function it is to watch over the welfare

of all classes, he was equally concerned with the interests of commerce and industry (Kolnische Zeitung, Feb. 20, 1906). Some credit for the immense material expansion of Germany under his chancellorship is certainly due to his zeal and self- devotion. This was generously recognized by the emperor in a letter publicly addressed to the chancellor on the 21st of May 1906, immediately after the passage of the Finance Bill. " I am fully conscious," it ran, " of the conspicuous share in the initia- tion and realization of this work of reform . . . which must be ascribed to the statesmanlike skill and self-sacrificing devotion with which you have conducted and promoted those arduous labours." Rumours had from time to time been rife of a " chan- cellor crisis " and Billow's dismissal; in the Berliner Tageblalt this letter was compared to the " Never!" with which the em- peror William I. had replied to Bismarck's proffered resignation.

On the 6th of June 1905 Count Biilow was raised to the rank of prince (Fiirst), on the occasion of the marriage of the crown prince. The coincidence of this date with the fall of M. Delcasse, the French minister for foreign affairs — a triumph for Germany and a humiliation for France — was much commented on at the time (see The Times, June 7, 1905) ; and the elevation of Bismarck to the rank of prince in the Hall of Mirrors at Versailles was recalled. Whatever element of truth there may have been in this, however, the significance of the incident was much exaggerated.

On the 5th of April 1906, while attending a debate in the Reichstag, Prince Biilow was seized with illness, the result of overwork and an attack of influenza, and was carried unconscious from the hall. At first it was thought that the attack would be fatal, and Lord Fitzmaurice in the House of Lords compared the incident with that of the death of Chatham, a compliment much appreciated in Germany. The illness, however, quickly took a favourable turn, and after a month's rest the chancellor was able to resume his duties. In 1907 Prince Biilow was made the subject of a disgraceful libel, which received more attention than it deserved because it coincided with the Harden- Moltke scandals; his character was, however,completely vindicated,and the libeller, a journalist named Brand, received a term of imprisonment.

The parliamentary skill of Prince Biilow in holding together the heterogeneous elements of which the government majority in the Reichstag was composed, no less than the diplomatic tact with which he from time to time " interpreted " the imperial indiscretions to the world, was put to a rude test by the famous " interview " with the German emperor, published in the London Daily Telegraph of the 28th of October 1908 (see William II., German emperor), which aroused universal reprobation in Germany. Prince Biilow assumed the official responsibility, and tendered his resignation to the emperor, which was not accepted; but the chancellor's explanation in the Reichstag on the 10th of November showed how keenly he felt his position. He declared his conviction that the disastrous results of the interview would " induce the emperor in future to observe that strict reserve, even in private conversations, which is equally indispensable in the interest of a uniform policy and for the authority of the crown," adding that, in the contrary case, neither he nor any successor of his could assume the responsibility (The Times, Nov. n, 1 908, p. 9) . The attitude of the emperor showed that he had taken the lesson to heart. It was not the imperial indiscretions, but the effect of his budget proposals in breaking up the Liberal-Conservative bloc, on whose support he depended in the Reichstag, that eventually

drove Prince Biilow from office (see Germany: History). At the emperor's request he remained to pilot the mutilated budget through the House; but on the 14th of July 1909 the acceptance of his resignation was announced.

Prince Biilow married, on the 9th of January 1886, Maria Anna Zoe Rosalia Beccadelli di Bologna, Princess Camporeale, whose first marriage with Count Karl von Donhoff had been dissolved and declared null by the Holy See in 1884. The princess, an accomplished pianist and pupil ot Liszt, was a step-daughter of the Italian statesman Minghetti.

See J. Penzler, Graf Billows Reden nebst urkundlichen Beitrdgen zu seiner Politik (Leipzig, 1903).

BULOW, DIETRICH HEINRICH, Freiherr von (1757-1807), Prussian soldier and military writer, and brother of General Count F. W. Biilow, entered the Prussian army in 1773. Routine work proved distasteful to him, and he read with avidity the works of the chevalier Folard and other theoretical writers on war, and of Rousseau. After sixteen years' service he left Prussia, and endeavoured without success to obtain a commission in the Austrian army. He then returned to Prussia, and for some time managed a theatrical company. The failure of this undertaking involved Biilow in heavy losses, and soon afterwards he went to America, where he seems to have been converted to, and to have preached, Swedenborgianism. On his return to Europe he persuaded his brother to engage in a speculation for exporting glass to the United States, which proved a complete failure. After this for some years he made a precarious living in Berlin by literary work, but his debts accumulated, and it was under great disadvantages that he produced his Geist des Neueren Kriegssystems (Hamburg, 1799) and Der Feldzug 1800 (Berlin, 1801). His hopes of military employment were againdisappointed, and his brother, the future field marshal, who had stood by him in all his troubles, finally left him. After wandering in France and the smaller German states, he reappeared at Berlin in 1804, where he wrote a revised edition of his Geist des Neueren Kriegs- systems (Hamburg, 1805), Lehrsdtze des Neueren Kriegs (Berlin, 1805), Geschichte des Prinzen Heinrich von Preussen (Berlin, 1805), Neue Taktik der Neicern wie sie sein sollte (Leipzig, 1805), and Der Feldzug 1805 (Leipzig, 1806). He also edited, with G. H. von Behrenhorst (1733-1814) and others, Annalen des Krieges (Berlin, 1806). These brilliant but unorthodox works, distinguished by an open contempt of the Prussian system, cosmopolitanism hardly to be distinguished from high treason, and the mordant sarcasm of a

disappointed man, brought upon Biilow the enmity of the official classes and of the government. He was arrested as insane, but medical examination proved him sane and he was then lodged as a prisoner in Colberg, where he was harshly treated, though Gneisenau obtained some mitiga- tion of his condition. Thence he passed into Russian hands and died in prison at Riga in 1807, probably as a result of ill-treatment.

In Biilow's writings there is evident a distinct contrast between the spirit of his strategical and that of his tactical ideas. As a strategist (he claimed to be the first of strategists) he reduces to mathematical rules the practice of the great generals of the 18th century, ignoring " friction," and manoeuvring his armies in vacuo. At the same time he professes that his system provides working rules for the armies of his own day, which in point of fact were " armed nations," infinitely more affected by " fric- -tion " than the small dynastic and professional armies of the preceding age. Biilow may therefore be considered as anything but a reformer in the domain of strategy. With more justice he has been styled the " father of modern tactics." He was the first to recognize that the conditions of swift and decisive war brought about by the French Revolution involved wholly new tactics, and much of his teaching had a profound influence on European warfare of the 19th century. His early training had shown him merely the pedantic minutiae of Frederick's methods, and, in the absence of any troops capable of illustrating the real linear tactics, he became an enthusiastic supporter of the methods, which (more of necessity than from judgment) the French revolutionary generals had adopted, of fighting in small columns covered by skirmishers. Battles, he maintained, were won by skirmishers. " We must organize disorder," he said; indeed, every argument of writers of the modern " extended order " school is to be found mutatis mutandis in Biilow, whose system acquired great prominence in view of the mechanical improvements in armament. But his tactics, like his strategy, were vitiated by the absence of " friction," and their dependence on the realization of an unattainable standard of bravery.

See von Voss, H. von Biilow (Koln, 1806) ; P. von Biilow, Familienbuch der v. Biilow (Berlin, 1859) ; Ed. von Biilow, Aus dem Leben Dietrichs v. Biilow, also Vermischte Schriften aus dem Nachlassvon Behrenhorst (1845); Ed. von Bulow and von Riistow, Militarische und vermischte Schriften von Heinrich Dietrich v. Billow (Leipzig, 1853) ; Memoirs by Freiherr v. Meerheimb in Allgemeine deutsche

BULOW, F. W.

Biographic vol. 3 (Leipzig, 1876), and "Behrenhorst und Biilow " (Historische Zeitschrift, 1861, vi.) ; Max Jahns, Ceschichte der Kriegs- wissenschaften, vol. iii. pp. 2133-2145 (Munich, 1891); General von Cammerer (transl. von Donat), Development of Strategical Science (London, 1905), ch. i.

BULOW, FRIEDRICH WILHELM, Fkeiherr von, count of Dennewitz (1755-1816), Prussian general, was born on the 1 6th of February 1755, at Falkenberg in the Altmark; he was the elder brother of the foregoing. He received an excellent education, and entered the Prussian army in 1768, becoming ensign in 1772, and second lieutenant in 1775. He took part in the " Potato War " of 1778, and subsequently devoted him- self to the study of his profession and of the sciences and arts. He was throughout his life devoted to music, his great musical ability bringing him to the notice of Frederick William II., and about 1790 he was conspicuous in the most fashionable circles of Berlin. He did not, however, neglect his military studies, and in 1 792 he was made military instructor to the young prince Louis Ferdinand, becoming at the same time full captain. He took part in the campaigns of 1792-93-94 on the Rhine, and received for signal courage during the siege of Mainz the order pour le m&rite and promotion to the rank of major. After this he went to garrison duty at Soldau. In 1802 he married the daughter of Colonel v. Auer, and in the following year he became lieutenant-colonel, remaining at Soldau with his corps. The vagaries and misfortunes of his brother Dietrich affected his happiness as well as his fortune. The loss of two of his children was followed in 1806 by the death of his wife, and a further source of disappointment was the exclusion of his regiment from the field army sent against Napoleon in 1806. The disasters of the campaign aroused his energies. He did excellent service under Lestocq's command in the latter part of the war, was wounded in action, and finally designated for a brigade command in Bliicher's force. In 1808 he married the sister of his first wife, a girl of eighteen. He was made a major-general in the same year, and henceforward he devoted himself wholly to the re-generation of Prussia. The intensity of his patriotism threw him into conflict even with Bllicher and led to his temporary retirement; in 181 1, however, he was again employed. In the critical days preceding the War of Liberation he kept his troops in hand without committing himself to any irrevocable step until the decision was made. On the 14th of March 1813 he was made a lieutenant-general. He fought against Oudinot in defence of Berlin (see Napoleonic Campaigns), and in the summer came under the command of Bernadotte, crown prince of Sweden. At the head of an army corps

*Biilow distinguished himself very greatly in the battle of Gross Beeren, a victory which was attri- buted almost entirely to his leadership. A little later he won the great victory of Dennewitz, which for the third time checked Napoleon's advance on Berlin. This inspired the greatest enthusiasm in Prussia, as being won by purely Prussian forces, and rendered Bulow's popularity almost equal to that of Blucher. Billow's corps played a conspicuous part in the final overthrow of Napoleon at Leipzig, and he was then entrusted with the task of evicting the French from Holland and Belgium. In an almost uniformly successful campaign he won a signal victory at Hoog- straa*ten, and in the campaign of 1814 he invaded France from the north-west, joined Bliicher, and took part in the brilliant victory of Laon in March. He was now made general of infantry and received the title of Count Biilow von Dennewitz. In the short peace of 1814-1815 he was at Konigsberg as commander- in-chief in Prussia proper. He was soon called to the field again, and in the Waterloo campaign commanded the IV. corps of Bliicher's army. He was not present at Ligny, but his corps headed the flank attack upon Napoleon at Waterloo, and bore the heaviest part in the fighting of the Prussian troops. He took part in the invasion of France, but died suddenly on the 25th of February 1816, a month after his return to the Konigsberg command.*

See General Graf Biilow von Dennewitz, 1813-1814 (Leipzig, 1843) ; Varnhagen von Ense, Leben des G. Graf en B. von D. (Berlin, 1854).'"

BULOW, HANS GUIDO VON (1830-1894), German pianist and conductor, was born at Dresden, on the 8th of January 1830.

At the age of nine he began to study music under Friedrich Wieck as part of a genteel education. It was only after an illness while studying law at Leipzig University in 1848 that he deter- mined upon music as a career. At this time he was a pupil of Moritz Hauptmann. In 1849 revolutionary politics took pos- session of him. In the Berlin Abendpost, a democratic journal, the young aristocrat poured forth his opinions, which were strongly coloured by Wagner's Art and Revolution. Wagner's influence was musical no less than political, for a performance of Lohengrin under Liszt at Weimar in 1850 completed von Bulow's determination to abandon a legal career. From Weimar he went to Zurich, where the exile Wagner instructed

him in the elements of conducting. But he soon returned to Weimar and Liszt; and in 1853 he made his first concert tour, which extended from Vienna to Berlin. Next he became prin- cipal professor of the piano at the Stern Academy, and married in his twenty-eight year Liszt's daughter Cosima. For the following nine years von Biilow laboured incessantly in Berlin as pianist, conductor and writer of musical and political articles. Thence he removed to Munich, where, thanks to Wagner, he had been appointed H of kapellmeister to Louis II., and chief of the Conservatorium. There, too, he organized model per- formances of Tristan and Die Meister singer. In 1869 his marriage was dissolved, his wife subsequently marrying Wagner, an in- cident which, while preventing Biilow from revisiting Bayreuth, never dimmed his enthusiasm for Wagner's dramas. After a temporary stay in Florence, Biilow set out on tour again as a pianist, visiting most European countries as well as the United States of America, before taking up the post of conductor at Hanover, and, later, at Meiningen, where he raised the orchestra to a pitch of excellence till then unparalleled. In 1885 he resigned the Meiningen office, and conducted a number of concerts in Russia and Germany. At Frankfort he held classes for the higher development of piano-playing. He constantly visited England, for the last time in 1888, in which year he went to live in Hamburg. Nevertheless he continued to conduct the Berlin Philharmonic Concerts. He died at Cairo, on the 13th of February 1894. Biilow was a pianist of the highest order of intellectual attainment, an artist of remarkably catholic tastes, and a great conductor. A passionate hater of humbug and affectation, he had a ready pen, and a biting, sometimes almost rude wit, yet of his kindness and generosity countless tales were told. His compositions are few and unimportant, but his annotated editions of the classical masters are of great value. Bulow's writings and letters {Briefe und Schrijten), edited by his widow, have been published in 8 vols. (Leipzig, 1895-1908).

BULRUSH, a name now generally given to Typha latifolia, the reed-mace or club-rush, a plant growing in lakes, by edges of rivers and similar localities, with a creeping underground stem, narrow, nearly flat leaves, 3 to 6 ft. long, arranged in opposite rows, and a tall stem ending in a cylindrical spike, half to one foot long, of closely packed male(above) and female(below) flowers. The familiar brown spike is a dense mass of minute one-seeded fruits, each on a long hair-like stalk and covered with long downy hairs, which render the fruits very light and readily carried by the wind. The name bulrush is more correctly applied to Scirpus lacustris, a member of a different family (Cyperaceae), a common plant in wet places, with tall spongy,

usually leafless stems, bearing a tuft of many-flowered spikelets. The stems are used for matting, &c. The bulrush of Scripture, associated with the hiding of Moses, was the Papyrus (q.v.), also a member of the order Cyperaceae, which was abundant in the Nile.

BULSTRODE, SIR RICHARD (1610-1711), English author and soldier, was a son of Edward Bulstrode (1588-1659), and was educated at Pembroke College, Cambridge; after studying law in London he joined the army of Charles I. on the outbreak of the Civil War in 1642. In 1673 he became a resident agent of Charles II. at Brussels; in 1675 he was knighted; then following James II. into exile he died at St Germain on the 3rd of October" 1 71 1. Bulstrode is chiefly known by his Memoirs and Reflections upon the Reign and Government of King Charles I. and King Charles II., published after his death in 1 7 2 1 . He also

wrote Life of James II., and Original Letters written to the Earl of Arlington (1712). The latter consists principally of letters written from Brussels giving an account of the important events which took place in the Netherlands during 1674.

His second son, Whitelocke Bulstrode (1650-1724), remained in England after the flight of James II.; he held some official positions, and in 1717 wrote a pamphlet in support of George I. and the Hanoverian succession. He published A Discnurse of Natural Philosophy, and was a prominent Protestant controversialist. He died in London on the 27th of November

1724.

BULWARK (a word probably of Scandinavian origin, froiri bol or bole, a tree-trunk, and werk, work, in Ger. Bollwerk, which has also been derived from an old German bolen, to throw, and so a machine for throwing missiles), a barricade of beams, earth, &c, a work in 15th and 16th century fortifications designed to mount artillery (see Boulevard). On board ship the term is used of the woodwork running round the ship above the level of the deck. Figuratively it means anything serving as a defence.

BUMBOAT, a small boat which carries vegetables, provisions, &c.,' to ships lying in port or off the shore. The word is probably connected with the Dutch bumboat or boomboot, a broad Dutch

fishing-boat, the derivation of which is either from boom, cf. Ger. baum, a tree, or from bon, a place in which fish is kept alive; and'bool, a boat. It appears first in English in the Trinity House By-laws of 1685 regulating the scavenging boats attending ships lying in the Thames.

BUMBULUM, Bombulum or Bunibulum, a fabulous musical instrument described in an apocryphal letter of St Jerome to Dardanus, 1 and illustrated in a series of illuminated MSS. of the oth to the 1 1 th century, together with other instruments described in the same letter. These MSS. are the Psalter of Emmeran, oth century, described by Martin Gerbert, 2 who gives a few illustrations from it; the Cotton MS. Tiberius C. VI. in the British Museum, nth century; the famous Boulogne Psalter, ad. 1000; and' the Psalter of Angers, 9th century. 3 In the Cotton MS. the instrument consists of an angular frame, from which depends by a chain a rectangular metal plate having twelve bent arms attached in two rows of three on each side, one above the other. The arms appear to terminate in small rectangular bells or plates, and it is supposed that the standard frame was intended to be shaken like a sistrum in order to set the bells jangling. Sebastian Virdung 4 gives illustrations of these instru 1 – ments of Jerome, and among them of the one called bumbulum in the Cotton MS., which Virdung calls Fistula Hieronimi. The general outline is the same, but instead of metal arms there is the same number of bent pipes with conical bore. Virdung explains, following the apocryphal letter, that the stand re- sembling the draughtsman's square represents the Holy Cross, the rectangular object dangling therefrom signifies Christ on the Cross, and the' twelve pipes are the twelve apostles. Virdung's illustration, probably copied from an older work in manuscript, conforms more closely to the text of the letter than does the instrument in the Cotton MS. There is no evidence whatever of the actual existence of such an instrument during the middle ages, with the exception of this series of fanciful pictures drawn to illustrate an instrument known from description only. The word bombulum was probably derived from the same root as the poixfiaiiKtos of Aristophanes (Acharnians, 866) (fid/jfios and aiiXos), a comic compound for a bag-pipe withaplayon|3ort3uAi6s, an insect that hums or buzzes (see Bag-Pipe). The original described in the letter, also from hearsay, was probably an early type of organ. (K. S.)

BUN, a small cake, usually sweet and round. In Scotland the word is used for a very rich spiced type of cake and in the north of Ireland for a round loaf of ordinary bread. The derivation of the word has been much disputed. It has been affiliated to the old provincial

French bugne, ” swelling,” in the sense of a

1 Ad Dardanum, de divtrsis generibus musicorum insttumenlorum.

2 De Cantu et Musica Sacra (1774).

. 3 For illustrations see Annates archeologiques, iii. p. 82 et Seq. 4 Musica getutscht ‘ und aussgezogen (Basle, 151 1).

” fritter,” but the New English Dictionary doubts the usage of the word. It is quite as probable that it has a far older and more interesting origin, as is suggested by an inquiry into the origin of hot cross buns. These cakes, which are now solely associated with the Christian Good Friday, are traceable to the remotest period of pagan history. Cakes were offered by ancient Egyptians to their moon-goddess; and these had imprinted on them a pair of horns, symbolic of the ox at the sacrifice of which they were offered on the altar, or of the horned moon-goddess, the equivalent of Ishtar of the Assyro-Babylonians. The Greeks offered such sacred cakes to Astarte and other divinities. This cake they called bous (ox), in’ allusion to the ox-symbol marked on it, and from the accusative boun it is suggested that the word “bun” is derived. Diogenes Laertius (c. a.d. 200), speaking of the offering made by Empedocles, says ” He offered one of the sacred liba, called a bouse, made of fine flour and honey.?’ Hesychius (c. 6th century) speaks of the boun, and describes it as a kind of cake with a representation of two horns marked on it; In time the Greeks marked these cakes with a cross, possibly an allusion to the four quarters of the moon, or more probably to facilitate the distribution of the sacred bread which was eaten by the worshippers. Like the Greeks, the Romans eat cross- bread at public sacrifices, such bread being usually purchased at the doors of the temple and taken in with them, — a custom alluded to by St Paul in 1 Cor. x. 28. At Herculaneum two small loaves about 5 in. in diameter, and plainly marked with a cross, were found. In the Old Testament a reference is made in Jer. vii. 18-xliv. 19, to such sacred bread being offered to the moon goddess. The cross-bread was eaten by the pagan Saxons in honour of Eoster, their goddess of light. The Mexicans and Peruvians are shown to have had a similar custom. The custom, in fact, was practically universal, and the early Church adroitly adopted the pagan practice, grafting it on to the Eucharist. The boun with its Greek cross became akin to the Eucharistic bread or cross-marked wafers mentioned in St Chrysostom’s Liturgy. In the medieval church, buns made from the dough for the consecrated Host were distributed to the communicants after Mass on Easter Sunday. In France and other Catholic countries, such blessed bread is still

given in the churches .to communicants who have a long journey before they can break their fast. The Holy Eucharist in the Greek church has a cross printed on it. In England there seems to have early been a disposition on the part of the bakers to imitate the' church, and they did a good trade in buns and cakes stamped with a cross, for as far back as 1252 the practice was forbidden by royal proclamation; but this seems to have had little effect, "With the rise of Protestantism the cross bun lost its sacrosanct nature- and became a mere eatable associated for no particular reason with Good Friday. Cross-bread is not, however, reserved for that day; in the north of England people usually crossmark their cakes with a knife before putting them in the oven. Many superstitions cling round hot cross buns. Thus it is still a common belief that one bun should be kept for luck's sake' to the following Good Friday. In Dorsetshire it is thought that a cross-loaf baked on that- day and hung over the chimneypiece prevents the bread baked in the house during the year from " going stringy."

BUNBURY, HENRY WILLIAM (1750-1811), English carica- turist, was the second son of Sir William Bunbury, 5th baronet, of Mildenhall, Suffolk, and came of an old Norman family. He was educated at Westminster school and St Catharine's Hall, Cambridge, and soon showed a talent for drawing, and especially for humorous subjects. His more serious efforts did not rise to a high level, but his caricatures are as famous as those of his contemporaries Rowlandson and Gillray, good examples being his " Country Club " (1788), " Barber's Shop " (1811) and "A Long Story" (1782.) He was a popular character, and the friend of most of the notabilities of his day, whom he never offended by attempting political satire; and his easy circum- stances and social position (he was colonel of the West Suffolk Militia, and was appointed equerry to the duke of York in 1787) enabled him to exercise his talents in comfort.

His son Sir Henry Edward Bunbury, Bart. (1778-1860), who succeeded to the family title on the death of his uncle, was a distinguished soldier, and rose to be a lieutenant-general; he was an active member of parliament, and the author of several historical works Of value; and the latter's second son, Sir Edward Herbert Bunbury, also a member of parliament, was well known as a geographer and archaeologist, and author of a History of Ancient Geography.

BUNBURY, a seaport and municipal town of Wellington county, Western Australia, 112 m. by rail S. by W. of Perth. Pop. (1901) 2455. The harbour, known as Koombanah Bay, is protected by a breakwater built on a coral reef. Coal is worked on the Collie river, 30 m. distant, and is shipped from this port, together with tin, timber, sandal-wood and agricultural produce.

BUNCOMBE, or Bunkum (from Buncombe county, North Carolina, United States), a term used for insincere political action or speaking to gain support or the favour of a constituency, and so any humbug or clap-trap. The phrase " to talk for (or to) Buncombe " arose in 1820, during the debate on the Missouri Compromise in Congress; the member for the district containing Buncombe county confessed that his long and much interrupted speech was only made because his electors expected it, and that he was " speaking for Buncombe."

BUNCRANA, a market-town and watering-place of Co. Donegal, Ireland, in the north parliamentary division on the east shore of Lough Swilly, on the Londonderry & Lough Swilly & Letterkenny railway. Pop. (1901) 1316. There is a trade in agricultural produce, a salmon fishery, sea fisheries and a manufacture of linen. The town is beautifully situated, being flanked on the east and south by hills exceeding 1000 ft. The picturesque square keep of an ancient castle remains, but the present Buncrana Castle is a residence erected in 1717. The golf-links are well known.

BUNDABER6, a municipal town and river port of Cook county, Queensland, Australia, 10 m. from the mouth of the river Burnett, and 217 m. by rail N. by W. of Brisbane. Pop. (1901) 5200. It lies on both sides of the river, and connexion between the two ports is maintained by road and railway bridges. There are saw-mills, breweries, brickfields and dis- tilleries in the town, and numerous sugar factories in the vicinity, notably at Millaquin, on the river below the town. There are wharves on both sides of the river, and the staple exports are sugar, golden-syrup and timber. The climate is remarkably healthy.

BUNDELKHAND, a tract of country in Central India, lying between the United and the Central Provinces. Historically it includes the five British districts of Hamirpur, Jalaun, Jhansi, Lalitpur and Banda, which now form part of the Allahabad division of the United Provinces, but politically it is restricted to a collection of native states, under the Bundelkhand agency. There are 9 states, 13 estates and the pargana of Alampur belonging to Indore state, with a total area of 9851 sq. m. and a total population (1901) of 1,308,326,

showing a decrease of 13 % in the decade, due to the effects of famine. The most important of the states are Orchha, Panna, Samthar, Charkhari, Chhatarpur, Datia, Bijawar and Ajaigarh. A branch of the Great Indian Peninsula railway traverses the north of the country. A garrison of all arms is stationed at Nowgong.

The surface of the country is uneven and hilly, except in the north-east part, which forms an irregular plain cut up by ravines scooped out by torrents during the periodical rains. The plains of Bundelkhand are intersected by three mountain ranges, the Bindhachal, Panna and Bander chains, the highest elevation not exceeding 2000 ft. above sea-level. Beyond these ranges the country is further diversified by isolated hills rising abruptly from a common level, and presenting from their steep and nearly inaccessible scarps eligible sites for castles and strongholds, whence the mountaineers of Bundelkhand have frequently set at defiance the most powerful of the native states of India. The general slope of the country is towards the north-east, as indicated by the course of the rivers which traverse or bound the territory, and finally discharge themselves into the Jumna.

The principal rivers are the Sind, Betwa, Ken, Baighin, Paisuni, Tons, Pahuj, Dhasan, Berma, Urmal and Chandrawal. The Sind, rising near Sironj in Malwa, marks the frontier line of Bundelkhand on the side of Gwalior. Parallel to this river, but more to the eastward, is the course of the Betwa. Still farther to the east flows the Ken, followed in succession by the Baighin, Paisuni and Tons. The Jumna and the Ken are the only two navigable rivers. Notwithstanding the large number of streams, the depression of their channels and height of their banks render them for the most part unsuitable for the purposes of irrigation, — which is conducted by means of jhils and tanks. These artificial lakes are usually formed by throwing embank- ments across the lower extremities of valleys, and thus arresting and accumulating the waters flowing through them. Some of the tanks are of great capacity; the Barwa Sagar, for instance, is i\ m. in diameter. Diamonds are found, particularly near the town of Panna, in a range of hills called by the natives Band-Ahil.

The mines of Maharajpur, Rajpur, Kimera and Gadasia have been famous for magnificent diamonds; and a very large one dug from the last was kept in the fort of Kalinjar among the treasures of Raja Himmat Bahadur. In the reign of the emperor Akbar the mines of Panna produced diamonds to the amount of £100,000 annually, and were a considerable source of revenue, but for many years they have

not been so profitable.

The tree vegetation consists rather of jungle or copse than forest, abounding in game which is preserved by the native chiefs. There are also within these coverts several varieties of wild animals, such as the tiger, leopard, hyena, wild boar, hilgdi and jackal.

The people represent various races. The Bundelas — the race who gave the name to the country — still maintain their dignity as chieftains, by disdaining to cultivate the soil, although by no means conspicuous for lofty sentiments of honour or morality. An Indian proverb avers that " one native of Bundelkhand commits as much fraud as a hundred Dandis " (weighers of grain> and notorious rogues). About Datia and Jhansi the inhabitants are a stout and handsome race of men, well off and contented; The prevailing religion in Bundelkhand is Hinduism.

The earliest dynasty recorded to have ruled in Bundelkhand were the Garhwas, who were succeeded by the Parihars; but nothing is known of either. About a.d. 800 the Parihars are said to have been oustedby the Chandels, and Dangha Varma,chief of the Chandel Rajputs, appears to have established the earliest paramount power in Bundelkhand towards the close of the 10th century a.d. Under his dynasty the country attained its greatest splendour in the early part of the nth century, when its raja; whose dominions extended from the Jumna to the Nerbudda, marched at the head of 36,000 horse and 45,000 foot, with 640 elephants, to oppose the invasion of Mahmud of Ghazni. In 1 1 82 the Chandel dynasty was overthrown by Prithwi Raj, the ruler of Ajmer and Delhi, after which the country remained in ruinous anarchy until the close of the 14th century, when the Bundelas, a spurious offshoot of the Garhwa tribe of Rajputs, established themselves on the right bank of the Jumna. One of these took possession of Orchha by treacherously poisoning its chief. His successor succeeded in further aggrandizing the Bundela state, but he is represented to have been a notorious plunderer, and his character is further stained by the assassina- tion of the celebrated Abul Fazl, the prime minister and historian of Akbar. Jajhar Singh, the third Bundela chief, unsuccessfully revolted against the court of Delhi, and his country became in- corporated for a short time with the empire. The struggles of the Bundelas for independence resulted in the withdrawal of the royal troops, and the admission of several petty states as feuda- tories of the empire on condition of military service. The Bundelas, under Champat Rai and his son. Chhatar Sal, ˆoffered a successful resistance to the proselytizing efforts of Aurangzeb. On the occasion of a Mahommedan invasion in 1732, Chhatar Sal asked and obtained the assistance of the

Mahratta Peshwaj whom he adopted as his son, giving him a third of his dominions. The Mahrattas gradually extended their. influence over Bundelkhand,

and in 1792 the peshwa was acknowledged as the lord para- mount of the country. The Mahratta power was, however, on the decline; the flight of the peshwa from his capital to Bassein before the British arms changed the aspect of affairs, and by the treaty concluded between the peshwa and the British government, the districts of Banda and Hamirpur were trans- ferred to the latter. Two chiefs then held the ceded districts, Himmat Bahadur, the leader of the Sanyasis, who promoted the views of the British, and Shamsher, who made common cause with the Mahrattas. In September 1803, the united forces of the English and Himmat Bahadur compelled Shamsher to retreat with his army. In 1809 Ajaigarh was besieged by a British force, and again three years later Kalinjar was besieged and taken after a heavy loss. In 1817, by the treaty of Poona, the British government acquired from the peshwa all his rights, interests and .pretensions, feudal, territorial or pecuniary, in Bundelkhand. In carrying out the provisions of the treaty, an assurance was given by the British government that the rights of those interested in the transfer should be scrupulously re- spected, and the host of petty native principalities in the pro- vince is the best proof of the sincerity and good faith with which this clause has been carried out. During the mutiny of 1857, however, many of the chiefs rose against the British, the rani of Jhansi being a notable example.

BUNDI, or Boondee, a native state of India, in the Rajputana agency, lying on the north-east of the river Chambal, in a hilly tract historically known as Haraoti, from the Hara sept of the great clan of Chauhan Rajputs, to which the maharao raja of Bundi belongs. It has an area of 2220 sq. m. Many parts of the state are wild and hilly, inhabited by a large Mina population, formerly notorious as a race of robbers. Two rivers, the Chambia and the Mej, water the state; the former is navigable by boats. In 1901 the population was 171,227, showing a decrease of 4.2% due to the effects of famine. The estimated revenue is £46,000, the tribute £8000. There is no railway, but the metalled road from Kotah to the British cantonment of Deoli passes through the state. The town of Bundi had a population in 1901 of 19,313. A school for the education of boys of high rank was opened in 1897.

The state of Bundi was founded about a.d. 1342 by the Hara chief Rao Dewa, or Deoraj, who captured the town from the Minas. Its importance, however, dates from the time of Rao Surjan, who succeeded to the chieftainship in 1554 and by throwing in his lot with the Mahommedan emperors of Delhi (1569) received a considerable accession of territory. From this time the rulers of Bundi bore the title of rao raja. In the 17th century their power was curtailed by the division of Haraoti into the two states of Kotah and Bundi; but they continued to play a prominent part in Indian history, and the title of maharao raja was conferred on Budh Singh for the part played by him in securing the imperial throne for Bahadur Shah I. after the death of Aurangzeb in 1707. In 1804 the maharao raja Bishan Singh gave valuable assistance to Colonel Monson in his disastrous retreat before Holkar, in revenge for which the Mahratas and Pindaris continually ravaged his state up to 1817. On the 10th of February 1818, by a treaty concluded with Bishan Singh, Bundi was taken under British protection. In 182 1 Bishan Singh was succeeded by his son Ram Singh, who ruled till 1889. He is described as a grand specimen of the Rajput gentleman, and " the most conservative prince in conservative Rajputana." His rule was popular and beneficent; and though during the mutiny of 1857 his attitude was equivocal, he continued to enjoy the favour of the British government, being created G.C.S.I. and a counsellor of the empire in 1877 and CLE. in 1878. He was succeeded by his son Raghubir Singh, who was made a K.C.S.I. in 1897 and a G.C.I.E. in 1901.

BUNER, a valley on the Peshawar border of the North- West Frontier Province of India. It is a small mountain valley, dotted with villages and divided into seven sub-divisions. The Mora Hills and the Ham range divide it from Swat, the Sinawar range from Yusafzai, the Guru mountains from the Chamla valley, and the Duma range from the Puran Valley. It is in-

habited by the Iliaszai and Malizai divisions of the Pathan tribe of Yusafzais, who are called after their country the Bunerwals. There is no finer race on the north-west frontier of India than the Bunerwals. Simple and austere in their habits, religious and truthful in their ways, hospitable to all who seek shelter amongst them, free from secret assassinations, they are bright examples of the Pathan character at its best. They are a power- ful and warlike tribe, numbering 8000 fighting men. The Umbeyla Expedition of 1863 under Sir Neville Chamberlain was occasioned by the Bunerwals siding with the Hindostani Fanatics, who had settled down at Malka in their territory. In the end the Bunerwals were subdued by a force of 9000 British troops, and Malka was destroyed, but they made so

fierce a resistance, in particular in their attack upon the " Crag " picket, that the Indian medal with a clasp for "Umbeyla" was granted in 1869 to the survivors of the expedition. The government of India refrained from interfering with the tribe again until the Buner campaign of 1897 under Sir Bindon Blood. Many Bunerwals took part in the attack of the Swatis on the Malakand fort, and a force of 3000 British troops was sent to punish them; but the tribe made only a feeble resistance at the passes into their country, and speedily handed in the arms demanded of them and made complete submission.

BUNGALOW (an Anglo-Indian word from the Hindustani 6o»g/ o,belonging to Bengal), a one-storeyed house with a verandah and a projecting roof, the typical dwelling for Europeans in India; the name is also used for similar buildings which have become common for seaside and summer residences in America and Great Britain. Dak or dawk bungalows (from dak or dawk, a post, a relay of men for carrying the mails, &c.) are the govern- ment rest-houses established at intervals for the use of travellers on the high roads of India.

BUNGAY, a market-town in the Lowestoft parliamentary division of Suffolk, England; 113 m. N.E. from London on a branch from Beccles of the Great Eastern railway. Pop. (1901) 3314. It is picturesquely placed in a deep bend of the river Waveney, the boundary with Norfolk. Of the two parish churches that of St Mary has a fine Perpendicular tower, and that of Holy Trinity a round tower of which the lower part is Norman. St Mary's was attached to a Benedictine nunnery founded in 1 1 60. The ruins of the castle date from 128 1. They are fragmentary though massive; and there are traces of earth- works of much earlier date. The castle was a stronghold of the powerful family of Bigod, being granted to Roger Bigod, a Norman follower of the Conqueror, in 1075. A grammar school was founded in 1592. There are large printing-works, and founding and malting are prosecuted. There is a considerable carrying trade on the Waveney.

BUNION (a word usually derived from the Ital. bugnont, a swelling, – but, according to the New English Dictionary, the late and rare literary use of the word makes an Italian derivation unlikely; there is an O. Eng. word " bunny," also meaning a swelling, and an O. Fr. buigne, modern bigne, showing a probable common origin now lost, cf. also " bunch "), an inflamed swelling of the bursa mucosa, the sac containing synovial fluid on the metatarsal joint of the big toe, or, more rarely, of the little toe. This may be accompanied by corns or suppuration, leading to an ulcer or even gangrene. The cause is

usually pressure; removal of this, and general palliative treatment by dressings, &c. are usually effective, but in severe and obstinate cases a surgical operation may be necessary.

BUNKER HILL, the name of a small hill in Charlestown (Boston), Massachusetts, U.S.A., famous as the scene of the first considerable engagement in the American War of Independ- ence (June 17, 1775). Bunker Hill (no ft.) was connected by a ridge with Breed's Hill (75 ft.), both being on a narrow peninsula a short distance to the north of Boston, joined by a causeway with the mainland. Since the affair of Lexington (April 19, I77S) General Gage, who commanded the British forces, had remained inactive at Boston awaiting reinforcements from England; the headquarters of the Americans were at Cambridge, with advanced posts occupying much of the 4 m. separating

Cambridge from Bunker Hill. When Gage received his re- inforcements at the end of May, he determined to repair his strange neglect by which the hills on the peninsula had been allowed to remain unoccupied and unfortified. As soon as the Americans became aware of Gage's intention they determined to frustrate it, and accordingly, on the night of the 16th of June, a force of about 1200 men, under Colonel William Prescott and Major-General Israel Putnam, with some engineers and a few field-guns, occupied Breed's Hill — to which the name Bunker Hill is itself now popularly applied — and when daylight disclosed their presence to the British they had already strongly entrenched their position. Gage lost no time in sending troops across from Boston with orders to assault. The British force, between 2000 and 3000 strong, under (Sir) William Howe, supported by artillery and by the guns of men-of-war and floating batteries stationed in the anchorage on either side of the peninsula, were fresh and well disciplined. The American force consisted for the most part of inexperienced volunteers, numbers of whom were already wearied by the trench work of the night. As communica- tion was kept up with their camp the numbers engaged on the hill fluctuated during the day, but at no time exceeded about 1500 men. The village of Charlestown, from which a galling musketry fire was directed against the British, was by General Howe's orders almost totally destroyed by hot shot during the attack. Instead of attempting to cut off the Americans by occupying the neck to the rear of their position, Gage ordered the advance to be made up the steep and

difficult ascent facing the works on the hill. Whether or not in obedience — as tradition asserts — to an order to reserve fire until they could see the whites of their assailants' eyes, the American volunteers with admirable steadiness waited till the attack was on the point of being driven home, when they delivered a fire so sustained and deadly that the British line broke in disorder. A second assault, made like the first, with the precision and discipline of the parade- ground met the same fate, but Gage's troops had still spirit enough for a third assault, and this time they carried the position with the bayonet, capturing five pieces of ordnance and putting the enemy to flight. The loss of the British was 1054 men killed and wounded, among whom were 89 commissioned officers; while the American casualties amounted to 420 killed and wounded, including General Joseph Warren, and 30 prisoners. (See American Wax of Independence.)

The significance of the battle of Bunker Hill is not, however, to be gauged by the losses on either side, heavy as they were in proportion to the numbers engaged, nor by its purely military results, but by the moral effect which it produced; and when it is considered from this standpoint its far-reaching consequences can hardly be over-estimated. " It roused at once the fierce instinct of combat in America . . ., and dispelled . . . the almost superstitious belief in the impossibility of encountering regular troops with hastily levied volunteers, . . . No one questioned the conspicuous gallantry with which the provincial troops had supported a long fire from the ships and awaited the charge of the enemy, and British soldiers had been twice driven back in disorder before their fire." 1 The pride which Americans naturally felt in such an achievement, and the self-confidence which it inspired, were increased when they learnt that the small force on Bunker Hill had not been properly reinforced, and that their ammunition was running short before they were dislodged from their, position. 2 Had the character of the fighting on that day been other than it was ; had the American volunteers been easily, and at the first assault, driven from their fortified position by the troops of George HI., it is not impossible that the resistance to the British government would have died out in the North American colonies through lack of confidence in their own power on the part of the colonists. Bunker Hill, whatever it may have to teach the student of war, taught the American colonists in 1775 that the odds against them in the enterprise in

1 W. E. H. Lecky, History of England in the Eighteenth Century, iii. 428.

- *General Gage's despatch. American Remembrancer, 1776, part 11, p. 132.*

which they had embarked were not so overwhelming as to deny them all prospect of ultimate success.

In 1843 a monument, 221 ft. high, in the form of an obelisk, of Quincy granite, was completed on Breed's Hill (now Bunker Hill) to commemorate the battle, when an address was delivered by Daniel Webster, who had also delivered the famous dedicatory oration at the laying of the corner-stone in 1825. Bunker Hill day is a state holiday.

See R. Frothingham, The Centennial: Battle of Bunker Hill (Boston, 1895), and Life and Times of Joseph Warren (Boston, 1865) ; Boston City Council, Celebration of Centen. Aniv. of Battle of Bunker Hill (Boston, 1875) ; G. E. Ellis, Hist, of Battle of Bunker's (Breed's) Hill (Boston, 1875) ; S. Sweet, Who was the Commander at Bunker Hill? (Boston, 1850); W. E. H. Lecky, History of England in the Eighteenth Century, vol. iii (London, 1883) ; Sir George O. Trevelyan, The American Revolution (London, 1899) ; Fortescue, History of the British Army, vol. iii. pp. 153 seq. (London, 1902). (R. J. M.)

BUNN, ALFRED (1796-1860), English theatrical manager, was appointed stage-manager of Drury Lane theatre, London, in 1823. In 1826 he was managing the Theatre Royal, Birming- ham, and in 1833 he undertook the joint management of Drury Lane and Covent Garden, London. In this undertaking he met with vigorous opposition. A bill for the abolition of the patent theatres was passed in the House of Commons, but on Bunn's petition was thrown out by the House of Lords. He had diffi- culties first with his company, then with the lord chamberlain, and had to face the keen rivalry of the other theatres. A long- standing quarrel with Macready resulted in the tragedian assaulting the manager. In 1 840 Bunn was declared a bankrupt, but he continued to manage Drury Lane till 1848. Artistically his control of the two chief English theatres was highly successful. Nearly every leading English actor played under his management, and he made a courageous attempt to establish English opera, producing the principal works of Balfe. He had some gift for writing, and most of the libretti of these operas were translated by himself. In The Stage Before and Behind the Curtain (3 vols., 1840) he gave a full account of his managerial experiences. He died at Boulogne on the 20th of December i860.

BUNNER, HENRY CUYLER (1855-1896), American writer, was born in Oswego, New York, on the 3rd of August 1855. He was educated in New York City. From being a clerk in an importing house, he turned to journalism, and after some work as a reporter, and on the staff of the Arcadian (1873), he became in 1877 assistant editor of the comic weekly Puck. He soon assumed the editorship, which he held until his death in Nutley, N.J., on the nth of May 1896. He developed Puck from a new struggling periodical into a powerful social and political organ. In 1886 he published a novel, The Midge, followed in 1887 by The Story of a New York House. But his best efforts in fiction were his short stories and sketches — Short Sixes (1891), More Short Sixes (1894), Made in France (1893), Zadoc Pine and Other Stories (1891), Love in Old Cloathes and Other Stories (1896), and Jersey Street and Jersey Lane (1896). His verses — Airs from Arcady and Elsewhere (1884), containing the well-known poem, The Way to Arcady; Rowen (1892); and Poems (1896), edited by his friend Brander Matthews— display a light play of imagina tion and a delicate workmanship. He also wrote clever vers drt societe and parodies. Of his several plays (usually written in collaboration), the best was The Tower of Babel (1883).

BUNSEN, CHRISTIAN CHARLES JOSIAS, Bakon von (1791- i860), Prussian diplomatist arid scholar, was born on the 25th of August 1791 at Korbach, an old town in the little German principality of Waldeck. His father was a farmer who was driven by poverty to become a soldier. Having studied at the Korbach grammar school and Marburg university, Bunsen went in his nineteenth year to Gottingen, where he supported himself by teaching and later by acting as tutor to W. B. Astor, the American irierchant. He won the university prize essay of the year 181 2 by a treatise on the Athenian Law of Inheritance, and a few months later the university of Jena granted him the honorary degree of doctor of philosophy. During 18 13 he travelled with Astor in South Germany, and then turned to the study of the religion, laws, language and literature of the Teutonic

races. He had read Hebrew when a bdy, and now worked at Arabic at Munich, Persian at Leiden, and Norse at Copenhagen. At the close of 1815 he went to Berlin, to lay before Niebuhr the plan of research which he had mapped out. Niebuhr was so impressed with Bunsen's ability that, two years later, when he became Prussian envoy to the

papal court, he made the young scholar his secretary. The intervening years Bunsen spent in assiduous labour among the libraries and collections of Paris and Florence. In July 18 17 he married Frances Waddington, eldest daughter and co-heiress of B. Waddington of Llanover, Monmouthshire.

As secretary to Niebuhr, Bunsen was brought into contact with the Vatican movement for the establishment of the papal church in the Prussian dominions, to provide for the largely increased Catholic population. He was among the first to realize the importance of this new vitality on the part of the Vatican, and he made it his duty to provide against its possible dangers by urging upon the Prussian court the wisdom of fair and impartial treatment of its Catholic subjects. In this object he was at first successful, and both from the Vatican and from Frederick William III., who put him in charge of the legation on Niebuhr's resignation, he received unqualified approbation. Owing partly to the wise statesmanship of Count Spiegel, arch- bishop of Cologne, an arrangement was made by which the thorny question of " mixed " marriages (i.e. between Catholic and Protestant) would have been happily solved; but the archbishop died in 1835, the arrangement was never ratified, and the Prussian king was foolish enough to appoint as Spiegel's successor the narrow-minded partisan Baron Droste. The pope gladly accepted the appointment, and in two years the forward policy of the Jesuits had brought about the strife which Bunsen and Spiegel had tried to prevent. Bunsen rashly recommended that Droste should be seized, but the coup was so clumsily attempted, that the incriminating documents were, it is said, destroyed in advance. The government, in this impasse, took the safest course, refused to support Bunsen, and accepted his resignation in April 1838.

After leaving Rome, where he had become intimate with all that was most interesting in the cosmopolitan society of the papal capital, Bunsen went to England, where, except for a short term as Prussian ambassador to Switzerland (1830-1841), he was destined to pass the rest of his official life. The accession to the throne of Prussia of Frederick William IV., on June 7th, 1840, made a great change in Bunsen's career. Ever since their first meeting in 1828 the two men had been close friends and had exchanged ideas in an intimate correspondence, published under Ranke's editorship in 1873. Enthusiasm for evangelical religion and admiration for the Anglican Church they held in common, and Bunsen was the instrument naturally selected for realizing the king's fantastic scheme of setting up at Jerusalem a Prusso- Anglican bishopric as a sort of advertisement of the unity and aggressive force of Protestantism. The

special mission of Bunsen to England, from June to November 1841, was completely successful, in spite of the opposition of English high churchmen and Lutheran extremists. The Jerusalem bishopric, with the consent of the British government and the active encouragement of the archbishop of Canterbury and the bishop of London, was duly established, endowed with Prussian and English money, and remained for some forty years an isolated symbol of Protestant unity and a rock of stumbling to Anglican Catholics.

During his stay in England Bunsen had made himself very popular among all classes of society, and he was selected by Queen Victoria, out of three names proposed by the king of Prussia, as ambassador to the court of St James's. In this pbst he remained for thirteen years. His tenure of the office coincided with the critical period in Prussian and European affairs which culminated in the revolutions of 1848. With the visionary schemes of Frederick William, whether that of setting up a strict episcopal organization in the Evangelical Church, or that of reviving the defunct ideal of the medieval Empire, Bunsen found himself increasingly out of sympathy. He realized the significance of the signs that heralded the coming storm, and tried in

vain to move the king to a policy which would have placed him at the head of a Germany united and free. He felt bitterly the humiliation of Prussia by Austria after the victory of the reaction; and in 1852 he set his signature reluctantly to the treaty which, in his view, surrendered the " constitutional rights of Schleswig and Holstein." His whole influence was now directed to withdrawing Prussia from the blighting influence of Austria and Russia, and attempting to drawcloser the ties that bound her to Great Britain. On the outbreak of the Crimean War he urged Frederick William to throw in his lot with the western powers, and create a diversion in the north-east which would have forced Russia at once to terms. The rejection of his advice, and the proclamation of Prussia J s attitude of ■"' benevolent neutrabty," led him in April 1854 to offer his resignation, which was accepted.

Bunsen's life as a public man was now practically at an end. He retired first to a villa on the Neckar near Heidelberg and later to Bonn. He refused to stand for a seat, in the Liberal interest, in the Lower House of the Prussian diet, but continued to take an active interest in politics, and in 1855 published in two volumes a work, Die Zeichen der Zeil: Brief e, &c, which exercised an immense influence in reviving the Liberal movement which the failure of the revolution had crushed. In September 1857 Bunsen attended, as the king's guest, a meeting of the Evan- gelical Alliance at Berlin; and

one of the last papers signed by Frederick William, before his mind gave way in October, was that which conferred upon him the title of baron and a peerage for life. In 1858, at the special request of the regent (afterwards the emperor) William, he took his seat in the Prussian Upper House, and, though remaining silent, supported the new ministry, of which his political and personal friends were members.

Literary work was, however, his main preoccupation during all this period. Two discoveries of ancient MSS. made during his stay in London, the one containing a shorter text' of the Epistles of St Ignatius, and the other an unknown work On all the Heresies, by Bishop Hippolytus, had already led him to write his Hippolytus and his Age: Doctrine and Practice of Rome under Commodus and Severus (1852). He now concentrated all his efforts upon a translation of the Bible with commentaries. While this was in preparation he published his God in History, in which he contends that the progress of mankind marches parallel to the conception of God formed within each nation by the highest exponents of its thought. At the same time he carried through the press, assisted by Samuel Birch, the con- cluding volumes of his work (published in English as well as in German) Egypt's Place in Universal ffistory- ˆcontaining a reconstruction of Egyptian chronology, together with an attempt to determine the relation in which the language and the religion of that country stand to the development of each among the more ancient non-Aryan and Aryan races. His ideas on this subject were most fully developed in two volumes published in London before he quitted England — Outlines of the Philosophy of Universal History as applied to Language and Religion (2 vols.,

*i*54).*

In 1858 Bunsen's health began to fail; visits to Cannes in 1858 and 1859 brought no improvement, and he died on November 28th,, i860. One of his last requests having been that his wife would write down recollections of their common life, she pub- lished his Memoirs in 1868, which contain much of his private correspondence. The German translation of these Memoirs has added extracts from unpublished documents, throwing a new light upon the political events in which he played a part. Baron Humboldt's letters to Bunsen were printed in 1869.

Bunsen's English connexion, both through his wife (d. 1876) and through his own long residence in London, was further in- creased in his family. He had ten children, including five sons, Henry

(1818-1855), Ernest (1819-1003), Karl '(1821-1887), Georg (1824-1896) and Theodor (-1832-1892). Of these Karl (Charles) and Theodor had careers in the German diplomatic service; and Georg, who for some time was an active politician in Germany, eventually retired to live in London; Henry, who was an English clergyman, became a naturalized Englishman,

and Ernest, who in 1845 married an Englishwoman, Miss Gurney, subsequently resided and died in London. The form of " de " Bunsen was adopted for the surname in England. Ernest de Bunseh was a scholarly writer, who published various works both in German and in English, notably on Biblical chronology and other questions of comparative religion. His son, Sir Maurice de Bunsen (b. 1852), entered the English diplomatic service in 1877, and after a varied experience became minister at Lisbon in 1905.

See also L. von Ranke, Aus dem Briefwechsel Friedrich Wilhelms TV. mit Bunsen (Berlin, 1873). The biography in the 9th edition of this encyclopaedia, which has been drawn upon above, was by Georg von Bunsen.

BUNSEN, ROBERT WILHELM VON (1811-1899), German chemist, was born at Gottingen on the 31st of March 1811, his father, Christian Bunsen, being chief librarian and professor of modern philology at. the university. He himself entered the university in 1828, and in 1834 became Privat-docent. In 1836 he became teacher of chemistry at the Polytechnic School of Cassel, and in 1839 took up the appointment of professor of chemistry at Marburg, where he remained till 1851. In 1852, after a brief period in Breslau, he was appointed to the chair of chemistry at Heidelberg, where he spent the rest of his life, in spite of an urgent invitation to migrate to Berlin as successor to E. Mitscherlich. He retired from active work in 1889, and died at Heidelberg on the 16th of August 1899. The first re- search by which attention was drawn to Bunsen's abilities was concerned with the cacodyl compounds (see Arsenic), though he had already, in 1834, discovered the virtues of freshly pre- cipitated hydrated ferric oxide as an antidote to arsenical poisoning. It was begun in 1837 at Cassel, and during the six years he spent upon it he not only lost the sight of one eye through an explosion, but nearly

killed himself by arsenical poisoning. It represents almost his only excursion into organic chemistry, and apart from its accuracy and completeness it is of historical interest in the development of that branch of the science as being the forerunner of the fruitful investigations on the organo-metallic compounds subsequently carried out by his English pupil, Edward Frankland. Simultaneously with his work on cacodyl, he was studying the composition of the gases given off from blast furnaces. He showed that in German furnaces nearly half the heat yielded by the fuel was being allowed to escape with the waste gases, and when he came to England, and in conjunction with Lyon Playfair investigated the conditions obtaining in English furnaces, he found the waste to amount to over 80%. These researches marked a stage in the application of scientific principles to the manufacture of iron, and they led also to the elaboration of Bunsen's famous methods of measuring gaseous volumes, &c, which form the subject of the only book he ever published (Gasomelrische Methoden, 1857). In 1 84 1 he invented the carbon-zinc electric cell which is known by his name, and which conducted him to several important achievements. He first employed it to produce the electric arc, and showed that from 44 cells a light equal to 1171-3 candles could be obtained with the consumption of one pound of zinc per hour. To measure this light he designed in 1844 another instrument, which in various modifications has come into ex- tensive use — the grease-spot photometer. In 1852 he began to carry out electrolytical decompositions by the aid of the battery. By means of a very ingenious arrangement he obtained magnesium for the first time in the metallic state, and studied its chemical and physical properties, among other things demon- strating the brilliance and high actinic qualities of the flame it gives when burnt in air. From 1855 to 1863 he published with Roscoe a series of investigations on photochemical measure- ments, which W. Ostwald has called the " classical example for all future researches in physical chemistry." Perhaps the best known of the contrivances which the world owes to him is the " Bunsen burner " which he devised in 1855 when a simple means of burning ordinary coal gas with a hot smokeless flame was required for the new laboratory at Heidelberg. Other appliances invented by him were the ice-calorimeter (1870), the vapour iv. 26

calorimeter (1887), and the filter pump (1868), which was worked out in the course of a research on the separation of the platinum metals. Mention must also be made of another piece of work of a rather different character. Travelling was one of his favourite relaxations, and in 1846 he paid a visit to Iceland. There he

investigated the phenomena of the geysers, the com- position of the gases coming off from the fumaroles, their action on the rocks with which they came into contact, &c, and on his observations was founded a noteworthy contribution to geological theory. But the most far-reaching of his achieve- ments was the elaboration, about 1859, jointly with G. R. Kirch- hoff , of spectrum analysis, which has put a new weapon of extra- ordinary power into the hands both of chemists and astronomers. It led Bunsen himself almost immediately to the isolation of two new elements of the alkali group, caesium and rubidium. Having noticed some unknown lines in the spectra of certain salts he was examining, he set to work to obtain the substance or substances to which these were due. To this end he evaporated large quantities of the Durkheim mineral water, and it says much both for his perseverance and powers of manipulation that he dealt with 40 tons of the water to get about 1 7 grammes of the mixed chlorides of the two substances, and that with about one-third of that quantity of caesium chloride was able to prepare the most important compounds of the element and determine their char- acteristics, even making goniometrical measurements of their crystals.

Bunsen founded no school of chemistry; that is to say, no body of chemical doctrine is associated with his name. Indeed, he took little or no part in discussions of points of theory, and, although he was conversant with the trend of the chemical thought of his day, he preferred to spend his energies in the collection of experimental data. One fact, he used to say , properly proved is worth all the theories that can be invented. But as a teacher of chemistry he was almost without rival, and his success is sufficiently attested by the scores of pupils who flocked from every part of the globe to study under him, and by the number of those pupils who afterwards made their mark in the chemical world. The secret of this success lay largely in the fact that he never delegated his work to assistants, but was constantly present with his pupils in the laboratory, assisting each with personal direction and advice. He was also one of the first to appreciate the value of practical work to the student, and he instituted a regular practical course at Marburg so far back as 1840. Though alive to the importance of applied science, he considered truth alone to be the end of scientific research, and the example he set his pupils was one of single-hearted devotion to the ad- vancement of knowledge.

See Sir Henry Roscoe's " Bunsen Memorial Lecture," Trans. Chem. Soc, 1900, which is reprinted (in German) with other obituary notices in an edition of Bunsen's collected works published by

Ostwald and Bodenstein in 3 vols, at Leipzig in 1904.

BUNTER, the name applied by English geologists to the lower stage or subdivision of the Triassic rocks in the United Kingdom. The name has been adapted from the German Buntsandstein, Der bunte Sandstein, for it was in Germany that this continental type of Triassic deposit was first carefully studied. In France, the Bunter is known as the Gres bigarri. In northern and central Germany, in the Harz, Thuringia and Hesse, the Bunter is usually conformable with the underlying Permian formation; in the south-west and west, however, it transgresses on to older rocks, on to Coal Measures near Saarbruck, and upon the crystalline schists of Odenwald and the Black Forest.

The German subdivisions of the Bunter are as follows; — (1) Upper Buntsandstein, or Rot, mottled red and green marls and clays with occasional beds of shale, sandstone, gypsum, rocksart and dolomite. In Hesse and Thuringia, a quartzitic sandstone prevails in the lower part. The " Rhizocoralhum Dolomite " (R. Jenense, probably a sponge) of the latter district contains the only Bunter fauna of any importance. In Lorraine and the Eifel and Saar districts there are micaceous clays and sandstones with plant remains— the Voltzia sandstone. The lower beds in the Black Forest, Vosges, Odenwald and Lorraine very generally contain strings of dolomite and carnelian — the so-called " Carneol bank." (2) Middle Buntsandstein-Hauptbuntsandstein (900 ft.), the bulk

of this subdivision is made up of weakly-cemented, coarse-grained sandstones, oblique lamination is very prevalent, and occasional conglomeratic beds make their appearance. The uppermost bed is usually fine-grained and bears the footprints of Cheirotherium. In the Vosges district, this subdivision of the Bunter is called the Grhs des Vosges, or the Grhs principal, which comprises: (i.) red micaceous and argillaceous sandstone ; (ii.) the conglomerat principal ; and (iii.) Grfc bigarre principal (=gris des Vosges, properly so-called). (3) Lower Buntsandstein, fine-grained clayey and micaceous sandstones, red-grey, yellow, white and mottled. The cement of the sandstones is often felspathic; for this reason they yield useful porcelain clays in the Thuringerwald. Clay galls are common in the

sandstones of some districts, and in the neighbourhood of the Harz an oolitic calcareous sandstone, Rogeristein, occurs. In eastern Hesse, the lowest beds are crumbly, shaly clays, Brockelschiefern.

The following are the subdivisions usually adopted in England : — (1) Upper Mottled Sandstone, red variegated sandstones, soft and generally free from pebbles. (2) Bunter Pebble Beds, harder red and brown sandstones with quartzose pebbles, very abundant in some places. (3) Lower Mottled Sandstone, very similar to the upper division. The Bunter beds occupy a large area in the midland counties where they form dry, healthy ground of moderate elevation (Cannock Chase, Trentham, Sherwood Forest, Sutton Coldfield, &c). Southward they may be followed through west Somerset to the cliffs of Budleigh Salterton in Devon; while northward they pass through north Staffordshire, Cheshire and Lancashire to the Vale of Eden and St Bees, reappearing in Elgin and Arran. A de- posit of these rocks lies in the Vale of Clwyd and probably flanks the eastern side of the Pennine Hills, although here it is not so readily differentiated from the Keuper beds. The English Bunter rests with a slight unconformity upon the older formations. It is gener- ally absent in the south-eastern counties, but thickens rapidly in the opposite direction, as is shown by the following table : —

Lancashire and W. Cheshire.

Staffordshire.

Leicestershire and Warwickshire.

(1) 500 ft.

(2) 500-750 ft.

(3) 200-500 ft.

50-200 ft.

100300 ft.

O-IOO ft.

Absent O-IOO ft. Absent

The material forming the Bunter beds of England came probably from the north-west, but in Devonshire there are indications which point to an additional source.

In the Alpine region, most of the Trias differs markedly from that of England and northern Germany, being of distinctly marine origin; here the Bunter is represented by the Werfen beds (from Werfen in Salzburg) in the northern Alps, a series of red and greenish- grey micaceous shales with gypsum, rock salt and limestones in the upper part; while in the southern Alps (S. Tirol) there is an upper series of red clays, the Campil beds, and a lower series of thin sand- stones, the Seis beds. Mojsisovics von Mojsvar has pointed out that the Alpine Bunter belongs to the single zone of Natica costata and Tirolites cassianus.

Fossils in the Bunter are very scarce; in addition to the footprints of Cheirotherium, direct evidence of amphibians is found in such forms as Trematosaurus and Mastodonsaurus. Myophoria costata and Gervillea Murchisoni are characteristic fossils. Plants are represented by Voltzia and by equisetums and ferns.

In England, the Bunter sandstones frequently act as valuable reservoirs of underground water; sometimes they are used for building stone or for foundry sand. In Germany some of the harder beds have yielded building stones, which were much used in the middle ages in the construction of cathedrals and castles in southern Germany and on the Rhine. In the northern Eifel region, at Mechernich and elsewhere, this formation contains lead ore in the form of spots and patches (Knolenerz) in the sandstone ; some of the lead ore was worked by the Romans.

For a consideration of the relationship of the Bunter beds to formations of the like age in other parts of the world, see Triassic System. (J. A. H.)

BUNTING, JABEZ (1779-1858), English Wesleyan divine, was born of humble parentage at Manchester on the 13th of May 1779. He was educated at Manchester grammar school, and at the age of nineteen began to preach, being received into full connexion in 1803. He continued to minister for upwards of fifty-seven years in Manchester, Sheffield, Leeds, Liverpool, London and elsewhere. In 1835 he was appointed president of the first Wesleyan theological college (at Hoxton), and in this position he succeeded in materially raising the standard of

education among Wesleyan ministers. He was four times chosen to be president of the conference, was repeatedly secretary of the " Legal Hundred," and for eighteen years was secretary to the Wesleyan Missionary Society. Under him Methodism ceased to be a society

based upon Anglican foundation, and became a distinct church. He favoured the extension of lay power in committees, and was particularly zealous in the cause of foreign missions. Bunting was a popular preacher, and an effective platform speaker; in 1818 he was given the degree of M.A. by Aberdeen University, and in 1834 that of D.D. by Wesleyan University of Middletown, Conn., U.S.A. He died on the 16th of June 1858. His eldest son, William Maclardie Bunting (1805-1866), was also a distinguished Wesleyan minister; and his grandson Sir Percy William Bunting (b. 1836), son of T. P. Bunting, became prominent as a liberal nonconformist and editor of the Contemporary Review from 1882, being knighted in 1908.

See Lives of Jabez Bunting (1859) and W. M. Bunting (1870) by Thomas Percival Bunting.

BUNTING, properly the common English name of the bird called by Linnaeus Emberiza miliaria, but now used in a general sense for all members of the family Emberizidae, which are closely allied to the finches (Fringillidae) , though, in Professor W. K. Parker's opinion, to be easily distin- guished therefrom — the Emberizidae possessing what none of the Fringillidae do, an additional pair of palatal bones, " palato-maxillaries." It will probably follow from this diagnosis that some forms of birds, particularly those of the New World, which have hitherto been commonly assigned to the latter, really belong to the former, and among them the genera Cardinalis and Phrygilus. The additional palatal bones just named are also found in several other peculiarly American families, namely, Tanagridae, Icteridae and Mniotillidae — whence it may be perhaps inferred that the Emberizidae are of Transatlantic origin. The buntings generally may be also outwardly distinguished from the finches by their angular gape, the posterior portion of which is greatly deflected; and most of the Old- World forms, together with some of those of the New World, have a bony knob on the palate — a swollen outgrowth of the dentary edges of the bill. Correlated with this peculiarity the maxilla usually has the tomia sinuated, and is generally concave, and smaller and narrower than the mandible, which is also concave to receive the palatal knob. In most other respects the buntings greatly resemble the finches, but their eggs are generally distinguishable by the irregular hair-like markings on the shell. In the British Islands by far the com- monest species of bunting is the yellow-hammer (E. citrinella), but the true bunting (or corn-bunting, or bunting-lark, as it is called in some districts) is a very well-known bird, while the reed-bunting (E. schoeniclus) frequents marshy soils almost to the exclusion of the two former, In certain localities in the south of England the cirl-bunting (E. cirlus) is also a resident; and in winter

vast flocks of the snow-bunting (Flectrophanes nivalis), at once recognizable by its pointed wings and elongated hind-claws, resort to our shores and open grounds. This last is believed to breed sparingly on the highest mountains of Scotland, but the majority of the examples which visit us come from northern regions, for it is a species which in summer inhabits the whole circumpolar area. The ortolan (E. hortulana), so highly prized for its delicate flavour, occasionally appears in England, but the British Islands seem to lie outside its proper range. On the continent of Europe, in Africa and throughout Asia, many other species are found, while in America the number belonging to the family cannot at present be computed. The beautiful and melodious cardinal (Cardinalis virginianus), commonly called the Virginian nightingale, must be included in this family. (A. N.)

BUNTING (a word of doubtful origin, possibly connected with bunt, to sift, or with the Ger. bunt, of varied colour), a loosely woven, woollen cloth fcr making flags; the term is also used of a collection of flags, and particularly those of a ship.

BUNYAN, JOHN (1628-1688), English religious writer, was born at Elstow, about a mile from Bedford, in November 1628. His father, Thomas Bunyan, 1 was a tinker, or, as he described himself, a " brasier." The tinkers then formed a hereditary caste, which was held in no high estimation. Bunyan's father had a fixed residence, and was able to send his son to a village school where reading and writing were taught.

The years of John's boyhood were those during which the Puritan spirit was in the highest vigour all over England; and nowhere had that spirit more influence than in Bedfordshire. It is not wonderful, therefore, that a lad to whom nature had given a powerful imagination and sensibility which amounted to a disease, should have been early haunted by religious terrors. Before he was ten his sports were interrupted by fits of remorse and despair; and his sleep was disturbed by dreams of fiends trying to fly away with him. As he grew older his mental conflicts became still more violent. The strong language in which he described them strangely misled all his earlier bio- graphers except Southey. It was long an ordinary practice with pious writers to cite Bunyan as an instance of the super- natural power of divine grace to rescue the human soul from the lowest

depths of wickedness. He is called in one book the most notorious of profligates; in another, the brand plucked from the burning. Many excellent persons, whose moral character from boyhood to old age has been free from any stain discernible to their fellow-creatures, have, in their autobiographies and diaries, applied to themselves, and doubtless with sincerity, epithets as severe as could be applied to Titus Oates or Mrs Brownrigg. It is quite certain that Bunyan was, at eighteen, what, in any but the most austerely puritanical circles, would have been considered as a young man of singular gravity and innocence. Indeed, it may be remarked that he, like many other penitents who, in general terms, acknowledge themselves to have been the worst of mankind, fired up, and stood vigorously on his defence, whenever any particular charge wag brought against him by others. He declares, it is true, that he had let loose the reins on the neck of his lusts, that he had delighted in all transgressions against the divine law, and that he had been the ringleader of the youth of Elstow in all manner of vice. But when those who wished him ill accused him of licentious amours, he called on God and the angels to attest his purity. No woman, he said, in heaven, earth or hell, could charge him with having ever made any improper advances to her. Not only had he been strictly faithful to his wife; but he had, even before his marriage, been perfectly spotless. It does not appear from his own confessions, or from the railings of his enemies, that he ever was drunk in his life. One bad habit he contracted, that of using profane language; but he tells us that a single reproof cured him so effectually that he never offended again. The worst that can be laid to his charge is that he had a great liking for some diversions, quite harmless in themselves, but condemned by the rigid precisians among whom he lived, and for whose opinion he had a great respect. The four chief sins of which he was guilty were dancing, ringing the bells of the parish church, playing at tipcat and reading the history of Sir Bevis of South- ampton. A rector of the school of Laud would have held such a young man up to the whole parish as a model. But Bunyan's notions of good and evil had been learned in a very different school; and he was made miserable by the conflict between his tastes and his scruples.

When he was about seventeen the ordinary course of his life was interrupted by an event which gave a lasting colour to his thoughts. He enlisted in the Parliamentary army, 2 and served

1 The name, in various forms as Buignon, Buniun, Bonyon or Binyan, appears in the local records of Elstow and the neighbouring parishes at intervals from as far back as 1 199. They were small freeholders, but all the property except the cottage had been lost in

the time of Bunyan's grandfather. Bunyan's own account of his family as the " meanest and most despised of all the families of the land must be put down to his habitual self-depreciation. Thomas Bunyan had a forge and workshop at Elstow.

1 There is no direct evidence to show on which side he fought, but the balance of probability justifies tbv view.

during the decisive campaign of 1645. All that we know of his military career is, that, at the siege of some town, 3 one of his comrades, who had marched with the besieging army instead of him, was killed by a shot. Bunyan ever after considered himself as having been saved from death by the special inter- ference of Providence. It may be observed that his imagination was strongly impressed by the glimpse which he had caught of the pomp of war. To the last he loved to draw his illustrations of sacred things from camps and fortresses, from guns, drums, trumpets, flags of truce, and regiments arrayed each under its own banner. His Greatheart, his Captain Boanerges and his Captain Credence are evidently portraits, of which the originals were among those martial saints who fought and expounded in Fairfax's army.

In 1646 Bunyan returned home and married about two years later. His wife had some pious relations, and brought him as her only portion some pious books. His mind, excitable by nature, very imperfectly disciplined by education, and exposed to the enthusiasm which was then epidemic in England, began to be fearfully disordered. The story of the struggle is told in Bunyan's Grace Abounding.

In outward things he soon became a strict Pharisee. He was constant in attendance at prayers and sermons. His favourite amusements were, one after another, relinquished, though not without many painful struggles. In the middle of a game at tipcat he paused, and stood staring wildly upwards with his stick in his hand. He had heard a voice asking him whether he would leave his sins and go to heaven, or keep his sins and go to hell ; and he had seen an awful countenance frowning on him from the sky. The odious vice of bell-ringing he renounced; but he still for a time ventured to go to the church tower and look on while others pulled the ropes. But soon the thought struck him that, if he persisted in such wickedness, the steeple would fall on his head; and he fled in terror from the accursed place. To give up dancing on the village green was still harder; and some months elapsed before he had the fortitude to part with his darling sin. When this last sacrifice had been made, he was,

even when tried by the maxims of that austere time, faultless. All Elstow talked of him as an eminently pious youth. But his own mind was more unquiet than ever. Having nothing more to do in the way of visible reformation, yet finding in religion no pleasures to supply the place of the juvenile amuse- ments which he had relinquished, he began to apprehend that he lay under some special malediction; and he was tormented by a succession of fantasies which seemed likely to drive him to suicide or to Bedlam. At one time he took it into his head that all persons of Israelite blood would be saved, and tried to make out that he partook of that blood; but his hopes were speedily destroyed by his father, who seems to have had no ambition to be regarded as a Jew. At another time Bunyan was disturbed by a strange dilemma: " If I have not faith, I am lost; if I have faith, I can work miracles." He was tempted to cry to the puddles between Elstow and Bedford, " Be ye dry," and to stake his eternal hopes on the event. Then he took up a notion that the day of grace for Bedford and the neighbouring villages was past; that all who were to be saved in that part of England were already converted; and that he had begun to pray and strive some months too late. Then he was harassed by doubts whether the Turks were not in the right and the Christians in the wrong. Then he was troubled by a maniacal impulse which prompted him to pray to the trees, to a broomstick, to the parish bull.

As yet, however, he was only entering the valley of the shadow of death. Soon the darkness grew thicker. Hideous forms floated before him. Sounds of cursing and wailing were in his ears. His way ran through stench and fire, close to the mouth of the bottomless pit. He began to be haunted by a strange curiosity about the unpardonable sin, and by a morbid longing to commit it. But the most frightful of all the forms which

3 There is no means of identifying the place besieged. It has been assumed to be Leicester, which was captured by the Royalists in May 1645, and recovered by Fairfax in the next month.

his disease took was a propensity to utter blasphemy, and especi- ally to renounce his share in the benefits of the redemption. Night and day, in bed, at table, at work, evil spirits, as he imagined, were repeating close to his ear the words, " Sell him, sell him." He struck at the hobgoblins; he pushed them from him; but still they were ever at his side. He cried out in answer to them, hour after hour, " Never,

never; not for thousands of worlds; not for thousands." At length, worn out by this long agony, he suffered the fatal words to escape him, " Let him go if he will." Then his misery became more fearful than ever. He had done what could not be forgiven. He had forfeited his part of the great sacrifice. Like Esau, he had sold his birth- right; and there was no longer any place for repentance. " None," he afterwards wrote, " knows the terrors of those days but myself." He has described his sufferings with singular energy, simplicity and pathos. He envied the brutes; he envied the very stones on the street, and the tiles on the houses. The sun seemed to withhold its light and warmth from him. His body, though cast in a sturdy mould, and though still in the highest vigour of youth, trembled whole days together with the fear of death and judgment. He fancied that this trembling was the sign set on the worst reprobates, the sign which God had put on Cain. The unhappy man's emotion destroyed his £ower of digestion. He had such pains that he expected to burst asunder like Judas, whom he regarded as his prototype.

Neither the books which Bunyan read, nor the advisers whom he consulted, were likely to do much good in a case like his. His small library had received a most unseasonable addition, the account of the lamentable end of Francis Spira. One ancient man of high repute for piety, whom the sufferer consulted, gave an opinion which might well have produced fatal consequences. " I am afraid," said Bunyan, " that I have committed the sin against the Holy Ghost." "Indeed," said the old fanatic, "I am afraid that you have."

At length the clouds broke ; the light became clearer and clearer; and the enthusiast who had imagined that he was branded with the mark of the first murderer, and destined to the end of the arch-traitor, enjoyed peace and a cheerful confidence in the mercy of God. Years elapsed, however, before his nerves, which had been so perilously overstrained, recovered their tone. When he had joined a Baptist society at Bedford, and was for the first time admitted to partake of the eucharist, it was with difficulty that he could refrain from imprecating destruction on his brethren while the cup was passing from hand to hand. After he had been some time a member of the congregation he began to preach; and his sermons produced a powerful effect. He was indeed illiterate; but he spoke to illiterate men. The severe training through which he had passed had given him such an experimental knowledge of all the modes of religious melan-choly as he could never have gathered from books; and his vigorous genius, animated by a fervent spirit of devotion, enabled him not only to exercise a great influence over the vulgar, but even to extort the half -contemptuous admiration of scholars; Yet it was long before

he ceased to be tormented by an impulse which urged him to utter words of horrible impiety in the pulpit. 1

Bunyan was finally relieved from the internal sufferings which had embittered his life by sharp persecution from without. He had been five years a preacher when the Restoration put it in the power of the Cavalier gentlemen and clergymen all over the country to oppress the dissenters. In November 1660 he was flung into Bedford gaol; and there he remained, with some intervals of partial and precarious liberty, during twelve years.

1 Bunyan had joined, in 1653, the nonconformist community which met under a certain Mr Gifford at St John's church, Bedford. This congregation was not Baptist, properly so called, as the ques- tion of baptism, with other doctrinal points, was left open.- When Bunyan removed to Bedford in 1655, he became a deacon of this church, and two years later he was formally recognized as a preacher, his fame soon spreading through the neighbouring counties. His wife died soon after their removal to Bedford, and he also lost his friend and pastor, Mr Gifford. His earliest work was directed against Quaker mysticism and appeared in 1656. It was entitled Some Gospel Truths Opened; it was followed in the same year by a second tract in the same sense, A Vindication of Gospel Truths.

The authorities tried to extort from him A promise thit he wtiiild abstain from preaching; but he was convinced that he was divinely set apart and commissioned to be a teacher of righteous- ness, and he was fully determined to obey God rather than man. He was brought before several tribunals, laughed at, caressed, reviled, menaced, but in vain. He was facetiously told that he was quite right in thinking that he ought not to hide his gift; but that his real gift was skill in repairing old kettles. He was compared to Alexander the coppersmith. He was told that if he would give up preaching he should be instantly liberated. He was warned that if he persisted in disobeying the law he would be liable to banishment, and that if he were found in England after a certain time his neck would be stretched. His answer was, " If you let me out to-day, I will preach again to-morrow." Year after year he lay patiently in a dungeon, compared with which the worst prison now to be found in the island is a palace. 2 His fortitude is the more extraordinary because his domestic feelings were unusually strong. Indeed, he was considered by his stern brethren as somewhat too fond and indulgent a parent. He had four small children, and among them a daughter who was blind, and whom he loved with peculiar tenderness. He could not, he said; bear even to let the wind blow on her; and now she must suffer

cold and hunger; she must beg; she must be beaten; "yet," he added, "I must, I must do it."

His second wife, whom he had married just before his arrest, tried in vain for his release; she even petitioned the House of Lords on his behalf. While he lay in prison he could do nothing in the way of his old trade for the support of his family. He determined, therefore, to take up a new trade. He learned to make long- tagged thread laces; and many thousands of these articles were furnished by him to the hawkers. While his hands were thus busied he had other employments for his mind and his lips. He gave religious instruction to his fellow-captives,' and formed from among them a little flock, of which he was himself the pastor. He studied indefatigably the few books which he possessed. His two chief companions were the Bible and Fox's Book of Martyrs. His knowledge of the Bible was such that he might have been called a living concordance; and on the margin of his copy of the Book of Martyrs are still legible the ill-spelt lines of doggerel in which he expressed his reverence for the brave sufferers, and his implacable enmity to the mystical Babylon.

Prison life gave him leisure to write, and during ■ his first imprisonment he wrote, in addition to several tracts and some verse, Grace Abounding to the Chief of Sinners, the narrative of his own religious experience. The book was published in 1666. A short period of freedom was followed by a second offence and a further imprisonment. Bunyan's works were coarse, indeed, but they showed a keen mother wit, a great command of the homely mother tongue, an intimate knowledge of the English Bible, and a vast and dearly bought spiritual experience. They therefore, when the corrector of the press had improved the syntax and the spelling, were well received.

Much of Bunyan's time was spent in controversy. He wrote sharply against the Quakers, whom he seems always to have held in utter abhorrence. He wrote against the liturgy of the Church of England. No two things, according to him, had less affinity than the form of prayer and the spirit of prayer. Those, he skid with much point, who have most of the spirit of prayer are all to be found in gaol; and those who have most zeal for the form of prayer are all to be found at the alehouse. The doctrinal Articles, on the other hand, he warmly praised and defended. The most acrimonious of all his works is his Defence of Justifica- tion by Faith, an answer to what Bunyan calls " the brutish and beastly latitudinarianism " of Edward Fowler, afterwards bishop of Gloucester, an excellent man, but not free from the taint of Pelagianism.

Bunyan had also a dispute with some of the chiefs of the sect to which he belonged. He doubtless held with perfect sincerity

2 He was not, however, as has often been stated, confined in the old gaol which stood on the bridge over the Ouse, but in the county gaol.

the distinguishing tenet of that sect, but he did not consider that tenet as one of high importance, and willingly joined in communion with pious Presbyterians and Independents. The sterner Baptists, therefore, loudly pronounced him a false brother. A controversy arose which long survived the original combatants. The cause which Bunyan had defended with rude logic and rhetoric against Kiffin and Danvers has since been pleaded by : Robert Hall with an ingenuity and eloquence such as no polemical writer has ever surpassed.

During the years which immediately followed the Restoration, Bunyan's confinement seems to have been strict. But as the passions of 1660 cooled, as the hatred with which the Puritans had been regarded while their reign was recent gave place to pity, he was less and less harshly treated. The distress of his family, and his own patience, courage and piety, softened the hearts of his judges. Like his own Christian in the cage, he found protectors even among the crowd at Vanity Fair. The bishop of the diocese, Dr Barlow, is said to have interceded for him. At length the prisoner was suffered to pass most of his time beyond the walls of the gaol, on condition, as it should seem, that he remained within the town of Bedford.

He owed his complete liberation to one of the worst acts of one of the worst governments that England has ever seen. In 1 67 1 the Cabal was in power. Charles II. had concluded the treaty by which he bound himself to set up the Roman Catholic religion in England. The first step which he took towards that end was to annul, by an unconstitutional exercise of his pre- rogative, all the penal statutes against the Roman Catholics; and in order to disguise his real design, he annulled at the same time the penal statutes against Protestant nonconformists. Bunyan was consequently set at large. 1 In the first warmth of his gratitude he published a tract, in which he compared ChaTles to that humane and generous Persian king, who, though not; himself blest with the light of the true religion, favoured the chosen people, and permitted them, after years of captivity, to rebuild their beloved temple.

Before he left his prison he had begun the book which has made his name immortal. 2 The history of that book is remark- able. The author was, as he tells us, writing a treatise, in which he had occasion to speak of the stages of the Christian progress. He compared that progress, as many others had compared it, to a pilgrimage. Soon his quick wit discovered innumerable points of similarity which had escaped his predecessors. Images came Crowding on his mind faster than he could put them into words, quagmires and pits, steep hills, dark and horrible glens, soft vales, sunny pastures, a gloomy castle, of which the courtyard was strewn with the skulls and bones of murdered prisoners, a town all bustle and splendour, like London on the Lord Mayor's Day, and the narrow path, straight as a rule could make it, running on up hill and down hill, through city and through wilderness, to the Black River and the Shining Gate. He had found out, as most people would have said, by accident, as he Would doubtless have said, by the guidance of Providence, where his powers lay. He had no suspicion, indeed, that he was pro- ducing a masterpiece. He could not guess what place his allegory would occupy in English literature; for of English literature he knew nothing. Those who suppose him to have studied the Faery Queen might easily be confuted, if this were the proper place for a detailed examination of the passages in which the two allegories have been thought to resemble each other. The only work of fiction, in all probability, with which he could compare his Pilgrim was his old' favourite, the legend of Sir Bevis of ' Southampton. He would have thought it a sift to borrow any time from the serious business of his life, from his expositions;

1 His formal pardon is dated the 13th of September 1672 ; but five months earlier he had received a royal licence to preach, and acted for the next three years as pastor of the nonconformist body to which he belonged, in a barn on the site of which stands the present Bunyan Meeting.

? It is now generally supposed that Bunyan wrote his PUgrim's Progress, not during his twelve years' imprisonment, but during a short period of > incarceration 1 in 1675, probably in the old gaol on the bridge; :

his controversies and his lace tags, for the purpose of amusing himself with what he considered merely as a trifle. It was only, he assures us> at spare moments that he returned to the House Beautiful, the Delectable Mountains and the Enchanted Ground. He had no assistance. Nobody but himself saw a line till the whole was complete. He then consulted his pious friends. Some were pleased.

Others were much scandalized. It was a vain story, a mere romance, about giants, and lions, and goblins, and warriors, sometimes fighting with monsters, and sometimes regaled by fair ladies in stately palaces. The loose atheistical wits at Will's might write such stuff to divert the painted Jezebels of the court; but did it become a minister of the gospel to copy the evil fashions of the world? There had been a time when the cant of such fools would have made Bunyan miserable. But that time was past; and his mind was now in a firm and healthy state. He saw that in employing fiction to make truth clear and goodness attractive, he was only following the example which every Christian ought to propose to himself; and he determined to print.

The Pilgnim's Progress was published in February 1678. Soon the irresistible charm of a book which gratified the imagina- tion of the reader with all the action and scenery of a fairy tale, which exercised his ingenuity by setting him to discover a multitude of curious analogies, which interested his feelings for human beings, frail like himself, and struggling with temptations from within and from without, which every moment drew a smile from him by some stroke of quaint yet simple pleasantry, and nevertheless left on his mind a sentiment of reverence for God and of sympathy for man, began to produce its effect. In puritanical circles, from which plays and novels were strictly excluded, that effect Was such as no work of genius, though it were superior to the Iliad, to Don Quixote or to Othello, can ever produce on a mind accustomed to indulge in literary luxury. A second edition came out in the autumn with additions; and the demand became immense. The eighth edition, which con- tains the last improvements made by the author, was published in 1682, the ninth in 1684, the tenth in 1685. The help of the engraver had early been called in; and tens of thousands of children looked with terror and delight on execrable copperplates, which represented Christian thrusting his sword into Apollyon, or writhing in the grasp of Giant Despair. In Scotland, and in some of the colonies, the Pilgrim was even more popular than in his , native country. Bunyan has told us, with very pardonable vanity, that in New England his dream was the daily subject of the conversation of thousands, and was thought worthy to appear in the most superb binding. He had numerous admirers in Holland, and amongst the Huguenots of France.

He continued to work the gold-field which he had discovered, and to draw from it new treasures, not indeed with quite such ease and in quite such abundance as when the precious soil was still virgin, but yet with success, which left all competition far behind. In 1680

appeared the Life and Death of Mr Badman; in 1684 the second part of the Pilgrim's Progress. In 1682 appeared the Holy War, which if the Pilgrim's Progress did not exist, would be the best allegory that ever was written.

Bunyan's place in society was now very different from what it had been. There had been a time when many dissenting ministers, who could talk Latin and read Greek, had affected to treat him with scorn. But his fame and influence now fai exceeded theirs. He had so great an authority among the Baptists that he was popularly called Bishop Bunyan. His episcopal visitations were annual. From Bedford he rode every year to London, and preached there to large and attentive congregations. From London he went his circuit through the country, animating the zeal of his brethren, collecting and distributing alms and making up quarrels. The magistrates seem in general to have given him little trouble. But there is reason to believe that, in the .year 1685, he was in some danger of again occupying his old quarters in Bedford gaol. In that year the rash and wicked enterprise of Monmouth gave the government a pretext for prosecuting the nonconformists; and scarcely one eminent divine of the Presbyterian. Independent

or Baptist persuasion remained unmolested. Baxter was in prison: Howe was driven into exile: Henry was arrested. Two eminent Baptists, with whom Bunyan had been engaged in controversy, were in great peril and distress. Danvers was in danger of being hanged; and Kiffin's grandsons were actually hanged. The tradition is that, during those evil days, Bunyan was forced to disguise himself as a wagoner, and that he preached to his congregation at Bedford in a smock-frock, with a cart- whip in his hand. But soon a great change took place. James II. was at open war with the church, and found it necessary to court the dissenters. Some of the creatures of the government tried to secure the aid of Bunyan. They probably knew that he had written in praise of the indulgence of 1672, and therefore hoped that he might be equally pleased with the indulgence of 1687. But fifteen years of thought, observation and commerce with the world had made him wiser. Nor were the cases exactly parallel. Charles was a professed Protestant; James was a professed Papist. The object of Charles's indulgence was dis- guised; the object of James's indulgence was patent. Bunyan was not deceived. He exhorted his hearers to prepare themselves by fasting and prayer for

the danger which menaced their civil and religious liberties, and refused even to speak to the courtier who came down to remodel the corporation of Bedford, and who, as was supposed, had it in charge to offer some municipal dignity to the bishop of the Baptists.

Bunyan did not live to see the Revolution. 1 In the summer of 1688 he undertook to plead the cause of a son with an angry father, and at length prevailed on the old man not to disinherit the young one. This good work cost the benevolent intercessor his life. He had to ride through heavy rain. He came drenched to his lodgings on Snow Hill, was seized with a violent fever, and died in a few days (August 31). He was buried in Bunhill Fields; and many Puritans, to whom the respect paid by Roman Catholics to the reliques and tombs of saints seemed childish or sinful, are said to have begged with their dying breath that their coffins might be placed as near as possible to the coffin of the author of the Pilgrim's Progress.

The fame of Bunyan during his life, and during the century which followed his death, was indeed great, but was almost entirely confined to religious families of the middle and lower classes. Very seldom was he during that time mentioned with respect by any writer of great literary eminence. Young coupled his prose with the poetry of the wretched D'Urfey. In the Spiritual Quixote, the adventures of Christian are ranked with those of Jack the Giant-Killer and John Hickathrift. Cowper ventured to praise the great allegorist, but did not venture to name him. It is a significant circumstance that, for a long time all the numerous editions of the Pilgrim's Progress were evidently meant for the cottage and the servants' hall. The paper, the printing, the plates, were all of the meanest ,. description. In general, when the educated minority and the common people differ about the merit of a book, the opinion of the educated minority finally prevails. The Pilgrim's Progress is perhaps the only book about which the educated minority has come over to the opinion of the common people.

The attempts which have been made to improve and to imitate this book are not to be numbered. It has been done into verse; it has been done into modern English. The Pilgrim- age of Tender Conscience, the Pilgrimage of Good Intent, the Pilgrimage of Seek Truth, the Pilgrimage of Theophilus, the Infant Pilgrim, the Hindoo Pilgrim, are among the many feeble copies of the great original. But the peculiar glory of Bunyan is that those who most hated his doctrines have tried to borrow the help of his genius. A Catholic version of his parable may be seen with the head of the virgin in the title-page. On the other hand, those Antinomians for whom his Calvinism is not strong

enough, may study the Pilgrimage of Hephzibah, in which

1 He had resumed his pastorate in Bedford after his imprison- ment of 1675, and, although he frequently preached in London to crowded congregations, and is said in the last year of his life to have been, of course unofficially chaplain to Sir John Shorter, lord mayor of London, he remained faithful to his own congregation.*

nothing will be found which can be construed into an admission of free agency and universal redemption. But the most extra- ordinary of all the acts of Vandalism by which a fine work of art was ever defaced was committed in the year 1853. It was determined to transform the Pilgrim's Progress into a Tractarian book. The task was not easy; for it was necessary to make two sacraments the most prominent objects in the allegory, and of all Christian theologians, avowed Quakers excepted, Bunyan was the one in whose system the sacraments held the least prominent place. However, the Wicket Gate became a type of baptism, and the House Beautiful of the eucharist. The effect of this change is such as assuredly the ingenious person who made it never contemplated. For, as not a single pilgrim passes through the Wicket Gate in infancy, and as Faithful hurries past the House Beautiful without stopping, the lesson which the fable in its altered shape teaches, is that none but adults ought to be baptized, and that the eucharist may safely be neglected. Nobody would have discovered from the original Pilgrim's Progress that the author was not a Paedobaptist. To turn his book into a book against Paedobaptism, was an achievement reserved for an Anglo-Catholic divine. Such blunders must necessarily be committed by every man who mutilates parts of a great work, without taking a comprehensive view of the whole. (M.)

The above article has been slightly corrected as to facts, as com- pared with its form in the 9th edition. Bunyan's works were first partially collected in a folio volume (1692) by his friend Charles Doe. A larger edition (2 vols., 1 736-1 737) was edited by Samuel Wilson of the Barbican. In 1853 a g°°d edition (3 vols., Glasgow) was produced by George Offer. Southey's edition (1830) of the Pilgrim's Progress contained his Life of Bunyan. Since then various editions of the Pilgrim's Progress, many illustrated (by Cruikshank, Byam Shaw, W. Strang and others), have appeared. An interesting life by " the author of Mark Rutherford " (W. Hale White) was published in 1904. Other lives are by J. A. Froude (1880) in the " English Men of Letters " series, and E. Venables (1888); but the standard work on the subject is John Bunyan; his Life, Times and Work (1885), by the Rev. J. Brown of Bedford. A bronze statue, by

Boehm, was presented to the town by the duke of Bedford in 1874.

BUNZLAU, a town of Germany, in Prussian Silesia, on the right bank of the Bober, 27 m. from Liegnitz on the Berlin- Breslau railway, which crosses the river by a great viaduct. Pop. (1900) 14,590. It has a handsome market square, an Evangelical and a Roman Catholic church, and monuments to the Russian field marshal Kutusov, who died here, and to the poet Martin Opitz von Boberfeld. The Bunzlau ppttery is famous ; woollen and linen cloth are manufactured, and there is a con- siderable trade in grain and cattle. Bunzlau (Boleslavia) received its name in the 12th century from Duke Boleslav, who separated it from the duchy of Glogau. Its importance was increased by numerous privileges and the possession of extensive mining works. It was frequently captured and recaptured in the wars of the 17th century, and in 1739 was completely destroyed by fire. On the 30th of August 1813 the French were here defeated on the retreat from the Katzbach by the Silesian army of the allies.

BUONAFEDE, APPIANO (1716-1793), Italian philosopher, was born at Comachio, in Ferrara, and died in Rome. He became professor of theology at Naples in 1740, and, entering the religious body of the Celestines, rose to be general of the order. His principal works, generally published under the assumed name of " Agatopisto Cromazione," are on the history of philosophy: — Delia Istoria e delle Indole' di ogni Filosofia, 7 vols., 1772 seq.; and Delia Restaurazione di o.gni Filosofia ne' Secoli, xvi., xvii., xviii,, 3 vols., 1789 (German trans, by C. Heydenreich). The latter gives a valuable account of 16th- century Italian philosophy. His other works are Istoria critica e filosofica del suicidio (1761); Delle conquiste celebri esaminate col naturale diritto delle genti (1763); Storia critica del moderno diritto di natura e delle genti (1789); and a few poems and philosophic comedies.

BUOY (15th century " boye "; through 0. Fr. or Dutch, from Lat. boia, fetter; the word is now usually pronounced as "boy," and it has been spelt in that form; but Hakluyt's

Voyages sp#s it " bwoy," and this seems to indicate a different pronunciation, which is also given in some modern dictionaries), a floating body employed to mark the navigable limits of channels,

their fairways, sunken dangers or isolated rocks, mined or torpedo grounds, telegraph cables, or the position of a ship's anchor after letting go; buoys are also used for securing a ship to instead of anchoring. They vary in size and construction from a log of wood to steel mooring buoys for battleships or a steel gas buoy.

In 1882 a conference was held upon a proposal to establish a uniform system of buoyage. It was under the presidency of the then duke of Edinburgh, and consisted of representatives from the various bodies interested. The questions of colour, visibility, shape and size were considered, and any modifica- tions necessary owing to locality. The committee proposed the following uniform system of buoyage, and it is now adopted by the general lighthouse authorities of the United Kingdom: — (1) The mariner when approaching the coast must determine

A

Ik

(f

))

> <

5 = ˆ1ˆ !ˆ£%nP

Fig. 2. > *Fig. 3.*

his position on the chart, and note the direction of – flood tide. (2) The term " starboard-hand " shall denote that side which would be on the right hand of the mariner either going with the main stream of the flood, or entering a harbour, river or estuary from seaward; the term " port-hand " shall denote the left hand of the mariner in the same circumstances. (3) 1 Buoys showing the pointed top of a cone above water shall be called conical (fig. 1) and shall always be starboard-hand buoys, as above defined. (4) 1 Buoys showing a flat top above water shall be called can (fig. 2) and shall always be port-hand buoys, as above defined. (5) Buoys showing a domed top above water shall be called spherical (fig. 3) and shall mark the ends of middle grounds. (6) Buoys having a tall central structure on

Fig. 4.

Fig. 5.

Fig. 6-

a broad face shall be called pillar buoys (fig. 4), and like all other special buoys, such as bell buoys, gas buoys, ancl automatic sounding buoys, shall be placed to mark special positions either on the coast or in the approaches to harbours. (7) Buoys showing only a mast above water shall be called spar-buoys 2 (fig. 5). (8) Starboard-hand buoys shall always be painted in one colour only. (9) Port-hand buoys shall be "painted of another characteristic colour, either single or parti-colour. (10) Spherical buoys (fig. 3) at the ends of middle grounds shall always be distinguished by horizontal stripes of white colour. (11) Surmounting beacons, such as staff and globe and others, 3 shall always be painted of one dark colour. (12) Staff and globe (fig. 1) shall only be used on starboard-hand

1 In carrying out the above system the Northern Lights Commissioners have adopted a red colour for conical or starboard-hand buoys, and black colour for can or port-hand buoys, and this system is applicable to the whole of Scotland.

- *Useful where floating ice is encountered.*

8 St George and St Andrew crosses are principally employed to surmount shore beacons.

Fig. 7.

buoys, staff and cage (fig. 2) on port hand; diamonds (fig. 7) at the outer ends of middle grounds; and triangles (fig. 3) at the inner ends. (13) Buoys on the same side of a channel, estuary or tideway may be distinguished from each other by names, numbers or letters, and where necessary by a staff surmounted with the appropriate beacon. (14) Buoys intended for moorings (fig. 6) may be of shape and colour according to the discretion of the authority within whose jurisdiction they are laid, but for marking submarine telegraph cables the colour shall be green with the word " Tele- graph " painted thereon in white letters.

Buoying and Marking of Wrecks. — (15) Wreck buoys in the open sea, or in the approaches to a harbour or estuary, shall be coloured green, with the word " Wreck " painted in white letters on them. (16) When possible, the buoy should be laid near to the side of the wreck next to mid-channel. (17) When a wreck-marking vessel is used, it shall, if possible, have its top sides coloured green, with the word

“Wreck” in white letters thereon, and shall exhibit by day, three balls on a yard 20 ft. above the sea, two placed vertically at one end and one at the other, the single ball being on the side nearer to the wreck; in fog a gong or bell is rung in quick succession at intervals not exceeding one minute (wherever practicable); by night, three white fixed lights are similarly arranged as the balls in daytime, but the ordinary riding lights are not shown. (18) In narrow waters or in rivers and harbours under the jurisdiction of local authorities, the same rules may be adopted, or at discretion, varied as follows: — When a wreck-marking vessel is used she shall carry a cross-yard on a mast with two balls by day, placed horizontally not less than 6 nor more than r2 ft. apart, and by night two lights similarly placed. When a barge or open boat only is used, a flag or ball may be shown in the daytime. (19) The position in which the marking vessel is placed with reference to the wreck shall be at the discretion of the local authority having jurisdiction. A uniform system by shape has been adopted by the Mersey. Dock and Harbour Board, to assist a mariner by night, and, in addition, where practicable, a uniform colour; the fairway buoys are specially marked by letter, shape and colour.

British India has practically adopted the British system, United States and Canada have the same uniform system; in the majority of European maritime countries and China various uniform systems have been adopted. In Norway and Russia the compass system is used, the shape, colour and surmount- ings of the buoys indicating the compass bearing of the danger from the buoy; this method is followed in the open sea by Sweden. An international uni- form system of buoyage, although desirable, appears impracticable. Germany employs yellow buoys to mark boundaries of quaran- tine stations. The question of shape versus colour, irrespective of size, is a disputed one; the shape is a better guide at night and colour in the daytime. All markings (figs. 8,, 9, 10 and 11) should be subordinate to the main colour of the buoy; the varying backgrounds and atmospheric conditions render the question a complex one.

London Trinity House buoys are divided into five classes, their use depending on whether the spot to be marked is in the open sea or otherwise exposed position, or in a sheltered harbour, or according to the depth of water and weight of moorings, or the importance of the danger. Buoys are moored with specially tested cables; the eye at the base of the buoy is of wrought iron to prevent it becoming ” reedy ” and the cable is secured to blocks (see Anchor) or mushroom anchors according to the nature of the ground. London Trinity House buoys are

Single Colour

Fig. 8.

Chequered Fig. 10.

Vertical Stripes

Fig. 9.

Horizontal Stripes

Fig. 11.

Fig. 12.

built of steel, with bulkheads to lessen the risk of their sinking by collision, and, with the exception of bell buoys, do not contain water ballast. In 1878 gas buoys, with fixed and occulting lights of 10-candle power, were introduced. In 1896 Mr T. Matthews, engineer-in-chief in the London Trinity Corporation, developed the present design (fig. 12). It is of steel, the lower plates being j in. and the upper jV in. in thickness,thus adding to the stability. The buoy holds 380 cub. ft. of gas, and exhibits an occult- ing light for 2533 hours. This light is placed 10 ft. above the sea, and, with an intensity of 50 candles, is visible 8 m. It occults every ten seconds, and there is seven seconds' visibility, with three seconds' obscuration. The occultations are actuated by a double valve arrangement. In the body of the ap- paratus there is a gas chamber having sufficient capacity, in the case of an occulting light, for maintaining the flame in action for seven seconds, and by means of a by-pass a jet remains alight in the centre of the burner. During the period of three seconds' darkness the gas chamber is re-charged, and at the end of that period is again opened to the main burner by a tripping arrange- ment of the valve, and remains in action seven seconds. The gas chamber of the buoy, charged to five atmospheres, is re- plenished from a steamer fitted with a pump and transport receivers carrying indicating valves, the receivers being charged to ten atmospheres. Practically no inconvenience has resulted from saline or other deposits, the glazing (glass) of the lantern being thoroughly cleaned when re-charging the buoy. Acetylene, generated from calcium carbide inside the buoy, is also used. Electric light is exhibited from some buoys in the United

States. In England an automatic electric buoy has been sug- gested, worked by the motion of the waves, which cause a stream of water to act on a turbine connected with a dynamo generating electricity. Boat-shaped buoys are also used (river Humber) for carrying a light and bell. The Courtenay whistling buoy (fig. 13) is actuated by the undulating move- ment of the waves. A hollow cylinder ex- tends from the lower part of the buoy to still water below the movement of the waves, ensuring that the water inside keeps at mean level, whilst the buoy follows the movements of the waves. By a special appar- atus the compressed air is forced through the whistle at the top of the buoy, and the air is replenished by two tubes at the upper part of the buoy. It is fitted with a rudder and secured in the usual manner. Automatic buoys cannot be relied on in calm days with a smooth sea. The nun buoy (fig. 14) for indicating the position of an anchor after letting go, is secured to the crown of the anchor by a buoy rope. It is usually made of galvanized iron, and consists of two cones joined together at the base. It is painted red for the port anchor and green for the starboard.

Mooring buoys (fig. 6) for battleships are built of steel in four watertight com- partments, and have sufficient buoyancy to keep afloat should a compartment be pierced; they are 13 ft. long with a diameter of 65 ft. The mooring cable (bridle) passes through a watertight 16- in. trunk pipe, built vertically in the centre of the buoy, and is secured to a " rocking shackle " on the upper surface of the buoy. Large mooring buoys are usually protected by horizontal wooden battens and are fitted with life chains. (J. W. D.)

BUPALUS and ATHENIS, sons of Archermus, and members of the celebrated school of sculpture in marble which flourished in Chios in the 6th century B.C. They were contemporaries of the poet Hipponax (about 540 B.C.), whom they were said to have caricatured. Their works consisted almost entirely of draped

Fig. 13.

female figures, Artemis, Fortune, the Graces, whenfc the Chian school has been well called a school of Madonnas. Augustus brought many of the works of Bupalus and Athenis to Rome, and placed them on the gable of the temple of Apollo Palatinus.

BUPHONIA, in Greek antiquities, a sacrificial ceremony, forming part of the Diipolia, a religious festival held on the 14th of the month Skirophorion (June-July) at Athens, when a labour- ing ox was sacrificed to Zeus Polieus as protector of the city in accordance with

a very ancient custom. The ox was driven forward to the altar, on which grain was spread, by members of the family of the Kentriadae (from K&vrpov, a goad), on whom this duty devolved hereditarily. When it began to eat, one of the family of the Thaulonidae advanced with an axe, slew the ox, then immediately threw away the axe and fled. The axe, as being polluted by murder, was now carried before the court of the Prytaneum (which tried inanimate objects for homicide) and there charged with having caused the death of the ox, for which it was thrown into the sea. Apparently this is an early instance analogous to deodand (q.v.). Although the slaughter of a labouring ox was forbidden, it was considered excusable in the exceptional circumstances; none the less it was regarded as a murder.

Porphyrius, De Abstinentia, ii. 29; Aelian, Var. Hist. viii. 3; Schol. Aristoph. Nubes, 485; Pausanias, i. 24, 28; see also Band, De Diipoliorum Sacro Atheniensium (1873).

BUR, or Burr (apparently the same word as Danish borre, burdock, cf. Swed. kard-boore), a prickly fruit or head of fruits, as of the burdock. In the sense of a woody outgrowth on the trunk of a tree, or " gnaur," the effect of a crowded bud-develop- ment, the word is probably adapted from the Fr. bourre, a vine-bud.

BURANO, a town of Venetia, in the province of Venice, on an island in the lagoons, 6 m. N.E. of Venice by sea. Pop. (1901) 8169. It is a fishing town, with a large royal school of lace- making employing some 500 girls. It was founded, like all the towns in the lagoons, by fugitives from the mainland cities at the time of the barbarian invasions. Torcello is a part of the commune of Burano,

BURAUEN, a town of the province of Leyte, island of Leyte, Philippine Islands, on the Dagitan river, 21 m. S. by W. of Tacloban, the capital. Pop. (1903) 18,197. Burauen is situated in a rich hemp-growing region, and hemp is its only important product. The language is Visayan.

BURBAGE, JAMES (d. 1597), English actor, is said to have been born at Stratford-on-Avon. He was a member of the earl of Leicester's players, probably for several years before he is first mentioned (1574) as being at the head of the company. In 1576, having secured the lease of land at Shoreditch, Burbage erected there the successful house which was known for twenty years as The Theatre from the fact that it was the first ever erected in London. He seems also to have been concerned in the erection of a second theatre

in the same locality, the Curtain, and later, in spite of all difficulties and a great deal of local opposition, he started what became the most celebrated home of the rising drama, — the BJackfriars theatre, built in 1 596 near the old Dominican friary.

His son Richard Burbage (c. 1567-1619), more celebrated than his father, was the Garrick of the Elizabethan stage, and acted all the great parts in Shakespeare's plays. He, too, is said to have been born at Stratford-on-Avon, and made his first appearance at an early age at one of his father's theatres. He had established a reputation by the time he was twenty, and in the next dozen years was the most popular English actor, the " Roscius " of his day. At the time of his father's death, a lawsuit was in progress against the lessor from whom James Burbage held the land on which The Theatre stood. This suit Was continued by Richard and his brother Cuthbert, and in 1 569 they pulled down the Shoreditch house and used the materials to erect the Globe theatre, famous for its connexion with Shake- speare. They occupied it as a summer playhouse, retaining the Blackfriars, which was roofed in, for winter performances. In this venture Richard Burbage had Shakespeare and others

as his partners, and it was in one or the other of these houses that he gained his greatest triumphs, taking the leading part in almost every new play. He was specially famous for his impersonation of Richard III. and other Shakespearian char- acters, and it was in tragedy that he especially excelled. Every playwright of his day endeavoured to secure his services. He died on the 13th of March 1619. Richard Burbage was a painter as well as an actor. The Felton portrait of Shakespeare is attributed to him, and there is a portrait of a woman, un- doubtedly by him, preserved at Dulwich College.

BURBOT, or Eel-Pout {Lota vulgaris), a fish of the family Gˆdidae, which differs from the ling in the dorsal and anal fins reaching the caudal, and in the small size of all the teeth. It exceeds a length of 3 ft. and is a freshwater fish, although examples are exceptionally taken in British estuaries and in the Baltic; some specimens are handsomely marbled wfth dark brown, with black blotches on the back and dorsal fins. It is very locally distributed in central and northern Europe, and an uncommon fish in England. Its flesh is excellent. The American burbot {Lota maculosa) is coarser, and not favoured for the table.

BURCKHARDT, JAKOB (1818-1897),- Swiss writer on art, was born at Basel on the 25th of May 1818; he was educated there and at Neuchatel, and till 1839 was intended to be a pastor. In 1838 he made his first journey to Italy, and also published his first important articles Bemerkungen iiber schweizerische Kathedralen. In 1839 he went to the university of Berlin, where he studied till 1843, spending part of 1841 at Bonn, where he was a pupil of Franz Kugler, the art historian, to whom his first book, Die Kunstwerke d. belgischen Stadte (1842), was dedicated. He was professor of history at the university of Basel (184 5-1847, 1849-1855 and 1858-1893) and at the federal polytechnic school at Zurich (1855-1858). In 1847 he brought out new editions of Kugler's two great works, Geschichte der Malerei and Kunst- geschichte, and in 1853 published his own work, Die Zeit Con- stantins des Grossen. He spent the greater part of the years 1853-1854 in Italy, where he collected the materials for one of his most famous works, Der Cicerone: eine Anleitung zum Genuss der Kunstwerke Italiens, which was dedicated to Kugler and appeared in 1855 (7th German edition, 1899; English trans- lation of the sections relating to paintings, by Mrs A. H. Clough, London, 1873). This work, which includes sculpture and architecture, as well as painting, has become indispensable to the art traveller in Italy. About half of the original edition was devoted to the art of the Renaissance, so that Burckhardt was naturally led on to the preparation of his two other cele- brated works, Die Cultur der Renaissance in Italien (i860, 5th German edition 1896, and English translation, by S. G. C. Middlemore, in 2 vols., London, 1878), and the Geschichte der Renaissance in Italien (1867, 3rd German edition 1891). In 1867 he refused a professorship at Tubingen, and in 1872 another (that left vacant by Ranke) at Berlin, remaining faithful to Basel. He died in 1897.

See Life by Hans Trog in the Easier Jahrbuch for 1898, pp. 1-172. (W. A. B. C.)

BURCKHARDT, JOHN LEWIS [Johann Ludwig] (1784- 181 7), Swiss traveller and orientalist, was born at Lausanne on the 24th of November 1784. After studying at Leipzig and Gottingen he visited England in the summer of 1806, carrying a letter of introduction from the naturalist Blumenbach to Sir Joseph Banks, who, with the other members of the African Association, accepted his offer to explore the interior of Africa. After studying in London and Cambridge, and inuring himself to all kinds of hardships and privations, Burckhardt left England in March 1809 for Malta, whence he proceeded, in the following autumn, to Aleppo. In order to obtain a better knowledge of oriental life he disguised himself as a

Mussulman, and took the name of Sheikh Ibrahim Ibn Abdallah. After two years passed in the Levant he had thoroughly mastered Arabic, and had acquired such accurate knowledge of the Koran, and of the commentaries upon its religion and laws, that after a critical examination the most learned Mussulmans entertained no doubt of his being really what he professed to be, a learned doctor

of their law. During his residence in Syria he visited Palmyra, Damascus, Lebanon and thence journeyed via Petra to Cairo with the intention of joining a caravan to Fezzan, and of exploring from there the sources of the Niger. In 181 2, whilst waiting for the departure of the caravan, he travelled up the Nile as far as Dar Mahass; and then, finding it impossible to penetrate westward, he made a journey through the Nubian desert in the character of a poor Syrian merchant, passing by Berber and Shendi to Suakin, on the Red Sea, whence he performed the pilgrimage to Mecca by way of Jidda. At Mecca he stayed three months and afterwards visited Medina. After enduring privations and sufferings of the severest kind, he returned to Cairo in June 181 5 in a state of great exhaustion; but in the spring of 181 6 he travelled to Mount Sinai, whence he returned to Cairo in June, and there again made preparations for his intended journey to Fezzan. Several hindrances prevented his prosecuting this intention, and finally, in April 1817, when the long-expected caravan prepared to depart, he was seized with illness and died on the 15th of October. He had from time to time carefully transmitted to England his journals and notes, and a very copious series of letters, so that nothing which appeared to him to be interesting in the various journeys he made has been lost. He bequeathed his collection of 800 vols, of oriental MSS. to the library of Cambridge University.

His works were published by the African Association in the following order: — Travels in Nubia (to which is prefixed a bio- graphical memoir) (1819) ; Travels in Syria and the Holy Land. (1822) ; Travels in Arabia (1829); Arabic Proverbs, or the Manners and Customs of the Modern Egyptians (1830); Notes on the Bedouins and Wahabys (1831).

BURDEAU, AUGUSTE LAURENT (1851-1894), French politician, was the son of a labourer at Lyons. Forced from childhood to earn his own living, he was enabled to secure an education by bursarships at the Lycee at Lyons and at the Lycee Louis Le Grand in Paris. In 1870 he was at the ficole Normale Superieure in Paris, but enlisted in the army, and was wounded and made prisoner in 1871. In 1874 he became professor of philosophy, and translated several works of Herbert Spencer and of Schopenhauer into French. His extraordinary

aptitude for work secured for him the position of chef de cabinet under Paul Bert, the minister of education, in 1881. In 1885 he was elected deputy for the department of the Rhone, and distinguished himself in financial questions. He was several times minister, and became minister of finance in the cabinet of Casimir-Perier (from the 3rd of November 1893 to the 22nd of May 1894). On the 5th of July 1894 he was elected president of the chamber of deputies. He died on the 12th of December 1894, worn out with overwork.

BURDEN, or Burthen, (i) (A.S. byrthen, from beran, to bear), a load, both literally and figuratively; especially the carrying capacity of a ship; in mining and smelting, the tops or heads of stream-work which lie over the stream of tin, and the pro- portion of ore and flux to fuel in the charge of a blast-furnace. In Scots and English law the term is applied to an encumbrance on real or personal property. (2) (From the Fr. bourdon, a droning, humming sound) an accompaniment to a song, or the refrain of a song; hence a chief or recurrent topic, as "the burden of a speech."

BURDER, GEORGE (1752-1832), English Nonconformist divine, was born in London on the 5th of June 1752. In early manhood he was an engraver, but in 1776 he began preaching, and was minister of the Independent church at Lancaster from 1778 to 1783. Subsequently he held charges at Coventry (1784- 1803) and at Fetter Lane, London (1803-1832). He was one of the founders of the British and Foreign Bible Society, the Religious Tract Society, and the London Missionary Society, and was secretary to the last-named for several years. As editor of the Evangelical Magazine and author of Village Sermons, he commanded a wide influence. He died on the 29th of May 1832, and a Life (by H. Burder) appeared in 1833.

BURDETT, SIR FRANCIS (1770-1844), English politician, was the son of Francis Burdett by his wife Eleanor, daughter of William Jones of Ramsbury manor, Wiltshire, and grandson of

Sir Robert Burdett, Bart. Born on the 25th of January 1770, he was educated at Westminster school and Oxford, and after- wards travelled in France and Switzerland. He was in Paris during the earlier days of the French Revolution, a visit which doubtless

influenced his political opinions. Returning to England he married in 1793 Sophia, daughter of Thomas Coutts the banker, and this lady brought him a large fortune. In 1706 he became member of parliament for Boroughbridge, having purchased this seat from the representatives of the 4th duke of Newcastle, and in 1 797 succeeded his grandfather as fifth baronet. In parliament he soon 'became prominent as an opponent of Pitt, and as an advocate of popular rights. He denounced the war with France, the suspension of the Habeas Corpus Act, the proposed exclusion of John Home Tooke from parliament, and quickly became the idol of the people. He was instrumental in securing an inquiry into the condition of Coldbath Fields prison, but as a result of this step he was for a time prevented by the government from visiting any prison in the kingdom. In 1797 he made the acquaintance of Home Tooke, whose pupil he became, not only in politics, but also in philology. At the general election of 1802 Burdett was a candidate for the county of Middlesex, but his return was declared void in 1804, and in the subsequent contest he was defeated. In 1805 this return was amended in his favour, but as this was again quickly reversed, Burdett, who had spent an immense sum of money over the affair, declared he would not stand for parliament again.

At the general election of 1806 Burdett was a leading supporter of James Paull, the reform candidate for the city of Westminster; but in the following year a misunderstanding led to a duel between Burdett and Paull in which both combatants were wounded. At the general election in 1807 Burdett, in spite of his reluctance, was nominated for Westminster, and amid great enthusiasm was returned at the top of the poll. He took up again the congenial work of attacking abuses and agitating for reform, and in 1810 came sharply into collision with the House of Commons. A radical named John Gale Jones had been committed to prison by the House, a proceeding which was denounced by Burdett, who questioned the power of the House to take this step, and vainly attempted to secure the release of Jones. He then issued a revised edition of his speech on this occasion, and it was published by William Cobbett in the Weekly Register. The House voted this action a breach of privilege, and the speaker issued a warrant for Burdett's arrest. Barring himself in his house, he defied the authorities, while the mob gathered in his defence. At length his house was entered, and under an escort of soldiers he was conveyed to the Tower. Released when parliament was prorogued, he caused his supporters much disappointment by returning to Westminster by water, and so avoiding a demonstration in his honour. He then brought actions against the speaker and the serjeant-at-arms, but the

courts upheld the action of the House. In parliament Burdett denounced corporal punishment in the army, and supported all attempts to check corruption, but his principal efforts were directed towards procuring a reform of parliament, and the removal of Roman Catholic disabilities. In 1809 he had pro- posed a scheme of parliamentary reform, and returning to the subject in 181 7 and 1818 he anticipated the Chartist movement by suggesting universal male suffrage, equal electoral districts, vote by ballot, and annual parliaments; but his motions met with very little support. He succeeded, however, in carrying a resolution in 1825 that the House should consider the laws concerning Roman Catholics. This was followed by a bill embodying his proposals, which passed the Commons but was rejected by the Lords. In 1827 and 1828 he again proposed resolutions on this subject, and saw his proposals become law in 1829. In 1820 Burdett had again come into serious conflict with the government. Having severely censured its action with reference to the " Manchester massacre," he was prosecuted at Leicester assizes, fined £1000, and committed to prison for three months. After the passing of the Reform Bill in 1832 the ardour of the veteran reformer was somewhat abated, and a number of his constituents soon took umbrage at his changed attitude.

Consequently he resigned his seat early in 1 83 7 , but was re-elected. However, at the general election in the same year he forsook Westminster and was elected member for North Wiltshire, which seat he retained, acting in general with the Conservatives, until his death on the 23rd of January 1844. He left a son, Robert, who succeeded to the baronetcy, and five daughters,the youngest of whom became the celebrated Baroness Burdett- Coutts. Im- petuous and illogical, Burdett did good work as an advocate of free speech, and an enemy of corruption. He was exceedingly generous, and spent money lavishly in furthering projects of reform.

See A. Stephens, Life of Home Tooke (London, 1813); Spencer Walpole, History of England (London, 1878-1886); C. Abbot, Baron Colchester, Diary and Correspondence (London, 1861). (A. W. H.)*

BURDETT-COUTTS, ANGELA GEORGINA BURDETT- COUTTS, Baroness (1814-1906), English philanthropist, youngest daughter of Sir Francis Burdett, was born on the 21st of April 18 14. When she was three-and- twenty, she inherited practically the whole of the immense wealth of her grandfather Thomas Coutts (approaching two millions sterling, a fabulous sum in those days), by the will of the duchess of St Albans, who, as the actress Henrietta Mellon, had been his second wife and had been left it on his death in 1821. Miss

Burdett then took the name of Coutts in addition to her own. " The faymale heiress, Miss Anjaley Coutts," as the author of the Ingoldsby Legends calfed her in his ballad on the queen's coronation in that year (1837), at once became a notable subject of public curiosity and private cupidity; she received numerous offers of marriage, but remained resolutely single, devoting herself and her riches to philanthropic work, which made her famous for well-applied generosity. In May 187 1 she was created a peeress, as Baroness Burdett-Coutts of Highgate and Brookfield, Middlesex. On the 18th of July 1872 she was presented at the Guildhall with the freedom of the city of London, the first case of a woman being admitted to that fellowship. It was not till 1 88 1 that, when sixty-seven years old, she married William Lehman Ashmead-Bartlett, an American by birth, and brother of Sir E. A. Ashmead-Bartlett, the Conservative member of parliament; and he then took his wife's name, entering the House of Commons as member for Westminster, 1885. Full of good works, and of social interest and influence, the baroness lived to the great age of ninety-two, dying at her house in Stratton Street, Piccadilly, on the 30th of December 1906, of bronchitis. She was buried in Westminster Abbey.

The extent of her benefactions during her long and active life can only be briefly indicated; but the baroness must remain a striking figure in the social history of Victorian England, for the thoughtful and conscientious care with which she " held her wealth in trust " for innumerable good objects. It was her aim to benefit the working-classes in ways involving no loss of independence or self-respect. She carefully avoided taking any side in party politics, but she was actively interested in phases of Imperial extension which were calculated to improve the condition of the black races, as in Africa, or the education and relief of the poor or suffering in any part of the world. Though she made no special distinction of creed in her charities, she was a notable benefactor of the Church of England, building and endowing churches and church schools, endowing the bishoprics of Cape Town and of Adelaide (1847), and founding the bishopric of British Columbia (1857). Among her many educational endowments may be specified the St Stephen's Institute in Vincent Square, Westminster (1846); she started sewing schools in Spitalfields when the silk trade began to fail; helped to found the shoe-black brigade; and placed hundreds of destitute boys in training-ships for the navy and merchant service. She established Columbia fish market (1869) in Bethnal Green, and presented it to the city, but owing to commercial difficulties this effort, which cost her over £200,000, proved abortive. She supported various schemes

of emigration to the colonies; and in Ireland helped to promote the fishing industry by starting schools, and providing boats, besides

advancing £250,000 in 1880 for supplying seed to the impoverished tenants. She was devoted to the protection of animals and prevention of cruelty, and took up with characteristic zeal the cause of the costermongers' donkeys, building stables for them on her Columbia market estate, and giving prizes for the best-kept animals. She helped to inaugurate the society for the prevention of cruelty to children, and was a keen supporter of the ragged school union. Missionary efforts of all sorts; hospitals and nursing; industrial homes and refuges; relief funds, &c. , found in her a generous supporter. She was associated with Louisa Twining and Florence Nightingale; and in 1877- 1878 raised the Turkish compassionate fund for the starving peasantry and fugitives in the Russo-Turkish War (for which she obtained the order of the Medjidieh, a solitary case of its conference on a woman). She relieved the distressed in far-off lands as well as at home, her helping hand being stretched out to the Dyaks of Borneo and the aborigines of Australia. She was a liberal patroness of the stage, literature and the arts, and delighted in knowing all the cultured people of the day. In short, her position in England for half a century may well be summed up in words attributed to King Edward VII., " after my mother (Queen Victoria) the most remarkable woman in the kingdom."

BURDON-SANDERSON, SIR JOHN SCOTT, Bart. (1828-1905), English physiologist, was born at West Jesmond, near Newcastle, on the 21st of December 1828. A member of a well-known Northumbrian family, he received his medical education at the university of Edinburgh and at Paris. Settling in London, he became medical officer of health for Paddington in 1856 and four years later physician to the Middlesex and the Brompton Consumption hospitals. When diphtheria appeared in England in 1858 he was sent to investigate the disease at the different points of outbreak, and in subsequent years he carried out a number of similar inquiries, e.g. into the cattle plague and into cholera in 1866. He became first principal of the Brown Institu- tion at Lambeth in 1871, and in 1874 was appointed Jodrell professor of physiology at University College, London, retaining that post till 1882. When the Waynflete chair of physiology was established at Oxford in 1882, he was chosen to be its first occupant, and immediately found himself the object of a

furious anti-vivisectionist agitation. The proposal that the university should spend £10,000 in providing him with a suitable laboratory, lecture-rooms, &c, in which to carry on his work, was strongly opposed, by some on grounds of economy, but largely because he was an upholder of the usefulness and necessity of experiments upon animals. It was, however, eventually carried by a small majority (88 to 85), and in the same year the Royal Society awarded him a royal medal in recognition of his researches into the electrical phenomena exhibited by plants and the relations of minute organisms to disease, and of the services he had rendered to physiology and pathology. In 1885 the university of Oxford was asked to vote £500 a year for three years for the purposes of the laboratory, then approaching completion. This proposal was fought with the utmost bitterness by Sander- son's opponents, the anti-vivisectionists including E. A. Freeman, John Ruskin and Bishop Mackarness of Oxford. Ultimately the money was granted by 41 2 to 244 votes. In 1895 Sanderson was appointed regius professor of medicine at Oxford, resigning the post in 1904; in 1899 he was created a baronet. His attain- ments, both in biology and medicine, brought him many honours. He was Croonian lecturer to the "Royal Society in 1867 and 1877 and to the Royal College of Physicians in 1891; gave the Harveian oration before the College of Physicians in 1878; acted as president of the British Association at Nottingham in 1893; and served on three royal commissions — Hospitals (1883), Tuberculosis, Meat and Milk (1890), and University for London (1892). He died at Oxford on the 23rd of November 1905.

BURDWAN, or Bardwan, a town of British India, in Bengal, which gives its name to a district and to a division. It has a station on the East Indian railway, 67 m. N.W. from Calcutta. Pop. (1901) 35,022. The town consists really of numerous villages scattered over an area of 9 sq. m., and is entirely rural

in character. It contains several interesting ancient tombs, and at Nawab Hat, some 2 m. distant, is a group of 108 Siva lingam temples built in T788. The place was formerly very unhealthy, but this has been to a large extent remedied by the establishment of water-works, a good supply of water being derived from the river Banka. Within the town, the principal objects of interest are the palaces and gardens of the maharaja. The chief educational institution is the Burdwan Raj college, which is entirely supported out of the maharaja's estate.

The town owes its importance entirely to being the head- quarters of the maharaja of Burdwan, the premier nobleman of lower Bengal, whose rent-roll is upwards of £300,000. The raj was founded in

1657 by Abu Ra Kapur, of the Kapur Khatri family of Kotli in Lahore, Punjab, whose descendants served in turn the Mogul emperors and the British government. The great prosperity of the raj was due to the excellent management of Maharaja Mahtab Chand (d. 1879), whose loyalty to the government— especially during the Santal rebellion of 1855 and the mutiny of 1857 — was rewarded with the grant of a coat of arms in 1868 and the right to a personal salute of 13 guns in 1877. Maharaja Bijai Chand Mahtab (b. 1881), who succeeded his adoptive father in 1888, earned great distinction by the courage with which he risked his life to save that of Sir Andrew Fraser, the lieutenant-governor of Bengal, on the occasion of the attempt to assassinate him made by Bengali malcontents on the 7th of November 1908.

The District of Burdwan lies along the right bank of the river Bhagirathi or Hugli. It has an area of 2689 sq. m. It is a flat plain, and its scenery is uninteresting. Chief rivers are the Bhagirathi, Damodar, Ajai, Banka, Kunur and Khari, of which only the Bhagirathi is navigable by country cargo boats throughout the year. The district was acquired by the East India Company under the treaty with Nawab Mir Kasim in 1760, and confirmed by the emperor Shah Alam in 1765. The land revenue was fixed in perpetuity with the zemindar in 1793. In 1901 the population was 1,532,475, showing an increase of 10 % in the decade. There are several indigo factories. The district suffered from drought in 1896-1897. The Eden Canal, 20 m. long, has been constructed for irrigation. The weaving of silk is the chief native industry. As regards European industries, Burdwan takes the first place in Bengal. It contains the great coal-field of Raniganj, first opened in 1874, with an output of more than three million tons. The Barrakur ironworks produce pig-iron, which is reported to be as good as that of Middlesbrough. Apart from Burdwan town and Raniganj, the chief places are the river-marts of Katwa and Kalna. The East Indian railway has several lines running through the district.

The Division of Burdwan comprises the six districts of Burdwan, Birbhum, Bankura, Midnapore, Hugli and Howrah, with a total area of 13,949 S Q- rn., and a population in 1901 of 8,240,076.

BUREAU (a Ft. word from burel or bureau, a coarse cloth used for coverings), a writing-table or desk (q.v.), also in America a low chest of drawers. From the meaning of " desk," the word is applied to an office or place of business, and particularly a government department; in the United States the term is used of certain subdivisions of the executive departments, as the bureau of statistics,

a division of the treasury department. The term " bureaucracy " is often employed to signify the concentra- tion of administrative power in bureaux or departments, and the undue interference by officials not only in the details of government, but in matters outside the scope of state interference. The word is also frequently used in the sense of " red-tapism."

BURFORD, a market town in the Woodstock parliamentary division of Oxfordshire, England, 18 m. W.N.W. of Oxford. Pop. (1901) 1 146. It is pleasantly situated in the valley of the Windrush, the broad, picturesque main street sloping upward from the stream, beside which stands the fine church, to the summit of the ridge flanking the valley on the south, along which runs the high road from Oxford. The church of St John the Baptist has a nave and aisles, mainly Perpendicular in appearance owing to alterations in that period, but actually of

earlier construction, the south aisle flanked by two beautiful chapels and an ornate porch; transepts and a central tower, and choir with flanking chapels. The massive Norman tower contrasts strongly with the delicate Perpendicular spire rising upon it. The church contains many interesting memorials, and, in the nave, a Perpendicular shrine dedicated to St Peter. Near the church is the half- ruined priory house, built in the 17th century, and containing much fine plaster ornament character- istic of the period; a curious chapel adjoins it. William Lenthall, speaker of the Long Parliament, was granted this mansion, died here in 1662, and is buried in the church. In the High Street nearly every house is of some antiquity. The Tolsey or old town hall is noteworthy among them; and under one of the houses is an Early English crypt. Burford is mentioned as the scene of a synod in 705; in 752 Cuthred, king of the West Saxons, fighting for independence, here defeated ˆEthelbald, king of Mercia; and in 1649 the town and district were the scene of victorious operations by Cromwell.

BURG, a town of Germany, in Prussian Saxony, on the river Ihle, and the railway from Berlin to Magdeburg, 14 m. N.E. of the latter. Pop. (1900) 22,432. It is noted for its cloth manu- factures and boot-making, which afford employment to a great part of its population. The town belonged originally to the lordship of Querfurt, passed with this into the possession of the archbishops of Magdeburg

in 1496, and was ceded in 1635 with other portions of the Magdeburg territories to Saxony; in 1687 it was ceded to Brandenburg. It owes its prosperity to the large influx of industrious French, Palatinate and Walloon refugees, which took place about the end of the 17th century.

BURGAGE (from Lat. burgus, a borough), a form of tenure, both in England and Scotland, applicable to the property connected with the old municipal corporations and their privileges. In England, it was a tenure whereby houses or tenements in an ancient borough were held of the king or other person as lord at a certain rent. The term, is of less practical importance in the English than in the Scottish system, where it held an important place in the practice of conveyancing, real property having been generally divided into feudal-holding and burgage-holding. Since the Conveyancing (Scotland) Act 1874, there is, however, not much distinction between burgage tenure and free holding. It is usual to speak of the English burgage- tenure as a relic of Saxon freedom resisting the shock of the Norman conquest and its feudalism, but it is perhaps more correct to consider it a local feature of that general exemption from feudality enjoyed by the municipia as a relic of their ancient Roman constitution. The reason for the system preserving for so long its specifically distinct form in Scottish conveyancing was because burgage-holding was an exception to the system of subinfeudation which remained prevalent in Scotland when it was suppressed in England. While other vassals might hold of a graduated hierarchy of overlords up to the crown, the burgess always held directly of the sovereign. It is curious that while in England the burgage-tenure was deemed a species of socage, to distinguish it from the military holdings, in Scotland it was strictly a military holding, by the service of watching and warding for the defence of the burgh. In England the franchises enjoyed by burgesses, freemen and other consuetudinary constituencies in burghs, were dependent on the character of the burgage- tenure. Tenure by burgage was subject to a variety of customs, the principal of which was Borough-English (q.v.).

See Pollock and Maitland, History of English Law (1898).

BURGAS (sometimes written Burghaz, Bourgas or Borgas, and, in the middle ages, Pyrgos), a seaport, and capital of the department of Burgas, in Bulgaria (Eastern Rumelia), on the gulf of Burgas, an inlet of the Black Sea, in 42 27′ N. and 27° 35′ E. Pop. (1906) 12,846. Burgas is built on a low foreland, between the lagoons of Ludzha, on the north, and Kara-Yunus, on the west; it faces towards the open sea on the east, and towards its own harbour on the south.

The principal approach is a broad isthmus on the north-west, along which runs the railway to Philippopolis and Adrianople. Despite its small population and the rivalry of Varna and the Turkish port of

Dedeagatch, Burgas has a considerable transit trade. Its fine harbour, formally opened in 1904, has an average depth of five fathoms; large vessels can load at the quays, and the outer waters of the gulf are well lit by lighthouses on the islets of Hagios Anastasios and Megalo-Nisi. In 1904, the port accom- modated over 1400 ships, of about 700,000 tons. These included upwards of 800 Bulgarian and Turkish sailing-vessels, engaged in the coasting trade. Fuel, machinery and miscellaneous goods are imported, chiefly from Austria-Hungary, Belgium, Germany and the United Kingdom; the exports include grain, wool, tallow, cheese, butter, attar of roses, &c. Pottery and pipes are manufactured from clay obtained in the neighbourhood.

BURGDORF (Fr. Berthoud), an industrial town in the Swiss canton of Bern. It is built on the left bank of the Emme and is 14 m. by rail N.E. of Bern. The lower (or modern) town is connected by a curious spiral street with the upper (or old) town. The latter is picturesquely perched on a hill, at a height of 1942 ft. above sea-level (or 167 ft. above the river); it is crowned by the ancient castle and by the 15th-century parish church, in the former of which Pestalozzi set up his educational establish- ment between 1798 and 1804. A large trade is carried on at Burgdorf in the cheese of the Emmenthal, while among the industrial establishments are railway works, and factories of cloth, white lead and tinfoil. In 1900 the population was 8404, practically all Protestants and German-speaking. A fine view of the Bernese Alps is obtained from the castle, while a still finer one may be enjoyed from the Lueg hill (2917 ft.), north-east of the town. The castle dates from the days of the dukes of Zaringen (nth-i2th centuries), the last of whom (Berchtold V.) built walls round the town at its foot, and granted it a charter of liberties. On the extinction (1218) of that dynasty both castle and town passed to the counts of Kyburg, and from them, with the rest of their possessions, in 1272 by marriage to the cadet line of the Habsburgs. By that line they were sold in 1384, with Thun, to the town of Bern, whose bailiff sˆ ruled in the castle till 1798. (W. A..B. C.)

BURGEE (of unknown origin), a small threeˆornered or swallow-tailed flag or pennant used by yachts or merchant vessels; also a kind of small coal burnt in engine furnaces.

BURGER, GOTTFRIED AUGUST (1 748-1 794), German poet, was

born on the 1st of January 1748 at Molmerswende near Halberstadt, of which village his father was the Lutheran pastor.' He was a backward child, and at the age of twelve was practically adopted by his maternal grandfather, Bauer, at Aschersleben, who sent him to the Pddagogium at Halle. Hence in 1764 he passed to the university, as a student of theology, which, however, he soon abandoned for the study of jurisprudence. Here he fell under the influence of C. A. Klotz (1738-1771), who directed Burger's attention to literature, but encouraged rather than discouraged his natural disposition to a wild and unregulated life. In consequence of his dissipated habits, he was in 1767 recalled by his grandfather, but on promising to reform was in 1768 allowed to enter the university of Gottingen as a law student. As he continued his wild career, however, his grandfather withdrew his support and he was left to his own devices. Meanwhile he had made fair progress with his legal studies, and had the good fortune to form a close friend- ship with a number of young men of literary tastes. In the Gottingen Musenalmanach, edited by H. Boie and F. W. Gotter, Burger's first poems were published, and by 1771 he had already become widely known as a poet. In 1772, through Boie's influence, Burger obtained the post of " Amtmann " or district magistrate at Altengleichen near Gottingen. His grandfather was now reconciled to him, paid his debts and established him in his new sphere of activity. Meanwhile he kept in touch with his Gottingen friends, and when the " Gottinger Bund " or " Hain " was formed, Burger, though not himself a member, kept in close touch with it. In 1773 the ballad Lenore was published in the Musenalmanach. This poem, which in dramatic force and in its vivid realization of the weird and supernatural remains without a rival, made his name a household word in Germany. In 1774 Burger married Dorette Leonhart, the

daughter of a Hanoverian official; but his passion for his wife's younger sister Auguste (the " Molly " of his poems and elegies) rendered the union unhappy and unsettled his life. In 1778 Burger became editor of the Musenalmanach, and in the same year published the first collection of his poems. In 1780 he took a farm at Appenrode, but in three years lost so much money that he had to abandon the venture. Pecuniary troubles oppressed him, and being accused of neglecting his official duties, and feeling his honour attacked, he gave up his official position and removed in 1784 to Gottingen, where he established himself as Privat-docent. Shortly

before his removal thither his wife died (30th of July 1784), and on the 29th of June in the next year he married his sister-in-law " Molly." Her death on the 9th of January 1786 affected him deeply. He appeared to lose at once all courage and all bodily and mental vigour. He still continued to teach in Gottingen; at the jubilee of the foundation of the university in 1787 he was made an honorary doctor of philosophy, and in 1789 was appointed extraordinary professor in that faculty, though without a stipend. In the following year he married a third time, his wife being a certain Elise Hahn, who, enchanted with his poems, had offered him her heart and hand. Only a few weeks of married life with his " Schwabenmadchen " sufficed to prove his mistake, and after two and a half years he divorced her. Deeply wounded by Schiller's criticism, in the 14th and 15th part of the Allge- meine Liter aturzeitung of 1791, of the 2nd edition of his poems, disappointed, wrecked in fortune and health, Burger eked out a precarious existence as a teacher in Gottingen until his death there on the 8th of June 1794.

Burger's character, in spite of his utter want of moral balance, was not lacking in noble and lovable qualities. He was honest in purpose, generous to a fault, tender-hearted and modest. His talent for popular poetry was very considerable, and his ballads are among the finest in the German language. Besides Lenore, Das Lied vom braven Marine, Die Kuh, Der Kaiser und der Abt and Der wilde Jdger are famous. Among his purely lyrical poems, but few have earned a lasting reputation; but mention may be made of Das Blumchen Wunderhold, Lied an den lieben Mond, and a few love songs. His sonnets, particularly the elegies, are of great beauty.

Editions of Biirger's Samtliche Schriften appeared at Gottingen, 1817 (incomplete); 1829-1833 (8 vols.), and 1835 (one vol.); also a selection by E. Grisebach (jjth ed., 1894). The Gedichte have been published in innumerable editions, the best being that by A. Sauer (2 vols., 1884). Brief e von und an Burger were edited by A. Strodt-mann in 4 vols. (1874). On Burger's life see the biography by H. Profile (1856), the introduction to Sauer's edition of the poems, and W. von Wurzbach, G. A. Burger (1900).

BURGERS, THOMAS FRANCOIS (1834-1881), president of the Transvaal Republic, was born in Cape Colony on the 15th of April 1834, and was educated at Utrecht, Holland, where he took the degree of doctor of theology. On his return to South Africa he was ordained minister of the Dutch Reformed Church, and stationed at Hanover in Cape Colony, where he exercised his ministrations for eight years. In 1862 his preaching attracted attention, and two years

later an ecclesiastical tribunal suspended him for heretical opinions. He appealed, however, to the colonial government, which. had appointed him, and obtained judgment in his favour, which was confirmed by the privy council of England on appeal in 1865. On the resignation of M. W. Pretorius and the refusal of President Brand of the Orange Free State to accept the office, Burgers was elected president of the Transvaal, taking the oath on the 1st of July 1872. In 1873 he endeavoured to persuade Montsioa to agree to an alteration in the boundary of the Barolong territory as fixed by the Keate award, but failed (see Bechuanaland). In 1875 Burgers, leaving the Transvaal in charge of Acting- President Joubert, went to Europe mainly to promote a scheme for linking the Transvaal to the coast by a railway from Delagoa Bay, which was that year definitely assigned to Portugal by the MacMahon award. With the Portuguese Burgers concluded a treaty, December 1875, providing for the construction of the raib-ay. After meeting with refusals of financial help in London,

Burgers managed to raise £90,000 in hoiland, and bought a quantity of railway plant, which on its arrival at Delagoa Bay was mortgaged to pay freight, and this, so far as Burgers was concerned, was the end of the matter. In June 1876 he induced the raad to declare war against Sikukuni (Secocoeni), a powerful native chief in the eastern Transvaal. The campaign was unsuccessful, and with its failure the republic fell into a condition of lawlessness and insolvency, while a Zulu host threatened invasion. Burgers in an address to the raad (3rd of March 1877) declared " I would rather be a policeman under a strong govern- ment than the president of such a state. It is you— you members of the raad and the Boers — who have lost the country, who have sold your independence for a drink." Sir Theophilus Shepstone, who had been sent to investigate the condition of affairs in the Transvaal, issued on the 1 2th of April a proclama- tion annexing the Transvaal to Great Britain. Burgers fully acquiesced in the necessity for annexation. He accepted a pension from the British government, and settled down to farm- ing in Hanover, Cape Colony. He died at Richmond in that colony on the 9th of December 1881, and in the following year a volume of short stories, Tooneelen uit ons dorp, originally written by him for the Cape Volksblad, was published at the Hague for the benefit of his family. A patriot, a fluent speaker both in Dutch and in English, and possessed of unbounded energy, the failure of Burgers was due to his fondness for large visionary plans, which he attempted to carry out with insufficient means (see Transvaal: History).

For the annexation period see John Martineau, The Life of Sir Bartle

Frere, vol. ii. chap, xviii. (London, 1895).

BURGERSDYK, or Buroersdicius, FRANCIS (1590-1629), Dutch logician, was born at Lier, near Delft, and died at Leiden. After a brilliant career at the university of Leiden, he studied theology at Saumur, where while still very young he became professor of philosophy. After five years he returned to Leiden, where he accepted the chair of logic and moral philosophy, and afterwards that of natural philosophy. His Logic was at one time widely used, and is still valuable. He wrote also Idea Philosophiae M oralis (1644).

BURGES, GEORGE (1786-1864), English classical scholar, was born in India. He was educated at Charterhouse school and Trinity College, Cambridge, taking his degree in 1807, and obtaining one of the members' prizes both in 1808 and 1809. He stayed up at Cambridge and became a most successful " coach." He had a great reputation as a Greek scholar, and was a somewhat acrimonious critic of rival scholars, especially Bishop Blomfield. Subsequently he fell into embarrassed circumstances through injudicious speculation, and in 1841 a civil list pension of £100 per annum was bestowed upon him. He died at Ramsgate, on the 1 ith of January 1864. Burges was a man of great learning and industry, but too fond of introducing arbitrary emendations into the text of classical authors. His chief works are: Euripides' Troadcs (1807) and Phoenissae (1809); Aeschylus' Supplices (1821), Eumenides (1822) and Prometheus (1831); Sophocles' Philoctetes (1833); E. F. Poppo's Prolegomena to Thucydides (1837), an abridged translation with critical remarks; Hermesianactis Fragmenta (1839). He also edited some of the dialogues of Plato with English notes, and translated nearly the whole of that author and the Greek antho- logy for Bohn's Classical library. He was a frequent contributor to the Classical Journal and other periodicals, and dedicated to Byron a play called The Son of Erin, or, The Cause of the Greeks (1823). ' – , ■ .. ,

BURGESS, DANIEL (1645-1713), English Presbyterian divine, was born at Staines, in Middlesex, where his father was minister. He was educated under Busby at Westminster school, and in 1660 was sent to Magdalen Hall, Oxford, but not being able conscientiously to subscribe the necessary formulae he quitted the university without taking his degree. In 1667, after taking orders, he was appointed by Roger Boyle, first Lord Orrery, to the headmastership of a school recently established by that nobleman at Charleville. Co. Cork, and soon after he became private Chaplain to Lady Mervin, near Dublin. There he was

ordained by the local presbytery, and on returning to England was imprisoned for preaching at Marlborough. He soon regained his liberty, and went to London, where he speedily gathered a large and influential congregation, as much by the somewhat excessive fervour of his piety as by the vivacious illustrations which he frequently employed in his sermons. He was a master of epigram, and theologically inclined to Calvinism. The Sacheverell mob gutted his chapel in 1710, but the government repaired the building. Besides preaching, he gave instruction to private pupils, of whom the most distinguished was Henry St John, afterwards Lord Bolingbroke. His son, Daniel Burgess (d. 1747), was secretary to the princess of Wales, and in 1723 obtained a regium donum or government grant of £500 half-yearly for dissenting ministers.

BURGESS, THOMAS (1756-1837), English divine, was born at Odiham, in Hampshire. He was educated at Winchester, and at Corpus Christi College, Oxford. Before graduating, he edited a reprint of John Burton's Pentalogia. In 1781 he brought out an annotated edition of Richard Dawes's Miscellanea Crilica (reprinted, Leipzig, 1800). In 1783 he became a fellow of his college, and in 1785 was appointed chaplain to Shute Barrington, bishop of Salisbury, through whose influence he obtained a prebendal stall, which he held till 1803. In 1788 he published his Considerations on the A bolition of Slavery, in which he advocated the principle of gradual emancipation. In 1791 he accompanied Barrington to Durham, where he did evangelistic work among the poorer classes. In 1803 he was appointed to the vacant bishopric of St David's, which he held for twenty years with great success. He founded the Society for Promoting Christian Knowledge in the diocese, and also St David's College at Lampeter, which he liberally endowed. In 1820 he was appointed first president of the recently founded Royal Society of Literature; and three years later he was promoted to the see of Salisbury, over which he presided for twelve years, prosecuting his benevolent designs with unwearied industry. As at St David's, so at Salisbury, he founded a Church Union Society for the assistance of infirm and distressed clergymen. He strenuously opposed both Unitarianism and Catholic emancipa- tion. He died on the 19th of February 1837.

A list of his works, which are very numerous, will be found in his biography by J. S. Harford (2nd ed., 1841). In addition to those

already referred to may be mentioned his Essay on the Study of Antiquities, The First Principles of Christian Knowledge; Reflections on the Controversial Writings of Dr Priestley, Emendationes in Suidam et Hesychium et alios Lexicographos Graecos; The Bible, and nothing but the Bible, the Religion of the Church of England.

BURGESS (Med. Lat. burgensis, from burgus, a borough, a town), a term, in its earliest sense, meaning an inhabitant of a borough, one who occupied a tenement therein, but now applied solely to a registered parliamentary, or more strictly, municipal voter. An early use of the word was to denote a member elected to parliament by his fellow citizens in a borough. In some of the American colonies (e.g. Virginia), a " burgess " was a member of the legislative body, which was termed the " House of Burgesses." Previously to the Municipal Reform Act 1835, burgess was an official title in some English boroughs, and in this sense is still used in some of the states of the United States, as in Connecticut, New Jersey, Pennsylvania. The Burgess- roll is the register or official list of burgesses in a borough.

BURGH [Bourke, Burke], the name of an historic Irish house, associated with Connaught for more than seven centuries. It was founded by William de Burgh, brother of Hubert de Burgh (q.v.). Before the death of Henry II. (1189) he received a grant of lands from John as lord of Ireland. At John's accession (1199) he was installed in Thomond and was governor of Limerick. In 1199-1201 he was supporting in turn Cathal Carrach and Cathal Crovderg for the native throne, but he was expelled from Limerick in 1203, and, losing his Connaught, though not his Munster estates, died in 1205. His son Richard, in 1227, received the land of " Connok " [Connaught], as forfeited byits king, whom he helped to fight. From 1228 to 1232 he held the high office of justiciar of Ireland. In 1234 he sided with the crown against Richard, earl marshal, who fell in battle

against him. Dying in 1243, he was succeeded as lord of Con- naught by his son Richard, and then (1248) by his younger sop Walter, who .carried on the family warfare against the native chieftains, and added greatly to his vast domains by obtaining (c. 1255) from Prince Edward a grant of " the county of Ulster," in consequence of which he was styled later earl of Ulster. At his death in 1271, he was succeeded by his son Richard as 2nd earl. In 1286 Richard ravaged and subdued Connaught, and deposed Bryan O'Neill as chief native king, substituting a nominee of his own. The native king of Connaught was also attacked by him, in favour of that branch of the O'Conors whom his own family supported. He led his forces from

Ireland to support Edward I. in his Scottish campaigns, and on Edward Bruce's invasion of Ulster in 13 15 Richard marched against him, but he had given his daughter Elizabeth in marriage to Robert Bruce, afterwards king of Scotland, about 1304. Occasionally summoned to English parliaments, he spent most of his forty years of activity in Ireland, where he was the greatest noble of his day, usually fighting the natives or his Anglo-Norman rivals. The patent roll of 1290 shows that in addition to his lands in Ulster, Connaught and Munster, he had held the Isle of Man, but had surrendered it to the king.

His grandson and successor William, the 3rd earl (1326-1333), was the son of John de Burgh by Elizabeth, lady of Clare, sister and co-heir of the last Clare earl of Hertford (d. 1314). He married a daughter of Henry, earl of Lancaster, and was appointed lieutenant of Ireland in 133 1, but was murdered in his 21st year, leaving a daughter, the sole heiress, not only of the de Burgh possessions, but of vast Clare estates. She was married in childhood to Lionel, son of Edward III., who was recognized in her right as earl of Ulster, and their direct repre- sentative, the duke of York, ascended the throne in 1461 as Edward IV., since when the earldom of Ulster has been only held by members of the royal family.

On the murder of the 3rd earl (1333), his male kinsmen, who had a better right, by native Irish ideas, to the succession than his daughter, adopted Irish names and customs, and becoming virtually native chieftains succeeded in holding the bulk of the de Burgh territories. Their two main branches were those of "MacWilliam Eighter" in southern Connaught, and "MacWilliam Oughter " to the north of them, in what is now Mayo. The former held the territory of Clanricarde, lying in the neighbour- hood of Galway, and in 1543 their chief, as Ulick " Bourck, alias Makwilliam," surrendered it to Henry VIII., receiving it back to hold, by English custom, as earl of Clanricarde and Lord Dunkellin. The 4th carl (1601-1635) distinguished himself on the English side in O'Neill's rebellion and afterwards, and obtained the English earldom of St Albans in 1628, his son Ulick receiving further the Irish marquessate of Clanricarde (1646). His cousin and heir, the 6th earl (1657-1666) was uncle of the 8th and 9th earls (1687-1722), both of whom fought for James II. and paid the penalty for doing so in 1691, but the 9th earl was restored in 1702, and his great-grandson, the 12th earl, was created marquess of Clanricarde in 1789. He left no son, but the marquessate was again revived in 1825, for his nephew the 14th earl, whose heir is the present marquess. The family, which changed its name from Bourke to de Burgh in 1752, and added that of

Canning in 1862, still own a vast estate in County Galway.

In 1603 " the MacWilliam Oughter," Theobald Bourke, similarly resigned his territory in Mayo, and received it back to hold by English tenure. In 1627 he was created Viscount Mayo. The 2nd and 3rd viscounts (1629-1663) suffered at Cromwell's hands, but the 4th was restored to his estates (some 50,000 acres) in 1666. The peerage became extinct or dormant on the death of the 8th viscount in 1767. In 1781 John Bourke, a Mayo man, believed to be descended from the line of " MacWilliam Oughter," was created Viscount Mayo, and four years later earl of Mayo, a peerage still extant. In 1872 the 6th earl was murdered in the Andaman Islands when viceroy of India.

The baronies of Bourke of Connell (1580) and- Bourke of Brittas (1618), both forfeited in 1691, were bestowed on branches

of the family which has also still representatives in the baronetage and landed gentry of Ireland.

The lords Burgh or Borough of Gainsborough (1487-1599) were a Lincolnshire family believed to be descended from a younger son of Hubert de Burgh. The 5th baron was lord deputy of Ireland in 1597, and his younger brother, Sir John (d. 1594), a distinguished soldier and sailor. (J. H. R.)

BURGH, HUBERT DE (d. 1243), chief justiciar of England in the reign of John and Henry III., entered the royal service in the reign of Richard I. He traced his descent from Robert of Mortain, half brother of the Conqueror and first earl of Cornwall; he married about 1200 the daughter of William de Vernon, earl of Devon; and thus, from the beginning of his career, he stood within the circle of the great ruling families. But he owed his high advancement to exceptional ability as an administrator and a soldier. Already in 1 201 he was chamberlain to King John, the sheriff of three shires, the constable of Dover and Windsor castles, the warden of the Cinque Ports and of the Welsh Marches. He served with John in the continental wars which led up to the loss of Normandy. It was to his keeping that the king first entrusted the captive Arthur of Brittany. Coggeshall is our authority for the tale, which Shakespeare has immortalized, of Hubert's refusal to permit the mutilation of his prisoner; but Hubert's loyalty was not shaken by the crime to which Arthur subsequently

fell a victim. In 1204 Hubert distinguished himself by a long and obstinate defence of Chinon, at a time when nearly the whole of Poitou had passed into French hands. In 12 13 he was appointed seneschal of Poitou, with a view to the invasion of France which ended disastrously for John in the next year.

Both before and after the issue of the Great Charter Hubert adhered loyally to the king; he was rewarded, in June 1215, with the office of chief justiciar. This office he retained after the death of John and the election of William, the earl marshal, as regent. But, until the expulsion of the French from England, Hubert was entirely engaged with military affairs. He held Dover successfully through the darkest hour of John's fortunes; he brought back Kent to the allegiance of Henry III.; he completed the discomfiture of the French and their allies by the naval victory which he gained over Eustace the Monk, the noted privateer and admiral of Louis, in the Straits of Dover (Aug. 1217). The inferiority of the English fleet has been much exaggerated, for the greater part of the French vessels were transports carrying reinforcements and. supplies. But Hubert owed his success to the skill with which he manoeuvred for the weather-gage, and his victory was not less brilliant than momentous. It compelled Louis to accept the treaty of Lambeth, under which he renounced his claims to the crown and evacuated England. As the saviour of the national cause the justiciar naturally assumed after the death of William Marshal (12 19) the leadership of the English loyalists. He was opposed by the legate Pandulf (1218-1221), who claimed the guardianship of the kingdom for the Holy See; by the Poitevin Peter des Roches, bishop of Winchester, who was the young king's tutor; by the foreign mercenaries of John, among whom Falkes de Breaute took the lead; and by the feudal party under the earls of Chester and Albemarle. On Pandulf's departure the pope was induced to promise that no other legate should be appointed in the lifetime of Archbishop Stephen Langton. Other opponents were weakened by the audacious stroke of 1223, when the justiciar suddenly announced the resumption of all the castles, sheriffdoms and other grants which had been made since the king's accession. A plausible excuse was found in the next year for issuing a sentence of confiscation and banishment against Falkes de Breaute. Finally in 1227, Hubert having proclaimed the king of age, dismissed the bishop of Winchester from his tutorship.

Hubert now stood at the height of his power. His possessions had been enlarged by four successive marriages, particularly by that which he contracted in 1221 with Margaret, the sister of Alexander II. of Scotland; in 1227 he received the earldom of Kent, which had

been dormant since the disgrace of Odo of Bayeux. But the favour of Henry III. was a precarious founda-

tion on which to build. The king chafed against the objections with which his minister opposed wild plans of foreign conquest and inconsiderate concessions to the papacy. They quarrelled violently in 1229, at Portsmouth, when the king was with diffi- culty prevented from stabbing Hubert, because a sufficient supply of ships was not forthcoming for an expedition to France. In 1 23 1 Henry lent an ear to those who asserted that the justiciar had secretly encouraged armed attacks upon the aliens to whom the pope had given English benefices. Hubert was suddenly dis- graced and required to render an account of his long administra- tion. The blow fell suddenly, a few weeks after his appointment as justiciar of Ireland. It was precipitated by one of those fits of passion to which the king was prone; but the influence of Hubert had been for some time waning before that of Peter des Roches and his nephew Peter des Rievaux. Some colour was given to their attacks by Hubert's injudicious plea that he held a charter from King John which exempted him from any liability to produce accounts. But the other charges, far less plausible than that of embezzlement, which were heaped upon the head of the fallen favourite, are evidence of an intention to crush him at all costs. He was dragged from the sanctuary at Bury St Edmunds, in which he had taken refuge, and was kept in strait confinement until Richard of Cornwall, the king's brother, and three other earls offered to be his sureties. Under their protection he remained in honourable detention at Devizes Castle. On the outbreak of Richard Marshal's rebellion (1233), he was carried off by the rebels to the Marshal stronghold of Striguil, in the hope that his name would add popularity to their cause. In 1 234 he was admitted, along with the other supporters of the fallen Marshal, to the benefit of a full pardon. He regained his earldom and held it till his death, although he was once in serious dangerfromtheavariceof theking (1 239), who was tempted by Hubert's enormous wealth to revive the charge of treason.

In his lifetime Hubert was a popular hero; Matthew Paris relates how, at the time of his disgrace, a common smith refused with an oath to put fetters on the man " who restored England to the English." Hubert's ambition of founding a great family was not realized. His earldom died with him, though he left two sons. In constitutional history he is remembered as the last of the great justiciars. The office, as having become too great for a subject, was now shorn of its most important powers and became politically insignificant.

See Roger of Wendover's Flores Historiarum, edited for the English Historical Society by H. O. Coxe (4 vols., 1841-1844); the Chronica Majora of Matthew Paris, edited by H. R. Luard for the Rolls Series (7 vols., 1872-1883); the Histoire des dues de Normandie, edited by F. Michel for the Soc. de l'Hist. de France (Paris, 1840) ; the Histoire de Guillaume le Marechal, edited by Paul Meyer for the same society (3 vols., Paris, 1891, &c); J. E. Doyle's Official Baronage of England, ii. pp. 271-274; R. Pauli's Geschichte von England, vol. iii. ; W. Stubbs's Constitutional History of England, vol. ii. (H. W. C. D.)

BURGHERSH, HENRY (1292-1340), English bishop and chancellor, was a younger son of Robert, Baron Burghersh (d. 1305), and a nephew of Bartholomew, Lord Badlesmere, and was educated in France. In 1320 owing to Badlesmere's influence Pope John XXII. appointed him bishop of Lincoln in spite of the fact that the chapter had already made an election to the vacant bishopric, and he secured the position without delay. After the execution of Badlesmere in 1322 Burghersh's lands were seized by Edward II., and the pope was urged to deprive him; about 1326, however, his possessions were restored, a proceeding which did not prevent him from joining Edward's queen, Isabella, and taking part in the movement which led to the deposition and murder of the king. Enjoying the favour of the new king, Edward III., the bishop became chancellor of England in 1328; but he failed to secure the archbishopric of Canterbury which became vacant about the same time, and was deprived of his office of chancellor and imprisoned when Isabella lost her power in 1330. But he was soon released and again in a position of influence. He was treasurer of England from 1334 to 1337, and high in the favour and often in the company of Edward III.; he was sent on several important

errands, and entrusted with important commissions. He died at Ghent on the 4th of December 1340.

The bishop's brother, Bartholomew Burghersh (d: 1355), became Baron Burghersh on the death of his brother Stephen in 1310. He acted as assistant to Badlesmere until the execution of the latter; and then, trusted by Edward III., was constable of Dover Castle and warden of the Cinque Ports. He filled other important positions, served Edward III. both as a diplomatist and a soldier, being present

at the battle of Crecy in 1346; arid retaining to the last the royal confidence, died in August 1355. His son and successor, Bartholomew (d. 1369), was one of the first knights of the order of the Garter, and earned a great reputation as a soldier, specially distinguishing himself at the battle of Poitiers in 1356.

BURGHLEY, WILLIAM CECIL, Baron (1521-1508), was born, according to his own statement, on the 13th of September 1521 at the house of his mother's father at Bourne, Lincolnshire. Pedigrees, elaborated by Cecil himself with the help of Camden; the antiquary, associated him with the Cecils or Sitsyllts of Altyrennes in Herefordshire, and traced his descent from an Owen of the time of King Harold and a Sitsylltof the reign of Rufus. The connexion with the Herefordshire family is not so impossible as the descent from Sitsyllt; but th6 earliest authentic ancestor of the lord treasurer is his grandfather,' David, who, according to Burghley's enemies, " kept the best inn " in Stam- ford. David somehow secured the favour of Henry VII. , to whom he seems to have been yeoman of the guard. He was serjeant- at-arms to Henry VIII. in 1526, sheriff of Northamptonshire in 1532, and a justice of the peace for Rutland. " His eldest son, Richard, yeoman of the wardrobe (d. 1554)1 married Jane, daughter of William Heckington of Bourne, and was father of three daughters and Lord Burghley.

William, the only son, was put to school first at Grantham and then at Stamford. In- May 1535, at the age of fourteen, he went up to St John's College, Cambridge, where he was brought into contact with the foremost educationists of the time, Roger Ascham and John Cheke, and acquired an unusual knowledge of Greek. He also acquired the affections of Cheke's sister, Mary, and was in 1541 removed by his father to Gray's Inn, without, after six years' residence at Cambridge, having taken a degree. The precaution proved useless, and four months later Cecil committed one of the rare rash acts of his life in marrying Mary Cheke. The only child of this marriage, Thomas, the future earl of Exeter, was born in May 1542, and in February 1543 Cecil's first wife died. Three years later he married (21st of December 1546) Mildred, daughter of Sir Anthony Cooke, who was ranked by Ascham with Lady Jane Grey as one of the two most learned ladies in the kingdom, and whose sister, Anne, became the wife of Sir Nicholas, and the mother of Sir Francis, Bacon.

Cecil, meanwhile, had obtained the reversion to the office of cuslos rotulorum brevium, and, according to his autobiographical notes, sat in parliament in 1543; but his name does not occur in the imperfect

parliamentary returns until 1547, when he was elected for the family borough of Stamford. Earlier in that year he had accompanied Protector Somerset on his Pinkie campaign, being one of the two " judges of the Marshalsea," i.e. in the courts-martial. The other was William Patten, who states that both he and Cecil began to write independent accounts of the campaign, and that Cecil generously communicated his notes for Patten's narrative, which has been reprinted more than once.

In 1548 he is described as the protector's master of requests, which apparently means that he was clerk or registrar of the court of requests which the protector, possibly at Latimer's instigation, illegally set up in Somerset House " to hear poor men's complaints." He also seems to have acted as private secretary to the protector, and was in some danger at the time of the protector's fall (October 1 J40) . The lords opposed to Somerset ordered his detention on the 10th of October, and in November he was in the Tower. On the 25th of January 1550 he was bound over in recognizances to the value of a thousand marks. How- ever, he soon ingratiated himself with Warwick, arid on the 15th

of September 1550 he was sworn one of the king's two secretaries. He was knighted on the nth of October 1551, on the eve oi Somerset's second fall, and was congratulated on his success in escaping his benefactor's fate. In- April he became chancellor oi the order of the Garter. But service under Northumberland was no bed of roses, and in his diary Cecil recorded his release in the phrase ex miser aulico f actus liber et mei juris. His responsibility for Edward's illegal "devise " of the crown has been, studiously minimized by Cecil himself and by his biographers. Years after- wards, he pretended that he had only signed the " devise "as a witness, but in his apology to Queen- Mary he did not venture to allege so flimsy an excuse; he preferred to lay stress ori the extent to which he succeeded in shifting the responsibility on to the shoulders of his brother-in-law, Sir ; John Cheke, and other friends, and on his intrigues to frustrate the queen to whom he had Sworn allegiance. There is no doubt that he saw which way the wind was blowing, and disliked Northumberland's scheme; but he had not the courage to resist the duke to his face. As soon, however, as the duke had set out to meet Mary, Cecil became the' most active intriguer against him, and to these efforts, of which he laid a full account before Queen Mary, he mainly owed his immunity. He had, moreover; had no part in the divorce of Catherine or in the humiliation of Mary in Henry's reign, and he made no scruple about conforming to the religious reaction. He went to rnass, confessed, and out of sheer zeal and in no official capacity went to

meet Cardinal Pole on his pious mission to England in December 1554, again accompanying him to Calais in May 1555. It was rumouredin December 1554 that Cecil would succeed Sir William Petre as secretary, an office which, with his chancellorship of the Garter, he had lost on Mary's accession. Probably the queen had more to do with the falsification of this rumour than Cecil, though he is said to have opposed in the parliament of 1555 — iri which he represented Lincolnshire— a bill for the confiscation of the estates of the Protestant refugees. But the story, even as told by his biographer (Peck, Desiderata Citriosa, i. n), does not represent Cecil's conduct as having been very courageous; and it is more to his credit that he found no seat in the parliament of 1558, for which Mary had directed the return of " discreet and good Catholic members."

By that time Cecil had begun to trim his- sails to a different breeze. He was in secret communication with Elizabeth before Mary died, and from the first the new queen relied on Cecil as she relied on no one else. Her confidence was not misplaced; Cecil Was exactly the kind of minister England then required. Personal experience had ripened his rare natural gift for avoiding dangers. It was no time for brilliant initiative or adventurous politics; the need was to avoid Scylla and Charybdis, and a via media had to be found in church and state, at home and abroad. Cedl was not a political genius; no great ideas emanated from his brain. But he Was eminently a safe man, hot an original thinker, but a counsellor of unrivalled wisdom. Caution was his supreme characteristic; he saw that above all things England required time. Like Fabius, he restored the fortunes of his country by deliberation. He averted open rupture until England was strong enough to stand the shock. There was nothing heroic about Cecil or his policy; it involved a callous attitude towards struggling Protestants abroad. Huguenots and Dutch Were aided just enough to keep them going in the struggles which warded danger off from England's shores. But Cecil never developed that passionate aversion from decided measures which became a second nature to his mistress. His intervention in Scotland in I SS9 _I S6° showed that he could strike on occasion; arid his action over the execution of "Ms.ry \ queen of Scots, proved that he was willing to take responsibility from which Elizabeth shrank. Generally he was in favour of more decided intervention on behalf of continental Protestants than Elizabeth would admit, but it is not always easy to ascertain the advice he gave. He has left endless memoranda lucidly setting forth the pros and cons of every course of action; but there are few indications of the line which he actually recommended when it came to a decision. How far he was personally responsible for the Anglican

Settlement, the Poor Laws, and the foreign policy of the reign, how far he Was

thwarted by the baleful influence of Leicester and the caprices of the queen, remains to a large extent a' matter of conjecture. His share in the settlement of 1 5 59 was considerable, and it coincided fairly with his own somewhat indeterminate religious views. Like the mass of the nation, he grew more Protestant as time wore on; he was readier to persecute Papists than Puritans; he had no love for ecclesiastical jurisdiction, and he warmly re- monstrated with Whitgift over his persecuting Articles of 1583. The finest encomium was passed on him by the queen herself, when she said, " This judgment I have of you, that you will not be corrupted with any manner of gifts, and that you will be faithful to the state."

From 1558 for forty years the biography of Cecilis almost indistinguishable from that of Elizabeth and from the history of England. Of personal incident, apart from his mission to Scotland in 1560, there is little. He represented Lincolnshire in the parliament of 1559, and Northamptonshire in that of 1563, and he took an active part in the proceedings of the House of Commons until his elevation to the peerage; but there seems no good evidence for the story that he was proposed as speaker in 1563. In January 1561 he was given the lucrative office of master of the court of wards in succession to Sir Thomas Parry, and he did something to reform that instrument of tyranny and abuse. Irt February 1 5 5 9 he was elected chancellor of Cambridge University in succession to Cardinal Pole; he was created M.A. of that university on the occasion of Elizabeth's visit in 1564, and M.A. of Oxford on a similar occasion in 1566. On the 25th of February 1 571 he was raised to the peerage as Baron Burghley of Burghley 1 (or Burleigh); the fact that he continued to act as secretary after his elevation illustrates the growing importance of that office, which under his son became a secretaryship of state. In 1572, however, the marquess of Winchester, who had been lord high, treasurer under Edward, Mary and Elizabeth, died, and Burghley succeeded to his post. It was a signal triumph oyer Leicester; and, although Burghley had still to reckon with cabals in the council and at court, his hold over the queen strengthened with the lapse of years. Before he died, Robert, his only surviving son by his second wife, was ready to step into his shoes as the qpeen's principal adviser. Having survived all his rivals, and all his children except

Robert and the worthless Thomas, Burghley died at his London house on the 4th of August 1598, and was buried in St Martin's, Stamford.

Burghley 's private life was singularly virtuous; he was a faithful husband, a careful father and a considerate master. A book-lover and antiquary, he made a, special hobby of heraldry and genealogy. It was the conscious and unconscious aim of the age to reconstruct a new landed aristocracy on the ruins of the old, and Burghley was a great builder and planter. All the arts of architecture and horticulture were lavished on Burghley House and Theobalds, which his son exchanged for Hatfield. His public conduct does not present itself in quite so amiable a light. As the marquess of Winchester said of himself, he was sprung from the willow rather than the oak, and he was not the man to suffer for convictions; The interest of the state was the supreme consideration, and to it he had no hesitation in sacrificing individual consciences.- He frankly disbelieved in toleration; " that state," he said, " could never be in safety where there was a toleration of two religions. For there is no enmity so great as that for religion; and therefore they that differ in the service of their God can never agree in the service of their country." With a maxim such as this, it was easy for him to maintain that Elizabeth's coercive measures were political and not religious. To say that he was Machiavellian is meaningless, for every statesman is so more or less; especially in the 16th century men preferred efficiency to principle. On the other hand, principles are valueless without law and order; and Burghley's craft and subtlety prepared a security in which principles might find some scope.

The sources and authorities for Burghley's life are endless. The most important collection of documents is at Hatfield, where there are some ten thousand papers covering the period down to Burghley's

1 This was the form always used by Cecil himself.

death ; these have been calendared in 8 volumes by the Hist. MSS. Comm. At least as many others are in the Record Office and British Museum, the Lansdowne MSS. especially containing a vast mass of his correspondence; see the catalogues of Cotton, Harleian, Royal, Sloane, Egerton and Additional MSS. in the British Museum, and the Calendars of Domestic, Foreign, Spanish, Venetian, Scottish and Irish State Papers.

Other official sources are the Acts of the' Privy Council (vols, i.-xxix.) ; Lords' and Commons' Journals, D'Ewes' Journals, Off. Ret. M.P.'s; Rymer's Foedera; Collins's Sydney State Papers; Nichols's

Progresses of Elizabeth. See also Strype's Works (26 vols.), Parker, Soc. Publ. (56 vols.) ; Camden's Annates; Holinshed, Stow and Speed's Chron.; Hayward's Annals; Machyn's Diary, Leycester Corr., Egerton Papers (Camden Soc). For Burghley's early life, see Cooper's. A thenae Cantab.; Baker's St John's Coll., Camb., ed. Mayor; Letters and. Papers of Henry VII J.; Tytler's Edward VI. ; Nichols's Lit. Remains of Edward VI. ; Leadam's Court of Requests, Chron. of Queen Jane (Camden Soc), and throughout Froude's Hist. No satisfactory life of Burghley has yet appeared ; some valuable anonymous notes, probably by Burghley's servant Francis Afford, were printed in Peck's Desiderata Curiosa (1732), i. 1-66; other notes are in Naunton's Fragmenta Regalia. Lives by Collins (1732), Charlton and Melvil (1738), were followed by Nares's biography in three of the most ponderous volumes (1828-1831) in the language ; this provoked Macaulay's brilliant but misleading essay. M. A., S. Hume's Great Lord Burghley^ (1898) is largely a piecing together of the references to Burghley in the same author's Calendar of Simancas MSS. The life by Dr Jessopp (1904) is an expansion of his article in the Diet. Nat. Biog. ; it is still only a sketch, though the volume contains a mass of genealogical and other incidental information by other hands. (A. F. P.)

BURGKMAIR, HANS or John (1473-? 1531), German painter and engraver on wood, believed to have been a pupil of Albrecht Diirer, was born at Augsburg. Professor Christ ascribes to him about 700 woodcuts, most of them distinguished by that spirit and freedom which we admire in the works of his supposed master. His principal work is the series of 13 5 prints representing the triumphs of the emperor Maximilian I. They are of large size, executed in chiaroscuro, from two blocks, and convey a high idea of his powers. Burgkmair was also an excellent painter in fresco arid in distemper, specimens of which are in the galleries of Munich and Vienna, carefully and solidly finished-ill the style of the old German school.

BURGLARY (burgi latrocinium; in ancient English law, hamesucken 2), at common law, the offence of breaking and entering the dwelling-house of another with intent to commit a felony. The offence and its punishment are regulated in England by the Larceny Act 1861. The four important points to be considered in connexion with the offence of burglary are (1) the time, (2) the place, (3) the manner and (4) the intent. The time, which is now the essence of the offence, was not con- sidered originally to have been very material, the gravity of the crime lying principally in the invasion of the sanctity of a man's domicile. But at some period before the reign of Edward VI. it had become settled that time was essential to the

offence, and it was not adjudged burglary unless committed by night. The day was then accounted as beginning at sunrise, and ending immediately after sunset, but it was afterwards decided that if there Were left sufficient daylight or twilight to discern the countenance of a person, it was no burglary. This, again, was superseded by ihe Larceny Act 1861, for the purpose of which night is deemed tp commence at nine o'clock in the evening of each day, and to conclude at six o'clock in the morning of the next succeeding day.

The place must, according to Sir E. Coke's definition, be a mansion-house, i.e. a man's dwelling-house or private residence. No building, although within the same curtilage as the dwelling- house, is deemed to be a part of the dwelling-house for the pur- poses of burglary, unless there is a communication between such building and dwelling-house either immediate or by means of a covered and enclosed passage leading from the one to the other. Chambers in a college or in an inn of court are the dwelling-house of the owner; so also are rooms or lodgings in a private house, provided the owner dwells elsewhere, or enters by a different outer door from his lodger, otherwise the lodger is merely an inmate and his apartment a parcel of the one dwelling-house.

s In Scots law, the word hamesUcken meant the feloniously beating or assaulting a man in his own house.

As to the manner, there must be both a breaking and an entry. Both must be at night, but not necessarily on the same night, provided that in the breaking and in the entry there is an intent to commit a felony. The breaking may be either an actual breaking of any external part of a building; or opening or lifting any closed door, window, shutter or lock; or entry by means of a threat, artifice or collusion with persons inside; or by means of such a necessary opening as a chimney. If an entry is obtained through an open window, it will not be burglary, but if an inner door is afterwards opened, it immediately becomes so. Entry includes the insertion through an open door or window, or any aperture, of any part of the body or of any instrument in the hand to draw out goods. The entry may be before the breaking, for the Larceny Act 1861 has extended the definition of burglary to cases in which a person enters another's dwelling with intent to commit felony, or being in such house commits felony therein, and in either case breaks out of such

dwelling- house by night.

Breaking and entry must be with the intent to commit a felony, otherwise it is only trespass. The felony need not be a larceny, it may be either murder or rape. The punishment is penal servitude for life, or any term not less than three years, or imprisonment not exceeding two years, with or without hard labour.

Housebreaking in English law is to be distinguished from burglary, in that it is not essential that it should be com- mitted at night, nor in a dwelling-house. It may, according to the Larceny Act 1861, he committed in a school-house, shop, warehouse or counting-house. Every burglary involves house- breaking, but every housebreaking does not amount to burglary. The punishment for housebreaking is penal servitude for any term not exceeding fourteen years and not less than three years, or imprisonment for any term not exceeding two years, with or without hard labour.

In the United States the common-law definition of burglary has been modified by statute in many states, so as to cover what is defined in England as housebreaking; the maximum punish- ment nowhere exceeds imprisonment for twenty years.

Authorities. — Pollock and Maitland, History of English Law; Stephen, History of Criminal Law ; Archbold, Pleading and Evidence in Criminal Cases; Russell, On Crimes and Misdemeanours; Stephen, Commentaries.

BURGON, JOHN WILLIAM (1813-1888), English divine, was born at Smyrna on the 21st of August 1813, the son of a Turkey merchant, who was a skilled numismatist and afterwards became an assistant in the antiquities department of the British Museum . His mother was a Greek. After a few years of business life, Burgon went to Worcester College, Oxford, in 1841, gained the Newdigate prize, took his degree in 1845, an(i won an Oriel fellowship in 1846. He was much influenced by his brother-in- law, the scholar and theologian Henry John Rose (1800-1873), a churchman of the old conservative type, with whom he used to spend his long vacations. Burgon made Oxford his head- quarters, while holding a living at some distance. In 1863 he was made vicar of St Mary's, having attracted attention by his vehement sermons against Essays and Reviews. In 1867 he was appointed Gresham professor of divinity. In 187 1 he published a defence of the genuineness of the twelve last verses of St Mark's Gospel. He now began an attack on the proposal for a new lectionary for the Church of England, based largely upon

his objections to the principles for determining the authority of MS. readings adopted by Westcott and Hort, which he assailed in a memorable article in the Quarterly Review for 1 88 1. This, with his other articles, was reprinted in 1884 under the title of The Revision Revised. His biographical essays on H. L. Mansel and others were also collected, and published under the title of Twelve Good Men (1888). Protests against the inclusion of Dr Vance Smith among the revisers, against the nomination of Dean Stanley to be select preacher in the university of Oxford, and against the address in favour of toleration in the matter of ritual, followed in succession. In 1876 Burgon was made dean of Chichester. He died on the 4th of August 1888.

His life was written by Dean E. M. Goulburn (1892). Vehement and almost passionate in his convictions, Burgon nevertheless possessed a warm and kindly heart. He may be described as a high churchman of the type prevalent before the rise of the Tractarian school. His extensive collection of transcripts from the Greek Fathers, illustrating the text of the New Testament, was bequeathed to the British Museum.

BURGONET, or Burganet (from Fr. bourguignote, Burgundian helmet), a form of light helmet or head-piece, which was in vogue in the 16th and 17th centuries. In its normal form the burgonet was a large roomy cap with a brim shading the eyes, cheek-pieces or flaps, a comb, and a guard for the back of the neck. In many cases a vizor, or other face protection, and a chin-piece are found in addition, so that this piece of armour is sometimes mistaken for an armet (q.v.), but it can always be distinguished by the projecting brim in front. The morion and cabasset have no face, cheek or neck protection. The typical head-piece of the 17th-century soldier in England and elsewhere is a burgonet skull-cap with a straight brim, neck-guard and often, in addition, a fixed vizor of three thin iron bars which are screwed into, and hang down from, the brim in front of the eyes.

BURGOS, a province of northern Spain; bounded on the N.E. by Biscay and Alava, E. by Logrono, S.E. by Soria, S. by Segovia, S.W. by Valladolid, W. by Palencia, and N.W. by Santander. Pop. (1900) 338,828; area, 5480 sq. m. Burgos includes the isolated county of Trevino, which is shut in on all sides by territory belonging to Alava. The northern and north- eastern districts of the province are mountainous, and the central and southern form part of the vast and elevated plateau of Old Castile. The extreme northern region is traversed by part of the great Cantabrian chain. Eastwards are the highest peaks of the province in the Sierra de la Demanda (with the

Cerro de San Millan, 6995 ft. high) and in the Sierra de Neila. On the eastern frontier, midway between these highlands and the Cantabrian chain, two comparatively low ranges, running east and west of Pancorbo, kave a gap through which run the railway and roads connecting Castile with the valley of the Ebro. This Pancorbo Pass has often been called the " Iron Gates of Castile," as a handful of men could hold it against an army. South and west of this spot begins the plateau, generally covered with snow in winter, and swept by such cold winds that Burgos is considered, with Soria and Segovia, one of the coldest regions of the peninsula. The Ebro runs eastwards through the northern half of the province, but is not navigable. The Douro, or Duero, crosses the southern half, running west-north-west; it also is unnavigable in its upper valley. The other important streams are the Pisuerga, flowing south towards Palencia and Valladolid, and the Arlanz6n, which flows through Burgos for over 75 m.

The variations of temperature are great, as from 9 to 20 of frost have frequently been recorded in winter, while the mean summer temperature is 64° (Fahr.). As but little rain falls in summer, and the soil is poor, agriculture thrives only in the valleys, especially that of the Ebro. In live-stock, however, Burgos is one of the richest of Spanish provinces. Horses, mules, asses, goats, cattle and pigs are bred in considerable numbers, but the mainstay of the peasantry is sheep-farming. Vast ranges of almost uninhabited upland are reserved as pasture for the flocks, which at the beginning of the 20th century contained more than 500,000 head of sheep. Coal, china-clay and salt are obtained in small quantities, but, out of more than 150 mines registered, only 4 were worked in 1903. The other industries of the province are likewise undeveloped, although there are many small potteries, stone quarries, tanneries and factories for the manufacture of linen and cotton of the coarsest description. The ancient cloth and woollen industries, for which Burgos was famous in the past, have almost disappeared. Trade is greatly hindered by the lack of adequate railway communication, and even of good roads. The Northern railways from Madrid to the French frontier cross the province in the central districts; the Valladolid-Bilbao line traverses the Cantabrian mountains, in the north; and the Valladolid-Sara- gossa line skirts the Douro valley, in the south.. The only

Important town in the province is Burgos, the capital (pop. 30,167). Few parts of Spain are poorer; education makes little progress, and least of all in the thinly peopled rural districts, with their widely scattered hamlets. The peasantry have thus every inducement to migrate to the Basque Provinces, Catalonia and other relatively prosperous regions; and consequently the population does not increase, despite the excess of births over deaths.

BURGOS, the capital formerly of Old Castile, and since 1833 of the Spanish province of Burgos, on the river Arlanzon, and on the Northern railways from Madrid to the French frontier. Pop. (1900) 30,167. Burgos, in the form of an amphitheatre, occupies the lower slopes of a hill crowned by the ruins of an ancient citadel. It faces the Arlanzon, a broad and swift stream, with several islands in mid-channel. Three stone bridges lead to the suburb of La Vega, on the opposite bank. On all sides, except up the castle hill, fine avenues and public gardens are laid out, notably the Paseo de la Isla, extending along the river to the west. Burgos itself was originally surrounded by a wall, of which few fragments remain; but although its streets and broad squares, such as the central Plaza Mayor, or Plaza de la Constitucion, have often quite a modern appearance, the city retains much of its picturesque character, owing to the number and beauty of its churches, convents and palaces. Unaffected by the industrial activity of the neighbouring Basque Provinces, it has little trade apart from the sale of agricultural produce and the manufacture of paper and leathern goods.

But it is rich in architectural and antiquarian interest. The citadel was founded in 884 by Diego Rodriguez Porcelos, count of Castile; in the 10th century it was held against the kings of Leon by Count Fernan Gonzalez, a mighty warrior; and even in 181 2 it was successfully defended by a French garrison against Lord Wellington and his British troops. Within its walls the Spanish national hero, the Cid Campeador, was wedded to Ximena of Oviedo in 1074; and Prince Edward of England (afterwards King Edward I.) to Eleanor of Castile in 1254. Statues of Porcelos, Gonzalez and the Cid, of Nuno Rasura and Lain Calvo, the first elected magistrates of Burgos, during its brief period of republican rule in the 10th century, and of the emperor Charles V., adorn the massive Arco de Santa Maria, which was erected between 1536 and 1562, and commemorates the return of the citizens to their allegiance, after the rebellion against Charles V. had been crushed in 1522. The interior of this arch serves as a museum. Tradition still points to the site of the Cid's birthplace; and a reliquary preserved in the town hall contains his bones, and those of Ximena, brought hither after many changes, including a

partial transference to Sigmaringen in Germany.

Other noteworthy buildings in Burgos are the late 15th century Casa del Cordon, occupied by the captain-general of Old Castile ; the Casa de Miranda, which worthily represents the best domestic architecture of Spain in the 16th century; and the barracks, hospitals and schools. Burgos is the see of an archbishop, whose province comprises the diocese of Palencia, Pamplona, Santander and Tudela. The cathedral, founded in 1221 by Ferdinand III. of Castile and the English bishop Maurice of Burgos, is a fine example of florid Gothic, built of white lime- stone (see Architecture, Plate II. fig. 65) . It was not completed until 1567, and the architects principally responsible for its construction were a Frenchman in the 13 th century and a German in the 15th. Its cruciform design is almost hidden by the fifteen chapels added at all angles to the aisles and transepts, by the beautiful 14th-century cloister on the north-west and the archiepiscopal palace on the south-west. Over the three central doorways of the main or western facade rise two lofty and graceful towers. Many of the monuments within the cathedral are of considerable artistic and historical interest. The chapel of Corpus Christi contains the chest which the Cid is said to have filled with sand and subsequently pawned for a large sum to the credulous Jews of Burgos. The legend adds that he redeemed his pledge. In the aisleless Gothic church of Santa Agueda, or Santa Gadea, tradition relates that the Cid

compelled Alphonso VI. of Leon, before his accession to the throne of Castile in 1072, to swear that he was innocent of the murder of Sancho his brother and predecessor on the throne. San Esteban, completed between 1280 and 1350, and San Nicolas, dating from 1505, are small Gothic churches, each with a fine sculptured doorway. Many of the convents of Burgos have been destroyed, and those which survive lie chiefly outside the city. At the end of the Paseo de la Isla stands the nunnery of Santa Maria la Real de las Huelgas, originally a summer palace {huelga, "pleasure-ground") of the kings of Castile. In 1187 it was transformed into a Cistercian convent by Alphonso VIII., who invested the abbess with almost royal prerogatives, including the power of life and death, and absolute rule over more than fifty villages. Alphonso and his wife Eleanor, daughter of Henry II. of England, are buried here. The Cartuja de Miraflores, a Carthusian convent, founded by John II. of Castile (1406-1454), lies 2 m. south-east of Burgos. Its church contains a monument of exceptional beauty, carved by Gil de Siloe in the 15th century, for the tomb of John and his second wife, Isabella of Portugal. The convent of San Pedro de Cardena, 7 m. south-east of

Burgos, was the original burial-place of the Cid, in 1099, and of Ximena, in 1 104. About 50 m. from the city is the abbey of Silos, which appears to have been founded under the Visigothic kings, as early as the 6th century. It was restored in 919 by Fernan Gonzalez, and in the nth century became celebrated throughout Europe, under the rule of St Dominic or Domingo. It was reoccupied in 1880 by French Benedictine monks.

The known history of Burgos begins in 884 with the foundation of the citadel. From that time forward it steadily increased in importance, reaching the height of its prosperity in the 15th century, when, alternately with Toledo, it was occupied as a royal residence, but rapidly declining when the court was finally removed to Madrid in 1560. Being on one of the principal military roads of the kingdom, it suffered severely during the Peninsular War. In 1808 it was the scene of the defeat of the Spanish army by the French under Marshal Soult. It was unsuccessfully besieged by Wellington in 18 12, but was sur- rendered to him at the opening of the campaign of the following year.

Of the extensive literature relating to Burgos, much remains unedited and in manuscript. A general description of the city and its monuments is given by A. Llacayo y Santa Maria in Burgos, &c. (Burgos, 1889). See also Architectural, Sculptural and Picturesque Studies in Burgos and its Neighbourhood, a valuable series of architectural drawings in folio, by J. B. Waring (London, 1852). The following are monographs on particular buildings: — Historia de la Catedral de Burgos, &c, by P. Orcajo (Burgos, 1856); El Castillo de Burgos, by E. de Oliver-Copons (Barcelona, 1893) ; La Real Cartuja de Miraflores, by F. Tarin y Juaneda (Burgos, 1896). For the history of the city see En Burgos, by V. Balaguer (Burgos, 1895) ; Burgos en las comunidades de Castillo and Cosas de la vieja Burgos, both by A. Salva (Burgos, 1895 and 1892). The following relate both to the city and to the province of Burgos: — Burgos, &c, by R. Amador de los Rios, in the series entitled Espana (Barcelona, 1888); Burgos y su provincia, anon. (Vitoria, 1898) ; Intento de un diccionario biogrdfico y bibliogrdfico de autores de la prov. de Burgos, by M. Ani- barro and M. Rives (Madrid, 1890).

BURGOYNE, JOHN (1722-1792), English general and dramatist, entered the army at an early age. In 1743 he made a runaway marriage with a daughter of the earl of Derby, but soon had to sell his commission to meet his debts, after which he lived abroad for seven years. By Lord Derby's interest Burgoyne was then reinstated at the outbreak of the Seven Years' War, and in 1758 he became

captain and lieutenant- colonel in the foot guards. In 1758-1759 he participated in expeditions made against the French coast, and in the latter year he was instrumental in introducing light cavalry into the British army. The two regiments then formed were commanded by Eliott (afterwards Lord Heathfield) and Burgoyne. In 1761 he sat in parliament for Midhurst, and in the following year he served as brigadier-general in Portugal, winning particular distinction by his capture of Valencia d'Alcantara and of Villa Velha. In 1768 he became M.P. for Preston, and for the next few years he occupied himself chiefly with his parliamentary duties, in which he was remarkable for his general outspokenness

andy in particular, for his attacks on Lord Clive. At the same time he devoted much attention to art and drama (his first play, The Maid of the Oaks, being produced by Garrick in 1775), and gambled recklessly. In the army he had by this time become a major-general, and on the outbreak of the American War of Independence he was appointed to a command. In 1777 he was at the head of the British reinforcements- designed for the invasion of the colonies from Canada. In this disastrous ex- pedition he gained possession of Ticonderoga (for which he was made a lieutenant-general) and Fort Edward; but, pushing on, was detached from his communications with Canada,and hemmed in by a superior force at Saratoga (q.v.). On the 17th of October his troops, about 3500 in number, laid down their arms. The success was the greatest the colonists had yet gained, and it proved the turning-point in the war. The indignation in England against Burgoyne was great, but perhaps unjust. He returned at once, with the leave of the American general, to defend his conduct, and demanded, but never obtained, a trial. He was deprived of his regiment and a governorship which he held. In 1782, however, when his political friends came into office, he was restored to his rank, given a colonelcy, and made com- mander-in-chief in Ireland and a privy councillor. After the fall of the Rockingham government in 1783, Burgoyne withdrew more and more into private life, his last public service being his participation in the impeachment of Warren Hastings. In his latter years he was principally occupied in literary and dramatic work. His comedy, The Heiress, which appeared in 1786, ran through ten editions within a year, and was translated into several foreign tongues. He died suddenly on the 4th of June 1792. General Burgoyne, whose wife died in June 1776 during his absence in Canada, had several natural children (born between 1782

and 1788) by Susan Caulfield, an opera singer, one of whom became Field Marshal Sir J. F. Burgoyne. His Dramatic and Poetical Works appeared in two vols., 1808.

See E. B. de Fonblanque, Political and Military Episodes from the Life and Correspondence of Right Hon. J. Burgoyne (1876) ; and W. L. Stone, Campaign of Lieut.-Gen. J. Burgoyne, &c. (Albany,: N.Y., 1877).

BURGOYNE, SIR JOHN FOX, Bart. (1782-1871), British field marshal, was an illegitimate son of General John Burgoyne (q.v.). He was educated at Eton and Woolwich, obtained his commission in 1798, and served in 1800 in the Mediterranean. In 1805, when serving on the staff of General Fox in Sicily, he was promoted second captain. He accompanied the unfortunate Egyptian expedition of 1807, and was with Sir John Moore in Sweden in 1808 and in Portugal in 1808-9, In the Corunna campaign Burgoyne held the very responsible position of chief of engineers with the rear-guard of the British army (see Peninsular War). He was with Wellesley at the Douro in 1809, and was promoted captain in the same year, after which he was engaged in the construction of the lines of Torres Vedras in 1810. He blew up Fort Concepcion on the river Turones, and was present at Busaco and Torres Vedras. In 181 1 he was employed in the unsuccessful siege of Badajoz, and in 1812 he won successively the brevets of major and lieutenant-colonel, for his skilful performance of engineer duties at the historic sieges of Ciudad Rodrigo and Badajoz. He was present in the same year (181 2) at the siege and battle of Salamanca, and after the battle of Vittoria in 1813 he became commanding, engineer on Lord Wellington's staff. At the close of the war he received the C.B., a reward which, he justly considered, was not commensurate with his services. In 1814-1815 he served at New Orleans and Mobile. Burgoyne was largely employed, during the long peace which followed Waterloo, in other public duties as well as military work. He sat on numerous commissions, and served for fifteen years as chairman of the Irish board of public works. He became a major-general and K.C.B. in 1838, and inspector- general of fortifications in 1845. In I 85i he was promoted lieutenant-general/and in the following year received the G.C.B. When the Crimean War broke out he accompanied Lord Raglan's headquarters to the East, superintended the disembarkation at Old Fort, and was in effect the principal engineer adviser to the English commander during the first part of the siege of

Sevastopol. He was recalled early in 1855, and though he-was at first bitterly criticized by the public for his part in the earlier and

unsuccessful operations against the fortress the wisdom of his advice was ultimately recognized. In 1856 he was created a baronet, and promoted to the full rank of general. In 1858 he was present at the second funeral of Napoleon I. as Queen Victoria's representative, and in 1865 he was made constable of the Tower of London. Three years later, on resigning his post as inspector-general of fortifications, he was made a field marshal. Parliament granted him, at the same time, a pension of £1500. He died on the 7th of October 1871, a year after the tragic death of his only son, Captain Hugh Talbot Burgoyne, V.C. (r833-i87o), who was in command of H.M.S. " Captain " when that vessel went down in the Bay of Biscay (September

7, 1870).

See Life and Correspondence of F.M. Sir John Fox Burgoyne (edited by Lt.-Col. Hon. • G. Wrottesley, R.E., London, 1873); Sir Francis Head, A Sketch of the Life and Death of F.M. Sir John Burgoyne (London, 1872); Military Opinions of General Sir John Burgoyne (ed. Wrottesley, London, 1859), a collection of the most important of Burgoyne's contributions to military literature.

BURGRAVE, the Eng. form, derived through the Fr., of the Ger. Burggraf and Flem. burg or burch-graeve (med. Lat. burc- gravius or burgicomes), i.e. count of a castle or fortified town. The title is equivalent to that of castellan (Lat. castettanus) or, chdtelain (q.v.). In Germany, owing to the peculiar conditions of the Empire, though the office of burgrave had become a sinecure by the end of the 13 th century, the title, as borne by feudal nobles having the status of princes of. the Empire, obtained a quasi-royal significance. It is still included among the subsidiary titles of several sovereign princes; and the king of Prussia, whose ancestors were burgraves of Nuremberg for over 200 years, is still styled burgrave of Nuremberg.

BURGRED, king of Mercia, succeeded to the throne in 852, and in 852 or 853 called upon /Ethelwulf of Wessex to aid him in subduing the North Welsh. The request was granted and the campaign proved successful, the alliance being sealed by the marriage of Burgred to ˆEthelswith, daughter of ˆEthelwulf. In 868 the Mercian king appealed to ˆEthelred and Alfred for assistance against the Danes, who were in possession of Notting- ham. The armies of Wessex and Mercia did no serious fighting, and the Danes were allowed to remain through the winter. In 8 74 the march of the Danes from Lindsey to Repton drove Burgred from his kingdom. He retired to Rome and died there.

See Saxon Chronicle (Earle and Plummer), years 852-853, 868, 874.

BURGUNDIO, sometimes erroneously styled Burgundius, an Italian jurist of the 12 th century. He was a professor at the university of Paris, and assisted at the Lateran Council in n 79, dying at a very advanced age in n 94. He was a distinguished Greek scholar, and is believed on the authority of Odofredus to have translated into Latin, soon after the Pandects were brought to Bologna, the various Greek fragments which occur in them, with the exception of those in the 27th book, the translation of which has been attributed to Modestinus. The Latin translations ascribed to Burgundio were received at Bologna as an integral part of the text of the Pandects, and form part of that known as The Vulgate in distinction from the Florentine text.

BURGUNDY. The name of Burgundy (Fr. Bourgogne, Lat, Burgundio) has denoted very diverse political and geographical areas at different periods of history and as used by different writers. The name is derived from the Burgundians (Burgundi, Burgondiones) , a people of Germanic origin, who at first settled between the Oder and the Vistula. In consequence of wars against the Alamanni, in which the latter had the advantage, ths Burgundians, after having taken part in the great invasion of Radagaisus in 407, were obliged in 411 to take refuge in Gaul, under the leadership of their chief Gundicar. Under the title of allies of the Romans, they established themselves in certain cantons of the Sequani and of upper Germany, receiving a part of the lands, houses and serfs that belonged to the inhabitants. Thus was founded the first kingdom of Burgundy, the boundaries of which were widened at different times by Gundicar and his son

Gunderic; its chief towns being Vienne, Lyons, Besancon, Geneva, Autun and Macon. Gundibald (d. 516), grandson of Gunderic is famous for his codification of the Burgundian law, known consequently as Lex Gundobada, in French Lot Gombette. His son Sigismund, who was canonized by the church, founded the abbey of St Maurice at Agaunum. ‘ But, incited thereto by Clotilda, the daughter of Chilperic (a brother of Gundibald, and assassinated by him), the Merovingian kings attacked Burgundy. An attempt made in 524 by Clodomer was unsuccessful; but in 534 Clotaire (Chlothachar) and his brothers possessed themselves of the lands of*

Gundimar, brother and successor of Sigismund, and divided them between them. In 561 the kingdom of Burgundy was reconstructed by Guntram, son of Clotaire I., and until 613 it formed a separate state under the government of a prince of the MerovingiaD family.

After 613 Burgundy was one of the provinces of the Frankish kingdom, but in the redistributions that followed the reign of Charlemagne the various parts of the ancient kingdom had different fortunes. In 843, by the treaty of Verdun, Autun, Chalon, Macon, Langres, &c, were apportioned to Charles the Bald, and Lyons with the country beyond the Saone to Lothair I. On the death of the latter the duchy of Lyons (Lyonnais and Viennois) was given to Charles of Provence, and the diocese of Besancon with the country beyond the Jura to Lothair, king of Lorraine. In 879 Boso founded the kingdom of Provence, wrongly called the kingdom of Cisjuran Burgundy, which extended to Lyons, and for a short time as far as Macon (see Provence).

In 888 the kingdom of Juran Burgundy was founded by Rudolph I., son of Conrad, count of Auxerre, and the German king Arnulf could not succeed in expelling the usurper, whose authority was recognized in the diocese of Besanfon, Basel, Lausanne, Geneva and Sion. For a short time his son and successor Rudolph II. (912-937) disputed the crown of Italy with Hugh of Provence, but finally abandoned his claims in exchange for the ancient kingdom of Provence, i.e. the country bounded by the Rh6ne, the Alps and the Mediterranean. His successor, Conrad the Peaceful (93 7-993), whose sister Adelaide married Otto the Great, was hardly more than a vassal of the German kings. The last king of Burgundy, Rudolph III. (993-1032), being deprived of all but a shadow of power by the development of the secular and ecclesiastical aristocracy — especially by that of the powerful feudal houses of the counts of Burgundy (see Franche-Comte), Savoy and Provence— died without issue, bequeathing his lands to the emperor Conrad II. Such was the origin of the imperial rights over the kingdom designated after the 13th century as the kingdom of Aries, which extended over a part of what is now Switzerland (from the Jura to the Aar), and included Franche-Comte, Lyonnais, Dauphine, Savoy and Provence.

The name of Burgundy now gradually became restricted to the countship of that name, which included the district between the Jura and the Sa6ne, in later times called Franche-Comte, and to the duchy which had been created by the Carolingian kings in the portion of Burgundy that had remained French, with the object of resisting Boso. This duchy had been granted to Boso's brother, Richard the

Justiciary, count of Autun. It comprised at first the countships of Autun, Macon, Chalon-sur-Saone, Langres, Nevers, Auxerre and Sens, but its boundaries and designations changed many times in the course of the 10th century. Duke Henry died in 1002; and in 1015, after a war which lasted thirteen years, the French king Robert II. reunited the duchy to his kingdom, despite the opposition of Otto William, count of Burgundy, and gave it to his son Henry, afterwards King Henry I. As king of France, the latter in 1032 bestowed the duchy upon his brother Robert, from whom sprang that first ducal house of Burgundy which flourished until 1361. A grandson of this Robert, who went to Spain to fight the Arabs, became the founder of the kingdom of Portugal; but in general the first Capet dukes of Burgundy were pacific princes who took little part in the political events of their time, or in that religious movement which was so marked in Burgundy, at Cluny to begin ; with, afterwards among the disciples of William of St Benigne

of Dijon, and later still among the monks of Clteaux. In the 1 2th and 13th centuries we may mention DukeHughM. (1162ˆ1193), who played an active part in the wars that marked the beginning of Philip Augustus's reign; Odo (Eudes) III. (1193-1218), one of Philip Augustus's principal supporters in his struggle with King John of England; Hugh IV. (1218-1272), who acquired the countships of Chalon and Auxonne; Robert II. (1 272-1309), one of whose daughters, Margaret, married Louis X. of France, and another, Jeanne, Philip of Valois ; Odo (Eudes) IV. (13 15-13 50), who gained the countship of Artois in right of his wife, Jeanne of France, daughter of Philip V. the Tall and of Jeanne, countess of Burgundy.

In 1361, on the death of Duke Philip de Rouvres, son of Jeanne of Auvergne and Boulogne, who had married the second time John II. of France, surnamed the Good, the duchy of Burgundy returned to the crown of France. In 1363 John gave it, with hereditary rights, to his son Philip, surnamed the Bold, thus founding that second Capet house of Burgundy which filled such an important place in the history of France during the 14 th and 15th centuries, acquiring as it did a territorial power which proved redoubtable to the kingship itself. By his marriage with Margaret of Flanders Philip added to his duchy, on the death of his father-in-law, Louis of Male, in 1384, the countships of Burgundy and Flanders; and in the same year he purchased the countship of Charolais from John, count of Armagnac. On the death of Charles V. in 1380 Philip and his brothers, the dukes of Anjou and Berry, had possessed themselves of the regency, and it was he who led Charles VI. against the rebellious Flemings, over whom the young king gained the victory of Roosebeke in 1382.

Momentarily deprived of power during the period of the " Marmousets' " government, he devoted himself to the administration of his own dominions, establishing in 1 386 an audit-office (chambre des comptes) at Dijon and another at Lille. In 1396 he refused to take part personally in the expedition against the Turks which ended in the disaster of Nicopolis, and would only send his son John, then count of Nevers. In 1392 the king's madness caused Philip's recall to power along with the other princes of the blood, and from this time dates that hostility between the party of Burgundy and the party of Orleans which was to become so intense when in May 1404 Duke Philip.had been succeeded by his son, John the Fearless.

In 1407 the latter caused the assassination of his political rival, Louis of Orleans, the king's brother. Forced to quit Paris for a time, he soon returned, supported in particular by the gild of the butchers and by the university. The monk Jean Petit pronounced an apology for the murder (1408).

The victory of Hasbain which John achieved on the 23rd of September r4o8 over the Liegeois, who had attacked his brother- in-law, John of Bavaria, bishop of Liege, still further strengthened his power and reputation, and during the following years the struggle between the Burgundians and the partisans of the duke of Orleans — or Armagnacs, as they were called — went on with varying results. In 1413 a reaction took place in Paris; John the Fearless was once more expelled from the capital, and- only returned there in 141 8, thanks to the treason of Perrinet Leclerc, who yielded up the town to him. In 1419, just when he was thinking of making advances towards the party of the dauphin (Charles VII.), he was assassinated by members of that party, during an interview between himself and the dauphin at the bridge of Montereau.

This event inclined the new duke of Burgundy, Philip the Good, towards an alliance with England. In 1420 he signed the treaty of Troyes, which recognized Henry V. as the legitimate successor of Charles VI.; in 1423 he gave his sister Anne in marriage to John, duke of Bedford; and during the following years the Burgundian troops supported the English pretender. But a dispute between him and the English concerning the succession in Hainaut, their refusal to permit the town of Orleans to place itself under his rule, and the defeats sustained by them, all combined to embroil, him with his allies, and in 1435 he concluded the treaty of Arras with Charles VII. The king relieved the duke of all homage for his estates during his lif etlme.

and gave up to him the countships of Macon, Auxerre, Bar-sur- Seine and Ponthieu; and, reserving the right of redemption, the towns of the Somme (Roye, Montdidier, Peronne, &c). Besides this Philip had acquired Brabant and Holland in 1433 as the inheritance of his mother. He gave an asylum to the dauphin Louis when exiled from Charles VII. 's court, but refused to assist him against his father, and henceforth rarely intervened in French affairs. He busied himself particularly with the administration of his state, founding the university of Dole, having records made of Burgundian customs, and seeking to develop the commerce and industries of Flanders. A friend to letters and the arts, he was the protector of writers like Olivier de la Marche, and of sculptors of the school of Dijon. He also desired to revive ancient chivalry as he conceived it, and in 1429 founded the order of the Golden Fleece; while during the last years of his life he devoted himself to the preparation of a crusade against the Turks. Neither these plans, however, nor his liberality, prevented his leaving a well-filled treasury and enlarged dominions when he died in 1467.

Philip's successor was his son by his third wife, Isabel of Portugal, Charles, surnamed the Bold, count of Charolois, born in 1433. To him his father had practically abandoned his authority during his last years. Charles had taken an active part in the so-called wars " for the public weal," and in the coalitions of nobles against the king which were so frequent during the first years of Louis XL's reign. His struggle against the king is especially marked by the interview at Peronne in 1468, when the king had to confirm the duke in his possession of the towns of the Somme, and by a fruitless attempt which Charles the Bold made on Beauvais in 1472. Charles sought above all to realize a scheme already planned by his father. This was to annex territory which would reunite Burgundy with the northern group of her possessions (Flanders, Brabant, &c), and to obtain the emperor's recognition of the kingdom of " Belgian Gaul." In 1469 he bought the landgraviate of Alsace and the countship of Ferrette from the archduke Sigismund of Austria, and in 1473 the aged duke Arnold ceded the duchy of Gelderland to him. In the same year he had an interview at Trier with the emperor Frederick III., when he offered to give his daughter and heiress, Mary of Burgundy, in marriage to the emperor's son Maximilian in exchange for the concession of the royal title. But the emperor, uneasy at the ambition of the " grand-duke of the West," did not pursue the negotiations.

Meanwhile the tyranny of the duke's lieutenant Peter von Hagenbach, who was established at Ferrette as governor (grand bailli or Landvogi) of Upper Alsace, had brought about an insurrection. The Swiss supported the cause of their allies, the inhabitants of the free towns of Alsace, and Duke Rene II. of Lorraine also declared war against Charles. In 1474 the Swiss invaded Franche-Comte and achieved the victory of Hericourt. In 1475 Charles succeeded in conquering Lorraine, but an expedition against the Swiss ended in the defeat of Grandson (February 1476). In the same year the duke was again beaten at Morat, and the Burgundian nobles had to abandon to the victors a considerable amount of booty. Finally the duke of Lorraine returned to his dominions; Charles advanced against him, but on the 6th of January 1477 he was defeated and killed before Nancy.

By his wife, Isabella of Bourbon, he only left a daughter, Mary, and Louis XL claimed possession of her inheritance as guardian to the young princess. He succeeded in getting himself acknow- ledged in the duchy and countship of Burgundy, which were occupied by French garrisons. But Mary, alarmed by this annexation, and by the insurrection at Ghent (secretly fomented by Louis), decided to marry the archduke Maximilian of Austria, to whom she had already been promised (August 1477), and hostilities soon broke out between the two princes. Mary died through a fall from her horse in March 1482, and in the same year the treaty of Arras confirmed Louis XL in possession of the duchy. Franche-Comte and Artois were to form the dowry of the little Margaret of Burgundy, daughter of Mary and Maxi- milian, who was promised in marriage to the dauphin. As to the

lands proceeding from the succession of Charles the Bold, which had returned to the Empire (Brabant, Hainaut, Limburg, Namur, Gelderland, &c), they constituted the " Circle of Burgundy " from 1512 onward.

We know that the title of duke of Burgundy was revived in 1682 for a short time by Louis XIV. in favour of his grandson Louis, the pupil of Fenelon. But from the 16th to the 18th century Burgundy constituted a military government bounded on the north by Champagne, on the south by Lyonnais, on the east by Franche-Comte, on the west by Bourbonnais and Niver- nais. It comprised Dijonnais, Autunois, Auxois, and the pays de la montagne or Country of the Mountain (Chatillon-sur-Seine), with the " counties " of Chalonnais, Maconnais, Auxerrois and Bar-sur-Seine, and, so far as administration went, the annexes of Bresse, Bugey, Valromey and

the country of Gex. Burgundy was a pays d'etats. The estates, whose privileges the dukes at first, and later Louis XL, had to swear to maintain, had their assembly at Dijon, usually under the presidency of the governor of the province, the bishop of Autun as representing the clergy, and the mayor of Dijon representing the third estate. In the judiciary point of view the greater part of Burgundy depended on the parlement of Dijon; but Auxerrois and Maconnais were amenable to the parlement of Paris.

See also U. Plancher, Histoire gSnSrale et particuliere de Bourgogne (Dijon, 1739-1781, 4 vols. 8vo); Courtepee, Description generate et particuliere du duche de Bourgogne (Dijon, 1774-1785, 7 vols. 8vo); O. Jahn. Geschichte der Burgundionen (Halle, 1874, 2 vols. 8vo) ; E. Petit de Vausse, Histoire des dues de Bourgogne de la race capetienne (Paris, 1885-1905, 9 vols. 8vo); B. de Barante, Histoire des dues de Bourgogne de la maison de Valois (Paris, 1833-1836, 13 vols. 8vo) ; the marquis Leon E. S. J. de Laborde, Les Dues de Bourgogne: Etudes sur les lettres, les arts et I'industrie pendant le XV' siecle (Paris, 1849- 1851, 3 vols. 8vo). (R. Po.)

BURHANPUR, a town of British India in the Nimar district of the Central Provinces, situated on the north bank of the river Tapti, 310 m. N.E. of Bombay, and 2 m. from the Great Indian Peninsula railway station of Lalbagh. It was founded in a.d. 1400 by a Mahommedan prince of the Farukhi dynasty of Khandesh, whose successors held it for 200 years, when the Farukhi kingdom was annexed to the empire of Akbar. It formed the chief seat of the government of the Deccan provinces of the Mogul empire till Shah Jahan removed the capital to Aurangabad in 1635. Burhanpur was plundered in 1685 by the Mahrattas, and repeated battles were fought in its neigh- bourhood in the struggle between that race and the Mussulmans for the supremacy of India. In 1739 the Mahommedans finally yielded to the demand of the Mahrattas for a fourth of the revenue, and in 1760 the Nizam of the Deccan ceded Burhanpur to the peshwa, who in 1778 transferred it to Sindhia. In the Mahratta War the army under General Wellesley, afterwards the duke of Wellington, took Burhanpur (1803), but the treaty of the same year restored it to Sindhia. .It remained a portion of Sindhia's dominions till 1 860-1 861, when, in consequence of certain territorial arrangements, the town and surrounding estates were ceded to the British government. Under the Moguls the city covered an area of about 5 sq. m., and was about 105 m. in circumference. In the Ain-4-Akbari it is described as a " large city, with many gardens, inhabited by all nations, and abounding with handicraftsmen." Sir Thomas Roe, who visited it in 1614, found that

the houses in the town were " only mud cottages, except the prince's house, the chan's and some few others." In 1865-1866 the city contained 8000 houses, with a population of 34,137, which had decreased to 33,343 in 1901. Burhanpur is celebrated for its muslins, flowered silks, and brocades, which, according to Tavernier, who visited it in 1668, were exported in great quantities to Persia, Egypt, Turkey, Russia and Poland. The gold and silver wires used in the manu- facture of these fabrics are drawn with considerable care and skill; and in order to secure the purity of the metals employed for their composition, the wire-drawing under the native rule was done under government inspection. The town of Burhanpur and its manufactures were long on the decline, but during recent times have made a slight recovery. The buildings of interest

in the town are a palace, built by Akbar, called the Lai Kila or the Red Fort, and the Jama Masjid or Great Mosque, built by Ali Khan, one of the Farukhi dynasty, in 1588. A consider- able number of Boras, a class of commercial Mahommedans, reside here.

BURI, or Bure, in Norse mythology, the grandfather of Odin. In the creation of the world he was born from the rocks, licked by the cow Andhumla (darkness). He was the father of Bor, and the latter, wedded to Bestla, the daughter of the giant Bolthorn (evil), became the father of Odin, the Scandinavian Jove.

BURIAL and BURIAL ACTS (in O. Ertg. byrgcls, whence byriels, wrongly taken as a plural, and so Mid. Eng. buryel, from O. Eng. byrgan, properly to protect, cover, to bury). The main lines of the law of burial in England may be stated very shortly. Every person has the right to be buried in the churchyard or burial ground of the parish where he dies, with the exception of executed felons, who are buried in the precincts of the prison or in a place appointed by the home office. At common law the person under whose roof a death takes place has a duty to provide for the body being carried to the grave decently covered; and the executors or legal representatives of the deceased are bound to bury or dispose of the body in a manner becoming the estate of the deceased, according to their discretion, and they are not bound to fulfil the wishes he may have expressed in this respect. The disposal must be such as will not expose the body to viola- tion, or offend the feelings or endanger the health of the living; and cremation under proper restrictions is allowable. In the case of

paupers dying in a parish house, or shipwrecked persons whose bodies are cast ashore, the overseers or guardians are responsible for their burial; and in the case of suicides the coroner has a similar duty. The expenses of burial are payable out of the deceased's estate in priority to all other debts. A husband liable for the maintenance of his wife is liable for her funeral expenses; the parents for those of their children, if they have the means of paying. Legislation has principally affected (1) places of burial, (2) mode of burial, (3) fees for burial, and (4) disinterment.

1. The overcrowded state of churchyards and burial grounds gradually led to the passing of a group of statutes known as the Burial Acts, extending from 1852 up to 1900. By these acts a general system was set up, the aim of which was to remedy the existing deficiencies of accommodation by providing new burial grounds and closing old ones which should be dangerous to health, and to establish a central authority, the home office (now for most purposes the Local Government Board) to super- intend all burial grounds with a view to the protection of the public health and the maintenance of public decency in burials. The Local Government Board thus has the power to obtain by order in council the closing of any burial ground it thinks fit, while its consent is necessary to the opening of any new burial ground; and it also has power to direct inspection of any burial ground or cemetery, and to regulate burials in common graves in statutory cemeteries and to compel persons in charge of vaults or places of burial to take steps necessary for preventing their becoming dangerous or injurious to health. The vestry of any parish, whether a common-law or ecclesiastical one, was thus authorized to provide itself with a new burial ground, if its exist- ing one was no longer available; such ground might be wholly or partly consecrated, and chapels might be provided for the performance of burial service. The ground was put under the management of a burial board, consisting of ratepayers elected by the vestry, and the consecrated portion of it took the place of the churchyard in all respects. Disused churchyards and burial grounds in the metropolis may be used as open spaces for recrea- tion, and only buildings for religious purposes can be built on them (1881, 1884, 1887). The Local Government Act 1894 introduced a change into the government of burial grounds (consequent on the general change made in parochial government) by transferring, or allowing to be transferred, the powers, duties, property and liabilities of the burial boards in urban districts to the district councils, and in rural parishes to the parish councils and parish meetings; and by allowing rural parishes

to adopt the Burials Acts, and provide and manage new burial grounds by the parish council, or a burial board elected by the parish meeting.

2. The mode of burial is a matter of ecclesiastical cognizance; in the case of churchyards and elsewhere it is in the discretion of the owners of the burial ground. The Local Government Board now makes regulations for burials in burial grounds provided under the Burial Acts; for cemeteries provided under the Public Health Act 1879. Private cemeteries and burial grounds make their own regulations. Burial may now take place either with or without a religious service in consecrated ground. Before 1880 no body could be buried in consecrated ground except with the service of the Church, which the incum- bent of the parish or a person authorized by him was bound to perform; but the canons and prayer-book refused the use of the office for excommunicated persons, majori excommunicatione, for some grievous and notorious crime, and no person able to testify of his repentance, unbaptized persons, and persons against whom a verdict of jelo de se had been found. But by the Burial Laws Amendment Act 1880, the bodies of persons entitled to be buried in parochial burial grounds, whether churchyards or graveyards, may be buried there, on proper notice being given to the minister, without the performance of the service of the Church of England, and either without any religious service or with a Christian and orderly religious service at the grave, which may be conducted by any person invited to do so by the person in charge of the funeral. Clergymen of the Church of England are also by the act allowed, but are not obliged, to use the burial service in any unconsecrated burial ground or cemetery, or building therein, in any case in which it could be used in consecrated ground. In cases where it may not be so used, and where such is the wish of those in charge of the service, the clergy may use a form of service approved by the bishop without being liable to any ecclesiastical or temporal penalty. Except as altered by this act, it is still the law that " the Church knows no such indecency as putting a body into consecrated ground without the service being at the same time performed "; and nothing in the act authorizes the use of the service on the burial of a felo de se, which, however, may take place in any way allowed by the act of 1880. The proper performance of the burial office is provided for by the Public Worship Regulation Act 1874. Statutory provision is made by the criminal law in this act for the preservation of order in burial grounds and protection of funeral services.

3. Fees are now payable by custom or under statutory powers on all burials. In a churchyard the parson must perform the office of burial

for parishioners, even if the customary fee is denied, and it is doubtful who is liable to pay it. The custom must be immemorial and invariable. If not disputed, its pay- ment can be enforced in the ecclesiastical court; if disputed, its validity must be tried by a temporal court. A special contract for the payment of an annual fee in the case of a non-parishioner can be enforced in the latter court. In the case of paupers and shipwrecked persons the fees are payable by the parish. In other parochial burial grounds and cemeteries the duties and rights to fees of the incumbents, clerks and sextons of the parishes for which the ground has been provided are the same as in burials in the churchyard. Burial authorities may fix the fees payable in such grounds, subject to the approval of the home secretary; but the fees for services rendered by ministers of religion and sextons must be the same in the consecrated as in the unconsecrated part of the burial ground, and no incumbent of a parish or a clerk may receive any fee upon burials except for services rendered by them (act of rgoo). On burials under the act of 1880 the same fees are payable as if the burial had taken place with the service of the Church.

4. A corpse is not the subject of property, nor capable of holding property. If interred in consecrated ground, it is under the protection of the ecclesiastical court; if in unconsecrated, it is under that of the temporal court. In the former case it is an ecclesiastical offence, and in either case it is a mis- demeanour, to disinter or remove it without proper authority,

whatever the motive for such an act may be. Such proper authority is (i) a faculty from the ordinary, where it is to be removed from one consecrated place of burial to another, and this is often done on sanitary grounds or to meet the wishes of relatives, and has been done for secular purposes, e.g. widening a thoroughfare, by allowing part of the burial ground (disused) to be thrown into it; but it has been refused where the object was to cremate the remains, or to transfer them from a church- yard to a Roman Catholic burial ground; (2) a licence from the home secretary, where it is desired to transfer remains from one unconsecrated place of burial to another; (3) by order of the coroner, in cases of suspected crime. There has been considerable discussion as to the boundary line of jurisdiction between (1) and (2), and whether the disinterment of a body from conse- crated ground for purposes of identification falls within (1) only or within both (1) and (2); and an attempt by the ecclesiastical court to enforce a penalty for that purpose without a licence has been prohibited by the temporal court.

See also Churchyard ; and, for methods of disposal of the dead, Cemetery; Cremation, and Funeral Rites.

Authorities. — Baker, Law of Burials (6th ed.by Thomas, London, 1898); PhiKmore, Ecclesiastical Law (2nd ed., London, 1895); Cripps, Law of Church and Clergy (6th ed., London, 1886). (G. G. P.)*

BURIAL SOCIETIES, a form of friendly societies, existing mainly in England, and constituted for the purpose of providing by voluntary subscriptions, for insuring money to be paid on the death of a member, or for the funeral expenses of the husband, wife or child of a member, or of the widow of a deceased member. (See Friendly Societies.)

.. BURIATS, a Mongolian race, who dwell in the vicinity of the Baikal Lake, for the most part in the government of Irkutsk and the Trans-Baikal Territory. They are divided into various tribes or clans, which generally take their names from the locality they frequent. These tribes are subdivided according to kinship. The Buriats are a broad-shouldered race inclined to stoutness, with small slanting eyes, thick lips, high cheek- bones, broad and flat noses and scanty beards. The men shave their heads and wear a pigtail like the Chinese. In summer they dress in silk and cotton gowns, in winter in furs and sheepskins. Their principal occupation is the rearing of cattle and horses. The Buriat horse is famous for its power of endurance, and

the attachment between master and animal is very great. At death the horse should, according to their religion, be sacrificed at its owner's grave; but the frugal Buriat heir usually substitutes an old hack, or if he has to tie up the valuable steed to the grave to starve he does so only with the thinnest of cords so that the animal soon breaks his tether and gallops off to join the other horses. In some districts the Buriats have learned agriculture from the Russians, and in Irkutsk are really better farmers than the latter. They are extraordinarily industrious at manuring and irrigation. They are also clever at trapping and fishing. In religion the Buriats are mainly Buddhists; and their head lama (Khambo Lama) lives at the Goose Lake (Guisinoe Ozero). Others are Shamanists, and their most sacred spot is the Shamanic stone at the mouth of the river Angar. Some thou- sands of them around Lake Baikal are Christians. A knowledge of reading and writing is common, especially among the Trans-Baikal Buriats, who possess books of their own, chiefly translated from the Tibetan. Their own language is Mongolian, and of three distinct dialects. It was in the 16th century that the Russians first came in touch with the Buriats, who were long known by the name of Bratskiye, " Brotherly," given them by the Siberian colonists. In the town of Bratskiyostrog, which grew up around the block-house built in 1631 at the confluence of the :Angara and Oka to bring them into subjection, this title is perpetuated. The Buriats made a vigorous resistance to Russian aggression, but were finally subdued towards the end of the 17th century, and are now among the most peaceful of

Russian peoples.

See J. G. Gmelin, Siberia; Pierre Simon Pallas, Sammlungen historischer Nachrichten iiber die mongolischen Vblkerschaften (St Petersburg, 1776-1802); M. A. Castren, Versuch einer buriatischen Spracklehre (1857); Sir H. H. Howorth, History of the Mongols IJB76-1888).

*BURIDAN, JEAN [Joannes BtjridantjsJ (c. 1207-e. 1358), French philosopher, was born at Bethune in Artois. He studied in Paris under William of Occam. He was professor of philosophy in the university of Paris, was rector in 1327, and in 1345 was deputed to defend its interests before Philip of Valois and at Rome. He was more than sixty years old in 1358, but the year of his death is not recorded. The tradition that he was forced to flee from France along with other nominalists, and founded the university of Vienna in 1356, is unsupported and in con- tradiction to the fact that the university was founded by Frederick II. in *237. An ordinance of Louis XL, in 1473, directed against the nominalists, prohibited the*

*reading of his works. In philosophy Buridan was a rationalist, and followed Occam in denying all objective reality to universals, *hich he regarded as mere words. The aim of his logic is represented as having been the devising of rules for the discovery of syllogistic middle terms; this system for aiding slow-witted persons became known as the pons asinorum. The parts of logic which he treated with most minuteness are modal propositions and modal syllogisms. In commenting on Aristotle's Ethics he dealt in a very independent manner with the question of free will, his conclusions being remarkably similar to those of John Locke. The only liberty which he admits is a certain power of suspending the deliberative process and determining the 1 direction of the intellect. Otherwise the will is entirely dependent on the view of the mind, the last result of examination. The comparison of the will unable to act between two equally balanced motives to an ass dying of hunger between two equal and equidistant bundles of hay is not found in his works, and may have been invented by his opponents to ridicule his determinism. That he was not the originator of the theory known as " liberty of indifference " {liberum arbitrium indifferentiae) is shown in G. Fonsegrive's Essai sur le libre arbitre, pp. 119, 199 (1887).*

His works are -.—Surmnula de dialectica (Paris, 1487) ; Compendium logicae (Venice, 1489) ; Quaestiones in viii. libros physicorum (Paris, 1516); In Aristotelis Metaphysica (1518); Quaestiones in x. libros ethicorum Aristotelis (Paris, 1489; Oxford, 1637); Quaestiones in viii. libros politicorum Aristotelis (1500). See K. Prantl's Geschichte der Logik, bk. iv. 14-38; Stockl's Geschichte der Philosophie des Miltelalters,\. 1023-1028; Herzog-Hauck, Realencyklopadie, s.v.

(1897).

BURKE, EDMUND (1729-1797), British statesman and political writer. His is one of the greatest names in the history of political literature. There have been many more important statesmen, for he was never tried in a position of supreme responsibility. There have been many more effective orators, for lack of imaginative suppleness prevented him from penetrat- ing to the inner mind of his hearers; defects in delivery weakened the intrinsic persuasiveness of his reasoning; and he had not that commanding authority of character and personality which has so often been the secret of triumphant eloquence. There have been many subtler, more original and more systematic thinkers about the conditions of the social union. But no one that ever lived used the general ideas of the thinker more success- fully to judge the particular problems of the statesman. No

one has ever come so close to the details of practical politics, and at the same time remembered that these can only be under- stood and only dealt with by the aid of the broad conceptions of political philosophy. And what is more than all for perpetuity of fame, he was one of the great masters of the high and difficult art of elaborate composition.

! A certain doubtfulness hangs over the circumstances of Burke's life previous to the opening of his public career. The very date of his birth is variously stated. The most probable opinion is that he was born at Dublin on the 1 2th of January 1729, new style: Of his family we know little more than his father was a Pro- testant attorney, practising in Dublin, and that his mother was a Catholic, a member of the family of Nagle. He had at least one sister, from whom descended the only existing representatives of Burke's family; and he had at least two brothers, Garret Burke and Richard Burke, the one older and the other younger than Edmund. The sister, afterwards Mrs French, was brought up and remained throughout life in the religious faith of her

mother; Edmund and his brothers followed that of their father. In 1 741 the three brothers were sent to school at Ballitore in the county of Kildare, kept by Abraham Shackleton, an Englishman, and a member of the Society of Friends. He appears to have been an excellent teacher and a good and pious man. Burke always looked back on his own connexion with the school at Ballitore as among the most fortunate circumstances of his life. Between himself and a son of his instructor there sprang up a close and affectionate friendship, and, unlike so many of the exquisite attachments of youth, this was not choked by the dust of life, nor parted by divergence of pursuit. Richard Shackleton was endowed with a grave, pure and tranquil nature, constant and austere, yet not without those gentle elements that often redeem the drier qualities of his religious persuasion. When Burke had become one of the most famous men in Europe, no visitor to his house was more welcome than the friend with whom long years before he had tried poetic flights, and exchanged all the sanguine confidences of boyhood. And we are touched to think of the simple-minded guest secretly praying, in the solitude of his room in the fine house at Beaconsfield, that the way of his anxious and overburdened host might be guided by a divine hand.

In 1 743 Burke became a student at Trinity College, Dublin, where Oliver Goldsmith was also a student at the same time. But the serious pupil of Abraham Shackleton would not be likely to see much of the wild and squalid sizar. Henry Flood, who was two years younger than Burke, had gone to complete his education at Oxford. Burke, like Goldsmith, achieved no academic dis- tinction. His character was never at any time of the academic cast. The minor accuracies, the limitation of range, the treading and re-treading of the same small patch of ground, the con- centration of interest in success before a board of examiners, were all uncongenial to a nature of exuberant intellectual curiosity and of strenuous and self-reliant originality. His knowledge of Greek and Latin was never thorough, nor had he any turn for critical niceties. He could quote Homer and Pindar, and he had read Aristotle. Like others who have gone through the conventional course of instruction, he kept a place in his memory for the various charms of Virgil and Horace, of Tacitus and Ovid; but the master whose page by night and by day he turned with devout hand, was the copious, energetic, flexible, diversified and brilliant genius of the declamations for Archias the poet and for Milo, against Catiline and against Antony, the author of the disputations at Tusculum and the orations against Verres. Cicero was ever to him the mightiest of the ancient names. In English literature Milton seems to have been more familiar to him than Shakespeare, and Spenser was perhaps more of a favourite with him than either.

It is too often the case to be a mere accident that men who become eminent for wide compass of understanding and pene- trating comprehension, are in their adolescence unsettled and desultory. Of this Burke is a signal illustration. He left Trinity in 1748, with no great stock of well-ordered knowledge. He neither derived the benefits nor suffered the drawbacks of systematic intellectual discipline.

After taking his degree at Dublin he went in the year 1750 to London to keep terms at the Temple. The ten years that followed were passed in obscure industry. Burke was always extremely reserved about his private affairs. All that we know of Burke exhibits him as inspired by a resolute pride, a certain stateliness and imperious elevation of mind. Such a character, while free from any weak shame about the shabby necessities of early struggles, yet is naturally unwilling to make them pro- minent in after life. There is nothing dishonourable in such an inclination. " I was not swaddled and rocked and dandled into a legislator," wrote Burke when very near the end of his days: " Nitor in adversum is the motto for a man like me. At every step of my progress in life (for in every step I was traversed and opposed), and

at every turnpike I met, I was obliged to show my passport. Otherwise no rank, no toleration even, for me." All sorts of whispers have been circulated by idle or malicious

gossip about Burke's first manhood. He is said to have been one of the numerous lovers of his fascinating countrywoman, Margaret Woffington. It is hinted that he made a mysterious visit to the American colonies. He was for years accused of having gone over to the Church of Rome, and afterwards recant- ing. There is not a tittle of positive evidence for these or any of the other statements to Burke's discredit. The common story that he was a candidate for Adam Smith's chair of moral philo- sophy at Glasgow, when Hume was rejected in favour of an obscure nobody (1751), can be shown to be wholly false. Like a great many other youths with an eminent destiny before them, Burke conceived a strong distaste for the profession of the law. His father, who was an attorney of substance, had a distaste still stronger for so vagrant a profession as letters were in that day. He withdrew the annual allowance, and Burke set to work to win for himself by indefatigable industry and capability in the public interest that position of power or pre-eminence which his detractors acquired either by accident of birth and connexions or else by the vile arts of political intrigue. He began at the bottom of the ladder, mixing with the Bohemian society that haunted the Temple, practising oratory in the free and easy debating societies of Covent Garden and the Strand, and writing for the booksellers.

In 1756 he made his first mark by a satire upon Bolingbroke entitled A Vindication of Natural Society. It purported to be a posthumous work from the pen of Bolingbroke, and to present a view of the miseries and evils arising to mankind from every species of artificial society. The imitation of the fine style of that magnificent writer but bad patriot is admirable. As a satire the piece is a failure, for the simple reason that the substance of it might well pass for a perfectly true, no less than a very eloquent statement of social blunders and calamities. Such acute critics as Chesterfield and Warburton thought the performance serious. Rousseau, whose famous discourse on the evils of civilization had appeared six years before, would have read Burke's ironical vindication of natural society without a suspicion of its irony. There have indeed been found persons who insist that the Vindication was a really serious expression of the writer's own opinions. This is absolutely incredible, for various reasons. Burke felt now, as he did thirty years later, that civil institutions cannot wisely or safely be measured by the tests of pure reason. His sagacity discerned that the rationalism by which Boling- broke and the deistic school believed themselves to have over- thrown revealed religion,

was equally calculated to undermine the structure of political government. This was precisely the actual course on which speculation was entering in France at that moment. His Vindication is meant to be a reduction to an absurdity. The rising revolutionary school in France, if they had read it, would have taken it for a demonstration of the theorem to be proved. The only interest of the piece for us lies in the proof which it furnishes, that at the opening of his life Burke had the same scornful antipathy to political rationalism which flamed out in such overwhelming passion at its close.

In the same year (1756) appeared the Philosophical Inquiry into the Origin of our Ideas on the Sublime and Beautiful, a crude and narrow performance in many respects, yet marked by an independent use of the writer's mind, and not without fertile' suggestion. It attracted the attention of the rising aesthetic school in Germany. Lessing set about the translation and annotation of it, and Moses Mendelssohn borrowed from Burke's speculation at least one of the most fruitful and important ideas of his own influential theories on the sentiments. In England the Inquiry had considerable vogue, but it has left no permanent trace in the development of aesthetic thought.

Burke's literary industry in town was relieved by frequent excursions to the western parts of England, in company with William Burke. There was a lasting intimacy between the two namesakes, and they seem to have been involved together in some important passages of their lives; but we have Edmund Burke's authority for believing that they were probably not kinsmen. The seclusion of these rural sojourns, originally dictated by delicate health, was as wholesome to the mind as to

the body. Few men, if any, have ever acquired a settled mental habit of surveying human affairs broadly, of watching the play of passion, interest, circumstance, in all its comprehensiveness, and of applying the instruments of general conceptions and wide principles to its interpretation with respectable constancy, unless they have at some early period of their manhood resolved the greater problems of society in independence and isolation. By 1756 the cast of Burke's opinions was decisively fixed, and they underwent no radical change.

He began a series of Hints on the Drama. He wrote a portion of an Abridgment of the History of England, and brought it down as far as the reign of John. It included, as was natural enough in a warm admirer of Montesquieu, a fragment on law, of which he justly said that it ought to be the leading science in every well-ordered commonwealth. Burke's early interest in America was shown by an Account of the European Settlements on that continent. Such works were evidently a sign that his mind was turning away from abstract speculation to the great political and economic fields, and to the more visible conditions of social stability and the growth of nations. This interest in the concrete phenomena of society inspired him with the idea of the Annual Register (1759), which he designed to present a broad grouping of the chief movements of each year. The execution was as excellent as the conception, and if we reflect that it was begun in the midst of that momentous war which raised England to her climax of territorial greatness in East and West, we may easily realize how the task of describing these portentous and far-reaching events would be likely to strengthen Burke's habits of wide and laborious observation, as well as to give him firmness and confidence in the exercise of his own judgment. Dodsley gave him £100 for each annual volume, and the sum was welcome enough, for towards the end of 1756 Burke had married. His wife was the daughter of a Dr Nugent, a physician at Bath. She is always spoken of by his friends as a mild, reasonable and obliging person, whose amiability and gentle sense did much to soothe the too nervous and excitable temperament of her husband. She had been brought up, there is good reason to believe, as a Catholic, and she was probably a member of that communion at the time of her marriage. Dr Nugent eventually took up his residence with his son-in-law in London, and became a popular member of that famous group of men of letters and artists whom Boswell has made so familiar and so dear to all later generations. Burke, however, had no intention of being dependent. His consciousness of his own powers animated him with a most justifiable ambition, if ever there was one, to play a part in the conduct of national affairs. Friends shared this ambition on his behalf; one of these was Lord Charlemont. He introduced Burke to William Gerard Hamilton (1759), now only remembered by the nickname " single-speech," derived from the circumstance of his having made a single brilliant speech in the House of Commons, which was followed by years of almost unbroken silence. Hamilton was by no means devoid of sense and acuteness, but in character he was one of the most despicable men then alive. There is not a word too many nor too strong in the description of him by one of Burke's friends, as " a sullen, vain, proud, selfish, cankered-hearted, envious

reptile." The reptile's connexion, however, was for a time of considerable use to Burke. When he was made Irish secretary, Burke accompanied him to Dublin, and there learnt Oxenstiern's eternal lesson, that awaits all who penetrate behind the scenes of government, quant parva sapientia mundus regitur.

The penal laws against the Catholics, the iniquitous restrictions on Irish trade and industry, the selfish factiousness of the parliament, the jobbery and corruption of administration, the absenteeism of the landlords, and all the other too familiar elements of that mischievous and fatal system, were then in full force. As was shown afterwards, they made an impression upon Burke that was never effaced. So much iniquity and so much disorder may well have struck deep on one whose two chief political sentiments were a passion for order and a passion for justice. He may have anticipated with something of remorse the reflection of a modern historian, that the absenteeism of

her landlords has been less of a, curse to Ireland than the absenteeism of her men of genius. At least he was never an absentee in heart. He always took the interest of an ardent patriot in his unfortunate country; and, as we shall see, made more than one weighty sacrifice on behalf of the principles which he deemed to be bound up with her welfare.

When Hamilton retired from his post, Burke accompanied him back to London, with a pension of £300 a year on the Irish Establishment. This modest allowance he hardly enjoyed for more than a single year. His patron having discovered the value of so laborious and powerful a subaltern, wished to bind Burke permanently to his service. Burke declined to sell himself into final bondage of this kind. When Hamilton continued to press his odious pretensions they quarrelled (1765), and Burke threw up his pension. He soon received a more important piece of preferment than any which he could ever have procured through Hamilton.

The accession of George III. to the throne in 1760 had been followed by the disgrace of Pitt, the dismissal of Newcastle, and the rise of Bute. These events marked the resolution of the court to change the political system which had been created by the Revolution of 1688. That system placed the government of the country in the hands of a territorial oligarchy, composed of a few families of large possessions, fairly enlightened principles, and shrewd political sense. It had been preserved by the existence of a Pretender. The two first kings of the house of Hanover could only keep the crown on their own heads by conciliating the Revolution families and accepting Revolution

principles. By 1760 all peril to the dynasty was at an end. George III., or those about him, insisted on substituting for the aristocratic division of political power a substantial concentration of it in the hands of the sovereign. The ministers were no longer to be the members of a great party, acting together in pursuance of a common policy accepted by them all as a united body; they were to become nominees of the court, each holding himself answerable not to his colleagues but to the king, separately, individually and by department. George III. had before his eyes the government of his cousin the great Frederick; but not every one can bend the bow of Ulysses, and, apart from difference of personal capacity and historic tradition, he forgot that a territorial and commercial aristocracy cannot be dealt with in the spirit of the barrack and the drill-ground. But he made the attempt, and resistance to that attempt supplies the keynote to the first twenty-five years of Burke's political life.

Along with the change in system went high-handed and absolutist tendencies in policy. The first stage of the new experiment was very short. Bute, in a panic at the storm of unpopularity that menaced him, resigned in 1763. George Grenville and the less enlightened section of the Whigs took his place. They proceeded to tax the American colonists, to inter- pose vexatiously against their trade, to threaten the liberty of the subject at home by general warrants, and to stifle the liberty of public discussion by prosecutions of the press. Their arbitrary methods disgusted the nation, and the personal arrogance of the ministers at last disgusted the king. The system received a temporary check. Grenville fell, and the king was forced to deliver himself into the hands of the orthodox section of the Whigs. The marquess of Rockingham (July 10, 1765) became prime minister, and he was induced to make Burke his piivate secretary. Before Burke had begun his duties, an incident occurred which illustrates the character of the two men. The old duke of Newcastle, probably desiring a post for some nominee of his own, conveyed to the ear of the new minister various absurd rumours prejudicial to Burke, — that he was an Irish papist, that his real name was O'Bourke, that he had been a Jesuit, that he was an emissary from St Omer's. Lord Rocking- ham repeated these tales to Burke, who of course denied them with indignation. His chief declared himself satisfied, but Burke, from a feeling that the indispensable confidence between them was impaired, at once expressed a strong desire to resign his post. Lord Rockingham prevailed upon him to reconsider his resolve, and from that day until Lord Rockingham's death in

1782, their relations were those of the closest friendship and confidence.

The first Rockingham administration only lasted a year and a few days, ending in July 1766. The uprightness and good sense of its leaders did not compensate for the weakness of their political connexions. They were unable to stand against the coldness of the king, against the hostility of the powerful and selfish faction of Bedford Whigs, and, above all, against the towering predominance of William Pitt. That Pitt did not join them is one of the many fatal miscarriages of history, as it is one of the many serious reproaches to be made against that extraordinary man's chequered and uneven course. An alliance between Pitt and the Rockingham party was the surest guarantee of a wise and liberal policy towards the colonies. He went further than they did, in holding, like Lord Camden, the doctrine that taxation went with representation, and that therefore parliament had no right to tax the unrepresented colonists. The ministry asserted, what no competent jurist would now think of denying, that parliament is sovereign; but they went heartily with Pitt in pronouncing the exercise of the right of taxation in the case of the American colonists to be thoroughly impolitic and inexpedient. No practical difference, therefore, existed upon the important question of the hour. But Pitt's prodigious egoism, stimulated by the mischievous counsels of men of the stamp of Lord Shelburne, prevented the fusion of the only two sections of the Whig party that were at once able, enlightened and disinterested enough to carry on the government efficiently, to check the arbitrary temper of the king, and to command the confidence of the nation. Such an opportunity did not return.

The ministerial policy towards the colonies was defended by Burke with splendid and unanswerable eloquence. He had been returned to the House of Commons for the pocket borough of Wendover, and his first speech (January 27, 1766) was felt to be the rising of a new light. For the space of a quarter of a century, from this time down to 1790, Burke was one of the chief guides and inspirers of a revived Whig party. The " age of small factions " was now succeeded by an age of great prin- ciples, and selfish ties of mere families and persons were trans- formed into a union resting on common conviction and patriotic aims. It was Burke who did more than any one else to give to the Opposition, under the first half of the reign of George III., this stamp of elevation and grandeur. Before leaving office the Rockingham government repealed the Stamp Act; con- firmed the

personal liberty of the subject by forcing on the House of Commons one resolution against general warrants, and another against the seizure of papers; and relieved private houses from the intrusion of officers of excise, by repealing the cider tax. Nothing so good was done in an English parliament for nearly twenty years to come. George Grenville, whom the Rockinghams had displaced, and who was bitterly incensed at their formal reversal of his policy, printed a pamphlet to demon- strate his own wisdom and statesmanship. Burke replied in his Observations on a late Publication on the Present State of the Nation (1769), in which he showed for the first time that he had not only as much knowledge of commerce and finance, and as firm a hand, in dealing with figures as Grenville himself, but also a broad, general and luminous way of conceiving and treating politics, in which neither then nor since has he had any rival among English publicists.

It is one of the perplexing points in Burke's private history to know how he lived during these long years of parliamentary opposition. It is certainly not altogether mere impertinence to ask of a public man how he gets what he lives upon, for inde- pendence of spirit, which is so hard to the man who lays his head on the debtor's pillow, is the prime virtue in such men. Probity in money is assuredly one of the keys to character, though we must be very careful in ascertaining and proportioning all the circumstances. Now, in 1769, Burke bought an estate at Beaconsfield, in the county of Buckingham. It was about 600 acres in extent, was worth some £500 a year, and cost £22,000. People have been asking ever since how the penniless man of

letters was able to raise so large a sum in the first instance, and how he was able to keep up a respectable establishment after- wards. The suspicions of those who are never sorry to disparage the great have been of various kinds. Burke was a gambler, they hint, in Indian stock, like his kinsmen Richard and William, and like Lord Verney , his political patron at Wendover. Perhaps again, his activity on behalf of Indian princes, like the raja of Tanjore, was not disinterested and did not go unrewarded. The answer to all these calumnious innuendoes is to be found in documents and title-deeds of decisive authority, and is simple enough. It is, in short, this. Burke inherited a small property from his elder brother, which he realized. Lord Rockingham advanced him a certain sum (£6000). The remainder, amounting to no less than two-thirds of the purchase-money, was raised on mortgage, and was never paid off during Burke's life. The rest of the story is equally simple, but more painful. Burke made some sort of income out of his 600 acres; he was for a

short time agent for New York, with a salary of £700; he continued to work at the Annual Register down to 1788. But, when all is told, he never made as much as he spent; and in spite of considerable assistance from Lord Rockingham, amounting it is sometimes said to as much as £30,000, Burke, like the younger Pitt, got every year deeper into debt. Pitt's debts were the result of a wasteful indifference to his private affairs. Burke, on the contrary, was assiduous and orderly, and had none of the vices of profusion. But he had that quality which Aristotle places high among the virtues — the noble mean of Magnificence, standing midway between the two extremes of vulgar ostentation and narrow pettiness. He was indifferent to luxury, and sought to make life, not commodious nor soft, but high and dignified in a refined way. He loved art, filled his house with statues and pictures, and extended a generous patronage to the painters. He was a collector of books, and, as Crabbe and less conspicuous men discovered, a helpful friend to their writers. Guests were ever welcome at his board; the opulence of his mind and the fervid copiousness of his talk naturally made the guests of such a man very numerous. Non invideo equidem, miror magis, was Johnson's good-natured remark, when he was taken over his friend's fine house and pleasant gardens. Johnson was of a very different type. There was something in this external dignity which went with Burke's imperious spirit, his spacious imagina- tion, his turn for all things stately and imposing. We may say, if we please, that Johnson had the far truer and loftier dignity of the two; but we have to take such men as Burke with the defects that belong to their qualities. And there was no corrup- tion in Burke's outlay. When the Pitt administration was formed in 1766, he might have had office, and Lord Rockingham wished him to accept it, but he honourably took his fate with the party. He may have spent £3000 a year, where he would have been more prudent to spend only £2000. But nobody was wronged; his creditors were all paid in time, and his hands were at least clean of traffic in reversions, clerkships, tellerships and all the rest of the rich sinecures which it was thought no shame in those days for the aristocracy of the land and the robe to wrangle for, and gorge themselves upon, with the fierce voracity of famishing wolves. The most we can say is that Burke, like Pitt, was too deeply absorbed in beneficent service in the affairs of his country, to have for his own affairs the solicitude that would have been prudent.

In the midst of intense political preoccupations, Burke always found time to keep up his intimacy with the brilliant group of his earlier friends. He was one of the commanding figures at the club at the Turk's Head, with Reynolds and Garrick, Goldsmith and Johnson.

The old sage who held that the first Whig was the Devil, was yet compelled to forgive Burke's politics for the sake of his magnificent gifts. " I would not talk to him of the Rock- ingham party," he used to say, " but I love his knowledge, his genius, his diffusion and affluence of conversation." And everybody knows Johnson's vivid account of him: " Burke, Sir, is such a man that if you met him for the first time in the street, where you were stopped by a drove of oxen, and you and he stepped aside to take shelter but for five minutes, he'd talk

to you in such a manner that when you parted you would say, 'This is an extraordinary man.' " They all grieved that public business should draw to party what was meant for mankind. They deplored that the nice and difficult test of answering Berkeley had not been undertaken, as was once intended, by Burke, and sighed to think what an admirable display of subtlety and brilliance such a contention would have afforded them, had not politics " turned him from active philosophy aside." There was no jealousy in this. They did not grudge Burke being the first man in the House of Commons, for they admitted that he would have been the first man anywhere.

With all his hatred for the book-man in politics, Burke owed much of his own distinction to that generous richness and breadth of judgment which had been ripened in him by literature and his practice in it. He showed that books are a better prepara- tion for statesmanship than early training in the subordinate posts and among the permanent officials of a public department. There is no copiousness of literary reference in his work, such as over-abounded in the civil and ecclesiastical publicists of the 17 th century. Nor can we truly say that there is much, though there is certainly some, of that tact which literature is alleged to confer on those who approach it in a just spirit and with the true gift. The influence of literature on Burke lay partly in the direction of emancipation from the mechanical formulae of practical politics; partly in the association which it engendered, in a powerful understanding like his, between politics and the moral forces of the world, and between political maxims and the old and great sentences of morals; partly in drawing him, even when resting his case on prudence and expediency, to appeal to the widest and highest sympathies; partly, and more than all, in opening his thoughts to the many conditions, possibilities and " varieties of untried being," in human character and situation, and

so giving an incomparable flexibility to his methods of political approach.

This flexibility is not to be found in his manner of composition. That derives its immense power from other sources; from passion, intensity, imagination, size, truth, cogency of logical reason. Those who insist on charm, on winningness in style, on subtle harmonies and fine exquisiteness of suggestion, are dis- appointed in Burke: they even find him stiff and over-coloured. And there are blemishes of this kind. His banter is nearly always ungainly, his wit blunt, as Johnson said, and often unseasonable. As is usual with a man who has not true humour, Burke is also without true pathos. The thought of wrong or misery moved him less to pity for the victim than to anger against the cause. Again, there are some gratuitous and unredeemed vulgarities; some images that make us shudder. But only a literary fop can be detained by specks like these.

The varieties of Burke's literary or rhetorical method are very striking. It is almost incredible that the superb imaginative amplification of the description of Hyder Ali's descent upon the Carnatic should be from the same pen as the grave, simple, un-adorned Address to the King (1777), where each sentence falls on the ear with the accent of some golden-tongued oracle of the wise gods. His stride is the stride of a giant, from the sentimental beauty of the picture of Marie Antoinette at Versailles, or the red horror of the tale of Debi Sing in Rungpore, to the learning, positiveness and cool judicial mastery of the Report on the Lords' Journals (1794), which Philip Francis, no mean judge, declared on the whole to be the " most eminent and extraordinary " of all his productions. But even in the coolest and driest of his pieces there is the mark of greatness, of grasp, of comprehension. In all its varieties Burke's style is noble, earnest, deep-flowing, because his sentiment was lofty and fervid, and went with sincerity and ardent disciplined travail of judgment. He had the style of his subjects; the amplitude, the weigh tiness, the laboriousness, the sense, the high flight, the grandeur, proper to a man dealing with imperial themes, with the fortunes of great societies, with the sacredness of law, the freedom of nations, the justice of rulers. Burke will always be read with delight and edification, because in the midst of discussions on the local and the accidental, he scatters apophthegms that take us into

the regions of lasting wisdom. In the midst of the torrent of his most strenuous and passionate deliverances, he suddenly rises aloof from his immediate subject, and in all tranquillity reminds us of some permanent relation of things, some enduring truth of human life or

human society. We do not hear the organ tones of Milton, for faith and freedom had other notes in the 18th century. There is none of the complacent and wise-browed sagacity of Bacon, for Burke's were days of personal strife and fire and civil division. We are not exhilarated by the cheerful- ness, the polish, the fine manners of Bolingbroke, for Burke had an anxious conscience, and was earnest and intent that the good should triumph. And yet Burke is among the greatest of those who have wrought marvels in the prose of our English tongue.

Not all the transactions in which Burke was a combatant could furnish an imperial theme. We need not tell over again the story of Wilkes and the Middlesex election. The Rocking- ham ministry had been succeeded by a composite government, of which it was intended that Pitt, now made Lord Chatham and privy seal, should be the real chief. Chatham's health and mind fell into disorder almost immediately after the ministry had been formed. The duke of Grafton was its nominal head, but party ties had been broken, the political connexions of the ministers were dissolved, and, in truth, the king was now at last a king indeed, Who not only reigned but governed. The revival of high doctrines of prerogative in the crown was accompanied by a revival of high doctrines of privilege in the House of Commons, and the ministry was so smitten with weakness and confusion as to be unable to resist the current of arbitrary policy, and not many of them were even willing to resist it. The unconstitutional prosecution of Wilkes was followed by the fatal recourse to new plans for raising taxes in the American colonies; These two points made the rallying ground of the new Whig opposition. Burke helped to smooth matters for a practical union between the Rockingham party and the powerful trium- virate, composed of Chatham, whose understanding had recovered from its late disorder, and of his brothers-in-law, Lord Temple and' George Grenville. He was active in urging petitions from the freeholders of the counties, protesting against the uncon- stitutional invasion of the right of election. And he added a durable masterpiece to political literature in a pamphlet which he called Thoughts on the Cause of the Present Discontents (1770). The immediate object of this excellent piece was to hold up the court scheme of weak, divided and dependent administrations in the light of its real purpose and design; to describe the distempers which had been engendered in parliament by the growth of royal influence and the faction of the king's friends; to show that the newly formed Whig party had combined for truly public ends, and was no mere family knot like the Grenvilles and the Bedfords; and, finally, to press for the hearty concur- rence both of

public men and of the nation at large in combining against " a faction ruling by the private instructions of a court against the general sense of the people." The pamphlet was disliked by Chatham on the one hand, on no reasonable grounds that we can discover; it was denounced by the extreme popular party of the Bill of Rights, on the other hand, for its modera- tion and conservatism. In truth, there is as strong a vein of conservative feeling in the pamphlet of 1770 as in the more resplendent pamphlet of 1790. "Our constitution," he said, " stands on a nice equipoise, with steep precipices and deep waters upon all sides of it. In removing it from a dangerous leaning towards one side, there may be a risk of oversetting it on the other. Every project of a material change in a government so complicated as ours is a matter full of difficulties; in which a considerate man will not be too ready to decide, a prudent man too ready to undertake, or an honest man too ready to promise." Neither now nor ever had Burke any other real conception of a polity for England than government by the territorial aristocracy in the interests of the nation at large, and especially in the interests of commerce, to the vital importance of which in our economy he was always keenly and wisely alive. The policy of George III., and the support which it found among

men who were weaTy of Whig factions,, disturbed this scheme, and therefore Burke denounced both the court policy and the court party with all his heart and all his strength.

Eloquence and good sense, however, were impotent in the face of such forces as were at this time arrayed against a govern- ment at once strong and liberal. The court was confident that a union between Chatham and the Rockinghams was impossible. The union was in fact hindered by the waywardness and the absurd pretences of Chatham, and the want of force in Lord Rockingham. In the nation at large, the late violent ferment had been followed by' as remarkable a deadness and vapidity, and Burke himself had to admit a year or two later that any remarkable robbery at Hounslow Heath would make more conversation than all the disturbances of America. The duke of Grafton went out, and Lord North became the head of a government, which lasted twelve years (1770-1782), and brought about more than all the disasters that Burke had foretold as the inevitable issue of the royal policy. For the first six years of this lamentable period Burke was actively employed in stimulating,

informing and guiding the patrician chiefs of his party. " Indeed, Burke," said the duke of Richmond, " you have more merit than any man in keeping us tdgether." They were well-meaning and patriotic men,but it was not always easy to get them to prefer politics to fox-hunting. When he reached his lodgings at night after a day in the city or a skirmish in the House of Commons, Burke used to find a note from the duke of Richmond or the marquess of Rockingham, praying him to draw a protest to be entered on the Journals of the Lords, and in fact he drew all the principal protests of his party between 1767 anci. 1782. The accession of Charles James Fox to the Whig party, which took place at this time, and was so important an event in its history, was mainly due to the teaching and influence of Burke. In the House of Commons his industry was almost excessive. He was taxed with speaking too often, and with being too forward. And he was mortified by a more serious charge than murmurs about superfluity of zeal. Men said and said again that he was Junius. His very proper unwillingness to stoop to deny an accusation, that would have been so dis- graceful if it had been true, made ill-natured and silly people the more convinced that it was not wholly false. But whatever the London world may have thought of him, Burke's energy and devotion of character impressed the better minds in the country. In 1774 he received the great distinction of being chosen as one of its representatives by Bristol, then the second town in the kingdom.

In the events which ended in the emancipation of the American colonies from the monarchy, Burke's political genius shone with an effulgence that was worthy of the great affairs over which it shed so magnificent an illumination. His speeches are almost the one monument of the struggle on which a lover of English greatness can look back with pride and a sense of worthiness, such as a churchman feels when he reads Bossuet, or an Anglican when he turns over the pages of Taylor or of Hooker. Burke's attitude in these high transactions is really more impressive than Chatham's, because he was far less theatrical than Chatham; and while he was no less nobly passionate for freedom and justice, in his passion was fused the most strenuous political argumenta- tion and sterling reason of state. On the other hand he was wholly free from that quality which he ascribed to Lord George Sackville, a man " apt to take a sort of undecided, equivocal, narrow ground, that evades the substantial merits of the question, and puts the whole upon some temporary, local, accidental or personal consideration." He rose to the full height of that great argument. Burke here and everywhere else displayed the rare art of filling his subject With generalities, and yet never intruding commonplaces. No publicist who deals as largely in

general propositions has ever been as free from truisms ; no one has ever treated great themes with so much elevation, and yet been so wholly secured against the pitfalls of emptiness and the vague. And it is instructive to compare the foundation of all his pleas for the colonists with that on which they erected their own theo- retic declaration of independence. The American leaders were

impregnated with the metaphysical ideas of rights which had come to them from the rising revolutionary school in France. Burke no more adopted the doctrines of Jefferson in 1776 than he adopted the doctrines of Robespierre in 1793. He says nothing about men being born free and equal, and on the other hand he never denies the position of the court and the country at large, that the home legislature, being sovereign, had the right to tax the colonies. What he does say is that the exercise of such a right was not practicable; that if it were practicable, it was inexpedient; and that, even if this had not been in- expedient, yet, after the colonies had taken to arms, to crush their resistance by military force would not be more disastrous to them than it would be unfortunate for the ancient liberties of Great Britain. Into abstract discussion he would not enter. " Show the thing you contend for to be reason; show it to be common sense; show it to be the means of attaining some useful end." "The question with me is not 'whether you have a right to render your people miserable, but whether it is not your interest to make them happy." There is no difference in social spirit and doctrine between his protests against the maxims of the English common people as to the colonists, and his protests against the maxims of the French common people as to the court and the nobles; and it is impossible to find a single principle either asserted or implied in the speeches on the American revolution which was afterwards repudiated in the writings on the revolution in France.*

It is one of the signs of Burke's singular and varied eminence that hardly any two people agree precisely which of his works to mark as the masterpiece. Every speech or tract that he composed on a great subject becomes, as we read it, the rival of every other. But the Speech on Conciliation (1775) has, perhaps, been more universally admired than any of his other productions, partly because its maxims are of a simpler and less disputable kind than those which adorn the pieces on France; and partly because it is most strongly characterized by that deep ethical quality which is the prime secret of Burke's great style and literary mastery. In this speech, moreover, and in the only less powerful one of the preceding year upon American taxation, as well as in the Letter to the Sheriffs of Bristol in 1777, we see the all-important truth conspicuously illustrated that

half of his eloquence always comes of the thoroughness with which he gets up his case. No eminent man has ever done more than Burke to justify the definition of genius as the consumma- tion of the faculty of taking pains. Labour incessant and intense, if it was not the source, was at least an inseparable condition of his power. And magnificent rhetorician though he was, his labour was given less to his diction than to the facts; his heart was less in the form than the matter. It is true that his manuscripts were blotted and smeared, and that he made so many alterations in the proofs that the printer found it worth while to have the whole set up in type afresh. But there is no polish in his style, as in that of Junius for example, though there is something a thousand times better than polish. " Why will you not allow yourself to be persuaded," said Francis after reading the Reflections," that polish is material to preservation ?" Burke always accepted the rebuke, and flung himself into vindication of the sense, substance and veracity of what he had written. His writing is magnificent, because he knew so much, thought so comprehensively, and felt so strongly.

The succession of failures in America, culminating in Corn- wallis's surrender at Yorktown in October 1781, wearied the nation, and at length the persistent and powerful attacks of the opposition began to tell. "At this time," wrote Burke, in words of manly self-assertion, thirteen years afterwards, " having a momentary lead (1 780-1 782), so aided and so encouraged, and as a feeble instrument in a mighty hand— I do not say I saved my country^-I am sure I did my country important service. There were few indeed at that time that did not acknowledge it. It was but one voice, that no man in the kingdom better deserved an honourable provision should be made for him." In the spring of 1782 Lord North resigned. It seemed as if the court system which Burke had been denouncing

for a dozen years was now finally broken, and as if the party which he had been the chief instrument in instructing, directing and keeping together must now inevitably possess power for many years to come. Yet in a few months the whole fabric had fallen, and the Whigs were thrown into opposition for the rest of the century. The story cannot be omitted in the most summary account of Burke's life. Lord Rockingham came into office on the fall of North. Burke was rewarded for services beyond price by being made paymaster of the forces, with the rank of a privy councillor. He had lost his seat for

Bristol two years before, in consequence of his courageous advocacy of a measure of tolerance for the Catholics, and his still more courageous exposure of the enormities of the commercial policy of England towards Ireland. He sat during the rest of his parliamentary life (to 1794) for Mai ton, a pocket borough first of Lord Rockingham's, then of Lord Fitzwilliam's. Burke's first tenure of office was very brief. He had brought forward in 1780 a comprehensive scheme of economical reform, with the design of limiting the resources of jobbery and corruption which the crown was able to use to strengthen its own sinister influence in parliament. Administrative reform was, next to peace with the colonies, the part of the scheme of the new ministry to which the king most warmly objected. It was carried out with greater modera- tion than had been foreshadowed in opposition. But at any rate Burke's own office was not spared. While Charles Fox's father was at the pay-office (1765-1778) he realized as the interest of the cash balances which he was allowed to retain in his hands, nearly a quarter of a million of money. When Burke came to this post the salary was settled at £4000 a year. He did not enjoy the income long. In July 1782 Lord Rockingham died; Lord Shelburne took his place; Fox, who inherited from his father a belief in Lord Shelburne's duplicity, which his own experience of him as a colleague during the last three months had made stronger, declined to serve under him. Burke, though he had not encouraged Fox to take this step, still with his usual loyalty followed him out of office. This may have been a proper thing to do if their distrust of Shelburne was incurable, but the next step, coalition with Lord North against him, was not only a political blunder, but a shock to party morality, which brought speedy retribution. Either they had been wrong, and violently wrong, for a dozen years, or else Lord North was the guiltiest political instrument since Strafford. Burke attempted to defend the alliance on the ground of the substantial agreement between Fox and North in public aims. The defence is wholly untenable. The Rockingham Whigs were as substantially in agreement on public affairs with the Shelburne Whigs as they were with Lord North. The movement was one of the worst in the history of English party. It served its immediate purpose, however, for Lord Shelburne found himself (February 24, 1783) too weak to carry on the government, and was succeeded by the members of the coalition, with the duke of Portland for prime minister (April 2, 1783). Burke went back to his old post at the pay-office and was soon engaged in framing and drawing the famous India Bill. This was long supposed to be the work of Fox, who was politically responsible for it. We may be sure that neither he nor Burke would have devised any government for India which they did not honestly believe to be

for the advantage both of that country and of England. But it cannot be disguised that Burke had thoroughly persuaded himself that it was indispens- able in the interests of English freedom to strengthen the party hostile to the court. As we have already said, dread of the peril to the constitution from the new aims of George III. was the main inspiration of Burke's political action in home affairs for the best part of his political life. The India Bill strengthened the anti- court party by transferring the government of India to seven persons named in the bill, and neither appointed nor removable by the crown. In other words, the bill gave the government to a board chosen directly by the House of Commons; and it had the incidental advantage of conferring on the ministerial party patronage valued at £300,000 a year, which would remain for a fixed term of years out of reach of the king. In a word, judging the India Bill from a party point of view, we see that Burke was

now completing the aim of his project of economic reform. That measure had weakened the influence of the crown by limiting its patronage. The measure for India weakened the influence of the crown by giving a mass of patronage to the party which the king hated. But this was not to be. The India Bill was thrown out by means of a royal intrigue in the Lords, and the ministers were instantly dismissed (December 18, 1783). Young William Pitt, then only in his twenty-fifth year, had been chancellor of the exchequer in Lord Shelburne's short ministry, and had refused to enter the coalition government from an honourable repugnance to join Lord North. He was now made prime minister. The country in the election of the next year ratified the king's judgment against the Portland combination; and the hopes which Burke had cherished for a political lifetime were irretrievably ruined.

The six years that followed the great rout of the orthodox Whigs were years of repose for the country, but it was now that Burke engaged in the most laborious and formidable enterprise of his life, the impeachment of Warren Hastings for high crimes and misdemeanours in his government of India. His interest in that country was of old date. It arose partly from the fact of William Burke's residence there, partly from his friendship with Philip Francis, but most of all, we suspect, from the effect which he observed Indian influence to have in demoralizing the House .of Commons. " Take my advice for once in your life," Francis wrote to Shee; " lay aside 40,000 rupees for a seat in parliament: in this country that alone makes all the differ- ence between somebody and nobody." The relations, moreover, between the East India Company and the government were of the most important kind, and occupied

Burke's closest attention from the beginning of the American war down to his own India Bill and that of Pitt and Dundas. In February 1 785 he delivered one of the most famous of all his speeches, that on the nabob of Arcot's debts. The real point of this superb declamation was Burke's conviction that ministers supported the claims of the fraudulent creditors in order to secure the corrupt advantages of a sinister parliamentary interest. His proceedings against Hastings had a deeper spring. The story of Hastings's crimes, as Macaulay says, made the blood of Burke boil in his veins. He had a native abhorrence of cruelty, of injustice, of disorder, of oppression, of tyranny, and all these things in all their degrees marked Hastings's course in India. They were, moreover, concentrated in individual cases, which exercised Burke's passionate imagination to its profoundest depths, and raised it to such a glow of fiery intensity as has never been rivalled in our history. For it endured for fourteen years, and was just as burning and as terrible when Hastings was acquitted in 1795, as in the select committee of 1781 when Hastings's enormities were first revealed. " If I were to call for a reward," wrote Burke, " it would be for the services in which for fourteen years, without intermission, I showed the most industry and had the least success, I mean in the affairs of India; they are those on which I value myself the most; most for the importance; most for the labour; most for the judgment; most for constancy and perseverance in the pursuit." Sheridan's speech in the House of Commons upon the charge relative to the begums of Oude probably excelled anything that Burke achieved, as a dazzling performance abounding in the most surprising literary and rhetorical effects. But neither Sheridan nor Fox was capable of that sustained and overflowing indignation at outraged justice and oppressed humanity, that consuming moral fire, which burst forth again and again from the chief manager of the impeachment, with such scorching might as drove even the cool and intrepid Hastings beyond all self-control, and made him cry out with protests and exclamations like a criminal writhing under the scourge. Burke, no doubt, in the course of that unparalleled trial showed some prejudice; made some minor overstatements of his case; used many intemperances; and suffered himself to be provoked into expressions of heat and impatience by the cabals of the defendant and his party, and the intolerable incompetence of the tribunal. It is one of the inscrut- able perplexities of human affairs, that in the logic of practical

life, in order to reach conclusions that cover enough for truth, we are constantly driven to premises that cover too much, and that in order to secure their right weight to justice and reason good men are forced to fling the two-edged sword of passion into the same scale. But these excuses were mere trifles, and well deserve to be forgiven, when we think that though the offender was in form acquitted, yet Burke succeeded in these fourteen years of laborious effort in laying the foundations once for all of a moral, just, philanthropic and responsible public opinion in England with reference to India, and in doing so performed perhaps the most magnificent service that any statesman has ever had it in his power to render to humanity.

Burke's first decisive step against Hastings was a motion for papers in the spring of 1786; the thanks of the House of Commons to the managers of the impeachment were voted in the summer of 1794. But in those eight years some of the most astonishing events in history had changed the political face of Europe. Burke was more than sixty years old when the states-general met at Versailles in the spring of 1789. He had taken a prominent part on the side of freedom in the revolution which stripped England of her empire in the West. He had taken a prominent part on the side of justice, humanity and order in dealing with the revolution which had brought to England new empire in the East. The same vehement passion for freedom, justice, humanity and order was roused in him at a very early stage of .the third great revolution in his history— the revolution which overthrew the old monarchy in France. From the first Burke looked on the events of 1789 with doubt and misgiving. He had been in France in 1 773, where he had not only the famous vision of Marie Antoinette at Versailles, " glittering like the morning star, full of life, and splendour and joy," but had also supped and discussed with some of the destroyers, the encyclo- paedists, " the sophisters, economists and calculators." His first speech on his return to England was a warning (March 17, 1773) that the props of good government were beginning to fail under the systematic attacks of unbelievers, and that principles were being propagated that would not leave to civil society any stability. The apprehension never died out in his mind; and when he knew that the principles and abstractions, the un-English dialect and destructive dialectic, of his

The scene grew still more sinister in his eyes after the march of the mob from Paris to Versailles in October, and the violent transport of the king and queen from Versailles to Paris. The same hatred of lawlessness and violence which fired him with a divine rage against the Indian malefactors was aroused by the violence and lawlessness of the Parisian insurgents. The same disgust for abstractions and

naked doctrines of right that had stirred him against the pretensions of the British parliament in 1774 and 1776, was revived in as lively a degree by political conceptions which he judged to be identical in the French assembly of 1789. And this anger and disgust were exasperated by the dread with which certain proceedings in England had inspired him, that the aims, principles, methods and language which he so misdoubted or abhorred in France were likely to infect the people of Great Britain.

In November 1790 the town, which had long been eagerly expecting a manifesto from Burke's pen, was electrified by the Reflections on the Revolution in France, and on the proceedings in certain societies in London relative to that event. The generous Windham made an entry in his diary of his reception of the new book. " What shall be said," he added, " of the state of things, when it is remembered that the writer is a man decried, persecuted and proscribed; not being much valued even by his own party, and by half the nation considered as little better than an ingenious madman?" But the writer now ceased to be decried, persecuted and proscribed, and his book was seized as the expression of that new current of opinion in Europe which the more recent events of the Revolution had slowly set

flowing. Its vogue was instant and enormous. Eleven editions were exhausted in little more than a year, and there is probably not much exaggeration in the estimate that 30,000 copies were sold before Burke's death seven years afterwards. George III. was extravagantly delighted; Stanislaus of Poland sent Burke words of thanks and high glorification and a gold medal. Catherine of Russia, the friend of Voltaire and the benefactress of Diderot, sent her congratulations to the man who denounced French philosophers as miscreants and wretches. " One wonders," Romilly said, by and by, " that Burke is not ashamed at such success." Mackintosh replied to him temperately in the Vindiciae GalMcae, and Thomas Paine replied to him less temperately but far more trenchantly and more shrewdly in the Rights of Man. Arthur Young, with whom he had corresponded years before on the mysteries of deep ploughing and fattening hogs, added a cogent polemical chapter to that ever admirable work, in which he showed that he knew as much more than Burke about the old system of France as he knew more than Burke about soils and roots. Philip Francis, to whom he had shown the proof-sheets, had tried to dissuade Burke from pub- lishing his performance. The passage about Marie Antoinette, which has since become a stock piece in books of recitation, seemed to Francis a mere piece of foppery; for was she not a Messalina and a jade? " I know nothing of your story of Messalitta," answered Burke; " am I obliged to prove judicially the

virtues of all those I shall see suffering every kind of wrong and contumely and risk of life, before I endeavour to interest others in their sufferings? . . . Are not high rank, great splendour of descent, great personal elegance and outward accomplishments ingredients of moment in forming the interest we take in the misfortunes of men? ... I tell you again that the recollection of the manner in which I saw the queen of France in 1774, and the contrast between that brilliancy, splendour and beauty, with the prostrate homage of a nation to her, and the abominable scene of 1789 which I was describing, did draw tears from me and wetted my paper. These tears came again into my eyes almost as often as I looked at the description, — they may again. You do not believe this fact, nor that these are my real feelings; but that the whole is affected, or as you express it, downright foppery. My friend, I tell you it is truth; and that it is true and will be truth when you and I are no more; and will exist as long as men with their natural feelings shall exist " (Corr. iii. 139).

Burke's conservatism was, as such a passage as this may illustrate, the result partly of strong imaginative associations clustering round the more imposing symbols of social continuity, partly of a sort of corresponding conviction in his reason that there are certain permanent elements of human nature out of which the European order had risen and which that order satisfied, and of whose immense merits, as of its mighty strength, the revolutionary party in France were most fatally ignorant. When Romilly saw Diderot in 1783, the great encyclopaedic chief assured him that submission to kings and belief in God would be at an end all over the world in a very few years. When Condorcet described the Tenth Epoch in the long development of human progress, he was sure not only that fulness of light and perfection of happiness would come to the sons of men, but that they were coming with all speed. Only those who know the incredible rashness of the revolutionary doctrine in the mouths of its most powerful professors at that time; only those who know their absorption in ends and their inconsiderateness about means, can feel how profoundly right Burke was in all this part of his contention. Napoleon, who had begun life as a disciple of Rousseau, confirmed the wisdom of the philosophy of Burke when he came to make the Concordat. That measure was in one sense the outcome of a mere sinister expediency, but that such a measure was expedient at all sufficed to prove that Burke's view of the present possibilities of social change was right, and the view of the Rousseauites and too sanguine Perfectibilitarians wrong. As we have seen, Burke's very first Diece, the satire on Bolingbroke, sprang from his conviction that merely rationalistic or destructive criticism, applied to the vast

in the social union, is either mischievous or futile, and mischievous exactly in proportion as it is not futile.

To discuss Burke's writings on the Revolution would be to write first a volume upon the abstract theory of society, and then a second volume on the history of France. But we may make one or two, further remarks. One of the most common charges against Burke was that he allowed his imagination and pity to be touched only by the sorrows of kings and queens, and forgot the thousands of oppressed and famine-stricken toilers of the land. " No tears are shed for nations," cried Francis, whose sympathy for the Revolution was as passionate as Burke's execration of it. " When the provinces are scourged to the bone by a mercenary and merciless military power, and every drop of its blood and substance extorted from it by the edicts of a royal council, the case seems very tolerable to those who are not involved in it. When thousands after thousands are dragooned out of their country for the sake of their religion, or sent to row in the galleys for selling salt against law, — when the liberty of every individual is at the mercy of every prostitute, pimp or parasite that has access to power or any of its basest substitutes, — my mind, I own, is not at once prepared to be satisfied with gentle palliatives for such disorders " {Francis to Burke, November 3, 1790). This is a very terse way of putting a crucial objection to Burke's whole view of French affairs in 1789. His answer was tolerably simple. The Revolution, though it had made an end of the Bastille, did not bring the only real practical liberty, that is to say, the liberty which comes with settled courts of justice, administering settled laws, un- disturbed by popular fury, independent of everything but law, and with a clear law for their direction. The people, he contended, were no worse off under the old monarchy than they will be in the long run under assemblies that are bound by the necessity of feeding one part of the community at the grievous charge of other parts, as necessitous as those who are so fed; that are obliged to flatter those who have their lives at their disposal by tolerating acts of doubtful influence on commerce and agriculture, and for the sake of precarious relief to sow the seeds of lasting want; that will be driven to be the instruments of the violence of others from a sense of their own weakness, and, by want of authority to assess equal and proportioned charges upon all, will be compelled to

lay a strong hand upon the possessions of a part. As against the moderate section of the Constituent Assembly this was just.

One secret of Burke's views of the Revolution was the contempt which he had conceived for the popular leaders in the earlier stages of the movement. In spite of much excellence of intention, much heroism, much energy, it is hardly to be denied that the leaders whom that movement brought to the surface were almost without exqeption men of the poorest political capacity. Danton, no doubt, was abler than most of the others, yet the timidity or temerity with which he allowed himself to be vanquished by Robespierre showed that even he was not a man of commanding quality. The spectacle of men so rash, and so incapable of controlling the forces which they seemed to have presumptuously summoned, excited in Burke both indignation and contempt. And the leaders of the Constituent who came first on the stage, and hoped to make a revolution with rose-water, and hardly realized any more than Burke did how rotten was the structure which they had undertaken to build up, almost deserved his contempt, even if, as is certainly true, they did not deserve his indignation. It was only by revolutionary methods, which are in their essence and for a time as arbitrary as despotic methods, that the knot could be cut. Burke's vital error was his inability to see that a root and branch revolution was, under the conditions, inevitable. His cardinal position, from which he deduced so many important conclusions, namely, that, the parts and organs of the old constitution of France were sound, and only needed moderate invigoration, is absolutely mistaken and untenable. There was not a single chamber in the old fabric that was not crumbling and tottering. The court was frivolous, vacillating, stone deaf and stone blind; the gentry were amiable, but distinctly bent to the very last on holding to their privileges,

and they were wholly devoid both of the political experience that only comes of practical responsibility for public affairs, and of the political sagacity that only comes of political experience. The parliaments or tribunals were nests of faction and of the deepest social incompetence. The very sword of the state broke short in the king's hand. If the king or queen could either have had the political genius of Frederick the Great, or could have had the good fortune to find a minister with that genius, and the good sense and good faith to trust and stand by him against mobs of aristocrats and mobs of democrats; if the army had been sound and the states-general had been convoked at Botirges or Tours instead of at Paris, then the type of French monarchy and French society might have been modernized without con- vulsion. But none of these conditions existed.

When he dealt with the affairs of India Burke passed over the circumstances of our acquisition of power in that continent. " There is a sacred veil to be drawn over the beginnings of all government," he said. " The first step to empire is revolution, by which power is conferred; the next is good laws, good order, good institutions, to give that power stability." Exactly on this broad principle of political force, revolution was the first step to the assumption by the people of France of ■ their own government. Granted that the Revolution was inevitable and indispensable, how was the nation to make the best of it ? And how were surrounding nations to make the best of it ? This was the true point of view. But Burke never placed himself at such a point. He never conceded the postulate, because, though he knew France better than anybody in England except Arthur Young, he did not know her condition well enough. "Alas!" he said, "they little know how many a weary step is to be taken before they can form themselves into a mass which has a true political personality."

Burke's view of French affairs, however consistent with all his former political conceptions, put an end to more than one of his old political friendships. He had never been popular in the House of Commons, and the vehemence, sometimes amount- ing to fury, which he had shown in the debates on the India Bill, on the regency, on the impeachment of Hastings, had made him unpopular even among men on his own side. In May 1 789— that memorable month of May in which the states-general marched in impressive array to hear a sermon at the church of Notre Dame at Versailles — a vote of censure had actually been passed on him in the House of Commons for a too severe expression used against Hastings. Fox, who led the party, and Sheridan, who led Fox, were the intimates of the prince of Wales; and Burke would have been as much out of place in' that circle of gamblers and profligates as Milton would have been out of place in the court of the Restoration. The prince, as somebody said, was like his father in having closets within cabinets and cupboards within closets. When the debates on the regency were at their height we have Burke's word that he was not admitted to the private counsels of the party. Though Fox and he were on friendly terms in society, yet Burke admits that for a considerable period before 1790 there had been between them " distance, coolness and want of confidence, if not total alienation on his part." The younger Whigs had begun to press for shorter parliaments, for the ballot, for redistribution of political power. Burke had never looked with any favour on these projects. His experience of the sentiment of the populace in the two greatest concerns of his life, — American affairs and Indian affairs,— had not been likely to prepossess him in favour

of the popular voice as the voice of superior political wisdom! He did not absolutely object to some remedy in the state of representation (Corr. ii. 387), still he vigorously resisted such proposals as the duke of Richmond's in 1780 for manhood suffrage. The general ground was this: — " The machine itself is well enough to answer any good purpose, provided the materials were sound. But what signifies the arrangement of rottenness ?"

Bad as the parliaments of George III. were, they contained their full share of eminent and capable men; and, what is more, their very defects were the exact counterparts of what we now look back upon as the prevailing stupidity in the Country.

BURKE, EDMUND

833

What Burke valued was good government. His Report on the Causes of the Duration of Mr Hastings's Trial shows how wide and sound were his views of law reform. His Thoughts on Scarcity attest his enlightenment on the central necessities of trade and manufacture, and even furnished arguments to Cobden fifty years afterwards. Pitt's parliaments were competent to discuss, and willing to pass, all measures for which the average political intelligence of the country was ripe. Burke did not believe that altered machinery was at that time needed to improve the quality of legislation. If wiser legislation followed the great reform of 1832, Burke would have said this was because the political intelligence of the country had improved.

Though averse at all times to taking up parliamentary reform, he thought all such projects downright crimes in the agitation of 1791-1792. This was the view taken by Burke, but it was not the view of Fox, nor of Sheridan, nor of Francis, nor of many others of his party, and difference of opinion here was naturally followed by difference of opinion upon affairs in France. Fox, Grey, Windham, Sheridan, Francis, Lord Fitzwilliam, and most of the other Whig leaders, welcomed the Revolution in France. And so did Pitt, too, for some time. " How much the greatest event it is that ever happened in the world," cried Fox, with the exaggeration of a man ready to 'dance the carmagnole, " and how much the best! " The dissension between a man who felt so passionately as Burke, and a man who spoke so impulsively as Charles Fox, lay in the very nature of things. Between Sheridan and Burke there was an open breach in the House of Commons upon the Revolution so early as February 1790, and Sheridan's influence with Fox was strong. This divergence of opinion

destroyed all the elation that Burke might well have felt at his compliments from kings, his gold medals, his twelve editions. But he was too fiercely in earnest in his horror of Jacobinism to allow mere party associations to guide him. In May 1 791 the thundercloud burst, and a public rupture between Burke and Fox took place in the House of Commons.

The scene is famous in English parliamentary annals. The minister had introduced a measure for the division of the province of Canada and for the establishment of a local legislature in each division. Fox in the course of debate went out of his way to laud the Revolution, and to sneer at some of the most effective passages in the Reflections. Burke was not present, but he announced his determination to reply. On the day when the Quebec Bill was to come on again, Fox called upon Burke, and the pair walked together from Burke's house in Duke Street down to Westminster. The Quebec Bill was recommitted, and Burke at once rose and soon began to talk his usual language against the Revolution, the rights of man, and Jacobinism whether English or French. There was a call to order. Fox, who was as sharp and intolerant in the House as he was amiable out of it, interposed with some words of contemptuous irony. Pitt, Grey, Lord Sheffield, all plunged into confused and angry debate as to whether the French Revolution was a good thing, and whether the French Revolution, good or bad, had anything to do with the Quebec Bill. At length Fox, in seconding a motion for confining the debate to its proper subject, burst into the fatal question beyond the subject, taxing Burke with inconsistency, and taunting him with having forgotten that ever-admirable saying of his own about the insurgent colonists, that he did not know how to draw an indictment against a whole nation. Burke replied in tones of firm self repression; complained of the attack that had been made upon him; reviewed Fox's charges of inconsistency; enumerated the points on which they had dis agreed, and remarked that such disagreements had never broken their friendship. But whatever the risk of enmity, and however bitter the loss of friendship, he would never cease from the warning to flee from the French constitution. " But there is no loss of friends," said Fox in an eager undertone. " Yes," said Burke, " there is a loss of friends. I know the penalty of my conduct. I have done my duty at the price of my friend — our iriendship is at an end." Fox rose, but was so overcome that for some moments he could not speak. At length, his eyes streaming with tears, and in a broken voice, he deplored the IV. 27

breach of a twenty years' friendship on a political question. Burke was inexorable. To him the political question was so vivid, so real, so

intense, as to make all personal sentiment no more than dust in the balance. Burke confronted Jacobinism with the relentlessness of a Jacobin. The rupture was never healed, and Fox and he had no relations with one another hence- forth beyond such formal interviews as took place in the manager's box in Westminster Hall in connexion with the impeachment.

A few months afterwards Burke published the Appeal from the New to the Old Whigs, a grave, calm and most cogent vindica- tion of the perfect consistency of his criticisms upon the English Revolution of 1688 and upon the French Revolution of 1789, with the doctrines of the great Whigs who conducted and after- wards defended in Anne's reign the transfer of the crown from James to William and Mary. The Appeal was justly accepted as a satisfactory performance for the purpose with which it was written. Events, however, were doing more than words could do, to confirm the public opinion of Burke's sagacity and foresight. He had always divined by the instinct of hatred that the French moderates must gradually be swept away by the Jacobins, and now it was all coming true. The humiliation of the king and queen after their capture at Varennes; the compulsory accept- ance of the constitution; the plain incompetence of the new Legislative Assembly; the growing violence of the Parisian mob, and the ascendency of the Jacobins at the Common Hall; the fierce day of the 20th of June (1792), when the mob flooded the Tuileries, and the bloodier day of the 10th of August, when the Swiss guard was massacred and the royal family flung into prison; the murders in the prisons in September; the trial and execution of the king in January (1793); the proscription of the Girondins in June, the execution of the queen in October— if we realize the impression likely to be made upon the sober and homely English imagination by such a heightening of horror by horror, we may easily understand how people came to listen to Burke's voice as the voice of inspiration, and to look on his burning anger as the holy fervour of a prophet of the Lord. •

Fox still held to his old opinions as stoutly as he could, and condemned and opposed the war which England had declared against the French republic. Burke, who was profoundly in- capable of the meanness of letting personal estrangement blind his eyes to what was best for the commonwealth, kept hoping against hope that each new trait of excess in France would at length bring the great Whig leader to a better mind. He used to declaim by the hour in the conclaves at Burlington House upon the necessity of securing Fox; upon the strength' which his genius would lend to the administration in its task of grap- pling with the sanguinary giant; upon the impossibility, at

least, of doing either with him or without him. Fox's most important political friends who had long wavered, at length, to Burke's great satisfaction, went over to the side of the govern- ment. In July 1794 the duke of Portland, Lord Fitzwilliam, Windham and Grenville took office under Pitt. Fox was left with a minority which was satirically said not to have been more than enough to fill a hackney coach. " That is a calumny," said one of the party, " we should have filled two." The war was prosecuted with the aid of both the great parliamentary parties of the country, and with the approval of the great bulk of the nation. Perhaps the one man in England who in his heart approved of it less than any other was William Pitt. The difference between Pitt and Burke was nearly as great as that between Burke and Fox. Burke would be content with nothing short of a crusade against France, and war to the death with her rulers. " I cannot persuade myself," he said, " that this war bears any the least resemblance to any that has ever existed in the world. I cannot persuade myself that any examples or any reasonings drawn from other wars and other politics are at all applicable to it " (Corr. iv. 219). Pitt, on the other hand, as Lord Russell truly says, treated Robespierre and Camot as he would have treated any other French rulers, whose ambition was to be resisted, and whose interference in the affairs of other nations was to be checked. And he entered upon the matter

in the spirit of a man of business, by sending ships to seize some islands belonging to France in the West Indies, so as to make certain of repayment of the expenses of the war.

In the summer of 1794 Burke was struck to the ground by a blow to his deepest affection in life, and he never recovered from it. His whole soul was wrapped up in his only son, of whose abilities he had the most extravagant estimate and hope. All the evidence goes to show that Richard Burke was one of the most presumptuous and empty-headed of human beings. " He is the most impudent and opiniative fellow I ever knew," said Wolfe Tone. Gilbert Elliot, a very different man, gives the same account. " Burke," he says, describing a dinner party at Lord Fitzwilliam's in 1793, " has now got such a train after him as would sink anybody but himself: his son, who is quite nauseated by all mankind; his brother, who is liked better than

his son, but is rather oppressive with animal spirits and brogue; and his cousin, William Burke, who is just returned unexpectedly from India, as much ruined as when he went years ago, and who is a fresh charge on any prospects of power Burke may ever have. Mrs Burke has in her train Miss French [Burke's niece], the most perfect She Paddy that ever was caught. Notwithstanding these disadvantages Burke is in himself a sort of power in the state. It is not too much to say that he is a sort of power in Europe, though totally without any of those means or the smallest share in them which give or maintain power in other men." Burke accepted the position of a power in Europe seriously. Though no man was ever more free from anything like the egoism of the intellectual coxcomb, yet he abounded in that active self-confidence and self-assertion which is natural in men who are conscious of great powers, and strenuous in promoting great causes. In the summer of 1791 he despatched his son to Coblenz to give advice to the royalist exiles, then under the direction of Calonne, and to report to him at Beaconsfield their disposition and prospects. Richard Burke was received with many compliments, but of course nothing came of his mission, and the only impression that remains with the reader of his prolix story is his tale of the two royal brothers, who afterwards became Louis XVIII. and Charles X., meeting after some parting, and embracing one another with many tears on board a boat in the middle of the Rhine, while some of the courtiers raised a cry of " Long live the king " — the king who had a few weeks before been carried back in triumph to his capital with Mayor Petion in his coach. When we think of the pass to which things had come in Paris by this time, and of the unappeasable ferment that boiled round the court, there is a certain touch of the ludicrous in the notion of poor Richard Burke writing to Louis XVI. a letter of wise advice how to comport himself.

At the end of the same year, with the approval of his father he started for Ireland as the adviser of the Catholic Association. He made a wretched emissary, and there was no limit to his arrogance, noisiness and indiscretion. The Irish agitators were glad to give him two thousand guineas and to send him home. The mission is associated with a more important thing, his father's Letters to Sir Hercules Langrishe, advocating the admis- sion of the Irish Catholics to the franchise. This short piece abounds richly in maxims of moral and political prudence. And Burke exhibited considerable courage in writing it; for many of its maxims seem to involve a contradiction, first, to the principles on which he withstood the movement in France, and second, to his attitude upon the subject of parliamentary reform. The contradiction is in fact only superficial. Burke was not

the man to fall unawares into a trap of this kind. His defence of Catholic relief — and it had been the conviction of a lifetime — was very properly founded en propositions which were true of Ireland, and were true neither of France nor of the quality of parliamentary representation in England. Yet Burke threw such breadth and generality over all he wrote that even these propositions, relative as they were, form a short manual of statesmanship.

At the close of the session of 1794 the impeachment of Hastings had come to an end, and Burke bade farewell to parliament.

Richard Burke was elected in his father's place at Malton. The king was bent on making the champion of the old order of Europe a peer. His title was to be Lord Beaconsfield, and it was designed to annex to the title an income for three lives. 'The patent was being made ready, when all was arrested by the sudden death of the son who was to Burke more than life. The old man's grief was agonizing and inconsolable. " The storrr has gone over me," he wrote in words which are well known, but which can hardly be repeated too often for any who have an ear for the cadences of noble and pathetic speech, — " The storm has gone over me, and I lie like one of those old oaks which the late hurricane has scattered about me. I am stripped of all my honours; I am torn up by the roots and lie prostrate on the earth. ... I am alone. I have none to meet mj enemies in the gate. ... I live in an inverted order. Thej who ought to have succeeded me have gone before me. They who should have been to me as posterity are in the place of ancestors."

A pension of £2500 was all that Burke could now be persuaded to accept. The duke of Bedford and Lord Lauderdale made some remarks in parliament upon this paltry reward to a man who, in conducting a great trial on the public behalf, had worked harder for nearly ten years 'than any minister in any cabinet of the reign. But it was not yet safe to kick up heels in face of the dying lion. The vileness of such criticism was punished, as it deserved to be, in the Letter to a Noble Lord (1796), in which Burke showed the usual art of all his compositions in shaking aside the insignificances of a subject. He turned mere personal defence and retaliation into an occasion for a lofty enforcement of constitutional principles, and this, too, with a relevancy and pertinence of consummate skilfulness. There was to be one more great effort before the end.

In the spring of 1796 Pitt's constant anxiety for peace had become more earnest than ever. He had found out the instability of the coalition and the power of France. Like the thrifty steward he was,

he saw with growing concern the waste of the national resources and the strain upon commerce, with a public debt swollen to what then seemed the desperate sum of £400,000,000. Burke at the notion of negotiation flamed out in the Letters on a Regicide Peace, in some respects the most splendid of all his compositions. They glow with passion, and yet with all their rapidity is such steadfastness, the fervour of imagination is so skilfully tempered by close and plausible reasoning, and the whole is wrought with such strength and fire, that we hardly know where else to look either in Burke's own writings or elsewhere for such an exhibition of the rhetorical resources of our language. We cannot wonder that the whole nation was stirred to the very depths, or that they strengthened the aversion of the king, of Windham and other important personages in the government against the plans of Pitt. The prudence of their drift must be settled by external considerations. Those who think that the French were likely to show a modera- tion and practical reasonableness in success, such as they had never shown in the hour of imminent ruin, will find Burke's judgment full of error and mischief. Those, on the contrary, who think that the nation which was on the very eve of surrender- ing itself to the Napoleonic absolutism was not in a hopeful humour for peace and the European order, will believe that Burke's protests were as perspicacious as they were powerful, and that anything which chilled the energy of the war was as fatal as he declared it to be.

When the third and most impressive of these astonishing productions came into the hands of the public, the writer was no more. Burke died on the 8th of July 1797. Fox, who with all his faults was never wanting in a fine and generous sensibility, proposed that there should be a public funeral, and that the body should lie among the illustrious dead in Westminster Abbey. Burke, however, had left strict injunctions that his burial should be private; and he was laid in the little church at Beaconsfield. It was the year of Campo Formio. So a black whirl and torment of rapine, violence and fraud was encircling the Western world, as a life went out which, notwithstanding some eccentricities

and some aberrations, had made great tides in human destiny very luminous. (J. Mo.)

Authorities. — Of the Collected Works, there are two main editions — the quarto and the octavo, (i) Quarto, in eight volumes, begun in 1792, under the editorship of Dr F. Lawrence; vols, i.-iii. were

published in 1792; vols, iv.-viii., edited by Dr Walter King, sometime bishop of Rochester, were completed in 1827. (2) Octavo in sixteen volumes. This was begun at Burke's death, also by Drs Lawrence and King; vols, i.-viii. were published in 1803 and reissued in 1808, when Dr Lawrence died; vols, ix.-xii. were published in 1813 and the remaining four vols, in 1827. A new edition of vols, i.-viii. was published in 1823 and the contents of vols, i.-xii. in 2 vols, octavo in 1834. An edition in nine volumes was published in Boston, Massachusetts, in 1839. This contains the whole of the English edition in sixteen volumes, with a reprint of the Account of the European Settlements in America which is not in the English edition.

Among the numerous editions published later may be mentioned that in Bohn's British Classics, published in 1853. This contains the fifth edition of Sir James Prior's life; also an edition in twelve volumes, octavo, published by J. C. Nimmo, 1898. There is an edition of the Select Works of Burke with introduction and notes by E. J. Payne in the Clarendon Press series, new edition, 3 vols., 1897. The Correspondence of Edmund Burke, edited by Earl Fitz- william and Sir R. Bourke, with appendix, detached papers and notes for speeches, was published in 4 vols., 1844. The Speeches of Edmund Burke, in the House of Commons and Westminster Hall, were published in 4 vols., 1816. Other editions of the speeches are those On Irish Affairs, collected and arranged by Matthew Arnold, with a preface (1881), On American Taxation, On Conciliation with America, together with the Letter to the Sheriff of Bristol, edited with introduction and notes by F. G. Selby {1895).

The standard life of Burke is that by Sir James Prior, Memoir of the Life and Character of Edmund Burke with Specimens of his Poetry and Letters (1824). The lives by C. MacCormick (1798) by R. Bisset (1798, 1800) are of little value. Other lives are those by the Rev. George Croly (2 vols., 1847), and by T. MacKnight (3 vols., 1898). Of critical estimates of Burke's life the Edmund Burke of John Morley, " English Men of Letters " series (1879), is an elabora- tion of the above article; see also his Burke, a Historical Study (1867); "Three Essays on Burke," by Sir James Fitzjames Stephen in Horae Sabbaticae, series iii. (1892) ; and Peptographia Dublinensis, Memorial Discourses preached in the Chapel of Trinity College, Dublin, 1895-1902; Edmund Burke, by G. Chadwick, bishop of Derry (1902).

BURKE, SIR JOHN BERNARD (1814-1892), British genea- logist, was born in London, on the 5th of January 1814, and was educated in London and in France. His father, John Burke (1787-1848), was

also a genealogist, and in 1826 issued a Genealogical and Heraldic Dictionary of the Peerage and Baronetage of the United Kingdom. This work, generally known as Burke's Peerage, has been issued annually since 1847. While practising as a barrister Bernard Burke assisted his father in his genealogical work, and in 1848 took control of his publications. In 1853 he was appointed Ulster king-at-arms; in 1854 he was knighted; and in 1855 he became keeper of the state papers in Ireland. After having devoted his life to genealogical studies he died in Dublin on the 12th of December 1892. In addition to editing Burke's Peerage from 1847 to his death, Burke brought out several editions of a companion volume, Burke's Landed Gentry, which was first published between 1833 and 1838. In 1866 and 1883 he published editions of his father's Dictionary of the Peerages of England, Scotland and Ireland, extinct, dormant and in abeyance (earlier editions, 1831,1840, 1846); in 1855 and 1876 editions of his Royal Families of England, Scotland and Wales (1st edition, 1847-1851); and in 1878 and 1883 enlarged editions of his Encyclopaedia of Heraldry, or General Armoury of England, Scotland and Ireland. Burke's own works include The Roll of Battle Abbey (1848); The Romance of the Aristocracy (1855); Vicissitudes of Families (1883 and several earlier editions); and The Rise of Great Families (1882). He was succeeded as editor of Burke's Peerage and Landed Gentry by his fourth son, Ashworth Peter Burke.

BURKE, ROBERT O'HARA (1820-1861), Australian explorer, was born at St Cleram, Co. Galway, Ireland, in 1820. Descended from a branch of the family of Clanricarde, he was educated in Belgium, and at twenty years of age entered the Austrian army, in which he attained, the rank of captain. In 1848 he left the Austrian service, and became a member of the Royal Irish Constabulary. Five years later he emigrated to Tasmania, and

shortly afterwards crossed to Melbourne, where he became an inspector of police. When the Crimean War broke out he went to England in the hope of securing a commission in the army, but peace had meanwhile been signed, and he returned to Victoria and resumed his police duties. At the end of 1857 the Philo- sophical Institute of Victoria took up the question of the ex- ploration of the interior of the Australian continent,and appointed a committee to inquire into and report upon the subject. In September 1858, when it became known that John McDouall Stuart had succeeded in penetrating as far as the centre of Australia, the sum of £1000 was anonymously offered for the promotion of an expedition to cross the continent

from south to north, on condition that a further sum of £2000 should be sub- scribed within a twelvemonth. The amount having been raised within the time specified, the Victorian parliament supplemented it by a vote of £6000, and an expedition was organized under the leadership of Burke, with W. J. Wills as surveyor and astronomical observer. The story of this expedition, which left Melbourne on the 21st of August i860, furnishes perhaps the most painful episode in Australian annals. Ten Europeans and three Sepoys accompanied the expedition, which was soon torn by internal dissensions. Near Menindie on the Darling, Landells, Burke's second in command, became insubordinate and resigned, his example being followed by the doctor — a German. On the nth of November Burke, with Wills and five assistants, fifteen horses and sixteen camels, reached Cooper's Creek in Queensland, where a depot was formed near good grass and abundance of water. Here Burke proposed waiting the arrival of his third officer, Wright, whom he had sent back from Torowoto to Menindie to fetch some camels and supplies. Wright, however, delayed his departure until the 26th of January 1861. Meantime, weary of waiting, Burke, with Wills, King and Gray as companions, determined on the 16th of December to push on across the continent, leaving an assistant named Brahe to take care of the depot until Wright's arrival. On the 4th of February 1861 Burke and his party, worn down by famine, reached the estuary of the Flinders river, not far from the present site of Normantown on the Gulf of Carpentaria. On the 26th of February began their return journey. The party suffered greatly from famine and exposure, and but for the rainy season, thirst would have speedily ended their miseries. In vain they looked for the relief which Wright was to bring them. On the 16th of April Gray died, and the emaciated survivors halted a day to bury his body. That day's delay, as it turned out, cost Burke and Wills their lives; they arrived at Cooper's Creek to find the depot deserted. But a few hours before Brahe, unrelieved by Wright, and thinking that Burke had died or changed his plans, had taken his departure for" the Darling. With such assistance as they could get from the natives, Burke, and his two companions struggled on, until death overtook Burke and Wills at the end of June. King sought the natives, who cared for him until his relief by a search party in September. No one can deny the heroism of the men whose lives were sacrificed in this ill-starred expedition. But it is admitted that the leaders were not bushmen and had had no experience in exploration. Disunion and disobedience to orders, from the highest to the lowest, brought about the worst results, and all that now remains to tell the story of the failure of this vast undertaking is a monument to the memory of the foolhardy

heroes, from the chisel of Charles Summers, erected on a promi- nent site in Melbourne.

*BURKE, WILLIAM (1792-1829), Irish criminal, was born in Ireland in 1792. After trying his*hand at a variety of trades there, he went to Scotland about 181 7 as a navvy, and in 1827 was living in a lodging-house in Edinburgh kept by William Hare, another Irish labourer. Towards the end of that year one of Hare's lodgers, an old army pensioner, died. This was the period of the body-snatchers or Resurrectionists, and Hare and Burke, aware that money could always be obtained for a corpse, sold the body to Dr Robert Knox, a leading Edinburgh anatomist, for £7, 10s. The price obtained and the simplicity of the transaction suggested to Hare an easy method of making a*

profitable livelihood, and Burke at once fell in with the plan. The two men inveigled obscure travellers to Hare's or some other lodging-house, made them drunk and then suffocated them, taking care to leave no marks of violence. The bodies were sold to Dr Knox for prices averaging from £8 to £14. At least fifteen victims had been disposed of in this way when the suspicions of the police were aroused, and Burke and Hare were arrested. The latter turned king's evidence, and Burke was found guilty and hanged at Edinburgh on the 28th of January 1829. Hare found it impossible, in view of the strong popular feeling, to remain in Scotland. He is believed to have died in England under an assumed name. From Burke's method of killing his victims has come the verb " to burke," meaning to suffocate, strangle or suppress secretly, or to kill with the object of selling the body for the purposes of dissection. '

See George Macgregor, History of Burke and Hare and of the Resurrectionist Times (Glasgow, 1884).

BURLAMAQUI, JEAN JACQUES (1694-1748), Swiss publicist, was born at Geneva on the 24th of June 1694. At the age of twenty-five he was designated honorary professor of ethics and the law of nature at the university of Geneva. Before taking up the appointment he travelled through France and England, and made the acquaintance of the most eminent writers of the period. On his return he began his lectures, and soon gained a wide reputation, from the simplicity of his style and the precision of his views. He continued to lecture for

fifteen years, when he was compelled on account of ill-health to resign. His fellow- citizens at once elected him a member of the council of state, and he gained as high a reputation for his practical sagacity as he had for his theoretical knowledge. He died at Geneva on the 3rd of April 1748. His works were Principes du droit naturel (1747), and Principes du droit politique (1751). These have passed through many editions, and were very extensively used as text-books. Burlamaqui's style is simple and clear, and his arrangement of the material good. His fundamental principle may be described as rational utilitarianism, and in many ways it resembles that of Cumberland.

BURLESQUE (Ital. burlesco, from burla, a joke, fun, playful trick), a form of the comic in art, consisting broadly in an imitation of a work of art with the object of exciting laughter, by distortion or exaggeration, by turning, for example, the highly rhetorical into bombast, the pathetic into the mock- sentimental, and especially by a ludicrous contrast between the subject and the style, making gods speak like common men and common men like gods. While parody (q.v.), also based on imitation, relies for its effect more on the close following of the style of its counterpart, burlesque depends on broader and coarser effects. Burlesque may be applied to any form of art, and unconsciously, no doubt, may be found even in architecture. In the graphic arts it takes the form better known as " caricature " (q.v.). Its particular sphere is, however, in literature, and especially in drama. The Batrachomachia, or Battle of the Frogs and Mice, is the earliest example in classical literature, being a travesty of the Homeric epic. There are many true burlesque parts in the comedies of Aristophanes, e.g. the appear- ance of Socrates in the Clouds. The Italian word first appears in the Opere Burlesche of Francesco Berni (1497-1535). In France during part of the reign of Louis XIV., the burlesque attained to great popularity; burlesque Aeneids, Iliads and Odysseys were composed, and even the most sacred subjects were not left untravestied. Of the numerous writers of these, P. Scarron is most prominent, and his VirgUe Travesti (1648- 1653) was followed by numerous imitators. In English literature Chaucer's Rime of Sir Thopas is a burlesque of the long-winded medieval romances. Among the best-known true burlesques in English dramatic literature may be mentioned the 2nd duke of Buckingham's The Rehearsal, a burlesque of the heroic drama; Gay's Beggar's Opera, of the Italian opera; and Sheridan's The Critic. In the later 19th century the name " burlesque " was given to a form of musical dramatic composition in which the true element of burlesque found little or no place. These musical burlesques, with which the Gaiety theatre, London, and the

names of Edward Terry, Fred Leslie and Nellie Farren are particularly connected, developed from the earlier extravaganzas of J. R. Planche, written frequently round fairy tales. The Gaiety type of burlesque has since given place to the " musical comedy," and its only survival is to be found in the modern pantomime.

BURLINGAME, ANSON (1820-1870), American legislator and diplomat, was born in New Berlin, Chenango county, New York, on the 14th of November 1820. In 1823 his parents took him to Ohio, and about ten years afterwards to Michigan. In 1838- 1841 he studied in one of the " branches " of the university of Michigan, and in 1846 graduated at the Harvard law school. He practised law in Boston, and won a wide reputation by his speeches for the Free Soil party in 1848. He was a member of the Massachusetts constitutional convention in 1853, of the state senate in 1853-1854, and of the national House of Representatives from 1855 to 1861, being elected for the first term as a " Know Nothing " and afterwards as a member of the new Republican party, which he helped to organize in Massachusetts. He was an effective debater in the House, and for his impassioned de- nunciation (June 21, 1856) of Preston S. Brooks (1819-1857), for his assault upon Senator Charles Sumner, was challenged by Brooks. Burlingame accepted the challenge and specified rifles as the weapons to be used; his second chose Navy Island, above the Niagara Falls, and in Canada, as the place for the meeting. Brooks, however, refused these conditions, saying that he could not reach the place designated " without running the gauntlet of mobs and assassins, prisons and penitentiaries, bailiffs and constables." To Burlingame's appointment as minister to Austria (March 22, 1861) the Austrian authorities objected because in Congress he had advocated the recognition of Sardinia as a first-class power and had championed Hungarian independ- ence. President Lincoln thereupon appointed him (June 14, 1861) minister to China. This office he held until November 1867, when he resigned and was immediately appointed (November 26) envoy extraordinary and minister plenipotentiary to head a Chinese diplomatic mission to the United States and the principal European nations. The embassy, which included two Chinese ministers, an English and a French secretary, six students from the Tung-wan Kwang at Peking, and a consider- able retinue, arrived in the United States in March 1868, and concluded at Washington (28th of July 1868) a series of articles, supplementary to the Reed Treaty of 1858, and later known as " The Burlingame Treaty." Ratifications of the treaty were not exchanged at Peking until November 23, 1869. The " Burlingame Treaty " recognizes China's right of eminent domain over all her

territory, gives China the right to appoint at ports in the United States consuls, " who shall enjoy the same privileges and immunities as those enjoyed by the consuls of Great Britain and Russia "; provides that " citizens of the United States in China of every religious persuasion and Chinese subjects in the United States shall enjoy entire liberty of con- science and shall be exempt from all disability or persecution on account of their religious faith or worship in either country "; and grants certain privileges to citizens of either country residing in the other, the privilege of naturalization, however, being specifically withheld. After leaving the United States, the embassy visited several continental capitals, but made no definite treaties. Burlingame's speeches did much to awaken interest in, and a more intelligent appreciation of, China's attitude toward the outside world. He died suddenly at St Petersburg, on the 23rd of February 1870.

His son Edward Livermore Burlingame (b. 1848) was educated at Harvard and at Heidelberg, was a member of the editorial staff of the New York Tribune in 1871-1872 and of the American Cyclopaedia in 1872-1876, and in 1886 became the editor of Scribner's Magazine.

BURLINGTON, a city and the county-seat of Des Moines county, Iowa, U.S.A., on the Mississippi river, in the S.E. part of the state. Pop. (1890) 22,565; (1900) 23,201; (1905, state census) 25,318 (4492 foreign-born); (iqio) 24,324. It is served by the Chicago, Burlington & Quincy (which has extensive

construction and repair shops here), the Chicago, Rock Island ' & Pacific, and the Toledo, Peoria & Western (Pennsylvania system) railways; and has an extensive river commerce. The river is spanned here by the Chicago, Burlington & Quincy railway bridge. Many of the residences are on bluffs command- ing beautiful views of river scenery; and good building material has been obtained from the Burlington limestone quarries. Crapo Park, of 100 acres, along the river, is one of the attractions of the city. Among the principal buildings are the county court house, the free public library, the Tama building, the German- American savings bank building and the post office. Burlington has three well-equipped hospitals. Among the city's manu- factures are lumber, furniture, baskets, pearl buttons, cars, carriages and wagons, Corliss engines, waterworks

pumps,metallic burial cases, desks, boxes, crackers, flour, pickles and beer. The factory product in 1905 was valued at $5,779,337, or 29-9% more than in 1900. The first white man to visit the site of Burlington seems to have been Lieutenant Zebulon M. Pike, who came in 1805 and recommended the erection of a fort. The American Fur Company established a post here in 1829 or earlier, but settlement really began in 1833, after the Black Hawk War, and the place had a population of 1200 in 1838, It was laid out as a town and named Flint Hills (a translation of the Indian name, Shokokon) in 1834; but the name was soon changed to Burlington, after the city of that name in Vermont. Burlington was incorporated as a town in 1 83 7 , and was chartered as a city in 1838 by the territory of Wisconsin, the city charter being amended by the territory of Iowa in 1839 and 1841. The territorial legislature of Wisconsin met here from 1836 to 1838 and that of Iowa from 1838 to 1840. In 1837 a newspaper, the Wisconsin Territorial Gazette, now the Burlington Evening Gazette, and in 1839 another, the Burlington Hawk Eye, were founded; the latter became widely known in the years immediately following 1872 from the humorous sketches contributed to it by Robert Jones Burdette (b. 1844), an associate editor, known as the "Burlington Hawk Eye Man," who in 1903 entered the Baptist ministry and became pastor of the Temple Baptist church in Los Angeles, California, and among whose publications are Hawkeyetems (1877), Hawkeyes (1879), and Smiles Yoked with Sighs (1900).

BURLINGTON, a city of Burlington county, New Jersey, U.SA., on the E. bank of the Delaware river, 18 m. N.E. of Philadelphia. Pop. (1890) 7264; (1900) 7392, of whom 636 were foreign-born and 590 were of negro descent; (1905) 8038; (1910) 8336. It is served by the Pennsylvania railway, and by passenger and freight steamboat lines on the Delaware river, connecting with river and Atlantic coast ports. Burlington is a pleasant residential city with a number of interesting old mansions long antedating the War of Independence, some of them the summer homes of old Philadelphia families. The Burlington Society library, established in 1 7 57 and still conducted under its original charter granted by George II., is one of the oldest public libraries in America. At Burlington are St Mary's Hall (1837; Protestant Episcopal), founded by Bishop G.W. Doane, one of the first schools for girls to be established in the country, Van Rensselaer Seminary and the New Jersey State Masonic home. In the old St Mary's church (Protestant Episcopal) , which was built in 1 703 and has been called St Anne's as well as St Mary's, Daniel Coxe (1 674-1 739), first provincial grand master of the lodge of Masons in

America, was buried; a commemorative bronze tablet was erected in 1907. Burlington College, founded by Bishop Doane in 1864, was closed as a college in 1877, but continued as a church school until 1900; the build- ings subsequently passed into the hands of an iron manufacturer. Burlington's principal industries are the manufacture of shoes and cast-iron water and gas pipes. Burlington was settled in 1677 by a colony of English Quakers. The settlement was first, known as New Beverly, but was soon renamed after Bridlington (Burlington), the Yorkshire home of many of the settlers. In 1 682 the assembly of West Jersey gave toBurlington " Matinicunk Island," above the town, " for the maintaining of a school for the education of youth "; revenues from a part of the island

are still used for the support of the public schools, and the trust fund is one of the oldest for educational purposes in the United States. Burlington was incorporated as a town in 1693 (re-incorporated, 1733), and became the seat of government of West Jersey. On the union of East and West Jersey in 1702, it became one of the two seats of government of the new royal province, the meetings of the legislature generally alternating between Burlington and Perth Amboy, undep both the colonial and the state government, until 1790. In 1777 the New Jersey Gazette, the first newspaper in New Jersey, was established here,; it was published (here and later in Trenton) until 1786, and was an influential paper, especially during the War of Independence. Burlington was chartered as a city in

1784- ._"

See Henry Armitt Brown, The Settlement of Burlington (Burlington, 1878) ; George M. Hills, History of the Church in Burlington (Trenton, 1885); an d Mrs A. M. Gummere, Friends in Burlington (Phil- adelphia, 1884).

BURLINGTON, a city, port of entry and the countyrseat of Chittenden county, Vermont, U.S.A., on the E. shore of Lake Champlain, in the N.W. part of the state, 90 m. S.E. of Montreal, and 300 m. N. of New York. It is the largest city in the state. Pop. (1880) 11,365; (1890) 14,590; (1900) 18,640, of whom 3726 were foreign-born; (1910, census) 20,468. It is served by the Central Vermont and the Rutland railways, and by lines of passenger and freight steamboats on Lake Champlain. The city is attractively situated on an arm of Lake Champlain, being built on a strip of land extending about 6 m. south from the mouth of the Winooski river along the lake shore and gradually rising from the water's edge to a height of 275 ft.; its situation and its cool and equable summer

climate have given it a wide reputation as a summer resort, and it is a centre for yachting, canoeing and other aquatic sports. During the winter months it has ice-boat regattas. Burlington is the seat of the university of Vermont (1791; non-sectarian and co-educational), whose official title in 1865 became " The University of Vermont and State Agricultural College." The university is finely situated on a hill (280 ft. above the lake) commanding a charming view of the city, lake, the Adirondacks and the Green Mountains. It has departments of arts, sciences and medicine, and a library of 74,800 volumes and 32,936 pamphlets housed in the Billings Library, designed by H. H. Richardson. The university received the Federal grants under the Morrill acts of 1862 and 1890, and in connexion with it the Vermont agricultural experiment station is maintained. At Burlington are also the Mt St Mary's academy (1889, Roman Catholic), conducted by the Sisters of Mercy; and two business colleges. Among the principal buildings are the city hall, the Chittenden county court house, the Federal and the Y.M.C.A. buildings, the Masonic temple, the Roman Catholic cathedral and the Edmunds high school. Burlington's charitable institutions include the Mary Fletcher hospital, the Adams mission home, the Lousia Howard mission, the Providence orphan asylum, and homes for aged women, friendless women and destitute children. The Fletcher free public library (47,000 volumes in 1908) is housed in a Carnegie building. In the city are two sanitariums. The city has two parks (one, Ethan Allen Park, is on a bluff in the north-west part of the city, and commands a fine view) and four cemeteries; in Green Mount Cemetery, which overlooks the Winooski valley, is a monument over the grave of Ethan Allen, who lived in Burlington from 1778 until his death. Fort Ethan Allen, a United States military post, is about 3 m. east of the city, with which it is connected by an electric line. Burlington is the most important manufacturing centre in the state; among its manufactures are sashes, doors and blinds, boxes, furniture and wooden-ware, cotton and woollen goods, patent medicines, refrigerators, house furnishings, paper and machinery. In 1905 the city's factory products were valued at $6,355,754, three-tenths of which was the value of lumber and planing mill products, including sashes, doors and blinds. The Winooski river, which forms the boundary between Burlington and the townshio of Colchester and which enters Lake Champlain N.W. of the city,

furnishes valuable water-power, but most of the manufactories are

operated by steam. Quantities of marble were formerly taken from quarries in the vicinity. The city is a wholesale distributing centre for all northern Vermont and New Hampshire, and is one of the principal lumber markets in the east, most of the lumber being imported from Canada. It is the port of entry for the Vermont customs district, whose exports and imports were valued respectively in 1907 at $8,333,024 and $5,721,034. A charter for a town to be founded here was granted by the province of New Hampshire in 1763, but no settlement was made until 1774. Burlington was chartered as a city in 1865..

BURMA, a province of British India, including the former kingdom of independent Burma, as well as British Burma, acquired by the British Indian government in the two wars of 1826 and 1852. It is divided into Upper and Lower Burma, the former being the territory annexed on 1st January 1886. The province lies to the east of the Bay of Bengal, and covers a range of country extending from the Pakchan river in o° 55′ north latitude to the Naga and Chingpaw, or Kachin hills, lying roughly between the 27th and 28th degrees of north latitude; and from the Bay of Bengal on the west to the Mekong river, the boundary of the dependent Shan States on the east, that is to say, roughly, between the 92nd and 100th degrees of east longitude. The extreme length from north to south is almost 1200 m., and the broadest part, which is in about latitude 21 north, is 575 m. from east to west. On the N. it is bounded by the dependent state of Manipur, by the Mishmi hills, and by portions of Chinese territory; on the E. by the Chinese Shan States, portions of the province of Yunnan, the French province of Indo-China, and the Siamese Shan, or Lao States and Siam; on the S. by the Siamese Malay States and the Bay of Bengal ; and on the W. by the Bay of Bengal and Chittagong. The coast-line from Taknaf, the mouth of the Naaf, in the Akyab district on the north, to the estuary of the Pakchan at Maliwun on the south, is about 1200 m. The total area of the province is estimated at 238,738 sq. m., of which Burma proper occupies 168, S73 sq. m., the Chin hills 10,250 sq. m., and the Shan States, which comprise the whole of the eastern portion of the province, some 59,915 sq. m.

Natural Divisions. — The province falls into three natural divisions : Arakan with the Chin hills, the Irrawaddy basin, and the old province of Tenasserim, together with the portion of the Shan and Karen-ni states in the basin of the Salween, and part of Kengtung in the western basin of the Mekong. Of these Arakan is a strip of country lying on the seaward slopes of the range of hills known as the Arakan Yornas. It stretches from Cape Negrais on the south to

the Naaf estuary, which divides it from the Chittagong division of Eastern Bengal and Assam on the north, and includes the dis- tricts of Sandoway, Kyaukpyu, Akyab and northern Arakan, an area of some 18,540 sq. m. The northern part of this tract is barren hilly country, but in the west and south are rich alluvial plains containing some of the most fertile lands of the province. Northwards lie the Chin and some part of the Kachin hills. To the east of the Arakan division, and separated from it by the Arakan Yornas, lies the main body of Burma in the basin of the Irrawaddy. This tract falls into four subdivisions. First, there is the highland tract including the hilly country at the sources of the Chindwin and the upper waters of the Lrawaddy, the Upper Chindwin, Katha, Bhamo, Myitkyina and Ruby Mines districts, with the Kachin hills and a great part of the Northern Shan states. In the Shan States there are a few open plateaus, fertile and well populated, and Maymyo in the Mandalay district, the hill-station to which in the hot weather the government of Burma migrates, stands in the Pyin-u-lwin plateau, some 3500 ft. above the sea. But the greater part of this country is a mass of rugged hills cut deep with narrow gorges, within which even the biggest rivers are confined. The second tract is that known as the dry zone of Burma, and includes theiwhole of the lowlands lying between the Arakan Yomas and the western fringe of the Southern Shan States. It stretches along both sides of the Irrawaddy from the north of Mandalay to Thayet- myo, and embraces the Lower Chindwin, Shwebo, Sagaing, Mandalay, Kyaukse, Meiktila, Yamethin, Myingyan, Magwe, Pak&kku and Minbu districts. This tract consists mostly of undulating lowlands, but it is broken towards the south by the Pegu Yomas, a considerable range of hills which divides the two remaining tracts of the Irrawaddy basin. On the west, between the Pegu and the Arakan Yomas, stretches the Irrawaddy delta, a vast expanse of level plain 12,000 sq. m. in area falling in a gradual unbroken slope from its apex not far south of Prome down to the sea. This delta, which includes the districtc ot Bassein, Myaungmya-Thftnffwa. Henzada, Hantha-

waddy, Tharrawaddy, Pegu and Rangoon town, consists almost entirely of a rich alluvial deposit, and the whole area, which between Cape Negrais and Elephant Point is 137 m. wide, is fertile in the highest degree. To the east lies a tract of country which, though geographically a part of the Irrawaddy basin, is cut off from it by the Yomas, and forms a separate system draining into the Sittang river. The northern portion of this tract, which on the east touches the basin of the Salween river, is hilly ; the remainder towards the confluence of the Salween, Gyaing and Attaran rivers consists of

broad fertile plains. The whole is comprised in the districts of Toungoo and Thaton, part of the Karen-ni hills, with the Salween hill tract and the northern parts of Amherst, which form the northern portion of the Tenasserim administrative division. The third natural division of Burma is the old province of Tenasserim, which, constituted in 1826 with Moulmein as its capital, formed the nucleus from which the British supremacy throughout Burma has grown. It is a narrow strip of country lying between the Bay of Bengal and the high range of hills which form the eastern boundary of the province towards Siam. It comprises the districts of Mergui and Tavoy and a part of Amherst, and includes also the Mergui Archi- pelago. The surface of this part of the country is mountainous and much intersected with streams. Northward from this lies the major portion of the Southern Shan States and Karen-ni and a narrowing strip along the Salween of the Northern Shan States.

Mountains. — Burma proper is encircled on three sides by a wall of mountain ranges. The Arakan Yomas starting from Cape Negrais extend northwards more or less parallel with the coast till they join the Chin and Naga hills. They then form part of a system of ranges which curve north of the sources of the Chindwin river, and with the Kumon range and the hills of the Jade and Amber mines, make up a highland tract separated from the great Northern Shan plateau by the gorges of the Irrawaddy river. On the east the Kachin, Shan and Karen hills, extending from the valley of the Irrawaddy into China far beyond the Salween gorge, form a con- tinuous barrier and boundary, and tail off into a narrow range which forms the eastern watershed of the Salween and separates Tenas- serim from Siam. The highest peak of the Arakan Yomas, Liklang, rises nearly 10,000 ft. above the sea, and in the eastern Kachin hills, which run northwards from the state of Mong Mit to join the high range dividing the basins of the Irrawaddy and the Salween, are two peaks, Sabu and Worang, which rise to a height of 11,200 ft. above the sea. The Kumon range running down from the Hkamti country east of Assam to near Mogaung ends in a peak known as Shwedaunggyi, which reaches some 5750 ft. There are several peaks in the Ruby Mines district which rise beyond 7000 ft. and Loi Ling in the Northern Shan States reaches 9000 ft. Compared with these ranges the Pegu Yomas assume the proportions of mere hills. Popa, a detached peak in the Myingyan district, belongs to this system and rises to a height of nearly 5000 ft., but it is interesting mainly as an extinct volcano, a landmark and an object of superstitious folklore, throughout the whole of Central Burma. Mud volcanoes occur at Minbu, but they are not in any sense mountains, resembling rather the hot springs which are found in

many parts of Burma. They are merely craters raised above the level of the surrounding country by the gradual accretion of the soft oily mud, which over- flows at frequent intervals whenever a discharge of gas occurs. Spurs of the Chin hills run down the whole length of the Lower Chindwin district, almost to Sagaing, and one hill, Powindaung, is particularly noted on account of its innumerable cave temples, which are said to hold no fewer than 446,444 images of Buddha. Huge caves, of which the most noted are the Farm Caves, occur in the hills near Moulmein, and they too are full of relics of their ancient use as temples, though now they are chiefly visited in connexion with the bats, whose flight viewed from a distance, as they issue from the caves, resembles a cloud of smoke.

Rivers. — Of the rivers of Burma the Irrawaddy is the most im- portant. It rises possibly beyond the confines of Burma in the unexplored regions, where India, Tibet and China meet, and seems to be formed by the junction of a number of considerable streams of no great length. Two rivers, the Mali and the N'mai, meeting about latitude 25° 45′ some 150 m. north of Bhamo, contribute chiefly to its volume, and during the dry weather it is navigable for steamers up to their confluence. Up to Bhamo, a distance of 900 m. from the sea, it is navigable throughout the year, and its chief tributary in Burma, the Chindwin, is also navigable for steamers for 300 m. from its junction with the Irrawaddy at Pakfikku. The Chindwin, called in its upper reaches the Tanai, rises in the hills south-west of Thama, and flows due north till it enters the south- east corner of the Hukawng valley, where it turns north-west and continues in that direction cutting the valley into two almost equal parts until it reaches its north-west range, when it turns almost due south and takes the name of the Chindwin. It is a swift clear river, fed in its upper reaches by numerous mountain streams. The Mogaung river, rising in the watershed which divides the Irrawaddy and the Chindwin drainages, flows south and south-east for 180 m. before it joins the Irrawaddy, and is navigable for steamers as far as Kamaing for about four months in the year. South of Thayetmyo, where arms of the Arakan Yomas approach the river and almost meet that spur of the Pegu Yomas which formed till 1886 the

northern boundary of British Burma, the valley of the Irrawaddy opens out again, and at Yegin Mingyi near Myanaung the influence of the tide is first felt, and the delta may be said to begin. The so-

called rivers of the delta, the Ngawun, Pyamalaw, Panmawaddy, Pyinzalu and Pantanaw, are simply the larger mouths of the Irrawaddy, and the whole country towards the sea is a close network of creeks where there are few or no roads and boats take the place of carts for every purpose. There is, however, one true river of some size, the Hlaing, which rises near Prome, flows southwards and meets the Pegu river and the Pazundaung creek near Rangoon, and thus forms the estuary which is known as the Rangoon river and constitutes the harbour of Rangoon. East of the Rangoon river and still within the deltaic area, though cut off from the main delta by the southern end of the Pegu Yomas, lies the mouth of the Sittang. This river, rising in the Sham-Karen hills, flows first due north and then southward through the Kyaukse, Yamethin and Toungoo districts, its line being followed by the Mandalay-Rangoon railway as far south as Nyaunglebin in the Pegu district. At Toungoo it is narrow, but below Shwegyin it widens, and at Sittang it is half a mile broad. It flows into the Gulf of Martaban, and near its mouth its course is constantly changing owing to erosion and corresponding accretions. The second river in the province in point of size is the Salween, a huge river, believed from the volume of its waters to rise in the Tibetan mountains to the north of Lhasa. It is in all probability actually longer than the Irrawaddy, but it is not to be compared to that river in importance. It is, in fact, walled in on either side, with banks varying in British territory from 3000 to 6000 ft. high and at present unnavigable owing to serious rapids in Lower Burma and at one or two places in the Shan States, but quite open to traffic for considerable reaches in its middle course. The Gyaing and the Attaran rivers meet the Salween at its mouth, and the three rivers form the harbour of Moulmein, the second seaport of Burma.

Lakes. — The largest lake in the province is Indawgyi in the Myitkyina district. It has an area of nearly 100 sq. m. and is surrounded on three sides by ranges of hrlls, but is open to the north where it has an outlet in the Indaw river. In the highlands of the Shan hills there are the Inle lakes near Yawnghwe, and in the Katha district also there is another Indaw which covers some 60 sq. m. Other lakes are the Paunglin lake in Minbu district, the Inma lake in Prome, the Tu and Duya in Henzada, the Shahkegyi and the Inyegyi in Bassein, the sacred lake at Ye in Tenasserim, and the Nagamauk, Panzemyaungand Walonbyanin Arakan. The Meiktila lake covers an area of some 5 sq. m., but it is to some extent at least an artificial reservoir. In the heart of the delta numerous large lakes or marshes abounding in fish are formed by the overflow of the Irrawaddy river during the rainy season, but these either assume very diminutive

proportions or disappear altogether in the dry season.

Climate. — The climate of the delta is cooler and more temperate than in Upper Burma, and this is shown in the fairer complexion and stouter physique of the people of the lower province as compared with the inhabitants of the drier and hotter upper districts as far as Bhamo, where there is a great infusion of other types of the Tibeto-Burman family. North of the apex of the delta and the boundary between the deltaic and inland tracts, the rainfall gradually lessens as far as Minbu, where what was formerly called the rainless zone commences and extends as far as Katha. The rainfall in the coast districts varies from about 200 in. in the Arakan and Tenasserim divisions to an average of 90 in Rangoon and the adjoining portion of the Irrawaddy delta. In the extreme north of Upper Burma the rainfall is rather less than in the country adjoining Rangoon, and in the dry zone the annual average falls as low as 20 and 30 in.

The temperature varies almost as much as the rainfall. It is highest in the central zone, the mean of the maximum readings in such districts as Magwe, Myingyan, Kyaukse, Mandalay and Shwebo in the month of May being close on 100° F., while in the littoral and sub-montane districts it is nearly ten degrees less. The mean of the minimum readings in December in the central zone districts is a few degrees under 60° F. and in the littoral districts a few degrees over that figure. In the hilly district of Mog&k (Ruby Mines) the December mean minimum is 36-8° and the mean maxi- mum 79°. The climate of the Chin and Kachin hills and also of the Shan States is temperate. In the shade and off the ground the thermometer rarely rises above 8o° F. or falls below_25° F. In the hot season and in the sun as much as 150° F. is registered, and on the grass in the cold weather ten degrees of frost are not uncommon. Snow is seldom seen either in the Chin or Shan hills, but there are snow-clad ranges in the extreme north of the Kachin country. In the narrow valleys of the Shan hills, and especially in the Salween valley, the shade maximum reaches ioo ° F. regularly for several weeks in April. The rainfall in the hills varies very considerably, but seems to range from about 60 in. in the broader valleys to about 500 in. on the higher forest-clad ranges.

Geology. — Geologically, British Burma consists of two divisions, an eastern and a western. The dividing line runs from the mouth of the Sittang river along the railway to Mandalay, and thence con- tinues northward, with the same general direction but curving slightly towards the east. West of this line the rocks are chiefly Tertiary and Quaternary; east of it they are mostly Palaeozoic or gneissic. In the western mountain ranges the beds are thrown into

a series of folds which form a gentle curve running from south to north with its convexity facing westward. There is an axial zone of Cretaceous and Lower Eocene, and this is flanked on each side by the Upper Eocene and the Miocene, while the valley of the Irrawaddy is occupied chiefly by the Pliocene. Along the southern part of the Arakan coast the sea spreads over the western Miocene zone. The Cretaceous beds have not yet been separated from the overlying Eocene, and the identification of the system rests on the discovery of a single Cenomanian ammonite. The Eocene beds are marine and contain nummulites. The Miocene beds are also marine and are characterized by an abundant molluscan fauna. The Pliocene, on the other hand, is of freshwater origin, and contains silicified wood and numerous remains of Mammalia. Flint chips, which appear to have been fashioned by hand, are said to have been found in the Miocene beds, but to prove the existence of man at so early a period would require stronger evidence than has yet been brought forward.

The older rocks of eastern Burma are very imperfectly known. Gneiss and granite occur; Ordovician fossils have been found in the Upper Shan States, and Carboniferous fossils in Tenasserim and near Moulmein. Volcanic rocks are not common in any part of Burma, but about 50 m. north-north-east of Yenangyaung the extinct volcano of Popa rises to a height of 3000 ft. above the surrounding Pliocene plain. Intrusions of a serpentine-like rock break through the Miocene strata north of Bhamo, and similar intrusions occur in the western ranges. Whether the mud " volcanoes" of the Irra- waddy valley have any connexion with volcanic activity may be doubted. The petroleum of Burma occurs in the Miocene beds, one of the best-known fields being that of Yenangyaung. Coal is found in the Tertiary deposits in the valley of the Irrawaddy and in Tenasserim. Tin is abundant in Tenasserim, and lead and silver have been worked extensively in the Shan States. The famous ruby mines of Upper Burma are in metamorphic rock, while the jadeite of the Bhamo neighbourhood is associated with the Tertiary intrusions of serpentine-like rock already noticed. 1

Population. — The total population of Burma in 1901 was 10,490,624 as against 7,722,053 in 1891; but a considerable portion of this large increase was due to the inclusion of the Shan States and the Chin hills in the census area. Even in Burma proper, however, there was an increase during the decade of 1,530,822, or 19-8 %. The density of population per square mile is 44 as compared with 167 for the whole of India and 552 for the Bengal Delta. England and Wales have a population more than twelve times as dense as that of Burma, so there is still room for expansion. The

chief races of Burma are Burmese (6,508,682), Arakanese (405,143), Karens (717,859), Shans (787,087), Chins (179,292), Kachins (64,405) and Talaings (321,898); but these totals do not include the Shan States and Chin hills, The Burmese in person have the Mongoloid char- acteristics common to the Indo-Chinese races, the Tibetans and tribes of the Eastern Himalaya. They may be generally described as of a stout, active, well-proportioned form; of a brown but never of an intensely dark complexion, with black, coarse, lank and abundant hair, and a little more beard than is possessed by the Siamese. Owing to their gay and lively dis- position the Burmese have been called " the Irish of the East," and like the Irish they are somewhat inclined to laziness. Since the advent of the British power, the immigration of Hindus with a lower standard of comfort and of Chinamen with a keener business instinct has threatened the economic independence of the Burmese in their own country. As compared with the Hindu, the Burmese wear silk instead of cotton, and eat rice instead of the cheaper grains; they are of an altogether freer and less servile, but also of a less practical character. The Burmese women have a keener business instinct than the men, and serve in some degree to redress the balance. The Burmese children are adored by their parents, and are said to be the happiest and merriest children in the world.

Language and Literature. — The Burmese are supposed by modern philologists to have come, as joint members of a vast Indo-Chinese immigration swarm, from western China to the head waters of the Irrawaddy and then separated, some to people Tibet and Assam, the others to press southwards into the

1 See also, for geology, W. Theobald, " On the Geology of Pegu," Mem. Geol. Surv. India,_ vol. x. pt. ii. (1874); F. Noetling, "The Development and Subdivision of the Tertiary System in Burma," Rec. Geol. Surv. India, vol. xxviii. (1895), pp. 59-86, pi. ii.; F. Noetling, " The Occurrence of Petroleum in Burma, and its Technical Exploitation," Mem. Geol. Surv. India, vol. xxvii. pt. ii. (i898)._

plains of Burma. The indigenous tongues of Burma are divided into the following groups: —

A. Indo-Chinese (1) Tibet-Burman family sub-family

(2) Siamese-Chinese

sub-family

(3) M6n-Annam

sub-family

B. Malay family

(a) The Burmese group.

(b) The Kachin group.

(c) The Kuki-Chin group.

(d) The Tai group.

(e) The Karen group.

(/) The Upper Middle Me- kong or Wa Palaung group.

(g) The North Cambodian group.

(h) The Selung language.

Burmese, which was spoken by 7,006,495 people in the province in iqoi, is a monosyllabic language, with, according to some authorities, three different tones; so that any given syllable may have three entirely different meanings only distinguishable by the intonation when spoken, or by accents or diacritical marks when written. There are, however, very many weighty authorities who deny the existence of tones in the language. The Burmese alphabet is borrowed from the Aryan Sanskrit through the Pali of Upper India. The language is written from left to right in what appears to be an unbroken line. Thus Burma possesses two kinds of literature, Pali and Burmese. The Pali is by far the more ancient, including as it does the Buddhist scriptures that originally found their way to Burma from Ceylon and southern India. The Burmese literature is fof the most part metrical, and consists of religious romances, chronological histories and songs. The Mafia Yazawin or " Royal Chronicle," forms the great historical work of Burma. This is an authorized history, in which everything unflattering to the Burmese monarchs was rigidly suppressed. After the Second Burmese War no record was ever made in the Yazawin that Pegu had been torn away from Burma by the British. The folk songs are the truest and most interesting national literature. The

Burmese are fond of stage-plays in which great licence of language is permitted, and great liberty to " gag " is left to the wit or intelligence of the actors.

Government. — The province as a division of the Indian empire is administered by a lieutenant-governor, first appointed 1st May 1897, with a legislative council of nine members, five of whom are officials. There are, besides, a chief secretary, revenue secretary, secretary and two under-secretaries, a public works department secretary with two assistants. The revenue ad- ministration of the province is superintended by a financial commissioner, assisted by two secretaries, and a director of land records and agriculture, with a land records departmental staff. There is a chief court for the province with a chief justice and three justices, established in May 1900. Other purely judicial officers are the judicial commissioner for Upper Burma, and the civil judges of Mandalay and Moulmein. There are four com- missioners of revenue and circuit, and nineteen deputy com- missioners in Lower Burma, and four commissioners and seventeen deputy commissioners in Upper Burma. There are two superintendents of the Shan States, one for the northern and one for the southern Shan States, and an assistant super- intendent in the latter; a superintendent of the Arakan hill tracts and of the Chin hills, and a Chinese political adviser taken from the Chinese consular service. The police are under the control of an inspector-general, with deputy inspector-general for civil and military police, and for supply and clothing. The education department is under a director of public instruction, and there are three circles — eastern, western and Upper Burma, each under an inspector of schools. – -4

The Burma forests are divided into three circles each under a conservator, with twenty-one deputy conservators. There are also a deputy postmaster-general, chief superintendent and four superintendents of telegraphs, a chief collector of customs, three collectors and four port officers, and an inspector-general of jails. At the principal towns benches of honorary magistrates,

exercising powers of various degrees, have been constituted. There are forty-one municipal towns, fourteen of which are in Upper Burma. The commissioners of division are ex officio sessions judges in their several divisions, and also have civil powers, and powers as revenue officers. They are responsible to the lieutenant-governor, each in his own division, for the working of every department of the public service, except the military department, and the branches of the administration directly under the control of the supreme government. The deputy commissioners perform the functions of

district magis- trates, district judges, collectors and registrars, besides the miscellaneous duties which fall to the principal district officer as representative of government. Subordinate to the deputy commissioners are assistant commissioners, extra-assistant commissioners and myooks, who are invested with various magisterial, civil and revenue powers, and hold charge of the townships, as the units of regular civil and revenue jurisdiction are called, and the sub-divisions of districts, into which most of these townships are grouped. Among the salaried staff of officials, the townships officers are the ultimate representatives of government who come into most direct contact with the people. Finally, there are the village headmen, assisted in Upper Burma by elders, variously designated according to old custom. Similarly in the towns, there are headmen of wards and elders of blocks. In Upper Burma these headmen have always been revenue collectors. The system under which in towns headmen of wards and elders of blocks are appointed is of comparatively recent origin, and is modelled on the village system.

The Shan States were declared to be a part of British India by notification in 1886. The Shan States Act of 1888 vests the civil, criminal and revenue administration in the chief of the „. „, state, subject to the restrictions specified in the sanad st . tes or patent granted to him. The law to be administered in each state is the customary law of the state, so far as it is in accordance with the justice, equity and good conscience, and not opposed to the spirit of the law in the rest of British India. The superintendents exercise general control over the administration of criminal justice, and have power to call for cases, and to exercise wide revisionary powers. Criminal jurisdiction in cases in which either the complainant or the defendant is a European, or American, or a government servant, or a British subject not a native of a Shan State, is withdrawn from the chiefs and vested in the superintendents and assistant superintendents. Neither the superintendents nor the assistant superintendents have power to try civil suits, whether the parties are Shans or not. In the Myelat division of the southern Shan States, however, the criminal law is practically the same as the law£n force in Upper Burma, and the ngwegunhmus, or petty chiefs, have been appointed magistrates of the second class. The chiefs of the Shan States are of three classes: — (1) sawbwas; (2) myosas; (3) ngwegunhmus. The last are found only in the M yelat, or border country between the southern Shan States and Burma. There are fifteen sawbwas, sixteen myosas and thirteen ngwegunhmus in the Shan States proper. Two sawbwas are under the supervision of the

commissioner of the Mandalay division, and two under the commissioner of the Sagaing division. The states vary enormously in size, from the 12,000 sq. m. of the Trans-Salween State of King Tung, to the 3-95 sq. m. of Nam Hk&m in the Myelat. The latter contained only 41 houses with 210 inhabitants in 1897 an d has since been merged in the adjoining state. There are five states, all sawbwaships, under the supervision of the superintendent of the northern Shan States, besides an indeterminate number of Wa States and communities of other races beyond the Salween river. The superintendent of the southern Shan States supervises thirty-nine, of which ten are sawbwaships. The headquarters of the northern Shan States are at Lashio, of the southern Shan States at Taung-gyi.

The states included in eastern and western Karen-ni are not part of British India, and are not subject to any of the laws in force in the Shan States, but they are under the supervision of the super-intendent of the southern Shan States.

The northern portion of the Karen hills is at present dealt with on the principle of political as distinguished from administrative control. The tribes are not interfered with as long as they keep the peace. What is specifically known as the Kachin hills, the country taken under administration in the Bhamo and Myitkyina districts, is divided into forty tracts. Beyond these tracts there are many Kachins in Katha, Mong-Mit, and the northern Shan States, but though they are often the preponderating, they are not the exclusive population. The country within the forty tracts may be considered the Kachin hills proper, and it lies between 23 30′ and 26 30′ N. lat. and 96 and 98° E. long. Within this area the petty chiefs have appointment orders, the people are disarmed, and the rate of tribute per household is fixed in each case. Government is regulated by the

A

C

D

96°

E

. Railways

Divisional Headquarters ® District Headquarters <

N.B. Where the name of a District is omitted, it is the same as that of Headquarters.

Where the name of the chief town in a Shan State is the same as that of State, it is shown underlined.

WgBBM

BURMA

Scale, 1:7,600,000

I

English Miles

50 100

G

*fc^y«A« "j**

•

\?v

^^v^^^pfe

M

lliliS

1

BURMA

Kachin hills regulation. Since 1894 the country has been practically undisturbed, and large numbers of Kachins are enlisted, and ready to enlist in the military police, and seem likely to form as good troops as the Gurkhas of Nepal.

The Chin hills were not declared an integral part of Burma until 1895, but they now form a scheduled district. The chiefs, however, are allowed to administer their own affairs, as far as may be, in accordance with their own customs, subject to the supervision of the superintendent of the Chin hills.

Religion. — Buddhists make up more than 88-6%; Mussulmans 3-28; spirit-worshippers 3-85; Hindus 2-76, and Christians 142 of the total population of the province. The large nominal pro- portion of Buddhists is deceptive. The Burmese are really as de- vbted to demonolatry as the hill-tribes who are labelled plain spirit-worshippers. The actual figures of the various religions, according to the census of 1 90 1, are as follows: —

Buddhists . . . 9,184,121 Sikhs 6,596

Spirit-worshippers . 399,390 Jews 685

Hindus .... 285,484 Parsees 245

Mussulmans . . . 339,446 Others 28

Christians . . . I47>5 2 5

The chief religious principle of the Burmese is to acquire merit for their next incarnation by good works done in this life. The bestowal of alms, offerings of rice to priests, the founding of a monas- tery, erection of pagodas, with which the country is crowded, the building of a bridge or rest-house for the convenience of travellers are all works of religious merit, prompted, not by love of one's fellow-creatures, but simply and solely for one's own future advantage.

An analysis shows that not quite two in every thousand Burmese profess Christianity, and there are about the same number of Mahom- medans among them. It is admitted by the missionaries themselves that Christianity has progressed very slowly among the Burmese in comparison with the rapid progress made amongst the Karens. It is amongst the Sgaw Karens that the greatest progress in Chris- tianity has been made, and the number of spirit-worshippers

among them is very much smaller. The number of Burmese Christians is considerably increased by the inclusion among them of the Christian descendants of the Portuguese settlers of Syriam deported to the old Burmese Tabayin, a village now included in the Ye-u subdivision of Shwebo. These Christians returned themselves as Burmese. The forms of Christianity which make most converts in Burma are the Baptist and Roman Catholic faiths. Of recent years many con- versions to Christianity have been made by the American Baptist missionaries amongst the Lahu or Muhso hill tribesmen.

Education. — Compared with other Indian provinces, and even with some of the countries of Europe, Burma takes a very high place in the returns of those able to both read and write. Taking the" sexes apart, though women fall far behind men in the matter of education, still women are better educated in Burma than in the rest of India. The average number of each sex in Burma per thousand is:— literates, male 378 ; female, 45 ; illiterates, male, 622 ; female, 955. The number of literates per thousand in Bengal is: — male, 104; female, 5. The proportion was greatly reduced in the 1901 census by the inclusion of the Shan States and the Chin hills, which mostly consist of illiterates.

The fact that in Upper Burma the proportion of literates is nearly as high as, and the proportion of those under instruction even higher than, that of the corresponding classes in Lower Burma, is a clear proof that in primary education, at least, the credit for the superiority of the Burman over the native of India is due to indigenous schools. In almost every village in the province there is a monastery, where the most regular occupation of one or more of the resident pongyis, or Buddhist monks, is the instruction free of charge of the children of the village. The standard of instruction, however, is very low, consisting only of reading and writing, though this is gradually being improved in very many monasteries. The absence of all prejudice in favour of the seclusion of women also is one of the main reasons why in this province the proportion who can read and write is higher than in any other part of India, Cochin alone excepted. It was not till 1890 that the education department took action in Upper Burma. It was then ascertained that there were 684 public schools with I 4. I 33 pupils, and 1664 private schools with 8685 pupils. It is worthy of remark that of these schools 29 were Mahommedan, and that there were 176 schools for girls in which upwards of 2000 pupils were taught. There are three circles — Eastern, Central and Upper Burma. For the special supervision and encouragement of indigen- ous primary education in monastic and in lay schools, each circle of inspection is divided into sub-circles

corresponding with one or more of the civil districts, and each sub-circle is placed under a deputy- inspector or a sub-inspector of schools. There are nine standards of instruction,and the classes in schools correspond with these standards. In Upper Burma all educational grants are paid from imperial funds; there is no cess as in Lower Burma. Grants-in-aid are given according to results. There is only one college, at Rangoon, which is affiliated to the Calcutta University. There are missionary schools amongst the Chins, Kachins and Shans, and a school for the sons of Shan chiefs at Taung-gyi in the southern Shan States. A Patatna- byan examination for marks in the Pali language was first instituted in 1896 and is held annually.

Finance. — The gross revenue of Lower Burma from all sources in 1871-1872 was Rs. 1, 36,34,520, of which Rs.i, 21, 70,530 was from imperial taxation, Rs.3,73,200 from provincial services, and Rs. 10,90,790 from local funds. The land revenue of the province was Rs. 34,45,230. In Burma the cultivators themselves continue to hold the land from government, and the extent of their holdings averages about five acres. The land tax is supplemented by a poll tax on the male population from 18 to 60 years of age, with the exception of immigrants during the first five years of their residence, religious teachers, schoolmasters, government servants and those unable to obtain their own livelihood. In 1890-1891 the revenue of Lower Burma has risen to Rs.2,08,38,872 from imperial taxation, Rs.1,55,51,897 for provincial services, and Rs.12, 14,596 from in-corporated local funds. The expenditure on the administration of Lower Burma in 1870-1871 was Rs.49, 70,020. In 1 890-1 891 it was Rs. 1, 58,48,041. In Upper Burma the chief source of revenue is the thathameda, a tithe or income tax which was instituted by King Mindon, and was adopted by the British very much as they found it. For the purpose of the assessment every district and town is classified according to its general wealth and prosperity. As a rule the basis of calculation was 1 00 rupees from every ten houses, with a 10% deduction for those exempted by custom. When the total amount payable by the village was thus determined, the village itself settled the amount to be paid by each individual householder. This was done by thamadis, assessors, usually appointed by the villagers themselves. Other important sources of revenue are the rents from state lands, forests, and miscellaneous items such as fishery, revenue and irrigation taxes. In 1886-1887, the year after the annexation, the amount collected in Upper Burma from all sources was twenty-two lakhs of rupees. In the following year it had risen to fifty lakhs. Much of Upper Burma, however, remained disturbed until 1890. The figures for 1890-1891, therefore, show the first really regular

collection. The amount then collected was Rs.87, 47,020.

The total revenue of Burma in the year ending March 31, 1900 was Rs.7,04,36,240 and in 1905, Rs.9, 65, 62,298. The total expenditure in the same years respectively was Rs. 4, 30,8 1,000 and Rs.5,66,60,047. The principal items of revenue in the budget are the land revenue, railways, customs, forests and excise.

Defence. — Burma is garrisoned by a division of the Indian army, consisting of two brigades, under a lieutenant-general. Of the native regiments seven battalions are Burma regiments specially raised for permanent service in Burma by transformation from military police. These regiments, consisting of Gurkhas, Sikhs and Pathans, are distributed throughout the Shan States and the northern part of Burma. In addition to these there are about 13,500 civil police and 15,000 military police. The military police are in reality a regular military force with only two European officers in command of each battalion; and they are recruited entirely from among the warlike races of northern India. A small battalion of Karens enlisted as sappers and miners proved a failure and had to be disbanded. Experiments have also been made with the Kachin hillmen and with the Shans ; but the Burmese character is so averse to discipline and control in petty matters that it is impossible to get really suitable men to enlist even in the civil police. The volunteer forces consist of the Rangoon Port Defence Volunteers, comprising artillery, naval, and engineer corps, the Moulmein artillery, the Moulmein, Rangoon, Railway and Upper Burma rifles.

Minerals and Mining. — In its three chief mineral products, earth-oil, coal and gold, Burma offers a fair field for enterprise and nothing more. Without yielding fortunes for speculator's, like South Africa or Australia, it returns a fair percentage upon genuine hard work. Coal is found in the Thayetmyo, Upper Chindwin and Shwebo districts, and in the Shan States; it also occurs in Mergui, but the deposits which have been so far discovered have been either of inferior quality or too far from their market to be worked to advantage. The tin mines in Lower Burma are worked by natives, but a company at one time worked mines in the Maliwun township of Mergui by European methods. The chief mines and minerals are in Upper Burma. The jade mines of Upper Burma are now practi- cally the only source of supply of that mineral, which is in great demand over all China. The mines are situated beyond Kamaing, north of Mogaung in the Myitkyina district. The miners are all Kachins, and the right to collect the jade duty of 33ˆ is farmed out by government to a lessee, who has hitherto always been a Chinaman. The amount

obtained has varied considerably. In 1887-1888 the rent was Rs.50,000. This dwindled to Rs.36,000 in 1892-1893, but the system was then adopted of letting for a term of three years and a higher rent was obtained. The value varies enormously according to colour, which should be a particular shade of dark green. Semi-transparency, brilliancy and hardness are, however, also essentials. The old river mines produced the best quality. The quarry mines on the top of the hill near Tawmaw produce enormous quantities, but the quality is not so good.

The most important ruby-bearing area is the Mog6k stone tract, in the hills about 60 m. east of the Irrawaddy and 90 m. north-north-west of Mandalay. The right to mine for rubies by European methods and to levy royalties from persons working by native methods was leased to the Burma Ruby Mines Company, Limited, in 1889, and the lease was renewed in 1896 for 14 years at a rent i H Rs.3,15,000 a year plus a share of the profits. The rent was

reduced permanently in 1898 to Rs.2,00,000 a year, but the share of the profits taken by government was increased from 20 to 30 %. There are other ruby mines at Nanyaseik in the Myitkyina district and at Sagyin in the Mandalay -district, where the mining is by native methods under licence-fees of Rs.5 and Rs.io a month. They are, however, only moderately successful. Gold is found in most of the rivers in Upper Burma, but the gold-washing industry is for the most part spasmodic in the intervals of agriculture. There is a gold mine at Kyaukpazat in the Mawnaing circle of the Kathra district, where the quartz is crushed by machinery and treated by chemical processes. Work was begun in 1895, and the yield of gold in that year was 274 oz., which increased to 893 oz. in 1 896-1 897. This, however, proved to be merely a pocket, and the mine is now shut down. Dredging for gold, however, seems likely to prove very profitable and gold dust is found in practically every river in the hills.

The principal seats of the petroleum industry are Yenangyaung in the Magwe, and Yenangyat in the Pakokku districts. _ The wells have been worked for a little over a century by the natives of the country. The Burma Oil Company since 1889 has worked by drilled wells on the American or cable system, and the amount produced is yearly becoming more and more important.

Amber is extracted by Kachins in the Hukawng valley beyond the administrative border, but the quality of the fossil resin is not very good. The amount exported varies considerably. Tourmaline or rubellite is found on the borders of the Ruby Mines district and in the Shan State of Mong Long. Steatite is extracted from the Arakan hill quarries. Salt is manufactured at various places in Upper Burma, notably in the lower Chindwin, Sagaing, Shwebo, Myingyan and Yamethin districts, as well as at Mawhkio in the Shan State of Thibaw. Iron is found in many parts of the hills, and is worked by inhabitants of the country. A good deal is extracted and manufactured into native implements at Pang L6ng in the Legya (Laihka) Shan State. Lead is extracted by a Chinese lessee from the mines at Bawzaing (Maw-s5n) in the Myelat, southern Shan States. The ore is rich in silver as well as in lead.

Agriculture. — The cultivation of the land is by far the most important industry in Burma. Only 9-4% of the people were classed as urban in the census of 1901, and a considerable pro- portion of this number were natives of India and not Burmese. Nearly two-thirds of the total population are directly or indirectly engaged in agriculture and kindred occupations. Throughout most of the villages in the rural tracts men, women and children all take part in the agricultural operations, although in riverine villages whole families often support themselves from the sale of petty commodities and eatables. The food of the people consists as a rule of boiled rice with salted fresh or dried fish, salt, sessamum-oil, chillies, onions, turmeric, boiled vegetables, and occasionally meat of some sort from elephant flesh down to smaller animals, fowls and almost everything except snakes, by way of condiment.

The staple crop of the province in both Upper and Lower Burma is rice. In Lower Burma it is overwhelmingly the largest crop; in Upper Burma it is grown wherever practicable. Throughout the whole of the moister parts of the province the agricultural season is the wet period of -the south-west monsoon, lasting from the middle of May until November. In some parts of Lower Burma and in the dry districts of Upper Burma a hot season crop is also grown with the assistance of irrigation during the spring months. Oxen are used for ploughing the higher lands with light soil, and the heavier and stronger buffaloes for ploughing wet tracts and marshy lands. As rice has to be transplanted as well as sown and irrigated, it needs a considerable amount of labour expended on it; and the Burman has the reputation of being a somewhat indolent cultivator. The Karens and Shans who settle in the plains expend much more care in ploughing and weeding their crops. Other crops which are grown in the province, especially

in Upper Burma, comprise maize, til- seed, sugar-cane, cotton, tobacco, wheat, millet, other food grains including pulse, condiments and spices, tea, barley, sago, linseed and other oil-seeds, various fibres, indigo and other dye crops, besides orchards and garden produce. At the time of the British annexation of Burma there were some old irrigation systems inthe Kyaukse and Minbu districts, which had been allowed to fall into disrepair, and these have now been renewed and extended. In addition to this the Mandalay Canal, 40 m. in length, with fourteen distributaries was opened in 1902 ; the Shwebo canal, 27 m. long, was opened in 1906, and a beginning had been made of two branches 29 and 20 m. in length, and of the M6n canal, begun in 1904, 53 m. in length. In all upwards of 300,000 acres are subject to irrigation under these schemes. On the whole the people of Burma are pros- perous and contented. Taxes and land revenue are light ; markets for the disposal of produce are constant and prices good; while fresh land is still available in most districts. Compared with the congested districts in the other provinces of India, with the exception of Assam, the lot of the Burman is decidedly enviable.

Forests.— The forests of Burma are the finest in British India and

one of the chief assets of the wealth of the country ; it is from Burma that the world draws its main supply of teak for shipbuilding, and indeed it was the demand for teak that largely led to the annexation of Burma. At the close of the First Burmese War in 1826 Tenasserim was annexed because it was supposed to contain large supplies of this valuable timber; and it was trouble with a British forest company that directly led to the Third Burmese War cf 1885. Since the introduction of iron ships teak has supplanted oak, because it contains an essential oil which preserves iron and steel, instead of corroding them like the tannic acid contained in oak. The forests of Burma, therefore, are now strictly preserved by the government, and there is a regular forest department for the conservation and cutting of timber, the planting of young trees for future generations, the prevention of forest fires, and for generally supervising their treatment by the natives. In the reserves the trees of commercial value can only be cut under a licence returning a revenue to the state, while unreserved trees can be cut by the natives for home consumption. There are naturally very many trees in these forests besides the teak. In Lower Burma alone the enumeration of the trees made by Sulpiz Kurz in his Forest Flora of British Burma (1877) includes some 1500 species, and the unknown species of Upper Burma and the Shan States would probably increase this total very considerably. In addition to teak, which provides the bulk of the

revenue, the most valuable woods are sha or cutch, india rubber, pyingado, or ironwood for railway sleepers, and padauk. Outside these reserves enormous tracts of forest and jungle still remain for clearance and cultivation, reservation being mostly confined to forest land unsuitable for crops. In 1870-1871 the state reserved forests covered only 133 sq. m., in all the Rangoon division. The total receipts from the forests then amounted to Rs. 7, 72, 400. In 1889-1890 the total area of reserved forests in Lower Burma was 5574 sq. m., and the gross revenue was Rs. 3 1,34, 720, and the expenditure was Rs. 13,31 ,930. The work of the forest department did not begin in Upper Burma till 189 1. At the end of 1892 the reserved forests in Upper Burma amounted to 1059 S Q- m – On 30th June 1896 the reserved area amounted to 5438 sq. m. At the close of 1899 the area of the reserved forests in the whole province amounted to 15,669 sq. m., and in 1903-1904 to 20,038 sq. m. with a revenue of Rs. 85, I9,404and expenditure amounting to Rs.35,00, 311. In 1905- 1906 there were 20,545 sq. m. of reserved forest, and it is probable that when the work of reservation is complete there will be 25,000 sq. m. of preserves or 12 % of the total area.

Fisheries. — Fisheries and fish-curing exist both along the sea-coast of Burma and in inland tracts, and afforded employment to 126,651 persons in 1907. The chief seat of the industry is in the Thongwa and Bassein districts, where the income from the leased fisheries on individual streams sometimes amounts to between £6000 and £7000 a yeaY. Net fisheries, worked by licence-holders in the principal rivers and along the sea-shore, are not nearly so profitable as the closed fisheries — called In — which are from time to time sold by auction for fixed periods of years. Salted fish forms, along with boiled rice, one of the chief articles of food among the Burmese ; and as the price of salted fish is gradually rising along with the prosperity and purchasing power of the population, this industry is on a very sound basis. There are in addition some pearling grounds in the Mergui Archipelago, which have a very recent history; they were practically unknown before 1890; in the early 'nineties they were worked by Australian adventurers, most of whom have since departed ; and now they are leased in blocks to a syndicate of Chinamen, who grant sub-leases to individual adventurers at the rate of £25 a pump for the pearling year. The chief harvest is of mother of pearl, which suffices to pay the working expenses; and there is over and above the chance of finding a pearl of price. Some pearls worth £1000 and upwards have recently been discovered.

Manufactures and Art. — The staple industry of Burma is agriculture, but many cultivators are also artisans in the by- season.

In addition to rice-growing and the felling and extraction of timber, and the fisheries, the chief occupations are rice-husking, silk-weaving and dyeing. The introduction of cheap cottons and silk fabrics has dealt a blow to hand- weaving, while aniline dyes are driving out the native vegetable product; but both industries still linger in the rural tracts. The best silk-weavers are to be found at Amarapura. There large numbers of people follow this occupation as their sole means of livelihood, whereas silk and cotton weaving throughout the province generally is carried on by girls and women while unoccupied by other domestic duties. The Burmese are fond of bright colours, and pink and yellow harmonize well with their dark olive complexion, but even here the influence of western civilization is being felt, and in the towns the tendency now is towards maroon, brown, olive and dark green for the women's skirts. The total number of persons engaged in the production of textile fabrics in Burma according tp the census of 1901 was 419,007. The chief dye- product of Burma is cutch, a brown dye obtained from the wood

of the'sha tree. Cutch-boiling forms the chief means of livelihood of a large number of the poorer classes in the Prome and Thayet- myo districts of Lower Burma, and a subsidiary means of subsistence elsewhere. Cheroot making and smoking is universal among both sexes. The chief arts of Burma are wood-carving and silver work. The floral wood-carving is remarkable for its freedom and spontaneity. The carving is done in teak wood when it is meant for fixtures, but teak has a coarse grain, and otherwise yamane dogwood, said to be a species of gmelina, is preferred. The tools employed are chisel, gouge and mallet. The design is traced on the wood with charcoal, gouged out in the rough, and finished with sharp fine tools, using the mallet for every stroke. The great bulk of the silver work is in the form of bowls of different sizes, in shape something like the lower half of a barrel, only more convex, of betel boxes, cups and small boxes for lime. Both in the wood-carving and silver work the Burmese character displays itself, giving boldness, breadth and freedom of design, but a general want of careful finish. Unfortunately the national art is losing its distinctive type through contact with western civilization.

Commerce. — The chief articles of export from Burma are rice and timber. In 1895 the quantity of rice exported in the foreign and coastal trade amounted to 1,419,173 tons valued at

Rs.9,77,66,132, and in 1905 the figures were 2,187,764 tons, value Rs.15,67,28,288. England takes by far the greatest share of Burma's rice, though large quantities are also consumed in Germany, while France, Italy, Belgium and Holland also consume a considerable amount. The regular course of trade is apt to be deflected by famines in India or Japan. In 1900 over one million tons of rice were shipped to India during the famine there. The rice-mills, almost all situated at the various seaports, secure the harvest from the cultivator through middlemen. The value of teak exported in 1895 was Rs.1,34,64,303, and in 1905, Rs.1,31,03,401. Subordinate products for exports include cutch dye, caoutchouc or india-rubber, cotton, petroleum and jade. By far the largest of the imports are cotton, silk and woollen piece-goods, while subordinate imports include hardware, gunny bags, sugar, tobacco and liquors.

The following table shows the progressive value of the trade of Burma since 1871-1872: —

Year.

Imports.

Exports.

Total.

1871- 1881- 1891- 1961- 1904-

-1872 -1882 -1892 -1902 -1905

Rs.

3,15,79,860

6,38,49,840

10,50,06,247

12,78,46,636

17,06,20,796

Rs.

3,78,02,170

8,05,71,410

12,67,21,878

18,74,47,200

23.94. 69,114

Rs.

6,93,82,030 14,44,21,250 23,17,28,125 31,52,93,836 41,00,89,910

*Internal Communications.— -In 1871-1872 there were 814 m. of road in Lower Burma, but the chief means of internal communication was by water. Steamers plied on the Irrawaddy as far as Thayetmyo. The vessels of the Irrawaddy Flotilla Company now ply to Bassein and to all points on the Irrawaddy as far north as Bhamo, and in the dry weather to Myitkyina, and also on the Chindwin as far north as Kindat, and to Homalin during the rains. The Arakan Flotilla Company has also helped to open up the Arakan division. The length of roads has not greatly increased in Lower Burma, but there has been a great deal of road constuction in Upper Burma. At the end of the year 1904-1905 there were in the whole province 7486 m. of road, 1516 m. of which were metalled and 3170 unmetalled, with 2799 m. of other tracks. But the chief advance in communications has been in railway construction. The first railway from Rangoon to Prome, 161 m., was opened in 1877, and that from Rangoon to Toungoo, 166 m., was opened in 1884. Since the annexation of Upper Burma this has been extended to Ma*idalay, and the Mu Valley railway has been constructed from Sagaing to Myitkyina, a distance of 752 m. from Rangoon. The Mandalay-Lashio railway has been completed, and trains run from Mandalay to Lashio, a distance of 178 m. The Sagaing-M6nywa-A16n branch and the Meiktila-Myingyan branch were opened to traffic during 1900. In 1902 a railway from Henzada to Bassein was formed and a con- necting link with the Prome line from Henzada to Letpadan was opened in 1903. Railways were also constructed from Pegu to Martaban, 121 m. in length, and from Henzada to Kyang-in, 66 m. in length; and construction was contemplated of a railway from Thazi towards Taung-gyi, the headquarters of the southern Shan States. The total length of lines open in 1904-1905 was 1340 m., , but railway communication in Burma is still very incomplete. Five ‘*

of the eight commissionerships and Lashio.the capital of the northern Shan States, have communication with each other by railway, but Taung-gyi and the southern Shan States can still only be reached by

a hill-road through difficult country for cart traffic, and the head-quarters of three commissionerships, Moulmein, Akyab and Minbu, have no railway communication with Rangoon. Arakan is in the worst position of all, for it is connected with Burma by neither railway nor river, nor even by a metalled road, and the only way to reach Akyab from Rangoon is once a week by sea.

Law. — The British government has administered the law in Burma on principles identical with those which have been adopted elsewhere in the British dominions in India. That portion of the law which is usually described as Anglo-Indian law (see Indian Law) is generally applicable to Burma, though there are certain districts inhabited by tribes in a backward state of civilization which are excepted from its operation. Acts of the British parliament relating to India generally would be applicable to Burma, whether passed before or after its annexa- tion, these acts being considered applicable to all the dominions of the crown in India. As regards the acts of the governor-, general in council passed for India generally — they, too, were from the first applicable to Lower Burma; and they have all been declared applicable to Upper Burma also by the Burma Laws Act of 1898. That portion of the English law which has been introduced into India without legislation, and all the rules of law resting upon the authority of the courts, are made applicable to Burma by the same act. But consistently with the practice which has always prevailed in India, there is a large field of law in Burma which the British government has not attempted to disturb. It is expressly directed by the act of 1898 above referred to, that in regard to succession, inheritance, marriage, caste or any religious usage or institution, the law to be administered in Burma is (a) the Buddhist law in cases where the parties are Buddhists, (b) the Mahommedan law in cases where the parties are Mahommedans, (c) the Hindu law in cases where the parties are Hindus, except so far as the same may have been modified by the legislature. The reservation thus made in favour of the native laws is precisely analogous to the similar reservation made in India (see Indian Law, where the Hindu law and the Mahom- medan Law are described). The Buddhist law is contained in certain sacred books called Dhammathats. The laws themselves are derived from one of the collections which Hindus attribute to Manu, but in some respects they now widely differ from the ancient Hindu law so far as it is known to us. There is no certainty as to the date or method of their introduction. The whole of the law administered now in Burma rests ultimately upon statutory authority; and all the Indian acts relating to Burma, whether of the governor-general or the lieutenant-governor of Burma in council, will

be found in the Burma Code (Calcutta, 1899), and in the supplements to that volume which are published from time to time at Rangoon. There is no complete translation of the Dhammathats, but a good many of them have been trans- lated. An account of these translations will be found in The Principles of Buddhist Law by Chan Toon (Rangoon, 1894), which is the first attempt to present those principles in something approaching to a systematic form.

History. — It is probable that Burma is the Chryse Regio of Ptolemy, a name parallel in meaning to Sonaparanta, the classic Pali title assigned to the country round the capital in Burmese documents. The royal history traces the lineage of the kings to the ancient Buddhist monarchs of India. This no doubt is fabulous, but it is hard to say how early communication with Gangetic India began. From the nth to the 13th century the old Burman empire was at the height of its power, and to this period belong the splendid remains of architecture at Pagan. The city and the dynasty were destroyed by a Chinese (or rather Mongol) invasion(i284 a.d.) in the reign of Kublai Khan. After that the empire fell to a low ebb, and Central Burma was often subject to Shan dynasties. In the early part of the 16th century the Burmese princes of Toungoo, in the north-east of Pegu, began to rise to power, and established a dynasty which at one time held possession of Pegu, Ava and Arakan. They made their capital at Pegu, and to this dynasty belong the gorgeous

descriptions of some of the travellers of the 16th century. Their wars exhausted the country, and before the end of the century it was in the greatest decay. A new dynasty arose in Ava, which subdued Pegu, and maintained their supremacy through- out the 17th and during the first forty years of the 18th century. The Peguans or Talaings then revolted, and having taken the capital Ava, and made the king prisoner, reduced the whole country to submission. Alompra, left by the conqueror in charge of the village of Motshobo, planned the deliverance of his country. He attacked the Peguans at first with small detachments; but when his forces increased, he suddenly advanced, and took possession of the capital in the autumn of 1753.

In 1754 the Peguans sent an armament of war-boats against Ava, but they were totally defeated by Alompra; while in the districts of Pro me, Donubyu, &c, the Burmans revolted, and expelled all the

Pegu garrisons in their towns. In 1754 Prome was besieged by the king of Pegu, who was again defeated by Alompra, and the war was transferred from the upper provinces to the mouths of the navigable rivers, and the numerous creeks and canals which intersect the lower country. In 1755 the yuva raja, the king of Pegu's brother, was equally unsuccessful, after which the Peguans were driven from Bassein and the adjacent country, and were forced to withdraw to the fortress of Syriam, distant 12 m. from Rangoon. Here they enjoyed a brief repose, Alompra being called away to quell an insurrection of his own subjects, and to repel an invasion of the Siamese; but returning victorious, he laid siege to the fortress of Syriam and took it by surprise. In these wars the French sided with the Peguans, the English with the Burmans. Dupleix, the governor of Pondicherry, had sent two ships to the aid of the former; but the master of the first was decoyed up the river by Alompra, where he was massacred along with his whole crew. The other escaped to Pondicherry. Alompra was now master of all the navigable rivers; and the Peguans, shut out from foreign aid, were finally subdued. In 1 7 5 7 the conqueror laid siege to the city of Pegu, which capitulated, on condition that their own king should govern the country, but that he should do homage for his kingdom, and should also surrender his daughter to the victorious monarch. Alompra never contemplated the fulfilment of the condition; and having obtained possession of the town, aban- doned it to the fury of his soldiers. In the following year the Peguans vainly endeavoured to throw off the yoke. Alompra afterwards reduced the town and district of Tavoy, and finally undertook the conquest of the Siamese. His army advanced to Mergui and Tenasserim, both of which towns were taken; and he was besieging the capital of Siam when he was taken ill. He immediately ordered his army to retreat, in hopes of reaching his capital alive; but he expired on the way, in 1760, in the fiftieth year of his age, after he had reigned eight years. In the previous year he had massacred the English of the establishment of Negrais, whom he suspected of assisting the Peguans. He was succeeded by his eldest son Noungdaugyi, whose reign was dis- turbed by the rebellion of his brother Sin-byu-shin, and after- wards by one of his father's generals. He died in little more than three years, leaving one son in his infancy; and on his decease the throne was seized by his brother Sin-byu-shin. The new king was intent, like his predecessors, on the conquest of the adjacent states, and accordingly made war in 1765 on the Manipur kingdom, and also on the Siamese, with partial success. In the following year he defeated the Siamese, and, after a long blockade, obtained possession of their capital. But while the Burmans were extending their conquests in this

quarter, they were invaded by a Chinese army of 50,000 men from the province of Yunnan. This army was hemmed in by the skill of the Burmans; and, being reduced by the want of provisions, it was afterwards attacked and totally destroyed, with the exception of 2500 men, who were sent in fetters to work in the Burmese capital at their several trades. In the meantime the Siamese revolted, and while the Burman army was marching against them, the Peguan soldiers who had been incorporated in it rose against their companions, and commencing an indiscriminate massacre, pursued the Burman army to the gates of Rangoon,

which they besieged, but were unable to capture. In 1774 Sin-byu-shin was engaged in reducing the marauding tribes. He took the district and fort of Martaban from the revolted Peguans; and in the following year he sailed down the Irrawaddy with an army of 50,000 men, and, arriving at Rangoon, put to death the aged monarch of Pegu, along with many of his nobles, who had shared with him in the offence of rebellion. He died in 1776, after a reign of twelve years, during which he had extended the Burmese dominions on every side. He was succeeded by his son, a youth of eighteen, called Singumin (Chenguza of Symes), who proved himself a bloodthirsty despot, and was put to death by his uncle, Bodawpaya or Mentaragyi, in 1781, who ascended the vacant throne. In 1 783 the new king effected the conquest of Arakan. In the same year he removed his residence from Ava, which, with brief interruptions, had been the capital for four centuries, to the new city of Amarapura, " the City of the Immortals."

The Siamese who had revolted in 1771 were never afterwards subdued by the Burmans; but the latter retained their dominion over the sea-coast as far as Mergui. In the year 1785 they attacked the island of Junkseylon with a fleet of boats and an army, but were ultimately driven back with loss; and a second attempt by the Burman monarch, who in 1786 invaded Siam with an army of 30,000 men, was attended with no better success. In 1793 peace was concluded between these two powers, the Siamese yielding to the Burmans the entire possession of the coast of Tenasserim on the Indian Ocean, and the two important seaports of Mergui and Tavoy.

In 1795 the Burmese were involved in a dispute with the British in India, in consequence of their troops, to the amount of 5000 men, entering the district of Chittagong in pursuit of three robbers who had fled from justice across the frontier. Explana- tions being made and terms of accommodation offered by General Erskine, the commanding officer, the Burmese com- mander retired from the

British territories, when the fugitives were restored, and all differences for the time amicably arranged.

But it was evident that the gradual extension of the British and Burmese territories would in time bring the two powers into close contact along a more extended line of frontier, and in all probability lead to a war between them. It happened, accordingly, that the Burmese, carrying their arms into Assam and Manipur, penetrated to the British border near Sylhet, on the north-east frontier of Bengal, beyond which were the possessions of the chiefs of Cachar, under the protection of the British government. The Burmese leaders, arrested in their career of conquest, were impatient to measure their strength with their new neighbours. It appears from the evidence of Europeans who resided in Ava, that they were entirely unacquainted with the discipline and resources of the Europeans. They imagined that, like other nations, they would fall before their superior tactics and valour; and their cupidity was inflamed by the prospect of marching to Calcutta and plundering the country. At length their chiefs ventured on the open violation of the British territories. They attacked a party of sepoys within the frontier, and seized and carried off British subjects, while at all points their troops, moving in large bodies, assumed the most menacing positions. In the south encroachments were made upon the British frontier of Chittagong. The island of Shahpura, at the mouth of the Naaf river, had been occupied by a small guard of British troops. These were attacked on the 23rd of September 1823 by the Burmese, and driven from their post with the loss of several lives; and to the repeated demands of the British for redress no answer was returned. Other outrages ensued; and at length, on March 5th, 1824, war was declared by the British government. The military operations, which will be found described under Burmese Wars, ended in the treaty of Yandaboo on the 24th of February 1826, which conceded the British terms and enabled their army to be withdrawn.

For some years the relations of peace continued undisturbed. Probably the feeling of amity on the part of the Burmese government was not very strong; but so long as the prince by whom the treaty was concluded continued in power, no attempt was

made to depart from its main stipulations. That monarch, Ba-ggi-daw, however, was obliged in 1837 to yield the throne to a usurper

who appeared in the person of his brother, Thar- rawaddi (Tharawadi) . The latter, at an early period, manifested not only that hatred of British connexion which was almost universal at the Burmese court, but also the extremest contempt. For several years it had become apparent that the period was approaching when war between the British and the Burmese governments would again become inevitable. The British resident, Major Burney, who had been appointed in 1830, finding his presence at Ava agreeable neither to the king nor to himself, removed in 1837 to Rangoon, and shortly afterwards retired from the country. Ultimately it became necessary to forego even the pretence of maintaining relations of friendship, and the British functionary at that time, CaptainMacleod, was withdrawn in 1840 altogether from a country where his continuance would have been but a mockery. The state of sullen dislike which followed was after a while succeeded by more active evidences of hostility. Acts of violence were committed on British ships and British seamen. Remonstrance was consequently made by the British government, and its envoys were supported by a small naval force. The officers on whom devolved the duty of representing the wrongs of their fellow-countrymen and demand- ing redress, proceeded to Rangoon, the governor of which place had been a chief actor in the outrages complained of; but so far were they from meeting with any signs of regret, that they were treated with indignity and contempt, and compelled to retire without accomplishing anything beyond blockading the ports. A series of negotiations followed; nothing was demanded of the Burmese beyond a very moderate compensation for the injuries inflicted on the masters of two British vessels, an apology for the insults offered by the governor of Rangoon to the repre- sentatives of the British government, and the re-establishment of at least the appearance of friendly relations by the reception of a British agent by the Burmese government. But the obduracy of King Pagan, who had succeeded his father in 1846, led to the refusal alike of atonement for past wrongs, of any expression of regret for the display of gratuitous insolence, and of any indication of a desire to maintain friendship for the future. Another Burmese war was the result, the first shot being fired in January 1852. As in the former, though success was varying, the British finally triumphed, and the chief towns in the lower part of the Burmese kingdom fell to them in succession. The city of Pegu, the capital of that portion which, after having been captured, had again passed into the hands of the enemy, was recaptured and retained, and the whole province of Pegu was, by proclamation of the governor-general, Lord Dalhousie, declared to be annexed to the British dominions on the 20th of December 1852. No treaty was obtained or insisted upon, — the British government being

content with the tacit acquiescence of the king of Burma without such documents; but its resolution was declared, that any active demonstration of hostility by him would be followed by retribution.

About the same time a revolution broke out which resulted in King Pagan's dethronement. His tyrannical and barbarous conduct had made him obnoxious at home as well as abroad, and indeed many of his actions recall the worst passages of the history of the later Roman emperors. The Mindon prince, who had become apprehensive for his own safety, made him prisoner in February 1853, and was himself crowned king of Burma towards the end of the year. The new monarch, known as King Mindon, showed himself sufficiently arrogant in his dealings with the European powers, but was wise enough to keep free from any approach towards hostility. The loss of Pegu was long a matter of bitter regret, and he absolutely refused to acknowledge it by a formal treaty. In the beginning of 1855 he sent a mission of compliment to Lord Dalhousie, the governor- general; and in the summer of the same year Major (afterwards Sir Arthur) Phayre, de facto governor of the new province of Pegu, was appointed envoy to the Burmese court. He was accompanied by Captain (afterwards Sir Henry) Yule as secretary, and Mr Oldham as geologist, and his mission added largely to

our knowledge of the state of the country; but in its main object of obtaining a treaty it was unsuccessful. It was not till 1862 that the king at length yielded, and his relations with Britain were placed on a definite diplomatic basis.

In that year the province of British Burma, the present Lower Burma, was formed,with Sir Arthur Phayre as chief commissioner. In 1867 a treaty was concluded at Mandalay providing for the free intercourse of trade and the establishment of regular diplo- matic relations. King Mindon died in 1 878, and was succeeded by his son King Thibaw. Early in 1879 he excited much horror by executing a number of the members of the Burmese royal family, and relations became much strained. The British resident was withdrawn in October 1879. The government of the country rapidly became bad. Control over many of the outlying districts was lost, and the elements of disorder on the British frontier were a standing menace to the peace of the country. The Burmese court, in contravention of the express terms of the treaty of 1869, created monopolies to the detriment of the trade of both England and Burma; and while the Indian government was unrepresented at Mandalay, representatives of Italy and France were welcomed, and two separate embassies were sent to Europe for the purpose of contracting new and, if possible, close alliances with

sundry European powers. Matters were brought to a crisis towards the close of 1885, when the Burmese government imposed a fine of £230,000 on the Bombay- Burma Trading Corporation, and refused to comply with a suggestion of the Indian government that the cause of complaint should be investigated by an impartial arbitrator. An ultimatum was therefore despatched on the 22nd of October 1885. On the 9th of November a reply was received in Rangoon amounting to an unconditional refusal. The king on the 7 th of November issued a proclamation calling upon his subjects to drive the British into the sea. On the 14th of November 1885 the British field force crossed the frontier, and advanced to Mandalay without incurring any serious resistance (see Burmese Wars). It reached Ava on the 26th of November, and an envoy from the king signified his submission. On the 28th of November the British occupied Mandalay, and next day King Thibaw was sent down the river to Rangoon, whence he was afterwards transferred to Ratnagiri on the Bombay coast. Upper Burma was formally annexed on the 1st of January 1886, and the work of restoring the country to order and introducing settled government commenced. This was a more serious task than the overthrow of the Burmese government, and occupied four years. This was in part due to the character of the country, which was characterized as one vast military obstacle, and in part to the disorganization which had been steadily growing during the six years of King Thibaw's reign. By the close of 1889 all the larger bands of marauders were broken up, and since 1890 the country has enjoyed greater freedom from violent crime than the province formerly known as British Burma. By the Upper Burma Village Regulations and the Lower Burma Village Act, the villagers themselves were made responsible for maintaining order in every village, and the system has worked with the greatest success. During the decade 1891-1901 the population increased by 19-8% and cultivation by 53%. With good harvests and good markets the standard of living in Burma has much improved. Large areas of cultivable waste have been brought under cultiva- tion, and the general result has been a contented people. The boundary with Siam was demarcated in 1893, and that with China was completed in 1900.

Authorities. — Official: Col. Horace Spearman, British Burma Gazetteer (2 vols., Rangoon, 1879) ; Sir J. George Scott, Upper Burma Gazetteer (5 vols., Rangoon, 1900-1901). Non-official: Right Rev. Bishop Bigandet, Life or Legend of Gautama (3rd ed., London, 1881); G. W. Bird, Wanderings in Burma (London, 1897); E. D. Cuming, In the Shadow of the Pagoda (London, 1893), With the Jungle Folk (London, 1897); Max and Bertha Ferrars, Burma

(London, 1000); H. Fielding, The Soul of a People {Buddhism in Burma) (London, 1898), Thibaw's Queen (London, 1899), A. People at School (1906); Capt. C. J. Forbes, F.S., Burma (London, 1878), Comparative Grammar of the Languages of Farther India (London, 1881), Legendary History of Burma and Arakan (Rangoon, 1882); J. Gordon, Burma and its Inhabitants (London, 1876) ; Mrs E. Hart,

Picturesque Burma (London, 1897); Gen. R. Macmahon, Far Cathay and Farther India (London, 1892); Rev. F. Mason, D.D., Burma (Rangoon, i860); E. H. Parker, Burma (Rangoon, 1892); Sir Arthur Phayre, History of Burma (London, 1883) ; G. C. Rigby, History of the Operations in Northern Arakan and the Yawdwin Chin Hills (Rangoon, 1897), Sir J.George Scott, Burma, As it is, As it was, and As it will be (London, 1886); Shway Yoe, The Burman, His Life and Notions (2nd ed., London, 1896); D. M. Smeaton, The Karens of Burma (London, 1887); Sir Henry Yule, A Mission to Ava (London, 1858); J. Nisbet, Burma under British Rule and Before (London, 1901); V. D. Scott O'Connor, The Silken East (London, 1904) ; Talbot Kelly, Burma (London, 1905) ; an ex- haustive account of the administration is contained in Dr Alleyne Ireland's The Province of Burma, Report prepared on behalf of the university of Chicago (Boston, U.S.A., 2 vols., 1907). (J. G. Sc.)

BURMANN, PIETER (1668-1741), Dutch classical scholar, known as " the Elder," to distinguish him from his nephew, was born at Utrecht. At the age of thirteen he entered the university where he studied under Graevius and Gronovius. He devoted himself particularly to the study of the classical languages, and became unusually proficient in Latin composition. As he was intended for the legal profession, he spent some years in attend- ance on the law classes. For about a year he studied at Leiden, paying special attention to philosophy and Greek. On his return to Utrecht he took the degree of doctor of laws (March 1688), and after travelling through Switzerland and part of Germany, settled down to the practice of law, without, however, abandoning his classical studies. In December 1691 he was appointed receiver of the tithes which were originally paid to the bishop of Utrecht, and five years later was nominated to the professorship of eloquence and history. To this chair was soon added that of Greek and politics. In 1714 he paid a short visit to Paris and ransacked the libraries. In the following year he was appointed successor to the celebrated Perizonius, who had

held the chair of history, Greek language and eloquence at Leiden. He was subsequently appointed professor of history for the United Provinces and chief librarian. His numerous editorial and critical works spread his fame as a scholar throughout Europe, and engaged him in many of the stormy disputes which were then so common among men of letters. Burmann was rather a compiler than a critic; his commentaries show immense learning and accuracy, but are wanting in taste and judgment. He died on the 31st of March 1741.

Burmann edited the following classical authors: — Phaedrus (1698); Horace (1699) ; Valerius Flaccus (1702); Petronius Arbiter (1709); Velleius Paterculus (1719); Quintilian (1720); Justin (1722); Ovid (1727); Poetae Latini minores (1731); Suetonius (1736) ; Lucan (1740). He also published an edition of Buchanan's works, continued Graevius's great work, Thesaurus Antiquitatum et Historiarum Italiae, and wrote a treatise De Vectigalibus popult Romani (1694) and a short manual of Roman antiquities, Antiquitatum Romanarum Brevis Descriptio (1711). His Sylloge epistolarum a viris illustribus scriptarum (1725) is of importance for the history of learned men. The list of his works occupies five pages in Saxe's Onomasticon. His poems and orations were published after his death. There is an account of his life in the Gentleman's Magazine for April (1742) by Dr Samuel Johnson.

BURMANN, PIETER (1714-1778), called by himself "the Younger " (Secundus), Dutch philologist, nephew of the above, was born at Amsterdam on the 13th of October 1714. He was brought up by his uncle in Leiden, and afterwards studied law and philology under C. A. Duker and Arnold von Drakenborch at Utrecht. In 1735 he was appointed professor of eloquence and history at Franeker, with which the chair of poetry was combined in 1741. In the following year he left Franeker for Amsterdam to become professor of history and philology at the Athenaeum. He was subsequently professor of poetry (1744), general librarian (1752), and inspector of the gymnasium (1753). In 1777 he retired, and died on the 24th of June 1778 at Sand- horst, near Amsterdam. He resembled his more famous uncle in the manner and direction of his studies, and in his violent disposition, which involved him in quarrels with contemporaries, notably Saxe and Klotz. He was a man of extensive learning, and had a great talent for Latin poetry. His most valuable works are: Anthologia Veterum Latinorum Epigrammatum et Poematum (1759-1773); Aristopkanis Qomoediae Novem (1760); Rhetorica ad Herennium (1761). He completed the editions of Virgil (1746)

and Claudian (1760), which had been left unfinished by his uncle, and commenced an edition of Propertius, one of his best works, which was only half printed at the time of his death. It was completed by L. van Santen and published in 1780.

BURMESE WARS. Three wars were fought between Burma and the British during the 19th century (see Burma: History)ˆ which resulted in the gradual extinction of Burmese independence.

First Burmese War, 1823-26. — On the 23rd of September 1823 an armed party of Burmese attacked a British guard on Shapura, an island close to the Chittagong side, killing and wounding six of the guard. Two Burmese armies, one from Manipur and another from Assam, also entered Cachar, which was under British protection, in January 1824. War with Burma was formally declared on the 5th of March 1824. On the 17th of May a Burmese force invaded Chittagong and drove a mixed sepoy and police detachment from its position at Ramu, but did not follow up its success. The British rulers in India, however, had resolved to carry the war into the enemy's country; an armament, under Commodore Charles Grant and Sir Archibald Campbell, entered the Rangoon river, and anchored off the town on the 10th of May 1824. After a feeble resistance the place, then little more than a large stockaded village, was surrendered, and the troops were landed. The place was entirely deserted by its inhabitants, the provisions were carried off or destroyed, and the invading force took possession of a complete solitude. On the 28th of May Sir A. Campbell ordered an attack on some of the nearest posts, which were all carried after a steadily weakening defence. Another attack was made on the 10th of June on the stockades at the village of Kemmendine. Some of these were battered by artillery frdm the war vessels in the river, and the shot and shells had such effect on the Burmese that they evacuated them, after a very unequal resistance. It soon, how- ever, became apparent that the expedition had been undertaken with very imperfect knowledge of the country, and without adequate provision. The devastation of the country, which was part of the defensive system of the Burmese, was carried out with unrelenting rigour, and the invaders were soon reduced to great difficulties. The health of the men declined, and their ranks were fearfully thinned. The monarch of Ava sent large reinforcements to his dispirited and beaten army; and early in June an attack was commenced on the British line, but proved unsuccessful. On the 8th the British assaulted. The enemy were beaten at all points; and their strongest stockaded works, battered to pieces by a powerful artillery, were in general abandoned. With the exception of an attack by the prince of Tharrawaddy in the end of

August, the enemy allowed the.British to remain unmolested during the months of July and August. This interval was employed by Sir A. Campbell in subduing the Burmese provinces of Tavoy and Mergui, and the whole coast of Tenasserim. This was an important conquest, as the country was salubrious and afforded convalescent stations to the sick, who were now so numerous in the British army that there were scarcely 3000 soldiers fit for duty. An expedition was about this time sent against the old Portuguese fort and factory of Syriam, at the mouth of the Pegu river, which was taken; and in October the province of Martaban.was reduced under the authority of the British.

The rainy season terminated about the end of October; and the court of Ava, alarmed by the discomfiture of its armies, recalled the veteran legions which were employed in Arakan, under their renowned leader Maha Bandula. Bandula hastened by forced marches to the defence of his country; and by the end of November an army of 60,000 men had surrounded the British position at Rangoon and Kemmendine, for the defence of which Sir Archibald Campbell had only 5000 efficient troops. The enemy in great force made repeated attacks on Kemmendine without success, and on the 7th of December Bandula was defeated in a counter attack made by Sir A. Campbell. The fugitives retired to a strong position on the river, which they again entrenched; and here they were attacked by the British on the 15th, and driven in complete confusion from the field.

Sir Archibald Campbell now resolved to advance on Prome,

Hi

about 100 m. higher up the Irrawaddy river. He moved with his force on the 13th of February 1825 in two divisions, one oroceeding by land, and the other, under General Willoughby Cotton, destined for the reduction of Danubyu, being embarked on Ihe flotilla. Taking the command of the land force, he con- tinued his advance till the nth of March, when intelligence reached him of the failure of the attack upon Danubyu. He instantly commenced a retrograde march; on the 2 7th he effected a junction with General Cotton's force, and on the 2nd of April entered the entrenchments at Danubyu without resistance, Bandula having been killed by the explosion of a bomb. The English general entered Prome on the 25th, and remained there during the rainy season. On the 17th of September an armistice was concluded for one month. In the course of the summer General

Joseph Morrison had conquered the province of Arakan; in the north the Burmese were expelled from Assam; and the British had made some progress in Cachar, though their advance was finally impeded by the thick forests and jungle.

The armistice having expired on the 3rd of November, the army of Ava, amounting to 60,000 men, advanced in three divisions against the British position at Prome, which was defended by 3000 Europeans and 2000 native troops. But the British still triumphed, and after several actions, in which the Burmese were the assailants and were partially successful, Sir A. Campbell, on the 1st of December, attacked the different divisions of their army, and successively drove them from all their positions, and dispersed them in every direction. The Burmese retired on Malun, along the course of the Irrawaddy, where they occupied, with 10,000 or 12,000 men, a series of strongly fortified heights and a formidable .stockade. On the 26th they sent a flag of truce to the British camp; and negotiations having commenced, peace was proposed to them on the following conditions: — (1) The cession of Arakan, together with the provinces of Mergui, Tavoy and Ye; (2) the renuncia- tion by the Burmese sovereign of all claims upon Assam and the contiguous petty states; (3) the Company to be paid a. crore of rupees as an indemnification for the expenses of the war; (4) residents from each court to be allowed, with an escort of fifty men; while it was also stipulated that British ships should no longer be obliged to unship their rudders and land their guns as formerly in the Burmese ports. This treaty was agreed to and signed, but the ratification of the king was still wanting; and it was soon apparent that the Burmese had no intention to sign it, but were preparing to renew the contest. On the 1 9th of January, accordingly, Sir A. Campbell attacked and carried the enemy's position at Malun. Another offer of peace was here made by the Burmese, but it was found to be insincere; and the fugitive army made at the ancient city of Pagan a final stand in defence of the capital. They were attacked and overthrown on the 9th of February 1826; and the invading force being now within four days' march of Ava, Dr Price, an American missionary, who with other Europeans had been thrown into prison when the war commenced, was sent to the British camp with the treaty (known as the treaty of Yandaboo) ratified, the prisoners of war released, and an instalment of 25 lakhs of rupees. The war was thus brought to a successful termination, and the British army evacuated the country.

■*Second Burmese War, 1852. — On the 15th of March 1852 Lord Dalhousie sent an ultimatum to King Pagan, announcing that hostile operations would be commenced if all his demands were not agreed*

to by the 1st of April. Meanwhile a force consisting of 8100 troops had been despatched to Rangoon under the command of General H. T. Godwin, C.B., while Commodore Lambert commanded the naval contingent. No reply being given to this letter, the first blow of the Second Burmese War was struck by the British on the 5th of April 1852, when Martaban was taken. Rangoon town was occupied on the 12th, and the Shwe Dag&n pagoda on the 14th, after heavy fighting, when the Burmese army retired northwards. Bassein was seized on the 19th of May, and Pegu was taken on the 3rd of June, after some sharp fighting round the Shwe-maw-daw pagoda. During the rainy season the approval of the East India Company's court of

directors and of the British government was obtained to the annexation of the lower portion of the Irrawaddy Valley, including Prome. Lord Dalhousie visited Rangoon in July and August, and discussed the whole situation with the civil, military and naval authorities. In consequence General Godwin occupied Prome on the 9th of October after but slight resistance. Early in December Lord Dalhousie informed King Pagan that the province of Pegu would henceforth form part of the British dominions, and that if his troops resisted the measure his whole kingdom would be destroyed. The proclamation of annexation was- issued on the 20th of January 1853, and thus the Second Burmese War was brought to an end without any treaty being signed.

Third Burmese War, 1885-86. — The imposition of an im- possible fine on the Bombay-Burma Trading Company, coupled with the threat of confiscation of all their rights and property in case of non-payment, led to the British ultimatum of the 22nd of October 1885; and by the 9th of November a practical refusal of the terms having been received at Rangoon, the occupa- tion of Mandalay and the dethronement of King Thibaw were determined upon. At this time, beyond the fact that the country was one of dense jungle, and therefore most unfavour- able for military operations, little was known of the interior of Upper Burma; but British steamers had for years been run- ning on the great river highway of the Irrawaddy, from Rangoon to Mandalay, and it was obvious that the quickest and most satisfactory method of carrying out the British campaign was an advance by water direct on the capital. Fortunately a large number of light-draught river steamers and barges (or " flats "), belonging to the Irrawaddy Flotilla Company, were available at Rangoon, and the local knowledge of the company's officers of the difficult river navigation was at the disposal of the govern- ment. Major-General, afterwards Sir, H. N. D. Prendergast, V.C., K.C.B., R.E., was placed in command of the expedition. As was only to be

expected in an enterprise of this description, the navy as well as the army was called in requisition; and as usual the services rendered by the seamen and guns were most im- portant. The total effective of the force was 9034 fighting men, 2810 native followers and 67 guns, and for river service, 24 machine guns. The river fleet which conveyed the troops and stores was composed of a total of no less than 55 steamers, barges, launches, &c.

Thayetmyo was the British post on the river nearest to the frontier, and here, by 14th November, five days after Thibaw's answer had been received, practically the whole expedition was assembled. On the same day General Prendergast received instructions to commence operations. The Burmese king and his country were taken completely by surprise by the unexampled rapidity of the advance. There had been no time for them to collect and organize for the stubborn resistance of which the river and its defences were capable. They had not even been able to block the river by sinking steamers, &c, across it, for, on the very day of the receipt of orders to advance, the armed steamers, the "Irrawaddy " and " Kathleen," engaged the nearest Burmese batteries, and brought .out from under their guns the king's steamer and some barges which were lying in readiness for this very purpose. On the 16th the batteries themselves on both banks were taken by a land attack, the enemy being evidently unprepared and making no resistance. On the 17 th of November, however, at Minhla, on the right bank of the river, the Burmans in considerable force held successively a barricade, a pagoda and the redoubt of Minhla. The attack was pressed home by a brigade of native infantry on shore, covered by a bombardment from the river, and the enemy were defeated with a loss of 170 killed and 276 prisoners, besides many more drowned in the attempt to escape by the river. The advance was continued next day and the following days, the naval brigade and heavy artillery leading and silencing in succession the enemy's river defences at Nyaungu, Pakokku and Myingyan. On the 26th of November, when the flotilla was approaching the ancient capital of Ava, envoys from King Thibaw met General Prender- gast with offers of surrender; and on the 27th, when the ships

were lying off that city and ready to commence hostilities, the order of the king to his troops to lay down their arms was received. There were three strong forts here, full at that moment with thousands of armed Burmans, and though a large number of these filed past and

laid down their arms by the king's com- mand, still many more were allowed to disperse with their weapons; and these, in the time that followed, broke up into dacoit or guerrilla bands, which became the scourge of the country and prolonged the war for years. Meanwhile, however, the surrender of the king of Burma was complete; and on the 28th of November, in less than a fortnight from the declaration of war, Mandalay had fallen, and the king himself was a prisoner, while every strong fort and town on the river, and all the king's ordnance (1861 pieces), and thousands of rifles, muskets and arms had been taken. Much valuable and curious " loot " and property was found in the palace and city of Mandalay, which, when sold, realized about 9 lakhs of rupees (£60,000).

From Mandalay, General Prendergast seized Bhamo on the 28th of December. This was a very important move, as it fore- stalled the Chinese, who were preparing to claim the place. But unfortunately, although the king was dethroned and deported, and the capital and the whole of the river in the hands of the British, the bands of armed soldiery, unaccustomed to conditions other than those of anarchy, rapine and murder, took advantage of the impenetrable cover of their jungles to continue a desultory armed resistance. Reinforcements had to be poured into the country, and it was in this phase of the campaign, lasting several years, that the most difficult and most arduous work fell to the lot of the troops. It was in this jungle warfare that the losses from battle, sickness and privation steadily mounted up; and the troops, both British and native, proved once again their fortitude and courage.

Various expeditions followed one another in rapid succession, penetrating to the remotest corners of the land, and bringing peace and protection to the inhabitants, who, it must be men- tioned, suffered at least as ihuch from the dacoits as did the troops. The final, and now completely successful, pacification of the country, under the direction of Sir Frederick (afterwards Earl) Roberts, was only brought about by an extensive system of small protective posts scattered all over the country, and small lightly equipped columns moving out to disperse the enemy whenever a gathering came to a head, or a pretended prince or king appeared.

No account of the Third Burmese War would be complete without a reference to the first, and perhaps for this reason most notable, land advance into the enemy's country. This was carried out in November 1885 from Toungoo, the British frontier post in the east of the country, by a small column of all arms under Colonel W. P. Dicken, 3rd Madras Light Infantry, the first objective being Ningyan. The

operations were completely successful, in spite of a good deal of scattered resistance, and the force afterwards moved forward to Yamethin and Hlaingdet. As inland operations developed, the want of mounted troops was badly felt, and several regiments of cavalry were brought over from India, while mounted infantry was raised locally. It was found that without these most useful arms it was generally impossible to follow up and punish the active enemy.

BURN, RICHARD (1700-1785), English legal writer, was born at Win ton, Westmorland, in 1709. Educated at Queen's College, Oxford, he entered the Church, and in 1736 became vicar of Orton in Westmorland. He was a justice of the peace for the counties of Westmorland and Cumberland, and devoted himself to the study of law. He was appointed chancellor of the diocese of Carlisle in 1765, an office which he held till his death at Orton on the 12th of November 1785. Burn's Justice of the Peace and Parish Officer, first published in 1755, was for many years the standard authority on the law relating to justices of the peace. It has passed through innumerable editions. His Ecclesiastical Law (1760), a work of much research,' was the foundation upon which were built many modern commentaries on ecclesiastical law. The best edition is that by R. Phillimore (4 vols., 1842).

Burn also wrote Digest of the Militia Laws (1760), and A Nets Law Dictionary (2 vols., 1792).

BURNABY, FREDERICK GUSTAVUS (1842-1885), English traveller and soldier, was born on the 3rd of March 1842, at Bedford, the son of a clergyman. Educated at Harrow and in Germany, he entered the Royal Horse Guards in 1859. Finding no chance for active service, his spirit of adventure sought outlets in balloon-ascents and in travels through Spain and Russia. In the summer of 1874 he accompanied the Carlist forces as correspondent of The Times, but before the end of the war he was transferred to Africa to report on Gordon's expedition to the Sudan. This took Burnaby as far as Khartum. Returning to England in March 1875, he matured his plans for a journey on horseback to Khiva through Russian Asia, which had just been closed to travellers. His accomplishment of this task, in the winterof 1875-1876, described inhis book A Ride toKhiva,brought him immediate fame. His next leave of absence was spent in another adventurous journey on horseback, through Asia Minor, from Scutari to Erzerum, with the object of observing the Russian frontier, an account of which he afterwards published. In the Russo-Turkish War of 1877, Burnaby (who soon after- wards became lieut.-colonel) acted as travelling agent to the Stafford House

(Red Cross) Committee, but had to return to England before the campaign was over. At this point began his active interest in politics, and in 1880 he unsuccessfully contested a seat at Birmingham in the Tory-Democrat interest. In 1882 he crossed the Channel in a balloon. Having been disappointed in his hope of seeing active service in the Egyptian campaign of 1882, he participated in the Suakin campaign of 1884 without official leave, and was wounded at El Teb when acting as an intelligence officer under General Valentine Baker. This did not deter him from a similar course when a fresh expedition started up the Nile. He was given a post by Lord Wolseley, and met his death in the hand-to-hand fighting of the battle of Abu Klea (17th January 1885).

BURNAND, SIR FRANCIS COWLEY (1836-), English humorist, was born in London on the 29th of November 1836. His father was a London stockbroker, of French-Swiss origin; his mother Emma Cowley, a direct descendant of Hannah Cowley (1743-1809), the English poet and dramatist. He was educated at Eton and Cambridge, and originally studied first for the Anglican, then for the Roman Catholic Church; but eventually took to the law and was called to the bar. From his earliest days, however, the stage had attracted him — he founded the Amateur Dramatic Club at Cambridge, — and finally he abandoned the church and the law, first for the stage and subsequently for dramatic authorship. His first great dramatic success was made with the burlesque Black-Eyed Susan, and he wrote a large number of other burlesques, comedies and farces. One of his early burlesques came under the favourable notice of Mark Lemon, then editor of Punch, and Burnand, who was already writing for the comic paper Fun, became in 1862 a regular contributor to Punch. In 1880 he was appointed editor of Punch, and only retired from that position in 1906. In 1902 he was knighted. His literary reputation as a humorist depends, apart from his long association with Punch, on his well- known book Happy Thoughts, originally published in Punch in 1863-1864 and frequently reprinted.

See Recollections and Reminiscences, by Sir F. C. Burnand (London,

1904).

BURNE-JONES, SIR EDWARD BURNE, Bart. (1833-1898), English painter and designer, was born on the 28th of August 1833 at Birmingham. His father was a Welsh descent, and the idealism of his nature and art has been attributed to this Celtic strain. An only son, he was educated at King Edward's school, Birmingham, and destined for the Church. He retained through life an interest in classical

studies, but it was the mythology of the classics which fascinated him. He went into residence as a scholar at Exeter College, Oxford, in January 1853. On the same day William Morris entered the same college, having also the intention of taking orders. The two were thrown together, and grew close friends. Their similar tastes and enthusiasms were

mutually stimulated. Burne- Jones resumed his early love of drawing and designing. With Morris he read Modern Painters and the Morte d' Arthur. He studied the Italian pictures in the University galleries, and Diirer's engravings; but his keenest enthusiasm was kindled by the sight of two works by a living man, Rossetti. One of these was a woodcut in Allingham's poems, " The Maids of Elfinmere "; the other was the water-colour " Dante drawing an Angel," then belonging to Mr Coombe, of the Clarendon Press, and now in the University collection. Having found his true vocation, Burne-Jones, like his friend Morris, determined to relinquish his thoughts of the Church and to become an artist. Rossetti, although not yet seen by him, was his chosen master; and early in 1856 he had the happiness, in London, of meeting him. At Easter he left college without taking a degree. This was his own decision, not due (as often stated) to Rossetti's persuasion; but on settling in London, where Morris soon joined him at 17 Red Lion Square, he began to work under Rossetti's friendly instruction and encouraging guidance.

As Burne-Jones once said, he " found himself at five-and- twenty what he ought to have been at fifteen." He had had no regular training as a draughtsman, and lacked the confidence of science. But his extraordinary faculty of invention as a designer was already ripening; his mind, rich in knowledge of classical story and medieval romance, teemed with pictorial subjects; and he set himself to complete his equipment by resolute labour, witnessed by innumerable drawings. The works of this first period are all more or less tinged by the influence of Rossetti; but they are already differentiated from the elder master's style by their more facile though less intensely felt elaboration of imaginative detail. Many are pen-and-ink draw- ings on vellum, exquisitely finished, of which the " Waxen Image " is one of the earliest and best examples; it is dated 1856. Although subject, medium and manner derive from Rossetti's inspiration, it is not the hand of a pupil merely, but of a potential master. This was recognized by Rossetti himself, who before long avowed that he had

nothing more to teach him. Burne-Jones's first sketch in oils dates from this same year, 1856; and during 1857 he made for Bradfield College the first of what was to be an immense series of cartoons for stained glass. In 1858 he decorated a cabinet with the " Prioress's Tale" from Chaucer, his first direct illustration of the work of a poet whom he especially loved and who inspired him with endless subjects. Thus early, therefore, we see the artist busy in all the various fields in which he was to labour.

In the autumn of 1857 Bume-Jones joined in Rossetti's ill- fated scheme to decorate the walls of the Oxford Union. None of the painters had mastered the technique of fresco, and their pictures had begun to peel from the walls before they were com- pleted. In 1859 Burne-Jones made his first journey to Italy. He saw Florence, Pisa, Siena, Venice and other places, and appears to have found the gentle and romantic Sienese more attractive than any other school. Rossetti's influence still persisted; and its impress is visible, more strongly perhaps than ever before, in the two water-colours " Sidonia von Bork " and " Clara von Bork," painted in i860. These little masterpieces have a directness of execution rare with the artist. In powerful characterization, combined with a decorative motive, they rival Rossetti at his best. In June of this year Burne-Jones was married to Miss Georgiana Macdonald, two of whose sisters were the wives of Sir E. Poynter and Mr J. L. Kipling, and they settled in Bloomsbury. Five years later he moved to Kensington Square, and shortly afterwards to the Grange, Fulham, an old house with a garden, where he resided till his death. In 1862 the artist and his wife accompanied Ruskin to Italy, visiting Milan and Venice.

In 1864 he was elected an associate of the Society of Painters in Water-Colours, and exhibited, among other works, " The Merciful Knight," the first picture which fully revealed his ripened personality as an artist. The next six years saw a series of fine water-colours at the same gallery; but in 1870, owing .to a misunderstanding, Burne-Jones resigned his membership

of the society. He was re-elected in 1886. During the next seven years, 1870-1877, only two works of the painter's were exhibited. These were two water-colours, shown at the Dudley Gallery in 1873, one of them being the beautiful " Love among the Ruins," destroyed twenty years later by a cleaner who supposed it to be an oil painting, but afterwards reproduced in oils by the painter. This silent period was, however, one of unremitting production. Hitherto Burne-Jones had worked almost entirely in water-colours. He now began a number of large pictures in oils, working at them in turn, and having

always several on hand. The " Briar Rose " series, " Laus Veneris," the " Golden Stairs," the " Pygmalion " series, and " The Mirror of Venus " are among the works planned and completed, or carried far towards completion, during these years. At last, in May 1877, the day of recognition came, with the opening of the first exhibition of the Grosvenor Gallery, when the " Days, of Creation," the " Beguiling of Merlin," and the " Mirror of- Venus " were all shown. Burne-Jones followed up the signal success of these pictures with " Laus Veneris," the " Chant d' Amour," " Pan and Psyche," and other works, exhibited in 1878. Most of these pictures are painted in gay and brilliant colours. A change is noticeable next year, 1879, in the " An- nunciation" and in the four pictures called "Pygmalion and the Image "; the former of these, one of the simplest and most perfect of the artist's works, is subdued and sober; in the latter a scheme of soft and delicate tints was attempted, not with entire success. A similar temperance of colours marks the " Golden Stairs," first exhibited in 1880. In 1884, following the almost sombre " Wheel of Fortune " of the preceding year, appeared " King Cophetua and the Beggar Maid," in which Burne-Jones once more indulged his love of gorgeous colour, refined by the period of self-restraint. This masterpiece is now in the National collection. He next turned to two important sets of pictures, " The Briar Rose " and " The Story of Perseus," though these were not completed for some years to come. In 1886, having been elected A.R.A. the previous year, he exhibited (for the only time) at the Royal Academy " The Depths of the Sea," a mermaid carrying down with her a youth whom she has unconsciously drowned in the impetuosity of her love. This picture adds to the habitual haunting charm a tragic irony of conception and a felicity of execution which give it a place apart among Burne- Jones's works. He resigned his Associateship in 1893. One of the " Perseus " series was exhibited in 1887, two more in 1888, with " The Brazen Tower," inspired by the same legend. In 1890 the four pictures of " The Briar Rose " were exhibited by themselves, and won the widest admiration. The huge tempera picture, " The Star of Bethlehem," painted for the corporation of Birmingham, was exhibited in 1891. A long illness for some time checked the painter's activity, which, when resumed, was much occupied with decorative schemes. An exhibition of his work was held at the New Gallery in the winter of 1892-1893. To this period belong several of his comparatively few portraits. In 1894 Burne-Jones was made a baronet Ill-health again interrupted the progress of his works, chief among which was the vast " Arthur in Avalon." In 1898 he had an attack of influenza, and had apparently recovered, when he was again taken suddenly ill, and died on the 17th of June. In the following winter a second exhibition of his

works was held at the New Gallery, and an exhibition of his drawings (including some of the charmingly humorous sketches made for children) at the Burlington Fine Arts Club.

His son and successor in the baronetcy, Sir Philip Burne- Jones (b. 1861), also became well known as an artist. The only daughter, Margaret, married Mr J. W. Mackail.

Burne-Jones's influence has been exercised far less in painting than in the wide field of decorative design. Here it has been enormous. His first designs for stained glass, 1857-1861, were made for Messrs Powell, but after 1861 he worked exclusively for Morris & Co. Windows executed from his cartoons are to be found all over England; others exist in churches abroad. For the American Church in Rome he designed a number of mosaics. Reliefs in metal, tiles, gesso- work, decorations for

pianos and organs, and cartoons for tapestry represent his manifold activity. In all works, however, which were only designed and not carried out by him, a decided loss of delicacy is to be noted. The colouring of the tapestries (of which the " Adoration of the Magi " at Exeter College is the best-known) is more brilliant than successful. The range and fertility of Burne-Jones as a decorative inventor can be perhaps most conveniently studied in thj sketch-book, 1885-1895, which he bequeathed to the British Museum. The artist's influence on book-illustration must also be recorded. In early years he made a few drawings on wood for Dalziel's Bible and for Good Words; but his later work for the Kelmscott Press, founded by Morris in 1891, is that by which he is best remembered. Besides several illustrations to other Kelmscott books, he made eighty- seven designs for the Chaucer of 1897;

Burne- Jones's aim in art is best given in some of his own • words, written to a friend: "I mean by a picture a beautiful, romantic dream of something that never was, never will be — in a light better than any light that ever shone — in a land no one can define or remember, only desire — and the forms divinely beautiful — and then I wake up, with the waking of Brynhild." No artist was ever more true to his aim. Ideals resolutely pursued are apt to provoke the resentment of the world, and Burne- Jones encountered, endured and conquered an extraordinary amount of, angry criticism. In so far as

this was directed against the lack of realism in his pictures, it was beside the point. The earth, the sky, the rocks, the trees, the men and women of Burne-Jones are not those of this world; but they are themselves a world, consistent with itself, and having therefore its own reality. Charged with the beauty and with the strangeness of dreams, it has nothing of a dream's incoherence. Yet it is a dreamer always whose nature penetrates these works, a nature out of sympathy with struggle and strenuous action. Burne- Jones's men and women are dreamers too. It was this which, more than anything else, estranged him from the age into which he was born. But he had an inbred " revolt from fact " which would have estranged him from the actualities of any age. That criticism seems to be more justified which has found in him a lack of such victorious energy and mastery over his materials as would have enabled him to carry out his conceptions in their original intensity. Representing the same kind of tendency as distinguished his French contemporary, Puvis de Chavannes, he was far less in the main current of art, and his position suffers accordingly. Often compared with Botticelli, he had nothing of the fire and vehemence of the Florentine. Yet, if aloof from strenuous action, Burne-Jones was singularly strenuous in production. His industry Was inexhaustible, and needed to be, if it was to keep pace with the constant pressure of his ideas. Invention, a very rare excellence, was his pre-eminent gift. Whatever faults his paintings may have, they have always the fundamental virtue of design; they are always pictures. His fame might rest on his purely decorative work. But his designs were informed with a mind of romantic temper, apt in the discovery of beautiful subjects, and impassioned with a delight in pure and variegated colour. These splendid gifts were directed in a critical and fortunate moment by the genius of Rossetti. Hence a career which shows little waste or misdirection of power, and, granted the aim proposed, a rare level of real success.

Authorities. — In 1904 was published Memorials of Edward Burne-Jones, by his widow, two volumes of extreme interest and charm. The Work of Burne-Jones, a collection of ninety-one photo- gravures, appeared in 1900.

See also Catalogue to Burlington Club Exhibition of Drawings by Burne-Jones, with Introduction by Cosmo Monkhouse (1899; Sir E. Burne-Jones: a Record and a Review, by Malcolm Belt (1898); Sir E. Burne-Jones, his Life and Work, by Julia Cartwright (Mrs Ady) (1894); The Life of William Morris, by J. W. Mackail (1899). (L. B.)

BURNELL, ARTHUR COKE (1840-1882), English Sanskrit scholar,

was born at St Briavels, Gloucestershire, in 1840. His father was an official of the East India Company, and in i860 he himself went out to Madras as a member of the Indian civil service. Here he utilized every available opportunity to acquire or copy Sanskrit manuscripts. In 1870 he presented his collection

of 350 MSS. to the India library. In 1874 he published a Hand- book of South Indian Palaeography, characterized by Max M tiller as "indispensable to every student of Indian literature," and in 1880 issued for the Madras government his greatest work, the Classified Index to the Sanskrit MSS. in the Palace at Tanjore. He was also the author of a large number of translations from, and commentaries on, various other Sanskrit manuscripts, being particularly successful in grouping arid elucidating the essential principles of Hindu law. In addition to his exhaustive acquaint- ance with Sanskrit, and the southern India vernaculars, he had some knowledge of Tibetan, Arabic, Kawi, Javanese and Coptic. Burnell originated with Sir Henry Yule the well-known dic- tionary of Anglo-Indian words and phrases, Hobson-Jobson. His constitution, never strong, broke down prematurely through the combined influence of overwork and the Madras climate, and he died at West Stratton, Hampshire, on the 12th of October 1882. A further collection of Sanskrit manuscripts was pur- chased from his heirs by the India library after his death.

BURNELL, ROBERT (d. 1292), English bishop and chancellor, was born at Acton Burnell in Shropshire, and began his public life probably as a clerk in the royal chancery. He was soon in the service of Edward, the eldest son of King Henry III., and was constantly in attendance on the prince, whose complete confidence he appears to have enjoyed. Having received some ecclesiastical preferments, he acted as one of the regents of the kingdom from the death of Henry III. in November 1272 until August 1274, when the new king, Edward I., returned from Palestine and made him his chancellor. In 1275 Burnell was elected bishop of Bath and Wells, and three years later Edward re- peated the attempt which he had made in 1270 to secure the arch- bishopric of Canterbury for his favourite. The bishop's second failure to obtain this dignity was due, doubtless, to his irregular and unclerical manner of life, a fact which also accounts, in part at least, for the hostility which existed between his victorious rival, Archbishop Peckham, and himself. As the chief adviser of Edward I. during the earlier part of his reign, and moreover as a trained and able lawyer, the bishop took a prominent part in the legislative acts of the " English Justinian," whose activity in this direction coincides practically with Burnefl's tenure of the office of chancellor. The bishop also influenced the king's policy with

regard to France, Scotland and Wales; was frequently employed on business of the highest moment; and was the royal mouthpiece on several important occasions. In 1283 a council, or, as it is sometimes called, a parliament, met in his house at Acton Burnell, and he was responsible for the settlement of the court of chancery in London. In spite of his numerous engagements, Burnell found time to aggrandize his bishopric, to provide liberally for his nephews and other kinsmen, and to pursue his cherished but futile aim of founding a great family. Licentious and avaricious, he amassed great wealth; and when he died on the 25th of October 1292 he left numerous estates in Shropshire, Worcestershire, Somerset, Kent, Surrey and elsewhere. He was, however, genial and kind-hearted, a great lawyer and a faithful minister. . See R. W. Eyton, Antiquities of Shropshire (London, 1854-1860); and E. Foss, The Judges of England, vol. iii. (London, 1848-1864).

BURNES, SIR ALEXANDER (1805-1841), British traveller and explorer, was born at Montrose, Scotland, in 1805. While serving in India, in the army of the East India Company, which he had joined in his seventeenth year, he made himself ac- quainted with Hindustani and Persian, and thus obtained an appointment as interpreter at Surat in 1822. Transferred to Cutch in 1826 as assistant to the political agent, he turned his attention more particularly to the history and geography of north-western India and the adjacent countries, at that time very imperfectly known. His proposal in 1829 to undertake a journey of exploration through the valley of the Indus was not carried out owing to political apprehensions; but in 1831 he was sent to Lahore with a present of horses from King William IV. to Maharaja Ranjit Singh and took advantage of the opportunity for extensive investigations. In the following years his travels were extended through Afghanistan across the Hindu Kush to.

Bokhara and Persia. The narrative which he published on his visit to England in 1834 added immensely to contemporary- knowledge of the countries traversed, and was one of the most pop'Uar books of the time. The first edition brought the author the sum of £800, and his services were recognized not only by the Royal Geographical Society of London, but also by that of Paris. Soon after his return to India in 1835 he was appointed to the court of Sind to secure a treaty for the navigation of the Indus; and in 1836 he undertook a

political mission to Dost Mahommed at Kabul. He advised Lord Auckland to support Dost Mahommed on the throne of Kabul, but the viceroy preferred to follow the opinion of Sir William Macnaghten and reinstated Shah Shuja, thus leading up to the disasters of the first Afghan War. On the restoration of Shah Shuja in 1839, he became regular political agent at Kabul, and remained there till his assassination in 1841 (on the 2nd of November), during the heat of an insurrection. The calmness with which he continued at his post, long after the imminence of his danger was apparent, gives an heroic colouring to the close of an honour- able and devoted life. It came to light in 1861 that some of Burnes' despatches from Kabul in 1839 had been altered, so as to convey opinions opposite to his, but Lord Palmerston refused after such a lapse of time to grant the inquiry demanded in the House of Commons. A narrative of his later labours was published in 1842 under the title of Cabool.

See Sir J. W. Kaye, Lives of Indian Officers (1889).

BURNET, GILBERT (1643-1 715), English bishop and historian, was born in Edinburgh on the 18th of September 1643, of an ancient and distinguished Scottish house. He was the youngest son of Robert Burnet (1592-1661), who at the Restoration became a lord of session with the title of Lord Crimond. Robert Burnet had refused to sign the Scottish Covenant, although the document was drawn up by his brother-in-iaw, Archibald Johnstone, Lord Warristoun. He therefore found it necessary to retire from his profession, and twice went into exile. He disapproved of the rising of the Scots, but was none the less a severe critic of the government of Charles I. and of the action of the Scottish bishops. This moderate attitude he impressed on his son Gilbert, whose early education he directed. The boy entered Marischal College at the age of nine, and five years later graduated M. A. He then spent a year in the study of feudal and civil law before he resolved to devote himself to theology. He became a probationer for the Scottish ministry in 1661 just before episcopal government was re-established in Scotland. His decision to accept episcopal orders led to difficulties with his family, especially with his mother, who held rigid Presby- terian views. From this time dates his friendship with Robert Leighton (1611-1684), who greatly influenced his religious opinions. Leighton had, during a stay in the Spanish Nether- lands, assimilated something of the ascetic and pietistic spirit of Jansenism, and was devoted to the interests of peace in the church. Burnet wisely refused to accept a benefice in the dis- turbed state of church affairs, but he wrote an audacious letter to Archbishop Sharp asking him to take measures to restore peace. Sharp sent for Burnet, and dismissed his advice without apparent

resentment. He had already made valuable acquaint- ances in Edinburgh, and he now visited London, Oxford and Cambridge, and, after a short visit to Edinburgh in 1663, when he sought to secure a reprieve for his uncle Warristoun, he proceeded to travel in France and Holland. At Cambridge he was strongly influenced by the philosophical views of Ralph Cudworth and Henry More, who proposed an unusual degree of toleration within the boundaries of the church and the limitations imposed by its liturgy and episcopal government; and his inter- course in Holland with foreign divines of different Protestant sects further encouraged his tendency to latitudinarianism.

When he returned to England in 1664 he established intimate relations with Sir Robert Moray and with John Maitland, earl and afterwards first duke of Lauderdale, both of whom at that time advocated a tolerant policy towards the Scottish covenanters. Burnet became a member of the Royal Society, of which Moray was the first president. On his father's death he had been offered

a living by a relative, Sir Alexander Burnet, and in 1663 the living of Saltoun, East Lothian, had been kept open for him by one of his father's friends. He was not formally inducted at Saltoun until June 1665, although he had served there since October 1664. For the next five years he devoted himself to his parish, where he won the respect of all parties. In 1666 he alienated the Scottish bishops by a bold memorial (printed in vol. ii. of the Miscellanies of the Scottish Historical Society), in which he pointed out that they were departing from the custom of the primitive church by their excessive pretensions, and yet his attitude was far too moderate to please the Presby- terians. In 1669 he resigned his parish to become professor of divinity in the university of Glasgow, and in the same year he published an exposition of his ecclesiastical views in his Modest and Free Conference between a Conformist and a Nonconformist (by " a lover of peace "). He was Leighton's right hand in the efforts at a compromise between the episcopal and the presby- terian principle. Meanwhile he had begun to differ from Lauderdale, whose policy after the failure of the scheme of " Accommodation " moved in the direction of absolutism and repression, and during Lauderdale's visit to Scotland in 1672 the divergence rapidly developed into opposition. He warily refused the offer of a Scottish bishopric, and published in 1673 his four "conferences," entitled Vindication of the Authority, Constitution and Laws of the Church and State of Scotland, in which he insisted on the duty of passive obedience. It was partly through the influence of Anne (d. 17 16), duchess of Hamilton in her own right, that he had been appointed at Glasgow,

and he made common cause with the Hamiltons. against Lauderdale. The duchess had made over to him the papers of her father and uncle, from which he compiled the Memoirs of the Lives and Actions of James and William, dukes of Hamilton and Castleherald. In which an Account is given of the Rise and Progress of the Civil Wars of Scotland . . . together with many letters . . . written by King Charles I. (London, 1677; Univ. Press, Oxford, 1852), a book which was published as the second volume of a History of the Church of Scotland., Spottiswoode's History forming the first. This work established his reputation as an historian. Meanwhile he had clandestinely married in 167 1 a cousin of Lauderdale, Lady Margaret Kennedy, daughter of John Kennedy, 6th earl of Cassilis, a lady who had already taken an active part in affairs in Scotland, and was eighteen years older than Burnet. The marriage was kept secret for three years, and Burnet renounced all claim to his wife's fortune.

Lauderdale's ascendancy in Scotland and the failure of the attempts at compromise in Scottish church affairs eventually led Burnet to settle in England. He was favourably received by Charles II. in 1673, when he went up to London to arrange for the publication of the Hamilton Memoirs, and he was treated with confidence by the duke of York. On his return to Scotland Lauderdale refused to receive him, and denounced him to Charles II. as one of the chief centres of Scottish discontent. Burnet found it wiser to retire to England on the plea of fulfilling his duties as royal chaplain Once in London he resigned his professorship (September 1674) at Glasgow; but, although James remained his friend, Charles struck him off the roll of court chaplains in 1674, and it was in opposition to court influence that he was made chaplain to the Rolls Chapel by the master, Sir Harbottle Grimston, and appointed lecturer at St Clement's. He was summoned in April 1675 before a committee of the House of Commons to give evidence against Lauderdale, and disclosed, without reluctance according to his enemies, confidences which had passed between him and the minister. He himself confesses in his autobiography that " it was a great error in me to appear in this matter," and his conduct cost him the patronage of the duke of York. In ecclesiastical matters he threw in his lot with Thomas Tillotson and John Tenison, and at the time of the Revolution had written some eighteen polemics against encroachments of the Roman Catholic Church. At the suggestion of Sir William Jones, the attorney-general, he began his History of the Reformation in England, based on original documents.

In the necessary research he received some pecuniary help from Robert Boyle, but he was hindered in the preparation of the first part (1679) through being refused access to the Cotton library, possibly by the influence of Lauderdale. For this volume he received the thanks of parliament, and the second and third volumes appeared in 1681 and 1715. In this work he undertook to refute the statements of Nicholas Sanders, whose De Origine et progressu schismatis Anglicani libri tres (Cologne, 1585) was still, in the French translation of Maucroix, the commonly accepted account of the English reformation. Burnet's contradictions of Sanders must not, however, be accepted without independent investigation. At the time of the Popish Plot in 1678 he displayed some moderation, refusing to believe the charges made against the duke of York, though he chose this time to publish some anti-Roman pamphlets. He tried, at some risk to himself, to save the life of one of the victims, William Staly, and visited William Howard, Viscount Stafford, in the Tower. To the Exclusion Bill he opposed a suggestion of compromise, and it is said that Charles offered him the bishopric of Chichester, " if he would come entirely into his interests." Burnet's reconciliation with the court was short-lived. In January 1680 he addressed to the king a long letter on the subject of his sins; he was known to have received the dangerous confidence of Wilmot, earl of Rochester, in his last illness; and he was even suspected, unjustly, in 1683, of having composed the paper drawn up on the eve of death by William Russell, Lord Russell, whom he attended to the scaffold. On the 5th of November 1684 he preached, at the express wish of his patron Grimston, and against his own desire, the usual anti-Catholic sermon. He was consequently deprived of his appointments by order of the court, and on the accession of James II. retired to Paris. He had already begun the writing of his memoirs, which were to develop into the History of His Own Time.

Burnet now travelled in Italy, Germany and Switzerland, finally settling in Holland'at the Hague, where he won from the princess of Orange a confidence which proved enduring. He rendered a signal service to William by inducing the princess to offer to leave the whole political power in her husband's hands in the event of their succession to the English crown. A prosecution against him for high treason was now set on foot both in England and in Scotland, and he took the precaution of naturalizing himself as a Dutch subject. Lady Margaret Burnet was dying when he left England, and in Holland he married a Dutch heiress of Scottish descent, Mary Scott. He returned to England with William and Mary, and drew up the English text of

their declaration. His earlier views on the doctrine of non-resistance had been sensibly modified by what he saw in France after the revocation of the edict of Nantes and by the course of affairs at home, and in 1688 he published an Inquiry into the Measures of Submission to the Supreme Authority in defence of the revolution. He was consecrated to the see of Salisbury on the 31st of March 1689 by a commission of bishops to whom Archbishop Sancroft had delegated his authority, declining personally to perform the office. In his pastoral letter to his clergy urging them to take the oath of allegiance, Burnet grounded the claim of William and Mary on the right of conquest, a view which gave such offence that the pamphlet was burnt by the common hangman three years later. As bishop he proved an excellent administrator, and gave the closest attention to his pastoral duties. He discouraged plurality of livings, and consequent non-residence, established a school of divinity at Salisbury, and spent much time himself in preparing candidates for confirmation, and in the examination of those who wished to enter the priesthood. Four discourses delivered to the clergy of his diocese were printed in 1694. During Queen Mary's lifetime ecclesiastical patronage passed through her hands, but after her death William III. appointed an ecclesiastical commission, on which Burnet was a prominent member, for the disposal of vacant benefices. In 1696 and 1697 he presented nwmorials to the king suggesting that the first-fruits and tenths raised by the clergy should be devoted to the

augmentation of the poorer livings, and though his suggestions were not immediately accepted, they were carried into effect under Queen Anne by the provision known as Queen Anne's Bounty. His second wife died of smallpox in 1698, and in 170a Burnet married again, his third wife being Elizabeth (1 661-1709), widow of Robert Berkeley and daughter of Sir Richard Blake, a rich and charitable woman, known by her Method of Devotion, posthumously published in 1710. In 1699 he was appointed tutor to the royal duke of Gloucester, son of the Princess Anne, an appointment which he accepted somewhat against his will. His influence at court had declined after the death of Queen Mary; William resented his often officious advice, placed little confidence in his discretion, and soon after his accession is even said to have described him as ein rechter Tartuffe. Burnet made a weighty speech against i-the bill (1 702-1 703) directed against the practice of occasional conformity, and was a consistent exponent of Broad Church principles. He devoted five years' labour to his Exposition of the Thirty-nine Articles (1699; ed. J. R. Page, 1837), which was severely criticized by the High Church clergy. But his hopes for a comprehensive scheme which might

include nonconformists in the English Church were necessarily destroyed on the accession of Queen Anne. He died on the 17th of March 1715, and was buried in the parish of St James's, Clerkenwell.

Burnet directed in his will that his most important work, the History of His Own Time, should appear six years after his death. It was published (2 vols., 1724-1734) by his sons, Gilbert and Thomas, and then not without omissions. It was attacked in 1 7 24 by John Cockburn in A Specimen of some free and impartial Remarks. Burnet's book naturally aroused much opposition, and there were persistent rumours that the MS. had been unduly tampered with. He has been freely charged with gross misrepresentation, an accusation to which he laid himself open, for instance, in the account of the birth of James, the Old Pretender. His later intimacy with the Marlboroughs made him very lenient where the duke was concerned. The greatest value of his work naturally lies in his account of transactions of which he had personal knowledge, notably in his relation of the church history of Scotland, of the Popish Plot, of the proceedings at the Hague previous to the expedition of William and Mary, and of the personal relations between the joint sovereigns.

Of his children by his second wife, William (d. 1729) became a colonial governor in America; Gilbert (d. 1726) became prebendary of Salisbury in 1715, and chaplain to George I. in 1718; and Sir Thomas (1694-1753), his literary executor and biographer, became in 1741 judge in the court of common pleas.

Bibliography. — The chief authorities for Bishop Burnet's life are the autobiography " Rough Draft of my own Life " (ed. H. C. Fox- croft, Oxford, 1902, in the Supplement to Burnet's History), the Life by Sir Thomas Burnet in the History 0} His Own Time (Oxford, 1823, vol. vi.), and the History itself. A rather severe but detailed and useful criticism is given in L. v. Ranke's History of England (Eng. ed., Oxford, 1875), vol. vi. pp. 45-101. Burnet's letters to his friend, George Savile, marquess of Halifax, were published by the Royal Historical Society {Camden Miscellany, vol. xi.). The History of His Own Time (2 vols, fol., 1724-1734) ran through many editions before it was reprinted at the Clarendon Press (6 vols., 1823, and supple- mentary volume, 1833) with the suppressed passages of the first volume and notes by the earls of Dartmouth and Hardwicke, with the remarks of Swift. This edition, under the direction of M. J. Routh, was enlarged in a second Oxford edition of 1833. A new edition, based on this, but making use of the Bodleian MS., which differs very considerably from the printed version, was edited by

Osmund Airy (Oxford, 1897, &c). In 1902 (Clarendon Press, Oxford) Miss H. C. Foxcroft edited A Supplement to Burnet's History of His Own Time, to which is prefixed an account of the relation between the different versions of the History — the Bodleian MS., the fragmentary Harleian MS. in the British Museum and Sir Thomas Burnet's edition; the book contains the remaining fragments of Burnet's original memoirs, his autobiography, his letters to Admiral Herbert and his private meditations. The chief differences between Burnet's original draft as represented by the Bodleian MS. and the printed history consist in a more lenient view generally of individuals, a modification of the censure levelled at the Anglican clergy, changes obviously dictated by a general variation in his point of view, and a more cautious account of personal matters such as his early relations with Lauderdale. He also cut out much minor detail, and information relating to himself and to members of his family. His

History of the Reformation of the Church of England was edited (Clarendon Press, Oxford, 7 vols., 1865) by N. Pocock.

Besides the works mentioned above may be noticed: Some Passages of the Life and Death of John, Earl of Rochester (Lond., 1680; facsimile reprint, with introduction by Lord Ronald Gower, 1875); The Life and Death of Sir Matthew Hale, Kt., sometime Lord Chief-Justice of his Majesties Court of Kings Bench (Lond., 1682), which is included in C. Wordsworth's Ecclesiastical Biography (vol. vi., 1 8 18) ; The History of the Rights of Princes in disposing of Ecclesiastical Benefices and Church Lands (Lond., 1682, 8vo) ; The Life of William Bedell, D.D., Bishop of Kilmore in Ireland (1685), containing the correspondence between Bedell and James Waddesdon of the Holy Inquisition on the subject of the Roman obedience; Reflections on Mr Varillas's " History of the Revolutions that have happened in Europe in matters of Religion," and more particularly on his Ninth Book, that relates to England (Amst., 1686), appended to the account of his travels entitled Some Letters, which was originally published at Rotterdam (1686) ; A Discourse of the Pastoral Care (1692, 14th ed., 1821); An Essay on the Memory of the late Queen (1695) I A Collection of various Tracts and Discourses written in the Years 1677 to 1704 (3 vols., 1704) ; and A Collection of Speeches, Prefaces, Letters, with a Description of Geneva and 'Holland (17 13). Of his shorter religious and polemical works a

catalogue is given in vol. vi. of the Clarendon Press edition of his History, and in Lowndes's Bibliographer's Manual. The following translations deserve to be mentioned: — Utopia, written in Latin by Sir Thomas More, Chancellor of England: translated into English (1685) ; A Relation of the Death of the Primitive Persecutors, written originally in Latin, by L. C. F. Lactantius: Englished by Gilbert Burnet, D.D., to which he hath made a large preface concerning Persecution (Amst.,

1687).

See also A Life of Gilbert Burnet, Bishop of Salisbury (1907), by T. E. S. Clarke and H. C. Foxcroft, with an introduction by C. H. Firth, which contains a chronological list of Burnet's published works. Of Burnet's personal character there are well-known de- scriptions in chapter vii. of Macaulay's History of England, and in W. E. H. Lecky's History of England in the Eighteenth Century, vol. i. pp. 80 seq.

BURNET, THOMAS (1635-1715), English divine, was born at Croft in Yorkshire about the year 1635. He was educated at Northallerton, and at Clare Hall, Cambridge. In r657 he was made fellow of Christ's, and in 1667 senior proctor of the uni- versity. By the interest of James, duke of Ormonde, he was chosen master of the Charterhouse in 1685, and took the degree of D.D. As master he made a noble stand against the illegal attempts to admit Andrew Popham as a pensioner of the house, strenuously opposing an order of the 26th of December 1686, addressed by James II. to the governors dispensing with the statutes for the occasion.

Burnet published his famous Telluris Theoria Sacra, or Sacred Theory of the Earth, 1 at London in 1681. This work, containing a fanciful theory of the earth's structure, 2 attracted much attention, and he was afterwards encouraged to issue an English translation, which was printed in folio, 1684-1689. Addison commended the author in a Latin ode, but his theory was attacked by John Keill, William Whiston and Erasmus Warren, to all of whom he returned answers. His reputation obtained for him an introduction at court by Archbishop Tillotson, whom he succeeded as clerk of the closet to King William. But he suddenly marred his prospects by the publication, in 1692, of a work entitled Archaeologiae Philosophicae: sive Doctrina anliqua de Rerum Originibus, in which he treated the Mosaic account of the fall of man as an allegory. This excited a great clamour against him; and the king was obliged to remove him from his office at court. Of this book an English translation was published in 1729. Burnet published several other minor works before his death, which took place at the Charterhouse on the 27th September r7i5. Two posthumous works appeared several years after his death — De Fide et Officiis Christianorum (1723), and De Statu Mortuorum et Resur gentium Traclatus (1723); in which he maintained the doctrine of a middle state, the millennium, and the limited duration of future punishment. A Life of Dr Burnet, by Heathcote, appeared in 1759.

1 " Which," says Samuel Johnson, " the critick ought to read for its

elegance, the philosopher for its arguments, and the saint for its piety " {Lives of English Poets, vol. i. p. 303).

2 Burnet held that at the deluge the earth was crushed like an egg, the internal waters rushing out, and the fragments of shell becoming the mountains.

BURNET, known botanically as Poterium, a member of the rose family. The plants are perennial herbs with pinnate leaves and small flowers arranged in dense long-stalked heads. Great burnet {Poterium officinale) is found in damp meadows; salad burnet {P. Sanguisorba) is a smaller plant with much smaller flower-heads growing in dry pastures.

BURNETT, FRANCES ELIZA HODGSON (1849-), Anglo- American novelist, whose maiden name was Hodgson, was born in Manchester, England, on the 24th of November 1849; she went to America with her parents, who settled in Knoxville, Tennessee, in 1865. Miss Hodgson soon began to write stories for magazines. In 1873 she married Dr L. M. Burnett of Washington, whom she afterwards (1898) divorced. Her reputation as a novelist was made by her remarkable tale of Lancashire life, That Lass 0′ Lowie's (1877), and a number of other volumes followed, of which the best were Through one Administration (1883) and A Lady of Quality (1896). In r886 she attained a new popularity by her charming story of Little Lord Fauntleroy, and this led to other stories of child-life. Little Lord Fauntleroy was dramatized (see Copyright for the legal questions involved) and had a great success on the stage; and other dramas by her were also produced. In r900 she married a second time, her husband being Mr Stephen Townesend, a surgeon, who (as Will Dennis) had taken to the stage and had collaborated with her in some of her plays.

BURNEY, CHARLES (1726-1814), English musical historian, was born at Shrewsbury on the 12th of April 1726. He received his earlier education at the free school of that city, and was afterwards sent to the public school at Chester. His first music master was Edmund Baker, organist of Chester cathedral, and a pupil of Dr John Blow. Returning to Shrewsbury when about fifteen years old, he continued his musical studies for three years under his half-brother, James Burney, organist of St Mary's church, and was then sent to London as a pupil of the celebrated Dr Arne, with whom he remained three years. Burney wrote some music for Thomson's Alfred, which was produced at Drury Lane theatre on the 30th of March 1745. In 1749 he was appointed organist of St Dionis-Backchurch, Fenchurch

Street, with a salary of £30 a year; and he was also engaged to take the harpsichord in the " New Concerts " then recently established at the King's Arms, Cornhill. In that year he married Miss Esther Sleepe, who died in 1761 ; in 1769 he married Mrs Stephen Allen of Lynn. Being threatened with a pulmonary affection he went in 1751 to Lynn in Norfolk, where he was elected organist, with an annual salary of £100, and there he resided for the next nine years. During that time he began to entertain the idea of writing a general history of music. His Ode for St Cecilia's Day was performed at Ranelagh Gardens in 1759; and in 1760 he re- turned to London in good health and with a young family; the eldest child, a girl of eight years of age, surprised the public by her attainments as a harpsichord player. The concertos for the harpsichord which Burney published soon after his return to London were regarded with much admiration. In 1766 he pro- duced, at Drury Lane, a free English version and adaptation of J. J. Rousseau's operetta Le Devin du village, under the title of The Cunning Man. The university of Oxford conferred upon him, on the 23rd of June 1769, the degrees of Bachelor and Doctor of Music, on which occasion he presided at the perform- ance of his exercise for these degrees. This consisted of an anthem, with an overture, solos, recitatives and choruses, accompanied by instruments, besides a vocal anthem in eight parts, which was not performed. In 1 769 he published An Essay towards a History of Comets.

Amidst his various professional avocations, Burney never lost sight of his favourite object — his History of Music — and there- fore resolved to travel abroad for the purpose of collecting materials that could not be found in Great Britain. Accordingly, he left London in June 1770, furnished with numerous letters of introduction, and proceeded to Paris, and thence to Geneva, Turin, Milan, Padua, Venice, Bologna, Florence, Rome and Naples. The results of his observations he published in The Present State of Music in France and Italy (17 71). Dr Johnson

thought so well of this work that, alluding to his own Journey to the Western Islands of Scotland, he said, " I had that clever dog Burney's Musical Tour in my eye." In July 1772 Burney again visited the continent, to collect further materials, and, after his return to London, published his tour under the title of The Present State of Music in Germany, the Netherlands and United Provinces (1773). In

1773 he was chosen a fellow of the Royal Society. In 1776 appeared the first volume (in 4to) of his long- projected History of Music. In 1782 Burney published his second volume; and in 1789 the third and fourth. Though severely criticized by Forkel in Germany and by the Spanish ex- Jesuit, Requeno, who, in his Italian' work Saggj sul Ristabili- mento dell' Arte Armonica de' Greci e Romani Cantori (Parma, 1798), attacks Burney's account of the ancient Greek music, and calls him lo scompigliato Burney, the History of Music was generally recognized as possessing great merit. The least satis- factory volume is the fourth, the treatment of Handel and Bach being quite inadequate. Burney's first tour was translated into German by Ebeling, and printed at Hamburg in 1772; and his second tour, translated into German by Bode, was published at Hamburg in 1773. A Dutch translation of his second tour, with notes by J. W. Lustig, organist at Groningen, was published there in 1786. The Dissertation on the Music of the Ancients, in the first volume of Burney's History, was translated into German by J. J. Eschenburg, and printed at Leipzig, 1781. Burney derived much aid from the first two' volumes of Padre Martini's very learned Storia della Musica (Bologna, 1757-1770). One cannot but admire his persevering industry, and his sacrifices of time, money and personal comfort, in collecting and preparing materials for his History, and few will be disposed to condemn severely errors and oversights in a work of such extent and difficulty.

In 1774 he had written A Plan for a Music School. In 1779 he wrote for the Royal Society an account of the infant Crotch, whose remarkable musical talent excited so much attention at that time. In 1784 he published, with an Italian title-page, the music annually performed in the pope's chapel at Rome during Passion Week. In 1785 he published, for the benefit of the Musical Fund, an account of the first commemoration of Handel in Westminster Abbey in the preceding year, with an excellent life of Handel. In 1796 he published Memoirs and Letters of Metastasio. Towards the close of his life Burney was paid £1000 for contributing to Rees's Cyclopaedia all the musical articles not belonging to the department of natural philosophy and mathematics. In 1783, through the treasury influence of his friend Edmund Burke, he was appointed organist to the chapel of Chelsea Hospital, and he moved his residence from St Martin's Street, Leicester Square, to live in the hospital for the remainder of his life. He was made a member of the Institute of France, and nominated a correspondent in the class of the fine arts, in the year 18 10. From 1806 until his death he enjoyed a pension of £300 granted by Fox. He died at Chelsea

College on the 1 2th of April 1814, and was interred in the burying-ground of the college. A tablet was erected to his memory in Westminster Abbey.

Burney's portrait was painted by Reynolds, and his bust was cut by Nollekens in 1805. He had a wide circle of acquaintance among the distinguished artists and literary men of his day. At one time he thought of writing a life of his friend Dr Samuel Johnson, but he retired before the crowd of biographers who rushed into that field. His character in private as well as in public life appears to have been very amiable and exemplary. Dr Burney's eldest son, James, was a distinguished officer in the royal navy, who died a rear-admiral in 182 1; his second son was the Rev. Charles Burney, D.D. ˆ757-1817), a well-known classical scholar, whose splendid collection of rare books and MSS. was ultimately bought by the nation for the British Museum; and his second daughter was Frances (Madame D'Arblay, q.v.).

The Diary and Letters of Madame D'Arblay contain many minute and interesting particulars of her father's public and private life, and of his friends and contemporaries. A life of Burney by Madame DArblay appeared in 1832.

Besides the operatic music above mentioned, Burney's known

compositions consist of: — (1) Six Sonatas for the harpsichord; (2) Two Sonatas for the harp or piano, with accompaniments for violin and violoncello; (3) Sonatas for two violins and a bass: two sets; (4) Six Lessons for the harpsichord ; (5) Six Duets for two German flutes; (6) Three Concertos for the harpsichord; (7) Six concert pieces with an introduction and fugue for the organ; (8) Six Concertos for the violin, &.c, in eight parts; (9) Two Sonatas for pianoforte, violin and violoncello; (10) A Cantata, &c; (11) Anthems, &c; (12) XII. Canzonetti a due voci in Canone, poesia dell' Abate Metastasio.

BURNHAM BEECHES, a wooded tract of 375 acres in Buckinghamshire, England, acquired in 1879 by the Corporation of the city of London, and preserved for public use. This tract, the remnant of an ancient forest, the more heautiful because of the undulating character of the land, lies west of the road between Slough and Beaconsfield, and 2 m. north of Burnham Beeches station on the Great Western railway. The poet Thomas Gray, who stayed frequently at Stoke Poges in the vicinity, is enthusi- astic concerning the beauty of the Beeches in a letter to Horace Walpole in 1737.

Near the township of Burnham are slight Early English remains of an abbey founded in 1265. Burnham is an urban district with a population (1901) of 3245.

BURNHAM-ON-CROUCH, an urban district in the south- eastern parliamentary division of Essex, England, 43 m. E. by N. from London on a branch of the Great Eastern railway. Pop. (1901) 2919. The church of St Mary is principally late Per- pendicular, a good example; it has Decorated portions and a Norman font. There are extensive oyster beds in the Crouch estuary. Burnham lies 6 m. from the North Sea; below it the Crouch is joined on the south side by the Roch, which branches into numerous creeks, and, together with the main estuary, forms Foulness, Wallasea, Potton and other low, flat islands, embanked and protected from incursions of the sea. Burnham is in some repute as a watering-place, and is a favourite yachting station. There is considerable trade in corn and coal, and boat-building is carried on.

BURNING TO DEATH. As a legal punishment for various crimes burning alive was formerly very wide-spread. It was common among the Romans, being given in the XII. Tables as the special penalty for arson. Under the Gothic codes adulterers were so punished, and throughout the middle ages it was the civil penalty for certain heinous crimes, e.g. poisoning, heresy, witchcraft, arson, bestiality and sodomy, and so continued in some cases, nominally at least, till the beginning of the 19th century. In England, under the common law, women condemned for high treason or petty treason (murder of husband, murder of master or mistress, certain offences against the coin, &c.) were burned, this being considered more " decent " than hanging and exposure on a gibbet. In practice the convict was strangled before being burnt. The last woman burnt in England suffered in 1789, the punishment being abolished in 1790,

Burning was not included among the penalties for heresy under the Roman imperial codes; but the burning of heretics by orthodox mobs had long been sanctioned by custom before the edicts of the emperor Frederick II. (1222, 1223) made it the civil-law punishment for heresy. His example was followed in France by Louis IX. in the Establishments of 1 2 70. In England, where the civil law was never recognized, the common law took no cognizance of ecclesiastical offences, and the church courts had no power to condemn to death. There were, indeed, in the 12th and 13th centuries isolated instances of the burning of heretics. William of Newburgh describes the burning of certain foreign sectaries in 1169, and early in the 13th century a deacon was burnt by order of the council of Oxford (Foxe

ii. 374; cf. Bracton, de Corona, ii. 300), but by what legal sanction is not obvious. The right of the crown to issue writs de haeretico comburendo, claimed for it by later jurists, was based on that issued by Henry IV. in r4oo for the burning of William Sawtre; but Sir James Stephen (Hist. Crim. Law) points out that this was issued " with the assent of the lords temporal," which seems to prove that the crown had no right under the common law to issue such writs. The burning of heretics was actually made legal in England by the statute de haeretico comburendo (1400), passed ten days after the issue of the above writ. This was repealed in 1 533, but the Six Articles Act of 1539 revived burning as a penalty

for denying transubstantiatidn. Under Queen Mary the acts of Henry IV. and Henry V. were revived; they were finally abolished in 1558 on the accession of Elizabeth. Edward VI., Elizabeth and James I., however, burned heretics (illegally as it would appear) under their supposed right of issuing writs for this purpose. The last heretics burnt in England were two Arians, Bartholomew Legate at Smithfield, and Edward Wightman at Lichfield, both in 1610. As for witches, countless numbers were burned in most European countries, though not in England, where they were hanged. In Scotland in Charles II. 's day the law still was that witches were to be " worried at the stake and then burnt "; and a witch was burnt at Dornoch so late as 1708.

BURNLEY, a market town and municipal, county and parliamentary borough of Lancashire, England, at the junction of the rivers Brun and Calder, 213 m. N.N.W. of London and 29 m. N. of Manchester, on the Lancashire & Yorkshire railway and the Leeds & Liverpool Canal. Pop. (1891) 87,016; (1901) 97,043. The church of St Peter dates from the 14th century, but is largely modernized; among a series of memorials of the Towneley family is one to Charles Towneley (d. 1805), who collected the series of antique marbles, terra-cottas, bronzes, coins and gems which are named after him and preserved in the British Museum. In 1902 Towneley Hall and Park were acquired by the corporation, the mansion being adapted to use as a museum and art gallery, and in 1903 a summer exhibition was held here. There are a large number of modern churches and chapels, a handsome town-hall, market hall, museum and art gallery, school of science, municipal technical school, various benevolent institutions, and pleasant public parks and recreation grounds. The

principal industries are cotton-weaving, worsted- making, iron-founding, coal-mining, quarrying, brick-burning and the making of sanitary wares. It has been suggested that Burnley may coincide with Brunanburh, the battlefield on which the Saxons conquered the Dano-Celtic force in 937. During the cotton famine consequent upon the American war of 1861-65 it suffered severely, and the operatives were employed on relief works embracing an extensive system of improvements. The parliamentary borough (1867), which returns one member, falls within the Clitheroe division of the county. The county borough was created in 1888. The town was incorporated in 1861. The corporation consists of a mayor, 12 aldermen and 36 councillors. By act of parliament in 1890 Burnley was created a suffragan bishopric of the diocese of Manchester. Area of the municipal borough, 4005 acres.

BURNOUF, EUGENE (1801-1852), French orientalist, was born in Paris on the 8th of April 1801. His father, Prof. Jean Louis Burnouf (1775-1844), was a . classical scholar of high reputation, and the author, among other works, of an excellent translation of Tacitus (6 vols., 1827-1833). Eugene Burnouf published in 1826 an Essai sur le Pdli . . ., written in collabora- tion with Christian Lassen; and in the following year Observa- tions grammaticales sur quelques passages de I'essai sur le Pdli. The next great work he undertook was the deciphering of the Zend manuscripts brought to France by Anquetil du Perron. By his labours a knowledge of the Zend language was first brought into the scientific world of Europe. He caused the Vendidad Sade, part of one of the books bearing the name of Zoroaster, to be lithographed with the utmost care from the Zend MS. in the Bibliotheque Nationale, and published it in folio parts, 1829-1843. From 1833 to 1835 he published his Commentaire sur le Yacna, I'un des livres liturgiques des Parses; he also published the Sanskrit text and French translation of the Bhdgavata Purdna ou histoire poitique de Krichna in three folio volumes (1840-1847). His last works were Introduction a V histoire du Bouddhisme indien (1844), and a translation of Le lotus de la bonne loi (1852). Burnouf died on the 28th of May 1852. He had been for twenty years a member of the Academie des Inscriptions and professor of Sanskrit in the College de France.

See a notice of Burnouf's works by Barthelemy Saint-Hilaire, prefixed to the second edition (1876) of the Introd. a I'histoire du Bouddhisme indien; also Naudet, " Notice historique sur M. M. Burnouf, pere et fils," in Mem. de VAcad. des Inscriptions, xx. A list of his valuable contributions to the Journal asiatique, and of

his MS. writings, is given in the appendix to the Choix de lettres d'Eugene Burnouf (1891).

BURNOUS (from the Arab, burnus), a long cloak of coarse woollen stuff with a hood, usually white in colour, wern by the Arabs and Berbers throughout North Africa.

BURNS, SIR GEORGE, Bart. (1795-1890), English shipowner, was born in Glasgow on the 10th of December 1795, the son of the Rev. John Burns. In partnership with a brother, James, he began as a Glasgow general merchant about 1818, and in 1824 in conjunction with a Liverpool partner, Hugh Matthie, started a line of small sailing ships which ran between Glasgow and Liverpool. As business increased the vessels were also sailed to Belfast, and steamers afterwards replaced the sailing ships. In 1830 a partnership was entered into with the Mclvers of Liverpool, in which George Burns devoted himself specially to the management of the ships. In 1838 with Samuel Cunard, Robert Napier and other capitalists, the partners (Mclver and Burns) started the " Cunard " Atlantic line of steamships. They secured the British government's contract for the carrying of the mails to North America. The sailings were begun with four steamers of about 1000 tons each, which made the passage in 15 days at some 8ˆ knots per hour. George Burns retired from the Glasgow management of the line in i860. He was made a baronet in 1889, but died on the 2nd of June 1890 at Castle Wemyss, where he had spent the latter years of his life.

John Burns (1829-1901), his eldest son, who succeeded him in the baronetcy, and became head of the Cunard Company, was created a peer, under the title of Baron Inverclyde, in 1897; he was the first to suggest to the government the use of merchant vessels for war purposes. George Arbuthnot Burns (1861-1905) succeeded his father in the peerage, as 2nd baron Inverclyde, and became chairman of the Cunard Company in 1902. He conducted the negotiations which resulted in the refusal of the Cunard Company to enter the shipping combination, the International Mercantile Marine Company, formed by Messrs J. P. Morgan & Co., and took a leading part in the application of turbine engines to ocean liners.

BURNS, JOHN (1858-), English politician, was born at Vauxhall, London, in October 1858, the second son of Alexander Burns, an engineer, of Ayrshire extraction. He attended a national school in Battersea until he was ten years old, when he was sent to work in Price's candle factory. He worked for a short time as a page-boy, then in some engine works, and at fourteen was apprenticed for

seven years to a Millbank engineer. He continued his education at the night-schools, and read exten- sively, especially the works of Robert Owen, J. S. Mill, Paine and Cobbett. He ascribed his conversion to the principles of socialism to his sense of the insufficiency of the arguments advanced against it by J. S. Mill, but he had learnt socialistic doctrine from a French fellow- workman, Victor Delahaye, who had witnessed the Commune. After working at his trade in various parts of England, and on board ship, he went for a year to the West African coast at the mouth of the Niger as a foreman engineer. His earnings from this undertaking were expended on a six months' tour in France, Germany and Austria for the study of political and economic conditions. He had early begun the practice of outdoor speaking, and his exceptional physical strength and strong voice were invaluable qualifications for a popular agitator. In 1878 he was arrested and locked up for the night for addressing an open-air demonstration on Clapham Common. Two years later he married Charlotte Gale, the daughter of a Battersea shipwright. He was again arrested in 1886 for his share in the West End riots when the windows of the Carlton and other London clubs were broken, but cleared himself at the Old Bailey of the charge of inciting the mob to violence. In November of the next year, however, he was again arrested for resisting the police in their attempt to break up the meeting in Trafalgar Square, and was condemned to six weeks' imprisonment. A speech ' delivered by him at the Industrial Remuneration Conference of 1884 had attracted considerable attention, and in that year he became a member of the Social Democratic Federation, which put him forward

unsuccessfully in the next year as parliamentary candidate for West Nottingham. His connexion with the Social Democratic Federation was short-lived; but he was an active member of the executive >of the Amalgamated Engineers' trade union, and was connected with the trades union congresses until 1895, when, through his influence, a resolution excluding all except wage labourers was passed. He was still working at his trade in Hoe's printing machine works when he became a Progressive member of the first London County Council, being supported by an allowance of £2 a week subscribed by his constituents, the Battersea working men. He introduced in 1892 a motion that all contracts for the County Council should be paid at trade union rates and carried out under trade union conditions, and devoted his efforts in general to a war against monopolies, except

those of the state or the municipality. In the same year (1889) in which he became a member of the County Council, he acted with Mr Ben Tillett as the chief leader and organizer of the London dock strike. He entered the House of Commons as member for Battersea in 1892, and was re-elected in 1895, 1900 and 1906. In parliament he became well known as an in- dependent Radical, and he was included in the Liberal cabinet by Sir Henry Campbell-Bannerman in December 1905 as president of the Local Government Board. During the next two years, though much out of favour with his former socialist allies, he earned golden opinions for his administrative policy, and for his refusal to adopt the visionary proposals put forward by the more extreme members of the Labour party for dealing with the " unemployed " question; and in 1908 he retained his office in Mr Asquith's cabinet.

BURNS, ROBERT (1759-1796), Scottish poet, was born on the 25th of January 1759 in a cottage about 2 m. from Ayr. He was the eldest son of a small farmer, William Burness, of Kincardine- shire stock, who wrought hard, practised integrity, wished to bring up his children in the fear of God, but had to fight all his days against the winds and tides of adversity. " The poet," said Thomas Carlyle, " was fortunate in his father — a man of thoughtful intense character, as the best of our peasants are, valuing knowledge, possessing some and open-minded for more, of keen insight and devout heart, friendly and fearless: a fully unfolded man seldom found in any rank in society, and worth descending far in society to seek. . . . Had he been ever so little richer, the whole might have issued otherwise. But poverty sunk the whole family even below the reach of our cheap school system, and Burns remained a hard-worked plough-boy."

Through a series of migrations from one unfortunate farm to another; from Alloway (where he was taught to read) to Mt. Oliphant, and then (1777) to Lochlea in Tarbolton (where he learnt the rudiments of geometry), the poet remained in the same condition of straitened circumstances. At the age of thirteen he thrashed the corn with his own hands, at fifteen he was the principal labourer. The family kept no servant, and for several years butchers' meat was a thing unknown in the house. " This kind of life," he writes, " the cheerless gloom of a hermit and the unceasing toil of a galley-slave, brought me to my sixteenth year." His naturally robust frame was overtasked, and his nervous constitution received a fatal strain. His shoulders were bowed, he became liable to headaches, palpitations and fits of depressing melancholy. From these hard tasks and his fiery temperament, craving in vain for sympathy in a frigid air, grew the strong temptations on which Burns was largely wrecked, — the

thirst for stimulants and the revolt against restraint which soon made headway and passed all bars. In the earlier portions of his career a buoyant humour bore him up; and amid thick- coming shapes of ill he bated no jot of heart or hope. He was cheered by vague stirrings of ambition, which he pathetically compares to the " blind groping of Homer's Cyclops round the walls of his cave." Sent to school at Kirkoswald, he became, for his scant leisure, a great reader — eating at meal-times with a spoon in one hand and a book in the other, — and carrying a few small volumes in his pocket to study in spare moments in the fields. " The collection oi song? " he tells us, " was my vade ■wcum. I pored oyer them driving my cart or walking to labour,

song by song, verse by verse, carefully noting the true, tender, sublime or fustian." He lingered over the ballads in his cold room by night; by day, whilst whistling at the plough, he invented new forms and was inspired by fresh ideas, " gathering round him the memories and the traditions of his country till they became a mantle and a crown." It was among the furrows of his father's fields that he was inspired with the perpetually quoted wish —

" That I for poor auld Scotland's sake Some useful plan or book could make, Or sing a sang at least."

An equally striking illustration of the same feeling is to be found in his summer Sunday's ramble to the Leglen wood, — the fabled haunt of Wallace, — which the poet confesses to have visited " with as much devout enthusiasm as ever pilgrim did the shrine of Loretto." In another reference to the same period he refers to the intense susceptibility to the homeliest aspects of Nature which throughout characterized his genius. " Scarcely any object gave me more — I do not know if I should call it pleasure — but something which exalts and enraptures me — than to walk in the sheltered side of a wood or high plantation in a cloudy winter day and hear the stormy wind howling among the trees and raving over the plain. I listened to the birds, and frequently turned out of my path lest I should disturb their little songs or frighten them to another station. " Auroral visions were gilding his horizon as he walked in glory, if not in joy, " behind his plough upon the mountain side "; but the swarm of his many-coloured fancies was again made grey by the atra cura of unsuccessful toils.

Burns had written his first verses of note, " Behind yon hills where Stinchar (afterwards Lugar) flows," when in 1781 he went to Irvine to learn the trade of a flax-dresser. " It was," he" says, " an unlucky

affair. As we were giving a welcome carousal to the New Year, the shop took fire and burned to ashes; and I was left, like a true poet, without a sixpence." His own heart, too, had unfortunately taken fire. He was poring over mathematics till, in his own phraseology, — still affected in its prose by the classical pedantries caught from Pope by Ramsay, — " the sun entered Virgo, when a charming fillette, who lived next door, overset my trigonometry, and set me off at a tangent from the scene of my studies." We need not detail the story, nor the incessant repetitions of it, which marked and sometimes marred his career. The poet was jilted, went through the usual despairs, and resorted to the not unusual sources of consolation. He had found that he was " no enemy to social life," and his mates had discovered that he was the best of boon companions in the lyric feasts, where his eloquence shed a lustre over wild ways of life, and where he was beginning to be distinguished as a champion of the New Lights and a satirist of the Calvinism whose waters he found like those of Marah.

In Robert's 25th year his father died, full of sorrows and apprehensions for the gifted son who wrote for his tomb in Alloway kirkyard, the fine epitaph ending with the characteristic line —

" For even his failings leaned to virtue's side."

For some time longer the poet, with his brother Gilbert, lingered at Lochlea, reading agricultural books, miscalculating crops, attending markets, and in a mood of reformation resolving, " in spite of the world, the flesh and the devil, to be a wise man." Affairs, however, went no better with the family; and in 1784 they migrated to Mossgiel, where he lived and wrought, during four years, for a return scarce equal to the wage of the commonest labourer in our day. Meanwhile he had become intimate with his future wife, Jean Armour; but the father, a master mason, discountenanced the match, and the girl being disposed to " sigh as a lover," as a daughter to obey, Burns, in 1786, gave up his suit, resolved to seek refuge in exile, and having accepted a situation as book-keeper to a slave estate in Jamaica, had taken his passage in a ship for the West Indies. His old associa- tions seemed to be breaking up, men and fortune scowled, and " hungry ruin had him in the wind," when he wrote the lines ending —

" Adieu, my native banks of Ayr,"

and addressed to the most famous of the loves, in which he was as prolific as Catullus or Tibullus, the proposal —

" Will ye go to the Indies, my Mary."

He was withheld from his project and, happily or unhappily, the current of his life was turned by the success of his first volume, which was published at Kilmarnock in June 1786. It contained some of his most justly celebrated poems, the results of his scanty leisure at Lochlea and Mossgiel; among others " The Twa Dogs," — a graphic idealization of Aesop, — " The Author's Prayer," the " Address to the Deil," " The Vision " and " The Dream," " Halloween," " The Cottar's Saturday Night," the lines " To a Mouse " and " To a Daisy," " Scotch Drink," "Man was made to Mourn," the " Epistle to Davie," and some of his most popular songs. This epitome of a genius so marvellous and so varied took his audience by storm. " The country murmured of him from sea to sea." " With his poems," says Robert Heron, " old and young, grave and gay, learned and ignorant, were alike transported. I was at that time resident in Galloway, and I can well remember how even plough-boys and maid-servants would have gladly bestowed the wages they earned the most hardly, and which they wanted to purchase necessary clothing, if they might but procure the works of Burns." This first edition only brought the author £20 direct return, but it introduced him to the literati of Edinburgh, whither he was invited, and where he was welcomed, feasted, admired and patronized. He appeared as a portent among the scholars of the northern capital and its university, and manifested, according to Mr Lockhart, " in the whole strain of his bearing, his belief that in the society of the most eminent men of his nation he was where he was entitled to be, hardly deigning to flatter them by exhibiting a symptom of being flattered."

Sir Walter Scott bears a similar testimony to the dignified simplicity and almost exaggerated independence of the poet, during this annus mirabilis of his success. " As for Burns, Virgilium vidi lantum, I was a lad of fifteen when he came to Edinburgh, but had sense enough to be interested in his poetry, and would have given the world to know him. I saw him one day with several gentlemen of literary reputation, among whom I remember the celebrated Dugald Stewart. Of course we youngsters sat silent, looked, and listened. ... I remember . . . his shedding tears over a print representing a soldier lying dead in the snow, his dog sitting in misery on one side, on the other his widow with a child in her arms. His person was robust, his manners rustic, not clownish. . . . His countenance was more massive than it looks in any of the portraits. There was a strong expression of shrewdness in

his lineaments; the eye alone indicated the poetic character and temperament. It was large and of a dark cast, and literally glowed when he spoke with feeling or interest. I never saw such another eye in a human head. His conversation expressed perfect self-confidence, without the least intrusive forwardness. I thought his acquaint- ance with English poetry was rather limited; and having twenty times the abilities of Allan Ramsay and of Fergusson he talked of them with too much humility as his models. He was much caressed in Edinburgh, but the efforts made for his relief were extremely trifling." Laudatur et alget. Burns went from those meetings, where he had been posing professors (no hard task), and turning the heads of duchesses, to share a bed in the garret of a writer's apprentice, — they paid together 3s. a week for the room. It was in the house of Mr Carfrae, Baxter's Close, I.awnmarket, " first scale stair on the left hand in going down, first door in the stair." During Burns's life it was reserved for William Pitt to recognize his place as a great poet; the more cautious critics of the North were satisfied to endorse him as a rustic prodigy, and brought upon themselves a share of his satire. Some of the friendships contracted during this period — as for Lord Glencairn and Mrs Dunlop — are among the most pleasing and permanent in literature; for genuine kindness was never wasted on one who, whatever his faults, has never been accused of ingratitude. But in the bard's city life there was an

unnatural element. He stooped to beg for neither smiles nor favour, but the gnarled country oak is cut up into cabinets in artificial prose and verse. In the letters to Mr Graham, the pro- logue to Mr Wood, and the epistles to Clarinda, he is dancing minuets with hob-nailed shoes. When, in 1787, the second edition of the Poems came out, the proceeds of their sale realized for the author £400. On the strength of this sum he gave him- self two long rambles, full of poetic material — one through the border towns into England as far as Newcastle, returning by Dumfries to Mauchline, and another a grand tour through the East Highlands, as far as Inverness, returning by Edinburgh, and so home to Ayrshire.

In 1788 Burns took a new farm at Ellisland on the Nith, settled there, married, lost his little money, and wrote, among other pieces, " Auld Lang Syne " and " Tarn o' Shanter." In 1 789 he obtained, through the good office of Mr Graham of Fintry , an appointment as excise-officer of the district, worth £50 per annum. In 1 791 he removed to a similar post at Dumfries worth £70. In the course of the following year he was asked to contri- bute to George Thomson's Select Collection of Original Scottish Airs with Symphonies and Accompaniments for the Pianoforte and Violin: the poetry by Robert

Burns. To this work he contributed about one hundred songs, the best of which are now ringing in the ear of every Scotsman from New Zealand to San Francisco. For these, original and adapted, he received a shawl for his wife, a picture by David Allan representing the " Cottar's Saturday Night," and £5! The poet wrote an indignant letter and never afterwards composed for money. Unfortunately the " Rock of Independence " to which he had proudly retired was but a castle of air, over which the meteors of French political enthusiasm cast a lurid gleam. In the last years of his life, exiled from polite society on account of his revolutionary opinions, he became sourer in temper and plunged more deeply into the dissipations of the lower ranks, among whom he found his only companionship and sole, though shallow, sympathy.

Burns began to feel himself prematurely old. Walking with a friend who proposed to him to join a county ball, he shook his head, saying " that's all over now," and adding a verse of Lady Grizel Baillie's ballad —

" O were we young as we ance hae been, We sud hae been galloping down on yon green, And linking it ower the lily-white lea, But were na my heart light I wad dee."

His hand shook; his pulse and appetite failed; his spirits sunk into a uniform gloom. In April 1796 he wrote — " I fear it will be some time before I tune my lyre again. By Babel's streams I have sat and wept. I have only known existence by the pressure of sickness and counted time by the repercussions of pain. I close my eyes in misery and open them without hope. I look on the vernal day and say with poor Fergusson — " Say wherefore has an all-indulgent heaven Life to the comfortless and wretched given."

On the 4th of July he was seen to be dying. On the 12th he wrote to his cousin for the loan of £10 to save him from passing his last days in jail. On the 21st he was no more. On the 25th, when his last son came into the world, he was buried with local honours, the volunteers of the company to which he belonged firing three volleys over his grave.

It has been said that " Lowland Scotland as a distinct nationality came in with two warriors and went out with two bards. It came in with William Wallace and Robert Bruce and went out with Robert Burns and Walter Scott. The first two made the history, the last two told the story and sung the song." But what in the minstrel's lay was mainly a requiem was in the people's poet also a prophecy. The

position of Burns in the progress of British literature may be shortly defined; he was a link between two eras, like Chaucer, the last of the old and the first of the new — the inheritor of the traditions and the music of the past, in some respects the herald of the future.

The volumes of our lyrist owe part of their popularity to the fact of their being an epitome of melodies, moods and memories that had belonged for centuries to the national life, the best

inspirations of which have passed into them. But in gathering from his ancestors Burns has exalted their work by asserting a new dignity for their simplest themes. He is the heir of Barbour, distilling the spirit of the old poet's epic into a battle chant, and of Dunbar, reproducing the various humours of a half- sceptical, half-religious philosophy of life. He is the pupil of Ramsay, but he leaves his master, to make a social protest and to lead a literary revolt. The Gentle Shepherd, still largely a court pastoral, in which " a man's a man " if born a gentleman, may be contrasted with " The Jolly Beggars " — the one is like a minuet of the ladies of Versailles on the sward of the Swiss village near the Trianon, the other like the march of the maenads with Theroigne de Mericourt. Ramsay adds to the rough tunes and words of the ballads the refinement of the wits who in the " Easy " and " Johnstone " clubs talked over their cups of Prior and Pope, Addison and Gay. Burns inspires them with a fervour that thrills the most wooden of his race. We may clench the contrast by a representative example. This is from Ramsay's version of perhaps the best-known of Scottish songs, —

" Methinks around us on each bough

A thousand Cupids play ; Whilst through the groves I walk with you,

Each object makes me gay. Since your return — the sun and moon

With brighter beams do shine, Streams murmur soft notes while they run

As they did lang syne."

Compare the verses in Burns —

" We twa hae run about the braes

And pu'd the gowans fine; But we've wandered mony a weary foot

Sin auld lang syne. We twa hae paidl'd in the burn,

Frae morning sun till dine: But seas between us braid hae roar'd

Sin auld lang syne."

Burns as a poet of the inanimate world doubtless derived hints from Thomson of The Seasons, but in his power of tuning its manifestation to the moods of the mind he is more properly ranked as a forerunner of Wordsworth. He never follows the fashions of his century, except in his failures — in his efforts at set panegyric or fine letter-writing. His highest work knows nothing of " Damon " or " Musidora." He leaves the atmo- sphere of drawing-rooms for the ingle or the ale-house or the mountain breeze.

The affectations of his style are insignificant and rare. His prevailing characteristic is an absolute sincerity. A love for the lower forms of social life was his besetting sin; Nature was his healing power. Burns compares himself to an Aeolian harp, strung to every wind of heaven. His genius flows over all living and lifeless things with a sympathy that finds nothing mean or insignificant. An uprooted daisy becomes in his pages an enduring emblem of the fate of artless maid and simple bard. He disturbs a mouse's nest and finds in the " tim'rous beastie " a fellow-mortal doomed like himself to " thole the winter's sleety dribble," and draws his oft-repeated moral. He walks abroad and, in a verse that glints with the light of its own rising sun before the fierce sarcasm of " The Holy Fair," describes the melodies of a " simmer Sunday morn." He loiters by Afton Water and " murmurs by the running brook a music sweeter than its own." He stands by a roofless tower, where " the howlet mourns in her dewy bower," and " sets the wild echoes flying," and adds to a perfect picture of the scene his famous vision of " Libertie." In a single stanza he concentrates the sentiment of many Night Thoughts —

" The pale moon is setting beyond the white wave, And Time is setting wi' me, O."

For other examples of the same graphic power we may refer to the course of his stream—

" Whiles ow'r a linn the burnie plays As through the glen it wimpled," &c,

or to " The Birks of Aberfeldy " or the " spate " in the dialogue of "

The Brigs of Ayr." The poet is as much at home in the

presence of this flood as by his " trottin' burn's meander." Familiar with all the seasons he represents the phases of a northern winter with a frequency characteristic of his clime and of his fortunes; her tempests became anthems in his verse, and the sounding woods " raise his thoughts to Him that walketh on the wings of the wind "; full of pity for the shelterless poor, the " ourie cattle," the " silly sheep," and the " helpless birds," he yet reflects that the bitter blast is not " so unkind as man's ingratitude." This constant tendency to ascend above the fair or wild features of outward things, or to penetrate beneath them, to make them symbols, to endow them with a voice to speak for humanity, distinguishes Burns as a descriptive poet from the rest of his countrymen. As a painter he is rivalled by Dunbar and James I. , more rarely by Thomson and Ramsay. The " lilt " of Tannahill's finest verse is even more charming. But these writers rest in their art; their main care is for their own genius. The same is true in a minor degree of some of his great English successors. Keats has a palette of richer colours, but he seldom condescends to " human nature's daily food." Shelley floats in a thin air to stars and mountain tops, and vanishes from our gaze like his skylark. Byron, in the midst of his revolutionary fervour, never forgets that he himself belongs to the " caste of Vere de Vere." Wordsworth's placid affection and magnanimity stretch beyond mankind, and, as in " Hart-leap-well " and the " Cuckoo," extend to bird and beast; he moralizes grandly on the vicissitudes of common life, but he does not enter into, because by right of superior virtue he places himself above them. " From the Lyrical Ballads," it has been said, " it does not appear that men eat or drink, marry or are given in marriage." We revere the monitor who, consciously good and great, gives us the dry light of truth, but we love the bard, nostrae deliciae, who is all fire — fire from heaven and Ayrshire earth mingling in the outburst of passion and of power, which is his poetry and the inheritance of his race. He had certainly neither culture nor philosophy enough to have written the " Ode on the Recollec- tions of Childhood," but to appreciate that ode requires an education. The sympathies of Burns, as broad as Wordsworth's, are more intense; in turning his pages we feel ourselves more decidedly in the presence of one who joys with those who rejoice and mourns with those who mourn. He is never shallow, ever plain, and the expression of his feeling is so terse that it is always memorable. Of the people he speaks more directly for the people than any of our more considerable poets. Chaucer has a perfect hold of the homeliest phases of life, but he wants the lyric element, and the charm of his

language has largely faded from untutored ears. Shakespeare, indeed, has at once a loftier vision and a wider grasp; for he sings of " Thebes and Pelops line," of Agincourt and Philippi, as of Falstaff, and Snug the joiner, and the " meanest flower that blows." But not even Shakespeare has put more thought into poetry which the most prosaic must appreciate than Burns has done. The latter moves in a narrower sphere and wants the strictly dramatic faculty, but its place is partly supplied by the vividness of his narrative. His realization of incident and character is manifested in the sketches in which the manners and prevailing fancies of his countrymen are immortalized in connexion with local scenery. Among those almost every variety of disposition findsitsfavourite. The quiet households of the kingdom have received a sort of apotheosis in the " Cottar's Saturday Night." It has been objected that the subject does not afford scope for the more daring forms of the author's genius; but had he written no other poem, this heartful rendering of a good week's close in a God-fearing home, sincerely devout, and yet relieved from all suspicion of sermonizing by its humorous touches, would have secured a permanent place in literature. It transcends Thomson and Beattie at their best, and will smell sweet like the actions of the just for generations to come.

Lovers of rustic festivity may hold that the poet's greatest performance is his narrative of " Halloween," which for easy vigour, fulness of rollicking life, blended truth and fancy, is unsurpassed in its kind. Campbell, Wilson, Hazlitt, Mont gomery, Burns himself, and the majority of his critics, have

recorded their preference for "Tam o' Shanter," where the weird superstitious element that has played so great a part in the imaginative work of this part of our island is brought more prominently forward. Few passages of description are finer than that of the roaring Doon and Alloway Kirk glimmering through the groaning trees; but the unique excellence of the piece consists in its variety, and a perfectly original combination of the terrible and the ludicrous. Like Goethe's Walpurgis Nacht, brought into closer contact with real life, it stretches from the drunken humours of Christopher Sly to a world of fantasies almost as brilliant as those of the Midsummer Night's Dream, half solemnized by the severer atmosphere of a sterner clime. The contrast between the lines " Kings may be blest," &c, and those which follow, beginning " But pleasures

are like poppies spread," is typical of the perpetual antithesis of the author's thought and life, in which, at the back of every revelry, he sees the shadow of a warning hand, and reads on the wall the writing, Omnia mutantur. With equal or greater confidence other judges have pronounced Burns's masterpiece to be " The Jolly Beggars." Certainly no other single production so illustrates his power of exalting what is insignificant, glorifying what is mean, and elevating the lowest details by the force of his genius. " The form of the piece," says Carlyle, " is a mere cantata, the theme the half-drunken snatches of a joyous band of vagabonds, while the grey leaves are floating on the gusts of the wind in the autumn of the year. But the whole is compacted, refined and poured forth in one flood of liquid harmony. It is light, airy and soft of movement, yet sharp and precise in its details; every face is a portrait, and the whole a group in clear photography. The blanket of the night is drawn aside; in full ruddy gleaming light these rough tatterdemalions are seen at their boisterous revel wringing from Fate another hour of wassail and good cheer." Over the whole is flung a half-humorous, half-savage satire — aimed, like a two-edged sword, at the laws and the law-breakers, in the acme of which the graceless crew are raised above the level of ordinary gipsies, footpads and rogues, and are made to sit " on the hills like gods together, careless of mankind," and to launch their Titan thunders of rebellion against the world.

" A fig for those by law protected ; Liberty's a glorious feast ; Courts for cowards were erected, Churches built to please the priest."

A similar mixture of drollery and defiance appears in the justly celebrated " Address to the Deil," which, mainly whimsical, is relieved by touches of pathos curiously quaint. " The effect of contrast," it has been observed, " was never more happily displayed than in the conception of such a being straying in lonely places and loitering among trees, or in the familiarity with which the poet lectures so awful a personage," — we may add, than in the inimitable outbreak at the close —

" would you tak a thought an' men'."

Carlyle, in reference to this passage, cannot resist the sugges- tion of a parallel from Sterne. " He is the father of curses and lies, said Dr Slop, and is cursed and damned already. I am sorry for it, quoth my Uncle Toby."

Burns fared ill at the hands of those who were not sorry for it, and who repeated with glib complacency every terrible belief of the

system in which they had been trained. The most scathing of his Satires, under which head fall many of his minor and frequent passages in his major pieces, are directed against the false pride of birth, and what he conceived to be the false pre- tences of religion. The apologue of " Death and Dr Hornbook," " The Ordination," the song " No churchman am I for to rail and to write," the " Address to the Unco Guid," " Holy Willie," and above all " The Holy Fair," with its savage caricature of an ignorant ranter of the time called Moodie, and others of like stamp, not unnaturally provoked offence. As regards the poet's attitude towards some phases of Calvinism prevalent during his life, it has to be remarked that from the days of Dunbar there has been a degree of antagonism between Scottish verse and the more rigid forms of Scottish theology.

It must be admitted that in protesting against hypocrisy he has occasionally been led beyond the limits prescribed by good taste. He is at times abusive of those who differ from him. This, with other offences against decorum, which here and there disfigure his pages, can only be condoned by an appeal to the general tone of his writing, which is reverential. Burns had a firm faith in a Supreme Being, not as a vague mysterious Power; but as the Arbiter of human life. Amid the vicissitudes of his career he responds to the cottar's summons, " Let us worship God."

" An atheist's laugh's a poor exchange For Deity offended "

is the moral of all his verse, which treats seriously of religious matters. His prayers in rhyme give him a high place among secular Psalmists.

Like Chaucer, Burns was a great moralist, though a rough one. In the moments of his most intense revolt against conventional prejudice and sanctimonious affectation, he is faithful to the great laws which underlie change, loyal in his veneration for the cardinal virtues — Truth, Justice and Charity, — and consistent in the warnings, to which his experience gives an unhappy force, against transgressions of Temperance. In the " Epistle to a Young Friend," the shrewdest advice is blended with exhorta- tions appealing to the highest motive, that which transcends the calculation of consequences, and bids us walk in the straight path from the feeling of personal honour, and " for the glorious privilege of being independent." Burns, like Dante, " loved well because he hated, hated wickedness that hinders loving," and this feeling, as in the lines — "Dweller in yon dungeon dark," sometimes breaks bounds; but his calmer moods are better represented by the well-known passages in the " Epistle to Davie," in

which he preaches acquiescence in our lot, and a cheerful acceptance of our duties in the sphere where we are placed. This pkilosophie douce, never better sung by Horace, is the prevailing refrain of our author's Songs. On these there are few words to add to the acclaim of a century. They have passed into the air we breathe; they are so real that they seem things rather than words, or, nearer still, living beings. They have taken all hearts, because they are the breath of his own; not polished cadences, but utterances as direct as laughter or tears. Since Sappho loved and sang, there has been no such national lyrist as Burns. Fine ballads, mostly anonymous, existed in Scotland previous to his time; and shortly before a fev. authors had produced a few songs equal to some of his best. Such are Alexander Ross's " Wooed and Married," Lowe's " Mary's Dream," " Auld Robin-Gray," " The Land o' the Leal " and the two versions of " The Flowers o' the Forest." From these and many of the older pieces in Ramsay's collection, Burns admits to have derived copious suggestions and impulses. He fed on the past literature of his country as Chaucer on the old fields of English thought, and —

" Still the elements o' sang,

In formless jumble, right and wrang,

Went floating in his brain."

But he gave more than he received; he brought forth an hundred-fold; he summed up the stray material of the past, and added so much of his own that one of the most conspicuous features of his lyrical genius is its variety in new paths. Between the first of war songs, composed in a storm on a moor, and the pathos of " Mary in Heaven," he has made every chord in our northern life to vibrate. The distance from " Duncan Gray " to " Auld Lang Syne " is nearly as great as that from Falstaff to Ariel. There is the vehemence of battle, the wail of woe, the march of veterans " red-wat-shod," the smiles of meeting, the tears of parting friends, the gurgle of brown burns, the roar of the wind through pines, the rustle of barley rigs, the thunder on the hill — all Scotland is in his verse. Let who will make her laws, Burns has made the songs, which her emigrants recall " by the long wash of Australasian seas," in which maidens are wooed, by which mothers lull their infants, which return " through open casements unto dying ears " — they are the links, the watchwords, the masonic symbols of the Scots race. (J. N.)

The greater part of Burns's verse was posthumously published, and, as he himself took no care to collect the scattered pieces of occasional verse, different editors have from time to time printed, as his, verses that must be regarded as spurious. Poems chiefly in the Scottish Dialect, by Robert Burns (Kilmarnock, 1786), was followed by an enlarged edition printed in Edinburgh in the next year. Other editions of this book were printed — in London (1787), an enlarged edition at Edinburgh (2 vols., 1793) and a reprint of this in 1794. Of a 1790 edition mentioned by Robert Chambers no traces can be found. Poems by Burns appeared originally in The Caledonian Mercury, The Edinburgh Evening Courant, The Edinburgh Herald, The Edinburgh Advertiser; the London papers, Stuart's Star and Evening Advertiser (subsequently known as The Morning Star), The Morning Chronicle; and in the Edinburgh Magazine and The Scots Magazine. Many poems, most of which had first appeared elsewhere, were printed in a series of penny chap-books, Poetry Original and Select (Brash and Reid, Glasgow), and some appeared separately as broadsides. A series of tracts issued by Stewart and Meikle (Glasgow, 1796-1799) includes some Burns's numbers, The Jolly Beggars, Holy Willie's Prayer and other poems making their first appearance in this way. The seven numbers of this publication were reissued in January 1800 as The Poetical Miscellany. This was followed by Thomas Stewart's Poems ascribed to Robert Burns (Glasgow, 1801). Burns's songs appeared chiefly in James Johnson's Scots Musical Museum (6 vols., 1787-1803), which he appears after the first volume to have virtually edited, though the two last volumes were published only after his death; and in George Thomson's Select Collection of Original Scottish Airs (6 vols., 1793-1841). Only five of the songs done for Thomson appeared during the poet's life- time, and Thomson's text cannot be regarded with confidence. The Hastie MSS. in the British Museum (Addit. MS. 22,307) include 162 songs, many of them in Burns's handwriting; and the Dalhousie MS., at Brechin Castle, contains Burns's correspondence with Thomson. For a full account of the songs see James C. Dick, The Songs of Robert Burns now first printed with the Melodies for which they were written (2 vols., 1903).

The items in Mr W. Craibe Angus's Printed Works of Robert Burns (1899) number nine hundred and thirty. Only the more important collected editions can be here noticed. Dr Currie was the anonymous editor of the Works of Robert Burns; with an Account of his Life, and a Criticism on his Writings . . . (Liverpool, 1800). This was undertaken for the benefit of Burns's family at the desire of his

friends, Alexander Cunningham and John Syme. A second and amended edition appeared in 1801, and was followed by others, but Currie's text is neither accurate nor complete. Additional matter appeared in Reliques of Robert Burns … by R. H. Cromek (London, 1808). In The Works of Robert Burns, With his Life by Allan Cunningham (8 vols., London, 1834) there are many additions and much biographical material. The Works of Robert Burns, edited by James Hogg and William Motherwell (5 vols., 1834-1836, Glasgow and Edinburgh), contains a life of the poet by Hogg, and some useful notes by Motherwell attempting to trace the sources of Burns's songs. The Correspondence between Burns and Clarinda was edited by W. C. M'Lehose (Edinburgh, 1843). An improved text of the poems was provided in the second " Aldine Edition" of the Poetical Works (3 vols., 1839), for which Sir H. Nicolas, the editor, made use of many original MSS. In the Life and Works of Robert Burns, edited by Robert Chambers (Edinburgh, 4 vols., 1851- 1852; library edition, 1856-1857; new edition, revised by William Wallace, 1896), the poet's works are given in chronological order, interwoven with letters and biography. The text was bowdlerized by Chambers, but the book contained much new and valuable information. Other well-known editions are those of George Gil- fillan (2 vols., 1864); of Alexander Smith (Golden Treasury Series, London, 2 vols., 1865); of P. Hately Waddell (Glasgow, 1867); one published by Messrs Blackie & Son, with Dr Currie's memoir and an essay by Prof. Wilson (1 843-1 844); of W. Scott Douglas (the Kilmarnock edition, 1876, and the " library " edition, 1877- 1879), an d of Andrew Lang, assisted by W. A. Craigie (London, 1896). The complete correspondence between Burns and Mrs Dunlop was printed in 1898.

A critical edition of the Poetry of Robert Burns, which may be regarded as definitive, and is provided with full notes and variant readings, was prepared by W. E. Henley and T. F. Henderson (4 vols., Edinburgh, 1896-1897; reprinted, 1901), and is generally known as the " Centenary Burns." In vol. iii. the extent of Burns's indebtedness to Scottish folk-song and his methods of adaptation are minutely discussed; vol. iv. contains an essay on " Robert Burns. Life, Genius, Achievement," by W. E. Henley.

The chief original authority for Burns's life is his own letters. The principal " lives " are to be found in the editions just mentioned. His biography has also been written by J. Gibson Lockhart {Life of Burns, Edinburgh, 1828); for the English Men of Letters " series in 1879 by Prof. J- Campbell Shairp; and by Sir Leslie Stephen in the Dictionary of National Biography (vol. viii., 1886). Among the more important essays on Burns are those by Thomas Carlyle (Edinburgh

Review, December 1828); by John Nichol, the writer of the above article (W. Scott Douglas's edition of Burns) ; by R. L. Stevenson (Familiar Studies of Men and Books) ; by Auguste Angellier (Robert Burns. La vie et les ceuvres, 2 vols., Paris,

1893) ; by Lord Rosebery (Robert Burns: Two Addresses in Edinburgh, 1896) ; by J. Logie Robertson (in In Scottish Fields, Edin., 1890, and Furth in Field, Edin., 1894); and T. F. Henderson (Robert Burns, 1904). There is a selected bibliography in chrono- logical order in W. A. Craigie's Primer of Burns (1896).

BURNS AND SCALDS. A burn is the effect of dry heat applied to some part of the human body, a scald being the result of moist heat. Clinically there is no distinction between the two, and their classification and treatment are identical. In Dupuytren's classification, now most generally accepted, burns are divided into six classes according to the severest part of the lesion. Bums of the first degree are characterized by severe pain, redness of the skin, a certain amount of swelling that soon passes, and later exfoliation of the skin. Burns of the second degree show vesicles (small blisters) scattered over the inflamed area, and containing a clear, yellowish fluid. Beneath the vesicle the highly sensitive papillae of the skin are exposed. Bums of this degree leave no scar, but often produce a permanent dis- coloration. In burns of the third degree, there is a partial destruction of the true skin, leaving sloughs of a yellowish or black colour. The pain is at first intense, but passes off on about the second day to return again at the end of a week, when the sloughs separate, exposing the sensitive nerve filaments of the underlying skin. This results in a slightly depressed cicatrix, which happily, however, shows but slight tendency to contraction. Burns of the fourth degree, which follow the prolonged application of any form of intense heat, involve the total destruction of the true skin. The pain is much less severe than in the preceding class, since the nerve endings have been totally destroyed. The results, however, are far more serious, and the healing process takes place only very slowly on account of the destruction of the skin glands. As a result, deep puckered scars are formed, which show great tendency to contract, and where these are situated on face, neck or joints the resulting deformity and loss of function may be extremely serious. In burns of the fifth degree the underlying muscles are more or less destroyed, and in those of the sixth the bones are also charred. Examples of the last two classes are mainly provided by epileptics who fall into a fire during a fit.

The clinical history of a severe burn can be divided into three

periods. The first period lasts from 36 to 48 hours, during which time the patient lies in a condition of profound shock, and consequently feels little or no pain. If death results from shock, coma first supervenes, which deepens steadily until the end comes. The second period begins when the effects of shock pass, and continues until the slough separates, this usually taking from seven to fourteen days. Considerable fever is present, and the tendency to every kind of complication is very great. Bronchitis, pneumonia, pleurisy, meningitis, intestinal catarrh, and even ulceration of the duodenum, have all been recorded. Hence both nursing and medical attendance must be very close during this time. It is probable that these complications are all the result of septic infection and absorption, and since the modem antiseptic treatment of burns they have become much less common. The third period is prolonged until recovery takes place. Death may result from septic absorption, or from the wound becoming infected with some organism, as tetanus, erysipelas, &c. The prognosis depends chiefly on the extent of skin involved, death almost invariably resulting when one-third of the total area of the body is affected, however superficially. Of secondary but still grave importance is the position of the bum, that over a serous cavity making the future more doubtful than one on a limb. Also it must be remembered that children very easily succumb to shock.

In treating a patient the condition of shock must be attended to first, since from it arises the primary danger. The sufferer must be wrapped immediately in hot blankets, and brandy given by the mouth or in an enema, while ether can be injected hypo- dermically. If the pulse is very bad a saline infusion must be administered. The clothes can then be removed and the burnt surfaces thoroughly cleansed with a very mild antiseptic, a weak solution of lysol acting very well. If there are blisters these must be opened and the contained effusion allowed to

escape. Some surgeons leave them at this stage, but others prefer to remove the raised epithelium. When thoroughly cleansed, the wound is irrigated with sterilized saline solution and a dressing subsequently applied. For the more superficial lesions by far the best results are obtained from the application of gauze soaked in picric acid solution and lightly wrung out, being covered with a large antiseptic wool pad and kept in position by a bandage. Picric acid 15 drams, absolute alcohol 3 oz., and distilled water 40 oz., make a good lotion. All

being well, this need only be changed about twice a week. The various kinds of oil once so greatly advocated in treating burns are now largely abandoned since they have no antiseptic properties. The deeper burns can only be attended to by a surgeon, whose aim will be first to bring septic absorption to a minimum, and later to hasten the healing process. Skin grafting has great value after extensive burns, not because it hastens healing, which it probably does not do, but because it has a marked influence in lessening cicatricial contraction. When a limb is hopelessly charred, amputation is the only course.

BURNSIDE, AMBROSE EVERETT (1824-1881), American soldier, was born at Liberty, Indiana, on the 23rd of May 1824, of Scottish pedigree, his American ancestors settling first in South Carolina, and next in the north-west wilderness, where his parents lived in a rude log cabin. He was appointed to the United States military academy through casual favour, and graduated in 1847, when war with Mexico was nearly over. In 1 8 S3 he resigned his commission, and from 1853 to 1858 was engaged in the manufacture of firearms at Bristol, R.I. In 1856 he invented a breech-loading rifle. He was employed by the Illinois Central railroad until the Civil War broke out. Then he took command of a Rhode Island regiment of three months militia, on the summons of Governor Sprague, took part in the relief of the national capital, and commanded a brigade in the first battle of Bull Run. On the 6th of August 1861 he was commissioned brigadier-general of volunteers, and placed in charge of the expeditionary force which sailed in January 1862 under sealed orders for the North Carolina coast. The victories of Roanoke Island, Newbern and Fort Macon (February — April) were the chief incidents of a campaign which was favourably contrasted by the people with the work of the main army on the Atlantic coast. He was promoted major-general U.S.V. soon afterwards, and early in July, with his North Carolina troops (IX. army corps), he was transferred to the Virginian theatre of war. Part of his forces fought in the last battles of Pope's campaign in Virginia, and Burnside himself was engaged in the battles of South Mountain and Antietam. At the latter he was in command of McClellan's left wing, but the want of vigour in his attack was unfavourably criticized. His patriotic spirit, modesty and amiable manners, made him highly popular, and upon McClellan's final removal (Nov. 7) from the Army of the Potomac, President Lincoln chose him as successor. The choice was unfortunate. Much as he was liked, no one had ever looked upon him as the equal of McClellan, and it was only with the greatest reluctance that he himself accepted the responsibility, which he had

on two previous occasions declined. He sustained a crushing defeat at the battle of Fredericksburg (13 Dec. 1862), and (Jan. 27) gave way to Gen. Hooker, after a tenure of less than three months. Transferred to Cincinnati in March 1863, he caused the arrest and court-martial of Clement L. Vallandigham, lately an opposi- tion member of Congress, for an alleged disloyal speech, and later in the year his measures for the suppression of press criticism aroused much opposition; he helped to crush Morgan's Ohio raid in July; then, moving to relieve the loyalists in East Tennessee, in September entered Knoxville, to which the Confederate general James Longs treet unsuccessfully laid siege. In 1864 Bumside led his old IX. corps under Grant in the Wilderness and Peters- burg campaigns. After bearing his part well in the many bloody battles of that time, he was overtaken once more by disaster. The failure of the " Burnside mine " at Petersburg brought about his resignation. A year later he left the service, and in 1866 he became governor of Rhode Island, serving for three terms (1866- 1869). From 1875 till his death he was a Republican member

of the United States Congress. He was present with the German headquarters at the siege of Paris in 1870-71. He died at Bristol, Rhode Island, on the 13th of September 1881.

See B. P. Poore, Life and Public Services of Ambrose E. Burnside (Providence, 1882); A. Woodbury, Major-General Burnside and the Ninth Army Corps (Providence, 1867).

BURNTISLAND, a royal, municipal ani police burgh of Fife, Scotland, on the shore of the Firth of Forth, 5! m. S.W. of Kirkcaldy by the North British railway. Pop. (1891) 4993; (1901) 4846. It is protected from the north wind by the Binn (632 ft.), and in consequence of its excellent situation, its links and sandy beach, it enjoys considerable repute as a summer resort. The chief industries are distilling, fisheries, ship- building and shipping, especially the export of coal and iron. Until the opening of the Forth bridge, its commodious harbour was the northern station of the ferry across the firth from Granton, 5 m. south. The parish church, dating from 1594, is a plain structure, with a squat tower rising in two tiers from the centre of the roof. The public buildings include two hospitals, a town- hall, music hall, library and reading room and science institute. On the rocks forming the western end of the harbour stands Rossend Castle, where the amorous French poet Chastelard repeated the insult to Queen Mary which led to his execution. In 1667 it was ineffectually bombarded by the Dutch. The burgh was originally called Parva Kinghorn and later Wester Kinghorn. The origin and

meaning of the present name of the town have always been a matter of conjecture. There seems reason to believe that it refers to the time when the site, or a portion of it, formed an island, as sea-sand is the subsoil even of the oldest quarters. Another derivation is from Gaelic words meaning " the island beyond the bend." With Dysart, Kinghorn and Kirkcaldy, it unites in returning one member to parliament.

BURR, AARON (1756-1836), American political leader, was born at Newark, New Jersey, on the 6th of February 1756. His father, the Rev. Aaron Burr (1715-1757), was the second presi- dent (1748-1757) of the College of New Jersey, now Princeton University; his mother was the daughter of Jonathan Edwards, the well-known Calvinist theologian. The son graduated from the College of New Jersey in 1772, and two years later began the study of law in the celebrated law school conducted by his brother-in-law, Tappan Reeve, at Litchfield, Connecticut. Soon after the outbreak of the War of Independence, in 1775, he joined Washington's army in Cambridge, Mass. He accompanied Arnold's expedition into Canada in 1775, and on arriving before Quebec he disguised himself as a Catholic priest and made a dangerous journey of 120 m. through the British lines to notify Montgomery, at Montreal, of Arnold's arrival. He served for a time on the staffs of Washington and Putnam in 1776-77, and by his vigilance in the retreat from Long Island he saved an entire brigade from capture. On becoming lieutenant-colonel in July 1777, he assumed the command of a regiment, and during the winter at Valley Forge guarded the " Gulf," a pass command- ing the approach to the camp, and necessarily the first point that would be attacked. In the engagement at Monmouth, on the 28th of June 1778, he commanded one of the brigades in Lord Stirling's division. In January 1779 Burr was assigned to the command of the " lines " of Westchester county, a region between the British post at Kingsbridge and that of the Ameri- cans about 15 m. to the north. In this district there was much turbulence and plundering by the lawless elements of both Whigs and Tories and by bands of ill-disciplined soldiers from both armies. Burr established a thorough patrol system, rigorously enforced martial law, and quickly restored order.

He resigned from the army in March 1779, on account of ill- health, renewed the study of law, was admitted to the bar at Albany in 1782, and began to practise in New York city after its evacuation by the British in the following year. In 1782 he married Theodosia Prevost (d. 1794), the widow of a British army officer who had died in the West Indies during the War of Independence. They had one child, a daughter, Theodosia, born in 1783, who became widely

known for her beauty and accomplishments, married Joseph Alston of South Carolina

in 1801, and was lost at sea in 1813. Burr was a member of the state assembly (1 784-1 785), attorney -general of the state (1789-1791), United States senator (1791-1797), and again a member of the assembly (1 798-1 799 and 1800-1801). As national parties became clearly defined, he associated himself with the Democratic-Republicans. Although he was not the founder of Tammany Hall, he began the construction of the political machine upon which the power of that organization is based. In the election of 1800 he was placed on the Demo- cratic-Republican presidential ticket with Thomas Jefferson, and each received the same number of electoral votes. It was well understood that the party intended that Jefferson should be president and Burr vice-president, but owing to a defect (later remedied) in the Constitution the responsibility for the final choice was thrown upon the House of Representatives. The attempts of a powerful faction among the Federalists to secure the election of Burr failed, partly because of the opposition of Alexander Hamilton and partly, it would seem, because Burr himself would make no efforts to obtain votes in his own favour. On Jefferson's election, Burr of course became vice-president. His fair and judicial manner as president of the Senate, recog- nized even by his bitterest enemies, helped to foster traditions in regard to that position quite different from those which have become associated with the speakership of the House of Representatives.

Hamilton had opposed Burr's aspirations for the vice-presi- dency in 1792, and had exerted influence through Washington to prevent his appointment as brigadier-general in 1798, at the time of the threatened war between the United States and France. It was also in a measure his efforts which led to Burr's lack of success in the New York gubernatorial campaign of 1804; moreover the two had long been rivals at the bar. Smarting under defeat and angered by Hamilton's criticisms, Burr sent the challenge which resulted in the famous duel at Weehawken, N.J., on the nth of July 1804, and the death of Hamilton (q.v.) on the following day. After the expiration of his term as vice- president (March 4, 1805), broken in fortune and virtually ah exile from New York, where, as in New Jersey, he had been indicted for murder after the duel with Hamilton, Burr visited the South-west and became involved in the so-called

conspiracy which has so puzzled the students of that period. The traditional view that he planned a separation of the West from the Union is now discredited. Apart from the question of political morality he could not, as a shrewd politician, have failed to see that the people of that section were too loyal to sanction such a scheme. The objects of his treasonable correspondence with Merry and Yrujo, the British and Spanish ministers at Washington, were, it would seem, to secure money and to conceal his real designs, which were probably to overthrow Spanish power in the South- west, and perhaps to found an imperial dynasty in Mexico. He was arrested in 1807 on the charge of treason, was brought to trial before the United States circuit court at Richmond, Virginia, Chief- Justice Marshall presiding, and he was acquitted, in spite of the fact that the political influence of the national administra- tion was thrown against him. Immediately afterward he was tried on a charge of misdemeanour, and on a technicality was again acquitted. He lived abroad from 1808 to 181 2, passing most of his time in England, Scotland, Denmark, Sweden and France; trying to secure aid in the prosecution of his filibustering schemes but meeting with numerous rebuffs, being ordered out of England and Napoleon refusing to receive him. In 1812 he returned to New York and spent the remainder of his life in the practice of law. Burr was unscrupulous, insincere and notori- ously immoral, but he was pleasing in his manners, generous to a fault, and was intensely devoted to his wife and daughter. In 1833 he married Eliza B. Jumel (1769-1865), a rich New York widow; the two soon separated, however, owing to Burr's having lost much of her fortune in speculation. He died at Port Richmond, Staten Island, New York, on the 14th of September

1836.

The standard biography is James Parton's The Life and Times of Aaron Burr (first edition, 1857; enlarged edition, 2 vols., Boston

and New York, 1898). W. F. McCaleb's The Aaron Burr Conspiracy (New York, 1903) is a scholarly defence of the Westand incidentally of Burr against the charge of treason, and is the best account of the subject; see also I. Jenkinson, Aaron Burr (Richmond, Ind., 1902). For the traditional view of Burr's conspiracy, see Henry Adams's History of the United States, vol. iii. (New York, 1890).

BURRIANA, a seaport of eastern Spain, in the province of Castell6n de la Plana; on the estuary of the river Seco, which flows into the Mediterranean Sea. Pop. (1900) 12,962. The harbour of Burriana on the open sea is annually visited by about three hundred small

coasting-vessels. Its exports consist chiefly of oranges grown in the surrounding fertile plain, which is irrigated with water from the river Mijares, on the north, and also produces large quantities of grain, oil, wine and melons. Burriana is connected by a light railway with the neighbouring towns of Onda(6s9s), Almazora (7076), Villarreal (16,068) and Castellon de la Plana (29,904). Its nearest station on the Barcelona-Valencia coast railway is Villarreal.

BURRITT, ELIHU (1810-1879), American philanthropist, known as " the learned blacksmith," was born in New Britain, Conn., on the 8th of December 1810, His father (a farmer and shoemaker), and his grandfather, both of the same name, had served in the Revolutionary army. An elder brother, Elijah, who afterwards published The Geography of the Heavens and other text-books, went out into the world while Elihu was still a boy, and after editing a paper in Georgia came back to New Britain and started a school. Elihu, however, had to pick up what knowledge he could get from books at home, where his father's long illness, ending in death, made his services necessary. At sixteen he was apprenticed to a blacksmith, and he made this his trade both there and at Worcester, Mass., where he removed in 1837. He had a passion for reading; from the village library he borrowed book after book, which he studied at his forge or in his spare hours ; and he managed to find time for attending his brother's school for a while, and even for pursuing his search for culture among the advantages to be found at New Haven. He mastered Latin, Greek, French, Spanish, Italian and German, and by the age of thirty could read nearly fifty languages. His extraordinary aptitude gradually made him famous. He took to lecturing, and then to an ardent crusade on behalf of universal peace and human brotherhood, which made him travel per- sistently to various parts of the United States and Europe. In 1848 he organized the Brussels congress of Friends of Peace, which was followed by annual congresses in Paris, Frankfort, London, Manchester and Edinburgh. He wrote and published voluminously, leaflets, pamphlets and volumes, and started the Christian Citizen at Worcester to advocate his humanitarian views. Cheap trans-oceanic postage was an ideal for which he agitated wherever he went. His vigorous philanthropy keeps the name of Elihu Burritt green in the history of the peace movement, apart from the fame of his learning. His country- men, at universities such as Yale and elsewhere, delighted to do him honour; and he was U.S. consul at Birmingham from 1865 to 1870. He returned to America and died at New Britain on the 9th of March 1879.

See Life, by Charles Northend, in the memorial volume (1879) '<

and an article by Ellen Strong Bartlett in the New England Magazine (June, 1897).

BURROUGHS, GEORGE (c. 1650-1692), American congre- gational pastor, graduated at Harvard in 1670, and became the minister of Salem Village (now Danvers) in 1680, a charge which he held till 1683. He lived at Falmouth (now Portland, Maine) until the Indians destroyed it in 1690, when he removed to Wells. In May 1692 during the witchcraft delusion, on the accusation of some personal enemies in his former congrega- tion who had sued him for debt, Burroughs was arrested and charged, among other offences, with " extraordinary Lifting and such feats of strength as could not be done without Dia- bolicall Assistance." Though the jury found no witch-marks on his body he was convicted and executed on Gallows Hill, Salem, on the 19th of August, the only minister wbo suffered this extreme fate.

BURROUGHS, JOHN (1837-), American poet and writer on natural history, was born in Roxbury, Delaware county, New York, on the 3rd of April 1837. In his earlier years he engaged in various pursuits, teaching, journalism, farming and fruit- raising, and for nine years was a clerk in the treasury department at Washington. After publishing in 1867 a volume of Notes on Walt Whitman as poet and person (a subject to which he returned in 1896 with his Whitman; a Study), he began in 1871, with Wake-Robin, a series of books on birds, flowers and rural scenes which has made him the successor of Thoreau as a popular essayist en the plants and animals environing human life. His later writings showed a more philosophic mood and a greater disposition towards literary or meditative allusion than their predecessors, but the general theme and method remained the same. His chief books, in addition to Wake-Robin, are Birds and Poets (1877), Locusts and Wild Honey (1879), Signs and Seasons (1886), and Ways of Nature (1905); these are in prose, but he wrote much also in verse, a volume of poems, Bird and Bough, being published in 1906. Winter Sunshine (1875) and Fresh Fields (1884) are sketches of travel in England and France.

A biographical sketch of Burroughs is prefixed to his Year in the Fields (new ed., 1901). A complete uniform edition of his works was issued in 1895, & c – (Riverside edition, Cambridge, Mass.).

BURSAR (Med. Lat. bursarius), literally a keeper of the bursa or purse. The word is now chiefly used of the official, usually one of the fellows, who administers the finances of a college at a university, or of the treasurer of a school or other institution. The term is also applied to the holder of " a bursary," an exhibi- tion at Scottish schools or universities, and also in England a scholarship or exhibition enabling a pupil of an elementary school to continue his education at a secondary school. The term " burse " (Lat. bursa, Gr. (36poa, bag of skin) is particularly used of the embroidered purse which is one of the insignia of office of the lord high chancellor of England, and of the pouch which in the Roman Church contains the " corporal " in the service of the Mass. The " bursa " is a square case opening at one side only and covered and lined with silk or linen; one side should be of the colour of the vestments of the day.

BURSCHENSCHAFT, an association of students at the German universities. It was formed as a result of the German national sentiment awakened by the War of Liberation, its object being to foster patriotism and Christian conduct, as opposed to the particularism and low moral standard of the old Landsmann-schaften. It originated at Jena, under the patronage of the grand-duke of Saxe- Weimar, and rapidly spread, the Allgemeine deutsche Burschenschaft being established in 1818. The loud political idealism of the Burschen excited the fears of the re- actionary powers, which culminated after the murder of Kotzebue (q.v.) by Karl Sand in 1819, a crime inspired by a secret society among the Burschen known as the Blacks (Schwarzen). The repressive policy embodied in the Carlsbad Decrees (q.v.) was therefore directed mainly against the Burschenschaft, which none the less survived to take part in the revolutions of 1830. After the imeute at Frankfort in 1833, the association was again suppressed, but it lived on until, in 1848, all laws against it were abrogated. The Burschenschaften are now purely social and non-political societies. The Reformburschenschaften, formed since 1883 on the principle of excluding duelling, are united in the Allgemeiner deutscker Burschenbund.

BURSIAN, CONRAD (1830-1883), German philologist and archaeologist, was born at Mutzschen in Saxony, on the 14th of November 1830. On the removal of his parents to Leipzig, he received his early education at the Thomas school, and entered the university in 1847. Here he studied under Moritz Haupt and Otto Jahn until 1851, spent six months in Berlin (chiefly to attend Bockh's lectures), and completed his university studies at Leipzig (1852). The next three years were devoted to travel- ling in Belgium, France, Italy and Greece. In 1856 he became a Privat-docent, and in

1858 extraordinary professor at Leipzig; in 1861 professor of philology and archaeology at Tubingen; in 1864 professor of classical antiquities at Zurich; in 1869 at

Jena, where, he was also director of the archaeological museum; in 1874 at Munich, where he remained until his death on the 21st of September 1883. His most important works are: Geographie von Griechenland (1862-1872); Beitrage zur Geschichte der klassischen Sludien im Mittelalter (1873); Geschichte der klassischen Philologie in Deutschland (1883); editions of Julius Firmicus Maternus' De Errore Profanarum Religionum (1856) and of Seneca's Suasoriae (1857). The article on Greek Art in Ersch and Gruber's Encyclopaedia is by him. Probably the work in connexion with which he is best known is the Jahres- bericht tiber die Fortschritte der klassischen Altertumswissenschaft (1873, &c), of which he was the founder and editor; from 1879 a Biographisches Jahrbuch fur Altertumskunde was pub- lished by way of supplement, an obituary notice of Bursian, with a complete list of his writings, being in the volume for

1884.

BURSLEM, a market town of Staffordshire, England, in the Potteries district, 150 m. N.W. from London, on the North Staffordshire railway and the Grand Trunk Canal. Pop. (1891) 31,999; (1901) 38,766. In the 17th century the town was already famous for its manufacture of pottery. Here Josiah Wedgwood was born in 1730, his family having practised the manufacture in this locality for several generations, while he himself began work independently at the Ivy House pottery in 1759. He is commemorated by the Wedgwood Institute, founded in 1863. It comprises a school of art, free library, museum, picture- gallery and the free school founded in 1794. The exterior is richly and peculiarly ornamented, to show the progress of fictile art. The neighbouring towns of Stoke, Hanley and Longton are connected with Burslem by tramways. Burslem is mentioned in Domesday. Previously to 1885 it formed part of the parlia- mentary borough of Stoke, but it is now included in that of Hanley. It was included in the municipal borough of Stoke-on- Trent under an act of 1908.

BURTON, SIR FREDERICK WILLIAM (1816-1900), British painter and art connoisseur, the third son of Samuel Burton of Mungret, Co. Limerick, was born in Ireland in 1816. He was educated in Dublin, where his artistic studies were carried on with marked success under the direction of Mr Brocas, an able teacher, who foretold for the lad

a distinguished career. That this estimate was not exaggerated was proved by Burton's immediate success in his profession. He was elected an associate of the Royal Hibernian Academy at the age of twenty-one and an academician two years later; and in 1842 he began to exhibit at the Royal Academy. A visit to Germany and Bavaria in 18 5 1 was the first of a long series of wanderings in various parts of Europe, which gave him a profound and intimate knowledge of the works of the Old Masters, and prepared him admirably for the duties that he undertook in 1874 when he was appointed director of the British National Gallery in succession to Sir W. Boxall, R.A. During the twenty years that he held this post he was responsible for many important purchases, among them Leonardo da Vinci's " Virgin of the Rocks," Raphael's " Ansidei Madonna," Holbein's " Ambassadors," Van Dyck's equestrian portrait of Charles I., and the " Admiral Pulido Pareja," by Velasquez; and he added largely to the noted series of Early Italian pictures in the gallery. The number of acquisitions made to the collection during his period of office amounts to not fewer than 500. His own painting, most of which was in water-colour, had more attraction for experts than for the general public. He was elected an associate of the Royal Society of Painters in Water-Colours in 1855, and a full member in the following year. He resigned in 1870, and was re-elected as an honorary member in 1886. A knighthood was conferred on him in 1884, and the degree of LL.D. of Dublin in 1889. In his youth he had strong sympathy with the " Young Ireland Party," and was a close associate with some of its members. He died in Kensington on the 16th of March 1900.

BURTON, JOHN HILL (1809-1881), Scottish historical writer, the son of an officer in the army, was born at Aberdeen on the 22nd of August 1809. After studying at the university of his native city, he removed to Edinburgh, where he qualified for

the Scottish bar and practised as an advocate; but his progress was slow, and he eked out his narrow means by miscellaneous literary work. His Manual of the Law of Scotland (1839) brought him into notice; he joined Sir John Bowring in editing the works of Jeremy Bentham, and for a short time was editor of the Scotsman, which he committed to the cause of free trade. In 1846 he achieved high reputation by his Life of David Hume, based upon extensive and unused MS. material. In 1847 he wrote his biographies of Simon,

Lord Lovat, and of Duncan Forbes, and in 1849 prepared for Chambers's Series manuals of political and social economy and of emigration. In the same year he lost his wife, whom he had married in 1844, and never again mixed freely with society, though in 1855 he married again. He devoted himself mainly to literature, contributing largely to the Scotsman and Blackwood, writing Narratives from Criminal Trials in Scotland (1852), Treatise on the Law of Bankruptcy in Scotland (1853), and publishing in the latter year the first volume of his History of Scotland, which was completed in 1870. A new and improved edition of the work appeared in 1873. Some of the more important of his contributions to Blackwood were em- bodied in two delightful volumes, The Book Hunter (1862) and The Scot Abroad (1864). Hehadin 1854 been appointed secretary to the prison board, an office which gave him entire pecuniary independence, and the duties of which he discharged most assiduously, notwithstanding his literary pursuits and the pressure of another important task assigned to him after the completion of his history, the editorship of the National Scottish Registers. Two volumes were published under his supervision. His last work, The History of the Reign of Queen Anne (1880), is very inferior to his History of Scotland. He died on the 10th of August 1881. Burton was pre-eminently a jurist and econo- mist, and may be said to have been guided by accident into the path which led him to celebrity. It was his great good fortune to find abundant unused material for his Life of Hume, and to be the first to introduce the principles of historical research into the history of Scotland. All previous attempts had been far below the modern standard in these particulars, and Burton's history will always be memorable as marking an epoch. His chief defects as a historian are want of imagination and an un- dignified familiarity of style, which, however, at least preserves his history from the dulness by which lack of imagination is usually accompanied. His dryness is associated with a fund of dry humour exceedingly effective in its proper place, as in The Book Hunter. As a man he was loyal, affectionate, phil- anthropic and entirely estimable.

A memoir of Hill Burton by his wife was prefaced to an edition of The Book Hunter, which like his other works was published at Edinburgh (1882). (R. G.)

BURTON, SIR RICHARD FRANCIS (1821-1890), British consul, explorer and Orientalist, was born at Barham House, Hertfordshire, on the 19th of March 1821. He came of the West- morland Burtons of Shap, but his grandfather, the Rev. Edward Burton, settled in Ireland as rector of Tuam, and his father, Lieutenant- Colonel Joseph

Netterville Burton, of the 36th Regiment, was an Irishman by birth and character. His mother was descended from the MacGregors, and he was proud of a remote drop of Bourbon blood piously believed to be derived from a morganatic union of the Grand Monarque. There were even those, including some of the Romany themselves, who saw gipsy written in his peculiar eyes as in his character, wild and resentful, essentially vagabond, intolerant of convention and restraint. His irregular education strengthened the inherited bias. A childhood spent in France and Italy, under scarcely any control, fostered the love of untrammelled wandering and a marvellous fluency in continental vernaculars. Such an educa- tion so little prepared him for academic proprieties, that when he entered Trinity College, Oxford, in October 1840, a criticism of his military moustache by a fellow-undergraduate was resented by a challenge to a duel, and Burton in various ways distinguished himself by such eccentric behaviour that rustication inevitably ensued. Nor was he much more in his element as a subaltern in the 18th Regiment of Bombay Native Infantry, which he

joined at Baroda in October 1842. Discipline of any sort he abhorred, and the one recommendation of the East India Com- pany's service in his eyes was that it offered opportunities for studying Oriental life and languages. He had begun Arabic without a'master at Oxford, and worked in London at Hindustani under Forbes before he went out; in India he laboured inde- fatigably at the vernaculars, and his reward was an astonishingly rapid proficiency in Gujarati, Marathi, Hindustani, as well as Persian and Arabic. His appointment as an assistant in the Sind survey enabled him to mix with the people, and he fre- quently passed as a native in the bazaars and deceived his own munshi, to say nothing of his colonel and messmates. His wanderings in Sind were the apprenticeship for the pilgrimage to Mecca, and his seven years in India laid the foundations of his unparalleled familiarity with Eastern life and customs, especially among the lower classes. Besides government reports and contributions to the Asiatic Society, his Indian period produced four books, published after his return home: Scinde, or the Unhappy Valley (1851), Sindh and the Races that Inhabit the Valley of the Indus (1851), Goa and the Blue Mountains (1851), and Falconry in the Valley of the Indus (1852). None of these achieved popularity, but the account of Sind is remarkably vivid and faithful.

The pilgrimage to Mecca in 1853 made Burton famous. He had planned it whilst mixing disguised among the Muslims of Sind, and had laboriously prepared for the ordeal by study and practice. No doubt the primary motive was the love of adventure, which was his

strongest passion; but along with the wanderer's restlessness marched the zest of exploration, and whilst wandering was in any case a necessity of his existence, he preferred to roam in untrodden ways where mere adventure might be dignified by geographical service. There was a " huge white blot " on the maps of central Arabia where no European had ever been, and Burton's scheme, approved by the Royal Geographical Society, was to extend his pilgrimage to this " empty abode," and remove a discreditable blank from the map. War among the tribes cur- tailed the design, and his journey went no farther than Medina and Mecca. The exploit of accompanying the Muslim hajj to the holy cities was not unique, nor so dangerous as has been imagined. Several Europeans have accomplished it before and since Burton's visit without serious mishap. Passing himself off as an Indian Pathan covered any peculiarities or defects of speech. The pilgrimage, however, demands an intimate proficiency in a complicated ritual, and a familiarity with the minutiae of Eastern manners and etiquette; and in the case of a stumble, presence of mind and cool courage may be called into request. There are legends that Burton had to defend his life by taking others'; but he carried no arms, and confessed, rather shamefastly, that he had never killed anybody at any time. The actual journey was less remarkable than the book in which it was recorded, The Pilgrimage to Al-Medinah and Meccah (1855). Its vivid descriptions, pungent style, and intensely personal " note " distinguish it from books of its class; its insight into Semitic modes of thought and its picture of Arab manners give it the value of an historical document; its grim humour, keen observation and reckless insobriety of opinion, expressed in peculiar, uncouth but vigorous language make it a curiosity of literature.

Burton's next journey was more hazardous than the pilgrimage, but created no parallel sensation. In 1854 the Indian govern- ment accepted his proposal to explore the interior of the Somali country, which formed a subject of official anxiety in its relation to the Red Sea trade. He was assisted by Capt. J. H. Speke and two other young officers, but accomplished the most difficult part of the enterprise alone. This was the journey to Harrar, the Somali capital, which no white man had entered. Burton vanished into the desert, and was not heard of for four months. When he reappeared he had not only been to Harrar, but had talked with the king, stayed ten days there in deadly peril, and ridden back across the desert, almost without food and water, running the gauntlet of the Somali spears all the way. Un- deterred by this experience he set out again, but was checked

by a skirmish with the tribes, in which one of his young officers was killed, Captain Speke was wounded in eleven places, and Burton himself had a javelin thrust through his jaws. His First Footsteps in East Africa (1856), describing these adventures, is one of his most exciting and most characteristic books, full of learning, observation and humour.

After serving on the staff of Beatson's Bashi-bazouks at the Dardanelles, but never getting to the front in the Crimea, Burton returned to Africa in 1856. The foreign office, moved by the Royal Geographical Society, commissioned him to search for the sources of the Nile, and, again accompanied by Speke, he explored the lake regions of equatorial Africa. They discovered Lake Tanganyika in February 1858, and Speke, pushing on during Burton's illness and acting on indications supplied by him, lighted upon Victoria Nyanza. The separate discovery led to a bitter dispute, but Burton's expedition, with its discovery of the two lakes, was the incentive to the later explorations of Speke and Grant, Baker, Livingstone and Stanley; and his report in volume xxxiii. of the Proceedings of the Royal Geo- graphical Society, and his Lake Regions of Equatorial Africa(i86o) , are the true parents of the multitudinous literature of " darkest Africa." Burton was the first Englishman to enter Mecca, the first to explore Somaliland, the first to discover the great lakes of Central Africa. His East African pioneering coincides with areas which have since become peculiarly interesting to the British Empire; and three years later he was exploring on the opposite side of Africa, at Dahomey, Benin and the Gold Coast, regions which have also entered among the imperial " questions " of the day. Before middle age Burton had compressed into his life, as Lord Derby said, " more of study, more of hardship, and more of successful enterprise and adventure, than would have sufficed to fill up the existence of half a dozen ordinary men." The City of the Saints (1861) was the fruit of a flying visit to the United States in i860.

Since 1849 his connexion with the Indian army had been practically severed; in 1861 he definitely entered the service of the foreign office as consul at Fernando Po, whence he was shifted successively to Santos in Brazil (1865), Damascus (1869), and Trieste (187 1), holding the last post till his death on the 20th of October 1890. Each of these posts produced its corresponding books: Fernando Po led to the publishing of Wanderings in West Africa (1863), Abeokula and the Cameroons (1863),ˆ Mission to Gelele, king of DahomS (1864), and Wit and Wisdom from West Africa (1865). The Highlands of the

Brazil (1869) was the result of four years' residence and travelling; and Letters from the Battlefields of Paraguay (1870) relate to a journey across South America to Peru. Damascus suggested Unexplored Syria (1872), and might have led to much better work, since no consulate in either hemisphere was more congenial to Burton's taste and linguistic studies; but he mismanaged his opportunities, got into trouble with the foreign office, and was removed to Trieste, where his Oriental prepossessions and prejudices could do no harm, but where, unfortunately, his Oriental learning was thrown away. He did not, however, abandon his Eastern studies or his Eastern travels. Various fresh journeys or revisitings of familiar scenes are recorded in his later books, such as Zanzibar (1872), Ultima Thule (1875), Etruscan Bologna (1876), Sind Revisited (1877), The Land of Midian (1879) and To the Gold Coast for Gold (1883). None of these had more than a passing interest. Burton had not the charm of style or imagination which gives immortality to a book of travel. He wrote too fast, and took too little pains about the form. His blunt, disconnected sentences and ill-constructed chapters were full of information and learning, and contained not a few thrusts for the benefit of government or other people, but they were not " readable." There was some- thing ponderous about his very humour, and his criticism was personal and savage. By far the most celebrated of all his books is the translation of the " Arabian Nights " (The Thousand Nights and a Night, 16 vols., privately printe'd, 1885-1888), which occu- pied the greater part of his leisure at Trieste. As a monument of his Arabic learning and his encyclopaedic knowledge of Eastern life this translation was his greatest achievement. It iv. 2J8 _

is open to criticism in many ways; it is not so exact in scholar- ship, nor so faithful to its avowed text, as might be expected from his reputation; but it reveals a profound acquaintance with the vocabulary and customs of the Muslims, with their classical idiom as well as their vulgarest " Billingsgate," with their philosophy and modes of thought as well as their most secret and most disgusting habits. Burton's " anthropological notes," embracing a wide field of pornography, apart from questions of taste, abound in valuable observations based upon long study of the manners and the writings of the Arabs. The translation itself is often marked by extraordinary resource and felicity in the exact reproduction of the sense of the original; Burton's vocabulary was marvellously extensive, and he had a genius for hitting upon the right word; but his fancy for archaic words and phrases, his habit of coining words, and the harsh and rugged style he affected, detract from the literary quality of the

work without in any degree enhancing its fidelity. With grave defects, but sometimes brilliant merits, the translation holds a mirror to its author. He was, as has been well said, an Elizabethan born out of time; in the days of Drake his very faults might have counted to his credit. Of his other works, Vikram and the Vampire, Hindu Tales (1870), and a history of his favourite arm, The Book of the Sword, vol. i. (1884), unfinished, may be men- tioned. His translation of The Lusiads of Camoens (1880) was followed (1881) by a sketch of the poet's life. Burton had a fellow-feeling for the poet adventurer, and his translation is an extraordinarily happy reproduction of its original. A manuscript translation of the " Scented Garden," from the Arabic, was burnt by his widow, acting in what she believed to be the interests of her husband's reputation. Burton married Isabel Arundell in 1 86 1, and owed much to her courage, sympathy and passionate devotion. Her romantic and exaggerated biography of her husband, with all its faults, is one of the most pathetic monu- ments which the unselfish love of a woman has ever raised to the memory of her hero. Another monument is the Arab tent of stone and marble which she built for his tomb at Mortlake.

Besides Lady Burton's Life of Sir Richard F. Burton (2 vols., 1893, 2nd edition, condensed, edited, with a preface, by W. H. Wilkins, 1898), there are A Sketch of the Career of R. F. Burton, by A. B. Richards, Andrew Wilson, and St Clair Baddeley (1886) ; The True Life of Captain Sir Richard F. Burton, by his niece, G. M. Stisted (1896); and a brief sketch by the present writer prefixed to Bohn's ■edition of the Pilgrimage to Al-Medinah and Meccah (1898), from which some sentences have here been by permission reproduced. In 1906 appeared the Life of Sir Richard Burton, by Thomas Wright of Olney, in two volumes, an industrious and rather critical work, interesting in particular for the doubts it casts on Burton's originality as an Arabic translator, and emphasizing his indebtedness to Payne's translation (1881) of the Arabian Nights. (S. L.-P.)

BURTON, ROBERT (1577-1640)ˆ English writer, author of The Anatomy of Melancholy, son of a country gentleman, Ralph Burton, was born at Lindley in Leicestershire on the 8th of February 1576-7. He was educated at the free school of Sutton Coldfield and at Nuneaton grammar school; became in 1593 a commoner of Brasenose College, and in 1599 was elected student at Christ Church, where he continued to reside for the rest of his life. The dean and chapter of Christ Church appointed him, in November 16 16, vicar of St Thomas in the west suburbs, and about 1630 his patron, Lord Berkeley, presented him to the rectory of Segrave in Leicestershire. He held the two livings " with much ado to his dying

day " (says Antony a Wood, the Oxford historian, somewhat mysteriously); and he was buried in the north aisle of Christ Church cathedral, where his elder brother William Burton, author of a History of Leicestershire, raised to his memory a monument, with his bust in colour. The epitaph that he had written for himself was carved beneath the bust: Paucis notus, paucioribus ignotus, hie facet Democritus Junior, cui vitam dedit et mortem Melancholia. Some years before his death he had predicted, by the calculation of his nativity, that the approach of his climacteric year (sixty- three) would prove fatal; and the prediction came true, for he died on the 25th of January 1639-40 (some gossips surmising that he had " sent up his soul to heaven through a noose about his neck " to avoid the chagrin of seeing his calculations falsified). His

portrait in Brasenose College shows the face of a scholar, shrewd, contemplative, humorous.

A Latin comedy, Philosophaster, originally written by Robert Burton in 1606 and acted at Christ Church in 1617, was long supposed to be lost; but in 1862 it was printed for the Rox- burghe Club from a manuscript belonging to the Rev. W. E. Buckley, who edited it with elaborate care and appended a collection of the academical exercises that Burton had contributed to various Oxford miscellanies (" Natalia," " Parentalia," &c). Philosophaster is a vivacious exposure of charlatanism. Desi- derius, duke of Osuna, invites learned men from all parts of Europe to repair to the university which he has re-established; and a crowd of shifty adventurers avail themselves of the invita- tion. There are points of resemblance to Philosophaster in Ben Jonson's Alchemist and Tomkis's Albumazar, but in the prologue Burton is careful to state that his was the earlier play. (Another manuscript of Philosophaster, a presentation copy to William Burton from the author, has since been found in the library of Lord Mostyn.)

In 1 62 1 was issued at Oxford the first edition, a quarto, of The Anatomy of Melancholy . . . by Democritus Junior. Later editions, in folio, were published in 1624, 1628, 1632, 1638, 1651, 1652, 1660, 1676. Burton was for ever engaged in revising his treatise. In the third edition (where first appeared the engraved emblematical title-page by C. Le Blond) he declared that he would make no further

alterations. But the fourth edition again bore marks of revision; the fifth differed from the fourth; and the sixth edition was posthumously printed from a copy contain- ing his latest corrections.

Not the least interesting part of the Anatomy is the long preface, " Democritus to the Reader," in which Burton sets out his reasons for writing the treatise and for assuming the name of Democritus Junior. He had been elected a student of " the most flourishing college of Europe " and he designed to show his gratitude by writing something that should be worthy of that noble society. He had read much; he was neither rich •nor poor; living in studious seclusion, he had been a critically observant spectator of the world's affairs. The philosopher Democritus, who was by nature very melancholy, " averse from company in his latter days and much given to solitariness," spent his closing years in the suburbs of Abdera. There Hippo- crates once found him studying in his garden, the subject of his study being the causes and cure of " this atra bills or melancholy." Burton would not compare himself with so famous a philosopher, but he aimed at carrying out the design which Democritus had planned and Hippocrates had commended. It is stated that he actually set himself to reproduce the old philosopher's reputed eccentricities of conduct. When he was attacked by a fit of melancholy he would go to the bridge foot at Oxford and shake his sides with laughter to hear the bargemen swearing at one another, just as Democritus used to walk down to the haven at Abdera and pick matter for mirth out of the humours of waterside life.

Burton anticipates the objections of captious critics. He allows that he has " collected this cento out of divers authors " and has borrowed from innumerable books, but he claims that " the composition and method is ours only, and shows a scholar." It had been his original intention to write in Latin, but no publisher would take the risk of issuing in Latin so voluminous a treatise. He humorously apologizes for faults of style on the ground that he had to work single-handed (unlike Origen who was allowed by Ambrosius six or seven amanuenses) and digest his notes as best he might. If any object to his choice of subject, urging that he would be better employed in writing on divinity, his defence is that far too many commentaries, expositions, sermons, &c, are already in existence. Besides, divinity and medicine are closely allied; and, melancholy being both a spiri- tual and bodily infirmity, the divine and the physician must unite to cure it.

The preface is followed by a tabular synopsis of the First Partition with its several Sections, Members and Subsections. After various

preliminary digressions Burton sets himself to

define what Melancholy is and what are its species and kinds. Then he discusses the Causes, supernatural and natural, of the disorder, and afterwards proceeds to set down the Symptoms (which cannot be briefly summarized, " for the Tower of Babel never yielded such confusion of tongues as the Chaos of Melan- choly doth of Symptoms "). The Second Partition is devoted to the Cure of Melancholy. As it is of great importance that we should live in good air, a chapter deals with " Air Rectified. With a Digression of the Air." Burton never travelled, but the study of cosmography had been his constant delight; and over sea and land, north, east, west, south — in this enchanting chapter — he sends his vagrant fancy flying. In the disquisition on " Exercise rectified of body and mind " he dwells gleefully on the pleasures of country life, and on the content that scholars find in the pursuit of their favourite studies. Love-Melancholy is the subject of the first Three Sections of the Third Partition, and.many are the merry tales with which these pages are seasoned. The Fourth (and concluding) Section treats, in graver mood, of Religious Melancholy; and to the " Cure of Despair " he devotes his deepest meditations.

The Anatomy, widely read in the 17th century, for a time lapsed into obscurity, though even " the wits of Queen Anne's reign and the beginning of George I. were not a little beholden to Robert Burton " (Archbishop Herring). Dr Johnson deeply admired the work; and Sterne laid it heavily under contribution. But the noble and impassioned devotion of Charles Lamb has been the most powerful help towards keeping alive the memory of the " fantastic great old man." Burton's odd turns and quirks of expression, his whimsical and affectate fancies, his kindly sarcasm, his far-fetched conceits, his deep-lying pathos, descended by inheritance of genius to Lamb. , The enthusiasm of Burton's admirers will not be chilled by the disparagement of unsympathetic critics (Macaulay and Hallam among them) who have consulted his pages in vain; but through good and evil report he will remain, their well-loved companion to the end.

The best of the modern editions of Burton was published in 1896, 3 vols. 8vo (Bell and Sons), under the editorship of A. R. Shilleto, who identified a large number of the classical quotations and many passages from post-classical authors. Prof. Bensley, of the univer- sity of Adelaide, has since contributed to the ninth and tenth series of Notes and Queries many valuable notes on the Anatomy. Dr Aldis Wright has long been engaged on the preparation of a definitive

edition. (A. H. B.)

BURTON, WILLIAM EVANS (1804-1860), English actor and playwright, born in London in September 1804, was the son of William George Burton (1774-1825), a printer and author of Research into the religions of the Eastern nations as illustrative of the scriptures (1805). He was educated for the Church, but, having entered his father's business, his success as an amateur actor led him to go upon the stage. After several years in the provinces, he made his first London appearance in 183 1. In 1834 he went to America, where he appeared in Philadelphia as Dr Ollapod in The Poor Gentleman. He took a prominent place, both as actor and manager, in New York, Philadelphia and Baltimore, the theatre which he leased in New York being renamed Burton's theatre. He had much popular success as Captain Cuttle in John Brougham's dramatization of Dombey and Son, and in other low comedy parts in plays from Dickens's novels. Burton was the author of a large number of plays, one of which, Ellen Wareham (1833), was produced simultaneously at five London theatres. In Philadelphia he established the Gentleman's Magazine, of which Edgar Allan Poe was for some time the editor. He was himself the editor of the Cambridge Quarterly and the Souvenir, and the author of several books, including a Cyclopaedia of Wit and Humour (1857). He collected a library of over 100,000 volumes, especially rich in Shake- speariana, which was dispersed after his death at New York City on the 9th of February i860.

BURTON-UPON-TRENT, a market town and municipal and county borough in the Burton parliamentary division of Staf- fordshire and the Southern parliamentary division of Derbyshire, England; lying mainly upon the left bank of the Trent, in Staffordshire. Pop. (1891) 46,047; (1901) 50,386. It is 127 m

north-west from London by the London & North-Western and the Midland railways, and is also served by the Great Northern and North Staffordshire railways. The Trent is navigable from a point near the town downward. The neighbouring country is pleasant enough, particularly along the river, but the town itself is purely industrial, and contains no pre-eminent build- ings. The church of St Mary and St Modwen is classic in style, of the 18th century, but embodies some remains of an ancient Gothic building. Of a Benedictine abbey dedicated to the same saints there remain a gatehouse and lodge, and a fine doorway. The former abbot's house at Seyney Park is a half-timbered building of the 1 5th century. The free grammar school was founded in 1525- A fine bridge over the Trent, and the municipal buildings, were provided by Lord Burton. There are pleasant recreation grounds on the Derbyshire side of the river.

Burton is the seat of an enormous brewing trade, representing nearly one-tenth of the total amount of this trade in the United Kingdom. It is divided between some twenty firms. The premises of Bass's brewery extend over 500 acres, while Allsopp's stand next; upwards of 5000 hands are employed in all, and many miles of railways owned by the firms cross the streets in all directions on the level, and connect with the lines of the railway companies. The superiority which is claimed for Burton ales is attributed to the use of well-water impregnated with sulphate of lime derived from the gypseous deposits of the district. Burton is governed by a mayor, 8 aldermen and 24 councillors. Area, 4202 acres.

Burton-upon-Trent (Burhton) is first mentioned towards the close of the oth century, when St Modwen, an Irish virgin, is said to have established a convent on the Isle of Andressey opposite Burton. In 1002 Wulfric, earl of Mercia, founded here a Benedictine abbey, and by charter of 1004 granted to it the town with other large en- dowments. Burton was evidently a mesne borough under the abbot,

who held the court of the manor and received the profits of the borough according to the charter of Henry I. granting sac and soc and other privileges and right in the town. Later charters were given by Henry II., by John in 1204 (who also granted an annual fair of three days' duration, 29th of October, at the feast of St Modwen, and a weekly market on Thursday), by Henry III. in 1227, by Henry VII. in 1488 (Henry VII. granted a fair at the feast of St Luke, 18th of October), and by Henry VIII. in 1509. At the dissolution Henry VIII. founded on the site of the abbey a collegiate church dissolved before 1545, when its lands, with all the privileges formerly vested in the abbot, were conferred on Sir William Paget, ancestor of the marquess of Anglesey, now holder of the manor. In 1878 it was incorporated under a mayor, 8 aldermen, 24 councillors. Burton was the scene of several engagements in the Civil War, when its large trade in clothing and alabaster was practically ruined. Although the abbey ale was mentioned as early as 1295, the brewing industry is comparatively of recent development, having begun about 1708. Forty years later it had a market at St Petersburg and the Baltic ports, and in 1796 there were nine brewing firms in the town.

See William Molyneux, History of Burton-on-Trent (1869) '< Victoria County History, Staffordshire.

BURU {Buro, Dutch Boeroe or Boeloe), an island of the Dutch East Indies, one of the Molucca Islands belonging to the residency of Amboyna, between 3° 4′ and 3 50′ S. and 125 58′ and 127° 15′ E. Its extreme measurements are 87 m. by 50 m., and its area is 3400 sq. m. Its surface is for the most part mountainous, though the seaboard district is frequently alluvial and marshy from the deposits of the numerous rivers. Of these the largest, the Kajeli, discharging eastward, is in part navigable. The greatest elevations occur in the west, where the mountain Tomahu reaches 8530 ft. In the middle of the western part of the island lies the large lake of Wakolo, at an altitude of 2200 ft., with a circumference of 37 m. and a depth of about 100 ft. It has been considered a crater lake; but this is not the case. It is situated at the junction of the sandstone and slate, where the water, having worn away the former, has accumulated on the latter. The lake has no affluents and only one outlet, the Wai Nibe to the north. The chief geological formations of Buru are crystalline slate near the north coast, and more to the south Mesozoic sandstone and chalk, deposits of rare occurrence in the archipelago. By far the larger part of the country is covered with natural forest and prairie land, but such portions as have

been brought into cultivation are highly fertile. Coffee, rice and a

variety of fruits, such as the lemon, orange, banana, pine-apple and coco-nut are readily grown, as well as sago, red-pepper, tobacco and cotton. The only important exports, however, are cajeput oil, a sudorific distilled from the leaves of the Mela- leuca Cajuputi or white- wood tree; and timber. The native flora is rich, and teak, ebony and canari trees are especially abundant; the fauna, which is similarly varied, includes the babirusa, which occurs in this island only of the Moluccas. The population is about 15,000. The villages on the sea-coast are inhabited by a Malayan population, and the northern and western portions of the island are occupied by a light-coloured Malay folk akin to the natives of the eastern Celebes. In the interior is found a peculiar race which is held by some to be Papuan. They are described, however, as singularly un-Papuan in physique, being only 5 ft. 2 in. in average height, of a yellow- brown colour, of feeble build, and without the characteristic frizzly hair and prominent nose of the true Papuan. They are completely pagan, live in scattered hamlets, and have come very little in contact with any civilization. Among the maritime population a small number of Chinese, Arabs and other races are also found. The island is divided by the Dutch into two districts. The chief settlement is Kajeli on the east coast. A number of Mahommedan natives here are descended from tribes compelled in 1657 to gather together from the different parts of the island, while all the clove-trees were exterminated in an attempt by the Dutch to centralize the clove trade. Before the arrival of the Dutch the islanders were under the dominion of the sultan of Ternate; and it was their rebellion against him that gave the Europeans the opportunity of effecting their subjugation.

BURUJIRD, a province of Persia, bounded W. by Luristan, N. by Nehavend and Malayir, E. by Irak and S. by Isfahan. It is divided into the following administrative divisions: — (1) town of Burujird with villages in immediate neighbourhood; (2) Silakhor (upper and lower); (3) Japalak (with Sarlek and Burbarud); (4) nomad Bakhtiari. It has a population of about 250,000 or 300,000, and pays a yearly revenue of about £16,000. It is very fertile and produces much wheat, barley, rice arid opium. With improved means of transport, which would allow the growers to export, the produce of cereals could easily be trebled. The province is sometimes joined with that of Luristan.

The town Burujird,. the capital of the province, is situated in the fertile Silakhor plain on the river Tahij, a tributary of the Dizful river (Ab i Diz), 70 m. by road from Hamadan and 212 m. from Isfahan, in 33 55′ N. and 48 55′ E., and at an elevation of 5315 ft. Pop. about 25,000. It manufactures various cotton stuffs (coarse

prints, carpet covers) and felts (principally hats and caps for Lurs and.Bakhtiaris). It has post and telegraph offices.

BURY, JOHN BAGNELL (1861-), British historian, was bom on the 16th of October 1861, and was educated at Trinity College, Dublin, where he was elected to a fellowship in 1885. A fine Greek scholar, he edited Pindar's Nemean and Isthmian Odes; but he devoted himself chiefly to the study of history, and was chosen professor of modern history at Dublin in 1893, becoming regius professor of Greek in 1898. He resigned both positions in rpo2, when he was elected regius professor of modern history in the university of Cambridge. His historical work was mainly concerned with the later Roman empire, and his edition of Gibbon's Decline and Fall, with a masterly introduction and valuable notes (r8g6-r90o), is the standard text of this history. He also wrote a History of Greece to the Death of Alexander the Great (1900) ; History of the Later Roman Empire, 3gs~8oo (1889) ; History of the Roman Empire 27 B.C.-180 a.D. (1893); Life of St Patrick and his Place in History (1905), &c. He was elected a fellow of King's College, Cambridge, and received honorary degrees from the universities of Oxford, Edinburgh, Glasgow, Aberdeen and Durham.

BURY, a market-town and municipal, county and parlia- mentary borough of Lancashire, England, on the river Irwell,

195 m. N.W. by W. from London, and io£ N. by W. from Man- chester, on the Lancashire & Yorkshire railway and the Man- chester & Bolton canal. Pop. (1801) 57,212; (1901) 58,029. The church of St Mary is of early foundation, but was rebuilt in 1876. Besides numerous other places of worship, there are a handsome town hall, athenaeum and museum, art gallery and public library, various assembly rooms, and several recreation grounds. Kay's free grammar school was founded in 1726; there are also municipal technical schools. The cotton manu- facture is the principal industry; there are also calico printing, dyeing and bleaching works, machinery and iron works, woollen manufactures, and coal mines and quarries in the vicinity. Sir Robert Peel was born at Chamber Hall in the neighbourhood, and his father did much for the prosperity of the town by the establishment of extensive print-works. A monument to the statesman stands in the market-place. The parliamentary borough returns one member (since 1832). The county borough was

created in 1888. The corporation consists of a mayor, 10 aldermen and 30 councillors. Area, 5836 acres.

Bury, of which the name is derived from the Anglo-Saxon burhg, birig or byrig (town, castle or fortified place), was the site of a Saxon station, and an old English castle stood in Castle Croft close to the town. It was a member of the Honour of Clitheroe and a fee of the royal manor of Tottington, which soon after the Conquest was held by the Lacys. The local family of Bury held lands here during the 13th century, and at least for a short time the manor itself, but before 1347 it passed by marriage to the Pilkingtons of Pilkington,withwhom itremained tilli48s,when on the attainder of Sir Thomas Pilkington it was granted to the first earl of Derby, whose descendants have since held it. Under a grant made by Edward IV. to Sir Thomas Pilkington, fairs are still held on March 5, May 3, and September 18, and a market was formerly held under the same grant on Thursday, which has, however, been long replaced by a customary market on Saturday. The woollen trade was established here through the agency of Flemish immigrants in Edward III.'s reign, and in Elizabeth's time this industry was of such importance that an aulneger was appointed to measure and stamp the woollen cloth. But although the woollen manufacture is still carried on, the cotton trade has been gradually superseding it since the early part of the 1 8th century. The family of the Kays, the inventors, belonged to this place, and Robert Peel's print-works were established here in 1770. The cognate trades of bleaching, dyeing and machine-making have been long carried on. A court-leet and view of frank pledge used to be held half-yearly at Easter and Michaelmas, and a court -baron in May. Until 1846 three constables were chosen annually at the court-leet to govern the place, but in that year the inhabitants obtained authority from parliament to appoint twenty-seven commis- sioners to undertake the local government. A charter of incor- poration was granted in 1876. The well-known Bury Co- operative Society was established in 1856. There was a church here at the time of the Domesday Survey, and the earliest mention of a rector is found in the year 1331-1332. One-half of the town is glebe belonging to the rectory.

BURY ST EDMUNDS, a market town and municipal and parliamentary borough of Suffolk, England, on the Lark, an affluent of the Great Ouse; 87 m. N.E. by N. from London by the Great Eastern railway. Pop. (1901) 16,255. It is pleasantly situated on a gentle eminence, in a fertile and richly cultivated district. The tower or church-gate, one of the finest specimens of early Norman architecture in England, and the western gate, a beautiful structure

of rich Decorated work, together with ruined walls of considerable extent, are all that remains of the great abbey. St Mary's church, with a beautifully carved roof, was erected in the earlier part of the 15th century, and contains the tomb of Mary Tudor, queen of Louis XII. of France. St James's church is also a fine Perpendicular building, with a modern chancel, and without a tower. All these splendid struc- tures, fronting one of the main streets in succession, form, even without the abbey church, a remarkable memorial of the wealth of the foundation. Behind them lie picturesque gardens which

contain the ruins, the plan of which is difficult to trace, though the outlines of some portions, as the chapter-house, have been made clear by excavation. There is a handsome Roman Catholic church of St Edmund. The so-called Moyses Hall (perhaps a Jew's House, of which there is a parallel example at Lincoln) retains transitional Norman work. The free grammar school, founded by Edward VI., has two scholarships at Cambridge, and six exhibitions to each university, and occupies modern buildings. The Church Schools Company has a school. There are large agricultural implement works, and the agricultural trade is important, cattle and corn markets being held. In the vicinity is Ickworth, the seat of the marquess of Bristol, a great mansion of the end of the 18th century. The parliamentary borough, which returns one member, is coextensive with the municipal borough. The town is governed by a mayor, 6 aldermen and 18 councillors. Area, 2947 acres.

Bury St Edmunds (Beodrices worth, St Edmund's Bury), sup- posed by some to have been the Villa Faustina of the Romans, was one of the royal towns of the Saxons. Sigebert, king of the East Angles, founded a monastery here about 633, which in 903 became the burial place of King Edmund, who was slain by the Danes about 870, and owed most of its early celebrity to the reputed miracles performed at the shrine of the martyr king. By 925 the fame of St Edmund had spread far and wide, and the name of the town was changed to St Edmund's Bury. Sweyn, in 1020, having destroyed the older monastery and ejected the secular priests, built a Benedictine abbey on its site. In 942 or 945 King Edmund had granted to the abbot and convent jurisdiction over the whole town, free from all secular services, and Canute in 1020 freed it from episcopal control. Edward the Confessor made the abbot lord of the franchise. By various grants from the abbots, the town gradually attained the rank of a borough. Henry III. in 1235 granted to the abbot two annual fairs, one in December (which still survives), the other the great St Matthew's fair, which was abolished by the Fairs Act of 1871. Another fair was granted by Henry IV. in 1405. Elizabeth in 1562

confirmed the charters which former kings had granted to the abbots, and James I. in 1606 granted a charter of incorpora- tion with an annual fair in Easter week and a market. Further charters were granted by him in 1608 and 1614, and by Charles II. in 1668 and 1684. The reversion of the fairs and two markets on Wednesday and Saturday were granted by James I. in fee farm to the corporation. Parliaments were held here in 1272, 1296 and 1446, but the borough was not represented until 1608, when James I. conferred the privilege of sending two members. The Redistribution Act 1885 reduced the representation to one. There was formerly a large woollen trade.

See Richard Yates, Hist, and Antiqs. of the Abbey of St Ed- mund's Bury (2nd ed., 1843) ; H. R. Barker, History of Bury St Edmunds.

BUSBECQ, OGIER GHISLAIN DE [Atjgerius Gislenius] (1522-1592), Flemish writer and traveller, was born at Comines, and educated at the university of Louvain and elsewhere. Having served the emperor Charles V. and his son Philip II. of Spain, he entered the service of the emperor Ferdinand I., who sent him as ambassador to the sultan Suleiman I. the Magnificent. He returned to Vienna in 1562 to become tutor to the sons of Maximilian II., afterwards emperor, subsequently taking the position of master of the household of Elizabeth, widow of Charles IX., king of France, and daughter of Maximilian. Busbecq was an excellent scholar, a graceful writer and a clever diplomatist. He collected valuable manuscripts, rare coins and curious inscriptions, and introduced various plants into Germany. He died at the castle of Maillot near Rouen on the 28th of October 1592. Busbecq wrote Itinera Constantino poli- tanum et Amasianum (Antwerp, 1581), a work showing consider- able insight into Turkish politics. This was published in Paris in 1589 as A. G. Busbequii legationis Turcicae epistolae iv., and has been translated into several languages. He was a frequent visitor to France, and wrote Epistolae ad Rudolpkum II. Imperatorem e Gallia scriptae (Louvain, 1630), an interesting account of affairs at the French court. His works were published

at Leiden in 1633 and at Basel in 1740. An English translation of the Itinera was published in 1 744.

See C. T. Forster and F. H. B. Daniel, Life and Letters of Ogier

Ghiselin de Busbecq (London, 1881); Viertel, Busbecks Erlebnisse in der Turkei (Gottingen, 1902).

BUSBY, BICHARD (1606-1655), English clergyman, and head master of Westminster school, was born at Lutton in Lincoln- shire in 1606. He was educated at the school which he after- wards superintended for so long a period, and first signalized himself by gaining a king's scholarship. From Westminster Busby proceeded to Christ Church, Oxford, where he graduated in 1628. In his thirty-third year he had already become re- nowned for the obstinate zeal with which he supported the falling dynasty of the Stuarts, and was rewarded for his services with the prebend and rectory of Cudworth, with the chapel of Knowle annexed, in Somersetshire. Next year he became head master of Westminster, where his reputation as a teacher soon became great. He himself once boasted that sixteen of the bishops who then occupied the bench had been birched with his " little rod." No school in England has on the whole produced so many eminent men as Westminster did under the regime of Busby. Among the more illustrious of his pupils may be mentioned South, Dryden, Locke, Prior and Bishop Atterbury. He wrote and edited many works for the use of his scholars. His original treatises (the best of which are his Greek and Latin grammars), as well as those which he edited, have, however, long since fallen into disuse. Busby died in 1695, in his ninetieth year, and was buried in Westminster Abbey, where his effigy is still to be seen.

BUSBY, the English name for a military head-dress of fur. Possibly the original sense of a " busby wig " came from associa- tion with Dr Busby of Westminster; but it is also derived from " buzz," in the phrase " buzz wig." In its first Hungarian form the military busby was a cylindrical fur cap, having a " bag " of coloured cloth hanging from the top; the end of this bag was attached to the right shoulder as a defence against sword-cuts. In Great Britain " busbies " are of two kinds: (a) the hussar busby, cylindrical in shape, with a bag; this is worn by hussars and the Royal Horse Artillery; (b) the rifle busby, a folding cap of astrachan, in shape somewhat resembling a " Glengarry " but taller. Both have straight plumes in the front of the head- dress. The word " busby " is also used colloquially to denote the tall bear-and-raccoon-skin " caps " worn by foot-guards and fusiliers, and the full dress feather bonnet of Highland infantry. Cylindrical busbies were formerly worn by the artillery engineers and rifles, but these are now obsolete in the regular army, though still worn by some territorial and colonial troops of these arms.

BUSCH, JULIUS HERMANN MORITZ (1821-1899), German

publicist, was born at Dresden on the 13th of February 1821. He entered the university of Leipzig in 184 1 as a student of theo- logy, but graduated as doctor philosophiae, and from 1847 devoted himself entirely to journalism and literature. In 1851 he went to America, but soon returned disillusioned to Germany, and published an account of his travels. During the next years he travelled extensively in the East and wrote books on Egypt, Greece and Palestine. From 1856 he was employed at Leipzig on the Grenzboten, one of the most influential German periodicals, which, under the editorship of Gustav Freytag, had become the organ of the Nationalist party. In 1864 he became closely connected with the Augustenburg party in Schleswig-Holstein, but after 1866 he transferred his services to the Prussian govern- ment, and was employed in a semi-official capacity in the newly conquered province of Hanover. From 1870 onwards he was one of Bismarck's press agents, and was at the chancellor's side in this capacity during the whole of the campaign of 1870-71. In 1878 he published the first of his works on Bismarck — a book entitled Bismarck und seine Leute, wdhrend des Krieges mil Frankreich, in which, under the form of extracts from his diary, he gave an account of the chancellor's life during the war. The vividness of the descriptions and the cleverness with which the conversations were reported ensured a success, and the work was translated into several languages. This was followed in 1885

by another book, Unser Reichskanzler, chiefly dealing with the work in the foreign office in Berlin. Immediately after Bis- marck's death Busch published the chancellor's famous petition to the emperor William II. dated the 18th of March 1890, re- questing to be relieved of office. This was followed by a pamphlet Bismarck und sein Werk; and in 1898 in London and in English, by the famous memoirs entitled Bismarck: some Secret Pages of his History (German by Grunow, under title Tagebuchbldtler) , in which were reprinted the whole of the earlier works, but which contains in addition a considerable amount of new matter, passages from the earlier works which had been omitted because of the attacks they contained on people in high position, records of later conversations, and some important letters and documents which had been entrusted to him by Bismarck. Many passages were of such a nature that it could not be safely published in Germany; but in 1899 a far better and more complete German edition was published at Leipzig in three volumes and consisting of three sections. Busch died at Leipzig on the 16th of November

1899.

See Ernst Goetz, in Biog. Jahrbuch (1900).

BUSCH, WILHELM (1832-1908), German caricaturist, was born at Wiedensahl in Hanover. After studying at the academies of Dusseldorf, Antwerp and Munich, he joined in 1859 the staff of Fliegende Blatter, the leading German comic paper, and was, together with Oberlander, the founder of modern German caricature. His humorous drawings and caricatures are remark- able for the extreme simplicity and expressiveness of his pen-and- ink line, which record with a few rapid scrawls the most com- plicated contortions of the body and the most transitory move- ment. His humorous illustrated poems, such as Max und Moritz, Der heilige Antonius von Padua, Die Fromme Helene, Hans Huckebein and Die Erlebnisse Knopps des Junggesellen, play, in the German nursery, the same part that Edward Lear's nonsense verses do in England. The types created by him have become household words in his country. He invented the series of comic sketches illustrating a story in scenes without words, which have inspired Caran d' Ache and other leading caricaturists.

BUSCHING, ANTON FRIEDRICH (1724-1793), German theologian and geographer, was born at Stadthagen in Schaum- burg-Lippe, on the 27th of September 1724. In 1748 he was appointed tutor in the family of the count de Lynars, who was then going as ambassador to St Petersburg. On this journey he resolved to devote his life to the improvement of geographical science. Leaving the count's family, he went to reside at Copenhagen, and devoted himself entirely to this new pursuit. In 1752 he published his Description of the Counties of Schleswig and Holstein. In 1754 he removed to Gottingen, where in 1757 he was appointed professor of philosophy; but in 1761 he accepted an invitation to the German congregation at St Peters- burg. There he organized a school which, under him, soon became one of the most flourishing in the north of Europe, but a disagreement with Marshal Munich led him, in spite of the empress's offers of high advancement, to return to central Europe in 1765. He first went to live at Altona; but next year he was called to superintend the famous " Greyfriars Gymnasium " {Gymnasium zum Grauen Kloster), which had been formed at Berlin by Frederick the Great. He died of dropsy on the 28th of May 1793, having by writing and example given a new impulse to education throughout Prussia. While at Gottingen he married the poetess, Christiana Dilthey.

Btischmg's works (on geography, history, education and religion) amount to more than a hundred. The first class com- prehends those upon which his fame chiefly rests; for although he did not possess the genius of D'Anville, he may be regarded as the creator of modern

Statistical Geography. His magnum opus is the Erdebeschreibung, in seven parts, of which the first four, comprehending Europe, were published in 1754-1761, and have been translated into several languages (e.g. into English with a preface by Murdoch, in six volumes, London, 1762). In 1768 the fifth part was published, being the first volume upon Asia, containing Asiatic Turkey and Arabia. It displays an immense extent of research, and is generally considered as his

masterpiece. Biisching was also the editor of a valuable collec- tion entitled Magazinfiir d. neue Historie und Geographic (23 vols. 4to, 1767-1793); also of Wochentl. Nachrichten von neuen Landkarten (Berlin, 1 7 73-1 787) . His works on education enjoyed great repute. In biography he wrote a number of articles for the above-mentioned Magazin, and a valuable collection of Beitrdge zur Lebensgeschichte merkwurdiger Personen (6 vols., 1783-1789), including an elaborate life of Frederick the Great. BUSENBAUM (or Busembaum), HERMANN (1600-1668), Jesuit theologian, was born at Nottelen in Westphalia. He attained fame as a master of casuistry, and out of his lectures to students at Cologne grew his celebrated book Medulla theologiae moralis, facili ac perspicua methodo resolvens casus conscientiae (1645). The manual obtained a wide popularity and passed through over two hundred editions before 1776. Pierre Lacroix added considerably to its bulk, and editions in two folio volumes appeared in both Germany (1710-1714) and France (1729). In these sections on murder and especially on regicide were much amplified, and in connexion with Damien's attempt on the life of Louis XV. the book was severely handled by the parlement of Paris. At Toulouse in 1757, though the offending sections were repudiated by the heads of the Jesuit colleges, the Medulla was publicly burned, and the episode undoubtedly led the way to the due de ChoiseuPs attack on the society. Busenbaum also wrote a book on the ascetic life, Lilium inter spinas. He became rector of the Jesuit college at Hildesheim and then at Munster, where he died on the 31st of January 1668, being at the time father-confessor to Bishop Bernard of Galen.

BUSH. (1) (A word common to many European languages, meaning " a wood," cf. the Ger. Busck, Fr. bois, Ital. bosco, and the med. Lat. boscus), a shrub or group of shrubs, especially of those plants whose branches grow low and thick. Collectively " the bush " is used in

British colonies, particularly in Australasia and South Africa, for the tract of country covered with brush- wood not yet cleared for cultivation. From the custom of hang- ing a bush as a sign outside a tavern comes the proverb " Good wine needs no bush." (2) (From a Teutonic word meaning " a box," cf. the Ger. Rad-biichse, a wheel box, and the termina- tion of " blunderbuss " and " arquebus "; the derivation from the Fr. bouche, a mouth, is not correct), a lining frequently inserted in the bearings of machinery. When a shaft and the bearing in which it rotates are made of the same metal, the two surfaces are in certain cases apt to " seize " and abrade each other. To prevent this, bushes of some dissimilar metal are employed; thus a shaft of mild steel or wrought iron may be made to run in hard cast steel, cast iron, bronze or Babbitt metal. The last, having a low melting point, may be cast about the shaft for which it is to form a bearing.

BUSHBUCK (Boschbok), the South African name of a medium- sized red antelope (q.v.), marked with white lines and spots, belong- ing to a local race of a widely spread species, Tragelaphus scriptus. The males alone have rather small, spirally twisted horns. There are several allied species, sometimes known as harnessed antelopes, which are of a larger size. Some of these such as the situtunga (T. spekei) have the hoofs elongated for walking on swampy ground, and hence have been separated as Limnotragus. BUSHEL (from the O. Fr. boissiel, cf. med. Lat. bustellus, busellus, a little box), a dry measure of capacity, containing 8 gallons or 4 pecks. It has been in use for measuring corn, potatoes, &c, from a very early date; the value varying locally and with the article measured. The " imperial bushel," legally established in Great Britain in 1826, contains 2218-192 cub. in., or 80 lb of distilled water, determined at 62° F., with the baro- meter at 30 in. Previously, the standard bushel used was known as the " Winchester bushel," so named from the standard being

Female Bushbuck.

kept in the town hall at Winchester; it contained 2150-42 cub. in. This standard is the basis of the bushel used in the United States and Canada; but other " bushels " for use in connexion with certain commodities have been legalized in different states. BUSHIDO (Japanese for " military-knight-ways "), the un- written code of laws governing the lives of the nobles of Japan, equivalent to the European chivalry. Its maxims have been orally handed down, together with a vast accumulation of traditional etiquette, the result of centuries of feudalism. Its inception is associated with the uprise

of feudal institutions under Yoritomo, the first of the Shoguns, late in the 12th century, but bushido in an undeveloped form existed before then. The samurai or nobles of Japan entertained the highest respect for truth. " A bushi has no second word " was one of their mottoes. And their sense of honour was so high as to dictate suicide where it was offended.

See Inazo Nitobe, Bushido: The Soul of Japan (1905); also Japan: Army.

BUSHIRE, or Bander Bushire, a town of Persia, on the northern shore of the Persian Gulf, in 28 59′ N., 50 49′ E. The name is pronounced Boosheer, and not Bew-shire, or Bus-hire; modern Persians write it Bushehr and, yet more incorrectly, Abushehr, and translate it as " father of the city," but it is most probably a contraction of Bokht-ardashir, the name given to the place by the first Sassanian monarch in the 3rd century. In a similar way Riv-ardashir, a few miles south of Bushire, has become Rishire (Reesheer). In the first half of the 18th century, when Bushire was an unimportant fishing village, it was selected by Nadir Shah as the southern port of Persia and dockyard of the navy which he aspired to create in the Persian Gulf, and the British commercial factory of the East India Company, established at Gombrun, the modern Bander Abbasi, was transferred to it in 1759. At the beginning of the 19th century it had a population of 6000 to 8000, and it is now the most important port in the Persian Gulf, with a population of about 25,000. It used to be under the government of Fars, but is (since about 1892) the seat of the governor of the Persian Gulf ports, who is responsible to the central government, and has under his jurisdiction the principal ports of the Gulf and their depend- encies. The town, which is of a triangular form, occupies the northern extremity of a peninsula 1 1 m. long and 4 broad, and is encircled by the sea on all sides except the south. It is fortified on the land side by a wall with 12 round towers. The houses being mostly built of a white conglomerate stone of shells and coral which forms the peninsula, gives the city when viewed from a distance a clean and handsome appearance, but on closer inspection the streets are found to be very narrow, irregular, ill-paved and filthy. Almost the only decent buildings are the governor's palace, the British residency and the houses of some well-to-do merchants. The sea immediately east of the town has a considerable depth, but its navigation is impeded by sand- banks and a bar north and west of the town, which can be passed only by vessels drawing not more than 9 ft. of water, except at spring tides, when there is a rise of from 8 to 10 ft. Vessels drawing more than 9 ft. must anchor in the roads miles away to the

west. The climate is very hot in the summer months and unhealthy. The water is very bad, and that fit for drinking requires to be brought from wells distant 1 1 to 3 m. from the city wall.

Bushire carries on a considerable trade, particularly with India, Java and Arabia. Its principal imports are cotton and woollen goods, yarn, metals, sugar, coffee, tea, spices, cashmere shawls, &c, and its principal exports opium, wool, carpets, horses, grain, dyes and gums, tobacco, rosewater, &c. The importance of Bushire has much increased since about 1862. It is now not only the headquarters of the English naval squadron in the Persian Gulf, and the land terminus of the Indo-European telegraph, but it also forms the chief station in the Gulf of the British Indian Steam Navigation Company, which runs its vessels weekly between Bombay and Basra. Consulates of Great Britain, Germany, France, Russia and Turkey and several European mercantile houses are established at Bushire, and

notwithstanding the drawbacks of bad roads to the interior, insufficient and precarious means of transport, and want of security, the. annual value of the Bushire trade since 1890 averaged about £1,500,000 (one-third being for exports, two- thirds for imports), and over two-thirds of this was British. Of the 278,000 tons of shipping which entered the port in 1905, 244,000 were British.

During the war with Persia (1856-57) Bushire surrendered to a British force and remained in British occupation for some months. At Rishire, some miles south of Bushire and near the summer quarters of the British resident and the British tele- graph buildings, there are extensive ruins among which bricks with cuneiform inscriptions have been found, showing that the place was a very old Elamite settlement. (A. H.-S.)

BUSHMEN, or Bosjesmans, a people of South Africa, so named by the British and Dutch colonists of the Cape. They often call themselves Saan [Sing. Sd], but this appears to be the Hottentot name. If they have a national name it is Khuai, probably " small man," the title of one group. This Khuai has, however, been translated as the Bushman word for tablier Sgyptien (see below), adopted as the. racial name because that malformation is one of their physical characteristics. The Kaffirs call them Abatwa, the Bechuana Masarwa (Maseroa). There is little reason to doubt that

they constitute the aboriginal element of the population of South Africa, and indications of their former presence have been found as far north at least as the Nyasa and Tanganyika basins. " It would seem," writes Sir H. H. Johnston (British Central Africa, p. 52), " as if the earliest known race of man inhabiting what is now British Central Africa was akin to the Bushman-Hottentot type of negro. Rounded stones with a hole through the centre, similar to those which are used by the Bushmen in the south for weighting their digging- sticks (the graaf stock of the Boers), have been found at the south end of Lake Tanganyika." The dirty yellow colour of the Bush-men, their slightly slanting eyes and prominent cheek-bones had induced early anthropologists to dwell on their resemblance to the Mongolian races. This similarity has been now recognized as quite superficial. More recently a connexion has been traced between the Bushmen and the Pygmy peoples inhabiting the forests of Central Africa. Though the matter cannot be regarded as definitely settled, the latest researches rather tend to discredit this view. In fact it would appear that the two peoples have little in common save diminutive proportions and a nomadic and predatory form of existence. Owing to the discovery of steatopygous figurines in Egyptian graves, a theory has been advanced that the Egyptians of the early dynasties were of the same primitive pygmy negroid stock as the Bushmen. But this is highly speculative. The physical characteristics of Egyptian skulls have nothing of the Bushman in them. Of the primitive pygmy negroid stock the Hottentots (q.v.), once considered the parent family, are now regarded as an offshoot of mixed Bantu- Bushman blood from the main Bushman race.

It seems probable that the Bushmen must be regarded as having extended considerably to the north of the area occupied by them within the memory of white men. Evidence has been produced of the presence of a belated Hottentot or Hottentot- Bushman group as far north as the district between Kilimanjaro and Victoria Nyanza. They were probably driven south by the Bantu tribes, who eventually outflanked them and confined them to the less fertile tracts of country. Before the arrival of Europeans in South Africa the Bushman race appears to have been, what it so essentially is to-day, a nomadic race living in widely scattered groups. The area in which the Bushmen are now found sporadically may be defined as extending from the inner ranges of the mountains of Cape Colony, through the central Kalahari desert to near Lake Ngami, and thence north-westward to the districts about the Ovambo river north of Damaraland. In short, they have been driven by European and Kaffir encroach- ments into the most barren regions of South Africa. A few

remain in the more inaccessible parts of the Drakensberg range about the sources of the Vaal. Only in one or two districts are they found in large numbers, chiefly in Great Bushman Land

towards the Orange river. A regularly planned and wholesale destruction of the Bushmen on the borders of Cape Colony in the earlier years of European occupation reduced their numbers to a great extent; but this cruel hunting of the Bushmen has ceased. In retaliation the Bushmen were long the scourge of the farms on the outer borders of the colony, making raids on the cattle and driving them off in large numbers. On the western side of the deserts they are generally at enmity with the Koranna Hottentots, but on the eastern border of the Kalahari they have to some extent fraternized with the earliest Bechuana migrants. Their language, which exists in several dialects, has in common with Hottentot, but to a greater degree, the peculiar sounds known as " clicks." The Hottentot language is more agglu- tinative, the Bushman more monosyllabic ; the former recognizes a gender in names, the latter does not; the Hottentots form the plural by a suffix, the Bushmen by repetition of the name; the former count up to twenty, the latter can only number two, all above that being " many." F.C.Selous records that Koranna Hottentots were able to converse fluently with the Bushmen of Bechuanaland.

The most striking feature of the Bushman's physique is shortness of stature. Gustav Fritsch in 1 863-1 866 found the average height of six grown men to be 4 ft. 9 in. Earlier, but less trustworthy, measurements make them still shorter. Among 150 measured by Sir John Barrow during the first British occupation of Cape Colony the tallest man was 4 ft. 9 in., the tallest woman 4 ft. 4 in. The Bushmen living in Bechuanaland measured by Selous in the last quarter of the 19th century were, however, found to be of nearly average height. Few persons were below 5 ft.; 5 ft. 4 in. was common, and individuals of even 6 ft. were not unknown. No great difference in height appears to exist between men and women. Fritsch's average from five Bushman women was one-sixth of an inch more than for the men. The Bushmen, as already stated, are of a dirty yellow colour, and of generally unattractive countenance. The skull is long and low, the cheek-bones large and prominent. The eyes are deeply set and crafty in expression. The nose is small and depressed, the mouth wide with moderately everted lips, and the jaws project. The teeth are not like badly cut ivory, as in Bantu, but regular and of a mother-of-pearl appearance. In general build the Bushman is slim and lean almost to emacia- tion. Even the children show little of the round outlines of youth. The amount of fat under the skin in both

sexes is remarkably small; hence the skin is as dry as leather and falls into strong folds around the stomach and at the joints. The fetor of the skin, so characteristic of the negro, is not found in the Bushman. The hair is weak in growth, in age it becomes grey, but baldness is rare. Bushmen have little body-hair and that of a weak stubbly nature, and none of the fine down usual on most skins. On the face there is usually only a scanty moustache. A hollowed back and protruding stomach are frequent characteristics of their figure, but many of them are well proportioned, all being active and capable of enduring great privations and fatigue. Considerable steatopygy often exists among the women, who share with the Hottentot women the extraordinary prolongation of the nymphae which is often called "the Hottentot apron" or tablier. Northward the Bushmen appear to improve both in general condition and in stature, probably owing to a tinge of Bantu blood. The Bush- man's clothing is scanty: a triangular piece of skin, passed between the legs and fastened round the waist with a string, is often all that is worn. Many men, however, and nearly all the women, wear the kaross, a kind of pelisse of skins sewn together, which is used at night as a wrap. The bodies of both sexes are smeared with a native ointment, buchu, which, aided by accre- tions of dust and dirt, soon forms a coating like a rind. Men and women often wear sandals of hide or plaited bast. They are fond of ornament, and decorate the arms, neck and legs with beads, iron or copper rings, teeth, hoofs, horns and shells, while they stick feathers or hares' tails in the hair. The women sometimes stain their faces with red pigment. They carry tobacco in goats' horns or in the shell of a land tortoise, while boxes of ointment

or amulets are hung round neck or waist. A jackal's tail mounted on a stick serves the double purpose of fan and handkerchief. For dwellings in the plains they have low huts formed of reed mats, or occupy a hole in the earth; in the mountain districts they make a shelter among the rocks by hanging mats on the windward side. Of household utensils they have none, except ostrich eggs, in which they carry water, and occasionally rough pots. For cooking his food the Bushman needs nothing but fire, which he obtains by rubbing hard and soft wood together.

Bushmen do not possess cattle, and have no domestic animals except a few half wild dogs, nor have they the smallest rudiments of agriculture. Living by hunting, they are thoroughly ac quainted with

the habits and movements of every kind of wild animal, following the antelope herds in their migrations. Their weapon is a bow made of a stout bough bent into a sharp curve. It is strung with twisted sinew. The arrow, which is neatly made of a reed, the thickness of a finger, is bound with thread to prevent splitting, and notched at the end for the string. At the point is a head of bone, or stone with a quill barb; iron arrow-blades obtained from the Bantu are also found. The arrow is usually 2 to 3 ft. long. The distance at which the Bushman can be sure of hitting is not great, about twenty paces. The arrows are always coated with a gummy poisonous compound which kills even the largest animal in a few hours. The prepara- tion is something of a mystery, but its main ingredients appear to be the milky juice of the Amaryllis toxicaria, which is abundant in South Africa, or of the Euphorbia arborescens, generally mixed with the venom of snakes or of a large black spider of the genus My gale; or the entrails of a very deadly caterpillar, called N'gwa or 'Kaa, are used alone. One authority states that the Bushmen of the western Kalahari use the juice of a chrysalis which they scrape out of the ground. From their use of these poisons the Bushmen are held in great dread by the neighbouring races. They carry, too, a club some 20 in. long with a knob as big as a man's fist. Assegais and knives are rare. No Bush- man tribe south of Lake Ngami is said to carry spears. A rude implement, called by the Boers graaf stock or digging stick, consisting of a sharpened spike of hard wood over which a stone, ground to a circular form and perforated, is passed and secured by a wedge, forms 'part of the Bushman equipment. This is used by the women for uprooting the succulent tuberous roots of the several species of creeping plants of the desert, and in digging pitfalls. These perforated stones have a special interest in indicating the former extension of the Bushmen, since they are found, as has been said, far beyond the area now occupied by them. The Bushmen are famous as hunters, and actually run down many kinds of game. Living a life of periodical starvation, they spend days at a time in search of food, upon which when found they feed so gluttonously that it is said five of them will eat a whole zebra in a few hours. They eat practically anything. The meat is but half cooked, and game is often not completely drawn. The Bushman eats raw such insects as lice and ants, the eggs of the latter being regarded as a great delicacy. In hard times they eat lizards, snakes, frogs, worms and caterpillars. Honey they relish, and for vegetables devour bulbs and roots. Like the Hottentot, the Bushman is a great smoker.

The disposition of the Bushman has been much maligned; the cruelty which has been attributed to him is the natural result of equal

brutalities practiced upon him by the other natives and the early European settlers. He is a passionate lover of freedom, and, like many other primitive people, lives only for the moment. Unlike the Hottentot he has never willingly become a slave, and will fight to the last for his personal liberty. He has been described as the " anarchist of South Africa." Still, when he becomes a servant, he is usually trust- worthy. His courage is remarkable, and Fritsch was told by residents who were well qualified to speak that supported by a dozen Bushmen they would not be afraid of a hundred Kaffirs. The terror inspired by the Bushmen has indeed had an effect in the deforestation of parts of Cape Colony, for the colonists, to guard against stealthy attacks, cut down all the bush far round

their holdings. Mission- work among the Bushmen has been singularly unsuccessful. But in spite of his savage nature, the Bushman is intelligent. He is quick-witted, and has the gift of imitating extraordinarily well the cries of bird and beast. He is musical, too, and makes a rough instrument out of a gourd and one or more strings. He is fond of dancing; besides the ordinary dances are the special dances at certain stages of the moon, &c. One of the most interesting facts about the Bushman is his possession of a remarkable delight in graphic illustration; the rocks of the mountains of Cape Colony and of the Drakens- berg and the walls of caves anciently inhabited by them have many examples of Bushman drawings of men, women, children and animals characteristically sketched. Their designs are partly painted on rock, with four colours, white, black, red and yellow ochre, partly engraved in soft sandstone, partly chiselled in hard stone. Rings, crosses and other signs drawn in blue pigment on some of the rocks, and believed to be one or two centuries old, have given rise to the erroneous speculation that these may be remains of a hieroglyphic writing. A discovery of drawings of men and women with antelope heads was made in the recesses of the Drakensberg in 1873 (J. M. Orpen in Cape Monthly Magazine, July 1874). A few years later Selous dis- covered similar rock-paintings in Mashonaland and Manicaland.

Little is known of the family life of the Bushmen. Marriage is a matter merely of offer and acceptance ratified by a feast. Among some tribes the youth must prove himself an expert hunter. Nothing is known of the laws of inheritance. The avoidance of parents-in-law, so marked among Kaffirs, is found among Bushmen. Murder, adultery, rape and robbery are offences against their code of morals. As among other African tribes the social position of the women is low. They are beasts of burden, carrying the children and the family property on the journeys, and doing all the work at the halting-place.

It is their duty also to keep the encampment supplied with water, no matter how far it has 'to be carried. The Bushman mother is devoted to her children, who, though suckled for a long time, yet are fed within the first few days after birth upon chewed roots and meat, and taught to chew tobacco at a very early age. The child's head is often protected from the sun by a plaited shade of ostrich feathers. There is practically no tribal organiza- tion. Individual families at times join together and appoint a chief, but the arrangement is never more than temporary. The Bushmen have no concrete idea of a God, but believe in evil spirits and supernatural interference with man's life. All Bushmen carry amulets, and there are indications of totemism in their refusal to eat certain foods. Thus one group will not eat goat's flesh, though the animal is the commonest in their district. Others reverence antelopes or even the caterpillar N'gwa. The Bushman cuts off the joints of the fingers as a sign of mourning and sometimes, it seems, as an act of repentance. Traces of a belief in continued existence after death are seen in the cairns of stone thrown on the graves of chiefs. Evil spirits are supposed to hide beneath these sepulchral mounds, and the Bushman thinks that if he does not throw his stone on the mounds the spirits will twist his neck. The whole family deserts the place where any one has died, after raising a pile of stones. The corpse's head is anointed, then it is smoke-dried and laid in the grave at full length, stones or earth being piled on it. There is a Bushman belief that the sun will rise later if the dead are not buried with their faces to the east. Weapons and other Bushman treasures are buried with the dead, and the hut materials are burnt in the grave.

The Bushmen have many animal myths, and a rich store of beast legends. The most prominent of the animal mytho- logical figures is that of the mantis, around which a great cycle of myths has been formed. He and his wife have many names. Their adopted daughter is the porcupine. In the family history an ichneumon, an elephant, a monkey and an eland all figure. The Bushmen have also solar and lunar myths, and observe and name the stars. Canopus alone has five names. Some of the constellations have figurative names. Thus they call Orion's Belt " three she-tortoises hanging on a stick," and Castor and

Pollux " the cow-elands." The planets, too, have their names and myths, and some idea of the astonishing wealth of this Bushman

folklore and oral literature may be formed from the fact that the materials collected by Bleek and preserved in Sir George Grey's library at Cape Town form eighty-four stout MS. volumes of 3600 pages. They comprise myths, fables, legends and even poetry, with tales about the sun and moon, the stars, the crocodile and other animals; legends of peoples who dwelt in the land before the Bushmen arrived from the north; songs, charms, and even prayers, or at least incanta- tions; histories, adventures of men and animals; tribal customs, traditions, superstitions and genealogies. A most curious feature in Bushman folklore is the occurrence of the speeches of various animals, into which the relater of the legend intro- duces particular " clicks," supposed to be characteristic of the animals in whose mouths they are placed.

See G. W. Stow, The Native Races of South Africa (London, 1905) ; Mark Hutchinson, " Bushman Drawings," in Jour. Anthrop. Instit., 1882, p. 464; Sir H. H. Johnston, Jour. Anthrop. Inst., 1883, p. 463; Dr H. Welcker, Archiv f. Anthrop. xvi. ; G. Bertin, "The Bushmen and their Language," Jour. R. Asiat. Soc. xviii. part i.; Gustav Fritsch, Die Eingeborenen Siidafrikas (Breslau, 1872) ; W. H. I. Bleek, Bushman Folklore (1875); J. L. P. Erasmus, The Wild Bushman, MS. note (1899); F. C. Selous, African Nature Notes and Reminiscences (1908), chap. xx. ; S. Passarge, Die Busch- manner der Kalahari (Berlin, 1907).

BUSHNELL, HORACE (1802-1876), American theologian, was born in the village of Bantam, township of Litchfield, Connecticut, on the 14th of April 1802. He graduated at Yale in 1827, was associate editor of the New York Journal of Com- merce in 1828-1829, and in 1829 became a tutor at Yale. Here he at first took up the study of law, but in 183 1 he entered the theological department of Yale College, and in 1833 was ordained pastor of the North Congregational church in Hartford, Conn., where he remained until 1859, when on account of long-continued ill-health he resigned his pastorate. Thereafter he' had no settled charge, but, until his death at Hartford on the 17th of February 1876, he occasionally preached and was diligently employed as an author. While in California in 1856, for the restoration of his health, he took an active interest in the organ- ization, at Oakland, of the college of California (chartered in 1855 and merged in the university of California in 1869), the presidency of which he declined. As a preacher, Dr Bushnell was a man of remarkable power. Not a dramatic orator, he was in high degree original, thoughtful and impressive in the pulpit. His theological position may be said to have been one of qualified revolt against the Calvinistic orthodoxy of his day. He criticized

prevailing conceptions of the Trinity, the atonement, conversion, and the relations of the natural and the supernatural. Above all, he broke with the prevalent view which regarded theology as essentially intellectual in its appeal and demonstrable by processes of exact logical deduction. To his thinking its proper basis is to be found in the feelings and intuitions of man's spiritual nature. He had a vast influence upon theology in America, an influence not so much, possibly, in the direction of the modification of specific doctrines as in " the impulse and tendency and general spirit which he imparted to theological thought." Dr Munger's estimate may be accepted, with reservations, as the true one: " He was a theologian as Copernicus was an astronomer; he changed the point of view, and thus not only changed everything, but pointed the way toward unity in theological thought. He was not exact, but he put God and man and the world into a relation that thought can accept while it goes on to state it more fully with ever growing knowledge. Other thinkers were moving in the same direction; he led the movement in New England, and wrought out a great deliverance. It was a work of superb courage. Hardly a theologian in his denomination stood by him, and nearly all pronounced against him." Four of his books were of particular importance: Christian Nurture (1847), in which he virtually opposed revival- ism and " effectively turned the current of Christian thought toward the young"; Nature and the Supernatural (1858), in which he discussed mirpcles and endeavoured to " lift the

natural into the supernatural " by emphasizing the super-naturalness of man; The Vicarious Sacrifice (1866), in which he contended for what has come to be known as the " moral view " of the atonement in distinction from the " governmental " and the " penal " or " satisfaction " theories; and God in Christ (1849) (with an introductory " Dissertation on Language as related to Thought "), in which he expressed, it was charged, heretical views as to the Trinity, holding, among other things, that the Godhead is " instrumentally three — three simply as related to our finite apprehension, and the communication of God's incommunicable nature." Attempts, indeed, were made to bring him to trial, but they were unsuccessful, and in 1852 his church unanimously withdrew from the local " consociation," thus removing any possibility of further action against him. To his critics Bushnell formally replied by writing Christ in Theology (1851), in which he employs the important argument that spiritual facts can be expressed only in approximate and poetical language, and concludes that an adequate dogmatic theology cannot exist. That he did not deny the divinity of Christ he proved in The Character of Jesus, forbidding his possible

Classification with Men (1861). He also published Sermons for the New Life (1858); Christ and his Salvation (1864); Work and Play (1864); Moral Uses of Dark Things (1868); Women's Suffrage, the Reform against Nature (1869); Sermons on Living Subjects (1872); and Forgiveness and Law (1874). Dr Bushnell was greatly interested in the civic interests of Hartford, and was the chief agent in procuring the establishment of the public park named in his honour by, that city.

An edition of his works, in eleven volumes, appeared in 1876- 188 1 ; and a further volume, gathered from his unpublished papers, as The Spirit in Man: Sermons and Selections, in 1903. New editions of his Nature and the Supernatural, Sermons for the New Life, and Work and Play, were published the same year. A full bibliography, by Henry Barrett Learned, is appended to his Spirit in Man. Con- sult Mrs M. B. Cheney's Life and Letters of Horace Bushnell (New York, 1 880; new edition, 1903), and DrTheodoreT. Munger's Horace Bushnell, Preacher and Theologian (Boston, 1899) ; also a series of papers in the Minutes of the General Association of Connecticut {Bushnell Centenary) (Hartford, 1902). (W. Wii.J

BUSlRl [Abu 'Abdallah. Muhammad ibn Sa'ld ul-BusIri] (1211-1294), Arabian poet, lived in Egypt, where he wrote under the patronage of Ibn Hinna, the vizier. His poems seem to have been wholly on religious subjects. The most famous of these is the so-called " Poem of the Mantle." It is entirely in praise of Mahomet, who cured the poet of paralysis by appearing to him in a dream and wrapping him in a mantle. The poem has little literary value, being an imitation of Ka'b ibn Zuhair's poem in praise of Mahomet, but its history has been unique (cf. I. Goldziher in Revue de I'histoire des religions, vol. xxxi. pp. 304 ff.). Even in the poet's lifetime it was regarded as sacred. Up to the present time its verses are used as amulets; it is employed in the lamentations for the dead; it has been frequently edited and made the basis for other poems, and new poems have been made by interpolating four or six lines after each line of the original. It has been published with English translation by Faizullabhai (Bombay, 1893), with French translation by R. Basset (Paris, 1894), with German trans- lation by C. A. Ralfs (Vienna, i860), and in other languages elsewhere.

For long list of commentaries, &c, cf. C. Brockelmann's Gesch. der Arab. Litteratur (Weimar, 1898), vol. i. pp. 264-267. (G. W. T.)

BUSIRIS, in a Greek legend preserved in a fragment of Pherecydes, an Egyptian king, son of Poseidon and Lyssianassa. After Egypt has

been afflicted for nine years with famine, Phrasius, a seer of Cyprus, arrived in Egypt and announced that the cessation of the famine would not take place until a foreigner was yearly sacrificed to Zeus or Jupiter. Busiris com- menced by sacrificing the prophet, and continued the custom by offering a foreigner on the altar of the god. It is here that Busiris enters into the circle of the myths and parerga of Heracles, who had arrived in Egypt from Libya, and was seized and bound ready to be killed and offered at the altar of Zeus in Memphis. Heracles burst the bonds which bound him, and, seizing his club, slew Busiris with his son Amphidamas and his herald Chalbes.

This exploit is often represented on vase paintings from the 6th century B.C. and onwards, the Egyptian monarch and his com- panions being represented as negroes, and the legend is referred to by Herodotus and later writers. Although some of the Greek writers made Busiris an Egyptian king and a successor of Menes, about the sixtieth of the series, and the builder of Thebes, those better informed by the Egyptians rejected him altogether. Various esoterical explanations were given of the myth, and the name not found as a king was recognized as that of the tomb of Osiris. Busiris is here probably an earlier and less accurate Graecism than Osiris for the name of the Egyptian god Usiri, like Bubastis, Buto, for the goddesses Ubasti and Uto. Busiris, Bubastis, Buto, more strictly represent Pusiri, Pubasti, Puto, cities sacred to these divinities. All three were situated in the Delta, and would be amongst the first known to the Greeks. All shrines of Osiris were called P -usiri, but the principal city of the name was in the centre of the Delta, capital of the 9th (Busirite) nome of Lower Egypt; another one near Memphis (now Abusir) may have helped the formation of the legend in that quarter. The name Busiris in this legend may have been caught up merely at random by the early Greeks, or they may have vaguely connected their legend with the Egyptian myth of the slaying of Osiris (as king of Egypt) by his mighty brother Seth, who was in certain aspects a patron of foreigners. Phrasius, Chalbes and Epaphus (for the grandfather of Busiris) are all explicable as Graecized Egyptian names, but other names in the legend are purely Greek. The sacrifice of foreign prisoners before a god, a regular scene on temple walls, is perhaps only symbolical, at any rate for the later days of Egyptian history, but foreign intruders must often have suffered rude treatment at the hands of the Egyptians, in spite of the generally mild character of the latter.

‘ See H. v. Gartringen, in Pauly-Wissowa, Realencyclopddie, for the evidence from the side of classical archaeology. (F. Ll. G.)

BUSK, GEORGE (1807-1886), British surgeon, zoologist and palaeontologist, son of Robert Busk, merchant of St Petersburg, was born in that city on the 12th of August 1807. He studied surgery in London, at both St Thomas’s and St Bartholomew’s hospitals, and was an excellent operator. He was appointed assistant-surgeon to the Greenwich hospital in 1832, and served as naval surgeon first in the Grampus, and afterwards for many years in the Dreadnought; during this period he made important observations on cholera and on scurvy. In 1855 he retired from service and settled in London, where he devoted himself mainly to the study of zoology and palaeontology. As early as 1842 he had assisted in editing the Microscopical Journal; and later he edited the Quarterly Journal of Microscopical Science (1853- 1868) and the Natural History Review (1861-1865). From 1856 to 1859 he was Hunterian professor of comparative anatomy and physiology in the Royal College of Surgeons, and he became president of the college in 1871. He was elected F.R.S. in 1850, and was an active member of the Linnean, Geological and other societies, and president of the Anthropological Institute (1873-1874); he received the Royal Society’s Royal medal and the Geological Society’s Wollaston and Lyell medals. Early in life he became the leading authority on the Polyzoa; and later the vertebrate remains from caverns and river-deposits occupied his attention. He was a patient and cautious investigator, full of knowledge, and unaffectedly simple in character. He died in London on the 10th of August 1886.

BUSKEN-HUET, CONRAD (1826-1886), Dutch literary critic, was born at the Hague on the 28th of December 1826. He was trained for the Church, and, after studying at Geneva and Lausanne, was appointed pastor of the Walloon chapel in Haarlem in 1851. In 1863 conscientious scruples obliged him to resign his charge, and Busken-Huet, after attempting journalism, went out to Java in 1868 as the editor of a newspaper. Before this time, however, he had begun his career as a polemical man of letters, although it was not until 1872 that he was made famous by the first series of his Literary Fantasies, a title under which he gradually gathered in successive volumes all that was most durable in his work as a critic. His one novel, Lidewijde,

was written under strong French influences. Returning from the East Indies, Busken-Huet settled for the remainder of his life in Paris, where he died in April 1886. For the last quarter of a century he had

been the acknowledged dictator in all questions of Dutch literary taste. Perfectly honest, desirous to be sympathetic, widely read, and devoid of all sectarian obstinacy, Busken-Huet introduced into Holland the light and air of Europe. He made it his business to break down the narrow prejudices and the still narrower self-satisfaction of his countrymen, without endangering his influence by a mere effusion of paradox. He was a brilliant writer, who would have been admired in any language, but whose appearance in a literature so stiff and dead as that of Holland in the 'fifties was dazzling enough to produce a sort of awe and stupefaction. The post- humous correspondence of Busken-Huet has been published, and adds to our impression of the vitality and versatility of his mind. (E. G.)

BUSKIN (a word of uncertain origin, existing in many European languages, as Fr. brousequin, Ital. borzacchino, Dutch brozeken, and Span, borcegui), a half -boot or high shoe strapped under the ankle, and protecting the shins; especially the thick-soled boot or cothurnus in the ancient Athenian tragedy, used to increase the stature of the actors, as opposed to the soccus, " sock," the light shoe of comedy. The term is thus often used figuratively of a tragic style.

BUSLAEV, FEDOR IVANOVIGH (1818-1808), Russian author and philologist, was born on the 13th of April 1818 at Kerensk, where his father was secretary of the district tribunal. He was educated at Penza and Moscow University. At the end of his academical course, 1838, he accompanied the family of Count S. G. Strogonov on a tour through Italy, Germany and France, occupying himself principally with the study of classical antiquities. On his return he was appointed assistant professor of Russian literature at the university of Moscow. A study of Jacob Grimm's great dictionary had already directed the atten- tion of the young professor to the historical development of the Russian language, and the fruit of his studies was the book On the Teaching of the National Language (Moscow, 1 844 and 1 86 7) , which even now has its value. In 1848 he produced his work On the Influence of'Christianity on the Slavonic Language, which, though subsequently superseded by Franz von Miklosich's Christliche Terminologie, is still one of the most striking dis- sertations on the development of the Slavonic languages. In this work Buslaev proves that long before the age of Cyril and Methodius the Slavonic languages had been subject to Christian influences. In 1855 he published Palaeo graphical and Philo- logical Materials for the History of the Slavonic Alphabets, and in 1858 Essay towards an Historical Grammar of the Russian Tongue, which, despite some trivial defects, is still a standard work, abounding with rich material for students, carefully collected from an immense quantity of ancient

records and monuments. In close connexion with this work in his Historical Chrestomathy of the Church-Slavonic and Old Russian Tongues (Moscow, 1861). Buslaev also interested himself in Russian popular poetry and old Russian art, and the result of his labours is enshrined in Historical Sketches of Russian Popular Literature and Art (St Petersburg, 1861), a very valuable collection of articles and monographs, in which. the author shows himself a worthy and faithful disciple of Grimm. His Popular Poetry (St Petersburg, 1887) is a valuable supplement to the Sketches. In 1881 he was appointed professor of Russian literature at Moscow, and three years later published his Annotated Apocalypse with an atlas of 400 plates, illustrative of ancient Russian art.

See S. D. Sheremetev, Memoir of F. I. Buslaev (Moscow, 1899).

(R. N. B.)

BUSS, FRANCES MARY (1 827-1894), English schoolmistress, was born in London in 1827, the daughter of the painter-etcher R. W. Buss, one of the original illustrators of Pickwick. She was educated at a school in Camden Town, and continued there as a teacher, but soon joined her mother in keeping a school in Kentish Town. In 1848 she was one of the original attendants at lectures at the new Queen's College for Ladies. In 1830 her

school was moved to Camden Street, and under its new name of the North London Collegiate School for Ladies it rapidly increased in numbers and reputation. In 1864 Miss Buss gave evidence before the Schools Inquiry Commission, and in its report her school was singled out for exceptional commendation. Indeed, under her influence, what was then pioneer work of the highest importance had been done to put the education of girls on a proper intellectual footing. Shortly afterwards the Brewers' Company and the Clothworkers' Company provided funds by which the existing North London Collegiate School was rehoused and a Camden School for Girls founded, and both were endowed under a new scheme, Miss Buss continuing to be principal of the former. She and Miss Beale of Cheltenham became famous as the chief leaders in this branch of the reformed educational movement; she played an active part in promoting the success of the Girls' Public Day School Company, encouraging the con- nexion of the girls' schools with the university standard by examinations,

working for the establishment of women's colleges, and improving the training of teachers; and her ener- getic personality was a potent force among her pupils and colleagues. She died in London on the 24th of December 1894. BUSSA, a town in the British protectorate of Northern Nigeria, on the west bank of the Niger, in 10° 9′ N., 4° 40′ E. It is situated just above the rapids which mark the limit of navigability of the Niger by steamer from the sea. Here in 1806 Mungo Park, in his second expedition to trace the course of the Niger, was attacked by the inhabitants, and drowned while endeavouring to escape. During 1894-1898 its possession was disputed by Great Britain and France, the last-named country acknowledging by the convention of June 1898 the British claim, which carried with it the control of the lower Niger. It is now the capital of northern Borgu (see Nigeria, and Borgu).

BUSSACO (or Bttsaco), SERRA DE, a mountain range on the frontiers of the Aveiro, Coimbra, and Vizeu districts of Portugal, formerly included in the province of Beira. The highest point in the range is the Ponta de Bussaco (1 795 ft.), which commands a magnificent view over the Serra da Estrella, the Mondego valley and the Atlantic Ocean. Luso (pop. i66i),a village celebrated for its hot mineral springs, is the nearest railway station, on the Guarda-Figueira da Foz line, which skirts the northern slopes of the Serra. Towards the close of the 19th century the Serra de Bussaco became one of the regular halting-places for foreign, and especially for British, tourists, on the overland route between Lisbon and Oporto. Its hotel, built in the Manoellian style — a blend of Moorish and Gothic — encloses the buildings of a secularized Carmelite monastery, founded in 1268. The convent woods, now a royal domain, have long been famous for their cypress, plane, evergreen oak, cork and other forest trees, many of which have stood for centuries and attained an immense size. A bull of Pope Gregory XV. (1623), anathematizing trespassers and forbidding women to approach, is inscribed on a tablet at the main entrance ; another bull, of Urban VIII. (1643), threatens with excommunication any person harming the trees. In 1873 a monument was erected, on the southern slopes of the Serra, to commemorate the battle of Bussaco, in which the French, under Marshal Massena, were defeated by the British and Portu- guese, under Lord Wellington, on the 27th of September 1810.

BUSSY, ROGER DE RABUTIN, Comte de (1618-1693), commonly known as Bussy-Rabutin, French memoir-writer, was born on the 13th of April 1618 at Epiry, near Autun. He represented a family of distinction in Burgundy (see Sevigne, Madame de), and his father,

Leonor de Rabutin, was lieutenant- general of the province of Nivernais. Roger was the third son, but by the death of his elder brothers became the representative of the family. He entered the army when he was only sixteen and fought through several campaigns, succeeding his father in the office of mestre de camp. He tells us himself that his two ambitions were to become " honnete homme " and to distinguish himself in arms, but the luck was against him. In 1 641 he was sent to the Bastille by Richelieu for some months as a punishment for neglect of his duties in his pursuit of gallantry. In 1643 he married a cousin, Gabrielle de Toulongeon, and for

a short time he left the army. But in 1645 he succeeded to his father's position in the Nivernais, and served under Conde in Catalonia. His wife died in 1646, and he became more notorious than ever by an attempt to abduct Madame de Miramion, a rich widow. This affair was with some difficulty settled by a considerable payment on Bussy's part, and he afterwards married Louise de Rouville. When Conde joined the party of the Fronde, Bussy joined him, but a fancied slight on the part of the prince finally decided him for the royal side. He fought with some distinction both in the civil war and on foreign service, and buying the commission of mestre de camp in 1655, he went to serve under Turenne in Flanders. He served there for several campaigns and distinguished himself at the battle of the Dunes and elsewhere; but he did not get on well with his general, and his quarrelsome disposition, his overweening vanity and his habit of composing libellous chansons made him eventually the enemy of most persons of position both in the army and at court. In the year 1659 he fell into disgrace for having taken part in an orgy at Roissy near Paris during Holy Week, which caused great scandal. Bussy was ordered to retire to his estates, and beguiled his enforced leisure by composing, for the amuse- ment of his mistress, Madame de Montglas, his famous Histoire amoureuse des Gaules. This book, a series of sketches of the intrigues of the chief ladies of the court, witty enough, but still more ill-natured, circulated freely in manuscript, and had numerous spurious sequels. It was said that Bussy had not spared the reputation of Madame, and the king, angry at the report, was not appeased when Bussy sent him a copy of the book to disprove the scandal. He was sent to the Bastille on the 17th of April 1665, where he remained for more than a year, and he was only liberated on condition of retiring to his estates, where he lived in exile for seventeen years. Bussy felt the disgrace keenly, but still bitterer was the enforced close of his military career. In 1682 he was allowed to revisit the court, but the coldness of his reception there

made his provincial exile seem preferable, and he returned to Burgundy, where he died on the 9th of April 1693.

The Histoire amoureuse is in its most striking passages adapted from Petronius, and, except in a few portraits, its attractions are chiefly those of the scandalous chronicle. But his Memoires, published after his death, are extremely lively and characteristic, and have all the charm of a historical romance of the adventurous type. His voluminous correspondence yields in variety and interest to few collections of the kind, except that of Madame de Sevigne, who indeed is represented in it to a great extent, and whose letters first appeared in it. The literary and historical student, therefore, owes Bussy some thanks.

The best edition of the Histoire amoureuse des Gaules is that of Paul Boiteau in the Bibliotheque Elzevirienne (3 vols., Paris, 1856-1859). The Memoires (2 vols., 1857) and Correspondance (6 vols., 1858-1859) were edited by Ludovic Lalanne. Bussy wrote other things, of which the most important, his Genealogy of the Rabutin Family, remained in MS. till 1867, while his Considerations sur la guerre was first published in Dresden in 1746. He also wrote, for the use of his children, a series of biographies, in which his own life serves a moral purpose.

BUSTARD (corrupted from the Lat. Avis tarda, though the application of the epithet 1 is not easily understood), the largest British land-fowl, and the Otis tarda of Linnaeus, which formerly frequented the champaign parts of Great Britain from East Lothian to Dorsetshire, but of which the native race is now extirpated. Its existence in the northern locality just named rests upon Sir Robert Sibbald's authority (circa 1684), and though Hector Boethius (1526) unmistakably described it as an in- habitant of the Merse, no later writer than the former has adduced any evidence in favour of its Scottish domicile. The last ex- amples of the native race were probably two killed in 1838 near Swaffham, in Norfolk, a district in which for some years previ- ously a few hen-birds of the species, the remnant of a plentiful stock, had maintained their existence, though no cock-bird had latterly been known to bear them company. In Suffolk, where the neighbourhood of Icklingham formed its chief haunt, an

1 It may be open to doubt whether tarda is here an adjective. Several of the medieval naturalists used it as a substantive

end came to the race in 1832; on the wolds of Yorkshire about 1826, or perhaps a little later; and on those of Lincolnshire about the same time. Of Wiltshire, George Montagu, author of an Ornithological Dictionary, writing in 1813, says that none had been seen in their favourite haunts on Salisbury Plain for the last two or three years. In Dorsetshire there is no evidence of an indigenous example having occurred since that date, nor in Hampshire nor Sussex since the opening of the 19th century. ' From other English counties, as Cambridgeshire, Hertfordshire and Berkshire, it disappeared without note being taken of the event, and the direct cause or causes of its extermination can only be inferred from what, on testimony cited by Henry Steven- son (Birds of Norfolk, ii. pp. 1-42), is known to have led to the same result in Norfolk and Suffolk. In the latter the extension of plantations rendered the country unfitted for a bird whose shy nature could not brook the growth of covert that might shelter a foe, and in the former the introduction of improved agricultural implements, notably the corn-drill and the horse-hoe, led to the discovery and generally the destruction of every.nest, for the bird's chosen breeding-place was in wide fields — " brecks," as they are locally called — of winter-corn. Since the extirpa- tion of the native race the bustard is known to Great Britain only by occasional wanderers, straying most likely from the open country of Champagne or Saxony, and occurring in one part or another of the United Kingdom some two or three times every three or four years, and chiefly in midwinter.

An adult male will measure nearly 4 ft. from the tip of the bill to the end of the tail, and its wings have an expanse of 8 ft. or more, — its weight varying (possibly through age) from 22 to 32 lb. This last was that of one which was recorded by the younger Naumann, the best biographer of the bird (Vogel Deutschlands, vii. p. 12), who, however, stated in 1834 that he was assured of the former existence of examples which had attained the weight °f 35 or 38 K>. The female is considerably smaller. Compared with most other birds frequenting open places, the bustard has disproportionately short legs, yet the bulk of its body renders it a conspicuous and stately object, and when on the wing, to which it readily takes, its flight is powerful and sustained. The bill is of moderate length, but, owing to the exceedingly flat head of the bird, appears longer than it really is. The neck, especially of the male in the breeding-season, is thick, and the tail, in the same sex at that time of year, is generally carried in an upright position, being, however, in the paroxysms of courtship turned forwards, while the head and neck are simultaneously

reverted along the back, the wings are lowered, and their shorter feathers erected. In this posture, which has been admirably portrayed by Joseph Wolf (Zool. Sketches, pi. 45), the bird presents a very strange appearance, for the tail, head and neck are almost buried amid the upstanding feathers before named, and the breast is protruded to a remarkable extent. The bustard is of a pale grey on the neck and white beneath, but the back is beauti- fully barred with russet and black, while in the male a band of deep tawny-brown — in some examples approaching a claret- colour — descends from either shoulder and forms a broad gorget on the breast. The secondaries and greater wing-coverts are white, contrasting vividly, as the bird flies, with the black primaries. Both sexes have the ear-coverts somewhat elongated — whence doubtless is derived the name Otis (Gr. dins) — and the male is adorned with a tuft of long, white, bristly plumes, springing from each side of the base of the mandible. The food of the bustard consists of almost any of the plants natural to the open country it loves, but in winter it will readily forage on those which are grown by man, and especially coleseed and similar green crops. To this vegetable diet much animal matter is added when occasion offers, and from an earthworm to a field- mouse little that lives and moves seems to come amiss to its appetite.

Though not many birds have had more written about them than the bustard, much is unsettled with regard to its economy. A moot point, which will most likely always remain undecided, is whether the British race was migratory or not, though that such is the habit of the species in most parts of the European

continent is beyond dispute. Equally uncertain as yet is the question whether it is polygamous or not — the evidence being perhaps in favour of its having that nature. But one of the most singular properties of the bird is the presence in some of the fully- grown males of a pouch or gular sac, opening under the tongue. This extraordinary feature, first discovered by James Douglas, a Scottish physician, and made known by Eleazar Albin in 1 740, though its existence was hinted by Sir Thomas Browne sixty years before, if not by the emperor Frederick II., has been found wanting in examples that, from the exhibition of all the outward marks of virility, were believed to be thoroughly mature; and as to its function and mode of development judgment had best be suspended, with the understanding that the old supposition of its serving as a receptacle whence the bird might supply itself or its companions with water in dry places must be deemed to be wholly untenable. The structure of this pouch — the existence of which in some examples has been well established — is, how- ever, variable; and though there is reason to believe that in one

form or another it is more or less common to several exotic species of the family Otididae, it would seem to be as inconstant in its occurrence as in its capacity. As might be expected, this remarkable feature has attracted a good deal of attention (Journ. fur Ornith., 1861, p. 153; Ibis, 1862, p. 107; 1865, p. 143; Proc. Zool. Soc, 1865, p. 747; 1868, p. 741; 1869, p. 140; 1874, p. 471), and the later researches of A. H. Garrod show that in an example of the Australian bustard (Otis australis) examined by him there was, instead of a pouch or sac, simply a highly dilated oesophagus — the distension of which, at the bird's will, produced much the same appearance and effect as that of the undoubted sac found at times in the 0. tarda.

The distribution of the bustards is confined to the Old World — the bird so called in the fur-countries of North America, and thus giving its name to a lake, river and cape, being the Canada goose (Bernicla canadensis). In the Palaearctic region we have the 0. tarda already mentioned, extending from Spain to Mesopo- tamia at least, and from Scania to Morocco, as well as a smaller species, O. tetrax, which often occurs as a straggler in, but was never an inhabitant of, the British Islands. Two species, known indifferently by the name of houbara (derived from the Arabic), frequent the more southern portions of the region, and one of them, O. macqueeni, though having the more eastern range and reaching India, has several times occurred in north-western Europe, and once even in England. In the east of Siberia the place of 0. tarda is taken by the nearly-allied, but apparently distinct, O. dybovskii, which would seem to occur also in northern China. Africa is the chief stronghold of the family, nearly a score of well-marked species being peculiar to that continent, all of which have been by later systematists separated from the genus Otis. India, too, has three peculiar species, the smaller of which are there known as floricans, and, like some of their African and one of their European cousins, are remarkable for the ornamental plumage they assume at the breeding-season. Neither in Madagascar nor in the Malay Archipelago is there any form of this family, but Australia possesses one large species already named. From Xenophon's days (Anab. i. 5) to our own the flesh of bustards has been esteemed as of the highest flavour. The bustard has long been protected by the game-laws in Great Britain, but, as will have been seen, to little purpose. A few attempts have been made to reinstate it as a denizen of this country, but none on any scale that would ensure success. Many of the older authors considered the bustards allied to the ostrich, a most mistaken view, their affinity pointing apparently towards the cranes in one direction and the plovers in another. (A. N.)

BUSTO ARSIZIO, a town of Lombardy, Italy, in the province of Milan, 21 m. N.W. by rail from the town of Milan. Pop. (1901) 19,673. It contains a fine domed church, S. Maria di Piazza, built in 1517 after the designs of Bramante: the picture over the high altar is one of Gaudenzio Ferrari's best works. The church of S. Giovanni Battista is a good baroque edifice of 161 7; by it stands a fine 13th-century campanile. Busto Arsizio is an active manufacturing town, the cotton factories being

especially important. It is a railway junction for Novara and Seregno.

BUTADES, of Sicyon, wrongly called Dibutades, the first Greek modeller in clay. The story is that his daughter, smitten with love for a youth at Corinth where they lived, drew upon the wall the outline of his shadow, and that upon this outline her father modelled a face of the youth in clay, and baked the model along with the clay tiles which it was his trade to make. This model was preserved in Corinth till Mummius sacked that town. This incident led Butades to ornament the ends of roof- tiles with human faces, a practice which is attested by numerous existing examples. He is also said to have invented a mixture of clay and ruddle, or to have introduced the use of a special kind of red clay (Pliny, Nat. Hist. xxxv. 12 [43]). The period at which he flourished is unknown, but has been put at about 600 B.C.

BUTCHER, one who slaughters animals, and dresses and prepares the carcass for purposes of food. The word also is applied to one who combines this trade with that of selling the meat, and to one who only sells the meat. The O. Fr. bochier or bouchier, modern boucher, from which " butcher " is derived, meant originally a killer of goats and a seller of goats' flesh, from the O. Fr. boc, a he-goat; cf. Ital. beccaio, from becco, a goat.

BUTE, JOHN STUART, 3RD Earl of (1713-1792), English prime minister, son of James, 2nd earl, and of Lady Jane Campbell, daughter of the 1st duke of Argyll, was born on the 25th of May 1 7 13; he was educated at Eton and succeeded to the earldom (in the peerage of Scotland; created for his grand- father Sir James Stuart in 1703) on his father's death in 1723. He was elected a representative peer for Scotland in 1737 but not in the following parliaments, and

appears not to have spoken in debate. In 1738 he was made a knight of the Thistle, and for several years lived in retirement in Bute, engaged in agricultural and botanical pursuits. From the quiet obscurity for which his talents and character entirely fitted him Bute was forced by a mere accident. He had resided in England since the rebellion of 1745, and in 1747, a downpour of rain having prevented the departure of Frederick, prince of Wales, from the Egham races, Bute was summoned to his tent to make up a whist party; he immediately gained the favour of the prince and princess, became the leading personage at their court, and in 1750 was appointed by Frederick a lord of his bedchamber. After the latter's death in 1751 his influence in the household increased. To his close intimacy with the princess a guilty character was commonly assigned by contemporary opinion, and their relations formed the subject of numerous popular lampoons, but the scandal was never founded on anything but conjecture and the malice of faction. With the young prince, the future king, Bute's intimacy was equally marked; he became his constant companion and confidant, and used his influence to inspire him with animosity against the Whigs and with the high notions of the sovereign's powers and duties found in Bolingbroke's Patriot King and Blackstone's Commentaries. In 1775 he took part in the negotiations between Leicester House and Pitt, directed against the duke of Newcastle, and in 1757 in the conferences between the two ministers which led to their taking office together. In 1756, by the special desire of the young prince, he was appointed groom of the stole at Leicester House, in spite of the king's pronounced aversion to him.

On the accession of George III. in 1760, Bute became at once a person of power and importance. He was appointed a privy councillor, groom of the stole and first gentleman of the bedchamber, and though merely an irresponsible confidant, without a seat in parliament or in the cabinet, he was in reality prime minister, and the only person trusted with the king's wishes and confidence. George III. and Bute immediately proceeded to accomplish their long-projected plans, the conclusion of the peace with France, the break-up of the Whig monopoly of power, and the supremacy of the monarchy over parliament and parties. Their policy was carried out with consummate skill and caution. Great care was shown not to alienate the Whig leaders in a body, which would have, raised up under Pitt's leadership a formidable party of resistance, but advantage was taken of disagreements

between the ministers concerning the war, of personal jealousies, and of the strong reluctance of the old statesmen who had served the

crown for generations to identify themselves with active opposition to the king's wishes. They were all discarded singly, and isolated, after violent disagreements, from the rest of the ministers. On the 25th of March 1761 Bute succeeded Lord Holdemess as secretary of state for the northern department, and Pitt resigned in October on the refusal of the government to declare war against Spain.

On the 3rd of November Bute appeared in his new capacity as prime minister in the House of Lords, where he had not been seen for twenty years. Though he had succeeded in disarming all organized opposition in parliament, the hostility displayed against him in the nation, arising from his Scottish nationality, his character as favourite, his peace policy and the resignation of the popular hero Pitt, was overwhelming. He was the object of numerous attacks and lampoons. He dared not show himself in the streets without the protection of prize-fighters, while the jack-boot (a pun upon his name) and the petticoat, by which the princess was represented, were continually being burnt by the mob or hanged upon the gallows. On the 9th of November, while proceeding to the Guildhall, he narrowly escaped falling into the hands of the populace, who smashed his coach, and he was treated with studied coldness at the banquet. In January

1762 Bute was compelled to declare war against Spain, though now without the advantages which the earlier decision urged by Pitt could have secured, and he supported the war, but with no zeal and no definite aim beyond the obtaining of a peace at any price and as soon as possible. In May he succeeded the duke of Newcastle as first lord of the treasury, and he was created K.G. after resigning the order of the Thistle. In his blind eager- ness for peace he conducted on his own responsibility secret negotiations for peace with France through Viri, the Sardinian minister, and the preliminary treaty was signed on the 3rd of November at Fontainebleau. The king of Prussia had some reason to complain of the sudden desertion of his ally, but there is no evidence whatever to substantiate his accusation that Bute had endeavoured to divert the tsar later from his alliance with Prussia, or that he had treacherously in his negotiations with Vienna held out to that court hopes of territorial compensation in Silesia as the price of the abandonment of France; while the charge brought against Bute in 1765 of having taken bribes to conclude the peace, subsequently after investigation pronounced frivolous by parliament, may safely be ignored. A parliamentary majority was now secured for the minister's policy by bribery and threats, and with the aid of Henry Fox, who deserted his party to become leader of the Commons. The definitive peace of Paris was signed on the 10th of

February 1763, and a wholesale proscription of the Whigs was begun, the most insignificant adherents of the fallen party, including widows, menial servants and schoolboys, incurring the minister's mean vengeance. Later, Bute roused further hostility by his cider tax, an ill-advised measure producing only £75,000 a year, imposing special burdens upon the farmers and landed interest in the cider counties, and extremely unpopular because extending the detested system of taxation by excise, regarded as an infringement of the popular liberties. At length, unable to contend any longer against the general and inveterate animosity displayed against him, fearing for the consequences to the monarchy, alarmed at the virulent attacks of the North Briton, and suffering from ill-health, Bute resigned office on the 8th of April. " Fifty pounds a year," he declared, " and bread and water were luxury compared with what I suffer." He had, however, before retiring achieved the objects for which he had been entrusted with power.

He still for a short time retained influence with the king, and intended to employ George Grenville (whom he recommended as his successor) as his agent; but the latter insisted on possessing the king's whole confidence, and on the failure of Bute in August

1763 to procure his dismissal and to substitute a ministry led by Pitt and the duke of Bedford, Grenville demanded and obtained Bute's withdrawal from the court. He resigned accordingly the office of privy purse, and took leave of George IIL

on the 28th of September. He still corresponded with the king, and returned again to London next year, but in May 1765, after the duke of Cumberland's failure to form an administration, Grenville exacted the promise from the king, which appears to have been kept faithfully, that Bute should have no share and should give no advice whatever in public business, and obtained the dismissal of Bute's brother from his post of lord privy seal in Scotland. Bute. continued to visit the princess of Wales, but on the king's arrival always retired by a back staircase.

The remainder of Bute's life has little public interest. He spoke against the government on the American question in February 1 766, and in March against the repeal of the Stamp Act. In 1768 and 1774 he was again elected a representative peer for Scotland, but took no

further part in politics, and in 1778 refused to have anything to do with the abortive attempt to effect an alliance between himself and Chatham. He travelled in Italy, complained of the malice of his opponents and of the'ingratitude of the king, and determined " to retire from the world before it retires from me." He died on the 10th of March 1792 and was buried at Rothesay in Bute.

Though one of the worst of ministers, Bute was by no means the worst of men or the despicable and detestable person represented by the popular imagination. His abilities were inconsiderable, his character weak, and he was qualified neither for the ordinary administration, of public business nor for the higher sphere of statesmanship, and was entirely destitute of that experience which sometimes fills the place of natural aptitude. His short administration was one of the most disgraceful and incompetent in English history, originating in an accident, supported only by the will of the sovereign, by gross corruption and intimidation, the precursor of the disintegration of political life and of a whole series of national disasters. Yet Bute had good principles and intentions, was inspired by feelings of sincere affection and loyalty for his sovereign, and his character remains untarnished by the grosser accusations raised by faction. In the circle of his family and intimate friends, away from the great world in which he made so poor a figure, he was greatly esteemed. Samuel Johnson, Lord Mansfield, Lady Hervey, Bishop Warburton join in his praise. For the former, a strong opponent of his administra- tion, he procured a pension of £300 a year. He was exceptionally well read, with a refined taste for books and art, and purchased the famous Thomason Tracts now in the British Museum. He was learned in the science of botany, and formed a magnificent collection and a botanic garden at Luton Hoo, where Robert Adam built for him a splendid residence. He engraved privately about 1785 at enormous expense Botanical Tables containing the Different Family s of British Plants, while The Tabular Distribution of British Plants (1787) is also attributed to him. Bute filled the offices of ranger of Richmond Forest, governor of the Charter- house, chancellor of Marischal College, Aberdeen (1761), trustee of the British Museum (1765), president of the Society of Anti- quaries of Scotland (1780) and commissioner of Chelsea hospital.

By his marriage with Mary, daughter of Edward Wortley Montagu of Wortley, Yorkshire, who in 1761 was created Baroness Mount Stuart of Wortley, and through whom he became possessed of the enormous Wortley property, he had, besides six daughters, five sons, the eldest of whom, John, Lord Cardiff (1744-1814), succeeded him as 4th earl and was created a marquess in 1796. John, Lord Mount Stuart

(1767-1794), the son and heir of the 1st marquess, died before his father, and consequently in 1814 the Bute titles and estates came to his son John (1793-1848) as 2nd marquess. The latter was succeeded by his only son John Patrick (1 847-1 900), whose son John (b. 1 881) inherited the title in 1900.

BUTE, the most important, though not the largest, of the islands constituting the county of the same name, in the Firth of Clyde, Scotland, about 18 m. S.W. of Greenock and 40 m., by water, from Glasgow. It is bounded on the N. and W. by the lovely Kyles of Bute, the narrow winding strait which separates it from Argyllshire, on the E. by the Firth of Clyde, and on the S. and S.W. by the Sound of Bute, about 6 m. wide, which divides it from Arran. Its area is about 49 sq. m., or

31,161 acres. It lies in a N.W. to S.E. direction, and its greatest length from Buttock Point on the Kyles to Garroch Head on the Firth of Clyde is 15 \ m. Owing to indentations its width varies from 1 \ m. to 4j m. There are piers at Kilchattan, Craigmore, Port Bannatyne and Rothesay, but Rothesay is practically the harbour for the whole island. Here there is regular communication by railway steamers from Craigendoran, Prince's Pier (Greenock), Gourock and Wemyss Bay, and by frequent vessels from the Broomielaw Bridge in Glasgow and otherpointson the Clyde. Pop. (1891) 11,735; (1901) 12,162.

The principal hills are in the north, where the chief are Kames Hill (91 1 ft.) and Kilbride Hill (836 f t.) . The streams are mostly burns, and there are six lochs. Loch Fad, about 1 m. S. of Rothesay, 25 m. long by 3 m. wide, was the source of the power used in the Rothesay cotton-spinning mill, which was the first establishment of the kind erected in Scotland. In 1827 on its western shore Edmund Kean built a cottage afterwards occupied by Sheridan Knowles. It now belongs to the marquess of Bute. From Loch Ascog, fully 1 m. long, Rothesay derives its water supply. The other lakes are Loch Quien, Loch Greenan, Dhu Loch and Loch Bull. Glen More in the north and Glen Callum in the south are the only glens of any size. The climate is mild and healthful, fuchsias and other plants flowering even in winter, and neither snow nor frost being of long continuance, and less rain falling than in many parts of the western coast. Some two-thirds of the area, mostly in the centre and south, are arable, yielding excellent crops of potatoes for the Glasgow market, oats and turnips; the rest consists of hill pastures and plantations. The fisheries are of considerable value. There is no lack of sandstone, slate and whinstone. Some coal exists, but it is of inferior quality and doubtful quan tity . At Kilchattan a superior clay for bricks and

tiles is found, and grey granite susceptible of high polish.

The island is divided geologically into two areas by a fault running from Rothesay Bay in a south-south-west direction by Loch Fad to Scalpsie Bay, which, throughout its course, coincides with a well-marked depression. The tract lying to the north-west of this dis-location is composed of the metamorphic rocks of the Eastern High-lands. The Dunoon phyllites form a narrow belt about a mile and a half broad crossing the island between Kames Bay and Etterick Bay, while the area to the north is occupied by grits and schists which may be the western prolongations of the Beinn Bheula group. Near Rothesay and along the hill slopes west of Loch Fad there are parallel strips of grits and phyllites. That part of the island lying to the east of this dislocation consists chiefly of Upper Old Red Sandstone strata, dipping generally in a westerly or south-westerly direction. At the extreme south end, between Kilchattan and Garroch Head, these conglomerates and sandstones are overlaid by a thick cornstone or dolomitic limestone marking the upper limit of the formation, which is surmounted by the cement-stones and contemporaneous lavas of Lower Carboniferous age. The bedded volcanic rocks which form a series of ridges trending north-west comprise porphyritic basalts, andesite, and, near Port Luchdach, brownish trachyte. Near the base of the volcanic series intrusive igneous rocks of Carboniferous age appear in the form of sills and bosses, as, for instance.the oval mass of olivine-basalt on Suidhe Hill. Remnants of raised beaches are conspicuous in Bute. One of the well-known localities for arctic shelly clays occurs at Kilchattan brick-works, where the dark red clay rests on tough boulder-clay and may be regarded as of late glacial age.

As to the origin of the name of Bute, there is some doubt. It has been held to come from both (Irish for " a cell ") , in allusion to the cell which St Brendan erected in the island in the 6th century; others contend that it is derived from the British words ey budh (Gaelic, ey bhiod), " the island of corn " (i.e. food), in reference to its fertility, notable in contrast with the barren- ness of the Western Isles and Highlands. Bute was probably first colonized by the vanguard of Scots who came over from Ireland, and at intervals the Norsemen also secured a footing for longer or shorter periods. In those days the Butemen were also called Brandanes, after the Saint. Attesting the antiquity of the island, " Druidical " monuments, barrows, cairns and cists are numerous, as well as the remains of ancient chapels. In virtue of a charter granted by James IV. in 1506, the numerous small proprietors took the title .of " baron," which became hereditary in their families. Now the title is practically extinct, the lands

conferring it having with very few exceptions passed

by purchase into the possession of the marquess of Bute, the proprietor of nearly the whole island. His seat, Mount Stuart, about 4ˆ m. from Rothesay by the shore road, is finely situated on the eastern coast. Port Bannatyne (pop. 1165), 2 m. north by west of Rothesay, is a flourishing watering-place, named after Lord Bannatyne (1 743-1 833), a judge of the court of session, one of the founders of the Highland and Agricultural Society in 1784. Near to it is Karnes Castle, where John Sterling, famous for Carlyle's biography, was born in 1806. Kilchattan, in the south-east of the island, is a favourite summer resort. Another object of interest is St Blane's Chapel, picturesquely situated about ˆ m. from Dunagoil Bay. Off the western shore of Bute, I m. from St Ninian's Point, lies the island of Inch- marnock, 2 m. in length and about f m. in width.

See J. Wilson, Account of Rothesay and Bute (Rothesay, 1848); and J. K. Hewison, History of Bute (1894-1895).

. BUTE, or Buteshire, an insular county in the S. W. of Scotland, consisting of the islands of Bute, from which the county takes its name, Inchmarnock, Great Cumbrae, Little Cumbrae, Arran, Holy Island and Pladda, all lying in the Firth of Clyde, between Ayrshire on the E. and Argyllshire on the W. and N. The area of the county is 140,307 acres, or rather more than 219 sq. m. Pop. (1891) 18,404; (1001) 18,787 (or 86 to the sq. m.). In 1901 the number of persons who spoke Gaelic alone was 20, of those speaking Gaelic and English 2764. Before the Reform Bill of 1832, Buteshire, alternately with Caithness-shire, sent one member to parliament — Rothesay at the same time sharing a representative with Ayr, Campbeltown, Inveraray and Irvine. Rothesay was then merged in the county, which since then has had a member to itself. Buteshire and Renfrewshire form one sheriffdom, with a sheriff -substitute resident in Rothesay who also sits periodically at Brodick and Millport. The circuit courts are held at Inveraray. The county is under school-board juris- diction, and there is a secondary school at Rothesay. The county council subsidizes technical education in agriculture at Glasgow and Kilmarnock. The staple crops are oats and potatoes, and cattle, sheep and horses are reared. Seed-growing is an extensive industry, and the fisheries are considerable. The Rothesay fishery district includes all the creeks in Buteshire and a few in Argyll and

Dumbarton shires, the Cumbraes being grouped with the Greenock district. The herring fishery begins in June, and white fishing is followed at one or other point all the year round. During the season many of the fishermen are employed on the Clyde yachts, Rothesay being a prominent yachting centre. The exports comprise agricultural produce and fish, trade being actively carried on between the county ports of Rothesay, Millport, Brodick and Lamlash and the main- land ports of Glasgow, Greenock, Gourock, Ardrossan and Wemyss Bay, with all of which there is regular steamer com- munication throughout the year.

BUTHROTUM. (1) An ancient seaport of Illyria, correspond- ing with the modern Butrinto (q.v.). (2) A town in Attica, mentioned by Pliny the Elder (Nat. Hist. iv. 37).

BUTLER, the name of a family famous in the history of Ireland. The great house of the Butlers, alone among the families of the conquerors, rivalled the Geraldines, their neighbours, kinsfolk and mortal foes. Theobald Walter, their ancestor, was not among the first of the invaders. He was the grandson of one Hervey Walter who, in the time of Henry I., held Witheton or Weeton in Amounderness, a small fee of the honour of Lancaster, the manor of Newton in Suffolk, and certain lands in Norfolk. In the great inquest of Lancaster lands that followed a writ of 1 212, this Hervey, named as the father of Hervey Walter, is said to have given lands in his fee of Weeton to Orm, son of Magnus, with his daughter Alice in marriage. Hervey Walter, son of this Hervey, advanced his family by matching with Maude, daughter of Theobald de Valognes, lord of Parham, whose sister Bertha was wife of Ranulf de Glanville, the great justiciar, " the eye of the king." When Ranulf had founded the Austin Canons priory of Butley, Hervey Walter, his wife's brother-in-law, gave to the house lands in Wingfield for the soul's health of himself and his wife Maude, of Ranulf de Glanville

and Bertha his wife, the charter, still preserved in the Harleian collection, being witnessed by Hervey's younger sons, Hubert Walter, Roger and Hamon. Another son, Bartholomew, wit- nessed a charter of his brother Hubert, 1190-1193. That these nephews of the justiciar profited early by their kinship is seen in Hubert Walter's foundation charter of the abbey of West Dere- ham, wherein he speaks of " dominus Ranulphus de Glan villa et domina Bertha uxor eius, qui nos nutrierunt." Hubert, indeed, becoming one of his uncle's clerks, was so much in his confidence that Gervase of Canterbury speaks of the two as ruling the kingdom together. King Richard, whom he accompanied to the Holy Land, made him bishop of

Salisbury and (1193) arch- bishop of Canterbury. " Wary of counsel, subtle of wit," he was the champion of Canterbury and of England, and the news of his death drew the cry from King John that " now, for the first time, am I king in truth."

Between these two great statesmen Theobald Walter, the eldest brother of the archbishop, rose and flourished. Theobald is found in the Liber Niger (c. 1166) as holding Amounderness by the service of one knight. In 1185 he went over sea to Waterford with John the king's son, the freight of the harness sent after him being charged in the Pipe Roll. Clad in that harness he led the men of Cork when Dermot MacCarthy, prince of Desmond, was put to the sword, John rewarding his services with lands in Limerick and with the important fief of Arklow in the vale of Avoca, where he made his Irish seat and founded an abbey. Returning to England he accompanied his uncle Randulf to France, both witnessing a charter delivered by the king at Chinon when near to death. Soon afterwards, Theobald Walter was given by John that hereditary office of butler to the lord of Ireland, which makes a surname for his descendants, styling himself pincerna when he attests John's charter to Dublin on the 1 5th of May 1192. J. Horace Round has pointed out that he also took a fresh seal, the inscription of which calls him Theobald Walter, Butler of Ireland, and henceforward he is sometimes surnamed Butler (le Botilkr). When John went abroad in 1192, Theobald was given the charge of Lancaster castle, but in 1194 he was forced to surrender to his brother Hubert, who summoned it in King Richard's name. Making his peace through Hubert's influence, he was sheriff of Lancashire for King Richard, who regranted to him all Amounderness. His fortunes turned with the king's death. The new sovereign, treating his surrender of the castle as treachery, took the shrievalty from him, disseised him of Amounderness and sold his cantreds of Limerick land to William de Braose. But the great archbishop soon found means to bring his brother back to favour, and on the 2nd of January 1 201-2 Amounderness, by writ of the king, is to be restored to Theobald Walter, dilecto et fideli nostra. Within a year or two Theobald left England to end his days upon his Arklow fief, busying himself with religious foundations at Wotheney in Limerick, at Arklow and at Nenagh. At Wotheney he is said to have been buried shortly before the 12th of February 1205-6, when an entry in the Close Roll is concerned with his widow. This widow, Maude, daughter of Robert le Vavasor of Denton, was given up to her father, who, buying the right of marrying her at a price of 1200 marks and two palfreys, gave her to Fulk fitz-Warine. Theobald, the son and heir of Theobald and Maude, a child of six years old, was likewise

taken into the keeping of his grandfather Robert, but letters from the king, dated the 2nd of March r 205-6, told Robert, " as he loved his body," to surrender the heir at once to Gilbert fitz-Reinfrid, the baron of Kendal.

Adding to its possessions by marriages the house advanced itself among the nobility of Ireland. On the 1st of September 13 1 5, its chief, Edmund Walter alias Edmund the Butler, for services against the Scottish raiders and Ulster rebels, had a charter of the castle and manors of Carrick, Macgriffyn and Roscrea to hold to him and his heirs sub nomine et honore comitis de Karryk. This charter, however, while apparently creating an earldom, failed, as Mr Round has explained, to make his issue earls of Carrick. But James, the son and heir of Edmund, having married in 1327 Eleanor de Bohun, daughter of Humfrey,

earl of Hereford and Essex, high constable of England, by a daughter of Edward I., was created an Irish earl on the 2nd of November 1328, with the title of Ormonde.

From the early years of the 14th century the Ormonde earls, generation by generation, were called to the chief government of Ireland as lords-keeper, lords-lieutenant, deputies or lords- justices, and unlike their hereditary enemies the Geraldines they kept a tradition of loyalty to the English crown and to English custom. Their history is full of warring with the native Irish, and as the sun stood still upon Gibeon, even so, we are told, it rested over the red bog of Athy while James the White Earl was staying the wild O'Mores. More than one of the earls of Ormonde had the name of a scholar, while of the 6th earl, master of every European tongue and ambassador to many courts, Edward IV. is said to have declared that were good breeding and liberal qualities lost to the world they might be found again in John, earl of Ormonde. The earls were often absent from Ireland on errands of war or peace. James, the 5th earl, had the English earldom of Wiltshire given him in 1449 for his Lancastrian zeal. He fought at St Albans in 145 5, casting his harness into a ditch as he fled the field, and he led a wing at Wakefield. His stall plate as a knight of the Garter is still in St George's chapel. Defeated with the eajrl of Pembroke at Mortimer's Cross and taken prisoner after Towton, his fate is uncertain, but rumour said that he was beheaded at Newcastle, and a letter addressed to John Paston about

May 1461 sends tidings that " the Erie of Wylchir is hed is sette on London Brigge."

To his time belongs a document illustrating a curious tradition of the Butlers. His petition to parliament when he was convey- ing Buckinghamshire lands to the hospital of St Thomas of Acres in London, recites that he does so "in worship of that glorious martyr St Thomas, sometime archbishop of Canterbury, of whose blood the said earl of Wiltshire, his father and many of his ancestors are lineally descended." But the pedigrees in which genealogists have sought to make this descent definite will not bear investigation. The Wiltshire earldom died with him and the Irish earldom was for a time forfeited, his two brothers, John and Thomas, sharing his attainder. John was restored in blood by Edward IV. ; and Thomas, the 7th earl, summoned to the English parliament in 1495 as Lord Rochford, a title taken from a Bohun manor in Essex, saw the statute of attainder annulled by Henry VII. 's first parliament. He died without male issue in 1515. Of his two daughters and co-heirs Anne was married to Sir James St Leger, and Margaret to Sir William Boleyn of Blickling, by whom she was mother of Sir James and Sir Thomas Boleyn. The latter, the father of Anne Boleyn, was created earl of Wiltshire and Ormonde in 1529.

In Ireland the heir male of the Ormonde earls, Sir Piers Butler — " red Piers " — assumed the earldom of Ormonde in 1515 and seized upon the Irish estates. Being a good ally against the rebel Irish, the government temporized with his claim. He was an Irishman born, allied to the wild Irish chieftains by his mother, a daughter of the MacMorrogh Kavanagh; the earldom had been long in the male line; all Irish sentiment was against the feudal custom which would take it out of the family, and the two co-heirs were widows of English knights. In 1522, styled " Sir Piers Butler pretending himself to be earl of Ormonde," he was made chief governor of Ireland as lord deputy, and on the 23rd of February 1527/8, following an agreement with the co-heirs of the 7th earl, whereby the earldom of Ormonde was declared to be at the king's disposal, he was created earl of Ossory. But the Irish estates, declared forfeit to the crown in 1 536 under the Act of Absentees, were granted to him as " earl of Ossory and Ormonde." Although the Boleyn earl of Ormonde and Wiltshire was still alive, there can be no doubt that Piers Butler had a patent of the Ormonde earldom about the 22nd of February 1537/8, from which date his successors must reckon their peerage. His son and heir, James the Lame, who had been created Viscount Thurles on the 2nd of January 1535/6, obtained an act of parliament in 1543/4 which, confirming the grant to his father of the

earldom, gave him the old " pre-eminence " of the ancient earldom of 1328.

Earl James was poisoned at a supper in Ely House in 1546, and Thomas the Black Earl, his son and heir, was brought up at the English court, professing the reformed religion. His sympathies were with the Irish, although he stood staunchly for law and order, and for the great part of his life he was wrest- ling with rebellion. His lands having been harried by hit hereditary enemies the Desmond Geraldines, Elizabeth gave him his revenge by appointing him in 1580 military governor of Munster, with a commission to " banish and vanquish these cankered Desmonds," then in open rebellion. In three months, by his own account, he had put to the sword 46 captains, 800 notorious traitors and 4000 others, and, after four years' fighting, Gerald, earl of Desmond, a price on his head, was taken and killed. Dyingin 1614 without lawful issue, Thomas was succeeded by his nephew Walter of Kilcash, who had fought beside him against the Burkes and O'Mores. But Sir Robert Preston, after- wards created earl of Desmond, claimed a great part of the Ormonde lands in right of his wife, the Black Earl's daughter and heir. In spite of the loyal services of Earl Walter, King James supported the claimant, and the earl, refusing to submit to a royal award, was thrown into gaol, where he lay for eight years in great poverty, his rents being cut off. Although liberated in 1625 he was not acknowledged heir to his uncle's estates until 1630. His son, Viscount Thurles, being drowned on a passage to England, a grandson succeeded him.

This grandson, James Butler, is perhaps the most famous of the long line of Ormondes. By his marriage with his cousin Elizabeth Preston, the Ormonde titles were once more united with all the Ormonde estates. A loyal soldier and statesman, he commanded for the king in Ireland, where he was between the two fires of Catholic rebels and Protestant parliamentarians. In Ireland he stayed long enough to proclaim Charles II. in 1649, but defeated at Rathmines, his garrisons broken by Cromwell, he quitted the country at the end of 1650. At the Restoration he was appointed lord-lieutenant, his estates having been restored to him with the addition of the county palatine of Tipperary, taken by James I. from his grandfather. In 1632 he had been created a marquess. The English earldom of Brecknock was added in 1660 and an Irish dukedom of Ormonde in the following year. In 1682 he had a patent for an English dukedom with the same title. Buckingham's intrigues deprived him for seven years of his lord-lieutenancy, and a desperate attempt was made upon his life in 1670, when a company of ruffians dragged him from

his coach in St James's Street and sought to hurry him to the gallows at Tyburn. His son's threat that, if harm befell his father he would pistol Buckingham, even if he were behind the king's chair, may have saved him from assassination. At the accession of James II. he was once more taken from active employment, and " Barzillai, crowned with honour and with years " died at his Dorsetshire house in 1688. He had seen his great-great-uncle the Black Earl, who was born in 1532, and a great-grandson was playing beside him a few hours before his death. His brave son Ossory, " the eldest hope with every grace adorned," died eight years before him, and he was succeeded by a grandson James, the second duke of Ormonde, who, a recognized leader of the London Jacobites, was attainted in 1 715, his honours and estates being forfeited. The duke lived thirty years in exile, chiefly at Avignon, and died in the rebellion year of 1745 without surviving issue. His younger brother Charles, whom King William had created Lord Butler of Weston in the English peerage and earl of Arran in the Irish, was allowed to purchase the Ormonde estates. On the earl's death without issue in 1758 the estates were enjoyed by a sister, passing in 1760, by settlement of the earl of Arran, to John Butler of Kilcash, descendant of a younger^ brother of the first duke. John dying six years later was succeeded by Walter Butler, a first cousin, whose son John, heir-male of the line of Ormonde, became earl of Ormonde and Ossory and Viscount Thurles in 1791, the Irish parliament reversing the attainder of 1715. Walter, son and heir of the restored earl, was given an English peerage as Lord Butler of Llanthony (1801) and an Irish marquessate of Ormonde (1816), titles that died with him. This Lord Ormonde in 1810

sold to the crown for the great sum of £216,000 his ancestral right to the prisage of wines in Ireland. For his brother and heir, created Lord Ormonde of Llahthony at the coronation of George IV., the Irish marquessate was revived in 1825 and descended in the direct line.

The earls of Carrick (Ireland 1748), Viscounts Ikerrin (Ireland 1629), claim descent from a brother of the first Ormonde earl, while the viscounts Mountgarret (Ireland 1550) spring from a younger son of Piers, the Red Earl of Ossory. The barony of Caher (Ireland 1543), created for Sir Thomas Butler of Chaier or Caher-down-Eske, a descendant in an illegitimate branch of the Butlers, fell into abeyance among heirs general on the death of the 2nd baron in

1560. It was again created, after the sur- render of their rights by the heirs general, in 1 583 for Sir Theobald Butler (d. 1596), and became extinct in 1858 on the death of Richard Butler, 13th baron and 2nd viscount Caher, and second earl of Glengall. Buttler von Clonebough, genannt Haimhausen, count of the Holy Roman Empire, descends from the 3rd earl of Ormonde, the imperial title having been revived in 1681 in memory of the services of a kinsman, Walter, Count Butler (d. 1634), the dragoon officer who carried out the murder of Wallenstein.

See Lancashire Inquests, 1205-1307; Lancashire and Cheshire Record Society, xlviii. ; Chronicles of Matthew Paris, Roger of Hoveden, Giraldus Cambrensis, &c. ; Dictionary of National Bio-

fraphy; G. E. C.'s Complete Peerage; Carte's Ormonde papers; 'aston Letters; Rolls of parliament; fine rolls, liberate rolls, pipe rolls, &c. (O. Ba.)

BUTLER, ALBAN (1710-1773), English Roman Catholic priest and hagiologist, was born in Northampton on the 24th of October 1710. He was educated at the English college, Douai, where on his ordination to the priesthood he held succes- sively the chairs of philosophy and divinity. He laboured for some time as a missionary priest in Staffordshire, held several positions as tutor to young Roman Catholic noblemen, and was finally appointed president of the English seminary at St Omer, where he remained till his death on the 15th of May 1773. Butler's great work, The Lives of the Saints, the result of thirty years' study (4 vols., London, 1756-1759), has passed through many editions and translations (best edition, including valuable notes, Dublin, 12 vols. 1779-1780). It is a popular and com- pendious reproduction of the Acta Sanctorum, exhibiting great industry and research, and is in all respects the best work of its kind in English literature.

See An Account of the Life of A. B. by C. B., i.e. by his nephew Charles Butler (London, 1799); and Joseph Gillow's Bibliographical Dictionary of English Catholics, vol. i.

BUTLER, BENJAMIN FRANKLIN (1818-1893), American lawyer, soldier and politician, was born in Deerfield, New Hampshire, on the 5th of November 1818. He graduated at Waterville (now Colby) College in 1838, was admitted to the Massachusetts bar in 1840, began practice at Lowell, Massa- chusetts, and early attained distinction as a lawyer, particularly in criminal cases. Entering politics as a Democrat, he first attracted general attention by his

violent campaign in Lowell in advocacy of the passage of a law establishing a ten-hour day for labourers; he was a member of the Massachusetts House of Representatives in 1853, and of the state senate in 1859, and was a delegate to the Democratic national conventions from 1848 to i860. In that of i860 at Charleston he advocated the nomina- tion of Jefferson Davis and opposed Stephen A. Douglas, and in the ensuing campaign he supported Breckinridge.

After the Baltimore riot at the opening of the Civil War, Butler, as a brigadier-general in the state militia, was sent by Governor John A. Andrew, with a force of Massachusetts troops, to reopen communication between the Union states and the Federal capital. By his energetic and careful work Butler achieved his purpose without fighting, and he was soon afterwards made major-general, U.S.V. Whilst in command at Fortress Monroe, he declined to return to their owners fugitive slaves who had come within his lines, on the ground that, as labourers for fortifications, &c, they were contraband of war, thus originating the phrase " contraband " as applied to the negroes. In the

conduct of tactical operations Butler was almost uniformly unsuccessful, and his first action at Big Bethel, Va., was a humili- ating defeat for the National arms. Later in 1861 he commanded an expeditionary force, which, in conjunction with the navy, took Forts Hatteras and Clark, N.C. In 1862 he commanded the force which occupied New Orleans. In the administration of that city he showed great firmness and severity. New Orleans was unusually healthy and orderly during the Butler regime. Many of his acts, however, gave great offence, particularly the seizure of $800,000 which had been deposited in the office of the Dutch consul, and an order, issued after some provocation, on May 1 5th, that if any woman should " insult or show contempt for any officer or soldier of the United States, she shall be regarded and shall be held liable to be treated as a woman of the town plying her avocation." This order provoked protests both in the North and the South, and also abroad, particularly in England and France, and it was doubtless the cause of his removal in December 1862. On the 1st of June he had executed one W. B. Mumford, who had torn down a United States flag placed by Farragut on the United States mint; and for this execution he was denounced (Dec. 1862) by President Davis as " a felon deserving capital punishment," who if captured should be reserved for execution. In the campaign of 1864 he was placed at the head of the Army of the James, which he commanded creditably in several battles. But his mismanagement of the expedition against Fort Fisher, N.C, led to his recall by General Grant in December.

He was a Republican representative in Congress from 1867 to 1879, except in 1875-1877. In Congress he was conspicuous as a Radical Republican in Reconstruction legislation, and was one of the managers selected by the House to conduct the impeachment, before the Senate, of President Johnson, opening the case and taking the most prominent part in it on his side; he exercised a marked influence over President Grant and was regarded as his spokesman in the House, and he was one of the foremost advocates of the payment in " greenbacks " of the government bonds. In 187 1 he was a defeated candidate for governor of Massachusetts, and also in 1879 when he ran on the Democratic and Greenback tickets, but in 1882 he was elected by the Democrats who got no other state offices. In 1883 he was defeated on renomination. As presidential nominee of the Greenback and Anti-Monopolist parties, he polled 175,370 votes in 1884, when he had bitterly opposed the nomination by the Democratic party of Grover Cleveland, to defeat whom he tried to " throw " his own votes in Massachusetts and New York to the Republican candidate. His professional income as a lawyer was estimated at f 100,000 per annum shortly before his death at Washington, D.C., on the nth of January 1893. He was an able but erratic administrator and soldier, and a brilliant lawyer. As a politician he excited bitter opposition, and was charged, apparently with justice, with corruption and venality in conniving at and sharing the profits of illicit trade with the Confederates carried on by his brother at New Orleans and by his brother-in-law in the department of Virginia and North Carolina, while General Butler was in command.

See James Parton, Butler in New Orleans (New York, 1863), which, however, deals inadequately with the charges brought against Butler; and The Autobiography and Personal Reminiscences of Major-General B. F. Butler.: Butler's Book (New York, 1893), to be used with caution as regards facts.

BUTLER, CHARLES (1750-1832), British lawyer and miscellaneous writer, was born in London on the 14th of August 1750. He was educated at Douai, and in 1775 entered at Lincoln's Inn. He had considerable practice as a conveyancer, and after the passing of the Roman Catholic Relief Act 1791 was called to the bar. In 1832 he took silk, and was made a bencher of Lincoln's Inn. He died on the 2nd of June in the same year. His literary activity was enormous, and the number of his published works comprises about fifty volumes. The most important of them are the Reminiscences (1821-1827); Horae Biblicae (1797), which has passed through several editions ; Horae Juridicae Subsecivae (1804); Book of the

Roman Catholic Church (1825), which was directed against Southey and excited

some controversy; lives of Erasmus, Grotius, Bossuet, Fenelon. He also edited and completed the Lives of the Saints of his uncle, Alban Butler, Fearne's Essay on Contingent Remainders and Hargrave's edition of Coke upon Littleton's Laws of England

(i775)-

A complete list of Butler's works is contained in Joseph Gillow's Bibliographical Dictionary of English Catholics, vol. i. pp. 357-364.

BUTLER, GEORGE (1774-1853), English schoolmaster and divine, was born in London and educated at Sidney Sussex College, Cambridge, where he afterwards became fellow, in the capacity first of mathematical lecturer, and afterwards of classical tutor. He was elected a public examiner of the university in 1804, and in the following year was one of the select preachers. As head master of Harrow (1805-1829) his all-round knowledge, his tact and his skill as an athlete rendered his administration successful and popular. On his retirement he settled down at Gayton, Northamptonshire, a living which had been presented to him by his college in 1814. In 1836 he became chancellor of the diocese of Peterborough, and in 1842 was appointed dean of Peterborough. His few publications include some notes of Harrow, entitled Harrow, a Selection of Lists of the School between lyjo and 1828 (Peterborough, 1849).

His eldest son, George Butler (1819-1890), was principal of Liverpool College (1866-1882) and canon of Winchester. In 1852 he married Josephine Elizabeth, daughter of John Grey of Dilston. She died on the 30th of December 1906 (see her Autobiography, 1909). Mrs Josephine Butler, as she was com- monly called afterwards, was a woman of intense moral and spiritual force, who devoted herself to rescue work, and specially to resisting the " state regulation of vice " whether by the CD. Acts in India or by any system analogous to that of the continent in England.

His youngest son, the Rev. Dr Henry Montagu Butler, became one of the best-known scholars of his day. Born in 1833, and educated at Harrow and Trinity, Cambridge, he was senior classic in 1855 and was elected a fellow of his college. In 1859 he became head master

of Harrow, as his father had been, and only resigned on being made dean of Gloucester in 1885. In 1886 he was elected master of Trinity, Cambridge. His publications include various volumes of sermons, but his reputa- tion rests on his wide scholarship, his remarkable gifts as a public speaker, and his great practical influence both as a headmaster and at Cambridge. He married first (1861), Georgina Elliot, and secondly (1888) Agneta Frances Ramsay (who in 1887 was senior classic at Cambridge), and had five sons and two daughters.

BUTLER, JOSEPH (1692-1752), English divine and philo- sopher, bishop of Durham, was born at Wantage, in Berkshire, on the 18th of May 1692. His father, a linen-draper of that town, was a Presbyterian, and it was his wish that young Butler should be educated for the ministry in that church. The boy was placed under the care of the Rev. Philip Barton, master of the grammar school at Wantage, and remained there for some years. He was then sent to Samuel Jones's dissenting academy at Gloucester, and afterwards at Tewkesbury, where his most intimate friend was Thomas Seeker, who became archbishop of Canterbury.

While at this academy Butler became dissatisfied with the principles of Presbyterianism, and after much deliberation resolved to join the Church of England. About the same time he began to study with care Samuel Clarke's celebrated Demon- stration of the Being and Attributes of God, which had been published as the Boyle Lectures a few years previously. With great modesty and secrecy Butler, then in his twenty-second year, wrote to the author propounding certain difficulties with regard to the proofs of the unity and omnipresence of the Divine Being. Clarke answered his unknown opponent with a gravity and care that showed his high opinion of the metaphysical acuteness displayed in the objections, and published the corre- spondence in later editions of the Demonstration. Butler acknow- ledged that Clarke's reply satisfied him on one of the points, and he subsequently gave his adhesion to the other. In one of

his letters we already find the germ of his famous dictum that " probability is the guide of life."

In March 17 15 he entered at Oriel College, Oxford, but for some time found it uncongenial and thought of migrating to Cambridge. But he made a close friend in one of the resident fellows, Edward Talbot, son of William Talbot, then bishop of Oxford, and afterwards of Salisbury and Durham. In 1718 he took his degree, was ordained deacon and priest, and on the recommendation of Talbot and Clarke

was nominated preacher at the chapel of the Rolls, where he continued till 1726. It was here that he preached his famous Fifteen Sermons (1726), including the well-known discourses on human nature. In 17 21 he had been given a prebend at Salisbury by Bishop Talbot, who on his translation to Durham gave Butler the living of Houghton-le-Skerne in that county, and in 1725 presented him to the wealthy rectory of Stanhope. In 1726 he resigned his preachership at the Rolls.

For ten years Butler remained in perfect seclusion at Stanhope. He was only remembered in the neighbourhood as a man much loved and respected, who used to ride a black pony very fast, and whose known benevolence was much practised upon by beggars. Archbishop Blackburne, when asked by Queen Caroline whether he was still alive, answered, " He is not dead, madam, but buried." In 1733 he was made chaplain to Lord Chancellor Talbot, elder brother of his dead friend Edward, and in 1736 prebendary of Rochester. In the same year he was appointed clerk of the closet to the queen, and had to take part in the metaphysical conversation parties which she loved to gather round her. He met Berkeley frequently, but in his writings does not refer to him. In 1736 also appeared his great work, The Analogy of Religion.

In 1737 Queen Caroline died; on her deathbed she recom- mended Butler to the favour of her husband. George seemed to think his obligation sufficiently discharged by appointing Butler in 1738 to the bishopric of Bristol, the poorest see in the kingdom. The severe but dignified letter to Walpole, in which Butler accepted the preferment, showed that the slight was felt and resented. Two years later, however, the bishop was pre- sented to the rich deanery of St Paul's, and in 1746 was made clerk of the closet to the king. In 1747 the primacy was offered to Butler, who, it is said, declined it, on tie ground that " it was too late for him to try to support a falling church." The story has not the best authority, and though the desponding tone of some of Butler's writings may give it colour, it is not in harmony with the rest of his life, for in 1750 he accepted the see of Durham, vacant by the death of Edward Chandler. His charge to the clergy of the diocese, the only charge of his known to us, is a weighty and valuable address on the importance of external forms in religion. This, together with the fact that over the altar of his private chapel at Bristol he had a cross of white marble, gave rise to an absurd rumour that the bishop had too great a leaning towards Romanism. At Durham he was very charitable, and expended large sums in building and decorating his church and residence. His private expenses were exceedingly small. Shortly after his translation his constitution began to break up, and he died on the 16th of June 1752, at Bath, whither he had removed for his health. He was buried in the cathedral of Bristol, and over his grave a monument was erected in 1834, with an epitaph by Southey. According to his express orders, all his MSS. were burned after his death. Bishop Butler was never married. His personal appearance has been sketched in a few lines by Hutchinson: — " He was of a most reverend aspect; his face thin and pale; but there was a divine

placidness which inspired veneration, and expressed the most benevolent mind. His white hair hung gracefully on his shoulders, and his whole figure was patriarchal."

Butler was an earnest and deep-thinking Christian, melancholy by temperament, and grieved by what seemed to him the hope- lessly irreligious condition of his age. In his view not only the religious life of the nation, but (what he regarded as synonymous) the church itself, was in an almost hopeless state of decay, as we see from his first and only charge to the diocese of Durham and

from many passages in the Analogy. And though there was a complete remedy just coming into notice, in the Evangelical revival, it was not of a kind that commended itself to Butler, whose type of mind was opposed to everything that savoured of enthusiasm. He even asked John Wesley, in 1 739, to desist from preaching in his diocese of Bristol, and in a memorable interview with the great preacher remarked that any claim to the extra- ordinary gifts of the Holy Spirit was " a horrid thing, a very horrid thing, sir." Yet Butler was keenly interested in those very miners of Kingswood among whom Wesley preached, and left £500 towards building a church for them. It is a great mistake to suppose that because he took no great part in politics he had no interest in the practical questions of his time, or that he was so immersed in metaphysics as to live in the clouds. His intellect was profound and comprehensive, thoroughly qualified to grapple with the deepest problems of metaphysics, but by natural preference occupying itself mainly with the practical and moral. Man's conduct in life, not his theory of the universe, was what interested him. The Analogy was written to counteract the practical mischief which he considered wrought by deists and other freethinkers, and the Sermons lay a good deal of stress on everyday Christian duties. His style has frequently been blamed for its obscurity and difficulty, but this is due to two causes: his habit of compressing his argu- ments into narrow compass, and of always writing with the opposite side of the case in view, so that it has been said of the Analogy that it raises more doubts than it solves. One is also often tempted away from the main course of the argument by the care and precision with which Butler formulates small points of detail.

His great work, The Analogy of Religion, Natural and Revealed, to

the Course and Constitution of Nature, cannot be adequately appreciated unless taken in connexion with the circumstances of the period at which it appeared. It was intended as a defence against the great tide of deistical speculation (see Deism), which in the apprehension of many good men seemed likely to sweep away the restraints of religion and make way for a general reign of licence. Butler did not enter the lists in the ordinary way. Most of the literature evoked by the controversy on either side was devoted to rebutting the attack of some individual opponent. Thus it was Bentley versus Collins, Sherlock versus Woolston, Law versus Tindal. The Analogy, on the contrary, did not directly refer to the deists at all, and yet it worked more havoc with their position than all the other books put together, and remains practically the one surviving landmark of the whole dispute. Its central motive is to prove that all the objections raised against revealed or supernatural religion apply with equal force to the whole constitution of nature, and that the general analogy between the principles of divine government, as set forth by the biblical revelation, and those observable in the course of nature, leads us to the warrantable conclusion that there is one Author of both. Without altogether eschewing Samuel Clarke's a priori system, Butler relies mainly on the inductive method, not professing to give an absolute demon- stration so much as a probable proof. And everything is brought into closest relation with " that which is the foundation of all our hopes and of all our fears; all our hopes and fears which are of any consideration; I mean a Future Life."

Butler is a typical instance of the English philosophical mind. He will admit no speculative theory of things. To him the universe is no realization of intelligence, which is to be deciphered by human thought; it is a constitution or system, made up of individual facts, through which we thread our way slowly and inductively. Complete knowledge is impossible; nay, what we call knowledge of any part of the system is inherently imperfect. " We cannot have a thorough knowledge of any part without knowing the whole." So far as experience goes, " to us probability is the very guide of life." Reason is certainly to be accepted; it is our natural light, and the only faculty whereby we can judge of things. But it gives no completed system of knowledge and in matters of fact affords only probable conclusions. In this emphatic declaration, that knowledge of the course of nature is merely probable, Butler is at one with Hume, who was a most diligent student of the bishop's works. What can come nearer Hume's celebrated maxim — " Anything may be the cause of anything else," than Butler's conclusion, " so that any one

thing whatever may, for aught we know to the contrary, be a necessary condition to any other ?

It is this strong grasp or the imperfect character of our knowledge of nature and of the grounds for its limitation that makes Butler so formidable an opponent to his deistical contemporaries. He will permit no anticipations of nature, no a priori construction of experience. " The constitution of nature is as it is," and no system of abstract principles can be allowed to take its place. He is willing with Hume to take the course of experience as the basis of his reasoning, seeing that it is common ground for himself and his antagonists. In one essential respect, however, he goes beyond Hume. The course of nature is for him an unmeaning expression, unless it be referred to some author; and he therefore makes ex- tensive use of the teleological method. This position is assumed throughout the treatise, and as against the deists with justice, for their whole argument rested upon the presupposition of the existence of God, the perfect Ruler of the world.

The premises, then, with which Butler starts are the existence of God, the known course of nature, and the necessary limitation of our knowledge. What does he wish to prove ? 1 1 is not his intention to prove God s perfect moral government over the world or the truth of religion. His work is in no sense a philosophy of religion. His purpose is entirely defensive; he wishes to answer objections that nave been brought against religion, and to examine certain diffi- culties that have been alleged as insuperable. And this is to be effected in the first place by showing that from the obscurities and inexplicabilities we meet with in nature we may reasonably expect to find similar difficulties in the scheme of religion. If difficulties be found in the course and constitution of nature, whose author is admitted to be God, surely the existence of similar difficulties in the plan of religion can be no valid objection against its truth and, divine origin. That this is at least in great part Butler's object is plain from the slightest inspection of his work. It has seemed to many to be an unsatisfactory mode of arguing and but a poor defence of religion ; and so much the author is willing to allow. But in the general course of his argument a somewhat wider issue appears. He seeks to show not only that the difficulties in the systems of natural and revealed religion have counterparts in nature, but also that the facts of nature, far from being adverse to the principles of religion, are a distinct ground for inferring their probable truth. He endeavours to show that the balance of probability is entirely in favour of the scheme of religion, that this probability is the natural conclusion from an in- spection of nature, and that, as religion is a matter of practice, we are bound to

adopt the course of action which is even probably the right one. If, we may imagine him saying, the precepts of religion are entirely analogous in their partial obscurity and apparent difficulty to the ordinary course of nature disclosed to us by ex- perience, then it is credible that these precepts are true; not only can no objections be drawn against them from experience, but the balance of probability is in their favour. This mode of reasoning from what is known of nature to the probable truth of what is contained in religion is the celebrated method of analogy.

Although Butler's work is peculiarly one of those which ought not to be exhibited in outline, for its strength lies in the organic completeness with which the details are wrought into the whole argument, yet a summary of his results will throw more light on the method than any description can.

Keeping clearly in view his premises — the existence of Gcd and the limited nature of knowledge — Butler begins by inquiring into the fundamental pre-requisite of all natural religion — the immortality of the soul. Evidently the stress of the whole question is here. Were man not immortal, religion would be of little value. Now, Butler does not attempt to prove the truth of the doctrine; that proof comes from another quarter. The only questions he asks are — Does experience forbid us to admit immortality as a possibility ? Does experience furnish any probable reason for inferring that im- mortality is a fact ? To the first of these a negative, to the second an affirmative answer is returned. All the analogies of our life here lead us to conclude that we shall continue to live after death ; and neither from experience nor from the reason of the thing can any argument against the possibility of this be drawn. Immortality, then, is not unreasonable; it is probable. If, he continues, we are to live after death, it is of importance for us to consider on what our future state may depend; for we may be either happy or miserable. Now, whatever speculation may say as to God's purpose being necessarily universal benevolence, experience plainly shows us that our present happiness and misery depend upon our conduct, and are not distributed indiscriminately. Therefore no argument can be brought from experience against the possibility of our future happi- ness and misery likewise depending upon conduct. The whole analogy of nature is in favour of such a dispensation ; it is therefore reasonable or probable. Further, we are not only under a govern- ment in which actions considered simply as such are rewarded and punished, but it is known from experience that virtue and vice are followed by their natural consequents — happiness and misery. And though the distribution of these rewards is not perfect, all hindrances are plainly temporary or accidental. It

may therefore be concluded that the balance of probability is in favour of God's government in general being a moral scheme, where virtue and vice are respectively rewarded and punished. It need not be objected to the justice of

this arrangement that men are sorely tempted, and may very easily be brought to neglect that on which their future welfare depends, for the very same holds good in nature. Experience shows man to be in a state of trial so far as regards the present ; it cannot, there- fore, be unreasonable to suppose that we are in a similar state as regards the future. Finally, it can surely never be advanced as an argument against the truth of religion that there are many things in it which we do not comprehend, when experience exhibits to us such a copious stock of incomprehensibilities in the ordinary course and constitution of nature.

It cannot have escaped observation, that in the foregoing course of argument the conclusion is invariably from experience of the present order of things to the reasonableness or probability of some other system — of a future state. The inference in all cases passes beyond the field of experience ; that it does so may be and has been advanced as a conclusive objection against it. See for example a passage in Hume, Works (ed. 1854), iv. 161-162, cf. p. 160, which says, in short, that no argument from experience can ever carry us beyond experience itself. However well grounded -this reasoning may be, it altogether misses the point at which Butler aimed, and is indeed a misconception of the nature of analogical argument. Butler never attempts to prove that a future life regulated according to the requirements of ethical law is a reality; he only desires to show that the conception of such a life is not irreconcilable with what we know of the course of nature, and that consequently it is not unreasonable to suppose that there is such a life. Hume readily grants this much, though he hints at a formidable difficulty which the plan of the Analogy prevented Butler from facing, the proof of the existence of God. Butler seems willing to rest satisfied with his opponents' admission that the being of God is proved by reason, but it would be hard to discover how, upon his own conception of the nature and limits of reason, such a proof could ever be given. It has been said that it is no flaw in Butler's argument that he has left atheism as a possible mode of viewing the universe, because his work was not directed against the atheists. It is, however, in some degree a defect;

for his defence of religion against the deists rests on a view of reason which would for ever preclude a demonstrative proof of God's existence.

If, however, his premises be granted, and the narrow issue kept in view, the argument may be admitted as perfectly satisfactory. From what we know of the present order of things, it is not unreasonable to suppose that there will be a future state of rewards and punishments, distributed according to ethical law. When the argument from analogy seems to go beyond this, a peculiar difficulty starts up. Let it be granted that our happiness and misery in this life depend upon our conduct — are, in fact, the rewards and punishments attached by God to certain modes of action, the natural conclusion from analogy would seem to be that our future happiness or the reverse will probably depend upon our actions in the future state. Butler, on the other hand, seeks to show that analogy leads us to believe that our future state will depend upon our present conduct. His argument, that the punishment of an imprudent act often follows after a long interval may be admitted, but does not advance a single step towards the conclusion that imprudent acts will be punished hereafter. So, too, with the attempt to show that from the analogy of the present life we may not unreasonably infer that virtue and vice will receive their respective rewards and punishments hereafter; it may be admitted that virtuous and vicious acts are naturally looked upon as objects of reward or punishment, and treated accord- ingly, but we may refuse to allow the argument to go further, and to infer a perfect distribution of justice dependent upon our conduct here. Butler could strengthen his argument only by bringing forward prominently the absolute requirements of the ethical consciousness, in which case he would have approximated to Kant's position with regard to this very problem. That he did not do so is, perhaps, due to his strong desire to use only such premises as his adversaries the deists were willing to allow.

As against the deists, however, he may be allowed to have made out his point, that the substantial doctrines of natural religion are not opposed to reason and experience, and may be looked upon as credible. The positive proof of them is to be found in revealed religion, which has disclosed to us not only these truths, but also a further scheme not discoverable by the natural light. Here, again, Butler joins issue with his opponents. Revealed religion had been declared to be nothing but a republication of the truths of natural religion (Matthew Tindal, Christianity as Old as the Creation), and all revelation had been objected to as impossible. To show that such objections are invalid, and that a revelation is at least not

impossible, Butler makes use mainly of his doctrine of human ignorance. Revelation had been rejected because it lay altogether beyond the sphere of reason and could not therefore be grasped by human intelligence. But the same is true of nature; there are in the ordinary course of things inexplicabilities ; indeed we may be said with truth to know nothing, for there is no medium between perfect and completed comprehension of the whole system of things, which we manifestly have not, and mere faith grounded on probability. Is it unreasonable to suppose that in a revealed system there should be the same superiority to our intelligence ? If we cannot explain or foretell by reason what the exact course of events in nature will be, is it to be expected that we can do so with regard to the wider

scheme of God's revealed providence ? Is it not probable that there will bernany things not explicable by us ? From our experience of the course of nature it would appear that no argument can be brought against the possibility of a revelation. Further, though it is the province of reason to test this revealed system, and though it be granted that, should it contain anything immoral, it must be rejected, yet a careful examination of the particulars will show that there is no incomprehensibility or difficulty in them which has not a counterpart in nature. The whole scheme of revealed principles is, therefore, not unreasonable, and the analogy of nature and natural religion would lead us to infer its truth. If, finally, it be asked, how a system professing to be revealed can substantiate its claim, the answer is, by means of the historical evidences, such as miracles and fulfilment of prophecy.

It would be unfair to Butler's argument to demand from it answers to problems which had not in his time arisen, and to which, even if they had then existed, the plan of his work would not have extended. Yet it is at least important to ask how far, and in what sense, the Analogy can be regarded as a positive and valuable contribution to theology. What that work. has done is to prove to the consistent deist that no objections can be drawn from reason or experience against natural or revealed religion, and, consequently, that the things objected to are not incredible and may be proved by external evidence. But the deism of the 17th century is a phase of thought that has no living reality now, and the whole aspect of the religious problem has been completely changed. To a generation that has been moulded by the philosophy of Kant and Hegel, by the historical criticism of modern theology, and by all that has been done in the field of comparative religion, the argument of the Analogy cannot but appear to lie quite outside the field of controversy. To Butler the Christian religion, and by that he meant the orthodox Church of

England system, was a moral scheme revealed by a special act of the divine providence,_ the truth of which was to be judged by the ordinary canons of evidence. The whole stood or fell on historical grounds. A speculative construction of religion was abhorrent to him, a thing of which he seems to have thought the human mind naturally incapable. The religious consciousness does not receive from him the slightest consideration. The Analogy, in fact, has and can have but little influence on the present state of theology; it was not a book for all time, but was limited to the problems of the period at which it appeared.

Throughout the whole of the Analogy it is manfest that the interest which lay closest to Butler's heart was the ethical. His whole cast of thinking was practical. The moral nature of man, his conduct in life, is that on account of which alone an inquiry into religion is of importance. The systematic account of this moral nature is to be found in the famous Sermons preached at the Chapel of the Rolls, especially in the first three. In these sermons Butler has made substantial contributions to ethical science, and it may be said with confidence, that in their own department nothing superior in value appeared during the long interval between Aristotle and Kant. To both of these great thinkers he has certain analogies. He resembles the first in his method of investigating the end which human nature is intended to realize; he reminds of the other by the consistency with which he upholds the absolute supremacy of moral law.

In his ethics, as in his theology, Butler had constantly in view a certain class of adversaries, consisting partly of the philosophic few, partly of the fashionably educated many, who all participated in one common mode of thinking. The keynote of this tendency had been struck by Hobbes, in whose philosophy man was regarded as a mere selfish sensitive machine, moved solely by pleasures and pains. Cudworth and Clarke had tried to place ethics on a nobler footing, but their speculations were too abstract for Butler and not sufficiently " applicable to the several particular relations and circumstances of life."

His inquiry is based on teleological principles. " Every work, both of nature and art, is a system; and as every particular thing both natural and artificial is for some use or purpose out of or beyond itself, one may add to what has been already brought into the idea of a system its conduciveness to this one or more ends." Ultimately this view of nature, as the sphere of the realization of final causes, rests on a theological basis; but Butler does not introduce promi- nently into his ethics the specifically theological groundwork, and may be

thought willing to ground his principle on experience. The ethical question then is, as with Aristotle, what is the ri\os of man? The answer to this question is to be obtained by an analysis of the facts of human nature, whence, Butler thinks, " it will as fully appear that this our nature, i.e. constitution, is adapted to virtue, as from the idea of a watch it appears that its nature, i.e. constitution or system, is adapted to measure time." Such analysis had been already attempted by Hobbes, and the result he came to was that man naturally is adapted only for a life of selfishness, — his end is the procuring of pleasure and the avoidance of pain. A closer examination, however, shows that this at least is false. The truth of the counter propositions, that man is 0u

passions, appetites and desires there are some whose tendency is as clearly towards the general good as that of others is towards the satisfaction of the self. Finally, that principle in man which reflects upon actions and the springs of actions, unmistakably sets the stamp of its approbation upon conduct that tends towards the general good. It is clear, therefore, that from this point of view the sum of practical morals might be given in Butler's own words — " that mankind is a community, that we all stand in a relation to each other, that there is a public end and interest of society, which each particular is obliged to promote." But deeper questions remain.

The threefold division into passions and affections, self-love and benevolence, and conscience, is Butler's celebrated analysis of human nature as found in his first sermon. But by regarding benevolence less as a definite desire for the general good >_ as such than as kind affection for particular individuals, he practically eliminates it as a regulative principle and reduces the authorities in the polity of the soul to two — conscience and self-love.

But the idea of human nature is not completely _ expressed by saving that it consists of reason and the several passions. "Who- ever thinks it worth while to consider this matter thoroughly should begin by stating to himself exactly the idea of a system, economy or constitution of any particular nature; and he will, I suppose, find that it is one or a whole, made up of several parts, but yet that the several parts, even considered as a whole, do not complete the idea, unless in the notion of a whole you include the relations and respects which these parts have to each other." This fruitful conception of

man's ethical nature as an organic unity Butler owes directly to Shaftesbury and indirectly to Aristotle; it is the strength and clearness with which he has grasped it that gives peculiar value to his system.

The special relation among the parts of our nature to which Butler alludes is the subordination of the particular passions to the universal principle of reflection or conscience. This relation is the peculiarity, the cross, of man ; and when it is said that virtue consists in following nature, we mean that it consists in pursuing the course of conduct dictated by this superior faculty. Man's function is not fulfilled by obeying the passions, or even cool self-love, but by obeying conscience. That conscience has a natural supremacy, that it is superior in kind, is evident from the part it plays in the moral constitution. We judge a man to have acted wrongly, i.e. unnaturally, when he allows the gratification of a passion to injure his happiness, i.e. when he acts in accordance with passion and against self-love. It would be impossible to pass this judgment if self-love were not regarded as superior in kind to the passions, and this superiority results from the fact that it is the peculiar province of self-love to take a view of the several passions and decide as to their relative importance. But there is in man a faculty which takes into consideration all the springs of action, including self-love, and passes judgment upon them, approving some and condemning others. From its very nature this faculty is supreme in authority, if not in power ; it reflects upon all the other active powers, and pronounces absolutely upon their moral quality. Superintendency and authority are constituent parts of its very idea. We are under obligation to obey the law revealed in the judgments of this faculty, for it is the law of our nature. And to this a religious sanction may be added, for " consciousness of a rule or guide of action, in creatures capable of considering it as given them by their Maker, not only raises immediately a sense of duty, but also a sense of security in following it, and a sense of danger in deviating from it." Virtue then consists in following the true law of our nature, that is, conscience. Butler, however, is by no means very explicit in his analysis of the functions to be ascribed to conscience. He calls it the Principle of Reflection, the Reflex Principle of Approbation, and assigns to it as its province the motives or propensions to action. It takes a view of these, approves or dis- approves, impels to or restrains from action. But at times he uses language that almost compels one to attribute to him the popular view of conscience as passing its judgments with unerring certainty on individual acts. Indeed his theory is weakest exactly at the point where the real difficulty begins. We get from him no satis-

factory answer to the inquiry, What course of action is approved by conscience? Every one, he seems to think, knows what virtue is, and a philosophy of ethics is complete if it can be shown that such a course of action harmonizes with human nature. When pressed still further, he points to justice, veracity and the common good as comprehensive ethical ends. His whole view of the moral government led him to look upon human nature and virtue as connected by a sort of pre-established harmony. His ethical principle has in it no possibility of development into a system of actual duties; it has no content. Even on the formal side it is a little difficult to see what part conscience plays. It seems merely to set the stamp of its approbation on certain courses of action to which we are led by the various passions and affections ; it has in itself no originating power. How or why it approves of some and not of others is left unexplained. Butler's moral theory, like those of his English contemporaries and successors, is defective from not perceiving that the notion of duty can have real significance only when connected with the will or practical reason, and that only in reason which wills itself have we a principle capable of development into an ethical system. It has received very small consideration at the hands of German historians of ethics.

Authorities. — See T. Bartlett, Memoirs of Butler (1839). The standard edition of Butler's works is that in 2 vols. (Oxford, 1844). Editions of the Analogy are very numerous ; that by Bishop William Fitzgerald (1849) contains a valuable Life and Notes. W. Whewell published an edition of the Three Sermons, with Introduction. Modern editions of the Works are those by W. E. Gladstone (2 vols, with a 3rd vol. of Studies Subsidiary, 1896), and J. H. Bernard, (2 vols, in the English Theological Library, 1900). For the history of the religious works contemporary with the Analogy, see Lechler, Gesch. d. Engl. Deismus; M. Pattison, in Essays and Reviews; W. Hunt, Religious Thought in England, vols., ii. and iii. ; L. Stephen, English Thought in the 18th Century; J. H. Overton and F. Relton, The English Church from the Accession of George I. to the End of the 18th Century. (R. Ad. ; A. J. G.)

BUTLER, NICHOLAS MURRAY (1862-), American educator, was born at Elizabeth, New Jersey, on the 2nd of April 1862. He graduated at Columbia College in 1882, was a graduate fellow in philosophy there from 1882 to 1884, when he took the degree of Ph. D., and then studied for a year in Paris and Berlin. He was an assistant in philosophy at Columbia in 1885- 1886, tutor in 1886-1889, adjunct professor of philosophy, ethics and psychology in 1 889-1 890, becoming full professor in 1890, and dean of the

faculty of philosophy in 1890-1902. From 1887 until 1891 he was the first president of -the New York college for the training of teachers (later the Teachers' College of Columbia University), which he had personally planned and organized. In 1891 he founded and afterwards edited the Educational Review, an influential educational magazine. He soon came to be looked upon as one of the foremost authorities on educational matters in America, and in 1894 was elected president of the National Educational Association. He was also a member of the New Jersey state board of education from 1887 to 1895, and was president of the Paterson (N.J.) board of education in 1892-1893. In 1901 he succeeded Seth Low as president of Columbia University. Besides editing several series of books, including " The Great Educators " and " The Teachers' Professional Library," he published The Meaning of Education (1898), a collection of essays; and two series of addresses, True and False Democracy (1907), and The American as he is (1908).

BUTLER (otBoteler), SAMUEL (1612-1680), English poet, author of Hudibras, son of Samuel Butler, a small farmer, was baptized at Strensham, Worcestershire, on the 8th of February 161 2. He was educated at the King's school, Worcester, under Henry Bright, the record of whose zeal as a teacher is preserved by Fuller {Worthies, Worcestershire). After leaving school he served a Mr Jeffereys of Earl's Croome, Worcestershire, in the capacity of justice's clerk, and is supposed to have thus gained his knowledge of law and law terms. He also employed himself at Earl's Croome in general study, and particularly in painting, which he is said to have thought of adopting as a profession. It is probable, however, that art has not lost by his change of mind, for, according to one of his editors, in 1774 his pictures " served to stop windows and save the tax; indeed they were not fit for much else." He was then recommended to Elizabeth, countess of Kent. At her home at Wrest, Bedfordshire, he had access to a good library, and there too he met Selden, who some- times employed him as his secretary. But his third sojourn, with Sir Samuel Luke at Cople Hoo, Bedfordshire, was not only apparently the longest, but also much the most important in its effects on his career and works. We are nowhere informed in what capacity Butler served Sir Samuel Luke, or how he came to reside in the house of a noted Puritan and Parliament man. In the family of this "valiant Mamaluke," who, whether he was or was not the original of Hudibras, was certainly a rigid Presby- terian, " a colonel in the army of the Parliament, scoutmaster- general for Bedfordshire and governor of Newport Pagnell," Butler must have had the most abundant opportunities of study- ing from the life those who were to

be the victims of his satire; he is supposed to have taken some hints for his caricature from Sir Henry Rosewell of Ford Abbey, Devonshire. But we know nothing positive of him until the Restoration, when he was appointed secretary to Richard Vaughan, 2nd earl of Carbery, lord president of the principality of Wales, who made him steward of Ludlow Castle, an office which he held from January 1661

to January 1662. About this time he married a rich lady, variously described as a Miss Herbert and as a widow named Morgan. His wife's fortune was afterwards, however, lost.

Early in 1663 Hudibras: The First Part: written in the Time of the Late Wars, was published, but this, the first genuine edition, had been preceded in 1662 by an unauthorized one. On the 26th of December Pepys bought it, and though neither then nor afterwards could he see the wit of " so silly an abuse of the Presbyter knight going to the wars," he repeatedly testifies to its extraordinary popularity. A spurious second part appeared within the year. This determined the poet to bring out the second part (licensed on the 7th of November 1663, printed 1664), which if possible exceeded the first in popularity. From this time till 1678, the date of the publication of the third part, we hear nothing certain of Butler. On the publication of Hudibras he was sent for by Lord Chancellor Hyde (Clarendon), says Aubrey, and received many promises, none of which was ful- filled. He is said to have received a gift of £300 from Charles II., and to have been secretary to George Villiers, 2nd duke of Buckingham, when the latter was chancellor of the university of Cambridge. Most of his biographers, in their eagerness to prove the ill-treatment which Butler is supposed to have received, disbelieve both these stories, perhaps without sufficient reason. Butler's satire on Buckingham in his Characters {Remains, 1759) shows such an intimate knowledge that it is probable the second story is true. Two years after the publication of the third part of Hudibras he died, on the 25th of September 1680, and was buried by his friend Longueville, a bencher of the Middle Temple, in the churchyard of St Paul's, Covent Garden. He was, we are told, "of a leonine-coloured hair, sanguine, choleric, middle-sized, strong." A portrait by Lely at Oxford and others elsewhere represent him as somewhat hard-featured.

Of the neglect of Butler by the court something must be said. It must be remembered that the complaints on the subject sup- posed to have been uttered by the poet all occur in the spurious posthumous works, that men of letters have been at all times but too prone to complain of lack of patronage, that Butler's actual service was rendered when the day was already won, and that the pathetic stories of the poet starving and dying in want are contradicted by the best authority — Charles Longueville, son of the poet's friend — who asserted that Butler, though often disappointed, was never reduced to anything like want or beggary and did not die in any person's debt. But the most significant notes on the subject are Aubrey's, 1 that " he might have had preferments at first, but would not accept any but very good, so at last he had none at all, and died in want"; and the memor- andum of the same author, that " satirical wits disoblige whom they converse with, &c, consequently make to themselves many enemies and few friends, and this was his manner and case."

Three monuments have been erected to the poet's memory — the first in Westminster Abbey in 172 1, by John Barber, mayor of London, who is spitefully referred to by Pope for daring to connect his name with Butler's. In 1786 a tablet was placed in St Paul's, Covent Garden, by residents of the parish. This was destroyed in 1845. Later, another was set up at Strensham by John Taylor of that place. Perhaps the happiest epitaph on him is one by John Dennis, which calls Butler " a whole species of poets in one."

Hudibras itself, though probably quoted as often as ever, has dropped into the class of books which are more quoted than read. In reading it, it is of the utmost importance to comprehend clearly and to bear constantly in mind the purpose of the author in writing it. This purpose is evidently not artistic but polemic, to show in the most unmistakable characters the vileness and folly of the anti-royalist party. Anything like a regular plot — the absence of which has often been deplored or excused — would have been for this end not merely a superfluity but a mistake, as likely to divert the attention and perhaps even enlist some sympathy for the heroes. Anything like regular character- drawing would have been equally unnecessary and dangerous —

1 Letters written by Eminent Persons . . . and Lives of Eminent Men, by John Aubrey, Esq. (2 vols., 1813).

for to represent anything but monsters, some alleviating strokes must have been introduced. The problem, therefore, was to produce characters just sufficiently unlike lay-figures to excite and maintain

a moderate interest, and to set them in motion by dint of a few incidents not absolutely unconnected, — meanwhile to subject the principles and manners of which these characters were the incarnation to ceaseless satire and raillery. The triumphant solution of the problem is undeniable, when it has once been enunciated and understood. Upon a canvas thus prepared and outlined, Butler has embroidered a collection of flowers of wit, which only the utmost fertility or imagination could devise, and the utmost patience of industry elaborate. In the union of these two qualities he is certainly without a parallel, and their combination has produced a work which is unique. The poem is of considerable length, extending to more than ten thousand verses, yet Hazlitt hardly exaggerates when he says that " half the lines are got by heart "; indeed a diligent student of later English literature has read great part of Hudibras though he may never have opened its pages. The tableaux or situations, though few and simple in construction, are ludicrous enough. The knight and squire setting forth on their journey; the routing of the bear-baiters; the disastrous renewal of the contest; Hudibras and Ralph in the stocks; the lady's release and conditional acceptance of the unlucky knight; the latter's deliberations on the means of eluding his vow; the Skimmington; the visit to Sidrophel, the astrologer; the attempt to cajole the lady, with its woeful consequences; the consultation with the lawyer, and the immortal pair of letters to which this gives rise, complete the argument of the whole poem. But the story is as nothing; throughout we have little really kept before us but the sordid vices of the sectaries, their hypocrisy, their churlish ungraciousness, their greed of money and authority, their fast and loose morality, their inordinate pride. The extraordinary felicity of the means taken to place all these things in the most ridiculous light has never been questioned. The doggerel metre, never heavy or coarse, but framed as to be the very voice of mocking laughter, the astounding similes and disparates, the rhymes which seem to chuckle and to sneer of themselves, the wonderful learning with which the abuse of learning is re- buked, the subtlety with which subtle casuistry is set at nought can never be missed. Keys like those of L'Estrange are therefore of little use. It signifies nothing whether Hudibras was Sir Samuel Luke of Bedfordshire or Sir Henry Rosewell of Devon- shire, still less whether Ralph's name in the flesh was Robinson or Pendle, least of all that Orsin was perhaps Mr Gosling, or Trulla possibly Miss Spencer. Butler was probably as little indebted to mere copying for his characters as for his ideas and style. These latter are in the highest degree original. The first notion of the book, and only the first notion, Butler undoubtedly received from Don Quixote. His obligations to the Satyre Menippee have been

noticed by Voltaire, and though English writers have sometimes ignored or questioned them, are not to be doubted. The art, perhaps the most terrible of all the weapons of satire, of making characters without any great violation of probability represent themselves in the most atrocious and despicable light, was never perhaps possessed in perfection except by Pithou and his colleagues and by Butler. Against these great merits some defects must certainly be set. As a whole, the poem is no doubt tedious, if only on account of the very blaze of wit, which at length almost wearies us by its ceaseless demands on our attention. It should, however, be remembered that it was originally issued in parts, and therefore, it may be supposed, intended to be read in parts, for there can be little doubt that the second part was written before the first was published. A more real defect, but one which Butler shares with all his con- temporaries, is the tendency to delineate humours instead of characters, and to draw from the outside rather than from within.

Attempts have been made to trace the manner and versifica- tion of Hudibras to earlier writers, especially in Cleveland's satires and in the Musarum Deliciae of Sir John Mennis (Pepys's Minnes) and Dr James Smith (1605-1667). But if it had few

ancestors it had an abundant offspring. A list of twenty-seven direct imitations of Hudibras in the course of a century may be found in the Aldine edition (1893). Complete translations of considerable excellence have been made into French (London, 1757 and 1819) by John Townley (1697-1782), a member of the Irish Brigade; and into German by D. W. Soltau (Riga, 1787); specimens of both may be found in R. Bell's edition. Voltaire tried his hand at a compressed version, but not with happy results.

Bibliography. — Butler's works published during his life include, besides Hudibras: To the Memory of the most renowned Du Vail: A Pindaric Ode (1671) ; and a prose pamphlet against the Puritans, Two Letters, one from J. Audland . . . to W. Prynne, the other Prynne's Answer (1672). In 1715-1717 three volumes, entitled Posthumous Works in Prose and Verse . . . with a key to Hudibras by Sir Roger V Estrange . . . were published with great success. Most of the contents, however, are generally rejected as spurious. The poet's papers, now in the British Museum (Addit. MSS. 32 , 625-6) , remained in the hands of his friend William Longueville, and after

his death were left untouched until 1759, when Robert Thyer, keeper of the public library at Manchester, edited two volumes of verse and prose under the title of Genuine Remains in Verse and Prose of Mr Samuel Butler. This collection contained The Elephant in the Moon, a satire on the Royal Society; a series of sketches in prose, Characters ; and some satirical poems and prose pamphlets. Another edition, Poetical Remains, was issued by Thyer in 1827. In 1726 Hogarth executed some illustrations to Hudibras, which are among his earliest but not, perhaps, happiest productions. In 1744 Dr Zachary Grey published an edition of Hudibras, with copious and learned annotations; and an additional volume of Critical and Historical and Explanatory Notes in 1752. Grey's has formed the basis of all subsequent editions.

Other pieces published separately and ascribed to Butler are: A Letter from Mercurius Civicus to Mercurius Rusticus, or London's Confession but not repentance . . . (1643), represented in vol. iv. of Somers's tracts; Mola Asinarum, on the unreasonable and insupportable burthen now pressed . . . upon this groaning nation . . . (1659), included in his posthumous works, which is supposed to have been written by John Prynne, though Wood ascribes it to Butler; The Acts and monuments of our late parliament . . . (1659, printed 1710), of which a continuation appeared in 1659; a "character" of Charles I. (1671) ; A New Ballad of King Edward and Jane Shore . . . (1671); A Congratulatory poem . . . to Sir Joseph Sheldon . . . (!675) 1 The Geneva Ballad, or the occasional conformist display' 'd (1674); The Secret history of the Calves head club, compleat . . . (4th edition, 1707) ; The Morning's Salutation, or a friendly conference between a puritan preacher and a family of his flock . . . (reprinted, Dublin, 1714). Two tracts of his appear in Somers's Tracts, vol. vii. ; he contributed to Ovid's Epistles translated by several hands (1680); and works by him are included in Miscellaneous works, written by . . . George Duke of Buckingham . . . also State Poems . . . (by various hands) (1704); and in The Grove . . . (172 1), a poetic mis- cellany, is a " Satyr against Marriage," not found in his works.

The life of Butler was written by an anonymous author, said by William Oldys to be Sir James Astrey, and prefixed to the edition of 1704. The writer professes to supplement and correct'the notice given by Anthony a Wood in Athenae Oxonienses. Dr Threadneedle Russel Nash, a Worcestershire antiquarian, supplied some additional facts in an edition of 1793. See the Aldine edition of the Poetical Works of Samuel Butler (1893), edited by Reginald Brimley Johnson, with complete bibliographical information. There is a good reprint of Hudibras (edited by Mr A. R. Waller, 1905) in the

Cambridge Classics.

BUTLER, SAMUEL (1774-1839), English classical scholar and schoolmaster, and bishop of Lichfield, was born at Kenilworth on the 30th of January 1774. He was educated at Rugby, and in 1792 went to St John's College, Cambridge. Butler's classical career was a brilliant one. He obtained three of Sir William Browne's medals, for the Latin (1792) and Greek (1793, 1794) odes, the medal for the Greek ode in 1792 being won by Samuel Taylor Coleridge. In 1793 Butler was elected to the Craven scholarship, amongst the competitors being John Keate, after- wards headmaster of Eton, and Coleridge. In 1 796 he was fourth senior op time and senior chancellor's classical medallist. In 1 7 9 7 and 1798 he obtained the 'members' prize for Latin essay. He took the degree of B.A. in 1796, M.A. 1799, and D.D. 1811. In 1797 he was elected a fellow of St John's, and in 1798 became headmaster of Shrewsbury school. In 1802 he was presented to the living cf Kenilworth, in 1807 to a prebendal stall in Lichfield cathedral, and in 1822 to the archdeaconry of Derby; all these appointments he held with his headmastership, but in 1 836 he was promoted to the bishopric of Lichfield (and Coventry,

which was separated from his diocese in the same year). He died on the 4th of December 1839. It is in connexion with Shrewsbury school that Butler will be chiefly remembered. During his headmastership its reputation greatly increased, and in the standard of its scholarship it stood as high as any other public school in England. His edition of Aeschylus, with the text and notes of Stanley, appeared 1800-18 16, and was some- what severely criticized in the Edinburgh Review, but Butler was prevented by his elevation to the episcopate from, revising it. He also wrote a Sketch of Modern and Ancient Geography (1813, frequently reprinted) for use in schools, and brought out atlases of ancient and modern geography. His large library included a fine collection of Aldine editions and Greek and Latin MSS.; the Aldines were sold by auction, the MSS. purchased by the British Museum.

Butler's life has been written by his grandson, Samuel Butler, author of Erewhon {Life and Letters of Dr Samuel Butler, 1896); see also Baker's History of St John's College, Cambridge (ed. J. E. B. Mayor, 1869) ; Sandys, Hist. Class. Schol. (ed. 1908), vol. iii. p. 398.

BUTLER, SAMUEL (1835-1902), English author, son of the Rev. Thomas Butler, and grandson of the foregoing, was born at Langar, near Bingham, Nottinghamshire, on the 4th of December 1835. He was educated at Shrewsbury school, and at St John's College,

Cambridge. He took a high place in the classical tripos of 1858, and was intended for the Church. His opinions, however, prevented his carrying out this intention, and he sailed to New Zealand in the autumn of 1859. He owned a sheep run in the Upper Rangitata district of the province of Canterbury, and in less than five years was able to return home with a moderate competence, most of which was afterwards lost in unlucky investments. The Rangitata district supplied the setting for his romance of Erewhon, or Over the Range (1872), satirizing the Darwinian theory and conventional religion. Erewhon had a sequel thirty years later (1901) in Erewhon Revisited, in which the narrator of the earlier romance, who had escaped from Erewhon in a balloon, finds himself, on revisiting the country after a considerable interval, the object of a topsy- turvy cult, to which he gave the name of " Sunchildism." In 1873 he had published a book of similar tendency, The Fair Haven, which purported to be a "work in defence of the mira- culous element in our Lord's ministry upon earth " by a fictitious J. P. Owen, of whom he wrote a memoir. Butler was a man of great versatility, who pursued his investigations in classical scholarship, in Shakespearian criticism, biology and art with equal independence and originality. On his return from New Zealand he had established himself at Clifford's Inn, and studied painting, exhibiting regularly in the Academy between 1868 and 1876. But with the publication of Life and Habit (1877) he began to recognize literature as his life work. The book was followed by three others, attacking Darwinism— Evolution Old and New, or the Theories of Bujfon, Dr Erasmus Darwin and Lamarck as compared with that of Mr C. Darwin (1879); Un- conscious Memory (1880), a comparison between the theory of Dr E. Hering and the Philosophy of the Unconscious of Dr E. von Hartmann ; and Luck or Cunning (1886). He had a thorough knowledge of northern Italy and its art. In Ex Voto (1888) he introduced many English readers to the art of Tabachetti and Gaudenzio Ferrari at Varallo. He learnt nearly the whole of the Iliad and the Odyssey by heart, and translated both poems (1898 and 1900) into colloquial English prose. In his Authoress of the Odyssey (1897) he propounded two theories: that the poem was the work of a woman, who drew her own portrait in Nausicaa ; and that it was written at Trapani, in Sicily, a proposition which he supported by elaborate investigations on the spot. In another book on the Shakespeare Sonnets (1899) he aimed at destroying the explanations of the orthodox commentators.

Butler was also a musician, or, as he called himself, a Handelian, and in imitation of the style of Plandel he wrote in collaboration

with H. Festing Jones a secular oratorio, Narcissus (1888), and had completed his share of another, Ulysses, at the time of his death on the 18th of June 1902. His other works include: Life and Letters (1896) of Dr Samuel Butler, his

grandfather, headmaster of Shrewsbury school and afterwards bishop of Lichfield; Alps and Sanctuaries (1881); and two posthumous works edited by R. A. Streatfeild, The Way of All Flesh (1903), a novel; and Essays on Life, Art and Science (1904).

See Samuel Butler, Records and Memorials (1903), by R. A. Streat-feild, a collection printed for private circulation, the most important article included being one by H. Festing Jones originally published in The Eagle (Cambridge, December 1902).

BUTLER, WILLIAM ARCHER (1814-1848), Irish historian of philosophy, was born at Annerville, near Clonmel in Ireland, probably in 1814. His father was a Protestant, his mother a Roman Catholic, and he was brought up as a Catholic. As a boy he was imaginative and poetical, and some of his early verses were remarkable. While yet at Clonmel school he became a Protestant. Later he entered Trinity College, Dublin, where he had a brilliant career. He specially devoted himself to literature and metaphysics, and was noted for the beauty of his style. In 1834 he gained the ethical moderatorship, newly instituted by Provost Lloyd, and continued in residence at college. In 1837 he decided to enter the Church, and in the same year he was elected to the professorship of moral philosophy, specially founded for him through Lloyd's exertions. About the same time he was presented to the prebend of Clondahorky, Donegal, and resided there when not called by his professorial duties to Dublin. In 1842 he was promoted to the rectory of Raymochy. He died on the 5th of July 1848. His Sermons (2 vols., 1849) were re- markably brilliant and forceful. The Lectures on the History of Ancient Philosophy, edited by W. Hepworth Thompson (2 vols., 1856; 2nd ed., 1 vol. 1875), take a high place among the few British works on the history of philosophy. The introductory lectures, and those on the early Greek thinkers, though they evidence wide reading, do not show the complete mastery that is found in Schwegler or Zeller; but the lectures on Plato are of considerable value. Among his other writings were papers in the Dublin University Magazine (1834-1837); and " Letters on Development " (in the Irish

Ecclesiastical Journal, 1845), a reply to Newman's famous Essay on the Development of Christian Doctrine.

See Memoir of W. A. Butler, prefixed by Rev. J. Woodward to first series of Sermoiis.

BUTLER, SIR WILLIAM FRANCIS (1838-), British soldier, entered the army as an ensign in 1858, becoming captain in 1872 and major in 1874. He took part with distinction in the Red River expedition (1870-71) and the Ashanti operations of 1873-74 under Wolseley, and received the C.B. in 1874. He served with the same general in the Zulu War (brevet lieut.- colonel), the campaign of Tel-el-Kebir, after which he was made an aide-de-camp to the queen, and the Sudan 1884-85, being employed as colonel on the staff 1885, and brigadier-general 1885-1886. In the latter year he was made a K. C.B. He was colonel on the staff in Egypt 1890-1892, and brigadier-general there until 1892, when he was promoted major-general and stationed at Aldershot, after which he commanded the south- eastern district. In 1898 he succeeded General Goodenough as commander-in-chief in South Africa, with the local rank of lieutenant-general. For a short period (Dec. 1898-Feb. 1899), during the absence of Sir Alfred Milner in England, he acted as high commissioner, and as such and subsequently in his military capacity he expressed views on the subject of the probabilities of war which were not approved by the home government; he was consequently ordered home to command the western district, and held this post until 1 905. He also held the Aldershot command for a brief period in 1900-1901. Sir William Butler was promoted lieutenant-general in 1900. He had long been known as a descriptive writer, since his publication of The Great Lone Land (1872) and other works, and he was the biographer (1899) of Sir George Colley. He married in 1877 Miss Elizabeth Thompson, an accomplished painter of battle-scenes, notably " The Roll Call " (1874), " Quatre Bras " (1875), " Rorke's Drift " (1881), " The Camel Corps " (1S91), and " The Dawn of Waterloo " (1895).

BUTLER, a borough and the county-seat of Butler county, Pennsylvania, U.S.A., on Conoquenessing Creek, about 30 m.

N. of Pittsburg. Pop. (1890) 8734; (1900) 10,853, of whom 928 were foreign-born; (1910 census) 20,728. It is served by the Pennsylvania, the Baltimore & Ohio, the Buffalo, Rochester & Pittsburg, and the Bessemer & Lake Erie railways, and is connected with Pittsburg by two electric lines. It is built on a small hill about roio ft. above sea-level, and commands extensive views of the surrounding valley. The Butler County hospital (1899) is located

here. A fair is held in Butler annually. Oil, natural gas, clay, coal and iron abound in the vicinity, and the borough has various manufactures, including lumber, railway cars (especially of steel), paint, silk, bricks, plate-glass, bottles and oil-well tools. The value of the city's factory products increased from $1,403,026 in 1900 to $6,832,007 in 1905, or 386-9%, this being much the greatest rate of increase shown by any city in the state having in 1900 a population of 8000 or more. Butler was selected as the site for the county-seat of the newly-formed county in 1802, was laid out in 1803, and was incorporated in the same year. The county and the borough were named in honour of General Richard Butler, a soldier in the War of Independence and leader of the right wing of General St Clair's army, which was sent against the Indians in 1791 and on the 4th of November was defeated, Butler being killed in the engagement.

BUTLER (through the O. Fr. bouteillier, from the Late Lat. buticuiarius, buticula, a bottle), a domestic servant who superintends the wine-cellar and acts as the chief male servant of a household; among his other duties are the conduct of the service of the table and the custody of the plate. The butler of a royal household was an official of high rank, whose duties, though primarily connected with the supply of wine for the royal table, varied in the different courts in which the office appears. In England, as superintendent of the importation of wine, a duty was payable to him (see Butlerage and Prisage); the butler- ship of Ireland, Pincema Hiberniae, was given by John, king of England, to Theobald Walter, who added the name of Butler to his own; it then became the surname of his descendants, the earls, dukes and marquesses of Ormonde (see Butler, family, above).

BUTLERAGE AND PRISAGE. In England there was an ancient right of the crown to purveyance or pre-emption, i.e. the right of buying up provisions and other necessities for the royal household, at a valuation, even without the consent of the owner. Out of this right originated probably that of taking customs, in return for the protection and maintenance of the ports and harbours. One such customs due was that of " prisage," the right of taking one tun of wine from every ship importing from ten to twenty tuns, and two tuns from every ship importing more than twenty tuns. This right of prisage was commuted, by a charter of Edward I. (1302), into a duty of two shillings on every tun imported by merchant strangers, and termed " butler- age," because paid to the king's butler. Butlerage ceased to be levied in 1809, by the Customs Consolidation Act of that year.

BUTO, the Greek name of the Egyptian goddess Uto (hierogl. W'zy-t), confused with the name of her city Buto (see Busiris). She was a cobra-goddess of the marshes, worshipped especially in the city of Buto in the north-west of the Delta, and at another Buto (Hdt. ii. 75) in the north-east of the Delta, now Tell Nebesheh. The former city is placed by Petrie at Tell Ferain, a large and important site, but as yet yielding no inscriptions. This western Buto was the capital of the kingdom of Northern Egypt in prehistoric times before the two kingdoms were united; hence the goddess Buto was goddess of Lower Egypt and the North. To correspond to the vulture goddess (Nekhbi) of the south she sometimes is given the form of a vulture; she is also figured in human form. As a serpent she is commonly twined round a papyrus stem, which latter spells her name; and generally she wears the crown of Lower Egypt. The Greeks identified her with Leto; this may be accounted for partly by the resemblance of name, partly by the myth of her having brought up Horus in a floating island, resembling the story of Leto and Apollo on Delos. Perhaps the two myths influenced each other. Herodotus describes the temple and other sacred

places of (the western) Buto, and refers to its festival, and to its oracle, which must have been important though nothing definite is known about it. It is strange that a city whose leading in the most ancient times was fully recognized throughout Egyptian history does not appear in the early lists of nome-capitals. Like Thebes, however (which lay in the 4th nome of Upper Egypt, its early capital being Hermonthis), it eventually became, at a very late date, the capital of a nome, in this case called Phtheneto, " the land of (the goddess) Buto." The second Buto (hierogl. 'Im-t) was capital from early times of the 19th nome of Lower Egypt.

See Herodotus ii. 155; Zeitschr. f. agyptische Sprache (1871), 1; K. Sethe in Pauly-Wissowa, Realencyclopadie, s.v. " Buto " ; D. G. Hogarth, Journal of Hellenic Studies, xxiv. I ; W. M. F. Petrie, Ehnasya, p. 36 ; Nebesheh and Defenneh. (F. Ll. G.)

BUTRINTO, a seaport and fortified town of southern Albania, Turkey, in the vilayet of Iannina; directly opposite the island of Corfu (Corcyra), and on a small stream which issues from Lake Vatzindro or Vivari, into the Bay of Butrinto, an inlet of the Adriatic Sea. Pop. (1900) about 2000. The town, which is situated about 2

m. inland, has a small harbour, and was formerly the seat of an Orthodox bishop. In the neighbourhood are the ruins of the ancient Buthrotum, from which the modern town derives its name. The ruins consist of a Roman wall, about a mile in circumference, and some remains of both later and Hellenic work. The legendary founder of the city was Helenus, son of Priam, and Virgil {A en. iii. 291 sq.) tells how Helenus here established a new Trojan kingdom. Hence the names New Troy and New Pergamum, applied to Buthrotum, and those of Xanthus and Simois, given to two small streams in the neighbourhood. In the 1st century B.C. Buthrotum became a Roman colony, and derived some importance from its position near Corcyra, and on the main highway between Dyrra- chium and Ambracia. Under the Empire, however, it was overshadowed by the development of Dyrrachium and Apollonia. The modern city belonged to the Venetians from the 14th century until 1797. It was then seized by the French, who in 1799 had to yield to the Russians and Turks.

BUTT, ISAAC (1813-1879), Irish lawyer .and Nationalist leader, was born at Glenfin, Donegal, in 1813, his father being the Episcopalian rector of Stranorlar. Having won high honours at Trinity, Dublin, he was appointed professor of political economy in 1836. In 1838 he was called to the bar, and not only soon obtained a good practice, but became known as a politician on the Protestant Conservative side, and an opponent of O'Connell. In 1844 he was made a Q.C. He figured in nearly all the important Irish law cases for many years, and was engaged in the defence of Smith O'Brien in 1848, and of the Fenians between 1865 and 1869. In 1852 he was returned to parliament by Youghal as a Liberal-Conservative, and retained this seat till 1865; but his views gradually became more liberal, and he drifted away from his earlier opinions. His career in parliament was marred by his irregular habits, which resulted in pecuniary embarrassment, and between 1865 and 1870 he returned again to his work at the law courts. The result, however, of the dis-establishment of the Irish Church was to drive Butt and other Irish Protestants into union with the Nationalists, who had always repudiated the English connexion; and on 19th May 1870, at a large meeting in Dublin, Butt inaugurated the Home Rule movement in a speech demanding an Irish parliament for local affairs. On this platform he was elected in 1871 for Limerick, and found himself at the head of an Irish Home Rule party of fifty-seven members. But it was an ill-assorted union, and Butt soon found that he had little or no control over his more aggressive followers. He had no liking for violent methods or for " obstruc- tion " in parliament; and his leadership gradually became a nullity. His false position undoubtedly

assisted in breaking down his health, and he died in Dublin on the 5th of May 1879.

BUTT. (1) (From the Fr. botte, boute; Med. Lat. butta, a wine vessel), a cask for ale or wine, with a capacity of about two hogsheads. (2) (A word common in Teutonic languages, meaning short, or a stump), the thick end of anything, as of a fishing-rod,

a gun, a whip, also the stump of a tree. (3) (From the Fr. but, a goal or mark, and butte, a target, a rising piece of ground, &c), a mark for shooting, as in archery, or, in its modern use, a mound or bank in front of which are placed the targets in artillery or musketry practice. This is sometimes called a " stop-butt," its purpose being to secure the ground behind the targets from stray shots. The word is used figuratively of a person or object at which derision or abuse are levelled.

BUTTE, the largest city of Montana, U.S.A., and the county- seat of Silver Bow county. It is situated in the valley of Deer Lodge river, near its head, at an altitude of about 5700 ft. Pop. (1880) 3363; (1890) 10,723; (1900) 30,470, of whom 10,210 were foreign-born, including 2474 Irish, 1518 English-Canadians, and 1503 English; (1910 census) 39,165. It is served by the Great Northern, the Northern Pacific, the Chicago, Milwaukee & Puget Sound, the Butte, Anaconda & Pacific, and the Oregon Short Line railways. Popularly the name " Butte " is applied to an area which embraces the city, Centerville, Walkerville, East Butte, South Butte and Williamsburg. These together form one large and more or less compact city. Butte lies in the centre of the greatest copper-mining district in the world; the surround- ing hills are honey-combed with mines, and some mines are in the very heart of the city itself. The best known of the copper mines is the Anaconda. The annual output of copper from the Butte district almost equals that from all the rest of the country together; the annual value of copper, gold and silver aggregates more than $60,000,000. Although mining and its allied industries of quartz crushing and smelting dominate all other industries in the place, there are also foundries and machine shops, iron- works, tile factories, breweries and extensive planing mills. Electricity, used in the mines particularly, is brought to Butte from Canon Ferry, 75 m. to the N.; from the plant, also on the Missouri river, of the Helena Power Transmission Company, which has a great steel dam 85 ft. high and 630 ft. long across the river, and a 6000-h.p. substation in Butte; and from the plant of the Madison River Power Company, on Madison river 7^ m. S.E. of Norris, whence power is also transmitted to Bozeman and Belgrade, Gallatin county, to Ruby, Madison

county, and to the Greene- Campbell mine near Whitehall, Jefferson county. In 1910 Butte had only one large smelter, and the smoke nuisance was thus abated. The city is the seat of the Montana School of Mines (1900), and has a state industrial school, a high school and a public library (rebuilt in 1906 after a fire) with more than 32,000 volumes. The city hall, Federal building and Silver Bow county court house are among the principal buildings. Butte was first settled as a placer mining camp in 1864. It was platted in 1866; its population in 1870 was only 24r, and for many years its growth was slow. Prosperity came, however, with the introduction of quartz mining in 1875, and in 1879 a city charter was granted. In the decade from 1890 to 1000 Butte's increase in population was 184-2%.

BUTTE (O. Fr. butte, a hillock or rising ground), a word used in the western states of North America for a flat-topped hill surrounded by a steep escarpment from which a slope descends to the plain. It is sometimes used for " an elevation higher than a hill but not high enough for a mountain." The butte capped by a horizontal platform of hard rock is characteristic of the arid plateau region of the west of North America.

BUTTER (Lat. bulyrum, Gr. Povrvpov, apparently connected with /3o0s, cow, and rupos, cheese, but, according to the New English Dictionary, perhaps of Scythian origin), the fatty portion of the milk of mammalian animals. The milk of all mammals contains such fatty constituents, and butter from the milk of goats, sheep and other animals has been and may be used; but that yielded by cow's milk is the most savoury, and it alone really constitutes the butter of commerce. The milk of the various breeds of cattle varies widely in the proportion of fatty matter it contains; its richness in this respect being greatly influenced by season, nature of food, state of the animals' health and other considerations. Usually the cream is skimmed off the surface of the milk for making butter, but by some the churning is performed on the milk itself without waiting for the

Plant of Ranunculus bul- bosus, showing determinate inflorescence.

separation of the cream. The operation of churning causes the rupture of the oil sacs, and by the coalescence of the fat so liberated butter is formed. Details regarding churning and the preparation of butter generally will be found under Dairy and Dairy Farming.

BUTTERCUP, a name applied to several species of the genus Ranunculus (q.v.), characterized by their deeply-cut leaves

and yellow, broadly cup-shaped flowers. Ranunculus acris and R. bulbosus are erect, hairy meadow plants, the latter having the stem swollen at the base, and distin- guished also by the furrowed flower-stalks and the often smaller flowers with reflexed, not spread- ing, sepals. R. repens, common on waste ground, produces long runners by means of which it rapidly covers the ground. The plants are native in the north temperate to arctic zones of the Old World, and have been intro- duced in America.

BUTTERFIELD, DANIEL (1831- 1901), American soldier, was born in Utica, New York. He gradu- ated at Union College in 1849, and when the Civil War broke out he became colonel of the 12th New York militia regiment. On the 14th of May 1861 he was trans- ferred to the regular army as a lieutenant-colonel, and in September he was made a brigadier-general U.S.V. He served in Virginia in 1861 and in the Peninsular campaign of 1862, and was wounded at Gaines' Mill. He took part in the campaign of second Bull Run (August 1862), and in November became major-general U.S.V. and in July 1863 colonel U.S.A. At Fredericksburg he commanded the V. corps, in which he had served since its formation. After General Hooker succeeded Burnside, Butterfield was appointed chief of staff, Army of the Potomac, and in this capacity he served in the Chancellorsville and Gettysburg campaigns. Not being on good terms with General Meade he left the staff, and was soon after- wards sent as chief of staff to Hooker, with the XL and XII. corps (later combined as the XX.) to Tennessee, and took part in the battle of Chattanooga (1863), and the Atlanta campaign of the following year, when he commanded a division of the XX. corps. His services were recognized by the brevets of brigadier- general and major-general in the regular army. He resigned in 1870, and for the rest .of his life was engaged in civil and com- mercial pursuits. In 1862 he wrote a manual of Camp and Outpost Duty (New York, 1862). General Butterfield died at Cold Spring, N.Y., on the 17th of July 1901. A Biographical Memorial, by his widow, was published in 1904. BUTTERFIELD, WILLIAM (1814-1900), English architect, was born in London, and educated for his profession at Worcester, where he laid the foundations of his knowledge of Gothic archi- tecture. He settled in London and became prominent in connexion with the Cambridge Camden Society, and its work in the improvement of church furniture and art. His first important building was St Augustine's, Canterbury (1845), and his reputation was made by All Saints', Margaret Street, London (1859), followed by St Alban's, Holborn

(1863), the new part of Merton College, Oxford (1864), Keble College, Oxford (1875), and many houses and ecclesiastical buildings. He also did much work as a restorer, which has been adversely criticized. He was a keen churchman and intimately associated with the English church revival. He had somewhat original views as to colour in architecture, which led to rather garish results, his view being that any combination of the natural colours of the materials was permissible. His private life was retiring, and he died unmarried on the 23rd of February 1900.

BUTTERFLY and MOTH (the former from "butter" and " nv)" a n old term of uncertain origin, possibly from the nature of the excrement, or the yellow colour of some particular species; the latter akin to O. Eng. mod, an earth-worm), the common English names applied respectively to the two groups of insects forming the scientific order Lepidoptera (q.v.).

BUTTER-NUT, the product of Caryocar nuciferum, a native of tropical South America. The large nuts, known also as saowari or suwarow nuts, are the hard stone of the fruit and contain an oily nutritious seed. The genus Caryocar contains ten species, in tropical South America, some of which form large trees affording a very durable wood, useful for shipbuilding.

BUTTERWORT, the popular name of a small insectivorous plant, Pinguiada vulgaris, which grows in wet, boggy land. It is a herb with a rosette of fleshy, oblong leaves, 1 to 3 in. long, appressed to the ground, of a pale colour and with a sticky surface. Small insects settle on the leaves and are caught in the viscid excretion. This, like the excretion of the sundew and other insectivorous plants, contains a digestive ferment (or enzyme) which renders the nitrogenous substances of the body of the insect soluble, and capable of absorption by the leaf. In

A, leaf of Butterwort (Pinguicula vulgaris) with left margin in-flected over a row of small flies. (After Darwin.) B, glands from surface of leaf by which the sticky liquid is secreted and by means of which the products of digestion are absorbed.

« this way the plant obtains nitrogenous food by means of its leaves. The leaves bear two sets of glands, the larger borne on usually unicellular pedicels, the smaller almost sessile (fig. B). When a fly is captured, the viscid excretion becomes strongly acid and the naturally incurved margins of the leaf curve still further inwards, rendering contact between the insect and the leaf-surface more

complete. The plant is widely distributed ill the north temperate zone, extending into the arctic zone.

BUTTERY (from O. Fr. boterie, Late Lat. botaria, a place where liquor is stored, from bulta, a cask), a place for storing wine; later, with a confusion with " butter," a pantry or store- room for food; especially, at colleges at Oxford and Cambridge, the place where food other than meat, especially bread and butter, ale and wines, &c, are kept.

BUTTMANN, PHILIPP KARL (1764-1829), German philo- logist, was born at Frankfort-on-Main in 1764. He was educated in his native town and at the university of Gottingen. In 1789 he obtained an appointment in the library at Berlin, and for some years he edited Speners Journal. In 1796 he became professor at the Joachimsthal Gymnasium in Berlin, a post which he held for twelve years. In 1806 he was admitted to the Academy of Sciences, and in 181 1 was made secretary of the Historico-Philological Section. He died in 1829. Buttmann's writings gave a great impetus to the scientific study of the Greek language. His Griechische Grammatik (1792) went through many editions, and was translated into English. His Lexilogus, a valuable study on some words of difficulty occurring prin- cipally in the poems of Homer and Hesiod, was published in 1818- 1825, and was translated into English. Buttmann's other works were Ausfuhrliche griechische Sprachlehre (2 vols., 1819-1827); Mythologus, a collection of essays (1828-1829); and editions of some classical authors, the most important being Demosthenes in Midiam (1823) and the continuation of Spalding's Quintilian.

BUTTON (Fr. boulon, O. Fr. boton, apparently from the same root as bouter, to push), a small piece of metal or other material which, pushed through a loop or button-hole, serves as a catch between different parts of a garment, &c. The word is also used of other objects which have a projecting knob-like character, e.g. button-mushrooms, the button of an electric bell-push, or the guard at the tip of a fencing foil; or which resemble a button in size and shape, as the button of metal obtained in assaying operations. At first buttons were apparently used for purposes of ornamentation; in Piers Plowman (1377) mention is made of a knife with " botones ouergylte," and in Lord Berner's translation of Froissart's Chronicles

(1525) of a book covered with crimson velvet with " ten botons of syluer and gylte." While this use has continued, especially in connexion with women's dress, they began to be employed as fastenings at least as early as the 15th century. As a term of comparison for some- thing trivial or worthless, the word is found in the 14th century. Buttons of distinctive colour or pattern, or bearing a portrait or motto, are often worn, especially in the United States, as a decoration, or sign of membership of a society or of adherence to a political party; among the most honoured of such buttons are those worn by members of the military order of the Loyal Legion of the United States, organized in 1865 by officers who had fought in the Civil War. Chinese officials wear a button or knob on their hats as a mark of rank, the grade being denoted by its colour and material (see Mandarin).

Many varieties of buttons are used on clothing, but they may be divided into two main classes according to the arrangement by which they are attached to the garment; in one class they are provided with a shank which may consist of a metal loop or of a tuft of cloth or similar material, while in the other they are pierced with holes through which are passed threads. To these two classes roughly correspond two broad differences in the method of manufacture, according as the buttons are composite and made up of two or more pieces, or are simply shaped disks of a single material; some composite buttons, however, are provided with holes, and simple metal buttons sometimes have metal shanks soldered or riveted on them. From an early period buttons of the former kind were made by needlework with the aid of a mould or former, but about 1807 B. Sanders, a Dane who had been ruined by the bombardment of Copen- hagen, introduced an improved method of manufacturing them at Birmingham. His buttons were formed of two disks of metal locked together by having their edges turned back on each other and enclosing a filling of cloth or pasteboard; and by methods of this kind, carried out by elaborate automatic machinery, buttons are readily produced, presenting faces of silk, mohair, brocade or other material required to harmonize with the fabric on which they are used. Sanders's buttons at first had metal shanks, but about 1825 his son invented flexible shanks of canvas or other substance through which the needle could pass freely in any direction. The mechanical manufacture of covered buttons was started in the United States in 1827 by Samuel Williston, of Easthampton, Mass., who in 1834 joined forces with Joel and Josiah Hayden, of Haydenville.

The number of materials that have been used for making buttons is very large — metals such as brass and iron for the cheaper kinds,

and for more expensive ones, gold and silver, sometimes ornamented with jewels, filigree work, &c.; ivory, horn, bone and mother-of-pearl or other nacreous products of shell-fish; vegetable ivory and wood; glass, porcelain, paper, celluloid and artificial compositions; and even the casein of milk, and blood. Brass buttons were made at Birmingham in 1689, and in the following century the metal button industry underwent considerable development in that city. Matthew Boulton the elder, about 1745, introduced great improvements in the processes of manufacture, and when his son started the Soho works in 1767 one of the departments was devoted to the production of steel buttons with facets, some of which sold for 140 guineas a gross. Gilt buttons also came into fashion about the same period. In this " Augustan age " of the Birmingham button industry, when there was a large export trade, the profits

of manufacturers who worked on only a modest scale amounted to £3000 and £4000 a year, and workmen earned from £2 to £4 a week. At one time the buttons had each to be fashioned separately by skilled artisans, but gradually the cost of pro- duction was lessened by the adoption of mechanical processes, and instead of being turned out singly and engraved or otherwise ornamented by hand, they came to be stamped out in dies which at once shape them and impress them with the desired pattern. Ivory buttons are among the oldest of all. Horn buttons were made at Birmingham at least by 1777; towards the middle of the 19th century Emile Bassot invented a widely-used process for producing them from the hoofs of cattle, which were softened by boiling. Pearl buttons are made from pearl oyster shells obtained from various parts of the world, and after being cut out by tubular drills are shaped and polished by machinery. Buttons of vegetable ivory can be readily dyed. Glass buttons are especially made in Bohemia, as also are those of porcelain, which were invented about 1840 by an Englishman, R. Prosser of Birmingham. In the United States few buttons were made until the beginning of the 19th century, when the manufacture of metal buttons was started at Waterbury, Conn., which is now the centre of that industry. In 181 2 Aaron Benedict began to make ivory and horn buttons at the same place. Buttons of vegetable ivory, now one of the most important branches of the American button industry, were first made at Leeds, Mass., in 1859 by an Englishman, A. W. Critchlow, and in 1875 com- mercial success was attained in the production of composition buttons at Springfield, Mass. Pearl buttons were made on a small scale in 1855, but their manufacture received an enormous impetus in the last decade of the 19th century, when J. F. Boepple began, at Muscatine, Iowa, to utilize the unio or "

niggerhead " shells found along the Mississippi. By 1905 the annual output of these "fresh-water pearl" buttons had reached 11,405,723 gross, worth $3,359,167, or 36-6% of the total value of the buttons produced in the United States. In the same year the mother-of-pearl buttons (" ocean pearl buttons ") numbered i)737>83o gross, worth $1,511,107, and the two kinds together constituted 44% of the number, and 53-9% of the value, of the button manufactures of the United States. (See U.S.A. Census Reports, igoo, Manufactures, part iii. pp. 315-327.)

BUTTRESS (from the O. Fr. bouteret, that which bears a thrust, from bouter, to push, cf. Eng. " butt " and " abutment "), masonry projecting from a wall, provided to give additional strength to the same, and also to resist the thrust of the roof or wall, especially when concentrated at any one point. In Roman architecture the plans of the building, where the vaults were of considerable span and the thrust therefore very great, were so arranged as to provide cross-walls, dividing the aisles, as in the case of the Basilica of Maxentius, and, in the Thermae of Rome, the subdivisions of the less important halls, so that there were no visible buttresses. In the baths of Diocletian, however, these cross-walls rose to the height of the great vaulted hall, the tepida- rium, and their upper portions were decorated with niches and pilasters. In a palace at Shuka in Syria, attributed to the end of the 2nd century a.d., where, in consequence of the absence of timber, it was necessary to cover over the building with slabs of stones, these latter were carried on arches thrown across the great hall, and this necessitated two precautions, viz. the pro- vision of an abutment inside the building, and of buttresses outside, the earliest example in which the feature was frankly accepted. In Byzantine work there were no external buttresses, the plans being arranged to include them in cross- walls or interior abutments. The buttresses of the early Romanesque churches were only pilaster strips employed to break up the wall surface and decorate the exterior. At a slightly later period a greater depth was given to the lower portion of the buttresses, which was then capped with a deep sloping weathering. The introduction of ribbed vaulting, extended to the nave in the 12th century, and the concentration of thrusts on definite points of the structure, rendered the buttress an absolute necessity, and from the first this would seem to have been recognized, and the architectural treatment already given to the Romanesque buttress received

a remarkable development. The buttresses of the early English period have considerable projection with two or three sets-off sloped at an acute angle dividing the stages and crowned by triangular heads; and slender columns ("buttress shafts") are used at the angle. In later work pinnacles and niches are usually employed to decorate the summits of the buttresses, and in the still later Perpendicular work the vertical faces are all richly decorated with panelling.

BUTYL ALCOHOLS, C 4 H 9 OH. Four isomeric alcohols of this formula are known; two of these are primary, one second- ary, and one tertiary (see Alcohols). Normal butyl alcohol, CH 3 -(CH 2) 2 - CH 2 OH, is a colourless liquid, boiling at n6-8°, and formed by reducing normal butyl aldehyde with sodium, or by a peculiar fermentation of glycerin, brought about by a schizo- mycete. Isobutyl alcohol, (CH 3) 2 CH-CH 2 OH, the butyl alcohol of fermentation, is a primary alcohol derived from isobutane. It may be prepared by the general methods, and occurs in fusel oil, especially in potato spirit. It is a liquid, smelling like fusel oil and boiling at 108-4° C. Methyl ethyl carbinol, CH 3 C 2 H 5 CHOH, is the secondary alcohol derived from n butane. It is a strongly smelling liquid, boiling at 99°. Trimethyl carbinol or tertiary butyl alcohol, (CH 3) 3 -COH, is the simplest tertiary alcohol, and was obtained by A. Butlerow in 1864 by acting with zinc methyl on acetyl chloride (see Alcohols). It forms rhombic prisms or plates which melt at 25° and boil at 83°, and has a spiritous smell, resembling that of camphor.

BUTYRIC ACID, C 4 H 8 2 . Two acids are known corresponding to this formula, normal butyric acid, CH 3 -CH 2 -CH 2 -COOH, and isobuiyric acid, (CH 3) 2 -CH-COOH. Normal butyric acid or fermentation butyric acid is found in butter, as an hexyl ester in the oil of Heracleum giganteum and as an octyl ester in parsnip (Paslinaca sativa) ; it has also been noticed in the fluids of the flesh and in perspiration. It may be prepared by the hydrolysis of ethyl acetoacetate, or by passing carbon monoxide over a mixture of sodium acetate and sodium ethylate at 205° C. (A. Geuther,yl»»., 1880, 2o2,p.3o6),C 2 H 5 ONa+CH 3 COONa+CO = H-C0 2 Na +CH 3 -CH 2 -CH 2 -COONa. It is ordinarily prepared by the fermentation of sugar or starch, brought about by the addition of putrefying cheese, calcium carbonate being added to neutralize the acids formed in the process. A. Fitz (Ber., 1878, n, p. 52) found that the butyric fermentation of starch is aided by the direct addition of Bacillus subtilis. The acid is an oily liquid of unpleasant smell, and solidifies at -19° C; it boils at 162-3° C, and has a specific gravity of 0-9746 (o° C). It is easily soluble in water and alcohol, and is thrown out of its aqueous solution by the addition of calcium

chloride. Potas- sium bichromate and sulphuric acid oxidize it to carbon dioxide and acetic acid, while alkaline potassium permanganate oxidizes it to carbon dioxide. The calcium salt, Ca(C4H70 2) 2 -H 2 0, is less soluble in hot water than in cold.

Isobutyric acid is found in the free state in carobs {Ceratonia siliqua) and in the root of Arnica dulcis, and as an ethyl ester in croton oil. It may be artificially prepared by the hydrolysis of isopropylcyanide with alkalies, by the oxidation of isopropyl alcohol with potassium bichromate and sulphuric acid (I. Pierre and E. Puchot, Ann. de chim. et de phys., 1873, [4] 28, p. 366), or by the action of sodium amalgam on methacrylic acid, CH 2 : C(CH 3)-COOH. It is a liquid of somewhat unpleasant smell, boiling at 155-5° C. Its specific gravity is 0-9697 (o°)- Heated with chromic acid solution to 140° C, it gives carbon dioxide and acetone. Alkaline potassium permanganate oxidizes it to a-oxyisobutyric acid, (CH 3) 2 -C(OH)-COOH, whilst concen- trated nitric acid converts it into dinitroisopropane. Its salts are more soluble in water than those of the normal acid.

BUXAR, or B axar, a town of India, in the district of Shahabad, Bengal, on the south bank of the Ganges, and on the East Indian railway. Pop. (1901) 13,945. There is a dismantled fort of small size which was important from its commanding the Ganges. A celebrated victory was gained here on the 23rd of October 1764 by the British forces under Major (afterwards Sir Hector) Munro, over the united armies of Shuja-ud-Dowlah and Kasim Ali Khan. The action raged from 9 o'clock till noon, when

the enemy gave way. Pursuit was, however, frustrated by Shuja-ud-Dowlah sacrificing a part of his army to the safety of the remainder. A bridge of boats had been constructed over a stream about 2 m. distant from the field of battle, and this the enemy destroyed before their rear had passed over. Through this act 2000 troops were drowned, or otherwise lost; but destructive as was this proceeding, it was, said Major Munro, " the best piece of generalship Shuja-ud-Dowlah showed that day, because if I had crossed the rivulet with the army, I should either have taken or drowned his whole army in the Karamnasa, and come up with his treasure and jewels, and Kasim Ali Khan's jewels, which I was informed amounted to between two and three millions."

BUXTON, JEDEDIAH (1707-1772), English arithmetician, was born on the 20th of March 1707 at Elm ton, near Chesterfield, in Derbyshire. Although his father was schoolmaster of the parish, and

his grandfather had been the vicar, his education had been so neglected that he could not write; and his knowledge, except of numbers, was extremely limited. How he came first to know the relative proportions of numbers, and their pro- gressive denominations, he did not remember; but on such matters his attention was so constantly riveted, that he fre- quently took no cognizance of external objects, and when he did, it was only with reference to their numbers. He measured the whole lordship of Elmton, consisting of some thousand acres, simply by striding over it, and gave the area not only in acres, roods and perches, but even in square inches. After this, he reduced them into square hairs'-breadths, reckoning forty-eight to each side of the inch. His memory was so great, that in resolving a question he could leave off and resume the operation again at the same point after the lapse of a week, or even of several months. His perpetual application to figures prevented the smallest acquisition of any other knowledge. His wonderful faculty was tested in 1754 by the Royal Society of London, who acknowledged their satisfaction by presenting him with a handsome gratuity. During his visit to the metropolis he was taken to see the tragedy of Richard III. performed at Drury Lane theatre, but his whole mind was given to the counting of the words uttered by David Garrick. Similarly, he set himself to count the steps of the dancers; and he declared that the innumerable sounds produced by the musical instruments had perplexed him beyond measure. He died in 1772.

A memoir appeared in the Gentleman's Magazine for June 1754, to which, probably through the medium of a Mr Holliday, of Haughton Hall, Nottinghamshire, Buxton had contributed several letters. In this memoir, his age is given as forty-nine, which points to his birth in 1705; the date adopted above is on the authority of Lysons' Magna Britannia (Derbyshire).

BUXTON, SIR THOMAS FOWELL (1786-1845), English philanthropist, was born in Essex on the 1st of April 1786, and was educated at Trinity College, Dublin, where, in spite of his early education having been neglected, hard work made him one of the first men of his time, with a high feputation as a speaker. In 1807 he married Hannah Gurney, sister of the celebrated Elizabeth Fry. As his means were not sufficient to support his family, he entered in 1808 the brewery of Truman, Hanbury & Company, of which his uncles, the Hanburys, were partners. He devoted himself to business with characteristic energy, became a partner in 181 1, and soon had the whole concern in his hands. In 181 6 he brought himself into notice by his speech on behalf of the Spitalfields weavers, and in

1818 he published his able Inquiry into Prison Discipline. The same year he was elected M.P. for Weymouth, a borough for which he continued to sit till 1837. In the House of Commons he had a high reputation as an able and straightforward speaker, devoted to philanthropic schemes. Of these plans the most important was that for the abolition of slavery in the British colonies. Buxton devoted his life to this object, and through defeat and opposition, despite the attacks of enemies and the remonstrances of faint-hearted friends, he remained true to it. Not till 1833 was he successful, and even then only partially, for he was compelled to admit into the bill some clauses against which his better judgment had decided. In 1837 he ceased to

sit in the House of Commons. He travelled on the continent in 1839 to recruit his health, which had given way, and took the opportunity of inspecting foreign prisons. He was made a baronet in 1840, and then devoted himself to a plan for ameliorat- ing the condition of the African natives. The failure of the Niger expedition of 1841 was a blow from which he never recovered. He died on the 19th of February 1845.

See Memoir and Correspondence, of Sir T. F. Buxton (1848), by his third son, Charles Buxton (1823-1871), a well-known philanthropist and member of parliament.

BUXTON, a market town and fashionable health-resort in the High Peak parliamentary division of Derbyshire, England, on the London & North-Western and Midland railways, 36 m. N.W. by N. of Derby. Pop. of urban district (1901) 10,181. It occupies a high position, lying between 1000 and 1150 ft. above sea-level, in an open hollow, surrounded at a distance by hills of considerable elevation, except on the south-east side, where the Wye, which rises about half a mile away, makes its exit. The old town (High Buxton) stands a little above the new, and consists of one wide street, and a considerable market-place with an old cross. The new town is the richer portion. The Crescent is a fine range of buildings in the Doric style, erected by the duke of Devonshire in 1779-1788. It contains hotels, a ball-room, a bank, a library and other establishments, and the surrounding open grounds are laid out in terraces and gardens. The Old Hall hotel at the west end of the Crescent stands on the site of the mansion built in 1 572 by the earl of Shrewsbury in the reign of

Queen Elizabeth, which was the residence of Mary queen of Scots when she visited the town. The mineral waters of Buxton, which have neither taste nor smell, are among the most noted in England, and are particularly efficacious in cases of rheumatism and gout. There are numerous public and private baths, the most important of which are those in the establish- ment at the eastern end of the Crescent. The springs supply hot and cold water at a very short distance from each other, flowing at the rate of 60 gallons a minute. The former possesses a uniform temperature of 82 Fahr., and the principal substances in solution are bicarbonate of calcium, bicarbonate of magnesium, chloride of sodium, chloride of magnesium and silica acid. There is also a chalybeate spring known as St Anne's well, situated at the S.W. corner of the Crescent, the water of which when mixed with that of the other springs proves purgative. The Devonshire hospital, formerly known as the Bath Charity, is a benevolent institution, supported by voluntary subscriptions. Every year some thousands of poor patients are treated free of cost; and the hospital was enlarged for their accommodation, a dome being added which is of greater circumference than any other in Europe. In 1894 the duke of Devonshire erected a handsome pump-room at St Anne's well. The Buxton season extends from June to October, and during that period the town is visited by thousands, but it is also popular as a winter resort. The Buxton Gardens are beautifully laid out, with ornamental waters, a fine opera-house, pavilion and concert hall, theatre and reading rooms. Electric lighting has been introduced, and there is an excellent golf course. The Cavendish Terrace forms a fine promenade, and the neighbourhood of the town is rich in objects of interest. Of these the chief are Poole's Hole, a vast stalactite cave, about half a mile distant; Diamond Hill, which owes its name to the quartz crystals which are not uncommon in its rocks; and Chee Tor, a remarkable cliff, on the banks of the Wye, 300 ft. high. Ornaments are manufactured by the inhabitants from alabaster and spar; and excellent lime is burned at the quarries near Poole's Hole. Buxton is an import- ant centre for horse-breeding, and a large horse-fair is held annually. Although the annual rainfall, owing to the situation of the town towards the western flank of the Pennine Hills, is about 49 in., the air is particularly dry owing to the high situation and the rapidity with which waters drain off through the limestone. The climate is bracing and healthy.

The waters were known and used by the Romans, but to a limited extent, and no remains of their baths survive. Roman roads connected the place with Derby, Brough in Edale and

Manchester. Buxton (Bawdestanes, Bue-stanes), formed into a civil

parish from Bakewell in 1895, has thus claims to be considered one of the oldest English spas. It was probably the " Bectune " mentioned in Domesday. After the departure of the Romans the baths seem to have been long neglected, but were again frequented in the 16th century, when the chapel of St Anne was hung round with the crutches of those who were supposed to owe their cure to her healing powers; these interest- ing relics were destroyed at the Reformation. The baths were visited at least four times by Mary queen of Scots, when a prisoner in charge of George, earl of Shrewsbury, other famous Elizabethan visitors being Lord Burleigh, the earl of Essex, and Robert, earl of Leicester. At the close of the 18th century the duke of Devonshire, lord of the manor (whose ancestor Sir Ralph de Gernons was lord of Bakewell in 1 2 51) , spent large sums of money on improvements in the town. In 1781 he began to build the famous Crescent, and since that time Buxton has steadily increased in favour as an inland watering-place. In 1813 a weekly market on Saturday and four annual fairs were granted. These were bought by the local authorities from the duke of Devonshire in 1864.

See Gough's edition of Camden's Britannia; Stephen Glover, History of the County of Derby (Derby, 1 829) ; W. Bemrose, Guide to Buxton (London, 1869).

BUXTORF, or Buxtorff, JOHANNES (1564-1629), German Hebrew and Rabbinic scholar, was born at Kamen in Westphalia on the 25th of December 1564. The original form of the name was Bockstrop, or Boxtrop, from which was derived the family crest, which bore the figure of a goat (Ger. Bock, he-goat). After the death of his father, who was minister of Kamen, Buxtorf studied at Marburg and the newly-founded university of Herborn, at the latter of which C. Olevian (1536-1587) and J. P. Piscator (1546-1625) had been appointed professors of theology. At a later date Piscator received the assistance of Buxtorf in the preparation of his Latin translation of the Old Testament, published at Herborn in 1602-1603. From Herborn Buxtorf went to Heidelberg, and thence to Basel, attracted by the reputation of J. J. Grynaeus and J. G. Hospinian (1515-1575). After a short residence at Basel he studied successively under H. B. Bullinger (1504-1575) at Zurich and Th. Beza at Geneva. On his return to Basel, Grynaeus, desirous that the services of so promising a scholar should be secured to the university, procured him a situation as tutor in the family of Leo Curio, son of Coelius Secundus Curio, well-known for his sufferings on account of the Reformed faith. At the instance of Grynaeus, Buxtorf undertook the duties of the Hebrew chair in the univer- sity, and discharged them for two years with such ability that at the end of that time he

was unanimously appointed to the vacant office. From this date (1591) to his death in 1629 he remained in Basel, and devoted himself with remarkable zeal to the study of Hebrew and rabbinic literature. He received into his house many learned Jews, that he might discuss his difficulties with them, and he was frequently consulted by Jews themselves on matters relating to their ceremonial law. He seems to have well deserved the title which was conferred upon him of " Master of the Rabbins." His partiality for Jewish society brought him, indeed, on one occasion into, trouble with the authorities of the city, the laws against the Jews being very strict. Nevertheless, on the whole, his relations with the city of Basel were friendly. He remained firmly attached to the university which first recognized his merits, and declined two invitations from Leiden and Saumur successively. His corre- spondence with the most distinguished scholars of the day was very extensive; the library of the university of Basel contains a rich collection of letters, which are valuable for a literary history of the time.

Works. — Manuale Hebraicum et Chaldaicum (1602; 7th ed., 1658); Synagoga Judaica (1603 in German; afterwards translated into Latin in an enlarged form), a valuable repertory of information regarding the opinions and ceremonies of the Jews ; Lexicon Hebraicum et Chaldaicum cum brevi Lexico Rabbinico Philosophico (1 607 ; reprinted at Glasgow, 1824); his great Rabbinical Bible, Biblic Hebraica cum Paraphr. Chalet, et Commentariis Rabbinorum (2 vols., 1618; 4 vols., 1618-1619), containing, in addition to the Hebrew

text, the Aramaic Paraphrases of Targums, punctuated after the analogy of the Aramaic passages in Ezra and Daniel (a proceeding which has been condemned by Richard Simon and others), and the Commentaries of the more celebrated Rabbis, with various other treatises; Tiberias, sive Commentarius Masoreticus (1620 ; quarto edition, improved and enlarged by J. Buxtorf the younger, 1665), so named from the great school of Jewish criticism which had its seat in the town of Tiberias. It was in this work that Buxtorf con- troverted the views of Elias Levita regarding the late origin of the Hebrew vowel points, a subject which gave rise to the controversy between Louis Cappel and his son Johannes Buxtorf (q.v.). Buxtorf did not live to complete the two works on which his reputation chiefly rests, viz. his great Lexicon Chaldaicum, Talmudicum, et Rabbinicum, and

the Concordantiae Bibliorum Hebraicorum, both of which were edited by his son. They are monuments of untiring labour and industry. The lexicon was republished at Leipzig in 1869 with some additions by Bernard Fischer, and the concordance was assumed by Julius Furst as the basis of his great Hebrew con- cordance, which appeared in 1840.

For additional information regarding his writings see Athenae Rauricae, pp. 444-448 ; articles in Ersch and Gruber's Encydopddie, and Herzog-Hauck, Realencyk. ; J. P. Niceron's Memoires, vol. xxxi. pp. 206-215; J. M. Schroeckh's Kirchengeschichte, vol. v. (Post-Reformation period), pp. 72 seq. (Leipzig, 1806) ; G. W. Meyer's Geschichte der Schrift-Erkldrung, vol. iii. (Gottingen, 1804) ; and E. Kautsch, Johannes Buxtorf der Altere (1879).

BUXTORF, or Buxtorff, JOHANNES (1599-1664), son of the preceding, was born at Basel on the 13th of August 1599, and when still a boy attained considerable proficiency in the classical languages. Entering the university at the age of twelve, he was only sixteen when he obtained his master's degree. He now gave himself up to theological and especially to Semitic studies, concentrating later on rabbinical Hebrew, and reading while yet a young man both the Mishna and the Jerusalem and Baby- lonian Gemaras. These studies he further developed by visits to Heidelberg, Dort (where he made the acquaintance of many of the delegates to the synod of 1619) and Geneva, and in all these places acquired a great reputation. In 1622 he published at Basel a Lexicon Chaldaicum et Syriacum, as a companion work to his father's great Rabbinical Bible. He declined the chair of logic at Lausanne, and in 1624 was appointed general deacon of the church at Basel. On the death of his father in 1629, he was unanimously designated his successor in the Hebrew professor- ship. From this date until his death in 1664 he remained at Basel, declining two offers which were made to him from Groningen and Leiden, to accept the Hebrew chair in these two celebrated schools. In 1647 the governing body of the university founded, specially for him, a third theological professorship, that of " Commonplaces and Controversies," which Buxtorf held for seven years along with the Hebrew chair. When, however, the professorship of the Old Testament became vacant in 1654 by the death of Theodor Zwinger, Buxtorf resigned the chair of theology and accepted that of the Old Testament instead. He was four times married, his three first wives dying shortly after marriage and the fourth predeceasing her husband by seven years. His children died young, with the exception of two boys, the younger of whom, Jakob (164 5-1 704), became his father's colleague, and then his successor,

in the chair of Hebrew. The same distinction fell to the lot of his nephew Johann (1663-1732).

A considerable portion of Buxtorf's public life was spent in controversy regarding disputed points in biblical criticism, in reference to which he had to defend his father's views. The attitude of the Reformed churches at that time, as opposed to the Church of Rome, led them to maintain many opinions in regard to biblical questions which were not only erroneous, but altogether unnecessary for the stability of their position. Having renounced the dogma of an infallible church, it was deemed necessary to maintain as a counterpoise, not only that of an infallible Bible, but, as the necessary foundation of this, of a Bible which had been handed down from the earliest ages without the slightest textual alteration. Even the vowel points and accents were held to have been given by divine inspiration. The Massoretic text of the Old Testament, therefore, as com- pared either with that of the recently discovered Samaritan Pentateuch, or the Septuagint or of the Vulgate, alone contained the true words of the sacred writers. Although many of the Reformers, as well as learned Jews, had long seen that these

assertions could not be made good, there had been as yet no formal controversy upon the subject. Louis Cappel (q.v.) was the first effectually to dispel the illusions which had long pre- vailed by a work on the modern origin of the vowel points and accents. The elder Buxtorf had counselled him not to publish his work, pointing out the injury which it would do the Protestant cause, but Cappel sent his MS. to Thomas Erpenius of Leiden, the most learned orientalist of his day, by whom it was published in 1624, under the title Arcanum Punctationis revelatum, but without the author's name. The elder Buxtorf, though he lived five years after the publication of the work, made no public reply to it, and it was not until 1648 that Buxtorf junior pub- lished his Tractatus de punctorum origine, antiquitate, et authoritate, oppositus Arcano punctationis revelato Ludovici Cappelli. He tried to prove by copious citations from the rabbinical writers, and by arguments of various kinds, that the points, if not so ancient as the time of Moses, were at least as old as that of Ezra, and thus possessed the authority of divine inspiration. Un- fortunately he allowed himself to employ contemptuous epithets towards Cappel ; such as " innovator " and " visionary." Cappel speedily prepared a second edition of his work, in which, besides replying to the arguments of his opponent, and fortifying his position with new ones, he retorted his contumelious epithets with interest. Owing to various causes, however, this second edition did not see the light until 1685, when it was published at Amsterdam in the edition

of his collected works. Besides this controversy, Buxtorf engaged in three others with the same antagonist, on the subject of the integrity of the Massoretic text of the Old Testament, on the antiquity of the present Hebrew characters, and on the Lord's Supper. In the two former Buxtorf supported the untenable position that the text of the Old Testament had been transmitted to us without any errors or alteration, and that the present square or so-called Chaldee characters were coeval with the original composition of the various books. These views were triumphantly refuted by his great opponent in his Critica Sacra, and in his Diatriba veris et antiquis Ebraicorum Uteris.

Besides the works already mentioned in the course of this article, Buxtorf edited the great Lexicon Chaldaicum, Talmudicum, et Rabbinicum, on which his father had spent the labour of twenty years, and to the completion of which he himself gave ten years of additional study; and the great Hebrew Concordance, which his father had little more than begun. In addition to these, he published new editions of many of his father's works, as well as others of his own, complete lists of which may be seen in the Athenae Rauricae and other works enumerated at the close of the preceding article.

BUYING IN, on the English stock exchange, a transaction by which, if a member has sold securities which he fails to deliver on settling day, or any of the succeeding ten days follow- ing the settlement, the buyer may give instructions to a stock exchange official to " buy in " the stock required. The official announces the quantity of stock, and the purpose for which he requires it, and whoever sells the stock must be prepared to deliver it immediately. The original seller has to pay the difference between the two prices, if the latter is higher than the original contract price. A similar practice, termed " selling out," prevails when a purchaser fails to take up his securities.

BUYS BALLOT'S LAW, in meteorology, the name given to a law which may be expressed as follows: — " Stand with your back to the wind; the low-pressure area will be on your left- hand." This rule, the truth of which was first recognized by the American meteorologists J. H. Coffin and W. Ferrel, is a direct consequence of Ferrel's Law (q.v.). It is approximately true in the higher latitudes of the Northern Hemisphere, and is reversed in the Southern Hemisphere, but the angle between barometric gradient and wind is not a right angle in low latitudes. The law takes its name from C. H. D. Buys Ballott, a Dutch meteor- ologist, who published it in the Comptes rendus, November 1857.

BUZEU, the capital of the department of Buzeu, Rumania, situated near the right bank of the river Buzeu, between the Carpathian Mountains and the fertile lowlands of south Moldavia and east Walachia. Pop. (1900) 21,561. Buzeu is important as a market for petroleum, timber and grain. It is the meeting-

place of railroads from Ramnicu Sarat, Braila and Ploesci. Amber is found by the riverside, and there are cloth-mills in the city. Buzeu is the seat of a bishop, whose cathedral was erected in 1640 by Prince Matthias Bassarab of Walachia, on the site of an older church. In the neighbourhood there are many monasteries. Buzeu was formerly called Napuca or Buzograd.

BUZOT, FRANQOIS NICOLAS LEONARD (1760-1794), French revolutionist, was born at Evreux on the 1st of March 1760. He studied law, and at the outbreak of the Revolution was an advocate in his native town. In 1789 he was elected deputy to the states-general, and there became known for his advanced opinions. He demanded the nationalization of the possessions of the clergy, and the right of all citizens to carry arms. After the dissolution of the Constituent Assembly, Buzot returned to Evreux, where he was named president of the criminal tribunal. In 1792 he was elected deputy to the Convention, and took his place among the Girondists. He demanded the formation of a national guard from the departments to defend the Convention against the populace of Paris. His proposal was carried, but never put into force; and the Parisians were extremely bitter against him and the Girondists. In the trial of Louis XVI., Buzot voted for death, but with appeal to the people and postponement of sentence. He had a decree of death passed against the emigres who did not return to France, and against anyone who should demand the re-establishment of the monarchy. Proscribed with the Girondists on the 2nd of June 1793, he succeeded in escaping, and took refuge in Normandy, where he contributed to organize a federalist insurrection against the Convention, which was speedily suppressed. Buzot was outlawed, and fled to the neighbourhood of Bordeaux, and committed suicide in the woods of St Emilion on the 18th of June 1794. He was an intelligent and honest man, although he seems to have profited by the sale of the possessions of the clergy, but he had a stubborn, unyielding temperament, was incapable of making concessions, and was dominated by Madame Roland, who imparted to him her hatred of

Danton and the Montagnards.

See Mcmoires de Petion, Barbaroux, Buzot, published by C. A. Daubon (Paris, 1866). For the history of the federalist movement in Normandy, see L. Boivin Champeaux, Notices pour servir a I'histoire de la Revolution dans le departement de I'Eure (Evreux and Paris, 1884).

BUZZARD, a word derived from the Lat. Buteo, through the Fr. Busard, and used in a general sense for a large group of diurnal birds-of-prey, which contains, among many others, the species usually known as the common buzzard {Buteo vulgaris, Leach), though the English epithet is nowadays hardly applic- able. The name buzzard, however, belongs quite as rightfully to the birds called in books " harriers," which form a distinct subfamily of Falconidae under the title Circinae, and by it one species, the moor-buzzard (Circus aeruginosus), is still known in such places as it inhabits. "Puttock" is also another name used in some parts of England, but perhaps is rather a synonym of the kite (Milvus ictinus). Though ornithological writers are almost unanimous in distinguishing the buzzards as a group from the eagles, the grounds usually assigned for their separation are but slight, and the diagnostic character that can be best trusted is probably that in the former the bill is decurved from the base, while in the latter it is for about a third of its length straight. The head, too, in buzzards is short and round, while in the eagles it is elongated. In a general way buzzards are smaller than eagles, though there are several exceptions to this statement, and have their plumage more mottled. Furthermore, most if not all of the buzzards, about which anything of the kind is with certainty known, assume their adult dress at the first moult, while the eagles take a longer time to reach maturity. The buzzards are fine-looking birds, but are slow and heavy of flight, so that in the old days of falconry they were regarded with infinite scorn, and hence in common English to call a man " a buzzard " is to denounce him as stupid. Their food consists of small mammals, young birds, reptiles, amphibians and insects ■ — particularly beetles — and thus they never could have been very injurious to the game-preserver, if indeed they were not really

his friends, though they have fallen under his ban; but at the present day they are so scarce that in England their effect, whatever it may be, is inappreciable. Buzzards are found over the whole world with the exception of the Australian region, and have been split into many genera by systematists. In the British Islands are two species, one resident (the B. vulgaris already mentioned), and now almost

confined to a few wooded districts; the other the rough-legged buzzard {Archibuteo lagopus), an irregular winter- visitant, sometimes arriving in large bands from the north of Europe, and readily distinguishable from the former by being feathered down to the toes. The honey- buzzard (Pernis apivorus), a summer- visitor from the south, and breeding, or attempting to breed, yearly in the New Forest, does not come into the subfamily Buteoninae, but is probably the type of a distinct group, Perninae, of which there are other examples in Africa and Asia. In America the name " buzzard " is popularly given to the turkey-buzzard or turkey-vulture (Cathartes Aura). (A. N.)

BYELAYA TSERKOV (i.e. White Church), a town of Russia, in the government of Kiev, 32 m. S.S.W. of Vasilkov, on the main road from Kiev to the Crimea, in 49° 47′ N. lat. and 30 7′ E. long. Pop. (i860) 12,075; (1897) 20,705. First mentioned in 1 1 55, Byelaya Tserkov was destroyed during the Mpngol invasion of the 13th century. In 1550 a castle was built here by the prince of Kiev, and various privileges were bestowed upon the inhabi- tants. From 1 65 1 the town was subject alternately to Poland and to independent hetmans (Cossack chiefs). In 1793 it was united to Russia. There is a trade in beer, cattle and grain, sold at eleven annual fairs, three of which last for ten days each.

BYELEV, a town of Russia, in the government of Tula, and 67 m. S.W. from the city of that name on the left bank of the Oka, in 53 48′ N. lat., and 36 9′ E. long. Pop. (i860) 8063; (1897) 9567. It is first mentioned in 1147. It belonged to Lithuania in the end of the 14th century; and in 1468 it was raised to the rank of a principality, dependent on that country. In the end of the 15th century this principality began to attach itself to the grand-duchy of Moscow; and by Ivan III. it was ultimately united to Russia. It suffered greatly from the Tatars in 1507, 1512, 1530, 1536 and 1544. In 1826 the empress Elizabeth died here on her way from Taganrog to St Petersburg. A public library was founded in 1858 in memory of the poet Zhukovsky, who was born (1782) in a neighbouring village. The industries comprise tallow-boiling, oil-manufacture, tanning, sugar-refining and distilling. There is a trade in grain, hemp oil, cattle and tallow. A fair is held from the 28th of August to the 10th of September every year.

BYELGOROD (i.e. White Town), a town of Russia, in the government of Kursk, 100 m. S.S.E. by rail from the city of that name, in 50 46′ N. lat. and 36 37′ E. long., clustering on a chalk hill on the right bank of the Donets. Pop. (i860) 11,722; (1897) 21,850. In the 17th

century it suffered repeatedly from Tatar incursions, against which there was built (from 1633 to 1740) an earthen wall, with twelve forts, extending upwards of 200 m. from the Vorskla to the Don, and called the Byelgorod line. In 1666 an archiepiscopal see was established in the town. There are two cathedral churches, both built in the 16th century, as well as a theological seminary. Candles, leather, soap, lime and bricks are manufactured, and a trade is carried on in grain, cattle, wool, honey, wax and tallow. There are three annual fairs, on the 10th Friday after Easter, the 29th of June and the 15th of August respectively.

BYELOSTOK (Polish, Bialystok), a town of West Russia, in the government of and 53 m. by rail S.W. of the city of Grodno, on the main railway line from Moscow to Warsaw, at its junction with the Kiev-Grayevo (Prussian frontier) line. Founded in 1320, it became part of Prussia after the third partition of Poland, but was annexed to Russia in 1807, after the peace of Tilsit. Its development dates from 1845, when woollen-mills were built. Since that time it has grown very rapidly, its population being 13,787 in 1857; 56,629 in 1889; and 65,781 in 1901, three-fourths Jews. Its woollen, silk and felt hat factories give occupation to several thousand workers.

BYEZHETSK, a town of Russia, in the government of Tver, and 70 m. N.N.E.. of the city of that name, on the right bank of the Mologa, in 57° 46′ N. lat. and 36° 43′ E. long. Pop. (i860) 5423; (1897) 9090. It is mentioned in the chronicles of 1137. On the fall of Novgorod, to which it had belonged, it was incor- porated (1479) with the grand-duchy of Moscow. The town is famous for itsscythes andshearing hooks,but makes also axes,nails and other hardware, and trades in grain, linen, hemp and flax.

BY-LAW, or Bye-law (by- being used in the sense of subor- dinate or secondary, cf. by-path), a regulation made by councils, boards, corporations and companies, usually under statutory power, for the preservation of order and good government within some place or jurisdiction. When made under authority of a statute, by-laws must generally, before they come into operation, be submitted to some confirming authority for sanction and approval; when approved, they are as binding as enacted laws. By-laws must be reasonable in themselves; they must not be retrospective nor contrary to the general law of the land. By various statutes powers are given to

borough, county and district councils, to make by-laws for various pur- poses; corporate bodies, also, are empowered by their charters to make by-laws which are binding on their members. Such by-laws must be in harmony with the objects of the society and must not infringe or limit the powers and duties of its officers.

BYLES, MATHER (1706-1788), American clergyman, was born in Boston, Massachusetts, on the 26th of March 1706, descended, on his mother's side, from John Cotton and Richard Mather. He graduated at Harvard in 1725, and in 1733 became pastor of the Hollis Street church (Congregational), Boston. He held a high rank among the clergy of the province and was noted for his scholarly sermons and his ready wit. At the out- break of the War of Independence he was outspoken in his advocacy of the royal cause, and after the British evacuation of Boston his connexion with his church was dissolved. He remained in Boston, however, and subsequently (1777) was arrested, tried and sentenced to deportation. This sentence Rras later changed to imprisonment in his own house. He was soon released, but never resumed his pastorate. He died in Boston on the 5th of July 1788. Besides many sermons he published A Poem on the Death of George I. (1727) and' Mis- cellaneous Poems {17 4$).

His son, Mather Byxes (1735-1814), graduated at Harvard in 1751, and was a Congregational clergyman at New London, Connecticut, until 1768, when he entered the Established Church, and became rector of Christ church, Boston. Sympathizing with the royal cause, he settled, after the War of Independence, in St Johns, New Brunswick, where he was rector of a church until his death.

BYNG, JOHN (1704-1757), British admiral, was the fourth son of George Byng, Lord Torrington, and entered the navy in 1 71 8. The powerful influence of his father accounts for his rapid rise in the service. He received his first appointment as lieutenant in 1723, and became captain in 1727. His career presents nothing of note till after his promotion as rear-admiral in 1745, and as vice-admiral in 1747. He served on the most comfortable stations, and avoided the more arduous work of the navy. On the approach of the Seven Years' War the island of Minorca was threatened by an attack from Toulon and was actually invaded in 1756. Byng, who was then serving in the Channel with the rank of admiral, which he attained in 1755, was ordered to the Mediterranean to relieve the garrison of Fort St Philip, which was still holding out. The squadron was not very well manned, and Byng was in particular much aggrieved because his marines were landed to make room for the soldiers who were to reinforce the

garrison, and he feared that if he met a French squadron after he had lost them he would be danger- ously undermanned. His correspondence shows clearly that he left prepared for failure, that he did not believe that the garrison could hold but against the French force landed, and that he was already resolved to come back from Minorca if he found that the task presented any great difficulty. He wrote home to that effect to the ministry from Gibraltar. The governor I

of the fortress refused to spare any of his soldiers to increase the relief for Minorca, and Byng sailed on the 8th of May. On the igth he was off Minorca, and endeavoured to open com- munications with the fort. Before he could land any of the soldiers, the French squadron appeared. A battle was fought on the following day. Byng, who had gained the weather gauge, bore down on the French fleet of M. de la Galissoniere at an angle, so that his leading ships came into action unsupported by the rest of his line. The French cut the leading ships up, and then slipped away. When the flag captain pointed out to Byng that by standing out of his line he could bring the centre of the enemy to closer action, he declined on the ground that Thomas Mathews had been condemned for so doing. The French, who were equal in number to the English, got away undamaged. After remaining near Minorca for four days without making any further attempt to communicate with the fort or sighting the French, Byng sailed away to Gibraltar leaving Fort St Philip to its fate. The failure caused a savage outburst of wrath in the country. Byng was brought home, tried by court-martial, condemned to death, and shot on the 14th of March 1757 at Portsmouth. The severity of the penalty, aided by a not unjust suspicion that the ministry sought to cover themselves by throw- ing all the blame on the admiral, led in after time to a reaction in favour of Byng. It became a commonplace to say that he was put to death for an error of judgment. The court had indeed acquitted him of personal cowardice or of disaffection, and only condemned him for not having done his utmost. But it must be remembered that in consequence of many scandals which had taken place in the previous war the Articles of War had been deliberately revised so as to leave no punishment save death for the officer of any rank who did not do his utmost against the enemy either in battle or pursuit. That Byng had not done all he could is undeniable, and he therefore fell under the law. Neither must it be forgotten that in the previous war in 1745 an unhappy young lieutenant, Baker Phillips by name, whose captain had brought his ship into action unprepared, and who, when his superior was killed, surrendered the ship when she could no longer be defended, was shot by sentence of a court-

martial. This savage punishment was approved by the higher officers of the navy, who showed great lenity to men of their own rank. The contrast had angered the country, and the Articles of War had been amended precisely in order that there might be one law for all.

The facts of Byng's life are fairly set out in Charnock's Biogr. Nav. vol. iv. pp. 145 to 179. The number of contemporary pamphlets about his case is very great, but they are of no historical value, except as illustrating the state of public opinion. (D. H.)

BYNKERSHOEK, CORNELIUS VAN (1673-1743), Dutch jurist, was born at Middleburg in Zeeland. In the prosecution of his legal studies, and while holding the offices first of member and afterwards of president of the supreme court, he found the common law of his country so defective as to be nearly useless for practical purposes. This abuse he resolved to reform, and took as the basis of a new system the principles of the ancient Roman law. His works are very voluminous. The most im- portant of them are De foro legatorum (1702); Observations Juris Romani (1710), of which a continuation in four books appeared in 1733; the treatise De Dominio Maris (1721); and the Quaestiones Juris Publici (1737). Complete editions of his works were published after his death; one in folio at Geneva in 1761, and another in two volumes folio at Leiden in 1766.

BYRD, WILLIAM (1543-1623), English musical composer, was probably a member of one of the numerous Lincolnshire families of the name who were to be found at Lincoln, Spalding, Pinchbeck, Moulton and Ep worth in the 16th century. Accord- ing to Wood, he was " bred up to musick under Thomas Tallis." He was appointed organist of Lincoln cathedral about 1563, and on the 14th of September 1568 was married at St Margaret in the Close to Ellen or Julian Birley. On the 2 2nd of February 1 569 he was sworn in as a member of the Chapel Royal, but he does not seem to have left Lincoln immediately. In the Chapel Royal he shared with Tallis the honorary post of organist, and on the 22nd

of January 1575 the two composers obtained a licence for twenty-one years from Elizabeth to print music and music-paper, a monopoly which does not seem to have been at all remunerative. In 1575 Byrd and Tallis published a collection of Latin motets for five and six voices, printed by Thomas Vautrollier. In 1578 Byrd and his

family were living at Harlington, Middlesex. As early as 1 581 his name occurs among lists of recusants, and though he retained his post in the Chapel Royal he was throughout his life a Catholic. About 1579 he set a three-part song in Thomas Legge's Latin play Ricardus Tertius. In 1588 he published Psalmes, Sonets and Songs of Sadnes and Pietie, and in the same year contributed two madrigals to Nicolas Yonge's Musica Transalpina. In 1589 appeared Songs of Sundrie Natures, a second edition of which was issued in 1610. In the same year he published Liber Primus Sacrarum Cantionum, a second series of which was brought out in 1 591. In 1590 two madrigals by Byrd were included in Thomas Watson's First Sett of Italian Madrigalls Englished; one of these seems to have been sung before Queen Elizabeth on her visit to Lord Hertford at Elvetham in 1591. In April 1592 Byrd was still living at Harlington, but about 1593 he became possessed of the remainder of a lease of Stondon Place, Essex, a farm of some 200 acres, belonging to William Shelley, who was shortly afterwards convicted of high treason. The property was sequestrated, and on the 15th of July 1595 Byrd obtained a crown lease of it for the lives of his eldest son Christopher and his daughters Elizabeth and Rachel. On the death of Shelley his son bought back his estates (in 1604), whereupon his widow attempted to oust Byrd from Stondon Place, on the ground that it formed part of her jointure. Byrd was upheld in his possession of the property by James I. {Calendar of State Papers, Dom. Series, James I. add. series, vol. xxxvi.), but Mrs Shelley persevered in her suit, apparently until her death in 1609. In the following year the matter was settled for a time by Byrd's buying Stondon Place in the names of John and Thomas Petre, part of the property being charged with a payment to Byrd of £20 for his life, with remainder to his second son Thomas. Throughout this long suit Byrd, though in posses- sion of property which had been confiscated from a recusant and actually taking part as a member of the Chapel Royal at the coronation of James I., had been excommunicated since 1598, while from 1605 until 161 2, and possibly later, he was regularly presented before the archidiaconal court of Essex as a Catholic. In 1603 Easte published a work (no copies of which are known to exist) entitled Medulla Musicke. Sucked out of the sappe of two [of] the most famous Musitians that ever were in this land, namely Master Wylliam Byrd . . . and Master Alphonso Ferabosco . . . either of whom having made 40 tie several! waies (without contention), showing most rare and intricate skill in 2 partes in one upon the playne song Miserere. In 1607 appeared two books of Gradualia, a second edition of which was issued in 1 6 10. In the following year he published Psalmes, Songs and Sonnets; some solemne, others joy full, framed to the life

of the Words. Probably in the same year was issued Parthenia, a collection of virginal music, in which Byrd was associated with Bull and Orlando Gibbons. The last work to which he con- tributed was Sir Thomas Leighton's Teares or Lamentations of a Sorrowfull Soule (1614). His death took place on the 4th of July 1623. It is recorded in the Cheque Book of the Chapel Royal as that of a "father of musicke." His will, dated the 15th of November 1622, shows that he remained a Catholic until the end of his life, and he expresses a desire that he may die at Stondon and be buried near his wife. From the same document it seems that his latter years had been embittered by a dispute with his eldest son, but that the matter was settled by an agreement with his daughter-in-law Catherine, to whom he left his property at Stondon, charged with the payment of £20 to his second son Thomas and £10 to his daughter Rachel, with remainder to his grandson Thomas and his second son of the same name. In 1635 the estate again came before the court of chancery, on the ground that the annuities had not been paid. The property seems about 1637 to have been let to one John Leigh, and in 165 1 was held by a member of the Petre family. The committee for iv. 29,.

compounding with delinquents at that date allowed Thomas Byrd the annuity of £20 bequeathed by his father. Byrd's arms, as entered in the Visitation of Essex of 1634 ex sigillo were three stags' heads cabossed, a canton ermine. His children were (1) Christopher, who married Catherine, daughter of Thomas Moore of Bamborough, and had a son, Thomas, living at Stondon in 1634; (2) Thomas; (3) Elizabeth, who married successively John Jackson and — Burdett; (4) Rachel, married (1) — Hook, by whom she had two children, William and Catherine, married to Michael Walton; in 1634 Rachel Hook had married (2) Edward Biggs; (5) Mary, married (1) Henry Hawksworth, by whom she had four sons, William, Henry, George and John; (2) Thomas Falconbridge. Anne Byrd, who is mentioned in the proceedings Shelley v. Byrd (Exchequer Decrees, 7 James I., series ii. vol. vii. fol. 294 and 328), was probably a fourth daughter who" died young.

Besides the works already mentioned Byrd was the composer of three masses, for three, four and five voices respectively, which seem to have been published with some privacy about 1 588. There exists a second edition (also undated) of the four-part mass; all three have recently appeared in modern editions, and increase Byrd's claim to rank as the greatest English composer of his age. In addition to his published works, a large amount still remains in MS., comprising nearly every kind of composition. The Fitzwilliam Virginal Book contains a long series of interest- ing pieces for the virginal, and

more still remains unpublished in Lady Neville's Virginal Book and other contemporary collections. His industry was enormous, and though his work is unequal and the licences he allowed can hardly be defended on strict grounds, his Latin church music and his instrumental compositions entitle him to high rank among his contemporaries. As a madrigalist he was inferior to Morley, Wilbye and Gibbons, though even in this branch of his art he often displays great charm and in- dividuality. (W. B. S.)*

BYROM, JOHN (1692-1763), English poet, writer of hymns and inventor of a system of shorthand, was born at Kersal Cell, near Manchester, on the 29th of February 1692, the younger son of a prosperous merchant. He was educated at Merchant Taylors school, and at Trinity College, Cambridge, of which he became a fellow in 1714. His first poem, " Colin to Phoebe," a pastoral, appeared in the Spectator, No. 603. The heroine is said to have been Dr Bentley's daughter, Joanna, the mother of Richard Cumberland, the dramatist. After leaving the uni- versity Byrom went abroad, ostensibly to study medicine, but he never practised and possibly his errand was really political, for he was an adherent of the Pretender. He was elected a member of the Royal Society in 1724. On his return to London he married his cousin in 1 7 2 1 , and to support himself taught a new method of shorthand of his own invention, till he succeeded (1 740) to his father's estate on the death of his elder brother. His diary gives interesting portraits and letters of the many great men of his time whom he knew intimately. He died on the 26th of September 1763. A collection of his poems was published in 1773, and he is included in Alexander Chalmers's English Poets. His system of shorthand was not published until after his death, when it was printed as The Universal English Shorthand; or the way of writing English in the most easy, concise, regular and beautiful manner, applicable to any other language, but particularly adjusted to our own (Manchester, 1767).

The Private Journal and Literary Remains of John Byrom, related by Richard Parkinson, D.D., was published by the Chetham Society

(1854-1857).

BYRON, GEORGE GORDON BYRON, 6th Baron (1788-1824), English poet, was born in London at 16 Holies Street, Cavendish Square, on the 22nd of January 1788. The Byrons were of Norman stock, but the founder of the family was Sir John Byron, who entered into possession of the priory and lands of Newstead in the county of Nottingham in 1540. From him it descended (but with a bar-sinister)

to a great-grandson, John (1st Baron) Byron (q.v.), a Cavalier general, who was raised to the peerage in 1643. The first Lord Byron died childless, and was succeeded by his brother Richard, the great-grandfather of William, the 5th lord, who outlived son and grandson, and was

succeeded by his great-nephew, the poet. Admiral the Hon. John Byron (q.v.) was the poet's grandfather. His eldest son, Captain John Byron, the poet's father, was a libertine by choice and in an eminent degree. He caused to be divorced, and married (1779) as his first wife, the marchioness of Carmarthen (born Amelia D'Arcy), Baroness Conyers in her own right. One child of the marriage survived, the Hon. Augusta Byron (1783-1851), the poet's half-sister, who, in 1807, married her first cousin, Colonel George Leigh. His second marriage to Catherine Gordon (b. 1765) of Gight in Aberdeenshire took place at Bath on the 13th of May 1785. He is said to have squandered the fortunes of both wives. It is certain that Gight was sold to pay his debts (1786), and that the sole provision for his wife was a settlement of £3000. It was an unhappy marriage. There was an attempt at living together in France, and, when this failed, Mrs Byron returned to Scotland. On her way thither she gave birth to a son, christened George Gordon after his maternal grandfather, who was descended from Sir William Gordon of Gight, grandson of James I. of Scotland. After a while her husband rejoined her, but went back to France and died at Valenciennes on the 2nd of August 1 79 1. His wife was not a bad woman, but she was not a good mother. Vain and capricious, passionate and self- indulgent, she mismanaged her son from his infancy, now provoking him by her foolish fondness, and now exciting his contempt by her paroxysms of impotent rage. She neither looked nor spoke like a gentlewoman; but in the conduct of her affairs she was praiseworthy. She hated and avoided debt, and when relief came (a civil list pension of £300 a year) she spent most of it upon her son. Fairly well educated, she was not without a taste for books, and her letters are sensible and to the point. But the violence of her temper was abnormal. Her father committed suicide, and it is possible that she inherited a tendency to mental derangement. If Byron owed anything to his parents it was a plea for pardon.

The poet's first years were spent in lodgings at Aberdeen. From 1794 to 1798 he attended the grammar school, " threading all classes " till

he reached the fourth. It was a good beginning, a solid foundation, enabling him from the first to keep a hand over his talents and to turn them to a set purpose. He was lame from his birth. His right leg and foot, possibly both feet, were contracted by infantile paralysis, and, to strengthen his muscles, his mother sent him in the summers of 1796, 1797 to a farm house on Deeside. He walked with difficulty, but he wandered at will, soothed and inspired by the grandeur of the scenery. To his Scottish upbringing he owed his love of moun- tains, his love and knowledge of the Bible,and too much Calvinism for faith or unfaith in Christianity. The death of his great-uncle (May 19, 1798) placed him in possession of the title and estates. Early in the autumn Mrs Byron travelled south with her son and his nurse, and for a time made her home at Newstead Abbey. Byron was old enough to know what had befallen him. " It was a change from a shabby Scotch flat to a palace," a half- ruined palace, indeed, but his very own. It was a proud moment, but in a few weeks he was once more in lodgings. The shrunken leg did not improve, andacting on bad advice his mother entrusted him to the care of a quack named Lavender, truss-maker to the general hospital at Nottingham. His nurse who was in charge of him maltreated him, and the quack tortured him to no purpose. At his own request he read Virgil and Cicero with a tutor.

In August 1799 he was sent to a preparatory school at Dulwich. The master, Dr Glennie, perceived that the boy liked reading for its own sake and gave him the free run of his library. He read a set of the British Poets from beginning to end more than once. This, too, was an initiation and a preparation. He remained at Dulwich till April 1801, when, on his mother's intervention, he was sent to Harrow. His school days, 1801-1805, were fruitful in two respects. He learned enough Latin and Greek to make him a classic, if not a classical scholar, and he made friends with his equals and superiors. He learned something of his own worth and of the worth of others. " My school-friendships," he says, " were with me passions." Two of his closest friends died young, and from Lord Clare, whom he loved best of all, he was separated

by chance'and circumstance. He was an odd mixture, now lying dreaming on his favourite tombstone in the churchyard, now the ring-leader in whatever mischief was afoot. He was a " record " swimmer, and, in spite of his lameness, enough of a cricketer to play for his school at Lord's, and yet he found time to read and master standard works of history and biography, and to acquire more general knowledge than boys and masters put together.

In the midsummer of 1803, when he was in his sixteenth year, he fell in love, once for all, with his distant relative, Mary Anne Chaworth, a " minor heiress " of the hall and park of Annesley which marches with Newstead. Two years his senior, she was already engaged to a neighbouring squire. There were meetings half-way between Newstead and Annesley, of which she thought little and he only too much. What was sport to the girl was death to the boy, and when at length he realized the " hopelessness of his attachment," he was " thrown out," as he said, " alone, on a wide, wide sea." She is the subject of at least five of his early poems, including the pathetic stanzas, " Hills of Annesley," and there are allusions to his love story in Childe Harold (c. 1 s.v.), and in "The Dream" (1816).

Byron went into residence at Trinity College, Cambridge, in October 1805. Cambridge did him no good. " The place is the devil," he said, and according to his own showing he did homage to the genius loci. But whatever he did or failed to do, he made friends who were worthy of his choice. Among them were the scholar-dandy Scrope Berdmore Davies, Francis Hodgson, who died provost of Eton, and, best friend of all, John Cam Hobhouse (afterwards Lord Broughton). And there was another friend, a chorister named Edleston, a " humble youth " for whom he formed a romantic attachment. He died whilst Byron was still abroad (May 1811), but not unwept nor unsung, if, as there is little doubt, the mysterious Thyrza poems of 1811, 1812 refer to his death. During the vacation of 1806, and in 1807 which was one " long vacation," he took to his pen, and wrote, printed and published most of his " Juvenile Poems." His first venture was a thin quarto of sixty-six pages, printed by S. and J. Ridge of Newark. The " advertisement " is dated the 23rd of December 1806, but before that date he had begun to prepare a second collection for the press. One poem (" To Mary ") contained at least one stanza which was frankly indecent, and yielding to advice he gave orders that the entire issue should be thrown into the fire. Early in January 1807 an expurgated collection entitled Poems on Various Occasions was ready for private distribution. Encouraged by two critics, Henry Mackenzie and Lord Woodhouselee, he determined to recast this second issue and publish it under his own name. Hours of Idleness, " by George Gordon Lord Byron, a minor," was published in June 1807. The fourth and last issue of Juvenilia, entitled Poems, Original and Translated, was published in March 1808.

Hours of Idleness enjoyed a brief triumph. The Critical and other reviews were " very indulgent," but the Edinburgh Review for January 1808 contained an article, not, as Byron believed, by Jeffrey, but by Brougham, which put, or tried to put, the author and " his poesy " to open shame. The sole result was that it supplied fresh material and a new title for some rhyming couplets on " British Bards " which he had begun to write. A satire on Jeffrey, the editor, and Lord Holland, the patron of the Edinburgh Review, was slipped into the middle of " British Bards," and the poem rechristened English Bards and Scotch Reviewers (published the 1st of March 1809).

In April 1808, whilst he was still " a minor," Byron entered upon his inheritance. Hitherto the less ruinous portions of the abbey had been occupied by a tenant, Lord Grey de Ruthven. The banqueting hall, the grand drawing-room, and other parts of the monastic building were uninhabitable, but by incurring fresh debts, two sets of apartments were refurnished for Byron and for his mother. Dismantled and ruinous, it was still a splendid inheritance. In line with the front of the abbey is the west front of the priory church, with its hollow arch, once a " mighty window," its vacant niches, its delicate Gothic mouldings. The abbey buildings enclose a grassy quadrangle

overlooked by two-storeyed cloisters. On the eastern side are the state apartments occupied by kings and queens not as guests, but by feudal right. In the park, which is part of Sherwood Forest, there is a chain of lakes — the largest, the north-west, Byron's " lucid lake." A waterfall or " cascade " issues from the lake, in' full view of the room where Byron slept. The possession of this lordly and historic domain was an inspiration in itself. It was an ideal home for one who was to be hailed as the spirit or genius of romance.

On the 13th of March 1809, he took his seat in the House of Lords. He had determined, as soon as he was of age, to travel in the East, but before he sought " another zone " he invited Hobhouse and three others to a house-warming. One of the party, C. S. Matthews, describes a day at Newstead. Host and guests lay in bed till one. " The afternoon was passed in various diversions, fencing, single-stick . . . riding, cricket, sailing on the lake." They dined at eight, and

after the cloth was removed handed round ” a human skull filled with Burgundy.” After dinner they ” buffooned about the house ” in a set of monkish dresses. They went to bed some time between one and three in the morning. Moore thinks that the picture of these festivities is ” pregnant in character,” and argues that there were limits to the misbehaviour of the ” wassailers.” The story, as told in Childe Harold (c. 1. s. v.-ix.), need not be taken too seriously. Byron was angry because Lord De La Warr did not wish him good-bye, and visited his displeasure on friends and ” lemans ” alike. May and June were devoted to the preparation of an enlarged edition of his satire. At length, accompanied by Hobhouse and a small staff of retainers, he set out on his travels. He sailed from Falmouth on the 2nd of July and reached Lisbon on the 7th of July 1809. The first two cantos of Childe Harold’s Pilgrimage contain a record of the principal events of his first year of absence.

The first canto describes Lisbon, Cintra, the ride through Portugal and Spain to Seville and thence to Cadiz. He is moved by the grandeur of the scenery, but laments the helplessness of the people and their impending fate. Talavera was fought and won whilst he was in Spain, but he is convinced that the ” Scourge of the World ” will prevail, and that Britain, ” the fond ally,” will display her blundering heroism in vain. Being against the government, he is against the war. History has falsified his politics, but his descriptions of places and scenes, of ” Morena’s dusky height,” of Cadiz and the bull-fight, retain their freshness and their warmth.

Byron sailed from Gibraltar on the 16th of August, and spent a month at Malta making love to Mrs Spencer Smith (the ” Fair Florence ” of c. n. s. xxix.-xxxiii.). He anchored off Prevesa on the 28th of September. The second canto records a journey ,on horseback through Albania, then almost a terra incognita, as far as Tepeleni, where he was entertained by Ali Pacha (October 20th) , a yachting tour along the shores of the Ambracian Gulf (November 8-23), a journey by land from Larnaki to Athens (December 15-25) ,andexcursionsin Attica, Suniumand Marathon (January 13-25, 1810).

Of the tour in Asia Minor, a visit to Ephesus (March 15, 1810), in excursion in the Troad (April 13), and the famous swim across the Hellespont (May 3), the record is to be sought elsewhere. The stanzas on Constantinople (lxxvii.-lxxxii.), where Byron and Hobhouse stayed for two months, though written at the time and on the spot, were not included in the poem till 1814. They are, probably, part of a projected third canto. On the i4thof July Hobhouse set sail for

England and Byron returned to Athens.

Of Byron's second year of residence in the East little is known beyond the bare facts that he was travelling in the Morea during August and September, that early in October he was at Patras, having just recovered from a severe attack of malarial fever, and that by the 14th of November he had returned to Athens and taken up his quarters at the Franciscan convent. Of his movements during the next five months there is no record, but of his studies and pursuits there is substantial evidence. He learnt Romaic, he compiled the notes to the second canto of Childe Harold . He wrote (March 1 2) Hints from Horace (published

183 1), an imitation or loose translation of the Epistola ad Pisones (Art of Poetry), and (March 17) The Curse of Minerva (published 1815), a skit on Lord Elgin's deportation of the metopes and frieze of the Parthenon.

He left Athens in April, passed some weeks at Malta, and landed at Portsmouth (e. July 20). Arrived in London his first step was to consult his literary adviser, R. C. Dallas, with regard to the publication of Hints from Horace. Of Childe Harold he said nothing, but after some hesitation produced the MS. from a " small trunk," and, presenting him with the copyright, commissioned Dallas to offer it to a publisher. Rejected by Miller of Albemarle Street, who published for Lord Elgin, it was finally accepted by Murray of Fleet Street, who undertook to share the profits of an edition with Dallas.

Meanwhile Mrs Byron died suddenly from a stroke of apoplexy. Byron set off at once for Newstead, but did not find his mother alive. He had but little affection for her while she lived, but her death touched him to the quick. " I had but one friend," he exclaimed, " and she is gone." Another loss awaited him. Whilst his mother lay dead in his house, he heard that his friend Matthews had been drowned in the Cam. Edleston and Wing- field had died in May, but the news had reached him on landing. There were troubles on every side. On the nth of October he wrote the " Epistle to a Friend " (" Oh, banish care," &c.) and the lines " To Thyrza," which-, with other elegies, were appended to the second edition of Childe Harold (April 17, 1812). It was this cry of desolation, this open profession of melancholy, which at first excited the interest of contemporaries, and has since been decried as morbid and unreal. No one who has read his letters can doubt the sincerity of his grief, but it is no less true that he measured and appraised its literary significance. He could and did turn it to account.

Towards the close of the year he made friends with Moore. Some lines in English Bards, &c. (ii. 466-467), taunting Moore with fighting a duel with Jeffrey with " leadless pistol " had led to a challenge, and it was not till Byron returned to England that explanations ensued, and that the challenge was withdrawn. As a poet Byron outgrew Moore, giving back more than he had received, but the friendship which sprang up between them still serves Byron in good stead. Moore's Life of Byron (1830) is no doubt a picture of the man at his best, but it is a genuine likeness. At the end of October Byron moved to London and took up his quarters at 8 St James's Street. On the 27th of February 181 2 he made his first speech in the House of Lords on a bill which made the wilful destruction of certain newly invented stocking- frames a capital offence, speaking in defence of the riotous " hands " who feared that their numbers would be diminished by improved machinery. It was a brilliant speech and won the praise of Burdett and Lord Holland. He made two other speeches during the same session, but thenceforth pride or laziness kept him silent. Childe Harold (4to) was published on Tuesday, the 10th of March i„8i2. "The effect," says Moore, " was . . . electric, his fame . . . seemed to spring, like the palace of a fairy king, in a night." A fifth edition (8vo) was issued on the 5th of December 1812. Just turned twenty-four he " found himself famous," a great poet, a rising statesman. Society, which in spite of his rank had neglected him, was now at his feet. But he could not keep what he had won. It was not only " villainous company," as he put it, which was to prove his " spoil," but the opportunity for intrigue. The excitement and absorption of one reigning passion after another destroyed his peace of mind and put him out of conceit with himself. His first affair of any moment was with Lady Caroline Lamb- the wife of William Lamb, better known as Lord Melbourne, a delicate, golden-haired sprite, who threw herself in his way, and afterwards, when she was shaken off, involved him in her own disgrace. To her succeeded Lady Oxford, who was double hi? own age, and Lady Frances Wedderburn Webster, the " Ginevra '" of his sonnets, the " Medora " of The Corsair.

His " way of life " was inconsistent with an official career, but there was no slackening of his poetical energies. In February 1813 he published The Waltz (anonymously), he wrote and

published The Giaour (published June 5, 1813) and The Bride of

Abydos (published November 29, 1813), and he wrote The Corsair (published February 1, 1814). The Turkish Tales were even more popular than Childe Harold. Murray sold 10,000 copies of The Corsair on the day of publication. Byron was at pains to make his accessories correct. He prided himself on the accuracy of his " costume." He was under no delusion as to the ethical or artistic value of these experiments on " public patience."

In the summer of 1813 a new and potent influence came into his life. Mrs Leigh, whose home was at Newmarket, came up to London on a visit. After a long interval the brother and sister met, and whether there is or is not any foundation for the dark story obscurely hinted at in Byron's lifetime, and afterwards made public property by Mrs Beecher Stowe (Macmillan's Magazine, 1869, pp. 377-396), there is no question as to the depth and sincerity of his love for his " one relative," — that her well-being was more to him than his own. Byron passed the " seasons " of 1813, 1814 in London. His manner of life we know from his journals. Socially he was on the crest of the wave. He was a welcome guest at the great Whig houses, at Lady Melbourne's, at Lady Jersey's, at Holland House. Sheridan and Moore, Rogers and Campbell, were his intimates and com- panions. He was a member of the Alfred, of Watier's, of the Cocoa Tree, and half a dozen clubs besides. After the publica- tion of The Corsair he had promised an interval of silence, but the abdication of Napoleon evoked " An Ode," &c, in his dis- honour (April 16); Lara, a Tale, an informal sequel to The Corsair, was published anonymously on August 6, 1814.

Newstead had been put up for sale, but pending the completion of the contract ˆas still in his possession. During his last visit but one, whilst his sister was his guest, he became engaged to Miss 'Anna Isabella Milbanke (b. May 17, 1792; d. May 16, i860), the only daughter of Sir Ralph Milbanke, Bart., and the Hon. Judith (born Noel), daughter of Lord Wentworth. .She was an heiress, and in succession to a peerage in her own right (becoming Baroness Wentworth in 1856). She was a pretty girl of " a perfect figure," highly educated, a mathematician, and, by courtesy, a poetess. She had rejected Byron's first offer, but, believing that her cruelty had broken his heart and that he was an altered man, she was now determined on marriage. High- principled, but self-willed and opinionated, she believed that she held her future in her own hands. On her side there was ambition touched with fancy — on his, a wish to be married and some hope perhaps of finding an escape from himself. The marriage took place at Seaham in Durham on the 2nd of January 1815. Bride and bridegroom spent three months in paying visits, and at the end of

March settled at 13 Piccadilly Terrace, London.

Byron was a member of the committee of management of Drury Lane theatre, and devoted much of his time to his pro- fessional duties. He wrote but little poetry. Hebrew Melodies (published April 1815), begun at Seaham in October 1814, were finished and given to the musical composer, Isaac Nathan, for publication. The Siege of Corinth and Parisina (published February 7, 18 16) were got ready for the press. On the 10th of December Lady Byron gave birth to a daughter christened Augusta Ada. To judge from his letters, for the first weeks or months of his marriage things went smoothly. His wife's impres- sion was that Byron " had avowedly begun his revenge from the first." It is certain that before the child was born his conduct was so harsh, so violent, and so eccentric, that she believed, or tried to persuade herself, that he was mad.

On the 15th of January 1816 Lady Byron left London for her father's house, claimed his protection, and after some hesitation and consultation with her legal advisers demanded a separation from her husband. It is a matter of common knowledge that in 1869 Mrs Beecher Stowe affirmed that Lady Byron expressly told her that Byron was guilty of incest with his half-sister, Mrs Leigh; also that in 1905 the second Lord Lovelace (Lord Byron's grandson) printed a work entitled Astarle which was designed to uphold and to prove the truth of this charge. It is a fact that neither Lady Byron nor her advisers

supported their demand by this or any other charge of mis- conduct, but it is also a fact that Lord Byron yielded to the demand reluctantly, under pressure and for large pecuniary considerations. It is a fact that Lady Byron's letters to Mrs Leigh before and after the separation are inconsistent with a knowledge or suspicion of guilt on the part of her sister-in-law, but jt is also a fact (see Astarte, pp. 142-145) that she signed a document (dated March 14, 181 6) to the effect that any renewal of intercourse did not involve and must not be construed as a withdrawal of the charge. It cannot be doubted that Lady Byron's conviction that her husband's relations with his half- sister before his marriage had been of an immoral character was a factor in her demand for a separation, but whether there were other and what issues, and whether Lady Byron's conviction was founded on fact, are questions which have not been finally answered. Lady Byron's charge, as reported by Mrs Beecher Stowe and upheld by the 2nd earl of Lovelace, is " non-proven." Mr Robert Edgcome, in Byron: the Last Phase (1909), insists that Mary Chaworth was the real object of Byron's passion, and that Mrs Leigh was only shielding

her.

The separation of Lord and Lady Byron was the talk of the town. Two poems entitled " Fare Thee Well " and " A Sketch," which Byron had written and printed for private circulation, were published by The Champion on Sunday, April 14. The other London papers one by one followed suit. The poems, more especially " A Sketch," were provocative of criticism. There was a balance of opinion, but politics turned the scale. Byron had recently published some pro-Gallican stanzas, " On the ' Star of the Legion of Honour,' " in the Examiner (April 7), and it was felt by many that private dishonour was the outcome of public disloyalty. The Whigs defended Byron as best they could, but his own world, with one or two exceptions, ostracized him. The " excommunicating voice of society," as Moore put it, was loud and insistent. The articles of separation were signed on or about the 18th of April, and on Sunday, the 25th of April, Byron sailed from Dover for Ostend. The " Lines on Churchill's Grave " were written whilst he was waiting for a favourable wind. His route lay through the Low Countries, and by the Rhine to Switzerland. On his way he halted at Brussels and visited the field of Waterloo. He reached Geneva on the 25th of May, where he met by appointment at Dejean's Hotel d'Angle- terre, Shelley, Mary Godwin and Clare (or " Claire ") Clairmont. The meeting was probably at the instance of Claire, who had recently become, and aspired to remain, Byron's mistress. On the 10th of June Byron moved to the Villa Diodati on the southern shore of the lake. Shelley and his party had already settled at an adjoining villa, the Campagne Montalegre. The friends were constantly together. On the 23rd of June Byron and Shelley started for a yachting tour round the lake. They visited the castle of Chillon on the 26th of June, and, being detained by weather at the Hotel de l'Ancre, Ouchy, Byron finished (June 27-29) the third canto of Childe Harold (pub- lished November 18), and began the Prisoner of Chillon (published December 5, 1816). These and other poems of July-September 1816, e.g. "The Dream" and the first two acts of Manfred (published June 16, 1817), betray the influence of Shelley, and through him of Wordsworth, both in thought and style. Byron knew that Wordsworth had power, but was against his theories, and resented his criticism of Pope and Dryden. Shelley was a believer and a disciple, and converted Byron to the Words- worthian creed. Moreover he was an inspiration in himself. Intimacy with Shelley left Byron a greater poet than he was before. Byron passed the summer at the Villa Diodati, where he also wrote the Monody on the Death of Sheridan, published September 9, 1816. The second half of September was spent and devoted to "an excursion in the

mountains." His journal (September 18-29), which was written for and sent to Mrs Leigh, is a great prose poem, the source of the word pictures of Alpine scenery in Manfred. His old friend Hobhouse was with him and he enjoyed himself, but at the close he confesses that he could not lose his " own wretched identity " in the " majesty and the power and the glory " of nature. Remorse was scotched, not

killed. On the 6th of October Byron and Hobhouse started via Milan and Verona for Venice, which was reached early in November. For the next three years Byron lived in or near Venice — at first, 1816-1817, in apartments in the Frezzeria, and after January 1818 in the central block of the Mocenigo palace. Venice appealed both to his higher and his lower nature. He set himself to study her history, to understand her constitu- tion, to learn her language. The sights and scenes with which Shakespeare and Otway, Schiller's Ghostseer, and Madame de StaeTs Corinne had made him familiar, were before his eyes, not dreams but realities. He would " repeople " her with her own past, and " stamp her image " on the creations of his pen. But he had no one to live for but himself, and that self he gave over to a reprobate mind. He planned and pursued a life of deliberate profligacy. Of two of his amours we learn enough or too much from his letters to Murray and to Moore — the first with his landlord's wife, Marianna Segati, the second with Margarita Cogni (the "Fornarina"), a Venetian of the lower class, who amused him with her savagery and her wit. But, if Shelley may be trusted, there was a limit to his candour. There is abundant humour, but there is an economy of detail in his pornographic chronicle. He could not touch pitch without being defiled. But to do him justice he was never idle. He kept his brains at work, and for this reason, perhaps, he seems for a time to have recovered his spirits and sinned with a good courage. His song of carnival, " So we'll go no more a-roving," is a hymn of triumph. About the middle of April he set out for Rome. His first halt was at Ferrara, which inspired the " Lament of Tasso " (published July 17, 18 17). He passed through Florence, where he saw " the Venus " (of Medici) in the Uffizi Gallery, by reedy Thrasymene and Term's " matchless cataract " to " Rome the Wonderful." At Rome, with Hobhouse as com- panion and guide, he stayed three weeks. He returned to Venice on the 28th of May, but shortly removed to a villa at Mira on the Brenta, some 7 m. inland. A month later (June 26) when memory had selected and reduced to order the first impressions of his tour, he began to work them up into a fourth canto of Childe

Harold. A first draft of 1 26 stanzas was finished by the 29th of July; the 60 additional stanzas which made up the canto as it stands were written up to material suggested by or supplied by Hobhouse, " who put his researches " at Byron's disposal and wrote the learned and elaborate notes which are appended to the poem. Among the books which Murray sent out to Venice was a copy of Hookham Frere's Whistlecraft. Byron took the hint and produced Beppo, a Venetian Story (published anonymously on the 28th of February 1818). He attributes his choice of the mock heroic ottava-rima to Frere's example, but he was certainly familiar with Casti's Novelle, and, according to Stendhal, with the poetry of Buratti. The success of Beppo and a growing sense that " the excellent manner of Whistlecraft " was the manner for him, led him to study Frere's masters and models, Berni and Pulci. An accident had led to a great discovery.

The fourth canto of Childe Harold was published on the 28th of April 1818. Nearly three months went by before Murray wrote to him, and he began to think that his new poem was a failure. Meanwhile he completed an " Ode on Venice," in which he laments her apathy and decay, and contrasts the tyranny of the Old World with the new birth of freedom in America. In September he began Don Juan. His own account of the inception of his last and greatest work is characteristic but misleading. He says (September 9) that his new poem is to be in the style of Beppo, and is " meant to be a little quietly facetious about everything." A year later (August 12, 1819), he says that he neither has nor had a plan — but that " he had or has materials." By materials he means books, such as Dalzell's Shipwrecks and Disasters by Sea, or de Castelnau's Histoire de la nouvelle Russie, &c, which might be regarded as poetry in the rough. The dedication to Robert Southey (not published till 1833) is a prologue to the play. The " Lakers " had given samples of their poetry, their politics and their morals, and now it was his turn to speak and to speak out. He too would write " An Excursion."

He doubted that Don Juan might be " too free for these modest days." It was too free for the public, for his publisher, even for his mistress; and the " building up of the drama," as Shelley puts it, was a slow and gradual process. Cantos I., 11. were published (410) on the 15th of July 1819; Cantos in., iv., v., finished in November 1820, were not published till the 8th of August 1821. Cantos vi.-xvi., written between June 1822 and March 1823, were published at intervals between the 15th of July 1823 and the 26th of March 1824. Canto xvn. was begun in May 1823, but was never finished. A fragment of fourteen stanzas, found in his room at Missolonghi, was

first published in 1903.

He did not put all his materials into Don Juan. " Mazeppa, a tale of the Russian Ukraine," based on a passage in Voltaire's Charles XII., was finished by the 30th of September 1818 and published with " An Ode " (on Venice) on the 28th of June 1819. In the spring of 1819 Byron met in Venice, and formed a connexion with, an Italian lady of rank, Teresa (born Gamba), wife of the'Cavaliere Guiccioli. She was young and beautiful, well-read and accomplished. Married at sixteen to a man nearly four times her age, she fell in love with Byron at first sight, soon became and for nearly four years remained his mistress. A good and true wife to him in all but name, she won from Byron ample devotion and a prolonged constancy. Her volume of Recollec- tions {Lord Byron juge par les temoins de sa vie, 1869), taken for what it is worth, is testimony in Byron's favour. The countess left Venice for Ravenna at the end of April; within a month she sent for Byron, and on the 10th of June he arrived at Ravenna and took rooms in the Strada di Porto Sisi. The house (now No. 295) is close to Dante's tomb, and to gratify the countess and pass the time he wrote the " Prophecy of Dante " (published April 21, 182 1). According to the preface the poem was a metrical experiment, an exercise in terza rima; but it had a deeper significance. It was " intended for the Italians." Its purport was revolutionary. In the fourth canto of Childe Harold, already translated into Italian, he had attacked the powers, and " Albion most of all " for her betrayal of Venice, and knowing that his word had weight he appeals to the country of his adoption to strike a blow for freedom — to "unite." It is difficult to realize the force or extent of Byron's influence on continental opinion. His own countrymen admired his poetry, but abhorred and laughed at his politics. Abroad he was the prophet and champion of liberty. His hatred of tyranny — his defence of the oppressed — was a word spoken in season when there were few to speak but many to listen. It brought con- solation and encouragement, and it was not spoken in vain. It must, however, be borne in mind that Byron was more of a king-hater than a people-lover. He was against the oppressors, but he disliked and despised the oppressed. He was aristocrat by conviction as well as birth, and if he espoused a popular cause it was de haul en has. His connexion with the Gambas brought him into touch with the revolutionary movement, and thence- forth he was under the espionage of the Austrian embassy at Rome. He was suspected and " shadowed," but he was left alone.

Early in September Byron returned to La Mira, bringing the countess with him. A month later he was surprised by a visit from Moore, who

was on his way to Rome. Byron installed Moore in the Mocenigo palace and visited him daily. Before the final parting (October 11) Byron placed in Moore's hands the MS. of his Life and Adventures brought down to the close of 1816. Moore, as Byron suggested, pledged the MS. to Murray for 2000 guineas, to be Moore's property if redeemed in Byron's lifetime, but if not, to be forfeit to Murray at Byron's death. On the 17th of May 1824, with Murray's assent and goodwill, the MS. was burned in the drawing-room of 50 Albemarle Street. Neither Murray nor Moore lost their money. The Longmans lent Moore a sufficient sum to repay Murray, and were themselves repaid out of the receipts of Moore's Life of Byron. Byron told Moore that the memoranda were not " confessions," that they were " the truth but not the whole truth." This, no doubt, was the truth, and the whole truth. Whatever they may or may

not have contained, they did not explain the cause or causes of the separation from his wife. 1

At the close of 1810 Byron finally left Venice and settled at Ravenna in his own apartments in the Palazzo Guiccioli. His relations with the countess were put on a regular footing, and he was received in society as her cavaliere servente. At Ravenna his literary activity was greater than ever. His translation of the first canto of Pulci's Morgante Maggiore (published in the Liberal, No. IV., July 30, 1832), a laborious and scholarly achievement, was the work of the first two months of the year. From April to July he was at work on the composition of Marino Faliero, Doge of Venice, a tragedy in five acts (published April ai, 1 821). The plot turns on an episode in Venetian history known as La Congiwa, the alliance between the doge and the populace to overthrow the state. Byron spared no pains in preparing his materials. In so far as he is unhistorical, he errs in company with Sanudo and early Venetian chronicles. Moved by the example of Alfieri he strove to reform the British drama by "a severer approach to the rules." He would read his countrymen a " moral lesson " on the dramatic propriety of observing the three unities. It was an heroic attempt to reassert classical ideals in a romantic age, but it was " a week" too late "; Byron's " regular dramas " are admirably conceived and finely worded, but they are cold and lifeless.

Eighteen additional sheets of the Memoirs and a fifth canto of Don

*Juan were the pastime of the autumn, and in January 182 1 Byron began to work on his second " historical drama," Sardanapalus. But politics intervened, and little progress was made. He had been elected capo of the " Americani," a branch of the Carbonari, and his time was taken up with buying and storing arms and ammunition, and consultations with leading conspirators. " The poetry of politics " and poetry on paper did not go together. Meanwhile he would try his hand on prose. A controversy had arisen between Bowles and Campbell with regard to the merits of Pope. Byron rushed into the fray. To avenge and exalt Pope, to decry the " Lakers," and to lay down his own canons of art, Byron addressed two letters to * * * * ****** (i.e. John Murray), entitled " Strictures on the Life and Writings of Pope." The first was published in 1821, the second in 1835.*

The revolution in Italy came to nothing, and by the 28th of May, Byron had finished his work on Sardanapalus. The Two Foscari, a third historical drama, was begun on the 12th of June and finished on the 9th of July. On the same day he began Cain, a Mystery. Cain was an attempt to dramatize the Old Testament; Lucifer's apology for himself and his arraign- ment of the Creator startled and shocked the orthodox. Theologically the offence lay in its detachment. Cain was not irreverent or blasphemous, but it treated accepted dogmas as open questions. Cain was published in the same volume with the Two Foscari and Sardanapalus, December 19, 1821. The " Blues," a skit upon literary coteries and their patronesses, was written in August. It was first published in The Liberal, No. III., April 26, 1823, When Cain was finished Byron turned from grave to gay, from serious to humorous theology. Southey had thought fit to eulogize George III. in hexameter verse. He called his funeral ode a " Vision of Judgment." In the preface there was an obvious reference to Byron. The " Satanic School " of poetry was attributed to " men of diseased hearts and depraved imaginations." Byron's revenge was complete. In his " Vision of Judgment " (published in The Liberal, No. I., October 15, 1822) the tables are turned. The laureate is brought before the hosts of heaven and rejected by devils and angels alike. In October Byron wrote Heaven and Earth, a Mystery (The Liberal, No. II., January 1, 1823), a lyrical drama based on the legend of the " Watchers," or fallen angels of the Book of Enoch. The countess and her family had been expelled from Ravenna in

1 An anonymous work entitled The Life, Writings, &fc. of . . . Lord Byron (3 vols., 1825) purports to give " Recollections of the Lately Destroyed Manuscript." To judge by internal evidence (see "The Wedding Day," &c. ii. 278-284) there is some measure of truth in

this assertion, but the work as a whole is untrustworthy.

July, but Byron still lingered on in his apartments in the Palazzo Guiccioli. At length (October 28) he set out for Pisa. On the road he met his old friend, Lord Clare, and spent a few minutes in his company. Rogers, whom he met at Bologna, was his fellow- traveller as far as Florence. At Pisa he rejoined the countess, who had taken on his behalf the Villa Lanfranchi on the Arno. At Ravenna Byron had lived amongst Italians. At Pisa he was surrounded by a knot of his own countrymen, friends and acquaintances of the Shelleys. Among them were E. J. Trelawny, Thomas Medwin, author of the well-known Conversations of Lord Byron (1824), and Edward Elliker Williams. His first work at Pisa was to dramatize Miss Lee's Kruitzner, or the German's Tale. He had written a first act in 1815, but as the MS. was mislaid he made a fresh adaptation of the story which he rechristened Werner, or the Inheritance. It was finished on the 20th of January and published on the 23rd of November 1822. Werner is in parts Kruitzner cut up into loose blank verse, but it contains lines and passages of great and original merit. Alone of Byron's plays it took hold of the stage. Macready's " Werner " was a famous impersonation.

In the spring of 1822 a heavy and unlooked-for sorrow befell Byron. Allegra, his natural daughter by Claire Clairmont, died at the convent of Bagna Cavallo on the 20th of April 1822. She was in her sixth year, an interesting and attractive child, and he had hoped that her companionship would have atoned for his enforced separation from Ada. She is buried in a nameless grave at the entrance of Harrow church. Soon after the death of Allegra, Byron wrote the last of his eight plays, The Deformed Transformed (published by John Hunt, February 20, 1824) . The " sources " are Goethe's Faust, The Three Brothers, a novel by Joshua Pickersgill, and various chronicles of the sack of Rome in 1527. The theme or motif is the interaction of personality and individuality. Remonstrances on the part of publisher and critic induced him to turn journalist. The control of a news- paper or periodical would enable him to publish what and as he pleased. With this object in view he entered into a kind of literary partnership with Leigh Hunt, and undertook to trans- port him, his wife and six children to Pisa, and to lodge them in the Villa Lanfranchi. The outcome of this arrangement was The Liberal — Verse and Prose from the South. Four numbers were issued between October 1822 and June 1823. The Liberal did not succeed financially, and the joint menage was a lament- able failure. Correspondence of Byron and some of his Con- temporaries (1828) was Hunt's revenge for the slights and indignities which he suffered

in Byron's service. Yachting was one of the chief amusements of the English colony at Pisa. A schooner, the " Bolivar," was built for Byron, and a smaller boat, the " Don Juan " re-named " Ariel," for Shelley. Hunt arrived at Pisa on the 1st of July. On the 8th of July Shelley, who had remained in Pisa on Hunt's account, started for a sail with his friend Williams and a lad named Vivian. The " Ariel " was wrecked in the Gulf of Spezia and Shelley and his companions were drowned. On the 1 6th of August Byron and Hunt witnessed the " burning of Shelley " on the seashore near Via Reggio. Byron told Moore that " all of Shelley was consumed but the heart." Whilst the fire was burning Byron swam out to the " Bolivar " and back to the shore. The hot sun and the violent exercise brought on one of those many fevers which weakened his constitution and shortened his life.

The Austrian government would not allow the Gambas or the countess Guiccioli to remain in Pisa. As a half measure Byron took a villa for them at Montenero near Leghorn, but as the authorities were still dissatisfied they removed to Genoa. Byron and Leigh Hunt left Pisa on the last day of September. On reaching Genoa Byron took up his quarters with the Gambas at the Casa Saluzzo, "a fine old palazzo with an extensive view over the bay," and Hunt and his party at the Casa Negroto with Mrs Shelley. Life at Genoa was uneventful. Of Hunt and Mrs Shelley he saw as little as possible, and though his still unpublished poems were at the service of The Liberal, he did little or nothing to further its success. Each number was badly received. Byron had some reason to fear that his popularity

was on the wane, and though he had broken with Murray and was offering Don Juan (cantos vi.-xii.) to John Hunt, the publisher of The Liberal, he meditated a " run down to Naples " and a recommencement of Childe Harold. There was a limit to his defiance of the " world's rebuke." Home politics and the congress of Verona (November-December 1822) suggested a satire entitled " The Age of Bronze " (published April 1, 1823). It is, as he said, " stilted," and cries out for notes, but it embodies some of his finest and most vigorous work as a satirist. By the middle of February (1823) he had completed The Island; or Christian and his Comrades (published June 26, 1823). The sources are Bligh's Narrative of the Mutiny of the Bounty, and Mariner's Account of the Tonga Islands. Satire and tale are a reversion to his earlier method. The execution of The Island is hurried and unequal, but there is a deep and tender note in

the love-story and the recital of the " feasts and loves and wars " of the islanders. The poetic faculty has been " softened into feeling " by the experience of life.

When The Island was finished, Byron went on with Don Juan. Early in March the news reached him that he had been elected a member of the Greek Committee, a small body of influential Liberals who had taken up the cause of the liberation of Greece. Byron at once offered money and advice, and after some hesita- tion on the score of health, determined " to go to Greece." His first step was to sell the " Bolivar " to Lord Blessington, and to purchase the " Hercules," a collier-built tub of 1 20 tons. On the 23rd of July the " Hercules " sailed from Leghorn and anchored off Cephalonia on the 3rd of August. The party on board consisted of Byron, Pietro Gamba, Trelawny, Hamilton Browne and six or seven servants. The next four months were spent at Cephalonia, at first on board the " Hercules," in the harbour of Argostoli and afterwards at Metaxata. The object of this delay was to ascertain the real state of affairs in Greece. The revolu- tionary Greeks were split up into parties, not to say factions, and there were several leaders. It was a question to which leader he would attach himself. At length a message reached him which inspired him with confidence. He received a summons from Prince Alexander Mavrocordato, a man of birth and education, urging him to come at once to Missolonghi, and enclosing a request from the legislative body " to co-operate with Mavrocordato in the organization of western Greece." Byron felt that he could act with a " clear conscience " in putting himself at the disposal of a man whom he regarded as the authorized leader and champion of the Greeks. He sailed from Argostoli on the 29th of December 1823, and after an adventurous voyage landed at Missolonghi on the 5th of January 1824. He met with a royal reception. Byron may have sought, but he did not find, " a soldier's grave." During his three months' residence at Missolonghi he accomplished little and he endured much. He advanced large sums of money for the payment of the troops, for repair and construction of fortifications, for the provision of medical appliances. He brought opposing parties into line, and served as a link between Odysseus, the democratic leader of the insurgents, and the " prince " Mavrocordato. He was eager to take the field, but he never got the chance. A revolt in the Morea, and the repeated disaffection of his Suliote guard pre- vented him from undertaking the capture of Epacto, an exploit which he had reserved for his own leadership. He was beset with difficulties, but at length events began to move. On the 18th of March he received an invitation from Odysseus and other chiefs to attend a conference at Salona, and by

the same messenger an offer from the government to appoint him " governor-general of the enfranchised parts of Greece." He promised to attend the conference but did not pledge himself to the immediate acceptance of office. But to Salona he never came. " Roads and rivers were impassable," and the conference was inevitably postponed.

His health had given way, but he does not seem to have realized that his life was in danger. On the 15th of February he was struck down by an epileptic fit, which left him speechless though not motionless. He recovered sufficiently to conduct his business as usual, and to drill the troops. But he suffered from dizziness in the head and spasms in the chest, and a few days later

he was seized with a second though slighter convulsion. These attacks may have hastened but they did not cause his death. For the first week of April the weather confined him to the house, but on the 9th a letter from his sister raised his spirits and tempted him to ride out with Gamba. It came on to rain, and though he was drenched to the skin he insisted on dismounting and returning in an open boat to the quay in front of his house. Two hours later he was seized with ague and violent rheumatic pains. On the nth he rode out once more through the olive groves, attended by his escort of Suliote guards, but for the last time. Whether he had got his deathblow, or whether copious blood-letting made recovery impossible, he gradually grew worse, and on the ninth day of his illness fell into a comatose sleep. It was reported that in his delirium he had called out, half in English, half in Italian, " Forward — forward — courage! follow my example — don't be afraid ! " and that he tried to send a last message to his sister and to his wife. He died at six o'clock in the evening of the 19th of April 1824, aged thirty-six years and three months. The Greeks were heartbroken. Mavrocordato gave orders that thirty-seven minute-guns should be fired at daylight and decreed a general mourning of twenty-one days. His body was embalmed and lay in state. On the 2 5th of May his remains, all but the heart, which is buried at Missolonghi, were sent back to England, and were finally laid beneath the chancel of the village church of Hucknall-Torkard on the 16th of July 1824. The authorities would not sanction burial in Westminster Abbey, and there is neither bust nor statue of Lord Byron in Poets' Corner.

The title passed to his first cousin as 7th baron, from whom the subsequent barons were descended. The poet's daughter Ada (d. 1852) predeceased her mother, but the barony of Wentworth went to her heirs. She was the first wife of Baron King, who in 1838 was

created 1st earl of Lovelace, and had two sons (of whom the younger, b. 1839, d. 1906, was 2nd earl of Lovelace) and a daughter, Lady Anne, who married Wilfrid S. Blunt (q.v.). On the death of the 2nd earl the barony of Wentworth went to his daughter and only child, and the earldom of Lovelace to his half- brother by the 1st earl's second wife.

Great men are seldom misjudged. The world passes sentence on them, and there is no appeal. Byron's contemporaries judged him by the tone and temper of his works, by his own confessions or self-revelations in prose and verse, by the facts of his life as reported in the newspapers, by the talk of the town. His letters, his journals, the testimony of a dozen memorialists are at the disposal of the modem biographer. Moore thinks that Byron's character was obliterated by his versatility, his mobility, that he was carried away by his imagination, and became the thing he wished to be, or conceived himself as becoming. But his nature was not chameleon-like. Self-will was the very pulse of the machine. Pride ruled his years. All through his life, as child and youth and man, his one aim and endeavour was the subjection of other people's wishes to, his own. He would subject even fate if he could. He has two main objects in view, glory, in the French rather than the English use of the word, and passion. It is hard to say which was the strongest or the dearest, but, on the whole, within his " little life " passion prevailed. Other inclinations he could master. Poetry was often but not always an exaltation and a relief. He could fulfil his tasks in " hours of gloom." If he had not been a great poet he would have gained credit as a painstaking and laborious man of letters. His habitual temperance was the outcome of a stern resolve. He had no scruples, but he kept his body in subjection as a means to an end. In his youth Byron was a cautious spendthrift. Even when he was " cursedly dipped " he knew what he was about; and afterwards, when his income was sufficient for his require- ments, he kept a hold on his purse. He loved display, and as he admitted, spent money on women, but he checked his accounts and made both ends meet. On the other hand, the " gift of continency " he did not possess, or trouble himself to acquire. He was, to use his own phrase, " passionate of body," and his desires were stronger than his will. There are points of Byron's character with regard to which opinion is divided. Candid he certainly was to the verge of brutality, but was he sincere? Was

he as melancholy as his poetry implies? Did he pose as pessimist or misanthropist, or did he speak out of the bitterness of his soul? It stands to reason that Byron knew that his sorrow and his despair would excite public interest, and that he was not ashamed to exhibit " the pageant of a bleeding heart." But it does not follow that he was a hypocrite. His quarrel with mankind, his anger against fate, were perfectly genuine. His outcry is, in fact, the anguish of a baffled will. Byron was too self-conscious, too much interested in himself, to take any pleasures in imaginary woes, or to credit himself with imaginary vices.

Whether he told the whole truth is another matter. He was naturally a truthful man and his friends lived in dread of un- guarded disclosures, but his communications were not so free as they seemed. There was a string to the end of the kite. Byron was kindly and generous by nature. He took pleasure in helping necessitous authors, men and women, not at all en grand seigneur, or without counting the cost, but because he knew what poverty meant, and a fellow-feeling made him kind. Even in Venice he set aside a fixed sum for charitable purposes. It was to his credit that neither libertinism nor disgrace nor remorse withered at its root this herb of grace. Cynical speeches with regard to friends and friendship, often quoted to his dis- advantage, need not be taken too literally. Byron talked for effect, and in accordance with the whim of the moment. His acts do not correspond with his words. Byron rejected and repudiated bath Protestant and Catholic orthodoxy, but like the Athenians he was " exceedingly religious." He could not, he did not wish to, detach himself from a belief in an Invisible Power. "A fearful looking for of judgment " haunted him to the last.

There is an increasing tendency on the part of modern critics to cast a doubt on Byron's sanity. It is true that he inherited bad bloQd on both sides of his family, that he was of a neurotic temperament, that at one time he maddened himself with drink, but there is no evidence that his brain was actually diseased. Speaking figuratively, he may have been " half mad," but, if so, it was a derangement of the will, not of the mind. He was responsible for his actions, and they rise up in judgment against him. He put indulgence before duty. He made a byword of his marriage and brought lifelong sorrow on his wife. If, as Goethe said, he was " the greatest talent " of the 19th century, he associated that talent with scandal and reproach. But he was born with certain noble qualities which did not fail him at his worst. Pie was courageous, he was kind, and he loved truth rather than lies. He was a worker and a fighter. He hated tyranny, and was prepared to sacrifice money and ease and life in the cause of popular freedom. If

the issue of his call to arms was greater and other than he designed or foresaw, it was a generous instinct which impelled him to begin the struggle.

With regard to the criticism of his works, Byron's personality has always confused the issue. Politics, religion, morality, have confused, and still confuse, the issue. The question for the modern critic is, of what permanent value is Byron's poetry? What did he achieve for art, for the intellect, for the spirit, and in what degree does he still give pleasure to readers of average intelligence? It cannot be denied that he stands out from other poets of his century as a great creative artist, that his canvas is crowded with new and original images, additions to already exsiting types of poetic workmanship. It has been said that Byron could only represent himself under various disguises, that Childe Harold and The Corsair, Lara and Manfred and Don Juan, are variants of a single personality, the egotist who is at war with his fellows, the generous but nefarious sentimentalist who sins and suffers and yet is to be pitied for his suffering. None the less, with whatever limitations as artist or moralist, he invented characters and types of characters real enough and distinct enough to leave their mark on society as well as on literature. These masks or replicas of his own personality were formative of thought, and were powerful agents in the evolution of sentiment and opinion. In language which was intelligible and persuasive, under shapes and forms which were suggestive and inspiring, Byron delivered a message of liberation. There was a double motive at work in his energies as a poet. He wrote, as he said, because " his

mind was full " of his own loves, his own griefs, but also to register a protest against some external tyranny of law or faith or custom. His own countrymen owe Byron another debt. His poems were a liberal education in the manners and customs of " the gorgeous East," in the scenery, the art, the history and politics of Italy and Greece. He widened the horizon of his contemporaries, bringing within their ken wonders and beauties hitherto unknown or unfamiliar, and in so doing he heightened and cultivated, he " touched with emotion," the unlettered and unimaginative many, that " reading public " which despised or eluded the refinements and subtleties of less popular writers.

To the student of literature the first half of the 19th century is the age of Byron. He has failed to retain his influence over English readers. The knowledge, the culture of which he was the immediate channel, were speedily available through other sources. The politics

of the Revolution neither interested nor affected the Liberalism or Radicalism of the middle classes. It was not only the loftier and wholesomer poetry of Wordsworth and of Tennyson which averted enthusiasm from Byron, not only moral earnestness and religious revival but the optimism and the materialism of commercial prosperity. As time went on, a severer and more intelligent criticism was brought to bear on his handiwork as a poet. It was pointed out that his constructions were loose and ambiguous, that his grammar was faulty, that his rhythm was inharmonious, and it was argued that these defects and blemishes were outward and visible signs of a lack of fineness in the man's spiritual texture; that below the senti- ment and behind the rhetoric the thoughts and ideas were mean and commonplace. There was a suspicion of artifice, a question- ing of the passion as genuine. Poetry came to be regarded more and more as a source of spiritual comfort, if not a religious exercise, yet, in some sort, a substitute for religion. There was little or nothing in Byron's poetry which fulfilled this want. He had no message for seekers after truth. Matthew Arnold, in his preface to The Poetry of Byron, prophesied that " when the year 1900 is turned, and our nation comes to recount the poetic glories in the century which has then just ended, her first names with her will be those of Byron and Wordsworth."

That prophecy still waits fulfilment, but without doubt there has been a reconsideration of Byron's place in literature, and he stands higher than he did, say, in 1875. His quarrel with orthodoxy neither alarms nor provokes the modern reader. Cynical or flippant turns of speech, which distressed and out- raged his contemporaries, are taken as they were meant, for witty or humorous by-play. He is regarded as the herald and champion of revolt. He is praised for his " sincerity and strength," for his single-mindedness, his directness, his audacity. A dis- passionate criticism recognizes the force and splendour of his rhetoric. The " purple patches " have stood the wear and tear of time. Byron may have mismanaged the Spenserian stanza, may have written up to or anticipated the guide-book, but the spectacle of the bull-fight at Cadiz is " for ever warm," the " sound of revelry " on the eve of Waterloo still echoes in our ears, and Marathon and Venice, Greece and Italy, still rise up before us, " as from the stroke of an enchanter's wand." It was, however, in another vein that Byron achieved his final triumph. In Don Juan he set himself to depict life as a whole. The style is often misnamed the mock-heroic. It might be more accurately described as humorous-realistic. His " plan was to have no plan " in the sense of synopsis or argument, but in the person of his hero to " unpack his heart," to avenge himself on his

enemies, personal or political, to suggest an apology for himself and to disclose a criticism and philosophy of life. As a satirist in the widest sense of the word, as an analyser of human nature, he comes, at whatever distance, after and yet next to Shakespeare. It is a test of the greatness of Don Juan that its reputation has slowly increased and that, in spite of its supposed immoral tendency, in spite of occasional grossness and voluptuous- ness, it has come to be recognized as Byron's masterpiece. Don Juan will be read for its own sake, for its beauty, its humour, its faithfulness. It is a " hymn to the earth," but it is a human sequence to " its own music chaunted."

BYRON, H. J.

905

In his own lifetime Byron stood higher on the continent of Europe than in England or even in America. His works as they came out were translated into French, into German, into Italian, into Russian, and the stream of translation has never ceased to flow. The Bride of Abydos has been translated into ten, Cain into nine languages. Of Manfred there is one Bohemian transla- tion, two Danish, two Dutch, two French, nine German, three Hungarian, three Italian, two Polish, one Romaic, one Rumanian? four Russian and three Spanish translations. The dictum or verdict of Goethe that " the English may think of Byron as they please, but this is certain that they show no poet who is to be compared with him " was and is the keynote of continental European criticism. A survey of European literature is a testimony to the universality of his influence. Victor Hugo, Lamartine, Delavigne, Alfred de Musset, in France; Borne, Miiller and Heine in Germany; the Italian poets Leopardi and Giusti; Pushkin and Lermontov among the Russians; Michiewicz and Slowacki among the Poles — more or less, as eulogists or imitators or disciples — were of the following of Byron. This fact is beyond dispute, that after the first outburst of popularity he has touched and swayed other nations rather than his own. The part he played or seemed to play in revolutionary politics endeared him to those who were struggling to be free. He stood for freedom of thought and of life. He made himself the mouth- piece of an impassioned and welcome protest against the hypo- crisy and arrogance of his order and his race. He lived on the continent and was known to many men in many cities. It has been argued that foreigners are insensible to his defects as a writer, and that this may account for an astonishing and perplex- ing preference. The cause is rather to be sought in the quality of his art. It was as the creator of new types, " forms more real than living man," that Byron appealed to the artistic sense and

to the imagination of Latin, Teuton or Slav. That " he taught us little " of the things of the spirit, that he knew no cure for the sickness of the soul, were considerations which lay outside the province of literary criticism. " It is a mark," says Goethe (Aus meinem Leben: Dichtung und Wahrheit, 1876, iii. 125), " of true poetry, that as a secular gospel it knows how to free us from the earthly burdens which press upon us, by inward serenity, by outward charm." Now of this " secular gospel " the redemption from " real woes " by the exhibition of imaginary glory, and imaginary delights, Byron was both prophet and evangelist.

Byron was 5 ft. 8 in. in height, and strongly built; only with difficulty and varying success did he prevent himself from growing fat. At five-and-thirty he was extremely thin. He was " very slightly lame," but he was painfully conscious of his deformity and walked as little and as seldom as he could. He had a small head covered and fringed with dark brown or auburn curls. His forehead was high and narrow, of a marble whiteness. His eyes were of a light grey colour, clear and luminous. His nose was straight and well-shaped, but " from being a little too thick, it looked better in profile than in front face." Moore says that ■t was in " the mouth and chin that the great beauty as well as expression of his fine countenance lay." The upper lip was of a Grecian shortly ss and the corners descending. His complexion was pale and colourless. Scott speaks of " his beautiful pale face — like a spirit's good or evil." Charles Matthews said that " he was the only man to whom he could apply the word beautiful." Coleridge said that " if you had seen him you could scarce disbelieve him . . . his eyes the open portals of the sun -ˆthings of light and for light." He was likened to " the god o f the Vatican," the Apollo Belvidere.

The best-known portraits are: (1) Byron at the age of seven by Kay of Edinburgh; (2) a drawing of Lord Byron at Cambridge by Gilchrist (1808); (3) a portrait in oils by George Sanders (1809); (4) a miniature by Sanders (181 2); (5) a portrait in oils by Richard Westall, R.A. (1813); (6) a portrait in oils (Byron in Albanian dress) by Thomas Phillips, R.A. (1813); (7) a portrait in oils by Phillips (1813); (8-9) a sketch for a miniature, and a miniature by James Holmes (1815); (10) a sketch by George Henry Harlow (1818); (n) a portrait in oils by Vincenzio Camuccini (in the Vatican) c. 1822; (12) a portrait

in oils by W. H. West (1822)5(13) a sketch by Count D'Orsay (1823). Busts were taken by Bertel Thorwaldsen (1817) and by Lorenzo Bartolini (1822). The statue (1829) in the library of Trinity

College, Cambridge, is by Thorwaldsen after the bust taken in 1817.

Authorities. — The best editions of Lord Byron's poetical works are : (I) The Works of Lord Byron with his Letters and Journals and his Life, by Thomas Moore (17 vols., London, John Murray, 1832, 1833); (2) The Works of Lord Byron (1 vol., 1837, reissued, 1838-1892); (3) The Poetical Works of Lord Byron (6 vols., 1855); (4) The Works of Lord Byron, new, revised and enlarged edition, Letters and Journals, edited by G. E. Prothero, 6 vols., Poetry, edited by E. H. Coleridge (7 vols., 1898-1903); (5) The Poetical Works of Lord Byron, with memoir by E. H. Coleridge (1 vol., 1905).

The principal biographies, critical notices, memoirs, &c, are: — Journey through Albania . . . with Lord Byron, by J. C. Hobhouse (1812; reprinted in 2 vols., 1813 and 1855); Memoirs of the Life and Writings of . . . Lord Byron [by Dr John Watkins] (1822) ; Letters on the Character and Poetical Genius of Lord Byron, by Sir E. Brydges, Bart. (1824) ; Correspondence of Lord Byron with a Friend (3 vols., Paris, 1824) ; Recollections of the Life of Lord Byron, by R. C. Dallas (1824) ; Journal of the Conversations of Lord Byron, by Capt. T. Medwin (1824); Last Days of Lord Byron, by W. Parry (1824) ; Narrative of a Second Visit to Greece, by E. Blaquiere (1825) ; A Narrative of Lord Byron's Last Journey to Greece, by Count Gamba (1825); The Life, Writings, Opinions and Times of Lord Byron (3 vols., 1825); The Spirit of the Age, by W. Hazlitt (1825); Memoir of the Life and Writings of Lord Byron, by George Clinton (1826) ; Correspondence of Byron and some of his Contemporaries , by J. H. Leigh Hunt (2 vols., 1828) ; Letters and Journals of Lord Byron, with Notices of his Life, by Thomas Moore (2 vols., 1830); The Life of Lord Byron, by J. Gait (1830) ; Conversations on Religion with Lord Byron, by J. Kennedy (1830) ; Conversations of Lord Byron with the Countess of Blessington (1834) ; Critical and Historical Essays, by T. B. Macaulay , i. 31 1-352 (1843) ; Lord Byron juge par les temoins de sa vie (1869), My Recollections of Lord Byron, by the Countess Guiccioli (1869); Lady Byron Vindicated, A History of the Byron Controversy, by H. Beecher Stowe (1870) ; Lord Byron, a Biography, by Karl Elze (1872) ; Kunst und Alterthum, Goethe's Sammtliche Werke (1874), vol. xiii. p. 641; Memoir of the Rev. F. Hodgson (2 vols., 1878) ; The Real Lord Byron, by J. C. Jeaffreson (2 vols., 1883); A Selection, &c, by A. C. Swinburne (1885); Records of Shelley, Byron and the Author, by E. J. Trelawny (1887); Memoirs of 'John Murray, by S. Smiles (2 vols., 1891); Poetry of Byron, chosen and arranged by Matthew Arnold (preface) (1892) ; The Siege of Corinth, edited by E. Kolbing (1893) ; Prisoner of Chillon and other Poems, edited by

E. Kolbing (1869) ; The Works of Lord Byron, edited by W. Henley, vol. i. (1897) ; A. Brandl's " Goethes Verhiiltniss zu Byron," Goethe Jahrbuch, zwanzigster Band (1899); Main Currents in Nineteenth Century Literature, by G. Brandis (6 vols., 1901-1905), translated from Hauptstr bmungen der Literatur des neunzehnten Jahrhunderts, 4 Bde. (Berlin, 1872- 1876); Chambers's Cyclopaedia of English Literature, vol. iii. (1903) art. " Byron," by T. Watts Dunton ; Studies in Poetry and Criticism, by J. Churton Collins (1905); Lord Byron, sein Leben, &c, by Richard Ackermann; Byron, 3 vols, in the Biblioteka velikikh pisatelei pod redaktsei, edited by S. A. Vengesova (St Petersburg, 1906) : a variorum translation; Byron et le romantisme frangais, by Edmond Esteve (1907). ˆ (E. H. C.)

BYRON, HENRY JAMES (1834-1884), English playwright, son of Henry Byron, at one time British consul at Port-au- Prince, was born in Manchester in January 1834. He entered the Middle Temple as a student in 1858, with the intention of devoting his time to play-writing. He soon ceased to make any pretence of legal study, and joined a provincial company as an actor. In this line he never made any real success; and, though he continued to act for years, chiefly in his own plays, he had neither originality nor charm. Meanwhile he wrote assiduously, and few men have produced so many pieces of so diverse a nature. He was the first editor of the weekly comic paper, Fun, and started the short-lived Comic Trials. His first successes were in burlesque; but in 1865 he joined Miss Marie Wilton (afterwards Lady Bancroft) in the management of the Prince of Wales's theatre, near Tottenham Court Road. Here several of his pieces, comedies and extravaganzas were produced with success; but, upon his severing the partnership two years later, and starting management on his own account in the provinces, he was financially unfortunate. The commercial success of his life was secured with Our Boys, which was played at the Vaudeville from January 1875 till April 1879 — a then un- precedented " run." The Upper Crust, another of his successes, gave a congenial opportunity to Mr J. L. Toole for one of his

inimitably broad character-sketches. During the last few years of his life Byron was in frail health; he died in Clapham on the nth of April 1884. H. J. Byron was the author of some of the most popular stage pieces of his day. Yet his extravaganzas have no wit but that of violence; his rhyming couplets are without polish, and decorated only

by forced and often pointless puns. His sentiment had T. W. Robertson's insipidity without its freshness, and restored an element of vulgarity which his predecessor had laboured to eradicate from theatrical tradition. He could draw a " Cockney " character with some fidelity, but his dramatis personae were usually mere puppets for the utterance of his jests. Byron was also the author of a novel, Paid in Full (1865), which appeared originally in Temple Bar. In his social relations he had many friends, among whom he was justly popular for geniality and imperturbable good temper.

BYRON, JOHN BYRON, 1st Baron (c. 1600-1652), English cavalier, was the eldest son of Sir John Byron (d. 1625), a member of an old Lancashire family which had settled at New- stead, near Nottingham. During the third decade of the 17th century Byron was member of parliament for the town and afterwards for the county of Nottingham; and having been knighted and gained some military experience he was an enthusi- astic partisan of Charles I. during his struggle with the parlia- ment. In December 1641 the king made him lieutenant of the Tower of London, but in consequence of the persistent demand of the House of Commons he was removed from this position at his own request early in 1642. At the opening of the Civil War Byron joined Charles at York. He was present at the skirmish at Powick Bridge; he commanded his own regiment of horse at Edgehill and at Roundway Down, where he was largely responsible for the royalist victory; and at the first battle of Newbury Falkland placed himself under his orders. In October 1643 he was created Baron Byron of Rochdale, and was soon serving the king in Cheshire, where the soldiers sent over from Ireland augmented his forces. His defeat at Nantwich, however, in January 1644, compelled him to retire into Chester, and he was made governor of this city by Prince Rupert. 'At Marston Moor, as previously at Edgehill, Byron's rashness gave a great advantage to the enemy; then after fighting in Lanca- shire and North Wales he returned to Chester, which he held for about twenty weeks in spite of the king's defeat at Naseby and the general hopelessness of the royal cause. Having obtained favourable terms he surrendered the city in February 1646. Byron took some slight part in the second Civil War, and was one of the seven persons excepted by parliament from all pardon in 1648. But he had already left England, and he lived abroad in attendance on the royal family until his death in Paris in August 1652. Although twice married Byron left no children, and his title descended to his brother Richard (1605-1679), who had been governor of Newark. Byron's five other brothers served Charles I. during the Civil War, and one authority says that the seven Byrons were all present at Edgehill.

BYRON, HON. JOHN (1723,-1786), British vice-admiral, second son of the 4th Lord Byron, and grandfather of the poet, was born on the 8th of November 1723. While still very young, he accompanied Anson in his voyage of discovery round the world. During many successive years he saw a great deal of hard service, and so constantly had he to contend, on his various expeditions, with adverse gales and dangerous storms, that he was nicknamed by the sailors, " Foul-weather Jack." It is to this that Lord Byron alludes in his Epistle to Augusta: —

" A strange doom is thy father's son's, and past Recalling as it lies beyond redress, Reversed for him our grandsite's fate of yore, He had no rest at sea, nor I on shore."

Among his other expeditions was that to Louisburg in 1760, where he was sent in command of a squadron to destroy the fortifications. And in 1764 in the " Dolphin " he went for a prolonged cruise in the South Seas. In 1768 he published a Narrative of some of his early adventures with Anson, which was to some extent utilized by his grandson in Don Juan. In 1769 he was appointed governor of Newfoundland. In 1775 he

attained his flag rank, and in 1778 became a vice-admiral. In the same year he was despatched with a fleet to watch the movements of the Count d'Estaing, and in July 1779 fought an indecisive engagement with him off Grenada. He soon after returned to England, retiring into private life, and died on the 10th of April 1786.

BYSTROM, JOHAN NIKLAS (1783-1848), Swedish sculptor, was born on the 18th of December 1783 at Philipstad. At the age of twenty he went to Stockholm and studied for three years under Sergei. In 1809 he gained the academy prize, and in the following year visited Rome. He sent home a beautiful work, " The Reclining Bacchante," in half life size, which raised him at once to the first rank among Swedish sculptors. On his return to Stockholm in 1816 he presented the crown prince with a colossal statue of himself, and was entrusted with several important works. Although he was appointed professor of sculpture at the academy, he soon returned to Italy, and with the exception of the years from 1838 to 1844 continued to reside there. He died at Rome in 1848. Among Bystrom's numerous productions the best are his representations of the female form, such as " Hebe," " Pandora," " Juno suckling Hercules," and the " Girl entering the Bath." His colossal statues of the Swedish kings are also much admired.

BYTOWNITE, a rock-forming mineral belonging to the plagioclase (q.v.) series of the felspars. The name was originally given (1835) by T. Thomson, to a greenish- white felspathic mineral found in a boulder near Bytown (now the city of Ottawa) in Ontario, but this material was later shown on microscopical examination to be a mixture. The name was afterwards applied by G. Tschermak to those plagioclase felspars which lie between labradorite and anorthite; and this has been generally adopted by petrologists. In chemical composition and in optical and other physical characters it is thus much nearer to the anorthite end of the series than to albite. Like labradorite and anorthite, it is a common constituent of basic igneous rocks, such as gabbro and basalt. Isolated crystals of bytownite bounded by well- defined faces are unknown. (L. J. S.)

BYWATER, INGRAM (1840-), English classical scholar, was born in London on the 27 th of June 1840. He was educated at University and King's College schools, and at Queen's College, Oxford. He obtained a first class in Moderations (i860) and in the final classical schools (1862), and became fellow of Exeter (1863), reader in Greek (1883), regius professor of Greek (1893 1908), and student of Christ Church. He received honorary degrees from various universities, and was elected corresponding member of the Prussian Academy of Sciences. He is chiefly known for his editions of Greek philosophical works: Heracliti Ephesii Reliquiae (1877); Prisciani Lydi quae extant (edited for the Berlin Academy in the Supplementum Aristolelicum, 1886); Aristotle, Ethica Nicomachea (1890), De Arte Poetica (1898); Contributions to the Textual Criticism of the Nicomachean Ethics (1892).

BYZANTINE ART. 1 By " Byzantine art " is meant the art of Constantinople (sometimes called Byzantium in the middle ages as in antiquity), and of the Byzantine empire; it represents the form of art which followed the classical, after the transitional interval of the early Christian period. It reached maturity under Justinian (527-565), declined and revived with the fortunes of the empire, and attained a second culmination from the 10th to the 1 2th centuries. Continuing in existence through- out the later middle ages, it is hardly yet extinct in the lands of the Greek Church. It had enormous influence over the art of Europe and the East during the early middle ages, not only through the distribution of minor works from Constantinople but by the reputation of its architecture and painting. Several buildings in Italy are truly Byzantine. It is difficult to set a time for the origin of the style. When Constantine founded new Rome the art was still classical, although it had even then gathered up many of the elements which were to transform its aspect. Just two

hundred years later some of the most char- acteristic works of this style of art were being produced, such

1 For Byzantine literature see Greek Literature: Byzantine.

BYZANTINE ART

Plate I.

INTERIOR OF THE HOLY WISDOM (S. SOPHIA), CONSTANTINOPLE. Sixth century, the dome was rebuilt in the tenth century. The metal balustrades, pulpits, and the large discs are Turkish.

S. VITA1.I, RAVENNA. Sixth century.

*IV sx**

CAPITALS OF COLUMNS.

S. MARK, VENICE. Eleventh century.

S. APOLLINARI, RAVENNA. Sixth century.

Plate II.

BYZANTINE ART

SMALL MEDIEVAL CATHEDRAL, ATHENS.

Phofo. Emery Walker.

T . T _„,_„ „„ „„ . „„„ „ from a Drawing by Sidney Barnsley.

INTERIOR OF ST. LUKE'S, NEAR DELPHI. Showing a typical scheme of internal decoration. The lower parts of the walls are covered with marble, and the upper surfaces and vaults with mosaics and paintings. Eleventh century. '

as the churches of St Sergius, the Holy Wisdom (St Sophia), and the Holy Apostles at Constantinople, and San Vitale at Ravenna. We may best set an arbitrary point for the demarca- tion of the new style midway between these two dates, with the practical separation of the

eastern and western empires.

The style may be said to have arisen from the orientalization of Roman art, and itself largely contributed to the formation of the Saracenic or Mahommedan styles. As Choisy well says, " The history of art in the Roman epoch presents two currents, one with its source in Rome, the other in Hellenic Asia. When Rome fell the Orient returned to itself and to the freedom of exploring new ways. There was now a new form of society, the Christian civilization, and, in art, an original type of architecture, the Byzantine." It has hardly been sufficiently emphasize'd how closely the art was identified with the outward expression of the Christian church; in fact, the Christian element in late classical art is the chief root of the new style, and it was the moral and intellectual criticism that was brought to bear on the old material, which really marked off Byzantine art from being merely a late form of classic.

Hardly any distinction can be set up in the material contents of the art; it was at least for a period only simplified and sweetened, and it is this freshening which prepared the way for future development. It must be confessed, however, that certain influences darkened the style even before it had reached maturity; chief among these was a gloomy hierarchical splendour, and a ritual rigidity, which to-day we yet refer to, quite properly, as Byzantinism. Choisy sees a distinction in the constructive types of Roman and Byzantine architecture, in that the former covered spaces by concreted vaults built on centres, which approximated to a sort of " monolithic " formation, whereas in the Byzantine style the vaults were built of brick and drawn forward in space without the help of preparatory support. Building in this way, it became of the greatest importance that the vaults should be so arranged as to bring about an equilibrium of thrusts. The distinction holds as between Rome in the 4th century and Constantinople in the 6th, but we are not sufficiently sure that the concreted construction did not depend on merely local circumstances, and it is possible, in other centres of the empire where strong cement was not so readily obtainable, and wood was scarce, that the Byzantine constructive method was already known in classical times. Choisy, following Dieulafoy, would derive the Byzantine system of construction from Persia, but this proposition seems to depend on a mistaken chronology of the monuments as shown by Perrot and Chipiez in their History of Art in Persia. It seems probable that the erection of brick vaulting was indigenous in Egypt as a building method. Strzygowski, in his recent elaborate examination of the art- types found at the palace of Mashita (Mschatta), a remarkable ruin discovered by Canon Tristram in

Moab, of which the most important parts have now been brought to the new Kaiser Friedrich Museum in Berlin, shows that there are Persian ideas intermixed with Byzantine in its decoration, and there are also brick arches of high elliptical form in the structure. He seems disposed to date this work rather in the 5th than in the 6th century, and to see in it an intermediate step between the Byzan- tine work of the west and a Mesopotamian style, which he postulates as probably having its centre at Seleucia-Ctesiphon. From the examples brought forward by the learned author himself, it is safer as yet to look on the work as in the main Byzantine, with many Egyptian and Syrian elements, and an admixture, as has been said, of Persian ideas in the ornamenta- tion. Egypt was certainly an important centre in the develop- ment of the Byzantine style.

The course of the transition to Byzantine, the first mature Christian style, cannot be satisfactorily traced while, guided by Roman archaeologists, we continue to regard Rome as a source of Christian art apart from the rest of the world. Chris- tianity itself was not of Rome, it was an eastern leaven in Roman society. Christian art even in that capital was, we may say, an eastern leaven in Roman art. If we set the year 450 for the beginning of Byzantine art, counting all that went before as

early Christian, we get one thousand years to the Moslem con- quest of Constantinople (1453). This millennium is broken into three well-marked periods by the great iconoclastic schism (726-842) and the taking of Constantinople by the Crusaders in 1204. The first we may call the classical epoch of Byzantine art; it includes the mature period under Justinian (the central year of which we may put as 550), from which it declined until the settlement of the quarrel about images, 400 years in all, to, say, 850. The second period, to which we may assign the limits 850-1200, is, in the main, one of orientalizing influences, especially in architecture, although in MSS. and paintings there was, at one time, a distinct and successful classical revival. The interregnum had caused almost complete isolation from the West, and inspiration was only to be found either by casting back on its own course, or by borrowing from the East. This period is best represented by the splendid works undertaken by Basil the Macedonian (867-886) and his immediate successors, in the imperial palace, Constantinople. The third period is marked by the return of western influence, of which the chief agency was probably the establishment of Cistercian monasteries. This western influence, although it may be traced here and there, was not sufficient, however, to change the essentially oriental character of the art, which from first to last may be described as Oriental-

Christian.

Architecture. — The architecture of our period is treated in some detail in the article Architecture; here we can only glance at some broad aspects of its development. As early as the building of Constantine's churches in Palestine there were two chief types of plan in use — the basilican, or axial, type, represented by the basilica at the Holy Sepulchre, and the circular, or central, type, represented by the great octagonal church once at Antioch. Those of the latter type we must suppose were nearly always vaulted, for a central dome would seem to furnish their very raison d'etre. The central space was sometimes surrounded by a very thick wall, in which deep recesses, to the interior, were formed, as at the noble church of St George, Salonica (5th century?), or by a vaulted aisle, as at Sta Costanza, Rome (4th century); or annexes were thrown out from the central space in such a way as to form a cross, in which these additions helped to counterpoise the central vault, as at the mausoleum of Galla Placidia, Ravenna (5th century). The most famous church of this type was that of the Holy Apostles, Constantinople. Vaults appear to have been early applied to the basilican type of plan ; for instance, at St Irene, Constantinople (6th century), the long body of the church is covered by two domes.

At St Sergius, Constantinople, and San Vitale, Ravenna, churches of the central type, the space under the dome was enlarged by having apsidal additions made to the octagon. Finally, at St Sophia (6th century) a combination was made which is perhaps the most remarkable piece of planning ever contrived. A central space of 100 ft. square is increased to 200 ft. in length by adding two hemicycles to it to the east and the west; these are again extended by pushing out three minor apses eastward, and two others, one on either side of a straight extension, to the west. This unbroken area, about 260 ft. long, the larger part of which is over 100 ft. wide, is entirely covered by a system of domical surfaces. Above the conchs of the small apses rise the two great semi-domes which cover the hemicycles, and between these bursts out the vast dome over the central square. On the two sides, to the north and south of the dome, it is supported by vaulted aisles in two storeys which bring the exterior form to a general square. At the Holy Apostles (6th century) five domes were applied to a cruciform plan, that in the midst being the highest. After the 6th century there were no churches built which in any way competed in scale with these great works of Justinian, and the plans more or less tended to approximate to one type. The central area covered by the dome was included in a considerably larger square, of which the four divisions, to the east, west, north and south, were

carried up higher in the vaulting and roof system than the four corners, forming in this way a sort of nave

and transepts. Sometimes the central space was square, some- times octagonal, or at least there were eight piers supporting the dome instead of four, and the " nave " and " transepts " were narrower in proportion. If we draw a square and divide each side into three so that the middle parts are greater than the others, and then divide the area into nine from these points, . we approximate to the typical setting out of a plan of this time. Now add three apses on the east side opening from the three divisions, and opposite to the west put a narrow entrance porch running right across the front. Still in front put a square court. The court is the atrium and usually has a fountain in the middle under a canopy resting on pillars. The entrance porch is the narthex. The central area covered by the dome is the solea, the place for the choir of singers. Here also stood the ambo. Across the eastern side of the central square was a screen which divided off the bema, where the altar was situated, from the body of the church; this screen, bearing images, is the icon- astasis. The altar was protected by a canopy or ciborium resting on pillars. Rows of rising seats around the curve of the apse with the patriarch's throne at the middle eastern point formed the synlhronon. The two smaller compartments and apses at the sides of the bema were sacristies, the diaconicon and prolhesis. The continuous influence from the East is strangely shown in the fashion of decorating external brick walls of churches built about the 12 th century, in which bricks roughly carved into form are set up so as to make bands of ornamentation which it is quite clear are imitated from Cufic writing. This fashion was associated with the disposition of the exterior brick and stone work generally into many varieties of pattern, zig-zags, key-patterns' &c; and, as similar decoration is found in many Persian buildings, it is probable that this custom also was derived from the East. The domes and vaults to the exterior were covered with lead or with tiling of the Roman variety. The window and door frames were of marble. The interior surfaces were adorned all over by mosaics or paintings in the higher parts of the edifice, and below with incrustations of marble slabs, which were frequently of very beautiful varieties, and disposed so that, although in one surface, the colouring formed a series of large panels. The choicer marbles were opened out so that the two surfaces produced by the division formed a symmetrical pattern resembling somewhat the

marking of skins of beasts.

Mosaics and Paintings. — The method of depicting designs by bringing together morsels of variously coloured materials is of high antiquity. We are apt to think of a line of distinction between classical and Christian mosaics in that the former were generally of marble and the latter mostly of coloured and gilt glass. But glass mosaics were already in use in the Augustan age, and the use of gilt tesserae goes back to the 1st or 2nd century. The first application of glass to this purpose seems to have been made in Egypt, the great glass-working centre of antiquity, and the gilding of tesserae may with probability be traced to the same source, whence, it is generally agreed, most of the gilt glass vessels, of which so many have been found in the catacombs, were derived. The earliest existing mosaics of a typically Christian character are some to be found at Santa Costanza, Rome (4th century). Other mosaics on the vaults of the same church are of marble and follow a classical tradition. It is probable that we have here the meeting-point of two art- currents, the indigenous and the eastern. In Rome, the great apse-mosaic of S. Pudenziana dates from about a.d. 400. The mausoleum of Galla Placidia, Ravenna, is incrusted within by mosaic work of the 5th century, and most probably the dome mosaics of the church of St George, Salonica, are also of this period. Of the 6th century are many of the magnificent examples still remaining at Ravenna, portions of the original incrustation of St Sophia, Constantinople, those of the basilica at Parenzo, on the Gulf of Istria, and of St Catherine's, Sinai. An interesting mosaic which is probably of this period, and has only recently been described, is at the small church of Keti in Cyprus. This, which may be the only Byzantine mosaic in the British dominions, fills the conch of a tiny apse, but is none the less of great dignity. In the centre is a figure of the Virgin with the

Holy Child in her arms standing between two angels who hold disks marked with the sign X. They are named Michael and Gabriel. Another mosaic of this period brought from Ravenna to Germany two generations ago has been recently almost re- discovered, and set up in the new Museum of Decorative Art in Berlin. In this, a somewhat similar composition fills the conch of the apse, but here it is the Risen Christ who stands between the two archangels. Above, in a broad strip, a frieze of angels blowing trumpets stand on the celestial sea on either hand of the Enthroned Majesty.

Such mosaics flowed out widely over the Christian world from its art centres, as far east as Sana, the capital of Yemen, as far north as Kiev in Russia, and Aachen in Germany, and as far west as Paris,

and continued in time for a thousand years without break in the tradition save by the iconoclastic dispute. The finest late example is the well-known " mosaic-church " (the Convent of the Saviour) at Constantinople, a work of the 14th century.

The single figures were from the first, and for the most part, treated with an axial symmetry. Almost all are full front; only occasionally will one, like the announcing angel, be drawn with a three-quarter face. The features are thus kept together on the general map of the face. In the same way the details of a tree will be collected on a simple including form which makes a sort of mat for them. Groups, similarly, are closely gathered up into masses of balanced form, and such masses are arranged with strict regard for general symmetry. " The art," as Bayet says, " in losing something of life and liberty became so much the better fitted for the decoration of great edifices." The technical means were just as much simplified, and only a few frank colours were made sufficient, by skilful juxtaposition, to do all that was required of them. The fine pure blue, or bright gold, backgrounds on which the figures were spaced, as well as the broken surface incidental to the process, created an atmosphere which harmonized all together. At St Sophia there were literally acres of such mosaics, and they seem to have been applied with similar profusion in the imperial palace.

Mosaic was only a more magnificent kind of painting, and painted design followed exactly the same laws; the difference is in the splendour of effect and in the solidity and depth of colour. Paintings, from the first, must have been of more grey and pearly hues. A large side chapel at the mosaic church at Constantinople is painted, and it is difficult to say which is really the more beautiful, the deep splendour of the one, or the tender yet gay colour of the other. The greatest thing in Byzan- tine art was this picturing of the interiors of entire buildings with a series of mosaics or paintings, filling the wall space, vaults and domes with a connected story. The typical character of the personages and scenes, the elimination of non-essentials, and the continuity of the tradition, brought about an intensity of ex- pression such as may nowhere else be found. It is part of the limited greatness of this side of Byzantine art that there was no room in it for the gaiety and humour of the later medieval schools; all was solemn, epical, cosmic. When such stories are displayed on the golden ground of arches and domes, and related in a connected cycle, the result produces, as it was intended to produce, a sense of the universal and eternal. Beside this great power of co-ordination possessed by Byzantine artists, they created imaginative types of the highest perfection. They clothed Christian ideas with

forms so worthy ; which have be- come so diffused, and so intimately one with the history, that we are apt to take them for granted, and not to see in them the superb results of Greek intuition and power of expression. Such a type is the Pantocrator, — the Creator-Redeemer, the Judge inflexible and yet compassionate, — who is depicted at the zenith of all greater domes; such the Virgin with the Holy Child, enthroned or standing in the conchs of apses, all tenderness and dignity, or with arms extended, all solicitude; of her image the Painter's Guide directs that it is to be painted with the " complexion the colour of wheat, hair and eyes brown, grand eyebrows, and beautiful eyes, clad in beautiful clothing, humble, beautiful and faultless "; such are the angels with their mighty

wings, splendid impersonations of beneficent power; such are the prophets, doctors, martyrs, saints, — all have been fixed into final types.

We are apt to speak of the rigidity and fixity of Byzantine work, but the method is germane in the strictest sense to the result desired, and we should ask ourselves how far it is possible to represent such a serious and moving drama except by dealing with more or less unchangeable types. It could be no otherwise. This art was not a matter of taste, it was a growth of thought, cast into an historical mould. Again, the artists had an extra- ordinary power of concentrating and abstracting the great things of a story into a few elements or symbols. For example, the seven days of creation are each figured by some simple detail, such as a tree, or a flight of birds, or symbolically, as seven spirits; the flood by an ark on the waters. What the capabilities of such a method are, where invention is not allowed to wander into variety, but may only add intensity, may, for instance, be seen in representations of the Agony in the Garden. This subject is usually divided into three sections, each con- secutive one showing, with the same general scene, greater darkness, an advance up the hill, and the figure of Christ more bowed. Another composition, the " Sleep (death) of the Virgin," is all sweetness and peace, but no less powerful. A remarkable invention is the etomasia, a splendid empty throne prepared for the Second Advent. The stories of the Old Testament are put into relation with the Gospel by way of type and anti-type. There are allegories: the anchorite life contrasted with the mad life of the world, the celestial ladder, &c, and fine impersona- tions, such as night and dawn, mercy and truth, cities

and rivers, are frequently found, especially in MS. pictures.

A few general schemes may be briefly summarized. St Sophia has the Pantocrator in the middle of the dome, and four cherubim of colossal size at the four corners ; on the walls below were angels, prophets, saints and doctors. On the circle of the apse was enthroned the Virgin. To the right and left, high above the altar, were two archangels holding banners inscribed " Holy, Holy, Holy." These last are also found at Nicaea, and at the monastery of St Luke. The church of the Holy Apostles had the Ascension in the central dome, and below, the Life of Christ. St Sophia, Salonica, also has the Ascension, a composition which is repeated on the central dome of St Mark's, Venice. In the eastern dome of the Venetian church is Christ surrounded by prophets, and, in the western dome, the Descent of the Holy Spirit upon the Apostles. A Pentecost similar to the last occupies the dome over the Bema of St Luke's monastery in Phocis; in the central dome of this church is the Pantocrator, while in a zone below stand, the Virgin to the east, St John Baptist to the west, and the four archangels, Michael, Gabriel, Raphael and Uriel, to the north and south. A better example of grandeur of treatment can hardly be cited than the paintings of the now destroyed dome of the little church of Megale Panagia at Athens, a dome which was only about 12 ft. across. At the centre was Christ enthroned, next came a series of nine semi- circles containing the orders of the angels, seraphim, cherubim, thrones, dominations, virtues, powers, principalities, archangels and angels. Below these came a wide blue belt set with stars and the signs of the zodiac; to the east the sun, to the west the moon. Still below these were the winds, hail and snow; and still lower mountains and trees and the life on the earth, with all of which were interwoven passages from the last three Psalms, forming a Benedicite. After St Mark's, Venice, the completest existing scheme of mosaics is that of the church of St Luke; those of Daphne, Athens, are the most beautiful. A complete series of paintings exists in one of the monastic churches on Mount Athos. The Pantocrator is at the centre of the dome, then comes a zone with the Virgin, St John Baptist and the orders of the angels. Then the prophets between the windows of the dome and the four evangelists in the pendentives. On the rest of the vaults is the life of Christ, ending at the Bema with the Ascension; in the apse is the Virgin above, the Divine Liturgy lower, and the four doctors of the church below. All the walls are painted as well as the vaults. The mosaics overflowed from

the interiors on to the external walls of buildings even in Roman days, and the same practice was continued on churches. The remains of an external mosaic of the 6th century exist on the west facade of

the basilica at Parenzo. Christ is there seated amongst the seven candlesticks, and adored by saints. At the basilica at Bethlehem the gable end was appropriately covered with a mosaic of the Nativity, also a work of the age of Justinian. In Rome, St Peter's and other churches had mosaics on the facades; a tradition represented, in a small way, at San Miniato, Florence. At Constantinople, according to Clavigo, the Spanish ambassador who visited that city about 1400, the church of St Mary of the Fountain had its exterior richly worked in gold, azure and other colours; and it seems almost necessary to believe that the bare front of the narthex of St Sophia was intended to be decorated in a similar manner. In Damascus the courtyard of the Great Mosque seems to have been adorned with mosaics; photographs taken before the fire in 1893 show patches on the central gable in some of the spandrels of the side colonnades and on the walls of the isolated octagonal treasury. The mosaics here were of Byzantine workmanship, and their effect, used in such abundance, must have been of great splendour. In Jeru- salem the mosque of Omar also had portions of the exterior covered with mosaics. We may imagine that such external decorations of the churches, where a few solemn figures told almost as shadows on the golden background brightly reflecting the sun, must have been even more glorious than the imagery of their interiors.

Painted books were hardly different in their style from the paintings on the walls. Of the MSS. the Cottonian Genesis, now only a collection of charred fragments, was an early example. The great Natural History of Dioscorides of Vienna (c. 500) and the Joshua Roll of the Vatican, which have both been lately published in perfect facsimile, are magnificent works. In the former the plants are drawn with an accuracy of observation which was to disappear for a thousand years. The latter shows a series of drawings delicately tinted in pinks and blues. Many of the compositions contain classical survivals, like personified rivers.

In some of the miniatures of the later school of the art the classical revival of the 10th century was especially marked. Still later others show a very definite Persian influence in their ornamentation, where intricate arabesques almost of the style of eastern rugs are found.

The Plastic Art. — If painting under the new conditions entered on a fresh course of power and conquest, if it set itself success- fully to provide an imagery for new and intense thought, sculpture, on the other hand, seems to have withered away as it became removed from the classic stock. Already in the pre-Con- stantinian epoch of classical art sculpture had become strangely dry and powerless, and

as time went on the traditions of modelling appear to have been forgotten. Two points of recent criticism may be mentioned here. It has been shown that the porphyry images of warriors at the south-west angle of St Mark's, Venice, are of Egyptian origin and are of late classical tradition. The celebrated bronze St Peter at Rome is now assigned to the .13th century. Not only did statue-making become nearly a lost art, but architectural carvings ceased to be seen as modelled form, and a new system of relief came into use. Ornament, instead of being gathered up into forcible projections relieved against retiring planes, and instead of having its surfaces modulated all over with delicate gradations of shade, was spread over a given space in an even fretwork. Such a highly developed member as the capital, for instance, was thought of first as a simple, solid form, usually more or less the shape of a bowl, and the carving was spread out over the general surface, the back- ground being sunk into sharply defined spaces of shadow, all about the same size. Often the background was so deeply excavated that it ceased to be a plane supporting the relieved parts, but passed wholly into darkness. Strzygowski has given to this process the name of the " deep-dark " ground. A further step was to relieve the upper fretwork of carving from the ground altogether in certain places by cutting away the sustaining portions.

gio

BYZANTINE ART

The simplicity, the definition and crisp sharpness of some of the results are entirely delightful. The bluntness and weari- ness of many of the later modelled Roman forms disappear in the new energy of workmanship which was engaged in exploring a fresh field of beauty. These brightly illuminated lattices of carved ornament seem to hold within them masses of cold shadow. Beautiful as was this method of architectural adorn- ment, it must be allowed that it was, in essence, much more elementary than the school of modelled form. All such carvings were usually brightly coloured and gilt, and it seems probable that the whole was considered rather as a colour arrangement than as sculpture proper.

Plaster work, again, an art on which wonderful skill was lavished in Rome, became under the Byzantines extremely rude. Many good examples of this work exist at San Vitale and Sant' Apollinare in Classe at Ravenna, also at Parenzo, and at St Sophia, Constantinople. Later examples of plaster work of Byzantine tradition are to be found at Cividale, and at Sant' Ambrogio, Milan,

where the tympana of the well-known baldachin are of this material, and contain modelled figures.

Coins and medallions of even the best period of Byzantine art prove what a deep abyss separates them from the power over modelled relief shown in classical examples. The sculptural art is best displayed by ivory carvings, although this is more to be attributed to their pictorial quality than to a feeling for modelling.

Metal Work, Ivories and Textiles. — One of the greatest of Byzantine arts is the goldsmith's. This absorbed so much from Persian and Oriental schools as to become semi-barbaric. Under Justinian the transformation from Classical art was almost complete. Some few examples, like a silver dish from Cyprus in the British Museum, show refined restraint; on the other hand, the mosaic portraits of the emperor and Theodora show crowns and jewels of full Oriental style, and the descrip- tion of the splendid fittings of St Sophia read like an eastern tale. Goldsmith's work was executed on such a scale for the great church as to form parts of the architecture of the interior. The altar was wholly of gold, and its ciborium and the iconastasis were of silver. In the later palace-church, built by Basil the Macedonian, the previous metals were used to such an extent that it is clear, from the description, that the interior was intended to be, as far as possible, like a great jewelled shrine. Gold and silver, we are told, were spread over all the church, not only in the mosaics, but in plating and other applications. The enclosure of the bema, with its columns and entablatures, was of silver gilt, and set with gems and pearls.

The most splendid existing example of goldsmith's work on a large scale is the Pala d'Oro of St Mark's, Venice; an assemblage of many panels on which saints and angels are enamelled. The monastic church of St Catherine, Sinai, is entered through a pair of enamelled doors, and several doors inlaid with silver still exist. In these doors the ground was of gilt-bronze; but there is also record of silver doors in the imperial palace at Constantinople. The inlaid doors of St Paul Outside the Walls at Rome were executed in Constantinople by Stauricios, in 1070, and have Greek inscriptions. There are others at Salerno (c. 1080) , but the best known are those at St Mark's, Venice. In all these the imagery was delineated in silver on the gilt-bronze ground. The earliest works of this sort are still to be found in Constanti- nople. The panels of a door at St Sophia bear the monograms of Theophilus and Michael (840) . Two other doors in the narthex of the same church, having simpler ornamentation of inlaid silver, are probably as early as the time of Justinian.

The process of enamelling dates from late classical times and Venturi supposes that it was invented in Alexandria. The cloisonne process, characteristic of Byzantine enamels, is thought by Kondakov to be derived from Persia, and to its study he has devoted a splendid volume. One of the finest examples of this cloisonne is the reliquary at Limburg on which the enthroned Christ appears between St Mary and St John in the midst of the twelve apostles. An inscription tells that it was executed for the emperors Constantine and Romanus (948-959).

A reliquary lately added to the J. Pierpont Morgan collection at South Kensington is of the greatest beauty in regard to the colour and clearness of the enamel. The cover, which is only about 4! by 3 ins., has in the centre a crucifixion with St Mary and St John to the right and left, while around are busts of the apostles. Christ is vested in a tunic. The ground colour is the green of emerald, the rest mostly blue and white. The cloisons are of gold. Two other Byzantine enamels are in the permanent collection at the Victoria and Albert Museum: one is a cross with the crucifixion on a background of the same emerald enamel; the other is a small head of St Paul of remarkably fine workmanship.

Ivory-working was another characteristic Byzantine art, although, like so many others it had its origin in antiquity. One of the earliest ivories of the Byzantine type is the diptych at Monza, showing a princess and a boy, supposed to be Galla Placidia and Valentinian III. This already shows the broad, flattened treatment which seems to mark the ivory work of the East. The majestic archangel of the British Museum, one of the largest panels known, is probably of the 5th century, and almost certainly, as Strzygowski has shown, of Syrian origin. Design and execution are equally fine. The drawing of the body, and the modelling of the drapery, are accomplished and classical. Only the full front pose, the balanced disposition of the large wings, and the intense outlook of the face, give it the Byzantine type.

Ivory, like gold-work and enamel, was pressed into the adornment of architectural works. The ambo erected by Justinian at St Sophia was in part covered by ivory panels set into the marble. The best existing specimen of this kind of work is the celebrated ivory throne at Ravenna. This master- piece, which resembles a large, high-backed chair, is entirely covered with sculptured ivory, delicate carvings of scriptural subjects and ornament. It is of the 6th century and bears the monogram of Bishop Maximian. It is probably of Egyptian or Syrian origin.

So many fragments of ivories have been discovered in recent explorations in Egypt that it is most likely that Alexandria, a fit centre for receiving the material, was also its centre of dis- tribution. The weaving of patterned silks was known in Europe in the classical age, and they reached great development in the Byzantine era. A fragment, long ago figured by Semper, showing a classical design of a nereid on a sea-horse, is so like the designs found on many ivories discovered in Egypt that we may probably assign it to Alexandria. Such fabrics going back to the 3rd century have been found in Egypt which must have been one of the chief centres for the production of silk as for linen textiles. The Victoria and Albert Museum is particularly rich in early silks. One fine example, having rose-coloured stripes and repeated figures of Samson and the lion, must be of the great period of the 6th century. The description of St Sophia written at that time tells of the altar curtains that they bore woven images of Christ, St Peter and St Paul standing under tabernacles upon a crimson ground, their garments being en- riched with gold embroidery. Later the patterns became more barbaric and of great scale, lions trampled across the stuff, and in large circles were displayed eagles, griffins and the like in a fine heraldic style. From the origin of the raw material in China and India and the ease of transport, such figured stuffs gathered up and distributed patterns over both Europe and Asia. The Persian influence is marked. There is, for example, a pattern of a curious dragon having front feet and a peacock's tail. It appears on a silver Persian dish in the Hermitage Museum, it is found on the mixed Byzantine and Persian carvings of the palace of Mashita, and it occurs on several silks of which there are two varieties at the Victoria and Albert Museum, both of which are classed as Byzantine; it is difficult to say of many of these patterns whether they are Sassanian originals or Byzantine adaptations from them.

Authorities. — A very complete bibliography is given by H. Leclercq, Manuel d'archeologie chretienne (Paris, 1907). The current authorities for all that concerns Byzantine history or art are : —

BYZANTIUM

Byzantimsche Zettschnft . . . (Leipzig, 1892 seq.) ; Oriens Christianus (Rome, 1900 seq.). See also Dom R. P. Cabrol, Dictionnaire darcheologie chretienne, &c. (Paris, 1902 seq.). The best general introduction is:— C. Bayet, L' Art byzantin (Paris, 1883 new edition 1904). See J. Strzygowski, Orient oder Rom (Leipzig, 1901) and other works; Kondakov, Les JEmaux byz. (1892), and other works; L. Diehl, Jushmen et la civilis. byz. (Paris, 1901), and other works;

G. Millet, Le Monastere de Daphne, &c. (Paris, 1809) and other works; L. G. Schlumberger, L'£p pee byz. &c. (1896 sen.)- A. Michel Histoire del' art, vol. i. (Paris, 1905) ; H. Brockhaus, Die Kunstm den Athos-Klostern (Leipzig, 1891); E. Molinier, Histoire generate des arts, &c 1., Ivoires (Paris, 1896) ; O. Dalton, Catalogue 0} Early Christian AnHqmties . . . of the British Museum (iqoi)- A van Milhngen, Byzantine Constantinople (1899); Salzenbere' Altchristhche Baudenkmdler &c. (Berlin, 1854) ; A. Choisy L'Art de batir chez lesByzantins (Paris, 1875) ; Couchand, Zglises byzan- tmes en Grece; Ongania, Basilica di S. Marco; Texier and Pullan L Architecture b 7 3 (1864) ; Lethaby and Swainson, Sancta Sophia, Constantinople (1894); Schultz and Barnsley, The Monastery of St Luke, &c. (1890) ; L. de Beylie, L'Habitation byz. (Paris, 1903) tor Syria: M. de Vogue, V Architecture . . . dans la Syrie centrale (^ns 1866-1877); H> C – Butler, Architecture and other Arts, &c New York 1904). For Egypt: W. E. Crum, Coptic Monuments (Cairo, 1902); A. Gayet, L'Art Copte (Paris, 1902); A. J. Butler, Ancient Coptic Churches. For North Africa: S. Csell, Les Monu- ments antiques de VAlgerie (Paris, 1901). For Italy: A. Venturi Storia dell' arte Itahana (Milan, 1901); G. Rivoira, Le Origini della architettura Lombarda (Rome, 1901); C. Errard and A. Gayet, L'Art byzantin, &c. (Paris, 1903). (\y. r t

BYZANTIUM, an ancient Greek city on the shores of the Bosporus, occupying the most easterly of the seven hills on which modern Constantinople stands. It was said to have been founded by Megarians and Argives under Byzas about 657 B.C., but the original settlement having been destroyed in the reign of Darius Hystaspes by the satrap Otanes, it was recolonized by the Spartan Pausanias, who wrested it from the Medes after the battle of Plataea (479 B.C.)— a circumstance which led several ancient chroniclers to ascribe its foundation to him. Its situation, said to have been fixed by the Delphic oracle, was remarkable for beauty and security. It had complete control over the Euxine grain- trade; the absence of tides and the depth of its harbour rendered its quays accessible to vessels of large burden; while the tunny and other fisheries were so lucrative that the curved inlet near which it stood became known as the Golden Horn. The greatest hindrance to its prosperity was the miscellaneous character of the population, partly Lacedaemonian and partly Athenian, who flocked to it under Pausanias. It was thus a subject of dispute between these states, and was alternately in the possession of each, till it fell into the hands of the Mace- donians. From the same cause arose the violent intestine con- tests which ended in the establishment of a rude and turbulent democracy. About

seven years after its second colonization, the Athenian Cimon wrested it from the Lacedaemonians; but in 440 B.C. it returned to its former allegiance. Alcibiades, after a severe blockade (408 B.C.), gained possession of the city through the treachery of the Athenian party; in 405 B.C. it was retaken by Lysander and placed under a Spartan harmost. It was under the Lacedaemonian power when the Ten Thousand, exasperated by the conduct of the governor, made themselves masters of the city, and would have pillaged it had they not been dissuaded by the eloquence of Xenophon. In 390 B.C. Thrasybulus, with the assistance of Heracleides and Archebius, expelled the Lacedaemonian oligarchy, and restored democracy and the Athenian influence.

After having withstood an attempt under Epaminondas to restore it to the Lacedaemonians, Byzantium joined with Rhodes, Chios, Cos, and Mausolus, king of Caria, in throwing off the yoke of Athens, but soon after sought Athenian assistance when Philip of Macedon, having overrun Thrace, advanced against it. The Athenians under Chares suffered a severe defeat from Amyntas, the Macedonian admiral, but in the following year gained a decisive victory under Phocion and compelled Philip to raise the siege. The deliverance of the besieged from a surprise, by means of a flash of light which revealed the advanc- ing masses of the Macedonian army, has rendered this siege memorable. As a memorial of the miraculous interference, the Byzantines erected an altar to Torch-bearing Hecate, and stamped

a crescent on their coins, a device which is retained by the Turks to this day. They also granted the Athenians extraordinary privileges, and erected a monument in honour of the event in a public part of the city.

During the reign of Alexander Byzantium was compelled to acknowledge the Macedonian supremacy; after the decay of the Macedonian power it regained its independence, but suffered from the repeated incursions of the Scythians. The losses which they sustained by land roused the Byzantines to indemnify themselves on the vessels which still crowded the harbour and the merchantmen which cleared the straits; but this had the effect of provoking a war with the neighbouring naval powers. lhe exchequer being drained by the payment of 10,000 pieces of gold to buy off the Gauls who had invaded their territories about 279 b.c, and by the imposition of an annual tribute which was ultimately raised to 80 talents, they were

compelled to exact a toU on all the ships which passed the Bosporus — a measure which the Rhodians resented and avenged by a war wherein the Byzantines were defeated. After the retreat of the Gauls Byzantium rendered considerable services to Rome in the contests with Philip II., Antiochus and Mithradates.

During the first years of its alliance with Rome it held the rank of a free confederate city; but, having sought arbitration on some of its domestic disputes, it was subjected to the im- perial jurisdiction, and gradually stripped of its privileges, until reduced to the status of an ordinary Roman colony. In recollec- tion of its former services, the emperor Claudius remitted the heavy tribute which had been imposed on it; but the last remnant of its independence was taken away by Vespasian, who, in answer to a remonstrance from Apollonius of Tyana, taunted' the inhabitants with having " forgotten to be free." During the civil wars it espoused the party of Pescennius Niger; and though skilfully defended by the engineer Periscus, it was besieged and taken (a.d. 196) by Severus, who destroyed the city, demolished the famous wall, which was built of massive stones so closely riveted together as to appear one block, put the principal in- habitants to the sword and subjected the remainder to the Perinthians. This overthrow of Byzantium was a great loss to the empire, since it might have served as a protection against the Goths, who afterwards sailed past it into the Mediterranean. Severus afterwards relented, and, rebuilding a large portion of the town, gave it the name of Augusta Antonina. He ornamented the city with baths, and surrounded the hippodrome with porticos; but it was not till the time of Caracalla that it was restored to its former political privileges. It had scarcely begun to recover its former position when, through the capricious resentment of Gallienus, the inhabitants were once more put to the sword and the town was pillaged. From this disaster the inhabitants recovered so far as to be able to give an effectual check to an invasion of the Goths in the reign of Claudius II., and the fortifications were greatly strengthened during the civil wars which followed the abdication of Diocletian. Licinius, after his defeat before Adrianople, retired to Byzantium, where he was besieged by Constantine, and compelled to surrender (a.d. 323-324). To check the inroads of the barbarians on the north of the Black Sea, Diocletian had resolved to transfer his capital to Nicomedia; but Constantine, struck with the advan- tages which the situation of Byzantium presented, resolved to build a new city there on the site of the old and transfer the seat of government to it. The new capital was inaugurated with special ceremonies, a.d. 330. (See Constantinople.)

The ancient historians invariably note the profligacy of the inhabitants of Byzantium. They are described as an idle, depraved people, spending their time for the most part in loitering about the harbour, or carousing over the fine wine of Maronea. In war they trembled at the sound of a trumpet, in peace they quaked before the shouting of their own demagogues; and during the assault of Philip II. they could only be prevailed on to man the walls by the savour of extempore cook-shops distributed along the ramparts. The modern Greeks attribute the introduction of Christianity into Byzantium to St Andrew; it certainly had some hold there in the time of Severus.

*CThe third letter in the Latin alphabet and its descendants corresponds in position and in origin to the Greek Gamma (r, 7), which in its turn is borrowed from the third symbol of the Phoenician alphabet (Heb. Gimel). The earliest Semitic records give its form as *-J or more frequently X or A- Tne I0rm A is found in the earliest inscriptions of Crete, Attica, Naxos and some other of the Ionic islands. In Argolis and Euboea especially a form with legs of unequal length is found fi • From this it is easy to pass to the most widely spread Greek form, the ordinary f~. In Corinth, however, and its colony Corcyra, in Ozolian Locris and Elis, a form < inclined at a different angle is found. From this form the transition is simple to the rounded C, which is generally found in the same localities as the pointed form, but is more widely spread, occurring in Arcadia and on Chalcidian vases of the 6th century B.C., in Rhodes and Megara with their colonies in Sicily. In all these cases the sound represented was a hard G (as in gig). The rounded form was probably that taken over by the Romans and with the value of G. This is shown by the permanent abbreviation of the proper names Gaius and Gnaeus by C. and Cn. respectively. On the early inscription discovered in the Roman Forum in 1899 the letter occurs but once, in the form .) written from right to left. The broad lower end of the symbol is rather an accidental pit in the stone than an attempt at a diacritic mark — the word is regei, in all prob- ability the early dative form of rex, " king." It is hard to decide why Latin adopted the g-symbol with the value of k, a letter which it possessed originally but dropped, except in such stereo- typed abbreviations as K. for the proper name Kaeso and Kal. for Calendae. There are at least two possibilities: (1) that in Latium g and k were pronounced almost identically, as, e.g., in the German of Wiirttemberg or in the Celtic dialects, the difference consisting only in the greater energy with which the &-*

sound is produced; (2) that the confusion is graphic, K being sometimes written | C, which was then regarded as two separate symbols. A further peculiarity of the use of C in Latin is in the abbreviation for the district Subura in Roma and its adjective Suburanus, which appears as SVC. Here C no doubt represents G, but there is no interchange between g and b in Latin. In other dialects of Italy b is found representing an original voiced guttural (gw), which, however, is regularly replaced by v in Latin. As the district was full of traders, Subura may very well be an imported word, but the form with C must either go back to a period before the disappearance of g before v or must come from some other Italic dialect. The symbol G was a new coinage in the 3rd century B.C. The pronunciation of C throughout the period of classical Latin was that of an unvoiced guttural stop (k). In other dialects, however, it had been palatalized to a sibilant before j-sounds some time before the Christian era; e.g. in the Umbrian facia = Latin Jaciat. In Latin there is no evidence for the interchange of c with a sibilant earlier than the 6th century a.d. in south Italy and the 7th century a.d. in Gaul (Lindsay, Latin Language, p. 88). This change has, however, taken place in all Romance languages except Sardinian. In Anglo-Saxon c was adopted to represent the hard stop. After the Norman conquest many English words were re-spelt under Norman influence. Thus Norman-French spelt its palatalized e-sound (= tsh) with ch as in cher and the English palatalized did, &c. became child, &c. In Provencal from the 10th century, and in the northern dialects of France from the 13th century, this palatalized c (in different districts ts and tsh) became a simple 5. English also adopted the value of s for c in the 13th century before e, i and y. In some foreign words like cicala the ch- (tsh) value is given to c. In the transliteration of foreign languages also it receives different values, having that of tsh" in the trans- literation of Sanskrit and of ts in various Slavonic dialects.

As a numeral C denotes 100. This use is borrowed from Latin, in which the symbol was originally O , a form of the Greek 6.

This, like the numeral symbols later identified with L and M, was thus utilized since it was not required as a letter, there being no sound in Latin corresponding to the Greek 6. Popular etymology identified the symbol with the initial letter of centum, " hundred." (P. Gi.)

CAB (shortened about 1825 from the Fr. cabriolet, derived from cabriole, implying a bounding motion), a form of horsed vehicle for passengers either with two (" hansom ") or four wheels (" four-wheeler " or " growler "), introduced into London as the cabriolet de

place, from Paris in 1820 (see Carriage). Other vehicles plying for hire and driven by mechanical means are included in the definition of the word " cab " in the London Cab and Stage Carriage Act 1907. The term " cab " is also applied to the driver's or stoker's shelter on a locomotive-engine.

Cabs, or hackney carriages, as they are called in English acts of parliament, are regulated in the United Kingdom by a variety of statutes. In London the principal acts are the Hackney Carriage Acts of 1831-1853, the Metropolitan Public Carriages Act 1869, the London Cab Act 1896 and the London Cab and Stage Carriage Act 1907. In other large British towns cabs are usually regulated by private acts which incorporate the Town Police Clauses Act 1847, an act which contains provisions more or less similar to the London acts. The act of 1869 defined a hackney carriage as any carriage for the conveyance of passengers which plies for hire within the metropolitan police district and is not a stage coach, i.e. a conveyance in which the passengers are charged separate and distinct fares for their seats. Every cab must be licensed by a licence renewable every year by the home secretary, the licence being issued by the commissioner of police. Every cab before being licensed must be inspected at the police station of the district by the inspector of public carriages, and certified by him to be in a fit condition for public use. The licence costs £2. The number of persons which the cab is licensed to carry must be painted at the back on the outside. It must carry a lighted lamp during the period between one hour after sunset and one hour before sunrise. The cab must be under the charge of a driver having a licence from the home secretary. A driver before obtaining a licence, which costs five shillings per annum, must pass an examina- tion as to his ability to drive and as to his knowledge of the topography of London.

General regulations with regard to fares and hiring may be made from time to time by the home secretary under the London Cab and Stage Carriage Act 1907. The hiring is by distance or by time as the hirer may decide at the beginning of the hiring; if not otherwise expressed the fare is paid according to distance. If a driver is hired by distance he is not compelled to drive more than six miles, and if hired by time he is not compelled to drive for more than one hour. When a cab is hired in London by distance, and discharged within a circle the radius of which is four miles (the centre being taken at Charing Cross), the fare is one shilling for any distance not exceeding two miles, and sixpence for every additional mile or part of a mile. Outside the circle the fare for each mile, or part of a mile, is one shilling. When a cab is hired by time, the fare (inside or

outside the circle) is two shillings and sixpence for the first hour, and eightpence for every quarter of an hour afterwards. Extra payment has to be made for luggage (twopence per piece outside), for extra passengers (sixpence each for more than two), and for waiting (eightpence each completed quarter of an hour). If a horse cab is fitted with a taximeter (vide infra) the fare for a journey wholly within or partly without and partly within the four-mile radius, and not exceeding one mile or a period of ten minutes, is sixpence. For each half mile or six minutes an additional threepence is paid. If the journey is wholly without the four-mile radius the fare for the first mile is one shilling, and for each additional quarter of a mile or period of three minutes, threepence is paid. If the cab is one propelled by mechanical means the fare for a journey not

exceeding one mile or a period of ten minutes is eightpence, and for every additional quarter mile or period of 23 minutes twopence is paid. A driver required to wait may demand a reasonable sum as a deposit and also payment of the sum which he has already earned. The London Cab Act 1896 (by which for the first time legal sanction was given to the word " cab ") made an important change in the law in the interest of cab drivers. It renders liable to a penalty on summary conviction any person who (a) hires a cab knowing or having reason to believe that he cannot pay the lawful fare, or with intent to avoid payment; (b) fraudulently endeavours to avoid payment; (c) refuses to pay or refuses to give his address, or gives a false address with intent to deceive. The offences mentioned (generally known as " bilking ") may be punished by imprisonment without the option of a fine, and the whole or any part of the fine imposed may be applied in compensation to the driver.

Strictly speaking, it is an offence for a cab to ply for hire when not waiting on an authorized " standing," but cabs passing in the street for this purpose are not deemed to be " plying for hire." These stands for cabs are appointed by the commissioner of police or the home secretary. " Privileged cabs " is the designa- tion given to those cabs which by virtue of a contract between a railway company and a number of cab-owners are alone admitted to ply for hire within a company's station, until they are all engaged, on condition (1) of paying a certain weekly or annual sum, and (2) of guaranteeing to have cabs in attendance at all hours. This system was abolished by the act of 1907, but the home secretary was empowered to suspend

or modify the abolition if it should interfere with the proper accommodation of the public.

At one time there was much discussion in England as to the desirability of legalizing on cabs the use of a mechanical fare-recorder such as, under the name of taximeter or taxameter, is in general use on the continent of Europe. It is now universal on hackney carriages propelled by mechanical means, and it has also extended largely to those drawn by animal power. A taximeter consists of a securely closed and sealed metal box containing a mechanism actuated by a flexible shaft connected with the wheel of the vehicle, in the same manner as the speedo- meter on a motor car. It has, within plain view of the passenger, a number of apertures in which appear figures showing the amount payable at any time. A small lever, with a metal flag, bearing the words " for hire " stands upright upon it when the cab is disengaged. As soon as a passenger enters the cab the lever is depressed by the driver and the recording mechanism starts. At the end of the journey the figures upon the dials show exactly the sum payable for hire; this sum is based on a combination of time and distance.

CABAL (through the Fr. cabale from the Cabbala or Kabbalah, the theosophical interpretation of the Hebrew scriptures), a private organization or party engaged in secret intrigues, and applied also to the intrigues themselves. The word came into common usage in English during the reign of Charles II. to describe the committee of the privy council known as the " Committee for Foreign Affairs," which developed into the cabinet. The invidious meaning attached to the term was stereotyped by the coincidence that the initial letters of the names of the five ministers, Clifford, Arlington, Buckingham, Ashley and Lauderdale, who signed the treaty of alliance with France in 1673, spelled cabal.

CABALLERO, FERNAn (1796-1877), the pseudonym adopted from the name of a village in the province of Ciudad Real by the Spanish novelist Cecilia Francisca Josefa Bohl de Faber y Larrea. Born at Morges in Switzerland on the 24th of December 1796, she was the daughter of Johan Nikolas Bohl von Faber, a Hamburg merchant, who lived long in Spain, married a native of Cadiz, and is creditably known to students of Spanish literature as the editor of the Floresta de rimas antiguas castellanas (1821- 1825), and the Teatro espanol anterior a Lope de Vega (1832). Educated principally at Hamburg, she visited Spain in 1815, and, unfortunately for herself, in 1816 married Antonio Planells y Bardaxi, an infantry captain of bad character. In the following year Planells was killed in action, and in

married Francisco Ruiz del Arco, marques de Arco Hermoso, an officer in one of the Spanish household regiments. Upon the death of Arco Hermoso in 1835, the marquesa found herself in straitened circumstances, and in less than two years she married Antonio Arron de Ayala, a man considerably her junior. Arr6n was appointed consul in Australia, engaged in business enterprises and made money; but unfortunate speculations drove him to commit suicide in 1859. Ten years earlier the name of Fernan Caballero became famous in Spain as the author of La Gaviota. The writer had already published in German an anonymous romance, Sola (1840), and curiously enough the original draft of La Gaviota was written in French. This novel, translated into Spanish by Jose Joaquin de Mora, appeared as the feuilleton of El Ileraldo (1849), and was received with marked favour. Ochoa, a prominent critic of the day, ratified the popular judgment, and hopefully proclaimed the writer to be a rival of Scott. No other Spanish book of the 19th century has obtained such instant and universal recognition. It was translated into most European languages, and, though it scarcely seems to deserve the intense enthusiasm which it excited, it is the best of its author's works, with the possible exception of La Familia de Ahareda (which was written, first of all, in German). Less successful attempts are Lady Virginia and Clemencia; but the short stories entitled Cuadros de Costumbres are interesting in matter and form, and Una en otra and Elia 6 la Espana treinta anos ha are excellent specimens of picturesque narration. It would be difficult to maintain that Fernan Caballero was a great literary artist, but it is certain that she was a born teller of stories and that she has a graceful style very suitable to her purpose. She came into Spain at a most happy moment, before the new order had perceptibly disturbed the old, and she brought to bear not alone a fine natural gift of observation, but a fresh- ness of vision, undulled by long familiarity. She combined the advantages of being both a foreigner and a native. In later publications she insisted too emphatically upon the moral lesson, and lost much of her primitive simplicity and charm; but we may believeˆher statement that, though she occasionally idealized circumstances, she was conscientious in choosing for her themes subjects which had occurred in her own experience. Hence she may be regarded as a pioneer in the realistic field, and this historical fact adds to her positive importance. For many years she was the most popular of Spanish writers, and the sensation caused by her death at Seville on the 7th of April 1877 proved that her na'ive truthfulness still attracted readers who were interested in records of national

customs and manners.

Her Obras completas are included in the Coleccion de escritores castellanos: a useful biography by Fernando de Gabriel Ruiz de Apodaca precedes the Ultimas producciones de Fernan Caballero (Seville, 1878). (J. F.-K).

CABANEL, ALEXANDRE (1823-1889), French painter, was born at Montpellier, and studied in Paris, gaining the Prix de Rome in 1845. His pictures soon attracted attention, and by his " Birth of Venus " (1863), now in the Luxembourg, he became famous, being elected that year to the Institute. He became the most popular portrait painter of the day, and his pupils included a number of famous artists.

CABANIS, PIERRE JEAN GEORGE (1757-1808), French physiologist, was born at Cosnac (Correze) on the 5th of June 1757, and was the son of Jean Baptiste Cabanis (1723-1786), a lawyer and agronomist. Sent at the age of ten to the college of B rives, he showed great aptitude for study, but his inde- pendence of spirit was so excessive that he was almost constantly in a state of rebellion against his teachers, and was finally dismissed from the school. He was then taken to Paris by his father and left to carry on his studies at his own discretion for two years. From 1773 to 1775 he travelled in Poland and Germany, and on his return to Paris he devoted himself mainly to poetry. About this time he ventured to send in to, the Academy a translation of the passage from Homer proposed for their prize, and, though his attempt passed without notice, he received so much encouragement from his friends that he contemplated translating the whole of the Iliad. But at the

desire of his father he relinquished these pleasant literary employments, and resolving to engage in some settled profession selected that of medicine. In 1789 his Observations sur les hdpitaux procured him an appointment as administrator of hospitals in Paris, and in 1795 he became professor of hygiene at the medical school of Paris, a post which he exchanged for the chair of legal medicine and the history of medicine in 1799. From inclination and from weak health he never engaged much in practice as a physician, his interests lying in the deeper problems of medical and physiological science. During the last two years of Mirabeau's life he was intimately

connected with that extraordinary man, and wrote the four papers on public education which were found among the papers of Mirabeau at his death, and were edited by the real author soon afterwards in 1791. During the illness which terminated his life Mirabeau confided himself entirely to the professional skill of Cabanis. Of the progress of the malady, and the circumstances attending the death of Mirabeau, Cabanis drew up a detailed narrative, intended as a justification of his treatment of the case. Cabanis espoused with enthusiasm the cause of the Revolution. He was a member of the Council of Five Hundred and then of the Conservative senate, and the dissolution of the Directory was the result of a motion .which he made to that effect. But his political career was not of long continuance. A foe to tyranny in every shape, he was decidedly hostile to the policy of Bona- parte, and constantly rejected every solicitation to accept a place under his government. He died at Meulan on the 5th of May 1808.

A complete edition of Cabanis's works was begun in 1825, and five volumes were published. His principal work, Rapports du physique et du moral de I'homme, consists in part of memoirs, read in 1796 and 1797 to the Institute, and is a sketch of physiological psychology. Psychology is with Cabanis directly linked on to biology, for sensibility, the fundamental fact, is the highest grade of life and the lowest of intelligence. All the intellectual processes are evolved from sensibility, and sensibility itself is a property of the nervous system. The soul is not an entity, but a faculty; thought is the function of the brain. Just as the stomach and intestines receive food and digest it, so the brain receives impressions, digests them, and has as its organic secretion, thought. Alongside of this harsh materialism Cabanis held another principle. He belonged in biology to the vitalistic school of G. E. Stahl, and in the posthumous work, Lettre sur les causes premieres (1824), the consequences of this opinion became clear. Life is something added to the organism ; over and above the universally diffused sensibility there is some living and productive power to which we give the name of Nature. But it is impossible to avoid ascribing to this power both intelligence and will. In us this living power constitutes the ego, which is truly immaterial and immortal. These results Cabanis did not think out of harmony with his earlier theory.

CABARRUS, FRANCOIS (1752-1810), French adventurer and Spanish financier, was born at Bayonne, where his father was a merchant. Being sent into Spain on business he fell in love with a Spanish lady, and marrying her, settled in Madrid. Here his private business was the manufacture of soap; but he soon began to interest

himself in the public questions which were ventilated even at the court of Spain. The enlightenment of the 1 8th century had penetrated as far as Madrid; the king, Charles III., was favourable to reform; and a circle of men animated by the new spirit were trying to infuse fresh vigour into an enfeebled state. Among these Cabarrus became con- spicuous, especially in finance. He originated a bank, and a company to trade with the Philippine Islands; and as one of the council of finance he had planned many reforms in that department of the administration, when Charles III. died (1788), and the reactionary government of Charles IV. arrested every kind of enlightened progress. The men who had taken an active part in reform were suspected and prosecuted. Cabarrus himself was accused of embezzlement and thrown into prison. After a confinement of two years he was released, created a count and employed in many honourable missions; he would even have been sent to Paris as Spanish ambassador, had not the Directory objected to him as being of French birth. Cabarrus took no part in the transactions by which Charles IV. was obliged to abdicate and make way for Joseph, brother of Napoleon, but his French birth and intimate knowledge of Spanish affairs

recommended him to the emperor as the fittest person for the difficult post of minister of finance, which he held at his death. His beautiful daughter Therese, under the name of Madame Tallien (afterwards princess of Chimay), played an interesting part in the later stages of the French Revolution.

CABASILAS, NICOLAUS (d. 1371), Byzantine mystic and theological writer. He was on intimate terms with the emperor John VI. Cantacuzene, whom he accompanied in his retirement to a monastery. In 1355 he succeeded his uncle Nilus Cabasilas, like himself a determined opponent of the union of the Greek and Latin churches, as archbishop of Thessalonica. In the Hesyfchast controversy he took the side of the monks of Athos, but refused to agree to the theory of the uncreated light. His chief work is his Hepi ttjs h> Xpicrro) f corjs (ed. pr. of the Greek text, with copious introduction, by W. Gass, 1849; new ed. by M. Heinze, 1899), in which he lays down the principle that union with Christ is effected by the three great mysteries of baptism, confirmation and the eucharist. He also wrote homilies on various subjects, and a speech againt usurers, printed with other works in Migne, Patrologia Graeca, c. i. A large number of his works is still extant in MS.

See C. Krumbacher, Geschichte der byzantinischen Litteratur (1897), and article in Herzog-Hauck, Realencyklopddie fur protestantische Theologie (1901).

CABATUAN, a town of the province of Iloilo, Panay, Philippine Islands, on a branch of the Suague river, 15 m. N.W. of Iloilo, the capital. Pop. (1903) 16,497. In I 9°3, after the census had been taken, the neighbouring town of Maasin, with a population of 8401, was annexed to Cabatuan. Its climate is healthful. The surrounding country is very fertile and produces large quantities of rice, as well as Indian corn, tobacco, sugar, coffee and a great variety of fruits. The language is Visayan. Cabatuan was founded in 1732.

CABBAGE. The parent form of the variety of culinary and fodder vegetables included under this head is generally supposed to be the wild or sea cabbage (Brassica oleracea), a plant found near the sea coast of various parts of England and continental Europe, although Alphonse de Candolle considered it to be really descended from the two or three allied species which are yet found growing wild on the Mediterranean coast. In any case the cultivated varieties have departed very widely from the original type, and they present very marked and striking dis- similarities among themselves. The wild cabbage is a compara- tively insignificant plant, growing from 1 to 2 ft. high, in appearance very similar to the corn mustard or charlock (Sinapis arvensis), but differing from it in having smooth leaves. The wild plant has fleshy, shining, waved and lobed leaves (the uppermost being undivided but toothed), large yellow flowers, elongated seed-pod, and seeds with conduplicate cotyledons. Notwithstanding the fact that the cultivated forms differ in habit so widely, it is remarkable that the flower, seed-pods and seeds of the varieties present no appreciable difference.

John Lindley proposed the following classification for the various forms, which includes all yet cultivated: (1) All the leaf-buds active and open, as in wild cabbage and kale or greens; (2) All the leaf - buds active, but forming heads, as in Brussels sprouts; (3) Terminal leaf-bud alone active, forming a head, as in common cabbage, savoys, &c; (4) Terminal leaf-bud alone active and open, with most of the flowers abortive and succulent, as in cauliflower and broccoli; (5) All the leaf-buds active and open, with most of the flowers abortive and succulent, as in sprouting broccoli. The last variety bears the same relation to common broccoli as Brussels sprouts do to the common cabbage. Of all these forms there are numerous gardeners' varieties, all of which reproduce faithfully enough their

parent form by proper and separate cultivation.

Under Lindley's first class, common or Scotch kale or borecole (Brassica oleracea var. acephala or var . fimbriata) includes several varieties which are amongst the hardiest of our esculents, and seldom fail to yield a good supply of winter greens. They require well-enriched soil, and sufficient space for full exposure to air; and they should also be sown early, so as to be well

established and hardened before winter. The main crops should be sown about the first week of April, or, in the north, in the third week of March, and a succession a month later. The Buda kale is sown in May, and planted out in September, but a sowing for late spring use may be made in the last week of August and transplanted towards the end of September. To prevent over- crowding, the plants should be transplanted as soon as they are of sufficient size, but if the ground is not ready to receive them a sufficient number should be pricked out in some open spot. In general the more vigorous sorts should be planted in rows 3 ft. and the smaller growers 2 ft. apart, and 18 in. from plant to plant. In these the heads should be first used, only so much of the heart as is fresh and tender being cut out for boiling; side shoots or sprouts are afterwards produced for a long time in succession, and may be used so long as they are tender enough to admit of being gathered by snapping their stalks asunder.

The plant sends up a stout central stem, growing upright to a height of about 2 ft., with close-set, large thick, plain leaves of a light red or purplish 1-iue. The lower leaves are stripped off for use as the plants grow up, and used for the preparation of broth or " Scotch kail," a dish at one time in great repute in the north-eastern districts of Scotland. A very remarkable variety of open-leaved cabbage is cultivated in the Channel Islands under the name of the Jersey or branching cabbage. It grows to a height of 8 ft., but has been known to attain double that altitude. It throws out branches from the central stem, which is sufficiently firm and woody to be fashioned into walking-sticks; and the stems are even used by the islanders as rafters for bearing the thatch on their cottage-roofs. Several varieties are cultivated as ornamental plants on account of their beautifully coloured, frizzled and laciniated leaves.

Brussels sprouts {Brassica oleracea var. bullata gemmifera) are

miniature cabbage-heads, about an inch in diameter, which form in the axils of the leaves. There appears to be no information as to the plant's origin, but, according to Van Mons (1765-1842), physician and chemist, it is mentioned in the year 1213, in the regulations for holding the markets of Belgium, under the name of spruylen (sprouts). It is very hardy and productive, and is much esteemed for the table on account of its flavour and its sightly appearance. The seed should be sown about the middle of March, and again in the first or second week in April for succession. Any good garden soil is suitable. For an early crop it may be sown in a warm pit in February, pricked out and hardened in frames, and planted out in a warm situation in April. The main crop may be planted in rows 2 ft. asunder, the plants 18 in. apart. They should be got out early, so as to be well established and come into use before winter. The head may be cut and used after the best of the little rosettes which feather the stem have been gathered; but, if cut too early, it exposes these rosettes, which are the most delicate portion of the produce, to injury, if the weather be severe. The earliest sprouts become fit for use in November, and they continue good, or even improve in quality, till the month of March following; by successive sowings the sprouts are obtained for the greater part of the year.

The third class is chiefly represented by the common or drum- head cabbage, Brassica oleracea var. capitata, the varieties of which are distinguished by difference in size, form and colour. In Germany it is converted into a popular article of diet under the name of Sauerkraut by placing in a tub alternate layers of salt and cabbage. An acid fermentation sets in, which after a few days is complete, when the vessel is tightly covered over and the product kept for use with animal food.

The savoy is a hardy green variety, characterized by its very wrinkled leaves. The Portugal cabbage, or Couve Tronchuda, is a variety, the tops of which form an excellent cabbage, while the midribs of the large leaves are cooked like sea-kale.

Cabbages contain a very small percentage of nitrogenous compounds as compared with most other articles of food. Their percentage composition, when cooked, is — water, 97-4; fat, o-i; carbohydrate, 0-4; mineral matter, o-i; cellulose, 1-3; nitro- genous matter (only about half being proteid), o-6. Their food-

value, apart from their anti-scorbutic properties, is therefore practically nil.

The cabbage requires a well-manured and well-wrought loamy soil. It should have abundant water in summer, liquid manure being specially beneficial. Round London, where it is grown in perfection, the ground for it is dug to the depth of two spades or spits, the lower portion being brought up to the action of the weather, and rendered available as food for the plants; while the top-soil, containing the eggs and larvae of many insects, being deeply buried, the plants are less liable to be attacked by the club disease. Farm-yard manure is that most suitable for the cabbage, but artificial manures such as guano, superphosphate of lime or gypsum, together with lime-rubbish, wood-ashes and marl, may, if required, be applied with advantage.

The first sowing of cabbage should be made about the beginning of March; this will be ready for use in July and August, following the autumn-sown crops. Another sowing should be made in the last week of March or first week pf April, and will afford a supply from August till November; and a further crop may be made in May to supply young-hearted cabbages in the early part of winter. The autumn sowing, which is the most important, and affords the supply for spring and early summer use, should be made about the last week in August, in warm localities in the south, and about a fortnight earlier in the north; or, to meet fluctuations of climate, it is as well in both cases to anticipate this sowing by another two or three weeks earlier, planting out a portion from each, but the larger number from that sowing which promises best to stand without running to seed.

The cabbages grown late in autumn and in the beginning of winter are denominated coleworts (vulg. collards) , from a kindred vegetable no longer cultivated. Two sowings are made, in the middle of June and in July, and the seedlings are planted a foot or 15 in. asunder, the rows being 8 or 10 in. apart The sorts employed are the Rosette and the Hardy Green.

About London the large sorts, as Enfield Market, are planted for spring cabbages 2 ft. apart each way; but a plant from an earlier sowing is dibbled in between every two in the rows, and an intermediate row a foot apart is put in between the permanent rows, these extra plants being drawn as coleworts in the course of the winter. The smaller sorts of cabbage may be planted 12 in. apart, with 12 or 15 in. between the rows. The large sorts should be planted 2 ft. apart, with 25 ft, between the rows. The only culture required is to stir the surface with the hoe to destroy the weeds, and to draw up the soil round the stems.

The red cabbage, Brassica oleracea var. capitata rubra, of which the Red Dutch is the most commonly grown, is much used for pickling. It is sown about the end of July, and again in March or April. The Dwarf Red and Utrecht Red are smaller sorts. The culture is in every respect the same as in the other sorts, but the plants have to stand until they form hard close hearts.

Cauliflower, which is the chief representative of class 4, consists of the inflorescence of the plant modified so as to form a com- pact succulent white mass or head. The cauliflower (Brassica oleracea var. botrytis cauliflora) is said by our old authors to have been introduced from Cyprus, where, as well as on the Mediter- ranean coasts, it appears to have been cultivated for ages. It is one of the most delicately flavoured of vegetables, the dense cluster formed by its incipient succulent flower-buds being the edible portion.

The sowing for the first or spring crop, to be in use in May and June, should be made from the 15th to the((2 5th of August for England, and from the 1st to the 15th of August for Scotland. In the neighbourhood of London the growers adhere as nearly as possible to the 21st day. A sowing to produce heads in July and August takes place in February on a slight hotbed. A lata spring sowing to produce cauliflowers in September or Octobei or later, should be made early in April and another about the 20th of May.

The cauliflower succeeds best in a rich soil and sheltered position; but, to protect the young plants in winter, they are sometimes pricked out in a warm situation at the foot of a south

wall, and in severe weather covered with hoops and mats. A better method is to plant them thickly under a garden frame, securing them from cold by coverings and giving air in mild weather. For a very early supply, a few scores of plants may be potted and kept under glass during winter and planted out in spring, defended with a hand-glass. Sometimes patches of three or four plants on a south border are sheltered by hand-glasses throughout the winter. It is advantageous to prick out the spring-sown plants into some sheltered place before they are finally transplanted in May. The later crop, the transplanting of which may take place at various times, is treated like early cabbages. After planting, all that is necessary is to hoe the ground and draw up the soil about the stems.

It is found that cauliflowers ready for use in October may be kept in perfection over winter. For this purpose they are lifted carefully with the spade, keeping a ball of earth attached to the roots. Some of the large outside leaves are removed, and any points of leaves that immediately overhang the flower are cut off. They are then placed either in pots or in garden frames, the plants being arranged close together, but without touching. In mild dry weather the glass frames are drawn off, but they are kept on during rainstorms, ventilation being afforded by slightly tilting the frames, and in severe frost they are thickly covered with mats.

Broccoli is merely a variety of cauliflower, differing from the other in the form and colour of its inflorescence and its hardiness. The broccoli (Brassica oleracea var. botrytis asparagoides) succeeds best in loamy soil, somewhat firm in texture. For the autumn broccolis the ground can scarcely be too rich, but the winter and spring sorts on ground of this character are apt to become so succulent and tender that the plants suffer from frost even in sheltered situations, while plants less stimulated by manure and growing in the open field may be nearly all saved, even in severe winters. The main crops of the early sorts for use in autumn should be sown early in May, and planted out while young to prevent them coming too early into flower; in the north they may be sown a fortnight earlier. The later sorts for use during winter and spring should be sown about the middle or end of May, or about ten days earlier in the north. The seed- beds should be made in fresh light soil; and if the season be dry the ground should be well watered before sowing. If the young plants are crowding each other they should be thinned. The ground should not be dug before planting them out, as the firmer it is the better; but a shallow drill may be drawn to mark the lines. The larger-growing sorts may be put in rows 3 ft. apart, and the plants about 23 ft. apart in the rows, and the smaller- growing ones at from 2 to 2§ ft. between, and i| to 2 ft. in the rows. If the ground is not prepared when young plants are ready for removal, they should be transferred to nursery beds and planted at 3 to 4 in. apart, but the earlier they can be got into their permanent places the better.

It is of course the young flower-heads of the plant which are eaten. When these form, they should be shielded from the light by bending or breaking down an inner leaf or two. In some of the sorts the leaves naturally curve over the heads. To prevent injury to the heads by frost in severe winters, the plants should be laid in with their heads sloping towards the north, the soil being thrown back so as to cover their stems; or they may be taken up and laid in closely in deep trenches, so that none of the lower bare portion of the stem may be

exposed. Some dry fern may also be laid over the tops. The spring varieties are extremely valuable, as they come at a season when the finer vegetables are scarce. They afford a supply from December to May inclusive.

Broccoli sprouts, the representative of the fifth class, are a form of recent introduction, and consist of flowering sprouts springing from the axils of the leaves. The purple-leaved variety is a very hardy and much-esteemed vegetable.

Kohl-rabi (Brassica oleracea var. caulo-rapa) is a peculiarvariety of cabbage in which the stem, just above ground, swells into a fleshy turnip-like mass. It is much cultivated in certain districts as a food for stock, for which purpose the drumhead cabbage and the thousand-headed kale are also largely used. Kohl-rabi is

exceedingly hardy, withstanding both severe frosts and drought. It is not much grown in English gardens, though when used young it forms a good substitute for turnips. The seeds should be sown in May and June, and the seedlings should be planted shallowly in well-manured ground, 8 or 10 in. apart, in rows 15 in. asunder; and they should be well watered, so as to induce quick growth.

The varieties of cabbage, like other fresh vegetables, are possessed of anti-scorbutic properties; but unless eaten when very fresh and tender they are difficult of digestion, and have a very decided tendency to produce flatulence.

Although the varieties reproduce by seed with remarkable constancy, occasional departures from the types occur, more especially among the varieties of spring cabbages, cauliflowers and broccoli. The departures, known technically as " rogues," are not as a rule sufficiently numerous to materially affect crops grown for domestic purposes. Rogues appearing among the stocks of seed-growers, however, if allowed to remain, very materially affect the character of particular stocks by the dissemination of strange pollen and by the admixture of their seed. Great care is exercised by seed-growers, with reputations to maintain, to eliminate these from among their stock-plants before the flowering period is reached.

Several species of palm, from the fact of yielding large sapid central buds which are cooked as vegetables, are known as cabbage- palms. The principal of these is Areca oleracea, but other species, such as the coco-palm, the royal palm (Oreodoxa regia), Arenga saccharifera and others yield similar edible leaf -buds.

CABEIRI, in Greek mythology, a group of minor deities, of whose character and worship nothing certain is known. Their chief seats of worship were the islands of Lemnos, Imbros and Samothrace, the coast of Troas, Thessalia and Boeotia. The name appears to be of Phoenician origin, signifying the " great " gods, and the Cabeiri seem to have been deities of the sea who protected sailors and navigation, as such often identified with the Dioscuri, the symbol of their presence being St Elmo's fire. Originally the Cabeiri were two in number, an older identified with Hephaestus (or Dionysus), and a younger identified with Hermes, who in the Samothracian mysteries was called Cadmilus or Casmilus. Their cult at an early date was united with that of Demeter and Kore, with the result that two pairs of Cabeiri appeared, Hephaestus and Demeter, and Cadmilus and Kore. According to Mnaseas 1 (quoted by the scholiast on Apollonius Rhodius i. 917) they were four in number: — Axieros, Axiokersa, Axiokersos, Casmilus. It is there stated that Axieros is Demeter; Axiokersa, Persephone ; Axiokersos, Hades ; and Casmilus , Hermes. The substitution of Hades for Hephaestus is due to the fact that Hades was regarded as the husband of Persephone. Cabeiro, who is mentioned in the logographers Acusilaus and Pherecydes as the wife of Hephaestus, is identical with Demeter, who indeed is expressly called Ka/Jeipia in Thebes. Roman antiquarians identified the Cabeiri with the three Capitoline deities or with the Penates. In Lemnos an annual festival of the Cabeiri was held, lasting nine days, during which all the fires were extin- guished and fire brought from Delos. From this fact and from the statement of Strabo x. p. 473, that the father of the Cabeiri was Camillus, a son of Hephaestus, the Cabeiri have been thought to be, like the Corybantes, Curetes and Dactyli, demons of volcanic fire. But this view is not now generally held. In Lemnos they fostered the vine and fruits of the field, and from their connexion with Hermes in Samothrace it would also seem that they promoted the fruitfulness of cattle.

By far the most important seat of their worship was Samo- thrace. Here, as early as the 5th century b. c, their mysteries, possibly under Athenian influence, attracted great attention, and initiation was looked upon as a general safeguard against all misfortune. But it was in the period after the death of Alex- ander the Great that their cult reached its height. Demetrius Poliorcetes, Lysimachus and Arsinoe regarded the Cabeiri with especial favour, and initiation was sought, not only by large numbers of pilgrims, but by persons of distinction. Initiation included also an asylum or refuge within the strong walls of Samothrace, for which purpose it was used among others by Arsinoe, who, to show her gratitude, afterwards caused a monu-

ment to be erected there, the ruins of which were explored in

1 A grammarian of Patrae in Achaea (or Patara in Lycia), pupil of Eratosthenes (275-195 B.C.), and author of a periplus and a collection of Delphic oracles.

1874 by an Austrian archaeological expedition. In 1888 interesting details as to the Boeotian cult of the Cabeiri were obtained by the excavations of their temple in the neighbourhood of Thebes, conducted by the German archaeological institute. The two male deities worshipped were Cabeiros and a boy: the Cabeiros resembles Dionysus, being represented on vases as lying on a couch, his head surrounded with a garland of ivy, a drinking cup in his right hand; and accompanied by maenads and satyrs. The boy is probably his cup-bearer. The Cabeiri were held in even greater esteem by the Romans, who regarded themselves as descendants of the Trojans, whose ancestor Dardanus (himself identified in heroic legend with one of the Cabeiri) came from Samothrace. The identification of the three Capitoline deities with the Penates, and of these with the Cabeiri, tended to increase this feeling.

See C. A. Lobeck, Aglaophamus (1829) ; F. G. Welcker, Die Aeschylische Trilogie und die Kabirenweihe zu Lemnos (1824); J. P. Rossignol, Les Metaux dans I'antiquite (1863), discussing the gods of Samothrace (the Dactyli, the Cabeiri, the Corybantes, the Curetes, and the Telchines) as workers in metal, and the religious origin of metallurgy; O. Rubensohn, Die Mysterienheiligtiimer in Eleusis und Samothrake (1892); W. H. Roscher, Lexikon der Mythologie (s.v. " Megaloi Theoi ") ; L. Pieller, Griechische Mythologie (4th ed., appendix) ; and the article by F. Lenormant in Daremberg and Saglio, Dictionnaire des Antiquites.

CABER TOSSING (Gaelic cabar, a pole or beam), a Scottish athletic exercise which consists in throwing a section of a trunk of a tree, called the " caber," in such a manner that it shall turn over in the air and fall on the ground with its small end pointing in the direction directly opposite to the " tosser." Tossing the caber is usually considered to be a distinctly Scottish sport, although " casting the bar," an exercise evidently similar in character, was popular in England in the 16th century but afterwards died out. The caber is the heavy trunk of a tree from 16 to 20 ft. long. It is often brought upon

the field heavier than can be thrown and then cut to suit the contestants, although sometimes cabers of different sizes are kept, each contestant taking his choice. The toss is made after a run, the caber being set up perpendicularly with the heavy end up by assistants on the spot indicated by the tosser, who sets one foot against it, grasps it with both hands, and, as soon as he feels it properly balanced, gives the word to the assistants to let go their hold. He then raises the caber and gets both hands underneath the lower end. " A practised hand, having freed the caber from the ground, and got his hands underneath the end, raises it till the lower end is nearly on a level with his elbows, then advances for several yards, gradually increasing his speed till he is some- times at a smart run before he gives the toss. Just before doing this he allows the caber to leave his shoulder, and as the heavy top end begins to fall forward, he throws the end he has in his hands upwards with all his strength, and, if successful, after the heavy end strikes the ground the small end continues its upward motion till perpendicular, when it falls forward, and the caber lies in a straight line with the tosser" (W. M. Smith). The winner is he who tosses with the best and easiest style, according to old Highland traditions, and whose caber falls straightest in a direct line from him. In America a style called the Scottish- American prevails at Caledonian games. In this the object is distance alone, the same caber being used by all contestants and the toss being measured from the tosser's foot to the spot where the small end strikes the ground. This style is repudiated in Scotland. Donald Dinnie, born in 1837 and still a champion in 1890, was the best tosser of modern times.

See W. M. Smith, Athletics and Athletic Sports in Scotland (Edinburgh, 1891).

CABET, ETIENNE (1788-1856), French communist, was born at Dijon in 1 788, the son of a cooper. He chose the profession of advocate, without succeeding in it, but ere long became notable as the persevering apostle of republicanism and com- munism. He assisted in a secondary way in the revolution of 1830, and obtained the appointment of procureur-geniral in Corsica under the government of Louis Philippe; but was dismissed for his attack upon the conservatism of the govern- ment, in his Histoire de la revolution de 1830. Elected, notwith-

standing, to the chamber of deputies, he was prosecuted for his bitter criticism of the government, and obliged to go into exile in England in 1834, where he became an ardent disciple of Robert Owen. On the amnesty of 1839 he returned to France, and attracted some notice by

the publication of a badly written and fiercely democratic history of the Revolution of 1 789 (4 vols., 1840), and of a social romance, Voyage en Icarie, in which he set forth his peculiar views. These works met with some success among the radical working-men of Paris. Like Owen, he sought to realize his ideas in practice, and, pressed as well by his friends, he made arrangements for an experiment in communism on American soil. By negotiations in England favoured by Owen, he purchased a considerable tract of land on the Red river, Texas, and drew up an elaborate scheme for the intending colony, community of property being the distinctive principle of the society. Accordingly in 1848 an expedition of 1500 "Icarians" sailed to America; but unexpected difficulties arose and the complaints of the disenchanted settlers soon reached Europe. Cabet, who had remained in France, had more than one judicial investigation to undergo in consequence, but was honourably acquitted. In 1849 he went out in person to America, but on his arrival, finding that the Mormons had been expelled from their city Nauvoo (q.v.), in Illinois, he transferred his settlement thither. There, with the exception of a journey- to France, where he returned to defend himself successfully before the tribunals, he remained, the dictator of his little society. In 1856, however, he withdrew and died the same year at St Louis.

See Communism. Also Felix Bonnaud, Cabet et son ceuvre, appel a tous les socialistes (Paris, 1900); J. Prudhommeaux, Icaria and its Founder, Ittienne Cabet (Nimes, 1907).

CABIN, a small, roughly built hut or shelter; the term is particularly applied to the thatched mud cottages of the negro slaves of the southern states of the Unites States of America, or of the poverty-stricken peasantry of Ireland or the crofter districts of Scotland. In a special sense it is used of the small rooms or compartments on board a vessel used for sleeping, eating or other accommodation. The word in its earlier English forms was cabane or caban, and thus seems to be an adaptation of the French cabane; the French have taken cabine, for the room on board a ship, from the English. In French and other Romanic languages, in which the word occurs, e.g. Spanish cabana, Portuguese cabana, the origin is usually found in the Medieval Latin capanna. Isidore of Seville {Origines, lib. xiv. 12) says: — Tugurium (hut) parva casula est, quam jaciunt sibi custodes vinearum, ad tegimen seu quasi tegurium. Hoc rustici Capannam vocant, quod unum tantum capiat (see Du Cange, Glossarium, s.v. Capanna). Others derive from Greek kwkt\, crib, manger. Skeat considers the English word was taken from the Welsh caban, rather than from the French, and that the original source for all the forms

was Celtic.

CABINET, a word with various applications which may be traced to two principal meanings, (1) a small private chamber, and (2) an article of furniture containing compartments formed of drawers, shelves, &c. The word is a diminutive of " cabin " and therefore properly means a small hut or shelter. This meaning is now obsolete; the New English Dictionary quotes from Leonard Digges's Stratioticos (published with additions by his son Thomas in 1579), " the Lance Knights encamp always in the field very strongly, two or three to a Cabbonet." From the use both of the article of furniture and of a small chamber for the safe-keeping of a collection of valuable prints, pictures, medals or other objects, the word is frequently applied to such a collec- tion or to objects fit for such safe-keeping. The name of Cabinet du Roi was given to the collection of prints prepared by the best artists of the 1 7th century by order of Louis XIV. These were intended to commemorate the chief events of his reign, and also to reproduce the paintings and sculptures and other art treasures contained in the royal palaces. It was begun in 1667 and was placed under the superintendence of Nicholas Clement (1647 or 1651-1712), the royal librarian. The collection was published in 1727. The plates are now in the Louvre. A " cabinet " edition

of a literary work is one of somewhat small size, and bound in such a way as would suit a tasteful collection. The term is applied also to a size of photograph of a larger size than the carte de visile but smaller than the " panel." The political use of the term is derived from the private chamber of the sovereign or head of a state in which his advisers met.

Cabinet in Furniture. — The artificer who constructs furniture is still called a " cabinet-maker," although the manufacture of cabinets, properly so called, is now a very occasional part of his work. Cabinets can be divided into a very large number of classes according to their shape, style, period and country of origin; but their usual characteristic is that they are supported upon a stand, and that they contain a series of drawers and pigeon-holes. The name is, however, now given to many pieces of furniture for the safe-keeping or exhibition of valuable objects, which really answer very little to the old conception of a cabinet. The cabinet represented an evolution brought about by the necessities of convenience, and it

appealed to so many tastes and needs that it rapidly became universal in the houses of the gentle classes, and in great measure took the impress of the peoples who adopted it. It would appear to have originated in Italy, probably at the very beginning of the 16th century. In its rudimentary form it was little more than an oblong box, with or without feet, small enough to stand upon a table or chair, filled with drawers and closed with doors. In this early form its restricted dimensions permitted of its use only for the safeguard of jewels, precious stones and some- times money. One of the earliest cabinets of which we have mention belonged to Francis I. of France, and is described as covered with gilt leather, tooled with mauresque work. As the Renaissance became general these early forms gave place to larger, more elaborate and more architectural efforts, until the cabinet became one of the most sumptuous of household adornments. It was natural that the countries which were earliest and most deeply touched by the Renaissance should excel in the designing of these noble and costly pieces of furniture. The cabinets of Italy, France and the Netherlands were especially rich and monumental. Those of Italy and Flanders are often of great magnificence and of real artistic skill, though like all other furniture their style was often grievously debased, and their details incongruous and bizarre. Flanders and Burgundy were, indeed, their lands of adoption, and Antwerp added to its renown as a metropolis of art by developing consummate skill in their manufacture and adorn- ment. The cost and importance of the finer types have ensured the preservation of innumerable examples of all but the very earliest periods; and the student never ceases to be impressed by the extraordinary variety of the work of the 16th and 17th centuries, and very often of the 18th also. The basis of the cabinet has always been wood, carved, polished or inlaid; but lavish use has been made of ivory, tortoise-shell, and those cut and polished precious stones which the Italians call pietra dura. In the great Flemish period of the 1 7th century the doorsand drawers of cabinets were often painted with classical or mythological scenes. Many French and Florentine cabinets were also painted. In many classes the drawers and pigeon-holes are enclosed by folding doors, carved or inlaid, and often painted on the inner sides. Perhaps the most favourite type during a great part of the 16th and 17th centuries — a type which grew so common that it became cosmopolitan — was characterized by a conceit which acquired astonishing popularity. When the folding doors are opened there is disclosed in the centre of the cabinet a tiny but palatial interior. Floored with alternate squares of ebony and ivory to imitate a black and white marble pavement, adorned with Corinthian columns or pilasters, and surrounded by mirrors, the

effect, if occasionally affected and artificial, is quite as often exquisite. Although cabinets have been produced in England in considerable variety, and sometimes of very elegant and graceful form, the foreign makers on the whole produced the most elaborate and monumental examples. As we have said, Italy and the Netherlands acquired especial distinction in this kind of work. In France, which has always enjoyed a peculiar genius for assimilating modes in furniture, Flemish cabinets were so greatly in demand that Henry IV. determined to establish the industry in his own

dominions. He therefore sent French workmen to the Low Countries to acquire the art of making cabinets, and especially those which were largely constructed of ebony and ivory. Among these workmen were Jean Mace and Pierre Boulle, a member of a family which was destined to acquire something approaching immortality. Many of the Flemish cabinets so called, which were in such high favour in France and also in England, were really armoires consisting of two bodies superimposed, whereas the cabinet proper does not reach to the floor. Pillared and fluted, with panelled sides, and front elaborately carved with masks and human figures, these pieces which were most often in oak were exceedingly harmonious and balanced. Long before this, how- ever, France had its own school of makers of cabinets, and some of their carved work was of the most admirable character. At a somewhat later date Andre Charles Boulle made many pieces to which the name of cabinet has been more or less loosely given. They were usually of massive proportions and of extreme elaboration of marquetry. The North Italian cabinets, and especially those which were made or influenced by the Florentine school, were grandiose and often gloomy. Conceived on a palatial scale, painted or carved, or incrusted with marble and pietra dura, they were intended for the adornment of galleries and lofty bare apartments where they were not felt to be overpowering. These North Italian cabinets were often covered with in tarsia or marquetry, which by its subdued gaiety retrieved somewhat their heavy stateliness of form. It is, however, often difficult to ascribe a particular fashion of shape or of workmanship to a given country, since the interchange of ideas and the imports of actual pieces caused a rapid assimilation which destroyed frontiers. The close connexion of centuries between Spain and the Netherlands, for instance, led to the production north and south of work that was not definitely characteristic of either. Spain, however, was more closely influenced than the Low Countries, and contains to this day numbers of cabinets which are not easily to be distinguished from the characteristic ebony, ivory and tortoise-shell work of the craftsmen whose skill was so rapidly acquired by the

emissaries of Henry IV. The cabinets of southern Germany were much influenced by the models of northern Italy, but retained to a late date some of the characteristics of domestic Gothic work such as elaborately fashioned wrought-iron handles and polished steel hinges. Often, indeed, 17th-century South Germany work is a curious blend of Flemish and Italian ideas executed in oak and Hungarian ash. Such work, however interesting, necessarily lacks simplicity and repose. A curious little detail of Flemish and Italian, and sometimes of French later 17th-century cabinets, is that the interiors of the drawers are often lined with stamped gold or silver paper, or marbled ones somewhat similar to the " end papers " of old books. The great English cabinet-makers of the 1 8th century were very various in their cabinets, which did not always answer strictly to their name; but as a rule they will not bear comparison with the native work of the preceding century, which was most commonly executed in richly marked walnut, frequently enriched with excellent marquetry of woods. Maho- gany was the dominating timber in English furniture from the accession of George II. almost to the time of the Napoleonic wars; but many cabinets were made in lacquer or in the bright-hued foreign woods which did so much to give lightness and grace to the British style. The glass-fronted cabinet for China or glass was in high favour in the Georgian period, and for pieces of that type, for which massiveness would have been inappropriate, satin and tulip woods, and other timbers with a handsome grain taking a high polish were much used. (J. P.-B.)

The Political Cabinet. — Among English political institutions, the " Cabinet " is a conventional but not a legal term employed to describe those members of the privy council who fill the highest executive offices in the state, and by their concerted policy direct the government, and are responsible for all the acts of the crown. The cabinet now always includes the persons filling the following offices, who are therefore called " cabinet ministers," viz. : — the first lord of the treasury, the lord chancellor of England, the lord president of the council, the lord privy seal, the five secretaries of state, the chancellor of the exchequer

and the first lord of the admiralty. The chancellor of the duchy of Lancaster, the postmaster-general, the first commissioner of works, the president of the board of trade, the chief secretary for Ireland, the lord chancellor of Ireland, the president of the local government

board, the president of the board of agriculture, and the president of the board of education, are usually members of the cabinet, but not necessarily so. A modern cabinet contains from sixteen to twenty members. It used to be said that a large cabinet is an evil; and the increase in its numbers in recent years has often been criticized. But the modern widening of the franchise has tended to give the cabinet the character of an executive committee for the party in power, no less than that of the prime-minister's consultative committee, and to make such a committee representative it is necessary to include the holders of all the more important offices in the administration, who are generally selected as the influential politicians of the party rather than for special aptitude in the work of the departments.

The word "cabinet," or "cabinet council," was originally employed as a term of reproach. Thus Lord Bacon says, in his essay Of Counsel (xx.), " The doctrine of Italy and practice of France, in some kings' times, hath introduced cabinet councils — a remedy worse than the disease"; and, again, "As for cabinet councils, it may be their motto Plenus rimarum sum." Lord Clarendon— after stating that, in 1640, when the great Council of Peers was convened by the king at York, the burden of affairs rested principally on Laud, Strafford and Cottington, with five or six others added to them on account of their official position and ability — adds, " These persons made up the com- mittee of state, which was reproachfully after called the J undo, and enviously then in court the Cabinet Council." And in the Second Remonstrance in January 1642, parliament complained " of the managing of the great affairs of the realm in Cabinet Councils by men unknown and not publicly trusted." But this use of the term, though historically curious, has in truth nothing in common with the modern application of it. It meant, at that time, the employment of a select body of favourites by the king, who were supposed to possess a larger share of his confidence than the privy council at large. Under the Tudors, at least from the later years of Henry VIII. and under the Stuarts, the privy council was the council of state or government. During the Commonwealth it assumed that name.

The Cabinet Council, properly so called, dates from the reign of William III. and from the year 1693, for it was not until some years after the Revolution that the king discovered and adopted the two fundamental principles of a constitutional executive government, namely, that a ministry should consist of statesmen holding the same political principles and identified with each other; and, secondly, that the ministry should stand upon a parliamentary basis, that is, that it must command and retain the majority of votes in the legislature. It was long before these principles were thoroughly

worked out and understood, and the perfection to which they have been brought in modern times is the result of time, experience and in part of accident. But the result is that the cabinet council for the time being is the government of Great Britain; that all the powers vested in the sovereign (with one or two exceptions) are practically exercised by the members of this body; that all the members of the cabinet are jointly and severally responsible for all its measures, for if differences 0% opinion arise their existence is unknown as long as the cabinet lasts — when publicly mani- fested the cabinet is at an end; and lastly, that the cabinet, being responsible to the sovereign for the conduct of executive business, is also collectively responsible to parliament both for its executive conduct and for its legislative measures, the same men being as members of the cabinet the servants of the crown, and as members of parliament and leaders of the majority responsible to those who support them by their votes and may challenge in debate every one of their actions. In this latter sense the cabinet has sometimes been described as a standing committee of both Houses of Parliament.

One of the consequences of the close connexion of the cabinet with the legislature is that it is desirable to divide the strength

of the ministry between the two Houses of Parliament. Pitt's cabinet of 1783 consisted of himself in the House of Commons and seven peers. But so aristocratic a government would now be impracticable. In Gladstone's cabinet of 1868, eight, and afterwards nine, ministers were in the House of Commons and six in the House of Lords. Great efforts were made to strengthen the ministerial bench in the Commons, and a new principle was introduced, that the representatives of what are called the spend- ing departments — that is, the secretary of state for war and the first lord of the admiralty — should, if possible, be members of the House which votes the supplies. Disraeli followed this precedent but it has since been disregarded. In Sir H. Campbell- Bannerman's cabinet formed in 1905, six ministers were in the House of Lords and thirteen in the House of Commons.

Cabinets are usually convoked by a summons addressed to " His Majesty's confidential servants " by the prime minister; and the ordinary place of meeting is either at the official residence of the first lord of the treasury in Downing Street or at the foreign office, but they may be held anywhere. No secretary or other officer is present at the deliberations of this council. No official record is kept of its proceedings, and it is even considered a breach of ministerial confidence to keep a private record of what passed in the cabinet, inasmuch as such memoranda may fall into other hands. But on

some important occasions, as is known from the Memoirs of Lord Sidmouth, the Correspondence of Earl Grey with King William IV., and from Sir Robert Peel's Memoirs, published by permission of Queen Victoria, cabinet minutes are drawn up and submitted to the sovereign, as the most formal manner in which the advice of the ministry can be tendered to the crown and placed upon record. (See also Sir Algernon West's Recollections, 1899.) More commonly, it is the duty of the prime minister to lay the collective opinion of his colleagues before the sovereign, and take his pleasure on public measures and appointments. The sovereign never presides at a cabinet; and at the meetings of the privy council, where the sovereign does preside, the business is purely formal. It has been laid down by some writers as a principle of the British constitution that the sovereign is never present at a discussion between the advisers of the crown; and this is, no doubt, an established fact and practice. But like many other political usages of Great Britain it originated in a happy accident.

King William and Queen Anne always presided at weekly cabinet councils. But when the Hanoverian princes ascended the throne, they knew no English, and were barely able to converse at all with their ministers; for George I. or George II. to take part in, or even to listen to, a debate in council was impossible. When George III. mounted the throne the practice of the independent deliberations of the cabinet was well estab- lished, and it has never been departed from.

Upon the resignation or dissolution of a ministry, the sovereign exercises the undoubted prerogative of selecting the person who may be thought by him most fit to form a new cabinet. In several instances the statesmen selected by the crown have found themselves unable to accomplish the task confided to them. But in more favourable cases the minister chosen for this supreme office by the crown has the power of distributing all the political offices of the government as may seem best to himself, subject only to the ultimate approval of the sovereign. The prime minister is therefore in reality the author and constructor of the cabinet; he holds it together; and in the event of his retirement, from whatever cause, the cabinet is really dissolved, even though its members are again united under another head.

Authorities. — Sir W. Anson, Law and Custom of the Constitution (1896); W. Bagehot, The English Constitution; M. T. Blauvelt, The Development of Cabinet Government in England (New York, 1902) ; E. Boutmy, The English Constitution (trans. I. M. Eaden, 1891); A. Lawrence Lowell, The Government of England (1908), part I. ; A. V.

Dicey, Law of the Constitution (1902) ; Sir T. Erskine May, Constitutional History of England (1863-1865); H. Hallam, Constitutional History of England; W. E. Hearn, The Government of England (1867); S. Low, The Governance of England (1904); W. Stubbs, Constitutional History of England; Hannis Taylor, Origin and Growth of the English Constitution (Boston, 1 889-1900);

A. Todd, Parliamentary Government in England (1867-1869); much valuable information will also be found in such works as W. E. Gladstone's Gleanings; the third earl of Malmesbury's Memoirs of an ex-Minister (1884-1885); Greville's Memoirs; Sir A. West's Recollections, 1832-1886 (1889), &c.

CABINET NOIR, the name given in France to the office where the letters of suspected persons were opened and read by public officials before being forwarded to their destination. This practice had been in vogue since the establishment of posts, and was frequently used by the ministers of Louis XIII. and Louis XIV. ; but it was not until the reign of Louis XV. that a separate office for this purpose was created. This was called the cabinet du secret des posies, or more popularly the cabinet noir. Although declaimed against at the time' of the Revolution, it was used both by the revolutionary leaders and by Napoleon. The cabinet noir has now disappeared, but the right to open letters in cases of emergency appears still to be retained by the French govern- ment; and a similar right is occasionally exercised in England under the direction of a secretary of state, and, indeed, in all civilized countries. In England this power was frequently employed during the 18th century and was confirmed by the Post Office Act of 1837; i ts most notorious use being, perhaps, the opening of Mazzini's letters in 1844.

CABLE, GEORGE WASHINGTON (1844-) American author, was born in New Orleans, Louisiana, on the 12th of October 1844. At the age of fourteen he entered a mercantile establishment as a clerk; joined the Confederate army (4th Mississippi Cavalry) at the age of nineteen; at the close of the war engaged in civil engineering, and in newspaper work in New Orleans; and first became known in literature by sketches and stories of old French-American life in that city. These were first published in Scribner's Monthly, and were collected in book form in 1879, under the title of Old Creole Days. The character- istics of the series^-of which the novelette Madame

Delphine (1881) is virtually a part — are neatness of touch, sympathetic accuracy of description of people and places, and a constant combination of gentle pathos with quiet humour. These shorter tales were followed by the novels The Grandissimes (1880), Dr Sevier (1883) and Bonaventure (1888), of which the first dealt with Creole life in Louisiana a hundred years ago, while the second was related to the period of the Civil War of 1861- 65. Dr Sevier, on the whole, is to be accounted Cable's master- piece, its character of Narcisse combining nearly all the qualities which have given him his place in American literature as an artist and a social chronicler. In this, as in nearly all of his stories, he makes much use of the soft French-English dialect of Louisiana. He does not confine himself to New Orleans, laying many of his scenes, as in the short story Belles Demoiselles Plantation, in the marshy lowlands towards the mouth of the Mississippi. Cable was the leader in the noteworthy literary movement which has influenced nearly all southern writers since the war of 1861 — a movement of which the chief importance lay in the determination to portray local scenes, characters and historical episodes with accuracy instead of merely imagina- tive romanticism, and to interest readers by fidelity and sympathy in the portrayal of things well known to the authors. Other writings by Cable have dealt with various problems of race and politics in the southern states during and after the " recon- struction period " following the Civil War; while in The Creoles of Louisiana (1884) he presented a history of that folk from the time of its appearance as a social and military factor. His dis- passionate treatment of his theme in this volume and its pre- decessors gave increasing offence to sensitive Creoles and their sympathizers, and in 1886 Cable removed to Northampton, Massachusetts. At one time he edited a magazine in North- ampton, and afterwards conducted the monthly Current Litera- ture, published in New York. His Collected Works were published in a uniform issue in 5 vols. (New York, 1898). Among his later volumes are The Cavalier (1901), Bylow Hill (1902), and Kincaid's Battery (1908).

CABLE (from Late Lat. capulum, a halter, from capere, to take hold of), a large rope or chain, used generally with ships, but often employed for other purposes; the term " cable " is also

used by analogy in minor varieties of similar engineering or other attachments, and in the case of " electric cables " for the sub- marine wires (see Telegraph) by which telegraphic messages are transmitted. 1

The cable by which a ship rides at her anchor is now made of iron;

prior to 18 11 only hempen cables were supplied to ships of the British navy, a first-rate's complement on the East Indian station being eleven; the largest was 25 in. (equal to 2 J in. iron cable) and weighed 6 tons. In 181 1, iron cables were supplied to stationary ships; their superiority over hempen ones was manifest, as they were less liable to foul or to be cut by rocks, or to be injured by enemy's shot. Iron cables are also handier and cleaner, an offensive odour being exhaled from dirty hempen cables, when unbent and stowed inboard. The first patent for iron cables was by Phillip White in 1634; twisted links were suggested in 1813 by Captain Brown (who afterwards, in con- junction with Brown, Lenox & Co., planned the Brighton chain pier in 1823) ; and studs were introduced in 1816. Hempen cables are not now supplied to ships, having been superseded by steel wire hawsers. The length of a hempen cable is 101 fathoms, and a cable's length, as a standard of measurement, usually placed on charts, is assumed to be 100 fathoms or 600 ft. The sizes, number and lengths of cables supplied to ships of the British navy are given in the official publication, the Ship's Establishment; cables for merchant ships are regulated by Lloyds, and are tested according to the Anchors and Chain Cables Act 1899.

In manufacturing chain cables, the bars are cut to the required length of link, at an angle for forming the welds and, after heating, are bent by machinery to the form of a link and welded by smiths, each link being inserted in the previous one before ■welding. Cables of less than 1 J in. are welded at the crown, there not being sufficient room for a side weld; experience has shown that the latter method is preferable and it is employed in making larger sized cables. In 1898 steel studs were introduced instead of cast iron ones, the latter having a tendency to work loose, but the practice is not universal. After testing, the licensed tester must place on every five fathoms of cable a distinctive mark which also indicates the testing establishments; the stamp or die employed must be approved by the Board of Trade. The iron used in the construction, also the testing, of mooring chains and cables for the London Trinity House Corporation are subject to more stringent regulations.

Cables for the British navy and mercantile marine are supplied in 12ˆ fathom and 15 fathom lengths respectively, connected together by " joining shackles," D (fig. 1). Each length is

!(

2 ˆ

.-1-6-

■h)

*1(■**

■ y'

•>,

? ?)

Fig. 1. — Stud Jink Chain.

" marked " by pieces of iron wire being twisted round the studs of the links; the wire is placed on the first studs on each side of the first shackle, on the second studs on each side of the second shackle, and so on; thus the number of lengths of cable out is clearly indicated. For instance, if the wire is on the sixth

'The word " cable " is a various reading for " camel " in the Biblical phrase, " it is easier for a camel to go through the eye of a needle " of Matt. xix. 24, Mark x. 25, and Luke xviii. 25, mentioned as early as Cyril of Alexandria (5th cent.) ; and it was adopted by Sir John Cheke and other 16th century and later English writers. The reading koˆiXos for kciˆtjXos is found in several late cursive MSS. Cheyne, in the Ency. Biblica, ascribes it to a non- Semitic scribe, and regards k&htiXos as correct. (See under Camel.)

studs on each side of the shackle, it indicates that six lengths or 75 fathoms of cable are out. In joining the lengths together, the round end of the shackle is placed towards the anchor. The end links of each length (C.C.) are made without studs, in order to take the shackle; but as studs increase the strength of a link, in a studless or open link the iron is of greater diameter. The next links (B.B.) have to be enlarged, in order to take the increased size of the links C.C. In the joining shackle (D), the pin is oval, its greater diameter being in the direction of the strain. The pin of a shackle, which attaches the cable to the anchor (called an "anchor shackle," to distinguish it from a joining shackle) projects and is secured by a forelock; but since any projection in a joining shackle would be liable to be injured when the cable is running out or when passing around a capstan, the

pins are made as shown at D, and are secured by a small pin d. This small pin is kept from coming out by being made a little short, and lead pellets are driven in at either end to fill up the holes in the shackle, which are made with a groove, so that as the pellets are driven in they expand or dovetail, keeping the small pin in its place. 1

The cables are stowed in chain lockers, the inboard ends being secured by a " slip " (in the mercantile marine the cable is often shackled or lashed to the kelson) ; the slip prevents the cable's inner end from passing overboard, and also enables the cable to be " slipped," or let go, in case of necessity. In the British navy, swivel pieces are fitted in the first and last lengths of cable, to avoid and, if required, to take out turns in a cable, caused by a ship swinging round when at anchor. With a ship moored with two anchors, the cables are secured to a mooring swivel (fig. 2), which prevents a "foul hawse," i.e. the cables being entwined round each other. When mooring, unmooring, and as may be necessary, cables are temporarily secured by "slips"

Fig. 2. — Mooring Swivel.

shackled to eye or ring bolts in the deck (see Anchor). The cable is hove up by either a capstan or windlass (see Capstan) actuated by steam, electricity or manual power. Ships in the British navy usually ride by the compressor, the cable holder being used for checking the cable running out. When a ship has been given the necessary cable, the cable holder is eased up and the com- pressor " bowsed to "; in a heavy sea, a turn, or if necessary two turns, are taken round the " bitts," a strong iron structure placed between the hawse and navel (" deck ") pipes. Asingleturn of cable is often taken round the bitts when anchoring in deep water. Small vessels of the mercantile marine ride by turns around the windlass; in larger or more modern vessels fitted with a steam windlass, the friction brakes take the strain, aided when required by the bitts, compressor or controller in bad weather. (J. W. D.)

CABLE MOULDING, in architecture, the term given to a convex moulding carved in imitation of a rope or cord, and used to decorate the mouldings of the Romanesque style in England,

1 The dimensions marked in the figure are those for i-in. chains, and signify so many diameters of the iron of the common links; thus forming a scale for all sizes.

France and Spain. The word "cabling" by itself indicates a convex circular moulding sunk in the concave fluting of a classic column, and rising about one-third of the height of the shaft.

CABOCHE, SIMON. Simon Lecoustellier, called " Caboche," a skinner of the Paris Boucherie, played an important part in the Parisian riots of 1413. He had relations with John the Fearless, duke of Burgundy, since 141 1, and was prominent in the seditious disturbances which broke out in April and May, following on the Etats of February 1413. In April he stirred the people to the point of revolt, and was among the first to enter the hotel of the dauphin. When the butchers had made themselves masters of Paris, Caboche became bailiff (huissier d'armes) and warden of the bridge of Charenton. Upon the publication of the great ordinance of May 26th, he used all his efforts to prevent concilia- tion between the Burgundians and the Armagnacs. After the fall of the Cabochien party on the 4th of August he fled to Burgundy in order to escape from royal justice. Doubtless he returned to Paris in 1418 with the Burgundians.

See Colville, £e.s Cabochiens el V ordonnance de 1413 (Paris, 1888).

CABOT, GEORGE (1751-1823), American political leader, was born in Salem, Massachusetts, on the 16th of December 1751. He studied at Harvard from 1766 to 1768, when he went to sea as a cabin boy. He gradually became a ship-owner and a suc- cessful merchant, retiring from business in 1794. Throughout his life he was much interested in politics, and though his tempera- mental indolence and his aversion for public life often prevented his accepting office, he exercised, as a contributor to the press and through his friendships, a powerful political influence, especially in New England. He was a member of the Massachusetts Constitutional Convention of 1779-1780, of the state senate in 1 782-1 783, of the convention which in 1788 ratified for Massa- chusetts the Federal Constitution, and from 1791 to 1796 of the United States Senate, in which, besides serving on various important committees, he became recognized as an authority on economic and commercial matters. Among the bills introduced by him in the Senate was the Fugitive Slave Act of 1793. Upon the establishment of the navy department in 1798, he was appointed and confirmed as its secretary, but he never performed the duties of the office, and was soon replaced by Benjamin Stoddert (1751-1813), actually though not nominally the first secretary of the department. In 1814-1815 Cabot was the pre- sident of the Hartford Convention, and as such was then and

afterwards acrimoniously attacked by the Republicans through- out the country. He died in Boston on the 18th of April 1823. In politics he was a staunch Federalist, and with Fisher Ames, Timothy Pickering and Theophilus Parsons (all of whom lived in Essex county, Massachusetts) was classed as a member of the " Essex Junto," — a wing of the party and not a formal organiza- tion. A fervent advocate of a strong centralized government, he did much to secure the ratification by Massachusetts of the Federal Constitution, and after the overturn of the Federalist by the Republican party, he wrote (1804): "We are democratic altogether, and I hold democracy in its natural operation to be a government of the worst."

See Henry Cabot Lodge's Life and Letters of George Cabot (Boston,

1877).

CABOT, JOHN [Giovanni Caboto] (1450-1498), Italian navigator and discoverer of North America, was born in Genoa, but in 1461 went to live in Venice, of which he became a natural- ized citizen in 1476. During one of his trading voyages to the eastern Mediterranean, Cabot paid a visit to Mecca, then the greatest mart in the world for the exchange of the goods of the East for those of the West. On inquiring whence came the spices, perfumes, silks and precious stones bartered there in great quantities, Cabot learned that they were brought by caravan from the north-eastern parts of farther Asia. Being versed in a knowledge of the sphere, it occurred to him that it would be shorter and quicker to bring these goods to Europe straight across the western ocean. First of all, however, a way would have to be found across this ocean from Europe to Asia. Full of this idea, Cabot, about the year 1484, removed with his family to London. His plans were in course of time made known to

the leading merchants of Bristol, from which port an extensive trade was carried on already with Iceland. It was decided that an attempt should be made to reach the island of Brazil or that of the Seven Cities, placed on medieval maps to the west of Ireland, and that these should form the first halting-places on the route to Asia by the west.

To find these islands vessels were despatched from Bristol during several years, but all in vain. No land of any sort could be seen. Affairs were in this state when in the summer of 1493 news reached

England that another Genoese, Christopher Columbus, had set sail westward from Spain and had reached the Indies. Cabot and his friends at once determined to forgo further search for the islands and to push straight on to Asia. With this end in view application was made to the king for formal letters patent, which were not issued until March 5, 1496. By these Henry VII. granted to his " well-beloved John Cabot, citizen of Venice, to Lewis, Sebastian and Santius, 1 sonnes of the said John, full and free authority, leave and power upon theyr own proper costs and charges, to seeke out, discover and finde whatsoever isles, countries, regions or provinces of the heathen and infidels, which before this time have been unknown to all Christians." Merchandise from the countries visited was to be entered at Bristol free of duty, but one-fifth of the net gains was to go to the king.

Armed with these powers Cabot set sail from Bristol on Tuesday the 2nd of May 1497, on board a ship called the " Mathew " manned by eighteen men. Rounding Ireland they headed first north and then west. During several weeks they were forced by variable winds to keep an irregular course, although steadily towards the west. At length, after being fifty-two days at sea, at five o'clock on Saturday morning, June 24, they reached the northern extremity of Cape Breton Island. The royal banner was unfurled, and in solemn form Cabot took possession of the country in the name of King Henry VII. The soil being found fertile and the climate temperate, Cabot was convinced he had reached the north-eastern coast of Asia, whence came the silks and precious stones he had seen at Mecca. Cape North was named Cape Discovery, and as the day was the festival of St John the Baptist, St Paul Island, which lies opposite, was called the island of St John.

Having taken on board wood and water, preparations were made to return home as quickly as possible. Sailing north, Cabot named Cape Ray, St George's Cape, and christened St Pierre and Miquelon, which then with Langley formed three separate islands, the Trinity group. Hereabout they met great schools of cod, quantities of which were caught by the sailors merely by lowering baskets into the water. Cape Race, the last land seen, was named England's Cape.

The return voyage was made without difficulty, since the prevailing winds in the North Atlantic are westerly, and on Sunday, the 6th of August, the " Mathew " dropped anchor once more in Bristol harbour. Cabot hastened to Court, and on Thursday the 10th of August received from the king £10 for having " found the new isle." Cabot reported that 700 leagues beyond Ireland he had reached the

country of the Grand Khan. Although both silk and brazil-wood could be obtained there, he intended on his next voyage to follow the coast southward as far as Cipangu or Japan, then placed near the equator. Once Cipangu had been reached London would become a greater centre for spices than Alexandria. Henry VII. was delighted, and besides granting Cabot a pension of £20 promised him in the spring a fleet of ten ships with which to sail to Cipangu.

On the 3rd of February 1498, fresh letters patent were issued, whereby Cabot was empowered to " take at his pleasure VI. englisshe shippes and theym convey and lede to the londe and ;ies of late founde by the seid John." Henry VII. himself also advanced considerable sums of money to various members of the expedition. As success seemed assured, it was expected the returns would be high.

In the spring Cabot visited Lisbon and Seville, to secure the services of men who had sailed along the African coast with 1 Nothing further is known of Lewis and Santius.

Cam and Diaz or to the Indies with Columbus. At Lisbon he met a certain Joao Fernandes, called Llavrador, who about the year 1492 appears to have made his way from Iceland to Green- land. Cabot, on learning from Fernandes that part of Asia, as they supposed Greenland to be, lay so near Iceland, determined to return by way of this country. On reaching Bristol he laid his plans accordingly. Early in May the expedition, which consisted of two ships and 300 men, left Bristol. Several vessels in the habit of trading to Iceland accompanied them. Off Ireland a storm forced one of these to return, tAit the rest of the fleet proceeded on its way along the parallel of 58°. Each day the ships were carried northward by the Gulf Stream. Early in June Cabot reached the east coast of Greenland, and as Fernandes was the first who had told him of this country he named it the Labrador's Land.

In the hope of finding a passage Cabot proceeded northward along the coast. As he advanced, the cold became more intense and the icebergs thicker and larger. It was also noticed that the land trended eastward. As a result on the nth of June in latitude 67° 30′ the crews mutinied and refused to proceed farther in that direction. Cabot had no alternative but to put his ships about and look for a passage towards the south. Rounding Cape Farewell he explored the southern coast of Greenland and then made his way a certain distance up the west coast. Here again his progress was checked by icebergs, whereupon a course was set towards the west. Crossing Davis Strait

Cabot reached our modern Baffin Land in 66°. Judging this to be the Asiatic mainland, he set off southward in search of Cipangu. South of Hudson Strait a little bartering was done with the Indians, but these could offer nothing in exchange but furs. Our strait of Belle Isle was mistaken for an ordinary bay, and Newfoundland was regarded by Cabot as the main shore itself. Rounding Cape Race he visited once more the region explored in the previous summer, and then proceeded to follow the coast of our Nova Scotia and New England in search of Cipangu. He made his way as far south as the thirty-eighth parallel, when the absence of all signs of eastern civilization and the low state of his stores forced him to abandon all hope of reaching Cipangu on this voyage. Accordingly the ships were put about and a course set for England, where they arrived safely late in the autumn of 1498. Not long after his return John Cabot died.

His son, Sebastian Cabot (1476-1557), 2 is not independently heard of until May 151 2, when he was paid twenty shillings " for making a carde of Gascoigne and Guyenne," whither he accompanied the English army sent that year by Henry VIII. to aid his father-in-law Ferdinand of Aragon against the French. Since Ferdinand and his daughter Joanna were contemplating the dispatch of an expedition from Santander to explore New- foundland, Sebastian was questioned about this coast by the king's councillors. As a result Ferdinand summoned him in September 1512 toLogrono,andon the 30th of October appointed him a captain in the navy at a salary of 50,000 maravedis a year. A letter was also written to the Spanish ambassador in England to help Cabot and his family to return to Spain, with the result that in March 15 14 he was again back at Court dis- cussing with Ferdinand the proposed expedition to Newfound- land. Preparations were made for him to set sail in March 1 5 16; but the death of the king in January of that year put an end to the undertaking. His services were retained by Charles V., and on the 5th of February 1518 Cabot was named Pilot Major and official examiner of pilots.

In the winterof 1520-1521 Sebastian Cabot returned to England

2 The dates are conjectural. Richard Eden {Decades of the Newe Worlde, f. 255) says Sebastian told him that when four years old he was taken by his father to Venice, and returned to England " after certeyne yeares: wherby he was thought to have bin born in Venice"; Stow (Annals, under year 1498) styles "Sebastian Caboto, a Genoas sonne, borne in Bristow." Galvano and Herrera also give England the honour of his nativity. See also Nicholls, Remarkable Life of Sebastian Cabot (1869), a eulogistic account, with which may be

contrasted Henry Harrisse's John Cabot and his son Sebastian (1896).

and while there was offered by Wolsey the command of five vessels which Henry VIII. intended to despatch to Newfoundland. ■Being reproached by a fellow Venetian with having done nothing for his own country, Cabot refused, and on reaching Spain entered into secret negotiations with the Council of Ten at Venice. It was agreed that as soon as an opportunity offered Cabot should come to Venice- and lay his plans before the Signiory. The conference of Badajoz took up his time in 1524, and on the 4-th of March 1 525 he was appointed commander of an expedition fitted out at Seville " to discover the Moluccas, Tarsis, Ophir, Cipango and Cathay."

The three vessels set sail in April, and by June were off the coast of Brazil and on their way to the Straits of Magellan. Near the La Plata river Cabot found three Spaniards who had formed part of De Solis's expedition of 1515- These men gave such glowing accounts of the riches of the country watered by this river that Cabot was at length induced, partly by their descriptions and in part by the casting away of his flag-ship, to forgo the search for Tarsis and Ophir and to enter the La Plata, which was reached in February 1527. All the way up the Parana Cabot found the Indians friendly, but those on the Paraguay proved so hostile that the attempt to reach the mountains, where the gold and silver were procured, had to be given up. On reaching Seville in August 1530, Cabot was condemned to four years' banishment to Oran in Africa, but in June 1533 he was once more reinstated in his former post of Pilot Major, which he continued to fill until he again removed to England.

As early as 1538 Cabot tried to obtain employment under Henry VIII., and it is possible he was the Sevillian pilot who was brought to London by the king in 1 541 . Soon after the accession of Edward VI., however, his friends induced the Privy Council to advance money for his removal to England, and on the 5th of January 1549 the king granted him a pension of £166, 13s. 4d. On Charles V. objecting to this proceeding, the Privy Council, on the 21st of April 1550, made answer that since " Cabot of himself refused to go either into Spayne or to the emperour, no reason or equitie wolde that he shulde be forced or compelled to go against his will." A fresh application to Queen Mary on the oth of September 1553 likewise

proved of no avail.

On the 26th of June 1550 Cabot received £200 " by waie of the kinges Majesties rewarde," but it is not clear whether this was for his services in putting down the privileges of the German Merchants of the Steelyard or for founding the company of Merchant Adventurers incorporated on the 18th of December 1551- Of this company Cabot was made governor for life. Three ships were sent out in May 1553 to search for a passage to the East by the north-east. Two of the vessels were caught in the ice near Arzina and the crews frozen to death. Chancellor's vessel alone reached the White Sea, whence her captain made his way overland to Moscow. He returned to England in the summer of 1 554 and was the means of opening up a very considerable trade with Russia. Vessels were again despatched to Russia in 1555 and 1556. On the departure of the " Searchthrift " in May 1556, " the good old gentleman Master Cabot gave to the poor most liberal alms, wishing them to pray for the good fortune and prosperous success of the ' Searchthrift '; and then, at the sign of the Christopher, he and his friends banqueted and made them that were in the company good cheer; and for very joy that he had to see the towardness of our intended discovery, he entered into the dance himself among the rest of the young and lusty company." On the arrival of King Philip II. in England Cabot's pension was stopped on the 26th of May 1557, but three days later Mary had it renewed. The date of Cabot's death has not been definitely discovered. It is supposed that he died within the year.

See G. P. Winship, Cabot Bibliography, with an Introductory Essay on the Careers of the Cabots (London, 1900); and H. P. Biggar, " The Voyagesof the Cabots to North America and Greenland, "in the Revue Hispanique, tome x. pp. 485-593 (Paris, 1903). (H. P. B.)

CABOTAGE, the French term for coasting-trade, a coast- pilotage. It is probably derived from cabot, a small boat, with which the name Cabot may be connected; the conjecture that

the word comes from cabo, the Spanish for cape, and means " sailing from cape to cape," has little foundation.

CABRA, a town of southern Spain, in the province of Cordova, 28 m. S.E. by S. of Cordova, on the Jaen-Malaga railway. Pop. (1900) 13,127. Cabra is built in a fertile valley between the Sierra de Cabra and the Sierra de Montilla, which together form the watershed between the rivers Cabra and Guadajoz. The town was for several centuries an episcopal see. Its chief buildings are the cathedral,

originally a mosque, and the ruined castle, which is the chief among many interesting relics of Moorish rule. The neighbouring fields of clay afford material for the manufacture of bricks and pottery; coarse cloth is woven in the town; and there is a considerable trade in farm produce. Cabra is the Roman Baebro or Aegabro. It was delivered from the Moors by Ferdinand III. of Castile in 1240, and entrusted to the Order of Calatrava ; in 1331 it was recaptured by the Moorish king of Granada ; but in the following century it was finally reunited to Christian Spain.

CABRERA, RAMON (1806-1877), Carlist general, was born at Tortosa, province of Tarragona, Spain, on the 27th of December 1806. As his family had in their gift two chaplaincies, young Cabrera was sent to the seminary of Tortosa, where he made himself conspicuous as an unruly pupil, ever mixed up in disturb- ances and careless in his studies. After he had taken minor orders, the bishop refused to ordain him as a priest, telling him that the Church was not his vocation, and that everything in him showed that he ought to be a soldier. Cabrera followed this advice and took part in Carlist conspiracies on the death of Ferdinand VII. The authorities exiled him and he absconded to Morella to join the forces of the pretender Don Carlos. In a very short time he rose by sheer daring, fanaticism and ferocity to the front rank among the Carlist chiefs who led the bands of Don Carlos in Catalonia, Aragon and Valencia. As a raider he was often successful, and he was many times wounded in the brilliant fights in which he again and again defeated the generals of Queen Isabella. He sullied his victories by acts of cruelty, shooting prisoners of war whose lives he had promised to spare and not respecting the lives and property of non-combatants. The queen's generals seized his mother as a hostage, whereupon Cabrera shot several mayors and officers. General Nogueras unfortunately caused the mother of Cabrera to be shot, and the Carlist leadei then started upon a policy of reprisals so merciless that the people nicknamed him " The Tiger of the Maeztrazgo." It will suffice to say that he shot n 10 prisoners of war, 100 officers and many civilians, including the wives of four leading Isabellinos, to avenge his mother. When Ma rshal Espartero induced the Carlists of the north-western provinces, with Maroto at their head, to submit in accordance with the Convention of Vergara, which secured the recognition of the rank and titles of 1000 Carlist officers, Cabrera held out in Central Spain for nearly a year. Marshals Espartero and O'Donnell, with the bulk of the Isabellino armies, had to conduct a long and bloody campaign against Cabrera before they succeeded in driving him into French territory in July 1 840. The government of Louis Philippe kept him in

a fortress for some months and then allowed him to go to England, where he quarrelled with the pretender, disapproving of his abdication in favour of the count of Montemolin. In 1 848 Cabrera reappeared in the mountains of Catalonia at the head of Carlist bands. These were soon dispersed and he again fled to France. After this last effort he did not take a very active part in the propaganda and subsequent risings of the Carlists, who, however, continued to consult him. He took offence when new men, not a few of them quondam regular officers, became the advisers and lieutenants of Don Carlos in the war which lasted more or less from 1870-1876. Indeed, his long residence in England, his marriage with Miss Richards, and his prolonged absence from Spain had much shaken his devotion to his old cause and belief in its success. In March 1875 Cabrera sprang upon Don Carlos a manifesto in which he called upon the adherents of the pretender to follow his own example and submit to the restored monarchy of Alphonso XII., the son of Queen Isabella, who recognized the rank of captain- general and the title of count of Morella conferred on Cabrera by

the first pretender. Only a very few insignificant Carlists followed Cabrera's example, and Don Carlos issued a proclamation declaring him a traitor and depriving him of all his honours and titles. Cabrera, who was ever afterwards regarded with contempt and execration by the Carlists, died in London on the 24th of May 1877. He did not receive much attention from the majority of his fellow-countrymen, who commonly said that his disloyalty to his old cause had proved more harmful to him than beneficial to the new state of things. A pension which had been granted to his widow was renounced by her in 1899 in aid of the Spanish treasury after the loss of the colonies. (A. E. H.)

CACCINI, GIULIO (1558-1615?), Italian musical composer, also known as Giulio Romano, but to be distinguished from the painter of that name, was born at Rome about 1558, and in 1578 entered the service of the grand duke of Tuscany at Florence. He collaborated with J. Peri in the early attempts at musical drama which were the ancestors of modern opera (Dafne, 1594, and Euridice, 1600), produced at Florence by the circle of musicians and amateurs which met at the houses of G. Bardi and Corsi. He also published in 1601 Le nuove musiche, a collection of songs which is of great importance in the history of singing as well as in that of the transition period of

musical composition. He was a lyric composer rather than a dramatist like Peri, and the genuine beauty of his works makes them acceptable even at the present day.

CACERES, a province of western Spain, formed in 1833 of districts taken from Estremadura, and bounded on the N. by Salamanca and Avila, E. by Toledo, S. by Badajoz, and W. by Portugal. Pop. (1900) 362,164; area, 7667 sq. m. Caceres is the largest of Spanish provinces, after Badajoz, and one of the most thinly peopled, although the number of its inhabitants steadily increases. Except for the mountainous north, where the Sierra de Gata and the Sierra de Gredos mark respectively the boundaries of Salamanca and Avila, and in the south-east, where there are several lower ranges, almost the entire surface is flat or undulating, with wide tracts of moorland and thin pasture. There is little forest and many districts suffer from drought. The whole province, except the extreme south, belongs to the basin of the river Tagus, which flows from east to west through the central districts, and is joined by several tributaries, notably the Alagon and Tietar, from the north, and the Salor and Almonte from the south. The climate is temperate except in summer, when hot east winds prevail. Fair quantities of grain and olives are raised, but as a stock-breeding province Caceres ranks second only to Badajoz. In 1900 its flocks and herds numbered more than 1,000,000 head. It is famed for its sheep and pigs, and exports wool, hams and the red sausages called embutidos. Its mineral resources are comparatively insignificant. The total number of mines at work in 1903 was only nine; their output consisted of phosphates, with a small amount of zinc and tin. Brandy, leather and cork goods, and coarse woollen stuffs are manu- factured in many of the towns, but the backwardness of education, the lack of good roads, and the general poverty retard the de- velopment of commerce. The more northerly of the two Madrid- Lisbon railways enters the province on the east; passes south of Plasencia, where it is joined by the railway from Salamanca, on the north; and reaches the Portuguese frontier at Valencia de Alcantara. This line is supplemented by a branch from Arroyo to the city of Caceres, and thence southwards to Merida in Badajoz. Here it meets the railways from Seville and Cordova. The principal towns of Caceres are Caceres (pop. 1900, 16,933); Alcantara (3248), famous for its Roman bridge; Plasencia (8208) ; Trujillo (12,512), and Valencia de Alcantara (9417). These are described in separate articles. Arroyo, or Arroyo del Puerco (7094), is an important agricultural market. (See also Estre- madura.)

CACERES, the capital of the Spanish province of Caceres, about 20 m. S. of the river Tagus, on the Caceres-Merida railway, and on a

branch line which meets the more northerly of the two Madrid-Lisbon railways at Arroyo, 10 m. W. Pop. (1900) 16,933. Caceres occupies a conspicuous eminence on a low ridge running east and west. At the highest point rises the lofty tower

of San Mateo, a fine Gothic church, which overlooks the old town, with its ancient palaces and massive walls, gateways and towers. Many of the palaces, notably those of the provincial legislature, the dukes of Abrantes, and the counts of la Torre, are good examples of medieval domestic architecture. The monastery and college of the Jesuits, formerly one of the finest in Spain, has been secularized and converted into a hospital. In the modern town, built on lower ground beyond the walls, are the law courts, town-hall, schools and the palace of the bishops of C6ria (pop. 3124), a town on the river Alagon. The industries of Caceres include the manufacture of cork and leather goods, pottery and cloth. There is also a large trade in grain, oil, live-stock and phosphates from the neighbouring mines. The name of Caceres is probably an adaptation of Los Alcazares, from the Moorish Alcdzar, a tower or castle; but it is frequently connected with the neighbouring Castra Caecilia and Castra Servilia, two Roman camps on the Merida-Salamanca road. The town is of Roman origin and probably stands on the site of Norba Caesarina. Several Roman inscriptions, statues and other remains have been discovered.

CACHAR, or Kachar, a district of British India, in the province of Eastern Bengal and Assam. It occupies the upper basin of the Surma or Barak river, and is bounded on three sides by lofty hills. Its area is 3769 sq. m. It is divided naturally between the plain and hills. The scenery is beautiful, the hills rising generally steeply and being clothed with forests, while the plain is relieved of monotony by small isolated undulations and by its rich vegetation. The Surma is the chief river, and its principal tributaries from the north are the Jiri and Jatinga, and from the south the Sonai and Daleswari. The climate is ex- tremely moist. Several extensive fens, notably that of Chatla, which becomes lakes in time of flood, are characteristic of the plain. This is alluvial and bears heavy crops of rice, next to which in importance is tea. The industry connected with the latter crop employs large numbers of the population; manu- facturing industries are otherwise slight. The Assam-Bengal railway serves the district, including the capital town of Silchar. The population of the district in 1901 was 455,593, and showed a large increase, owing in great part to immigration from the adjacent district of Sylhet. The plain is the most thickly populated part of the district; in the North Cachar Hills the population is sparse. About 66 % of the population

are Hindus and 25 % Mahommedans. There are three administrative sub- divisions of the district: Silchar, Hailakandi and North Cachar. The district takes name from its former rulers of the Kachari tribe, of whom the first to settle here did so early in the 18th century, after being driven out of the Assam valley in 1536, and from the North Cachar Hills in 1 706, by the Ahoms. About the close of the 18th century the Burmans threatened to expel the Kachari raja and annex his territory; the British, however, intervened to prevent this, and on the death of the last raja without heir in 1830 they obtained the territory under treaty. A separate principality which had been established in the North Cachar Hills earlier in the century by a servant of the raja, and had been subsequently recognized as such, was taken over by the British in 1854 owing to the misconduct of its rulers. The southern part of the district was raided several times in' the 19th century by the turbulent tribe of Lushais.

CACHOEIRA, an important inland town of Bahia, Brazil, on the Paraguassti river, about 48 m. from Sao Salvador, with which it is connected by river-boats. Pop. (1890) of the city, 12,607; of the municipality, 48,352. The Bahia Central railway starts from this point and extends S. of W. to Machado Portella, 161 m., and N. to Feira de Santa Anna, 28 m. Although badly situated on the lower levels of the river (52 ft. above sea-level) and subject to destructive floods, Cachoeira is one of the most thriving commercial and industrial centres in the state. It exports sugar and tobacco and is noted for its cigar and cotton factories.

CACTUS. This word, applied in the form of kolktos by the ancient Greeks to some prickly plant, was adopted by Linnaeus as the name of a group of curious succulent or fleshy-stemmed plants, most of them prickly and leafless, some of which produce

beautiful flowers, and are now so popular in our gardens that the name has become familiar. As applied by Linnaeus, the name Cactus is almost conterminous with what is now regarded as the natural order Cactaceae, which embraces several modern genera. It is one of the few Linnaean generic terms which have been entirely set aside by the names adopted for the modern divisions of the group.

The Cacti may be described in general terms as plants having a woody axis, overlaid with thick masses of cellular tissue forming the

fleshy stems. These are extremely various in character and form, being globose, cylindrical, columnar or flattened into leafy expansions or thick joint-like divisions, the surface being either ribbed like a melon, or developed into nipple-like protuberances, or variously angular, but in the greater number of the species furnished copiously with tufts of horny spines, some of which are exceedingly keen and powerful. These tufts show the position of buds, of which, however, comparatively few are developed. The stems are in most cases leafless, using the term in a popular sense; the leaves, if present at all, being generally reduced to minute scales. In one genus, however, Peireskia, the stems are less succulent, and the leaves, though rather fleshy, are developed in the usual form. The flowers are frequently large and showy, and are generally attractive from their high colouring. In one group, represented by Cereus, they consist of a tube, more or less elongated, on the outer surface of which, towards the base, are developed small and at first inconspicuous scales, which gradually

1, Flower reduced; 2, Same in vertical section; 3, Flattened branch much reduced ; 4, Horizontal plan of arrangement of flower.

increase in size upwards, and at length become crowded, numer- ous and petaloid, forming a funnel-shaped blossom, the beauty of which is much enhanced by the multitude of conspicuous stamens which with the pistil occupy the centre. In another group, represented by Opuntia (fig. 1), the flowers are rotate, that is to say, the long tube is replaced by a very short one. At the base of the tube, in both groups, the ovary becomes developed into a fleshy (often edible) fruit, that produced by the Opuntia being known as the prickly pear or Indian fig.

The principal modern genera are grouped by the differences in the flower – tube just explained. Those with long – tubed flowers comprise the genera Melocactus, Mammillaria, Echino- cactus, Cereus, Pilocereus, Echinopsis, Phyllocactus, Epiphyllum, &c. ; while those with short-tubed flowers are Rhipsalis, Opuntia, Peireskia, and one or two of minor importance. Cactaceae belong almost entirely to the New World; but some of the Opuntias have been so long distributed over certain parts of Europe, especially on the shores of the Mediterranean and the volcanic soil of Italy, that they appear in some places to have taken possession of the soil, and to be distinguished with difficulty from the aboriginal vegetation. The habitats which they affect are the hot, dry regions of tropical America, the aridity of which they are enabled to withstand in consequence of the thickness of their skin and the paucity of

evaporating pores or stomata with which they are furnished, — these conditions not permitting the moisture they contain to be carried off too rapidly; the thick

fleshy stems and branches contain a store of water. The succu- lent fruits are not only edible but agreeable, and in fevers are freely administered as a cooling drink. The Spanish Americans plant the Opuntias around their houses, where they serve as impenetrable fences.

Melocactus, the genus of melon-thistle or Turk's-cap cactuses, contains, according to a recent estimate, about 90 species, which inhabit chiefly the West Indies, Mexico and Brazil, a few extending into New Granada. The typical species, M. communis, forms a succulent mass of roundish or ovate form, from I ft. to 2 ft. high, the surface divided into numerous furrows like the ribs of a melon, with projecting angles, which are set with a regular series of stellated spines — each bundle consisting of about five larger spines, accom- panied by smaller but sharp bristles — and the tip of the plant being surmounted by a cylindrical crown 3 to 5 in. high, composed of reddish-brown, needle-like bristles, closely packed with cottony wool. At the summit of this crown the small rosy-pink flowers are produced, half protruding from the mass of wool, and these are succeeded by small red berries. These strange plants usually grow in rocky places with little or no earth to support them; and it is said that in times of drought the cattle resort to them to allay their thirst, first ripping them up with their horns and tearing off the outer skin, and then devouring the moist succulent parts. The fruit, which has an agreeably acid flavour, is frequently eaten in the West Indies. The Melocacti are distinguished by the distinct cephalium or crown which bears the flowers.

Mammillaria. — This genus, which comprises nearly 300 species, mostly Mexican, with a few Brazilian and West Indian, is called nipple cactus, and consists of globular or cylindrical succulent plants, whose surface instead of being cut up into ridges with alternate furrows, as in Melocactus, is broken up into teat-like cylindrical or angular tubercles, spirally arranged, and terminating in a radiating tuft of spines which spring from a little woolly cushion. The flowers issue from between the mammillae, towards the upper part of the stem, often disposed in a zone just below the apex, and are either purple, rose-pink, white or yellow, and of moderate size. The spines are variously coloured, white and yellow tints predominating, and from the symmetrical arrangement of the areolae or tufts of spines they are very pretty objects, and are hence

frequently kept in drawing-room'plant cases. They grow freely in a cool greenhouse. ■ Echinocactus (fig. 2) is the name given to the genus bearing the popular name of hedgehog cactus. It comprises some 200 species, distributed from the south-west United States to Brazil and Chile. They have the fleshy stems characteristic of the order, these being either globose, oblong or cylin- drical, and either ribbed as in Melocactus, or broken up into distinct tubercles, and most of them armed with stiff sharp pines, set i.n little woolly cushions occupying the place of the buds. The flowers, produced near the apex of the plant, are generally large and showy, yellow and rose being the prevailing colours. They are succeeded by succulent fruits, which are exserted, and frequently scaly or spiny, in which respects this genus differs both from Melo- cactus and Mammillaria, which have the fruits immersed and smooth. One of the most interest- ing species is the E. ingens, of which some very large plants have been from time to time im- ported. These large plants have from 40 to 50 ridges, on which the buds and clusters of spines are sunk at intervals, the aggre- ' gate number of the spines having been in some cases computed at upwards of 50,000 on a single plant. These spines are used by the Mexicans as toothpicks. The plants are slow growers and must

have plenty of sun heat; they require sandy loam with a mixture of sand and bricks finely broken and must be kept dry in winter.

Cereus. — This group bears the common name of torch thistle. It comprises about 100 species, largely Mexican but scattered through South America and the West Indies. The stems are colum nar or elongated, some of the latter creeping on the ground or climbing up the trunks of trees, rooting as they grow. C. giganleus, the largest and most striking species of the genus, is a native of hot, arid, desert regions of New Mexico, growing there in rocky valleys and on mountain sides, where the tall stems with their erect branches have the appearance of telegraph poles. The stems grow to a height of from 50 ft. to 60 ft., and have a diameter of from 1 ft. to 2 ft., often unbranched, but sometimes furnished with branches

Fig. 2. — Echinocactus much reduced; the flowers are several inches in diameter.

which grow out at right angles from the main stem, and then curve

upwards and continue their growth parallel to it ; these stems have from twelve to twenty ribs, on which at intervals of about an inch are the buds with their thick yellow cushions, from which issue five or six large and numerous smaller spines. The fruits of this plant, which are green oval bodies from 2 to 3 in. long, contain a crimson pulp from which the Pimos and Papagos Indians prepare an excellent preserve; and they also use the ripe fruit as an article of food, gathering it by means of a forked stick attached to a long pole. The Cereuses include some of our most interesting and beautiful hothouse plants. In the allied genus Echinocereus , with 25 to 30 species in North and South America, the stems are short, branched or simple, divided into few or many ridges all armed with sharp, formidable spines. E. pectinalus produces a purplish fruit resem- bling a gooseberry, which is very good eating ; and the fleshy part of the stem itself, which is called cabeza del viego by the Mexicans, is eaten by them as a vegetable after removing the spines.

Pilocereus, the old man cactus, forms a small genus with tallish erect, fleshy, angulate stems, on which, with the tufts of spines, are developed hair-like bodies, which, though rather coarse, bear some resemblance to the hoary locks of an old man. The plants are nearly allied to Cereus, differing chiefly in the floriferous portion developing these longer and more attenuated hair-like spines, which surround the base of the flowers and form a dense woolly head or cephalium. The most familiar species is P. senilis, a Mexican plant, which though seldom seen more than a foot or two in height in greenhouses, reaches from 20 ft. to 30 ft. in its native country.

Echinopsis is another small group of species, separated by some authors from Cereus. They are dwarf, ribbed, globose or cylin- drical plants; and the flowers, which are produced from the side instead of the apex of the stem, are large, and in some cases very beautiful, being remarkable for the length of the tube, which is more or less covered with bristly hairs. They are natives of Brazil, Bolivia and Chile.

Phyllocactus (fig. 3), the Leaf Cactus family, consists of about a dozen species, found in Central and tropical South America.

Fig. 3. — Branch of Phyllocactus much reduced ; the flowers are 6 in. or more in diameter.

They differ from all the forms already noticed in being shrubby and epiphytal in habit, and in having the branches compressed and dilated so as to resemble thick fleshy leaves, with a strong median

axis and rounded woody base. The margins of these leaf-like branches are more or less crenately notched, the notches representing buds, as do the spine-clusters in the spiny genera; and from these crenatures the large showy flowers are produced. As garden plants the Phyllocacti are amongst the most ornamental of the whole family, being of easy culture, free blooming and remarkably showy, the colour of the flowers ranging from rich crimson, through rose-pink to creamy white. Cuttings strike readily in spring before growth has commenced ; they should be potted in 3-in. or 4-in. pots, well drained, in loamy soil made very porous by the admixture of finely broken crocks and sand, and placed in a temperature of 60°; when these pots are filled with roots they are to be shifted into larger ones, but overpotting must be avoided. During the summer they need considerable heat, all the light possible and plenty of air; in winter a temperature of 45 or 50 will be sufficient, and they must be kept tolerably dry at the root. By the spring they may have larger pots if required and should be kept in a hot and fairly moistened atmosphere; and by the end of June, when they have

made new growth, they may be turned out under a south wall in the full sun, water being given only as required. In autumn they are to be returned to a cool house and wintered in a dry stove. The turning of them outdoors to ripen their growth is the surest way to obtain flowers, but they do not take on a free blooming habit until they have attained some age. They are often called Epiphyllum, which name is, however, properly restricted to the group next to be mentioned.

Epiphyllum. — This name is now restricted to two or three dwarf branching Brazilian epiphytal plants of extreme beauty, which agree with Phyllocactus in having the branches dilated into the form of fleshy leaves, but differ in having them divided into short truncate leaf-like portions, which are articulated, that is to say, provided with a joint by which they separate spontaneously ; the margins are crenate or dentate, and the flowers, which are large and showy, magenta or crimson, appear at the apex of the terminal joints. In E. truncatum the flowers have a very different aspect from that of other Cacti, from the mouth of the tube being oblique and the seg- ments all reflexed at the tip. The short separate pieces of which these plants are made up grow out of each other, so that the branches may be said to resemble leaves joined together endwise.

Rhipsalis, a genus of about 50 tropical species, mainly in Central and South America, but a few in tropical Africa and Madagascar. It is a very heterogeneous group, being fleshy-stemmed with a woody axis, the branches being angular, winged, flattened or cylindrical,

and the flowers small, short-tubed, succeeded by small, round, pea-shaped berries. Rhipsalis Cassytha, when seen laden with its white berries, bears some resemblance to a branch of mistletoe. All the species are epiphytal in habit.

Opuntia, the prickly pear, or Indian fig cactus, is a large typical group, comprising some 150 species, found in North America, the West Indies, and warmer parts of South America, extending as far as Chile. In aspect they are very distinct from any of the other groups. They are fleshy shrubs, with rounded, woody stems, and numerous succulent branches, composed in most of the species of separate joints or parts, which are much compressed, often elliptic or suborbicular, dotted over in spiral lines with small, fleshy, caducous leaves, in the axils of which are placed the areoles or tufts of barbed or hooked spines of two forms. The flowers are mostly yellow or reddish-yellow, and are succeeded by pear-shaped or egg-shaped fruits, having a broad scar at the top, furnished on their soft, fleshy rind with tufts of small spines. The sweet, juicy fruits of 0. vulgaris and 0. Tuna are much eaten under the name of prickly pears, and are greatly esteemed for their cooling properties. Both these species are extensively cultivated for their fruit in Southern Europe, the Canaries and northern Africa; and the fruits are not unfrequently to be seen in Covent Garden Market and in the shops of the leading fruiterers of the metropolis. 0. vulgaris is hardy in the south of England.

The cochineal insect is nurtured on a species of Opuntia (0. coccinellifera) , separated by some authors under the name of Nopalea, and sometimes also on 0. Tuna. Plantations of the nopal and the tuna, which are called nopaleries, are established for the purpose of rearing this insect, the Coccus Cacti, and these often contain as many as 50,000 plants. The females are placed on the plants about August, and in four months the first crop of cochineal is gathered, two more being produced in the course of the year. The native country of the insect is Mexico, and it is there more or less cultivated; but the greater part of our supply comes from Colombia and the Canary Islands.

Peireskia aculeata, or Barbadoes gooseberry, the Cactus peireskia of Linnaeus, differs from the rest in having woody stems and leaf-bearing branches, the leaves being somewhat fleshy, but otherwise of the ordinary laminate character. The flowers are subpaniculate, white or yellowish. This species is frequently used as a stock on which to graft other Cacti. There are about a dozen species known of this genus, mainly Mexican.

CADALSO VAZQUEZ, JOSE (1 741-1782), Spanish author, was born at Cadiz on the 8th of October 1741. Before com- pleting his twentieth year he had travelled through Italy, Germany, England, France and Portugal, and had studied the literatures of these countries. On his return to Spain he entered the army and rose to the rank of colonel. He was killed at the siege of Gibraltar, on the 27th of February 1782. His first published work was a rhymed tragedy, Don Sancho Garcia, Conde de Caslilla (1771). In the following year he published his Erudilos d la Violeta, a prose satire on superficial knowledge, which was very successful. In 1773 appeared a volume of miscellaneous poems, Ocios de mi juventud, and after his death there was found among his MSS. a series of fictitious letters in the style of the Lettres Persanes; these were issued in 1793 under the title of Cartas marruecas. A good edition of his works appeared at Madrid, in 3 vols., 1823. This is supple- mented by the Obras ineditas (Paris, 1894) published bv R. Foulche-Delbosc.

CADAMOSTO (or Ca Da Mosto), ALVISE (1432-1477), a Venetian explorer, navigator and writer, celebrated for his voyages in the Portuguese service to West Africa. In 1454 he sailed from Venice for Flanders, and, being detained by contrary winds off Cape St Vincent, was enlisted by Prince Henry the Navigator among his explorers, and given command of an ex- pedition which sailed (22nd of March 1455) for the south. Visit- ing the Madeira group and the Canary Islands (of both which he gives an elaborate account, especially concerned with European colonization and native customs), and coasting the West Sahara (whose tribes, trade and trade-routes he likewise describes in detail), he arrived at the Senegal, whose lower course had already, as he tells us, been explored by the Portuguese 60 m. up. The negro lands and tribes south of the Senegal, and especially the country and people of Budomel, a friendly chief reigning about 50 m. beyond the river, are next treated with equal wealth of interesting detail, and Cadamosto thence proceeded towards the Gambia, which he ascended some distance (here also examin- ing races, manners and customs with minute attention), but found the natives extremely hostile, and so returned direct to Portugal. Cadamosto expressly refers to the chart he kept of this voyage. At the mouth of the Gambia he records an observation of the "Southern Chariot" (Southern Cross). Next year (1456) he went out again under the patronage of Prince Henry. Doubling Cape Blanco he was driven out to sea by con- trary winds, and thus made the first

known discovery of the Cape Verde Islands. Having explored Boavista and Santiago, and found them uninhabited, he returned to the African mainland, and pushed on to the Gambia, Rio Grande and Geba. Returning thence to Portugal, he seems to have remained there till 1463, when he reappeared at Venice. He died in 1477.

Besides the accounts of his two voyages, Cadamosto left a narra- tive of Pedro de Cintra's explorations in 1461 (or 1462) to Sierre Leone and beyond Cape Mesurado to El Mina and the Gold Coast ; all these relations first appeared in the 1507 Vicenza Collection of Voyages and Travels (the Paesinovamente retrovati et novo mondo da Alberico Vesputio Florentino) ; they have frequently since been reprinted and translated (e.g. Ital. text in 1508, 1512, 1519, 1521, ! 55° (Ramusio), &c. ; Lat. version, Itinerarium Portugallensium, &c, 1508, 1532 (Grynaeus), &c. ; Fr. Sensuyt le nouveau monde, &c, 1516, 1521; German, Newe unbekante Landte, &c. 1508). See also C. Schefer, Relation des voyages . . . de Ca' da Mosto (1895); R. H. Major, Henry the Navigator (i868),pp. 246-287; C. R. Beazley, Henry the Navigator (1895), pp. 261-288; Yule Oldham, Discovery of the Cape Verde Islands (1892), esp. pp. 4-15.

It may be noted that Antonio Uso di Mare (Antoniotto Ususmaris), the Genoese, wrote his famous letter of the 12th of December 1455 (purporting to record a meeting with the last surviving descendant of the Genoese-Indian expedition of 1291, at or near the Gambia), after accompanying' Cadamosto to West Africa; see Beazley, Dawn of Modern Geography (1892), iii. 416-418.

CADASTRE (a French word from the Late Lat. capitastrum, a register of the poll-tax), a register of the real property of a country, with details of the area, the owners and the value. A " cadastral survey " is properly, therefore, one which gives such information as the Domesday Book, but the term is sometimes used loosely of the Ordnance Survey of the United Kingdom (1 = 2500), which is on sufficiently large a scale to give the area of every field or piece of ground.

CADDIS-FLY and CADDIS-WORM, the name given to insects with a superficial resemblance to moths, sometimes referred to the Neuroptera, sometimes to a special order, the Trichoptera, in allusion to the hairy clothing of the body and wings. Apart from this feature the Trichoptera also differ from the typical Neuroptera in the relatively simple, mostly longitudinal neuration of the wings, the absence or obsolescence of the mandibles and the semi-haustellate nature of the rest of the mouth-parts. Although caddis-flies are

sometimes referred to several families, the differences between the groups are of no great importance. Hence the insects may more conveniently be regarded as con- stituting the single family Phryganeidae. The larvae known as caddis-worms are aquatic. The mature females lay their eggs in the water, and the newly-hatched larvae provide them- selves with cases made of various particles such as grains of sand, pieces of wood or leaves stuck together with silk secreted from the salivary glands of the insect. These cases differ greatly

in structure and shape. Those of Phyrganea consist of bits of twigs or leaves cut to a suitable length and laid side by side in a long spirally-coiled band, forming the wall of a subcylindrical cavity. The cavity of the tube of Helicopsyche, composed of grains of sand, is itself spirally coiled, so that the case exactly resembles a small snail-shell in shape. One species of Limno- philus uses small but entire leaves; another, the shells of the pond- snail Planorbis; another, pieces of stick arranged transversely with reference to the long axis of the tube. To admit of the free inflow and outflow of currents of water necessary for respira- tion, which is effected by means of filamentous abdominal tracheal gills, the two ends of the tube are open. Sometimes the cases are fixed, but more often portable. In the latter case the larva crawls about the bottom of the water or up the stems of plants, with its thickly-chitinized head and legs protruding from the larger orifice, while it maintains a secure hold of the silk lining of the tube by means of a pair of strong hooks at the posterior end of its soft defenceless abdomen. Their food appears for the most part to be of a vegetable nature. Some species, however, are alleged to be carnivorous, and a North American form of the genus Hydropsyche is said to spin around the mouth of its burrow a silken net for the capture of small animal organisms living in the water. Before passing into the pupal stage, the larva partially closes the orifice of the tube with silk or pieces of stone loosely spun together and pervious to water. Through this temporary protection the active pupa, which closely re- sembles the mature insect, subsequently bites a way by means of its strong mandibles, and rising to the surface of the water casts the pupal integument and becomes sexually adult.

The above sketch may be regarded as descriptive of the life- history of a great majority of species of caddis-flies. It is only necessary here to mention one anomalous form, Enoicyla pusilla, in which the mature female is wingless and the larva is terrestrial, living in moss or decayed leaves.

Caddis-flies are universally distributed. Geologically they are known

to date back to the Oligocene period, and wings believed to be referable to them have been found in Liassic and Jurassic beds. (R. I. P.)

CADDO, a confederacy of North American Indian tribes which gave its name to the Caddoan stock, represented in the south by the Caddos, Wichita and Kichai, and in the north by the Pawnee and Arikara tribes. The Caddos, now reduced to some 500, settled in western Oklahoma, formerly ranged over the Red River (Louisiana) country, in what is now Arkansas, northern Texas and Oklahoma. The native name of the confederacy is Hasinai, corrupted by the French into Asinais and Cenis. The Caddoan tribes were mostly agricultural and sedentary, and to-day they are distinguished by their industry and in- telligence.

See Handbook of American Indians (Washington, 1907).

CADE, JOHN (d. 1450), commonly called Jack Cade, English rebel and leader of the rising of 1450, was probably an Irishman by birth, but the details of his early life are very scanty. He seems to have resided for a time in Sussex, to have fled from the country after committing a murder, and to have served in the French wars. Returning to England, he settled in Kent under the name of Aylmer and married a lady of good position. When the men of Kent rose in rebellion in May 1450, they were led by a man who took the name of Mortimer, and who has generally been regarded as identical with Cade. Mr James Gairdner, however, considers it probable that Cade did not take command of the rebels until after the skirmish at Sevenoaks on the r8th of June. At all events, it was Cade who led the insurgents from Blackheath to Southwark, and under him they made their way into London on the 3rd of July. A part of the populace was doubtless favourable to the rebels, but the opposing party gained strength when Cade and his men began to plunder. Having secured the execution of James Fiennes, Baron Say and Sele, and of William Crowmer, sheriff of Kent, Cade and his followers retired to Southwark, and on the 5th of July, after a fierce struggle on London Bridge, the citizens prevented them from re-entering the city. Cade then met the chancellor, John

Kemp, archbishop of York, and William of Wayneflete, bishop of Winchester, and terms of peace were arranged. Pardons were drawn

up, that for the leaders being in the name of Mortimer. Cade, however, retained some of his men, and at this time, or a day or two earlier, broke open the prisons in Southwark and released the prisoners, many of whom joined his band. Having collected some booty, he went to Rochester, made a futile attempt to capture Queenborough castle, and then quarrelled with his followers over some plunder. On the ioth of July a proclamation was issued against him in the name of Cade, and a reward was offered for his apprehension. Escaping into Sussex he was captured at Heathfield on the 12th. During the scuffle he had been severely wounded, and on the day of his capture he died in the cart which was conveying him to London. The body was afterwards beheaded and quartered, and in 1451 Cade was attainted.

See Robert Fabyan, The New Chronicles of England and France, edited by H. Ellis (London, 181 1); William of Worcester, Annates rerum Anglicarum, edited by J. Stevenson, (London, 1864) ; An English Chronicle of the Reigns of Richard II., Henry IV., Henry V. and Henry VI., edited by J. S. Davies (London, 1856) ; Historical Collections of a Citizen of London, edited by J. Gairdner (London, 1876) ; Three Fifteenth Century Chronicles, edited by J. Gairdner (London, 1880) ; J. Gairdner, Introduction to the Paston Letters (London, 1904) ; G. Kriehn, The English Rising of 1450 (Strassburg,

1892.)

CADENABBIA, a village of Lombardy, Italy, in the province of Como, about 15 m. N.N.E. by steamer from the town of Como. It is situated on the W. shore of the lake of Como, and owing to the great beauty of the scenery and of the vegetation, and its sheltered situation, is a favourite spring and autumn resort. The most famous of its villas is the Villa Carlotta, now the property of the duke of Saxe-Meiningen, which contains marble reliefs by Thorwaldsen, representing the triumph of Alexander, and statues by Canova.

CADENCE (through the Fr. from the Lat. cadentia, from coder e, to fall), a falling or sinking, especially as applied to rhythmical or musical sounds, as in the " fall " of the voice in speaking, the rhythm or measure of verses, song or dance. In music, the word is used of the closing chords of a musical phrase, which succeed one another in such a way as to produce, first an expectation or suspense, and then an impression of finality, indicating also the key strongly. " Cadenza," the Italian form of the same word, is used of a free flourish in a vocal or instru- mental composition, introduced immediately before the close of a movement or at the end of the

piece. The object is to display the performer's technique, or to prevent too abrupt a contrast between two movements. Cadenzas are usually left to the improvisation of the performer, but are sometimes written in full by the composer, or by some famous executant, as in the cadenza in Brahms's Violin Concerto, written by Joseph Joachim.

CADER IDRIS (" the Seat of Idris "), the second most imposing mountain in North Wales, standing in Merionethshire to the S. of Dolgelly, between the broad estuaries of the Mawddach and the Dovey. It is so called in memory of Idris Gawr, celebrated in the Triads as one of the three " Gwyn Serenyddion," or " Happy Astronomers," of Wales, who is traditionally supposed to have made his observations on this peak. Its loftiest point, known as Pen-y-gader, rises to the height of 2914 ft., and in clear weather commands a magnificent panorama of immense extent. The mountain is everywhere steep and rocky, especially on its southern side, which falls abruptly towards the Lake of Tal-y-llyn. Mention of Cader Idris and its legends is frequent in Welsh literature, old and modern.

CADET (through the Fr. from the Late Lat. capiteltum, a diminutive of caput, head, through the Provencal form capdet), the head of an inferior branch of a family, a younger son; particularly a military term for an accepted candidate for a commission in the army or navy, who is undergoing training to become an officer. This latter use of the term arose in France, where it was applied to the younger sons of the noblesse who gained commissioned rank, not by serving in the ranks or by entering the ecoles militaires, but by becoming attached to corps

without pay but with certain privileges. " Cadet Corps," in the British service, are bodies of boys or youths organized, armed and trained on volunteer military lines. Derived from " cadet," through the Scots form " cadee," comes " caddie," a messenger-boy, and particularly one who carries clubs at golf, and also the slang word " cad," a vulgar, ill-bred person.

CADGER (a word of obscure origin possibly connected with "catch"), a hawker or pedlar, a carrier of farm produce to market. The word in this sense has fallen into disuse, and now is used for a beggar or loafer, one who gets his living in more 01 less questionable ways.

CADI (qadi), a judge in a mahkama or Mahommedan ecclesi- astical court, in which decisions are rendered on the basis of the canon law of Islam {short 'a). It is a general duty, according to canon law, upon a Moslem community to judge legal disputes on this basis, and

it is an individual duty upon the ruler of the community to appoint a cadi to act for the community. Accord- ing to Shafi'ite law, such a cadi must be a male, free, adult Moslem, intelligent, of unassailed character, able to see, hear and write, learned in the Koran, the traditions, the Agreement, the differences of the legal schools, acquainted with Arabic grammar and the exegesis of the Koran. He must not sit in a mosque, except under necessity, but in some open, accessible place. He must maintain a strictly impartial attitude of body and mind, accept no presents from the people of his district, and render judgment only when he is in a normal condition mentally and physically. He may not engage in any business. He shall ride to the place where he holds court, greeting the people on both sides. He shall visit the sick and those returned from a journey, and attend funerals. On some of these points the codes differ, and the whole is to be regarded as the ideal qualification, built up theoretically by the canonists.

See Mahommedan Law; also Juynboll, De Mohammedaansche Wet (Leiden, 1903), pp. 287 ff.; Sachau, Muhammedanisches Rechl (Berlin, 1897), pp. 687 ff. (D. B. Ma.)

CADILLAC, a city and the county seat of Wexford county, Michigan, U.S.A., on Lake Cadillac, about 95 m. N. by E. of Grand Rapids and about 85 m. N.W. of Bay City. Pop. (1890) 4461; (1900) 5997, of whom 1676 were foreign-born; (1904) 68935(1910) 8375. Itis served bytheAnn Arbor and the Grand Rapids & Indiana railways. Cadillac overlooks picturesque lake scenery, and the good fishing for pike, pickerel and perch in the lake, and for brook trout in streams near by, attracts many visitors. Among the city's chief manufactures are hardwood lumber, iron, tables, crates and woodenware, veneer, flooring and flour. Cadillac was settled in 187.1, was incorporated as a village under the name of Clam Lake in 1875, was chartered as a city under its present name (from Antoine de la Mothe Cadillac) in 1877, and was rechartered in 1895.

CADIZ, a town of the province of Negros Occidental, island of Negros, Philippine Islands, on the N. coast, about 53 m. N.N.E. of Bacolod, the capital. Pop. (1903) 16,429. Lumber products are manufactured in the town, and a saw-mill here is said to be the largest in the Philippines.

CADIZ (Cddiz), a maritime province in the extreme south of Spain, formed in 1833 of districts taken from the province of Seville; and bounded on the N. by Seville, E. by Malaga, S.E. by the Mediterranean sea, S. by the Straits of Gibraltar, and W. by the

Atlantic Ocean. Pop. (1900) 452,659; area 2834 sq. m.; inclusive, in each case, of the town and territory of Ceuta, on the Moroccan coast, which belong, for administrative purposes, to Cadiz. The sea-board of Cadiz possesses several features of exceptional interest. On the Atlantic littoral, the broad Guadal- quivir estuary marks the frontier of Seville; farther south, the river Guadalete, which waters the northern districts, falls into the magnificent double bay of Cadiz; farther south again, is Cape Trafalgar, famous for the British naval victory of 1805. Near Trafalgar, the river Barbate issues into the straits of Gibraltar, after receiving several small tributaries, which combine with it to form, near its mouth, the broad and marshy Laguna de la Janda. Punta Marroqui, on the straits, is the southernmost promontory of the European mainland. The

most conspicuous feature of the east coast is Algeciras Bay, overlooked by the rock and fortress of Gibraltar. The river Guadiaro, which drains the eastern highlands, enters the Mediter- ranean close to the frontier of Malaga. In the interior there is a striking contrast between the comparatively level western half of Cadiz and the very picturesque mountain ranges of the eastern half, which are well wooded and abound in game. The whole region known as the Campo de Gibraltar is of this character; but it is in the north-east that the summits are most closely massed together, and attain their greatest altitudes in the Cerro de San Cristobal (5630 ft.) and the Sierra del Pinar (5413 ft.).

The climate is generally mild and temperate, some parts of the coast only being unhealthy owing to a marshy soil. Severe drought is not unusual, and it was largely this cause, together with want of capital, and the dependence of the peasantry on farming and fishing, that brought about the distress so prevalent early in the 20th century. The manufactures are insignificant compared with the importance of the natural products of the soil, especially wines and olives. Jerez de la Frontera (Xeres) is famous for the manufacture, and export of sherry. The fisheries furnish about 2500 tons of fish per annum, one-fifth part of which is salted for export and the rest consumed in Spain. There are no important mines, but a considerable amount of salt is obtained by evaporation of sea-water in pans near Cadiz, San Fernando, Puerto Real and Santa Maria. The railway from Seville passes through Jerez de la Frontera to Cadiz and San Fernando, and another line, from Granada, terminates at Algeciras; but at the

beginning of the 20th century, although it was proposed to construct railways from Jerez inland to Grazalema and coastwise from San Fernando to Tarifa, travellers who wished to visit these places were compelled to use the old-fashioned diligence, over indifferent roads, or to go by sea. The principal seaports are, after Cadiz the capital (pop. 1900, 69,382), Algeciras (13,302), La Linea (31,862), Puerto de Santa Maria (20,120), Puerto Real (10,535), the naval station of San Fernando (29,635), San Lucar (23,883) and Tarifa (11,723); the principal inland towns are Arcos de la Frontera (13,926), Chiclana (10,868), Jerez de la Frontera (63,473), Medina Sidonia (11,040), and V6jer de la Frontera (11,298). These are all described in separate articles. Grazalema (5587), Jimena de la Frontera (7549), and San Roque (8569) are less important towns with some trade in leather, cork, wine and farm produce. They all contain many Moorish antiquities, and Grazalema probably represents the Roman Lacidulermium. (See also Andalusia.)

CADIZ (in Lat. Gades, and formerly called Coles by the Eng- lish), the capital and principal seaport of the Spanish province of Cadiz; on the Bay of Cadiz, an inlet of the Atlantic Ocean, in 36 27′ N. and 6° 12′ W., 94 m. by rail S. of Seville. Pop. (1900) 69,382. Cadiz is built on the extremity of a tongue of land, projecting about 5 m. into the sea, in a north-westerly direction from the Isla de Leon. Its noble bay, more than 30 m. in circuit, and almost entirely land-locked by the isthmus and the headlands which lie to the north-east, has principally contributed to its commercial importance. The outer bay stretches from the promontory and town of Rota to the mouth of the river Guadalete; the inner bay, protected by the forts of Matagorda and Puntales, affords generally good anchorage, and contains a harbour formed by a projecting mole, where vessels of small burden may discharge. The entrance to the bays is rendered somewhat dangerous by the low shelving rocks (Cochinos and Las Puercas) which encumber the passage, and by the shifting banks of mud deposited by the Guadalete and the Rio Santi Petri, a broad channel separating the Isla de Leon from the main- land. At the mouth of this channel is the village of Caracca; close beside it is the important naval arsenal of San Fernando (q.v.); and on the isthmus are the defensive works known as the Cortadura, or Fort San Fernando, and the well-frequented sea- bathing establishments.

From its almost insular position Cadiz enjoys a mild and

serene climate. The Medina, or land-wind, so-called because it

blows from the direction of Medina Sidonia, prevails during the

Winter; the moisture-laden VirazSn, a westerly sea-breeze,

sets in with the spring. The mean annual temperature is about 64° F., while the mean summer and winter temperatures vary only about io° above and below this point; but the damp atmosphere is very oppressive in summer, and its unhealthiness is enhanced by the inadequate drainage and the masses of rotting seaweed piled along the shore. The high death-rate, nearly 45 per thousand, is also due to the bad water-supply, the water being either collected in cisterns from the tops of the houses, or brought at great expense from Santa Maria on the opposite coast by an aqueduct nearly 30 m. long. An English company started a waterworks in Cadiz about 1875, but came to grief through the incapacity of the population to appreciate its necessity.

The city, which is 6 or 7 m. an circumference, is sur- rounded by a wall with five gates, one of which communicates with the isthmus. Seen from a distance off the coast, it presents a magnificent display of snow-white turrets rising majestically from the sea; and for the uniformity and elegance of its buildings, it must certainly be ranked as one of the finest cities of Spain, although, being hemmed in on all sides, its streets and squares are necessarily contracted. Every house annually receives a coating of whitewash, which, when it is new, produces a disagree- able glare. The city is distinguished by its somewhat deceptive air of cleanliness, its quiet streets, where no wheeled traffic passes, and its lavish use of white Italian marble. But the most characteristic feature of Cadiz is the marine promenades, fringing the city all round between the ramparts and the sea, especially that called the Alameda, on the eastern side, commanding a view of the shipping in the bay and the ports on the opposite shore. The houses are generally lofty and surmounted by turrets and flat roofs in the Moorish style.

Cadiz is the see of a bishop, who is suffragan to the archbishop of Seville, but its chief conventual and monastic institutions have been suppressed. Of its two cathedrals, one was originally erected by Alphonso X. of Castile (1252-1284), and rebuilt after 1596; the other, begun in 1722, was completed between 1832 and 1838. Under the high altar of the old cathedral rises the only freshwater spring in Cadiz. The chief secular buildings include the Hospicio, or Casa de Misericordia, adorned with a marble portico, and having an interior court with Doric colonnades; the bull-ring, with room for 12,000 spectators; the two theatres, the prison, the custom-house, and the

lighthouse of San Sebastian on the western side rising 1 7 2 f t. from the rock on which it stands. Besides the Hospicio already mentioned, which sometimes contains 1000 inmates, there are numerous other charitable in- stitutions, such as the women's hospital, the foundling institu- tion, the admirable Hospicio de San Juan de Dios for men, and the lunatic asylum. Gratuitous instruction is given to a large number of children, and there are several mathematical and commercial academies, maintained by different commercial corporations, a nautical school, a school of design, a theological seminary and a flourishing medical school. The museum is filled for the most part with Roman and Carthaginian coins and other antiquities; the academy contains a valuable collection of pictures. In the church of Santa Catalina, which formerly belonged to the Capuchin convent, now secularized, there is an unfinished picture of the marriage of St Catherine, by Murillo, who met his death by falling from the scaffold on which he was painting it (3rd of April 1682).

Cadiz no longer ranks among the first marine cities of the world. Its harbour works are insufficient and antiquated, though a scheme for their improvement was adopted in 1903; its com- munications with the mainland consist of a road and a single line of railway; its inhabitants, apart from foreign residents and a few of the more enterprising merchants, rest contented with such prosperity as a fine natural harbour and an unsurpassed geographical situation cannot fail to confer. Several great shipping lines call here; shipbuilding yards and various factories exist on the mainland; and there is a considerable trade in the exportation of wine, principally sherry from Jerez, salt, olives, figs, canary-seed and ready-made corks; and in the importation of fuel, iron and machinery, building materials, American oak staves for casks, &c. In 1904, 2753 ships of 1,745,588 tons

entered the port. But local trade, though still considerable, remains stationary if it does not actually recede. Its decline, originally due to the Napoleonic wars and the acquisition of independence by many Spanish colonies early in the 19th century, was already recognised, and an attempt made to check it in 1828, when the Spanish government declared Cadiz a free warehousing port; but this

valuable privilege was withdrawn in 1 S3 2 . Among the more modern causes of depression have been the rivalry of Gibraltar and Seville ; the decreasing demand for sherry; and the disasters of the Spanish -American war of 1898, which almost ruined local commerce with Cuba and Porto Rico.

History. — Cadiz represents the Sem. Agadir, Gadir, or Gaddir (" stronghold ") of the Carthaginians, the Gr. Gadeira, and the Lat. Gades. Tradition ascribes its foundation to Phoenician merchants from Tyre, as early as 1100 B.C.; and in the 7th century it had already become the great mart of the west for amber and tin from the Cassiterides (q.v.) . About 501 B.C. it was occupied by the Carthaginians, who made it their base for the conquest of southern Iberia, and in the 3rd century for the equipment of the armaments with which Hannibal undertook to destroy the power of Rome. But the loyalty of Gades, already weakened by trade rivalry with Carthage, gave way after the second Punic War. Its citizens welcomed the victorious Romans, and assisted them in turn to fit out an expedition against Carthage. Thenceforward, its rapidly-growing trade in dried fish and meat, and in all the produce of the fertile Baetis (Guadalquivir) valley, attracted many Greek settlers; while men of learning, such as Pytheas in the 4th century B.C., Polybius and Artemidorus of Ephesus in the 2nd, and Posidonius in the 1st, came to study the ebb and flow of its tides, unparalleled in the Mediterranean. C. Julius Caesar conferred the civitas of Rome on all its citizens in 49 B.C.; and, not long after L. Cornelius Balbus Minor built what was called the " New City," constructed the harbour which is now known as Puerto Real, and spanned the strait of Santi Petri with the bridge which unites the Isla de Leon with the mainland, and is now known as the Puente de Zuazo, after Juan Sanchez de Zuazo, who restored it in the 1 5th century. Under Augustus, when it was the residence of no fewer than 500 equites, a total only surpassed in Rome and Padua, Gades was made a municipium with the name of Augusta Urbs Gaditana, and its citizens ranked next to those of Rome. In the 1 st century a.d. it was the birthplace or home of several famous authors, including Lucius Columella, poet and writer on husbandry; but it was more renowned for gaiety and luxury than for learning. Juvenal and Martial write of Jocosae Gades, " Cadiz the Joyous," as naturally as the modern Andalusian speaks of Cadiz la Joyosa; and throughout the Roman world its cookery and its dancing-girls were famous. In the 5th century, however, the overthrow of Roman dominion in Spain by the Visigoths involved Cadiz in destruction. A few fragments of masonry, submerged under the sea, are almost all that remains of the original city. Moorish rule

over the port, which was re- named Jezirat-Kadis, lasted from 711 until 1262, when Cadiz was captured, rebuilt and repeopled by Alphonso X. of Castile. Its renewed prosperity dates from the discovery of America in 1492. As the headquarters of the Spanish treasure fleets, it soon recovered its position as thewealthiest port of westernEurope,and consequently it was a favourite point of attack for the enemies of Spain. During the 16th century it repelled a series of raids by the Barbary corsairs; in 1587 all the shipping in its harbour was burned by the English squadron under Sir Francis Drake; in 1596 the fleet of the earl of Essex and Lord Charles Howard sacked the city, and destroyed forty merchant vessels and thirteen warships. This disaster necessitated the rebuilding of Cadiz on a new plan. Its recovered wealth tempted the duke of Bucking-ham to promote the fruitless expedition to Cadiz of 1626; thirty years later Admiral Blake blockaded the harbour in an endeavour to intercept the treasure fleet; and in 1702 another attack was made by the British under Sir George Rooke and the duke of Ormonde. During the 18th century the wealth of Cadiz became greater than ever; from 1720 to 1765, when it ' enjoyed a monopoly of the trade with Spanish America, the city

annually imported gold and silver to the value of about £5,000,000. With the closing years of the century, however, it entered upon a period of misfortune. From February 1797 to April 1798 it was blockaded by the British fleet, after the battle of Cape St Vincent; and in 1800 it was bombarded by Nelson. In 1808 the citizens captured a French squadron which was imprisoned by the British fleet in the inner bay. From February 1810 until the duke of Wellington raised the siege in August 1812, Cadiz resisted the French forces sent to capture it; and during these two years it served as the capital of all Spain which could escape annexation by Napoleon. Here, too, the Cortes met and promulgated the famous Liberal constitution of March 1 8 1 2 . To secure a renewal of this constitution, the citizens revolted in 1820; the revolution spread throughout Spain; the king, Ferdinand VII., was imprisoned at Cadiz, which again became the seat of the Cortes; and foreign intervention alone checked the movement towards reform. A French army, under the due d'Angouleme, seized Cadiz in 1823, secured the release of Ferdinand and suppressed Liberalism. In 1868 the city was the centre of the revolution which effected the dethronement of Queen Isabella.

See Sevilla y Cadiz, sus monumentos y artes, su naturaleza e historia, an illustrated volume in the series " Espafia," by P. de Madrazo (Barcelona, 1884) ; Recuerdos Gaditanos, a very full history of local affairs, by J. M. Leon y Dominguez (Cadiz, 1897) ;

Historia de Cadiz y de su provincia desde los remotos tiempos hasta 1 824, by A. de Castro (Cadiz, 1858) ; and Description historico-artistica de la catedral de Cadiz, by J. de Urrutia (Cadiz, 1843).

CADMIUM (symbol Cd, atomic weight 112-4 (0 = i6)), a metallic element, showing a close relationship to zinc, with which it is very frequently associated. It was discovered in 181 7 by F. Stromeyer in a sample of zinc carbonate from which a specimen of zinc oxide was obtained, having a yellow colour, although quite free from iron; Stromeyer showing that this coloration was due to the presence of the oxide of a new metal. Simultaneously Hermann, a German chemical manufacturer, discovered the new metal in a specimen of zinc oxide which had been thought to contain arsenic, since it gave a yellow precipitate, in acid solution, on the addition of sulphuretted hydrogen. This supposition was shown to be incorrect, and the nature of the new element was ascertained.

Cadmium does not occur naturally intheuncombinedcondition, and only one mineral is known which contains it in any appreci- able quantity, namely, greenockite, or cadmium sulphide, found at Greenock and at Bishopton in Scotland, and in Bohemia and Pennsylvania. It is, however, nearly always found associated with zinc blende, and with calamine, although only in small quantities.

The metal is usually obtained from the flue-dust (produced during the first three or four hours working of a zinc distillation) which is collected in the sheet iron cones or adapters of the zinc retorts. This is mixed with small coal, and when redistilled gives an enriched dust, and by repeating the process and distilling from cast iron retorts the metal is obtained. It can be purified by solution in hydrochloric acid and subsequent precipitation by metallic zinc.

Cadmium is a white metal, possessing a bluish tinge, and is capable of taking a high polish ; on breaking, it shows a distinct fibrous fracture. By sublimation in a current of hydrogen it can be crystallized in the form of regular octahedra; it is slightly harder than tin, but is softer than zinc, and like tin, emits a crackling sound when bent. It is malleable and can be rolled out into sheets. The specific gravity of the metal is 8-564, this value being slightly increased after hammering; its specific heat is 0-0548 (R. Bunsen), it melts at 310-320 C. and boils between 763-772° C. (T. Carnelley), forming a deep yellow vapour. The cadmium molecule, as shown by determinations of the density of its vapour, is monatomic. The metal unites with the majority of the heavy metals to form alloys; some of these, the so-called fusible alloys, find a useful application from the

fact that they possess a low melting-point. It also forms amalgams with mercury, and on this account has been employed in dentistry for the purpose of stopping (or filling)

teeth. The metal is quite permanent in dry air, but in moist air it becomes coated with a superficial layer of the oxide; it burns on heating to redness, forming a brown coloured oxide; and is readily soluble in mineral acids with formation of the corre- sponding salts. Cadmium vapour decomposes water at a red heat, with liberation of hydrogen, and formation of the oxide of the metal.

Cadmium oxide, CdO, is a brown powder of specific gravity 6-5, which can be prepared by heating the metal in air or in oxygen; or by ignition of the nitrate or carbonate; by heating the metal to a white heat in a current of oxygen it is obtained as a dark red crystalline sublimate. It does not melt at a white heat, and is easily reduced to the metal by heating in a current of hydrogen or with carbon. It is a basic oxide, dissolving readily in acids, with the formation of salts, somewhat analogous to those of zinc.

Cadmium hydroxide, Cd(OH)2, is obtained as a white precipitate by adding potassium hydroxide to a solution of any soluble cad- mium salt. It is decomposed by heat into the oxide and water, and is soluble in ammonia but not in excess of dilute potassium hydroxide; this latter property serves to distinguish it from zinc hydroxide.

• The chloride,CdCl 2 , bromide, CdBr 2 ,and iodide,CdI 2 ,arealsoknown, cadmium iodide being sometimes used in photography, as it is one of the few iodides which are soluble in alcohol. Cadmium chloride and iodide have been shown to behave in an anomalous way in aqueous solution (W. Hittorf, Pogg. Ann., 1859, 106, 513), probably owing to the formation of complex ions; the abnormal behaviour apparently diminishing as the solution becomes more and more dilute, until, at very high dilutions the salts are ionized in the normal manner.

Cadmium sulphate, CdSC>4, is known in several hydrated forms; being deposited, on spontaneous evaporation of a concentrated aqueous solution, in the form of large monosymmetric crystals of composition 3CdS04-8H 2 0, whilst a boiling saturated solution, to which concentrated sulphuric acid has been added, deposits crystals

of composition CdS0 4 -H 2 0. It is largely used for the purpose of making standard electric cells, such for example as the Weston cell.

Cadmium sulphide, CdS, occurs naturally as greenockite (q.v.), and can be artificially prepared by passing sulphuretted hydrogen through acid solutions of soluble cadmium salts, when it is precipitated as a pale yellow amorphous solid. It is used as a pigment (cadmium yellow), for it retains its colour in an atmosphere containing sulphuretted hydrogen ; it melts at a white heat, and on cooling solidifies to a lemon-yellow micaceous mass.

Normal cadmium carbonates are unknown, a white precipitate of variable composition being obtained on the addition of solutions of the alkaline carbonates to soluble cadmium salts.

Cadmium nitrate, Cd(N0 3)2-4H 2 0, is a deliquescent salt, which may be obtained by dissolving either the metal, or its oxide or carbonate in dilute nitric acid. It crystallizes in needles and is soluble in alcohol.

Cadmium salts can be recognized by the brown incrustation which is formed when they are heated on charcoal in the oxidizing flame of the blowpipe; and also by the yellow precipitate formed when sulphuretted hydrogen is passed though their acidified solu- tions. This precipitate is insoluble in cold dilute acids, in ammonium sulphide, and in solutions of the caustic alkalis, a behaviour which distinguishes it from the yellow sulphides of arsenic and tin. Cadmium is estimated quantitatively by conversion into the oxide, being precipitated from boiling solutions by the addition of sodium carbonate, the carbonate thus formed passing into the oxide on ignition. It can also be determined as sulphide, by precipitation with sulphuretted hydrogen, the precipitated sulphide being dried at 100° C. and weighed.

The atomic weight of cadmium was found by O. W. Huntington (Berichte, 1882, 15, p. 80), from an analysis of the pure bromide, to be 111-9. H. N. Morse and H. C. Jones (Amer. Chem. Journ., 1892, 14, p. 261) by conversion of cadmium into the oxalate and then into oxide, obtained values ranging from 111-981 to 112-05, whilst W. S. Lorimer and E. F. Smith (Zeit. fur anorg. Chem., 1891, I, p. 364), by the electrolytic reduction of cadmium oxide in potas- sium cyanide solution, obtained as a mean value 112-055. The atomic weight of cadmium has been revised by G. P. Baxter and M. A. Hines (Journ. Amer. Chem. Soc, 1905, 27, p. 222), by deter- minations of the ratio of cadmium chloride to silver chloride, and of the amount

of silver required to precipitate cadmium chloride. The mean value obtained was 112-469 (Ag = 107-93). The mean value 112-467 was obtained by Baxter, Hines and Frevert {ibid., 1906, 28, p. 770) by analysing cadmium bromide.

CADMUS, in Greek legend, son of Agenor, king of Phoenicia and brother of Europa. After his sister had been carried off by Zeus, he was sent out to find her. Unsuccessful in his search, he came in the course of his wanderings to Delphi, where he con- sulted the oracle. He was ordered to give up his quest and follow a cow which would meet him, and to build a town on the spot

where she should lie down exhausted. The cow met him in Phocis, and guided him to Boeotia, where he founded the city of Thebes. Intending to sacrifice the cow, he sent some of his companions to a neighbouring spring for water. They were slain by a dragon, which was in turn destroyed by Cadmus; and by the instructions of Athena he sowed its teeth in the ground, from which there sprang a race of fierce armed men, called Sparti (sown) . By throwing a stone among them Cadmus caused them to fall upon each other till only five survived, who assisted him to build the Cadmeia or citadel of Thebes and became the founders of the noblest families of that city (Ovid, Metam. iii. 1 ff.; Apollodorus iii. 4, 5). Cadmus, however, because of this bloodshed, had to do penance for eight years. At the expiration of this period the gods gave him to wife Harmonia (q.v.), daughter of Ares and Aphrodite, by whom he had a son Polydorus, and four daughters, Ino, Autonoe, Agave and Semele — a family which was overtaken by grievous misfortunes. At the marriage all the gods were present; Harmonia received as bridal gifts a peplos worked by Athena and a necklace made by Hephaestus. Cadmus is said to have finally retired with Harmonia to Illyria, where he became king. After death, he and his wife were changed into snakes, which watched the tomb while their souls were translated to the Elysian fields.

There is little doubt that Cadmus was originally a Boeotian, that is, a Greek hero. In later times the story of a Phoenician immigrant of that name became current, to whom was ascribed the introduction of the alphabet, the invention of agriculture and working in bronze and of civilization generally. But the name itself is Greek rather than Phoenician; and the fact that Hermes was worshipped in Samothrace under the name of Cadmus or Cadmilus seems to show that the Theban Cadmus was originally an ancestral Theban hero corresponding to the Samothracian. The name may mean " order," and be used to characterize one who introduces order and civilization.

The exhaustive article by O. Crusius in W. H. Roscher's Lexikon der Mythologie contains a list of modern authorities on the subject of Cadmus; see also O. Gruppe, De Cadmi Fabula (1891).

CADMUS OF MILETUS, according to some ancient authorities the oldest of the logographi (q.v.). Modern scholars, who accept this view, assign him to about 550 B.C.; others regard him as purely mythical. A confused notice in Suidas mentions three persons of the name: the first, the inventor of the alphabet; the second, the son of Pandion, " according to some " the first prose writer, a little later than Orpheus, author of a history of the Foundation of Miletus and of Ionia generally, in four books; the third, the son of Archelaus, of later date, author of a history of Attica in fourteen books, and of some poems of an erotic character. As Dionysius of Halicarnassus (Judicium de Thucydide, c. 23) distinctly states that the work current in his time under the name of Cadmus was a forgery, it is most prob- able that the two first are identical with the Phoenician Cadmus, who, as the reputed inventor of letters, was subsequently trans- formed into the Milesian and the author of an historical work. In this connexion it should be observed that the old Milesian nobles traced their descent back to the Phoenician or one of his companions. The text of the notice of the third Cadmus of Miletus in Suidas is unsatisfactory; and it is uncertain whether he is to be explained in the same way, or whether he was an historical personage, of whom all further record is lost.

See C. W. Miiller, Frag. Hist. Graec. ii. 2-4; and O. Crusius in Roscher's Lexikon der Mythologie (article " Kadmos," 90, 91).

CADOGAN, WILLIAM CADOGAN, 1st Earl (1675-1726), British soldier, was the son of Henry Cadogan, a Dublin barrister, and grandson of Major William Cadogan (1601-1661), governor of Trim. The family has been credited with a descent from Cadwgan,the old Welsh prince. Cadogan began his military career as a cornet of horse under William III. at the Boyne, and, with the regiment now known as the 5th (Royal Irish) Lancers, made the campaigns in the Low Countries. In the course of these years he attracted the notice of Marlborough. In 1701 Cadogan was employed by him as a staff officer in the complicated task of concentrating the grand army formed by contingents from

multitudinous states, and Marlborough soon made the young officer his confidential staff officer and right-hand man. His services in the campaign of 1701 were rewarded with the colonelcy of the famous " Cadogan's Horse " (now the 5th Dragoon Guards) . As quartermaster-general, it fell to his lot to organize the celebrated march of the allies to the Danube, which, as well as the return march with its heavy convoys, he managed with consummate skill. At the Schellenberg he was wounded and his horse shot under him, and at Blenheim he acted as Marlborough's chief of staff. Soon afterwards he was promoted brigadier- general, and in 1705 he led " Cadogan's Horse " at the forcing of the Brabant lines between Wange and Elissem, capturing four standards. He was present at Ramillies, and immediately afterwards was sent to take Antwerp, which he did without difficulty. Becoming major-general in 1706, he continued to perform the numerous duties of chief staff officer, quartermaster-general and colonel of cavalry, besides which he was throughout constantly employed in delicate diplomatic missions. In the course of the campaign of 1707, when leading a foraging expedi- tion, he fell into the hands of the enemy but was soon exchanged. In 1 708 he commanded the advanced guard of the army in the operations which culminated in the victory of Oudenarde, and in the same year he was with Webb at the action of Wynendael. On the 1st of January 1709 he was made lieutenant-general. At the siege of Menin in this year occurred an incident which well illustrates his qualifications as a staff officer and diplomatist. Marlborough, riding with his staff close to the French, suddenly dropped his glove and told Cadogan to pick it up. This seem- ingly insolent command was carried out at once, and when Marlborough on the return to camp explained that he wished a battery to be erected on the spot, Cadogan informed him that he had already given orders to that effect. He was present at Malplaquet, and after the battle was sent off to form the siege of Mons, at which he was dangerously wounded. At the end of the year he received the appointment of lieutenant of the Tower, but he continued with the army in Flanders to the end of the war. His loyalty to the fallen Marlborough cost him, in 171 2, his rank, positions and emoluments under the crown. George I. on his accession, however, reinstated Cadogan, and, amongst other appointments, made him lieutenant of the ordnance. In 1715, as British plenipotentiary, he signed the third Barrier Treaty between Great Britain, Holland and the emperor. His last campaign was the Jacobite insurrection of 1715-1716. At first as Argyle's subordinate (see Coxe, Memoirs of Marlborough, cap. cxiv.), and later as commander-in-chief, General Cadogan by his firm, energetic and skilful handling of his task restored quiet and order in Scotland. Up to the death of Marlborough he was

continually employed in diplomatic posts of special trust, and in 17 18 he was made Earl Cadogan, Viscount Caversham and Baron Cadogan of Oakley. In 1722 he succeeded his old chief as head of the army and master-general of the ordnance, becoming at the same time colonel of the 1st or Grenadier Guards. He sat in five successive parliaments as member for Woodstock. He died at Kensington in 1726, leaving two daughters, one of whom married the second duke of Richmond and the other the second son of William earl of Portland.

Readers of Esmond will have formed a very unfavourable estimate of Cadogan, and it should be remembered that Thackeray's hero was the friend and supporter of the opposition and General Webb. As a soldier, Cadogan was one of the best staff officers in the annals of the British army, and in com- mand of detachments, and also as -a commander-in-chief, he showed himself to be an able, careful and withal dashing leader.

He was succeeded, by special remainder, in the barony by his brother, General Charles Cadogan (1691-1776), who married the daughter of Sir Hans Sloane, thus beginning the association of the family with Chelsea, and died in 1776, being succeeded in turn by his son Charles Sloane (1728-1807), who in the year 1800 was created Viscount Chelsea and Earl Cadogan. His descendant George Henry, 5th Earl Cadogan (b. 1840), was lord privy seal from 1886 to 1892, and lord-lieutenant of Ireland from 1895 to

1902.

CADOUDAL, GEORGES (1771-1804), leader of the Ckouans during the French Revolution, was born in 1771 near Auray. He had received a fair education, and when the Revolution broke out he remained true to his royalist and Catholic teaching. From 1793 he organized a rebellion in the Morbihan against the revolu- tionary government. It was quickly suppressed and he there- upon joined the army of the revolted Vendeans, taking part in the battles of Le Mans and of Savenay in December 1 793. Return- ing to Morbihan, he was arrested, and imprisoned at Brest. He succeeded, however, in escaping, and began again the struggle against the Revolution. In spite of the defeat of his Hfirty, and of the fact that he was forced several times to take refuge in England, Cadoudal did not cease both to wage war and to con- spire in favour of the royalist pretenders. He refused to come to any understanding with the government, although offers were made to him by Bonaparte, who admired his skill and his obstinate energy. From 1800 it was impossible for Cadoudal to

continue to wage open war, so he took altogether to plotting. He was indirectly concerned in the attempt made by Saint- Regent in the rue Sainte Nicaise on the life of the First Consul, in December 1800, and fled to England again. In 1803 he returned to France to undertake a new attempt against Bonaparte. Though watched for by the police, he succeeded in eluding them for six months, but was at length arrested. Found guilty and condemned to death, he refused to ask for pardon and was executed in Paris on the 10th of June 1804, along with eleven of his companions. He is often called simply Georges.

See Proces de Georges, Moreauet Pichegru (Paris, 1804, 8 vols. 8vo) ; the Memoires of Bourrienne, of Hyde de Neuville and of Rohu ; Lenotre, Tournebut (on the arrest) ; Lejean, Biographie bretonne; and the bibliography to the article Vendee.

CADRE (Fr. for a frame, from the Lat. quadrum, a square), a framework or skeleton, particularly the permanent establishment of a military corps, regiment, &c. which can be expanded on emergency.

CADUCEUS (the Lat. adaptation of the Doric Gr. Kapvutvov, Attic KTjpweiov, a herald's wand), the staff used by the mes- sengers of the gods, and especially by Hermes as conductor of the souls of the dead to the world below. The caduceus of Hermes, which was given him by Apollo in exchange for the lyre, was a magic wand which exercised influence over the living and the dead, bestowed wealth and prosperity and turned every- thing it touched into gold. In its oldest form it was a rod ending in two prongs twined into a knot (probably an olive branch with two shoots, adorned with ribbons or garlands), for which, later, two serpents, with heads meeting at the top, were substituted. The mythologists explained this by the story of Hermes finding two serpents thus knotted together while fighting; he separated them with his wand, which, crowned by the serpents, became the symbol of the settlement of quarrels (Thucydides i. 53; Macro- bius, Sat. i. 19; Hyginus, Poet. Aslron. ii. 7). A pair of wings was sometimes attached to the top of the staff, in token of the speed of Hermes as a messenger. In historical times the caduceus was the attribute of Hermes as the god of commerce and peace, and among the Greeks it was the distinctive mark of heralds and ambassadors, whose persons it rendered inviol- able. The caduceus itself was not used by the Romans, but the derivative caduceator occurs in the sense of a peace commissioner.

See L. Preller, " Der Hermesstab " in Philologus, i. (1846) ; O. A. Hoffmann, Hermes und Kerykeion (1890), who argues that Hermes

is a male lunar divinity and his staff the special attribute of Aphrodite- Astarte.

CADUCOUS (Lat. caducus), a botanical term for " falling early," as the sepals of a poppy, before the petals expand.

CAECILIA. This name was given by Linnaeus to the blind, or nearly blind, worm-like Batrachians which were formerly associated with the snakes and are now classed as an order under the names of Apoda, Peromela or Gymnophiona. The type of the genus Caecilia is Caecilia tcntacidata, a moderately slender species, not unlike a huge earth-worm, growing to 2 ft. in length with a diameter of three-quarters of an inch. It is one of the largest species of the order. Other species of the same genus are very slender in form, as for instance Caecilia gracilis.

which with a length of 2j ft. has a diameter of only a quarter of an inch. One of the most remarkable characters of the genus Caecilia, which it shares with about two-thirds of the known genera of the order, is the presence of thin, cycloid, imbricate scales imbedded in the skin, a character only to be detected by raising the epidermis near the dermal folds, which more or less completely encircle the body. This feature, unique among living Batrachians, is probably directly inherited from the scaly Stego- cephalia, a view which is further strengthened by the similarity of structure of these scales in both groups, which the histological in- vestigations of H. Credner have revealed. The skull is well ossified and contains a greater number of bones than occur in any other living Batrachian. There is therefore strong reason for tracing the Caecilians directly from the Stegocephalia, as was the view of T. H. Huxley and of R. Wiedersheim, since supported by H. Gadow and by J. S. Kingsley. E. D. Cope had advocated the abolition of the order Apoda and the incorporation of the Caecilians among the Urodela or Caudata in the vicinity of the Amphiumidae, of which he regarded them as further degraded descendants; and this opinion, which was supported by very feeble and partly erroneous arguments, has unfortunately received the support of the two great authorities, P. and F. Sarasin, to whom we are indebted for our first information on the breeding habits and development of these Batrachians.

The knowledge of species of Caecilians has made rapid progress, and

we are now acquainted with about fifty, which are referred to twenty-one genera. The principal characters on which these genera are founded reside in the presence or absence of scales, the presence or absence of eyes, the presence of one or of two series of teeth in the lower jaw, the structure of the tentacle (representing the so-called " balancers " of Urodele larvae) on the side of the snout, and the presence or absence of a vacuity between the parietal and squamosal bones of the skull. Of these twenty-one genera six are peculiar to tropical Africa, one to the Seychelles, four to south-eastern Asia, eight to Central and South America, one occurs in both continental Africa and the Seychelles, and one is common to Africa and South America.

These Batrachians are found in damp situations, usually in soft mud. The complete development of Ichthyophis glutinosus has been observed in Ceylon by P. and F. Sarasin. The eggs, forming a rosary-like string, are very large, and deposited in a burrow near the water. The female protects them by coiling herself round the egg-mass, which the young do not leave till after the loss of the very large external gills (one on each side) ; they then lead an aquatic life, and are provided with an opening, or spiraculum, on each side of the neck. In these larvae the head is fish-like, provided with much-developed labial lobes, with the eyes much more distinct than in the perfect animal; the tail, which is quite rudimentary in all Caecilians, is very distinct, strongly compressed, and bordered above and beneath by a dermal fold.

In Hypogeophis, a Caecilian from the Seychelles studied by A. Brauer, the development resembles that of Ichthyophis, but there is no aquatic larval stage. The young leaves the egg in the perfect condition, and at once leads a terrestrial life like its parents. In accordance with this abbreviated development, the caudal membranous crest does not exist, and the branchial aperture closes as soon as the external gills disappear.

In the South American Typhlonectes, and in the Dermophis from the Island of St Thome, West Africa, the young are brought forth alive, in the former as larvae with external gills, and in the latter in the perfect air-breathing condition.

References. — R. Wiedersheim, Anatomie der Gymnophionen (Jena, 1879), 4to; G. A. Boulenger, " Synopsis of the Genera and Species," P.Z.S., 1895, P- 4 01 ; R- Greeff, " f jber Siphonops tho- mensis," Sizb. Ges. Naiurw. (Marburg, 1884), p, 15 ; P. and F. Sarasin, Naturwissenschaftliche Forschungen auf Ceylon, ii. (Wiesbaden,

1887- 1890), 4to; A. Brauer, " Beitrage zur Kenntnis der Entwicklungsgeschichte und der Anatomie der Gymnophionen," Zool. Jahrb. Ana. x., 1897, P- 389, xii., 1898, p. 477, and xvii., 1904, Suppl. p. 381 ; E. A. Goldi, " Entwickl'ung von Siphonops annulatus," Zool. Jahrb. Syst. xii., 1899, p. 170; J. S. Kingsley, "The systematic Position of the Caecilians," Tufts Coll. Stud, vii., 1902, p. 323.

(G. A. B.)

CAECILIA, VIA, an ancient highroad of Italy, which diverged from the Via Salaria at the 35th m. from Rome, and ran by Amiternum to the Adriatic coast, passing probably by Hadria. A branch ran to Interamna Praetuttiorum (Teramo) and thence probably to the sea at Castrum Novum (Giulianova), a distance of about 151 m. from Rome. It was probably constructed by L. Caecilius Metellus Diadematus (consul in 117 B.C.).

See C. Hiilsen in Notizie degli Scavi (1896), 87 seq. N. Persichetti in Rdmische Mitteilungen (1898), 193 seq.; (1902), 277 seq.

CAECILIUS, of Calacte (KaXij'A/c-n?) in Sicily, Greek rhetorician, flourished at Rome during the reign of Augustus. Originally called Archagathus, he took the name of Caecilius from his patron, one of the Metelli. According to Suidas, he was by birth a Jew. Next to Dionysius of Halicarnassus, he was the most important critic and rhetorician of the Augustan age. Only fragments are extant of his numerous and important works, among which may be mentioned : On the Style of the Ten Orators (including their lives and a critical examination of their works), the basis of the pseudo-Plutarchian treatise of the same name, in which Caecilius is frequently referred to; On the Sublime, attacked by (?) Longinus in his essay on the same subject (see L. Martens, De Libello Ilept vfovs, 1877); History of the Servile Wars, or slave risings in Sicily, the local interest of which would naturally appeal to the author; On Rhetoric and Rhetorical Figures; an Alphabetical Selection of Phrases, intended to serve as a guide to the acquirement of a pure Attic style — the first example of an Atticist lexicon, mentioned by Suidas in the preface to his lexicon as one of his authorities; Against the Phrygians, probably an attack on the florid style of the Asiatic school of rhetoric.

The fragments have been collected and edited by T. Burckhardt (1863), and E. Ofenloch (1907); some in C. W. Miiller, Fragmenta Historicorum Graecorum, iii.; C. Bursian's Jahresbericht . . . der classischen Altertumswissenschaft, xxiii. (1896), contains full notices of recent works on Caecilius, by C. Hammer; F. Blass,

Griechische Beredsamkeit von Alexander bis auf Augustus (1865), treats of Dionysius of Halicarnassus and Caecilius together; see also J. Brzoska in Pauly-Wissowa, Realencyclopddie (1897).

CAECILIUS STATIUS, or Statius Caecilius, Roman comic poet, contemporary and intimate friend of Ennius, died in 168 (or 166) B.C. He was born in the territory of the Insubrian Gauls, and was probably taken as a prisoner to Rome {c. 200), during the great Gallic war. Originally a slave, he assumed the name of Caecilius from his patron, probably one of the Metelli. He supported himself by adapting Greek plays for the Roman stage from the new comedy writers, especially Menander. If the statement in the life of Terence by Suetonius is correct and the reading sound, Caecilius's judgment was so esteemed- that he was ordered to hear Terence's Andria (exhibited 166 B.C.) read and to pronounce an opinion upon it. After several failures Caecilius gained a high reputation. Volcacius Sedigitus, the dramatic critic, places him first amongst the comic poets; Varro credits him with pathos and skill in the construction of his plots; Horace {Epistles, ii. 1. 59) contrasts his dignity with the art of Terence. Quintilian {Inst. Orat., x. 1. 99) speaks somewhat disparagingly of him, and Cicero, although he admits with some hesitation that Caecilius may have been the chief of the comic poets {De Optimo Genere Oratorum, 1), considers him inferior to Terence in style and Latinity {Ad Alt. vii. 3), as was only natural, considering his foreign extraction. The fact that his plays could be referred to by name alone without any indica- tion of the author (Cicero, De Finibus, ii. 7) is sufficient proof of their widespread popularity. Caecilius holds a place between Plautus and Terence in his treatment of the Greek originals; he did not, like Plautus, confound things Greek and Roman, nor, like Terence, eliminate everything that could not be romanized.

The fragments of his plays are chiefly preserved in Aulus Gellius, who cites several passages from the Plocium (necklace) together with the original Greek of Menander. The translation which is diffuse and by no means close, fails to reproduce the spirit of the original. Fragments in Ribbeck, Scaenicae Romanorum Poesis Fragmenta (1898); see also W. S. Teuffel, Caecilius Statius, &c. (1858); Mommsen, Hist, of Rome (Eng. tr.), bk. iii. ch. 14; F. Skutsch in Pauly-Wissowa, Realencyclopddie (1897).

CAEClNA, the name of a distinguished Etruscan family of Volaterrae. Graves have been discovered belonging to the family, whose name is still preserved in the river and hamlet of Cecina.

Aulus Caecina, son of Aulus Caecina who was defended by Cicero (69 B.C.) in a speech still extant, took the side of Pompey in the civil wars, and published a violent tirade against Caesar, for which he was banished. He recanted in a work called Querelae, and by the intercession of his friends, above all, of Cicero,obtained pardon from Caesar. Caecina was regarded as an important authority on the Etruscan system of divination (Etrusca Dis- ciplina), which he endeavoured to place on a scientific footing by harmonizing its theories with the doctrines of the Stoics. Con- siderable fragments of his work (dealing with lightning) are to be found in Seneca (Naturales Quaestiones, ii. 31-49). Caecina was on intimate terms with Cicero, who speaks of him as a gifted and eloquent man and was no doubt considerably indebted to him in his own treatise De Divinatione. Some of their correspondence is preserved in Cicero's letters (Ad Fam. vi. 5-8; see also ix. and xiii. 66).

Aulus Caecina Alienus, Roman general, was quaestor of Baetica in Spain (a.d. 68). On the death of Nero, he attached himself to Galba, who appointed him to the command of a legion in upper Germany. Having been prosecuted for embezzling public money, Caecina went over to Vitellius, who sent him with a large army into Italy. Caecina crossed the Alps, but was defeated near Cremona by Suetonius Paulinus, the chief general of Otho. Subsequently, in conjunction with Fabius Valens, Caecina defeated Otho at the decisive battle of Bedriacum (Betriacum). The incapacity of Vitellius tempted Vespasian to take up arms against him. Caecina, who had been entrusted with the repression of the revolt, turned traitor, and tried to persuade his army to go over to Vespasian, but was thrown into chains by the soldiers. After the overthrow of Vitellius, he was released, and taken into favour by the new emperor. But he could not remain loyal to any one. In 79 he was implicated in a conspiracy against Vespasian, and was put to death by order of Titus. Caecina is described by Tacitus as a man of handsome presence and boundless ambition, a gifted orator and a great favourite with the soldiers.

Tacitus, Histories, i. 53, 61, 67-70, ii. 20-25, 41-44, iii. 13; Dio Cassius lxv. 10-14, lxvi. 16; Plutarch, Otho, 7; Suetonius, Titus, 6; Zonaras xi. 17.

CffiDMON, the earliest English Christian poet. His story, and even his very name, are known to us only from Baeda (Hist. Eccl. iv. 24).

He was, according to Baeda (see Bede), a herdsman, who received a divine call to poetry by means of a dream. One night, having quitted a festive company because, from want of skill, he could not comply with the demand made of each guest in turn to sing to the harp, he sought his bed and fell asleep. He dreamed that there appeared to him a stranger, who addressed him by his name, and commanded him to sing of " the beginning of created things." He pleaded inability, but the stranger insisted, and he was compelled to obey. He found himself uttering " verses which he had never heard." Of Caedmon's song Baeda gives a prose paraphrase, which may be literally rendered as follows: — " Now must we praise the author of the heavenly kingdom, the Creator's power and counsel, the deeds of the Father of glory: how He, the eternal God, was the author of all marvels — He, who first gave to the sons of men the heaven for a roof, and then, Almighty Guardian of mankind, created the earth." Baeda explains that his version represents the sense only, not the arrangement of the words, because no poetry, however excellent, can be rendered into another language, without the loss of its beauty of expression. When Caedmon awoke he remembered the verses that he had sung and added to them others. He related his dream to the farm bailiff under whom he worked, and was conducted by him to the neighbouring monastery at Streanaeshalch (now called Whitby) . The abbess Hild and her monks recognized that the illiterate herdsman had received a gift from heaven, and, in order to test his powers, proposed to him that he should try to render into verse a portion of sacred history which they explained to him. On

the following morning he returned having fulfilled his task. At the request of the abbess he became an inmate of the monastery. Throughout the remainder of his life his more learned brethren from time to time expounded to him the events of Scripture history and the doctrines of the faith, and all that he heard from them he reproduced in beautiful poetry. " He sang of the creation of the world, of the origin of mankind and of all the history of Genesis, of the exodus of Israel from Egypt and their entrance into the Promised Land, of many other incidents of Scripture history, of the Lord's incarnation, passion, resurrection and ascension, of the coming of the Holy Ghost and the teaching of the apostles. He also made many songs of the terrors of the coming judgment, of the horrors of hell and the sweetness of heaven; and of the mercies and the judgments of God." All his poetry was on sacred themes, and its unvarying aim was to turn men from sin to righteousness and the love of God. Although many amongst the Angles had, following his example, essayed to compose religious poetry, none of them, in Baeda's opinion, had

approached the excellence of Caedmon's songs.

Bseda's account of Caedmon's deathbed has often been quoted, and is of singular beauty. It is commonly stated that he died in 680, in the same year as the abbess Hild, but for this there is no authority. All that we know of his date is that his dream took place during the period (658-680) in which Hild was abbess of Streanaeshalch, and that he must have died some considerable time before Baeda finished his history in 731.

The hymn said to have been composed by Caedmon in his dream is extant in its original language. A copy of it, in the poet's own Northumbrian dialect, and in a handwriting of the 8th century, appears on a blank page of the Moore MS. of Basda's History; and five other Latin MSS. of Baeda have the poem (but transliterated into a more southern dialect) as a marginal note. In the old English version of Baeda, ascribed to King Alfred, and certainly made by his command if not by himself, it is given in the text. Probably the Latin MS. used by the translator was one that con- tained this addition. It was formerly maintained by some scholars that the extant Old English verses are not Baeda's original, but a mere retranslation from his Latin prose version. The argument was that they correspond too closely with the Latin; Baeda's words, " hie est sensus, non autem ordo ipse verborum," being taken to mean that he had given, not a literal translation, but only a free paraphrase. But the form of the sentences in Baeda's prose shows a close adherence to the parallel- istic structure of Old English verse, and the alliterating words in the poem are in nearly every case the most obvious and almost the inevitable equivalents of those used by Baeda. The sentence quoted above 1 can therefore have been meant only as an apology for the absence of those poetic graces that necessarily disappear in translations into another tongue. Even on the assumption that the existing verses are a retranslation, it would still be certain that they differ very slightly from what the original must have been. It is of course possible to hold that the story of the dream is pure fiction, and that the lines which Baeda translated were not Caedmon's at all. But there is really nothing to justify this extreme of scepticism. As the hymn is said to have been Caedmon's first essay in verse, its lack of poetic merit is rather an argument for its genuineness than against it. Whether Baeda's narrative be historical or not — and it involves nothing either miraculous or essentially improbable — there is no reason to doubt that the nine lines of the Moore MS. are Caedmon's composition.

This poor fragment is all that can with confidence be affirmed to

remain of the voluminous works of the man whom Baeda regarded as the greatest of vernacular religious poets. It is true that for two centuries and a half a considerable body of verse has been currently known by his name; but among modern scholars the use of the customary designation is merely a matter of convenience, and does not imply any belief in the correctness of the attribution. The so-called Caedmon poems are contained

1 It is a significant fact that the Alfredian version, instead of translating this sentence, introduces the verses with the words, " This is the order of the words."

in a MS. written about a.d. iooo, which was given in 1651 by Archbishop Ussher to the famous scholar Francis Junius, and is now in the Bodleian library. They consist of paraphrases of parts of Genesis, Exodus and Daniel, and three separate poems, the first on the lamentations of the fallen angels, the second on the " Harrowing of Hell," the resurrection, ascension and second coming of Christ, and the third (a mere fragment) on the temptation. The subjects correspond so well with those of Csdmon's poetry as described by Bffida that it is not surprising that Junius, in his edition, published in 1655, unhesitatingly attributed the poems to him. The ascription was rejected in 1684 by G. Hickes, whose chief argument, based on the character of the language, is now known to be fallacious, as most of the poetry that has come down to us in the West Saxon dialect is certainly of Northumbrian origin. Since, however, we learn from Baeda that already in his time Caedmon had had many imitators, the abstract probability is rather unfavourable than otherwise to the assumption that a collection of poems contained in a late 10th century MS. contains any of his work. Modern criticism has shown conclusively that the . poetry of the " Caedmon MS." cannot be all by one author. Some portions of it are plainly the work of a scholar who wrote with his Latin Bible before him. It is possible that some of the rest may be the composition of the Northumbrian herdsman; but in the absence of any authenticated example of the poet's work to serve as a basis of comparison, the internal evidence can afford no ground for an affirmative conclusion. On the other hand, the mere unlikeness of any particular passage to the nine lines of the Hymn is obviously no reason for denying that it may have been by the same author.

The Genesis contains a long passage (ii. 235-851) on the fall of the angels and the temptation of our first parents, which differs markedly in style and metre from the rest. This passage, which begins in the middle of a sentence (two leaves of the MS. having been lost) is one of the finest in all Old English poetry. In 1877 Professor E. Sievers argued, on linguistic grounds, that it was a translation, with some original insertions, from a lost poem in Old Saxon, probably by the author of the Heliand. Sievers's conclusions were brilliantly confirmed in 1894 by the discovery in the Vatican library of a MS. containing 62 lines of the Heliand and three fragments of an old Saxon poem on the story of Genesis. The first of these fragments includes the original of 28 lines of the interpolated passage of the Old English Genesis. The Old Saxon Biblical poetry belongs to the middle of the 9th century; the Old English translation of a portion of it is consequently later than this.

As the Genesis begins with a line identical in meaning, though not in wording, with the opening of Caedmon's Hymn, we may perhaps infer that the writer knew and used Caedmon's genuine poems. Some of the more poetical passages may possibly echo Caedmon's expressions; but when, after treating of the creation of the angels and the revolt of Lucifer, the paraphrast comes to the Biblical part of the story, he follows the sacred text with servile fidelity, omitting no detail, however prosaic. The ages of the antediluvian patriarchs, for instance, are accurately rendered into verse. In all probability the Genesis is of North- umbrian origin. The names assigned to the wives of Noah and his three sons (Phercoba, Olla, Olliua, Olliuani x) have been traced to an Irish source, and this fact seems to point to the influence of the Irish missionaries in Northumbria.

The Exodus is a fine poem, strangely unlike anything else in Old English literature. It is full of martial spirit, yet makes no use of the phrases of the heathen epic, which Cynewulf and other Christian poets were accustomed to borrow freely, often with little appropriateness. The condensation of the style and the peculiar vocabulary make the Exodus somewhat obscure in many places. It is probably of southern origin, and can hardly be supposed to be even an imitation of Caedmon. The Daniel is often unjustly depreciated. It is not a great

1 The invention of these names was perhaps suggested by Pericope Oollae et Oolibae, which may have been a current title for the 23rd chapter of Ezekiel.

poem but the narration is lucid and interesting. The author has

borrowed some 70 lines from the beginning of a poetical rendering of the Prayer of Azarias and the Song of the Three Children, of which there is a copy in the Exeter Book. The borrowed portion ends with verse 3 of the canticle, the remainder of which follows in a version for the most part independent, though containing here and there a line from Azarias. Except in inserting the prayer and the Benedicite, the paraphrast draws only from the canonical part of the book of Daniel. The poem is obviously the work of a scholar, though the Bible is the only source used.

The three other poems, designated as " Book II " in the Junius MS., are characterized by considerable imaginative power and vigour of expression, but they show an absence of literary culture and are somewhat rambling, full of repetitions and generally lacking in finish. They abound in passages of fervid religious exhortation. On the whole, both their merits and their defects are such as we should expect to find in the work of the poet celebrated by Baeda, and it seems possible, though hardly more than possible, that we have in these pieces a com- paratively little altered specimen of Caedmon's compositions.

Of poems not included in the Junius MS., the Dream of the Rood (see Cynewulf) is the only one that has with any plausi- bility been ascribed to Caedmon. It was affirmed by Professor G. Stephens that the Ruthwell Cross, on which a portion of the poem is inscribed in runes, bore on its top-stone the name " Cadmon "; 2 but, according to Professor W. Vietor, the traces of runes that are still visible exclude all possibility of this reading. The poem is certainly Northumbrian and earlier than the date of Cynewulf. It would be impossible to prove that Cadmon was not the author, though the production of such a work by the herdsman of Streanseshalch would certainly deserve to rank among the miracles of genius.

Certain similarities between passages in Paradise Lost and parts of the translation from Old Saxon interpolated in the Old English Genesis have given occasion to the suggestion that some scholar may have talked to Milton about the poetry published by Junius in 1655, and that the poet may thus have gained some hints which he used in his great work. The parallels, however, though very interesting, are only such as might be expected to occur between two poets of kindred genius working on what was essentially the same body of traditional material.

The name Caedmon (in the MSS. of the Old English version of Baeda written Cedmon, Ceadmann) is not explicable by means of Old

English; the statement that it means "boatman" is founded on the corrupt gloss liburnam, ced, where ced is an editorial misreading for ceol. It is most probably the British Cadman, intermediate between the Old Celtic Catumanus and the modern Welsh Cadfan. Possibly the poet may have been of British descent, though the inference is not certain, as British names may sometimes have been given to English children. The name Caedwalla or Ceadwalla was borne by a British king mentioned by Baeda and by a king of the West Saxons. The initial element Caed— or Cead (probably adopted from British names in which it represents calu, war) appears combined with an Old English terminal element in the name Caedbaed (cp., however, the Irish name Cathbad), and hypocoristic forms of names containing it were borne by the English saints Ceadda (commonly known as St Chad) and his brother Cedd, called Ceadwealla in one MS. of the Old English Martyrology. A Cadmon witnesses a Buckinghamshire charter of about a.d. 948. The older editions of the so-called " Cadmon's Paraphrase" t/ £v£ mus (l6 ,55); B. Thorpe (1832), with an English translation; K. W. Bouterwek (1851-1854) ; C. W. M. Grein in his Bibliothek der angelsachsischen Poesie (1857) are superseded, so far as the text is concerned, by R. Wiilker's re-edition of Grein's Bibliothek, Bd ii. U 8 95)- rhis work contains also the texts of the Hymn and the Dream of the Rood. The pictorial illustrations of the Junius MS were published in 1833 by Sir H. Ellis. (H Br)

2 Stephens read the inscription on the top-stone as Cadmon ma faucepo, which he rendered " Cadmon made me." But these words are mere jargon, not belonging to any known or possible Old English i dialect. 6

93 6

CAELIA— CAERE

CAELIA, the name of two ancient cities in Italy, (i) In Apulia (mod. Ceglie di Bart) on the Via Traiana, 5 m. S. of Barium. Coins iound here bearing the inscription KaiXivcav prove that it was once an independent town. Discoveries of ruins and tombs have also been made. (2) In Calabria (mod. Ceglie Messapiea) 25 m. W. of Brundusium, and 991 ft. above sea-level. It was in early times a place of some importance, as is indicated by the remains of a prehistoric enceinte and by the discovery of several Messapian inscriptions.

See Ch. Hiilsen in Pauly-Wissowa, Realencyclopadie, iii. 1252.

CAEN, a city of north-western France, capital of the depart- ment of Calvados, 7J m. from the English Channel and 149 m. W.N.W. of Paris on the Western railway to Cherbourg. Pop. (1906) 36,247. It is situated in the valley and on the left bank of the Orne, the right bank of which is occupied by the suburb of Vaucelles with the station of the Western railway. To the south-west of Caen, the Orne is joined by the Odon, arms of which water the " Prairie," a fine plain on which a well-known race-course is laid out. Its wide streets, of which the most important is the rue St Jean, shady boulevards, and public gardens enhance the attraction which the town derives from an abundance of fine churches and old houses. Hardly any remains of its once extensive ramparts and towers are now to be seen; but the castle, founded by William the Conqueror and completed by Henry I., is still employed as barracks, though in a greatly altered condition. St Pierre, the most beautiful church in Caen, stands at the northern extremity of the rue St Jean, in the centre of the town. In the nfain, its architecture is Gothic, but the choir and the apsidal chapels, with their elaborate interior and exterior decoration, are of Renaissance workmanship. The graceful tower, which rises beside the southern portal to a height of 255 ft., belongs to the early 14th century. The church of St Etienne, or 1'Abbaye-aux-Hommes, in the west of the town, is an important specimen of Romanesque architecture, dating from about 1070, when it was founded by William the Conqueror. It is unfortunately hemmed in by other buildings, so that a comprehensive view of it is not to be obtained. The whole building, and especially the west facade, which is flanked by two towers with lofty spires, is characterized by its simplicity. The choir, which is one of the earliest examples of the Norman Gothic style, dates from the early 13th century. In 1562 the Protestants did great damage to the building, which was skil- fully restored in the early 17th century. A marble slab marks the former resting-place of William the Conqueror. The abbey- buildings were rebuilt in the 17th and 18th centuries, and now shelter the lycee. Matilda, wife of the Conqueror, was the foundress of the church of La Trinite or PAbbaye-aux-Dames, which is of the same date as St Etienne. Two square unfinished towers flank the western entrance, and another rises above the transept. Queen Matilda is interred in the choir, and a fine crypt beneath it contains the remains of former abbesses. The buildings of the nunnery, reconstructed in the early 18th century, now serve as a hospital. Other interesting old churches are those of St Sauveur, St Michel de Vaucelles, St Jean, St Gilles, Notre-Dame de la Gloriette, St Etienne le Vieux and St Nicolas, the last two now secularized. Caen possesses many old timber houses and stone mansions, in one of which, the hotel d'Ecoville (c. 1530), the

exchange and the tribunal of commerce are estab- lished. The hotel de Than, also of the 16th century, is remark- able for its graceful dormer-windows. The Maison des Gens d'Armes (1 5th century), in the eastern outskirts of the town, has a massive tower adorned with medallions and surmounted by two figures of armed men. The monuments at Caen include one to the natives of Calvados killed in 1870 and 1871 and one to the lawyer J. C. F. Demolombe, together with statues of Louis XIV, Elie de Beaumont, Pierre Simon, marquis de Laplace, D. F. E. Auber and Francois de Malherbe, the two last natives of the town. Caen is the seat of a court of appeal, of a court of assizes and of a prefect, It is the centre of an academy and has a university with faculties of law, science and letters and a preparatory school of medicine and pharmacy; there are also a lycee, training colleges, schools of art and music, and two large

hospitals. The other chief public institutions are tribunals of first instance and commerce, an exchange, a chamber of com- merce and a branch of the Bank of France. The h6tel-de-ville contains the library, with more than 100,000 volumes and the art museum with a fine collection of paintings. The town is the seat of several learned societies including the Societe des Anti- quaires, which has a rich museum of antiquities. Caen, despite a diversity of manufactures, is commercial rather than industrial. Its trade is due to its position in the agricultural and horse- breeding district known as the " Campagne de Caen " and to its proximity to the iron mines of the Orne valley, and to manu- facturing towns such as Falaise, Le Mans, &c. In the south-east of the town there is a floating basin lined with quays and con- nected with the Orne and with the canal which debouches into the sea at Ouistreham 9 m. to the N.N.E. The port, which also includes a portion of the river-bed, communicates with Havre and Newhaven by a regular line of steamers; it has a consider- able fishing population. In 1905 the number of vessels entered was 563 with a tonnage of 190,190. English coal is foremost among the imports, which also include timber and grain, while iron ore, Caen stone, 1 butter and eggs and fruit are among the exports. Important horse and cattle fairs are held in the town. The industries of Caen include timber-sawing, metal-founding and machine-construction, cloth-weaving, lace-making, the manufacture of leather and gloves, and of oil from the colza grown in the district, furniture and other wooden goods and chemical products.

Though Caen is not a town of great antiquity, the date of its foundation is unknown. It existed as early as the 9th century, and when, in 912, Neustria was ceded to the Normans by Charles the Simple, it was a large and important place. Under the dukes of

Normandy, and particularly under William the Conqueror, it rapidly increased. It became the capital of lower Normandy, and in 1346 was besieged and taken by Edward III. of England. It was again taken by the English in 141 7, and was retained by them till 1450, when it capitulated to the French. The university was founded in 1436 by Henry VI. of England. During the Wars of Religion, Caen embraced the reform; in the succeeding century its prosperity was shattered by the revocation of the edict of Nantes (1685). In 1793 the city was the focus of the Girondist movement against the Convention.

See G. Mancel et C. Woinez, Hist, de la ville de Caen et de ses progris (Caen, 1836); B. Pent, Hist, de la ville de Caen, ses origines (Caen, 1866) ; E. de R. de Beaurepaire, Caen illtistre: son histoire, ses monuments (Caen, 1896).

CAEPIO, QUINTUS SERVILIUS, Roman general, consul 106 B.C. During his year of office, he brought forward a law by which the jurymen were again to be chosen from the senators instead of the equites (Tacitus, Ann. xii. 60). As governor of Gallia Narbonensis, he plundered the temple of the Celtic Apollo at Tolosa (Toulouse), which had joined the Cimbri. In 105, Caepio suffered a crushing defeat from the Cimbri at Arausio (Orange) on the Rhone, which was looked upon as a punishment for his sacrilege; hence the proverb Aurum Tolosanum habet, of an act involving disastrous consequences. In the same year he was deprived of his proconsulship and his property confis- cated; subsequently (the chronology is obscure, see Mommsen, History of Rome, bk. iv. ch. 5) he was expelled from the senate, accused by the tribune Norbanus of embezzlement and mis- conduct during the war, condemned and imprisoned. He either died during his confinement or escaped to Smyrna.

Livy, Epit. 67; Valerius Maximus iv. 7. 3; Justin xxxii. 3; Aulus Gellius iii. 9.

CAERE (mod. Cerveteri, i.e. Caere vetus, see below), an ancient city of Etruria about 5 m. from the sea coast and about 20 m. N.W. of Rome, direct from which it was reached by branch roads from the Via Aurelia and Via Clodia. Ancient writers tell us that its original Pelasgian name was Agylla, and that the Etrus- cans took it and called it Caere (when this occurred is not known),

1 A limestone well adapted for building. It was well known in the 15th and 16th centuries, at which period many English churches

were built of it.

but the former name lasted on into later times as well as Caere. It was one of the twelve cities of Etruria, and its trade, through its port Pyrgos (q.v.), was of considerable importance. It fought with Rome in the time of Tarquinus Priscus and Servius Tullius, and subsequently became the refuge of the expelled Tarquins. After the invasion of the Gauls in 390 B.C., the vestal virgins and the sacred objects in their custody were conveyed to Caere for safety, and from this fact some ancient authorities derive the word caerimonia, ceremony. A treaty was made between Rome and Caere in the same year. In 353, however, Caere took up arms against Rome out of friendship for Tarquinii, but was defeated, and it is probably at this time that it became partially incorporated with the Roman state, as a community whose members enjoyed only a restricted form of Roman citizenship, without the right to a vote, and which was, further, without internal autonomy. The status is known as the ius Caeritum, and Caere was the first of a class of such municipalities (Th. Mommsen, Romische Staatsrecht, iii. 583). In the First Punic War, Caere furnished Rome with corn and provisions, but other- wise, up till the end of the Republic, we only hear of prodigies being observed at Caere and reported at Rome, the Etruscans being especially expert in augural lore. By the time of Augustus its population had actually fallen behind that of the Aquae Caeretanae (the sulphur springs now known as the Bagni del Sasso, about 5 m. W.), but under either Augustus or Tiberius its prosperity was to a certain extent restored, and inscriptions speak of its municipal officials (the chief of them called dictator) and its town council, which had the title of senatus. In the middle ages, however, it sank in importance, and early in the 13th century, a part of the inhabitants founded Caere novum (mod. Cert) 3 m. to the east.

The town lay on a hill of tufa, running from N.E. to S.W., isolated except on the N.E., and about 300 ft. above sea-level. The modern town, at the western extremity, probably occupies the site of the acropolis. The line of the city walls, of rectangular blocks of tufa, can be traced, and there seem to have been eight gates in the circuit, which was about 4 m. in length. There are no remains of buildings of importance, except the theatre, in which many inscriptions and statues of emperors were found. The necropolis in the hill to the north-west, known as the Banditaccia, is important. The tomb

chambers are either hewn in the rock or covered by mounds. One of the former class was the family tomb of the Tarchna-Tarquinii, perhaps descended from the Roman kings; others are interesting from their architectural and decorative details. One especially, the Grotta dei Bassirilievi, has interesting reliefs cut in the rock and painted, while the walls of another were decorated with painted tiles of terracotta. The most important tomb of all, the Regolini- Galassi tomb (taking its name from its discoverers), which lies S.W. of the ancient city, is a narrow rock-hewn chamber about 60 ft. long, lined with masonry, the sides converging to form the roof. The objects found in it (a chariot, a bed, silver goblets with reliefs, rich gold ornaments, &c.) are now in the Etruscan Museum at the Vatican: they are attributed to about the middle of the 7th century b.c. At a short distance from the modern town on the west, thousands of votive terracottas were found in 1886, some representing divinities, others parts of the human body (Notizie degli Scavi, 1886, 38). They must have belonged to some temple.

See G. Dennis, Cities and Cemeteries of Etruria, i. 226 seq.; C. Hiilsen in Pauly-Wissowa, Realencyclopddie, iii. 1281. (T. As.)

CAERLEON, an ancient village in the southern parliamentary division of Monmouthshire, England, on the right (west) bank of the Usk, 3 m. N.E. of Newport. Pop. (1901) 141 1. Its claim to notice rests on its Roman and British associations. As Isca Silurum, it was one of the three great legionary fortresses of Roman Britain, established either about a.d. 50 (Tacitus, Annals, xii. 32), or perhaps, as coin-finds suggest, about a.d. 74-78 in the governorship of Julius Frontinus, and in either case intended to coerce the wild Silures. It was garrisoned by the Legio II. Augusta from its foundation till near the end of the Roman rule in Britain. Though never seriously excavated, it

contains plentiful visible traces of its Roman period — part of the ramparts', the site of an amphitheatre, and many inscriptions, sculptured stones, &c, in the local museum. No civil life or municipality seems, however, to have grown up outside its walls, as at York (Eburdcum). Like Chester (see Deva), it remained purely military, and the common notion that it was the seat of a Christian bishopric in the 4th century is unproved and improbable. Its later history is obscure. We do not know when the legion was finally withdrawn, nor what succeeded. But Welsh legend has made the site very famous with tales of Arthur (revived by Tennyson in his Idylls), of Christian martyrs, Aaron and Julius, and of an archbishopric held by St Dubric and shifted to St David's in the 6th century. Most of

these traditions date from Geoffrey of Monmouth (about 1130-1140), and must not be taken for history. The ruins of Caerleon attracted notice in the 12 th and following centuries, and gave plain cause for legend-making. There is better, but still slender, reason for the belief that it was here, and not at Chester, that five kings of the Cymry rowed Edgar in a barge as a sign of his sovereignty (a.d. 973). The name Caerleon seems to be derived from the Latin Castra legionum, but it is not peculiar to Caerleon- on-Usk, being often used of Chester and occasionally of Leicester and one or two other places. (F. J. H.)

CAERPHILLY, a market town of Glamorganshire, Wales, 1 52 J m. from London by rail via Cardiff, 7 m. from Cardiff, 12 m. from Newport and 6 m. from Pontypridd. The origin of the name is unknown. It was formerly in the ancient parish of Eglwysilan, but from that and Bedwas (Mon.) an ecclesiastical parish was formed in 1850, while the whole of the parishes of Eglwysilan and Llanfabon, with a total acreage of 14,426, were in 1893 constituted into an urban district; its population in 1901 was 15,385, of which 4343 were in the "town" ward. In 1858 was opened the Rhymney railway from Rhymney to Caerphilly and on to Taff 's Well, whence it had running powers over the Taff Vale railway to Cardiff, but in 1871, by means of a tunnel about 2000 yds. long, under Cefn Onn, a direct line was provided from Caerphilly to Cardiff. A branch line, 4 m. long, was opened in 1894 to Senghenydd. The Pontypridd and New-port railway was constructed in 1887, and there is a joint station at Caerphilly for both railways. Some 2 m. eastwards there is a station on the Brecon and Merthyr railway at Bedwas.

The ancient commote of Senghenydd (corresponding to the modern hundred of Caerphilly) comprised the mountainous district extending from the ridge of Cefn Onn on the south to Breconshire on the north, being bounded by the rivers Taff and Rumney on the west and east. Its inhabitants, though nomin- ally subject to the lords of Glamorgan since Fitzhamon's con- quest, enjoyed a large measure of independence and often raided the lowlands. To keep these in check, Gilbert de Clare, during the closing years of the reign of Henry III., built the castle of Caerphilly on the southern edge of this district, in a wide plain between the two rivers. It had probably not been completed, though it was already defensible, when Prince Llewelyn ab Griffith, incensed by its construction and claiming its site as his own, laid siege to it in 1271 and refused to retire except on conditions. Subsequently completed and strengthened it became and still remains (in the words of G. T. Clark) " both the earliest and the most complete example in Britain of a concentric castle of the type

known as ‘ Edwardian,’ the circle of walls and towers of the outer, inner and middle wards ex- hibiting the most complete illustration of the most scientific military architecture.” The knoll on which it stood was con- verted almost into an island by the damming up of an adjacent brook, and the whole enclosed area amounted to 30 acres. The great hall (which is 73 ft. by 35 ft. and about 30 ft. high) is a fine example of Decorated architecture. This and other additions are attributed to Hugh le Despenser (1318-1326). Edward II. visited the castle shortly before his capture in 1326. The defence of the castle was committed by Henry IV. to Constance, Lady Despenser, in September 1403, but it was shortly afterwards taken by Owen Glyndwr, to whose mining operations tradition ascribes the leaning position of a large

circular tower, about 50 ft. high, the summit of which overhangs its base about 9 ft. Before the middle of the 15th century it had ceased to be a fortified residence and was used as a prison, which was also the case in the time of Leland (1535), who describes it as in a ruinous state. It is still, however, one of the most extensive and imposing ruins of the kind in the kingdom.

The town grew up around the castle but never received a charter or had a governing body. In 1661 the corporation of Cardiff complained of Cardiff’s impoverishment by reason of a fair held every three weeks for the previous four years at Caer- philly, though ” no Borough.” Its markets during the 19th century had been chiefly noted for the Caerphilly cheese sold there. The district was one of the chief centres of the Methodist revival of the 18th century, the first synod of the Calvinistic Methodists being held in 1743 at Watford farm close to the town, from which place George Whitefield was married at Eglwysilan church two years previously. The church of St Martin was built in 1879, and there are Nonconformist chapels. Mining is now the chief industry of the district. (D. Ll. T.)

CAESALPINUS (Cesalpino), ANDREAS (1519-1603), Italian natural philosopher, was born in Arezzo in Tuscany in 15 19. He studied anatomy and medicine at the university of Pisa, where he took his doctor’s degree in 1551, and in 1555 became professor of materia medica and director of the botanical garden. Appointed physician to Pope Clement VIII., he removed in 1592 to Rome, where he died on the 23rd of February 1603. Caesalpinus was the most distinguished

botanist of his time. His work, De Plantis libri xvi. (Florence, 1583), was not only the source from which various subsequent writers, and especially Robert Morison (1620-1683) derived their ideas of botanical arrangement but it was a mine of science to which Linnaeus himself gratefully avowed his obligations. Linnaeus's copy of the book evinces the great assiduity with which he studied it; he laboured throughout to remedy the defect of the want of synonyms, sub- joined his own generic names to nearly every species, and particularly indicated the two remarkable passages where the germination of plants and their sexual distinctions are explained. Caesalpinus was also distinguished as a physiologist, and it has been claimed that he had a clear idea of the circulation of the blood (see Harvey, William). His other works include Daemonum investigatio peripatetica (1580), Quaestionum medicarum libri ii. (1593), De Metallicis (1596), and Quaestionum peripateticarum libri v.

(iS7i).

CAESAR, GAIUS JULIUS (102-44 B.C.), the great Roman soldier and statesman, was born on the 12th of July 102 B.C. 1 His family was of patrician rank and traced a legendary descent from lulus, the founder of Alba Longa, son of Aeneas and grandson of Venus and Anchises. Caesar made the most of his divine ancestry and built a temple in his forum to Venus Genetrix; but his patrician descent was of little importance in politics and disqualified Caesar from holding the tribunate, an office to which, as a leader of the popular party, he would naturally have aspired. The Julii Caesares, however, had also acquired the new nobilitas, which belonged to holders of the great magistracies. Caesar's uncle was consul in 91 B.C., and his father held the praetorship. Most of the family seem to have belonged to the senatorial party (optimales) ; but Caesar himself was from the first a popularis. The determining factor is no doubt to be sought in his relationship with C. Marius, the husband of his aunt Julia. Caesar was born in the year of Marius's first great victory over the Teutones, and as he grew up, inspired by the 'traditions of the great soldier's career, attached himself to his party and its fortunes. Of his education we know scarcely anything. His mother, Aurelia, belonged to a distinguished family, and Tacitus {Dial, de Oral, xxviii.) couples her name with that of Cornelia, the mother of the Gracchi, as an example of the Roman matron

1 In spite of the explicit statements of Suetonius, Plutarch and Appian that Caesar was in his fifty-sixth year at the time of his murder, it is, as Mommsen has shown, practically certain that he was born in 102 B.C., since he held the chief offices of state in

regular order, beginning with the aedileship in 65 B.C., and the legal age for this was fixed at 37-38.

Early years.

whose disciplina and severitas formed her son for the duties of a soldier and statesman. His tutor was M. Antonius Gnipho, a native of Gaul (by which Cisalpine Gaul may be meant), who is said to have been equally learned in Greek and Latin literature, and to have set up in later years a school of rhetoric which was attended by Cicero in his praetorship 66 B.C. It is possible that Caesar may have derived from him his interest in Gaul and its people and his sympathy with the claims of the Romanized Gauls of northern Italy to political rights.

In his sixteenth year (87 B.C.) Caesar lost his father, and assumed the toga virilis as the token of manhood. The social war (90-89 b.c.) had been brought to a close by the enfranchisement of Rome's Italian subjects; and the civil war which followed it led, after the departure of Sulla for the East, to the temporary triumph of the populates, led by Marius and Cinna, and the ■indiscriminate massacre of their political opponents, including both of Caesar's uncles. Caesar was at once marked out for high distinction, being created flamen Dialis or priest of Jupiter. In the following year (which saw the death of Marius) Caesar, rejecting a proposed marriage with a wealthy capitalist's heiress, sought and obtained the hand of Cornelia, the daughter of Cinna, and thus became further identified with the ruling party. His career was soon after interrupted by the triumphant return of Sulla (82 B.C.), who ordered him to divorce his wife, and on his refusal deprived him of his property and priesthood and was induced to spare his life only by the intercession of his aristo- cratic relatives and the college of vestal virgins.

Released from his religious obligations, Caesar now (81 B.C.) left Rome for the East and served his first campaign under Minueius Thermus, who was engaged in stamping out the embers of resistance to Roman rule in the province of Asia, and received from him the " civic crown " for saving a fellow-soldier's life at the storm of Mytilene. In 78 B.C. he was serving under Servilius Isauricus against the Cilician pirates when the news of Sulla's death reached him and he at Once returned to Rome. Refusing to entangle himself in the abortive. and equivocal schemes of Lepidus to subvert the Sullan constitution, Caesar took up the only instrument of political warfare left to the opposition by prosecuting two senatorial governors, Cn. Cornelius Dolabella (in 77 B.C.) and C. Antonius (in 76 B.C.) for

extortion in the provinces of Macedonia and Greece, and though he lost both cases, probably convinced the world at large of the corruption of the senatorial tribunals. After these failures Caesar determined to take no active part in politics for a time, and retraced his steps to the East in order to study rhetoric under Molon, at Rhodes. On the journey thither he was caught by pirates, whom he treated with consummate non- chalance while awaiting his ransom, threatening to return and crucify them ; when released he lost no time in carrying out his threat. Whilst he was studying at Rhodes the third Mithradatic War broke out, and Caesar at once raised a corps of volunteers and helped to secure the wavering loyalty of the provincials of Asia. When Lucullus assumed the command of the Roman troops in Asia, Caesar returned to Rome, to find that he had been elected to a seat on the college of pontifices left vacant by the death of his uncle, C. Aurelius Cotta. He was likewise elected first of the six tribuni militum a populo, but we hear nothing of his service in this capacity. Suetonius tells us that he threw himself into the agitation for the restoration of the ancient powers of the tribunate curtailed by Sulla, and that he secured the passing of a law of amnesty in favour of the partisans of Sertorius. He was not, however, destined to compass the downfall of the Sullan rigime; the crisis of the Slave War placed the Senate at the mercy of Pompey and Crassus, who in 70 B.C. swept away the safeguards of senatorial ascendancy, restored the initiative in legislation to the tribunes, and replaced the Equestrian order, i.e. the capitalists, in partial possession of the jury-courts. This judicial reform (or rather compromise) was the work of Caesar's uncle, L. Aurelius Cotta. Caesar himself, however, gained no accession of influence. In 69 B.C. he served as quaestor under Antistius Vetus, governor of Hither Spain, and on his way back to Rome (according to Suetonius) promoted a revolutionary agitation

amongst the Transpadanes for the acquisition of full political rights, which had been denied them by Sulla's settlement.

Caesar was now best known as a man of pleasure, celebrated for his debts and his intrigues; in politics he had no force behind him save that of the discredited party of the populares, Opposition rec [U ced to lending a passive support to Pompey and Ootimates. Crassus. But as soon as the proved incompetence of the senatorial government had brought about the mission of Pompey to the East with the almost

unlimited powers con- ferred on him by the Gabinian and Manilian laws of 67 and 66 B.C. (see Pompey), Caesar plunged "into a network of political intrigues which it is no longer possible to unravel. In his public acts he lost no opportunity of upholding the democratic tradition. Already in 68 B.C. he had paraded the bust of Marius at his aunt's funeral; in 65 B.C., as curule aedile, he restored the trophies of Marius to their place on the Capitol; in 64 B.C., as president of the murder commission, he brought three of Sulla's executioners to trial, and in 63 B.C. he caused the ancient procedure of trial by popular assembly to be revived against the murderer of Saturninus. By these means, and by the lavishness of his expenditure on public entertainments as aedile, he acquired such popularity with the plebs that he was elected pontifex maximus in 63 B.C. against such distinguished rivals as Q. Lutatius Catulus and P. Servilius Isauricus. But all this was on the surface. There can be no doubt that Caesar was cognizant of some at least of the threads of conspiracy which were woven during Pompey's absence in the East. According to one story, the enfants perdus of the revolutionary party — Catiline, Autronius and others — designed to assassinate the consuls on the 1st of January 65, and make Crassus dictator, with Caesar as master of the horse. We are also told that a public proposal was made to confer upon him an extraordinary military command in Egypt, not without a legitimate king and nominally under the protection of Rome. An equally abortive attempt to create a counterpoise to Pompey's power was made by the tribune Rullus at the close of 64 B.C. He proposed to create a land commission with very wide powers, which would in effect have been wielded by Caesar and Crassus. The bill was defeated by Cicero, consul in 63 B.C. In the same year the conspiracy associated with the name of Catiline came to a head. The charge of complicity was freely levelled at Caesar, and indeed was hinted at by Cato in the great debate in the senate. But Caesar, for party reasons, was bound to oppose the execution of the conspirators; while Crassus, who shared in the accusation, was the richest man in Rome and the least likely to further anarchist plots. Both, however, doubtless knew as much and as little as suited their convenience of the doings of the left wing of their party, which served to aggravate the embarrassments of the government.

As praetor (62 B.C.) Caesar supported proposals in Pompey's favour which brought him into violent collision with the senate. This was a master-stroke of tactics, as Pompey's return was imminent. Thus when Pompey landed in Italy and disbanded his army he found in Caesar a natural ally. After some delay, said to have been caused by

the exigencies of his creditors, which were met by a loan of £200,000 from Crassus, Caesar left Rome for his province of Further Spain, where he was able to retrieve his financial position, and to lay the foundations of a military reputation. He returned to Rome in 60 B.C. to find that the senate had sacrificed the support of the capitalists (which Cicero had worked so hard to secure), and had finally alienated Pompey by refusing to ratify his acts and grant lands to his soldiers. Caesar at once approached both Pompey and Crassus, who alike detested the existing system of government but were personally at variance, and succeeded in persuading them to forget their quarrel and join him in a coalition which should put an end to the rule of the oligarchy. He even made a generous, though unsuccessful, endeavour to enlist the support of Cicero. The so-called First Triumvirate was formed, and constitutional government ceased to exist save in name.

The first prize which fell to Caesar was the consulship, to secure which he forewent the triumph which he had earned in Spain. His colleague was M. Bibulus, who belonged to the

Gallic wars.

straitest sect of the senatorial oligarchy and, together with his party, placed every form of constitutional obstruc- coalition tioninthepathofCaesar'slegislation. Caesar, however, with Pom- overrode all opposition, mustering Pompey's veterans P^yand to drive his colleague from the forum. Bibulus became a virtual prisoner in Ins own house, and Caesar placed himself outside the pale of the free republic. Thus the programme of the coalition was carried through. Pompey was satisfied by the ratification of his acts in Asia, and by the assignment of the Campanian state domains to his veterans, the capitalists (with whose interests Crassus was identified) had their bargain for the farming of the Asiatic revenues cancelled, Ptolemy Auletes received the confirmation of his title to the throne of Egypt (for a consideration amounting to £1,500,000), and a fresh act was passed for preventing extortion by provincial governors.

It was now all-important for Caesar to secure practical irresponsibility by obtaining a military command. The senate, in virtue of its constitutional prerogative, had assigned as the provincia of the consuls of 59 B.C. the supervision of roads and forests in Italy. Caesar secured the passing of a legislative enactment conferring upon himself the government of Cisalpine Gaul and Illyria for five years, and exacted from the terrorized senate the addition of Transalpine Gaul, where, as he well knew, a storm was brewing

which threatened to sweep away Roman civilization beyond the Alps. The mutual jealousies of the Gallic tribes had enabled German invaders first to gain a foothold on the left bank of the Rhine, and then to obtain a predominant position in Central Gaul. In 60 B.C. the German king Ariovistus had defeated the Aedui, who were allies of Rome,, and had wrested from the Sequani a large portion of their territory. Caesar must have seen that the Germans were preparing to dispute with Rome the mastery of Gaul; but it was necessary to gain time, and in 59 B.C. Ariovistus was inscribed on the roll of the friends of the Roman people. In 58 B.C. the Helvetii, a Celtic people inhabiting Switzerland, determined to migrate for the shores of the Atlantic and demanded a passage through Roman territory. According to Caesar's statement they numbered 368,000, and it was necessary at all hazards to save the Roman province from the invasion. Caesar had but one legion beyond the Alps. With this he marched to Geneva, destroyed the bridge over the Rhone, fortified the left bank of the river, and forced the Helvetii to follow the right bank. Hastening back to Italy he withdrew his three remaining legions from Aquileia, raised two more, and, crossing the Alps by forced marches, arrived in the neighbourhood of Lyons to find that three-fourths of the Helvetii had already crossed the Saone, marching westward. He destroyed their rearguard, the Tigurini, as it was about to cross, transported his army across the river in twenty-four hours, pursued the Helvetii in a northerly direc- tion, and utterly defeated them at Bibracte (Mont Beuvray). Of the survivors a few were settled amongst the Aedui; the rest were sent back to Switzerland lest it should fall into German hands.

The Gallic chiefs now appealed to Caesar to deliver them from the actual or threatened tyranny of Ariovistus. He at once demanded a conference, which Ariovistus refused, and on hearing that fresh swarms were crossing the Rhine, marched with all haste to Vesontio (Besancon) and thence by way of Belfort into the plain of Alsace, where he gained a decisive victory over the Germans, of whom only a few (including Ariovistus) reached the right bank of the Rhine in safety. These successes roused natural alarm in the minds of the Belgae — a confederacy of tribes in the north-west of Gaul, whose civilization was less advanced than that of the Celtae of the centre — and in the spring of 57 B.C. Caesar determined to anticipate the offensive movement which they were understood to be preparing and marched northwards into the territory of the RemI (about Reims), who alone amongst their neighbours were friendly to Rome. He successfully checked the advance of the enemy at the passage of the Aisne (between Laon and Reims) and their ill-organized force melted

away as he advanced. But the Nervii, and their neighbours further to the north-west, remained to be dealt with, and were

crushed only after a desperate struggle on the banks of the Sambre, in which Caesar was forced to expose his person in the melie. Finally, the Aduatuci (near Namur) were compelled to submit, and were punished for their subsequent treachery by being sold wholesale into slavery. In the meantime Caesar's lieutenant, P. Crassus, received the submission of the tribes of the north-east, so that by the close of the campaign almost the whole of Gaul — except the Aquitani in the south-west — acknow- ledged Roman suzerainty.

In 56 B.C., however, the Veneti of Brittany threw off the yoke and detained two of Crassus's officers as hostages. Caesar, who had been hastily summoned from Illyricum, crossed the Loire and invaded Brittany, but found that he could make no headway without destroying the powerful fleet of high, flat-bottomed boats like floating castles possessed by the Veneti. A fleet was hastily constructed in the estuary of the Loire, and placed under the command of Decimus Brutus. The decisive engagement was fought (probably) in the Gulf of Morbihan and the Romans gained the victory by cutting down the enemy's rigging with sickles attached to poles. As a punishment for their treachery, Caesar put to death the senate of the Veneti and sold their people into slavery. Meanwhile Sabinus was victorious on the northern coasts, and Crassus subdued the Aquitani. At the close of the season Caesar raided the territories of the Morini and Menapii in the extreme north-west.

*In 55 B.C. certain German tribes, the Usipetes and Tencteri, crossed the lower Rhine, and invaded the modern Flanders. Caesar at once marched to meet them, and, on the pre- tioo^s to * ext tnat *- ne y na(l violated a truce, seized their leaders Britain. who had come to parley with him, and then surprised and practically destroyed their host. His enemies in Rome accused him of treachery, and Cato even proposed that he should be handed over to the Germans. Caesar meanwhile constructed his famous bridge over the Rhine in ten days, and made a demonstration of force on the right bank. In the remaining weeks of the summer he made his first expedition to Britain, and this was followed by a second crossing in 54 B.C. On the first occasion Caesar took with him only two legions, and effected little beyond a landing on the coast of Kent. The second expedition consisted of five legions and 2000 cavalry, and set out from the Portus Itius (Boulogne or Wissant; see T. Rice Holmes, Ancient Britain and the Invasions of Julius Caesar, 1907, later views in Classical Review, May 1909, and H. S. Jones, in Eng. Hist. Rev. xxiv., 1909, p. 115). Caesar now penetrated into Middlesex and crossed the Thames, but the British prince Cassivellaunus with his war-chariots harassed the Roman columns, and Caesar was compelled to return to Gaul after imposing a tribute which was never paid.*

The next two years witnessed the final struggle of the Gauls for freedom. Just before the second crossing to Britain, Dumnorix, an Aeduan chief, had been detected in treasonable intrigues, and killed in an attempt to escape from Caesar's camp. At the close of the campaign Caesar distributed his legions over a somewhat wide extent of territory. Two of their camps were treacherously attacked. At Aduatuca (near Aix- la-Chapelle) a newly-raised legion was cut to pieces by the Eburones under Ambiorix, while Quintus Cicero was besieged in the neighbourhood of Namur and only just relieved in time by Caesar, who was obliged to winter in Gaul in order to check the spread of the rebellion. Indutiomarus, indeed, chief of the Treveri (about Treves), revolted and attacked Labienus, but was defeated and killed. The campaign of 53 B. c. was marked. by a second crossing of the Rhine and by the destruction of the Eburones, whose leader Ambiorix, however, escaped. In the autumn Caesar held a conference at Durocor- torum (Reims), and Acco, a chief of the Senones, was convicted of treason and flogged to death.

Early in 52 B.C. some Roman traders were massacred at Cenabum (Orleans), and, on hearing the news, the Arverni re- volted under Vercingetorix and were quickly joined by other tribes, especially the

Bituriges, whose capital was Avaricum (Bourges). Caesar hastened back from Italy, slipped past

Vercingetorix and reached Agedincum (Sens), the headquarters of his legions. Vercingetorix saw that Caesar could not be met in open battle, and determined to concentrate his forces in a few strong positions. Caesar first besieged and took Avaricum, whose occupants were massacred, and then invested Gergovia (near the Puy-de-D6me), the capital of the Arverni, but suffered a severe repulse and was forced to raise the siege. Hearing that the Roman province was threatened, he marched westward, defeated Vercingetorix near Dijon and shut him up in Alesia (Mont-Auxois) , which he surrounded with lines of circumvallation. An attempt at relief by Vercassivellaunus was defeated after a desperate struggle and Vercingetorix surrendered. The struggle was over except for some isolated operations in 51 B.C., ending with the siege and capture of Uxellodunum (Puy d'Issolu), whose defenders had their hands cut off. Caesar now reduced Gaul to the form of a province, fixing the tribute at 40,000,000 sesterces (£350,000), and dealing liberally with the conquered tribes, whose cantons were not broken up.

In the meantime his own position was becoming critical. In 56 B.C., at the conference of Luca (Lucca), Caesar, Pompey and Crassus had renewed their agreement, and Caesar's command in Gaul, which would have expired on the ™Ae"" P 1st of March 54 B.C., was renewed, probably for five Coalition. years, i.e. to the 1st of March 49 B.C., and it was enacted that the question of his successor should not be discussed until the 1 st of March 50 B.C., by which time the provincial commands for 49 B.C. would have been assigned, so that Caesar would retain imperium, and thus immunity from persecution, until the end of 49 B.C. He was to be elected consul for 48 B.C., and, as the law prescribed a personal canvass, he was by special enactment dispensed from its provisions. But in 54 B.C. Julia, the daughter of Caesar and wife of Pompey, died, and in 53 B.C. Crassus was killed at Carrhae. Pompey now drifted apart from Caesar and became the champion of the senate. In 52 B.C. he passed a fresh law de jure magislratuum which cut away the ground beneath Caesar's feet by making it possible to provide a successor to the Gallic provinces before the close of 49 B.C., which meant that Caesar would become for some months a private person, and thus liable to be called to account for his unconstitu- tional acts. Caesar had no resource left but uncompromising obstruction, which he sustained by enormous bribes. His representative in 50 B.C., the tribune C. Scribonius Curio, served him well, and induced the lukewarm majority of the senate to refrain from extreme measures, insisting

that Pompey, as well as Caesar, should resign the imperium. But all attempts at negotiation failed, and in January 49 B.C., martial law having been proclaimed on the proposal of the consuls, the tribunes Antony and Cassius fled to Caesar, who crossed the Rubicon (the frontier of Italy) with a single legion, exclaiming " Alea jacta est."

Pompey's available force consisted in two legions stationed in Campania, and eight, commanded by his lieutenants, Afranius and Petreius, in Spain; both sides levied troops in Italy. Caesar was soon joined by two legions from Gaul and marched rapidly down the Adriatic coast, overtaking Pompey at Brundisium (Brindisi), but failing to prevent him from embarking with his troops for the East, where the prestige of his name was greatest. Hereupon Caesar (it is said) exclaimed " I am going to Spain to fight an army without a general, and thence to the East to fight a general without an army." He carried out the first part of this programme with marvellous rapidity. He reached Ilerda (Lerida) on the 23rd of June and, after extricating his army from a perilous situation, outmanoeuvred Pompey's lieutenants and received their submission on the 2nd of August. Returning to Rome, he held the dictatorship for eleven days, was elected consul for 48 B.C., and set sail for Epirus at Brundisium on the 4th of January. HeattemptedtoinvestPompey's linesatDyrrhachium (Durazzo), though his opponent's force was double that of his own, and was defeated with considerable loss. He now marched east- wards, in order if possible to intercept the reinforcements which Pompey's father-in-law, Scipio, was bringing up; but Pompey

The Civil War.

was able to effect a junction with this force and descended into the plain of Thessaly, where at the battle of' Pharsalus he was decisively defeated and fled to Egypt, pursued by Caesar, who learnt of his rival's murder on landing at Alexandria. Here he remained for nine months, fascinated (if the story be true) by Cleopatra, and almost lost his life in an emeute. In June 47 B.C. he proceeded to the East and Asia Minor, where he " came, saw and conquered " Pharnaces, son of Mithradates the Great, at Zela. Returning to Italy, he quelled a mutiny of the legions (including the faithful Tenth) in Campania, and crossed to Africa, where a republican army of fourteen legions under Scipio was cut to pieces at Thapsus (6th of April 46 B.C.).

Here most of the republican leaders were killed and Cato committed suicide. On the 26th to 29th July Caesar celebrated a fourfold triumph and received the dictatorship for ten years. In November, however, he was obliged to sail for Spain, where the sons of Pompey still held out. On the 17th of March 45 B.C. they were crushed at Munda. Caesar returned to Rome in September, and six months later (15th of March 44 B.C.) was murdered in the senate house at the foot of Pompey's statue.

It was remarked by Seneca that amongst the murderers of Caesar were to be found more of his friends than of his enemies.

We can account for this only by emphasizing the !f S ? r ' S ˆ act t ˆ lat l ˆ e ˆ orm °f Caesar's government became ship. as time went on more undisguised in its absolutism,

while the honours conferred upon him seemed designed to raise him above the rest of humanity. It is explained else- where (see Rome: History, Ancient) that Caesar's power was exercised under the form of the dictatorship. In the first instance (autumn of 49 B.C.) this was conferred upon him as the only solution of the constitutional deadlock created by the flight of the magistrates and senate, in order that elections (including that of Caesar himself to the consulship) might be held in due course. For this there were republican precedents. In 48 B.C. he was created dictator for the second time, probably with constituent powers and for an undefined period, according to the dangerous and unpopular precedent of Sulla. In May 46 b .c. a third dictatorship was conferred on Caesar, this time for ten years and apparently as a yearly office, so that he became Dictator IV. in May 45 B.C. Finally, before the 1 5th of February 44 B.C., this was exchanged for a life-dictatorship. Not only was this a contradiction in terms, since the dictatorship was by tradition a makeshift justified only when the state had to be carried through a serious crisis, but it involved military rule in Italy and the permanent suspension of the constitutional guarantees, such as intercessio and provocatio, by which the liberties of Romans were protected. That Caesar held the impcrium which he enjoyed as dictator to be distinct in kind from that of the republican magistrates he indicated by placing the term imperator at the head of his titles. 1 Besides the dictator- ship, Caesar held the consulship in each year of his reign except 47 B.C. (when no curule magistrates were elected save for the last three months of the year) ; and he was moreover invested by special enactments with a number of other privileges and powers; of these the most important was the tribunicia potestas, which we may believe to have been free from the limits of place (i.e. Rome) and

collegiality. Thus, too, he was granted the sole right of making peace and war, and of disposing of the funds in the treasury of the state. 2 Save for the title of dictator, which undoubtedly carried unpopular associations and was formally abolished on the proposal of Antony after Caesar's death, this cumulation of powers has little to distinguish it from the Principate of Augustus; and the assumption of the per- petual dictatorship would hardly by itself suffice to account for the murder of Caesar. But there are signs that in the last six months of his life he aspired not only to a monarchy in name as well as in fact, but also to a divinity which Romans should

1 Suetonius, Jul. 76, errs in stating that he used the title imperator as a praenomen.

2 The statement of Dio and Suetonius, that a general cura legum et morum was conferred on Caesar in 46 B.C., is rejected by Mommsen. It is possible that it may have some foundation in the terms of the law establishing his third dictatorship.

acknowledge as well as Greeks, Orientals and barbarians. His statue was set up beside those of the seven kings of Rome, and he adopted the throne of gold, the sceptre of ivory and the embroidered robe which tradition ascribed to them. He allowed his supporters to suggest the offer of the regal title by putting in circulation an oracle according to which it was destined for a king of Rome to subdue the Parthians, and when at the Lupercalia (15th February 44 b.c.) Antony set the diadem on his head he rejected the offer half-heartedly on account of the groans of the people. His image was carried in the pompa circensis amongst those of the immortal gods, and his statue set up in the temple of Quirinus with the inscription " To the Unconquerable God." A college of Luperci, with the surname Juliani, was instituted in his honour and flamines were created as priests of his godhead. This was intolerable to the aristocratic republicans, to whom it seemed becoming that victorious com- manders should accept divine honours at the hands of Greeks and Asiatics, but unpardonable that Romans should offer the same worship to a Roman.

Thus Caesar's work remained unfinished, and this must be borne in mind in considering his record of legislative and administrative reform. Some account of this is given elsewhere (see Rome: History, Ancient), but it 7l!f /s " may be well to single out from the list of his measures reforms, (some of which, such as the restoration of exiles and the children of proscribed persons, were dictated by political expediency, while others, such as his financial proposals for the

relief of debtors, and the steps which he took to restore Italian agriculture, were of the nature of palliatives) those which have a permanent significance as indicating his grasp of imperial problems. The Social War had brought to the inhabitants of Italy as far as the Po the privileges of Roman citizenship; it remained to extend this gift to the Transpadane Italians, to establish a uniform system of local administration and to devise representative institutions by which at least some voice in the government of Rome might be permitted to her new citizens. This last conception lay beyond the horizon of Caesar, as of all ancient statesmen, but his first act on gaining control of Italy was to enfranchise the Transpadanes, whose claims he had consistently advocated, and in 45 B.C. he passed the Lex Julia Municipalis, an act of which considerable fragments are inscribed on two bronze tables found at Heraclea near Tarentum. 3 This law deals inter alia with the police and the sanitary arrange- ments of the city of Rome, and hence it has been argued by Mommsen that it was Caesar's intention to reduce Rome to the level of a municipal town. But it is not likely that such is the case. Caesar made no far-reaching modifications in the govern- ment of the city, such as were afterwards carried out by Augustus, and the presence in the Lex Julia Municipalis of the clauses referred to is an example of the common process of " tacking " (legislation per saturam, as it was called by the Romans) . The law deals with the constitution of the local senates, for whose members qualifications of age (30 years) and military service are laid down, while persons who have suffered conviction for various specified offences, or who are insolvent, or who carry on discreditable or immoral trades are excluded. It also provides that the local magistrates shall take a census of the citizens at the same time as the census takes place in Rome, and send the registers to Rome within sixty days. The existing fragments tell us little as to the decentralization of the functions of govern- ment, but from the Lex Rubria, which applies to the Transpadane districts enfranchised by Caesar (it must be remembered that Cisalpine Gaul remained nominally a province until 42 b.c.) we gather that considerable powers of independent jurisdiction were reserved to the municipal magistrates. But Caesar was not content with framing a uniform system of local government

3 Since the discovery of a fragmentary municipal charter at Tarentum (see Rome), dating from a period shortly after the Social War, doubts have been cast on the identification of the tables of Heraclea with Caesar's municipal statute. It has been questioned whether Caesar passed such a law, since the Lex Julia Municipalii mentioned in an inscription of Patavium (Padua) may have been a

local charter. See Legras, La Table latine d'Heraclee (Paris, 1907).

Colonies.

for Italy. He was the first to carry out on a large scale those plans of transmarine colonization whose inception was due to the Gracchi. As consul in 59 B.C. Caesar had established colonies

of veterans in Campania under the Lex Julia Agraria,

and had even then laid down rules for the foundation of such communities. As dictator he planted numerous colonies both in the eastern and western provinces, notably at Corinth and Carthage. Mommsen interprets this policy as signifying that " the rule of the urban community of Rome over the shores of the Mediterranean was at an end," and says that the first act of the " new Mediterranean state " was " to atone for the two greatest outrages which that urban community had perpetrated on civilization." This, however, cannot be admitted. The sites of Caesar's colonies were selected for their commercial value, and that the citizens of Rome should cease to be rulers of the Mediterranean basin could never have entered into Caesar's mind. The colonists were in many cases veterans who had served under Caesar, in others members of the city proletariat. We possess the charter of the colony planted at Urso in southern Spain under the name of Colonia Julia Genetiva Urbanorum. Of the two latter titles, the first is derived from the name of Venus Genetrix, the ancestress of the Julian house, the second indicates that the colonists were drawn from the plebs urbana. Accordingly, we find that free birth is not, as in Italy, a necessary qualification for municipal office. By such foundations Caesar began the extension to the provinces of that Roman civilization which the republic had carried to the bounds of the Italian peninsula. Lack of time alone prevented him from carrying into effect such projects as the piercing of the Isthmus of Corinth, whose object was to promote trade and intercourse throughout the Roman dominions, and we are told that at the time of his death he was contemplating the extension of the empire to its natural frontiers, and was about to engage in a war with Parthia with the object of carrying Roman arms to the Euphrates. Above all, he was determined that the empire should be governed in the true sense of the word and no longer exploited by its rulers, and he kept a strict control over the legati, who, under the

form of military subordination, were respon- sible to him for the administration of their provinces.

Caesar's writings are treated under Latin Literature. It is sufficient here to say that of those preserved to us the

seven books Commentarii de hello Gallico appear to mentaries. have been written in 51 B.C. and carry the narrative

of the Gallic campaigns down to the close of the previous year (the eighth book, written by A. Hirtius, is a supplement relating the events of 51-50 B.C.), while the three books De hello civili record the struggle between Caesar and Pompey (49-48 B.C.). Their veracity was impeached in ancient times by Asinius Pollio and has often been called in question by modern critics. The Gallic War, though its publication was doubtless timed to impress on the mind of the Roman people the great services rendered by Caesar to Rome, stands the test of criticism as far as it is possible to apply it, and the accuracy of its narrative has never been seriously shaken. The Civil War, especially in its opening chapters is, however, not altogether free from traces of misrepresentation. With respect to the first moves made in the struggle, and the negotiations for peace at the outset of hostilities, Caesar's account sometimes conflicts with the testimony of Cicero's correspondence or implies movements which cannot be reconciled with geographical facts. We have but few fragments of Caesar's other works, whether political pamphlets such as the Anticato, grammatical treatises {De Analogia) or poems. All authorities agree in describing him as a consummate orator. Cicero {Brut. 22) wrote: de Caesar e ita judico, ilium omnium fere oratorum Latine loqui elegantissime, while Quintilian (x. 1. 114) says that had he practised at the bar he would have been the only serious rival of Cicero.

The verdict of historians on Caesar has always been coloured by their political sympathies. All have recognised his com- Character. manding genius, and few have failed to do justice to his

personal charm and magnanimity, which almost won the heart of Cicero, who rarely appealed in vain to his clemency.

Indeed, he was singularly tolerant of all but intellectual opposi- tion. His private life was not free from scandal, especially in his youth, but it is difficult to believe the worst of the tales which were circulated by his opponents, e.g. as to his relations with Nicomedes of Bithynia. As to his public character, however, no agreement is possible between those who regard Caesarism as a great political

creation, and those who hold that Caesar by destroying liberty lost a great opportunity and crushed the sense of dignity in mankind. The latter view is unfortunately confirmed by the undoubted fact that Caesar treated with scant respect the historical institutions of Rome, which with their magnificent traditions might still have been the organs of true political life. He increased the number of senators to 900 and introduced provincials into that body; but instead of making it into a grand council of the empire, representative of its various races and nationalities, he treated it with studied contempt, and Cicero writes that his own name had been set down as the proposer of decrees of which he knew nothing, conferring the title of king on potentates of whom he had never heard. A similar treatment was meted out to the ancient magistracies of the republic; and thus began the process by which the emperors undermined the self-respect of their subjects and eventually came to rule over a nation of slaves. Few men, indeed, have partaken as freely of the inspiration of genius as Julius Caesar; few have suffered more disastrously from its illusions. See further Rome: History, ii. " The Republic," Period C ad fin.

Authorities. — The principal ancient authorities for the life of Caesar are his own Commentaries, the biographies of Plutarch and Suetoni,us, letters and speeches of Cicero, the Catiline of Sallust, the Pharsalia of Lucan, and the histories of Appian, Dio Cassius and Velleius Paterculus (that of Livy exists only in the Epitome). Amongst modern works may be named the exhaustive repertory of fact contained in Drumann, Geschichte Roms, vol. iii. (new ed. by Groebe, 1906, pp. 125-829), and the brilliant but partial panegyric of Th. Mommsen in his History of Rome (Eng. trans., vol. iv., esp. p. 450 ff.). J. A. Froude's Caesar; a Sketch (2nd ed., 1896) is equally biased and much less critical. W. Warde Fowler's Julius Caesar (1892) gives a favourable account (see also his Social Life at Rome, 1909). On the other side see especially A. Holm, History of Greece (Eng. trans., vol. iv. p. 582 ff.), J. L. Strachan Davidson, Cicero (1894), p. 345 ff., and the introductory Lections in Prof. Tyrrell's edition of the Correspondence of Cicero, particularly " Cicero's case against Caesar," vol. v. p. 13 ff. Vol. ii. of G. Ferrero's Greatness and Decline of Rome (Eng. trans., 1907) is largely devoted to Caesar, but must be used with caution. The Gallic campaigns have been treated by Napoleon III., Histoire de Jules Cesar (1865- 1866), which is valuable as giving the result of excavations, and in English by T. Rice Holmes, Caesar's Conquest of Gaul (1901), in which references to earlier literature will be found. A later account is that of G. Veith, Geschichte der Feldzilge C. Jidius Caesars (1906). For

maps see A. von Kampen. For the Civil War see Colonel Stoffel (the collaborator of Napoleon III.), Histoire de Jules Cesar: guerre civile (1887). There is an interesting article, " The Likenesses of Julius Caesar," by J. C. Ropes, in Scribncr's Magazine, Feb. 1887, with 18 plates. (H. S. J.)

Medieval Legends.

In the middle ages the story of Caesar did not undergo such extraordinary transformations as befell the history of Alexander the Great and the Theban legend. Lucan was regularly read in medieval schools, and the general facts of Caesar's life were too well known. He was generally, by a curious error, regarded as the first emperor of Rome, 1 and representing as he did in the popular mind the glory of Rome, by an easy transition he became a pillar of the Church. Thus, in a French pseudo-historic romance, Les Faits des Romains {c. 1223), he receives the honour of a bishopric. His name was not usually associated with the marvellous, and the Irouvere of Huon de Bordeaux outstepped the usual sober tradition when he made Oberon the son of Julius Caesar and Morgan la Fay. About 1240 Jehan de Tuim com- posed a prose Hystore de Julius Cesar (ed. F. Settegast, Halle, 1881) based on the Pharsalia of Lucan, and the commentaries of Caesar (on the Civil War) and his continuators (on the Alex- andrine, African and Spanish wars) . The author gives a romantic description of the meeting with Cleopatra, with an interpolated dissertation on amour courtois as understood by the trouveres.

1 Brunetto Latini, TrSsor: " Et ainsi Julius Cesar fu li premiers empereres des Romains."

The Hystore was turned into verse (alexandrines) by Jacot de Forest (latter part of the 13th century) under the title of Roman de Julius Cisar. A prose compilation by an unknown author, Les Fails des Romains (c. 1225), has little resemblance to the last two works, although mainly derived from the same sources. It was originally intended to contain a history of the twelve Caesars, but concluded with the murder of the dictator, and in some MSS. bears the title of Li livres de Cesar. Its popularity is proved by the numerous MSS. in which it is pre- served and by three separate translations into Italian. A Mistaire de Julius Cisar is said to have been represented at Amboise in 1500 before Louis XII.

See A. Graf, Roma nella memoria e nella imaginazione del medio evo, i. ch. 8 (1882-1883); P. Meyer in Romania, xiv. (Paris, 1885), where the Fails des Romains is analysed at length; A. Duval in Histoire litteraire de la France, xix. (1838); L. Constans in Petit de Jullevilles' Hist, de la langue et de la litt. francaise, 1. (1896) ; H. Wesemann, Die Casarfabeln des Mittelalters (Lowenberg, 1879). (M. Br.)

CAESAR, SIR JULIUS (1SS7-1SS8-1636), English judge, descended by the female line from the dukes de' Cesarini in Italy, was born near Tottenham in Middlesex. He was educated at Magdalen Hall, Oxford, and afterwards studied at the university of Paris, where in the year 1581 he was made a doctor of the civil law. Two years later he was admitted to the same degree at Oxford, and also became doctor of the canon law. He held many high offices during the reigns of Elizabeth and James I., including a judgeship of the admiralty court (1584), a mastership in chancery (1588), a mastership of the court of requests (1595), chancellor and under treasurer of the exchequer (1606). He was knighted by King James in 1603, and in 1614 was appointed master of the rolls, an office which he held till his death on the 18th of April 1636. He was so remarkable for his bounty and charity to all persons of worth that it was said of him that he seemed to be the almoner-general of the nation. His manuscripts, many of which are now in the British Museum, were sold by auction in 1757 for upwards of £500.

See E. Lodge, Life of Sir Julius Caesar (1810) ; Wood, Fasti Oxonienses, ed. Bliss ; Foss, Lives of the Judges.

CAESAREA MAZACA (mod. Kaisarieh), chief town of a sanjak in the Angora vilayet of Asia Minor. Mazaca, the resi- dence of the kings of Cappadocia, later called Eusebea (perhaps after Ariarathes Eusebes), and named Caesar ea probably by Claudius, stood on a low spur on the north side of Erjies Dagh (M. Argaeus). The site, now called Eski-shekr, shows only a few traces of the old town. It was taken by Tigranes and destroyed by the Persian king Shapur (Sapor) I. after his defeat of Valerian in a.d. 260. At this time it is stated to have contained 400,000 inhabitants. In the 4th century Basil, when bishop, established an ecclesiastical centre on the plain, about 1 m. to the north-east, and this gradually supplanted the old town. A portion of Basil's new city was surrounded with strong walls and turned into a fortress by Justinian; and within the walls, rebuilt in the 13th and 16th centuries, lies the greater part of Kaisarieh, altitude 3500 ft. The town was captured by the Seljuk sultan, Alp Arslan, 1064, and by the Mongols, 1243, before passing to the

Osmanli Turks. Its geographical situation has made it a place of commercial importance throughout history. It lay on the ancient trade route from Sinope to the Euphrates, on the Persian " Royal Road " from Sardis to Susa, and on the great Roman highway from Ephesus to the East. It is still the most important trade centre in eastern Asia Minor. The town is noted for its fruit, especially its vines; and it exports tissues, carpets, hides, yellow berries and dried fruit Kaisarieh is the headquarters of the American mission in Cappadocia, which has several churches and schools for boys and girls and does splendid medical work. It is the seat of a Greek bishop, an Armenian archbishop and a Roman Catholic bishop, and there is a Jesuit school. On the 30th of November 1895 there was a massacre of Armenians, in which several Gregorian priests and Protestant pastors lost their lives. Pop., according to Cuinet, 71,000 (of whom 26,000 are Christians). Sir C. Wilson gave it as 50,000 (23,000 Christians). (C. W. W.; J. G. C. A.)

CAESAREAN SECTION, in obstetrics (q.v.) the operation for removal of a foetus from the uterus by an abdominal incision, so called from a legend of its employment at the birth of Julius Caesar. This procedure has been practised on the dead mother since very early times; in fact it was prescribed by Roman law that every woman dying in advanced pregnancy should be so treated; and in 1608 the senate of Venice enacted that any practitioner who failed to perform this operation on a pregnant woman supposed to be dead, laid himself open to very heavy penalties. But the first recorded instance of its being performed on a living woman occurred about 1500, when a Swiss pig-gelder operated on his own wife. From this time onwards it was tried in many ways and under many conditions, but almost invariably with the same result, the death of the mother. Even as recently as the first half of the 19th century the recorded mortality is over 50%. Thus it is no surprise that craniotomy — in which the life of the child is sacrificed to save that of the mother — was almost invariably preferred. As the use of antiseptics was not then understood, and as it was customary to return the uterus to the body cavity without suturing the incision, the immediate cause of death was either septicaemia or haemorrhage. But in 1882 Sanger published his method of suturing the uterus — that of employing two series of sutures, one deep, the other superficial. This method of procedure was immediately adopted by many obstetricians, and it has proved so satisfactory that it is still in use to-day. This, and the increasing knowledge of aseptic technique, has brought the mortality from this opera- tion to less than 3 % for the mother and about 5 % for the child; and every year it is being advised more freely for a

larger number of morbid conditions, and with increasingly favourable results. Craniotomy, i.e. crushing the head of the foetus to reduce its size, is now very rarely performed on the living child, but sym- physiotomy, i.e. the division of the symphysis pubis to produce a temporary enlargement of the pelvis, or caesarean section, is advocated in its place. Of these two operations, symphysio- tomy is steadily being replaced by caesarean section.

This operation is now advised for (1) extreme degrees of pelvic contraction, (2) any malformation or tumour of the uterus, cervix or vagina, which would render the birth of the child through the natural passages impossible, (3) maternal complica- tions, as eclampsia and concealed accidental haemorrhage, and (4) at the death of the mother for the purpose of saving the child.

CAESAREA PALAESTINA, a town built by Herod about 25-13 B.C., on the sea-coast of Palestine, 30 m. N. of Joppa, on the site of a place previously called Turris Stratonis. Remains of all the principal buildings erected by Herod existed down to the end of the 19th century; the ruins were much injured by a colony of Bosnians established here in 1884. These buildings are a temple, dedicated to Caesar; a theatre; a hippodrome; two aqueducts; a boundary wall; and, chief of all, a gigantic mole, 200 ft. wide, built of stones 50 ft. long, in 20 fathoms of water, protecting the harbour on the south and west. The harbour measures 180 yds. across. The massacre of Jews at this place led to the Jewish rebellion and to the Roman war. Ves- pasian made it a colony and called it Flavia: the old name, however, persisted, and still survives as Kaisarieh. Eusebius was archbishop here (a.d. 315-318). It was captured by the Moslems in 638 and by the Crusaders in 1102, by Saladin in 1187, recaptured by the Crusaders in 1191, and finally lost by them in 1265, since when till its recent settlement it has lain in ruins. Remains of the medieval town are also visible, consisting of the walls (one-tenth the area of the Roman city), the castle, the cathedral (now covered by modern houses), and a church. (R.- A. S. M.)

CAESAREA PHILIPPI, the name of a town 95 m. N. of Jerusalem, 35 m. S.W. from Damascus, n 50 ft. above the sea, on the south base of Hermon, and at an important source of the Jordan. It does not certainly appear in the Old Testament history, though identifications with Baal-Gad and (less certainly) with Laish (Dan) have been proposed. It was certainly a place of great sanctity from very early times, and when foreign

religious influences intruded upon Palestine, the cult of its local numen gave place to the worship of Pan, to whom was dedicated the cave in which the copious spring feeding the Jordan arises. It was long known as Panium or Panias, a name that has survived in the modern Banias. When Herod the Great received the territory from Augustus, 20 B.C., he erected here a temple in honour of his patron; but the re-foundation of the town is due to his son, Philip the Tetrarch, who here erected a city which he named Caesarea in honour of Tiberius, adding Philippi to immortalize his own name and to distinguish his city from the similarly-named city founded by his father on the sea-coast. Here Christ gave His charge to Peter (Matt. xvi. 13). Many Greek inscriptions have been found here, some referring to the shrine. Agrippa II. changed the name to Neronias, but this name endured but a short while. Titus here exhibited gladiatorial shows to celebrate the capture of Jerusalem. The Crusaders took the city in 1130, and lost it to the Moslems in 1 165. Banias is a poor village inhabited by about 350 Moslems; all round it are gardens of fruit-trees. It is well watered and fertile. There are not many remains of the Roman city above ground. The Crusaders' castle of Subeibeh, one of the finest in Palestine, occupies the summit of a conical hill above the village. (R. A. S. M.)

CAESIUM (symbol Cs, atomic weight 132-9), one of the alkali metals. Its name is derived from the Lat. caesius, sky-blue, from two bright blue lines of its spectrum. It is of historical importance, since it was the first metal to be discovered by the aid of the spectroscope (R. Bunsen, Berlin Acad. Ber., i860), although caesium salts had undoubtedly been examined before, but had been mistaken for potassium salts (see C. F. Plattner, Pog. Ann., 1846, p. 443, on the analysis of pollux and the subsequent work of F. Pisani, Comptes Rendus, 1864, 58, p. 714). Caesium is found in the mineral springs of Frankenhausen, Montecatini, di Val di Nievole, Tuscany, and Wheal Clifford near Redruth, Cornwall (W. A. Miller, Chem. News, 1864, 10, p. 181), and, associated with rubidium, at Diirkheim; it is also found in lepidolite, ieucite, petalite, triphylline and in the carnallite from Stassfurt. The separation of caesium from the minerals which contain it is an exceedingly difficult and laborious process. According to R. Bunsen, the best source of rubidium and caesium salts is the residue left after extraction of lithium salts from lepidolite. This residue consists of sodium, potassium and lithium chlorides, with small quantities of caesium and rubidium chlorides. The caesium and rubidium are separated from this by repeated fractional crystallization of their double platinum chlorides, which

are much less soluble in water than those of the other alkali metals (R. Bunsen, Ann., 1862, 122, p. 347; 1863, 125, p. 367). The platino-chlorides are reduced by hydrogen, and the caesium and rubidium chlorides extracted by water. See also A. Schrotter {Jour. prak. Chem., 1864, 93, p. 2075) and W. Heintz (Journ. prak. Chem., 1862, 87, p. 310). W. Feit and K. Kubierschky (Chem. Zeit., 1892, 16, p. 33s) separate rubidium and caesium from the other alkali metals by converting them into double chlorides with stannic chloride; whilst J. Redtenbacher (Jour. prak. Chem., 1865, 94, p. 442) separates them from potas- sium by conversion into alums, which C. Setterberg (Ann., 1882, 211, p. 100) has shown are very slightly soluble in a solution of potash alum. In order to separate caesium from rubidium, use is made of the different solubilities of their various salts. The bitartrates RbHC 4 H 4 6 and CsHC 4 H 4 6 have been em- ployed, as have also the alums (see above). The double chloride of caesium and antimony 3CsCl • 2SbCl 3 (R. Godeffroy, Ber., 1874, 7, p. 37s; Ann., 1876, 181, p. 176) has been used, the corresponding compound not being formed by rubidium. The metal has been obtained by electrolysis of a mixture of caesium and barium cyanides (C. Setterberg, Ann., 1882, 211, p. 100) and by heating the hydroxide with magnesium or aluminium (N. Beketoff, Chem. Centralblatt, 1889, 2, p. 245). L. Hackspill (Comptes Rendus, 1905, 141, p. 101) finds that metallic caesium can be obtained more readily by heating the chloride with metallic calcium. A special V-shaped tube is used in the opera- tion, and the reaction commences between 400° C. and 500° C.

It is a silvery white metal which burns on heating in air. It melts at 26 to 27 C. and has a specific gravity of i-88 (i5°C). The atomic weight of caesium has been determined by the analysis of its chloride and bromide. Richards and Archibald (Zeit. anorg. Chem., 1903, 34, p. 353) obtained 132-879 (0=i6).

Caesium hydroxide, Cs(OH)2, obtained by the decomposition of the sulphate with baryta water.is a greyish-white deliquescent solid, which melts at a red heat and absorbs carbon dioxide rapidly. It readily dissolves in water, with evolution of much heat. Caesium chloride, CsCl, is obtained by the direct action of chlorine on caesium, or by solution of the hydroxide in hydrochloric acid. It forms small cubes which melt at a red heat and volatilize readily. It deliquesces in moist air. Many double chlorides are known, and may be prepared by mixing solutions of the two components in the requisite pro- portions. The bromide, CsBr, and iodide, Csl, resemble the corre- sponding potassium salts. Many trihaloid salts of caesium are also known, such as CsBr 3 , CsOBr 2 , Csl 3 , CsBrI 2 , CsBr 2 I,

&c. (H. L. Wells and S. L. Penfield, Zeit. fur anorg. Chem., 1892, 1, p. 85). Caesium sulphate, Cs 2 S0 4 , may be prepared by dissolving the, hydroxide or carbonate in sulphuric acid. It crystallizes in short hard prisms, which are readily soluble in water but insoluble in alcohol. It com- bines with many metallic sulphates (silver, zinc, cobalt, nickel, &c.) to form double sulphates of the type Cs 2 S0 4 - RS0 4 -6H 2 0. It also forms a caesium-alum Cs 2 S04-Al 2 (S0 4) 3 -24H 2 0. Caesium nitrate, CsNC>3, is obtained by dissolving the carbonate in nitric acid, and crystallizes in glittering prisms, which melt readily, and on heating evolve oxygen and leave a residue of caesium nitrite. The carbonate, Cs 2 C03, silicofluoride, Cs 2 SiF6, borate, Cs 2 O3B 2 03, and the sulphides Cs 2 S-4H 2 0, Cs 2 S 2 - H20, Cs 2 S 3 -H 2 0, Cs 2 S 4 and ,Cs 2 Sfi-H 2 0, are also known.

Caesium compounds can be readily recognized by the two bright blue lines (of wave length 4555 and 4593) in their flame spectrum, but these are not present in the spark spectrum. The other lines include three in the green, two in the yellow, and two in the orange.

CAESPITOSE (Lat. caespes, a sod), a botanical term for " growing in tufts," like many grasses.

CAESTUS, or Cestus (from Lat. caedo, strike), a gauntlet or boxing-glove used by the ancient pugilists. Of this there were several varieties, the simplest and least dangerous being the meilichae (jueiXIx a 0> which consisted of strips of raw hide tied under the palm, leaving the fingers bare. With these the athletes in the palaestrae were wont to practise, reserving for serious contests the more formidable kinds, such as the sphaerae (ctbalpai), which were sewn with small metal balls covered with leather, and the terrible murmekes (tivpixques) , sometimes called "limb-breakers" (yvixnopoC) , which were studded with heavy nails. The straps (tfiavres) were of different lengths, many reaching to the elbow, in order to protect the forearm when guarding heavy blows (see J. H. Krause, Gymnaslik und Agonistik der Hellenen, 1841). The caestus is to be distinguished from cestus (= embroidered, from Ktvrdv), an adjective used as a noun in the sense of " girdle," especially the girdle of Aphrodite, which was supposed to have the power of exciting love.

CAESURA (Lat. for " cutting," Gr. To/xif), in prosody, a rest or pause, usually occurring about the middle of a verse, which is thereby separated into two parts (icuKa, members). In Greek and Latin hexameters the best and most common caesura is the penthemimeral (i.e. after the 5th half-foot) :

Mtjvlv a{6L§€, Oe\a, \ H77 1 X^l'a | dew 'Axt| Xijos Arma vi| rumque ca|no, Tro|jae qui | primus ab | oris.

Another caesura very common in Homer, but rare in Latin verse, is after the 2nd syllable of the 3rd dactyl:

Oiw| voZai rt I Traai. At|6s 8' ire\deTO] /3ouXij.

On the other hand, the hephthemimeral caesura (i.e. after the 7th half -foot) is common in Latin, but rare in Greek:

Formo|sam reso | nare do|ces Ama |ryllida | silvas. The " bucolic " caesura, peculiar to Greek (so called because it is chiefly found in writers like Theocritus) occurs after the 4th dactyl :

"Kvipa /tot I ivvewi, \ Movaa, tto | \vTptmov, | 5s /xdXa | iraXXAr

In the pentameter verse of the elegiac distich the caesura is always penthemimeral. In the iambic trimeter (consisting of three dipodia or pairs of feet), both in Greek and Latin, the most usual caesura is the penthemimeral; next, the hephthemimeral: T Q r'tK I va KAS| /iov roD | 7r&Xcu [vka. \ Tpoi) Supplex I et o [ro reg | na per | Proser| pinae.

Verses in which neither of these caesuras occurs are considered faulty. On the other hand, secondary or subsidiary caesuras are found in both Greek and Latin; thus, a trithemimeral (after the 3rd half -foot) is combined with the hephthemimeral, which divides the verse into two unequal parts. A caesura is often called masculine when it falls after a long, feminine when it falls after a short syllable.

The best treatise on Greek and Latin metre for general use is L. Miiller, Die Metrik der Griechen und Romer (1885) ; see also the article Verse.

CAFFEINE, or Theine (1.3.7 trimethyl 2.6 dioxypurin), C 8 H10 N 4 2 . H 2 0, a substance found in the leaves and beans of the coffee tree, in tea, in Paraguay tea, and in small quantities in cocoa and in the kola nut. It may be extracted from tea or coffee by boiling with water, the dissolved tannin precipitated by basic lead acetate, the solution filtered, excess of lead pre- cipitated by sulphuretted

hydrogen and the filtered liquid then evaporated to crystallization; or, tea is boiled with water, and the whole then evaporated to a syrup, which is mixed with slaked lime, evaporated to dryness on the water-bath and extracted with chloroform (P. Cazeneuve, Bull, de la soc. chim. de Paris, 187 6- 1877, 27, p. 199). Synthetically it may be prepared by the methylation of silver theobromine and silver theophyllin or by boiling heteroxanthine with methyl iodide and potash. E. Fischer and L. Ach (Berichte, 1895, 28, p. 3135) have synthesized it from dimethyl alloxan, whilst W. Traube (Berichte, 1900, 33, P- 3435) has obtained it from 1 . 3 diamethyl 4. 5 diamino 2.6 dioxypyrimidine. On the constitution of caffeine see Purin and also E. Fischer (Annalen, 1882, 215, p. 253).

Caffeine crystallizes in long silky needles, which are slightly soluble in cold water. It becomes anhydrous at 100° C. and melts at 234° to 23 5 C. It has a faint bitter taste and gives salts with mineral acids. On oxidation with nitric acid caffeine gives cholesterophane (dimethyl parabanic acid) , but if chlorine water be used as the oxidant, then it yields monomethyl urea and dimethyl alloxan (E. Fischer).

CAFFIERI, JACQUES (1678-1755), 'French worker in metal, the most famous member of a family several of whom distinguished themselves in plastic art, was the fifth son of Philippe Caffieri (1634-17 16), a decorative sculptor, who, after serving Pope Alexander VII., entered the service of Louis XIV. in 1660. An elder son of Philippe, Francois Charles (1667-1721), was associ- ated with him. As a fondeur ciseleur, however, the renown of the house centred in Jacques, though it is not always easy to distinguish between his own work and that of his son Philippe (1714-1777). A large proportion of his brilliant achievement as a designer and chaser in bronze and other metals was executed for the crown at Versailles, Fontainebleau, Compiegne, Choisy and La Muette, and the crown, ever in his debt, still owed him money at his death. Jacques and his son Philippe undoubtedly worked together in the " Appartement du Dauphin " at Versailles, and although much of their contribution to the palace has dis- appeared, the decorations of the marble chimney-piece still remain. They belong to the best type of the Louis XV. style — ■ vigorous and graceful in design, they are executed with splendid skill. It is equally certain that father and son worked together upon the gorgeous bronze case of the famous astronomical clock made by Passement and Danthiau for Louis XV. between 1749 and 1753. The form of the case has been much criticized, and even ridiculed, but the severest critics in that particular have been the readiest to laud the boldness and freedom of the motives, the jewel-like finish of the

craftsmanship, the magnifi- cent dexterity of the master-hand. The elder Caffieri was, indeed, the most consummate practitioner of the style rocaille, which he constantly redeemed from its mannered conventionalism by the ease and mastery with which he treated it. From the studio in which he and his son worked side by side came an amazing amount of work, chiefly in the shape of those gilded bronze mounts which in the end became more insistent than the pieces of furniture which they adorned. Little of his achievement was ordinary; an astonishingly large proportion of it is famous. There is in the Wallace collection (Hertford House, London) a

commode from the hand of Jacques Caffieri in which the brilliance and spontaneity, the sweeping boldness and elegance of line that mark his style at its best, are seen in a perfection hardly exceeded in any other example. Also at Hertford House is the exception- ally fine lustre which was a wedding present from Louis XV. to Louise Elizabeth of France. After Jacques' death his son Philippe continued to work for the crown, but had many private clients. He made a great cross and six candlesticks for the high altar of Notre Dame, which disappeared in the revolution, but similar work for Bayeux cathedral still exists. A wonderful enamelled toilet set which he executed for the Princess of Asturias has also disappeared. Philippe's style was gradually modified into that which prevailed in the third quarter of the 18th century, since by 1777, when he died, the taste for the magnificent mounts of his early days had passed away. Like his father, he drew large sums from the crown, usually after giving many years' credit, while many other years were needed by his heirs to get in the balance of the royal indebtedness. Philippe's younger brother, Jean Jacques Caffieri (1725-1792), was a sculptor, but was sufficiently adept in the treatment of metals to design the fine rampe d'escalier which still adorns the Palais Royal.

CAFTAN, or Kaftan (a Turkish word, also in use in Persia), a tunic or under-dress with long hanging sleeves, tied with a girdle at the waist, worn in the East by persons of both sexes. The caftan was worn by the upper and middle classes in Russia till the time of Peter the Great, when it was generally discarded.

CA6LI, a town and (with Pergola) an episcopal see of the Marches, Italy, in the province of Pesaro and Urbino, 18 m. S. of the latter town by rail, and 830 ft. above sea-level. Pop. (1901) of town, 4628; commune, 12,533. The church of S. Domenico contains a good fresco (Madonna and saints) by Giovanni Santi, the father of Raphael. The citadel of the 15th century, constructed by Francesco di Giorgio Martini of Siena, is on the S.E. of the modern town. Cagli

occupies the site of an ancient vicus (village) on the Via Flaminia, which seems to have borne the name Cale, 24 m. N. of Helvillum (mod. Sigillo) and 18 m. S.W. of Forum Sempronii (mod. Fossombrone) . Below the town to the north is a single arched bridge of the road, the arch having the span of 38J ft. (See G. Mochi, Storia di Cagli, Cagli, 1878.) About 5 m. to the N.N.W. of Cagli and 2§ m. W. of the Via Flaminia at the mod. Acqualagna is the site of an ancient town; the place is now called piano di Valeria, and is scattered with ruins. Inscriptions show that this was a Roman municipium, perhaps Pitinum Mergens {Corp. Inscr. Lot. xi. [Berlin, 1901] p. 876). Three miles north of Acqualagna the Via Flaminia, which is still in use as the modern high-road, traverses the Furlo Pass, a tunnel about 40 yds. long, excavated by Vespasian in a.d. 77, as an inscription at the north end records. There is another tunnel at lower level, which belongs to an earlier date; this seems to have been in use till the construction of the Roman road, which at first ran round the rock on the out- side, until Vespasian cut the tunnel. In repairing the modern road just outside the south entrance to the tunnel, a stratum of carbonized corn, beans, &c, and a quantity of burnt wood, stones, tiles, pottery, &c, was found under and above the modern road, for a distance of some 500 yds. This debris must have belonged to the castle of Petra Pertusa, bumed by the Lombards in 570 or 571 on their way to Rome. The castle itself is mentioned by Procopius (Bell. Goth. ii. n, iii. 6, iv. 28, 34). Here also was found the inscription of a.d. 295, relating to the measures taken to suppress brigandage in these parts. (See Apennines.) See A. Vernarecci in Notizie degli Scavi, 1886, 411 (cf. ibid. 227); Corp. Inscr. Lat. (Berlin, 1901), Nos. 6106, 6107. (T. As.)

CAGLIARI (anc. Carales), the capital of the island of Sardinia, an archiepiscopal see, and the chief town of the province of Cagliari, which embraces the southern half of the island. It is 270 m. W.S.W. of Naples, and 375 m. south of Genoa by sea. Pop. (1900) of town, 48,098; of commune, 53,057. It is finely situated at the northern extremity of the Gulf of Cagliari, in the centre of the south coast of the island. The medieval town occupies a long narrow hill running N. and S. with precipitous

cliffs on the E. and W. which must have been the ancient acropolis, but the modern town, like the Roman town before it, extends to the slopes of the hill and to the low ground by the sea. On each side of

the town are lagoons. That of S. Gilla on the W., which produces fish in abundance, was originally an open bay. That of Molentargius on the E. has large saltpans. The upper town still retains in part its fortifications, including the two great towers at the two extremities, called the Torre dell' Elefante (S.) and the Torre di S. Pancrazio (N.), both erected by the Pisans, the former in 1307, the latter in 1305. The Torre di S. Pancrazio at the highest point (367 ft. above sea-level) commands a magnificent view. Close to it is the archaeological museum, the most important in the island. To the north of it are the modern citadel and the barracks, and beyond, a public promenade. The narrow streets run from north to south for the whole length of the upper town. On the edge of the cliffs on the E. is the cathe- dral, built in 1257-1312 by the Pisans, and retaining two of the original transept doors. The pulpit of the same period is also fine: it now stands, divided into two, on each side of the entrance, while the lions which supported it are on the balus- trade in front of the cathedral (see E. Brunelli in V Arte, Rome, iqoi, 50; D. Scano, ibid. 204). Near the sacristy are also some Gothic chapels of the Aragonese period. The church was, however, remodelled in 1676, and the interior is baroque. Two fine silver candelabra, the tabernacle and the altar front are of the 17th century; and the treasury also contains some good silver work. (See D. Scano in Bolletino d'Arte, February 1907, p. 14; and E. Brunelli in U Arte, 1907, p. 47.) The crypt contains three ancient sarcophagi. The facade, in the baroque style, was added in 1 703. The university, a little farther north, the buildings of which were erected in 1764, has some 240 students. At the south extremity of the hill, on the site of the bastian of south Caterina, a large terrace, the Passeggiata Umberto Primo, has been constructed: it is much in use on summer evenings, and has a splendid view. Below it are covered promenades, and from it steps descend to the lower town, the oldest part of which (the so-called Marina), sloping gradually towards the sea, is probably the nucleus of the Roman muni- cipium, while the quarter of Stampace lies to the west, and beyond it again the suburb of Sant' Avendrace. The northern portion of this, below the castle hill, is the older, while the part near the shore consists mainly of modern buildings of no great interest. To the east of the castle hill and the Marina is the quarter of Villanova, which contains the church of S. Saturnino, a domed church of the 8th century with a choir of the Pisan period. The harbour of Cagliari (along the north side of which runs a promenade called the Via Romo) is a good one, and has a considerable trade, exporting chiefly lead, zinc and other minerals and salt, the total annual value of exports amounting to nearly 1 5 million sterling in value. The Campidano of Cagliari, the plain which

begins at the north end of the lagoon of S. Gilla, is very fertile and much cultivated, as is also the district to the east round Quarto S. Elena, a village with 8459 inhabitants (1901). The national costumes are rarely now seen in the neighbourhood of Cagliari, except at certain festivals, especially that of S. Efisio (May 1-4) at Pula (see Nora). The methods of cultiva- tion are primitive : the curious water-wheels, made of brushwood with pots tied on to them, and turned by a blindfolded donkey, may be noted. The ox-carts are often made with solid wheels, for greater strength. Prickly pear (opuntia) hedges are as frequent as in Sicily. Cagliari is considerably exposed to winds in winter, while in summer it is almost African in climate. The aqueduct was constructed in quite recent times, rain-water having previously given the only supply. The main line of railway runs north to Decimomannu (for Iglesias), Oristano, Macomer and Chilivani (for Golfo degli Aranci and Sassari); while another line (narrow-gauge) runs to Mandas (for Sorgono and Tortoli). There is also a tramway to Quarto S. Elena.

In a.d. 485 the whole of Sardinia was taken by the Vandals from Africa; but in 533 it was retaken by Justinian. In 687 Cagliari rose against the East Roman emperors, under Gialetus, one of the citizens, who made himself king of the whole island,

his three brothers becoming governors of Torres (in the N.W.), Arborea (in the S.W.) and Gallura (in the N.E. of the island). The Saracens devastated it in the 8th century, but were driven out, and the island returned to the rule of kings, until they fell in the 10th century, their place being taken by four " judges " of the four provinces, Cagliari, Torres, Arborea and Gallura. In the 12th century Musatto, a Saracen, established himself in Cagliari, but was driven out with the help of the Pisans and Genoese. The Pisans soon acquired the sovereignty over the whole island with the exception of Arborea, which continued to be inde- pendent. In 1297 Boniface VIII. invested the kings of Aragon with Sardinia, and in 1326 they finally drove the Pisans out of Cagliari, and made it the seat of their government. In 1348 the island was devastated by the plague described by Boccaccio. It was not until 1403 that the kings of Aragon were able to conquer the district of Arborea, which, under the celebrated Eleonora (whose code of laws — the so-called Carta de Logu — was famous), offered a heroic resistance. In 1479 the native princes were deprived of all independence. The island remained in the hands of Spain until the peace of Utrecht (1714), by which it was assigned to Austria. In 1720 it was ceded by the latter, in exchange for Sicily, to the duke of Savoy, who assumed the title of king 01 Sardinia (Cagliari continuing to be the seat of government),

and this remained the title of the house of Savoy until 1861. Cagliari was bombarded by the French fleet in 1793, but Napoleon's attempt to take the island failed. (T. As.)

CAGLIOSTRO, ALESSANDRO, Count (1743-1795), Italian alchemist and impostor, was born at Palermo on the 8th of June 1743. Giuseppe Balsamo — for such was the "count's" real name— gave early indications of those talents which afterwards gained for him so wide a notoriety. He received the rudiments of his education at the monastery of Caltagirone in Sicily, but was expelled from it for misconduct and disowned by his relations. He now signalized himself by his dissolute life and the ingenuity with which he contrived to perpetrate forgeries and other crimes without exposing himself to the risk of detection. Having at last got into trouble with the authorities he fled from Sicily, and visited in succession Greece, Egypt, Arabia, Persia, Rhodes — where he took lessons in alchemy and the cognate sciences from the Greek Althotas — and Malta. There he presented himself to the grand master of the Maltese order as Count Cagliostro, and curried favour with him as a fellow alchemist, for the grand master's tastes lay in the same direction. From him he obtained introductions to the great houses of Rome and Naples, whither he now hastened. At Rome he married a beautiful but unprincipled woman, Lorenza Feliciani, with whom he travelled, under different names, through many parts of Europe. It is unnecessary to recount the various infamous means which he employed to pay his expenses during these journeys. He visited London and Paris in 1771, selling love- philtres, elixirs of youth, mixtures for making ugly women beautiful, alchemistic powders, &c, and deriving large profits from his trade. After further travels on the continent he re- turned to London, where he posed as the founder of a new system of freemasonry, and was well received in the best society, being adored by the ladies. He went to Germany and Holland once more, and to Russia, Poland, and then again to Paris, where, in 1785, he was implicated in the affair of the Diamond Necklace (q.v.); and although Cagliostro escaped conviction by the matchless impudence of his defence, he was imprisoned for other reasons in the Bastille. On his liberation he visited England once more, where he succeeded well at first; but was ultimately outwitted by seme English lawyers, and confined for a while in the Fleet prison. Leaving England, he travelled through Europe as far as Rome, where he was arrested in 1789. He was tried and condemned to death for being a heretic, but the sentence was commuted to perpetual imprisonment, while his wife was immured in a convent. He died in the fortress prison of San Leo in 1795.

The best account of the life, adventures and character of Giuseppe Balsamo is contained in Carlyle's Miscellanies. Dumas's novel, Memoirs of a Physician, is founded on his adventures; see a!so ti

series of papers in the Dublin University Magazine, vols, lxxviii. and lxxix. ; Memorial, or Brief for Cagliostro in the Cause of Card, de Rohan, &c. (Ft.) by P. Macmahon (1786); Compendio della vita e delle gesta di Giuseppe Balsamo denominato il conte di Cagliostro (Rome, 1791); Sierke, Schwarmer und Schwindler zu Ende des XVIII. Jahrhunderts (1875); and the sketch of his life in D. Silvagni's La Corte e la Societi Romana nei secoli XVIII. e XIX. vol. i. (Florence, 1881). (L. V.)*

CAGNIARD DE LA TOUR, CHARLES (1777-1859), French engineer and physicist, was born in Paris on the 31st of March 1777, and after attending the Ecole Poly technique became one of the ingenieurs gSographiques. He was made a baron in 1818, and died in Paris on the 5th of July 1859. He was the author of numerous inventions, including the cagniardelle, a blowing machine, which consists essentially of an Archimedean screw set obliquely in a tank of water in such a way that its lower end is completely and its upper end partially immersed, and operated by being rotated in the opposite direction to that re- quired for raising water. In acoustics he invented, about 1819, the improved siren which is known by his name, using it for ascertaining the number of vibrations corresponding to a sound of any particular pitch, and he also made experiments on the mechanism of voice-production. In course of an investigation in 182 2-1823 on the effects of heat and pressure on certain liquids he found that for each there was a certain temperature above which it refused to remain liquid but passedintothegaseous state, no matter what the amount of pressure to which it was subjected, and in the case of water he determined this critical temperature, with a remarkable approach to accuracy, to be 362 C. He also studied the nature of yeast and the influence of extreme cold upon its life.

CAGNOLA, LUIGI, Marchese (1762-1833), Italian architect, was born on the 9th of June 1762 in Milan. He was sent at the age of fourteen to the Clementine College at Rome, and after- wards studied at the university of Pavia. He was intended for the legal profession, but his passion for architecture was too strong, and after holding

some government posts at Milan, he entered as a competitor for the construction of the Porta Orientale. His designs were commended, but were not selected on account of the expense their adoption would have involved. From that time Cagnola devoted himself entirely to architecture. After the death of his father he spent two years in Verona and Venice, studying the architectural structures of these cities. In 1806 he was called upon to erect a triumphal arch for the marriage of Eugene Beauharnais with the princess of Bavaria. The arch was of wood, but was of such beauty that it was re- solved to carry it out in marble. The result was the magnificent Arco della Pace in Milan, surpassed in dimensions only by the Arc de l'Etoile at Paris. Among other works executed 'by Cagnola are the Porta di Marengo at Milan, the campanile at Urgnano, and the chapel of Santa Marcellina in Milan. He died on the 14th of August 1833, five years before the completion of the Arco del Sempione, which he designed for his native city.

CAGOTS, a people found in the. Basque provinces, Beam, Gascony and Brittany. The earliest mention of them is in 1 288, when they appear to have been called Christiens or Christianos. In the 1 6th century they had many names, Cagots, Gahets, Gafets in France; Agotes, Gafos in Spain; and Cacons, Cahets, Caqueux and Caquins in Brittany. During the middle ages they were popularly looked upon as cretins, lepers, heretics and even as cannibals. They were shunned and hated; were allotted separate quarters in towns, called cagoteries, and lived in wretched huts in the country distinct from the villages. Excluded from all political and social rights, they were only allowed to enter a church by a special door, and during the service a rail separated them from the other worshippers. Either they were altogether forbidden to partake of the sacrament, or the holy wafer was handed to them on the end of a stick, while a receptacle for holy water was reserved for their exclusive use. They were compelled to wear a distinctive dress, to which, in some places, was attached the foot of a goose or duck (whence they were sometimes called Canards). And so pestilential was their touch considered that it was a crime for them to walk the common road barefooted. The

only trades allowed them were those of butcher and carpenter, and their ordinary occupation was wood-cutting. Their language is merely a corrupt form of that spoken around them; but a Teutonic origin seems to be indicated by their fair complexions and blue eyes. Their crania have a normal development; their cheek-bones are high; their noses prominent, with large nostrils; their lips straight; and they are marked by the absence of the auricular lobules.

The origin of the Cagots is undecided. Littr6 defines them as " a people of the Pyrenees affected with a kind of cretinism." It has been suggested that they were descendants of the Visigoths, and Michael derives the name from caas (dog) and Goth. But opposed to this etymology is the fact that the word cagot is first found in the for of Beam not earlier than 1551. Marca, in his Histoire de BSarn, holds that the word signifies " hunters of the Goths," and that the Cagots are descendants of the Saracens. Others made them descendants of the Albigenses. The old MSS. call them Chretiens or Chrestiaas,and from this it has beenargued that they were Visigoths who originally lived as Christians among the Gascon pagans. A far more probable explanation of their name " Chretiens " is to be found in the fact that in medieval times all lepers were known as pauperes Christi, and that, Goths or not, these Cagots were affected in the middle ages with a particular form of leprosy or a condition resembling it. Thus would arise the confusion between Christians and Cretins. To-day their descendants are not more subject to goitre and cretinism than those dwelling around them, and are recognized by tradition and not by features or physical degeneracy. It was not until the French Revolution that any steps were taken to ameliorate their lot, but to-day they no longer form a class, but have been practically lost sight of in the general peasantry.

See Francisque Michel, Histoire des races maudites de France el d'Espagne (Paris, 1846) ; Abbe Venuti, Recherches sur les Cahets de Bordeaux (1754); Bulletins de la societe anthropologique (1861, 1867, 1868, 1871); Annates medico-psychologiques (Jan. 1867); Lagneau, Questionnaire sur Veihnologie de la France; Paul Raymond, Mosurs bearnaises (Pau, 1872) ; V. de Rochas, Les Parias de France et d'Espagne (Cagots et Bohemiens) (Paris, 1877); J. Hack Tuke, Jour. Anthropological Institute (vol. ix., 1880).

CAHER (or Cahir), a market- town of Co. Tipperary, Ireland, in the south parliamentary division, beautifully situated on the river Suir at the foot of the Galtee Mountains. Pop. (1901) 2058. It stands midway between Clonmel and Tipperary town on the Waterford and Limerick line of the Great Southern and Western railway, 124 m. S.W. from Dublin. It is the centre of a rich agricultural district, and there is some industry in flour- milling. Its name (cathair, stone fortress) implies a high antiquity and the site of the castle, picturesquely placed on an island in •the river, was occupied from very early times. Here was a fortress-palace of Munster, originally called Dun-iasgach, the suffix signifying " abounding in fish." The present castle dates from 1 142, being built by O'Connor, lord of Thomond, and is well restored. It was besieged during the wars of

1599 and 1647, and by Cromwell. Among the fine environs of the town the demesne of Caher Park is especially noteworthy. The Mitchels- town stalactite caverns, 10 m. S.W.,and the finely-placed Norman castle of Ardfinnan, on a precipitous crag 6 m. down the Suir, are other neighbouring features of interest, while the Galtee Mountains, reaching in Galtymore a height of 301 5 ft., command admirable prospects.

CAHITA, a group of North American Indians, mainly of the Mayo and Yaqui tribes, found chiefly in Mexico, belonging to the Piman family, and numbering some 40,000.

CAHOKIA, the name of a North American Indian tribe of the Illinois confederacy, and of their mission station, near St Louis. The " Cahokia mound " there (a model of which is in the Pea- body Museum, Cambridge, Mass.) is interesting as the largest pre-historic earth-work in America.

CAHORS, a city of south-western France, capital of the department of Lot, 70 m. N. of Toulouse, on the railway between that city and Limoges. Pop. (1906) 10,047. Cahors stands on the right bank of the river Lot, occupying a rocky peninsula formed by a bend in the stream. It is divided into two portions

by the Boulevard Gambetta, which runs from the Pont Louis Philippe on the south to within a short distance of the fortified wall of the 14th and 15th centuries enclosing the town on the north. To the east lies the old town, with its dark narrow streets and closely-packed houses ; west of the Boulevard a newer quarter, with spacious squares and promenades, stretches to the bank of the river. Cahors communicates with the opposite shore by three bridges. One of these, the Pont Valentre to the west of the town, is the finest fortified bridge of the middle ages in France. It is a structure of the early 14th century, restored in the 19th century, and is defended at either end by high machicolated towers, another tower, less elaborate, surmounting the centre pier. The east bridge, the Pont Neuf , also dates from the 14th century. The cathedral of St Etienne stands in the heart of the old town. It dates from the 12th century, but was entirely restored in the 13th century. Its exterior, for the most part severe in appearance, is relieved by some fine sculpture, that of the north portal being especially remarkable. The nave, which is without

aisles, is surmounted by two cupolas; its interior is whitewashed and plain in appearance, while the choir is decorated with medieval paintings. Adjoining the church to the south-east there are remains of a cloister built from 1494 to 1509. St Urcisse, the chief of the other ecclesiastical buildings, stands near the cathedral. Dating from the 12th and 13th centuries, it preserves Romanesque capitals recarved in the 14th century. The principal of the civil buildings is the palace of Pope John XXII., built at the beginning of the 14th century; a massive square tower is still standing, but the rest is in ruins. The residence of the seneschals of Quercy, a building of the 14th to the 17 th centuries, known as the Logis du Roi, also remains. The chief of the old houses, of which there are many in Cahors, is one of the 15th century, known as the Maison d'Henri IV. Most of the state buildings are modern, with the exception of the prefecture which occupies the old episcopal palace, and the old convent and the Jesuit college in which the Lycee Gambetta is established. The Porte de Diane is a large archway of the Roman period, probably the entrance to the baths. Of the commemorative monuments, the finest is that erected in the Place d'Armes to Gambetta, who was a native of the town. There is also a statue of the poet Clement Marot, born at Cahors in 1496. Cahors is the seat of a bishopric, a prefect and a court of assizes. It has tribunals of first instance and of commerce, a chamber of commerce and a branch of the Bank of France. There are also training colleges, a lycee, a communal college for girls, an ecclesiastical seminary, a library, museum and hospital. The manufacture of farm implements, tanning, wool-spinning, metal-founding, distilling and the preparation of pdU de foie gras and other delicacies are carried on. Wine, nuts, oil of nuts, ' tobacco, truffles and plums are leading articles of commerce.

History. — Before the Roman conquest, Cahors, which grew up near the sacred fountain of Divona (now known as the Fontaine des Chartreux), was the capital of the Cadurci. Under the Romans it enjoyed a prosperity partly due to its manufacture of cloth and of mattresses, which were exported even to Rome. The first bishop of Cahors, St Genulfus, appears to have lived in the 3rd century. In the middle ages the town was the capital of Quercy, and its territory until after the Albigensian Crusade was a fief of the counts of Toulouse. The seigniorial rights, in- cluding that of coining money, belonged to the bishops. In the 13th century Cahors was a financial centre of much import- ance owing to its colony of Lombard bankers, and the name cahorsin consequently came to signify " banker " or " usurer." At the beginning of the century a commune was organized in the town. Its constant opposition to the bishops drove them, in 1316,

to come to an arrangement with the French king, by which the administration of the town was placed almost entirely in the hands of royal officers, king and bishop being co-seigneurs. This arrangement survived till the Revolution. In 1331 Pope John XXII., a native of Cahors, founded there a university, which afterwards numbered Jacques Cujas among its teachers and Francois F6nelon among its students. It flourished till 1751, when it was united to its rival the university of Toulouse.*

During the Hundred Years' War, Cahors, like the rest of Quercy, consistently resisted the English occupation, from which it was relieved in 1428. In the 16th century it belonged to the viscounts of Beam, but remained Catholic and rose against Henry of Navarre who took it by assault in 1 580. On his accession Henry IV. punished the town by depriving it of its privileges as a wine— market; the loss of these was the chief cause of its decline.

CAIATIA (mod. Caiazzv), an ancient city of Campania, on the right bank of the Volturnus, 1 1 m. N.E. of Capua, on the road between it and Telesia. It was already in the hands" of the Romans in 306 B.C., and since in the 3rd century B.C. it issued copper coins with a Latin legend it must have had the civitas sine sufragio. In the Social War it rebelled from Rome, and its territory was added to that of Capua by Sulla. In the imperia.' period, however, we find it once more a municipium. Caiatia has remains of Cyclopean walls, and under the Piazza del Mercato is a large Roman cistem,which still provides a good water supply. The episcopal see was founded in a.d. 966: The place is frequently confused with Caiatia (q.v.). ■

CAIETAE PORTUS (mod. Gaeta), an ancient harbour of Latium adiectum, Italy, in the territory of Formiae, from which it is 5 m. S.W. The name (originally Atyn;) is generally derived from the nurse of Aeneas. The harbour, owing to its fine anchorage, was much in use, but the place was never a separate town, but always dependent on Formiae. Livy mentions a temple of Apollo. The coast of the Gulf not only between Caietae Portus and Formiae, but E. of the latter also, as far as the modern Monte Scauri, was a favourite summer resort (see Formia). Cicero may have had villas both at Portus Caietae and at Formiae 1 proper, and the emperors certainly possessed property at both places. After the destruction of Formiae In a.d. 847 it became one of the most important seaports of central Italy (see Gaeta). In the town are scanty remains of an amphi-theatre and theatre: near the church of La Trinita, higher up, are remains of a large reservoir. There are also traces of an : aqueduct. The promontory (548 ft.) is crowned by the tomb of Munatius

Plancus, founder of Lugudunum (mod. Lyons), who' died after 2 2 B.C. It is a circular structure of blocks of travertine 160 ft. high and 180 ft. in diameter. Further inland is the so- called tomb of L. Atratinus, about 100 ft. in diameter. Caietae Portus was no doubt connected with the Via Appia (which passed through Formiae) by a deverticulum. There seems also to have been a road running W.N.W. along the precipitous coast to Speluncae (mod. Sperlonga).

See E. Gesualdo Osservazioni critiche sopra la storia della Via Appia di Pratilli p. 7 (Naples, 1754). (T. As.)

CAILLlfi (or Caille), RENlS AUGUSTE (1799-1838), French explorer, was born at Mauze, Poitou, in 1799, the son of a baker. The reading of Robinson Crusoe kindled in him a love of travel and adventure, and at the age of sixteen he made a voyage to Senegal whence he went to Guadeloupe. Returning to Senegal in 1 8 18 he made a journey to Bondu to carry supplies to a British expedition then in that country. Ill with fever he was obliged to go back to France, but in 1824 was again in Senegal with the fixed idea of penetrating to Timbuktu. He spent eight months with the Brakna " Moors " living north of Senegal river, learning Arabic and being taught, as a convert, the laws and customs of Islam. He laid his project of reaching Timbuktu before the governor of Senegal, but receiving no encouragement went to Sierra Leone where the British authorities made him superintendent of an indigo plantation. Having saved £80 he joined a Mandingo caravan going inland. He was dressed as a Mussulman, and gave out that he was an Arab from Egypt who had been carried off by the French to Senegal and was desirous of regaining his own country. Starting from Kakundi near Boke on the Rio Nunez on 19th of April 1827, he travelled east along the hills of Futa Jallon, passing the head streams of the Senegal and crossing the Upper Niger at Kurussa. Still going east he came to the Kong highlands, where at a place called Time he was detained five months by illness. Resuming his journey 1 The two places are sufficiently close for the one villa to have borne both names; but Mommsen {Corp. Inscrip. Lat. x., Berlin, 1883, p. 603) prefers to differentiate them.

in January 1828 he went north-east and gained the city of JennS, whence he continued his journey to Timbuktu by water. After spending a fortnight (20th Aprii-4th May) in Timbuktu he joined a

caravan crossing the Sahara to Morocco, reaching Fez on the 12th of August. From Tangier he returned to France. He had been preceded at Timbuktu by a British officer, Major Gordon Laing, but Laing had been murdered (18ˆ6) on leaving the city and Caillie was the first to accomplish the journey in safety. He was awarded the prize of £400 offered by the Geographical Society of Paris to the first traveller who should gain exact information of Timbuktu, to be compared with that given by .Mungo Park. He also received the order of the Legion of Honour, a pension, and other distinctions, and it was at the public expense that his Journal d'un voyage a Temboctou et a Jenne dans VAfrique Centrale, etc. (edited by E. F. Jomard) was published in three volumes in 1830. Caillie died at Badere in 1838 of a malady contracted during his African travels. For the greater part of his life he spelt his name Caillie, afterwards omitting the second " i."

See Dr Robert Brown's The Story of Africa, vol. i. chap. xii. . (London, 1892) ; Goepp and Cordier, Les Grands Hommes de France, voyageurs: Rene Cattle (Paris, 1885) ; E. F. Jomard, Notice his- iorique sur la vie et les voyages de R. Caillie (Paris, 1839). An English version of Caillie's Journal was published in London in 1830 in two volumes under the title of Travels through Central Africa to Tim- buctoo, &c.

CAIN, in the Bible, the eldest son of Adam and Eve (Gen. iv.), was a tiller of the ground, whilst his younger brother, Abel, was a keeper of sheep. Enraged because the Lord accepted Abel's offering, and rejected his own, he slew his brother in the field (see Abel). For this a curse was pronounced upon him, and he was condemned to be a " fugitive and a wanderer " on the earth, a mark being set upon him " lest any finding him should kill him." He took up his abode in the land of Nod (" wandering ") on the east of Eden, where he built a city, which he named after his son Enoch. The narrative presents a number of difficulties, which early commentators sought to solve with more ingenuity than success. But when it is granted that the ancient Hebrews, like other primitive peoples, had their own mythical and tradi- tional figures, the story of Cain becomes less obscure. The mark set upon Cain is usually regarded as some tribal mark or sign analogous to the cattle marks of Bedouin and the related usages in Europe. Such marks had often a religious significance, and denoted that the bearer was a follower of a particular deity. The suggestion has been made that the name Cain is the eponym of the Kenites, and although this clan has a good name almost everywhere in the Old Testament, yet in Num. xxiv. 22 its de- struction is foretold, and the Amalekites, of whom they formed a division, are consistently represented as the inveterate enemies of

Yahweh and of his people Israel. The story of Cain and Abel, which appears to represent the nomad life as a curse, may be. an attempt to explain the origin of an existence which in the eyes of the settled agriculturist was one of continual restlessness, whilst at the same time it endeavours to find a reason for the in- stitution of blood-revenge on the theory that at some remote age a man (or tribe) had killed his brother (or brother tribe). Cain's subsequent founding of a city finds a parallel in the legend of the origin of Rome through the swarms of outlaws and broken men of all kinds whom Romulus attracted thither. The list of Cain's descendants reflects the old view of the beginnings of civiliza- tion; it is thrown into the form of a genealogy and is parallel to Gen. v. (see Genesis). It finds its analogy in the Phoenician account of the origin of different inventions which Eusebius (Praep. Evang. i. 10) quotes from Philo of Bybliis (Gebal), and probably both go back to a common Babylonian origin.

On this question, see Driver, Genesis (Westminster Comm., London, 1904), p. 80 seq. ; A. Jeremias, Alte Test, im Lichte d. Alten Orients (Leipzig, 1906), pp. 220 seq. ; also Enoch, Lamech. On the story of Cain, see especially Stade,ˆ4 kademische Rede.n, pp. 229-273 ; Ed. Meyer, Israeliten, pp. 395 sqq,; A. R. Gordon, Early Trad. Genesis (Index). Literary criticism (see Cheyne, Encycl. Bib. col. 620-628, and 4411-4417) has made it extremely probable that Cain the nomad and outlaw (Gen. iv. 1-16) was originally distinct from Cain the city-builder (w. 17 sqq.). The latter was perhaps regarded as a " smith," cp. v. 22 where Tubal-cain is the " facher " of those who

*work in bronze (or copper). That the Kenites, too, were a race of metal-workers is quite uncertain, although even at the present day the smiths in Arabia form a distinct nomadic class. Whatever be the meaning of the name, the words put into Eve's mouth (v. 1) probably are not an etymology, but an assonance (Driver). It is noteworthy that Kenan, son of Enosh (" man," Gen. v. 9), appears in Sabaean inscriptions of South Arabia as the name of a tribal-god. A Gnostic sect of the 2nd century was known by the name of Cainites. They are first mentioned by Irenaeus, who connects them with the Valentinians. They believed that Cain derived his exist- ence from the superior power, and Abel from the inferior power, and that in this respect he was the first of a line which included Esau, Korah, the Sodomites and Judas Iscariot. * (S. A. C.)*

CAINE, THOMAS HENRY HALL (1853-), British novelist and dramatist, was born of mixed Manx and Cumberland paren- tage at Runcorn, Cheshire, on the 14th of May 1853. He was educated with a view to becoming an architect, but turned to journalism, becoming

a leader-writer on the Liverpool Mercury. He came up to London at the suggestion of D. G. Rossetti, with whom he had had some correspondence, and lived with the poet for some time before his death. He published a volume of Recollections of Rossetti (1882), and also some critical work; but in 1885 he began an extremely successful career as a novelist of a melodramatic type with The Shadow of a Crime, followed by The Son of H agar (1886), The Deemster (1887), The Bondman (1890), The Scapegoat (1891), TheManxman(i8g4), The Christian (1897) I, The Eternal City (1901), and The Prodigal Son (1904). His writings on Manx subjects were acknowledged by his election in 1901 to represent Ramsey in the House of Keys. The Deemster, The Manxman and The Christian had already been produced in dramatic form, when The Eternal City was staged with magnificent accessories by Mr Beerbohm Tree in 1902, and in 1905 The Prodigal Son had a successful run at Drury Lane.

See C. F. Kenyon, Hall Caine; The Man and the Novelist (1901); and the novelist's autobiography, My Story (1908).

CA'ING WHALE (Globicephalus melas), a large representative of the dolphin tribe frequenting the coasts of Europe, the Atlantic coast of North America, the Cape and New Zealand. From its nearly uniform black colour it is also called the " black- fish." Its maximum length is about 20 ft. These cetaceans are gregarious and inoffensive in disposition and feed chiefly on cuttle-fish. Their sociable character constantly leads to their destruction, as when attacked they instinctively rush together,, and blindly follow the leaders of the herd, whence the names pilot-whale and ca'ing (or driving) whale. Many hundreds at a time are thus frequently driven ashore and killed, when a herd enters one of the bays or fiords of the Faeroe Islands or north of Scotland. The ca'ing whale of the North Pacific has been dis- tinguished as G. scammoni, while one from the Atlantic coast, south of New Jersey, and another from the bay of Bengal, are possibly also distinct. (See Cetacea.)

CAINOZOIC (from the Gr. koxvos, recent, feci h'fe), also written Cenozoic (American), Kainozoisch, Canozoisch (German) , Cinozoaire (Renevier), in geology, the name given to the youngest of the three great eras of geological time, the other two being the Mesozoic and Palaeozoic eras. Some authors have employed the term " Neozoic " (Neozoisch) with the same significance, others have restricted its application to the Tertiary epoch {Niozoique, De Lapparent). The " Neogene " of Homes (1853) included the Miocene and Pliocene periods; Renevier subse- quently modified its form to

NSogSnique. The remaining Tertiary periods were classed as Paleogaen by Naumaun in 1866. The word " Neocene " has been used in place of Neozoic, but its employment is open to objection.

Some confusion has been introduced by the use of the term Cainozoic to include, on the one hand, the Tertiary period alone, and on the other hand, to make it include both the Tertiary and the post-Tertiary or Quaternary epochs; and in order that it may bear a relationship to the concepts of time and faunal development similar to those indicated by the terms Mesozoic and Palaeozoic it is advisable to restrict its use to the latter alternative. Thus the Cainozoic era would embrace all the geological periods from Eocene to Recent. (See Tertiary and Pleistocene.) (J. A. H.)

CAlQUE (from Turk. Kaik), a light skiff or rowing-boat used by the Turks, having from one to twelve rowers; also a Levantine sailing vessel of considerable size. CA IRA, a song of the French Revolution, with the refrain: — "Ah! ca ira, ca ira, ca ira! Les aristocrates a la lanterne."

The words, written by one Ladre, a street singer, were put to an older tune, called " Le Carillon National," and the song rivalled the " Carmagnole " (q.v.) during the Terror. It was forbidden by the Directory.

CAIRD, EDWARD (1835-1008), British philosopher and theologian, brother of John Caird (q.v.), was born at Greenock on the 22nd of March 1835; and educated at Glasgow University and Balliol College, Oxford. He took a first class in moderations in 1862 and in Liter ae kumaniores in 1863, and was Pusey and Ellerton scholar in 1861. From 1864 to 1866 he was fellow and tutor of Merton College. In 1866 he became professor of moral philosophy in the university of Glasgow, and in 1893 succeeded Benjamin Jowett as master of Balliol. With Thomas Hill Green he founded in England a school of orthodox neo-Hegelianism (see Hegel, ad fin.), and through his pupils he exerted a far- reaching influence on English philosophy and theology. Owing to failing health he gave up his lectures in 1904, and in May 1906 resigned his mastership, in which he was succeeded by James Leigh Strachan-Davidson, who had previously for some time, as senior tutor and fellow, borne the chief burden of college administration. Dr Caird received the honorary degree of

D.C.L. in 1892; he was made a corresponding member of the French Academy of Moral and Political Science and a fellow of the British Academy. His publications include Philosophy of Kant (1878); Critical Philosophy of Kant (1889); Religion and Social Philosophy of Comte (1885); Essays on Literature and Philosophy (1892); Evolution of Religion (Gifford Lectures, 1891-1892); Evolution of Theology in the Greek Philosophers (1904); and he is represented in this encyclopaedia by the article on Cartesianism. He died on the 1st of November 1908.

For a criticism of Dr Caird's theology, see A. W. Benn, English, Rationalism in the igth Century (London, 1906).

CAIRD, JOHN (1820-1898), Scottish divine and philosopher, was born at Greenock on the 15th of December 1820. In his sixteenth year he entered the office of his father, who was partner and manager of a firm of engineers. Two years later, however, he obtained leave to continue his studies at Glasgow University. After a year of academic life he tried business again, but in 1840 he gave it up finally and returned to college. In 1845 he entered the ministry of the Church of Scotland, and after holding several livings accepted the chair of divinity at Glasgow in 1862. During these years he won a foremost place among the preachers of Scotland. In theology he was a Broad Churchman, seeking always to emphasize the permanent elements in religion, and ignor- ing technicalities. In 1873 he was appointed vice-chancellor and principal of Glasgow University. He delivered the Gifford Lectures in 1892-1893 andin 1895-1896. His Introduction to the Philosophy of Religion (1880) is an attempt to show the essential rationality of religion. It is idealistic in character, being in fact a reproduc- tion of Hegelian teaching in clear and melodious language. His argument for the Being of God is based on the hypothesis that thought — not individual but universal — is the reality of all things, the existence of this Infinite Thought being demonstrated by the limitations of finite thought. Again his Gifford Lectures are devoted to the proof of the truth of Christianity on grounds of right reason alone. Caird wrote also an excellent study of Spinoza, in which he showed the latent Hegelianism of the great Jewish philosopher. He died on the 30th of July 1898.

CAIRN (in Gaelic and Welsh, Cam), a heap of stones piled up in a conical form. In modern times cairns are often erected as landmarks. In ancient times they were erected as sepulchral monuments. The Duan Eireanach, an ancient Irish poem, describes the erection of a family cairn; and the Senchus Mor, a collection of ancient Irish laws, prescribes a fine of three three- year-old heifers for " not erecting the

tomb of thy chief. " Meet- ings of the tribes were held at them, and the inauguration of a

new chief took place on the cairn of one of bis predecessors. It is mentioned in the Annals of the Four Masters that, in 1225, the O'Connor was inaugurated on the cairn of Fraech, the son ot Fiodhach of the red hair. In medieval times cairns are often referred to as boundary marks, though probably not originally raised for that purpose. In a charter by King Alexander II. (1221), granting the lands of Burgyn to the monks of Kinloss, the boundary is described as passing " from the great oak in Malevin as far as the Rune Pictorum," which is explained as " the Carne of the Pecht's fieldis." In Highland districts small cairns used to be erected, even in recent times, at places where the coffin of a distinguished person was " rested " on its way to the churchyard. Memorial cairns are still occasionally erected, as, for instance, the cairn raised in memory of the prince consort at Balmoral, and " Maule's Cairn," in Glenesk, erected by the earl of Dalhousie in 1866, in memory of himself and certain friends specified by name in the inscription placed upon it. (See Barrow.)

CAIRNES, JOHN ELLIOTT (1823-1875), British political economist, was born at Castle Bellingham, Ireland, in 1823. After leaving school he spent some years in the counting-house of his father, a brewer. His tastes, however, lay altogether in the direction of study, and he was permitted to enter Trinity College, Dublin, where he took the degree of B.A. in 1848, and six years later that of M.A. After passing through the curriculum of arts he engaged in the study of law and was called to the Irish bar. But he felt no very strong inclination for the legal profession, and during some years he occupied himself to a large extent with contributions to the daily press, treating of the social and economical questions that affected Ireland. He devoted most attention to political economy, which he studied with great thoroughness and care. While residing in Dublin he made the acquaintance of Archbishop Whately, who conceived a very high respect for his character and abilities. In 1856 a vacancy occurred in the chair of political economy at Dublin founded by Whately, and Cairnes received the appointment. In accordance with the regulations of the foundation, the lectures of his first year's course were published. The book appeared in 1857 with the title Character and Logical Method of Political Economy. It follows up and expands J. S. Mill's treatment in the Essays on some Unsettled Questions in Political Economy, and forms an admirable introduction to the study of economics as a science. In it the author's peculiar powers of thought and expression are displayed to the best advantage. Logical

exactness, precision of language, and firm grasp of the true nature of economic facts, are the qualities characteristic of this as of all his other works. If the book had done nothing more, it would still have conferred inestimable benefit on political economists by its clear exposition of the true nature and meaning of the ambiguous term "law." To the view of the province and method of political economy expounded in this early work the author always remained true, and several of his later essays, such as those on Political Economy and Land, Political Economy and Laissez-Faire, are but reitera- tions of the same doctrine. His next contribution to economical science was a series of articles on the gold question, published partly in Fraser's Magazine, in which the probable consequences of the increased supply of gold attendant on the Australian and Caiifornian gold discoveries were analysed with great skill and ability. And a critical article on M. Chevalier's work On the Probable Fall in the Value of Gold appeared in the Edinburgh Review for July i860.

In 1 861 Cairnes was appointed to the professorship of political economy and jurisprudence in Queen's College, Galway, and in the following year he published his admirable work The Slave Poiter, one of the finest specimens of. applied economical philo- sophy. The inherent disadvantages of the employment of slave labour were exposed with great fulness and ability, and the conclusions arrived at have taken their place among the recog- nized doctrines of political economy. The opinions expressed by Cairnes as to the probable issue of the war in America were largely verified by the actual course of events, and the appearance of the book had a marked influence on the attitude taken by serious political thinkers in England towards the southern states.

During the remainder of his residence at Galway Professor Cairnes published nothing beyond some fragments and pamphlets mainly upon Irish questions. The most valuable of these papers are the series devoted to the consideration of university education. His health, at no time very good, was still further weakened in 1865 by a fall from his horse. He was ever afterwards incapa- citated from active exertion and was constantly liable to have his work interfered with by attacks of illness. In 1866 he was appointed professor of political economy in University College, London. He was compelled to spend the session 1868-1869 in Italy but on his return continued to lecture till 1872. During his last session he conducted a mixed class, ladies

being admitted to his lectures. His health soon rendered it impossible for him to discharge his public duties; he resigned his post in 1872, and retired with the honorary title of emeritus professor of political economy. In 1873 his own university conferred on him the degree of LL.D. He died at Blackheath, near London, on the 8th of July 1875.

The last years of his life were spent in the collection and publication of some scattered papers contributed to various reviews and magazines, and in the preparation of his most extensive and important work. The Political Essays, published in 1873, comprise all his papers relating to Ireland and its uni- versity system, together with some other articles of a somewhat similar nature. The Essays in Political Economy, Theoretical and Applied, which appeared in the same year, contain the essays towards a solution of the gold question, brought up to date and tested by comparison with statistics of prices. Among the other articles in the volume the more important are the criticisms on Bastiat and Comte, and the essays on Political Economy and Land, and on Political Economy and Laissez-Faire, which have been referred to above. In 1874 appeared his largest work, Some Leading Principles of Political Economy, newly Expounded, which is beyond doubt a worthy successor to the great treatises of Smith, Malthus, Ricardo and Mill. It does not expound a completed system of political economy; many important doctrines are left untouched; and in general the treatment of problems is not such as would be suited for a systematic manual. The work is essentially a commentary on some of the principal doctrines of the English school of econo- mists, such as value, cost of production, wages, labour and capital, and international values, and is replete with keen criticism and lucid illustration. While in fundamental harmony with Mill, especially as regards the general conception of the science, Cairnes differs from him to a greater or less extent on nearly all the cardinal doctrines, subjects his opinions to a searching examination, and generally succeeds in giving to the truth that is common to both a firmer basis and a more precise statement. The last labour to which he devoted himself was a republication of his first work on the Logical Method of Political Economy.

Taken as a whole the works of Cairnes formed the most important contribution to economical science made by the English school since the publication of J. S. Mill's Principles. It is not possible to indicate more than generally the special advances in economic doctrine effected by him, but the following points may be noted as establishing for him a claim to a place beside Ricardo arid Mill: (1) His exposition of the province and method of political economy. He never suffers it to be forgotten that political economy is a science,

and consequently that its results are entirely neutral with respect to social facts or systems. It has simply to trace the necessary connexions among the phenomena of wealth and dictates nc rules for practice. Further, he is distinctly opposed both to those who would treat political economy as an integral part of social philosophy, and to those who have attempted to express economic facts in quantitative formulae and to make economy a branch of applied mathematics. According to him political economy is a mixed science, its field being partly mental, partly physical. It may be called a positive science, because its premises are facts, but it is hypothetical in so far as the laws it lays down are only approximately true, i.e. are only valid in the absence of counteracting agencies.

From this view of the nature of the science, it follows at once that the method to be pursued must be that called by Mill the physical or concrete deductive, which starts from certain known causes, investigates their consequences and verifies or tests the result by comparison with facts of experience. It may, perhaps, be thought that Cairnes gives too little attention to the effects of the organism of society on economic facts, and that he is disposed to overlook what Bagehot called the postulates of political economy. (2) His analysis of cost of production in its relation to value. According to Mill, the universal elements in cost of production are the wages of labour and the profits of capital. To this theory Cairnes objects that wages, being remuneration, can in no sense be considered as cost, and could only have come to be regarded as cost in consequence of the whole problem being treated from the point of view of the capitalist, to whom, no doubt, the wages paid represent cost. The real elements of cost of production he looks upon as labour, abstinence and risk, the second of these falling mainly, though not necessarily, upon the capitalist. In this analysis he to a considerable extent follows and improves upon Senior, who had previously defined cost of production as the sum of the labour and abstinence necessary to production. (3) His exposi- tion of the natural or social limit to free competition, and of its bearing on the theory of value. He points out that in any organized society there can hardly be the ready transference of capital from one employment to another, which is the indispensable condition of free competition; while class distinctions render it impossible for labour to transfer itself readily to new occupations. Society may thus be regarded as consisting of a series of non-competing industrial groups, with free competition among the members of any one group or class. Now the only condition under which cost of production will regulate value is perfect competition. It follows that the normal value of commodities — ■ the value which

gives to the producers the average and usual remuneration — will depend upon cost of production only when the exchange is confined to the members of one class, among whom there is free competition. In exchange between classes or non-competing industrial groups, the normal value is simply a case of international value, and depends upon reciprocal demand, that is to say, is such as will satisfy the equation of demand. This theory is a substantial contribution to economical science and throws great light upon the general problem of value. At the same time, it may be thought that Cairnes overlooked a point brought forward prominently by Senior, who also had called attention to the bearing of competition on the relation between cost of production and value. The cost to the producer fixes the limit below which the price cannot fall without the supply being affected; but it is the desire of the consumer — i.e. what he is willing to give up rather than be compelled to produce the commodity for himself — that fixes the maximum value of the article. To treat the whole problem of natural or normal value from the point of view of the producer is to give but a one-sided theory of the facts. (4) His defence of the wages fund doctrine. This doctrine, expounded by Mill in his Prin- ciples, had been relinquished by him, but Cairnes still undertook to defend it. He certainly succeeded in removing from the theory much that had tended to obscure its real meaning and in placing it in its very best aspect. He also showed the sense in which, when treating the problem of wages, we must refer to some fund devoted to the payment of wages, and pointed out the conditions under which the wages fund may increase or decrease. It may be added that his Leading Principles contain admirable discussions on trade unions and protection, together with a clear analysis of the difficult theory of international trade and value, in which there is much that is both novel and valuable. The Logical Method contains about the best exposition and defence of Ricardo's theory of rent; and the Essays contain a very clear and formidable criticism of Bastiat's economic doctrines.

Professor Cairnes's son, Captain W. E. Cairnes (1862-1906), was an able writer on military subjects, being author of An Absent-minded War (1900), The Coming Waterloo (1905), &c.

95 2

CAIRNGORM— CAIRNS, LORD

CAIRNGORM, a yellow or brown variety of quartz,' named from Cairngorm or Cairngorum, one of the peaks of the Grampian Mountains in Banffshire, Scotland; According to Mr E. H.

Cunningham-Craig, the mineral occurs in crystals lining cavities in highly-inclined veins of a fine-grained granite running through the coarser granite of the main mass: Shallow pits were formerly dug in the kaolinized granite for sake of the cairngorm and the mineral was also found as pebbles in' the bed of the river Avon. Cairngorm is a favourite ornamental stone in Scotland, being set in the lids of snuff-mulls, in the handles of dirks and in brooches for Highland costume. A rich sherry-yellow colour is much esteemed. ' Quartz of yellow< and brown colour is often known in trade as " false topaz," or simply " topaz." Such quartz is found at many localities in Brazil, Russia and Spain. Much of the yellow quartz used in jewellery is said to be " burnt amethyst"; that is, it was originally amethystine quartz, the colour of which has been modified by heat (see Amethyst). Yellow quartz is sometimes known as citrine; when the quartz presents a pale brown tint it is called " smoky quartz"; and when the brown is so deep that the stone appears almost black it is termed morion. The brown colour has been referred to the presence of titanium.

CAIRNS, HUGH MC CALMONT CAIRNS, rsT Earl (1810-18S5), Irish statesman, and lord chancellor of England, was born at Cultra, Co. Down, Ireland, on the 27th of December 1819. His father, William Cairns, formerly a captain in the 47th regiment, came of a family 1 of Scottish origin, which: migrated to Ireland in the time of James I. Hugh Cairns was his second son, and was educated at Belfast academy and at Trinity College, Dublin, graduating with a senior moderatorship in classics in 1838. In 1844 he was called to the bar at the Middle Temple, to which he had migrated from Lincoln's Inn. During his first years at the chancery bar, Cairns showed little promise of the eloquence which afterwards distinguished him. Never a rapid speaker, he was then so slow and diffident, that he feaxed that this defect might interfere with his legal career. Fortunately he was soon able to rid himself of the idea that he was only fit for practice as a con- veyancer. In 1852 he entered parliament as member for Belfast, and his Inn, on his becoming a Q.C. in 1856, made him a bencher.

In 1858 Cairns was appointed solicitor-general, and was knighted, and in May of that year made two of his most brilliant and best-remembered speeches in the House of Commons. In the first, he defended the action of Lord Ellenborough, who, as president of the board of' control, had not only censured Lord Canning for a proclamation issued; by him as governor-general of India but had made public the despatch in which the censure was conveyed. On the other occasion referred to, Sir Hugh Cairns spoke in opposition to Lord John Russell's amendment to the motion for the second reading

of the government Reform Bill, winning the most cordial commendation of DisTaeli. Disraeli's appreciation found an opportunity for displaying itself some years later, when in 1868 he invited him to be lord chancellor in the brief Conservative administration which, followed Lord Derby's resignation of the leadership of his party. Meanwhile, Cairns had maintained his reputation in many other debates, both when his party was in power and when it was in opposition. In 1866 Lord Derby, returning to office, had made him attorneys- general, and in the same year he had availed himself of a vacancy to seek the comparative rest of the court of appeal. While a lord justice he had been offered a peerage, and though at first uhable to accept it, he had finally done so on a relative, a member of the wealthy family of McCalmont, providing the means necessary for the endowment of a title.

The appointment of Baron Caims of Garmoyleaslord chancellor in 1868 involved the superseding of Lord Chelmsford, an act which apparently was carried out by Disraeli with less tact than might have been expected of him. Lord Chelmsford bitterly declared that he had been sent away with less courtesy than if he had been a butler, but the testimony of Lord Malmesbury is strong that the affair was the result of an understanding arrived

1 See History of the family of Cairnes or Cairns, by H. C. Lawlor

(1907). '

at when Lord Chelmsford took office. Disraeli held office oh this occasion for a few months only, and when Lord Derby died in 1869, Lord Cairns became the leader of the Conservative Opposi- tion in the House of Lords. He had distinguished himself in the Commons by his resistance to the Roman Catholics' Oath BlB brought in in 1865; in the Lords, his efforts on behalf of the Irish Church were equally strenuous. His speech on Gladstone's Suspensory Bill was afterwards published as a pamphlet, but the attitude which he and the peers who followed him had taken up, in insisting on their amendments to the preamble of the bill, was one difficult to maintain, and Lord Cairns made terms with Lord Granville in circumstances which precluded his consulting his party first. He issued a circular to explain his action in taking a course for which many blamed him. Viewed dispassionately, the incident appears to have exhibited his statesmanlike qualities in a marked degree, for he secured concessions which would have been irretrievably lost by continued opposition. Not long after this, Lord Cairns resigned the leadership of his party in the upper house, but he had to resume it in 1870 and

took a strong part in opposing the Irish Land Bill in that year. On the Conservatives coming into power in 1874, he again became lord chancellor; in 1878 he was made Viscount Garmoyle and Earl Cairns; and in 1880 his party went out of office. In opposition he did not take as prominent a part as previously, but when Lord Beaconsfield died in 1881, there were some Conservatives who considered that his title to lead the party was better than that of Lord Salisbury. His health, however, never robust, had for many years shown intermittent signs of failing. He had periodically made enforced retirements to the Riviera, and for many years had had a house at Bournemouth, and it was here that he died on the 2nd of April

1885.

Cairns was a great lawyer, with an immense grasp of first principles and the power to express them ; his judgments taking the form of luminous expositions or treatises upon the law govern- ing the case before him, rather than of controversial discussions of the arguments adduced by counsel or of analysis of his own reasons. Lucidity and logic were the leading characteristics of his speeches in his professional capacity and in the political arena; In an eloquent tribute to bis memory in the House of Lords, Lord Chief Justice Coleridge expressed the high opinion of the legal profession upon his merits and upon the severe integrity and single-minded desire to do his duty, which animated him in his selections for the bench. His piety was reflected by that of his great opponent, rival and friend, Lord Selborne. Like Lord Selborne and Lord Hatherley, Cairns found leisure at his busiest for teaching in the Sunday-school, but it is not recorded of them (as of him) that they refused to undertake work at the bar on Saturdays, in order to devote that day to hunting. He used to say that his great incentive to hard work at his profession in early days was his desire to keep hunters, and he retained his keenness as a sportsman as long as he was able to indulge it. Of his personal characteristics, it may be said that he was a spare man, with a Scottish, not an Irish, cast of countenance. He was scrupulously neat in his personal appearance, faultless in bands and necktie, and fond of- wearing a flower in his button-hole. His chilly manner, coupled with his somewhat austere religious principles, had no doubt much to do with the fact that he was never a popular man. His friends claimed for him a keen sense of humour, but it was not to be detected by those whose knowledge of him was professional rather than personal. Probably he thought the exhibition of humour incompatible with the dignity of high judicial position. Of his legal attainments there can be no doubU His influence upon the legislation of the day

was largely felt where questions affecting religion and the Church were involved and in matters peculiarly affecting his own profession. His power was felt, as has been said, both when he was in office and when hiss party was in opposition. He had been chairman of the committee on judicature reform, and although he was not in office when the Judicature Act was passed, all the reforms in the legal procedure of his day owed much to him. He took part, when out of office, in the passing of the Married Women's Property Act, and was directly responsible for the Conveyancing Acts of 1881-1882, and

for the Settled Land Act. Many other statutes in which he was largely concerned might be quoted. His judgments are to be found in the Law Reports and those who wish to consider his oratory should read the speeches above referred to, or that delivered in the House of Lords on the Compensation for Dis- turbance Bill in 1880, and his memorable criticism of Mr Gladstone's policy in the Transvaal, after Majuba Hill. (See Hansard and The Times, 1st of April 1881.) His style of delivery was, as a rule, cold to a marked degree. The term " frozen oratory " has been applied to his speeches, and it has been said of them that they flowed "like water from a glacier. . . . The several stages of his speech are like steps cut out in ice, as sharply defined, as smooth and as cold." Lord Caims married in 1856 Mary Harriet, eldest daughter of John McNeill, of Parkmount, Co. Antrim, by whom he had issue five sons and two daughters. He was succeeded in the earldom by his second but eldest surviving son, Arthur William (1861-1890), who left one daughter, and from whom the title passed to his two next younger brothers in succession, Herbert John, third earl (1863-1905), and Wilfrid

Dallas, fourth earl (b. 1865).

Authorities. — See The Times, 3rd and 14th of April 1885; Law Journal, Law Times, Solicitors' Journal, nth of April 1885; the Law Magazine, vol. xi. p. 133; the Law Quarterly, vol. i. p. 365; Earl Russell's Recollections; Memoirs of Lord Malmesbury; Sir Theodore Martin, The Life of the Prince Consort; E. Manson, Builders of our Law; J. B. Atlay, Victorian Chancellors, vol. ii.

CAIRNS, JOHN (1818-1892), Scottish Presbyterian divine, was born at Ayton Hill, Berwickshire, on the 23rd of August 1818, the son of a shepherd. He went to school at Ayton and Oldcambus, Berwickshire, and was then for three years a herd boy, but kept up his education. In 1834 he entered Edinburgh University, but during

1836 and 1837, owing to financial straits, taught in a school at Ayton. In November 1837 he returned to Edinburgh, where he became the most distinguished student of his time, graduating M.A. in 1841, first in classics and philo- sophy and bracketed first in mathematics. While at Edinburgh he organized the Metaphysical Society along with A. Campbell Fraser and David Masson. He entered the Presbyterian Seces- sion Hall in 1840, and in 1843 wrote an article in the Secession Magazine on the Free Church movement, which aroused the interest of Thomas Chalmers. The years 1843-1844 he spent at Berlin studying German philosophy and theology. He was licensed as preacher on the 3rd of February 1845, an d on the 6th of August ordained as minister of Golden Square Church, Berwick-on-Tweed. There his preaching was distinguished by its impressiveness and by a broad and unaffected humanity. He had many " calls " to other churches, but chose "to remain at Berwick. In 1857 he was one of the representatives at the meeting of the Evangelical Alliance in Berlin, and in 1858 Edin- burgh University conferred on him an honorary D.D. In the following year he declined an invitation to become principal of Edinburgh University. In 1872 he was elected moderator of the United Presbyterian Synod and represented his church in Paris at the first meeting of the Reformed Synod of France. In May 1876, he was appointed joint professor of systematic theology and apologetics with James Harper, principal of the United Presbyterian Theological College, whom he succeeded as principal in 1879. He was an indefatigable worker and speaker, and in order to facilitate his efforts in other countries and other literatures he learnt Arabic, Norse, Danish and Dutch. In 1890 he visited Berlin and Amsterdam to acquaint himself with the ways of younger theologians, especially with the Ritschlians, whose work he appreciated but did not accept as final. On his return he wrote a long article on " Recent Scottish Theology " for the Presbyterian and Reformed Review, for which he read over every theological work of note published in Scotland during the preceding half-century. He died on the 1 2th of March, 1892, at Edinburgh. Among his principal publications are An Examination of Ferrier's " Knowing and Being," and the Scottish Philosophy — (a work which gave him the reputation of being an independent Hamiltonian in philosophy); Memoir of John Brown, D.D. (i860); Romanism and Rationalism (1863); Outlines of Apologetical Theology (1867); The Doctrine of the

Presbyterian Church (1876) ; Unbelief in the iSth Century (,1881); Doctrinal Principles of the United Presbyterian Church (Dr Blair's

Manual, 1888).

See MacEwen's Life and Letters of John Cairns (1895). (D. Mn.)

CAIRNS, a seaport of Nares county, Queensland, Australia, 890 rn. direct N.N.W. of Brisbane. Pop. (1901) 3557. The town lies parallel with the sea, on the western shore of Trinity Bay, with an excellent harbour, and a long beach, finely timbered. ' Cairns is the natural outlet for the gold-fields, tin-mines and silver-fields of the district and for the rich copper district of Chillagoe. A government railway, 48 m. long, runs to Mareeba, whence a private company's line continues to Mungana, 100 m. W. There is also a line belonging to a private company connect- ing Chillagoe with Mareeba. In the vicinity of Cairns are extensive sugar plantations, with sugar mills and refineries;, the culture of coffee and tobacco has rapidly extended; bananas, pine-apples and other fruits are exported in considerable ' quantities and there is a large industry in cedar. The Barron- Falls, among the finest in Australia, are near Kuranda, 19 m. from Cairns. Cairns became a municipality in 1885.

*CAIRO (Arabic Misr-al-Kahira, or simply M isr), the capital of modern Egypt and the nlost populous city in Africa, on the Nile, 12 m. S. of the apex of the Delta, in 30 3′ N. and 31 21′ E. It is 130 m. S.E. of Alexandria, and 148 E. of Suez by rail, though only 84 m. from the last-named port by the overland route across the desert, in use before the opening of the Suez Canal. Cairo occupies a length of 5 m. *n the east bank of the Nile, stretching north from the old Roman fortress of Babylon, and covers an area of about 8 sq. m. It is built partly on the alluvial plain of the Nile valley and partly on the rocky slopes of the Mokattam hills, which rise 550 ft. above the town.*

The citadel, which is built on a spur of the Mokattam hills, occupies the S.E. angle of the city. The prospect from the ramparts of this fortress is one of striking picturesqueness and beauty. Below lies the city with its ancient waEs and lofty towers, its gardens and squares, its palaces and its mosques, with their delicately-carved domes and minarets covered with fantastic tracery, the port of Bulak, the gardens and palace of Shubra, the broad river studded with islands, the valley of the Nile dotted with groups of trees, with the pyramids on the north horizon, and on the east the barren cliffs, backed by a waste of sand. Since the middle of the 19th century the city has more than doubled in size and population. The newer quarters, situated near the river, are laid out in the fashion of French cities, but the eastern parts of the town retain, almost unimpaired, their Oriental

aspect, and in scores of narrow, tortuous streets, and busy bazaars it is easy to forget that there has been any change from the Cairo of medieval times. Here the line of fortifications still marks the eastern limits of the city, though on the north large districts have grown up beyond the walls. Neither on the south nor towards the river are there any fortifica- tions left.

Principal Quarters and Modern Buildings. — From the citadel a straight road, the Sharia. Mehemet Ali, runs N. to the Ezbekia (Ezbekiyeh) Gardens, which cover over 20 acres, and form the central point of the foreign colony. North and west of the Ezbekia runs the Ismailia canal, and on the W. side of the canal, about half a mile N. of the Gardens, is the Central railway station, approached by a broad road, the Sharia Clot Bey. The Arab city and the quarters of the Copts and Jews lie E. of the two streets named. West of the Ismailia canal lies the Bulak quarter, the port or riverside district. At Bulak are the arsenal, foundry and railway works, a paper manufactory and the government printing press, founded by Mehemet Ali. A little distance S.E. of the Ezbekia is the Place Atabeh, the chief point of intersection of the electric tramways which serve the newer parts of the town. From the Place Atabeh a narrow street, the Muski, leads E. into the heart of the Arab city. Another street leads S. W. to the Nile, at the point where the Kasr en Nil or Great Nile bridge spans the river, leading to Gezira Bulak, an island whereon is a palace, now turned into a hotel, polo, cricket and tennis grounds, and a racecourse. The districts between the bridge, the Ezbekia

and the Ismailia canal, are known as the Ismailia and Tewfikia quarters, after the khedives in whose reigns they were laid out. The district immediately south of the bridge is called the Kasr el-Dubara quarter. Abdin Square, which occupies a central position, is connected with Ezbekia Gardens by a straight road. The narrow canal, El Khalig, which branched from the Nile at Old Cairo and traversed the city from S.W. to N.E., was filled up in 1897, and an electric tramway runs along the road thus made. With the filling up of the channel the ancient festival of the cutting of the canal came to an end.

The government offices and other modern public buildings are nearly all in the western half of the city. On the south side of the Ezbekia

are the post office, the courts of the International Tribunals,and the opera house. On theeastsidearetheboursеand the Credit Lyonnais, on the north the buildings of the American mission. On or near the west side of the gardens are most of the large and luxurious hotels which the city contains for the accom- modation of Europeans. Facing the river immediately north of the Great Nile bridge are the large barracks, called Kasr-en-Nil, and the new museum of Egyptian antiquities (opened in 1 902) . South of the bridge are the Ismailia palace (a khedivial residence), the British consulate general, the palace of the khedive's mother, the medical school and the government hospital. Farther removed from the river are the offices of the ministries of public works and of war — a large building surrounded by gardens— and of justice and finance. On the east side of Abdin Square is Abdin palace, an unpretentious buildiAg used for official recep- tions. Adjoining the palace are barracks. N.E. of Abdin Square, in the Sharia Mehemet Ali, is the Arab museum and khedivial library. Near this building are the new courts of the native tribunals. Private houses in these western districts consist chiefly of residential flats, though in the Kasr el-Dubara quarter are many detached residences.

The Oriental City. — The eastern half of Cairo is divided into many quarters. These quarters were formerly closed at night by massive gates. A few of these gates remain. In addition to the Mahommedan quarters, usually called after the trade of the inhabitants or some notable building, there are the Copt or Christian quarter, the Jews' quarter and the old " Frank " quarter. The last is the Muski district where, since the days of Saladin, " Frank " merchants have been permitted to live and trade. Some of the principal European shops are still to be found in this street. The Copt and Jewish quarters lie north of the Muski. The Coptic cathedral, dedicated to St Mark, is a modern building in the basilica style. The oldest Coptic church in Cairo is, probably, the Keniset-el-Adra, or Church of the Virgin, which is stated to preserve the original type of Coptic basilica. The Coptic churches in the city are not, however, of so much interest as those in Old Cairo (see below). In the Copt quarter are also Armenian, Syrian, Maronite, Greek and Roman Catholic churches. In the Copt and Jewish quarters the streets, as in the Arab quarters, are winding and narrow. In them the projecting upper stories of the houses nearly meet. Sebils or public fountains are numerous. These fountains are generally two-storeyed, the lower chamber enclosing a well, the upper room being often used for scholastic purposes. Many of the fountains are fine specimens of Arab architecture. While the houses of the poorer classes are mean and too often dirty, in marked

contrast are the houses of the wealthier citizens, built generally in a style of elaborate arabesque, the windows shaded with projecting cornices of graceful woodwork (mushrebiya) and ornamented with stained glass. A winding passage leads through the ornamental doorway into the court, in the centre of which is a fountain shaded with palm-trees. The principal apartment is generally paved with marble; in the centre a decorated lantern is suspended over a fountain, while round the sides are richly inlaid cabinets and windows of stained glass; and in a recess is the divan, a low, narrow, cushioned seat. The basement storey is generally built of the soft calcareous stone of the neighbouring hills, and the upper storey, which contains the harem, of painted brick. The shops of the merchants are small and open to the street. The greater part of the trade is

done, however, in the bazaars or markets, which are held in large khans or storehouses, of two storeys and of considerable size. Access to them is gained from the narrow lanes which usually surround them. The khans often possess fine gateways. The principal bazaar, the Khan-el-Khalil, marks the site of the tombs of the Fatimite caliphs.

The Citadel and the Mosques. — Besides the citadel, the prin- cipal edifices in the Arab quarters are the mosques and the ancient gates. The citadel or El-Kala was built by Saladin about 1166, but it has since undergone frequent alteration, and now contains a palace erected by Mehemet Ali, and a mosque of Oriental alabaster (based on the model of the mosques at Constantinople) founded by the same pasha on the site of " Joseph's Hall," so named after the prenomen of Saladin. The dome and the two slender minarets of this mosque form one of the most picturesque features of Cairo, and are visible from a great distance. In the centre is a well called Joseph's Well, sunk in the solid rock to the level of the Nile. There are four other mosques within the citadel walls, the chief being that of Ibn Kalaun, built in a.d. 13 17 by Sultan Nasir ibn Kalaun. The dome has fallen in. After having been used as a prison, and, later, as a military storehouse, it has been cleared and its fine colonnades are again visible. The upper parts of the minarets are covered with green tiles. They are furnished with bulbous cupolas. The most magnificent of the city mosques is that of Sultan Hasan, standing in the immediate vicinity of the citadel. It dates from a.d. 1357, and is celebrated for the grandeur of its porch and cornice and the delicate stalactite vaulting which adorns them. The restoration of parts of the mosque which had fallen into decay was begun in 1904. Besides it there is the mosque of Tulun (c. a.d. 879) exhibiting very ancient specimens of the pointed

arch; the mosque of Sultan El Hakim (a.d. 1003), the mosque el Azhar (the splendid), which dates from about a.d. 970, and is the seat of a Mahom- medan university; and the mosque of Sultan Kalaun, which is attached to the hospital or madhouse (muristan) begun by Kalaun in a.d. 1285. The whole forms a large group of build- ings, now partially in ruins, in a style resembling the contem- poraneous medieval work in Europe, with pointed arches in several orders. Besides the mosque proper there is a second mosque containing the fine mausoleum of Kalaun. Adjacent to the muristan on the north is the tomb mosque of al Nasir, completed 1303, with a fine portal. East of the Khan-el-Khalil is the mosque of El Hasanen, which is invested with peculiar sanctity as containing relics of Hosain and Hasan, grandsons of the Prophet. This mosque was rebuilt in the 19th century and is of no architectural importance. In all Cairo contains over 260 mosques, and nearly as many zawias or chapels. Of the gates the finest are the Bab-en-Nasr, in the north wall of the city, and the Bab-ez-Zuwela, the only surviving part of the southern fortifications.

Tombs of the Caliphs and Mamelukes. — Beyond the eastern wall of the city are the splendid mausolea erroneously known to Europeans as the tombs of the caliphs; they really are tombs of the Circassian or Burji Mamelukes, a race extinguished by Mehemet Ali. Their lofty gilt domes and fanciful network or arabesque tracery are partly in ruins, and the mosques at- tached to them are also partly ruined. The chief tomb mosques are those of Sultan Barkuk, with two domes and two minarets, completed a.d. 1410, and that of Kait Bey (c. 1470), with a slender minaret 135 ft. high. This mosque was carefully re- stored in 1898. South of the citadel is another group of tomb- mosques known as the tombs of the Mamelukes. They are architecturally of less interest than those of the " caliphs." Southwest of the Mameluke tombs is the much-venerated tomb-mosque of the Imam esh-Shafih or Shaf'i, founder of one of the four orthodox sects of Islam. Near the imam's mosque is a family burial-place built by Mehemet Ali.

Old Cairo: the Fortress of Babylon and the Nilometer.- — About a mile south of the city is Masr-el-Atika, called by Europeans Old Cairo. Between Old Cairo and the newer city are large mounds of debris marking the site of Fostat (see below, History).

Berak el Khiam*

El Motamadi;

?lHjitiaj

Race CotA

*J^b^^^^SP^R^*" «ll?TomW>f thecals: > * – ,-*

*Railways ****** Canals Reference*

i. Arab Museum and Khediufal Library

2. Ismailia Palace

3. Abdin Palace

4. Palace of the Khedive's Mother

5. Ministries 0/ Public Works and War

6. Goveroment Hospital

7. Medical School

8. Coptic Cathedral

9. Mosque of Sultan Hasan

10. Mosque of Tutun

11. Mosque of Sultan El Hakim

12. Mosque of El Azhar

13. Mosque of Nasir ibn Kalaun

14. Mosque and Murtstan of Kalaun iS- Mosque of Hasanen

16. Mosque of Muayyad

17. Mosque of Barkukiya

18. Bab-ez-Zuwela

19- Monastery of the Howling Dervishes

Emery 'O

CAIRO

955

The road to Old Cairo by the river leads past the monastery of the " Howling " Dervishes, and the head of the aqueduct which formerly supplied the citadel with water. Farther to the east is the mosque of Amr, a much-altered building dating from a.d. 643 and containing the tomb of the Arab conqueror of Egypt. Most important of the quarters of Masr-el-Atika is that of Kasr-esh-Shama (Castle of the Candle), built within the outer walls of the Roman fortress of Babylon. Several towers of this fortress remain, and in the south wall is a massive gateway, un- covered in 1 901. In the quarter are five Coptic churches, a Greek convent and two churches, and a synagogue. The principal Coptic church is that of Abu Serga (St Sergius). The crypt dates from about the 6th century and is dedicated to Sitt Miriam (the Lady Mary), from a tradition that in the flight into Egypt the Virgin and Child rested at this spot. The upper church is basilican in form, the nave being, as customary in Coptic churches, divided into three sections by wooden screens, which are adomed by carvings in ivory and wood. The wall above the high altar is faced with beautiful mosaics of marbles, blue glass and mother-of-pearl. Of the other churches in Kasr- esh-Shama the most noteworthy is that of El Adra (the Virgin), also called El Moallaka, or The Suspended, being built in one of the towers of the Roman gateway. It contains fine wooden and ivory screens. The pulpit is supported on fifteen columns, which rest on a slab of white marble. The patriarch of the Copts was formerly consecrated in this church. The other buildings in Old Cairo, or among the mounds of rubbish which adjoin it, in- clude several fort-like ders or convents. One, south of the Kasr- esh-Shama, is called Der Bablun, thus preserving the name of the ancient fortress. In the Der Abu Sephin, to the north of Babylon, is a Coptic church of the 10th century, possessing magnificent carved screens, a pulpit with fine mosaics and a semi-circle of marble steps.

Opposite Old Cairo lies the island of Roda, where, according to Arab tradition, Pharaoh's daughter found Moses in the bul- rushes. Two bridges, opened in 1008, connect Old Cairo with Roda, and a third bridge joins Roda to Giza on the west bank of the river. Roda Island contains a mosque built by Kait Bey, and at its southern extremity is the Nilometer, by which the Cairenes have for over a thousand years measured the rise of the river. It is a square well with an octagonal pillar marked in cubits in the centre.

Northern and Western Suburbs.- — Two miles N.E. of Cairo and on the edge of the desert is the suburb of Abbasia (named after the viceroy Abbas), connected with the city by a continuous line of houses. Abbasia is now largely a military colony, the cavalry barracks being the old palace of Abbas Pasha. In these barracks

Arabi Pasha surrendered to the British on the 14th of September 1882, the day after the battle of Tel el-Kebir. Mataria, a village 3 m. farther to the N.E., is the site of the defeat of the Mamelukes by the Turks in 1 5 1 7 , and of the defeat of the Turks by the French under General Kleber in 1800. At Mataria was a sycamore-tree, the successor of a tree which decayed in 1665, venerated as being that beneath which the Holy Family, rested on their flight into Egypt. This tree was blown down in July 1906 and its place taken by a cutting made from the tree some years previously. Less than a mile N.E. of Mataria are the scanty remains of the ancient city of On or Heliopolis, The chief monument is an obelisk, about 66 ft. high, erected by Usertesen I. of the Xllth dynasty. A residential suburb, named Heliopolis, containing many fine build- ings, was laid out between Mataria and Abbasia during 1905-10.

On the west bank of the Nile, opposite the southern end of Roda Island, is the small town of Giza or Gizeh, a fortified place of considerable importance in the times of the Mamelukes. In the viceregal palace here the museum of Egyptian antiquities was housed for several years (1889-1902). The grounds of this palace have been converted into zoological gardens. A broad, tree-bordered, macadamized road, along which run electric trams, leads S.S.W. across the plain to the Pyramids of Giza, 5 m. distant, built on the edge of the desert.

Helwan. — Fourteen miles S. of Cairo and connected with it by railway is the town of Helwan, built in the desert 3 m. E. of the

Nile, and much frequented by invalids on account of its sulphur baths, which are owned by the Egyptian government. A khedivial astronomical observatory was built here in 1903- 1904, to take the place of that at Abbasia, that site being no longer suitable in consequence of the northward extension of the city. The ruins of Memphis are on the E. bank of the Nile opposite Helwan.

Inhabitants. — The inhabitants are of many diverse races, the various nationalities being frequently distinguishable by differ- ences in dress as well as in physiognomy and colour. In the oriental quarters of the city the curious shops, the markets of different trades (the shops of each trade being generally congre- gated in one street or district), the easy merchant sitting before his shop, the musical and quaint street-cries of the picturesque vendors of fruit, sherbet, water, &c, with the ever-changing and many-coloured throng of passengers, all render the streets a delightful study for the lover of Arab life, nowhere else to be seen in such perfection, or with so fine

a background of magnifi- cent buildings. The Cairenes, or native citizens, differ from the fellahin in having a much larger mixture of Arab blood, and are at once keener witted and more conservative than the peasantry. The Arabic spoken by the middle and higher classes is generally inferior in grammatical correctness and pronunciation to that of the Bedouins of Arabia, but is purer than that of Syria or the dialect spoken by the Western Arabs. Besides the Cairenes proper, who are largely engaged in trade or handicrafts, the inhabitants include Arabs, numbers of Nubians and Negroes — mostly labourers or domestics in nominal slavery — and many Levantines, there being considerable colonies of Syrians and Armenians. The higher classes of native society are largely of Turkish or semi-Turkish descent. Of other races the most numerous are Greeks, Italians, British, French and Jews. Bedouins from the desert frequent the bazaars.

At the beginning of the 19th century the population was estimated at about 200,000, made up of 120,000 Moslems, 60,000 Copts, 4000 Jews and 16,000 Greeks, Armenians and " Franks." In 1882 the population had risen to 374,000, in 1897 to 570,062, and in 1907, including Helwan and Mataria, the total population was 654,476, of whom 46,507 were Europeans.

Climate and Health. — In consequence of its insanitary condition, Cairo used to have a heavy death-rate. Since the British occupa- tion in 1882 much has been done to better this state of things, notably by a good water-supply and a proper system of drainage. The death-rate of the native population is about 35 per 1000. The climate of the city is generally healthy, with a mean tempera- ture of about 68° F. Though rain seldom falls, exhalations from the river, especially when the flood has begun to subside, render the districts near the Nile damp during September, October and November, and in winter early morning fogs are not uncommon. The prevalent north wind and the rise of the water tend to keep the air cool in summer.

Commerce. — The commerce of Cairo, of considerable extent and variety, consists mainly in the transit of goods. Gum, ivory, hides, and ostrich feathers from the Sudan, cotton and sugar from Upper Egypt, indigo and shawls from India and Persia, sheep and tobacco from Asiatic Turkey, and European manufactures, such as machinery, hardware, cutlery, glass, and cotton and woollen goods, are the more important articles. The traffic in slaves ceased in 1877. In Bulak are several factories founded by Mehemet Ali for spinning, weaving and printing cotton, and a paper-mill established by the khedive Ismail in 1870. .Various kinds of paper are manufactured,

and especially a fine quality for use in the government offices. In the Island of Roda there is a sugar-refinery of considerable extent, founded in 1859, and principally managed by Englishmen. Silk goods, saltpetre, gunpowder, leather, &c, are also manufactured. An octroi duty of 9 % ad valorem formerly levied on all food stuffs entering the city was abolished in 1903. It used to produce about £1 50,000 per annum.

Mahommedan Architecture. — Architecturally considered Cairo is still the most remarkable and characteristic of Arab cities. The edifices raised by the Moorish kings of Spain and the Moslem

rulers of India may have been more splendid in their materials, and more elaborate in their details; the houses of the great men of Damascus may be more costly than were those of the Mameluke beys; but for purity of taste and elegance of design both are far excelled by many of the mosques and houses of Cairo. These mosques have suffered much in the beauty of their appearance from the effects of time and neglect; but their colour has been often thus softened, and their outlines rendered the more picturesque. What is most to be admired in their Style of architecture is its extraordinary freedom from restraint, shown in the wonderful variety of its forms, and the skill in design which has made the most intricate details to harmonize with grand outlines. Here the student may best learn the history of Arab art. Like its contemporary Gothic, it has three great periods, those of growth, maturity and decline. Of the first, the mosque of Ahmed Ibn-Tulun in the southern part of Cairo, and the three great gates of the city, the Bab-en-Nasr, Bab-el-Futuh and Bab-Zuwela, are splendid examples. The design of these entrance gateways is extremely simple and massive, depending for their effect on the fine ashlar masonry in which they are built, the decoration being more or less confined to ornamental disks. The mosque of Tulun was built entirely in brick, and is the earliest instance of the employment of the pointed arch in Egypt. The curve of the arch turns in slightly below the springing, giving a horse-shoe shape. Built in brick, it was found necessary to give a more monumental appearance to the walls by a casing of stucco, which remains in fair preservation to the present day. This led to the enrichment of the archivolts and imposts with that peculiar type of conventional foliage which characterizes Mahommedan work, and which in this case was carried out by Coptic craftsmen. The attached angle- shafts of piers

are found here for the first time, and their capitals are enriched, as also the frieze surmounting the walls, with other conventional patterns. The second, period passes from the highest point to which this art attained to a luxuriance promising decay. The mosque of sultan Hasan, below the citadel, those of Muayyad and Kalaun, with the Barkukiya and the mosque of Barkuk in the cemetery of Kait Bey, are instances of the second and more matured style of the period. The simple plain ashlar masonry still predominates, but the wall surface is broken up with sunk panels, sometimes with geometrical patterns in them. The principal characteristics of this second period are the magnifi- cent portals, rising sometimes, as in the mosque of sultan Hasan, to 80 or 00 ft., with elaborate stalactite vaulting at the top, and the deep stalactite cornices which crown the summit of the building. The decoration of the interior consists of the casing of the walls with marble with enriched borders, and (about 20 ft. above the ground) friezes 3 to 5 ft. in height in! which.the precepts of the Koran are carved in relief, with a background of conven- tional foliage. Of the last style of this period the Ghuriya and the mosque of Kait Bey in his cemetery are beautiful specimens. They show an elongation of forms and an excess of decoration in which the florid qualities predominate. Of the age of decline the finest monument is the mosque of Mahommad Bey Abu-Dahab. The forms are now poor, though not lacking in grandeur, and the details are not as well adjusted as before, with a want of mastery of the most suitable decoration. The usual plan of a congrega- tional mosque is a large, square, open court, surrounded by arcades of which the chief, often several bays deep, and known as the Manksura, or prayer-chamber, faces Mecca (eastward), and has inside its outer wall a decorated niche to mark the direction of prayer. In the centre of the court is a fountain for ablutions, often surmounted by a dome, and in the prayer- chamber a pulpit and a desk for readers. When a mosque is also the founder's tomb, it has a richly ornamented sepulchral chamber always covered by a dome (see further Mosque, which contains plans of the mosques of Amr and sultan Hasan, and of the tomb mosque of Kait Bey).

After centuries of neglect efforts are now made to preserve the monuments of Arabic art, a commission with that object having been appointed in 1881. To this commission the govern- ment makes an annual grant of £4000. The careful and syste- I

matic work accomplished by this commission has preserved much of interest and beauty which would otherwise have gone utterly to ruin. Arrangements were made in 1902 for the systematic repair and preservation of Coptic monuments.

Museums and Library. —The. museum of Egyptian antiquities was founded at Bulak in 1863, being then housed in a mosque, by the French savant Auguste Mariette. In 1889 the collection was transferred to the Giza (Ghezireh) palace, and in 1902 was removed to its present quarters, erected at a cost of over £2 50,000, A statue of Mariette was unveiled in 1904. The museum is entirely devoted to antiquities of Pharaonic times, and, except in historical papyri, in which it is excelled by the British Museum, is the most valuable collection of such antiquities in existence.

The Arab museum and khedivial library are housed in a building erected for the purpose, at a cost of £66,000, and opened in 1903. In the museum are preserved treasures of Saracenic art, including many objects removed from the mosques for their better security. The khedivial library contains some 64,000 volumes, over two-thirds being books and MSS. in Arabic, Persian, Turkish, Amharic and Syriac. The Arabic section includes a unique collection of 2677 korans. The Persian section is rich in illuminated MSS. The numismatic collection, as regards the period of the caliphs and later dynasties, is one of the richest in the world.

History. — Before the Arab conquest of Egypt the site of Cairo appears to have been open country. Memphis was some 12 m. higher up on the opposite side of the Nile, and Heliopolis was S or 6 m. distant on the N.E. The most ancient known settlement in the immediate neighbourhood of the present city was the town called Babylon. From its situation it may have been a north suburb of Memphis, which was still inhabited in the 7th century a.d. Babylon is said by Strabo to have been founded by emi- grants from the ancient city of the same name in 525 B.C., i.e. at the time of the Persian conquest of Egypt. Here the Romans built a fortress and made it the headquarters of one of the three legions which garrisoned the country. The church of Babylon mentioned in 1 Peter v. 13 has been thought by some writers to refer to this town — an improbable supposition. Amr, the conqueror of Egypt for the caliph Omar, after taking the town besieged the fortress for the greater part of a year, the garrison surrendering in April a.d. 641. The town of Babylon dis- appeared, but the strong walls of the fortress in part remain, and the name survived, " Babylon of Egypt," or " Babylon " simply, being frequently used in medieval writings as synonymous with Cairo or as denoting the successive Mahommedan dynasties of Egypt.

Cairo itself is the fourth Moslem capital of Egypt; the site of one of those that had preceded it is, for the most part, included within its walls, while the other two were a little to the south. Amr founded El-

Fostat, the oldest of these, close to the fortress which he had besieged. Fostat signifies " the tent," the town being built where Amr had pitched his tent. The new town speedily became a place of importance, and was the residence of the naibs, or lieutenants, appointed by the orthodox and Omayyad caliphs. It received the name of Masr, properly Misr, which was also applied by the Arabs to Memphis and to Cairo, and is to-day, with the Roman town which preceded it, repre- sented by Masr el-Atika, or " Old Cairo." Shortly after the overthrow of the Omayyad dynasty, and the establishment of the Abbasids, the city of El-'Askar was founded (a.d. 750) by Suleiman, the general who subjugated the country, and became the capital and the residence of the successive lieutenants of the Abbasid caliphs. El-'Askar was a small town N.E. of and adjacent to El-Fostat, of which it was a kind of suburb. Its site is now entirely desolate. The third capital, El-Katai, wa.s founded about a.d. 873 by Ahmed Ibn Tulun, as his capital. It continued the royal residence of his successors; but was sacked not long after the fall of the dynasty and rapidly decayed. A part of the present Cairo occupies its site and contains its great mosque, that of Ahmed Ibn Tulun.

Jauhar (Gohar) el-Kaid, the conqueror of Egypt for the Fatimite caliph El-Moizz, founded a new capital, a.d. 968, which

was named El-Kahira, that is, " the Victorious," a name cor- rupted into Cairo. The new city, like that founded by Amr, was originally the camp of the conqueror. This town occupied about a fourth part, the north-eastern, of the present metropolis. By degrees it became greater than El-Fostat, and took from it the name of Misr, or Masr, which is applied to it by the modern Egyptians. With its rise Fostat, which had been little affected by the establishment of Askar and Katai, declined. It con- tinually increased so as to include the site of El-Katai to the south. In a.d. 1 1 76 Cairo was unsuccessfully attacked by the Crusaders; shortly afterwards Saladin built the citadel on the lowest point of the mountains to the east, which immediately overlooked El-Katai, and he partly walled round the towns and large gardens within the space now called Cairo. Under the prosperous rule of the Mameluke sultans this great tract was filled with habitations; a large suburb to the north, the Hoseynia, was added; and the town of Bulak was founded. After the Turkish conquest (a.d. 1517) the metropolis decayed, but its limits were the same. In 1708 the city was captured by the French, who were driven

out in 1801 by the Turkish and English forces, the city being handed over to the Turks. Mehemet Ah", originally the Turkish viceroy, by his massacre of the Mamelukes in 181 1, in a narrow street leading to the citadel, made himself master of the country, and Cairo again became the capital of a virtually independent kingdom. Under Mehemet and his successors all the western part of the city has grown up. The khedive Ismail, in making the straight road from the citadel to the Ezbekia gardens, destroyed many of the finest houses of the old town. In 1882 Cairo was occupied by the British, and British troops continue to garrison the citadel.

Bibliography. — S. L. Poole, The Story of Cairo (London, 1902), a historical and architectural survey of the Moslem city; E. Reynolds-Ball, Cairo: the City of the Caliphs (Boston, U.S.A., 1897) ; Prisse d'Avennes, L'Art arabe d'apres les monuments du Caire (Paris, 1847); P. Ravaisse, L'Histoire et la topographie du Caire d'apris Makrizi (Paris, 1887) ; E. W. Lane, Cairo Fifty Years Ago (London, 1896), presents a picture of the city as it was before the era of European " improvements," and gives extracts from the Khital of Maqrizi, written in 1417, the chief original authority on the antiquities of Cairo; Murray's and Baedeker's Guides, and A. and C. Black's Cairo of To-day (1905), contain much useful and accurate information about Cairo. For the fortress of Babylon and its churches consult A. J. Butler, Ancient Coptic Churches in Egypt (Oxford, 1884).

CAIRO, a city and the county-seat of Alexander county, Illinois, U.S.A., in the S. part of the state, at the confluence of the Ohio and Mississippi rivers, 365 m. S. of Chicago. Pop. (1890) 10,324; (1900) 12,566, of whom 5000 were negroes; (1910 census) 14,548. Cairo is served by the Illinois Central, the Mobile & Ohio, the Cleveland, Cincinnati, Chicago & St Louis, the St Louis, Iron Mountain & Southern, and the St Louis South- Western railways, and by river steamboat lines. The city, said to be the " Eden " of Charles Dickens's Martin Ckuzzlewit, is built on a tongue of land between the rivers, and has suffered many times from inundations, notably in 1858. It is now protected by great levees. A fine railway bridge (1888) spans the Ohio. The city has a large government building, a U.S. marine hospital (1884), and the A. B. Safford memorial library (1882), and is the seat of St Joseph's Loretto Academy (Roman Catholic, 1864). In one of the squares there is a bronze statue, "The Hewer," by G. G. Barnard. In the N. part of the city is St Mary's park (30 acres). At Mound City (pop. in 1910, 2837), 5 m. N. of Cairo, there is a national cemetery. Lumber and flour are Cairo's principal manufactured products, and the city is an important hardwood and

cotton-wood market ; the Singer Manufacturing Co. has veneer mills here, and there are large box factories. In 1905 the value of the city's factory products was $4,381,465, an increase of 40-6% since 1900. Cairo is a shipping-point for the surrounding agricultural country. The city owes its origin to a series of commercial experiments. In 1818 a charter was secured from the legislature of the territory of Illinois incorporating the city and bank of Cairo. The charter was soon forfeited, and the land secured by it reverted to the government. In 1835 a new charter was granted to a second company, and in 1837 the Cairo City & Canal Co. was

formed. By 1842, however, the place was practically abandoned. A successful settlement was made in 1851-1854 under the auspices of the New York Trust Co.; the Illinois Central railway was opened in 1856; and Cairo was chartered as a city in 1857. During the Civil War Cairo was an important strategic point, and was a military centre and depot of supplies of considerable importance for the Federal armies iri the west. In 1862 Admiral Andrew H. Foote established at Mound City a naval depot, which was the basis of his operations on the Mississippi.

CAIROLI, BENEDETTO (1825-1889), Italian statesman, was born at Pavia on the 28th of January 1825. From 1848 until the completion of Italian unity in 1870, his whole activity was devoted to the Risorgimento, as Garibaldian officer, political refugee, anti-Austrian conspirator and deputy to parliament. He commanded a volunteer company under Garibaldi in 1859 and i860, being wounded slightly at Calatafimi and severely at Palermo in the latter year. In 1866, with the rank of colonel, he assisted Garibaldi in Tirol, in 1867 fought at Mentana, and in 1870 conducted the negotiation's with Bismarck, during which the German chancellor is alleged to have promised Italy posses- sion of Rome and of her natural frontiers if the Democratic party could prevent an alliance between Victor Emmanuel and Napoleon. The prestige personally acquired by Benedetto Cairoli was augmented by that of his four brothers, who fell during the wars of Risorgimento, and by the heroic conduct of their mother. His refusal of all compensation or distinction further endeared him to the Italian people. When in 1876 the Left came into power, Cairoli, then a deputy of sixteen years' standing, became parliamentary leader of his party, and, after the fall of Depretis, Nicotera and Crispi, formed his first cabinet in March 1878 with a Francophil and Irredentist policy. After his marriage with the countess Elena Sizzo of Trent, he permitted the Irredentist agitation to carry the country to the verge of a war with Austria. General irritation was caused by his and Count Corti's policy of " clean

hands " at the Berlin Congress, where Italy obtained nothing, while Austria-Hungary secured a European mandate to occupy Bosnia and the Herzegovina. A few months later the attempt of Passanante to assassinate King Humbert at Naples (12th of December 1878) caused his downfall, in spite of the courage displayed and the severe wound received by him in protecting the king's person on that occasion. On the 3rd Of July 1879 Cairoli returned to power, and in the following November formed with Depretis a coalition ministry, in which he retained the premiership and the foreign office. Confidence in French assurances, and belief that Great Britain would never permit the extension of French influence in North Africa, prevented him from foreseeing the French occupation of Tunis (nth of May 1881). In view of popular indignation he resigned in order to avoid making inopportune declarations to the chamber. Thenceforward he practically disappeared from political life. In 1887 he received the knight- hood of the Annunziata, the highest Italian decoration, and on the 8th of August 1889 died while a guest of King Humbert in the royal palace of Capodimonte near Naples. Cairoli was one of the most conspicuous representatives of that type of Italian public men who, having conspired and fought for a generation in the cause of national unity, were despite their valour little fitted for the responsible parliamentary and official positions they subsequently attained; and who by their ignorance of foreign affairs and of internal administration unwittingly impeded the political development of their country. ■ CAISSON (from the Fr. caisse, the variant form " cassoon " being' adapted from the Ital. casone), a chest or case. When employed as a military term, it denotes an ammunition wagon or chest; in architecture it is the term used for a sunk panel or coffer in a ceiling, or in the soffit of an arch or a vault.

In civil engineering, however, the word has attained a far wider signification, and has been adopted in connexion with a considerable variety of hydraulic works. A caisson in this sense implies a case or enclosure of wood or iron, generally employed for keeping out water during the execution of foundations and other works in water-bearing strata, a't' the side of or under rivers, and also

in the sea. There are two distinct forms of this type of caisson : — (i) A caisson open at the top, whose sides, when it 'is sunk in position, emerge above the water-level, and which is either provided with a

water-tight bottom or is carried down, by being weighted at the top and having a cutting edge round the bottom, into a water-tight stratum, aided frequently by excavation inside; (2) A bottomless caisson, serving as a sort of diving-bell, in which men can work when compressed air is introduced to keep out the water in proportion to the depth below the water- level, which is gradually carried down to an adequately firm foundation by excavating at the bottom of the caisson, and building up a quay-wall or pier out of water on the top of its roof as it descends. An example of a caisson with a water-tight bottom is furnished by the quays erected alongside the Seine at Rouen, where open-timber caissons were sunk on to bearing- piles down to a depth of of ft. below low-water, the brick and concrete lower portions of the quay- wall being built inside them out of water (see Dock). At Bilbao, Zeebrugge and Scheven- ingen harbours, large open metal caissons, built inland, ballasted with concrete, floated out into position, and then sunk and filled with concrete, have been employed for forming very large foundation blocks for the breakwaters (see Breakwater). Open iron caissons are frequently employed for enclosing the site of river piers for bridges, where a water-tight stratum can be reached at a moderate depth, into which the caisson can be taken down, so that the water can be pumped out of the enclosure and the foundations laid and the pier carried up in the open air. Thus the two large river piers carrying the high towers, bascules, and machinery of the Tower Bridge, London, were each founded and built within a group of twelve plate-iron caissons open at the top; whilst four of the piers on which the cantilevers of the Forth Bridge rest, were each erected within an open plate-iron caisson fitted at the bottom to the sloping rock, where ordinary cofferdams could not have been adopted.

Where foundations have to be carried down to a considerable depth in water-bearing strata, or through the alluvial bed of a river, to reach a hard stratum, bottomless caissons sunk by excavating under compressed air are employed. The caisson at the bottom, forming the working chamber, is usually provided with a strong roof, round the top of which, when the caisson is floated into a river, plate-iron sides are erected forming an upper open caisson, inside which the pier or quay-wall is built up out of water, on the top of the roof, as the sinking proceeds. Shafts through the roof up to the open air provide access for men and materials to the working chamber, through an air-lock consisting of a small chamber with an air-tight door at each end, enabling locking into and out of the compressed-air portion to be readily effected, on the same principle as a water-lock on a canal. When a sufficiently reliable stratum has been reached, the men leave

the working chamber; and it is filled with concrete through the shafts, the bottomless caisson remaining embedded in the work. The foundations for the two river piers of the Brooklyn Suspension Bridge, carried down to the solid rock, 78 and 45 ft. respectively below high-water, by means of bottomless timber caissons with compressed air, were an early instance of this method of carrying out subaqueous foundations; whilst the Antwerp quay-walls, commenced many years ago in the river Scheldt at some distance out from the right bank, and the foundations of six of the piers supporting the cantilevers of the Forth Bridge, carried down to rock between 64 and 89 ft. below high-water, are notable examples of works founded under water within wrought iron bottomless caissons by the aid of compressed air. The foundations of the two piers of the Eiffel Tower adjoining the Seine were carried down through soft water- bearing strata to a depth of 33 ft. by means of wrought iron bottomless caissons sunk by the help of compressed air; and the deep foundations under the sills of the new large Florida lock at Havre (see Dock) were laid underneath the water logged alluvial strata close to the Seine estuary by similar means. Workmen, after emerging from such caissons, sometimes exhibit symptoms of illness which is known as caisson disease (q.v.).

As in the above system, significantly termed by French

engineers par caisson perdu, the materials of the bottomless caisson have to be left in the work, a more economical system has been adapted for carrying out similar foundations, at moder- ate depths, by using movable caissons, which, after the lowest portions of the foundations have been laid, are raised by screw- jacks for constructing the next portions. In this way, instead of building the pier or wall on the roof of the caisson, the work is carried out under water in successive stages, by raising the bottomless caisson as the work proceeds; and by this arrange- ment, the caisson, having completed the subaqueous portion of the structure, is available for work elsewhere. This movable system has been used with advantage for the foundations for some piers of river bridges, some breakwater foundations, and, at the Florida lock, Havre, for founding portions of the side walls.

Closed iron caissons, termed ship-caissons, and sliding or roll- ing caissons, are generally employed for closing graving-docks, especially the former (so called from their resemblance in shape to a vessel) on account of their simplicity, being readily floated into and out of position; whilst sliding caissons are sometimes used instead of lock-gates at docks, but require a chamber at the side to receive them

when drawn back. They possess the ad- vantage, particularly for naval dockyards where heavy weights are transported, of providing in addition a strong movable bridge, thereby dispensing with a swing-bridge across the opening.

The term caisson is sometimes applied to flat air-tight construc- tions used for raising vessels out of water for cleaning or repairs, by being sunk under them and then floated ; but these floating caissons are more commonly known as pontoons, or, when air-chambers are added at the sides, as floating dry-docks. (L. F. V.-H.)

CAISSON DISEASE. In order to exclude the water, the air pressure within a caisson used for subaqueous works must be kept in excess of the pressure due to the superincumbent water; that is, it must be increased by one atmosphere, or 15 lb per sq. in. for every 335 ft. that the caisson is submerged below the surface. Hence at a depth of 100 ft. a worker in a caisson, or a diver in a diving-dress, must be subjected to a pressure of four atmospheres or 60 lb per sq. in. Exposure to such pressures is apt to be followed by disagreeable and even dangerous physio- logical effects, which are commonly referred to as caisson disease or compressed air illness. The symptoms are of a very varied character, including pains in the muscles and joints (the " bends "), deafness, embarrassed breathing, vomiting, paralysis (" divers' palsy "), fainting and sometimes even sudden death. At the St Louis bridge, where a pressure was employed equal to 4i atmospheres, out of 600 workmen, 119 were affected and 14 died. At one time the symptoms were attributed to congestion produced by the mechanical effects of the pressure on the internal organs of the body, but this explanation is seen to be untenable when it is remembered that the pressure is immediately trans- mitted by the fluids of the body equally to all parts. They do not appear during the time that the pressure is being raised nor so long as it is continued, but only after it has been removed; and the view now generally accepted is that they are due to the rapid effervescence of the gases which are absorbed in the body-fluids during exposure to pressure. Experiment has proved that in animals exposed to compressed air nitrogen is dissolved in the fluids in accordance with Dalton's law, to the extent of roughly 1 % for each atmosphere of pressure, and also that when the pressure is suddenly relieved the gas is liberated in bubbles within the body. It is these bubbles that do the mischief. Set free in the spinal cord, for instance, they may give rise to ' partial paralysis, in the labyrinth of the ear to auditory vertigo, or in the heart to stoppage of the circulation; on the other hand, they may be liberated in positions where they do no harm. But if the pressure is relieved gradually they are not formed, because the gas comes out of

solution slowly and is got rid of by the heart and lungs. Paul Bert exposed 24 dogs to pressure of 7-9I atmospheres and " decompressed " them rapidly in 1-4 minutes. The result was that 21 died, while only one showed no symptoms. In one of his cases, in which the apparatus burst while at a pressure of 9J atmospheres, death was instantaneous and the body was enormously distended, with the right heart full of gas.

But he also found that dogs exposed, for moderate periods, to similar pressures suffered no ill effects provided that the pressure was relieved gradually, in 1-13 hours; and his results have been confirmed by subsequent investigators. To prevent caisson disease, therefore, the decompression should be slow; Leonard Hill suggests it should be at a rate of not less than 20 minutes for each atmosphere of pressure. Good ventilation of the caisson is also of great importance (though experiment does not entirely confirm the view that the presence of carbonic acid to an amount exceeding iorij parts per thousand exercises a specific influence on the production of compressed air illness), and long shifts should be avoided, because by fatigue the circulatory and respiratory organs are rendered less able to eliminate the absorbed gas. Another reason against long shifts, especially at high pressures, is that a high partial pressure of oxygen acts as a general protoplasmic poison. This circumstance also sets a limit to the pressures that can possibly be used in caissons and therefore to the depths at which they can be worked, though there is reason to think that the maximum pressure (4 J atmos- pheres) so far used in caisson work might be considerably ex- ceeded with safety, provided that proper precautions were observed in regard to slow decompression, the physique of the workmen, and the hours of labour. As to the remedy for the symptoms after they have appeared, satisfactory results have been obtained by replacing the sufferers in a compressed air chamber (" recompression "), when the gas is again dissolved by the body fluids, and then slowly " decompressing " them.

See Paul Bert, La Pression barometrique (1878) ; and Leonard Hill, Recent Advances in Physiology and Biochemistry (1906), (both these works contain bibliographies); also a lecture by Leonard Hill delivered at the Royal Institution of Great Britain on the 25th of May 1906; " Diving and Caisson Disease," a summary of recent investigations, by Surgeon Howard Mummery, British Medical

Journal, June 27th, 1908; Diseases of Occupation, by T. Oliver (1908); Diseases of Workmen, by T. Luson and R. Hyde (1908).

CAITHNESS, a county occupying the extreme north-east of Scotland, bounded W. and S. by Sutherlandshire, E. by the North Sea, and N. by the Pentland Firth. Its area is 446,01 7 acres, or nearly 697 sq. m. The surface generally is flat and tame, consisting for the most part of barren moors, almost destitute of trees. It presents a gradual slope from the north and east up to the heights in the south and west, where the chief mountains are Morven (2313 ft.), Scaraben (2054 ft.) and Maiden Pap (1587 ft.). The principal rivers are the Thurso (" Thor's River "), which, rising in Cnoc Crom Uillt (1199 ft.) near the Sutherlandshire border, pursues a winding course till it reaches the sea in Thurso Bay; the Forss, which, emerging from Loch Shurrery, follows a generally northward direction and enters the sea at Crosskirk, a fine cascade about a mile from its mouth giving the river its name (fors, Scandinavian, " water- fall; " in English the form is force); and Wick Water, which, draining Loch Watten, flows into the sea at Wick. There are many other smaller streams well stocked with fish. Indeed, the county offers fine sport for rod and gun. The lochs are numerous, the largest being Loch Watten, 2J m. by f m., and Loch Calder, 2j by 1 m., and Lochs Colam, Hempriggs, Heilen, Ruard, Scarmclate, St John's, Toftingale and Wester. So much of the land is low-lying and boggy that there are no glens, except in the mountainous south-west, although towards the centre of the county are Strathmore and Strathbeg (the great and little valleys). Most of the coast-line is precipitous and inhospitable, particularly at the headlands of the Ord, Noss, Skirsa, Duncans- bay, St John's Point, Dunnet Head (346 ft.), the most northerly poftit of Scotland, Holburn and Brims Ness. From Berriedale at frequent intervals round the coast occur superb " stacks," or detached pillars of red sandstone, which add much to the grandeur of the cliff scenery.

Caithness is separated from the Orkneys by the Pentland Firth, a strait about 14 miles long and from 6 to 8 miles broad. Owing to the rush of the tide, navigation is difficult, and, in rough weather, dangerous. The tidal wave races at a speed which varies from 6 to 12 m. an hour. At the meeting of the western and eastern currents the waves at times rise into the

air like a waterspout, but the current does not always nor everywhere flow at a uniform rate, being broken up at places into eddies as perilous as itself. The breakers caused by the sunken reefs off Duncansbay Head create the Bores of Duncans- bay, and eddies

off St John's Point are the origin of the Merry Men of Mey, while off the island of Stroma occurs the whirlpool of the Swalchie, and off the Orcadian Swona is the vortex of the Wells of Swona. Nevertheless, as the most direct road from Scandinavian ports to the Atlantic the Firth is used by at least 5000 vessels every year. In the eastern entrance to the Firth lies the group of islands known as the Pentland Skerries. They are four in number — Muckle Skerry, Little Skerry, Clettack Skerry and Louther Skerry — and the nearest is 4 J m. from the mainland. On Muckle Skerry, the largest (3 m. by I m.), stands a lighthouse with twin towers, 100 ft. apart. The island of Stroma, i| m. from the mainland (pop. 375), belongs to Caithness and is situated in the parish of Canisbay. It is 2j m. long by 1 J m. broad. In 1862 a remarkable tide climbed the cliffs (200 ft.) and swept across the island.

Geology. — Along the western margin of the county from Reay on the north coast to the Scaraben Hills there is a narrow belt of country which is occupied by metamorphic rocks of the types found in the east of Sutherland. They consist chiefly of granu- litic quartzose schists and felspathic gneisses, permeated in places by strings and veins of pegmatite. On the Scaraben Hills there is a prominent development of quartz-schists the age of which is still uncertain. These rocks are traversed by a mass of granite sometimes foliated, trending north and south, which is traceable from Reay southwards by Aultnabreac station to Kinbrace and Strath Helmsdale in Sutherland. Excellent sections of this rock, showing segregation veins, are exposed in the railway cuttings between Aultnabreac and Forsinard. A rock cf special interest described by Professor Judd occurs on Achvarasdale Moor, near Loch Scye, and hence named Scyelite. It forms a small isolated boss, its relations to the surrounding rocks not being apparent. Under the microscope, the rock consists of biotite, hornblende, serpentinous pseudo-morphs after olivine and possibly after enstatite and magnetite, and may be described as a mica-hornblende-picrite. The remainder of the county is occupied by strata of Old Red Sandstone age, the greater portion being grouped with the Middle or Orcadian division of that system, and a small area on the promontory of Dunnet Head being provisionally placed in the upper division. By means of the fossil fishes, Dr Traquair has arranged the Caithness flagstone series in three groups, the Achanarras beds at the base, the Thurso flagstones in the middle, and the John o' Groats beds at the top. In the extreme south of the county certain minor subdivisions appear which probably underlie the lowest fossiliferous beds containing the Achanarras fauna. These comprise (1) the coarse basement

conglomerate, (2) dull chocolate-red sandstones, shales and clays around Braemore in the Berriedale Water, (3) the brecciated conglomerate largely composed of granite detritus'seen at Badbea, (4) red sandstones, shales and conglomeratic bands found in the Berriedale Water and further northwards in the direction of Strathmore. Morven, the highest hill in Caithness, is formed of gently inclined sand— stones and conglomerates resting on an eroded platform of quartz-schists and quartz-mica-granulites. The flagstones yielding the fishes of the lowest division of the Orcadian series appear on Achanarras Hill about three miles south of Halkirk. The members of the overlying Thurso group have a wide dis- tribution as they extend along the shore on either side of Thurso and spread across the county by Castletown and Halkirk to Sinclairs Bay and Wick. They are thrown into folds which are traversed by faults some of which run in a north and south direction. They consist of dark grey and cream-coloured flagstones, sometimes thick-bedded with grey and blue shales and thin limestones and occasional intercalations of sandstone. In the north-west of the county the members of the Thurso group appear to overlap the Achanarras beds and to rest directly on the platform of crystalline schists. In the extreme north- east there is a passage upwards into the John o' Groats group

with its characteristic fishes, the strata consisting of sandstones, flagstones with thin impure limestones. The rocks of Dunnet Head, which are provisionally classed with the upper Old Red Sandstone, are composed of red and yellow sandstones, marls and mudstones. Hitherto no fossils have been obtained from these beds save some obscure plant-like markings, but they are evidently a continuation southwards of the sandstones of Hoy, which there rest unconformably on the flagstone series of Orkney. This patch of Upper Old Red strata is faulted against the Caithness flagstones to the south. For many years the flagstones have been extensively quarried for pavement purposes, as for instance near Thurso, at Castletown and Achanarras. Two instances of volcanic necks occur in Caithness, one piercing the red sandstones at the Ness of Duncansbay and the other the sandstones of Dunnet Head north of Brough. They point to volcanic activity subsequent to the deposition of the John o' Groats beds and of the Dunnet sandstones. The materials filling these vents consist of agglomerate charged with blocks of diabase, sandstone, flagstone and limestone.

An interesting feature connected with the geology of Caithness is the deposit of shelly boulder clay which is distributed over the low ground, being deepest in the valleys and in the cliffs surrounding the bays on the east coast. Apart from the shell fragments, many of which are striated, the deposit contains blocks foreign to the county, as for instance chalk and chalk- flints, fragments of Jurassic rocks with fossils and pieces of jet. The transport of local boulders shows that the ice must have moved from the south-east towards the north-west, which coincides with the direction indicated by the striae. The Jurassic blocks may have been derived from the strip of rocks of that age on the east coast of Sutherland. The shell fragments, many of which are striated, include arctic, boreal and southern forms, only a small number being characteristic of the littoral zone.

Climate and Agriculture'. — The climate is variable, and though the winter storms fall with great severity on the coast, yet owing to proximity to a vast expanse of sea the cold is not intense and snow seldom lies many days continuously. In winter and spring the northern shore is subject to frequent and disastrous gales from the N. and N.W. Only about two-fifths of the arable land is good. In spite of this and the cold, wet and windy climate, progressive landlords and tenants keep a considerable part of the acreage of large farms successfully tilled. In 1824 James Traill of Ratter, near Dunnet, recognizing that it was impossible to expect tenants to reclaim and improve the land on a system of short leases, advocated large holdings on long terms, so that farmers might enjoy a substantial return on their capital and labour. Thanks to this policy and the farmers' skill and enter- prise, the county has acquired a remarkable reputation for its produce; notably oats and barley, turnips, potatoes and beans. Sheep — chiefly Leicester and Cheviots — of which the wool is in especial request in consequence of its fine quality, cattle, horses and pigs are raised for southern markets.

Other Industries. — The great source of profit to the inhabitants is to be found in the fisheries of cod, ling, lobster and herring. The last is the most important, beginning about the end of July and lasting for six weeks, the centre of operations being at Wick. Besides those more immediately engaged in manning the boats, the fisheries give employment to a large number of coopers, curers, packers and helpers. The salmon fisheries on the coast and at the mouths of rivers are let at high prices. The Thurso is one of the best salmon streams in the north. The flagstone quarries, mostly situated in the Thurso, Olrig and Halkirk districts, are another important source of revenue. Of manu- factures there is little beyond tweeds, ropes, agricultural imple- ments and whisky, and the principal imports consist of coal,

wood, manure, flour and lime.

The only railway in the county is the Highland railway, which, from a point some four miles to the south-west of Aultnabreac station, crosses the shire in a rough semicircle, via Halkirk, to Wick, with a branch from Georgemas Junction to Thurso. There is also, however, frequent communication by steamer between

Wick and Thurso and the Orkneys and Shetlands, Aberdeen, Leith and other ports. : The deficiency of railway accommodation is partly made good by coach services between different places.

Population and Government. — The population of Caithness in 1 89 1 was 33,177, and in 1901, 33,870, of whom twenty-four persons spoke Gaelic only, and 2876 Gaelic and English. The chief towns are Wick (pop. in 1901, 791 1) and Thurso (3723). The county returns one member to parliament. Wick is the only royal burgh and one of the northern group of parliamentary burghs which includes Cromarty, Dingwall, Dornoch, Kirkwall and Tain. Caithness unites with Orkney and Shetland to form a sheriffdom, and there is a resident sheriff-substitute at Wick, who sits also at Thurso and Lybster. The county is under school- board jurisdiction, and there are academies at Wick and Thurso. The county council subsidizes elementary schools and cookery classes and provides apparatus for technical classes.

History. — The early history of Caithness may, to some extent, be traced in the character of its remains and its local nomen- clature. Picts' houses, still fairly numerous, Norwegian names and Danish mounds attest that these peoples displaced each other in turn, and the number and strength of the fortified keeps show that its annals include the usual feuds, assaults and re- prisals. Circles of standing stones, as at Stemster Loch and Bower, and the ruins of Roman Catholic chapels and places of pilgrimage in almost every district, illustrate the changes which have come over its ecclesiastical condition. The most important remains are those of Bucholie Castle, Girnigo Castle, and the tower of Keiss; and, on the S.E. coast, the castles of Clyth, Swiney, Forse, Laveron, Knockinnon, Berriedale, Achastle and Dunbeath, the last of which is romantically situated on a de- tached stack of sandstone rock. About six miles from Thurso stand the ruins of Braal Castle, the residence of the ancient bishops of Caithness. On the coast of the Pentland Firth, ij miles west of Dunscansbay Head, is the site of John o' Groat's house.

See S. Laing, Prehistoric Remains of Caithness (London and Edin-

burgh, 1866) ; James T. Calder, History of Caithness (2nd edition, Wick); John Home, In and About Wick (Wick); Thomas Sinclair, Caithness Events (Wick, 1899) ; History of the Clan Gunn (Wick, 1890); J. Henderson, Caithness Family History (Edinburgh, 1884); Harvie-Brown, Fauna of Caithness (Edinburgh, 1887) ; Principal Miller, Our Scandinavian Forefathers (Thurso, 1872) ; Smiles, Robert Dick, Botanist and Geologist (London, 1878) ; H. Morrison, Guide to -Sutherland and Caithness (Wick, 1883) ; A. Auld, Ministers and Men in the Far North (Edinburgh, 1891).

CAIUS or Gaius, pope from 283 to 296, was the son of Gaius, or of Concordius, a relative of the emperor Diocletian, and became pope on the 17th of December 283. His tomb, with the original epitaph, was discovered in the cemetery of Calixtus and in it the ring with which he used to seal his letters (see Arringhi, Roma subterr., 1. iv. c. xlviii. p. 426). He died in 296.

CAIUS [Anglice Kees, Keys, etc.], JOHN (1510-1573), English physician, and second founder of the present Gonville and Caius College, Cambridge, was born at Norwich on the 6th of October 1 5 10. He was admitted a student at what was then Gonville Hall, Cambridge, where he seems to have mainly studied divinity. After graduating in 1533, he visited Italy, where he studied under the celebrated Montanus and Vesalius at Padua; and in 1541 he took his degree in physic at Padua. In 1543 he visited several parts of Italy, Germany and France; and re- turned to England. He was a physician in London in 1547, and was admitted fellow of the College of Physicians, of which he was for many years president. In 1557, being then physician to Queen Mary, he enlarged the foundation of his old college, changed the name from " Gonville Hall " to " Gonville and Caius College," and endowed it with several considerable estates, adding an entire new court at the expense of £1834. Of this college he accepted the mastership (24th of January 1558/9) on the death of Dr Bacon, and held it till about a month before his death. He was physician to Edward VI., Queen Mary and Queen Elizabeth. He returned to Cambridge from London for a few days in June 1573, about a month before his death, and resigned the mastership to Dr Legge, a tutor at Jesus College. He died at his London House, in St Bartholomew's, on the 29th

of July, 1573, but his body was brought to Cambridge, and buried in

the chapel under the well-known monument which he had designed. Dr Caius was a learned, active and benevolent man. In 1557 he erected a monument in St Paul's to the memory of Linacre. In 1564 he obtained a grant for Gonville and Caius College to take the bodies of two malefactors annually for dis- section; he was thus an important pioneer in advancing the science of anatomy. He probably devised, and certainly pre- sented, the silver caduceus now in the possession of Caius College as part of its insignia; he first gave it to the College of Physicians, and afterwards presented the London College with another.

His works are: Annals of the College from 1555 to 1572; translation of several of Galen's works, printed at different times abroad. Hippocrates de Medicamenlis, first discovered and published by Dr Caius; also De Ratione Victus (Lov. 1556, 8vo). De Mendeti Methodo (Basel, 1554; London, 1556, 8vo). Account of the Sweating Sickness in England (London, 1556, 1721), (it is entitled De Ephemera Britannica). History of the University of Cambridge (London, 1568, 8vo; 1574, 4to, in Latin). De Thermis Britannicis; but it is doubtful whether this work was ever printed. Of some Rare Plants and Animals (London, 1570). De Canibus Britannicis (1570, 1729). De Pronunciation Graecae et Latinae Linguae (London, 1574) ; De Libris propriis (London, 1570). He also wrote numerous other works which were never printed.

For further details see the Biographical History of Caius College, an admirable piece of historical work, by Dr John Venn (1897).

CAJAMARCA, or Caxamarca, a city of northern Peru, capital of a department and province of the same name, 90 m. E. by N. of Pacasmayo, its port on the Pacific coast. Pop. (1906, estim- ate) of the department, 333,310; of the city, 9000. The city is situated in an elevated valley between the Central and Western Cordilleras, 9400 ft. above sea level, and on the Eriznejas, a small tributary of the Maranon. The streets are wide and cross at right angles; the houses are generally low and built of clay. Among the notable public buildings are the old parish church built at the expense of Charles II. of Spain, the church of San Antonio, a Franciscan monastery, a nunnery, and the remains of the palace of Atahualpa, the Inca ruler whom Pizarro treacher- ously captured and executed in this place in 1533. The hot sulphur springs of Pultamarca, called the Bafios del Inca (Inca's baths) are a short distance east of the city and are still fre- quented. Cajamarca is an important commercial and manufacturing town, being the distributing centre for a large inland region, and having long-established manufactures of woollen and

linen goods, and of metal work, leather, etc. It is the seat of one of the seven superior courts of the republic, and is connected with the coast by telegraph and telephone. A railway has been under- taken from Pacasmayo, on the coast, to Cajamarca, and by 1908 was completed as far as Yonan, 60 m. from its starting-point.

The department of Cajamarca lies between the Western and Central Cordilleras and extends from the frontier of Ecuador S. to about 7 S. iat., having the departments of Piura and Lamba- yeque on the W. and Amazonas on the E. Its area according to official returns is 12,542 sq. m. The upper Maranon traverses the department from S. to N. The department is an elevated region, well watered with a large number of small streams whose waters eventually find their way through the Amazon into the Atlantic. Many of its productions are of the temperate zone, and considerable attention is given to cattle-raising. Coal is found in the province of Hualgayoc at the southern extremity of the de- partment, which is also one of the rich silver-mining districts of Peru. Next to its capital the most important town of the department is Cajamarquilla, whose population was about 6000 in 1906.

CAJATAMBO, or Caxatambo, a town and province of the de-partment of Ancachs, Peru, on the western slope of the Andes. Since 1896 the population of the town has been estimated at 6000, but probably it does not exceed 4500. The town is 1 10 m. N. by E. of Lima, in lat. 9 53′ S.,long. 76 57′ W. The principal industries of the province are the raising of cattle and sheep, and the cultivation of cereals. Cochineal is a product of this region. Near the town there are silver mines, in which a part of its population is employed. IV. 31

CAJETAN (Gaetanus), Cardinal (1470-1534), was bora at Gaeta in the kingdom of Naples. His proper name was Tommaso 1 de Vio, but he adopted that of Cajetan from his birthplace. He entered the order of the Dominicans at the age of sixteen, and ten years later became doctor of theology at Padua, where he was subsequently professor of metaphysics. A public disputation at Ferrara (1494) with Pico della Mirandola gave him a great reputation as a theologian, and in 1508 he became general of his order. For his zeal in defending the papal pretensions against the council of Pisa, in a series of works which were condemned by the Sorbonne and publicly burnt by order of King Louis XII., he obtained the bishopric of Gaeta, and in 1 517 Pope Leo X. made him a cardinal and archbishop of Palermo. The year following he went as legate into Germany, to quiet the commotions raised by Luther. It was before him that the Reformer appeared at the diet of Augsburg; and it was he who, in 1519, helped in drawing

up the bull of excommunica- tion against Luther. Cajetan was employed in several other negotiations and transactions, being as able in business as in letters. In conjunction with Cardinal Giulio de' Medici in the conclave of 1521-1522, he secured the election of Adrian Dedel, bishop of Tortosa, as Adrian VI. Though as a theologian Cajetan was a scholastic of the older Thomist type, his general position was that of the moderate reformers of the school to which Reginald Pole, archbishop of Canterbury, also belonged; i.e. he desired to retain the best elements of the humanist revival in harmony with Catholic orthodoxy illumined by a revived appreciation of the Augustinian doctrine of justification. Nominated by Clement VII. a member of the committee of cardinals appointed to report on the " Nuremberg Recess," he recommended, in opposition to the majority, certain concessions to the Lutherans, notably the marriage of the clergy as in the Greek Church, and communion in both kinds according to the decision of the council of Basel. In this spirit he wrote com- mentaries upon portions of Aristotle, and upon the Summa of Aquinas, and towards the end of his life made a careful transla- tion of the Old and New Testaments, excepting Solomon's Song, the Prophets and the Revelation of St John. In contrast to the majority of Italian cardinals of his day, Cajetan was a man of austere piety and fervent zeal; and if, from the standpoint of the Dominican idea of the supreme necessity of maintaining ecclesi- astical discipline, he defended the extremist claims of the papacy, he also proclaimed that the pope should be " the mirror of God on earth." He died at Rome on the 9th of August 1534.

See " Aktenstiicke iiber das Verhalten der romischen Kurie zur Reformation, 1524-1531," in Quellen und Forschungen (Kon. Prenss. Hist. Inst., Rome), vol. iii. p. 1-20; T. M. Lindsay, History of the Reformation, vol. i. (Edinburgh, 1906).

CAJUPUT OIL, a volatile oil obtained by distillation from the leaves of the myrtaceous tree Melaleuca leucadendron, and probably other species. The trees yielding the oil are found throughout the Indian Archipelago, the Malay Peninsula and over the hotter parts of the Australian continent; but the greater portion of the oil is produced from Celebes Island. The name cajuput is derived from the native Kayupufi or white wood. The oil is prepared from leaves collected on a hot dry day, which are macerated in water, and distilled after fermenting for a night. This oil is extremely pungent to the taste, and has the odour of a mixture of turpentine and camphor. It consists mainly of cineol (see Terpenes) , from which cajuputene having a hyacinthine odour can be obtained by distillation with phosphorus pentoxide. The drug is a typical volatile oil, and is used internally in

doses of £ to 3 minims, for the same purposes as, say, clove oil. It is frequently employed externally as a counter- irritant.

CAKCHIQUEL, a tribe of Central American Indians of Mayan stock, inhabiting parts of Guatemala. Their name is said to be that of a native tree. At the conquest they were found to be in a much civilized condition.

See D. G. Brinton, Annals of the Cakchiquels.

1 He was christened Giacomo, but afterwards took the name of Tommaso in honour of Thomas Aquinas.

CALABAR (or Old Calabar), a seaport of West Africa in the British protectorate of Southern Nigeria, on the left bank of the Calabar river in 4 56′ N., 8° 18′ E., 5 m. above the point where the river falls into the Calabar estuary of the Gulf of Guinea. Pop. about 15,000. It is the capital of the eastern province of the protectorate, and is in regular steamship and telegraphic communication with Europe. From the beach, Where are the business houses and customs office, rise cliffs of moderate elevation, and on the sides or summits of the hills are the principal buildings, such as Government House, the European hospital and the church of the Presbyterian mission. The valley between the hills is occupied by the native quarter, called Duke Town. Here are several fine houses in bungalow style, the residences of the chiefs or wealthy natives. Along the river front runs a tramway connecting Duke Town with Queen Beach, which is higher up and provided with excellent quay accommodation. Among the public institutions are government botanical gardens, primary schools and a high school. Palms, mangos and other trees grow luxuriantly in the gardens and open spaces, and give the town a picturesque setting. The trade is very largely centred in the export of palm oil and palm kernels and the import of cotton goods and spirits, mostly gin. (See Nigeria for trade returns.)

Calabar was the name given by the Portuguese discoverers of the;. 15th century to the tribes on this part of the Guinea coast at the time of their arrival, when as yet the present inhabitants were unknown in the district. It was not till the early part of the 1 8th century that the Erik, owing to civil war with their kindred and the Ibibio, migrated from the neighbourhood of the Niger to the shores of the river

Calabar, and established themselves at Ikoritungko or Creek Town, a spot 4 m. higher up the river. To get a better share in the European trade at the mouth of the river a body of colonists migrated further down and built Obutong or Old Town, and shortly afterwards a rival colony established itself at Aqua Akpa or Duke Town, which thus formed the nucleus of the existing town. The native inhabitants are still mainly Efik. They are pure negroes. They have been for several generations the middle men between the white traders on the coast and the inland tribes of the Cross liver and Calabar district. Christian missions have been at work among the Efiks since the middle of the 19th century. Many of the natives are well educated, profess Christianity and dress in European fashion. A powerful bond of union among the Efik, and one that gives them considerable influence over other tribes, is the secret society known as the Egbo (q.v.). The chiefs of Duke Town and other places in the neighbourhood placed themselves in 1884 under British protection. From that date until 1906 Calabar was the headquarters of the European administration in the Niger delta. In 1906 the seat of govern- ment was removed to Lagos.

Until 1904 Calabar was generally, and officially, known as Old Calabar, to distinguish it from New Calabar, the name of a river and port about 100 m. to the east. Since the date mentioned the official style is Calabar simply. Calabar estuary is mainly formed by the Cross river (q.v.), but receives also the waters of the Calabar and other streams. The Rio del Rey creek at the eastern end of the estuary marks the boundary between (British) Nigeria and (German) Cameroon. The estuary is 10 to 12 m. broad at its mouth and maintains the same breadth for about 30 m.

CALABAR BEAN, the seed of a leguminous plant, Physostigma venmosum, a native of tropical Africa. It derives its scientific name from a curious beak-like appendage at the end of the stigma, in the centre of the flower; this appendage though solid was supposed to be hollow (hence the name from vcra, a bladder, and stigma). The plant has a climbing habit like the scarlet runner, and attains a height of about 50 ft. with a stem an inch or two in thickness. The seed pods, which contain two or three seeds or beans, are 6 or 7 in. in length; and the beans are about the size of an ordinary horse bean but much thicker, with a deep chocolate-brown colour. They constitute the E-ser-e or ordeal beans of the negroes of Old Calabar, being administered

to persons accused of witchcraft or other crimes. In cases where the poisonous material did its deadly work, it was held at once to

indicate and rightly to punish guilt; but when it was rejected by the stomach of the accused, innocence was held to be satisfactorily established. A form of duelling with the seeds is also known among the natives, in which the two opponents divide a bean, each eating one-half; that quantity has been known to kill both adversaries. Although thus highly poisonous, the bean has nothing in external aspect, taste or smell to distinguish it from any harmless leguminous seed, and very disastrous effects have resulted from its being incautiously left in the way of children. The beans were first introduced into England in the year 1840; but the plant was not accurately described till 1861, and its physiological effects were investigated in 1863 by Sir Thomas R. Fraser.

The bean usually contains a little more than 1 % of alkaloids. Of these two have been identified, one called calabarine, and the other, now a highly important drug, known as physostigmine — or occasionally as eserine. The British pharmacopoeia contains an alcoholic extract of the bean, intended for internal administra- tion; but the alkaloid is now always employed. This is used as the sulphate, which has the empirical formula of (Ci5H 2 iN 3 02)2, H2SO4, plus an unknown number of molecules of water. It occurs in small yellowish crystals, which are turned red by exposure to light or air. They are readily soluble in water or alcohol and possess a bitter taste. The dose is ˆVˆV grain, and should invariably be administered by hypodermic injection. For the use of the oculist, who constantly employs this drug, it is also prepared in lamellae for insertion within the conjunctival sac. Each of these contains one-thousandth part of a grain of physostigmine sulphate, a quantity which is per- fectly efficient.

Physostigmine has no action on the unbroken skin. When swallowed it rapidly causes a great increase in the salivary secretion, being one of the most powerful sialogogues known. It has been shown that the action is due to a direct influence on the secreting gland-cells themselves. After a few minutes the salivation is arrested owing to the constricting influence of the drug upon the blood-vessels that supply the glands. There is also felt a sense of constriction in the pharynx, due to the action of the drug on its muscular fibres. A similar stimulation of the non-striped muscle in the alimentary canal results in violent vomiting and purging, if a large dose has been taken. Physo- stigmine, indeed, stimulates nearly all the non-striped muscles in the body, and this action upon the muscular coats of the arteries, and especially of the arterioles, causes a great rise in blood-pressure shortly after its absorption, which is very rapid. The terminals of the vagus nerve are also stimulated, causing the heart to

beat more slowly. Later in its action, the drug depresses the intra-cardiac motor ganglia, causing prolongation of diastole and finally arrest of the heart in dilatation. A large lethal dose kills by this action, but the minimum lethal dose by its combined action on the respiration and the heart. The respiration is at first accelerated by a dose of physostigmine, but is afterwards slowed and ultimately arrested. The initial hastening is due to a stimulation of the vagus terminals in the lung, as it does not occur if these nerves are previously divided. The final arrest is due to paralysis of the respiratory centre in the medulla oblongata, hastened by a quasi-asthmatic contrac- tion of the non-striped muscular tissue in the bronchial tubes, and by a " water-logging " of the lungs due to an increase in the amount of bronchial secretion. It may here be stated that the non-striped muscular tissue of the bladder, the uterus and the spleen is also stimulated, as well as that of the iris (see below). It is only in very large doses that the voluntary muscles are poisoned, there being induced in them a tremor which may simulate ordinary convulsions. The action is a direct one upon the muscular tissue (cf. the case of the gland-cells), sinceit occurs in an animal whose motor nerves have been paralysed by curare.

Consciousness is entirely unaffected by physostigmine, there being apparently no action on any part of the brain above the medulla oblongata. But the influence of the alkaloid upon the

spinal cord is very marked and characteristic. The reflex functions of the cord are entirely abolished, and it has been experimentally shown that this is due to a direct influence upon the cells in the anterior cornua. It is precisely the reverse of the typical action of strychnine. Near the termination of a fatal case there is a paralysis of the sensory columns of the cord, so that general sensibility is lowered. The alkaloid calabarine is, on the other hand, a stimulant of the motor and reflex functions of the cord, so that only the pure alkaloid physostigmine and not any preparation of Calabar bean itself should be used when it is desired to obtain this action.

Besides the secretions already mentioned as being stimulated, the bile, the tears and the perspiration are increased by. the exhibition of this drug.

There remains only to consider its highly important action upon the

eye. Whether administered in the form of the official lamella or by subcutaneous injection, physostigmine causes a contraction of the pupil more marked than in the case of any other known drug. That this action is a direct and not a nervous one is shown by the fact that if the eye be suddenly shaded the pupil will dilate a little, showing that the nerves which cause dilatation are still competent after the administration of physo- stigmine. Besides the sphincter pupillae, the fibres of the ciliary muscle are stimulated. There is consequently spasm of accommodation, so that clear vision of distant objects becomes impossible. The intra-ocular tension is markedly lowered. This action, at first sight somewhat obscure, is due to the extreme pupillary contraction which removes the mass of the iris from pressing upon the spaces of Fontana, through which the intra- ocular fluids normally make a very slow escape from the eye into its efferent lymphatics.

There is a marked antagonism in nearly all important par- ticulars between the actions of physostigmine and of atropine. The details of this antagonism, as well as nearly all our knowledge of this valuable drug, we owe to Sir Thomas Fraser, who intro- duced it into therapeutics.

The clinical uses of physostigmine are based upon the facts of its pharmacology, as above detailed. It has been recommended in cases of chronic constipation, and of want of tone in the muscular wall of the urinary bladder. It has undoubtedly been of value in many cases of tetanus, in which it must be given in maximal doses. (The tetanus antitoxin should invariably be employed as well.) Sir Thomas Fraser differs from nearly all other authorities in regarding the drug as useless in cases of strychnine poisoning, and the question must be left open. There is some doubtful evidence of the value of the alkaloid in chorea. The oculist uses it for at least six purposes. Its stimulant action on the iris and ciliary muscle is employed when they are weak or paralysed. It is used in all cases where one needs to reduce the intra-ocular tension, and for this and other reasons in glaucoma. It is naturally the most efficient agent in relieving the discomfort or intolerable pain of photophobia; and it is the best means of breaking down adhesions of the iris, and of preventing prolapse of the iris after injuries to the cornea. In fact it is hardly possible to over-estimate its value in ophthal- mology. The drug has been highly and widely recommended in general paralysis, but there remains grave doubt as to its utility in this disease.

Toxicology. — The symptoms of Calabar bean poisoning have all been stated above. The obvious antidote is atropine, which may often

succeed; and the other measures are those usually employed to stimulate the circulation and respiration. Un- fortunately the antagonism between physostigmine and atropine is not perfect, and Sir Thomas Fraser has shown that in such cases there comes a time when, if the action of the two drugs be summated, death results sooner than from either alone. Thus atropine will save life after three and a half times the fatal dose of physostigmine has been taken, but will hasten the end if four or more times the fatal dose has been ingested. Thus it would be advisable to use the physiological antidote only when the dose of the poison — assuming estimation to be possible — was known to be comparatively small.

CALABASH (from the Span, calabaza, a gourd or pumpkin, possibly derived from the Pers. kharlunza, a melon), the shell of a gourd or pumpkin made into a vessel for holding liquids ; also a vessel of similar shape made of other materials. It is the name of a tree (Crescentia Cnjete) of tropical America, whose gourd-like fruit is so hard that vessels made of it can be used over a fire many times before being burned.

CALABASH TREE, a native of the West Indies and South America, known botanically as Crescenlia Cujete (natural order, Bignoniaceae). The fruit resembles a gourd, and has a woody rind, which after removal of the pulp forms a calabash.

CALABOZO, or Calaboso, an inland town of Venezuela, once capital of the province of Caracas in the colonial period, and now capital of the state of Guarico. Pop. (1801) 5618. Calabozo is situated in the midst of an extensive llano on the left bank of the Guarico river, 325 ft. above sea-level and 123 m. S.S.W. of Caracas. The plain lies slightly above the level of intersecting rivers and is frequently flooded in the rainy season; in summer the heat is most oppressive, the average temperature being 88° F. The town is regularly laid out with streets crossing at right angles, and possesses several fine old churches, a college and public school. It is also a bishop's see, and a place of considerable commercial importance because of its situation in the midst of a rich cattle-raising country. It is said to have been an Indian town originally, and was made one of the trading stations of the Compania Guipuzcoana in 1730. However, like most Venezuelan towns, Calabozo made little growth during the 19th century. In 1820 the Spanish forces under Morales were defeated here by the revolutionists under Bolivar and Paez.

CALABRESELLA (sometimes spelt Calabrasella) , an Italian card-game (" the little Calabrian game ") for three players. All the tens,

nines and eights are removed from an ordinary pack; the order of the cards is three, two, ace, king, queen, &c. In scoring the ace counts 3 ; the three 2 ; king, queen and knave 1 each. The last trick counts 3. Each separate hand is a whole game. One player plays against the other two, paying to each or receiving from each the difference between the number of points that he and they hold. Each player receives twelve cards, dealt two at a time. The remainder form the stock, which is left face downwards. There are no trumps. The player on the dealer's left declares first: he can either play or pass. The dealer has the last option. If one person announces that he plays, the others combine against him. If all decline to play, the deal passes, the hands being abandoned. The single player may demand any " three " he chooses, giving a card in exchange. If the three demanded is in the stock, no other card may be asked for. If a player hold all the threes, he may demand a two. The single player must take one card from the stock, in exchange for one of his own (which is never exposed) and may take more. He puts out the cards he wishes to exchange face downwards, and selects what he wishes from the stock, which is now exposed; the rejected cards and cards left in the stock form the " discard." The player on the dealer's left then leads. The highest card wins the trick, there being no trumps. Players must follow suit, if they can. The single player and the allies collect all the tricks they win respectively. The winner of the last trick, besides scoring three, adds the discard to his heap. The heaps are then searched for the scoring cards, the scores are compared and the stakes paid. It is important to remember that the value and the order of the cards are not the same, thus the ace, whose value is 3, is only third as a trick-winner; also that it is highly important to win the last trick. Thirty-five is the full score.

CALABRIA, a territorial district of both ancient and modern Italy.

(1) The ancient district consisted of the peninsula at its south- east extremity, between the Adriatic Sea and the Gulf of Tarentum, ending in the Iapygian promontory (Lat. Promunturium Sal- lentinum; the village upon it was called Leuca — Gr. Atvua, white, from its colour — and is still named S. Maria di Leuca) and corresponding in the main with the modern province of Lecce, Brundisium and Tarentum being its most north-westerly cities, though the boundary of the latter extends somewhat farther

west. It is a low terrace of limestone, the highest parts of which seldom reach 1500 ft.; the cliffs, though not high, are steep, and it has no rivers of any importance, but despite lack of water it was (and is) remarkably fertile. Strabo mentions its pastures and trees, and its olives, vines and fruit trees (which are still the principal source of prosperity) are frequently spoken of by the ancients. The wool of Tarentum and Brundisium was also famous, and at the former place were considerable dye-works. These two towns acquired importance in very early times owing to die excellence of their harbours. Traces of a prehistoric population of the stone and early bronze age are to be found all over Calabria. Especially noticeable are the menhirs (pietre fitte) and the round tower-like specchie or truddhi, which are found near Lecce, Gallipolli and Muro Leccese (and only here in Italy); they correspond to similar monuments, the perdas fittas and the nuraghi, of Sardinia, and the inter-relation between the two populations which produced them requires care- ful study. In 272-266 B.C. we find six triumphs recorded in the Roman fasti over the Tarentini, Sallentini and Messapii, while the name Calabria does not occur; but after the foundation of a colony at Brundisium in 246-245 B.C., and the final subjection of Tarentum in 209 B.C., Calabria became the general name for the peninsula. The population declined to some extent; Strabo (vi. 281) tells us that in earlier days Calabria had been extremely populous and had had thirteen cities, but that in his time all except Tarentum and Brundisium, which retained their com- mercial importance, had dwindled down to villages. The Via Appia, prolonged to Brundisium perhaps as early as 190 B.C., passed through Tarentum; the shorter route by Canusium, Barium and Gnathia was only made into a main artery of com- munication by Trajan (see Appia, Via). The only other roads were the two coast roads, the one from Brundisium by Lupiae, the other from Tarentum by Manduria, Neretum, Aletium (with a branch to Callipolis) and Veretum (hence a branch to Leuca), which met at Hydruntum. Augustus joined Calabria to Apulia and the territory of the Hirpini to form the second region of Italy. From the end of the second century we find Calabria for juridical purposes associated either with Apulia or with Lucania and the district of the Bruttii, while Diocletian placed it under one corrector with Apulia. The loss of the name Calabria came with the Lombard conquest of this district, when it was trans- ferred to the land of the Bruttii, which the Byzantine empire still held.

(2) The modern Calabria consists of the south extremity of Italy (the " toe of the boot " in the popular simile, while the ancient Calabria, with which the present province of Lecce more or less Coincides, is

the " heel "), bounded on the N. by the province of Potenza (Basilicata) and on the other three sides by the sea. Area 5819 sq. m. The north boundary is rather farther north than that of the ancient district of the Bruttii (q.v.). Calabria acquired its present name in the time of the Byzantine supremacy, after the ancient Calabria had fallen into the hands of the Lombards and been lost to the Eastern empire about a.d. 668. The name is first found in the modern sense in Paulus Diaconus's Historia Lango- bardorum (end of the 8th century). It is mainly mountainous; at the northern extremity of the district the mountains still belong to the Apennines proper (the highest point, the Monte Pollino, 7325 ft., is on the boundary between Basilicata and Calabria) , but after the plain of Sibari, traversed by the Crati (anc. Crathis, a river 58 m. long, the only considerable one in Calabria), the granite mountains of Calabria proper (though still called Apennines in ordinary usage) begin. They consist of two groups. The first extends as far as the isthmus, about 22 m. wide, formed by the gulfs of S. Eufemia and Squillace; its highest point is the Botte Donato (6330 ft.). It is in modern times generally called the Sila, in contradistinction to the second (southern) group, the Aspromonte (6420 ft.) ; the ancients on the other hand applied the name Sila to the southern group. The rivers in both parts of the chain are short and unimportant. The mountain districts are in parts covered with forest (though less so than in ancient times) , still largely government property, while in much of the rest there is good pasture. The scenery is fine, though the country is hardly

at all visited by travellers. The coast strip is very fertile, and though some parts are almost deserted owing to malaria, othera produce wine, olive-oil and fruit (oranges and lemons, figs, &c.) in abundance, the neighbourhood of Reggio being especially fertile. The neighbourhood of Cosenza is also highly cultivated; and at the latter place a school of agriculture has been founded, though the methods used in many parts of Calabria are still primitive. Wheat, rice, cotton, liquorice, saffron and tobacco are also cultivated. The coast fisheries are important, especially in and near the straits of Messina. Commercial organization is, however, wanting. The climate is very hot in summer, while snow lies on the mountain-tops for at least half the year. Earthquakes are frequent and have done great damage : that of the autumn of 1905 was very disastrous (0. Malagodi, Calabria Desolata, Rome, 1905), but it was surpassed in its effects by the terrible earth- quake of 1908, by which Messina (q.v.) was destroyed, and in Calabria itself Reggio and numerous smaller places ruined. The railway communications are sufficient for the coast

districts; there are lines along both the east and west coasts (the latter forms part of the through route by land from Italy to Sicily, ferry-boats traversing the Strait of Messina with the through trains on board) which meet at Reggio di Calabria. They are connected by a branch from Marina di Catanzaro passing through Catanzaro to S. Eufemia; and there is also a line from Sibari up the valley of the Crati to Cosenza and Pietrafitta. The interior is otherwise untouched by railways; indeed many of the villages in the interior can only be approached by paths ; and this is one of the causes of the economic difficulties of Calabria. Another is the unequal distribution of wealth, there being practically no middle class; a third is the injudicious disforestation which has been carried on without regard to the future. The natural check upon torrents is thus removed, and they sometimes do great damage. The Calabrian costumes are still much worn in the remoter districts: they vary considerably in the different villages. There is, and has been, considerable emigration to America, but many of the emigrants return, forming a slightly higher class, and producing a rise in the rate of payment to cultivators, which has increased the difficulties of the small proprietors. The smallness and large number of the communes, and the consequently large number of the professional classes and officials, are other difficulties, which, noticeable throughout Italy, are especially felt in Calabria. The population of Calabria was 1,439,329 in 1901 . The chief towns of the province of Catanzaro were in 1901:— Catanzaro (32,005), Nicastro (18,150), Monteleone (13,481), Cotrone (9545), total of province (1871) 412,226; (1901) 498,791; number of communes, 152; of the province of Cosenza, Cosenza (20,857), Corigliano Calabro (15,379), Rossano (13,354), S. Giovanni in Fiore (13,288), Castrovillari (9945), total of province (1871) 440,468; (1901) 503,329, number of communes, 151; of the province of Reggio, Reggio di Calabria (44,569), Palmi (13,346), Cittanova (11,782), GioiosaIonica(n,2oo),BagnaraCalabra (11,136), Siderno Marina (10,775), Gerace (10,572), Polistena (10,112); number of com- munes 106; total of province (1871) 353,608; (1901) 437,209. A feature of modern Calabria is the existence of several Albanian colonies, founded in the 15th century by Albanians expelled by the Turks, who still speak their own language, wear their national costume, and worship according to the Greek rite. Similar colonies exist in Sicily, notably at Piana dei Greci near Palermo. (T. As.)

CALAFAT, a town of Rumania in the department of Doljiu; on the river Danube, opposite the Bulgarian fortress of Vidin. Pop. (1900) 7113. Calafat is an important centre of the grain trade, and is

connected by a branch line with the principal Walachian railways, and by a steam ferry with Vidin. It was founded in the 14th century by Genoese colonists, who employed large numbers of workmen (Calfats) in repairing ships — which industry gave its name to the place. In 1854 a Russian force was defeated at Calafat by the Turks under Ahmed Pasha, who surprised the enemy's camp.

CALAH (so in the Bible; Kalah in the Assyrian inscriptions), an ancient city situated in the angle formed by the Tigris and

the upper Zab, 19 m: S. of Nineveh, and one of the capitals of Assyria. According to' the inscriptions, it was built by Shal- maneser I. about 1300 B.C., as a residence city in place of the older Assur. After that it seems to have fallen into decay or been destroyed, but was restored by Assur-nasir-pal, about 880 B.C., and from that time to the overthrow of the Assyrian power it remained a residence city of the Assyrian kings. It shared the fate of Nineveh, was captured and destroyed by the Medes and Babylonians toward the close of the 7th century, and from that time has remained a ruin. The site was discovered by Sir A. H. Layard, in 1845, m the tel of Nimrud. Hebrew tradition (in the J narrative, Genesis x. n, 12) mentions Calah as built by Nimrod. Modern Arabic tradition likewise ascribes the ruins, like those of Birs Nimrud, near Babylon, to Nimrod, because they are the most prominent ruins of that region. Similarly the ancient dike in the river Tigris at this point is ascribed to Nimrod. The ruin mounds of Nimrud consist of an oblong enclosure, formed by the walls of the ancient city, of which fifty-eight towers have been traced on the N. and about fifty on the E. In the S.W. corner of this oblong is an elevated platform in the form of a rectangular parallelogram, some 600 yds. from N. to S. and 400 yds. from E. to W., raised on an average about 40 ft. above the plain, with a lofty cone 140 ft. high in the N.W. corner. This is the remains of the raised plat- form of unbaked brick, faced with baked bricks and stone, on which stood the principal palaces and temples of the city, the cone at the N.W. representing the ziggurat, or stage-tower, of the principal temple. Originally on the banks of the Tigris, this platform now stands some distance E. of the river. Here Layard conducted excavations from 1845 to 1847, and again from 1849 to 1 851. The means at his disposal were inadequate, his ex- cavations were incomplete and also unscientific in that his prime object was the discovery of inscriptions and museum objects; but he was

wonderfully successful in achieving the results at which he aimed, and the numerous statues, monuments, inscribed stones, bronze objects and the like found by him in the ruins of Calah are among the most precious possessions of the British Museum. Excavations were also conducted by Hormuzd Rassan in 1852-1854, and again in 1878, and by George Smith in 1873. But while supplementing in some important respects Layard's excavations, this later work added relatively little to his dis- coveries whether of objects or of facts. The principal buildings discovered at Calah are : — (a) the North-West palace, south of the ziggurat, one of the most complete and perfect Assyrian buildings known, about 350 ft. square, consisting of a central court, 129 ft. by 90 ft., surrounded by a number of halls and chambers. This palace was originally constructed by Assur-nasir-pal I. (885-860 B.C.), and restored and reoccupied by Sargon (722-705 B.C.). In it were found the winged lions, now in the British Museum,, the fine series of sculptured bas-reliefs glorifying the deeds of Assur-nasir-pal in war and peace, and the large collection of bronze vessels and implements, numbering over 200 pieces;

(b) the Central palace, in the interior of the mound, toward its southern end, erected by Shalmaneser II. (860-825 B.C.) and rebuilt by Tiglath-pileser III. (745-727 B.C.). Here were found the famous black obelisk of Shalmaneser, now in the British Museum, in the inscription on which the tribute of Jehu, son of Omri, is mentioned, the great winged bulls, and also a fine series of slabs representing the battles and sieges of Tiglath-pileser;

(c) the South-West palace, in the S.W. corner of the platform, an uncompleted building of Esarhaddon (681-668 B.C.), who robbed the North-West and Central palaces, effacing the inscriptions of Tiglath-pileser, to obtain material for his construction; (d) the smaller West palace, between the South-West and the North- West palaces, a construction of Hadad-nirari or Adadnirari III. (812-783 b.c); (e) the South-East palace, built by Assur-etil- ilani, after 626 b.c, for bis harem, in the S.E. corner of the platform, above the remains of an older similar palace of Shal- maneser; (/) two small temples of Assur-nasir-pal, in connexion with the ziggurat in the N.W. corner; and (g) a temple called E-Zida, and dedicated to Nebo, near the South-East palace. From the number of colossal figures of Nebo discovered here it

would appear that the cult of Nebo was a favourite one, at least during the later period. The other buildings on the E. side of the platform had been ruined by the post- Assyrian use of the mound for a cemetery, and for tunnels for the storage and concealment of

grain. While the ruins of Calah were remarkably rich in monumental material, enamelled bricks, bronze and ivory objects and the like, they yielded few of the inscribed clay tablets found in such great numbers at Nineveh and various Babylonian sites. Not a few of the astrological and omen tablets in the Kuyunjik collection of the British Museum, however, although found at Nineveh, were executed, according to their own testi- mony, at Calah for the rab-dup-sarrS or principal librarian during the reigns of Sargon and Sennacherib (716-684 B.C.). From this it would appear that there was at that time at Calah a library or a collection of archives which was later removed to Nineveh. In the prestige of antiquity and religious renown, Calah Was inferior to the older capital, Assur, while in population and general importance it was much inferior to the neighbouring Nineveh. There is no proper ground for regarding it, as some Biblical scholars of a former generation did, through a false interpretation of the book of Jonah, as a part or suburb of Nineveh.

See A. H. Layard, Nineveh and its Remains (London, 1849); George Smith, Assyrian Discoveries (London, 1883); Hormuzd Rassam, Ashur and the Land of Nimrod (London and New York, 1897). . (J. P. Pe.)

CALAHORRA (anc. Calagurris), a city of northern Spain, in the province of Logrofio; on the left bank of the river Cidacos, ; which enters the Ebro 3 m. E., and on the Bilbao-Saragossa railway. Pop. (1900) 9475. Calahorra is built on the slope of a hill overlooking the wide Ebro valley, which supplies its markets with an abundance of grain, wine, oil and flax. Its cathedral, which probably dates from the foundation of the see of Calahorra in the 5th century, was restored in 1485, and subsequently so much altered that little of the original Gothic structure survives. The Casa Santa, annually visited by many thousands of pilgrims on the 31st of August, is said to contain the bodies of the martyrs Emeterius and Celedonius, who were beheaded in the 3rd or 4th century, on the site now occupied by the cathedral. Their heads, according to local legend, were cast into the Ebro, and, after floating out to sea and rounding the Iberian peninsula, are now preserved at SantandeT.

The chief remains of the Roman Calagurris are the vestiges of an aqueduct and an amphitheatre. Calagurris became famous in 76 B.C., when it was successfully defended against Pompey by the adherents of Sertorius. Four years later it was captured by Pompey's legate, Afranius, after starvation had reduced the garrison to cannibalism. Under Augustus (31 b.c-a.d. 14) Calagurris received the privileges of Roman citizenship, and at a later date it was given

the additional name of Nassica to dis- tinguish it from the neighbouring town of Calagurris Fibula- rensis, the exact site of which is uncertain. The rhetorician Quintilian was born at Calagurris Nassica about a.d. 35.

CALAIS, a seaport and manufacturing town of northern France, in the department of Pas-de-Calais, 18 m. E.S.E. of Dover, and 185 m. N. of Paris by the Northern railway. Pop. (1906) 59,623. Calais, formerly a celebrated fortress, is de- fended by four forts, not of modern construction, by a citadel built in 1 560, which overlooks it on the west, and by batteries. The old town stands on an island hemmed in by the canal and the harbour basins, which divide it from the much more ex- tensive manufacturing quarter of St Pierre, enveloping it on the east and south. The demolition of the ramparts of Old Calais was followed by the construction of a new circle of defences, embracing both the old and new quarters, and strengthened by a deep moat. In the centre of the old town is the Place d'Armes, in which stands the former hotel-de-ville (rebuilt in 1740, re- stored in 1867), with busts of Eustache de St Pierre, Francis, duke of Guise, and Cardinal Richelieu. The belfry belongs to the 16th and early 17th century. Close by is the Tour du Guet, or watch-tower, used as a lighthouse until 1848. The church of Notre-Dame, built during the English occupancy of Calais, has- a

fine high altar of the 17th century; its lofty tower serves as a landmark for sailors. A gateway flanked by turrets (14th century) is a relic of the H6tel de Guise, built as a gild hall for the English woolstaplers, and given to the duke of Guise as a reward for the recapture of Calais. The modern town-hall and a church of the 19th century are the chief buildings of the quarter of St Pierre. Calais has a board of trade-arbitrators, a tribunal and a chamber of commerce, a commercial and industrial school, and a communal college.

The harbour is entered from the roads by way of a channel leading to the outer harbour which communicates with a floating basin 22 acres in extent, on the east, and with the older and less commodious portion of the harbour to the north and west of the old town. The harbour is connected by canals with the river Aa and the navigable waterways of the department.

Calais is the principal port for the continental passenger traffic with

England carried on by the South-Eastern & Chatham and the Northern of France railways. The average number of passengers between Dover and Calais for the years 1902-1906 inclusive was 315,012. Trade is chiefly with the United Kingdom. The principal exports are wines, especially champagne, spirits, hay, straw, wool, potatoes, woven goods, fruit, glass-ware, lace and metal-ware. Imports include cotton and silk goods, coal, iron and steel, petroleum, timber, raw wool, cotton yarn and cork. During the five years 1901-1905 the average annual value of exports was £8,388,000 (£6,363,000 in the years 1896-1900), of imports £4,145,000 (£3,759,000 in 1896- 1900). In 1905, exclusive of passenger and mail boats, there entered the port 848 vessels of 312,477 tons and cleared 857 of 305,284 tons, these being engaged in the general carrying trade of the port. The main industry of Calais is the manufacture of tulle and lace, for which it is the chief centre in France. Brewing, saw-milling, boat-building, and the manufacture of biscuits, soap and submarine cables are also carried on. Deep-sea and coast fishing for cod, herring and mackerel employ over 1000 of the inhabitants.

Calais was a petty fishing-village, with a natural harbour at the mouth of a stream, till the end of the 10th century. It was first improved by Baldwin IV., count of Flanders, in 997, and afterwards, in 1224, was regularly fortified by Philip Hurepel, count of Boulogne. It was besieged in 1346, after the battle of Crecy, by Edward III. and held out resolutely by the bravery of Jean de Vienne, its governor, till after nearly a year's siege famine forced it to surrender. Its inhabitants were saved from massacre by the devotion of Eustache de St Pierre and six of the chief citizens, who were themselves spared at the prayer of Queen Philippa. The city remained in the hands of the English till 1 5 58 , when it was taken by Francis, duke of Guise, at the head of 30,000 men from the ill-provided English garrison, only 800 strong, after a siege of seven days. From this time the Calaisis or territory of Calais was known as the Pays Reconquis. It was held by the Spaniards from 1595 to 1598, but was restored to France by the treaty of Vervins.

CALAIS, a city and sub-port of entry of Washington county, Maine, U.S.A., on the Saint Croix river, 12 m. from its mouth, opposite Saint Stephens, New Brunswick, with which it is connected by bridges. Pop. (1890) 7290; (jqoo) 7655 (1908 being foreign-born) ; (1910) 61 16. It is served bv the Washington County railway (102-5 m – to Washington Junction, where it connects with the Maine Central railway), and by steamboat lines to Boston, Portland and Saint Johns. In the city limits are the post-offices of Calais, Milltown

and Red Beach. The city has a small public library. The valley here is wide and deep, the banks of the river bold and picturesque, and the tide rises and falls about 25 ft. The city has important interests in lumber, besides foundries, machine shops, granite works — there are several granite (notably red granite) quarries in the vicinity — a tannery, and manufactories of shoes and calcined plaster. Big Island, now in the city of Calais, was visited in the winter of 1604-1605 by Pierre du Guast, sieur de Monts. Calais was first settled in 1779, was incorporated as a town in 1809, and was chartered as a city in 1851.

CALAiS and ZETES (the Boreadae), in Greek mythology, the winged twin sons of Boreas and Oreithyia. On their arrival with the Argonauts at Salmydessus in Thrace, they liberated their sister Cleopatra, who had been thrown into prison with her two sons by her husband Phineus, the king of the country (Sophocles, Antigone, 966; Diod. Sic. iv. 44). According to another story, they delivered Phineus from the Harpies (q.v.), in pursuit of whom they perished (Apollodorus i. 9; iii. 15). Others say that they were slain by Heracles near the island of Tenos, in consequence of a quarrel with Tiphys, the pilot of the Argonauts, or because they refused to wait during the search for Hylas, the favourite of Heracles (Hyginus, Fab., 14. 273; schol. on Apollonius Rhodius i. 1304). They were changed by the gods into winds, and the pillars over their tombs in Tenos were said to wave whenever the wind blew from the north. Like the Harpies, Calais and Zetes are obvious personifications of winds. Legend attributed the foundation of Cales in Campania to Calais (Silius Italicus viii. 512).

CALAMINE, a mineral species consisting of zinc carbonate, ZnCOs, and forming an important ore of zinc. It is rhombohedraj in crystallization and isomorphous with calcite and chalybite. Distinct crystals are somewhat rare; they have the form of the primitive rhombohedron {rr' — ,]2° 20'), the faces of which are generally curved and rough. Botryoidal and stalactitic masses are more common, or again the mineral may be compact and granular or loose and earthy. As in the other rhombohedral carbonates, the crystals possess perfect cleavages parallel to the faces of the rhombohedron. The hardness is 5 ; specific gravity, 4-4. The colour of the pure mineral is white; more often it is brownish, sometimes green or blue: a bright-yellow variety containing cadmium has been found in Arkansas, and is known locally as " turkey-fat ore." The pure material contains 52% of zinc, but this is often partly replaced isomorphously by small amounts of iron and manganese, traces of calcium and magnesium, and sometimes by copper or cadmium.

Calamine is found in beds and veins in limestone rocks, and is often associated with galena and blende. It is a product of alteration of blende, having been formed from this by the action of carbonated waters; or in many cases the zinc sulphide may have been first oxidized to sulphate, which in solution acted on the surrounding limestone, producing zinc carbonate. The latter mode of origin is suggested by the frequent occurrence of calamine pseudomorphous after calcite, that is, having the form of calcite crystals. Deposits of calamine have been extensively mined in the limestones of the Mendip Hills, in Derbyshire, and at Alston Moor in Cumberland. It also occurs in large amount in the province of Santander in Spain, in Missouri, and at several other places where zinc ores are mined. The best crystals of the mineral were found many years ago at Chessy near Lyons; these are rhombohedra of a fine apple-green colour. A translucent botryoidal calamine banded with blue and green is found at Laurion in Greece, and has sometimes been cut and polished for small ornaments such as brooches.

The name calamine (German, Galmei), from lapis calaminaris, a Latin corruption of cadmia (xaS/jta), the old name for zinc ores in general (G. Agricola in 1546 derived it from the Latin calamus, a reed), was early used indiscriminately for the carbonate and the hydrous silicate of zinc, and even now both species are included by miners under the same term. The two minerals often closely resemble each other in appearance, and can usually only be distinguished by chemical analysis; they were first so distinguished by James Smithson in 1803. F. S. Beudant in 1832 restricted the name calamine to the hydrous silicate and proposed the name " smithsonite " for the carbonate, and these meanings of the terms are now adopted by Dana and many other mineralogists. Unfortunately, however, in England (following Brooke and Miller, 1852) these designations have been reversed, calamine being used for the carbonate and smithsonite for the silicate. This unfortunate confusion is somewhat lessened by the use of the terms zinc-spar and hemimorphite {q.v.) for the carbonate and silicate respectively. (L. J. S.)

CALAMIS, an Athenian sculptor of the first half of the 5th century B.C. He made statues of Apollo the averter of ill, Hermes the ram-bearer, Aphrodite and other deities, as well as part of a chariot group for Hiero, king of Syracuse. His works are praised by ancient

critics for delicacy and grace, as opposed to breadth and force. Archaeologists are disposed to regard the bronze charioteer recently found at Delphi as a work of Calamis; but the evidence is not conclusive (see Greek Art).

CALAMY, EDMUND, known as "the elder" (1600-1666), English Presbyterian divine, was bom of Huguenot descent in Walbrook, London, in February 1600, and educated at Pembroke Hall, Cambridge, where his opposition to the Arminian party, then powerful in that society, excluded him from a fellowship. Nicholas Felton, bishop of Ely, however, made him his chaplain, and gave him the living of St Mary, Swaffham Prior, which he held till 1626. He then removed to Bury St Edmunds, where he acted as lecturer for ten years, retiring when his bishop (Wren) insisted on the observance of certain ceremonial articles. In 1636 he was appointed rector (or perhaps only lecturer) of Rochford in Essex, which was so unhealthy that he had soon to leave it, and in 1639 he was elected to the perpetual curacy of St Mary Aldermanbury in London, where he had a large following. Upon the opening of the Long Parliament he distinguished himself in defence of the Presbyterian cause, and had a principal share in writing the conciliatory work known as Smectymnuus, against Bishop Joseph Hall's presentation of episcopacy. The initials of the names of the several contributors formed the name under which it was published, viz., S. Marshal, E. Calamy, T. Young, M. Newcomen and W. Spurstow. Calamy was an active member in the Westminster assembly of divines, and, refusing to advance to Congregationalism, found in Presby- terianism the middle course which best suited his views of theology and church government. He opposed the execution of Charles I., lived quietly under the Commonwealth, and was assiduous in promoting the king's return; for this he was after- wards offered the bishopric of Coventry and Lichfield, but declined it, it is said, on his wife's persuasion. He was made one of Charles's chaplains, and vainly tried to secure the legal ratification of Charles's declaration of the 25th of October 1660. He was ejected for Nonconformity in 1662, and was so affected by the sight of the devastation caused by the great fire of London that he died shortly afterwards, on the 29th of October 1666. He was buried in the ruins of his church, near the place where the pulpit had stood. His publications are almost entirely sermons. His eldest son (Edmund), known as " the younger," was educated at Cambridge, and was ejected from the rectory of Moreton, Essex, in 1662. He was of a retiring disposition and moderate views, and died in 168.5.

CALAMY, EDMUND (1671-1732), English Nonconformist divine,

the only son of Edmund Calamy " the younger," was born in London, in the parish of St Mary Aldermanbury, on the 5th of April 1671. He was sent to various schools, including Merchant Taylors', and in 1688 proceeded to the university of Utrecht. While there, he declined an offer of a professor's chair in the university of Edinburgh made to him by the principal, William Carstares, who had gone over on purpose to find suitable men for such posts. After his return to England in 169 1 he began to study divinity, and on Baxter's advice went to Oxford, where he was much influenced by Chillingworth. He declined invita- tions from Andover and Bristol, and accepted one as assistant to Matthew Sylvester at Blackfriars (1692). In June 1694 he was publicly ordained at Annesley's meeting-house in Little St Helen's, and soon afterwards was invited to become assistant to Daniel Williams in Hand Alley, Bishopsgate. In 1702 he was chosen one of the lecturers in Salters' Hall, and in 1703 he succeeded Vincent Alsop as pastor of a large congregation in Westminster. In 1709 Calamy made a tour through Scotland, and had the degree of doctor of divinity conferred on him by the universities of Edinburgh, Aberdeen and Glasgow. Calamy's forty-one publications are mainly sermons, but his fame rests on his nonconformist biographies. His first essay was a table of contents to Baxter's Narrative of his life and times, which was

sent to the press in 1696; he made some remarks on the work itself and added to it an index, and, reflecting on the usefulness of the book, he saw the expediency of continuing it, as Baxter's history came no further than the year 1684. Accordingly, he composed an abridgment of it, with an account of many other ministers who were ejected after the restoration of Charles II. ; their apology, containing the grounds of their nonconformity and practice as to stated and occasional communion with the Church of England; and a continuation of their history until the year 1691. This work was published in 1702. The most im- portant chapter (ix.) is that which gives a detailed account of the ministers ejected in 1662; it was afterwards published as a distinct volume. He afterwards published a moderate defence of Nonconformity, in three tracts, in answer to some tracts of Benjamin, afterwards Bishop, Hoadly. In 1713 he published a second edition (2 vols.) of his Abridgment of. Baxter's History, in which, among various additions, there is a continuation of the history through the reigns of William and Anne, down to the passing of the Occasional Bill. At the end is subjoined the reformed liturgy, which was drawn up and presented to the bishops in 1 66 1 . In 1 7 1 8 he wrote a vindication of his grandfather and several other persons against certain reflections cast upon them by Laurence

Echard in his History of England. In 1 7 1 9 he published The Church and the Dissenters Compar'd as to Persecu- tion, and in 1728 appeared his Continuation of the Account of the ejected ministers and teachers, a volume which is really a series of emendations of the previously published account. He died on the 3rd of June 1732, having been married twice and leaving six of his thirteen children to survive him. Calamy was a kindly man, frankly self-conscious, but very free from jealousy. He was an able diplomatist and generally secured his ends. His great hero was Baxter, of whom he wrote three distinct memoirs. His eldest son Edmund (the fourth) was a Presbyterian minister in London and died 1755; another son (Edmund, the fifth) was a barrister who died in 1816; and this one's son (Edmund, the sixth) died in 1850, his younger brother Michael, the last of the direct Calamy line, surviving till 1876.

CALARASHI (C&la'rasi) , the capital of the Jalomitza depart- ment, Rumania, situated on the left bank of the Borcea branci of the Danube, amid wide fens, north of which extends th< desolate Baragan Steppe. Pop. (1900) 11,024. Calarashi has a considerable transit trade in wheat, linseed, hemp, timber and fish from a broad mere on the west or from the Danube. Small vessels carry cargo to Braila and Galatz, and a branch railway from Calarashi traverses the Steppe from south to north, and meets the main line between Bucharest and Constantza.

CALAS, JEAN (1698-1762), a Protestant merchant at Toulouse, whose legal murder is a celebrated case in French history. His wife was an Englishwoman of French extraction. They had three sons and three daughters. His son Louis had embraced the Roman Catholic faith through the persuasions of a female domestic who had lived thirty years in the family. In October 1761 another son, Antoine, hanged himself in his father's ware- house. The crowd, which collected on so shocking a discovery, took up the idea that he had been strangled by the family to prevent him from changing his religion, and that this was a common practice among Protestants. The officers of justice adopted the popular tale, and were supplied by the mob with what they accepted as conclusive evidence of the fact. The fraternity of White Penitents buried the body with great cere- mony, and performed a solemn service for the deceased as a martyr; the Franciscans followed their example; and these formalities led to the popular belief in the guilt of the unhappy family. Being all condemned to the rack in order to extort con- fession, they appealed to the parlement; but this body, being as weak as the subordinate magistrates, sentenced the father to the torture, ordinary and extraordinary, to be broken alive upon the wheel, and then to be

burnt to ashes; which decree was carried into execution on the 9th of March 1762. Pierre Calas, the surviving son, was banished for life; the rest were acquitted. The distracted widow, however, found some friends, and among them Voltaire, who laid her case before the council of state at

Versailles. For three years he worked indefatigably to procure justice, and made the Calas case famous throughout Europe (see Vor-TArRE). Finally the king and council unanimously agreed to annul the proceeding of the parletnent of Toulouse; Calas was declared to have been innocent, and every imputation of guilt was removed from the family.

See Causes celebres, tome iv. ; Raoul Allier, Voltaire et Calas, une erreur judiciaire an XVIII' Steele (Paris, 1898); and biographies of Voltaire.

CALASH (from Fr. caliche, derived from Polish kolaska, a wheeled carriage), a light carriage with a folding hood; the Canadian calash is two-wheeled and has a seat for the driver on the splash-board. The word is also used for a kind of hood made of silk stretched over hoops, formerly worn by women.

CALASIAO, a town of the province of Pangasinan, Luzon, Philippine Islands, on a branch of the Agno river, about 4 m. S. by E. of Dagupan, the N. terminal of the Manila & Dagupan railway. Pop. (1903) 16,539. In 1903, after the census had been taken, the neighbouring town of Santa Barbara (pop. 10,367) was annexed to Calasiao. It is in the midst of a fertile district and has manufactures of hats and various woven fabrics.

CALASIO, MARIO DI (1550-1620), Italian Minorite friar, was born at a small town in the Abruzzi whence he took his name. Joining the Franciscans at an early age, he devoted himself to Oriental languages and became an authority on Hebrew. Coming to Rome he was appointed by Paul V., whose confessor he was, to the chair of Scripture at Ara Coeli, where he died on the 1st of February 1620. Calasio is known by his Concordanliae sacrorum Bibliorum hebraicorum, published in 4 vols. (Rome, 1622), two. years after his death, a work which is based on Nathan's Hebrew Concordance (Venice, 1523). For forty years Calasio laboured on this work, and

he secured the assistance of the greatest scholars of his age. The Concordance evinces great care and accuracy. All root-words are treated in alphabetical order and the whole Bible has been collated for every passage containing the word, so as to explain the original idea, which is illustrated from the cognate usages of the Chaldee, Syrian, Rabbinical Hebrew and Arabic. Calasio gives under each Hebrew word the literal Latin translation, and notes any existing differences from the Vulgate and Septuagint readings. An incomplete English translation of the work was published in London by Romaine in 1747. Calasio also wrote a Hebrew grammar, Canones generates linguae sanctatae (Rome, 1616), and the Dictionarium hebraicum (Rome, 16 17).

CALATAFIMI, a town of the province of Trapani, Sicily, 30 m. W.S.W. of Palermo direct (51! m. by rail). Pop. (1901) 11,426. The name of the town is derived from the Saracenic castle of Kalat-al-Fimi (castle of Euphemius), which stands above it. The principal church contains a fine Renaissance reredos in marble. Samuel Butler, the author of Erewhon, did much of his work here. The battlefield where Garibaldi won his first victory over the Neapolitans on the 15th of May i860, lies 2 m. S.W.

CALATAYtJD, a town of central Spain, in the province of Saragossa, at the confluence of the rivers Jalon and Jiloca, and on the Madrid-Saragossa and Calatayud-Sagunto railways. Pop. (1900) 11,526. Calatayud consists of a lower town, built on the left bank of the Jal6n, and an upper or Moorish town, which contains many dwellings hollowed out of the rock above and inhabited by the poorer classes. Among a number of ecclesi- astical buildings, two collegiate churches are especially note- worthy. Santa Maria, originally a mosque, has a lofty octagonal tower and a fine Renaissance doorway, added in 1528; while Santo Sepulcro, built in 1141, and restored in 1613, was long the principal church of the Spanish Knights Templar. In commercial importance Calatayud ranks second only to Saragossa among the Aragonese towns, for it is the central market of the exceptionally fertile expanse watered by the Jalon and Jiloca. About 2 m. E. are the ruins of the ancient Bilbilis, where the poet Martial was born c. a.d. 40. It was celebrated for its breed of horses, its armourers, its gold and its iron; but Martial also mentions its unhealthy climate, due to the icy winds which sweep down from

the heights of Moncayo (7705 ft.) on the north. In the middle ages the ruins were almost destroyed to provide stone for the building of Calatayud, which was founded by a Moorish amir named Ayub and named Kalat Ayub, " Castle of Ayub." Calatayud was captured by

Alphonso I. of Aragon in n 19.

CALAT1A, an ancient town of Campania, Italy, 6 m. S.E. of Capua, on the Via Appia, near the point where the Via Popillia branches off from it. It is represented by the church of £ Giacomo alle Galazze. The Via Appia here, as at Capua, abandons its former S.E. direction for .a length of 2000 Oscan ft. (1804J English ft.), for which it runs due E. and then resumes its course S.E. There are no ruins, but a considerable quantity of d6bris; and the pre-Roman necropolis was partially excavated in 1882. Ten shafts lined with slabs of tufa which were there found may have been the approaches to tombs or may have served as wells. The history of Calatia is practically that of its more powerful neighbour Capua, but as it lay near the point where the Via Appia turns east and enters the mountains, it had some strategic import- ance. In 313 B.C. it was taken by the Samnites and recaptured by the dictator Q. Fabius; the Samnites captured it again in 311, but it must have been retaken at an unknown date. In the 3rd century we find it issuing coins with an Oscan legend, but in 211 B.C. it shared the fate of Capua. In 174 we hear of its walls being repaired by the censors. In 59 B.C. a colony was established here by Caesar.

See Ch. Hiilsen in Pauly-Wissowa, Realencyclop&die, iii. 1334 (Stuttgart, 1899).

CALAVERAS SKULL, a famous fossil cranium, reported by Professor J. D. Whitney as found (1886) in the undisturbed auriferous gravels of Calaveras county, California. The dis- covery at once raised the still discussed question of " tertiary man " in the New World. Doubt has been thrown on the genuine- ness of the find, as the age of the gravels is disputed and the skull is of a type corresponding exactly with that of the present Indian inhabitants of the district. Whitney assigns the fossil to late Tertiary (Pliocene) times; and concludes that " man existed in California previous to the cessation of volcanic activity in the Sierra Nevada, to the epoch of the greatest extension of the glaciers in that region and to the erosion of the present river canons and valleys, at a time when the animal and vegetable creation differed entirely from what they now are. . . ." The specimen is preserved in the Peabody museum, Cambridgeˆ Mass.

CALBAYOG, a town of the province of Samar, Philippine Islands, on the W. coast at the mouth of the Calbayog river, about 30 m. N.W. of Catbalogan, the capital, in lat. 12 3′ N. Pop. (1903) 15,895. Calbayog has an important export trade in hemp, which is shipped to Manila. Copra is also produced in considerable quantity, and there is fine timber in the vicinity. There are hot springs near the town. The neighbouring valleys of the Gandara and Hippatan rivers are exceedingly fertile, but in 1908 were uncultivated. The climate is very warm, but healthy. The language is Visayan.

CALBE, or Kalbe, a town of Germany, on the Saale, in Prussian Saxony. It is known as Calbe-an-der-Saale, to dis- tinguish it from the smaller town of Calbe on the Milde in the same province. Pop. (1905) 12,281. It is a railway junction, and among its industries are wool-weaving and the manufacture of cloth, paper, stoves, sugar and bricks. Cucumbers and onions are cultivated, and soft coal is mined in the neighbourhood.

CALCAR (or Kalcker) , JOHN DE (1499-1546), Italian painter, was born at Calcar, in the duchy of Cleves. He was a disciple of Titian at Venice, and perfected himself by studying Raphael. He imitated those masters so closely as to deceive the most skilful critics. Among his various pieces is a Nativity, represent- ing the angels around the infant Christ, which he arranged so that the light emanated wholly from the child. He died at Naples.

CALCEOLARIA, in botany, a genus belonging to the natural order Scrophulariaceae, containing about 150 species of herb- aceous or shrubby plants, chiefly natives of the South American Andes of Peru and Chile. The calceolaria of the present day has

oeen developed into a highly decorative plant, in which the herbaceous habit has preponderated. The plants are now very generally raised annually from seed, which is sown about the end of June in a mixture of loam, leaf-mould and sand, and, being very small, must be only slightly covered. When the plants are large enough to handle they are pricked out an inch or two apart into 3-inch or 5-inch pots; when a little more advanced they are potted singly. They should be wintered in a greenhouse with a night temperature of about 40 , occupying a shelf near the light. By the end of February they should be moved into 8-inch or 10-inch pots, using a compost of three parts good turfy loam, one part leaf -mould, and one part thoroughly rotten manure, with a fair addition of sand. They need plenty of light and air, but must not be subjected to draughts. When the pots get well filled with roots, they must be liberally supplied with manure water. In all stages of growth the plants are subject to the attacks of the green-fly, for which they must be fumigated.

The so-called shrubby calceolarias used for bedding are in- creased from cuttings, planted in autumn in cold frames, where they can be wintered, protected from frost by the use of mats and a good layer of litter placed over the glass and round the sides.

CALCHAQUI, a tribe of South American Indians, now extinct, who formerly occupied northern Argentina. Stone and other remains prove them to have reached a high degree of civilization. They offered a vigorous resistance to the first Spanish colonists coming from Chile.

CALCHAS, of Mycenae or Megara, son of Thestor, the most famous soothsayer among the Greeks at the time of the Trojan war. He foretold the duration of the siege of Troy, and, when the fleet was detained by adverse winds at Aulis, he explained the cause and demanded the sacrifice of Iphigeneia. When the Greeks were visited with pestilence on account of Chryseis, he disclosed the reasons of Apollo's anger. It was he who suggested that Neoptolemus and

Philoctetes should be fetched from Scyros and Lemnos to Troy, and he was one of those who advised the construction of the wooden horse. When the Greeks, on their journey home after the fall of Troy, were overtaken by a storm, Calchas is said to have been thrown ashore at Colophon. Accord- ing to another story, he foresaw the storm and did not attempt to return by sea. It had been predicted that he should die when he met his superior in divination; and the prophecy was fulfilled in the person of Mopsus, whom Calchas met in the grove of the Clarian Apollo near Colophon. Having been beaten in a trial of soothsaying, Calchas died of chagrin or committed suicide. He had a temple and oracle in Apulia.

Ovid, Metam. xii. 18 ff.; Homer, Iliad i. 68, ii. 322; Strabo vi. p. 284, xiv. p. 642.

CALCITE, a mineral consisting of naturally occurring calcium carbonate, $CaC0_3$, crystallizing in the rhombohedral system. With the exception of quartz, it is the most widely distributed of minerals, whilst in the beautiful development and extraordinary variety of form of its crystals it is surpassed by none. In the massive condition it occurs as large rock-masses (marble, lime- stone, chalk) which are often of organic origin, being formed of the remains of molluscs, corals, crinoids, &c, the hard parts of which consist largely of calcite.

The name calcite (Lat. calx, calcis, meaning burnt lime) is of comparatively recent origin, and was first applied, in 1836, to the "barleycorn" pseudomorphs of calcium carbonate after celestite from Sangerhausen in Thuringia; it was not until about 1843 that the name was used in its present sense. The mineral had, however, long been known under the names calcareous spar and calc-spar, and the beautifully transparent variety called Iceland-spar had been much studied. The strong double refrac- tion and perfect cleavages of Iceland-spar were described in detail by Erasmus Bartholinus in 1669 in his book Experimenta Crystalli Islandici disdiaclastici; the study of the same mineral led Christiaan Huygens to discover in 1690 the laws of double refraction, and E. L. Malus in 1808 the polarization of light.

An important property of calcite is the great ease with which it may be cleaved in three directions; the three perfect cleavages

are parallel to the faces of the primitive rhombohedron, and the angle between them was determined by W. H. Wollaston in 1812, with the aid of his newly invented reflective goniometer, to be 74°

55'. The cleavage is of great help in distinguishing calcite from other minerals of similar appearance. The hardness of 3 (it is readily scratched with a knife), the specific gravity of 2-72, and the fact that it effervesces briskly in contact with cold dilute acids are also characters of determinative value.

Crystals of calcite are extremely varied in form, but, as a rule, they may be referred to four distinct habits, namely: rhombo- hedral, prismatic, scalenohedral and tabular. The primitive rhombohedron, r {100} (fig. 1), is comparatively rare except in combination with other forms. A flatter rhombohedron, e {110} , is shown in fig. 2, and a more acute one, / {nij, in fig. 3. These three rhombohedra are related in such a manner that, when in combination, the faces of / truncate the polar edges of /, and the faces of e truncate the edges of r. The crystal of prismatic habit shown in fig. 4 is a combination of the prism m (211} and the rhombohedron e 1 1 10} ; fig. 5 is a combination of the scaleno- hedron 11 {201) and the rhombohedron r {100}; and the crystal of tabular habit represented in fig. 6 is a combination of the basal pinacoid c {in}, prism m {211J, and rhombohedron e {110} . In these figures only six distinct forms (r, e, /, m, v, c) are

Fig. 4. Fig. 5. Fig. 6.

Figs. 1-6. — Crystals of Calcite.

represented, but more than 400 have been recorded for calcite, whilst the combinations of them are almost endless.

Depending on the habits of the crystals, certain trivial names have been used, such, for example, as dog-tooth-spar for the crystals of scalenohedral habit, so common in the Derbyshire lead mines and limestone caverns; nail-head-spar for crystals terminated by the obtuse rhombohedron e, which are common in the lead mines of Alston Moor in Cumberland; slate-spar (German Schieferspath) for crystals of tabular habit, and some- times as thin as paper: cannon-spar for crystals of prismatic habit terminated by the basal pinacoid c.

Calcite is also remarkable for the variety and perfection of its twinned crystals. Twinned crystals, though not of infrequent occurrence, are, however,f ar less common than simple (untwinned) crystals. No less than four well-defined twin-laws are to be distinguished: —

i. Twin-plane c (in). — Here there is rotation of one portion with respect to the other through 180 about the principal (trigonal) axis, which is perpendicular to the plane c (in); or the same result may be obtained by reflection across this plane, Fig. 7 shows a prismatic crystal (like fig. 4) twinned in this manner, and fig. 8 represents a twinned scalenohedron v {201}.

ii. Twin-plane e (no). — The principal axes of the two portions are inclined at an angle of 52 305'. Repeated twinning on this plane is very common, and the twin-lamellae (fig. 9) to which it gives rise are often to be observed in the grains of calcite of crystalline limestones which have been subjected to pressure. This lamellar twinning is of secondary origin; it may be readily produced artificially by pressure, for example, by pressing a knife into the edge of a cleavage rhombohedron.

iii. Twin-plane r (ioo). — Here the principal axes of the two portions are nearly at right angles (8o° 14'), and one of the directions of cleavage in both portions is parallel to the twin-plane. Fine crystals of prismatic habit twinned according to this law were formerly found in considerable numbers at Wheal Wrey in Cornwall, and of scalenohedral habit at Eyam in Derbyshire and CleatorMoor in Cumberland; those from the last two localities are known as " butterfly twins " or " heart-shaped twins " (fig. 10), according to their shape.

iv. Twin-plane/ (111). — The principal axes are here inclined at 53° 46'. This is the rarest twin-law of calcite.

Calcite when pure, as in the well-known Iceland-spar, is perfectly transparent and colourless. The lustre is vitreous. Owing to the presence of various impurities, the transparency and colour may vary considerably. Crystals are often nearly white or colourless, usually with a slight yellowish tinge. The yellowish colour is in most cases due to the presence of iron, but in some cases it has been proved to be due to organic matter (such as apocrenic acid) derived from the humus overlying the rocks in which the crystals were formed. An opaque calcite of a grass-green colour, occurring as large cleavage masses in central India and known as hislopite, owes its colour to enclosed " green- earth " (glauconite and celadonite). A stalagmitic calcite of a

*(^*

^1

1

1

1

1

\til t

**

>-”

1

>,-.

1

1

-h.Zl

A J

Fig. 7. Fig. 8. Fig. 10.

Fig. 7-10. — Twinned Crystals of Calcite.

beautiful purple colour, from Reichelsdorf in Hesse, is coloured

by colbalt.

Optically, calcite is uniaxial with negative bi-refringence, the index of refraction for the ordinary ray being greater than for the extraordinary ray; for sodium-light the former is 1-6585 and the latter 1-4862. The difference, 0-1723, between these two indices gives a measure of the bi-refringence or double refraction.

Although the double refraction of some other minerals is greater than that of calcite {e.g. for cinnabar it is 0.347, and for calomel 0.683), y et this phenomenon can be best demonstrated in calcite, since it is a mineral obtainable in large pieces of perfect trans- parency. Owing

to the strong double refraction and the con- sequent wide separation of the two polarized rays of light traversing the crystal, an object viewed through a cleavage rhombohedron of Iceland-spar is seen double, hence the name doubly-refracting spar. Iceland-spar is extensively used in the construction of Nicol's prisms for polariscopes, polarizing microscopes and saccharimeters, and of dichroscopes'for testing the pleochroism of gem-stones.

Chemically, calcite has the same composition as the ortho- rhombic aragonite (q.v.), these minerals being dimorphous forms of calcium carbonate. Well-crystallized material, such ■ as Iceland-spar, usually consists of perfectly pure calcium car- bonate, but at other times the calcium may be isomorphously replaced by small amounts of magnesium, barium, strontium, manganese, zinc or lead. When the elements named are present in large amount we have the varieties dolomitic calcite, bari- calcite, strontianocalcite, ferrocalcite, manganocalcite, zinco- calcite and plumbocalcite, respectively.

Mechanically enclosed impurities are also frequently present, and it is to these that the colour is often due. A remarkable

case of enclosed impurities is presented by the so-called Fontaine-bleau limestone, which consists of crystals of calcite of an acute rhombohedral form (fig. 3) enclosing 50 to 60% of quartz-sand. Similar crystals, but with the form of an acute hexagonal pyramid, and enclosing 64% of sand, have recently been found in large quantity over a wide area in South Dakota, Nebraska and Wyoming. The case of hislopite, which encloses up to 20% of "green earth," has been noted above.

In addition to the varieties of calcite noted above, some others, depending on the state of aggregation of the material, are distinguished. A finely fibrous form is known as satin-spar (q.v.), a name also applied to fibrous gypsum: the most typical example of this is the snow-white material, often with a rosy tinge and a pronounced silky lustre, which occurs in veins in the Carboniferous shales of Alston Moor in Cumberland. Finely scaly varieties with a pearly lustre are known as argentine and aphrite (German Schaumspath) ; soft, earthy and dull white varieties as agaric mineral, rock-milk, rock-meal, &c. — these form a transition to marls, chalk, &c. Of the granular and compact forms numerous varieties are distinguished (see Lime- stone and Marble). In the form of stalactites calcite is of extremely common occurrence. Each stalactite usually consists of an aggregate of radially arranged crystalline individuals, though sometimes it may consist of a single

individual with crystal faces developed at the free end. Onyx-marbles or Oriental alabaster (see Alabaster) and other stalagmitic de- posits also consist of calcite, and so do the allied deposits of travertine, calc-sinter or calc-tufa.

The modes of occurrence of calcite are very varied. It is a common gangue mineral in metalliferous deposits, and in the form of crystals is often associated with ores of lead, iron, copper and silver. It is a common product of alteration in igneous rocks, and frequently occurs as well-developed crystals in association with zeolites lining the amygdaloidal cavities of basaltic and other rocks. Veins and cavities in limestones are usually lined with crystals of calcite. The wide distribution, under various conditions, of crystallized calcite is readily ex- plained by the solubility of calcium carbonate in water contain- ing carbon dioxide, and the ease with which the material is again deposited in the crystallized state when the carbon dioxide is liberated by evaporation. On this also depends the formation of stalactites and calc-sinter.

Localities at which beautifully crystallized specimens of calcite are found are extremely numerous. For beauty of crystals and variety of forms the haematite mines of the Cleator Moor district in west Cumberland and the Furness district in north Lancashire are unsurpassed. The lead mines of Alston in Cumberland and of Derbyshire, and the silver mines of Andreas- berg in the Harz and Guanajuato in Mexico have yielded many fine specimens. From the zinc mines of Joplin in Missouri enormous crystals of golden-yellow and amethystine colours have been recently obtained. At all the localities here mentioned the crystals occur with metalliferous ores. In Iceland the mode of occurrence is quite distinct, the mineral being here found in a cavity in basalt.

The quarry, which since the 17th century has supplied the famous Iceland-spar, is in a cavity in basalt, the cavity itself measuring 12 by 5 yds. in area and about 10 ft. in height. It is situated quite close to the farm Helgustadir, about an hour's ride from the trading station of Eskifjordur on Reydar Fjordur, on the east coast of Iceland. This cavity when first found was filled with pure crystallized masses and enormous crystals. The crystals measure up to a yard across, and are rhombohedral or scalenohedral in habit; their faces are usually dull and corroded or coated with stilbite. In recent years much of the material taken out has not been of sufficient transparency for optical purposes, and this, together with the very limited supply, has caused a considerable rise in price. Only very occasionally has calcite from any locality other than Iceland been

used for the construction of a Nicol's prism. (L. J. S.)

CALCIUM [symbol Ca, atomic weight 400 (0= 16)], a metallic chemical element, so named by Sir Humphry Davy from its

occurrence in chalk (Latin calx). It does not occur in nature in the free state, but in combination it is widely and abundantly diffused. Thus the sulphate constitutes the minerals anhydrite, alabaster, gypsum, and selenite; the carbonate occurs dissolved in most natural waters and as the minerals chalk, marble, calcite, aragonite; also in the double carbonates such as dolomite, bromlite, barytocalcite; the fluoride as fluorspar; the fluo- phosphate constitutes the mineral apatite; while all the more important mineral silicates contain a proportion of this element. Extraction. — Calcium oxide or lime has been known from a very remote period, and was for a long time considered to be an elementary or undecomposable earth. This view was questioned in the 18th century, and in 1808 Sir Humphry Davy {Phil. Trans., 1808, p. 303) was able to show that lime was a combina- tion of a metal and oxygen. His attempts at isolating this metal were not completely successful; in fact, metallic calcium re- mained a laboratory curiosity until the beginning of the 20th century. Davy, inspired by his successful isolation of the metals sodium and potassium by the electrolysis of their hydrates, attempted to decompose a mixture of lime and mercuric oxide by the electric current; an amalgam of calcium was obtained, but the separation of the mercury was so difficult that even Davy himself was not sure as to whether he had obtained pure metallic calcium. Electrolysis of lime or calcium chloride in contact with mercury gave similar results. Bunsen {Ann., 1854, 92, p. 248) was more successful when he electrolysed calcium chloride moistened with hydrochloric acid; and A. Matthiessen {Jour. Chem. Soc, 1856, p. 28) obtained the metal by electrolysing a mixture of fused calcium and sodium chlorides. Henri Moissan obtained the metal of 99% purity by electro- lysing calcium iodide at a low red heat, using a nickel cathode and a graphite anode; he also showed that a more convenient process consisted in heating the iodide with an excess of sodium, forming an amalgam of the product, and removing the sodium by means of absolute alcohol (which has but little action on calcium), and the mercury by distillation.

The electrolytic isolation of caicium has been carefully in-

vestigated, and this is the method followed for the commercial production of the metal. In 1902 W. Borchers and L. Stockem (Zeit.jilr Electrochemie, 1902, p. 875?) obtained the metal of go % purity by electrolysing calcium chloride at a temperature of about 780 , using an iron cathode, the anode being the graphite vessel in which the electrolysis was carried out. In the same year, O. Ruff and W. Plato {Ber. 1902, 35, p. 3612) employed a mixture of calcium chloride (100 parts) and fluorspar (16-5 parts), which was fused in a porcelain crucible and electrolysed with a carbon anode and an iron cathode. Neither of these processes admitted of commercial application, but by a modifica- tion of Ruff and Plato's process, W. Ruthenau and C. Suter have made the metal commercially available. These chemists electrolyse either pure calcium chloride, or a mixture of this salt with fluorspar, in a graphite vessel which serves as the anode. The cathode consists of an iron rod which can be gradu- ally raised. On electrolysis a layer of metallic calcium is formed at the lower end of this rod on the surface of the electrolyte; the rod is gradually raised, the thickness of the layer increases, and ultimately a rod of metallic calcium, forming, as it were, a con- tinuation of the iron cathode, is obtained. This is the form in which calcium is put on the market.

An idea as to the advance made by this method is recorded in the variation in the price of calcium. At the beginning of 1904 it was quoted at 5s. per gram, £250 per kilogram or £1 10 per pound; about a year later the price was reduced to 21s. per kilogram, or 12s. per kilogram in quantities of 100 kilograms. These quotations apply to Germany; in the United Kingdom the price (1905) varied from 27s. to 30s. per kilogram (12s. to 13s. per lb.). Properties. — A freshly prepared surface of the metal closely resembles zinc in appearance, but op exposure to the air it rapidly tarnishes, becoming yellowish and ultimately grey or white in colour owing to the formation of a surface layer of calcium hydrate. A faint smell of acetylene may be perceived during the oxidation in moist air; this is probably due to traces of -calcium carbide.

It is rapidly acted on by water, especially if means are taken to remove the layer of calcium hydrate formed on the metal; alcohol acts very slowly. In its chemical properties it closely resembles barium and strontium, and to some degree magnesium; these four elements comprise the so-called metals of the " alkaline earths." It combines directly with most elements, including nitrogen; this can be taken advantage of in forming almost a perfect vacuum, the oxygen combining to form the oxide, CaO, and the nitrogen to form the nitride, CaaN2. Several of its physical properties have been

determined by K. Arndt {Ber., 1904, 37, p. 4733). The metal as prepared by electrolysis generally contains traces of aluminium and silica. Its specific gravity is 1-54, and after remelting 1-56; after distillation it is 1-52. It melts at about 800°, but sublimes at a lower temperature. Compounds. — Calcium hydride, obtained by heating electrolytic calcium in a current of hydrogen, appears in commerce under the name hydrolite. Water decomposes it to give hydrogen free from ammonia and acetylene, I gram yielding about 100 ccs. of gas (Prats Aymerich, Abst. J. C. S., 1907, ii p. 460). Calcium forms two oxides —the monoxide, CaO, and the dioxide, Ca02. The monoxide and its hydrate are more familiarly known as lime {q.v.) and slaked – lime. The dioxide was obtained as the hydrate, Ca0 2 -8H 2 0, by P. Thenard {Ann. Chim. Phys.,_ 1818, 8, p. 213), who precipitated lime-water with hydrogen peroxide. It is permanent when dry ; on heating to 130° C. it loses water and gives the anhydrous dioxide as an unstable, pale buff-coloured powder, very sparingly soluble in water. It is used as an antiseptic and oxidizing agent.

Whereas calcium chloride, bromide, and iodide are deliquescent solids, the fluoride is practically insoluble in water; this is a parallelism to the soluble silver fluoride, and the insoluble chloride, bromide and iodide. Calcium fluoride, CaF2, constitutes the mineral fluor-spar {q.v.), and is prepared artificially as an insoluble white powder by precipitating a solution of calcium chloride with a soluble fluoride. One part dissolves in 26,000 parts of water. Calcium chloride, CaCl 2 , occurs in many natural waters, and as a by-product in the manufacture of carbonic acid (carbon dioxide), and potassium chlorate. Aqueous solutions deposit crystals containing 2, 4 or 6 molecules of water. Anhvdrous calcium chloride, prepared by heating the hydrate to 200° (preferably in a current of hydrochloric acid gas, which prevents the formation of any oxychloride) , is very hygroscopic, and is used as a desiccating agent. It fuses at 723°. It_ combines with gaseous ammonia and forms crystalline compounds with certain alcohols. The crystallized salt dissolves very readily in water with a considerable absorption of heat; hence its use in forming ” freezing mixtures.” A temperature of — 55 C. isobtained by mixing 10 parts of the hexahydrate with 7 parts of snow. A saturated solution of calcium chloride contains 325 parts of CaCl 2 to iooof waterat the boiling point(i79”5°). Calcium iodide and bromide are white deliquescent solids and closely resemble the chloride.

Chloride of lime or ” bleaching powder ” is a calcium chlor-hypochlorite or an equimolecular mixture of the chloride and hypochlorite (see Alkali Manufacture and Bleaching).

Calcium carbide, CaC 2 , a compound of great industrial importance as a source of acetylene, was first prepared by F. Wohler. It is now manufactured by heating lime and carbon in the electric furnace (see Acetylene). Heated in chlorine or with bromine, it yields carbon and calcium chloride or bromide; at a dull red heat it burns in oxygen, forming calcium carbonate, and it becomes incandescent in sulphur vapour at 500 , forming calcium sulphide and carbon disulphide. Heated in the electric furnace in a current of air, it yields calcium cyanamide (see Cyanamide).

Calcium carbonate, CaC03, is of exceptionally wide distribution in both the mineral and animal kingdoms. It constitutes the bulk of the chalk deposits and limestone locks; it forms over one-half of the mineral dolomite and the rock magnesium limestone; it occurs also as the dimorphous minerals aragonite {q.v.) and calcite {q.v.). Tuff {q.v.) and travertine are calcareous deposits found in volcanic districts. Most natural waters contain it dissolved in carbonic acid; this confers "temporary hardn2ss " on the water. The dissipation of the dissolved carbon dioxide results in the formation of " fur " in kettles or boilers, and if the solution is falling, as from the roof of a cave, in the formation of stalactites and stalagmites. In the animal kingdom it occurs as both calcite and aragonite in the tests of the foraminifera, echinoderms, brachiopoda, and mollusca; also in the skeletons of sponges and corals. Calcium carbonate is obtained as a white precipitate, almost insoluble in water (1 part requiring 10,000 of water for solution), by mixing solutions of a carbonate and a calcium salt. Hot or dilute cold solutions deposit minute orthorhombic crystals of aragonite, cold saturated or moder- ately strong solutions, hexagonal (rhombohedral) crystals of calcite. Aragonite is the least stable form ; crystals have been found altered to calcite.

Calcium nitride, Ca 3 N 2 , is a greyish-yellow powder formed by heating calcium in air or nitrogen; water decomposes it with evolution of ammonia (see H. Moissan, Compt. Rend., 127, p. 497). Calcium nitrate, Ca(N03)2"4H 2 0, is a highly deliquescent salt,

crystallizing in.monoclinic prisms, and occurring in various natural waters, as an efflorescence in limestone caverns, and in the neighbour- hood of decaying nitrogenous organic matter. ' Hence its synonyms, " wall-saltpetre " and " lime-saltpetre " ; from its

disintegrating action on mortar, it is sometimes referred to as " saltpetre rot. The anhydrous nitrate, obtained by heating the crystallized salt, is very phosphorescent, and constitutes " Baldwin's phosphorus." A basic nitrate, Ca(N0s)rCa(0H)2-3H 2 0, is obtained by dissolving calcium hydroxide in a solution of the normal nitrate.

Calcium phosphide, Ca 3 p2, is obtained as a reddish substance by passing phosphorus vapour over strongly heated lime. Water decomposes it with the evolution of spontaneously inflammable hydrogen phosphide; hence its use as a marine signal fire (" Holmes lights '), (see L. Gattermann and W. Haussknecht, Ber., 1890, 23, p. 1 176, and H. Moissan, Compt. Rend., 128, p. 787).

Of the calcium orthophosphates, the normal salt, Ca 3 (P04) 2 , is the most important. It is the principal inorganic constituent of bones, and hence of the " bone-ash " of commerce (see Phosphorus) ; it occurs with fluorides in the mineral apatite (q.v.) ; and the concretions known as coprolites (q.v.) largely consist of this salt. It also constitutes the minerals ornithite, Ca3(P04)2-2H 2 0, osteolite and sombrerite. The mineral brushite, CaHP04-2H 2 0, which is isomorphous with the acid arsenate pharmacolite, CaHAs0 4 -2H 2 0, is ah acid phosphate, and assumes monoclinic forms. The normal salt may be obtained artificially, as a white gelatinous precipitate which shrinks greatly on drying, by mixing solutions of sodium hydrogen phosphate, ammonia, and calcium chloride. Crystals may be obtained by heating di-calcium pyrophosphate, Ca 2 P 2 07, with water under pressure. It is insoluble in water; slightly soluble in solutions of carbonic acid and common salt, and readily soluble in concentrated hydrochloric and nitric acid. Of the acid orthophosphates, the mono-calcium salt, CaH.i(PO.i) 2 , may be obtained as crystalline scales, containing one molecule of water, by evaporating a solution of the normal salt in hydrochloric or nitric acid. It dissolves readily in water, the solution having an acid reaction. The artificial manure known as " superphosphate of lime " consists of this salt and calcium sulphate, and is obtained by treating ground bones, coprolites. &c, with sulphuric acid. The di-calcium salt, Ca 2 H 2 (P04) 2 , occurs in a concretionary form in the ureters and cloaca of the sturgeon, and also in guano. It is obtained as rhombic plates by mixing dilute solutions of calcium chloride and sodium phosphate, and passing carbon dioxide into the liquid. Other phosphates are also known.

Calcium monosulphide, CaS, a white amorphous powder, sparingly soluble in water, is formed by heating the sulphate with charcoal, or by heating'lime in a current of sulphuretted hydrogen. It is particu-

larly noteworthy from the phosphorescence which it exhibits when heated, or after exposure to the sun's rays; hence its synonym " Canton's phosphorus," after John Canton (1718-1772), an English natural philosopher. The sulphydrate or hydrosulphide, Ca(SH) 2 , is obtained as colourless, prismatic crystals of the composition Ca(SH) 2 -6H 2 0, by passing sulphuretted hydrogen into milk of lime. The strong aqueous solution deposits colourless, four-sided prisms of the hydroxy-hydrosulphide, Ca(OH)(SH). The disulphide, CaS 2> and pentasulphide, CaS 5 , are formed when milk of lime is boiled with flowers of sulphur. These sulphides form the basis of Balmain's luminous paint. An oxysulphide, 2CaS-CaO, is sometimes present in "soda-waste," and orange- coloured, acicular crystals of 4CaS-CaS04-18H 2 occasionally settle out on the long standing of oxidized " soda- or alkali-waste " (see Alkali Manufacture).

Calcium sulphite, CaS0 3 , a white substance, soluble in water, is prepared by passing sulphur dioxide into milk of lime. This solution with excess of sulphur dioxide yields the " bisulphite of lime " of commerce, which is used in the " chemical " manufacture of wood-pulp for paper making.

Calcium sulphate, CaS04, constitutes the minerals anhydrite (q.v.), and, in the hydrated form, selenite, gypsum (q.v.), alabaster (q.v.), and also the adhesive plaster of Paris (see Cement). It occurs dissolved in most natural waters, which it renders " permanently hard." It is obtained as a white crystalline precipitate, sparingly soluble in water (100 parts of water dissolve 24 of the salt at 15 C), by mixing solutions of a sulphate and a calcium salt; it is more soluble in solutions of common salt and hydrochloric acid, and especially of sodium thiosulphate.

_ Calcium silicates are exceptionally abundant in the mineral kingdom. Calcium metasilicate, CaSi0 3 , occurs in nature as mono-clinic crystals known as tabular spar or wollastonite ; it may be prepared artificially from solutions of calcium chloride and sodium silicate. H. Le Chatelier (Annates des mines, 1887, p. 345) has obtained artificially the compounds: CaSi0 3 , Ca 2 Si04, Ca3Si 2 (>7, and CasSiOs. (See also G. Oddo, Chemisches Centralblatt, 1896, 228.) Acid calcium silicates are represented in the mineral kingdom by gyrolite, H 2 Ca 2 (Si03) 3 -H 2 0, a lime zeolite, sometimes regarded as an altered form of apophyllite (q.v.), which is itself an acid calcium silicate containing an alkaline fluoride, by okenite, H 2 Ca(Si0 3)2-H20, and by xonalite 4CaSi0 3 -H 2 0. Calcium silicate is also present in the minerals: olivine, pyroxenes, amphiboles, epidote, felspars, zeolites, scapolites (qq.v.).

Detection and Estimation. — Most calcium compounds, especially when moistened with hydrochloric acid, impart an orange-red colour

to a Bunsen flame, which when viewed through green glass appears to be finch-green; this distinguishes it in the presence of strontium, whose crimson coloration is apt to mask the orange-red calcium flame (when viewed through green glass the strontium flame appears to be a very faint yellow). In the spectroscope calcium exhibits two intense lines — an orange line (a), (X 6163), a green line (/S), (X 4229), and a fainter indigo line. Calcium is not precipitated by sulphuretted hydrogen, but falls as the carbonate when an alkaline carbonate is added to a solution. Sulphuric acid gives a white precipitate of calcium sulphate with strong solutions; ammonium oxalate gives calcium oxalate, practically insoluble in water and dilute acetic acid, but readily soluble in nitric or hydrochloric acid. Calcium is gener- ally estimated by precipitation as oxalate which, after drying, is heated and weighed as carbonate or oxide, according to the degree and duration of the heating.

CALCULATING MACHINES. Instruments for the mechanical performance of numerical calculations, have in modern times come into ever-increasing use, not merely for dealing with large masses of figures in banks, insurance offices, &c, but also, as cash registers, for use on the counters of retail shops. They may be classified as follows: — (i.) Addition machines; the first invented by Blaise Pascal (1642). (ii.) Addition machines modified to facilitate multiplication; the first by G. W. Leibnitz (1671). (iii.) True multiplication machines; Leon Bolles (1888), Steiger (1894). (iv.) Difference machines; Johann Helfrich von Miiller (1 786) , Charles Babbage (1822). (v.) Analytical machines ; Babbage (1834). The number of distinct machines of the first three kinds is remarkable and is being constantly added to, old machines being improved and new ones invented; Professor R. Mehmke has counted over eighty distinct machines of this type. The fullest published account of the subject is given by Mehmke in the Encyclopadie der mathematischen Wissenschaften, article " Numerisches Rechnen," vol. i., Heft 6 (1901). It contains historical notes and full references. Walther von Dyck's Catalogue also contains descriptions of various machines. We shall confine our- selves to explaining the principles of some leading types, without giving an exact description of any particular one.

Practically all calculating machines con- tain a " counting work," a series of " figure disks " consisting in the original form of horizontal circular disks (fig. 1), on which the figures o, 1, 2, to 9 are marked. Each disk can turn about its vertical axis, and is covered by a fixed

plate with a hole or " window " in it through which one figure can be seen. On turning the disk through one- tenth of a revolution this figure will be changed into the next higher or lower. Such turning may be called a " step," positive if the next higher and negative if the next lower figure appears. Each positive step therefore adds one unit ˆcMats to the figure under the window, while two steps add two, and so on. If a series, say six, of such figure disks be placed side by side, their windows lying in a row, then any number of six places can be made to appear, for instance 000373. In order to add 6425 to this number, the disks, counting from right to left, have to be turned 5, 2, 4 and 6 steps respectively. If this is done the sum 006798 will appear. In case the sum of the two figures at any disk is greater than 9, if for instance the last figure to be added is 8 instead of 5, the sum for this disk is 11 and the 1 only will appear. Hence an arrangement for " carrying " has to be introduced. This may be done as follows. The axis of a figure disk contains a wheel with ten teeth. Each figure disk has, besides, one long tooth which when its o passes the window turns the next wheel to the left, one tooth forward, and hence the figure disk one step. The actual mechanism is not quite so simple, because the long teeth as described would gear also into the wheel to the right, and besides would interfere with each other. They must therefore be replaced by a somewhat more com- plicated arrangement, which has been done in various ways not necessary to describe more fully. On the way in which this is done, however, depends to a great extent the durability and trustworthiness of any arithmometer; in fact, it is often its weakest point. If to the series of figure disks arrangements are added for turning each disk through a required number of steps,

Fig. 1.

we have an addition machine, essentially of Pascal's type. In it each disk had to be turned by hand. This operation has been simplified in various ways by mechanical means. For pure addition machines key- boards have been added, say for each disk nine keys marked i to 9. On pressing the key marked 6 the disk turns six steps and so on. These have been introduced by Stettner (1882), Max Mayer (1887), and in the comptometer by Dorr Z. Felt of Chicago. In the comptograph by Felt and also in " Burrough's Registering Accountant " the result is printed. These machines can be used for multiplication, as repeated addition, but the process is laborious, depending for

*rapid execu- tion essentially on the skill of the operator. 1 To adapt n **M d an addition machine, as described, to rapid multipli- macMals. cation the turnings of the separate figure disks are replaced by one motion, commonly the turning of a handle. As, however, the different disks have to be turned through different steps, a contrivance has to be inserted which can be " set " in such a way that by one turn of the handle each disk is moved through a number of steps equal to the number of units which is to be added on that disk. This may be done by making each of the figure disks receive on its axis a ten-toothed wheel, called hereafter the A-wheel, which is acted on either directly or indirectly by another wheel (called the B-wheel) in which the number of teeth can be varied from o to 9. This variation of the teeth has been effected in different ways. Theoretically the simplest seems to be to have on the B-wheel nine teeth which can be drawn back into the body of the wheel, so that at will any number from o to 9 can be made to project. This idea, previously mentioned by Leibnitz, has been realized by Bohdner in the " Brunsviga." Another way, also due to Leibnitz, consists in inserting between the axis of the handle bar and the A-wheel a " stepped " cylinder. This may be considered as being made up of ten wheels large enough to contain about twenty teeth each; but most of these teeth are cut away so that these wheels retain in succession 9, 8, . . . 1, o teeth. If these are made as one piece they form a cylinder with teeth of lengths from 9, 8 . . . times the length of a tooth on a single wheel.*

In the diagrammatic vertical section of such a machine (fig. 2) FF is a figure disk with a conical wheel A on its axis. In the covering nlate HK is the window W. A stepped cylinder is shown at B. The axis Z, which runs along the whole machine is turned by a handle, and itself turns the cylinder B by aid of conical wheels. Above this cylinder lies an axis EE with square section along which a wheel D can be moved. The same axis carries at E a pair of conical

Fig. 2.

wheels C and C, which can also slide on the axis so that either can be made to drive the A-wheel. The covering plate MK has a slot above the axis EE allowing a rod LL' to be moved by aid of a button L, carrying the wheel D with it. Along the slot is a scale ol numbers o I 2 … 9 corresponding with the number of teeth on the cylinder B, with which the wheel D will gear in any given position. A series of such slots is shown in the top middle part of Steiger s machine (fig. 3). Let now the handle driving the axis Z be turned once round, the button being set to 4. Then four teeth of the B- wheel will turn D and with it

the A-wheel, and consequently tne figure disk will be moved four steps. These steps will be positive or forward if the wheel C gears in A, and consequently four will be added to the figure showing at the window W. But if the wheels Cl- are moved to the right, C will gear with A moving backwards, with

1 For a fuller description of the manner in which a mere addition machine can be used for multiplication and division, and even for the extraction of square roots, see an article by C. V. Boys in Nature, nth July 1901.

the result that four is subtracted at the window. This motion of all the wheels C is done simultaneously by the push of a lever which appears at the top plate of the machine, its two positions being marked " addition " and " subtraction." The B-wheels are in fixed positions below the plate MK. Level with this, but separate, is the plate KH with the window. On it the figure disks are mounted.

This plate is hinged at the back at H and can be lifted up, thereby throwing the A- wheels out of gear. When thus raised the figure disks can be set to any figures; at the same time it can slide to and tro so that an A-wheel can be put in gear with any C-wheel iorming with it one " element." The number of these varies with the size of the machine. Suppose there are six B-wheels and twelve figureˆ disks. Let these be all set to zero with the exception of the last four to the right, these showing 1432, and let these be placed opposite the last B-wheels to the right. If now the buttons belonging to the latter be set to 3 2 5 6, then on turning the B-wheels all once round the latter figures will be added to the former, thus showing 4 6 8 8 at the windows. By aid of the axis Z, this turning of the B-wheels is performed simultaneously by the movement of one handle. We have thus an addition machine. If it be required to multiply a number, say 725, by any number upto six figures, say 357, the buttons are set to the figures 725, the windows all showing zero. The handle is then turned, 725 appears at the windows, and successive turns add this number to the first. Hence seven turns show the product seven times 725. Now the plate with the A- wheels is lifted and moved one step to the right, then lowered and the handle turned five times, thus adding fifty times 725 to the product obtained. Finally, by moving the piate again, and turning the handle three times, the required product is obtained. If the machine has six B-wheels and twelve disks the product of two six-figure numbers can be obtained. Division is performed by repeated sub- traction. The lever regulating the C-wheel is set to subtraction, producing negative steps at the disks. The dividend is set up at the windows and the divisor at the buttons. Each

turn of the handle subtracts the divisor once. To count the number of turns of the handle a second set of windows is arranged with number xiisks below. These have no carrying arrangement, but one is turned one step for each turn of the handle. The machine described is essentially that of Thomas of Colmar, which was the first that came into practical use. Of earlier machines those of Leibnitz, Miiller (1782), and Harm (1809) deserve to be mentioned (see Dyck, Catalogue). Thomass machine has had many imitations, both in England and on the Continent, with more or less important alterations. Joseph Edmondson of Halifax has given it a circular form, which has many advantages. .

The accuracy and durability of any machine depend to a great extent on the manner in which the carrying mechanism is con- structed. Besides, no wheel must be capable of moving in any other way than that required ; hence every part must be locked and be released only when required to move. Further, any disk must carry to the next only after the carrying to itself has been completed. If all were to carry at the same time a considerable force would be required to turn the handle, and serious strains would be introduced. It is for this reason that the B-wheels or cylinders have the greater part of the circumference free from teeth. Again, the carrying acts generally as in the machine described, in one sense only, and this involves that the handle be turned always in the same direction. Subtraction therefore cannot be done by turning it in the opposite way, hence the two wheels C and C are introduced. These are moved all at once by one lever acting on a bar shown at R in section (fig. 2).

In the Brunsviga, the figure disks are all mounted on a common horizontal axis, the figures being placed on the rim. On the side of each disk and rigidly connected with it lies its A-wheel with which it can turn independent of the others. The B-wheels, all fixed on another horizontal axis, gear directly on the A-wheels. By an ingenious contrivance the teeth are made to appear from out ol the rim to any desired number. The carrying mechanism, too, is different, and so arranged that the handle can be turned either way, no special setting being required for subtraction or division. It is extremely handy, taking up much less room than the others. Pro- fessor Eduard Selling of Wurzburg has invented an altogether different machine, which has been made by Max O.tt, of Munich. The B-wheels are replaced by lazy-tongs. To the joints of these the ends of racks are pinned ; and as they are stretched out the racks are moved forward o to 9 steps, according to the joints they are pinned to. The racks gear directly in the A-wheels, and the figures are placed on cylinders as in the Brunsviga. The carrying is done continuously

by a train of epicycloidal wheels. The working is thus rendered very smooth, without the jerks which the ordinary carrying tooth produces ; but the arrangement has the disadvantage that the resulting figures do not appear in a straight line, a figure followed by a 5, for instance, being already carried half a step forward. This is not a serious matter in the hands of a mathe- matician or an operator using the machine constantly, but it is serious for casual work. Anyhow, it has prevented the machine from being a commercial success, and it is not any longer made. For ease and rapidity of working it surpasses all others. _ Since the lazy-tongs allow of an extension equivalent to five turnings 91 the handle, if the multiplier is 5 or under, one push forward will do the

)

same as five (or less) turns of the handle, and more than two pushes are never required.

The Steiger-Egli machine is a multiplication machine, of which fig. 3 gives a picture as it appears to the manipulator. The lower „ H , part of the figure contains, under the covering plate, a

Hcatlaa carriage with two rows of windows for the figures marked machines ff and £«• 0n P ressin g down the button W the carriage can be moved to right or left. Under each window is a figure disk, as in the Thomas machine. The upper part has three

*nOno n O[i 0Q0 30 **

3 3 3 3 3 3

*«• 4 + * + **

T6 36 6 6 6 6

Sioilllaslillil

©@®®@® ®@

w o

*Tea**

t 1 2 a «

f o®°0Do®e®°@°@o®°@f c

gc&c@o® = ®'@'®<®«© ® < ®' : ® c ®' : ® c ®

j « s ♦

- *a 1 10 11 it 19 1**

Qito Srciger HonsW.EjIi Zurich*

Fig. 3.

sections. The one to the right contains the handle K for working the machine, and a button U for setting the machine for addition, multiplication, division, or subtraction. In the middle section a number of parallel slots are seen, with indices which can each be set to one of the numbers o to 9. Below each slot, and parallel to it, lies a shaft of square section on which a toothed wheel, the A-wheel, slides to and fro with the index in the slot. Below these wheels again lie 9 toothed racks at right angles to the slots. By setting the index in any slot the wheel below it comes into gear with one of these racks. On moving the rack, the wheels turn their shafts and the figure disks gg opposite to them. The dimensions are such that a motion of a rack through I cm. turns the figure disk through one " step " or adds I to the figure under the window. The racks are moved by an arrangement contained in the section to the left of the slots. There is a vertical plate called the multiplication table block, or more shortly, the block. From it project rows of horizontal rods of lengths varying from o to 9 centimetres. If one of these rows is brought opposite the row of racks and then pushed forward to the right through 9 cm., each rack will move and add to its figure disk a number of units equal to the number of centimetres of the rod which operates on it. The block has a square face divided into a hundred squares. Looking at its face from the right — i.e. from the side where the racks lie — suppose the horizontal rows of these squares numbered from o to 9, beginning at the top, and the columns num- bered similarly, the o being to the right; then the multiplication table for numbers o to 9 can be placed on these squares. The row 7 will therefore contain the numbers 63, 56, . . . 7, o. Instead of these numbers, each square receives two " rods " perpendicular to the plate, which may be called the units-rod and the tens-rod. Instead of the number 63 we have thus a tens-rod 6 cm. and a units- rod 3 cm. long. By aid of a lever H the block can be raised or lowered so that any row of the block

comes to the level of the racks, the units-rods being opposite the ends of the racks.

The action of the machine will be understood by considering an example. Let it be required to form the product 7 times 385. The indices of three consecutive slots are set to the numbers 3, 8, 5 respectively. Let the windows gg opposite these slots be called o, b, c. Then to the figures shown at these windows we have to add 21, 56, 35 respectively. This is the same thing as adding first the number 165, formed by the units of each place, and next 2530 corresponding to the tens; or again, as adding first 165, and then moving the carriage one step to the right, and adding 253. The first is done by moving the block with the units-rods opposite the racks forward. The racks are then put out of gear, and together with the block brought back to their normal position ; the block is moved sideways to bring the tens-rods opposite the racks, and again moved forward, adding the tens, the carriage having also been moved forward as required. This complicated movement, together with the necessary carrying, is actually performed by one turn of the handle. During the first quarter-turn the block moves forward, the units-rods coming into operation. During the second quarter-turn the carriage is put out of gear, and moved one step to the right while the necessary carrying is performed ; at the same time the block and the racks are moved back, and the block is shifted so as to bring the tens-rods opposite the racks. During the next two quarter-turns the process is repeated, the block ultimately returning to its original position. Multiplication by a number with more places

is' performed as in the Thomas. The advantage of this machine over the Thomas in saving time is obvious. Multiplying by 817 requires in the Thomas 16 turns of the handle, but in the Steiger-Egli only 3 turns, with 3 settings of the lever H. If the lever H is set to I we have a simple addition machine like the Thomas or the Brunsviga. The inventors state that the product of two 8-figure numbers can be got in 6-7 seconds, the quotient of a 6-figure number by one of 3 figures in the same time, while the square root to 5 places of a 9-figure number requires 18 seconds.

Machines of far greater powers than the arithmometers mentioned have been invented by Babbage and by Scheutz. A description is impossible without elabor- ate drawings. The following account will afford some idea of the working of Babbage's difference machine. Imagine a number of striking clocks placed in a row, each with only an hour hand, and with only the striking apparatus retained. Let the hand of the first clock be turned. As it comes opposite a number on

the dial the clock strikes that number of times. Let this clock be connected with the second in such a manner that by each stroke of the first the hand of the second is moved from one number to the next, but can only strike when the first comes to rest. If the second hand stands at 5 and the first strikes 3, then when this is done the second will strike 8 ; the

second will act similarly on the third,

and so on. Let there be four such clocks with hands set to the numbers 6, 6, 1,0 respectively. Now set the third clock striking I , this sets the hand of the fourth clock to 1 ; strike the second (6), this puts the third to 7 and the fourth to 8. Next strike the first (6) ; this moves the other hands to 12, 19, 27 respectively, and now repeat the striking of the first. The hand of the fourth clock will then give in succes- sion the numbers I, 8, 27, 64, &c, being the cubes of the natural numbers. The numbers thus obtained on the last dial will have the differences given by those shown in succession on the dial before it, their differences by the next, and so on till we come to the constant difference on the first dial. A function

y = o-i-bx--cx % --dx i --ex i

gives, on increasing x always by unity, a set of values for which the fourth difference is constant. We can, by an arrangement like the above, with five clocks calculate y for x = i, 2, 3, ... to any extent. This is the principle of Babbage's difference machine. The clock dials have to be replaced by a series of dials as in the arith- mometers described, and an arrangement has to be made to drive the whole by turning one handle by hand or some other power. Imagine further that with the last clock is connected a kind of type- writer which prints the number, or, better, impresses the number in a soft substance from which a stereotype casting can be taken, and we have a machine which, when once set for a given formula like the above, will automatically print, or prepare stereotype plates for the printing of, tables of the function without any copying or typesetting, thus excluding all possibility of errors. Of this " Difference engine," as Babbage called it, a part was finished in 1834, the government having contributed £17,000 towards the cost. This great expense was chiefly due to the want of proper machine tools.

Meanwhile Babbage had conceived the idea of a much more powerful machine, the " analytical engine," intended to perform any series of possible arithmetical operations. Each of these was to be communicated to the machine by aid of cards with holes punched in

them into which levers could drop. It was long taken for granted that Babbage left complete plans; the committee of the British Association appointed to consider this question came, however, to the conclusion (Brit. Assoc. Report, 1878, pp. 92-102) that no detailed working drawings existed at all ; that the drawings left were only diagrammatic and not nearly sufficient to put into the hands of a draughtsman for making working plans; and " that in the present state of the design it is not more than a theoretical possibility." A full account of the work done by Babbage in con- nexion with calculating machines, and much else published by others in connexion therewith, is contained in a work published by his son, General Babbage.

Slide rules are instruments for performing logarithmic'calcula- tions mechanically, and are extensively used, especially where only rough approximations are required. They are almost as old as logarithms themselves. Edmund Gunter drew a " logarithmic line " on his " Scales " as follows (fig. 4): — -On a line AB lengths are set off to scale to represent the common logarithms of the numbers 1 2 3 ... 10, and the points thus obtained are marked with these numbers.

SUde rules.

CALCULATING MACHINES

975

As log 1 = 0, the beginning A has the number i and B the number 10, hence the unit of length is AB, as log 10 = i. The same divi- sion is repeated from B to C. The distance 1,2 thus repre- sents log 2, 1,3 gives log 3, the distance between 4 and 5 gives log 5- log 4 = log £ , and so for others. In order to multiply two numbers, say 2 and 3, we have log 2X3 = log 2 + log 3. Hence, setting off the distance 1,2 from 3 forward by the aid of a pair

be performed. It is then convenient to make the scales circular. A number of rings or disks are mounted side by side on a cylinder, each having on its rim a log-scale.

The " Callendar Cable Calculator," invented by Harold Hastings and manufactured by Robert W. Paul, is of this kind. In it a number of disks are mounted on a common shaft, on which each turns freely unless a button is pressed down whereby

J

t t 3 » s s t a

I i l I

7T

*U «/’ al *l si k Ji Jel» rr*

OJr

-U-U,

I

3”- ‘A’ l6″

■ *hl.tl.l-.*

“KTT

— i 1 a »

■■ *1 1 l Mi*

-pnpTo

, y«<»i ? t ? 7 ? m

I’ll I

,1.1, J, ,1 J.I.

+h

I ‘ l’ ri f i n 1 1 i | ‘ i i’ i ‘ i l’i n ‘if ‘i ” i’ i r| 1

l / l | l f/ | l ” l | /. | l | |1u/ | l i l i}//i l i l il 1 l iVif| t [” r ””

Fig. 4.

of compasses will give the distance log 2+log 3, and will bring us to 6 as the required product. Again, if it is required to find £ of 7, set off the distance between 4 and 5 from 7 backwards, and the required number will be obtained. In the actual scales the spaces between the numbers are subdivided into 10 or even more parts, so that from two to three figures may be read. The numbers 2, 3. . . in the interval BC give the logarithms of 10 times the same numbers in the interval AB; hence, if the 2 in the latter means 2 or -2, then the 2 in the former means 20 or 2.

Soon after Gunter's publication (1620) of these " logarithmic lines," Edmund Wingate (1672) constructed the slide rule by repeating the logarithmic scale on a tongue or " slide," which could be moved along the first scale, thus avoiding the use of a pair of compasses. A clear idea of this device can be formed if the scale in fig. 4 be copied on the edge of a strip of paper placed against the line A C. If this is now moved to the right till its 1 comes opposite the 2 on the first scale, then the 3 of the second will be opposite 6 on the top scale, this being the product of 2 and 3; and in this position every number on the top scale will be twice that on the lower. For every position of the lower scale the ratio of the numbers on the two scales which coincide will be the same. Therefore multiplications, divisions, and simple proportions can be solved at once.

Dr John Perry added log log scales to the ordinary slide rule in order to facilitate the calculation of a or e x according to the formula log logo 1 = log log*

Many different forms of slide rules are now on the market. The handiest for general use is the Gravet rule made by Tavernier- Gravet in Paris, according to instructions of the mathematician V. M. A. Mannheim of the Ecole Polytechnique in Paris. It contains at the back of the slide scales for the logarithms of sines and tangents so arranged that they can be worked with the scale on the front. An improved form is now made by Davis and Son of Derby, who engrave the scales on white celluloid instead of on box-wood, thus greatly facilitating the readings. These scales have the distance from one to ten about twice that in fig. 4. Ta vernier- Gravet makes them of that size and longer, even § metre long. But they then become somewhat unwieldy, though they allow of reading to more figures. To get a handy long scale Professor G. Fuller has constructed a spiral slide rule drawn on a cylinder, which admits of reading to three and four figures. The handiest of all is perhaps the " Calculating Circle " by Boucher, made in the form of a watch. For various purposes special adaptations of the slide rules are met with — for instance, in various exposure meters for photo- graphic purposes. General Strachey introduced slide rules into the Meteorological Office for performing special calculations. At some blast furnaces a slide rule has been used for determining the amount of coke and flux required for any weight of ore. Near the balance a large logarithmic scale is fixed with a slide which has three indices only. A load of ore is put on the scales, and the first index of the slide is put to the number giving the weight, when the second and third point to the weights of coke and flux required.

By placing a number of slides side by side, drawn if need be to different scales of length, more complicated calculations may

the disk is clamped to the shaft. Another disk is fixed to the shaft. In front of the disks lies a fixed zero line. Let all disks be set to zero and the shaft be turned, with the first disk clamped, till a desired number appears on the zero line; let then the first disk be released and the second clamped and so on; then the fixed disk will add up all the turnings and thus give the product of the numbers shown on the several disks. If the division on the disks is drawn to different scales, more or less complicated calculations may be rapidly performed. Thus if for some purpose the value of say ab 3 V c is required for many different values of a, b, c, three movable disks would be needed with divisions drawn to scales of lengths in the proportion 1: 3: 5. The instrument

I now on sale contains six movable disks.

j Continuous Calculating Machines or Integrators. — In order to measure the length of a curve, such as the road on a map, a wheel is rolled along it. For one 'revolution of the wheel the path described by its point of contact is ro "ˆr& equal to the circumference of the wheel. Thus, if a cyclist counts the number of revolutions of his front wheel

j he can calculate the distance ridden by multiplying that number by the circumference of the wheel. An ordinary cyclometer is nothing but an arrangement for counting these revolutions, but it is graduated in such a manner that it gives at once the distance in miles. On the same principle depend a number of instruments which, under various fancy names, serve to measure the length of any curve; they are in the shape of a small meter chiefly for the use of cyclists. They all have a small wheel which is rolled along the curve to be measured, and this sets a hand in motion which gives the reading on a dial. Their accuracy is not very great, because it is difficult to place the wheel so on the paper that the point of contact lies exactly over a given point; the beginning and end of the readings are therefore badly defined. Besides, it is not easy to guide the wheel along the curve to which it should always lie tangentially. To obviate this defect more complicated curvometers or kartometers have been devised. The handiest seems to be that of G. Coradi. He uses two wheels; the tracing-point, halfway between them, is guided along the curve, the line joining the wheels being kept normal to the curve. This is pretty easily done by eye; a constant deviation of 8° from this direction produces an error of only 1%. The sum of the two readings

gives the length. E. Fleischhauer uses three, five or more wheels arranged symmetrically round a tracer whose point is guided along the curve; the planes of the wheels all pass through the tracer, and the wheels can only turn in one direction. The sum of the readings of all the wheels gives approximately the length of the curve, the approximation increasing with the number of the wheels used. It is stated that with three wheels practically useful results can be obtained, although in this case the error, if the instrument is consistently handled so as always to produce the greatest inaccuracy, may be as much as 5%.

Planimeters are instruments for the determination by mechani- cal means of the area of any figure. A pointer, generally called the "tracer," is guided round the boundary of the figure, and then the area is read off on the recording apparatus Sere™ of the instrument. The simplest and most useful is Amsler's (fig. 5). It consists of two bars of metal OQ and QT,

Fig

which are hinged together at Q. At is a needle-point which is driven into the drawing-board, and at T is the tracer. As this is guided round the boundary of the' figure a wheel

W mounted on QT rolls on the paper, and the turning of this wheel measures, to some known scale, the area. We shall give the theory of this instrument fully in an elementary manner by aid of geometry. The theory of other plani- meters can then be easily understood.

Consider the rod QT with the wheel W, without the arm OQ. Let it be placed with the wheel on the paper, and now moved per- pendicular to itself from AC to BD (fig. 6). The rod sweeps over, or generates, the area of the rectangle ACDB = lp, where / denotes the length of the rod and p the distance AB through which it has been moved. This distance, as measured by the rolling of the wheel, which acts as a curvometer, will be called the " roll " of the wheel and be denoted by w. In this case p = w, and the area P is given by F = wl. Let the circumfer- ence of the wheel be divided into say a hundred equal parts «; then w registers the number of «'s rolled over, and w therefore gives the number of areas iu contained in the rectangle. By suitably select- ing the radius of the wheel and the length 7, this area

lu may be any convenient unit, say a square inch or square centimetre. By changing I the unit will be changed. Again, suppose the rod to turn (fig. 7) about the end- Q, then will describe an arc of a circle, and the rod will generate an area

iP9, where is the angle AQB through which the rod has turned. The wheel will roll over an arc cO, where c is the distance of the wheel from Q. The "roll" is now w~c6; hence the area gen- erated is „ P II i~w,

and is again determined

by w.

Next let the rod be moved p IG _ » parallel to itself, but in a

!■' direction not perpendicular

to itself (fig_. 8). The wheel will now not simply roll. Consider a small motion of the rod from QT to QT'. This may be resolved into the motion to RR' perpendicular to the rod, whereby the rectangle QTR'R is generated, and the sliding of the rod along itself from RR' to Q'T'. During this second step no area will be generated. During the first step the roll of the wheel will be QR, whilst during the second step there

will be no roll at all. The — T T'

roll of the wheel will there- fore measure the area of the rectangle which eguals the parallelogram QTT'Q'. If the whole motion of the rod be considered as made up of a very great number of small steps, each resolved as stated, it will be seen that the roll again measures the area generated. But it has to be noticed that now the wheel does not only roll, but also slips, over the

Fig. 8.

paper. This, as will be pointed out later, may introduce an error in the reading.

We can now investigate the most general motion of the rod. We again resolve the motion into a number of small steps. Let (fig. 9) AB be one position, CD the next after a step so small that the arcs AC and BD over which the ends have passed may be considered as straight lines. The area generated is ABDC. This motion we resolve into a step from AB to CB', parallel to AB and a turning about C from CB' to

CD, steps such as have been investigated. During the first, the "roll" will be_* the altitude of the parallelogram; during the second will be cO. Therefore

w = p + c8.

Fig. 9.

7 h ? ˆ r „ ea , generated is lp+$P9, or, expressing p in terms of w,

lw + (iF-lc)6. For a finite motion we get the area equal to the sum

of the areas generated during

the different steps. But the

wheel will continue rolling,

and give the whole roll as

the sum of the rolls for the

successive steps. Let then

w denote the whole roll (in

fig. 10), and let o denote the

sum of all the small turnings

6; then the area is

P~lw + (hl-lc)a. (1) Here a is the angle which the last position of the rod makes with the first. In all applica- tions of the planimeter the rod is brought back to its original position. Then the angle a is either zero, or it is 2ir if the rod has been once turned quite round.*

Hence in the first case we have

P=to . (2a) and w gives the area as in case of a rectangle.

In the other case

p=to+rc . (26)

where C = (§l-c)2ir, if the rod has once turned round. The number C will be seen to be always the same, as it de- pends only on the dimen- sions of the instrument. Hence now again the area is determined by

wif C is known.

Thus it is seen that the area generated by the motion of the rod can be measured by the roll of the wheel ; it remains to show how any given area can be generated by the rod. Let the rod move in any manner but return to

*its original position. Q 5_*

and T then describe closed curves. Such motion may be called cyclical. Here the theorem holds:— If a rod QT performs a cyclical motion, then the area gener- ated equals the difference of the areas enclosed by the paths of T and Q respec- tively. The truth of this proposition will be seen from a figure. In fig. 11 different posit'ons of the

Fig. 10.

Fig 11.

moving rod QT have been marked, and its motion can be easily followed. It will be seen that every part of the area TT'BB' will be passed over once and always by a forward motion of the rod, whereby the wheel will increase its roll. The area AA'QQ' will also be swept over once, but with a backward roll ; it must therefore be counted as negative. The area between the curves is passed over twice, once with a forward and once with a backward roll; it therefore counts once positive and once negative ; hence not at all. In more complicated figures it may happen that the area within one of the curves, say TT'BB', is passed over several times, but then it will be passed over once more in the forward direction than in the backward one, and thus the theorem will still hold.

To use Amsler's planimeter, place the pole O on the paper outside the figure to be measured. Then the area generated by QT is that of

Fig. 12.

the figure, because the point Q moves on an arc of a circle to and fro enclosing no area. At the same time the rod comes back without making a complete rotation. We have therefore in formula (1) , o = o;

P = to,

which is read off. But if the area is too large the pole O may be placed within the area. The rod describes the area between the

boundary of the figure and the circle with radius r = OQ, whilst the rod turns once com- pletely round, making a=2x. The area measured by the wheel is by formula (i), lw + {%P-lc)2ir. To this the area of the circle 71T 2 must be added, so that now

P = lw + {W-lc)2ir + ->rr\ or

P = /a/ + C,

where C = (iP-fc)27r+«- 2 is a constant, as it depends on the dimensions of the instrument alone. This constant is given with each instrument.

Amsler's planimeters are made either with a rod QT of fixed length, which gives the area therefore in terms of a fixed unit, say in square inches, or else the rod can be moved in a sleeve to which the arm OQ is hinged (fig. 13). This makes it possible to change the unit lu, which is proportional

to /.

In the planimeters described the recording or integrating apparatus is a smooth wheel rolling on the paper or on some other surface. Amsler has described another recorder, viz. a wheel with a sharp edge. This will roll on the paper but not slip. Let the rod QT carry with it an arm CD perpendicular to it. Let there be mounted

Fig. 13.

Early forms.

Fig. 14.

on it a wheel W, which can slip along and turn about it. If now QT is moved parallel to itself to Q'T', then W will roll without slipping parallel to QT, and slip along CD. This amount of slipping will equal the perpendicular distance between QT and Q i , and therefore serve to measure the area swept over like the wheel in the machine already described. The turning of the rod will also produce slipping of the wheel, but it will be seen without difficulty that this will cancel during a cyclical motion of the rod, provided the rod does not

perform a whole rotation. . . , A

The first planimeter was made on the following principles :— A frame FF (fig. 15) can move parallel to OX. It carries a rod IT

movable along its own length, hence the tracer T can be guided along any curve ATB. When the rod has been pushed back to Q'Q, the tracer moves along the axis OX. On the frame a cone VCC is mounted with its axis sloping so that its top edge is horizontal and parallel to TT', whilst its vertex V is opposite Q'. As the frame moves it turns the cone. A wheel W is mounted on the rod at T', or on an axis parallel to and rigidly connected with it. This wheel rests on the top edge of the cone. If now the tracer T, when pulled out through a distance y above Q, be moved parallel to OX through a dis- tance dx, the frame moves through an equal distance, and the cone turns through an angle dff proportional to dx. The wheel W rolls on the cone to an amount again proportional to dx, and also proportional to t, its distance from V. Hence the roll of the wheel is proportional to the area ydx described by the rod QT. As T is moved fromA to B along the curve the roll of the wheel will therefore be proportional to the area AA'B'B. If the curve is closed, and the tracer moved round

it, the roll will measure the area independent of the position of the axis OX, as will be seen by drawing a figure. The cone may with advantage be replaced by a horizontal disk, with its centre at V; this allows of y being negative. It may be noticed at, once that the roll of the wheel givee at every moment the area AATQ. It

will therefore allow of registering a set of values of j ydx for any

values of x, and thus of tabulating the values of any indefinite integral. In this it differs from Amsler's planimeter. Planimeters of this type were first invented in 1814 by the Bavarian engineer Hermann, who, however, published nothing. They were reinvented by Prof. Tito Gonnella of Florence in 1 824, and by the Swiss engineer Oppikofer, and improved by Ernst in Paris, the astronomer Hansen in Gotha, and others (see Henrici, British Association Report, 1894). But all were driven out of the field by Amsler's simpler planimeter. Altogether different from the planimeters described is the hatchet planimeter, invented by Captain Prytz, a Dane, and made by Herr Cornelius Knudson

Hatchet plani- meters.

tr

in Copenhagen. It consists of a single rigid piece like fig. 16. The one end T is the tracer, the other Q has a sharp hatchet-like edge. If this is placed with QT on the paper and T is moved along any curve, Q will follow, describ- ing a " curve of pursuit." In consequence of the sharp

o

Fig. 16.

edge, Q"can only move in the direction of QT, but the whole can turn about Q. Any small step forward can therefore be considered as made up of a motion along QT, together with a turning about Q. The latter motion alone generates an area. If therefore a line OA = QT is turning about a fixed point O, always keeping parallel to QT, it will sweep over an area equal to that generated by the more general motion of QT. Let now (fig. 17) QT be placed on OA, and T be guided round the closed curve in the sense of the arrow. Q will describe a curve OSB. It may be made visible by putting a piece of " copying paper " under the hatchet. When T has returned to A the hatchet has the position BA. A line turning frorn OA about O kept parallel to QT will describe the circular sector OAC, which is equal in magnitude and sense to AOB. This therefore measures the area generated by the motion of QT. To make this motion cyclical, suppose the hatchet turned about A till Q comes from B to O. Hereby the sector AOB is again described, and again in the positive sense, if it is remembered that it turns about the tracer T fixed at A. The whole area now generated is therefore twice the area of this sect6r, or equal to OA. OB, where OB is measured along the arc. According to the theorem given above, this area also equals the area of the given curve less the area OSBO. To make this area disappear, a slight modification of the motion of QT is required. Let the tracer T be moved, both from the first position OA and the last BA of the rod, along some straight line AX. Q describes curves OF and BH respectively. Now begin the motion with T at some point R on AX, and move it along this line to A, round the curve and back to R. Q will describe the curve DOSBED, if the motion is again made cyclical by turning QT with T fixed at A. If R is properly selected, the path of Q will cut itself, and parts of the area will be positive, parts negative, as marked in the figure, and may there- fore be made to vanish. When this, is done the area of the curve will equal twice the area of the sector RDE. It is therefore equal to the arc DE multiplied by the lengtt QT; if the latter equals 10 in., then 10 times the number of inche contained in the arc DE gives the number of square inches contained within the given figure. If the area is not too large, the arc

DB may be replaced by the straight line DE.

To use this simple instrument as a planimeter requires the possibility of selecting the point R. The geometrical theory here given has so far failed to give any rule. In fact, every line through any point in the curve contains such a point. The analytical theory of the inventor, which is very similar to that given by F. W. Hill (Phil. Mag. 1894), is too complicated to repeat here. The integrals expressing the area generated by QT have to be expanded in a series. By retaining only the most important terms a result is obtained which comes to this, that if the mass-centre of the area be taken as R, then A may be any point on the curve. This is only approximate. Captain Prytz gives the following instructions : — Take a point R as near as you can guess to the mass-centre, put the tracer T on it, the knife-edge Q outside; make a mark on the paper by pressing the knife-edge into it ; guide the tracer from R along a straight line to a point A on the boundary, round the boundary.

Inte- grators.

and back from A to R; lastly, make again a mark with the knife-edge, and measure the distance c between the marks; then the area is nearly cl, where I = QT. A nearer approximation is obtained by repeating the operation after turning QT through 180° from the original posi- tion, and using the mean of the two values of c thus obtained. The greatest dimension of the area should not exceed \l, otherwise the area must be divided into parts which are determined separ- ately. This condition being fulfilled, the instrument gives very satisfactory results, especially if the figures to be measured, as irj the case of indicator diagrams, are much cf the same shape, for in this case the operator soon learns where to put the point R.

Integrators serve to evaluate a de- finite integral (J(x)dx. If we plot out

the curve whose equation is

y— /(*)) ˆe integral J ydx between the proper limits represents the area of a figure bounded by the curve, the axis of x, and the ordinates at x = a, x = b. Hence if the curve is drawn, any planimeter may be used for finding the value of the integral. In this sense planimeters are inte- grators. In fact, a planimeter may often be used

with advantage to solve problems more complicated than the determination of a mere area, by con- verting the one problem graphically into the other. We give an example : —

Let the problem be to determine for the figure ABG (fig. 1 8), not only the area, but also the first and second moment with regard to the axis XX. At a distance a draw a line, CD', parallel to XX. In the figure draw a number of lines parallel to AB. Let CD be one of them. Draw C and D vertically upwards to CD', join these points to some point O in XX, and mark the points C1D1 where OC and OD' cut CD. Do this for a sufficient number of lines, and join the points ODi thus obtained. This gives a new curve, which may be called the first derived curve. By the same process get a. new curve from this, the second derived curve. By aid of a plani- meter determine the areas P, Pi, P 2 , of these three curves. Then, if x is the distance of the mass-centre of the given area from XX; Xi the same quantity for the first derived figure, and I=A£ 2 the moment of inertia of the first figure, k its radius of gyration, with regard to XX as axis, the following relations are easily proved : —

Px = aPi ; PjXi = aP 2 ; I = oPj-Ci = a 2 PiP 2 ; k = xx u which determine P, * and I or k. Amsler has constructed an inte- grator which serves to determine these quantities by guiding a*

carriage which runs on a straight rail (fig. 19). This carries a hori- zontal disk A, movable about a vertical axis Q. Slightly more than half the circumference is circular with radius 20, the other part with

*C_*

-x « 1 J –

:\ l\ g /; /

tracer once round the boundary of the given figure (see below). Again, it may be required to find the value of an integral

J y4 > (x)dx between given limits where ˆ(x) is a simple function like

sin nx, and where y is given as the ordinate of a curve. The har- monic analysers described below are examples of instruments for evaluating such integrals.

Amsler has modified his planimeter in such a manner that instead of the area it gives the first or second moment of a figure about an axis in its plane. An instrument giving all three quantities simul-

taneously is known as Amsler's integrator or moment-planimeter. It has one tracer, but three recording wheels. It is mounted on a

Amsler's inte- grator.

Fig. 19.

radius 3

— X

Fig. 20.

*and T 2 , and in the direction of the axes of the wheels. Then these arms with their wheels will again be planimeters. As T is guided round the given figure F, these points Ti and T 2 will describe closed curves, F! and F 2 , and the " rolls " of Wi and W 2 will give their areas Ai and A 2 . Let XX (fig. 20) denote the line, parallel to the rail, on which O moves; then when T lies on this line, the arm BTi is perpendicular to XX, and CT 2 parallel to it. If OT is turned through an angle 0, clockwise, BTi will turn counter-clockwise through an angle 20, and CT 2 through an angle 30, also counter- clockwise. If in this position T is moved through a distance * parallel to the axis XX, the points Ti and T 2 will move parallel to it through an equal distance. If now the first arm is turned through a small angle d6, moved back through a distance x, and lastly turned back through the angle d6, the tracer T will have described the boundary ot a small strip of area. We divide the given figure into*

such strips. Then to every such strip will correspond a strip of equal length x of the figures described by Tj and T 2 .

The distances of the points, T, Ti, T 2 , from the axis XX may be called y, y u y 2 . They have the values

y = /sin 0, yi=/cos 20, y 2 = —/sin 39, from which

dy = lcos0.de, dyi= —2lsin2e.de, dy 2 = —3I cos $6.dd. The areas of the three strips are respectively

dA = xdy, dAi = xdyi, dA 2 = xdyi. Now dyi can be written dyi= — 4/ sin cos 6dd=— 4 sin edy; therefore

dAi = —4 sin B.dA = — -,ydA;

whence

A 1 = -7J r ˆA = -4Aj,

where A is the area of the given figure, and y the distance of its mass-centre from the axis XX. But Ai is the area of the second figure Fi, which is proportional to the reading of Wi. Hence we may say _

Ay = C1W1, where O is a constant depending on the dimensions of the instrument. The negative sign in the expression for Ai is got rid of by numbering the wheel Wi the other way round. Again

dy2 = -2>l cos 6 {4 cos 2 0-T,\de = -3 {4 cos 2 0-3}dy

which gives

—3Jfc-3:

dy,

and

dki = — -pyHA + qdA,

A2 = -7?jV

But the integral gives the moment of inertia I of the area A about the axis XX. As A 2 is proportional to the roll of w 2 , A to that of W, we can write

I = Ca> — C2W2, Ay = CiOii, A = Ccw. If a line be drawn parallel to the axis XX at the distance y, it will pass through the mass-centre of the given figure. If this represents the section of a beam subject to bending, this line gives for a proper choice of XX the neutral fibre. The moment of inertia for it will be I + Ay 2 . Thus the instrument gives at once all those quantities which are required for calculating the strength of the beam under bending. One chief use of this integrator is for the calculation of the displacement and stability of a ship from the drawings of a number of sections. It will be noticed that the length of the figure in the direction of XX is only limited by the length of the rail.

This integrator is also made in a simplified form without the wheel W 2 . It then gives the area and first moment of any figure.

While an integrator determines the value of a definite integral, hence a

mere constant, an integraph

gives the value of an indefinite

integral, which is a function of x. Analytically if y is a given function f(x) of x and

Y = j 'ydx or Y = j ycfc + const.

the function Y has to be determined from the condition

dY

dx- = y-

Graphically y = /(«) if a curve, is drawn

tangent to the curve, and the axis of x. becomes

Our condition therefore

E,—"

tan = -•

This is eisily constructed for any given point on the y-curve : — From the foot B' (fig. 21) of the ordinate y = B'B set off, as in the figure, B'B = a, then angle BDB' = tf>. Let now DB' with a perpendicular B'B move along the axis of x, whilst B follows the y-curve, then a pen P on B'B will describe the Y-curve pro- vided it moves at every moment in a direction par- allel to BD. The object of the integraph is to draw this new curve when the tracer of the instrument is guided along the y-curve.

The first to describe such instruments was Abdank- Abakanowicz, who in 1889 published a. book in which a variety of mechanisms to obtain the object in question are described. Some years later G. Coradi, in Zurich, carried^ out his ideas. Before this was done, C. V. Boys, without knowing of Abdank-Abakanowicz's work, actually made an inte- graph which was exhibited at the Physical Society in 1881. Both make use of a sharp edge wheel. Such a wheel will not slip sideways ; it will roll forwards along the line in which its plane intersects the plane of the paper, and while rolling will be able to turn gradually about its point of contact. If then the angle between

its direction of rolling and the tf-axis be always equal to , the wheel will roll along the Y-curve required. The axis of x is fixed only in direction; shifting it parallel to itself adds a constant to Y, and this gives the arbitrary constant of integration.

In fact, if Y shall vanish for x-c, or if

Y =

B'

Fig. 21.

= J "ydx,

then the axis of x has to be drawn through that point on the y-curve which corresponds to x = c.

In Coradi's integraph a rectangular frame FiF 2 F 3 Fi (fig. 22)

Inte- graphs.

is a length.

or the graph : y, therefore, _ dY . But Tx 1S

either given by of the equation and similarly Y,

in this case a mere number, and cannot

equal a length y. Hence we introduce an arbitrary constant length a, the unit to which the integraph draws the curve, and write

dY _y

dx dY dx

*= *■ and oY*

= j ydx.

Now for the Y-curve ˆ = tan <>, where £ is the angle between the*

Fig. 22.

rests with four rollers R on the drawing board, and can roll freely in the direction OX, which will be called the axis of the instrument. On the front edge P1F2 travels a carriage AA' supported at A' on

another rail. A bar DB can turn about D, fixed to the frame in its axis, and slide through a point B fixed in the carriage AA'. Along it a block K can slide. On the back edge F3F4 of the frame another carriage C travels. It holds a vertical spindle with the knife-edge wheel at the bottom. At right angles to the plane o) the wheel, the spindle has an arm GH, which is kept parallel to a

similar arm attached to K perpendicular to DB. The plane of the knife-edge wheel r is therefore always parallel to DB. If now the point B is made to follow a curve whose y is measured from OX, we have in the triangle BDB', with the angle at D,

tan 4 > — yla, where a = DB' is the constant base to which the instrument works. The point of contact of the wheel r or any point' of the carriage G will therefore always move in a direction making art angle with the axis of x, whilst it moves in the ˆ-direction through the same distance as the point B on the y-curve — that is to say, it will trace out the integral curve required, and so will any point rigidly con- nected with the carriage C. A peri P attached to this carriage will therefore draw the integral curve. Instead of moving B along the y-curve, a tracer T fixed to the carriage A is guided along it. For using the instrument the carriage is placed on the drawing-board with the front edge parallel to the axis of y, the carriage A being clamped in the central position with A at E and B at B' on the axis of x. The tracer is then placed on the x-axis of the y-curve and clamped to the carriage, and the instrument is ready for use. As it is convenient to have the integral curve placed directly opposite to the y-curve so that corresponding values of y or Y are drawn on the same line, a pen P' is fixed to C in a line with the tracer.

Boys' integraph was invented during a sleepless night, and during the following days carried out as a working model, which gives highly satisfactory results. It is ingenious in its simplicity, and a direct realization as a mechanism of the principles explained in connexion with fig. 21. The line B'B is represented by the edge of an ordinary T-square sliding against the edge of a drawing-board. The points B and P are connected by two rods BE and EP, jointed at E. At B, E and P are small pulleys of equal diameters. Over these an endless string runs, ensuring that the pulleys at B and P always turn through equal angles. The pulley at B is fixed to a rod which passes through the point D, which itself is fixed in the T-square. The pulley at P carries

the knife-edge wheel. If then B and P are kept on the edge of the T-square, and B is guided along the curve, the wheel at P will roll along the Y-curve, it having been originally set parallel to BD. To give the wheel at P sufficient grip on the paper, a small loaded three-wheeled carriage, the knife-edge wheel P being one of its wheels, is added. If a piece of copying paper is in- serted between the wheel P and the drawing paper the Y-curve is drawn very sharply.

Integraphs have also been constructed, by aid of which ordinary differential equations, especially linear ones, can be solved, the solution being given as a curve. The first suggestion in this direction was made by Lord Kelvin. So far no really useful instrument has been made, although the ideas seem sufficiently developed to enable a skilful instrument rinaker to produce one should there i>e sufficient demand for it. Sometimes a combination of graphical work with an integraph will serve the purpose. This is the case if the variables are separated, hence if the equation

Xdx+Ydy = has to he integrated where ~X = p(x), Y = <£(y) are given as curves. If we write

au= \Xdx, av = jYdy,

then u as a function of x, and rasa function of y can be graphically found by the integraph. The general solution is then

*u+v = c with the condition, for the determination for c, that y = yo, for x = x . This determines £ = «j>-f-»o, where «o and !),, are known from the graphs of u and v. From this the solution as a curve giving y a function of * can be drawn :— For any x take u from its graph, and find the y for which v = c-u, plotting these y against their * gives the curve required.*

If a periodic function y of x is given by its graph for one period c, it can, according to the theory of Fourier's Series; be expanded in a series.

y = Ao+Aicose+A 2 cos2e+ . . . +A n cos«0-|- . . . +B,sin9+B 2 sin2 0+ . . . +B,,sinra0-f i . . .

where = — -•

The absolute term Ao equals the mean ordinate of the curve, and can therefore be determined by any planimeter. The other co- efficients are

A, = i)1

'sir

y cos nO.dd;

irj (

27T

y sin nO.dd.

A harmonic analyser is an instrument which determines these integrals, and is therefore an integrator. The first instrument of this kind is due to Lord Kelvin (Proc Roy. Soc, vol. xxiv., 1876). Since then several others have been invented (see Dyck's Catalogue; Henrici, Phil. Mag., July 1894; Phys. Soc, 9th March; Sharp, Phil. Mag., July 1894; Phys. Soc, 13th April). In Lord Kelvin's instrument the curve to be analysed is drawn on a cylinder whose circumference equals the period c, and the sine and cosine terms of the integral are introduced by aid of simple harmonic motion. Sommerfeld and Wiechert, of Konigsberg, avoid this motion by turning the cylinder about an axis perpendicular to that of the cylinder. Both these machines are large, and practically fixtures in the room where they are used. The first has done good work in the Meteoro- logical Office in London in the analysis of meteorological curves. Quite different and simpler constructions can be used, if the integrals determining A,, and B,, be integrated by parts. This gives

»A,

/27T ,1tf

sin nB.dy; »B„ = -| cos.n6.dy. o V o

An analyser presently to be described, based on these forms, has been constructed by Coradi in Zurich (1894). Lastly, a most powerful analyser has been invented by Michelson and Stratton (U.S.A.) {Phil. Mag., 1898), which will also be described.

The Henrici-Coradi analyser has to add up the values of dy. sin nO and dy. cos nd. But these are the components of dy in two directions perpendicular to each other, of which one makes an angle nd with the axis of x or of 0. This decomposition can be performed by Amsler's registering wheels. Let two of these be mounted, perpendicular to each other, in one horizontal frame which can be

Harmonic analysers.

Fig. 23.

turned about a vertical axis, the wheels resting on the paper on which the curve is drawn. When the tracer is placed on the curve at the point 8 = the one axis is parallel to the axis of 8. As the tracer follows the curve the frame is made to turn through an angle nd. At the same time the frame moves with the tracer in the direction of y. For a small motion the two wheels will then register just the components required, and during the continued motion of the tracer along the curve the wheels will add these components, and thus give the values of nA n and «B„. The factors i/?r and i/ir are taken account of in the graduation of the wheels. The readings have then to be divided by n to give the coefficients required. Goradi's realization of this idea will be understood from fig. 23. The frame PP' of the instrument rests on three rollers E, E', and D. The first two drive an axis with a disk C on it. It is placed parallel to the axis of x of the curve. The tracer is attached to a carriage WW which runs on the rail P. As it follows the curve this carriage moves through a distance x whilst the whole instrument runs forward through a distance y. The wheel C turns through an angle propor tional, during each small motion, to dy. On it rests a glass sphere which will therefore also turn about its horizontal axis proportionally, to dy. The registering frame is suspended by aid of a spindle S, having a disk H. It is turned by aid of a wire connected with the carriage WW, and turns n times round as the tracer describes the whole length of the curve. The

registering wheels R, R' rest against the glass sphere and give the values raA„ and reB„. The value of » can be altered by changing the disk H into one of different diameter. It is also possible to mount on the same frame a number of spindles with registering wheels and glass spheres, each of the latter resting on a separate disk C. As many as five have been introduced. One guiding of the tracer over the curve gives then at once the ten coefficients A„ and B„ for n — 1 to 5.

All the calculating machines and integrators considered so far have been kinematic. We have now to describe a most remarkable instrument based on the equilibrium of .a rigid body under the action of springs. The body itself for rigidity's sake is made a hollow

CALCUTTA

981

cylinder H, shown in fig. 24 in end view. It can turn about its axis,

being supported on knife-edges O. To it springs are attached at the

prolongation of a horizontal diameter; to the left a series

Mlchelson Q j n sma \[S p r ; n g S Sl all alike, side by side at equal in-

**° tervals at a distance a from the axis of the knife-edges ;*

aal°"r to the right a single spring S at distance; 6, These springs

' are supposed to follow Hooke's law. If the elongation

beyond the natural length of a spring is X, the force asserted by

it is p = k. Let for the position of equilibrium /, L be respectively

the elongation of a small and the large spring, k, K their constants,

then

nhla = KLb.

The position now obtained will be called the normal one. Now let the top ends C of the small springs be raised through distances Vu yi<— yn- Then the body H will turn; B will move down

through a distance z and A up through a distance j-z. The new

forces thus introduced will be in equilibrium if

Or

ok (2y — n ,-z j = bKz. Xy

‘ a , 6K n b+ak ”

*< *+a-*

This shows that the displacement z of B is proportional to the sum of the displacements y of the tops of the small springs. The arrangement can therefore be used for the addition of a number of displacements. The instrument made has eighty small springs, and the authors state that from the experience gained there is no impossibility

*of increasing their number even to a thousand. The displacement z, which neces- sarily must be small, can be enlarged by aid of a lever OT’. To regulate the dis- placements y of the points C (fig. 24) each spring is attached to a lever EC, ful- crum E. To this again a long rod FG is fixed by aid of a joint at F. The lower end of this rod rests on another lever GP, fulcrum N, at a changeable distance j” = NG from N. The elon- gation y of any spring s can thus be produced by a motion of P. If P be raised through a distance y’, then the displacement y of C will be pro- portional to y’y”; it is, say, equal to ny’y” where n is the same for all springs. Now let the points C, and with it the springs s, the levers, &c. , be numbered Co, Ci, C 2 . . . There will be a zero-position for the points P all in a straight horizontal line. When in this position the points C will also be in a line, and this we take as axis of x. On it the points Co, Ci, C 2 . . . follow at equal distances, say each equal to h. The point Ck lies at the distance kh which gives the * of this point. Suppose now that the rods FG are all set at unit distance NG from N, and that the points P be raised so as to form points in a continuous curve y’ = =#(*), then the points C will lie in a curve y = ii(x). The area of this curve is*

M I {x)dx.

Approximately this equals ~Zhy = hXy. Hence we have

Fig. 24.

/:

4>{x)dx = -Xy = — z,

where z is the displacement of the point B which can be measured. The curve y' = 4>(x) may be supposed cut out as a templet. By putting this under the points P the area of the curve is thus determined — the instrument is a simple integrator.

The integral can be made more general by varying the distances NG = y\ These can beset to form another curve y" =/(*). Wehave now y = py'y" = nf(x)(x) , and get as before

/;

f(x)4>(x)dx= — z.

These integrals are obtained by the addition of ordinates, and therefore by an approximate method. But the ordinates . are numerous, there being 79 of them, and the results are in consequence very accurate. The displacement z of B is small, but it can be magnified by taking the reading of a point T' on the lever AB. The actual reading is done at point T connected with T' by a long vertical rod. At T either a scale can be placed or a drawing-board, on which a pen at T marks the displacement.

; If the points G are set so that the distances NG on the different levers are proportional to the terms of a numerical series

«0 + «l+«2-f • • •

and if all P be moved through the same distance, then z will be proportional to the sum of this series up to 80 terms. We get an Addition Machine.

*The use of the machine can, however, be still further extended. Let a templet with a curve 'y' = *#('{) be set under each point P at right angles to the axis of x hence parallel to the plane of the figure. Let these templets form sections of a continuous surface, then each section parallel to the axis of x will form a curve like the old y' = 4>(x), but with a variable parameter £, or y' = #({, x). For each value of £ the displacement of T will' give the integral*

Y=-f'jbW&)dx-F®,

(i)

where Y equals the displacement of T to some scale dependent on

the constants of the instrument.

,. If the whole block of templets be now pushed under the points P

and if the drawing-board be moved at the same rate, then the pen T

will draw the curve Y = F({). The instrument now is an inlegraph

giving the value of a definite integral as function of a variable

parameter.

Having thus shown how the lever with its springs can be made to serve a variety of purposes, we return to the description of the actual instrument constructed. The machine serves first of all to sum up a series of harmonic motions or to draw the Curve

Y=di cos x+02 cos 2x+a 3 cos 3+ . . (2)*

The motion of the points P1P2 ... is here made harmonic by aid of a series of excentric disks arranged so that for one revolution of the first the other disks complete 2, 3, . . . revolutions. They are all driven by one handle. These disks take the place of the templets described before. The distances NG are made equal to the amplitudes a it aˆ, 03, . . . The drawing-board, moved forward by the turning of the handle, now receives a curve of which (2) is the equation. If all excentrics are turned through a right angle a sine-series can be added up.

It is a remarkable fact that the same machine can be used as a harmonic analyser of a given curve. Let the curve to be analysed be set off along the levers NG so that in the old notation it is

whilst the curves y' = {x£) are replaced by the excentrics, hence | by the angle through which the first excentric is turned, so that y k — cos k6. But kh = x and nh = w, n being the number of springs s, and 7r taking the place of c. This makes

keˆ.x.

■*K*

Hence our instrument draws a curve which gives the integral (f) in the form

y—\ x /()cos (-0) dx

as a function of 8. But this integral becomes the coefficient a m in the cosine expansion if we make

6n/w = m or 8 = nnr/n. The ordinates of the curve at the values 8=w/n, 2ir/n . . . give therefore all coefficients up to m = 80. The curve shows at a glance which and how many of the coefficients are of rmportance.

The instrument is described in Phil. Mag., vol. xlv., 1898. A number of curves drawn by it are given, and also examples of the analysis of curves for which the coefficients a m are known. These indicate that a remarkable accuracy is obtained. (0. H.)

CALCUTTA, the capital of British India and also of the province of Bengal. It is situated in 22 34′ N. and 88° 24′ E., on the left or east bank of the Hugli, about 80 m. from the sea. Including its suburbs it covers an area of 27,267 acres, and contains a population (1901) of 949,144. Calcutta and Bombay have long contested the position of the premier city of India in population and trade; but during the decade 1891-1901 the prevalence of plague in Bombay gave a considerable advantage to Calcutta, which was comparatively free from that disease. Calcutta lies only some 20 ft. above sea-level, and extends about 6 m. along the Hugli, and is bounded elsewhere by the Circular Canal and the Salt Lakes, and by suburbs which form separate municipalities. Fort William stands in its centre.

Public Buildings. — Though Calcutta was called by Macaulay ” the city of palaces,” its modern public buildings cannot compare with those of Bombay. Its chief glory is the Maidan or park, which is large enough to embrace the area of Fort William and a racecourse. Many monuments find a place on the Maidan, among them being modern equestrian statues of Lord Roberts and Lord Lansdowne, which face one another on each side of the Red Road, where the rank and

fashion of Calcutta take their evening drive. In the north- eastern corner of the Maidan the Indian memorial to Queen Victoria, consisting of a marble hall, with a statue and historical relics, was opened by the prince of Wales in January 1906. The government acquired Metcalfe Hall, in order to convert it into a public library and reading-room worthy of the capital of India; and also the country-house of Warren Hastings at Alipur, for the entertainment of

Indian princes. Lord Curzon restored, at his own cost, the monument which formerly com- memorated the massacre of the Black Hole, and a tablet let into the wall of the general post office indicates the position of the Black Hole in the north-east bastion of Fort William, now occupied by the ■ roadway. Government House, which is situated near the Maidan and Eden Gardens, is the residence of the viceroy; it was built by Lord Wellesley in 1799, and is a fine pile situated in grounds covering six acres, and modelled upon Kedleston Hall in Derbyshire, one of the Adam buildings. Belvedere House, the official residence of the lieutenant-governor of Bengal, is situated close to the botanical gardens in Alipur, the southern suburb of Calcutta. Facing the Maidan for a couple of miles is the Chowringhee, one of the famous streets of the world, once a row of palatial residences, but now given up almost entirely to hotels, clubs and shops.

Commerce. — Calcutta owes its commercial prosperity to the fact that it is situated near the mouth of the two great river systems of the Ganges and Brahmaputra. It thus receives the produce of these fertile river valleys, while the rivers afford a cheaper mode of conveyance than any railway. In addition Calcutta is situated midway between Europe and the Far East and thus forms a meeting-place for the commerce and peoples of the Eastern and Western worlds. The port of Calcutta is one of the busiest in the world, and the banks of the Hugli rival the port of London in their show of shipping. The total number of arrivals and departures during 1904-1905 was 3027 vessels with an average tonnage of 3734. But though the city is such a busy commercial centre, most of its industries are carried on outside municipal limits. Howrah, on the opposite side of the Hugli, is the terminus of three great railway systems, and also the headquarters of the jute industry and other large factories. It is connected with Calcutta by an immense floating bridge, 1530 ft. in length, which was constructed in 1874. Other railways have their terminus at Sealdah, an eastern suburb. The docks lie outside Calcutta, at Kidderpur, on the south; and at Alipur are the zoological gardens, the residence of the lieutenant-governor of Bengal, cantonments for a native infantry regiment, the central gaol and a government reforma- tory. The port of Calcutta stretches about 10 m. along the river. It is under the control of a port trust, whose jurisdiction extends to the mouth of the Hugli and also over the floating bridge. New docks were opened in 1892, which cost upwards of two millions sterling. The figures for the sea-borne trade of Calcutta are included in those of Bengal. Its inland trade is carried on by country boat, inland steamer, rail and road, and amounted in

1904-190 5 to about four and three quarter millions sterling. More than half the total is carried by the East Indian railway, which serves the United Provinces. Country boats hold their own against inland steamers, especially in imports.

Municipality. — The municipal government of Calcutta was reconstituted by an act of the Bengal legislature, passed in '899. Previously, the governing body consisted of seventy-five com- missioners, of whom fifty were elected. Under the new system modelled upon that of the Bombay municipality, this body, styled the corporation, remains comparatively unaltered; but a large portion cf their powers is transferred to a general com- mittee, composed of twelve members, of whom one-third are elected by the corporation, one-third by certain public bodies and one-third are nominated by the government. At the same time, the authority of the chairman, as supreme executive officer, is considerably strengthened. The two most important works undertaken by the old municipality were the provision of a supply of filtered water and the construction of a main drainage system. The water-supply is derived from the river

Hugli, about 16 m. above Calcutta, where there are large pumping-stations and settling-tanks. The drainage-system consists of underground sewers, which are discharged by a pumping-station into a natural depression to the eastward, called the Salt Lake. Refuse is also removed to the Salt Lake by means of a municipal railway.

Education. — The Calcutta University was constituted in 1857, as an examining body, on the model of the university of London. The chief educational institutions are the Government Presidency College; three aided missionary colleges, and four unaided native colleges; the Sanskrit College and the Mahommedan Madrasah; the government medical college, the government engineering college at Sibpur, on the opposite bank of the Hugli, the govern- ment school of art, high schools for boys, the Bethune College and high schools for girls.

Population. — The population of Calcutta in 1 7 1 o was estimated at 12,000, from which figure it rose to about 117,000 in 1752. In the census of 1831 it was 187,000, in 1839 it had become 229,000 and in 1901, 949,144. Thus in the century between 1 801 and 1 901 it increased sixfold, while during the same period London only increased fivefold. Out of the total population of town and suburbs in 1901, 615,000 were Hindus, 286,000 Mahommedans and 38,000 Christians.

Climate and Health. — The climate of the city was originally very unhealthy, but it has improved greatly of recent years with modern sanitation and drainage. The climate is hot and damp, but has a pleasant cold season from November to March. April, May and June are hot; and the monsoon months from June to October are distinguished by damp heat and malaria. The mean annual temperature is 79 F., with a range from 85 in the hot season and 83 in the rains to 72 in the cool season, a mean maximum of 102° in May and a mean minimum of 48 in January. Calcutta has been comparatively fortunate in escaping the plague. The disease manifested itself in a sporadic form in April 1898, but disappeared by September of that year. Marty of the Marwari traders fled the city, and some trouble was experienced in shortage of labour in the factories and at the docks. The plague returned in 1899 and caused a heavy mortality during the early months of the following year; but the population was not demoralized, nor was trade interfered with. A yet more serious outbreak occurred in the early months of 1901, the number of deaths being 7884. For three following years the totals were (1902-1903) 7284; (1903-1904) 8223; and (1904-1905) 4689; but these numbers compared very favourably with the condition of Bombay at the same time.

History. — The history of Calcutta practically dates from the 24th of August 1690, when it was founded by Job Charnock (<7.i>.)of the English East India Company. In 1596 it had obtained a brief entry as a rent-paying village in the survey of Bengal executed by command of the emperor Akbar. But it was not till ninety years later that it emerged into history. In 1686 the English merchants at Hugli under Charnock's leadership, finding themselves compelled to quit their factory in consequence of a rupture with the Mogul authorities, retreated about 26 m. down the river to Sutanati, a village on the banks of the Hugli, now within the boundaries of Calcutta. They occupied Sutanati temporarily in December 1686, again in November 1687 and permanently on the 24th of August 1690. It was thus only at the third attempt that Charnock was able to obtain the future capital of India for his centre and the subsequent prosperity of Calcutta is due entirely to his tenacity of purpose. The new settlement soon extended itself along the river bank to the then village of Kalikata, and by degrees the cluster of neighbouring hamlets grew into the present town. In T696 the English built the original Fort William by permission of the nawab, and in 1698 they formally purchased the three villages of- Sutanati, Kalikata and Govindpur from Prince Azim, son of the emperor Aurangzeb.

The site thus chosen had an excellent anchorage and was defended

by the river from the Mahrattas, who harried the districts on the other side. /The fort, subsequently rebuilt on the Vauban principle, and a moat, designed to form a semicircle

round the town, and to be connected at both ends with the river, but never completed, combined with the natural position of Calcutta to render it one of the safest places for trade in India during the expiring struggles of the Mogul empire. It grew up without any fixed plan, and with little regard to the sanitary- arrangements required for a town. Some parts of it lay below high-water mark on the Hugh, and its low level throughout rendered its drainage a most difficult problem. Until far on in the 18th century the malarial jungle and paddy fields closely hemmed in the European mansions; the vast plain (maiddn), now covered with gardens and promenades, was then a swamp during three months of each year; the spacious quadrangle known as Wellington Square was built upon a filthy creek. A legend relates how one-fourth of the European inhabitants perished in twelve months, and during seventy years the mortality was so great chat the name of Calcutta, derived from the village of Kalikata, was identified by mariners with Golgotha, the place of a skull.

The chief event in the history of Calcutta is the sack of the town, and the capture of Fort William in 1756, by Suraj-ud- Dowlah, the nawab of Bengal. The majority of the English officials took ship and fled to the mouth of the Hugli river. The Europeans, under John Zephaniah Holwell, who remained were compelled, after a short resistance, to surrender themselves to the mercies of the young prince. The prisoners, numbering 146 persons, were forced into the guard-room, a chamber measure- ing only 18 ft. by 14 ft. 10 in., with but two small windows, where they were left for the night. It was the 20th of June; the heat was intense; and next morning only 23 were taken out alive, among them Holwell, who left an account of the awful sufferings endured in the " Black Hole." The site of the Black Hole is now covered with a black marble slab, and the incident is commemorated by a monument erected by Lord Curzon in 1902. The Mahommedans retained possession of Calcutta for about seven months, and during this brief period the name of the town was changed in official documents to Alinagar. In January 1757 the expedition despatched from Madras, under the command of Admiral Watson and Colonel Clive, regained possession of the city. They

found many of the houses of the English residents demolished and others damaged by fire. The old church of St John lay in ruins. The native portion of the town had also suffered much. Everything of value had been swept away, except the merchandise of the Company within the fort, which had been reserved for the nawab. The battle of Plassey was fought on the 23rd of June 1757, exactly twelve months after the capture of Calcutta. Mir Jafar, the nominee of the English, was created nawab of Bengal, and by the treaty which raised him to this position he agreed to make restitution to the Calcutta merchants for their losses. The English received £500,000, the Hindus and Mahommedans £200,000, and the Armenians £70,000. By another clause in this treaty the Com- pany was permitted to establish a mint, the visible sign in India of territorial sovereignty, and the first coin, still bearing the name of the Delhi emperor, was issued on the 19th of August 1757. The restitution money was divided among the sufferers by a committee of the most respectable inhabitants. Commerce rapidly revived and the ruined city was rebuilt. Modern Calcutta dates from 1757. The old fort was abandoned, and its site devoted to the custom-house and other government offices. A new fort, the present Fort William, was begun by Clive a short distance lower down the river, and is thus the second of that name. It was not finished till 1773, and is said to have cost two millions sterling. At this time also the maiddn, the park of Calcutta, was formed; and the healthiness of its position induced the European inhabitants gradually to shift their dwellings eastward, and to occupy what is now the Chowringhee quarter.

Up to 1707, when Calcutta was first declared a presidency, it had been dependent upon the older English settlement at Madras. From 1707 to 1773 the presidencies were maintained on a footing of equality; but in the latter year the act of parliament was passed, which provided that the presidency of Bengal should exercise a control over the other possessions of the

Company; that the chief of that presidency should be styled governor-general; and that a supreme court of judicature should be established at Calcutta. In the previous year, 1772, Warren Hastings had taken under the immediate management of the Company's servants the general administration of Bengal, which had hitherto been left in the hands of the old Mahommedan officials, and had removed the treasury from Murshidabad to Calcutta. The latter town thus became the capital of Bengal and the seat of the supreme government in India. In 1834 the governor-general of Bengal was created governor-general of India, and was permitted to appoint a deputy-governor to manage the affairs of Lower Bengal during his

occasional absence. It was not until 1854 that a separate head was appointed for Bengal, who, under the style of lieutenant-governor, exercises the same powers in civil matters as those vested in the governors in council of Madras or Bombay, although subject to closer supervision by the supreme government. Calcutta is thus at present the seat both of the supreme and the local government, each with an independent set of offices. . (See Bengal.)

See A. K. Ray, A Short History of Calcutta (Indian Census, 1901) ; H. B. Hyde, Parochial Annals of Bengal (1901); K. Blechynden, Calcutta, Past and Present (1905); H. E. Busteed, Echoes from Old Calcutta (1897); G. W. Forrest, Cities of India (1903); C. R. Wilson, Early Annals of the English in Bengal (1895) ; and Old Fort William in Bengal (1906); Imperial Gazetteer of India (Oxford, 1908), s.v. " Calcutta."

CALDANI, LEOPOLDO MARCO ANTONIO (1725-1813), Italian anatomist and physician, was born at Bologna in 1725. After studying under G. B. Morgagni at Padua, he began to teach practical medicine at Bologna, but in consequence of the intrigues of which he was the object he returned to Padua, where in 1771 he succeeded Morgagni in the chair of anatomy. He continued to lecture until 1805 and died at Padua in 1813. His works include Institutiones pathologicae (1772), Institutiones physiologicae (1773) and Icones anatomicae (1801-1813).

His brother, Petronio Maria Caldani (1735-1808), was professor of mathematics at Bologna, and was described by J. le R. D'Alembert as the " first geometer and algebraist of Italy."

CALDECOTT, RANDOLPH (1846-1886), English artist and illustrator, was born at Chester on the 22nd of March 1846. From 1861 to 1872 he was a bank clerk, first at Whitchurch in Shropshire, afterwards at Manchester; but devoted all his spare time to the cultivation of a remarkable artistic faculty. In 1872 he migrated to London, became a student at the Slade School and finally adopted the artist's profession. He gained immedi- ■ ately a wide reputation as a prolific and original illustrator, gifted with a genial, humorous faculty, and he succeeded also, though in less degree, as a painter and sculptor. His health gave way in 1876, and after prolonged suffering he died in Florida on the 12th of February 1886. His chief book illustrations are as follows: — Old Christmas (1876) and Bracebridge Hall (1877), both by Washington Irving; North Italian Folk (1877), by Mrs Comyns Carr; The Harz Mountains (1883); Breton Folk (1879), by Henry Blackburn; picture-books {John

Gilpin, The House that Jack Built, and other children's favourites) from 1878 onwards; Some Aesop's Fables with Modern Instances, 6"c. (1883). He held a roving commission for the Graphic, and was an occasional contributor to Punch. He was a member of the Royal Institute of Painters in Water-colours.

See Henry Blackburn, Randolph Caldecott, Personal Memoir of his Early Life (London, 1886).

CALDER, SIR ROBERT, Bart. (1745-1818), British admiral, was born at Elgin, in Scotland, on the 2nd of July 1745 (o.s.). He belonged to a very ancient family of Morayshire, and was the second son of Sir Thomas Calder of Muirton. He was educated at the grammar school of Elgin, and at the age of fourteen entered the British navy as midshipman. In 1766 he was serving as lieutenant of the " Essex," under Captain the Hon. George Faulkner, in the West Indies. Promotion came slowly, and it was not till 1782 that he attained the rank of post- captain. He acquitted himself honourably in the various services to which he was called, but for a long time had no opportunity

of distinguishing himself. In 1796 he was named captain of the fleet by Sir John Jervis, and took part in the great battle off Cape St Vincent (February 14, 1797). He was selected as bearer of the despatches announcing the victory, and on that occasion was knighted by George III. He also received the thanks of parliament, and in the following year was created a baronet. In 1799 he became rear-admiral; and in 180 1 he was despatched with a small squadron in pursuit of a French force, under Admiral Gantheaume, conveying supplies to the French in Egypt. In this pursuit he was not successful, and returning home at the peace he struck his flag. When the war again broke out he was recalled to service, was promoted vice-admiral in 1804, and was employed in the following year in the blockade of the ports of Ferrol and Corunna, in which (amongst other ports) ships were preparing for the invasion of England by Napoleon I. He held his position with a force greatly inferior to that of the enemy, and refused to be enticed out to sea. On its becoming known that the first movement directed by Napoleon was the raising of the blockade of Ferrol, Rear-Admiral Stirling was ordered to join Sir R. Calder and cruise with him to intercept the fleets of France and Spain on their passage to Brest. The approach of the enemy was

concealed by a fog; but on the 22nd of July 1805 their fleet came in sight. It still outnumbered the British force; but Sir Robert entered into action. After a combat of four hours, during which he captured two Spanish ships, he gave orders to discontinue the action. He offered battle again on the two following days, but the challenge was not accepted. The French admiral Villeneuve, however, did not pursue his voyage, but took refuge in Ferrol. In the judg- ment of Napoleon, his scheme of invasion was baffled by this day's action; but much indignation was felt in England at the failure of Calder to win a complete victory. In consequence of the strong feeling against him at home he demanded a court- martial. This was held on the 23rd of December, and resulted • in a severe reprimand of the vice-admiral for not having done his utmost to renew the engagement, at the same time acquitting him of both cowardice and disaffection. False expectations had been raised in England by the mutilation of his despatches, and of this he indignantly complained in his defence. The tide of feeling, however, turned again; and in 18.15, by way of public testimony to his services, and of acquittal of the charge made against him, he was appointed commander of Portsmouth. He died at Holt, near Bishop's Waltham, in Hampshire, on the 31st of August 1818.

See Naval Chronicle, xvii.; James, Naval History, iii. 356-379 fi86o).

CALDER, an ancient district of Midlothian, Scotland. It has been divided into the parishes of Mid-Calder (pop. in 1901 3132) and West- Calder (pop. 8092), East-Calder belonging to the parish of Kirknewton (pop. 3221). The whole locality owes much of its commercial importance and prosperity to the enormous development of the mineral oil industry. Coal- mining is also extensively pursued, sandstone and limestone are worked, and paper-mills flourish. Mid-Calder, a town on the Almond (pop. 703), has an ancient church, and John Spottis- wood (1510-1585), the Scottish reformer, was for many years minister. His sons — John, archbishop of St Andrews, and James (1567-1645), bishop of Clogher — were both born at Mid-Calder. West-Calder is situated on Breich Water, an affluent of the Almond, 15I m. S.W. of Edinburgh by the Caledonian railway, and is the chief centre of the district. Pop. (1901) 2652. At Addiewell, about i| m. S.W., the manufacture of ammonia, naphtha, paraffin oil and candles is carried on, the village practically dating from 1866, and having in 1901 a population jof 1 591. The Highland and Agricultural Society have an experimental farm at Pumpherston (pop. 1462). The district i contains several tumuli, old ruined castles and a Roman camp in fair preservation.

CALDERON, RODRIGO (d. 1621), Count of Oliva and Marques de las Siete Iglesias, Spanish favourite and adven- turer, was born at Antwerp. His father, Francisco Calder6n, a member of a family ennobled by Charles V., was a captain

in the army who became afterwards comendador mayor of Aragon, presumably by the help, of his son. The mother was a Fleming, said by Calder6n to have been a lady by birth and called by him Maria Sandelin. She is said by others to have been first the mistress and then the wife of Francisco Calderon. Rodrigo is said to have been born out of wedlock. In 1598 he entered the service of the duke of Lerma as secretary. The accession of Philip III. in that year made Lerma, who had unbounded influence over the king, master of Spain. Calderon, who was active and unscrupulous, made himself the trusted agent of Lerma. In the general scramble for wealth among the worthless intriguers who governed in the name of Philip III., Calderon was conspicuous for greed, audacity and insolence. He was created count of Oliva, a knight of Santiago, commendador of Ocana in the order, secretary to the king (secretario de cdmara), was loaded with plunder, and made an advantageous marriage with Ines de Vargas. As an insolent upstart he was peculiarly odious to the enemies of Lerma. Two religious persons, Juan de Santa Maria, a Franciscan, and Mariana de San Jose, prioress of La Encarnacion, worked on the queen Margarita, by whose influence Calder6n was removed from the secretaryship in 161 1. He, however, retained the favour of Lerma, an indolent man to whom Calder6n's activity was indispensable. In 161 2 he was sent on a special mission to Flanders, and on his return was made marques de.las Siete Iglesias in 16 14. When the queen Margarita died in that.year in childbirth, Calderon was accused of having used witchcraft against her. Soon after it became generally known that he had ordered the murder of one Francisco de Juaras. When Lerma was driven from court in 1618 by the intrigues of his own son, the duke of Uceda, and the king's confessor, the Dominican Aliaga, Calder6n was seized upon as an expiatory victim to satisfy public clamour. He was arrested, despoiled, and on the 7th of January 1620 was savagely tortured to make him confess to the several charges of murder and witch- craft brought against him. Calderon confessed to the murder of Juaras, saying that the man was a pander, and adding that he gave the particular reason by word of mouth since it was more fit to be spoken than written. He steadfastly denied all the other charges of murder and the witchcraft. Some hope of pardon seems to have remained in his mind till he heard the bells tolling for Philip III. in March 1621. " He is dead, and I too am dead " was his resigned

comment. One of the first measures of the new reign was to order his execution. Calderon met his fate firmly and with a show of piety on the 21st of October 1621, and this bearing, together with his broken and prematurely aged appearance, turned public sentiment in his favour. The magnificent devotion of his wife helped materially to placate the hatred he had aroused. Lord Lytton made Rodrigo Calder6n the hero of his story Calderon the Courtier.

See Modests de la Fuente, Historia General Espana (Madrid, 1850-1867), vol. xv. pp. 452 et seq. ; Quevedo, Obras (Madrid, 1794), vol. x. — Grandes Anales de Quince Dias. A curious contemporary French pamphlet on him, Histoire admirable et declin pitoyable advenue en la personne d'unfawary de la Cour d'Espagne, is reprinted by M. E. Fournier in Varietes historiques (Paris, 1855), vol. i. (D. H.)

CALDER6N DE LA BARCA, PEDRO (1600-1681), Spanish dramatist and poet, was bom at Madrid on the 17th of January 1600. His mother, who was of Flemish descent, died in 1610; his father, who was secretary to the treasury, died in 16 15. Calderon was educated at the Jesuit College in Madrid with a view to taking orders and accepting a family living; abandoning this project, he studied law at Salamanca, and competed with success at the literary fetes held in honour of St Isidore at Madrid (1620-1622), According to his biographer, Vera Tassis, Calder6n served with the Spanish army in Italy and Flanders between 1625 and 1635; but this statement is contradicted by numerous legal documents which prove that Calderon resided at Madrid during these years. Early in 1629 his brother Diego was stabbed by an actor who took sanctuary in the convent of the Trinitarian nuns; Calderon and his friends broke into the cloister and attempted to seize the offender. This violation was denounced by the fashionable preacher, Hortensio Felte Paravicino (?.».), in a sermon preached before Philip IV.;

Calder6n retorted by introducing into El Principe constanle a mocking reference (afterwards cancelled) to Paravicino's gongoristic verbiage, and was committed to prison. He was soon released, grew rapidly in reputation as a playwright, and, on the death of Lope de Vega in 1635, was recognized as the fore- most Spanish dramatist of the age. A volume of his plays, edited by his brother Jose in 1636, contains such celebrated and diverse productions as La Vida es

suetto, El Purgatorio de San Patricio, La Devocidn de la cruz, La Dama duende and Peor esld que estaba. In 1 636-1 63 7 he was made a knight of the order of Santiago by Philip IV., who had already commissioned from him a series of spectacular plays for the royal theatre in the Buen Retire Calderon was almost as popular with the general public as Lope de Vega had been in his zenith; he was, moreover, in high favour at court, but this royal patronage did not help to develop the finer elements of his genius. On the 28th of May 1640 he joined a company of mounted cuirassiers recently raised by Olivares, took part in the Catalonian campaign, and distinguished himself by his gallantry at Tarragona ; his health failing, he retired from the army in November 1642, and three years later was awarded a special military pension in recognition of his services in the field. The history of his life during the next few years is obscure. He appears to have been profoundly affected by the death of his mistress — the mother of his son Pedro Jose — about the year 1 648-1 649; his long connexion with the theatre had led him into temptations, but it had not diminished his instinctive spirit of devotion, and he now sought consolation in religion. He became a tertiary of the order of St Francis in 1650, and finally reverted to his original intention of joining the priesthood. He was ordained in 1651, was presented to a living in the parish of San Salvador at Madrid, and, according to his statement made a year or two later, determined to give up writing for the stage. He did not adhere to this resolution after his preferment to a prebend at Toledo in 1653, though he confined himself as much as possible to the composition of autos sacramentales — allegorical pieces in which the mystery of the Eucharist was illustrated dramatically, and which were performed with great pomp on the feast of Corpus Christi and during the weeks immediately ensuing. In 1662 two of Calderon's autos — Las ordenes militares and Misticay real Babilonia — were the subjects of an inquiry by the Inquisition; the former was censured, the manuscript copies were confiscated, and the condemnation was not rescinded till 167.1. Calderon was appointed honorary chaplain to Philip IV. in 1663, and the royal favour was continued to him in the next reign. In his eighty-first year he wrote his last secular play, Hado y Divisa de Leonido y Marfisa, in honour of Charles II. 's marriage to Marie-Louise de Bourbon. Not- withstanding his position at court and his universal popularity throughout Spain, his closing years seem to have been passed in poverty. He died on the 25th of May 1681.

Like most Spanish dramatists, Calder6n wrote too much and too speedily, and he was too often content to recast the productions of his predecessors. His Saber del pml y del bien is an adaptation of

Lope de Vega's play, Las Mudanzas de la fortuna y sucesos de Don Beltran de Aragdn; his Selva confusa is also adapted from a play of Lope's which bears the same title ; his Encanto sin encanto derives from Tirso de Molina's Amar por senas, and, to take an extreme instance, the second act of his Cabellos de Absaldn is transferred almost bodily from the third act of Tirso 's Venganza de Tamar. It would be easy to add other examples of Calderon's lax methods, but it is simple justice to point out that he committed no offence against the prevailing code of literary morality. Many of his contemporaries plagiarized with equal audacity, but with far less success. Sometimes, as in El Alcalde de Zalamea, the bold procedure is completely justified by the result; in this case by his individual treatment he transforms one of Lope de Vega's rapid improvisa- tions into a finished masterpiece. It was not given to him to initiate a great dramatic movement; he came at the end of a literary revolution, was compelled to accept the conventions which Lope de Vega had imposed on the Spanish stage, and he accepted them all the more readily since they were peculiarly

suitable to the display of his splendid and varied gifts. Not a master of observation nor an expert in invention, he showed an unexampled skill in contriving ingenious variants on existing themes; he had a keen dramatic sense, an unrivalled dexterity in manipulating the mechanical resources of the stage, and in addition to these minor indispensable talents he was endowed with a lofty philosophic imagination and a wealth of poetic diction. Naturally, he had the defects of his great qualities; his ingenuity is apt to degenerate into futile embellishment; his employment of theatrical devices is the subject of his own good-humoured satire in No hay burlas con el amor; his philo- sophic intellect is more interested in theological mysteries than in human passions ; and the delicate beauty of his style is tinged with a wilful preciosity. Excelling Lope de Vega at many points, Calder6n falls below his great predecessor in the delineation of character. Yet 'in almost every department of dramatic art Calder6n has obtained a series of triumphs. In the symbolic drama he is best represented by El Principe constanle, by El Mdgico prodigioso (familiar to English readers in Shelley's free translation), and by La Vida es sueno, perhaps the most profound and original of his works. His tragedies are more remarkable for their acting qualities than for their convincing truth, and the fact that in La Nina de Gomez Arias he inter- polates an entire act borrowed from Velez -de Guevara's play of the same title seems to indicate that this kind of composition awakened no great interest in him; but in El MSdico de sa honra and El Mayor monstruo los celos

the theme of jealousy is handled with sombre power, while El Alcalde de Zalamea is one of the greatest tragedies in Spanish literature. Calderon is seen to much less advantage in the spectacular plays — dramas de Iramoya — which he wrote at the command of Philip IV.; the dramatist is subordinated to the age-carpenter, but the graceful fancy of the poet preserves even such a mediocre piece as Los Tres Mayores prodigios (which won him his knighthood) from complete oblivion. A greater opportunity is afforded in the more animated comedias palaciegas, or melodramatic pieces destined to.be played before courtly audiences in the royal palace: La Banda y la flor and El Galdn fanlasma are charming illustrations of Calderon's genial conception and refined artistry. His historical plays (La Gran Cenobia, Las armas de la hermosura, &c.) are the weakest of all his formal dramatic productions; El Golfo de la sirenas and La Purpura de la rosa are typical zarzuelas, to be judged by the standard of operatic libretti, and the entremeses are lacking in the lively humour which should characterize these dramatic interludes. On the other hand, Calder6n's faculty of ingenious stagecraft is seen at its best in his " cloak-and-sword " plays (comedias de capa y espada) which are invaluable pictures of contemporary society. They are conventional, no doubt, in the sense that all representations of a specially artificial society must be con- ventional; but they are true to life, and are still as interesting as when they first appeared. In this kind No siempre lo peor es cierlo, La Dama duende, Una casa con dos puertas mala es de guardar and Gudrdate del agua mansa are almost unsurpassed. But it is as a writer of autos sacramentales that Calderon defies rivalry: his intense devotion, his subtle intelligence, his sub- lime lyrism all combine to produce such marvels of allegorical poetry as La Cena del rey Baltasar, La Vina del Senor and La Serpiente de metal. The autos lingered on in Spain till 1765, but they may be said to have died with Calderon, for his successors merely imitated him with a tedious fidelity. Almost alone among Spanish poets, Calder6n had the good fortune to be printed in a fairly correct and readable edition (1682-1691), thanks to the enlightened zeal of his admirer, Juan de Vera Tassis y Villaroel, and owing to this happy accident he came to be regarded generally as the first of Spanish dramatists. The publication of the plays of Lope de Vega and of Tirso de Molina has affected the critical estimate of Calderon's work; he is seen to be inferior to Lope de Vega in creative power, and inferior-to Tirso de Molina in variety of conception. But, setting aside the extravagances of his admirers, he is admittedly an exquisite poet, an expert in the dramatic form, and a typical representative of the

devout, chivalrous, patriotic and artificial society in which he moved.

Bibliography. — H. Breymann, Calderon-Studien (Miinchen and Berlin, 1905), i. Teil, contains a fairly exhaustive list of editions, translations and arrangements; Autos sacramentales (Madrid, 1759-1760, 6 vols.), edited by Juan Fernandez de Apontes; Comedias (Madrid, 1848-1850, 4 vols.), edited by Juan Eugenio Hartzenbuch; Max Krenkel, Klassische Biihnendichtungen der Spanier, containing La Vida es sueno, El mdgico prodigioso and El Alcalde de Zalamca (Leipzig, 1881-1887, 3 vols.); Teatro selecto (Madrid, 1884, 4 vols.), edited by M. Menendez y Pelayo; El Mdgico prodigioso (Heilbronn, 1877), edited by Alfred Morel-Fatio; Select Plays of Calderon (London, 1888), edited by Norman MacColl; F. W. V. Schmidt, Die Schauspiele Calderon' s (Elberfeld, 1857); E. Gunthner, Calderon und seine Werke (Freiburg i. B., 1888, 2 vols.); Felipe Picatoste y Rodriguez, Biografia de Don Pedro Calderon de la Barca in Homenage d Calderon (Madrid, 1881); Antonio Sanchez Moguel, Memoria acerca de " El Mdgico prodigioso " (Madrid, i88t); M. Menendez y Pelayo, Calderon y su teatro (Madrid, 1881); Ernest Martinenche, La Comedia espaenole en France de Hardy & Racine (Paris, 1900).

(J. F.-K.)

CALDERWOOD, DAVID (1575-1630), Scottish divine and historian, was born in 1575. He was educated at Edinburgh, where he took the degree of M.A. in 1593- About 1604 he became minister of Crailing, near Jedburgh, where he became conspicuous for his resolute opposition to the introduction of Episcopacy. In 161 7, while James was in Scotland, a Re- monstrance, which had been drawn up by the Presbyterian clergy, was placed in Calderwood's hands. He was summoned to St Andrews and examined before the king, but neither threats nor promises could make him deliver up the roll of signatures to the Remonstrance. He was deprived of his charge, committed to prison at St Andrews and afterwards removed to Edinburgh. The privy council ordered him to be banished from the kingdom for refusing to acknowledge the sentence of the High Commis- sion. He lingered in Scotland, publishing a few tracts, till the 27th of August 1619, when he sailed for Holland. During his residence in Holland he published his Altare Damascenum. Calderwood appears to have

returned to Scotland in 1624, and he was soon afterwards appointed minister .of Pencaitland, in the county of Haddington. He continued to take an active part in the affairs of the church, and introduced in 1649 trie practice, now confirmed by long usage, of dissenting from the decision of the Assembly, and requiring the protest to be entered in the record. His last years were devoted to the preparation of a History of the Church of Scotland. In 1648 the General Assembly urged him to complete the work he had designed, and voted him a yearly pension of £800. He left behind him a historical work of great extent and of great value as a storehouse of authentic materials for history. An abridgment, which appears to have been prepared by himself, was published after his death. An excellent edition of the complete work was published by the Wodrow Society, 8 vols., 1842-1849. The manuscript, which belonged to General Calderwood Durham, was presented to the British Museum. Calderwood died at Jedburgh on the 29th of October 1650.

CALDERWOOD, HENRY (1830-1897), Scottish philosopher and divine, was born at Peebles on the 10th of May 1830. He was educated at the Royal High school, and later at the university of Edinburgh. He studied for the ministry of the United Presby- terian Church, and in 1856 was ordained pastor of the Greyfriars church, Glasgow. He also examined in mental philosophy for the university of Glasgow from 1 861 to 1864, and from 1866 conducted the moral philosophy classes at that university, until in 1868 he became professor of moral philosophy at Edinburgh. He was made LL.D. of Glasgow in 1865. He died on the 19th of November 1897. His first and most famous work was The Philosophy of the Infinite (1854), in which he attacked the statement of Sir William Hamilton that we can have no knowledge of the Infinite. Calder- wood maintained that such knowledge, though imperfect, is real and ever-increasing; that Faith implies Knowledge. His moral philosophy is in direct antagonism to Hegelian doc- trine, and endeavours to substantiate the doctrine of divine sanction. Beside the data of experience, the mind has pure activity of its own whereby it apprehends the fundamental

realities of life and combat. He wrote in addition A Handbook of Moral Philosophy, On the Relations of Mind and Brain, Science and Religion, The Evolution of Man's Place in Nature. Among his religious works the best-known is his Parables of Our Lord, and just before his death he finished a Life of David Hume in the " Famous Scots " series. His interests were not confined to religious and intellectual matters; as the first chairman of the Edinburgh school board, he worked hard to bring the Education Act into working

order. He published a well-known treatise on education. In the cause of philanthropy and temperance he was indefatigable. In politics he was at first a Liberal, but became a Liberal Unionist at the time of the Home Rule Bill.

A biography of Calderwood was published in 1900 by his son W. C. Calderwood and the Rev. David Woodside, with a special chapter on his philosophy by Professor A. S. Pringle-Pattison.

CALEB (Heb. keleb, "dog"), in the Bible, one of the spies sent by Moses from Kadesh in South Palestine to spy out the land of Canaan. For his courage and confidence he alone was rewarded by the promise that he and his seed should obtain a possession in it (Num. xiii. seq.). The later tradition includes Joshua, the hero of the conquest of the land. Subsequently Caleb settled in Kirjath-Arba (Hebron), but the account of the occupation is variously recorded. Thus (a) Caleb by himself drove out the Anakites, giants of Hebron, and promised to give his daughter Achsah to the hero who could take Kirjath-Sepher (Debir). This was accomplished by Othniel, the brother of Caleb (Josh. xv. 14-19). Both are " sons " of Kenaz, and Kenaz is an Edomite clan (Gen. xxxvi. n, 15, 42). Elsewhere (6) Caleb the Kenizzite, reminds Joshua of the promise at Kadesh; he asks that he may have the " mountain whereof Yahweh spake," and hopes to drive out the giants from its midst. Joshua blesses him and thus Hebron becomes the inheritance of Caleb (Josh. xiv. 6-15). Further © the capture of Hebron and Debir is ascribed to Judah who gives them to Caleb (Judg. i. 10 seq. 20) ; and finally (d) these cities are taken by Joshua himself in the course of a great and successful campaign against South Canaan (Josh. x. 36-39). Primarily the clan Caleb was settled in the south of Judah but formed an independent unit (1 Sam. xxv., xxx. 14). Its seat was at Carmel, and Abigail, the wife of the Calebite Nabal, was taken by David after her husband's death. Not until later are the small divisions of the south united under the name Judah, and this result is reflected in the gene- alogies where the brothers Caleb and Jerahmeel are called " sons of Hezron " (the name typifies nomadic life) and become descendants of Judah.

Similarly in Num. xiii. 6, xxxiv. 19 (post-exilic), Caleb becomes the representative of the tribe of Judah, and also in c (above) Caleb's enterprise was later regarded as the work of the tribe with which it became incorporated, b and d are explained in accordance with the aim of the book to ascribe to the initiation or the achievements of one man the conquest of the whole of Canaan (see Joshua). ' The mount or hill-country in b appears to be that which the Israelites unsufccessfully attempted to take (Num. xiv. 41-45), but according

to another old fragment Hormah was the scene of a victory (Num. xxi. 1-3), and it seems probable that Caleb, at least, was supposed to have pushed his way northward to Hebron. (See Jerahmeel, Kenites, Simeon.)

The genealogical lists place the earliest seats of Caleb in the south of Judah (1 Chron. ii. 42 sqq.; Hebron, Maon, &c). Another list numbers the more northerly towns of Kirjath-jearim, Bethlehem, &c, and adds the " families of the scribes," and the Kenites (ii. 50 seq.). This second move is characteristically expressed by the statements that Caleb's first wife was Azubah (" abandoned," desert region) — Jeri5th (" tent curtains ") appears to have been another — and that after the death of Hezron he united with Ephrath (v. 24 Bethlehem). On the details in 1 Chron. ii., iv., see further, J. Wellhausen, De Gent, et Famil. Judaeorum (1869) ; S. Cook, Critical Notes on 0. T. History, Index, s.v. ; E. Meyer, Israeliten, pp. 400 sqq.; arid the commentaries on Chronicles (q.v.). (S. A. C.)

CALEDON (1) a town of the Cape Province, 81 m. by rail E.S.E. of Cape Town. Pop. (1904) 3508. The town is 15 m. N. of the sea at Walker Bay and is built on a spur of the Zwart- berg, 800 ft. high. The streets are lined with blue gums and oaks. From the early day of Dutch settlement at the Cape Caledon has been noted for the curative value of its mineral springs, which yield 150,000 gallons daily. There are seven springs, six with a natural temperature of 12O F., the seventh

being cold. The district is rich in flowering heaths and ever- lasting flowers. The name Caledon was given to the town and district in honour of the 2nd earl of Caledon, governor of the Cape 1807-1811. (2) A river of South Africa, tributary to the Orange (g.v.), also named after Lord Caledon.

CALEDONIA, the Roman name of North Britain, still used especially in poetry for Scotland. It occurs first in the poet Lucan (a.d. 64), and then often in Roman literature. There were (1) a district Caledonia, of which the southern border must have been on or near the isthmus between the Clyde and the Forth, (2) a Caledonian Forest (possibly in Perthshire), and (3) a tribe of Caledones or Calidones, named by the geographer Ptolemy as living within boundaries which are now unascertain- able. The Romans first

invaded Caledonia under Agricola (about a.d. 83) . They then fortified the Forth and Clyde Isthmus with a line of forts, two of which, those at Camelon and Barhill, have been identified and excavated, penetrated into Perthshire, and fought the decisive battle of the war (according to Tacitus) on the slopes of Mons Graupius. 1 The site— quite as hotly contested among antiquaries as between Roman and Caledonian — may have been near the Roman encampment of Inchtuthill (in the policies of Delvine, 10 m. N. of Perth near the union of Tay and Isla), which is the most northerly of the ascertained Roman encampments in Scotland and seems to belong to the age of Agricola. Tacitus represents the result as a victory. The home government, whether averse to expensive conquests of barren hills, or afraid of a victorious general, abruptly recalled Agricola, and his northern conquests — all beyond the Tweed, if not all beyond Cheviot — were abandoned. The next advance followed more than fifty years later. About a.d. 140 the district up to the Firth of Forth was definitely annexed, and a rampart with forts along it, the Wall of Antoninus Pius, was drawn from sea to sea (see Britain: Roman; and Graham's Dyke). At the same time the Roman forts at Ardoch, north of Dunblane, Carpow near Abernethy, and perhaps one or two more, were occupied. But the conquest was stubbornly disputed, and after several risings, the land north of Cheviot seems to have been lost about a.d. 180-185. About a.d. 208 the emperor Septimius Severus carried out an extensive punitive expedition against the northern tribes, but while it is doubtful how far he penetrated, it is certain that after his death the Roman writ never again ran north of Cheviot. Rome is said, indeed, to have recovered the whole land up to the Wall of Pius in a.d. 368 and to have estab- lished there a province, Valentia. A province with that name was certainly organized somewhere. But its site and extent is quite uncertain and its duration was exceedingly brief. Through- out, Scotland remained substantially untouched by Roman influences, and its Celtic art, though perhaps influenced by Irish, remained free from Mediterranean infusion. Even in the south of Scotland, where Rome ruled for half a century (a.d. 142-180), the occupation was military and produced no civilizing effects. Of the actual condition of the land during the period of Roman rule in Britain, we have yet to learn the details by excavation. The curious carvings and ramparts, at Burghead on the coast of Elgin, and the underground stone houses locally called " wheems," in which Roman fragments have been found, may represent the native forms of dwelling, &c, and some of the "Late Celtic" metal-work may belong to this age. But of the political divisions, the boundaries and capitals of the tribes, and the like, we know nothing. Ptolemy gives a list of

tribe and place-names. But hardly one can be identified with any approach to certainty, except in the extreme south. Nor has any certainty been reached about the ethnological problems of the population, the Aryan or non-Aryan character of the Picts and the like. That the Caledonians, like the later Scots, sometimes sought their fortunes in the south, is proved by a curious tablet of about a.d. 220, found at Colchester, dedicated to an unknown equiva- lent of Mars, Medocius, by one " Lossio Veda, nepos [= kin of] Vepogeni, Caledo." The name Caledonia is said to survive in

1 This, not Grampius, is the proper spelling, though Grampius was at one time commonly accepted and indeed gave rise to the modern name Grampian.

the second syllable of Dunkeld and in the mountain name Schiehallion (Sith-chaillinn).

Authorities. — Tacitus, Agricola; Hist. Augusta, Vita Severi; Dio lxxvi. ; F. Haverfield, The Antonine Wall Report (Glasgow, 1899), pp. 154-168; J. Rhys, Celtic Britain (ed. 3). On Burghead, see H. W. Young, Proc. of Scottish Anliq. xxv., xxvii. ; J. Macdonald, Trans. Glasgow Arch. Society. The Roman remains of Scotland are described in Rob. Stuart's Caled. Romana (Edinburgh, 1852), the volumes of the Scottish Antiq. Society, the Corpus- Inscriptionum Latinarum, vol. vii., and elsewhere. (F. J. H.)

CALEDONIAN CANAL. The chain of fresh-water lakes- Lochs Ness, Oich and Lochy — which stretch along the line of the Great Glen of Scotland in a S.W. direction from Inverness early suggested the idea of connecting the east and west coasts of Scotland by a canal which would save ships about 400 m. of coasting voyage round the north of Great Britain through the stormy Pentland Firth. In 1773 James Watt was employed by the government to make a survey for such a canal, which again was the subject of an official report by Thomas Telford in 1801. In 1803 an act of parliament was passed authorizing the construc- tion of the canal, which was begun forthwith under Telford's direction, and traffic was started in 1822. From the northern entrance on Beauly Firth to the southern, near Fort William, the total length is about 60 m., that of the artificial portion being about 22 m. The number of locks is 28, and their standard dimensions are: — length 160 ft., breadth 38 ft., water-depth 15 ft. Their lift is in general about 8 ft., but some of them are for regulating purposes only. A flight of 8 at Corpach, with a total lift of 64 ft., is known as " Neptune's Staircase." The navigation is vested in and managed by the commissioners of the Caledonian

Canal, of whom the speaker of the House of Commons is ex officio chairman. Usually the income is between £7000 and £8000 annually, and exceeds the expenditure by a few hundred pounds; but the commissioners are not entitled to make a profit, and the credit balances, though sometimes allowed to accumulate, must be expended on renewals and improvements of the canal. They have not, however, always proved sufficient for their purposes, and parliament is occasionally called upon to make special grants. In the commissioners is also vested the Crinan Canal, which extends from Ardrishaig on Loch Gilp to Crinan on Loch Crinan. This canal was made by a company incorporated by act of parliament in 1793, and was opened for traffic in 1 80 1. At various times it received grants of public money, and ultimately in respect of these it passed into the hands of the government. In 1848 it was vested by parliament in the commissioners of the Caledonian Canal (who had in fact ad ministered it for many years previously); the act contained a proviso that the company might take back the undertaking on repayment of the debt within 20 years, but the power was not exercised. The length of the canal is 9 m., and it saves vessels sailing from the Clyde a distance of about 85 m. as compared with the alternative route round the Mull of Kintyre. Its highest reach is 64 ft. above sea level, and its locks, 1 5 in number, are 96 ft. long, by 24 ft. wide, the depth of water being such as to admit vessels up to a draught of 95 ft. The revenue is over £6000 a year, and there is usually a small credit balance which, as with the Caledonian Canal, must be applied to the purposes of the undertaking.

CALENBERG, or Kalenberg, the name of a district, including the town of Hanover, which was formerly part of the duchy of Brunswick. It received its name from a castle near Schulenburg, and is traversed by the rivers Weser and Leine, its area being about 1050 sq. m. The district was given to various cadets of the ruling house of Brunswick, one of these being Ernest Augustus, afterwards elector of Hanover, and the ancestor of the Hano- verian kings of Great Britain and Ireland.

CALENDAR, so called from the Roman Calends or Kalends, a method of distributing time into certain periods adapted to the purposes of civil life, as hours, days, weeks, months, years, &c.

Of all the periods marked out by the motions of the celestial bodies, the most conspicuous, and the most intimately con- nected with the affairs of mankind, are the solar day, which is

distinguished by the diurnal revolution of the earth and the alternation of light and darkness, and the solar year, which completes the circle of the seasons. But in the early ages of the world, when mankind were chiefly engaged in rural occupations, the phases of the moon must have been objects of great atten- tion and interest, — hence the month, and the practice adopted by many nations of reckoning time by the motions of the moon, as well as the still more general practice of combining lunar with solar periods The solar day, the solar year, and the lunar month, or lunation, may therefore be called the natural divisions of time. All others, as the hour, the week, and the civil month, though of the most ancient and general use, are only arbitrary and conventional.

Day. — The subdivision of the day (q.v.) into twenty-four parts, or hours, has prevailed since the remotest ages, though different nations have not agreed either with respect to the epoch of its commencement or the manner of distributing the hours. Euro- peans in general, like the ancient Egyptians, place the com mencement of the civil day at midnight, and reckon twelve morning hours from midnight to midday, and twelve evening hours from midday to midnight. Astronomers, after the example of Ptolemy, regard the day as commencing with the sun's culmination, or noon, and find it most convenient for the purposes of computation to reckon through the whole twenty- four hours. Hipparchus reckoned the twenty-four hours from midnight to midnight. Some nations, as the ancient Chaldeans and the modern Greeks, have chosen sunrise for the commence- ment of the day; others, again, as the Italians and Bohemians, suppose it to commence at sunset. In all these cases the begin- ning of the day varies with the seasons at all places not under the equator. In the early ages of Rome, and even down to the middle of the 5 th century after the foundation of the city, no other divisions of the day were known than sunrise, sunset, and midday, which was marked by the arrival of the sun between the Rostra and a place called Graecostasis,' where ambassadors from Greece and other countries used to stand. The Greeks divided the natural day and night into twelve equal parts each, and the hours thus formed were denominated temporary hours, from their varying in length according to the seasons of the year. The hours of the day and night were of course only equal at the time of the equinoxes. The whole period of day and night they called vvxOyntpov.

Week. — The week is a period of seven days, having no reference whatever to the celestial motions, — a circumstance to which it owes

its unalterable uniformity. Although it did not enter into the calendar of the Greeks, and was not introduced at Rome till after the reign of Theodosius, it has been employed from time immemorial in almost all eastern countries; and as it forms neither an aliquot part of the year nor of the lunar month, those who reject the Mosaic recital will be at a loss, as Delambre remarks, to assign it to an origin having much semblance of probability. It might have been suggested by the phases of the moon, or by the number of the planets known in ancient times, an origin which is rendered more probable from the names universally given to the different days of which it is composed. In the Egyptian astronomy, the order of the planets, beginning with the most remote, is Saturn, Jupiter, Mars, the Sun, Venus, Mercury, the Moon. Now, the day being divided into twenty- four hours, each hour was consecrated to a particular planet, namely, one to Saturn, the following to Jupiter, the third to Mars, and so on according to the above order; and the day received the name of the planet which presided over its first hour. If, then, the first hour of a day was consecrated to Saturn, that planet would also have the 8th, the 15th, and the 22nd hour; the 23rd would fall to Jupiter, the 24th to Mars, and the 25th, or the first hour of the second day, would belong to the Sun. In like manner the first hour of the 3rd day would fall to the Moon, the first of the 4th day to Mars, of the 5th to Mercury, of the 6th to Jupiter, and of the 7th to Venus. The cycle being completed, the first hour of the 8th day would return to Saturn, and all the others succeed in the same order. According to Dio Cassius, the Egyptian week commenced with Saturday. On

their flight from Egypt, the Jews, from hatred to their ancient oppressors, made Saturday the last day of the week.

The English names of the days are derived from the Saxon. The ancient Saxons had borrowed the week from some Eastern nation, and substituted the names of their own divinities for those of the gods of Greece. In legislative and justiciary acts the Latin names are still retained.

Latin. Dies Solis. Dies Lunae. Dies Martis. Dies Mercurii. Dies Jovis. Dies Veneris. Dies Saturni.

English.

Sunday.

Monday.

Tuesday.

Wednesday.

Thursday.

Friday.

Saturday.

Saxon. Sun's day. Moon's day. Tiw's day. Woden's day. Thor's day. Frigg's day. Seterne's day.

Month. — Long before the exact length of the year was deter- mined, it must have been perceived that the synodic revolution of the moon is accomplished in about 295 days. Twelve luna- tions, therefore, form a period of 354 days, which differs only by about iij days from the solar year. From this circumstance has arisen the practice, perhaps universal, of dividing the year into twelve months. But in the course of a few years the accumu- lated difference between the solar year and twelve lunar months would become considerable, and have the effect of transporting the commencement of the year to a different season. The difficulties that arose in attempting to avoid this inconvenience induced some nations to abandon the moon altogether, and regulate their year by the course of the sun. The month, how- ever, being a convenient period of time, has retained its place in the calendars of all nations; but, instead of denoting a synodic revolution of the moon, it is usually employed to denote an arbitrary number of days approaching to the twelfth part of a solar year.

Among the ancient Egyptians the month consisted of thirty days invariably; and in order to complete the year, five days were added at the end, called supplementary days. They made use of no intercalation, and by losing a fourth of a day every year, the commencement of the year went back one day in every period of four years, and consequently made a revolution of the seasons in 1461 years. Hence 1461 Egyptian years are equal to 1460 Julian years of 365 \ days each. This year is called vague, by reason of its commencing sometimes at one season of the year, and sometimes at another.

The Greeks divided the month into three decades, or periods of ten days, — a practice which was imitated by the French ift their unsuccessful attempt to introduce a new calendar at the period of the Revolution. This division offers two advantages: the first is, that the

period is an exact measure of the month of thirty days; and the second is, that the number of the day of the decade is connected with and suggests the number of the day of the month. For example, the 5th of the decade must necessarily be the 5th, the 15th, or the 25th of the month; so that when the day of the decade is known, that of the month can scarcely be mistaken. In reckoning by weeks, it is necessary to keep in mind the day of the week on which each month begins.

The Romans employed a division of the month and a method of reckoning the days which appear not a little extraordinary, and must, in practice, have been exceedingly inconvenient. As frequent allusion is made by classical writers to this em- barrassing method of computation, which is carefully retained in the ecclesiastical calendar, we here give a table showing the correspondence of the Roman months with those of modern Europe.

Instead of distinguishing the days by the ordinal numbers first, second, third, &c, the Romans counted backwards from three fixed epochs, namely, the Calends, the Nones and the Ides. The Calends (or Kalends) were invariably the first day of the month, and were so denominated because it had been an ancient custom of the pontiffs to call the people together on that day, to apprize them of the festivals, or days that were to be kept sacred during the month. The Ides (from an obsolete verb iduare, to divide) were at the middle of the month, either the 13th or the 15th day; and the Nones were the ninth day before the

Ides, counting inclusively. From these three terms the days received their denomination in the following manner: — Those which were comprised between the Calends and the Nones were called the days before the Nones; those between the Nones and the Ides were called the days before the Ides; and, lastly, all the days after the Ides to the end of the month were called the days before the Calends of the succeeding month. In the months of March, May, July and October, the Ides fell on the 15th day, and the Nones consequently on the 7th; so that each of these months had six days named from the Nones. In all the other months the Ides were on the 13th and the Nones on the 5th; consequently there were only four days named from the Nones. Every month had eight days named from the Ides. The number of days receiving their denomination from the Calends depended on the

number of days in the month and the day on which the Ides fell. For example, if the month contained 31 days and the Ides fell on the 13th, as was the case in January, August and December, there would remain 18 days after the

Days of

March.

May.

July. October.

January.

April.

June. September. November.

the Month.

August. December.

February.

1

Calendae.

Calendae.

Calendae.

Calendae.

2 3 4

6 5 4

4

3

Prid. Nonas.

4

3

Prid. Nonas.

4

3

Prid. Nonas.

5

3

Nonae.

Nonae.

Nonae.

6

Prid. Nonas.

8

8

8

7

Nonae.

7

7

7

8

8

6

6

6

9

7

5

5

5

10

6

4

4

4

11

5

, 3

3

3

12

4

Prid. Idus.

Prid. Idus.

Prid. Idus.

13

Prid. Idus.

Idus.

Idus.

Idus.

14

19

18

16

IS

Idus.

18

17

15

16

17

17

16

14

17

16

16

15

13

18

15

15

14

12

19

14

H

13

11

20

13

13

12

10

21

12

12

11

9

22

11

11

10

8

23

10

10

9

7

24

9

9

8

6

25

8

8

7

5

26

7

7

6

4

27

6

6

5

3

28

5

5

4

Prid. Cal.

29

4

4

Prid. Calen.

Mart.

30

3

3

31

Prid. Calen.

Prid. Calen.

Ides, which, added to the first of the following month, made 19 days of Calends. In January, therefore, the 14th day of the month was called the nineteenth before the Calends of February (counting inclusively), the 15th was the 18th before the Calends and so on to the 30th, which was called the third before the Calend (tertio Calendas), the last being the second of the Calends, or the day before the Calends (pridie Calendas).

Year. — The year is either astronomical or civil. The solar astronomical year is the period of time in which the earth performs a revolution in its orbit about the sun, or passes from any point of the ecliptic to the same point again; and consists of 365 days 5 hours 48 min. and 46 sec. of mean solar time. The civil year is that which is employed in chronology, and varies among different nations, both in respect of the season at which it commences and of its subdivisions. When regard is had to the sun's motion alone, the regulation of the year, and the distribution of the days into months, may be effected without much trouble; but the difficulty is greatly increased when it is sought to reconcile solar and lunar periods, or to make the

subdivisions of the year depend on the moon, and at the same time to preserve the correspondence between the whole year and the seasons.

Of the Solar Year. — In the arrangement of the civil year, two objects are sought to be accomplished, — first, the equable

distribution of the days among twelve months; and secondly; the preservation of the beginning of the year at the same distance from the solstices or equinoxes. Now, as the year consists of 365 days and a fraction, and 365 is a number not divisible by 12, it is impossible that the months can all be of the same length and at the same time include allthe days of the year. By reason also of the fractional excess of the length of the year above 365 days, it likewise happens that the years cannot all contain the same number of days if the epoch of their commencement remains fixed; for the day and the civil year must necessarily be considered as beginning at the same instant; and therefore the extra hours cannot be included in the year till they have accumulated to a whole day. As soon as this has taken place, an additional day must be given to the year.

The civil calendar of all European countries has been borrowed from that of the Romans. Romulus is said to have divided the year into ten months only, including in all 304 days, and it is not very well known how the remaining days were disposed of. The ancient Roman year commenced with March, as is indicated by the names September, October, November, December, which the last four months still retain. July and August, likewise, were anciently denominated Quintilis and Sextilis, their present appellations having been bestowed in compliment to Julius Caesar and Augustus. In the reign of Numa two months were added to the year, January at the beginning and February at the end; and this arrangement con- tinued till the year 452 B.C., when the Decemvirs changed the order of the months, and placed February after January. The months now consisted of twenty-nine and thirty days alternately, to correspond with the synodic revolution of the moon, so that the year contained 354 days; but a day was added to make the number odd, which was considered more fortunate, and the year therefore consisted of 355 days. This differed from the solar year by ten whole days and a fraction; but, to restore the coincidence, Numa ordered an additional or intercalary month to be inserted every second year between the 23rd and 24th of February, consisting of twenty-two and twenty-three days alternately, so that four years contained 1465 days, and the mean length of the year was consequently 366J days. The additional month was called Mercedinus or Mercedonius, from merces, wages, probably because the wages of workmen and

domestics were usually paid at this season of the year. According to the above arrangement, the year was too long by one day, which rendered another correction necessary. As the error amounted to twenty- four days in as many years, it was ordered that every third 1 period of eight years, instead of containing' four intercalary months, amounting in all to ninety days, should contain only three of those months, consisting of twenty-two days each. The mean length of the year was thus reduced to 365J days; but it is not certain at what time the octennial periods, borrowed from the Greeks, were introduced into the Roman calendar, or whether they were at any time strictly followed. It does not even appear that the length of the intercalary month was regulated by any certain principle, for a discretionary power was left with the pontiffs, to whom the care of the calendar was committed, to intercalate more or fewer days according as the year was found to differ more or less from the celestial motions. This power was quickly abused to serve political objects, and the calendar consequently thrown into confusion. By giving a greater or less number of days to the intercalary month, the pontiffs were enabled to prolong the term of a magistracy or hasten the annual elections; and so little care had been taken to regulate the year, that, at the time of Julius Caesar, the civil equinox differed from the astronomical by three months, so that the winter months were carried back into autumn and the autumnal into summer.

In order to put an end to the disorders arising from the negligence or ignorance of the pontiffs, Caesar abolished the use of the lunar year and the intercalary month, and regulated the civil year entirely by the sun. With the advice and assistance of Sosigenes, he fixed the mean length of the year at 3651 days, and decreed that every fourth year should have 366 days, thy

other years having each 365. In order to restore the vernal equinox to the 25th of March, the place it occupied in the time of Numa, he ordered two extraordinary months to be inserted between November and December in the current year, the first to consist of thirty-three, and the second of thirty-four days. The intercalary month of twenty-three days fell into the year of course, so that the ancient year of 355 days received an augmentation of ninety days; and the year on that occasion contained in all 445 days. This was called the last year of confusion. The first Julian year commenced with the 1st of January of the 46th before the birth of Christ, and the 708th from

the foundation of the city.

In the distribution of the days through the several months, Caesar adopted a simpler and more commodious arrangement than that which has since prevailed. He had ordered that the first, third, fifth, seventh, ninth and eleventh months, that is January, March, May, - July, September and November, should have each thirty-one days, and the other months thirty, excepting February, which in common years should have only twenty-nine, but every fourth year thirty days. This order was interrupted to gratify the vanity of Augustus, by giving the month bearing his name as many days as July, which was named after the first Caesar. A day was accordingly taken from February and given to August; and in order that three months of thirty-one days might not come together, September and November were reduced to thirty days, and thirty-one given to October and December. For so frivolous a reason was the regulation of Caesar abandoned, and a capricious arrangement introduced, which it requires some attention to remember.

The additional day which occured every fourth year was given to February, as being the shortest month, and was inserted in the calendar between the 24th and 25th day. February having then twenty-nine days, the 25th was the 6th of the calends of March, sexto calendas; the preceding, which was the additional or intercalary day, was called bis-sexto calendas, — hence the term bissextile, which is still employed to distinguish the year of 366 days. The English denomination of leap-year would have been more appropriate if that year had differed from common years in defect, and contained only 364 days. In the modern calendar the intercalary day is still added to February, not, however, between the 24th and 25th, but as the 29th.

The regulations of Caesar were not at first sufficiently under- stood; and the pontiffs, by intercalating every third year instead of every fourth, at the end of thirty six years had inter calated twelve times, instead of nine. This mistake having been discovered, Augustus ordered that all the years from the thirty- seventh of the era to the forty-eighth inclusive should be common years, by which means the intercalations were reduced to the proper number of twelve in forty-eight years. No account is taken of this blunder in chronology; and it is tacitly supposed that the calendar has been correctly followed from its com- mencement.

Although the Julian method of intercalation is perhaps the most convenient that could be adopted, yet, as it supposes the year too

long by n minutes 14 seconds, it could not without correction very long answer the purpose for which it was devised, namely, that of preserving always the same interval of time between the commencement of the year and the equinox. Sosigenes could scarcely fail to know that this year was too long; for it had been shown long before, by the observations of Hip- parchus, that the excess of 3 65 J days above a true solar year would amount to a day in 300 years. The real error is indeed more than double of this, and amounts to a day in 128 years; but in the time of Caesar the length of the year was an astrono- mical element not very well determined. In the course of a few centuries, however, the equinox sensibly retrograded towards the beginning of the year. When the Julian calendar was introduced, the equinox fell on the 25th of March. At the time of the council of Nice, which was held in 325, it fell on the 21st; and when the reformation of the calendar was made in 1582, it had retrograded to the nth. In order to restore the equinox to its' former place, Pope Gregory XIII. directed ten days to be

suppressed in the calendar; and as the error of the Julian intercalation was now found to amount to three days in 400 years, he ordered the intercalations to be omitted on all the centenary years excepting those which are multiples of 400. According to the Gregorian rule of intercalation, therefore, every year of which the number is divisible by four without a remainder is a leap year, excepting the centurial years, which are only leap years when divisible by four after omitting the two ciphers. Thus 1600 was a leap year, but 1700, 1800 and 1900 are common years; 2000 will be a leap year, and so on.

As the Gregorian method of intercalation has been adopted in all Christian countries, Russia excepted, it becomes interesting to examine with what degrees of accuracy it reconciles the civil with the solar year. According to the best determinations of modern astronomy (Le Verrier's Solar Tables, Paris, 1858, p. 102), the mean geocentric motion of the sun in longitude, from the mean equinox during a Julian year of 365-25 days, the same being brought up to the present date, is 36o°-r-27"-685. Thus the mean length of

the solar year is found to be 36o «^. 2 7 ». 6S X365-25 =365-3422

days, or 365 days 5 hours 48 min. 46 sec. Now the Gregorian rule gives 97 intercalations in 400 years; 400 years therefore contain 365X400+97, that is, 146,097 days; and consequently one year contains 365-2425 days, or 365 days 5 hours 49 min. 12 sec. This exceeds the true solar year by 26 seconds, which amount to a day in

3323 years. It is perhaps unnecessary to make any formal provision against an error which can only happen after so long a period of time; but as 3323 differs little from 4000, it has been proposed to correct the Gregorian rule by making the year 4000 and all its multiples common years, With this correction the rule of intercalation is as follows : —

Every year the number of which is divisible by 4 is a leap year, excepting the last year of each century, which is a leap year only when the number of the century is divisible by 4; but 4000, and its multiples, 8000, 12,000, 16,000, &c. are common years. Thus the uniformity of the intercalation, by continuing to depend on the number four, is preserved, and by adopting the last correction the commencement of the year would not vary more than a day from its present place in two hundred centuries.

In order to discover whether the coincidence of the civil and solar year could not be restored in shorter periods by a different method of intercalation, we may proceed as follows: — The fraction 0-2422, which expresses the excess of the solar year above a whole number of days, being converted into a continued fraction, becomes

1

4+i

7+j

i-fi

3+i

4 + 1

i + .&c. which gives the series of approximating fractions,

178 31 132 163 4′ 29′ 33′ 128′ 545′ 673′

The first of these, -, gives the Julian intercalation of one day in

four years, and is considerably too great. It supposes the year to contain 365 days 6 hours.

7

The second, ~r, gives seven intercalary days in twenty-nine

years, and errs in defect, as it supposes a year of 365 days 5 hours 47 min. 35 sec.

o

The third, — , gives eight intercalations in thirty-three years or

seven successive intercalations at the end of four years respectively, and the eighth at the end of five years. This supposes the year to contain 365 days 5 hours 49 min. 5-45 sec.

The fourth fraction, ·f = |x33 + 29 '

combines three

periods of thirty-three years with one of twenty-nine, and would consequently be very convenient in application. It supposes the year to consist of 365 days 5 hours 48 min. 45 sec, and is practically exact.

Q

The fraction — offers a convenient and very accurate method

33

of intercalation. It implies a year differing in excess from the true year only by 19-45 sec ' while the Gregorian year is too long by 26 sec. It produces a much nearer coincidence between the civil and solar years than the Gregorian method ; and, by reason of its shortness of period, confines the evagations of the mean equinox from the true within much narrower limits. It has been stated by Scaliger, Weidler, Montucla, and others, that the modern Persians actually follow this method, and intercalate eight days in thirty-three

CALENDAR

99 1

years. The statement has, however, been contested on good authority; and it seems proved (see Delambre, Aslronomie Moderne, torn. i. p.8l) that the Persian intercalation combines the two periods 7 8 7 4 "X ˆ 8 it

29 and 33" If they follow the combination 29 + 3X33 ° 128' their deterrhination of the length of the tropical year has been extremely exact. The discovery of the period of thirty-three years is ascribed to

Omar Khayyam, one of the eight astronomers appointed by Jelal ud-Din Malik Shah, sultan of Khorasan, to reform or construct a calendar, about the year 1079 ˚f our er a-

If the commencement of the year, instead of being retained at the same place in the seasons by a uniform method of intercalation, were made to depend on astronomical phenomena, the intercalations would succeed each other in an irregular manner, sometimes after four years and sometimes after five; and it would occasionally, though rarely indeed, happen, that it would be impossible to determine the day on which the year ought to begin. In the calendar, for example, which was attempted to be introduced in France in : 793. the beginning of the year was fixed at midnight preceding the day in which the true autumnal equinox falls. But supposing the instant of the sun's entering into the sign Libra to be very near midnight, the small errors of the solar tables might render it doubt- ful to which day the equinox really belonged; and it would be in vain to have recourse to observation to obviate the difficulty. It is therefore infinitely more commodious to determine the commence- ment of the year by a fixed rule of intercalation ; and of the various methods which might be employed, no one, perhaps is on the whole more easy of application, or better adapted for the purpose of com- putation, than the Gregorian now in use. But a system of 31 inter- calations in 128 years would be by far the most perfect as regards mathematical accuracy. Its adoption upon our present Gregorian calendar would only require the suppression of the usual bissextile once in every 128 years, and there would be no necessity for any further correction, as the error is so insignificant that it would not amount to a day in 100,000 years.

Of the Lunar Year and Luni-solar Periods. — The lunar year, ronsisting of twelve lunar months, contains only 334 days; its commencement consequently anticipates that of the solar year by eleven days, and passes through the whole circle of the seasons in about thirty-four lunar years. It is therefore so obviously ill-adapted to the computation of time, that, excepting the modern Jews and Mahommedans, almost all nations who have regulated their months by the moon have employed some method of intercalation by means of which the beginning of the year is retained at nearly the same fixed place in the seasons.

In the early ages of Greece the year was regulated entirely by the moon. Solon divided the year into twelve months, consisting alternately of twenty-nine and thirty days, the former of which were called deficient months, and the latter full months. The lunar year,

therefore, contained 354 days, falling short of the exact time of twelve lunations by about 8-8 hours. The first expedient adopted to reconcile the lunar and solar years seems to have been the addition of a month of thirty days to every second year. Two lunar years would thus contain 25 months, or 738 days, while two solar years, of 3651 days each, contain 7305 days. The difference of 75 days was still too great to escape observation; it was accordingly proposed by Cleostratus of Tenedos, who flourished shortly after the time of Thales, to omit the biennary intercalation every eighth year. In fact, the 7 J days by which two lunar years exceeded two solar years, amounted to thirty days, or a full pionth, in eight years. By inserting, therefore, three additional months instead of four in every period of eight years, the coincidence between the solar and lunar year would have been exactly restored if the latter had contained only 354 days, inasmuch as the period contains 354X8+3 X30= 2922 days, corresponding with eight solar years of 365J days each. But the true time of 99 lunations is 2923-528 days, which exceeds the above period by 1-528 days, or thirty- six hours and a few minutes. At the end of two periods, or six- teen years, the excess is three days, and at the end of 160 years, thirty days. It was therefore proposed to employ a period of 160 years, in which one of the intercalary months should be omitted; but as this period was too long to be of any practical use, it was never generally adopted. The common practice was to make occasional corrections as they became necessary, in order to preserve the relation between the octennial period and the state of the heavens; but these corrections being left to the care of incompetent persons, the calendar soon fell into great

disorder, and no certain rule was followed till a new division of the year was proposed by Meton and Euctemon, which was immediately adopted in all the states and dependencies of Greece.

The mean motion of the moon in longitude, from the mean equinox, during a Julian year of 365-25 days (according to Hansen's Tables de la Lune, London, 1857, pages 15, 16) is, at the present date, i3X36o +477644"- 4 o9; that of the sun being 36o°+27"-685. Thus the corresponding relative mean geocentric motion of the moon from the sun is i2X36o°+4776i6"-724; and the duration of the mean synodic revolution of the moon, or lunar

month, is therefore

J&L

*i2X3&°+4776l6*724 X 3 6 S-25 = 29-530588 days, or 29 days, 12*

hours, 44 min. 2-8 sec.

The Metonic Cycle, which may be regarded as the chef-d'oeuvre of ancient astronomy, is a period of nineteen solar years, after which the new moons again happen on the same days of the year. In nineteen solar years there are 235 lunations, a number which, on being divided by nineteen, gives twelve lunations for each year, with seven of a remainder, to be distributed among the years of the period. The period of Meton, therefore, con- sisted of twelve years containing twelve months each, and seven years containing thirteen months each; and these last formed the third, fifth, eighth, eleventh, thirteenth, sixteenth, and nine- teenth years of the cycle. As it had now been discovered that the exact length of the lunation is a little more than twenty-nine and a half days, it became necessary to abandon the alternate succession of full and deficient months; and, in order to preserve a more accurate correspondence between the civil month and the lunation, Meton divided the cycle into 125 full months of thirty days, and no deficient months of twenty-nine days each. The number of days in the period was therefore 6940. In order to distribute the deficient months through the period in the most equable manner, the whole period may be regarded as consisting of 235 full months of thirty days, or of 7050 days, from which 1 10 days are to be deducted. This gives one day to be suppressed in sixty-four; so that if we suppose the months to contain each thirty days, and then omit every sixty-fourth day in reckoning from the beginning of the period, those months in which the omission takes place will, of course, be the deficient months.

The number of days in the period being known, it is easy to ascertain its accuracy both in respect of the solar and lunar motions. The exact length of nineteen solar years is 19X365-2422 = 6939-6018 days, or 6939 days 14 hours 26-592 minutes; hence the period, which is exactly 6940 days, exceeds nineteen revolutions of the sun by nine and a half hours nearly. On the other hand, the exact time of a synodic revolution of the moon is 29-530588 days; 235 lunations, therefore, contain 235X29-530588 = 6939-68818 days, or 6939 days 16 hours 31 minutes, so that the period exceeds 235 lunations by only seven and a half hours.

After the Metonic cycle had been in use about a century, a correction was proposed by Calippus. At the end of four cycles, or seventy-six years, the accumulation of the seven and a half hours of difference between the cycle and 235 lunations amounts to thirty hours, or one whole day and six hours. Calippus, therefore, proposed to quadruple the period of Meton, and deduct one day at the end of that time by

changing one of the full months into a deficient month. The period of Calippus, there- fore, consisted of three Metonic cycles of 6940 days each, and a period of 6939 days; and its error in respect of the moon, consequently, amounted only to six hours, or to one day in 304 years. This period exceeds seventy-six true solar years by fourteen hours and a quarter nearly, but coincides exactly with seventy-six Julian years; and in the time of Calippus the length of the solar year was almost universally supposed to be exactly 365 \ days. The Calippic period is frequently referred to as a date by Ptolemy.

Ecclesiastical Calendar. — The ecclesiastical calendar, which is adopted in all the Catholic, and most of the Protestant countries of Europe, is luni-solar, being regulated partly by the solar, and partly by the lunar year, — a circumstance which gives rise to the

distinction between the movable and immovable feasts. So early 1 as the 2nd century of our era, great disputes had arisen among the Christians respecting the proper time of celebrating Easter, which governs all the other movable feasts. The Jews celebrated their passover on the 14th day of the first month, that is to say, the lunar month of which the' fourteenth day either falls on, or next follows, the day of the vernal equinox. Most Christian sects agreed that Easter should be celebrated on a Sunday. Others followed the example of the Jews, and adhered to the 14th of the moon; but these, as usually happened to the minority, were accounted heretics, and received the appellation of Quartodecimans. In order to terminate dissensions, which produced both scandal and schism in the church, the council of Nicaea, which was held in the year 3 2 5, ordained that the celebra- tion of Easter should thenceforth always take place on the Sunday which immediately follows the full moon that happens upon, or next after, the day of the vernal equinox. Should the 14th of the moon, which is regarded as the day of full' moon, happen on a Sunday, the celebration Of Easter was deferred to the Sunday following, in order to avoid concurrence with the Jews and the above-mentioned heretics. The observance of this rule renders it necessary to reconcile three periods which have no common measure, namely, the week, the lunar month, and the solar year; and as this can only be done approximately, and within certain limits, the determination of Easter is an affair of considerable nicety and complication. It is to be regretted that the reverend fathers who formed the council of Nicaea did not abandon the moon altogether,

and appoint the first or second Sunday of April for the celebration of the Easter festival. The ecclesiastical calendar would in that case have possessed all the simplicity and uniformity of the civil calendar, which only requires the adjustment of the civil to the solar year; but they were probably not sufficiently versed in astronomy to be aware of the practical difficulties which their regulation had to encounter.

Dominical Letter. — The first problem which the construction of the calendar presents is to connect the week with the year, or to find the day of the week corresponding to a given day of any year of the era. As the number of days in the week and the number in the year are prime to one another, two successive years cannot begin with the same day; for if a common year begins, for example, with Sunday, the following year will begirt with Monday, and if a leap year begins with Sunday, the year following will begin with Tuesday. For the sake of greater generality, the days of the week are denoted by the first seven letters of the alphabet, A, B, C, D, E, F, G, which are placed in the calendar beside the days of the year, so that A stands opposite the first day of January, B opposite the second, and so on to G, which stands opposite the seventh; after which A returns to the eighth, and so on through the 365 days of the year. Now if one of the days of the week, Sunday for example, is represented by E, Monday will be represented by F, Tuesday by G, Wednesday by A, and so on; and every Sunday through the year will have the same character E, every Monday F, and so with regard to the rest. The letter which denotes Sunday is called the Dominical Letter, or the Sunday Letter; and when the dominical letter of the year is known, the letters which respec- tively correspond to the other days of the week become known at the same time.

Solar Cycle. — In the Julian calendar the dominical letters are readily found by means of a short cycle, in which they recur in the same order without interruption. The number of years in the intercalary period being four, and the days of the week being seven, their product is 4 X 7 = 28; twenty-eight years is therefore a period which includes all the possible combinations of the days of the week with the commencement of the year. This period is called the Solar Cycle, or the Cycle of the Sun, and restores the first day of the year to the same day of the week. At the end of the cycle the dominical letters return again in the same order on the same days of the month; hence a table of dominical letters, constructed for twenty-eight years, will serve to show the dominical letter of any given year from the com-

mencement of the era to the Reformation. The cycle, though probably

not invented before the time of the council of Nicaea, is regarded as having commenced nine years before the era, so that the year one was the tenth of the solar cycle. To find the year of the cycle, we have therefore the following rule: — Add nine to the date, divide the sum by twenty-eight; the quotient is the number of cycles elapsed, and the remainder is the year of the cycle. Should there be no remainder, the proposed year is the twenty- eighth Or last of the cycle. This rule is conveniently expressed

*fx -f~ q\ by the formula \~2S~1 r > * n which * denotes the date, and the*

symbol r denotes that the remainder, which arises from the division of x + 9 by 28, is the number required. Thus, for 1840,

we have — g — — 66; therefore (— ˆg —) r = 1, and the year

1840 is the first of the solar cycle. In order to make use of the solar cycle in finding the dominical letter, it is necessary to know that the first year of the Christian era began with Saturday. The dominical letter of that year, which was the tenth of the cycle, was consequently B. The following year, or the nth of the cycle, the letter was A; then G. The fourth year was bissextile, and the dominical letters were F, E; the following year D, and so on. In this manner it is easy to find the dominical letter belonging to each of the twenty-eight years of the cycle. But at the end of a century the order is interrupted in the Gregorian calendar by the secular suppression of the leap year; hence the cycle can only be employed during a century. In the reformed calendar the intercalary period is four hundred years, which number being multiplied by seven, gives two thousand eight hundred years as the interval in which the coincidence is restored between the days of the year and the days of the week. This long period, however, may be reduced to four hundred years; for since the dominical letter goes back five places every four years, its variation in four hundred years, in the Julian calendar, was five hundred places, which is equiva- lent to only three places (for five hundred divided by seven leaves three) ; but the Gregorian calendar suppresses exactly three intercalations in four hundred years, so that after four hundred years the dominical letters must again return in the same order. Hence the following table of dominical letters for four hundred years will serve to show the dominical letter of any year in the Gregorian calendar for ever. It contains four columns of letters, each column serving for a century. In order to find the column from which the letter in any given case is to be taken, strike off the last two figures of the date, divide the preceding figures by

four, and the remainder will indicate the column. The symbol X, employed in the formula at the top of the column, denotes the riiimber of centuries, that is, the figures remaining after the last two have been struck off. For example, required the dominical letter of the year 1839? In this case X = 18, therefore

(-7) r = 2 5 an d in the second column of letters, opposite 39, in the table we find F, which is the letter of the proposed year.

It deserves to be remarked, that as the dominical letter of the first year of the era was B, the first column of the following table will give the dominical letter of every year from the commence- ment of the era to the Reformation. For this purpose divide the date by 28, and the letter opposite the remainder, in the first column of figures, is the dominical letter of the year. For example, supposing the date to be 1148. On dividing by 28, the remainder is o, or 28; and opposite 28, in the first column of letters, we find D, C, the dominical letters of the year 1148.

Lunar Cycle and Golden Number. — In connecting the lunar month with the solar year, the framers of the ecclesiastical calendar adopted the period of Meton, or lunar cycle, which they supposed to be exact. A different arrangement has, how- ever, been followed with respect to the distribution of the months. The lunations are supposed to consist of twenty-nine and thirty days alternately, or the lunar year of 354 days; and in order to make up nineteen solar years, six embolismic or intercalary months, of thirty days each, are introduced in the course of the cycle, and one of twenty-nine days is added at the

end. This gives 19X354+6X304-29 = 6935 days, to be dis- tributed among 235 lunar months. But every leap year one day must be added to the lunar month in which the 29th of February is included. Now if leap year happens on the first, second or third year of the period, there will be five leap years in the period, but only four when the first leap year falls on the fourth. In the former case the number of days in the period becomes 6940 and in. the latter 6939. The mean length of the cycle is

Table I. — Dominical Letters.

Years of the Century.

(!), =■

(!), = >

(f)r= 3

®,-

c

E

G

B,A

1 29 57 85

B

D

F

G

2 30 58 86

A

C

E

F

3 31 59 87

G

B

D

E

4 32 60 88

F, E

A, G

C, B

D, C

5 33 61 89

D

F

A

B

6 34 62 90

C

E

G

A

7 35 63 91

B

D

F

G

8 36 64 92

A, G

C, B

E,D

F, E

9 37 65 93

F

A

C

D

10 38 66 94

E

G

B

C

11 39 67 95

D

F

A

B

12 40 68 96

C, B

E, D

G, F ‘ ‘

A, G

13 41 69 97

A

C

E

F

14 42 70 98

G

B

D

E

15 43 71 99

F

A

C

D

16 44 72

E, D

G,F

B, A

C,B

17 45 73

C

E

G

A

18 46 74

B

D

F

G

19 47 75

A

C

E

F

20 48 76

G, F

B, A

D, C

E,D

21 49 77

E

G

B

C

22 50 78

D

F

A

B

23 51 79

C

E

G

A

24 52 80

B, A

D, C

F, E

G, F

25 53 81

G

B

D

E

26 54 82

F

A

C

D

27 55 83

E

G

B

C

28 56 84

D,C

F,E

A, G

B, A

-

T

ABLE II

— The Day of the Week.

Month.

Dominical Letter.

Jan. Oct.

A

B

C

D

E

F

G

Feb. Mar. Nov.

D

E

F

G

A

B

C

April July

G

A

B

C

D

E

F

May

B

C

D

E

F

G

A

June

E

F

G

A

B

C

D

August

C

D

E

F

G

A

B

Sept. Dec.

F

G

A

B

C

D

E

1

8

15

22

29

Sun.

Sat.

Frid.

Thur.

Wed.

Tues.

Mon.

2

9

16

23

30

Mon.

Sun.

Sat.

Frid.

Thur.

Wed.

Tues.

3

10

17

24

31

Tues.

Mon.

Sun.

Sat.

Frid.

Thur.

Wed.

4

11

18

25

Wed.

Tues.

Mon.

Sun.

Sat.

Frid.

Thur.

5

12

19

26

Thur.

Wed.

Tues.

Mon.

Sun.

Sat.

Frid.

6

13

20

27

Frid.

Thur.

Wed.

Tues.

Mon.

Sun.

Sat.

7

14

21

28

Sat.

Frid.

Thur.

Wed.

Tues.

Mon.

Sun.

therefore 6939! days, agreeing exactly with nineteen Julian years.

By means of the lunar cycle the new moons of the calendar were indicated before the Reformation. As the cycle restores these phenomena to the same days of the civil month, they will fall on the same days in any two years which occupy the same place in the cycle; consequently a table of the moon's phases for 19 years will serve for any year whatever when we know its number in the cycle. This number is called the Golden Number, either because iv. 32

it was so termed by the Greeks, or because it was usual to mark it with red letters in the calendar. The Golden Numbers were introduced into the calendar about the year 530, but disposed as they would have been if they had been inserted at the time of the council of Nicaea. The cycle is supposed to commence with the year in which the new moon falls on the 1st of January, which took place the year preceding the commencement of our era. Hence, to find the Golden Number N, for any year x, we have N= (ˆjjp) r , which gives the following rule: Add 1 to the date,

divide the sum by 19; the quotient is the number of cycles elapsed, and the remainder is the Golden Number. When the remainder is o, the proposed year is of course the last or 19th of the cycle. It ought to be remarked that the new moons, determined in this manner, may differ from the astronomical new moons sometimes as much as two days. The reason is that the sum of the solar and lunar inequalities, which are compensated in the whole period, may amount in certain cases to io°, and thereby cause the new moon to arrive on the second day before or after its mean time.

Dionysian Period.— The cycle of the sun brings back the days of the month to the same day of the week; the lunar cycle restores the new moons to the same day of the month; therefore 28X19 = 532 years, includes all the variations in respect of the new moons and the dominical letters, and is consequently a period after which the new moons again occur on the same day of the month and the same day of the week. This is called the Dionysian or Great Paschal Period, from its having been employed by Dionysius Exiguus, familiarly styled " Denys the Little," in determining Easter Sunday. It was, however, first proposed by Victorius of Aquitain, who had been appointed by Pope Hilary to revise and correct the church calendar.

Hence it is also called the Victorian Period. It continued in use. till the Gregorian reformation.

Cycle qfIndiction. — Besides the solar and lunar cycles, there is a third of 15 years, called the cycle of indiction, frequently employed in the computations of chronologists. This period is not astronomical, like the two former, but has reference to certain judicial acts which took place at stated epochs under the Greek emperors. Its commencement is referred to the 1st of January of the year 313 of the common era. By extending it backwards, it will be found that the first of the era was the fourth of the cycle of indiction. The number of any year in this cycle will therefore be given by the formula / 2LxJ \ I

that is to say, add 3 tothedate.divide.the sum by 1 5, and the remainder is the year of the indiction. When the remainder is o, the proposed year is the fifteenth of the cycle.

JulianPeriod. — The Julian period, proposed by the celebrated Joseph Scaliger as an universal measure of chronology, is formed by taking the continued product of the three cycles of the sun, of the moon, and of the in- diction,and is consequently 28X 19 X 1 5 = 7980 years. In the course of this long period no two years can be expressed by the same numbers in all the three cycles. Hence, when the number of any proposed year in each of the cycles is known, its number in the Julian period can be determined by the resolution of a very simple problem of the indeterminate analysis. It is unnecessary, however, in the present case to exhibit the general solution of the problem, because when the number in the period corre- sponding to any one year in the era has been ascertained, it is easy to establish the correspondence for all other years, without having again recourse to the direct solution of the problem. We shall therefore find the number of the Julian period corre- sponding to the first of our era.

We have already seen that the year 1 of the era had 10 for its number in the solar cycle, 2 in the lunar cycle, and 4 in the cycle of indiction; the question is therefore to find a number such, that

when it is divided by the three numbers 28, 19, and 1 5 respectively the three remainders shall be 10, 2, and 4.

Let x, y, and z be the three quotients of the divisions; the number sought will then be expressed by 28X + 10, by 19V+2, or by 152+4. Hence the two equations

28 x + 10 = 19 y+2 = 15 z+4.

To solve the equations 28x+io = i9y+2, or y = x+ y , let

9+ 8 , ,, , m — 8*

»ra = z -— — , we have then x = 2m-i — -— .

Let ˆ~ — =m'; then m = gm'+8; hence

x = i8m'+i6+m' = igm' + i6.....

Again, since 28 £+10 = 15 z+4, we have

„ , ,- 2X—6

152 = 28ˆ+6, orz = 2 — ■*

2 × 6 n

Let T . =n;then2.r=i5w+6, and» = 7n+3+-.

*15 ■**

Let -=»'; then n =2 »'; consequently

.(1).

- *= i4n'+3+ra' = i5ra'+3..*

Equating the above two values of x, we have

i5"'+3 = I 9»»'i6; whence n' = m' „ ■ Let Jl —P't we have then

4»j' = i5£ — 13, and m' = 4/>- Let ± =#'; then ·=4-13;

.(2).

£ + 13

whence m' = i6£' — 52— £' = 15 £■ — 52. Now in this equation p' may be any number whatever, provided 15 £' exceed 52. The smallest value of p' (which is the one here wanted) is therefore 4; for 15X4 = 60. Assuming therefore p' = 4, we have w' = 6o — 52 =

8; and consequently, since x = ig m' + i6, x = 19X8 + 16 = 168. The number required is consequently 28X168 + 10 = 4714.

Having found the number 4714 for the first of the era, the correspondence of the years of the era and of the period is as follows: — Era, I, 2, 3,... x,

Period, 4714, 4715, 47i6,...47l3+x; from which it is evident, that if we take P to represent the year of the Julian period, and x the corresponding year of the Christian era, we shall have

P = 47i3+«, and » = P— 4713. With regard to the numeration of the years previous to the com- mencement of the era, the practice is not uniform. ChrOnologists, in general, reckon the year preceding the first of the era —I, the next preceding —2, and so on. In this case

Era, —1, —2, — 3,.. — x,

Period, 4713, 4712, 47ii,...47i4-x; whence

P=47i4— x, and £ = 4714 — P. But astronomers, in order to preserve the uniformity of computa- tion, make the series of years proceed without interruption, and reckon the year preceding the first of the era o. Thus Era, o, —1, —2,... —x,

Period, 4713, 4712, 47il,...47l3-i; therefore, in this case

P = 47i3— x, and ˆ = 4713 — P.

Reformation of the Calendar. — The ancient church calendar was founded on two suppositions, both erroneous, namely, that the year contains 3655 days, and that 235 lunations are exactly equal to nineteen solaf years. It could not therefore long continue to preserve its correspondence with the seasons, or to indicate the days of the new moons with the same accuracy. About the year 730 the venerable Bede had already perceived the anticipation of the equinoxes, and remarked that these phenomena then took place about three days earlier than at the time of the council of Nicaea. Five centuries after the time of Bede, the divergence of the true equinox from the 21st of March, which now amounted to seven or eight days, was pointed out by Johannes de Sacro Bosco (John Holywood, fl. 1230) in his De Anni Ratione; and by Roger Bacon, in a treatise De Reformatione Calendarii, which, though never published, was transmitted to the pope. These works were probably little regarded at the time; but as the errors of the calendar went on increasing, and the true length of the year, in consequence of the

progress of astronomy, became better known, the project of a reformation was again revived in the 1 5th century; and in 1474 Pope Sixtus IV. invited Regiomontanus,

the most celebrated astronomer of the age, to Rome, to superia tend the reconstruction of the calendar. The premature death of Regiomontanus caused the design to be suspended for the time; but in the following century numerous memoirs appeared on the subject, among the authors of which were Stonier, Albert Pighius, Johann Schoner, Lucas Gauricus, and other mathematicians oi celebrity. At length Pope Gregory XIII. perceiving that the measure was likely to confer a great eclat on his pontificate, undertook the long-desired reformation; and having found the governments of the principal Catholic states ready to adopt his views, he issued a brief in the month of March 1582, in which he abolished the use of the ancient calendar, and substituted that which has since been received in almost all Christian countries under the name of the Gregorian Calendar or New Style. The author of the system adopted by Gregory was Aloysius Lilius, or Luigi LilioGhiraldi, a learned astronomer and physician of Naples, who died, however, before its introduction; but the individual who most contributed to give the ecclesiastical calendar its present form, and who was charged with all the calculations necessary for its verification, was Clavius, by whom it was com- pletely developed and explained in a great folio treatise of 800 pages, published in 1603, the title of which is given at the end of this article.

It has already been mentioned that the error of the Julian year was corrected in the Gregorian calendar by the suppression of three intercalations in 400 years. In order to restore the beginning of the year to the same place in the seasons that it had occupied at the time of the council of Nicaea, Gregory directed the day following the feast of St Francis, that is to say the 5th of October, to be reckoned the 1 5th of that month. By this regula- tion the vernal equinox wdiich then happened on the nth of March was restored to the 2 1st. From 1 582 to 1 700 the difference between the old and new style continued to be ten days; but 1700 being a leap year in the Julian calendar, and a common year in the Gregorian, the difference of the styles during the 18th century was eleven days. The year 1 800 was also common in the new calendar, and, consequently, the difference in the 19th century was twelve days. From 1900 to 2100 inclusive it is thirteen days.

The restoration of the equinox to its former place in the year and the correction of the intercalary period, were attended with no difficulty;

but Lilius had also to adapt the lunar year to the new rule of intercalation. The lunar cycle contained 6939 days 18 hours, whereas the exact time of 235 lunations, as we have already seen, is 235X29-530588 = 6939 days 16 hours 31 minutes. The difference, which is 1 hour 29 minutes, amounts to a day in 308 years, so that at the end of this time the new moons occur one day earlier than they are indicated by the golden numbers. During the 1257 years that elapsed between the council of Nicaea and the Reformation, the error had accumulated to four days, so that the new moons which were marked in the calendar as happening, for example, on the 5th of the month, actually fell on the 1st. It would have been easy to correct this error by placing the golden numbers four lines higher in the new calendar; and the suppression of the ten days had already rendered it necessary to place them ten lines lower, and to carry those which belonged, for example, to the 5th and 6th of the month, to the 15th and 16th. But, supposing this correction to have been made, it would have again become necessary, at the end of 308 years, to advance them one line higher, in consequence of the accumulation of the error of the cycle to a whole day. On the other hand, as the golden numbers were only adapted to the Julian calendar, every omission of the centenary intercalation would require them to be placed one line lower, opposite the 6th, for example, instead of the 5th of the month; so that, generally speaking, the places of the golden numbers would have to be changed every century. On this account Lilius thought fit to reject the golden numbers from the calendar, and supply their place by another set of numbers called Epacts, the use of which we shall now proceed to explain.

Epacts. — Epact is a word of Greek origin, employed in the calendar to signify the moon's age at the beginning of the year.

The common solar year containing 365 days, and the lunar year only 354 days, the difference is eleven; whence, if a new moon fall on the 1st of January in any year, the moon will be eleven days old on the first day of the following year, and twenty- two days on the first of the third year. The numbers eleven and: twenty-two are therefore the epacts of those years respec- tively. Another addition of eleven gives thirty-three for the epact of the fourth year; but in consequence of the insertion of the intercalary month in each third year of the lunar cycle, this epact is reduced to three. In like manner

the epacts of all the following years of the cycle are obtained by successively adding eleven to the epact of the former year, and rejecting thirty as often as the sum exceeds that number. They are therefore connected with the golden numbers by the formula

(—ˆ-J , in which n is any Whole number; and for a whole

lunar cycle (supposing the first epact to be n), they are as follows:— n, 22, 3, 14, 25, 6, 17, 28, 9, 20, 1, 12, 23, 4, 15, 26, 7, 18, 29. But the order is interrupted at the end of the cycle; for the epact of the following year, found in the same manner, would be 29 + 11 = 40 or 10, whereas it ought again to be 11 to correspond with the moon's age and the golden number 1. The reason of this is, that the intercalary month, inserted at the end of the cycle, contains only twenty-nine days instead of thirty; whence, after n has been added to the epact of the year coi responding to the golden number 19, we must reject twenty-nine instead of thirty, in order to have the epact of the succeeding year; or, which comes to the same thing, we must add twelve to the epact of the last year of the cycle, and then reject thirty as before.

This method of forming the epacts might have been continued indefinitely if the Julian intercalation had been followed without correction, and the cycle been perfectly exact; but as neither of these suppositions is true, two equations or corrections must be applied, one depending on the error of the Julian year, which is called the solar equation; the other on the error of the lunar cycle, which is called the lunar equation. The solar equation occurs three times in 400 years, namely, in every secular year which is not a leap year; for in this case the omission of the intercalary day causes the new moons to arrive one day later in all the following months, so that the moon's age at the end of the month is one day less than it would have been if the inter- calation had been made, and the epacts must accordingly be all diminished by unity. Thus the epacts 11, 22, 3, 14, &c, become 10, 21, 2, 13, &c. On the other hand, when the time by which the new moons anticipate the lunar cycle amounts to a whole day, which, as we have seen, it does in 308 years, the new moons will arrive one day earlier, and the epacts must conse- quently be increased by unity. Thus the epacts n, 22, 3, 14, &c, in consequence of the lunar equation, become 12, 23, 4, 15, &c. In order td preserve the uniformity of the calendar, the epacts are changed only at the commencement of a century; the correction of the error of the lunar cycle is therefore made at the end of 300 years. In the Gregorian calendar this error is assumed to amount to one day in 3125 years or eight days in 2500 years, an assumption

which requires the line of epacts to be changed seven times successively at the end of each period of 300 years, and once at the end of 400 years; .and, from the manner in which the epacts were disposed at the Reformation, it was found most correct to suppose one of the periods of 2500 years to terminate with the year 1800.

The years in which the solar equation occurs, counting from the Reformation, are 1700, 1800, 1900, 2100, 2200, 2300, 2500, &c. Those in which the lunar equation occurs are 1800, 2100, 2400, 2700, 3000, 3300, 3600, 3900, after which, 4300, 4600 and so on. When the solar equation occurs, the epacts are diminished by unity; when the lunar equation occurs, the epacts are augmented by unity; and when both equations occur together, as in 1800, ˆ100, 2700, &c, they compensate each other, and the epacts are not changed.

In consequence of the solar and lunar equations, it is evident that the epact or moon's age at the beginning of the year, must,

in the course of centuries, have all different values from one to thirty inclusive, corresponding to the days in a full lunar month. Hence, for the construction of a perpetual calendar, there must be thirty different sets or lines of epacts.. These are exhibited in the subjoined table (Table III.) called the Extended Table of Epacts, which is constructed in the following manner. The series of golden numbers is written in a line at the top of the table, and under each golden number is a column of thirty epacts, arranged in the order of the natural numbers, beginning at the bottom and proceeding to the top of the column. The first column, under the golden number 1, contains the epacts, 1, 2, 3, 4, &c, to 30 or o. The second column, corre- sponding to the following year in the lunar cycle, must have all its epacts augmented by 11; the lowest number, therefore, in the column is 1 2, then 13, 14, 15 and so on. The third column corresponding to the golden number 3, has for its first epact 12 + 11 = 23; and in the same manner all the nineteen columns of the table are formed. Each of the thirty lines of epacts is designated by a letter of the alphabet, which serves as its index or argument. The order of the letters, like that of the numbers, is from the bottom of the column upwards.

In the tables of the church calendar the epacts are usually printed in Roman numerals, excepting the last, which is desig- nated by an asterisk (*), used as an indefinite symbol to denote 30 or o, and 25, which in the last eight columns is expressed in Arabic characters, for a reason that will immediately be explained. In the table here given, this distinction is made by means of an accent placed over the last

figure.

At the Reformation the epacts were given by the line D. The year 1600 was a leap year; the intercalation accordingly took place as usual, and there was no interruption in the order of the epacts; the line D was employed till 1700. In that year the omission of the intercalary day rendered it necessary to diminish the epacts by unity, or to pass to the line C. In 1800 the solar equation again occurred, in consequence of which it was necessary to descend one line to, have the epacts diminished by unity; but in this year the lunar equation also occurred, the anticipation of the new moons having amounted to a day; the new moons accordingly happened a day earlier, which ren- dered it necessary to take the epacts in the next higher line. There was, consequently, no alteration; the two equations destroyed each other. The line of epacts belonging to the present century is therefore C. In 1900 the solar equation occurs, after which the line is B. The year 2000 is a leap year, and there is no alteration. In 2100 the equations again occur together and destroy each other, so that the line B will serve three centuries, from 1900 to 2200. From that year to 2300 the line will be A. In this manner the line of epacts belonging to any given century is easily found, and the method of proceeding is obvious. When the solar equation occurs alone, the line of epacts is changed to the next lower in the table; when the lunar equation occurs alone, the line is changed to the next higher; when both equations occur together, no change takes place. In order that it may be perceived at once to what centuries the different lines of epacts respectively belong, they have been placed in a column on the left hand side of the table on next page. The use of the epacts is to show the days of the new moons, and consequently the moon's age on any day of the year. For this purpose they are placed in the calendar (Table IV.) along with the days of the month and dominical letters, in a retrograde order, so that the asterisk stands beside the 1st of January, 29 beside the 2nd, 28 beside the 3rd and so on to 1, which corre- sponds to the 30th. After this comes the asterisk, which corre- sponds to the 31st of January, then 29, which belongs to the 1st of February, and so on to the end of the year. The reason of thia distribution is evident. If the last lunation of any year ends, for example, on the 2nd of December, the new moon falls on the 3rd; and the moon's age on the 31st, or at the end of the year, is twenty-nine days. The epact of the following year is therefore twenty-nine. Now that lunation having commenced on the 3rd of December, and consisting of thirty days, will end on the 1st of January. The 2nd of January is therefore the day

of the new moon, which is indicated by the epact twenty-nine. In like manner, if the new moon fell on the 4th of December, the epact of the following year would be twenty-eight, which, to indicate the day of next new moon, must correspond to the 3rd of January.

When the epact of the year is known, the days on which the new moons occur throughout the whole year are shown by Table IV., which is called the Gregorian Calendar of Epacts. For

example, the golden number of the year 1832 is (— 2— — J r =g,

and the epact, as found in Table III. , is twenty -eight. This epact occurs at the 3rd of January, the 2nd of February, the 3rd of March, the 2nd of April, the 1st of May, &c, and these days are consequently the days of the ecclesiastical new moons in 1832. The astronomical new moons generally take place one or two days, sometimes even three days, earlier than those of the calendar.

There are some artifices employed in the construction of this table, to which it is necessary to pay attention. The thirty

placed in the calendar beside 26. When 25 and 26 occur in the same line, of epacts, the 25 is not accented, and in the calendar stands beside 24. The lines of epacts in which 24 and 25 both occur, are those which are marked by one of the eight letters b, e, k, n, r, B, E, N, in all of which 25′ stands in a column corresponding to a golden number higher than n. There are also eight lines' in which 25 and 26 occur, namely, c, f, I, p, s, C, F, P. In the other 14 lines, 25 either does not occur at all, or it occurs in a line in which neither 24 nor 26 is found. From this it appears that if the golden number of the year exceeds it, the epact 25, in six months of the year, must correspond to the same day in the calendar as 26; but if the golden number does not exceed 11, that epact must correspond to the same day as 24. Hence the reason for distinguishing 25 and 25'. In using the calendar, if the epact of the year is 25, and the golden number not above 11, take 25; but if the golden number exceeds n, take 25'.

Another peculiarity requires explanation. The epact it>' (also distinguished by an accent or different character) is placed

Table III.-

—Extended Table of

Epacts.

\

Index.

Golden Numbers.

V ears.

1

2

3

4

5

6

7

8

9

10

11

12

}3

?4

15

16

17

18

19

1700

1800 8700

C

•

11

22

• 3

14

25

6

17

28

9

20

I

12

23

4

15

26

7

18

1900

2000 2100

B

29

10

21

2

13

24

5

16

27

8

17

•

11

22

3

14

25′

6

17

2200

2400

A

28

9

20

1

12

23

4

15

26

7

19

29

10

21

2

13

24

5

16

2300

2500

u

27

8

19

•

11

22

3

14

25

6

17

28

9

20

1

12

23

4

15

2600

2700 2800

t

26

7.

18

29

10

21

2

J 3

24

5

16

27

8

J ?

•

11

22

3

14

2900

3000

s

25

6

17

28

9

20

1

12

23

4

15

26

7

18

29

10

21

2

13

3100

3200 3300

r

24

5

16

27

8

19

-

11

22

3

14

25′

6

17

28

9

20

1

12

3400

3600

q

23

4

15

26

7

18

29

10

21

2

13

24

5

.16

27

8

19

•

11

3500

3700

p

22

3

14

25

6

17

28

9

20

1

12

23

4

15

26

7

18

29

10

3800

3900 4000

n

21

2

13

24

5

16

27′

8

19

•

Ii

22

3

H

25′

6

17

28

9

4100

m

20

1

12

23

.4

15

26

”” 7

18

29

10

21

2

13

24

5

16

27

8

4200

4300 4400

1

19

•

11

22

3

14

25

6

17

28

9

20

1

12

23

4

15

26

7

4500

4600

k

18

29

10

21

■ *2*

13

24

‘■‘5

16

27

8

19

•

11

22

3

14

25′

6

4700

4800 ˆ900

i

17

28

9

20

1

12

■23

4

15

26

7

18

29

10

21

2

13

24

5

5000

5200

h

16

27

8

19

•

11

22

3

14

25

6

17

28

9

20

1

12

23

4

5100

5300

f

15

26

7

18

29

10

21

2

13

24

5

16

27

8

19

•

II

22

3

5400

5500 5600

H

25

6

17

28

9

20

1

12

23

4

15

26

7

18

29

10

21

2

5700

5800

e

13

24

5

16

27

8

19

•

11

22

3

14

25′

6

17

28

9

20

1

5900

6000 6100

d

12

23

4

15

26

7

18

29

10

21

2

13

24

5

16

27

8

19

•

6200

6400

c

n

22

3

14

2 5

6

17

28

9

20

1

12

23

4

15

26

7

18

29

6300

6500

b

10

21

2

13

24

5

16

27

8

19

•

II

22

3

14

25′

6

17

28

6600

6800

a

9

20

1

12

23

4

15

26

7

18

29

IO

21

2

13

24

5

16

27

6700

6900

P

8

19

•

11

22

■ *3*

14

25

6

17

28

9

20

1

12

23

4

15

26

7000

7100 7200

K

7

18

29

10

21

2

13

24

5

16

27

8

19

•

11

22

3

14

25′

7300

7400

. M

6

17

28

9

20

1

12

23

4

IS

26

7

18

29

10

21

2

13

24

7500

7600 7700

H

5

16

27

8

19

•

11

22

3

14

25

6

17

28

9

20

1

12

23

7800

8000

G

4

15

26

7

18

29

10

21

2

13

24

5

16

27

8

19

-

11

22

7900

8100

F

3

14

25

6

17

28

9

20

1

12

23

4

15

26

7

18

29

10

21

8200

8300 8400

E

2

13

24

5

16

27

8

19

•

11

22

3

M

25′

6

17

28

9

20

1500

1600 8500

D

1

12

23

4

IS

26

7

18

29

10

21

. 2

13

24

5

16

27

8

19

epacts correspond to the thirty days of a full lunar month; but the lunar months consist of twenty-nine and thirty days alter- nately, therefore in six months of the year the thirty epacts must correspond only to twenty -nine days. For this reason the epacts twenty-five and twenty-four are placed together, so as to belong only to one day in the months of February, April, June, August. September and November, and in the same months another 25', distinguished by an accent, or by being printed in a different character, is placed beside 26, and belongs to the same day. The reason for doubling the 25 was to prevent the new moons from being indicated in the calendar as happening twice on the same day in the course of the lunar cycle, a thing which actually cannot take place. For example, if we observe the line B in Table III., we shall see that it contains both the epacts twenty-four and twenty-five, so that if these correspond to the same day of the month, two new moons would be indicated as happening on that day within nineteen years. Now the three epacts 24, 25, 26, can never occur in the same line; therefore in those lines in which 24 and 25 occur, the 25 is accented, and

in the same line with 20 at the 3 1st of December. It is, however, only used in those years in which the epact 19 concurs with the golden number 19. When the golden number is 19, that is to say, in the last year of the lunar cycle, the supplementary month contains only 39 days. Hence, if in that year the epact should be 19, a new moon would fall on the 2nd of December, and the lunation would terminate on the 30th, so that the next new moon would arrive on the 3 1st. The epact of the year, therefore, or 19, must stand beside that day, whereas, according to the regular order, the epact corresponding to the 31st of December is 20; and this is the reason for the distinction.

As an example of the use of the preceding tables, suppose it were required to determine the moon's age on the 10th of April

1832. In 1832 the golden number is r ˆ 2 Q) r =9, and the line

of epacts belonging to the century is C. In Table III. under g, and in the line C, we find the epact 28. In the calendar, Table IV., look for April, and the epact 28 is found opposite the second day. The 2nd of April is therefore the first day of the moon,

CALENDAR

997

and the ioth is consequently the ninth day of the moon. Again, suppose it were required to find the moon's age on the 2nd of December in the year 1916. In this case the golden number is

*\ 'iq 1) r = x – 7 " ˆ nc * * n Table m'-.i opposite to 1900, the line of epacts is B. Under 17, in line B, the epact is 25'. In the calendar this epact first occurs before the 2nd of December at the 26th of November. The 26th of November is consequently the first day of the moon, and the 2nd Of December is therefore the seventh day.*

Easter.— The next, and indeed the principal use of the calendar, is to find Easter, which, according to the traditional regulation of the council 6f Nice, must be determined from the following conditions: — 1st, Easter must be celebrated on a Sunday; 2nd, this Sunday must follow the 14th day of the paschal moon, so that if the 14th of the paschal moon falls on a Sunday then Easter must be celebrated on the Sunday following; 3rd, the paschal

in this ease the 18th of April is Sunday, then Easter must be celebrated on the following Sunday, or the 25th of AprıL Hence

Easter Sunday cannot happen earlier than the 22nd of March, or later than the 25th of April.

Hence we derive the following rule for finding Easter Sunday from the tables: — 1st, Find the golden number, and, from Table III., the epact of the proposed year. 2nd, Find in the calendar (Table IV.) the first day after the 7th of March which corresponds to the epact of the year; this will be the first day of the paschal moon. 3rd, Reckon thirteen days after that of the first of the moon, the following will be the 14th of the moon or the day of the full paschal moon. 4th, Find from Table I. the dominical letter of the year, and observe in the calendar the first day, after the fourteenth of the moon, which corresponds to the dominical letter; this will be Easter Sunday.

Example.— Required the day on which Easter Sunday falls in the year 1840? 1st, For this year the golden number is

Table IV. — Gregorian Calendar.

Days.

Jan.

Feb.

March.

April.

May.

June.

July.

August.

Sept.

October.

Nov.

Dec.

E

L

E

L

E

L

E

L

E

L

E

L

E

L

E

L

E

L

E

L

E

L

E

L

1

-

A

29

D

-

D

29

G

28

B

27

E

26

G

2524

C

23

F

22

A

21

D

20

F

2

29

B

28

E

29

E

28

A

27

C

2526

F

25‘2,S

A

23

D

22

G

21

B

20

E

19

G

3

28

C

27

F

28

F

2 7

B

26

V

2.S24

G

‘24

B

22

E

21

A

20

C

19

F

18

A

4

27

L)

2,^26

G

27

G

2.V26

C

25‘2.S

E

23’

A

■*23*

C

21

F

20

B

19

D

18

G

17

B

5

26

K

25 24

A

26

A

2524

D

24

F

22

B

22

D

20

G

19

C

18

E

17

A

16

C

6

2.S‘25

F

23

B

25‘25

B

23

E

23

G

21

C

21

E

19

A

18

D

17

F

16

B

15

D

7

24

G

22

C

24

C

22

1-

22

A

20

D

20

F

18

B

17

E

16

G

15

C

14

E

8

23

A

21

D

23

D

21

G

21

B

19

E

19

G

17

C

16

F

15

A

14

D

13

F

9

22

a

20

E

22

E

20

A

20

C

18

F

18

A

16

D

IS

G

14

B

13

E

12

G

10

21

c

19

F

21

F

19

B

19

L>

17

G

J 7

B

15

E

14

A

13

C

12

F

. 11

A

11

20

D

18

G

20

G

18

C

18

E

16

A

16

C

14

F

13

B

12

D

11

G

10

B

12

19

E

17

A

19

A

17 ‘

D

17

F

15

B

i,S

D

13

G

12

C

11

E

10

A

9

C

13

18

K

16

B

18

B

16

K

16

G

14

C

14

E

12

A

11

D

10

F

9

B

8

D

14

17

G

15

17

V

IS

F

15

A

13

L)

13

F

11

B

10

E

9

G

• 8

C

7

E

15

16

A

14

D

16

U

14

G

H

B

12

E

12

G

10

C

9

F

8

A

7

D

6

F

16

15

B

13

E

15

E

13

A

13

C

II

F

11

A

9

D

8

G

7

B

6

E

5

G

17

14

C

12

F

H

F

12

B

r2

D

IO

G

10

B

8

E

7

A

6

C

5

F

4

A

18

13

D

II

G

13

G

II

C

n

E

9

A

9

C

7

F

6

B

5

D

4

G

3

B

19

12

E

10

A

12

A

IO

D

10

F

8

B

8

D

6

G

■*i*

C

4

E

3

A

2

O

20

II

F

9

B

11

B

9

E

9

G

, 7

C

7

E

5

A

4

D

3

F

2

B

1

D

21

IO

G

8

C

10

C

8

F

8

A

6

D

6

F

4

B

3

E

2

G

1

C

•

F

22

9

A

7

D

9

D

7

G

7

B

5

E

S

G

3

c

2

F

1

A

•

n

20

F

23

8

B

6

E

8

E

6

A

6

C

4

F

4

A

2

D

1

G

•

B

• *2 9*

E

28

G

24

7

C

5

F

7

F

5

B

5

L>

3

G

3

B

1

E

•

A

29

C

28

F

27

A

25

6

D

4

G

6

G

4

C

4

E

2

A

2

C

•

F

29

B

28

D

27

G

26

B

26

5

E

3

A

5

A

3

D

3

F

1

B

1

D

29

G

28

C

27

E

25‘26

A

25‘25

C

27

4

F

2

B

4

B

2

E

2

G

C

•

E

28

A

27

D

26

F

25‘24

B

24

D

28

3

G

1

C

3

C

1

F

1

A

29

D

29

F

27

B

25‘26

E

25‘25

G

23

C

33

E

29

2

A

2

D

•

G

B

28

E

28

G

26

C

2524

F

24

A

22

D

22

F

30

1

B

1

E

29

A

29

C

27

F

27

A

25‘25

D

23

G

23

B

21

E

21

G

3i

»

C

F

28

D

25‘26

B

24

E

22

C

ig‘20

A

moon is that of which the 14th day falls on or next follows the day of the vernal equinox; 4th the equinox is fixed invariably in the calendar on the 2 1st of March. Sometimes a misunderstanding has arisen from not observing that this regulation is to be construed according to the tabular full moon as determined from the epact, and not by the true full moon, which, in general, occurs one or two days earlier.

From these conditions it follows that the paschal full moon, or the 14th of the paschal moon, cannot happen before the 21st of March, and that Easter in consequence cannot happen before the 22nd of March. If the 14th of the moon falls on the 21st, the new moon must fall on the 8th; for 21 — 13 = 8; and the paschal new moon cannot happen before the 8th; for suppose the new moon to fall on the 7th, then the full moon would arrive ort the 20th, or the day before the equinox. The following moon would be the paschal moon. But the fourteenth of this moon falls at the latest on the 18th of April, or 29 days after the 20th of March; for by reason of the double epact that occurs at the 4th and 5th of April, this lunation has only 29 days. Now, if

(— TQ) r — l 7 > an d the epact (Table III. line C) is 26. 2nd,

After the 7th of March the epact 26 first occurs in Table III. at the 4th of April, which, therefore, is the day of the new moon. 3rd, Since the new moon falls on the 4th, the full moon is on the 17th (4 + 13 = 17). 4th, The dominical letters of 1840 are E, D (Table I.), of which D must be taken, as E belongs only to January and February. After the 17th of April D first occurs in the calendar (Table IV.) at the 19th. Therefore, in 1840, Easter Sunday falls on the 19th of April. The operation is in all cases much facilitated by means of the table on next page.

Such is the very complicated and artificial, though highly ingenious method, invented by Lilius, for the determination of Easter and the other movable feasts. Its principal, though perhaps least obvious advantage, consists in its being entirely independent of astronomical tables, or indeed of any celestial phenomena whatever; so that all chances of disagreement arising from the inevitable errors of tables, or the uncertainty of observation, are avoided, and Easter determined without the

possibility of mistake. But this advantage isonly procured by the sacrifice of some accuracy; for notwithstanding the cumber- some apparatus employed, the conditions of the problem are not always exactly satisfied, nor is it possible that they can be always satisfied by any similar method of proceeding. The equinox is fixed on the 21st of March, though the sun enters Aries generally on the 20th of that month, sometimes even on the 19th. It is accordingly quite possible that a full moon may arrive after the true equinox, and yet precede the 21st of March. This, therefore, would not be the paschal moon of the calendar, though it un- doubtedly ought to be so if the intention of the council of Nice were rigidly followed. The new moons indicated by the epacts also differ from the astronomical new moons, and even from the mean new moons, in general by one or two days. In imitation of the Jews, who counted the time of the new moon, not from the moment of the actual phase, but from the time the moon first became visible after the conjunction, the fourteenth day of the moon is regarded as the full moon : but the moon is in opposition generally on the 16th day; therefore, when the new moons of the

must therefore be diminished by the number of units in -, or by

(4/ w (this notation Dein S use d to denote the quotient, in a whole number, that arises from dividing x by 4). Hence in the Julian calendar the dominical letter is given by the equation

L = 7»+3 --©.,*

This equation gives the dominical letter of any year from the commencement of the era to the Reformation. In order to adapt it to the Gregorian calendar, we must first add the 10 days that were left out of the year 1582 ; in the second place we must add one day for every century that has elapsed since 1600, in consequence of the secular suppression of the ftitercalary day; and lastly we must deduct the units contained in a fourth of the same number, because every fourth centesimal year is still a leap year. ‘ Denoting, therefore, the number of the century (or the date after the two right-hand digits have been struck out) by c, the value of L must be increased

by io + (c — 16)

We have then

L-7+3-*-(f) B ,io(,*

-16).

/ £I M6S \ 4 /’

Table V-

-Perpetual

Table, showing Easter

Dominical Letter.

Epact.

For Leap Years use the second Letter.

A

B

C

D

E

F

G

•

Apr. 16

Apr. 17

Apr. 18

Apr. 19

Apr. 20

Apr. 14

Apr. 15

1

» 16

.. 17

„ 18

» 19

.. 13

.. 14

.. 15

2

,, 16

.. 17

„ 18

.. 12

.. 13

., 14

.. 15

3

,. 16

.. 17

,, II

,. 12

.. 13

„ 14

.. 15

4

„ 16

» 10

.1 II

.. 12

.. 13

„ 14

.. 15

5

.. 9

>i 10

1. II

.. 12

» 13

,. 14

.. 15

6

.. 9

» 10

11 II

» 12

-. 13

„ 14

.. 8

7

.. 9

» 10

II II

>i 12

.. 13

.. 7

„ 8

8

.. 9

„ 10

,, II

.< 12

6

.. 7

„ 8

9

.. 9

» 10

> > II

-. 5

6

.. 7

„ 8

10

.. 9

„ 10

.- 4

5

» 6

.. 7

„ 8

11

.. 9

.. 3

.. 4

>. 5

„ 6

.. 7

8

12

,. 2

.. 3

., 4

.. 5

„ 6

.. 7

„ 8

13

,, 2

.. 3

,, 4

.. 5

„ 6

.- 7

„ 1

14

.. 2

.. 3

„ 4

.. 5

,, 6

Mar. 31

»» ˆ

15

> > 2

.. 3

„ 4

.. 5

Mar. 30

.. ‘ 31

it 1

16

,. 2

.. 3

4

Mar. 29

■.. 30

.. 31

M I

17

>. 2

-. 3

Mar. 28

.. 29

„ 3°

.. 31

II I

18

., 2

Mar. 27

„ 28

„ 29

„ 30

.. 3i

*II **

19

Mar. 26

-. 27

„ 28

.. 29

,. 30

.. 3i

II I

20

„ 26

„ 27

„ 28

.. 29

„ 3°

.. 3i

Mar. 25

21

„ 26

,. 27

„ 28

.. 29

.. 30

,. 24

.. 25

22

„ 26

.. 27

., 28

„ 29

■M 23

.. 24

.. 25

23

., 26

»> 2 7

„ 28

>» 22

.. 23

.. 24

.. 25

24

Apr. 23

Apr. 24

Apr. 25

Apr. 19

Apr. 20

Apr. 21

Apr. 22

25

.. 23

.. 24

,. 25

„ 19

,, 20

>, 21

„ 22

26

., 23

„ 24

„ 18

,. 19

„ 20

„ 21

11 22

27

.. 23

.. 17

„ 18

„ 19

,, 20

11 21

„ 22

28

» 16

.. 17

„ 18

,. 19

,, 20

11 21

„ 22

29

,. 16

... ‘17

„ 18

„ 19

„ 20

,1 21

.. 15

*4 / *”’*

that is, since 3 + 10 = 13 or 6 (the 7 days being re- jected, as they do not affect the value of L),

L = 7+6-*-g) w+ (e i6)(£^) w ;*

This formula is perfectly general, and easily calculated.

As an example, let us take the year 1839. In this case,

**- l8 *(D W (*

*= (lJ f)w = *S9,c = l o. Hence*

8, c — 16=2,

calendar nearly concur with the true new moons, the full moons are considerably in error. The epacts are also placed so as to indicate the full moons generally one or two days after the true full moons; but this was done purposely, to avoid the chance of concurring with the Jewish passover, which the framers of the calendar seem to have considered a greater evil than that of celebrating Easter a week too late.

We will now show in what manner this whole apparatus of methods and tables may be dispensed with, and the Gregorian calendar reduced to a few simple formulae of easy computation.

And, first, to find the dominical letter. Let L denote the number of the dominical letter of any given year of the era. Then, since every year which is not a leap year ends with the same day as that with which it began, the dominical letter of the following year must be L — 1, retrograding one letter every common year. After x years, therefore, the number of the letter will be L — x. But as L can never exceed 7, the number x will always exceed L after the first seven years of the era. In order, therefore, to render the subtraction possible, L must be increased by some multiple of 7, as “jm, and the formula then becomes 7»i+L — x. In the year preceding the first of the era, the dominical letter was C ; for that year, therefore, we have

L = 3; consequently for any succeeding year x, L = ym+2—x, the years being all supposed to consist of 365 days. But every fourth year is a leap year, and the effect of the intercalation is to throw the dominical letter one place farther back. The above expression

L = 7W+6 – 1839 -459+2 -o L = 7jm — 2290 = 7X328— 2290. L=6 = letterF.

The year therefore begins with Tuesday. It will be remembered that in a leap year there are always two dominical letters, one of which is employed till the 29th of February, and the other till the end of the year. In this case, as the formula supposes the intercalation already made, the resulting letter is that which applies after the 29th of February. Before the intercalation the dominical letter had retrograded one place less. Thus for 1840 the formula gives D; during the first two months, therefore, the dominical letter is E.

In order to investigate a formula for the epact, let us make

E = the true epact of the given year ; J=the Julian epact, that is to say, the number the epact would have been if the Julian year had been still in use and the lunar cycle had been exact ; S=the correction depending on the solar year; M = the correction depending on the lunar cycle; then the equation of the epact will be E = J+S + M; so that E will be known when the numbers J, S, and M are deter- mined.

The epact J depends on the golden number N, and must be deter- mined from the fact that in 1582, the first year of the reformed calendar, N was 6, and J 26. For the following years, then, the golden numbers and epacts are as follows :

1583. N= 7, J=26 + ii-30= 7;

1584, N= 8, J= 7 + 11 =18;

1585. N= 9, J = i8 + n =29;

1586, N = io, 1=29 + 11—30 — 10;

and, therefore, in general J = (73) . But the numerator

of this fraction becomes by reduction 11 N— 40 or II N — 10 (the 30 being rejected, as the remainder only is sought) = N + lo(N — 1);

therefore, ultimately,

J =

(:

N + io(N-i)

30

),

On account of the solar equation S, the epact J must be dimin- ished by unity every centesimal year, excepting always the fourth.

After x centuries, therefore, it must be diminished by x — (– 1 . Now,

as 1600 was a leap year, the first correction of the Julian intercalation took place in 1700; hence, taking c to denote the number of the

century as before, the correction becomes (c — 16)— 1 — – —) ,

which

CALENDAR

999

must be deducted from J.

S = -(c-i6) + (!

We have therefore c — 16

centuries, is

The last period of twenty-five

4 I w With regard to the lunar equation M, we have already stated that in the Gregorian calendar the epacts are increased by unity at the end of every period of 300 years seven times successively, and then the increase takes place once at the end of 400 years. This gives

eight to be added in a period of twenty-five centuries, and — in x

centuries. But — = - (_ rr) . Now, from the manner in which*

the intercalation is directed to be made (namely, seven times successively at the end of 300 years, and once at the end of 400),

it is evident that the fraction — must amount to unity when the

number of centuries amounts to twenty-four. In like manner, when

the number of centuries is 24+25 =49, we must have — =2 ; when

x the number of centuries is 24+2X25 = 74, then rr = 3; and, gener- ally, when the number of centuries is 24+ˆX25, then— = » + i. Now this is a condition which will evidently be expressed in general by the formula n— I j . Hence the correction of the epact,

or the number of days to be intercalated after x centuries reckoned from the commencement of one of the periods of twenty-five

Hffil

3)””>

centuries terminated with 1800; therefore, in any succeeding year, if c be the number of the century, we shall have x = c— 18 and

x -f 1 =c— 17. Let ( ) w =a>, then for all years after 1800 the

value of M will be given by the formula (J ; therefore,

counting from the beginning of the calendar in 1582,

(3)«» By the substitution of these values of J, S and M, the equation of the epact becomes

E= piˆL-i) ,_ (c _ i6 h (*) w+ (=!j=!) w .

It may be remarked, that as 0= ( ) , the value of a will be

o till e — 17=25 or £ = 42; therefore, till the year 4200, a may be neglected in the computation. Had the anticipation of the new moons been taken, as it ought to have been, at one day in 308 years instead of 312J, the lunar equation would have occurred only twelve times in 3700 years, or eleven times successively at the end of 300 years, and then at the end of 400. In strict accuracy, therefore, a ought to have no value till e— 17 = 37, or c = 54> that is to say, till the year 5400. The above formula for the epact is given by Delambre {Hist, de Vastronomie moderne, t. i. p. 9) ; it may be exhibited under a variety of forms, but the above is perhaps the best adapted for

calculation. Another had previously been given by Gauss, but inaccurately, inasmuch as the correction depending on a was omitted.

Having determined the epact of the year, it only remains to find Easter Sunday from the conditions already laid down. Let P = the number of days from the 21st of March to the 15th of the paschal moon, which is the first day on which Easter Sunday can fall; £ = the number of days from the 21st of March to Easter Sunday; L = the number of the dominical letter of the year; / = letter belonging to the day on which the 15th of the moon falls: then, since Easter is the Sunday following the 14th of the moon, we have

P = P + (L-l), which is commonly called the number of direction.

The value of L is always given by the formula for the dominical letter, and P and I are easily deduced from the epact, as will appear from the following considerations.

*When P = l the full moon is on the 21st of March, and the new moon on the 8th (21 — 13=8), therefore the moon's age on the 1st of March (which is the same as on the 1st of January) is twenty- three days; the epact of the year is consequently twenty-three. When P = 2 the new moon falls on the ninth, and the epact is con- sequently twenty-two ; and, in general, when P becomes 1 +x, E becomes 23—x, therefore P+E = l+x+23 — £ = 24, and P = 24 — E. In like manner, when P = l, / = D=4; for D is the dominical letter of the calendar belonging to the 22nd of March. But it is evident that when / is increased by unity, that is to say, when the full moon falls a day later, the epact of the year is diminished by unity; therefore, in general, when / = 4+x, E=23— *, whence/+E=27 and*

/ = 27 — E. But P can never be less than I nor / less than 4, and in both cases E=23. When, therefore, E is greater than 23, we must add 30 in order that P and / may have positive values in the formula P=24 — E and / = 27 — E. Hence there are two cases. P=24-E.

When < 24,

When E>23,

jr=24-n..

W = 27-E, ■ P=54-E

/ = 57-E,or

By substituting one or other of these values of P and /, according ai the case may be, in the formula £ = P + (L— /), we shall have p, or the number of days from the 21st of March to Easter Sunday. It will be remarked, that as L—l cannot either be o or negative, we must add 7 to L as often as may be necessary, in order that L—l may be a positive whole number.

By means of the formulae which we have now given for the dominical letter, the golden number and the epact, Easter Sunday may be computed for any year after the Reformation, without the assistance of any tables whatever. As an example, suppose it were required to compute Easter for the year 1840. By substituting this number in the formula for the dominical letter, we have # = 1840,

; – 1 6 = 2 , (~ -) w = o, therefore

For the golden number we have N =

•(3).

L = 7ot+6 — 1840— 460+2

~7m— 2292

= 7X328 — 2292=2296—2292=4 L=4=Ietter D (1).

(ˆr' therefore

N = 17 (2).

For the epact we have

/ N + io(N-i) \ = /i7 + i6o\ /I77\ = ,,. \ 30)r \ 30)r \30/r 2 ' '

likewise c — 16 = 18 — 16 = 2, — — -2 = 1,0 = 0; therefore

E = 27 — 2 + 1=26 .. Now since E>23, we have for P and /,

P = 54-E = 54- 2 6 = 28,

consequently, since £ = P+(L — I),

. £ = 28 + (4-3)=29;

that is to say, Easter happens twenty-nine days after the 21st of March, or on the 19th April, the same result as was before found from the tables.

The principal church feasts depending on Easter, and the times of their celebration are as fol. Septuagesima Sunday . First Sunday in Lent . Ash Wednesday Rogation Sunday . Ascension day or Holy Thursday Pentecost or Whitsunday . Trinity Sunday

6 weeks .46 days ■"5 weeks

39 days

7 weeks h weeks

I Tl± \ before J Easter.

I after J Easter.

The Gregorian calendar was introduced into Spain, Portugal and part of Italy the same day as at Rome. In France it was received in the same year in the month of December, and by the Catholic states of Germany the year following. In the Protestant states of Germany the Julian calendar was adhered to till the year 1700, when it was decreed by the diet of Regens- burg that the new style and the Gregorian correction of the intercalation should be adopted. Instead, however, of employing the golden numbers and epacts for the determination of Easter and the movable feasts, it was resolved that the equinox and the paschal moon should be found by astronomical computation from the Rudolphine tables. But this method, though at first view it may appear more accurate, was soon found to be attended with numerous inconveniences, and was at length in 1774 abandoned at the instance of Frederick II., king of Prussia. In Denmark and Sweden the reformed calendar was received about the same time as in the Protestant states of Germany. It is remarkable that Russia still adheres to the Julian reckoning.

In Great Britain the alteration of the style was for a long time successfully opposed by popular prejudice. The inconvenience, however, of using a different date from that employed by the greater part of Europe in matters of history and chronology began to be generally felt; and at length the Calendar (New

Style) Act 1750 was passed for the adoption of the new style in all public and legal transactions. The difference of the two styles, which then amounted to eleven days, was removed by ordering the day

following the 2nd of September of the year 1752 to be accounted the 14th of that month; and in order to preserve uniformity in future, the Gregorian rule of intercalation respect- ing the secular years was adopted. At the same time, the commencement of the legal year was changed from the 25th of March to the 1st of January. In Scotland, January 1st was adopted for New Year's Day from 1600, according to an act of the privy council in December 1599. This fact is of importance with reference to the date of legal deeds executed in Scotland between that period and 1751, when the change was effected in England. With respect to the movable feasts, Easter is determined by the rule laid down by the council of Nice; but instead of employing the new moons and epacts, the golden numbers are prefixed to the days of the full moons. In those years in which the line of epacts is changed in the Gregorian calendar, the golden numbers are removed to different days, and of course a new table is required whenever the solar or lunar equation occurs. The golden numbers have been placed so that Easter may fall on the same day as in the Gregorian calendar. The calendar of the church of England is therefore from century to century the same in form as the old Roman calendar, excepting that the golden numbers indicate the full moons instead of the new moons.*

Hebrew Calendar. — In the construction of the Jewish calendar numerous details require attention. The calendar is dated from the Creation, which is considered to have taken place 3760 years and 3 months before the commencement of the Christian era. The year is luni-solar, and, according as it is ordinary or embolismic, consists of twelve or thirteen lunar months, each of which has 29 or 30 days. Thus the duration of the ordinary year is 354 days, and that of the embolismic is 384 days. In either case, it is sometimes made a day more, and sometimes a day less, in order that certain festivals may fall on proper days of the week for their due observance. The distribu- tion of the embolismic years, in each cycle of 19 years, is deter- mined according to the following rule: —

The number of the Hebrew year (Y) which has its commence- ment in a Gregorian year (x) is obtained by the addition of 3761 years; that is, $Y = x + 3761$. Divide the Hebrew year by 19; then the quotient is the number of the last completed cycle, and the remainder is the year of the current cycle. If the remainder be 3, 6, 8, n, 14, 17 or 19 (o), the year is embolismic; if any other number, it is ordinary. Or, otherwise, if we find the remainder

-m

the year is embolismic when R < 7.

The calendar is constructed on the assumptions that the mean lunation is 29 days 12 hours 44 min. 3 J sec, and that the year commences on, or immediately after, the new moon following the autumnal equinox. The mean solar year is also assumed to be 365 days 5 hours 55 min. 25! f sec, so that a cycle of nineteen of such years, containing 6939 days 16 hours $s min. 3$ sec, is the exact measure of 235 of the assumed lunations. The year 5606 was the first of a cycle, and the mean new moon, appertain- ing to the 1st of Tisri for that year, was 1845, October 1,15 hours 42 min. 43$ sec, as computed by Lindo, and adopting the civil mode of reckoning from the previous midnight. The times of all future new moons may consequently be deduced by successively adding 29 days 12 hours 44 min. 3 J sec. to this date.

To compute the times of the new moons which determine the commencement of successive years, it must be observed that in passing from an ordinary year the new moon of the following year is deduced by subtracting the interval that twelve lunations fall short of the corresponding Gregorian year of 365 or 366 days; and that, in passing from an embolismic year, it is to be found by adding the excess of thirteen lunations over the ' Gregorian year. Thus to deduce the new moon of Tisri, for the year

immediately following any given year (Y), when Y is '

[ordinary, subtract (J°) days 15 hours 11 min. 20 sec,

I embolismic, add /J j days 21 hours 32 min. 43i sec.

the second-mentioned number of days being used, in each case, whenever the following or new Gregorian year is bissextile.

Hence, knowing which of the years are embolismic, from their ordinal position in the cycle, according to the rule before stated, the times of the commencement of successive years may be thus carried on indefinitely without any difficulty. But some slight adjustments will occasionally be needed for the reasons before assigned, viz. to avoid certain festivals falling on incompatible days of the week. Whenever the computed conjunction falls on a Sunday, Wednesday or Friday, the new year is in such case to be fixed on the day after. It will also be requisite to attend to the following conditions:—

If the computed new moon be after 18 hours, the following day is to be taken, and if that happen to be Sunday, Wednesday or Friday, it

must be further postponed one day. If, for an ordinary year, the new moon falls on a Tuesday, as late as 9 hours 11 min. 20 sec, it is not to be observed thereon; and as it may not be held on a Wednesday, it is in such case to be postponed to Thursday. If, for a)'ear immediately following an en bolismic year, the computed new moon is on Monday, as late as 15 hours 30 min. 52 sec, the new year is to be fixed on Tuesday.

After the dates of commencement of the successive Hebrew years are finally adjusted, conformably with the foregoing directions, an estimation of the consecutive intervals, by taking the differences, will show the duration and character of the years that respectively intervene. According to the number of days thus found to be comprised in the different years, the days of the several months are distributed as in Table VI.

The signs + and — are respectively annexed to Hesvan and Kislev to indicate that the former of these months may some- times require to have one day more, and the latter sometimes one day less, than the number of days shown in the table— the result, in every case, being at once determined by the total number of days that the year may happen to contain. An ordinary year may comprise 353, 354 or 355 days; and an embolismic year 383, 384 or 385 days. In these cases respectively the year is said to be imperfect, common or perfect. The inter- calary month, Veadar, is introduced in embolismic years in order that Passover, the 1 5th day of Nisan, may be kept at its proper season, which is the full moon of the vernal equinox, or that which takes place after the sun has entered the sign Aries. It always precedes the following new year by 163 days, or 23 weeks and 2 days; and Pentecost always precedes the new year by 113 days, or 16 weeks and 1 day.

Table VI. — Hebrew Months.

Hebrew Month.

Ordinary Year.

Embolismic Year.

Tisri .

Hesvan

Kislev

Tebet

Sebat

Adar .

(Veadar)

Nisan

Yiar .

Sivan

Tamuz

Ab .

Elul .

30 29 +

30- 29 30 29 (...) 30 29 30 29 30 29

30

29 +

30-

29

30

30

(29)

30

29

30

29

30

29

Total

354

384

The Gregorian epact being the age of the moon of Tebet at the beginning of the Gregorian year, it represents the day of Tebet which corresponds to January 1 ; and thus the approximate date of Tisri 1 , the commencement of the Hebrew year, may be other- wise deduced by subtracting the epact from

Oct' 24} after an {emboUsmic} Hebrew year.

CALENDAR

IOOI-

The result so obtained would in general be more accurate than the Jewish calculation, from which it may differ a day, as fractions of a day do not enter alike in these computations. Such difference may also in part be accounted for by the fact that the assumed duration of the solar year is 6 min. 39-jHf sec. in excess of the true astronomical value, which will cause the dates of commencement of future Jewish years, so calculated, to advance forward from the equinox a day in error in 216 years. The lunations are estimated with much greater precision.

The following table is extracted from Woolhouse's Measures, Weights and Moneys of all Nations: —

Table VII. — Hebrew Years.

Jewisl Year.

Num- ber of Days.

Commencement (1st of Tisri).

Jewisl Year.

Num

1 beroi

Days

Commencement (1st of Tisri).

5606 07 08 09 10

II

12 .13

■*S‘4 >-i5 U16*

&I7 « 18

19 20 21 22 23 24

354 355 383 354 355 385 353 384 355 355 383 354 355 385 354 353 385 354 383

Thur.

Mon.

Sat.

Thur.

Mon.

Sat.

Sat.

Tues.

Mon.

Sat.

Thur.

Tues.

Sat.

Thur.

Thur.

Mon.

Thur.

Thur.

Mon.

2 Oct. 1845 21 Sept. 1846 11 Sept. 1847

28 Sept. 1848 17 Sept. 1849

7 Sept. 1850 27 Sept. 1851 14 Sept. 1852

3 Oct. 1853 23 Sept. 1854

13 Sept. 1855 30 Sept. 1856 19 Sept. 1857

9 Sept. 1858

29 Sept. 1858 17 Sept. i860

5 Sept. 1861 25 Sept. 1862

14 Sept. 1863

5673

74

•3 76

u 77 u 78

879

“8o

.81

385 354 353 385 354 355 383 354 385

Thur.

Thur.

Mon.

Thur.

Thur.

Mon.

Sat.

Thur.

Mon.

12 Sept. 1912 2 Oct. 1913

21 Sept. 1914 9 Sept. 1915

28 Sept. 1916

17 Sept. 1917 7 Sept. 1918

25 Sept. 1919

13 Sept. 1920

5682

83 84

85 86

87

88

v 89

£90

U9I

092

&93 94 95 96 97 98 99

5700

355 353 384 355 355 383 354 385 353 354 385 355 354 383 355 354 385 353 385

Mon.

Sat.

Tues.

Mon.

Sat.

Thur.

Tues.

Sat.

Sat.

Tues.

Sat.

Sat.

Thur.

Mon.

Sat.

Thur.

Mon.

Mon.

Thur.

3 Oct. 192 1 23 Sept. 1922

11 Sept. 1923 29 Sept. 1924 19 Sept. 1925

9 Sept. 1926

27 Sept. 1927 15 Sept. 1928

5 Oct. 1929 23 Sept. 1930

12 Sept. 1931 1 Oct. 1932

21 Sept. 1933 10 Sept. 1934

28 Sept. 1935 17 Sept. 1936

6 Sept. 1937 26 Sept. 1938 14 Sept. 1939

5625 26

27 28

29

30

31

.32

-S33

►34

u 35

£36

N 37

38

39

40

41 42 43

355 354 385 353 354 385 355 383 354 355 383 355 354 385 355 354 383 355 383

Sat.

Thur.

Mon.

Mon.

Thur.

Mon.

Mon.

Sat.

Thur.

Mon.

Sat.

Thur.

Tues.

Sat.

Sat.

Thur.

Mon.

Sat.

Thur.

1 Oct. 1864

21 Sept. 1865 10 Sept. 1866 30 Sept. 1867

17 Sept. 1868 6 Sept. 1869

26 Sept. 1870

16 Sept. 1 87 1

3 Oct. 1872

22 Sept. 1873 12 Sept. 1874 30 Sept. 1875 19 Sept. 1876

8 Sept. 1877 28 Sept. 1878

18 Sept. 1879 6 Sept. 1880

24 Sept. 1 88 1 14 Sept. 1882

5701 02

03 04

05

06

07

.08

>9

>,I0

U11

S12

“>i3

H

15

16

17

18

19

354 355 383 354 355 383 354 385 355 353 384 355 355 383 354 355 385 354 383

Thur.

Mon.

Sat.

Thur.

Mon.

Sat.

Thur.

Mon.

Mon.

Sat.

Tues.

Mon.

Sat.

Thur.

Tues.

Sat.

Thur.

Thur.

Mon.

3 Oct. 1940 22 Sept. 1941 12 Sept. 1942 30 Sept. 1943 18 Sept. 1944

8 Sept. 1945 26 Sept. 1946 15 Sept. 1947

4 Oct. 1948 24 Sept. 1949 12 Sept. 1950

1 Oct. 1 95 1 20 Sept. 1952 10 Sept. 1953 28 Sept. 1954 17 Sept. 1955

6 Sept. 1956 26 Sept. 1957 15 Sept. 1958

5644 45 46 47

, 48

i 49

5o

Us 2

CJ53 °o 54 (N 55

56

57 58

“‘59 60 61 62

354 355 385 354 353 385 354 383 355 354 385 353 355 384 355 353 384 355 383

Tues.

Sat.

Thur.

Thur.

Mon.

Thur.

Thur.

Mon.

Sat.

Thur.

Mon.

Mon.

Thur.

Tues.

Mon.

Sat.

Tues.

Mon.

Sat.

2 Oct. 1883 20 Sept. 1884

10 Sept. 1885 30 Sept. 1886 19 Sept. 1887

6 Sept. 1888

26 Sept. 1889 15 Sept. 1890

3 Oct. 1 89 1 22 Sept. 1892

11 Sept. 1893 1 Oct. 1894

19 Sept. 1895 8 Sept. 1896

27 Sept. 1897 17 Sept. 1898

5 Sept. 1899 24 Sept. 1900 14 Sept. 1901

5720 21 22 23 24 25 26

■*27*

^28

Cj 2 9

a 31 ^32

33

34

35 36

37 38

355 354 383 355 354 385 353 385 354 355 383 354 355 383 355 354 385 353

3«4

Sat.

Thur.

Mon.

Sat.

Thur.

Mon.

Mon.

Thur.

Thur.

Mon.

Sat.

Thur.

Mon.

Sat.

Thur.

Tues.

Sat.

Sat.

Tues.

3 Oct. 1959

22 Sept. i960 11 Sept. 1961 29 Sept. 1962

19 Sept. 1963 7 Sept. 1964

27 Sept. 1965 15 Sept. 1966

5 Oct. 1967

23 Sept. 1968 13 Sept. 1969

1 Oct. 1970

20 Sept. 1 97 1 9 Sept. 1972

27 Sept. 1973 17 Sept. 1974

6 Sept. 1975 25 Sept. 1976 13 Sept. 1977

5663 64

4-65

■*S66*

Cj 6 7 u 68

S69

“70

71

72

355 354 385 355 354 383 355 383 354 355

Thur.

Tues.

Sat.

Sat.

Thur.

Mon.

Sat.

Thur.

Tues.

Sat.

2 Oct. 1902

22 Sept. 1903 10 Sept. 1904 30 Sept. 1905 20 Sept. 1906

9 Sept. 1907 26 Sept. 1908 16 Sept. 1909

4 Oct. 1010

23 Sept. 191 1 |

Table VII. — Hebrew Years (continued).

Jewish Year.

5739 40

41 42 43 44 45

a; 46

-47

£48

050

52 53 54 55 56 57

Num- ber of Davs.

5758

59 60 61 62

63

64

.65

.2 66

£67

“68

S-69

71

72

73 74 75 76

355 355 383 354 355 385 354 383 355 354 383 355 354 385 353 355 384 355 383

Commencement (1st of Tisri).

5777 78

«J 79 “§2°

U82

£83

ˆ84

85

354 355 385 353 354 385 355 383 354 355 383 354 355 385 354 353 385 354 385

Mon.

Sat.

Thur.

Tues.

Sat.

Thur.

Thur.

Mon.

Sat.

Thur.

Mon.

Sat.

Thur.

Mon.

Mon.

Thur.

Tues.

Mon.

Sat.

2 Oct. 1978 22 Sept. 1979

11 Sept. 1980

29 Sept. 1981 18 Sept. 1982

8 Sept. 1983

27 Sept. 1984 16 Sept. 1985

4 Oct. 1986

24 Sept. 1987

12 Sept. 1988

30 Sept. 1989 20 Sept. 1990

9 Sept. 1991

28 Sept. 1992 16 Sept. 1993

6 Sept. 1994

25 Sept. 1995 14 Sept. 1996

353 354 385 355 353 384 355 383 355

Thur. Mon. Sat. Sat. Tues. Sat. Sat. Thur. Tues. Sat. Thur. Tues. Sat. Thur. Thur. Mon. Thur. Thur. Mon.

Jewish Year.

5786

87

88

«J8 9

ˆ90

U9I

«92

&93

94

95

Num- ber of Days.

Mon.

Thur.

Mon.

Mon.

Sat.

Tues.

Mon.

Sat.

Thur.

2 Oct. 21 Sept. 11 Sept. 30 Sept.

18 Sept.

7 Sept. 27 Sept.

16 Sept.

4 Oct. 23 Sept.

13 Sept. 30 Sept.

19 Sept.

8 Sept. 29 Sept.

17 Sept.

5 Sept. 25 Sept.

14 Sept.

1997 1998 1999 2600 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 201 1 2012 2013 2014 2015

3 Oct. 21 Sept. 10 Sept. 30 Sept.

:9 Sept.

7 Sept. 26 Sept.

: 6 Sept.

3 Oct.

2016 2017 2018 2019 2020 2021 2022 2023 2024

5796 97 98 99

5800 01 02

03

04

605

£06

007

>oo8

&09

10

11

12

13

14

354 385 355 354 383 355 354 383 355 385

Commencement (1st of Tisri).

5815 16

17 18

19

20

21

.22

-ˆ23 ˆ.24

U 2 <5 g-26

r0 2 7

28 29 30 31 32

33

354 353

385 354 355 383 354 385 353 355 384 355 353 384 355 355 383 354 385

Tues.

Sat.

Sat.

Thur.

Mon.

Sat.

Thur.

Mon.

Sat.

Thur.

355 354 383 355 354 383 355 385 354 353 385 354 355 383 354 355 383 355 384

Thur.

Mon.

Thur.

Thur.

Mon.

Sat.

Thur.

Mon.

Mon.

Thur.

Tues.

Mon.

Sat.

Tues.

Mon.

Sat.

Thur.

Tues.

Sat.

23 Sept. 2025 12 Sept. 2026

2 Oct. 2027 21 Sept. 2028 10 Sept. 2029 28 Sept. 2030 18 Sept.

2031

6 Sept. 2032

24 Sept. 2033 14 Sept. 2034

4 Oct. 2035 22 Sept. 2036 10 Sept. 2037 30 Sept. 2038 19 Sept. 2039

8 Sept. 2040

26 Sept. 2041 15 Sept. 2042

5 Oct. 2043 22 Sept. 2044

12 Sept. 2045 1 Oct. 2046

21 Sept. 2047 8 Sept. 2048

27 Sept. 2049 17 Sept. 2050

7 Sept. 2051 24 Sept. 2052

13 Sept. 2053

Sat.

Thur.

Mon.

Sat.

Thur.

Mon.

Sat.

Thur.

Thur.

Mon.

Thur.

Thur.

Mon.

Sat.

Thur.

Mon.

Sat.

Thur.

Tues.

3 Oct. 2054

23 Sept. 2055 1 1 Sept. 2056 29 Sept. 2057

19 Sept. 2058 8 Sept. 2059

25 Sept. 2060

15 Sept. 2061

5 Oct. 2062

24 Sept. 2063 1 1 Sept. 2064

1 Oct. 2065

20 Sept. 2066 10 Sept. 2067 27 Sept. 2068

16 Sept. 2069

6 Sept. 2070 24 Sept. 2071 13 Sept. 2072

Mahommedan Calendar. — The Mahommedan era, or era of the Hegira, used in Turkey, Persia, Arabia, &c. , is dated from the first day of the month preceding the flight of Mahomet from Mecca to Medina, i.e. Thursday the 1 5 th of July a.d. 622, and it commenced on the day following. The years of the Hegira are purely lunar, and always consist of twelve lunar months, commencing with the approximate new moon, without any intercalation to keep them to the same season with respect to the sun, so that they retrograde through all the seasons in about 32! years. They are also partitioned into cycles of 30 years, 19 of which are common years of 354 days each, and the other 11 are intercalary years having an additional

day appended to the last month. The mean length of the year is therefore 354ˆ days, or 354 days 8 hours 48 min., which divided by 12 gives 29ˆ-fˆ days, or 29 days 1 2 hours 44 min., as the time of a mean lunation, and this differs from the astronomical mean lunation by only 2-8 seconds. This small error will only amount to a day in about 2400 years.

To find if a year is intercalary or common, divide it by 30 ; the quotient will be the number of completed cycles and the remainder will be the year of the current cycle ; if this last be one of the numbers 2, 5, 7, 10, 13, 16, 18, 21, 24, 26, 29, the year is intercalary and consists of 355 days ; if it be any other number, the year is ordinary.

Or if I' denote the number of the Mahommedan year, and

the year is intercalary when J?< 11.

1002

CALENDAR

year

the

Also the number of intercalary years from the year I up to

Y inclusive = (— — -) ; and the same up to the year

y-_ 1= (lll±3\ .

\ 30 /TO –

To find the day of the week on which any year of the Hegira begins, we observe that the year i| began on a Friday, and that after every common year of 354 days, or 50 weeks and 4 days, the day of the week must necessarily become postponed 4 days, besides the additional day of each intercalary year.

Hence if w — I I 2 I 3 I 4 . I 5 I 6 I 7 indicate Sun. | Mon. | Tues. | Wed. | Thur. | Frid. I Sat. the day of the week on which the year Y commences will be

10 = 2+4 (y) r + (" 30 3 j ˆ(rejecting sevens).

Biwia o(iiit3) B . I2+44 K_ 4 (»ˆl) r .

or (LL ~) w = 5 +2 Y+3 (U ~ A) r (rejecting sevens). So that

W = 6 (7) r +5 ("30 3) r (re i ectin S sevens), the values of which obviously circulate in a period of 7 times 30 or 210 years.

Let C denote the number of completed cycles, and y the year of the cycle; then F=30 C+y, and

if = 5 (7) ,. +6 (jj r +3 ("^ 3) r (rejecting sevens).

From this formula the following table has been constructed : —

Table VIII.

970224 1362

1940448

5821344 2910672 970224

1321-445088 621-5774

1943-0225 365

8-2125

Year of the

Number of the Period of Seven Cycles

-®,

Current Cycle (y).

1

2

3

4

5

6

8

Mon.

Sat.

Thur.

Tues.

Sun.

Frid.

Wed.

1

9

17.

25

Frid.

Wed.

Mon.

Sat.

Thur.

Tues.

Sun.

**2*

**IO*

**I8*

**26*

Tues.

Sun.

Frid.

Wed.

Mon.

Sat.

Thur.

3

11

19

27

Sun.

Frid.

Wed.

Mon.

Sat.

Thur.

Tues.

4

12

20

28

Thur.

Tues.

Sun.

Frid.

Wed.

Mon.

Sat.

**5*

**n*

**2I*

**29*

Mon.

Sat.

Thur.

Tues.

Sun.

Frid.

Wed.

6

M

22

30

Sat.

Thur.

Tues.

Sun.

Frid.

Wed.

Mon.

**7*

15

23

Wed.

Mon.

Sat.

Thur.

Tues.

Sun.

Frid.

—

**I6*

**2 4*

Sun.

Frid.

Wed.

Mon.

Sat.

Thur.

Tues.

To find from this table the day of the week on which any year of the Hegira commences, the rule to be observed will be as follows: —

Ride. — Divide the year of the Hegira by 30 ; the quotient is the number of cycles, and the remainder is the year of the current cycle. Next divide the number of cycles by 7, and the second re- mainder

will be the Number of the Period, which being found at the top of the table, and the year of the cycle on the left hand, the required day of the week is immediately shown.

The intercalary years of the cycle are distinguished by an asterisk.

For the computation of the Christian date, the ratio of a mean year of the Hegira to a solar year is

*Year of Hegira = 354ˆ_*

*Mean solar year 365-2422 ” *’ The year I began 16 July 622, Old Style, or 19 July 622, according to the New or Gregorian Style. Now the day of the year answering to the 19th of July is 200, which, in parts of the solar year, is 0-5476, and the number of years elapsed = Y— 1. Therefore, as the inter- calary days are distributed with considerable regularity in both calendars, the date of commencement of the year Y expressed in Gregorian years is*

0-970224 (F—i) +622-5476, or 0-970224 7+621-5774. This formula gives the following rule for calculating the date of the commencement of any year of the Hegira, according to the Gregorian or New Style.

Rule. — Multiply 970224 by the year of the Hegira, cut off six decimals from the product, and add 621-5774. The sum will be the year of the Christian era, and the day of the year will be found by multiplying the decimal figures by 365.

The result may sometimes differ a day from the truth, as the intercalary days do not occur simultaneously ; but as the day of the week can always be accurately obtained from the foregoing table, the result can be readily adjusted.

Example. — Required the date on which the year 1362 of the Hegira begins.

Thus the date is the 8th day, or the 8th of January, of the year 1943. To find, as a test, the accurate day of the week, the proposed year of the Hegira, divided by 30, gives 45 cycles, and remainder 12, the year of the current cycle.

Also 45, divided by 7, leaves a remainder 3 for the number of the period.

Therefore, referring to 3 at the top of the table, and 12 on the left,

the required day is Friday.

The tables, page 571, show that 8th January 1943 is a Friday, therefore the date is exact.

For any other date of the Mahommedan year it is only requisite to know the names of the consecutive months, and the number of days in each ; these are —

Muharram 30 Shaaban .... 29 Saphar . 29 Ramadan .... 30 Rabia I. . 30 Shawall (Shawwal) . 29 Rabiall. . 29 Dulkaada (Dhu'l Qa'da) 30 Jornada I. 30 Dulheggia (Dhu'l Hijja) 29 Jornada II. 29 and in intercalary Rajab . 30 years 30

The ninth month, Ramadan, is the month of Abstinence observed by the Moslems.

The Moslem calendar may evidently be carried on indefinitely by successive addition, observing only to allow for the additional day that occurs in the bissextile and intercalary years; but for any remote date the computation according to the pre- ceding rules will be most efficient, and such computation may be usefully employed as a check on the accuracy of any con- siderable extension of the calendar by induction alone.

The following table, taken from Woolhouse's Measures, Weights and Moneys of all Nations, shows the dates of com- mencement of Mahommedan years from 1845 up to 2047, or from the 43rd to the 49th cycle inclusive, which form the whole of the seventh period of seven cycles. Throughout the next period of seven cycles, and all other like periods, the days of the week will recur in exactly the same order. All the tables of this kind previously published, which extend beyond the year 1900 of the Christian era, are erroneous, not excepting the celebrated French work, L' Art de verifier les dates, so justly regarded as the greatest authority in chronological matters. The errors have probably arisen from a continued excess of 10 in the discrimination of the intercalary years.

Table IX. — Mahommedan Years.

43rd Cycle.

Year of

Commencement

Year of

Commencement

Hegira.

(1st of Muharram).

Hegira.

(1st

of Muharram).

I26l

Frid.

10 Jan. 1845

*1273**

Mon.

I Sept. 1856

*1262**

Tues.

30 Dec. 1845

I274

Sat.

22 Aug. 1857

1263

Sun.

20 Dec. 1846

1275

Wed.

11 Aug. 1858

I264

Thur.

9 Dec. 1847

*1276**

Sun.

31 July 1859

*I265**

Mon.

27 Nov. 1848

*1277**

Frid.

20 July i860

1266

Sat.

17 Nov. 1849

*1278**

Tues.

9 July 1861

*1267**

Wed.

6 Nov. 1850

1279

Sun.

29 June 1862

1268

Mon.

27 Oct. 1851

1280

Thur.

18 June 1863

1269

Frid.

15 Oct. 1852

*I28l**

Mon.

6 June 1864

*1270**

Tues.

4 Oct. 1853

1282

Sat.

27 May 1865

1271

.Sun.

24 Sept. 1854

1283

Wed.

16 May 1866

1272

Thur.

13 Sept. 1855

*1284**

Sun.

5 May 1867

CALENDAR

1003

43 rd Cycle—continued.

Year of Hegira.

1285 1286 1287*

r 1288

1289 1290*

*1291 1292**

1293

1294

*1295**

1296

*1297**

1298

1299

*1300**

1301

1302

*1303**

1304

1305

*1306**

1307

*1308**

1309

1310

*1311**

1312

1313

*1314**

1315

*1316**

1317 1318 1319 1320*

Commencement (1st of Muharram).

Frid.

Tues.

Sun.

Thur.

Mon.

Sat.

24 April 1868 13 April 1869

3 April 1870 23 Mar. 1871 11 Mar. 1872

1 Mar. 1873

44th Cycle.

1351

*1352**

1353

1354

*1355**

1356

*1357**

1358

1359

*1360**

1361

Wed.

Sun.

Frid.

Tues.

Sat.

Thur.

Mon.

Sat.

Wed.

Sun.

Frid.

Tues.

Sat.

Thur.

Mon.

Frid.

Wed.

Sun.

Frid.

Tues.

Sat.

Thur.

Mon.

Frid.

Wed.

Sun.

Frid.

Tues.

Sat.

Thur.

18 Feb. 7 Feb.

28 Jan.

16 Jan. 5 Jan.

26 Dec. 15 Dec.

4 Dec.

23 Nov. 12 Nov.

2 Nov.

21 Oct. 10 Oct. 30 Sept.

19 Sept. 7 Sept.

28 Aug.

17 Aug. 7 Aug.

26 July

15 July

5 July

24 June 12 June

2 June

22 May 12 May

I May

20 April 10 April

45th Cycle.

1321

Mon.

*1322**

Frid.

1323

Wed.

1324

Sun.

1325

Thur.

1326

Tues.

*1327**

Sat.

1328

Thur.

1329

Mon.

*1330**

Frid.

1331

Wed.

1332

Sun.

*1 1333**

Thur.

1334

Tues.

1335

Sat.

*1336**

Wed.

1337

Mon.

*1338**

Frid.

1339

Wed.

1340

Sun.

*1341**

Thur.

1342

Tues.

1343

Sat.

*1344**

Wed.

1345

Mon.

*1346**

Frid.

1347

Wed.

3348

Sun.

*1349**

Thur.

1350

Tues.

30 Mar.

18 Mar.

8 Mar.

25 Feb.

14 Feb. 4 Feb.

23 Jan.

13 Jan. 2 Jan.

22 Dec.

11 Dec. 30 Nov.

19 Nov.

9 Nov.

28 Oct. 17 Oct.

7 Oct.

26 Sept.

15 Sept. 4 Sept.

24 Aug.

14 Aug. 2 Aug.

22 July

12 July I July

20 June 9 June

29 May 19 May

1874

1875 1876

1877

1878

1878

1879

1880

1881

1882

18

18

1885

1886

1887

18”

18

1890

1891

1892

1893 1894

1895 1896 1897 1898 1899 1900 1901 1902

1903 1904

1905 1906 1907 1908 1909 1910 1911 191 1 1912

1913 1914

1915

1916

1917

1918

1919

1920

1921-

1922

1923

1924

1925 1926 1927 1928 1929 1930 1931

46th Cycle — continued

Year of Hegira.

*1360**

I '361 J

46th

Sat.

Wed.

Mon.

Frid.

Tues.

Sun.

Thur.

Tues.

Sat.

Wed.

Mon.

Cycle.

7 May 1932 26 April 1933 16 April 1934

5 April 1935 24 Mar. 1936 14 Mar. 1937

3 Mar. 1938 21 Feb. 10 Feb. 29 Jan. 19 Jan.

1362

*1363**

1364

1365ˆ

*1366**

1367ˆ

*1368**

1369

1370

*1371**

1372

1373

*1374**

1375

*1376**

1377

1378

*1379**

1380

*1411 1412**

1413 1414

*HI5**

1416

*1417**

1418

1419

*1420**

1421

1422

*1423**

1424

H25 ˆ

1426 1427 1428* .1429 1430 143 1* 1432 1433 1434* 1435 1436**

1437 1438 1439 1440*

Commencement (1st of Muharram).

Frid.

Tues.

Sun.

Thur.

Mon.

Sat.

Wed.

Mon.

Frid.

Tues.

Sun.

Thur.

Mon.

Sat.

Wed.

Mon.

Frid.

Tues.

Sun.

8 Jan.

28 Dec.

17 Dec.

6 Dec. 25 Nov. 15 Nov.

3 Nov. 24 Oct. 13 Oct.

2 Oct. 21 Sept. 10 Sept. 30 Aug. 20 Aug.

8 Aug.

29 July

18 July

7 July !6ji

26 June

1943 1943 1944

1945 1946

1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959

i960

47th Cycle.

1381

Thur.

*1382**

Mon.

1383

Sat.

1384

Wed.

*1385**

Sun.

1386

Frid.

*1387**

Tues.

1388

Sun.

1389

Thur.

*1390**

Mon.

1391

Sat.

1392

Wed.

*1393**

Sun.

1394

Frid.

1395

Tues.

*1396**

Sat.

1397

Thur.

*1398**

Mon.

1399

Sat.

1400

Wed.

*1401**

Sun.

1402

Frid.

1403

Tues.

*1404**

Sat.

1405

Thur.

*1406**

Mon.

1407

Sat.

1408

Wed.

*1409**

Sun.

1410

Frid.

15 June I 96 I 4 June 1962

25 May 1963

13 May .1964

2 May 1965

22 April 1966

11 April 1967 31 Mar. 1968

20 Mar. 1969 9 Mar. 1970

27 Feb.

16 Feb. 4 Feb.

25 Jan.

14 Jan.

3 Jan.

23 Dec.

12 Dec. 2 Dec.

21 Nov. 9 Nov.

30 Oct. 19 Oct.

8 Oct. ˆ„ 27 Sept. 1984 16 Sept. 1985

6 Sept. 1986

26 Aug. 1987 14 Aug. 1988

4 Aug. 1989

1971 1972 1973 1974 1975 1976 1976 1977 1978 1979 1980 1981 1982 1983

48th Cycle.

Tues.

Sat.

Thur.

Mon.

Frid.

Wed.

Sun.

Frid.

Tues.

Sat.

Thur.

Mon.

Frid.

Wed.

Sun.

Thur.

Tues.

Sat.

Thur.

Mon.

Frid.

Wed.

Sun.

Thur.

Tues.

Sat.

Thur.

Mon.

Frid.

Wed.

24 July 1990 13 July 1991

2 July 1992

21 June 1993 10 June 1994 31 May 1995

19 May 1996 9 May 1997

28 April 1998

17 April 1999 6 April 2000

26 Mar. 2001 15 Mar. 2002

5 Mar. 2003

22 Feb. 2004 10 Feb. 2005 31 Jan. 2006

20 Jan. 2007 10 Jan. 2008

29 Dec. 2008

18 Dec. 2009 8 Dec. 2010

27 Nov. 201 1 15 Nov. 2012

5 Nov. 2013

25 Oct. 2014 15 Oct. 2015

3 Oct. 2016

2017

22 Sept.

12 Sept. 2018

49th Cycle.

Year of

Commencement

Year of

Commencement

Hegira.

(1st

of Muharram) .

Hegira.

(1st

jf Muharram) .

1441

Sun.

1 Sept. 2019

*1456**

Tues.

21 Mar. 2034

*1442**

Thur.

20 Aug. 2020

1457

Sun.

11 Mar. 2035

1443

Tues.

10 Aug. 2021

*1458**

Thur. ■

28 Feb. 2036

1444

Sat.

30 July 2022

1459

Tues.

17 Feb. 2037

*1445**

Wed.

19 July 2023

1460

Sat.

6 Feb. 2038

1446

Mon.

8 July 2024

*1461**

Wed.

26 Jan. 2039

*1447**

Frid.

27 June 2025

1462

Mon.

16 Jan. 2040

1448

Wed.

17 June 2026

1463

Frid.

4 Jan. 2041 24 Dec. 2041

1449

Sun.

6 June 2027 25 May 2028

*1464**

Tues.

*1450**

Thur.

H65

Sun.

14 Dec. 2042

T 45 1

Tues.

15 May 2029

*1466**

Thur.

3 Dec. 2043

H52

Sat.

4 May 2030

1467

Tues.

22 Nov. 2044

*1453**

Wed.

23 April 2031

1468

Sat.

11 Nov. 2045

H54

Mon.

12 April 2032

*1469**

Wed.

31 Oct. 2046

1455

Frid.

1 April 2033

1470

Mon.

21 Oct. 2047

Table X. — Principal Days of the Hebrew Calendar.

Tisri

Kislev Tebet Adar

Nisan Sivan Tamuz Ab Table XI.-

Muharram

1, New Year, Feast of Trumpets.

3, 1 Fast of Guedaliah.

10, Fast of Expiation.

15, Feast of Tabernacles.

21, Last Day of the Festival.

22, Feast of the 8th Day.

23, Rejoicing of the Law.

25, Dedication of the Temple.

10, Fast, Siege of Jerusalem.

13, 2 Fast of Esther, J In embolismic

14, Purim, I years. Veadar.

15, Passover. 6, Pentecost.

17, 1 Fast, Taking of Jerusalem.

9, 1 Fast, Destruction of the Temple. -Principal Days of the Mahommedan Calendar.

1, 10, 11, 20,

15,

,, 20,

Shaaban 15,

Shawall I, 2,3,

Dulheggia 10,

Table XII.

Rabia I. Jornada I. Rajab

New Year. Ashura.

Birth of Mahomet. Taking of Constantinople. Day of Victory. Exaltation of Mahomet. Borak's Night. Kutshuk Bairam. Qurban Bairam. — Epochs, Eras, and Periods.

N m

Christian Date of

Name.

Christian Date of

Commencement .

Commencement .

Grecian Mun-

Sidonian era .

Oct. IIO B.C.

dane era .

1 Sep. 5598 B.C.

Caesarean era

Civil era of Con-

of Antioch .

i Sep. 48 .,

stantinople

1 Sep. 5508 „

Julian year

1 Jan. 45 ,,

Alexandrian

Spanish era

1 Jan. 38 ,,

era

29 Aug. 5502 „

Actian era

1 Jan. 30 „

Ecclesiastical

Augustan era

14 Feb. 27 ,,

era of An-

Vulgar Chris-

tioch .

1 Sep. 5492 „

tian era .

1 Jan. 1 a.d.

Julian Period .

1 Jan. 4713 „

Destruction of

Mundane era .

Oct. 4008 ,,

Jerusalem

1 Sep. 69 ,,

Jewish Mun-

Era of Macca-

dane era .

Oct. 3761 „

bees .

24 Nov. 1 66 ,,

Era of Abraham

1 Oct. 2015 „

Era of Diocle-

Era of the

tian .

17 Sep. 284 ,,

Olympiads

1 July 776 „

Era of Ascen-

Roman era

24 April 753 „

sion .

12 Nov. 295 ,,

Era of Nabo-

Era of the Ar-

nassar .

26 Feb. 747 ,,

menians .

7 July 552 ,,

Metonic Cycle .

15 July 432 „

Mahommedan

Grecian or Syro-

era of the

Macedonian

Hegira

16 July 622 ,,

era

1 Sep. 312 „

Persian era of

Tyrian era

19 Oct. 125 „

Yezdegird

16 June 632 ,,

For the Revolutionary Calendar see French Revolution ad fin.

The principal works on the calendar are the following : — Clavius, Romani Calendarii a Gregorio XIII. P.M. restituti Explicatio (Rome, 1603); L'Art de verifier les dates; Lalande, Astronomic tome ii.; Traite de la sphere et du calendrier, par M. Revard (Paris, 1816); _ Delambre, Traite de I ' astronomie theorique et pratique, tome iii. ; Histoire de I' astronomie moderne; Methodus technica brevis, perfacilis, ac perpetm conslruendi Calendarium Ecclesiasticum, Stylo tarn novo quam vetere, pro cunctis Christianis Europae populis &c, auctore Paulo Titte l (Gottingen, 1816); Formole analitiche pel

1 If Saturday, substitute Sunday immediately following.

2 If Saturday, substitute Thursday immediately preceding.

calcolo della Pasqtta, e correzione di quello di Gauss, con critiche Ofservazioni sit quanta ha scritto del ealendario il Delambri, di Lodovico Ciccolini (Rome, 1817); E. H. Lindo, Jewish Calendar for

Sixty-four Years (1838); W. S. B. Woolhouse, Measures, Weights, and Moneys of all Nations (1869). (T. G. ; W. S. B. W.) ,

CALENDER, (1) (Fr. calendre, from the Med. Lat. caiendra, a corruption of the Latinized form of the Gr. Kv\u>5pos, a cylinder), a machine consisting of two or more rollers or cylinders in close contact with each other, and often heated, through which are passed cotton, calico and other fabrics, for the purpose of having a finished smooth surface given to them; the process flattens the fibres, removes inequalities, and also gives a glaze to the surface. It is similarly employed in paper manufacture (q.v.). (2) (From the Arabic qalandar), an order of dervishes, who separated from the Baktashite order in the 14th century; they were vowed to perpetual travelling. Other forms of the name by which they are known are Kalenderis, Kalenderites, and Qalandarites (see Dervish).

CALENUS, QUINTUS FUFIUS, Roman general. As tribune of the people in 61 B.C., he was chiefly instrumental in securing the acquittal of the notorious Publius Clodius when charged with having profaned the mysteries of Bona Dea (Cicero, Ad. Alt. i.- 16). In 59 Calenus was praetor, and brought forward a law that the senators, knights, and tribuni aerarii, who composed the judices, should vote separately, so that it might be known how they gave their votes (Dio Cassius xxxviii. 8). He fought in Gaul (51) and Spain (49) under Caesar, who, after he had crossed over to Greece (48), sent Calenus from Epirus to bring over the rest of the troops from Italy. On the passage to Italy, most of the ships were captured by Bibulus and Calenus himself escaped with difficulty. In 47 he was raised to the consulship through the influence of Caesar. After the death of the dictator, he joined Antony, whose legions he afterwards commanded in the north of Italy. He died in 41, while stationed with his army at the foot of the Alps, just as he was on the point of marching against Octavianus.

Caesar, B.G. viii. 39; B.C. i. 87, iii. 26; Cic. Philippicae, viii. 4.

CALEPINO, AMBROGIO (1435-1511), Italian lexicographer, born at Bergamo in 1435, was descended of an old family of Calepio, whence he took his name. Becoming an Augustinian monk, he devoted his whole life to the composition of a polyglott dictionary, first printed at Reggio in 1502. This gigantic work was afterwards augmented by Passerat and others. The most complete edition, published at Basel in 1590, comprises no fewer than eleven languages. The best edition is that published at Padua in seven languages in 1772. Calepino died blind in 151 1.

CALES (mod. Calvi), an ancient city of Campania, belonging originally to the Aurunci, on the Via Latina, 8 m. N.N.W. of Casilinum. It was taken by the Romans in 335 B.C., and, a colony with Latin rights of 2500 citizens having been established there, it was for a long time the centre of the Roman dominion in Campania, and the seat of the quaestor for southern Italy even down to the days of Tacitus. 1 It was an important base in the war against Hannibal, and at last refused further contributions for the war. Before 184 more settlers were sent there. After the Social War it became a municipium. The fertility of its territory and its manufacture of black glazed pottery, which was even exported to Etruria, made it prosperous. At the end of the 3rd century it appears as a colony, and in the 5th century it became an episcopal see, which (jointly with Teano since 1818) it still is, though it is now a mere village. The cathedral, of the 12th century, has a carved portal and three apses decorated with small arches and pilasters, and contains a fine pulpit and episcopal throne in marble mosaic. Near it are two grottos

1 To the period after 335 belong numerous silver and bronze coins with the legend Caleno.

which have been used for Christian worship and contain frescoes of the 10th and nth centuries (E. Bertaux, V Art dans I'ltalie meridionale (Paris, 1904), i. 244, &c). Inscriptions name six gates of the town: and there are considerable remains of anti- quity, especially of an amphitheatre and theatre, of a supposed temple, and other edifices. A number of tombs belonging to the Roman necropolis were discovered in 1883.

See C. Htilsen in Pauly-Wissowa, Realencyclopadie, iii. 13 si (Stuttgart, 1899). (T. As.)

CALF. (1) (A word common in various forms to Teutonic languages, cf. German Kalb, and Dutch kalf), the young of the family of Bovidae, and particularly of the domestic cow, also of the elephant, and of marine mammals, as the whale and seal. The word is applied to a small island close to a larger one, like a calf close to its mother's side, as in the " Calf of Man," and to a mass of ice detached from an iceberg. (2) (Of unknown origin, possibly connected with the Celtic calpa, a leg), the fleshy hinder part of the leg, between the knee and the ankle.

CALF, THE GOLDEN, a molten image made by the Israelites when Moses had ascended the Mount of Yahweh to receive the Law (Ex. xxxii.). Alarmed at his lengthy absence the people clamoured for "

gods " to lead them, and at the instigation of Aaron, they brought their jewelry and made the calf out of it. This was celebrated by a sacred festival, and it was only through the intervention of Moses that the people were saved from the wrath of Yahweh (cp. Deut. ix. 19 sqq.). Nevertheless 3000 of them fell at the hands of the Levites who, in answer to the summons of Moses, declared themselves on the side of Yahweh. The origin of this particular form of worship can scarcely be sought in Egypt; the Apis which was worshipped there was a live bull, and image-worship was common among the Canaanites in connexion with the cult of Baal and Astarte (qq.v.). In early Israel it was considered natural to worship Yahweh by means of images (cp. the story of Gideon, Judg. viii. 24 sqq.), and even to Moses himself was attributed the bronze-serpent whose cult at Jerusalem was destroyed in the time of Hezekiah (2 Kings xviii. 4, Num. xxi. 4-9). The condemnation which later writers, particularly those imbued with the spirit of the Deuteronomic reformation, pass upon all image-worship, is in harmony with the judgment upon Jeroboam for his innovations at Bethel and Dan (1 Kings xii. 28 sqq., xvi. 26, &c). But neither Elijah nor Elisha raised a voice against the cult; then, as later, in the time of Amos, it was nominally Yahweh-worship, and Hosea is the first to regard it as the fundamental cause of Israel's misery.

See further, W. R. Smith, Prophets of Israel, pp. 175 sqq.; Kennedy, Hastings' Diet. Bib. i. 342; and Hebrew Religion.

• *(S. A. C.)*

CALGARY, the oldest city in the province of Alberta. Pop. (1901) 4091; (1907) 21,112. It is situated in 114 15′ W., and 5i°4§' N., on the Bow river, which flows with its crystal waters from the pass in the Rocky Mountains, by which the main line of the Canadian Pacific railway crosses the Rocky Mountains. The pass proper — Kananaskis — penetrates the mountains beginning 40 m. west of Calgary, and the well-known watering- place, Banff, lies 81 m. west of it, in the Canadian national park. The streets are wide and laid out on a rectangular system. The buildings are largely of stone, the building stone used being the brown Laramie sandstone found in the valley of the Bow river in the neighbourhood of the city. Calgary is an important point on the Canadian Pacific railway, which has a general super- intendent resident here. It is an important centre of wholesale dealers, and also of industrial establishments. Calgary is near the site of Fort La Jonquiere founded by the French in 1752. Old Bow fort was- a trading post for many years though now in ruins. The present city was created by the building of the Canadian

Pacific railway about 1883.

PRINTED IN U.S.A.

VOL05_CALHOUN-CHATELAINE

Britannica

THE

ENCYCLOPAEDIA BRITANNICA

A

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME V

CALHOUN to CHATELAINE

New York

Encyclopaedia Britannica, Irtc

342 Madison Avenue

Copyright, in the United States of America, 1910,

by

The Encyclopaedia Britannica Company.

A.

M.

C.

A.

M.

CI.

A.

N.

A.

P.

c.

A.

P.

H.

INITIALS USED IN VOLUME V. TO IDENTIFY INDIVIDUAL

CONTRIBUTORS, 1 WITH THE HEADINGS OF THE

ARTICLES IN THIS VOLUME SO SIGNED.

A. BO.* AUGUSTE BOUDINHON, D.D., D.C.L. frannn Taw r 1

Professor of Canon Law at the Catholic University of Paris. Honorary Canon of i Jf n .. , ‘ uenerM ‘ > Paris. Editor of the Canoniste Contemporain. I Cardinal.

A. C. S. Algernon Charles Swinburne. i”ni,„„ m .,„ n„„»„„ /• a ,v

See the biographical article, Swinburne, Algernon Charles. \ Cna Pman George (m pari).

A.E.H. A.E.Houghton. ,.„„„„„._. . t . , – , ,. , .. J Camaoho; Canovas del Castillo;

Formerly Correspondent of r he Standard, in Spain. Author of Restoration of the i r; a stplar v Rinnll Bourbons in Spain. I udslelar 3 Kipoil.

A. E. S. Arthur Everett Shipley, F.R.S., F.Z.S., F.L.S. f

Fellow, Tutor and Lecturer of Christ’s College, Cambridge. University Reader I Chaetognatha; in Zoology. Formerly University Lecturer on the Advanced Morphology of the “j Chaetosomatida Invertebrata. Author of Zoology of the Invertebrata. Editor of the Pitt Press Natural Science Manuals, &c. ˆ

A. Go.* Rev. Alexander Gordon, M.A. J –

Lecturer in Church History at the University of Manchester. \ ˆarranza.

A. H. J. G. Abel Hendy Jones Greenidge, D.Litt. (Oxon.), (d. 1905). r

Formerly Fellow and Lecturer of Hertford College, Oxford, and of St John's College, Oxford. Author of Infamia in Roman Law, Handbook of Greek Constitutional -j Censor: Ancient. History; Roman Public Life, History of Rome. Joint-author of Sources of Roman History, 133-70 B.C. I

A. H. S. Rev. Archibald Henry Sayce, D.Litt., LL.D. L .

See the biographical article, Sayce, A. H. \ oana –

A. J. G. Rev. Alexander James Grieve, M.A., B.D. f

Professor of New Testament and Church History at the United Independent College, J Catechism; Bradford. Sometime Registrar of Madras University and Member of Mysore] Calvin (in -bart) Educational Service. L \ r)•

A.L. Andrew Lang. ..,.,_. j Casket Letters.

See the biographical article, Lang, Andrew. I

A. Lo. Auguste Longnon. _ f

Professor at the College de France. Director of the ficole des hautes 6tudes. Chevalier of the Legion of Honour. Member of the Institute. Author of LivreA Champagne. des vassaux du Comte de Champagne et de Brie ; Geographic de la Gdule au VI Steele ; Atlas historique de la France depuis Cesar jusqu'a nos jours; &c. '-

Cassini.

Agnes Mary Clerke.

See the biographical article, Clerke, A. M.

Agnes Muriel Clay (Mrs Wilde).

Late Resident Tutor of Lady Margaret Hall, Oxford. Joint-author of Sources o/-{ Centumviri. Roman History, 133-70 B.C.

Alfred Newton, F.R.S. /Canary;

See the biographical article, Newton, Alfred. 1 Capereallv.

Arthur Philemon Coleman, F.R.S. r

Professor of Geology, University of Toronto. i Canada: Geography.

Alfred Peter Hillier, M.D., M.P. r

Author of South African Studies; The Commonweal; &c. Served in Kaffir War, Cane Colony § History (in 1878-1879. Partner with Dr L. S. Jameson in medical practice in South Africa till < A

1896. Member of Reform Committee, Johannesburg, and Political Prisoner at part).

Pretoria, 1895-1896. M.P. for Hitchin division of Herts, 1910. {

A. SI. Arthur Shadwell, M.A., M.D., LL.D., F.R.C.P. j

Member of Council of Epidemiological Society. Author of The London Water- “1 Cancer. Supply; Industrial Efficiency; Drink, Temperance and Legislation. I

J A complete list, showing all individual contributors, appears in the final volume.

VI

A. S. C,

A. V. De P. A. Wa.

A. W. H. *

A. Z.

B. Bl.

B. Ra.

C. F. A.

C. F. C. C. J. J.

C.L. C. Pf. C. R. B.

C. S. L.

D. E. J. D. F. T. D. G. H.

D. H.

D, LI. T.

D. Mn.

E. At.

INITIALS AND HEADINGS OF ARTICLES

Alan Summerly Cole, C.B. r

Assistant Secretary for Art, Board of Education, 1900-1908. Took part in organiza- tion o(the Textile Manufacturers' Section, St Louis Exhibition, 1904. Author of -j Carpet. Ancient Needle Point and Pillow Lace; Embroidery and Lace; Ornament in European Silks ;&c. ' I

Ceramics: §Hispano-Moresque.

A. van de Put.

Assistant, Victoria and Albert Museum, South Kensington. Author of Hispano- Moresque Ware of the XV. Century; The Aragonese Double-Crown and the Borja or' Borgia Device. I

Arthur Waugh, M.A. f

Managing Director of Chapman & Hall, Ltd., Publishers. Formerly literary ? dviser J f> a i vpr i- v n c to Kegan Paul & Co. Author of Alfred Lord Tennyson ; Legends of the Wheel ; Robert 1 *"" velle J» u – a – Browning in " Westminster Biographies." Editor of Johnson's Lives of the Poets. I

Arthur William Holland.

Formerly Scholar of St John's College, Oxford.

1900.

Alice Zimmern. f

Author of Methods of Education in the United States ; The Renaissance of Girls' i Carpenter, Mary. Education in England; Women's Suffrage in Many Lands; &c. ^

Bertram Blount, F.C.S., F.I.C. r

Consulting Chemist to the Crown Agents for the Colonies. Section of International Association for Testing Materials, Buda-Pesth. Practical

Electro- Chemistry.

Bacon Scholar of Gray's Inn, A Charlemagne.

Hon. President, Cement I Author of -S

Cement.

Bernard Rackham, M.A.

Assistant, Victoria and Albert Museum, South Kensington.

f Ceramics: § German, Dutch \ and Scandinavian.

Charles Francis Atkinson. r

Formerly Scholar of Queen's College, Oxford. Captain, 1st City of London (Royal J. Castle (in part). Fusiliers). Author of The Wilderness and Cold Harbour. ˆ

C.

-j Cellulose.

F. Cross., B.Sc. (Lond.), F.C.S., F.I.C. Analytical and Consulting Chemist.

Charles Jasper Joly, F.R.S., F.R.A.S. (1864-1906). r

Royal Astronomer of Ireland and Andrews Professor of Astronomy in the University Camera Lucida*

of Dublin, 1897-1906. Fellow of Trinity College, Dublin. Secretary of the Royal i c amera Qbscur'a (in part)

Author of Lord J Ceylon (in part).

Author of I Capillary; Carolingians; |Charibert; Charles MarteL

Irish Academy.

H. Caldwell Lipsett.

Formerly Editor of the Civil and Military Gazette, Lahore, India. Curzon in India ; &c.

Christian Pfister, D-es-L.

Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour.

Etudes sur le regne de Robert le Pieux.

Charles Raymond Beazley, M.A., D.Litt. r g am Dingo*

Professor of Modern History in the University of Birmingham. Formerly Fellow of J r • • / • I Merton College, Oxford. University Lecturer in the History of Geography. Author] ˆarpini U» part) ; of Henry the Navigator ; The Dawn of Modern Geography ; &c. [Chang Chun.

Charles Stewart Loch, D.C.L. (Oxford), LL.D. (St Andrews).

Secretary to the Council of the London Charity Organization Society since 1875. Member of the Royal Commission on the Poor Laws. Dunkin Trust Lecturer, Manchester College, Oxford, 1896 and 1902. Vice-President, Royal Statistical Society, 1894-1895-1897-1901. Author of Charity Organization; Old Age Pensions and Pauperism; Methods of Social Advance; &c.

Rev D.E. Jenkins (” Calvinistic Methodists;

Calvinistic Methodist Minister, Denbigh. Author of Life of Lewis Charles 4 r i..i.. ti.«ˆ.«>, Edwards of Bala. ˆuianes, 1 nomas.

Donald Francis Tovey. r

Author of Essays in Musical Analysis: comprising The Classical Concerto, The < Cantata. Goldberg Variations, and analyses of many other classical works. (_

David George Hogarth, M.A. r

Fellow of Magdalen College, Oxford. Fellow of the British Academy. Keeper of the

Ashmolean Museum, Oxford. Excavated at Paphos, 1888 ; Naucratis, 1899 and 1903 ; i Cappadocia (in part). Ephesus, i904-i905;_Assiutˆ 1906-1907ˆ Director, British School at Athens,

Charity and Charities.

1897-1900; Director, Cretan Exploration Fund, 1899.

David Hannay.

Formerly British Vice-Consul at Barcelona. Navy ; Life of Emilio Castelar ; &c.

Daniel Lleufer Thomas.

Barrister at law, Lincoln's Inn.

Author of Short History of the Royal

Carvajal, Luisa de; Chateau-Renault.

Stipendiary Magistrate at Pontypridd and Rhondda

Rev. Dugald Macfadyen, M.A.

Minister of South Grove Congregational Church, Highgate. Author of Constructive Congregational Ideals ; &c.

Edward Armstrong, M.A.

Fellow of the British Academy. Fellow, Bursar and Lecturer in Modern History, Queen's College, Oxford. Warden of Bradfield College. Lecturer to the University in Foreign History, 1902-1904. Author of The Emperor Charles V.; Elisabeth Farnese ; Lorenzo de Medici ; The French Wars of Religion ; &c.

j Cardiff.

[Campbell, John McLeod; I Chalmers, Thomas (in part)..

Charles V., Emperor.

INITIALS AND HEADINGS OF ARTICLES

VII

B. A. J. E. B.*

E. C. E. C. B.

E. C. Q.

E.

G.

E.

Gr

E.

H.

B.

E.

H.

G.

E.

H.

M.

E;L. W.

Ed. M. E. 0.*

E. Pr.

E. Tn.

E. V.

F. C. C.

F. J. H.

F. LI. G. F. N. M.

E. Alfred Jones.

Author of Old English Gold Plate ; Old Church Plate of the Isle of Man ; Old Silver Sacramental Vessels of Foreign Protestant Churches in England ; Illustrated Catalogue – of Leopold de Rothschild's Collection of Old Plate ; A Private Catalogue of The Royal Plate at Windsor Castle; &c.

Ernest Charles Francois Babelon.

Professor at the College de France. Keeper of the department of Medals and Antiquities at the Bibliotheque Nationale. Member of the

Academie des Inscrip- tions de Belles Lettres, Paris. Chevalier of the Legion of Honour. Author of Descriptions Historiques des Monnaies de la Republique Romaine ; Traites des Monnaies Grecques et Romaines; Catalogue des Camees de la Bibliotheque Nationale.

Edward Caird, D.C.L., D.Litt.

See the biographical article, Caird, Edward.

Rt. Rev. Edward Cuthbert Butler, O.S.B., M.A., D.Litt. (Dublin).

Abbot of Downside Abbey, Bath. Author of ” The Lausiac History of Palladius,” in Cambridge Texts and Studies, vol. vi.

Edmund Crosby Quiggin, M.A.

Fellow of, and Lecturer in Modern Languages and Monro Lecturer in Celtic at- Gonville and Caius College, Cambridge.

Edmund Gosse, LL.D.

See the biographical article, Gosse, Edmund

Ernest Arthur Gardner.

See the biographical article, Gardner, Percy.

Sir Edward Herbert Bunbury, Bart., M.A., F.R.G.S. (d. 1895).

M.P. for Bury-St-Edmunds, 1847-1852. Author of a History of Ancient Geography, &c.

E. H. Godfrey.

Editor, Census and Statistics Office, Department of Agriculture, Ottawa.

Ellis Hovell Minns, M.A.

University Lecturer in Palaeography, Cambridge. Lecturer and Assistant Librarian at Pembroke College, Cambridge. Formerly Fellow of Pembroke College.

Sir Edward Leader Williams (d. 1910).’

Vice-President, Institute of Civil Engineers. Consulting Engineer, Manchester Ship Canal. Chief Engineer of the Manchester Ship Canal

during its construction. Author of papers printed in Proceedings of Institute of Civil Engineers. I

Eduard Meyer, Ph.D., D.Litt. (Oxon.), LL.D. (Chicago). r

Professor of Ancient History in the University of Berlin. Author of Geschichte des \ Alterthums ; Geschichte des alien Aegyptens ; Die Israeliten und ihre Nachbarstdmme. [_

Edmund Owen, M.B., F.R.C.3., LL.D., D.Sc.

Consulting Surgeon to St Mary's Hospital, London, and to the Children's Hospital, Great Ormond Street, London. Chevalier of the Legion of Honour. Late Ex- aminer in Surgery at the Universities of Cambridge, London and Durham. Author of A Manual of Anatomy for Senior Students.

Edgar Prestage.

Special Lecturer in Portuguese Literature in the University of Manchester. Ex- aminer in Portuguese in the Universities of London, Manchester, &c. Commendador Portuguese Order of S. Thiago. Corresponding Member of Lisbon Royal Academy of Sciences, Lisbon Geographical Society, &c. Author of Letters of a Portuguese Nun; Azurara's Chronicle of Guinea; &c.

Rev. Ethelred Leonard Taunton (d. 1907).

Author of The English Black Monks of St Benedict ; History of the Jesuits in England ; &c.

Rev. Edmund Venables, M.A., D.D. (1819-1895).

Canon and Precentor of Lincoln. Author of Episcopal Palaces of England.

Frederick Cornwallis Conybeare, M.A., D.Th. (Giessen).

Fellow of the British Academy. Formerly Fellow of University College, Oxford. Author of The Ancient Armenian Texts of Aristotle; Myth, Magic and Morals' (1909); &c.

Francis John Haverfield, M.A., LL.D. (Aberdeen), F.S.A.

Camden Professor of Ancient History at Oxford University. Fellow of Brasenose College, Oxford. Fellow of the British Academy. Member of the German Imperial Archaeological Institute. Formerly Senior Censor,

Student, Tutor and Librari?n ” of Christ Church, Oxford. Ford’s Lecturer, 1906. Author of Monographs on Roman History, &c.

Francis Llewelyn Griffith, M.A., Ph.D. (Leipzig), F.S.A. r

Reader in Egyptology, Oxford University. Editor of the Archaeological Survey I fannniiPUS. German Archaeological Institute.

Cellini, Benvenuto (in part).

Carthage: Ancient.

Cartesianism.

Camaldulians; Canon: Church Dignitary; Capuchins; Carmelites; Carthusians; Celestines.

Celt: Languages and Literature.

Canzone; Carew, Thomas;

Cavendish, George; Chansons

de Geste; Chant Royal. “Calydon; Ceos. , Cephalonia.

Cappadocia {in part).

Canada: § Agriculture.

Carpi: Ancient Tribes.

Canal.

Cambyses.

Carbuncle.

Camoens; Castello Branco; Castilho.

Campeggio; Campion, Edmund; Cano, Melehior; Cassander, George; , Castellesi. Catacomb (in part).

Cathars.

Celtiberia; Cassiterides.

Fellow of Imperial j

Col. Frederic Natusch Maude, C.B.

Lecturer in Military History at Manchester University. Author of War and the World' c Policy ; The Leipzig Campaign ; The Jena C.amt,n, {gn

Cavalry.

Vlll

Px

•

F.

R.

C.

F.

W,

. R.*

G.

A.

B.

G.

G.

Co.

G.

H.

C.

G.

M.

W.

G.

R.

P.

G.

W.

, T.

H.

A.

M.S.

H.

B.

Wa.

INITIALS AND HEADINGS OF ARTICLES

H.

Ch.

H.

De.

H.

F. G.

H.

L. C.

H.

M. V.

H.

P. B.

H.

R. H.

H.

Sy.

H. T. A. H. W. R.*

H. W. S.

H. Y. J. A. B.

Frank Puaux.

President of the Society de l'Histoire du Protestantisme francais. Author of Les pr&curseurs frangais de la Tolerance ; Histoire de I'etablissement des protestants frangais en Suede ; L'Aglise r&formie de France ; &c.

Frank R. Cana.

Author of South Africa from the Great Trek to the Union.

Frederick William Rudler, I.S.O., F.G.S.

Curator and Librarian of the Museum of Practical Geology, London, 1879-1902 President of the Geologists' Association, 1 887-1 889.

George A. Boulenger, F.R.S., D.Sc, Ph.D. (Giessen).

Assistant in the Department of Zoology, Natural History Museum, South Kensing- ton. Vice-President of the Zoological Society.

George Gordon Coulton, M.A.

Birkbeck Lecturer in Ecclesiastical History, Trinity College, Cambridge. Author of Medieval Studies ; Chaucer and his England ; From St Francis to Dante ; &c.

G. H. Carpenter, B.Sc.

Professor of Zoology in the Royal College of Science, Dublin. Author

of Insects: their Structure and Life. , • ‘

George McKinnon Wrong, M.A., F.R.S. (Canada).

Professor of History at Toronto University. Author of A Canadian Manor and its Seigneurs: The British Nation: a History; &c.

Camisards; i Cavalier, Jean.

J” Cameroon;

I Cape Colony.

r Carbonado; Cassiterite;

j Cat’s Eye; Celestine;

*- Chalcedony.

Carp; Cat-Fish.

Celibacy.

i Chafer. Canada: History to Federation

f Canada: History from Federa-

I tion.

Carmathians.

< Calhoun, John C.

Ceramics: Greek, Etruscan and Roman.

Campbell Bannerman, Sir H.; Canon: Music; Chamberlain, J.

Canonization.

1 Chameleon.

J Calibration; \ Calorimetry.

“j Charles Edward.

| Cartier, Jacques.

Ceramics: Egypt and Western

Asia.

Formerly Lecturer in Greek and Roman History -j Chambord, Comte de.

George Robert Parkin, LL.D., C.M.G. See the biographical article, Parkin, G. R.

Rev. Griffithes Wheeler Thatcher, M.A., B.D.

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and Old Testament History at Mansfield College, Oxford.

Henry A. M. Smith.

Henry Beauchamp Walters, M.A., F.S.A.

Assistant to Keeper of Greek and Roman Antiquities, British Museum. Author of The Art of the Greeks; History of Ancient Pottery; Catalogue of the Greek and- Etruscan Vases in the British Museum, vol. ii. ; Catalogue of Bronzes, Greek, Roman and Etruscan ; &c.

Hugh Chisholm, M.A.

Formerly Scholar of Corpus Christi College, Oxford. Editor of the nth edition- of the Encyclopaedia Britannica ; co-editor of the loth edition.

Hippolyte Delehaye, S.J.

Assistant in the compilation of the Bollandist publications: Analecta Bollandiana' and Acta Sanctorum.

Ha£js Friedrich Gadow, F.R.S., Ph.D.

Strickland Curator and Lecturer on Zoology in the University of Cambridge. – Author of Amphibia and Reptiles.

Hugh Longbourne Callendar, F.R.S. , LL.D. (McGill Univ.).

Professor of Physics, Royal College of Science, London. Formerly Professor of Physics in McGill College, Montreal, and in University College, London.

Herbert M. Vaughan, F.S.A.

Keble College, Oxford. Author of The Last of the Royal Stuarts; The Medici Popes; The Last Stuart Queen.

H. P. Biggar.

Author of The Voyages of the Cabots to Greenland.

Henry R. H. Hall, M.A

Assistant in the Department of Egyptian and Assyrian Antiquities, British Museum.

Henry Symons.

Assistant in the British Museum. at Bedford College, London.

Rev. Herbert Thomas Andrews.

Professor of New Testament Exegesis, New College, London. Author of The Com- ˆ mentary on Acts in the Westminster New Testament; Handbook on the Apocryphal" Books in the Century Bible.

Rev. Henry Wheeler Robinson, M.A.

Professor of Church History in Rawdon College, Leeds. Senior Kennicott Scholar, Oxford, 1901. Author of Hebrew Psychology in Relation to Pauline Anthropology (in Mansfield College Essays) ; &c.

H. Wickham Steed.

Correspondent of The Times at Vienna.

1897-1902.

Correspondent of The Times at Rome, '

Colonel Sir Henry Yule, K. C.S.I. See the biographical article, Yule, Sir H.

Sir Jervoise Athelstane Baines, C.S.I.

President, Royal Statistical Society, 1909-1910. Census Commissioner under the Government of India, 1889-1893. Employed at India Office as Secretary to Royal Commission on Opium, 1894-1895. Author of Official Reports on Provincial Administration on Indian Census Operations; &c.

Catechumen. Canticles {in part).

Cavallotti. \ Carpini {in part). 1 Census.

INITIALS AND HEADINGS OF ARTICLES

IX

J.

A.

H.

J.

A.

M’N

J.

Bt

•

J.

C.

M.

J.

D.

Pr.

J.

P.

D.

J.

F.-

K.

J. H. F. J. H. R.

J. HI. R.

J. M'D.

J. P.-B. J. P. E.

J. R. C. J. S. F.

J. T. Be. J. T. C.

J. Wa.

J. W. D. J. W. He.

Chaldaea.

Editor and translator of theT Ceylon (in part).

John Allen Howe, B.Sc.

Curator and Librarian of the Museum of Practical Geology, London.

J. A. M'Naught.

Member of the Jury for Carriage Building, Paris Exposition, 1900.

J. Bartlett.

Lecturer on Construction, Architecture, Sanitation, Quantities, &c, at King's College, London. Member of Society of Architects. Member of Institute of Junior Engineers.

James Clerk Maxwell, F.R.S.

See biographical article: Maxwell, James Clerk.

John Dvneley Prince, Ph.D.

Professor of Semitic Languages, Columbia University, New York. Took part in . the Expedition to Southern Babylonia, 1 888-1 889. Author of A Critical Commentary on the Book of Daniel.

Sir J. Frederick Dickson, K.C.M.G.

Reorganized the North-West Province of Ceylon. Upasampada-Kammavaca and the Patimokha.

James Fitzmaurice-Kelly, Litt.D., F.R.Hist.S.

Gilmour Professor of Spanish Language and Literature, Liverpool University. Norman MacColl Lecturer, Cambridge University. Fellow of the British Academy. – Corresponding Member of the Royal Spanish Academy. Author of A History of Spanish Literature ; &c.

John Henry Freese, M.A.

Formerly Fellow of St John's College, Cambridge.

John Horace Round, M.A., LL.D. (Edin.).

Author of Feudal England ; Studies in Peerage and Family History; Peerage and – Pedigree.

John Holland Rose, M.A., Litt.D.

Lecturer on Modern History to the Cambridge University Local Lectures Syndicate. _ Author of Life of Napoleon I. ; Napoleonic Studies ; The Development of the European " Nations; The Life of Pitt; chapters in the Cambridge Modern History.

James Macdonald, M.A., LL.D.

Vice-President of the Society of Antiquaries of Scotland, 1895-1897. Rhind Lecturer on Archaeology, 1897. Author of Tituli Hunteriani: an Account of the ' Roman Stones in the Hunterian Museum.

rCallovian; Cambrian System; J, Caradoc Series; L Carboniferous System; Chalk.

-j Carriage.

Carpentry.

I

-I Capillary Action (in part).

Campoamor y Campoosorio; Castillo Solorzano; Celestina, La; Cervantes.

Calpurnius, Titus.

Castle (in part). Castle Guard.

Cambaceres.

Chalmers, George.

Chair.

James George Joseph Penderel-Brodhurst, Editor of the Guardian (London).

Jean Paul Hippolyte Emmanuel Adhemar Esmein. r

Professor of Law in the University of Paris. Officer of the Legion of Honour. J Chatelet Member of the Institute of France. Author of Cours elementaire d'histoire du droit 1 francais ; &c. [

Joseph Rogerson Cotter, M.A. f

Assistant to the Professor of Natural and Experimental Philosophy, Trinity College, -j Calorescence. Dublin. Editor of 2nd edition of Preston's Theory of Heat. [

John Smith Flett, D.Sc, F.G.S. r

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in J Charnockite. Edinburgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby 1 Medallist of the Geological Society of London. [

John T. Bealby ,,,,.,,, f Caspian Sea (in part);

Joint author of Stanford s Europe. _ Formerly editor of the Scottish Geographical J Caucasia* Magazine. Translator of Sven Hedin's Through Asia, Central Asia and Tibet; &c. 1 – '/. ..

Joseph Thomas Cunningham, M.A., F.Z.S.

Lecturer on Zoology at the South-Western Polytechnic, London. Formerly

Assistant Professor of Natural History in the University of Edinburgh. Naturalist -i Cephalopoda.

to the Marine Biological Association, and Fellow of University College, Oxford.

Author of numerous papers in scientific journals.

Major-General James Waterhouse.

Indian Staff Corps. Vice-President of the Royal Photographic Society. Assistant Surveyor-General in charge of Photographic Operations in the Surveyor-General's Office, Calcutta, 1866-1897. Took part in the observation of total eclipses, 1 87 1 and 1875, and of transit of Venus, 1874. President of the Asiatic Society of Bengal, 1888-1890. Author of The Preparation of Drawings for Photographic Reproduction; &c.

Captain J. Whitly Dixon, R.N.

Nautical Assessor to the Court of Appeal.

James Wycliefe Headlam, M.A. f

Staff Inspector of Secondary Schools under the Board of Education. Formerly I Fellow of King's College, Cambridge, and Professor of Greek and Ancient History "j Caprlvi. at Queen's College, London. Author of Bismarck and thei Foundation of the German Empire; &c. (.

Camera Obscura: History.

Capstan.

X L. D*

L. J. B. L. J. S.

L. S. L. V.*

M.Br. M. G.

M. H. S.

M. J. de G. M. P. N. E. D.

N. W. T.

0. Ba.

O.Br. 0. M. D.

P. A.

INITIALS AND HEADINGS OF ARTICLES

A. K

C. Y.

La.

Vb.

A. M

Joint author (with Henry J. Morgan) of

Monseigneur Louis Marie Olivier Duchesne. See the biographical article: Duchesne, L. M. O.

Lawrence J. Burpee.

Author of The Search for the Western Sea. Canadian Life in Town and Country.

Leonard James Spencer, M.A.

Assistant in the Department of Mineralogy, British Museum. Formerly Scholar, of Sidney Sussex College, Cambridge, and Harkness Scholar. Editor of the Minera- logical Magazine.

Sir Leslie Stephen, K.C.B., Litt.D.

See the biographical article: Stephen, Sir Leslie.

Luigi Villari.

Italian Foreign Office (Emigration Dept.). Formerly Newspaper Correspondent in . east of Europe. Italian Vice-Consul in New Orleans, 1906, Philadelphia, 1907, and Boston, U.S.A., 1907-1910. Author of Italian Life in Town and Country; &c.

jCalixtus I.; Celestine I. – :

Canada: Literature, English- Canadian.

Cerargyrite; Cerussite; Chabazite; Chalybite.

Carlyle.

Cantu; Cappello; Xi

Capponi, G. and P.;

Caracciolo; Carbonari;

Carmagnola;

Carrara; CaVour. ■

Margaret Bryant.

Chapman, George {part); . Charlemagne: Legends. Moses G aster, Ph.D. (Leipzig). r

Chief Rabbi of the Sephardic Communities of England. Vice-President, Zionist Congress, 1898, 1899, 1900. Ilchester Lecturer at Oxford on Slavonic and Byzantine J Cantacuzino; Literature, 1886 and 1891. President, Folklore Society of England. Vice-President] Cantemir. Anglo-Jewish Association. Author of History of Rumanian Popular Literature ; &c. (_

Marion H. Spielmann, F.S.A.

Formerly Editor of the Magazine of Art. Member of Fine Art Committee of Inter- national Exhibitions of Brussels, Paris, Buenos Aires, Rome, and the Franco- British Exhibition, London. Authorof History of" Punch"; British Portrait Painting* to the Opening of the 19th Century; Works of G. F. Watts, R.A.; British Sculpture and Sculptors of To-day; Henriette Ronner; &c.

Michael Jan de Goeje.

See the biographical article: Goeje, Michael Jan de.

Rev. Mark Pattison.

See the biographical article: Pattison, Mark.

Narcisse Etjtrope Dionne, M.D., LL.D., F.R.S. (Canada).

Librarian of the Legislature of the Province of Quebec. Chief Editor of Le Courrier du Canada, 1880-1884. Chief Inspector of Federal Licences, 1884-1886. Chief Editor of Le Journal de Quebec, 1886. Author of Life of Samuel Champlain, Founder * of Quebec; Life of Jacques Cartier, discoverer of Canada; La Nouvelie France, 1540-1603 ; Quebec et Nouvelie France ; &c.

Northcote Whitbridge Thomas, M.A.

Government Anthropologist to Southern Nigeria. Corresponding Member of the ,

Soci6t6 d' Anthropologic de Paris. Author of Thought Transference; Kinship and] Cannibalism.

Marriage in Australia; &c. I

Oswald Barron, F.S.A.

Editor of The Ancestor, 1902-1905.

Caricature; Cartoon.

Caliphate.

Casaubon, Isaac.

Champlain, Samuel de.

Ceeil.

Oscar Briliant.

Ormonde Maddock Dalton, M.A., F.S.A.

{

j Carpathian Mountains {in part) .

Assistant Keeper, Department of British and Medieval Antiquities, British Museum. J

Corresponding Member of the Imperial Russian Archaeological Society. Author of) Catacomb {in part).

Guide to the Early Christian and Byzantine Antiquities; &c. I

Paul Daniel Alphandery.

Professor of the History of Dogma, Ecole Pratique des Hautes Etudes, Sorbonne, Paris. Author of Les Idees morales chez les httirodoxes latines au dtbut du XIII" ' siecle.

Prince Peter Alexeivitch Kropotkin.

See the biographical article : Kropotkin, P. A.

Philip Chesney Yorke, M.A. Magdalen College, Oxford.

Philip Lake, M.A., F.G.S.

Lecturer on Physical and Regional Geography in Cambridge University.

jf the Geological Survey of India. Author of Monograph of British Cambrian ~\

Trilobites. Translator and Editor of Kayser's Comparative Geology. I

Capistrano. f

f Caspian Sea {in part) ; I Caucasus {in part).

/Catherine of Aragon; I Charles I.; Charles II.

Formerly j Carpathian Mountains (in pari) ;

Caucasus: Geology.

Editor of the Poetical Works of Thomas Campion. { Campion, Thomas.

Perctval Sylvanus Vivian. Author of Poems of Marriage.

Percy Alexander Macmahon, F.R.S. , D.Sc r

Late Major R.A. Deputy Warden of the Standards. Board of Trade. Joint- J fi av i ew General Secretary of the British Association. Formerly Professor of Physics, 1 KM *' 9 " Ordnance College, and President of London Mathematical Society. [_

INITIALS AND HEADINGS OF ARTICLES

XI

R.

R. A.* R. Ad. R. A. S. M. R. G. R. I. P. R. R. D.

R. L.*

R. L. H.

{

The Rt. Hon. Lord Rayleigh.

See the biographical article: Rayleigh, 3rd Baron.

Robert Anchel.

. Archivist to the Department de l'Eure.

Robert Adamson.

See the biographical article: Adamson, R.

Robert Alexander Stewart Macalister, M.A., F.S.A. Director of Excavations for the Palestine Exploration Fund.

Richard Garnett.

See the biographical article: Garnett, Richard.

R. I. Pocock, F.Z.S.

Superintendent of the Zoological Gardens, London.

Sir Robert Kennaway Douglas.

Formerly Keeper of Oriental Printed Books and MSS. at the British Museum, and . Professor of Chinese, King's College, London. Author of The Language and Litera- ture of China; &c. I

Richard Lydekker, F.R.S., F.G.S., F.Z.S. f Camel; Capuchin Monkey;

Member of the Staff of the Geological Survey of India, 1874-1882. Author of J CarniVOra" Cat" Caw Catalogues of Fossil Mammals, Reptiles and Birds in British Museum; The Deer of\„, I. ' . '

all Lands; The Came Animals of Africa; &c. L Wtacea; Cftamois.

Capillary Action (in pari).

fCambon, Pierre Joseph; 1 Cathelineau.

I Category (in part).

I Capernaum; I Carmel.

1 Cardan.

Centipede.

Canton.

R. N. B.

Robert Lockhart Hobson.

Assistant in the Department of British and Medieval Antiquities, British Museum. Author of Porcelain: Oriental, Continental and British; Marks on Pottery and- Porcelain (with W. Burton); and Catalogue and Guide of English Pottery and Porcelain in British Museum.

Robert Nisbet Bain (d. ioco).

Assistant Librarian, British Museum, 1 883-1909. Author of Scandinavia, the Political History of Denmark, Norway and Sweden, 1313-1900; The First Romanovs, 1613-1725; Slavonic Europe, the Political History of Poland and Russia from 1469 to 1796 ; &c.

R. Po. R. P. S.

R. S. C. R.W.

R. We. STC. S. D.

T. As.

T A. H, T. Ba.

T. F. C.

Ceramics: Medieval and Later Italian; Persian, Syrian, Egyptian and Turkish.

Canute; Canute VI.; Casimir III.; Casimir IV.; Catherine I.; Charles I. (Hungary); Charles IX., X., XL, XII.

(Sweden). Charles XIII., XIV., XV.

(Sweden and Norway).

Charles the Bold.

Rene Poupardin, D. is L. r

Secretary of . the ficole des Chartes. Honorary Librarian at the Bibliotheque J Nationale, Paris. Author of Le Royaume de Provence sous les Carolingiens ; Recueil 1 des chartes de Saint-Germain; &c. L

R. Phene Spiers, F.S.A., F.R.I.B.A. r

Master of the Architectural School and Surveyor, Royal Academy, London. Campanile; Capital; Arch.; Past President of Architectural Association. Associate and Fellow of King's J Cathedral: Arch.; College, London. Corresponding Member of the Institute of France. Edited Ceiling. Fergusson's History of Architecture. Author of Architecture East and West; &c. I

Robert Seymour Conway, M.A., D.Lrrr. (Cantab.). r

Professor of Latin in the University of Manchester. Formerly Professor of Latin J Campania (in part) in University College, Cardiff; and Fellow of Gonville and Caius College, Cambridge. 1 Author of The Italic Dialects. i_

Robert Wallace, F.R.S. (Edin.), F.L.S.

Professor of Agriculture and Rural Economy at Edinburgh University, and Carton Lecturer on Colonial and Indian Agriculture. Professor of Agriculture, R.A.C., Cirencester, 1882-1885. Author of Farm Live Stock of Great Britain; Indian Agri-' culture; The Agriculture and Rural Economy of Australia and New Zealand; Farming Industries of Cape Colony; &c.

Richard Webster, A.M.

Editor of Elegies of Maximianus.

Viscount St Cyres.

See the biographical article: Iddesleigh, ist Earl of.

Samuel Davidson, D.D.

See the biographical article : Davidson, Samuel.

Thomas Ashby, M.A., D.Litt., F.S.A.

Director of the British School of Archaeology at Rome. Corresponding Member of the Imperial German Archaeological Institute. Formerly Scholar of Christ Church, Oxford. Craven Fellow, Oxford, 1897. Author of The Classical Topo- graphy, of the Roman Campagna ; &c.

Captain Thomas A. Hull, R.N.

Formerly Superintendent of Admiralty Charts.

Sir Thomas Barclay, M.P.

Member of the Institute of International Law. Member of the Supreme Council of the Congo Fres State. Officer of the Legion of Honour. Author of Problems of International Practice and Diplomacy; &c. M.P. for Blackburn, 1910.

Theodore Freylinghuysen Collier, Ph.D.

Assistant Professor of History, Williams College, Williamstown, Mass., U.S.A.

Cattle (in part).

Channing, William E.

J. Casuistry.

J Canon: Scriptures.

ˆ Camerino; Campania (in part) ;

Canosa; Canusium; Capena;

Capri; Capua; Carales;

Carsioli; Casilinum; Casinum;

Cassia, Via; Catania;

Caudine Forks; Cefalu;

Centuripe; Cesena. I Chart.

} Capture.

/Carthage, Synods of; \Chaleedon, Council of.

11

T.

K.

C.

T.

M.

F.

T.

W.

F.

W.

A

B. C

W.

A

P.

W.

B.

•

W.

B.

D.

W.

B.

Du.

W

F.

•

C.

INITIALS AND HEADINGS OF ARTICLES

W. F. W.

w.

Ft.

w.

G.*

w.

G. F.

P

w.

G. M.

w.

Ha.

w.

J. G.

W. L.*

W. L. A.

W. L. G.

W. M. R. W. Ri.

Canaan, Canaanites. Cathedral.

Author of Mechanics of -l Carding.

Rev. Thomas Kelly Cheyne. D.Litt., D.D. See the biographical article : Cheyne, T. K.

Thomas Macall Fallow, M.A., F.S.A. f

Formerly editor of The Antiquary, 1 895-1 899. Author of Memorials

of Old Yorkshire ; < The Cathedral Churches of Ireland. I

Thomas William Fox.

Professor of Textiles in the University of Manchester. Weaving.

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S.

Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1 880-1 881. Author of Guide to Switzerland; The Alps in Nature ' and in History; &c. Editor of The Alpine Journal, 1 880-1 889.

Walter Alison Phillips, M.A.

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, – Oxford. Author of Modern Europe ; &c.

William Burton, Hon. M.A. (Vict.), F.C.S.

Chairman, Joint-Committee of Pottery Manufacturers of Great Britain. Examiner for Board of Education in Pottery Design and for Technological Examinations in Pottery Manufacture. Author of English Stoneware and Earthenware ; Porcelain ; &c.

William Boyd Dawkins, F.R.S., D.Sc.

See the biographical article : Dawkins, William Boyd.

William Bartlett Duitield, M.A.

Barrister at Law, Inner Temple. Secretary to the Royal Commission on Canals,

1906-1910.

William Feilden Craies, M.A. [

Barrister-at-Law, Inner Temple. Lecturer on Criminal Law at King's College, -i Capital Punishment. London. Editor of Archbold's Criminal Pleading (23rd edition). (_

Walter Francis Willcox, LL.B., Ph.D. r

Dean of, and Professor of Political Economy and Statistics at, Cornell University. Formerly Chief Statistician and now Special Agent of the U.S. Census Bureau. J Census: U.S.A. Author of The Divorce Problem

— a Study in Statistics ; Social Statistics of the United States; &c. , L

William Fream (d. 1907), LL.D., F.G.S., F.L.S., F.S.S. f

Author of Handbook of Agriculture. Formerly Agricultural Correspondent of The -i Cattle (in part). Times. I

Walcot Gibson, D.Sc, F.G.S.

Geologist on H.M. Geological Survey. Author of The Gold-bearing Rocks of the S. Transvaal ; Mineral Wealth of Africa ; The Geology of Coal and Coal Mining ; &c.

Sir Walter George Frank Phillimore, Bart., D.C.L., LL.D.

Judge of the King's Bench Division. President of International Law Association, 1905. Author of Book of Church Law. Editor of 2nd ed. of Phillimore' s Ecclesi- astical Law; 3rd ed. of vol. iv. of Phillimore' s International Law; &c. I

Walter G. M'Millan, F.C.S., M.I.M.E. (d. 1004). f

Formerly Secretary of the Institute of Electrical Engineers. Lecturer on Metallurgy, -> Carborundum. Mason College, Birmingham. Author of A Treatise on Electro-Metallurgy. [

Cannes;

Chamonix;

Chartreuse, La Grande.

' Canon: Church Dignitary; Capo d'Istria; Carlsbad Decrees; Chasuble!

Ceramics {in part). Cave.

Cape Colony: Geology.

Canon Law: Anglican.

Chalmers, Thomas {in part).

Literature, Welsh.

Rev. William Hanna, LL.D., D.D. (1802-1882).

Minister of St John's Free Church, Edinburgh, 1850-1866. Author of

Life of Dr Chalmers ; Wycliffe and the Huguenots ; Martyrs of the Scottish Reformation.

William John Gruffydd, M.A.

Lecturer in Celtic, University College, Cardiff. Examiner in Welsh to the Central) Welsh Board for Intermediate Education. Author of Caneuon a Cherddi: An~\ Celt: Anthology of Medieval Welsh Poetry. _

Walter Lehmann, M.D. r

Directorial Assistant of the Royal Ethnographical Museum, Munich. Conducted J r t , Am(, ri(, a . Arrhamlnvv Exploring Expedition in Mexico and Central America, 1907-1909. Author of many 1 central America. Arcnaeowgy. publications on Mexican and Central American Archaeology. [

Calvin (in part).

Rev. William Lindsay Alexander, D.D., LL.D., F.R.S. (Edin.) (180S-1

Classical Tutor, Lancashire Independent College. Pastor -of Independent Chapel, N. College Street, Edinburgh. One of the Old Testament Revisers. Author of A Moral Philosophy.

William Lawson Grant, M.A.

Professor at Queen's University, Kingston, Canada. Formerly Beit Lecturer in Colonial History at Oxford University. Editor of Acts of the Privy Council, Colonial series; Canadian Constitutional Development (in collaboration).

William Michael Rossetti.

See the biographical article : Rossetti, Dante Gabriel.

William Ridgeway, M.A., D.Sc, LL.D. (Aberdeen), D.Litt.

Fellow of the British Academy. Disney Professor of Archaeology at Cambridge University. Professor of Greek, Queen's College, Cork, 1883. Ex-President of Cambridge Philological, Antiquarian and Classical Societies. Author of The Oldest Irish Epic; Origin of Metallic Currency and Weight Standards; The Early Age of Greece; &c.

Canada: Statistics;

Cartier, Sir Georges Etiehne.

Canova; Caracci; Cartoon; Cellini, Benvenuto (in part); Charlet.

Celt.

INITIALS AND HEADINGS OF ARTICLES

xm

W. R. B.

W. R. S. W. Wo.

W. W. R.* W. Y. S.

Rt. Rev. William Robert Brownlow, M.A., D.D. (d. 1901). f

Roman Catholic Bishop of Clifton. Provost and Domestic Frelate to Pope Leo

XIII. Co-editor of English Roma Sotterranea. Author of Early Christian Symbol-\ Catacomb (in part). ism; Lectures on Sacerdotalism, on the Catacombs and other Archaeological Subjects. Translator of Cur Deus Homo and Vitis mystica. L

William Robertson Smith. [.,

See the biographical article: Smith, William Robertson. • ˆCanticles Km part).

William Wood, D.C.L., F.R.S. (Canada). _ f

Lieut. -Col., Canadian Militia. Formerly President of the English Section of the) Canada: Literature, French' Royal Society of Canada and of the Historic Landmarks Association. Author of] Canadian. The Fight for Canada ; The Logs of the Conquest of Canada, &c.

William Walker Rockwell, Lie. Theol.

Assistant Professor of Church History, Union Theological Seminary, New York.

William Young Sellar.

See the biographical article: Sellar, William Young.

{celestine III. and V. | Catullus (in part).

PRINCIPAL UNSIGNED ARTICLES

California. Cambodia. Cambridge, Earls and Dukes

of. Cambridge, England. Cambridgeshire. Campbell, Thomas. Canary Islands. Canning, George. Canterbury. Cape Town. Cape Verde Islands. Capital (Economics). Capitulations. Carbolic Acid. Carbon. Cardiganshire. Cards, Playing. Carducci, Giosue. Carinthia. Carlisle, Earls of.

Carlisle.

Carlos.

Carlsbad.

Carlstadt.

Carmarthenshire.

Carnarvonshire.

Carnegie, Andrew.

Carnot.

Carol.

Caroline Islands.

Carrier.

Cartagena.

Cassel.

Cassiodorus.

Caste.

Catherine, Saint.

Catherine II.

Catherine de' Medici

Catiline.

Cato.

Causation.

Cavaignac, Louis EugSne.

Cavan.

Cavendish, Henry.

Caxton, William.

Cedar.

Celebes.

Celsus.

Cemetery.

Chambers, Robert.

Chancellor.

Chancery.

Channel* Islands.

Chantrey, Sir Francis.

Charles V., VI., VII. of France.

Charles, Archduke of Austria.

Charles Albert, king of Sar- dinia.

Charles Augustus.

Chartism.

Chateaubriand.

CALHOUN, JOHN CALDWELL (1782-1850), American states- man and parliamentarian, was born, of Scottish-Irish descent, in Abbeville District, South Carolina, on the 18th of March 1782. His father, Patrick Calhoun, is said to have been born in Donegal, in North Ireland, but to have left Ireland when a mere child. The family seems to have emigrated first to Pennsylvania, whence they removed, after Braddock's defeat, to Western Virginia. From Virginia they removed in 1756 to South Caro- lina and settled on Long Cane Creek, in Granville (now Abbeville) county. Patrick Calhoun attained some prominence in the colony, serving in the colonial legislature, and afterwards in the state legislature, and taking part in the War of Independence. In 1770 he had married Martha Caldwell, the daughter of another Scottish-Irish settler.

The opportunities for obtaining a liberal education in the remote districts of South Carolina at that time were scanty. Fortunately, young Calhoun had the opportunity, although late, of studying under his brother-in-law, the Rev. Moses Waddell (1770-1840), a Presbyterian minister, who afterwards, from 1819 to 1829, was president of the University of Georgia. In 1802 Calhoun entered the junior class in Yale College, and graduated with distinction in 1804. He then studied first at the famous law school in Litchfield, Conn., and afterwards in a law office in Charleston, S.C., and in 1807 was admitted to the bar. He began practice in his native Abbeville District, and soon took a leading place in his profession. In 1808 and 1809 he was a member of the South Carolina legislature, and from 1811 to 1817 was a member of the national House of Repre- sentatives.

When he entered the latter body the strained relations between Great Britain and the United States formed the most important question for the deliberation of Congress. Henry Clay, the Speaker of the House, being eager for war and knowing Calhoun's hostility to Great Britain, gave him the second place on the committee of foreign affairs, of which he soon became the actual head. In less than three weeks the committee reported resolutions, evidently written by Calhoun, recommend- ing preparations for a struggle with Great Britain; and in the following June Calhoun submitted a second report urging a formal declaration of war. Both sets of resolutions the House adopted. Clay and Calhoun did more, probably, than any other two men in Congress to force the reluctant president into beginning hostilities.

In 1816 Calhoun delivered in favour of a protective tariff a speech that was ever after held up by his opponents as evidence of his

inconsistency in the tariff controversy. The embargo and the war had crippled American commerce, but had stimulated manufactures. With the end of the Napoleonic wars in Europe v. 1

the industries of the old world revived, and Americans began to feel their competition. In the consequent distress in the new industrial centres there arose a cry for protection. Calhoun, believing that there was a natural tendency in the United. States towards the development of manufactures, supported the Tariff Bill of 1816, which laid on certain foreign commodities duties' higher than were necessary for the purposes of revenue. He believed that the South would share in the general industrial development, not having perceived as yet that slavery was an insuperable obstacle. His opposition to protection in later years resulted from an honest change of convictions. He always denied that in supporting this bill he had been inconsistent, and insisted that it was one for revenue.

From 1817 to 1825 Calhoun was secretary of war under* President Monroe. To him is due the fostering and the reforma- tion of the National Military Academy at West Point, which he found in disorder, but left in a most efficient state. Calhoun was vice-president of the United States from 1825 to 1832, during the administration of John Quincy Adams, and during most of the first administration of Andrew Jackson. This period was for Calhoun a time of reflection. His faith in a strong national- istic policy was gradually undermined, and he finally became the foremost champion of particularism and the recognized leader of what is generally known as the " States Rights "or " Strict Construction " party.

In 1824 there was a very large increase in protective duties. In 1828 a still higher tariff act, the so-called " Bill of Abomina- tions," was passed, avowedly for the purpose of protection. The passage of these acts caused great discontent, especially among the Southern states, which were strictly agricultural. They felt that the great burden of this increased tariff fell on them, as they consumed, but did not produce, manufactured articles. Under such conditions the Southern states questioned the constitutionality of the imposition. Calhoun himself now"- perceived that the North and the South represented diverse tendencies. The North was outstripping the South in population and wealth, and already by the tariff acts was, as he believed, selfishly levying taxes for its sole benefit. The minority must, he insisted, be protected from " the tyranny of the majority." In his first important political essay, " The South Carolina Exposition," prepared by him in the summer of 1828, he showed how this should be done. To him it was clear that the Federal Constitution was a limited instrument, by

which the sovereign states had delegated to the Federal government certain general powers. The states could not, without violating the constitu- tional compact, interfere with the activities of the Federal government so long as the government confined itself to its proper sphere; but the attempt of Congress, or any other

department of the Federal government, to exercise any power which might alter the nature of the instrument would be an act of usurpation. The right of judging such an infraction belonged to the state, being an attribute of sovereignty of which the state could not be deprived without being reduced to a wholly sub- ordinate condition. As a remedy for such a breach of compact the state might resort to nullification (q.v.), or, as a last resort, to secession from the Union. Such doctrines were not original with Calhoun, but had been held in various parts of the Union from time to time. It remained for him, however, to submit them to a rigid analysis and reduce them to a logical form.

Meantime the friendship between Calhoun and Jackson had come to an end. While a member of President Monroe's cabinet, Calhoun had favoured the reprimanding of General Jackson (q.v.) for his high-handed course in Florida in 1818, during the first Seminole War. In 1831 W. H. Crawford, who had been a member of this cabinet, desiring to ruin Calhoun politically by turning Jackson's hostility against him, revealed to Jackson what had taken place thirteen years before. Jackson could brook no criticism from one whom he had considered a friend; Calhoun, moreover, angered the president still further by his evident sanction of the social proscription of Mrs Eaton (q.v.) ; the political views of the two men, furthermore, were becoming more and more divergent, and the rupture between the two became complete.

The failure of the Jackson administration to reduce the Tariff of 1828 drew from Calhoun his " Address to the People of South Carolina " in 183 1, in which he elaborated his views of the nature of the Union as given in the " Exposition." In 1832 a new tariff act was passed, which removed the " abominations " of 1828 but left the principle of protection intact. The people of South Carolina were not satisfied, and Calhoun in a third political tract, in the form of a letter to Governor James Hamilton (1786-1857) of South Carolina, gave his doctrines their final form, but without altering the fundamental principles that have already been stated.

In 1832 South Carolina, acting in substantial accordance with Calhoun's theories, " nullified " the tariff acts passed by Congress in 1828 and 1832 (see Nullification; South Carolina; and United States). On the 28th of December 1832 Calhoun resigned as vice-president, and on the 4th of January 1833 took his seat in the Senate. President Jackson had, in a special message, taken strong ground against the action of South Carolina, and a bill was introduced to extend the jurisdiction of the courts of the United States and clothe the president with additional powers, with the avowed object of meeting the situ- ation in South Carolina. Calhoun, in turn, introduced resolu- tions upholding the doctrine held by South Carolina, and it was in the debate on the first-named measure, termed the " Force Bill," and on these resolutions, that the first intellectual duel took place between Daniel Webster and Calhoun. Webster declared that the Federal government through the Supreme Court was the ultimate expounder and interpreter of its own powers, while Calhoun championed the rights of the individual state under a written contract which reserved to each state its sovereignty.

The practical result of the conflict over the tariff was a com- promise. Congress passed an act gradually reducing the duties to a revenue basis, and South Carolina repealed her nullification measures. As the result of the conflict, Calhoun was greatly strengthened in his position as the leader of his party in the South. Southern leaders generally were now beginning to perceive, as Calhoun had already seen, that there was a permanent conflict between the North and the South, not only a divergence of interests between manufacturing and agricultural sections, but an inevitable struggle between free and slave labour. Should enough free states be admitted into the Union to destroy the balance of power, the North would naturally gain a preponderance in the Senate, as it had in the House, and might, within constitutional limits, legislate as it pleased; The Southern minority recognized, therefore, that they must henceforth direct the policy of the government in all questions affecting their peculiar interests, or their section would undergo a social and economic revolution. The Constitution, if strictly interpreted according to Calhoun's

views, would secure this control to the minority, and prevent an industrial upheaval.

An element of bitterness was now injected into the struggle. The Northern Abolitionists, to whom no contract or agreement was sacred that involved the continuance of slavery, regarded the clauses in the Federal Constitution which maintained the property rights of the slave-owners as treaties with evil, binding on no one, and bitterly

attacked the slave-holders and the South generally. Their attacks may be said to have destroyed the moderate party in that section. Any criticism of their peculiar institution now came to be highly offensive to Southern leaders, and Calhoun, who always took the most advanced stand in behalf of Southern rights, urged (but in vain) that the Senate refuse to receive abolitionist petitions. He also advocated the exclusion of abolitionist literature from the mails.

Indeed from 1832 until his death Calhoun may be said to have devoted his life to the protection of Southern interests. He became the exponent, the very embodiment, of an idea. It is a mistake, however, to characterize him as an enemy to the Union. His contention was that its preservation depended on the recog- nition of the rights guaranteed to the states by the Constitution, and that aggression by one section could only end in disruption. Secession, he contended, was the only final remedy left to the weaker. Calhoun was re-elected to the Senate in i834andin 1840, serving until 1843. From 1832 to 1837 he was a man without a party. He attacked the ” spoils system ” inaugurated by President Jackson, opposed the removal of the government deposits from the Bank of the United States, and in general was a severe critic of Jackson’s administration. In this period he usually voted with the Whigs, but in 1837 he went over to the Democrats and supported the ” independent treasury ” scheme of President Van Buren. He was spoken of for the presidency in 1844, but declined to become a candidate, and was appointed as secretary of state in the cabinet of President Tyler, serving from the 1st of April 1844, throughout the remainder of the term, until the 10th of March 1845. While holding this office he devoted his energies chiefly to the acquisition of Texas, in order to preserve the equilibrium between the South and the constantly growing North. One of his last acts as secretary of state was to send a despatch, on the 3rd of March 1845, inviting Texas to accept the terms proposed by Congress. Calhoun was once more elected to the Senate in 1845. The period of his subsequent service covered the settlement of the Oregon dispute with Great Britain and the Mexican War. On the 19th of February 1847 he introduced in the Senate a series of resolutions concerning the territory about to be acquired from Mexico, which marked the most advanced stand as yet taken by the pro-slavery party. The purport of these resolutions was to deny to Congress the power to prohibit slavery in the territories and to declare all previous enactments to this effect unconstitutional.

In 1850 the Union seemed in imminent danger of dissolution. California was applying for admission to the Union as a state under a constitution which did not permit slavery. Her ad- mission with two Senators would have placed the slave-holding states in the minority.

In the midst of the debate on this applica- tion Calhoun died, on the 31st of March 1850, in Washington.

Calhoun is most often compared with Webster and Clay. The three constitute the trio upon whom the attention of students at this period naturally rests. Calhoun possessed neither Webster's brilliant rhetoric nor his easy versatility, but he surpassed him in the ordered method and logical sequence of his mind. He never equalled Clay in the latter's magnetism of impulse and inspiration of affection, but he far surpassed him in clearness and directness and in tenacity of will. He surpassed them both in the distinct- ness with which he saw results, and in the boldness with which he formulated and followed his conclusions.

Calhoun in person was tall and slender, and in his later years was emaciated. His features were angular and somewhat harsh, but with a striking face and very fine eyes of a brilliant dark blue. To his slaves he was just and kind. He lived the modest, unassuming life of a country planter when at his home, and at Washington lived as unostentatiously as possible, consistent with

his public duties and position. His character in other respects was always of stainless integrity.

Bibliography. — A collected edition of Calhoun's Works (6 vols., New York, 1 853-1 855) has been edited by Richard K*. Cralle. The most important speeches and papers are: — The South Carolina Exposition (1828) ; Speech on the Force Bill (1833) ; Reply to Webster ('833); Speech on the Reception of Abolitionist Petitions (1836), and on the Veto Power (1842) ; a Disquisition on Government, and a Discourse on the Constitution and Government of the United States (1849-1850) — the last two, written a short time before his death, defend with great ability the rights of a minority under a govern- ment such as that of the United States. Calhoun's Correspondence, edited by J. Franklin Jameson, has been published by the American Historical Association (see Report for 1-899, vo '- »•)• The biography of Calhoun by Dr Hermann von Hoist in the " American States- men Series " (Boston, 1882) is a condensed study of the political questions of Calhoun's time. Gustavus M. Pinckney's Life of John C. Calhoun (Charleston, 1903) gives a sympathetic Southern view. Gaillard Hunt's John C. Calhoun (Philadelphia, 1908) is a valuable work. (H. A. M. S.)

CALI, an inland town of the department of Cauca, Colombia, South

America, about 180 m. S.W. of Bogota and 50 m. S.E. of the port of Buenaventura, on the Rio Cali, a small branch of the Cauca. Pop. (1906 estimate) 16,000. Cali stands 3327 ft. above sea-level on the western side of the Cauca valley, one of the healthiest regions of Colombia. The land-locked character of this region greatly restricts the city's trade and development; but it is considered the most important town in the department. It has a bridge across the Cali, and a number of religious and public edifices. A railway from Buenaventura will give Cali and the valley behind it, with which it is connected by over 200 m, of river navigation, a good outlet on the Pacific coast. Coal deposits exist in the immediate vicinity of the town.

CALIBRATION, a term primarily signifying the determination of the " calibre " or bore of a gun. The word calibre was intro- duced through the French from the Italian calibro, together with other terms of gunnery and warfare, about the 1 6th century. The origin of the Italian equivalent appears to be uncertain. It will readily be understood that the calibre of a gun requires accurate adjustment to the standard size, and further, that the bore must be straight and of uniform diameter throughout. The term was subsequently applied to the accurate measurement and testing of the bore of any kind of tube, especially those of thermometers.

In modern scientific language, by a natural process of transi- tion, the term " calibration " has come to denote the accurate comparison of any measuring instrument with a standard, and more particularly the determination of the errors of its scale. It is seldom possible in the process of manufacture to make an instrument so perfect that no error can be discovered by the most delicate tests, and it would rarely be worth while to attempt to do so even if it were possible. The cost of manufacture would in many cases be greatly increased without adding materially to the utility of the apparatus. The scientific method, in all cases which admit of the subsequent determination and correc- tion of errors, is to economize time and labour in production by taking pains in the subsequent verification or calibration. This process of calibration is particularly important in laboratory research, where the observer has frequently to make his own apparatus, and cannot afford the time or outlay required to make special tools for fine work, but is already provided with apparatus and methods of accurate testing. For non-scientific purposes it is generally possible to construct instruments to measure with sufficient precision without further correction. The present article will therefore be restricted to the scientific use and application of methods of accurate testing.

General Methods and Principles. — The process of calibration of any

measuring instrument is frequently divisible into two parts, which differ greatly in importance in different cases, and of which one or the other may often be omitted. (1) The deter- mination of the value of the unit to which the measurements are referred by comparison with a standard unit of the same kind. This is often described as the Standardization of the instrument, or the determination of the Reduction factor. (2) The verification of the accuracy of the subdivision of the scale of the instrument. This may be termed calibration of the scale, and does not

necessarily involve the comparison of the instrument with any independent standard, but merely the verification of the accuracy of the relative values of its indications. In many cases the process of calibration adopted consists in the comparison of the instrument to be -tested with a standard over the whole range of its indications, the relative values of the subdivisions of the standard itself having been previously tested. In this case the distinction' of two parts in the process is unnecessary, and the term calibration is for this reason frequently employed to include both. In some cases it is employed to denote the first part only, but for greater clearness and convenience of description we shall restrict the term as far as possible to the second meaning.

The methods of standardization or calibration employed have much in common even in the cases that appear most diverse. They are all founded on the axiom that " things which are equal to the same thing are equal to one another." Whether it is a question of comparing a scale with a standard, or of testing the equality of two parts of the same scale, the process is essentially one of interchanging or substituting one for the other, the two things to be compared. In addition to the things to be tested there is usually required some form of balance, or comparator, or gauge, by which the equality may be tested. The simplest of such comparators is the instrument known as the callipers, from the same root as calibre, which is in constant use in the workshop for testing equality of linear dimensions, or uniformity of diameter of tubes or rods. The more complicated forms of optical comparators or measuring machines with scales and screw adjustments are essentially similar in principle, being finely adjustable gauges to which the things to be compared can be suc- cessively fitted. A still simpler and more accurate comparison is that of volume or capacity, using a given mass of liquid as the gauge or test of equality, which is the basis of many of the most accurate and most important methods of calibration. The common balance for testing equality of mass or weight is so delicate and so easily tested that the process of calibration may frequently with advantage be reduced to a series of

weighings, as for instance in the calibration of a burette or measure-glass by weighing the quantities of mercury required to fill it to different marks. The balance may, however, be regarded more broadly as the type of a general method capable of the widest application in accurate testing. It is possible, for instance, to balance two electromotive forces or two electrical resistances against each other, or to measure the refractivity of a gas by balancing it against a column of air adjusted to produce the same retardation in a beam of light. These ” equilibrium,” or ” null,” or ” balance ” methods of comparison afford the most accurate measurements, and are generally selected if possible as the basis of any process of calibration. In spite of the great diversity in the nature of things to be compared, the fundamental principles of the methods employed are so essentially similar that it is possible, for instance, to describe the testing of a set of weights, or the cali- bration of an electrical resistance-box, in almost the same terms, and to represent the calibration correction of a mercury thermometer or of an ammeter by precisely similar curves.

Method of Substitution. — In comparing two units of the same kind and of nearly equal magnitude, some variety of the general method of substitution is invariably adopted. The same method in a more elaborate form is employed in the calibration of a series of multiples or submultiples of any unit. The details of the method depend on the system of subdivision adopted, which is to some extent a matter of taste. The simplest method of subdivision is that on the binary scale, proceeding by multiples of 2. With a pair of submultiples of the smallest denomination and one of each of the rest, thus 1, I, 2, 4, 8, 16, &c, each weight or multiple is equal to the sum of all the smaller weights, which may be substituted for it, and the small difference, if any, observed. If we call the weights A, B, C, &c, where each is approximately double the following weight, and if we write a for observed excess of A over the rest of the weights, b for that of B over C+D+&C, and so on, the observa- tions by the method of substitution give the series of equations,

A— rest=a, B — rest = &,C—rest = c, &c. . . (1) Subtracting the second from the first, the third from the second, and so on, we obtain at once the value of each weight in terms of the preceding, so that all may be expressed in terms of the largest, which is most conveniently taken as the standard

B=A/2 + (b-a)l2, C = B/2 + (c-b)2,&c. . . (2)

The advantages of this method of subdivision and comparison, in addition to its extreme simplicity, are (1) that there is only one

possible combination to represent any given weight within the range of the series; (2) that the least possible number of weights is required to cover any given range; (3) that the smallest number of substitutions is required for the complete calibration. These advantages are important in cases where the accuracy of calibration is limited by the constancy of the conditions of observation, as in the case of an electrical resistance-box, but the reverse may be the case when it is a question of accuracy of estimation by an observer.

In the majority of cases the ease of numeration afforded by familiarity with the decimal system is the most important

consideration. The most convenient arrangement on the decimal system for purposes of calibration is to have the units, tens, hundreds, &c, arranged in groups of four adjusted in the proportion of the numbers I, 2, 3, 4. The relative values of the weights in each group of four can then be determined by substitution inde- pendently of the others, and the total of each group of four, making ten times the unit of the group, can be compared with the smallest weight in the group above. This gives a sufficient number of equations to determine the errors of all the weights by the method of substitution in a very simple manner. A number of other equa- tions can be obtained by combining the different groups in other ways, and the whole system of equations may then be solved by the method of least squares; but the equations so obtained are not all of equal value, and it may be doubted whether any real advantage is gained in many cases by the multiplication of comparisons, since it is not possible in this manner to eliminate constant errors or personal equation, which are generally aggravated by prolonging the observations. A common arrangement of the weights in each group on the decimal system is 5, 2, I, I, or 5, 2., 2, I. These dp not admit of the independent calibration of each group by substitution. The arrangement 5, 2, I, I, I, or 5, 2, 2, 1, I, permits independent calibration, but involves a'larger number of weights and observations than the I, 2, 3, 4, grouping. The arrangement of ten equal weights in each group, which is adopted in " dial " resistance-boxes, and in some forms of chemical balances where the weights are mechanically applied by turning a handle, presents great advantages in point of quickness of manipulation and ease of numeration, but the complete calibration of such an arrangement is tedious, and in the case of a resistance-box it is difficult to make the necessary connexions. In all cases where the same total can be made up in a variety of ways, it is necessary in accurate work to make sure that the same weights are always used for a given combination, or else to

record the actual weights used on each occasion. In many investigations where time enters as one of the factors, this is a serious drawback, and it is better to avoid the more complicated arrangements. The accurate adjust- ment of a set of weights is so simple a matter that it is often possible to neglect the errors of a well-made set, and no calibration is of any value without the most

scrupulous attention to de- Table

tails of manipulation, and particularly to the correction for the air displaced in com- paring weights of different materials. Electrical resist- ances are much more difficult to adjust owing to the change of resistance with tempera- ture, and the calibration of a resistance-box can seldom be neglected on account of the changes of resistance which are liable to occur after adjustment from imperfect annealing. It is also necessary to remember that the order of accuracy required, and the actual values of the smaller resistances, depend to some extent on the method of connexion, and that the box must be calibrated with due regard to the conditions under which it is to be used. Otherwise the method of procedure is much the same as in the case of a box of weights, but it is necessary to pay more attention to the constancy and uniformity of the temperature conditions of the observing-room.

Method of Equal Steps.-. rln calibrating a continuous scale divided into a number of divisions of equal length, such as a metre scale divided in millimetres, or a thermometer tube divided in degree's of temperature, or an electrical slide-wire, it is usual to proceed by a method of equal steps. The simplest method is that known as the method of Gay Lussac in the calibration of mercurial thermometers or tubes of small bore. It is essentially a method of substitution employing a column of mercury of constant volume as the gauge for comparing the capacities of different parts of the tube. A pre- cisely similar method, employing a pair of microscopes at a fixed distance apart as a standard of length, is applicable to the calibration of a divided scale. The interval to be calibrated is divided into a whole number of equal steps or sections, the points of division at which the corrections are to be determined are called points of calibration.

Calibration of a Mercury Thermometer. — To facilitate description, we will take the case of a fine-bore tube, such as that of a ther- mometer, to be calibrated with a thread of mercury. The bore of such a tube will generally vary considerably even in the best stan- dard instruments, the tubes of which have been specially drawn and selected. The correction for inequality of bore may amount to a quarter or half a degree, and is seldom less than a tenth. In ordinary

chemical thermometers it is usual to make allowance for variations of bore in graduating the scale, but such instruments present discontinuities of division, and cannot be used for accurate work, in which a finely-divided scale of equal parts is essential. The calibration of a mercury thermometer intended for work of precision is best effected after it has been sealed. A-thread of mer- cury of the desired length is separated from the column. The exact adjustment of the length of the thread requires a little manipulation.

The thermometer is inverted and tapped to make the mercury run down to the top of the tube, thus collecting a trace of residual gas at the end of the bulb. By quickly reversing the thermometer the bubble passes to the neck of the bulb. If the instrument is again inverted and tapped, the thread will probably break off at the neck of the bulb, which should be previously cooled or warmed so as to obtain in this manner, if possible, a thread of the desired length-. If the thread so obtained is too long or not accurate enough, it is removed to the other end of the tube, and the bulb further warmed till the mercury reaches some easily recognized division. At this point the broken thread is rejoined to the mercury column from the bulb, and a microscopic bubble of gas is condensed which generally suffices to determine the subsequent breaking of the mercury column at the same point of the tube. The bulb is then allowed to cool till the length of the thread above the point of separation is equal to the desired length, when a slight tap suffices to separate the thread. This method is difficult to work with short threads owing to deficient inertia, especially if the tube is very perfectly evacuated. A thread can always be separated by local heating with a small flame, but this is dangerous to the thermometer, it is difficult to adjust the thread exactly to the required length, and the mercury does not run easily past a point of the tube which has been locally heated in this manner. ‘

Having separated a thread of the required length, the thermo- meter is mounted in a horizontal position on a suitable support, preferably with a screw adjustment in the direction of its length. By _ tilting or tapping the instrument the thread is brought into position corresponding to the steps of the calibration successively, and its length in each position is carefully observed with a pair o r f reading microscopes fixed at a suitable distance apart. Assuming that the temperature remains constant, the variations of length of the thread are inversely as the variations of cross-section of the tube. If the length of the thread is very nearly equal to one step, and if the tube is nearly uniform, the average of the observed lengths of the thread, taking all the steps throughout the interval, is equal to the length which the thread should have occupied in each position had the bore

been uniform throughout arid all the divisions equal.

I. — Calibration by Method of Guy Lussac.

No. of Step.

I

2

3

4

5

6

7

8

9

10 ■

Ends of (thread. \

Excess- length.

Error of step.

Correc- tion.

I +-OIO

\ +-038 -•028

-i 7 -6

+ 17-6

— •016 + •017 -•033

— 22-6

+40-2

— ■020 -•003

— •017

— 6-6

+46-8

-•031

— •022

— •009

+ i-4

+45-4

+ •016 + •010 + T006

+ 16-4

+2Q-0

+ •008 + •005 -•003

+ 7-4

+21-6

+ •013

+ •033

— •020

- 9-6 +31-2

+•017 +•018 — •001

+ 9-4

+21-8

+ •004 + •013 — •004

+ 6-4 + 15-4

-■088 -•003 + •005

+ 15-4 !

The error of each step is therefore found by subtracting the average length from the observed length in each position. Assuming that the ends of the interval itself are correct, the correction to be applied at any point of calibration to reduce the readings to a uniform tube and scale, is found by taking the sum of the errors of the steps up to the point considered with the sign reversed.

In the preceding example of the method an interval of ten degrees is taken, divided into ten steps of I ° each. The distances of the ends of the thread from the nearest degree divisions are estimated by the aid of micrometers to the thousandth of a degree. The error of any one of these readings probably does not exceed half a thousandth, but they are given to the nearest thousandth only. The excess length of the thread in each position over the corresponding degree is obtained by subtracting the second reading from the first. Taking the average of the numbers in this line, the mean excess-length is — 10-4 thousandths. The error of each step is found by subtracting this mean from each of the numbers in the previous line. Finally, the corrections at each degree are obtained by adding up the errors of the steps and changing the sign. The errors and corrections are given in thousandths of i°.

Complete Calibration. — The simple method of Gay Lussac does very well for short intervals when the number of steps is not ex- cessive, but it would not be satisfactory for a large range owing to the accumulation of small errors of estimation, and the variation of the personal equation. The observer might, for instance, con- sistently over-estimate the length of the thread in one half of the tube, and under-estirnate it in the other. The errors near the middle of the range would probably be large. It is evident that the correc- tion at the middle point of the interval could be much more accu- rately determined by using a thread equal to half the length of the interval. To minimize the effect of these errors of estimation, it is usual to employ threads of different lengths in calibrating the same interval, and to divide up the fundamental interval of the thermometer into a number of subsidiary sections for the purpose of calibration, each of these sections being treated as a step in the calibration of the fundamental interval. The most symmetrical method of calibrating a section, called by C. E. Guillaume a ” Com- plete Calibration,” is to use threads of all possible lengths which are

integral multiples of the calibration step. In the example already given nine different threads were used, and the length of each was observed in as many positions as possible. Proceeding in this manner the following numbers were obtained for the excess-length of each thread in thousandths of a degree in different positions, starting in each case with the beginning of the thread at 0°, and moving it on by steps of i°. The observations in the first column are the excess-lengths of the thread of l° already given in illustration of the method of Gay Lussac. The other columns give the corresponding observations with the longer threads. The simplest and most symmetrical method of solving these observations, so as to find the errors of each step in terms of the whole interval, is to obtain the differences of the steps in pairs by subtracting each observation from the one

Table II. — Complete Calibration of Interval of 10° in 10 Steps.

Lengths of Threads.

i°

2°

3°

4°

5°

6°

7°

8°

9°

Observed excess- o°

-28

,•7-32

-67

-62

— 11

-15

-48

— 2

■’- 8

lengths of threads, I °

-33

‘•i-21

-47

-28

+ 14

-‘8

— 22

+21

+24

in various posi- 2°

-17

+ 2

- 8

+ 1

+26

+23

+ 6

+58

tions, the begin- 3

- 9

+26

+ 5

~ 3

+41

+36

+28

ning of the thread 4

+ 6

+31

- 7

+ 4

+45

+49

being set near the 5°

- 3

+ 5

-15

- 6

+43

points. 6°

—20

+ 7

-16

+ 2

7°

— 1

+23

+ 10

8°

- 4

+29

9°

+ 5

above it. This method eliminates the unknown lengths of the threads, and gives each observation approximately its due weight. Subtracting the observations in the second line from those in the first, we obtain a series of numbers, entered in column 1 of the next table, representing the excess of step (1) over each of the other steps. The sum of these differences is ten times the error of the first step, since by hypothesis the sum of the errors of all the steps is zero in terms of the whole interval. The numbers in the second column of Table III. are similarly obtained by subtracting the third line from the second in Table II., each difference being inserted in its. appropriate place in the table. Proceeding in this way we find the excess of each interval over those which follow it. The table is completed by a diagonal row of zeros representing the difference of each step from itself, and by repeating the numbers already found in symmetrical positions with their signs changed, since the excess of any step, say 6 over 3, is evidently equal to that of 3 over 6 with the sign changed. The errors of each step having been found by adding the columns, and dividing by 10, the corrections at each point of the calibration are deduced as before.

Table III. — Solution of Complete Calibration.

ampoules, were calibrated by Chappuis in five sections of 20° each, to determine the corrections at the points 20°, 40% 6o°, 8o°, which may be called the ” principal points ” of the calibration, in terms of the

fundamental interval. Each section of 20° was subsequently calibrated in steps of 2°, the Corrections being at first referred, as in the example already given, to the mean degree of the section itself, and being afterwards expressed, by a simple transformation, in terms of the fundamental interval, by means of the corrections already found for the ends of the section. Supposing, for instance, that the corrections at the points 0° and 10° of Table III. are not zero, but C° and C respectively, the correction C„ at any intermediate point n will evidently be given by the formula,

C n = >C° + c„ + (C'-C°)n/io . . . (3)

where c„ is the correction already given in the table.

If. the corrections are required to the thou- sandth of a degree, it is necessary to tabulate the results of the calibration at much more frequent intervals than 2°, since the correction, even of a good thermometer, may change by as much as 20 or 30 thousandths in 2°. To save the labour and difficulty of calibrating with shorter threads, the corrections at inter- mediate points are usually calculated by a formula of interpolation. 5 This leaves much to be desired, as the section of a tube often changes very suddenly and capriciously. It is probable that the graphic method gives equally good results with less labour.

Slide-Wire. — The calibration of an electrical slide-wire into parts of equal resistance is precisely analogous to that of a capillary tube into parts of equal volume. The Carey Foster method, employing short steps of equal resistance, effected by trans- ; ferring a suitable small resistance from one side of the slide-wire to the other, is exactly analogous to the Gay Lussac method, and suffers from the same defect of the accumulation of small errors unless steps of several different lengths are used. The calibration of a sliderwire, however, is much less troublesome than that of a thermometer tube for several reasons. It is easy to obtain a wire uniform to one part in 500 or even less, and the section is not liable to capricious variations. In all work of precision the slide-wire is supplemented by auxiliary resistances by which the scale may be indefinitely extended. In accurate electrical thermometry, for example, the slide-wire itself would correspond to only 1°, or less, of the whole scale, which is less than a single step in the calibration of a mercury thermometer, so that an accuracy of a thousandth of a degree can generally be obtained without any calibration of the slide- wire. In the rare cases in which it is necessary to employ a long slide-wire, such as the cylinder potentiometer of Latimer Clark, the calibration is best effected by comparison with a

standard,

Step

No.

1

2

3

4

5

6

7

8

9

10

1

- 5

+ 11

+20

+34

+25

+ 7

-I-26

+23

+32

2

+ 5

+16

+23

+39

+29

+ 12

+31

-f-28

+37

3

— 11

-16

+ 8

+24

+ 13

- 4

+ 15

+13

+22

4

— 20

-23

- 8

+ 15

+ 5

— 12

+ 7

+ 4

+ 13

5

-34

-39

-24

-15

- 9

-26

- 8

— 10

— 2

6

-25

-29

-13

- 5

+ 9

-17

+ 2

— 1

+ 8

7

- 7

— 12

+ 4

+ 12

+26

+ 17

+ 19

+ 16

+26

8

-26

-3i

-15

- 7

+ 8

— 2

-19

- 3

+ 6

9

-23

-28

-13

- 4

+ 10

+ 1

-16

+ 3

+ 9

10

-32

-37

— 22

-13

+ 2

- 8

-26

- 6

- 9

Error of step.

-17-3

— 22-0

- 6.4

+ 1-9

+ 16-7

+ 7-i

— 10- 1

+ 8-9

+ 6-1

+ 15-1

Correc-

tions.

+ 17-3

+39-3

+45-7

+43-8

+27-1

+20-0

+30-1

+2I-2

+ 15-1

such as a Thomson-Varley slide-box.

The advantages of this method are the simplicity and symmetry of the work of reduction, and the accuracy of the result, which exceeds that of the Gay Lussac method in consequence of the much larger number of independent observations. It may be noticed, for instance, that the correction at point 5 is 27-1 thousandths by the complete calibration, which is 2 thousandths less than the value 29 obtained by the Gay Lussac method, but agrees well with the value 27 thousandths obtained by taking only the first and last observations with the thread

of 5 °, The disadvantage of the method lies in the great number of observations required, and in the labour of adjusting so many different threads to suitable lengths. It is probable that sufficiently good results may be obtained with much less trouble by using fewer threads, especially if more care is taken in the micrometric determination of their errors.

The method adopted for dividing up the fundamental interval of any thermometer into sections and steps for calibration may be widely varied, and is necessarily modified in cases where auxiliary bulbs or ” ampoules ” are employed. The Paris mercury-standards, which read continuously from 0° to 100° C, without intermediate

Graphic Representation of Results. — The results of a calibration are often best represented by means of a correc- tion curve, such as that illustrated in the diagram, which is plotted to repre- sent the corrections found in Table III. The. abscissa of such a curve is the read- ing of the instrument to be corrected. The ordinate is the correction to be added to the observed reading to reduce to a uniform scale. The corrections are plotted in the figure in terms of the whole section, taking the correction to be zero at the beginning and end. As a matter of fact the corrections at these points in terms of the fundamental in- terval were found to be -29 and -9 thousandths respectively. The correction curve is transformed to give corrections in terms of the fundamental interval by ruling a straight line joining the points +29 and +9 respectively, and reckoning the ordinates from this line instead of from the base-line. Or the curve may be replotted with the new ordinates thus obtained. In draw- ing the curve from the corrections obtained at the points of calibration, the exact form of the curve is to some extent a matter of taste, but the curve should generally be drawn as smoothly as possible on the assumption that the changes are gradual and continuous.

The ruling of the straight line across the curve to express the corrections in terms of the fundamental interval, corresponds to the first part of the process of calibration mentioned above under the term ” Standardization.” It effects the reduction of the

readings to a common standard, and may be neglected if relative values only are required. A precisely analogous correction occurs in the case of electrical instruments. A potentiometer, for instance, if correctly graduated or calibrated in parts of equal

resistance, will give correct relative values of any differences of

3 4 6 6.7

Calibration Curve.

potential within its range if connected to a constant cell to supply the steady current through the slide-wire. But to determine at any time the actual value of its readings in volts, it is necessary to standardize it, or determine its scale-value or reduction-factor, by comparison with a standard cell.

A very neat use of the calibration curve has been made by Professor W. A. Rogers in the automatic correction of screws of divid- ing machines or lathes. It is possible by the process of grinding, as applied by Rowland, to make a screw which is practically perfect in point of uniformity, but even in this case errors may be introduced by the method of mounting. In the production of divided scales, and more particularly in the case of optical gratings, it is most im- portant that the errors should be as small as possible, and should be automatically corrected during the process of ruling. With this object a scale is ruled on the machine, and the errors of the un- corrected screw are determined by calibrating the scale. A metal template may then be cut out in the form of the calibration-correc- tion curve on a suitable scale. A lever projecting from the nut which feeds the carriage or the slide-rest is made to follow the contour of the template, and to apply the appropriate correction at each point of the travel, by turning the nut through a small angle on the screw. A small periodic error of the screw, recurring regularly at each revolution, may be similarly corrected by means of a suitable cam or eccentric revolving with the screw and actuating the template. This kind of error is important in optical gratings, but is difficult to determine and correct.

Calibration by Comparison with a Standard. — The commonest and most generally useful process of calibration is the direct comparison of the instrument with a standard over the whole range of its scale. It is necessary that the standard itself should have been already calibrated, or else that the law of its indications should be known. A continuous current ammeter, for instance, can be calibrated, so far as the relative values of its readings are concerned, by comparison with a tangent galvanometer, since it is known that the current in this instrument is proportional to the tangent of the angle of deflection. Similarly an alternating current ammeter can be calibrated by comparison with an electro- dynamometer, the reading of which varies as the square of the current. But in either case it is neccessary, in order to obtain the

readings in amperes, to standardize the instrument for some particular value of the current by comparison with a voltameter, or in some equivalent manner. Whenever possible, ammeters and voltmeters are calibrated by comparison of their readings with those of a potentiometer, the calibration of which can be reduced to the comparison and adjustment of resistances, which is the most accurate of electrical measurements. The commoner kinds of mercury thermometers are generally calibrated and graduated by comparison with a standard. In many cases this is the most convenient or even the only possible method. A mercury thermometer of limited scale reading between 250° and 400 ° C, with gas under high pressure to prevent the separation of the mercury column, cannot be calibrated on itself, or by comparison with a mercury standard possessing a fundamental interval, on account of difficulties of stem exposure and scale. The only practical method is to compare its readings every few degrees with those of a platinum thermometer under the condi-

tions for which it is to be used. This method has the advantage of combining all the corrections for fundamental interval, &c, with the calibration correction in a single curve, except the correction for variation of zero which must be tested occasionally

at some point of the sca/e.

Authorities. — Mercurial Thermometers: Guillaume, Thermo' metrie de Precision (Paris, 1889), gives several examples and refer- ences to original memoirs. The best examples of comparison and testing of standards are generally to be found in publications of Standards Offices, such as those of the Bureau International des Poids et Mesures at Paris. Dial Resistance- Box: Griffiths, Phil. Trans. A, 1893; Platinum Thermometry-Box : J. A. Harker and P. Chappuis, Phil. Trans. A, 1900; Thomson- Varley Potentiometer and Binary Scale Box: Callendar and Barnes, Phil. Trans. A, 1901. (H. L. C.)

CALICO, a general name given to plain cotton cloth. The word was spelt in various forms, including " calicut," which shows its derivation from the lindian city of Calicut or Kolikod, a seaport in the presidency of Madras, and one of the chief ports of intercourse with Europe in the 16th century, where cotton cloths were made. The name seems to have been applied to all kinds of cotton cloths imported from the East. In England it is now applied particularly to grey or bleached cotton cloth used for domestic purposes, and, generally, to any fairly heavy cotton cloth without a pattern. In the United States there is "a special application to printed cloth " of a coarser quality than muslin." In England " printed calico " is a comprehensive term.

CALICUT, a city of British India, in the Malabar district of Madras; on the coast, 6 m. N. of Beypur. In 1901 the popula- tion was 76,981, showing an increase of 14% in the decade. The weaving of cotton, for which the place was at one time so famous that its name became identified with its calico, is no longer of any importance. Calicut is of considerable antiquity; and about the 7th century it had its population largely increased by the immigration of the Moplahs, a fanatical race of Mahom- medans from Arabia, who entered enthusiastically into com- mercial life. The Portuguese traveller Pero de Covilham (q.v.) visited Calicut in 1487 and described its possibilities for European trade; and in May 1498 Vasco da Gama, the first European navigator to reach India, arrived at Calicut. At that time it was a very flourishing city, and contained several stately buildings, among which was especially mentioned a Brahminical temple, not inferior to the largest monastery in Portugal. Vasco da Gama tried to establish a factory, but he met with persistent hostility from the local chief (zamorin), and a similar attempt made by Cabral two years later ended in the destruction of the factory by the Moplahs. In revenge the Portuguese bombarded the town, but no further attempt was made for some years to establish a trading settlement there. In 1509 the marshal Don Fernando Coutinho made an un- successful attack on the city; and in the following year it was again assailed by Albuquerque with 3000 troops. On this occasion the palace was plundered and the town burnt; but the Portuguese were finally repulsed, and fled to their ships after heavy loss. In the following year they concluded a peace with the zamorin and were allowed to build a fortified factory on the north bank of the Kallayi river, which was however again, and finally, abandoned in 1525. In 161 5 the town was visited by an English expedition under Captain Keeling, who concluded a treaty with the zamorin; but it was not until 1664 that an English trading settlement was established by th/3 East India Company. The French settlement, which still exists, was founded in 1698. The town was taken in 1765 by Hyder Ali, who expelled all the merchants and factors, and destroyed the cocoa-nut trees, sandal-wood and pepper vines, that the country reduced to ruin might present no temptation to the cupidity of Europeans. In 1782 the troops of Hyder were driven from Calicut by the British; but in 1788 it was taken and destroyed by his son Tippoo, who carried off the inhabitants to Beypur and treated them with great cruelty. In the latter part of 1790 the country was occupied by the British; and under the treaty concluded in 1792, whereby Tippoo was deprived of half his dominions, Calicut fell to the British. After this event the

inhabitants returned and rebuilt the town, which in 1800 con- sisted of 5000 houses.

As the administrative headquarters of the district, Calicut maintains its historical importance. It is served by the Madras railway, and is the chief seaport on the Malabar coast, and the principal exports are coffee, timber and coco-nut products. There are factories for coffee-cleaning, employing several hundred hands; for coir-pressing and timber-cutting. The town has a cotton-mill, a saw-mill, and tile, coffee and oil works. A detach- ment of European troops is generally stationed here to overawe the fanatical Moplahs.

CALIFORNIA, one of the Pacific Coast states of the United States of America, physically one of the most remarkable, economically one of the more independent, and in history and social life one of the most interesting of the Union* It is bounded N. by Oregon, E. by Nevada and Arizona, from which last it is separated by the Colorado river, and S. by the Mexican province of Lower California. The length of its medial line N. and S. is about 780 m., its breadth varies from 150 to 350 m., and its total area is 158,207 sq. m., of which 2205 are Water surface. In size it ranks second among the states of the Union. The coast is bold and rugged and with very few good harbours; San Diego and San Francisco bays being exceptions. The coast line is more than 1000 m. long. There are eight coast islands, all of inconsiderable size, and none of them as yet in any way important.

Physiography.— The physiography of the state is simple; its main, features are few and bold: a mountain fringe along the ocean,, another mountain system along the east border, between them — closed in at both ends by their junction — a splendid valley of imperial extent, and outside all this a great area of barren, arid lands, belonging partly to the Great Basin and partly to the Open Basin region.

Along the Pacific, and some 20-40 m. in width, runs the mass of the Coast Range, made up of numerous indistinct chains — most of which have localized individual names— that are broken down into innumerable ridges and spurs, and small valleys drained by short streams of rapid fall. The range is cut by numerous fault lines, some of which betray evidence of recent activity; it is probable that movements along these faults cause the earthquake tremors to which the region is subject, all of which seem to be tectonic. The altitudes of the Coast Range vary from about 2000 to 8000 ft. ; in the neighbourhood of San Francisco Bay the culminating peaks are about 4000 ft. in height (Mount Diablo, 3856 ft.; Mount St Helena, 4343 ft.), and to the north and south the elevation of the ranges increases. In the

east part of the state is the magnificent Sierra Nevada, a great block of the earth's crust, faulted along its eastern side and tilted up so as to have a gentle back slope to the west and a steep fault escarpment facing east, the finest mountain system of the United States. The Sierra proper, from Lassen's Peak to Tehachapi Pass in Kern county, is about 430 m. long (from Mt. Shasta in Siskiyou county to Mt. San Jacinto in Riverside county, more than 600 m.). It narrows to the north and the altitude declines in the same direction. Far higher and grander than the Coast Range, the Sierra is much less complicated, being indeed essentially one chain of great simplicity of structure. It is only here and there that a double line of principal summits exists. The slope is everywhere long and gradual on the west, averaging about 200 ft. to the mile. Precipitous gorges or canyons often from 2000 to 5000 ft. in depth become a more and more marked feature of the range as one proceeds north- ward; over great portions of it they average probably not more than 20 m. apart. Where the volcanic formations were spread uniformly over the flanks of the mountains, the contrast between the canyons and the plain-like region of gentle slope in which they have been excavated is especially marked and characteristic. The eastern slope is very precipitous, due to a great fault which drops the rocks of the Great Basin region abruptly downward several thousand feet. Rare passes cross the chain, opening at the foot of the mountains on the east and the west high on their flanks, 7000-10,000 ft. above the sea. Between 36 20′ and 38

the lowest gap of any kind is above 0000 ft., and the average height of those actually used is probably not less than 11,000 ft. The Kearsarge, most used of all, is still higher. Very few in the entire Sierra are passable by vehicles. Some forty peaks are catalogued between 5000 and 8000 ft., and there are eleven above 14,000. The highest portion of the system is between the parallels of 36 30′ and 37 30'; here the passes are about 12,000 ft. in elevation, and the peaks range from 13,000 ft. upward, Mount Whitney, 14,502 ft., being the highest summit of the United States, excluding Alaska. From this peak north- ward there is a gradual decline, until at the point where the Central Pacific crosses in lat. 30° 20′ the elevation is only 7000 ft.

Of the mountain scenery the granite pinnacles and domes of the highest Sierra opposite Owen's Lake, where there is a drop eastward into the valley of about 10,000 ft. in 10 m.; the snowy volcanic cone of Mt Shasta, rising 10,000 ft. above the adjacent plains; and the lovely valleys of the Coast Range, and the south fork of the King river — all these have their charms; but most beautiful of all is the unique scenery of the Yosemite Valley (q.v.). Much of the ruggedness and beauty of the mountains is due to the erosive action of many alpine

glaciers that once existed on the higher summits, and which have left behind their evidences in valleys and amphitheatres with towering walls, polished rock-expanses, glacial lakes and meadows and tumbling waterfalls. Remnants of these glaciers are still to be seen, — as notably on Mt. Shasta, — though shrunk to small dimensions. Glacial action may be studied well as far south as 36 . The canyons are largely the work of rivers, modified by glaciers that ran through them after the rivers had formed them. All of the Sierra lakes and ponds are of glacial origin and there are some thousands of them. The lower lake line is about 8000 ft. ; it is lower to the north than to the south, owing to the different climate, and the different period of glacial retrogression. Of these lakes some are fresh, and some — as those of the north-east counties— alkali. The finest of all is Tahoe, 6225 ft. above the sea, lying between the true Sierras and the Basin Ranges, with peaks on several sides rising 4000-5000 ft. above it. It is 1500 ft. deep and its waters are of extraordinary purity (containing only three grains of solid matter to the gallon). Clear Lake, in the Coast Range, is another beautiful sheet of water. It is estimated by John Muir that on an average ” perhaps more than a mile ” of degradation took place in the last glacial period; but with regard to the whole subject of glacial action in California as in other fields, there is considerable difference of opinion. The same authority counted 65 small residual glaciers between 36° 30′ and 39 ; two-thirds of them lie between 37° and 38 , on some of the highest peaks in the district of the San Joaquin, Merced, Tuolumne and Owen’s rivers. They do not descend, on an average, below 1 1,000 ft. ; the largest of all, on Mt. Shasta, descends to 9500 ft. above the sea.

Volcanic action has likewise left abundant traces, especially in the northern half of the range, whereas the evidences of glacial action are most perfect (though not most abundant) in the south. Lava covers most of the northern half of the range, and there are many craters and ash-cones, some recent and of perfect form. Of these the most remarkable is Mt. Shasta. In Owen’s Valley is a fine group of extinct or dormant volcanoes.

Among the other indications of great geological disturbances on the Pacific Coast may also be mentioned the earthquakes to which California like the rest of the coast is liable. From 1850 to 1887 almost 800 were catalogued by Professor E. H. Holden for California, Oregon and Washington. They occur in all seasons, scores of slight tremors being recorded every year by the Weather Bureau; but they are of no importance, and even of these the number affecting any particular locality is small. From 1769 to 1887 there were 10 ” destructive ” and 24 other ” extremely severe ” shocks according to the Rossi Forel

nomen- clatural scale of intensity. In 1812 great destruction was wrought by an earthquake that affected all the southern part of the state; in 1865 the region about San Francisco was violently disturbed; in 1872 the whole Sierra and the state of Nevada were violently shaken; and in 1906 San Francisco fo.tO was in

large part destroyed by a shock that caused great damage else- where in the state.

North of 40 N. lat. the Coast Range and Sierra systems unite, forming a country extremely rough. The eastern half of this area is covered chiefly with volcanic plains, very dry and barren, lying between precipitous, although not very lofty, ranges; the western half is magnificently timbered, and toward the coast excessively wet. Between 35 and 36 N. lat. the Sierra at its southern end turns westward toward the coast as the Tehachapi Range. The valley is thus closed to the north and south, and is surrounded by a mountain wall, which is broken down in but a single place, the gap behind the Golden Gate at San Francisco. Through this passes the entire drainage of the interior. The length of the valley is about 450 m., its breadth averages about 40 m. if the lower foothills be included, so that the entire area is about 18,000 sq. m. The drainage basin measured from the water-partings of the enclosing mountains is some three times as great. From the mouth of the Sacramento to Redding, at the northern head of the valley, the rise is 552 ft. in 192 m., and from the mouth of the San Joaquin southward to Kern lake it is 282 ft. in 260 m.

Two great rivers drain this central basin,— the San Joaquin, whose valley comprises more than three-fifths of the entire basin, and the Sacramento, whose valley comprises the remainder. The San Joaquin is a very crooked stream flowing through a low mud-plain, with tule banks; the Sacramento is much less meandering, and its immediate basin, which is of sandy loam, is higher and more attractive than that of the San Joaquin. The eastward flanks of the Coast Range are very scantily forested, and they furnish not a single stream permanent enough to reach either the Sacramento or San Joaquin throughout the dry season; On the eastern side of both rivers are various important tribu- taries, fed by the more abundant rains and melting snows of the western flank of the Sierra; but these streams also shrink greatly in the dry season. The Feather, emptying into the Sacramento river about 20 m. N. of the city of Sacramento, is the most important tributary of the

Sacramento river. A striking feature of the Sacramento system is that for 200 m. north of the Feather it does not receive a single tributary of any importance, though walled in by high mountains. Another peculiar and very general feature of the drainage system of the state is the presence of numerous so-called river ” sinks,” where the waters disappear, either directly by evaporation or (as in Death Valley) after flowing for a time beneath the surface. These ” sinks ” are therefore not the true sinks of limestone regions. The popular name is applied to Owen’s lake, at the end of Owen’s river; to Mono lake, into which flow various streams rising in the Sierra between Mount Dana and Castle Peak; and to Death Valley, which contains the ” sink ” of the Amargosa river, and evidently was once an extensive lake, although now only a mud-flat in ordinary winters, and a dry, alkaline, desert plain in summer. All these lakes, and the other mountain lakes before referred to, show by the terraces about them that the water stood during the glacial period much higher than it does now. Tulare lake, which with Buena Vista lake and Kern lake receives the drainage of the southern Sierra, shows extreme local variations of shore-line, and is generally believed to have shrunk extremely since 1850, though of this no adequate proof yet exists. In 1900 it was about 200 sq. m. in area. In wet seasons it overflows its banks and becomes greatly extended in area, discharging its surplus waters into the San Joaquin; but in dry seasons the evaporation is so great that there is no such discharge. The drainage of Lassen, Siskiyou and Modoc counties has no outlet to the sea and is collected in a number of great alkaline lakes.

Finally along the sea below Pt. Conception are fertile coastal plains of considerable extent, separated from the interior deserts by various mountain ranges from 5000 to 7000 ft. high, and with peaks much higher (San Bernardino, 11,600; San Jacinto, 10,800; San Antonio, 10,140). Unlike the northern Sierra, the ranges of Southern California are broken down in a number of. places. It is over these passes — Soledad, 2822 ft., Cajon,

San Gorgonio, 2560 ft.— that the railways cross to the coast; That part of California which lies to the south and east of the southern inosculation of the Coast Range and the Sierra c6m- prises an area of fully 50,000 sq. m., and belongs to the Basin” Range region. For the most part it is excessively dry and barren. The Mohave desert — embracing Kern, Los AhgeleS and San Bernardino, as also a large part of San Diego, Imperial and Riverside counties— belong to the ” Great Basin,” while a narrow strip along the Colorado river is in the “Open Basin Region.” They have no drainage to the sea, save fitfully for slight areas through the Colorado river. The Mohave desert is about

2000 ft. above the sea in general altitude. The southern part of the Great Basin region is vaguely designated the Colorado desert. In San Diego, Imperial and Riverside counties a number of creeks or so-called rivers, with beds that are normally dryy flow centrally toward the desert of Salton Sink or ” Sea “; this is the lowest part of a large area that is depressed below the level of the sea, — at Salton 263 ft., and 287 ft. at the lowest point.; In 1900 the Colorado river (q.v.) was tapped south of the Mexican- boundary for water wherewith to irrigate land in the Imperial Valley along the Southern Pacific railway, adjoining Salton Sea. The river enlarged the canal, and finding a steeper gradient than” that to its mouth, was’diverted into the Colorado desert, flooding: Salton Sea; 1 and when the break in this river was closed for the second time in February 1907, though much of its water i still escaped through minor channels and by seepage, a lake more than 400 sq. m. in area was left. A permanent 60 ft. masonry dam was completed in July 1907. The region to the east of the Sierra, likewise in the Great Basin province, between the crest of that range and the Nevada boundary, is very moun- tainous. Owen’s river runs through it from north to south for some 180 m. Near Owen’s lake the scenery is extremely grand. The valley here is very narrow, and on either side the mountains rise from 7000 to 10,000 ft. above the lake and river. The Inyo range, on the east, is quite bare of timber, and its summits are only occasionally whitened with snow for a few days during the winter, as almost all precipitation is cut off by the higher ranges to the westward. Still further to the east some 40 m. from the lake is Death Valley (including Lost or Mesquite Valley)— the name a reminder of the fate of a party of “forty-niners ” who- perished here, by thirst or by starvation and exposure. Death Valley, some 50 m. long and on an average 20-25 m. broad from- the crests of the inclosing mountain ranges (or Sˆto’ m. at their base), constitutes an independent drainage basin. It is below sea level (about 276 ft. according torecent surveys) , arid altogether is one of the most remarkable physical features of California. The mountains about it are high and bare and brilliant with varied colours. The Amargosa river, entering the valley from Nevada, disappears in the salty basin. Enormous quantities’ of borax, already exploited, and of nitrate of soda, are known to be present in the surrounding country, the former as almost pure borate of lime in Tertiary lake sediments.

The physiography of the state is the evident determinant of its climate, fauna and flora. California has the highest’ land and the lowest land of the United States, the greatest variety of temperature and rainfall, and of products of the soil.

Climate. — The climate is very different from that of the Atlantic

coast; and indeed very different from that of any part of the country save that bordering California* Amid great variations of local weather there are some peculiar features that obtain all over the state. In the first place, the climate of the entire Pacific Coast is milder and more uniform in temperature than that of the states in corresponding latitude east of the mountains. Thus we have to go north as far as Sitka in 57 N. lat. to find the same mean yearly temperature as that of Halifax, Nova Scotia, in latitude 44 39'. And going south along the' coast, we find the mean temperature of San Diego 6″ or 7? less than that of Vicksburg, Miss., or Charleston, S.C. The quantity of total annual heat supply "at Puget Sound exceeds that ; at Philadelphia, Pittsburg, Cleveland or Omaha, all more than

1 In December 1904 Salton Sea was dry; in February 1906 if was occupied by a lake 60 m. long.

Emery Walker sc.

500 m. farther south; Cape Flattery, exposed the year round to cold ocean fogs, receives more heat than Eastport, Maine, which is 3 farther south and has a warmer summer. In the second place, the means of winter and summer are much nearer the mean of the year in California than in the east. This condi- tion of things is not so marked as one goes inward from the coast; yet everywhere save in the high mountains the winters are comparatively mild. In the third place, the division of the year into two seasons — a wet one and a dry (and extremely dusty) one-ˆ-marks this portion of the Pacific Coast in the most decided manner, and this natural climatic area coincides almost exactly in its extension with that of California; being truly characteristic neither of Lower California nor of the greater part of Oregon, though more so of Nevada and Arizona. And finally, in the fourth place, except on the coast the disagreeableness of the heat of summer is greatly lessened by the dryness of the air and the consequent rapidity of evaporation. Among the peculiarities of Calif ornian climate it is not one of the least striking that as one leaves the Sacramento or San Joaquin plains and travels into the mountains it becomes warmer, at least for the first 2O00 or 3000 ft. of ascent.

Along both the Coast Range and the Sierra considerable rainfall is certain, although, owing to the slight snow accumula- tions of the former, its streams are decidedly variable. A heavy rain-belt, with a

normal fall of more than 40 in., covers all the northern half of the Sierra and the north-west counties; shading off from this is the region of 10-20 in. fall, which covers all the rest of the state save Inyo, Kern and San Bernardino counties, Imperial county and the eastern portion of Riverside county; the precipitation of this belt is from o to 10 in. In excessively dry years the limits of this last division may include all of the state below Fresno and the entire Central Valley as well. In the mountains the precipitation increases with the altitude; above 6000 or 7000 ft. it is almost wholly in the form of snow; and this snow, melting in summer, is of immense importance to the state, supplying water once for placer mining and now for irrigation. 1 The north-west counties are extremely wet; many localities here have normal rainfalls of 60-70 in. and even higher annually, while in extreme seasons as much as 125 in. falls. Along the entire Pacific Coast, but particularly N. of San Fran- cisco, there is a night fog from May to September. It extends but a few miles inland, but within this belt is virtually a pro- longation of the rainy season and has a marked effect on vegetation. Below San Francisco the precipitation decreases along the coast, until at San Diego it is only about 10 in. The south-east counties are the driest portions of the United States. At Ogilby, Volcano, Indio and other stations on the Southern Pacific line the normal annual precipitation is from 1-5 to 2-5 in.; and there are localities near Owen's lake, even on its very edge, that are almost dry. For days iri succession when it storms along the Southern California coasts and dense rain clouds blow landwards to the mountains, leaving snow or rain on their summits, it has been observed that within a few miles beyond the ridge the contact of the desert air dissipates the remaining moisture of the clouds into light misty masses, like a steam escape in cold air. The extreme heat of the south-east is tempered fey the extremely low humidity characteristic of the Great Basin, which in the interior of the two southernmost counties is very low. The humidity of places such as Fresno, Sacramento and Red Bluff in the valley varies from 48 to 58. Many places in northern, southern, central, mountain and southern coastal California normally have more than 200 perfectly clear days in a year; and many in the mountains and in the south, even on the coast, have more than 250. The extreme variability in the amount of rainfall is remarkable. 1 The effects of a season of drought on the dry portions of the state need not be adverted fo;> and as there is no rain or snow of any consequence on the mountains during summer, a succession of dry seasons may almost bare the ranges of the accumulated stock

1 During the interval from 1850 to 1872 the yearly rainfall at San Francisco ranged from 11-37 to 49-27 in.; from 1850 to 1904 the

average was 22-74, and the probable annual variation 4 in.

of previous winter snows, thus making worse what, is already bad. ,

The Colorado desert (together with the lower Gila Valley of Arizona) is the hottest part of the United States. Along the line of the Southern Pacific the yearly extreme is frequently from 124 to 129 F. (i.e. in the shade, which is almost if not quite the greatest heat ever actually recorded in any part of the world). At the other extreme, temperatures of — 20 to —36° are recorded yearly on the Central (Southern) Pacific line near Lake Tahoe. The normal annual means of the coldest localities of the state are from 37° to 44 F.; the monthly means from 20 to 65° F. The normal annual means on Indio, Mammoth Tanks, Salton and Volcano Springs are from 73-9° to 78-4 F.; the monthly means from 52-8° to 101-3° (frequently 95° to 98°), The normal trend of the annual isotherms of the state is very simple: a low line of about 40° circles the angle in the Nevada boundary line; 50° normally follows the northern Sierra across the Oregon border; lines of higher temperature enclose the Great Valley; and lines of still higher tempera ture— usually 6o° to 70°, in hotter years 6o° to 75 — run transversely across the southern quarter of the state.

Another weather factor is the winds, which are extremely regular in their movements.. There are brisk diurnal sea-breezes, and seasonal trades and counter-trades. Along the coast an on-shore breeze blows every summer day; in the evening it is replaced by a night-fog, and the cooler air draws down the mountain sides in opposition to its movement during the day. In the upper air a dry off-shore wind from the Rocky Mountain plateau prevails throughout the summer; and in winter an on- shore rain wind; The last is the counter- trade, the all-year wind of Alaska and Oregon; it prevails in. winter even off Southern California. .

There is the widest and most startling variety of local climates. At Truckee, for example, lying about 5800 ft. above the sea near Lake Tahoe, the lowest temperature of the year may be— 2,5° F. or colder, when 70 m. westward at Rocklin, which lies in the foothills about 250 ft. above the sea, the mercury. does not fall below 28°. Snow never falls at Rocklin, but falls in large quantity at Truckee; ice is the crop of the one, oranges of the other, at the same time. There are points in Southern California where one may actually look from sea to desert and from snow to orange groves. Distance from the ocean, situation with reference to the mountain ranges, and altitude are all important determinants of these climatic differences; but of these the last seems to be most important. At any rate it may be said that generally

speaking the maximum, minimum and mean temperatures of points of approximately equal altitude are respectively but slightly different in northern or southern California, 2

Death Valley surpasses for combined heat and aridity any meteorological stations on earth where regular observations are taken, although for extremes of heat it is exceeded by places in the Colorado desert. The minimum daily temperature in summer is rarely below 70 F. and often above 90° F. (in the shade), while the maximum may for days in succession be as high as 120 F. A record of 6 months (1891) showed an average daily relative humidity of 30-6 in the morning and 15-6 in the evening, and the humidity sometimes falls to 5. Yet the surrounding country is not devoid of vegetation. The hills are very fertile when irrigated, and the wet season develops a variety of perennial herbs, shrubs and annuals.

Fauna. — California embraces areas of every life-zone of North America: of the boreal, the Hudsonian and Canadian subzones; of the transition, the humid Pacific subzone; of the upper austral, the arid or upper Sonoran subzone; of the lower austral, the arid or lower Sonoran; of the tropical, the ” dilute arid ” subzone. As will be inferred from the above

2 The means for Los Angeles and Red Bluff, of Redding and Fresno, of San Diego and Sacramento, of San Francisco or Monterey and Independence, are respectively about the same; and all of them lie between 56 and 63° F. The places mentioned are scattered over ■3t* of longitude and 6|° of latitude.

account of temperature, summer is longer in the north, and localities in the Valley have more hours of heat than do those of south California. Hence that climatic characteristic of the entire Pacific Coast — already referred to and which is of extreme importance in determining the life-zones of California — the great amount of total annual heat supply at comparatively high latitudes. A low summer temperature enables northern species to push far southward, while the high heat total of the year enables southern species to push far north. The resultant intermingling of forms is very marked and characteristic of the Pacific Coast states. The distribution of life-zones is primarily a matter of altitude and corresponds to that of the isotherms. The mountain goat and mountain sheep live in the Sierran upper-land,

though long ago well-nigh exterminated. The Douglas red squirrel is ubiquitous in the Sierran forests and their most conspicuous inhabitant. White-tailed deer and especially black-tails are found on the high Sierra; the mule deer, too, although its habitat is now mainly east of the range, on the plateau, is also met with. Grizzly, black, cinnamon and brown bears are all Calif ornian- species once common and to-day rare. When Americans began to rule in California elk and antelope herded in great numbers in the Great Valley; the former may to-day sometimes- be seen, possibly, in the northern forests, and the latter occasionally cross into the state from Nevada. The sage-hen is abundant on the eastern flank of the Sierra. Grouse, quail, crows and woodpeckers (Melanerpes formicivorus) furnish species characteristic of the state. There are various species of ground-squirrels and gophers, which are very abundant. Noteworthy in the animal life of tie lower Sonoran and tropic region are a variety of snakes and lizards, desert rats and mice; and, among birds, the cactus wren, desert thrasher, desert sparrow, Texas night-hawk, mocking-bird and ground cuckoo or road runner (Geococcyx Calif ornianus). The California vulture, the largest flying bird in North America and fully as large as the Andean condor, is not limited to Cali- fornia but is fairly common there. In the zoology and botany of California as of the rest of the Pacific Coast, the distinctions between the upper austral and humid transition zones are largely obliterated; and as one passes southward into the arid lands, life forms of both these zones intermingle with those of the arid transition.

Fish are abundant. The United States fish commission, and an active state commission established in 1869, have done much to preserve and increase this source of food. In 1904 the yield of the fisheries of the three Pacific Coast states was 168,600,000 lbs., valued at $6,681,000, — nearly half that of the New England states, more than one-third that of the Middle Atlantic states and more than that of the South Atlantic and Gulf states combined. Of the total, California yielded between a quarter and a third. A third of her fish comes from the Sacramento river. Some 230 — more or less — marine food fishes are to be found in the market at San Francisco. The exports of fish from that port from 1892- 1899 were valued at from $2,000,000 to $2,500,000 annually. Native oysters are small and of peculiar flavour; eastern varieties also are fattened, but not bred in California waters. Shrimp are abundant; the shrimp fishers are Chinese and four- fifths of the catch is exported to China. Sturgeon were once the cheapest fish after salmon; to-day, despite all efforts to increase the supply, they are the dearest. Salmon, once threatened with extinction, have been saved, maintained in good supply, and indeed have probably regained

their pristine abundance. Shad and striped bass are both very abundant and cheap. Black bass, flounders, terrapin, sea -turtles, perch, turbot, sole and catfish are also common. Great herds of seals once lay like toll-gatherers off the Golden Gate and other bays of the coast, taking a large share of the salmon and other fish; but they are no longer common. The sea-lions sometimes raid the rivers for 100 m. inland. They have greatly increased since hunting them for their hides and oil ceased to be profitable, and thousands sometimes gather on the Farallones, off the Golden Gate.

Flora. — Inclusiveness of range in the distribution of vegetable life is perhaps more suggestive than the distribution of animal

species. The variation is from dwarf mountain pine to giant cactus and dates. The humid transition belt is the habitat of California's magnificent forests. Nut pine, juniper and true sage-brush (Artemisia tridentata) characterize the upper Sonoran, — although the latter grows equally in the transition zone. Cereals, orchard fruits and alfalfa are of primary importance in the upper and of secondary importance in the lower Sonoran. In the arid portions of thisand the tropic areas the indigenous plants are creosote, mesquite and alfileria bushes, desert acacias, paloverdes, alkali-heath, salt grass, agaves, yuccas (especially the Spanish-bayonet and Joshua tree) and cactuses. Among exotics the Australian saltbush spreads successfully over the worst alkali land. The introduction of other exotics into these zones, — made humid by irrigation, which converts them, the one into true austro-riparian the other into true humid tropical, — has revolur tionized the agricultural, and indeed the whole, economy of California. At the two ends of Cajon Pass, only four or five kilometres apart, are the two utterly distinct floras of the Mohave desert and the San Bernardino valley. Despite the presence of the pass, plants do not spread, so great is the difference of climatic conditions. On the desert the same plant will vary in different years from 4 in. to 10 ft. in height when equally mature, according to the rainfall and other conditions of growth. Many mature plants are not taller than 0-4 to o-8 in. The tree yucca often attains a height of 20 to 25 ft., and a diameter of 1-5 ft. About 600 species of plants were catalogued in desert California in 189 1 by a government botanical party. The flora of the coast islands of California is very interesting. On Santa Cruz Professor Joseph Le Conte found 248 species, nearly all of which are distinctively Californian, 48 being peculiar to the surrounding islands and 28 peculiar to Southern California* Various other things indicate a separation of the islands from the mainland in quaternary times; since which, owing to the later southward movement on the continent of northern forms in glacial times, there has been a struggle for existence

on the mainland from which the islands have largely escaped.

Forests. — The forests and agricultural crops of the state de- mand particular notice. In 1906 the woodland was estimated by the United States census at 22% of the state's area, and the total stand at 200,000 million ft. of timber. The variety of forest trees is not great, but some of the California trees are unique, and the forests of the state are, with those of Oregon and Washington, perhaps the most magnificent of the world. At least the coni- ferous forests which make up nine-tenths of California's woodland surpass all others known in number of species and in the size and beauty of the trees. Forty-six species occur, namely, 32 species of pitch trees (18 pines), 12 species of the cypresses and their allies (2 sequoia), and 2 species of yews or their allies. Peculiar to California are the two species of sequoia (q.v.), — the redwood (S. sempervirens) , and the big-tree (S. gigantea), remnants of an earlier age when they were common in other parts of the world. The redwood grows only in a narrow strip on the Coast Range from Southern Oregon (where there are not more than 1000 acres) down nearly to the Golden Gate, in a habitat of heavy rains and heavy fogs. They cover an area of about 2000 sq. m. almost unmixed with other species. One fine grove stands S. of San Francisco near Santa Cruz. These noble trees attain very often a height of more than 300 ft., frequently of 350 and even more, and a butt diameter of more than 1 5 to 20 ft., with clean, straight fluted trunks rising 200 ft. below the lowest branches. They grow in a very dense timber stand; single acres have yielded 1,500,000 ft. B.M. of lumber, and single trees have cut as high as 100,000 ft. The total stand in 1900 was estimated by the United States census as 75,000,000,000 ft., and the ordinary stand per acre varies from 25,000 to 150,000 ft., averaging probably 60,000 ft. The redwood is being rapidly used for lumber. There is nowhere any considerable young growth from seed, although this mode of reproduction is not (as often stated) unknown; the tree will reproduce itself more than once from the stump (hence its name) . In thirty years a tree has been known to grow to a height of 80 ft. and a diameter of 16 in. The wood contains no pitch and much water, and in a green condition will not bum. To this fact

it owes its immunity from: the forest fires which wreak frightful havoc among the surrounding forests. ■ As the redwood is limited to the Coast Range, so the big tree is limited wholly to the Sierra Nevada. Unlike the redwood the big tree occurs in scattered groves (ten in all)

among other species. Its habitat extends some 200 m., from latitude 36 to 39 , nowhere descending much below an altitude of 5000 ft., nor rising above 8000 ft. The most northerly grove and the nearest to San Francisco is the Calaveras Grove near Stockton; the Mariposa Grove just south of the Yose- mite National Park, is a state reservation and easily accessible to tourists. The noblest groves are near Visalia, and are held as a national park. The average height is about 275 ft., and the diameter near the ground 20 ft. ; various individuals stand over 300 ft, and a diameter of 25 ft. is not rare. One tree measures 35-7 ft. inside the bark 4 ft. above the ground, 10 fti at 200 ft. above the ground, and is 325 ft. tall. Specimens have been cut down that were estimated to be 1300 and even 2200 years old; many trees standing are presumably 250 × 2 years old. It is the opinion of John Muir that the big tree would normally live 5000 years or more; that the California groves are still in their prime; that, contrary to general ideas, the big tree was never more widely distributed than now, at least not “within the past 8000 or 10,000 years; that it is not a decaying species, but that on the contrary ” no tree of all the forest is more enduringly established in con- cord with climate and soil,” growing like the mountain pine even on granite, and in little danger save from the greed of the lumber- man; but other excellent authorities consider it as hardly hold- ing its own, especially in the north. Three main wood belts cover the flanks of the Sierra: the lower or main pine belt, the silver fir belt, and the upper pine belt. The sugar pine, the yellow or silver pine and the Douglas spruce (considerably smaller than in Oregon and Washington), are rivals in stature and nobility, all attaining 200 ft. or more when full grown; and the incense cedar reaches a height of 150 ft. In this belt and the following one of firs the big tree also grows. The white silver fir (abies concolor) and the silver or red fir {ab. magnified), standing 200 to 250 ft., make up almost wholly the main forest belt from 5000 to 9000 ft. for some 450 m. Above the firs come the tamarack, constituting the bulk of the lower Alpine forest; the hardy long-lived mountain pine; the red cedar or juniper, growing even on the baldest rocks; the beautiful hemlock spruce; the still higher white pine, nut pine, needle pine; and finally, at 10,000 to 12,000 ft., the dwarf pine, which grows in a tangle on the earth over which one walks, and may not show for a century’s growth more than a foot of height or an inch of girth. The Nevada slope of the mountains below 7 500 ft. is covered with the nut pine down to the sage plains. Its nuts are gathered in enormous amounts by the Indians for food; and it is estimated that the yearly harvest of these nuts exceeds in bulk that of all the cereals of California (John Muir). On the Sierra the underbrush is characterized by the purtgent manzanita, the California buckeye and the chamiso;

the last two growing equally abundantly on the Coast Range. The chamiso and the manzanita, with a variety of shrubby oaks and thorny plants, often grow together in a dense and sometimes quite impenetrable undergrowth, forming what is known as “chaparral”; if the chamiso occurs alone the thicket is a ” chamisal.” The elm, the hickory, the beech, the chestnut, and many others of the most characteristic and useful trees of the eastern states were originally entirely wanting in California. Oaks are abundant; they are especially characteristic of the Great Valley, where they grow in magnificent groves. Up to igionationalforestreservesamounted to 27,968,510 acres. In 1909 Congress created a national forest to include the big tree groves in Calaveras and Tuolumne counties. One of the noblest redwood areas (that of Santa Cruz county) is a state reservation (created in 1901). Even within reservations almost all the merchantable timber is owned by private in- dividuals. In addition to native trees many others — especially ornamental species — have been successfully introduced from various parts of the world.

Soil. — Sand and loams in great variety, grading from mere sand to adobe, make up the soils of the state. The plains of the north-east counties are volcanic, and those of the south-east

sandy. It is impossible to say with accuracy what part of the state may properly be classed as tillable. The total farm acreage in 1900 was 28,828,951 acres, of which 41-5 % were improved; since 1880 the absolute amount of improved land has remained practically constant, despite the extraordinary progress of the state in these years. Much land is too rough, too elevated or too arid ever to be made agriculturally available; but irriga- tion, and the work of the state and national agricultural bureaus in introducing new plants and promoting scientific farming, have accomplished much that once seemed impossible. The peculiarities of the climate, especially its division into two seasons, make Californian (and Southern Arizona) agriculture very different from that of the rest of the country. During the winter no shelter is necessary for live-stock, nor, during summer, for the grains that are harvested in June and July, and may lie for weeks or months in the field. The mild, wet winter is the season of planting and growth, and so throughout the year there is a succession of crops. The dangers of drought in the long dry seasons particularly increase the uncertainties of agriculture in regions naturally arid. Irrigation was introduced in Southern California before 1 780, but its use was desultory and its spread slow till after 1850. In 1900 almost 1,500,000 acres were irrigated — an increase of 46% since 1890. About half of this total was in San Joaquin Valley. California has the greatest area of irrigated land of any state in the Union, and offers the most complete

utilization of resources. In the south artesian wells, and in the Great Valley the rivers of the Sierra slope, are the main source ©f water-supply. On nearly all lands irrigated some crops will grow in ordinary seasons without irrigation, but it is this that makes possible selection of crops; practically indispensable for all field and orchard culture in the south, save for a few moist coastal areas, it everywhere increases the yield of all crops and is practised generally all over the state. Of the acreage devoted to alfalfa in 1899, 76-2 % was irrigated; of that devoted to subtropical fruits, 71-7%. Small fruits, orchard fruits, hay, garden products and grains are decreasingly dependent on irrigation; wheat, which was once California's great staple, is (for good, but not for best results) comparatively independent of it, — hence its early predominance in Californian agriculture, due to this success on arid lands since taken over for more remunerative irrigated crops.

Agriculture. — The spread of irrigation and of intensive cultiva- tion, and the increase of small farms during the last quarter of the 19th century, have made California what it is to-day. Agri- culture had its beginning in wheat-raising on great ranches, from 50,000 even to several hundred thousand acres in extent. A few of these, particularly in the Great Valley, are still worked, but only a few. The average size of farms in 1850 (when the large Mexican grants were almost the only farms, and these unbroken) was 4466 acres; in i860 it was 466-4, and in 1900 only 397-4 acres. Stock ranches, tobacco plantations, and hay and grain farms, average from 800 to 530 acres, and counteract the tendency of dairy farms, beet plantations, orchards, vegetable gardens and nurseries to lower the size of the farm unit still further. The renting of large holdings prevails to a greater extent than in any other state except Texas. From 1880 to 1900 the number of farms above 500 and below 1000 acres doubled; half of the total in 1900 were smaller than 100 acres. The most remunerative and most characteristic farming to-day is diversified and intensive and on small holdings. The essential character of California's economic life has been determined by the successive predominance of grass, gold, grain and fruits. Omitting the second it may be truly said that the order of agricultural development has been mainly one of blind experi- ment or fortuitous circumstances. Staple products have changed with increasing knowledge of climatic conditions, of life-zones and of the fitness of crops; first hides and tallow, then wool, wheat, grapes (which in the early eighteen-nineties were the leading fruit), deciduous orchard fruits, and semi-tropical citrus fruits successively. Prunes were introduced in 1854, but their possibilities were only slightly appreciated for some thirty years. Of various other crops much the same is true. Of late years

progress has been very intelligent; in earlier years it was gained through a multitude of experiments and failures, and great pecuniary loss, and progress was a testimonial chiefly to courage and perseverance. The possibilities of the lower Sonoran and tropical areas are still imperfectly known. Nature has been niggard of rain but lavish in soil and sun. Irrigation has shown that with water, arid and barren plains, veritable deserts may be made to bloom with immense wealth of semi-tropical fruits; and irrigation in the tropical area along the Colorado river, which is so arid that it naturally bears only desert vegetation, has made it a true humid-tropical region like Southern Florida, growing true tropical fruits.

In 1900 California ranked eleventh among the states in total value of farm property ($796,527,955) and in 1899 fourteenth in the value of farm products ($131,690,606). The growth of the former from 1890 to 1900 was only 2-5%, one of the smallest increases among all the states.

The pastoral period extended from 1769 to 1848. The live- stock industry was introduced by the Franciscans and flourished exceedingly. In 1834, when the missions had already passed their best days, there were some 486,000 cattle, horses, mules and asses on the ranges, and 325,000 small animals, principally sheep. Throughout the pre-American period stock-raising was the leading industry; it built up the prosperity of the missions, largely supported the government and almost ex- clusively sustained foreign commerce. Hides and tallow were the sum and substance of Californian economy. Horses were slaughtered wholesale at times to make way for cattle on the ranges. There was almost no dairying; olive oil took the place of butter, and wine of milk, at the missions; and in general indeed the Mexicans were content with water. In the develop- ment of the state under the American regime the live-stock industry has been subordinate. A fearful drought in 1862-1864 greatly depressed it, and especially discouraged cattle ranching. Sheep then became of primary importance, until the increase of the flocks threatened ranges and forests with destruction. As late as 1876 there were some 7,000,000 sheep, in 1900 only 2,581,000, and in 1906 only 1,750,000. In the total value of all live stock (5,402,297 head) in 1900 ($65,000,000) the rank of the state was 1 5th in the Union, and in value of dairy products in 1899 (12-84 million dollars) 12th. The live-stock industry showed a tendency to decline after 1890, and the dairy industry also,

despite various things — notably irrigation and alfalfa culture — that have favoured them.

Cereals replaced hides and tallow in importance after 1848. Wheat was long California's greatest crop. Its production steadily increased till about 1884, the production in 1880, the banner year, being more than 54 million bushels (32,537,360 centals). Since 1884 its production has markedly fallen off; in 1905 the wheat crop was 17,542,013 bushels, and in 1906, 26,883,662 bushels (valued at $20,162,746). There has been a general parallelism between the amount of rain and the amount of wheat produced; but as yet irrigation is little used for this crop. In the eighth decade of the 19th century, the value of the wheat product had come to exceed that of the annual output of gold. Barley has always been very important. The acreage given to it in 1899 was one-fourth the total cereal acreage, and San Francisco in 1902-1904 was the shipping point of the larger part of American exported barley, of (roughly) three-quarters in 1902, seven-eighths in 1903 and four-fifths in 1904. In 1906. California produced 38,760,000 bushels of barley, valued at $20,930,400. The great increase in the acreage of barley, which was 22'5% of the country's barley acreage in 1906, and 24-2% in 1905, is one reason for the decreased production of wheat. The level nature of the great grain farms of the valley led to the utilization of machinery of remarkable character. Combined harvesters (which enter a field of standing grain and leave this grain piled in sacks ready for shipment), steam gang-ploughs, and other farm machinery are of truly extraordinary size and efficiency. In 1899 cereals represented more than a third of the total crop acreage and crop product ($93,641,334) of the state. Wheat and other cereals are in part cut for hay, and the hay crop

of 1906 was i,i33;465 tons, valued at $12,751ˆ4.81. California is one of the leading hop-producing states of the Union, the average annual production since 1901 being more than 10,000,000 lb. The product of sugar beets increased between 1888 and 1902 from 1910 to 73,761 tons (according to the state board of trade), and in 1909 (according to the department of agriculture) it was 882,084 tons, from which 254,544,000 lb of sugar was manufactured. In this industry California in 1909 ranked second to Colorado. Truck gardening for export is an. assured industry, especially in the north. Great quantities of vegetables, fresh and canned, are shipped yearly, and the same ; is true on a far larger scale of fruit. Vegetable exports more than doubled between 1894 and 1903. In 1899 hay and grain represented slightly more than a third of the farm acreage and capital and also of the value of all farm products; live-stock and dairy farms represented

slightly more than half the acreage, and slightly under 30% of the capital and- produce; fruit farms absorbed 6-2% of the acreage and 27% of the capital, and returned 22-5% of the value of farm produce.

Fruit-growing. — Horticulture is now the principal industry, and in this field California has no rival in the United States, although ranking after Florida in the growth of some tropical, or semi-tropical fruits,— pineapples, guava, limes, pomeloes or grape-fruit and Japanese persimmons. In 1899 California's output of fruit was more than a fifth of that of the whole Union. The supremacy of the state is established in the growth of oranges, lemons, citrons, olives, figs, almonds, Persian (or English) walnuts, plums and prunes, grapes and raisins, nectarines,; apricots and pomegranates; it also leads in pears, and peaches, but here its primacy is not so assured. Southern California ■ by no means monopolizes the warm-zone fruits. Oranges, lemons and walnuts come chiefly from that section, but citrus fruits grow splendidly in the Sierra foothills of the Sacramento Valley, and indeed ripen earlier there than hi the southern district. Almonds, as well as peaches, pears, plums, cherries and apricots, come mainly from the north. Over half of the prune crop comes from Santa Clara county, and the bulk of the raisin output from Fresno county. Olives thrive as far north' as the head of the Great Valley, growing in all the valleys and foothills up to 1500 or 2000 ft. They were introduced by the Franciscans (as were various other subtropical fruits, pears and grapes), but their scientific betterment and commercial import- ance date from about 1885. They grow very abundantly and of the finest quality; for many years poor methods of preparation prejudiced the market against the Californian product, but this has ceased to be the case. The modern orange industry practic- ally began with the introduction into Southern California in 1873 of two seedless orange trees from Brazil; from their stock have been developed by budding millions of trees bearing a seedless fruit known as the " Washington navel," which now holds first rank in American markets; other varieties, mainly seedlings, are of great but secondary importance. Shipments continue the year round. There has been more than one horticultural excitement in California, but especially in orange culture, which was for a time almost as epidemic a fever as gold seeking once was. By reason of the co-operative effort demanded for the large problems of irrigation, packing and marketing, the citrus industry has done much for the permanent development of the state, and its extraordinary growth made it, towards the close of the 19th century, the most striking and most potent single influence in the growth of agriculture. State legislation has advanced the fruit interest in all possible ways. Between 1872 and 1903 exports of canned fruits

increased from 91 to 94,205 short tons; between 1880 and 1903 the increase of dried fruit ex- ports was from 295 to 149,531 tons; of fresh deciduous fruits, from 2590 to 101,199; of raisins, from 400 to > 39,963; of citrus fruits, from 458 to 299,623; of wines and brandies between 1 891 and 1903, from 47,651 to 97,332 tons. Of the shipments in 1903 some 44 % were from Southern California, — i x. from the seven southernmost counties.

Grape culture has a great future in California. Vines were

first introduced by the Franciscans in 1771 from Spain, and until after i860″ Mission ” grapes were practically the only stock in California. Afterwards many hundredˆ of European varieties were introduced with great success. ” The state has such a variety of soil, slope, elevation, temperature and climatic conditions as to reproduce, somewhere within its borders, any wine now manufactured” (United States Census, 1900); but experience has not as yet divided the state into districts of specialized produce, nor determined just how far indigenous American vines may profitably be used, either as base or graftings, with European varieties. Grapes are grown very largely over the state. Raisins do well as far north as Yolo county, but do best in Madera, Fresno, Kings, Tulare and San Diego counties. The product ■ is more than sufficient for the markets of the United States. Dry wine grapes do best in the counties around San Francisco Bay, on unirrigated lands; while sweet wine stocks do best in Yolo, San Joaquin and the counties of the raisin grape, and on irrigated lands. In 1000 California produced about three-fifths in value ($3,937,871) and in 1905 the same proportion ($6,688,620) of the wine output of the United States. The value of: product more than sextupled from 1880 to 1900. In quantity the product was more than four times the combined product of all other states. The better California wines are largely sold under French labels. Brandies are an important product. They are made chiefly from grapes, and are used to fortify wines. It was officially estimated that in the spring of 1904 there were some 227,000 acres of vineyards in the state, of which exactly five-tenths were in wine grapes and four-tenths in raisin grapes.

Gold. — Between the pastoral period and the era of wheat was the golden epoch of Californian history. The existence of gold had long been suspected, and possibly known, in California before 1848, and there had been desultory washings in parts where there was very little

to reward prospectors. The first perfectly authenticated discovery was made near Los Angeles in 1842. The discovery of real historical importance was made in January 1848 (the 24th is the correct date) at John A. Sutter's mill, on the south fork of the American river near Coloma, by a workman, James W. Marshall (1810-1885). His monument now marks the spot. From 1848 to the 1st of January 1903, according to the state mining bureau, California produced $1,379,275,408 in goldi There were two periods of intense excitement. The first ended in 1854, at which time there was a decided reaction throughout the United States in regard to mining matters. The Californian discoveries had given rise to a general search for metalliferous deposits in the Atlantic states, and this had* been followed by wild speculations. At the time of their greatest productiveness, from 1850 to 1853, the highest yield of the washings was probably not less than $65,000,000 a year; accord- ing to the state mining bureau the average production from 1851-1854 was $73,570,087 ($81,294,270 in 1852, the banner year), and from 1850-1861 $55,882,861, never falling below $50,000,000. The estimates of other competent authorities differ considerably, and generally are somewhat less generous than these figures.

At first the diggings were chiefly along the rivers. These were " flumed," — that is, the water was diverted by wooden flumes from the natural channel and the sand and gravel in the bed were washed. All the "gulches" or ravines lead- ing down into the canyons were also worked over, with or without water. These were the richest " placers," but in them the gold was very unequally distributed. Those who first got possession of the rich bars on the American, Yuba, Feather, Stanislaus and the other smaller streams in the heart of the gold region, made sometimes from $1000 to $5000 a day; but after one rith spot was worked out it might be days or weeks before another was found. In 1848 $500ˆ700 a day was not unusual luck; but, on the other hand, the income of the great majority of miners was certainly far less than that of men who seriously devoted themselves to trade or even to common labour.. Many extraordinary nuggets were found, varying from $1000 to $20,000 in value. The economic stimulus given by

such times may be imagined. For several years gold-dust was a regular circulating medium in the cities as well as in the mining districts of the state. An ounce of dust in 1848 frequently went for $4 instead of $17; for a number of years traders in dust were sure of a margin of several dollars, as for example in private coinage, mints for which were common by 1851. From the record of actual exports and a comparison of the most authori- tative estimates of total production, it

may be said that from 1848 to 1856 the yield was almost certainly not less than $450,000,000, and that about 1870 the billion dollar mark had been passed. Just at this time came the highest point and the sudden fall of the second great mining fever of the state. This was a stock speculation based on the remarkable output ($300,000,000 in 20 years) of the silver “bonanzas” of the Comstock lode at Virginia City, Nevada, which were opened and financed by San Francisco capitalists. The craze pervaded all classes. Shares that at first represented so many dollars per foot in a tangible mine were multiplied and remultiplied until they came to represent paper thicknesses or almost nothing, yet still their prices mounted upward. In April 1872 cam* the revulsion; there was a shrinkage of $60,000,000 in ten days; then in 1873 a tremendous advance, and in 1875 a final and disastrous collapse; in ten years thereafter the stock of the Comstock lode shrank from $3,000,000 to $2,000,000. This Comstock fever belongs to Californian rather than to Nevadan history, and is one of the most extraordinary in mining annals.

First the “rocker,” then the “torn,” the “flume,” and the hydraulic stream were the tools of the miner. Into the ” rocker ” and the ” torn ” the miner shovelled dirt, rocking it as he poured in water, catching the gold on riffles set across the bottom of his box; thus imitating in a wooden box the work of nature in the rivers. The ” flume ” enabled him to dry the bed of a stream while he worked over its gravels. The hydraulic stream came into use as early as 1852 (or 1853) when prospecting of the higher ground made it certain that the ” deep ” or ” high ” gravels — i.e. the detrital deposits of tertiary age — contained gold, though in too small quantities to be profitably worked in the ordinary way. The hydraulic process received an immense development through successive improvements of method and machinery. In this method tremendous blasts of powder, sometimes twenty-five or even fifty tons, were used to loosen the gravel, which was then acted on by the jet of water thrown from the ” pipes.” To give an idea of the force of the agent thus employed it may be stated that when an eight-inch nozzle is used under a heavy head, more than 3000 ft. may be discharged in a minute with a velocity of 150 ft. per second. The water as it thus issues from the nozzle feels to the touch like metal, and the strongest man cannot sensibly affect it with a crowbar. A gravel bank acted on by such tremendous force crumbled rapidly, and the disintegrated material could be run readily through sluices to the ” dumps.” Hydraulic mining is no longer practised on the scale of early days. The results were wonderful but disastrous, for the ” dumps ” were usually river-beds. From 1870-1879 the bed of Bear river was raised in places in its lower course 97 ft. by the detritus

wash of the hydraulic mines, and that of Sleepy Hollow Creek 136 ft. The total filling up to that time on the streams in this vicinity had been from 100 to 250 ft., and many thousand acres of fine farming land were buried under gravel, — some 16,000 on the lower Yuba alone. For many years the mining interests were supreme, and agriculture, even after it had become of great importance, was invariably worsted when the two clashed; but in 1884 the long and bitter ” anti-d6bris ” or ” anti-slickins ” fight ended in favour of the farmers. In 1893 the United States government created a California Debris Commission, which has acted in unison with the state authorities. Permits for hydraulic mining are granted by the commission only when all gravel is satisfactorily impounded and no harm is done to the streams; and the improvement of these, which was impossible so long as limits were not set to hydraulic mining, can now be effectively advanced. Quartz mining began as early asi8si. Ini 908 about five-eighths

of the gold output was from such mines. Quartz veins are very often as £ood at a depth of 3000 ft. as at the surface. A remarkable feature of recent years (especially since 1900) is gold “dredging.” Thousands of acres even of orchard, vine- yard and farming land have been thus treated in recent years. Gold was being produced in 1906 in more than thirty counties. The annual output since 1875 has been about $15,000,000 to $17,000,000; in 1905, according to the Mines Report, it was $18,898,545. Colorado now excels California as a gold producer.

Mineral Products. — California produces more than forty mineral substances that are of commercial significance. Gold, petroleum, copper, borax and its products, clays, quicksilver and silver lead, in order of importance, representing some four- fifths of the total. From 1894 to 1902 the aggregate production increased from 20-2 to 35-1 million dollars; in 1908 it was $65,137,636. Metallic products long represented three-fourths of the total, but the feature of recent years has been the rising im* portance of hydrocarbons and gases, and of structural materials, and indeed of non-metallic products generally. The production of crude petroleum has grown very rapidly since about 1895. Oil is found from north to south over some 600 m., but especially in Southern California. The high cost of coal, which has always been a hindrance to the development of manufactures, makes the petroleum deposits of peculiar value. Their total output increased

from 4,250,000 to 44,854,737 barrels between i960 and 1908, and the value of the product in 1908 was $23,433,502. The Kern river field is the most important in the state and one of the greatest in the world. Those of Coalinga, Santa Maria and Lompoc, and Los Angeles are next in importance. Both in 1900 and in 1905 California ranked fifth among the states of the United States in the petroleum refining industry. Copper has risen in importance in very recent years; it is mined mainly in Shasta county; the value of the state's total product in 1908 was $5,232,986 Gold mining still centres in the mountainous counties north of Tuolumne. This is the region of quartz mining. In borax (of which California's output in 1904 was 45,647 tons) and structural materials San Bernardino has a long lead.' More than nine-tenths of the borax product of the country comes from about Death Valley. San Bernardino marbles have a very high repute. California was the fourth state of the Union in 1908 in the production of granite. It furnishes about two-fifths of the quicksilver of the world. This has been mined since 1824; the output was greatest from 1875-1883, when it averaged about 43,000,000 pounds. The New Almaden mine (opened in 1824) in Santa Clara couhty produced from 1850 to 1896 some 73,000,000 pounds. The centre of production is north and south of San Francisco Bay. Calif ornian coal is almost wholly inferior brown lignite, together with a small quantity of bituminous coals of poor quality; the state does not produce a tenth part of the coal it consumes. Of growing importance are the gems found in California: a few diamonds in Butte county; rock crystal in Calaveras county; and tourmalines, kunzite, the rare pink beryl and bright blue topazes in San Diego county. Chrysoprase, mined near Porterville and near Visalia (Tulare county), is used partly for gems, but more largely (like the vesuvianite found near Exeter, in the same county) for mosaic work; and there are ledges of fine rose quartz in the Coahuila mountains of Riverside county and near Lemon Cove, Tulare county.

A vivid realization of the industrial revolution in the state is to be gained from the reflection that in 1875 California was pre-eminent only for gold and sheep; that the aggregate mineral output thirty years later was more than a third greater than then, and that nevertheless the value of farm produce at the opening of the 20th century exceeded by more than $100,000,000 the value of mineral produce, and exceeded by $50,000,000 the most generous estimate of the largest annual gold output in the annals of the state.

Manufactures. — Previous to i860 almost every manufactured article used in the state was imported from the east or from Europe. Dairy products, for example, for whose production

good facilities always existed, were long greatly neglected, and not for two decades at least after 1848 was the state independent in this respect. The high cost of coal, the speculative attractions of mining, and the high wages of labour, handicapped the development of manufactures in early years. The first continued to be a drag on such industries, until after 1895 the increasing use of crude petroleum obviated the difficulty. Several remark- able electric power and lighting plants utilize the water power of the mountains. 1 Geographic isolation has somewhat fostered state industries. The value of gross manufactured products increased4i-9%from 1890 to 1900. In the latter year California ranked 12th among the states in the gross value of all manufac- tures ($302,874,761); the per-capita value of manufactured and agricultural products being $293,— -$89 of the latter, $204 of the former. Of the wage-earners 6 1 % were engagedin manufacturing. Fourteen industries represented from 41% to 45% of the employees,, wages, capital and product of the aggregate manu- facturers of the state. The leading ones in order of importance and the rvalue of product in millions of dollars were: the manu- facture of railway, foundry, and machine shop products (19-6 million dollars), lumber and timber industries (18-57), sugar and molasses refining (15-01), beef slaughtering (15-72), canning and preserving (13 >o8) , flour and grist milling (13- 10) , the manufacture of malt, vinousi and distilled liquors (9-26), leather industries (7-40), printing and publishing (6-86). In the second, third and fifth of these industries the state ranked respectively fifth, fourth and first in the Union. 2 The canning and preserving of fruits and vegetables is in the main an industry of the northern and central counties. In 1890 the state board of forestry estimated that the redwood forests were in danger of exhaustion by 1930. The redwood is a general utility lumber second only to the common white pine, and the drain on the woods has been continuous since 1850. The wood has a fine, straight and even grain; and though light and soft, is firm and extremely durable, lying, it is authoritatively asserted, for centuries in the forest without appreciable decay. It takes a beautiful polish. The colour varies from cedar colour to mahogany. A small southern belt in San Mateo, Santa Clara and Santa Cruz counties is not being commercially exploited. The annual lumber cut from 1 898-1 903 averaged more than 663,348,000 ft.; of the 852,638,000 ft. cut in 1903, 465,460,000 were of redwood, and 264,890,000 of yellow pine; fir and sugar pines contributing another 104,600,000, and spruce and cedar 17,670,000 ft. In 1 900 California ranked 16th among the states in value of product ($13,764,647, out of a total of $566,852,984). The total cut was under £ of 1% of the estimated stand. In Humboldt county, in the redwood belt near Eureka, are probably the most modern and remarkable lumber mills of

the world. In 1900 it was estimated that lumbermen controlled somewhat less than a fifth of the timber of the state, and the same part of the redwood. After 1800 important shipyards were established near San Francisco. The most important naval station of the United

1 Small masses of water made to fall great distances and the use of turbines are important features of such plants. One on the North Yuba river at Colgate, where there is a 700 ft. fall, serves Oakland, San Jose and San Francisco, at high pressure yielding in San Francisco (220 m. away) 75 % of its power. Other plants are one at Electra (154 m. from San Francisco), and one on the San Joaquin, which delivers to Fresno 62 m. distant.

2 The 1905 census of manufactures deals only with establishments under the factory system; its figures for 1905 and the figures for 1900 reduced to the same limits are as follows : — total value of pro- ducts, 1905 $367,218,494; 1900, 5257,385,521, an increase of 42-7 %; leading industries, with value of product in millions of dollars — canning and preserving, first in 1905 with 23-8 millions, third in 1900 with 13-4 millions; slaughtering and meat-packing, second in 1905 with 21-79 millions, first in 1900 with 15-71 millions- flour and grist mill products, third in 1905 with 20-2 millions, fourth in 1900 with 13-04 millions; lumber and timber, fourth in 1905 with 18-27 millions, second in 1900 with 13-71 millions; printing and publishing, fifth in 1905 with 17-4 millions, sixth in 1900 with 9-6 millions; foundry and machine shop products, sixth in 1905 with 15-7 millions, fifth in 1900 with 12-04 millions; planing mill products, seventh in 1905 with 13-9 millions, twelfth in 1900 with 4-8 millions; bread and other bakery products, eighth in IQOS with IO-6 millions, eleventh in 1900 with 4-87 millions.

States on the Pacific coast is at Mare Island at the northern end of San Francisco Bay, and the private Union Iron Works, on the peninsula near San Francisco, is one of the largest shipyards of the country. In 1905 more than one-half of the factory product was the output of four cities: San Francisco ($137,788,233), Los Angeles ($34,814,475), Sacramento ($10,310,416) and Fresno ($9,849,001); next ranked Oakland, Stockton, and San Jose.

The transportation facilities in California increased rapidly after 1870. The building of the Central Pacific and Union Pacific lines are among

the romances of American railway history. They joined tracks near Ogden, Utah, in May 1869. The New Orleans line of the Southern Pacific was opened in January 1883; the Atchison, Topeka & Santa F6 completed its line to San Diego in 1885, and to San Francisco Bay in 1900. •The San Pedro, Los Angeles & Salt Lake, with trans-continental connexions at the eastern terminus, was chartered in 1901 and fully opened in March 1903. Railway mileage increased 137-3 % from 1870 to 1880, and 154-6% from 1880 to 1900. At the close of 1908 the total mileage was 7039-36 m., practically all of which is either owned or controlled by the two great trans- continental systems of the Southern Pacific and the Atchison, Topeka & Santa Fe. From 1869 to 1875 registered mail ex- changes were opened with China, Japan, Hawaii and Australia. There are now frequent mail connexions from San Francisco with Hawaii, Australasia, and eastern Asia, as well as with American ports north and south. The commerce of San Francisco amounts to some $80,000,000 or $90,000,000 yearly, about equally divided between imports and exports, until after 1905 — in 1907 the imports were valued at $54,207,011, and the exports at $30,378,355 (less than any year since 1896). San Diego has a very good harbour, and the harbours of San Pedro (Los Angeles) and Eureka are fairly good and of growing importance. Grains, lumber, fish, fruits and fruit products, petroleum, vegetables and sugar are the leading items in the commerce of San Francisco. Other ports are of very secondary importance. Navigation on the Sacramento and San Joaquin rivers was very important in early days, but is to-day of relatively slight importance in comparison with railway traffic.

Population. — The population of California increased in successive decades from 1850 to 1910 respectively by 310-3, 47-3, 54-3, 40-3, 22-4 and 60-1%. (The percentage of increase in 1900-1910 was exceeded in Washington, Oklahoma, Idaho, Ne- vada, North Dakota and Oregon.) In 1 910 the total population was 2 ,3 7 7 , 549 , or 1 5 • 2 per sq.m. In 1 900 there were 116 incorporated towns and cities; and of the total population 43-3% was urban, — i.e. resident in cities (n in number) of 8000 or more inhabitants. These n cities were: San Francisco (pop. 342,782), Los Angeles (102,479), Oakland (66,960), Alameda (16,464), Berkeley (13,214), — the last three being suburbs of San Francisco, and the last the seat of the state university, — Sacramento, the state capital (29,282), San Jose (21,500), San Diego (17,700), Stockton (17,506), Fresno (12,470), and Pasadena (9117). Eight other cities had populations of more than 5000 — Riverside City (7973), Vallejo (7965), Eureka (7327), Santa Rosa (6673), Santa Barbara (6587), San Bernardino (6156), Santa Cruz (5659), and Pomona (5526).

Of the entire population in 1900 persons of foreign birth or parentage (one or both parents being foreign) constituted 54-2 and those of native birth were 75-3%. Of the latter six-tenths were born in California. The foreign element included 45,753 i Chinese (a falling off of 25,313 since 1890), and 10,151 Japanese (an increase of 9004 in the same decade). Twenty-two foreign Countries contributed over 1000 residents each, the leading ones being the United Kingdom (91,638), Germany (72,449), Canada (29,618; 27,408 being English Canadians), Italy (22,777), Sweden (14,549), France (12,256), Portugal (12,068), Switzerland (10,974), Japan, Denmark, and Mexico, in the order named. Persons of negro descent numbered 1 1 ,045. Almost all the Indians of the state are taxed as citizens. In 1906 of 611,464 members of religious denominations 354,408 were Roman Catholics, 64,528 Methodist Episcopalians, 37,682 Presbyterians, 26,390 Congregationalists, 24,801 Baptists, 21,317 Protestant Episcopa-

lians, 11,371 Lutherans, and 9,110 members of Eastern Orthodox churches. A peculiar feature in the population statistics of California is the predominance of males, which in 1900 was 156,009; the Asiatic element accounts for a third of this number. Since 1885 the eight counties south of the Tehachapi Range, which are known collectively and specifically as Southern Califor- nia have greatly advanced in population. In 1 880 their population was 7-3, in 1890 17- 2, and in 1900 20-1% of the total population of the state. The initial impulse to this increase was the beginning of the ” fruit epoch ” in these counties, combined with a railway ” rate-war ” following the completion to the coast in 1885 of the Santa Fe, and an extraordinary land boom prevailing from 1886 to 1888. The conjuncture of circumstances, and the immigration it induced, were unusual. The growth of the South, as of the rest of the state, has been continuous and steady.

The Indians were prominent in early Californian history, but their progress toward their present insignificance began far back in the Spanish period. It proceeded much more rapidly after the restraining influence of the missions was removed, leaving them free to revert to savagery; and the downward progress of the race was fearfully accelerated during the mining period, when they were abused, depraved, and in large numbers killed. There have been no Indian wars in California’s annals, but many butcheries. The natives have declined exceedingly in number since 1830, in 1900 numbering 15,377. They have always been mild-tempered, low, and unintelligent, and are to-day a poor and miserable race. They are all called ” Digger Indians ” indiscriminately, although divided by a multiplicity of tongues.

Government and Institutions. — In the matter of constitution- making California has been conservative, having had only two between 1849 an< i 1910- The first was framed by a convention at Monterey in 1849, and ratified by the people and proclaimed by the United States military governor in the same year. The present constitution, framed by a convention in 1878-1879, came into full effect in 1880, and was subsequently amended. It was the work of the labour party, passed at a time of high discontent, and goes at great length into the details of government, as was demanded by the state of public opinion. The qualifications required for the suffrage are in no way different from those common throughout the Union, except that by a constitutional amendment of 1894 it is necessary for a voter to be able to read the state constitution and write his name. As compared with the earlier constitution it showed many radical advances toward popular control, the power of the legislature being everywhere curtailed. The power of legislation was taken from it by specific inhibition in thirty-one subjects before within its power; its control of the public domain, its powers in taxation, and its use of the state credit were carefully safe-guarded. " Lobbying " was made a felony; provisions were inserted against lotteries and stock-exchange gambling, to tax and control common carriers and great corporations, and to regulate telegraph, telephone, storage and wharfage charges. The powers of the executive department were also somewhat curtailed. For the judiciary, provisions were made for expediting trials and deci- sions. Notable was the innovation that agreement by three- fourths of a jury should be sufficient in civil cases and that a jury might be waived in minor criminal cases, a provision which of course was based on experience under the Mexican law. All these changes in the organic law reflect bitter experience after 1850; and, read with the history of those years as a commentary, few American constitutions are more instructive. The con- stitution of 1879 corresponds very closely to the ordinary state constitution of to-day. The incorporation of banks issuing circulating notes is forbidden. Marriage is not only declared a civil contract, but the laws expressly recognize that the mere consent of the parties is adequate to constitute a binding marriage. The union of whites with persons of African descent is forbidden. Felons twice convicted may not be pardoned except on the recommendation of a majority of the judges of the supreme court. Judges and state executive officers are elected for terms longer than is usual in the different states (supreme judges 12 years, executive officers 4 years). These few provisions

arc mentioned, not as of particular importance in themselves, but as exceptions of some moment to the usual type of state Constitutions (see United States). The Australian ballot was introduced in 1891. In local government there are no deviations from the usual types that demand notice. In the matter of liquor-laws there is local option, and a considerable proportion of the towns and smaller cities, particularly in the south, adopt prohibition. In most of the rest high licence is more or less strictly enforced.

The total assessed valuation of property grew from $666,390,985 in 1880 to $1, 217, 648,683 in 1900 and $1,879,728,763 in 1907. In 1904, when the U.S. Census Report showed California to be the twenty- first state of the Union in population . but the sixth in wealth, the total estimated true value of all property was $4,115,491,106, of which $2,664,472,025 was the value of real property and improvements thereon. The per capita wealth of the state was then reported as $2582.32, being exceeded only by the three sparsely settled states of Montana, Wyoming and Nevada. In 1898 California had the largest savings-bank deposit per depositor ($637.75) of anv state in the Union; the per caput deposit was $110 in 1902, and about one person in seven was a depositor. The state bonded debt in 1907 amounted to three and a half million dollars, of which all but $767,529.03 was represented by bonds purchased by the state and held for the school and university funds; for the common school fund on the 1st of July 1907 there were held bonds for $4,890,950, and $800,000 in cash available for investment; for the university fund there were held $751,000 in state bonds, and a large amount in other securities. The total bonded county indebtedness was $4,879,600 in 1906 (not including that of San Francisco, a consolidated city and county, which was $4,568,600). A homestead, entered upon record and limited to a value of $5000 if held by the head of a family and to a value of $1000 if held by one not the head of a family, is exempt from liability for debts,except for a mortgage, a lien before it was claimed as a home- stead or a lien afterward for improvements. A homestead held by a married man cannot be mortgaged without consent of his wife.

Under an act approved on the 25th of March 1903 a state board of charities and corrections, — consisting of six members, not more than three being of the same political party, appointed by the governor, with the advice and consent of the senate, and holding office for twelve years, two retiring at the end of each quadrennium, — investigates, examines, and makes ” reports upon the charitable, correctional and penal institutions of the state,” excepting the Veterans’ Home at Yountville, Napa county, and the Woman’s Relief

Corps Home at Evergreen, Santa Clara county. There are state prisons with convicts working under the public account system, at San Quentin, Marin county, and Folsom, Sacramento county. The Preston (Sonoma county) School of Industry, for older boys, and the Whittier (Los Angeles county) State School, for girls and for boys under sixteen, are the state reformatories, each having good industrial and manual training departments. There are state hospitals for the insane at Agnew, Santa Clara county; at Stockton, San Joaquin county; at Napa, Napa county; at Patton, San Bernardino county; and, with a colony of tuber- cular patients, at Ukiah, Mendocino county. In 1906 the ratio of insane confined to institutions, to the total population, was 1 to every 270. Also under state control are the home for care and training of feeble-minded children, at Eldridge, Sonoma county; the institution for the deaf and the blind at Berkeley, and the home of mechanical trades for the adult blind at Oakland. A Juvenile Court Law was enacted in 1903 and modified in 1905.

The educational system of Califofnia is one of the best in the country. The state board of education is composed of the governor of the 6tate, who is its president; the superintendent of public instruction, who is its secretary; the presidents of the five normal schools and of the University of California, and the professor of pedagogy in the university. Sessions are long in primary schools, and attendance was made compulsory in 1874 (and must not be less than two-thirds of all school days). The state controlled the actual preparation ‘and sale of text-books

for the common schools from 1885 to 1903, when the Perry amendment to the constitution ‘(ratified by popular vote in 1884) was declared to mean that such text-books must be manufactured within the state, but that the texts need not be prepared in California. The experiment of state-prepared text-books was expensive, and its effect was bad on the public school system, as such text-books were almost without exception poorly written and poorly printed. After 1903 copyrights were leased hy the state. Secondary schools are closely affiliated with, and closely inspected by, the state university. All schools are generously supported, salaries are unusually good, and pension funds in all cities are authorized by state laws. The value of school property in 1900 was $19,135,722, and the expenditure for the public schools $6,195,000; in 1906 the value of school property was $29,013,150, and the expenditure for public- schools $10,815,857. The average school attendance for all minors of school age (5-20 years) was 59-9%; of those native-born 61-5, of those foreign-bom 34-6; of coloured children, including Asiatics and Indians, 35-8, and of white, 6o-8%. In 1900,6-2% of the males of voting age, and 2-4% of

the native-bom males of voting age, were illiterate (could not write). Some 3% of the total population could not speak English; Chinese and Japanese constituting almost half of the number, foreign-born whites somewhat less, and Indians and native-born whites of foreign parentage together less than a tenth of the total. Of the higher educational institutions of the state the most important are the state university at Berkeley and Leland Stanford Jr. University at Palo Alto. The former is supported with very great liberality by the state; and the latter, the endowment of which is private (the state, however, exempting it from taxation), is one of the richest educational institutions of America. In 1906 there were also five state normal schools (at Chico, Los Angeles, San Diego, San Francisco, and San Jose), and a considerable number of denominational colleges. There is also a state polytechnic school at San Luis Obispo (1903).

History. — The name ” California ” was taken from Ordonez de Montalvo’s romance of chivalry Las Sergas de Esplandian (Madrid, 1 5 10) , in which is told of black Amazons ruling an island of this name ” to the right of the Indies, very near the quarter of the terrestrial paradise.” The name was given to the unknown north-west before 1 540. It does not show that the namers were prophets or wise judges, for the Spaniards really knew California not at all for more than two centuries, and then only as a genial but rather barren land; but it shows that the conquistador es mixed poetry with business and illustrates the glamour thrown about the ” Northern Mystery.” Necessarily the name had for a long time no definite geographical meaning. The lower Colorado river was discovered in 1540, but the explorers did not penetrate California; in 1 542-1 543 Juan Rodriguez Cabrillo explored at least the southern coast; in 1579 Sir Francis Drake repaired his ships in some Californian port (almost certainly not San Francisco Bay), and named the land New Albion; two Philippine ships visited the coast in 1584 and 1595, and in 1602 and 1603 Sebastian Vizcaino discovered the sites of San Diego and Monterey. There was apparently no increase of knowledge thereafter for 150 years, Most of this time California was generally supposed to be an island or a group of islands. Jesuit missionaries entered Lower California as early as 1697, maintain- ing themselves there until Charles III.‘s expulsion in 1767 of all Jesuits from his dominions; but not until Russian explorations in Alaska from 1 745-1 765 did the Spanish government show interest in Upper California. Because of these explorations, and also the long-felt need of a refitting point on the California coast for the galleons from Manila, San Diego was occupied in 1769 and Monterey in 1770 as a result of urgent orders from Charles III. San Francisco Bay was discovered in the former year. Mean- while the

Jesuit property in the Peninsula had been turned over to Franciscan monks, but in 1772 the Dominicans took over the missions, and the Franciscans not unwillingly withdrew to Upper California, where they were to thrive remarkably for some fifty years.

This is the mission period — or from an economic standpoint.

the pastoral period — of Californian history. In all, twenty-one missions were established between 1 769 and 1823. The otthe 1 * leader in this movement was a really remarkable man, missions. Miguel Jose Serra (known as Junipero Serra, 1713- 1784), a friar of very great ability, purest piety, and tireless zeal. He possessed great influence in Mexico and Madrid. ” The theory of the mission system,” says H. H. Bancroft, ” was to make the savages work out their own salvation and that of the priests also.” The last phrase scarcely does justice to the truly humane and devout intentions of the missionaries; but- in truth the mission system was a complete failure save in the accumulation of material wealth. Economically the missions were the blood and life of the province. At them the neophytes worked up wool, tanned hides, prepared tallow, cultivated hemp and wheat, raised a few oranges, made soap, some iron and leather articles, mission furniture, and a very little wine and olive oil. Such as it was, this was about the only manufacturing or handicraft in California. Besides, the hides and tallow yielded by the great herds of cattle at the missions were the support of foreign trade and did much toward paying the expenses of the government. The Franciscans had no sympathy for profane knowledge, even among the Mexicans, — sometimes publicly burning quantities of books of a scientific or miscellaneous nature; and the reading of Fenelon’s Tilimaque brought ex- communication on a layman. As for the intellectual develop- ment of the neophytes the mission system accomplished nothing; save the care of their souls they received no instruction, they were virtually slaves, and were trained into a fatal dependence, so that once coercion was removed they relapsed at once into barbarism. It cannot be said, however, that Anglo-Americans have done much better for them.

The political upheavals in Spain and Mexico following 1808 made little stir in this far-off province. Joseph was never recognized, and allegiance was sworn to Ferdinand (1809). When revolution broke out in Mexico (1811), California remained loyal, suffering much by the cessation of supplies from Mexico, the resulting deficits falling as an

added burden upon the missions. The occupation of Monterey for a few hours by a Buenos Aires privateer (1818) was the only incident of actual war that Cali- fornia saw in all these years; and it, in truth, was a ridiculous episode, fit introduction to the bloodless play-wars, soon to be inaugurated in Californian politics. In 1820 the Spanish coif- stitution was duly sworn to in California, and in 1822 allegiance was given to Mexico. Under the Mexican Federal constitution of 1824 Upper California, first alone (it was made a distinct province in 1804) and then with Lower California, received representation in the Mexican congress.

The following years before American occupation may be divided into two periods of quite distinct interest. From about 1840 to 1848 foreign relations are the centre of interest. From 1824 to 1840 there is a complicated and not uninteresting movement of local politics and a preparation for the future, — the missions fall, republicanism grows, the sentiment of local patriotism becomes a political force, there is a succession of sectional controversies and personal struggles among provincial chiefs, an increase of foreign commerce, of foreign immigration and of foreign influence.

The Franciscans were mostly Spaniards in blood and in sympathies. They viewed with displeasure and foreboding the fall of Iturbide's empire and the creation of the republic. They were not treasonable, but talked much, refusing allegiance to the new government; and as they controlled the resources of th? colony and the good will of the Indians, they felt their strength against the local authority; besides, they were its constant benefactors. But secularization was in harmony with the growth of republican ideas. There was talk in California of the rights of man and neophytes, and of the sins of friars. The missions were never intended to be permanent. The mission- aries were only the field workers sent out to convert and civilize the Indians, who were to be turned over then to the regular clergy, the monks pushing further onward into new fields. This was the well-established policy of Spain. In 1813 the Spanish Cortes ordered the secularization of all missions in America that

were ten years old, but this decree was not published in California until 182 1. After that secularization was the burning question in Californian politics. In 1826 a beginning toward it was made in partially emancipating the neophytes, but active and thorough secularization of the missions did not begin until 1834; by 1835 it was consummated at sixteen missions out of twenty-one, and by 1840 at all. At some of the missions the monks acted later as temporary curates for the civil authorities, until in 1845-1846 all the missions

were sold by the government. Unfortunately the manner of carrying it out discredited a policy neither unjust nor bad in itself, increasing its importance in the political struggles of the time. The friars were in no way mistreated: Californians did not share Mexican resentments against Spaniards, and the national laws directed against these were in the main quietly ignored in the province. In 1831 the mission question led to a rising against the reactionary clerical rule of Governor Manuel Victoria. He was driven out of the province.

This was the first of the opera bouffe wars. The causes underlying them were serious enough. In the first place, there was a growing dissatisfaction with Mexican rule, which accom- plished nothing tangible for good in California, — although its plans were as excellent as could be asked had there only been peace and means to realize them; however, it made the mistake of sending convicts as soldiers. Californians were enthusiastic republicans, but found the benefits of republicanism slow in coming. The resentment of the Franciscans, the presence of these and other reactionaries and of Spaniards, the attitude of foreign residents, and the ambitions of leading Californian families united to foment and propagate discontent. The feeling against Mexicans — those ” de la otra banda ” as they were significantly termed— invaded political and even social life. In the second place, there was growing jealousy between northern towns and southern towns, northern families and southern families. These entered into disputes over the location of the capital and the custom-house, in the Franciscan question also (because the friars came some from a northern and some from a southern college) , and in the question of the distribution of commands in the army and offices in the civil government. Then there was the mission question; this became acuter about 1833 when the friars began to destroy, or sell and realize on, the mission property. The next decade was one of plunder and ruin in mission history. Finally there was a real growth of republic- anism, and some rulers — notably Victoria — were wholly out of sympathy with anything but personal, military rule. From all these causes sprang much unrest and considerable agitation. 1

In 1 8 28- 1 8 29 there was a revolution of unpaid soldiers aided by natives, against alleged but not serious abuses, that really aimed at the establishment of an independent native government. In 1 83 1 Governor Victoria was deposed; in 1836 Governor Mariano Chico was frightened out of the province; in 1836 Governor Nicolas Gutierrez and in 1 844-1 845 Governor Manuel Micheltorena were driven out of office. The leading natives headed this last rising. There was talk of independence, but sectional and personal jealousies could not be over-come. In all these wars there was not enough blood shed to discolour

a sword. The rising of 1836 against Gutierrez seems to-day most interesting, for it was in part a protest against the growth of federalism in Mexico. California was even deferred to as (declared to be seems much too strong a statement) an Estado Libre y Soberano; and from 1836 to 1838, when the revolutionary governor, Juan B. Alvarado, was recognized by the Mexican government, which had again inclined to federalism and, besides, did not take the matter very seriously, the local government rested simply on local sentiment. The satisfaction of this ended all difficulties.

By this time foreign influence was showing itself of importance. Foreign commerce, which of course was contraband, being contrary to all Spanish laws, was active by the begin- ^^

ning of the 19th century. It was greatly stimulated ˆ m ign- during the Spanish-American revolutions (the Lima tlon. and Panama trade dating from about 1813), for, as the Californian authorities practically ignored the law. smuggling

was unnecessary; this was, indeed, much greater after 1822 under the high duties (in 1836-1840 generally about 100%) of the Mexican tariffs. In the early ‘forties some three-fourths of the imports, even at Monterey itself, are said to have paid no duties, being landed by agreement with the officials. Wholesale and retail trade flourished all along the coast in defiance of pro- hibitory laws. American trade was by far most important. The Boston traders — whose direct trade began in 1822, but the in- direct ventures long before that — were men of decided influence in California. The trade supplied almost all the clothing, merchandise and manufactures used in. the province; hides and furs were given in exchange. If foreign trade was not to be received, still less were foreign travellers, under the Spanish laws. However, the Russians came in 1805, and in 181 2 founded on Bodega Bay a post they held till 1841, whence they traded and hunted (even in San Francisco Bay) for furs. From the day of the earliest foreign commerce sailors and traders of divers nationalities began to settle in the province. In 1826 American hunters first crossed to the coast; in 1830 the Hudson’s Bay Company began operations in northern California. By this time the foreign element was considerable in number, and it doubled • in the next six years, although the true overland immigration from the United States began only about 1840. Asa class foreigners were respected, and they were influential beyond

proportion to their numbers. They controlled commerce, and were more energetic, generally, than were the natives; many were naturalized, held generous grants of land, and had married into Cali- fornian families, not excluding the most select and influential. Most prominent of Americans in the interior was John A. Sutter (1803-1880), who held a grant of eleven square leagues around the present site of Sacramento, whereon he built a fort. His position as a Mexican official, and the location of his fortified post on the border, commanding the interior country and lying on the route of the overland immigrants, made him of great im- portance in the years preceding and immediately following American occupation; although he was a man of slight abilities and wasted his great opportunities. Other settlers in the coast towns were also of high standing and importance. In short, Americans were hospitably received and very well treated by the government and the people; despite some formalities and ostensible surveillance there was no oppression whatever. There was, however, some jealousy of the ease with which Americans secured land grants, and an entirely just dislike of ” bad ” Americans. The sources from which all the immigrants were recruited made inevitable an element of lawlessness and truculence. The Americans happened to predominate. Along with a full share of border individuality and restlessness they had the usual boisterous boastfulness and a racial contempt, which was arrogantly proclaimed, for Mexicans, — often too for Mexican legal formalities. The early comers were a conservative American force in politics, but many of the later comers wanted and Euro to make California a second, Texas. As early as 1805 pean la- (at j- ne ˆj me { j ames Monroe’s negotiations for Florida), there are traces of Spain’s fear of American ambitions even in this far-away province. It was a fear she felt for all her American possessions. Spain’s fears passed on to Mexico, the Russians being feared only less than Americans. An offer was made by President Jackson in 1835 to buy the northern part of California, including San Francisco Bay, but was refused. In 1836 and 1844 Americans were prominent in the incidents of revolution; divided in opinion in both years they were neutral in the actual ” hostilities ” of the latter, but some gave active support to the governor in 1836. From 1836 on, foreign inter- ference was much talked about. Americans supposed that Great Britain wished to exchange Mexican bonds for California; France also was thought to be watching for an opening for gratifying supposed ambitions; and all parties saw that even without overt act by the United States the progress of American settlement seemed likely to gain them the province, whose connexion with Mexico had long been a notoriously loose one. A considerable literature written by travellers of all the countries named had before

this discussed all interests. In 1840 for too

active interest in politics some Americans and Englishmen were temporarily expelled.

In 1842 Commodore T. A. C. Jones (1789-1858) of the United States navy, believing that war had broken out between his country and Mexico and that a British force was about to seize California,raised the American flag over Monterey (October 21st), but finding that he had acted on misinformation he lowered the flag next day with due ceremony and warm apology. In Cali- fornia this incident served only to open up agreeable personal relations and social courtesies, but it did not tend to clarify the diplomatic atmosphere. It showed the ease of seizing the country, the indifference of the natives, and the resolution of the United States government. Mexico sought to prevent American immigration, but the local authorities would not enforce such orders, however positive. Between 1843 and 1845, Great Britain, the United States, and France opened consulates. By 1845 there was certainly an agreement in opinion among all American residents (then not 700 in number) as regards the future of the country. The policy of France and Great Britain in these years is unknown. That of the United States is fully known. In 1845 the American consul at Monterey, Thomas O. Larkin (1802-1858), was instructed to work for the secession of California from Mexico, without overt aid from the United States, but with their good-will and sympathy. He very soon gained from leading officers assurances of such a movement before 1848. At the same time American naval officers were instructed to occupy the port* in case of war with Mexico, but first and last to work for the good-will of the natives. In 1845 Captain J. C. Fremont, — whose doings in California in the next two years were among the main assets in a life-long reputation and an unsuccessful presi- dential campaign, — while engaged in a government surveying expedition, aroused the apprehensions of the Californian authorities by suspicious and very possibly intentionally provocative movements, and there was a show of military force by both parties. Fremont had information beyond that of ordinary men that made him believe early hostilities between the United States and Mexico to be inevitable; he was also officially informed of Larkin's secret task and in no way authorized to hamper it. Resentment, however, incited him to personal revenge on the Californian government, and an ambition that clearly saw the gravity of the crisis prompted him to improve it unscrupulously for his own advancement, leaving his government to support or disavow him according as p/JL" *" war should come or not. In violation therefore of international amities, and practically in disobedience of orders, he broke the peace, caused a band of Mexican cavalry mounts to be

seized, and prompted some American settlers to occupy Sonoma (14th June 1846). This episode is known as the ” Bear Flag War,” inasmuch as there was short-lived talk of making California an independent state, and a flag with a bear as an emblem (California is still popularly known as the Bear Flag State)flew for a few days at Sonoma. It was a very small, very disingenuous, inevitably an anomalous, and in the vanity of proclamations and other concomitant incidents rather a ridiculous affair; and fortunately for the dignity of history — and for Fremont— it was quickly merged in a larger question, when Commodore John Drake Sloat (1780-1867) on the 7th of July raised the flag of the United States over Monterey, proclaiming California a part of the United States. The opening hostilities of the Mexican War had occurred on the Rio Grande. The excuses and explanations later given by Fremont — military preparations by the Californian authorities , the imminence of their attack, ripening British schemes for the seizure of the province, etc. — made up the stock account of historians until the whole truth came out in 1886 (in Royce’s California). Californians had been very friendly to Americans, but Larkin’s intimates thought they had been tricked, and the people resented the stealthy and unprovoked breaking of peace, and unfortunately the Americans did not known how to treat them except inconsiderately and somewhat contemptuously. The result was a feeble rising in the south. The country was fully pacified by January 1847. The aftermath of Fremont’s filibustering acts, followed as they were

by wholly needless hostilities and by some injustice then and later in the attitude of Americans toward the natives, was a growing misunderstanding and estrangement, regrettable in Californian history. Thus there was an end to the ” lotos-land society ” of California. Another society, less hospitable, less happy, less contented, but also less mild, better tempered for building states, and more ” progressive,” took the place of the old.

By the treaty of Guadalupe Hidalgo in 1848 Mexico ceded California to the United States. It was just at this time that California Sold was discovered, and the new territory took on ceded to great national importance. The discussion as to what the United snou id be done with it began in Congress in 1846, States. immediately involving the question of slavery. A furious conflict developed, so that nothing was accomplished in two successive sessions; even at the end of a third, in

March 1849, the only progress made toward creating a government for the territory was that the national revenue laws had been extended over it and San Francisco had been made a port of entry. Meanwhile conditions grew intolerable for the inhabit- ants. Before the end of the war Mexican laws not incompatible with United States laws were by international law supposed to be in force; but nobody knew what they were, and tie uncer- tainties of vague and variable alcalde jurisdictions were increased when Americans began to be alcaldes and grafted English common-law principles, like the jury, on Californian practice. Never was a population more in need of clear laws than the motley Californian people of 1848-1849, yet they had none when, with peace, military rule and Mexican law technically ended. There was a curious extra-legal fusion of laws, a half-breed legal system, and no definite basis for either law or government. Even the acts and theories of the officials were very inconsistent. Early in 1849 temporary local governments were set up in various towns, and in September a convention framed a free- state constitution and applied for admission to the Union. On the 7th of September 1850 a bill finally passed Congress admit- ting California as a free state. This was one of the bargains in the ” Compromise • Measures of 1850″ that were intended to dispose of the question of slavery in the Territories. Meanwhile the gold discoveries culminated and surpassed ” three centuries of wild talk about gold in California.” For three months there was little excitement, then a wild rush. Settlements were completely deserted; homes, farms and stores abandoned. Ships deserted by their sailors crowded the bay at San Francisco — there were 500 of them in July 1850; soldiers deserted whole- sale, churches were emptied, town councils ceased to sit, merchants, clerks, lawyers and judges and criminals, everybody, flocked to the foothills. Soon, from Hawaii, Oregon and Sonora, from the Eastern states, the South Seas, Australia, South America

and China came an extraordinary flow of the hopeful Mr mid and adventurous. In the winter of ‘48 the rush began

from the states to Panama, and in the spring across the plains. It is estimated that 80,000 men reached the coast in 1849, about half of them coming overland; three-fourths were Americans. Rapid settlement, excessive prices, reckless waste of money, and wild commercial ventures that glutted San Francisco with all objects usable and unusable made the following years astounding from an economic point of view; but not less bizarre was the social development, nor less extraordinary the ‘problems of state-building in a society ” morally and socially tried as no other American community ever has been tried ” (Royce). There was of course no home life in early California.

In 1850 women numbered 8% of the population, but only 2% in the mining counties. The miners were an energetic, covetous, wandering, abnormally excitable body of men. Occasionally a kind of frenzy even would seem to seize on them, and lured by the. hope of new deposits of unheard-of richness thousands would flock on unfounded rumours to new and perhaps distant localities, where many might perish from disease and starvation, the rest returning in poverty and rags. Such were the Kern River fever of 1855 and the greater ” Fraser River rush ” of 1858, the latter, which took perhaps 20,000 men out of the state,

causing a terrible amount of suffering. Many interior towns lost half their population and some virtually all their population as a result of this emigration; and it precipitated a real estate crash in San Francisco that threatened temporary ruin. Mining times in California brought out some of the most ignoble and some of the best traits of American character. Professor Josiah Royce has pictured the social-moral process by which society finally impressed its ” claims on wayward and blind individuals ” who ” sought wealth and not a social order,” and so long as possible shirked all social obligations. Through varied instru- ments — lynch law, popular courts, vigilance committees— order was, however, enforced, better as times went on, until there was a stable condition of things. In the economic life and social character of California to-day the legacies of 1848 are plain.

The slavery question was not settled for California in 1850. Until the Civil War the division between the Whig and Demo- cratic parties, whose organization in California preceded state- hood, was essentially based on slavery. The struggle fused with the personal contests of two men, rivals for the United States Senate, William McKendree Gwin (1805-85, U.S. senator, l8 5°-55 and 1857-61), the leader of the pro-slavery party, and David Colbreth Broderick (1819-1859), formerly a leader of Tammany in New York, and after 1857 a member from California of the United States Senate, the champion of free labour, who declared in i860 for the policy of the Republican party. Broderick’s undoing was resolved upon by the slavery party, and he was killed in a duel. The Gwin party hoped to divide California into two states and hand the southern over to slavery; on the eve of the Civil War it considered the scheme of a Pacific coast republic. The decade 1850-1860 was also marked by the activity of filibusters against Sonora and Central America. Two of these — a French adventurer, one Gaston Raoux, comte de Raousset-Boulbon (1817-1854), and William Walker, had very picturesque careers. The state was thoroughly loyal when war came. The later ‘fifties are characterized by H.H.Bancroft as a period of ” moral, political and financial night.” National politics were put first, to the complete

ignoring of excessive taxation, financial extravagance, ignorant legislation and corruption in California. The public was exploited for many years with impunity for the benefit of private interests. One legacy that ought to be briefly noted here is that of disputed land grants. Under the Mexican regime such ˆ5”” grants were generous and common, and the complicated grant*. ‘formalities theoretically essential to their validity were very often, if not usually, only in part attended to. Titles thus gained would never have been questioned under continued Mexican government, but Americans were unaccustomed to such riches in land and to such laxity. From the very first hundreds ” squatted ” on large claims, contesting the title. Instead of confirming all claims existing when the country passed to the United States, and so ensuring an immediate settlement of the matter, which was really the most important thing for the peace and purse of the community, the United States government undertook through a land commission and courts to sift the valid from the fraudulent. Claims of enormous aggregate value were thus considered and a large part of those dating from the last years of Mexican dominion (many probably artfully con- cocted and fraudulently antedated after the commission was at work) were finally rejected. This litigation filled the state and federal courts for many years. The high value of realty in San Francisco naturally offered extraordinary inducements to fraud, and the largest part of the city was for years involved in fraudulent claims, and its peace broken by ” squatter “-troubles. Twenty or thirty years of the state’s life were disturbed by these controversies. Land monopoly is an evil of large proportions in California to-day, but it is due to the laxness of the United States government in enabling speculators to accumulate holdings and not to the original extent of Mexican grants.

In state gubernatorial elections after the Civil War the Democrats won in 1867, 1875,1882, 1886, 1894; the Republicans ini87i, 1879, 1890, 1898, 1902, 1906, 1910. Features of political life and of legislation after 1876 were a strong labour agitation,

the struggle for the exclusion of the Chinese, for the control of hydraulic mining, irrigation, and the advancement by state-aid of the fruit interests; the last three of which have already been referred to above. Labour conditions were peculiar in the decade following 1870. Mining, war times and the building of the Central Pacific had up to then inflated prices and prosperity. Then there came a slump;

probably the truth was rather that money was becoming less unnaturally abundant than that there was any over-supply of labour. The turning off of some 1 5,000 Chinese (principally in 1869-18 70) from the Central Pacific lines who flocked to San Francisco, augmented the discontent of incompetents, of disappointed late immigrants, and the reaction from flush times. Labour unions became strong and demon- strative. In 1877-1878 Denis Kearney (1847-1907), an Irish drayman and demagogue of considerable force and daring, headed the discontented. This is called the ” sand-lots agita- tion ” from the favourite meeting-place (in San Francisco) of the agitators.

The outcome of these years was the Constitution of 1879, already described, and the exclusion of Chinese by national law. In 1879 California voted against further immigration of Chinese by 154,638 to 883. Congress re-enacted exclusion legislation in 1-962. All authorities agree that the Chinese in early years were often abused in the mining country and their rights most un- justly neglected by the law and its officers. Men among the most respected in California (Joaquin Miller, H. H. Bancroft and others) have said most in praise and defence of the Chinaman. From railroad making to cooking he has proved his abilities and trustworthiness. He is found to-day in the mines and fisheries, in various lines of manufacture, in small farming, and in all branches of domestic service. The question of the economic development of the state, and of trade to the Orient, the views of the mercenary labour-contractor and of the philanthropist, the factor of ” upper-race ” repugnance, the ” economic-leech” argument, the ” rat-rice-filth-and-opium ” argument, have all entered into the problem. Certain it is that though the unpre- judiced must admit that exclusion has not been at all an unmixed blessing, yet the consensus of opinion is that a large population, non-citizen and non-assimilable, sending — it is said— most of their earnings to China, living in the main meanly at best, and practically without wives, children or homes, is socially and economically a menace ‘outweighing the undoubted convenience of cheaper (and frequently more trustworthy) menial labour than the other population affords. The exclusion had much to do with making the huge single crop ranches unprofitable and in leading to their replacement by small farms and varied crops. Many of the Chinese now in the state are wealthy. Race feeling against them has become much less marked. : One outcome of early mission history, the ” Pious Fund of the Californias,” claimed in 1902 the attention of the Hague Tribunal. (See Arbitration, International, Hague cases section.) In 1906- 1 907 ; there was throughout the state a re- markable anti-Japanese agitation, centring in San Francisco (q.v.) and affecting international relations and national politics.

Governors of California (State) 1 I. Spanish

served 1767-1770

1771-1774

Gasper de Portola

Filipe de Barri

Felipe de Neve

Pedro rages

Jose Antonio Romeu ‘Jose Joaquin de Arillaga

Diego de Borica . *J6se Joaquin de Arillaga

Jose Joaquin de Arillaga *Jose Diario Arguello

Pablo Vicente de Sola .

1774-1782 1782-1791 1791-1792

1 792-1 794 1 794-1 800 1800-1804 1804-18 14 1814-1815 1815-1822

1 As months and even years often elapsed between the date when early governors were appointed and the beginning of their actual service, the date of commission is disregarded, and the date of service given. Sometimes this is to be regarded as beginning at Monterey, sometimes elsewhere in California, sometimes at Loreto in LoWer California, All the Spanish and Mexican governors were appointed by the national government, except in the case of the

Pablo Vicente de Sola *Luis Antonio Arguello

Jos6 Maria Echeandia

Manuel Victoria

Jose Maria Echeandia 2

Pio Pico 8 .

Jose Figueroa *Jose Castro . *Nicolas Gutierrez

Mariano Chico

Nicolas Gutierrez

Juan Bautista Alvarado *

Carlos Antonio Carrillo 6

Manuel Micheltorena .

Pio Pico .

II. Mexican

John D. Sloat Richard F. Stockton Stephen W. Kearny R. B. Mason Bennett Riley

Peter H. Burnett .

*John H. McDpugall John Bigler John M. Johnson . John B. Weller Milton S. Latham

*John G. Downey . Leland Stanford . Frederick F. Low Henry H. Haight . Newton Booth

*Romualdo Pacheco William Irwin George G. Perkins George C. Stoneman Washington Bartlett

*Robert W. Waterman Henry H. Markham James H. Budd Henry T. Gage George C. Pardee James N. Gillett . Hiram W. Johnson

III. American (a) Military.

served 1822

1822-1825

1825-1831

1831

1831-1832

1832

1832-1835

1 835-1 836

1836

1836

1836

1 836-1 842

1837-1838

1842-1845

1 845-1 846

appointed 1846

„ 1846-1847

(b) State.

1849-1851 1851-1852 1852-1856

I 856-1 858

1858-1860

i860 (6 days)

1860-1862

I 862-1 863

1 863-1 867 1867-1871 1871-1875

1875

1875-1880

1 880-1 883

1 883-1 887

1887

1887-1891

1891-1895

1 895-1 899

1899-1903

1903-1907

1907-1911

1847

1 847-1 849

1849

Democrat

Know Nothing Lecompton Democrat

Republican

Democrat Republican

Democrat

Republican

Democrat

>» Republican

Democrat Republican

1911-

The mark * before the name of one of the Spanish governors indicates that he acted only ad interim, and, in the case of governors since 1849, that the officer named was elected as lieutenant-governor and succeeded to the office of governor.

Bibliography. — For list of works on California, see University of California Library Bulletin, No. 9, 1887, ” List of Printed Maps of California”; catalogue of state official publications by State Library (Sacramento, 1894). The following may be cited here on different aspects: —

Topography. — J. Muir, Mountains of California (New York, 1894) ; H. Gannett, ” Dictionary of Elevations ” (1898), and ” River Profiles,” publications of United States Geological Survey; G. W- James, The Wonders of the Colorado Desert (2 vols., Boston, 1966).

Climate, &c.’ — U.S. Department of Agriculture, California Climate and Crop Service, monthly reports; E. S. Holden, Recorded Earthquakes in California, Lower California, Oregon, and Washington Territory (California State University, 1887) ; United States Depart-, ment Agriculture, Weather Bureau, Bulletins, Alexander G. McAdie, “Climatology of California ” (Washington, 1903). There is a great mass of general descriptive literature, especially on South- ern California, such as Charles Dudley Warner, Our Italy (New York, 1891); Kate Sanborn, A Truthful Woman in Southern California (New York, 1893); W. Lindley and J. P. Widney, California of the South (New York, 1896) ; J. W. Hanson, American Italy (Chicago, 1896) ; T. S. Van Dyke, Southern California (New York, 1886), &c.

Fauna, Flora. — Muir, op. cit.\ United States Geological Survey, 19th Annual Report, pt. v., H. Gannett, ” Forests of the United States”; idem, 20th Annual Report, pt. v., ” United States Forest Reserves”; United States Division of Forestry, Bulletin No. 28, ” A Short Account of the Big Trees of California ” (1900), No. 38, ” The Redwood ” (a volume, 1903), also Professional Papers, e.g. No. 8, J. B. Leiberg, ” Forest Conditions in the Northern Sierra Nevada ” (1902) ; California Board of Forestry, Reports (1885—);

semi-revolutionary rulers of 1831-1832 and 1836 (Alvarado), whose title rested on revolution, or on local choice under a national statute regarding gubernatorial vacancies.

2 Acting political chief, revolutionary title.

8 Briefly recognized in South. ‘

4 Revolutionary title, 1836-1838.

6 Appointed 1837, never recognized in the North.

CALIFORNIA, LOWER

2, 1

United States Censuses, reports on forests; United States Biological Survey, North American Fauna, No. 16, 1899, C. H. Merriam, ” Biological Survey of Mt. Shasta “■; United States Department Agriculture, Contributions from United States National Herbarium, iv., 1893, F. V. Coville, Botany of Death Valley Expedition”; State Board of Fish Commissioners, Reports, from 1877; United States Fish Commissioners, Annual Reports, from 187 1, and Bulletins from 1882; J. le Conte, ” Flora of the Coast Islands ” (1887), being Bulletin No. 8 of California Academy of Sciences; consult also its Proceedings, Memoirs, and Occasional Papers; G. J. Peirce, Studies on the Coast Redwood (publication of Leland Stanford jr. University,

Agriculture. — California Agricultural Experiment Station, Bulletins from 1884; Reports of the State Dairy Bureau, from 1898; State Board of Horticulture, Reports, 1 889-1 894; United States Censuses, 1890 and 1900, reports on irrigation.

Industries.— J. S. Hittell, Resources of California (7th ed., San Francisco, 1879); J. S. Hittell, Commerce and Industries of the Pacific Coast (San Francisco, 1882) ; T. F. Cronise, Natural Wealth of California (San Francisco, 1868); E. W. Maslin, Resources of California, prepared by order of Governor H. H. Markham (Sacramento, 1893); United States Treasury, Bureau of Statistics, report by T. J. Vivian on ” Commercial, Industrial, Agricultural, Trans- portation and Other Industries of California ” (Washington 1890, valuable for whole period before 1890); United States Censuses, 1890 and 1900, reports on agriculture, manufactures, mines and fisheries; California Stale Board of Trade (San Francisco), Annual Report from 1890. On Mineral Industries: — J. R. Browne, Report on ” Mineral Resources of the States and Territories west of the Rocky Mountains” {United States

Treasury, 2 vols., Washington, 1867-1868); United States Geological Survey, Annual Reports, Mineral Resources; consult also the bibliographies of publications of the Survey, issued as Bulletins; California State Mining Bureau, Bulletins from 1888, note especially No. 30, 1904, by A. W. Vodges, ” Bibliography relating to the Geology, Palaeontology and Mineral Resources of California” (2nd ed., the 1st being Bulletin No. 10, 1896); California Debris Commission, Reports (in Annual Reports Chief of Engineers, United States Army, from 1893).

Government. — E. F. Treadwell, The Constitution of the State of California . . . Annotated (San Francisco, 1902) ; Johns Hopkins University, Studies in History and Political Science, xiii., R. D. Hunt, “Genesis of California’s First Constitution”; Annals of the American Academy of Political and Social Science, xii., R. D. Hunt, ” Legal Status of California, 1846-1849 “; Reports of the various officers, departments and administrative boards of the state govern- ment (Sacramento), and also the Appendix to the Journals of the Senate and Assembly, which contains, especially in the earlier decades of the state’s history, many of these state official reports along with valuable legislative reports of varied character.

History. — Accounts of the valuable archives in Bancroft, and by Z. E. Eldridge in California Genealogical Society (1901); elaborate bibliographies in Bancroft with analyses and appreciations of many works. Of general scope and fundamental importance is the work of two men, Hubert H. Bancroft and Theodore H. Hittell. The former has published a History of California, 1542-1890 (7 vols., San Francisco, 1 884-1 890), also California Pastoral, 1769-1848 (San Francisco, 1888), California Inter-Pocula, 1848-1856 (San Francisco, 1888), and Popular Tribunals (2 vols., San Francisco, 1887). These volumes were largely written under Mr. Bancroft’s direction and control by an office staff, and are of very unequal value; they are a vast storehouse of detailed material which is of great usefulness, although their judgments of men are often in- adequate and prejudiced. As regards events the histories are of substantial accuracy and adequacy. Written by one hand and more uniform in treatment and good judgment, is T. H. Hittell’s History of California (4 vols., San Francisco, 1 885-1 897). The older historian of the state was Francisco Palou, a Franciscan, the friend and biographer of Serra; his ” Noticias de la Nueva California ” (Mexico, 1857, in the Doc. Hist. Mex., ser. iv., torn, vi.viii. ; also San Francisco, 1874, 4 vols.) is no longer of importance save for its historical interest. Of the contemporary material on the period of Mexican domination the best is afforded by R. H. Dana’s Two Years Before the Mast (New York, 1840, many later and foreign editions’}; also A.

Robinson, Life in California (New York, 1846); and Alexander Forbes, California: A History of Upper and Lower California from their First Discovery to the Present Time (London, 1839) ; see also F. W. Blackmar, ” Spanish Institutions of the Southwest ” {Johns Hopkins University Studies, 1891). A beautiful, vivid and reputedly very accurate picture of the old society is given in Helen Hunt Jackson’s novel, Ramona (New York, 1884). There is no really scientific separate account of mission history ; there are books by Father Z. Engelhart, The Franciscans in California (Harbor Springs, Michigan, 1899), written entirely from a Franciscan standpoint ; C. F. Carter, Missions of Nueva California (San Fran cisco, 1900); Bryan J. Clinch, California and its Missions: Their History to the Treaty of Guadalupe Hidalgo (2 vols., San Francisco, 1904) ; Francisco Palou, Relacion Historica de la Vida. . . . del Fray Junipero Serra (Mexico, 1787), the standard contemporary source; the Craftsman (Syracuse, N. Y., vol. v.), a series of articles on ” Mission Buildings,” by G. W. James. On the case of the Pious

Fund of the missions see J. F. Doyle, History of the Pious Fund (San Francisco, 1887); United States Department of State,” United States v. Mexico. Report of J. H. Ralston, agent of the United States and of counsel in the matter of the Pious Fund of the Cali- fornias ” (Washington, 1902). On the ” flush ” mining years the best books of the time are J. Q. Thornton’s Oregon and California (2 vols., New York, 1849); Edward Bryant’s What I Saw in Cali- fornia (New York, 1848) ; W. Shaw’s Golden Dreams (London, 1851) ; Bayard Taylor’s Eldorado (2 vols., New York, 1850); W. Colton’s Three Years in California (New York, 1850); E. G. Buffum’s Six Months in the Gold Mines; from a Journal of Three Years’ Residence in Upper and Lower California (London, 1850); J. T. Brooks’ Four Months among the Gold Finders (London, 1849) ; G. G. Foster, Gold Regions of California (New York, 1884). On this same period consult Bancroft’s Popular Tribunals; D. Y. Thomas, ” A History of Military Government in Newly Acquired Territory of the United States,” in vol. xx. No. 2 (New York, 1904) of Columbia University Studies in History, Economics, and Public Law; C. H. Shinn’s Mining Camps: A Study in American Frontier Government {New York, 1885); J. Royce, California . . .A Study of American Char- acter, 1846-1856 (Boston, 1886) ; and, for varied pictures of mining and frontier life, the novels and sketches and poems of Bret Harte. See also P. H. Burnet, Recollections and Opinions of an Old Pioneer (New York, 1880); S. J. Field, Personal Reminiscences of Early Days in California (privately published, copyright 1893). , ;

• CALIFORNIA, LOWER (Baja California), a long narrow peninsula between the Gulf of California and the Pacific Ocean, forming a

territory of the republic of Mexico. Pop. (1895), 42,245; (1900) 47,624. Lower California is a southward ex- tension of the State of California, United States, and is touched by only one of the Mexican states, that of Sonora on the E. The peninsula is about 760 m. long and from 30 to 150 m. wideband has an area of 58,328 sq m. It is traversed throughout its en,tire length by an irregular range of barren mountains, which slopes toward the Pacific in a succession of low hills, but breaks down abruptly toward the Gulf. The coast has two or three good sheltered bays, that of La Paz on the Gulf side and of Magda- lena on the Pacific side being best known. The coast is bordered by numerous islands, especially on the eastern side. The general appearance of the surface is arid and desolate, partly because of the volcanic remains, and partly because of the scanty rainfall, which is insufficient to support vegetation other than that of the desert except in the deeper mountain valleys. The northern part is hot and dry, like southern California, but the southern part receives more rain and has some fertile tracts, with a mild and pleasant climate. The principal natural product in this region is orchil, or Spanish, moss, but by means of irrigation the soil produces a considerable variety of products, including sugar cane, cotton, cassava, cereals, tobacco and grapes. Horses, sheep and cattle are raised in the fertile valleys, but only to a limited extent. The territory is rich in minerals, among which are gold, silver, copper, lead, gypsum, coal and salt. The silver mines near La Paz were worked by the Jesuits, as early as 1 700. There are also extensive pearl fisheries in the Gulf, La Paz being the headquarters of the industry, and whale fisheries on the W. coast in the vicinity of Magdalena Bay. The- development of mining and other industries in the territory has led to an exten- sion of the California railway system southwardinto thepeninsula, with the Mexican government's permission, the first section of 37 m. from the northern frontier being completed and opened to traffic in 1907. The territory is divided into two districts, the northern having its capital at the insignificant little village of La Ensenada, on Todos Santos Bay, and the southern having its capital at La Paz, at the head of a deep bay opening into the Gulf. La Paz is a port of call for steamships running between Mazatlan and San Francisco, and had a population of 5056 in 1900. La Ensenada (pop. in 1906, about 1500), 65 m. by sea S. of San Diego, Cal., is the only port for the northern part of the territory, and supplies a district extending 2 50 m. along the coast and 60 m. inland, including the mining camps of the north; it manufactures and exports flour and leather.

By orders of Cortes the coast of Lower California was explored in 1539 by Francisco de Ulloa, but no settlement resulted. It was called

California, the name (according to E. E. Hale) being derived from a popular Spanish romance of that time, entitled Sergas de Esplandian, in which an island named California was mentioned and situated ” on the right hand of the Indies, very

near the terrestrial paradise.” The name must have been given derisively, as the barren coasts of Lower California could not have suggested the proximity of a ” terrestrial paradise.” The exploration of the coast did not extend above the peninsula until 1842. The name California was at first applied exclusively to the peninsula; later, on the supposition that a strait con- nected the Pacific with the head of the Gulf of California, the name Islas Californias was frequently used. This erroneous theory was held as late as 1721. The first settlement was made in 1 597, but was abandoned. From 1633 to 1683 five unsuccessful attempts were made to establish a settlement at La Paz. Finally the Jesuits succeeded in founding a mission at Loreto on the Gulf coast, in about 26° “N. lat., in 1697, and at La Paz in 1720. At the time of their expulsion (1767) they had sixteen missions which were either self-supporting or were maintained by funds invested for that special purpose. The settlement of Upper California began in 1769, after which the two provinces were distinguished as California Baja or Antigua, and California Alta, the seat of government remaining in the former for a short time. The two provinces were separated in 1804, were united under one governor residing in California Alta in 1825, and were then re- united in a single department through the political changes of 1836, which lasted no later than 1847. Lower California was only slightly disturbed by the struggle for independence among the Spanish-American colonies, but in 1822 Admiral Lord Cochrane, who was in the service of the Chilean revolutionists, appeared on the coast and plundered San Jose del Cabo, Todos Santos and Loreto. In the war between Mexico and the United States La Paz and other coast towns were occupied by small detachments from California. In 1853 a filibustering expedition against Sonora under William Walker took possession of La Paz and proclaimed a republic consisting of Sonora and the peninsula. Fearing an attack from the mainland, the filibusters first with- drew to La Ensenada, near the American frontier, and then in the following year broke up altogether during an attempt to invade Sonora by land. A revolution under the leadership of Marquez de Leon in 1879 met with some temporary success, but died for want of material support in 1880. The development of mining and other industries since that time, together with vigorous efforts to found

colonies in the more favoured localities, have greatly improved the situation in the territory.

See the two volumes of H. H. Bancroft's North Mexican States and Texas, lettered vols. 15 and 16 of his Works-, also Arthur Walbridge North, The Mother of California (San Francisco, 1908).

CALIFORNIA, UNIVERSITY OF, one of the largest and most important of state universities in America, situated at Berkeley, California, on the E. shore of San Francisco Bay. It took the place of the College of California (founded in 1855), received Cali- fornia's portion of the Federal land grant of 1862, was chartered as a state institution by the legislature in 1868, and opened its doors in 1869 at Oakland. In 1873 it was removed to its present site. In the revised state constitution of 1879 provision is made for it as the head of the state's educational system. The grounds at Berkeley cover 270 acres on the lower slopes (299-900 ft.) of the Berkeley Hills, which rise 1000 ft. or more above the university; the view over the bay to San Francisco and the Golden Gate is superb. In recent years new and better buildings have gradually been provided. In 1896 an international archi- tectural competition was opened at the expense of Mrs Phoebe R. Hearst (made a regent of the university in 1898) for plans for a group of buildings harmonizing with the university's beautiful site, and ignoring all buildings already existing. The first prize was awarded in 1899 to Emile Benard, of Paris. The first building begun under the new plans was that for the college of mines (the gift of Mrs Hearst), completed in 1907, providing worthily for the important school of mining, from 1885 directed by Prof. S. B. Christy (b. 1853); California Hall, built by state appropriation, had been completed in 1906. The Greek theatre (1903), an open-air auditorium seating 7500 spectators, on a hill-side in a grove of towering eucalypts, was the gift of William Randolph Hearst; this has been used regularly for concerts by the university's symphony orchestra,

under tjie professor of music, John Frederick Wolle (b. 1S63), who originated the Bach. Festivals at Bethlehem, Pa.; free public concerts are given on Sunday afternoons; and there have been some remarkable dramatic performances here, notably Sudraka's Mricchakattika in English, and Aeschylus's Eumenides in Greek, in April 1907. There are no dormitories. Student self-government works through the " Undergraduate Students' Affairs Committee " of the Associated Students. The faculty of the university has its own social club, with a handsome building on the grounds. At Berkeley is carried on the work in the colleges of letters, social sciences, natural sciences, commerce, agriculture, mechanical, mining and civil engineering, and

chemistry, and the first two years' course of the college of medicine — the Toland Medical College having been absorbed by the university in 1873; at Mount Hamilton, the work of the Lick astronomical department; and in San Francisco, that of dentistry (1888), pharmacy, law, art, and the concluding (post graduate or clinical) years of the medical course — the San Francisco Polyclinic having become a part of the university in 1892. Three of the San Francisco departments occupy a group of three handsome buildings in the western part of the city, overlooking Golden Gate Park. The Lick astronomical department (Lick Observatory) on Mount Hamilton, near San Jose, occupies a site covering 2777 acres. It was founded in 1875 by James Lick of San Francisco, and was endowed by him with $700,000, $610,000 of this being used for the original buildings and equipments, which were formally transferred to the uni- versity in 1888. The art department (San Francisco Institute of art) was until 1 906 housed in the former home of Mark Hopkins, a San Francisco " railroad king "; it dated from 1893, under the name " Mark Hopkins Institute of Art." The building was destroyed in the San Francisco conflagration of 1906; but under its present name the department resumed work in 1907 on the old site. At the university farm, of nearly 750 acres, at Davis- ville, Yolo county, instruction is given in practical agriculture, horticulture, dairying, &c; courses in irrigation are given at Berkeley; a laboratory of plant pathology, established in 1907 at Whittier, Riverside county, and an experiment station on 20 acres of land near Riverside, are for the study of plant and tree diseases and pests and of their remedies. A marine biologi- cal laboratory is maintained at La Jolla, near San Diego, and another, the Hertzstein Research Laboratory, at New Monterey; the Rudolph Spreckels Physiological Laboratory is in Berkeley. The university has excellent anthropological and archaeological collections, mostly made by university expeditions, endowed by Mrs Hearst, to Peru and to Egypt. In 1907 the university library contained 160,000 volumes, ranking, after the destruction of most of the San Francisco libraries in 1906, as the largest collection in the vicinity. The building of the Doe library (given by the will of Charles Franklin Doe), for the housing of the university library, was begun in 1907. The university has also the valuable Bancroft collection of 50,000 volumes and countless pamphlets and manuscripts, dealing principally with the history of the Pacific Coast from Alaska through Central America, and of the Rocky Mountain region, including Montana, Utah, Wyoming, Colorado, Arizona, New Mexico and Western Texas. This collection (that of the historian Hubert Howe Bancroft) was acquired in 1905 for $250,000 (of which Mr Bancroft contributed $100,000), and was entrusted (1907) to the newly organized Academy of Pacific Coast History. The library of Karl

Weinhold (1823-1901) of Berlin, which is especially rich in Germanic linguistics and " culture history," was presented to the university in 1903 by John D. Spreckels. The university publishes The University of California Chronicle, an official record; and there are important departmental publications, especially those in American archaeology and ethnology, edited by Frederic Ward Putnam (b. 1839), including the reports of various expeditions, maintained by Mrs Hearst; in physiology, edited by Jacques Loeb (b. 1859); in botany, edited by William Albert Setchell (b. 1864); in zoology, edited by William Emerson Ritter (b. 1859); and in astronomy, the publications of the Lick Observatory, edited by William Wallace

Campbell (b, 1862). In 1902, under the direction of Henry Morse Stephens (b. 1857), who then became professor of history, a department of university extension was organized; lecture courses, especially on history and literature, were de- livered in 1906-1907 at fifteen extension " centres," at most of which classes of study were formed. Annexes to the university, but having no corporate connexion with it, are the Berkeley Bible Seminary (Disciples of Christ), the Pacific Theological Seminary (Congregational), the Pacific Coast Baptist Seminary and a Unitarian school.

The growth of the university has been extremely rapid. From 1890 to 1900 the number of students increased fourfold. In the latter year the university of California was second to Harvard only in the number of academic graduate and undergraduate students, and fifth among the educational institutions of the country in total enrolment. In July 1907 there were 519 officers in the faculties and 2987 students, of whom 226 were in the professional schools in San Francisco. In addition there were 707 students in the 1906 summer session, the total for 1906-1907 thus being 3684; of this number 1506 were women. The university conferred 482 degrees in 1907, 546 in 1906, 470 in 1905. The affairs of the university are administered by a board of twenty-three regents, seven state officials and heads of educational institutions, being members ex officio, and sixteen other members being appointed by the governor and senate of the state; its instruction is governed by the faculties of the different colleges, and an academic senate in which these are joined. The gross income from all sources for 1905-1906 was $1,564,190, of which about $800,000 was income from invest- ments, state and government grants, fees, &c, and the remainder was gifts and endowments. There is a permanent

endowment of more than $3,000,000, partly from munificent private gifts, especially from Mrs Hearst and from Miss Cora Jean Flood. The financial support of the state has always been generous. No tuition fee is charged in the academic colleges to students resident in the state, and only $10.00 annually to students from without the state. The university maintains about 90 under- graduate scholarships, and 10 graduate scholarships and fellow- ships. All able-bodied male students are required to take the courses in military science, under instruction by an officer of the United States army detailed for the purpose. Physical culture and hygiene are prescribed for all men and women. A state law forbids the sale of liquor within one mile of the university grounds. To realize the ideal of the university as the head of the educational system of the state, a system of inspection of high schools has been developed, whereby schools reaching the pre- scribed standard are entitled to recommend their graduates for admission to the university without examination. It was anticipated at one time that the foundation of the Leland Stanford Junior University at Palo Alto would injure the state institution at Berkeley; but in practice this was not found to be the case; on the contrary, the competition resulted in giving new vigour and enterprise to the older university. Joseph Le Conte (professor from 1872 to 1901) and Daniel C. Gilman (president in 1872-1875) deserve mention among those formerly connected with the university. In 1899 Benjamin Ide Wheeler (b. 1854) became president. He had been a graduate (1875) of Brown University, and was professor first of comparative philology and then of Greek at Cornell University; his chief publications are Der griechische N ominalaccent (1885); Analogy, and the Scope of its Application in Language (1887) ; Principles of Language Growth (1891); The Organization of Higher Education in the United States (1897); Dionysos and Immortality (1899); and Life of Alexander the Great (1900).

CALIPASH and CALIPEE (possibly connected with carapace, the upper shell of a turtle), the gelatinous substances in the upper and lower shells, respectively, of the turtle, the calipash being of a dull greenish and the calipee of a light yellow colour.

CALIPH, Calif, or Khalif (Arab. khUlifa; the lengthening of the a is strictly incorrect), literally ” successor,” ” repre- sentative,” a title borne originally by Abu Bekr, who, on the death of Mahomet, became the civil and religious head of the

Mahommedan state. In the same sense the term is used in the Koran of both Adam and David as the vicegerents of God. Abu Bekr and his three (or four) immediate successors are known as the ” perfect ”

caliphs; after them the title was borne by the thirteen Omayyad caliphs of Damascus, and subsequently by the thirty-seven Abbasid caliphs of Bagdad whose dynasty fell before the Turks in 1258. By some rigid Moslems these rulers were regarded as only amirs, not caliphs. There were titular caliphs of Abbasid descent in Egypt from that date till 151 7 when the last caliph was captured by Selim I. On the fall of the Omayyad dynasty at Damascus, the title was assumed by the Spanish branch of the family who ruled in Spain at Cordova (755-1031), and the Fatimite rulers of Egypt, who pretended to descent from Ali, and Fatima, Mahomet's daughter, also assumed the name (see Fatimites).

According to the Shi'ite Moslems, who call the office the " imamate " or leadership, no caliph is legitimate unless he is a lineal descendant of the Prophet. The Sunnites insist that the office belongs to the tribe of Koreish (Quraish) to which Mahomet himself belonged, but this condition would vitiate the claim of the Turkish sultans, who have held the office since its trans- ference by the last caliph to Selim I. According to a tradition falsely ascribed to Mahomet, there can be but one caliph at a time; should a second be set up, he must be killed, for he "is a rebel." (See Mahommedan Institutions.)

CALIPHATE. 1 The history of the Mahommedan rulers in the East who bore the title of caliph (q.v.) falls naturally into three main divisions: — (a) The first four caliphs, the immediate successors of Mahomet; (b) The Omayyad caliphs; (c) The Abbasid caliphs. To these three groups the present article is con- fined; for the Western caliphs, see Spain: History (and minor articles such as Almohades, Almoravides) ; for the Egyptian caliphs see Egypt: History (§ Mahommedan) and Fatimites. The history of Arabia proper will be found under Arabia : History,

A.— The First Four Caliphs

After the death of Mahomet the question arose who was to be his " representative." The choice lay with the community of Medina; so much was understood; but whom were they to choose? The natives of Medina believed themselves to be now once more masters in their own house, and wished to promote one of themselves. But the Emigrants (see Mahomet) asserted their opposing claims, and with success, having brought into the town a considerable number of outside Moslems, so as to terrorize the men of Medina, who besides were still divided into two parties. The Emigrants' leading spirit was Omar; he did not, however, cause homage to be paid to himself, but to Abu Bekr, the friend and father-in-law of the Prophet.

The affair would not have gone on so smoothly, had not the opportune defection of the Arabians put a stop to the inward schism which threatened. Islam suddenly found itself once more limited to the community of Medina; only Mecca and Taif (Tayef) remained true. The Bedouins were willing enough to pray, indeed, but less willing to pay taxes; their defection, as might have been expected, was a political movement. 2 None the less was it a revolt from Islam, for here the political society and the religious are identical. A peculiar compliment to Mahomet was involved in the fact that the leaders of the rebellion in the various districts did not pose as princes and kings, but as prophets; in this appeared to He the secret of Islam's success.

1. Reign of Abu Bekr.— Abu Bekr proved himself quite equal to the perilous situation. In the first place, he allowed the expedition against the Greeks, already arranged by Mahomet, quietly to set out, limiting himself for the time to the defence of Medina. On the return of the army he proceeded to attack

' Throughout this article, well-known names of persons and places appear in their most familiar forms, generally without accents or other diacritical signs. For the sake of homogeneity the articles on these persons or places are also given under these forms, but in such cases, the exact forms, according to the system of transliteration adopted, are there given in addition.

2 See Noldeke, Beitr&ge zur Kenntniss der Poesie der alien Araber (1864), pp. 89 seq.

the rebels. The holy spirit of Islam kept the men of Medina together, and inspired in them an all-absorbing zeal for the faith; the Arabs as a whole had no other bond of union and no better source of inspiration than individual interest. As was to be expected, they were worsted; eleven small flying columns of the Moslems, sent out in various directions, sufficed to quell the revolt. Those who submitted were forthwith received back into favour; those who persevered in rebellion were punished with death. The majority accordingly converted, the obstinate were extirpated. In Yamama (Yemama) only was there a severe struggle; the Banii ganlfa under their prophet Mosailima fought bravely, but here also Islam triumphed.

The internal consolidation of Islam in Arabia was, strange to say,

brought about by its diffusion abroad. The holy war against the border countries which Mahomet had already inaugurated, was the best means for making the new religion popular among the Arabs, for opportunity was at the same time afforded for gaining rich booty. The movement was organized by Islam, but the masses were induced to join it by quite other than religious motives. Nor was this by any means the first occasion on which the Arabian cauldron had overflowed; once and again in former times emigrant swarms of Bedouins had settled on the borders of the wilderness. This had last happened in consequence of the events which destroyed the prosperity of the old Sabaean kingdom. At that time the small Arabian kingdoms of Ghassan and Hira had arisen in the western and eastern borderlands of cultivation; these now presented to Moslem conquest its nearest and natural goal. But inasmuch as Hira was subject to the Persians, and Eastern Palestine to the Greeks, the annexation of the Arabians involved the exten- sion of the war beyond the limits of Arabia to a struggle with the two great powers (see further Arabia: History).

After the subjugation of middle and north-eastern Arabia, Khalid b. al-Walid proceeded by order of the caliph to the conquest of the districts on the lower Euphrates. Thence he was summoned to Syria, where hostilities had also broken out. Damascus fell late in the summer of 635, and on the 20th of August 636 was fought the great decisive battle on the Hieromax (Yarmuk), which caused the emperor Heraclius (q.v.) finally to abandon Syria. 1 Left to themselves, the Christians hence- forward defended themselves only in isolated cases in the fortified cities; for the most part they witnessed the disappearance -of the Byzantine power without regret. Meanwhile the war was also carried on against the Persians in Irak, unsuccessfully at first, until the tide turned at the battle of Kadisiya (Kadessia, Qadislya) (end of 637). In consequence of the defeat which they here sustained, the Persians were forced to abandon the western portion of their empire and limit themselves to Iran proper. The Moslems made themselves masters of Ctesiphon (Madain), the residence of the Sassanids on the Tigris, and conquered in the immediately following years the country of the two rivers. In 639 the armies of Syria and Irak were face to face in Mesopotamia. In a short time they had taken from the Aryans all the principal old Semitic lands — Palestine, Syria, Mesopotamia, Assyria and Babylonia. To these was soon added Egypt, which was overrun with little difficulty by ‘Amr ibn-el- Ass (q.v.) in 640. (See Egypt: History, § Mahommedan.) This completed the circle of the lands bordering on the wilderness of Arabia; within these limits annexation was practicable and natural, a repetition indeed of what

had often previously oc- curred. The kingdoms of Ghassan and Hira, advanced posts hitherto, now became the headquarters of the Arabs; the new empire had its centres on the one hand at Damascus, on the other hand at Kufa and Basra, the two newly-founded cities in the region of old Babylonia. The capital of Islam continued indeed for a while to be Medina, but soon the Hejaz (Hijaz) and the whole of Arabia proper lay quite on the outskirt of affairs.

The ease with which the native populations of the con- quered districts, exclusively or prevailingly Christian, adapted themselves to the new rule is very striking. Their nationality had

1 De Gpeje, Memoires d'hist. et de giog. orient. No. 2 (2nd ed., Leiden, 1864); Noldeke, D.M.Z., 1875, p. 76 sqq.; Baladhuri 137.

been broken long ago, but intrinsically it was more closely allied to the Arabian than to the Greek or Persian. Their .religious sympathy with the West was seriously impaired by dogmatic controversies; from Islam they might at any rate hope for toleration, even though their views were not in accordance with the theology of the emperor of the day. The lapse of- the masses from Christianity to Islam, however, which took place during the first century after the conquest, is to be accounted for only by the fact that in reality they had no inward relation to the gospel at all. They changed their creed merely to acquire the rights and privileges of Moslem citizens. In no case were they compelled to do so; indeed the Omayyad caliphs saw with displeasure the diminishing proceeds of the poll-tax derived from their Christian subjects (see Mahommedan Institutions).

It would have been a great advantage for the solidity oj > the Arabian empire if it had confined itself within the limits of those old Semitic lands, with perhaps the addition of Egypt.-, But the Persians were not so ready as the Greeks to give up the contest;, they did not rest until the Moslems had subjugated the whole of the Sassanid empire. The most important eVent in the protracted war which led to the conquest of Iran, was thebattle of Nehawend in 641 ; 2 the most obstinate resistance was offered by Persis proper, and especially by the capital; Istakhr -(Perse? polis). In the end, all the numerous and partly autonomous provinces of the Sassanid empire fell, one after the other, into the hands of the Moslems, and the young king, Yazdegerd III. (q.v.), was compelled to retire to the farthest corner of hisˆ realm, where he came to a miserable end. 3 But it was long before the Iranians learned to accept the situation. Unlike the Christians of western Asia, they had a vigorous feeling of national pride* based upon glorious memories and especially upon a church having a

connexion of the closest kind with the state. Internal disturbances of a religious and political character and external disasters had long ago shattered the empire of the Sassanids indeed, but the Iranians had not yet lost their patriotism. They were fighting, in fact, against the despised and hated Arabs, in defence of their holiest possessions, their nationality and their faith. Their subjection was only external, nor did Islam ever succeed in assimilating them as the Syrian Christians were assimilated. Even when in process of time they did accept the religion of the prophet, they leavened it thoroughly with their own peculiar leaven, and, especially, deprived it of the practical political and national character which it had assumed after the flight to Medina. To the Arabian state they were always a thorn in the flesh; it was they who helped most to break up its internal order, and it was from them also that, it at last received its outward death-blow. The fallof the Omayyads was their work, and with the Omayyads fell the Arabian empire.

2. Reign of Omar. — Abu Bekr died after a short reign on the 22nd of August 634, and as a matter of course was succeeded by Omar. To Omar's ten years' Caliphate belong for the most part the great conquests. He himself did not take the field, but remained in Medina with the exception of his visit to Syria in 638; he never, however, suffered the reins to slip from his grasp, so powerful was the influence of his personality and the Moslem community of feeling. His political insight is shown by the fact that he endeavoured to limit the indefinite extension of Moslem conquest, to maintain and strengthen the national Arabian character of the commonwealth of Islam, 4 and especially to promote law and order in its internal affairs. The saying with which he began his reign will never grow antiquated: " by Allah, he that is weakest among you shall be in my sight the strongest, until I have . vindicated for him his rights; but him that is strongest will I treat as the weakest, until he complies

2 The accounts differ ; see Baladhuri 305. The chronology of the conquests is in many points uncertain.

3 Baladhuri 315 sq.; Tabari i. 1068.

4 He sought to make the whole nation a great host of God ; the Arabs were to be soldiers and nothing else. They were forbidden to acquire landed estates in the conquered countries; all land was either made state property or was restored to the old owners subject to a perpetual tribute which provided pay on a splendid scale for the army.

with. the laws.”. After the administration of justice he directed his organizing activity, as the circumstances demanded, chiefly towards financial questions — the incidence of taxation in the conquered territories, 1 and the application of the vast resources which poured into the treasury at Medina. It must not be brought against him as a personal reproach, that in dealing with these he acted on the principle that the Moslems were the char- tered plunderers of all the rest of the world. But he had to atone by his death for the fault of his system. In the mosque at Medina he was stabbed by a Kufan workman and died in November 644. 3. Reign of Othman. — Before his death Omar had nominated six of the leading Mohajir (Emigrants) who should choose the caliph from among themselves — Othman, Ali, Zobair, Talha, Sa’d b. Abi Waqqas, and Abdarrahman b. Auf. The last-named declined to be a candidate, and decided the election in favour of Othman. Under this weak sovereign the government of Islam fell entirely into the hands of the Koreish nobility. We have already seen that Mahomet himself prepared the way for this transference; Abu Bekr and Omar likewise helped it; the Emigrants were unanimous among themselves in thinking that the 1 precedence and leadership belonged to them as of right. Thanks to the energy of Omar, they were successful in appro- priating to themselves the succession to the Prophet. They indeed rested their claims on the undeniable priority of their services to the faith, but they also appealed to their blood relationship with the Prophet as a corroboration of their right to the inheritance ; and the ties of blood connected them with the Koreish in general. In point of fact they felt a closer con- nexion with these than, for example, with the natives of Medina; nature had not been expelled by faith. 2 The supremacy of the Emigrants naturally furnished the means of transition to the supremacy of’ the Meccan aristocracy. Othman did all in his power to press forward this development of affairs. He belonged to the foremost family of Mecca, the Omayyads, and that he should favour his relations and the Koreish as a whole, in every possible way, seemed to him a matter of course. Every position of influence and emolument was assigned to them; they them- selves boastingly called the important province of Irak the garden of Koreish. In truth, the entire empire had become that garden. Nor was it unreasonable that from the secularization of Islam the chief advantage should be reaped by those who best knew the world. Such were beyond all doubt the patricians of Mecca, and after them those of Taif, people like Khalid b. al-Walid, Amr- ; ibn-el-Ass, ‘Abdallah b. abi Sarh, Moghira b. Sho’ba, and, above all, old Abu Sofian with his son Moawiya.

‘ Against the rising tide of worldliness an opposition, however, now

began to appear. It was led by what may be called the spiritual noblesse of Islam, which, as distinguished from the hereditary nobility of Mecca, might also be designated as the nobility of merit, consisting of the ” Defenders ” (Ansar), and especially of the Emigrants who had lent themselves to the elevatiori of the Koreish, but by no means with the intention of allowing themselves thereby to be effaced. The opposition was headed by Ali, Zobair, Talha, both as leading men among the Emigrants and as 1 disappointed candidates for the Caliphate. Their motives were purely selfish; not God’s cause but their own, not religion but power and preferment, were what they sought. 3 Their party Was a mixed one. To it belonged the men of real piety, who saw with displeasure the promotion to the first places in the commonwealth of the great lords who had actually done nothing for Islam, and had joined themselves to it only at the last moment. But the majority were merely a band

■ l Noldeke, Tabari, 246. To Omar is due also the establishment of the Era of the Flight (Hegira),

2 Even in the list of the slain at the battle of Honain the Emi-

§ rants are enumerated along with the Meccans and Koreish, and istinguished from the men of Medina. _

: 3 It was the same opposition of the spiritual to the secular nobility that afterwards showed itself in the revolt of the sacred cities against the Omayyads. The movement triumphed with the elevation of the Abbasids to the throne. But, that the spiritual nobility was fighting not for principle but for personal advantage was as apparent in All’s hostilities against Zobair and Talha as in that of the Abbasids against the followers of , Ali. ...

of men without views, whose aim was a change not of system, but of persons in their own interest. Everywhere in the pro- vinces there was agitation against the caliph and his governors, except in Syria, where Othman’s cousin, Moawiya, son of Abu Sofian (see below), carried on a wise and strong administration. The movement was most energetic in Irak and in Egypt. Its ultimate aim was the deposition of Othman in favour of Ali, whose own services as well as his close relationship to the Prophet seemed to give him the best claim to the Caliphate. Even then there were enthusiasts who held him to be a sort of Messiah.

The malcontents sought to gain their end by force. In bands they came from the provinces to Medina to wring concessions from Othman, who, though his armies were spreading terror from the Indus and

Oxus to the Atlantic, had no troops at hand in Medina. He propitiated the mutineers by concessions, but as soon as they had gone, he let matters resume their old course. Thus things went on from bad to worse. In the following year (656) the leaders of the rebels came once more from Egypt and Irak to Medina with a more numerous following; and the caliph again tried the plan of making promises which he did not intend to keep. But the rebels caught him in a flagrant breach of his word, 4 and now demanded his abdication, besieging him in his own house, where he was defended by a few faithful subjects. As he would not yield, they at last took the building by storm and put him to death, an old man of eighty. His death in the act of maintaining his rights was of the greatest service to his house and of corresponding disadvantage to the enemy.

4. Reign of Ali. — Controversy as to the inheritance at once arose among the leaders of the opposition. The mass of the mutineers summoned Ali to the Caliphate, and compelled even Talha and Zobair to do him homage. But soon these two, along with Ayesha, the mother of the faithful, who had an old grudge against Ali, succeeded in making their escape to Irak, where at Basra they raised the standard of rebellion. Ali in point of fact had no real right to the succession, and moreover was apparently actuated not by piety but by ambition and the desire of power, so that men of penetration, even although they condemned Othman's method of government, yet refused to recognize his successor. The new caliph, however, found means of disposing of their opposition, and at the battle of the Camel, fought at Basra in November 656, Talha and Zobair were slain, and Ayesha was taken prisoner.

But even so Ali had not secured peace. With the murder of Othman the dynastic principle gained the twofold advantage of a legitimate cry — that of vengeance for the blood of the grey-haired caliph and a distinguished champion, the governor Moawiya, whose position in Syria was impregnable. The kernel of his subjects consisted of genuine Arabs, not only recent immigrants along with Islam, but also old settlers who, through contact with the Roman empire and the Christian church, had become to some extent civilized. Through the Ghassanids these latter had become habituated to monarchical government and loyal obedience, and for a long time much better order had prevailed amongst them than elsewhere in Arabia. Syria was the proper soil for the rise of an Arabian kingdom, and Moawiya was just the man to make use of the situation. He exhibited Othman's blood-stained garment in the mosque at Damascus, and incited his Syrians to vengeance.

Ali's position in Kufa was much less advantageous. The population of Irak was already mixed up with Persian elements; it fluctuated greatly, and was largely composed of fresh immigrants. Islam had its headquarters here; Kufa and Basra were the home of the pious and of the adventurer, the centres of religious and political movement. This movement it was that had raised Ali to the Caliphate, but yet it did not really take any personal interest in him. Religion proved for him a less trustworthy and more dangerous support than did the conservative and secular feeling of Syria for the Omayyads. Moawiya could either act or ■ refrain from acting as he chose, secure in either case

4 Or, at least, so they thought. The history of the letter to 'Abdallah b. abi Sarh seems to have been a trick played on the caliph, who suspected Ali of having haˆ – hand in it.

of the obedience of his 'subjects. AH, on the other hand, was unable to convert enthusiasm for the principle inscribed on his banner into enthusiasm for his person. It was necessary that he should accommodate himself to the wishes of his supporters, which, however, were inconsistent. They compelled him suddenly to break off the battle of Siffin, which he was apparently on the point of gaining over Moawiya, because the Syrians fastened copies of the Koran to their lances to denote that not the sword, but the word of God should decide the contest (see further below, B. i ; also Axi). But in yielding to the will of the majority he excited the displeasure of the minority, the genuine zealots, who in Moawiya were opposing the enemy of Islam, and regarded Ali's entering into negotiations with him as a denial of the faith. When the negotiations failed and war was resumed, the Kharijites refused to follow Ali's army, and he had to turn his armies in the first instance against them. He succeeded in disposing of them without difficulty at the battle of Nahrawan, but in his success he lost the soul of his following. For they were the true champions of the theocratic principle; through their elimination it became clear that the struggle had in no sense anything to do with the cause of God. Ali's defeat was a foregone conclusion, once religious enthusiasm had failed him; the secular resources at the disposal of his adversaries were far superior. Fortunately for him he was murdered (end of January 66 1), thereby posthumously attaining an importance in the eyes of a large part of the Mahommedan world (Shl'a) which he had never possessed during his life. l

B. — The Omayyad Dynasty

Summary of Preceding Movements. — The conquest of Mecca had been of the greatest importance to the Prophet, not only because Islam thus obtained possession of this important city with its famous sanctuary, but above all because his late adversaries were at last compelled to acknowledge him as the Envoy of God. Among these there were many men of great ability and influence, and he was so eager to conciliate them or, as the Arabic ex- pression has it, ” to mellow their hearts ” by concessions and gifts, that his loyal helpers (Ansar) at Medina became dissatisfied and could only with difficulty be brought to acquiesce in it. Mahomet was a practical man; he realized that the growing state needed skilful administrators, and that such were found in much greater number among the antagonists of yesterday than among the honest citizens of Medina. The most important positions, such as the governorships of Mecca and Yemen, were entrusted to men of the Omayyad house, or that of the Makhzum and other Koreishite families. Abu Bekr followed the Prophet’s example. In the great revolt of the Arabic tribes after the death of Mahomet, and in the invasion of Irak and Syria by the Moslems, the principal generals belonged to them. Omar did not deviate from that line of conduct. It was he who appointed Yazld, the son of Abu Sofian, and after his death, his brother Moawiya as governor of Syria L and assigned the province of Egypt to Amr-ibn-el-Ass (“Amr b. As). It is even surprising to find among the leading men so few-of the house of Hashim, the nearest family of the Prophet. The puzzled Moslem doctors explain this fact on the ground that the Hashimites were regarded as too noble to hold ordinary administrative offices, and that they could not be spared at Medina, where their counsel was required in all important affairs. There is, however, a tradition in which Ali himself calls the Omayyads born rulers. As long as Omar lived opposition was silent. But Othman had not the strong personality of his predecessor, and, although he practically adhered to the policy of Omar, he was accused of favouring the (members of his own family — the caliph belonged himself to the house of Omayya — at the expense of theHashimitesandthe Ansar. The jealousy of the latter two was prompted by the fact that the governorship and military commands had become not only much more important, but also much more lucrative, while power and money again procured many adherents. The truly devout Moslems on the other hand were scandalized by the growing luxury which relaxed the austere morals of the first Moslems, and this also was imputed to Othman.

We thus see how the power of the house of Omayya developed itself, and how there arose against it an opposition, which led in the first

place to the murder of Othman and the Caliphate of Ali, and furthermore; during the whole period of the Omayyad caliphs, repeatedly to dangerous outbreaks, culminating in the great catastrophe which placed the Abbasids on the throne. The elements of this opposition were of very various kinds: — (i) The old-fashioned Moslems, sons of the Ansar and Mohajir, who had been Mahomet's first companions and supporters, and could, not bear the thought that the sons of the old enemies of the Prophet in Mecca, whom they nicknamed tolaqa (freedmen), should be in control of the imamate, which carried with it the management of affairs both civil and religious. This party was in the foreground, chiefly in the first period. (2) The partisans of Ali, the Shi'a (Shi'ites), who in proportion as their influence with the Arabs declined, contrived to strengthen it by obtaining the support of the non-Arabic Moslems, aided thereto, especially in the latter period, by the Abbasids, who at the decisive moment succeeded in seizing the supreme power for themselves. (3) The Kharijites, who, in spite of the heavy losses they sus- tained at the hands of Ali, maintained their power by gaining new adherents from among those austere Moslems, who held both Omayyads and Alids as usurpers, and have often been called, not unjustly, the Puritans of Islam. (4) The non-Arabic Moslems, who on their conversion to Islam, had put themselves under the patronage of Arabic families, and were therefore called maula's (clients). These were not only the most numerous, but also, in virtue of the persistency of their hostility, the most dangerous. The largest and strongest group of these were the Persians, who, before the conquest of Irak by the Moslems, were the ruling class of that country, so that Persian was the dominant language. With them all malcontents, in particular the Shi'ites, found support; by them the dynasty of the Omayyads and the supremacy of the Arabs was finally overthrown. To these elements of discord we must add: — (1) That the Arabs, notwith- standing the bond of Islam that united them, maintained their old tribal institutions, and therewith their old feuds and factions; (2) that the old antagonism between Ma'adites 1 (original northern tribes) and Yemenites (original southern tribes), accentuated by the jealousy between the Meccans, who belonged to the former, and the Medinians, who belonged to the latter division, gave rise to perpetual conflicts; (3) that more than one dangerous pretender — some of them of the reigning family itself — contended with the caliph for the sovereignty, and must be crushed coute que co&te. It is only by the detailed enumera- tion of these opposing forces that we can form an idea of the heavy task that lay before the Prince of the Believers, and of the amount of tact and ability which his position demanded.

The description of the reign of the Omayyads is extremely difficult. Never perhaps has the system of undermining authority by continual slandering been applied on such a scale as by the Alids and the Abbasids. The Omayyads were accused by their numerous missionaries of every imaginable vice; in their, hands Islam was not safe ; it would be a godly work to extirpate them from the earth. When the Abbasids had occupied the throne, they pursued this policy to its logical conclusion. But not content with having exterminated the hated rulers themselves, they carried their hostility to a further point. The official history of the Omayyads, as it has been handed down to us, is coloured by Abbasid feeling to such an extent that we can scarcely distinguish the true from the false. An example of this occurs at the outset in the assertion that Moawiya deliberately refrained from marching to the help of Othman, and indeed that it was with secret joy that he heard of the fatal result of the plot. The facts seem to contradict this view. When, ten weeks before the murder, some hundreds of men came to Medina from Egypt and Irak, pretending that they were on their pilgrimage to Mecca, but wanted to bring before the caliph their complaints against his vicegerents, nobody could have the slightest suspicion that the life of the caliph was in danger; indeed it was only during

1 Ma'ad is in the genealogical system the father of the Modar and the Rab'ia tribes. Qais is the principal branch of the Motjar.

the few days that Othman was besieged in his house that the danger became obvious. If the caliph then, as the chroniclers tell, sent a message to Moawiya for help, his messenger could not have accomplished half the journey to Damascus when the catastrophe took place. There is no real reason to doubt that the painful news fell on Moawiya unexpectedly, and that he, as mightiest representative of the Omayyad house, regarded as his own the duty of avenging the crime. He could not but view Ali in the light of an accomplice, because if, as he protested, he did not abet the murderers, yet he took them under his protection. An acknowledgment of Ali as caliph by Moawiya before he had cleared himself from suspicion was therefore quite impossible.

1. The Reign of Moawiya. — Moawiya, son of the well-known Meccan chief Abu Sofian, embraced Islam together with his father and his brother Yazid, when the Prophet conquered Mecca, and was, like

them, treated with the greatest distinction. He was even chosen to be one of the secretaries of Mahomet. When Abu Bekr sent his troops for the conquest of Syria, Yazid, the eldest son of Abu Sofian, held one of the chief commands, with Moawiya as his lieu tenant. In the year 639 Omar named him governor of Damascus and Palestine; Othman added to this province the north of Syria and Mesopotamia. To him was committed the conduct of the war against the Byzantine emperor, which he continued with energy, at first only on land, but later, when the caliph had at last given in to his urgent representations, at sea also. In the year 34 (a.d. 655) was fought off the coast of Lycia the great naval battle, which because of the great number of masts has been called “the mast fight,” in which the Greek 1 fleet, commanded by the emperor Constans II. in person, was utterly defeated. Moawiya himself was not present, as he was conducting an attack (the result of which we do not know) on Caesarea in Cappadocia. The Arabic historians are so entirely preoccupied with the internal events that they have no eye for the war at the frontier. The contention which Moawiya had with Ah checked his progress in the north.

Moawiya was a born ruler, and Syria was, as we have seen, the best administered province of the whole empire. He was so loved and honoured by his Syrians that, when he invited them to avenge the blood of Othman, they replied unanimously, ” It is your part to command, ours to obey.” Ah was a valiant man, but had no great talent as a ruler. His army numbered a great many enthusiastic partisans, but among them not a few wise- acres; there were also others of doubtful loyalty. The battle at Siffin (657), near the Euphrates, which lasted two months and consisted principally in, sometimes bloody, skirmishes, with alternate success, ended by the well-known appeal to the decision of the Koran on the part of Moawiya. This appeal has been called by a European scholar ” one of the unworthiest comedies of the whole world’s history,” accepting the report of very partial Arabic writers that it happened when the Syrians were on the point of losing the battle. He forgot that Ali himself, before the Battle of the Camel, appealed likewise to the decision of the Koran, and began the fight only when this had been rejected. There is in reality no room for suspecting Moawiya of not having been in earnest when making this appeal; he might well regret that internecine strife should drain the forces which were so much wanted for the spread of Islam. That the Book of God could give a solution, even of this arduous case, was doubtless the firm belief of both parties. But even if the appeal to the Koran had been a stratagem, as Ali himself thought, it would have been perfectly legitimate, according to the general views of that time, which had been also those of the

Prophet. It is not unlikely that the chief leader of the Yemenites in Ali's army, Ash'ath b. Qais, knew beforehand that this appeal would be made. Cer- tainty is not to be obtained in the whole matter.

On each side an umpire was appointed, Abu Mtisa al-Ash'ari, the candidate of Ash'ath, on that of Ah, Amr-ibn-el-Ass (q.v.) on that of Moawiya. The arbitrators met in the year 37 (a.d. 658) at Adhroh, in the south-east of Syria, where are the ruins of the Roman Castra described by Brtinnow and Domaszewsky (Die Provincia Arabia, i. 433-463). Instead of this place, the 1 The Arabs always call them Rum, i.e. Romans.

historians generally put Dumat-al-Jandal, the biblical Duma, now called Jauf , but this rests on feeble authority. The various accounts about what happened in this interview are without exception untrustworthy. J. Wellhausen, in his excellent book Das arabische Reich und sein Stiirz, has made it very probable that the decision of the umpires was that the choice of Ali as caliph should be cancelled, and that the task of nominating a successor to Othman should be referred to the council of notable men (shura), as representing the whole community. Ah refusing to submit to this decision, Moawiya became the champion of the law, and thereby gained at once considerable support for the conquest of Egypt, to which above all he directed his efforts. As soon as Amr returned from Adhroh, Moawiya sent him with an army of four or five thousand men against Egypt. About the same time the constitutional party rose against Ali's vicegerent Mahommed, son of Abu Bekr, who had been the leader of the murderous attack on Othman. Mahommed was beaten, taken in his flight, and, according to some reports, sewn in the skin of an ass and burned.

Moawiya, realizing that Ali would take all possible means to crush him, took his measures accordingly. He concluded with the Greeks a treaty, by which he pledged himself to pay a large sum of money annually on condition that the emperor should give him hostages as a pledge for the maintenance of peace. Ali, however, had first to deal with the insurrection of the Kharijites, who condemned the arbitration which followed the battle of Siffin as a deed of infidelity, and demanded that Ali should break the compact (see above, A. 4) . Freed from this difficulty, Ali prepared to direct his march against Moawiya, but his soldiers declined to move. One of his men, Khirrit b. Rashid, renounced him altogether, because he had not submitted to the decision of the umpires, and persuaded many others to refuse the payment of the poor-rate. Ali was obliged to subdue him, a task which he effected not without difficulty. Not a few of his former partisans

went over to Moawiya, as already had happened before the days of Siffin, amongst others Ali's own brother 'Aqil. Lastly, there were in Kufa, and still more in Basra, many Othmaniya or legitimists, on whose co-operation he could not rely. Moawiya from his side made incessant raids into Ali's dominion, and by his agents caused a very serious revolt in Basra. The statement that a treaty was concluded between Moawiya and Ali to maintain the status quo, in the beginning of the year 40 (a.d. 660), is not very probable, for it is pretty certain that just then Ali had raised an army of 40,000 men against the Syrians, and also that in the second or third month of that year Moawiya was proclaimed caliph at Jerusalem. At the same time Bosr b. Abi Artat made his expedition against Medina and Mecca, whose inhabitants were compelled to acknowledge the caliphate of Moawiya. On the murder of Ah in 661, his son Hasan was chosen caliph, but he recoiled before the prospect of a war with Moawiya, having neither the ambition nor the energy of Ali. Moawiya stood then with a large army in Maskin, a rich district lying to the north of the later West Bagdad, watered by the Dojail, or Little Tigris, a channel from the Euphrates to the Tigris. . The army of Trak was near Madain, the ancient Ctesiphon. The reports about what occurred are confused and contradictory; but it seems probable that Abdallah b. Abbas, the vicegerent of Ali at Basra and ancestor of the future Abbasid dynasty, was in command. No battle was fought. Hasan and Ibn Abbas opened, each for himself, negotiations with Moawiya. The latter made it a condition of surrender that he should have the free disposal of the funds in the treasury of Basra. Some say that he had already before the death of Ali rendered himself master of it. Notwith- standing the protest of the Basrians, he transported this booty safely to M ecca. When his descendants had ascended the throne and he had become a demi-saint, the historians did their best to excuse his conduct. Hasan demanded, in exchange for the power which he resigned, the contents of the treasury at Kufa, which amounted to five millions of dirhems, together with the revenues of the Persian province of Darabjird (Darab). When these nego- tiations became known, a mutiny broke out in Hasan's camp. Hasan himself was wounded and retired to Medina, where he

died eight or nine years afterwards. The legend that he was poisoned by order of Moawiya is without the least foundation. It seems that he never received the revenues of Dar&bjird, the Basrians to whom they belonged refusing to cede them.

Moawiya now made his entry into Kufa in the summer of a.h. 41 (a.d. 661) and received the oath of allegiance as Prince of the Believers. This year is called the year of union (jamd'a). Moghlra b. Sho'ba was appointed governor of Kufa. IJomran b. Aban had previously assumed the government of Basra. This is represented commonly as a revolt, but as Homran was a client of Othman, and remained in favour with the Omayyads, it is almost certain that he took the management of affairs only to maintain order.

One strong antagonist to Moawiya remained, in the person of Ziyad. This remarkable man was said to be a bastard of Abu Sofian, the father of Moawiya, and was, by his mother, the brother of Abu Bakra, a man of great wealth and position at Basra. He thus belonged to the tribe of Thaqif at Taif, which produced many very prominent men. At the age of fourteen years Ziyad was charged with the financial administration of the Basrian army. He had won the affection of Omar, by his know- ledge of the Koran and the Sunna of the Prophet, and by the fact that he had employed the first money he earned to purchase the freedom of his mother Somayya. He was a faithful servant of Ah and put down for him the revolt excited by Moawiya's partisans in Basra. Thence he marched into Fars and Kirman, where he maintained peace and kept the inhabitants in their allegiance to Ali. After Ali's death he fortified himself in his castle near Istakhr and refused to submit. Moawiya, therefore, sent Bosr b. Abi Artat to Basra, with orders to capture Ziyad's three sons, and to force Ziyad into submission by threatening to kill them. Ziyad was obdurate/ and it was due to his brother Abu Bakra, who persuaded Moawiya to cancel the order, that the threat was not executed. On his return to Damascus, Moawiya charged Moghlra b. Sho'ba to bring his countryman to reason. Abdallah b. 'Amir was made governor of Basra.

As soon as Moawiya had his hands free, he directed all his forces against the Greeks. Immediately after the submission of Irak, he had denounced the existing treaty, and as early as 662 had sent his troops against the Alans and the Greeks. Since then, no year passed without a campaign. Twice he made a serious effort to conquer Constantinople, in 669 when he besieged it for three months, and in 674. On the second occasion his fleet occupied Cyzicus, which it held till shortly after his death in 680, when a treaty was signed. In Africa also the extension of Mahommedan power was pursued energetically. In 670 took place the famous march of 'Okba ("Oqba) b. Nafi' and tke founda- tion of Kairawan, where the great mosque still bears his name. Our information about these events, though very full, is untrust- worthy, while of the events in Asia Minor the accounts are scarce and short. The Arabic historians are still absorbed by the events

in Irak and Khorasan.

The talented prefect of Kufa, Moghlra b. Sho'ba, eventually broke down the resistance of Ziyad, who came to Damascus to render an account of his administration, which the caliph ratified. Moawiya seems also to have acknowledged him as the son of Abu Sofian, and thus as his brother; in 664 this recogni- tion was openly declared. 1 In the next year Ziyad was appointed governor df Basra and the eastern provinces belonging to it. As the austere champion of the precepts of Islam, he soon restored order in the whole district. Outwardly, this was the case in Kufa also. A rising of Kharijites in the year 663 had ended in the death of their chief. But the Shi'ites were dissatisfied and

1 A single genealogist, Abu Yaqazan, says that he was a legiti- mate son of Abu Scfian, and that his mother was Asma, daughter of A'war. But all others call his mother Somayya, who is said to have been a slave-girl of Hind, the wife of Abu Sofian, and who became later also the mother of Abu Bakra. We cannot make out whether Abu Sofian acknowledged him as his son or not. At a later period, the Abbasid caliph Mahdi had the names of Ziyad and his descendants struck off the rolls of the Koreish ; but, after his death, the persons concerned gained over the chief of the rolls office, and had their names replaced in the lists (see Tabari iii. 479).

even dared to give public utterance to their hostility. Moghlra contented himself with a warning. He wasalready aged and had no mind to enter on a conflict. He died about the year 670, and his province also was entrusted to Ziyad, who appointed 'Amr b. Horaith as his vicegerent. At a Friday service in the great mosque 'Amr was insulted and pelted with pebbles. Ziyad then came himself, arrested the leader of the Shi'ites, and sent fourteen rebels to Damascus, among them several men of consideration. Seven of them who refused to pledge themselves to obedience were put to death; the Shi'ites considered them as martyrs and accused Moawiya of committing a great crime. But in Kufa peace was restored, and this not by military force, but by the headmen of the tribes. We must not forget that Kufa and Basra were military colonies, and that each tribe had its own quarter of the city. A wholesome diversion was provided by the serious re- sumption of the policy of eastern expansion, which had been interrupted by the civil war. For this purpose Irak had to furnish the largest contingent. The first army sent by Ziyad into Khorasan recaptured Merv, Herat and Balkh, conquered Tokharistan and advanced as far as the Oxus. In 673 'Obai- dallah, the son of Ziyad, crossed the river, occupied Bokhara, and returned laden with booty taken from the wandering Turkish tribes of Transoxiana. He brought

2000 Turkish archers with him to Basra, the first Turkish slaves to enter the Moslem empire. Sa'id, son of the caliph Othman, whom Moawiya made governor of Khorasan, in 674 marched against Samarkand.: Other generals penetrated as far as the Indus and conquered Kabul, Sijistan, Makran and Kandahar. 1 ■•

Ziyad governed Irak with the greatest vigour, but as long as discontent did not issue in action, he let men alone. At his death (672-673), order was so generally restored that " nobody had any more to fear for life or estate, and even the unprotected woman was safe in her house without having her door bolted." •

Moawiya was a typical Arab sayyid (gentleman) . He governed, not by force, but by his superior intelligence, his self-control, his mildness and magnanimity. The following anecdote may illustrate this. One of Moawiya's estates bordered on that of Abdallah b. Zobair, who complained in a somewhat truculent letter that Moawiya's slaves had been guilty of trespassing. Moawiya, disregarding his son Yazid's advice that he should exact condign punishment for Zobair's disrespect, replied 1 in flattering terms, regretting the trespass and resigning both slaves and estate to Zobair. In reply Zobair protested his loyalty to Moawiya, who thereupon pointed a moral for the instruction of Yazid. ' ■ ; ;)

Moawiya has been accused of having poisoned more than one of his adversaries, among them Malik Ashtar, Abdarrahman the son of the great captain Khalid b. Walid, and Hasan b. Ali. As for the latter, European scholars have long been agreed that' the imputation is groundless. As to Abdarrahman the story is in the highest degree improbable. Madaini says that Moawiya was prompted to it, because when he consulted the Syrians about the choice of his son Yazid as his successor, they had proposed Abdarrahman. The absurdity of this is obvious, for Abdarrah- man died in the year 666. 1 Others say 2 that Moawiya. was afraid lest Abdarrahman should become too popular. Now, Abdarrah- man had not only been a faithful ally of Moawiya in the wars r with Ali, but after the peace devoted all his energy to the Greek war. It is almost incredible that Moawiya out of petty jealousy would have deprived himself of one of his best men. The probability is that Abdarrahman was ill when returning from the frontier, that Moawiya sent him his own medical man, the Christian doctor Ibn Othal, and that the rumour arose that the doctor had poisoned him. It is remarkable withal that this rumour circulated, not in Horns (Emesa), where Abdarrahman died, but in Medina-. There a young relation of Abdarrahman was so roused by the taunt that the death of his kinsman was unavenged, that he killed Ibn Othal near the mosque

of Damascus. Moawiya imprisoned him and let him pay a high ransom, the law not permitting the talio against a Moslem for having killed a Christian. The story that

1 Aghani xx. p, 13, Ibn abi Osaibia i.‘p. 118.

2 Tabari ii. p. 82.

this relative was Khalid, the son of Abdarrahman, is absurd in- asmuch as Moawiya made this Khalid commander against the Greeks in succession to his father. In the third case — that of Malik Ashtar — the evidence is equally inadequate. In fact, since Moawiya did not turn the weapon of assassination against such men as Abdallah b. Zobair and Hosain b. Ali, it is unlikely that he used it against less dangerous persons. These two men were the chief obstacles to Moawiya’s plan for securing the Caliphate for his son Yazid. The leadership with the Arabic tribes was as a rule hereditary, the son succeeding his father, but only if he was personally fit for the position, and was acknowledged as such by the principal men of the tribe. The hereditary principle had not been recognized by Islam in the cases of Abu Bekr, Omar and Othman; it had had some influence upon the choice of Ali, the husband of Fatima and the cousin of the Prophet. But it had been adopted entirely for the election of Hasan. The example of Abu Bekr proved that the caliph had the right to appoint his successor. But this appointment must be sanctioned by the principal men, as representing the community. Moawiya seems to have done his best to gain that approbation, but the details given ;by the historians are altogether unconvincing. This only seems to. be certain, that the succession of Yazid was’ generally acknowledged before the death of his father, except in Medina. (See Mahommedan Institutions.)

, Moawiya died in the month of Rajab 60 (a.d. 680) . His last words are said to have been: ” Fear ye God, the Elevated and Mighty, for God, Praise be to Him, protects the man that fears Him; he who does not fear God, has no protection.” Moawiya was, in fact, a religious man and a strict disciple of the precepts of Islam. We can scarcely, therefore, credit the charges made by the adversaries of his chosen successor Yazid, that he was a drinker of wine, fond of pleasure, careless about religion. All the evidence shows that, during the reign of the. Omayyads, life in Damascus and the rest of Syria was austere

and in striking contrast to the dissolute manners which prevailed in Medina.

2. Rule of Yazid. — When Moawiya died, the opposition had already been organized. On bis accession Yazid sent a circular to all lus prefects, officially announcing his father's death, and ordering them to administer the oath of allegiance to their subjects. In that sent to Walid b. 'Otba, the governor of Medina, he enclosed a private note charging him in particular to administer the oath, to Hosain, Abdallah b. Omar and Abdallah b. Zobair, if necessary, by force. Walid sent a messenger inviting them to a conference, thus giving them time to assemble their followers and %o escape to Mecca, where the prefect Omar b. Sa'id could do nothing against them. In the month Ramadan this Omar was made governor of Medina and sent an army against Ibn Zobair. This army was defeated, and from that time Ibn Zobair was supreme at Mecca.

On the news of Yazid's accession, the numerous partisans of the family of Ali in Kufa sent addresses to Hosain, inviting him to take refuge with them, and promising to have him proclaimed caliph in Irak. Hosain, having learned that the majority of the inhabitants were apparently ready to support him strenuously, prepared to take action. Meanwhile Yazid, having been in- formed of the riotous behaviour of the Shi'ites in Kufa, sent Obaidallah, son of the famous Ziyad and governor of Basra, to restore order. Using the same tactics as his father had used before, Obaidallah summoned the chiefs of the tribes and made them responsible for the conduct of their men. On the 8th of Dhu'l-Hijja Hosain set out from Mecca with all his family, expecting to be received with enthusiasm by the citizens of Kufa, but on his arrival at Kerbela west of the Euphrates, he was confronted by an army sent by Obaidallah under the command of Omar, son of the famous Sa'd b. Abi Waqqas, the founder of Kufa. Hosain gave battle, vainly relying on the promised aid from Kufa, and fell with almost all his followers on the 10th of Muharram 61 (10th of October 680).

No other issue of this rash expedition could have been expected. But, as it involved the grandson of the Prophet, the son of Ali, and so many members of his family, Hosain's devout partisans ajt Kuˆa, who by their overtures had been the principal cause of

the disaster, regarded it as a tragedy, and the facts gradually acquired a wholly romantic colouring. Omar b. Sa'd and his officers, Obaidallah and even Yazid came to be regarded as murderers, and their names have ever since been held accursed by all Shi'ites. They observe the 10th of Muharram, the day of ' Ashura, as a day of public mourning.

Among the Persians, stages are erected on that day in public places, and plays are acted, representing the misfortunes of the family of Ali. 1 ” Revenge for Hosain ” became the watchword of all Shi’ites, and the Meshed Hosain (Tomb of the martyr Hosain) at Kerbela is to them the holiest place in the world (see Kerbela). Obaidallah sent the head of Hosain to Damascus, together with the women and children and Ali b. Hosain, who, being ill, had not taken part in the fight. Yazid was very sorry for the issue, and sent the prisoners under safe-conduct to Medina. Ali remained faithful to the caliph, taking no share in the revolt of the Medinians, and openly condemning the risings of the Shi’ites.

Ibn Zobair profited greatly by the distress caused by Hosain’s death. Though he named himself publicly a refugee of the House of God, he had himself secretly addressed as caliph, and many of the citizens of Medina acknowledged him as such. Yazid, when informed of this, swore in his anger to have him imprisoned. But remembering the wisdom of his father, he sent messengers with a chain made of silver coins, and bearing honourable proposals. At the same time he received a number of the chief men of Medina, sent by the prefect, with great honour and loaded them with gifts and presents. But Ibn Zobair refused, and the Medinians, of whom the majority probably had never before seen a prince’s court, however simple, were only confirmed in their rancour against Yazid, and told many horrible tales about his profligacy, that he hunted and held wild orgies with Bedouin sheikhs, and had no religion. A characteristically Arabic cere- mony took place in the mosque of Medina. ” I cast off the oath of allegiance to Yazid, as I cast off my turban,” exclaimed the first; and all others followed, casting off one of their garments, till a heap of turbans and sandals lay on the floor. Ibn Hanzala was made commander. The Omayyads, though they with their clients counted more than 1000 men, were not able to maintain themselves, and were allowed to depart only on condition of strict neutrality.

At last the patience of Yazid was exhausted. An army — the accounts about the number vary from 4000 to 20,060— was equipped in all haste and put under the command of Moslim b. ‘Oqba, with orders first to exact submission from the Medinians, if necessary by force, and then to march against Ibn Zobair. Moslim, having met the expelled Omayyads at Wadi ‘1-Qora, encamped near the city (August 683) and gave the inhabitants three days in which to return to obedience, wishing to spare the ci ty of the Prophet and to prevent the shedding of blood. When, however, after the lapse of three days, a final earnest appeal had been answered insultingly, he began the battle. The Medinians fought valiantly, but could not hold out against

the well-dis- ciplined Syrians. Moreover, they were betrayed by the Medinian family of the Banu. Haritha, who introduced Syrian soldiers into the town. Medina lies between two volcanic hills, called harra. After one of these the battle has been named ” The Day of Harra.” For three days the city was given up to plunder. It is said that a thousand bastards (the ” children of the Harra “) were born in consequence of these days. The remaining citizens were compelled to take the oath of allegiance to Yazid in a humiliating form; the few who refused were killed. Ali b. Hosain, who had refused to have anything to do with the revolt, was treated with all honour. Mahommed b. al-Hanafiya, the son of Ali, and Abdallah b. Omar had likewise abstained, but they had left Medina for Mecca.

Moslim then proceeded towards Mecca. He was already ill, and died about midway between the two cities, after having given the command, according to the orders of the caliph, to Hosain b. Nomair. It is quite natural that the man who delivered up the city of the Prophet to plunder, and at whose hands so many prominent Moslems fell, should have been an object of detestation 1 See Chodzko, Theatre person (Paris, 1878).

to the devout. Even some European scholars have drawn a false picture of his personality, as has been clearly shown by Wellhausen. About Medina also false statements have been made. The city recovered very soon from the disaster, and remained the seat not only of holy tradition and jurisdiction, but also of the Arabic aristocracy. In no city of the empire, during the reign of the Omayyads, lived more singers and musicians than in Medina.

Hosain b. Nomair arrived before Mecca in September 683 and found Ibn Zobair ready to defend it. A number of the citizens of Medina had come to the aid of the Holy City, as well as many Kharijites from Yamama under Najda b. “Amir. The siege had lasted 65 — others say 40— days, when the news came of the death of Yazid, which took place presumably on the 14th of Rabia I, 64 (12th November 683). Eleven days before a fire, caused by imprudence, had consumed all the woodwork of the Ka’ba and burst the black stone in three places. The evidence is quite conclusive; yet the fire has been imputed to the Syrians, and a tale was invented about ballistas which hurled against the House of God enormous stones and vessels full of bitumen. In fact, the siege had been confined to enclosure and skirmishes. It is said that

on the news of the death of Yazid a conference took place between Hosain and Ibn Zobair, and that the former offered to proclaim the latter as caliph provided he would accompany him to Syria and proclaim a general amnesty. Ibn Zobair refused haughtily, and Hosain, with a contemptuous criticism of his folly, ordered his army to break up for Syria.

Hitherto Ibn Zobair had confined himself to an appeal to the Moslems to renounce Yazid and to have a caliph elected by the council (shitrd) of the principal leading men. He now openly assumed the title of caliph and invited men to take the oath of allegiance. He was soon acknowledged throughout Arabia, in Egypt and in Irak. The Omayyads, who had returned to Medina, were again expelled.

Yazid is described in theContinualio Isidori Byz.ˆ2y , as"iucun- . dissimus et cunctis nationibus regni eius subditis vir gratissime habitus, qui nullam unquam, ut omnibus moris est, sibi regalis fastigii causa gloriam appetivit, sed communis 1 cum omnibus civiliter vixit." This is confirmed by the fact that Moawiya H. is said to have been a mild ruler, like his father, and goes far to outweigh the prejudiced account given by his opponents and coloured still further by tradition. Against the accusation of being a drinker of wine he himself protested in verses which he recited when he sent the army against Ibn Zobair. Decisive is also the testimony of Ibn al-Hanafiya, who declared that all the accusations brought by the Medinians were false. It may be true that he was fond of hunting, but he was a peace-loving, generous prince. It is uncertain at what age he died. Accounts vary between 33 and 39. The latter finds confirmation in the statement that he was born in a.h. 25, though another account places his birth in 22. As his son Moawiya who succeeded him was certainly adult (the accounts vary between 17 and 23), the latter date seems to be preferable.

3. Moawiya II. had reigned a very short time — how long is again wholly uncertain — when he fell sick and died. Then commenced a period of the greatest confusion. The mother of Yazid, Maisun, belonged to the most powerful tribe in Syria, the Kalb, and it seems that this and the cognate tribes of Qoda'a (Yemenites) had enjoyed certain prerogatives, which had aroused the jealousy of the Qais and the cognate tribes of Modar. Im- mediately after the death of Yazid, Zofar b. Harith, who had already fought with Ibn Zobair against Yazid, had induced northern Syria and Mesopotamia to declare for Ibn Zobair. In Horns (Emesa) the governor No'man b. Bashlr had pledged himself to the same cause. The prefect of Damascus, Dahhak b. Qais, seemed to be wavering in his loyalty. Khalid, the brother of Moawiya II., was still a youth and appears to have had no strength of character.

There was, however, a much more dangerous candidate, viz. Merwan b. Hakam, of another branch of the Omayyads, who had been Othman's right-hand man. He had pledged himself after some hesitation to Yazid, but now his 1 Dozy took communis for a gloss to civiliter.

turn had come. The amir of the Kalb, Ibn Bahdal, persuaded probably by Obaidallah b. Ziyad, conceived that only a man of distinction could win the contest, and proclaimed Merwan caliph, on condition that his successor should be Khalid b. Yazid, and after him 'Amr b. Sa'id al-Ashdaq, who belonged to the third branch of the Omayyads. Meanwhile Dahhak had declared himself openly for Ibn Zobair. A furious battle (a.d. 684) ensued at Merj Rahit, near Damascus, in which Dahhak and Zofar, though they had the majority of troops, were utterly defeated. This battle became the subject of a great many poems and had pernicious consequences, especially as regards the antagonism between the Qais-Modar and Kalb- Yemenite tribes.

4. Reign of Merwan I. — Merwan strengthened his position according to the old oriental fashion by marrying the widow of Yazid, and soon felt himself strong enough to substitute his own son Abdalmalik for Khalid b. Yazid as successor-designate. Khalid contented himself with protesting; he was neither a politician nor a soldier, but a student of alchemy and astronomy; translations of Greek books have been ascribed to him (Jahiz, Baydn, i. p. 126). In the year a.h. 435 there was still in Egypt a brazen \dobe attributed to Ptolemy which had belonged to Khalid (ibn Qifti, p. 440, 1.15). He was also consulted about future events. There were, however, not a few who deplored the fact that the throne had passed from the descendants of Abu Sofian. This feeling gave rise to the prophecy that there should appear later a Sofiani on the throne, who would reign with might and wisdom. 'Amr Ashdaq made no opposition till the death of Merwan. After the victory at Merj Rahit, Merwan conquered Egypt, and installed as governor his second son Abd/ilazlz. An army sent to the rescue by Ibn Zobair under the command of his brother Mus'ab was beaten in Palestine by "Amr Ashdaq. But a division sent by Merwan to the Hejaz was cut to pieces. Obaidallah b. Ziyad set out with the purpose of subduing Mesopotamia and marching thence against Irak. But he was detained a whole year in the former country, by a rising of the Shi'ites in Kufa, who were still in mourning for Hosain and had formed an army which called itself " the army of the penitent." They were routed at Ras 'Ain, but Obaidallah had still to fight Zofar.

Meanwhile Mokhtar (son of that Abu 'Obaid the Thaqifite who had commanded the Arabs against the Persians in the un- fortunate battle

of the Bridge), a man of great talents and still greater ambition, after having supported Ibn Zobair in the siege of Mecca, had gone to Kufa, where he joined the Shi'ites, mostly Persians, and acquired great power. He claimed that he was commissioned by Ali's son, Mahommed ibn al-Hanafiya, who after the death of Hosain was recognized by the Shi'ites as their Mahdi. A vague message from Mahommed, that it was the duty of every good Moslem to take part with the family of the Prophet, was interpreted in favour of Mokhtar, and thenceforward all the Shi'ites, among them the powerful Ibrahim, son of Ali's right hand Malik Ashtar, followed him blindly as their chief. After- wards Ibn al-Hanafiya seems to have acknowledged him dis- tinctly as his vicegerent. . Ibn Zobair's representative in Kufa was compelled to flee, and all those who had participated in the battle of Kerbela were put to death. An army despatched against Obaidallah under Ibrahim routed the Syrians near Mosul (battle of Khazir); Obaidallah and Hosain b. Nomair were slain. Mokhtar was now at the zenith of power, but Ibn Zobair, determined to get rid at all costs of so dangerous an enemy, named his brother Mus'ab governor of Basra and ordered him to march against Kufa. Basra was at that time full of fugitives from Kufa, Arabian chiefs who resented the arrogance of Mokhtar's adherents, and desired eagerly to regain their former position in Kufa. The troops of Basra had been, since the death of Yazid, at war with the Kharijites, who had supported Ibn Zobair during the siege of Mecca, but had deserted him later. Their caliph, Nafi' b. Azraq, after whom they were called also Azraqites, threatened even the city itself, when Mohallab b. Abi Sofra, a very able general, compelled them to retire. Mohallab then marched with Mus'ab against Kufa. Mokhtar fell, and with

him the ephemeral dominion of the Persian Shi'ites. This had been their first attempt to dispute the authority of their Arabian conquerors, but it was not to be the last. Ibrahim b. Ashtar, Mokhtar's governor of Mesopotamia, submitted and acknow- ledged the Caliphate of Ibn Zobair.

5. Reign of Abdalmalik. — Merwan died on the 27th of Ramadan 65 (7th May 685); according to tradition, he was suffocated by his wife, because he had insulted her son Khalid and herself. The accession of Abdalmalik was attended with no difficulty, but the first years of his reign were occupied by troubles in northern Syria, where, instigated by the Greeks, the Mardaites of the Amanus, called Jarajima by the

Arabs, penetrated into the Lebanon. He was obliged to conclude an unfavourable treaty first with them, later with the emperor of Constantinople. Moreover, in the year 68 (a.d. 687-688) Syria was afflicted by a serious famine. Ibn Zobair, however, was occupied at Mecca with the rebuilding of the Ka'ba, and Mus'ab was harassed not only by the Kharijites, but also by a noble freebooter, Obaidallah b. Horr, who had created for himself a principality in the vicinity of Madain (Ctesiphon).

The period of the pilgrimage caused a momentary truce to all these struggles, and in Dhu '1-hijja, a.h. 68 (January 688), was seen the curious spectacle of four different standards planted near Mecca, belonging respectively to four chiefs, each of whom was a pretender to the empire; the standard of Abdallah b. Zobair, caliph of Mecca; that of the caliph of Damascus, Abdalmalik; that of Ali's son Mahommed b. al-Hanafiya, Mahdi of the Shi'ites; and that of the Kharijites, who were at that time under the command of Najda b. "Amir. Such, however, was the respect inspired by the holy places, that no disorders resulted.

When, in the year (69 a.h.) 689 Abdalmalik had at last en- camped at Boˆnan IJablb in the vicinity of Kinnesrin (Qinnasrin) , l with the purpose of marching against Mu§'ab, his cousin 'Amr Ashdaq, to whom by the treaty of Jabia, before the battle of Merj Rahit, the succession to Merwan had been promised, took advantage of his absence to lay claim to the supreme power, and to have himself proclaimed caliph by his partisans. Abdalmalik was obliged to retrace his steps and to lay siege to his own capital. The garrison of Damascus took fright, and deserted their posts, so that 'Amr Ashdaq was compelled to surrender. The caliph Abdalmalik summoned him to his palace and slew him with his own hand. Abdalmalik has every claim to our esteem as one of the ablest monarchs that ever reigned, but this murder remains a lasting blot on his career.

Abdalmalik could now give his whole attention to the pro- jected expedition against Irak. Mus'ab was encamped at Bajomaira in the neighbourhood of Takrit. But Abdalmalik's first task was to subdue Zofar and his Qaisites at Kerkesia (Qarqisia), and the rest of the partisans of Mokhtar at Nisibis. Meanwhile, Mu§'ab had to curb a violent revolt in Basra, brought about by agents of Abdalmalik, and called after a place in the city the revolt of the Jof rites. About the middle of a.d. 691 Abdalmalik at last encamped at Dair al-Jathallq (the monastery of the Catholicus) between Maskin, not far from the site of Bagdad, and Bajomaira. Mus'ab's best troops were fighting under Mohallab against the Kharijites; many Basrians were secretly

favourable to the Omayyads, nor were the Kufian soldiers to be trusted. The people of Irak had never been accustomed to discipline, and no improvement had taken place during the troubles of the last years. Abdalmalik, therefore, wrote secretly to the chiefs of Mus'ab's army, and persuaded them to desert to him, with the exception of Ibrahim b. Ashtar, the brave son of a brave father, who, after the fall of Mokhtar, had become a faithful supporter of Ibn Zobair. His death, in the beginning of the battle, decided the fate of Mu§'ab, who was slain sword in hand by a Shi'ite of Kufa.

This victory opened the gates of Kufa to Abdalmalik, and all Irak received him with acclamation. Thence, a few days later, he sent Hajjaj b. Yusuf at the head of 2000 Syrians against Ibn Zobair in Mecca, and despatched a messenger toTariq b.' Amr, who

1 Formerly the capital of the homonymous province of Syria ; it lies a day's march west from Haleb (Aleppo).

was encamped at Wadi '1-Qora with 5000 men, to make himself master of Medina and thence to rejoin Hajjaj. Before the arrival of this reinforcement, Hajjaj confined himself to skir- mishes, in which his soldiers always had the advantage. Then, in Dhu 1 Qa'da 72 (March 25th, 692) Mecca was invested. The blockade lasted more than six months, during which the city was a prey to all the horrors of siege and famine. Hajjaj had set up a balista on the hill of Abu Qobais, whence he poured on the city a hail of stones, which was suspended only in the days of the pilgrimage. Ibn Zobair employed against him Abyssinians armed with Greek-fire-tubes, who, however, quitted him soon under the pressure of famine. This at length triumphed over his last adherents. Ten thousand fighting men, and even two of the sons of the pretender (it is said, on his own advice), left the city and surrendered. Mecca being thus left without defenders, Ibn Zobair saw that ruin was inevitable. Hajjaj having promised him amnesty if he would surrender, he went to his mother Asma, the daughter of Abu Bekr, who had reached the age of a hundred years, and asked her counsel. She answered that, if he was confident in the justice of his cause, he must die sword in hand. In embracing him for the last time, she felt the cuirass he wore and exclaimed that such a precaution was unworthy of a man resolved to die. He, therefore, took off the cuirass, and, when the Omayyad troops made their way into the city, attacked them furiously, notwithstanding his advanced age, and was slain. • His head was cut off, and sent by Hajjaj to Damascus.

With Ibn Zobair perished the influence which the early companions of Mahomet had exercised over Islam. Medina and Mecca, though they

continued to be the holy cities, had no longer their old political importance, which had already been shaken to its foundations by the murder of Othman and the subsequent troubles. Henceforward we shall find temporal interests, represented by Damascus, predominating over those of religion, and the centre of Islam, now permanently removed beyond the limits of Arabia, more susceptible to foreign influence, and assimilating more readily their civilizing elements. Damascus, Kufa and Basra will attract the flower of all the Moslem pro- vinces, and thus that great intellectual, literary and scientific movement, which reached its apogee under the first Abbasid Caliphs at Bagdad, steadily becomes more marked.

After the burning of the Ka'ba during the siege of Mecca by Hosain b. Nomair, Ibn Zobair had rebuilt and enlarged the house of God. It is said that he thus carried out a design of the Prophet, which he had not ventured to undertake for fear of offending the newly converted Koreishites. Hajjaj pulled down the enlargements and restored the Ka'ba to its old state. Mean- while, the caliph committed to him the government of the Hejaz. The Medinians, whose loyalty was suspected, were treated by him with severity; not a few maulas (clients) were obliged to wear a leaden badge on their neck (Tabari, ii. p. 854 seq.).

Thus the protracted war against Ibn Zobair was brought to an end; hence this year (71) also is called the " year of union " (jama' a). But the storms in Irak and Mesopotamia had not yet altogether subsided. The Qais could not leave unavenged the blood shed at Merj Rahit. For about ten years the Syrian and Mesopotamian deserts were the scene of a series of raids, often marked by great cruelty, and which have been the subject of a great many poems. Abdalmalik had need of all his tact and energy to pacify ultimately the zealous sectaries, but the antagonism between Yemenites (Kalb and Azd) and Modarites (Qais and Tamim) had been increased by these struggles, and even in the far east and the far west had fatal consequences.

When Abdalmalik, after a stay of forty days, returned from Irak to Syria, he left two Omayyad princes as his vicegerents in Kufa and Basra. Mohallab, who at the time of the battle of Bajomaira was in the field against the Azraqites (Kharijites), and had put himself at the disposal of the caliph, had orders to carry on the war. But the two princes proved unequal to their task and did not support Mohallab sufficiently, so that the Kharijites gained more than one victory. Abdalmalik in alarm made Hajjaj governor of Irak with the most extensive powers. The troops of Kufa, who accompanied Mohallab in an expedition against the

Kharijites, had abandoned their general and dispersed to their homes, and nothing could induce them to return to their duty. Then, in the year 75 (a.d. 694),' at the moment when the people were assembled in the mosque for morning prayers, an unknown young man of insignificant appearance, with a veil over his face, ascended the pulpit. It seemed at first that he could not find his words. One of the audience, with a contemptuous remark, took a handful of pebbles to pelt him with. But he let them fall when Hajjaj lifted his veil and began to speak.

" Men of Kufa," he said, " I see before me heads ripe for the sickle, and the reaper- — I am he. It seems to me, as if I saw already the blood between your turbans and your shoulders. I am not one of those who can be frightened by inflated bags of skin, nor need any one think to squeeze me like a fig. The Prince of the Believers has spread before him the arrows of his quiver, and has tried every one of them by biting its wood. It is my wood that he has found the hardest and strongest, and I am the arrow which he shoots against you."

At the end of this address he ordered his clerk to read the letter of the caliph. He began: " From the servant of God, Abdalmalik, Prince of the Believers, to the "Moslems that are in Kufa, peace be with you." As nobody uttered a word in reply, Hajjaj said: " Stop, boy," and exclaimed: " The Prince of the Believers salutes you, and you do not answer his greeting ! You have been but poorly taught. I will teach you afresh, unless you behave better. Read again the letter of the Prince of the Believers." Then, as soon as he had read: " peace upon ye," there remained not a single man in the mosque who did not respond, "and upon the Prince of the Believers be peace." Thereupon Hajjaj ordered that every man capable of bearing arms should immediately join Mohallab in Khuzistari (Susiana), and swore that all who should be found in the town after the third day should be beheaded. This threat had its effect, and Hajjaj proceeded to Basra, where his presence was followed by the same results. Mohallab, reinforced by the army of Irak, at last succeeded, after a struggle of eighteen months, in subjugating the Kharijites and their caliph Qatara b. Foja'a, and was able at the beginning of the year 78 (a.d. 697) to return to Hajjaj at Basra. The latter loaded him with honours and made him governor of Khorasan, whence he directed several expeditions into Transoxiana. In the meantime Hajjaj himself had, in 695 and 696, with great difficulty suppressed Shablb b. Yazid at the

head of the powerful tribe of Shaiban, who, himself a Kharijite, had assumed the title of Prince of the Believers, and had even succeeded in occupying Kufa. In the east the realm of Islam had been very much extended under the reign of Moawiya, when Ziyad was governor of Irak and Khorasan. Balkh and Tokharistan, Bokhara, Samarkand and Khwarizm (modern Khiva), even Kabul and Kandahar had been subdued; but in the time of the civil war a great deal had been lost again. Now at last the task of recovering the lost districts could be resumed. When, in 697, Hajjaj gave the government of Khorasan to Mohallab, he committed that of Sijistan (Seistan) to Obaidallah b. Abi Bakra, a cousin of Ziyad. This prefect allowed himself to be enticed by Zanbll, prince of Zabulistan, to penetrate into the country far from his base, and escaped narrowly, not without severe losses. The command over Sijistan was now given to Abdarrahman b. Ash'ath, a descendant of the old royal family of Kinda, and a numerous army was entrusted to him, so magnifi- cently equipped that it was called " the peacock army." Not long after his arrival in Sijistan, Ibn Ash'ath, exasperated by the masterful tone of Hajjaj, the plebeian, towards himself, the high-born, decided to revolt. The soldiers of Irak, who did not love: the governor, and disliked the prospect of a long and difficult war far from home, eagerly accepted the proposition of returning to Irak, and even proclaimed the dethronement of Abdalmalik, in favour of Ibn Ash'ath. The new pretender entered Fars and Ahwaz (Susiana) , and it was in this last province near Tostar (Shuster) that Hajjaj came up with him, after receiving from Syria the reinforcements which he had demanded in all haste from the caliph. Ibn Ash'ath drove him back to Basra, entered the city, and then turned his arms against Kufa.

of which be took possession with aid from within. Hajjaj, afraid lest his communications with Syria should be cut off, pitched his camp at Dair Qorra, eighteen miles west from Kufa towards the desert, where Mahommed, the brother of the caliph, and Abdallah, his son, brought him fresh troops. Ibn Ash'ath encamped not far from him at Dair al-Jamajim with a far more numerous army. In great alarm Abdalmalik endeavoured to stifle the revolt by offering to dismiss Hajjaj from his post. The insurgents rejected this offer, and hostilities recommenced. At the end of three months and a half, in July 702, a decisive action took place. Victory declared for Hajjaj. Ibn Ash'ath fled to Basra, where he managed to collect fresh troops; but having been again beaten in a furious battle that took place at Maskin near the Dojail, he took refuge at Ahwaz, from which he was soon driven by the troops of Hajjaj under 'Omara b. Tamlm. The rebel then retired to Sijistan, and afterwards sought • an asylum with the king of Kabul. His partisans fled before 'Omara's army and penetrated into Khorasan, where they

were disarmed by the governor Yazid, son of the celebrated Mohallab, who had died in the year 701. The pretender was betrayed by the king of Kabul and killed himself. His head was sent to Hajjaj and then to Damascus. This happened in the year 703 or 704. Yazid b. Mohallab was soon after deprived of the government of Khorasan, Majjaj accusing him of partiality towards the rebels of Yemenite extraction. He appointed in his stead first his brother Mofaddal b. Mohallab, and nine months after Qotaiba b. Moslim, who was destined in a later period to extend the sway of Islam in the east as far as China.

The struggle of Ibn Ash'ath was primarily a contest for hegemony between Irak and Syria. The proud Arabic lords could not acquiesce in paying to a plebeian like Hajjaj, invested with absolute power by the caliph, the strict obedience he re- quired. They considered it further as an injustice that the Syrian soldiers received higher pay than those of Irak. This is apparent from the fact that one of the conditions of peace proposed by Abdalmalik before the battle of Dair al-Jamajim had been that henceforth the Irakian troops should be paid equally with the Syrian. Moreover, Hajjaj, in order to maintian the regular revenue from taxation, had been obliged to introduce stringent regulations, and had compelled a great many villagers who had migrated to the cities to return to their villages. Several of these -werefaqihs, students of Koranic science and law, and all these seconded Ibn Ash'ath with all their might. But, as Wellhausen has shown, it is not correct to consider the contest as a reaction of the maula's (Persian Moslems) against the Arabic supremacy.

Immediately after the victories of Dair al-Jamajim and Maskin, in 702, Hajjaj, built a new residence on the Tigris, between Basra and Kufa, which he called Wasit (" Middle "). There his Syrian soldiers were not in contact with the turbulent citizens of the two capitals, and were at any moment ready to suppress any fresh outburst.

At the beginning of his reign Abdalmalik had replaced the humble mosque built by Omar on the site of the temple at Jerusalem by a magnificent dome, which was completed in the year 691. Eutychius and others pretend that he desired to substitute Jerusalem for Mecca, because Ibn Zobair had occupied the latter place, and thus the pilgrimage to the Ka'ba had become difficult for the Syrians. This is quite improbable. Abdalmalik was born and educated in Islam, and distinguished himself in his youth by piety and continence. He regarded himself as the champion of Islam and of the communion of the believers, and had among his intimates men of acknowledged devoutness such as Raja b. Haywa. The idea of interfering with the pilgrimage to the House of God at Mecca, which would have alienated

from him all religious men, and thus from a political point of view would have been suicidal, cannot have entered his mind for a moment. But the glorification of Jerusalem, holy alike for Moslems, Christians and Jews, could not but exalt the glory of Islam and its rulers within and without.

As soon as the expedition to Irak against Mus'ab had termin- ated, the holy war against the Greeks was renewed. The

operations in Asia Minor and Armenia were entrusted to Mahommed b. Merwan, the caliph's brother, who was appointed governor of Mesopotamia and Armenia, and in 692 beat the army of Justinian II. near Sebaste in Cilicia. From this time forth the Moslems made yearly raids, the chief advantage of which was that they kept the Syrian and Mesopotamian Arabs in continual military exercise. After the victorious march of Okba (Oqba) b. Nan' through north Africa and the foundation of Kairawan, his successor Qais b. Zohair had been obliged to retreat to Barca (Cyrenaica). In the year 696 Abdalmalik sent Hassan b. No'man into Africa at the head of a numerous army. He retook Kairawan, swept the coast as far as Carthage, which he sacked, expelling the Greek garrisons from all the fortified places; he then turned his arms against the Berbers, who, commanded by the Kahina (Diviner), as the Arabs called their queen, beat him so completely that he was compelled to retreat to Barca. Five years later he renewed the war, defeated and killed the Kahina, and subdued the Berbers, who henceforward remained faithful to the Arabs. Hassan continued to be governor of Kairawan till after the death of Abdalmalik.

In the meantime Abdalmalik reconstituted the administration of the empire on Arabic principles. Up to the year 693 the Moslems had no special coinage of their own, and chiefly used Byzantine and Persian money, either imported or struck by themselves. Moawiya, indeed, had struck dinars and dirhems with a Moslem inscription, but his subjects would not accept them as there was no cross upon them. Abdalmalik instituted a purely Islamitic coinage. If we may believe Theophanes, who says that Justinian II. refused to receive these coins in payment of the tribute and therefore declared the treaty at an end, we must put the beginning of the coinage at least two years earlier. Hajjaj coined silver dirhems at Kufa in 694. A still greater innovation was that Arabic became the official language of the state. In the conquered countries till then, not only had the Greek and Persian

administration been preserved, but Greek remained the official language in the western, Persian in the eastern provinces. All officials were now compelled to know Arabic and to conduct their administration in that language. To this change was due in great measure the predominance of Arabic throughout the empire. Lastly, a regular post service was instituted from Damascus to the provincial capitals, especi- ally destined for governmental despatches. The postmasters .were charged with the task of informing the caliph of all important news in their respective countries.

All the great rivals of Abdalmalik having now disappeared, he was no longer like his predecessors primus inter pares, but dominus. Under his rule the members of the Omayyad house enjoyed a greater amount of administrative control than had formerly been the case, but high office was given only to com- petent men. He succeeded in reconciling the sons of ‘Amr Ashdaq, and also Khalid b. Yazid, to whom he gave bis own daughter in marriage. He himself had married ‘Atika, a daughter of Yazid, a union which was in all respects a happy one. He took great care in the education of his sons, whom he destined as his successors. His brother Abdalazlz, governor of Egypt, whom Merwan had marked out as his successor, died in the year 703 or 704, and Abdalmalik chose as heirs to the empire first his son Walid, and after him his second son Suleiman. He himself died on the 14th Shawwal 86 (9th October 705) at the age of about sixty. His reign was one of the most stormy in the annals of Islam, but also one of the most glorious. Abdalmalik not only brought triumph to the cause of the Omayyads, but also extended and strengthened the Moslem power as a whole. He was well versed in old Arabic tradition and in the doctrine of Islam, and was passionately fond of poetry. His court was crowded with poets, whom he loaded with favours, even if they were Christians like Akhtal. In his reign flourished also the two celebrated rivals of Akhtal, Jarir and Farazdaq.

6. Reign of Walid I. — This is the most glorious epoch in the history of Islam. In Asia Minor and Armenia, Maslama, brother of the caliph, and his generals obtained numerous successes against the Greeks. Tyana was conquered after a long siege,

v. 2

and a great expedition against Constantinople was in preparation. In Armenia Maslama advanced even as far as! the Caucasus. In Africa, Musa b. Nosair, who succeeded Hassan b. No’man as governor, in a short time carried his conquests as far as Fez, Tangier and Ceuta, and one of his captains even made -a descent on Sicily and plundered

Syracuse. When he returned from the west to Kairawan, he made his client Tariq (or Tarik) governor of Tangier and of the whole western part of Africa. Under him the chiefs who had submitted to the Moslem arms retained their authority. One of them was the Greek exarch of Tangier, Julian, who, supported by the powerful Berber tribe of Ghomera, had long resisted and even asked for aid from Spain, but had been compelled to surrender and was left governor of Cedta. Meanwhile in Spain, after the death of the Gothic king Witiza in the year 90 (708-709), anarchy arose, which was terminated by the council of noblemen at Toledo electing Roderic, the power- ful duke of Baetica, to be his successor in the fifth year of Walid. The eldest son of Witiza then applied to Julian, and asked the aid of the Arabs for the recovery of his father's throne. Tariq forwarded the embassy to Kairawan, and Musa asked the caliph's permission to send an expedition into Spain. Authorized by Musa, Tariq now sent, in Ramadan 91 (July 710), 500 Berbers under the command of Tarif to reconnoitre the country. This expedition, seconded by partisans of Witiza, was successful. Ill the beginning of a.d. 711 Roderic had been summoned to the north on account' of an invasion of Navarra by the Franks', caused, it is said, by the conspirators. Tariq s thus certain of meeting no serious opposition to his landing; passed into Spain himself with an army composed mainly of Berbers of the Ghomera tribe under the guidance of Julian. The spot where he landed thence acquired the name of Jebel Tariq, " Mountain of Tariq," afterwards corrupted into Gibraltar. Having made himself master of Algeciras and thereby secured his communication with Africa, Tariq set out at once in the direction of Cordova. At the news of the invasion Roderic hastened back and led a numerous army against the combined forces of Tariq and the partisans of Witiza. A fierce battle took place in the plain of Barbata on the little river of Guadaleta (north of Medina Sidonia), in which Roderic was completely routed. The spoils of the victors were immense, especially in horses, but the king himself had dis- appeared. Fearing lest he should have escaped to Toledo and should there fit out another army, the partisans of Witiza insisted that Tariq should march immediately against the capital. Tariq complied with their wishes, notwithstanding the express command of Musa b. Nosair that he should not venture too far into the country, and the protests of Julian. Having made himself master of Ecija and having despatched a detachment under Moghlth against Cordova, Tariq took Mentesa (Villanueva de la Fuente) and marched upon Toledo, which he soon con- quered. At the same time Moghlth took Cordova. But, notwithstanding these successes, Tariq knew that his situation was most critical. King Roderic, who had escaped to Lusitania, and the noble Goths, who had fled from Toledo, would certainly not be slow

in making efforts to regain what they had lost. He therefore sent a message in all haste to Musa, entreating him to come speedily. Musa, though angered by the disobedience of Tariq, hastened to the rescue and embarked in April 712 with 18,000 men, among them many noble Arabs, and began, advised by Julian, a methodical campaign, with the purpose of estab- lishing and securing a line of communication between the sea and Toledo. After having taken Seville, Carmona and Merida, he marched from the latter place by the Via Romana to Sala- manca, after having ordered Tariq to rejoin him in order to encounter king Roderic. Not far from Tamames the king was defeated and killed. King Alphonso the Great found his tomb- stone at Viseo with the inscription, ” Hie requiescit Rodericus rex Gothorum.” After this battle Must reconquered Toledo, which, after the departure of Tariq, had recovered its independence, and entered the capital in tfiumph . Already, before the expedi- tion to Salamanca, he had perceived that the sons of Witiza had neither military nor political ability. He therefore proclaimed the caliph of Damascus as sole ruler of the whole peninsula.

The Gothic princes must content themselves with honours and apanages, in which they readily acquiesced. In the same year 93 (a.d. 712) Musa struck Moslem coins with Latin inscriptions. Musa then continued the subjugation of Spain, till Walid recalled him to Damascus. He obeyed after having appointed his son Abdalazlz governor of Andalos (Andalusia), as the Arabs named the peninsula, and assigned Seville as his residence. AbdalazTz consolidated his power by marrying the widow of the late king Roderic. Musa left Spain about August 714, and reached Damascus shortly before the death of Walid. Notwithstanding the immense booty he brought, he did not receive his due reward. Accused of peculation, he was threatened with imprisonment unless he paid a fine of 100,000 pieces of gold. The old man — he was born in the year 640 — was released by Yazid b. Mohallab, the then mighty favourite of the caliph Suleiman, but died in the same year 716 on his way to Mecca. His son Abdalazlz was an excellent ruler, who did much for the consolidation of the new conquests, but he reigned only one year and eleven months, when he was murdered. His death has been falsely imputed by some historians to the caliph Suleiman. 1

In the East the Moslem armies gained the most astonishing successes. In the course of a few years Qotaiba b. Moslim conquered Paikend,

Bokhara, Samarkand, Khwarizm (mod. Khiva), Ferghana and Shash (Tashkent), and even Kashgar on the frontiers of China. Meanwhile Mahommed b. Qasim invaded Makran, took Daibol, passed the Indus, and marched, after having beaten the Indian king Daher, through Sind upon Multan, which he conquered and whence he carried off an immense booty.

Walid was the first caliph, born and trained as prince, who felt the majesty of the imamate and wished it to be felt by his subjects. He desired to augment the splendours of Islam and its sovereign, as Abdalmalik had already done by building the dome of Jerusalem. In the time of the conquest of Damascus, one half of the great church had been made a mosque, while the remaining half had been left to the Christians. Walid annexed this part, indemnifying the Christians elsewhere, and restored the whole building sumptuously and magnificently. In his time many fine palaces and beautiful villas were built in Syria, and Becker's conjecture seems not altogether improbable, that from this period dates the palace of Mashetta, the facade of which is now in the Kaiser Friedrich Museum at Berlin, as perhaps also the country houses discovered by Musil in the land of Moab. Walid also caused the mosque of Medina to be enlarged. For this purpose, the apartments of the Prophet and his wives were demolished, which at first caused much discontent in Medina, some crying out that thereby a verse of the Book of God (S. 49, v. 4) was cancelled. With this exception, the citizens of Medina had nothing to complain of. The vicegerent of Abdalmalik had treated them harshly. Walid immediately on his accession appointed as governor of Hejaz his cousin Omar b. Abdalazlz, who was received there with joy, his devoutness and gentle character being well known. But the reputation of Omar attracted to the two holy cities a great number of the inhabitants of Irak, who had been deeply involved in the rebellion of Ibn Ash'ath. Hajjaj, however, was not the man to allow the forma- tion of a fresh nucleus of sedition, and persuaded the caliph to dismiss Omar in the year 712, and appoint Othman b. H a yyan at Medina and Khalid al-Qasri at Mecca. These two prefects compelled the refugees to return to Irak, where many of them were severely treated and even put to death by Hajjaj.

Few people have been so slandered as this great viceroy of the Orient. In reality he was a man of extraordinary ability, and accomplished the task committed to him with vigour and energy. To his unflagging constancy was due the suppression of the dangerous rebellion of Ibn Ash'ath. After the restoration of peace his capacity for organization was displayed in all directions.

1 This account of the conquest is based partly on the researches of Dozy, but mainly on those of Saavedra in his Estudio sobre la Invasion de los Arabes en Espana (Madrid, 1892). Some of the details, however, e.g. the battle near Tamames and the part played by the sons of Witiza, are based, not on documentary evidence, but on probable inferences. For other accounts of the deaths of Musa and Abdalaziz see Sir Wm. Muir, Caliphate (London, 1891), pp.368-9.

The draining and tilling of submerged or uncultivated land on a large scale, the promotion of agriculture in every way, in par- ticular by the digging of channels, and the regulation of the system of taxation, were carried out on his initiative. He showed the utmost wisdom in the selection of his lieutenants. The fear of his name was so great that even in the desert there was security for life and property, and his brilliant military successes were unquestionably due in a great measure to the care which he bestowed on equipment and commissariat. The heavy expenses entailed thereby were largely met by the booty which he won. Hajjaj was a sincere Moslem; this, however, did not prevent him from attacking Ibn Zobair in the Holy City, nor again from punishing rebels, though they bore the name of holy men. He enjoyed the entire confidence of Abdal- malik with Walid, but Suleiman, the appointed successor, regarded him with disfavour. Yazid b. Mohallab, whom he had recalled from Khorasan, and imprisoned, had escaped and put himself under the protection of Suleiman, who made himself surety for the fine to which Yazid had been condemned. Hajjaj foreboded evil, and prayed eagerly that he might die before Walid. His death took place about the end of Ramadan 95 (June or July 714).

7. Reign of Suleiman (Solaiman). — Suleiman had early missed the throne. Walid wished to have his son Abdalazlz chosen as his successor, and had offered Suleiman a large sum of money to induce him to surrender bis rights. Walid went still further and sent letters to the governors of all the provinces, calling on them to take the oath of allegiance to his son. None, except Hajjaj and his two generals Qotaiba b. Moslim and Mahommed b. Qasim, consented thus to set at naught the order of succession established by Abdalmalik; and Suleiman succeeded without difficulty on the death of his brother Jornada II. 96 (February 715). We can easily conceive the hatred felt by Suleiman for Hajjaj and for all that belonged to him. Hajjaj himself was dead; but Suleiman poured out his wrath on his family and his officers. The governors of Medina and Mecca were dismissed; Mahommed b. Qasim, the conqueror of India, cousin of Hajjaj, was dismissed from his post and outlawed. Qotaiba b. Moslim, the powerful governor of Khorasan, tried to anticipate the caliph by a

revolt, but a conspiracy was formed against him, which ended in his murder. Some historians say that he was falsely accused of rebellion.

Yazid b. Mohallab, the enemy of Maj jaj, was made governor • of Irak. His arrival was hailed with joy, especially by the Azd, to whom his family belonged, and the other Yemenite tribes. Yazid discovered soon that the system of taxation as regulated by Hajjaj could not be altered without serious danger to the finances of the empire, and that he could not afford the expenses which his prodigal manner of life involved. He there- fore asked the caliph to give him the governorship of Khorasan also, and took his residence in Merv, where he was free from control. On his return to Khorasan he set on foot a series of new expeditions against Jorjan and Tabaristan, with only partial success. He sent, however, to the caliph an exaggerated account of his victories and the booty he had made. He had cause to repent this later.

Walid had, in the last years of his reign, made preparations for a great expedition against Constantinople. Suleiman carried them on with energy, and as early as the autumn of a.d. 715 Maslama invaded Asia Minor at the head of a numerous army, whilst a well-equipped fleet under Omar b. Hobaira sailed out to second him. It is said that Suleiman was firmly persuaded that Constantinople would be conquered during his reign, in accordance with a Sibylline prophecy which said that the city would be subdued by a caliph bearing the name of a prophet, he himself being the first to fulfil this condition. 2 Moreover, the Byzantine empire was in these years disturbed by internal troubles. The first year of the expedition was not unsuccessful. The siege of Amorium in Phrygia was broken up, but Pergamum and Sardis were taken. On the 25th of August 716 the blockade

2 Solaiman is the Arabic form of Solomon. The prophecy is to be found in the Kitab al-Oyun, p. 24; cf. Tabari ii. p. 1138.

of Constantinople began from the land side, and two weeks later from the sea side. A few months before, Leo the Isaurian had ascended the throne and prepared the city for the siege. This lasted about a year. The besieged were hard pressed, but the besiegers suffered by the severe winter, and were at last obliged to raise the siege. Maslama brought back the rest of his army in a pitiful state, while the fleet, on its return, was partly de- stroyed by a violent tempest. The Moslems

regard this failure as one of the great evils that have befallen the human race, and one which retarded the progress of the world for ages, 1 the other calamity being the defeat in the battle of Tours by Charles Martel.

Maslama was still on his way back when Suleiman died at Dabiq in northern Syria, which was the base of the expeditions into Asia Minor. He seems not to have had the firmness of character nor the frugality of Walid; but he was very severe against the looseness of manners that reigned at Medina, and was highly religious. Raja. b. Haywa, renowned for his piety, whose influence began under Abdalmalik and increased under Walid, was his constant adviser and even determined him to designate as his successor his devout cousin Omar b. Abdalazlz. Suleiman was kind towards the Alids and was visited by several of them, amongst others by Abu Hashim, the son of Mahommed b. al Hanaflya, who after his father's death had become the secret Imam (head) of the Shi'ites. On his way back to Hejaz this man visited the family of Abdallah b. 'Abbas, which resided at Homaima, a place situated in the vicinity of 'Amman, and died there, after having imparted to Mahommed b. Ali b. Abdallah b. Abbas the names of the chiefs of the Shi'a in Irak and Khorasan, and disclosed his way of corresponding with them. From that time the Abbasids began their machinations against the Omayyads in the name of the family of the Prophet, avoiding all that could cause suspicion to the Shi'ites, but holding the strings firmly in their own hands.

8. Reign of Omar II. — Omar b. Abdalazlz did his best to imitate his grandfather Omar in all things, and especially in maintaining the simple manner of life of the early Moslems. He was, however, born in the midst of wealth; thus frugality became asceticism, and in so far as he demanded the same rigour from his relatives, he grew unjust and caused uneasiness and discontent. By paying the highest regard to integrity in the choice of his officers, and not to ability, he did not advance the interests of his subjects, as he earnestly wished to do. In the matter of taxes, though actuated by the most noble designs, he did harm to the public revenues.. The principle of Islam was, that no Moslem, whatever might be his nationality, should pay any tax other than the zakdt or poor-rate (see Mahommedan Institutions). In practice, this privilege was confined to the Arabic Moslems. Omar wished to maintain the principle. The original inhabitants had been left on the conquered lands as agriculturists, on condition of paying a fixed sum yearly for each district. If one of these adopted Islam, Omar permitted him to leave his place,' which had been strictly forbidden by Hajjaj in Irak and the eastern provinces, because by it many hands were withdrawn from the tilling of the ground, and those who

remained were unable to pay the allotted amount. Omar's system not only diminished the actual revenue, but largely increased in the cities the numbers of the mania's (clients), mainly Persians, who were weary of their dependency on their Arabic lords, and demanded equal rights for themselves. Their short dominion in Kufa under Mokhtar had been suppressed, but the discontent continued. In North Africa particularly, and in Khorasan the effect of Omar's proclamation was that a great multitude embraced Islam. When it became necessary to impose a tribute upon the new converts, great discontent arose, which largely increased the number of those who followed the Shi'ite preachers of revolt. Conversion to Islam was promoted by the severe regulations which Omar introduced for the non-believers, such as Christians and Jews. 1 1 was he who issued those humiliat- ing rescripts, which are commonly but unjustly attributed to Omar I. But he forbade extortion and suppressed more than

1 Seyid Ameer Ali, A Critical Examination of the Life and Teach- ings of Mahomet, pp. 341-343.

one illegal impost. He endeavoured above all to procure justice for all his subjects. Complaints against oppression found in him a ready listener, and many unlawfully acquired possessions were restored to the legal owners, for instance, to the descendants of Ali and Talha. Even to the Kharijites he contrived to give satisfaction, as far as possible. In all these matters he followed the guidance of divines and devotees, in whose congenial company he delighted. It is, therefore, not to be wondered at that these men saw in Omar the ideal of a prince, and that in Moslem history he has acquired the reputation of a saint.

After the failure of the siege of Constantinople, the advanced posts in Asia Minor were withdrawn, but the raids were continued regularly. It has been said that it was Omar's intention to give up his Spanish conquests, but the facts argue the contrary. The governor, named by Omar, Samh b. Abdallah, even crossed the Pyrenees and took possession of Narbonne; but he was beaten and killed at Toulouse in July 720. But Omar did all he could to prevent the degradation of the Holy War, which, instead of being the ultimate expedient for the propagation of Islam, if all 6ther means had failed, had often degenerated into mere pillaging expeditions against peaceful nations.

9. Reign of Yazid II. — Omar's reign was as short as that of his predecessor. He died on the 24th of Rajab 101 (a.d. 9th February 720). Yazid II., son of Abdalmalik and, by his mother 'Atika, grandson of Yazid I., ascended the throne without opposi- tion. He had at once,

however, to put down a dangerous rebellion. Yazid b. Mohallab had returned to Irak, after the conquest of Jorjan, when Suleiman was still alive. Shortly after, AdI b. Artat, whom Omar II. had appointed governor, arrived, arrested Yazid, and sent him to Omar, who called him to account for the money he had mentioned in his letter to Suleiman, and imprisoned him when he pretended not to be able to pay the amount. Yazid II. had personal grounds for ill-will to Yazid b. Mohallab. One of the wives of the new caliph, the same who gave birth to that son of Yazid II. who afterwards reigned as Walid II., was niece to the celebrated Hajjaj, whose family had been ill-treated by the son of Mohallab, when he was governor of Irak under Suleiman. Aware that Yazid b. Abdalmalik, on ascending the throne, would spare neither him nor his family, Yazid b. Mohallab had succeeded in escaping to Basra, the home of his family, where his own tribe the Azd was predominant. Meanwhile ‘AdI b. Artat had all the brothers of Yazid and other members of the family of Mohallab arrested, and tried to prevent Yazid from entering the city. But ‘Adi was too scrupulous to employ the public money for raising the pay of his soldiers, whilst Yazid promised mountains of gold. Yazid stormed the castle and took ‘AdI prisoner, the public treasury fell into his hands, and he employed the money to pay his troops largely and to raise fresh ones. A pardon obtained for him from the caliph came too late; he had already gone too far. He now proclaimed a Holy War against the Syrians, whom he declared to be worse enemies of Islam than even the Turks and the Dailam. Notwith- standing the warnings of the aged Hasan al-Basri, the friend of Omar II., the religious people, took the part of Yazid, and were followed by the manias. Though the number of his adherents thus increased enormously, their military value was small. Ahwaz (Khuzistan), Fars and Kirman were easily subdued, but in Khorasan the Azd could not prevail over the Tamlm, who were loyal to the caliph. As the rebellion threatened to spread far and wide, Yazid II. was obliged to appeal to his brother, the celebrated Maslama. With the approach of the Syrians, Yazid b. Mohallab tried to forestall them at Kufa. He took his way over Wasit, which he mastered — the Syrian garrison seems to have been withdrawn in the days of Omar II. — but, before he could get hold of Kufa, the Syrian troops arrived. The meeting took place at ‘Aqr in the vicinity of Babel, and Yazid was completely defeated and fell in the battle. His brothers and sons fled to Basra; thence they went by sea to Kirman and then to Kandabil in India; but they were pursued relentlessly and slain with only two exceptions by the officers of Maslama. The possessions of the Mohallabites were confiscated.

Maslama was rewarded with the governorship of Irak and

Khorasan, but was soon replaced by Omar b. Hobaira, who under Omar II. had been governor of Mesopotamia. He belonged to the tribe of Qais, and was very severe against the Azd and other Yemenite tribes, who had more or less favoured the part of Yazid b. Mohallab. In these years the antagonism between Qais (Modar) and Yemenites became more and more acute, especially in Khorasan. The real cause of the dismissal of Maslama was, that he did not send the revenue-quota to Damascus. Omar b. Hobaira, to supply the deficiency, ordered the prefect of Khorasan, Sa'id-al-Harashl, to take tribute from the Sogdians in Transoxiana, who had embraced Islam on the promise of Omar II. The Sogdians raised a revolt in Ferghana, but were subdued by Sa'id and obliged to pay. A still more questionable measure of Ibn Hobaira was his ordering the successor of Sa'id Harashi to extort large sums of money from several of the most respectable Khorasanians. The discontent roused thereby became one of the principal causes of the fall of the Omayyads.

In Africa serious troubles arose from the same cause. Yazid b. Abi Moslim, who had been at the head of the financial department in Irak under Hajjaj, and had been made governor of Africa by Yazid II., issued orders that the villagers who, having adopted Islam, were freed from tribute according to the promise of Omar II., and had left their villages for the towns, should return to their domiciles and pay the same tribute as before their conver- sion. The Berbers rose in revolt, slaughtered the unfortunate governor, and put in his place the former governor Mahommed b. Yazid. The caliph at first ratified this choice, but soon after dismissed Mahommed from his post, and replaced him by Bishr b. §a£wan, who under Hisham made an expedition against Sicily.

Yaiid II. was by natural disposition the opposite of his prede- cessor. He did not feel that anxiety for the spiritual welfare of his subjects which had animated Omar II. Poetry and music, not beloved by Suleiman and condemned by Omar, were held by him in great honour. Two court-singers, Sallama and Hababa, exercised great influence, tempered only by the austerity of manners that prevailed in Syria. He was so deeply affected by the death of Hababa, that Maslama entreated him not to exhibit his sorrow to the eyes of the public. He died a few days later, on the 26th of January 724, according to the chroniclers from grief for her loss. As his successor he had appointed in the first place his brother Hisham, and after him his own son Walid.

10. Reign of Hisham. — Hisham was a wise and able prince and an enemy of luxury, not an idealist like Omar II., nor a worldling like Yazid II., but more like his father Abdalmalik, devoting all his energy to the pacification of the interior, and to extending and consolidating the empire of Islam. But the dis- content, which had been sown under his predecessors, had now developed to such an extent that he could not suppress it in detail. His first care was to put an end to the tyrannical rule of, the Qaisites (Modarites) in Irak and Khorasan by dismissing Omar b. Hobaira and appointing in his place Khalid al-Qasri. This very able man, who under Hajjaj had been prefect of Mecca, belonged properly neither to the Qaisites nor to the Yemenites, but as he took the place of Ibn Hobaira and dis- missed his partisans from their posts, the former considered him as. their adversary, the latter as their benefactor. After his death, in' particular, the Yemenites celebrated him as their chief, and assigned as the reason for their revolt the injuries which he suffered, Khalid himself assuredly did not intend it. He was a loyal servant of the dynasty, and remained such even after receiving very harsh treatment from them. For fifteen years Khalid governed the eastern half of the empire, and continued to maintain peace with only few exceptions throughout. He did much for the reclaiming and improving of lands in Irak, in which the caliph himself and several princes took an active part. The great revenues obtained thereby naturally caused much jealousy. Khalid lived on a very rich scale and was extra- ordinarily liberal, and he was charged with having carried out all his improvements for his own interests, and upbraided for Selling -the corn of his estates only when the prices were high. To these charges were added the accusation that he was too tolerant ; to Christians, Jews and Zoroastrians. As his mother

professed the Christian religion, he was accused of infidelity. At last a conspiracy, into which the principal engineer of Khalid, Hassan the Nabataean, had been drawn, succeeded in inciting Hisham against Khalid. They told him that Khalid had used disrespectful terms in speaking of the caliph, and that he had appropriated revenues belonging to the state. The latter imputation especially influenced Hisham, who was very parsi- monious. When the dismissal of Khalid had been resolved upon, Yusuf b. Omar, his appointed successor, was sent secretly to Kuf a, where he seized on Khalid unawares. For eighteen months Khalid remained in prison. But when he declined even under torture to confess that he had been guilty of extensive peculation, he was finally released. He settled at Damascus and made a noble return for his injuries by taking an active part in the war against the Greeks. In the summer of a.d. 740, while he was in Asia Minor, a great fire broke out in Damascus, the guilt of which was

attributed to Khalid. Though it soon appeared that the imputation was false, Khalid, on his return, was furious, and uttered very offensive words against the caliph. Hisham, how- ever, would not again punish his old servant; on the contrary, he seems to have regarded his indignation as a proof of innocence.

The successor of Khalid in Irak had not long been in office when Zaid b. Ali, grandson of Hosain b. Ali, who had come to Kufa for a lawsuit, was persuaded by the chiefs of the Shi'a to organize a revolt. He succeeded in so far that 15,000 Kufians swore to fight with him for the maintenance of the command- ments of the Book of God and the Sunna (orthodox tradition) of his Prophet, the discomfiture of the tyrants, the redress of injury, and last, not least, the vindication of the family of the Prophet as the rightful caliphs. The revolt broke out on the 6th of January 740. Unfortunately for Zaid he had to do with the same Kufians whose fickleness had already been fatal to his family. He was deserted by his troops and slain. His body was crucified in Kufa, his head sent to Damascus and thence to Medina. His son Yahya, still a youth, fled to Balkh in Khorasan, but was discovered at last and hunted down, till he fell sword in hand under Walid II. Abu Moslim, the founder of the Abbasid dynasty, proclaimed himself his avenger, and on that occasion adopted the black garments, which remained the distinctive colour of the dynasty.

In Khorasan also there were very serious disturbances. The Sogdians, though subdued by Sa'id al Harashi, were not appeased, but implored the assistance of the Turks, who had long been contending earnestly against the Arabs for the dominion of Transoxiana. They found besides a most valuable ally in Harith b. Soraij, a distinguished captain of the Arabic tribe of Tamlm, who, with many pious Moslems, was scandalized by the government's perfidy in regard to the new converts. Harith put himself at the head of all the malcontents, and raised ■ the black flag, in compliance with a Sibylline prophecy, holding that the man with the black flag (the Prophet's flag) would put an end to the tyranny, and be the precursor of the Mahdi. 1 The government troops suffered more than one defeat, but in the last month of the year 118 (a.d. 736) the governor Asad al- Qasrl, the brother of Khalid, after having defeated* Harith, gained a brilliant victory over the Turks, which finally caused them to retreat. Asad died almost simultaneously with the dismissal of Khalid. Hisham then separated Khorasan from Irak and chose as governor of the former Nasr b. Sayyar, a valiant soldier who had grown grey in war, and who, besides all his other capacities, was an excellent poet. Nasr instituted a system of taxation, which, if it had been introduced earlier, would perhaps have saved the Arabic domination. It was that which later on

was generally adopted, viz. that all possessors of conquered lands (i.e. nearly the whole empire except Arabia), whether Moslems or not, should pay a fixed tax, the latter in addition to pay a poll-tax, from which they were relieved on conversion to Islam. During thd reign of Hisham, Nasr made a successful expedition against Harith and the Turks. The

1 Cf. Van Vloten, Recherches stir la domination arabe, le Chiitisme et les croyances messianiques sous le Khalifat des Omayades (Amsterdam, 1894), p. 63 seq.

propaganda of the Shi'a by the Abbasids was continued in these years with great zeal. •

In India several provinces which had been converted to Islam under the Caliphate of Omar II. declared themselves independent, because the promise of equal rights for all Moslems was not kept under the reign of his successors. This led to the evacuation of the eastern part of India (called Hind by the Arabs, Sind being the name of the western part) , and to the founding of the strong cities of Mahfuza and Mansura for the purpose of controlling the land.

In the north and north-west of the empire there were no internal disorders, but the Moslems had hard work to maintain themselves against the Alans and the Khazars. In the year 112 (a.d. 730) they suffered a severe defeat, in which the general Jarrah perished. But the illustrious Maslama b. Abdalmalik, and Merwan b. Mahommed (afterwards caliph), governor of Armenia' and Azerbaijan (Adherbaijan), succeeded in repelling the Khazars, imposing peace on the petty princes of the eastern Caucasus, and consolidating the Arab power in that quarter. The war against the Byzantines was continued with energy during the whole of Hisham's reign. Moawiya, the son of Hisham, whose descendants reigned later in Spain, was in com- mand till 118 (a.d. 736), when he met his death accidentally in Asia Minor by a fall from his horse. After his death, Suleiman, another son of the caliph, had the supreme command. Both were eager and valiant warriors. But the hero of all the battles was Abdallah b. Hosain, surnamed al-Battal (the brave). He has been the subject of many romantic tales. Tabarl tells how he took the emperor Constantine prisoner in the year 114 (a.d. 732; but Constantine V. Copronymus only began to reign in. 740 or 741 a.d.); another Arabic author places

this event in the year 122, adding that al-Battal, having defeated the Greeks, was attacked and slain in returning with his captives. The Greek historians say nothing about Constantine having been made prisoner. It is probable that the Arabs took another Greek soldier for the prince. 1 The victories of the Moslems had no lasting results. During the troubles that began in the reign of Walid II., the Greeks reconquered Marash (Germanicia), Malatia (Malatiyeh) and Erzerum (Theodosiopolis) .

In Spain the attention of the Moslems was principally turned to avenge the defeat of Samh beyond the Pyrenees. As early as the second year of the reign of Hisham, ‘Anbasa, the governor of Spain, crossed the Pyrenees, and pushed on military operations vigorously. Carcassonne and Nimes were taken, Autun sacked. The death of ‘Anbasa in a.d. 725 and internal troubles put a stop to further hostilities. The Berbers were the chief contingent of the Moslem troops, but were treated by their Arab masters as inferior people. They began to resent this, and one of their chiefs, Munisa (Munuza) , made himself independent in the north and allied himself with Odo, king of Aquitaine, who gave him his daughter in marriage. In the year 113 Abdarrahman b. Abdallah subdued Munisa, crossed the mountains and penetrated into Gascony by the valley of Roncesvalles. The Moslems beat Odo, gained possession of Bordeaux, and overran the whole of southern Gaul nearly as far as the Loire. But in October 732 their march was checked between Tours and Poitiers by Charles Martel and after some days of skirmishing a fierce but indecisive battle was fought. Abdarrahman was among the slain and the Moslems retreated hastily in the night, leaving their camp to the Franks. They were, however, not yet discouraged. In 739 the new governor of Spain, Oqba (Aucupa) b. Hajjaj, a man of high qualities, re-entered Gaul and pushed forward his raids as far as Lyons, but the Franks again drove back the Arabs as far as Narbonne. Thenceforth the continual revolts of the Berbers in Africa, and the internal troubles which disturbed Spain until the reign of Abdarrahman I., effectually checked the ambition of the Moslems.

In Africa the hand of government pressed heavily. The Berbers, though they had pledged themselves to Islam and had furnished the latest contingents for the Holy War, were treated as tributary serfs, notwithstanding the promises given by Omar II. The Kharijites, of whom a great many had emigrated

1 Cf. Wellhausen, Die Kdmpfe der Araber mit den Rom. in der Zeit der Umaijiden (Gottingen, 1901), p. 31.

to Africa, found them eager listeners. Still, they could: not believe that it was according to the will of the caliph that they here thus treated, until a certain number of their chiefs went as a deputation to Hisham, but failed to obtain an audience. There- upon a fierce insurrection broke out, against which the governor of Africa was powerless. Hisham at once sent an army of more than 30,000 men, under the command of Kolthum al-Qoshairl, and Balj b. Bishr. Not far from the river Sabu in Algeria, 2 the meeting with the army of the insurgents took place (a.d. 740). Kolthum was beaten and killed; Balj b. Bishr led the rest of the Syrian army to Ceuta, and thence, near the end of 741, to Spain, where they aided in the suppression of the dangerous revolt of the peninsular Berbers. Balj died in 742. A year later the governor, Abu'l-Khattar, assigned to bis troops for settlement divers countries belonging to the public domain. 3 An effort of the African Berbers to make themselves masters of Kairawan failed, their army being utterly defeated by the governor Hanzala.

Hisham died in February 743, after a reign of twenty years. He had not been wanting in energy and ability, and kept the reins of the government in his own hands. He was a correct Moslem and tolerant towards Christians and Jews. His financial ad- ministration was sound and he guarded against any misuse of the revenues of the state. But he was not popular. His residence was at Rosafa on the border of the desert, and he rarely admitted visitors into his presence; as a rule they were received by his chamberlain Abrash. Hisham tried to keep himself free from and above the rival parties, but as his vicegerents were inexorable in the exaction of tribute, the Qaisites against the Yemenites, the Yemenites against the Qaisites, both parties alternately had reason to complain, whilst the non-Arabic Moslems suffered under the pressure and were dissatisfied. He caused a large extent of land to be brought into cultivation, and many public works to be executed, and he was accused of overburdening his subjects for these purposes. Therefore, Yazid III. (as also the Abbasids) on taking office undertook to abstain from spending money on building and digging. The principle that a well-filled treasury is the basis of a prosperous government was pushed by him too far. Notwithstanding his activity and his devotion to the management of affairs, the Moslem power declined rather than advanced, and signs of the decay of the Omayyad dynasty- began to show themselves. The history of his four successors, Walid II., Yazid III., Ibrahim and Merwan II., is but the history of the fall of the Omayyads.

ir. Reign of Walid II. — Walid II. was a handsome man, possessed of extraordinary physical strength, and a distinguished poet. But Hisham, to whom he was successor-designate, foolishly kept him in the

background, and even made earnest efforts to get his own son Maslama acknowledged as his successor. Walid therefore retired to the country, and passed his time there in hunting, cultivating poetry, music and the like, waiting with impatience for the death of Hisham and planning vengeance on all those whom he suspected of having opposed him. His first public action was to increase the pay of all soldiers by 10 dirhems, that of the Syrians by 20. The Omayyads who came to pay their respects to him received large donations. Many philanthropic institutions were founded. As to the family of his predecessor, he contented himself with confiscating their possessions, with the single exception of Suleiman b. Hisham, whom he had whipped and put in prison. But the Makhzumites, who were related to Hisham by his mother, he deprived of all their power and had them tortured to death. The vicegerents of Hisham were replaced by Qaisites; Yusuf b. Omar, the governor of Irak, being a Qaisite, was not only confirmed in his office, but received with it the supreme command of Khorasan. He made use of it immediately by ordering Nasr b. Sayyar to collect a rich present of horses, falcons, musical instruments, golden and silver vessels and to offer it to the caliph in person, but before the present was ready the news came that Walid had been murdered.

2 Bayan i. p. 42 ; Dozy, Histoire des musulmans d'Espagne, i. p. 246, names the place Bacdoura or Nafdoura, the Spanish chronist Nauam.

3 Dozy i. p. 268,

It is not certain that Walid also suspected Khalid al-Qasrl of having intrigued against him. But Yusuf b. Omar did not rest until he had his old enemy in his power. It is said that he guaranteed Walid a large sum of money, which he hoped to extort from Khalid. This unfortunate man died under torture, which he bore with fortitude, in Muharram 126 (November

743)-

Walid designated his two sons as heirs to the Caliphate. These were still under age and were not the children of a free- born, noble mother. Both circumstances, according to the then prevailing notions, made them unfit for the imamate. Moreover, it was an affront, in particular, for the sons of Walid I., who already had considered the

nomination of Yazid II. as a slight to themselves. A conspiracy arose, headed by Yazid b. Walid I., and joined by the majority of the Merwanid princes and many Kalbites and other Yemenites who regarded the ill-treatment of Khalid al-Qasrl as an insult to themselves. Various stories were circulated about the looseness of Walid's manner of life; Yazid accused him of irreligion, and, by representing himself as a devout and God-fearing man, won over the pious Moslems. The conspirators met with slight opposition. A great many troops had been detached by Hisham to Africa and other provinces, the caliph himself was in one of his country places; the prefect of Damascus also was absent. Without difficulty, Yazid made himself master of Damascus, and immediately sent his cousin Abdalazlz with 2000 men against Walid, who had not more than 200 fighting men about him. A few men hastened to the rescue, among others 'Abbas b. Walid with his sons and followers. Abdalazlz interrupted his march, took him prisoner and compelled him to take the oath of allegiance to his brother Yazid. Walid's small body of soldiers was soon overpowered. After a valiant combat, the caliph retired to one of his apartments and sat with the Koran on his knee, in order to die just as Othman had died. He was killed on the 17th of April 744. His head was taken to Damascus and carried about the city at the end of a spear.

On the news of the murder of the caliph, the citizens of Horns (Emesa) put at their head Abu Mahommed as-Sofianl, a grandson of Yazid I., and marched against Damascus. They were beaten by Suleiman b. Hisham at a place called Solaimanla, 12 m. from the capital. Abu Mahommed was taken prisoner and shut up with several of his brethren and cousins in the Khadra, the old palace of Moawiya, together with the two sons of Walid II. One or two risings in Palestine were easily suppressed. But the reigning family had committed suicide. Their unity was broken. The holiness of their Caliphate, their legitimate authority, had been trifled with; the hatred of the days of Merj Rahit had been revived. The orthodox faith also, whose strong representative and defender had hitherto been the caliph, was shaken by the fact that Yazid III. belonged to the sect of the Qadaris who rejected the doctrine of predestination. The disorganization of the empire was at hand.

12. Reign of Yazid III. — Yazid III., on his accession, made a fine speech, in which he promised to do all that could be expected from a good and wise ruler, even offering to make place im- mediately for the man whom his subjects should find better qualified for the Caliphate than himself. He cancelled, however, the increase of the pay granted by Walid and thus earned the nickname of the Ndqis (diminisher). As

he owed his position to the aid of the Kalbites, he chose his officers from among them. The governorship of Irak was confided to a Kalbite, Mansur b. Jomhur, a hot-headed and unscrupulous man. Yusuf b. Omar was unable to offer resistance, and was ultimately taken and confined in the Khadra. Mansur had hardly been three months in office when Yazid replaced him by Abdallah, son of Omar II. The distant provinces, with the exception of Sind and Sijistan, renounced the authority of the new caliph. In Africa Abdarrah- man b. Hablb, a descendant of the famous ‘Oqba b. Nafi”, was almost independent. In Spain every amir tried to free himself from a suzerainty which appeared to him only nominal. Nasr b. Sayyar, the governor of Khorasan, had not yet decided whether he ought to take the oath of allegiance when Yazid died; after a

reign of only five months and a half, on the 12th of Dhu’l-Hijja •a.h. 126 (25th September a.d. 744).

13. Yazid III. left his brother Ibrahim as his successor. He was acknowledged as caliph only in a part of Syria, and reigned no longer than two months, when he was obliged to abdicate and to submit to the authority of Merwan II.

14. Merwan II., the son of Mahommed b. Merwan and cousin of Maslama, was a man of energy, and might have revived the strength of the Omayyad dynasty, but for the general disorder which pervaded the whole empire. In 73 2 Hisham had entrusted to him the government of Armenia and Azerbaijan, which he held with great success till the death of Walid II. He had great military capacity and introduced important reforms. On the murder of Walid he prepared to dispute the supreme power with the new caliph, and invaded Mesopotamia. Yazid III., in alarm, offered him as the price of peace the government of this province together with Armenia and Azerbaijan. Merwan resolved to accept those conditions, and sent a deputation to Damascus, which, however, had just reached Manbij (Hiera- polis) when Yazid died. Leaving his son Abdalmalik with 40,000 men in Rakka, Merwan entered Syria with 80,000 men. Sulei- man b. Hisham, at the head of 120,000 men, was defeated at ‘Ain al-Jarr, between Baalbek and Damascus. Merwan made many prisoners, whom he treated with the greatest mildness, granting them freedom on condition that they should take the oath of allegiance to the sons of Walid II. He then marched upon Damascus. But Suleiman b. Hisham, Yazid, the son of Khalid al-Qasri, and other chiefs, hastened to the Khadra and killed the two princes, together with Yusuf b. Omar. Suleiman then made himself master of the treasury and fled with the caliph Ibrahim to Tadmor (Palmyra). Only Abu Mahommed as-Sofianl

escaped the murderers. When Merwan entered Damascus this man testified that the sons of Walid II., who had just become adult, had named Merwan successor to the Caliphate, and was the first to greet him as Prince of the Believers. All the generals and officers followed his example and took the oath of allegiance (7th December a.d. 744). Merwan did all he could to pacify Syria, permitting the Arabs of the four provinces to choose their own prefects, and even acquiescing in the selection as prefect of Palestine of Thabit b. No'aim, who had behaved very treacherously towards him before, but whom he had forgiven. He did not, however, wish to reside in Damascus, but transplanted the seat of government to his own town, Harran in Mesopotamia. Suleiman b. Hisham and Ibrahim tendered their submission and were pardoned.

But the pacification was only on the surface. Many Omayyad princes considered Merwan as an upstart, his mother being a slave-girl; the Damascenes were angry because he had chosen Harran for his residence; the Kalbites felt themselves slighted, as the Qaisites predominated. Thabit b. No'aim revolted in Palestine, Emesa (Homs) and Tadmor were turbulent, Damascus was besieged by Yazid b. Khalid al QasrI. Merwan, who wanted to march against Irak, was obliged to return to Syria, where he put an end to the troubles. This time Thabit b. No'aim had to pay for his perfidy with his life. After this new pacification, Merwan caused the Syrians to acknowledge his two sons as heirs to the Caliphate, and married them to two daughters of Hisham. All the Omayyad princes were invited to the wedding, Merwan hoping still to conciliate them. He then equipped 10,000 Syrians, and ordered them to rejoin the army of 20,000 men from Kinnesrin (Qinnasrin) and Mesopotamia, who, under Yazid b. Omar b. Hobaira, were already on the march towards Irak. When these Syrians came to Rosafa (Rusafa), Suleiman b. Hisham persuaded them to proclaim himself caliph, and made himself master of Kinnesrin. From all sides Syrians flocked to his aid till he had 70,000 men under his orders. Merwan im- mediately ordered Ibn Hobaira to stop his march and to wait for him at Durln, and marched with the main force against Suleiman, whom he Utterly defeated at Khosaf in the district of Kinnesrin. Suleiman fled to Horns and thence to Tadmor and on to Kufa, leaving his brother ˆa'id in Homs. The siege of this place by Merwan lasted rfearly five nfdnths. After the victoty the walls

were demolished, and likewise those of Baalbek, Damascus, Jerusalem

and other towns. Syria was utterly crushed, and therewith the bulwark of the dynasty was destroyed. Not until the summer of 128 (a.d. 746) could Merwan resume his campaign against Irak.

The governor of this province, Abdallah, the son of Omar II., was a man of small energy, whose principal care was his personal ease and comfort. An ambitious man, Abdallah b. Moawiya, a great-grandson of Ali's brother Ja'far, put himself at the head of a band of Shi'ites and manias, made himself master of Kufa and marched upon Hira, where, since Yusuf b. Omar, the governor and the Syrian troops had resided. The rebels were defeated, and Kufa surrendered (October 744) under condition of amnesty for the insurgents and freedom for Abdallah b. Moawiya. This adventurer now went into Media (Jabal), where a great number of manias and Shi'ites, even members of the reigning dynasty and of the Abbasid family, such as the future caliph Mansur, rejoined him. With their help he became master of a vast empire, which, however, lasted scarcely three years.

Ibn Omar did not acknowledge Merwan as caliph. For the moment Merwan coald do no more than send a new governor, Ibn Sa'id al IJarashi. This officer was supported only by the Qaisite troops, the Kalbites, who were numerically superior, maintaining Ibn Omar in his residence at Hira. There were many skirmishes between them, but a common danger soon forced them to suspend their hostilities. The general disorder after the death of Hisham had given to the Khawarij an oppor- tunity of asserting their claims such as they had never had before. They belonged for the greater part to the Rabl'a, who always stood more or less aloof from the other Arabs, and had a particular grudge against the Modar. Their leading tribe, the Shaiban, possessed the lands on the Tigris in the province of Mosul, and here, after the murder of Walid II., their chief proclaimed himself caliph. Reinforced by many Kharijites out of the northern provinces, he marched against Kufa. Ibn Omar and Ibn Sa'id al Harash! tried to defend their province, but were completely defeated. Harashi fled to Merwan, Ibn Omar to Hira, which, after a siege of two months, he was obliged to surrender in Shawwal 127 (August a.d. 745). Mansur b. Jomhflr was the first to pass over to the Khawarij; then Ibn Omar himself took the oath of allegiance. That a noble Koreishite, a prince of the reigning house, should pledge himself to follow Dahhak the Shaibanite as his Imam, was an event of which the Khawarij were very proud. Ibn Omar was rewarded with the government of eastern Irak, KhQzistan and Fars.

Whilst Merwan besieged Horns, Dahhak returned to Meso- potamia and took Mosul, whence he threatened Nisibis, where Abdallah, the

son of Merwan, maintained himself with difficulty. Suleiman b. Hisham also had gone over to the Khawarij, who now numbered 1 20,000 men. Mesopotamia itself was in danger, when Merwan at last was able to march against the enemy. In a furious battle at Kafartutha (September a.d. 746) the Khawarij were defeated; Dahhak and his successor Khaibari perished; the survivors were obliged to retire to Mosul, where they crossed the Tigris. Merwan followed them and encamped on the western bank. Immediately after the battle of Kafartutha, Yazid b. Omar b. Hobaira directed his troops towards Irak. He beat the Kharijites repeatedly and entered Kufa in May or June 747. Ibn Omar was taken prisoner; Mansur b. Jomhur fled to Ibn Moawiya. Ibn Hobaira was at last free to send Ibn Dobara with an army to Mesopotamia. At his approach the Kharijites left their camp and fled to Abdallah b. Moawiya, who was now at the height of his power. But it was not destined to last. The two generals of Ibn Hobaira, Ibn Dobara and Nobata b. Hanzala defeated his army; Ibn Moawiya fled to Khorasan, where he met his death; the chief of the Kharijites, Shaiban Yashkori went to eastern Arabia; Suleiman b. Hisham and Mansur b. Johmur escaped to India. Thus, at last, the western and south-eastern parts of the empire lay at the feet of Merwan. But in the north- east, in Khorasan, meanwhile a storm had arisen, against which bis resources and his wisdom were alike of no avail.

When the news of the murder of Walid II. reached Khorasan,

Nasr b. Sayyar did not at once acknowledge the Caliphate of Yazid III., but induced the Arab chiefs to accept himself as amir of Khorasan, until a caliph should be universally acknowledged. Not many months later (Shawwal 126) he was confirmed in his post by Yusuf b. Orriar, the governor of Irak. But Nasr had a personal enemy, the chief of the Azd (Yemenites) Jodai' al- Kirmanl, a very ambitious man. A quarrel arose, and in a short time the Azd under Kirma.nl, supported by the Rabl'a, who always were ready to join the opposition, were in insurrection, which Nasr tried in vain to put down by concessions.

So stood matters when Harith b. Soraij, seconded by Yazid III;, reappeared on the scene, crossed the Oxus and came to Merv. Nasr received him with the greatest honour, hoping to get his aid against Kirmani, but Harith, to whom 3000 men of his tribe, the Tamim, had gone over, demanded Nasr's abdication and tried to make himself master of Merv. Having failed in this, he allied himself with Kirmani. Nasr could hold Merv no longer, and retired to Nishapur. But the Tamim of Harith could not endure the supremacy of the Azd. In a moment the allies were divided into two camps; a battle ensued, in

which Harith was defeated and killed. Originally, Harith seems to have had the highest aims, but in reality he did more than any one else to weaken the Arabic dominion. He brought the Turks into the field against them; he incited the native population of Transoxiana against their Arab lords, and stirred up discord between the Arabs themselves. . Being a Tamimite, he belonged to the Modar, on whom the government in Khorasan depended; but he aided the Yemenites to gain the upper hand of them. Thus he paved the way for Abu Moslim.

Since the days of Ali there had been two tendencies among the Shi'ites. The moderate party distinguished itself from the other Moslems only by their doctrine that the imamate belonged legally to a man of the house of the Prophet. The other party, that of the ultra-Shi'ites, named Hashimiya after Abu Hashim the son of Mahommed b. al-Hanafiya, preached the equality of all Moslems, Arabs or non-Arabs, and taught that the same divine spirit that had animated the Prophet, incorporated itself again in his heirs (see Shi'ites). After the death of Hosain, they chose for their Imam Mahommed b. al-Hanafiya, and at his decease his son Abu Hashim, from whom Mahommed b. Ali, the grandson of Abdallah b. Abbas, who resided at Homaima in the south-east of Syria, obtained the secrets of the party and took the lead (a.h. 98, see above). This Mahommed, the father of the two first Abbasid caliphs, was a man of unusual ability and great ambition. He directed his energies primarily to Khorasan. The missionaries were charged with the task of undermining the authority of the Omayyads, by drawing attention to all the injustices that took place under their reign, and to all the luxury and wantonness of the court, as contrasted with the misery of many of their subjects. God would not suffer it any longer. As soon as the time was ripe — and that time could not be far off — He would send a saviour out of the house of the Prophet, the Mahdi, who would restore Islam to its original purity. All who desired to co-operate in this holy purpose must pledge themselves to unlimited obedience to the Imam, and place their lives and property at his disposal. As a proof of their sincerity they were required at once to pay a fixed sum for the Imam. The missionaries had great success, especially among the non- Arabic inhabitants of Khorasan and Transoxiana.

Mahommed b. Ali died a.h. 126 (a.d. 743-744), and his son Ibrahim, the Imam, took his place. Ibrahim had a confidant about whose antecedents one fact alone seems certain, that he was a mania (client) of Persian origin. This man, Abu Moslim by name, was a man of real ability and devoted to his master's cause. To him,in 745-746, the management of affairs in Khorasan was entrusted, with instructions to consult in all weighty matters the head of the mission, the Arab

Suleiman b. Kathir. At first the chiefs of the mission were by no means prepared to recognize Abu Moslim as the plenipotentiary of the heir of the Prophet. In the year 129 he judged that the time for open manifestation had arrived. His partisans were ordered to assemble from all sides on a fixed day at Siqadenj in the province of Merv. Then, on the 1st Shawwal (15th June 747), the first solemn meeting took

place and the black flags were unfolded. On that occasion Suleiman b. Kathlr was still leader, but by the end of the year . Abu Moslim, whom the majority believed to belong himself to the family of the Prophet, was the acknowledged head of a strong . army. Meantime, Nasr had moved from Nishapur to Merv, and here the two Arabic armies confronted each other. Then, at last, the true significance of Abu Moslim's work was recognized. Nasr warned the Arabs against their common enemy, " who preaches a religion that does not come from the Envoy of God, and whose chief aim is the extirpation of the Arabs." In< vain he had entreated Merwan and Ibn Hobaira to send him troops before it should be too late. When at last it was possible to them to fulfil his wish, it was in fact too late. For a moment it seemed as though the rival Arab factions, realizing their common peril, would turn their combined forces against the Shi'ites. But Abu Moslim contrived to re-awaken their mutual distrust and jealousy, and, taking advantage of the opportunity, made himself master of Merv, in Rabia II. aˆh. i3o(December747). Nasr escaped only by a headlong flight to Nishapur. This was the end of the Arabic dominion in the East. Many Arab chiefs were killed, partly by order of Abu Moslim, partly by their clients. The latter, however, was strictly forbidden by Abu Moslim. So severe indeed was the discipline he exercised, that one of the chief missionaries, who by a secret warning had rendered possible the escape of Nasr from Merv, paid for it with his life.

As soon as Abu Moslim had consolidated his authority, he sent his chief general Qahtaba against Nishapur. Nasr's son Tamlm was vanquished and killed, and Nasr retreated to Kumis (Qumis) on the boundary of Jorjan, whither also advanced from the other side Nobata at the head of an army sent by Merwan. Qahtaba detached his son Hasan against Nasr and went himself to meet Nobata, whom he beat on the ist of Dhu'l-hijja 130 (6th August 748). Nasr could not further resist. He reached Sawa. in the vicinity of Hamadan, where he died quite exhausted, at the age of eighty-five years. Rei and Hamadan

were taken without serious difficulty. Near Nehawend, Ibn Dobara, at the head of a large army, encountered Qahtaba, but was defeated and killed. In themonthof Dhu'l-qa'da 131 (June 749) Nehawend (Nehavend) surrendered, and thereby the way to Irak lay open to Qahtaba. Ibn Hobaira was overtaken and compelled to retire to Wasit. Qahtaba himself perished in the combat, but his son Hasan entered Kufa without any resistance on the 2nd of September 740.

Merwan had at last discovered who was the real chief of the movement in Khorasan, and had seized upon Ibrahim the Imam ■ and imprisoned him at Harran. There he died, probably from the plague, though Merwan was accused of having killed him. When the other Abbasids left Homaima is not certain. But they arrived at Kufa in the latter half of September 749, where in the meantime the head of the propaganda, Abu Salama, called the wazir of the family of Mahomet, had previously undertaken the government. This Abu Salama seems to have had scruples against recognizing Abu'l-Abbas as the successor of his brother Ibrahim, and to have expected that the Mahdi, whom he looked for from Medina, would not be slow in making his appearance, little thinking that an Abbasid would present himself as such. But Abu Jahm, on the instructions of Abu Moslim, declared to the chief officers of the Khorasanian army that the Mahdi was in their midst, and brought them to Abu'l-Abbas, to whom they swore allegiance. Abu Salama also was constrained to take the oath. On Friday, the 12th Rabia II. a.h. 132 (28th November 749) Abu'l-Abbas was solemnly proclaimed caliph in the principal mosque of Kufa. The trick had been carried out admirably. On the point of gathering the ripe fruit, the Alids were suddenly pushed aside,' and the fruit was snatched away by the Abbasids. The latter gained the throne and they took good care never to be deprived of it.

After the conquest of Nehawend, Qahtaba had detached one of his captains, Abu 'Aun, to Shahrazur, where he defeated the Syrian army which was stationed there. Thereupon Abu 'Aun occupied the land of Mosul, where he obtained reinforcements from Kufa, headed by Abdallah b. AH, an uncle of Abu'l-Abbas, who was to have the supreme command. Merwan advanced

to meet him, and was completely defeated near the Greater Zab, an affluent of the Tigris, in a battle which lasted eleven days. Merwan retreated to Harran, thence to Damascus, and finally to Egypt, where he fell in a last struggle towards the end of 132 (August 750). His head was cut off and sent to Kufa. 1 Abu Aun, who had been the real leader of the campaign against Merwan, remained in Egypt as its governor. Ibn Hobaira, who had been besieged in Wasit for eleven

months, then con- sented to a capitulation, which was sanctioned by Abu'l-Abbas. Immediately after the surrender, Ibn Hobaira and his principal officers were treacherously murdered. In Syria, the Omayyads were persecuted with the utmost rigour. Even their graves were violated, and the bodies crucified and destroyed. In order that no members of the family should escape, Abdallah b. Ali pre- tended to grant an amnesty to all Omayyads who should come in to him at Abu Fotros (Antipatris) and acknowledge the new caliph, and even promised them the restitutionof alltheirproperty. Ninety men allowed themselves to be entrapped, and Abdallah invited them to a banquet. When they were all collected, a body of executioners rushed into the hall and slew them with clubs. He then ordered leathern covers to be thrown upon the dying men, and had the banquet served upon them. In Medina and Mecca Da'ud b. Ali, another uricle of Abu'l-Abbas, con- ducted the persecution; in Basra, Suleiman b. Ali. Abu'l-Abbas himself killed those he could lay his hands on in Hira and Kufa, amongst them Suleiman b. Hisham, who had been the bitterest enemy of Merwan. Only a few Omayyads escaped the massacre, several of whom were murdered later. A grandson of Hisham, Abdarrahman, son of his most beloved son Moawiya, reached Africa and founded in Spain the Omayyad dynasty of Cordova.

With the dynasty of the Omayyads the hegemony passes finally from Syria to Irak. At the same time the supremacy of the Arabs came to an end. Thenceforth it is not the contingents of the Arabic tribes which compose the army, and on whom the government depends; the new dynasty relies on a standing army, consisting for the greater part of non-Arabic soldiers. The barrier that separated the Arabs from the conquered nations begins to crumble away. Only the Arabic religion, the Arabic language and the Arabic civilization maintain themselves, and spread more and more over the whole empire.

C. — The Abbasids

We now enter upon the history of the new dynasty, under which the power of Islam reached its highest point.

1. Abu'l-Abbas inaugurated his Caliphate by a harangue in Which he announced the era of concord and happiness which was to begin now that the House of the Prophet had been restored to its right. He asserted that the Abbasids were the real heirs of the Prophet, as the descendants of his oldest uncle Abbas. Addressing the Kufians, he said, " Inhabitants of Kufa, ye are those whose affection towards us has ever been constant and true; ye have never changed your mind, nor swerved from it, notwithstanding all the pressure of the unjust upon

you. At last our time has come, and God has brought you the new era. Ye are the happiest of men through us, and the dearest to us. I increase your pensions with 100 dirhems; make now your preparations, for I am the lavish shedder of blood 2 and the avenger of blood.”

Notwithstanding these fine words, Abu'l-Abbas did not trust

1 Merwan has been nicknamed al-Ja'di and al-Himar (the Ass). As more than one false interpretation of these names has been given, it is not superfluous to cite here Qaisarani (ed. de Jong, p. 31), who says on good authority that a certain al-Ja'd b. Durham, killed under the reign of Hisham for heretical opinions, had followers in Mesopotamia, and that, when Merwan became caliph, the Khora- sanians called him a Ja'd, pretending that all'Ja'd had been his teacher. As to al-Himar this was substituted also by the Khorasanians for his usual title, al-Faras, " the race-horse."

2 The Arabic word for " shedder of blood," as-Saffah, which by that speech became a name of the caliph, designates the liberal host who slaughters his camels for his guests. European scholars have taken it unjustly in the sense of the bloodthirsty, and found in it an allusion to the slaughter of the Omayyads and many others. At the same time, it was not without much bloodshed that Abu'l- Abbas finally established his power.

the Kufians. He resided outside the town with the Khorasanian troops, and with them went first to Hira, then to Hashimiya, which he caused to be built in the neighbourhood of Anbar. For their real sympathies, he knew, were with the house of Ali, and Abu Salama their leader, who had reluctantly taken the oath of allegiance, did not conceal his disappointment. Abu Jahm, the vizier {q.v.; also Mahommedan Institutions), or " helper," of Abu Moslim, advised that Abu Ja'far, the caliph's brother, should be sent to Khorasan to consult Abu Moslim. . The result was that Abu Salama was assassinated, and at the same time Suleiman b. Kathlr, who had been the head of the propaganda in Khorasan, and bad also expected that the Mahdi would belong to the house of Ali. It is said that Abu Ja'far, whilst in Khorasan, was so impressed by the unlimited power of Abu Moslim, and saw so clearly that, though he called his brother and himself his masters, he considered them as his creatures, that he vowed his death at the first opportunity. ,

The ruin of the Omayyad empire and the rise of the new dynasty did not take place without mighty convulsions. In Bathanlya and the Hauran, in the north of Syria, in Mesopo- tamia and Irak Khorasan

insurrections had to be put down with fire and sword. The new caliph then distributed the provinces among the principal members of his family and his generals. To his brother Abu Ja'far he gave Mesopotamia, Azerbaijan and Armenia; to his uncle Abdallah b. AH, Syria; to his uncle Da'ud, Hejaz, Yemen and Yamama (Yemama); to his cousin 'Isa b. Musa, the province of Kufa. Another uncle, Suleiman b. Ali, received the government of Basra with Bahrein and Oman; Isma 'il b. Ali that of Ahwaz; Abu Moslim, Khora- san and Transoxiana; Mahommed b. Ash'atb, Fars; Abu 'Aun, Egypt. In Sind the Omayyad governor, Mansur b. Jomhur, had succeeded in maintaining himself, but was defeated by an army sent against him under Musa b. Ka'b, and the black standard of the Abbasids was raised over the city of Mansura. Africa and Spain are omitted from this catalogue, because the Abbasids never gained any real footing in Spain, while Africa remained, at least in the first years, in only nominal subjection to the new dynasty. In 754 Abu Moslim came to Irak to visit Abu'l- Abbas and to ask his permission to make the pilgrimage to Mecca. He was received with great honour, but the caliph said that he was sorry not to be able to give him the leadership of the pilgrimage, which he had already purposely entrusted to his brother, Abu Ja'far.

Abu'l-Abbas died on the 13th of Dhu'l-hijja 136 (5th June 754). He seems to have been a man of limited capacity, and had very little share in the achievements accomplished in his name. He initiated practically nothing without the consent of Abu Jahm, who was thus the real ruler. In the few cases where he had to decide, he acted under the influence of his brother Abu Ja'far.

2. Reign of Mansur. — Abu'l-Abbas had designated as his successors first Abu Ja'far, surnamed al-Mansur (the victorious), and after him his cousin 'Isa b. Musa. Abu Ja'far was, according to the historians, older than Abu'l-Abbas, but while the mother of the latter belonged to the powerful Yemenite tribe of al- Harith b. Ka'b, the mother of Abu Ja'far was a Berber slave-girl. But he was a son of Mahommed b. Ali, and was therefore pre- ferred by Abu Moslim to his uncles and cousins. Abu'l-Abbas, however, had promised the succession to his uncle Abdallah b. Ali, when he marched against Merwan. When the news of the death of Abu'l-Abbas reached Abdallah, who at the head of a numerous army was on the point of renewing the Byzantine war, he came to Harran, furious at his exclusion, and proclaimed himself caliph. Abu Moslim marched against him, and the two armies met at Nisibis, where, after a number of skirmishes, a decisive engagement took place (2 8th November 754). Abdallah was defeated and escaped to Basra, where he found a refuge with his brother Suleiman. A year later he asked for pardon, and took the oath of allegiance to Mansur.

The caliph spared his life for a time, but he did no.t forget. In 764 Abdallah met his death by the collapse of his house, which had been deliberately undermined.

The first care of Mansur was now to get rid of the' powerful Abu Moslim, who had thus by another brilliant service strengthened his great reputation. On pretence of conferring with him on important business of state, Mansur induced him, in spite of the warnings of his best general, Abu Nasr, to come to Madain (Ctesiphon), and in the most perfidious manner caused him to be murdered by his guards. Thus miserably perished the real, founder of the Abbasid dynasty, the Sahib addaula, as he is commonly called, the Amin (trustee) of the House of the Prophet. A witty man, being asked his opinion about Abu Ja'far (Mansur) and Abu Moslim, said, alluding to the Koran 21, verse 22, "if there were two Gods, the universe would be ruined." The Khorasanian chiefs were bribed into submission, and order was at last re-established by Mansur's general Khazim b. Khozaima in Mesopotamia, and by Abu Da'ud, the governor of Khorasan in the east.

About the same time Africa 1 and Spain escaped from the dominion of the eastern Caliphate; the former for a season, the latter permanently. The cause of the revolt of Africa was as follows. Mansur had written to Abdarrahman, announcing the death of Abu'l-Abbas, and requiring him to take the oath of allegiance. Abdarrahman sent in his adhesion, together with a few presents of little value. The caliph replied by a threatening letter which angered Abdarrahman. He called the people to- gether at the hour of. prayer, publicly cursed Mansur from the pulpit and declared him deposed. He next caused a circular letter, commanding all Maghribins to refuse obedience to the caliph, to be read from the pulpit throughout the whole extent of the Maghrib (western North Africa) . A brother of Abdarrah- man, Ilyas, saw in this revolt an opportunity of obtaining the government of Africa for himself. Seconded by many of the inhabitants of Kairawan, who had remained faithful to the cause of the Abbasids, he attacked his brother, slew him, and pro- claimed himself governor in his stead. This revolution in favour of the Abbasids was, however, not of long duration. Hablb, the eldest son of Abdarrahman, who had fled in the night of his father's murder, was captured, but the vessel which was to convey him to Spain having been detained by stress of weather, his partisans took arms and rescued him. Ilyas was marching against them, when the idea occurred to Habib of challenging him to single combat. Ilyas hesitated, but his own soldiers compelled him to accept the challenge. He measured arms with Habib, and was slain. The party of independence thus triumphed, but in the year 144 (761)

Mahommed b. Ash'athˆ the Abbasid general, entered Kairawan and regained posses- sion of Africa in the name of the eastern caliph. From the year 800, it must be added, Africa only nominally belonged to the Abbasids; for, under the reign of Harun al-Rashid, Ibrahim b. al-Aghlab, who was invested with the government of Africa, founded in that province a distinct dynasty, that of the Aghlabites.

At the same time as the revolt in Africa, the independent Caliphate of the western Omayyads was founded in Spain. The long dissensions which had preceded the fall of that dynasty in the East had already prepared the way fcr the independence of a province so distant from the centre of the empire. Every: petty amir then tried to seize sovereign power for himself, and the people groaned under the consequent anarchy. Weary of these commotions, the Arabs of Spain atjast came to an understanding among themselves for the election of a caliph, and their choice fell upon one of the last survivors of the Omayyads, Abdarrah- man b. Moawiya, grandson of the caliph Hisham. This prince was wandering in the deserts' of Africa, pursued by his implacable enemies, but everywhere protected and concealed by the desert tribes, who pitied his misfortunes and respected his illustrious origin. A deputation from Spain sought him out in Africa and offered him the Caliphate, which he accepted with joy. On the 1st Rabia I. 138 (14th August 755) Abdarrahman landed in the Iberian peninsula, where he was universally welcomed, and

1 The rule of the caliphs in Morocco, which had never been firmly established, had already, 1 in 740, given place to that of independent princes (see Morocco, History).

speedily founded at Cordova the Western Omayyad Caliphate (see Spain: History).

While Mansur was thus losing Africa and Spain, be was trying to redeem the losses the empire had sustained on the northern frontier by the Byzantines. In 750-751 the emperor Constantine V. (Copronymus) had unsuccessfully blockaded Malatia; but five years later he took it by force and razed its wall to the ground. Mansur now sent in 757 an army of 70,000 men under the com- mand of his cousin Abdalwahhab, the son of Ibrahim the Imam, whom he had made governor of Mesopotamia, the real chief being Hasan b. Qahtaba. They rebuilt all that the emperor had destroyed, and made this key of Asia

Minor stronger than ever before. The Moslems then made a raid by the pass of Hadath (Adata) and invaded the land of the Byzantines. Two aunts of the caliph took part in this expedition, having made a vow that if the dominion of the Omayyads were ended they would wage war in the path of God. Constantine advanced with a numerous army, but was afraid of attacking the invaders. The Moslems also rebuilt Mopsuestia. But from 758 till 763 Mansur was so occupied with his own affairs that he could not think of further raids.

In 758 (others say in 753 or 754) a body of 600 sectaries, called Rawendls (?.».), went to Hashimiya, the residence of the caliph, not far from Kufa. They believed that the caliph was their lord, to whom they owed their daily bread, and came to pay him divine honours. They began by marching in solemn procession round the palace, as if it had been the Ka'ba. Mansur being told of it said: " I would rather they went to hell in obedience to us, than to heaven in disobedience." But as they grew tumul- tuous, and he saw that this impious homage gave offence to his men, he caused the principal leaders to be seized and thrown into prison. The Rawendls immediately rose in revolt, broke the prison doors, rescued their chiefs, and returned to the palace. The unfortunate fanatics were hunted down and massacred to the last man, and thereby the ties that bound the Abbasids to the ultra-Shi'ites were severed. From that time forward the Abbasid caliphs became the maintainers of orthodox Islam, just as the Omayyads had been. The name of Hashimiya, which the reigning family still retained, was henceforward derived not from Abu Hashim, but from Hashim, the grandfather of Abbas, the great-grandfather of the Prophet.

A much greater danger now threatened Mansur. In the last days of the Omayyads, the Shi'ites had chosen as caliph, Mahommed b. Abdallah b. Hasan, whom they called the Mahdi and the " pure soul," and Mansur had been among those who pledged themselves to him by oath. Not unnaturally, the Alids in Medina were indignant at being supplanted by the Abbasids, and Mansur's chief concern was to get Mahommed into his power. Immediately after his occupying the throne, he named Ziyad b. Obaidallah governor of Medina, with orders to lay hands on Mahommed and his brother Ibrahim, who, warned betimes, took refuge in flight. In 758 Mansur, informed that a revolt was in preparation, came himself to Medina and ordered Abdallah to tell him where his sons were. As he could not or would not tell, he together with all his brothers and some other relatives were seized and transported to Irak, where Abdallah and bis brother AH were beheaded and the others imprisoned. Notwithstanding all these precautions, a vast conspiracy was formed. On the same day

Mahommed was to raise the standard of revolt in Medina, Ibrahim in Basra. But the Alids, though not devoid of personal courage, never excelled in politics or in tactics. In a.d. 762 Mahommed took Medina and had himself proclaimed caliph. The governor of Kufa, ‘Isa b. Musa, received orders to march against him, entered Arabia, and captured Medina, which, fortified by Mahommed by the same means as the Prophet had employed against the besieging Meccans, could not hold out against the well-trained Khorasanians. Mahommed was defeated and slain. His head was cut off and sent to Mansur. When on the point of death, Mahommed gave the famous sword of the Prophet called Dhu’l-Fiqar to a merchant to whom he owed 400 dinars. It came later, into the possession of Harun al-Rashid. In the meanwhile Ibrahim had not only gained

possession of Ba$ra, Ahwaz and Fars, but had even occupied Wasit. The empire of the Abbasids was in great jeopardy. For fifty days Mansur stayed in his room, neither changing his clothes nor allowing himself a moment’s repose. The greater part of his troops were in Rei with his son al-Mahdi, who had conquered Tabaristan, in Africa, with Mahommed b. Ash’ath, and in Arabia with ‘Isa b. Musa. Had Ibrahim marched at once against Kufa he might have crushed Mansur, but he let slip the opportunity. A terrible conflict took place at Ba-Khamra, 48 m. from Kufa. Homaid b. Qahtaba, the eommander of Mansur’s army, was defeated, only a small division under ‘Isa b. Musa holding its ground. At that moment Salm, the son of the famous Qotaiba b. Moslim, came to the rescue by attacking the rear of Ibrahim. Homaid rallied his troops, and Ibrahim was overpowered. At last he fell, pierced by an arrow, and, in spite of the desperate efforts of his followers, his body remained in the hands of the enemy. His head was cut off and brought to Mansur.

Mansur could now give his mind to the founding of the new capital. When the tumult of the Rawendls took place he saw clearly that his personal safety was not assured in Hashimiya, 1 where a riot of the populace could be very dangerous, and his troops were continually exposed to the perverting influence of the fickle and disloyal citizens of Kufa. He had just made choice of the admirable site of the old market-town of Bagdad when the tidings came of the rising of Mahommed in Medina. In those days he saw that he had been very imprudent to denude himself of troops, and decided to keep henceforth always with him a body of 30,000 soldiers. So Bagdad, or properly ” the round city ” of Mansur, on the western bank of the Tigris, was built as the capital. Strictly it was a huge citadel, in the centre of which was the palace of the caliph and the great mosque. But around this nucleus there soon grew up the great metropolis

which was to be the centre of the civilized world as long as the Caliphate lasted. 2 The building lasted three years and was completed in the year 149 (a.d. 766). That year is really the beginning of the new era. ” The Omayyads,” says the Spanish writer Ibn Hazm, ” were an Arabic dynasty; they had no fortified residence, nor citadel; each of them dwelt in his villa, where he lived before becoming caliph; they did not desire that the Moslems should speak to them as slaves to their master, nor kiss the ground before them or their feet; they only gave their care to the appointment of able governors in the provinces of the empire. The Abbasids, on the contrary, were a Persian dynasty, under which the Arab tribal system, as regulated by Omar, fell to pieces; the Persians of Khorasan were the real rulers, and the government became despotic as in the days of Chrosroes.” The reign of Abu’l- Abbas and the first part of that of Mansur had been almost a continuation of the former period. But now his equals in birth and rank, the Omayyads and the Alids, had been crushed; the principal actors in the great struggle, the leaders of the propaganda and Abu Moslim were out of the way; the caliph stood far above all his subjects; and his only possible an- tagonists were the members of his own family.

‘Isa b. Musa had been designated, as we have seen, by Abu’l- Abbas as successor to Mansur. The latter having vainly tried to compel ‘Isa to renounce his right of succession, in favour of Mansur’s son Mahommed al-Mahdi, produced false witnesses who swore that he had done so. However unwillingly, ‘Isa was obliged at last to yield, but it was understood that, in case of Mahommed’s death, the succession should return to ‘Isa. One of the false witnesses was, it is asserted, Khalid b. Barmak, the head of that celebrated family the Barmecides (q.v.), which played so important a part in the reign of Harun al-Rashid. This Khalid, who was descended from an old sacerdotal family in Balkh, and had been one of the trusty supporters of Abu Moslim, Mansur appointed as minister of finance.

A son of Mahommed the Alid had escaped lo India, where,

1 This Hashimiya near Kufa is not to be confused with that founded by Abu’l-Abbas near Anbar.

2 Cf. G. le Strange, Baghdad during the Abbasid Caliphate (Oxford,

1900).

with the connivance of the governor Omar b. IJaf s Hazarmerd, he had found refuge with an Indian king. Mansur discovered his abode, and caused him to be killed. His infant son was sent to Medina and delivered to his family. Omar Hazarmerd lost his government and received a command in Africa, where he died in 770.

In a.h. 158 (a.d. 775) Mansur undertook a pilgrimage to Mecca, but succumbed to dysentery at the last station on the route. He was about sixty-five years of age, and had reigned for twenty-two years. He was buried at Mecca. He was a man of rare energy and strength of mind. His ambition was boundless and no means, however perfidious, were despised by him. But he was a great statesman and knew how to choose able officers for all places. He was thrifty and anxious to leave to his son a full treasury. He seems, to have cherished the ideal that this son, called Mahommed b. Abdallah, after the Prophet, should fulfil the promises of peace and happiness that had been tendered to the believers, and therefore to have called him al-Mahdi. For that purpose it was necessary that he should have the means not only to meet all state expenses, but also to be bounteous. But from the report of the historian Haitham b. ‘AdI x about the last discourse which father and son had together, we gather that the . former had misgivings in regard to the fulfilment of his wishes.

Khalid b. Barmak took the greatest care of the revenues, but contrived at the same time to consult his own interests. Mansur discovered this in the same year in which he died, and threatened him with death unless he should pay to the treasury three millions of dirhems within three days. Khalid already had so many friends that the sum was brought together with the exception of 30,000 dirhems. At that moment tidings came about a rising in the province of Mosul, and a friend of Khalid said to the caliph that Khalid was the only man capable of putting it down. Thereupon Mansur overlooked the deficiency and gave Khalid the government of Mosul. ” And,” said a citizen of that town, ” we had such an awe and reverence for Khalid, that he appeased the disorders, almost without punishing anybody.”

3. Reign of Mahdi. — As soon as Mansur was dead, Rabl”, his client and chamberlain, induced all the princes and generals who accompanied the caliph, to take the oath of allegiance to his son Mahommed al-Mahdi, who was then at Bagdad. Isa b. Musa hesitated, but was compelled to give in. In 776 Mahdi constrained him for a large bribe to renounce his right of succession in favour of his sons, Musa. and Harun. Mansur wrote in his testament to his son that he had brought together so much money that, even if no revenue should come in for ten years, it would suffice for all the wants of the state.

Mahdi, therefore, could afford to be munificent, and in order to make his accession doubly welcome to his subjects, he began by granting a general amnesty to political prisoners. Among these was a certain Ya'qiib b. Da'ud, who, having insinuated himself into the Confidence of the caliph, especially by discovering the hiding places of certain Alids, was afterwards (in 778) made prime minister. The provincial governors in whom his father had placed confidence, Mahdi superseded by creatures of his own.

In Khorasan many people were discontented. The promises made to them during the war against the Omayyads had not been fulfilled, and the new Mahdi did not answer at all to their ideal. A revolt in 160 under the leadership of a certain Yusuf b. Ibrahim, surnamed al-Barm, was suppressed by Yazid b. Mazyad, who, after a desperate struggle, defeated Yusuf , took him prisoner and brought him in triumph to Bagdad, where he with several of his officers was killed and crucified. In the following year, Mahdi was menaced by a far more dangerous revolt, led by a sectary, known generally as Mokanna (q.v.), or " the veiled one," because he always appeared in public wearing a mask. He took up his abode in the Transoxianian province of Kish and Nakhshab, where he gathered around him a great number of adherents. After some successes, the pretender was ultimately cornered at the castle of Sanam near Kish, and took poison together with all the members of his family. His head was cut off and sent to Mahdi in the year

163.

1 Tabari iii. p. 443 seq.

Mahdi had been scarcely a year on the throne when he resolved to accomplish the pilgrimage to Mecca. The chroniclers relate that on this occasion for the first time camels loaded with ice for the use of the caliph came to Mecca. Immediately on his arrival in the Holy City he applied himself, at the request of the inhabi- tants, to the renewal of the curtains which covered the exterior walls of the Ka'ba. For a very long time no care had been taken to remove the old covering when a new one was put on; and the accumulated weight caused uneasiness respecting the stability of the walls. Mahdi caused the house to be entirely stripped and anointed with perfumes, and covered the walls again with a single cloth of great richness. The temple itself was enlarged and restored. On this occasion he distributed considerable largesses among the Meccans. From Mecca Mahdi went to Medina, where he caused the mosque to be enlarged, and where a similar distribu- tion of gifts took place. During his stay in that city he

formed for himself a guard of honour, composed of 500 descendants of the Ansar, 2 to whom he assigned a quarter in Bagdad, named after them the Qatfa (Fief) of the Ansar. Struck by the difficulties of every kind which had to be encountered by poor pilgrims to Mecca from Bagdad and its neighbourhood, he ordered Yaqtin, his freedman, to renew the milestones, to repair the old reservoirs, and to dig wells and construct cisterns at every station of the road where they were missing. He also had new inns built and decayed ones repaired. Yaqtin remained inspector of the road till 767.

During the reign of Mansur the annual raids against the Byzantines had taken place almost without intermission, but the only feat of importance had been the conquest of Laodicea, called “the burnt” (17 KaraKeKavnivrj), by Ma’yuf b. Yahya in the year 770. At first the armies of Mahdi were not successful. The Greeks even conquered Marash (Germanicia) and annihilated the Moslem army sent from Dabiq. In 778, however, Hasan b. Qahtaba made a victorious raid as far as Adhruliya (Dorylaeum) ; it was on his proposition that Mahdi resolved on building the frontier town called Hadath (Adata), which became an outpost. In 779 the caliph decided on leading his army in person. He assembled his army in the plains of Baradan north of Bagdad and began his march in the early spring of 780, taking with him his second son Harun, and leaving his elder son Musa as his lieutenant in Bagdad. Traversing Mesopotamia and Syria, he entered Cilicia, and established himself on the banks of the Jihan (Pyramus). Thence he despatched an expeditionary force, nomi- nally under the command of Harun,. but in reality under that of his tutor, the Barmecide Yahya b.’ Khalid. Harun captured the fortress Samalu after a siege of thirty-eight days, the inhabi- tants surrendering on condition that they should not be killed or separated from one another. The caliph kept faith with them, and settled them in Bagdad, where they built a monastery called after their native place. In consequence of this feat, Mahdi made Harun governor of the whole western part of the empire, including Azerbaijan and Armenia. Two years later war broke out afresh between the Moslems and the Greeks. Leo IV., the East Roman emperor, had recently died, leaving the crown to Constan- tine VI. This prince being only ten years old, his mother Irene acted as regent and assumed the title Augusta. By her orders an army of 90,000 men, under the command of Michael Lachano- drakon, entered Asia Minor. The Moslems, on their side, invaded Cilicia under the orders of Abdalkabir who, being afraid of encountering the enemy, retired with his troops. Irritated by this failure, the caliph in 781 sent Harun, accompanied by his chamberlain Rabf, with an army of nearly 100,000 men, with orders to carry the

war to the very gates of Constantinople. The patrician Nicetas, count of Opsikion, who sought to oppose his march, was defeated by Harun's general, Yazid b. Mazyad, and put to flight. Harun then marched against Nicomedia, where he vanquished the domesticus, the chief commander of the Greek forces, and pitched his camp on the shores of the Bosporus. Irene took alarm, sued for peace, and obtained a truce for three years, but only on the humiliating terms of paying an annual

2 The first citizens of Medina who embraced Islam were called Ansar ("helpers ").

tribute of 90,000 denarii, and supplying the Moslems with guides and markets on their way home. This brilliant success so increased Mahdi's affection for Harun that he appointed him successor-designate after Musa and named him al-Rashld (" the follower of the right cause "). Three years later, he resolved even to give to him the precedence in the succession instead of Musa, yielding to the importunity of Khaizoran, the mother of the two princes, and to his own predilection. It was necessary first to obtain from Musa a renunciation of his rights; and for that purpose he was recalled from Jorjan, where he was engaged on an, expedition against the rebels of Tabaristan. Musa, informed of his father's intentions, refused to obey this order, and Mahdi determined to march in person against him. But, after his arrival at Masabadhan, a place in Jabal (Media, the later Persian Irak), he died suddenly, at the age of only forty-three. Some attribute his death to an accident met with in hunting; others believe him to have been poisoned. Some European scholars have suspected Musa of having been concerned in it, but of this we have no proof whatever.

The reign of Mahdi was a time of great prosperity. Much was done for the organization of the huge empire; agriculture and commerce flourished; the revenues were increasing, whilst the people fared well. The power of the state was acknowledged even in the far east: the emperor of China, the king of Tibet, and many Indian princes concluded treaties with the caliph. He was an ardent champion of the orthodox faith, repudiating all the extravagant doctrine preached by the Abbasid missionaries and formerly professed by his father. In particular he persecuted mercilessly the Manichaeans and all kinds of freethinkers.

4. Reign of Modi. — On the death of Mahdi, Harun, following the advice of Yahya b. Khalid, sent the insignia of the Caliphate, with letters of condolence and congratulation, to Musa in Jorjan, and brought the army which had accompanied Mahdi peacefully back from Media to Bagdad. Musa returned in all haste to the capital, and assumed the title of ahHadi (" he who directs"). The accession of a new caliph doubtless appeared to the partisans of the house of Ali a favourable opportunity for a rising. Hosain ,b. AIT b. Hasan III. raised an insurrection at Medina with the support of numerous adherents, and proclaimed himself caliph. .Thence he went to Mecca, where on the promise of freedom many slaves flocked to him, and many pilgrims also acknowledged him. Suleiman b. Mansur, the caliph's representative in the pilgrimage of that year, was entrusted with the command against him. Hosain was attacked at Fakh, 3 m. from Mecca, and perished in the combat with many other Alids. His maternal uncle, Idris b. Abdallah, a brother of Mahommed and Ibrahim, the rivals of Mansur, succeeded in escaping, and fled to Egypt, whence by the help of the postmaster, himself a secret partisan of the Shi'ites, he passed into West Africa, where at a later period his son founded the Idrisite dynasty in Fez (see Morocco) .

: Hadi, who had never been able to forget that he had narrowly escaped being supplanted by his brother, formed a plan for excluding him from the Caliphate and transmitting the succes- sion to his own son Ja'far. To this he obtained the assent of his ministers and the principal chiefs of his army, with the exception of Yahya b. Khalid, Harun's former tutor, who showed such firmness and boldness that Hadi cast him into prison and resolved on his death. Some historians say that he had already given orders for his execution, when he himself was killed (September 14th, 786) by bis mother Khaizoran, who had systematically and successfully intrigued against him with the object of gaining the real power for herself. Hadi, indignant at the fact that she was generally regarded as the real source of authority, had attempted to poison her, and Khaizoran, hoping to find a more submissive instrument of her will in her second and favourite son, caused Hadi to be smothered with cushions by two young slaves whom she had presented to him. She herself died three years later.

5. Reign of Harun al-Rashld. — We have now reached the most celebrated name among the Arabian caliphs, celebrated not only in the East, but in the West as well, where the stories of the Thousand and One Nights have made us familiar with that world

which the narrators represent in such brilliant colours. Harun ascended the throne without opposition. His first act was to choose as

prime minister his former tutor, the faithful Yahya, b. Khalid, and to confide important posts to the two sons of Yahya. Fadl and Ja'far, of whom the former was bis own foster-brother, the latter his intimate friend. The Barmecide family were endowed in the highest degree with those qualities of gsnerosity and liberality which the Arabs prized so highly, and the chronicles never weary in their praises. Loaded with all the burdens of government, Yahya brought the most distinguished abilities' to the exercise of his office. He put the frontiers in a good state Of defence; he filled the public treasury, and carried the splendour of the throne to the highest point. His sons, especially Fadl, were worthy of their father.

Although the administration of Harun's states was committed to skilful hands, yet the first years of his long reign were not free from troubles. Towards the year 176 (a.d. 792-793) a man of the house of Ali, named Yahya b. Abdallah, another brother' of Mahommed and Ibrahim, who had taken refuge in the land of Dailam on the south-western shores of the Caspian Sea, succeeded in forming a powerful party, and publicly claimed the Caliphate. Harun immediately sent against him an army of 50,000 men, under the command of Fadl, whom he made governor of all the Caspian provinces. Reluctant, however, to fight against a descendant of the Prophet, Fadl first attempted to induce him to submit by promising him safety and a brilliant position at the court of Bagdad. Yahya accepted the proposal, but required that the caliph should send him letters of pardon countersigned by the highest legal authorities and the principal personages of the empire. Harun consented and Yahya went to Bagdad, where he met with a splendid reception. At the end of some months, however, he Was calumniously accused of conspiracy, and the caliph, seizing the opportunity of ridding himself of a possible rival, threw him into prison, where he died, according to the majority of the historians, of starvation. Others say that Ja'far b. Yahya b. Khalid, to whose care he had been entrusted; suffered him to escape, and that this was the real cause of Harun's anger against the Barmecides (q.v.). Dreading fresh insurrections of the Alids, Harun secured the person of another descendant of Ali, Musa b. Ja'far, surnamed al-Kazim, who enjoyed great consideration at Medina, and had already been arrested and released again by Mahdi. The unfortunate man was brought by the caliph himself to Bagdad, and there died, apparently by poison.

Meanwhile Harun did not forget the hereditary enemy of Islam. In the first year of his reign all the strong places of Kinnesrin and Mesopotamia were formed into a special pro- vince, which received the name of al-'Awasim (" the defending for- tresses ") , with Manbij (Hierapolis) as its capital. The building of the fortress of Hadath

having been completed, Harun com- mitted to Faraj the Turk the task of rebuilding and fortifying the city of Tarsus. Thanks to these and similar measures, the Mos- lem armies were able to advance boldly into Asia Minor. Almost every year successful raids were made, in the year 797 under the command of the caliph himself, so that Irene was compelled to sue for peace. An attack by the Khazars called the caliph's attention from his successes in Asia Minor. This people had made an irruption into Armenia, and their attack had been so sudden that the Moslems and Christians were unable to defend themselves, and 100,000 had been reduced to captivity. Two valiant generals, Khozaima b. Khazim and Yazld b. Mazyad, marched against the Khazars and drove them out of Armenia.

In the midst of the cares of war, Harun was assiduous in his religious duties, and few years passed without his making the pilgrimage. Having determined to fix the order of succession in so formal a manner as to take away all pretext for future con- tentions, he executed a deed by which he appointed his eldest son Mahommed his immediate heir, and after him the second, Abdallah, and after Abdallah the third, Qasim. Mahommed received the surname of al-Amtn (" the Sure "), Abdallah that of al-Ma'mun ("he in whom men trust "), and Qasim that of al-Mo'tamin billah (" he who trusts in God "). Harun further

stipulated that Mamun should have as his share during the life- time of his brother the government of the eastern part of the empire. Each of the parties concerned swore to observe faithfully every part of this deed, which the caliph caused to be hung up in the Ka'ba, imagining that it would be thus guaranteed against all violation on the part of men, a precaution which was to be rendered vain by the perfidy of Amin.

• It was in the beginning of the following year, at the very moment when the Barmecides thought their position most secure, that Harun brought sudden ruin upon them. The causes of their disgrace have been differently stated by the annalists (see Barmecides). The principal cause appears to have been that they abused the sovereign power which they exercised. Not a few were jealous of their greatness and sought for opportunities of instilling distrust against them into the mind of Hartin, and of making him feel that he was caliph only in name. The secret dissatisfaction thus aroused was increased, according

to some apparently well-informed authorities, by the releasing of the Ahd Yahya b. Abdallah, already mentioned. Finally Harun resolved on their destruction, and Ja'far b. Yahya, who had just taken leave of him after a day's hunting, was arrested, taken to the castle of Harun, and beheaded. The following day, his father Yahya, his brother "Fadl, and all the other Barmecides were arrested and imprisoned; all their property was confiscated. The only Barmecide who remained unmolested with his family was Mahommed the brother of Yahya, who had been the cham- berlain of the caliph till 795, when Fadl b. Rabi' got his place. This latter had henceforward the greatest influence at court.

In the same year a revolution at Constantinople overthrew the empress Irene. The new emperor Nicephorus, thinking himself strong enough to refuse the payment of tribute, wrote an insulting letter to Harun, who contented himself with replying: " Thou shall not hear, but see, my answer." He entered Asia Minor and took Heraclea, plundering and burning along his whole line of march, till Nicephorus, in alarm, sued for peace. Scarcely had the caliph returned into winter quarters when Nicephorus broke the treaty. When the news came to Rakka, where Harun was residing, not one of the ministers ventured to tell him, until at last a poet introduced it in a poem which pleased the monarch. Notwithstanding the rigour of the season, Harun retraced his steps, and Nicephorus was compelled to observe his engagements. In' 805 the first great ransoming of Moslem prisoners took place on the banks of the little river Lamus in Cilicia. But Nicephorus:, profiting by serious disturbances in Khorasan, broke the treaty again, and overran the country as far as Anazarha and Kanisat as-sauda (" the black church ") on the frontier,. where he took many prisoners, who were, however, recovered by the garrison of Mopsuestia. Thus Harun was obliged to take the field again. He entered Asia Minor with an army of 135,000 regulars, beside volunteers and camp followers. Heraclea was taken, together with many other places, and Tyana was made a military station. At the same time his admiral, Homaid b. Ma'yuf, conquered Cyprus, which had broken the treaty, and took 16,000 of its people captive. Nicephorus was now so completely beaten that he was compelled to submit to very harsh conditions. In the year 808 the second ransoming between the Moslems and the Greeks took place near the river Lamus.

The disturbances in Khorasan were caused by the malversa- tions of the governor of that province, Ali b. 'Isa. b. Mahan. The caliph went in person to Merv, in order to judge of the reality of the complaints which had reached him. Ali b. 'Isa hastened to meet the caliph on his arrival at Rai (Rhagae), near the modern Teheran, with a great

quantity of costly presents, which he distributed with such profusion among the princes and courtiers that no one was anxious to accuse him. Harun confirmed him in his post, and, after having received the chiefs of Tabaristan who came to tender their submission, returned through Bagdad to Rakka on the Euphrates, which city was his habitual residence. In the following year Rafi' b. Laith, a grandson of Nasr b. Sayyar, raised the standard of revolt in Samarkand, and, at the head, of a numerous army, defeated the son of Ali b. 'Isa. Thereupon Ali fled from Balkh, leaving

the treasury, which was plundered by the populace after his departure. The caliph on learning that the revolt was due to Ali's tyranny, sent Harthama b. A'yan with stringent orders to seize Ali and confiscate his possessions. This order was carried out, and it is recorded that 1 500 camels were required to transport the confiscated treasures. The caliph's hope that Rafi' would submit on condition of receiving a free pardon was not fulfilled, and he resolved to set out himself to Khorasan, taking with him his second son Mamun. On the journey he was attacked by an internal malady, which carried him off, ten months after his departure from Bagdad, a.h. 193 (March 809), just on his arrival at the city of Tus. Hartin was only forty-five years of age. He was far from having the high qualifications of his grandfather Mansur; indeed he did not even possess the qualities of his father and his brother. When the latter asked him to renounce his right of succession, he was willing to consent; saying that a quiet life with his beloved wife, the princess Zobaida, was his highest wish, but he obeyed his mother and Yahya b. Khalid. As long as the Barmecides were in office, he acted only on their direction. After their disgrace he was led into many impolitic actions by his violent and often cruel propensities. But the empire was, especially in the earlier part of his reign, in a very: prosperous state, and was respected widely by foreign powers. Embassies passed between Charlemagne and Hartin in the years 180 (a.d. 797) and 184 (a.d. 801), by which the former obtained facilities for the pilgrims to the Holy Land, the- latter probably concessions for the trade on the Mediterranean ports. The ambassadors brought presents with them; on one of these occasions the first elephant reached the land of the Franks. . ; .

Under the reign of Hartin, Ibrahim b. al-Aghlab, the governor of Africa, succeeded in making himself independent of the central government, on condition of paying a fixed annual tribute -to his suzerain the caliph. This was, if we do not take Spain into the account, the first instance of dismemberment, later to be followed by many others.

In the days of this caliph the first paper factories were founded in Bagdad.

6. Reign of Amin.- — On the death of Hartin his minister, Fadl b. Rabi", with the view of gaining the new caliph's con- fidence, hastened to call together all the troops of the late caliph and to lead them back to Bagdad, in order to place them in the hands of the new sovereign, Amin. He even, in direct violation of Harun's will, led back the corps which was intended to occupy Khorasan under the authority of Mamun. Aware, however, that in thus acting he was making Mamun his irreconcilable enemy, he persuaded Amin to exclude Mamun from the succes- sion. Mamun, on receiving his brother's invitation to go to Bagdad, was greatly perplexed; but his tutor and later vizier, Fadl b. Sahl, a Zoroastrian of great influence, who in 806 had adopted Islam, reanimated his courage, and pointed out to him that certain death awaited him at Bagdad. Mamun resolved to hold out, and found pretexts for remaining in Khorasan. Amin, in anger, caused the will of his father, which, as we have seen, was preserved in the Ka'ba, to be destroyed, declared on his own authority that Mamun's rights of succession were forfeited, and caused the army to swear allegiance to his own son Mtisa, a child of five, on whom he bestowed the title of anˆNatiq bil-Haqq (" he who speaks according to truth "), a.h. 194 (a.d. 809-810). On hearing the news, Mamun, strong in the rightful- ness of his claim, retaliated by suppressing the caliph's name in all public acts. Amin immediately despatched to Khorasan an army of 40,000 under the command of Ali b. 'Isa, who had re- gained his former influence, and told the caliph that, at his coming to Khorasan, all the leading men would come over to his side. Zobaida, the mother of the caliph, entreated Ali to treat Mamun kindly when he should have made him captive. It is said that Fadl b. Sahl had, through a secret agent, induced Fadl b. Rabi' to select Ali, knowing that the dislike felt towards him by the Khorasanians would double their strength in fighting against him. Mamun; on his side, sent in all haste an army of less than 4000 men of his faithful Khorasanians, and entrusted

their command to Tahir b. Hosain, who displayed remarkable abilities in the war that ensued. The two armies met under the walls of Rai (Shaaban 195, May 811). By a bold attack, in the manner of the Kharijites of yore, Tahir penetrated into the centre of the hostile army and killed Ah. The frightened army fled, leaving the camp with all its

treasures to Tahir, who from that day was named ” the man with the two right hands.” A courier was despatched immediately to Merv, who performed the journey, a distance of about 750 miles, in three days. On the very day of his arrival, Harthama b. A’yan had left Merv with reinforcements. Mamun now no longer hesitated to take the title of caliph.

When the news of Ali’s defeat came to Bagdad, Amln sent Abdarrahman b. Jabala to Hamadan with 20,000 men. Tahir defeated him, forced Hamadan to surrender, and occupied all the strong places in Jabal (Media). The year after, Amln placed in the field two new armies commanded respectively by Ahmad b. Mazyad and Abdallah b. Homaid b. Qahˆaba. The skilful Tahir succeeded in creating divisions among the troops of his adversaries, and obtained possession, without striking a blow, of the city of Holwan, an advantage which opened the way to the very gates of Bagdad. He was here reinforced by troops sent from Khorasan under the command of Harthama b. A’yan, who was appointed leader of the war against Amln, with orders to send Tahir to Ahwaz. Tahir continued his victorious march, conquered Ahwaz, took Wasit and Madain, and pitched his camp near one of the gates of the capital, where he was rejoined by Harthama. One after the other the provinces fell away from Amln, and he soon found himself in possession of Bagdad alone. The city, though blockaded on every side, made a desperate defence for nearly two years. Ultimately the eastern part of the city fell into the hands of Tahir, and Amln, deserted by his followers, was compelled to surrender. He resolved to treat with Harthama, as he was averse to Tahir; but this step caused his ruin. Tahir succeeded in intercepting him on his way to Harthama, and immediately ordered him to be put to death. His head was sent to Mamun (September 813). It was presented to him by his vizier, Fadl, b. Sahl, surnamed Dhu’l-Riyasatain, or ” the man with two governments,” because his master had committed to him both the ministry of war and the general administration. Mamun hid his joy beneath a feigned display of sorrow.

■ Amln was only twenty-eight years old. As a ruler he was wholly incompetent. He hardly comprehended the importance of the affairs with which he was called upon to deal. He acted invariably on the advice of those who for the time had his confidence, and occupied himself mainly with the affairs of his harem, with polo, fishing, wine and music. The five years of his reign were disastrous to the empire, and in particular to Bagdad which never entirely recovered its old splendour.

7. Reign of Mamun. — On the day following the death of Amln Tahir

caused Mamun to be proclaimed at Bagdad, and promised in his name a general amnesty. The accession of this prince appeared likely to restore to the empire the order necessary for it3 prosperity. It was not so, however. The reign of Mamun — that reign in which art, science and letters, under the patronage of the caliph, threw so brilliant a lustre — had a very stormy beginning. Mamun was in no haste to remove to Bagdad, but continued to reside at Merv.. In his gratitude to Fadl b. Sahl, to whose service he owed his success, he not only chose him as prime minister of the empire, but also named his brother, Hasan b. Sahl, governor of Media, Fars, Ahwaz, Arabia and Irak. The two generals to whom he owed still more were not treated as they deserved. Harthama was ordered to return to Khorasan; Tahir was made governor of Mesopotamia and Syria, with the task of subduing Nasr b. Shabath, who with numerous adherents refused submission to the caliph. The Alids seized on the eleva- tion of Mamun as a pretext for fresh revolts. At Kufa a certain Ibn Tabataba placed an army in the field under Abu'l-Saraya, who had been a captain in the army of Harthama. An army sent by Hasan b. Sahl was defeated, and Abu'l-Saraya, no longer content to play a second part, poisoned his chief, Ibn Tabataba,

and put in his place another of the family of Ali, Mahoriuned b. Mahommed, whom, on account of his extreme youth, he hoped to govern at his will. Abu'l-Saraya's success continued, and several cities of Irak — Basra, Wasit and Madain — fell into his hands. Mecca, Medina and Yemen also were mastered by the Alids, who committed all kinds of atrocities and sacrilege. Abu'l-Saraya, who even struck money in Kufa, began to menace the capital, when Hasan b. Sahl hastily sent a messenger to Harthama b. A'yan, who was already at Holwan on his way back to Merv, entreating him to come to his aid. Harthama, who was deeply offended by his dismissal, refused at first, but at last consented, and at once checked the tide of disaster. The troops of the Alids were everywhere driven back, and the whole of Irak fell again into the hands of the Abbasids. Kufa opened its gates; Basra was taken by assault. Abu'l-Saraya and Mahommed b. Mahommed fled to Mesopotamia, but were made prisoners. The former was decapitated, the, latter was sent to Khorasan, the revolt in Arabia was quickly suppressed, and peace seemed within reach. This, however, was by no means the case. The disorder of civil war had caused a multitude of robbers and vagabonds to emerge from the purlieus of Bagdad. These ruffians proceeded to treat the capital as a conquered city, and it became necessary for all good citizens to organize them- selves into a regular militia. Harthama, having vanquished Abu'l-Saraya, did not go to Hasan b. Sahl, but proceeded

towards Merv with the purpose of telling Mamun that the state of affairs was not as Fadl b. Sahl represented it to him, and urging him to come to Bagdad, where his presence was necessary. Fadl, informed of his intentions, filled the caliph's mind with distrust against the old general, so that when Harthama arrived Mamun had him cast into prison, where he died shortly after- wards. When the tidings of his disgrace came to Bagdad, the people expelled the lieutenant of Hasan b. Sahl, called by them the Majuzl (" the Zoroastrian "), who had chosen Madain for his residence, and put at their head Mansur, a son of Mahdi, who refused to assume the title of caliph, but consented to be Mamun's vicegerent instead of Hasan b. Sahl.

Meanwhile, at Merv, Mamun was adopting a decision which fell like a thunderbolt on the Abbasids. In a.h. 201 (a.d. 817), under pretence of putting an end to the continual revolts of the partisans of Ali, and acting on the advice of his prime minister Fadl, he publicly designated as his successor in the Caliphate Ali ar-Rida, a son of that Musa al-Kazim who perished in the prison of Mahdi, a direct descendant of Hosain, the son of Ali, and proscribed black, the colour of the Abbasids, in favour of that of the house of Ali, green. This step was well calculated to delight the followers of Ali, but it could not fail to exasperate the Abbasids and their partisans. The people of Bagdad refused to take the oath to Ali b. Musa, declared Mamun deposed, and elected his uncle, Ibrahim, son of Mahdi, to the Caliphate. 1 It was only indirectly that the news reached the caliph, who then saw that Fadl had been treating him as a puppet. His anger was great, but he kept it carefully to himself. Fadl was one day found murdered, and Ah b. Musa died suddenly. The historians bring no open accusation against Mamun, but it seems clear that the opportune removal of these men was not due to chance. Mamun affected the profoundest grief, and, in order to disarm suspicion, appointed as bis prime minister the brother of Fadl, Hasan b. Sahl, whose daughter Buran he afterwards married. Soon after the news came to him that Hasan b. Sahl had become insane. Mamun appointed an officer to act as his lieutenant, and wrote that he was coming to Bagdad in a short time. From that moment the pseudo-caliph Ibrahim found himself deserted, and was obliged to seek safety in concealment. His precarious reign had, however, lasted nearly two years. Mamun had found out also that the general uneasiness was largely due to bis treat- ment of Harthama and Tahir, the latter having been put in a rebellious country without the men and the money to maintain his authority. The caliph therefore wrote to Tahir to meet him at Nahrawan, where he was received with the greatest honour.

1 On this event, see a remarkable essay by Barbier de Meynard in the

Journal Asiatique for March-April, 1869.

CALIPHATE

4?

Having taken all precautions, Mamun now made his solemn entry into Bagdad, but, to show that he came as a master, he still displayed for several days the green colours, though at last, at the request of Tahir, he consented to resume the black. From this time, a.h. 204 (August 819), the real reign of Mamun began, freed as he now was from the tutelage of Fadl.

When welcoming Tahir, Mamun bade him ask for any reward he might desire. Tahir, fearing lest the caliph, not being able to endure the sight of the murderer of his brother, should change his mind towards him, contrived to get himself appointed governor of Khorasan. Like most of the great Moslem generals, Tahir, it is said, had conceived the project of creating an inde- pendent kingdom for himself. His death, a.h. 207 (a.d. 822), prevented its realization; but as his descendants succeeded him one after the other in the post of governor, he may be said in reality to have founded a dynasty in Khorasan. His son Abdallah b. Tahir was a special favourite of Mamun, He brought Nas,r b. Shabath to subjection in Mesopotamia, and overcame by great ability a very dangerous rebellion in Egypt. When he returned thence, the caliph gave him the choice between the government of Khorasan and that of the northern provinces, where he would have to combat Babak the Khorramite. Abdallah chose the former (see below, § 8).

The pseudo-caliph, Ibrahim, who, since Mamun's entry into Bagdad, had led a wandering life, was eventually arrested. But Mamun generously pardoned him, as well as Fadl b. Rabf, the chief promoter of the terrible civil war which had so lately shaken the empire. After that time, Ibrahim lived- peacefully at the court, cultivating the arts of singing and music.

Tranquillity being now everywhere re-established, Mamun gave himself up to science and literature. He caused works on mathematics, astronomy, medicine and philosophy to be trans- lated from the Greek, and founded in Bagdad a kind of academy, called the " House of Science," with a library and an observatory. It was also by his orders that two learned mathematicians undertook the measurement of a degree of the earth's circum- ference. Mamun interested himself too in questions of religious dogma. He had embraced the Motazilite

doctrine about free will and predestination, and was in particular shocked at the opinion which had spread among the Moslem doctors that the Koran was the uncreated word of God. In the year 212 (a.d. 827) he published an edict by which the Motazilite (Mu'tazilite) doctrine was declared to be the religion of the state, the orthodox faith condemned as heretical. At the same time he ordered all his subjects to honour Ali as the best creature of God after the Prophet, and forbade the praise of Moawiya. In a.h. 218 (a.d. 833) a new edict appeared by which all judges and doctors were summoned to renounce the error of the uncreated word of God. Several distinguished doctors, and, among others, the celebrated Ahmad b. Hanbal (q.v.), founder of one of the four orthodox Moslem schools, were obliged to appear before an inquisitorial tribunal; and as they persisted in their belief respecting the Koran, they were thrown into prison. Mamun, being at Tarsus, received from the governor of Bagdad the report of the tribunal, and ordered that the culprits should be sent off to him. Happily for these unfortunate doctors, they had scarcely reached Adana, when news of the caliph's death arrived and they were brought back to Bagdad. The two successors of Mamun maintained the edicts — Ahmad b. Hanbal, who obstinately refused to yield, was flogged in the year 834 — but it seems that Motasim did not himself take much interest in the question, which perhaps he hardly understood, and that the prosecution of the inquisition by him was due in great part to the charge which was left him in Mamun's will. In the reign of Motawakkil the orthodox faith was restored, never to be assailed again. 1

In spite of these manifold activities Mamun did not forget the hereditary enemy of Islam. In the years 830, 831 and 832 he made expeditions into Asia Minor with such success that Theo- philus, the Greek emperor, sued for peace, which Mamun

1 Cf. W. M. Patton, Ahmed ibn Hanbal and the Mihna (Leiden, 1897) ; and article Mahommedan Religion. «

haughtily refused to grant. Accordingly, he decided on marching in the following year against Amorium, and thence to Constanti- nople itself. Having sent before him his son Abbas to make Tyana a strong fortress, he set out for Asia Minor to put himself at the head of the army, but died of a fever brought on by bathing in the chill river, Pedendon, 40 m. from Tarsus, in Rajab 218 (a.d. August 833), at the age of forty-eight.

Mamun was a man of rare qualities, and one of the best rulers of the whole dynasty after Mansur. By him the ascendancy of the Persian

element over the Arabian was completed. Moreover, he began to attract young Turkish noblemen to his court, an example which was followed on a much larger scale by his successor and led to the supremacy of the Turks at a later period.

8. Reign of Motasim. — Abu Ishak al-Mo'tasnn had for a long time been preparing himself for the succession. • Every year he had bought Turkish slaves, and had with him in the last expedi- tion of Mamun a bodyguard of 3000. Backed by this force he seems to have persuaded the ailing caliph to designate him as his successor. The chroniclers content themselves with recording that he himself wrote in the name of the caliph to the chief authorities in Bagdad and elsewhere that he was to be the successor. His accession, however, met at first with active opposition in the army, where a powerful party demanded, that Abbas should take the place of his father. Abbas, however, publicly renounced all pretension to the Caliphate, and the whole army accepted Motasim, who immediately had the fortifications of Tyana demolished and hastened back to Bagdad, where he made his public entry on the 20th of September 833.

Motasim wanted officers for his bodyguard. Immediately after his coming to Bagdad, he bought all the Turkish slaves living there who had distinguished themselves. Among them were Ashnas, Itakh, Wasif, Slma, all of whom later became men of great influence. The guard was composed of an undisciplined body of soldiers, who, moreover, held in open contempt the religious precepts of Islam. Tired of the excesses committed by these Turks, the people of Bagdad beat or killed as many of them as they could lay hands on, and Motasim, not daring to act with severity against either his guard or the citizens, took the course of quitting the city. Having bought in 834 territories at Samarra, a small place situated a few leagues above Bagdad, he caused a new residence to be built there, whose name, which could be interpreted " Unhappy is he who sees it," was changed by him into Sorra-man-ra'a, " Rejoiced is he who sees it." Leaving the government of the capital in the hands of his son Harun al-Wathiq, he established himself at Samarra in 836. This resolution of Motasim was destined to prove fatal to his dynasty; for it placed the caliphs at the mercy of their prae- torians. In fact, from the time of Wathiq, the Caliphate became the plaything of the Turkish guard, and its decline was continuous.

In the time of the civil war the marshlands in Irak between Basra and Wasit had been occupied by a large population of Indians, called yat, or, according to the Arabic pronunciation, Zott, who infested the roads and levied a heavy tribute from the ships ascending and descending

the Tigris. From the year 821 onwards Mamun had tried in vain to bring them to submission. When Motasim came back to Bagdad, after the death of his brother, he found the people in great distress, their supply of dates from Basra having been cut off by the Zott, and resolved to put them down with all means. After seven months of vigorous resistance, they at last yielded on condition of safety of life and property. In January 835 the Zott in their national costume and with their own music were conducted on a great number of boats through Bagdad. Thence they were transported to Ainzarba (Anazarba) on the frontier of the Greek empire. Twenty years later they entered Asia Minor, whence in a later period they came into Europe, under the name of Athinganoi (Ziganes) and Egyptians (gipsies). 2

A far more difficult task lay before Motasim, the subjection of Babak al-Khorraml in Azerbaijan. Though the name Khorrami is often employed by the Moslem writers to designate such

2 See M. J. de Goeje, Memoire sur les migrations des Ziganes a travers VAsie (Leiden, 1903) ; also Gipsies.

extravagant Moslem sectaries as the Hashimlya,the real Khorrami were not Moslems, but Persian Mazdaqites, or communists. The name Khorrami, or Khorramdlni, ” adherent of the pleasant religion,” seems to be a nickname. As they bore red colours, they were also called Mohammira, or Redmakers. Their object was to abolish Islam and to restore ” the white religion.” We find the first mention of them in the year 808, when Harun al-Rashid sent an army against them. During the civil war their power was steadily increasing, and spread not only over Azerbaijan, but also over Media (Jabal) and Khorasan. The numerous efforts of Mamun to put them down had been all in vain, and they were now in alliance with the Byzantine emperor. Therefore, in the year 835, Motasim made Afshln, a Turkish prince who had distinguished himself already in the days of Mamun, governor of Media, with orders to take the lead of the war against Babak. After three years’ fighting, Babak was taken prisoner. He was carried to Samarra, led through the city on the back of an elephant, and then delivered to the execu- tioners, who cut off his arms and legs. His head was sent to Khorasan, his body was crucified. For long afterwards the place where this happened bore the name of ” Babak’s Cross.”

In the hope of creating a diversion in Babak's favour, Theo- philus in 837 fell upon and laid waste the frontier town of Zibatra. There and in several other places he took a great number of prisoners, whom he mutilated. The news arrived just after that of the capture of Babak, and Motasim swore to take exemplary vengeance. He assembled a formidable army, penetrated into Asia Minor, and took the city of Amorium, where he gained rich plunder. During his return the caliph was informed of a conspiracy in the army in favour of 'Abbas the son of Mamun, of which 'Ojaif b. 'Anbasa was the ringleader. The unfortunate prince was arrested and died soon after in prison. .The conspirators were killed, many of them with great cruelty. (For the campaign see Bury in J.H.S., 1909, xxix. pt. i.)

Motasim had just returned to Samarra when a serious revolt broke out in Tabaristan, Maziyar, one of the hereditary chiefs of that country, refusing to acknowledge the authority of Abdallah Ibn Tahir, the governor of Khorasan, of which Tabaristan was a province. The revolt was suppressed with great difficulty, and it came out that it was due to the secret instigation of Afshln, who hoped thereby to cause the fall of the Tahirids, and to take their place, with the ulterior object of founding an independent kingdom in the East. Afshln, who stood at that moment in the highest favour of the caliph, was condemned and died in prison. Motasim died a year later, January 842.

9. Reign of Wathiq. — His son Wathiq, who succeeded, though not in the least to be compared with Mamun, had yet in common with him a thirst for knowledge — perhaps curiosity would be a more appropriate term — which prompted him, as soon as he became caliph, to send tbe famous astronomer Mahommed b. Musa into Asia Minor to find out all about the Seven Sleepers which he discovered in the neighbourhood of Arabissus, 1 and Sallam the Interpreter to explore the situation of the famous wall of Gog and Magog, which he reached at the north-west frontier of China. 2 For these and other personal pursuits he raised money by forcing a number of high functionaries to dis- gorge their gains. In so vast an empire the governors and administrators had necessarily enjoyed an almost unrestricted power,. and this had enabled them to accumulate wealth. Omar had already compelled them to furnish an account of their riches, and, when he found that they had abused their trust, to relin- quish half to the state. As time went on, nomination to an office was more and more generally considered a step to wealth. During the reign of the Omayyads a few large fortunes were made thus. But with the increasing luxury after Mansur, the thirst for money became universal, and the number of honest officials lessened fast. Confiscation of property had been

1 See M. J. de Goeje, ” De legende der Zevenslapers van Efeze,” Versl. en Meded. der K. Akad. v. Wetensch. Afd. Letterk. 4 e Reeks, iii.,

1900.

2 See M. J. de Goeje, ” De muur van Gog en Magog,” Versl. en Meded. 3° Reeks, v., 1888.

employed with success by Harun al-Rashid after the disgrace of the Barmecides, and occasionally by his successors, but Wathiq was the first to imprison high officials and fine them heavily on the specific charge of peculation.

The caliph also shared Mamun’s intolerance on the doctrinal question of the uncreated Koran. He carried his zeal to such a point that, on the occasion of an exchange of Greek against Moslem prisoners in 845, he refused to receive those Moslem captives who would not declare their belief that the Koran was created. The orthodox in Bagdad prepared to revolt, but were discovered in time by the governor of the city. The ringleader Ahmad b. Nasr al-Khoza’I was seized and brought to Samarra, where Wathiq beheaded him in person. The only other event of importance in the reign of Wathiq was a rising of the Arabian tribes in the environs of Medina, which the Turkish general Bogha with difficulty repressed. When he reached Samarra with his prisoners, Wathiq had just died (August 846). That the predominance of the praetorians was already established is clear from the fact that Wathiq gave to two Turkish generals, Ash n as and Itakh respectively, the titular but lucrative supreme govern- ment of all the western and all the eastern provinces. In his days the soldiery at Samarra was increased by a large division of Africans (Maghribls).

10. Reign of Motawakkil. — As Wathiq had appointed no successor the vizier Mahommed Zayyat had cast his eye on his son Mahommed, who was still a child, but the generals Wasif and Itakh, seconded by the upper cadi Ibn abi Da’ud, refused their consent, and offered the supreme power to Wathiq’s brother Ja’far, who at his installation adopted the name of al-Motawakkil ‘aid ‘llah (” he who trusts in God “). The new caliph hated the vizier Zayyat, who had opposed his election, and had him seized and killed with the same atrocious cruelty which the vizier himself had inflicted on others. His possessions, and those of others who had opposed the caliph’s election, were confiscated. But the arrogance of Itakh, to whom he owed his Caliphate, became insufferable. So, with the perfidy of his race, the caliph took him off his guard, and had him imprisoned and killed at Bagdad. He was succeeded by Wasif.

About this time an impostor named Mahmud b. Faraj had set himself up as a prophet, claiming to be Dhu'l-Qarnain (Alexander the Great) risen from the dead. Asserting that Gabriel brought him revelations, he had contrived to attract twenty -seven followers. The caliph had him flogged, and compelled each of the twenty-seven to give him ten blows on the head with his fist. The " prophet " expired under the blows (850).

One of the first acts of Motawakkil was the release of all those who had been imprisoned for refusing to admit the dogma of the created Koran, and the strict order to abstain from any litigation about the Book of God. The upper cadi Ibn abi Da'ud, the leader of the movement against orthodoxy, who had stood in great esteem with Mamun and had fulfilled his high office under the reigns of Motasim and Wathiq, had a stroke of paralysis in the year 848. His son Mahommed was put in his place till 851, when all the members of the family were arrested. They released themselves by paying the enormous sum of 240,000 dinars and 16,000,000 dirhems, which constituted nearly their whole fortune, and were then sent to Bagdad, where father and son died three years later. An orthodox upper cadi was named instead, and the dogma of the created Koran was declared heresy; therewith began a persecution of all the adherents of that doctrine and other Motazilite tenets. Orthodoxy triumphed, never again to lose its place as the state religion. Hand in hand with these reactionary measures came two others, one against Jews and Christians, one against the Shi'ites. The first caliph who imposed humiliating conditions on the Dhimmls, or Cove- nanters, who, on condition of paying a certain not over-heavy tribute, enjoyed the protection of the state and the free exercise of their cult, was Omar II., but this policy was not continued. A proposition by the cadi Abu Yiisuf to Harun al-Rashid to renew it had not been adopted. Motawakkil, in 850, formulated an edict by which these sectaries were compelled to wear a distinctive dress and to distinguish their houses by a figure of

the devil nailed to the door, excluding them at the same time from all public employments, and forbidding them to send their children to Moslem schools. Nevertheless, he kept his Christian medical men, some of whom were high in favour. He showed his hatred for the Shi'ites by causing the mausoleum erected over the tomb of Hosain at Kerbela, together with all the buildings surrounding it, to be levelled to the ground and the site to be ploughed up, and by forbidding any one to visit the spot. A year before, a descendant of Hosain, Yahya b.

Omar, had been arrested and flogged on his orders. He escaped afterwards, rose in rebellion at Kufa in 864, and was killed in battle. It is reported that the caliph even permitted one of his buffoons to turn the person of Ali into mockery.

In the year 848-849 Ibn Ba'ith, who had rendered good service in the war against Babak, but had for some cause been arrested, fled from Samarra to Marand in Azerbaijan and revolted. Not without great difficulty Bogha, the Turkish general, succeeded in taking the town and making Ibn Ba'ith prisoner. He was brought before Motawakkil and died in prison. In the year 237 (a.d. 851-852) a revolt broke out in Armenia. Notwithstanding a vigorous resistance, Bogha subdued and pacified the province in the following year. In that same year, 852-853, the Byzan- tines made a descent on Egypt with 300 vessels. 'Anbasa the governor had ordered the garrison of Damietta to parade at the capital Fostat. The denuded town was taken, plundered and burned. The Greeks then destroyed all the fortifications at the mouth of the Nile near Tinnis, and returned with prisoners and booty. The annual raids of Moslems and Greeks in the border districts of Asia Minor were attended with alternate successes, though on the whole the Greeks had the upper hand. In 856 they penetrated as far as Amid (Diarbekr), and returned with 10,000 prisoners. But in the year 859 the Greeks suffered a heavy defeat with losses of men and cattle, the emperor Michael himself was in danger, whilst the fleet of the Moslems captured and sacked Antalia. This was followed by a truce and an exchange of prisoners in the following year.

In 855 a revolt broke out in Horns (Emesa), where the harsh conditions imposed by the caliph on the Christians and Jews had caused great discontent. It was repressed after a vigorous resistance. A great many leading men were flogged to death, all churches and synagogues were destroyed and all the Christians banished.

In the year 851 the Boja (or Beja), a wild people living between the Red Sea and the Nile of Upper Egypt, the Blemmyes of the ancients, refused to pay the annual tribute, and invaded the land of the gold and emerald mines, so that the working of the mines was stopped. The caliph sent against them Mahommed al-Qomml, who subdued them in 856 and brought their king Ali Baba to Samarra before Motawakkil, on condition that he should be restored to his kingdom.

About this time Sijistan liberated itself from the supremacy of the Tahirids. Ya'qub b. Laith al-Saffar proclaimed himself amir of that province in the year 860, and was soon after con- firmed in this dignity by the caliph.

In 858 Motawakkil, hoping to escape from the arrogant patronage of Wasif, who had taken the place of Itakh as head of the Turkish guard, transferred his residence to Damascus. But the place did not agree with him, and he returned to Samarra, where he caused a magnificent quarter to be built 3 m. from the city, which he called after his own name Ja'fariya, and on which he spent more than two millions of dinars (about £900,000). He found the means by following the example of his predecessor in depriving many officials of their ill-gotten gains. He contrived to enrol in his service nearly 12,000 men, for the greater part Arabs, in order to crush the Turks. In the year of his elevation to the Caliphate, he had regulated the succession to the empire in his own family by designating as future caliphs his three sons, al-Montasir billah (" he who seeks help in God "), al-Mo'tazz billah (" he whose strength is of God "), and al-Mowayyad billah (" he who is assisted by God "). By and by he conceived an aversion to his eldest son, and wished to supplant him by Motazz, the son of bis favourite wife Qablha. The day had been fixed on 1

which Montasir, Wasif and several other Turkish generals were to be assassinated. But Wasif and Montasir had been informed, and resolved to anticipate him. In the night before, Shawwal a.h. 247 (December 861), Motawakkil, after one of his wonted orgies, was murdered, together with his confidant, Fath b. Khaqan. The official report, promulgated by his successor, was that Fath b. Khaqan had murdered his master and had been punished for it by death. For the administrative system in this reign see Mahommed an Institutions.

11. Reign of Montasir. — On the very night of his father's assassination Montasir had himself proclaimed caliph. He was a man of very feeble character, and a mere puppet in the hands of his vizier Ahmad b. Khaslb and the Turkish generals/ He was compelled to send Wasif, the personal enemy of Ibn Khaslb, to the frontier for a term of four years, and then to deprive his two brothers Motazz and Mowayyad, who were not agreeable to them, of their right of succession. He died six months after, by poison, it is said.

12. Reign of Mosta'in. — The Turkish soldiery, now the chief power in the state, chose, by the advice of Ibn Khaslb, in suc- cession to Montasir, his cousin Ahmad, who took the title of al-Mosta'in billah (" he who looks for help to God ")• In the reign of this feeble prince the Greeks inflicted serious losses on the Moslems in Asia Minor. A great many volunteers from all parts, who offered their services, were hunted down as rioters by the Turkish generals, who were wholly absorbed by their own interests. The party which had placed Mosta'in on the throne, led by Ibn Khaslb and Otamish, were soon overpowered

by Wasif and Bogha. Ibn Khaslb was banished to Crete, Otamish murdered. The superior party, however, maintained Mosta'in on the throne, because they feared lest Motaizz should take vengeance upon them for the murder of his father Mota- wakkil. But in the year 865 Wasif and Bogha fled with Mosta'in to Bagdad, and Motazz was proclaimed caliph at Samarra. A terrible war ensued; Mosta'in was obliged to abdicate, and was killed in the following year.

In 864 a descendant of Ali, named Hasan b. Zaid, gained possession of Tabaristan and occupied the great city of Rai (Rey) near Teheran. A year later the province was reconquered by the Tahirid governor of Khorasan, so that Hasan was obliged to retreatfor refuge to the land of the Dailam. But he returned soon, and after many reverses ruled over Tabaristan and Jorjan for many years.

13. Reign of Motazz. — Motazz, proclaimed caliph at Bagdad in the first month of 252 (January 866), devoted himself to the object of freeing himself from the omnipotent Turkish generals, especially Wasif and Bogha, who had opposed his election. But such a task demanded an ability and energy which he did not possess. He was obliged to grant them amnesty and to recall them to Samarra. He mistrusted also his brothers Mowayyad and Mowaffaq, who had interceded for them. He put the former to death and drove the latter into exile to Bagdad. Some time after he had the satisfaction of seeing Wasif killed by his own troops, and succeeded, a year later, in having Bogha assassinated. But a more difficult problem was the payment of the Turkish, Persian and African guards, which was said to have amounted in a.h. 252 to 200,000,000 dirhems 1 (about £6,500,000), 01 apparently twice the revenue derived from the land tax. As the provincial revenues annually decreased, it became impossible to pay this sum, and Salih the son of Wasif, in spite of the remonstrances of the caliph, confiscated the property of state officials. Upon a further demand, Motazz, having failed to procure money from his mother Qablha, who was enormously rich, was seized upon and tortured, and died of starvation in prison (Shaaban 255, July 868).

The dismemberment of the empire continued fast in these years, and the caliph was compelled to recognize the virtual independence of the governors Ya'qub the Saffarid (see Saf- farids and Persia, History, § B) in Seistan, and Ahmad b. Tulun in Egypt.

1 " Dinars " in the text of Tabari iii. 1685, must be an error for " dirhems."

14. Reign of Mohtadi, — Immediately after the seizure of Motazz, the Turks, led by Salih b. Waslfy proclaimed as caliph one of the sons of Wathiq with the title of al-Mohtadi billah (" the guided by God "), who, however, refused to occupy the throne until his predecessor had solemnly abdicated. Mohtadi, who was a man of noble and generous spirit and had no lack of energy, began by applying the precarious measure of power which was left him to the reform of the court. He banished the musicians and singers, and forbade all kinds of games; he devoted himself to the administration of justice, and gave public audiences to the people for the redress of their grievances. At the same time he contrived to elevate the power of the Abna, the descendants of those Persian soldiers who had established the dynasty of the Abbasids, in order to break the supremacy of the Turks and other mercenaries. But Mohtadi came too late, and the Turks did not leave him time to finish his work.

On the news of the conspiracy against Motazz, Musa, the son of the famous general Bogha, 1 then governor of Media (Jabal), ordered his deputy-general Moflih to return at once from a pro- posed invasion of Dailam, and moved with his army towards Samarra, notwithstanding the peremptory orders of the caliph. At his approach Salih, who was afraid of Musa, hid himself, but was soon discovered and killed. At that moment a Kharijite, named Mosawir, who in 867 had risen in Mesopotamia and beaten more than one general of the government, took Balad and menaced Mosul. Musa could not refuse to comply with the formal command of the caliph to march against him. During the absence of these troops, Mohtadi seems to have tried to get rid of the principal Turkish leaders. A brother of Musa and one of his best generals, Bayikbeg (Baiekbak), were killed, but the soldiery he had gained over for himself were not strong enough. Mohtadi was overwhelmed and killed, Rajab 256 (June 870).

15. Reign of Motamid. — Whether from weariness or from repentance, the Turkish soldiery discontinued for a time their hateful excesses, and their new leader, Musa b. Bogha, was without the greed and ambition of his predecessors. A son of Motawakkil was brought out of prison to succeed his cousin, and reigned for twenty-three years under the name of al-Mo'tatnid 'ala'lldh ("he whose support is God ") . He was a feeble, pleasure- loving monarch, but Mohtadi had regained for the Caliphate some authority, which was exercised by Obaidallah b. Khaqan, the able vizier of Mohtadi, and by Motamid's talented brother Abu Ahmad al-Mowaffaq; Miisa b. Bogha himself remained till his death a staunch servant of the government. During the reign of

Motamid great events took place. The great power long wielded by the Tahirids, not only in the eastern provinces, but also at Bagdad itself, had been gradually diminishing, and came to an end in the year 873, when Ya'qub the Saffarid occupied Nishapur and imprisoned Mahommed b. Tahir with his whole family. The power of Ya'qub then increased to such an extent that he was not content with the caliph's offer to recognize him as supreme in the provinces he had conquered, and military governor of Bagdad, but marched against Irak. The caliph himself, wearing the mantle and the staff of the Prophet, then went out against him, and after a vigorous resistance he 'was beaten by Mowaffaq, who had the command of the troops, and fled to Jondisapur in Khuzistan, where he died three years later, leaving his empire to his brother 'Amr. This prince maintained himself in power till the year 900, when he was beaten and taken prisoner by Isma'Il b. Ahmed the Samanid. The Samanids had been governors of Transoxiana from the time of Mamun, and after the fall of the Tahirids, had been confirmed in this office by the caliph. After 287 (900) they were independent princes, and under their dominion these districts attained to high prosperity.

Motamid had also to deal with a rising of the negro slaves in the province of Basra, led by one Ali b. Mahommed, who called himself a descendant of Ali. It lasted from 869 to 883, and tasked the government to its utmost. 2

'This Bogha was called al-Kabir, or major; the ally of Wasif, a man of much inferior consideration, al-Saghir, or minor. 8 See Noldeke, Orientalische Skizzen, pp. 155 seq.

In the west, Ahmad b. Ttilun became a mighty prince, whose sway extended over Syria and a part of Mesopotamia. Motamid, who wished to free himself from the guardianship of his brothel Mowaffaq, concerted with him a plan to emigrate to Egypt, Ahmad being himself angered against Mowaffaq on personal grounds. Motamid's flight was stopped by his vizier Ibn Makhlad, and the caliph himself was reconducted to Samarra as a prisoner in the year 882. From that time there was war between the Abbasids and the Tfllunids. Ahmad died in 270 (884). His son Khomaruya succeeded him, and maintained himself in power till his death in 896, in which year his daughter was married to the caliph Motadid. Ten years later Egypt was conquered by a general of the caliph Moktafl.

During the reign of Motamid the emperor Basil I. conducted the war against the Moslems with great success, till in the year 270 (a.d. 884) his army suffered a terrible defeat near Tarsus, in which the greater

part of the army, the commander Andreas, and many other patricians perished.

Motamid had appointed his son al-Mofawwid as successor to the Caliphate, and after him his brother Mowaffaq. When the latter died in the year 891, his son Abu '1-' Abbas, al-Mo'tadid ("he who seeks his support in God"), was put in his place. Next year Mofawwid was compelled to abdicate in favour of his cousin. Shortly after Motamid died, Rajab 279 (October 892). Not long before these events, the seat of the Caliphate bad been restored to Bagdad.

16. Reign of Motadid.— Motadid may be called, after Mansur, the most able and energetic of all the Abbasid rulers. He took good care of the finances, reformed the administration, was an excellent commander in war, and maintained order as far as possible. The Kharijites in Mesopotamia, who for many years had molested the government, were finally crushed with the aid of their former ally Hamdan, who became the founder of the well-known dynasty of the Hamdanites. The mighty house of Abu Dolaf in the south-west of Media, which had never ceased to encroach on the Caliphate, was put down. The governor of Azerbaijan and Armenia, belonging to the powerful Turkish house of the Sajids or Sajites, whose loyalty was always doubtful, planned an invasion of Syria and Egypt. Motadid frustrated it by a quick movement. The citizens of Tarsus who were involved in the plot were severely punished. The chief punishment, however, the burning of the fleet, wa/ a very impolitic measure, as it strengthened the hands of the Byzantines.

Almost simultaneously with the rising of the negro slaves in Basra there arose in the province of Kufa the celebrated sect of the Carmathians (q.v.) , Fatimites 3 or Isma'ilites. This powerful sect, which save for a difference of opinion would have joined the negro rising, remained outwardly quiet during Motamid's reign, but under Motadid the government began to have misgivings about them. Abu Sa'Id al-Jannabl, who had founded a Carmathian state in Bahrein, the north-eastern province of Arabia (actually called Lahsa), which could become dangerous for the pilgrim road as well as for the commerce of Basra, in the year 900 routed an army sent against him by Motadid, and warned the caliph that it would be safer to let the Carmathians alone. In the same year the real chief of the sect, whose abode had been discovered by the caliph, fled from Salamia in Syria, where he lived, to Africa, and hid himself at Sijilmasa (in Tafilalt) in the far west, whence he reappeared ten years later at Kairawan as the Mahdi, the first caliph of the Fatimites. 4

Motadid died in Rabia II. a.h. 289 (March 902), leaving the Caliphate to his son al-Mokt&fl billah (" he who sufficeth himself in God ").

17. Reign of'Moktafi. — Moktafi inherited his father's intre- pidity, and seems to have had high personal qualities, but his reign of six years was a constant struggle against the Carmathians in Syria, who defeated the Syrian and Egyptian troops, and

s For the connexion between Carmathians and Fatimites see under Fatimites.

1 M. J. de Goeje, Memoire sur les Carmathes du Bahrain el les Fatimides (Leiden, 1886).

conquered Damascus and other cities. Moktafi led his troops in person, and his general, Mahommed b. Suleiman, gained a signal victory. Three of their chiefs were taken and put to death. But, to avenge their defeat, they lay in wait for the great pilgrim caravan on its return from Mecca in the first days of 294 (906), and massacred 20,000 pilgrims, making an immense booty. This horrible crime raised the whele Moslem world against them. Zikriiya their chief was defeated at last and perished.

After the defeat of the Syrian Carmathians, Mahommed b. Suleiman was sent by the caliph to Egypt, where he overthrew the dominion of the TulQnids. 'Isa b. Mahommed al-Naushari was made governor in their stead (905).

The war with the Byzantines was conducted with great energy during the reign of Moktafi. In the year 905 the Greek general Andronicus took Marash, and penetrated as far as Haleb (Aleppo), but the Moslems were successful at sea, and in 907 captured Iconium, whilst Andronicus went over to the caliph's side, so that the Byzantine emperor sent an embassy to Bagdad to ask for a truce and an exchange of prisoners.

18. Reign of Moqtadir. — The sudden death of Moktafi, Dhu'l- qa'da 295 (August 908), was a fatal blow to the prestige of the Caliphate, which had revived under the successive governments of Mowaffaq, Motadid and himself. The new caliph, al-Moqtadir billah (" the powerful through God "), a brother of Moktafi, was only thirteen years of age when he ascended the throne. Owing to his extreme youth

many of the leading men at Bagdad rebelled and swore allegiance to Abdallah, son of the former caliph Motazz, a man of excellent character and of great poetical gifts; but the party of the house of Motadid prevailed, and the rival caliph was put to death. Moqtadir, though not devoid of noble qualities, allowed himself to be governed by his mother and her ladies and eunuchs. He began by squandering the 15,000,000 dinars which were in the treasury when his brother died in largesses to his courtiers, who, however, merely increased their demands. His very able vizier, the noble and disinterested Ali b. ‘Isa, tried to check this foolish expenditure, but his efforts were more than counterbalanced by the vizier Ibn abi’l-Forat and the court. The most shameless bribery and the robbery of the well-to-do went together with the most extravagant luxury. The twenty-four years of Moqtadir’s reign are a period of rapid decay. The most important event in the reign was the foundation of the Fatimite dynasty, which reigned first in the Maghrib and then in Egypt for nearly three centuries (see Fatimites and Egypt: History, ” Mahommedan “).

Far more dangerous, however, for the Caliphate of Bagdad at the time were the Carmathians of Bahrein, then guided by Abu Tahir, the son of Abu Sa’Id Jannabl. In 311 (a.d. 923) they took and ransacked Basra; in the first month of the following year the great pilgrim caravan on its return from Mecca was overpowered; 2500 men perished, while an even larger number were made prisoners and brought to Lahsa, the residence of the Carmathian princes, together with an immense booty. The caravan which left Bagdad towards the end of this year returned in all haste before it had covered a third of the way. Then Kufa underwent the fate that had befallen Basra. In 313 (a.d. 926) the caravan was allowed to pass on payment of a large sum of money. The government of Bagdad resolved to crush the Carmathians, but a large army was utterly defeated by Abu Tahir in 315 (927), and Bagdad was seriously threatened. Next year Mecca was taken and plundered; even the sacred Black Stone was transported to Lahsa, where it remained till 339 (950), when by the express order of the Imam, the Fatimite caliph, it was restored to the Ka’ba.

In 317 (929) a conspiracy was formed to dethrone Moqtadir, to which Munis, the chief commander of the army, at first assented, irritated by false reports. Very soon he withdrew, and though he could not prevent the plundering of the palace, and the proclamation as caliph of another son of Motadid with the title al-Qahir billah (” the victorious through God “), he rescued Moqtadir and his mother, and at the same time his imprisoned friend Ali b. ‘Isa, and brought them to his own house. A few days later, a counter-revolution took place; the leaders

of the revolt were killed, and Moqtadir, against his wish, was replaced on the throne. In 320 (a.d. 932) Munis, discovering a court intrigue against him, set out for Mosul, expecting that the Hamdanids, who owed to him their power, would join him. Instead of doing this, they opposed him with a numerous army, but were defeated. Munis took Mosul, and having received reinforcements from all parts, marched against Bagdad. The caliph, who wished nothing more than to be reconciled to his old faithful servant, was forced to take arms against him, and fell in battle Shawwal 320 (October 932), at the age of 38 years. His reign, which lasted almost twenty-five years, was in all respects injurious to the empire.

19. Reign of Qahir. — After the victory Munis acted with great moderation and proclaimed a general amnesty. His own wish was to call Abu Ahmad, a son of Moktafi, or a son of Moq- tadir, to the Caliphate, but the majority of generals preferring Qahir because he was an adult man and had no mother at his side, he acquiesced, although he had a personal dislike for him, knowing his selfish and cruel character. Qahir was a drunkard, and derived the money for his excesses from promiscuous con- fiscation. He ill-treatetl the sons of Moqtadir and Abu Ahmad, and ultimately assassinated his patrons Munis and Yalbak, whose guardianship he resented. In Jornada I. 322 (April 934) he was dethroned and blinded, and died in poverty seven years later.

During the last years of Moqtadir and the reign of Qahir a new dynasty rose. Buya, the chief of a clan of the Dailam, a warlike people who inhabit the mountainous country south-west of the Caspian Sea, had served under the Samanids, and found a footing in the south of Media (Jabal), whence his three sons — well known under the titles they assumed at a later period: Tmad addaula (” prop of the dynasty “), Rokn addaula (” pillar of the dynasty “), and Mo’izz addaula (” strengthener of the dynasty “) — succeeded in subduing the province of Fars, at the time of Qahir’s dethronement (see Persia: History).

20. Reign of Radi. — Moqtadir’s son, who was then proclaimed caliph under the name of ar-Rddi billah (” the content through God”), was pious and well-meaning, but inherited only the shadow of power. The vizier Ibn Moqla tried to maintain his authority at least in Irak and Mesopotamia, but without success. The treasury was exhausted, the troops asked for pay, the people in Bagdad were riotous. In this extremity the caliph bade Ibn Raiq, who had made himself master of Basra and Wasit, and had command of money and men, to come to his help. He created for him the office of Amir al-Omara, ” Amir of the Amirs,” which nearly corresponds to that of Mayor of the Palace

among the Franks. 1 Thenceforth the worldly power of the Caliphate was a mere shadow. The empire was by this time practically reduced to the province of Bagdad; Khorasan and Transoxiana were in the hands of the Samanids, Fars in those of the Buyids; Kirman and Media were under independent sovereigns; the Hamdanids possessed Mesopotamia; the Sajids Armenia and Azerbaijan; the Ikshldites Egypt; as we have seen, the Fatimites Africa, the Carmathians Arabia. The Amir al-Omara was obliged to purchase from the latter the freedom of the pilgrimage to Mecca, at the price of a disgraceful treaty.

During the troubles of the Caliphate the Byzantines had made great advances; they had even taken Malatia and Samosata (Samsat). But the great valour of the Hamdanid prince Saif- addaula checked their march. The Greek army suffered two severe defeats and sued for peace.

21. Reign of Mottaqi. — Radi diedinRabial. A.H.329 (December 940). Another son of Moqtadir was then proclaimed caliph under the name of al-Mottaqi billah (" he who guards himself by God ") . At the time of his accession the Amir al-Omara was the Turkish general Bajkam, in whose favour Ibn Raiq had been obliged to retire. Unfortunately Bajkam died soon after, and his death was followed by general anarchy. A certain Barldl, who had carved out for himself a principality in the province of Basra, marched against Bagdad and made himself master of the capital, but was soon driven out by the Dailamite general

1 See Defremery, Memoire sur les Emirs al-Omara (Paris, 1848).

Kurtakln. Ibn Raiq came back and reinstated himself as Amir al-Omara. But Barldl again laid siege to Bagdad, and Mottaqi fled to Nasir addaula the Hamdanid prince of Mosul, who then marched against Bagdad, and succeeded in repelling Barldl. In return he obtained the office of Amir al-Omara. But the Dailamite and Turkish soldiery did not suffer him to keep this office longer than several months. Tuzun, a former captain of Bajkam, compelled him to return to Mosul and took his place. Mottaqi fled again to Mosul and thence to Rakka. The Ikshid, sovereign of Egypt and Syria, offered him a refuge, but Tuzun, fearing to see the caliph obtain such powerful support, found means to entice him to his tent, and had his eyes put out, Saphar 333 (October 944).

22. Reign of Mostakfi. — As successor Tuzun chose al-Mostakfi billdh ("he who finds full sufficiency with God"), a son of Moktafi. This prince, still more than his predecessors, was a mere puppet in the hands of Tuzun, who died a few months later, and his successor Ibn Shirzad. Such was the weakness of the caliph that a notorious robber, named Hamdl, obtained immunity for his depredations by a monthly payment of 25,000 dinars. One of the Buyid princes, wtiose power had been steadily increasing, marched about this time against Bagdad, which he entered in Jornada I. a.h. 334 (December 945), and was acknowledged by the caliph as legal sovereign, under the title of Sultan. He assumed at this time the name of Mo'izz addaula. Mostakfi was soon weary of this new master, and plotted against him. At least Mo'izz addaula suspected him and deprived him of his eyesight, Jornada II. a.h. 334 (January 946). There were thus in Bagdad three caliphs who had been dethroned and blinded, Qahir, Mottaqi and Mostakfi.

23. Reign of Moti. — Mo'izz addaula soon abandoned his original idea of restoring the title of caliph to one of the descend- ants of Ali, fearing a strong opposition of the people, and also dreading lest this should lead to the recovery by the caliphs of their former supremacy. His choice fell on a son of Moqtadir, who took the title of al-Motl' billdh ("he who obeys God"). The sultan, reserving to himself all the powers and revenues of the Caliphate, allowed the caliph merely a secretary and a pension of 5000 dirhems a day. Though in public prayers and on the coins the name of the caliph remained as that of the supreme authority, he had in reality no authority out of the palace, so that the saying became proverbial, " he contents himself with sermon and coin."

The Hamdanid prince of Mosul, who began to think his possessions threatened by Mo'izz addaula, tried without success to wrest Bagdad from him, and was obliged to submit to the payment of tribute. He died in 358 (a.d. 969), and ten years later the power of this branch of the Hamdanids came to an end. The representative of the other branch, Saif addaula, the prince of Haleb (Aleppo), conducted the war against the Byzantines with great valour till his death in 356 (a.d. 967), but could not stop the progress of the enemy. His descendants maintained themselves, but with very limited power, till a.h. 413 (a.d. 1022).

Mo'izz addaula died in the same year as Saif addaula, leaving his power to his son Bakhtiyar Tzz addaula, who lacked his father's energy and loved pleasure more than business.

While the Abbasid dynasty was thus dying out in shame and degradation, the Fatimites, in the person of Mo'izz li-din-allah (or Mo'izz Abu Tamin Ma'add) (" he who makes God's religion victorious "), were reaching the highest degree of power and glory in spite of the opposition of the Carmathians, who left their old allegiance and entered into negotiations with the court of Bagdad, offering to drive back the Fatimites, on condition of being assisted with money and troops, and of being rewarded with the government of Syria and Egypt. The former condition was granted, but the caliph emphatically refused the latter demand, saying: " Both parties are Carmathians, they profess the same religion and are enemies of Islam." The Carmathians drove the Fatimites out of Syria, and threatened Egypt, but, notwithstanding their intrepidity, they were not able to cope with their powerful rival, who, however, in his turn could not bring them to submission. In 978-979 peace was made on

condition that the Carmathians should evacuate Syria: for an annual payment of. 70,000 dinars. But the losses sustained by the Carmathians during that struggle had been enormous. Their power henceforward declined, and came to an end in a.h. 474 (a.d. 1081).

Mo'izz addaula, as we have seen, professed a great veneration for the house of Ali. He not only caused the mourning for the death of Hosain and other Shi'ite festivals to be celebrated at Bagdad, but also allowed imprecations against Moawiya and even against Mahomet's wife Ayesha and the caliphs Abu Bekr, Omar and Othman, to be posted up at the doors of the mosques. These steps annoyed the people and the Turkish soldiery, who were Sunnites, and led at last to an insurrection. Moti was compelled to abdicate, and Bakhtiyar was driven out of Bagdad Dhu'l-qa'da 363 (August 974).

24. Reign of Tai. — Moti left the empty title of caliph to his son al-Td'i li-amri'lldh (" the obedient to the command of God "). The Turks who had placed him on the throne could not maintain themselves, but so insignificant was the person of the caliph that 'Adod addaula, who succeeded his cousin Bakhtiyar in Bagdad, did not think of replacing him by another. Under this prince, or king, as he was called, the power of the Buyids reached its zenith. His empire stretched from the Caspian to the Persian Sea, and in the west to the eastern frontier of Syria. He did his best to remedy the misery caused by the intestine wars, repaired the ruined mosques and other public edifices, founded hospitals and libraries — his library in Shiraz was one of the wonders of the world — and improved irrigation. It was also he who built the mausoleum of Hosain at Kerbela, and that of Ali at Kufa. But after his death in the year 372 (a.d. 983), his sons, instead of following the

example of their predecessors, the three sons of Buya, fought one against the other. In 380 (a.d. 990) the youngest of them, Baha addaula, had the upper hand. This prince, who was as avaricious as he was ambitious, wishing to deprive the caliph Ta'i of his possessions, compelled him to abdicate a.h. 381 (a.d. 991).

25. Reign of Qddir. — A grandson of Moqtadir was then made caliph under the name of al-Qddir billdh (" the powerful through God "). The only deed of power, however, that is recorded of him, is that he opposed himself to the substitution of a Shi'ite head cadi for the Sunnite, so that Baha addaula had to content himself with giving to the Shi'ites a special judge, to whom he gave the title of naqib (superintendent). During this caliphate the Buyid princes were in continual war with one another. Meanwhile events were preparing the fall of their dynasty. In 350 (a.d. 961) a Turkish general of the Samanids had founded for himself a principality in Ghazni, arid at his death in 366 (a.d. 976) his successor Sabuktagin had conquered Bost in Sijistan and Qosdar in Baluchistan, beaten the Indian prince Diaya Pala, and been acknowledged as master of the lands west of the Indus. At his death in 387 his son Mahmud conquered the whole of Khorasan and Sijistan, with a great part of India. He then attacked the Buyids, and would have destroyed their dynasty but for his death in the year 421 (a.d. 1030).

In 389 (a.d. 999) Uek-khan, the prince of Turkistan, took Bokhara and made an end to the glorious state of the Samanids, the last prince of which was murdered in 395 (a.d. 1005). The Samanids had long been a rampart of the Caliphate against the Turks, whom they held under firm control. From their fall dates the invasion of the empire by that people. The greatest gainer for the moment was Mahmud of Ghazni. In Mesopotamia and Irak several petty states arose on the ruins of the dominions of the Hamdanids and of the Abbasids.

Qadir died in the last month of a.h. 422 (November 1031). He is the author of some theological treatises.

26. Reign of QditH.—He was succeeded by his son, who at his accession took the title of al-Qdim bi-amri'lldh (" he who main- tains the cause of God "). During the first half of his long reign took place the development of the power of the Ghtizz, a great Turkish tribe, who took the name Seljuk from Seljuk their chief in Transoxiana. Already during the reign of Mahmud large bodies had passed the Oxus and spread over Khorasan and the adjacent

countries. In the time of his successor the bulk of the tribe followed, and in the year 429 (a.d. 1038) Toghrul Beg, their chief, beat the army of the Ghaznevids and made his entry into Nishapur. Thenceforth this progress was rapid (see Seljuks). The situation in Bagdad had become so desperate that the caliph called Toghrul to his aid. This prince entered Bagdad in the month of Ramadan a.h. 447 (December 1055), and overthrew finally the dynasty of the Buyids. 1 In 449 (a.d. 1058) the caliph gave him the title of ” King of the East and West.” But in the following year, 450, during his absence, the Shi’ites made them- selves masters of the metropolis, and proclaimed the Caliphate of the Fatimite prince Mostansir. They were soon overthrown by Toghrul, who was now supreme, and compelled the caliph to give him his daughter in marriage. Before the marriage, however, he died, and was succeeded by his nephew Alp Arslan, who died in 465 (25th December) (a.d. 1072). Qaim died two years later, Shaaban a.h. 467 (April 1075).

In the year 440 Mo’izz b. Badls, the Zeirid ruler of the Maghrib, made himself independent, and substituted in prayer the name of the Abbasid caliph for that of Mostansir. In order to punish him, the latter gave permission to the Arab tribes in Egypt to cross the Nile, and granted them possession of all the lands they should conquer. This happened in 442 (a.d. 1050) and was of the greatest significance for the subsequent fate of Africa.

27. Reign of Moqtadi.- — In the first year of the Caliphate of al-Moqladi bi-amri’lldh (■” he who follows the orders of God “), a grandson of Qaim, the power of the Seljuk empire reached its zenith. All the eastern provinces, a great part of Asia Minor, Syria, with the exception of a few towns on the shore, the main part of West Africa acknowledged the caliph of Bagdad as the Imam. Yemen had been subjected, and at Mecca and Medina his name was substituted in the public prayers for that of the Fatimite caliph. But after the death of Malik-Shah a contest for the sultanate took place. The caliph, who had in 1087 married the daughter of Malik-Shah, had been compelled two years after to send her back to her father, as she complained of being neglected by her husband. Just before his death, the Sultan had ordered him to transfer his residence from Bagdad to Basra. After his death he stayed and supported the princess Turkan Khatiin. This lost him his life. The day after Barki- yaroq’s triumphant entry into Bagdad, Muharram 487 (February 1094), he died suddenly, apparently by poison.

28. Reign of Mostazhir. — Al-Mostazhir billdh (” he who seeks to triumph through God “), son of Moqtadi, was only sixteen years old when he was proclaimed caliph. His reign is memorable chiefly for the growing power of the Assassins (q.v.) and for the first Crusade (see Crusades) . The Seljuk princes were too much absorbed by internal strife to concentrate against the new assailants. After the death of Barkiyaroq in November 1104, his brother Mahommed reigned till April n 18. His death was followed about four months later by that of Mostazhir.

29. Reign of Mostarshid. — Al-Mostarshid billdh (” he who asks guidance from God .”), who succeeded his father inRabia II. 512 (August 1118), distinguished himself by a vain attempt to re- establish the power of the caliph. Towards the end of the year 529 (October 1134) he was compelled to promise that he would confine himself to his palace and never again take the field. Not long after he was assassinated. About the same time Dobais was killed, a prince of the family of the Banu Mazyad, who had founded the Arabian state of Hillah in the vicinity of the ruins of Babel in 1102.

30. Reign of Rdshid. — Al-Rdshid billdh (“the just through God”) tried to follow the steps of his father, with the aid of Zengi, the prince of Mosul. But the sultan Mas’ud beat the army of the allies, took Bagdad and had Rashid deposed (August 1 136) . Rashid escaped, but was murdered two years later.

31. Reign of Moqtafi. — His successor Al-Moqtafi li-amri’lldh (” he who follows the orders of God “), son of Mostazhir, had better success. He was real ruler not only of the district of Bagdad, but also of the rest of Irak, which he subdued by force.

1 Henceforward the history of thp Caliphate is largely that of the Seljuk princes (see Seljuks).

He died in the month of Rabia II. 555 (March 1 160). Under his reign the central power of the Seljuks was rapidly sinking. In the West of Atabeg (prince’s guardian) Zengi, the prince of Mosul, had extended his dominion over Mesopotamia and the north of Syria, where he had been the greatest defender of Islam against the P’ranks. At his death in the year 541 (a.d. 1146), his noble son, the well-known Nureddm, who was called ” the just king,” continued his father’s glorious career. Transoxiana was conquered by the heathen hordes of Khata, who towards the end of 535 (a.d. 1141) under the king Ghurkhan defeated the great army of the Seljuk prince and compelled the Turkish tribes of the Ghuzz to cross the Oxus and to occupy Khorasan.

32. Reign of Mostanjid. — Al-Mostanjid billdh (“he who invokes help from God”), the son of Moqtafi, enlarged the dominion of the Caliphate by making an end to the state of the Mazyadites in Hillah. His allies were the Arabic tribe of the Montafiq, who thenceforth were powerful in southern Irak. The greatest event towards the end of his Caliphate was the conquest of Egypt by the army of Nureddln, the overthrow of the Fatimite dynasty, and the rise of Saladin. He was killed by his major- domo in Rabia II. 566 (December n 70).

33. Reign of Mostadi. — His son and successor al-Mostadi’ bi-amri’lldh (” he who seeks enlightenment by the orders of God “)’, though in Egypt his name was now substituted in public prayers for that of the Fatimite caliph, was unable to obtain any real authority. By the death of Nureddln in 569 (a.d. i i 74) Saladin’s power became firmly rooted. The dynasty founded by him is called that of the Ayyubites, after the name of his father Ayyub. Mostadi died in the month of Dhu’l-qa’da 575 (March 1180).

Sˆ.Reignof Nasir. — Quite a different man from his father was his successor al-Ndsir li-dini’lldh (“he who helps the religion of God “) . During his reign Jerusalem was reconquered by Saladin, 27 Rajab 583 (October 2nd, n 87). Not long before that event the well- known Spanish traveller Ibn Jubair visited the empire of Saladin, and came to Bagdad in 580, where he saw the caliph himself. Nasir was very ambitious; he had added Khuzistan to bis . dominions, and desired to become also master of Media (Jabal, or Persian Irak, as it was called in the time of the Seljuks) . Here, however, he came into conflict with the then mighty prince of Khwarizm (Khiva), who, already exasperated because the caliph refused to grant him the honours he asked for, resolved to overthrow the Caliphate of the Abbasids, and to place a descendant of Ali on the throne of Bagdad. In his anxiety, Nasir took a step which brought the greatest misery upon western Asia, or at least accelerated its arrival.

In the depths of Asia a great conglomeration of east Turkish tribes (Tatars or Mongols), formed by a terrible warrior, known under his honorific title Jenghiz Khan, had conquered the northern provinces of China, and extended its power to the frontiers of the Transoxianian regions. To this heathen chief the Imam of the Moslems sent a messenger, inducing him to attack the prince of Khwarizm, who already had provoked the Mon- golian by a disrespectful treatment of his envoys. Neither he nor the caliph had the slightest notion of the imminent danger they conjured up. When Nasir died, Ramadan 622 (October 1225), the eastern provinces of the empire had been trampled down by the wild hordes, the towns burned, and the

inhabitants killed without mercy.

35. Reign of Zdhir. — Al-Zdhir bi-amri'lldh (" the victorious through the orders of God ") died within a year after his father's death, in Rajab 623 (July 1226). He and his son and successor are praised as beneficent and just princes.

36. Reign of Mostansir. — Al-Mostansir billdh (" he who asks help from God ") was caliph till his death in Jornada II. 640 (December 1242). In the year 624 (1227) Jenghiz Khan died, but the Mongol invasion continued to advance with immense strides. The only man who dared, and sometimes with success, to combat them was Jelaleddin, the ex-king of Khwarizm, but after his death in 628 (a.d. 1231) all resistance was paralysed.

37. Reign of Mostasim. — Al-Mosta'sim billdh ("he who clings to God for protection "), son of Mostansir, the last caliph of Bagdad, was a narrow-minded, irresolute man, guided moreover

by bad counsellors. In the last month of the year 653 (January 1256) Hulaku or Hulagu, the brother of the gteat khan of the Mongols, crossed the Oxus, and began by destroying all the strongholds of the Isma'ilis. Then the turn of Bagdad came. On the nth of Muharram 656 (January 1258) Hulaku arrived under the walls of the capital. In vain did Mostasim sue for peace. Totally devoid of dignity and heroism, he ended by surrendering and imploring mercy from the barbarian victor. On the 4th of Saphar (February 10th) he came with his retinue into the camp. The city was then given up to plunder and slaughter; many public buildings were burnt; the caliph, after having been compelled to bring forth all the hidden treasures of the family, was killed with two of his sons and many relations. With him expired the eastern Caliphate of the Abbasids, which had lasted 524 years, from the entry of Abu'l- Abbas into Kufa.

In vain, three years later, did Abu'l-Qasim Ahmad, a scion of the race of the Abbasids, who had taken refuge in Egypt with Bibars the Mameluke sultan, and who had been proclaimed caliph under the title al-Mostansir billdh (" he who seeks help from God "), make an effort to restore a dynasty which was now for ever extinct. At the head of an army he marched against Bagdad, but was defeated and killed before he reached that city. Then another descendant of the Abbasids, who

also had found an asylum in Egypt, was proclaimed caliph at Cairo under the name of al-Hakim bi-amri'lldh (" he who decides according to the orders of God "). His sons inherited his title, but, like their father, remained in Egypt without power or influence (see Egypt : History, " Mahommedan period ")■ This shadow of sovereignty continued to exist till the conquest of Egypt by the Turkish sultan Selim I., who compelled the last of them, Motawakkil, to abdicate in his favour (see Turkey: History). He died at Cairo, a pensionary of the Ottoman government, in 1538.

Another scion of the Abbasid family, Mahommed, a great- grandson of the caliph Mostansir, found at a later period a refuge in India, where the sultan of Delhi received him with the greatest respect, named him Makhdumzadeh, " the Master's son," and treated him as a prince. Ibn Battita saw him when he visited India, and says that he was very avaricious. On his return to Bagdad the traveller found there a young man, son of this prince, who gained a single dirhem daily for serving as imam in a mosque, and did not get the least relief from his rich father. It seems that this Mahommed, or his son, emigrated later to Sumatra, where in the old Samutra the graves of their descendants have been lately discovered. (M. J. de G.)

CALIVER, a firearm used in the 16th century. The word is an English corruption of " calibre," and arises from the " arque- bus of calibre," that is, of standard bore, which replaced the older arquebus. " Caliver," therefore, is practically synonymous with " arquebus." The heavier musket, fired from a rest, re- placed the caliver or arquebus towards the close of the century.

CALIXTUS, or Callistus, the name of three popes.

Calixtus I., pope from 217 to 222, was little known before the discovery of the book of the Philosophumena. From this work, which is in part a pamphlet directed against him, we learn that Calixtus was originally a slave and engaged in banking. Falling on evil times, he was brought into collision with the Jews, who denounced him as a Christian and procured his exile to Sardinia. On his return from exile he was pensioned by Pope Victor, and, later, was associated by Pope Zephyrinus in the government of the Roman church. On the death of Zephyrinus (217) he was elected in his place and occupied the papal chair for five years. His theological adversary Hippolytus, the author of the Philosophumena, accused him of having favoured the modalist or Patripassian doctrines both before and after his election. Calixtus, however, condemned Sabellius, the most prominent champion of that system. Hippolytus accused him also of certain relaxations of

discipline. It appears that Calixtus reduced the penitential severities applied until his time to those guilty of adultery and other analogous sins. Under Calixtus and his two immediate successors, Hippolytus was the leader of a schismatic group, organized by way of protest

against the election of Calixtus. Calixtus died in 222, in circumstances obscured by legends. In the time of Constantine the Roman church reckoned him officially among the martyr popes. (L. D.*)

Calixtus II. (d. 1124), pope from 1110 to 1124, was Guido, a member of a noble Burgundian family, who became archbishop of Vienne about 1088, and belonged to the party which favoured reform in the Church. In September 1 1 1 2, after Pope Paschal II. had made a surrender to the emperor Henry V., Guido called a council at Vienne, which declared against lay investiture, and excommunicated Henry. In February 11 19 he was chosen pope at Cluny in succession to Gelasius II., and in opposition to the an ti -pope Gregory VIII. , who was in Rome. Soon after his consecration he opened negotiations with the emperor with a view to settling the dispute over investiture. Terms of peace were arranged, but at the last moment difficulties arose and the treaty was abandoned; and in October 11 19 both emperor and anti-pope were excommunicated at a synod held at Reims. The journey of Calixtus to Rome early in n 20 was a triumphal march. He was received with great enthusiasm in the city, while Gregory, having fled to Sutri, was delivered into his hands and treated with great ignominy. Through the efforts of some German princes negotiations between pope and emperor were renewed, and the important Concordat of Worms made in September n 22 was the result. This treaty, made possible by concessions on either side, settled the investiture controversy, and was confirmed by the Lateran council of March n 23. During his short reign Calixtus strengthened the authority of the papacy in southern Italy by military expeditions, and restored several buildings within the city of Rome. During preparations for a crusade he died in Rome on the 13th or 14th of December

1 1 24.

See M. Maurer, Pabst Calixt II. (Munich, 1889); U. Robert, Histoire du pape Calixte II. (Paris, 1891) ; and A. Hauck’s Real- encyklopadie, Band iii. (Leipzig, 1897).

Calixtus III. (c. 1378-1458), pope from 1455 to 1458, was a Spaniard named Alphonso de Borgia, or Borja. A native of Xativa, he gained a great reputation as a jurist, becoming pro- fessor at Lerida; in 1429 he

was made bishop of Valencia, and in 1444 a cardinal, owing his promotion mainly to his close friendship with Alphonso V., king of Aragon and Sicily. Chosen pope in April 1455, ne was ver y anxious to organize a crusade against the Turks, and having sold many of his possessions, succeeded in equipping a fleet. Neither the princes nor the people of Europe, however, were enthusiastic in this cause, and very little result came from the pope's exertions. During his papacy Calixtus became involved in a quarrel with his former friend, Alphonso of Aragon, now also king of Naples, and after the king's death in June 1438 he refused to recognize his ille- gitimate son, Ferdinand, as king of Naples, asserting that this kingdom was a fief of the Holy See. This pope was notorious for nepotism, and was responsible for introducing his nephew, Rodrigo Borgia, afterwards Pope Alexander VI., to Rome. He died on the 6th of August 1458.

See A. Hauck's Realencyklopadie, Band iii. (Leipzig, 1897).

CALIXTUS, GEORG (1586-1656), Lutheran divine, was born at Medelby, a village of Schleswig, in 1586. After studying philology, philosophy and theology at Helmstadt, Jena, Giessen, Tubingen and Heidelberg, he travelled through Holland, France and England, where he became acquainted with the leading Reformers. On his return in 1614 he was appointed professor of theology at Helmstadt by the duke of Brunswick, who had admired the ability he displayed when a young man in a dispute with the Jesuit Augustine Turrianus. In 1613 he published a book, Disputationes de Praecipuis Religionis Christianae Capitibus, which provoked the hostile criticism of orthodox scholars; in 1619 he published his Epitome theologiae, and some years later his Theologia Moralis (1634) and De Arte Nova Nihusii. Roman Catholics felt them to be aimed at their own system, but they gave so great offence to Lutherans as to induce Statius Buscher to charge the author with a secret leaning to Romanism. Scarcely had he refuted the accusation of Buscher, when, on account of

his intimacy with the Reformed divines at the conference of Thorn (1645), and his desire to effect a reconciliation between them and the Lutherans, a new charge was preferred against him, principally at the instance of Abraham Calovius (1612-1686), of a secret attachment to Calvinism. In fact, the great aim of his life was to reconcile Christendom by removing all unimportant differences. The disputes to which this attitude gave rise, known in the Church as the Syncretistic

controversy, lasted during the whole lifetime of Calixtus, and distracted the Lutheran church, till a new controversy arose with P. J. Spener and the Pietists of Halle. Calixtus died in 1656.

There is a monograph on Calixtus by E. L. T. Henke (2 vols., 1853-1856); see also Isaak Dorner, Gesch. d. protest. Theol. pp. 606-624; and especially Herzog-Hauck, Realencyklopddie.

CALL (from Anglo-Saxon ceallian, a common Teutonic word, cf. Dutch kallen, to talk or chatter), to speak in a loud voice, and particularly to attract some one's attention by a loud utterance. Hence its use for a visit at a house, where the name of the occupier, to whom the visit was made, was called aloud, in early times, to indicate the presence of the visitor. It is thus trans- ferred to a short stay at a place, but usually with the idea of a specific purpose, as in " port of call," where ships stop in passing. Connected with the idea of summoning by name are such uses as " roll-call " or " call-over," where names are called over and answered by those present; similar uses are the " call to the bar," the summoning at an Inn of Court of those students qualified to practise as barristers, and the " call within the bar " to the appointment of king's counsel. In the first case the " bar " is that which separates the benchers from the rest of the body of members of the Inn, in the other the place in a court of law within which only king's counsel, and formerly serjeants-at-law, are allowed to plead. " Call " is also used with a particular reference to a divine summons, as of the calling of the apostles. It is thus used in nonconformist churches of the invitation to serve as minister a particular congregation or chapel. It is from this sense of a vocatio or summons that the word " calling " is used, not only of the divine vocation, but of a man's ordinary profession, occupation or business. In card games " call " is used, in poker, of the demand that the hand of the highest bettor be exposed or seen, exercised by that player who equals his bet; in whist or bridge, of a certain method of play, the " call " for a suit or for trumps on the part of one partner, to which the other is expected to respond; and in many card games for the naming of a card, irregularly exposed, which is laid face up on the table, and may be thus " called " for, at any point the opponent may choose.

" Call " is also a term on the English and American stock exchanges for a contract by which, in consideration of a certain sum, an" option " is given by the person making or signing the agreement to another named therein or his order or to bearer, to " call " for a specified amount of stock at a certain day for a certain price. A " put," which is the reverse of a " call," is the option of selling (putting) stock at a certain day for a certain price. A combined option of either calling or

putting is termed a ” straddle,” and sometimes on the American stock exchange a “spread-eagle.” (See further Stock Exchange.) The word is also used, in connexion with joint-stock companies, to signify a demand for instalments due on shares, when the capital of the company has not been demanded or “called “up at once. (See Company.)

CALLANDER, a police burgh of Perthshire, Scotland, 16 m. north-west of Stirling by the Caledonian railway. Pop. (1001) 1458. Situated oh the north bank of the Teith, here crossed by a three-arched bridge, and sheltered by a ridge of wooded hills, it is in growing repute as a health resort. A mile and a half north- east are the Falls of Bracklinn (Gaelic, “white-foaming pool”), formed by the Keltie, which takes a leap of 50 ft. down the red sandstone gorge on its way to the Teith. Two miles north-west of Callander is the Pass of Leny, ” the gate of the Highlands,” and farther in the same direction is Loch Lubnaig, on the shores of which stand the ruins of St Bride’s chapel. Callander owes much of its prosperity to the fact that it is the centre from which the Trossachs is usually visited, the route being that

described in Scott’s Lady of the Lake. The ascent of Ben Ledi is commonly made from the town.

CALLAO, a city, port and coast department of Peru, 85 m. west of Lima, in 12 04′ S., 77° 13′ W. Pop. (1905) 31,128, of whom 3349 were foreigners. The department includes the city and its environs, Bella vista and La Punta, and the neighbouring islands, San Lorenzo, Fronton, the Palominos, &c, and covers an area of 14-J sq. m. Callao is the principal port of the republic, its harbour being a large bay sheltered by a tongue of land on the south called La Punta, and by the islands of San Lorenzo and Fronton. The anchorage is good and safe, and the harbour is one of the best on the Pacific coast of South America. The city stands on the south side of the bay, and is built on a flat point of land only 8 ft. above sea-level. The houses are for the most part low and cheaply built, and the streets are narrow, badly paved, irregular and dirty. The climate is good and the coast is swept by cool ocean breezes, the average temperatures ranging from 65 to 77 F., but notwithstanding this, Callao has a bad reputation for fevers and contagious diseases, chiefly because of its insanitary condition. Its noteworthy public buildings are the custom-house and its storehouses which occupy the old quadrangular fortress built by the Spanish government between 1770 and 177s, and cover 15 acres, the prefecture, the military and naval offices and barracks, the post-office, three Catholic churches, a hospital, market, three clubs and some modern commercial houses. The present city is half a mile north of the

site of the old town, which was destroyed by an earthquake and tidal wave in 1746. For a short time the commercial interests of the stricken city centred at Bellavista, ij m. east, where wheat granaries were built and still remain, but later the greater convenience of a waterside site drew the merchants and population back to the vicinity of the submerged town. The importance of Callao in colonial times, when it was the only open port south of Panama, did not continue under the new political order, because of the unsettled state of public affairs and the loss of its monopoly. This decline in its prosperity was checked, and the modern development of the port began, when a railway was built from Callao into the heart of the Andes, and Callao is now an important factor in the development of copper-mining. The port is connected with Lima by two railways and an electric tramway, with Oroya by railway 138 m. long, and with Cerro de Pasco by railway 221m. A short railway also runs from the port to the Bellavista storehouses. The port is provided with modern harbour improvements, consisting of sea-walls of concrete blocks, two fine docks with berthing spaces for 30 large vessels, and a large floating-dock (300 ft. long on the blocks and capable of receiving vessels up to 21 ft. draught and 5000 tons weight), which was built in Glasgow and was sent out to Callao in 1863. The docks are provided with gas and electric lights, 18 steam cranes for loading and discharging vessels, a triple line of railway and a supply of fresh water. Callao was formerly the head- quarters in South America of the Pacific Steam Navigation Co., Ltd. (incorporated 1840), but Valparaiso now occupies that position. There are, owing perhaps to the proximity of Lima, few industrial establishments in the city; among them are a large sugar refinery, some flour-mills, a brewery, a factory for making effervescent drinks, and a number of foundries and repair shops. Being a port of the first class, Callao is an im- portant distributing centre for the coasting trade, in which a large number of small vessels are engaged. The foreign steam- ship companies making it a regular port of call are the Pacific Steam Navigation Co. (British), the Compafiia Sud-America (Chilean) , the Kosmos and Roland lines (German) , the Merchants line (New York), and a Japanese line from the ports of Japan and China. A subsidized Peruvian line is also contemplated to ply between the Pacific ports of South America with an eventual extension of the service to Europe. The arrivals from and clearances for foreign ports in 1907 were as follows: —

Arrivals Clearances

Steamers. .Sailing Vessels.

No. Tonnage. No. Tonnage.

5i8 937,302 924 174.165

517 937,7o6 _ 931 163,365

CALLCO’TT— CALLIAS AND HIPPONICUS

The exports from Callao are guano, sugar, cotton; wool, hides, silver, copper, gold and forest products, and the imports include timber and other building materials, cotton and other textiles, general merchandise for personal, household and industrial uses, railway material, coal, kerosene, wheat, flour and other food stuffs. The maintenance of peace and order, and the mining development of the interior, have added to the trade and pros- perity of the port.

The history of Callao has been exceptionally eventful. It was founded in 1537, two years after Pizarro had founded Lima. As the port of that capital and the only open port below Panama it grew rapidly in importance and wealth. It was raised to the dignity of a city in 1671. The appearance of Sir Francis Drake in the bay in 1578 led to the fortification of the port, which proved strong enough to repel an attack by the Dutch in 1624. The city was completely destroyed and partly submerged by the great earthquake of the 28th of October 1746, in which about 6000 persons perished. The new city was strongly fortified and figured prominently in the struggle for independence, and also in the various revolutions which have convulsed the republic. Its political autonomy dates from 1836, when it was made a coast department. The Callao fortifications were bombarded by a Spanish fleet under Admiral Mendez Nunez on the 2nd of May 1866, when there were heavy losses both in lives and material. Again, in 1880, the city was bombarded by the Chileans, though it was almost defenceless, and fell into the possession of the invaders after the capture of Lima in the following year. Before the surrender all the Peruvian naval vessels in the harbour were sunk, to prevent their falling into the possession of the enemy. CALLCOTT, SIR AUGUSTUS WALL (1770-1844), English landscape painter, was born at Kensington in 1779 and died there in 1844. His first study was music; and he sang for several years in the choir of Westminster Abbey. But at the age of twenty he had determined to give up music, and had exhibited his first painting at the Royal Academy. He gradually rose to distinction, and was elected an associate in 1807 and an aca- demician in 1810. In 1827 he received the honour of knighthood; and, seven years later, was appointed surveyor of the royal pictures. His two principal subject pictures — ” Raphael and the Fornarina,” and ” Milton dictating to his Daughters,” are much inferior to his landscapes, which are placed in the highest class by

their refined taste and quiet beauty.

His wife, MARiA,Lady Callcott (1786-1844), whom he married in 1827, was a daughter of Admiral Dundas and widow of Captain Thomas Graham, R.N. (d. 182 2) . With her first husband she travelled in India, South Africa and South America, where she acted for some time as teacher of Donna Maria, who became queen of Portugal in 1826; and in the company of her second husband she spent much time in the south of Europe. She published accounts of her visits to India (1812), and to the environs of Rome (1820); Memoirs of Poussin (1820); a History of France; a History of Spain (1828); Essays toward a History of Painting (1836); Little Arthur's History of England (1836) ; and the Scripture Herbal (1842).

CALLCOTT, JOHN WALL (1766-1821), English musician, brother of Sir Augustus Callcott, was born at Kensington on the 20th of November 1766. At the age of seven he was sent to a neighbouring day-school, where he continued for five years, studying chiefly Latin and Greek. During this time he frequently went to Kensington church, in the repairs of which his father was employed, and the impression he received on hearing the organ of that church seems to have roused his love for music. The organist at that time was Henry Whitney, from whom Callcott received his first musical instruction. He did not, however, choose music as a profession, as he wished to become a surgeon. But on witnessing a surgical operation he found his nervous system so seriously affected by the sight, that he determined to devote himself to music. His intimacy with Dr Arnold and other leading musicians of the day procured him access to artistic circles; he was deputy organist at St George the Martyr, Queen Square, Bloomsbury, from 1783 to 1785, in which year his success- ful competition for three out of the four prize medals offered by

the " Catch Club " soon spread his reputation as composer of glees, catches, canons and other pieces of concerted vocal music. The compositions with which he won these medals were — the catch " O beauteous fair," the canon " Blessed is he," and the glee " Dull repining sons of care." In these and other similar compositions he displays considerable skill and talent, and some of his glees retain their popularity at the present day. In 1787 Callcott helped Dr Arnold and others to form the " Glee Club." In 1789 he became one of the two organists at St Paul's, Covent Garden, and from 1793 to 1802 he was organist to the Asylum for Female Orphans. As an instrumental composer Callcott never succeeded, not even after he had taken lessons from Haydn. But of far greater importance than his compositions are his theoretical writings. His Musical Grammar,

published in 1806 (3rd ed., 1817), was long considered the standard English work of musical instruction, and in spite of its being antiquated when compared with modern standards, it remains a scholarly and lucid treatment of the rudiments of the art. Callcott was a much-esteemed teacher of music for many years. In 1800 he took his degree of Mus.D. at Oxford, where fifteen years earlier he had received his degree of bachelor of music, and in 1805 he succeeded Dr Crotch as musical lecturer at the Royal Institution. Towards the end of his life his artistic career was twice interrupted by the failure of his mental powers. He died at Bristol after much suffering on the 15th of May 1821. A posthumous collection of his most favourite vocal pieces was published in 1824 with a memoir of his life by his son-in-law, William Horsley, himself a composer of note.

Callcott's son, William Hutchins Callcott (1807-1882), in- herited to a large extent the musical gifts of his father. His song, " The last man," and his anthem, " Give peace in our time, O Lord," were his best-known compositions.

CALLIAS, tyrant of Chalcis in Euboea. With the assistance of Philip II. of Macedon, which he hoped to obtain, he contem- plated the subjugation of the whole island. But finding that Philip was unwilling to help him, Callias had recourse to the Athenians, although he had previously (350 B.C.) been engaged in hostilities with them. With the support of Demosthenes, he was enabled to conclude an alliance with Athens, and the tribute formerly paid by Eretria and Oreus to Athens was handed over to him. But his plan of uniting the whole of Euboea under his rule, with Chalcis as capital, was frustrated by Philip, who set up tyrants chosen by himself at Eretria and Oreus. Subsequently, when Philip's attention was engaged upon Thrace, the Athenians in conjunction with Callias drove out these tyrants, and Callias thus became master of the island (Demosthenes, De Pace, p. 58; Epistola Philippi, p. 159; Diod. Sic. xvi. 74). At the end of his life he appears to have lived at Athens, and Demosthenes pro- posed to confer the citizenship upon him (Aeschines, Contra Ctesiphontem, 85, 87).

CALLIAS and HIPPONICUS, two names borne alternately by the heads of a wealthy and distinguished Athenian family. During the 5th and 4th centuries B.C. the office of daduchus or torch-bearer at the Eleusinian mysteries was the hereditary privilege of the family till its extinction. The following members deserve mention.

1. Callias, the second of the name, fought at the battle of Marathon (490) in priestly attire. Some time after the death of Cimon, probably about 445 B.C., he was sent to Susa to conclude with Artaxerxes, king

of Persia, a treaty of peace afterwards misnamed the ” peace of Cimon.” Cimon had nothing to do with it, and he was totally opposed to the idea of peace with Persia (see Cimon). At all events Callias’s mission does not seem to have been successful ; he was indicted for high treason on his return to Athens and sentenced to a fine of fifty talents.

See Herodotus vii. 151; Diod. Sic. xii. 4; Demosthenes, De Falsa Legatione, p. 428 ; Grote recognizes the treaty as a historical fact, History of Greece, ch. xlv., while Curtius, bk. iii. ch. ii., denies the conclusion of any formal treaty; see also Ed. Meyer, Forschungeru, ii. ; J. B. Bury in Hermathena, xxiv. (1898).

2. Hipponicus, son of the above. Together with Eurymedon he commanded the Athenian forces in the incursion into Boeotian territory (426 B.C.) and was slain at the battle of Delium (424).

His wife, whom he divorced, subsequently became the wife of Pericles; one of his daughters, Hipparete, married Alcibiades; another, the wife of Theodorus, was the mother of the orator Isocrates.

See Thucydides iii. 91; Diod. Sic. xii. 65; Andocides, Contra Alcibiadem, 13.

3. Callias, son of the above, the black sheep of the family, was notorious for his profligacy and extravagance, and was ridiculed by the comic poets as an example of a degenerate Athenian (Aristophanes, Frogs, 429, Birds, 283, and schol. Andocides, De Mysteriis, 1 10-13 1). The scene of Xenophon’s Symposium and Plato’s Protagoras was laid at his house. He was reduced to a state of absolute poverty and, according to Aelian (Var. Hist. iv. 23), committed suicide, but there is no confirmation of this. In spite of his dissipated life he played a certain part in public affairs. In 392 he was in command of the Athenian hoplites at Corinth, when the Spartans were defeated by Iphicrates. In 371 he was at the head of the embassy sent to make terms with Sparta. Tfie peace which was the result was called after him the ” peace of Callias.”

See Xenophon, Hellenica, iv. 5, vi. 3 ; and Dklian League.

CALLIMACHUS, an Athenian sculptor of the second half of the 5th century B.C. Ancient critics associate him with Calamis, whose relative

he may have been. He is given credit for two inventions, the Corinthian column and the running borer for drilling marble. The most certain facts in regard to him are that he sculptured some dancing Laconian maidens, and made a golden lamp for the Erechtheum (about 408 B.C.) ; and that he used to spoil his works by over-refinement and excessive labour.

CALLIMACHUS, Greek poet and grammarian, a native of Cyrene and a descendant of the illustrious house of the Battiadae, flourished about 250 B.C. He opened a school in the suburbs of Alexandria, and some of the most distinguished grammarians and poets were his pupils. He was subsequently appointed by Ptolemy Philadelphus chief librarian of the Alexandrian library, which office he held till his death (about 240). His Pinakes (tablets), in 120 books, a critical and chronologically arranged catalogue of the library, laid the foundation of a history of Greek literature. According to Suidas, he wrote about 800 works, in verse and prose; of these only six hymns, sixty-four epigrams and some fragments are extant; a considerable fragment of the Hecale, an idyllic epic, has also been discovered in the Rainer papyri (see Kenyon in Classical Review, November 1893). His Coma Berenices is only known from the celebrated imitation of Catullus. His Aitia (causes) was a collection of elegiac poems in four books, dealing with the foundation of cities, religious ceremonies and other customs. According to Quintilian (Instit. x. 1. 58) he was the chief of the elegiac poets; his elegies were highly esteemed by the Romans, and imitated by Ovid, Catullus and especially Propertius. The extant hymns are extremely learned, and written in a laboured and artificial style. The epigrams, some of the best specimens of their kind, have been incorporated in the Greek Anthology. Art and learn- ing are his chief characteristics, unrelieved by any real poetic genius; in the words of Ovid {Amores, i. 15) —

” Quamvis ingenio non valet, arte valet.”

Editions. — Hymns, epigrams and fragments (the last collected by Bentley) by J. A. Ernesti (1761), and O. Schneider (1870-1873) (with elaborate indices and excursuses) ; hymns and epigrams, by A. Meineke (1861), and U. Wilamowitz-Mollendorff (1897). See Neue Bruchstiicke aus der Hekale des Kallimachus, by T. Gomperz (1893) ; also G. Knaack, Callimachea (1896); A. Beltrami, GV Inni di Calli- macho e il Nomo di Terpandro (1896) ; K. Kuiper, Studia Callimachea (1896) ; A. Hamette, Les tipigrammes de Callimaque: etude critique el litteraire (Paris, 1907). There are English translations (verse) by W. Dodd (1755) and H. W. Tytler (1793) ; (prose) by J. Banks (1856). See also Sandys, Hist, of Class. Schol. i. (ed. 1906), p. 122.

CALLINUS of Ephesus, the oldest of the Greek elegiac poets and the creator of the political and warlike elegy. He is supposed to have flourished between the invasion of Asia Minor by the Cimmerii and their expulsion by Alyattes (630-560 B.C.). During his lifetime his own countrymen were also engaged in a life-and- death struggle with the Magnesians. These two events give the key to his poetry, in which he endeavours to rouse the indolent

Ionians to a sense of patriotism. Only scanty fragments of his poems remain; the longest of these (preserved in Stobaeus, Florilegium, li. 19) has even been ascribed to Tyrtaeus.

Edition of the fragments by N. Bach (1831), and in Bergk, Poetae Lyrici Graeci (1882). On the date of Callinus, see the histories of Greek literature by Mure and Miiller; G. H. Bode, Geschichte ‘der hellenischen Dichtkunst, ii. pt. i. (1838); and G. Geiger, De Callini Aetate (1877), who places him earlier, about 642.

CALLIOPE, the muse of epic poetry, so named from the sweet- ness of her vioce (Gr. icaXXos, beauty; 6\//, voice). In Hesiod she was the last of the nine sisters, but yet enjoyed a supremacy over the others. (See also Muses, The.)

CALLIRRHOE, in Greek legend, second daughter of the river- god Achelous and wife of Alcmaeon (q.v.). At her earnest request her husband induced Phegeus, king of Psophis in Arcadia, and the father of his first wife Arsinoe (or Alphesiboea), to hand over to him the necklace and peplus (robe) of Harmonia (q.v.), that he might dedicate them at Delphi to complete the cure of his madness. When Phegeus discovered that they were really meant for Callirrhoe, he gave orders for Alcmaeon to be waylaid and killed (Apollodorus iii. 7, 2. 5-7; Thucydides ii. 102). Callirrhoe now implored the gods that her two young sons might grow to manhood at once and avenge their father’s dea|;h. This was granted, and her sons Amphoterus and Acarnan slew Phegeus with his two sons, and returning with the necklace and peplus dedicated them at Delphi (Ovid, Metam. ix. 413).

CALLISTHENES (c. 360-328 B.C.) , of Olynthus, Greek historian, a relative and pupil of Aristotle, through whose recommendation he was appointed to attend Alexander the Great in his Asiatic expedition. He censured Alexander’s adoption of oriental customs, inveighing especially against the servile ceremony of adoration. Having thereby greatly offended the king, he was accused of being privy to a treasonable conspiracy and thrown into prison, where he died from torture or disease. His melan- choly end was commemorated in a

special treatise (KaXXtc&wrjs fj Tepl irevdovs) by his friend Theophrastus, whose acquaint- ance he made during a visit to Athens. Callisthenes wrote an account of Alexander's expedition, a history of Greece from the peace of Antalcidas (387) to the Phocian war (357), a history of the Phocian war and other works, all of which have perished. The romantic life of Alexander, the basis of all the Alexander legends of the middle ages, originated during the time of the Ptolemies, but in its present form belongs to the 3rd century a.d. Its author is usually known as pseudo- Callis- thenes, although , in the Latin translation by Julius Valerius Alexander Polemius (beginning of the 4th century) it is ascribed to a certain Aesopus; Aristotle, Antisthenes, Onesicritus and Arrian have also been credited with the authorship. There are also Syrian, Armenian and Slavonic versions, in addition to four Greek versions (two in prose and two in verse) in the middle ages (see Krumbacher, Geschichte der byzantinischen Litteratur, 1897, p. 849). Valerius's translation was completely superseded by that of Leo, arch-priest of Naples in the 10th century, the so- called Historia de Preliis.

See Scriptores rerum Alexandri Magni (by C. W. Miiller, in the Didot edition of Arrian, 1846), containing the genuine fragments and the text of the pseudo-Callisthenes, with notes and introduc- tion; A. Westermann, De Callisthene Olynihio et Pseudo-Callisthene Commentatio (1838-1842); J. Zacher, Pseudo-Callisthenes (1867); W. Christ, Geschichte der griechischen Litteratur (1898), pp. 363, 819; article by Edward Meyer in Ersch and Gruber's Allgemeine Ency- klopadie; A. Ausfeld, Zur Kritik des griechischen Alexanderromans (Bruchsal, 1894) ; Plutarch, Alexander, 52-55; Arrian, Anab. iv. 10-14; Diog. Laertius v. 1; Quintus Curtius viii. 5-8; Suidas s.v. See also Alexander the Great (ad fin.). For the Latin trans- lations see Teuffel-Schwabe, Hist, of Roman Literature (Eng. trans.), § 399; and M. Schanz, Geschichte der romischen Litteratur, iv. i.,p.43.

CALLISTO, in Greek mythology, an Arcadian nymph, daughter of Lycaon and companion of Artemis. She was transformed into a bear as a penalty for having borne to Zeus a son, Areas, the ancestor of the Arcadians. Hera, Zeus and Artemis are all mentioned as the authors of the transformation. Areas, when hunting, encountered the bear Callisto, and would have shot her, had not Zeus with swift wind carried up both to the skies, where he placed them as a constellation. In another version, sJie was

slain by Artemis. Callisto was originally only an epithet of the Arcadian Artemis herself.

See Apollodorus iii. 8; Ovid, Metam. ii. 381-530; R. Franz, De Callistus fabula (1890), which deals exhaustively with the various forms of the legend.

CALLISTRATUS, Alexandrian grammarian, flourished at the beginning of the 2nd century B.C. He was one of the pupils of Aristophanes of Byzantium, who were distinctively called Aristophanei. Callistratus chiefly devoted himself to the elucidation of the Greek poets; a few fragments of his com- mentaries have been preserved in the various collections of scholia and in Athenaeus. He was also the author of a miscel- laneous work called Sdˆ/uiktA, used by the later lexicographers, and of a treatise on courtesans (Athenaeus iii. 125 B, xiii. 501 D). He is not to be confused with Callistratus, the pupil and successor of Isocrates and author of a history of Heraclea in Pontus.

See R. Schmidt, De Callistrato Aristophaneo, appended to A. Nauck's Aristophanis Byzantii Fragmenta (1848); also C. W. Miiller, Fragmenta Hisloricorum Graecorum, iv. p. 353 note.

CALLISTRATUS, an Athenian poet, only known as the author of a hymn in honour of Harmodius (q.v.) and Aristogeiton. This ode, which is to be found in Athenaeus (p. 695), has been beauti- fully translated by Thomas Moore.

CALLISTRATUS, Greek sophist and rhetorician, probably flourished in the 3rd century. He wrote 'EKˆpcuras, descriptions of fourteen works of art in stone or brass by distinguished artists. This little work, which is written in a dry and affected style, without any real artistic feeling, is usually edited with the Ei/com of Philostratus.

Edition by Schenkl-Reisch (Teubner series, 1902) ; see also C. G. Heyne, Opuscula Academica, v. pp. 196-221, with commentary on the Descriptiones ; F. Jacobs, Ammadversiones criticae in Callistrati statuas (1797).

CALLISTRATUS of Aphidnae, Athenian orator and general in the 4th century B.C. For many years, as prostates, he supported Spartan interests at Athens. On account of the refusal of the Thebans to surrender Oropus, which on his advice they had been allowed to occupy temporarily, Callistratus, despite his mag- nificent defence (which so impressed Demosthenes that he resolved to study oratory), was condemned to death, 361 B.C. He fled to Methone in Macedonia,

and on his return to Athens in 355 he was executed. ,

See Xenophon, Hellenica, iii. 3, vi. 2 ; Lycurgus, In Leocr. 93.

CALLOT, JACQUES (1592-1635), French engraver, was born at Nancy in Lorraine, where his father, Jean Callot, was a herald- at-arms. He early discovered a very strong predilection for art, and at the age of twelve quitted home without his father's consent, and set out for Rome where he intended to prosecute his studies. Being utterly destitute of funds he joined a troop of Bohemians, and arrived in their company at Florence. In this city he had the good fortune to attract the notice of a gentleman of the court, who supplied him with the means of study; but he removed in a short time to Rome, where, however, he was recognized by some relatives, who immediately compelled him to return home. Two years after this, and when only fourteen years old, he again left France contrary to the wishes of his friends, and reached Turin before he was overtaken by his elder brother, who had been despatched in quest of him. As his enthusiasm for art remained undiminished after these disappoint- ments, he was at last allowed to accompany the duke of Lorraine's envoy to the papal court. His first care was to study the art of design, of which in a short time he became a perfect master. Philip Thomasin instructed him in the use of the graver, which, however, he ultimately abandoned, substituting the point as better adapted for his purposes. From Rome he went to Florence, where he remained till the death of Cosimo II., the Maecenas of these times. On returning to his native country he was warmly received by the then duke of Lorraine, who admired and encour- aged him. As his fame was now spread abroad in various countries of Europe, many distinguished persons gave him commissions to execute. By the Infanta Isabella, sovereign of the Low Countries, he was commissioned to engrave a design of the siege of Breda; and at the request of Louis XIII. he designed the siege of Rochelle and the attack on the Isle of Re. When,.

however, in 163 1 he was desired by that monarch to execute an engraving of the siege of Nancy, which he had just taken, Callot refused, saying, " I would rather cut off my thumb than do anything against the honour of my prince and of my country "; to which Louis replied that the duke of Lorraine was happy in possessing such subjects as Callot. Shortly after this he returned to his native place, from which the king failed to allure him with the offer of a handsome pension. He engraved in all about 1600 pieces, the best of which are those executed in aquafortis. No one ever possessed in a higher degree the talent for grouping a large number of figures in a small space, and of representing with two or three bold strokes the expression, action

and peculiar features of each individual. Freedom, variety and naivetS characterize all his pieces. His Fairs, his Miseries of War, his Sieges, his Temptation of St Anthony and his Conversion of St Paul are the best-known of his plates.

See also Edouard Meaume, Recherches sur la vie de Jacques Callot (i860).

CALLOVIAN (from Callovium, the Latinized form of Kellaways, a village not far from Chippenham in Wiltshire), in geology, the name introduced by d'Orbigny for the strata which constitute the base of the Oxfordian or lowermost stage of the Middle Oolites. The term used by d'Orbigny in 1844 was " Kellovien," subsequently altered to " Callovien " in 1849; William Smith wrote "Kellaways" or "Kelloways Stone" towards the close of the 18th century. In England it is now usual to speak of the Kellaways Beds; these comprise (1) the Kellaways Rock, alternating clays and sands with frequent but irregular con- cretionary calcareous sandstones, with abundant fossils; and (2) a lower division, the Kellaways Clay, which often contains much selenite but is poor in fossils. The lithological characters are impersistent, and the sandy phase encroaches sometimes more, sometimes less, upon the true Oxford Clay. The rocks may be traced from Wiltshire into Bedfordshire, Lincolnshire and Yorkshire, where they are well exposed in the cliffs at Scarborough and Gristhorpe, at Hackness (90 ft.), Newtondale (80 ft.), and Kepwick (100 ft.). In Yorkshire, however, the Callovian rocks lie upon a somewhat higher palaeontological horizon than in Wiltshire. In England, Kepplerites calloviensis is taken as the zone fossil; other common forms are Cosmoceras modiolare, C. gowerianum, Belemnites oweni, Ancyloceras callo- viense, Nautilus calloviensis, Avicula ovalis, Gryphaea bilobata, &c.

On the European continent the " Callovien " stage is used in a sense that is not exactly synonymous with the English Callovian; it is employed to embrace beds that lie both higher and lower in the time-scale. Thus, the continental Callovien includes the following zones: — • Upper Callovien f Zone of Peltoceras athleta, Cosmoceras Duncani, (Divesien) \ Quenstedtoceras Lamberti and Q. mariae.

{Zone of Reineckia anceps, Stephanoceras co*o- natum and Cosmoceras jason and a lower zone of C. gowerianum and Macrocephalites macrocephalus.

Rocks of Callovian age (according to the continental classifica- tion) are widely spread in Europe, which, with the exception of numerous

insular masses, was covered by the Callovian Sea. The largest of these land areas lay over Scandinavia and Finland, and extended eastward as far as the 40th meridian. In arctic regions these rocks have been discovered in Spitzbergen, Franz Josef Land, the east coast of Greenland, and Siberia. They occur in the Hebrides and Skye and in England as indicated above. In France they are well exposed on the coast of Calvados between Trouville and Dives, where the marls and clays are 200 ft. thick. In the Ardennes clays bearing pyrites and oolitic limonite are about 30 ft. thick. Around Poitiers the Callovian is 100 ft. thick, but the formation thins in the direction of the Jura.

Clays and shales with ferruginous oolites represent the Callovian of Germany; while in Russia the deposits of this age are mainly argillaceous. In North America Callovian fossils are found in California; in South America in Bolivia. In Africa they have been found in Algeria and Morocco, in Somaliland and Zanzibar, and on the west coast of Madagascar. In India they are

represented by the shales and limestones of the Chari series of Cutch. Callovian rocks are also recorded from New Guinea and the Moluccas.

See Jurassic; also A. de Lapparent, Traite de geologie, vol. ii. (5th ed., 1906), and H. B. Woodward, ” The Jurassic Rocks of Britain,” Mem. Geol. Survey, vol. v. (J. A. H.)

CALM, an adjective meaning peaceful, quiet; particularly used of the weather, free from wind or storm, or of the sea, opposed to rough. The word appears in French caime, through which it came into English, in Spanish, Portuguese and Italian calma. Most authorities follow Diez (Etym. Wbrterbuck der romanischen Sprachen) in tracing the origin to the Low Latin cauma, an adaptation of Greek Kavfia, burning heat, kclUw, to burn. The Portuguese calma has this meaning as well as that of quiet. The connexion would be heat of the day, rest during that period, so quiet, rest, peacefulness. The insertion of the /, which in English pronunciation disappears, is probably due to the Latin color, heat, with which the word was associated.

CALMET, ANTOINE AUGUSTIN (1672-1757), French Bene- dictine, was born at Mesnil-la-Horgne on the 26th of February 1672. At the age of seventeen he joined the Benedictine order, and in 1698 was appointed to teach theology and philosophy at the abbey of Moyen-Moutier. He was successively prior at Lay, abbot at Nancy and of Senones in Lorraine. He died in Paris on the 25th of October 1757. The erudition of Calmet's exegeti- cal writings won him a reputation that was not confined to the Roman Catholic Church, but they have failed to stand the test of modern scholarship. The most noteworthy are: — Commentaire de la Bible (Paris, 23 vols., 1707-17 16), and Dictionnaire historique, geographique, critique, chronologique et UttSral de la Bible (Paris, 2 vols., 1720). These and numerous other works and editions of the Bible are known only to students, but as a pioneer in a branch of Biblical study which received a wide development in the 19th century, Calmet is worthy of remembrance. As a histori- cal writer he is best known by his Histoire eccUsiastique et civile de la Lorraine (Nancy, 1728), founded on original research and various useful works on Lorraine, of which a full list is given In Vigouroux's Dictionnaire de la Bible.

See A. Digot, Notice biographique et litteraire sur Dom Augustin Calmet (Nancy, i860).

CALNE, a market town and municipal borough in the Chippen- ham parliamentary division of Wiltshire, England, 99 m. west of London by the Great Western railway. Pop. (1901) 3457. Area, 356 acres. It lies in the valley of the Calne, and is sur- rounded by the high table-land of Salisbury Plain and the Marlborough Downs. The church of St Mark has a nave with double aisles, and massive late Norman pillars and arches. The tower, which fell in 1628, was perhaps rebuilt by Inigo Jones. Other noteworthy buildings are a grammar school, founded by John Bentley in 1660, and the town-hall. Bacon-curing is the staple

industry, and there are flour, flax and paper mills. The manufacture of broadcloth, once of great importance, is almost extinct. Calne is governed by a mayor, four aldermen and twelve councillors.

In the 10th century Calne (Canna, Koine) was the site of a palace of the West-Saxon kings. Calne was the scene of the synod of 978 when, during the discussion of the question of celibacy, the floor suddenly gave way beneath the councillors, leaving Archbishop Dunstan alone standing upon a beam. Here also a witenagemot was summoned in 997. In the Domes- day Survey Calne appears as a royal borough; it comprised forty-seven burgesses and was not assessed in hides. In 1565 the borough possessed a gild merchant, at the head of which were two gild stewards. Calne claimed to have received a charter from Stephen and a confirmation of the same from Henry III., but no record of these is extant, and the charter actually issued to the borough by James II. in 1687 apparently never came into force. The borough returned two members to parliament more or less irregularly from the first parliament of Edward I. until the Reform Bill of 1832. From this date the borough returned one member only until, by the Redistribution of Seats Act of 1885, the privilege was annulled. In 1303 Lodovicus de Bello Monte,

prebendary of Salisbury, obtained a grant of a Saturday market at the manor of Calne, and a three days' fair at the feast of St Mary Magdalene; the latter was only abandoned in the 19th century. Calne was formerly one of the chief centres of cloth manufacture in the west of England, but the industry is extinct.

CALOMEL, a drug consisting of mercurous chloride, mercury subchloride, Hg_2Cl_2, which occurs in nature as the mineral horn-quicksilver, found as translucent crystals belonging to the tetragonal system, with an adamantine lustre, and a dirty white grey or brownish colour. The chief localities are Idria, Ober- moschel, Horowitz in« Bavaria and Almaden in Spain. It was used in medicine as early as the 16th century under the names Draco mitigalus, Manna metallorum, Aquila alba, Mercurius dulcis ; later it became known as calomel, a name probably derived from the Greek ko.\6s, beautiful, and /xe\as, black, in allusion to its blackening by ammonia, or from ko\6s and jueXi, honey, from its sweet taste. It may be obtained by heating mercury in chlorine, or by reducing mercuric chloride (corrosive sublimate) with mercury or sulphurous acid. It is manufactured by heating a mixture of mercurous sulphate and common salt in iron retorts, and condensing the sublimed calomel in brick chambers. In the wet way it is obtained by precipitating a mercurous salt with hydrochloric acid. Calomel is a white powder which sublimes at a low

red heat; it is insoluble in water, alcohol and ether. Boiling with stannous chloride solution reduces it to the metal; digestion with potassium iodide gives mercurous iodide. Nitric acid oxidizes it to mercuric nitrate, while potash or soda decomposes it into mercury and oxygen. Long continued boiling with water gives mercury and mercuric chloride; dilute hydrochloric acid or solutions of alkaline chlorides convert it into mercuric chloride on long boiling.

The molecular weight of mercurous chloride has given occasion for much discussion. E. Mitscherlich determined the vapour density to be 8 • 3 (air = 1) , corresponding to HgCl. The supporters of the formula Hg 2 Cl 2 pointed out that dissociation into mercury and mercuric chloride would give this value, since mercury is a monatomic element. After contradictory evidence as to whether dissociation did or did not occur, it was finally shown by Victor Meyer and W. Harris (1894) that a rod moistened with potash and inserted in the vapour was coloured yellow, and so con- clusively proved dissociation. A. Werner determined the mole- cular weights of mercurous, cuprous and silver bromides, iodides and chlorides in pyridine solution, and obtained results point- ing to the formula HgCl, etc. However, the double formula, Hg 2 Cl 2 , has been completely established by H. B. Baker (Journ. Chem. Soc, 1900, 77, p. 646) by vapour density determinations of the absolutely dry substance.

Calomel possesses certain special properties and uses in medicine which are dealt with here as a supplement to the general discussion of the pharmacology and therapeutics of mercury (q.v.). Calomel exerts remote actions in the form of mercuric chloride. The specific value of mercurous chloride is that it exerts the valuable properties of mercuric chloride in the safest and least irritant manner, as the active salt is continuously and freshly generated in small quantities. Its pharmacopeial preparations are the ” Black wash,” in which calomel and lime react to form mercurous oxide, a pill still known as ” Plummer’s pill ” and an ointment. Externally the salt has not any par- ticular advantage over other mercurial compounds, despite the existence of the official ointment. Internally the salt is given in doses — for an adult of from one-half to five grains. It is an admirable aperient, acting especially on the upper part of the intestinal canal, and causing a slight increase of intestinal secretion. The stimulant action occurring high up in the canal (duodenum and jejunum), it is well to follow a dose of calomel with a saline purgative a few hours afterwards. The special value of the drug as an aperient depends on its antiseptic power and its stimulation of the liver. The stools are dark green, containing calomel, mercuric sulphide and bile which, owing to the antiseptic action, has not been decomposed. The salt is often used

in the treatment of syphilis, but is probably less useful than certain other mercurial compounds. It is also employed for

fumigation;: the patient sits naked with a blanket over him, on a cane -bottomed chair, under which twenty grains of calomel are volatilized by a spirit-lamp; in about twenty minutes the calomel is effectually absorbed by the skin. •

CALONNE, CHARLES ALEXANDRE DE (1734-1802), French statesman, was born at Douai of a good family. He entered the profession of the law, and became in succession advocate to the general council of Artois, procureur to the parlement of Douai, master of requests, then intendant of Metz (1768) and of Lille (1774). He seems to have been a man of great business capacity, gay and careless in temperament, and thoroughly unscrupulous in political action. In the terrible crisis of affairs preceding the French Revolution, when minister after minister tried in vain to replenish the exhausted royal treasury and was dismissed for want of success, Calonne was summoned to take the general control of affairs. He assumed office on the 3rd of November 1783. He owed the position to Vergennes, who for three years and a half continued to support him ; but the king was not well disposed towards him, and, according to the testimony of the Austrian ambassador, his reputation with the public was ex- tremely poor. In taking office he found ” 600 millions to pay and neither money nor credit.” At first he attempted to develop the latter, and to carry on the government by means of loans in such a way as to maintain public confidence in its solvency. In October 1785 he recoined the gold coinage, and he developed the caisse a” escompte. But these measures failing, he proposed to the king the suppression of internal customs, duties and the taxation of the property of nobles and clergy. Turgot and Necker had attempted these reforms, and Calonne attributed their failure to the malevolent criticism of the parlements. Therefore he had an assembly of ” notables “called together in January 1787. Before it he exposed the deficit in the treasury, and proposed the establishment of a subvention territoriale, which should be levied on all property without distinction. This suppression of privileges was badly received by the privileged notables. Calonne, angered, printed his reports and so alienated the court. Louis XVI. dismissed him on the 8th of April 1787 and exiled him to Lorraine. The joy was general in Paris, where Calonne, accused of wishing to augment the imposts, was known as ” ■ Monsieur Deficit.” In reality

his audacious plan of reforms, which Necker took up later, might have saved the monarchy had it been firmly seconded by the king. Calonne soon afterwards passed over to England, and during his residence there kept Up a polemical correspondence with Necker on the finances. In 1789, when the states-general were about to assemble, he crossed over to Flanders in the hope of being allowed to offer himself for election, but he was sternly forbidden to enter France. In revenge he joined the tmigrt party at Coblenz, wrote in their favour, and expended nearly all the fortune brought him by his wif e , a wealthy widow. In 1 80 2 , having again taken up his abode in London, he received permission from Napoleon to return to France. He died on the 30th of October 1802, about a month after his arrival in his native country.

See Ch. Gomel, Les Causes financiires de la Revolution (Paris, 1893) ; R. Stourm, Les Finances de Vancien regime et de la Revolution (2 vols., Paris, 1885); Susane, La Tactique financi&re de Calonne, with biblio- graphy (Paris, 1902).

CALORESCENCE (from the Lat. color, heat), a term invented by John Tyndall to describe an opticalphenomenon, the essential feature of which is the conversion of rays belonging to the dark infra-red portion of the spectrum into the more refrangible visible rays, i.e. heat rays into rays of light. Such a transformation had not previously been observed, although the converse pheno- menon, i.e. the conversion of short waves of light into longer or less refrangible waves, had been shown by Sir G. G. Stokes to occur in fluorescent bodies. Tyndall's experiments, however, were carried out on quite different lines, and have nothing to do with fluorescence (q.v.). His method was to sift out the long dark waves which are associated with the short visible waves constituting the light of the sun or of the electric arc and to concentrate the former to a focus. If the eye was placed at the focus, no sensation of light was observed, although small pieces

of charcoal or blackened platinum foil were immediately raised to incandescence, thus giving rise to visible rays.

The experiment is more easily carried out with the electric light than with sunlight, as the former contains a smaller pro- portion of visible rays. According to Tyndall, 90% of the radiation from the electric arc is non-luminous. The arc being struck in the usual way between two carbons, a concave mirror, placed close behind it, caused a large part of the radiation to be directed through an aperture in the camera and concentrated to a focus outside. In front of the aperture were placed a plate of transparent rock-salt, and a flat cell of thin glass containing a

solution of iodine in carbon bisulphide. Both rock-salt and carbon bisulphide are extremely transparent to the luminous and also to the infra-red rays The iodine in the solution, however, has the property of absorbing the luminous rays, while transmitting the infra-red rays copiously, so that in sufficient thicknesses the solution appears nearly black. Owing to the inflammable nature of carbon bisulphide, the plate of rock-salt was found to be hardly a sufficient protection, and Tyndall surrounded the iodine cell with an annular vessel through which cold water was made to flow. Any small body which was a goqd absorber of dark rays was rapidly heated to redness when placed at the focus. Platinized platinum (platinum foil upon which a thin film of platinum had been deposited electrolytically) and charcoal were rendered incandescent, black paper and matches immediately inflamed, ordinary brown paper pierced and burned, while thin white blotting-paper, owing to its transparency to the invisible rays, was scarcely tinged. A simpler arrange- ment, also employed by Tyndall, is to cause the rays to be re- flected outwards parallel to one another, and to concentrate them by means of a small flask, containing the iodine solution and used as a lens, placed some distance from the camera. The rock-salt and cold water circulation can then be dispensed with.

Since the rays used by Tyndall in these experiments are similar to those emitted by a heated body which is not hot enough to be luminous, it might be thought that the radiation, say from a hot kettle, could be concentrated to a focus and employed to render a small body luminous. It would, however, be impossible by such means to raise the receiving body to a higher temperature than the source of radiation. For it is easy to see that if, by means of lenses of rock-salt or mirrors, we focused all or nearly all the rays from a small surface on to another surface of equal area, this would not raise the temperature of the second surface above that of the first; and we could not obtain a greater concentration of rays from a large heated surface, since we could not have all parts of the surface simultaneously in focus. The desired result could be obtained if it were possible, by reflection or otherwise, to cause two different rays to unite without loss and pursue a common path. Such a result must be regarded as impossible of attain- ment, as it would imply the possibility of heat passing from one body to another at a higher temperature, contrary to the second law of thermodynamics (q.v.). Tyndall used the dark rays from a luminous source, which are emitted in a highly concentrated form, so that it was possible to obtain a high temperature, which was, however, much lower than that of the source.

A full account of Tyndall’s experiments will be found in his Heat, a

Mode of Motion. (J. R. C.)

CALORIMETRY, the scientific name for the measurement of quantities of heat (Lat. color), to be distinguished from ther- mometry, which signifies the measurement of temperature. A calorimeter is any piece of apparatus in which heat is measured. This distinction of meaning is purely a matter of convention, but it is very rigidly observed. Quantities of heat may be measured indirectly in a variety of ways in terms of the different effects of heat on material substances. The most important of these effects are (a) rise of temperature, (b) change of state, (c) trans- formation of energy.

§ 1. The rise of temperature of a body, when heat is imparted to it, is found to be in general nearly proportional to the quantity of heat added. The thermal capacity of a body is measured by the quantity of heat required to raise its temperature one degree, and is necessarily proportional to the mass of the body for bodies

of the same substance under similar conditions. The specific heat of a substance is sometimes denned as the thermal capacity of unit mass, but more often as the ratio of the thermal capacity of unit mass of the substance to that of unit mass of water at some standard temperature. The two definitions are identical, provided that the thermal capacity of unit mass of water, at a standard temperature, is taken as the unit of heat. But the specific heat of water is often stated in terms of other units. In any case it is necessary to specify the temperature, and sometimes also the pressure, since the specific heat of a substance generally depends to some extent on the external conditions. The methods of measurement, founded on rise of temperature, may be classed as thermometric methods, since they depend on the observation of change of temperature with a thermometer. The most familiar of these are the method of mixture and the method of cooling.

§ 2. The Method of Mixture consists in imparting the quantity of heat to be measured to a known mass of water, or some other standard substance, contained in a vessel or calorimeter of known thermal capacity, and in observing the rise of temperature pro- duced, from which data the quantity of heat may be found as explained in all elementary text-books. This method is the most generally convenient and most readily applicable of calorimetric methods, but it is not always the most accurate, for various reasons. Some heat is generally

lost in transferring the heated body to the calorimeter; this loss may be minimized by performing the trans- ference rapidly, but it cannot be accurately calculated or eliminated. Some heat is lost when the calorimeter is raised above the tempera- ture of its enclosure, and before the final temperature is reached. This can be roughly estimated by observing the rate of change of temperature before and after the experiment, and assuming that the loss of heat is directly proportional to the duration of the experiment and to the average excess of temperature. It can be minimized by making the mixing as rapid as possible, and by using a large calori- meter, so that the excess of temperature is always small. The latter method was generally adopted by J. P. Joule, but the rise of tem- perature is then difficult to measure with accuracy, since it is neces- sarily reduced in nearly the same proportion as the correction. There is, however, the advantage that the correction is rendered much less uncertain by this procedure, since the assumption that the loss of heat is proportional to the temperature-excess is only true for small differences of temperature. Rumford proposed to eliminate this correction by starting with the initial temperature of the calorimeter as much below that of its enclosure as the final temperature was expected to be above the same limit. This method has been very generally recommended, but it is really bad, because, although it diminishes the absolute magnitude of the correction* it greatly increases the uncertainty of it and therefore the probable error of the result. The coefficient of heating of a calorimeter when it is below the temperature of its surroundings is seldom, if ever, the same as the coefficient of cooling at the higher temperature, since the convection currents, which do most of the heating or cooling, are rarely symmetrical in the two cases, and moreover, the duration of the two stages is seldom the same. In any case, it is desirable to diminish the loss of heat as much as possible by polishing the exterior of the calorimeter to diminish radiation, and by suspending it by non-conducting supports, inside a polished case, to protect it from draughts. It is also very important to keep the surrounding condi- tions as constant as possible throughout the experiment. This may be secured by using a large water-bath to surround the apparatus, but in experiments of long duration it is necessary to use an accurate temperature regulator. The method of lagging the calorimeter with cotton-wool or other non-conductors, which is often recommended, diminishes the loss of heat considerably, but renders it very uncertain and variable, and should never be used in work of precision. The bad conductors take so long to reach a steady state that the rate of loss of heat at any moment depends on the past history more than on the temperature of the calorimeter at the moment. A more serious objection to the use of lagging of this kind is

the danger of its absorb- ing moisture. The least trace of damp in the lagging, or of moisture condensed on the surface of the calorimeter, may produce serious loss of heat by evaporation. This is another objection to Rumford's method of cooling the calorimeter below the surrounding temperature before starting. Among minor difficulties of the method may be mentioned the uncertainty of the thermal capacity of the calorimeter and stirrer, and of the immersed portion of the thermometer. This is generally calculated by assuming values for the specific heats of the materials obtained by experiment between loo" C. and 20° C. Since the specific heats of most metals increase rapidly with rise of temperature, the values so obtained are generally too high. It is best to make this correction as small as possible by using a large calorimeter, so that the mass of water is large in proportion to that of metal. Analogous difficulties arise in the application of other calorimetric methods. The accuracy of the work in each case depends principally on the skill and ingenuity of the experimentalist in devising methods of eliminating the various sources of error.

The form of apparatus usually adopted for the method of mixtures is that of Regnault with slight modifications, and figures and descriptions are given in all the text-books. Among special method, which have been subsequently developed there are two. which deserve mention as differing in principle from the common type. These are (i) the constant temperature method, (2) the continuous flow method.

The constant temperature method of mixtures was proposed by N. Hesehus (Jour. Phys., 1888, vii. p. 489). Cold water at a known

Fig. 1.

temperature is added to the calorimeter, immediately after dropping in the heated substance, at such a rate as to keep the temperature of the calorimeter constant, thus eliminating the corrections for the water equivalent of the calorimeter and the external loss of heat. The calorimeter is surrounded by an air-jacket connected to a petroleum gauge which indicates any small change of temperature in the calorimeter, and enables the manipulator to adjust the supply of cold water to compensate it. The apparatus as arranged by F. A. Waterman is shown in fig. 1 (Physical Review, 1896, iv. p. 161). A is the calorimetric tube, B the air-jacket and L the gauge. H is an electric heater for raising the body to a suitable temperature, which can swing into place directly over the calori- meter. W is a conical can containing water cooled by ice I nearly to o°, which is swung over the calori- meter as soon as the hot body has been introduced and the heater removed. The cold water flow is regulated by a tap S with a

long handle O, and its temperature is taken by a delicate thermometer with its bulb at G. The method is interesting, but the manipulations and obser- vations involved are more troublesome than with the ordinary type of calori- meter, and it may be doubted whether any ad- vantage is gained in accuracy.

The continuous flow method is specially applic- able to the important case of calorific value of gaseous fuel, where a large quan- tity of heat is continu- ously generated at a nearly uniform rate by combustion.

Fig. 2.

Fig. 2 illustrates a recent type of gas calorimeter devised by C. V. Boys (Proc. R.S-, J 906; A. 77, p. 122). The heated products of combustion from the burner B impinge on a metal box H, through which water is circulating, and then pass downwards and outvvards through a spiral cooler which re- duces them practically to the atmospheric temperature. A steady stream of water enters the apparatus by the inflow thermometer O,

flows through the spiral coolers N and M, and finally through the box H, where it is well mixed before passing the outflow thermometer P. As soon as a steady state is reached, the difference of temperature between the outflow and inflow thermometers, multiplied by the current of water in grammes per minute gives the heat per minute supplied by combustion. The gas current is simultaneously ob- served by a suitable meter, which, with subsidiary corrections for pressure, temperature, &c, gives the necessary data for deducing calorific value.

A continuous flow calorimeter has been used by the writer for measuring quantities of heat conveyed by conduction (see Con- duction of Heat), and also for determining the variation of the specific heat of water. In the latter case two steady currents of water at different temperatures, say o° and ioo° are passed through an equalizer, and the resulting temperature measured without mixing the currents, which are then separately determined by weighing. This is a very good method of comparing the mean specific heats over two ranges of temperature such as 0-50, and 50-100, or 0-20 and 20-40, but it is not so suitable as the electric methodˆ described below for obtaining the actual specific heat at any point of the range.

§ 3. Method of Cooling. — A common example of this method is the

determination of the specific heat of a liquid by filling a small calorimeter with the liquid, raising it to a convenient temperature, and then setting it to cool in an enclosure at a steady temperature, and observing the time taken to fall through a given range when the conditions have become fairly steady. The same calorimeter is afterwards filled with a known liquid, such as water, and the time of cooling is observed through the same range of temperature, in the same enclosure, under the same conditions. The ratio of the times of cooling is equal to the ratio of the thermal capacities of the calorimeter and its contents in the two cases. The advantage of the method is that there is no transference or mixture; the defect is that the whole measure- ment depends on the assumption that the rate of loss of heat is the same in the two cases, and that any variation in the con- ditions, or uncertainty in the rate of loss, produces its full effect in the result, whereas in the previous case it would only affect a small correction. Other sources of uncertainty are, that the rate of loss of heat generally depends to some extent on the rate of fall of temperature, and that it is difficult to take accurate observations on a rapidly falling thermometer. As the method is usually practised, the calorimeter is made very small, and the surface is highly polished to diminish radiation. It is better to use a fairly large calorimeter to diminish the rate of cooling and the uncertainty of the correction for the water equivalent. The surface of the calorimeter and the enclosure should be perma- nently blackened so as to increase the loss of heat by radiation as much as possible, as compared with the losses by convection and conduction, which are less regular. For accurate work it is essential that the liquid in the calorimeter should be continuously stirred, and also in the enclosure, the lid of which must be water-jacketed, and kept at the same steady temperature as the sides. When all these precautions are taken, the method loses most of the simplicity which is its chief advantage. It cannot be satis- factorily applied to the case of solids or powders, and is much less generally useful than the method of mixture.

§ 4. Method of Fusion. — The methods depending on change of state are theoretically the simplest, since they do not necessarily involve any reference to thermometry, and the corrections for external loss of heat and for the thermal capacity of the con- taining vessels can be completely eliminated. They nevertheless present peculiar difficulties and limitations, which render their practical application more troublesome and more uncertain than is usually supposed. They depend on the experimental fact that the quantity of heat required to produce a given change of state (e.g. to convert one gramme of ice at o° C. into water at o° C, or one gramme of water at ioo° C. into steam

at 100° C.) is always the same, and that there need be no change of temperature during the process. The difficulties arise in connexion with the deter- mination of the quantities of ice melted or steam condensed, and in measuring the latent heat of fusion or vaporization in terms of other units for the comparison of observations. The earlier forms of ice-calorimeter, those of Black, and of Laplace and Lavoisier, were useless for work of precision, on account of the impossibility of accurately estimating the quantity of water left adhering to

the ice in each case. This difficulty was overcome by the inven- tion of the Bunsen calorimeter, in which the quantity of ice melted is measured by observing the diminution of volume, but the successful employment of this instrument requires consider- able skill in manipulation. The sheath of ice surrounding the bulb must be sufficiently continuous to prevent escape of heat, but it must not be so solid as to produce risk of strain. The ideal condition is difficult to secure. In the practical use of the instrument it is not necessary to know both the latent heat of fusion of ice and the change of volume which occurs on melting; it is sufficient to determine the change of volume per calorie, or the quantity of mercury which is drawn into the bulb of the apparatus per unit of heat added. This can be determined by a direct calibration, by inserting a known quantity of water at a known temperature and observing the contraction, or weighing the mercury drawn into the apparatus. In order to be inde- pendent of the accuracy of the thermometer employed for observing the initial temperature of the water introduced, it has been usual to employ water at 100° C, adopting as unit of heat the " mean calorie," which is one-hundredth part of the heat given up by one gramme of water in cooling from ioo° to o c C. The weight of mercury corresponding to the mean calorie has been determined with considerable care by a number of observers well skilled in the use of the instrument. The following are some of their results: — Bunsen, 15-41 mgm.; Velten, 15-47 mgm.; Zakrevski, 15-57 mgm,; Staub, 15-26 mgm. The explanation of these discrepancies in the fundamental constant is not at all clear, but they may be taken as an illustration of the difficulties of manipulation attending the use of this instrument, to which reference has already been made. It is not possible to deduce a more satisfactory value from the latent heat and the change of density, because these constants are very difficult to determine. The following are some of the values deduced by well-known experimentalists for the latent heat of fusion: — Regnault, 79-06 to 79-24 calories, corrected by Person to 79-43; Person, 79-99 calories; Hess, 80-34 calories; Bunsen, 80-025 calories. Regnault, Person and Hess employed the method of mixture which is probably

the most accurate for the purpose. Person and Hess avoided the error of water sticking to the ice by using dry ice at various temperatures below o° C, and determining the specific heat of ice as well as the latent heat of fusion. These discrep- ancies might, no doubt, be partly explained by differences in the units employed, which are somewhat uncertain, as the specific heat of water changes rapidly in the neighbourhood of 0° C; but making all due allowance for this, it remains evident that the method of ice-calorimetry, in spite of its theoretical simplicity, presents grave difficulties in its practical application.

One of the chief difficulties in the practical use of the Bunsen calorimeter is the continued and often irregular movement of the mercury column due to slight differences of temperature, or pressure between the ice in the calorimeter and the ice bath in which it is immersed. C. V. Boys {Phil. Mag., 1887, vol. 24, p. 214) showed that these effects could be very greatly reduced by surrounding the calorimeter with an outer tube, so that the ice inside was separated from the ice outside by an air space which greatly reduces the free passage of heat. The present writer has found that very- good results may be obtained by enclosing the calorimeter in a vacuum jacket (as illustrated in fig. 3), which practically eliminates conduction and convec- tion. If the vacuum jacket is silvered inside, radiation also is reduced to such an extent that, if the vacuum is really good, the external ice bath may be dispensed with for the majority of purposes. If the inner bulb is filled with mercury instead of water and ice, the same arrangement answers admirably as a Favre and Silbermann calorimeter, for measuring small quantities of heat by the expansion of the mercury.

The question has been raised by E. L. Nichols (Phys. Rev. vol. 8, January 1899) whether there may not be different modifications of ice with different densities, and different values of the latent heat of fusion. He found for natural pond-ice a density 0-9179 and for artificial ice 0-9161. J. Vincent (Phil. Trans. A. 198, p. 463) also found a density -9160 for artificial ice, which is probably very nearly

Fig. 3.

correct. If such variations of density exist, they may introduce some uncertainty in the absolute values of results obtained with the ice

calorimeter, and may account for some of the discrepancies above enumerated.

§ 5. The Method of Condensation was first successfully applied by J. Joly in the construction of his steam calorimeter, a full description of which will be found in text-books. The body to be tested is placed in a special scale-pan, suspended by a fine wire from the arm of a balance inside an enclosure which can be filled with steam at atmospheric pressure. The temperature of the enclosure is carefully observed before admitting steam. The weight of steam condensed on the body gives a means of calculat- ing the quantity of heat required to raise it from the atmospheric temperature up to 100° C. in terms of the latent heat of vaporiza- tion of steam at ioo° C. There can be no appreciable gain or loss of heat by radiation, if the admission of the steam is sufficiently rapid, since the walls of the enclosure are maintained at ioo° C, very nearly. The thermal capacity of the scale-pan, &c, can be determined by a separate experiment, or, still better, eliminated by the differential method of counterpoising with an exactly similar arrangement on the other arm of the balance. The method requires very delicate weighing, as one calorie corresponds to less than two milligrammes of steam condensed; but the successful application of the method to the very difficult problem of measuring the specific heat of a gas at constant volume, shows that these and other difficulties have been very skilfully overcome. The application of the method appears to be practically limited to the measurements of specific heat between the atmospheric temperature and 100° C. The results depend on the value assumed for the latent heat of steam, which Joly takes as 536.7 calories, following Regnault. Joly has himself deter- mined the mean specific heat of water between 12 and ioo° C. by this method, in terms of the latent heat of steam as above given, and finds the result -9952. Assuming that the mean specific heat of water between 12 and ioo° is really i-ooii in terms of the calorie at 20 C. (see table, p. 66), the value of the latent heat of steam at 100° C, as determined by Joly, would be 540-2 in terms of the same unit. The calorie employed by Regnault is to some extent uncertain, but the difference is hardly beyond the probable errors of experiment, since it appears from the results of recent experiments that Regnault made an error of the same order in his determination of the specific heat of water at ioo° C.

§ 6. Energy MetJtods. — The third general method of calorimetry, that based on the transformation of some other kind of energy into the form of heat, rests on the general principle of the con- servation of energy, and on the experimental fact that all other forms of energy are readily and completely convertible into the form of heat. It is

therefore often possible to measure quantities of heat indirectly, by measuring the energy in some other form and then converting it into heat. In addition to its great theoretical interest, this method possesses the advantage of being frequently the most accurate in practical application, since energy can be more accurately measured in other forms than in that of heat. The two most important varieties of the method are (a) mechanical, and (b) electrical. These methods have reached their highest development in connexion with the determination of the mechanical equivalent of heat, but they may be applied with great advantage in connexion with other problems, such as the measurement of the variation of specific heat, or of latent heats of fusion or vaporization.

§ 7. Mechanical Equivalent of Heat. — The phrase ” mechanical equivalent of heat ” is somewhat vague, but has been sanctioned by long usage. It is generally employed to denote the number of units of mechanical work or energy which, when completely converted into heat without loss, would be required to produce one heat unit. The numerical value of the mechanical equivalent necessarily depends on the particular units of heat and work employed in the comparison. The British engineer prefers to state results in terms of foot-pounds of work in any convenient latitude per pound-degree-Fahrenheit of heat. The continental engineer prefers kilogrammetres per kilogramme-degree-centi-

Jtm-

grade. For scientific use the C.G.S. system of expression in ergs per gramme-degree-centigrade, or ” calorie,” is the most appro- priate, as being independent of ,the value of gravity. A more convenient unit of work or energy, in practice, on account of the smallness of the erg, is the joule, which is equal to io- 7 ergs, or one watt-second of electrical energy. On account of its practical convenience, and its close relation to the international electrical units, the joule has been recommended by the British Association for adoption as the absolute unit of heat. Other convenient practical units of the same kind would be the watt-hour, 3600 joules, which is of the same order of magnitude as the kilo- calorie, and the kilowatt-hour, which is the ordinary commercial unit of electrical energy.

§ 8. Joule. — The earlier work of Joule is now chiefly of historical interest, but his later measurements in 1878, which were undertaken on a larger scale, adopting G. A. Hirn’s method of measuring the work expended in terms of the torque and the number of revolutions, still possess value as experimental evidence. In these experiments (see fig.

4) the paddles were revolved by hand at such a speed as to produce a constant torque on the calorimeter h, which was supported on a float to in a vessel of water v, but was kept at rest by the couple due to a pair of equal weights k sus- pended from fine strings pass- ing round the circumference of a horizontal wheel attached to the calorimeter. Each experi- ment lasted about forty minutes, and the rise of tem- perature produced was nearly 3 C. The calorimeter con- tained about 5 kilogrammes of water, so that the rate of heat-supply was about 6 calories per second. Joule's

II

I 1

■—^

a

W

1 , ^

l l

ll

w

V ,

Fig. 4.

final result was 772-55 foot-pounds at Manchester per poun i-degree-Fahrenheit at a temperature of 62 F., but individual experiments differed by as much as 1 %. This result in C.G.S. measure is equi- valent to 4-177 joules per calorie at 16-5° C, on the scale of Joule's mercury thermometer. His thermometers were subsequently cor- rected to the Paris scale by A- Schuster in 1895, which had the effect of reducing the above figure to 4-173.

§ 9. Rowland. — About the same time H. A. Rowland {Proc. Amer. Acad. xv. p. 75, 1880) repeated the experiment, employing the same method, but using a larger calorimeter (about 8400 grammes) and a petroleum motor, so as to obtain a greater rate of heating (about 84 calories per second), and to reduce the importance of the un- certain correction for external loss of heat. Rowland's apparatus is shown in

fig. 5. The calorimeter was suspended by a steel wire, the torsion of which made the equilibrium stable. The torque was measured by weights O and P suspended by silk ribbons passing over the pulleys n and round the disk kl. The power was transmitted to the paddles by bevel wheels/, g, rotating a spindle passing through a stuffing box in the bottom of the calorimeter. The number of revolutions and the rise of temperature were recorded on a chrono- graph drum. He paid greater attention to the important question of thermometry, and extended his researches over a much wider range of temperature, namely 5 ° to 35 ° C. His experiments revealed for the first time a diminution in the specific heat of water with rise of temperature between 0° and 30° C, amounting to four parts in io-ooo per l°C. His thermometers were compared with a mercury thermometer standardized in Paris, and with a platinum thermo- meter standardized by Griffiths. The result was to reduce the co- efficient of diminution of specific heat at 15° C. by nearly one half, but the absolute value at 20° C. is practically unchanged. Thus corrected his values are as follows :—

Temperature .	io°	15	20	25	30	35
Joules per cal. .	4-197	4-188	4-181	4-176	4-175	4-177

These are expressed in terms of the hydrogen scale, but the difference from the nitrogen scale is so small as to be within the limits of ex- perimental error in this particular case. Rowland himself considered his results to be probably correct to one part in 500, and supposed that the greatest uncertainty lay in the comparison of the scale of his mercury thermometer with the air thermometer. Thesubsequent correction, though not carried out strictly under the conditions of the experiment, showed that the order of accuracy of his work about the middle of the range from 15° to 25° was at least I in 1000, and probably 1 in 2000. At 30 he considered that, owing to the increas- ing magnitude and uncertainty of the radiation correction, there

” might be a small error in the direction of making the equivalent too great, and that the specific heat might go on decreasing; to even 40 C.” The results considered with reference to the variation of

«=£>

Fig. 5.

the specific heat of water are shown in the curve marked Rowland in Fig. 6.

§ 10. Osborne Reynolds and W.H.Moorby {Phil. Trans. ,1897, p. 381) determined the mechanical equivalent of the mean thermal unit between o° and 100 C.,ona very large scale, with a Froude- Reynolds hydraulic brake and a steam-engine of 100 h.p. This brake is practically a Joule calorimeter, ingeniously designed to churn the water in such a manner as to develop the greatest possible resistance. The admission of water at o° C. to the brake was controlled by hand in such a manner as to keep the outflow nearly at the boiling-point, the quantity of water in the brake required to produce a constant torque being regulated automatically, as the speed varied, by a valve worked by the lifting of the weighted lever attached to the brake.

Fig. 6.

The accompanying illustration (fig. 7) shows the brake lagged with cotton-wool, and the 4-ft. lever to which the weights are suspended. The power of the brake may be estimated by comparison with the size of the rope pulley seen behind it on the same shaft. With 300 pounds on a 4-ft. lever at 300 revolutions per minute, the rate of generation of heat was about 12 kilo-calories per second. In spite of the large range of temperature, the correction for external loss of heat amounted to only 5%, with the brake uncovered, and was reduced to less than 2 % by lagging. This is the special advantage of working on so large a scale with so rapid a generation of heat. But, for the same reason, the method necessarily presents peculiar difficulties, which were not overcome without great pains and in- genuity. The principal troubles arose from damp in the lagging which necessitated the rejection of several trials, and from dissolved air in the water, causing loss of heat by the formation of steam. Next to the radiation loss, the most uncertain correction was that for conduction of heat along the 4-in. shaft. These losses were as far as possible eliminated by combining the trials in pairs, with differ-

ent loads on the brake, assuming that the heat-loss would be the same in the heavy and light trials, provided that the external temperature and the gradient in the shaft, as estimated from the temperature of the bearings, were the same. The values deduced in this manner for the equivalent agreed as closely as could be expected considering the impossibility of regulating the external condition of temperature and moisture with any certainty in an engine-room. The extreme variation of results in any one series was only from 776.63 to 779.46 ft. - pounds, or less than 2%. This variation may have been due to the state

of the lagging, which Moorby distrusted in spite of the great reduction of the heat-loss, or it may have been partly due to the difficulty of regulating the speed of the engine and the water- supply to the brake in such a manner as to maintain a constant temperature in the outflow, and avoid variations in the heat capacity of the brake. Since hand regulation is necessarily discontinuous, the speed and the temperature were constantly varying, so that it was useless to take readings nearer than the tenth of a degree. The largest variation recorded in the two trials of which full details are given, was 4-9 ° F. in two minutes in the outflow temperature, and four or five revolutions per minute on the speed. These variations, so far as they were of a purely accidental nature, would be approxi- mately eliminated on the mean of a large number of trials, so that the accuracy of the final result would be of a higher order than might be inferred from a comparison of separate pairs of trials. Great pains

Fig. 7.

were taken to discuss and eliminate all the sources of constant error which could be foreseen. The results of the light trials with 400 ft.-pounds on the brake differ slightly from those with 600 ft. -pounds. This might be merely accidental, or it might indicate some constant difference in the conditions requiring further investigation. It would have been desirable, if possible, to have tried the effect of a larger range of variation in the experimental conditions of load and speed, with a view to detect the existence of constant errors ; but owing to the limitations imposed by the use of a steam-engine, and the difficulty of securing steady conditions of running, this proved to be impossible. There can be no doubt, however, that the final result is the most accurate direct determination of the value of the mean calorie between o” and 100 C. in mechanical units. Expressed in joules per calorie the result is 4-1832, which agrees very closely with the value found by Rowland as the mean over the range 15 to 20° C. The value 4-183 is independently confirmed in a remarkable manner by the results of the electrical method described below, which give 4-185 joules for the mean calorie, if Rowland’s value is assumed as the starting-point, arid taken to be 4-180 joules at 20° C.

§ 11. Electrical Methods. — The value of the international electrical units has by this time been so accurately determined in absolute measure that they afford a very good, though indirect, method of determining the mechanical equivalent of heat. But, quite apart from this, electrical methods possess the greatest value for calorimetry, on account of the facility and accuracy of regulating and measuring the quantity of heat supplied by an electric current. The frictional

generation of heat in a metallic wire conveying a current can be measured in various ways, which correspond to slightly different methods. By Ohm's law, rod by the definition of difference of electric pressure or potential, we obtain the following alternative expressions for the quantity of heat H in joules generated in a time T seconds by a current of C amperes flowing in a wire of resistance R ohms, the difference of potential between the ends of the wire being E = CR volts:—

H = ECT=ORT = &TIR . . . (1.) The method corresponding to the expression ORT was adopted

t>y Joule and by most of the early experimentalists. The defects of the earlier work from an electrical point of view lay chiefly in the difficulty of measuring the current with sufficient accuracy owing to the imperfect development of the science of electrical measurement. These difficulties have been removed by the great advances since 1880, and in particular by the introduction of accurate standard cells for measurements of electrical pressure.

§ 12. Griffiths.— The method adopted by E. H. Griffiths {Phil. Trans., 1893, p. 361), whose work threw a great deal of light on the failure of previous observers to secure consistent results, corre- sponded to the last expression E?T/R, and consisted in regulating the current by a special rheostat, so as to keep the potential difference E on the terminals of the resistance R balanced against a given number of standard Clark cells of the Board of Trade pattern. The resistance R could be deduced from a knowledge of the temperature of the calorimeter and the coefficient of the wire. But in order to obtain trustworthy results by this method he found it necessary to employ very rapid stirring (2000 revolutions per minute), and to insulate the wire very carefully from the liquid to prevent leakage of the current. He also made a special experiment to find how much the temperature of the wire exceeded that of the liquid under the conditions of the experiment. This correction had been neglected by previous observers employing similar methods. The resistance R was about 9 ohms, and the potential difference E was varied from three to six Clark cells, giving a rate of heat-supply about 2 to 6 watts. The water equivalent of the calorimeter was about 85 grammes, and was determined by varying the quantity of water from 140 to 260 or 280 grammes, so that the final results depended on a difference in the weight of water

of 120 to 140 grammes. The range of temperature in each experiment was 14 to 26 C. The rate of rise was observed with a mercury thermometer standardized by com- parison with a platinum thermometer under the conditions of the experiment. The time of passing each division was recorded on an electric chronograph. The duration of an experiment varied from about 30 to 70 minutes. Special observations were made to deter- mine the corrections for the heat supplied by stirring, and that lost by radiation, each of which amounted to about 10% of the heat- supply. The calorimeter C, fig. 8, was gilded, and completely

_K

Fig. 8.

surrounded by a nickel-plated steel enclosure B, forming the bulb of a mercury thermo-regulator, immersed in a large water-bath maintained at a constant temperature. ‘In spite of the large cor- rections the results were extremely consistent, and the value of the temperature-coefficient of the diminution of the specific heat of water, deduced from the observed variation in the rate of rise at different points of the range 15° to 25 , agreed with the value subse- quently deduced from Rowland’s experiments over the same range, when his thermometers were reduced to the same scale. Griffiths’ final result for the average value of the calorie over this range was 4-192 joules, taking the E.M.F. of the Clark cell at 15° C. to be 1ˆ4342 volts. The difference from Rowland’s value, 4-181, could be explained by supposing the E.M.F. of the Clark cells to have in reality been 1-4323 volts, or about 2 millivolts less than the value assumed. Griffiths subsequently applied the same method to the measurement of the specific heat of aniline, and the latent heat of vaporization of benzene and water.

§ 13. Schuster and Gannon. — The method employed by A. Schuster and W. Gannon for the determination of the specific heat of water in terms of the international electric units (Phil. Trans. A, 1895, p. 415) corresponded to the expression ECT, and differed in many essential details from that of Griffiths. The current through a platinoid resistance of about 31 ohms in a calorimeter containing 1500 grammes of water was regulated so that the potential difference on its ter- minals was equal to that of twenty Board of Trade Clark cells in series. The duration of an experiment was about ten minutes, and the product of the mean current and the time, namely CT, was measured by the weight of silver deposited in a voltameter, which

amounted to about 0-56 gramme. The uncertainty due to the correction for the water equivalent was minimized by making it small (about 27 grammes) in comparison with the water weight. The correction for external loss was reduced by employing a small rise of temperature (only 2-22°), and making the rate of heat-supply relatively rapid, nearly 24 watts. The platinoid coil was insulated from the water by shellac varnish. The wire had a length of 760 cms., and the potential difference on its terminals was nearly 30 volts. The rate of stirring adopted was so slow that the heat generated by it could be neglected. The result found was 4-191 joules per calorie at 19 C. This agrees very well with Griffiths considering the difficulty of measuring so small a rise of temperature at 2° with a mercury thermometer. Admitting that the electro-chemical equiva- lent of silver increases with the age of the solution, a fact subse- quently discovered, and that the E.M.F. of the Clark cell is probably less than 1-4340 volts (the value assumed by Schuster and Gannon), there is no difficulty in reconciling the result with that of Rowland.

§ 14. H. L. Callendar and H. T. Barnes (Brit. Assoc. Reports, 1897 and 1899) adopted an entirely different method of calorimetry, as well as a different method of electrical measurement. A steady current of liquid, Q grammes per second, of specific heat, Js joules per degree, flowing through a fine tube, A B, fig. 9, is heated by a steady electric current during its passage through the tube, and the difference of temperature dd between the inflowing and the outflowing liquid is measured by a single reading with a delicate pair of differential platinum thermometers at A and B. The difference of potential E between the ends of the tube, and the electric current C through it, are measured on an accurately calibrated potentiometer, in terms of a Clark cell and a standard resistance. If hde is the radiation loss in watts we have the equation,

EC = JsQde + .hde . . _. . (2). The advantage of this method is that all the conditions are steady, so that the observations can be pushed to the limit of accuracy and

Fig. 9.

sensitiveness of the apparatus. The water equivalent of the calorimeter is immaterial, since there is no appreciable change of tem perature. The heat-loss can be reduced to a minimum by enclosing the flow-tube in a hermetically sealed glass vacuum jacket. Stirring is effected by causing the water to circulate spirally round the bulbs of the thermometers and the heating conductor as indicated in the figure. The conditions can be very easily varied through a wide range.

The heat-loss hde is determined and eliminated by varying the flow of liquid and the electric current simultaneously, in such a manner as to secure approximately the same rise of temperature for two or more widely different values of the flow of liquid. An example taken from the Electrician, September 1897, of one of the earliest experiments by this method on the specific heat of mercury will make the method clearer. The flow-tube was about r metre long and I millim. in diameter, coiled in a short spiral inside the vacuum jacket. The outside of the vacuum jacket was immersed in a water jacket at a steady temperature equal to that of the in- flowing mercury.

Specific Heat of Mercury by continuous Electric Method

Flow of Hg.

Rise of Temp.

Watts.

Heat-loss.

Specific Heat.

gm./sec.

8-753 4-594

de

11-764 12-301

EC

14-862

7-912

hd0

0-655 0-685

Per gm. deg.) -13780 joules) -03297 cals.

It is assumed as a first approximation that the heat-loss is proportional to the rise of temperature de, provided that de is nearly the same in both cases, and that the distribution of temperature in the apparatus is the same for the same rise of temperature whatever the

flow of liquid The result calculated on these assumptions is given in the last column in joules, and also in calories of 20 C. The heat- loss in this example is large, nearly 4-5 % of the total supply, owing to the small flow and the large rise of temperature, but this correction was greatly reduced in.subsequent observations on the specific heat of water by the same method. In the case of mercury the liquid itself can be utilized to conduct the electric current. In the case of water or other liquids it is necessary to employ a platinum wire stretched along the tabe as heating conductor. This introduces additional difficulties of construction, but does not otherwise affect

the method. The absolute value of the specific heat deduced necessarily depends on the absolute values of the electrical standards employed in the investigation. But for the determination of relative values of specific heats in terms of a standard liquid, or of the variations of specific heat of a liquid, the method depends only on the constancy of the standards, which can be readily and accurately tested. The absolute value of the E.M.F. of the Clark cells employed was determined with a special form of electrodynamometer (Callendar, Phil. Trans. A. 313, p. 81), and found to be 1-4334 volts, assuming the ohm to be correct. Assuming this value, the result found by this method for the specific heat of water at 20 C. agrees with that of Rowland within the probable limits of error.

§ 15. Variation of Specific Heat of Water. — The question of the variation of the specific heat of water has a peculiar interest and importance in connexion with the choice of a thermal unit. Many of the uncertainties in the reduction of older experiments, such as those of Regnault, arise from uncertainty in regard to the unit in terms of which they are expressed, which again depends on the scale of the particular thermometer employed in the investigation. The first experiments of any value were those of Regnault in 1847 on the specific heat of water between no C. and 192° C. They were conducted on a very large scale by the method of mixture, but showed discrepancies of the order of 0-5 , and the calculated results in many cases do not agree with the data. This may be due merely to deficient explanation of details of tabulation. We may probably take the tabulated values as showing correctly the rate of variation between 110 and 190 C, but the values in terms of any particular thermal unit must remain uncertain to at least 0-5 owing to the uncertainties of the thermometry. Regnault himself adopted the formula,

s = 1 +o- 00004ˆ+0-0000009ˆ (Regnault), (3)

for the specific heat 5 at any temperature / C. in terms of the specific heat at 0° C. taken as the standard. This formula has since been very generally applied over the whole range 0° to 200 C, but the experiments could not in reality give any information with regard to the specific heat at temperatures below 100° C. The linear formula proposed by J. Bosscha from an independent reduction of Regnault's experiments is probably within the limits of accuracy between 100 and 200 C., so far as the mean rate of variation is concerned, but the absolute values require reduction. It may be written —

s = Sm + -00023 (/ — 1 00) (Bosscha-Regnault) (4). The work of L. Pfaundler and H. Platter, of G. A. Hirn, of J. C. Jamin and Amaury, and of many other experimentalists who suc- ceeded Regnault, appeared to indicate much larger rates of increase than he had found, but there can be little doubt that the discrepancies of their results, which often exceeded 5%, were due to lack of appreciation of the difficulties of calorimetric measure- ments. The work of Rowland by the mechanical method was the first in which due attention was paid to the thermometry and to the reduction of the results to the absolute scale of temperature. The agreement of his corrected results with those of Griffiths by a very different method, left very little doubt with regard to the rate of diminution of the specific heat of water at 20° C. The work of A. Bartoli and E. Stracciati by the method of mixture between 0° and 30 C, though their curve is otherwise similar to Rowland's, had appeared to indicate a minimum at 20° C, followed by a rapid rise. This lowering of the minimum was probably due to some constant errors inherent in their method of experiment. The more recent work of Liidin, 1895, under the direction of Prof. J. Pernet, extended from o° to ioo° C., and appears to have attained as high a degree of excellence as it is possible to reach by the employment of mercury thermometers in conjunction with the method of mixture. His results, exhibited in fig. 6, show a minimum at 25 ” C, and a maximum at 87 C, the values being -9935 and 1-0075 respectively in terms of the mean specific heat between 0° and 100 C. He paid great attention to the thermometry, and the discrepancies of in- dividual measurements at any one point nowhere exceed 0-3 %, but he did not vary the conditions of the experiments materially, and it does not appear that the well-known constant errors of the method could have been completely eliminated by the devices which he adopted. The rapid rise from 25 to 75 may be due to radiation error from the hot water supply, and the subsequent fall of the curve to the inevitable loss of heat by evaporation of the boiling water on its way to the calorimeter. It must be observed, however, that there is another grave

difficulty in the accurate determination of the specific heat of water near 100 C. by this method, namely, that the quantity actually observed is not the specific heat at the higher temperature /, but the mean specific heat over the range 18 to /. The specific heat itself can be deduced only by differentiating the curve of observation, which greatly increases the uncertainty. The peculiar advantage of the electric method of Callendar and Barnes, already referred to, is that the specific heat itself is determined over a range of 8° to io" at each point, by adding accurately measured quantities of heat to the water at the desired temperature in an isothermal enclosure, under perfectly steady conditions, without any possibility of evaporation or loss of heat in transference. These experiments, which have been extended by Barnes over the whole range o° to ioo°, agree very tvcll with Rowland and Griffiths in the rate of variation at 20° C, but show a rather flat minimum of specific

heat in the neighbourhood of 38 to 40 6 C. At higher points the rate of variation is very similar to that of Regnault's curve, but taking the specific heat at 20 as the standard of reference, the actual values are nearly 0-56% less than Regnault's. It appears probable that his values for higher temperatures may be adopted- with this reduc- tion, which is further confirmed by the results of Reynolds and Moorby, and by those of Liidin. According to the electric method, the whole range of variation of the specific heat between io° and 80° is only 0-5 %. Comparatively simple formulae, therefore, suffice for its expression to 1 in 10,000, which is beyond the limits of accuracy of the observations. It is more convenient in practice to use a few simple formulae, than to attempt to represent the whole range by a single complicated expression : —

Below 20° C. s = 0-9982 +0-000,0045 (< — 40) 2 — 0-000,0005 if — 20) 3 . From 20 to 60 °, 5 = 0-9982+0-000,0045 (t— 40) 2 (5).

(i = o-9944 + -ooo-04/+o-ooo,ooo9 t? (Regnault Above 6o° to 200° j corrd.)

(5 = 1-000+0-000,22 (t — 60), (Bosscha corrd.)

The addition of the cubic term below 20° is intended to represent the somewhat more rapid change near the freezing-point. This effect is probably due, as suggested by Rowland, to the presence of a certain proportion of ice molecules in the liquid, which is also no doubt the cause of the anomalous expansion. Above 6o° C. Regnault's formula is adopted, the absolute values being simply diminished by a constant quantity 0-0056 to allow for the probable errors of his thermometry.

Above 100 C, and for approximate work generally, the simpler formula of Bosscha, similarly corrected, is probably adequate.

The following table of values, calculated from these formulae, is taken from the Brit. Assoc. Report, 1899, with a slight modification

Specific Heat of Water in terms of Unit at 20

C. 4- 1 80 Joules

t°C.

Joules.

s.

h.

Rowland.

0°

4-208

1 -0094

5°

4-202

1 -0054

5-037

5-037

10°

4-191

1-0027

10-056

10-058

<

4-184

I -001 1

15-065

15-068

20°

4- 1 80

I- 0000

20-068

20-071

K

4-177

0-9992

25-065

25-067

3°:

4-175

0-9987

30-060

30-057

35 o

4- T 73

0-9983

35-052

35-053

4°:

4-173

0-9982

40-044

5°°

4-175

0-9987

50-028

6o°

4-180

I-OOOO

60-020

7°:

4-187

1-0016

70-028

80°

4-194

1 -0033

80-052

90

4-202

1 -0053

90-095

Shaw

100°

4-211

1-0074

100-158

Regnault

120°

4-231

I-0I2I

120-35

120-73

I4O

4-254

I-OI76

140-65

140-88

160

4-280

1-0238

161-07

161-20

180

4-309

I-O308

181-62

182-14

200°

4-341

1-0384

202-33

220°

4-376

1-0467

223-20

■ -,-». — 1..„— ■

to allow for the increase in the specific heat below 20 C. This was estimated in 1899 as being equivalent to the addition of the constant quantity 0-020 to the values of the total heat h of the liquid as reckoned by the parabolic formula (5). This quantity is now, as the result of further experiments, added to the values of h, and also re-presented in the formula for the specific heat itself by the cubic term.

The unit of comparison in the following table is taken as the specific heat of water at 20 C. for the reasons given below. This unit is taken as being 4-180 joules per gramme-degree-centigrade on the scale of the platinum thermometer, corrected to the absolute scale as explained in the article Thermometry, which has been shown to be practically equivalent to the hydrogen scale. The value 4-180 joules at 20 C. is the mean between Rowland's corrected result 4-181 and the value 4- 1 79, deduced from the experiments of Reynolds and Moorby on the assumption that the ratio of the mean specific heat o° to ioo° to that at 20° is 1 0016, as given by the formulae repre senting the results of Callendar and Barnes. This would indicate that Rowland's corrected values should, if anything, be lowered. In any case the value of the mechanical equivalent is uncertain to at least 1 in 2000.

The mean specific heat, over any range of temperature, may be obtained by integrating the formulae between the limits required, or by taking the difference of the corresponding values of the total heat'

h, and dividing by the range of temperature. The quantity actually observed by Rowland was the total heat. It may be re- marked that starting from the same value at 5°, for the sake of comparison, Rowland's values of the total heat agree to I in 5000 with those calculated from the formulae. The values of the total heat observed by Regnault, as reduced by Shaw, also show a very fair agreement, considering the uncertainty of the units. It must be admitted that it is desirable to redetermine the variation of the specific heat above ioo° C. This is very difficult on account of the steam-pressurt, and could not easily be accomplished by the electrical

method. Callendar has, however, devised a continuous method of mixture, which appears to be peculiarly adapted to the purpose, and promises to give more certain results. In any case it may be remarked that formulae such as those of Jamin, Henrichsen, Baum- gartner, Winkelmann or Dieterici, which give far more rapid rates of increase than that of Regnault, cannot possibly be reconciled with his observations, or with those of Reynolds and Moorby, or Callendar and Barnes, and are certainly inapplicable above ioo° C.

§ 16. On the Choice of the Thermal Unit. — So much uncertainty still prevails on this fundamental point that it cannot be passed over without reference. There are three possible kinds of unit, depending on the three fundamental methods already given: (1) the thermometric unit, or the thermal capacity of unit mass of a standard substance under given conditions of temperature and pressure on the scale of a standard thermometer. (2) The latent-heat unit, or the quantity of heat required to melt or vaporize unit mass of a standard substance under given conditions. This unit has the advantage of being independent of thermometry, but the applicability of these methods is limited to special cases, and the relation of the units to other units is difficult to determine. (3) The absolute or mechanical unit, the quantity of heat equivalent to a given quantity of mechanical or electrical energy. This can be very accurately realized, but is not so convenient as (1) for ordinary purposes.

In any case it is necessary to define a thermometric unit of class (1). The standard substance must be a liquid. Water is always selected, although some less volatile liquid, such as aniline or mercury, would possess many advantages. With regard to the scale of tem- perature, there is very general agreement that the absolute scale as realized by

the hydrogen or helium thermometer should be adopted as the ultimate standard of reference. But as the hydrogen thermometer is not directly available for the majority of experiments, it is necessary to use a secondary standard for the practical definition of the unit. The electrical resistance thermometer of platinum presents very great advantages for this purpose over the mercury thermometer in point of reproducibility, accuracy and adaptability to the practical conditions of experiment. The conditions of use of a mercury thermometer in a calorimetric experiment are neces- sarily different from those under which its corrections are determined, and this difference must inevitably give rise to constant errors in practical work. The primary consideration in the definition of a unit is to select that method which permits the highest order of accuracy in comparison and verification. For this reason the de- finition of the thermal unit will in the end probably be referred to a scale of temperature defined in terms of a standard platinum thermometer.

There is more diversity of opinion with regard to the question of the standard temperature. Many authors, adopting Regnault's formula, have selected 0° C. as the standard temperature, but this cannot be practically realized in the case of water, and his formula is certainly erroneous at low temperatures. A favourite tempera- ture to select is 4 C, the temperature of maximum density, since at this point the specific heat at constant volume is the same as that at constant pressure But this is really of no consequence, since the specific heat at constant volume cannot be practically realized. The specific heat at 4 could be accurately determined at the mean over the range 0° to 8° keeping the jacket at 0° C. _ But the change appears to be rather rapid near 0°, the temperature is inconveniently low for ordinary calorimetric work, and the unit at 4 would be so much larger than the specific heat at ordinary temperatures that nearly all experiments would require reduction. The natural point to select would be that of minimum specific heat, but if this occurs at 40 C. it would be inconveniently high for practical realization except by the continuous electrical method. It was proposed by a committee of the British Association to select the temperature at which the specific heat was 4-200 joules, leaving the exact tempera- ture to be subsequently determined. It was supposed at the time, from the original reduction of Rowland's experiments, that this would be nearly at io c C, but it now appears that it may be as low as 5 C, which would be inconvenient. This is really only an absolute unit in disguise, and evades the essential point., which is the selection of a standard temperature for the water thermometric unit. A similar objection applies to selecting the temperature at which the specific heat is equal to its mean value

between o” and 100°. The mean calorie cannot be accurately realized in practice in any simple manner, and is therefore unsuitable as a standard of comparison. Its relation to the calorie at any given temperature, such as 15 or 20°, cannot be determined with the same degree of accuracy as the ratio of the specific heat at 15 to that at 20 , if the scale of temperature is given. The most practical unit is the calorie at 15 or 20 or some temperature in the range of ordinary practice. The temperature most generally favoured is 15 , but 20° would be more suitable for accurate work. These units differ only by II parts in 10,000 according to Callendar and Barnes, or by 13 in 10,000 according to Rowland and Griffiths, so that the difference

between them is of no great importance for ordinary purposes. But for purposes of definition it would be necessary to take the mean value of the specific heat over a given range of temperature, preferably at least 10°, rather than the specific heat at a point which necessitates reference to some formula of reduction for the rate of variation. The specific heat at 15 would be determined with reference to the mean over the range 10° to 20 , and that at 20 from the range 15° to 25°. There can be no doubt that the range 10° to 20° is too low for the accurate thermal regulation of the conditions of the experiment. The range 15 to 25° would be much more convenient from this point of view, and a mean temperature of 2o c is probably nearest the average of accurate calorimetric work. For instance 20° is the mean of the range of the experiments of Griffiths and of Rowland, and is close to that of Schuster and Gannon. It is readily attainable at any time in a modern laboratory with adequate heating arrangements, and is probably on the whole the most suitable temperature to select.

§ 17. Specific Heat of Gases. — In the case of solids and liquids under ordinary conditions of pressure, the external work of expansion is so small that it may generally be neglected; but with gases or vapours, or with liquids near the critical point, the external work becomes so large that it is essential to specify the conditions under which the specific heat is measured. The most important cases are, the specific heats (1) at constant volume; (2) at constant pressure; (3) at saturation pressure in the*case of a liquid or vapour. In consequence of the small thermal capacity of gases and vapours per unit volume at ordinary pressures, the difficulties of direct measurement are almost insuperable except in case (2). Thus the direct experimental evidence is somewhat meagre and conflicting, but the question of the relation of the specific heats of gases is one of great interest in connexion with the kinetic theory and the constitution of the molecule. The well-known experiments of Regnault and Wiedemann on the specific heat of gases at constant pressure agree in showing that the molecular specific heat, or the

thermal capacity of the mole- cular weight in grammes, is approximately independent of the temperature and pressure in case of the more stable diatomic gases, such as H 2 ,0 2 , N 2 , CO, &c, and has nearly the same value for each gas. They also indicate that it is much larger, and increases considerably with rise of temperature, in the case of more condensible vapours, such as Cl 2 , Br 2 , or more complicated molecules, such as C0 2 ,N 2 0, NH 3 , C2H4. The direct determina- tion of the specific heat at constant volume is extremely difficult, but has been successfully attempted by Joly with his steam calorimeter, in the case of air and C0 2 . Employing pressures between 7 and 27 atmospheres, he found that the specific heat of air between io° and 100° C. increased very slightly with increase of density, but that of C0 2 increased nearly 3 % between 7 and 2 1 atmospheres. The following formulae represent his results' for the specific heat $ at constant volume in terms of the density d in gms. per c. c. : —

Air, i = o-i7i5 + o-028(f,

C0 2 , s = o-i65 + o-2i3d + o-34d 2 .

§ 18. Ratio of Specific Heats. — According to the elementary kinetic theory of an ideal gas, the molecules of which are so small and so far apart that their mutual actions may be neglected, the kinetic energy of translation of the molecules is proportional to the absolute temperature, and is equal to 3/2 of pv, the product of the pressure and the volume, per unit mass. The expansion per degree at constant pressure is v/8 = R/p. The external work of expansion per degree is equal to R, being the product of the pressure and the expansion, and represents the difference of the specific heats S — s, at constant pressure and volume, assuming as above that the in- ternal work of expansion is negligible. If the molecules are supposed to be like smooth, hard, elastic spheres, incapable of receiving any other kind of energy except that of translation, the specific heat at constant volume would be the increase per degree of the kinetic energy namely 3pv/2d = 3 R/2 , that at constant pressure would be 5.R/2, and the ratio of the specific heats would be 5/3 or 1 666. This appears to be actually the case for monatomic gases such as mercury vapour (Kundt and Warburg, 1876), argon and helium (Ramsay, 1896). For diatomic or compound gases Clerk Maxwell supposed that the molecule would also possess energy of rotation, and en deavoured to prove that in this case the energy would be equally divided between the six degrees of freedom, three of translation and three of rotation, if the molecule were regarded as a rigid body incapable of vibration-energy. In this case we should have s = $R, S = 4-R, 5/5 = 4/3 = 1-333. In 1879 Maxwell considered itoneof the greatest difficulties which the kinetic

theory had yet encountered, that in spite of the many' other degrees of freedom of vibration revealed by the spectroscope, the experimental value of the ratio

S/s was 1-40 for so many gases, instead of being less than 4/3. Somewhat later L. Boltzmann suggested that a diatomic molecule regarded as a rigid dumb-bell or figure of rotation, might have only five effective degrees of freedom, since the energy of rotation about the axis of symmetry could not be altered by collisions between the molecules. The theoretical value of the ratio S/s in this case would be the required 7/5. For a rigid molecule on this theory the smallest value possible would be 4/3. Since much smaller values are found for more complex molecules, we may suppose that, in these cases, the energy of rotation of a polyatomic molecule may be greater than its energy of translation, or else that heat is expended in splitting up molecular aggregates, and increasing energy of vibration. A hypothesis doubtfully attributed to Maxwell is that each addi- tional atom in the molecule is equivalent to two extra degrees of freedom. From an m-atomic molecule we should then have S/s~l+al(2tn + i). This givesaseries of ratios 5/3, 7/5, 9/7, 11/9, &c, for I, 2, 3, 4, &c, atoms in the molecule, values which fall within the limits of experimental error in many cases. It is not at all clear, however, that energy of vibration should bear a constant ratio to that of translation, although this would probably be the case for rotation. For the simpler gases, which are highly dia- thermanous and radiate badly even at high temperature, the energy of vibration is probably very small, except under the special con- ditions which produce luminosity in flames and electric discharges. For such gases, assuming a constant ratio of rotation to translation, the specific heat at low pressures would be very nearly constant. For more complex molecules the radiative and absorptive powers are known to be much greater. The energy of vibration may be appreciable at ordinary temperatures, and would probably increase more rapidly than that of translation with rise of temperature, especially near a point of dissociation. This would account for an increase of S, and a diminution of the ratio S/s, with rise of temperature which apparently occurs in many vapours. The experimental evidence, however, is somewhat conflicting, and further investigations are very desirable on the variation of specific heat with temperature. Given the specific heat as a function of the temperature, its variation with pressure may be determined from the characteristic equation of the gas. The direct methods of measuring the ratio S/s, by

the velocity of sound and by adiabatic expansion, are sufficiently described in many text-books.

I 19. Atomic and Molecular Heats.-— The ideal atomic heat is the thermal capacity of a gramme-atom in the ideal state of monatomic gas at constant volume. . This would be nearly three calories. For a diatomic gas, the molecular heat would be nearly five calories, or the atomic heat of a gas in the diatomic state would be 2-5. Esti- mated at constant pressure the atomic heat would be 3-5. Some authors adopt 2-5 and some 3-5 for the ideal atomic heat. The atomic heat of a metal in the solid state is in most cases larger than six calories at ordinary temperatures. Considering the wide varia- tions in the physical condition and melting points, the comparatively close agreement of the atomic heats of the metals at ordinary tem- peratures, known as Dulong and Petit's Law, is very remarkable. The specific heats as a rule increase with rise of temperature, in some cases, e.g. iron and nickel, very rapidly. According to W. A. Tilden {Phil. Trans., 1900), the atomic heats of pure nickel and cobalt, as determined from experiments at the boiling-points of O2, and CO2, diminish so rapidly at temperatures below 0° C. as to suggest that they would reach the value 2-42 at the absolute zero. This is the value of the minimum of atomic heat calculated by Perry from diatomic hydrogen, but the observations themselves might be equally well represented by taking the imaginary limit 3, since the quantity actually observed is the mean specific heat between 0° and — 182-5° C. Subsequent experiments on other metals at low tem- peratures did not indicate a similar diminution of specific heat, so that it may be doubted whether the atomic heats really approach the ideal value at the absolute zero. No doubt there must be approximate relations between the atomic and molecular heats of similar elements and compounds, but considering the great variations of specific heat with temperature and physical state, in alloys, mixtures or solutions, and in allotropic or other modifications, it would be idle to expect that the specific heat of a compound could be accurately deduced by any simple additive process from that of its constituents.

Authorities. — Joule's Scientific Papers (London, 1890); Ames and Griffiths, Reports to the International Congress (Paris, 1900), " On the Mechanical Equivalent of Heat," and " On the Specific Heat of Water ' ' ; Griffiths, Thermal Measurement of Energy (Cam- bridge, 1901); Callendar and Barnes, Phil. Trans. A, 1901, "On the Variation of the Specific Heat of Water"; for combustion methods, see article Thermochemistry, and treatises by Thomsen, Pattison-Muir and Berthelot; see also articles Thermodynamics and Vaporization. (H. L. C.)

CALOVIUS, ABRAHAM (1612-1686), German Lutheran divine, was born at Mohrungen in east Prussia, on the 16th of April 1612. After studying at Konigsberg, in 1650 he was appointed professor of theology at Wittenberg, where he after- wards became general superintendent and primarius. He died on the 25th of February 1686. Calovius was the most noteworthy

of the champions of Lutheran orthodoxy in the 17 th century. He strongly opposed the Catholics, Calvinists and Socinians, attacked in particular the reconciliation policy or ” syncretism ” of Georg Calixtus (cf. the Consensus repetitus fidei vere lutheranae, 1665), and as a writer of polemics he had few equals. His chief dogmatic work, Systema locorum theologicorum (12 vols. 1655- 1677), represents the climax of Lutheran scholasticism. In his Biblia Illustrata (4 vols.), written from the point of view of a very strict belief in inspiration, his object is to refute the state- ments made by Hugo Grotius in his Commentaries. His Historia Syncretistica (1682) was suppressed.

CALPURNIUS, TITUS, Roman bucolic poet, surnamed Siculus from his birthplace or from his imitation of . the style of the Sicilian Theocritus, most probably nourished during the reign of Nero. Eleven eclogues have been handed down to us under his name, of which the last four, from metrical considerations and express MS. testimony, are now generally attributed to Nemesi- anus (q.v.), who lived in the time of the emperor Carus and his sons (latter half of the 3rd century a.d.). Hardly anything is known of the life of Calpurnius; we gather from the poems themselves (in which he is obviously represented by “Cory don “) that he was in poor circumstances and was on the point of emigrating to Spain, when ” Meliboeus ” came to his aid. Through his influence Calpurnius apparently secured a post at Rome. The time at which Calpurnius lived has been much discussed, but all the indications seem to point to the time of Nero. The emperor is described as a handsome youth, like Mars and Apollo, whose accession marks the beginning of a new golden age, prognosticated by the appearance of a comet, doubtless the same that appeared some time before the death of Claudius; he exhibits splendid games in the amphitheatre (probably the wooden amphitheatre erected by Nero in 57); and in the words

maternis causam qui vicit Iulis 1 (i. 45), there is a reference to the speech delivered in Greek by Nero on behalf of the Ilienses (Suetonius, Nero, 7; Tacitus, Annals, xii. 58), from whom the Julii derived their family. 2 Meliboeus, the poet’s patron, has been variously identified with Columella, Seneca the philosopher, and C. Calpurnius Piso. Although the sphere of Meliboeus’s literary activity (as indicated in iv.

53) suits none of these, what is known of Calpurnius Piso fits in well with what is said of Meliboeus by the poet, who speaks of his generosity, his intimacy with the emperor, and his interest in tragic poetry. His claim is further supported by the poem De Laude Pisonis (ed. C. F. Weber, 1859) which has come down t© us without the name of the author, but which there is considerable reason for attributing to Calpurnius. 3 The poem exhibits a striking similarity with the eclogues in metre, language and subject-matter. The author of the Laus is young, of respectable family and desirous of gaining the favour of Piso as his Maecenas. Further, the similarity between the two names can hardly be accidental; it is suggested that the poet may have been adopted by the courtier, or that he was the son of a freedman of Piso. The attitude of the author of the Laus towards the subject of the panegyric seems to show less intimacy than the relations between Corydon and Meliboeus in the eclogues, and there is internal evidence that the Laus was written during the reign of Claudius (Teuffel-Schwabe, Hist, of Rom. Lit. § 306,6).

Mention may here be made of the fragments of two short hexameter poems in an Einsiedeln MS., obviously belonging to the time of Nero, which if not written by Calpurnius, were imitated from him.

1 Iulis for in ulnis according to the best MS. tradition.

2 According to Dr R. Garnett (and Mr Greswell, as stated in Conington's Virgil, i. p. 123, note) the emperor referred to is the younger Gordian (a.d. 238). His arguments in favour of this will be found in the article on Calpurnius by him in the 9th edition of the Encyclopaedia Britannica and in the Journal of Philology, xvi., 1888; see in answer J. P. Postgate, "The Comet of Calpurnius Siculus " in Classical Review, June I902. Dean Merivale {Hist, of the Romans under the Empire, ch. 60) and Pompei, " Intorno al Tempo del Poeta Calpurnio " in Atti del Istituto Veneto, v. 6 (1880), identify the amphitheatre with the Colosseum (Flavian amphitheatre) and assign Calpurnius to the reign of Domitian.

3 It has been variously ascribed to Virgil, Ovid, Lucan, Statius and Saleius Bassus.

Although there is nothing original in Calpurnius, he is ” a skilful literary craftsman.” Of his models the chief is Virgil, of whom (under the name of Tityrus) he speaks with great en- thusiasm; he is also indebted to Ovid and Theocritus. Cal- purnius is ” a fair scholar, and an apt courtier, and not devoid of real poetical feeling. The bastard style of pastoral cultivated by him, in which the description of nature is made the writer’s pretext, while ingenious flattery is his real purpose, nevertheless excludes genuine pleasure, and consequently genuine poetical achievement. He may be fairly compared to the minor poets of the reign of Anne ” (Garnett).

Calpurnius was first printed in 1471, together with Silius Italicus and has been frequently republished, generally with Gratius Faliscus and Nemesianus. The separate authorship of the eclogues of Calpurnius and Nemesianus was established by M. Haupt’s De Carminibus bucolicis Calpurnii et Nemesiani (1854). Editions by H. Schenkl (1885), with full introduction and index verborum, and by C. H. Keene (1887), with introduction, commentary and appendix. English verse translation by E. J. L. Scott (1891) ; see H. E. Butler, Post-Augustan Poetry (Oxford, 1909), pp. 150 foil., and F. Skutsch in Pauly-Wissowa’s Realencydopddie, iii. 1 (1897). (J. H. F.)

CALTAGIRONE, a city and episcopal see of the province of Catania, Sicily, situated 1999 ft. above sea-level, 36 m. S.W. of Catania direct (55 m. by rail). Pop. (1881) 25,978; (1901) town 35,116; commune 45,956. It is well built, and is said to be the most civilized provincial town in Sicily. Extensive Sicel cemeteries have been explored to the north of the town (Not. Scavi, 1904, 65), and a Greek necropolis of the 6th and 5th centuries B.C. has been found to the south-east (ibid. 132). Remains of buildings of Roman date have also been discovered ; but the name of the ancient city which stood here is unknown. The present name is a corruption of the Saracen Kalat-al-Girche (the castle of Girche, the chieftain who fortified it).

CALTANISETTA, a town and episcopal see of Sicily, the capital of a province of the same name, 60 m. S.E. of Palermo direct and 83 m. by rail, situated 1930 ft. above sea-level. Pop. (1901) 43,303. The town is of Saracenic origin, as its name Kalat-al-Nisa, the “Ladies’ Castle,” indicates, and some ruins of the old castle (called Pietrarossa) still exist. Otherwise the town contains no buildings of artistic or historical interest, but it commands striking views. It is the centre of the Sicilian sulphur industry and the seat of a royal school of mines. Two miles east is the interesting Norman abbey of S. Spirito.

CALTROP (from the Mid. Eng. calketrappe, probably derived from the Lat. calx, a heel, and trappa, Late Lat. for a snare), an iron ball, used as an obstacle against cavalry, with four spikes so arranged, that however placed in or on the ground, one spike always points upwards. It is also the botanical name for several species of thistles.

CALUIRE-ET-CUIRE, a town of eastern France, in the department of Rhone, 25 m. N. by E. of Lyons by rail. Pop. (1906) 9255. It has manufactures of coarse earthenware and hard-ware, copper and bronze foundries and nursery-gardens.

CALUMET (Norm. Fr. form of chalumet, from Lat. calamus, a reed), the name given by the French in Canada to the ” peace- pipe ” of the American Indians. This pipe occupied among the tribes a position of peculiar symbolic significance, and was the object of profound veneration. It was smoked on all ceremonial occasions, even on declarations of war, but its special use was at the making of treaties of peace. It was usually about 2§ ft. long, and in the west the bowl was made of red pipes tone (catlinite), a fine-grained, easily-worked stone of a rich red colour found chiefly in the Coteau des Prairies west of Big Stone Lake, Dakota. The quarries were formerly neutral ground among the warring Indian tribes, many sacred traditions being associated with the locality and its product (Longfellow, Hiawatha, i.). The pipe stem was of reed decorated with eagles’ quills or women’s hair. Native tobacco mixed with willow-bark or sumac leaves was smoked. The pipe was offered as a supreme proof of hospitality to distinguished strangers, and its refusal was regarded as a grievous affront. In the east and south-east, the bowl was of white stone, sometimes pierced with several stem holes so that many persons might smoke at once.

See Joseph D. Macguire (exhaustive report, 640 pages), ” Pipes and

Smoking Customs of the American Aborigines” in Smithsonian Repott (American Bureau of Ethnology) for 1897, vol. i. ; and authorities quoted in Handbook of American Indians (Washington,ˆl907).

CALUMPIT, a town of the province of Bulacan, Luzon, Philippine Islands, at the junction of the Quingua river with the Rio Grande de la Pampanga, about 25 m. N.W. of Manila. Pop. (1963) 13,897. It is served by the Manila & Dagupan railway, and the bridge across the Rio Grande is one of the longest in the Philippines. The surrounding country is a fertile plain, producing large quantities of rice, as well as sugar, Indian corn and a variety of fruits. Calumpit has a large rice-mill and one of the largest markets in the Philippines. The bridge,

convent and church of the town were fired and completely destroyed by insurgent troops in 1899. The language is Tagalog.

CALVADOS, a department of north-western France, formed in 1790 out of Bessin, Cinglais, Hiemois, Bocage, the Campagne de Caen, Auge and the western part of Lieuvin. Pop. (1906) 403,431. Area, 2197 sq. m. It received its name from a ledge of rocks, stretching along the coast for a distance of about 15 m. between the mouths of the rivers Orne and Vire. It is bounded N. by the English Channel, E. by the department of Eure, S. by that of Orne, W. by that of Manche. The Bocage, or south-western part of the department, is elevated, being crossed from south-east to north-west by the hills of Normandy, the highest of which is 1 197 ft.; the rest of the surface is gently undulating, and consists of extensive valleys watered by numerous streams which fall into the English Channel. The coast, formed by cliffs, sandy beaches or reefs, is generally inaccessible, except at the mouths of the principal rivers, such as the Touques, the Dives, the Orne and the Vire, which are navigable at high tide for several miles inland. Trouville is the chief of the numerous coast resorts. The climate, though humid and variable, is healthy. The raising of cattle, sheep and horses is the mainstay of the agriculture of the department. Pasture is good and abundant in the east and north- west, and there is a large export trade in the butter, eggs and cheese (Camembert, Livarot, Pont l'Evfique) of these districts, carried on by Honfleur, Isigny and other ports. The plain of; Caen is a great centre for horse breeding. Wheat, oats, barley, colza and potatoes are the chief crops. The orchards of Auge and Bessin produce a superior kind of cider, of which upwards of 40,000,000 gallons are made in the department; a large quantity of cider brandy (eau-de-vie de Calvados) is distilled. Poultry to a considerable amount is sent to the Paris markets, and there is a large output of honey and wax. The spinning and weaving of wool and cotton are the chief industries. Besides these, paper-mills, oil-mills, tanneries, saw-mills, shipbuilding yards, rope-works, dye-works, distilleries and bleach-fields, scattered throughout the department, give employment to a number of hands. There are productive iron-mines and building-stone, slate and lime are plentiful. Fisheries, chiefly of lobster, oyster (Courseulles), herring and mackerel, are prosecuted. Coal, timber, grain, salt-fish and cement are among the imports; exports include iron, dairy products and sand. Caen and Honfleur are the most important commercial ports. There is a canal 9 m. in length from Caen to Ouistreham on the coast. The department is served by the Ouest-Etat railway. It is divided into the six arrondissements (38 cantons, 763 communes) of Caen, Falaise, Bayeux, Vire, Lisieux and Pont 1'Eveque. Caen, the capital, is the seat

of a court of appeal and the centre of an acadimie (educa- tional division). The department forms the diocese of Bayeux, in the ecclesiastical province of Rouen, and belongs to the region of the III. army-corps. The other principal towns are Falaise, Lisieux, Conde-sur-Noireau, Vire, Honfleur and Trouville (q.v.) .

Amongst the great number of medieval churches which the department possesses, the fine Gothic chprch of St. Pierre- sur-Dives is second in importance only to those of Lisieux and Bayeux; that of Norrey, a good example of the Norman- Gothic style, and that of Tour-en-Bessin, in which Romanesque and Gothic architecture are mingled, are of great interest. Fontaine- Henri has a fine chateau of the 15th and 16th centuries.

CALVART, DENIS (1540-1619), Flemish painter, was born at Antwerp. After studying landscape-painting for some time in

his native city he went to Bologna, where he perfected himself in the anatomy of the human form under Prospero Fontaha, and so completely lost the mannerism of Flemish art that his paintings appear to be the work of an Italian. From Bologna he went to Rome, where he assisted Lorenzo Sabbatini (1533-1577) in his works for the papal palace, and devoted much of his time to copying and studying the works of Raphael. He ultimately returned to Bologna and founded a school, of which the greatest ornaments are Guido and Domenichino. His works are especially admired for the power of grouping and colouring which they display.

CALVARY, the conventional English rendering of the calvaria of the Vulgate, the Latin version of the Greek Kpaviov, both meaning ” skull ” and representing the Hebrew Golgotha, the name given to the scene of Christ’s crucifixion. The term ” a Calvary ” is applied to a sculptured representation of the Crucifixion, either inside a church, or adjoining one in the open air. There are many examples of the latter in France, Italy and Spain. Among the most important are the Sacro Monte (i486) at Varallo in Piedmont, and those at Guimiliau (.1581), Plougastel (1602), St Thegonnec (1610), and Pleyben near Quimper (1670), in Brittany, all in good preservation.,

CALV& EMMA (1864-), Spanish operatic soprano, was born at Madrid, and trained in Paris, making her first important appearance in

opera at Brussels in 1882. She sang mainly in Paris for some years, but in 1892 was first engaged at Covent Garden, London, and at once became famous as the most vivid Carmen (in Bizet's opera) of the day.

CALVERLEY, CHARLES STUART (1 831-1884), English poet and wit, and the literary father of what may be called the university school of humour, was born at Martley in Worcester- shire on the 2 2nd of December 1 83 1 . His father, the Rev. Henry Blayds, resumed in 1852 the old family name of Calverley, which his grandfather had exchanged for Blayds in 1807. It was as Charles Stuart Blayds that most of the son's university distinc- tions were attained. He went up to Balliol from Harrow in 1850, and was soon known in Oxford as the most daring and most high-spirited undergraduate of his time. He was a universal favourite, a delightful companion, a brilliant scholar and the playful enemy of all " dons." In 1851 he won the Chancellor's prize for Latin verse, and it is said that the entire exercise was written in an afternoon, when his friends had locked him into his rooms, declining to let him out till he had finished what they were confident would prove the prize poem. A year later he took his name off the books, to avoid the consequences of a college escapade, and migrated to Christ's College, Cambridge. Here he was again successful in Latin verse, and remains the unique example of an undergraduate who has won the Chancellor's prize at both universities. In 1856 he took second place in the first class in the Classical Tripos. He was elected fellow of Christ's (1858), published Verses and Translations in 1862, and was called to the bar in 1865. Owing to an accident while skating he was prevented from following up a professional career, and during the last years of his life he was an invalid. His Translations into English and Latin appeared in 1866; his Theocritus translated into English Verse in 1869; Fly Leaves in 1872; and Literary Remains in 1885. He died on the 17th of February 1884. Calverley was one of the most brilliant men of his day; and, had he enjoyed health, might have achieved distinction in any career he chose. Constitutionally indolent, he was endowed with singular gifts in every department of culture; he was a scholar, a musician, an athlete and a brilliant talker. What is left us marks only a small portion of his talent, but his sparkling, dancing verses, which have had many clever imitators, are still without a rival in their own line. His humour was illumined by good nature ; his satire was keen but kind; his laughter was of that human sort which is often on the verge of tears. Imbued with the classical spirit, he intro- duced into the making of light verse the polish and elegance of the great masters, and even in its most whimsical mood his verse is raised to the level of poetry by the saving excellence of style.

His Complete Works,' with a biographical notice by Sir W. J. Sendall,

appeared in 1901. (A, Wa.)

CALVERT, the name of three English artists: Charles (1785- 1852), a well-known landscape-painter; Edward (1803-1883), an important wood-engraver and follower of Blake; and Frederick, an excellent topographical draughtsman, whose work in water-colour is represented at the Victoria and Albert Museum, and who published a volume of Picturesque Views in Staffordshire and Shropshire (1830).

CALVERT, FREDERICK CRACE (1819-1873), English chemist, was born in London on the 14th of November 1819. From about 1836 till 1846 he lived in France, where, after a course of study at Paris, he became manager of some chemical works, later acting as assistant to M. E. Chevreul. On his return to England he settled in Manchester as a consulting chemist, and was appointed professor of chemistry at the Royal Institution in that city. Devoting himself almost entirely to industrial chemistry, he gave much attention to the manufacture of coal-tar products, and particularly carbolic acid, for the production of which he established large works in Manchester in 1865. Besides contributing extensively to the English and French scientific journals, he published a work on Dyeing and Calico-Priniing. He died in Manchester on the 24th of October 1873.

CALVERT, SIR HARRY, Bart. (c. 1763-1826), British general,. was probably born early in 1763 at Hampton, near London. He was educated at Harrow, and at the age of fifteen entered the army. In: the following year he served with his regiment in America, being present at the siege of Charleston, and serving through the campaign of Lord Cornwallis which ended with the surrender of Yorktown. From 1781 to 1783 he was a prisoner of war. Returning to England in 1784, he next saw active service in 1 793-1 794 in the Low Countries, where he was aide-de-camp to the duke of York, and in 1795 was engaged on a confidential mission to Brunswick and Berlin. In 1 799, having already served as deputy adjutant general, he was made adjutant general, holding the post till 1818. In this capacity he effected many improvements in the organization and discipline of the service. He greatly improved the administration of the army medical and hospital department, introduced regimental schools, developed the two existing military colleges (since united at Sandhurst), and was largely responsible for the founding of the Duke of York's school, Chelsea. In recognition of his work as adjutant general he was made a G.C.B. (181 5), and, on retiring from office, received a baronetcy (1818). In 1820 he was made governor of Chelsea hospital. He died on the 3rd of September 1826, at Middle Claydon, Buckinghamshire.

CALVES' HEAD CLUB, a club established shortly after his death in derision of the memory of Charles I. Its chief meeting was held on the 30th of each January, the anniversary of the king's execution, when the dishes served were a cod's head to represent the individual, Charles Stuart; a pike representing tyranny; a boar's head representing the king preying on his subjects; and calves' heads representing Charles as king and his adherents. On the table an axe held the place of honour. After the banquet a copy of the king's Ikon Basilike was burnt, and the toast was " To those worthy patriots who killed the tyrant." After the Restoration the club met secretly. The first mention of it is in a tract reprinted in the Harleian Miscellany entitled " The Secret History of the Calves' Head Club." The club survived till 1734, when the diners were mobbed owing to the popular ill-feeling which their outrages on good taste provoked, and the riot which ensued put a final stop to the meetings.

CALVI, a sea-port in Corsica, capital of an arrondissement in the N.W. of the island, 112 m. N. of Ajaccio by road. Pop. (1906) 1967. It is situated on the Bay of Calvi, in a malarial region, and is the port in Corsica nearest to France, being 109 m. from Antibes; the harbour, however, is exposed to the east and north-east winds. The modern town lies at the foot of a rock, on which stands the old town with its steep rock-paved streets and fortified walls, commanded by the Fort Muzello. Fishing is carried on, and timber, oil, wine, lemons and other sub-tropical fruits are exported to some extent. The most important buildings are the old palace of the Genoese governor, used as barracks, and the church (16th century), with the monument of the. Baglioni

family, which was intimately associated with the history of the town.

Calvi was founded in the 13th century and in 1278 passed into the hands of the Genoese. From that date it was remarkable for its adherence to their side, especially in 1553 when it repulsed two attacks of the united forces of the French and Turks. In recogni- tion thereof the Genoese senate caused the words Civitas Calvi semper fidelis to be carved on the chief gate of the city, which still preserves the inscription. In 1794 Calvi was captured by the English, but it was retaken by the Corsicans in the following year.

CALVIN, JOHN (1500-1564), Swiss divine and reformer, was born at

Noyon, in Picardy, on the 10th of July 1 509. His father, Gerard Cauvin or Calvin, 1 was a notary-apostolic and procurator- fiscal for the lordship of Noyon, besides holding certain ecclesi- astical offices in connexion with that diocese. The name of his mother was Jeanne le Franc; she was the daughter of an inn- keeper at Cambrai, who afterwards came to reside at Noyon. Gerard Cauvin was esteemed as a man of considerable sagacity and prudence, and his wife was a godly and attractive lady. She bore him five sons, of whom John was the second. By a second wife there were two daughters.

Of Calvin's early years only a few notices remain. His father destined him from the first for an ecclesiastical career, and paid for his education in the household of the noble family of Hangest de Montmor. In May 1521 he was appointed to a chaplaincy attached to the altar of La Gesine in the cathedral of Noyon, and received the tonsure. The actual duties of the office were in such cases carried out by ordained and older men for a fraction of the stipend. The plague having visited Noyon, the young Hangests were sent to Paris in August 1523, and Calvin accompanied them, being enabled to do so by the income received from his benefice. He lived with his uncle and attended as an out-student the College de la Marche, at that time under the regency of Mathurin Cordier, a man of character, learning and repute as a teacher, who in later days followed his pupil to Switzerland, taught at Neuchatel, and died in Geneva in 1 564. In dedicating to him his Commentary on the First Epistle to the Thessalonians, as " eximiae pietatis et doctrinae viro," he declares that so had he been aided by his instruction that whatever subsequent- progress he had made he only regarded as received from him, and " this," he adds, " I wish to testify to posterity that if any utility accrue to any from my writings they may acknowledge it as having in part flowed from thee." From the College de la Marche he removed to the College de Montaigu, 2 where the atmosphere was more ecclesi- astical and where he had for instructor a Spaniard who is described as a man of learning and to whom Calvin was indebted for some sound training in dialectics and the scholastic philosophy. He speedily outstripped all his competitors in grammatical studies, and by his skill and acumen as a student of philosophy, and in the college disputations gave fruitful promise of that consummate excellence as a reasoner in the department of speculative truth which he afterwards displayed. Among his friends were the Hangests (especially Claude), Nicolas and Michel Cop, sons of the king's Swiss physician, and his own kinsman Pierre Robert, better known as Olivetan. Such friend- ships testify both to the worth and the attractiveness of his character, and contradict the old legend that he was an unsociable misanthrope. Pleased with his

success, the canons at Noyon gave him the curacy of St Martin de Marteville in September 1527. After holding this preferment for nearly two years, he exchanged it in July 1529 for the cure of Pont L'fiveque, a village

1 The family name of Calvin seems to have been written indiffer- ently Cauvin, Chauve, Chauvin, Calvus, Calvinus. In the con- temporary notices of Gerard and his family, in the capitular registers of the cathedral at Noyon, the name is always spelt Cauuin. The anagram of Calvin is Alcuin, and this in its Latinized fortn Alcuinus appears in two editions of his Institutio as that of the author (Audin, Vie de Calvin, i. 520). The syndics of Geneva address him in a letter written in 1540, and still preserved, as " Docteur Caulvin." In his letters written in French he usually signs himself " Jean Calvin." He affected the title of " Maitre," for what reason is not known.

2 Pierre de Montaigu refoundcd this institution in 1388. Erasmus and Ignatius Loyola also studied here.

near to Noyon, and the place to which his father originally belonged. He appears to have been not a little elated by his early promotion, and although not ordained, he preached several sermons to the people. But though the career of ecclesiastical preferment was thus early opened to him, Calvin was destined not to become a priest. A change came over the mind both of his father and himself respecting his future career. Gerard Cauvin began to suspect that he had not chosen the most lucrative profession for his son, and that the law offered to a youth of his talents and industry a more promising sphere. 3 He was also now out of favour with the cathedral chapter at Noyon. It is said also that John himself, on the advice of his relative, Pierre Robert Olivetan, the first translator of the Bible into French, had begun to study the Scriptures and to dissent from the Roman worship. At any rate he readily complied with his father's suggestion, and removed from Paris to Orleans (March 1528) in order to study law under Pierre Taisan de l'Etoile, the most distinguished jurisconsult of his day. The university atmosphere here was less ascetic than at Paris, but Calvin's ardour knew no slackening, and such was his progress in legal knowledge that he was fre- quently called upon to lecture, in the absence of one or other of the regular staff. Other studies, however, besides those of law occupied him while in this city, and moved by the humanistic spirit of the age he eagerly developed his classical knowledge. " By protracted vigils," says Beza, " he secured indeed a solid erudition and an excellent memory; but it is probable he at the same time sowed the seeds of that disease (dyspepsia) which occasioned him various illnesses in after life, and at last brought upon

him premature death.” 4 His friends here were Melchior Wolmar, a German schoolmaster and a man of exemplary scholarship and character, Francois Daniel, Francois de Connam and Nicolas Duchemin; to these his earliest letters were written.

From Orleans Calvin went to Bourges in the autumn of 1529 to continue his studies under the brilliant Italian, Andrea Alciati (1492-1550), whom Francis I. had invited into France and settled as a professor of law in that university. His friend Daniel went with him, and Wolmar followed a year later. By Wolmar Calvin was taught Greek, and introduced to the study of the New Testament in the original, a service which he gratefully acknowledges in one of his printed works. 5 The conversation of Wolmar may also have been of use to him in his consideration of the doctrines of the Reformation, which were now beginning to be widely diffused through France. Twelve years had elapsed since Luther had published his theses against indulgences — twelve years of intense excitement and anxious discussion, not in Germany only, but in almost all the adjacent countries. In France there had not been as yet any overt revolt against the Church of Rome, but multitudes were in sympathy with any attempt to improve the church by education, by purer morals, by better preaching and by a return to the primitive and un- corrupted faith. Though we cannot with Beza regard Calvin at this time as a centre of Protestant activity, he may well have preached at Lignieres as a reformatory Catholic of the school of Erasmus. Calvin’s own record of his ” conversion ” is so scanty and devoid of chronological data that it is extremely difficult to trace his religious development with any certainty. But it seems probable that at least up to 1532 he was far more concerned about classical scholarship than about religion.

His residence at Bourges was cut short by the death of his father in May 1531. Immediately after this event he went to Paris, where the ” new learning ” was now at length ousting the medieval scholasticism from the university. He lodged in the College Fortet, reading Greek with Pierre Danes and beginning Hebrew with Francois Vatable. It was at this time (April 1532) that Calvin issued his first publication, a commentary in Latin on Seneca’s tract De dementia. This book he published at his own cost, and dedicated to Claude Hangest, abbot of St Eloi, a member of the de Montmor family, with whom Calvin had been

3 Calv. Praef. ad Comment, in Psalmos.

4 Jo. Calvini Vita, sub init.

6 Epist. Dei., Comment in Ep. II. ad Corinthios praefix.

brought up. It was formerly thought that Calvin published this work with a view to influence the king to put a stop to the attacks on the Protestants, but there is nothing in the treatise itself or in the commentary to favour this opinion.

Soon after the publication of his first book Calvin returned to Orleans, where he stayed for a year, perhaps again reading law, and still undecided as to his life's work. He visited Noyon in August 1533, an d by October of the same year was settled again in Paris. Here and now his destiny became certain. The conservative theology was becoming discredited, and humanists like Jacques Lefevre of Etaples (Faber Stapulensis) and Gerard Roussel were favoured by the court under the influence of Margaret of Angouleme, queen of Navarre and sister of Francis I. Calvin's old friend, Nicolas Cop, had just been elected rector of the university and had to deliver an oration according to custom in the church of the Mathurins, on the feast of All Saints. The oration (certainly influenced but hardly composed by Calvin) was in effect a defence of the reformed opinions, especially of the doctrine of justification by faith alone. It is to the period between April 1532 and November 1533, and in particular to the time of his second sojourn at Orleans, that we may most fittingly assign the great change in Calvin which he describes (Praef. ad Psalmos; opera xxxi. 21-24) as his "sudden con- version " and attributes to direct divine agency. It must have been at least after his Commentary on Seneca's De Clementia that his heart was " so subdued and reduced to docility that in comparison with his zeal for true piety he regarded all other studies with indifference, though not entirely forsaking them. Though himself a beginner, many flocked to him to learn the pure doctrine, and he began to seek some hiding-place and means of withdrawal from people." This indeed was forced upon him, for Cop's address was more than the conservative party could bear, and Cop, being summoned to appear before the parlement of Paris, found it necessary, as he failed to secure the support either of the king, or of the university, to make his escape to Basel. An attempt was at the same time made to seize Calvin, but, being forewarned of the design by his friends, he also made his escape. His room in the College Fortet, however, was searched, and his books and papers seized, to the imminent peril of some of his friends, whose letters were found in his repositories. He went to Noyon, but, proceedings against him being dropped, soon

returned to Paris. But desiring both security and solitude for study he left the city again about New Year of 1 534 and became the guest of Louis du Tillet, a canon of the cathedral, at Angouleme, where at the request of his host he prepared some short discourses, which were circulated in the surrounding parishes, and read in public to the people. Here, too in du Tillet's splendid library, he began the studies which resulted in his great work, the Institutes, and paid a visit to'Nerac, where the venerable Lefevre, whose revised translation of the Bible into French was published about this time, was spending his last years under the kindly care of Margaret of Navarre.

Calvin was now nearly twenty-five years of age, and in the ordinary way would have been ordained to the priesthood. Up till this time his work for the evangelical cause was not so much that of the public preacher or reformer as that of the retiring but influential scholar and adviser. Now, however, he had to decide whether, like Roussel and other of his friends, he should strive to combine the new doctrines with a position in the old church, or whether he should definitely break away from Rome. His mind was made up, and on the 4th of May he resigned his chaplaincy at Noyon and his rectorship at Pont l'Eveque. Towards the end of the same month he was arrested and suffered two short terms of imprisonment, the charges against him being not strong enough to be pressed. He seems to have gone next to Paris, staying perhaps with fitienne de la Forge, a Protestant merchant who suffered for his faith in February 153 5. To this time belongs the story of the proposed meeting between Calvin and the Spanish reformer Servetus. Calvin's movements at this time are difficult to trace, but he visited both Orleans and Poitiers, and each visit marked a stage in his development.

The Anabaptists of Germany had spread into France, and were disseminating many wild and fanatical opinions among those who had seceded from the Church of Rome. Among other notions which they had imbibed was that of a sleep of the soul after death. To Calvin this notion appeared so pernicious that he- composed a treatise in refutation of it, under the title of Psychopannychia. The preface to this treatise is dated Orleans 1534, but it was not printed till 1542. In it he chiefly dwells upon the evidence from Scripture in favour of the belief that the soul retains its intelligent consciousness after its separation from the body — passing by questions of philosophical speculation, as tending on such a subject only to minister to an idle curiosity. At Poitiers Calvin gathered round him a company of cultured and gentle men whom in private intercourse he influenced considerably. Here too in a grotto near the town he for the first time celebrated the communion in the Evangelical Church of France, using a piece of the

rock as a table.

The year 1534 was thus decisive for Calvin. From this time forward his influence became supreme, and all who had accepted the reformed doctrines in France turned to him for counsel and instruction, attracted not only by his power as a teacher, but still more, perhaps because they saw in him so full a develop- ment of the Christian life according to the evangelical model. Renan, no prejudiced judge, pronounces him ” the most Christian man of his time,” and attributes to this his success as a reformer. Certain it is that already he had becorne conspicuous as a prophet of the new religion; his life was in danger, and he was obliged to seek safety in flight. In company with his friend Louis du Tillet, whom he had again gone to Angouleme to visit, he set out for Basel. On their way they were robbed by one of their servants, and it was only by borrowing ten crowns from their other servant that they were enabled to get to Strassburg, and thence to Basel. Here Calvin was welcomed by the band of scholars and theologians who had conspired to make that city the Athens of Switzerland, and especially by Oswald Myconius, the chief pastor, Pierre Viret and Heinrich Bullinger. Under the aupices and guidance of Sebastian Minister, Calvin now gave himself to the study of Hebrew.

Francis I., desirous to continue the suppression of the Protest- ants but anxious, because of his strife with Charles V., not to break with the Protestant princes of Germany, instructed his ambassador to assure these princes that it was only against Anabaptists, and other parties who called in question all civil magistracy, that his severities were exercised. Calvin, indignant at the calumny which was thus cast upon the reformed party in France, hastily prepared for the press his Institutes of the Christian Religion, which he published ” first that I might vindicate from unjust affront my brethren whose death was precious in the sight of the Lord, and, next, that some sorrow and anxiety should move foreign peoples, since the same sufferings threatened many.” The work was dedicated to the king, and Calvin says he wrote it in Latin that it might find access to the learned in all lands. 1 Soon after it appeared he set about translating it into French, as he himself attests in a letter dated October 1536. This sets at rest a question, at one time much agitated, whether the book appeared first in French or in Latin. The earliest French edition known is that of 1540, and this was after the work had been much enlarged, and several Latin editions had appeared. In its first form the work consisted of only six chapters, and was intended merely as a brief manual of Christian doctrine. The chapters follow a traditional scheme of religious teaching: (1) The Law, (as in the Ten Words), (2) Faith (as

in the Apostles' Creed) (3) Prayer, (4) the Sacraments; to these were added (5) False Sacraments, (6) Christian liberty, ecclesiastical power and civil administration. The closing chapters of the work are more polemical than the earlier ones. His indebtedness to Luther is of course great, but his spiritual kinship with Martin Bucer of

1 This edition forms a small 8vo of 514 pages, and 6 pages of index. It appeared at Basel from the press of Thomas Platter and Balthasar Lasius in March 1536, and was published by Johann Oporin. The dedicatory preface is dated 23rd August 1535. It is a masterpiece of apologetic literature. See W. Walker, John Calvin, 132 f., and for an outline of the contents of the treatise, ib. 137-149.

Strassburg is even more marked. Something also he owed to Scotus and other medieval schoolmen. The book appeared anonymously, the author having, as he himself says, nothing in view beyond furnishing a statement of the faith of the persecuted Protestants, whom he saw cruelly cut to pieces by impious and perfidious court parasites. 1 In this work, though produced when the author was only twenty-six years of age, we find a complete outline of the Calvinist theological system. In none of the later editions, nor in any of his later works do we find reason to believe that he ever changed his views on any essential point from what they were at the period of its first publication. Such an instance of maturity of mind and of opinion at so early an age would be remarkable under any circumstances; but in Calvin's case it is rendered peculiarly so by the shortness of the time which had elapsed since he gave himself to theological studies. It may be doubted also if the history of literature presents us with another instance of a book written at so early an age, which has exercised such a prodigious influence upon the opinions and practices both of contemporaries and of posterity.

After a short visit (April 1 536) to the court of Renee, duchess of Ferrara (cousin to Margaret of Navarre), which at that time afforded an asylum to several learned and pious fugitives from persecution, Calvin returned through Basel to France to arrange his affairs before finally taking farewell of his native country. His intention was to settle at Strassburg or Basel, and to devote himself to study. But being unable, in consequence of the war between Francis I. and Charles V., to reach Strassburg by the ordinary route, he with his younger brother Antoine and his half-sister Marie journeyed to Lyons and so to Geneva,

making for Basel. In Geneva his progress was arrested, and his resolution to pursue the quiet path of studious research was dispelled by what he calls the ” formidable obtestation ” of Guillaume Farel. 2 After many struggles and no small suffering, this energetic spirit had succeeded in planting the evangelical standard at Geneva; and anxious to secure the aid of such a man as Calvin, he entreated him on his arrival to relinquish his design of going farther, and to devote himself to the work in that city. Calvin at first declined, alleging as an excuse his need of securing more time for personal improvement, but ultimately, believing that he was divinely called to this task and that ” God had stretched forth His hand upon me from on high to arrest me,” he consented to remain at Geneva. He hurried to Basel, transacted some business, and returned to Geneva in August 1536. He at once began to ex- pound the epistles of St Paul in the church of St Pierre, and after about a year was also elected preacher by the magistrates with the consent of the people, an office which he would not accept until it had been repeatedly pressed upon him. His services seem to have been rendered for some time gratuitously, for in February 1537 there is an entry in the city registers to the effect that six crowns had been voted to him, ” since he has as yet hardly received anything.”

Calvin was in his twenty-eighth year when he was thus constrained to settle at Geneva; and in this city the rest of his life, with the exception of a brief interval, was spent. The post to which he was thus called was not an easy one. Though the people of Geneva had cast off the obedience of Rome, it was largely a political revolt against the duke of Savoy, and they were still (says Beza) ” but very imperfectly enlightened in divine knowledge; they had as yet hardly emerged from the filth of the papacy.” 3 This laid them open to the incursions of those fanatical teachers, whom the excitement attendant upon the Reformation had called forth, and who hung mischievously upon the rear of the reforming body. To obviate the evils thence resulting, Calvin, in union with Farel, drew up a condensed statement of Christian doctrine consisting of twenty-one articles. This the citizens were summoned, in parties of ten each, to profess and swear to as the confession of their faith — a process which, though not in accordance with modern notions of the best way of establishing men in the faith, was gone through, Calvin tells us, ” with much satisfaction.” As the people took this oath

1 Praef. ad Psalmos. 2 Ibid.

3 Beza, Vit. Calv. an. 1536.

in the capacity of citizens, we may see here the basis laid for that

theocratic system which subsequently became peculiarly characteristic of the Genevan polity. Deeply convinced of the import- ance of education for the young, Calvin and his coadjutors were solicitous to establish schools throughout the city, and to enforce on parents the sending of their children to them; and as he had no faith in education apart from religious training, he drew up a catechism of Christian doctrine which the children had to learn whilst they were receiving secular instruction. Of the troubles which arose from fanatical teachers, the chief proceeded from the efforts of the Anabaptists; a public disputation was held on the 16th and 17th of March 1537, and so excited the populace that the Council of Two Hundred stopped it, declared the Anabaptists vanquished and drove them from the city. About the same time also, the peace of Calvin and his friends was much disturbed and their work interrupted by Pierre Caroli, another native of northern France, who, though a man of loose principle and belief, had been appointed chief pastor at Lausanne and was discrediting the good work done by Pierre Viret in that city. Calvin went to Viret's aid and brought Caroli before the com- missioners of Bern on a charge of advocating prayers for the dead as a means of their earlier resurrection. Caroli brought a counter-charge against the Geneva divines of Sabellianism and Arianism, because they would not enforce the Athanasian creed, and had not used the words " Trinity " and " Person " in the confession they had drawn up. It was a struggle between the thoroughgoing humanistic reformer who drew his creed solely from the " word of God " and the merely semi-Protestant reformer who looked on the old creed as a priceless heritage. In a synod held at Bern the matter was fully discussed, when a verdict was given in favour of the Geneva divines, and Caroli deposed from his office and banished. He returned to France, rejoined the Roman communion and spent the rest of his life in passing to and from the old faith and the new. Thus ended an affair which seems to have occasioned Calvin much more uneasi- ness than the character of his assailant, and the manifest false- hood of the charge brought against him, would seem to justify. Two brief anti-Romanist tracts, one entitled De fugiendis impiorum sacris, the other De sacerdotio papali abjiciendo, were also published early in this year.

Hardly was the affair of Caroli settled, when new and severer trials came upon the Genevan Reformers. The austere sim- plicity of the ritual which Farel had introduced, and to which Calvin had conformed; the strictness with which the ministers sought to enforce not only the laws of morality, but certain sumptuary regulations respecting the dress and mode of living of the citizens; and their determination in spiritual matters and ecclesiastical ceremonies not to

submit to the least dictation from the civil power, led to violent dissensions. Amidst much party strife Calvin perhaps showed more youthful impetuosity than experienced skill. He and his colleagues refused to ad- minister the sacrament in the Bernese form, i.e. with unleavened bread, and on Easter Sunday, 1538, declined to do so at all because of the popular tumult. For this they were banished from the city. They went first to Bern, and soon after to Zurich, where a synod of the Swiss pastors had been convened. Before this assembly they pleaded their cause, and stated what were the points on which they were prepared to insist as needful for the proper discipline of the church. They declared that they would yield in the matter of ceremonies so far as to employ un- leavened bread in the eucharist, to use fonts in baptism, and to allow festival days, provided the people might pursue their ordinary avocations after public service. These Calvin re- garded as matters of indifference, provided the magistrates did not make them of importance, by seeking to enforce them; and he was the more willing to concede them, because he hoped thereby to meet the wishes of the Bernese brethren whose ritual was less simple than that established by Farel at Geneva. But he and his colleagues insisted, on the other hand ˆthat for the proper maintenance of discipline, there should be a division of parishes — that excommunications should be permitted, and should be under the power of elders chosen by the council, in

conjunction with the clergy — that order should be observed in the admission of preachers — and that only the clergy should officiate in ordination by the laying on of hands. It was proposed also, as conducive to the welfare of the church, that the sacrament of the Lord's Supper should be administered more frequently, at least once every month, and that congregational singing of psalms should be practised in the churches. On these terms the synod interceded with the Genevese to restore their pastors; but through the opposition of some of the Bernese (especially Peter Kuntz, the pastor of that city) this was frustrated, and a second edict of banishment was the only response.

Calvin and Farel betook themselves, under these circumstances, to Basel, where they soon after separated, Farel to go to Neu- chatel and Calvin to Strassburg. At the latter place Calvin resided till the autumn of 1541, occupying himself partly in literary exertions, partly as a preacher and especially an organizer in the French church, and partly

as a lecturer on theology. These years were not the least valuable in his experience. In 1539 he attended Charles V.‘s conference on Christian reunion at Frankfort as the companion of Bucer, and in the following year he appeared at Hagenau and Worms, as the delegate from the city of Strassburg. He was present also at the diet at Regensburg, where he deepened his acquaintance with Melanchthon, and formed with him a friendship which lasted through life. He also did something to relieve the persecuted Protestants of France. It is to this period of his life that we owe a revised and enlarged form of his Institutes, his Commentary on the Epistle to the Romans, and his Tract on the Lord’s Supper. Notwithstand- ing his manifold engagements, he found time to attend to the tenderer affections; for it was during his residence at Strass- burg that he married, in August 1540, Idelette de Bure, the widow of one Jean Stordeur of Liege, whom he had converted from Anabaptism. In her Calvin found, to use his own words, ” the excellent companion of his life,” a ” precious help ” to him amid his manifold labours and frequent infirmities. She died in 1549, to the great grief of her husband, who never ceased to mourn her loss. Their only child Jacques, born on the 28th of July 1542, lived only a few days.

During Calvin’s absence disorder and irreligion had prevailed in Geneva. An attempt was made by Cardinal Jacopo Sadoleto (1477-1547), bishop of Carpentras, to take advantage of this so as to restore the papal supremacy in that district; but this design Calvin, at the request of the Bernese authorities, who had been consulted by those of Geneva, completely frustrated, by writing such a reply to the letter which the bishop had addressed to the Genevese, as constrained him to desist from all further efforts. The letter had more than a local or temporary reference. It was a popular yet thoroughgoing defence of the whole Protest- ant position, perhaps the best apologia for the Reformation that was ever written. He seems also to have kept up his connexion with Geneva by addressing letters of counsel and comfort to the faithful there who continued to regard him with affection. It was whilst he was still at Strassburg that there appeared at Geneva a translation of the Bible into French, bearing Calvin’s name, but in reality only revised and corrected by him from the version of Olivetan. Meanwhile the way was opening for his return. Those who had driven him from the city gradually lost power and office. Farel worked unceasingly for his recall. After much hesitation, for Strassburg had strong claims, he yielded and returned to Geneva, where he was received with the utmost enthusiasm (September 13, 1541). He entered upon his work with a firm determination to carry out those reforms which he had originally purposed, and to set up in all its

integrity that form of church polity which he had carefully matured during his residence at Strassburg. He now became the sole directive spirit in the church at Geneva. Farel was retained by the Neuchatelois, and Viret, soon after Calvin's return, re- moved to Lausanne. His duties were thus rendered exceedingly onerous, and his labour became excessive. Besides preaching every day in each alternate week, he taught theology three days in the week, attended weekly meetings of his consistory, read the Scriptures once a week in the congregation, carried on an

extensive correspondence on a multiplicity of subjects, prepared commentaries on the books of Scripture, and was engaged repeatedly in controversy with the opponents of his opinions. " I have not time," he writes to a friend, " to look out of my house at the blessed sun, and if things continue thus I shall forget what sort of appearance it has. When I have settled my usual business. I have so many letters to write, so many questions to answer, that many a night is spent without any offering of sleep being brought to nature."

It is only necessary here to sketch the leading events of Calvin's life after his return to Geneva. He recodified the Genevan laws and constitution, and was the leading spirit in the negotiations with Bern that issued in the treaty of February 1544. Of the controversies in which he embarked, one of the most important was that in which he defended his doctrine concerning predestination and election. His first antagonist on this head was Albert Pighius, a Romanist, who, resuming the controversy between Erasmus and Luther on the freedom of the will, violently attacked Calvin for the views he had expressed on that subject. Calvin replied to him in a work published in 1543, in which he defends his own opinions at length, both by general reasonings and by an appeal to both Scripture and the Fathers, especially Augustine. So potent were his reasonings that Pighius, though owing nothing to the gentleness or courtesy of Calvin, was led to embrace his views. A still more vexatious and protracted controversy on the same subject arose in 1551. Jerome Hermes Bolsec, a Carmelite friar, having renounced Romanism, had fled from France to Veigy, a village near Geneva, where he practised as a physician. Being a zealous opponent of predestinarian views, he expressed his criticisms of Calvin's teaching on the subject in one of the public con- ferences held each Friday. Calvin replied with much vehemence, and brought the matter before the civil authorities. The council were at a loss which course to take ; not that they doubted which of the disputants was right, for they all held by the views 'of Calvin, but they were unable to determine to what extent and in which way Bolsec should be punished for his heresy. The question was submitted to the

churches at Basel, Bern, Zurich and Neuchatel, but they also, to Calvin's disappointment, were divided in their judgment, some counselling severity, others gentle measures. In the end Bolsec was banished from Geneva ; he ultimately rejoined the Roman communion and in 1577 avenged himself by a particularly slanderous biography of Calvin. Another painful controversy was that with Sebastien Castellio (1515-1363), a teacher in the Genevan school and a scholar of real distinction. He wished to enter the preaching ministry but was excluded by Calvin's influence because he had criticized the inspiration of the Song of Solomon and the Genevan interpretation of the clause " he descended into hell." The bitterness thus aroused developed into life-long enmity. During all this time also the less strict party in the city and in the council did not cease to harry the reformer.

But the most memorable of all the controversies in which Calvin was engaged was that into which he was brought in 1553 with Michael Servetus (q.v.). After many wanderings, and after having been condemned to death for heresy at Vienne, whence he was fortunate enough to make his escape, Servetus arrived in August 1 553 at Geneva on his way to Naples. He was recognized in church and soon after, at Calvin's instigation, arrested. The charge of blasphemy was founded on certain statements in a book published by him in 1553, entitled Christi- anismi Restitutio, in which he animadverted on the Catholic doctrine of the Trinity, and advanced sentiments strongly savouring of Pantheism. The story of his trial is told elsewhere (see art. Servetus), but it must be noted here that the struggle was something more than a doctrinal one. The cause of Servetus was taken up by Calvin's Genevan foes headed by Philibert Berthelier, and became a test of the relative strength of the lival forces and of the permanence of Calvin's control. That Calvin was actuated by personal spite and animosity against Servetus himself may be open to discussion; we have his own express declaration that, after Servetus was convicted, he used no

urgency that he should be put to death, and at their last inter- view he told Servetus that he never had avenged private injuries, and assured him that if he would repent it would not be his fault if all the pious did not give him their hands. 1 There is the fact also that Calvin used his endeavour to have the sentence which had been pronounced against Servetus mitigated, death by burning being regarded by him as

an ” atrocity,” for which he sought to substitute death by the sword. 2 It can be justly charged against Calvin in this matter that he took the initiative in bringing on the trial of Servetus, that as his accuser he pro- secuted the suit against him with undue severity, and that he approved the sentence which condemned Servetus to death. When, however, it is remembered that the unanimous decision of the Swiss churches and of the Swiss state governments was that Servetus deserved to die; that the general voice of Christendom was in favour of this; that even such a man as Melanchthon affirmed the justice of the sentence; 3 that an eminent English divine of the next age should declare the process against him ” just and honourable,” 4 and that only a few voices here and there were at the time raised against it, many will be ready to accept the judgment of Coleridge, that the death of Servetus was not ” Calvin’s guilt especially, but the common opprobrium of all European Christendom.” 5

Calvin was also involved in a protracted and somewhat vexing dispute with the Lutherans respecting the Lord’s Supper, which ended in the separation of the evangelical party into the two great sections of Lutherans and Reformed, — the former holding that in the eucharist the body and blood of Christ are objectively and consubstantially present, and so are actually partaken of by the communicants, and the latter that there is only a virtual presence of the body and blood of Christ, and consequently only a spiritual participation thereof through faith. In addition to these controversies on points of faith, he was for many years greatly disquieted, and sometimes even endangered, by the opposition offered by the libertine party in Geneva to the ecclesiastical discipline which he had established there. His system of church polity was essentially theocratic ; it assumed that every member of the state was also under the discipline of the church; and he asserted that the right of exercising this discipline was vested exclusively in the consistory or body of preachers and elders. His attempts to carry out these views brought him into collision both with the authorities and with the populace, — the latter being not unnaturally restive under the restraints imposed upon their liberty by the vigorous system of church discipline, and the former being inclined to retain in their own hands a portion of that power in things spiritual which Calvin was bent on placing exclusively in the hands of the church rulers. His dauntless courage, his perseverance, and his earnestness at length prevailed, and he had the satisfaction, before he died, of seeing his favourite system of church polity firmly established, not only at Geneva, but in other parts of Switzerland, and of knowing that it had been adopted substantially by the Reformers in France and Scotland. The men whom he trained at Geneva carried his principles

into almost every country in Europe, and in varying degree these principles did much for the cause of civil liberty. 6 Nor was it only in religious matters that Calvin busied himself; nothing was indifferent to him that concerned the welfare and good order of the state or the advantage of its citizens. His work embraced everything; he was consulted on every affair, great and small, that came before the council, — on questions of law, police, economy, trade, and manufactures, no less than on questions of doctrine and church polity. To him the city owed her trade in cloths and velvets, from which so much wealth accrued to her

1 Fidelis Expositio Errorum Serveti, sub init. Calvini, Opp. t. ix.

2 Calvin to Farel, 20th Aug. 1553.

3 Tuo judicio prorsus assentior. Affirmo etiam vestros magi- stratus juste fecisse quod hominem blasphemum, re ordine judicata, interfecerunt. — Melanchthon to Calvin, 14th Oct. 1554.

4 Field On the Church, bk. iii. c. 27, vol. i. p. 288 (ed. Cambridge,

1847).

5 Notes on English Dromes, vol. i. p. 49. See also Table Talk, vol. ii. p. 282 (ed. 1835).'

6 W. Walker, John Calvin, pp. 403-8.

citizens; sanitary regulations were introduced by him which made Geneva the admiration of all visitors; and in him she reverences the founder of her university. This institution was in a sense Calvin's crowning work. It added religious education to the evangelical preaching and the thorough discipline already established, and so completed the reformer's ideal of a Christian commonwealth.

Amidst these multitudinous cares and occupations, Calvin found time to write a number of works besides those provoked by the various controversies in which he was engaged. The most numerous of these were of an exegetical character. Including discourses taken down from his lips by faithful auditors, we have from him expository comments or homilies on nearly all the books of Scripture, written partly in Latin and partly in French. Though naturally knowing nothing of the modern idea of a progressive revelation, his judiciousness, penetration, and tact in eliciting his author's meaning, his precision, condensation, and concinnity as an expositor, the accuracy of his learning, the closeness of his reasoning, and the elegance of his style,

all unite to confer a high value on his exegetical works. The series began with Romans in 1540 and ended with Joshua in 1564. In 1558-1559 also, though in very ill health, he finally perfected the Institutes.

The incessant and exhausting labours to which Calvin gave himself could not but tell on his fragile constitution. Amid many sufferings, however, and frequent attacks of sickness, he manfully pursued his course; nor was it till his frail body, torn by many and painful diseases — fever, asthma, stone, and gout, the fruits for the most part of his sedentary habits and unceasing activity — had, as it were, fallen to pieces around him, that his indomitable spirit relinquished the conflict. In the early part of the year 1 564 his sufferings became so severe that it was manifest his earthly career was rapidly drawing to a close. On the 6th of February of that year he preached his last sermon, having with great difficulty found breath enough to carry him through it. He was several times after this carried to church, but never again was able to take any part in the service. With his us.ual dis-interestedness he refused to receive his stipend, now that he was no longer able to discharge the duties of his office. In the midst of his sufferings, however, his zeal and energy kept him in continual occupation; when expostulated with for such un- seasonable toil, he replieď " Would you that the Lord should find me idle when He comes?" After he had retired from public labours he lingered for some months, enduring the severest agony without a murmur, and cheerfully attending to all the duties of a private kind which his diseases left him strength to discharge. On the 25th of April he made his will, on the 27th he received the Little Council, and on the 28th the Genevan ministers, in his sick-room; on the 2nd of May he wrote his last letter — to his old comrade Farel, who hastened from Neuchatel to see him once again. He spent much time in prayer and died quietly, in the arms of his faithful friend Theodore Beza, on the evening of the 27th of May, in the fifty-fifth year of his age. The next day he was buried without pomp " in the common cemetery called Plain-palais " in a spot not now to be identified.

Calvin was of middle stature; his complexion was somewhat pallid and dark; his eyes, to the latest clear and lustrous, bespoke the acumen of his genius. He was sparing in his food and simple in his dress; he took but little sleep, and was capable of extraordinary efforts of intellectual toil. He had a most retentive memory and a very keen power of observation. He spoke without rhetoric, simply, directly, but with great weight. He had many acquaintances but few close friends. His private character was in harmony with his public reputation and position. If somewhat severe and irritable, he was at the same time scrupulously just, truthful, and steadfast; he never deserted a friend or

took an unfair advantage of an antagonist; and on befitting occasions he could be cheerful and even facetious among his intimates. ” God gave him,” said the Little Council after his death, ” a character of great majesty.” ” I have been a witness of him for sixteen years,” says Beza, ” and I think I am fully entitled to say that in this man there was exhibited to all an

example of the life and death of the Christian, such as it will not be easy to depreciate, such as it will be difficult to emulate.”

Though Calvin built his theology on the foundations laid by earlier reformers, and especially by Luther and Bucer, his peculiar gifts of learning, of logic and of style made him pre-eminently the theologian of the new religion. The following may be regarded as his characteristic tenets, though not all are peculiar to him.

The dominant thought is the infinite and transcendent sovereignty of God, to know whom is the supreme end of human endeavour. God is made known to man especially by the Scriptures, whose writers were ” sure and authentic amanuenses of the Holy Spirit.” To the Spirit speaking therein the Spirit-illumined soul of man makes response. While God is the source of all good, man as a sinner is guilty and corrupt. The first man was made in the image and likeness of God, which not only implies man’s superiority to all other creatures, but indicates his original purity, integrity and sanctity. From this state Adam fell, and in his fall involved the whole human race descended from him. Hence depravity and corruption, diffused through all parts of the soul, attach to all men, and this first makes them obnoxious to the anger of God, and then comes forth in works which the Scripture calls works of the flesh (Gal. v. 19). Thus all are held vitiated and perverted in all parts of their nature, and on account of such corruption deservedly con- demned before God, by whom nothing is accepted save righteousness innocence, and purity. Nor is that a being bou’ndforanother’s offence ; for when it is said that we through Adam’s sin have become ob- noxious to the divine judgment, it is not to be taken as if we, being ourselves innocent and blameless, bear the fault of his offence, but that, we having been brought under a curse through his trans- gression, he is said to have bound us. From him, however, not only has punishment overtaken us, but a pestilence instilled from him resides in us, to which punishment is justly due. Thus even infants, whilst they bring their own condemnation with

them from their mother's womb, are bound not by another's but by their own fault. For though they have not yet brought forth the fruits of their iniquity, they have the seed shut up in them ; nay, their whole nature is a sort of seed of sin, therefore it cannot but be hateful and abomin- able to God (Instit. bk. ii. ch. i. sect. 8).

To redeem man from this state of guilt, and to recover him from corruption, the Son of God became incarnate, assuming man's nature into union with His own, so that in Him were two natures in one person. Thus incarnate He took on Him the offices of prophet, priest and king, and by His humiliation, obedience and suffering unto death, followed by His resurrection and ascension to heaven, He has perfected His work and fulfilled all that was required in a redeemer of men, so that it is truly affirmed that He has merited for man the grace of salvation (bk. ii. ch. 13-17). But until a man is in some way really united to Christ so as to partake of Him, the benefits of Christ's work cannot be attained by him. Now it is by the secret and special operation of the Holy Spirit that men are united to Christ and made members of His body. Through faith, which is a firm and certain cognition of the divine benevolence towards us founded on the truth of the gracious promise in Christ, men are by the operation of the Spirit united to Christ and are made partakers of His death and resurrection, so that the old man is crucified with Him and they are raised to a new life, a life of righteous- ness and holiness. Thus joined to Christ the believer has life in Him and knows that he is saved, having the witness of the Spirit that he is a child of God, and having the promises, the certitude of which the Spirit had before impressed on the mind, sealed by the same Spirit on the heart (bk. iii. ch. 33-36). From faith proceeds repentance, which is the turning of our life to God, proceeding from a sincere and earnest fear of God, and consisting in the mortification of the flesh and the old man within us and a vivification of the Spirit. Through faith also the believer receives justification, his sins are forgiven, he is accepted of God, and is held by Him as righteous, the righteousness of Christ being imputed to him, and faith being the instrument by which the man lays hold on Christ, so that with His righteousness the man appears in God's sight as righteous. This imputed righteousness, however, is not disjoined from real personal righteousness, for regeneration and sanctification come to the believer from Christ no less than justification; the two blessings are not to be confounded, but neither are they to be dis- joined. The assurance which the believer has of salvation he receives from the operation and witness of the Holy Spirit ; but this again rests on the divine choice of the man to salvation; and this falls back on God's eternal sovereign purpose, whereby He has predestined some to

eternal life while the rest of mankind are predestined to condemnation and eternal death. Those whom God has chosen to life He effectually calls to salvation, and they are kept by Him in progressive faith and holiness unto the end (bk. iii. passim). The external means or aids by which God unites men into the fellowship of Christ, and sustains and advances those who believe, are the church and its ordinances, especially the sacra- ments. The church universal is the multitude gathered from diverse nations, which though divided by distance of time and place, agree in one common faith, and it is bound by the tie of the same religion ; and wherever the word of God is sincerely preached, and the sacra- ments are duly administered, according to Christ's institute, there

beyond doubt is a church of the living God (bk. iv. ch. I, sect. 7-1 1). The permanent officers in the church are pastors and teachers, to the former of whom it belongs to preside over the discipline of the church, to administer the sacraments, and to admonish and exhort the members ; while the latter occupy themselves with the exposition of Scripture, so that pure and wholesome doctrine may be retained. With them are to be joined for the government of the church certain pious, grave and holy men as a senate in each church ; and to others, as deacons, is to be entrusted the care of the poor. The election of the officers in a church is to be with the people, and those duly chosen and called are to be ordained by the laying on of the hands of the pastors (ch. 3, sect. 4-16). The sacraments are two — Baptism and the Lord's Supper. Baptism is the sign of initiation whereby men are admitted into the society of the church and, being grafted into Christ, are reckoned among the sons of God; it serves both for the confirmation of faith and as a confession before men. The Lord's Supper is a spiritual feast where Christ attests that He is the life-giving bread, by which our souls are fed unto true and blessed immortality. That sacred communication of His flesh and blood whereby Christ transfuses into us His life, even as if it penetrated into our bones and marrow, He in the Supper attests and seals; and that not by a vain or empty sign set before us, but there He puts forth the efficacy of His Spirit whereby He fulfils what He promises. In the mystery of the Supper Christ is truly exhibited to us by the symbols of bread and wine ; and so His body and blood, in which He fulfilled all obedience for the obtaining of righteousness for us, are presented. There is no such presence of Christ in the Supper as that He is affixed to the bread or included in it or in any way circumscribed ; but whatever can express the true and sub- stantial communication of the body and blood of the Lord, which is exhibited to believers under the said symbols of the Supper, is to be received, and that not as perceived by

the imagination only or mental intelligence, but as enjoyed for the aliment of the eternal life (bk. iv. ch. 15, 17).

The course of time has substantially modified many of these positions. Even the churches which trace their descent from Calvin's work and faith no longer hold in their entirety his views on the magistrate as the preserver of church purity, the utter de- pravity of human nature, the non-human character of the Bible, the dealing of God with man. But his system had an immense value in the history of Christian thought. It appealed to and evoked a high order of intelligence, and its insistence on personal individual salvation has borne worthy fruit. So also its insistence on the chief end of man " to know and do the will of God " made for the strenuous morality that helped to build up the modern world. ' Its effects are most clearly seen in Scotland, in Puritan England and in the New England states, but its influence was and is felt among peoples that have little desire or claim to be called Calvinist.

Bibliography. — The standard edition of Calvin's works is that undertaken by the Strassburg scholars, J. W. Baum, E. Cunitz, E. Reuss, P. Lobstein, A. Erichson (59 vols., 1863-1900). The last of these contains an elaborate bibliography which was also published separately at Berlin in 1900. The bulk of the writings was published in English by the Calvin Translation Society (48 vols., Edinburgh, 1843-1855); the Institutes have often been translated. The early lives by Beza and Collodon are givan in the collected editions. Among modern biographies are those by P. Henry, Das Leben J. Calvins (3 vols., Hamburg, 1 835-1 844; Eng. trans, by H. Stebbing, London and New York, 1849); V. Audin, Histoire de la vie, des ouvrages, et des doctrines de Calvin (2 vols., Paris, 1841 ; Eng. trans, by J. McGill, London, 1843 and 1850) unfairly antagonistic; T. H. Dyer, Life of John Calvin (London, 1850); E. Stahelin, J oh. Calvin, Leben und ausgewahlte Schriften (2 vols., Elberfeld, 1863); F. W. Kampschulte, Joh. Calvin, seine Kirche und sein Staat in Genf (2 vols., 1869, 1899, unfinished); Abel Lefranc, La Jeunesse de Calvin (Paris, 1888); E. Choisy, La Theocratie a Geneve au temps de Calvin (Geneva, 1897) ; E. Doumergue, Jean Calvin; les homines et les choses de son temps (5 vols., 1899-1908). See also A. M. Fair- bairn, " Calvin and the Reformed Church " in the Cambridge Modern History, vol. ii. (1904); P. Schaff's, History of the Christian Church, vol. vii. (1892), and R. Stahelin's article in Hauck-Herzog's Real- encyk. fiir prot. Theologie und Kirche. Each of these contains a useful bibliography, as also does the excellent life by Professor Williston Walker, John Calvin, the Organizer of Reformed Protes- tantism, " Heroes of the Reformation " series (1906). See also C. S. Home in Mansfield Coll. Essays (1909).

(W. L. A.; A. J. G.)

CALVINISTIC METHODISTS, a body of Christians forming a church of the Presbyterian order and claiming to be the only denomination in Wales which is of purely Welsh origin. Its beginnings may be traced to the labours of the Rev. Griffith Jones (1684-1761), of Llanddowror, Carmarthenshire, whose sympathy for the poor led him to set on foot a system of circu- lating charity schools for the education of children. In striking contrast to the general apathy of the clergy of the period, Oriffrth Jones's 7xal appealed to the public imagination, and bis powerful preaching exercised a widespread influence, many

travelling long distances in order to attend his ministry. There was thus a considerable number of earnest people dispersed throughout the country waiting for the rousing of the parish clergy. An impressive announcement of the Easter Communion Service, made by the Rev. Pryce Davies, vicar of Talgarth, on the 30th of March 1735, was the means of awakening Howell Harris (1714-1773) of Trevecca, and he immediately began to hold services in his own house. He was soon invited to do the same at the houses of others, and ended by becoming a fiery itinerant preacher, stirring to the depths every neighbour- hood he visited. Griffith Jones, preaching at Llanddewi Brefi, Cardiganshire — the place at which the Welsh Patron Saint, David, first became famous — found Daniel Rowland (17 13-1790), curate of Llangeitho, in his audience, and his patronizing attitude in listening drew from the preacher a personal supplication on his behalf, in the middle of the discourse. Rowland was deeply moved, and became an ardent apostle of the new movement. Naturally a fine orator, his new-born zeal gave an edge to his eloquence, and his fame spread abroad. Rowland and Harris had been at work fully eighteen months before they met, at a service in Devynock church, in the upper part of Breconshire. The acquaintance then formed lasted to the end of Harris's life — an interval of ten years excepted. Harris had been sent to Oxford in the autumn of 1735 to " cure him of his fanaticism," but he left in the following February. Rowland had never been to a university, but, like Harris, he had been well grounded in general knowledge. About 1739 another prominent figure appeared. This was Howell Davies of Pembrokeshire, whose ministry was modelled on that of his master, Griffith Jones, but with rather more clatter in his thunder.

In 1736, on returning home, Harris opened a school, Griffith Jones

supplying him with books from his charity. He also set up societies, in accordance with the recommendations in Josiah Wedgwood's little book on the subject; and these exercised a great influence on the religious life of the people. By far the most notable of Harris's converts was William Williams (17 17- 1791), Panty Celyn, the great hymn-writer of Wales, who while listening to the revivalist preaching on a tombstone in the graveyard of Talgarth, heard the " voice of heaven," and was " apprehended as by a warrant from on high." He was ordained deacon in the Church of England, 1740, but Whitefield recom- mended him to leave his curacies and go into the highways and hedges. On Wednesday and Thursday, January 5th and 6th, 1743, the friends of aggressive Christianity in Wales met at Wadford, near Caerphilly, Glam., in order to organize their societies. George Whitefield was in the chair. Rowland, Williams and John Powell — afterwards of Llanmartin — (clergymen), Harris, John Humphreys and John Cennick (laymen) were present. Seven lay exhorters were also at the meetings; they were questioned as to their spiritual experience and allotted their several spheres; other matters pertaining to the new conditions created by the revival were arranged. This is known as the first Methodist Association — held eighteen months before Johm Wesley's first conference (June 25th, 1744). Monthly meetings covering smaller districts, were organized to consider local matters, the transactions of which were to be reported to the Quarterly Association, to be confirmed, modified, or rejected. Exhorters were divided into two classes — public, who were allowed to itinerate as preachers and superintend a number of societies; private, who were confined to the charge of one or two societies. The societies were distinctly understood to be part of the established church, as Wedgwood's were, and every attempt at estranging them therefrom was sharply reproved; but persecution made their position anomalous. They did not accept the discipline of the Church of England, so the plea of Conformity was a feeble defence; nor had they taken out licenses, so as to claim the protection of the Toleration Act. Harris's ardent loyalty to the Church of England, after three refusals to ordain him, and his personal contempt for ill-treatment from persecutors, were the only things that prevented separation.

A controversy on a doctrinal point — " Did God die on Calvary? " — raged for some time, the principal disputants

being Rowland and Harris; and in 1751 it ended in an open rupture, which threw the Connexion first into confusion and then into a state of coma. The societies split up into Harrisites and Rowlandites, and it was only with the revival of 1762 that the breach was fairly repaired. This revival is a landmark in the history of the Connexion. Williams of

Pant y Celyn had just published a little volume of hymns, the singing of which inflamed the people. This led the bishop of St David's to suspend Rowland's license, and Rowland had to confine himself to a meeting-house at Llangeitho. Having been turned out of other churches, he had leased a plot of land in 1759, anticipating the final withdrawal of his license, in 1763, and a spacious building was erected to which the people crowded from all parts on Sacrament Sunday. Llangeitho became the Jerusalem of Wales; and Rowland's popularity never waned until his physical powers gave way. A notable event in the history of Welsh Methodism was the publication in 1770, of a 4to annotated Welsh Bible by the Rev. Peter Williams, a forceful preacher, and an indefatigable worker, who had joined the Methodists in 1746, after being driven from several curacies. It gave birth to a new interest in the Scriptures, being the first definite commentary in the language. A powerful revival broke out at Llangeitho in the spring of 1780, and spread to the south, but not to the north of Wales. The ignorance of the people of the north made it very difficult for Methodism to benefit from these manifestations, until the advent of the Rev. Thomas Charles (1755-1814), who, having spent five years in Somersetshire as curate of several parishes, returned to his native land to marry Sarah Jones of Bala. Failing to find employment in the established church, he joined the Methodists in 1784. His circulating charity schools and then his Sunday schools gradually made the North a new country. In 1791 a revival began at Bala; and this, strange to say, a few months after the Bala Association had been ruffled by the proceedings which led to the expulsion of Peter Williams from the Connexion, in order to prevent him from selling John Canne's Bible among the Methodists, because of some Sabellian marginal notes.

In 1790, the Bala Association passed " Rules regarding the proper mode of conducting the Quarterly Association," drawn up by Charles; in 1801, Charles and Thomas Jones of Mold, published (for the association) the " Rules and Objects of the Private Societies among the People called Methodists." About 1795, persecution led the Methodists to take the first step towards separation from the Church of England. Heavy fines made it impossible for preachers in poor circumstances to continue without claiming the protection of the Toleration Act, and the meeting-houses had to be registered as dissenting chapels. In a large number of cases this had only been delayed by so con- structing the houses that they were used both as dwellings and as chapels at one and the same time. Until 181 1 the Calvin* istic Methodists had no ministers ordained by themselves; their enormous growth in numbers and the scarcity of ministers to administer the Sacrament — only three in North Wales, two of whom had joined only at the dawn

of the century — made the question of ordination a matter of urgency. The South Wales clergy who regularly itinerated were dying out; the majority of those remaining itinerated but irregularly, and were most of them against the change. The lay element, with the help of Charles and a few other stalwarts, carried the matter through — ordaining nine at Bala in June, and thirteen at Llandilo in August. In 1823, the Confession of Faith was published; it is based on the Westminster Confession as " Calvinistically construed," and contains 44 articles. The Connexion's Constitutional Deed was formally completed in 1826.

Thomas Charles had tried to arrange for taking oyer Trevecca College when the trustees of the Countess of Huntingdon's Connexion removed their seminary to Cheshunt in 1791 ; but the Bala revival broke out just at the time, and, when things grew quieter, other matters pressed for attention. A college had been mooted in 1816, but the intended tutor died suddenly, and the matter was for the tim« dropped. Candidates for the Connex- ional ministry were compelled to shift for themselves until 1837,

when Lewis Edwards (1809-1887) and David Charles (1812- 1878) opened a school for young men at Bala. North and South alike adopted it as their college, the associations contributing a hundred guineas each towards the education of their students. In 1842, the South Wales Association opened a college at Trevecca, leaving Bala to the North; the Rev. David Charles became principal of the former, and the Rev. Lewis Edwards of the latter. After the death cf Dr Lewis Edwards, Dr. T. C. Edwards resigned the principalship of the University College at Aberystwyth to become head of Bala (1801), now a purely theological college, the students of which were sent to the university colleges for their classical training. In 1905 Mr David Da vies of Llandinam — one of the leading laymen in the Connexion — offered a large building at Aberystwyth as a gift to the denomination for the purpose of uniting North and South in one theological college; but in the event of either association declining the proposal, the other was permitted to take possession, giving the association that should decline the option of joining at a later time. The Association of the South accepted, and that of the North declined, the offer; Trevecca College was turned into a preparatory school on the lines of a similar institution set up at Bala in 1891.

The missionary collections of the denomination were given to the

London Missionary Society from 1798 to 1840, when a Connexional Society was formed; and no better instances of missionary enterprise are known than those of the Khasia and Jaintia Hills, and the Plains of Sylhet in N. India. There has also been a mission in Brittany since 1842.

The constitution of the denomination (called in Welsh, ” Hen Gorph,” i.e. the Old Body) is a mixture of Presbyterianism and Congregationalism; each church manages its own affairs and reports (1) to the district meeting, (2) to the monthly meeting, the nature of each report determining its destination. The monthly meetings are made up of all the officers of the churches comprised in each, and are split up into districts for the purpose of a more local co-operation of the churches. The monthly meetings appoint delegates to the quarterly Associations, of which all officers are members. The Associations of North and South are distinct institutions, deliberating and determining matters pertaining to them in their separate quarterly gatherings. For the purpose of a fuller co-operation in matters common to both, a general assembly (meeting once a year) was established in 1864. This is a purely deliberative conclave, worked by committees, and all its legislation has to be confirmed by the two Associations before it can have any force or be legal. The annual conference of the English churches of the denomination has no legislative standing, and is meant for social and spiritual intercourse and discussions.

In doctrine the church is Calvinistic, but its preachers are far from being rigid in this particular, being warmly evangelical, and, in general, distinctly cultured. The London degree largely figures on the Connexional Diary; and now the Welsh degrees, in arts and divinity, are being increasingly achieved. It is a remarkable fact that every Welsh revival, since 1735, has broken out among the Calvinistic Methodists. Those of 1735, 1762, 1780 and 1791 have been mentioned; those of 1817, 1832, 1859 and 1904-1905 were no less powerful, and their history is inter- woven with Calvinistic Methodism, the system of which is so admirably adapted for the passing on of the torch. The minis- terial system is quite anomalous. It started in pure itineracy; the pastorate came in very gradually, and is not yet in universal acceptance. The authority of the pulpit of any individual church is in the hands of the deacons; they ask the pastor to supply so many Sundays a year — from twelve to forty, as the case may be — and they then fill the remainder with any preacher they choose. The pastor is” paid for his pastoral work, and receives his Sunday fee just as a stranger does; his Sundays from home he fills up at the request of deacons of other churches, and it is a breach of connexional etiquette for aminister to apply for engage- ments, no

matter how many unfilled Sundays he may have. Deacons and preachers make engagements seven or eight years in advance. The Connexion provides for English residents

wherever required, and the English ministers are oftener in their own pulpits than their Welsh brethren.

The Calvinistic Methodists form in some respects the strongest church in Wales, and its forward movement, headed by Dr. John Pugh of Cardiff, has brought thousands into its fold since its establishment in 1891. Its Connexional Book Room, opened in 1891, yields an annual profit of from £1600 to £2000, the profits being devoted to help the colleges and to establish Sunday school libraries, etc. Its chapels in 1907 numbered 1641 (with accommodation for 488,080), manses 229; its churches 1 num- bered 1428, ministers 921, unordained preachers 318, deacons 6179; its Sunday Schools 1731, teachers 27,895, scholars 193,460, communicants 189,164, total collections for religious purposes £300,912. The statistics of the Indian Mission are equally good: communicants 8027, adherents 26,787, missionaries 23, native ministers (ordained) 15, preachers (not ordained) 60.

The Calvinistic Methodists are intensely national in sentiment and aspirations, beyond all suspicion loyalists. They take a great interest in social, political and educational matters, and are prominent on public bodies. They support the Eisteddfod as the promoter and inspirer of arts, letters and music, and are con- spicuous among the annual prize winners. They thus form a living, democratic body, flexible and progressive in its movements, yet with a sufficient proportion of conservatism both in religion and theology to keep it sane and safe. (D. E. J.)

CALVISIUS, SETHUS (1556-1615), German chronologer, was born of a peasant family at Gorschleben in Thuringia on the 21st of February 1556. By the exercise of his musical talents he earned money enough for the start, at Helmstadt, of an university career, which the aid of a wealthy patron enabled him to continue at Leipzig. He became director of the music-school at Pforten in 1572, was transferred to Leipzig in the same capacity in 1594, and retained this post until his death on the 24th of November 1615, despite the offers successively made to him of mathematical professorships at Frankfort and Wittenberg . In his Opus Chronologicum (Leipzig, 1605, 7th ed. 1685) he expounded a system based on the records of nearly 300 eclipses. An ingenious, though ineffective, proposal for the reform of the calendar was put forward in his Elenchus Calendarii Gregoriani (Frankfort, 161 2); and he published a book on music, Melodiae

condendae ratio (Erfurt, 1592), still worth reading.

For details see V. Schmuck's Leichenrede (1615); J. Bertuch's Chronicon Portense (1739); F. W. E. Rost's Oratio ad renovendam S. Calvisii memoriam (1805); J. G. Stallbaum's Nachrichten iiber die Cantoren an der Thomasschule (1842); Allgemeine Deutsche Biographie; Poggendorff's Biog.-Litterarisches Handworterbuch.

CALVO, CARLOS (1 824-1 906), Argentine publicist and historian, was born at Buenos Aires on the 26th of February 1824, and devoted himself to the study of the law. In i860 he was sent by the Paraguayan government on a special mission to London and Paris. Remaining in France, he published in 1 863 his Der echo international teorico y practico de Europa y America, in two volumes, and at the same time brought out a French version. The book immediately took rank as one of the highest modern authorities on the subject, and by 1887 the first French edition had become enlarged to six volumes. Sefior Calvo's next publications were of a semi-historical character. Between 1862 and 1869 he published in Spanish and French his great collection in fifteen volumes of the treaties and other diplomatic acts of the South American republics, and between 1864 and 1875 his Annates historiques de la revolution de V Amirique latine, in five volumes. In 1884 he was one of the founders at the Ghent congress of the Institut de Droit International. In the following year he was Argentine minister at Berlin, and published his Dictionnaire du droit international public et prive in that city, Calvo died in May 1906 at Paris.

CALW or Kalw, a town of Germany, in the kingdom of Wurttemberg, on the Nagold, 34 m. S.W. of Stuttgart by rail. Pop. (1905), 4943. It contains a Protestant and a Roman Catholic Church, two schools, missionary institution, and a fine

1 Adherents and members in scattered hamlets and attending different meeting-houses or chapels, often combine to form one society or church.

public library. The industries include spinning and weaving operations in wool and cotton. Carpets, cigars and leather are also manufactured. The timber trade, chiefly with the Nether- lands, is important. The place is in favour as a health resort.

The name of Calw appears first in 1037. In the middle ages the town

was under the dominion of a powerful family of counts, whose possessions finally passed to Wiirttemberg in 1345. In 1634 the town was taken by the Bavarians, and in 1692 by the French.

CALYDON (Ka\vScov), an ancient town of Aetolia, according to Pliny, 75 Roman m. from the sea, on the river Euenus. It was said to have been founded by Calydon, son of Aetolus; to have been the scene of the hunting, by Meleager and other heroes, of the famous Calydonian boar, sent by Artemis to lay waste the fields; and to have taken part in the Trojan war. In historical times it is first mentioned (391 B.C.) as in the possession of the Achaeans, who retained it for twenty years, by the assistance of the Lacedaemonian king, Agesilaus, notwithstanding the attacks of the Arcarnanians. After the battle of Leuctra (371 B.C.) it was restored by Epaminondas to the Aetolians. In the time of Pompey it was a town of importance; but Augustus removed its inhabitants to Nicopolis, which he founded to commemorate his victory at Actium (31 B.C.). The wallsof Calydon are almost certainly to be recognized in the Kastro of Kurtaga. These comprise a circuit of over 2 m., with one large gate and five smaller ones, and are situated on a hill on the right or west bank of the Euenus. Remains of large terrace walls outside the town probably indicate the position of the temple of Artemis Laphria, whose gold and ivory statue was transferred to Patras, together probably with her ritual. This included a sacrifice in which all kinds of beasts, wild and tame, were driven into a wooden pyre and consumed.

See W. M. Leake, Travels in N. Greece, i. p. 109, iii. pp. 533 sqq. ; W. J. Woodhouse, Aetolia, pp. 95 sqq. (E. Gr.)

CALYPSO, in Greek mythology, daughter of Atlas (or Oceanus, or Nereus), queen of the mythical island of Ogygia. When Odysseus was shipwrecked on her shores, Calypso entertained the hero with great hospitality, and prevailed on him to remain with her seven years. Odysseus was then seized with a longing to return to his wife and home; Calypso's promise of eternal youth failed to induce him to stay, and Hermes was sent by Zeus to bid her release him. When he set sail, Calypso died of grief. (Homer, Odyssey, i. 50, v. 28, vii. 254; Apollodorus i. 2, 7.)

CAM (CAO), DIOGO (fl. 1480-1486), Portuguese discoverer, the first European known to sight and enter the Congo, and to explore the West African coast between Cape St Catherine (2°S.) and Cape Cross (21 50′ S.) almost from the equator to Walfish Bay. When King John II. of Portugal revived the work of Henry the Navigator, he sent out Cam (about midsummer (?) 1482) to open up the African coast still

further beyond the equator. The mouth of the Congo was now discovered (perhaps in August 1482), and marked by a stone pillar (still existing, but only in fragments) erected on Shark Point; the great river was also ascended for a short distance, and intercourse was opened with the natives. Cam then coasted down along the present Angola (Portuguese West Africa), and erected a second pillar, probably marking the termination of this voyage, at Cape Santa Maria (the Monte Negro of these first visitors) in 13 26′ S. He certainly returned to Lisbon by the beginning of April 1484, when John II. ennobled him, made him a cavalleiro of his house- hold (he was already an escudeiro or esquire in the same), and granted him an annuity and a coat of arms (8th and 14th of April 1484). That Cam, on his second voyage of 1483-1486, was accompanied by Martin Behaim (as alleged on the latter's Nuremberg globe of 1492) is very doubtful; but we know that the explorer revisited the Congo and erected two more pillars beyond the furthest of his previous voyage, the first at another " Monte Negro " in 15° 41′ S., the second at Cape Cross in 2i c 50', this last probably marking the end of his progress southward. According to one authority (a legend on the 1489 map of Henricus Martellus Germanus), Cam died off Cape Cross; but Joao de Barros and others make him return to the Congo,

and take thence a native envoy to Portugal. The four pillars set up by Cam on his two voyages have all been discovered in situ, and the inscriptions on two of them from Cape Santa Maria and Cape Cross, dated 1482 and 1485 respectively, are still to be read and have been printed; the Cape Cross padrao is now at Kiel (replaced on the spot by a granite facsimile) ; those from the Congo estuary and the more southerly Monte Negro are in the Museum of the Lisbon Geographical Society.

See Barros, Decadas da Asia, Decade i. bk. iii., esp. ch. 3; Ruy de Pina, Chronica d' el Ret D. Joao II. ; Garcia de Resende, Chronica ; Luciano Cordeiro, " Diogo Cao " in Eoletim of the Lisbon Geog. Soc, 1892; E; G. Ravenstein, "Voyages of Diogo Cao," &c, in Geog. Jnl. vol. xvi. (1900) ; also Geog. Jnl. xxxi. (1908). (C. R. B.)

CAMACHO, JUAN FRANCISCO (1824-1896), Spanish states- man and financier, Was born in Cadiz in 1824. The first part of his life was devoted to mercantile and financial pursuits at Cadiz and then in Madrid, where he managed the affairs of and liquidated a mercantile and industrial society to the satisfaction and profit of the shareholders. In 1837 he became a captain in the national militia, in 1852 Conservative deputy in the Cortes for Alcoy, in 1853 secretary of congress, and was afterwards elected ten times deputy, twice senator

and life senator in 1877. Camacho took a prominent part in all financial debates and committees, was offered a seat in the Mon cabinet of 1864, and was appointed under-secretary of state finances in 1866 under Canovas and O'Donnell. After the revolution of 1868 he declined the post of minister of finance offered by Marshal Serrano, but served in that capacity in 1872 and 1874 in Sagasta's cabinets. When the restoration took place, Camacho sat in the Cortes among the dynastic Liberals with Sagasta as leader, and became finance minister in 1881 at a critical moment when Spain had to convert, reduce, and consolidate her treasury and other debts with a view to resuming payment of coupons. Camacho drew up an excellent budget and collected taxation with a decidedly unpopular vigour. A few years later Sagasta again made him finance minister under the regency of Queen Christina, but had to sacrifice him when public opinion very clearly pronounced against his too radical financial reforms and his severity in collection of taxes. He was for the same reasons unsuccessful as a governor of the Tobacco Monopoly Company. He then seceded from the Liberals, and during the last years of his life he affected to vote with the Conservatives, who made him governor of the Bank of Spain. He died in Madrid on the 23rd of January 1896. (A. E. H.)

CAMALDULIANS, or Camaldolese, a religious order founded by St Romuald. Born of a noble family at Ravenna c. 950, he- retired at the age of twenty to the Benedictine monastery of S. Apollinare in Classe; but being strongly drawn to the ere- mitical life, he went to live with a hermit in the neighbourhood of Venice and then again near Ravenna. Here a colony of hermits grew up around him and he became the superior. As soon as they were established in their manner of life, Romuald moved to another district and there formed a second settlement of hermits, only to proceed in the same way to the establishment of other colonies of hermits or " deserts " as they were called. In this way during the course of his life Romuald formed a great number of " deserts " throughout central Italy. His chief foundation was at Camaldoli on the heights of the Tuscan Apennines not far from Arezzo, in a vale snow-covered during half the year. Romuald's idea was to reintroduce into the West the primitive eremitical form of monachism, as practised by the first Egyptian and Syrian monks. His monks dwelt in separate huts around the oratory, and came together only for divine service and on certain days for meals. The life was one of extreme rigour in regard to food, clothing, silence and general observance. Besides the hermits there were lay brothers to help in carrying out the field work and rougher occupations. St Romuald and the early Camaldolese exercised

considerable influence on the religious movements of their. time; the emperors Otto III. and Henry II. esteemed him highly and sought his advice on religious questions. Disciples of St Romuald went on missions to the still heathen parts of Russia, Poland and Prussia, where some of them suffered martyrdom. In his extreme old age St Romuald with twenty-five

of his monks started on a missionary expedition to Hungary, but he was unable to accomplish the journey. He died in 1027. After his death mitigations were gradually introduced into the rule and manner of life; and in the monastery of St Michael in Murano, Venice, the life became cenobitical. From that time to the present day there have always been both eremitical and cenobitical Camaldolese, the latter approximating to ordinary Benedictine life. The Camaldolese spread all over Italy, and into Germany, Poland and France. Camaldoli itself exists as a ” desert,” the primitive observance of the institute being strictly maintained. There are a few other ” deserts,” all in Italy, except one in Poland; and there are about 90 hermits. The chief monastery of the cenobitical Camaldolese is S. Gregorio on the Caelian Hill in Rome; they number less than forty. Since the nth-century there have been Camaldolese nuns; at present there are five nunneries with 150 nuns, all belonging to the cenobitical branch of the order. The habit of the Camaldulians is white.

See Helyot, Hist, des ordres religieux (1792) v. cc. 21-25; Max Heimbucher, Orden und Kongregationen (1896) i. § 29; and the art. ” Camaldulenser ” in Wetzer and Welte, Kirchenlexikon (2nd ed.), and Herzog, Realencyklopddie (3rd ed.). (E. C. B.)

CAMARGO, MARIE ANNE DE CUPIS DE (1710-1770), French dancer, of Spanish descent, was born in Brussels on the 15th of April 1710. Her father, Ferdinand Joseph de Cupis, earned a scanty living as violinist and dancing-master, and from childhood she was trained for the stage. At ten years of age she was given lessons by Mile Francoise Prevost (1680-1741), then the first dancer at the Paris Opera, and at once obtained an engagement as premiere danseuse, first at Brussels and then at Rouen. Under her grandmother’s family name of Camargo she made her Paris dibut in 1726, and at once became the rage. Every new fashion bore her name; her manner of doing her hair was copied by all at court; her shoemaker — she had a tiny foot — made his fortune. She had many titled adorers whom she nearly ruined by her

extravagances, among others Louis de Bourbon, comte de Clermont. At his wish she retired from the stage from 1736 to 1741. In her time she appeared in seventy-eight ballets or operas, always to the delight of the public. She was the first ballet-dancer to shorten the skirt to what afterwards became the regulation length. There is a charming portrait of her by Nicolas Lancret in the Wallace collection, London.

CAMARGUE {Insula Camaria), a thinly-populated region of southern France contained wholly in the department of Bouches- du-Rhone, and comprising the delta of the Rhone. The Camargue is a marshy plain of alluvial formation enclosed between the two branches of the river, the Grand Rhone to the east and the Petit Rhone to the west. Its average elevation is from 6| to 8 ft. The Camargue has a coast-line some 30 m. in length and an area of 290 sq. m., of which about a quarter consists of cultivated and fertile land. This is in the north and on the banks of the rivers. The rest consists of rough pasture grazed by the black bulls and white horses of the region and by large flocks of sheep, or of marsh, stagnant water and waste land impregnated with salt. The region is inhabited by flocks of flamingoes, bustards, partridge, and by sea-birds of various kinds. The Etang de Vaccares, the largest of the numerous lagoons and pools, covers about 23 sq. m. ; it receives three main canals con- structed to drain off the minor lagoons. The Camargue is protected by dikes from the inundations both of the sea and of the rivers. Inlets in the sea-dike let in water for the purposes of the lagoon fisheries and the salt-pans; and the river- water is used for irrigation and for the submersion of vines. The climate is characterized by hard winters and scorching summers. Rain falls in torrents, but at considerable intervals. The mistral, blowing from the north and north-west, is the prevailing wind. The south-eastern portion of the Camargue is known as the He du Plan du Bourg. A secondary delta to the west of the Petit Rhone goes by the name of Petite Camargue.

CAMARINA, an ancient city of Sicily, situated on the south coast, about 17 m. S.E. of Gela (Terranova). It was founded by Syracuse in 599 B.C., but destroyed by the mother city ih 552 for Attempting to assert its independence. Hippocrates of Gtela

received its territory from Syracuse and restored the town in 492, but it was destroyed by Gelon in 484; the Geloans, however, founded it anew in 461. It seems to have been in general hostile to Syracuse, but, though an ally of Athens in 427, it gave some slight help to Syracuse in 415-413. It was destroyed by the Carthaginians in 405, restored by Timoleon in 339 after its abandonment by Dionysius's order, but in 258 fell into the hands of the Romans. Its complete destruction dates

from a.d. 853. The site of the ancient city is among rapidly shifting sandhills, and the lack of stone in the neighbourhood has led to its buildings being used as a quarry even by the inhabitants of Terranova, so that nothing is now visible above ground but a small part of the wall of the temple of Athena and a few founda- tions of houses; portions of the city wall have been traced by excavation, and the necropolis has been carefully explored (see J. Schubring in Philologus, xxxii. 490; P. Orsi in Monumenti dei Lined, ix. 201, 1899; xiv. 756, 1904). To the north lay the lake to which the answer of the Delphic oracle referred, jui) Kivti Kanaptvav, when the citizens inquired as to the advisability of draining it.

CAMBACERES, JEAN JACQUES REGIS DE, duke of Parma (1753-1824), French statesman, was born at Montpellier on the 18th of October 1753. He was descended from a well-known family of the legal nobility (noblesse de la robe). He was designed for the magistracy of his province; and in 1771, when for a time the provincial parlement was suppressed, with the others, by the chancellor Maupeou, he refused to sit in the royal tribunal substituted for it. He continued, however, to study law with ardour, and in 1774 succeeded his father as councillor in the court of accounts and finances of his native town. Espousing the principles of the Revolution in 1789, he was commissioned by the noblesse of the province to draw up the cahier (statement of principles and grievances); and the senechausste of Montpellier elected him deputy to the states-general of Versailles; but the election was annulled on a technical point. Nevertheless in 1792 the new department of Herault, in which Montpellier is situated, sent him as one of its deputies to the Convention which assembled and proclaimed the Republic in September 1792. In the strife which soon broke out between the Girondins and the Jacobins he took no decided part, but occupied himself mainly with the legal and legislative work which went on almost without intermission even during the Terror. The action of Cambaceres at the time of the trial of Louis XVI. (December 25, 1792-January 20, 1793) was characteristic of his habits of thought. At first he protested against the erection of the Convention into a tribunal in these words: ” The people has chosen you to be legislators; it has not appointed you as judges.” He also demanded that the king should have due facilities for his defence. Nevertheless, when the trial proceeded, he voted with the majority which declared Louis to be guilty, but recommended that the penalty should be postponed until the cessation of hostilities, and that the sentence should then be ratified by the Convention or by some other legislative body. It is therefore inexact to count him among the regicides, as was done by

the royalists after 1815. Early in 1793 he became a member of the Committee of General Defence, but he did not take part in the work of its more famous successor, the Committee of Public Safety, until the close of the year 1794. In the meantime he had done much useful work, especially that of laying down, conjointly with Merlin of Douai, the principles on which the legislation of the revolutionary epoch should be codified. At the close of 1794 he also used his tact and eloquence on behalf of the restoration of the surviving Girondins to the Convention, from which they had been driven by the coup d'Uat of the 31st of May 1793. In the course of the year 179s, as president of the Committee of Public Safety, and as responsible especially for foreign affairs, he was largely instrumental in bringing about peace with Spain. Never- theless, not being a regicide, he was not appointed to be one of the five Directors to whom the control of public • affairs was entrusted after the Coup d'ttat of Vendemiaire 1795; but, as before, his powers of judgment and of tactful debating soon carried him to the front in the council of Five Hundred. Th«

moderation of his views brought him into opposition to the Directors after the coup d'Uat of Fructidor (September 1797), and for a time he retired into private life. Owing, however, to the influence of Sieves, he became minister of justice in July 1799. He gave a guarded support to Bonaparte and Sieves in their enterprise of overthrowing the Directory {coup d'Uat of Brumaire 1799).

After a short interval Cambaceres was, by the constitution of December 1799, appointed second consul of France — a position which he owed largely to his vast legal knowledge and to the conviction which Sieyes entertained of his value as a mani- pulator of public assemblies. It is impossible here to describe in detail his relations to Napoleon, and the part which he played in the drawing up of the Civil Code, later on called the Code Napoleon. It must suffice to say that the skilful intervention of Cambaceres helped very materially to ensure to Napoleon the consulship for life (August 1, 1802); but the second consul is known to have disapproved of some of the events which followed, notably the execution of the due d'Enghien, the rupture with England, and the proclamation of the Empire (May 19, 1804). This last occurrence ended his title of second consul; it was replaced by that of arch-chancellor of the Empire. To him was decreed the presidence of the Senate in perpetuity. He also became a prince of the Empire and received in 1808 the title duke of Parma. Apart from

the important part which he took in helping to co-ordinate and draft the Civil Code, Cambaceres did the state good service in many directions, notably by seeking to curb the impetuosity of the emperor, and to prevent enterprises so fatal as the intervention in Spanish affairs (1808) and the invasion of Russia (181 2) proved to be. At the close of the campaign of 1814 he shared with Joseph Bonaparte the responsi- bility for some of the actions which zealous Bonapartists have deemed injurious to the fortunes of the emperor. In 181 5, during the Hundred Days, he took up his duties reluctantly at the bidding of Napoleon; and after the second downfall of his master, he felt the brunt of royalist vengeance, being for a time exiled from France. A decree of 13th May 1818 restored him to his civil rights as a citizen of France; but the last six years of his life he spent in retirement. He was a member of the Academy till the 31st of March 1816, when a decree of exclusion was passed. In demeanour he was quiet, reserved and tactful, but when occasion called for it he proved himself a brilliant orator. He was a celebrated gourmet, and his dinners were utilized by Napoleon as a useful adjunct to the arts of statecraft.

See A. Aubriet, Vie de Cambaceres (2nd ed., Paris, 1825).

(J. Hl. R.)

CAMBALUC, the name by which, under sundry modifications, the royal city of the great khan in China became known to Europe during the middle ages, that city being in fact the same that we now know as Peking. The word itself represents the Mongol Khan-Balik, ” the city of the khan,” or emperor, the title by which Peking continues, more or less, to be known to the Mongols and other northern Asiatics.

A city occupying approximately the same site had been the capital of one of the principalities into which China was divided some centuries before the Christian era; and during the reigns of the two Tatar dynasties that immediately preceded the Mongols in northern China, viz. that of the Khitans, and of the Kin or ” Golden ” khans, it had been one of their royal residences. Under the names of Yenking, which it received from the Khitan, and of Chung-tu, which it had from the Kin, it holds a conspicuous place in the wars of Jenghiz Khan against the latter dynasty. He cap turedit in 1 21 s, but it was not till 1284 that it was adopted as the imperial residence in lieu of Karakorum in the Mongol steppes by his grandson Kublai. The latter selected a position a few hundred yards to the north-east of the old city of Chung-tu or Yenking, where he founded the new city of Ta-tu (” great capital “), called by the Mongols Taidu or Daitu, but also Khan- Balik;

and from this time dates the use of the latter name as applied to this site.

The new city formed a rectangle, enclosed by a colossal mud rampart, the longer sides of which ran north and south. These

were each about 5ˆ English m.‘in length, the shorter sides 3! m., so that the circuit was upwards of 18 m. The palace of the khan, with its gardens and lake, itself formed an inner enclosure fronting the south. There were eleven city gates, viz. three on the south side, always the formal front with the Tatars, and two on each of the other sides; and the streets ran wide and straight from gate to gate (except, of course, where interrupted by the palace walls), forming an oblong chess-board plan.

Ta-tu continued to be the residence of the emperors till the fall of the Mongol power (1368). The native dynasty (Ming) which supplanted them established their residence at Nan-king (” South Court “), but this proved so inconvenient that Yunglo, the third sovereign of the dynasty, reoccupied Ta-tu, giving it then, for the first time, the name of Pe-king (” North Court “). This was the name in common use when the Jesuits entered China towards the end of the 16th century, and began to send home accurate information about China. But it is not so now; the names in ordinary use being King-cheng or King-tu, both signifying ” capital.” The restoration of Cambaluc was com- menced in 1409. The size of the city was diminished by the retrenchment of nearly one-third at the northern end, which brought the enceinte more nearly to a square form. And this constitutes the modern (so-called) ” Tatar city ” of Peking, the south front of which is identical with the south front of the city of Kublai. The walls were completed in 1437. Population gathered about the southern front, probably using the material of the old city of Yenking, and the excrescence so formed was, in 1544, enclosed by a wall and called the ” outer city.” It is the same that is usually called by Europeans ” the Chinese city.” The ruins of the retrenched northern portion of Kublai’s great rampart are still prominent along their whole extent, so that there is no room for question as to the position or true dimensions of the Cambaluc of the middle ages; and it is most probable, indeed it is almost a necessity, that the present palace stands on the lines of Kublai’s palace.

The city, under the name of Cambaluc, was constituted into an archiepiscopal see by Pope Clement V. in 1307, in favour of the missionary Franciscan John of Montecorvino (d. 1330); but though some successors were nominated it seems probable that no second metropolitan ever actually occupied the seat.

Maps of the 16th and 17th centuries often show Cambaluc in an imaginary region to the north of China, a part of the miscon- ception that has prevailed regarding Cathay. The name is often in popular literature written Cambalu, and is by Longfellow accented in verse C&mb&lu. But this spelling originates in an accidental error in Ramusio's Italian version, which was the chief channel through which Marco Polo's book was popularly known. The original (French) MSS. all agree with the etymology in calling it Cambaluc, which should be accented C&mb&luc.

CAMBAY, a native state of India, within the Gujarat division of Bombay. It has an area of 350 sq. m. Pop. (1901) 75,225, showing a decrease of 16% in the decade, due to the famine of 1899-1900. The estimated gross revenue is £27,189; the tribute, £1460. In physical character Cambay is entirely an alluvial plain. As a separate state it dates only from about 1730, the time of the dismemberment of the Mogul empire. The present chiefs are descended from Momin Khan II., the last of the governors of Gujarat, who in 1742 murdered his brother-in-law, Nizam Khan, governor of Cambay, and established himself there.

The town o"f Cambay had a population in 1901 of 31,780. It is supposed to be the Camanes of Ptolemy, and was formerly a very flourishing city, the seat of an extensive trade, and cele- brated for its manufactures of silk, chintz and gold stuffs; but owing principally to the gradually increasing difficulty of access by water, owing to the silting up of the gulf, its commerce has long since fallen away, and the town has become poor and dilapidated, The spring tides rise upwards of 30 ft., and in a channel usually so shallow form a serious danger to shipping. The trade is chiefly confined to the export of cotton. The town is celebrated for its manufacture of agate and carnelian ornaments, of reputation principally in China. The houses in many instances are built of stone (a circumstance which indicates the former

wealth of the city, as the material had to be brought from a very considerable distance); and remains of a brick wall, 3 m. in circumference, which formerly surrounded the town, enclose four large reservoirs of good water and three bazaars. To the south- east there are very extensive ruins of subterranean temples and other buildings half-buried in the sand by which the ancient town was overwhelmed. These temples belong to the Jains, and contain two

massive statues of their deities, the one black, the other white. The principal one, as the inscription intimates, is Pariswanath, or Parswanath, carved in the reign of the emperor Akbar; the black one has the date of 1651 inscribed. In 1780 Cambay was taken by the army of General Goddard, was restored to the Mahrattas in 1 783, and was afterwards ceded to the British by the peshwa under the treaty of 1803. It was provided with a railway in 1901 by the opening of the n m. required to connect with the gaekwar of Baroda's line through Petlad.

CAMBAY, GULF OF, an inlet in the coast of India, in the Gujarat division of Bombay. It is about 80 m. in length, but is shallow and abounds in shoals and sandbanks. It is supposed that the depth of water in this gulf has been decreasing for more than two centuries past. The tides, which are very high, run into it with amazing velocity, but at low water the bottom is left nearly dry for some distance below the latitude of the town of Cambay. It is, however, an important inlet, being the channel by which the valuable produce of central Gujarat and the British districts of Ahmedabad and Broach is exported; but the railway from Bombay to Baroda and Ahmedabad, near Cambay, has for some time past been attracting the trade to itself.

CAMBER (derived through the Fr. from Lat. camera, vault), in architecture, the upward curvature given to a beam and provided for the depression or sagging, which it is liable to, before it has settled down to its bearings. A " camber arch " is a slight rise given to the straight-arch to correct an apparent sinking in the centre (see Arch).

CAMBERT, ROBERT (1628-1677), French operatic composer, was born in Paris in 1628. He was a pupil of Chambonnieres. In 1655, after he had obtained the post of organist at the church of St Honore, he married Marie du Moustier. He was musical superintendent to Queen Anne of Austria, mother of Louis XIV., and for a time held a post with the marquis de Sourdeac. His earlier works, the words of which were furnished by Pierre Perrin, continued to be performed before the court at Vincennes till the death of his patron Cardinal Mazarin. In 1669 Perrin received a patent for the founding of the Acadimie Nationale de musique, the germ of the Grand Opera, and Cambert had a share in the administration until both he and Perrin were discarded in the interests of Lulli. Displeased at his subsequent neglect, and jealous of the favour shown to Lulli, who was musical superintendent to the king, he went in 1673 to London, where soon after his arrival he was appointed master of the band to Charles II. One at least of his operas, Pomone, was performed in London under his direction, but it did not suit the popular taste, and he is supposed

to have killed himself in London in 1677. His other principal operas were Ariadne ou les amours de Bacchus and Les Peines et les plaisirs de V amour.

CAMBER WELL, a southern metropolitan borough of London, England, bounded N. by Southwark and Bermondsey, E. by Deptford and Lewisham, W. by Lambeth, and extending S. to the boundary of the county of London. Pop, (1901) 259,339. Area, 4480 acres. It appears in Domesday, but the derivation of the name is unknown. It includes the districts of Peckham and Nunhead, and Dulwich (q.v.) with its park, picture-gallery and schools. Camberwell is mainly residential, and there are many good houses, pleasantly situated in Dulwich and south- ward towards the high ground of Sydenham. Dulwich Park (72 acres) and Peckham Rye Common and Park (113 acres) are the largest of several public grounds, and Camberwell Green was once celebrated for its fairs. Immediately outside the southern boundary lies a well-known place of recreation, the Crystal Palace. Among institutions may be mentioned the Camberwell school of arts and crafts, Peckham Road. In Camberwell Road is Cambridge House, a university settlement.

founded in 1897 and incorporating the earlier Trinity settlement. i The parliamentary borough of Camberwell has three divisions, North, Peckham and Dulwich, each returning one member; but is not wholly coincident with the municipal borough, the Dulwich division extending to include Penge, outside the county of London. The borough council consists of a mayor, ten aldermen, and sixty councillors.

CAMBIASI, LUCA (1527-1585), Genoese painter, familiarly known as Lucchetto da Genova (his surname is written also Cambiaso or Cangiagio), was born at Moneglia in the Genoese state, the son of a painter named Giovanni Cambiasi. He took to drawing at a very early age, imitating his father, and developed great aptitude for foreshortening. At the age of fifteen he painted, along with his father, some subjects from Ovid's Metamorphoses on the front of a house in Genoa, and afterwards, in conjunction with Marcantonio Calvi, a ceiling showing great daring of execution in the Palazzo Doria. He also formed an early friend- ship with Giambattista Castello; both artists painted together, with so much similarity of style that their works could hardly be told apart; from this friend Cambiasi learned much in the way of perspective and architecture. Luchetto's best artistic period lasted for twelve years after his first successes; from that time he declined in power, though not at once in reputation, owing to the agitations and vexations brought upon him by a passion

which he conceived for his sister-in-law. His wife having died, and the sister-in-law having taken charge of his house and children, he endeavoured to procure a papal dispensation for marrying her; but in this he was disappointed. In 1583 he accepted an invitation from Philip II. to continue in the Escorial a series of frescoes which had been begun by Castello, now deceased; and it is said that one principal reason for his closing with this offer was that he hoped to bring the royal influence to bear upon the pope, but in this again he failed. Worn out with his disquietudes, he died in the Escorial in the second year of his sojourn. Cambiasi had an ardent fancy, and was a bold designer in a Raphaelesque mode. His extreme facility astonished the Spanish painters; and it is said that Philip II., watching one day with pleasure the offhand zest with, which Luchetto was painting a head of a laughing child, was allowed the further surprise of seeing the laugh changed, by a touch or two upon the lips, into a weeping expression. The artist painted sometimes with a brush in each hand, and with a certainty equalling or transcending that even, of Tintoret. He made a vast number of drawings, and was also something of a sculptor, executing in this branch of art a figure of Faith. Altogether he ranks as one of the ablest artists of his day. Inpersonal character, notwithstanding his executive energy, he is reported to have been timid and diffident. His son Orazio became likewise a painter, studying under Luchetto.

The best works of Cambiasi are to be seen in Genoa. In the church of S. Giorgio — the martyrdom of that saint; in the Palazzo Imperiali Terralba, a Genoese suburb — a fresco of the ” Rape of the Sabines ” ; in S. Maria da Carignano — a ” Pieta,” containing his own portrait and (according to tradition) that of his beloved sister-in- law. In the Escorial he executed several pictures; one is a Paradise on the vaulting of the church, with a multitude of figures. For this picture he received 12,000 ducats, probably the largest sum that had, up to that time, ever been given for a single work.

CAMBODIA ‘ (called by the inhabitants Sroc Khmer and by the French Cambodge), a country of south-eastern Asia and a pro- tectorate of France, forming part of French Indo-China.

Geography. — It is bounded N. by Siam and Laos, E. by Annam, S.E. andS. by Cochin-China, S.W. by the Gulf of Siam, and W. by Siam. Its area is estimated- at approximately 65,000 sq. m.; its population at 1,500,000, of whom some three-quarters are Cambodians, the rest Chinese, Annamese, Chams, Malays, and aboriginal natives. The whole of Cambodia lies in the basin of the lower Mekong, which, entering this territory on the north, flows south for some distance, then inclines

south-west as far as Pnom-penh, where it spreads into a delta and resumes a southerly course. The salient feature of Cambodian geography is the large lake Tonle-Sap, in a depression 68 m. long from south-east to north-west and 15m. wide. It is fed by several 1 See also Indo-China, French.

rivers and innumerable torrents, and at flood-time serves as a reservoir for the Mekong, with which it is connected by a channel some 70 m. long, known as the Bras du Lac and joining the river at Pnom-Penh. In June thewatersof theMekong,swollenby therains and the melting of the Tibetan snows, rise to a height of 40 to 45 ft. and flow through the Bras du Lae towards the lake, which then covers an area of 770 sq. m., and like the river inundates the marshes and forests on its borders. During the dry season the current reverses and the depression empties so that the lake shrinks to an area of 100 sq. m., and its depth falls from 45-48 ft. to a maximum of 5 ft. Tonle-Sap probably represents the chief wealth of Cambodia. It supports a fishing population of over 30,000, most of whom are Annamese; the fish, which are taken by means of large nets at the end of the inundation, are either dried or fermented for the production of the sauce known as nuoc-mam. The northern and western provinces of Cambodia which fall outside the densely populated zone of inundation are thinly peopled; they consist of plateaus, in many places thickly wooded and intersected by mountains, the highest of which does not exceed 5000 ft. The region to the east of the Mekong is traversed by spurs of the mountains of Annam and by affluents of the Mekong, the most important of these being the Se-khong and the Tonle-srepok, which unite to flow into the Mekong at Stung-treng. Small islands, inhabited by a fishing population, fringe the west coast.

Climate, Fauna and Flora. — The climate of Cambodia, like that of Cochin China, which it closely resembles, varies with the monsoons. During the north-east monsoon, from the middle of October to the middle of April, dry weather prevails and the thermometer averages from 77 to 8o° F. During the south- west monsoon, from the middle of April to the middle of October, rain falls daily and the temperature varies between 8 5 and 95 . The wild animals of Cambodia include the elephant, which is also domesticated, the rhinoceros, buffalo and some species of wild ox; also the tiger, panther, leopard and honey-bear. Wild boars, monkeys and rats abound and are the chief enemies of the cultivator. The crocodile is found in the Mekong, and there are many

varieties of reptiles, some of them venomous. The horse of Cambodia is only from 1 1 to 1 2 hands in height, but is strong and capable of great endurance; the buffalo is the chief draught animal. Swine are reared in large numbers. Nux vomica, gamboge, caoutchouc, cardamoms, teak and other valuable woods and gums are among the natural products.

People. — The Cambodians have a far more marked affinity with their Siamese than with their Annamese neighbours. The race is probably the result of a fusion of the Malay aborigines of Indo-China with the Aryan and Mongolian invaders of the country. The men are taller and more muscular than the Siamese and Annamese, while the women are small and inclined to stoutness. The face is flat and wide, the nose short, the mouth large and the eyes only slightly oblique. The skin is dark brown, the hair black and, while in childhood the head is shaved with the exception of a small tuft at the top, in later life it is dressed so as to resemble a brush. Both sexes wear the langouti or loin- cloth, which the men supplement with a short jacket, the women with a long scarf draped round the figure or with a long clinging robe. Morose, superstitious, and given to drinking and gambling, the Cambodians are at the same time clean, fairly intelligent, proud and courageous. The wife enjoys a respected position and divorce may be demanded by either party. Polygamy is almost confined to the richer classes. Though disinclined to work, the Cambodians make good hunters and woodsmen. Many of them live on the borders of the Mekong and the great lake, in huts built upon piles or floating rafts. The religion of Cambodia is Buddhism, and involves great respect towards the dead; the worship of spirits or local genii is also wide-spread, and Brahman-ism is still maintained at the court. Monks or bonzes are very numerous; they live by alms and in return they teach the young to read, and superintend coronations, marriages, funerals and the other ceremonials which play a large part in the lives of the Cambodians. As in the rest of Indo-China, there is no hereditary nobility, but there exist castes founded on blood-

relationship — the members of the royal family within the fifth degree (the Brah-Vansa) those beyond the fifth degree (Brah- Van), and the Bakou, who, as descendants of the ancient Brah- mans, exercise certain official functions at the court. These castes, as well as the mandarins, who form a class by themselves, are exempt from tax or forced service. The mandarins are nominated by the king and their children have a position at court, and are generally chosen to fill the vacant posts in the admini- stration. Under the native regime the common people attached themselves to one or other of the mandarins, who in return granted them the protection of his influence. Under

French rule, which has modified the old usages in many respects, local govern- ment of the Annamese type tends to supplant this feudal system. Slavery was abolished by a royal ordinance of 1897.

Cambodian idiom bears a likeness to some of the aboriginal dialects of south Indo-China; it is agglutinate in character and rich in vowel-sounds. The king's language and the royal writing, and also religious words are, however, apparently of Aryan origin and akin to Pali. Cambodian writing is syllabic and com- plicated. The books (manuscripts) are generally formed of palm- leaves upon which the characters are traced by means of a style.

Industry and Commerce. — Iron, worked by the tribe of the Kouis, is found in the mountainous region. The Cambodians show skill in working gold and silver; earthenware, bricks, mats, fans and silk and cotton fabrics, are also produced to some small extent, but fishing and the cultivation of rice and in a minor degree of tobacco, coffee, cotton, pepper, indigo, maize, tea and sugar are the only industries worthy of the name. Factories exist near Pnom-Penh for the shelling of cotton-seeds. The Cambodian is his own artificer and self-sufficing so far as his own needs are concerned. Rice, dried fish, beans, pepper and oxen are the chief elements in the export trade of the country, which is in the hands of Chinese. The native plays little or no part in commerce.

Trade is carried on chiefly through Saigon in Cochin-China, Kampot, the only port of Cambodia, being accessible solely to coasting vessels. With the exception of the highway from Pnom-Penh (q.v.) the capital, to Kampot, the roads of Cambodia are not suited for vehicles. Pnom-Penh communicates regularly by the steamers of the " Messageries Fluviales " by way of the Mekong with Saigon.

Administration. — At the head of the government is the king (raj). His successor is either nominated by himself, in which case he sometimes abdicates in his favour, or else elected by the five chief mandarins from among the Brah Vansa. The upayu- vraj (obbaioureach) or king who has abdicated, the heir-pre- sumptive (uparaj, obbareach) and the first princess of the blood are high dignitaries with their own retinues. The king is advised by a council of five ministers, the superior members of the class of mandarins; and the kingdom is divided into about fifty provinces administered by members of that body. France is represented by a resident superior, who presides over the ministerial council and is the real ruler of the country, and by residents exercising supervision in the districts into which the country is split up for the purposes of the French administration. In each residential district there is a council, composed of natives and presided over by the

resident, which deliberates on questions affecting the district. The resident superior is assisted by the protectorate council, consisting of heads of French administrative departments (chief of the judicial service, of public works, &c) and one native ” notable,” and the royal orders must receive its sanction before they can be executed. The control of foreign policy, public works, the customs and the exchequer are in French hands, while the management of police, the collection of the direct taxes and the administration of justice between natives remain with the native government. A French tribunal alone is competent to settle disputes where one of the parties is not a native.

The following is a summary of the local budget of Cambodia for 1899 and 1904: — ■ Receipts. Expenditure.

1899 • • £235,329 £188,654

1904 . . 250,753 229,880

The chief sources of revenue are the direct taxes, including the poll-tax and the taxes on the products of the soil, which together amounted to £172,636 in 1904. The chief heads of expenditure are the civil list, comprising the personal allow- ance to the king and the royal family (£46,018 in 1904), public works (£39,593) and government house and residences

G09,977)-

History. — The Khmers, the ancient inhabitants of Cambodia, are conjectured to have been the offspring of a fusion between the autochthonous dwellers in the Indo-Chinese peninsula, now represented by the Kouis and other savage tribes, and an invading race from the plateaus of central Asia. As early as the 12th century B.C., Chinese chronicles, which are almost the only source for the history of Cambodia till the 5th century a.d., mention a region called Fou-nan, in later times appearing under the name of Tchin-la; embracing the basin of the Menam, it extended east- wards to the Mekong and may be considered approximately coextensive with the Khmer kingdom. Some centuries before the Christian era, immigrants from the east coast of India began to exert a powerful influence over Cambodia, into which they introduced Brahmanism and the Sanskrit language. This Hindu- izing process became more marked about the 5th century a.d., when, under S’rutavarman, the Khmers as a nation

rose into prominence. The name Kambuja, whence the European form Cambodia, is derived from the Hindu Kambu, the name of the mythical founder of the Khmer race; it seems to have been officially adopted by the Khmers as the title of their country about this period. At the end of the 7th century the dynasty of S'rutavarman ceased to rule over the whole of Cambodia, which during the next century was divided into two portions ruled over by two sovereigns. Unity appears to have been re-established about the beginning of the 9th century, when with Jayavarman III. there begins a dynasty which embraces the zenith of Khmer greatness and the era during which the great Brahman monu- ments were built. The royal city of Angkor-Thorn (see Angkor) was completed under Yasovarman about a.d. 900. In the 10th century Buddhism, which had existed for centuries in Cambodia, began to become powerful and to rival Brahmanism, the official religion. The construction of the temple of Angkor Vat dates probably from the first half of the 12th century, and appears to have been carried out under the direction of the Brahman Divakara, who enjoyed great influence under the monarchs of this period. The conquest of the rival kingdom of Champa, which embraced modern Cochin-China and southern Annam, and in the later 1 5th century was absorbed by Annam, may probably be placed at the end of the 12th century, in the reign of Jayavarman VIII., the last of the great kings. War was also carried on against the western neighbours of Cambodia, and the exhaustion consequent upon all these efforts seems to have been the immediate cause of the decadence which now set in. From the last decade of the 13th century there dates a valuable description of Tchin-la 1 written by a member of a Chinese embassy thereto. The same period probably also witnessed the liberation of the Thais or inhabitants of Siam from the yoke of the Khmers, to whom they had for long been subject, and the expulsion of the now declining race from the basin of the Menam. The royal chronicles of Cambodia, the historical veracity of which has often to be questioned, begin about the middle of the 14th century, at which period the Thais assumed the offensive and were able repeatedly to capture and pillage Angkor-Thom. These aggressions were continued in the 15th century, in the course of which the capital was finally abandoned by the Khmer kings, the ruin of the country being hastened by internal revolts and by feuds between members of the royal family. At the end of the 1 6th century, Lovek, which had succeeded Angkor-Thom as capital, was itself abandoned to the conquerors. During that century, the Portuguese had established some influence in the country, whither they were followed by the Dutch, but after the middle of the 17th century, Europeans counted for little in Cambodia till the arrival of the French. At the beginning of the

1 Translated by Abel Remusat, Nouveaux Melanges Asiatiques

(1829).

17 th century the Nguyen, rulers of southern Annam, began to encroach on the territory of Cochin-China, and in the course of that and the 18th century, Cambodia, governed by two kings supported respectively by Siam and Annam, became a field for the conflicts of its two powerful neighbours. At the end of the 1 8th century the provinces of Battambang and Siem-reap were annexed by Siam. The rivalries of the two powers were con- cluded after a last and indecisive war by the treaty of 1 846, as a result of which Ang-Duong, the protege of Siam, was placed on the throne at the capital of Oudong, and the Annamese evacuated the country. In 1863, in order to counteract Siamese influence there, Doudart de Lagree was sent by Admiral la Grandiere to the court of King Norodom, the successor of Ang-Duong, and as a result of his efforts Cambodia placed itself under the protectorate of France. In 1866 Norodom transferred his capital to Pnom- penh. In 1867 a treaty between France and Siam was signed, whereby Siam renounced its right to tribute and recognized the French protectorate over Cambodia in return for the provinces of Battambang and Angkor, and the Laos territory as far as the Mekong. In 1884 another treaty was signed by the king, con- firming and extending French influence, and reducing the royal authority to a shadow, but in view of the discontent aroused by it, its provisions were not put in force till several years later. In 1904 the territory of Cambodia was increased by the addition to it of the Siamese provinces of Melupre and Bassac, and the maritime district of Krat, the latter of which, together with the province of Dansai, was in 1907 exchanged for the provinces of Battambang, Siem-reap and Sisophon. By the same treaty France renounced its sphere of influence on the right bank of the Mekong. In 1904 King Norodom was suc- ceeded by his brother Sisowath.

See E. Aymonier, Le Cambodge (3 vols., Paris, 190O-1904); L. Moura, Le royaume de Cambodge (2 vols., Paris, 1883) ; A. Leclere, Les codes cambodgiens (2 vols., Paris, 1898), and other works on Cambodian law; Francis Gamier, Voyage a” exploration en Indo- Chine (Paris, 1873).

CAMBON, PIERRE JOSEPH (1756-1820), French statesman, was the son of a wealthy cotton merchant at Montpellier. In 1785 his father retired, leaving the direction of the business to Pierre and his two brothers, but in 1788 Pierre turned aside to politics, and was sent by his fellow-citizens as deputy suppliant to Versailles, where he was

little more than a spectator. In January 1790 he returned to Montpellier, was elected a member of the municipality, was one of the founders of the Jacobin club in that city, and on the flight of Louis XVI. in 179 1, he drew up a petition to invite the Constituent Assembly to proclaim a republic, — the first in date of such petitions. Elected to the Legislative Assembly, Cambon became notedforhisindependence, his honesty and his ability in finance. He was the most active member of the committee of finance and was often charged to verify the state of the treasury. Nothing could be more false than the common opinion that as a financier his sole expedient was to multiply the emissions of assignats. His remarkable speech of the 24th of November 1791 is a convincing proof of his sagacity. In politics, while he held aloof from the clubs, and even from parties, he was an ardent defender of the new institu- tions. On the 9th of February 1792, he succeeded in having a law passed sequestrating the possessions of the emigres, and de- manded, though in vain, the deportation of refractory priests to French Guiana. He was the last president of the Legislative Assembly. Re-elected to the Convention, he opposed the pre- tensions of the Commune and the proposed grant of money to the municipality of Paris by the state. He denounced Marat's placards as inciting to murder, summoned Danton to give an account of his ministry, watched carefully over the furnishing of military supplies, and was a strong opponent of Dumouriez, in spite of the general's great. popularity. Cambon then incurred the hatred of Robespierre by proposing the suppression of the pay to the clergy, which would have meant the separation of church and state. His authority grew steadily. On the 15th of December 1792 he got the Convention to adopt a proclamation to all nations in favour of a universal republic. In the trial of

Louis XVI. he voted for his death, without appeal or postpone- ment. He attempted to prevent the creation of the Revolutionary Tribunal, but when called to the first Committee of Public Safety he worked on it energetically to organize the armies. On the 3rd of February 1793 he had decreed the emission of 800 millions of assignats, for the expenses of the war. His courageous intervention in favour of the Girondists on the 2nd of June 1793 served Robespierre as a pretext to prevent his re-election to the Committee of Public Safety. But Cambon soon came to the conclusion that the security of France depended upon the triumph of the Mountain, and he did not hesitate to accord his active co- operation to the second committee. He took an active

share in the various expedients of the government for stopping the depreciation of the assignats. He was responsible, especially, for the great operation known as the opening of the Grand Livre (August 24), which was designed to consolidate the public debt by cancelling the stock issued under various conditions prior to the Revolution, and issuing new stock of a uniform character, so that all fund-holders should hold stock of the revolutionary gov- ernment and thus be interested in its stability. Each fund-holder was to be entered in the Great Book, or register of the public debt, for the amount due to him every year. The result of this measure was a rise in the face value of the assignats from 27% to 48 % by the end of the year. In matters of finance Cambon was now supreme; but his independence, his hatred of dictator- ship, his protests against the excesses of the Revolutionary Tribunal, won him Robespierre's renewed suspicion, and on the 8th Thermidor Robespierre accused him of being anti- revolutionary and an aristocrat. Cambon 's proud and vehement reply was the signal of the resistance to Robespierre's tyranny and the prelude to his fall. Cambon soon had reason to repent of that event, for he became one of those most violently attacked by the Thermidorian reaction. The royalist pamphlets and the journals of J. L. Tallien attacked him with fury as a former Montagnard. He was charged with being responsible for the dis- credit of the assignats, and even accused of malversations. On the 21st of February 1795 the project which he presented to with- draw four milliards of assignats from circulation, was rejected, and on the 3rd of April he was excluded from the committee of finance. On the 16th Germinal, Tallien procured a decree of ac- cusation against him, but he was already in safety, taking refuge probably at Lausanne. In any case he does not seem to have re- mained in Paris, although in the riot of the 1st Prairial some of the insurgents proclaimed him mayor. The amnesty of the 4th Bru- maire of the year IV. (the 5th of October 1795), permitted him to return to France, and he withdrew to his estate of Terral near Montpellier, where, during the White Terror, he had a narrow escape from an attempt upon his life. At first Cambon hoped to find in Bonaparte the saviour of the republic, but, deceived by the 1 8th Brumaire, he lived throughout the whole of the empire in peaceful seclusion. During the Hundred Days he was deputy for Herault in the chamber of representatives, and pronounced himself strongly against the return of the Bourbons, and for religious freedom. Under the Restoration the " amnesty " law of 1 816 condemned him as a regicide to exile, and he withdrew to Belgium, to St Jean-Ten-Noode, near Brussels, where he died ontheisthof February 1820. (R. A.*)

See Bornarel, Cambon (Paris).

CAMBON, PIERRE PAUL (1843-), French diplomatist, was born on the 20th of January 1843. He was called to the Parisian bar, and became private secretary to Jules Ferry in the prefecture of the Seine. After ten years of administrative work in France as secretary of prefecture, and then as prefect succes- sively of the departments of Aube (1872), Doubs (1876), Nord (1877-1882), he exchanged into the diplomatic service, being nominated French minister plenipotentiary at Tunis. In 1886 he became French ambassador to Madrid; was transferred to Constantinople in 1890, and in 1898 to London. He was decor- ated with the grand cross of the Legion of Honour, and became a member of the French Academy of Sciences.

His brother, Jules Martin Cambon (1845-), was called to the bar in 1866, served in the Franco-Prussian War and

entered the civil service in 1871. He was prefect of the depart- ment of Nord (1882) and of the Rhone (1887-1891), and in 1891 became governor-general of Algeria (see Guyot, L'muvre de M. Jules Cambon, Paris, 1897), where he had served in a minor position in 1874. He was nominated French ambassador at Washington in 1897, and in that capacity negotiated the pre- liminaries of peace on behalf of the Spanish government after the war with the United States. He was transferred in 1902 to Madrid, and in 1907 to Berlin.

CAMBORNE, a market town in the Camborne parliamentary division of Cornwall, England, on the Great Western railway, 13 m.E.N.E. of Penzance. Pop. of urban district (1901), 14,726. It lies on the northward slope of the central elevation of the county, and is in the neighbourhood of some of the most pro- ductive tin and copper mines. These and the manufacture of mining machinery employ most of the inhabitants. The parish church of St Martin contains several monuments and an ancient stone altar bearing a Latin inscription. There are science and art and mining schools, and practical mining is taught in South Condurrow mine, the school attracting a large number of students. It was developed from classes initiated in 1859 by the Miners' Association, and a three years' course of instruction is provided.

Camborne (Cambron, Camron) formed a portion of the ex- tensive manor of Tehidy, which at the time of the Domesday Survey was held by the earl of Mortain and subsequently by the Dunstanville and Basset families. Its interests were economic- ally insignificant until the beginning of the 18th century when the rich deposits of copper and tin began to be vigorously worked at Dolcoath. It has been estimated that in 1788 this mine alone had produced ore worth £2,000,000 and

in 1882 ore worth £5,500,000. As the result of the prosperity of this and other mines in the neighbourhood the population in i860 was double that of 1830, six times that of 1770 and fifteen times that of 1660. Camborne was the scene of the scientific labours of Richard Trevithick (1771-1833), the engineer, born in the neighbouring parish of Illogan, and of William Bickford, the inventor of the safety-fuse, a native of Camborne. Three fairs on the feasts of St Martin and St Peter and on 2 5th of February were granted in 1708. The two former are still held, the last has been transferred to the 7th of March. A Tuesday market formed the subject of a judicial inquiry in 1768, but since the middle of the 19th century it has been held on Saturdays.

CAMBRAI, a town of northern France, capital of an arrondisse- ment in the department of Nord, 37 m. S.S.E. of Lille on the main line of the Northern railway. Pop. (1906) 21,791. Cambrai is situated on the right and eastern bank of the Scheldt (arms of which traverse the west of the town) and at one extremity of the canal of St Quentin. The fortifications with which it was formerly surrounded have been for the most part demolished. The fosses have been filled up and the ramparts in part levelled to make way, as the suburbs extended, for avenues stretching out on all sides. The chief survivals from the demolition are the huge square citadel, which rises to the east of the town, the chateau de Selles, a good specimen of the military architecture of the 13th century, and, among other gates, the Porte Notre-Dame, a stone and brick structure of the early 17th century. Handsome boulevards now skirt the town, the streets of which are clean and well-ordered, and a large public garden extends at the foot of the citadel, with a statue of Enguerrand de Monstrelet the chronicler. The former cathedral of Cambrai was destroyed after the Revolu- tion. The present cathedral of Notre-Dame is a church of the 19th century built on the site of the old abbey church of St S6pulchre. Among other monuments it contains that of Fenelon, archbishop from 1695 to 171 5, by David d'Angers. The church of St Gery (18th century) contains, among other works of art, a marble rood-screen of Renaissance workmanship. The Place d'Armes, a large square in the centre of the town, is bordered on the north by a handsome h6tel de ville built in 1634 and rebuilt in the 19th century. The Tour St Martin is an old church-tower of the 15th and 1 8th centuries transformed into a belfry. The triple stone portal, which gave entrance to the former archi- episcopal palace, is a work of the Renaissance period. The

present archbishop's palace, adjoining the cathedral, occupies the site of an old Benedictine convent.

Cambrai is the seat of an archbishop and a sub-prefect, and has tribunals of first instance and of commerce, a board of trade-arbitrators, a chamber of commerce and a branch of the Bank of France. Its educational institutions include communal colleges, ecclesiastical seminaries, and schools of drawing and music. The library has over 40,000 volumes and there is a museum of antiquities and objects of art. The chief industry of Cambrai is the weaving of muslin {batiste) and other fine fabrics (see Cambric); wool-spinning and weaving, bleaching and dyeing, are carried on, as well as the manufacture of chicory, oil, soap, sausages and metal boxes. There are also large beet- sugar works and breweries and distilleries. Trade is in cattle, grain, coal, hops, seed, &c.

Cambrai is the ancient Nervian town of Camaracum, which is mentioned in the Antonine Itinerary. In the 5th century it was the capital of the Frankish king Raguacharius. Fortified by Charlemagne, it was captured and pillaged by the Normans in > 870, and unsuccessfully besieged by the Hungarians in 953. During the 10th, nth and 12th centuries it was the scene of frequent hostilities between the bishop and his supporters on the one hand and the citizens on the other; but the latter ultimately effected their independence. In 1478 Louis XL, who had obtained possession of the town on the death of Charles the Bold, duke of Burgundy, handed it over to the emperor, and in the 16th century Charles V. caused it to be fortified with a strong citadel, for the erection of which the castles of Cavillers, Escau-doeuvres and many others were demolished. From that date to the peace of Nijmwegen, 1678, which assigned it to France, it frequently passed from hand to hand by capture or treaty. In 1793 it was besieged in vain by the Austrians. The League of Cambrai is the name given to the alliance of Pope Julius II., Louis XII., Maximilian I., and Ferdinand the Catholic against the Venetians in 1508; and the peace of Cambrai, or as it is also called, the Ladies' Peace, was concluded in the town in 1529 by Louise of Savoy, mother of Francis I., and Margaret of Austria, aunt of Charles V., in the name of these monarchs. The bishopric of Cambrai dates from the 5th century, and was raised in 1559 to the rank of an archbishopric, which continued till the Revolution, and has since been restored. The bishops received the title of count from the emperor Henry I. (919-936), and in 1510 were raised to the dignity of dukes, their territory including the town itself and its territory, called Cambresis.

See E. Bouly, Histoire de Cambrai et du Cambresis (Cambria,

1843)-

CAMBRIA, the Med. Lat. name for Wales. After the end of the western Roman empire the Cymric Celts held for a while both Wales and the land round the Solway (now Cumber- land and adjacent regions), and the former came to be called Cambria, the latter Cumbria, though the two names were some- times interchanged by early medieval writers.

CAMBRIAN SYSTEM, in geology, the name now universally employed to designate the earliest group of Palaeozoic rocks which possesses a connected suite of fossils. The strata of this system rest upon the Pre-Cambrian, and are succeeded by the Ordovician system. Until the fourth decade of the 19th century all stratified rocks older than the Carboniferous had been grouped by geologists into a huge and indefinite ” Transition Series.” In 1 83 1 Adam Sedgwick and Sir Roderick I. Murchison began the herculean task of studying and sub-dividing this series of rocks as it occurs in Wales and the bordering counties of England. Sedgwick attacked the problem in the Snowdon district, where the rocks are highly altered and displaced and where fossils are comparatively difficult to obtain; Murchison, on the other hand, began to work at the upper end of the series where the strati-graphy is simple and the fossils are abundant. Murchison naturally 4nade the most of the fossils collected, and was soon able to show that the transition series could be recognized by them, just as younger formations had fossils peculiar to themselves; as he zealously worked on he followed the fossiliferous rocks further afield and continually lower in the series. This fossil-bearing I

set of strata he first styled the ” fossiliferous greywacke series,” changing it in 1835ˆ0 ” Silurian system.”

In the same year Sedgwick introduced the name ” Cambrian series ” for the older and lower members. Murchison published his Silurian system in 1839, wherein he recognized the Cambrian to include the barren slates and grits of Harlech, Llanberis and the Long Mynd. So far, the two workers had been in agreement; but in his presidential address to the Geological Society of London in 1842 Murchison stated his opinion that the Cambrian contained no fossils, that differed from those of the Lower Silurian. Where- upon Sedgwick undertook a re-examination of the Welsh rocks with the assistance of J. W. Salter, the palaeontologist; and in 1852 he included the Llandeilo and Bala beds (Silurian) in the Upper Cambrian. Two years later Murchison brought out his Siluria, in which he treated the Cambrian system as a mere local fades of the Silurian system, and he included in the latter, under J. Barrande’s term ” Primordial zone,” all the lower rocks, although

they had a distinctive fauna.

Meanwhile in Europe and America fossils were being collected from similar rocks which were classed as Silurian, and the use of ” Cambrian ” was almost discarded, because, following Murchison, it was taken to apply only to a group of rocks without a charac- teristic fauna and therefore impossible to recognize. Most of the Cambrian rocks were coloured as Silurian on the British official geological maps.

Nevertheless, from 1851 to 1855, Sedgwick, in his writings on the British palaeozoic deposits, insisted on the independence of the Cambrian system, and though Murchison had pushed his Silurian system downward in the series of rocks, Sedgwick adhered to the original grouping of his Cambrian system, and even proposed to limit the Silurian to the Ludlow and Wenlock beds with the May Hill Sandstone at the base. This attitude he maintained until the year of his death (1873), when there appeared his introduction to Salter’s Catalogue of Cambrian and Silurian- Fossils.

It is not to be supposed that one of these great geologists was necessarily in the wrong; each had right on his side. It was left for the subsequent labours of Salter and H. Hicks to prove that the rocks below the undoubted lower Silurian of Murchison did indeed possess a characteristic fauna, and their work was con- firmed by researches going on in other countries. To-day the recognition of the earliest fossil-bearing rocks, below the Llan- deilo formation of Murchison, as belonging to the Cambrian system, and the threefold subdivision of the system according to palaeontological evidence, may be regarded as firmly established.

It should be noted that A. de Lapparent classifies the Cambrian as the lowest stage in the Silurian, the middle and upper stages being Ordovician and Gothlandian. E. Renevier proposed to use Silurique to cover the same period with the Cambrian as the lowest series, but these differences of treatment are merely nominal. Jules Marcou and others have used Taconic (Taconian) as the equivalent of Cambrian, and C.Lapworth proposed to apply the same term to the lowest sub- division only; he had also used ” Annelidian ” in the same sense. These names are of historical interest alone.

Cambrian Rocks. — The lithological characters of the Cambrian rocks possess a remarkable uniformity in all quarters of the globe. Muds, sands, grits and conglomerates are the predominant types. In Scotland, North America and Canada important deposits of limestone occur and subordinate limestones are found in the Cambrian of central Europe.

In some regions, notably in the Baltic province and in parts of the United States, the rocks still retain their original horizon- tality of deposition, the muds are scarcely indurated and the sands are still incoherent; but in most parts of the world they bear abundant evidence of the many movements and stresses to which they have been exposed through so enormous a period of time. Thus, we find them more frequently, folded, tilted and cleaved ; the muds have become shales, slates, phyllites or schists, the grey and red sands and conglomerates have become quartzites and greywackes, while the limestones are very gener- ally dolomitized. In the Cambrian limestones, as in their more

recent analogues, layers and nodules of chert and phosphatized material are not wanting.

Igneous rocks are not extensively developed; in Wales they form an important feature and occur in considerable thickness;

Distribution of

Cambrian Rocks

wF&ˆ wˆ0$

Areas in which marine deposits are known.

Areas gained by the Sea between the beginning

and dose of the Period.

1 \Unknown. The broken lines indicate the possible

1 \distribution of Land and Sen,

n

alter Ds Lapp&rent

Emery Valker 5C.

they are represented by lavas of olivine-diabase and by con- temporaneous tuffs which are traversed by later granite and quartz felsite. In the Cambrian of Brittany there are acid lavas and tuffs.

Quartz porphyry, diabase and diorite appear in the Ardennes. In Bohemia, North America and Canada igneous rocks have been observed.

In China, on the Yang-tse river, a thick deposit has been found full of boulders of diverse kinds of rock, striated in the manner that is typical of glacial action. A similar deposit occurs in the Gaisa beds near the Varanger Fjord in Norway. These forma- tions lie at the base of the lowest Cambrian strata and may possibly be included in the pre-Cambrian, though in Norway they are clearly resting upon a striated floor of crystalline rocks.

Cambrian Life. — In a general survey of the life of this period, as it is revealed by the fossils, three outstanding facts are ap- parent: (1) the great divergence between the Cambrian fauna and that of the present day; (2) the Cambrian life assemblage differs in no marked manner from that of the succeeding Ordovi- cian and Silurian periods; there is a certain family likeness which unites all of them; (3) the extraordinary complexity and diversity not only in the assemblage as a whole but within certain limited groups of organisms. Although in the Cambrian strata we have the oldest known fossiliferous rocks — if we leave out of account the very few and very obscure organic remains hitherto recorded from the pre-Cambrian — yet we appear to enter suddenly into the presence of a world richly peopled with a suite of organisms already far advanced in differentiation; the Cambrian fauna seems to be as far removed from what must have been the first forms of life, as the living forms of this remote period are distant from the creatures of to-day.

With the exception of the vertebrates, every one of the great classes of animals is represented in Cambrian rocks. Simple protozoa appear in the form of Radiolaria; Lithistid sponges are represented by such forms as Archaeoscyphia, Hexactinellid sponges by Protospongia; Graptolites {Diciyograptus (Diclyo- nemo)) come on in the higher parts of the system. Medusa-like casts have been found in the lower Cambrian of Scandinavia (Medusina) and in the mid-Cambrian of Alabama (Brooksella) . Corals, Archaeocyathus, Spirocyathus, &c, lived in the Cambrian seas along with starfishes (Palaeasterina) , Cystideans, Protocys- tites, Trochocystites and possibly Crinoids, Dendrocrinus. An- nelids left their traces in burrows and casts on the sea-floor (Arenicolites, Cruziana, Scolithus, &c). Crustacea occupied an extremely prominent place; there were Phyllocarids such as Hymenocaris, and ‘ Ostracods like Entomidella; but by far the most important in numbers and development were the Trilo-

bites, now extinct, but in palaeozoic times so abundant. In the Cambrian period trilobites had already attained their maximum size; some species of Paradoxides were nearly 2 ft. long, but in company with these monsters were tiny forms like Agnostus and Microdiscus. Many of the Cambrian trilobites appear to have been blind, and they had not at this period developed that flexibility in the carapace that some forms acquired later.

Brachiopods were fairly abundant, particularly the non- articulated forms {Obolus, Lingulella, Acrotreta, Discinopsis, &c); amongst the articulate genera are Kutorgina, Orthis, Khynchonella. It is a striking fact that certain of these non- articulate “lamp-shells” are familiar inhabitants of our present seas. Each of the principal groups of true mollusca was repre- sented: Pelecypods (Modioloides); Gasteropods (Scenella, Pleurotomaria, Trochonema) ; Pteropods (Hyolithellus, Hyo- lithes, S alter ella); Cephalopods {Orthoceras, Cystoceras) . Of land plants no traces have yet been discovered. Certain markings on slates and sandstones, such as the ” fucoids ” of Scandinavia and Scotland, the Phycoides of the Fichtelgebirge, Eophyton and other seaweed-like impressions, may indeed be the casts of fucoid plants; but it is by no means sure that many of them are not mere inorganic imitative markings or the tracks or casts of worms. Oldhamia, a delicate branching body, abundant in the Cambrian of the south-east of Ireland, is probably a calcareous alga, but its precise nature has not been satisfactorily determined.

Cambrian Stratigraphy. — Wherever the Cambrian strata have been carefully studied it has now been found possible and con- venient to arrange them into three series, each of which is charac- terized by a distinctive genus of trilobite. Thus we have a Lower Cambrian with Olenellus, a middle series with Paradoxides and an Upper Cambrian with Olenus. It is true that these fossils are not invariably present in every occurrence of Cambrian strata, but this fact notwithstanding, the threefold division holds with sufficient constancy. An uppermost series lies above the Olenus fauna in some areas; it is represented by the Tremadoc beds in Britain or by the Dictyonema beds or Euloma-Niobe fauna elsewhere. Three regions deserve special attention: (1) Great Britain, the area in which the Cambrian was first differ- entiated from the old ” Transition Series “; (2) North America, on account of the wide-spread occurrence of the rocks and the abundance and perfection of the fossils; and (3) Bohemia, made classic by the great labours of J. Barrande.

Great Britain and Ireland. — The table on p. 88 contains the names that have been applied to the subdivisions of the Cambrian strata in

the areas of outcrop in Wales a nd England ; at the same time it indicates approximately their relative position in the system.

In Scotland the upper and middle series are represented by a thick mass of limestone and dolomite, the Durness limestone (1500 ft.). In the lower series are, in descending order, the ” Ser- pulite grits ” or ” Salterella beds,” the ” Fucoid beds ” and the ” Eriboll quartzite,” which is divided into an upper ” Pipe rock ” and lower ” Basal quartzite.”

The Cambrian rocks of Ireland, a great series of purple and green shales, slates and grits with beds of quartzite, have not yet yielded sufficient fossil evidence to permit of a correlation with the Welsh rocks, and possibly some parts of the series may be transferred in the future to the overlying Ordovician.

North America. — On the North American continent, as in Europe, the Cambrian system is divisible into three series: (1) the lower or ” Georgiaa,” with Olenellus fauna; (2) the middle or ” Acadian,” with Paradoxides or Dikelocephalus fauna; (3) the upper or ” Pots- dam,” with Olenus fauna (with Saratogan or St Croix as synonyms for Potsdam). The lower division appears on the Newfoundland and Labrador coasts, and is traceable thence, in a great belt south- west of those points, through Maine and the Hudson-Champlain valley into Alabama, a distance of some 2000 m.; and the rocks are brought up again on the western uplift, in Nevada, Idaho, Utah, western Montana and British Columbia. The middle division covers approximately the same region as the lower one, and in addition it is found in the states of Texas, Oklahoma, and Arizona, in western Montana, and possibly in western Wisconsin. The lower division, in addition to covering the areas already indicated, spreads over the interior of the United States.

Bohemia. — The Cambrian rocks of this country are now recognized by J. F. Pompeskj to comprise the Paradoxidian and Olenelledian groups. They were made famous through the researches of Barrande. The Cambrian system is covered by his stages ” B ” and ‘ C ” ; the

former a barren series of conglomerates and quartzites, the latter a series of grey and green fissile shales 1200 ft. thick with sandstones, greywackes and conglomerates.

Scandinavia. — Here the Cambrian system is only distinguished

clearly on the eastern side, where the three subdivisions are found in a thin series of strata (400 ft.), in which black concretion-bearing

North Wales.

South Wales.

Midland and West of England.

Shropshire.

Malvern Hills.

Nuneaton.

Upper Cambrian Olenus fauna

Tremadoc slates

Tremadoc beds

Shineton shales

Bronsil shales,

Upper Stocking-

(Eitloma-Niobe

and shales with

grey (Niobe

ford shales

fauna)

Dictyonema

fauna)

(Merivale shales)

Lingula flags

Lingula flags

Malvern black shales (White- leaved-oak shales)

(1) Dolgellybeds

(2) Ff est i niog

Middle Stocking-

beds

ford shales, (Oldbury shales)

(3) Maentwrog

beds

Middle Cam-

Menevian beds

Menevian beds

brian, Paradox-

ides fauna

Solva group

Comley or Holly-

Hollybush sand-

Lower Stocking-

bush sandstone

stone

ford shales

with upper

(Purley shales)

Comley lime-

stone

Lower Cambrian,

Harlech grits and

Caerfai group

Lower Comley

Hollybush sand-

Upper Hartshill

Olenellus fauna

Llanberis slates

limestone Wrekin quartzite

stone with Mal- vern quartzite and conglomer- ate at the base

quartzite. Hyo- lith.es shales and limestone

Middle arid lower Hartshill quart- zite and the quartzite of the

Lickey Hills

shales play an important part. Limestones and shales with the Euloma-Niobe fauna come at the top. The upper series {Olenus) has been minutely zoned by W. C. Brogger, S. A. Tullberg and J. C. Moberg. In the middle series (Paradoxides) three thin limestone bands have been distinguished, the Fragmenten-Kalk, the Exulans- Kalk and the Andrarums-Kalk.

On the Norwegian side the Cambrian is perhaps represented by the Roros schists which lie at the base of a great series of crystal- line schists, the probable equivalent of Ordovician and Silurian rocks.

Baltic Province. — The Cambrian rocks in this region are nearly all

soft sediments, some 600 ft. thick; they reach from the Guff of Finland towards Lake Ladoga. At the base is the so-called ” blue clay ” (really greenish) with ferruginous sandstones and with a fucoidal sandstone at its summit. This division is the equivalent of the Lower Cambrian. Above the fucoidal sandstone an im- portant break appears in the system, for the Paradoxides and Olenus divisions are absent. The upper members are the ” Ungulite grit ” and about 20 ft. of Dictyonema shale. Cambrian rocks have been traced into Siberia (lat. 71 °) and on the island of Vaigatch.

Central Europe. — Besides the Bohemian region previously mentioned, Cambrian rocks are present in Belgium and the north of France, in Spain and the Thiiringer Wald. In the Ardennes the system is represented by grits and sandstones, shales, slates and quartz schists, and includes also whet slates and some igneous rocks. A. Dumont has arranged the whole series {Terrain ardennais) into three systems, an upper ” Salmien,” a middle ” Revinien ” and a lower ” Devillien,” but J. Gosselet has subsequently proposed to unite the two lower groups in one.

France. — -In northern France Cambrian rocks, mostly purple conglomerates and red shales, rest with apparent unconformability upon pre-Cambrian strata in Brittany, Normandy and northern Poitou. In the Rennes basin limestones — often dolomitic — are associated with quartzites and conglomerates; silicious limestones also occur in the Sarthe region. Farther south, around the old lands of Languedoc, equivalents of the two upper divisions of the Cambrian have been recorded ; and the uppermost members of the system appear in Herault. Patches of Cambrian rocks are found in the Pyrenees.

In Spain slates and quartzites, the slates of Rivadeo, more than 9000 ft. thick, are followed by the middle Cambrian beds of La Vega, thick quarˆites with limestone, slates and iron ores. Cambrian rocks occur also in the provinces of Seville and Ciudad-Real. Upper Cambrian strata have been found in upper Alemtejo in Portugal.

In Russian Poland is a series of conglomerates, quartzites and shales; some of the beds yield a Paradoxides fauna.

In the Thiiringer Wald are certain strata, presumably Cambrian since the uppermost beds contain the Euloma-Niobe fauna.

Sardinia contains both middle and upper Cambrian. The Cam- brian system is represented in the Salt Range of India by the Neo- bolus or Khussack beds, which may possibly belong to the middle subdivision.

The same group is probably represented in Corea

and the Liao-tung by the thick ” Sinisian ” formation of F. von Richthofen.

In South America upper Cambrian rocks have been recorded from north Argentina.

The Lower Cambrian has been found at vari- ous places ,in South Australia; and in Tas- mania a thick series of strata appears to be in part at least of Upper Cambrian age.

General Physical Conditions in the Cam- brian Period. — The Cambrian rocks previ- ously described are all such as would result from deposition, in comparatively shallow seas, of the products of degradation of land surfaces by the ordinary agents of denudation. Evidences of shallow water conditions are abundant; very fre- quently on the bedding surfaces of sandstones and other rocks we find cracks made by the sun’s heat and pittings caused by the showers that fell from the Cambrian sky, and these records of the weather of this remote period are pre- served as sharply and clearly as those made only to-day on our tidal reaches. Ripple marks and current bedding further point, to the shallowness of the water at the places where the rocks were made.

No Cambrian rocks are such as would be formed in the abysses of the sea— although the absence of well-developed eyes in the trilobites has led some to assume that this condition was an indication that the creatures lived in abyssal depths.

At the close of the pre-Cambrian, many of the deposits of that period must have been elevated into regions of fairly high ground; this we may assume from the nature of the Cambrian deposits which are mainly the product of the denudation of such ground. Over the land areas thus formed, the seas in Cambrian time gradually spread, laying down first the series known as Lower Cambrian, then by further encroachment on the land the wider spread Upper Cambrian deposits — in Europe, the middle series is the most extensive. Consequently, Cambrian strata are usually unconformable on older rocks.

During the general advance of the sea, local warpings of the crust may have given rise to shallow lagoon or inland-lake con- ditions. The common occurrence of red strata has been cited in support of this view.

Compared with some other periods, the Cambrian was free from

extensive volcanic disturbances, but in Wales and in Brittany the earlier portions of this period were marked by voluminous outpourings; a condition that was feebly reflected in central and southern Europe.

No definite conclusions can be drawn from the fossils as to the climatic peculiarities of the earth in Cambrian times. The red rocks may in some cases suggest desert conditions; and there is good reason to suppose that in what are now Norway and China a glacial cold prevailed early in the period.

Considerable variations occur in the thickness of Cambrian deposits, which may generally be explained by the greater

rapidity of deposition in some areas than in others. Nothing could be more striking than the difference between the thick- nesses in western and eastern Europe; in Brittany the deposits are over 24,000 ft. thick, in Wales at least 12,000 ft., in western England they are only 3000 ft., and in northern Scotland 2000 ft., while no farther east than Scandinavia the complete Cambrian succession is only about 400 ft. thick. Again, in North America, the greatest thicknesses are found along the mountainous regions on the west and on the east — reaching 12,000 ft. in the latter and probably nearly 40,000 ft. in the former (in British Columbia) — while over the interior of the continent it is seldom more than 1000 ft. thick.

Any attempt to picture the geographical conditions of the Cambrian period must of necessity be very imperfect. It was pointed out by Barrande that early in Palaeozoic Europe there appeared two marine provinces— a northern one extending from Russia to the British Isles through Scandinavia and northern Germany, and a southern one comprising France, Bohemia, the Iberian peninsula and Sardinia. It is assumed that some kind of land barrier separated these two provinces. Further, there is a marked likeness between the Cambrian of western Europe and eastern America; many fossils of this period are common to Britain, Sweden and eastern Canada; therefore it is likely that a north Atlantic basin existed. Prof. Kayser suggests thaf there was also a Pacific basin more extensive than at present; this is borne out by the similarity between the Cambrian faunas of China, Siberia and Argentina. The same author postulates an Arctic continent, bordering upon northern Europe, Greenland and North America; an African-

Brazilian continent across the present south Atlantic, and a marine communication between Australia and India, where the faunas have much in common. References. — The literature devoted to the Cambrian period is very voluminous, important contributions having been made by A. Sedgwick, Sir R. I. Murchison, H. Hicks, C. Lapworth, T. Groom, J. W. Salter, J. E. Marr, C. D. Walcott, G. F. Matthew, E. Emmons, E. Billings, J. Barrande, F. Schmidt, W. C. Brogger, 5, A. Tullberg, S. L. Torngrist, G. Linnarsson and many others. A good general account of the period will be found in Sir A. Geikie's Text-Book of Geology, vol. ii. 4th ed. 1903 (with references), and from an American point of view, in T. C. Chamberlin and R. D. Salisbury's Geology, vol. ii., 1906 (references to American sources). See also J. E. Marr, The Classification of the Cambrian and Silurian Rocks,ˆ 1883 (with bibliography up to the year of publication); A. Geikie Q. J. Geol. Soc, 1891, xlvii., Ann. address, p. 90; F. Freeh, " Die geographische Verbrcitung und Entwickelung des Cambrium," Compte Rendu. Congres Geol. Internat. 18 Q7, St-Petersbourg (1899); Geological Literature added to the Geological Society's Library, pub- lished annually since 1893. (J- A. H.)

CAMBRIC, a word derived from Kameryk or Kamerijk, the Flemish name of Cambrai, a town in the department of Nord, France, where the cloth of this name is said to have been first made. It was originally made of fine linen. There is a record of a privy purse expenditure in 1 530 for cambric for Henry VIII. 's shirts. Cambric has been used for many years in the manufacture of handkerchiefs, collars, cuffs, and for fine underclothing; also for the best shrouds, and for fine baby linen. The yarns for this cloth are of very fine quality, and the number of threads and picks often reaches and sometimes exceeds 120 per inch. Embroidery cambric is a fine linen used for embroidery. Batiste, said to be called after Baptiste, a linen-weaver of Cambrai, is a kind of cambric frequently dyed or printed. All these fabrics are largely copied in cheaper materials, mixtures of tow and cotton, and in many cases cotton alone, taking the place of the original flax line yarns.

CAMBRIDGE, EARLS AND DUKES OF. Under the Norman and early Plantagenet kings of England the earldom of Cam- bridge was united with that of Huntingdon, which was held among others by David I., king of Scotland, as the husband of earl Waltheof's daughter, Matilda. As a separate dignity the earldom dates from about 1340, when William V., count (after- wards duke) of Juliers, was created earl of Cambridge by King Edward III.; and in 1362 (the year after William's death) Edward created his own son, Edmund of Langley, earl of Cam- bridge, the title being afterwards merged in that of duke of York, which was bestowed upon Edmund in 13S5. Edmund's elder

son, Edward, earl of Rutland, who succeeded his father as duke of York and earl of Cambridge in 1402; appears to have resigned the latter dignity in or before 1414, as in this year his younger brother, Richard, was made earl of Cambridge. In the following year Richard was executed for plotting against King Henry V., and his title was forfeited, but it was restored to his son, Richard, who in 141 5 became duke of York in succession to his uncle Edward. Subsidiary to the dukedom of York the title was held by Richard, and after his death in 1460 by his son Edward, afterwards King Edward IV., becoming extinct on the fall of the Yorkist dynasty.

In 1619 King James I., anxious to bestow an English title upon James Hamilton, 2nd marquess of Hamilton (d. 1625), created him earl of Cambridge, a title which came to his son and successor James, 3rd marquess and first duke of Hamilton (d. 1649). In 1651 when William, 2nd duke of Hamilton, died, his English title became extinct.

Again bestowed upon a member of the royal house, the title of earl of Cambridge was granted in 1659 by Charles II. to his brother Henry, duke of Gloucester, only to become extinct on Henry's death in the following year. In 1661 Charles, the infant son of James, duke of York, afterwards King James II., was designated as marquess and duke of Cambridge, but the child died before the necessary formalities were completed. However, two of James's sons, James (d. 1667) and Edgar (d. 1671), were actually created in succession dukes of Cambridge, but both died in childhood. After the passing of the Act of Settlement in 1701 it was proposed to grant an English title to George Augustus, electoral prince of Hanover, who, after his grandmother, the electress Sophia, and his father, the elector George Louis, was heir to the throne of England; and to give effect to this proposal George Augustus was created marquess and duke of Cambridge in November 1706. The title lapsed when he became king of Great Britain and Ireland in 1727, but it was revived in 1801 in favour of Adolphus Frederick, the seventh son of George III. He and his son are dealt with below.

Adolphus Frederick, duke of Cambridge (1774-1850), was born in London on the 24th of February 1774. Having studied at the university of Gottingen, Adolphus Frederick served in the Hanoverian and British armies, and, in November 1801, was created earl of Tipperary and duke of Cambridge, becoming a member of the privy council in the following year. The duke is chiefly known for his connexion with Hanover. In 1813, on the conclusion of the war, the electorate of Hanover was raised to the rank of a kingdom, and in the following year the duke was appointed viceroy. He held this position until the separation of Great Britain and Hanover in 1837, and

displaying tact and moderation, appears to have ruled the country with great success during a difficult period. Returning to England the duke became very popular, and was active in supporting many learned and benevolent societies. He died in London on the 8th of July 1850. In 1818 he married Augusta (1797-1889), daughter of Frederick, landgrave of Hesse-Cassel. He left three children: his successor, George; Augusta Caroline (b. 1822), who married Frederick William, grand duke of Mecklenburg-Strelitz; and Mary Adelaide (1833-1897), who married Francis, duke of Teck.

George William Frederick Charles, duke of Cam- bridge (1819-1904), was born at Hanover on the 26th of March 1819. He was thus about two months older than his cousin,. Queen Victoria, and was for that period in the line of succession to the British throne. He was educated at Hanover by the Rev. J. R. Wood, a canon of Worcester. In November 1837, after he had served for a short time in the Hanoverian army, the rank of colonel in the British army was conferred upon him, and he was attached to the staff at Gibraltar from October 1838 to April 1839. After serving in Ireland with the 12th Royal Lancers, he was appointed in April 1842 colonel of the 17th Light Dragoons (now Lancers). From 1843 to 1845 he was colonel on the staff in the Ionian Islands, and was then promoted major-general. In October 1846 he took command of the Limerick district, and shortly afterwards of the Dublin district. In 1850 his father died, and he succeeded to the

dukedom. Being appointed inspector of cavalry in 1852, he held that post until 1854, when, upon the outbreak of the Crimean War, he was placed in command of the 1st division (Guards and Highland brigades) of the British army in the East. In June of the same year he was promoted lieutenant-general. He was present at the battles of the Alma, Balaklava and Inkerman, and at the siege of Sevastopol. On the 15th of July 1856 he was appointed general commanding-in-chief, on the 9th of November 1862 field marshal, and by letters patent, 1887, commander- in-chief. The long period during which he held the command of the army was marked by many changes. The Crimean War brought to light great administrative defects, and led to a re-grouping of the departments, which, with the whole personnel of the army, were brought under the authority of the secretary of state for war. The constitutional changes involved did not, however, affect seriously the organization of the military forces. Only in 1870, after

the successes of Prussia had created a pro- found impression, were drastic changes introduced by Card well into the entire fabric of the army. The objects of the reformers of 1870 were undoubtedly wise; but some of the methods adopted were open to question, and were strongly resented by the duke of Cambridge, whose views were shared by the majority of officers. Further changes were inaugurated in 1880, and again the duke found much to criticize. His opinions stand recorded in the voluminous evidence taken by the numerous bodies appointed to inquire into the condition of the army. They show a sound military judgment, and, as against innovations as such, a strong attachment to the old regimental system. That this judgment and this attachment were not so rigid as was generally supposed is proved by his published correspondence. Throughout the period of change, while protesting, the duke invariably accepted and loyally endeavoured to carry out the measures on which the government decided. In a memorandum addressed to Mr Childers in 1880 he defined his attitude as follows:— ” Should it appear, however, that for reasons of state policy it is necessary that the contemplated changes should be made, I am prepared to carry them out to the best of my ability.” This attitude he consistently maintained in all cases in which his training and associations led him, rightly or wrongly, to deprecate changes the need for which was not apparent to him. His judgment was especially vindicated in the case of an ill-advised reduction of the artillery carried out by Mr. Stanhope. Under the order in council of February 1888, the whole responsibility for military duties of every kind was for the first time centred upon the commander-in-chief. This, as pointed out by the Hartington commission in 1890, involved ” an excessive centralization ” which ” must necessarily tend to weaken the sense of responsibility of the other heads of departments, and thus to diminish their efficiency.” The duke of Cambridge, whose position entailed many duties apart from those strictly apper- taining to a commander-in-chief, could not give personal atten- tion to the vast range of matters for which he was made nominally responsible. On the other hand, the adjutant-general could act in his name, and the secretary of state could obtain military advice from officials charged with no direct responsibility. The effect was to place the duke in a false position in the eyes of the army and of the country. If the administration of the army suffered after 1888, this was due to a system which violated principles. His active control of its training during the whole period of his command was less hampered, and more directly productive of good results.

Throughout his long term of office the duke of Cambridge evinced a warm interest in the welfare of the soldier, and great experience

combined with a retentive memory made him a master of detail. He was famous for plain, and strong, language; but while quick to condemn deviations from the letter of regulations, and accustomed to insist upon great precision in drill, he was never a martinet, and his natural kindliness made him ready to bestow praise. Belonging to the older generation of soldiers, he could not easily adapt himself to the new conditions, and in dispensing patronage he was some- what distrustful of originality, while his position as a member of

the royal family tended to narrow his scope for selection. He was ‘ thus inclined to be influenced by considerations of pure seniority, and to underrate the claims of special ability. The army, however, always recognized that in the duke of Cambridge it had a commander-in-chief devoted to its interests, and keenly anxious amid many difficulties to promote its well-being. The duke resigned the commandership-in-chief on the 1st of November 1895, and was succeeded by Lord Wolseley, the duties of the office being considerably modified. He was at the same time gazetted honorary colonel-in-chief to the forces. He was made ranger of Hyde Park and St James’s Park in 1852, and of Richmond Park in 1857; governor of the Royal Military Academy in 1862, and its president in 1870, and personal aide- de-camp to Queen Victoria in 1882. He died on the 17th of March 1904 at Gloucester House, London. The chief honours conferred upon him were: G.C.H., 1825; K.G., 1835; G.C.M.G., 1845; G.C.B., 1855; K.P., 1861; K.T., 1881. From 1854 he was president of Christ’s hospital. The duke of Cambridge was married to Louisa Fairbrother, who took the name of FitzGeorge after her marriage. She died in 1890.

See Rev. E. Sheppard, George, Duke of Cambridge; a Memoir of his Private Life (London, 1906) ; and Willoughby Verner, Military Life of the Duke of Cambridge (1905).

CAMBRIDGE, RICHARD OWEN (1717-1802), English poet, was born in London on the 14th of February 1717. He was educated at Eton and at St John’s College, Oxford. Leaving the university without taking a degree, he took up residence at Lincoln’s Inn in 1737. Four years later he married, and went to live at his country seat of Whitminster, Gloucestershire. In 1751 he removed to Twickenham, where he enjoyed the society of many notable persons. Horace Walpole in his letters makes many jesting allusions to Cambridge in the character of news- monger. He died at Twickenham on the 17th of September 1802. His chief work is the Scribleriad (r75i), a mock epic poem, the hero of which is the Martinus Scriblerus of Pope, Arbuthnot and Swift. The poem is preceded by a dissertation on the mock heroic, in which he avows Cervantes as his master. The satire shows considerable

learning, and was eagerly read by literary people; but it never became popular, and the allusions, always obscure, have little interest for the present-day reader. He made a valuable contribution to history in his Account of the War in India . . . on the Coast of Coromandel from the year 17 50 to 1760 . . . (1761). He had intended to write a history of the rise and progress of British power in India, but this enterprise went no further than the work just named, as he found that Robert Orme, who had promised him the use of his papers, contemplated the execution of a similar plan.

The Works of Richard Owen Cambridge, Esq., including several Pieces never before published, with an Account of his Life and Char- acter by his Son, George Owen Cambridge (1803), includes, besides the Scribleriad, some narrative and satirical poems, and about twenty papers originally published in Edward Moore's paper called The World. His poems are included in A. Chalmers's English Poets(i8l6).

CAMBRIDGE, a municipal and parliamentary borough, the seat of a university, and the county town of Cambridgeshire, England, 56 m. N. by E. of London by the Great Eastern railway, served also by the Great Northern, London & North- western and Midland lines. Pop. (1901) 38,379. It lies in a flat plain at the southern border of the low Fen country, at an elevation of only 30 to 50 ft. above sea-level. The greater part of the town is situated on the east (right) bank of the Cam, a tributary of the Ouse, but suburbs extend across the river. To the south and west the slight hills bordering the fenland rise gently. The parliamentary borough of Cambridge returns one member. The municipal borough is under a mayor, 1 2 aldermen, and 36 councillors. Area, 3233 acres.

Cambridge University 1 shares with that of Oxford the first place among such institutions in the British empire. It is the dominating factor in the modern importance of History the town, and it is therefore necessary to outline the historical conditions which led to its establishment. The geographical situation of Cambridge, in its present appearance 1 See also Universities.

possessing little attraction or advantage, calls nevertheless for first consideration. Cambridge, in fact, owed its growth to its position on a natural line of communication between the east and the midlands of England, flanked on the one hand by the deep forests which covered

the uplands, on the other by the unreclaimed fens, then desolate and in great part impenetrable. The import- ance of this highway may be judged from the number of early earthworks in the vicinity of Cambridge; and the Castle Hill, at the north side of the present town (near the west bank of the river), is perhaps a British work. Roman remains discovered in the same locality give evidence of the existence of a small town or village at the junction of roads; the name of Camboritum is usually attached to it, but without certainty. The modern name of Cambridge has no connexion with this. The present form of the name has usually been derived from a corruption of the original name Grantebrycge or Grantabridge (Skeat); but Mr Arthur Gray points out that there is no documentary evidence for this corruption in the shape of such probable intermediate forms as Grantebrig or Crantebrig. On the other hand, he brings evidence to show that the name Cantebrig, though not applied to the whole town, was very early given to that quarter of it near the Cante brig, i.e. the bridge over the Cante (the ward beyond the Great Bridge was called " Parcelle of Cambridge " as late as 1340); in this quarter, close to the bridge, Cambridge castle was built by the Conqueror, and from the castle and the castle- quarter the name spread within sixty years to the whole town, the similarity between the names Grantebrig and Cantebrig playing some part in this extension (The Dual Origin of the Town of Cambridge, p. 3 1) . Granta is the earlier and still an alternative name of the river Cam, this more common modern form having been adopted in sympathy with the modern name of the town. Cambridge had a further importance from its position at the head of river navigation, and a charter of Henry I., in which the town is already referred to as a borough, grants it exclusive rights as a river-port, and regulates traffic and tolls. The wharves lay principally along that part of the river where are now the celebrated " backs " of some of the colleges, whose exquisite grounds slope down to the water. The great Sturbridge or Stourbridge Fair at Barnwell, formerly one of the most important in England, is a further illustration of the ancient commercial importance of Cambridge; the oldest known charter concerning it dates from the opening of the 13th century, though its initiation may perhaps be placed a century before.

Concerning the early municipal history of Cambridge little is known, but at the time of the Domesday survey its citizens felt themselves strong enough to protest against the exactions of the Norman sheriff, Roger Picot; and the town had attained a considerable degree of importance when, in 1068, William the Conqueror built a castle on the site known as Castle Hill, and used it as a base of operations against Hereward the Wake and the insurgents of the fenland.

Cambridge, however, has practically no further military history. From the 14th century onward materials were taken from the castle by the builders of colleges, while the gatehouse, the last surviving portion, was removed in

1842.

The medieval spirit of emulation between the universities of Cambridge and Oxford resulted in a series of remarkable fables to account for the foundation of both. That of Cambridge was assigned to a Spanish prince, Cantaber, in the 4321st year after the Creation. A charter from King Arthur dated 531, and the transference of students from Cambridge to Oxford by King Alfred, were also claimed as historical facts. The true germ of the university is to be sought in the religious foundations in the town. The earliest to be noticed is the Augustinian house of St Giles, founded by Hugoline, wife of Roger Picot the sheriff, in 1092; this was removed in n 12 to Barnwell, where the chapel dedicated to St Andrew the Less is practically the sole remnant of its buildings. In 1224 the Franciscans came to Cambridge, and later in the same century a number of other religious orders settled here, such as the Dominicans, the Gilbertines and the Carmelites, who had before been established at Newnham. Students were gradually attracted to these several religious

houses, and Cambridge was already recognized as a centre of learning when, in 1 231, Henry III. issued a writ for its governance as such, among other provisions conferring certain disciplinary powers on the bishop of Ely. It soon became evident that the influence of the religious orders on those who came to them for instruction was too narrow. This was recognized elsewhere, for it was in order to counteract that influence that Walter de Merton drew up the statute of governance for his foundation of Merton College, Oxford, a statute which was soon afterwards used as a model by Hugh de Balsham, bishop of Ely, when, in 1 281-1284 he founded the first Cambridge college, Peterhouse.

The friction between town and university, due in the main to the conflict of their jurisdictions, the tradition of which, as in the sister university, died hard in the annual efforts of some under- graduates to revive the ” town and gown ” riots, culminated during the rebellion of Wat Tyler (1381) in an episode which is alone worthy of record and may serve to illustrate the whole. This was an attack by the rabble, instigated, it is said, by the more reputable townspeople, on the colleges, several of which were sacked. The attack was ultimately defeated by the courage and resource of Henry Spenser or Le

Dispencer, bishop of Norwich. The relations of the university of Cambridge with the crown were never so intimate as those of Oxford. Henry III. fortified the town with two gates, but these were burnt by the rebellious barons; and in much later times the two first of the Stuart kings, and the two first of the Georges, cultivated friendly personal relations with the university. During the civil war the colleges even melted down their plate for the war chest of King Charles; but Cambridge showed little of the stubborn royalism of Oxford, and submitted to the Commonwealth without serious resistance.

The history of collegiate foundation in Cambridge after that of Peterhouse may be followed through the ensuing description of the colleges, but for ease of reference these are dealt colieees with in alphabetical order. The main street which traverses the town from south to north, parallel to, and at a short distance from the river, is known successively as Trumping- ton Street, King's Parade, Trinity Street, St John's Street and Bridge Street. The majority of the colleges lie on either side of this street, and chiefly between it and the river. Those of St John's, Trinity, Trinity Hall, Clare, King's and Queens' present the famous " backs " towards the river, which is crossed by a series of picturesque bridges leading to the gardens and grounds on the opposite bank.

Christ's College is not among the group indicated above; it stands farther to the east, in St Andrew's Street. It was founded in 1505 by the Lady Margaret Beaufort, mother of Henry VII. It incorporated God's House, which had been founded by William Bingham, a cleric of London, in 1439, had been removed when the site was required for part of King's College, and had been refounded with the countenance of Henry VI. in 1448. This was a small house, but the Lady Margaret's endowment provided for a master, twelve fellows and forty-seven scholars. Edward VI. added another fellowship and three scholarships and the present number of fellows is fifteen. There are certain exhibitions in election to which preference is given to schools in the north of England — Giggleswick, Kirkby Lonsdale, Skipton and Sedbergh. The buildings of Lady Margaret's foundation were in great part faced in classical style in the 17th century; a building east of the old quadrangle is also of this period, and is ascribed to Inigo Jones. The rooms occupied by the foundress herself are preserved, though in an altered condition, as are those of the poet Milton, who was educated here, and with whom the college has many associations. In the fine gardens is an ancient mulberry tree believed to have been planted by him. Among illustrious names connected with this college are John Leland the antiquary, Archdeacon Paley, author of the

Evidences, and Charles Darwin, while Henry More and others of the school of Cambridge Platonists in the 17th century were educated here.

Clare College lies close to the river, south of Trinity Hall. In 1326 the university erected a hall, known as University Hall, to accommodate a number of students, and in 1338 Elizabeth de

Burgh, countess of Clare, re-endowed the hall, which took the name of Clare Hall, and only became known as college in 1856. There was a strong ecclesiastical tendency in this foundation; six out of the twenty fellows were to be priests when elected. The foundation now consists of a master and fifteen fellows, besides scholars, of whom three receive emoluments from the endowment of Lady Clare. The old college buildings were in great part destroyed by fire in 1521; the present buildings date from 1638 to 1715, and are admirable examples of their period. They surround a very beautiful quadrangle, and the back towards the river is also fine. Unconfirmed tradition indicates the poet Chaucer as an alumnus of this college; other famous men associated with it were Hugh Latimer the martyr, Ralph Cudworth, one of the ” Platonists,” and Archbishop Tillotson.

Corpus Christi College (commonly called Corpus) stands on the east side of Trumpington Street. The influence of medieval gilds in Cambridge, the character of which was primarily religious, was exceedingly strong. About the be- ginning of the 14th century there is first mentioned the gild of St Mary, which was connected with Great St. Mary’s church. The gild was at this time prosperous, but about 1350, when the idea of the foundation of a college by the gilds was matured, the fraternity of St Mary lacked the means to proceed save by amalgamating with another gild, that of Corpus Christi. The age of this institution, whose church was St Benedict’s or St Bene’t’s, is not known. By the two gilds, therefore, the “House of Scholars of Corpus Christi and the Blessed Virgin Mary” was founded in 1352, the foundation being the only instance of its kind. In early times it was commonly known as St Bene’t’s from the church connected with the Corpus gild which stands over against the college, and served as its chapel for nearly three centuries. The foundation consists of a master and twelve fellows, with scholars of the old and later foundations. The ancient small quadrangle remains, and is of historical rather than architectural interest. The great quadrangle dates from 1823-1825.

The library contains the famous collection of MSS. bequeathed by .Archbishop Matthew Parker, alumnus of the college, in the 16th century.

Downing College is in the southern part of the town, to the east of Trumpington Street. Sir George Downing, baronet, of Gamlingay Park, who died in 1749, left estates to various relations, who died without issue. In this event, Downing's will provided for the foundation of a college, but the heirs contested the will with the university, and in spite of a decision against them in 1769, continued to hold the estates for many years, so that it was not until 1800 that the charter for the college was obtained. The foundation-stone was laid in 1807, and the two ranges of buildings, in classical style, represent all that was completed of an intended quadrangle. The foundation consists of a master, professors of English law and of medicine, six fellows and six scholars.

Emmanuel College overlooks St Andrew's Street. It was founded in 1 584 by Sir Walter Mildmay (c. 1 5 20-1 589) , chancellor of the exchequer and privy councillor under Queen Elizabeth. The foundation, considerably enlarged from the original, consists of a master, sixteen fellows and thirty scholars. There are further scholarships on other foundations which are awarded by pre- ference to pupils of Uppingham and other schools in the midlands. Emmanuel was noted from the outset as a stronghold of Puritan- ism; it is indeed recorded that Elizabeth rallied the founder on his intention that this should be so. Mildmay assuredly had the welfare of the church primarily at heart, and he attempted to provide against the life residence of fellows, which he con- sidered an unhealthy feature in some colleges. The site of Emmanuel was previously occupied by a Dominican friary, and some of its buildings were adapted to collegiate uses. There is only a little of the earliest building remaining; the greater part Of the present college dates from the second half of the 18th century. The chapel, however, is by Sir Christopher Wren (1677). Richard Holdsworth, Gresham professor, and William Sancroft, archbishop of Canterbury, were masters of this college; I

Bishops JoseprrTTall and Thomas Percy were among its alumni, as was John Harvard, principal founder of the great American college which bears his name.

Gonville and Caius College (commonly called Caius, pronounced Kees), stands mainly on the west side of Trinity Street. It arose out of an earlier foundation. In 1348 Edmund Gonvile or Gonevill founded the hall of the Annunciation of the Blessed Virgin, which was

commonly called Gonville Hall, for the education of twenty scholars in dialectic and other sciences, with endowment for a master and three fellows. This hall stood on part of the present site of Corpus, but on the death of its founder in 1351 it was moved to the north-west corner of the site of the present Caius, by William Bateman, bishop of Norwich and founder of Trinity Hall. The famous physician John Caius (q.v.) , who was educated at this small institution, later conceived the idea of refounding and enlarging it, obtained a charter to do so in 1557, and became master of the new foundation of Gonville and Caius College. The foundation consists of a master and not less than twenty- two fellows, exclusive of the provision under the will of William Henry Drosier (d. 1889), doctor of medicine and fellow of the college, for the endowment of seven additional fellowships. Since its refoundation by Caius, the college has had a peculiar connexion with the study of medicine, while, besides many eminent physicians, Sir Thomas Gresham, Judge Jeffreys, Robert Hare, Jeremy Taylor, Henry Wharton and Lord Thurlow are among its noted names. Three sides of the main quadrangle, Tree Court, including the frontage towards Trinity Street, are modern (1870). The interior of this court is picturesque, and the design of the smaller Caius Court was inspired by Caius himself. He also designed the gates of Honour, Virtue and Humility, of which the two first stand in situ; the gate of Honour is a peculiarly good example of early Renaissance work. Caius is buried in the chapel.

Jesus College lies apart from and to the north-east of the majority of the colleges. It was founded in 1496 by John Alcock, 1 bishop of Ely. The site was previously occupied by a Benedictine nunnery dedicated to St Radigund, which was already in existence in the first half of the 12th century and was claimed by Alcock to have been founded from Ely, to the bishops of which it certainly owed much. The name given to Alcock's college was that of " the most Blessed Virgin Mary, St John the Evangelist, and the glorious Virgin Saint Radigund," but it appears that the founder himself intended the name to be Jesus College. He provided for a master and six fellows, but the foundation now consists of a master and sixteen fellows, with twenty scholars or more. There are several further scholarships confined to the sons of clergymen of the Church of England. Architecturally Jesus is one of the most interesting colleges in Cambridge, for Alcock retained, and there still remains, a con- siderable part of the old buildings of the nunnery. The most important of these is the church, which Alcock, by removing most of the nave and other portions, converted into the usual form of a college chapel. The tower, however, is retained. The bulk of the building is an admirable example of Early English work, but there are

traces of Norman; and Alcock added certain Perpendicular features. Of the rest of the college buildings, the hall is Alcock's work, the brick gatehouse is a fine structure of the close of the 15th century, while the cloister is a little later, and stands on the site of the nuns' cloister. Another court dates from the 17th and early 18th centuries, and there is a considerable amount of modern building. The most famous name connected with Jesus College is that of Cranmer. Among many others are Sir Thomas Elyot, John Bale, John Pearson, bishop of Chester, Hugh Peters, Gilbert Wakefield, Thomas Malthus, Laurence Sterne and Samuel Taylor Coleridge.

King's College has its fine frontage upon the western side of King's Parade. It was founded by King Henry VI. in 1441. The first site was small and circumscribed, and in 1443 the existing site was with difficulty cleared of dwellings. The king designed a close connexion between this college and his other foundation at Eton; he provided for a provost and for seventy scholars, all of whom should be Etonians. In 1861 open scholarships

were instituted, and the foundation now consists of a provost, forty-six fellows and forty-eight scholars. Half the scholarships are still appropriated to Eton. An administrative arrangement peculiar to King's College is that by which the provost has absolute authority within its walls, to the exclusion of officers of the University. The chief architectural ornament of the college, and one of the most notable in the town, is the magnifi- cent Perpendicular chapel, comparable with those of St George at Windsor and Henry VII. at Westminster Abbey. The building was begun in 1446, and extended (apart from the interior fittings) over nearly seventy years. Within, the most splendid features are the fan-vaulting which extends throughout the chapel, the noble range of stained-glass windows, which date for the most part from the early part of the 16th century, and the wooden organ screen, which, with part of the stalls, is of the time of Henry VIII. The college services are celebrated for the beauty of their music. The bulk of the other collegiate buildings are of the 18th century or modern. The old court of King's College is occupied by the modern university library, north of the chapel; the gateway, a good example (1444), is preserved. John Frith the Martyr, Richard Croke, Giles Fletcher, Richard Mulcaster, Sir William Temple, William Oughtred, the poet Waller, and Horace Walpole and others of his family are among many illustrious alumni of the college.

Magdalene College (pronounced Maudlin) stands on the west bank of the Cam, near the Great Bridge. In 1428 the Bene- dictines of Crowland Abbey founded a home for student monks on this site, and in 15 19 Edward, duke of Buckingham, partly secularized this institution by founding Buckingham College in connexion with it. After the dissolution of the monastery, Thomas, Baron Audley of Walden, erected Magdalene in place of the former house in 1542. The foundation consists of a master and seven fellows, besides scholars. There are some valuable exhibitions appropriated to Wisbech school. The appointment of the master is peculiar, the office being in the gift of the occupant of Audley End, an estate near Saffron Walden, Essex. Some parts of the original building are preserved, but the most notable portion of the college is the Pepysian library, dating c. 1 700. It contains the very valuable collection of books bequeathed by Samuel Pepys to the college, at which he was a student. Buckingham College had Archbishop Cranmer as a lecturer; Charles Kingsley and Charles Stewart Parnell were educated at Magdalene.

Pembroke College stands to the east of Trumpington Street. It was founded in 1347 by Mary de St Paul, widow of Aylmer de Valence, carl of Pembroke. Henry VI. made notable bene- factions to it. The foundation consists of a master and thirteen fellows, and there are six scholarships on the original foundation, besides others of later institution. The older existing buildings are mainly of the 18th century, but much of the original fabric was removed and rebuilt in 1874. The chapel is of the middle of the 17th century, and is ascribed to Sir Christopher Wren. The poets Spenser and Gray, Nicholas Ridley the martyr, Archbishop Whitgift and William Pitt were associated with this college; and from the number of bishops whose names are associated with it the college has obtained the style of collegium episcopale.

Petcrhousc or St Peter's College is on the west side of Trump- ington Street, almost opposite Pembroke. It has already been indicated as the oldest Cambridge college (1284). Hugh de Balsham, the founder, had settled some secular scholars in the ancient Augustinian Hospital of St John in 1280, but the experi- ment was not a success. Nor did he carry out his full intentions as regards Peterhouse, the foundation of which followed on the failure of the fusion of his scholars with the hospital; but Simon Montagu, his successor in the bishopric of Ely, carried on his work, and in 1344 gave the college a code of statutes in which the influence of the Merton code is plainly visible. A master and fourteen fellows formed the original foundation, but the present consists of a master, and not less than eleven fellows and twenty- three scholars. The hall retains some original work; it was first built out of a legacy

from the founder. The library building (c. 1590) is due to a legacy from Dr Andrew Pernc I

(master 1554-1580) ; and Dr Matthew Wren (master 1625-1634), uncle of the famous architect Sir Christopher Wren, directed the building of the chapel and cloisters. The most famous name connected with the college is that of Cardinal Beaufort.

Queens' College stands at the south of the riverside group, and one of its ranges of buildings rises immediately from the river. A college of St Bernard had been established in 1445 by Andrew Docket or Dokett, rector of St Botolph's church, who had also been principal of a hostel, or students' lodge, of St Bernard. He sought and obtained the patronage of Margaret of Anjou, wife of Henry VI., who undertook the foundation of a new house on another site in 1448, to bear the name of Queens'. Docket became the first master. In 1465 Elizabeth Woodville, wife of Edward IV., became the college's second foundress. The foundation consists of a president and eleven fellows. The buildings are exceedingly picturesque. The main quadrangle, of red brick, was completed very soon after the foundation. The smaller cloister court, towards the river, retains building of the same period, and the beautiful wooden gallery of the president's lodge deserves notice. Another court is called Erasmus's; the rooms which he is said to have occupied remain, and a walk in the college garden across the river bears his name.

St Catharine's College, on the west side of Trumpington Street, was founded by Dr Robert Woodlark or Wodelarke, chancellor of the university and (1452) provost of King's College. It was opened in 1473, but the charter of incorporation dates from 1475. The foundation provided for a master (Woodlark being the first) and three fellows; there are now six fellows, and twenty-six scholars. The principal buildings, surrounding a court on three sides, date mainly from a complete reconstruction of the college at the close of the 17th century.

St John's College, at the north of the riverside group of colleges, was founded in 1511 by the Lady Margaret Beaufort, also foundress of Christ's College. It replaced the Hospital of St John, which dated from the early years of the 13th century, and has been mentioned already in connexion with Peterhouse. The Lady Margaret died before the college was firmly established, and her designs were not carried out without many difficulties, which were overcome chiefly by the exertions of John Fisher, bishop of Rochester, one of her executors. Thirty-two fellow- ships were endowed, but subsequent endowments

allowed extension, and the foundation now consists of a master, fifty-six fellows, sixty scholars and nine sizars. A large number of exhibitions are appropriated to special schools. Of the four courts of St John's, the easternmost is the original, and has a very fine Tudor gateway of brick. The chapel is modern (1863-1869), an ornate example of the work of Sir Gilbert Scott. The second court, practically unaltered, dates from 1 598-1602. In this there is a beautiful Masters' gallery, panelled, with a richly-moulded ceiling; it is now used as a combination room or fellows' common- room. The third court, which contains the library (1624), backs on to the river, and the fourth, which is on the opposite bank, was built c. 1830. A covered bridge connects the two, and is commonly called the Bridge of Sighs from a certain resemblance to the bridge of that name at Venice. Among the notable names connected with this college are Cecil, Lord Burghley, Thomas Cartwright, Wentworth, earl of Strafford, Roger Ascham, Richard Bentley, John Cleveland, the satirist, Thomas Baker, the historian, Lord Palmerston, Professor Adams, Sir John Herschel, Bishop Colenso, Dr Benjamin Kennedy, Dean Merivale, Home Tooke, Samuel Parr and William Wilberforce, and the poets Herrick (afterwards of Trinity Hall) and Wordsworth.

Selwyn College, standing west of the river (Sidgwick Avenue), was founded in 1882 by public subscription in memory of George Augustus Selwyn, bishop of New Zealand and afterwards of Lichfield, for the purpose of giving university education with economy " combined," according to the charter, " with Christian training, based upon the principles of the Church of England."

Sidney Sussex College faces Sidney Street. It was founded under the will (1588) of the Lady Frances Sidney, dowager countess of Sussex (d. 1589), and received its charter in 1S96. The foundress provided for a master, ten fellows and twenty

scholars, but thirty-six scholarships are now provided. The original buildings were of brick, but they were plastered over and greatly altered by Wyatville about 1830. The Grey Friars had occupied the site, and part of their buildings remained in the chapel until 1777. A beautiful block of new buildings, with a cloister, was erected in 1890. The most famous name associated with the college is that of Oliver Cromwell, who was a fellow commoner, as also was Thomas Fuller, author of the Worthies of England.

Trinity College, the front of which is on Trinity Street, is the largest collegiate foundation in Cambridge, and larger than any in Oxford. It was founded in 1546 by King Henry VIII. and absorbed several earlier institutions — King's Hall (founded by Edward III. in 1336), St Michael's or Michaelhouse (founded by Hervey de Stanton, chancellor of the exchequer under Edward II., in 1323), Fyswick or Physick's Hostel, belonging to Gonville Hall, and other hostels. Henry's original foundation was for a master and sixty fellows and scholars, but Queen Mary and other later benefactors enabled extensions to be made, and the foundation now consists of a master (appointed by the crown), at least sixty fellows, seventy-four scholars and sixteen sizars, with minor scholars, chaplains librarian and the regius professors of Divinity, Hebrew and Greek. Major scholarships are open to undergraduates, not being of standing to take the degree of bachelor of arts, as well as to non-members of the university under nineteen years of age, while minor scholarships and exhibitions are open only to the latter. There are valuable exhibitions appropriated to certain schools, of which the most important are those confined to Westminster school. Trinity College is entered from Trinity Street by the King's Gateway (1518-1535) preserved from King's Hall, but subsequently altered. The principal or Great Court is the largest in Cambridge and very fine. Its buildings are of different dates. In the centre is a picturesque fountain, erected by Thomas Neville, master (1593-1615), under whose direction much of the building was carried out. The chapel on the north side of the court was begun in the reign of Mary. The carved oak fittings within date from the mastership of Richard Bentley (1 700-1 742). The organ is particularly fine. A statue of Sir Isaac Newton by Roubiliac stands in the antechapel, and Richard Porson and William Whewell are buried here. The hall on the west of the court is Neville's work (1605), and very beautiful. The second court is also his foundation and bears his name. The library on the west side is the work of Sir Christopher Wren. Its interior is excellent, and besides busts of some of the vast number of famous men connected with Trinity, it contains a statue of Lord Byron by the Danish sculptor Thorvaldsen. The New Court, Gothic in style, was begun in 1823. The beautiful grounds and walks of the college extend down to and beyond the river. The college has extended its buildings to the opposite side of Trinity Street, where the two courts known as Whewell's Hostel were built (c. i860) at the charge of Dr William Whewell during his mastership. The eminent alumni of this great college are too numerous to admit of selection.

Trinity Hall, which lies near the river, south of Trinity, was founded by William Bateman, bishop of Norwich, in 1350. On the site there

had been, for about twenty years before the founda- tion , a house of mona stic students from Ely. The present college is alone in preserving the term Hall in its title. The foundation consists of a master and thirteen fellows, and the study of law, which the founder had especially in mind, is provided for by lectureships, and not less than three studentships tenable by graduates of the college. The buildings are for the most part modern or modernized, but the interior of the library well preserves its character of the early part of the 17th century.

Of the churches of Cambridge one has long been recognized as the church of the university, namely Great St Mary's, which

stands in the centre of the town, between King's buildings* P ara de and Market Hill. It is a fine Perpendicular

structure, founded in 1478; but the tower was not completed until 1608. Some Decorated details are preserved from a former building. The university preachers deliver their

sermons in this church, but it was formerly the meeting-place of the university for the transaction of business, for learned disputations and for secular festivals. The " Cambridge chimes " struck by the clock are famous, and a curfew is rung each evening on the great bell. The Senate House, standing opposite Great St Mary's, dates from 1730 and is classical in style. The buildings of the university library, in the immediate vicinity, enclose two quadrangles, and in part occupy the site of the old court of King's College. One of the quadrangles was formerly occupied by the schools or lecture rooms, but as the library grew it usurped their place. Important modern ad- ditions date from 1842, 1864 and 1888. The facade of the old schools is an excellent work of 1758. The library is one of those which is entitled to receive, under the Copyright Act, a copy of every book published in the United Kingdom. The Fitzwilliam Museum, a massive classical building, was begun in 1837 to contain the bibliographical and art collection bequeathed by Richard, Viscount Fitzwilliam, in 18 16. The museum of archaeology (classical, general and local, 1884), is connected with the Fitzwilliam Museum. The Pitt Press (1833), housing the university printing establishment, was begun out of the residue of a fund for erecting the statues of William Pitt in Hanover Square, London, and Westminster Abbey. It stands near Pembroke, Pitt's college. The Selwyn Divinity School (1879), opposite St John's College, was built largely at the charge of Dr William Selwyn, Lady Margaret professor of divinity. The museums and lecture rooms (begun in 1863) are extensive buildings on each side of Downing Street. Include?! in these

are the museum of zoology, which had its origin in collections made by Sir Busick Harwood, professor of anatomy in 1785-1814, and contains the collection of fishes made by Charles Darwin in the ship “Beagle”; the medical school, botanical museum and herbarium, mineralogical museum, engineering laboratory (1894), optical and astronomical lecture room, chemical laboratory (1887), and the Cavendish laboratory for physical research (1874), the gift of William Cavendish, 7th duke of Devonshire and chancellor of the university. The Sedgwick Geological Museum, opened by King Edward VII. in 1904, commemorates Adam Sedgwick, Woodwardian pro- fessor of geology, and originated in the collections of Dr John Woodward (d. 1728). Adjoining this building, in Down- ing Street is the law library, founded on a bequest from Miss Rebecca Flower Squire (d. 1898) with the law school. The observatory (1824) is on the outskirts of the town in Mad- ingley Road, and the botanic garden (founded 1762, and removed to its present site in 1831) borders Trumpington Road. The club-rooms and debating hall of the Cambridge Union Society are adjacent to the Holy Sepulchre church.

The non-collegiate students of the university (i.e those who receive the university education and possess the same status as collegiate students without belonging to any college) have lecture and other rooms and a library in Fitzwilliam Hall. This body was created in 1869. The students reside in lodgings. There are two women’s colleges — Girton, established in 1873 on the north-western outskirts of the town, having been previously opened at Hitchin in 1869, and Newnham (1875), originally (1873) a hall of residence for students attending special lectures for women. Among other educational establishments mention must be made of the Leys school, founded in 1875 by prominent Wes- leyans for non-sectarian education, and the Perse School, an ancient foundation remodelled in 1902.

Out of a number of ancient churches in Cambridge, two, besides Great St Mary’s, deserve special notice. In St Bene- dict’s or Benet’s, which has been already mentioned in connexion with Corpus College, the tower is of uni y ers i ty great interest, being the oldest surviving building in buildings. Cambridge, of pre-Norman workmanship, having rude ornamentation on the exterior and the tower arch within. The church of the Holy Sepulchre in Bridge Street is one of the four ancient round churches in England. Its supposed date is 1120- 1140, but although it is doubtless to be associated with the Knights Templars, the circumstances of its foundation are not

adminis- tration.

known. The chancel is practically a modern reconstruction, and an extensive restoration, which has been adversely criticized, was applied by the Cambridge Camden Society to the whole fabric in 1841. At several of the villages neighbouring or suburban to Cambridge there are churches of interest, as at Chesterton, Trumpington, Grantchester (where the name indi- cates a Roman station, borne out by the discovery of remains), Fen Ditton and Barnwell, near which is the Norman Sturbridge chapel. In Cambridge itself there is a Norman house, .much altered, which by a tradition of unknown origin bears the name of the School of Pythagoras.

The university is a corporate body, including all the colleges. These, however, are also corporations in themselves, and have University tneir own statutes, but they are further subject to the constttu- paramount laws of the university. The university Hon and statutes of Queen Elizabeth were only replaced in 1858. The statutes as revised by a commission in that year were soon found to require emendation; in 1872 another commission was appointed, and in 1882 new statutes received the approval of the queen in council. The head of the university is the chancellor. He is a member of the university, of high rank and position, elected by the senate. Being generally non-resident, he delegates his administrative duties to the vice-chancellor, who is the head of a college, and is elected for one year by the senate. The principal executive officers under the vice-chancellor are as follows. The two proctors have as their main duty that of disciplinary officers over the members of the university in statu pupillari. In each year two colleges nominate one proctor each, according to a fixed rotation which gives the larger colleges a more frequent choice than the smaller. The proctors are assisted by four pro-proctors. The public orator is the spokesman of the senate upon such public occasions as the conferring of honorary degrees. The librarian has charge of the university library. The registrary, with his assistant, records the proceedings of the senate, &c, and has charge of documents. The university returns two members to parliament, elected by the members of the senate. The chancellor and sex viri (elected by the senate) form a court for offences against the university statutes by members not in statu pupillari. The chancellor and six heads of colleges, appointed by the senate, form a court of discipline for members in statu pupillari.

The senate in congregation is the legislative body. Those who have

votes in it are the chancellor, vice-chancellor, doctors of divinity, law, medicine, science, letters and music, and masters of art, law, surgery and music. The council of the senate, consisting of the chancellor, vice-chancellor, four heads of colleges, four professors and eight other members of the senate chosen by the vice-chancellor, brings all proposals (called Graces) before the senate. The revenues of the university are derived chiefly from fees at matriculation, for certain ex- aminations, and for degrees, from a tax upon all members of the university, and from contributions by the colleges, together with the profits of the University Press. A financial board, consisting of the vice-chancellor ex officio and certain elected members, administers the finances of the university. There are boards for each of the various faculties, and a General Board of Studies, with the vice-chancellor at the head. There are university professors, readers or lecturers in a large number of subjects. The oldest professorship is the Lady Margaret professorship of divinity, instituted by the founders of Christ's and St John's Colleges in 1502. In 1540 Henry VIII. founded the regius professorships of divinity, civil law, physic, Hebrew and Greek.

The head of a college generally bears the title of master, as indicated above in the account of the several colleges. It has College a ' so been seen that the foundation of each college organiza- includes a certain number of fellows and scholars. Hon— The affairs of the college are managed by the head and the fellows, or a committee of fellows. The scholars, and other members in statu pupillari are generally termed collectively undergraduates. Those who receive ' no emoluments (and therefore pay the full fees) are technically

Senate.

under- graduates.

called pensioners, and form the bulk of the undergraduates. Another group of students receiving emoluments are termed sizars ; the primary object of sizarships is to open the university course to men of limited means. The title of fellow-commoners belongs to wealthy students who pay special fees and have the right of dining at the fellows' tables. This class has virtually ceased to exist. As regards his work, the undergraduate in college is under the intimate direction of his tutor; the discip- linary officer in college is the dean. Besides the foundation scholarships in each college there are generally certain scholar- ships and exhibitions founded by private or special benefactions ; these are frequently awarded for the encouragement of specific branches of study, or are confined wholly, or by preference, to

students from certain schools.

The total number of students is about 3000. The colleges cannot accommodate this number, so that a student commonly spends some part of his residence in lodgings, which gesld- ‘ are licensed by, and under the control of, the university ence and authorities. Such residence implies no sacrifice of examina- membership of a college. There are three terms — ons ” Michaelmas (October), Lent and Easter (summer). They include together not less than 227 days, though the actual period of residence for undergraduates is about 24 weeks annually. Undergraduates usually begin residence in Michaelmas term. An elementary examination or other evidence of qualification is required for admission to a college. After nine terms’ (three years’) residence an undergraduate can take the first degree, that of bachelor of arts (b.a.). The examinations required for the ordinary b.a. degree are — (1) Previous examination or Little-go (usually taken in the first term of residence or at least in the first year), including classics, mathematics and a gospel in Greek and Paley’s Evidences of Christianity, or an additional Greek or Latin classic and logic. (2) General examination in classics and mathematics, with a portion of English history, &c. (3) Special examination in a subject other than classical or mathematical. Candidates for honours are required to pass the Previous examina- tion with certain additional subjects; they then have only a ” tripos. ” examination in one of the following subjects — mathe- matics, classics, moral sciences, natural sciences, theology, law, history, oriental languages, medieval and modern languages, mechanical sciences, economics. The mathematical tripos is divided into two parts, in the first of which, down to 1909, the candidates were classed in the result as Wranglers, Senior Optimes and Junior Optimes. There was also an individual order of merit, the most proficient candidate being placed at the head of the list as Senior Wrangler. But in 1906 a number of important reforms of this tripos were proposed by the Mathe- matical Board, and among these the abolition of the individual order of merit was recommended and passed by the senate. It is not employed in any other tripos. The classical tripos is also in two parts, to the second of which certain kindred subjects are added (ancient philosophy, history, &c). Individual order of merit is not observed in either part, the candidates being grouped in classes. There are a large number of university prizes and scholarships on special foundations. Such are the Smith’s prizes for mathematics and natural philosophy, on the foundation (1768) of Robert Smith, master of Trinity, awarded up to 1883 after examination, but since then for an essay on some branch of each subject, and the Chancellor’s medals, of which two have been awarded

annually in classics since the foundation of the prizes in 1751 by Thomas Holies, duke of Newcastle.

The university may adopt as affiliated colleges institutions in the United Kingdom or in any part of the British empire which fulfil certain conditions as to the education of adult students. Attendance at these institutions is counted as colleges. equivalent to a certain period of residence at Cambridge University in the event of a student wishing to pursue his work here. There are over twenty such affiliated colleges. There are also, in England, certain ” affiliated centres.” These are towns in which there is no affiliated college, but students who have there attended a course of education managed in connexion with the university by a committee may enter the university

with privileges similar to those enjoyed by students from affiliated colleges.

The principal social function of the university is the ‘■’ May Week ” at the close of the Easter term. It actually takes place Ma eek * n J une an< ^ ' asts l° n g er than a week. There is a great influx of visitors into Cambridge for this occasion. The first four days are occupied by the college boat-races on the Cam, and on subsequent days there are college balls, concerts, theatrical performances and other entertainments. On the Tuesday after the races there is a Congregation, at which prize exercises are recited, and usually, but not invariably, a number of honorary degrees are conferred on eminent men by invitation. This final period of the academic year is called Commencement, or in Latin Comitia Maxima.

Authorities. — For details of the administration of the university and colleges, regulations as to studies, prizes, scholarships, &c, see the annual Cambridge University Calendar and The Students’ Hand- book to tlie University and Colleges of Cambridge; see also R. Willis and J. W. Clark, Architectural History of the University of Cambridge (3 vols., Cambridge, 1886); J. Bass Mullinger, History of the Uni- versity of Cambridge from the Earliest Times to the Accession of Charles I. (2 vols., 1873-1884; third vol., 1909); and smaller History of Cambridge, in Longman’s “Epoch” Series (1888); J. W. Clark, Cambridge, Historical and Picturesque (London, 1890) ; T. D. Atkinson, Cambridge Described and Illustrated, with intro- duction by J. W. Clark (London, 1897) ; F. W. Maitland, Township and Borough

(Cambridge, 1898); C. W. Stubbs, Cambridge, in “Mediaeval Towns” series (London, 1905); Arthur Gray, The Dual Origin of the Town of Cambridge (publications of the Cambridge Antiquarian Soc, new ser. No. 1, Cambridge, 1908); J. W. Clark, Liber memorandorum ecclesie de Bernewelle (Cambridge, 1907), with an introduction by F. W. Maitland. For the individual colleges, see the series of College Histories, by various authors (London, 1899 et seq.).

CAMBRIDGE, a city and the county-seat of Dorchester county, Maryland, U.S.A., on the Choptank river, near Chesa- peake Bay, about 60 m. S.E. of Baltimore. Pop. (1890) 4192; (1900) 5747 (1958 being negroes); (1910)6407. It is served by the Cambridge branch of the Philadelphia, Baltimore & Washing- ton railway (Pennsylvania railway), which connects with the main line at Seaford, 30 m. distant, and with the Baltimore, Chesapeake & Atlantic at Hurlock, 16 m. distant; and by steamers of the Baltimore, Chesapeake & Atlantic railway company. It is a business centre for the prosperous farming region by which it is surrounded, and is a shipping point for oysters and fish; among its manufactures are canned fruits and vegetables, flour, hominy, phosphates, underwear and lumber. Cambridge was founded in 1684, received its present name in 1686, and was chartered as a city in 1900.

CAMBRIDGE, a city and one of the county-seats of Middlesex county, Massachusetts, U.S.A., situated on the Charles river, in the outskirts of Boston, of which it is in effect a part, although under separate government. Pop. (1880) 52,669; (1890) 70,028; (1900) 91,886; (1910 census) 104,839. Of the total population in 1900, 30,446 were foreign-born, including 11,235 Irish, 9613-English Canadians, 1944 English, 1483 French Canadians and 1584 Swedish; and 54,200 were of foreign parentage (both parents foreign-born), including 24,961 of Irish parentage, 9829 of English-Canadian parentage, 2587 of English parentage, and 2 288 of French-Canadian parentage. Cambridge is entered directly by only one railway, the Boston & Maine. The township, now practically built over by the city, contained originally several separate villages, the names of which are still used as a convenience in designating corresponding sections of the municipality: Old Cambridge, North Cambridge, Cam- bridgeport and East Cambridge, the last two being manufactur- ing and commercial districts.

Old Cambridge is noted as the seat of Harvard University (q.v.) and as a literary and scientific centre. Radcliffe College (1879), for women, practically a part of Harvard; an Episcopal Theological School (1867), and the New Church (Swedenborgian or New Jerusalem) Theological

School (1866) are other educa- tional institutions of importance. To Cambridge also, in 1908, was removed Andover Theological Seminary, a Congregational institution chartered in 1807, opened in Andover, Massachusetts,

in 1808 (re-incorporated under separate trustees in 1907). This seminary is one of the oldest and most famous theological institu- tions in the United States; it grew out of the theological teaching previously given in Phillips Academy, and was founded by the widow of Lt.-Governor Samuel Phillips, her son John Phillips and Samuel Abbot (1 732-181 2). The instruction was strongly Calvinistic in the earlier period, but the seminary has always been ” equally open to Protestants of every denomination.” Very liberal aid is given to students, and there is no charge for tuition. The Bibliotheca Sacra, founded in 1843 by Edward Robinson and in 1844 taken over by Professors Bela B. Edwards and Edwards A. Park, and the Andover Review (1884-1893), have been the organs of the seminary. In 1886 some of its professors published Progressive Orthodoxy, a book which made a great stir by its liberal tone, its opposition to supernaturalism and its evident trend toward the methods of German ” higher criticism.” Legal proceedings for the removal of five professors, after the publication of this book, failed; and their successful defence helped to secure greater freedom in thought and in instruction in American Presbyterian and Congregational theological seminaries. The seminary is now affiliated with Harvard University, though it remains independent and autonomous.

Cambridge is a typical New England city, built up in detached residences, with irregular streets pleasantly shaded, and a considerable wealth of historic and literary associations. There are many reminders of the long history of Harvard, and of the War of Independence. Cambridge was the site of the camp of the first American army, at the outbreak of the war, and from it went the detachment which intrenched on Bunker’s Hill. Here are the Ap thorp House (built in 1760), in which General Burgoyne and his officers were lodged as prisoners of war in 1777; the elm under which, according to tradition, Washington took command of the Continental Army on the 3rd of July 1775; the old Vassall or Craigie House (1759), where Washington lived in 1775-1776, and which was later the home of Edward Everett, Joseph E. Worcester, Jared Sparks and (1837-1882) Henry W. Longfellow. Elbridge Gerry lived and James Russell Lowell Was born, lived and died in ” Elmwood ” (built in 1767); Oliver Wendell Holmes was born in Cambridge also; John Fiske, the historian, lived here; and there are many other literary associa- tions, attractive and important for those interested in

American letters. In Mt Auburn Cemetery are buried many artists, poets, scholars and other men and women of fame. Cambridge is one of the few American cities possessing a crematorium (1900). The municipal water-works are excellent. A handsome bridge joining Cambridgeport to Boston (cost about $2,250,000) was opened late in 1906. Four other bridges span the Charles river between the two cities. A dam between East Cambridge and Boston, traversed by a roadway 150 ft. wide, was in the process of construction in 1907; and an extension of the Boston subway into Cambridge to the grounds of Harvard University, a distance of about 3 m., was projected. The city government is admini- stered almost entirely under the state civil-service laws, Cam- bridge having been a leader in the adoption of its provisions. A non-partisan association for political reform did excellent work from 1890 to 1900, when it was superseded by a non-partisan party. Since 1887 the city has declared yearly by increasing majorities for prohibition of the liquor traffic. The high schools enjoy a notable reputation. A handsome city hall (cost $235,000) and public library (as well as a manual training school) were given to the city by Frederick H. Rindge, a one- time resident, whose benefactions to Cambridge aggregated in value $650,000. Cambridge has many manufacturing estab- lishments, and in 1905 the city's factory products were valued at $42,407,064, an increase of 45-8% over their value in 1900. The principal manufactures are slaughtering and meat-packing products, foundry and machine-shop products, rubber boots and shoes, rubber belting and hose, printing and publishing products, carpentering, pianos and organs, confectionery and furniture. Cambridge is one of the chief publishing centres of the country. The tax valuation of property in 1906 ($105,153,235) was more than $1000 per inhabitant.

Cambridge is "one of the few American towns that may be said to have owed their very name and existence to the pursuit of letters " (T. W. Higginson). Its site was selected in 1630 by Governor Winthrop and others as suitable for fortifications and defence, and it was intended to make it the capital of the Massachusetts Bay Colony; but as Boston's peninsular position gave it the advantage in commerce and in defence against the Indians, the plan fell through, although up to 1638 various sessions of the general court and particular courts were held here. The township records (published) are continuous since 1632. A direct tax for the wooden " pallysadoe " about Cam- bridge led the township of Watertown in 1632 to make the first protest in

America against taxation without representation. The settlement was firsfknown as the ” New Towne,” but in 1638 was named Cambridge in honour of the English Cambridge, where several score of the first immigrants to the colony were educated. The oldest college in America (Harvard) was founded here in 1636. In 1639 there was set up in Cambridge the first printing press of British North America (Boston having none until 1676). Other notable dates in history are 1637 and 1647, when general synods of New England churches met at Cambridge to settle disputed doctrine and define orthodoxy; the departure for Connecticut of Thomas Hooker’s congregation in 1636; the meeting of the convention that framed the present constitution of the commonwealth, 1779-1780; the separation of the Congregationalists and Unitarians of the first parish church, in 1829; and the grant of a city charter in 1846. The original township of Cambridge was very large, and there have been successively detached from it, Newton (1691), Lexington (1713), Brighton (1837) and Arlington (1867).

See Lucius R. Paige, History of Cambridge, Massachusetts, 1630- 1877 (Boston, Mass., 1877); T. W. Higginson, Old Cambridge (New York, 1899) ; Arthur Gilman (ed.), The Cambridge of Eighteen Hundred and Ninety-Six (Cambridge, 1896); and Historic Guide to Cambridge (Cambridge, 1907.)

CAMBRIDGE, a city and the county-seat of Guernsey county, Ohio, U.S.A., on Wills Creek, about 75 m. E. by N. of Columbus. Pop. (1890) 4361; (1900) 8241, of whom 407 were foreign- born; (1910 census) 11,327. It is served by the Baltimore & Ohio and the Pennsylvania railways, and is connected by an electric line with Byesville (pop. in 1910, 3156), about 7 m. S. Cambridge is built on a hill about 800 ft. above sea-level. There is a public library. Coal, oil, natural gas, clay and iron are found in the vicinity, and among the city’s manufactures are iron, steel, glass, furniture and pottery. The value of its factory products in 1905 was $2,440,917. The municipality owns and operates the water-works. Cambridge was first settled in 1798 by emigrants from the island of Guernsey (whence the name of the county); was laid out as a town in 1806; was incorporated as a village in 1837; and was chartered as a city in 1893.

CAMBRIDGE PLATONISTS, a school of philosophico-religious thinkers which flourished mainly at Cambridge University in the second half of the 17th century. The founder was Benjamin Whichcote and the chief members were Ralph Cudworth, Richard Cumberland, Joseph Glanvill, Henry More and John Norris (see separate articles). Other less important members were Nathanael Culverwel (d. 1651?),

Theophilus Gale (1628- 1678), John Pordage (1607-1681), George Rust (d. 1670), John Smith (1618-1652) and John Worthington (1618-1671). They represented liberal thought at the time and were generally known as Latitudinarians. Their views were due to a reaction against three main tendencies in contemporary English thought: the sacerdotalism of Laud and his followers, the obscurantist sectaries and, most important of all, the doctrines of Hobbes. They consist chiefly of a reconciliation between reason and religion, resulting in a generally tolerant spirit. They tend always to mysticism and the comtemplation of things transcen dental. In spite of inaccuracy and the lack of critical capacity in dealing with their authorities both ancient and modern, the Cambridge Platonists exercised a valuable influence on English theology and thought in general. Their chief contributions to

thought were Cudworth's theory of the " plastic nature " of God, More's elaborate mysticism, Norris's appreciation of Male- branche, Glanvill's conception of scepticism as an aid to Faith,- and, in a less degree, the harmony of Faith and Reason elaborated by Culverwel. The one doctrine on which they all combined to lay especial emphasis was the absolute existence of right and wrong quite apart from the theory of divine authority. Their chief authorities were Plato and the Neo-platonists (between whom they made no adequate distinction), and among modern philosophers, Descartes, Malebranche and Boehme. From these sources they attempted to evolve a philosophy of religion, which would not only refute the views of Hobbes, but would also free theology finally from the errors of scholasticism, without plunging it in the newer dangers of unfettered rational- ism (see Ethics).

See Tulloch, Rational Theology in England in the 17th Century, Hallam, Literature of Europe (chap, on Philosophy from 1650 to 1700; Hunt, Religious Thought in England; von Stein, Sieben Biicher zur Geschichte des Platonismus (1862), and works on individual philo- sophers appended to biographies.

CAMBRIDGESHIRE, an eastern county of England, bounded N. by Lincolnshire, E. by Norfolk and Suffolk, S. by Essex and Hertfordshire, and W. by Bedfordshire, Huntingdonshire and Northamptonshire, The area is 858-9 sq. m. The greater part of the county falls within the district of the Fens, and is flat, elevated only a few feet above sea-level, and intersected with innumerable drainage channels. The physical characteristics of this district, and the history of its

reclamation from a marshy and in great part uninhabitable condition, fall for consideration under the heading Fens. Except in the south of the county the scenery of the flat land is hardly ever varied by rising ground or wood, and owes the attraction it possesses rather to individuality than to beauty. At the south-eastern and southern boundaries, and to the west of Cambridge, bordering the valley of the Cam on the north, the land rises in gentle undulations; but for the rest, such elevations as the Gog Magog Hills, S.E. of Cambridge, and the gentle hillock on which the city of Ely stands, are. isolated and conspicuous from afar. The principal rivers are the Ouse and its tributaries in the south and centre, and the Nene in the north; the greater part of the waters of both these rivers within Cambridgeshire flow in artificial channels, of which those for the Ouse, two great parallel cuts between Earith and Denver Sluice, in Norfolk, called the Bedford Rivers, form the most remarkable feature in the drainage of the county, The old main channel of the Ouse, from Ely downward to Denver (below which are tidal waters), is filled chiefly by the waters of the Cam or Granta, which joins the Ouse 3 m. above Ely, the Lark (which with its feeder, the Kennett, forms the boundary of the county with Suffolk for a considerable distance) and the Little Ouse, forming part of the boundary with Norfolk.

Geology. — By its geological features, Cambridgeshire is divisible into three well-marked regions; in the south and south-east are the low uplands formed by the Chalk; north of this, but best developed in the south-west, is a clay and greensand area; all the remaining portion is alluvial Fenland. The general strike of the rocks is along a south-west and north-east line, the dip is south-easterly. The oldest rock is the Jurassic Oxford Clay, which appears as an irregular strip of elevated flat ground reaching from Croxton by Conington and Fenny Drayton to Willingham and Rampton. Eastward and northward it no doubt forms the floor of the Fen country, and at Thorney and Whittlesea small patches rise like islands, through the level fen alluvium. The Coralline Oolite, with the Els worth or St Ives rock at the base, occurs as a small patch, covered by Greensand, at Upware, whence many fossils have been obtained; elsewhere its place is taken by the Ampthill Clays, which are passage beds between the Oxford and Kimmeridge Clays. The latter clay lies in a narrow strip by Papworth St Agnes, Oakington and Cottenham; a large irregular outcjrop surrounds Haddenham and Ely, and similar occurrences are at March, Chatteris and Manea. Above the Kimmeridge Clay comes the Lower Greensand, sandy for the

greater part, but here and there hardened into the condition known as ” Carstone,” which has been used as an inferior building-stone. This formation is thickest in the south-west ; it extends from the border by Gamlingay, Cuxton and Cottenham, and appears again in outliers at Upware, Ely and Haddenham. The Gault forms a strip of flat ground, 4 to 6 m. wide, running roughly parallel with the course of the river Cam, from Guilden Morden through Cambridge to Soham; it is a stiff blue clay 200 ft. thick in the south-west, but is thinner eastward. At the bottom of the chalk is the Chalk Marl, 10 to 20 ft. thick, with a glauconitic and phosphatic nodule-bearing layer at its base, known as the Cambridge Greensand. This bed has been largely worked for the nodules and for cement; it contains many fossils derived from the Gault below. Several outliers of Chalk Marl lie upon the Gault west of the Cam. The Chalk comprises all the main divisions of the formation, including the Totternhoe stone, Melbourn rock and Chalk rock. Much glacial boulder clay covers all the higher ground of the county; it is a stiff brownish clay with many chalk fragments of travelled rocks. Near Ely there is a remarkable mass of chalk, evidently trans- ported by ice, resting on and surrounded by boulder clay. Plateau gravel caps some of the chalk hills, and old river gravels occur at lower levels with the bones of mammoth, rhinoceros and other extinct mammals. The low-lying Fen beds are marly silt with abundant peat beds and buried forests; at the bottom is a gravel layer of marine origin.

Industries. — The climate is as a whole healthy, the fens being so carefully drained that diseases to which dwellers in marshy districts are commonly liable are practically eliminated. The land is very fertile, and although some decrease is generally apparent in the acreage under grain crops, Cambridgeshire is one of the principal grain-producing counties in England. Nearly nine-tenths of the total area is under cultivation, and an unusually small proportion is under permanent pasture. Wheat is the chief grain crop, but large quantities of barley and oats are also grown. Among green crops potatoes occupy a large and increasing area. Dairy-farming is especially practised in the south-west, where the district of the Cam valley has long been known as the Dairies; and much butter and cheese are sent to the London markets. Sheep are pastured extensively on the higher ground, but the number of these and of cattle for the county as a whole is not large. Beans occupy a considerable acreage, and fruit-growing and market-gardening are important in many parts. There is no large manufacturing industry common to the county in general; among

minor trades brewing is carried on at several places, and brick-making and lime- burning may also be mentioned.

Communications. — The principal railway serving the county is the Great Eastern, of which system numerous branch lines centre chiefly upon Cambridge, Ely and March. Cambridge is also served by branches of the Great Northern line from Hitchin, of the London & North- Western from Bletchley and Bedford, and of the Midland from Kettering. A trunk line connecting the eastern counties with the north and north-west of England runs northward from March under the joint working of the Great Northern and Great Eastern companies. The artificial water- ways provide the county with an extensive system of inland navigation; and a considerable proportion of the industrial population is employed on these. In this connexion the building of boats and barges is carried on at several towns.

Population and Administration.- — The area of the ancient county is 549,723 acres, with a population in 1891 of 188,961, and in 1901 of 190,682. The ancient county includes the two administrative counties of Cambridge in the south and the Isle of Ely in the north. The liberty of the Isle of Ely was formerly of the independent nature of a county palatine, but ceased to be so under acts of 1836 and 1837. Its area is 238,048 acres, and that of the administrative county of Cambridge 315,171 acres. Cambridgeshire contains seventeen hundreds. The municipal boroughs are Cambridge, the county town (pop. 38,379), in the administrative county of Cambridge, and Wisbech (9381) in the Isle of Ely. The other urban districts are — -in the

administrative county of Cambridge, Chesterton (9591), and in the Isle of Ely, Chatteris (4711), Ely (7713), March (7565) and Whittlesey (3909). Among other considerable towns Soham (4230) and Littleport (4181), both in the neighbourhood of Ely. may be mentioned. The town of Newmarket, which, although wholly within the administrative county of West Suffolk, is mainly in the ancient county of Cambridgeshire, is famous for its race-meetings. The county is in the south-eastern circuit, and assizes are held at Cambridge. Each administrative county has a court of quarter sessions, and the two are divided into ten petty sessional divisions. The borough of Cambridge has a separate court of quarter sessions, and this borough and Wisbech have separate commissions of the peace. The university of Cambridge exercises disciplinary jurisdiction over its members. There are 168 entire civil parishes in the two administrative counties. Cambridgeshire is almost wholly in the diocese of Ely and the archdeaconries of Ely and Sudbury, but small portions are within the dioceses of St Albans and Norwich. There are 194 ecclesiastical

parishes or districts wholly or in part within the county. The parliamentary divisions are three, namely. Northern or Wisbech, Western or Chesterton, and Eastern or Newmarket, each returning one member. The county also contains the parliamentary borough of Cambridge, returning one member; and the university of Cambridge returns two members.

History. — The earliest English settlements in what is now Cambridgeshire were made about the 6th century by bands of Engles, who pushed their way up the Ouse and the Cam, and established themselves in the fen-district, where they became known as the Gyrwas, the districts corresponding to the modern counties of Huntingdonshire and Cambridgeshire being dis- tinguished as the lands of the North Gyrwas and the South Gyrwas respectively. At this period the fen-district stretched southward as far as Cambridge, and the essential unity which it preserved is illustrated later by its inclusion under one sheriff, chosen in successive years from Cambridgeshire proper, the Isle of Ely and Huntingdonshire. In 656 numerous lands in the neighbourhood of Wisbech were included in the endowment of the abbey of Peterborough, and in the same century religious houses were established at Ely and Thorney, both of which, however, were destroyed during the Danish invasions of the 9th century. After the treaty of Wedmore the district became part of the Danelaw. On the expulsion of the Danes by Edward in the 10th century it was included in East Anglia, but in the nth century was again overrun by the Danes, who in the course of their devastations burnt Cambridge. The first mention of the shire in the Saxon Chronicle records the valiant resistance which it opposed to the invaders in 1010 when the rest of East Anglia had taken ignominious flight. The shire-system of East Anglia was in all probability not definitely settled before the Conquest, but during the Danish occupation of the 9th century the district possessed a certain military and political organization round Cambridge, its chief town, whence probably originated the constitution and demarcation of the later shire. At the time of the Domesday Survey the county was divided as now, except that the Isle of Ely, which then formed two hundreds having their meeting-place at Witchford, is now divided into the four hundreds of Ely, Wisbech, North Witchford and South Witch- ford, while Cambridge formed a hundred by itself. The hundred of Fiendish was then known as Flamingdike. Cam- bridgeshire was formerly included in the diocese of Lincoln, until, on the erection of Ely to a bishop's see in 1109, almost the whole county was placed in that diocese. In 1291 the whole county, with the exception of parishes in the deanery of Fordham and diocese of Norwich, constituted the archdeaconry of Ely,

comprising the deaneries of Ely, Wisbech, Chesterton, Cambridge, Shingay, Bourn, Barton and Camps. The Isle of Ely formerly constituted an independent franchise in which the bishops exercised quasi-palatinate rights, and offences were held to be committed against the bishop's peace. These privileges were considerably abridged in the reign of Henry VIII. , but the Isle still had separate civil officers, appointed by the bishop, chief

among whom were the chief justice, chief bailiff, deputy bailiff and two coroners. The bishop is still cuslos rotulorum of the Isle. Cambridgeshire has always been remarkable for its lack of county families, and for the frequent changes in the ownership of estates. No Englishmen retained lands of any importance after the Conquest, and at the time of the Domesday Survey the chief lay proprietors were Alan, earl of Brittany, whose descendants the Zouches retained estates in the county until the 15th century; Picot the sheriff, whose estates passed to the families of Peverell and Peche; Aubrey de Vere, whose descendants retained their estates till the 16th century; and Hardwinus de Scalariis, ancestor of the Scales of Whaddon.

From the time of Hereward's famous resistance to the Con- queror in the fen-district, the Isle of Ely was intimately concerned with the great political struggles of the country. It was defended against Stephen by Bishop Nigellus of Ely, who fortified Ely and Aldreth, and the latter in 1144 was held for the empress Maud by Geoffrey de Mandeville. During the struggles between John and his barons, Faukes de Breaute was made governor of Cambridge Castle, which, however, surrendered to the barons in the same year. The Isle of Ely was seized by the followers of Simon de Montfort in 1266, but in 1267 was taken by Prince Edward. At the Reformation period the county showed much sympathy with the Reformers, and in 1642 the knights, gentry and commoners of Cambridgeshire petitioned for the removal of all unwarrantable orders and dignities, and the banishment of popish clergy. In the civil war of the 17th century Cambridgeshire was one of the associated counties in which the king had no visible party, though the university assisted him with contributions of plate and money.

Cambridgeshire has always been mainly an agricultural county. The Domesday Survey mentions over ninety mills and numerous valuable fisheries, especially eel-fisheries, and contains frequent references to wheat, malt and honey. The county had a flourishing wool-industry in

the 14th century, and became noted for its worsted cloths. The Black Death of 1349 and the ravages committed during the Wars of the Roses were followed by periods of severe depression, and in 1439 several Cambridgeshire towns obtained a remission of taxation on the plea of poverty. In the 16th century barley for malt was grown in large quantities in the south, and the manufacture of willow- baskets was carried on in the fen-districts. Saffron was extens- ively cultivated in the 1 8th century, and paper was manufactured near Sturbridgc. Sturbridge fair was at this period reckoned the largest in Europe, the chief articles of merchandise being wool, hops and leather; and the Newmarket races and horse- trade were already famous. Large waste areas were brought under cultivation in the 17 th century through the drainage of the fen-district, which was brought to completion about 1652 through the labours of Cornelius Vermuyden, a Dutchman. The coprolite industry was very profitable for a short period from 1850 to 1880, and its decline was accompanied by a general industrial and agricultural depression. Cambridgeshire returned three members to parliament in 1290, and in 1295 the county returned two members, the borough of Cambridge two members, and the city of Ely two members, this being the sole return for Ely. The university was summoned to return members in 1300 and again in 1603, but no returns are recorded before 1614, after which it continued to return two members. Under the Reform Act of 1832 the county returned three members. . Antiquities. — In ecclesiastical architecture Cambridgeshire would be rich only in the possession of the magnificent cathedral at Ely and the round church of the Holy Sepulchre, Jesus College and King's College chapels, and many other examples in Cambridge. But there are many fine churches elsewhere. At Thorney, a small town in the north of the county, which owes much in appearance to the 8th duke of Bedford (d. 1872), the parish church is actually a portion of the church of an abbey said to date originally from the 7 th century, and refounded in 972 by Ethelwold, bishop of Winchester, as a Benedictine monastery. The church is partly fine Norman. Another Norman building of special interest is Sturbridge chapel near

Cambridge, which belonged to a lepers' hospital. To this foundation King John granted a fair, which became, and continued until the 18th century, one of the most important in England. It is still held in September. At Swaffham Prior there are remains of two churches in one churchyard, the tower of one being good Transitional Norman, while that of the other is Perpendicular, the upper part octagonal. Among many Early English examples the church of Cherry Hinton near Cambridge may be mentioned. The churches of Trumpington and

Bottisham are fine specimens of the Decorated style; in the first is a famous brass to Sir Roger de Trumpington (1289). As Perpendicular examples the tower and spire of St Mary's, Whittlesey, and the rich wooden roof of Outwell church, may be selected. Monastic remains are scanty. Excluding the town of Cambridge there are no domestic buildings, either ancient or modern, of special note, with the exception of Sawston Hall, in the south of the county, a quadrangular mansion dated 1557-1584.

Authorities. — See D. and S. Lysons, Magna Britannia, vol. ii. part i. (London, 1808) ; C. C. Babington, Ancient Cambridgeshire (Cambridge, 1883); R. Bowes, Catalogue of Books printed at or relating to Cambridge (Cambridge, 1891 et seq.) ; E. Conybeare, History of Cambridgeshire (London, 1897); Victoria County History, Cambridgeshire.

CAMBUSLANG, a town of Lanarkshire, Scotland. It is situ- ated near the Clyde, 45 m. S.E. of Glasgow (of which it is a residential suburb) by the Caledonian railway. Pop. (1891) 8323; (1901) 12,252. Its leading industries include coal-mining, turkey-red dyeing and brick-making. It contains one of the largest steel works in the United Kingdom. Among the chief edifices are a public hall, institute and library. It was the birthplace of John Claudius London (1783-1843), the land- scape gardener and writer on horticulture, whose Arboretum et Fruticetum Britannicum still ranks as an authority.

CAMBYSES (Pers. Kambujiya) , the name borne by the father and the son of Cyrus the Great. When Cyrus conquered Babylon in 539 he was employed in leading religious ceremonies (Chronicle of Nabonidus), and in the cylinder which contains Cyrus's proclamation to the Babylonians his name is joined to that of his father in the prayers to Marduk. On a tablet dated from the first year of Cyrus, Cambyses is called king of- Babel. But his authority seems to have been quite ephemeral; it was only in 530, when Cyrus set out on his last expedition into the East, that he associated Cambyses on the throne, and numerous Babylonian tablets of this time are dated from the accession and the first year of Cambyses, when Cyrus was " king of the countries " {i.e. of the world). After the death of his father in the spring of 528 Cambyses became sole king. The tablets dated from his reign in Babylonia go down to the end of his eighth year, i.e. March 521 B.C. 1 Herodotus (iii. 66), who dates his reign from the death of Cyrus, gives him seven years five months, i.e. from 528 to the summer of 521. For these dates cf. Ed. Meyer, Forschungen zur alien Geschichte, ii. 470 ff.

The traditions about Cambyses, preserved by the Greek authors, come from two different sources. The first, which forms the main part of the account of Herodotus (iii. 2; 4; 10-37), is of Egyptian origin. Here Cambyses is made the legitimate son of Cyrus and a daughter of Apries (Herod, iii. 2, Dinon fr. n, Polyaen. viii. 29), whose death he avenges on the successor of the usurper Amasis. (In Herod, iii. 1 and Ctesias ap. Athen. xiii. 560 D, this tradition is corrected by the Persians: Cambyses wants to marry a daughter of Amasis, who sends him a daughter of Apries instead of his own daughter, and by her Cambyses is induced to begin the war.) His great crime is the killing of the Apis, for which he is punished by madness, in which he commits many other crimes, kills his brother and his sister, and at last loses his empire and dies from a wound in the hip, at the same place where he had wounded the sacred animal. Intermingled are some stories derived from the Greek mercen- aries, especially about their leader Phanes of Halicarnassus, who

1 On the much discussed tablet, which is said to date from his nth year, the writer had at first written ” 10th year of Cyrus,” and then corrected this date into ” 1st year of Cambyses”; see Strassmaier, Inschriften von Cambyses, No. 97.

betrayed Egypt to the Persians. In the Persian tradition the crime of Cambyses is the murder of his brother; he is further accused of drunkenness, in which he commits many crimes, and thus accelerates his ruin. These traditions are found in different passages of Herodotus, and in a later form, but with some trustworthy detail about his household, in the fragments of Ctesias. With the exception of Babylonian dated tablets and some Egyptian inscriptions, we possess no contemporary evidence about the reign of Cambyses but the short account of Darius in the Behistun inscription. It is impossible from these sources to form a correct picture of Cambyses’ character; but it seems certain that he was a wild despot and that he was led by drunkenness to many atrocious deeds.

It was quite natural that, after Cyrus had conquered Asia, Cambyses should undertake the conquest of Egypt, the only remaining independent state of the Eastern world. Before he set out on his expedition he killed his brother Bardiya (Smerdis), whom Cyrus had appointed governor of the eastern provinces. The date is given by Darius, whereas the Greek authors narrate the murder after the

conquest of Egypt. The war took place in 525, when Amasis had just been succeeded by his son Psam- metichus III. Cambyses had prepared for the march through the desert by an alliance with Arabian chieftains, who brought a large supply of water to the stations. King Amasis had hoped that Egypt would be able to withstand the threatened Persian attack by an alliance with the Greeks. But this hope failed; the Cyprian towns and the tyrant Polycrates of Samos, who possessed a large fleet, now preferred to join the Persians, and the commander of the Greek troops, Phanes of Halicarnassus, went over to them. In the decisive battle at Pelusium the Egyptians were beaten, and shortly afterwards Memphis was taken. The captive king Psammetichus was executed, having attempted a rebellion. The Egyptian inscriptions show that Cambyses officially adopted the titles and the costume of the Pharaohs, although we may very well believe that he did not conceal his contempt for the customs and the religion of the Egyptians. From Egypt Cambyses attempted the conquest of Ethiopia (Cush), i.e. the kingdom of Napata and Meroe, the modern Nubia. But his army was not able to cross the deserts; after heavy losses he was forced to return. In an inscription from Napata (in the Berlin museum) the Ethiopian king Nastesen relates that he had beaten the troops of Kembasuden, i.e. Cambyses, and taken all his ships (H. Schafer, Die Aethiopische Konigsinschrift des Berliner Museums, 1901). Another expedi- tion against the great oasis failed likewise, and the plan of attack- ing Carthage was frustrated by the refusal of the Phoenicians 1 operate against their kindred. Meanwhile in Persia a usurper, the Magian Gaumata, arose in the spring of 522, who pretended to be the murdered Bardiya (Smerdis). He was acknowledged throughout Asia. Cambyses attempted to march against him, but, seeing probably that success was impossible, died by his own hand (March 521). This is the account of Darius, which certainly must be preferred to the traditions of Herodotus and Ctesias, which ascribe his death to an accident. According to Herodotus (iii. 64) he died in the Syrian Ecbatana, i.e. Hamath; Josephus {Ant. xi. 2. 2) names Damascus; Ctesias, Babylon, which is absolutely impossible.

See A. Lincke, Kambyses in der Sage, Litteratur und Kunst des Mittelalters, in Aegyptiaca: Festschrift fur Georg Ebers (Leipzig 1897), pp. 41-61; also Persia: Ancient History. (Ed. M.)

CAMDEN, CHARLES PRATT, ist Earl (1714-1794), lord chancellor of England, was born in Kensington in 17 14. He was a descendant of an old Devonshire family of high standing, the third son of Sir John Pratt, chief-justice of the king's bench in the reign of George I. He received his early education at Eton and King's College, Cambridge. In 1734 he became a fellow of his college, and in the following year obtained his

degree of B.A. Having adopted his father's profession, he had entered the Middle Temple in 1728, and ten years later he was called to the bar. He practised at first in the courts of common law, travelling also the western circuit. For some years his practice was so limited, and he became so much discouraged, that he seriously

thought of turning his back on the law and entering the church. He listened, however, to the advice of his friend Sir Robert Henley, a brother barrister, afterwards known as Lord Chancellor Northington, and persevered, working on and waiting for success. The first case which brought him prominently into notice and gave him assurance of ultimate success was the government prosecution, in 1752, of a bookseller, William Owen, for a libel on the House of Commons.

His speech for the defence contributed much to the verdict for the defendant. In 1757, through the influence of William Pitt (afterwards earl of Chatham), with whom he had formed an intimate friendship while at Eton, he received the appointment of attorney-general. The same year he entered the House of Commons as member for the borough of Downton in Wiltshire. He sat in parliament four years, but did not distinguish himself as a debater. His professional practice now largely increased. One of the most noticeable incidents of his tenure of office as attorney-general was the prosecution of Dr. J. Shebbeare (1709- 1788), a violent party writer of the day, for a libel against the government contained in his notorious Letters to the People of England, which were published in the years 1756-1758. As a proof of Pratt's moderation in a period of passionate party warfare and frequent state trials, it is noted that this was the only official prosecution for libel which he set on foot. In January 1762 Pratt was raised to the bench as chief-justice of the common pleas. He was at the same time knighted. Soon after his elevation the nation was thrown into great excitement about the prosecution of John Wilkes, and the question involved in it of the legality of " general warrants." Chief-Justice Pratt pronounced, with decisive and almost passionate energy, against their legality, thus giving voice to the strong feeling of the nation and winning for himself an extraordinary degree of popularity as one of the " maintainers of English constitutional liberty." Honours fell thick upon him in the form of addresses from the city of London and many large towns, and of presentations of freedom from various corporate bodies. In July 1765 he was raised to the peerage as Baron Camden, of Camden Place, in the county of Kent; and in the following year he was removed from the court of common pleas to take his seat as lord chancellor (July 30, 1766). This seat he retained less than four years; for although he discharged its duties in so efficient a manner that, with one exception, his decisions were never reversed on appeal,

he took up a position of such uncompromising hostility to the governments of the day, the Grafton and North administrations, on the greatest and most exciting matters, the treatment of the American colonies and the proceedings against John Wilkes, that the government had no choice but to require of him the surrender of the great seal. He retired from the court of chancery in January 1770, but he continued to take a warm interest in the political affairs and discussions of the time. He continued steadfastly to oppose the taxation of the American colonists, and signed, in 1778, the protest of the Lords in favour of an address to the king on the subject of the manifesto of the commissioners to America. In 1782 he was appointed president of the council under the Rockingham administration, but retired in the following year. Within a few months he was reinstated in this office under the Pitt administration, and held it till his death. Lord Camden was a strenuous opponent of Fox's India Bill, took an animated part in the debates on important public matters till within two years of his death, introduced in 1786 the scheme of a regency on occasion of the king's insanity, and to the last zealously defended his early views on the functions of juries, especially of their right to decide on all questions of libel. He was raised to the dignity of an earl in May 1786, and was at the same time created Viscount Bayham. Earl Camden died in London on the 18th of April 1794. His remains were interred in Seale church in Kent.

CAMDEN, JOHN JEFFREYS PRATT, 2ND Earl and ist Marquess (1759-1840), only son of the ist earl, was born on the nth of February 1759, and was educated at Trinity College, Cambridge. In 1780 he was chosen member of parliament for Bath, and he obtained the lucrative position of teller of the

exchequer, an office which he kept until his death, although after 1812 he refused to receive the large income arising from it. In the ministry of William Pitt, Pratt was successively a lord of the admiralty and a lord of the treasury; then, having suc- ceeded his father in the earldom in 1794, he was appointed lord- lieutenant of Ireland in 1 795. Disliked in Ireland as an opponent of Roman Catholic emancipation and as the exponent of an unpopular policy, Camden's term of office was one of commotion and alarm, culminating in the rebellion of 1798. Immediately after the suppression of the rising he resigned, and in 1804 became secretary for war and the colonies under Pitt, and in 1 805 lord president of the council. He was again

lord presi- dent from 1807 to 181 2, after which date he remained for some time in the cabinet without office. In 181 2 he was created earl of Brecknock and Marquess Camden. He died on the 8th of October 1840, and was succeeded by his only son, George Charles, 2nd marquess (1799-1866). The present marquess is his descendant. Camden was chancellor of the university of Cambridge and a knight of the Garter.

CAMDEN, WILLIAM (1551-1623), English antiquary and historian, was born in London on the 2nd of May 1551. His father, Sampson Camden, a native of Lichfield, had settled in London, and, as a painter, had become a member of the company of painter-stainers. His mother, Elizabeth, belonged to the old Cumberland family of Curwen. Young Camden received his early education at Christ's Hospital and St Paul's school, and in 1566 went to Magdalen College, Oxford, probably as a servitor or chorister. Failing to obtain a demyship at Magdalen he re- moved to Broadgates Hall, afterwards Pembroke College, and later to Christ Church, where he was supported by his friend, Dr Thomas Thornton, canon of Christ Church. As a defender of the established religion he was soon engaged in controversy, and his failure to secure a fellowship at All Souls' College is attributed to the hostility of the Roman Catholics. In 1570 he supplicated in vain for the degree of B.A., and although a renewed application was granted in 1573 it is doubtful if he ever took a degree; and in 1571 he went to London and devoted himself to antiquarian studies, for which he had already acquired a taste.

Camden spent some time in travelling in various parts of England collecting materials for his Britannia, a work which was first published in 1586. Owing to his friendship with Dr Gabriel Goodman, dean of Westminster, Camden was made second master of Westminster school in 1575; and when Dr Edward Grant resigned the headmastership in 1593 he was appointed as his successor. The vacations which he enjoyed as a schoolmaster left him time for study and travel, and during these years he supervised the publication of three further editions of the Britannia. Although a layman he was granted the prebend of Ilfracombe in 1589, and in 1597 he resigned his position at Westminster on being made Clarencieux king-at-arms, an appointment which caused some ill-feeling, and the York herald, Ralph Brooke, led an attack on the genealogical accuracy of the Britannia, and accused its author of plagiarism. Camden replied to Brooke in an appendix to the fifth edition of the Britannia, published in 1600, and his reputation came through the ordeal untarnished. Having brought out an enlarged and improved edition of the Britannia in 1607, he began to work on a history of the reign of Queen Elizabeth, to which he had

been urged by Lord Burghley in 1597. The first part of this history dealing with the reign down to 1588 was published in 1615 under the title Annates rerum Anglicarum et Hibernicarum regnante Elizabetha. With regard to this work some controversy at once arose over the author's treatment of Mary, queen of Scots. It was asserted that Camden altered his original narrative in order to please James L, and, moreover, that the account which he is said to have given to his friend, the French historian, Jacques de Thou, differed substantially from his own. It seems doubtful if there is any truth in either of these charges. The second part of this work, finished in 1617, was published, after the author's death, at Leiden in 1625 and in London in 1627, In 1622 Camden carried out a plan to found a history lectureship

at Oxford. He provided an endowment from some lands at Bexley, and appointed as the first lecturer, his friend, Degory Wheare. The present occupant of the position is known as the Camden professor of ancient history. His concluding years were mainly spent at Chislehurst, where he had taken up his residence in 1609, and in spite of recurring illnesses he continued to work at material for the improvement of the Britannia and kindred subjects. He died at Chislehurst on the 9th of November 1623, and was buried in Westminster Abbey, where a monument now stands to his memory.

The Britannia, the first edition of which is dedicated to Burgh- ley, is a survey of the British islands written in elegant Latin. It was first translated into English in 1610, probably under the author's direction, and other translations have subsequently appeared, the best of which is an edition edited by Richard Gough and published in three volumes in 1789, and in four volumes in 1806. The Annates has been translated into French, and English translations appeared in 1635, 1675 and 1688. The Latin version was published at Leiden in 1639 and 1677, and under the editorship of T, Hearne at Oxford in 17 17. In addition to these works Camden compiled a Greek grammar, Institutio Graecae Grammatices Compendiaria, which became very popular, and he published an'edition of the writings of Asser, Giraldus Cambrensis, Thomas Walsingham and others, under the title, Anglica, Hibernica, Normannica, Cambrica, a veteribus scripta, published at Frankfort in 1602, and again in 1603. He also drew up a list of the epitaphs in Westminster Abbey, which was issued as Reges, Reginae, Nobiles et alii in ecclesia collegiata Beati Petri Westmonasterii sepulti. This was enlarged and published again in 1603 and 1606. In 1605 he published his Remains concerning Britain, a book of collections from the Britannia, which quickly passed through seven editions; and he wrote an official account of the trial of the Gunpowder Plot

conspirators as Actio in Henricum Garnetum, Societatis Jesuiticae in Anglia superiorem et caeteros.

Camden, who refused a knighthood, was a man of enormous industry, and possessed a modest and friendly disposition. He had a large number of influential friends, among whom were Archbishop Ussher, Sir Robert Cotton, John Selden, the French jurist Brisson, and Isaac Casaubon. His correspondence was published in London in 1691 by Dr Thomas Smith under the title, Vita Gulielmi Camdeni et Illustrium virorum ad G. Camdenum Epistolae. This- volume also contains his Memorabilia de seipso; his notes of the reign of James L; and other interesting matter. In 1838 the Camden Society was founded in his honour, and much valuable work has been done under its auspices.

CAMDEN, a city and the county-seat of Camden county, New Jersey, U.S.A., on the Delaware river, directly opposite Philadelphia, Pa. Pop. (1880) 41,659; (1890) 58,313; (1900) 75,935> of whom 10,097 wer e foreign-born and 5576 were negroes; (1910) 94,538. It is a terminus of the Atlantic City, the West Jersey & Sea Shore, and the Pennsylvania (Amboy division) railways, and is also served by river and coasting steamboat lines. Camden is practically a suburb of Philadelphia, with which it is connected by ferries. It has several pleasant residential sections, and among its public buildings are the city hall, the Camden county court house, the post office, the free public library, the Cooper hospital and the West Jersey homeopathic hospital. The high school has a thoroughly equipped manual training department. The city owns and operates its water- works system,and is an important manufactur- ing and ship-building centre, among its manufactories being chemical works; asbestos, wall-paper, oil-cloth and morocco- leather factories; woollen, worsted and yarn mills; preserving factories; iron and steel mills; boot and shoe factories; and ship-yards. In 1900 the total value of the city's manufactured products was $20,451,874 (of which $17,969,954 was the value of factory products, which in 1905 had increased 86-5% to $33>587,273), several of the largest items being worsted goods ($2,090,991 in 1900, and $2,528,040 in 1905); leather, tanned, curried and finished ($1,515,935 in 1900, and $6,364,928 in 1905); oil-cloth ($1,638,556 in 1900); pickles, preserves and

sauces ($683, 358 in 1900), and wooden ships and boats ($409,500 in 1900, and $361,089 in 1905, when the value of the iron and steel

ship-building industry was $4,673,504). The first settlers on the site of Camden came in 1679, but for a century the settle- ment consisted of isolated farms and a small group of houses about the ferry by which travellers from the east crossed to Philadelphia. The early settlers were largely Quakers. About 1773 Jacob Cooper laid out a town near the ferry, and gave it the name Camden in honour of Lord Chancellor Camden, who had been one of the strongest opponents of the Stamp Act. The settlement, however, was known variously as"Pluckemin," " The Ferry " and " Cooper's Ferry " until about the time of the War of 181 2. Until 1828 it was administratively a part of the town of Newton, Gloucester county, but in that year, with more than a thousand inhabitants, it was chartered as a city under its present name. During the British occupation of Philadelphia in the War of Independence, a British force was stationed here, and Camden was the scene of several skir- mishes between the British troops and the New Jersey irregular militia. Camden was the home of Walt Whitman from 1873 until his death.

CAMDEN, a town and the county-seat of Kershaw county, South Carolina, U.S.A., near the Wateree river, 33 m. N.E. of Columbia. Pop. (1890) 3533; (1900) 2441; this decrease was due to the separation from Camden during the decade of its suburb "Kirkwood," re-annexed in 1905; (1910) 3569. It is served by the Atlantic Coast Line, the Seaboard Air Line and the Southern railways. Camden is situated about 100 ft. above the river, which is navigable to this point. The town is a winter resort, chiefly for Northerners. Cotton, grain and rice are produced in the vicinity, and there are some manufactories, including cotton mills, a cotton-seed oil mill and planing mills. Camden, first known as Pine Tree Hill, is one of the oldest interior towns of the state, having been settled in 1758; in 1768 the present name was adopted in honour of Lord Chancellor Camden. The town was first incorporated in 1791; its present charter dates from 1890. For a year following the capture of Charleston by the British in May 1780, during the War of Independence, Camden was the centre of important military operations. It was occupied by the British under Cornwallis in June 1780, was well fortified and was garrisoned by a force under Lord Rawdon. On the 16th of August Gen. Horatio Gates, with an American force of about 3600, including some Virginia militia under Charles Porterfield (1 750-1 780) and Gen. Edward Stevens (1745-1820), and North Carolina militia under Gen. Richard Caswell (1729-1789), was defeated here by the British, about 2000 strong, under Lord Cornwallis, who had joined Rawdon in anticipation of an attack by Gates. Soon after the engagement began a large part of the Americans, mostly North Carolina and Virginia militia, fled

precipitately, carrying Gates with them ; but Baron De Kalb and the Maryland troops fought bravely until overwhelmed by numbers, De Kalb himself being mortally wounded. A monument was erected to his memory in 1825, Lafayette laying the corner-stone. The British loss in killed, wounded and missing was 324; the American loss was about 800 or 900 killed and 1000 prisoners, besides arms and baggage. On the 3rd of December Gates was superseded by Gen. Nathanael Greene, who after Cornwallis had left the Carolinas, advanced on Camden and arrived in the neighbourhood on the 19th of April 1781. Considering his force (about 1450) insufficient for an attack on the fortifications, he withdrew a short distance north of Camden to an advantageous position on Hobkirk's Hill, where on the 25th of April Rawdon, with a force of only 950, took him somewhat by surprise and drove him from the field. The casualties on each side were nearly equal: American 271; British 258. On the 8th of May Rawdon evacuated the town, after burning most of it. On the 24th of February 186 5, during the Civil War, a part of Gen. W.T.Sherman's army entered Camden and burned stores of tobacco and cotten, and several buildings. (See American War of Independence.)

See also T. J. Kirkland and R. M. Kennedy, Historic Camden (Columbia, S.C., 1905).

CAMEL (from the Arabic Djemal or the Heb. Gamal), the name of the single-humped Arabian Camelus dromedarius, but also applied to the two-humped central Asian C. bactrianus and to the extinct relatives of both. The characteristics of camels and their systematic position are discussed under the headings Tylopoda and Artiodactyla. The two living species are distinguishable at a glance. It may be mentioned that the Bactrian camel, which is a shorter-legged and more ponderous animal than the Arabian species, grows an enormously long and thick winter coat, which is shed in blanket-like masses in spring. The Arabian camel, which is used not only in the country from which it takes its name, but also in North Africa and India, and has been introduced into Australia and North America, is known only as a domesticated animal. On the other hand, the Bactrian species, which is employed throughout a large tract of central Asia in the domesticated condition, appears, according to recent researches, to exist in the wild state in some of the central Asian deserts. From the examination of specimens collected by Dr Sven Hedin, Professor W. Leche shows that the wild Bactrian camel differs from the domesticated breed of central Asia in the following external characters: the humps are smaller; the long hair does not occupy nearly so much of the body; the colour is much more rufous; and the ears and muzzle are shorter. Many important 'differences are also

recorded between the skulls of the two animals, and it is especially noteworthy that the last lower molar is smaller in the wild than in the tame race. In connexion with this point it should be noticed that, unlike what occurs in the yak, the wild animal is not larger than the tame one, although it is incorrect to say that the former is decidedly the inferior of the latter in point of stature. Dr Leche also institutes a com- parison between the skeletons of the wild and the tame Bactrian camel with the remains of certain fossil Asiatic camels, namely, Camelus knoblochi from Sarepta, Russia, and C. alutensis from the Aluta valley, Rumania. This comparison leads to the important conclusion that the wild Bactrian Camelus bactrianus ferns comes much nearer to the fossil species than it does to the domesticated breed, the resemblance being specially noticeable in the absolutely and relatively small size of the last molar. In view of these differences from the domesticated breed, and the resemblance of the skull or lower jaw to that of the extinct European species, it becomes practically impossible to regard the wild camels as the offspring of animals that have escaped from captivity.

On the latter hypothesis it has been generally assumed that the wild camels are the descendants of droves of the domesticated breed which escaped when certain central Asian cities were overwhelmed by sand-storms. This theory, according to Pro- fessor Leche, is rendered improbable by Dr Sven Hedin's observations on the habits and mode of life of the wild camel. The habitat of the latter extends from the lower course of the Keria river to the desert at the termination of that river, and thence to the neighbourhood of the Achik, the ancient bed of the Tarim river. These animals also occur in the desert district south of the Tarim; but are most abundant in the deserts and mountains to the southward of Kuruktagh, where there are a few brackish-water pools, and are also common in the barren mountains between Kuruktagh and Choetagh. Large herds have also been observed in the deserts near Altyntagh. The capacity of camels for travelling long distances without water — owing to special structural modifications in the stomach — is familiar to all. That the Arabian species was one of the earliest animals to be domesticated is evident from the record of Scripture, where six thousand camels are said to have formed part of the wealth of the patriarch Job. Camels also formed part of the present which Pharaoh gave to Abraham, and it was to a company of Ishmaelites travelling from Gilead to Egypt on camels, laden with spices, much as their Arabian descendants do at the present day, that Joseph was sold by his brothers.

The hump (or humps) varies in size according to the condition of the animal, becoming small and flaccid after hard work and poor diet.

During the rutting-season male camels become exceedingly

savage and dangerous, uttering a loud bubbling roar and engaging in fierce contests with their fellows. The female carries her young for fully eleven months, and produces only one calf at a time, which she suckles for a year. Eight days after birth the young Arabian camel stands 3 ft. high, but does not reach its full growth till its sixteenth or seventeenth year; it lives from forty to fifty years. The flesh of the young camel resembles veal, and is a favourite food of the Arabs, while camel's milk forms an excellent and highly nutritious beverage, although it does not furnish butter. The long hair is shorn every summer, and woven into a variety of stuffs used by the Arab for clothing himself and his family, and covering his tent. It was in raiment of camel's hair that John the Baptist appeared as a preacher. The hair imported into Europe is chiefly used in the manufacture of small brushes used by painters, while the thick hide is formed into a very durable leather. The droppings are used as fuel, and from the incinerated remains of these sal-ammoniac is extracted, which was at one time largely exported from Egypt.

The Bactrian camel is, if possible, of still more importance to many of the central Asian Mongol races, supplying them alike with food and raiment. It is, however, as " the ship of the desert," without which vast tracts of the earth's surface could scarcely be explored, that the camel is specially valuable. In its fourth year its training as a beast of burden begins, when it is taught to kneel and to rise at a given signal, and is gradually accustomed to bear increasing loads. These vary in weight from 500 to 1000 lb, according to the variety of camel employed, for of the Arabian camel there are almost as many breeds as there are of the horse. When crossing a desert camels are expected to carry their loads 25 m. a day for three days without drink, getting a supply of water, however, on the fourth; but the fleeter breeds will carry their rider and a bag of water 50 m. a day for five days without drinking. When too heavily laden the camel refuses to rise, but on the march it is exceedingly patient under its burden, only yielding beneath it to die. Relieved from its load it does not, like other animals, seek the shade, even when that is to be found, but prefers to kneel beside its burden in the broad glare of the sun, seeming to luxuriate in the burning sand. When overtaken by a dust-storm it falls on its knees, and stretching its neck along the sand, closes its nostrils and remains thus motionless till the atmosphere clears; and in this position it affords some shelter to its driver, who, wrapping his face in his mantle, crouches behind his beast.

The food of the camel consists chiefly of the leaves of trees, shrubs and dry hard vegetables, which it is enabled to tear down and masticate by means of its powerful front teeth. As regards temperament, if, writes Sir F. Palgrave, ” docile means stupid, well and good; in such a case the camel is the very model of docility. But if the epithet is intended to designate an animal that takes an interest in its rider so far as a beast can, that in some way understands his intentions, or shares them in a sub- ordinate fashion, that obeys from a sort of submissive or half- fellow-feeling with his master, like the horse or elephant, then I say that the camel is by no means docile — very much the contrary. He takes no heed of his rider, pays no attention whether he be on his back or not, walks straight on when once set agoing, merely because he is too stupid to turn aside, and then should some tempting thorn or green branch allure him out of the path, continues to walk on in the new direction simply because he is too dull to turn back into the right road. In a word, he is from first to last an undomesticated and savage animal rendered serviceable by stupidity alone, without much skill on his master’s part, or any co-operation on his own, save that of an extreme passiveness. Neither attachment nor even habit impresses him; never tame, though not wide-awake enough to be exactly wild.”

For extinct camels see Tylopoda. (R- L.*)

The Biblical expression (Matt. xix. 24, &c), ” it is easier for a camel to go through a needle’s eye,” &c, is sometimes explained by saying that the ” needle’s eye ” means the small gate which is opened in the great gate of a city, when the latter is closed for the night; but recent criticism (e.g. Post in Hastings’ Diet., under ” Camel “) throws doubt on this explanation, and assumes that the more violent hyper-

bole is intended. There is a various reading k&miAos (cable) for kA,l»jXos (camel), but Cheyne, in the Ency. Biblica, rejects this (see Cable).

CAMELFORD, THOMAS PITT, 1ST Baron (1737-1703), English politician and art patron, was a nephew of the 1st earl of Chatham. He sat in parliament from 1761 till 1784, siding against his uncle and following George Grenville, who was also a relative; and in 1784 he was raised to the peerage. He dabbled in architecture and the arts generally, and was a pro- minent figure in the artistic circles of his day. His son Thomas Pitt, 2nd Baron Camelford (1775-1804), who succeeded him in 1793, had an adventurous and misspent career in

the navy, but is principally remembered for his death in a duel with Mr Best on the 10th of March 1804, the title becoming extinct.

CAMELLIA, a genus or subgenus of evergreen trees or shrubs belonging to the natural order Ternstroemiaceae, with thick dark shining leaves and handsome white or rose-coloured flowers. The name Camellia was given by Linnaeus in honour of George Joseph Camellus or Kamel, a Moravian Jesuit who travelled in Asia and wrote an account of the plants of the Philippine Island, Luzon, which is included in the third volume of John Ray's Historia Plantarum (1704). Modern botanists are agreed that the tea-plant, placed by Linnaeus in a separate genus, Thea, is too nearly allied to Camellia to admit of the two being regarded as distinct genera. Thea and Camellia are therefore now considered to represent one genus, which has been generally called Camellia, but more correctly Thea, as this name was the earlier of the two. Under the latter view Camellia is regarded as a subgenus or section of Thea. It contains about eight species, natives of India, China and Japan. Most of the numerous cultivated forms are horticultural products of C. japonica, a native of China and Japan, which was introduced into Europe by Lord Petre in 1739. The wild plant has red flowers, recalling those of the wild rose, but most of the cultivated forms are double. In the variety anemonaeflora nearly all the stamens have become transformed into small petaloid structures which give the flower the appearance of a double anemone.

Another species, C. reticulata, a native of Hongkong, is also prized for its handsome flowers, larger than those of C. japonica, which are of a bright rose colour and as known in cultivation semi-double or double.

Both C. sasanqua and C. drupifera, the for:ner inhabiting Japan and China, the latter Cochin-China and the mountains of India, are oil-yielding plants. The oil of C. sasanqua (of which sasankwa is the native Japanese name) has an agreeable odour and is used for many domestic purposes. It is obtained from the seeds by subjecting them to pressure sufficient to reduce them to a coarse powder, and then boiling and again pressing the crushed materip.1. The leaves are also used in the form of a decoction by the Japanese women for washing their hair; and in a dried state they are mixed with tea on account of their pleasant flavour. The oil of C. drupifera, which is closely allied to C. sasanqua, is used medicinally in Cochin- China. The flowers of these two species, unlike those of C. japonica and C. reticulata, are odoriferous.

Camellias, though generally grown in the cool greenhouse, are hardy in the south of England and the south-west of Scotland and Ireland.

They grow best in a rich compost of sandy peat and loam, and should not be allowed to get too dry at the roots; a liberal supply of water is especially necessary during the flowering period. The best position — when grown out of doors — is one facing north or north-west, with a wall or hedge behind for protection from cold winds. July is the best time for plant- ing; care must be taken that the roots are evenly spread, not matted into a ball.

The plants are propagated by layers or cuttings, and the single-flowered ones also by seeds. Cuttings are taken in August and placed in sandy peat or loam in a cold shaded frame. In the following spring those which have struck are placed in a gentle heat, and in September or October the rooted plants are potted off. Camellias are also propagated by grafting or inarching in early spring on stocks of the common variety of C. japonica. The scale insect sometimes attacks the camellia. To remove

the white scale, the plants are washed with a sponge and solution of soft soap as soon as their growth is completed, and again before the buds begin to swell. The brown scale may be got rid of by repeated washings with one of the many insecticides, but it should be applied at a temperature of 90°.

CAMEO, a term of doubtful origin, applied in the first instance to engraved work executed in relief on hard or precious stones. It is also applied to imitations of such stones in glass, called ” pastes,” or on the shells of molluscous animals. A cameo is therefore the converse of an intaglio, which consists of an incised or sunk engraving in the same class of materials. For the history of this branch of art, and for an account of some of its most remarkable examples, see Gem.

The origin of the word is doubtful and has been a matter of copious controversy. The New English Dictionary quotes its use in a Sarum inventory of 1222, ” lapis unus cameu ” and ” magnus cameku.” The word is in current use in the 13th century. Thus Matthew Paris, in his Life of Abbot Leofric of St Albans, in the Abbatum S. Albani Vitae, says: ” retentis quibusdam nobilibus lapidibus insctdptis, quos camaeos vulgariter appellamus.” In variant forms the word has found its way into most languages, e.g. Latin, camahutus, camahelus, camaynus; Italian, chammeo, chameo; French, camahieu, chemahou, camaut, camaieu. The following may be mentioned among the

derivations that have been proposed: — von Hammer: camaut, the hump of a camel; Littre and others: camateum, an assumed Low Latin form from Kafiwrevav and KanaTov; Chabouillet and Babelon: / cfcijttijXia, treasures, connecting the word in particular with the dispersion of treasures from Constantinople, in 1204; King: Arabic camea, an amulet.

For a bibliography of the question, see Babelon, Cat. des Camees . . . de la Bibliotheque Nationale, p. iv.

CAMERA (a Latin adaptation of Gr. Ka.ixa.pa., an arched chamber), in law, a word applied at one time to the English judges' chambers in Serjeants' Inn, as distinct from their bench in Westminster Hall. It was afterwards applied to the judges' private room behind the court, and, hence, in the phrase in camera, to cases heard in private, i.e. in chambers. So far as criminal cases are concerned, the courts have no power to hear them in private, nor have they any power to order adults (men or women) out of court during the hearing. In civil proceedings at common law, it may also be laid down that the public cannot be excluded from the court; in Malan v. Young, 1889, 6 T.L.R. 68, Mr Justice Denman held that he had power to hear the case in camera, but he afterwards stated that there was considerable doubt among the judges as to the power to hear cases in camera, even by consent, and the case was, by consent of the parties, finally proceeded with before the judge as arbitrator. In the court of chancery it is the practice to hear in private cases affecting wards of the court and lunatics, family disputes (by consent), and cases where a public trial would defeat the object of the action {Andrew v. Raeburn, 1874, L.R. 9 Ch. 522). In an action for infringement of a patent for a chemical process the defendant was allowed to state a secret process in camera (Badische Anilin und Soda Fabrik v. Gillman, 1883, 24 Ch. D. 156). The Court of Appeal has decided that it has power to sit in private; in Mellor v. Thompson, 1883, 31 Ch. D. 55, it was stated that a public hearing would defeat the object of the action, and render the respondent's success in the appeal useless. In matrimonial causes, the divorce court, following the practice of the ecclesi- astical courts under the provisions of the Matrimonial Causes Act 1857, s. 22, hears suits for nullity of marriage on physical grounds in camera, but not petitions for dissolution of marriage, which must be heard in open court. It was also decided in Bruce v. Druce, 1903, 19 T.L.R. 387, that in cases for judicial separation the court has jurisdiction to hear the case in camera, where it is satisfied that justice cannot be done by hearing the case in public.

CAMERA LUCIDA, an optical instrument invented by Dr William Hyde

Wollaston for drawing in perspective. Closing one eye and looking vertically downwards with the other through a slip of plain glass, e.g. a microscope cover-glass, held close to the eye and inclined at an angle of 45 to the horizon, one can see the images of objects in front, formed by reflection from the

Object

Fig. 1.

Object

1st Image

Fig. 2.

surface of the glass, and at the same time one can also see through the transparent glass. The virtual images of the objects appear projected on the surface of a sheet of paper placed beneath the slip of glass, and their outline can be accurately traced with a pencil. This is the simplest form of the camera lucida. The image (see fig. 1) is, however, inverted and perverted, and it is not very bright owing to the poor reflecting power of unsilvered glass. The brightness of the image is sometimes in-‘ creased by silvering the glass; and on removing a small portion of the silver the observer can see the image with part of the pupil while he sees the paper through the unsilvered aperture ■«— « with the remaining part. This form of the in- lm ˆ strument is often used in conjunction with the microscope, the mirror being attached to the eye-piece and the

tube of the microscope being placed horizontally.

About the beginning of the 19th century Dr Wollaston in- vented a simple form of the camera lucida which gives bright and erect images. A four-sided prism of glass is constructed having one angle of 90°, the opposite angle of 135°, and the two remaining angles each of 67!°. This is represented in cross- section and in position in fig. 2. When the pupil of the eye is held half over the edge of the prism a, one sees the image of the object with one half of the pupil and the paper with the other half. The image is formed by successive total reflection at the surfaces b c and a b. In the first place an in- verted image (first image) is formed in the face b c, and then an image of this image is formed in a b, and it is the outline of this second image seen pro- jected on the paper that is traced by the pencil. It is desirable for two reasons that the image should lie in the plane of the paper, and this can be secured by placing a suitable lens between the object and the prism. If the image does not lie in the plane of the paper, it is impossible to see it and the pencil-point clearly at the same time. Moreover, any slight movement of the head will cause the image to appear to move relatively to the paper, and will render it difficult to obtain an accurate drawing.

Before the application of photography, the camera lucida was of considerable importance to draughtsmen. The advantages claimed for it were its cheapness, smallness and portability; that there was no appreciable distortion, and that its field was much larger than that of the camera obscura. It was used largely for copying, for reducing or for enlarging existing drawings. It will readily be understood, for example, that a copy will be half- size if the distance of the object from the instrument is double the distance of the instrument from the copy. (C. J. J.)

CAMERA OBSCURA, an optical apparatus consisting of a darkened chamber (for which its name is the Latin rendering) at the top of which is placed a box or lantern containing a convex lens and sloping mirror, or a prism combining the lens and mirror. If we hold a common reading lens (a magnifying lens) in front of a lamp or some other bright object and at some distance from it, and if we hold a sheet of paper vertically at a suitable distance behind the lens, we see depicted on the paper an image of the lamp. This image is inverted and perverted. If now we place a plane mirror (e.g. a lady’s hand glass) behind the lens and inclined at an angle of 45 to the horizon so as to reflect Jec the rays of light vertically downwards, we can produce on a horizontal sheet of paper an unperverted image of the bright object (fig. 1), i.e. the image has the same appear- ance as the

object and is not perverted as when the reflection of a printed page is viewed in a mirror. This is the principle of the

Mirror Lens

50

Image with Mirror

Fig. 1.

camera obscura, which was extensively used in sketching from nature before the introduction of photography, although it is now scarcely to be seen except as an interesting side-show at places of popular resort. The image formed on the paper may be traced out by a pencil, and it will be noticed that in this case the image is real— not virtual as in the case of the camera lucida. Generally the mirror and lens are combined into a single piece of wo/rked glass represented in section in fig. 2. Rays from external objects are first re- fracted at the convex surface a b, then totally reflected at the plane surface a c, and finally refracted at the concave surface b c (fig. 2) so as to form an image on the sheet of paper d e. The curved surfaces take the place of the lens in fig. 1, and the plane surface per- forms the function of the mirror. The prism a ft c is fixed at the top of a small tent fur- nished with opaque curtains so as to prevent the diffused day- light from overpowering the image on the paper, and in the darkened tent the images of external objects are seen very distinctly.

Quite recently, the camera obscura has come into use with submarine vessels, the periscope being simply a camera obscura under a new name. (C.J.J.)

History. — The invention of this instrument has generally been ascribed, as in the ninth edition of this work, to the famous Neapolitan savant of the 16th century, Giovanni Battista della Porta, but as a matter of fact the principle of the simple camera obscura, or darkened chamber with a small aperture in a window or shutter, was well known and in practical use for observing eclipses long before his time. He was anticipated in the improve- ments he claimed to have made in it, and all he seems really to have done was to popularize it. The increasing importance of the camera obscura as a photographic instrument makes it desirable to bring together what is known of its early history, which is far more extensive than is usually recognized. In southern climes, where during the summer heat it is usual to close the rooms from the glare of the sunshine outside, we may often see depicted on the walls vivid inverted images of outside objects formed by the light reflected from them passing through chinks or small apertures in doors or window-shutters. From the opening passage of Euclid’s Optics (c. 300 B.C.), which formed the foundation for some of

the earlier middle age treatises on geometrical perspective, it would appear that the above phenomena of the simple darkened room were used by him to demonstrate the rectilinear propagation of light by the passage of sunbeams or the projection of the images of objects through small openings in windows, &c. In the book known as Aristotle's Problems (sect. xv. cap. 5) we find the correlated problem of the image of the sun passing through a quadrilateral aperture always appearing round, and he further notes the lunated image of the eclipsed sun projected in the same way through the interstices of foliage or lattice-work.

There are, however, very few allusions to these phenomena in the later classical Greek and Roman writers, and we find the first scientific investigation of them in the great optical treatise of the Arabian philosopher Alhazen (q.v.), who died at Cairo in a.d. 1038. He seems to have been well acquainted with the projection of images of objects through small apertures, and to have been the first to show that the arrival of the image of an object at the concave surface of the common nerve— or the retina — corresponds with the passage of light from an object through an aperture in a darkened place, from which it falls upon a surface facing the aperture. He also had some knowledge of the properties of concave and convex lenses and mirrors in forming images. Some two hundred years later, between a.d. 1266 and 1279, these problems were taken up by three almost contemporaneous writers on optics, two of whom, Roger Bacon and John Peckham, were Englishmen, and Vitelloor Witelo, a Pole.

That Roger Bacon was acquainted with the principle of the camera obscura is shown by his attempt at solving Aristotle's

problem stated above, in the treatise De Speculis, and also from his references to Alhazen's experiments of the same kind, but although Dr John Freind, in his History of Physick, has given him the credit of the invention on the strength of a passage in the Perspectiva, there is nothing to show that he constructed any instrument of the kind. His arrangement of concave and plane mirrors, by which the realistic images of objects inside the house or in the street could be rendered visible though intangible, there alluded to, may apply to a camera on Cardan's principle or to a method of aerial projection by means of concave mirrors, which Bacon was quite familiar with, and indeed was known long before his time. On the strength of similar arrangements of lenses and mirrors the invention of the camera obscura has also been claimed for Leonard Digges, the author of Pantometria (1571), who is said to have constructed a telescope from informa- tion given in a book of Bacon's experiments.

Archbishop Peckham, or Pisanus, in his Perspectiva Communis (1270), and Vitello, in his Optics (1270), also attempted the solution of Aristotle's problem, but unsuccessfully. Vitello's work is to a very great extent based upon Alhazen and some of the earlier writers, and was first published in 1535. A later edition was published, together with a translation of Alhazen, by F. Risner in 1572.

The first practical step towards the development of the camera obscura seems to have been made by the famous painter and architect, Leon Battista Alberti, in 1437, contemporaneously with the invention of printing. It is not clear, however, whether his invention was a camera obscura or a show box, but in a fragment of an anonymous biography of him, published in Muratori's Rerum Italicarum Scriptores (xxv. 296), quoted by Vasari, it is stated that he produced wonderfully painted pictures, which were exhibited by him in some sort of small closed box through a very small aperture, with great verisimili- tude. These demonstrations were of two kinds, one nocturnal, showing the moon and bright stars, the other diurnal, for day scenes. This description seems to refer to an arrangement of a transparent painting illuminated either from the back or the front and the image projected through a hole on to a white screen in a darkened room, as described by Porta {Mag. Nat. xvii. cap. 7) and figured by A. Kircher (Ars Magna Lucis et Umbrae), who notes elsewhere that Porta had taken some arrangement of pro- jecting images from an Albertus, whom he distinguished from Albertus Magnus, and who was probably L. B. Alberti, to whom Porta also refers, but not in this connexion.

G. B. I. T. Libri-Carucci dalla Sommaja (1803-1869), in his account of the invention of the camera obscura in Italy (Histoire des sciences mathematiques en Italie, iv. 303), makes no mention of Alberti, but draws attention to an unpublished MS. of Leonardo da Vinci, which was first noticed by Venturi in 1797, and has since been published in facsimile in vol. ii. of J. G. F. Ravaisson- Mollien's reproductions of the MSS. in the Institut de France at Paris (MS. D, fol. 8 recto). After discussing the structure of the eye he gives an experiment in which the appearance of the reversed images of outside objects on a piece of paper held in front of a small hole in a darkened room, with their forms and colours, is quite clearly described and explained with a diagram, as an illustration of the phenomena of vision. Another similar passage is quoted by Richter from folio 404b of the reproduc- tion of the Codice Atlantico, in Milan, published by the Italian government. These are probably the earliest distinct accounts of the natural phenomena of the camera obscura, but remained unpublished for some three centuries. Leonardo also discussed the old Aristotelian problem of the rotundity of the sun's image after passing through an

angular aperture, but not so successfully as Maurolycus. He has also given methods of measuring the sun's distance by means of images thrown on screens through small apertures. He was well acquainted with the use of magni- fying glasses and suggested a kind of telescope for viewing the moon, but does not seem to have thought of applying a lens to the camera.

The first published account of the simple camera obscura was discovered by Libri in a translation of the Architecture of

Vitruvius, with commentary by Cesare Caesariano, one of the architects of Milan cathedral, published at Como in 1521, shortly after the death of Leonardo, and some twenty years before Porta was born. He describes an experiment made by a Benedictine monk and architect, Dom Papnutio or Panuce, of the same kind as Leonardo's but without the demonstration.

About the same time Francesco Maurolico, or Maurolycus, the eminent mathematician of Messina, in his Theoremata de Lumine et Umbra, written in 1521, fully investigated the optical problems connected with vision and the passage of rays of light through small apertures with and without lenses, and made great advances in this direction over his predecessors. He was the first correctly to solve Aristotle's problem, stated above, and to apply it practically to solar observations in a darkened room (Cosmographia, 1535)- Erasmus Reinhold has described the method in his edition of G. Purbach's Theoricae Novae Planetarum (1542), and probably got it from Maurolycus. He says it can also be applied to terrestrial objects, though he only used it for the sun. His pupil, Rainer Gemma-Frisius, used it for the observation of the solar eclipse of January 1544 at Louvain, and fully described the methods he adopted for making measurements and drawings of the eclipsed sun, in his De Radio Astronomico et Geometrico (1545)- He says they can be used for observation of the moon and stars and also for longitudes. The same arrangement was used by Copernicus, Tycho Brahe, by M. Moestlin and his pupil Kepler — the latter applying it in 1607 to the observation of a transit of Mercury — also by Johann Fabricius, in 161 1, for the first observations of sun-spots. It is interesting to note this early employment of the camera obscura in the field of astronomical research, in which its latest achieve- ments have been of such pre-eminent value.

The addition of optical appliances to the simple dark chamber for the purpose of seeing what was going on outside, was first described by Girolamo Cardan in his De Subtilitate (1550), as noted by Libri. The sun shining, he fixed a round glass speculum (orbem e vitro) in a window-shutter, and then closing it the images of outside objects would be seen transmitted through the aperture on to the opposite wall, or better, a white paper screen suitably placed. The account is not very clear, but seems to imply the use of a concave mirror rather than a lens, which might be suggested by the word orbem. He refers to Maurolycus' work with concave specula.

We now come to Giovanni Battista della Porta, whose account of the camera obscura in the first edition of the Magia Naturalis, in four books (1558, lib. iv. cap. 2), is very similar to Caesariano's — a darkened room, a pyramidal aperture towards the sun, and a whitened wall or white paper screens, but no lens. He discloses as a great secret the use of a concave speculum in front of the aperture, to collect the rays passing through it, when the images will be seen reversed, but by prolonging them beyond the centre they would be seen larger and unreversed. This is much the same as Cardan's method published eight years earlier, but though more detailed is not very clear. He then notes the application to portraiture and to painting by laying colours on the projected images. Nothing is said about the use of a lens or of solar observations. The second edition, in which he in the same words discloses the use of a convex lens in the aperture as a secret he had intended to keep, was not published till 1589, thirty-one years after the first. In this interval the use of the lens was discovered and clearly described by Daniello Barbaro, a Venetian noble, patriarch of Aquileia, in his work La Pratica della perspeltiva (p. 192), published in 1568, or twenty-one years before Porta's mention of it. The lens used by Barbaro was an ordinary convex or old man's spectacle-glass; concave, he says, will not do. He shows how the paper must be moved till it is brought into the focus of the lens, the use of a diaphragm to make the image clearer, and also the application of the method for drawing in true perspective. That Barbaro was really the first to apply the lens to the carnera obscura is supported by Marius Bettinus in his Apiaria (1645), and by Kaspar Schott in his Magia Universalis (1657), the former taunting Porta with the appropriation.

In an Italian translation of Euclid's Optica, with commentary, Egnacio Danti (1573), after discussing the effects of plane, convex and concave reflectors, fully describes the method of showing reversed images passing through an aperture in a darkened room, and shows how, by placing a mirror behind the aperture, unreversed images might be obtained, both effects being illustrated by diagrams. F. Risner, who

died in 1580, also in his Opticae (1606) very clearly explained the reversal of the images of the simple camera obscura. He notes the convenience of the method for solar observations and its previous use by some of the observers already mentioned, as well as its advantages for easily and accurately copying on an enlarged or reduced scale, especially for chorographical or topographical documents. This is probably the first notice of the application of the camera to cartography and the reproduction of drawings, which is one of its principal uses at the present time. In the Diversarum Speculationum M athematicarum et Physicarum (1585), by the Venetian Giovanni Battista Benedetti, there is a letter in which he discusses the simple camera obscura and mentions the improvement some one had made in it by the use of a double convex lens in the aperture; he also says that the images could be made erect by reflection from any plane mirror.

Thus the use of the camera and of the lens with it was well known before Porta published his second edition of the Magia Naturalis in 1589. In this the description of the camera obscura is in lib. xvii. cap. 6. The use of the convex lens, which is given as a great secret, in place of the concave speculum of the first edition, is not so clearly described as by Barbaro; the addition of the concave speculum is proposed for making the images larger and clearer, and also for making them erect, but no details are given. He describes some entertaining peep-show arrange- ments, possibly similar to Alberti's, and indicates how the dark chamber with a concave speculum can be used for observing eclipses. There is no mention whatever of a portable box or construction beyond the darkened room, nor is there in his later work, De Refractione Optices Parte (1593), in which he discusses the analogy between vision and the simple dark room with an aperture, but incorrectly. Though Porta's merits were un- doubtedly great, he did not invent or improve the camera obscura. His only novelty was the use of it as a peep-show; his descriptions of it are vague, but being published in a book of general reference, which became popular, he acquired credit for the invention.

The first to take up the camera obscura after Porta was Kepler, who used it in the old way for solar observations in 1600, and in his Ad Vitellionem Paralipomena (1604) discusses the early problems of the passages of light through small apertures, and the rationale of the simple dark chamber. He was the first to describe an instrument fitted with a sight and paper screen for observing the diameters of the sun and moon in a dark room. In his later book, Dioptrice (161 1), he fully discusses refraction and the use of lenses, showing the action of the double convex lens in the camera obscura, with the principles which regulate its use and the reason of the reversal of the image. He also

demonstrates how enlarged images can be produced and projected on paper by using a concave lens at a suitable distance behind the convex, as in modem telephotographic lenses. He was the first to use the term camera obscura, and in a letter from Sir H. Wotton written to Lord Bacon in 1620 we learn that Kepler had made himself a portable dark tent fitted with a telescope lens and used for sketching landscapes. Further, he extended the work of Maurolycus, and demonstrated the exact analogy between the eye and the camera and the arrangement by which an inverted image is produced on the retina.

In 1609 the telescope came into use, and the danger of observ- ing the sun with it was soon discovered. In 161 1 Johann Fabricius published his observations of sun-spots and describes how he and his father fell back upon the old method of projecting the sun's image in a darkened room, finding that they could observe the spots just as well as with the telescope. They do not seem to have used a lens, or thought of using the telescope for projecting an enlarged imase on Kepler's principle. This

was done in 1612 by Christoph Scheiner, who fully described his method of solar observation in the Rosa Ursina (1630), demon- strating very clearly and practically the advantages and dis- advantages of using the camera, without a lens, with a single convex lens, and with a telescopic combination of convex object-glass and concave enlarging lens, the last arrangement being mounted with an adjustable screen or tablet on an equa- torial stand. Most of the earlier astronomical work was done in a darkened room, but here we first find the dark chamber constructed of wooden rods covered with cloth or paper, and used separately to screen the observing- tablet.

Various writers on optics in the 17th century discussed the principle of the simple dark chamber alone and with single or compound lenses, among them Jean Tarde (Les Astres de Borbon, 1623); Descartes, the pupil of Kepler (Dioptrique, 1637); Bettinus (Apiaria, 1645); A. Kircher {Ars Magna Lucis et Umbrae, 1646); J. Hevelius (Selenographia, 1647); Schott Magia Universalis Naturae et Artis, 1674); C. F. M. Deschales (Cursus, seu Mundus Mathematicus, 1674); Z. Traber {Nervus Opticus, 1675), hut their accounts are generally more interesting theoretically than as recording progress in the practical use and development of the instrument.

The earliest mention of the camera obscura in England is probably in Francis Bacon's De Augmentis Scientiarum, but it is only as an illustration of the projected images showing better on a white screen than on a black one. Sir H. Wotton's letter of 1620, already noted, was not published till 1651 {Reliquiae Wottonianae, p. 141), but in 1658 a description of Kepler's portable tent camera for sketching, taken from it, was published in a work called Graphice, or the most excellent Art of Painting, but no mention is made of Kepler. In W. Oughtred's English edition (1633) of the Recreations mathematiques (1627) of Jean Leurechon (" Henry van Etten ") there is a quaint description, with figures, of the simple dark chamber with aperture, and also of a sort of tent with a lens in it and the projection on an inner wall of the face of a man standing outside. The English translation of Porta's Natural Magick was published in 1658.

Robert Boyle seems to have been the first to construct a box camera with lens for viewing landscapes. It is mentioned in his essay On the Systematic or Cosmical Qualities of Things (ch. vi.), written about 1570, as having been made several years before and since imitated and improved. It could be extended or shortened like a telescope. At one end of it paper was stretched, and at the other a convex lens was fitted in a hole, the image being viewed through an aperture at the top of the box. Robert Hooke, who was some time Boyle's assistant, described {Phil. Trans., 1668, 3, p. 741) a camera lucida on the principle of the magic lantern, in which the images of illuminated and inverted objects were projected on any desired scale by means of a broad convex lens through an aperture into a room where they were viewed by the spectators. If the objects could not be inverted, another lens was used for erecting the images. From Hooke's Posthumous Works (1705), p. 127, we find that in one of the Cutlerian lectures on Light delivered in 1680, he illustrated the phenomena of vision by a darkened room, or perspective box, of a peculiar pattern, the back part, with a concave white screen at the end of it, being cylindrical and capable of being moved in and out, while the fore part was conical, a double convex lens being fixed in a hole in front. The image was viewed through a large hole in the side. It was between 4 and 5 ft. long.

Johann Zahn, in his Oculus Artificialis Teledioptricus (1685- 1686), described and figured two forms of portable box cameras with lenses. One was a wooden box with a projecting tube in which a combination of a concave with a convex lens was fitted, for throwing an enlarged image upon the focusing screen, which in its proportions and application is very similar to our modern telephotographic objectives. The image was first thrown upon an inclined mirror and then reflected

upwards to a paper screen on the top of the box. In an earlier form the image is thrown upon a vertical thin paper screen and viewed through a hole in the back of the camera. There is a great deal of practical

information on lenses in connexion with the camera and other optical instruments, and the book is valuable as a repertory of early practical optics, also for the numerous references to and extracts from previous writers. An improved edition was published in 1702.

Most of the writers already noticed worked out the problems connected with the projection of images in the camera obscura more by actual practice than by calculation, but William Molyneux, of Dublin, seems to have been the first to treat them mathematically in his Dioptrica Nova (1692), which was also the first work in English on the subject, and is otherwise an interest- ing book. He has fully discussed the optical theory of the dark chamber, with and without a lens, and its analogy to the eye. also several optical problems relating to lenses of various forms and their combinations for telescopic projection, rules for finding foci, &c. He does not, however, mention the camera obscura as an instrument in use, but in John Harris's Lexicon Technicum (1704) we find that the camera obscura with the arrangement called the " scioptric ball," and known as scioptricks, was on sale in London, and after this must have been in common use as a sketching instrument or as a show.

Sir Isaac Newton, in his Opticks (1704), explains the principle of the camera obscura with single convex lens and its analogy with vision in illustration of his seventh axiom, which aptly embodies the correct solution of Aristotle's old problem. He also made great use of the simple dark chamber for his optical experiments with prisms, &c. Joseph Priestley (1772) mentions the application of the solar microscope, both to the small and portable and the large camera obscura. Many patterns of these two forms for sketching and for viewing surrounding scenes are described in W. J. 's Gravesande's Essai de perspective (1711), Robert Smith's Compleat System of Optics (1738), Joseph Harris's Treatise on Optics (1775), Charles Hutton's Philo- sophical and Mathematical Dictionary, and other books on optics and physics of that period. The camera obscura was first applied to photography {q.v.) probably about 1794, by Thomas Wedgwood. His experiments with Sir Humphrey Davy in endeavouring to fix the images of natural objects as seen in the camera were published in 1802 (Journ. Roy. Inst.). (J. Wa.)

CAMERARIUS, JOACHIM (1500-1574), German classical scholar, was born at Bamberg on the 12th of April 1500. His family name was

Liebhard, but he was generally called Kammer- meister, previous members of his family having held the office of chamberlain (camerarius) to the bishops of Bamberg. He studied at Leipzig, Erfurt and Wittenberg, where he became intimate with Melanchthon. For some years he was teacher of history and Greek at the gymnasium, Nuremberg. In 1530 he was sent as deputy for Nuremberg to the diet of Augsburg, where he rendered important assistance to Melanchthon in drawing up the Confession of Augsburg. Five years later he was commissioned by Duke Ulrich of Wurttemberg to reorganize the university of Tubingen; and in 1541 he rendered a similar service at Leipzig, where the remainder of his life was chiefly spent. He translated into Latin Herodotus, Demosthenes, Xenophon, Homer, Theocritus, Sophocles, Lucian, Theodoretus, Nicephorus and other Greek writers. He published upwards of 1 50 works, including a Catalogue of the Bishops of the Principal Sees; Greek Epistles; Accounts of his Journeys, in Latin verse; a Commentary on Plautus; a treatise on Numismatics; Euclid in Latin; and the Lives of Helius Eobanus Hessus, George of Anhalt and Philip Melanchthon. His Epistolae Familiares (published after his death) are a valuable contribution to the history of his time. He played an important part in the Re- formation movement, and his advice was frequently sought by leading men. In 1535 he entered into a correspondence with Francis I. as to the possibility of a reconciliation between the Catholic and Protestant creeds; and in 1568 Maximilian II. sent for him to Vienna to consult him on the same subject. He died at Leipzig on the 1 7th of April 1 5 74.

See article by A. Horawitz in Allgemeine deutsche Biographie; C. Bursian, Die Geschichte der klassischen Philologie in Deutschland (1883); J. E. Sandys, Hist. Class. Schol. (ed. 1908), ii. 266.

io8

CAMERARIUS-ˆCAMERON, S.

CAMERARIUS, JOACHIM (1534-1598), German botanist and physician, son of the classical scholar of the same name, was born at Nuremberg on the 6th of November 1 534. After finishing his studies in Germany he visited Italy, where he graduated as doctor of medicine. On his return he was invited to reside at the courts of several princes, but preferred to settle in his native town of Nuremberg, where he had a botanical garden and formed extensive collections. He wrote a Hortus Medicus (1 588) and several other works. He died at Nuremberg on the nth of October 1598.

CAMERARIUS, RUDOLF JAKOB (1665-1721), German botanist and physician, was born at Tubingen on the 12th of February 1665, and became professor of medicine and director of the botanical gardens at Tubingen in 1687. He died at Tubingen on the nth of September 1721. He is chiefly known for his investigations on the reproductive organs of plants {De sexu plantarum epistola, 1694).

CAMERINO (anc. Camerinum) , a city and episcopal see (since 465, if not sooner; Treia is now combined with it) of the Marches, Italy, in the province of Macerata, 6 m. S. of the railway station of Castelraimondo (to which there is an electric tramway) which is 24 m. W. of Macerata; 2148 ft. above sea-level. Pop. (1901) of town, 4005; of commune, 12,083. The cathedral is modern, the older building having fallen in 1799; the church of S. Venanzio suffered similarly, but preserves a portal of the 1 5th century. The citadel, perhaps constructed from the plans of Leonardo da Vinci, dates from 1503. Camerino occupies the site of the ancient Camerinum, the inhabitants of which (Camertes Umbri) became allies of the Romans in 310 b.c. (at the time of the attack on the Etruscans in the Ciminian Forest). On the other hand, the Ka/iepnot referred to in the history of the year 295 B.C. are probably the inhabitants of Clusium. Later it appears as a dependent autonomous community with thefoedus aequum (Mommsen, Rom. Staatsrecht, iii. 664). Two cohorts of Camertes fought with distinction under Marius against the Cimbri. It was much affected by the conspiracy of Catiline, and is frequently mentioned in the Civil Wars; under the empire it was a municipium. It belonged to ancient Umbria, but was on the borders of Picenum. No ancient buildings are visible, the Roman level lying as much as 30 ft. below the modern.

See P. Savini, Storia della Cittd di Camerino (2nd ed., Camerino, 1895); M. Mariani, Intorno agli antichi Camerti Umbri (Camerino, 1900). (T. As.)_

CAMERON, JOHN (1579-1623), Scottish theologian, was born at Glasgow about 1579, and received his early education in his native city. After having taught Greek in the university for twelve months, he removed to Bordeaux, where he was soon appointed a regent in the college of Bergenia He did not remain long at Bordeaux, but accepted the offer of a chair of philosophy at Sedan, where he passed two years. He then returned to Bordeaux, and in the beginning of 1604 he was nominated one of the students of divinity who were maintained at the expense of the church, and who for the period of four years were at liberty to prosecute their studies in any Protestant seminary. During this period he acted as tutor to the two sons of Calignon, chancellor of

Navarre. They spent one year at Paris, and two at Geneva, whence they removed to Heidelberg. In this university, on the 4th of April 1608, he gave a public proof of his ability by maintaining a series of theses, De triplici Dei cum Homine Foedere, which were printed among his works. The same year he was recalled to Bordeaux, where he was appointed the colleague of Dr Primrose; and when Francis Gomarus was removed to Leiden, Cameron, in 161 8, was appointed professor of divinity at Saumur, the principal seminary of the French Protestants.

In 1620 the progress of the civil troubles in France obliged Cameron to seek refuge for himself and family in England. For a short time he read private lectures on divinity in London; and in 1622 the king appointed him principal of the university of Glasgow in the room of Robert Boyd, who had been removed from his office in consequence of his adherence to Presbyterian- ism. Cameron was prepared to accept Episcopacy, and was

cordially disliked for his adherence to the doctrine of passive obedience. He resigned his office in less than a year.

He returned to France, and lived at Saumur. After an interval of a year he was appointed professor of divinity at Montauban. The country was still torn by civil and religious dissensions; and Cameron excited the indignation of the more strenuous adherents of his own party. He withdrew to the neighbouring town of Moissac; but he soon returned to Montau- ban, and a few days afterwards he died at the age of about forty-six. Cameron left by his first wife several children, whose maintenance was undertaken by the Protestant churches in France. All his works were published after his death.

His name has a distinct place in the development of Calvinistic theology in Europe. He and his followers maintained that the will of man is determined by the practical judgment of the mind; that the cause of men's doing good or evil proceeds from the knowledge which God infuses into them; and that God does not move the will physically, but only morally, by virtue of its dependence on the judgment of the mind. This peculiar doctrine of grace and free-will was adopted by Amyraut, Cappel, Bochart, Daill6 and others of the more learned among the Reformed ministers, who dissented from Calvin's. The Cameronites (not to be confused with the Scottish sect called Cameronians) are moderate Calvinists, and approach to the opinion of the Arminians. They are also called Universalists, as holding the universal reference of Christ's death, and sometimes Amyrald- ists. The rigid adherents to the synod of Dort accused them

of Pelagianism, and even of Manichaeism, and the controversy between the parties was carried on with great zeal; yet the whole question between them was only, whether the will of man is determined by the immediate action of God upon it, or by the intervention of a knowledge which God impresses on the mind.

CAMERON, RICHARD (1648 ?-i68o), founder of a Scottish religious sect of Cameronians, which formed the nucleus of the regiment of this name in the British army, was born at Falkland in the county of Fife. He was educated at the village school, and his success was so great that, while still a youth, he was appointed schoolmaster. In this situation he became acquainted with some of the more enthusiastic field-preachers. Persuaded by them he resigned his post and entered the family of Sir Walter Scott of Harden as chaplain and tutor. Refusing to acknowledge the Indulgence, he joined the ranks of the non- conforming ministers, and incited the inhabitants of the southern counties of Scotland to protest openly against the new edict. So formidable was the agitation that the government pronounced illegal all armed assemblages for religious purposes. Cameron took refuge in Holland, where he resided for some time; but in the autumn of 1679 (probably) he returned to Scotland, and once more made himself formidable to the government. Shortly after the defeat of the Covenanters at Bothwell Bridge in that year, Cameron was slain in a skirmish at the Aird's, or Airs, Moss, fighting bravely at the head of the few troops which he had been able to collect. His prayer before going into battle became a tradition — " Lord spare the green and take the ripe." After the accession of William III. the survivors were amnestied, and the Cameronian regiment was formed from them.

See Andrew Lang, History of Scotland, vol. iii. (1907) ; Herzog-Hauck, Realencyklopadie (1897), s.v. " Cameronianer " ; A. Smellie, Men of the Covenant; Herkless, Richard Cameron; P. Walker, Six Saints of the Covenant.

CAMERON, SIMON (1799-1889), American politician, was born in Lancaster county, Pennsylvania, on the 8th of March 1799. Left an orphan at the age of nine, he early entered journalism, and, in banking and railway enterprises, accumulated a considerable fortune. He became influential in Pennsylvania politics, and in 184 5-1849 served in the United States Senate, being elected by a combination of Democratic, Whig and "American" votes to succeed James Buchanan. In 1854, having failed to secure the nomination for senator from the "Know-Nothing" Party, which he had recently joined, he became a leader of the " People's Party," as the Republican

Party was at first called in Pennsylvania. In 1857 he was elected to the United States Senate as a Republican, despite a Democratic majority in the state legislature, a fact that gave rise to charges of bribery. His prominence as a candidate first for the presidential and then for the vice-presidential nomination in the Republican national convention of i860 led to his being selected by President Lincoln as secretary of war. His adminis- tration of this office at a critical time was marked by his accus- tomed energy, but unfortunately also by partiality in the letting of government contracts, which brought about his resignation at Lincoln's request in January 1862 and his subsequent censure by the House of Representatives. Lincoln sent him as minister to Russia, but he returned in November 1862* He again served in the Senate (after 1872, being chairman of the committee on foreign relations) from 1867 until 1877, when he resigned to make room for his son, whose election he dictated. Cameron was one of the ablest political organizers the United States has ever known, and his long undisputed control of Pennsylvania politics was one of the most striking examples of " boss rule " in American history. The definition of an honest politician as " one who when he is bought will stay bought " has been attributed to him. He died on the 26th of June 1889.

His son James Donald Cameron (1833-) was born at Middletown, Pennsylvania, on the 14th of May 1833, graduated at Princeton in 1852, became actively interested in his father's banking and railway enterprises, and from 1863 to 1874 was president of the Northern Central railway. Trained in the political school of his father, he developed into an astute politician. From June 1876 to March 1877 he was secretary of war in President Grant's cabinet. In the Republican national conven- tion of 1876 he took an influential part in preventing the nomina- tion of James G. Blaine, and later was one of those who directed the policy of the Republicans in the struggle for the presidency between Tilden and Hayes. From 1877 until 1897 he was a member of the United States Senate, having been elected originally to succeed his father, who resigned in order to create the vacancy. He was chairman of the Republican national committee during the campaign of 1880.

CAMERON, VERNEY LOVETT (1 844-1 804), English traveller in Central Africa, was born at Radipole, near Weymouth, Dorset- shire, on the 1st of July 1844. He entered the navy in 1857, served in the Abyssinian campaign of 1868, and was employed for a considerable

time in the suppression of the East African slave trade. The experience thus obtained led to his being selected to command an expedition sent by the Royal Geographi- cal Society in 1873, to succour Dr. Livingstone. He was also instructed to make independent explorations, guided by Living- stone's advice. Soon after the departure of the expedition from Zanzibar, Livingstone's servants were met bearing the dead body of their master. Cameron's two European companions turned back, but he continued his march and reached Ujiji, on Lake Tanganyika, in February 1874, where he found and sent to England Livingstone's papers. Cameron spent some time determining the true form of the south part of the lake, and solved the question of its outlet by the discovery of the Lukuga river. From Tanganyika he struck westward to Nyangwe, the Arab town on the Lualaba previously visited by Livingstone. This river Cameron rightly believed to be the main stream of the Congo, and he endeavoured to procure canoes to follow it down. In this he was unsuccessful, owing to his refusal to countenance slavery, and he therefore turned south-west. After tracing the Congo-Zambezi watershed for hundreds of miles he reached Bihe and finally arrived at the coast on the 28th of November 1875, being the first European to cress Equatorial Africa from sea to sea. His travels, which were published in 1877 under the title Across Africa, contain valuable suggestions for the opening up of the continent, including the utilization of the great lakes as a " Cape to Cairo " connexion. In recognition of his work he was promoted to the rank of commander, made a Companion of the Bath and given the gold medal of the Geographical Society. The remainder of Cameron's life was chiefly devoted to projects for the commercial develop-

ment of Africa, and to writing tales for the young. He visited the Euphrates valley in 1878-1879 in connexion with a proposed railway to the Persian Gulf, and accompanied Sir Richard Burton in his West African journey of 1882. At the Gold Coast Cameron surveyed the Tarkwa region, and he was joint author with Burton of To the Gold Coast for Gold (1 883) . He was killed, near Leighton Buzzard, by a fall from horseback when returning from hunting, on the 24th of March 1894.

A second edition of Across Africa, with new matter and corrected maps, appeared in 1885. A summary of Cameron's great journey, from his own pen, appears in Dr Robert Brown's The Story of Africa, vol. ii. pp. 266-279 (London, 1893).

CAMERON OF LOCHIEL, SIR EWEN (1629-1719), Scottish Highland chieftain, was the eldest son of John Cameron and the grandson of Alan Cameron, the head of the clan Cameron. Having lost his father in

infancy he passed part of his youth with the marquess of Argyll at Inveraray, leaving his guardian about 1647 to take up his duties as chief of the clan Cameron, a position in which he succeeded his grandfather. In 1653 Lochiel joined the earl of Glencairn in his rising on behalf of Charles II., and after the defeat of this attempt he served the Royalist cause by harassing GeneralMonk. In 1681 he was knighted by Charles II., and in July 1689 he was with Viscount Dundee at Killiecrankie. He was too old to share personally in the Jacobite rising of 1715, but his sympathies were with the Stuarts, and his son led the Camerons at Sheriff muir. Lochiel, who died in February 17 19, is called by Macaulay the "Ulysses of the Highlands." He was a man of enormous strength and size, and one who met him in 1716 says " he wrung some blood from the point of my fingers with a grasp of his hand." An incident showing his strength and ferocity in single combat is used by Sir Walter Scott in The Lady of the Lake (canto v.). Lochiel's son and successor, John, who was attainted for sharing in the rebellion of 17 15, died in Flanders in 1748. John's son Donald, sometimes called " gentle Lochiel," joined Charles Edward, the Young Pretender, in 1745, was wounded at Culloden, and escaped to France, dying in the same year as his father. The 79th regiment, or Cameron Highlanders, was raised from among the members of the clan in 1793 by Sir Alan Cameron (1753-1828).

See Memoirs of Sir Ewen Cameron of Lochiel (Bannatyne Club,

1842).

CAMERONIANS, the name given to that section of the Scottish Covenanters (q.v.) who followed Richard Cameron (q.v.), and who were chiefly found among those who signed the Sanquhar Declaration in 1680. Known also as " Society Men," " San- quharians " and " Hillmen," they became a separate church after the religious settlement of 1690, taking the official title of Reformed Presbyterians in 1743. Societies of Cameronians for the maintenance of the Presbyterian form of worship were formed about 1681; their testimony, " The Informatory Vindica- tion," is dated 1687; and they quickly became the most pro- nounced and active adherents of the covenanting faith. Holding fast to the two covenants, the National Covenant of 1580 and the Solemn League and Covenant of 1643, they wished to restore the ecclesiastical order which had existed between 1638 and 1649, and were' dissatisfied with the moderate character of the religious settlement of 1690. Refusing to take the oaths of allegiance to an " uncovenanted " ruler, or to exercise any civil function, they passed through a period of trial and found some difficulty in maintaining a regular ministry; but in 1706 they were reinforced by some converts

from the established church. They objected strongly to the proposal for the union of England and Scotland, and were suspected of abetting a rising which took place in the west of Scotland in 1 706 ; but there appears to be no foundation for the statement that they intrigued with the Jacobites, and they gave no trouble to the government either in 171 5 or in 1745. In 171 2 they publicly renewed the covenants at Auchensauch Hill in Lanarkshire, and in 1743 their first presbytery was ce-nstituted at Braehead, while a presbytery was formed in North America in 1774. In 1863 the Cameronians, or Reformed Presbyterians, decided to inflict no penalties upon those members who had taken the oaths, or had exercised civil functions, and

no

consequently a few congregations seceded. In 1876 the general body of the Reformed Presbyterians united with the Free Church of Scotland, leaving the few seceding congregations as the representatives of the principles of the Cameronians. In the British army the first battalion of the Cameronians (Scottish Rifles) is directly descended from the ” Cameronian guard,” which, composed of Cameronians, was embodied by the con- vention parliament in 1689, and was afterwards employed to restore order in the Highlands.

See J. H. Burton, History of Scotland, vols. vii. and viii. (Edin- burgh, 1905) ; and A. Lang, History of Scotland, vol. iv. (Edinburgh,

1907).

CAMEROON 1 (Ger. Kamerun), a German protectorate in’West Africa, bounded W. by the Atlantic, N.W. by British Nigeria, N. by Lake Chad, E. and S. by French Congo, save for a short

muˆb mtwAzm

Longitude East 12° of Greenwich

distance on the south where it is conterminous with the Spanish Muni river settlement.

Boundaries and Area. — The sea frontier extends from the Rio del Rey, just where the great bend of the coast-line east to south begins, forming the Bight of Biafra, to the Campo river, a dis- tance of 200 m.

The north-western boundary, laid down in an agreement between Germany and Great Britain on the 15th of November 1893, runs from the mouth of the Rio del Rey to the ” rapids ” of the Cross river in 8° 48′ E. Thence it is continued in a north-east line towards Yola, as far as the confines of that

1 This English form of the name, adopted in the 10th ed. of the Ency. Brit., from the German, appears preferable both to the un- English Kamerun and to the older and clumsy ” the Cameroons.”

town. The boundary is then deflected south so as to leave Yola in British territory, turning north again to cross the Benue river at a spot 3 m. west of where the Faro joins the Benue. From this point the frontier goes north-east to the border of Lake Chad, 35 m. east of the meridian of the town ofKuka. The southern shores of Lake Chad for a distance of some 40 m. belong to the protectorate. The south and east boundaries were laid down by agreements between Germany and France on the 24th of December 1885, the 15th of March 1894 and the 18th of April 1908. The south boundary runs in a fairly direct line from the mouth of the Campo river to the river Dscha (or Ngoko), which it follows to its confluence with the Sanga. The eastern boundary runs from the Sanga irregularly north to io° N., where it approaches the British frontier at Yola, so that at its narrowest part the protectorate is little more than 50 m. across. From io° N. the frontier turns eastwards to the Logone, thence going north-east to the Shari river, which it follows to Lake Chad. The protectorate has an area of about 190,000 sq. m. Estimated population (1908) 3,500,000, of whom 1 1 28 were whites.

Origin of the Name.— The name Camaroes was first given by the Portuguese discoverers of the 15th and 16th centuries to a large bay or estuary, lying south-east of a great mountain close to the sea, met with after passing the Niger delta. This estuary they called the Rio dos Camaroes (the river of Prawns), from the abundance of the Crustacea found therein. The name Camaroes was also used to designate the neighbouring mountains. The English usage until nearly the end of the 19th century was to confine the term ” the Cameroons ” to the mountain range, and to speak of the estuary as the Cameroons river. Locally it was often called ” the Bay.” On their acquisition of the country in 1884 the Germans extended the use of the name in its Teutonic form — Kamerun — to the whole protectorate.

Physical Features. — Cameroon forms the north-west corner of the great Central African plateau. This becomes evident in its eastern section, where are wide-spreading plains, which farther west assume

an undulating character, and gradually merge into a picturesque moun- tain range. This range, running from north to south, is flanked by a parallel and lower range in the west, with a wide valley between. In the north-west the Upper Guinea mountains send their eastern spurs across the boundary, and from a volcanic rift, which runs south-west to north-east, the Cameroon peak towers up, its summit 13,370 ft. high. This mountain, whose south-western base is washed by the Atlantic, is the highest point on the western side of Africa, and it alone of the great moun- tains of the continent lies close to the coast. From any vantage point, but especially from the sea, it presents a magnificent spectacle, while some 30 m. westward rises Clarence peak, the culminating point of Fernando Po. With an area, on an isolated base, of 700 to 800 sq. m., Cameroon mountain has but two district peaks, Great Cameroon and Little Cameroon (5826 ft.), which is from foot to top covered with dense forest. The native designation of the highest peak is Mongo-ma-Loba, or the Mountain of Thunder, and the whole upper region is usually called Mongo-mo-Ndemi, or the Mountain of Greatness. On the principal summit there are a group of craters. In 1909 the mountain was in eruption and huge streams of lava were ejected. Inland the Chebchi and Mandara mountains indicate the direction and extent of the rift.

The mountains of the plateau sweep grandly round to the

Emery Waltcer sc

CAMEROON

in

east on reaching the eighth degree of N. lat. Here they give rise to a number of small rivers, which collect in the rift and form the Benue, the great eastern affluent of the Niger. This part of the protectorate is known as Adamawa (q.v.). Farther north, beyond the Mandara mountains, the country, here part of the ancient sultanate of Bornu, slopes to the shores of Lake Chad, and has a general level of 800 to 1000 ft. The greater part of Cameroon is thus a mountainous country, with, on the coast, a strip of low land. In the south this is very narrow ; it widens to- wards the north savewhere the Cameroon peak reaches to the sea.

At the foot of the Cameroon peak a number of estuaries cut deep bays which form excellent harbours. The small rivers which empty into them can be ascended for some miles by steam launches. The principal estuary, which is over 20 m. wide, is called, as already noted, the

Cameroon river or bay. The term river is more particularly confined to a ramification of the estuary which receives the waters of the Mungo river (a considerable stream which flows south from the Cameroon mountains), the Wuri, a river coming from the north-east, and various smaller rivers. Under the shadow of Cameroon peak lies the bay of Ambas, with the islands of Ndami (Ambas) and Mondola. It forms a tolerable harbour/‘capable of receiving large vessels.

Traversing the central portion of the country is a large river known in its upper course as the Lorn, and in its lower as the Sanaga, which enters the ocean just to the south of the Cameroon estuary. Both the Lorn and the Nyong (a more southerly stream) rise in the central plateau, from which they descend in splendid cascades, breaking through the parallel coast range in rapids, which indicate the extent of their navigability. The Lokunja and Kribi are smaller rivers with courses parallel to and south of the Nyong. In the south-east of the colony the streams — of which the chief are the Dscha and Bumba — are tributaries of the Sanga, itself an affluent of the Congo (q.v.). About 100 m. of the right bank of the Sanga, from the confluence of the Dscha upwards, are in German territory. In the north the country drains into Lake Chad through the Logone and Shari (q.v.). Including the headwaters of the Benue the colony has four distinct river-systems, one connecting with the Niger, another with the Congo, and a third with Lake Chad, the fourth being the rivers which run direct to the sea. The Niger and Shari systems communicate, with, at high water, but one obstruc- tion to navigation. The connecting link is a marshy lake named Tuburi. From it issues the Kebbi (Mao Kebi) a tributary of the Benue, and through it flows a tributary of the Logone, the chief affluent of the Shari. The one obstruction in the waterway is a fall of 165 ft. in the Kebbi.

Geology. — The oldest rocks, forming the greater mass of the hinterland, are gneisses, schists and granites of Archaean age. Along the Benue river a sandstone (Benue sandstone) forms the banks to 14 E. Cretaceous rocks occur around the basalt platform of the Cameroon mountain and generally along the coastal belt. Basalt and tuff, probably of Tertiary age, form the great mass of the Cameroon mountain, also the island of Fernando Po. Extensive areas in the interior, more especially towards Lake Chad, are covered with black earth of alluvial or lacustrine origin.

Climate. — The country lies wholly within the tropics and has a characteristic tropical climate. In the interior four seasons can be distinguished; a comparatively dry and a wet one alter- nating. July to October are the coldest months, and also bring most rain, but there is

hardly a month without rain. On the coast the temperature is high all the year round, but on the plateau it is cooler. Malarial fever is frequent, and even the Africans, especially those coming from other countries, suffer from it. The middle zone of the Cameroon mountain has, however, a temperate climate and affords excellent sites for sanatoria.

Flora and Fauna. — The southern part of the low coast is chiefly grass land, while the river mouths and arms of the bays are lined with mangroves. The mountainous region is covered with primeval forest, in which timber and valuable woods for cabinet-making are plentiful. Most important are the Elaeis guineensis, Sterculia acuminata and the wild coffee tree. On

Cameroon peak the forest ascends to 8000 ft. ; above it is grass land. Towards the east the forest gradually grows thinner, assumes a park-like appearance, and finally disappears, wide grass uplands taking its place. The country north of the Benue is rich and well cultivated. Cotton and rubber are found in considerable quantities, and fields of maize, corn, rice and sugar- cane bear witness to the fertility of the soil.

Animals are plentiful, including the great pachyderms and carnivora. The latter prey on the various kinds of antelopes which swarm on the grass lands. Two kinds of buffaloes are found in the forests, which are the home of the gorilla and chimpanzee. Large rodents, like the porcupine and cane rat, are numerous. Of birds there are 316 species, and several of venomous snakes.

Inhabitants. — The north of Cameroon is inhabited by Fula (q.v.) and Hausa (q.v.) and allied tribes, the south by Bantu- speaking races. The Fula came from the north and north-east, gradually driving the Bantu-negroes before them. They brought horses and horned cattle, unknown in these regions until then, and they founded well-organized states, like that of Adamawa, now divided between Cameroon and the British protectorate of Nigeria. In the vicinity of the rivers Benue, Faro and Kebbi, the people, who are good agriculturists, raise cereals and other crops, while on the plateaus stock-raising forms the chief pursuit of the inhabitants. In this northern region villages are built in the Sudanese zeriba style, surrounded with thorn fences; more important places are enclosed by a well-built wall and strongly fortified. Of martial disposition, the people often waged war with their neighbours, and also amongst themselves until the pacification of the hinterland by Germany at the beginning of the 20th century.

The Bantu-negroes inhabit the country south of about 7 N. Chief among the tribes are the Dualla (q.v.), the Ba-kwiri (q.v.), the Ba-Long, the Ba-Farami, the Wuri, the Abo and the Ba- Kundu. They build square houses, are active traders and are ruled by independent chiefs, having no political cohesion. Among the Dualla a curious system of drum signals is note- worthy. In the coast towns are numbers of Krumen, who, however, rarely settle permanently in the country. The Fula, as also most of the Hausa, are Moslems, the other tribes are pagans. Missionary societies, both Protestant and Roman Catholic, are represented in the colony, and their schools are well attended, as are the schools belonging to the government. In all the schools German is taught, but pidgin-English is largely spoken at the coast towns.

Chief Towns. — Duala, the chief town in the protectorate, is situated on the Cameroon estuary at the mouth of the Wuri river in 4 2′ N. 9 42′ E. It consists of various trading stations and native towns close to one another on the south bank of the river and known, before the German occupation, as Cameroon, Bell town, Akwa town, &c. Hickory, on the north side of the stream and the starting point of the railway to the interior, is also part of Duala, which has a total population of 22,000, includ- ing about 170 Europeans. Duala is the headquarters of the merchants and missionaries. The principal streets are wide and tree lined, the sanitation is good. The government offices are placed in a fine park in which are statues of Gustav Nachtigal and others. The port is provided with a floating dock. The seat of government is Buea, a post 3000 ft. above the sea on the slopes of the Cameroon mountain. Victoria is a flourishing town in Ambas Bay, founded by the British Baptist missionaries expelled from Fernando Po in 1858 (see below). Batanga and Campo are trading stations in the southern portion of the colony. On the route from Duala to Lake Chad is the large commercial town of Ngaundere, inhabited chiefly by Hausas and occupied by the Germans in 1901. Another large town is Garua on the Benue river. Farther north and within 30 m. of Lake Chad is Dikwa (Dikoa), in Bornu, the town chosen by Rabah (q.v.) as his capital after his conquest of Bornu. Gulfei on the lower Shari and Kusseri on the Logone are also towns of some note. Ngoko is a trading station on the Dscha, in the south-east of the pro- tectorate, near the confluence of that river with the Sanga .

Products and Industry. — Cameroon is rich in natural products* one of the most important being the oil-palm. Cocoa cultivation was

introduced by the Germans and proved remarkably success- ful. Rubber is collected from the Landolphia and various species of Ficus. Palm-oil, palm kernels, cocoa, copal, copra, Calabar beans, kola-nuts and ivory are the principal exports. There are several kinds of finely-grained wood, amongst which a very dark ebony is specially remarkable. Cotton, indigo and various fibres of plants deserve notice. The natives grow several kinds of bananas, yams and batatas, maize, pea-nuts, sugar-cane, sorghum and pepper. Minerals have not been found in paying quantities. Iron is smelted by the natives, who, especially amongst the Hausas, are very clever smiths, and manufacture fine lances and arrow heads, knives and swords, and also hoes. Dikwa is the centre of an important trade of which the chief articles are coffee, sugar, velvet, silk and weapons, as well as gold and silver objects brought by caravans from Tripoli. The natives round the Cameroon estuary are clever carvers of wood, and make highly ornamental figure heads for their canoes, which also sometimes show very fine workmanship. In the interior the people use the wild-growing cotton and fibres of plants to manufacture coarse drapery and plait-work. Plantations founded by German industry are fairly successful. Large reserves are set apart for the natives by government when marking off the land granted to plantation companies. The best-known of these companies, the Siid-Kamerun, holds a concession over a large tract of country by the Sanga river, exporting its rubber, ivory and other produce via the Congo. The principal imports are cotton goods, spirits, building material, firearms, hardware and salt. The annual value of the external trade in the period i 900-1905 averaged about £800,000. In 1907 the value of the trade had increased to. £1,700,000. Some 70% of the import and export trade was with Germany, the remainder being almost entirely with Great Britain. The percentage of the trade with Germany was increasing, that with Britain decreasing. Communications. — There is regular steamship communication with Europe by German and British boats. On the rivers which run into the Cameroon estuary small steam launches ply. The protectorate belongs to the Postal Union, and is connected by cable with the British telegraph station at Bonny in the Niger delta.

An imperial guarantee of interest was obtained in 1905 for the construction of a railway from Hickory to Bayong, a place 100 m. to the north, the district traversed being fertile and populous. From Victoria a line runs to Soppo (22 m.) near Buea and is continued thence northward. Another line, sanc- tioned in 1908, runs S.E. from Duala to the upper waters of the Nyong. In the neighbourhood of government stations excellent roads have been built. The chief towns in the coast region are connected by telegraph and telephone.

Government Revenue, &c. — The administration is under the direction of a governor appointed by and responsible to the imperial authorities. The governor is assisted by a chancellor and other officials and an advisory council whose members are merchants resident in the protectorate. Decrees having the force of law are issued by the imperial chancellor on the advice of the governor. In Adamawa and German Bornu are various Mahommedan sultanates controlled by residents stationed at Garua and Kusseri. Revenue is raised chiefly by customs dues on spirits and tobacco and a general 10% ad valorem duty on most goods. A poll tax is imposed on the natives. The local revenue (£131,000 in 1905) is supplemented by an imperial grant, the protectorate in the first twenty-one years of its existence never having raised sufficient revenue to meet its expenditure, which in 1905 exceeded £230,000. Order is maintained by a native force officered by Germans.

History. — Cameroon and the neighbouring coast were dis- covered by the Portuguese navigator, Fernando Po, towards the close of the 1 5th century. They were formerly regarded as with- in the Oil Rivers district, sometimes spoken of as the Oil Coast. Trading settlements were established by Europeans as early as the 17th century. The trade was confined to the coast, the Dualla and other tribes being recognized intermediaries between

the coast ” factories ” and the tribes in the interior, whither they allowed no strange trader to proceed. They took a quantity of goods on trust, visited the tribes in the forest, and bartered for ivory, rubber and other produce. This method of trade, called the trust system, worked well, but when the country came under the administration of Germany, the system broke down, as inland traders were allowed to visit the coast. Before this happened the ” kings ” of the chief trading stations — Akwa and Bell — were wealthy merchant princes. From the beginning until near the end of the 19th century they were very largely under British influence. In 1837 the king of Bimbia, a district on the mainland on the north of the estuary, made over a large part of the country round the bay to Great Britain. In 1845, at which time there was a flourishing trade in slaves between Cameroon and America, the Baptist Missionary Society made its first settlement on the mainland of Africa, Alfred Saker (1814-1880) obtaining from the Akwa family the site for a mission station. In 1848 another mission station was estab- lished at Bimbia, the king agreeing to abolish human sacri- fices at the funerals of his great men. Into the Cameroon country Saker and his colleagues introduced the elements of civilization, and with the help of British men-of-war the oversea slave trade was finally stopped (c. 1875). The struggles between the Bell

(Mbeli) and Akwa families were also largely composed. In 1858, on the expulsion of the Baptists from Fernando Po (

The extension of German influence in the interior was gradually accomplished, though not without considerable bloodshed. That part of Adamawa recognized as outside the British frontier was occupied in 1901 after somewhat severe fighting. In 1902 the imperial troops first penetrated into that part of Bornu reserved to Germany by agreements with Great Britain and France. They found the country in the military occupation of France. The French officers, who stated that their presence was due to

1 On the 26th of July a French gunboat also entered the estuary on a belated annexation mission.

“3

the measures rendered necessary by the ravages of Rabah and his sons, withdrew their troops into French territory. The shores of Lake Chad were first reached by a German military force on the 2nd of May 1902. In 1904 and again in 1905 there were native risings in various parts of the protectorate. These dis- turbances were followed, early in 1906, by the recall of the governor, Herr von Puttkamer, who was called upon to answer charges of maladministration. He was succeeded in 1907 by Dr T. Seitz. Collisions on the southern border of the protectorate between French and German troops led in 1905-1906 to an accurate survey of the south and east frontier regions and to a new convention (1908) whereby for the straight lines marking the frontier in former agreements natural features were largely substituted. Germany gained a better outlet to the Sanga river. The ascent of the Cameroon mountain was first attempted by Joseph Merrick of the Baptist Missionary Society in 1847; but it was not till 1861 that the summit was gained, when the ascent was made by Sir Richard Burton, Gustav Mann, a noted botanist, and Sefior Calvo. The starting-point was Babundi, a place on the seashore west of the mountain. From the south-east the summit was reached by Mary Kingsley in 1895.

See Mary H. Kingsley, Travels in West Africa (London, 1897); Sir R. Burton, Abeokuta and the Cameroons Mountains (2 vols., London, 1863) ; E. B. Underhill, Alfred Saker . . . A Biography (London, 1884); Sir H. H. Johnston, George Grenfell and the Congo . . . and Notes on the Cameroons . . . (London, 1908) ; Max Buchner, Kamerun Skizzen

und Betrachtungen (Leipzig, 1887); S. Passarge, Adamaua (Berlin, 1895); E. Zintgraph, Nord-Kamerun (Berlin, 1895) ; F. Hutter, Wanderungen und Forschungen im Nqrd-Hinter-. land von Kamerun (Brunswick, 1902) ; F. Bauer, Die deutsche Niger-Benue-Tsadsee-Expedition, 1902-1903 (Berlin, 1904); C. Rene, Kamerun und die deutsche Tsddsee Eisenbahn (Berlin, 1905) ; O. Zimmermann, Durch Busch und Steppe vom Campo bis zum Schari, 1892-1902 (Berlin, 1909) ; also British Foreign Office Reports. For special study of particular sciences see F. Wohltmann, Der Planta- genbau in Kamerun und seine Zukunft (Berlin, 1896); F. Plehn, Die Kamerunkiiste, Studien zur Klimatologie , Physiologie und Pathologie in den Tropen (Berlin, 1898) ; E. Esch, F. Solger, M. Oppenheim and 0. Jaekel, Beitrage zur Geologie von Kamerun (Stuttgart, 1904). For geology the following works may also be consulted: Stromer von Reichenbach, Geologie der deutschen Schulzgebiete in Afrika (Berlin, 1896); A. von Koenen, ” Ober Fossilien der unteren Kreide am Ufer des Mungo in Kamerun,” Abh. k. Wiss., Gottingen, 1897; E. Cohen, ” Lava vom Camerun-Gebirge,” Neues Jahrb. f. Min., 1887. (F. R. C.)

CAMILING, a town of the province of Tarlac, Luzon, Philip- pine Islands, on the Camiling river, about 80 m. N.N.W. of Manila. Pop. (1903) 25,243. In 1903 after the census had been taken, the adjacent towns of Santa Ignacia (pop. 191 1) and San Clemente (pop. 1822) were annexed to Camiling. Its pro- ducts are rice, Indian corn and sugar. Fine timber grows in the vicinity. The principal language is Ilocano; Pangasinan, too, is spoken. Being in an isolated position, very difficult of access during the rainy season, Camiling has always been infested with thieves and bands of outlaws, who come here for concealment.

CAMILLUS, MARCUS FURIUS, Roman soldier and statesman, of patrician descent, censor in 403 B.C. He triumphed four times, was five times dictator, and was honoured with the title of Second Founder of Rome. When accused of having unfairly distributed the spoil taken at Veii, which was captured by him after a ten years’ siege, he went into voluntary exile at Ardea. The real cause of complaint against him was no doubt his patrician haughtiness and his triumphal entry into Rome in a chariot drawn by white horses. Subsequently the Romans, when besieged in the Capitol by the Gauls, created him dictator; he completely defeated the enemy (but see Brennus and Rome: History, ii., ” The Republic “) and drove them from Roman territory. He dissuaded the Romans, disheartened by the devastation wrought by the Gauls, from migrating to Veii, and induced them to rebuild the city. He afterwards fought success- fully against the Aequi, Volsci and Etruscans, and repelled a fresh invasion of the Gauls in 367. Though

patrician in sym- pathy, he saw the necessity of making concessions to the plebeians and was instrumental in passing the Licinian laws. He died of the plague in the eighty-first year of his age (365). The story of Camillus is no doubt largely traditional. To this element prob-

ably belongs the story of the schoolmaster who, when Camillus was attacking Falerii (q.v.), attempted to betray the town by bringing into his camp the sons of some of the principal inhabit- ants of the place. Camillus, it is said, had him whipped back, into the town by his pupils, and the Faliscans were so affected by this generosity that they at once surrendered.

See Livy v. 10, vi. 4; Plutarch, Camillus. For the Gallic retreat, see Polybius ii. 18; T. Mommsen, Rbmische Forschungen, ii. pp. 113-

152 (1879).

CAMILLUS and CAMILLA, in Roman antiquity, originally terms used for freeborn children. Later, they were used to denote the attendants on certain priests and priestesses, especially the flamen dialis and flaminica and the curiones. It was neces- sary that they should be freeborn and the children of parents still alive (Dion. Halic. ii. 21). The name Camillus has been connected with the Cadmilus or Casmilus of the Samothracian mysteries, identified with Hermes (see Cabeiri).

CAMISARDS (from camisade, obsolete Fr. for ” a night attack,” from the Ital. camiciata, formed from camicia — Fr. chemise — a shirt, from the fact of a shirt being worn over the armour in order to distinguish friends from foes), the name given to the peasantry of the Cevennes who, from 1702 to 1705 and for some years afterwards, carried on an organized military resistance to the dragonnades, or conversion by torture, death and confiscation of property, by which, in the Huguenot districts of France, the revocation of the edict of Nantes was attempted to be enforced. The Camisards were also called Barbets (” water-dogs,” a term also applied to the Waldenses), Vagabonds, Assemblers {assemblee was the name given to the meeting or conventicle of Huguenots), Fanatics and the Children of God. They belonged to that romance-speaking people of Gothic descent whose mystic imagination and independent character made the south of France the most fertile nursing-ground of medieval heresy (see Cathars and Albigenses). At the time of the Reformation the same causes produced like results. Calvin was warmly welcomed when he preached at Nimes; Montpellier became the chief centre for the instruction of the Huguenot youth. It was, however, in the great triangular plateau of mountain called the C6vennes that, among the

small farmers, the cloth and silk weavers and vine dressers, Protestantism was most intense and universal. These people were (and still are) very poor, but intelligent and pious, and of a character at once grave and fervent. From the lists of Huguenots sent from Languedoc to the galleys (1684 to 1762), we gather that the .common type of physique is ” belle taille, cheveux bruns, visage ovale.” The chief theatre of the revolt comprised that region of the Cevennes bounded by the towns of Florae, Pont-de-Montvert, Alais and Lasalle, thus embracing the southern portion of the department of Lozere (the Bas-Gevaudan) and the neighbouring district in the east of the department of Gard.

In order to understand the War of the Cevennes it is necessary to recall the persecutions which preceded and followed the revocation of the edict of Nantes. It is also necessary to re- member the extraordinary religious movement which had for a great number of years agitated the Protestants of France. Faced by the violation of that most solemn of treaties, a treaty which had been declared perpetual and irrevocable by Henry IV., Louis XIII. and even Louis XIV. himself, they could not, in the enthusiasm of their faith, believe that such a crime would be left unpunished. But being convinced that no human power could give them liberty of conscience, they went to the Bible to find when their deliverance would come. As far back as 1686 Pierre Jurieu published his work L’ Accomplissement des propkSties, in which, speaking of the Apocalypse, he predicted the end of the persecution and the fall of Babylon — that is to say of Roman Catholicism — for 1689. The Revolution in England seemed to provide a striking corroboration of his prophecies, and the apocalyptic enthusiasm took so strong a hold on people’s minds that Bossuet felt compelled to refute Jurieu’s arguments in his Apocalypse expliqute, published in 1689. The Lettres pastorales of Jurieu (Rotterdam, 1686-1687), a series of brief tracts which were secretly circulated in France,

continued to narrate events and prodigies in which the author saw the intervention of God, and thus strengthened the courage of his adherents. This religious enthusiasm, under the influence of Du Serre, was manifested for the first time in the Dauphine. Du Serre, who was a pupil of Jurieu, communicated his mystic faith to young children who were called the “petits prophetes,” the most famous of whom was a girl named ” La belle Isabeau.” Brought up on the study of the

prophets and the Apocalypse, these children went from village to village quoting and requoting the most obscure and terrible passages from these ancient prophecies (see Antichrist). It is necessary to remember that at this time the Protestants were without ministers, all being in exile, and were thus deprived of all real religious instruction. They listened with enthusiasm to this strange preaching, and thousands of those who were called New Catholics were seen to be giving up attendance at Mass. The movement advanced in Languedoc with such rapidity that at one time there were more than three hundred children shut up in the prisons of Uzes on the charge of prophesying, and the Faculty of Medicine of Montpellier, which was entrusted with their examination, went so far in their ignorance as to pronounce these irresponsible infants guilty of fanaticism. After the peace of Ryswick, 1697, the fierceness of the persecution was redoubled in the South. ” I will show no mercy to the preachers,” wrote the terrible Baville, the so-called “king of Languedoc,” and he kept his word. The people of the Cevennes were in despair, for their loyalty to the king had been remarkable. In 1683 on the 6th of September an assembly composed of fifty pastors, sixty-four noblemen and thirty-four notables, held at Colognac, had drawn up a statement of its unalterable loyalty to Louis XIV. It is important to notice that the revolt of the C6vennes was essentially a popular move- ment. Among its leaders there was not a single nobleman, but only men of the people, a baker, a blacksmith, some ex-soldiers; but by far the most extraordinary characterisic is the presence, no longer of children, but of men and women who declared themselves inspired, who fell into religious ecstasies and roused in their comrades the most heroic bravery in battle and at the stake.

The assassination of the abbe du Chayla marks the beginning of the war of the Cevennes. The abbe, a veteran Catholic missionary from Siam, had been appointed inspector of missions in the Cevennes. There he introduced the ” squeezers ” (which resembled the Scottish “boot”), and his systematic and refined cruelty at last broke the patience of his victims. His murder, on the 23rd of July 1702, at Pont de Monvert, was the first blow in the war. It was planned by Esprit Seguier, who at once began to carry out his idea of a general massacre of the Catholic priests. He soon fell, and was succeeded by Laporte, an old soldier, who, as his troop increased, assumed the title of ” the Colonel of the Children of God,” and named his camp the ” Camp of the Eternal.” He used to lead his followers to the fight, singing Clement Marot’s grand version of the 68th Psalm, ” Que Dieu se montre seulement,” to the music of Goudimel. Besides Laporte, the forest-ranger Castanet, the wool-carders Conderc and Mazel, the

soldiers Catinat, Joany and Ravenel were selected as captains — all men whom the thiomanie or prophetic malady had visited. But the most important figures are those of Roland, who after- wards issued the following extraordinary despatch to the inhabit- ants of St Andre: — “Nous, comte et seigneur Roland, generalis- sime des Protestants de France, nous ordonnons que vous ayez a congedier dans trois jours tous les pretres et missionnaires qui sont chez vous, sous peine d’etre brules tout vifs, vous et eux ” (Court, i. p. 219) ; and Jean Cavalier, the baker’s boy, who, at the age of seventeen, commanded the southern army of the Camisards, and who, after defeating successively the comte de Broglie and three French marshals, Montrevel, Berwick and Villars, made an honourable peace. (See Cavalier, Jean.)

Cavalier for nearly two years continued to direct the war. Regular taxes were raised, arsenals were formed in the great limestone caves of the district, the Catholic churches and their decorations were burned and the clergy driven away. Occasion- ally routed in regular engagements, the Camisards, through their desperate valour and the rapidity of their movements, were

constantly successful in skirmishes, night attacks and ambuscades, A force of 60,000 was now in the field against them; among others, the Irish Brigade which had just returned from the persecutions of the Waldenses. The rising was far from being general, and never extended to more than three or four thousand men, but it was rendered dangerous by the secret and even in many places the open support of the people in general. On the other hand their knowledge of a mountainous country clothed in forests and without roads, gave the insurgents an enormous advantage over the royal troops. The rebellion was not finally suppressed until Baville had constructed roads throughout this almost savage country.

Montrevel adopted a policy of extermination, and 466 villages were burned in the Upper Cevennes alone, the population being for the most part put to the sword. Pope Clement XL assisted in this work by issuing a bull against the ” execrable race of the ancient Albigenses,” and promising remission of sins to the holy militia which was now formed among the Catholic population, and was called the Florentines, Cadets of the Cross or White Camisards. Villars, the victor of Hochstadt and Friedlingen, saw that conciliation was necessary; he took advantage of the feeling of horror with which the quiet Protestants of Nimes and other towns now regarded the war, and published an amnesty. In May 1704 a formal meeting between Cavalier and Villars took place at Nimes. The result of the interview was that a document entitled Tres humble requite des reformes du

Languedoc au Roi was despatched to the court. The three leading requests for liberty of conscience and the right of assembly outside walled towns, for the liberation of those sentenced to prison or the galleys under the revocation, and for the restitution to the emigrants of their property and civil rights, were all granted, — the first on condition of no churches being built, and the third on condition of an oath of allegiance being taken. The greater part of the Camisard army under Roland, Ravenel and Joany would not accept the terms which Cavalier had arranged. They insisted that the edict of Nantes must be restored, — “point de paix, que nous n’ayons nos temples.” They continued the war till January 1705, by which time all their leaders were either killed or dispersed.

In 1 709 Mazel and Claris, with the aid of two preaching women, Marie Desubas and Elizabeth Catalon, made a serious effort to rekindle revolt in the Vivarais. In 1711 all opposition and all signs of the reformed religion had disappeared. On the 8th of March 1715, by medals and a proclamation, Louis XIV. announced the entire extinction of heresy.

What we know of the spiritual manifestations in the Cevennes (which much resembled those of the Swedish Raestars of Smaland in 1844) is chiefly derived from Le Thedtre sacre des Cevennes, London, 1707, reprinted at Paris in 1847; A Cry From the Desert, &c, by John Lacy, London, 1707; La Clef des propheties de M. Marion, London, 1707; Avertissements prophetiques d’Elie Marum, &c, London, 1707. About the date of these publications the three prophets of the Cevennes, Marion, Durand-Fage and Cavalier (a cousin of the famous Jean Cavalier) were in London and were objects of lively curiosity. The consistory of the French church in the Savoy sent a protest to the lord mayor against ” cette secte impie et extra vagante ” and the matter was tried at the Guildhall. Misson, author of the Thi&tre sacre, declared in defence of the accused, that the same spirit which had caused Balaam’s ass to speak could speak through the mouths of these prophets from the Cevennes. Marion and his two friends Fatio, a member of the Royal Society of London, and Daud6, a leading savant, who acted as his secretaries, were condemned to the pillory and to the stocks. Voltaire relates (Siecle de Louis XIV. c. 36) that Marion wished to prove his inspiration by attempting to raise a dead body (Thomas Emes) from St Paul’s churchyard. He was at last compelled to leave England. 1

The inspiration (of which there were four degrees, avertissement,

1 This curious affair provoked a lengthy controversy, which is

described in ” La Relation historique de ce qui s’est passe a Londres au sujet des prophetes camisards ” (Republique des Lettres, 1708), in the study of M. Vesson, Les Prophetes camisards a Londres (1893), and also in the book Les Prophetes cevenols, ch. iii. (1861) by Alfred Dubois.

swffie, prophitie, dons) was sometimes communicated by a kiss at the assembly. The patient, who had gone through several fasts three days in length, became pale and fell insensible to the ground. Then came violent agitations of the limbs and head, as Voltaire remarks, ” quite according to the ancient custom of all nations, and the rules of madness transmitted from age to age.” Finally the patient (who might be a little child, a woman, a half-witted person) began to speak in the good French of the Huguenot Bible words such as these: ” Mes freres, amendez-vous, faites penitence, la fin du monde approche; le jugement general sera dans trois mois;repentez-vousdu grand peche que vous avezcommis d’aller a la messe; c’est le Saint-Esprit qui parle par ma bouche ” (Brueys, Histoire du fanatisme de notre temps, Utrecht, 1737, vol. i. p. 153). The discourse might go on for two hours; after which the patient could only express himself in his native patois, — a Romance idiom, — and had no recollection of his ” ecstasy.” All kinds of miracles attended on the Camisards. Lights in the sky guided them to places of safety, voices sang encouragement to them, shots and wounds were often harmless. Those entranced fell from trees without hurting themselves; they shed tears of blood; and they subsisted without food or speech for nine days. The supernatural was part of their life. Much literature has been devoted to the discussion of these marvels. The Catholics Flechier (in his Lettres choisies) and Brueys consider them the product of fasting and vanity, nourished on apocalyptic literature. The doctors Bertrand (Du magnitisme animal, Paris, 1826) and Calmeil (De la folie, Paris, 1845) speak of magnetism, hysteria and epilepsy, a prophetic monomania based on belief in divine possession. The Protestants especially emphasized the spiritu- ality of the inspiration of the Camisards; Peyral, Histoire des pasteurs du desert, ii. 280, wrote: ” II fallait a cet effort gigan- tesque un ressort prodigieux, l’enthousiasme ordinaire n’y eut pas sum.” Dubois, who has made a careful study of the problem, says: ” L’inspiration cevenole nous apparait comme un phenomene purement spirituel.” Conservative Catholics, such as Hippolyte Blanc in his book on L’inspiration des Camisards (1859), regard the whole thing as the work of the devil. The publication of J. F. K. Hecker’s

work, Die Volkskrankheiten des Mittelalters, made it possible to consider the subject in its true relation. This was translated into English in 1844 by B. G. Babington as The Epidemics of the Middle Ages.

Although the Camisards were guilty of great cruelties in the prosecution of the war, there does not seem to be sufficient ground for the charge made by Marshal de Villars: ” Le plupart de leurs chefs ont leurs demoiselles ” (letter of 9th August 1704, in the War Archives, vol. 1797). Court replied to these unjust charges: ” Their enemies have accused them of leading a life of licence because there were women in their camps. These were their wives, their daughters, their mothers, who were there to prepare their food and to nurse the wounded” (Histoire, vol. i.p. 71).

Bibliography. — The works devoted to the history of the Cami- sards are very numerous. Nevertheless there exists no work speci- fically devoted to this extremely interesting period in French history, for in none of the published works has proper use been made of the valuable documents preserved in the archives of the ministry of war. Among the chief works are : — Pere Louvreleuil (priest, former cure of St. Germain de Calberte), Histoire du fanatisme renouvele oil Ton raconte les sacrileges, les maladies et les meurtres commis dans les Cevennes (Toulouse, 1704); M. de Brueys, Suite de I’histoire du fanatisme de noire temps oil I’ on voit les derniers troubles des Cevennes (Paris, 1709) ; Lettres choisies de M. Flechier eveque de Nimes avec une relation des fanatiques du Vivarez (Paris, 1715); Madame de Merez de l’lncarnation, Memoires et journal tres fidele de ce qui s’est passe le 11 de may 170J jusqu’au 1 juin 1705 a Nimes touchant les phanatiques, published by fi. de Barthelemy (Montpellier, 1874). These works are written by Catholic writers immediately after the war of the Cevennes, and, despite their partiality, include some valuable documents. Memoires du marquis de Guiscard (Delft, 1 705) ; Maximilien Misson, Le Theatre sacre des Cevennes ou Recit de diverses merveilles nfiuvellement operees dans cette partie de la province de Languedoc (London, 1707); Misson, the author of the Voyages en Italie, which met with such a great success, gave prominence to the facts relating to the inspiration of the Camisards; the Thedtre also contains important extracts from the works of Benoit, Brueys, Guiscard and Boyer, and several original letters from Camisards; Histoire des Camisards, fife. (London, 1740), the anonymous work of a distinguished writer, which was eventually condemned by the par-

lement of Toulouse to be torn up and burnt in 1759; Antoine Court, Histoire des troubles des Cevennes (3 vols., 1760), the best work of

this period, compiled from numerous manuscript references. The war of the Cevennes has been treatedin several English works, e.g. A Compleat History of the Cevennes, giving a Particular Account of the Situation, fife., by a doctor of civil law (London, 1703). This work includes a dedication to the queen, an historical account of the people of the Cevennes, the bull of Pope Clement against the Camisards, and the bishop of Nimes's mandate publishing the bull, and a discourse on the obligations of the English to help the Camisards, and a form of prayer used in the Camisard assembly, printed in London in 1703 under the title Formulaire de prieres des Cevennols dans leurs assemblies. The History of the Rise and Downfal of the Camisards, fife. (London, 1709), dealt with the prophets of the Cevennes in London, and is only an abridged translation of Pere Louvreleuil's work. Among modern works are, Ernest Moret, Quinze ans du regne de Louis XIV (3 vols., 1859), a work which gives a remarkable history of the war of the Cevennes; Les Insurges protestants sous Louis XIV, studies and unedited documents published by G. Frosterus (1868); Memoires de Bonbonnoux, chief Camisard and pastor of the desert, published by Vielles (1883); Bonnemere, Histoire de la guerre des Camisards (1859). Two popular works are — F\ Puaux, Histoire populaire de la guerre des Camisards (1875); Anna E. Bray, The Revolt of the Protestants of the Cevennes with some Account of the Huguenots of the Seventeenth Century (London, 1870). (F. Px.)

CAMOENS [Camoes], LUIS VAZ DE (1524-1580), the prince of Portuguese poets, sprang from an illustrious and wealthy family of Galician origin, whose seat, called the castle of Camoens, lay near Cape Finisterre. His ancestor, the poet Vasco Pires de Camoens, followed the party of Peter the Cruel of Castile against Henry II., and on the defeat of the former had to take refuge along with other Galician nobles in Portugal, where he founded the Portuguese family of his name. King Fernando received him well, and gave him posts of honour and estates, and though the master of Aviz sequestered some of these and Vasco lost others after the battle of Aljubarrota, where he fought on the Spanish side, considerable possessions still remained to him. Antao Vaz, the grandfather of Luis, married one of the Algarve Gamas, so that Vasco da Gama and Camoens, the dis- coverer of the sea route to India and the poet who immortalized the voyage in his Lusiads, were kinsmen. Antao 's eldest son Simao Vaz was born in Coimbra at the close of the 1 5th century, and married Anna de Sa e Macedo, who bore him an only son, Luis Vaz de Camoens; thus the poet, like his father and grand- father, was a cavalleirofidalgo, that is, an untitled noble.

Four cities dispute the honour of being his birthplace, though Lisbon

has the better title; and there is a like dispute about the year, which, however, was almost certainly 1524. The poet spent his childhood in Coimbra, where his father owned a pro- perty, and made his first studies at the college of All Saints, designed for " honourable poor students," and there contracted friendships with noblemen like D. Goncalo da Silveira and his brother D. Alvaro, who were inmates of the nobles' college of St Michael. These colleges were offshoots from and attached to the Augustinian monastery of Santa Cruz, an important religious and scholastic establishment, where the poet's uncle D. Bento de Camoens, a virtuous and very learned man, was professed. The Renaissance, though late in penetrating into Portugal, had by this time definitely triumphed, and the university of Coimbra, after its reform in 1537 under the auspices of King John III., boasted the best teachers drawn from every country, among them George Buchanan. The possession of classical culture was regarded as the mark of a gentleman; the colleges of Santa Cruz required conversation within the walls to be in Greek or Latin, and the university, when it absorbed the colleges, adopted the same rule. In these surroundings, aided by a retentive memory, Camoens steeped himself in the literature and mytho- logy of the ancients, as his works show, and he was thus able in after years to perfect the Portuguese language and to enrich it with many neologisms of classical origin. It is fortunate, however, for his country and his fame that he never followed the fashion of writing in Latin; on the contrary, except for his Spanish poems, he always employed his native tongue. After completing his grammar and rhetoric the poet entered on his university course for the degree of bachelor of arts, which lasted for three years, from 1539 to 1542, and during this period he met Jorge

de Montemayor, the author of Diana, who was then studying music. He seems to have imbibed much of that encyclopaedic instruction to which the humanists aspired, for his writings show a very extensive reading, anci his scientific knowledge and faculty of observation compelled the admiration of the great Humboldt. The thoroughness of his teaching is apparent when we remember that he wrote his epic in the fortresses of Africa and Asia, far from books, and yet gave proof of acquaintance with universal history, geography, astronomy, Greek and Latin literature, and the modern poetry of Italy and Spain. Much of the credit for this learning must be attributed to the encouragement of D. Bento, now prior of Santa Cruz, who became chancellor of the university the very year when Camoens entered it. There is a tradition

that this uncle destined him for the church and caused him to study theology. The poet's knowledge of dogma and the Bible, his friendly intercourse with the Lisbon Dominicans at the end of his life, and the share he is said to have taken in their disputa- tions, make the hypothesis a likely one, but he made his own choice and preferred a lay life. We have very little verse of his Coimbra time, but it seems that he began in the Italian manner, following the new classical school of Sa de Miranda (g.u.),and that, though attached to the popular muse and well acquainted with the national songs and romances, legends and lore, his poetry in the old style (medida velha) is mostly of later date. An exception may perhaps be found in his Auto after the manner of Gil Vicente (q-v.), The Amphitryons, a Portuguese adaptation from Plautus which was very well received. At the age of eighteen Camoens left Coimbra, bidding adieu to the old city in verses breathing the most tender saudade. Lisbon, which impressed Cervantes so much as to draw from him a classic description in the novel Persiles y Sigismunda, made an even greater impression on the youthful Camoens, and the Lusiads are full of eulogistic epithets on the city and the Tagus.

Arriving in 1543, it has been conjectured that he became tutor to D. Antonio de Noronha, son of the great noble D. Francisco de Noronha, count of Linhares, who had lately returned from a French embassy to his palace at Xabregas. The poet's birth and talents admitted him to the society of men like D. Constantine de Braganza, the duke of Aveiro, the marquis of Cascaes, the count of Redondo, D. Manoel de Portugal and D. Goncalo da Silveira, son of the count of Sortelha, who died a Christian martyr in Monomotapa. At Xabregas Camoens must have met Francisco de Moraes (q.v.), who had served as secretary to the count of Linhares on his embassy, and there he probably read the MS. of Palmeirim; this would explain the origin of two of his roundels which are clearly founded on passages in the romance. Camoens had had a youthful love affair in Coimbra, but on Good Friday of the year 1544 he experienced the passion of his life. On that day in some Lisbon church he caught sight of D. Catherina de Ataide (daughter of D. Antonio de Lima, high chamberlain to the infant D. Duarte), who had recently become a lady-in-waiting to the queen. This young girl, the Nathercia of his after songs, counted then some thirteen years, and was destined to be his Beatrice. To see more of her, he persuaded the count of Linhares to introduce him to the court, where his poetical gifts and culture ensured him a ready welcome, and his fifth idyll, addressed to his patron on this occasion, paved the way for his entrance. Though inferior to his later compositions, it excels in harmony any verse pre- viously written in Portuguese. At first his suit

probably met with few difficulties, and if Catherina's family regarded it seriously, their poverty, combined with the fact that the poet came of a good stock and had the future in his hands, may have prevented any real opposition. It was his own imprudence that marred his fortunes, and his consciousness of this fact gave his muse that moving expression, truth and saudade, which are lacking in the somewhat artificial productions of the sentimental Petrarch. But while Camoens gained protectors and admirers, his temperament and conduct ensured him envious foes, and the secret of his love got out and became the subject of gossip. All was not smooth with the lady, who showed herself coy; now yielding to her heart, she was kind; and then listening to her

friends, who_ would have preferred a better match for her, she repelled her lover. Jealousy then seized him, and sick of court life for the moment, he gladly accompanied his patron to the latter's country house; but once there he recognized that Lisbon, was the centre of attraction for him and that he could not be happy at -a distance. His verses at this time reveal his parlous condition. He oscillates between joy and depression. He passes from tender regrets to violent outbursts, which are followed by calm and peace, while expressions of passionate love alternate with bold desires and lofty ambitions. It is clear that there was an understanding between him and Catherina and that they looked forward to a happy ending, and this encouraged him in his weary waiting and his search for a lucrative post which would enable him to approach her family and ask for her hand. From this period date the greater part of his roundels and sonnets, some of the odes and nearly all the eclogues.

His fifth eclogue shows that he was seriously thinking of his patriotic poem in 1544; and from the fourth it seems likely that the Lusiads were in course of composition, and that cantos 3 and 4 were practically completed. He had by now established his fame and was known as the Lusitanian Virgil, but presently he had a rude awakening from his dreams of love and glory. He had shown his affection too openly, and some infraction of court etiquette, about which the queen was strict, caused the tongue of scandal to wag; perhaps it was an affair with one of Catherina's brothers, even a duel, that led to the decree which exiled him from Lisbon.

Camoens's rashness, self-confidence and want of respect for the authorities all contributed to the penalty, and the composi- tion of the play El Rei Seleuco would aggravate his offence in the eyes of John III. Produced in 1545 and derived from Plutarch, the plot was calculated to draw attention to the relations between the king and his

stepmother, and to recall the action of D. Manoel in robbing his son John III. of his intended bride. Camoens composed it for a wedding festivity in the house of Estacio da Fonseca, and some of the verses refer so openly to his passion, that if, as is likely, he spoke them himself, emphasizing them with voice and gesture so as to publish his love to the world, this new boldness, combined with the subject of the piece, must have rendered his exile a certainty. All we know definitely, however, is that the court was henceforth closed to him, and in 1546 he had to leave Lisbon, the abode of his love and the scene of his triumph. Tradition says that he went to the Ribatejo and spent seven or eight months with his mother's relatives in or near Santarem, whence he poured out a number of his finest poems, including his Elegy of Exile and some magnificent sonnets, which, in vigour of ideas and beauty of expression, exceeded anything he had hitherto produced. Poets cannot live on bays, however, and pressed by necessity he determined to become a soldier.

One of his best modern biographers thinks that he petitioned the king for liberty to commute his penalty into military service in Africa; but whether this be so, or whether he merely went there to gain his spurs, certain it is that in the autumn of 1547 he proceeded to Ceuta. For the next two years, the usual period of service there, he lived the routine life of a common soldier in this famous trade emporium and outpost-town, and he lost his right eye in a skirmish with the Moroccans, though some writers make the incident occur on the voyage across the straits when his ship was attacked by Sallee rovers. Elegy ii. and a couple of odes date from his stay in Ceuta. He is full of sadness and almost in despair, but is saved from suicide by love and memory of the past. He has intervals of calm and resignation, even of satirical humour, and these become more frequent as the term of his exile draws near, and in one of them he wrote his prose letter to a " Lisbon friend." The octaves on the Discontent of the World, which breathe a philosophic equanimity and lift the reader out of the tumult of daily life, go to show that his restless heart had found peace at last and that he had accustomed himself to solitude.

In November 1549 the aged governor of Ceuta, D. Affonso de Noronha, was summoned to court and created viceroy of India,

and Camoens accompanied him to Lisbon, intending to follow him to the East in the armada which was due to sail in the spring of 1550.

Reaching the capital in December, the poet almost immediately enlisted, but when the time came for departure he had changed his mind. His affection for Catherina and dreams of literary glory detained him, and he lived on in the expecta- tion of obtaining a post on the strength of his services and wound. But month after month passed by without result, and in his disappointment he allied himself with a group of hot-blooded youths, including the ex-friar Antonio Ribeiro, nicknamed ” the Chiado,” after whom the main street of Lisbon takes its name, and endeavoured to forget his troubles in their society. He took part in their extravagances and gained the name of ” Trinca-fortes ” (” Crack-braves “) from his bohemian com- panions, while there were ladies who mocked at his disfigurement, dubbing him ” devil ” and ” eyeless face.” In the course of his adventures he had often to draw his sword, either as attacker or attacked, and he boasted that he had seen the soles of the feet of many but none had seen his. When the reply to his application came from the palace it was a negative one, and he had now nothing further to expect. His stock of money brought from Ceuta was certainly exhausted, and misery stared him- in the face, making him desperate. On the feast of Corpus Christi, the 1 6th of June 1552, he found two masked friends of his engaged in a •Street fight near St Dominic’s convent, and joining in the fray he wounded one Goncalo Borges, a palace servant, with the result that he was apprehended and lodged in gaol. This unprovoked attack upon a royal servant on so holy a day constituted a serious offence and cost him eight months’ imprisonment. In a pathetic sonnet he describes his terrible experiences, which made such an impression on him that years afterwards he recurred to them in his great autobiographical Canzon 10. When Borges’ wound was completely healed, the poet’s friends intervened to assist him, and it was arranged that on his formally imploring pardon Borges should grant it and desist from proceeding with the case. This was effected on the 13 th of February 1553, and on the 7 th of March the king, taking into consideration that Camoens was ” a youth and poor and decided to serve this year in India,” confirmed the pardon. He had been obliged to humble his pride and enlist again, but while he complained of his troubles he recognized, in his frank, honest way, that his own mistakes were in part the causes of them.

After bidding good-bye to Catherina for the last time, Camoens set sail on Palm Sunday, the 24th of March 1553, in the ” S. Bento,” the flagship of a fleet of four vessels, under Fernao Alvares Cabral. His last words, he says in a letter, were those of Scipio Africanus, ” Ingrata patria, non possidebis ossa mea.”

He relates some of his experiences on board and the events of the

voyage in various sonnets in Elegy iii. and in the Lusiads. In those days the sailors navigated the ships, while the men-at- arms kept the day and night watches, helped in the cleaning and, in case of necessity, at the pumps, but the rank of Camoens doubtless saved him from manual work. He had much time to himself in his six months' voyage and was able to lay in a store of nautical knowledge, while tempestuous weather off the Cape of Good Hope led him to conceive the dramatic episode of Adamastor {Lusiads, canto 5). The " S. Bento," the best ship of the fleet, weathered the Cape safely, and without touching at Mozambique, the watering-place of ships bound for India, anchored at Goa in September. It seems probable that the idea of the Lusiads took further shape on the voyage out, and that Camoens modified his plan; cantos 3 and 4 were already written, but from an historical he now made it a maritime epic. The discovery of India became the main theme, while the history of Portugal was interlaced with it, and the poem ended with the espousals between Portugal and the ocean, and a prophecy of the future greatness of the fatherland.

At the time of his arrival Goa boasted 100,000 inhabitants, and with its magnificent harbour was the commercial capital of the west of India. The first viceroy had been content with a sea dominion, but the great Affonso de Albuquerque saw that this was not enough to secure the supremacy of the Portuguese;

recpgnizing the strategic value "of Goa, he seized it and made it the capital of a land empire, and built fortresses in every important point through the East. Since his death a succession of remark- able victories had made the flag of Portugal predominant, but the enervating climate, the pleasures and the plunder of Asia, began to tell on the conquerors. Corruption was' rife from the governor downwards, because the ruling ambition was to get rich and return home, and the hero of one day was a pirate the next. After all, it was only human nature, for a governorship lasted but three years and Portugal was far away, so the saying went round — " They are installed the first year, they rob the second, and then pack up in the third to sail away." Camoens was well received at first, owing to his talents and bravery, and he found the life cheap and merry, but having left his country with high ideals, the injustice and demoralization of manners he found in India soon disgusted him. He compared Goa to Babylon, and called it " the motherof villains and the stepmother of honest men."

His first military service in the East took place in November 1 553, when he went with a force led by the viceroy to chastise a petty king on the Malabar coast. The expedition only lasted two or three months, and after some trivial combats it returned to Goa. In February of the

following year Camoens accom- panied the viceroy's son, D. Fernando de Menezes, who led an armada to the mouth of the Red Sea and thence up the Arabian coast to snap up hostile merchantmen and suppress piracy. Next the fleet went on to Ormuz, as was the custom with these annual cruises, and then to Bassora, where the poet helped to make some valuable prizes, and wrote a sonnet — it was ever, with him, " in one hand the sword, in the other the pen " ! Returning to Goa in November he learnt of the deaths of Prince John, and of his friend and pupil the young D. Antonio de Noronha, and paid his tribute in a feeling sonnet and eclogue. In February 1555 he sailed on another pirate hunt and spent six weary months off Cape Guardafui, varied by a visit to Mombasa and by further work on his epic, and only got back to Goa in the following September. His experiences are recorded in the profound and sad 10th Canzon.

Meanwhile Francisco Barreto, an honourable and generous man, had become governor-general of India in the June of 1555, and, his appointment being popular, a reign of festivities began in Golden Goa to welcome his succession, in the course of which Camoens produced his Filodemo, a dramatized novel written in his court days. The same occasion probably gave birth to the Disparates na India (" Follies of India "), and certainly to the Satyr a do Torneio (" Satire of the Tourney "), which confirmed the poet's reputation as a sayer of sharp things and gave con- siderable umbrage to those whom the cap fitted. However, it Was not the enmities thus aroused but military duty which compelled him to quit Goa once more in the spring of 1556. He had enlisted in Lisbon for five years, the usual term, and in compliance with the orders of the governor he sailed for the Moluccas in April and there fought and versified for two years, though nearly all is guesswork at this period of his life. He appears to have spent the time between September 1556 and February 1557 in the island of Ternate, where he wrote Canzon 6, revealing a state of moral depression similar to that of Canzon 10, and he perhaps visited Banda and Amboina. In the following year he took part in the military occupation of Macao, which the emperor of China had presented to the Portuguese in return for their destruction of a pirate fleet which had besieged Canton. The poet's five years' term of service was now over, and he remained at Macao many months waiting for a ship to carry him back to India. He had made some profit out of the Merct de Viagem, granted by the governor Barreto to free him from the poverty in which he habitually lived, and he spent his money royally. At the same time he continued his epic, working in the grotto which still bears his name.

All seemed to be going smoothly with him until suddenly his fortunes

took a serious turn for the worse. As the result of an intrigue the captain of the yearly ship from China to India, who acted as governor of Macao during his stay in port, imprisoned

Camoens, and took him on board with a view of bringing him to trial in India. The ship, however, was wrecked in October 1559 at the mouth of the Mekong river, and the poet had to save his life and his Lusiads by swimming to shore, and though he preserved the six or seven finished cantos of the poem, he lost everything else. While wandering about on the Cambodian coast awaiting the monsoon and a vessel to take him to Malacca, he composed those magnificent stanzas ” By the Waters of Babylon,” called by Lope de Vega ” the pearl of all poetry,” in which he recalls the happy days of his youth, sighs for Lisbon (Sion) and his love, and mourns his long exile from home. He got somehow to Malacca, and after a short stay there reached Goa, still as prisoner, in June 1561. He was straightway lodged in gaol, where he heard for the first time of the death of Catherina, and he poured out his grief in the great sonnet, Alma Minha Gentil. The viceroy, D. Constantius de Braganca, had recently returned from Jafanapatam, bringing as prize a tooth of Buddha, and Camoens approached him with a splendid epistle in twenty octaves, after the manner of Horace’s ode to Augustus. It failed, however, to hasten the consideration of his case, but in September the Conde de Redondo, a good friend, came into office and immediately ordered his release from prison. His troubles were not yet at an end, however, for one Miguel Rodriguez Coutinho, a well-known soldier and citizen of Goa who lent money at usurious rates, thought the opportunity a good one to obtain repayment of a debt, and had Camoens lodged once more in gaol. As soon as he came out the poet composed a burlesque roundel satirizing his persecutor under the nickname of Fios Seccos (” dry threads “).

Though very poor he now led an easier, even a pleasant life for a time. He was able to see his friends D. Vasco de Ataide, D. Francisco de Almeida, Heitor da Silveira, Joao Lopes Leitao and Francisco de Mello, all men of family and note. One day he invited them to a banquet, at which, instead of the usual dishes, each guest was served with a set of witty verses, and after these had been read out and chaff had gone round, the food came and they formed a merry party. The poet used his interest with the viceroy to recommend to him the naturalist Garcia da Orta, whose Colloquies on the simples and drugs of the East,

the first product of the press in India, appeared in April 1563 with an ode by Camoens. His life for the next three years is almost a blank, but we know that he was hard at work finishing his epic, assisted by the advice of the historian Diogo do Couto, who became its commentator, and further that the new viceroy, his friend D. Antao de Noronha, nominated him to a reversion of the factory of Chaul, which, however, never fell into possession. It is clear from his writings that fourteen years in the East had told on Camoens. His best friends were dead or scattered, and he was overwhelmed with saudade. His sole ambition was to go home and print his poem, but he had no money to pay his passage. In September 1567, however, Pedro Barreto was named captain of Mozambique, and insisted on the poet accom- panying him to Sofala, at the same time lending him two hundred cruzades. It was part of the way home, so Camoens accepted, but after they reached Mozambique Barreto called in this money, and his debtor, being unable to pay, was detained there for two whole years. Here Diogo do Couto found him " so poor that he ate at the cost of friends, and in order that he might embark for the Kingdom we friends collected for him the clothes he needed and some gave him to eat, and that winter he finished perfecting the Lusiads for the press and wrote much in a book he was making, which he called Parnaso of Luiz de Camoes, a book of much learning, doctrine and philosophy, which was stolen from him." Thanks to Couto and others, Camoens was able to liquidate his debt and set sail in November 1569 in the " Santa Clara," and he reached Portugal on the 7th of April 1570, after an absence of seventeen years.

The only wealth he brought with him from India was the MS. of his great poem, a " Tesoro del Luso " in the words of Cervantes. Moreover, he returned at an unfortunate moment — one of pest and famine. The great plague which had killed a quarter, or, as some say, half of the population of the capital, was declining,

but a rigid quarantine prevailed, and the ship had to lie off Cascaes until the sanitary authorities allowed her to enter the Tagus. Camoens was welcomed by his mother, whom he found " very old and very poor " — his father had died at Goa about 1555 — r and after a visit to Catherina 's tomb, which inspired the poignant sonnet 337, he set about obtaining the royal licence to print the Lusiads. This was dated the 24th of September 1571 and gave him a ten years' copyright, and as soon as the book appeared some friendly and influential hand, perhaps D. Manoel de Portugal, perhaps D. Francisca de Aragao for whom he had rhymed in the happy days of his youth, presented the national epic to King Sebastian. Shortly afterwards, on the 28th of July 1572, the king gave the poet a pension of fifteen milreis for the

term of three years, as a reward for his services in India and for his poem. It was relatively a considerable sum, seeing that he had no great military record, and it seems even generous when we remember that Magellan had only received twelve, and had left Portugal because King Manoel would not give him a slight increase. , Many functionaries with families had less to live on, and Camoens's subsistence was secure for the time being, and he could afford an attendant, so that the legend of the slave Antonio may well be true. Moreover, he was in the enjoyment of the fame his poem brought him. Philip II. is said to have read and admired it, and the powerful minister, Pedro de Alcacova Carneiro, echoed the general opinion when, he remarked that it had only one defect, in not being short enough to learn by heart or long enough to have no ending. Tributes came from abroad too. Tasso wrote and sent Camoens a sonnet in his praise, Fernando de Herrera celebrated him, and the year 1580 saw the publication of two Spanish versions, one at Alcala, the other at Salamanca. His pension lapsed in 1575, but on the 2nd of August it was renewed for a further term; owing, however, to a mistake of the treasury officials, Camoens drew nothing for about a year and a half and fell into dire distress. This explains the story of Ruy da Camara, who had engaged him to translate the penitential psalms, and not receiving the version, called on the poet, who said in excuse that he had no spirit for such work now that he wanted for everything, and that his slave had asked him for a penny for fuel and he could not give it.

On the 2nd of June 1 578, just before his start for the expedition to Africa which cost him his life and Portugal her independence, King Sebastian had renewed the poet's pension for a further period. Though Camoens had neither the health nor the means to accompany the splendid train of nobles and courtiers who followed the last crusading monarch to his doom, he began an epic to celebrate the enterprise, but burnt it when he heard the news of the battle of Alcacer. Instead, he mourned the death of his royal benefactor in a magnificent sonnet, and in Elegy x. reproached the cowardly soldiery who contributed to the rout. On the 31st of January 1580 the cardinal king Henry died, and, foreseeing the Spanish invasion, Camoens wrote in March to bis old friend D. Francisco de Almeida: " All will see that I so loved my country that I was content not only to die in her but with her." A great plague had been raging in Lisbon since the previous year, and the poet, who lay ill in his poor cottage in the rua de Santa Anna, depressed by the calamities of his country, fell a victim to it. He was removed to a hospital and there passed away, unmarried and the last of his line, on the 10th of June 1580. A Carmelite, Frei Jose Indio,

attended him in his last moments and received the only recognition Camoens could give, his copy of the Lusiads. He wrote afterwards: ” What more grievous thing than to see so great a genius thus unfortunate. I saw him die in a hospital in Lisbon, without a sheet to cover him, after having triumphed in the East Indies and sailed 5000 leagues by sea.” The house of Vimioso supplied the winding-sheet, and Camoens was buried with other victims of the plague in a common grave in the cemetery of Santa Anna. Years later D. Goncalo Coutinho erected in the church of that invocation an in memoriam slab of marble with an inscription, and subsequently epitaphs were added by other admirers, but the earthquake of 1755 damaged the building, and all traces of these last acts of homage

to genius have disappeared. The third centenary of the poet’s death was made the occasion of a national apotheosis; and on the 8th of June 1880 some remains, piously Relieved to be his, were borne with those of Vasco da Gama to the national pantheon > theJeronymosatBelem. ; ,i !

The masterpiece of Camoens, the Uusiads, is < the epos of dis- covery. It is written in hendecasyllabic : ott&va. vimd, and i is divided into ten cantos containing in all 1102 stanzas'. Its argu- ment is briefly as follows. After an exordium proposing the sub- ject \ invoking the Tagus muses and addressing King Sebastian, Vasco da Gama's ships are shown sailing up the East. African coafston their way to India. At a council of the gods the fate of the fleet is discussed, and Bacchus promises to thwart the voyage, while Venus and Mars favour the navigators; They arrive at Mozambique, where the governor endeavours to destroy them by stratagem, and, this failing., Bacchus tries other plots against them at Quiloa and Mombasa which are foiled by Venus. In answer to her appeal, Jupiter foretells the glorious feats of the Portuguese in the East, and sends Mercury to direct the voyagers to Melinde, where they are hospitably received and get a pilot to guide them to India. The local ruler visits the fleet and asks Gama about his country and its history, and in response the latter gives an account of the origin of the kingdom of Portugal, its kings and principal achievements, ending with the incidents of the voyage out. This recital occupies cantos ■ 3, 4′ and 5, and includes some of the most admired and most power- ful episodes in the poem, e.g. those of Ighez de Gastro, King Manoel's dream of the rivers Ganges and Indus, the speech of the old man of Belem and the apparition of

Adamastor off the Cape of Good Hope. Canto 6 describes the crossing of the Indian Ocean from Melinde to Calicut and a fresh hostile attempt on the part of Bacchus. He descends to Neptune's palace, and at a council of the sea-gods it is resolved to order Aeolus to loose the winds against the Portuguese, but the tempest is quelled by Venus and her nymphs in answer to Gama' s prayer, and the morning light reveals the Ghats of India. Just before the storm, occurs the night scene in which Velloso entertains his shipmates with the story of the Twelve of England, another of the famous episodes. Canto 7 is taken up with the arrival at Calicut, a description of the country and the details of Gama's reception by the raja. The governor of the city visits the fleet and inquires about the pictures on their banners, wnereupon Paulo da Gama, Vasco's brother, tells him of the deeds of the early Portuguese kings. Meanwhile Bacchus, not to be baulked, appears to a priest in the guise of Mahomet, and stirs up the Moslems against the Christian adventurers, with the result that the raja charges Gama with being a leader of convicts and pirates. To this the captain makes a spirited reply and gets his despatch, but he has new snares to avoid and further difficulties to over- come before he is finally able to set sail on the return voyage. Pitying their toils, Venus determines to give the voyagers repose and pleasure on their way home, and directs their course to an enchanted island, which is described in canto 9, in the longest and perhaps the most beautiful episode in the poem. On landing they are received by the goddess and her nymphs, and general joy ensues, heightened by banquets and amorous play. In a prophetic song, the siren tells of the exploits of the Portuguese viceroys, governors and captains in India until the time of D. John de Castro, after which Tethys ascends a mountain with Gama, shows him the spheres after the system of Ptolemy and the globe of Asia and Africa, and describes the Indian life of St Thomas the apostle. Finally the navigators quit the island and reach Lisbon, and an epilogue contains a patriotic exhorta- tion to King Sebastian and visions of glory, which ended so disastrously at the battle of Alcacer.

Though the influence of Camoens on Portuguese has been exaggerated, it was very considerable, and he so far fixed the written language that at the present day it is commonly and not inaccurately called ” the language of Camoens.” The Lusiads is the most successful modern epic cast in the ancient mould, and it has done much to preserve the corporate life of th.e Portu- guese people and to keep alive the spirit of nationality in times

of adversity like the ” Spanish Captivity ” and the Napoleonic invasion. Even now it forms a powerful bond between the mother-country and her potentially mighty daughter-nation across the

Atlantic, the United States of Brazil. The men of the Renaissance saw nothing incongruous in that mixture of paganism and Christianity which is found in the Lusiads as in Ariosto, though some modern critics, like Voltaire, consider it a grave artistic defect in the poem. The fact that the Lusiads is written in a little-known language, and its intensely national and almost exclusively historical character, undoubtedly militate against a right estimate of its value, now that Portugal, once a world power, has long ceased to hold the East in fee or to guide the destinies of Europe. But though political changes may and do react on literary appreciations, the Lusiads remains none the less a great poem, breathing the purest religious fervour, love of country and spirit of chivalry, with splendid imaginative and descriptive, passages full of the truest and deepest poetry. The structure is Virgilian, but the whole conception is the author's own, while the style is natural and noble, the diction nearly always correct and elegant, and the verse, as a rule, sonorous and full of harmony.

■vltt addition to his epic, Camoens wrote sonnets, canzons, odes, sextines/ eclogues, elegies, octaves, roundels, letters and comedies. The roundels include cartas, motes, voltas, cantigas , trovas, pastorals and endechas. In the opinion of many competent judges Camoens only attains his true stature in his lyrics; and a score of his sonnets, two or three of the canzons, eclogues and elegies, and the Babylonian roundels will bear comparison with any composition of the same kind that other literatures can show. Referring to the Lusiads, A. von Humboldt calls Camoens a " great ;maritime painter," but in his best lyrics he is a thinker as well as a poet, and when free from the trammels of the epic and inherited respect for classical traditions, he reveals a person- ality so virile and deep, a philosophy so broad and human, a vision so wide, and a form and style so nearly perfect, as not only to make him the foremost of Peninsular bards but to entitle him to a place in that small company of universal poets of the first rank.

The oldest and most authentic portrait of Camoens appeared in 1 624 with his life, by Manoel Severim de Faria. It is a kitcat and shows the poet in armour wearing a laurel crown; his right hand holds a pen, his left rests on a copy of the Lusiads, while a shield above shows the family arms, a dragon rising from between rocks; The likeness exhibits a Gothic or northern type, and the tradition of his red beard and blue eyes confirms it. Except for an ode, sonnet and elegy, all Camoens 's lyrics were published posthumously.

Authorities. — The most modern and most critical biographies are those of Dr Theophilo Braga, Camoes, epoca e Vide (Oporto, 1907), and of Dr Wilhelm Storck, Luis de Camoes Leben (Paderborn, 1890),

while the most satisfactory edition of the complete works is due to the Visconde de Juromenha (6 vols., Lisbon, 1860-1869), though it contains some spurious matter. While rejecting without good reason many of the traditions accepted by Juromenha in his life of the poet, Storck embroiders on his own account, and Braga must be preferred to him. Two volumes of Innocencio da Silva's Diccionario Bibliographico Portuguez (14 and 15) are entirely devoted to Camoens and Camoniana, the second of them dealing fully with the tercentenary celebrations. Among modern Portuguese studies Of the national epic the most important are perhaps Camoes e a Renascenca em Portugal, by Oliveira Martins, and Camoes e Senti- mento National, by Dr T. Braga (Oporto, 1891). The latter volume contains useful information on the various editions of Camoens, with an account of the texts and remarks on his plagiarists. Very few poets have been so often translated, and a list and estimate of the English translations of the Lusiads from the time of Sir Richard Fanshawe (1655) downwards, will be found in Sir Richard Burton's Camoens: His Life and His Lusiads, which, notwithstanding some errors, is a most informing book, and the result of a curious similarity of temperament and experience between master and disciple. Burton translated the Lusiads (2 vols., London, 1880) and the 'Lyricks (sonnets, canzons, odes and sextines; 2 vols., London, 1 884) , and left a version of all the minor works in MS. The accurate and readable version of the epic by Mr J. J. Aubertin, with the Portuguese text opposite, has gone through two editions (2nd ed., 2 vols., London, 1884), and there is a version of seventy of the sonnets, accompanied by the Portuguese text, by the same author (London, 1881). (E. Pr.)

CAMORRA, a secret society of Naples associated With robbery, blackmail and murder. The origin of the name is doubtful. Probably both the word and the association were introduced into Naples by Spaniards. There is a Spanish word camorra (a quarrel), and similar societies seem to have existed in > Spain long before the appearance of the Camorra in Naples. It was in 1820 that the society first became publicly known. It was primarily social, not political, and originated in the Neapolitan prisons then filled with the victims of Bourbon misrule and oppression, its first purpose being the protection of prisoners. In or about 1830 the Camorra was carried into the city by prisoners «who had served their terms. The members Worked the streets in gangs. They had special methods of communicat- ing with each other. They mewed like cats at the approach df the patrol, and

crowed like cocks when a likely victim approached! A long sigh gave warning that the latter was not alone, a sneeze meant he was not " worth powder and shot," and so on. The society rapidly extended its power, and its operations included smuggling and blackmail of all kinds in addition to ordinary road-robberies. Its influence grew to be considerable. ; Princes were in league with and shared the profits of the smugglers: statesmen and dignitaries of the church, all classes in fact, were involved in the society's misdeeds. From brothels the Camoifra drew huge fees, and it maintained illegal lottery offices. The general disorder of Naples was so great and the police so badly organized that merchants were glad to engage the Gamorrato superintend the loading and unloading of merchandise. Being non-political, the government did not interfere with the society; indeed its members were taken into the police service and the Camorra sometimes detected crimes which baffled the' authorities. After 1848 the society became political. In i860, when the constitution was granted by Francis II., the eamorristi then in gaol were liberated in great numbers. The association' became all-powerful at elections, and general disorder reigned till 186-2. Thereafter severe repressive measures were taken to curtail its power. In September 1877 there was a determined effort to exterminate it: fifty-seven of the most notorious eamorristi being simultaneously arrested in the market-place. ThoUgh much of its power has gone, the Camorra has remained vigorous. It has grown upwards, and highly-placed and well-known c'arrior- ristі have entered municipal administrations and political life; In 1900 revelations as to the Camorra's power were made iii the course of a libel suit, and these led to the dissolution of the Naples municipality and the appointment of a royal* commis- sioner. A government inquiry also took place. As the result of this investigation the Honest Government League was formed, which succeeded in 1901 in entirely defeating the Camorra candidates at the municipal elections.

The Camorra was divided into classes. There were the " swell mobsmen," the eamorristi who dressed faultlessly and mixed with and levied fines on people of highest rank. Most of these were well connected. There were the lower order of blackmailers who preyed on shopkeepers, boatmen, &c; and there were political and murdering eamorristi. The ranks of the society were largely recruited from the prisons. A youth had to serve for one year an apprenticeship so to speak to a fully admitted camorrista when he was sometimes called. picciotlo.d' honore, and after giving proof of courage and zeal became a picciotto di sgarro, one, that is, of the lowest grade of members. In some localities he was then called tamurro. The initiatory ceremony

for full membership is now a mock duel in which' the arm alone is wounded. In early times initiation was more severe. The eamorristi stood round a coin laid on the ground, and at a signal all stooped to thrust at it with their knives while the novice had ; at the same time to pick the coin up, with the result that his hand was generally pierced through in several places. The noviciate as picciotto di sgarro lasted three years, during which the lad had to work for the camorrista who had been assigned to him as \ master. After initiation there was a ceremony of reception. The eamorristi stood round a table on which were a dagger, ! a loaded pistol, a glass of water or wine supposed to be poisoned and a lancet. The picciotto was brought in and one of his veins

opened. Dipping his > haad' in his own blood, he held it out to the caihorristii arid swore to, keep .the society's secrets and obey orders. < Then he bad t < & stick/the dagger into the table, cock the pistol, and hold rthe glass to; his, mouth to shpw his readiness to die for the society. His master now bade him kneel before the dagger, placed' his right , band on the lad's head while with the left he fired'.oflf the pistol into the air and smashed the poison- glass. He then drew the dagger from the table and presented it to the new comrade: and embraced him, as did all the others, The Camorra iwas divided into centres, each; under a chief. There "were twelve at Naples. The society seems at one time to have always 1 had a: i supreme chief. The last known was Aniello Ansiello, mho finally disappeared and was never arrested. The! chief: of every centre was elected by the members of it. All the earnings' of the centre were paid to and then distributed by him.: The camdrristd' employ, a whole vocabulary of cant terms, Their chief is masto or si:masto,' " sir master." When a member meets him he salutes with the phrase Masto, voJite niente? ("Master, do you 'want anything-? "). The members are addressed ' simply airf.

See Mohhier, La 'Camorra (Florence!, 1 r863); Umilta, Camorra et Afo/5f»(NeiuGhStet,- 11878)- Alongi, La Camorra (18.90); C. W. Heckethorh-i Secret Societies oj Ail Ages (London, 1897) ; Blasio, Usi e. costumi dei Camorriste (Naples, 1897),

GAMP {from Lat. campus, field), a, term used more particularly in a military sense, but also generally for a temporarily organized place of food^and shelter in open country, as opposed to ordinary housing (see Camping-out). The shelter of troops in the field has always been of the greatest importance to their well- being,' and from the earliest times tents and other temporary shelters ; have been employed as much as possible when it is not feasible or advisable to; quarter the troops in barracks or in houses. The applied sense of. the word " camp " as a

military post of any kind comes from the practice which prevailed in the Roman' ariby of fortifying every encampment. In modern warfare the word is' used in two ways. In the wider sense, ' l 'earrip ! " is opposed to " billets, " " cantonments " or " quarters," in which the troops are scattered amongst the houses of towns or villages for food- and' shelter. In a purely military camp the Soldiers live and' sleep in 1 an; area of open ground allotted for their sole usfe'. They ; are thus kept in a state of concentration and readiness for immediate action, and are under better disciplinary control than when in quarters, but they suffer more from the weather and from the want of comfort and warmth. In the restricted Sense " camp " implies tents for all ranks, and is thus opposed to " bivouac," in which the only shelter is that afforded by improvised screens, &c, or at most small tenles d'abri carried in sections by the men themselves. The weight of large regula tion tents and the consequent increase in the number of horses and vehicles in the transport service are, however, disadvantages so grave that the employment of canvas camps in European warfare is ! almost a thing of the past. If the military situation permits, all t

Circumstances may of course require occasionally a whole army to bivouac, but 'in theatres of war in which quarters are not to be depended ! upon, tents must be. provided, for no troops can endure many successive nights in bivouac, except in summer, without serious detriment to their efficiency. In a war on the Russo-Gerrhan 'frontier, for instance, especially if operations were carried Cut in the autumn and winter, tents would be ■absolutely [essential at whatever cost of transport. In this connexion it may be said that a good railway system obviates many of the disadvantages attending the use of tents. For training 'purposes in peace time, standing camps are formed. TheSe" may be considered simply as temporary barracks. An entrenched camp' is an 1 area Of ground occupied by, or suitable for, the camps of large bodies of troops, and protected by fortifications. '

Ancient Camps.— English -writers Use "camp " as a generic tefrri for any remains of ancient military posts, irrespective of

their special age, size; purpose, &fc. Thus they include : under it various dissimilar things. We may distinguish: (i) Roman "camps " (castra) of three kinds, large permanent fortresses^'small permanent forts (both usually built' of stone) and temporary earthen encampments (see Roman Army)*;. (2) Pre-Roman; and (3) Post-

Roman camps, such as occur; on: many English hilltops. We know far too little, to be able to assign these to their special periods. Often we can say no more than that the “camp” is not Roman. But we know that enclosures fortified with earthen walls were thrown up as early as the! Bronze Age and probably earlier still, and that they continued: to be built down to Norman times. These consisted of hilltops or cliff f promontories or other suitable positions fortified with one or more lines of earthen ramparts with ditches, often attaining huge size. But the idea,of an artificial elevation seems to have come in first with the Normans.. Their mattes or earthen mounds crowned with wooden palisades or stone towers and surrounded by an enclosure on the flat constituted a new element in fortification and greatly aided the conquest of England. (See Castle.): ‘ •;.- ‘ !

CAMPAGNA DI ROMA, the low country siirrounding the city of Rome, bounded on the N.W. by> the hills, surrounding the lake of Bracciano, ; on the N;E. by the Sabine mountains, on the S.E. by the Alban hills, and on the S.W. by the sea. (See Latium, and Rome (province).)

CAMPAIGN, a military term for the continuous operations of ah army during a wax or part of a war. The name refers to the time when armies went into quarters during the winter and literally ” took the field ” at the opening of summer. The word is also used figuratively, especially in politics, of any continuous operations aimed at a definite object, as the ‘< Plan of Campaign " ih Ireland during 1886-1887. The word is derived'from the Latin Campania, the plain lying south-west of the Tiber, c.f. Italian, la Campagna di Roma, from which came two French forms: (1) Champagne, the name given to the level province of that name, and hence the English " champaign," a'level- tract of country free from woods and hills; and. (2) Campagne, and the' English " campaign " with the restricted military meaning. ■

CAMPAN, JEANNE LOUISE HENRIETTE (1752-1822), French educator, the companion of Marie Antoinette, was born atParis in 1752! Her father, whose name was’ Genest, was first clerk in the foreign office, and, although without fortune, placed her in the most cultivated society. At the age of fifteen she could speak English and Italian, and had gained so high a reputation for her accomplishments as to be appointed reader to the three daughters of Louis XV. At court she was a general favourite, and .When she bestowed her hand upon M: Campan, son of the secretary of the royal cabinet, the kirig gave her an annuity of 5000 litres as dowry. She was soon’ afterwards appointed’ first lady of the bedchamber by Marie Antoinette; and she continued to be her faithful attendant till she was forcibly separated

from her at the sacking of the Tuileries on the 20th of June 1792. Madame Campan survived the dangers of the Terror, but after the oth Thermidor finding herself almost penniless, and being thrown on her own resources by the illness of ‘her husband, she bravely determined to support herself by establishing a school at St Germain. The institution prospered, and was patronized by Hortense de Beauharnais, whose influence ledto the appointment of Madame Campan as superintendent of’ the academy founded by Napoleon at Ecouen for the education of the daughters’ and sisters of members of the Legion of Honour: This post she held till it was abolished at the restoration of theBourbons, when she retired to Mantes, _ where she spent the rest of’ her life amid the kind attentions of affectionate friends, but saddened by the loss of her only son, and by the calumnies circulated on account of her connexion with the Bonapartes. Shedifedin 1822, .leaving : valu able M imoires sur la vie priv£e de Marie Antoinette, suivis’de souvenirs et anecdotes historiques sur tes regnes de Louis XI.V.-X V. (Paris, 1823); a treatise De l’ £ducatien ‘des •Femmes; and one or two small didactic works, written* in a clear and riatural style. The most noteworthy thing in her educational system; and that vthich especially recommended it to Napoleon, , was the 1 place

given to domestic economy in the education of girls. At Ecouen

the pupils underwent a complete training in all branches of

housework.

“See Jules Flammermont, Les MSmoires de Madame de Campan

(Paris, 1 886), and histories of the time.

CAMPANELLA, TOMMASO (1568-1639), Italian Renaissance philosopher, was born at Stilo in Calabria. Before he was thirteen years of age he had mastered nearly all the Latin authors pre- sented to him. In his fifteenth year he entered the order of the Dominicans, attracted partly by reading the lives of Albertus Magnus and Aquinas, partly by his love of learning. He took a course in philosophy in the convent at Morgentia in Abruzzo, and in theology at Cosenza. Discontented with this narrow course of study, he happened to read the De Rerum Natura of Bernardino Telesio, and was delighted with its freedom of speech and its appeal to nature rather than to authority. His first work in philosophy (he was already the author of numerous poems) was a defence of Telesio, Philosophia sensibus demonstrata (1591). His attacks upon established authority having brought him into disfavour with the clergy, he left Naples, where he had been

residing, and proceeded to Rome. For seven years he led an unsettled life, attracting attention everywhere by his talents and the boldness of his teaching. Yet he was strictly orthodox, and was an uncompromising advocate of the pope's temporal power. He returned to Stilo in 1598. In the following year he was committed to prison because he had joined those who desired to free Naples from Spanish tyranny. His friend Naudee, however, declares that the expressions used by Campanella were wrongly interpreted as revolutionary. He remained for twenty-seven years in prison. Yet his spirit was unbroken; he composed sonnets, and prepared a series of works, forming a complete system of philosophy. During the latter years of his confinement he was kept in the castle of Sant' Elmo, and allowed considerable liberty. Though, even then, his guilt seems to have been regarded as doubtful, he was looked upon as dangerous, and it was thought better to restrain him. At last, in 1626, he was nominally set at liberty; for some three years he was detained in the chambers of the Inquisition, but in 1629 he was free. He was well treated at Rome by the pope, but on the outbreak of a new conspiracy headed by his pupil, Tommaso Pignatelli, he was persuaded to go to Paris (1634), where he was received with marked favour by Cardinal Richelieu. The last "few years of his life he spent in preparing a complete edition of his works; but only the first volume appears to have been published. He died on the 21st of May 1639.

Ih philosophy, Campanella was, like Giordano Bruno (q.v.), a follower of Nicolas of Cusa and Telesio. He stands, therefore, in the uncertain half-light which preceded the dawn of modern philosophy. The sterility of scholastic Aristotelianism, as he understood it, drove him to the study of man and nature, though he was never entirely free from the medieval spirit. Devoutly accepting the authority of Faith in the region of theology, he considered philosophy as based on perception. The prime fact in philosophy was to him, as to Augustine and Descartes, the certainty of individual consciousness. To this consciousness he assigned a threefold content, power, will and knowledge. It is of the present only, of things not as they are, but merely as they seem. The fact that it contains the idea of God is the one, and a sufficient, proof of the divine existence, since the idea of the Infinite must be derived from the Infinite. God is therefore a unity, possessing, in the perfect degree, those attributes of power, will and knowledge which humanity possesses only in part. Furthermore, since community of action presupposes homogeneity, it follows that the world and all its parts have a spiritual nature. The emotions of love and hate are in everything. The more remote from God, the greater the degree of imperfection (i.e. Not-being) in things. Of imperfect

things, the highest are angels and human beings, who by virtue of the possession of reason are akin to the Divine and superior to the lower creation. Next comes the mathematical world of space,- then the corporeal world, and finally the empirical world with its limitations of space and time. The impulse of self-

preservation in nature is the lowest form of religion; above this comes animal religion; and finally rational religion, the perfection of which consists in perfect knowledge, pure volition and love, and is union with God. Religion is, therefore, not political in origin; it is an inherent part of existence. The church is superior to the state, and, therefore, all temporal government should be in subjection to the pope as the representative of God.

In natural philosophy Campanella, closely following Telesio; advocates the experimental method and lays down heat and cold as the fundamental principles by the strife of which all life is explained. In political philosophy (the Civitas Solis) he sketches an ideal communism, obviously derived from the Platonic, based on community of wives and property with state- control of population and universal military training. In every detail of life the citizen is to be under authority, and the authority of the administrators is to be based on the degree of knowledge possessed by each. The state is, therefore, an artificial organism for the promotion of individual and collective good. In contrast to More's Utopia, the work is cold and abstract, and lacking in practical detail. On the view taken as to his alleged complicity in the conspiracy of 1599 depends the vexed question as to whether this system was a philosophic dream, or a serious attempt to sketch a constitution for Naples in the event of her becoming a free city. The De Monorchia Hispanica contains an able account of contemporary politics especially Spanish.

Thus Campanella, though neither an original nor a systematic thinker, is among the precursors, on the one hand, of modern empirical science, and on the other of Descartes and Spinoza. Yet his fondness for the antithesis of Being and Not-being (Ens and Non-ens) shows that he had not shaken off the spirit of scholastic thought.

Bibliography. — For his works see Quetif-Echard, appendix to E. S. Cypriano, Vita Campanellae (Amsterdam, 1705 and 1722); Al. d'Ancona's edition, with introduction (Turin, 1854). The most

important are De sensu rerum (1620); Realis philosophiae epilogisticae partes IV. (with Civitas Solis) (1623); Atheismus trium- phatus (1631); Phihs. rationalis (1637); Phiios. universalis seu metaph. (1637); De Monarchic, Hispanica (1640). For his life, see Cypriano (above); M. Baldachini, Vita e filos. di Tommaso Cam- panella (Naples, 1840-1853, 1847-1857); Dom. Berti, Lettere inedite di T. Campanella e catalogo dei suoi scritti (1878); and Nuovi docu- menti di T. C. (1881); and especially L. Amabile, Fra T. Cam- panella (3 vols., Naples, 1882). Far his philosophy H.Ritter, History of Phiios.; M. Carriere, Phiios. Weltanschauung d. Reformations- zeit, pp. 542-608; C. Dareste, Th. Morus et Campanella (Paris, 1843); Chr. Sigwart, Kleine Schriften, i. 125 seq.; and histories of philo- sophy. For his political philosophy, A. Calenda, Fra Tommaso Campanella e la sua dottrina sociale e politica di fronte al socialismo modemo (Nocera Inferiore, 1895). His poems, first published by Tobias Adami (1622), were rediscovered and printed again (1834) by J. G. Orclli; the sonnets were rendered into English verse by J. A. Symonds (1878). For a full bibliography see Diet, de thiol, cath., col. 1446 (1904).

CAMPANIA, a territorial division of Italy. The modern district (II. below) is of much greater extent than that known by the name in ancient times.

I. Campani was the name used by the Romans to denote the inhabitants first of the town of Capua and the district subject to it, and then after its destruction in the Hannibalic war (211 B.C.), to describe the inhabitants of the Campanian plain generally. The name, however, is pre-Roman and appears with Oscan terminations on coins of the early 4th (or late 5th) century B.C. (R. S. Conway, Italic Dialects, p. 143), which were certainly struck for or by the Samnite conquerors of Campania, whom the name properly denotes, a branch of the great Sabelline stock (see Sabini) ; but in what precise spot the coins were minted is uncertain. We know from Strabo (v. 4. 8.) and others that the Samnites deprived the Etruscans of the mastery of Campania in the last quarter of the 5th century; their earliest recorded appearance being at the conquest of their chief town Capua, probably in 438 B.C. (or 445, according to the method adopted in interpreting Diodorus xii. 31; on this see under Cumae), or 424 according to Livy (iv. 37). Cumae was taken by them in 428 or 421, Nola about the same time, and the Samnite language they spoke, henceforward known as Oscan, spread oyer a& Campania

except the Greek cities* though small communities of Etruscans remained here and there for at least another century (Conway, op. cit. p. 94). The hardy warriors from the mountains took ovex not merely

the wealth of the Etruscans, but many of their customs ; the haughtiness and luxury of the men of Capua was proverbial at Rome. This town became the ally of Rome in 338 B.C. (iLivy viii. 14) and received the civitas sine suffragio, the highest status that could be granted to a community which did not speak Latin. By the end of the 4th century Campania was completely" Roman politically. Certain towns with their terri- tories (Neapolis, Nola, Abella, Nuceria) were nominally inde- pendent in alliance with Rome. These towns were faithful to Rome throughout the Hannibalic war. But Capua and the towns dependent- on it revolted (Livy xxiii.-xxvi.) ; after its capture in 211 Capua was utterly destroyed, and the jealousy and dread with which Rome had long regarded it were both finally appeased (cf. Cicero. Z,eg. Agrar. ii. ,88). We have between thirty and forty Oscan inscriptions (besides some coins) dating, probably, from both the 4th and the 3rd centuries ■ (Conway (Italic Dialects, pp. 100-137 and 148), of which most belong to the curious cult described under : Jovixae, while two or three are curses written on lead; see Osca Lingua.

See further Conway, op. Cit. p. 99 ff. ; J. Beloch, Campanien (2nd ed,), c. " Capua " ; Th. Mommsen, C.I. I., x. p. 365. (R. S. C.)

The name Campania was first formed by Greek authors, from Campani (see above), and did not come into common use until the middle of the 1st century a.d. Polybius and Diodorus avoid it entirely., Varro and Livy use it sparingly, preferring Campanus ager. Polybius (2nd century B.C.) uses the phrase to, Telia ra Kara Kairvriv to express the district bounded on the north by the mountains of the Aurunci, on the east by the Apennines of Samnium, on the south by the spur of these mountains which ends in the peninsula of Sorrento, and on the south and west .by the sea, and this is what Campania meant to Pliny and Ptolemy. But the geographers of the time of Augustus (in whose division of Italy Campania, with Latium, formed the first region) carried the north boundary of Campania as far south as Sinuessa, and even the river Volturnus, while farther inland the modern village of San Pietro in Fine preserves the memory of the north-east boundary which ran between Venafrum and Casinum. On the east the valley of the Volturnus and the foot-hills of the Apen- nines as far as Abellinum formed the boundary; this town is sometimes reckoned as belonging to Campania, sometimes to Samnium. The south boundary remained unchanged. From the time of Diocletian onwards the name Campania was extended much farther north, and included the whole of Latium. This district was governed by a corrector, who about a.d. 333 received, the title oiconsuldris. It is for this reason that the district round Rome still bears the name of Campagna di Roma, being no

doubt popularly connected with Ital. campo, Lat. campus. This district (to take its earlier extent), consisting mainly of a very fertile plain with hills on the north, east and south, and the sea on the south and west, is traversed by two great rivers, the Liris and Vol- turnus, divided by the Mons Massicus, which comes right down to the sea at Sinuessa. The plain at the mouth of the former is comparatively small, while that traversed by the Volturnus is the main plain of Campania. Both of these rivers rise in the central Apennines,, and only smaller streams, such as the Sarnus, Sebethus, Savo, belong entirely to Campania.

The road system of Campania was extremely well developed and touched all , the important towns. The main lines are followed (though less completely) by the modern railways. The most important road centre of Campania was Capua, at the east edge of the plain. At Casilinum, 3 m. to the north-west, was the only bridge over the Volturnus until the construction of the Via, Domitiana; and here met the Via Appia, passing through Minturnae, Sinuessa and Pons Campanus (where it crossed the Savo) and the Via Latina which ran through Teanum Sidicinum and Cales. At Calatia,, 6 m. south-east of Capua, the Via Appia began to tujjn east and to approach the mountains on its way to Beneventum, while the Via Popillia went straight on to Nola (whence a load ran to Abella and Abellinum) and thence to

Nuceria Alfaterna and the south, terminating at Regium. From Capua itself a road ran north to Vicus Dianae, Caiatia and Telesia, while to the south the so-called Via Campana (there is no ancient warrant for the name) led to Puteoli, with a branch to Cumae, Baiae and Misenum; there was also connexion between Cumae, Puteoli and Neapolis (see below), and another road to Atella and Neapolis. Neapolis could also be reached by a branch from the Via Popillia at Suessula, which passed through Acerrae. From Suessula, too, there was a short cut to the Via Appia before it actually entered the mountains. Domitian further improved the communications of this district with Rome, by the construc- tion of the Via Domitiana, which diverged from the Via Appia at Sinuessa, and followed the low sandy coast; it crossed the river Volturnus at Volturnum, near its mouth, by a bridge, which must have been a considerable undertaking, and then ran, still along the shore, past Liternum to Cumae and thence to Puteoli. Here it fell into the existing roads to Neapolis, the older Via

Antiniana over the hills, at the back, and the newer, dating from the time of Agrippa, through the tunnel of Pausilypon and along the coast. The mileage in both cases was reckoned from Puteoli. Beyond Naples a road led along the coast through Herculaneum to Pompeii, where there was a branch for Stabiae and Surrentum, and thence to Nuceria, where it joined the Via Popillia. From Nuceria, which was an important road centre, a direct road ran to Stabiae, while from Salernum, n m. farther south-east but outside the limits of Campania proper, a road ran due north to Abellinum and thence to Aeclanum or Beneventum. Teanum was another important centre : it lay at the point where the Via Latina was crossed at right angles by a road leaving the Via Appia at Minturnae, and passing through Suessa Aurunca, while east of Teanum, it ran on to Allifae, and there fell into the road from venafrum to Telesia. Five miles north of Teanum a road branched off to Venafrum from the straight course of the Via Latina, and rejoined it near Ad Flexum (San Pietro in Fine). It is, indeed, probable that the original road made the detour by Venafrum, in order to give a direct communication between Rome and the interior of Samnium (inasmuch as roads ran from Venafrum to Aesernia and to Telesia by way of Allifae), and Th. Mommsen {Corp. Inscrip. Lat. x., Berlin, 1883, p. 699) denies the antiquity of the short cut through Rufrae (San Felice a Ruvo), though it is shown in Kiepert's map at the end of the volume, with a milestone numbered 93 upon it. This is no doubt an error bofh in placing and in numbering, and refers to one numbered 96 found on the road to Venafrum; but it is still difficult to believe that the short cut was not used in ancient times. The 4th and 3rd century coins of Telesia, Allifae and Aesernia are all of the Campanian type,

Of the harbours of Campania, Puteoli was by far the most important from the commercial point of view. Its period of greatest comparative importance was the 2nd-ist century B.C. The harbours constructed by Augustus by connecting the Lacus Ayernus and Lacus Lucrinus with the sea, and that at Misenum (the latter the station of one of the chief divisions of the Roman navy, the other fleet being stationed at Ravenna), were mainly naval. Naples also had a considerable trade, but was less important than Puteoli.

The fertility of the Campanian plain was famous in ancient as in modern times ; 1 the, best portion was the Cainpi Laborini or Leborini (called Phlegraei by the Greeks and Terra di Lavoro in modern times, though the name has now extended to the whole province of Caserta) between the roads from Capua to Puteoli and Cumae (Pliny, Hist. Nat. xviii. in). The loose black volcanic earth (terra pulla) was easier to work than the stiffer Roman soil, and gave three or four crops a year.

The spelt, wheat and millet are especially mentioned, as also fruit and vegetables; and the roses supplied the perfume factories of Capua. The wines of the Mons Massicus and of the Ager, Falernus (the flat ground to the east and south-cast of it) were the most sought after, though other districts also produced good wine; but the olive was better suited to the slopes than to the plain, though that of Venafrum was good.

1 The name Osci — earlier Opsci, Opusci (Gr. ‘OttikoL) — presumably meant “tillers of the soil.”

The Oscan language remained in use in the south of Campania (Pompeii, Nola, Nuceria) at all events until the Social War, but at some date soon after that Latin became general, except in Neapolis, where Greek was the official language during the whole of the imperial period.

See J. Beloch, Campanien (2nd ed., Breslau, 1890); Conway, Italic Dialects,pp. 51-57 ; Ch. Hiilsen in Pauly-Wissowa, Realencyklo- padie, iii. (Stuttgart, 1899), 1434.

II. Campania in the modern sense includes a considerably larger area than the ancient name, inasmuch as to the comparti- mento of Campania belong the five provinces of Caserta, Bene- vento, Naples, Avellino and Salerno.

It is bounded on the north by the provinces of Rome, Aquila (Abruzzi) and Campobasso (Molise), on the north-east by that of Foggia (Apulia), on the east by that of Potenza (Basilica ta) and on the south and west by the Tyrrhenian Sea. The area is 6289 sq. m. It thus includes the whole of the ancient Campania, a considerable portion of Samnium (with a part of the main chain of the Apennines) and of Lucania, and some of Latium adjedum, consisting thus of a mountainous district, the greater part of which lies on the Mediterranean side of the watershed, with the extra- ordinarily fertile and populous Campanian plain (Terra di Lavoro, with 473 inhabitants to the square mile) between the mountains and the sea. The principal rivers are the Garigliano or Liri (anc. Liris), which rises in the Abruzzi (105 m. in length) ; the Volturno (94 m. in length), with its tributary the Calore; the Sarno, which rises near Sarno and waters the fertile plain south-east of Vesuvius; and the Sele, whose main tributary is the Tanagro, which is in turn largely fed by another Calore. The headwaters of the Sele have been tapped for the great aqueduct for the Apulian provinces.

The coast-line begins a little east of Terracina at the lake of Fondi with a low-lying, marshy district (the ancient Ager Caecubus), renowned for its wine (see Fondi). The mountains (of the ancient Aurunci) then come down to the sea, and on the east side of the extreme promontory to the south-east is the port of Gaeta, a strongly fortified naval station. The east side of the Gulf of Gaeta is occupied by the marshes at the mouth of the Liri, and the low sandy coast, with its unhealthy lagoons, continues (interrupted only by the Monte Massico, which reaches the sea at Mondragone) past the mouth of the Volturno, as far as the volcanic district (no longer active) with its several extinct craters (now small lakes, the Lacus Avernus, &c.) to the west of Naples, which forms the north-west extremity of the Bay of Naples. Here the scenery completely changes: the Bay of Naples, indeed, is one of the most beautiful in the world. The island of Procida lies 2§ m. south-west of the Capo Miseno, and 3 m. south-west of Procida is that of Ischia. In consequence of the volcanic character of the district there are several import- ant mineral springs which are used medicinally, especially at Pozzuoli, Castellammare di Stabia, and on the island of Ischia.

Pozzuoli (anc. Puteoli), the most important harbour of Italy in the 1st century B.C., is now mainly noticeable for the large armour-plate and gun works of Messrs Armstrong, and for the volcanic earth (pozzolana) which forms so important an element in concrete and cement, and is largely quarried near Rome also. Naples, on the other hand, is one of the most important harbours of modern Italy. Beyond it, Torre del Greco and Torre Annun- ziata at the foot of Vesuvius, are active trading ports for smaller vessels, especially in connexion with macaroni, which is manu- factured extensively by all the towns along the bay. Castellam- mare di Stabia, on the west coast of the gulf, has a large naval shipbuilding yard and an important harbour. Beyond Castel- lammare the promontory of Sorrento, ending in the Punta della Campanella (from which Capri is 3 m. south-west) forms the south-west extremity of the gulf. The highest point of this mountain ridge, which is connected with the main Apennine chain, is the Monte S. Angelo (4735 ft.). It extends as far east as Salerno, where the coast plain of the Sele begins. As in the low marshy ground at the mouths of the Liri and Volturno, malaria is very prevalent. The south-east extremity of the Gulf of Salerno is formed by another mountain group, culminating

in the Monte Cervati (6229 ft.); and on the east side of this is the Gulf

of Policastro, where the province of Salerno, and with it Campania, borders, on the province of Potenza.

The population of Campania was 3,080,503 in 1001; that of the province of Caserta was 705,412, with a total of 187 com- munes, the chief towns being Caserta (32,709), Sta Maria Capua Vetere (21,825), Maddaloni (20,682), Sessa Aurunca (21,844); that of the province of Benevento was 256,504, with 73 communes, the only important town being Benevento itself (24,647); that of the province of Naples 1,151,834, with 69 communes, the most important towns being Naples (5 63 , 540) , Torre del Greco (33,299)) Castellammare di Stabia (32,841), Torre Annunziata (28,143), Pozzuoli (22,907); that of the province of Avellino (Principato Ulteriore in the days of the Neapolitan kingdom) 402,425, with 128 communes, the chief towns being Avellino (23,760) and Ariano di Puglia (17,650); that of the province of Salerno (Principato Citeriore) 564,328, with 158 communes, the chief towns being Salerno (42,727), Cava dei Tirreni (23,681), Nocera Inferiore (19,796). Naples is the chief railway centre: a main line runs from Rome through Roccasecca (whence there is a branch via Sora to Avezzano, on the railway from Rome to Castellammare Adriatico), Caianello (junction for Isernia, on the line between Sulmona and Campobasso or Benevento), Sparanise (branch to Formia and Gaeta) and Caserta to Naples. From Caserta, indeed, there are two independent lines to Naples, while a main Jine runs to Benevento and Foggia across the Apennines. From Benevento railways run north to Vinchiaturo (for Isernia or Campobasso) and south to Avellino. From Cancello, a station on one of the two lines from Caserta to Naples, branches run to Torre Annunziata, and to Nola, Codola, Mercato, San Severino and Avellino. Naples, besides the two lines to Caserta (and thence either to Rome or Benevento), has local lines to Pozzuoli and Torregaveta (for Ischia) and two lines to Sarno, one via Ottaiano, the other via Pompeii, which together make up the circum-Vesuvian electric line, and were in connexion with the railway to the top of Vesuvius until its destruction in April 1906. The main line for southern Italy passes through Torre Annunziata (branch for Castellammare di Stabia and Gragnano), Nocera (branch for Codola), Salerno (branch for Mercato San Severino), and Battipaglia. Here it divides, one line going east-south-east to Sicignano (branch to Lagonegro), Potenza and Metaponto (for Taranto and Brindisi or the line along the east coast of Calabria to Reggio), the other going south-south-east along the west coast of Calabria to Reggio.

Industrial activity is mainly concentrated in Naples, Pozzuoli and the towns between Naples and Castellammare di Stabia (including the latter) on the north-east shores of the Bay of Naples. The native

peasant industries are (besides agriculture, for which see Italy) the manufacture of pottery and weaving with small hand-looms, both of which are being swept away by the introduction of machinery; but a government school of textiles has been established at Naples for the encouragement of the trade. (T. As.)

CAMPANI-ALIMENIS, MATTEO, Italian mechanician and natural philosopher of the 17th century, was born at Spoleto. He held a curacy at Rome in 166 1, but devoted himself principally to scientific pursuits. As an optician he is chiefly celebrated for , the manufacture of the large object-glasses with which G. D. Cassini discovered two of Saturn's satellites, and for an attempt to rectify chromatic aberration by using a triple eye- glass; and in clock-making, for his invention of the illuminated dial-plate, and that of noiseless clocks, as well as for an attempt to correct the irregularities of the pendulum which arise from variations of temperature. Campani published in 1678 a work on horology, and on the manufacture of lenses for telescopes. His younger brother Giuseppe was also an ingenious optician (indeed the attempt to correct chromatic aberration has been ascribed to him instead of to Matteo), and is, besides, note- worthy as an astronomer, especially for his discovery, by the aid of a telescope of his own construction, of the spots in Jupiter, the credit of which was, however, also claimed by Eustachio Divini.

CAMPANILE, 1 the r beH tbwer attached to the churches and town-halls irrltaly (from campand, a bell). Bells are supposed to have been first used for announcing the sacred offices by Pope Sabinian (604), the immediate successor to St Gregory; and their use by the municipalities came with the rights granted by kings and emperors to the citizens to enclose their towns with fortifications, arid assemble at the sound of a great bell. It is to the Lombard architects of the north of Italy that we are indebted for the introduction and development of the campanile, which, when used in connexion with a sacred building, is a feature peculiar to Christian architecture — Christians alone making use of the bell to gather the' multitude to public worship. The campanile of Italy serves the same purpose as the tower or steeple of the churches in the north and west of Europe, but differs from it in design and position with 1 regard to the body of the church. It 'is amidst always detached from the church, or at most Connected with it by an arcaded passage. As a rule also there is hever more than one campanile to a church, with a few exceptions, as in S: Ambrogio, Milan; the cathedral of Novara; S. Abbondio, Como';' S. Antonio, Padua; and some of the churches in south Italy and Sicily. The design differs entirely from the northern type; it never has buttresses, is very tall and thin in proportion to its height, and as a rule rises abruptly

from the ground without base or plinth mouldings undiminished to the summit; it is usually divided by string-courses into storeys of nearly equal height, arid in north and central Italy the wall surface is decorated with pilaster strips and arcaded corbel strings. Later, the ; square tower was crowned with an octagonal turret, sometimes with a conical roof , as in Cremona and Modern cathedrals. As a rule the openings increase in number and dimensions as theyrise, those at the top therefore giving a light- ness to the structure, while the lower portions, with narrow slits only, impart solidity to the whole composition.

The earliest examples are: those of the two churches of S. Apollinare in Classe (see Basilica, fig: 8) and S. Apollinare Nuovo at Ravenna, dating from the 6th century. They are circular, of considerable height, and probably were erected as watch towers or depositories for the treasures of the church. The next in order are those in Rome, of which there are a very large number in existence, dating from the 8th to the ‘nth century. These towers are square and in several storeys, the lower part quite plain ‘till well above the church to which they are attached. Above this they are; divided into storeys by brick cornices carried on stone corbels, generally taken from ancient buildings, the 1 lower storeys with blind arcades and the upper storeys with open arcades. The earliest on record was one connected with St Peter’s, to the atrium of which, in the middle of the 8th century, a bell-toweT overlaid with gold was added. One of the finest is that of S. Maria-in-Cosmedin, ascribed to the 8th or 9th century. In the lower part of it are embedded some ancient columns of the Composite Order belonging to the Temple of Ceres. The tower is 1 20 ft. high, the upper part’ divided into seven storeys, the four upper ones with open arcades,’ the bells being hung in the second from the top. The arches of the arcades, two or three in number, are recessed in two orders and rest on long impost blocks (their length equal to the thickness of the wall above), carried by a mid- wall shaft/ This type of arcade or window is found in early German work, except that, as a rule, there is a capital under the impost block. Rome is probably the source from which the Saxon windows were derived, the example in Worth church being identically’ the same as those in the Roman campanili. In the campanile o’f’S. Alessio there are two arcades in each storey, each divided with a mid-wall shaft. Among others, those of SS. Giovanni e Paolo, S. Lorenzo in Lucina 1 , S. Francesca Romana, S. Croce in Gerusalemme, S. Giorgio in Velabro (fig. 1) , S. Cecilia, S. Pudenziana, S. Bartolommeo in Isola (982), S. Silvestro in Capite, are characteristic examples. On some of the towers are encrusted plaques of marble or of red or green porphyry, enclosed in a tile or moulded brick border;

sometimes these plaques are in majolica' with Byzantine patterns.

The early campanili of the north of Italy are of quite another type, the north campanile of S. Ambrogio, Milan (11 29), being

decorated with vertical flat >pilastei strips, four 'on each face', and horizontal ; arcaded corbel strings. Of- earlier date {879), the campanile of S. Satiro at Milan is in perfect preservation; it is divided into four storeys by. arched corbel tables, the upper storey having a similar arcade with mid-wall shaft to those in ■Rome. One of the most notable examples in north Italy is the campanile of Pomposa near FeWara. It is of immense height and has nine storeys crowned with a lofty conical' spire, the wall face being divided vertically with pilaster strips- and' horizontally

From a photograph by Alinari. i ,' • : .:

Fig. 1. — Campanile of S. Giorgio in- Velabro, Rome..

with arcaded corbel tables,— this campanileˆ the two towers of S; : Antonio, Padua, and that of S. Gottardo, Milan, of octagonal plan, being among the few which are thus terminated. In the campanile at- Torcello we find an entirely different treatment: doubly recessed pilaster-strips divide each face into two lofty- blind arcades rising from the ground to the belfry storey, over 100 ft. high, with small slits for windows, ':the upper or belfry storeyhaving an arcade of four arches' on'each front. ; This is the type generally adopted in the campanili of Venice, where there are no string-courses. Thecampanilie of St Mark's wais of "similar design, with four lofty blind arcades on each face. The lower portion, built in brick, 162 ft. high,' was commenced in 002 but

not completed till the middle of the 12th century. In 15 10 a

belfry storey was added with an open arcade of four arches on

each face, and slightly set back from the face of the tower above

was a mass of masonry with pyramidal roof, the total height

being 320 ft. On the 14th of July 1902 the whole structure

collapsed; its age, the great weight of the additions made in 1510, and probably the cutting away inside of the lower part, would seem to have been the principal contributors to this disaster, as the pile foundations were found to be in excellent condition. In central Italy the two fcarly campanili at Lucca return to the Lombard type of the north, with pilaster strips and arcaded Corbel strings, and the same is found in S. Fran- cesco (Assisi), S. Frediano (Lucca), S. Pietro-in-Grado and S. Michele-in-Orticaia (Pisa), and S. Maria-Novella (Florence). The campanile of S. Nic- cola, Pisa, is octagonal on plan, with a lofty blind arcade on each face like those in Venice, but with 3 single string-course half-wayup. The gallery above is an open eaves

gallery like those in north

Italy.

In southern Italy the

design of the campanile

varies again. In the two

more important examples

at Bari and Molfetta, there

are two towers in each case

attached to the east end

of the cathedrals. The

campanili are . in plain

masonry, the storeys being

suggested only by blind

arches or windows, there

being' neither pilaster

strips nor string-courses.

The same treatment is

found at B arietta and

Caserta Vecchia; in the ; latter the upper storey has . been made octagonal with

circular turrets at each

angle, and this type of

design is followed at ■ Amalfi, the centre portion .

being circular instead of

octagonal and raised much

higher. In Palermo the From a photograph by Brogi.

campanile of the Marto- Fig. 2.— Campanileof St Mark's, Venice.

rana, of which the two lower storeys, decorated with three concen- ; trie blind pointed arches on each face, probably date from the

Saracenic occupation, has angle turrets on the two upper storeys.

The upper portions of the campanile of the cathedral have I similar angle turrets, which, crowned with conical roofs, group : well with the central octagonal spires of the towers. The two

towers -of the west front of the cathedral at Cefalu resemble i those of Bari and Molfetta as regards their treatment.

The campanili of S. Zenone, Verona, and the cathedrals of

Siena and Prato, differ from those already mentioned in that

they owe their decoration to the alternating courses of black

andwhite marble. Of this type by far the most remarkable so

far as its marble atˆoration is concerned is Giotto's campanile at Florence, built in 1334. It measures 275 ft. high, 45 ft. square, and is encased in black, white and red marble, with occasional sculptured ornament. The angles are emphasized by octagonal projections, the panelling of which seems to have ruled that of the whole structure. There are five storeys, of which the three upper ones are pierced -with windows; twin arcades side by side

From a photograph by Alinari.

Fig. 3. — Giotto's Campanile, Florence.

in the two lower, and a lofty triplet window with tracery in the belfry stage. A richly corbelled cornice crowns the structure, above which a spire was projected by Giotto, but never carried out.

The loftiest campanile in Italy is that of Cremona, 396 ft. high. Though built in the second half of the 13th century, and showing therefore Gothic influence in the pointed windows of the belfry and two storeys below, and the substitution of the pointed

for the semicircular arch of the arcaded corbel string-courses, it follows the Lombard type in its general design, and the same is found

in the campanile of S. Andrea, Mantua. In the 16th century an octagonal lantern in two strings crowned with a conical roof was added. Owing to defective foundations, some of the Italian campanili incline over considerably; of these leaning towers, those of the Garisendi and Asinelli palaces at Bologna form, con- spicuous objects in the town; the two more remarkable ex- amples are the cam- panile of S. Martino at Este, of early Lombard type, and the leaning tower at Pisa, which was built by the citizens in 1 1 74 to rival that of Venice. The Pisa tower is circular on plan, about 51 ft. in diameter and 172 ft. high. Not including the belfry storey, which is set back on the inner wall, it is divided into seven storeys all sur- rounded with an open gallery or arcade. (See Architecture, Plate I. fig. 62.) Owing to the sinking of the piles on the south side, the in- clination was already noticed when the tower was about 30 ft. high, and slight additions in the height of the masonry on that side were in- introduced to correct the level, but with- out result, so that the . works were stopped for many years and taken up again in 1234 under the direction of William of Inns- bruck; he also at- tempted to rectify the levels by increas- ing the height of the masonry on the south side. At a

later period the bel- F <* m a photograph by Alinari.

fry storey was added. Fig. 4. — Campanile of the Palazzo del The inclination now Signore, Verona,

approaches 14 ft: out of the perpendicular. The outside is built entirely in white marble and is of admirable workmanship, but it is a question whether the equal subdivision of the several storeys is not rather monotonous. The campanili of the churches of S. Nicolas and S. Michele in Orticaia, both in Pisa, are also inclined to, a slight extent.

The campanili hitherto described are all attached to churches, but there are others belonging to civic buildings some of which are of great importance. The campanile of the town hall of Siena risqs to an enormous height, being 285 ft., and only 22 ft. wide; it is built in brick and crowned with a battlemented

“«ssS

MflttMff

hKpBp

parapet carried on machicolation corbels, 16 ft. high, all in stone, and

a belfry storey above set back behind the face of the tower. The campanile of the Palazzo Vecchio at Florence is similarly crowned, but it does not descend to the ground, being balanced in the centre of the main wall of the town hall. A third example is the fine campanile of the Palazzo-del-Signore at Verona, fig. 4, the lower portion built in alternate courses of brick and stone and above entirely in brick, rising to a height of nearly 250 ft., and pierced with putlog holes only. The belfry window on each face is divided into three lights with coupled shafts. An octagonal tower of two storeys rises above the corbelled eaves.

In the campanili of the Renaissance in Italy the same general proportions of the tower are adhered to, and the style lent itself easily to its decoration; in Venice the lofty blind arcades were adhered to, as in the campanile of the church of S. Giorgio dei Greci. In that of S. Giorgio Maggiore, however, Palladio re- turned to the simple brickwork of Verona, crowned with a belfry storey in stone, with angle pilasters and columns of the Corinthian order in antis, and central turret with spire above. In Genoa there are many examples; the quoins are either decorated with rusticated masonry or attenuated pilasters, with or without horizontal string-courses, always crowned with a belfry storey in stone and classic cornices, which on account of their greater projection present a fine effect. (R. P. S.)

CAMPANULA (Bell-flower), in botany, a genus of plants containing about 230 species, found in the temperate parts of the northern hemisphere, chiefly in the Mediterranean region. The name is taken from the bell-shaped flower. The plants are perennial, rarely annual or biennial, herbs with spikes or racemes of white, blue or lilac flowers. Several are native in Britain; Campanula rotundijolia is the harebell (q.v.) or Scotch bluebell, a common plant on pastures and heaths, — the delicate slender stem bears one or a few drooping bell-shaped flowers; C. Rapunculus, rampion or ramps, is a larger plant with a panicle of broadly campanulate red-purple or blue flowers, and occurs on gravelly roadsides and hedgebanks, but is rare. It is cultivated, but not extensively, for its fleshy roots, which are used, either boiled or raw, as salad. Many of the species are grown in gardens for their elegant flowers; the dwarf forms are excellent for pot culture, rockeries or fronts of borders. C. Medium, Canterbury bell, with large blue, purple and white flowers, is a favourite and handsome biennial, of which there are numerous varieties. C. persicifolia, a perennial with more open flowers, is also a well-known border plant, with numerous forms, including white and blue-flowered and single and double. C. glomerata, which has sessile flowers crowded in heads on the stems and branches, found native in Britain in chalky and dry pastures, is

known in numerous varieties as a border plant. C. pyramidalis, with numerous flowers forming a tall pyramidal inflorescence, is a handsome species. There are also a number of alpine species suitable for rockeries, such as C. alpina, cauca- sica, caespitosa and others. The plants are easily cultivated. The perennials are propagated by dividing the roots or by young cuttings in spring, or by seeds.

CAMPBELL, ALEXANDER (1788-1866), American religious leader, was born near Ballymena, Co. Antrim, Ireland, on the 12th of September 1788, and was the son of Thomas Campbell (1763-1854), a schoolmaster and clergyman of the Presbyterian " Seceders." Alexander in 1809, after a year at Glasgow University, joined his father in Washington, Pennsylvania, where the elder Campbell had just formed the Christian Associa- tion of Washington, " for the sole purpose of promoting simple evangelical Christianity." With his father's desire for Church unity the son agreed. He began to preach in 1&10, refusing any salary; in 1811 he settled in what is now Bethany, West Virginia, and was licensed by the Brush Run Church, as the Christian Association was now called. In 1812, urging baptism by immersion upon his followers by his own example, he took his father's place as leader of the Disciples of Christ (q.v., popularly called Christians, Campbellites and Reformers). He seemed momentarily to approach the doctrinal position of the Baptists, but by his statement, " I will be baptized only into the primitive

Christian faith," by his iconoclastic preaching and his editorial conduct of The Christian Baptist (1823-1830), and by the tone of his able debates with Paedobaptists, he soon incurred the disfavour of the Redstone Association of Baptist churches in western Pennsylvania, and in 1823 his followers transferred their membership to the Mahoning Association of Baptist churches in eastern Ohio, only to break absolutely with the Baptists in 1830. Campbell, "who in 1829 had been elected to the Constitutional Convention of Virginia by his anti-slavery neighbours, now established The Millennial Harbinger (1830-1865), in which, on Biblical grounds, he opposed emancipation, but which he used principally to preach the imminent Second Coming, which he actually set for 1866, in which year he died, on the 4th of March, at Bethany, West Virginia, having been for twenty-five years president of Bethany College. He travelled, lectured, and preached throughout the United States and in England and Scotland; debated with many Presbyterian champions, with Bishop Purcell of Cincinnati and with Robert Owen; and edited a revision of the New Testament.

See Thomas W. Grafton's Alexander Campbell, Leader of the Great Reformation of the Nineteenth Century (St Louis, 1897).

CAMPBELL, BEATRICE STELLA (Mrs Patrick Campbell) (1865-), English actress, was born in London, her maiden name being Tanner, and in 1884 married Captain Patrick Campbell (d. 1900). After having appeared on the provincial stage she first became prominent at the Adelphi theatre, London, in 1892, and next year created the chief part in Pinero's Second Mrs Tanqueray at the St James's, her remarkable impersonation at once putting her in the first rank of English actresses. For some years she displayed her striking dramatic talent in London, playing notably with Mr Forbes Robertson in Davidson's For the Crown, and in Macbeth; and her Magda (Royalty, 1900) could hold its own with either Bernhardt or Duse. In later years she paid successful visits to America, but in England played chiefly on provincial tours.

CAMPBELL, GEORGE (1719-ˆ6), Scottish theologian, was born at Aberdeen on the 25th of December 1719. His father, the Rev. Colin Campbell, one of the ministers of Aberdeen, the son of George Campbell of Westhall, who claimed to belong to the Argyll branch of the family, died in 1728, leaving a widow and six children in somewhat straitened circumstances. George, the youngest son, was destined for the legal profession, and after attending the grammar school of Aberdeen and the arts classes at Marischal College, – he was sent to Edinburgh to serve as an apprentice to a writer to the Signet. While at Edinburgh he attended the theological lectures, and when the term of his apprenticeship expired, he was enrolled as a regular student in the Aberdeen divinity hall. After a distinguished career he was, in 1746, licensed to preach by the presbytery of Aberdeen. From 1748 to 1 757 he was minister of Banchory Ternan, a parish on the Dee, some 20 m. from Aberdeen. He then transferred to Aber- deen, which was at the time a centre of considerable intellectual activity. Thomas Reid was professor of philosophy at King's College; John Gregory (1724-1773), Reid's predecessor, held the chair of medicine; Alexander Gerard (1728-1795) was professor of divinity at Marischal College; and in 1760 James Beattie (j735~ l8o 3) became professor of moral philosophy in the same college. These men, with others of less note, formed themselves in 1 7 58 into a society for the discussions of questions in philosophy. Reid was its first secretary, and Campbell one of its founders. It lasted till about 1773, and during this period numerous papers were read, particularly those by Reid and Campbell, which were afterwards expanded and published.

In 1 7 59 Campbell was made principal of Marischal College. In 1763

he published his celebrated Dissertation on Miracles, in which he seeks to show, in opposition to Hume, that miracles are capable of proof by testimony, and that the miracles of Christi- anity are sufficiently attested. There is no contradiction, he argues, as Hume said there was, between what we know by testimony and the evidence upon which a law of nature is based; they are of a different description indeed, but we can without inconsistency believe that both are true. The Dissertation is not

a complete treatise upon miracles, but with all deductions it was and still is a valuable contribution to theological literature. In 1 77 1 Campbell was elected professor of theology at Marischal College, and resigned his city charge, although he still preached as minister of Greyfriars, a duty then attached to the chair. His Philosophy of Rhetoric, planned at Banchory Ternan years before, appeared in 1776, and at once took a high place among books on the subject. In 1778 his last and in some respects his greatest work appeared, A New Translation of the Gospels. The critical and explanatory notes which accompanied it gave the book a high value.

In 1795 he was compelled by increasing weakness to resign the offices he held in Marischal College, and on his retirement he received a pension of £300 from the king. ‘ He died on the 3 1st of March 1796.

His Lectures on Ecclesiastical History were published after his death with a biographical notice by G. S. Keith ; there is a uniform edition of his works in 6 vols.

CAMPBELL, JOHN (1708-1775), Scottish author, was born at Edinburgh on the 8th of March 1708. Being designed for the legal profession, he was sent to Windsor, and apprenticed to an attorney; but his tastes soon led him to abandon the study of law and to devote himself entirely to literature. In 1736 he published the Military History of Prince Eugene and the Duke of Marlborough, and soon after contributed several important articles to the Ancient Universal History. In 1742 and 1744 appeared the Lives of the British Admirals, in 4 vols., a popular work which has been continued by other authors. Besides contributing to the Biographia Britannica and Dodsley’s Pre- ceptor, he published a work on The Present State of Europe, consisting of a series of papers which had appeared in the Museum. He also wrote the histories of the Portuguese, Dutch, Spanish, French,

Swedish, Danish and Ostend settlements in the East Indies, and the histories of Spain, Portugal, Algarve, Navarre and France, from the time of Clovis till 1656, for the Modern Universal History. At the request of Lord Bute, he published a vindication of the peace of Paris concluded in 1763, embodying in it a descriptive and historical account of the New Sugar Islands in the West Indies. By the king he was appointed agent for the provinces of Georgia in 1 7 5 5 . His last and most elaborate work, Political Survey of Britain, 2 vols. 4to, was published in 1744, and greatly increased the author's reputation. Campbell died on the 28th of December 1775. He received the honorary degree of LL.D. from the university of Glasgow in 1745.

CAMPBELL, JOHN CAMPBELL, Baron (1779-1861), lord chancellor of England, the second son of the Rev. George Campbell, D.D., was born on the 17th of September 1779 at Cupar, Fife, where his father was for fifty years parish minister. For a few years Campbell studied at the United College, St Andrews. In 1800 he was entered as a student at Lincoln's Inn, and, after a short connexion with the Morning Chronicle, was called to the bar in 1806, and at once began to report cases decided at nisi prius (i.e. on jury trial) . Of these Reports he published altogether four volumes, with learned notes; they extend from Michaelmas 1807 to Hilary 1816. Campbell also devoted himself a good deal to criminal business, but in spite of his unceasing industry he failed to attract much attention behind the bar; he had changed his circuit from the home to the Oxford, but briefs came in slowly, and it was not till 1827 that he obtained a silk gown and found himself in that " front rank " who are permitted to have political aspirations. He unsuccessfully contested the borough of Stafford in 1826, but was elected for it in 1830 and again in 1831. In the House he showed an extraordinary, sometimes an excessive zeal for public business, speaking on all subjects with practical sense, but on none with eloquence or spirit. His main object, however, like that of Brougham, was the amelioration of the law, more by the abolition of cumbrous technicalities than by the assertion of new and striking principles.

Thus his name is associated with the Fines and Recoveries Abolition Act 1833; the Inheritance Act 1833; the Doweir Act 1833; the Real Property Limitation Act 1833; the Wills Act 1837 ; one of the Copyhold Tenure Acts 1841 ; and the Judgments

Act 1838. All these measures were important and were carefully-drawn; but their merits cannot be explained in a biographical notice. The second was called for by the preference which the common law gave to a distant collateral over the brother of the half-blood' of the first purchaser; the fourth conferred an indefeasible title on adverse

possession for twenty years (a term shortened by Lord Cairns in 1875 to twelve years); the fifth reduced the number of witnesses required by law to attest wills, and removed the vexatious distinction which existed in this respect between freeholds and copyholds; the last freed an innocent debtor from imprisonment only before final judgment (or on what was termed mesne process), but the principle stated by Campbell that only fraudulent debtors should be imprisoned was ultimately given effect to for England and Wales in 1869. ‘ In one of his most cherished objects, however, that of Land Registration (q.v.), which formed the theme of his maiden speech in parliament, Campbell was doomed to disappointment. His most important appearance as member for Stafford was in defence of Lord John Russell’s first Reform Bill (1831). In a temperate and learned speech, based on Fox’s declaration against constitu- tion-mongering, he supported both the enfranchising and the disfranchising clauses, and easily disposed of the cries of ” cor- poration robbery,”” nabob representation,” ” opening for young men of talent,” &c. The following year (1832) found Campbell solicitor-general, a knight and member for Dudley, which he represented till 1834. In that year he became attorney-general and was returned by Edinburgh, for which he sat till 1841. 2

His political creed declared upon the hustings there was that of a moderate Whig. He maintained the connexion of church and state, and opposed triennial parliaments and the ballot. In parliament he continued to lend the most effective help to the Liberal party. .His speech in 1835 in support of the motion for inquiry into the Irish Church temporalities with a view to their partial appropriation for national purposes (for disestablishment was not then dreamed of as possible) contains much terse argu- ment, and no doubt contributed to the fall of Peel and the formation of the Melbourne cabinet. The next year Campbell had a fierce encounter with Lord Stanley in the debate which followed the motion of T. Spring Rice(af terwards Lord Monteagle) on the repair and maintenance of parochial churches and chapels. The legal point in the dispute (which Campbell afterwards made the subject of a separate pamphlet) was whether the church-wardens of the parish, in the absence of the vestry, had any means of enforcing a rate except the antiquated interdict or ecclesiastical censure. It was not on legal technicalities, however, but on the broad principle of religious equality, that Campbell supported the abolition of church rates, in which he included the Edinburgh annuity-tax.

In the same year he spoke for Lord Melbourne, in the action (thought by some to be a political conspiracy 3) which the Hon. G. C. Norton brought against the Whig premier for criminal conversation with his

wife. At this time also he exerted himself for the reform of justice in the ecclesiastical courts, for the uniformity of the law of marriage (which he held should be a purely civil contract) and for giving prisoners charged with felony the benefit of counsel. His defence of The Times news- paper, which had accused Sir John Conroy, equerry to the duchess of Kent, of misappropriation of money (1838), is chiefly remarkable for the Confession — ” I despair of any definition of libel which shall exclude no publications which ought to be suppressed, and include none which ought to be permitted.” His own definition of blasphemous libel was enforced in the

1 Two of his later acts, allowing the defendant in an action for libel to prove Veritas, and giving a right of action to the representatives of persons killed through negligence, also deserve mention.

2 Greville in his Memoirs says that Campbell got this post on condition that he should not expect the ordinary promotion to the bench; a condition which, it if were so, he immediately violated by claiming the vice-chancellorship on the death of Sir John Leach. Pepys (Lord Cottenham) and Bickersteth (Lord Langdale) were both promoted to the bench in preference to Campbell.

3 ” There can be no doubt that old Wynton was at the bottom of it all, and persuaded Lord Grantley to urge it on for mere political purposes.” — Greville, iii. 351.

prosecution which, as attorney-general, he raised against the bookseller H. Hetherington, and which he justified on the singular ground that ” the vast bulk of the population believe that morality depends entirely on revelation; and if a doubt could be raised among them that the ten commandments were given by God from Mount Sinai, men would think they were at liberty to steal, and women would consider themselves absolved from the restraints of chastity.” But his most distinguished effort at the bar was undoubtedly the speech for the House of Commons in the famous case of Stockdale v. Hansard, 1837, 7 C. and P. 731. The Commons had ordered to be printed, among other papers, a report of the inspectors of prisons on Newgate, which stated that an obscene book, published by Stockdale, was given to the prisoners to read. Stockdale sued the Commons’ publisher, and was met by the plea of parliamentary privilege, to which, however, the judges did not give effect, on the ground that

they were entitled to define the privileges of the Commons, and that publica- tion of papers was not essential to the functions of parliament. The matter was settled by an act of 1840.

In 1840 Campbell conducted the prosecution against John Frost, one of the three Chartist leaders who attacked the town of Newport, all of whom were found guilty of high treason. We may also mention, as matter of historical interest, the case before the high steward and the House of Lords which arose out of the duel fought on Wimbledon Common between the earl of Cardigan and Captain Harvey Tuckett. The law of course was clear that the ” punctilio which swordsmen falsely do call honour ” was no excuse for wilful murder. To the astonishment of everybody, Lord Cardigan escaped from a capital charge of felony because the full name of his antagonist (Harvey Garnett Phipps Tuckett) was not legally proved. It is difficult to suppose that such a blunder was not preconcerted. Campbell himself made the extraordinary declaration that to engage in a duel which could not be declined without infamy {i.e. social disgrace) was ” an act free from moral turpitude,” although the law properly held it to be wilful murder. Next year, as the Melbourne administration was near its close, Plunkett, the venerable chancellor of Ireland, was forced by discreditable pressure to resign, and the Whig attorney-general, who had never practised in equity, became chancellor of Ireland, and was raised to the peerage with the title of Baron Campbell of St Andrews, in the county of Fife. His wife, Mary Elizabeth Campbell, the eldest daughter of the first Baron Abinger by one of the Campbells of Kilmorey, Argyllshire, whom he had married in 1821, had in 1836 been created Baroness Stratheden in recognition of the withdrawal of his claim to the mastership of the rolls. The post of chancellor Campbell held for only sixteen days, and then resigned it to his successor Sir Edward Sugden (Lord St Leonards). The circumstances of his appointment and the erroneous belief that he was receiving a pension of £4000 per annum for his few days’ court work brought Campbell much unmerited obloquy. 1 It was during the period 1 841-1849, when he had no legal duty, except the self-imposed one of occasionally hearing Scottish appeals in the House of Lords, that the unlucky dream of literary fame troubled Lord Campbell’s leisure. 2

Following in the path struck out by Miss Strickland in her Lives of the Queens of England, and by Lord Brougham’s Lives of Eminent Statesmen, he at last produced, in 1849, The Lives of the Lord Chancellors and Keepers of the Great Seal of England, from the earliest times till the reign of King George IV., 7 vols. 8vo. The conception of this work is magnificent; its execution wretched. Intended to evolve a history of jurisprudence from the truthful

portraits of England's greatest lawyers, it merely exhibits the ill-digested results of desultory learning, without a trace of scientific symmetry or literary taste, without a spark of that divine imaginative sympathy which alone can give flesh and spirit to the dead bones of the past, and without which the present

1 See thereon J. B. Atlay, The Victorian Chancellors (1908), vol. ii. p. 174.

2 In 1842 he published the Speeches of Lord Campbell at the Bar and in the House of Commons, with an Address to the Irish Bar as Lord Chancellor of Ireland (Edin., Black).

becomes an unintelligible maze of mean and selfish ideas. : A charming style, a vivid fancy, exhaustive research, were not to be expected from a hard-worked barrister; but he must certainly be held responsible for the frequent plagiarisms, the still more frequent inaccuracies of detail, the colossal vanity which obtrudes on almost every page, the hasty insinuations against the memory of the great departed who were to him as giants, and the petty sneers which he condescends to print against his own contem- poraries, with whom he was living from day to day on terms of apparently sincere friendship.

These faults are painfully apparent in the lives of Hardwicke, Eldon, Lyndhurst and Brougham, and they have been pointed out by the biographers of Eldon and by Lord St Leonards. 1 And yet the book is an invaluable repertory of facts, and must endure until it is superseded by something better. It was followed by the Lives of the Chief Justices of England, from the Norman Conquest till the death of Lord Mansfield, 8vo, 2 vols., a book of similar construction but inferior merit.

It must not be supposed that during this period the literary lawyer was silent in the House of Lords. He spoke frequently. The 3rd volume of the Protests of the Lords, edited by Thorold Rogers (1875), contains no less than ten protests by Campbell, entered in the years 1842-1845. He protests against Peel's Income Tax Bill of 1842; against the Aberdeen Act 1843, as conferring undue power on church courts; against the per- petuation of diocesan courts for probate and administration; against Lord Stanley's absurd bill providing compensation for the destruction of fences to dispossessed Irish tenants; and against the Parliamentary Proceedings Bill, which proposed that all bills, except money bills, having reached a certain

stage or having passed one House, should be continued to next session. The last he opposed because the proper remedy lay in resolutions and orders of the House. He protests in favour of Lord Mont- eagle's motion for inquiry into the sliding scale of corn duties; of Lord Normanby's motion on the queen's speech in 1843, for inquiry into the state of Ireland (then wholly under military occupation) ; of Lord Radnor's bill to define the constitutional powers of the home secretary, when Sir James Graham opened Mazzini's letters. In 1844 he records a solitary protest against the judgment of the House of Lords in R. v. Millis, 1844, 10 Cla. and Fin. 534, which affirmed that a man regularly married according to the rites of the Irish Presbyterian Church, and afterwards regularly married to another woman by an episcopally ordained clergyman, could not be convicted of bigamy, because the English law required for the validity of a marriage that it should be performed by an ordained priest.

On the resignation of Lord Denman in 1850, Campbell was appointed chief justice of the queen's bench. For this post he was well fitted by his knowledge of common law, his habitual attention to the pleadings in court and his power of clear state- ment. On the other hand, at nisi prius and on the criminal circuit, he was accused of frequently attempting unduly to influence juries in their estimate of the credibility of evidence. It is also certain that he liked to excite applause in the galleries by some platitude about the " glorious Revolution " or the " Protestant succession." He assisted in the reforms of special pleading at Westminster, and had a recognized place with Brougham and Lyndhurst in legal discussions in the House of Lords. But he had neither t,he generous temperament nor the breadth of view which is required in the composition of even a mediocre statesman. In 1859 he was made lord chancellor of Great Britain, probably on the understanding that Bethell should succeed as soon as he could be spared from the House of Commons. His short tenure of this office calls for no remark. In the same year he published in the form of a letter to Payne Collier an amusing and extremely inconclusive essay on Shakespeare's legal acquirements. One passage will show the conjectural

1 It was of this book that Sir Charles Wethercll said, referring to its author, " and then there is my noble and biographical friend who has added a new terror to death." See Misrepresentations in Camp- bell's " Lives of Lyndhurst and Brougham" corrected by St LeonnHs (London, 1869).

process which runs through the book: ” If Shakespeare was really articled to a Stratford attorney, in all probability, during the five years of his clerkship, he visited London several times on his master’s business, and he may then have been intro- duced to the green-room at Blackfriars by one of his country- men connected with that theatre.” The only positive piece of evidence produced is the passage from Thomas Nash’s ” Epistle to the Gentlemen of the Two Universities,” prefixed to Greene’s Arcadia, 1859, in which he upbraids somebody (not known to be Shakespeare) with having left the ” trade of Noverint ” and busied himself with ” whole Hamlets ” and ” handfuls of tragical speeches.” The knowledge of law shown in the plays is very much what a universal observer must have picked up. Lawyers always underestimate the legal knowledge of an intelli- gent layman. Campbell died on the 23rd of June 1861. It has been well said of him in explanation of his success, that he lived eighty years and preserved his digestion unimpaired. He had a hard head, a splendid constitution, tireless industry, a generally judicious temper. He was a learned, though not a scientific lawyer, a faithful political adherent, thoroughly honest as a judge, dutiful and happy as a husband. But there was nothing admirable or heroic in his nature. On no great subject did his principles rise above the commonplace of party, nor had he the magnanimity which excuses rather than aggravates the faults of others. His life was the triumph of steady determination unaided by a single brilliant or attractive quality.

Authorities. — Life of Lord Campbell, a Selection from his Auto- biography, Diary and Letters, ed. by Hon. Mrs Hardcastle (1881); E. Foss, The Judges of England (1848-1864) ; W. H. Bennet, Select Biographical Sketches from Note-books of a Law Reporter (1867); E. Manson, Builders of our Law (ed. 1904) ; J. B. Atlay, The Victorian Chancellors, vol. ii. (1908).

CAMPBELL, JOHN FRANCIS, of Islay (1822-1885), Gaelic scholar, was born on the 29th of December 1822, heir to the beautiful Isle of Islay, on the west coast of Argyllshire. Of this inheritance he never became possessed, as the estate had to be sold by his father, and he began life under greatly changed conditions. Educated at Eton and at Edinburgh University, he occupied at various times several minor government posts. His leisure was largely employed in collecting, translating and editing the folklore of the western Highlands, taken down from the lips of the natives. The results of his investigations were published in four volumes under the title Popular Tales of the West Highlands (1860-1862), and form a most important con- tribution to the subject,

the necessary precursor to the subse- quent Gaelic revival in Great Britain. Campbell was also devoted to geology and other scientific pursuits, and he invented the sunshine recorder, used in most of the British meteorological stations. He died at Cannes on the 17th of February 1885.

CAMPBELL, JOHN McLEOD (1800-1872), Scottish divine, son of the Rev. Donald Campbell, was born at Kilninver, Argyll- shire', in 1800. Thanks to his father he was already a good Latin scholar when he went to Glasgow University in 181 1. Finishing his course in 1817, he became a student at the Divinity Hall, where he gained some reputation as a Hebraist. After further training at Edinburgh he was licensed as preacher by the presbytery of Lome in 182 1. In 1825 he was appointed to the parish of Row on the Gareloch. About this time the doctrine of Assurance of Faith powerfully influenced him. He began to give so much prominence to the universality of the Atonement that his parishioners went so far as to petition the presbytery in 1829. This petition was withdrawn, but a subsequent appeal in March 1830 led to a presbyterial visitation followed by an accusation of heresy. The General Assembly by which the charge was ultimately considered found Campbell guilty of teaching heretical doctrines and deprived him of his living. Declining an invitation to join Edward Irving in the Catholic Apostolic Church, he worked for two years as an evangelist in the High- lands. Returning to Glasgow in 1843, he was minister for sixteen years in a large chapel erected for him, but he never attempted to found a sect. In 1856 he published his famous book on The Nature of the Atonement, which has profoundly influenced all writing on the subject since his time. His aim is to

view the Atonement in the light of the Incarnation. The divine mind in Christ is the mind of perfect sonship towards God and perfect brotherhood towards men. By the light of this divine fact the Incarnation is seen to develop itself naturally and necessarily as an atonement; the penal element in the sufferings of Christ is minimized. Subsequent critics have pointed out that Campbell's position was not self-consistent in the place assigned to the penal and expiatory element in the sufferings of Christ, nor adequate in its recognition of the principle that the obedience of Christ perfectly affirms all righteousness and so satisfies the holiness of God. In 1859 his health gave way, and he advised his congregation to join the Barony church, where Norman McLeod was pastor. In 1862 he published Thoughts on Revelation. In 1868 he received the degree of D.D. from Glasgow University. In 1870 he removed to Roseneath, and there began his Reminiscences and Reflections, an unfinished work published after his death by his son. Campbell was greatly loved and esteemed by a circle

of friends, which included Thomas Erskine, Norman McLeod, Bishop Alexander Ewing, F. D. Maurice, D. J. Vaughan, and he lived to be recognized and honoured as a man whose opinion on theological subjects carried great weight. In 187 1 a testimonial and address were presented to him by representatives of most of the religious bodies in Scotland. He died on the 27th of February 1872, and was buried in Roseneath churchyard. (D. Mn.)

CAMPBELL, LEWIS (1830-1908), British classical scholar, was born at Edinburgh on the 3rd of September 1830. His father, Robert Campbell, R.N., was a first cousin of Thomas Campbell, the poet. He was educated at Edinburgh Academy, and Glasgow and Oxford universities, He was fellow and tutor of Queen's College, Oxford (1855-1858), vicar of Milford, Hants (1858-1863), and professor of Greek and Gifford lecturer at the university of St Andrews (1863-1894). In 1894 he was elected an honorary fellow of Balliol. As a scholar he is best known by his work on Sophocles and Plato. His published works include: Sophocles (2nd ed., 1879); Plato, Sophistes and Polilicus (1867), Theaetetus (2nd ed., 1883), Republic (with Jowett, 1894); Life and Letters of Benjamin Jowett (with E. Abbott, 1897), Letters of B. Jowett (1899); Life of James Clerk Maxwell (with W. Garnett, new ed., 1884); A Guide to Greek Tragedy for English Readers (1891) ; Religion in Greek Literature (1898) ; On the Nationalisation of the Old English Universities (1901); Verse translations of the plays of Aeschylus (1890); Sophocles (1896); Tragic Drama in Aeschylus, Sophocles and Shakespeare (1904); Paralipomena Sophoclea (1907). He died on the 25th of October 1908.

CAMPBELL, REGINALD JOHN (1867-), British Congre- gationalist divine, son of a United Free Methodist minister of Scottish descent, was born in London, and educated at schools in Bolton and Nottingham, where his father successively removed, and in Belfast, the home of his grandfather. At an early age he taught in the high school at Ashton, Cheshire, and was already married when in 189 1 he went to Christchurch, Oxford, where he graduated in 1895 in the honours school of modern history. He had gone to Oxford with the intention of becoming a clergy- man in the Church of England, but in spite of the influence of Bishop Gore, then head of the Pusey House, and of Dean Paget (afterwards bishop of Oxford), his Scottish and Irish Noncon- formist blood was too strong, and he abandoned the idea in order to take up work in the Congregational ministry. He accepted a call, on leaving Oxford, to the small Congregational church in Union Street, Brighton, and quickly became famous there as a preacher, so much so that on Joseph Parker's death he was chosen as his successor (1903) at the City Temple, London. Here he notably enhanced his

popularity as a preacher, and became one of the recognized leaders of Nonconformist opinion. At the end of 1906 he attracted widespread attention by his vigorous propagation of what was called the ” New Theology,” a restate- ment of Christian beliefs to harmonize with modern critical views and beliefs, and published a book with this title which gave rise to considerable discussion.

CAMPBELL, THOMAS (1777-1844), Scottish poet, eighth son of Alexander Campbell, was born at Glasgow on the 27 th of

July 1777. His father, who was a cadet of the family of Campbell of Kirnan, Argyllshire, belonged to a Glasgow firm trading in Virginia, and lost his money in consequence of the American war. Campbell was educated at the grammar school and university of his native town. He won prizes for classics and for verse-writing, and the vacations he spent as a tutor in the western Highlands. His poem ” Glenara ” and the ballad of ” Lord Ullin’s Daughter ” owe their origin to a visit to Mull. In May 1797 he went to Edinburgh to attend lectures on law. He supported himself by private teaching and by writing, towards which he was helped by Dr Robert Anderson, the editor of the British Poets. Among his contemporaries in Edinburgh were Sir Walter Scott, Henry Brougham, Francis Jeffrey, Dr Thomas Brown, John Leyden and James Grahame. To these early days in Edinburgh may be referred ” The Wounded Hussar,” ” The Dirge of Wallace ” and the ” Epistle to Three Ladies.” In 1799, six months after the publication of the Lyrical Ballads of Wordsworth and Coleridge, The Pleasures of Hope was pub- lished. It is a rhetorical and didactic poem in the taste of his time, and owed much to the fact that it dealt with topics near to men’s hearts, with the French Revolution, the partition of Poland and with negro slavery. Its success was instantaneous, but Campbell was deficient in energy and perseverance and did not follow it up. He went abroad in June 1800 without any very definite aim, visited Klopstock at Hamburg, and made his way to Regensburg, which was taken by the French three days after his arrival. He found refuge in a Scottish monastery. Some of his best lyrics, ” Hohenlinden,” “Ye Mariners of England” and ” The Soldier’s Dream,” belong to his German tour. He spent the winter in Altona, where he met an Irish exile, Anthony McCann, whose history suggested “The Exile of Erin.” 1 He had at that time the intention of writing an epic on Edinburgh to be entitled ” The Queen of the North.” On the outbreak of war between Denmark and England he

hurried home, the ” Battle of the Baltic ” being drafted soon after. At Edinburgh he was introduced to the first Lord Minto, who took him in the next year to London as occasional secretary. In June 1803 appeared a new edition of the Pleasures of Hope, to which some lyrics were added.

In 1803 Campbell married his second cousin, Matilda Sinclair, and settled in London. He was well received in Whig society, especially at Holland House. His prospects, however, were slight when in 1805 he received a government pension of £200. In that year the Campbells removed to Sydenham. Campbell was at this time regularly employed on the Star newspaper, for which he translated the foreign news. In 1809 he published a narrative poem in the Spenserian stanza,” Gertrude of Wyoming,” with which were printed some of his best lyrics. He was slow and fastidious in composition, and the poem suffered from over- elaboration. Francis Jeffrey wrote to the author: ” Your timidity or fastidiousness, or some other knavish quality, will not let you give your conceptions glowing, and bold, and powerful, as they present themselves; but you must chasten, and refine, and soften them, forsooth, till half their nature and grandeur is chiselled away from them. Believe me, the world will never know how truly you are a great and original poet till you venture to cast before it some of the rough pearls of your fancy.” In 181 2 he delivered a series of lectures on poetry in London at the Royal Institution; and he was urged by Sir Walter Scott to become a candidate for the chair of literature at Edinburgh University. In 1814 he went to Paris, making there the acquaint- ance of the elder Schlegel, of Baron Cuvier and others. His pecuniary anxieties were relieved in 181 5 by a legacy of £4000. He continued to occupy himself with his Specimens of the British Poets, the design of which had been projected years before. The work was published in 1819. It contains on the whole an admirable selection with short lives of the poets, and prefixed to it an essay on poetry containing much valuable criticism. In 1820 he accepted the editorship of the New Monthly Magazine,

‘The original authorship of this poem was by many people assigned to G. Nugent Reynolds. Campbell’s claim is established in Literary Remains of the United Irishmen, by R. R. Madden (1887).

and in the same year made another tour in Germany. Four years later appeared his ” Theodric,” a not very successful poem of domestic life. He took an active share in the foundation of the university of London, visiting Berlin to inquire into the German system of education, and making recommendations which were adopted by Lord Brougham. He was elected lord rector of Glasgow University three times

(1826-1829). In the last election he had Sir Walter Scott for a rival. Campbell retired from the editorship of the New Monthly Magazine in 1830, and a year later made an unsuccessful venture with the Metropolitan Magazine. He had championed the cause of the Poles in The Pleasures of Hope, and the news of the capture of Warsaw by the Russians in 1831 affected him as if it had been the deepest of personal calamities. ” Poland preys on my heart night and day,” he wrote in one of his letters, and his sympathy found a practical expression in the foundation in London of the Associa- tion of the Friends of Poland. In 1834 he travelled to Paris and Algiers, where he wrote his Letters from the South (printed 1837).

The small production of Campbell may be partly explained by his domestic calamities. His wife died in 1828. Of his two sons, one died in infancy and the other became insane. His own health suffered, and he gradually withdrew from public life. He died at Boulogne on the 15th of June 1844, and was buried in Westminster Abbey.

Campbell’s other works include a Life of Mrs Siddons (1842), and a narrative poem, ” The Pilgrim of Glencoe ” (1842). See The Life and Letters of Thomas Campbell (3 vols., 1849), edited by William Beattie, M.D. ; Literary Reminiscences and Memoirs of Thomas Camp- bell (1 860) , by Cyrus Redding ; ThePoehcal Works of Thomas Campbell (1875), in the Aldine Edition of the British Poets, edited by the Rev. W. Alfred Hill, with a sketch of the poet’s life by William Allingham ; and the ” Oxford Edition ” of the Complete Works of Thomas Campbell (1908), edited by J. Logie Robertson. See also Thomas Campbell in the Famous Scots Series, by J. C. Hadden, and a selection by Lewis Campbell (1904) for the Golden Treasury Series.

CAMPBELL-BANNERMAN, SIR HENRY (1836-1908), English prime minister, was born on the 7th of September 1836, being the second son of Sir James Campbell, Bart., of Stracathro, Forfar- shire, lord provost of Glasgow. His elder brother James, who just outlived him, was Conservative M.P. for Glasgow and Aberdeen Universities from 1880 to 1906. Both his father and his uncle William Campbell, who had together founded an important drapery business in Glasgow, left him considerable fortunes; and he assumed the name of Banner’man in 1872, in compliance with the provisions of the will of his maternal uncle, Henry Bannerman, from whom he inherited a large property in Kent. He was educated at Glasgow University and at Trinity College, Cambridge (senior optime, and classical honours) ; was returned to parliament for Stirling as a Liberal in 1868 (after an unsuccessful attempt at a by-election); and became financial secretary at the war office (1871-1874; 1880-1882), secretary to the admiralty

(1882-1884), and chief secretary for Ireland (1884-1885). When Mr Gladstone suddenly adopted the cause of Home Rule for Ireland, he ” found salvation,” to use his own phrase, and followed his leader. In Mr Gladstone’s 1886 ministry he was secretary for war, and filled the same office in the Liberal ministry of 1892-1895. In the latter year he was knighted (G.C.B.). It fell to his lot as war minister to obtain the duke of Cambridge’s resignation of the office of commander-in-chief; but his intended appointment of a chief of the staff in substitution for that office Was frustrated by the resignation of the ministry. It was an imputed omission on the part of the war office, and therefore of the war minister, to provide a sufficient supply of small-arms ammunition for the army which on the 21st of June 1895 led to the defeat of the Rosebery government. Wealthy, popular and possessed of a vein of oratorical humour (Mr T. Healy had said that he tried to govern Ireland with Scottish jokes), Sir Henry had already earned the general respect of all parties, and in April 1895, when Mr Speaker Peel retired, his claims for the vacant post were prominently canvassed; but his colleagues were averse from his retirement from active politics and Mr Gully was selected. Though a prominent member of the inner Liberal circle and a stanch party man, it was not supposed by the public at this time that any ambition

for the highest place could be associated with Sir Henry Campbell-Bannerman; but the divisions among the Liherals, and the rivalry between Lord Rosebery and Sir William Harcourt, made the political situation an anomalous one. The very fact that he was apparently unambitious of personal supremacy combined with his honourable record and experience to make him a safe man; and in December 1898, on Sir W. Harcourt’s formal resignation of the leadership of the Opposition, he was elected to fill the position in the House of Commons with the general assent of the party. In view of its parliamentary impotence, and its legacy of an unpopular Home Rule programme, Sir Henry had a difficult task to perform, but he prudently inter- preted his duty as chiefly consisting in the effort to keep the Radical party together in the midst of its pronounced differences. In this he was successful, although the advent of the Boer War of 1899-1902 created new difficulties with the Liberal Imperialists. The leader of the Opposition from the first denounced the diplomatic steps taken by Lord Milner and Mr Chamberlain, and objected to all armed intervention or even preparation for hostilities. Sir Henry’s own tendency to favour the anti-war section, his refusal to

support the government in any way, and his allusion to ” methods of barbarism ” in connexion with the conduct of the British army (June 14, 1901), accentuated the crisis within the party; and in 1901 the Liberal Imperialists, who looked to Lord Rosebery (q.v.) and Mr Asquith (q.v.) for their political inspiration, showed pronounced signs of restiveness. But a party meeting was called on the 9th of July, and Sir Henry was unanimously confirmed in the leadership.

The end of the war in 1902 showed the value of his persistency throughout the years of Liberal unpopularity and disunion. The political conflict once more resumed its normal condition, for the first time since 1892. The blunders of the government were open to a united attack, andMr Chamberlain’s tariff-reform movement in 1903 provided a new rallying point in defence of the existing fiscal system. In the Liberal campaign on behalf of free trade the real leader, however, was Mr Asquith. Sir Henry’s own principal contribution to the discussion was rather unfortunate, for while insisting on the blessings derived by England from its free-trade policy, he coupled this with the rhetorical admission (at Bolton in 1903) that ” 12,000,000 British citizens were under- fed and on the verge of hunger.” But Lord Salisbury’s retire- ment, Unionist divisions, the staleness of the ministry, and the accumulating opposition in the country to the Education Act of 1902 and to the continued weight of taxation, together with the growth of the Labour movement, and the antagonism to the introduction of Chinese coolies (1904) into South Africa under conditions represented by Radical spokesmen as those of ” slavery,” made the political pendulum swing back. A Liberal majority at the dissolution was promised by all the signs at by-elections. The government held on, but collapse was only a question of time (see the articles on Balfoijr, A. J., and Chamberlain, J.). On the 4th of December 1905 the Unionist government resigned, and the king sent for Sir Henry Campbell- Bannerman, who in a few days formed his cabinet. Lord Rosebery, who until a short time before had seemed likely to co-operate, alone held aloof. In a speech at Stirling on the 23rd of November, Sir Henry appeared to him to have deliberately flouted his well-known susceptibilities by once more writing Home Rule in large letters on the party programme, and he declared at Bodmin that he would ” never serve under that banner.” Sir Henry’s actual words, which undoubtedly influenced the Irish vote, were that he ” desired to see the effective manage- ment of Irish affairs in the hands of a representative Irish assembly. If an instalment of representative control was offered to Ireland, or any administrative improvement, he would advise the Nationalists to accept it, provided it was consistent and led up to their larger policy.” But if Lord

Rosebery once more separated himself from the official Liberals, his principal hench- men in the Liberal League were included in the cabinet, Mr Asquith becoming chancellor of the exchequer, Sir Edward Grey foreign secretary, and Mr Haldane war minister. Other sections of the party were strongly represented by Mr John Morley as

secretary for India, Mr Bryce (afterwards ambassador f at Washington) as chief secretary for Ireland, Sir R. T. Reid (Lord Loreburn) as lord chancellor, Mr Augustine Birrell as education minister (afterwards Irish secretary), Mr Lloyd-George as president of the Board of Trade, Mr Herbert Gladstone as home secretary, and Mr John Burns — a notable rise for a Labour leader — as president of the Local Government Board. Lord Ripon became leader in the House of Lords; and Lord Elgin (colonial secretary) , Lord Carrington(agriculture) , Lord Aberdeen (lord lieutenant of Ireland), Sir Henry Fowler (chancellor of the duchy of Lancaster), Mr Sidney Buxton (postmaster-general), Mr L. V. Harcourt (first commissioner of works), and Captain John Sinclair (secretary for Scotland) completed the ministry, a place of prominence outside the cabinet being found for Mr Winston Churchill as undersecretary for the colonies. In 1907 Mr R. McKenna was brought into the cabinet as education minister. There had been some question as, to whether Sir Henry Campbell-Bannerman should go to the House of Lords, but there was a decided unwillingness in the party, and he determined to keep his seat in the Commons.

At the general election in January 1906 an overwhelming Liberal majority was returned, irrespective of the Labour and Nationalist vote, and Sir Henry himself was again elected for Stirling. The Liberals numbered 379, the Labour members 51, the Nationalists 83 , and the Unionists only 157. His premiership was the reward of undoubted services rendered to his party; it may be said, however, that, in contradistinction to the prime ministers for some time previous, he represented the party, rather than that the party represented him. It was not his ideas or his commanding personality, nor any positive programme, that brought the Liberals back to power, but the country's weariness of their predecessors and the successful employment at the elections of a number of miscellaneous issues. But as the man who had doggedly, yet unpretentiously, filled the gap in the days: of difficulty, and been somewhat contemptuously criticized by the Unionist press for his pains, Sir Henry was clearly marked out for the post of prime minister when his party got its chance; and, as the head of a strongly composed cabinet, he satisfied the demands of the situation and was accepted as leader by all sections. Once prime minister, his personal popularity proved to be a powerful unifying influence in a somewhat heterogeneous party; and though the illness and death (August 30,

1906) of his wife (daughter of General Sir Charles Bruce), whom he had married in i860, made his constant attendance in the House of Commons impossible, his domestic sorrow excited widespread sympathy and appealed afresh to the affection of his political followers. This became all the more apparent as his own health failed during 1907; for, though he was : obliged to leave much of the leadership in the Commons to Mr Asquith, his possible resignation of the premiership was strongly deprecated; and even after November, when it became clear that his health was not equal to active work, four or five months elapsed before the necessary change became a fait accompli. Personal affection and political devotion had in these two years made him appear indispensable to the party, although nobody ever regarded him as in the front line of English statesmen so far as originality of ideas or brilliance of debating power were concerned. It is not the fortune of many more brilliant statesmen to earn this testimonial to character. From the beginning of the session of 1908 it was evident, however, that Mr Asquith, who was acting as deputy prime minister, would before long succeed to the Liberal leadership; and on the 5th of April Sir Henry Campbell-Bannerman's resignation was formally announced. He died on the 22nd of the same month. He had spoken in the House of Commons on the 13 th of February, but since then had been prostrated and unable to transact business, his illness dating really from a serious heart attack in the night of the 13th of November at Bristol, after a speech at the Colston banquet.

From a party-political point of view the period of Sir Henry Campbell-Bannerman's premiership was chiefly marked by the sontinued controversies remaining from the general election of 1906, — tariff reform and free trade, the South African question

and the allied Liberal policy for abolishing Chinese labour, the administration of Ireland, and the, amendment of the Education Act of 1902 so as to remove its supposed denominational character. In his speech at the Albert Hallon the 21st of December 1005 it was noticeable that, before the elections, the prime minister laid stress on only one subject which could be regarded as part of a constructive programme — the necessity of doing something for canals, which was soon shelved to a royal commission. But in spite of the fiasco of the Irish Councils Bill (1907), the struggles over education (Mr Birrell's bill of 1906 being dropped on account of the Lords' amendments), the rejection by the peers of the Plural Voting Abolition Bill (1906), and

the failure (again due to the Lords) of the Scottish Small Holdings Bill and Valuation Bill (1907), which at the time made his premiership appear to be a period of bitter and unproductive debate, a good many reform- ing measures of some moment were carried. A new Small Holdings Act (1907) for England was passed; the Trades Disputes Act (1906) removed the position of trades unions from the controversy excited over the Taff Vale decision; Mr Lloyd- George's Patents Act (1907) and Merchant Shipping Act (1906) were welcomed by the tariff reformers as embodying their own policy; a long-standing debate was closed by the passing of the Deceased Wife's Sister Act (1907); and acts for establishing a public trustee, a court of criminal appeal, a system of probation for juvenile offenders, and a census of production* were passed in 1907. Meanwhile, though the Colonial Conference (re-named Imperial) of 1907 showed that there was a wide difference of opinion on the tariff question between the free-trade government and the colonial premiers, in one part of the empire the ministry took a decided step — in the establishment of a self-governing constitution for the Transvaal and Orange River colonies — which, for good or ill, would make the period memorable. Mr Haldane's new army scheme was no less epoch-making in Great Britain. In foreign affairs, the conclusion of a treaty with Russia for delimiting the British and Russian spheres of influence in the Middle East laid the foundations of entirely new relations between the British and Russian governments. On the other hand, so far as concerned the ultimate fortunes of the Liberal party, Sir Henry Campbell-Bannerman's premiership can only be regarded as a period of marking time. He had become its leader as a conciliator of the various sections, and it was as a conciliator, ready to sympathize with the strong views of all sections of his following, that he kept the party together, while his colleagues went their own ways in their own departments. His own special " leads " were few, owing to the personal reasons given above; his declaration at the Queen's Hall, London, early in 1907, in favour of drastic land reform, served only to encourage a number of extremists; and the Liberal enthusiasm against the House of Lords, violently excited in 1906 by the fate of the Education Bill and Plural Voting Bill, was rather damped than otherwise, when his method of procedure by resolution of the House of Commons was disclosed in 1907. The House passed by an enormous majority a resolution (introduced on June 25) " that in order to give effect to the will of the people, as expressed by their represent- atives, it is necessary that the power of the other House to alter or reject bills passed by this House should be so restricted by law as to secure that within the limits of a single parliament the final decision of the Commons shall prevail " ; but the prime minister's explanation that statutory provision should be

made for two or three successive private conferences between the two Houses as to any bill in dispute at intervals of about six months, and that, only after that, the bill in question should be finally sent up by the Commons with the intimation that unless passed in that form it would become law over their heads, was obviously not what w r as wanted by enthusiastic opponents of the second chamber. The problem still remained, how to get the House of Lords to pass a ” law ” to restrict their own powers. After the passing of this resolution the cry against the House of Lords rapidly weakened, since it became clear at the by-elections (culminating at Peckham in March 1908) that the ” will of the people ” was by no means unanimously on the side of the bills which had failed to pass. The result of the two years was undoubtedly to revive the

confidence of the Opposition, who found that they had outlived the criticisms of the general election, and both on the question of tariff reform and on matters of general politics were again holding their own. The failure of the government in Ireland (where the only success was Mr Birrell’s introduction of the Universities Bill in April 1908), their internal divisions as regards socialistic legislation, their variance from the views of the self- governing colonies on Imperial administration, the admission after the general election that the alleged ” slavery ” of the Chinese in the Transvaal was, in Mr Winston Churchill’s phrase, a ” terminological inexactitude,” and the introduction of extreme measures such as the Licensing Bill of 1908, offered excellent opportunities of electioneering attack. Moreover, the Liberal promises of economy had been largely falsified, the reductions in the navy estimates being dangerous in themselves, while the income tax still remained at practically the war level. For much of all this the prime minister’s colleagues were primarily responsible; but he himself had given a lead to the anti-militarist section by prominently advocating international disarmament, and the marked rebuff to the British proposals at the Hague conference of 1907 exposed alike the futility of this Radical ideal and the general inadequacy of the prime minister’s policy of pacificism. Sir Henry’s rather petulant intolerance of Unionist opposition, shown at the opening of the 1906 session in his dismissal of a speech by Mr Balfour with the words ” Enough of this foolery!” gradually gave way before the signs of Unionist reintegration. His resignation took place at a moment when the Liberal, Irish and Labour parties were growing restive under their obligations, government policy stood in need of con- centration against an Opposition no longer divided and making marked headway in the country, and the ministry had to be reconstituted under a successor, Mr Asquith, towards whom, so far, there was no such

feeling of personal devotion as had been the chief factor in Sir Henry Campbell-Bannerman's leadership. (H. Ch.)

CAMPBELTOWN, a royal, municipal and police burgh, and seaport of Argyllshire, Scotland. Pop. (1901) 8286. It is situated on a fine bay, towards the S.E. extremity of the peninsula of Kintyre, n m. N.E. of the Mull and 83 m. S.W. of Glasgow by water. The seat of the Dalriad monarchy in the 6th or 7 th century, its importance declined when the capital was transferred to Forteviot. No memorial of its antiquity has survived, but the finely sculptured granite cross standing on a pedestal in the market-place belongs to the 12 th century, and there are ruins of some venerable chapels and churches. Through the interest of the Campbells, who are still the overlords and from whom it takes its name, it became a royal burgh in 1700. It was the birthplace of the Rev. Dr Norman Macleod (181 2). The chief public buildings are the churches (one of which occupies the site of a castle of the Macdonalds), the town house, the Academy and the Athenaeum. The staple industry is whisky distilling, of which the annual output is 2,000,000 gallons, more than half for export. The port is the head of a fishery district and does a thriving trade. Shipbuilding, net and rope-making, and woollen manufacturing are other industries, and coal is mined in the vicinity. There are three piers and a safe and capacious harbour, the bay, called Campbeltown Loch, measuring 2 m. in length by 1 in breadth. At its entrance stands a lighthouse on the island of Davaar. On the Atlantic shore is the splendid golf-course of Machrihanish, 5 m. distant. Machrihanish is connected with Campbeltown by a light railway. Near the village of Southend is Machrireoch, the duke of Argyll's shooting-lodge, an old structure modernized, commanding superb views of the Firth of Clyde and its islands, and of Ireland. On the rock of Dunaverty stood the castle of Macdonald of the Isles, who was dispossessed by the Campbells in the beginning of the 17th century. At this place in 1647 General David Leslie is said to have ordered 300 of the Macdonalds to be slain after their surrender. Of the ancient church founded here by Columba, only the walls remain. Campbeltown unites with Ayr, Inveraray, Irvine and Oban in sending one member (for the " Ayr Burghs ") to parliament.

CAMPE, JOACHIM HEINRICH (1746-1818), German educa- tionist, was born at Deensen in Brunswick in 1746. He studied theology at the university of Halle, and after acting for some time as chaplain at Potsdam, he accepted a post as director of studies in the Philanthropin

at Dessau (see Basedow). He soon after set up an educational establishment of his own at Trittow, near Hamburg, which he was obliged to give up to one of his assistants within a few years, in consequence of feeble health. In 1787 he proceeded to Brunswick as counsellor of education, and purchased the Schulbuchhandlung, which under his direction became a most prosperous business. He died in 1818. His numerous educational works were widely used throughout Germany. Among the most popular were the Kleine Kinderbibliothek (nth ed., 1815); Robinson der Jilngere (59th ed., 1861), translated into English and into nearly every European language; and Sammtliche Kinder- undjugendschriften, 37 vols.

CAMPECHE (Campeachy), a southern state of Mexico, com- prising the western part of the peninsula of Yucatan, bounded N. and E. by Yucatan, S. by Guatemala, S.W. by Tabasco and N.W. by that part of the Gulf of Mexico designated on English maps as the Bay of Campeachy. Pop. (1895) 87,264; (1900) 86,542, mostly Indians and mestizos. Area, 18,087 sq. m. The name of the state is derived from its principal forest product, palo de campeche (logwood). The surface, like that of Yucatan, consists of a vast sandy plain, broken by a group of low elevations in the north, heavily forested in the south, but with open tracts in the north adapted to grazing. The northern part is insuf- ficiently watered, the rains filtering quickly through the soil. In the south, however, there are some large rivers, and the forest region is very humid. The climate is hot and unhealthy. In the north-west angle of the state is the Laguna de Terminos, a large tide-water lake, which receives the drainage of the southern districts. Among the products and exports are log- wood, fustic, lignum-vitae, mahogany, cedar, hides, tortoise- shell and chicle, the last extracted from the zapote chico trees {Achras sapota, L.). Stock-raising engages some attention. One railway crosses the state from the capital, Campeche, to Merida, Yucatan, but there are no other means of transportation except the rivers and mule-paths. The port of Carmen (pop. in 1900, about 6000), on a sand key between the Laguna de Terminos and the Gulf, has an active trade in dyewoods and other forest products, and owing to its inland water communications with the forest areas of the interior is the principal port of the state and of Tabasco. –

CAMPECHE, or Campeche de Baranda, a fortified city and port of Mexico, and capital of a state of the same name, situated on the Bay of Campeche, 825 m. E. of the city of Mexico and 90 m. S.W. of Merida, in lat. 20° 5′ N., long. oo° 16′ W. Pop. (1900) 17,109. Campeche was one of the three open ports of this coast under the Spanish regime, and its walls, general plan, fine public edifices, shady squares and comfortable stone residences are evidence of the wealth it once

possessed. It is still one of the most attractive towns on the Gulf coast of Mexico. It had a monopoly of the Yucatan trade and enjoyed large profits from its logwood exports, both of which have been largely lost. It was formerly the principal port for the state and for a part of Yucatan, but the port of Carmen at the entrance to Laguna de Terminos is now the chief shipping port for logwood and other forest products, and a considerable part of the trade of Campeche has been transferred to Progreso, the port of Merida. The port of Campeche is a shallow roadstead defended by three forts and protected by a stone pier or wharf 160 ft. long, but vessels drawing more than 9 ft. are compelled to lie outside and discharge cargo into lighters. The exports include logwood, cotton, hides, wax, tobacco, salt and cigars of local manufacture. The principal public buildings are the old citadel, some old churches, the town hall, a handsome theatre, hospital and market. The streets are traversed by tramways, and a railway runs north-eastward to Merida. Campeche stands on the site of an old native town, of which there are interesting remains in the vicinity, and which was first visited by Hernandez de

Cordoba in 1517. The Spanish town was founded in 1540, and was sacked by the British in 1659 and by buccaneers in 1678 and 1685. During the revolution of 1842 Campeche was the scene of many engagements between the Mexicans and people of Yucatan.

CAMPEGGIO, LORENZO (1464-1539), Italian cardinal, was born at Milan of a noble Bolognese family. At first he followed a legal career at Pavia and Bologna, and when in 1499 he took his doctorate he was esteemed the most learned canonist in Europe. In 1500 he married Francesca de' Gualtavillani, by whom he had five children, one of whom, Allessandro, born in 1504, became cardinal in 1551, and another, Gianbaptista, became bishop of Minorca. His wife dying in 1510, he went into the church; on account of his services during the rebellion of Bologna, he was made by Julius II. auditor of the Rota in 1511, and sent to Maximilian and to Vienna as nuncio. Raised to the see of Feltre in 151 2, he went on another embassy to Maximilian in 1513, and was created cardinal priest of San Tommaso in Pavione, 27th of June 1517. Leo X., needing a subsidy from the English clergy, sent Campeggio to England on the ostensible business of arranging a crusade against the Turks. Wolsey, then engaged in beginning his reform of the English church, procured that he himself should be joined to the legation as senior legate; thus the Italian, who arrived in England on the 23rd of July 1518, held a subordinate position and his special legatine faculties were suspended. Campeggio's mission failed in its immediate object; but he returned to Rome, where he was received in Consistory on the 28th of November 1519, with the gift

from the king of the palace of Cardinal Adriano Castellesi (q.v.), who had been deposed, and large gifts of money and furniture. He was made protector of England in the Roman curia; and in 1524 Henry VIII. gave him the rich see of Salisbury, and the pope the archbishopric of Bologna. After attending the diet of Regensburg, he shared the captivity of Clement VII. during the sack of Rome in 1527 and did much to restore peace. On the 1st of October 1528 he arrived in England as co-legate with Wolsey in the matter of Henry's divorce. He brought with him a secret document, the Decretal, which defined the law and left the legates to decide the question of fact; but this important letter was to be shown only to Henry and Wolsey. " Owing to recent events," that is, the loss of the temporal power, Clement was in no way inclined to offend the victorious Charles V., Catherine's nephew, and Campeggio had already received (16th of September 1528) distinct instructions " not to proceed to sentence under any pretext without express commission, but protract the matter as long as possible." After using all means of persuasion to restore peace between the king and queen, Campeggio had to resist the pressure brought upon him to give sentence. The legatine court opened at Blackfriars on the 18th of June 1520, but the final result was certain. Campeggio could not by the terms of his commission give sentence; so his only escape was to prorogue the court on the 23rd of July on the plea of the Roman vacation. Having failed to satisfy the king, he left England on the 26th of October 1529, after his baggage had been searched at Dover to find the Decretal, which, however, had been burnt. Returning to Bologna, the cardinal assisted at the coronation of Charles V. on the 24th of February 1530, and went with him to the diet of Augsburg. He was deprived by Henry of the English protectorate; and when sentence was finally given against the divorce, Campeggio was deprived of the see of Salisbury as a non-resident alien, by act of parliament (nth of March 1535); but his rich benefices in the Spanish dominions made ample amends. In 1537 he became cardinal bishop of Sabina, and died in Rome on the 25th of July 1539. His tomb is in the church of S. Maria in Trastevere. (E. Tn.)

CAMPER, PETER (1722-1789), Dutch anatomist and natural- ist, was born at Leiden on the nth of May 1722. He was educated at the university there, and in 1746 graduated in philosophy and medicine. After the death of his father in 1748 he spent more than a year in England, and then visited Paris, Lyons and Geneva, and returned to Franeker, where in 1750 he had been appointed to the professorship of philosophy, medicine

and surgery. He visited England a second time in 1752, and in 1755 he was called to the chair of anatomy and surgery at the Athenaeum in Amsterdam. He resigned this post after six years, and retired to his country house near Franeker, in order uninterruptedly to carry on his-studies. In 1763, however, he accepted the professorship of medicine, surgery and anatomy at Groningen, and continued in the chair for ten years. He then returned to Franeker, and after the death of his wife in 1776 spent some time in travelling. In 1762 he had been returned as one of the deputies in the assembly of the province of Fries- land, and the latter years of his life were much occupied with political affairs. In 1787 he was nominated to a seat in the council of state, and took up his residence at the Hague, where he died on the 7th of April 1789.

Camper's works, mainly memoirs and detached papers, are very numerous; the most important of those bearing on comparative anatomy were published in 3 vols, at Paris in 1803, under the title (Euvres de P. Camper qui ont pour objet Vhistoire nalurelle, la physiologie, et I'anatomie comparee. His Dissertation physique sur les differences reelles que presentent les traits du visage chez les hommes de differents pays et de differents ages; sur le beau qui caracterise les statues antiques et les pieces gravees, &c., which was published in 1781 both in Dutch and in French, contains an account of the facial angle which he used as a cranial characteristic. (See also Anatomy.)

CAMPHAUSEN, OTTO VON (1812-1896), Prussian statesman, was born at Hunshoven in the Rhine Provinces on the 21st of October 1812. Having studied jurisprudence and political economy at the universities of Bonn, Heidelberg, Munich and Berlin, he entered the legal career at Cologne, and immediately devoted his attention to financial and commercial questions. Nominated assessor in 1837, he acted for five years in this capacity at Magdeburg and Coblenz, became in 1845 counsellor in the ministry of finance, and was in 1849 elected a member of the second chamber of the Prussian diet, joining the Moderate Liberal party. In 1869 he was appointed minister of finance. On taking office, he was confronted with a deficit in the revenue, which he successfully cleared off by effecting a conversion of a greater part of the state loans. The French war indemnity enabled him to redeem a considerable portion of the state debt and to remit certain taxes. He was, however, a too warm adherent of free trade principles to enjoy the confidence either of the Agrarian party or of Prince Bismarck, and his antagonism to the tobacco monopoly and the general economic policy of the latter brought about his retirement. Camphausen's great services to Prussia were recognized by his

sovereign in the bestowal of the order of the Black Eagle in 1895, a dignity carrying with it a patent of nobility. He died at Berlin on the 18th of May 1896.

CAMPHAUSEN, WILHELM (1818-1885), German painter, was born at Diisseldorf, and studied under A. Rethel and F. W. von Schadow. As an historical and battle painter he rapidly became popular, and in 1859 was made professor of painting at the Diisseldorf academy, together with other later distinctions. His ” Flight of Tilly ” (1841), ” Prince Eugene at the Battle of Belgrade ” (1843 ; in the Cologne museum), ” Flight of Charles II. after the Battle of Worcester” (Berlin National Gallery), ” Cromwell’s Cavalry ” (Munich Pinakothek), are his principal earlier pictures; and his ” Frederick the Great at Potsdam,” ” Frederick II. and the Bayreuth Dragoons at Hohenfriedburg,” and pictures of the Schleswig-Holstein campaign and the war of 1866 (notably ” Lines of Diippel after the Battle,” at the Berlin National Gallery), made him famous in Germany as a representa- tive of patriotic historical art. He also painted many portraits of German princes and celebrated soldiers and statesmen. He died at Diisseldorf on the 16th of June 1885.

CAMPHORS, organic chemical compounds, the alcohols and ketones of the hydrocarbons known as terpenes, occurring associated with volatile oils in many plants. They are extracted together with volatile oils by distilling certain plants with steam, the volatile oils being subsequently separated by fractional distillation. The term ” camphor ” is generally applied to the solid products so obtained, and hence includes the ” stear- optenes,” or solid portions of the volatile oils. They are mostly white crystalline solids, possessing a characteristic odour; they

are sparingly soluble in water, but readily dissolve in alcohol and ether. Chemically, the camphors may be divided into two main groups, according to the nature of the corresponding hydrocarbon or terpene. In this article only the camphors of commercial importance will be treated; details as to the chemical structure, syntheses and relations will be found in the article Terpenes.

Menthol, mentha or peppermint camphor, Ci H l9 OH, 5-methyl- 2-isopropyl hexahydrophenol, an oxyhexahydrocymene, occurs in the volatile oils of Mentha piperita and M. arvensis (var. piper ascens and glabrata), from which it is obtained by cooling and subsequently pressing the separated crystals; or by frac- tional distillation. It crystallizes in prisms, having the odour and taste of peppermint; it melts at 42 and boils at 212°. It is very slightly soluble in water, but

readily dissolves in alcohol and ether. It is optically active, being laevo-rotatory. Menthol is used in medicine to relieve pain, as in rheumatism, neuralgia, throat affections and toothache. It acts also as a local anaes- thetic, vascular stimulant and disinfectant.

Thymol, thyme camphor, Ci H 13 OH, 3-methyl-6-isopropyl phenol, an oxycymene, occurs in the volatile oil of Ajowan, Carum ajowan, garden thyme, Thymus vulgaris, wild thyme, T. Serpyllum and horse mint, Monarda punctata. Thymol crystallizes in large colourless plates which melt at 44° and boil at 230 . It has the odour of thyme, is sparingly soluble in water, but very soluble in alcohol, ether and in alkaline solutions. In medicine it is used as an antiseptic, being more active than phenol. Iodine and potash convert it into di-iodthymol, which has been introduced in surgery under the names aristol and annidalin, as a substitute for iodoform.

Borneol, Borneo camphor or camphol, also known as Malayan, Barus or Dryobalanops camphor, CioH 17 OH, occurs in fissures in the wood of Dryobalanops aromatica, a majestic tree flourishing in the East Indies. This product is dextro-rotatory; the laevo and inactive modifications occur in the so-called baldrianic camphor. Borneol melts at 203 and boils at 21 2 . It is very similar to common or Japan camphor, but has a somewhat peppery odour. Sodium and alcohol reduce common camphor to a mixture of d- and /-borneol.

Common camphor, Japan or Laurel camphor, Ci Hi 6 O, which constitutes the bulk of the camphor of commerce, is the product of the camphor laurel, Cinnamonum camphora, a tree flourishing in Japan, Formosa and central China. It also occurs in various volatile oils, e.g. lavender, rosemary, sage and spike. To ex- tract the camphor, chips of the tree are steamed, and the mixed vapours of camphor, volatile oils and water are conducted to a condensing plant, where most of the camphor separates out. This is filtered, and the remainder, about 20 % of the total, which is retained in solution, is extracted by fractional distilla- tion and cooling the distillate. The crude camphor so obtained is exported from Japan in two grades — Samuel A and Samuel B. It is purified by mixing with a little charcoal, sand, iron filings or quicklime and subliming, by steam distillation or by crystalliza- tion. Common camphor forms a translucent mass of hexagonal prisms, melting at 175 and boiling at 204°. It sublimes very readily. In alcoholic solution it is dextro-rotatory; the laevo form, Matricaria camphor, occurs in the oil of Matricaria parthe- nium and closely resembles the d form. Camphor is chiefly used in the celluloid industry. The so-called ” artificial camphor ” is pinene hydrochloride (see Terpenes).

Externally applied it acts medicinally as a counter-irritant, and, in some degree, as a local anaesthetic, being also a definite antiseptic. It is, therefore, largely used in liniments for the relief of myalgia, sciatica, lumbago, etc. Combined with chloro- form, thymol or carbolic acid, it is a valuable local application for neuralgia and for toothache due to dental caries. Taken internally, camphor is a nerve stimulant, a diaphoretic and a feeble antipyretic. It is excreted by the kidneys as various substances, including campho-glycuric add (Schmiedeberg) . In large doses it causes marked nervous symptoms, exhilaration being followed by abdominal pain, violent epileptiform con- vulsions, coma and death. Its internal uses are in hysteria, and

in such conditions as diarrhoea, dysentery and cholera. It is a popular remedy for ” cold in the head,” but it is not to be relied upon as a prophylactic against infection either by an ordinary cold or true influenza.

CAMPHUYSEN, DIRK RAFELSZ (1586-1627), Dutch painter, poet and theologian, was the son of a surgeon at Gorcum. As he manifested great artistic talent, his brother, in whose charge he was left on the death of his parents, placed him under the painter Govaerts. But at that time there was intense interest in theology; and Camphuysen, sharing in the prevailing enthusiasm, deserted the pursuit of art, to become first a private tutor and afterwards minister of Vleuten near Utrecht(i6i6). As; however, he had embraced the doctrines of Arininius with fervour, he was deprived of this post and driven into exile (161 9). His chief solace was poetry; and he has left a translation of the Psalms, and a number of short pieces, remarkable for their fresh- ness and depth of poetic feeling. He is also the author of several theological works of fair merit, among which is a Compendium Doctrinae Sociniorum; but his fame chiefly rests on his pictures, which, like his poems, are mostly small, but of great beauty; the colouring, though thin, is pure; the composition and pencilling are exquisite, and the perspective above criticism. The best of his works are his sunset and moonlight scenes and his views of the Rhine and other rivers. The close of his life Was spent at Dokkum. His nephew Raphael (b. 1598) is by some considered to have been the author of several of the works ascribed to him ; and his son Govaert (1624-1674), a follower or imitator of Paul Potter, is similarly credited. ■■’■■’

CAMPI, GIULIO (1500-1572), the founder of a school of Italian painters, was born at Cremona. He was son of a painter, Galeazzo Campi (147 5-1 536), under whom he took his first lessons in art. He was then taught by Giulio Romano; and he made a special study of Titian, Correggio and Raphael. His works are remarkable for their correctness, vigour and loftiness of style. They are very numerous, and the church of St Margaret in his native town owes all its paintings to his hand. Among the earliest of his school are his brothers, Vincenzo and Antonio, the latter of whom was also of some mark as a sculptor and as historian of Cremona.

Giulio's pupil, Bernardino Campi (1 522-1 592), in some respects superior to his master, began life as a goldsmith. After an education under Giulio Campi and Ippolito Corta, he attained such skill that when he added another to the eleven Caesars of Titian, it was impossible to say which was the master's and which the imitator's. He was also much influenced by Correggio and Raphael. His principal work is seen in the frescoes of the cupola at San Sigismondo, at Cremona.

CAMPILLO, JOSlS DEL (1695-1743), Spanish statesman, was of very obscure origin. From his own account of his youth, written to Antonio de Mier in 1726, we only know that he was born in " a house equally poor and honest," that he studied Latin by his own wish, that he entered the service of Don Antonio Maldonado, prebendary of Cordoba, who wished apparently to train him as a priest, and that he declined to take orders. He left the service of Maldonado in 17 13, being then eighteen years of age. In 171 5 he became " page " to D. Fran- cisco de Ocio, superintendent general of customs, who doubtless employed him as a clerk. In 1717 he attracted the favourable notice of Patifio, the head of the newly-organized navy, and was by him transferred to the naval department. Under the pro- tection of Patifio, who became prime minister in 1726, Campillo was constantly employed on naval administrative work both at home and in America. It was Patino's policy to build up a navy quietly at home and in America, without attracting too much attention abroad, and particularly in England. Campille proved an industrious and honest subordinate. Part of his experience was to be present at a shipwreck in Central America in which he was credited with showing spirit and practical ability in saving the lives of the crew. In 1 7 26 he was denounced to' the Inquisition for the offence of reading forbidden books. The proceedings against him were not carried further, but the incident is an example of the vexatious tyranny exercised by the

Holy Office, and the effect it must have had even in its decadence in

damping all intellectual activity. It was not until in 1741, when Spain was entangled in a land war in Italy and a naval war with England, that Campillo was summoned by the king to take the place of prime minister. He had to find the means of carrying on a policy out of all proportion to the resources of Spain, with an empty treasury. His short tenure of power was chiefly notable for his vigorous attempt to sweep away the system of farming the taxes, which left the state at the mercy of contractors and financiers. Campillo's predecessors were constantly com- pelled to apply to capitalists to provide funds to meet the demands of the king for his buildings and his foreign policy. A whole year's revenue was frequently forestalled. Campillo persuaded the king to allow him to establish a system of direct collection, by which waste and pilfering would be avoided. Some progress was made towards putting the national finances on a sound footing, though Campillo could not prevent the king from disposing, without his' knowledge, of large sums of money needed for the public service. He died suddenly on the 1 ith of April 1743. Campillo was the author of a treatise on a New System of Government for America printed at Madrid 1789. He also left a MS. treatise with the curious title, What is superfluous and is wanting in Spain, in order that it may be what it ought to be, and not what it is.

See D. Antonio Rodriquez Villa, Patifio y Campillo (Madrid, 1882).

CAMPINAS,: an inland city of the state of Sao Paulo, Brazil; 65 m. by rail N;W. of the city of Sao Paulo and 114 m. from the port of Santos, with which it is connected by the Paulista & Sao Paulo railway. Pop. (1890) of the city and municipality, 33,921. Campinas is the commercial centre of one of the oldest coffee-producing districts of the state and the outlet for a rich and extensive ' agricultural region lying farther inland. The Mogyana railway starts from this point and extends north to Uberaba, Minas Geraes, while the Paulista lines extend north- west into new and very fertile regions. Coffee is the staple production, though Indian corn, mandioca and fruit are pro- duced largely for local Consumption. The city is built in a bowl- like depression of the great central plateau, and the drainage from the surrounding hillsides has produced a dangerously insanitary condition, from which one or two virulent fever epidemics have resulted.

CAMPING-OUT. The sport of abandoning ordinary house-life, and living in tents, touring in vans, boats, &c, has been elabor- ately developed in modern times, and a considerable literature has been devoted to it, to which the curious may be referred.

See, for Europe, A. A. Macdonell's Camping-out (1892) and Voyages on German Rivers (1890) ; G. R. Lowndes, Gipsy Tents (1890).

For Australia and Africa, W. B. Lord, Shifts and . Expedients of Camp Life (1871); the articles by F. J. Jackson in the Big Game Shooting volume of the "Badminton Library"; the articles on " Camping out " in The Encyclopaedia of Sport; F. C. Selous, A Hunter's Wanderings in Africa (1881), and Travel and Adventure in South Africa (1893); A. W. Chanler, Through Jungle and Desert (1896); A. B. Rathbone, Camping and Tramping in Malaya (1898).

For America, G..O. Shields, Camping and Camp Outfits (1890); W. W. Pascoe, Canoe and Camp Cookery (1893) ; Woodcraft, by " Nessmuk " (1895); W. S. Rainsford, Camping and Hunting in the Shoshone (1896); S. E. White, The Forest (1903), and The Mountains (1904) ; Suggestions as to Outfit for Tramping and Camp- ing (1904), published by "The Appalachian Mountain Club," Boston. Valuable information will be found in the sporting periodicals, and in the catalogues of outfitters and dealers in sporting goods.

CAMPION, EDMUND (1 540-1 581), English Jesuit, was born in LOndott, received his early education at Christ's Hospital, and, as the best of the London scholars, was chosen in their name to make the complimentary speech when Queen Mary visited the city on the 3rd of August 1553. He went to Oxford and became fellow of St John's College in 1557, taking the oath of supremacy on the occasion of his degree in 1 564, in which year he was orator in the schools. He had already shown his talents as a speaker at the funeral of Amy Robsart in 1560; and when Sir Thomas White, the founder of the college, was buried in 1564, the Latin oration fell to the lot of Campion. Two years later he welcomed Queen Elizabeth to the university, and won a regard, which the queen

preserved until the end. Religious difficulties now began to beset him; but at the persuasion of Edward Gheyney, bishop of Gloucester, although holding Catholic doctrines, he took deaconfs orders in the English Church. Inwardly " he took a remorse of conscience and detestation of mind." Rumours of his opinions began to spread and, giving up the office of proctor, he left Oxford in 1569 and went to Ireland to take part in a proposed restoration of the Dublin University. The suspicion of papistry followed him; and orders were given for his

arrest. For some three months he eluded pursuit, hiding among friends and occupying himself by writing a history of Ireland (first published in Holin- shed's Chronicles), a superficial work of no real value. At last he escaped to Douai, where he joined William Allen (q.v.) and was reconciled to the Roman Church. After being ordained sub- deacon, he went to Rome and became a Jesuit in 1573, spending some years at Briinn, Vienna and Prague. In 1580 the Jesuit mission to England was begun, and he accompanied Robert Parsons (q.v.) who, as superior, was intended to counterbalance Campion's fervour and impetuous zeal. He entered England in the characteristic guise of a jewel merchant, arrived in London oil the 24th of June 1580, and at once began to preach. His presence became known to the authorities and an indiscreet declaration, " Campion Brag," made the position more difficult. The hue and cry was out against him; henceforth he led a hunted life, preaching and ministering to Catholics in Berkshire, Oxford- shire, Northamptonshire and Lancashire. During this time he was writing his Decern Rationes, a rhetorical display of reasons against the Anglican Church. The book was printed in a private press at Stonor Park, Henley, and 400 copies were found on the benchesof St Mary's, Oxford, at the Commencement, on the 27th of June 1581. The sensation was immense, and the pursuit became keener. On his way to Norfolk he stopped at Lyford in Berkshire, where he preached on the 14th of July and the follow- ing day, yielding to the foolish importunity of some pious women. Here he was captured by a spy and taken to London, bearing on his hat a paper with the inscription, " Campion, the Seditious Jesuit." Committed to the Tower, he was examined in the presence of Elizabeth, who asked him if he acknowledged her to be really queen of England, and on his replying straightly in the affirmative, she made him offers, not only of life but of wealth and dignities, on conditions which his conscience could not allow. He was kept a long time in prison, twice racked by order of the council, and every effort was made to shake his constancy. Despite the effect of a false rumour of retraction and a forged confession, his adversaries in despair summoned him to four public conferences (1st, 18th, 23rd and 27th of September), and althou'gh still suffering, and allowed neither time nor books for preparation, he bore himself so easily and readily that he won the admiration of most of the audience. Racked again on the 31st of October, he was indicted at Westminster that he with others had conspired at Rome and Reims to raise a sedition in the realm and dethrone the queen. On the 20th of November he was brought in guilty before Lord Chief Justice Wray; and in reply to him said: " If our religion do make traitors we are worthy to be condemned; but otherwise are and have been true subjects as ever the queen had." He received the sentence of the

traitor's death with the Te Deum laudamus, and, after spending his last days in pious exercises, was led with two companions to Tyburn (1st of December 1581) and suffered the barbarous penalty. Of all the Jesuit missionaries who suffered for their allegiance to the ancient religion, Campion stands the highest. His life and his aspirations were pure, his zeal true and his loyalty unquestionable. He was beatified by Leo XIII. in 1886. ,

An admirable biography is to be found in Richard Simpson's Edmund Campion (1867); and a complete list of his- works in De Backer's Bibliotheaue de la compagnie de Jesus. (E. Tn.)

CAMPION, THOMAS (1567-1620), English poet and musician, was born in London on the 12th of February 1567, and christened at St Andrew's, Holborn. He was the son of John Campion of the Middle Temple, who was by profession one of the cursitors of the chancery court, the clerks " of course," whose duties were to draft the various writs and legal instruments' in correct form. His

mother was Lucy Searle, daughter of Laurence Se'arle, one of the queen's serjeants-at-arms. Upon the death of Campion's father in 1576, his mother married Augustine Steward and died herself soon after.. Steward acted for some years as guardian of the orphan, and sent him in 1581, together with Thomas Sisley, his stepson by his second wife Anne, relict of Clement Sisley,: to Peterhouse, Cambridge, as a gentleman pensioner. He studied at Cambridge for four years, and left the university, it would appear, without a degree, but strongly imbued with those tastes for classical literature which exercised such powerful influence upon his subsequent work. In April 1.587 he was admitted to Gray's Inn, possibly with the intention of adopting a legal profession, but he had little sympathy with legal studies and does not appear to have been called to the bar. His subsequent movements are not certain, but in 1501 he appears to have take!. part in the French expedition under Essex, sent for the assistance of Henry IV. against the League; and in 1606 he first appears with the degree of doctor of physic, though the absence of records does not permit us to ascertain where this was obtained. The rest of his life was probably spent in London, where he practised as a physician until his death on the 1st of March 1620, leaving behind him, it would appear, neither wife nor issue. He was buried the same day at St Dunstan's-in-the-West, Fleet Street.

The body of his works is considerable, the earliest known being a group of five anonymous poems included in the Songs of Divers Noblemen and Gentlemen, appended to Newman's surreptitious

edition of Sidney's Astrophel and Stella, which appeared in 1591. In 1595 appeared under his own name the Poemata, a collection of Latin panegyrics, elegies and epigrams, which evince much skill in handling, and won him considerable reputation. This was followed in 1601 by A Booke of Ayres, one of the song-books so fashionable in his day,the music of which was contributed in equal proportions by himself and Philip Rosseter, while the words were almost certainly all written by him. The following year he published his Observations in the Art of English Poesie, " against the vulgar and unartificial custom of riming," in favour of rhyme- less verse on the model of classical quantitative poetry. Its appearance at this stage was important as the final statement of the crazy prejudice by one of its sanest and best equipped champions, but the challenge thus thrown down was accepted by Daniel, who in his Defence of Ryme, published the same year, finally demolished the movement.

In 1607 he wrote and published a masque for the occasion of the marriage of Lord Hayes, and in 1613 he issued a volume of Songs of Mourning (set' to music by Coperario or John Cooper) for the loss of Prince Henry, which was sincerely lamented by the whole English nation. The same year he wrote and arranged three masques, the Lords' Masque for the marriage of Princess Elizabeth, an entertainment for the amusement of Queen Anne at Caversham House, and a third for- the marriage of the earl of Somerset to the infamous Frances Howard, countess of Essex. If, moreover, as appears quite likely, his Two Bookes of Ayres (both words and music written by himself) belongs also to this year, it was indeed his annus mirabilis.

Some time in or after 161 7 appeared his Third and Fourth Booke of Ayres; while to that year probably also belongs his New Way of making Foure Parts in Counter-point, a technical treatise which was for many years the standard text-book on the subject. It was included, with annotations by Christopher Sympson, in Playfair's Brief Introduction to the Skill of Mustek, and two editions appear to have been bought up by 1660. In 1 61 8 appeared The Ayres that were sung and played at Brougham Castle on- the occasion of the king's entertainment there, the music by Mason and Earsden, while the words were almost certainly by Campion; and in 16 19 he published his Epigram- matum Libri II. Umbra Elegiarum liber tinus, a reprint of his 1595 collection with considerable omissions, additions (in the form of another book of epigrams) and corrections.

While Campion had attained a considerable reputation in his own day, in the years that followed his death his works sank into complete oblivion. No doubt this was due to the nature of the media in which

he mainly worked, the masque and the

song-book. The masque was an amusement at any time too costly to be popular, and with the Rebellion it was practically extinguished. The vogue of the song-books was even more ephemeral, and, as in the case of the masque, the Puritan ascendancy, with its distaste for all secular music, effectively put an end to the madrigal. Its loss involved that of many hundreds of dainty lyrics, including those of Campion, and it is due to the enthusiastic efforts of Mr A. H. Bullen, who first published a collection of the poet's works in 1889, that his genius has been recognized and his place among the foremost rank of Elizabethan lyric poets restored to him.

Campion set little store by his English lyrics; they were to him " the superfluous blossoms of his deeper studies," but we may thank the fates that his precepts of rhymeless versification so little affected his practice. His rhymeless experiments are certainly better conceived than many others, but they lack the spontaneous grace and freshness of his other poetry, while the whole scheme was, of course, unnatural. He must have possessed a very delicate musical ear, for not one of his songs is unmusical; moreover, the fact of his composing both words and music gave rise to a metrical fluidity which is one of his most characteristic features. Rarely indeed are his rhythms uniform, while they frequently shift from line to line. His range was very great both in feeling and expression, and whether he attempts an elaborate epithalamium or a simple country ditty, the result is always full of unstudied freshness and tuneful charm. In some of his sacred pieces he is particularly successful, combining real poetry with genuine religious fervour.

Bibliography. — Works, &c, ed. A. H. Bullen (1889) excluding A New Way, &c. ; Songs and Masques, ed. A. H. Bullen (1903), with an introduction on Campion's music by Janet Dodge; Poems, &c. (in English), ed. P. Vivian (1907); Complete Works, ed. P. Vivian (Clarendon Press, 1908). The " Observations in the Art of English Poesie " are also published in Haslewood's Ancient Critical Essays and Gregory Smith's Elizabethan Critical Essays, vol. ii. (1903).

(P. Vn.)

CAMPISTRON, JEAN GALBERT DE (1656-1723), French dramatist,

was born at Toulouse of noble family in 1656. At the age of seventeen he was wounded in a duel and sent to Paris. Here he became an ardent disciple of Racine. If he copied his master's methods of construction with some success, in the execution of his plans he never advanced beyond mediocrity, nor did he ever approach the secret of the musical lines of Athalie and Phedre. He secured the patronage of the influential duchesse de Bouillon by dedicating Arminius to her, and in 1685 he scored his first success with Andronic, which disguised under other names the tragic story of Don Carlos and Elizabeth of France. The piece made a great sensation, but Campistron's treatment is weak, and he failed to avail himself of the possibilities inherent in his subject. Racine was asked by Louis Joseph, due de Vend6me, to write the book of an opera to be performed at a fete given in honour of the Dauphin. He handed on the com- mission to Campistron, who produced A cis et Galathee for Lulli's music. Campistron had another success in Tiridate (1691), in which he treated, again under changed names, the biblical story of Amnon's passion for his sister Tamar. He wrote many other tragedies and two comedies, one of which, Le Jaloux disabuse, has been considered by some judges to be his best work. In 1686 he had been made intendant to the due de Venddme and followed him to Italy and Spain, accompanying him on all his campaigns. If he was not a good poet he was an honest man under circumstances in which corruption was easy and usual. Many honours were conferred on him. The king of Spain bestowed on him the order of St James of the Sword; the duke of Mantua made him marquis of Penango in Montferrat; and in 1 701 he was received into the Academy. After thirty years of service with Vendome he retired to his native place, where he died on the nth of May 1723.

CAMPOAMOR Y CAMPOOSORIO, RAMON DE (1817-1001), Spanish poet, was born at Navia (Asturias) on the 24th of September 181 7. Abandoning his first intention of entering the Jesuit order, he studied medicine at Madrid, found an opening in politics as a supporter of the Moderate party, and, after occupying

several subordinate posts, became governor of Castellon de 1* Plana, of Alicante and of Valencia. His conservative tendencies grew more pronounced with time, and his Polemicas con la Democracia (1862) may be taken as the definitive expression of his political opinions. His first appearance as a poet dated from 1840, when he published his Ternezas y flores, a collection of idyllic verses, remarkable for their technical excellence. His Ayes del Alma (1842) and his Fabulas morales y polUicas (1842) sustained his reputation, but showed no perceptible increase of power or skill. An epic poem in sixteen cantos, Coldn (1853), is no more successful than modern epics usually are.

Campoamor's theatrical pieces, such as El Palacio de la Verdad (1871), Dies Irae (1873), El Honor (1874) and Glorias Humanas (1885), are interesting experiments; but they are totally lacking in dramatic spirit. He always showed a keen interest in metaphysical and philosophic questions, and defined his position in La Filosofia de las leyes (1846), El Personalismo (1855), Lo Absolute (1865) and El Ideismo (1883). These studies are chiefly valuable as embodying fragments of self-revelation, and as having led to the composition of those doloras, humoradas and pequenos poemas, which the poet's admirers consider as a new poetic species. The first collection of Doloras was printed in 1846, and from that date onwards new specimens were added to each succeeding edition. It is difficult to define a dolora. One critic has described it as a didactic, symbolic stanza which combines the lightness and grace of the epigram, the melancholy of the endecha, the concise narrative of the ballad, and the philosophic intention of the apologue. The poet himself declared that a dolora is a dramatic humorada, and that a pequeno poema is a dolora on a larger scale. These definitions. are unsatisfactory. The humoristic, philosophic epigram is an ancient poetic form to which Campoamor has given a new name; his invention goes no further. It cannot be denied that in the Doloras Campoamor's special gifts of irony, grace and pathos find their best expression. Taking a commonplace theme, he presents in four, eight or twelve lines a perfect miniature of condensed emotion. By his choice of a vehicle he has avoided the fatal facility and copiousness which have led many Spanish poets to destruction. It pleased him to affect a vein of melancholy, and this affectation has been reproduced by his followers. Hence he gives the impression of insincerity, of trifling with grave subjects and of using mysticism as a mask for frivolity. The genuine Campoamor is a poet of the sunniest humour who, under the pretence of teaching morality by satire, is really seeking to utter the gay scepticism of a genial, epicurean nature. His influence has not been alto- gether for good. His formula is too easily mastered, and to his example is due a plague of doloras and humoradas by poetasters who have caricatured their model. Campoamor, as he himself said, did not practise art for art's sake; he used art as the medium of ideas, and in ideas his imitators are poor. He died at Madrid on the 12th of February 1901. Of late years a deep silence had fallen upon him, and we are in a position to judge him with the impartiality of another generation. The over- whelming bulk of his work will perish; we may even say that it is already dead. His pretensions, or the pretensions put forward in his name, that he discovered a new poetic genre will be rejected later, as they are rejected now by all competent judges. The title of a philosophic poet will be denied to him. But he will certainly

survive, at least in extract, as a distinguished humorist, an expert in epigrammatic and sententious aphorism, an artist of extremely finished execution. (J. F.-K.)

CAMPOBASSO, a city of Molise, Italy, the capital of the province of Campobasso, 172 m. E.S.E. of Rome by rail, situated 2132 ft. above sea-level. Pop. (1901) town 11,273; commune 14,491. The town itself contains no buildings of antiquarian interest, but it has some fine modern edifices. Its chief industry is the manufacture of arms and cutlery. Above the town are the picturesque ruins of a castle of the 15th century. The date of the foundation of Campobasso is unknown. The town, with the territory surrounding it, was under the feudal rule of counts until 1739, when it passed to the Neapolitan crown, in considera- tion of a payment of 108,000 ducats.

CAMPODEA, a small whitish wingless insect with long flexible antennae and a pair of elongated caudal appendages. The best- known species (Campodea staphylinus) has a wide distribution and is equally at home in the warm valleys of south Europe, in the subarctic conditions of mountain tops, in caves and in woods and gardens in England. It lives in damp places under stones, fallen trees or in rotten wood and leaves. Although blind, it immediately crawls away on exposure to the light into the nearest crevice or other sheltered spot, feeling the way with its antennae. Its action is characteristically serpentine, recalling that of a centipede. Campodea is one of the bristle-tailed or thysanurous insects of the order Aptera (q.v.).

CAMPOMANES, PEDRO RODRIGUEZ, Conde de (1723-1802), Spanish statesman and writer, was born at Santa Eulalia de Sorribia, in Asturias, on the istof July 1723. From 1788 to 1793 he was president of the council of Castile; but on the accession of Charles IV. he was removed from his office, and retired from public life, regretted by the true friends of his country. His first literary work was Antiquidad maritima de la republica de Cartago, with an appendix containing a translation of the Voyage of Hanno the Carthaginian, with curious notes. This appeared in a quarto volume in 1756. His principal works are two admir- able essays, Discurso sobre el fomento de la industria popular, 17 74, and Discurso sobre la educacion popular de los artesanos y su fomento, 1775. As a supplement to the last, he published four appendices, each considerably larger than the original essay. The first contains reflections on the origin of the decay of arts

and manufactures in Spain during the last century. The second points out the steps necessary for improving or re-establishing the old manufactures, and contains a curious collection of royal ordinances and rescripts regarding the encouragement of arts and manufactures, and the introduction of foreign raw materials. The third treats of the gild laws of artisans, contrasted with the results of Spanish legislation and the municipal ordinances of towns. The fourth contains eight essays of Francisco Martinez de Mata on national commerce, with some observations adapted to present circumstances. These were all printed at Madrid in 1774 and 1777, in five volumes. Count Campomanes died on the 3rd of February 1802.

Don A. Rodriguez Villa has placed a biographical notice of Campomanes as an introduction to the first edition of his Cartas politico-economicas, published in 1878.

CAMPOS, ARSENIO MARTINEZ DE (1831-1900), Spanish marshal, senator and knight of the Golden Fleece, was born at Segovia on the 14th of December 1831. He graduated as a lieutenant in 1852, and for some years was attached to the staff college as an assistant professor. He took part in the Morocco campaign of 1859-1860, and distinguished himself in sixteen actions, obtaining the cross of San Fernando, and the rank of lieutenant-colonel. He then returned to the staff college as a professor. Afterwards he joined the expedition to Mexico under Prim. In 1869 he was sent to Cuba, where he was promoted to the rank of general in 1872. On his return to the Peninsula, the Federal Republican government in 1873 confided to General Campos several high commands, in which he again distinguished himself against the Cantonal Republicans and the Carlists. About that time he began to conspire with a view to restore the son of Queen Isabella. Though Campos made no secret of his designs, Marshal Serrano, in 1874, appointed him to the command of a division which took part in the relief of Bilbao on the 2nd of May of that year, and in the operations around Estella in June. On both occasions General Campos tried in vain to induce the other commanders to proclaim Alphonso XII. He then affected to hold aloof, and would have been arrested, had not the minister of war, Ceballos, answered for his good behaviour, and quartered him in Avila under surveillance. He managed to escape, and after hiding in Madrid, joined General Daban at Sagunto on the 29th of December 1874, where he proclaimed Alphonso XII. king of Spain. From that date he never ceased to exercise great influence in the politics of the restoration. He was considered as a sort of supreme counsellor, being consulted by King Alphonso, and later by his widow, the queen-regent, in every important

political crisis, and on every international or colonial question, especially when othei generals or the army itself became troublesome. He took an important part in the military operations against the Carlists, and in the negotiations with their leaders, which put an end to the civil war in 1876. In the same way he brought about the pacification of Cuba in 1878. On his return from that island he presided over a Conservative cabinet for a few months, but soon made way for Canovas, whom he ever afterwards treated as the leader of the Conservative party. In 1 88 1, with other discontented generals, he assisted Sagasta in obtaining office. After the death of King Alphonso, Campos steadily supported the regency of Queen Christina, and held high commands, though declining to take office. In 1893 he was selected to command the Spanish army at Melilla, and went to the court of Morocco to make an advantageous treaty of peace, which averted a war. When the Cuban rising in 1895 assumed a serious aspect, he was sent out by the Conservative cabinet of Canovas to cope with the rebellion, but he failed in the field, as well as in his efforts to win over the Creoles, chiefly because he was not allowed to give them local self-government, as he wished. Subsequently he remained aloof from politics, and only spoke in the senate to defend his Cuban administration and on army questions. After the war with America, and the loss of the colonies in 1899, when Sefior Silvela formed a new Conservative party and cabinet, the old marshal accepted the presidency of the senate, though his health was failing fast. He held this post up to the time of his death. This took place in the summer recess of 1900 at Zarauz, a village on the coast of Guipuzcoa,, where he was buried.

CAMPOS, an inland city of the state of Rio de Janeiro, Brazil, on the Parahyba river, 30 m. from the sea, and about 143 m. N.E. of the city of Rio de Janeiro. Pop. (1890) of the city, 22,518; of the municipality, 78,036. The river is navigable for small steamers above and below the city, but is closed to coast- wise navigation by dangerous sandbars at its mouth. The shipping port for Campos is Imbetiba (near Macahe) , 60 m. south- west, with which it is connected by rail. There is also water communication between the two places by means of coastal lakes united by canals. Campos has indirect railway communication with Rio de Janeiro by way of Macahe, and is the starting point for several small independent lines. The elevation of the city is only 69 ft. above sea level, and it stands near the western margin of a highly fertile alluvial plain devoted to the production of sugar. The climate is hot and humid, and many kinds of tropical fruit are produced in abundance.

CAMPULUNG (also written Campu Lung and Kimpulung), the capital

of the department of Muscel, Rumania, and the seat of a suffragan bishop; situated among the outlying hills of the Carpathian Mountains, at the head of a long well-wooded glen traversed by the river Tirgului, a tributary of the Argesh. Pop. (1900) 13,033. Its pure air and fine scenery render Campulung a popular summer resort. In the town are more than twenty churches, besides a monastery and a cathedral, which both claim to have been founded, in the 13th century, by Radul Negru, first prince of Walachia. The Tirgului supplies water-power for several paper-mills; annual fairs are held on the 20th of July and the 24th of October; and there is a considerable traffic with Transylvania, over the Torzburg Pass, 15 m. north, and with the south by a branch railway to Ploesci. Near Campulung are the remains of a Roman camp; and, just beyond the gates, vestiges of a Roman colony, variously identified with Romula, Stepenium and Ulpia Traiana, but now called Gradistea or Jidovi.

CAMUCCINI, VINCENZO (1773-1844), Italian historical painter, was born at Rome. He was educated by his brother Pietro, a picture-restorer, and Borubelli, an engraver, and, up to the age of thirty, attempted nothing higher than copies of the great masters, his especial study being Raphael. As an original painter, Camuccini belongs to the school of the French artist David. His works are rather the fruits of great cleverness and patient care than of fresh and original genius; and his style was essentially imitative. He enjoyed immense popularity, both personally, and as an artist, and received many honours and,

preferments from the papal and other Italian courts. He was appointed director of the Academy of San Luca and of the Neapolitan Academy at Rome, and conservator of the pictures of the Vatican. He was also made chevalier of nearly all the orders in Italy, and member of the Legion of Honour. His chief works are the classical paintings of the ” Assassination of Caesar,” the ” Death of Virginia,” the ” Devotion of the Roman Women,” ” Young Romulus and Remus,” ” Horatius Codes,” the ” St Thomas,” which was copied in mosaic for St Peter’s, the ” Pre- sentation of Christ in the Temple ” and a number of excellent portraits. He became a rich man, and made a fine collection of pictures which in 1856 were sold, a number of them (including Raphael’s ” Madonna with the Pink “) being bought by the duke of Northumberland.

CAMULODUNUM, also written Camalodunum (mod. Col- chester, q.v.), a British and Roman town. It was the capital of the British chief Cunobelin and is named on his coins: after his death and the Roman conquest of south Britain, the Romans established (about a.d. 48) a colonia or municipality peopled with discharged legionaries, and intended to serve both as an informal garrison and as a centre of Roman civilization. It was stormed and burnt a.d. 61 in the rising of Boadicea (q.v.), but soon recovered and became one of the chief towns in Roman Britain. Its walls and some other buildings still stand and abundant Roman remains enrich the local museum. The name denotes ” the fortress of Camulos,” the Celtic Mars.

CAMUS, ARMAND GASTON (1740-1804), French revolu- tionist, was a successful advocate before the Revolution. In 1789 he was elected by the third estate of Paris to the states general, and attracted attention by his speeches against social inequalities. Elected to the National Convention by the depart- ment of Haute-Loire, he was named member of the committee of general safety, and then sent as one of the commissioners charged with the surveillance of General C. F. Dumouriez. Delivered with his colleagues to the Austrians on the 3rd of April 1793, he was exchanged for the daughter of Louis XVI. in November 1795. He played an inconspicuous r61e in the council of the Five Hundred. On the 14th of August 1 789 the Constituent Assembly made Camus its archivist, and in that capacity he organized the national archives, classified the papers of the different assemblies of the Revolution and drew up analytical tables of the proces- verbaux. He was restored to the office in 1796 and became absorbed in literary work. He remained an austere republican, refusing to take part in the Napoleonic regime.

CAMUS, CHARLES ETIENNE LOUIS (1699-1768), French mathematician and mechanician, was born at Crecy-en-Brie, near Meaux, on the 25th of August 1699. He studied mathe- matics, civil and military architecture, and astronomy, and became associate of the Academie des Sciences, professor of geometry, secretary to the Academy of Architecture and fellow of the Royal Society of London. In 1736 he accompanied Pierre Louis Maupertuis and Alexis Claude Clairaut in the expedition to Lapland for the measurement of a degree of the meridian. He died on the 2nd of February 1768. He was the author of a Cours de mathematiques (Paris, 1766), and a number of essays on mathematical and mechanical subjects (see Poggen- dorff. Bioˆ.-lit. Handworterbuch).

CAMUS’, FRANCOIS JOSEPH DES (1672-1732), French mechanician, was born near St Mihiel, on the 14th of September 1672. After

studying for the church, he devoted himself to mechanical inventions, a number of which he described in his Train des forces mouvantes pour la pratique des arts et mf tiers, Paris, 1722. He died in England in 1732.

CAMUS DE MiZIERES, NICOLAS LE (1721-1789), French architect, was born at Paris on the 26th of March 1721, and died at the same city on the 27th of July 1789. He published several works on architectural and related subjects.

CANA, of Galilee, a village of Palestine remarkable as the home of Nathanael, and the scene of Christ's " beginning of miracles " (John ii. i-n, iv: 46-54). Its site is unknown, but it is evident from the biblical narrative that it was in the neighbour- hood of, and higher than, Capernaum. Opinion as to identifica-

tion is fairly divided between Kefr Kenna and Kana'-elˆJelil. The : former, about 4 m. N.N.E. of Nazareth, contains a ruined church and a small Christian population; the latter is an uninhabited village about 9 m. N. of Nazareth, with no remains but a few cisterns. ■ ■ ■

CANAAN, CANAANITES. These geographical and ethnic terms have a shifting reference, which doubtless arises out of the migrations of the tribes to which the term " Canaanites " belongs. Thus in Josh. v. 1 the term seems to be applied to a population on the coast of the Mediterranean, and in Josh. xi. 3,: Num. xiii. 29 (cf. also Gen. xiii. 12) not only to these, but to a people in the Jordan Valley. In Isa. xxiii. 1 1 it seems to be used of Phoenicia, and in Zeph. ii. 5 (where, however, the text is disputed) of Philistia. Most often it is applied comprehensively to the population of the entire west Jordan land and its pre- Israelitish inhabitants. This usage is characteristic of the writer called the Yahwist (J); see e.g. Gen. xii. 5, xxxiii. 18; Ex. xv. 15; Num. xxxiii; 51; Josh. xxii. 9; Judg. iii. 1; Ps. cvi. 38, and elsewhere. It was also, as Augustine tells us, 1 a usage of the Phoenicians to call their land " Canaan." This is confirmed by coins of the city of Laodicea by the Lebanon, which bear the legend, " Of Laodicea, a metropolis in Canaan " ; these coins are da ted under Antiochus IV. (1 7 5-1 64B.C.) , and his successors, Greek writers, too, tell us a fact of much interest, viz. that the original name of Phoenicia was x"a-, i.e. Kena, a short, collateral form of Kena'an or Kan'an. The form Kan'an is favoured by the Egyptian usage. Seti I. is said to have conquered the Shasu, or Arabian nomads, from the fortress of Taru (Shur?) to " the Ka-n-'-na," and Rameses III. to have built a temple to the god Amen in " the Ka-n-'-na." By this geographical name is probably meant all western Syria and Palestine with Raphia — " the (first) city of the Ka-n-'-na " — for

the south-west boundary towards the desert. 2 In the letters sent by governors and princes of Palestine to their Egyptian overlord 3 — commonly known as the Tel-el- Amarna tablets — we find the two forms Kinahhi and Kinahna, corres- ponding to Kena' and Kena'an respectively, and standing, as Ed. Meyer has shown, for Syria in its widest extent.

On the name " Canaan " Winckler remarks/ "There is at present no prospect of an etymological explanation." From the fact that Egyptian (though not Hebrew) scribes constantly prefix the article, we may suppose that it originally meant " the country of the Canaanites," just as the Hebrew phrase " the Lebanon " may originally have meant " the highlands of the Libnites"; and we are thus permitted to group the term "Canaan" with clan-names such as Achan, Akan, Jaakan, Anak (generally with the article prefixed), Kain, Kenan. Nor are scholars more unanimous with regard to the region where the terms " Canaanite " and " Canaan " arose. It may be true that the term Kinahhi in the Amarna letters corresponds to Syria and Palestine in their entirety. But this does not prove that the terms "Canaanite " and " Canaan " arose in that region, for they are presumably much older than the Amarna tablets. Let us refer at this point to a document in Genesis which is perhaps hardly estimated at its true value, the so-called Table of Peoples in Gen. x. Here we find " Canaan " included among the four sons of 5am. If Cush in v. 6 really means Ethiopia, and M-s-r-i-m Egypt, arid Put the Libyans, and if Ham is really a Hebraized form of the old Egyptian name for Egypt, Kam-t (black), 5 the passage is puzzling in the extreme. But if, as has recently been suggested, 6 Cush, M-s-r-i-m, and Put are in north Arabia, and Harri is the short for Yarham or Yerahme'el (see 1 Chr. ii. 25-27, 42), a north Arabian name intimately associated with Caleb, all becomes clear, and Canaan in particular is shown to be an Arabian name. Now it is no mere hypothesis that beginning

1 Enarratio in Psalm civ.

2 W. M. Miiller, Asien und Europa, p. 205.

3 The letters are written in the official and diplomatic language — Babylonian, though " Canaanitish " words and idioms are not wanting.

4 Die Keilinschriften und das Alte Testament, p. 181.

6 These explanations are endorsed by Driver (Genesis,on Gen. x.). 6 See the relevant articles in Ency. Bib. and Cheyne's Genesis and Exodus.

from about 4000 B.C. 1 a wave of Semitic migration poured out of Arabia, and flooded Babylonia certainly, and possibly, more or less, Syria and Palestine also. Also that between 2800 and 2600 B.C. a second wave from Arabia took the same course, covering not only Babylonia, but also Syria and Palestine and probably also Egypt (the Hyksos). It is soon after this that we meet with the great empire-builder and civilizer, Khammurabi (2267-2213), the first king of a united Babylonia. It is noteworthy that the first part of his name is identical with the name of the father of Canaan in Genesis (Ham or Kham), indicating his Arabian origin. 2 It was he, too, who restored the ancient supremacy of Babylonia over Syria and Palestine, and so prevented the Babylonizing of these countries from coming to an abrupt end.

We now understand how the Phoenicians, whose ancestors arrived in the second Semitic migration, came to call their land ” Canaan.” They had in fact the best right to do so. The first of the Canaanite immigrants were driven seawards by the masses which followed them. They settled in Phoenicia, and in after times became so great in commerce that ” Canaanite “became a common Hebrew term for ” merchant ” (e.g. Isa. xxiii. 8). It is a plausible theory that in the conventional language of their inscriptions they preserved a number of geographical and re- ligious phrases which, for them, had no clear meaning, and belonged properly to the land of their distant ancestors, Arabia. 3 For their own traditions as to their origin see Phoenicia; we cannot venture to reject these altogether. The masses of immi- grants which followed them may have borne the name of Amorites. A few words on this designation must here be given. Both within and without Palestine the name was famous.

First, as regards the Old Testament. We find ” the Amorite ” (a collective term) mentioned in the Table of Peoples (Gen. x. i6-i8a) among other tribal names, the exact original reference of which had probably been forgotten. No one in fact would gather from this and parallel passages how important a part was played by the Amorites in the early history of Palestine. In Gen. xiv. 7 f., Josh. x. 5 f., Deut. i. 19 ff., 27, 44 wefind them located in the southern mountain country, while in Num. xxi. 13, 21 f., Josh.ii.io, ix.io, xxiv.8, 1 2,&c. we hear of two great Amorite kings, residing respectively at Heshbon and Asbtaroth on the east 6f the Jordan. Quite different/however, is the view taken in Gen. xv. 16, xlviii. 22, Josh.xxiv.i 5, Judg. i. 34, Am.

ii.o, 10, &c, where the name of Amorite is synonymous with ” Canaanite,” except that ” Amorite ” is never used for the population on the ooast. Next, as to the extra-Biblical evidence. In the Egyptian inscriptions and in the Amarna tablets Amar and Amurru have a more limited meaning, being applied to the mountain-region east of Phoenicia, extending to the Orontes. Later on, Arnurru became the Assyrian term for the interior of south as well as north Palestine, and at a still more recent period the term ” the •land of Hatti ” (conventionally = Hittites) displaced ” Amurru ” so far as north Palestine is concerned (see Hittites).

Thus the Phoenicians and the Amorites belong to the first stage of the second great Arabian migration. In the interval preceding the second stage Syria with Palestine became an ■Egyptian dependency, though the links’ with the sovereign power were not so strong as to prevent frequent local rebellions. Under Thothmes III. and Amen-hotep II. the pressure of a strong hand kept the Syrians and Canaanites sufficiently loyal to the Pharaohs. The reign of Amen-hotep III., however, was not cjuite so tranquil for the Asiatic province. Turbulent chiefs began to seek their opportunities, though as a rule they did not “find them because they could not obtain the help of a neighbour- ing king. 4 The boldest of the disaffected was Aziru, son of Abd-

1 For the grounds of these dates see Winckler, Gesch. Isr. i. 12/f..; Paton, Early Hist, of Syria and Palestine (1902) , pp. 6-8, 25-28.

2 It is true the Babylonians themselves interpreted the name differently (5 R. 44a b2i), kimta rapashtum, “wide family.” That, however, is only a natural protest against what we may call Canaan- ism or Arabism.

3 See Cheyne, Genesis and Exodus (on Gen. i. 26), and cf. G. A. Cooke, N. Sem. Inscriptions (e.g. pp. 30-40, on Eshmunazar’s in- •scription).

: 4 See Amat.na Letters, Winckler’s edition, No. 7.

ashirta, a prince of Amurru, who even before the death of Amenˆ hotep III. endeavoured to extend his power into the plain of Damascus. Akizzi, governor of Katna (near Horns or Hamath), reported this to the Pharaoh who seems to have frustrated the attempt. In the next reign, however, both father and son caused infinite trouble to loyal servants: of Egypt like Rib-Addi, governor of Gubla (Gebal).

It was, first, the advance of the Hatti (Hittites) into Syria, which began

in the time of Amen-hotep III., but became far more threatening in that of his successor, and next, the resumption of the second Arabian migration, which most seriously undermined the Egyptian power in Asia. Of the former we cannot speak here (see Hittixes), except so far as to remark the Abd- Ashirta and his son Aziru, though at first afraid of the Hatti, was after- wards clever enough to make a treaty with their king, and, with other external powers, to attack the districts which remained loyal to Egypt. In vain did Rib-Addi send touching appeals for aid to the distant Pharaoh, who was far too much engaged in his religious innovations to attend to such messages. What most interests us is the mention of troublesomeinvaderscalledsome times sa-gas (a Babylonian ideogram meaning ” rohber “), sometimes Habiri. Who are these IJabiri? Not, as was at first thought by some, specially the Israelites, but all those tribes of land-hungry nomads (” Hebrews “) who were attracted by the wealth and luxury of the settled regions, and sought to appropriate it for themselves. Among these we may include not only the Israelites or tribes which afterwards became Israelitish, but the Moabites, Ammonites and Edomites. We meet with the Habiri in north Syria. Itakkama writes thus to the Pharaoh, 5 ” Behold, Namyawaza has surrendered all the cities of the king, my lord, to the Sa-gas in the land of Kadesh and in Ubi. But I will go, and if thy gods and thy sun go before me, I will bring back the cities to the king, my lord, from the Habiri, to show myself subject’ to him; and I will expel the Sa-gas.” Similarly Zimrida, king of Sidon, declares, ” All my cities which the king has given into my hand, have come into the hand of the Habiri.” 6 Nor had Palestine any immunity from the Arabian invaders. The king of Jerusalem, Abd-Hiba, the second part of whose name has been thought to represent the Hebrew Yahweh, 7 reports thus to the Pharaoh, ” If (Egyptian) troops come this year, lands and princes will remain to the king, my lord; but if troops come no t; these lands and princes will not remain to the king, my lord. 8 Abd-Hiba’s chief trouble arose from persons called Milkili and the sons of Lapaya, who are said to have entered into a treason- able league with the Habiri. Apparently this restless warrior found his death at the siege of Gina. 9 All these princes, however, malign each other in their letters to the Pharaoh, and protest their own innocence of traitorous intentions. Namyawaza, for instance, whom Itakkama (see above) accuses of disloyalty, writes thus to the Pharaoh, ” Behold, I and my warriors and my chariots, together with my brethren and my Sa-gas, and my Suti ■**? areat the disposal of the(royal) troops,to go whithersoever the king, my lord, commands. ” u This petty prince, therefore, sees no, harm in having a band of Arabians for his garrison, as indeed Hezekiah long afterwards had his Urbi to help him against Sennacherib. From the same period we have**

recently derived fresh .and important evidence as to pre-Israelitish Palestine. As soon as the material gathered is large enough to be thoroughly classified and critically examined,' a true history of early Palestine will be within measurable distance. At present, there are five places whence the new evidence has, been obtained: 1. Tell-el-Hasy, generally identified with the Lachish of the Old Testament. Excavations were made here in 1890-189 2 by Flinders Petrie and Bliss* 2. Gezer.pdausibly identified with the Gezer of 1 Kings ix. 16. 'Here R. A. Si MaCalister began excavating in 1902. 3. Tell-es-Safy, possibly th? Gath of. the Old Testament, 6 m.from Eleutheropolis. Here F. J. Bliss and R. A. S. Macalister made

6 Op. cit. No. 146. -* Op. cit. No. 147.

7 Johns, Assyrian Deeds, iii. p. 16.

8 Amarna Letters, No. 180 (xi. 20-24).

9 Ibid. No. 164 (xi. 15-18). 10 Nomads of the Syrian desert. n Amarna Letters, No. 144 (xi. 24-32).

some discoveries in 1899-1900. A complete examination of the site, however, was impossible. 4. Tell-el-Mutasellim, near Lejjun (Megiddo-Legio). Schumacher began working here in 1903 for the German Palestine Society. 5. Taannek, on the south of the plain of Esdraelon. Here Prof. Ernst Sellin of Vienna was able to do much in a short time (1902-1904). It may be mentioned here that on the first of these sites a cuneiform tablet belonging to the Amarna series was discovered; at Gezer, a deed of sale; at Tell-el-Hasy the remains of a Babylonian stele, three seals, and three cylinders with Babylonian mytho- logical representations; at Tell-el-Mutasellim, a seal bearing a Babylonian legend, and at Taannek, twelve tablets and frag- ments of tablets were found near the fragments of the terra- cotta box in which they were stored. It is a remarkable fact that the kings or chiefs of the neighbourhood should have used Babylonian cuneiform in their own official correspondence. But much beside tablets has been found on these sites; primitive sanctuaries, for instance. The splendid alignment of monoliths at Gezer is described in detaii in P.E.F. Quart. Statement, January 1903, p. 23, and July 1903, p. 219. There is reason, as Macalister thinks, to believe that it is the result of a gradual

development, beginning with two small pillars, and gradually enlarging by later additions. There is a smaller one at Tell-es- Safy. The Semitic cult of sacred standing stones is thus proved to be of great antiquity; Sellin's discoveries at Taannek and those of Bliss at Tell-e§- Safy fully confirm this. Rock-hewn altars have also been found, illustrating the prohibition in Ex. xx. 25, 26, and numerous jars with the skeletons of infants. We cannot doubt that the sacrificing of children was practised on a large scale among the Canaanites. Their chief deity was Ashtart (Astarte) , the goddess of fertility. Numerous images of her have been found, but none of the god Baal. The types of the divine form vary in the different places. The other images which have been found represent Egyptian deities. We must not, however, infer that there was a large Egyptian element in the Canaanitish Pantheon. What the images do prove is the large amount of intercourse between Egypt and Canaan, and the presence of Egyptians in the subject country.

See the 7 'ell-el- Amarna Letters, ed. by Winckler, with translation (1896) ; the reports of Macalister in the Pal. Expl. Fund Statements from 1903 onwards; Sellin's report of excavations at Tell Ta'annek; also H. W. Hogg, " Recent Assyriology," &c., in Inaugural Lectures ed. by Prof. A. S. Peake (Manchester University, 190,5). On Biblical questions, see Dillmann's commentaries and the Bible dictionaries. See further articles Palestine ; Jews. (T. K. C.)

CANACHUS, a sculptor of Sicyon in Achaea, of the latter part of the 6th century B.C. He was especially noted as the author of two great statues of Apollo, one in bronze made for the temple at Miletus, and one in cedar wood made for Thebes. The coins of Miletus furnish us with copies of the former and show the god to have held a stag in, one hand and a bow in the other. The rigidity of these works naturally impressed later critics.

CANADA. The Dominion of Canada comprises the northern half of the continent of North America and its adjacent islands, excepting Alaska, which belongs to the United States, and Newfoundland, still a separate colony of the British empire. Its boundary on the south is the parallel of latitude 49 , between the Pacific Ocean and Lake-of-the- Woods, then a chain of small lakes and rivers eastward to the mouth of Pigeon river on the north-west side of Lake Superior, and the Great Lakes with their connecting rivers to Cornwall, on the St Lawrence. From this eastward to the state of Maine the boundary is an artificial line nearly corresponding to lat. 45°; then an irregular line partly determined by watersheds and rivers divides Canada from Maine, coming out on the Bay of Fundy. The western boundary is the Pacific

on the south, an irregular line a few miles inland from the coast along the ” pan handle ” of Alaska to Mount St Elias, and the meridian of 141° to the Arctic Ocean. A somewhat similar relationship cuts off Canada from the Atlantic on the east, the north-eastern coast of Labrador belong- ing to Newfoundland.

Physical Geography. — In spite of these restrictions of its natural coast line on both the Atlantic and the PacifiQ. Canada

is admirably provided with harbours on both oceans. The Gulf of St Lawrence with its much indented shores and the coast of Nova Scotia and New Brunswick supply endless harbours, the northern ones closed by ice in the winter, but the southern ones open all the year round; and on the Pacific British Columbia is deeply fringed with islands and fjords with well-sheltered harbours everywhere, in strong contrast with the unbroken shore of the United States to the south. The long stretches of sheltered navigation from the Straits of Belle Isle north of Newfoundland to Quebec, and for 600 m. on the British Columbian coast, are of great advantage for the coasting trade. The greatly varied Arctic coast line of Canada with its large islands, inlets and channels is too much clogged with ice to be of much practical use, but Hudson Bay, a mediterranean sea 850 m. long from north to south and 600 m. wide, with its outlet Hudson Strait, has long been navigated by trading ships and whalers, and may become a great outlet for the wheat of western Canada, though closed by ice except for four months in the summer. Of the nine provinces of Canada only three have no coast line on salt water, Manitoba, Alberta and Saskatchewan, and the first may soon be extended to Hudson Bay. Ontario has a seaboard only on Hudson Bay’s southern extension, James Bay, and there is no probability that the shallow harbours of the latter bay will ever be of much importance for shipping, though Churchill Harbour on the west side of Hudson Bay may become an im- portant grain port. What Ontario lacks in salt water navi- gation is, however, made up by the busy traffic of the Great Lakes.

The physical features of Canada are comparatively simple, and drawn on a large scale, more than half of its surface sloping gently inwards towards the shallow basin of Hudson Bay, with higher margins to the south-east and south-west. In the main it is a broad trough, wider towards the north than towards the south, and unsymmetrical, Hudson Bay occupying much of its north-eastern part, while to the west broad plains rise gradually to the foot-hills of the Rocky Mountains, the eastern member of the Cordillera which follows the Pacific coast of America. The physical geography of Canada is so closely bound up with its geology that at least an outline of the

geological factors involved in its history is necessary to understand the present physiography. The mountain structures originated in three great orogenic periods, the earliest in the Archean, the second at the end of the Palaeozoic and the third at the end of the Mesozoic.

The Archean mountain chains, which enclosed the „ . _

r TT , _ ‘ , Geology.

present region of Hudson Bay, were so ancient that

they had already been worn down almost to a plain before the early Palaeozoic sediments were laid down. This ruling geological and physical feature of the North American continent has been named by E. Suess the ” Canadian Shield.” Round it the Palaeozoic sands and clays, largely derived from its own waste, were deposited as nearly horizontal beds, in many places still almost undisturbed. Later the sediments lying to the south-east of this ” protaxis,” or nucleus of the continent, were pushed against its edge and raised into the Appalachian chain of moun- tains, which, however, extends only a short distance into Canada. The Mesozoic sediments were almost entirely laid down to the west and south-west of the protaxis, upon the flat-lying Palaeo- zoic rocks, and in the prairie region they are still almost hori- zontal; but in the Cordillera they have been thrust up into the series of mountain chains characterizing the Pacific coast region. The youngest of these mountain chains is naturally the highest, and the oldest one in most places no longer rises to heights deserving the name of mountains. Owing to this unsymmetric development of North America the main structural watershed is towards its western side, on the south coinciding with the Rocky Mountains proper, but to the northward falling back to ranges situated further west in the same mountain region. The great central area of Canada is drained towards Hudson Bay, but its two largest rivers have separate watersheds, the Mackenzie flowing north-west to the Arctic Ocean and the St Lawrence north-east towards the Atlantic, the one to the south-west and the other to the south-east of the Archean protaxis. While

GEOGRAPHY]

CANADA

h:

these ancient events shaped the topography in a broad way, its final development was comparatively recent, during the glacial period, when the loose materials were scoured from some regions and spread

out as boulder clay, or piled up as moraines in others; and the original water-ways were blocked in many places. The retreat of the ice left Canada much in its present condition except for certain post-glacial changes of level which seem to be still in progress. For this reason the region has a very youthful topography with innumerable lakes and waterfalls as evidence that the rivers have not long been at work. The uneven carving down of the older mountain systems, especially that of the Archean pro taxis, and the disorderly scattering of glacial material provide most of the lake basins so characteristic of Canada.

Lakes and Rivers. — As a result of the geological causes just mentioned many parts of Canada are lavishly strewn with lakes of all sizes and shapes, from bodies of water hundreds of miles long and a thousand feet deep to ponds lost to sight in the forest. Thousands of these lakes have been mapped more or less carefully, and every new survey brings to light small lakes hitherto un- known to the white man. For numbers they can be compared only with those of Finland and Scandinavia in Europe, and for size with those of eastern Africa; but for the great extent of lake-filled country there is no comparison. From the map it will be noticed that the largest and most thickly strewn lakes occur within five hundred or a thousand miles of Hudson Bay, and belong to the Archean protaxis or project beyond its edges into the Palaeozoic sedimentary rocks which lean against it. The most famous of the lakes are those of the St Lawrence system, which form part of the southern boundary of Canada and are shared with the United States; but many others have the right to be called ” Great Lakes ” from their magnitude. There are nine others which have a length of more than ioo m., and thirty-five which are more than 50 m. long. Within the Archean protaxis they are of the most varied shapes, since they represent merely portions of the irregular surface inundated by some morainic dam at the lowest point. Comparatively few have simple outlines and an unbroken surface of water, the great majority running into long irregular bays and containing many islands, sometimes even thousands in number, as in Georgian Bay and Lake-of-the- Woods. In the Cordilleran region on the other hand the lakes are long, narrow and deep, in reality sections of mountain valleys occupied by fresh water, just as the fjords of the adjoining coast are valleys occupied by the sea. The lakes of the different regions present the same features as the nearest sea coasts but on a smaller scale. The majority of the lakes have rocky shores and islands and great variety of depth, many of the smaller ones, however, are rimmed with marshes and are slowly filling up with vegetable matter, ultimately becoming peat bogs, the muskegs of the Indian. Most of Canada is so well watered that the lakes have outlets and are kept fresh, but there

are a few small lakes in southern Saskatchewan, e.g. the Quill and Old Wives lakes, in regions arid enough to require no outlets. In such cases the waters are alkaline, and contain various salts in solution which are deposited as a white rim round the basin towards the end of the summer when the amount of water has been greatly reduced by evaporation. It is interesting to find maritime plants, such as the samphire, growing on their shores a thousand miles from the sea and more than a thousand feet above it. In many cases the lakes of Canada simply spill over at the lowest point from one basin into the next below, making chains of lakes with no long or well-defined channels between, since in so young a country there has not yet been time for the rivers to have carved wide valleys. Thus canoe navigation may be carried on for hundreds of miles, with here and there a water- fall or a rapid requiring a portage of a few hundred yards or at most a mile or two. The river systems are therefore in many cases complex and tortuous, and very often the successive connecting links between the lakes receive different names. The best example of this is the familiar one of the St Lawrence, which may be said to begin as Nipigon river and to take the names St Mary's, St Clair, Detroit and Niagara, before finally flowing from Lake Ontario to the sea under its proper name. As these

lakes are great reservoirs and settling basins, the rivers which empty them are unusually steady in level and contain beautifully clear water. The St Lawrence varies only a few feet in the year and always has pellucid bluish-green water, while the Mississippi, whose tributaries begin only a short distance south of the Great Lakes, varies 40 ft. or more between high- and low-water and is loaded with mud. The St Lawrence is far the most important Canadian river from the historic and economic points of view, since it provided the main artery of exploration in early days, and with its canals past rapids and between lakes still serves as a great highway of trade between the interior of the continent and the seaports of Montreal and Quebec. It is probable that politically Canada would have followed the course of the States to the south but for the planting of a French colony with widely extended trading posts along the easily ascended channel of the St Lawrence and the Great Lakes, so that this river was the ultimate bond of union between Canada and the empire.

North of the divide between the St Lawrence system and Hudson Bay there are many large rivers converging on that inland sea, such as Whale river, Big river, East Main, Rupert and Nottaway rivers coming in from Ungava and northern Quebec; Moose and Albany rivers with important tributaries from northern Ontario; and Severn, Nelson and Churchill rivers from the south-west. All of these are rapid and

shallow, affording navigation only for canoes; but the largest of them, Nelson river, drains the great Manitoban lakes, Winnipeg, Winnipegosis and Manitoba, which are frequented by steamers, and receive the waters of Lake-of-the- Woods, Lake Seul and many others emptying into Winnipeg river from Ontario; of Red river coming in from the United States to the south; and of the southern parts of the Rocky Mountains and the western prairie provinces drained by the g-reat Saskatchewan river. The parallel of 49 approximately separates the Saskatchewan waters from the streams going south to the Missouri, though a few small tributaries of the latter river begin on Canadian territory.

The northern part of Alberta and Saskatchewan and much of northern British Columbia are drained through the Athabasca and Peace rivers, first north-eastwards towards Athabasca Lake, then north through Slave river to Great Slave Lake, and finally north-west through Mackenzie river to the Arctic Ocean. If measured to the head of Peace river the Mackenzie has a length of more than 2000 m., and it provides more than 1000 m. of navigation for stern-wheel steamers. Unfortunately, like other northward-flowing rivers, it does not lead down to a frequented sea, and so bears little traffic except for the northern fur-trading posts. The Mackenzie forms a large but little-known delta in lat. 69 , and in its flood season the head-waters pour down their torrents before the thick ice of the lower part with its severer climate has yet given way, piling up the ice in great barriers and giving rise to widespread floods along the lower reaches. Similar flooding takes place in several other important northward-flowing rivers in Canada, the St Lawrence at Montreal affording the best-known instance. Second among the great north-western rivers is the Yukon, which begins its course about 18 m. from tide-water on an arm of the Pacific, 2800 ft. above the sea and just within the Canadian border. It flows first to the north, then to the north-west, passing out of the Yukon territory into Alaska, and then south-west, ending in Bering Sea, the northward projection of the Pacific, 2000 m. from its head-waters. Of its course 1800 m. are continuously navigable for suitable steamers, so that most of the traffic connected with the rich Klondike gold-fields passes over its waters. The rest of the rivers flowing into the Pacific pass through British Columbia and are much shorter, though the two southern ones carry a great volume of water owing to the heavy precipitation of snow and rain in the Cordilleran region. The Columbia is the largest, but after flowing north-west and then south for about 400 m., it passes into the United States. With its expansions, the narrow and deep Arrow lakes, it is an important waterway in the Kootenay region. The Fraser, next in size but farther

north, follows a similar course, entering the sea at Vancouver; while the Skeena and Stikine in northern British Columbia are much

shorter and smaller, owing to the encroachments of Peace and Liard rivers, tributaries of the Nelson, on the Cordilleran territory. All of these rivers are waterways of some importance in their lower course, and are navigated by powerful stern wheel boats supplying the posts and mining camps of the interior with their requirements. In most cases they reach the coast through deep valleys or profound canyons, and the transcontinental railways find their way beside them, the Canadian Pacific following at first tributaries of the Columbia near its great bend, and after wards Thompson river and the Fraser; while the Grand Trunk Pacific makes use of the valley of the Skeena and its tributaries. The divide between the rivers flowing west and those flowing east and north is very sharp in the southern Rocky Mountains, but there are two lakes, the Committee's Punch Bowl and Fortress Lake, right astride of it, sending their waters both east and west; and there is a mountain somewhat south of Fortress Lake whose melting snows drain in three directions into tribu- taries of the Columbia, the Saskatchewan and the Athabasca, so that they are distributed between the Pacific, the Atlantic (Hudson Bay) and the Arctic Oceans. The divide between the St Lawrence and Hudson Bay in eastern Canada also presents one or two lakes draining each way, but in a much less striking position, since the water-parting is flat and boggy instead of being a lofty range of mountains. The rivers of Canada, except the St Lawrence, are losing their importance as means of com- munication from year to year, as railways spread over the interior and cross the mountains to the Pacific; but from the point of view of the physical geographer there are few things more remarkable than the intricate and comprehensive way in which they drain the country. As most of the Canadian rivers have waterfalls on their course, they must become of more and more importance as sources of power. The St Lawrence system, for instance, generates many thousand horse-power at Sault Ste Marie, Niagara and the Lachine rapids. All the larger cities of Canada make use of water power in this way, and many new enterprises of the kind are projected in eastern Canada; but the thousands of feet of fall of the rivers in the Rocky Mountain region are still almost untouched, though they will some day find use in manufactures like those of Switzerland. The Archean Protaxis. — The

broad geological and geographical relationships of the country have already been outlined, but the more important sub-divisions may now be taken up with more detail, and for that purpose five areas may be distinguished, much the largest being the Archean protaxis, covering about 2,000,000 sq. m. It includes Labrador, Ungava and most of Quebec on the east, northern Ontario on the south; and the western boundary runs from Lake-of-the-Woods north-west to the Arctic Ocean near the mouth of Mackenzie river. The southern parts of the Arctic islands, especially Banksland, belong to it also. This vast area, shaped like a broad-limbed V or U, with Hudson Bay in the centre, is made up chiefly of monotonous and barren Laurentian gneiss and granite; but scattered through it are important stretches of Keewatin and Huronian rocks intricately folded as synclines in the gneiss, as suggested earlier, the bases of ancient mountain ranges. The Keewatin and Huronian, consisting of greenstones, schists and more or less metamorphosed sedimentary rocks, are of special interest for their ore deposits, which include most of the important metals, particularly iron, nickel, copper and silver. The southern portion of the protaxis is now being opened up by railways, but the far greater northern part is known only along the lakes and rivers which are navigable by canoe. Though once consisting of great mountain ranges there are now no lofty elevations in the region except along the Atlantic border in Labrador, where summits of the Nachvak Mountains are said to reach 6000 ft. or more. In every other part the surface is hilly or mammilated, the harder rocks, such as granite or greenstone, rising as rounded knobs, or in the case of schists forming narrow ridges, while the softer parts form valleys generally floored with lakes. From the summit of any of the higher hills one sees that the region is really a somewhat dissected plain, for all the hills rise to about the same level with a uniform skyline at the horizon.

The Archean protaxis is sometimes spoken of as a plateau, but probably half of it falls below 1000 ft. The lowland-part includes from 100 to 500 m. all round the shore of Hudson Bay, and extends south-west to the edge of the Palaeozoic rocks on Lake Winnipeg. Outwards from the bay the level rises slowly to an average of about 1500 ft., but seldom reaches 2000 ft. except at a few points near Lake Superior and on the eastern coast of Labrador. In most parts the Laurentian hills are bare roches moutonnees scoured by the glaciers of the Ice Age, but a broad band of clay land extends across northern Quebec and Ontario just north of the divide. The edges of the protaxis are in general its highest parts, and the rivers flowing outwards often have a descent of several hundred feet in a few miles towards the Great Lakes, the St Lawrence or the Atlantic, and in some cases they have cut back deep

gorges or canyons into the tableland. The waterfalls are utilized at a few points to work up into wood pulp the forests of spruce which cover much of Labrador, Quebec and Ontario. Most of the pine that formerly grew on the Archean at the. northern fringe of the settlements has been cut, but the lumberman is still advancing northwards and approaching the northern limit of the famous Canadian white pine forests, beyond, which spruces, tamarack (larch) and poplar are the prevalent trees. As one advances northward the timber grows smaller and includes fewer species of trees, and finally the timber line is reached, near Churchill on the west coast of Hudson Bay and somewhat farther south on the Labrador side. Beyond this to the north are the ” barren grounds ” on which herds of caribou (reindeer) and musk ox pasture, migrating from north to south according to the season. There are no permanent ice sheets known on the mainland, of north-eastern Canada, but some of the larger islands to the north of Hudson Bay and Straits are partially covered with glaciers on. their higher points. Unless by its mineral resources, of which scarcely anything is known, the barren grounds can never support a white population and have little to tempt even the Indian or Eskimo, who visit it occasionally in summer to hunt the deer in their migrations.

The Acadian Region. — The ” maritime provinces ” of eastern Canada, including Nova Scotia, New Brunswick and Prince Edward Island, may be considered together; and to these provinces as politically bounded may be added, from a physical point of view, the analogous south-eastern part of Quebec— the, entire area being designated the Acadian region- Taken as a whole, this eastern part of Canada, with a very irregular and extended coast-line on the Gulf of St Lawrence and the Atlantic, may be regarded as a northern continuation of the Appalachian mountain system that runs parallel to the Atlantic coast of the United States. The rocks underlying it have been subjected to successive foldings and crumplings by forces acting chiefly from the direction of the Atlantic Ocean, with alternating pro- longed periods of waste and denudation. The main axis of disturbance and the highest remaining land runs through the south-eastern part of Quebec,forming the Notre Dame Mountains, and terminates in the Gaspe peninsula as the Shickshock Mountains. The first-named seldom exceed 1500 ft. in height, but the Shickshocks rise above 3000 ft. The province of New . Brunswick exhibits approximately parallel but subordinate ridges, with wide intervening areas of nearly flat Silurian and Carboniferous rocks. The peninsula of Nova Scotia, connected by a narrow neck with New Brunswick, is formed by still another and more definite system; of parallel ridges, deeply fretted on all sides by bays and harbours. A

series of quartzites and slates referred to the Cambrian, and holding numerous and important veins of auriferous quartz, characterize its Atlantic or south- eastern side, while valuable coal-fields occur in Cape Breton and on parts of its shores on the Gulf of St Lawrence. In New Brunswick the Carboniferous rocks occupy a large area, but the coal seams so far developed are thin and unimportant. Metalliferous ores of various kinds occur both in Nova Scotia and in this province, but with the exception of the gold already mentioned, have not yet become the objects of important industries. Copper and asbestos are the principal mineral products of that part of Quebec included in the region now under

description, although many other minerals are known and already worked to some extent. Extensive tracts of good arable land exist in many parts of the Acadian region. Its surface was originally almost entirely wooded, and the products of the forest continue to hold a prominent place. Prince Edward Island, the smallest province of # Canada, is low and undulating, based on Permo-Carboniferous and Triassic rocks affording a red and very fertile soil, much of which is under cultivation.

The St Lawrence Plain. — As the St Lawrence invited the earliest settlers to Canada and gave the easiest communication with the Old World, it is not surprising to find the wealthiest and most populous part of the country on its shores and near the Great Lakes which it leads up to; and this early development was greatly helped by the flat and fertile plain which follows it inland for over 600 m. from the city of Quebec to Lake Huron. This affords the largest stretch of arable land in eastern Canada, including the southern parts of Ontario and Quebec with an area of some 38,000 sq. m. In Quebec the chief portion is south of the St Lawrence on the low plain extending from Montreal to the mountains of the ” Eastern Townships,” while in Ontario it extends from the Archean on the ,north to the St Lawrence and Lakes Ontario, Erie and Huron. The whole region is underlain by nearly horizontal and undisturbed rocks of the Palaeozoic from the Devonian downward. Superimposed on these rocks are Pleistocene boulder clay, and clay and sand deposited in post-glacial lakes or an extension of the Gulf of St Lawrence. Though petroleum and salt occur in the south- west peninsula of Ontario, metalliferous deposits are

wanting, and the real wealth of this district lies in its soil and climate, which permit the growth of all the products of temperate regions. Georgian Bay and the northern part of Lake Huron with the whole northern margin of Lake Superior bathe the foot of the Laurentian plateau, which rises directly from these lakes; so that the older fertile lands of the country with their numerous cities and largely-developed manufactures are cut off by an elevated, rocky and mostly forest-covered tract of the Archean from the newer and far more extensive farm lands of the west. For many years this southern projection of the northern wilder- ness was spanned by only one railway, and offered a serious hindrance to the development of the regions beyond; but settlements are now spreading to the north and rapidly filling up the gap between east and west.

The Interior Continental Plain. — Passing westward by rail from the forest-covered Archean with its rugged granite hills, the;flat prairie of Manitoba with its rich grasses and multitude of flowers comes as a very striking contrast, introducing the Interior Continental plain in its most typical development. This great plain runs north-westward between the border of the Archean prbtaxis and the line of the Rocky Mountains, including most of Manitoba, the southern part of Saskatchewan and most of Alberta. At the international boundary in lat. 49° it is 800 m. wide, but in lat. 56° it has narrowed to 400 m. in width, and to the north of lat. 6 2° it is still narrower and somewhat interrupted , but preserves its main physical features to the Arctic Ocean about the mouth of the Mackenzie. This interior plain of the continent represents the area of the ancient sea by which it was occupied in Mesozoic times, with a more ancient margin towards the north-west against the Archean, where undisturbed lime- stones and other rocks of the Silurian and Devonian rest upon the downward slope of the Laurentian Shield. Most of the plains are underlain by Cretaceous and early Tertiary shales and sandstones lying nearly unaltered and undisturbed where they were deposited, although now raised far above sea-level, par- ticularly along the border of the Rocky Mountains where they were thrust up into foot-hills when the range itself was raised. These strata have been subjected to great denudation, but owing to their comparatively soft character this has been, in the main, nearly uniform, and has produced no very bold features of relief, Coal and lignitic coal are the principal economic minerals met with in this central plain, though natural gas occurs and is put to use near Medicine Hat, and ” tar sands ” along the north-eastern edge of the Cretaceous indicate the presence of petroleum.

Its chief value lies in its vast tracts of fertile soil, now rapidly filling up with settlers from all parts of the world, and the grassy uplands in

the foot-hill region affording perennial pasturage for the cattle, horses and sheep of the rancher. Though the region is spoken of as a plain there are really great differences of level between the highest parts in south-western Alberta, 4500 ft. above the sea, and the lowest in the region of Lake Winnipeg, where the prairie is at an elevation of only 800 ft. The very flat and rich prairie near Winnipeg is the former bed of the glacial Lake Agassiz; but most of the prairie to the west is of a gently rolling character and there are two rather abrupt breaks in the plain, the most westerly one receiving the name of the Missouri Coteau. The first step represents a rise to 1600 ft., and the second to 3000 ft. on an average. In so flat a country any eleva- tion of a few hundred feet is remarkable and is called a mountain, so that Manitoba has its Duck and Riding mountains. More important than the hills are the narrow and often rather deep river valleys cut below the general level, exposing the soft rocks of the Cretaceous and in many places seams of lignite. When not too deep the river channels may be traced from afar across the prairie by the winding band of trees growing beside the water. The treeless part of the plains, the prairie proper, has a triangular shape with an area twice as large as that of Great Britain. North of the Saskatchewan river groves or ” bluffs ” of trees begin, and somewhat farther north the plains are generally wooded, because of the slightly more humid climate. It has been proved, however, that certain kinds of trees if protected will grow also on the prairie, as may be seen around many of the older farm- steads. In the central southern regions the climate is arid enough to permit of ” alkaline ” ponds and lakes, which may completely dry up in summer, and where a supply of drinking-water is often hard to obtain, though the land itself is fertile.

The Cordilleran Belt. — The Rocky Mountain region as a whole ; best named the Cordillera or Cordilleran belt, includes several parallel ranges of mountains of different structures and ages, the eastern one constituting the Rocky Mountains proper. This band of mountains 400 m. wide covers towards the south almost all of British Columbia and a strip of Alberta east of the watershed, and towards the north forms the whole of the Yukon . Territory. While it is throughout essentially a mountainous country, very complicated in its orographic features and inter- locking river systems, two principal mountain axes form its ruling features — the Rocky Mountains proper, above referred to, and the Coast Ranges. Between them are many other ranges shorter and less regular in trend, such as the Selkirk Mountains, the Gold Ranges and the Caribou Mountains. There is also in the southern inland region an interior plateau, once probably a peneplain, but now elevated and greatly dissected by river valleys, which extends north-

westward for 500 m. with a width of about 100 m. and affords the largest areas of arable and pasture land in British Columbia. Similar wide tracts of less broken country occur, after a mountainous interruption, in northern British Columbia and to some extent in the Yukon Territory, where wide valleys and rolling hills alternate with short mountain ranges of no great altitude. The Pacific border of the coast range of British Columbia is ragged with fjords and channels, where large steamers may go 50 or 100 m. inland between mountainous walls as on the coast of Norway; and there is also a bordering mountain system partly submerged forming Vancouver Island and the Queen Charlotte Islands. The highest mountains of the Cordillera in Canada are near the southern end of the boundary separating Alaska from the Yukon Territory, the meridian of 141°, and they include Mount Logan (19,540 ft.) and Mount St Elias (18,000 ft.), while the highest peak in North America, Mount McKinley (20,000 ft.), is not far to the north-west in Alaska. This knot of very lofty mountains, with Mount Fairweather and some others, all snowy and glacier- clad for almost their whole height, are quite isolated from the highest points of the Rocky Mountains proper, which are 1000 m. to the south-east. Near the height of land between British Columbia and Alberta there are many peaks which rise from 10,000 to 12,000 ft. above sea-level, the highest which has been

carefully measured being Mount Robson (13,700 ft.). The next range to the east, the Selkirks, has several summits that reach 10,000 ft. or over, while the Coast Ranges scarcely go beyond 9000 ft. The snow line in the south is from 7500 to 9000 ft. above sea-level, being lower on the Pacific side where the heaviest snowfall comes in winter than on the drier north-eastern side. The snow line gradually sinks as one advances north-west, reaching only 2000 or 3000 ft. on the Alaskan coast. The Rockies and Selkirks support thousands of glaciers, mostly not very large, but having some 50 or 100 sq. m. of snowfield. All the glaciers are now in retreat, with old tree-covered moraines, hundreds or thousands of feet lower down the valley. The timber line is at about 7500 ft. in southern British Columbia and 4000 ft. in the interior of the Yukon Territory. On the westward slopes, especially of the Selkirks and Coast Ranges, vegetation is almost tropical in its density and luxuriance, the giant cedar and the Douglas fir sometimes having diameters of 10 ft. or more and rising to the height of 150 ft. On the

eastern flanks of the ranges the forest is much thinner, and on the interior plateau and in many of the valleys largely gives way to open grass land. The several ranges of the Cordillera show very different types of structure and were formed at different ages, the Selkirks with their core of pre-Cambrian granite, gneiss and schists coming first, then the Coast Ranges, which seem to have been elevated in Cretaceous times, formed mainly by a great upwelling of granite and diorite as batholiths along the margin of the continent and sedimentary rocks lying as remnants on their flanks; and finally the Rocky Mountains in the Laramie or early Eocene, after the close of the Cretaceous. This latest and also highest range was formed by tremendous thrusts from the Pacific side, crumpling and folding the ancient sedimentary rocks, which run from the Cambrian to the Cretaceous, and faulting them along overturned folds. The outer ranges in Alberta have usually the form of tilted blocks with a steep cliff towards the north-east and a gentler slope, corresponding to the dip of the beds, towards the south-west. Near the centre of the range there are broader foldings, carved into castle and cathedral shapes. The most easterly range has been shown to have been actually pushed . 7 m. out upon the prairies. In the Rocky Mountains proper no eruptive rocks have broken through, so that no ore deposits of importance are known from them, but in the Cretaceous syn- clines which they enclose valuable coal basins exist. Coal of a bituminous and also semi-anthracite kind is produced, the best mined on the Pacific slope of the continent, the coking coals of the Fernie region supplying the fuel of the great metal mining districts of the Kootenays in British Columbia, and of Montana and other states to the south. The Selkirks and Gold Ranges west of the Rockies, with their great areas of eruptive rocks, both ancient and modern, include most of the important mines of gold, silver, copper and lead which give British Columbia its leadership among the Canadian provinces as a producer of metals. In early days the placer gold mines of the Columbia, Fraser and Caribou attracted miners from everywhere, but these have declined, and lode mines supply most of the gold as well as the other metals. The Coast Ranges and islands also include many mines, especially of copper, but up to the present of less value than those inland. Most of the mining development is in southern British Columbia, where a network of railways and waterways gives easy access; but as means of communication improve to the north a similar development may be looked for there. The Atlin and White Horse regions in northern British Columbia and southern Yukon have attracted much attention, and the Klondike placers still farther north have furnished many millions of dollars' worth of gold. Summing up the economic features of the Cordilleran belt, it includes many of the

best coal-mines and the most extensive deposits of gold, copper, lead and zinc of the Dominion, while in silver, nickel and iron Ontario takes the lead. When its vast area stretching from the international boundary to beyond the Arctic circle is opened up, it may be expected to prove the counterpart of the great mining region of the Cordillera in the United States to the south.

Climate. — In a country like Canada ranging from lat. 42° to the Arctic regions and touching three oceans, there must be great variations of climate. If placed upon Europe it would extend from Rome to the North Cape, but latitude is of course only one of the factors influencing climate, the arrangement of the ocean currents and of the areas of high and low pressure making a very wide difference between the climates of the two sides of the Atlantic. In reality the Pacific coast of Canada, rather than the Atlantic coast, should be compared with western Europe, the south-west corner of British Columbia, in lat. 48° to 50 , having a climate very similar to the southern coast of England. In Canada the isotherms by no means follow parallels of latitude, especially in summer when in the western half of the country they run nearly north-west and south-east; so that the average temperature of 55° is found about on the Arctic circle in the Mackenzie river valley, in lat. 50° near the Lake-of-the- Woods, in lat. 55° at the northern end of James Bay, and in lat. 49 on Anticosti in the Gulf of St Lawrence. The proximity of the sea or of great lakes, the elevation and the direction of mountain chains, the usual path of storms and of prevalent winds, and the relative length of day and amount of sunshine in summer and winter all have their effect on different parts of Canada. One cannot even describe the climate of a single province, like Ontario or British Columbia, as a unit, as it varies so greatly in different parts. Details should therefore be sought in articles on the separate provinces. In eastern Canada Ungava and Labrador are very chill and inhospitable, owing largely to the iceberg-laden current sweeping down the coast from Davis Strait, bringing fogs and long snowy winters and a temperature for the year much below the freezing-point. South of the Gulf of St Lawrence, however, the maritime provinces have much more genial temperatures, averaging 40° F. for the year and over 60° for the summer months. The amount of rain is naturally high so near the sea, 40 to 56 in., but the snowfall is not usually excessive. In Quebec and northern Ontario the rainfall is diminished, ranging from 20 to 40 in., while the snows of winter are deep and generally cover the ground from the beginning of December to the end of March. The winters are brilliant but cold, and the summers average from 6o° to 65° F., with generally clear skies and a bracing atmosphere which makes these regions favourite

summer resorts for the people of the cities to the south. The winter storms often sweep a little to the north of southern Ontario, so that what falls as snow in the north is rain in the south, giving a much more variable winter, often with too little snow for sleighing. The summers are warm, with an average temperature of 65 and an occasional rise to 90 . As one goes westward the precipitation diminishes to 17-34 in. in Manitoba and 13-35 for the other two prairie provinces, most of this, however, coming opportunely from May to August, the months when the growing grain most requires moisture. There is a much lighter snowfall in winter than in northern Ontario and Quebec, with somewhat lower temperatures. The snow and the frost in the ground are considered useful as furnishing moisture to start the wheat in spring. The precipitation in southern Saskatchewan and Alberta is much more variable than farther east and north, so that in some seasons crops have been a failure through drought, but large areas are now being brought under irrigation to avoid such losses. The prairie provinces have in most parts a distinctly continental climate with com- paratively short, warm summers and long, cold winters, but with much sunshine in both seasons. In southern Alberta, however, the winter cold is often interrupted by chinooks, westerly winds which have lost their moisture by crossing the mountains and become warmed by plunging down to the plains, where they blow strongly, licking up the snow and raising the temperature, sometimes in a few hours, from 20 to 40 F. In this region cattle and horses can generally winter on the grass of the ranges without being fed, though in hard seasons there may be heavy losses. Northwards chinooks become less frequent and the winter's cold increases, but the coming of spring is not much later, and the summer temperatures, with sunshine for twenty hours out of twenty-four in June, are almost the same

FLQRA AND FAUNA]

as for hundreds of miles to the south, so that most kinds of grain and vegetables ripen far to the north in the Peace river valley. Though the climate of the plains is one of extremes and often of rather sudden changes, it is brisk and invigorating and of particular value for persons affected with lung troubles.

The climate of the Cordilleran region presents even more variety than that of the other provinces because of the ranges of mountains which run parallel to the Pacific. Along the coast itself the climate is insular, with little frost in winter and mild heat in summer, and with a very heavy rainfall amounting to 100 in. on the south-west side of Vancouver Island and near Port Simpson. Within 100 m. inland beyond the Coast Range the precipitation and general climate are, like those of Ontario, comparatively mild and with moderate snowfall towards the south, but with keen winters farther north. The interior plateau may be described as arid, so that irrigation is required if crops are to be raised. The Selkirk Mountains have a heavy rainfall and a tremendous snowfall on their western flanks, but very much less precipitation on their eastern side. The Rocky Mountains have the same relationships but the whole precipita- tion is much less than in the Selkirks. The temperature depends largely, of course, on altitude, so that one may quickly pass from perpetual snow above 8000 ft. in the mountains to the mild, moist climate of Vancouver or Victoria, which is like that of Devonshire, In the far north of the territories of Yukon, Mackenzie and Ungava the climate has been little studied, as the region is un- inhabited by white men except at a few fur-trading posts. North-west and north-east of Hudson Bay it becomes too severe for the growth of trees as seen on the ” barren grounds,” and there may be perpetual ice beneath the coating of moss which serves as a non-conducting covering for the ” tundras.” There is, however, so little precipitation that snow does not accumulate on the surface to form glaciers, the summer’s sun having warmth enough to thaw what falls in the winter. Leaving out the mari- time provinces, southern Ontario, southern Alberta and the Pacific coast region on the one hand, and the Arctic north, particularly near Hudson Bay, on the other, Canada has snowy and severe winters, a very short spring with a sudden rise of temperature, short warm summers, and a delightful autumn with its ” Indian summer.” There is much sunshine, and the atmosphere is bracing and exhilarating.

Flora. — The general flora of the Maritime Provinces, Quebec and Eastern Ontario is much the same, except that in Nova Scotia a number of species are found common also to Newfound- land that are not apparent inland. Professor Macoun gives us a few notable species

— Calluna tulgaris, Salisb., Alchemilla vulgaris, L., Rhododendron maximum, L., Ilex glabia, Gray, Hudsonia ericoides, L., Gaylussacia dumosa, F. and G., and Schezaea pusilla, Pursh. In New Brunswick the western flora begins to appear as well as immigrants from the south, while in the next eastern province, Quebec, the flora varies considerably. In the lower St Lawrence country and about the Gulf many Arctic and sub-Arctic species are found. On the shores of the lower reaches Thalictrum alpinum, L., Vesicaria arctica, Richards, Arapis alpina, L., Saxifraga oppositifolia, L., Ceras- tium alpinum, L., Saxifraga cacspitosa, L. and S. have been gathered, and on the Shickshock Mountains of Eastern Canada Silene acaulis, L., Lychnis alpina, L., Cassiope hypnoides, Don., Rhododendron laponicum, Wahl, and many others. On the summit of these hills (4000 ft.) have been collected Aspidium aculeatum, Swartz var., Scopulinum, D. C. Eaton, Pellaea densa, Hook, Gallium kamtschaticum, Sletten. From the city of Quebec westwards there is a constantly increasing ratio of southern forms, and when the mountain (so called) at Montreal is reached the representative Ontario flora begins. In Ontario the flora of the northern part is much the same as that of the Gulf of St Lawrence, but from Montreal along the Ottawa and St Lawrence valleys the flora takes a more southern aspect, and trees, shrubs and herbaceous plants not found in the eastern parts of the Dominion become common. In the forest regions north of the lakes the vegetation on the shores of Lake Erie requires a high winter temperature, while the east and north

shores of Lake Superior have a boreal vegetation that shows the summer temperature of this enormous water-stretch to be quite low. Beyond the forest country of Ontario come the prairies of Manitoba and the North-West Territories. In the ravines the eastern flora continues for some distance, and then disappearing gives place to that of the prairie, which is found everywhere between the Red river and the Rocky Mountains except in wooded and damp localities. Northwards, in the Saskatchewan country, the flora of the forest and that of the prairies intermingle. On the prairies and the foot-hills of the Rocky Mountains a great variety of grasses are found, several years' collection resulting in 42 genera and 156 species. Of the best hay and pasture grasses, Agropyrum Elymus, Stipa, Bromus, Agrostis, Calamagrostes and Poa, there are 59 species. Besides the grasses there are leguminous plants valuable for pasture — Astragalus, Vicia (wild vetch), Lathyrus (wild pea) of which there are many species. The rose family is represented by Prunus, Potentilla, Fragaria, Rosa, Rubus and Amelanchier.

About the saline lakes and marshes of the prairie country are found Ruppia maritima, L., Heliotropium curassavicum, L., natives of the

Atlantic coast, and numerous species of Cheno- podium, Atriplex and allied genera. The flora of the forest belt of the North-West Territories differs little from that of northern Ontario. At the beginning of the elevation of the Rocky Moun- tains there is a luxurious growth of herbaceous plants, including a number of rare umbellifers. At the higher levels the vegetation becomes more Arctic. Northwards the valleys of the Peace and other rivers differ little from those of Quebec and the northern prairies. On the western slope of the mountains, that is, the Selkirk and Coast ranges as distinguished from the eastern or Rocky Mountains range, the flora differs, the climate being damp instead of dry. In some of the valleys having an outlet to the south the flora is partly peculiar to the American desert, and such species as Purshia tridentata, D.C., and Artemisia tridentata, Nutt., and species of Gilia, Aster and Erigonum are found that are not met with elsewhere. Above Yale, in the drier part of the Fraser valley, the absence of rain results in the same character of flora, while in the rainy districts of the lower Fraser the vegetation is so luxuriant that it resembles that of the tropics. So in various parts of the mountainous country of British Columbia, the flora varies according to climatic conditions. Nearer the Pacific coast the woods and open spaces are filled with flowers and shrubs. Liliaceous flowers are abundant, including Erythoniums, Trilliums, Alliums, Brodeaeas, Fritil- larias, Siliums, Camassias and others.

Fauna. — The larger animals of Canada are the musk ox and the caribou of the barren lands, both having their habitat in the far north; the caribou of the woods, found in all the provinces except in Prince Edward Island; the moose, with an equally wide range in the wooded country; the Virginia deer, in one or other of its varietal forms, common to all the southern parts; the black -tailed deer or mule deer and allied forms, on the western edge of the plains and in British Columbia; the pronghorn antelope on the plains, and a small remnant of the once plentiful bison found in northern Alberta and Mackenzie, now called ” wood buffalo.” The wapiti or American elk at one time abounded from Quebec to the Pacific, and as far north as the Peace river, but is now found only in small numbers from Manitoba westwards. In the mountains of the west are the grizzly bear, black bear and cinnamon bear. The black bear is also common to most other parts of Canada; the polar bear everywhere along the Arctic littoral. The large or timber wolf is found in the wooded districts of all the provinces, and on the plains there is also a smaller wolf called the coyote. In British Columbia the puma or cougar, sometimes called the panther and the American lion, still frequently occurs; and in all parts the common fox and the silver fox, the lynx, beaver, otter, marten,

fisher, wolverene, mink, skunk and other fur-bearing animals. Mountain and plain and Arctic hares and rabbits are plentiful or scarce in localities, according to seasons or other circumstances. In the mountains of British Columbia are the bighorn or Rocky Mountain sheep and the Rocky Mountain goat, while the

saddleback and white mountain sheep have recently been dis- covered in the northern Cordillera. The birds of Canadaare mostly migratory, and are those common to the northern and central states of the United States. The wildfowl are, particularly in the west, in great numbers; their breeding-grounds extending from Manitoba and the western prairies up to Hudson Bay, the barren lands and Arctic coasts. The several kinds of geese- including the Canada goose, the Arctic goose or wavey, the laughing goose, the brant and others — all breed in the northern regions, but are found in great numbers throughout the several provinces, passing north in the spring and south in the autumn. There are several varieties of grouse, the largest of which is the grouse of British Columbia and the pennated grouse and the prairie chicken of Manitoba and the plains, besides the so-called partridge and willow partridge, both of which are grouse. While the pennated grouse (called the prairie chicken in Canada) has always been plentiful, the prairie hen (or chicken) proper is a more recent arrival from Minnesota and the Dakotas, to which it had come from Illinois and the south as settlement and accom- panying wheatfields extended north. In certain parts of Ontario • the wild turkey is occasionally found and the ordinary quail, but in British Columbia is found the California quail, and a larger bird much resembling it called the mountain partridge. The golden eagle, bald-headed eagle, osprey and a large variety of hawks are common in Canada, as are the snowy owl, the horned owl and others inhabiting northern climates. The raven frequently remains even in the colder parts throughout the winter; these, with the Canada jay, waxwing, grosbeak and snow bunting, being the principal birds seen in Manitoba and northern districts in that season. The rook is not found, but the common crow and one or two other kinds are there during the summer. Song- birds are plentiful, especially in wooded regions, and include the American robin, oriole, thrushes, the cat-bird and various sparrows; while the English sparrow, introduced years ago, has multiplied excessively and become a nuisance in the towns. The smallest of the birds, the ruby

throat humming-bird, is found everywhere, even up to timber line in the mountains. The sea-birds include a great variety of gulls, guillemots, cor- morants, albatrosses (four species), fulmars and petrels, and in the Gulf of St Lawrence the gannet is very abundant. Nearly all the sea-birds of Great Britain are found in Canadian waters or are represented by closely allied species. (A. P. C.)

A rea and Population. — The following table shows the division of the Dominion into provinces and districts, with the capital, population and estimated area of each.

Area in sq.m.

Population.

Official Capital.

1881.

1901.

Provinces — Ontario Quebec Nova Scotia New Brunswick Manitoba British Columbia Prince Edward I Saskatchewan Alberta

Districts — Keewatin Yukon Mackenzie . Ungava Franklin

;land

260,862

351.873 21,428

27-985

73.732

372,630

2,184

250,650

253.540

516,571 196,976 562,182 354.961 500,000

1,926,922

1.359.027

440,572

321,233

62,260

49.459 108,891 ,.,

\ 25,515

V 30,931

2,182,947 1,648,898 ,

-. 459,574 . 331,120 255,211!

178,657 103,259

91,46c 1

72,841 1

8,800

27,219

5,216

5,H3

Toronto

Quebec

Halifax

Fredericton

Winnipeg

Victoria

Charlottetown

Regina

Etdroonton

Dawson City

The Dominion

3.745,574 2

4,324,810

5,37i,3 I 5

Ottawa

1 The census is taken every ten years, save in these three provinces, where it is taken every five. Their population in 1906 was: — Manitoba, 360,000; Saskatchewan, 257,000; Alberta, 184,000.

2 The areas assigned to Prince Edward Island, Nova Scotia, New Brunswick and British Columbia are exclusive of the territorial seas, that to Quebec is exclusive of the Gulf of St Lawrence (though including the islands lying within it), and that to Ontario is exclusive of the Canadian portion of the Great Lakes. About 500,000 sq. m. belong to the Arctic region and 125,755 sq. m. are water.

In 1867 the Dominion was formed by the union of the provinces of Nova Scotia, New Brunswick, Quebec (Lower Canada) and Ontario (Upper Canada). In 1869 the North-west Territories were purchased from the Hudson's Bay Company, from a corner of which Manitoba was carved in the next year. In 187 1 British Columbia and in 1873 Prince Edward Island joined the Dominion. The islands and other districts within the Arctic circle became a portion of the Dominion only in 1880, when all British posses- sions in North America, excepting Newfoundland, with its dependency, the Labrador coast, and the Bermuda islands, were annexed to Canada. West of the province of Ontario, then inaccurately defined, the provinces of Manitoba and British Columbia were the only organized divisions of the western territory, but in 1882 the provisional districts of Assiniboia, Athabasca, Alberta and Saskatchewan were formed, leaving the remainder of the north-west as unorganized territories, a certain portion of the north-east, called Keewatin, having previously been placed under the lieutenant-governor of Mani- toba. In 1905 these four districts were formed into the two provinces of Alberta and Saskatchewan, and Keewatin was placed directly under the federal government. In 1898, owing to the influx of miners, the Yukon territory was constituted and granted a limited measure of self-

government. The un- organized territories are sparsely inhabited by Indians, the people of the Hudson's Bay Company's posts and a few missionaries;

Population. — The growth of population is shown by the following figures:— 1871, 3,485,761; 1881, 4,324,810; 1891, 4,833,239; 1901, 5,371,315. Since 1901 the increase has been more rapid 1 , and in 1905 alone 144,621 emigrants entered Canada, of whom about two-fifths were from Great Britain and one- third from the United States.

The density of population is greatest in Prince Edward Island, where it is> 51-6 to the sq. m.; in Nova Scotia it is 22-3; New Brunswick, n-8; Ontario, 9-9; Manitoba, 4ˆ9; Quebec, 4-8; Saskatchewan, i-oi; Alberta, 0-72; British Columbia, 0-4; the Dominion, i-8. This is not an indication of the density in settled parts; as in Quebec, Ontario and the western provinces there are large unpopulated districts, the area of which enters into the calculation. The population is composed mainly of English- or French-speaking people, but there are German settlements of some extent in Ontario, and of late years there has been a large immigration into the western provinces and territories from other parts of Europe, including Russians, Galicians, Polish and Russian Jews, and Scandinavians. These foreign elements have been assimilated more slowly than in the United States, but the process is being hastened by the growth of a national consciousness. English, Irish and Scots and their descendants form the bulk of the popula- tion of Ontario, French- Canadians of Quebec, Scots of Nova Scotia, the Irish of a large proportion of New Brunswick. In the other provinces the latter race tends to confine itself to the cities. Manitoba is largely peopled from On- tario, together with a decreasing number of half-breeds — i.e. children of white fathers (chiefly French or Scottish) and Indian mothers — who originally formed the bulk of its inhabitants. Alberta and Saskatchewan, particularly the ranching districts, are chiefly peopled by English immigrants, though since 1900 there has also been a large influx from the United States. British Columbia contains a mixed population, of which in the mining districts a large proportion is American. Since 187 1 a great change has taken place throughout the west, i.e. from Lake Superior to the Pacific. Then Manitoba was principally inhabited by English and French half-breeds (or Metis), descendants of Hudson's Bay Company's employes, or

adventurous pioneers from Quebec, together with Scottish-settlers, descendants of those brought out by Lord Selkirk {q.v.) : , some English army pensioners and others, ana the van of the immigra- tion that shortly followed from Ontario. Beyond Manitoba buffalo were still running on the plains, and British Columbia having lost its mining population of 1839 and i860 was largely inhabited by Indians, its white population which centred in ithe city of Victoria being principally English.

French is the language of the province of Quebec, though English is much spoken in the cities; both languages are officially recognized in that province, and in the federal courts and parlia- ment. Elsewhere, English is exclusively used, save by the newly-arrived foreigners. The male sex is slightly the more numerous in all the provinces except Quebec, the greatest discrepancy existing in British Columbia.

The birth-rate is high, especially in Quebec, where families of twelve to twenty are not infrequent, but is decreasing in Ontario. In spite of the growth of manufactures since 1878, there are few large cities, and the proportion of the urban population to the rural is small. Herein it differs noticeably from Australia. Between 1801 and 1001 the number of farmers in Ontario, Quebec and the Maritime provinces decreased, and there seemed a prospect of the Country being divided into a manufacturing east and an agricultural west, but latterly large tracts in northern Ontario and Quebec have proved suitable for cultivation and are being opened up.

Religion. — There is no established church in Canada, but in the province of Quebec certain rights have been allowed to the Roman Catholic church ever since the British conquest. In that province about 87% of the population belongs to this church, which is strong in the others also, embracing over two-fifths of the population of the Dominion. The Protestant3 have shown a tendency to subdivision, and many curious' and ephemeral sects have sprung up; of late years, however, the various sections of Presbyterians, Methodists and Baptists have united, and a working alliance has been formed between Presbyterians, Methodists and Congregationalists. The Methodists are the strongest, and in Ontario form over 30% of the population. Next come the Presbyterians, the backbone of the maritime provinces. The Church of England is strong in the cities, especially Toronto. Save among the Indians, active disbelief in Christianity is practically non-existent, and even among them 90% are nominally Christian.

Indians. — The Indian population numbers over 100,000 and has slightly increased since 1881. Except in British Columbia and the

unorganized territories, nearly all of these are on reserva- tions, where they are under government supervision, receiving an annuity in money and a certain amount v of provisions; and where, by means of industrial schools and other methods, civilized habits are slowly superseding their former mode of life: British Columbia has about 2s, 000 , most ˚f whom are along the coast, though one of the important tribes, the Shuswaps, is in the interior. An almost equal number are found in the three prairie provinces. Those of Ontario, numbering about 20,000, are more civilized than those of the west, many of them being good farmers. In all the provinces they are under the Control of the federal government which acts as their trustee, investing the money which they derive chiefly from the sale of lands and timber, and making a large annual appropriation for the pay- ment of their annuities, schools and other expenses. While unable to alienate their reservations, save to the federal govern- ment, they are not confined to them, but wander at pleasure. As they progress towards a settled mode of life, they are given the franchise; this process is especially far advanced in Ontario'. A certain number are found in all the provinces. They make incomparable guides for fishing, hunting and surveying parties, on which they. will cheerfully undergo the greatest hardships, though tending'to shrink from regular employment in cities or on farms.

Orientals. — The Chinese and Japanese numbered in 1906 about ˆo.ooo, of whom, three-quarters were in British Columbia, though they were spreading through the other provinces, chiefly as

laundrymen. They are as a rule frugal, industrious and law- abiding, and are feared rather for their virtues than for theiT vices. Since 1885 a tax has been imposed on all Chinese entering Canada, and in 1903 this was raised to £100 ($500). British Columbia endeavoured in 1905 to lay a similar restriction on the Japanese, but the act was disallowed by the federal legislature.

Finance. — Since 1871 the decimal system of coinage, corre- sponding to that of the United States, has been the only one employed. One dollar is divided into one hundred cents (£i = $4-86f). The money in circulation consists of a limited number of notes issued by the federal government, and the notes of the chartered banks, together with gold, silver and Copper coin. Previous to 1906 this coin was minted in England, but in that year a branch of the royal mint was established at Ottawa. Though the whole financial system rests on the main- tenance of the gold standard, gold coin plays a much smaller part in daily business than in England, France or Germany. United States' notes and silver are usually received at par; those of other nations are subject to

a varying rate of exchange. ‘

The banking system, which retains many features of the Scotch system, on which it was originally modelled, combines security for the note-holders and depositors with prompt increase and diminution of the circulation in accordance with the varying conditions of trade. This is especially important in a country where the large wheat crop renders an additional quantity of money necessary on very short notice during the autumn and winter. There has been no successful attempt to introduce the “wild cat ” banking , which had such disastrous effects in the early days of the western states. Since federation no chartered bank has been compelled to liquidate without paying its note-holders in full. The larger banks are chartered by the federal govern- ment; in the smaller towns a number of private banks remain, but their importance is small, owing to the great facilities given to the chartered banks by the branch system. In 1906 there were 34 chartered banks, of which the branches had grown from 619 in 1900 to 1565 in 1906, and the number since then has rapidly increased. The banks are required by law to furnish to the finance minister detailed monthly statements which are published in the official gazette. Once in every ten years the banking act is revised and weaknesses amended. Clearing- houses have been established in the chief commercial centres. In October 1906 the chartered banks had an aggregate paid-up capitalof over $94,000,000 with a note circulation of $83,000,000 and deposits of over $553,000,000.

There are four kinds of savings banks in Canada: — :(i) the post-office savings banks; (2) the government savings banks of the Maritime provinces taken over at federation and being gradually merged with the former; (3) two special savings banks in the cities bf Montreal and Quebec; (4) the savings bank departments of the chartered banks. The rate of interest allowed by the government is now 3%, and the chartered banks usually follow the government rate. The amount on deposit in the first three increased from $5,057,607 in 1868 to $89,781,546 in October 1906. The returns from the chartered banks do not specify the deposits in these special accounts.

The numerous loan and trust companies also possess certain banking privileges.

The federal revenue is derived mainly from customs and excise duties, with subsidiary amounts from mining licences, timber dues, post-office, &c. Both the revenue and the expendi- ture have in recent years increased greatly, the revenue rising from$46,743,io3 in 1899 to $71,186,073 in 1905 and the expendi- ture keeping pace with it. The

debt of the Dominion in 1873 and in 1905 was:—

1873.

1905.

Gross, debt . .

Assets . , • Net debt . ‘ .

$129,743,432 30,894,970 98,848,462

fo77,678,58o

111,454,413 266,224,167

While the debt had thus increased faster than the population, it weighed less heavily on the people, not only on account of the

great increase in commercial prosperity, but of the much lower rate of interest paid, and of the increasing revenue derived from assets. Whereas in 1867 the rate of interest was over 4%, and interest was being paid on former provincial loans of over 6%, Canada could in 1906 borrow at 3%.

The greater part of the debt arises from the assumption of die debts of the provinces as they entered federation, expenditure on canals and assistance given to railways. It does not include the debts incurred by certain provinces since federation, a matter which concerns themselves alone. A strong prejudice against direct taxation exists, and none is imposed by the federal government, though it has been tentatively introduced in the provinces, especially in Quebec, in the form of liquor hcences, succession duties, corporation taxes, &c. British Columbia has a direct tax on property and on income. The cities, towns and municipalities resort to it to supply their local needs, and there is a tendency, especially pronounced in Ontario on account of the excellence of her municipal system, to devolve the burden of educational payments, and others more properly provincial, upon the municipal authorities on the plea of decentralization.

Commerce and Manufactures. — Since 1867 the opening up of the

fertile lands in the north-west, the increase of population, the discovery of new mineral fields, the construction of railways and the great improvement of the canal system have changed the conditions, methods and channels of trade. The great extension during the same period of the use of water-power has been of immense importance to Canada, most of the provinces possessing numerous swift-flowing streams or waterfalls, capable of generating a practically unlimited supply of power.

In 1878 the introduction of the so-called ” National Policy ” of protection furthered the growth of manufactures. Protection still remains the trade policy of Canada, though modified by a preference accorded to imports from Great Britain and from most of the British colonies. The tariff, though moderate as compared with that of the United States, amounted in 1907 to about 28% on dutiable imports and to about 16% on total imports. Tentative attempts at export duties have also been made. Inter- provincial commerce is free, and the home market is greatly increasing in importance. The power to make commercial treaties relating to Canada rests with the government of Great Britain, but in most cases the official consent of Canada is required, and for many years no treaty repugnant to her interests has been signed. The denunciation by the British government in 1897 of commercial treaties with Belgium and Germany, at the request of Canada, was a striking proof of her increasing importance, and attempts have at various times been made to obtain the full treaty-making power for the federal government. The great proportion of the foreign trade of the Dominion is with the United States and Great Britain. From the former come most of the manufactured goods imported and large quantities of raw materials; to the latter are sent food-stuffs. Farm products are the most important export, and with the extension of this industry in the north-west provinces and in northern Ontario will probably continue to be so. Gold, silver, copper and other minerals are largely exported, chiefly in an unrefined state and almost entirely to the United States. The exports of lumber are about equally divided between the two. Formerly, the logs were shipped as square timber, but now almost always in the form of deals, planks or laths; such square timber as is still shipped goes almost entirely to Great Britain. Wood pulp for the manufacture of paper is exported chiefly to the United States. To that country fresh fish is sent in large quantities, and there is an important trade in canned salmon between British Columbia and Great Britain. Few of the manufacturers do more than compete with the foreigner for an increasing share of the home market. In this they have won increased success, at least five-sixths of the manufactured goods used being produced within the

country, but a desire for further protection is loudly expressed. Though the chief foreign commerce is with Great Britain and the United States, the Dominion has trade relations with all the chief countries of the

world and maintains commercial agents among them. Her total foreign trade (import and export) was in 1906 over £100,000,000.

Shipping. — The chief seaports from east to west are Halifax, N.S., Sydney, N.S., St John, N.B., Quebec and Montreal on the Atlantic; and Vancouver, Esquimalt and Victoria, B.C., on the Pacific. Halifax is the ocean terminus of the Intercolonial railway; St John, Halifax and Vancouver of the Canadian Pacific railway. Prince Rupert, the western terminus of the Grand Trunk Pacific railway, was in 1906 only an uninhabited harbour, but was being rapidly developed into a flourishing city. Though Halifax and St John are open in winter, much of the winter trade eastwards is done through American harbours, especially Portland, Maine, owing to the shorter railway journey. Esquimalt, Halifax, Kingston (Ont.) and Quebec have well- equipped graving-docks. The coast, both of the ocean and of the Great Lakes, is well lighted and protected. The decay of the wooden shipbuilding industry has lessened the comparative importance of the mercantile marine, but there has been a great increase in the tonnage employed in the coasting trade and upon inland waters. Numerous steamship lines ply between Canada and Great Britain; direct communication exists with France, and the steamers of the Canadian Pacific railway run regularly to Japan and to Australia.

Internal Communications. — Her splendid lakes and rivers, the development of her canal system, and the growth of railways have made the interprovincial traffic of Canada far greater than her foreign; and the portfolio of railways and canals is one of the most important in the cabinet. There are, nominally, about 200 railways, but about one-half of these, comprising five-sixths of the mileage, have been amalgamated into four great systems: the Grand Trunk, the Canadian Pacific, the Canadian Northern and the Intercolonial; most of the others have been more or less consolidated. With the first of the four large systems is connected the Grand Trunk Pacific. The Intercolonial, as also a line across Prince Edward Island, is owned and operated by the federal government. Originally built chiefly as a military road, and often the victim of political exigencies, it has not been a commer- cial success. With the completion of the Grand Trunk Pacific (planned for 191 1) and the Canadian Northern, the country would possess three trans-continental railways, and be free from the reproach, so long hurled at it, of possessing length without breadth.

At numerous points along the frontier, connexion is made with the railways of the United States. Liberal aid is given by the federal, provincial and municipal governments to the construction of railways, amounting often to more than half the cost of the road. The government of Ontario has con- structed a line to open up the agricultural and mining districts of the north of the province, and is operating it by means of a commission. Practically all the cities 1 and large towns have electric tramways, and electricity is also used as a motive power on many lines uniting the larger cities with the surrounding towns and villages. Since 1903 the Dominion government has instituted a railway commission of three members with large powers of control over freight and passenger rates and other such matters. Telephone and express companies are also subject to its jurisdiction. From its decisions an appeal may be made to the governor-general in council, i.e. to the federal cabinet. It has exercised a beneficial check on the railways and has been cheerfully accepted by them. In Ontario a some- what similar commission, appointed by the local government, exercises extensive powers of control over railways solely within the province, especially over the electric lines.

Despite the increase in railway facilities, the waterways remain important factors in the transportation of the country. Steamers ply on lakes and rivers in every province, and even in the far northern districts of Yukon and Mackenzie. Where necessary obstacles are surmounted by canals, on which over £22,000,000 have been spent, chiefly since federation. The St Lawrence

1 In Canada a city must have over 10,000 inhabitants, a town over 2000.

river canal system from Lake Superior to tide water overcomes a difference of about 600 ft., and carries large quantities of grain from the west to Montreal, the head of summer navigation on the Atlantic. These canals have a minimum depth of 14 ft. on the sills, and are open to Canadian and American vessels on equal terms; the equipment is in every respect of the most modern character. So great, however, is the desire to shorten the time and distance necessary for the transportation of grain from Lake Superior to Montreal that an increasing quantity is taken by water as far as the Lake Huron and

Georgian Bay ports, and thence by rail to Montreal. Numerous smaller canals bring Ottawa into connexion with Lake Champlain and the Hudson river via Montreal; by this route the logs and sawn lumber of Ontario, Quebec and New Brunswick find their destination. It has long been a Canadian ideal to shorten the distance from Lake Superior to the sea. With this object in view, the Trent Valley system of canals has been built, connecting Lake Ontario with the Georgian Bay (an arm of Lake Huron) via Lake Simcoe. In 1899 and subsequently surveys were made with a view to connecting the Georgian Bay through the intervening water stretches, with the Ottawa river system, and thence to Montreal. In 1903 all tolls were taken off the Canadian canals, greatly to the benefit of trade.

Mining. — The mineral districts occur from Cape Breton to the islands in the Pacific and the Yukon district. Nova Scotia, British Columbia and the Yukon are still the most productive, but the northern parts of Ontario are proving rich in the precious metals. Coal, chiefly bituminous, occurs in large quantities in Nova Scotia, British Columbia and in various parts of the north-west (lignite), though most of the anthracite is imported from the United States, as is the greater part of the bituminous coal used in Ontario. Under the stimulus of federal bounties, the production of pig iron and of steel, chiefly from imported ore, is rapidly increasing. Bounties on certain minerals and metals are also given by some of the provinces. The goldfields of the Yukon, though still valuable, show a lessening production. Sudbury, in Ontario, is the centre of the nickel production of the world, the mines being chiefly in American hands, and the product exported to the United States. Of the less important minerals, Canada is the world's chief producer of asbestos and corundum. Copper, lead, silver and all the important metals are mined in the Rocky Mountain district. From Quebec westwards, vast regions are still partly, or completely, unexplored.

Lumber. — In spite of great improvidence, and of loss by fire, the forest wealth of Canada is still the greatest in the world. Measures have been taken, both by the provincial and the federal governments, for its preservation, and for re-foresta- tion of depleted areas. Certain provinces prohibit the exporta- tion of logs to the United States, in order to promote the growth of saw-mills and manufactures of wooden-ware within the country, and the latter have of late years developed with great rapidity. The lumber trade of British Columbia has suffered from lack of an adequate market, but is increasing with the greater demand from the provinces of Alberta and Saskatchewan. A great development has also taken place in Ontario and the eastern provinces, through the use of spruce and other trees, long considered

comparatively useless, in the manufacture of wood-pulp for paper-making.

Crown Lands. — Large areas of unoccupied land remain in all the provinces (except Prince Edward Island). In Manitoba, Saskatchewan, Alberta, the so-called railway belt of British Columbia and the territories, these crown lands are chiefly owned by the federal parliament; in the other provinces, by the local legislatures. So great is their extent that, in spite of the immigration of recent years, the Dominion government gives a freehold of 160 acres to every bona fide settler, subject to certain conditions of residence and the erection of buildings during the first three years. Mining and timber lands are sold or leased at moderate rates. All crown lands controlled by the provinces must be paid for, save in certain districts of Ontario, where free grants are given, but the price charged is

low. The Canadian Pacific railway controls large land areas in the two new provinces; and large tracts in these provinces are owned by land companies. Both the Dominion and the provincial governments have set apart certain areas to be preserved, largely in their wild state, as national parks. Of these the most extensive are the Rocky Mountains Park at Banff, Alberta, owned by the Dominion government, and the "Algon- quin National Park," north-east of Lake Simcoe, the property of Ontario.

Fisheries. — The principal fisheries are those on the Atlantic coast, carried on by the inhabitants of Nova Scotia, New Bruns- wick, Prince Edward Island, and the eastern section of Quebec. Cod, herring, mackerel and lobsters are the fish chiefly caught, though halibut, salmon, anchovies and so-called sardines are also exported. Bounties to encourage deep-sea fishing have been given by the federal government since 1882. In British Columbian waters the main catch is of salmon, in addition to which are halibut, oolachan, herring, sturgeon, cod and shell- fish. The lakes of Ontario and Manitoba produce white fish, sturgeon and other fresh-water fish. About 80,000 persons find more or less permanent employment in the fishing industry, including the majority of the Indians of British Columbia.

The business of fur-seal catching is carried on to some extent in the North Pacific and in Bering Sea by sealers from Victoria, but the returns show it to be a decreasing industry, as well as one causing friction with the United States. Indeed, no depart- ment of national life has caused more continual trouble between the two peoples than the fisheries, owing to different laws regarding fish protection, and the constant invasion by each of the territorial waters of the other.

Education.— The British North America Act imposes on the provincial legislatures the duty of legislating on educational matters, the privileges of the denominational and separate schools in Ontario and Quebec being specially safeguarded. In 1871, the New Brunswick legislature abolished the separate school system, and a contest arose which was finally settled by the authority of the legislature being sustained, though certain concessions were made to the Roman Catholic dissentients, Subsequently a similar difficulty arose in Manitoba, where the legislature in 1890 abolished the system of separate schools which had been established in 1871. After years of bittei controversy, in which a federal ministry was overthrown, a compromise was arranged in 1897, in which the Roman Catholic leaders have never fully acquiesced. In the provinces of Alberta and Saskatchewan, formed in 1905, certain educational privileges, (though not amounting to a separate school system) were granted to the Roman Catholics.

All the provinces have made sacrifices to insure the spread of education. In 1901, 76% of the total population could read and write, and 86% of those over five years of age. These percentages have gradually risen ever since federation, especially in the province of Quebec, which was long in a backward state. The school systems of all the provinces are, in spite of certain imperfections, efficient and well-equipped, that of Ontario being especially celebrated. A fuller account of their special features will be found under the articles on the different provinces.

Numerous residential schools exist and are increasing in number with the growth of the country in wealth and culture. In Quebec are a number of so-called classical colleges, most of them affiliated with Laval University.

Higher education was originally organized by the various religious bodies, each of which retains at least one university in more or less integral connexion with itself. New Brunswick, Ontario and Manitoba support provincial universities at Fredericton, Toronto and Winnipeg. Those of most importance 1 are: — Dalhousie University, Halifax, N.S. (1818); the Univer- sity of New Brunswick, Fredericton, N.B. (1800); McGill University, Montreal, Que. (1821); Laval University, Quebec, and Montreal, Que. (1852); Queen's University, Kingston, Ont. (1841); the University of Toronto, Toronto, Ont. (1827); 1 The date of foundation is given in brackets.

Trinity University, Toronto, Ont. (1852); Victoria Uni- versity, Toronto, Ont. (1836); the University of Ottawa, Ottawa, Ont. (1848); the University of Manitoba, Winnipeg, Man. (1877).

Of these McGill (see Montreal) is especially noted for the excellence of its training in practical and applied science. Many of the students, especially in the departments of medicine and theology, complete their education in the United States, Britain or Europe.

Most of the larger towns and cities contain public libraries, that of Toronto being especially well-equipped.

Of the numerous learned and scientific societies, the chief is the Royal Society of Canada, founded in 188 1.

Defence. — The command in chief of all naval and military forces is vested in the king, but their control rests with the federal parliament. The naval forces, consisting of a fisheries protection service, are under the minister of marine and fisheries, the land forces under the minister of militia and defence. Prior to 1903, command of the latter was vested in a British officer, but since then has been entrusted to a militia council, of which the minister is president. The fortified harbours of Halifax (N.S.) and Esquimalt (B.C.) were till 1005 maintained and garrisoned by the imperial government, but have since been taken over by Canada. This has entailed the increase of the permanent force to about 5000 men. Previously, it had num- bered about 1000 (artillery, dragoons, infantry) quartered in various schools, chiefly to aid in the training of the militia. In this all able-bodied citizens between the ages of 18 and 6b are nominally enrolled, but the active militia consists of about 45,000 men of all ranks, in a varying state of efficiency. These cannot be compelled to serve outside the Dominion, though special corps may be enlisted for this purpose, as was done during the war in South Africa (1899-1902). At Quebec is a Dominion arsenal, rifle and ammunition factories. Cadet corps flourish in most of the city schools. At Kingston (Ont.) is the Royal Military College, to the successful graduates of which a certain number of commissions in the British service is annually awarded.

Justice and Crime. — Justice is well administered throughout the country, and even in the remotest mining camps there has been little of the lawlessness seen in similar districts of Australia and the United

States. For this great credit is due to the ” North-west mounted police,” the ” Riders of the Plains,” a highly efficient body of about seven hundred men, Under the control of the federal government. Judges are appointed for life by the Dominion parliament, and cannot be removed save by impeachment before that body, an elaborate process never attempted since federation, though more than once threatened. From the decisions of the supreme court of Canada appeal may be made to the judicial committee of the imperial privy council.

Authorities. — The Canadian Geological Survey has published (Ottawa, since 1845) a series of reports covering a great number of subjects. Several provinces have bureaus or departments of mines, also issuing reports. The various departments of the federal and the provincial governments publish annual reports and frequent special reports, such as the decennial report on the cefisus, from which a vast quantity of information may be obtained. Most of this is summed up in the annual Statistical Year Book of Canada and in the Official Handbook of the Dominion of Canada, issued at frequent intervals by the Department of the Interior. See also J. W. White (the Dominion geographer), Atlas of Canada (1906); J. Castell Hopkins, Canada: an Encyclopaedia (6 vols., 1898-1900); The Canadian Annual Review (yearly since 1902), replacing H. J. Morgan’s Canadian Annual Register (1878-1886) ; Sir J. W. Dawson, Handbook of Canadian Geology (1889); George Johnson, Alphabet of First Things in Canada (3rd ed., 1898); A. G. Bradley, Canada in the Twentieth Century (1903) ; Transactions of the Royal Society of Canada (yearly since 1883) ; R. C. Breckenridge, The Canadian Banking System (1895); A. Shortt, History of Canadian Banking (1902-1906); Sir S. Fleming, The Intercolonial (1876); John Davidson, “Financial Relations of Canada and the Provinces” (Economic Journal, June 1905) ; Transactions of the Royal Society of Canada, passim, for valuable papers by H. M. Ami, A. P. Coleman, G. M. Dawson, W. F. Ganong, B. J. Harrington and others; also articles in Canadian Economics and in the Handbook of Canada, published on the occasion of visits of the British Association.

(W. L. G.)

‘ , Agriculture

Canada is pre-eminently an agricultural country. Of the total population (estimated in 1907 at 6,440,000) over 50% are directly engaged in practical agriculture. In addition large numbers are engaged in industries arising out of agriculture; among these are manufacturers of agricultural implements, millers of flour and

oatmeal, curers and packers of meat, makers of cheese and butter, and persons occupied in the transportation and commerce of grain, hay, live stock, meats, butter, cheese, milk, eggs, fruit and various other products. The country is splendidly formed for the production of food. Across the continent there is a zone about 3500 m. long and as wide as or wider than France, with (over a large part of this area) a climate adapted to the production of foods of superior quality. Since the opening of the 20th century, great progress has been made in the settlement and agricultural development of the western territories between the provinces of Manitoba and British Columbia. The three ” North- West Provinces ” (Manitoba, Saskatchewan, Alberta) have a total area of 369,869,898 acres, of which 12,853,120 acres are water. In 1906 their population was 808,863, nearly double what it was in 1901. The land in this vast area varies in virginal fertility, but the best soils are very rich in the constituents of plant food. Chemical analyses made by Mr F. T. Shutt have proved that soils from the North- West Provinces contain an average of 18,000 ib of nitrogen, 15,580 lb of potash and 6,700 lb of phosphoric acid per acre, these important elements of plant food being therefore present in much greater abundance than, they are in ordinary cultivated Europea,n soils of good quality. The prairie lands of Manitoba and Saskatchewan produce wheat of the finest quality. Horse and cattle ranching is practised in Alberta, where the milder winters allow of the outdoor wintering of live stock to a greater degree than is possible in the colder parts of Canada. The freezing of the soil in winter, which at first sight seems a drawback, retains the soluble nitrates which might otherwise be drained out. The copious snowfall protects vegetation, supplies moisture, and contributes nitrogen to the soil. The geographical position of Canada, its railway systems and steamship service for freight across the Atlantic and Pacific oceans, are favourable to the extension of the export trade in farm products to European and oriental countries. Great progress has been made in the develop- ment of the railway systems of Canada, and the new trans-continental line from the Atlantic to the Pacific, passing through Saskatchewan via Saskatoon, and Alberta via Edmonton, renders possible of settlement large areas of fertile wheat-growing soil. The canal system of Canada, linking together the great natural waterways, is also of much present and prospective importance in cheapening the transportation of agricultural produce.

Of wheat many varieties are grown. The methods of cultiva- tion do not involve the application of so much hand labour per acre as in Europe. The average yield of wheat for the crops. whole of Canada is nearly 20 bushels per acre. In 1901 the total production of wheat in

Canada was 55! million bushels; In 1906 the estimated total production was 136 million bushels. The total wheat acreage, which at the census of 1901 was 4,224,000, was over 6,200,000 in 1906, an increase of nearly two million acres in five years.

Up to the close of the 19th century, Ontario was the largest wheatrgrowing province in Canada. In 1900 the wheat acreage in Ontario was 1,487,633, producing 28,418,907 bushels, an average yield of 19-10 bushels per acre. Over three-quarters of this production was of fall or winter wheat, the average yield of which in Ontario over a series of years since 1883 had been about 20 bushels per acre. But the predominance in wheat- growing has now shifted to the new prairie regions of the west. A census taken in 1906 shows that the total, acreage of wheat in the North- West Provinces was 5,062,493, yielding 110,586,824 bushels, an average in a fairly normal season of 21-84 bushels per acre. Of this total wheat acreage, 2,721,079 acres were in Manitoba, 2,117,484 acres in Saskatchewan, and 223,930 acres

in Alberta, with average yields per acre at the rates of 20-02 bushels in Manitoba, 23-70 in Saskatchewan and 26-49 m Alberta. In these provinces spring wheat is almost universally sown, except in Alberta where fall or winter wheat is also sown to a considerable extent. Summer fallowing for wheat is a practice that has gained ground in the North-West Provinces. Land ploughed and otherwise tilled, but left unseeded during the summer, is sown with wheat in the succeeding autumn or spring. Whep,t on summer fallow land yielded, according to the North- West census of 1006, from 2 to 8 bushels per acre more than that sown on other land. Summer fallowing is, however, subject to One drawback: the strong growth which it induces is apt to retard the ripening of the grain. Canada is clearly destined to rank as one of the most important grain-producing countries of the world. The northern limits of the wheat-growing areas have not been definitely ascertained; but samples of good wheat were grown in 1907 at Fort Vermilion on the Peace river, nearly 600 m. north of Winnipeg in lat. 58-34 and at Fort Simpson on the Mackenzie river in lat. 61-52, more than 800 m. north of Winnipeg and about 1000 m. north of the United States boundary. As a rule the weather during the harvesting period permits the grain to be gathered safely without damage from

sprouting. Occasionally in certain localities in the north-west the grain is liable to injury from frost in late summer; but as the proportion of land under cultivation increases the climate becomes modified and the danger from frost is appreciably less. The loss from this cause is also less than formerly, because any grain unfit for export is now readily purchased for the feeding of animals in Ontario and other parts of eastern Canada.

Suitable machinery for cleaning the grain is everywhere in general use, so that weed seeds are removed before the wheat is ground. This gives Canadian wheat excellent milling pro- perties, and enables the millers to turn out flour uniform in quality and of high grade as to keeping properties. Canadian flour has a high reputation in European markets. It is known as flour from which bakers can make the best quality of bread, and also the largest quantity per barrel, the quantity of albumi- noids being greater in Canadian flour than in the best brands of European. Owing to its possession of this characteristic of what millers term " strength," i.e. the relative capacity of flour to make large loaves of good quality, Canadian flour is largely in demand for blending with the flour of the softer English wheats. For this reason some of the strong Canadian wheats have com- manded in the home market 5s. and 6s. a quarter more than English-grown wheat. At the general census of 1901 the number of flouring and grist mill establishments, each employing five persons and over, was returned at 400, the number of employes being 4251 and the value of products $31,835,873. A special census of manufactures in 1906 shows that these figures had grown in 1905 to 832 establishments, 5619 employes and $56,703,269 value of the products. There is room for a great extension in the cultivation of wheat and the manufacture and exportation of flour.

In the twelve months of 1907 Canada exported 37,503,057 bushels of wheat of the value of $34,132,759 and 1,858,485 barrels of flour of the value of $7,626,408. The corresponding figures in 1 900 were — wheat,i6,844,65obushels,value, $11,995,488, and flour, 768,162 bushels, value, $2,791,885.

Oats of fine quality are grown in large crops from Prince Edward Island on the Atlantic coast to Vancouver Island on the Pacific coast. Over large areas the Canadian soil and climate are admirably adapted' for producing oats of heavy weight per bushel. In all the provinces of eastern Canada the acreage under o.ats greatly exceeds that under wheat. The annual average oat crop in all Canada is estimated at about 248 million bushels. As the total annual export of oats is now less than three million bushels the home consumption is large, and

this is an advantage in maintaining the fertility of the soil. In 1907 the area under oats in Ontario was 2,932,509 acres and yielded 83,524,301 bushels, the area being almost as large as that of the acreage under hay and larger than the combined total of the other

principal cereals grown in the province. Canadian oatmeal is equal in, quality to the best. It is prepared in different forms, and in various degrees of fineness.

Barley was formerly grown for export to the United States for malting purposes. After the raising of the duty on barley under the McKinley and Dingley tariffs that trade was practically destroyed and Canadian farmers were obliged to find other uses for this crop. Owing to the development of the trade with the mother-country in dairying and meat products, barley as a home feeding material has become more indispensable than ever. Before the adoption of the McKinley tariff about nine million bushels of barley were exported annually, involving the loss of immense stores of plant food. In 1907, with an annual produc- tion of nearly fifty million bushels, only a trifling percentage was exported, the rest being fed at home and exported in the form of produce without loss from impoverishment of the soil. The preparation Of pearl or pot barley is an incidental industry.

Rye is cultivated successfully, but is seldom used for human food. Flour from wheat, meal from oats, and meal from Indian corn are preferred.

Buckwheat flour is used in considerable quantities in some districts for the making of buckwheat cakes, eaten with maple syrup. These two make an excellent breakfast dish, character- istic of Canada and some of the New England states. There are also numerous forms of preparations from cereals, sold as break- fast foods, which, owing to the high quality of the grains grown in Canada and the care exercised in their manufacture, compare favourably with similar products in other countries.

Peas in large areas are grown free from serious trouble with insect pests. Split peas for soup, green peas as vegetables and sweet peas for canning are obtained of good quality.

Vegetables are grown everywhere, and form a large part of the diet of the people. There is a comparatively small export, except in the case of turnips and potatoes and of vegetables which have been canned or dried. Besides potatoes, which thrive well and yield large quantities of excellent quality, there are turnips, carrots, parsnips and beets. The

cultivation of sugar beets for the manufacture of sugar has been established in Ontario and in southern Alberta, where in 1906 an acreage under this crop of 3344 yielded 27,211 tons, an average of 8-13 tons per acre. Among the common vegetables used in the green state are peas, beans, cabbage, cauliflowers, asparagus, Indian corn, onions, leeks, tomatoes, lettuce, radish, celery, parsley, cucumbers, pumpkins, squash and rhubarb. Hay, of good quality of timothy (Phleum pratense), and also of timothy and clover, is grown over extensive areas. For export it is put up in bales of about 150 lb each. Since 1899 a new form of pressing has been employed, whereby the hay is compressed to stow in about 70 cub. ft. per ton. This has been a means of reducing the ocean freight per ton. The compact condition permits the hay to be kept with less deterioration of quality than under the old system of more loose baling. Austrian brome grass (Bromus inermis) and western rye grass (Agropyrum tenerum) are both extensively grown for hay in the North- West Provinces.

The almost universal adoption of electrical traction in towns has not led to the abandonment of the breeding of horses to the extent that was at one time anticipated. Heavy draught horses are reared in Ontario, and to a less stock.

but increasing extent in the North-West Provinces, the breeds being mainly the Clydesdale and the Shire. Percherons are also bred in different parts of Canada, and a few Belgian draught horses have been introduced. Good horses suitable for general work on farms and for cabs, omni- buses, and grocery and delivery wagons, are plentiful for local markets and for export. Thoroughbred and pure bred hackney stallions are maintained in private studs and by agricultural associations throughout the Dominion, and animals for cavalry and mounted infantry remounts are produced in all the provinces including those of the North-West. Useful carriage horses and saddle horses are bred in many localities. Horse ranching is practised largely in Alberta. There are no government

stud farms. The total number of horses in the Dominion was estimated on the basis of census returns at 2,019,824 for the year 1907, an increase of 609,309 since 1901.

Cattle, sheep, swine and poultry are reared in abundance. The bracing weather of Canadian winters is followed by the warmth and humidity of genial summers, under which crops grow in almost tropical luxuriance, while the cool evenings and nights give the plants a robustness of quality which is not to be found in tropical regions, and also make life for the various domestic animals wholesome and comfortable. In the North- West Provinces there are vast areas of prairie land, over which cattle pasture, and from which thousands of fat bullocks are shipped annually. Throughout other parts bullocks are fed on pasture land, and also in stables on nourishing and succulent feed such as hay, Indian corn fodder, Indian corn silage, turnips, carrots, mangels, ground oats, barley, peas, Indian corn, rye, bran and linseed oil cake. The breeding of cattle, adapted for the production of prime beef and of dairy cows for the production of milk, butter and cheese, has received much attention. There is government control of the spaces on the steamships in which the cattle are carried, and veterinary inspection prevents the exportation of diseased animals.

A considerable trade has been established in the exportation of dressed beef in cold storage, and also in the exportation of meat and other foods in hermetically sealed receptacles. By the Meat and Canned Foods Act of 1907 of the Dominion parliament and regulations thereunder, the trade is carried on under the strictest government supervision, and no canned articles of food may be exported unless passed as absolutely wholesome and officially marked as such by government inspectors. There is a considerable trade in ” lunch tongues.”

The cattle breeds are principally those of British origin. For beef, shorthorns, Herefords, Galloways and Aberdeen- Angus cattle are bred largely, whilst for dairying purposes, shorthorns, Ayrshires, Jerseys, Guernseys and Holstein-Friesians prevail. The French-Canadian cattle are highly esteemed in eastern Canada, especially by the farmers of the French provinces. They are a distinct breed of Jersey and Brittany type, and are stated to be descended from animals imported from France by the early settlers. The estimated number of cattle in Canada in 1907 was 7,439,051, an increase of 2,066,547 over the figures of the census of 1901.

All parts of the Dominion are well adapted for sheep; but various causes, amongst which must be reckoned the prosperity of other branches of agriculture, including wheat-growing and dairying, have in several of the provinces contributed to prevent that attention to this branch which its importance deserves, though there are large areas of rolling, rugged yet nutritious pastures well suited to sheep-farming. In

the maritime provinces and in Prince Edward Island sheep and lambs are reared in large numbers. In Ontario sheep breeding has reached a high degree of perfection, and other parts of the American continent draw their supplies of pure bred stock largely from this province. All the leading British varieties are reared, the Shropshire, Oxford Down, Leicester and Cotswold breeds being most numerous. There are also excellent flocks of Lincolns and South- downs. The number of sheep and lambs in Canada was estimated for the year 1907 at 2,830,785, as compared with 2,465,565 in 1901.

Pigs, mostly of the Yorkshire, Berkshire and Tamworth breeds, are reared and fattened in large numbers, and there is a valuable export trade in bacon. Canadian hogs are fed, as a rule, on feeds suited for the production of what are known as ” fleshy sides.” Bacon with an excess of fat is not wanted, except in the lumber camps; consequently the farmers of Canada have cultivated a class of swine for bacon having plenty of lean and firm flesh. The great extension of the dairy business has fitted in with the rearing of large numbers of swine. Experimental work has shown that swine fattened with a ration partly of skim-milk were lustier and of a more healthy appearance than swine fattened wholly on grains. Slaughtering

and curing are carried on chiefly at large packing houses. The use of mechanical refrigerating plants for chilling the pork has made it practicable to cure the bacon with the use of a small percentage of salt, leaving it mild in flavour when delivered in European markets. Regular supplies are exported during every week of the year. Large quantities of lard, brawn and pigs’ feet are exported. In 1907 the number of pigs in Canada was estimated at 3,530,060, an increase of 1,237,385 over the census record of 1901. Turkeys thrive well, grow to a fine size and have flesh of tender quality. Chickens are raised in large numbers, and poultry-keeping has developed greatly since the opening of the 20th century. Canadian eggs are usually packed in cases containing thirty dozens each. Card- board fillers are used which provide a separate compartment for each egg. There are cold storage warehouses at various points in Canada, at which the eggs are collected, sorted and packed before shipment. These permit the eggs to be landed in Europe in a practically fresh condition as to flavour, with the shells quite full.

Canada has been called the land of milk and honey. Milk is plentiful, and enters largely into the diet of the people. With a climate which produces healthy, vigorous animals, notably free from epizootic diseases, with a fertile products. soil for the growth of fodder crops and pasture, with abundance of pure air and water, and with a

plentiful supply of ice, the conditions in Canada are ideal for the dairying industry. Large quantities of condensed milk, put up in hermetically sealed tins, are sold for use in mining camps and on board steamships. The cheese is chiefly of the variety known as ” Canadian Cheddar.” It is essentially a food cheese rather than a mere condiment, and 1 lb cf it will furnish as much nourishing material as 2j lb cf the best beefsteak. The industry is largely carried on by co-operative associations of farmers. The dairy factory system was introduced into Canada in 1864, and from that time the production and exportation of cheese grew rapidly. Legislation was passed to protect Canadian dairy produce from dishonest manipulation, and soon Canadian cheese obtained a deservedly high reputation in the British markets. In 1891 cheese factories and creameries numbered 1733, and in 1899 there were 3649. In 1908 there were 4355 of these factories, of which 1284 were in Ontario, 2806 in Quebec, and 265 in the remaining seven provinces of Canada. Those in Ontario are the largest in size. Amongst the British imports of cheese the Canadian product ranks first in quality, whilst in quantity it represents about 72% of the total value of the cheese imports, and 84 % of the total value of the imports of that kind of cheese which is classed as Cheddar. In 1906 the total exports of cheese to all countries from Canada reached 215,834,543 R> ˚f the value of $24,433,169.

Butter for export is made in creameries, where the milk, cream and butter are handled by skilled makers. The creameries are provided with special cold storage rooms, into which the butter is placed on the same day in which it is made. From them it is carried in refrigerator railway cars and in cold storage chambers on steamships to its ultimate destination. For the export trade it is packed in square boxes made of spruce or some other odourless wood. These are lined with parchment paper, and contain each 56 lb net of butter. The total export of butter from Canada in 1906 was 34,031,525 lb, of the value of $7,075,539. According to a census of manufactures taken in 1906, the total value of factory cheese and butter made in Canada during that year was $32,402,265.

There are large districts lying eastward of the Great Lakes and westward of the Rocky Mountains, where apples of fine quality can be grown; and there are other smaller pruits. areas in which pears, peaches and grapes are grown in quantities in the open air. The climate is favourable to the growth of plums, cherries, strawberries, raspberries, currants, gooseberries, etc. There are many localities in which cran- berries are successfully grown, and in which blueberries also grow wild in great profusion.

Apples and pears are the chief sorts of fruit exported. The

high flavour, the crisp, juicy flesh and the long-keeping qualities of the Canadian apples are their chief merits. Apples are exported in barrels and also in boxes containing about one bushel each. Large quantities are also evaporated and exported. Establishments for evaporating fruit are now found in most of the larger apple-growing districts, and canning factories and jam factories have been established in many parts of Canada, and are conducted with advantage and profit.

The chief fruit-growing districts have long been in southern and western Ontario and in Nova Scotia; but recently much attention has been devoted to fruit-growing in British Columbia, where large areas of suitable land are available for the cultivation of apples, pears and other fruits. In some parts of the semi- arid districts in the interior of the province irrigation is being successfully practised for the purpose of bringing land under profitable cultivation for fruit. Collections of fruit grown in British Columbia have received premier honours at the com- petitive exhibitions of the Royal Horticultural Society in London, where their high quality and fine colour have been greatly appreciated.

Wine is made in considerable quantities in the principal vine-growing districts, and in several localities large vineyards have been planted for this purpose. An abundance of cider is also made in all the large apple-growing districts.

Honey is one of the minor food-products of Canada, and in many localities bees have abundance of pasturage. Canadian honey for colour, flavour and substance is unsurpassed. Maple sugar and syrup are made in those areas of the country where the sugar-maple tree flourishes. The syrup is used chiefly as a substitute for jam or preserved fruits, and the sugar is used in country homes for sweetening, for cooking purposes and for the making of confectionery. The processes of manu- facture have been improved by the introduction of specially constructed evaporators, and quantities of maple sugar and syrup are annually exported.

Tobacco is a new crop which has been grown in Canada since 1904.

Its cultivation promises to be successful in parts of Ontario, Quebec and British Columbia.

The department of agriculture of the Dominion government renders aid to agriculture in many ways, maintaining the state aid experimental farms and various effective organiza- tions for assisting the live-stock, dairying and fruit- growing industries, for testing the germination and purity of agricultural seeds, and for developing the export trade in agricultural and dairy produce. The health of animals branch, through which are administered the laws relating to the contagious diseases of animals, and the control of quarantine and inspection stations for imported animals, undertakes also valuable experiments on the diseases of farm live-stock, including glanders in horses, tuberculosis in cattle, &c. The policy of slaughtering horses reacting to the mallein test has been success- fully initiated by Canada, the returns for 1908 from all parts of the country indicating a considerable decrease from the previous year in the number of horses destroyed and the amount of compensation paid. A disease of cattle in Nova Scotia, known as the Pictou cattle disease, long treated as contagious, has now been demonstrated by the veterinary officers of the department to be due to the ingestion of a weed, the ragwort, Senecio Jacobea. Hog cholera or swine fever has been almost eradicated. A laboratory is maintained for bacteriological and pathological researches and for the preparation of preventive vaccines. Canada is entirely free from rinderpest, pleuro- pneumonia and foot-and-mouth disease.

The work of the live-stock branch is directed towards the improvement of the stock-raising industry, and is carried on through the agencies of expert teachers and stock judges, the systematic distribution of pure-bred breeding stock, the yearly testing of pure-bred dairy herds, the supervision of the accuracy of the registration of pure-bred animals and the nationalization of live-stock records. The last two objects are secured by act of the Dominion parliament passed in 1905. Under this act a, record committee, appointed annually by the pedigree stud,

herd and flock book associations of Canada, perform the duties of accepting the entries of pure-bred animals for the respective pedigree registers, and are provided with an office and with stationery and franking privileges by the government. Pedigree certificates are certified as correct by an officer of the department of agriculture, so that in Canada there exist national registration and government authority for the accuracy of pedigree live- stock certificates. The government promotes the extension of markets for farm products; it

maintains officers in the United Kingdom who make reports from time to time on the condition in which Canadian goods are delivered from the steam- ships, and also on what they can learn from importing and distributing merchants regarding the preferences of the market for different qualities of farm goods and differen t sorts of packages. Through this branch of the public service a complete chain of cold-storage accommodation between various points in Canada and markets in Europe, particularly in Great Britain, has been arranged. The government offered a bonus to those owners of creameries who would provide cold-storage accommodation at them and keep the room in use for a period of three years. It also arranged with the various railway companies to run refrigerator cars weekly on the main lines leading to Montreal and other export points. The food-products from any shippers are received into these cars at the various railway stations at the usual rates, without extra charge for icing or cold-storage service. The government offered subventions to those who would provide cold-storage warehouses at various points where these were necessary, and also arranged with the owners of ocean steam-ships to provide cold-storage chambers on them by means of mechanical refrigerators. The policy of encouraging the provision of ample cold-storage accommodation has been developed still further by the Cold Storage Act of the Dominion parliament passed in 1907, under which subsidies are granted in part pay- ment of the cost of erecting and equipping cold-storage ware- houses in Canada for the preservation of perishable food- products.

Besides furnishing technical and general information as to the carrying on of dairying operations, the government has established and maintained illustration cheese factories and creameries in different places for the purpose of introducing the best methods of co-operative dairying in both the manufacturing and shipping of butter and cheese. Inspectors are employed to give information regarding the packing of fruit, and also to see to the enforcement of the Fruit Marks Acts, which prohibit the marking of fruit with wrong brands and packing in any fraudulent manner.

The seed branch qf the department of agriculture was estab- lished in 1900 for the purpose of encouraging the production and use of seeds of superior quality, thereby improving all kinds of field and garden crops grown in Canada. Seeds are tested in the laboratory for purity and germination on behalf of farmers and seed merchants, and scientific investigations relating to seeds are conducted and reported upon. In the year 1 906-1 907 6676 samples of seeds were tested. Encouragement to seed- growing is given by the holding of seed fairs, and bulletins are issued on weeds, the methods of treating seed-wheat

against smut and on other subjects. Collections of weed seeds are issued to merchants and others to enable them readily to identify noxious weed seeds. The Seed Control Act of 1905 brings under strict regulations the trade in agricultural seeds, prohibiting the sale for seeding of cereals, grasses, clovers or forage plants unless free from weeds specified, and imposing severe penalties for infringements.

The census and statistics office, reorganized as a branch of the department of agriculture in 1905, undertakes a complete census of population, of agriculture, of manufactures and of all the natural products of the Dominion every ten years, a census of the population and agriculture of the three North- West Provinces every five years, and various supplemental statistical inquiries at shorter intervals.

Experimental farms were established in 1887 in different parts of the Dominion, and were so located as to render efficient help

to the farmers in the more thickly settled districts, and at the same time to cover the varied climatic and other conditions which influence agriculture in Canada. The central experimental farm is situated at Ottawa, near the boundary line Expert- between Quebec and Ontario, where it serves as an aid farms. to agriculture in these two important provinces. One of the four branch farms then established is at Napp'an, Nova Scotia, near the boundary between that province and New Brunswick, where it serves the farmers of the three maritime provinces. A second branch experimental farm is at Brandon in Manitoba, a third is at Indian Head in Saskatchewan and the fourth is at Agassiz in the coast climate of British Columbia. In 1906-1907 two new branch farms were established. One is situated at Lethbridge, southern Alberta, where problems will be investigated concerning agriculture upon irrigated land and dry farming under conditions of a scanty rainfall. The other is at Lacombe, northern Alberta, about 70 m. south of Edmonton, in the centre of a good agricultural district on the Canadian Pacific railway. Additional branch farms in different parts of the Dominion are in process of establishment. At all these farms experiments are conducted to gain information as to the best methods of preparing the land for crop and of maintaining its fertility, the most useful and profitable crops to grow, and how the various crops grown can be disposed of to the greatest advantage. To this end

experiments are conducted in the feeding of cattle, sheep and swine for flesh, the feeding of cows for the production of milk, and Of poultry both for flesh and eggs. Experiments are also conducted to test the merits of new or untried varieties of cereals and other field crops, of grasses, forage plants, fruits, vegetables, plants and trees; and samples, particularly of the most promising cereals, are distributed freely among farmers for trial, so that those which promise to be most profitable may be rapidly brought into general cultiva- tion. Annual reports and occasional bulletins are published and widely distributed, giving the results of this work. Farmers are invited to visit these experimental farms, and a large corre- spondence is conducted with those interested in agriculture in all parts of the Dominion, who are encouraged to ask advice and information from the officers of the farms.

The governments of the several provinces each have a depart- ment of agriculture. Among other provincial agencies for A . imparting information there are farmers' institutes,

cultural travelling dairies, live-stock associations, farmers', organiza- dairymen's, seed-growers', and fruit-growers' associa- tions, and agricultural and horticultural societies. These are all maintained or assisted by the several provinces. Parts of the proceedings and many of the ad- dresses and papers presented at the more important meetings of these associations are published by the provincial governments, and distributed free to farmers who desire to have them. There are also annual agricultural exhibitions of a highly important character, where improvements in connexion with agricultural and horticultural products, live-stock, implements, &C, are shown in competition. The Dominion government makes in turn to one of the chief local agricultural exhibition societies a grant of $50,000 for the purposes of the national representation of agriculture and live-stock. The exhibition receiving the grant loses its local character, and thus becomes the Dominion exhibi- tion or fair for that year.

There are several important agricultural colleges for the practical education of young men in farming, foremost amongst them being the Ontario Agricultural College at Guelph. Agri- cultural colleges are also maintained at Truro, Nova Scotia, and Winnipeg, Manitoba. In most of the provinces are dairy schools where practical instruction and training are given. Since the beginning of the 20th century agricultural education and rural training in Canada have been greatly stimulated by the munificence of Sir William C. Macdonald of Montreal. A donation by him of $10,000, distributed to boys and girls on Canadian farms for prizes in a competition for the selection of seed

grain, as recommended by Professor J. W. Robertson, led to the Macdonald-Robertson Seed Growers' Association. This

tlons and education.

soon assumed national proportions in the Canadian Seed Growers' Association, which, with the seed branch of the department of agriculture mentioned above, has done much to raise to a uniform standard of excellence the grain grown over large areas of' the Canadian wheat-fields. The Macdonald Institute at Guelph, Ontario, the buildings and equipment of which Sir William provided at a cost of $182,500, and the Macdonald College at Ste Anne de Bellevue, 20 m. west of Montreal, have been established to promote the cause of rural education upor. the lines of nature study, with school gardens, manual training, doiriestic science, &c, which on both sides of the Atlantic are now being found so effective in the hands of properly trained and enthusiastic teachers. The property of the Macdonald College at Ste Anne de Bellevue comprises 561 acres, of which 74 acres are devoted to campus and field-research plots, 100 acres to a petite culture farm and 387 acres to a live-stock and grain farm. The college includes a sehoolfbr teachers, a school of theoretical and practical agriculture and a school of household science for the training of young women. The land, buildings and equipment of the college, which cost over $2,500,000, were presented by Sir William Macdonald; who in addition has pro- vided for the future maintenance of the work by a trust fund of over $2 ,000,000. In connexion with the public elementary schools throughout Canada; "where the principles of agriculture are taught to some extent, manual training centres, provided out of funds supplied by the same public-spirited donor, are now maintained by local and provincial public school authorities. (E. H. G.)

History

About a.d. 1000 Leif Ericsson, a Norseman, led an expedition from Greenland to the shores probably of what is now Canada, but the first effective: contact of Europeans with Canada „. was not until the end of the 15th century. John Cabot {q.v.), sailing from Bristol, reached the shores of Canada in 1497. Soon after fishermen from Europe began to go in considerable numbers to the Newfoundland banks, and in time to the coasts of the mainland of America. In 1534 a French expedition under Jacques Cartier, a seaman of St Malo, sent' out by Francis I., entered the Gulf of St Lawrence: In the following year Cartier sailed up the river as far as the Lachine Rapids, to the spot where Montreal now stands. During the next sixty years -the fisheries and the fur trade

received some attention, but no colonization was undertaken.

At the beginning of the 17th century we find the first great* name in Canadian history. Samuel de Champlain (q.v.), who had seen service under Henry IV. of France, was employed in the interests of successive fur-trading colony. monopolies and sailed up the St Lawrence in 1603. In the next year he was on the Bay of Fundy and had a share in-founding the first permanent French colony in North America ˆ•that of Port Royal, now Annapolis, Nova Scotia. In 1608 he began the settlement which was named Quebec. From 1608 to his death in 1635 Champlain worked unceasingly to develop Canada as a colony, to promote the fur trade and to explore the interior. He passed southward from the St Lawrence to the beautiful lake which still bears his name and also westward, up the St Lawrence and the Ottawa, in the dim hope of reaching the shores of China. He reached Lake Huron and Lake Ontario, but not the great lakes stretching still farther west.

The era was that of the Thirty Years' War (1618-48), and during that great upheaval England was sometimes fighting France. Already, in 1613, the English from Virginia had almost completely wiped out the French settlement at Port Royal, and when in 1629 a small English fleet appeared at Quebec, Champlain was forced to surrender But in 1632 Canada was restored to France by the treaty of St Germain-en-Laye. . Just at this time was formed under the aegis of Cardinal Richelieu the " Company of New France," known popularly as "The Company of One Hundred Associates." With 120 members' it was granted the whole St Lawrence valley; for fifteen years from 1629 it was to have a complete monopoly of trade; and products from its territory were to enter France

free of duty. In return the company was to take to New France ' 300 colonists a year; only French Catholics might go; and for each settlement the company was to provide three priests. ■ Until 1663 this company controlled New France.

It was an era of missionary zeal in the Roman Catholic church, and Canada became the favourite mission. The Society of Jesus was only one of several orders — Franciscans (Recollets), Sulpicians, Ursulines, &c. — who worked in New France. The Jesuits have attracted chief

attention^ not ‘merely on account of their superior zeal and numbers, but also because of the tragic fate of some of their missionaries in Canada. In the voluminous Relations of their doings the story has beeh preserved. Among the Huron Indians, whose settlements bordered on the lake of that name, they secured a great influence. But there was relentless war between the Hurons and the Iroquois occupying the southern shore of Lake Ontario, and when in 1649 the Iroquois ruined and almost completely destroyed the Hurons, the Jesuit missionaries also fell victims to the conquerors’ rage. Missionaries to the Iroquois themselves met with a similar fate and the missions failed. Commercial life also languished. The company planned by Richelieu was not a success. It did little to colonize New France, and in 1660, after more than thirty years of its monopoly, there were not more than 2000 French in the whole country. In 1663 the charter of the company was revoked. No longer was a trading Company to discharge the duties of a sovereign. New France now became a royal province, with governor, intendant, &c, on the model of the provinces of France.

In 1664 a new ” Company of the West Indies ” (Compagnie des Indes Occidentales) was organized to control French trade and colonization not only in Canada but also in West Africa, South America and the West Indies. At first it promised well. In 1665 some 2000 emigrants were sent to Canada; the European population was soon doubled, and Louis XIV. began to take a personal interest in the colony. But once more, in contrast with English experience, the great trading company proved a failure in French hands as a colonizing agent, and in 1674 its charter was summarily revoked by Louis XIV. Hence- forth in name, if not in fact, monopoly is ended in Canada. ■ By this time French explorers were pressing forward to unravel the mystery of the interior. By 1659 two Frenchmen, Radisson and Groseillers, had penetrated beyond the great lakes to the prairies of the far West; they were probably the first Europeans to see the Mississippi. By 1666 a French mission was established on the shores of Lake Superior, and in 1673 Joliet and Marquette, explorers from Canada, reached and for some distance descended the Mississippi. Five years later Cavelier de la Salle was making his toilsome way westward from Quebec to discover the true character of the great river and to perform the feat, perilous in view of the probable hostility of the natives, of descending it to the sea. In 1682 he accom- plished his task, took possession of the valley of the Mississippi in the name of Louis XIV. and called’ it Louisiana. Thus from Canada as her basis was France reaching out to grasp a continent.

There was a keen rivalry between church and state for dominance in this new empire. In 1659 arrived at Quebec a young prelate of noble

birth, Francois Xavier de Laval- Montmorency, who had come to rule the church in Canada, An ascetic, who practised the whole cycle of medieval austerities, he was determined that Canada should be ruled by the church, and he desired for New France a Puritanism as strict as that of New England. His especial zeal was directed towards the welfare of the Indians. These people showed, to their own ruin, a reckless liking for the brandy of the white man. Laval insisted that the traders should not supply brandy to the natives. He declared excommunicate any one who did so and for a time he triumphed. More than once he drove from Canada governors who tried to thwart him. In 1663 he was actually invited to choose a governor after his own mind and did so, but with no cessation of the old disputes. In 1672 Louis de

Buade, eomte de Frontenac (g.v.), was named governor of New France, and in him the church found her match. Yet not at once; for, after a bitter struggle, he was recalled in 1682. But Canada needed him. He knew how to control the ferocious Iroquois, who had cut off France from access to Lake Ontario; to check them he had built a fort where now stands the city of Kingston. With Frontenac gone, these savages almost strangled the colony. On a stormy August 1 night in 1689 1500 Iroquois burst in on the village of Lachine near Montreal, butchered 200 of its people, and carried off more than 100 to be tortured to death at their leisure. Then the strong man Frontenac was recalled to face the crisis.

It was a critical era. James II. had fallen in England, and William III. was organizing Europe ftgainst French aggression. France's plan for a great empire in America was now taking shape and there, as in Europe, a deadly wjtjˆ** struggle with England was inevitable. Frontenac England. planned attacks upon New England and encouraged a ruthless border warfare that involved many horrors. Him, in return, the English attacked. Sir William Phips sailed from Boston in 1690, conquered Acadia, now Nova Scotia, and then hazarded the greater task of leading a fleet up the St Lawrence against Quebec. On the 16th of October 1690 thirty-four English ships, some of them only fishing craft, appeared in its basin and demanded the surrender of the town. When Frontenac answered defiantly, Phips attacked the place; but he was repulsed and in the end sailed away unsuccessful.

Each side had now begun to see that the vital point was control of the interior, which time was to prove the most extensive fertile area in the world. La Salle's expedition had aroused the French to the importance of the Mississippi," and they Soon had a bold plan to occupy it, to

close in from the rear on the English on the Atlantic coast, seize their colonies and even deport the colonists. The plan was audacious, for the English in America outnumbered the French by twenty to one. But their colonies were democracies, disunited because each was pursuing its own special interests, while the French were united under despotic leadership. Frontenac attacked the Iroquois mercilessly in 1696 and forced these proud savages to sue for peace. But in the next year was made the treaty of Ryswick, which brought a pause in the conflict, and in 1698 Frontenac died.

After Frontenac the Iroquois, though still hostile to France, are formidable no more, and the struggle for the continent is frankly between the English and the French. The peace of Ryswick proved but a truce, and when in 1701, on the death of the exiled James II., Louis XIV. flouted the claims of William III. to the throne of England by proclaiming as king James's son, renewed war was inevitable. In Europe it saw the brilliant victories of Marlborough; in America it was less decisive, but France lost heavily. Though the English, led by Sir Hovenden Walker, made in 1711 an effort to take Quebec which proved abortive, they seized Nova Scotia; and when the treaty of Utrecht was made in 17 13, France admitted defeat in America by yielding to Britain her claims to Hudson Bay, Newfoundland and Nova Scotia. • But she still held the shores of the St Lawrence, and she retained, too, the island of Cape Breton to command its mouth. There she built speedily the fortress of Louisbourg, and prepared once more to challenge British supremacy in America. With a sound instinct that looked to future greatness, France still aimed, more and more, at the control of the interior of the Continent. The danger from the Iroquois on Lake Ontario had long cut her off from the most direct access to the West, and from the occupation of the Ohio valley leading to the Mississippi, but now free from this savage scourge she could go where she would. In 1701 she founded Detroit, commanding the route from Lake Erie to Lake Huron. Her missionaries and leaders were already at Sault Ste Marie commanding the approach to Lake Superior, and at Michilimackinac commanding that to Lake Michigan. They had also penetrated to what is now the Canadian West, and it was a French Canadian, La Verendrye, who, by the route leading past the point where now stands the city of Winnipeg,

pressed on into the far West until in 1743, first recorded of white men, he came in sight of the Rocky Mountains. In the south of the continent France also crowned La Salle's work by founding early in the 18th century New Orleans at the mouth of the Mississippi. It was a far cry from New Orleans to Quebec. If France could link them by a chain of settlements and shut in the English to their narrow strip of Atlantic seaboard there was good promise that North America would be hers.

The project was far-reaching, but France could do little to make it effective. Louis XV. allowed her navy to decline and her people showed little inclination for emigration to the colonies. In 1 744, when the war of the Austrian Succession broke out, the New England colonies planned and in 1745 effected the capture of Louisbourg, the stronghold of France in Cape Breton Island, which menaced their commerce. But to their disgust, when the peace of Aix-la-Chapelle was made in 1748, this conquest was handed back to France. She continued her work of building a line of forts on the great lakes — on the river Niagara, on the Ohio, on the Mississippi; and the English colonies, with the enemy thus in their rear, grew ever more restive. In 1753 Virginia warned the French on the Ohio that they were encroaching on British territory. The next year, in circumstances curiously like those which were repeated when the French expedition under Marchand menaced Britain in Egypt by seeking to establish a post on the Upper Nile, George Washington, a young Virginian officer, was sent to drive the French from their Fort Duquesne on the Ohio river, where now stands Pittsburgh. The result was sharp fighting between English and French in a time of nominal peace. In 1755 the British took the stern step of deporting the Acadian French from Nova Scotia. Though this province had been ceded to Great Britain in 17 13 many of the Acadians had refused to accept British sovereignty. In 1749 the British founded Halifax, began to colonize Nova Scotia, and, with war imminent, deemed it prudent to disperse the Acadians, chiefly along the Atlantic seaboard (see Nova Scotia: History). In 1756 the Seven Years' War definitely began. France had no resources to cope with those of Britain in America, and the British command of the sea proved decisive. On the 13th of September 1759 Wolfe won his great victory before Quebec, which involved the fall of that place, and a year later at Montreal the French army in Canada surrendered. By the peace of Paris, 1763, the whole of New France was finally ceded to Great Britain.

With only about 60,000 French in Canada at the time of the conquest it might have seemed as if this population would soon be absorbed by the incoming British. Some thought Englishˆ that, under a Protestant sovereign, the Canadian s/oa. eS " Catholics would be rapidly

converted to Protestantism. But the French type proved stubbornly persistent and to this day dominates the older Canada. The first English settlers in the conquered country were chiefly petty traders, not of a character to lead in social or public affairs. The result was that the government of the time co-operated rather with the leaders among the French.

After peace was concluded in 1763, Canada was governed under the authority of a royal proclamation, but sooner or later a constitution specially adapted to the needs of the country was inevitable. In 1774 this was provided by the Quebec Act passed by the Imperial parliament. Under this act the western territory which France had claimed, extending as far as the Mississippi and south to the Ohio, was included with Canada in what was called the Province of Quebec. This vast territory was to be governed despotically from Quebec; the Roman Catholic church was given its old privileges in Canada; and the French civil law was established permanently side by side with the English criminal law. The act linked the land-owning class in Canada and the church by ties of self-interest to the British cause. The habitant, placed again under their authority, had less reason to be content.

In 1775 began the American Revolution. Its leaders tried to make the revolt continental, and invaded Canada, hoping that the French would join them. They took Montreal and besieged

Quebec during the winter of 1775-1776; but the prudent leader- ship of Sir Guy" Carleton, afterwards Lord Dorchester, saved Quebec and in 1776 the revolutionary army withdrew unsuccess- ful from Canada. Since that time any prospect of Canada's union to the United States has been very remote.

But the American Revolution profoundly influenced the life of Canada. The country became the refuge of thousands of American loyalists who would not desert Great Britain. To Nova Scotia, to what are now New Brunswick (q.v.) and Ontario (q.v.) they fled in numbers not easily estimated, but probably reaching about 40,000. Until this time the present New Bruns- wick and Ontario had contained few European settlers; now they developed, largely under the influence of the loyalists of the Revolution. This meant that the American type of colonial life would be reproduced in Canada; but it meant also bitter hostility on the part of these colonists to the United States, which refused in any way to compensate the loyalists for their con- fiscated property. Great Britain did something; the loyalists received liberal grants of land and cash compensation amounting to nearly

£4,000,000.

A prevailingly French type of government was now no longer adequate in Canada, and in 1791 was passed by the British parliament the" Constitutional Act, separating Canada at the Ottawa river into two parts, each with its own government; Lower Canada, chiefly French, retaining the old system of laws, with representative institutions now added, and Upper Canada, on the purely British model. (For the history of Lower and Upper Canada, now Quebec and Ontario, the separate articles must be consulted.) Each province had special problems; the French in Lower Canada aimed at securing political power for their own race, while in Upper Canada there was no race problem, and the great struggle was for independence of official control and in all essential matters for government by the people. It may be doubted whether at this time it would have been safe to give these small communities complete self-government. But this a clamorous radical element demanded insistently, and the issue was the chief one in Canada for half a century.

But before this issue matured war broke out between Great Britain and the United States in 181 2 from causes due chiefly to Napoleon's continental policy. The war seemed to furnish a renewed opportunity to annex Canada to the American Union, and Canada became the chief theatre of conflict. The struggle was most vigorous on the Niagara frontier. But in the end the American invasion failed and the treaty made at Ghent in 1814 left the previous status unaltered.

In 1837 a few French Canadians in Lower Canada, led by Louis Joseph Papineau (q.v.), took up arms with the wild idea of establishing a French republic on the St Lawrence. In the same year William Lyon Mackenzie (q.v.) led a similar armed revolt in Upper Canada against the domination of the ruling officialdom called, with little reason, the " Family Compact." Happening, as these revolts did, just at the time of Queen Victoria's accession, they attracted wide attention, and in 1838 the earl of Durham (q.v.) was sent to govern Canada and report on Durham. the affairs of B ritish North America. Clothed as he was with large powers, he undertook in the interests of leniency and reconciliation to banish, without trial, some leaders of the rebellion in Lower Canada. For this reason he was censured at home and he promptly resigned, after spending only five months in the country. But his Report, published in the following year, is a masterly survey of the situation and included recommenda- tions that profoundly influenced the later history of Canada. He recommended the union of the two Canadian provinces at once, the ultimate union of all British North America and the granting to this large state of full self-government.

The French element he thought a menace to Canada's future, and partly for this reason he desired all the provinces to unite so that the British element should be dominant.

To carry out Lord Durham's policy the British government passed in 1840 an Act of Union joining Upper and Lower Canada, and sent out as governor Charles Poulett Thompson, who was made Baron Sydenham and Toronto:. In the single

parliament each province was equally represented. By this time there was more than a million people in Canada, and the country was becoming important. Lord Sydenham died in 1841 before his work was completed, and he left Canada stiH in a troubled condition. The French were suspicious of the Union, aimed avowedly at checking their influence, and the complete self-government for which the " Reformers " in English-speaking Canada had clamoured was not yet conceded by the colonial office. But rapidly it became obvious that the provinces united had become too important to be held in leading strings. The issue was finally settled in 1849 when the earl of Elgin was governor and the Canadian legislature, sitting at Montreal, passed by a large majority the Rebellion Losses Bill, compensating citizens, some of them French, in Lower Canada, for losses incurred at the hands of the loyal party during the rebellion a decade earlier. The cry was easily raised by the Conservative minority that this was to vote reward for rebellion. They appealed to London for inter- vention. The mob in Montreal burned the parliament buildings and stoned Lord Elgin himself because he gave the royal assent to the bill. He did so in the face of this fierce opposition, on the ground that, in Canadian domestic affairs, the Canadian parliament must be supreme.

The union of the two provinces did not work well. Each was jealous of the other and deadlocks frequently occurred. Commercially, after 1849, Canada was prosperous. In 1854 Lord Elgin negotiated a reciprocity treaty with the United States which gave Canadian natural products free entrance to the American market. The outbreak of the Civil War in the United States in 1861 increased the demand for such products, and Canada enjoyed an extensive trade with her neighbour. But, owing largely to the unfriendly attitude of Great Britain to the northern side during the war, the United States cancelled the treaty,

when its first term of ten years ended in 1865, and it has never been renewed.

Under the party system in Canada cabinets changed as often as, until recently, they did in France, and the union of the two provinces did not give political stability. The French and English were sufficiently equal in strength to make the task of government well nigh impossible. In 1864 came the opportunity for change, when New Brunswick, Nova Scotia and Prince Edward Island were considering a federal union. Canada suggested a wider plan to include herself and, in October 1864, a conference was held at Quebec. The conference out- lined a plan of federation which subsequently, with slight modifications, passed th2 imperial parliament as ” The British North America Act,” and on the 1st of July 1867, the Dominion of Canada came into existence. It was born during the era of the American Civil War, and was planned to correct defects which time had revealed in the American federation. The provinces in Canada were conceded less power than have the states in the American union; the federal government retaining the residuum of power not conceded. (G.M.W.)

When federation was accomplished in 1867 the Dominion of Canada comprised only the four provinces of Ontario, Quebec, Canada New Brunswick and Nova Scotia. Lord Monck was since appointed the first governor-general, and at his

federa- request the Hon. John Alexander Macdonald under- took the formation of an administration. A coalition cabinet was formed, including the foremost Liberals and Con- servatives drawn from the different provinces. Under a proclamation issued from Windsor Castle by Queen Victoria on the 22nd of May the new constitution came into effect on the 1st of July. This birthday of the Dominion has been fixed by statute as a public holiday, and is annually observed under the name of ” Dominion Day.” Seventy- two senators — half Conservatives and half Liberals — were appointed, and lieutenant- governors were named for the four provinces. The prime minister was created a K.C.B., and minor honours were con- ferred on other ministers in recognition of their services in bringing about the union.

The first general election for the Dominion House of Commons was held during the month of August, and except in the province of Nova Scotia was favourable to the administration, which entered upon its parliamentary work with a Scotia majority of thirty-two. The first session of parliament question. was opened on the 8th of November, but adjourned on the 21st of December till the 12th of March 1868, chiefly on account of the fact that members of the Dominion

parliament were allowed, in Ontario and Quebec, to hold seats in the local legislatures, so that it was difficult for the different bodies to be in session simultaneously. It was not till 1873 that an act was passed making members of the local legislatures ineligible for seats in the House of Commons. Immediately after the completion of federation a serious agitation for repeal of the union arose in Nova Scotia, which had been brought into the federal system by a vote of the existing legislature, without any direct preliminary appeal to the people. Headed by Joseph Howe (q.v.), the advocates of repeal swept the province at the Dominion election. Out of 19 members then elected 18 were pledged to repeal, Dr Tupper, the minister responsible for carrying the Act of Union, alone among the supporters of federation securing a seat. The local assembly, in which 36 out of 38 members were committed to repeal, passed an address to Her Majesty praying her not to ” reduce this free, happy and hitherto self-governed province to the degraded condition of a servile dependency of Canada,” and sent Howe with a delegation to London to lay the petition at the foot of the throne. Howe enlisted the support of John Bright and other members of parliament, but the imperial government was firm, and the duke of Buckingham, as colonial secretary, soon informed the governor-general in a despatch that consent could not be given for the withdrawal of Nova Scotia from the Dominion. Meanwhile Howe, convinced of the impossibility of effecting separation, and fearing disloyal tendencies which had manifested themselves in some of its advocates, entered into negotiations with Dr Tupper in London, and later with the Dominion government, for better financial terms than those originally arranged for Nova Scotia in the federal system. The estimated amount of provincial debt assumed by the general government was increased by $1,186,756, and a special annual subsidy of $82,698 was granted for a period of ten years. These terms having been agreed to, Howe, as a pledge of his approval and support, accepted a seat as secretary of state in the Dominion cabinet. By taking this course he sacrificed much of his remark- able popularity in his native province, but confirmed the work of consolidating the Dominion. It was many years before the bitterness of feeling aroused by the repeal agitation entirely subsided in Nova Scotia.

A gloom was cast over the first parliament of the Dominion by the assassination in 1868 of one of the most brilliant figures in the politics of the time, D’Arcy McGee (q.v.). His murderer, a Fenian acting under the instructions of the secret society to which he belonged, was discovered, and executed in 1869.

The reorganization of the various departments of state, in view of the

wider interests with which they had to deal, occupied much of the attention of the first parliament of the Dominion. In 1867 the postal rates were reduced and unified. In 1868 a militia system for the whole Dominion was organized, the tariff altered and systematized, and a Civil Service Act passed. The banking system of the country was put on a sound footing by a series of acts culminating in 187 1, and in the same year a uniform system of decimal currency was established for the whole Dominion. While the new machinery of state was thus being put in operation other large questions presented themselves.

The construction of the Inter-Colonial railway as a connecting link between the provinces on the seaboard and those along the St Lawrence and the Great Lakes was a part of the federation compact, a clause of the British Colonial North America Act providing that it should be begun railway. within six months after the date of union. The guarantee of the imperial government made easy the provision

terri- tories.

of the necessary capital, but as this was coupled with a voice in the decision of the route, it complicated the latter question, about which a keen contest arose. The most direct and therefore commercially most promising line of construction passed near the boundary of the United States. Recent friction with that country made this route objected to by the imperial and many Canadian authorities. Ultimately the longer, more expensive, but more isolated route along the shores of the Gulf of St Lawrence was adopted. The work was taken in hand at once, and pressed steadily forward to completion. It has since been supplemented by other lines built for more distinctly com- mercial ends. Though not for many years a financial success, the Inter-Colonial railway, which Was opened in 1876, has in a marked way fulfilled its object by binding together socially and industrially widely separated portions of the Dominion.

Within a ‘month of the meeting of the first parliament of the Dominion a question of vast importance to the future of the Hudson’s count ry was brought forward by the Hon.W.McDougall Bay Com- in a series of resolutions which were adopted, and on pany which was based an address to the queen praying that

Her Majesty would unite Rupert's Land and the North- West Territories to Canada. A delegation consisting of Sir G. E. Cartier and the Hon. W. McDougall was in 1868 sent to England to negotiate with the Hudson's Bay Company (q.v.) for the extinction of its claims, and to arrange with the imperial government for the transfer of the territory. After' prolonged discussions the company agreed to surrender to the crown, in consideration of a payment of £300,006, the rights arid interests in the north-west guaranteed by its charter, with the exception of a reservation of one-twentieth part of the fertile belt, arid 45,000 acres of land adjacent to the trading posts of the company. For the purposes of this agreement the " fertile belt " was to be bounded as follows: — "On the south by the U.S. boundaryˆ on the west by the Rocky Mountains, on the north by the northern branch of the Saskatchewan river, on the east by Lake Winnipeg, the Lake of the Woods, and the waters connect- ing them." An act authorizing the change of control was passed by the imperial parliament in July 1868; the arrangement made with the Hudson's Bay Company was accepted by the Canadian parliament in June 1869; and the deed of "surrender from the Hudson's Bay Company to Her Majesty is dated November 10th, 1869. In anticipation of the formal transfer to the Dominion an act was passed by the Canadian parliament in the same month providing for the temporary government of Rupert's Land and the North- West Territories. On the 28th of September the Hon. W. McDougall was appointed the first governor, and left at once to assume control on the 1st of December, when it had been understood that the formal change of possession Would'take place. Meanwhile a serious condition of affairs was developing in the Red river settlement, the most considerable centre of population in the newly acquired territory. The half-breeds rebellion, regarded with suspicion a transfer of control concerning which they had not been consulted. They resented the presence of the Canadian surveyors sent to lay out roads and townships, and the tactless way in which 'some of these did their work increased the suspicion that long-established rights to the soil would not be respected. A population largely Roman Catholic in creed, and partly French in origin and language, feared that an influx of new settlers would overthrow cherished traditions. Some were afraid of increased taxation. A group of immigrants from the United States fomented disturb- ance in the hope that it would lead to annexation. Louis Riel, a fanatical half-breed, placed himself at the head of the move- ment. His followers established what they called a " provisional government " of which he was chosen president, and When the newly appointed governor reached the boundary line he was prevented from entering the territory. Several of the white settlers who resisted this rebellious movement were arrested and kept in

confinement. One of these, a young man named Thomas Scott, having treated Riel with defiance, was court-martialled for treason to the provisional government, condemned, and on the 4th of March 1870, shot in cold blood under the walls of Fort

Garry. This crime aroused intense excitement througl country, and the Orange body, particularly, to whic belonged, demanded the immediate punishment of his n and the suppression of the rebellion. An armed force, cc partly of British regulars and partly of Canadian vol was made ready and placed under the command of Garnet Wolseley, afterwards Lord Wolseley. As a force could not pass through the United States, the ex Was compelled to take the route up Lake Superior, and i head of that lake through 500 m. of unbroken and wilderness. In August 1870, the force reached Fort to find the rebels scattered and their leader, Riel, a fu. the neighbouring states. Meanwhile, during the progre expedition, an act had been passed creating Manitoba a p with full powers of self-government, and the arriva military was closely followed by that of the first g Mr (later Sir) Adams G. Archibald, who succeeded in ing the administration on a satisfactory basis. For became Winnipeg, and there were soon indications was destined to be a great city, and the commerci way : to the vast prairies that lay beyond. Meanw adequate means of transportation were provided, it 1 that city and prairie alike must wait for any large i population.

■ •■ Provision was made in the British- North Americ; receive new provinces into the Dominion. Manitoba first to be constituted; in 1871 British Columbia, which had hitherto held aloof, determined, under the persuasion of a sympathetic governor, Mr (later Sir) Antony Musgrave, to throw in its lot with the D Popular feeling in British Columbia itself was not sti favour of union, and the terms under which the new was to be received were the subject of much negotiation provincial authorities, and were keenly debated in p; before the bill in which they were embodied was finalb The clause on which there was the widest divergence Was one providing that a trans-continental railway, a the Pacific province with the eastern part of the E should be begun within tWo, and completed within t To a province which at the time contained a populatio 36,000, and but half of this white, the inducement thus was immense. The Opposition in parliament claimed contract was one impossible for the Dominion to fu government of Sir John Macdonald felt, however, future of the Dominion depended upon linking tog Atlantic and the Pacific, and in view of the vast ui spaces lying between the Great Lakes and the Rocky M open to immigration from the United States, their ai undertaking the work was doubtless justified. The coi of the Canadian

Pacific railway, thus inaugurated, h several years the chief subject of political contentior opposing parties.

Anticipating the order of chronology slightly, ii mentioned here that in 1873 Prince Edward Island (q. had in 1865 decisively rejected proposals of the Quebec c and had in the following year repeated its rejection of by a resolution of the legislature affirming that no tern could offer would be acceptable, now decided to thnrv with the Dominion. The island had become involvec railway expenditure, and financial necessities led the take a broader view of the question. In the end t government assumed the railway debt, arrangem made for extinguishing certain proprietary rights i long been a source of discontent, and on the 1st of the Dominion was rounded off by the accession o province.

Finally in 1878, in order to remove all doubts occupied territory, an imperial order in council v, in response to an address of the Canadian parliame ing to the Dominion all British possessions in Nortl except Newfoundland. That small colony, which ha presented at the Quebec conference, also rejected the

of 1865, and, in spite pf various efforts to arrange satisfac- tory terms, has steadily held aloof, and so has proved the only obstacle to the complete political unification of British North America.

A signal proof was soon furnished of the new standing in the empire which federation had given to the Canadian provinces. fi mm A heritage of differences and difficulties had been iiiities left to be settled between England, Canada and the witb the American Union as the result of the Civil War. . In United retaliation for the supposed sympathy of Canadians with the South in this struggle the victorious North took steps to abrogate in 1866 the reciprocity treaty of 1854, which had conferred such great advantages on both countries. It followed that the citizens of the United States lost the right which they had received under the treaty to share in the fisheries of Canada. American fishermen, how- ever, showed so little inclination to give up what they had enjoyed so long, that it was found necessary to take vigorous steps to protect Canadian fishing rights ,, and frequent causes of friction consequently arose. During the progress of the Civil War American feeling had been greatly exasperated by the losses inflicted on commerce by the cruiser “Alabama,” which, it was claimed, was

allowed to leave a British port in violation of international law. On the other hand, Canadian feeling had been equally exasperated by the Fenian raids, organized on American soil, which had cost Canada much expenditure of money and some loss of life. In addition to these causes of difference there was an unsettled boundary dispute in British Columbia, and questions about the navigation of rivers common to the United States and Canada, In 1869 the government of Canada sent a deputation to England to press upon the imperial government the necessity of asserting Canada's position in regard to the fisheries, and the desirability of settling other questions in dispute with the republic. The outcome of this application was the appointment of a commission to consider and if possible settle outstanding differences between the three countries. The prime minister of the Dominion, Sir John Macdonald, was asked to act as one of the imperial commissioners in carrying on these negotiations. This was tbe first time that a colonist had been called upon to assist in the settlement of international disputes. , The commission assembled at the , American capital in February 1871; and after discussions extending over several weeks signed what is known as the treaty of Washington. By the terms of this treaty the " Alabama " claims and the San Juan boundary were referred to arbitration; the free navigation of the 1 St. Lawrence was granted to the United States in return for the, free use of Lake Michigan and certain Alaskan rivers; and it was settled that a further commission should decide the excess of value of the Canadian fisheries thrown open to the United States over and above the reciprocal, concessions made to Canada. Much to the annoyance of the people, of the Dominion the claims for the Fenian raids were withdrawn at the request of the British government, which undertook to make good to Canada any losses she had suffered. To some of these terms the representative of Canada made a strenuous opposition, and in finally signing the treaty stated that he did so chiefly for imperial interests, although in these he believed Canadian interests to be involved; The clauses relating to the fisheries and the San Juan boundary were reserved for the approval of the Canadian parliament, which, in spite of much violent opposition, ratified them by a large majority. Under the "Alabama" arbitration • Great Britain ,paid to the United States damages to the amount of $15,500,000, while the German Emperor decided the San Juan boundary in favour of the United States. The Fishery Commission, on the other hand, which sat in Halifax, awarded Canada $5,500,000 as the excess value of its fisheries for twelve years, and after much hesitation this sum was paid by the United States into the Canadian treasury. An imperial guarantee of a loan for the construction of railways was the only compensation Canada received for the Fenian raids,:

The second general election for the. Dominion took place in 1872. It was marked by the complete defeat of the Anti- Unionist party in Nova Scotia, only one member of Canadian which secured his election, thus exactly reversing the pacific vote of 1867. While Sir John Macdonald's adminis- ™"™y tration was supported in Nova Scotia, it was weakened *"' s on ' in Ontario on account of the clemency shown to Riel, and in Quebec by the refusal to grant a general amnesty to all who had taken part in the rebellion. Two important members of the cabinet, Sir G. Carrier and. Sir F. Hincks, were defeated. Opposition to the Washington treaty and drea,d of the bold railway policy of the government also contributed to weaken its position. . But a grayer blow, ending in the complete over- throw of the administration, was soon to fall as the result of the election, : In 1872 two companies had been formed and received charters to build the Canadian Pacific railway. Sir Hugh Ailan of Montreal was at the head of the one, and the Hon. David Macpherson of Toronto was president of the other. The government endeavoured to bring about an amalgamation of these rival companies, believing that the united energies and financial ability of the whole country were required for sq vast an undertaking. While negotiations to this end were still proceeding the election of r872 came on with the result already mentioned. Soon after the meeting of parliament) a Liberal member of the House, Mr L. S. Huntingdon, formally charged certain members pf the cabinet with having received large sums of money, for use in the election, from Sir Hugh Allan, on condition, as it was claimed, that the Canadian Pacific contract should be given to the new company, of which he became the head on the failure of the plan for amalgamation. These charges were investigated by a royal commission, which was appointed after it had been decided that the parliamentary committee named for that purpose could not legally take evidence under oath. Parliament met in October 1873, to receive thereport of the commission. While members of the government were exonerated by the report from the charge of personal corruption, the payment of large sums of money by Sir Hugh Ailan was fully established, and public feeling on the matter was so strong that Sir J. Macdonald, while asserting his own innocence, felt compelled to resign without waiting for the vote of parliament. Lord Dufferin, who had succeeded Lord Lisgar as governor-general in 1872, at once sent for the leader of the Opposition, Mr Alexander Mackenzie (?.».), who succeeded in forming a Liberal administration which, on appealing to the constituencies, was supported by an over- whelming majority, and held power for the five following years.

On the accession to power of the Liberal party, a new policy was adopted for the construction of the trans-continental railway. It was proposed to lessen the cost of construction by utilizing the water stretches along the route, while, on the ground that the contract made was impossible of fulfilment, the period of completion : was postponed indefinitely. Meanwhile the surveys and constructipn were carried forward not by a company, but. as .a government work. Under this arrangement British Columbia became exceedingly restive, holding the Dominion to the engagement by which it had been induced to enter the union. A representative of the government, Mr (later Sir James) Edgar, sent out to conciliate the province by some new agreement, failed to apcomplish his object, and all the influence of the governor-general, Lord Dufferin, who paid a visit at this time to the Pacific coast, was required to quiet the public excitement, which had shown itself in a resolution passed by the legislature for separation from the Dominioif unless the terms of union were fulfilled.

Meanwhile a policy destined to affect profoundly the future of the. Dominion had, along with that of the construction of the Canadian Pacific railway, become a subject of burning political discussion and party division. ^^tiTnai During the period of Mr Mackenzie's administration policy." a profound business depression affected the whole continent of America. , The Dominion revenue showed a series of; deficits for several years in succession. The factories of

the United States, unduly developed by an extreme system of protection, sought in Canada a slaughter market for their surplus products, to the detriment or destruction of Canadian industries. Meanwhile the republic, which had for many years drained Canada of hundreds of thousands of artisans to work, its factories, steadily declined to consider any suggestion for improving trade relations between the two countries. In these circumstances Sir J. Macdonald brought forward a proposal to adopt what was called a " national policy," or, in other words, a system of protection for Canadian industries. Mr Mackenzie and his chief followers, whose inclinations were towards free trade, pinned their political fortunes to the maintenance of a tariff for revenue only. After some years of fierce discussion in parliament and throughout the country the question was brought to an issue in 1878, when, with a large majority of followers

pledged to carry out protection, Sir John Macdonald was restored to power. The new system was laid before parlia- ment in 1879 by the finance minister, Sir Leonard Tilley; and the tariff then agreed upon, although it received considerable modification from time to time, remained, under both Con- servative and Liberal administrations, the basis of Canadian finance, and, as Canadians generally believed, the bulwark of their industry. It had almost immediately the effect of lessening the exodus of artisans to the United States, and of improving the revenue and so restoring the national credit.

In October 1878 Lord Dufferin's term of office expired, and his place as governor-general was taken by the marquess of Lome, whose welcome to the Dominion was accentuated by the fact that he was the son-in-law of the queen, and that his viceroyalty was shared by the princess Louise. The election of 1878 marked the beginning of a long period of Conservative rule — the premier- ship of Sir J. Macdonald continuing from that time without a break until his death in 1891, while his party remained in power till 1896, This long-continued Conservative supremacy was apparently due to the policy of bold and rapid development which it had adopted, and which appealed to a young and ambitious country more strongly than the more cautious pro- posals of the Liberal leaders. As soon as the government had redeemed its pledge to establish a system of protection a vigorous _ _ railway policy was inaugurated. A contract was made Hon of the with a new company to complete the Canadian Pacific Canadian railway within ten years, on condition of receiving a Pacific grant of $25,000,000 and 25,000,000 acres of land, r way. together with those parts of the line already finished under government direction. After fierce debate in parliament these terms were ratified in the session of 1881. The financial difficulties encountered by the company in carrying out their gigantic task were very great, and in 1884 they were compelled to obtain from the Dominion government a loan of $20,000,000 secured on the company's property. This loan was repaid by 1887. Meanwhile the work was carried forward with so much energy that, five years before the stipulated period of completion, an the 7th of November 1886, the last spike was driven by Mr Donald A. Smith (Lord Strathcona), whose fortune had been largely pledged to the undertaking, along with those of other prominent Canadian business men, especially Mr George Stephen (Lord Mountstephen), Mr Duncan Mclntyre, and Mr R. B. Angus. Under the energetic management of Mr (later Sir) W. C. Van Home, who was appointed president of the company in 1888, the new railway soon became the most prominent feature in the development of the country; lines of steamships were established on the great lakes and the Pacific; a

stream of immigration began to flow into the prairie region; and the increasing prosperity of the railway had a powerful influence in improving the public credit.

Even before the Canadian Pacific railway was fully completed, it proved of great service in a national emergency which suddenly arose in the north-west. With the organization of Manitoba and the opening of improved communication immigrants began to move rapidly westward, and government surveyors were soon busy laying off lands in the Saskatchewan valley. The numbers of the half -breed settlers of this district had been increased by

the migration of many of those who had taken part in the first uprising at Fort Garry. Influenced by somewhat similar motives, fearing from the advance of civilization the destruction of the buffalo, on which they chiefly depended for food, rebellion. with some real grievances and others imaginary, the discontented population sent for Riel, who had been living, since his flight from Fort Garry, in the United States. He returned to put himself at the head of a second rebellion. At first he seemed inclined to act with moderation and on lines of constitutional agitation, but soon, carried away by fanaticism, ambition and vanity, he turned to armed organization against the government. To half-breed rebellion was added the imminent danger of an Indian uprising, to which Riel looked for support. The authorities at Ottawa were at first careless or sceptical in regard to the danger, the reality of which was only brought home to them when a body of mounted police, advancing to regain a small post at Duck Lake, of which the rebels had taken possession, was attacked and twelve of their number killed. Volunteers and militia were at once called out in all the old provinces of Canada, and were quickly conveyed by the newly constructed line of railway to the neighbourhood of the point of disturbance. Major-general Middleton, of th« imperial army, who was then in command of the Canadian militia, led the expedition. Several minor engagements with half-breeds or Indians preceded the final struggle at Batoche, where Gabriel Dumont, Riel's military lieutenant, had skilfully entrenched his forces. After a cautious advance the eagerness of the troops finally overcame the hesita- tion of the commander in exposing his men, the rifle pits were carried with a rush, and the rebellion crushed at a single stroke. Dumont succeeded in escaping across the United States boundary; Riel was captured, imprisoned, and in due course tried for treason. This second rebellion carried on under his leadership had lasted about three months, had cost the country many valuable lives, and in money about five millions of dollars. Clear as was his guilt, Riel's trial, condemnation and execution on the 16th of November

1885, provoked a violent political storm which at one time threatened to overthrow the Conservative govern- ment. The balance of power between parties in parliament was held by the province of Quebec, and there racial and religious feeling evoked no slight sympathy for Riel. But while a section of Quebec was eager to secure the rebel's pardon, Ontario was equally bent on the execution of justice, so that in the final vote on the question in parliament the defection of French Conserva- tives was compensated for by the support of Ontario Liberals. In the end 25 out of 53 French members voted in justification of Riel's punishment. With him were executed several Indian chiefs who had been concerned in a massacre of whites. Painful as were the circumstances connected with this rebellion, it is certain that the united action of the different provinces in suppressing it tended to consolidate Canadian sentiment, and the short military campaign had the effect of fixing public attention upon the immense fertile territory then being opened up.

The general election of 1882 turned chiefly upon endorsement of the national policy of protection; in that of 1887 the electoral test was again applied to the same issue, while Sir John Macdon- Macdonald also asked for approval of the government's aid's action in exacting from Riel the full penalty of his f' scal guilt. On both issues the Conservative policy was po cy ' upheld by the electors, and Macdonald was continued in power with a large parliamentary majority. From the election of 1887 the Riel agitation ceased to seriously influence politics, but the fiscal controversy continued under new forms. Between 1887 and 1 89 1 a vigorous agitation was kept up under Liberal auspices in favour of closer trade relations with the United States, at first under the name of Commercial Union and later under that of Unrestricted Reciprocity. The object in both cases was to break down tariff barriers between the United States and Canada, even though that should be at the expense of discrimination agairist Great Britain. The Conservative party took the position that commercial union, involving as it would a common protec- tive tariff against all other countries, including the motherland,

would inevitably lead to political unification with the United States. The question after long and vehement discussion was brought to a final issue in the election of 1891, and Sir John Macdonald's

government was again sustained. From that time protection became the- settled policy of the country. On their accession to power in 1896 it was adopted by the Liberals, who joined to it a preference for the products of the mother country. Under the protective policy thus repeatedly confirmed, Canada gradually became more independent of the American market than in earlier times, and enjoyed great commercial prosperity. Soon after the election of 1891 Sir John Macdonald (q.v.) died, after an active political career of more than forty years. Under his direction the great lines of policy which have governed the development of Canada as a confederated state within the empire were inaugurated and carried forward with great success, so that his name has become indissolubly connected with the history of the Dominion at its most critical stage.

During the years which succeeded the death of Sir John Macdonald a succession of losses weakened the position of

the Conservative party which had held power so long. aWsZc- The Hon – J- C – C – Abbott, leader of the party in the cessors. Senate, became prime minister on Macdonald's death in

1891, but in 1892 was compelled by ill-health to resign, and in 1893 he died. His successor, Sir John Thompson, after a successful leadership of about two years, died suddenly of heart disease at Windsor Castle, immediately after being sworn of the imperial privy council. Charges of corruption in the administration of the department of public works, which led to the expulsion of one member of parliament, involved also the resignation from the cabinet of Sir Hector Langevin, leader of the French Conservatives, against whom carelessness at least in administration had been established. The brief premiership of Sir Mackenzie Bowell, between 1894 and 1896, was marked by much dissension in the Conservative ranks, ending finally in a reconstruction of the government in 1896 under Sir Charles Tupper. Breaks had been made in the Liberal ranks also by the death in 1892 of the Hon. Alexander Mackenzie and the with- drawal of the Hon. Edward Blake from Canadian politics to accept a seat in the British parliament as a member of the Home Rule party. But the appeal made to the electors in 1896 resulted in a decisive victory for the Liberal party, and marked the beginning of a long period of Liberal rule.

Sir Wilfrid Laurier (q.v.) became prime minister, and strengthened the cabinet which he formed by drawing into , , it from provincial politics the premiers of Ontario,

New Brunswick and Nova Scotia. The administration thus established underwent many changes, but after winning three general elections it was still in power in 1909. The period of Sir Wilfrid Laurier's rule was one of striking progress in material growth, and a marked development of national feeling. While the federation of the provinces favoured the growth of a strong sentiment of Canadian individuality, the result of unification had been to strengthen decidedly the ties that bind the country to the empire. This was as true under Liberal as under Conservative auspices — as Canadians understood the meaning of these party names. The outbreak of the South African war in 1899 furnished an occasion for a practical display of Canadian loyalty to imperial interests. Three contingents of troops were despatched to the seat of war and took an active part in the events which finally secured the triumph of the British arms. These forces were supplemented by a regiment of Canadian horse raised and equipped at the sole expense of Lord Strathcona, the high commissioner of the Dominion in London. The same spirit was illustrated in other ways. In bringing about a system of penny postage throughout the empire; in forwarding the construction of the Pacific cable to secure close and safe imperial telegraphic connexion; in creating rapid and efficient lines of steamship communication with the motherland and all the colonies; in granting tariff preference to British goods and in striving for preferential treatment of inter-imperial trade; in assuming responsibility for imperial defence at the two important stations of Halifax and Esquimalt,— Canada, under the

guidance of Sir Wilfrid Laurier and his party, took a leading part and showed a truly national spirit.

The opening years of the 20th century were marked by a prolonged period of great prosperity. A steady stream of emigrants from Europe and the United States, some- times rising in number to 300,000 in a single year, Spans/on. began to occupy the vast western prairies. So considerable was the growth of this section of the Dominion that in 1905 it was found necessary to form two new provinces, Alberta and Saskatchewan, from the North-West Territories, the area of each being 275,000 sq. m. Each province has a lieutenant-governor and a single legislative chamber, with a representation of four members in the Senate and five in the House of Commons of the Dominion parliament. The control of the public lands is retained by the general government

on the ground that it has been responsible for the development of the country by railway construction and emigration. With the rapid increase of population, production in Canada also greatly increased; exports, imports and revenue constantly expanded, and capital, finding abundant and profitable employment, began to flow freely into the country for further industrial development. New and great railway undertakings were a marked feature of this period. The Canadian Pacific system was extended until it included 12,000 m. of line. The Canadian Northern railway, already constructed from the Great Lakes westward to the neighbourhood of the Rockies, and with water arid rail connexions reaching eastward to Quebec, began to transform itself into a complete transcontinental system, with an extension to the Hudson Bay. That this line owed its inception and construction chiefly to the joint enterprise of two private individuals, Messrs Mackenzie and Mann, was a striking proof of the industrial capacities of the country. To a still more ambitious line, the Grand Trunk Pacific, extending from the Atlantic to the Pacific, aiming at extensive steamship connexion on both oceans, and closely associated with the Grand Trunk system of Ontario and Quebec, the government of Canada gave liberal support as a national undertaking. The eastern section of 1875 m., extending from Winnipeg to Moncton, where connexion is secured with the winter ports of Halifax and St John, was, under the act of incorporation, to be built by the government, and then leased for fifty years, under certain conditions, to the Grand Trunk Pacific Company. The western portion, of 1480 m., from Winnipeg to the Pacific, was to be built, owned and operated by the company itself, the government guaranteeing bonds to the extent of 7.5 % of the whole cost of construction. The discovery of large deposits of nickel at Sudbury; of extremely rich gold mines on the head-waters of the Yukon, in a region previously con- sidered well-nigh worthless for human habitation; of extensive areas of gold, copper and silver ores in the mountain regions of British Columbia; of immense coal deposits in the Crow's Nest Pass of the same province and on the prairies; of veins of silver and cobalt of extraordinary richness in northern Ontario — -all deeply affected the industrial condition of the country and illustrated the vastness of its undeveloped resources. The use of wood-pulp in the manufacture of paper gave a greatly enhanced value to many millions of acres of northern forest country. The application of electricity to purposes of manu- facture and transportation made the waterfalls and rapids in which the country abounds the source of an almost unlimited supply of energy capable of easy distribution for industrial purposes over wide areas.

Since confederation a series of attempts has been made with varying degrees of success to settle the questions in dispute between the Dominion and the United States, naturally Relations arising from the fact that they divide between them with the the control of nearly the whole of a large continent and ˆn'ted its adjoining waters. Considering the vastness of the interests involved, there is much cause for satisfaction in the fact that these differences have been settled by peaceful arbitrament rather than by that recourse to force which has so often marked the delimitation of rights and territory on other continents

The Washington Treaty of 1871 has already been referred to. Its clauses dealing with the fisheries and trade lasted for fourteen years, and were then abrogated by the action of the United States. Various proposals on the part of Canada for a renewal of the reciprocity were not entertained. After 1883 Canada was therefore compelled to fall back upon the treaty of 18 18 as the guarantee of her fishing rights. It became necessary to enforce the terms of that convention, under which the fishermen of the United States could not pursue their avocations within the three miles' limit, tranship cargoes of fish in Canadian ports, or enter them except for shelter, water, wood or repairs'. On account of infractions of the treaty many vessels were seized and some were condemned. In 1887 a special commission was appointed to deal with the question. On this commission Mr Joseph Chamber- lain, Sir Sackville West and Sir Charles Tupper represented British and Canadian interests; Secretary T. F. Bayard, Mr W. le B. Putnam and Mr James B. Angell acted for the United States. The commission succeeded in agreeing to the terms of a treaty, which was recommended to Congress by President Cleveland as supplying " a satisfactory, practical and final adjustment, upon a basis honourable and just to both parties, of the difficult and vexed questions to which it relates." This agreement, known as the Chamberlain-Bayard treaty, was rejected by the Senate, and as a consequence it became necessary to carry on the fisheries under a modus vivendi renewed annually.

In 1886 a difference about international rights on the high seas arose on the Pacific coast in connexion with the seal fisheries of Bering Sea. In that year several schooners, fitted out in British Columbia for the capture of seals in the North Pacific, were seized by a United States

cutter at a distance of 60 m. from the nearest land, the officers were imprisoned and fined, and the vessels themselves subjected to forfeiture. The British government at once protested against this infraction of inter- national right, and through long and troublesome negotiations firmly upheld Canada's claims in the matter. The dispute was finally referred to a court of arbitration, on which Sir John Thompson, premier of the Dominion, sat as one of the British arbitrators. It was decided that the United States had no jurisdiction in the Bering Sea beyond the three miles' limit, but the court also made regulations to prevent the wholesale slaughter of fur-bearing seals. The sum of $463,454 was finally awarded as compensation to the Canadian sealers who had been unlawfully seized and punished. This sum was paid by the United States in 1898.

As the result of communications during 1897 between Sir Wilfrid Laurier and Secretary Sherman, the governments of Great Britain and the United States agreed to the appointment of a joint high commission, with a view of settling all outstanding differences between the United States and Canada. The com- mission, which included three members of the Canadian cabinet and a representative of Newfoundland, and of which Lord Herschell was appointed chairman, met at Quebec on the 23rd of August 1898. The sessions continued in Quebec at intervals until the 10th of October, when the commission adjourned to meet in Washington on the 1st of November, where the discussions were renewed for some weeks. Mr Nelson Dingley, an American member of the commission, died during the month of January, as did the chairman, Lord Herschell, in March, as the result of an accident, soon after the close of the sittings of the commission. The Alaskan boundary, the Atlantic and inland fisheries, the alien labour law, the bonding privilege, the seal fishery in the Bering Sea and reciprocity of trade in certain products were among the subjects considered by the commission. On several of these points much progress was made towards a settlement, but a divergence of opinion as to the methods by which the Alaskan boundary should be determined put an end for the time to the negotiations.

In 1903 an agreement was reached by which the question of this boundary, which depended on the interpretation put upon the treaty of 1825 between Russia and England, should be submitted to a commission consisting of " six impartial jurists of repute," three British and three American. The British

commissioners appointed were: Lord Alverstone, lord chief justice of England; Sir Louis Jette, K.C., of Quebec; and A.B. Aylesworth, K.C., of Toronto. On the American side were appointed: the Hon. Henry C.

Lodge, senator for Massachusetts; the Hon. Elihu Root, secretary of war for the United States government; and Senator George Turner. Canadians could not be persuaded that the American members fulfilled the condition of being ” impartial jurists,” and protest was made, but, though the imperial government also expressed surprise, no change in the appointments was effected. The commission met in London, and announced its decision in October. This was distinctly unfavourable to Canada’s claims, since it excluded Canadians from all ocean inlets as far south as the Portland Channel, and in that channel gave to Canada only two of the four islands claimed. A statement made by the Canadian commissioners, who refused to sign the report, of an unexplained change of opinion on the part of Lord Alverstone, produced a widespread impression for a time that his decision in favour of American claims was diplomatic rather than judicial. Later Canadian opinion, however, came to regard the decision of the commission as a reasonable compromise. The irritation caused by the decision gradually subsided, but at the moment it led to strong expressions on the part of Sir Wilfrid Laurier and others in favour of securing for Canada a fuller power of making her own treaties. While the power of making treaties must rest ultimately in the hands that can enforce them, the tendency to give the colonies chiefly interested a larger voice in inter- national arrangements had become inevitable. The mission of a Canadian cabinet minister, the Hon. R. Lemieux, to Japan in 1907, to settle Canadian difficulties with that country, illustrated the change of diplomatic system in progress.

Under the British North American Act the control of education was reserved for the provincial governments, with a stipulation that all. rights enjoyed by denominational schools at ˆucatloa. the time of confederation should be respected. Pro- vincial control has caused some diversity of management; the interpretation of the denominational agreement has led to acute differences of opinion which have invaded the field of politics. In all the provinces elementary, and in some cases secondary, education is free, the funds for its support being derived from local taxation and from government grants. The highly organized school system of Ontario is directed by a minister of education, who is a member of the provincial cabinet. The other provinces have boards of education, and superintendents who act under the direction of the provincial legislatures. In Quebec the Roman Catholic schools, which constitute the majority, are chiefly controlled by the local clergy of that church. The Protestant schools are managed by a separate board. In Ontario as well as in Quebec separate schools are allowed to Roman Catholics. In Nova Scotia, New Brunswick, Prince Edward Island, Manitoba and British Columbia the

public schools are strictly undenominational. This position was only established in New Brunswick and Manitoba after violent political struggles, and frequent appeals to the highest courts of the empire for decisions on questions of federal or provincial juris- diction. The right of having separate schools has been extended to the newly constituted provinces of Alberta and Saskatchewan.

Secondary education is provided for by high schools and collegiate institutes in all towns and cities, and by large resi- dential institutions at various centres, conducted on the principle of the English public schools. The largest of these is Upper Canada College at Toronto. Each province has a number of normal and model schools for the training of teachers. For higher education there are also abundant facilities. M'Gill University at Montreal has been enlarged and splendidly en- dowed by the munificence of a few private individuals; Toronto University by the provincial legislature of Ontario; Queen's University at Kingston largely by the support of its own graduates and friends. University work in the maritime provinces, instead of being concentrated, as it might well be, in one powerful institution, is distributed among five small, but within their range efficient universities. The agricultural college at Guelph and

the experimental farms maintained by the federal government give excellent training and scientific assistance to farmers. Sir William Macdonald in 1908 built and endowed, at an ex- penditure of at least £700,000, an agricultural college and normal school at St Anne's, near Montreal. While the older universities have increased greatly in influence and efficiency, the following new foundations have been made since confederation: — Uni- versity of Manitoba, Winnipeg, 1877; Presbyterian College, Winnipeg, 1870; Methodist College, Winnipeg, 1888; Wesleyan College, Montreal, 1873; Presbyterian College, Montreal, 1868; School of Practical Science, Toronto, 1877; Royal Military College, Kingston, 1875; M'Master University, Toronto, 1888. All the larger universities have schools of medicine in affiliation, and have the power of conferring medical degrees. Since 1877 Canadian degrees have been recognized by the Medical Council of Great Britain.

In her treatment of the aboriginal inhabitants of the country

(numbering 93,318 in 1901) Canada has met with conspicuous

success. Since the advance of civilization and indis- Mbes criminate slaughter have deprived them of the bison,

so long their natural means of subsistence, the north- west tribes have been maintained chiefly at the expense of the country. As a result of the great care now used in watching over them there has been a small but steady increase in their numbers. Industrial and boarding schools, established in several of the provinces, by separating the children from the degrading influences of their home life, have proved more effectual than day schools for training them in the habits and ideas of a higher civilization. (See Indians, North American.) The constitution of the Dominion embodies the first attempt made to adapt British principles and methods of government

to a federal system. The chief executive authority Coastitu- j s veSteK j j n t jj e sovereign, as is the supreme command

of the military and naval forces. The governor- general represents, and fulfils the functions of, the crown, which appoints him. He holds office for five years, and his powers are strictly limited, as in the case of the sovereign, all executive acts being done on the advice of his cabinet, the members of which hold office only so long as they retain the confidence of the people as expressed by their representatives in parliament. The governor-general has, however, the inde- pendent right to withhold his assent to any bill which he considers in conflict with imperial interests. The following governors- general have represented the crown since the federation of the provinces, with the year of their appointment : Viscount Monck, 1867; Sir John Young (afterwards Baron Lisgar), 1868; the earl of Dufferin, 1872; the marquess of Lome (afterwards duke of Argyll), 1878; the marquess of Lansdowne, 1883; Lord Stanley of Preston (afterwards earl of Derby), 1888; the earl of Aberdeen, 1893; the earl of Minto, 1898; Earl Grey, 1904. The upper house, or Senate, is composed of members who hold office for life and are nominated by the governor-general in council. It originally consisted of 72 members, 24 from Quebec, 24 from Ontario, and 24 from the maritime provinces, but this number has been from time to time slightly increased as new provinces have been added. The House of Commons consists of representatives elected directly by the people. The number of. members, originally 196, is subject to change after each decennial census. The basis adopted in the British North America Act is that Quebec shall always have 65 representatives, and each of the other provinces such a number as will give the same proportion of members to its population as the number 65 bears to the

population of Quebec at each census. In 1908 the number of members was 218.

Members of the Senate and of the House of Commons receive an annual indemnity of $2500, with a travelling allowance. Legislation brought forward in 1906 introduced an innovation in assigning a salary of $7000 to the recognized leader of the Opposition, and pensions amounting to half their official income to ex-cabinet ministers who have occupied their posts fo? five consecutive years. This pension clause has since been repealed. One principal object of the framers of the Canadian

constitution -was to establish a strong central government. An opposite plan was therefore adopted to that employed in the system of the United States, where the federal government enjoys only the powers granted to it by the sovereign states. The British North America Act assigns to the different provinces, as to the central parliament, their spheres of control, but all residuary powers are given to the general government. Within these limitations the provincial assemblies have a wide range of legislative power. In Nova Scotia and Quebec the bicameral system of an upper and lower house is retained; in the other provinces legislation is left to a single representative assembly. For purely local matters municipal institutions are organized to cover counties and townships, cities and towns, all based on an exceedingly democratic franchise.

The creation of a supreme court engaged the attention of Sir John Macdonald in the early years after federation, but was only finally accomplished in 1876, during the premiership of Alexander Mackenzie. This court is presided over by a chief justice, with five puisne judges, and has appellate civil and criminal jurisdiction for the Dominion. By an act passed in 1 89 1 the government has power to refer to the supreme court any important question of law affecting the public interest. The right of appeal from the supreme court, thus constituted, to the judicial committee of the privy council marks, in questions judicial, Canada's place as a part of the British empire.

The appointment, first made in 1897, of the chief justice of Canada, along with the chief justices of Cape Colony and South Australia, as colonial members of the judicial committee still further established the position of that body as the final court of appeal for the British people. The grave questions of respective jurisdiction which have from time to time arisen between the federal and provincial governments have for the most part been settled by appeal to one or both of these judicial bodies. Some of these questions have played a considerable

part in Canadian politics, but are of too complicated a nature to be dealt with in the present brief sketch. They have generally consisted in the assertion of provincial rights against federal authority. The decision of the courts has always been accepted as authoritative and final.

An excellent bibliography of Canadian history will be found in the volume Literature of American History, published by the American Library Association. The annual Review of Historical Publications Relating to Canada, published by the University of Toronto, gives a critical survey of the works on Canadian topics appearing from year to year. (G. R. P.)

Literature : 1. English-Canadian Literature is marked by the weaknesses as well as the merits of colonial life. The struggle for existence, the conquering of the wilderness, has left scant room for broad culture or scholarship, and the very fact that Canada is a colony, however free to control her own affairs, has stood in the way of the creation of anything like a national literature. And yet, while Canada's intellectual product is essentially an offshoot of the parent literature of England, it is not entirely devoid of originality, either in manner or matter. There is in much of it a spirit of freedom and youthful vigour characteristic of the country. It is marked by the wholesomeness of Canadian life and Canadian ideals, and the optimism of a land of limitless potentialities.

The first few decades of the period of British rule were lean years indeed so far as native literature is concerned. This period of unrest gave birth to little beyond a flood of political pamphlets, of no present value save as material for the historian. We may perhaps except the able though thoroughly partisan writings of Sir John Beverley Robinson and Bishop Strachan on the one side, and Robert Fleming Gourlay and William Lyon Mackenzie on the other. In the far West, however, a little group of adventurous fur-traders, of whom Sir Alexander Mackenzie, David Thompson, Alexander Henry and Daniel Williams Harmon may be taken as conspicuous types, were unfolding the vast expanse of the future dominion. They were men of action, not of words, and had no thought of literary

fame, but their absorbingly interesting journals are none the less an essential part of the literature of the country. ■

Barring the work of Francis Parkman, who was not a Canadian, no history of the first rank has yet been written in or of- Canada. Canadian historians have not merely lacked so far the genius for really great historical work, but they have lacked the point of view; they have stood too close to their subject to get the true perspective. At the same time they have brought together invaluable material for the great historian of the future. Robert Christie's History of Lower Canada (1848-18 54) was the first serious attempt to deal with the period of British rule. William Kingsford's (18 19-1898) ambitious work, in ten volumes, comes down like Christie's to the Union of 1841, but goes back to the very beginnings of Canadian history. In the main it is impartial and accurate, but the style is heavy and sometimes slovenly. J. C. Dent's (1841-1888) Last Forty Years (1880) is practically a continuation of Kingsford. Dent also wrote an interesting though one-sided account of the rebellion of 1837. Histories of the maritime provinces have been written by Thomas Chandler Haliburton, Beamish Murdoch and James Hannay. Hali- burton's is much the best of the three. The brief but stirring history of western Canada has been told by Alexander Begg (1840-1898); and George Bryce (b. 1844) and Beckles Willson (b. 1869) have written the story of the Hudson's Bay Company. Much scholarship and research have been devoted to local and special historical subjects, a notable example of which is Arthur Doughty's exhaustive work on the siege of Quebec. J. McMullen (b. 1820), Charles Roberts (b. i860) and Sir. John Bourinot (1837-1902) have written brief and popular histories, covering the whole field of Canadian history more or less adequately. Alpheus Todd's (1821-1884) Parliamentary Government in England (1867-1869) and Parliamentary Government in the British Colonies (1880) are standard works, as is also Bourinot's Parliamentary Procedure and Practice (1884).

Biography has been devoted mainly to political subjects. The best of these are Joseph Pope's Memoirs of Sir John Mac- donald (1894), W. D. le Sueur's Frontendc (1906), Sir John Bourinot's Lord Elgin (1905), Jean Mcllwraith's Sir Frederick Haldimand (1904), D. C. Scott's John Graves Simcoe (1905), A. D. de Celles' Papineau and Cartier (1904), Charles Lindsey's William Lyon Mackenzie (1862), J. W. Longley's Joseph Howe (1905) and J. S. Willison's Sir Wilfrid Laurier (1903).

In belles lettres very little has been accomplished, unless we may count Goldwin Smith (q.v.) as a Canadian. As a scholar, a thinker, and a master of pure English he has exerted a marked influence upon

Canadian literature and Canadian life.

While mediocrity is the prevailing characteristic of most of what passes for poetry in Canada, a few writers have risen to a higher level. The conditions of Canadian life have not been favourable to the birth of great poets, but within the limits of their song such men as Archibald Lampman (1861-1891), William Wilfred Campbell (b. 1861), Charles Roberts, Bliss Carman (b. 1861) and George Frederick Cameron have written lines that are well worth remembering. Lampman's poetry is the most finished and musical. He fell short of being a truly great poet, inasmuch as great poetry must, which his does not, touch life at many points, but his verses are marked by the qualities that belonged to the man — sincerity, purity, seriousness. Campbell's poetry, in spite of a certain lack of compression, is full of dramatic vigour: Roberts has put some of his best work into sonnets and short lyrics, while Carman has been very successful with the ballad, the untrammelled swing and sweep of which he has finely caught; the simplicity and severity of Cameron's style won the commendation of even so exacting a critic as Matthew Arnold. One remarkable drama — Charles Heavysege's (1816-1876) Saul (1857) — belongs to Canadian literature. Though unequal in execution, it contains passages of exceptional beauty and power. The sweetness and maturity of Isabella Valency Crawford's (1851-1887) verse are also very worthy of remembrance. The habitant poems of Dr W. H. Drummond (1854-1907) stand in a class by themselves, between English and French Canadian literature, presenting

the simple life of the habitant with unique humour and pieturesqueness.

The first distinctively Canadian novel was John Richardson's (1796-1852) Wacousta (1832), a stirring tale of the war of 1812. Richardson afterwards wrote half a dozen other romances, dealing chiefly with incidents in Canadian history. Susanna Moodie (1803-1885) and Katharine Parr Traill (1802-1899), sisters of Agnes Strickland, contributed novels and tales to one of the earliest and best of Canadian magazines, the Literary Garland (1838-1847). The Golden Dog, William Kirby's (1817- 1906) fascinating romance of old Quebec, appeared in 1877, in a pirated edition. Twenty years later the first authorized edition was published. James de Mille (1833-1880) was the author of some thirty novels, the best of which is Helena's Household (1868), a story of Rome in the 1st century. The Dodge Club (1869), a humorous book of travel, appeared, curiously enough, a few months before Innocents Abroad. De Mille's posthumous novel, A Strange Manuscript found in a Copper Cylinder (1888), describes a

singular race whose cardinal doctrine is that poverty is honourable and wealth the reverse. Sir Gilbert Parker (b. 1862) stands first among contemporary Canadian novelists. He has made admirable use in many of his novels of the inexhaustible stores of romantic and dramatic material that lie buried in forgotten pages of Canadian history. Of later Canadian novelists mention may be made of Sara Jeannette Duncan (Mrs Everard Cotes, b. 1862), Ralph Connor (Charles W. Gordon, b. 1866), Agnes C. Laut (b. 1872), W. A. Fraser (b. 1859) and Ernest Thompson Seton (b. i860). Thomas Chandler Haliburton (q.v.) stands in a class by himself. In many respects his is the most striking figure in Canadian literature. He is best known as a humorist, and as a humorist he ranks with the creators of “My Uncle Toby ” and ” Pickwick.” But there is more than humour in Haliburton’s books. He lacked, in fact, but one thing to make him a great novelist: he had no conception of how to construct a plot. But he knew human nature, and knew it intimately in all its phases; he could construct a character and endow it with life; his people talk naturally and to the point; and many of his descriptive passages are admirable. Those who read Haliburton’s books only for the sake of the humour will miss much of their value. His inimitable Clockmaker (1837), as well as the later books, The Old Judge (1849), The Attache (1843), Wise Saws and Modern Instances (1853) and Nature and Human Nature (1855), are mirrors of colonial life and character.

For general treatment of English-Canadian literature, reference may be made. to Sir John Bourinot’s Intellectual Development of the Canadian People (1881); G. Mercer Adam’s Outline History of Canadian Literature (1887); “Native Thought and Literature,” in J. E. Colliris’s Life of Sir John A. Macdonald (1883) ; ” Canadian Literature,” by J. M. Oxley, in the Encyclopaedia Americana, vol. ix. (1904) ; A. MacMurchy’s Handbook of Canadian Literature (1906) ; and articles by J. Oastell Hopkins, John Reade, A. B. de Mille and Thomas O’Hagan, in vol. v. of Canada : an Encyclopaedia of the Country (1898-1900) ; also to Henry J. Morgan’s Bibliotheca Cana- densis (1867) and Canadian Men and Women of the Time (1898) ; W. D. Lighthall, Songs of the Great Dominion; Theodore Rand’s Treasury of Canadian Verse (1900) ; C. C. James’s Bibliography of Canadian Verse (1898) ; L< E. Homing's and L. J. Burpee's Biblio- graphy of Canadian Fiction (1904) ; S. E. Dawson's Prose Writers of Canada (1901) ; "Canadian Poetry," by J. A. Cooper, in The National, 29, p. 364; " Recent Canadian Fiction," by L. J. Burpee, in The Forum, August 1899. For individual authors, see Hali- burton's A Centenary Chaplet (1897), with a bibliography; " Hali- burton," by F. Blake Crofton, in Canada: an Encyclopaedia of the Country; C. H. Farnham's Life of Francis

Parkman and H. D. Sedgwick's Francis Parkman (1901); and articles on " Parkman," by E. L. Godkin, in The Nation, 71,- p. 441; by Justin Winsor in The Atlantic, 73, p. 660; by W. D. Howells, The Atlantic, 34, p. 602 ; by John Fiske, The Atlantic, 73, p. 664; by J. B. Gilder in The Critic, 23, p. 322; " Goldwin Smith as a Critic," by H. Spencer, Contemp. Review, '41, p. 519; " Goldwin Smith's Historical Works," by C. E. Norton, North -American Review, 99, p. 523; "Poetry of Charles Heavysege," by Bayard Taylor, Atlantic, 16, p. 412; " Charles Heavysege," by L. J. Burpee, in Trans. Royal Society of Canada, 1961 ; " Archibald Lampman," by W. D. Howells, Literature (N.Y.), 4, p. 217; "Archibald Lampman," by L. J. Burpee, in North American Notes and Queries (Quebec), August and September 1900; "Poetry of Bliss Carman," by J. P. Mowbray, Critic, 41,

308 ; ” Isabella Valency Crawford,” in Poet-Lore (Boston), xiii. No. 4; Roberts and the Influences of Ms Time (1906), by James Cappon; ” William Wilfred Campbell,” Sewanee Review, October 1900; ” Kingsford’s History of Canada,” by G. M. Wrong, N. A. Review, L P-55°; “Books of Gilbert Parker,” by C. A. Pratt, Critic, 33, p. 271. (L. J. B.)

2. French-Canadian Literature at the opening of the 20th century might be described as entirely the work of two genera- tion’s, and it was separated from the old regime by three more generations whose racial sentiment only found expression in the traditional songs and tales which their forefathers of the 17th century had brought over from the mere patrie. Folk-lore has always been the most essentially French of all imaginative influences in Canadian life; and the songs are the quintessence of the lore. Not that the folk-songs have no local variants. Indian words, like moccasin and toboggan, are often introduced. French forms are freely turned into pure Canadianisms, like cageux, raftsman, boucane, brushwood smoke, portage, &c. New characters, which appeal more directly to the local audience, sometimes supplant old ones, like the quatre vieux sauvages who have ousted the time-honoured quatre-z-officiers from the Canadian version of Malbrouk. There are even a few entire songs of transatlantic origin. But all these variants together are mere stray curios among the crowding souvenirs of the old home over sea. No other bridge can rival le Pont d’ Avignon. ” let ” in C’est le bon vin qui danse id can be

nowhere else but in old France— le bon vin alone proves this. And the Canadian folk-singer, though in a land of myriad springs, still goes a la claire fontaine of his ancestral fancy; while the lullabies his mother sang him, like the love-songs with which he serenades his blonde, were nearly all sung throughout the Normandy of le Grand Monarque. The habitant was separated from old- world changes two centuries ago by difference of place and circumstances, while he has hitherto been safeguarded from many new- world changes by the segregative influences of race, religion, language and custom; and so his folk-lore still remains the intimate alter et idem of what it was in the days of the great pioneers. It is no longer a living spirit among the people at large; but in secluded villages and ” back concessions ” one can still hear some charming melodies as old and pure as the verses to which they are sung, and even a few quaint survivals of Gregorian tunes. The best collection, more particularly from the musical point of view, is Les Chansons populaires du Canada, started by Ernest Gagnon (1st cd. 1865).

Race-patriotism is the distinguishing characteristic of French-Canadian literature, which is so deeply rooted in national politics that L. J. Papineau, the most insistent demagogue of 1837, must certainly be named among the founders, for the sake of speeches which came before written works both in point of time and popular esteem. Only 360 volumes had been published during 80 years, when, in 1845, the first famous book appeared — Francois Xavier Garneau’s (1 809-1 866) Histoire du Canada. It had immense success in Canada, was favourably noticed in France, and has influenced all succeeding men of letters. Unfortunately, the imperfect data on which it is based, and the too exclusively patriotic spirit in which it is written, prevent it from being an authoritative history: the author himself declares ” Votis vcrrez si la defaite de nos ancelres ne vaut pas toutes les victoires.” But it is of far-reaching importance as the first great literary stimulus to racial self-respect. ” Le Canada jrancais avail perdu ses lettres de noblesse; Garneau les lui a r endues.” F. X. Garneau is also remembered for his poems, and he was followed by his son Alfred Garneau (1836-

1904)-

A. Gerin-Lajoie was a mere lad when the exile of some com- patriots inspired Le Canadien errant, which immediately became a universal folk-song. Many years later he wrote discrimin- atingly about those Dix ans au Canada (1888) that saw the establishment of responsible government. But his fame rests on Jean Rivard (1874), the prose bucolic of the habitant. The hero, left at the head of a fatherless family

of twelve when nearly through college, turns from the glut of graduates swarming round the prospects of professional city-bred careers, steadfastly

wrests a home from the wilderness, helps his brothers and sisters, marries a habitante fit for the wife of a pioneer, brings up a large family, and founds a settlement which grows into several parishes and finally becomes the centre of the electoral district of " Rivardville," which returns him to parliament. These simple and earnest Scenes de la vie reelle are an appealing revelation of that eternal secret of the soil which every people wishing to have a country of its own must early lay to heart; and Jean Rivard, le defricheur, will always remain the eponym of the new colons of the 19th century.

Philippe de Gaspe's historical novel, Les Anciens Canadiens (1863); is the complement of Garneau and Gerin-Lajoie. Every-; thing about the author's life helped him to write this book. Born in 1784, and brought up among reminiscent eye-witnesses of the old regime, he was an eager listener, with a wonderful memory and whole-hearted pride in the glories of his race and family, a kindly seigneur, who loved and was loved by all his censitaires, a keen observer of many changing systems, down to the final Confederation of 1867, and a man who had felt both extremes of fortune (Memoir es, 1866). The story rambles rather far from its well-worn plot. But these very digressions give the book its intimate and abiding charm; for they keep the reader in close personal touch with every side of Canadian life, with songs and tales and homely forms of speech, with the best features of seigniorial times and the strong guidance of an ardent church, with voyageurs, coureurs de bois, Indians, soldiers, sailors and all the strenuous adventurers of a wild, new, giant world. The poet of this little band of authors was Octave Cremazie, a Quebec bookseller, who failed in business and spent his last years as a penniless exile in France. He is usually rather too derivative, he lacks the saving grace of style, and even his best Canadian poems hardly rise above fervent occasional verse. Yet he became a national poet, because he was the first to celebrate occasions of deeply felt popular emotion in acceptable rhyme, and he will always remain one because each occasion touched some lasting aspiration of his race. He sings what Garneau recounts— the love of mother country, mother church and Canada. The Guerre de Crimee, Guerre d'ltalie, even Castel-fidardo, are duly chronicled. An ode on Mgr. de Montmorency-Laval, first bishop of Quebec, brings him nearer to his proper themes, which are found in full perfection in the Chant du vieux soldat canadien, composed in 1856 to honour the first French man-of-war that visited British Quebec, and Le Drapeau de Carillon (1858), a centennial paean for Montcalm's Canadians at

Ticonderoga. Much of the mature work of this first generation, and of the juvenilia of the second, appeared in Les Soirees canadiennes and Le Foyer canadien, founded in 1862 and 1863 respectively. The abbe Ferland was an enthusiastic editor and historian, and Etienne Parent should be remembered as the first Canadian philosopher.

At Confederation many eager followers began to take up the work which the founders were laying down. The abbe Casgrain devoted a life-time to making the French-Canadians appear as the chosen people of new- world history; but, though an able advocate, he spoilt a really good case by trying to prove too much. His Pclerinage au pays d' Evangeline (1888) is a splendid defence of the unfortunate Acadians; and all his books attract the reader by their charm of style and personality. But his Montcalm et Levis (1891) and other works on the conquest, are all warped by a strong bias against both Wolfe and Montcalm, and in favour of Vandreuil, the Canadian-born governor; while they show an inadequate grasp of military problems, and practically ignore the vast determining factor of sea-power altogether. Benjamin Suite's comprehensive Histoire des Canadiens-francais (1882) is a well-written, many-sided work. Thomas Chapais' monographs are as firmly grounded as they are finely expressed; his Jean Talon (1904) is of prime im- portance; and his Montcalm (1901) is the generous amende honorable paid by French-Canadian literature to a much mis- represented, but admirably wrought, career. A. Gerin-Lajoie's cry of " back to the land " was successfully adapted to modern developments in Le Saguenay (1896) and L'Outaouais supirieur

(1889) by Arthur Buies, who showed what immense inland breadths of country lay open to suitable " Jean Rivards " from the older settlements along the St Lawrence. In oratory, which most. French-Canadians admire beyond all other forms of verbal art, Sir Wilfrid Laurier has greatly surpassed L. J. Papineau, by dealing with more complex questions, taking a higher point of view, and expressing himself with a much apter flexibility of style.

Among later poets may be mentioned Pierre Chauveau (1820- 1890), Louis Fiset, (b. 1827), and Adolphe Poisson (b. 1849). Louis Frechette (183 9-1 908) has,however, long been the only poet with a reputation outside of Canada. In 1879 Les Fleurs borˆales won the Prix Monthyon from the French Academy. In 1887 La Ligende d'un peuple became the acknowledged epic of a race. He occasionally nods; is rather

strident in the patriotic vein; and too often answers the untoward call of rhetoric when his subject is about to soar into the heights of poetry. But a rich vocabulary, a mastery of verse-forms quite beyond the range of Cr6mazie, real originality of conception, individual distinction of style, deep insight into the soul of his people, and, still more, the glow of warm-blooded life pulsing through the whole poem, all combine to give him the greatest place at home and an im- portant one in the world at large. Les Vengeances (1875), by Leon Pamphile Le May, and Les Aspirations (1904), by W. Chapman, worthily represent the older and younger contem- poraries. Dr Neree Beauchemin keeps within somewhat narrow limits in Les Floraisons matutinales (1897); but within them he shows true poetic genius, a fine sense of rhythm, rhyme and verbal melody, a curiosa felicitas of epithet and phrase, and so sure an eye for local colour that a stranger could choose no better guide to the imaginative life of Canada.

A Canadian drama hardly exists; among its best works are the pleasantly epigrammatic plays of F. G. Marchand. Novels are not yet much in vogue; though Madame Conan's L'Oublie (1902) has been crowned by the Academy; while Dr Choquette's Les Ribaud (1898) is a good dramatic story, and his Claude Paysan (1899) is an admirably simple idyllic tale of the hopeless love of a soil-bound habitant, told with intense natural feeling and fine artistic reserve. Chief- Justice Routhier, a most accom- plished occasional writer, is very French-Canadian when arraign- ing Les Grands Drames of the classics (1889) before his ecclesi- astical court and finding them guilty of Paganism.

The best bibliographies are Phileas Gagnon's Essai de biblio- graphie canadienne (1895), and Dr N. E. Dionne's list of publications from the earliest times in the Transactions of the Royal Society of Canada for 1905. (W. Wo.)

CANAL (from Lat. canalis, " channel " and " kennel " being doublets of the word), an artificial water course used for the drainage of low lands, for irrigation (q.v.), or more especially for the purpose of navigation by boats, barges or ships. Probably the first canals were made for irrigation, but in very early times they came also to be used for navigation, as in Assyria and Egypt. The Romans constructed various works of the kind, and Charle- magne projected a system of waterways connecting the Main and the Rhine with the Danube, while in China the Grand Canal, joining the Pei-ho and Yang-tse-Kiang and constructed in the 13th century, formed an important artery of commerce, serving also for irrigation. But although it appears from Marco Polo that inclines were used on the Grand Canal, these early waterways suffered in general from the defect that no method being

known of conveniently transferring boats from one level to another they were only practicable between points that lay on nearly the same level; and inland navigation could not become generally useful and applicable until this defect had been remedied by the employment of locks. Great doubts exist as to the person, and even the nation, that first introduced locks. Some writers attribute their invention to the Dutch, holding that nearly a century earlier than in Italy locks were used in Holland where canals are very numerous, owing to the favourable physical conditions. On the other hand, the contrivance has been claimed for engineers of the Italian school, and it is said that two brothers Domenico of Viterbo constructed a lock-chamber enclosed by

a pair of gates in 1481, and that in 1487 Leonardo da Vinci completed six locks uniting the canals of Milan. Be that as it may, however, the introduction of locks in the 14th or 15th century gave a new character to inland navigation and laid the basis of its successful extension.

The Languedoc Canal (Canal du Midi) may be regarded as the pioneer of the canals of modern Europe. Joining the Bay of Biscay and the Mediterranean it is 148 m. long and rises 620 ft. above sea-level with 119 locks, its depth being about 6§ ft. It was designed by Baron Paul Riquet de Bonrepos (1604-1680) and was finished in 1681. With it and the still earlier Briare canal (1605-1642) France began that policy of canal construction which has provided her with over 3000 m. of canals, in addition to over 4600 m. of navigable rivers. In Russia Peter the Great undertook the construction of a systenj of canals about the beginning of the 18th century, and in Sweden a canal with locks, connecting Eskilstuna with Lake Malar, was finished in 1606. In England the oldest artificial canal is the Foss Dyke, a relic of the Roman occupation. It extends from Lincoln to the river Trent near Torksey (n m.), and formed a continuation of the Caer Dyke, also of Roman origin but now filled up, which ran from Lincoln to Peterborough (40 m.). Camden in his Britannia says that the Foss Dyke was deepened and to some extent rendered navigable in 1 1 2 1 . Little, however, was done in making canals in Great Britain until the middle of the 18th century, though before that date some pro- gress had been made in rendering some of the larger rivers navigable. In 1759 the duke of Bridgewater obtained powers to construct a canal between Manchester and his collieries at Worsley, and this work, of which James Brindley was the engineer, and which was opened for traffic in 1 76 1 ,was followed by a period of great activity in canal construction, which, however, came to an end with the introduction of railways. According to evidence given before the royal commission on canals in 1906 the total mileage of existing canals in the United

Kingdom was 3901. In the United States the first canal was made in 1792- 1796 at South Hadley, Massachusetts, and the canal-system, though its expansion was checked by the growth of railways, has attained a length of 4200 m., most of the mileage being in New York, Ohio, and Pennsylvania. The splendid inland navigation system of Canada mainly consists of natural lakes and rivers, and the artificial waterways are largely ” lateral ” canals, cut in order to enable vessels to avoid rapids in the rivers. (See the articles on the various countries for accounts of the canal- systems they possess.)

The canals that were made in the early days of canal-construc- tion were mostly of the class known as barge or boat canals, and owing to their limited depth and breadth were only available for vessels of small size. But with the growth of commerce the advantage was seen of cutting canals of such dimensions as to enable them to accommodate sea-going ships. Such ship-canals, which from an engineering point of view chiefly differ from barge-canals in the magnitude of the works they involve, have mostly been constructed either to shorten the voyage between two seas by cutting through an intervening isthmus, or to convert important inland places into sea-ports. An early example of the first class is afforded by the Caledonian Canal (q.v.), while among later ones may be mentioned the Suez Canal (q.v.), the Kaiser Wilhelm, Nord-Ostsee or Kiel Canal, connecting Brunsbiittel at the mouth of the Elbe with Kiel, (q.v.) on the Baltic, and the various canals that have been proposed across the isthmus that joins North and South America (see Panama Canal). Examples of the second class are the Manchester Ship Canal and the canal that runs from Zeebrugge on the North Sea to. Bruges (q.v.).

Construction. — In laying out a line of canal the engineer is more restricted than in forming the route of a road or a railway, Since water runs downhill, gradients are inadmissible, and the canal must either be made on one uniform level or must be adapted to the general rise or fall of the country through which it passes by being constructed in a series of level reaches at varying heights above a chosen datum line, each closed by a

lock or some equivalent device to enable vessels to be transferred from one to another. To avoid unduly heavy earthwork, the reaches must closely follow the bases of hills and the windings of valleys, but from time to time it will become necessary to cross a sudden

depression by the aid of an embankment or aqueduct, while a piece of rising ground or a hill may involve a cutting or a tunnel. Brindley took the Bridgewater canal over the Irwell at Barton by means of an aqueduct of three stone arches, the centre one having a span of 63 ft., and T. Telford arranged that the Ellesmere canal should cross the Dee valley at Pont-y-Cysyllte partly by embankment and partly by aqueduct. The embankment was continued till it was 75 ft. above the ground, when it was succeeded by an aqueduct, 1000 ft. long and 127 ft. above the river, consisting of a cast iron trough supported on iron arches with stone piers. Occasionally when a navigable stream has to be crossed, a swing viaduct is necessary to allow shipping to pass. The first was that built by Sir E. Leader Williams to replace Brindley's aqueduct at Barton, which was only high enough to give room for barges (see Man- chester Ship Canal). One of the earliest canal tunnels was made in 1766-1777 by Brindley at Harecastle on the Trent and Mersey canal; it is 2880 yds. long, 12 ft. high and 9 ft. wide, and has no tow-path, the boats being propelled by men lying on their backs and pushing with their feet against the tunnel walls (" leggers ")• A-second tunnel, parallel to this but 16 ft. high and 14 ft. wide, with a tow-path, was finished by Telford in 1827. Standedge tunnel, on the Huddersfield canal, is over 3 m. long, and is also worked by leggers.

The dimensions of a canal, apart from considerations of water- supply, are regulated by the size of the vessels which are to be used on it. According to J. M. Rankine, the depth of sioas. ' water and sectional area of waterway should be such as not to cause any material increase of the resistance to the motion of the boats beyond what would be encountered in open water, and he gives the following rules as fulfilling these conditions: —

Least breadth of bottom = 2 X greatest breadth of boat.

Least depth of water =ij ft.) greatest draught of boat.

Least area of waterway =6Xgreatest midship section of boat.

The ordinary inland canal is commonly from 25 to 30 ft. wide at the bottom, which is flat, and from 40 to 50 ft. at the water level, with a depth of 4 or 5 ft., the angle of slope of the sides varying with the nature of the soil. To retain the water in porous ground, and especially on embankments, a strong watertight lining of puddle or tempered clay must be provided on the bed and sides of the channel. Puddle is made of clay which has been finely chopped up with narrow spades, water being supplied until it is in a semi-plastic state. It is used in thin layers, each of which is worked so as to be firmly united with the

lower stratum. The full thickness varies from 2 to 3 ft. To prevent the erosion of the sides at the water-line by the wash from the boats, it may be necessary to pitch them with stones or face them with brushwood. In some of the old canals the slopes have been cut away and vertical walls built to retain the towing- paths, with the result of adding materially to the sectional area of the waterway.

A canal cannot be properly worked without a supply of water calculated to last over the driest season of the year: If

there be no natural lake available in the district for supply. storage and supply, or if the engineer cannot draw . upon

some stream of sufficient size, he must form artificial reservoirs in suitable situations, and the conditions which must be attended to in selecting the positions of these and in con- structing them are the same as those for drinking-water supply, except that the purity of the water is not a matter of moment. They must be situated at such an elevation that the water from them may flow to the summit-level of the canal, and if the expense of pumping is to be avoided, they must command a sufficient catchment area to supply the loss of water from the canal by evaporation from the surface, percolation through the bed, and lockage. If the supply be inadequate, the draught of the boats plying on the canal may have to be reduced in a dry

season, and the consequent decrease in the size of their cargoes will both lessen the carrying capacity of the canal and increase the working expenses in relation to the tonnage handled. Again, since the consumption of water in lockage increases both with the size of the locks and the frequency with which they are used, the difficulty of finding a sufficient water supply may put a limit to the density of traffic possible on a canal or may prohibit its locks from being enlarged so as to accommodate boats of the size necessary for the economical handling of the traffic under modern conditions. It may be pointed out that the up con- sumes more water than the down traffic. An ascending boat on entering a lock displaces a volume of water equal to its submerged capacity. The water so displaced flows into the lower reach of the canal, and as the boat passes through the lock is replaced by water flowing from the upper reach. A descending boat in the same way displaces a volume of water equal to its submerged capacity, but in this case the water flows back into the higher reach where it is retained when the gates are closed.

An essential adjunct to a canal is a sufficient number of waste-weirs to discharge surplus water accumulating during floods, which, if not

provided with an exit, may waste- overflow the.tow-path, and cause a breach in the banks, weirs and stoppage of the traffic, and damage to adjoining stop ~ lands. The number and positions of these waste-weirs ga es ‘ must depend on the nature of the country through which the canal passes. Wherever the canal crosses a stream a waste- weir should be formed in the aqueduct; but independently of this the engineer must consider at what points large influxes of water may be apprehended, and must at such places form not only waste-weirs of sufficient size to carry off the surplus, but also artificial courses for its discharge into the nearest streams. These waste-weirs are placed at the top water-level of the canal, so that when a flood occurs the water flows over them and thus relieves the banks.

Stop-gates are necessary at short intervals of a few miles for the purpose of dividing the canal into isolated reaches, so that in the event of a breach the gates may be shut, and the discharge of water confined to the small reach intercepted between two of them, instead of extending throughout the whole line of canal. In broad canals these stop-gates may be formed like the gates of locks, two pairs of gates being made to shut in opposite directions. In small works they may be made of thick planks slipped into grooves formed at the narrow points of the canal under road bridges, or at contractions made at intermediate points to receive them. Self-acting stop-gates have been tried, but have not proved trustworthy. When repairs have to be made stop-gates allow of the water being run off by ” off-lets ” from a short reach, and afterwards restored with but little interruption of the traffic. These off -lets are pipes placed at the level of the bottom of the canal and provided with valves which can be opened when required. They are generally formed at aqueducts or bridges crossing rivers, where the contents of the canal between the stop-gates can be run off into the stream.

Locks are chambers, constructed of wood, brickwork, masonry or concrete, and provided with gates at each end, by the aid of which vessels are transferred from one reach of Locks the canal to another. To enable a boat to ascend, the upper gates and the sluices which command the flow of water from the upper reach are closed. The sluices at the lower end of the lock are then opened, and when the level of the water in the lock has fallen to that of the lower reach, the boat passes in to the lock. The lower gates and sluices being then closed, the upper sluices are opened, and when the water rising in the lock has floated the boat up the level of the upper reach the upper gates are opened and it passes out. For a descending boat the procedure is reversed. The sluices by which the lock is filled or emptied are carried through the walls in large locks, or consist of

openings in the gates in small ones. The gates are generally of oak, fitting into recesses of the walls when open, and closing against sills in the lock bottom when shut.

In small narrow locks single gates only are necessary; in large locks pairs of gates are required, fitting together at the head or ” mitre-post ” when closed. The vertical timber at the end of the gate is known as the ” heel-post,” and at its foot is a casting that admits an iron pivot which is fixed in the” lock bottom, and on which the gate turns. Iron straps round the head of the heel-post are let into the lock-coping to support the gate. The gates are opened and closed by balance beams projecting over the lock side, by gearing or in cases where they are very large and heavy by the direct action of a hydraulic ram. In order to economize water canal locks are made only a few inches wider than the vessels they have to accommodate. The English canal boat is about 70 or 75 ft. long and 7 or 8 ft. in beam; canal barges are the same length but 14 or 15 ft. in width, so that locks which will hold one of them will admit two of the narrower canal boats side by side. In general canal locks are just long enough to accommodate the longest vessels using the navigation. In some cases, however, provision is made for admitting a train of barges; such long locks have sometimes intermediate gates by which the effective length is reduced when a single vessel is passing. The lift of canal locks, that is, the difference between the level of adjoining reaches, is in general about 8 or 10 ft., but sometimes is as little as 1 5 ft. On the Canal du Centre (Belgium) there are locks with a lift of 17 ft., and on the St Denis canal near La Villette basins in Paris there is one with a lift of 32 J ft. In cases where a considerable difference of level has to be surmounted the locks are placed close together in a series or ” flight,” so that the lower gates of one serve also as the upper gates of the next below. To save water, expecially where the lift is considerable, side ponds are sometimes employed; they are reservoirs into which a portion of the water in a lock-chamber is run, instead of being discharged into the lower reach, and is afterwards used for partially filling the chamber again. Double locks, that is, two locks placed side by side and communicating by a passage which can be opened or closed at will, also tend to save water, since each serves as a side pond to the other. The same advantage is gained with double flights of locks, and time also is saved since vessels can pass up and down simultaneously. A still greater economy of water can be effected by the use of inclined planes or vertical lifts in place of locks. In China Inclines ruc ‘ e i ac ‘i ne s

appear to have been used at an early date, vessels being carried down a sloping plane of stonework by the aid of a flush of water or hauled up it by capstans. On the Bude canal (England) this plan was adopted in an improved form, the small flat-bottomed boats employed being fitted with wheels to facilitate their course over the inclines. Another variant, often adopted as an adjunct to locks where many small pleasure .boats have to be dealt with, is to fit the incline itself with rollers, upon which the boats travel. In some cases the boats are conveyed on a wheeled trolley or cradle running on rails; this plan was adopted on the Morris canal, built in 1825-1831,ˆ1 the case of 23 inclines having gradients of about 1 in 10, the rise of each varying from 44 to 100 ft. Between the Ourcq canal and the Marne, near Meaux, the difference of level is about 40 ft., and barges weighing about 76 tons are taken from the one to the other on a wheeled cradle weighing 35 tons by a wire rope over an incline nearly 500 yards long. But heavy barges are apt to be strained by being supported on cradles in this way, and to avoid this objection they are sometimes drawn up the inclines floating in a tank or caisson filled with water and running on wheels. This arrangement was utilized about 1840 on the Chard canal (England), and 10 years later it was adapted at Blackhill on the Monkland canal (Scotland) to replace a double flight of locks, in consequence of the traffic having been interrupted by insufficiency of water. There the height to be overcome was 96 ft. Two pairs of rails, of 7 ft. gauge, were laid down on a gradient of 1 in 10, and on these ran two carriages having wrought iron, water-tight caissons with lifting gates at each end, in which the barges floated partially but not wholly sup- ported by water. The carriages, with the barge and water,

weighed about 80 tons each, and were arranged to counte*. balance each other, one going up as the other was going down. The power required was provided by two high pressure steam engines of 25 h.p., driving two large drums round which was coiled, in opposite directions, the 2-inch wire rope that hauled the caissons. An incline constructed on the Union canal at Foxton (England) to replace 10 locks giving a total rise of 75 ft., accommodates barges of 70 tons, or two canal boats of 33 tons. It is in some respects like the Monkland canal incline, but the movable caissons work on four pairs of rails on an incline of 1 in 14, broadside on, and the boats are entirely waterborne. Steam power is employed, with an hydraulic accumulator which enables hydraulic power to be used in keeping the caisson in position at the top of the incline while the boats are being moved in or out, a water-tight joint being . maintained with the final portion of the canal during the operation. The gates in the caisson and canal are also

worked by hydraulic power. The incline is capable of passing 200 canal boats in 1 2 hours, and the whole plant is worked by three men.

Vertical lifts can only be used instead of locks with advantage, at places where the difference in level occurs in a short length of canal, since otherwise long embankments or Lifts.

aqueducts would be necessary to obtain sites for their construction. An early example was built in 1809 at Tardebigge on the Worcester and Birmingham canal. It consisted of a timber caisson, weighing 64 tons when full of water, counterpoised by heavy weights carried on timber platforms. The lift of 1 2 ft. was effected in about three minutes by two men working winches. Seven lifts, erected on the Grand Western canal between Wellington and Tiverton about 1835, consisted of two chambers with a masonry pier between them. In each chamber there worked a timber caisson, suspended at either end of a chain hung over large pulleys above. As one caisson descended the other rose, and the apparatus was worked by putting about a ton more water in the descending caisson than in the ascending one. At Anderton a lift was erected in 1875 to connect the Weaver navigation with the Trent and Mersey canal, which at that point is 50 ft. higher than the river. The lift is a double one, and can deal with barges up to 100 tons. The change is made while the vessels are floating in 5 ft. of water contained in a wrought iron caisson, 75 ft. long and 155 ft. wide. An hydraulic ram 3 ft. in diameter supports each caisson, the bottom of which is strengthened so as to transfer the weight to the side girders. The descending caisson falls owing to being filled with 6 in. greater depth of water than the ascending one, the weight on the rams (240 tons) being otherwise constant, since the barge displaces its own weight of water; an hydraulic accumulator is used to over- come the loss of weight in the descending caisson when it begins to be immersed in the lower level of the river. The two presses in which the rams work are connected by a 5-in. pipe, so that the descent of one caisson effects the raising of the other. A similar lift, completed in 1888 at Fontinettes on the Neuffosse canal in France, can accommodate vessels of 250 tons, a total weight of 785 tons being lifted 43 ft.; and a still larger example on the Canal du Centre at La Louviere in Belgium has a rise of 50 ft., with caissons that will admit vessels up to 400 tons, the total weight lifted amounting to over 1000 tons. This lift, with three others of the same character, overcomes the rise of 217 ft., which occurs in this canal in the course of 4! m.

Haulage. — The horse or mule walking along a tow-path and drawing or ” tracking ” a boat or barge by means of a towing rope, still remains the typical method of conducting traffic on the smaller canals;

on ship- canals vessels proceed under their own steam or are aided by tugs. Horse traction is very slow. The maximum speed on a narrow canal is about 35 m. an hour, and the average speed, which, of course, depends largely on the number of locks to be passed through, very much less. It has been calculated that in England on the average one horse hauls one narrow canal boat about 2 m. an hour loaded or 3 m. empty, or two narrow canal boats 15 m. loaded and 25m.

Animal power.

Mechani- cal power.

empty. Efforts have accordingly been made not only to quicken the rate of transit, but also to move heavier loads, thus increasing the carrying capacity of the waterways. But at speeds exceeding about 35 m. an hour the ” wash ” of the boat begins to cause erosion of the banks, and thus necessitates the employment of special protective measures, such as building side walls of masonry or concrete. For a canal of given depth there is a particular speed at which a boat can be hauled with a smaller expenditure of energy than at a higher or a lower speed, this maximum being the speed of free propagation of the primary wave raised by the motion of the boat (see Wave). About 1830 when, in the absence of railways, canals could still aspire to act as carriers of passengers, advantage was taken of this fact on the Glasgow and Ardrossan canal, and subsequently on some others, to run fast passenger boats, made lightly of wrought iron and measuring 60 ft. in length by about 6 ft. in breadth. Provided with two horses they started at a low speed behind the wave, and then on a given signal were jerked on the top of the wave, when their speed was maintained at 7 or 8 m. an hour, the depth of the canal being 3 or 4 ft. This method, however, is obviously inapplicable to heavy barges, and in their case improved conditions of transport had to be sought in other directions.

Steam towage was first employed on the Forth and Clyde canal in 1802, when a tug-boat fitted with steam engines by W. Symington drew two barges for a distance of 19! m. in 6 hours in the teeth of a strong headwind. As a result of this successful experiment it was proposed to employ steam tugs on the Bridgewater canal; but the project fell through owing to the death of the duke of Bridge- water, and the directors of the Forth and Clyde canal also decided against

this method because they feared damage to the banks. Steam tugs are only practicable on navigations on which there are either no locks or they are large enough to admit the tug and its train of barges simultaneously; otherwise the advantages are more than counterbalanced by the delays at locks. On the Bridgewater canal, which has an average width of 50 ft. with a depth of 55 ft., is provided with vertical stone walls in place of sloping banks, and has no locks for its entire length of 40 m. except at Runcorn, where it joins the Mersey, tugs of 50 i.h.p., with a draught of 4 ft., tow four barges, each weighing 60 tons, at a rate of nearly 3 m. an hour. On the Aire and Calder navigation, where the locks have a minimum length of 215 ft., a large coal traffic is carried in trains of boat-compartments on a system designed by W. H. Bartholomew. The boats are nearly square in shape, except the leading one which has an ordinary bow; they are coupled together by knuckle-joints fitted into hollow stern-posts, so that they can move both laterally and vertically, and a wire rope in tension on each side enables the train to be steered. No boat crews are required, the crew of the steamer regulating the train. If the number of boats does not exceed n they can be pushed, but beyond that number they are towed. Each compartment carries 35 tons, and the total weight in a train varies from 700 to goo tons. On the arrival of a train at Goole the boats are detached and are taken over submerged cradles under hydraulic hoists which lift the boat with the cradle sufficiently high to enable it to be turned over and discharge the whole cargo at once into a shoot and thence into sea-going steamers. Another method of utilizing steam-power, which was also first tried on the Forth and Clyde canal by Symington in 1789, is to provide each vessel with a separate steam engine, and many barges are now running fitted in this way. Experiments have also been made with internal combustion engines in place of steam engines. In some cases, chiefly on rivers having a strong current, recourse has been had to a submerged chain passed round a drum on a tug: this drum is rotated by steam power and thus the tug is hauled up against the current. To obviate the inconvenience of passing several turns of the chain round the drum in order to get sufficient grip, the plan was introduced on the Seine and Oise in 1893 of passing the chain round a pulley which could be magnetized at will, the necessary

adhesion being thus ■■ obtained by the magnetic attraction exercised on the iron chain; and it was also adopted about the same time in combination with electrical haulage on a small portion of the Bourgogne canal, electricity being employed to drive the motor that worked the pulley. Small locomotives running on rails along the towpath were tried on the Shropshire Union canal, where they were

abandoned on account of practical difficulties in working, and also on certain canals in France and Germany, where, however, the financial results were not satisfactory. On portions of the Teltow canal, joining the Havel and the Spree, electrical tractors run on rails along both banks, taking their power from an overhead wire; they attain a speed of 25 m. an hour when hauling two 600-ton barges. The electrical supply is also utilized for working the lock gates and for various other purposes along the route of the canal. In the Mont-de-Rilly tunnel, at the summit level of the Aisne-Marne canal, a system of cable-traction was established in 1894, the boats being taken through by being attached to an endless travelling wire rope supported by pulleys en the towpath.

When railways were being carried out in England some canal companies were alarmed for their future, and sold their canals to the railway companies, who in 1906 owned 1138 m. of canals out of a total length in the United Kingdom of 3901 m. As some of these canals are links in the chain of internal water communication com- plaints have frequently arisen on the question of through traffic and tolls. The great improvements carried out in America and on the continent of Europe by state ‘aid enable manufacturers to get the raw material they use and goods they export to and from their ports at much cheaper rates than those charged on British canals. The association of chambers of commerce and other bodies having taken up the matter, a royal commission was appointed in 1906 to report on the canals and water-ways of the kingdom, with a view to considering how they could be more profitably used for national purposes. Its Report was published in December 1909.

Authorities.— L. F. Vernon-Harcourt, Rivers and Canals (2nd ed., 1896); Chapman, Canal Navigation; Firisi, On Canals; R. Fulton, Canal Navigation; Tatham, Economy of Inland Navigation; Valancy, Treatise on Inland Navigation; D. Stevenson, Canal and River Engineering; John Phillips, History of Inland Navigation; J. Priestley, History of Navigable Rivers, Canals, &c. in Great Britain (1831); T. Telford, Life (1838); John Smeaton, Reports (1837); Reports of the International Congresses on Interior ‘Naviga- tion; Report and Evidence of the Royal Commission on Canals {Great Britain), 1906-9. (jr. l_ \m ,

CANAL DOVER, a city of Tuscarawas county, Ohio, U.S.A., on the Tuscarawas river, about 70 m. S. by E. of Cleveland. Pop. (1890) 3470; (1900) 5422 (939 foreign-born); (1910) 6621. It is served by the Baltimore & Ohio and the Pennsylvania railways, and by the Ohio canal, and is connected with Cleveland by an inter-urban electric line. It lies on a plateau about 880 ft. above sea-level and commands

pleasant views of diversified scenery. Coal and iron ore abound in the vicinity, and the city manufactures iron, steel, tin plate, electrical and telephone supplies, shovels, boilers, leather, flour, brick and tile, salt, furniture and several kinds of vehicles. The municipality owns and operates its water-works. Canal Dover was laid' out as a town in 1807, and was incorporated as a village in 1842, but its charter was soon allowed to lapse and was not revived until 1867. Canal Dover became a city under the Ohio municipal code of

1903.

CANALE (or Canaletto), ANTONIO (1697-1768), Venetian painter, born on the 18th of October 1697, was educated under his father Bernard, a scene-painter of Venice, and for . some time followed his father's line of art. In 17 19 he went to Rome, where he employed himself chiefly in delineating ancient ruins, and particularly studied effects of light and shade, in which he became an adept. He was the first painter who made practical use of the camera lucida. On returning home he devoted his powers to views in his native city, which he painter! with a clear and firm touch and the most facile mastery of colour in a deep tone, introducing groups of figures with much effect. In his latter days he resided some time in England. His pictures, in their particular range, still remain unrivalled for their magnificent perspective. The National Gallery, London, has five pictures by him, notably the " View on the Grand Canal, Venice," and

the " Regatta on the Grand Canal." He died on the 20th of August 1768. Bellotto (commonly named Bernardo), who is also sometimes called Canaletto (1724-1780), was his nephew and pupil, and painted with deceptive resemblance to the style of the more celebrated master.

CANALIS (also "canal" and "channel"; from the Latin), in architecture, the sinking between the fillets of the volute of the Ionic capital: in the earliest examples, though sunk below the fillets, it is slightly convex in section.

CANANDAIGUA, a village and the county-seat of Ontario county, New York, U.S.A., 30 m. S.E. of Rochester. Pop. (1890) 5868; (1900) 6151; (1910) 7217. It is served by the New York Central and Hudson River, and the North- ern Central (Pennsylvania system) railways, and is con- nected with Rochester by an inter-urban electric line. Among the

manufactures are pressed bricks, tile, beer, ploughs, flour, agate and tin- ware. The village, picturesquely situated at the north end of Canandaigua Lake, a beautiful sheet of water about 15 m. long with a breadth varying from a mile to a mile and a half, is a summer resort. It has a county court house; the Canandaigua hospital of physicians and surgeons; the Frederick Ferris Thompson memorial hospital, with a bacteriological laboratory supported by the county; the Clark Manor House (a county home for the aged), given by Mrs Frederick Ferris Thompson in memory of her mother and of her father, Myron Holley Clark (1806-1892), president of the village of Canandaigua in 1850-1851 and governor of New York in 1855-1857; the Ontario Orphan Asylum; Canandaigua Academy; Granger Place school for girls; Brigham Hall (a private sanatorium for nervous and mental diseases); Young Men's Christian Association building (1905); and two libraries, the Wood (public) library and the Union School library, founded in 1795. There is a public playground in the village with free instruction by a physical director; and a swimming school, endowed by Mrs F. F. Thompson, gives free lessons in swimming. The village owns its water-supply system. A village of the Seneca Indians, near the present Canandaigua, bearing the same name, which means " a settlement was formerly there " (not, as Lewis Morgan thought, " chosen spot "), was destroyed by Gen. John Sullivan in 1779. There are boulder memorials of Sullivan's expedition and of the treaty signed here on the 1 ith of November 1 794 by Timothy Pickering, on behalf of the United States with the Six Nations — a treaty never ratified by the Senate. Canan- daigua was settled in 1789 and was first incorporated in

1812.

CANARD (the Fr. for " duck "), a sensational or extravagant story, a hoax or false report, especially one circulated by news- papers. This use of the word in France dates from the 17th century, and is supposed by Littre to have originated in the old expression, " vendre un canard a moitiS " (to half -sell a duck) ; as it is impossible to " half-sell a duck," the phrase came to signify to take in, or to cheat.

CANARY (Serinus canarius), a well-known species of passerine bird, belonging to the family Fringillidae or finches (see Finch) . It is a native of the Canary Islands and Madeira, where it occurs abundantly in the wild state, and is of a greyish-brown colour, slightly varied with brighter hues, although never attaining the beautiful plumage of the domestic bird. It was first domesti- cated in Italy during the 16th century, and soon spread over Europe, where it is now the most common of cage-birds. During the years of its domestication, the

canary has been the subject of careful artificial selection, the result being the production of a bird differing widely in the colour of its plumage, and in a few of its varieties even in size and form, from the original wild species. The prevailing colour of the most admired varieties of the canary is yellow, approaching in some cases to orange, and in others to white; while the most robust birds are those which, in the dusky green of the upper surface of their plumage, show a distinct approach to the wild forms. The least prized are those in which the plumage is irregularly spotted and speckled. In one of the most esteemed varieties, the wing and tail feathers are at first black— a peculiarity, however, which disappears

after the first moulting. Size and form have also been modified by domestication, the wild canary being not more than 5! in. in length, while a well-known Belgian variety usually measures 8 in. There are also hooped or bowed canaries, feather-footed forms and top-knots, the latter having a distinct crest on the head; but the offspring of two such top-knotted canaries, instead of showing an increased development of crest, as might be expected, are apt to be bald on ‘the crown. Most of the varieties, however, of which no fewer than twenty-seven were recognized by French breeders so early as the beginning of the 1 8th century, differ merely in the colour and the markings of the plumage. Hybrids are also common, the canary breeding freely with the siskin, goldfinch, citril, greenfinch and linnet. The hybrids thus produced are almost invariably sterile. It is the female canary which is almost invariably employed in crossing, as it is difficult to get the females of the allied species to sit on the artificial nest used by breeders. In a state of nature canaries pair, but under domestication the male bird has been rendered polygamous, being often put with four or five females; still he is said to show a distinct preference for the female with which he was first mated. It is from the others, however, that the best birds are usually obtained. The canary is very prolific, producing eggs, not exceeding six in number* three or four times a year; and in a state of nature it is said to breed still oftener. The work of building the nest, and of in- cubation, falls chiefly on the female, while the duty of feeding the young rests mainly with the cock bird. The natural song of the canary is loud and clear; and in their native groves the males, especially during the pairing season, pour forth their song with such ardour as sometimes to burst the delicate vessels of the throat. The males appear to compete with each other in the brilliancy of their melody, in order to attract the females, which, according to the German naturalist Johann Matthaus Bechstein (1757-1822) always select the best singers for their mates. The canary readily imitates the notes of other birds, and in Germany and

especially Tirol, where the breeding of canaries gives employment to a large number of people, they are usually placed for this purpose beside the nightingale. (A. N.)

CANARY ISLANDS (Canarias), a Spanish archipelago in the Atlantic Ocean; about 60 m. W. of the African coast, between 27 40′ and 29 30′ N., and between 13 20′ and 18° 10′ W. Pop. (1900) 358,564; area 2807 sq. m. The Canary Islands resemble a roughly-drawn semicircle, with its convex side facing south- wards, and with the island of Hierro detached on the south-west. More precisely, they may be considered as two groups, one of which, including Teneriffe, Grand Canary, Palma, Hierro and

Gomera, consists of mountain peaks, isolated and rising directly from an ocean of great depth; while the other, comprising Lanzarote, Fuerteventura and six uninhabited islets, is based on a single submarine plateau, of far less depth. Teneriffe and Gomera, the only members of the principal group which have a common base, may be regarded as the twin peaks of one great volcanic mass. Ever since the researches of Leopold von Buch the Canary Islands have been classical ground to the student of volcanic action. Buch considered them to be representative of his ” craters of elevation.” In common with the other West

African islands they are of volcanic origin. The lavas consist chiefly of trachytes and basalts.

Climate. — From April to October a north or north-east wind blows upon the islands, beginning about 10 a.m. and continuing until 5 or 6 p.m. In summer this wind produces a dense stratum of sea-cloud (cumuloni), 500 ft. thick, whose lower surface is about 2 500 ft. above the sea at Teneriffe. This does not reach up to the mountains, which have on every side a stratum of their own, about 1000 ft. thick, the lower surface being about 3500 ft. above the level of the sea. Between these two distinct strata there is a gap, through which persons on a vessel near the island may obtain a glimpse of the peak. The sea-cloud conceals from view the other islands, except those whose mountains pierce through it. On the south-west coasts there is no regular sea or land breeze. In winter they are occasionally visited by a hot south-east wind from Africa, which is called the Levante, and produces various disagreeable consequences on the exposed parts of the person, besides

injuring the vegetation, especially on the higher grounds. Locusts have sometimes been brought by this wind. In 181 2 it is said that locusts covered some fields in Fuerteventura to the derkh of 4 ft. Hurricanes, accom- panied by waterspouts, sometimes cause much devastation; but, on the whole, the islands are singularly free from such visitations. The climate generally is mild, dry and healthy. On the lower grounds the temperature is equable, the daily range seldom exceeding 6° Fahr. At Santa Cruz the mean for the year is about 71 . The rainy season occurs at the same period as in southern Europe. The dry season is at the time of the trade-winds, which extend a few degrees farther north than this latitude.

Fauna. — The indigenous mammals of the Canary Islands are very few in number. The dog, swine, goat and sheep were alone found upon the island by the Spanish conquerors: The race of large dogs which is supposed to have given a name to the islands has been long extinct. A single skeleton has been found, which is deposited in one of the museums at Paris. The ferret, rabbit, cat, rat, mouse and two kinds of bat have become naturalized. The ornithology is more interesting, on account at once of the birds native to the islands, and the stragglers from the African coast, which are chiefly brought over in winter, when the wind has blown for some time from the east. Among the indigenous birds are some birds of prey, as the African vulture, the falcon, the buzzard, the sparrow-hawk and the kite. There are also two species of owl, three species of sea-mew, the stockdove, quail, raven, magpie, chaffinch, goldfinch, blackcap, canary, titmouse, blackbird, house-swallow, &c. As to the insects, mention may be made of a species of gnat or mosquito which is sometimes troublesome, especially to strangers. The list of reptiles is limited to three varieties of lizard and one species of frog. The only fresh-water fish is the eel. Marine fishes are not numerous, the reason perhaps being that the steepness of the coast does not allow seaweed to grow in sufficient quantity to support the lower forms of marine animal life. Whales and seals are occasionally seen. The cuttle-fish is abundant, and is sought for as an article of food.

Flora. — The position of mountainous islands like the Canaries, in the subtropical division of the temperate zone, is highly favourable to the development, within a small space, of plants characteristic of both warm and cold climates. Von Buch refers to five regions of vegetation in Teneriffe:— (1) From the sea to the height of 1300 ft. This he styles the African region. The climate in the hottest parts is similar to that of Egypt. Here grow, among the introduced plants, the coffee tree, the date-palm, the sugar-cane, the banana, the orange tree, the American agave and two species of cactus; and among in- digenous plants, the

dragon tree on the north-west of Teneriffe. A leafless and fantastic euphorbia, E. canariensis, and a shrubby composite plant, Cacalia kleinia, give a character to the land- scape about Santa Cruz. (2) Between 1300 ft. and 2800 ft. This is the region of south European vegetation, the climate answering to that of southern France and central Italy. Here flourish vines and cereals. (3) The region of indigenous trees, including

various species of laurel, an Ardisia, Ilex, Rhamnus, Oka, Myrica, and other trees found wild also at Madeira. The clouds rest on this region during the day, and by their humidity support a vegetation amongst the trees, partly of shrubs, and partly of ferns. It extends to the height of 4000 ft. (4) The region of the beautiful Pinus canariensis, extending to the height of 6400 ft. ; here the broad-leaved trees have ceased to grow, but arborescent heaths are found throughout its whole extent, and specimens of Juniperus oxycedrus may be met with. (5) The region of Retama (Cytisus nubigenus), a species of white-flowering and sweet- scented broom, which is found as high as 1 1 ,000 ft. At the upper edge of this region a lilac-coloured violet clings to the soil, and above there is nothing but a little lichen. The number of wild flowering plants may be estimated at 900, upwards of 270 of which are peculiar to the Canaries. The forms of vegetation must in the main be considered North African. The character of the vegetation in Lanzarote and Fuerteventura, islands com- posed of extensive plains and low hills, with few springs, is different from that of the other islands, which are more elevated and have many springs. The wood is less abundant, and the vegetation less luxuriant.

Inhabitants. — The Guanches (q.v.) , who occupied the Canaries at the time of the Spanish invasion, no longer exist as a separate race, for the majority were exterminated, and the remainder intermarried with their conquerors. The present inhabitants are slightly darker than the people of Spain, but in other respects are scarcely distinguishable from them. The men are of middle height, well-made and strong; the women are not striking in respect of beauty,' but they have good eyes and hair. Spanish is the only language in use. The birth-rate is uniformly high and the death-rate low; and, despite the emigration of many families to South America and the United States, the census of 1900 showed that the population had increased by over 75,000 since 1877. The excess of females over males, which in 1900 amounted to upwards of 22,000, is partly explained by the fact that few Women emigrate. Fully 80 % of the inhabitants could neither read nor write in 1900; but education progresses more rapidly than in many other Spanish provinces. Good schools are numerous, and the return of emigrants and their children who have been educated in the United

States, tends to raise the standard of civilization. The sustenance of the poorer classes is chiefly composed of fish, potatoes and gofio, which is merely Indian corn or wheat roasted, ground and kneaded with water or milk. The land is, in great part, strictly entailed.

Government. — The archipelago forms one Spanish province, of which the capital is Santa Cruz de Tenerife, the residence of the civil governor, who has under his command one of the two districts into which the archipelago is divided, this first district comprising Teneriffe, Palma, Gomera and Hierro. The other district includes Grand Canary, Lanzarote, Fuerte- ventura, and has at its head a sub-governor, residing in Las Palmas, on Grand Canary, who is independent of the governor except in regard to elections and municipal administration. The chief finance office is at Santa Cruz de Tenerife. The court of appeal, created in 1526, is in Las Palmas. The captain- general and second commandant of the archipelago reside in Santa Cruz de Tenerife, and there is a brigadier-governor of Grand Canary, residing in Las Palmas, besides eight inferior military commandants. The province furnishes no men for the Spanish peninsular army, but its annual conscription provides men for the local territorial militia, composed of regiments of infantry, squadrons of mounted rifles and companies of garrison artillery — about 5000 men all told. The archipelago is divided into two naval districts, commanded by royal navy captains. Roman Catholicism is the official religion, and ecclesiastical law is the same as in other Spanish provinces. The convents have been suppressed, and in many cases converted to secular uses. Laguna and Las Palmas are episcopal sees, in the arch- bishopric of Seville.

Industry and Commerce. — Owing to the richness of the volcanic soil, agriculture in the Canaries is usually very profitable.

Land varies in value according to the amount of water available, but as a rule commands an extraordinarily high price. In the Terrenos de secano, or non-irrigable districts, the average price of an acre ranges from £7 to £17; in the Terrenos de riego, or irrigable land, it ranges from £100 to £250. Until 1853 wine was the staple product, and although even the finest brand (known as Vidonia) never equalled the best Madeira vintages, it was largely consumed abroad, especially in England. The annual value of the wine exported often, exceeded £500,000. In 1853, however, the grape disease attacked the vineyards;

and thenceforward the production of cochineal, which had been introduced in 1825, took the place of viticulture so com- pletely that, twenty years later, the exports of cochineal were worth £556,000. France and England were the chief purchasers. This industry declined in the later years of the 19th century, and was supplanted by the cultivation of sugar-cane, and afterwards of bananas, tomatoes, potatoes and onions. Bananas are the most important crop. Other fruits grown in smaller quantities include oranges, figs, dates, pineapples, guavas, custard-apples and prickly pears. Tobacco-planting is encouraged by the Spanish government, and the sugar trade is maintained, despite severe competition. The grain harvest does not supply the needs of the islanders. Pigs and sheep of a small, coarse-woolled breed, are numerous; and large herds of goats wander in an almost wild state over the higher hills. Fishing is a very important industry, employing over 10,000 hands. The fleet of about 2200 boats operates along some 600 m. of the African coast, between Cape Cantin and the Arguin Bank. Shipbuilding is carried on at Las Palmas; and the minor industries include the manufacture of cloth, drawn-linen (calado) work, silk, baskets, hats, &c. A group of Indian merchants, who employ coolie labour, produce silken, jute and cotton goods, Oriental embroideries, wrought silver, brass-ware, porcelain, carved sandal-wood, &c. The United Kingdom heads the import trade in coal, textiles, hardware, iron, soap, candles and colonial products. Timber comes chiefly from North America and Scandinavia, alcohol from Cuba and the United States, wheat and flour from various British possessions, maize from Morocco and Argentina. Large quantities of miscellaneous imports are sent by Germany, Spain, France and Italy. Bananas, tomatoes, potatoes, sugar and wine are exported. The total value of the foreign trade fluctuates very greatly, and the difficulty of forming an estimate is enhanced in many years by the absence of official statistics; but imports and exports together probably amount in a normal year to about £1,000,000. The chief ports are Las Palmas and Santa Cruz, which annually accommodate about 7000 vessels of over 8,000,000 tons. In 1854 all the ports of the Canaries were practically declared free; but on the 1st of November 1904 a royal order prohibited foreign vessels from trading between one island and another. This decree deprived the outlying islands of their usual means of communication, and, in answer to a protest by the inhabitants, its operation was postponed.

History. — There is ground for supposing that the Phoenicians were not ignorant of the Canaries. The Romans learned of their existence through Juba, king of Mauretania, whose account of an expedition to the islands, made about 40 B.C., was preserved by the elder Pliny. He

mentions ” Canaria, so called from the multitude of dogs of great size,” and ” Nivaria, taking its name from perpetual snow, and covered with clouds,” doubtless Teneriffe. Canaria was said to abound in palms and pine trees. Both Plutarch and Ptolemy speak of the Fortunate Islands, but from their description it is not clear whether the Canaries or one of the other island groups in the western Atlantic are meant; see Isles of the Blest. In the 1 2th century the Canaries were visited by Arab navigators, and in 1334 they were rediscovered by a French vessel driven among them by a gale. A Portuguese expedition, undertaken about the same time, failed to find the archipelago, and want of means frustrated the project of conquest entertained by a grandson of Alphonso X. of Castile, named Juan de la Cerda,

who had obtained a grant of the islands and had been crowned king of them at Avignon, by Pope Clement VI. Two or possibly more Spanish expeditions followed, and a monastic mission was established, but at the close of the 14th century the Guanches remained unconquered and unconverted. In 1402, however, Gadifer de la Salle and Jean de Bethencourt (q.v.) sailed with two vessels from Rochelle, and landed early in July on Lanzarote. The relations between these two leaders, and their respective shares in the work of conquest and exploration, have been the subject of much controversy. Between 1402 and 1404 La Salle conquered Lanzarote and part of Fuerteventura, besides exploring other islands; Bethencourt meanwhile sailed to Cadiz for reinforcements. He returned in 1404 with the title of king, which he had secured from Henry III. of Castile. La Salle, thus placed in a position of inferiority, left the islands and appealed unsuccessfully for redress at the court of Castile. In 1405 Bethencourt visited Normandy, and returned with fresh colonists who conquered Hierro. In December 1406 he left the Canaries, entrusting their government to his nephew Maciot de Bethencourt, and reserving for himself a share in any profits obtained, and the royal title. ‘Eight years of misrule followed before Queen Catherine of Castile intervened. Maciot there- upon sold his office to her envoy, Pedro Barba de Campos; sailed to Lisbon and resold it to Prince Henry the Navigator; and a few years afterwards resold it once more to Enrique de Guzman, count of Niebla. Jean de Bethencourt, who died in 1422, bequeathed the islands to his brother Reynaud; Guzman sold them to another Spaniard named Paraza, who was forced to re-sell to Ferdinand and Isabella of Castile in 1476; and Prince Henry twice endeavoured to enforce his own claims. Meanwhile the Guanches remained unconquered throughout the greater part of the archipelago. In 1479 the sovereignty of Ferdinand and Isabella over the Canaries was established by the treaty of Alcafova, between Portugal and Castile. After much bloodshed, and

with reinforcements from the mother country, the Spaniards, under Pedro de Vera, became masters of Grand Canary in 1483. Palma was conquered in 1491, and Teneriffe in 1495, by Alonzo de Lugo. The archipelago was included for administrative purposes in the captaincy-general of Andalusia until 1833, when it was made a separate province. In 1902 a movement in favour of local autonomy was repressed by Spanish troops.

Bibliography. — For a general description of the islands, see Les ties Canaries, by J. Pitard and L. Proust (Paris, 1909) ; Madeira and the Canary Islands, by A. Samler Brown, a guide for travellers and invalids, with coloured maps and plates (London, 1901) ; A Guide to the Canary Islands, by J. H. T. Ellerbeck (London, 1892); The Canary Islands as a Winter Resort, by J. Whitford (London, 1890, with maps and illustrations) ;. De la Tierra Canaria, by L. and A. Millares Cubas (Madrid, 1894) ; and Physikalische Beschreibung der kanarischen Inseln, by L. von Buch (Berlin, 1825). Besides the inter- esting folio atlas of von Buch (Paris, 1836), good modern maps have been published by E. Stanford (London, 1891, 125 English m. to 1 in.), and M. Perez y Rodriquez (Madrid, 1896-1898, 4 sheets). See also Histoire naturelle des lies Canaries, by P. Barker- Webb and S. Berthelot (Paris, 1835-1849) ; and ” Les lies Canaries et les parages de p6che canariens,” by Dr. A. Taquin, in the B.S.R. Beige G. 26 (1902), and 27 (1903) ; and, for history and antiquities, the Historia general de las islas Canarias, by A. Millares Cubas, in 10 vols. (Las Palmas, 1893—1895), and Historia de la Inquisicion en las islas Canarias, by the same author (Las Palmas, 1874); Antiquites canariennes , by S. Berthelot (Paris, 1879).

CANCALE, a fishing port of north-western France in the depart- ment of Ille-et-Vilaine on the Bay of Cancale, 9 m. E.N.E. of St Malo by road. Pop. (1906) town 3827, commune 7061. It exports oysters, which are found in its bay in large numbers and of excellent quality, and equips a fleet for the Newfoundland cod-fisheries. The harbour is protected by the rocks known as the Rochers de Cancale. In 1758 an English army under the duke of Marlborough landed here for the purpose of attacking St Malo and pillaged the town. It was again bombarded by the English in 1779.

CANCEL (from the Lat. cancelli, a plural diminutive of cancer.. a grating or lattice, from which are also derived ” chancel ” and ” chancellor “), a word meaning to cross out, from the

crossed latticed lines drawn across a legal document to annul it, hence to delete or destroy.

CANCELLI (plural of Lat. cancellus, dim. of cancer, a crossing bar), in architecture, the term given to barriers which correspond to the modern balustrade or railing, especially the screen divid- ing the body of a church from the part occupied by the ministers; hence ” chancel ” (q.v.). By the Romans cancelli were similarly employed to divide off portions of the courts of law (cf . the English ” bar “).

CANCER, LUIS (d. 1549), Spanish missionary to Central America, was born at Barbastro near Saragossa. After working for some time in Dominica and Haiti, he crossed to the mainland, where he had great success in pacifying the Indians whom more violent methods had failed to subdue. He upheld the cause of the natives at an ecclesiastical assembly held in Mexico in 1546, and three years later, on the 26th of June, met his death at their hands on the west coast of Florida.

CANCER (” The Crab “), in astronomy, the fourth sign of the zodiac, denoted by the symbol ˆ . Its name may be possibly derived from the fact that when the sun arrives at this part of the ecliptic it apparently retraces its path, resembling in some manner the sidelong motion of a crab. It is also a constellation, mentioned by Eudoxus (4th century b.c.) and Aratus (3rd century B.C.); Ftolemy catalogued 13 stars in it, Tycho Brahe 15 and Hevelius 29. Its most interesting objects are: a large loose cluster of stars, known as Praesepe or the Beehive, visible as a nebulous patch to the naked eye, and f Cancri, a remarkable multiple star, composed of two stars, of magnitudes 5 and 5-7, revolving about each other in 60 years, and a third star of magni- tude 5-5 which revolves about these two in an opposite direction in a period of 175 years; from irregularities in the motion of this star, it is supposed to be a satellite of an invisible body which itself revolves about the two stars previously mentioned, in a period of 600 to 700 years.

CANCER, or Carcinoma (from Lat. cancer, Gr. Kapdvcafia, an eating ulcer), the name given to a class of morbid growths or tumours which occur in man, and also in most or all vertebrate animals. The term ” malignant disease ” is commonly used as synonymous with ” cancer.” For the general pathology, &c, of tumours see Tumour.

Cancer exists in various forms, which, although differing from each

other in many points, have yet certain common characters to which they owe their special significance.

1. In structure such growths are composed of nucleated cells and free nuclei together with a milky fluid called cancer juice, all contained within a more or less dense fibrous stroma or framework.

2. They have no well-defined limits, and they involve all textures in their vicinity, while they also tend to spread by the lymphatics and veins, and to cause similar growths in distant parts or organs called " secondary cancerous growths."

3. They are undergoing constant increase, and their progress is usually rapid.

4. Pain is a frequent symptom. When present it is generally of a severe and agonizing character, and together with the local effects of the disease and the resulting condition of ill health or " cachexia," hastens the fatal termination to which all cancerous growths tend.

5. When such growths are removed by the surgeon they are apt to return either at the same or at some other part.

The chief varieties of cancer are Scirrhus or hard cancer, Encephaloid or soft cancer and Epithelial cancer.

Scirrhus is remarkable for its hardness, which is due to the large amount of its fibrous, and relatively small proportion of its cell elements. It is of comparatively slow growth, but it tends to spread and to ulcerate. Its most common seat by far is the female breast, though it sometimes affects internal organs.

Encephaloid is in structure the reverse of the last, its softness depending on the preponderance of its cell over its fibrous ele- ments. Its appearance and consistence resemble brain substance (hence its name) , and it is of such rapid growth as to have given rise to its beine occasionally termed acute cancer. Its most

frequent seats are internal organs or the limbs. Ulceration and haemorrhage are common accompaniments of this form of cancer.

Epithelial cancer, is largely composed of cells resembling the natural epithelium of the body. It occurs most frequently in those parts provided with epithelium, such as the skin and mucous membranes, or where those adjoin, as in the lips. This form of cancer does not spread so rapidly nor produce secondary growths in other organs to the same

extent as the two other varieties, but it tends equally with them to involve the neigh bouring lymphatic glands, and to recur after removal.

Cancer affects all parts of the body, but is much more frequent in some, tissues than. in others. According to recent statistics prepared by the registrar-general for England and Wales (sixty- seventh annual report) the most frequent seats are, in numerical order, as follows :~r- males — stomach, liver, rectum, intestines, aesophagus, tongue; females — uterus, breast, stomach, liver, intestines, rectum. Other statistics give similar, though not identical results. It may be said, broadly, that the most frequent seats are the female sexual organs and after them the digestive tract in both sexes. In children, in whom cancer is rare, the most frequent seats appear to be— under five, the kidneys and supra-renal bodies; five to ten, the brain; ten to twenty, the arm and leg bones.

Cancer tends to advance steadily to a fatal termination, but its duration varies in different cases according to the part affected and according to the variety of the disease. Soft cancer affecting important organs of the body often proves fatal in a few months, while, on the other hand, cases of hard or epithelial cancer may sometimes last for several years; but no precise limit can be assigned for any form of the disease. In some rare instances growths exhibiting all the signs of cancer may exist for a great length of time without making any progress, and may even dwindle and disappear altogether. This is called ” spontaneous cure.”

. Cancer has been the subject of observation from time immemorial, and of the most elaborate investigation by innumer- able workers in recent years; but the problems of its _ origin and character have hitherto baffled inquiry. researe /, # Modern scientific study of them may be said to have begun with J. Muller’s microscopic work in the structure of cancerous tissue early in the 19th century. A great impetus to this line of investigation was given by the cellular theory of R. Virchow and the pathological researches of Sir J. Paget, and general attention was directed to the microscopic examina- tion of the cells of which cancer is composed. This led to a classification, on which much reliance was once placed, of different kinds of cancer, based on the character of the cells, and particularly to a distinction between carcinoma, in which the cells are of the epithelial type, and sarcoma, in which they are of the connective tissue type. The distinction, though still maintained, has proved barren; it never had any real signifi- cance, either clinical or pathological, and the tendency in recent research is to ignore it. The increased knowledge

gained in numerous other branches of biological science has also been brought to bear on the problem of cancer and has led to a number of theories; and at the same time the apparently increasing prevalence of the disease recorded by the vital statistics of many countries has drawn more and more public attention to it. Two results have followed. One is the establishment of special endowed institutions devoted to cancer research; the other is the publication and discussion of innumerable theories and proposed methods of treatment. Popular interest has been constantly fanned by the announcement of some pretended discovery or cure, in which the public is invited to place its trust. Such announcements have no scientific value whatever. In the rare cases in which they are not pure quackery, they are always premature and based on inadequate data.

Organized cancer research stands on a different footing. It may be regarded as the revival at the end of the 19th century of what was unsuccessfully attempted at the beginning. As early as 1792, at the suggestion of Mr. John Howard, surgeon, a ward was opened at the Middlesex hospital in London for

the special benefit of persons suffering from cancer. It was fitted up and endowed anonymously by Mr. Samuel Whitbread, M.P. for Bedford, and according to the terms of the benefaction at least six patients were to be continually maintained in it until relieved by art or released by death. The purpose was both philanthropic and scientific, as Mr. Howard explained' in bringing forward the suggestion. Two principal objects, he said, presented themselves to his mind, " namely, the relief of persons suffering under this disease and the investigation of a complaint which, although extremely common, is both with regard to its natural history and cure but imperfectly known." This benefaction was the origin of one of the most complete institutions for the scientific study of cancer that exists to-day. In 1804 a Society for Investigating the Nature of Cancer was formed by a number of medical men in London, Edinburgh and other towns at the instigation of John Hunter. The aim was collective investigation, and an attempt was made to carry it out by issuing forms of inquiry; but the imperfect means of communication then existing caused the scheme to be aban- doned in a short time. Subsequent attempts at collective investigation also failed until recently. About 1 900 a movement, which had been for some time gathering force, began to take visible shape simultaneously in different countries. The cancer

ward at. the Middlesex hospital had then developed into a cancer wing, and to it were added special laboratories for the investigation of cancer, which were opened oh the 1st of March 1900. In this establishment the fully equipped means of clinical and laboratory research were united under one roof and manned by a staff of investigators under the direction of Br W. S. Lazarus Barlow. In the same year the Deutsche Comiti ftir Krebsforschung was organized in Berlin, receiving an annual subsidy of 5000 marks (£250) from the imperial exchequer. This body devoted its energies to making a census of cancer patients in Germany on a definite date. A special ward for cancer was also set apart at the Charite hospital in Berlin,- with a state endowment of S3; 000 marks (£2560) per annum, and a laboratory for cancer research was attached to the first medical clinique under Professor Ernst von Leyden at the same hospital. A third institution in Germany is a special cancer department at the Royal Prussian Institute for Experimental Therapeutics at Frankfort-on-Main, which has been supported, like the Imperial Cancer Research Fund in England, by private contributions on a generous scale. The fund just mentioned was initiated in October 1901, and its operations took definite shape a year later, when Dr. E. F. Bashford was appointed general superintendent of research. The patron of the founda- tion was King Edward VII., and the president was the prince of Wales. It had in 1908 a capital endowment of about £120,000, subscribed by private munificence and producing an income of about £7000 a year. The central laboratory is situated in the examination building of the Royal Colleges of Physicians and Surgeons in London, and the work is conducted under the superintendence of an executive committee formed by repre- sentatives of those bodies. In the United States a cancer laboratory, which had been established in Buffalo in 1899 under Dr Roswell Park, was formally placed under the control of New York state in June 1901, and is supported by an annual grant of $15,000 (£3000). There are other provisions in the United States connected with Harvard and Cornell universities. At the former the ” Caroline Brewer Croft Fund for Cancer Research ” started special investigations in the surgical depart- ment of the Harvard Medical School in 1900 or the previous year, and in connexion with the Cornell University Medical School there is a small endowment called the ” Huntingdon Cancer Research Fund.” There appear to be institutions of a similar character in other countries, in addition to innumerable investigators at universities and other ordinary seats of scientific research.

Some attempt has been made to co-ordinate the work thus carried on in different countries. An international cancer congress was held at

Heidelberg and Frankfort in 1906, and a proposal was put forward by German representatives that a

permanent international conference on cancer should be estab lished, with headquarters in Berlin. The committee of the Imperial Cancer Research Fund did not fall in with the proposal, being of opinion that more was to be gained in the existing stage of knowledge by individual intercourse and exchange of material between actual laboratory workers.

In spite of the immense concentration of effort indicated by the simultaneous establishment of so many centres of endowed research, and in spite of the light thrown upon the problem from many sides by modern biological Jf**ocer science, our knowledge of the- origin of cancer is still in such a tentative state that a detailed account of the theories put forward is not called for; it will suffice to indicate their general drift. The actual pathological process of cancer is extremely simple. Certain cells, which are apparently of a normal character and have previously performed normal functions, begin to grow and multiply in an abnormal way in some part of the body. They continue this process so per- sistently that they first invade arid then destroy the surrounding tissues; nothing can withstand their march. They are moreover carried to other parts of the body, where they establish them- selves and grow in the same way. Their activity is carried on with relentless determination, though at a varying pace, until the patient dies, unless they are bodily removed. Hence the Word ” malignant.” The problem is— what are these cells, or why do they behave in this way? The principal answers put forward may be summarized:- — (1) they are epithelial cells which grow without ceasing because the connective tissue has lost the capacity to hold their proliferative powers in check (H. Freund, following K. Thiersch and W. Waldeyer); (2) they are embryonic cells accidentally shut off (J. F. Cohnheim)

(3) they are epithelial cells With a latent power of unlimited proliferation which becomes active on their being dislocated from the normal association (M. W. H. Ribbert and Borrmann);

(4) they are stimulated to unlimited growth by the presence of a parasite (Plimmer, Sanfelice, Roncali and others); (5) they are fragments of reproductive tissue (G. T. Beatson); (6) they are cells which have lost their differentiated character and assumed elementary properties (von Hausemann, O. Hertwig). The very number and variety of hypotheses show that none is established. Most of theni attempt to explain the growth but not the origin of the disease. The

hypothesis of a parasitic origin, suggested by recent discoveries in relation to other diseases, has attracted much attention; but the observed phenomena of cancerous growths are not in keeping with those of all known parasitic diseases, and the theory is now somewhat discredited. A more recent theory that cancer is due to failure of the normal secretions of the pancreas has not met with much acceptance.

Some generalizations bearing on the problem have been drawn from the work done in the laboratories of the Imperial Cancer Research Fund, They may be summarily stated thus. Cancer has been shown to be an identical process in all vertebrates (including fishes), and to develop at a time which conforms in a striking manner to the limits imposed by the long or short compass of life in different animals. Cancerous tissue can be artificially propagated in the short-lived mouse by actual transference to another individual, but only to one of the same species. Cancerous tissue thus propagated presents all the characteristic features of the malignant growth of sporadic tumours; it infiltrates and produces extensive secondary growths. Under suitable experimental conditions the aggregate growth of a cancer is undefined, of enormous and, so far as we can judge, of limitless amount. This extraordinary growth is due to the continued proliferation of cancerous cells when trans- planted. The processes by which growing cancer cells are trans- ferred to a new individual are easily distinguishable and funda- mentally different from all known processes of infection. The artificial propagation of cancer causes no specific symptoms of illness in the animal in which it proceeds. Under artificial propagation cancer maintains all the characters of the original tumours of the primary hosts. Carcinoma and sarcoma agree

in possessing all the pathological and cellular features of malig- nant new growths.

Simultaneously with the active pursuit of laboratory research much statistical work has been devoted to establishing the broad

facts of the prevalence and incidence of cancer on a o/cancer. nrm basis. The point of most general interest is the

apparently steady increase of the disease in all countries possessing fairly trustworthy records. It will be sufficient to give the figures for England and Wales as an example.

Annual Death-rates from Cancer to a Million living. England and Wales.

1871-1875.

1876-1880.

1881-1885.

i886-i8qo.

1891-1895.

T896-I9OO.

I90 1 -1 9O4.

445

493

547

631

711

800

[861

In forty years the recorded rate had risen from 403 to 861. The question how far these and similar statistics represent a real increase cannot be satisfactorily resolved, because it is impossible to ascertain how much of the apparent increase is due to more accurate diagnosis and improved registration. Some of it is certainly due to those causes, so that the recorded figures cannot be taken to represent the facts as they stand. At the same time it is certain that some increase has taken place in consequence of the increased average length of life; a larger proportion of persons now reach the ages at which cancer is most frequent. Increase due to this fact, though it is a real increase, does not indicate that the cause of cancer is more rife or more potent; it only means that the condition of the popula- tion in regard to age is more favourable to its activity. On the whole it seems probable that, when allowance has been made for this factor and for errors due to improved registration, a real increase due to other causes has taken place, though it is not so great as the recorded statistics would

indicate.

The long-established conclusions concerning the incidence of the disease in regard to age and sex have been confirmed and rendered more precise by modern statistics. Cancer is a disease of old age; the incidence at the ages of sixty-five to seventy-five is ten times greater than at the ages thirty -five to forty-five. This fact is the source of frequent fallacies when different countries or districts and different periods are compared with each other, unless account is taken of the differences in age and constitution. With regard to sex females are far more liable than males; the respective death-rates per million living for England and Wales in 1904 were — males 740; females 1006. But the two rates show a tendency to approximate; the increase shown over a series of years has been considerably more rapid among males than among females. One result of more careful examination of statistics has been to discredit, though perhaps somewhat hastily, certain observations regarding the prevalence of cancer in special districts and special houses. On the other hand the fuller statistics now available concerning the relative frequency of cancer in the several organs and parts of the body, of which some account is given above, go to confirm the old observation that cancer commonly begins at the seat of some local irritation. By far the most frequent seats of disease are the uterus and breast in women and the digestive tract in both sexes, and these are all particularly subject to such irritation. With regard to the influence of heredity the trend of modern research is to minimize or deny its importance in cancer, as in phthisis, and to explain family histories by other considerations. At most heredity is only thought to confer a predisposition.

The only ” cure ” for cancer remains removal by operation; but improved methods of diagnosis enable this to be done in many cases at an earlier stage of the disease than formerly; and modern methods of surgery permit not only of operation in parts of the body formerly inacces- sible, but also more complete removal of the affected tissues. Numerous forms of treatment by modern therapeutic means, both internal and external, have been advocated and tried; but they are all of an experimental nature and have failed to meet with general acceptance. One of the most recent is treat- ment by trypsin, a pancreatic ferment. This has been suggested

Treat- ment

by Dr John Beard of Edinburgh in conformity with the theory, mentioned above, that failure of the pancreatic secretions is the cause of cancer. It has been claimed that the drug exercises a favourable

influence in conjunction with operation and even without it. The experience of different observers with regard to results is contradictory; but clinical investigations conducted at Middlesex hospital in a number of cases of undoubted cancer in strict accordance with Dr Beard's directions, and summarized by Dr Walter Ball and Dr Fairfield Thomas in the Sixth Report from the Cancer Research Laboratories {Archives of Middlesex Hospital, vol. ix.) in May 1907, resulted in the conclusion " that the course of cancer, considered both as a disease and as a morbid process, is unaltered by the administration of trypsin and amylopsin." The same conclusion has been reached after similar trials at the cancer hospital. Another experimental method of treatment which has attracted much attention is application of the X-rays. The results vary in a capricious and inexplicable manner; in some cases marked benefit has followed, in others the disease has been as markedly aggravated. Until more is known both of cancer and of X-rays, their use must be considered not only experimental but risky. (A. Sl.)

CANCRIN, FRANZ LUDWIG VON (1738-1812), German mineralogist and metallurgist, was born on the 21st of February 1738, at Breitenbach, Hesse-Darmstadt. In 1764 he entered the service of the landgrave of Hesse-Darmstadt at Hanau, be- coming professor of mathematics at the military academy, head of the civil engineering department of the state, director of the theatre and (1774) of the mint. A work on the copper mines of Hesse (1767) earned him a European reputation, and in 1783 he accepted from Catherine II. of Russia the directorship of the famous Staraya salt-works, living thenceforth in Russia. In 1798 he became a councillor of state at St Petersburg. He pub- lished many works on mineralogy and metallurgy, of which the most important, the Grundzilge der Berg- wnd Salzwerkskunde (13 vols., Frankfort, 1773-1791), has been translated into several languages; His son, Count Georg von Cancrin, or Kankrin (1774-1845), was the eminent Russian minister of finance.

CANDELABRUM (from Lat. candela, a taper or candle), the stand on which ancient lamps were placed. The most ancient example is the bronze candelabrum made by Callimachus for the Erechtheum at Athens, to carry the lamp sacred to Minerva. In this case it is probable the lamp was suspended, as in the example from Pompeii, now in the Naples museum; this con- sisted of a stalk or reed, the upper part moulded with projecting feature to carry the lamps, and a base resting on three lions' or griffins' feet; sometimes there was a disk at the top to carry a lamp, and sometimes there was a hollow cup, in which resinous woods were burnt. The origin of the term suggests that on the top of the disk was a spike to carry a wax or tallow candle (candela or

furialia). Besides these bronze candelabra, of which there are many varieties in museums, the Romans used more ponderous supports in stone or marble, of which many examples were found in the Thermae. These consisted of a base, often triangular, and of similar design to the small sacrificial altars, and a shaft either richly moulded or carved with the acanthus plant and crowned with a large cup or basin. There is a fine example of the latter in the Vatican. The Roman examples seem to have served as models for many of the candelabra in the churches in Italy. The word ” candelabrum ” is also now used to describe many different forms of lighting with multiple points, and is often applied to hanging lights as well as to those which rise from a stand.

CANDIA, formerly the capital and still the most populous city of Crete (?.».), to which it has given its name. It is situated on the northern shore somewhat nearer the eastern than the western end.of the island, in 35 20′ N. lat. and 25 9′ E. long. It is still surrounded by its extensive Venetian fortifications; but they have fallen into disrepair, and a good part of the town is in a dilapidated condition, mainly from the effects of earthquakes. The principal buildings are the Venetian loggia (barbarously mutilated by; the new regime), the Konak (now Prefecture), the mosques, which are fourteen in number, the new cathedral,

the two Greek churches, the Armenian church, the Capuchin monastery, the bazaars and the baths. There are also some beautiful Venetian fountains. The town is the seat of a Greek archbishop. A highly interesting museum has been formed here containing the antiquities found during the recent excava- tions. The chief trade is in oil and soap, both of which are of excellent quality. The coasting trade, which is of considerable importance, is mainly carried on in Turkish vessels. The manu- facture of leather for home consumption is an extensive industry, and wine of good quality is produced in the neighbourhood. The harbour, which had grown almost inaccessible, was deepened by Mustapha Pasha between 1820 and 1840. It is formed for the most part by the ancient moles, and was never deep enough to admit the larger vessels even of the Venetians, which were accustomed to anchor in the port of the neighbouring island of Standia. A short distance from St George’s Gate there was a small village exclusively inhabited by lepers, who numbered about seventy families, but they have now been transported to Spinalonga. The

population of the town is estimated at from 15,000 to 18,000, about half being Mahommedan Greeks. The site of Candia, or, as it was till lately locally known, Megalo castro (the Great Fortress), has been supposed to correspond with that of the ancient Heracleion, the seaport of Cnossus, and this appellation has now been officially revived by its Greek inhabitants. The ruins of Cnossus are situated at the distance of about 3 m. to the south-east at the village of Makryteichos or Long Wall. Founded by the Saracens in the oth century, Candia was fortified by the Genoese in the 1 2th, and was greatly extended and strengthened by the Venetians in the 13th, 14th and 15th centuries. It was besieged by the Turks under the vizier Achmet in 1667; and, in spite of a most heroic defence, in which the Venetians lost 30,000 in killed and wounded, it was forced to surrender in 1669. (See also Crete.)

CANDIDATE, one who offers himself or is selected by others for an office or place, particularly one who puts up for election to parliament or to any public body. The word is derived from the Latin candidatus, clad in white (candid-us) . In Rome, candidates for election to the higher magistracies appeared in the Campus Martius, the Forum and other public places, during their canvass, in togas with the white of the natural wool brightened by chalk.

CANDLE (Lat. candela, from candere, to glow), a cylindrical rod of solid fatty or waxy matter, enclosing a central fibrous wick, and designed to be burnt for giving light. The oldest materials employed for making candles are beeswax and tallow, while among those of more recent introduction are spermaceti, stearine and paraffin wax. Waxlights (cereus, sc. funis) were known to the Romans. In the midlde ages wax candles were little used, owing to their expense, except for the ceremonies of the church and other religious purposes (see Lights, Cere- monial Use of), but in the 15th century, with the cheapening of wax, they began to find wider employment. The tallow candle, mentioned by Apuleius as sebaceus, was long an article of domestic manufacture. The tallow was melted and strained, and then lengths of cotton or flax fibre, or rushes from which most of the external skin had been stripped, only sufficient being left to support the pith (“rushlights”), were dipped into it, the opera- tion being repeated until the desired thickness had been attained. In Paris, in the 13th century, there was a gild of candlemakers who went from house to house to make tallow candles, the manufacture of wax candles being in the hands of another gild. This separation of the two branches of the trade is also exempli- fied by the existence of two distinct livery companies in the city of London — the Waxchandlers and the Tallowchandlers; the French chandelle properly means tallow candle, candles made of

materials less fusible than tallow being called bougies, a term said to be derived from the town of Bougie in Algeria, either because wax was produced there or because the Venetians imported wax candles thence into Europe. The old, /tallow “dips” gave a poor light, and tallow itself is now used only to a limited extent, except as a source of “stearine.” This is the trade name for a mixture of solid fatty acids—mainly

stearic and palmitic — manufactured not only from tallow and other animal fats, but also from such vegetable fats as palm-oil. Paraffin wax, a mixture of solid hydrocarbons obtained from crude North American and Rangoon petroleum, and also yielded in large quantities by the Scotch shale oil industry, is, at least in Great Britain, a still more important material of candle- manufacture, which came into use about 1854. Spermaceti, a crystalline fatty substance obtained from the sperm whale (Physeter macrocephalus) , was introduced as a material for candles about a century earlier. In practice the candlemaker mostly uses mixtures of these materials. For instance, 5-10% of stearine, which is used alone for candles that have to be burnt in hot climates, is mixed with paraffin wax, to counteract the tendency to bend with heat exhibited by the latter substance. Again, the brittleness of spermaceti is corrected by the addition of beeswax, stearine, paraffin wax or ceresin (obtained from the mineral wax ozocerite) . In some ” composite ” candles stearine is mixed with the hard fat (” cocoa-nut stearine “) expressed from cocoa-nut oil by hydraulic pressure; and this cocoa-nut stearine is also used for night-lights, which are short thick candles with a thin wick, calculated to burn from six to ten hours .

The stearine or stearic acid industry originated in the discovery made by M. E. Ghevreul about 1815, that fats are glycerides or compounds of glycerin with fatty acids, mostly palmitic, stearic and oleic. The object of the candlemaker is to remove this glycerin, not only because it is a valuable product in itself, but also because it is an objectionable constituent of a candle; the vapours of acrolein formed by its decomposition in the flame are the cause of the unpleasant odours produced by tallow ” dips.” He also removes the oleic acid, which is liquid at ordinary temperatures, from the palmitic and stearic acids, mixtures of which solidify at temperatures varying from about 130 to 155° F., according to the percentage of each present. Several methods are in use for the decomposition of the fats. In the autoclave process the fat, whether tallow, palm-oil or a mixture of the two, mixed with 25 or 30% of water and about 3 % of lime, is subjected in an autoclave to steam at a pressure of about 120 lb per square inch for eight or ten hours, when nearly all of it is saponified. On standing the

product separates into two layers — ” sweet water ” containing glycerin below, ajid the fatty acids with a certain amount of lime soap above. The upper layer is then boiled and treated with enough sulphuric acid to decompose the lime soap, the calcium sulphate formed is allowed to subside, and the fatty acids are run off into shallow boxes to be crystallized or ” seeded ” prior to the separation of the oleic acid, which is effected by pressing the solid blocks from the boxes, first cold and then hot, by hydraulic machinery. In another process saponification is effected by means of con- centrated sulphuric acid. The fat is mixed with 4-6% of the acid and treated with steam in boiling water till the hydrolysis is complete,when on standing the glycerin and sulphuric acid sink to the bottom and the fatty acids rise to the top. Owing to the darkness of their colour, when this process is employed, the latter usually have to be distilled before being crystallized. The autoclave process yields about 45% of stearine, one-third of which is recovered from the expressed oleic acid, but with sulphuric acid saponification the amount of stearine is higher — over 60% — and that of oleic acid less, part of it being converted into solid material by the action of the acid. The yield of glycerin is also less. In a combination of the two processes the fat may first be treated by the autoclave process, so as to obtain a full yield (about 10%) of glycerin, and the resulting fatty acids then subjected to acid saponification, so as to get the higher amount of stearine. At the best, however, some 30% of oleic acid remains, and though often sought, no satisfactory method of converting this residue into solid has been discovered. It constitutes ” red oil,” and is used in soap-making and in woollen manufacture. In the process patented by Ernst Twitcheh in 1898, decomposition is effected by boiling the fat with half its bulk of water in presence of a reagent obtained by the action of sulphuric acid on oleic acid and an aromatic hydrocarbon such as benzene.

The wick is a most important part of a candle, and unless it is of proper size and texture either too much or too little fuel will be supplied to the flame, and the candle will gutter or be otherwise unsatisfactory. The material generally employed is cotton yarn, plaited or ” braided ” by machinery, and treated or ” pickled ” with a solution of boracic acid, ammonium or potassium nitrate, or other salt. The tightness of the plaiting varies with the material used for the candle, wicks for stearine being looser than for paraffin, but tighter than for wax or spermaceti. The plaited wick is flat and curls over as the candle burns, and thus the end is kept projecting into the outer part of

the flame where it is consumed, complete com- bustion being aided by the pickling process it has undergone. In the old tallow dips the strands of cotton were merely twisted together, instead of being plaited; wicks made in this way had no determinate bias towards the outside of the flame, and thus were not wholly consumed, the result being that there was apt to be an accumulation of charred matter, which choked the flame unless removed by periodical ” snuffing.”

Four ways of making candles may be distinguished — dipping, pouring, drawing and moulding, the last being that most com- monly employed. Dipping is essentially the same as the domestic process already described, but the rate of production is increased by mounting a number of wicks in a series of frames, each of which in turn is brought over the tallow bath so that its wicks can be dipped. Pouring, used in the case of wax, which cannot well be moulded because it contracts in cooling- and also has a tendency to stick to the moulds,, consists in ladling molten wax upon the wicks suspended from an iron ring. When of the desired thickness the candles are rolled under a plate on a marble slab. • In drawing, used for small tapers, the wick, rolled on a drum, is passed through the molten wax or paraffin, drawn through a circular hole and slowly wound on a second drum; it is then passed again through the molten material and through a somewhat larger hole, and reeled back on the first drum, this process being repeated with larger and larger holes until the coating is of the required thickness. In moulding, a number of slightly conical moulds are fixed by the larger extremity to a kind of trough, with their tapered ends projecting downwards and with wicks arranged down their centres. The molten material is poured into the trough and fills the moulds, from which the candles are withdrawn when solidified. Modern candle-moulding machines are continuous in their operation; long lengths of wick are coiled on bobbins, one for each mould, and the act of removing one set of candles from their moulds draws in a fresh set of wicks. ” Self-fitting ends,” which were invented by J. L. Field in 1864, and being shaped like a trun- cated cone enable the candles to be fixed in candlesticks of any diameter, are formed by means of an attachment to the tops of the moulds; spirally twisted candles are, as it were, unscrewed from their moulds. It is necessary to be able to regulate the temperature of the moulds accurately, else the candles will not come out freely and will not be of good appearance. For stearine candles the moulds are immersed in tepid water and the cooling must be slow, else the material will crystallize, though if it be too slow cracking will occur. For paraffin, on the other hand, the moulds must be rather hotter than the molten material (about 200 F.), and must be quickly cooled to prevent the candles from sticking.

A candle-power, as a unit of light in photometry, was defined by the (London) Metropolis Gas Act of i860 as the light given by a sperm candle, of which six weighed 1 lb and each burned 120 grains an hour.

See W. Lant Carpenter, Soaps and Candles (London, 1895); C. E. Groves and W. Thorp, Chemical Technology, vol. ii. " Lighting " (London, 1895); L. L. Lamborn, Soaps, Candles and Glycerine (New York, 1906); J. Lewkowitsch, Oils, Fats, and Waxes (London, 1909).

CANDLEMAS (Lat. festum candelarum sive luminum), the name for the ancient church festival, celebrated annually on the 2nd of February, in commemoration of the presentation of Christ in the Temple. In the Greek Church it is known as TTraTrajTTj rov Kvpiov (" the meeting of the Lord," i.e. with

Simeon and Anna), in the West as the Purification of the Blessed Virgin. It is the most ancient of all the festivals in honour of the Virgin Mary. A description is given of its celebration at Jeru- salem in the Peregrinalio of Etheria (Silvia), in the second half of the 4th century. It was then kept on the 14th of February, forty days after Epiphany, the celebration of the Nativity (Christmas) not having been as yet introduced; the Armenians still keep it on this day, as " the Coming of the Son of God into the Temple." The celebration gradually spread to other parts of thˆ church, being moved to the 2nd of February, forty days after the newly established feast of Christmas. In 542 it was established throughout the entire East Roman empire by Justinian. Its introduction in the West is somewhat obscure. The 8th-century Gelasian Sacramentary, which embodies a much older tradition, mentions it under the title of Purification of the Blessed Virgin Mary, which has led some to suppose that it was ordained by Pope Gelasius I. in 492 x as a counter-attraction to the heathen Lupercalia; but for this there is no warrant. The procession on this day was introduced by Pope Sergius I. (687-701). The custom of blessing the candles for the whole year on this day, whence the name Candlemas is derived, did not come into common use until the nth century.

In the Quadragesimae de Epiphania as described by Etheria there is, as Monsignor Duchesne points out {Christian Worship, p. 272), no indication of a special association with the Blessed Virgin; and the distinction between the festival as celebrated in the East and West is that in the former it is a festival of Christ, in the latter a festival pre-eminently of the Virgin Mother.

See L. Duchesne, Christian Worship (Eng. trans., London, 1904); art.

s.v. by F. G. Holweck in the Catholic Encyclopaedia.

CANDLESTICK, the receptacle for holding a candle, now- adays made in various art-forms. The word was formerly used for any form of support on which lights, whether candles or lamps, were fixed; thus a candelabrum (q.v.) is sometimes spoken of from tradition as a candlestick, e.g. as when Moses was commanded to make a candlestick for the tabernacle, of hammered gold, a talent in weight, and consisting of a base with a shaft rising out of it and six arms, and with seven lamps supported on the summits of the six arms and central shaft. When Solomon built the temple, he placed in it ten golden candlesticks, five on the north and five on the south side of the Holy Place; but after the Babylonish captivity the golden candlestick was again placed in the temple, as it had been before in the tabernacle by Moses. On the destruction of Jerusalem by Titus, it was carried with other spoils to Rome. Representations of the seven-branched candlestick, as it is called, occur on the arch of Titus at Rome, and on antiquities found in the Catacombs at Rome. The primitive form of candlestick was a torch made of slips of bark, vine tendrils or wood dipped in wax or tallow, tied together and held in the hand by the lower end, such as are frequently figured on ancient painted vases. The next step was to attach to them a cup (discus) to catch the dripping wax or tallow.

A candlestick may be either ” flat ” or ” tall.” The former has a short stem, rising from a dish, and is usually furnished with an extinguisher fitting into a socket; the latter has a pillar which may be only a few inches in height or may rise to several feet, and rarely has an extinguisher. The flat variety is some- times called a ” bedroom candlestick.” The beginnings of this interesting and often beautiful appliance are not exactly known, but it dates certainly as far back as the 14th century and is probably older. It is most usually of metal, earthenware or china, but originally it was made of some hard wood and had no socketed pillar, the candle fitting upon a metal spike, in the fashion still familiar in the case of many church candlesticks. It has been constantly influenced by mobiliary and architectural fashions, and has varied, as it still varies, from the severest simplicity of form and material to the most elaborate artistic treatment and the costliest materials — gold and silver, crystal, marble and enamel. Previous to the 17th century, iron, latten, bronze and copper were chiefly used, but thenceforward the 1 So Baronius, Ann. ad ann. 544.

most elegant examples Were chiefly of silver, though in more modem periods Sheffield plate, silver plate and china became exceedingly popular. Sometimes the base and sconce are of one material and the pillar of another, as when the former are of silver and the pillar of marble or china. The choice and com- bination of materials are, indeed, infinite. The golden age of the candlestick lasted, roughly speaking, from the third quarter of the 17 th century to the end of the 18th. The later Jacobean, Queen Anne and early Georgian forms were often extremely elegant, with broad bases, round, oval or square and swelling stems. Fine examples of these periods, especially when of silver, are much sought after and command constantly augmenting prices. As with most domestic appliances the history of the candlestick is an unceasing tendency towards simplicity, the most elaborate and fantastic forms, animals and reptiles, the monstrous creatures of mythology, lions and men-at-arms, angels and cupids, having gradually given place to architectural motives such as the baluster stem and to the classic grace of the Adam style. The candlestick in its modern form is, indeed, artistically among the least unsatisfactory of household plenishings.

CANDLISH, ROBERT SMITH (1806-1873), Scottish divine, was born at Edinburgh on the 23rd of March 1806, and spent his early years in Glasgow, where he graduated in 1823. During the years 1823-1826 he went through the prescribed course at the divinity hall, then presided over by Dr Stevenson MacGill, and on leaving, accompanied a pupil as private tutor to Eton, where he stayed two years. In 1829 he entered upon his life's work, having been licensed to preach during the summer vacation of the previous year. After short assistant pastorates at St Andrew's, Glasgow, and Bonhill, Dumbartonshire, he obtained a settled charge as minister of the important parish of St George's, Edinburgh. Here he at once took the place he so long held as one of the ablest preachers in Scotland. Destitute of natural oratorical gifts and somewhat ungainly in his manner, he attracted and even riveted the attention of his audience by a rare combination of intellectual keenness, emotional fervour, spiritual insight and power of dramatic representation of character and life. His theology was that of the Scottish Calvinistic school, but his sympathetic character combined with strong conviction gathered round him one of the largest and most intelligent congregations in the city.

From the very commencement of his ministry in Edinburgh, Candlish took the deepest interest in ecclesiastical questions, and he soon became involved as one of the chief actors in the struggle which was then agitating the Scottish church. His first Assembly speech, delivered in 1839, placed him at once among the leaders of the party

that afterwards formed the Free Church, and his influence in bringing about the Disruption of 1843 was inferior only to that of Thomas Chalmers. Great as was his popularity as a preacher, it was in the arena of ecclesiastical debate that his ability chiefly showed itself, and probably no other single man had from first to last so large a share in shaping the constitution and guiding the policy of the Free Church. He took his stand on two principles: the right of the people to choose their ministers, and the independence of the church in things spiritual. On his advice Hugh Miller was appointed editor of the Witness, the powerful Free Church organ. He was actively engaged at one time or other in nearly all the various schemes of the church, but special mention should be made of his services on the education committee, of which he was convener from 1846 to 1863, and in the un-successful negotiations for union among the non-established Presbyterian denominations of Scotland, which were carried on during the years 1863-1873. In the Assembly of 1861 he filled the moderator's chair.

As a theologian the position of Candlish was perhaps inferior to that which he held as a preacher and ecclesiastic, but it was not inconsiderable. So early as 1841 his reputation in this department was sufficient to secure for him the government nomination to the newly founded chair of Biblical criticism in the university of Edinburgh. Owing to the opposition of Lord Aberdeen, however, the presentation was cancelled. In

1847 Candlish, who had received the degree of D.D. from Prince- ton, New Jersey, in 1841, was chosen by the Assembly of the Free Church to succeed Chalmers in the chair of divinity in the New College, Edinburgh. After partially fulfilling the duties of the office for one session, he was led to resume the charge of St George's, the clergyman who bad been chosen by the congregation as his successor having died before entering on his work. In 1862 he succeeded William Cunningham as principal of New College with the understanding that he should still retain his position as minister of St George's. He died on the 19th of October 1873.

Though his greatest power was not displayed through the press, Candlish made a number of contributions to theological literature. In 1842 he published the first volume of his Con- tributions towards the Exposition of the Book of Genesis, a work which was completed in three volumes several years later. In 1854 he delivered, in Exeter Hall, London, a lecture on the Theological Essays of the Rev. F. D. Maurice, which he after- wards published, along with a fuller examination of the doctrine of the essays. In this he defended the forensic aspect of

the gospel. A treatise entitled The Atonement; its Reality, Completeness and Extent (1861) was based upon a smaller work which first appeared in 1845. In 1864 he delivered the first series of Cunningham lectures, taking for his subject The Father- hood of God. Published immediately afterwards, the lectures excited considerable discussion on account of the peculiar views they represented. Further illustrations of these views were given in two works published about the same time as the lectures, one a treatise On the Sonship and Brotherhood of Believers, and the other an exposition of the first epistle of St John.

See William Wilson, Memorials of R. S. Candlish, D.D., with a chapter on his position as a theologian by Robert Rainy.

CANDOLLE, AUGUSTIN PYRAME DE (1778-1841), Swiss botanist, was born at Geneva on the 4th of February 1778. He was descended from one of the ancient families of Provence, whence his ancestors had been expatriated for their religion in the middle of the 16th century. Though a weakly boy he showed great aptitude for study, and distinguished himself at school by his rapid attainments in classical and general literature, and specially by a faculty for writing elegant verse. He began his scientific studies at the college of Geneva, where the teaching of J. P. E. Vaucher first inspired him with the determination to make botanical science the chief pursuit of his life. In 1796 he removed to Paris. His first productions, Historia Plantarum Succulentarum{\ vols., i799)and Astragalogia (1802), introduced him to the notice of Cuvier, for whom he acted as deputy at the College de France in 1802, and to j . B. Lamarck, who afterwards confided to him the publication of the third edition of the Flore francaise (1803-1815). The Principes SISmentaires de bolanique, printed as the introduction to this work, contained the first exposition of his principle of classifica- tion according to the natural as opposed to the Linnean or artificial method. In 1804 he was granted the degree of doctor of medicine by the medical faculty of Paris, and published his Essai sur les propriitis midicales des plantes comparies avec leurs formes extirieures et leur classification naturelle, and soon after, in 1806, his Synopsis plantarum in flora Gallica descriptarum. At the desire of the French government he spent the summers of the following six years in making a botanical and agricultural survey of the whole kingdom, the results of which were published in 181 3. In 1807 he was appointed professor of botany in the medical faculty of the university of Montpellier, and in 1810 he was transferred to the newly founded chair of botany of the faculty of sciences in the same university. From Montpellier, where he published his Theorie iUmentaire de la botanique (181 3), he removed to Geneva in 1816, and in the

following year was invited by the now independent republic to fill the newly created chair of natural history. The rest of his life was spent in an attempt to elaborate and complete his ” natural ” system of botanical classification. The results of his labours in this department are to be found in his Regni vegetabilis systema

naturale, of which two volumes only were completed (1821) when he found that it would be impossible for him to execute the whole work on so extensive a scale. Accordingly in 1824 he began a less extensive work of the same kind — his Prodromus systematis regni vegetabilis — but even of this he was able to finish only seven volumes, or two-thirds of the whole. He had been for several years in delicate health when he died on the 9th of September 1841 at Geneva.

His son, Alphonse Louis Pierre Pyrame de Candolle, born at Paris on the 28th of October 1806, at first devoted himself to the study of law, but gradually drifted to botany and finally succeeded to his father’s chair. He published a number of botanical works, including continuations of the Prodromus in collaboration with his son, Anne Casimir Pyrame de Candolle. He died at Geneva on the 4th of April

1893.

CANDON, a town of South Ilocos province, Luzon, Philippine Islands, on the W. coast, about 200 m. N. by W. of Manila. Pop. (1903) 18,828. Its climate is hot, though healthy. Candon is surrounded by an extensive and fertile plain, and is defended by a small fort. Its inhabitants are noted for their honesty and industry, as well as for their regard for law and order. They carry on an extensive traffic with the wild tribes of the neighbouring mountains. Indigo is grown in considerable quantity, as are rice and tobacco. The weaving of blankets, handkerchiefs, and cotton and silk cloths constitutes quite an important industry. The language is Ilocanc ,

CANDYTUFT {Iberis amara, so called from Iberia, i.e. Spain, where many species of the genus are native, and amara, bitter, i.e. in taste), a small annual herb (natural order Cruciferae) with white or purplish flowers, the outer petals of which are longer than the rest. It is a native of western Europe and found wild on dry soil in cultivated ground in the centre and east of England. This and several other species of the genus are known as garden plants, and are of easy

culture in ordinary garden soil if well exposed to sun and air. The common candytuft of gardens is I. umbellata, a hardy annual, native of southern Europe, and known in a number of varieties differing in colour of flowers. /. coronaria (rocket candytuft) has long dense heads of white flowers and is also an annual. Some species have a shrubby growth and are evergreen perennials; the best-known is I. sempervirens, a native of southern Europe, a much-branched plant about a foot high with long racemes of white flowers. /. gibraltarica is a showy, handsome half hardy evergreen.

CANE, a name applied to many plants which have long, slender, reed-like stalks or stems, as, for example, the sugar-cane, the bamboo-cane or the reed-cane. From the use as walking- sticks to which many of these plants have been applied, the name ” cane ” is improperly given to sticks, irrespective of the source from which they are derived. Properly it should be re- stricted to a peculiar class of palms, known as rattans, included under the two closely allied genera Calamus and Daemonorops, of which there are a large number of species. The plants are found widely extended throughout the islands of the Indian Archi- pelago, the Malay Peninsula, China, India and Ceylon; and also in Australia and Africa. They were described by Georg Eberhard Rumpf or Rumphius (1627-1702), governor of Amboyna, and author of the Herbarium Amboynense (6 vols, folio, Amsterdam, .1741-1755), under the name of Palmijunci, as inhabitants of dense forests into which the rays of the sun scarce can penetrate, where they form spiny bushes, obstructing the passage through the jungle. The slender stems rarely exceed an inch in diameter and are generally much smaller. They creep or trail to an enormous length, often reaching 500 or 600 ft., and support themselves on trees or bushes by recurved spines borne on the stalk or back of the midrib of the leaf, or by stiff hooks replacing the upper leaflets. In some cases the midrib is elongated beyond the leaflets to form a long whip-like structure, bearing recurved hooks at intervals. The natives, in preparing the canes for the market, strip off the leaves by pulling the cut plant through a notch made in a tree. The canes always present distinct rings at the junction of the sheathing leaves with the stem. They

assume a yellow colour as they dry; and those imported from Calcutta have a glossy surface, while the produce of the Eastern Archipelago presents a dull exterior.

Canes, on account of their lightness, length, strength and flexibility, are used for a great variety of purposes by the inhabit- ants of the countries in which they grow. Split into thin strips they are twisted to form ropes and ships’ cables, an application mentioned by Captain

Dampier in his Voyages. A more im- portant application, however, is for basket-work, and for making chairs, couches, pillows, &c, as the great strength and durability of thin and easily prepared strips admit of such articles being made at once airy, strong and flexible. Much of the beautiful and elaborate basket-work of the Chinese and Japanese is made from thin strips of cane, which are also used by the Chinese for larger works, such as door-mats, houses and sheds.

A very large trade with Western countries and the United States is carried on in canes and rattans, the principal centres of the trade being Batavia, Sarawak, Singapore, Penang and Calcutta. In addition to the varieties used for walking-sticks, whip and umbrella handles, &c, the common rattans are in extensive demand for basket-making, the seats and backs of chairs, the ribs of cheap umbrellas, saddles and other harness- work; and generally for purposes where their strength and flexibility make them efficient substitutes for whalebone. The walking-stick ” canes ” of commerce include a great many varieties, some of which, however, are not the produce of trailing palms. The well-known Malacca canes are obtained from Calamus Scipionum, the stems of which are much stouter than is the case with the average species of Calamus.

CANEA, or Khania, the principal seaport and since 1841 the capital of Crete, finely situated on the northern coast of the island, about 25 m. from its western extremity, on the isthmus of the Akrotiri peninsula, which lies between the Bay of Canea and the Bay of Suda (latitude 35° 31′ N., longitude 24° 1′ E.). Surrounded by a massive Venetian wall, it forms a closely built, irregular and overcrowded town, though of late years a few of its streets have been widened. The ordinary houses are of wood; but the more important buildings are of more solid materials. The Turks have a number of mosques; there are Greek churches and a Jewish synagogue; an old Venetian structure serves as a military hospital; and the prison is of substantial construction. The town is now the principal seat of government; the seat of a Greek bishop, who is suffragan to the metropolitan at Candia, and the official residence of the European consuls. The harbour, formed by an ancient transverse mole nearly 1 200 ft. long,/ and protected by a lighthouse and a fort, would admit vessels of considerable tonnage; but it has been allowed to silt up until it shoals off from 24 ft. to 10 or even 8, so that large vessels have to anchor about 4 or 5 m. out. The principal articles of trˆde are oil and soap, and there is a pretty extensive manufacture of leather. The fosse is laid out in vegetable gardens; public gardens have been constructed outside the walls; and artesian wells have been bored by the government. To the east of the town a large Arab village had grown up, inhabited for the most part by natives of Egypt and

Cyrenaica, who acted as boatmen, porters and servants, but since the fall of the Turkish govern- ment most of these have quitted the island; while about a mile off on the rising ground is the village of Khalepa, where the consuls and merchants reside. The population of the town is estimated at 20,000. Canea probably occupies the site of the ancient Cydonia, a city of very early foundation and no small importance. During the Venetian rule it was one of the strongest cities in the island, but it fell into the hands of the Turks in 1646, several years before the capture of Candia. . In 1856 it suffered from an earthquake. The neighbouring plain is famous for its fruitfulness, and the quince is said to derive its name Cydonia from the town. (See also Crete.)

CANE-FENCING (the Fr. canne), the art of defending oneself with a walking-stick. It may be considered to be single-stick fencing without a guard for the hand, with the important difference that in cane-fencing the thrust is as important as

the cut, and thus canne approaches nearer to sabre-play. The cuts are practically identical with those of the single-stick (q.v.), but they are generally given after one or more rapid preliminary flourishes (tnoulinets, circles) which the lightness of the stick facilitates, and which serve to perplex and disconcert an assailant. The thrusts are similar to those in foil-play, but are often carried out with both hands grasping the stick, giving greater force and enabling it to be used at very close quarters. The canes used in French fencing schools are made of several kinds of tough wood and are about 3 ft. long, tapering towards the point. As very severe blows are exchanged, masks, gloves, padded vests and shin-guards, similar to those used in football, are worn.

See Georges d'Amoric, French Method. of the Noble Art of Self-Defence (London, 1898); J. Charlemont, L 'Art de la Boxe francaise el de la Canne (Paris, 1899).

CANEPHORAE (Gr. Kaveov, a basket, and 4>kptiv, to carry), " basket-bearers," the title given of old to Athenian maidens of noble family, annually chosen to carry on their heads baskets with sacrificial implements and apparatus at the Panathenaic and other festivals. The term (also in the form Canephori) is applied in architecture to figures of either sex carrying on their heads baskets, containing edibles or material for sacrifices. The term might well be applied to the

Caryatide figures of the Erechtheum. Those represented in the Panathenaic frieze of the Parthenon carry vases on their shoulders.

CANES VENATICI (" The Hounds," or " the Greyhounds "), in astronomy, a constellation of the northern hemisphere named by Hevelius in 1690, who compiled it from the stars between the older asterisms Ursa Major, Bootes and Coma Berenices. Interesting objects in this portion of the heavens are: the famous spiral nebula first described by Lord Rosse; a-Canum Venati- corum, a double star, of magnitudes 3 and 6: this star was named Cor Caroli, or The Heart of Charles II., by Edmund Halley,on the suggestion of Sir Charles Scarborough (1616-1694), the court physician; a cluster of stars of the nth magnitude and fainter, extremely rich in variables, of the 900 stars examined no less than 132 being regularly variable.

CANGA-ARGUELLES, JOSfi (1770-1843), Spanish statesman, was born in 1770. He took an active part in the Spanish resist- ance to Napoleon in a civil capacity and was an energetic member of the cortes of 181 2. On the return of the Bourbon line in 1814, Canga-Arguelles was sent into exile in the province of Valencia. On the restoration in 1820 of the constitution of 181 2, he was appointed minister of finance. He continued at this post till the spring of 1821, distinguishing himself by the zeal and ability with which he sought to reform the finances pf Spain. It was high time; for the annual deficit was greater than the entire revenue itself, and landed and other property was, to an unheard-of extent, monopolized by the priests. The measures he proposed had been only partially enforced, when the action of the king with regard to the ministry, of which he was a member, obliged him to resign. Thereafter, as a member of the Moderate Liberal party, Canga-Arguelles advocated constitutional government and financial reform, till the overthrow of the constitution in 1823, when he fled to England. He did not return to Spain till 1829, and did not again appear in public life, being appointed keeper of the archives at Simancas. He died in 1843. Canga-Arguelles is the author of three works: Elementos de la Ciencia de Hacienda (Elements of the Science of Finance), London, 1825; Diccionario de Hacienda (Dictionary of Finance), London, 1827; and Obser- vaciones sobre la guerra de la Peninsula (Observations on the Peninsular War), in which he endeavoured to show that his countrymen had taken a far more effective part in the national struggle against the French than English historians were willing to admit.

CANGAS DE ONfS, or Cangas, a town of northern Spain, in the province of Oviedo; situated on the right. bank Of the river Sella, in a fertile, well-watered, partly wooded, undulating region. Pop. (1000)

8537. The trade of Cangas de Onis is chiefly in live-stock and coal from the neighbouring mines. A Latin

inscription on the town-hall records the fact that this place was the residence of the first Spanish kings after the spread of the Moors over the Peninsula. Here early in the 8th century lived King Pelayo, who started the Christian reconquest of Spain. His historic cave of Covadonga is only 8 m. distant (see Asturias). The church of the Assumption, rebuilt in the 19th century, is on the model and site of an older church of the middle ages. Near Cangas are ruins and bridges of the Roman period.

CANGAS DE TINEO, a town of northern Spain, in the province of Oviedo, and on the river Narcea. Pop. (1900) 22,742: There is no railway and the river is not navigable, but a good road runs through Tineo, Grado and the adjacent coal-fields, to the ports of Cudillero and Aviles. The inhabitants have thus an easily accessible market for the farm produce of the fertile hills round Cangas de Tineo, and for the cloth, leather, pottery, &c, manufactured in the town.

CANGUE, or Cang, the European name for the Chinese Kia or Kea, & portable pillory, carried by offenders convicted of petty offences. It consists of a square wooden collar weighing from 20 to 60 lb, through a hole in which the victim's head is thrust. It fits tight to the neck and must be worn day and night for the period ordered. The offender is left exposed in the street. Over the parts by which it fastens slips of paper bearing the mandarin's seal are pasted so that no one can liberate the condemned. The length of the punishment is usually from a fortnight to a month. As the cangue is 3 to 4 ft. across the convict is unable to feed himself or to lie down, and thus, unless fed by friends or passers-by, often starves to death. As in the English pillory, the name of the man and the nature of his offence are inscribed on the cangue.

CANINA, LUIGI (1795-1856), Italian archaeologist and architect, was born at Casale in Piedmont. He became professor of architecture at Turin, and his most important works were the excavation of Tusculum in 1829 and of the Appian Way in 1848, the results of which he embodied in a number of works published in a costly form by his patroness, the queen of Sardinia.

CANINI, GIOVANNI AGNOLO (1617-1666), Italian designer and engraver, was born at Rome. He was a pupil of Domenichino and afterwards of Antonio Barbalonga. He painted some altar-pieces at Rome, including two admired pictures for the church of San Martino

a' Monti, representing the martyrdom of St Stephen and of St Bartholomew. Having accompanied Cardinal Chigi to France, he was encouraged by the minister Colbert to carry into execution his project of designing from medals, antique gems and similar sources a series of portraits of the most illustrious characters of antiquity, accompanied with memoirs; but shortly after the commencement of the undertaking Canini died at Rome. The work, however, was prosecuted by his brother Marcantonio, who, with the assistance of Picard and Valet, completed and published it in 1699, under the title of Iconografia di Gio. Ag. Canini. It contains 150 engravings. A reprint in Italian and French appeared at Amster- dam in 1731.

CANIS MAJOR (" Great Dog "), in astronomy, a constellation placed south of the Zodiac, just below and behind the heels of Orion. Cards minor, the " little dog," is another constellation, also following Orion and separated from Canis major by the Milky Way. Both these constellations, or at least their principal stars, Sirius in the Great Dog and Procyon in the Little Dog, were named in very remote times, being referred to as the " dogs of Orion " or in equivalent terms. Sirius is the brightest star in the heavens; and the name is connected with the adjectives crapos and ctlpios, scorching. It may possibly be related to the Arabic Siraj, thus meaning the " glittering one." Hommel has shown that Sirius and Procyon were " the two Si'ray " or glitterers. It is doubtful whether Sirius is referred to in the Old Testament. By some it has been identified with the Hebrew mazzaroth, the Lucifer of the Vulgate; by others with mazzaloth, the duodceim signa of the Vulgate; while Professor M. A. Stern identifies it with the Hebrew kimah, which is rendered variously

in the Vulgate as Arcturus, Hyades and Pleiades. 1 The in- habitants of the Euphrates valley includeˆ both constellations in their stellar system; but considerable difficulty is encountered in the allocation of the Babylonian names to the dominant stars. The name kak-ban, which occurs on many tablets, has oeen determined by Epping and Strassmaier, and also by Jensen and Hommel, as equivalent to Sirius; etymologically tliis word means " dog-star " (or, according to R. Brown, Primitive Constellations, " bow-star "). On the other hand, K.aksidi or Kak-si-sa, meaning the " leader," has been identified by Sayce and others with Sirius, while Hommel regards it as Procyon. The question is mainly philological, and the arguments seem inconclusive. We may notice, however, that connexions were made

between Kaksidi and the weather, which have strong affinities with the ideas expressed at a later date by the Greeks. For example, its appearance in the morning with the sun heralded the ” north winds,” the j3opeeu kn)

The Greeks, borrowing most of their astronomical knowledge from the Babylonians, held similar myths and ideas as to the constellations and stars. Sirius was named Seiptos, Kvuv (the dog) and to aarpov, the star; and its heliacal rising was associated with the coming of the dry, hot and sultry season. Hesiod tells us that ” Sirius parches head and knees”; Homer speaks similarly, calling it KaKov cfjua, the evil star, and the star of late summer (oTrwpo), the rainy and stormy season. Procyon (Upoicvwv) was so named because it rose before Kvwv. The Euphratean myth of the dogs has its parallel in Greece, Sirius being the hound of the hunter Orion, and as recorded by Aratus always chasing the Hare; Pindar refers to the chase of Pleione, the mother of the Pleiads, by Orion and his dogs. •Similarly Procyon became Maera, the dog of Icarius, when Bootes became Icarius, and Virgo his daughter Erigone.

The Romans adopted the Greek ideas. They named the constellation Canis, and Sirius was known as Canis also, and as Canicula. Procyon became Antecanem and Antecanis, but these names did not come into general use. They named the hottest part of the year associated with the heliacal rising of Sirius the Dies caniculares, a phrase which has survived in the modern expression “dog-days”; and the pestilences which then prevailed occasioned the offering of sacrifices to placate this inimical star. Festus narrates, in this connexion, the sacri- ficing of red dogs at the feast of Floralia, and Ovid of a dog on the Robigalia. The experience of the ancient Greeks that Sirius rose with the sun as the latter entered Leo, i.e. the hottest part of the year, was accepted by the Romans with an entire disregard of the intervening time and a different latitude. To quote Sir Edward Sherburne {Sphere of Manilius, 1675), ” The greater part of the Antients assign the Dog Star rising to the time of the Sun’s first entering into Leo, or, as Pliny writes, 23 days after the summer solstice, as Varro 29, as 1 See G. Schiaparelli, Astronomy in the Old Testament (1905).

Columella 30. 2 … At this day with us, according to Vulgar computation, the rising and setting of the said Star is in a manner coincident with the P’easts of St Margaret (which is about the 13th of our July) and St Lawrence (which falls on the 10th of our August).”

Sirius is the most conspicuous star in the sky; it sends to the earth eleven times as much light as Aldebaran, the unit standard adopted in

the revised Harvard Photometry; numeric- ally its magnitude is-i-6. At the present time its colour is white with a tinge of blue, but historical records show that this colour has not always prevailed. Aratus designated it xot/ciXos, many coloured; the Alexandrian Ptolemy classified it with Aldebaran, Antares and Betelgeuse as wrouppos, .fiery red; Seneca describes it as “redder than Mars”; while, in the 10th century, the Arabian Biruni termed it ” shining red.” On the other hand Sufi, who also flourished in the 10th century, pointedly omits it from his list of coloured stars. The question has been thoroughly discussed by T. J. J. See, who shows that Sirius has shone white for the last 1000 to 1200 years. 3 The parallax has been determined by Sir David Gill and W. L. Elkin to be 0-37”; it is therefore distant from the earth over 5X10 13 miles, and its light takes 8-6 years to traverse the inter- vening space. If the sun were at the same distance Sirius would outshine it 30 times, the sun appearing as a star of the second magnitude. It has a large proper motion, which shows recurrent undulations having a 50-year period. From this Bessel surmised the existence of a satellite or companion, for which C. A. F. Peters and A. Auwers computed the elements. T. H. Safford determined its position for September 1861; and on the 31st of January 1862, Alvan G. Clark, of Cambridgeport, Mass., telescopically observed it as a barely visible, dull yellow star of the 9th to 10th magnitude. The mean distance apart is about 20 astronomical units; the total mass of the pair is 3-7 times the mass of the sun, Sirius itself being twice as massive as its companion, and, marvellously enough, forty thousand times as bright. The spectrum of Sirius is characterized by prominent absorption lines due to hydrogen, the metallic lines being weak; other stars having the same spectra are said to be of the ” Sirian type.” Such stars are the most highly heated (see Star). |

Procyon, or a Canis minoris, is a star of the 2nd magnitude, one-fifth as bright as Sirius, or numerically 0-47 when compared with Aldebaran. It is more distant than Sirius, its parallax being 0-33”; and its light is about six times that of the sun. Its proper motion is large, 1-25”, and its velocity at right angles to the line of sight is about 1 1 m. per second. Its proper motion shows large irregularities, pointing to a relatively massive com- panion; this satellite was discovered on the 13 th of November 1896 by J. M. Schaeberle, with the great Lick telescope, as a star of the 13 th magnitude. Its mass is equal to about that of the sun, but its light is only one twenty-thousandth.

CANITZ, FRIEDRICH RUDOLF LUDWIG, Freiherr von (1654-1699), German poet and diplomatist, was born at Berlin on the 27th of November 1654. He attended the universities of Leiden and Leipzig, travelled in England, France, Italy and Holland, and on his return was

appointed groom of the bed- chamber (Kammerjunker) to the elector Frederick William of Brandenburg, whom he accompanied on his campaigns in Pomerania and Sweden. In 1680 he became councillor of lega- tion, and he was employed on various embassies. In 1697 the elector Frederick III. made him a privy councillor, and the emperor Leopold I. created him a baron of the Empire. Having fallen ill on an embassy to the Hague, he obtained his discharge and died at Berlin in 1699. Canitz's poems {Nebenstunden unterschiedener Gedichte), which did not appear until after his death (1700), are for the most part dry and stilted imitations of French and Latin models, but they formed a healthy

2 For other values of the interval between the summer solstice and the rising of Sirius, see Smith's Diet, of Greek and Roman A ntiquities.

1 See Thomas Barker, Phil. Trans., 1760, 51, p. 498, for quotations from classical authors; also T. J. J. See, Astronomy and Astrophysics, vol. xi. p. 269.

contrast to the coarseness and bombast of the later Silesian poets.

A complete edition of Canitz's poems was published by U. Konig in 1727; see also L. Fulda, Die Gegner der zweiten schlesischen Schule, ii. (1883).

CANIZARES, JOSfi DE (1676-1750), Spanish dramatist, was born at Madrid on the 4th of July 1676, entered the army, and retired with the rank of captain in 1702 to act as censor of the Madrid theatres and steward to the duke of Osuna. In his fourteenth year Canizares recast a play by Lope de Vega under the title of Las Cuentas del Gran Capitdn, and he speedily became a fashionable playwright. His originality, however, is slight, and El Dfimine Lucas, the only one of his pieces that is still read, is an adaptation from Lope de Vega. Canizares produced a version of Racine's Iphigenie shortly before 1716, and is to some extent responsible for the destruction of the old Spanish drama. He died on the 4th of September 175°, at Madrid.

CANNAE (mod. Canne), an ancient village of Apulia, near the river Aufidus, situated on a hill on the right bank, 6 m. S.W. from its mouth. It is celebrated for the disastrous defeat which the Romans received there from Hannibal in 216 B.C. (see Punic Wars). There is a considerable controversy as to whether the battle took place on the right or the left bank of the river. In later times the place became a municipium, and un- important Roman remains still exist upon the hill known as Monte di Canne. In the middle ages it became a bishopric, but was destroyed in 1276.

See O. Schwab, Das Schlachtfeld von Canna (Munich, 1898), and authorities under Punic Wars.

CANNANORE, or Kananore, a town of British India, in the Malabar district of Madras, on the coast, 58 m. N. from Calicut and 470 m. by rail from Madras. Pop. (1901) 27,811. Cannanore belonged to the Kalahasti or Cherakal rajas till the invasion of Malabar by Hyder Ali. In 1498 it was visited by Vasco da Gama; in 1501 a Portuguese factory was planted here by Cabral; in 1502 da Gama made a treaty with the raja, and in 1505 a fort was built. In 1656 the Dutch effected a settlement and built the present fort, which they sold to Ali Raja in 1771. In 1783 Cannanore was captured by the British, and the reigning princess became tributary to the East India Company. Here is the residence of the Moplah chief, known as the Ali Raja, who owns most of the Laccadive Islands. Cannanore was the military headquarters of the British on the west coast until 1887.

CANNES, a seaport of France, in the department of the Alpes

Maritimes, on the Mediterranean, 19 m. S.W. of Nice and 120 m. E. of Marseilles by rail. Pop.(i9o6) 24,531. It enjoys a southern exposure on a seaward slope, and is defended from the northern winds by ranges of hills. Previous to 1831, when it first attracted the attention of Lord Brougham, it mainly consisted of the old quarter (named Sucquet), and had little to show except an ancient castle, and a church on the top of Mont Chevalier, dedicated in 1603 to Notre Dame du Mont Esperance; but since that period it has become a large and important town, and is now one of the most fashionable winter resorts in the south of France, much frequented by English visitors, the Americans preferring Nice. The neighbourhood is thickly studded with magnificent villas, which are solidly built of a stone so soft that it is sawn and not hewn. There is an excellent quay, and a beautiful promenade runs along the beach; and numerous sheltered roads stretch up the valleys amidst groves of olive trees. On the north the modern town climbs up to Le Cannet (2 m.), while on the east it practically extends along the coast to Golfe Jouan (35 m.), where Napoleon landed on the 1st of March 18 15, on his return from Elba. From Cannes a railway runs north in 12ˆ m. to Grasse. On the top of the hill behind the town are a Roman Catholic and a Protestant cemetery. In the most prominent part of the latter is the grave of Lord Brougham, distinguished by a massive stone cross standing on a double basement, with the simple inscription — ” Henricus Brougham, Natus mdcclxxvui., Decessit MDCCCLxvm.”; and in the immediate vicinity lies James, fourth duke of Montrose, who died December 1874. The country around is very beautiful

and highly fertile; orange and lemon trees are cultivated- like peach trees in England, while olives, almonds, figs, peaches, grapes and other fruits are grown in abundance, and, along with the produce of the fisheries, form the chief exports of the town. Essences of various kinds are manufactured, and flowers are extensively cultivated for the perfumers. The climate of Cannes has been the subject of a considerable variety of opinion, — the preponderance being, however, in its favour. According to Dr de Valcourt, it is remarkable by reason of the elevation and regularity of the temperature during the height of the day, the clearness of the atmosphere and abundance of light, the rarity of rain and the absence of fogs.

Cannes is a place of great antiquity, but its earlier history is very obscure. It was twice destroyed by the Saracens in the 8th and the 10th centuries; but it was afterwards repeopled by a colony from Genoa. Opposite the town is the island of Ste Marguerite (one of the Lerins) , in the citadel of which the Man with the Iron Mask was confined from 1686 to 1698, and which acquired notoriety as the

prison whence Marshal Bazaine escaped in August 1874. On the other chief island (St Honorat) of the Lerins is the famous monastery (5th century to 1 788) , in connexion with which grew up the school of Lerins, which had a wide influence upon piety and literature in the 5th and 6th centuries.

See L. Alliez, Histoire du monastere de Lerins (2 vols., Paris, 1862) ; and Les ties de Lerins, Cannes, et les rivages environnants (Paris, 1 860) ; Cartulaire du monastere de Lerins (2 vols., Paris, 1883 and 1905) ; de Valcourt, Cannes and its Climate (London, 1873); Joanne, special Guide to Cannes; J. R. Green, essay on Cannes and St Honorat, in the first series of his Stray Studies (1st ed., 1876); A. Cooper-Marsdin, The School of Lerins (Rochester, 1905). (W. A. B. C.)

CANNIBALISM, the eating of human flesh by men (from a Latinized form of Carib, the name of a tribe of South America, formerly found also in the West Indies), also called “anthro- pophagy “(Gr. avdpuiros, man, and (txxyeiv, to eat). Evidence has been adduced from some of the palaeolithic cave-dwellings in France to show that the inhabitants practised cannibalism, at least occasionally. From Herodotus, Strabo and others we hear of peoples like the Scythian Massagetae, a nomad race north-east of the Caspian Sea, who killed old people and ate them. In the middle ages reports, some of them probably un- trustworthy, by Marco Polo and others, attributed cannibalism to the wild tribes of China, the Tibetans, &c. In our own days cannibalism prevails, or prevailed until recently, over a great part of West and Central Africa, New Guinea, Melanesia (especially Fiji) and Australia. New Zealand and the Polynesian Islands were great centres of the practice. It is extensively practised by the Battas of Sumatra and in other East Indian islands and in South America; in earlier days it was a common feature of Indian wars in North America. Sporadic cannibalism occurs among more civilized peoples as a result of necessity or as a manifestation of disease (see Lycanthropy) .

Classification. — Cannibalistic practices may be classified from two points of view: (1) the motives of the act; (2) the cere— monial regulations. A third division of subordinate importance is also possible, if we consider whether the victims are actually killed for food or whether only such are eaten as have met their death in battle or other ways.

1. From a psychological point of view the term cannibalism groups together a number of customs, whose only bond of union is that they all involve eating of human flesh, (a) Food canni- balism, where the object is the satisfaction of hunger, may occur” sporadically as a result

of real necessity or may be kept up for the simple gratification of a taste for human flesh in the absence of any lack of food in general or even of animal food, (i.) Canni- balism from necessity is found not only among the lower races, such as the Fuegians or Red Indian tribes, but also among civilized races, as the records of sieges and shipwrecks show. (ii.) Simple food cannibalism is common in Africa; the Niam-Niam and Monbuttu carry on wars for the sake of obtaining human flesh; in West Africa human flesh could formerly be seen exposed for sale in the market like any other article of commerce; and among some tribes it is the practice to sell the corpses of dead relatives for consumption as food, (b) In

curious contrast to this latter custom is the practice of devouring dead kinsfolk as the most respectful method of disposing of their remains. In a small number of cases this practice is combined with the custom of killing the old and sick, but in the great majority of peoples it is simply a form of burial; it seems to prevail in most parts of Australia, many parts of Melanesia, Africa and South America, and less frequently in other parts of the world. To this group belong the customs described by Herodotus; we may perhaps regard as a variant form the custom of using the skull of a dead man as a drinking-cup. This practice is widely found, and the statement of Herodotus that the skull was set in gold and preserved by the Issedones may point in this direction; from the account given of the Tibetans some seven hundred years ago by William of Ruysbruck (Rubruquis) it appears that they had given up cannibalism but still preserved the use of the skull as a drinking vessel. Another modification of an original ritual cannibalism is the custom of drinking the ashes of the dead, which is practised by some African and South American tribes. The custom of holding burial feasts has also been traced to the same origin. More incomprehensible to the European than any other form of cannibalism is the custom of partaking of the products of putrefaction as they run down from the body. The Australians smoke-dry the bodies of tribesmen; here, too, it is the custom to consume the portions of the body which are rendered liquid by the heat, (c) The ritual cannibal- ism just mentioned shades over into and may have been originally derived from magical cannibalism, of which three sub-species may be distinguished, (i.) Savages are accustomed, on the one hand, to abstain from certain foods in order that they may not acquire certain qualities; on the other hand other foods are eagerly desired in order that they may by partaking of the flesh also come to partake of the mental or bodily

peculiarities of the man or animal from which the meat is derived; thus, after the birth of a child, especially the first-born, the parents are frequently forbidden the flesh of slow-moving animals, because that would prevent the child from learning to walk; conversely, eating the heart of a lion is recommended for a warrior to make him brave; from this point of view therefore we readily under- stand the motives which lead to the eating of those slain in battle, both friends and foes, (ii.) We may term protective an entirely different kind of magical cannibalism, which consists in the consumption of a small portion of the- body of a murdered man, in order that his ghost may not trouble the murderer; according to Hans Egede, the Eskimo, when they kill a witch, eat a portion of her heart, that she may not haunt them, (iii.) The practice is also said to have the effect of causing the relatives of the murdered man to lose heart or to prevent them from exercising the right of revenge; in this case it may be brought into relation with the ceremony of the blood covenant in one of the forms of which the parties drink each other's blood; or, it may point to a reminiscence of a ritual eating of the dead kins- man. The late survival of this idea in Europe is attested by its mention by Dante in the Purgatorio. (d) The custom of eating food offered to the gods is widespread, and we may trace to this origin Mexican cannibalism, perhaps, too, that of Fiji. The Aztec worship of the god of war, Huitzilopochtli, led to the sacrifice of prisoners, and the custom of sacrifice to their frequent wars. The priest took out the heart, offered it to the sun, and then went through the ceremonies of feeding the idol with the heart and blood; finally the bodies of the victims were consumed by the worshippers, (e) We reach an entirely different set of motives in penal and revenge cannibalism. For the origin of these ideas we may perhaps look to that of protective magic, dealt with above; but it seems possible that there is also some idea of influencing the lot of the criminal in a future life; it may be noted that the whole of the body is seldom eaten in protective cannibalism; among the Battas, however, the criminal, and in parts of Africa the debtor, are entirely consumed. Other cases, especially where the victim is an enemy, may be due to mere fury and bravado. (/) In the west of North America a peculiar kind of cannibalism is found, which is confined to a Certain body of magicians termed " Hametzen " and a necessary

condition of admission to their order. Another kind of initiatory cannibalism prevailed in the south of Australia, where a magician had to eat a portion of a child's body before he was admitted. The meaning of these ceremonials is not clear.

2. Most kinds of cannibalism are hedged round with ceremonial regulations. Certain tribes, as we have seen above, go to war to

provide human flesh; in other cases it is only the nearest relatives who may not partake of a body; in other cases again it is precisely the nearest relatives on whom the duty falls. A curious regulation in south-east New Guinea prescribes that the killer of the victim shall not partake in the feast ; in some cases the whole of the clan to which belonged the man for whom revenge is taken abstains also; in other cases this clan, together with any others of the same intermarrying group, takes part in the feast to the exclusion of (a) the clan or group with which they intermarry and (b) all outside clans. Some peoples forbid women to eat human flesh; in others certain classes, as the Muri of the Bambala, a tribe in the Kassai, may be forbidden to eat it. In Mindanao the only person who might eat of a slain enemy was the priest who led the warriors, and he was not per- mitted to escape this duty. In Grand Bassam all who had taken part in a festival at the foundation of a new village were com- pelled to eat of the human victim. But the variations are too numerous for any general account to be given of ceremonial limitations. S. R. Steinmetz has proposed a division into endo- and exo-cannibalism; but these divisions are frequently of minor importance, and he has failed to define satisfactorily the limits of the groups on which his classification is based.

Origin. — It will probably never be possible to say how canni- balism originated; in fact the multiplicity of forms and the diversity of ceremonial rules — some prescribing that tribesmen shall on no account be eaten, others that the bodies of none but tribesmen shall provide the meal of human flesh — point to a multiple origin. It has been maintained that the various forms of endo-cannibalism (eating of tribesmen) spring from an original practice of food cannibalism which the human race has in common with many animals; but this leaves unexplained inter alia the limitation of the right of participation in the funeral meal to the relatives of the dead man; at the same time it is possible to argue that the magical ideas now associated with cannibalism are of later growth. Against the view put forward by Steinmetz it may be urged that we have other instances of magical foods, such as the eating of a lion's heart, which do not point to an original custom of eating the animal as food. We shall probably be justified in referring all forms of endo-cannibalism to a ritual origin; otherwise the limitation is inexplicable; on the other hand exo-cannibalism, in some of its forms, and much of the extension of endo-cannibalism must be referred to a desire for human flesh, grown into a passion.

Bibliography. — Steinmetz, in Mitt. Anthrop. Ges. Wien, N.F. xvi.; Andree, Die Anthropophagie ; Bergmann, Die Verbreitung der

Anthropophagie; Schneider, Die Naturvolker, i. 121-200; Schaff-hausen, Anthropologische Studien, Internat. Archiv iii. 69-73; xii. 78; E. S. Hartland, Legend of Perseus, vol. ii. ; Dictionnaire des sci. mid., s.v. ” Anthropophagie “; Dr Seligmann in Reports of the Cook-Daniels Expedition to New Guinea. (N. W. T.)

CANNING, CHARLES JOHN, Earl (181 2-1862), English states- man, governor-general of India during the Mutiny of 1857, was the youngest child of George Canning, and was born at Brompton, near London, on the 14th of December 181 2. He was educated at Christ Church, Oxford, where he graduated B.A. in 1833, as first class in classics and second class in mathematics. In 1836 he entered parliament, being returned as member for the town of Warwick in the Conservative interest. He did not, however, sit long in the House of Commons; for, on the death of his mother in 1837, he succeeded to the peerage which had been conferred on her with remainder to her only surviving soh, and as Viscount Canning took his seat in the House of Lords. His first official appointment was that of under-secretary of state for foreign affairs, in the administration formed by Sir Robert Peel in 1841 — his chief being the earl of Aberdeen. This post he held till January 1846; and from January to July of that year, when the Peel administration was broken up,

Lord Canning filled the post of commissioner of woods and forests. He declined to accept office under the earl of Derby; but on the formation of the coalition ministry under the earl of Aberdeen in January 1853, he received the appointment of postmaster-general. In this office he showed not only a large capacity for hard work, but also general administrative ability and much zeal for the improvement of the service. He retained his post under Lord Palmerston’s ministry until July i8ss> when, in consequence of the death of Lord Dalhousie and a vacancy in the governor-generalship of India, he was selected by Lord Palmerston to succeed to that great position. This appointment appears to have been made rather on the ground of his father’s great services than from any proof as yet given of special personal fitness on the part of Lord Canning. The new governor sailed from England in December 1855, and entered upon the duties of his office in India at the close of February 1856. His strong common sense and sound practical judgment led him to adopt a policy of conciliation towards the native princes, and to promote measures tending to the betterment of the condition of the people.

In the year following his accession to office the deep-seated discontent of the people broke out in the Indian Mutiny (q.v.). Fears were entertained, and even the friends of the viceroy to some extent shared them, that he was not equal to the crisis. But the fears proved groundless. He had a clear eye for the gravity of the situation, a calm judgment, and a prompt, swift hand to do what was really necessary. By the union of great moral qualities with high, though not the highest, intellectual faculties, he carried the Indian empire safely through the stress of the storm, and, what was perhaps a harder task still, he dealt wisely with the enormous difficulties arising at the close of such a war, established a more liberal policy and a sounder financial system, and left the people more contented than they were before. The name of ” Clemency Canning,” which was applied to him during the heated animosities of the moment, has since become a title of honour.

While rebellion was raging in Oudh he issued a proclamation declaring the lands of the province forfeited; and this step gave rise to much angry controversy. A ” secret despatch,” couched in arrogant and offensive terms, was addressed to the viceroy by Lord Ellenborough, then a member of the Derby administration, which would have justified the viceroy in immediately resigning. But from a strong sense of duty he continued at his post; and ere long the general condemnation of the despatch was so strong that the writer felt it necessary to retire from office. Lord Canning replied to the despatch, calmly and in a statesman-like manner explaining and vindi- cating his censured policy. In April 1859 he received the thanks of both Houses of Parliament for his great services during the mutiny. He was also made an extra civil grand cross of the order of the Bath, and in May of the same year he was raised to the dignity of an earl. By the strain of anxiety and hard work his health and strength were seriously impaired, while the death of his wife was also a great shock to him; in the hope that rest in his native land might restore him, he left India, reaching England in April 1862. But it was too late. He died in London on the 17th of June following. About a month before his death he was created K.G. As he died without issue the title became extinct.

See Sir H. S. Cunningham, Earl Canning (“Rulers of India” series), 1891 ; and A. J. C. Hare, The Story of Two Noble Lives (1893).

CANNING, GEORGE (1770-1827), British statesman, was born in London on the nth of April 1770. The family was of English origin and had been settled at Bishop’s Canynge in Wiltshire. In 16 18 a George Canning, son of Richard Canning of Foxcote in Warwickshire, received a grant of the manor of Garvagh in Londonderry, Ireland, from King

James I. The father of the statesman, also named George, was the eldest son of Mr Stratford Canning, of Garvagh. He quarrelled with and was disowned by his family. He came to London and led a struggling life, partly in trade and partly in literature. In May 1768 he married Mary Annie Costello, and he died on the nth of April 1771, exactly

one year after the birth of his son. Mrs Canning, who was left destitute, received no help from her husband's family, and went on the stage, where she was not successful. She married a dis- solute and brutal actor of the name of Reddish. Her son owed his escape from the miseries of her household to another member of the company, Moody, who wrote to Mr Stratford Canning, a merchant in London and younger brother of the elder George Canning. Moody represented to Mr Stratford Canning that the boy, although full of promise, was on the high road to the gallows under the evil influence of Reddish. Mr Stratford Canning exerted himself on behalf of his nephew. An estate of the value of £200 a year was settled on the boy, and he was sent in succes- sion to a private school at Hyde Abbey near Winchester, to Eton in 1781, and to Christchurch, Oxford, in 1787. After leaving Eton and before going to Oxford, he was entered as a student at Lincoln's Inn. At Eton he edited the school magazine, The Microcosm, and at Oxford he took the leading part in the formation of a debating society. He made many friends, and his reputation was already so high that Sheridan referred to him in the House of Commons as a rising hope of the Whigs. According to Lord Holland, he had been noted at Oxford as a furious Jacobin and hater of the aristocracy. In 1792 he came to London to read for the bar. He had taken his B. A. in 1 791 and proceeded M.A. on the 6th of July 1794.

Soon after coming to London he became acquainted with Pitt in some uncertain way. The hatred of the aristocracy, for which Lord Holland says he was noted at Oxford, would naturally deter an ambitious young man with his way to make in the world, and with no fixed principles, from attaching his fortune to the Whigs. Canning had the glaring examples of Burke and Sheridan himself to show him that the great " revolution families " — Cavendishes, Russells, Bentincks — who controlled the Whig party, would never allow any man, however able, who did not belong to their connexion, to rise to the first rank. He therefore took his place among the followers of Pitt. It is, however, only fair to note that he always regarded Pitt with strong personal affection, and that he may very naturally have been influenced, as multitudes of other Englishmen were, by the rapid development of the French Revolution from a reform- ing to an aggressive and conquering force. In a letter to his friend Lord Boringdon (John Parker, afterwards

earl of Morley), dated the 13th of December 1792, he explicitly states that this was the case. Enlightened self-interest was doubtless combined with honest conviction in ranking him among the followers of Pitt. By the help of the prime minister he entered parliament for the borough of Newtown in the Isle of Wight in July 1793. His maiden speech, on the subvention to the king of Sardinia, was made on the 31st of January 1794. It is by some said to have been a failure, but he satisfied himself, and he soon estab- lished his place as the most brilliant speaker on the ministerial side. It may be most conveniently noted here, that his political patrons exerted themselves to provide for his private as well as his official prosperity. Their favour helped him to make a lucrative marriage with Miss Joan Scott, who had a fortune of £100,000, on the 8th of July 1800. The marriage was a very happy one, though the bulk of the fortune was worn away in the expenses of public and social life. Mrs Canning, who survived her husband for ten years, was created a viscountess in 1828. Four children were born of the marriage — a son who died in his father's lifetime, and was lamented by him in very touching verse; another a captain in the navy, drowned at Madeira in 1827; a third son, Charles {q.v.), afterwards created Earl Canning; and a daughter Harriet, who married the marquess of Clanricarde in 1825.

The public life of Canning may be divided into four stages. From 1793 to 1801 he was the devoted follower of Pitt, was in minor though important office, and was the wittiest of the defenders of the ministry in parliament and in the press. From 1801 to 1809 he was partly in opposition, partly in office, fighting for the foremost place. Between 1809 and 1822 there was a period of comparative eclipse, during which he was indeed at times in office, but in lesser places than he would have beei

prepared to accept between 1804 and 1809, and was regarded with general distrust. From 1822 till his death in 1827 he was the most powerful influence in English, and one of the most powerful in European, politics.

In the spring of 1796 he was appointed under-secretary for the foreign office, and in the election of that year he was returned for Wendover. He was also appointed receiver-general of the alienation office, a sinecure post which brought him £700 a year. His position as under-secretary brought him into close relations with Pitt and the foreign

secretary, Lord Grenville (q.v.). During the negotiations for peace at Lille (1797), Canning was actively concerned in the devices which were employed by Pitt and Grenville to keep the real character of the discussion secret from other members of the cabinet. Canning had a taste for mystery and disguises, which he had shown at Oxford, and which did much to gain him his unfortunate reputation for trickery. From the 20th of November 1797, till the 9th of July 1798, he was one of the most active, and was certainly the most witty of the contributors to the Anti- Jacobin, a weekly paper started to ridicule the frothy philanthropic and eleutheromaniac rant of the French republicans, and to denounce their brutal rapacity and cruelty. But Canning's position as under-secretary was not wholly pleasant to him. He disliked his immediate chief Grenville, one of the Whigs who joined Pitt, and a man of thoroughly Whiggish aristocratic insolence. In 1799 he left the foreign office and was named one of the twelve commissioners for India, and in 1800 joint paymaster of the forces, a post which he held till the retirement of Pitt in 1801.

During these years of subordinate activity Canning had established his position as an orator and a wit. His oratory cannot be estimated with absolute confidence. Speeches were then badly reported. The text of his own, published by Therry (6 volumes, London, 1828), were revised by himself, and not for the better. Though his favourite author was Dryden, whose prose is uniformly manly and simple, and though he had a keen eye for faults of taste in the style of others, Canning had himself a leaning to preciosity and tinsel. His wit was, and remains, above all question. In public life it did him some harm in the opinion of serious people, who could not believe that so jocose a politician had solid capacity. It exasperated opponents, some of whom, notably Peter Pindar (see Wolcot, John), retaliated by brutal personalities. Canning was constantly reminded that his mother was a strolling actress, and was accused of foisting his pauper family on the public funds. The accusation was perfectly untrue, but this style of political controversy was common, and was adopted by Canning. He put himself on a level with Peter Pindar when he assailed Pitt's successor Addington (see Sidmouth, Viscount) on the ground that he was the son of a doctor.

While out of office with Pitt, Canning proved a somewhat insubordinate follower. The snobbery and malignity of his attacks on Addington roused considerable feeling against him, and his attempts to act as a political go-between in ministerial arrangements were unfortunate. On the formation of Pitt's second ministry he took the post of treasurer of the navy on the 12th of May 1804. In office he continued to be insubordinate, and committed mistakes which got him into bad odour as un- trustworthy. He endeavoured to persuade Lord

Hawkesbury (see Liverpool, Earls or) to join in a scheme for turning an old friend out of the India Office. Though his relations with Pitt began to be somewhat strained towards the end, he left office on the minister's death on the 21st of January 1806.

Canning, who delivered the eulogy of Pitt in the House of Commons on the 3rd of February, refused to take office in Fox's ministry of " all the talents." Attempts were made to secure him, and he was offered the leadership of the House of Commons, under the supervision of Fox, an absurd proposal which he had the good sense to decline. After the death of Fox, and the dismissal by the king of Lord Grenville's ministry, he joined the administration of the duke of Portland as secretary of state for foreign affairs. He held the office from the 25th of March 1807 til! the 9th of September 1809. During these two years he had a

large share in the vigorous policy which defeated the secret articles of the treaty of Tilsit by the seizure of the Danish fleet. As foreign secretary it fell to him to defend the ministry when it was attacked in parliament. He refused to tell how he be- came aware of the secret articles, and the mystery has never been fully solved. He threw himself eagerly into the prosecution of the war in Spain, yet his tenure of office ended in resignation in circumstances which left him under deep discredit. He be- came entangled in what can only be called two intrigues. In view of the failing health of the duke of Portland he told his colleague, Spencer Perceval, chancellor of the exchequer, that a new prime minister must be found, that he must be in the House of Commons, that the choice lay between them, adding that he might not be prepared to serve as subordinate. In April of 1809 he had told the duke of Portland that Lord Castlereagh, secretary for the colonies and war, was in his opinion unfit for his post, and must be removed to another office. The duke, a sickly and vacillating man, said nothing to Castlereagh, and took no steps, and Canning did not enlighten his colleague. When he found that no measures were being taken to make a change of office, Canning resigned on the 7th of September. Castlereagh then learnt the truth, and after resigning sent Canning a challenge on the 19th of' September. In the duel on Putney Heath which followed Canning was wounded in the thigh. His apologists have endeavoured to defend him against the charge of double dealing, but there can be no question that Castlereagh had just ground to be angry. Public opinion was strong against Canning, and in the House of Commons he was looked upon with distrust. For twelve years he remained out of office or in inferior places. His ability made it impossible that he should be obscure. In 1810 he was a member of the Bullion Committee, and his speeches on the report showed his mastery

of the subject. It was no doubt his reputation for economic knowledge which chiefly recommended him to the electors of Liverpool in 1812. He had been elected for Tralee in 1803, for Newtown (Hants) in 1806 and for Harwich in 1807. But in parliament he had lost all influence, and is described as wandering about neglected and avoided. In 181 2 he committed the serious mistake of accepting a well-paid ornamental mission to Lisbon, which he was about to visit for the health of his eldest son. He remained abroad for eighteen months. In 18 16 he submitted to enter office as president of the Board of Control in Lord Liver- pool's cabinet, in which Castlereagh, to whom he had now become reconciled, was secretary of state for foreign affairs. In 1820 he resigned his post in order to avoid taking any part in the proceedings against Queen Caroline, the wife of George IV.

Canning's return to great office and influence dates from the suicide of Castlereagh in 1822. He had accepted the governor- generalship of India, which would have implied his retirement from public life at home, and refused to remain unless he was promised " the whole inheritance " of Castlereagh, — the foreign office and the leadership of the House of Commons. His terms were accepted, and he took office in September 1822. He held the office from that date till April 1827, when he became prime minister in succession to Lord Liverpool, whose health had broken down. Even before this he was the real director of the policy of the cabinet — as Castlereagh had been from 181 2 to

1822. It may be noted that he resigned his seat for Liverpool in

1823, and was elected for Harwich, which he left for Newport in 1826. Few English public men have represented so many constituencies.

His fame as a statesman is based mainly on the foreign policy which he pursued in those years — the policy of non-intervention, and of the patronage, if not the actual support, of national and liberal movements in Europe (see the historical articles under Europe, Spain, Portugal, Turkey, Greece). To this policy he may be said to have given his name, and he has- enjoyed the reputation of having introduced a generous spirit into British politics, and of having undone the work of his predecessor at the foreign office, who was constantly abused as the friend of despotism and of despots. It may well be believed that Canning followed his natural inclinations, and it can be asserted without

the possibility of contradiction, if also without possibility of proof, that he had influenced the mind of Castlereagh. Yet the fact remains that when Canning came into office in September 1822, he found the instructions to be given to the representative of the British government at the congress of Verona already drawn up by his predecessor, who had meant to attend the congress himself (see Londonderry, Robert Stewart, 2nd Marquess or). These instructions were handed on without change by Canning to the duke of Wellington, who went as representative, and they contain all the principles which have been said to have been peculiarly Canning's. Indeed this policy was dictated by the character and position of the British govern- ment, and had been followed in the main since the conference of Aix-la-Chapelle in 1818. Canning was its orator and minister rather than its originator. Yet his eloquence has associated with his name the responsibility for British policy at the time. No speech of his is perhaps more famous than that in which he claimed the initiative in recognizing the independence of the revolted Spanish colonies in South America in 1823 — " I resolved that, if France had Spain, it should not be Spain with the Indies. I called the New World into existence to redress the balance of the Old" (December 12, 1826).

When Lord Liverpool was struck down in a fit on the 17 th of February 1827, Canning was marked out by position as his only possible successor. He was not indeed accepted by all the party which had followed Liverpool. The duke of Wellington, Sir Robert Peel and several other members of the ministry, moved perhaps by personal animosity, and certainly by dislike of his known and consistent advocacy of the claims of the Roman Catholics, refused to serve with him. Canning succeeded in constructing a ministry in April — but the hopes and the fears of friends and enemies proved to be equally unfounded. His health had already begun to give way, and broke down altogether under the strain of the effort required to form his ministry. He had caught cold in January at the funeral of the duke of York, and never recovered. He died on the 8th of August 1827, at Chiswick, in the house of the duke of Devonshire, where Fox had died, and in the same room.

See Speeches, with a memoir by R. Therry (London, 1826) ; A.'G. Stapleton, Political Life of Canning, 1822-1827 (2nd ed., London, 1831); Canning and His Times (London, 1859); Lord Dalling and Bulwer, Historical Characters (London, 1868); F. H. Hill, George Canning (London, 1887); Some Political Correspondence of George Canning, ed. E. J. Stapleton (2 vols., 1897); J. A. R. Marriott, George

Canning and His Times, a Political Study (London, 1903) ; W. Alison Phillips, George Canning (London, 1903), with repro- ductions of contemporary portraits and caricatures; H. W. V. Temperley, George Canning (London, 1-905).

CANNIZZARO, STANISLAO (1826-1910), Italian chemist, was born at Palermo on the 13th of July 1826. In 1841 he entered the university of his native place with the intention of making medicine his profession, but he soon turned to the study of chemistry, and in 1845 and 1846 acted as assistant to Rafaelle Piria (1815-1865), known for his work on salicin, who was then professor of chemistry at Pisa and subsequently occupied the same position at Turin. During the Sicilian revolution he served as an artillery officer at Messina and was also chosen deputy for Franca villa in the Sicilian parliament; and after the fall of Messina in September 1848 he was stationed at Taormina. On the collapse of the insurgents he escaped to Marseilles, in May 1849, and after visiting various French towns reached Paris in October. There he gained an introduction to M. E. Chevreul's laboratory, and in conjunction with F. S. Cloez (1817-1883) made his first contribution to chemical research in 1 8 5 1 , when they prepared cyanamide by the action of ammonia on cyanogen chloride in ethereal solution. In the same year he was appointed professor of physical chemistry at the National College of Alexandria, where he discovered that aromatic aldehydes are decomposed by alcoholic potash into a mixture of the corresponding acid and alcohol, e.g. benzaldehyde into benzoic acid and benzyl alcohol (" Cannizzaro's reaction "). In the autumn of 1855 he became professor of chemistry at Geneva university, and six years later, after declining professor-

ships at Pisa and Naples, accepted the chair of inorganic and organic chemistry at Palermo. There he spent ten years, studying the aromatic compounds and continuing to work on the amines, until in 1871 he was appointed to the chair of chemistry at Rome university. Apart from his work on organic chemistry, which includes also an investigation of santonin, he rendered great service to the philosophy of chemistry when in his memoir Sunto di un corso di Filosofia chemica (1858) he insisted on the distinction, till then imperfectly realized, between molecular and atomic weights, and showed how the atomic weights of elements contained in volatile compounds can be deduced from the molecular weights of those compounds, and how the atomic weights of elements of whose compounds the vapour densities are unknown can be ascertained from a knowledge of their specific heats. For this achievement, of fundamental importance for the atomic theory in chemistry, he was awarded the Copley medal by the Royal Society in 1891. Cannizzaro's scientific eminence in 187 1

secured him admission to the Italian senate, of which he was vice-president, and as a member of the Council of Public Instruction and in other ways he rendered important services to the cause of scientific education in Italy.

CANNOCK, a market town in the western parliamentary division of Staffordshire, England, in the district known as Cannock Chase, 130 m. N.W. from London by the London and North Western railway. Pop. of urban district (1891) 20,613; (1901) 23,974. The church of St Luke is Perpendicular, enlarged in modern times. The famous political preacher, Henry Sach- everell, held the living early in the 18th century. Cannock has tool, boiler, brick and tile works. Cannock Chase, a tract generally exceeding 500 ft. in elevation, extends on an axis from north-west to south-east over some 36,000 acres. It was a royal preserve, and remains for the most part an uncultivated waste, but it is also a rich coalfield, and there are mines in every- direction. Brownhills, Burntwood and Chase Town, Great Wyrley, Hednesford, Hammerwich, and Pelsall are townships or villages of the mining population.

CANNON (a word common to Romance languages, from the Lat. canna, a reed, tube, with the addition of the augmentative termination -on, one), a gun or piece of ordnance. The word, first found about 1400 (there is an indenture of Henry IV. 1407 referring to ” canones, seu instrumenta Anglice gunnes vocata”), is commonly applied to any form of firearm which is fired from a carriage or fixed mounting, in contradistinction to “small arms,” which are fired without a rest or support of any kind. 1 An exception must be made, however, in the case of machine guns (q.v.), and the word as used in modern times may be defined as follows: “a piece of ordnance mounted upon a fixed or movable carriage and firing a projectile of greater calibre than i| in.” In French, however, canon is the term applied to the barrel of small arms, and also, as an alternative to mitrailleuse or mitrailleur, to machine guns, as well as to ordnance properly so-called. The Hotchkiss machine gun used in several navies is officially called ” revolving cannon.” For details see Artillery, Ordnance, Machine Guns, &c. Amongst the many derived senses of the word may be mentioned ” cannon curls,” in which the hair is arranged in horizontal tubular curls one above the other. For “cannon” in billiards see Billiards.

In the 16th and 17th centuries the “cannon” in England was distinctively a large piece, smaller natures of ordnance being called by various special names such as culverin, saker, falcon, demi-cannon, &c. We hear of Cromwell taking with him to Ireland (1649) ” two cannon of eight inches, two cannon of seven, two demi-cannon, two

twenty-four pounders," &c.

Sir James Turner, a distinguished professional soldier con- temporary with Cromwell, says: " The cannon or battering ordnance is divided by the English into Cannon Royal, Whole Cannon and Demi-Cannon. The first is likewise called the Double Cannon, she weighs 8000 pound of metal and shoots a bullet of 60, 62 or 63 pound weight. The Whole Cannon weighs 7000 pound of metal and shoots a bullet of 38, 39 or 40 pound.

1 The original small arms, however, are often referred to as hand cannon.

The Demi-Cannon weighs about 6000 pound and shoots a bullet of 28 or 30 pound. . . . These three several guns are called cannons of eight, cannons of seven and cannons of six." The generic sense of " cannon, " in which the word is now exclusively used, is found along with the special sense above mentioned as early as 1474. A warrant of that year issued by Edward IV. of England to Richard Copcote orders him to provide "bumbardos, canones, culverynes . . . et alios canones quoscumque, ac pulveres, sulfer . . . pro eisdem canonibus necessarias." " Artillery " and " ordnance," however, were the more usual terms up to the time of Louis XIV. (c. 1670), about which time heavy ordnance began to be classified according to the weight of its shot, and the special sense of " cannon " disappears.

CANNON-BALL TREE (Couroupita guianensis), a native of tropical South America (French Guiana), which bears large spherical woody fruits, containing numerous seeds, as in the allied genus Bertholletia (Brazil nut).

CANNSTATT, or Kannstatt, a town of Germany in the kingdom of Wiirttemberg, pleasantly situated in a fertile valley on both banks of the Neckar, 25 m. from Stuttgart, with which it has been incorporated since 1904. Pop. (1905) 26,497. It is a railway centre, has two Evangelical and a Roman Catholic church, two bridges across the Neckar, handsome streets in the modern quarter of the town and fine promenades and gardens. There is a good deal of business in the town. Railway plant, •automobiles and machinery are manufactured; spinning and weaving are carried on; and there are chemical works and a brewery here. Fruit and vines are largely cultivated in the

neighbourhood. A large population is temporarily attracted to Cannstatt by the fame of its mineral springs, which are valu- able for diseases of the throat and weaknesses of the nervous system. These springs were known to the Romans. Besides the usual bathing establishments there are several medical institutions for the treatment of disease. Near the town are the palaces of Rosenstein and Wilhelma; the latter, built (1842- 1851) for King William of Wiirttemberg in the Moorish style, is surrounded by beautiful gardens. In the neighbourhood also are immense caves in the limestone where numerous bones of mammoths and other extinct animals have been found. On the Rotenberg, where formerly stood the ancestral castle of the house of Wiirttemberg, is the mausoleum of King William and his wife.

Cannstatt (Condistat) is mentioned early in the 8th century as the place where a great court was held by Charlemagne for the trial of the rebellious dukes of the Alamanni and the Bavarians. From the emperor Louis the Bavarian it received the same rights and privileges as were enjoyed by the town of Esslingen, and until the middle of the 14th century it was the capital of the county of Wiirttemberg. Cannstatt was the scene of a victory gained by the French over the Austrians on the 21st of July

1796.

See Veiel, Der Kurort Kannstatt und seine Mineralquellen (Cann- statt, 1875).

CANO, ALONZO (1601-1667), Spanish painter, architect and sculptor, was born at Granada. He has left in Spain a very great number of specimens of his genius, which display the boldness of his design, the facility of his pencil, the purity of his flesh-tints and his knowledge of chiaroscuro. He learned archi- tecture from his father, Miguel Cano, painting from Pacheco and sculpture from Juan Martinez Montafies. As a statuary, his most famous works are the Madonna and Child in the church of Nebrissa, and the colossal figures of San Pedro and San Pablo. As an architect he indulged in too profuse ornamentation, and gave way too much to the fancies of his day. Philip IV. made him royal architect and king's painter, and gave him the church preferment of a canon. His more important pictures are at Madrid. He was notorious for his ungovernable temper; and it is said that once he risked his life by committing the then capital offence of dashing to pieces the statue of a saint, when in a rage with the purchaser who grudged the price he demanded. His known passionateness also (according to another stbry) caused him to be suspected, and even

tortured, for the murder of

his wife, though all other circumstances pointed to his servant as the culprit.

CANO, MELCHIOR (1325-1560), Spanish theologian, born at Tarancon, in New Castile, joined the Dominican order at an early age at Salamanca, where in 1546 he succeeded to the theological chair in that university. A man of deep learning and originality, proud and a victim to the odium theologicum, he could brook no rivalry. The only one who at that time could compare with him was the gentle Bartolomeo de Caranza, also a Dominican and afterwards archbishop of Toledo. At the uni- versity the schools were divided between the partisans of the two professors; but Cano pursued his rival with relentless virulence, and took part in the condemnation for heresy of his brother-friar. The new society of the Jesuits, as being the fore-runners of Antichrist, also met with his violent opposition; and he was not grateful to them when, after attending the council of Trent in 1545, he was sent, by their influence, in 1552, as bishop of the far-off see of the Canaries. His personal influence with Philip II. soon procured his recall, and he was made pro- vincial of his order in Castile. In 1556 he wrote his famous Consultatio theologica, in which he advised the king to resist the temporal encroachments of the papacy and, as absolute monarch, to defend his rights by bringing about a radical change in the administration of ecclesiastical revenues, thus making Spain less dependent on Rome. With this in his mind Paul IV. styled him ” a son of perdition.” The reputation of Cano, however, rests on a posthumous work, De Locis theologicis (Salamanca, 1562), which stands to-day. unrivalled in its own line. In this, a genuine work of the Renaissance, Cano endeavours to free dogmatic theology from the vain subtleties of the schools and, by clearing away the puerilities of the later scholastic theologians, to bring religion back to first principles; and, by giving rules, method, co-ordination and system, to build up a scientific treatment of theology. He died at Toledo on the 30th of September 1560. (E. Tn.)

CANOE (from Carib. candoa, the West Indian name found in use by Columbus; the Fr. canot, boat, and Ger. Kahn, are derived from the Lat. carina, reed, vessel), a sort of general term for a boat sharp at both ends, originally designed for propulsion by one or more paddles (not oars) held without a fixed fulcrum, the paddler facing the bow. As the historical native name for certain types of boat used by savages, it is applied in such cases to those which, like other boats, are open within from end to end, and the modern ” Canadian canoe ” preserves this sense; but a more specific usage of the name is for such

craft as differ essentially from open boats by being covered in with a deck, except for a ” well ” where the paddler sits. Modern developments are the cruising canoe, combining the use of paddle and sails, and the racing canoe, equipped with sails only.

The primitive canoes were light frames of wood over which skins (as in the Eskimo canoe) or the bark of trees (as in the North Americanlndians’ birch-bark canoe) were tightly stretched. The modern painted canvas canoe, built on Indian lines, was a natural development of this idea. The Indian also used, and the African still uses, the ” dug-out,” made from a tree hollowed by fire after the manner of Robinson Crusoe. Many of these are of considerable size and carrying capacity; one in the New York Natural History Museum from Queen Charlotte’s Island is 63 ft. long, 8 ft. 3 in. wide, and 5 ft. deep, cut from a single log. The ” war canoe ” of paddling races is its modern successor. In the islands of the Pacific primitive canoes are wonderfully handled by the natives, who make long sea voyages in them, often stiffening them by attaching another hull (see Catamaran) .

In the earlier part of the 19th century, what was known as a ” canoe ” in England was the short covered-in craft, with a ” well- ” for the paddler to sit in, which was popularly used for short river practice; and this type still survives. But the sport of canoeing in any real sense dates from 1865, when JohnMac- Gregor (q.v.) designed the canoe “Rob Roy ” for long journeys by water, using both double-bladed paddle and sails, yet light enough (about 70 ft) to be carried over land. The general type of this canoe is built of oak with a cedar deck ; the length is from

12 ft. to 15 ft., the beam from 26 in. to 30 in., the depth 10 in. to 16 in. The paddle is 7 ft. long and 6 in. wide in the blade, the canoeist sits low in a cockpit, and in paddling dips the blades first on one side and then the other. The rig is generally yawl.

In 1866 the Royal Canoe Club was formed in England, and the prince of Wales (afterwards Edward VII.) became commodore. Its headquarters are at Kingston-on-Thames and it is still the leading organization. There is also the British Canoe Association, devoted to cruising. After the English canoes were seen in Paris at the Exhibition of 1867, others like them were built in France. Branches and clubs

were formed also at the English universities, and in Liverpool, Hull, Edinburgh and Glasgow. The New York Canoe Club was founded in 187 1. One member of the Royal Canoe Club crossed the English Channel in his canoe, another the Irish Channel from Scotland to Ireland, and many rivers were explored in inaccessible parts, like the Jordan, the Kishon, and the Abana and the Pharpar at Damascus, as well as the Lake Menzaleh in the Delta of the Nile, and the Lake of Galilee and Waters of Merom'in Syria.

W. Baden Powell modified the type of the " Rob Roy " in the " Nautilus," intended only for sailing. From this time the two kinds of pleasure canoe — paddling and sailing — parted company, and developed each on its own lines; the sailing canoe soon (1882) had a deck seat and tiller, a smaller and smaller cockpit, and a larger and larger sail area, with the consequent necessary air and water-tight bulkheads in the hull. Paul Butler of Lowell, Mass., added (1886) the sliding outrigger seat, allowing the canoeist to slide out to windward. The final stage is the racing machine pure and simple, seen in the exciting contests at the annual August meets of the American Canoe Association on the St Lawrence river, or at the more frequent race days of its constituent divisions, associated as Canadian (47 clubs), Atlantic (32 clubs), Central (26 clubs) and Western.

The paddling canoe, propelled by single-bladed paddles, is also represented in single, tandem and crew (" war canoe ") races, and this form of the sport remains more of the amateur type. The " Canadian," a clinker or carvel built mahogany or cedar or bass-wood canoe, or the painted canvas, bark or compressed paper canoe, all on the general lines of the Indian birch bark, are as common on American rivers as the punt is on the Thames, and are similarly used.

See MacGregor, A Thousand Miles in the Rob Roy Canoe (1866), The Rob Roy on the Baltic, &c. ; W. Baden Powell, Canoe Travelling (187 1) ; W. L. Alden, Canoe and the Flying Proa (New York, 1878) ; J. D. Hayward, Camping out with the British Canoe Association; C. B. Vaux, Canoe Handling (New York, 1888) ; Stephens, Canoe and Boat Building (New York, 1881).

CANON. The Greek word navthv means originally a straight rod or pole, and metaphorically what serves to keep a thing upright or straight, a rule. In the New Testament it occurs in Gal. vi. 16, and 2 Cor. x. 13, 15, 16, signifying in the former passage a measure, in the latter what is measured, a district. The general applications of the word fall mainly into two groups, in one of which the underlying meaning is that of rule, in the other that of a list or catalogue, i.e. of

books containing the rule. Of the first, such uses as that of a standard or rule of conduct or taste, or of a particular form of musical composition (see below) may be mentioned, but the principal example is of the sum of the laws regulating the ecclesiastical body (see Canon Law) . In the second group of uses that of the ecclesiastical dignitary (see below) , that of the list of the names of those persons recognized as saints by the Church (see Canonization) , and that of the authoritative body of Scriptures (see below) are examples.

Music. — A canon in part-music is the form taken by the earliest compositions in harmony, successive or consequent parts having the same melody, but each beginning at a stated period after its precursor or antecedent. In many early polyphonic compositions, one or more voices were imitated note for note by the others, so that the other parts did not need to be written out at all, but were deduced from the leaders by a rule or canon. Sir Frederick Bridge has pointed out that in this way the term ” canon ” came to supersede the old name of the art-form, Fuga ligata. (See also under Fugue, Contrapuntal Forms and I

Music.) When the first part completes its rhythmical sentence before the second enters, and then continues the melody as an accompaniment to the second, and so on for the third or fourth, this form of canon in England was styled a ” round ” or ” catch ” ; the stricter canon being one in which the succession of parts did not depend on the ending of the phrase. But outside England catches and canons were undifferentiated. The ” round ” derived its name from the fact that the first part returned to the beginning while the others continued the melody; the ” catch ” meant that each later part caught up the tune. The problem of the canon, as an artistic composition, is to find one or more points ‘ in a melody at which one or more successive parts may start the same tune harmoniously. Catches were familiar in English folk music until after the Restoration; different trades having characteristic melodies of their own. In the time of Charles II. they took a bacchanalian cast, and later became sentimental. Gradually the form went out as a type of folk music, and now survives mainly in its historical interest. (H. Ch.)

The Church Dignitary. — A canon is a person who possesses a prebend, or revenue allotted for the performance of divine service in a cathedral or collegiate church. Though the institute of canons as it at present exists does not go back beyond the nth century it has a long history behind it. The name is derived from the list (matricula) of the clergy belonging to a church, Kavdov being thus used in the council of Nicaea (c. 16). In the synod of Laodicea the adjective kclvovlkos is

found in this sense (c. 15); and during the 6th century the word canonicus occurs commonly in western Europe in relation to the clergy belonging to a cathedral or other church. Eusebius of Vercelli (d. 370) was the first to introduce the system whereby the cathedral clergy dwelt together, leading a semi-monastic life in common and according to rule; and St Augustine established a similar manner of life for the clergy of his cathedral at Hippo. The system spread widely over Africa, Spain and Gaul; a familiar instance is St Gregory's injunction to St Augustine that at Canterbury the bishop and his clergy should live a common life together, similar to the monastic life in which he had been trained; that these " clerics " at Canterbury were not monks is shown by the fact that those of them in the lower clerical grades were free to marry and live at home, without forfeiting their position or emoluments as members of the body of cathedral clergy (Bede, Hist. Eccl. i. 27). This mode of life for the secular clergj , which became common in the west, seems never to have taken root in the east. It came to be called vita canonica, canonical life, and it was the object of various enactments of councils during the 6th, 7th and 8th centuries. The first serious attempt to legislate for it and reduce it to rule was made by Chrodegang, bishop of Metz (c. 750) , who composed a rule for the clergy of his cathedral, which was in large measure an adaptation of the Benedictine Rule to the case of secular clergy living in common. Chrodegang's Rule was adopted in many churches, both cathedral and collegiate (i.e. those served by a body of clergy). In 816 the synod of Aix-la-Chapelle (see Mon. Germ. Concil. ii. 307) made further regulations for the canonical life, which became the law in the Frankish empire for cathedral and collegiate churches. The Rule of Chrodegang was taken as the basis, but was supplemented and in some points mitigated and made less monastic in character. There was a common dormitory and common refectory for all, but each canon Was allowed a dwelling room within the cloister; the use of flesh meat was permitted, and the clothing was of better quality than that of monks. Each canon retained the use of his private property and money, but the revenues of the cathedral or church were treated as a common fund for the maintenance of the whole establishment. The chief duty of the canons was the performance of the church services. Thus the canons were not monks, but secular clergy living in community, without taking the monastic vows or resigning their private means — a form of life somewhat resembling that of the fathers of the London or Birmingham Oratory in our day. The bishop was expected to lead the common life along with his clergy.

The canonical life as regulated by the synod of Aix, subsisted in the

9th and 10th centuries; but the maintenance of this

intermediate form of life was of extreme difficulty. . There was a constant tendency to relax the bonds of the common life, and attempts in various directions to restore it. In England, by the middle of the 10th century, the prescriptions of the canonical life seem to have fallen into desuetude, and in nine cathedrals the canons were replaced by communities of Benedictines. In the nth century the Rule of Chrodegang was introduced into certain of the English cathedrals, and an Anglo-Saxon transla- tion of it was made under Leofric for his church of Exeter. The turning point came in 1059, when a reforming synod, held at the Lateran, exhorted the clergy of all cathedral and collegiate churches to live in community, to hold all property and money in common, and to ” lead the life of the Apostles ” (cf . Acts ii.44, 45). The clergy of numerous churches throughout Western Europe (that of the Lateran Basilica among them) set themselves to carry out these exhortations, and out of this movement grew the religious order of Canons Regular or Augustinian Canons (q.v.). The opposite tendency also ran its course and produced the institute of secular canons. The revenues of the cathedral were divided into two parts, that of the bishop and that of the clergy; this latter was again divided among the clergy them- selves, so that each member received his own separate income, and the persons so sharing, whatever their clerical grade, were the canons of the cathedral church. Naturally all attempt at leading any kind of common life was frankly abandoned. In England the final establishment of this order of things was due to St Osmund (1090). The nature and functions of the institute of secular canons are described in the article Cathedral.

See Du Cange, Glossarium, under ” Canonicus ” ; Amort, Vetus Disciplina Canonicorum (1747), to be used with caution for the earlier period; C. du Molinet, Reflexions historiques et curieuses sur les antiquites des chanoines iant seculiers que reguliers (1674) ; Herzog, Realencyklopddie (3rd ed.), art. ” Kapitel ” ; Wetzer und Welte, Kirchenlexicon (2nd ed.), art. ” Canonica vita ” and ” Canonikat.” The history of the canonical institute is succinctly told, and the best literature named, by Max Heimbucher, Orden und Kongregationen, 1896, i. § 55; also by Otto Zockler, Askese und Mbnchtum, 1897, pp. 422-425. On medieval secular canons a standard work is Chr. Wordsworth’s Statutes of Lincoln Cathedral (1892-1897); see also an article thereon by Edm. Bishop in Dublin Review, July 1898.

(E. C B.)

In the Church of England, the canons of cathedral or collegiate churches retain their traditional character and functions, though they are now, of course, permitted to marry. Their duties were defined by the Canons of 1603, and included that of residence at the cathedrals according to “their local customs and statutes,” and preaching in the cathedral and in the churches of the diocese, ” especially those whence they or their church receive any yearly rent or profit.” A canonry not being legally a ” cure of souls,” a canon may hold a benefice in addition to his prebend, in spite of the acts against pluralities. By the Canons of 1603 he was subject to discipline if he made his canonry an excuse for neglecting his cure. By the act of 1840 reforming cathedral chapters the number of canonries was greatly reduced, wbjje some were made applicable to the endowment of arch-deaconries and professorships. At the same time it was enacted that a canon must have been six years in priest’s orders, except in the case of canonries annexed to any professorship, headship or other office in any university. The obligatory period of residence, hitherto varying in different churches, was also fixed at a uniform period of three months. The right of presentation to canonries is now vested in some cases in the crown, in others in the lord chancellor, the archbishop or in the bishop of the diocese.

Honorary canons are properly canons who have no prebend or other emoluments from the common fund of the chapter. In the case of old cathedrals the title is bestowed upon deserving clergymen by the bishop as a mark of distinction. In new cathedrals, e.g. Manchester or Birmingham, where no endowment exists for a chapter, the bishop is empowered to appoint honorary canons, who carry out the ordinary functions of a cathedral body (see Cathedral).

Minor canons, more properly styled priest-vicars, are ap- pointed by the dean and chapter. Their function is mainly to sing the service, and they are selected therefore mainly for their

voices and musical qualifications. They may hold a benefice, if it lies within 6 m. of the cathedral.

In the Protestant churches of the continent canons as ecclesi- astical officers have ceased to exist. In Prussia and Saxony, however, certain chapters, secularized at the Reformation, still exist. The canons (Domherren) are, however, laymen with no ecclesiastical character whatever, and their rich prebends are merely sources of endowment for the cadets of noble families.

See Phillimore, Eccles. Law, 2 vols. (London, 1895). (W. A. P.)

The Scriptures. — There are three opinions as to the origin of the application of the term ” canon ” to the writings used by the Christian Church. According to Semler, Baur and others, the word had originally the sense of list or catalogue — the books publicly read in Christian assemblies. Others, as Steiner, suppose that since the Alexandrian grammarians applied it to collections of old Greek authors as models of excellence or classics, it meant classical (canonical) writings. According to a third opinion, the term included from the first the idea of a regulating principle. This is the more probable, because the same idea lies in the New Testament use of the noun, and pervades its applications in the language of the early Fathers down to the time of Constantine, as Credner has shown. 1 The ” navwv of the church ” in the Clementine homilies, 2 the ” ecclesiastical ko.v6>v” 3 and the ” icavoiv of the truth ” in Clement and Irenaeus, 4 the kolvwv of the faith in Polycrates, 6 the regula fidei of Tertullian, 6 and the libri regulates of Origen 7 imply a normative principle. Credner’s view of Kavwv as an abbreviation of ypa

The earliest example of its application to a catalogue of the Old or New Testament books occurs in the Latin translation of Origen’s homily on Joshua, where the original seems to have been Kavwv. The word itself is certainly in Amphilochius, 9 as well as in Jerome 10 and Rufinus. 11 As the Latin translation of Origen has canonicus and canonizatus, we infer that he used KavoviKos, opposed as it is to apocryphus or secrelus. The first occurrence of ko.vovi.k6s is in the 50th canon of the council of Laodicea, where it is contrasted with iSicotikos and aKavovurros. KavouLˆbfxeva,“canonized books,” is first used in Athanasius’s festal epistle. 12 The kind of rule which the earliest Fathers thought the Scriptures to be can only be conjectured; it is certain that they believed the Old Testament books to be a divine and infallible guide. But the New Testament was not so considered till towards the close of the 2nd century, when the conception of a Catholic Church was realized. The collection of writings was not called Scripture, or put on a par with the Old Testament as sacred and inspired, till the time of Theophilus of Antioch (about 180 a.d.). Hence Irenaeus applies the epithets divine and perfect to the Scriptures; and Clement of Alexandria calls them inspired.

When distinctions were made among the Biblical writings other words were employed, synonymous with Kavoviˆoneva, or mko.- ww/j6to, such as kvSiadrjKa, wpuxfiiva. The canon was thus a catalogue of writings, forming a rule of truth, sacred, divine, revealed by God for the instruction of men. The rule was perfect for its purpose. (See Bible:

section Canon.)

The term ” canonical,” i.e. that which is approved or ordered by the ” canon ” or rule, is applied to ecclesiastical vest- ments, ” canonicals,” and to those hours set apart by the Church for prayer and devotion, the ” Canonical Hours ” (see Breviary). (S. D.)

1 Zur Gesckichte des Kanons, pp. 3-68.

2 Clement Horn., ap. Coteler. vol. i. p. 608.

3 Stromata, vi. 15, p. 803, ed. Potter.

4 Adv. Haeres. i. 95. 5 Euseb. H.E. v. 24.

6 De praescript. Haereticorum, chs. 12, 13.

7 Comment, in Mat. iii. p. 916, ed. Delarue.

8 Monumenta Vetera ad Donatistarum historiam pertinentia, ed. Dupin, p. 168.

9 At the end of the Iambi ad Seleucum, on the books of the New Testament, he adds, outos aˆevikararos kolv&iv av etq tu>v BeowvevaTav ■ypaS>v. 10 Prologus galeatus in ii. Reg.

11 Expos, in Symb. Apost. 37, p. 374, ed. Migne.

12 After the word is added kcu 7rapa8oflei’Ta, TnoTevOivra ri Oeia tivai. Opp. vol. i. p. 961, ed. Benedict.

CANONESS (Fr. chanoinesse, Get. Kanonissin, Lat. canonica or canonica virgo), a female beneficiary of a religious college. In the 8th century chapters of canons were instituted in the Frankish empire, and in imitation of these certain women took common vows of obedience and chastity, though not of poverty. Like nuns they had common table and dormitory, and recited the breviary, but generally the rule was not so strict as in the case of nuns. The canonesses often taught girls, and were also employed in embroidering ecclesiastical vestments and transcribing liturgical books. A distinction was drawn between regular and secular canonesses, the latter being of noble family and not practising any austerity. Some of their abbesses were notable feudal princesses. In Germany several foundations of this kind (e.g.

Gandersheim, Herford and Quedlinburg), which were practically secular institutions before the Reformation, adopted the Protestant faith, and still exist, requiring of their members the simple conditions of celibacy and obedience to their superior during membership. These institutions (Stifter) are now practi- cally almshouses for the unmarried daughters of noble families. In some cases the right of presentation belongs to the head of the family, sometimes admission is gained by purchase; but in modern times a certain number of prebends have been created for the daughters of deserving officials. The organization of the Stift is collegiate, the head bearing the ancient titles of abbess, prioress rr provostess (Prbbstin), and the canonesses (Siiftsdamen) meet periodically in Konvent for the discussion of the affairs of the community. The ladies are not bound to residence. In many of these Stifter quaint pre-Reformation customs and ceremonies still survive; thus, at the convent of St John the Baptist at Schleswig, on the day of the patron saint, the room in which the Konvent is held is draped in black and a realistic life-size wax head of St John on a charger is placed in the centre of the table round which the canonesses sit.

CANONIZATION, in its widest sense, an act by which in the Christian Church the ecclesiastical authority grants to a deceased believer the honour of public cidtus. In the early Church there was no formal canonization. The cultus applied at first to local martyrs, and it was only in exceptional circumstances that a kind of judiciary inquiry and express decision became necessary to legitimate this cultus. The peculiar situation of the Church of Africa explains the Vindicatio martyrum, which was early practised there (Optatus Milevit. , i. 1 6) . In the cultus rendered to confessors, the authorization of the Church had long been merely implicit. But when an express decision was given, it was the bishop who gave it. Gradually the canonization of saints came to be included in the centralizing movement which reserved to the pope the most important acts of ecclesiastical power. The earliest acknowledged instance of canonization by the pope is that of Ulric of Augsburg, who was declared a saint by John XV. in a.d. 993. From that time the pontifical intervention became more and more frequent, and, in practice, the right of the bishops in the matter of canonization continued to grow more restricted. In 1 1 70 the new right was sufficiently established for Pope Alexander III. to affirm that the bishops could not institute the cultus of a new saint without the authority of the Roman Church (Cap. Audivimus, Decret. De Rett, etvenerat. Sanctorum, iii. 115). The 12th and, especially, the 13th centuries furnish many examples of canonizations pronounced by the popes, and the procedure of this period is well ascertained. It was

much more summary than that practised in modern times. The evidence of those who had known the holy personages was collected on the spot. The inquiry was as rapid as the judgment, and both often took place a short time after the death of the saint, as in the cases of St Thomas of Canterbury (died 1 1 70, canonized 1 1 73) , St Peter of Castelnau (died on the 15th of January 1208, canonized on the 1 2th of March of the same year), St Francis of Assisi (died on the 4th of October 1226, canonized on the 19th of July 1228), and St Anthony of Padua (died on the 13th of June 1231, canonized on the 3rd of June 1232).

At this period there was no marked difference between canon- ization and beatification. In modern practice, as definitively settled by the decrees of Pope Urban VIII. (1625 and 1634), the

two acts are. totally distinct. Canonization is the solemn and definitive act by which the pope decrees the plenitude of public honours. Beatification consists in permitting a cultus, the manifestations of which are restricted, and is merely a step towards canonization.

The procedure at present followed at the Roman curia is either exceptional or common. The approval of immemorial cultus comes within the category of exceptional procedure. Urban VIII., while forbidding the rendering of a public cultus without author- ization from the Holy See, made an exception in favour of the blessed who were at that time (1625) in possession of an im- memorial cultus, i.e. dating back at least a century (1525). The procedure per viam casus excepti consists in the legitimation of a cultus which has been rendered to a saint for a very long time. The causes of the martyrs (declarations martyrii) also are exceptional. Juridical proof is required of the fact of the martyr- dom and of its cause, i.e. it must be established that the servant of God was put to death through hatred of the faith. These are the two cases which constitute exceptional procedure.

The common procedure is that in which the cause is prosecuted per viam non cultus. It is, in reality, a suit at law, pleaded before the tribunal of the Congregation of Rites, which is a permanent commission of cardinals, assisted by a certain number of sub- ordinate officers and presided over by a cardinal. The supreme judge in the matter is the pope himself. The postulator, who is the mandatory of a diocese or ecclesiastical commonalty, is the solicitor. He must furnish the proofs, which are collected according to very stringent rules. The promoter of the faith, popularly called the ” devil’s advocate ” (advocatus diaboli), is the’ defendant, whose official duty is to point

out to the tribunal the weak points of the case.

The procedure is loaded with many formalities, of which the historical explanation lies in the tribunals of the ancient system, and which considerably delay the progress of the causes. The first decisive step is the introduction of the cause. If, by the advice of the cardinals who have examined the documents, the pope pronounce his approval, the servant of God receives the title of ” Venerable,” but is not entitled to any manifestation of cultus. Only in the event of the claimant passing this test successfully can the essential part of the procedure be begun, which will result in conferring on the Venerable the title of ” Blessed.” This part consists in three distinct proceedings: (1) to establish a reputation for sanctity, (2) to establish the heroic quality of the virtues, (3) to prove the working of miracles. A favourable judgment on all three of these tests is called the decree de tuto, by which the pope decides that they may safely proceed to the solemn beatification of the servant of God {Tuto procedi potest ad solemnem V. S.D.N, beatificationem) . In the ceremony of beatification the essential part consists in the reading of the pontifical brief, placing the Venerable in the rank of the Blessed, which is done during a solemn mass, celebrated with special rites in the great hall above the vestibule of the basilica of St Peter.

The process of canonization, which follows that of beatification, is usually less lengthy. It consists principally jn the discussion of the miracles (usually two in number) obtained by the intercession of the Blessed since the decree of beatification. After a great number of formalities and prayers, the pope pronounces the sentence, and indicates eventually the day on which he will proceed to the ceremony of canonization, which takes place with great solemnity in the basilica of St Peter.

The extremely complicated procedure which is prescribed for the conduct of the cases in order to ensure every opportunity for exercising rigour and discretion, considerably retards the progress of the causes, and necessitates a numerous staff. This circum- stance, together with the custom of ornamenting the basilica of St Peter very richly on the day of the ceremony, accounts for the considerable cost which a canonization entails. To prevent abuses, a minute tariff of expenses was drawn up during the pontificate of Leo XIII.

The Greek Church, represented by the patriarch of Constanti- nople, and the Russian Church, represented by the Holy Synod, also canonize their saints after a preliminary examination of their

titles to public cultus. Their procedure is less rigorous than that of the Roman Church, and as yet has been but imperfectly studied.

See J. Fontanini, Codex Constitutionum quas sutnmi pontifices ediderunt in solemni canonizatione sanctorum (Rome, 1729, a collection of original documents); Pr. Lambertini (Pope Benedict XIV.). De. servorum Dei beatificatione et beatorum canonizatione (Bologna, 1734- : 738), several times reprinted, and more remarkable for erudition and knowledge of canon law than for historical criticism; Al. Lauri, Codex pro postulatoribus causarum beatificationis et canonizationis , recognovit Joseph Fornari (Romae, 1899) ; F. W. Faber, Essay on Beatification, Canonization, fife. (London, 1848); A. Boudinhon, Les Proces de beatification et de canonisation (Paris, 1905) ; E. Golu- binskii, Istorija Kanonizacii sviatichvrusskoj cerkvi (Moscow, 1903).

(H. De.)

CANON LAW. Canon law, jus canonicum, is the sum of the laws which regulate the ecclesiastical body; for this reason it is also called ecclesiastical law, jus ecclesiasticum. It is also re- ferred to under the name of canones, sacri canones, a title of great antiquity, for the Kavbves, regulae, were very early dis- tinguished from the secular laws, the vofioi, leges.

The word Kavoiv, canon, has been employed in ecclesiastical literature in several different senses (see Canon above). The W 0nt disciplinary decisions of the council of Nicaea, for

“canon.” example (can. 1, 2, &c), employ it in the sense of an Different established rule, ecclesiastical in its origin and in its mean ngs. jjj ect g ut tfie expression is most frequently used to designate disciplinary laws, in which case canons are distinguished from dogmatic definitions. With regard to form, the decisions of councils, even when dogmatic, are called canons; thus the definitions of the council of Trent or of the Vatican, which generally begin with the words ” Si quis dixerit,” and end with the anathema, are canons; while the long chapters, even when dealing with matters of discipline, retain the name of chapters or decrees. Similarly, it has become customary to give the name of canons to the texts inserted in certain canonical compilations such as the Decretum of Gratian, while the name of

chapters is given to the analogous quotations from the Books of the Decretals. It is merely a question of words and of usage. As to the expression jus canonicum, it implies the systematic codification of ecclesiastical legislation, and had no existence previous to the labours which resulted in the Corpus juris canonici.

Canon law is divided into public law and private law; the former is concerned with the constitution of the Church, and, Divisions conse q uen tly, with the relations between her and other bodies, religious and civil; the latter has as its object the internal discipline of the ecclesiastical body and its members. This division, which has been found convenient for the study of canon law, has no precedent in the collections of texts. With regard to the texts now in force, the name of jus antiquum, ancient law, has been given to the laws previous to the Corpus juris canonici; the legislation of this Corpus has been called jus novum, new law; and finally, the name of recent law, jus novissimum, has been given to the law established by the council of Trent and subsequent papal constitutions. There is a further distinction between the written law, jus scriptum, laws made by the councils or popes, which are to be found in the collections, and the unwritten law, jus non scriptum, a body of practical rules arising rather from natural equity and from custom than from formal laws; with this is connected the customary law. In the Church, as in other societies, it has happened that the unwritten customary law has undergone a gradual diminution in importance, as a consequence of centralization and the accumulation of written laws; nowadays it need not be reckoned with, save in cases where local customs are involved. The common law is that which is intended to regulate the whole body; special or local law is that which is concerned with certain districts or certain categories of persons, by derogation from or addition to the common law.

By the sources or authors of the canon law are meant the

authorities from which it is derived; they must obviously be of

Sources. sucn a nature as t0 be binding upon the whole religious

body, or at least upon a specified portion of it. In the

highest rank must be placed Christ and the Apostles, whose

dispositions for the constitution and government of the Church are contained in the New Testament, completed by tradition; for the Church did not accept the disciplinary and ritual pro- visions of the

Old Testament as binding upon her (see Acts xi., xv.). To the apostles succeeded the episcopal body, with its chief the bishop of Rome, the successor of St. Peter, whose legislative and disciplinary power, by a process of centralization, underwent a slow but uninterrupted development. It is then to the episcopate, assembled in ecumenical council, and to its chief, that the function of legislating for the whole Church belongs; the inferior authorities, local councils or isolated bishops and prelates, can only make special laws or statutes, valid only for that part of the Church under their jurisdiction. Most of the canons, however, which constitute the ancient law, and notably those which appear in the Decretum of Gratian, emanate from local councils, or even from individual bishops; they have found a place in the common law because the collections of canons, of which they formed the most notable part, have been everywhere adopted.

Having made these general observations, we must now consider the history of those texts and collections of canons which to-day form the ecclesiastical law of the Western Church: (1) up to the Decretum of Gratian, (2) up to the council of Trent, (3 and 4) up to the present day, including the codification ordered by Pius X.

1. From the Beginning to the Decretum oj Gratian. — At no time, and least of all during the earliest centuries, was there any attempt to draw up a uniform system of legislation for the whole of the Christian Church. The various communities ruled them- selves principally according to their customs and traditions, which, however, possessed a certain uniformity resulting from their close connexion with natural and divine law. Strangely enough, those documents which bear the greatest resemblance to a small collection of canonical regulations, such as the Didache, the Didascalia and the Canons of Hippolytus, have not been retained, and find no place in the collections of canons, doubtless for the reason that they were not official documents. Even the Apostolical Constitutions (q.v.), an expansion of the Didache and the Didascalia, after exercising a certain amount of influence, were rejected by the council in Trullo (692). Thus the only pseudo-epigraphic document preserved in the law of the Greek Church is the small collection of the eighty-five so-called ” Apos- tolic Canons ” (q.v.). The compilers, in their several collections, gathered only occasional decisions, the outcome of no pre- determined plan, given by councils or by certain great bishops.

These compilations began in the East. It appears that in several different districts canons made by the local assemblies 1 were added to those of the council of Nicaea which were everywhere accepted and observed. The first collection. example seems to be that of the

province of Pontus, where after the twenty canons of Nicaea were placed the twenty- five canons of the council of Ancyra (314), and the fifteen of that of Neocaesarea (3 1 5-3 20) . These texts were adopted at Antioch, where there were further added the twenty-five canons of the so-called council in encaeniis of that city (341). Soon after- wards, Paphlagonia contributed twenty canons passed at the council of Gangra (held, according to the Synodicon orientate, in 343), 2 and Phrygia fifty-nine canons of the assembly of Laodicea (345-381?), or rather of the compilation known as the work of this council. 3 The collection was so well and so widely known that all these canons were numbered in sequence, and thus at the council of Chalcedon (451) several of the canons of Antioch were read out under the number assigned to them in the collection of the whole. It was further increased by the

1 The councils which we are about to mention, up to the 9th century, have been published several times, notably in the great collections of Hardouin, Mansi, &c. ; they will be found brought together in one small volume in Bruns, Canones apostolorum et conciliorum (Berlin, 1839).

2 The date of this council was formerly unknown ; it is ascribed to 343 by the Syriac Nestorian collection recently published by M. Chabot, Synodicon Orientate, p. 278, note 4.

3 See Boudinhon, ” Note sur le concile de Laodicee,” in the Compte rendu du premier congres des savants catholiques & Paris, 1888 (Paris, 1889), vol. ii. p. 420.

twenty-eight (thirty) canons of Chalcedon; about the same time were added the four canons of the council of Constantinople of 381, under the name of which also appeared three (or seven) other canons of a later date. Towards the same date, also, the so-called ” Apostolic Canons ” were placed at the head of the group. Such was the condition of the Greek collection when it was translated and introduced into the West.

In the course of the 6th century the collection was completed by the addition of documents already in existence, but which had hitherto remained isolated, notably the canonical letters of several great bishops, Dionysius of Alexandria, St Basil and others. It was at this

time that the Latin collection of Dionysius Exiguus became known; and just as he had given the Greek councils a place in his collection, so from him were borrowed the canons of councils which did not appear in the Greek collection — the twenty canons of Sardica (343), in the Greek text, which differs considerably from the Latin ; and the council of Carthage of 419, which itself included, more or less completely, in 105 canons, the decisions of the African councils. Soon after came the council in Trullo (692), also called the Quinisextum, because it was considered as complementary to the two councils (5th and 6th ecumenical) of Constantinople (553 and 680), which had not made any disciplinary canons. This assembly elabor- ated 102 canons, which did not become part of the Western law till much later, on the initiative of Pope John VIII. (872-881). Now, in the second of its canons, the council in Trullo recognized and sanctioned the Greek collection above men- torm* tioned; it enumerates all its articles, insists on the recognition of these canons, and at the same time pro- hibits the addition of others. As thus defined, the collection contains the following documents: firstly, the eighty-five Apostolic Canons, the Constitutions having been put aside as having suffered heretical alterations; secondly, the canons of the councils of Nicaea, Ancyra, Neocaesarea, Gangra, Antioch, Laodicea, Constantinople (381), Ephesus (the disciplinary canons of this council deal with the reception of the Nestorians, and were not communicated to the West), Chalcedon, Sardica, Carthage (that of 419, according to Dionysius), Constantinople (394) ; thirdly, the series of canonical letters of the following great bishops — Dionysius of Alexandria, Peter of Alexandria (the Martyr), Gregory Thaumaturgus, Athanasius, Basil, Gregory of Nyssa, Gregory of Nazianzus, Amphilochus of Iconium, Timotheus of Alexandria, Theophilus of Alexandria, Cyril of Alexandria, Gennadius of Constantinople; the canon of Cyprian of Carthage (the Martyr) is also mentioned, but with the note that it is only valid for Africa. With the addition of the twenty-two canons of the ecumenical council of Nicaea (787), this will give us the whole contents of the official collection of the Greek Church; since then it has remained unchanged. The law of the Greek Church was in reality rather the work of the Byzantine emperors. 1

The collection has had several commentators; we need only mention the commentaries of Photius (883), Zonaras (n 20) and Balsamon (n 70). A collection in which the texts are simply reproduced in their chronological order is obviously inconvenient; towards 550, Johannes Scholasticus, patriarch of Constantinople, drew up a methodical classification of them under fifty heads. Finally should be mentioned yet another kind of compilation still in use in the Greek Church,

bearing the name of nomocanon, because in them are inserted, side by side with the ecclesiastical canons, the imperial laws on each subject: the chief of them are the one bearing the name of Johannes Scholasticus, which belongs, however, to a later date, and that of Photius (883).

The canon law of the other Eastern Churches had no marked influence on the collections of the Western Church, so we need not speak of it here. While, from the 5th century onwards a certain unification in the ecclesiastical law began to take place

1 For the further history of the law of the Greek Church and that of the Eastern Churches, see Vering, Kirchenrecht, §§ T4-183 (ed. 1893). The Russian Church, as we know, adopted the Greek ecclesi- astical law.

Nomo- canon.

Africa.

within the sphere of the see of Constantinople, it was not till later that a similar result was arrived at in the West. For several centuries there is no mention of any but local collections of canons, and even these are not found till west.

the 5th century; we have to come down to the 8th or even the 9th century before we find any trace of unification. This process was uniformly the result of the passing on of the various collections from one region to another.

The most remarkable, and the most homogeneous, as well as without doubt the most ancient of these local collections is that of the Church of Africa. It was formed, so to speak, automatically, owing to the plenary assemblies of the African episcopate held practically every year, at which it was customary first of all to read out the canons of the previous councils. This gave to the collection an official character. At the time of the Vandal invasion this collection comprised the canons of the council of Carthage under Gratus (about 348) and under Genethlius (390), the whole series of the twenty or twenty-two plenary councils held during the episcopate of Aurelius, and finally, those of the councils held at Byzacene. Of the last-named we have only fragments, and the series of the councils under Aurelius is very incomplete. The African collec- tion has not come to us directly: we have two incomplete and confused arrangements of it, in two collections, that of the Hispana and that of Dionysius Exiguus.

Dionysius knows only the council of 419, in connexion with the affair of Apiarius; but in this single text are reproduced, more or less fully, almost all the synods of the collection; this was the celebrated Concilium Africanum, so often quoted in the middle ages, which was also recognized by the Greeks. The Spanish collection divides the African canons among seven councils of Carthage and one of Mileve; but in many cases it ascribes them to the wrong source; for example, it gives under the title of the fourth council of Carthage, the Statuta Ecclesiae antiqua, an Arlesian compilation of Saint Caesarius,. which has led to a number of incorrect references. Towards the middle of the 6th century a Carthaginian deacon, Fulgentius Ferrandus, drew up a Brevia- tio canonum? a methodical arrangement of the African collection, in the order of the subjects. From it we learn that the canons of Nicaea and the other Greek councils, up to that of Chalcedon, were also known in Africa.

The Roman Church, even more than the rest, governed itself according to its own customs and traditions. Up to the end of the 5th century the only canonical document of non-Roman origin which it officially recognized was the group of canons of Nicaea, under which name were also included those of Sardica. A Latin version of the other Greek councils (the one referred to by Dionysius as prised) was known, but no canonical use was made of it. The local law was founded on usage and on the papal letters called decretals. The latter were of two kinds: some were addressed to the bishops of the ecclesiastical province immediately subject to the pope; the others were issued in answer to questions submitted from various quarters; but in both cases the doctrine is the same. At the beginning of the 6th century the Roman Church adopted the double collection, though of private origin, which was drawn up at that time by the monk Dionysius, known by the Dionysius name of Dionysius Exiguus, which he himself had Exiguus assumed as a sign of humility. He was a Scythian and his by birth, and did not come to Rome till after 496; °° e °”’ his learning was considerable for his times, and to him we owe the employment of the Christian era and a new way of reckoning Easter. At the desire of Stephen, bishop of Salona, he undertook the task of making a new translation, from the original Greek text, of the canons of the Greek collection. The manuscript which he used contained only the first fifty of the Apostolic Canons; these he translated, and they thus became part of the law of the West. This part of the work of Dionysius was not added to later; it was otherwise with the second part. This

‘Edited by Pierre Pithou (Paris, 1588), and later by Chifflet, Fttlg. Frrrandi opera (Dijon, 1694); reproduced in Migne, Patr. Lai. vol. by, col. 949.

Rome,

embodied the documents containing the local law, namely 39 decretals of the popes from Siricius (384-398) to Anastasius II. (496-498). As was natural this collection received successive additions as further decretals appeared. The collection formed by combining these two parts remained the only official code of the Roman Church until the labours undertaken in consequence of the reforming movement in the nth century. In 774 Pope Adrian I. gave the twofold collection of the Scythian monk to the future emperor Charlemagne as the canonical book of the Roman Church; this is what is called the Dionysio-Hadriana. This was an important stage in the history of the centralization of canon law; the collection was officially received Hadrians, ˆy t ‘ le F ran kish Church, imposed by the council of Aix-la-Chapelle of 802, and from that time on was recognized and quoted as the liber canonum. If we consider that the Church of Africa, which had already suffered considerably from the Vandal invasion, was at this period almost entirely destroyed by the Arabs, while the fate of Spain was but little better, it is easy to see why the collection of Dionysius became the code of almost the whole of the Western Church, with the exception of the Anglo-Saxon countries; though here too it was known.

The other collections of canons, of Italian origin, compiled before the 10th century, are of importance on account of the documents which they have preserved for us, but as they have”’ not exercised any great influence on the development of canon law, we may pass them over.

The Dionysio-Hadriana did not, when introduced into Gaul, take the place of any other generally received collection of in Oaul. canons – I n this country the Church had not been centralized round a principal see which would have produced unity in canon law as in other things; even the political territorial divisions had been very unstable. The only canonical centre of much activity was the Church of Aries, which exercised considerable influence over the surrounding region in the 5th and 6th centuries. The chief collection known throughout Gaul before the Dionysio-Hadriana was the so- called collection of Quesnel, named after its first collection, editor. 1 It is a rich collection, though badly arranged, and contains 98 documents — Eastern and African canons and papal letters, but no Gallic councils; so that it is not a collection of local law. We might expect to find such a collection, in

view of the numerous and important councils held in Gaul; but their decisions remained scattered among a great number of collections none of which had ever a wide circulation or an official character.

It would be impossible to enumerate here all the Gallic councils which contributed towards the canon law of that country; we Councils. w ˆ mention only the following: — Aries (314), of great importance; a number of councils in the district of Aries, completed by the Statuto, Ecclesiae antiqua of St Caesarius; 2 the councils of the province of Tours; the assemblies of the episcopate of the three kingdoms of the Visigoths at Agde (506), of the Franks at Orleans (511), and of the Bur- gundians at Epaone (517); several councils of the kingdoms of the Franks, chiefly at Orleans; and finally, the synods of the middle of the 8th century, under the influence of St Boniface. Evidently the impulse towards unity had to come from without; it began with the alliance between the Carolingians and the Papacy, and was accentuated by the recognition of the liber canonum.

In Spain the case, on the contrary, is that of a strong centraliza- tion round the see of Toledo. Thus we find Spanish canon law in Spain, embodied in a collection which, though perhaps not official, was circulated and received everywhere; this was the Spanish collection, the Hispana. 3 The collection is well put together and includes almost all the important

1 Published by Quesnel in his editku of the works of St Leo, vol. ii. (Paris, 1675); reproduced by the ˆothers Ballerini, with learned dissertations, Opera S. Leonis, vol. iii. , Migne, P.L. 56.

2 Malnory, Saint Cesaire a” Aries (Paris, 1894).

3 Collectio canonum Ecclesiae Hispanae (Madrid, 1808); repro- duced in Migne, P.L. 84.

canonical documents. In the first part are contained the councils, arranged according to the regions in which they were held: Greek councils, following a translation of Italian origin, but known by the name of Hispana; African councils, Gallican councils and Spanish councils. The latter.

The Hispana

Ireland.

which form the local section, are further divided into several classes: firstly, the synods held under the Roman empire, the chief being that

of Elvira * (c. 300) ; next the texts belonging to the kingdom of the Suevi, after the conversion of these barbarians by St Martin of Braga: these are, the two councils of Braga (563 and 572), and a sort of free translation or adaptation of the canons of the Greek councils, made by Martin of Braga; this is the document frequently quoted in later days under the name of Capitula Martini papae; thirdly, the de- cisions of the councils of the Visigothic Church, after its con- version to Catholicism. Nearly all these councils were held at Toledo, beginning with the great council of 589. The series continued up to 694 and was only interrupted by the Mussulman invasion. Finally, the second part of the Hispana contains the papal decretals, as in the collection of Dionysius.

From the middle of the 9th century this collection was to become even more celebrated; for, as we know, it served as the basis for the famous collection of the False Decretals.

The Churches of Great Britain and Ireland remained still longer outside the centralizing movement. Their contribution towards the later system of canon law consisted in areat two things: the Penitentials and the influence of the Britain Irish collection, the other sources of local law not f”f_ having been known to the predecessors of Gratian nor to Gratian himself.

The Penitentials 5 are collections intended for the guidance of confessors in estimating the penances to be imposed for various sins, according to the discipline in force in the Anglo- Saxon countries. They are all of Anglo-Saxon or tMsT”’ Irish origin, and although certain of them were com- piled on the continent, under the influence of the island mis- sionaries, it seems quite certain that a Roman Penitential has never existed. 6 They are, however, of difficult and uncertain ascription, since the collections have been largely amended and remodelled as practice required. Among the most important we may mention those bearing the names of Vinnianus (d. 589), Gildas (d. 583), Theodore of Canterbury (d. 690), the Venerable Bede (d. 735) and Egbert of York (732-767); the Penitentials which are ascribed to St Columbanus, the founder of Luxeuil and Bobbio (d. 615), and Cumean (Cumine Ailbha, abbot of Iona); in the Frankish kingdom the most interesting work is the Penitential of Halitgar, bishop of Cambrai 7 from 817 to 831. As penances had for a long time been lightened, and the books used by confessors began to consist more and more of instructions in the style of the later moral theology (and this is already the case of the books of Halitgar and Rhabanus Maurus), the canonical collections began to include a greater or smaller number of the penitential canons.

The Irish collection, 8 though it introduced no important documents into the law of the Western Church, at least set canonists the example of quoting passages from the Scriptures and the writings of the Fathers. This col- c „aec«on. lection seems to date from the 8th century; besides the usual sources, the author has included several documents of local origin, beginning with the pretended synod of St Patrick.

4 L. Duchesne, ” Le Concile d’Elvire ” in the Melanges Renier.

6 For the Penitentials, see Wasserschleben, Die Bussordnungen der abendldndischen Kirche (Halle, 1 851) ; Mgr.H.J.Schmitz, Die Buss- biicher und die Bussdisciplin der Kirche (2 vols., Mainz, 1883, 1898).

6 This is proved, in spite of the contrary opinions of Wasser- schleben and Schmitz, by M. Paul Fournier, ” fitude sur les Peni- tentiels,” in the Revue d’histoire et de litterature religieuses , vol. vi. (1901), pp. 289-317, and vol. vii., 1902, pp. 59-70 and 121-127.

7 In Migne, P.L. 105, col. 651.

8 Edited by Wasserschleben (Giessen, 1874). See also P. Fournier, ” De l’influence de la collection irlandaise sur la formation des collections canoniques,” in Nouvelle Revue historigue de droit fran- cais et etranger, vol. xxiii, note I,

In the very middle of the 9th century a much enlarged edition of the Hispana began to be circulated in France. To this rich

collection the author, who assumes the name of Isidore, decretals. tne sa i nt ly bishop of Seville, added a good number

of apocryphal documents already existing, as well as a series of letters ascribed to the popes of the earliest centuries, from Clement to Silvester and Damasus inclusive, thus filling up the gap before the decretal of Siricius, which is the first genuine one in the collection. The other papal letters only rarely show signs of alteration or falsification, and the text of the councils is entirely respected. 1 From the same source and at the same date came two other forged documents — firstly, a collection of Capitularies, in three books, ascribed to a certain Benedict (Benedictus Levita), 2 a deacon of the church of Mainz; this collection, in which authentic documents find

very little place, stands with regard to civil legislation exactly in the position of the False Decretals with regard to canon law. The other document, of more limited scope, is a group of Capitula given under the name of Angilram, bishop of Metz. It is now- adays admitted by all that these three collections come from the same source. For a study of the historical questions connected with the famous False Decretals, see the article Decretals (False); here we have only to consider them with reference to the place they occupy in the formation of ecclesiastical law. In spite of some hesitation, with regard rather to the official character than to the historical authenticity of the letters attri- buted to the popes of the earlier centuries, the False Decretals were accepted with confidence, together with the authentic texts which served as a passport for them. All later collections availed themselves indiscriminately of the contents of this vast collection, whether authentic or forged, without the least suspicion. The False Decretals did not greatly modify nor corrupt the Canon Law, but they contributed much to accelerate its progress towards unity. For they were the last of the chrono- logical collections, i.e. those which give the texts in the order in which they appeared. From this time on, canonists began Syste- to exercise their individual judgment in arranging. matic their collections according to some systematic order,

coliec grouping their materials under divisions more or less oas ‘ happy, according to the object they had in view.

This was the beginning of a codification of a common canon law, in which the sources drawn upon lose, as it were, their local character. This is made even more noticeable by the fact that, in a good number of the works extant, the author is not content merely to set forth and classify the texts; but he proceeds to discuss the point, drawing conclusions and sometimes outlining some controversy on the subject, just as Gratian was to do more fully later on.

During this period, which extended from the end of the 9th century to the middle of the 1 2th, we can enumerate about forty systematic collections, of varying value and circulation, which all played a greater or lesser part in preparing the juridical renaissance of the 12th century, and most of which were utilized by Gratian. We need mention only the chief of them — the Collectio Anselmo dedicata, by an unknown author of the _ . end of the 9th century; the Libri duo de synodalibus

causis et disciplinis ecclesiasticis, 3 compiled about 906 by Regino, abbot of Priim, and dedicated to Hatto of Mainz, relatively a very original treatise; the enormous compilation Burchard ln twenty books

of Burchard, bishop of Worms (1112-

11 22), the Decretum or Collectarium* very widely spread and known under the name of Brocardum, of which the 19th book, dealing with the process of confession, is specially noteworthy. Towards the end of the nth century, under the

1 The collection of the False Decretals has been published with a long critical introduction by P. Hinschius, Decretales Pseudo- Isidorianae et capitula Angilramni (Leipzig, 1863). For the rest of the bibliography, see Decretals (False).

2 The latest edition is in Pertz, Monumenta Germaniae, vol. ii. part ii.

3 Edited by Wasserschleben (Leipzig, 1840) ; reproduced by Migne, P.L. 132.

4 Edited several times; in Migne, P.L. 140,

influence of Hildebrand, the reforming movement makes itself felt in several collections of canons, intended to support the rights of the Holy See and the Church against the pretensions of the emperor. To this group belong an anonymous collec- tion, described by M. P. Fournier as the first manual of the Reform; 5 the collection of Anselm, bishop of Lucca, 6 in 13 books (1080-1086); that of Cardinal Deusdedit, 7 in 4 books, dedicated to Pope Victor III. (1086-1087); D eusdedu% and lastly that of Bonizo, 8 bishop of Sutri, in 10 books (1089). In the 1 2 th century, the canonical works of Ivo of Chartres 9 are of great importance. His Panormia, compiled about 1095 or 1096, is a handy and well-arranged collection in 8 books; as to the Decretum, a weighty chartres compilation in 17 books, there seems sufficient proof that it is a collection of material made by Ivo in view of his Panormia. To the 12th century belong the collection in the MS. of Saragossa {Caesaraugustana) to which attention was drawn by Antonio Agustin; that of Cardinal Gregory, called by him the Polycarpus, in 8 books (about 1115); and finally the Liber de misericordia et justitia of Algerus, 10 scholasticus of Liege, in 3 books, compiled at latest in n 23.

But all these works were to be superseded by the Decretum of Gratian.

2. The Decretum of Gratian and the Corpus Juris Canonici. — The work of Gratian, though prepared and made possible by those of his predecessors, greatly surpasses them in scientific value and in magnitude. It is certainly n e e cretam the work which had the greatest influence on the oforatian. formation of canon law; it soon

became the sole manual, both for teaching and for practice, and even after the publication of the Decretals was the chief authority in the universities. The work is not without its faults; Gratian is lacking in historical and critical faculty; his theories are often hesitating; but on the whole, his treatise is as complete and as perfect as it could be; so much so that no other work of the same kind has been compiled; just as there has never been made another Book of the Sentences. These two works, which were almost contemporary (Gratian is only about two years earlier), 11 were destined to have the same fate; they were the manuals, one for theology, the other for canon law, in use in all the universities, taught, glossed and commented on by the most illustrious masters. From this period dates the more marked and definitive separation between theology and ecclesi- astical law.

Of Gratian we know practically nothing. He was a Camaldu- lensian monk of the convent of St Felix at Bologna, where he taught canon law, and published, probably in 1 148, his treatise called at first Concordantia discordanlium canonum, but soon known under the name of the Decretum. Nowadays, and for some time past, the only part of the Decretum considered is the collection of texts; but it is actually a treatise, in which the author endeavours to piece together a coherent juridical system from the vast body of texts, of widely differing periods and origin, which are furnished by the collections. These texts he inserts bodily in the course of his dissertation; where they do not agree, he divides them into opposite aratiaaL groups and endeavours to reconcile them; but the really original part of his work are the Dicta Gratiani, inserted between the texts, which are still read. Gratian drew his materials from the existing collections, and especially from the

5 P. Fournier, ” Le Premier Manuel canonique de la reforme du XI e siecle,” in Melanges de V ‘Itcole francaise de Rome, xiv. (1894).

6 Unpublished.

7 Edited by Mgr. Pio Martinucci(Venice, 1869). On this collection see Wolf von Glanvell, Die Kanonessammlung des Kardinals Deus- dedit (Paderborn, 1905).

8 Unpublished.

9 Several times edited; in Migne, P.L. 161. See P. Fournier, ” Les Collections canˆniques attributes a Yves de Chartres,” Biblio- iheque de I’Hcole de’ Chartes (1896 and 1897).

10 Printed in Martene, Nov. Thesaur. anecdot. vol. v. col. 1019.

11 See P. Fournier, ” Deux Controverses sur les origines du Decret de Gratien,” in the Revue d’histoire et de littirature religieuses vol. iii. (1898), pp. n. 2 and 3.

richer of them; when necessary, he has recourse to the Roman laws, and he made an extensive use of the works of the Fathers and the ecclesiastical writers ; he further made use of the canons of the recent councils, and the recently published decretals, up to and including the Lateran council of 1139. His immense Contents wor k consists of three parts (partes). The first,

treating of the sources of canon law and of ecclesi- astical persons and offices, is divided according to the method of Paucapalea, Gratian’s pupil, into 101 distinctiones, which are subdivided into canones. The second part consists of 36 causae (cases proposed for solution) , subdivided into quaestiones (the several questions raised by the case), under each of which are arranged the various canones (canons, decretals, &c.) bearing on the question. But causa xxxiii. quaestio 3, headed Tractatus de Poenitentia, is divided like the main part into seven dis- tinctiones, containing each several canones. The third part, which is entitled De Consecratione, gives, in five distinctiones, the law bearing on church ritual and the sacraments. The

following is the method of citation. A reference to citation. tne nrst P art indicates the initial words or number

of the canon and the number of the distinctio, e.g. can. Propter ecclesiasticas, dist. xviii. or c. 15, d. xviii. The second part is cited by the canon, causa and quaestio, e.g.. can. Si quis suadente, C. 17, qu. 4, ore. 29, C.xvii.,qu. 4. The treatise De Poenitentia, forming the 3rd quaestio of the 33rd causa of the second part, is referred to as if it were a separate work, e.g. c. Principium, D. ii. de poenit. or c. 45, D. ii. de poenit. In quoting a passage from the third part the canon and distinctio are given, t.g. c. Missar. solenn. D. I. de consecrat., or c. 12, D. I. de (onsecr.

Considered from the point of view of official authority, the Decretum occupies an intermediate position very difficult to Authority define. It is not and cannot be a really official code,

in which every text has the force of a law. It has never been recognized as such, and the pretended endorsement of it by Pope Eugenius III. is entirely apocryphal. Moreover, it could not have become an official code; it would be impossible to transform into so many laws either the discordant texts which Gratian endeavoured to reconcile or his own Dicta; a treatise on canon law is not a code. Further, there wa.s as yet no idea of demanding an official compilation. The Decretum has thus remained a work of private authority, and the texts embodied in it have only that legal value which they possess in themselves. On the other hand, the Decretum actually enjoys a certain public authority which is unique; for centuries it has been the text on which has been founded the instruction in canon law in all the universities; it has been glossed and commented on by the most illustrious canonists; it has become, without being a body of laws, the first part of the Corpus juris canonici, and as such it has been cited, corrected and edited by the popes. It has thus, by usage, obtained an authority perfectly recognized and accepted by the Church. 1

Gratian's collection, for the very reason that it had for its aim the creation of a systematic canon law, was a work of a transi-

tional character. Henceforth a significant differentia – aratian. fi° n began to appear; the collections of texts, the

number of which continued to increase, were clearly separated from the commentaries in which the canonists con- tinued the formation and interpretation of the law. Thus the way was prepared for official collections. The disciples of Gratian, in glossing or commenting on the Decretum, turned to the papal decretals, as they appeared, for information and the determination of doubtful points. Their idea, then,- was to make collections of these points, to support their teaching; this is the origin of those Compilationes which were soon to be embodied in the collection of Gregory IX. But we must not forget that these compilations were intended by their authors to complete the Decretum of Gratian; in them were included the decretals called extravagantes, i.e. quae vagabantur extra Decretum. This is why we find in them hardly any documents earlier than the time of Gratian, and also why canonists have 1 See Laurin, Introductio in corpus juris canonici, c. vii. p. 73.

continued to refer to the decretals of Gregory IX. by the abbrevia- tion X (Extra, i.e. extra Decretum) .

There were numerous collections of this kind towards the end of the 1

2th and at the beginning of the 13th century. Passing over the first Additiones to the Decretum and the Appendix concilii Lateranensis (council of n 79), we “Q u,n w e will speak only of the Quinque compilationes,’ 2 which tiones.” served as a basis for the works of Raymond of Penna- forte. The first and most important is the work of Bernard, provost and afterwards bishop of Pavia, namely, the Breviarium extravagantium, compiled about n 90; it included the decretals from Alexander III. to Clement III., together with Bernard certain ” useful chapters ” omitted by Gratian. The ot Pavia, important feature of the book is the arrangement ” B . reyl ” l of the decretals or sections of decretals in five books, divided into titles (tituli) logically arranged. The five books treat of (1) ecclesiastical persons and dignitaries or judges; (2) procedure; (3) rights, duties and property of the clergy, i.e. benefices, dues, sacraments, &c, with the exception of marriage, which is the subject of book (4); (5) of penalties. There is a well-known hexameter summing up this division :

Judex, judicium, clerus, connubia, crimen.

This is the division adopted in all the official collections of the Corpus juris. By a bull of the 28th of December 1210 Innocent III. sent to the university of Bologna an authentic collection of the decretals issued during the first twelve oiiaUo years of his pontificate; this collection he had caused tertia.” to be drawn up by his notary, Petrus Collivacinus of Benevento, his object being to supersede the collections in circu- lation, which were incomplete and to a certain extent spurious. This was the Compilatio tertia; for soon cunda.” after, Joannes Galensis (John of Wales) collected the decretals published between the collection of Bernard of Pavia and the pontificate of Innocent III.; and this, though of later date, became known as the Compilatio secunda. The nQ uarta- it quarta, the author of which is unknown, contained the decretals of the last six years of Innocent III., and the important decrees of the Lateran council of 121 5. ..pnxnte.” Finally, in 1226, Honorius III. made an official pre- sentation to Bologna of his own decretals, this forming the Com- pilatio quinta.

The result of all these supplements to Gratian’s work, apart from the inconvenience caused by their being so scattered, was the accumulation of a mass of material almost as considerable as the Decretum itself, from which they /q]LLL, tended to split off and form an independent whole, ix. embodying as they did the latest state of the law. From 1230 Gregory IX. wished to remedy this condition of affairs, and gave to his penitentionary, the Dominican Raymond of Pennaforte, the task of condensing the five compilations in use into a single collection, freed from useless and redundant docu- ments. The

work was finished in 1 234, and was at once sent by the pope to Bologna with the bull Rex pacificus, declaring it to be official. Raymond adopts Bernard of Pavia's division into five books and into titles; in each title he arranges the decretals in chronological order, cutting out those which merely repeat one another and the less germane parts of those which he preserves; but these partes decisae, indicated by the words " et infra " or " et j," are none the less very useful and have been printed in recent editions. Raymond does not attempt any original work ; to the texts already included in the Quinque compilationes, he adds only nine decretals of Innocent III. and 196 chapters of Gregory IX. This first official code was the basis of the second part of the Corpus juris canonici. The collection of Gregory IX. is cited as follows: the opening words of. the chapter are given, or else its order or number, then the title to which it belongs; earlier scholars added X (extra); nowadays, this indication is omitted, and the order or number of the title in the book is given

2 By referring to the decretals of Gregory IX. for the texts in- serted there, E. Friedberg has succeeded in giving a much abridged edition of the Quinque compilationes (Leipzig, 1882).

instead, e.g. Quum olim, de Consuetudine, X. ; or cap. 6, de consuet. (I. iv.); that is to say, book I., title iv., de consuetudine, chapter 6, beginning with the words Quum olim.

Though Gregory IX. wished to supersede the compilationes, he had no idea of superseding the Decretum of Gratian, still less of Their codifying the whole of the canon law. Though his

relation to collection is still in theory the chief monument of the general ecclesiastical law, it only marked a certain stage and aw ' was before long to receive further additions. The

reason for this is that in most cases the decretals did not formu- late any law, but were merely solutions of particular cases, given as models; to arrive at the abstract law it was necessary to examine the solution in each case with regard to the circum- stances and thus formulate a rule; this was the work of the canonists. The " decretalists " commented on the new collec- tion, as the " decretists " had done for that of Gratian; but the canonists were not legislators: even the summaries which they placed at the head of the chapters could not be

adduced as legislative texts. The abstract law was to be found rather in the Summae of the canonists than in the decretals. Two important results, however, were achieved: on the one hand, supple- mentary collections on private authority ceased to be made, for this Gregory IX. had forbidden; on the other hand, the collec- tions were no longer indefinitely swelled by the addition of new decisions in particular cases, those already existing being enough to form a basis for the codification of the abstract law; and for this reason subsequent collections contain as a rule only the ” constitutions ” of popes or councils, i.e. rules laid down as of general application. Hence arose a separation, which became more and more marked, between legislation and jurisprudence. This change was not produced suddenly, the old method being at first adhered to. In 1245 Innocent IV. sent to the universities a collection of 45 decretals, with the order that they should be inserted under their proper titles in the collection of Gregory IX. In 1253 he sent a further list of the first words {principia) of the complementary constitutions and decretals; but the result was practically nil and the popes gave up this system of successive additions. It was, however, found expedient to publish a new official collection. At the instance of the university of Bologna, Boniface VIII., himself an eminent canonist, had this prepared by a committee of canonists and published it in 1298. As it came as an addition to the five books of Gregory IX., it was called the sixth book, the Liber

Sextus. It includes the constitutions subsequent to “Liber I2 34> an d notably the decrees of the two ecumenical Sextus.” councils of Lyons, and is arranged in books and titles,

as above described; the last title, de regulis juris, con- tains no less than eighty-eight legal axioms, mostly borrowed from Roman law. The Liber Sextus is cited like the decretals of Gregory IX., only with the addition of: in sexto (in VI .).

The same observations apply to the next collection, the Clementinae. It was prepared under the care of Clement V., and

even promulgated by him in consistory in March 13 14 ; “Ciemea- ˆ ut > * n con sequence of the death of the pope, which tinae.” took place almost immediately after, the publication

and despatch of the collection to the universities was postponed till 1317, under John XXII. It includes the consti- tutions of Clement V., and above all, the decrees of the council of Vienne of 131 1, and is divided, like preceding collections, into books and titles; it is cited in the same way, with the additional indication Clem-ientino) .

At this point the official collections stop. The two last, which have found a place in the editions of the Corpus, are “Extrava- collections of private authority, but in which all the gantes” of documents are authentic. Evidently the strict pro- •?*” hibition of the publishing of collections not approved

by the Holy See had been forgotten. The Exlravo- ganles (i.e. extra collectiones publicas) of John XXII. number 20,

and are classified under fourteen titles. The Extra-

vagantes communes (i.e. coming from several popes)

number 73, from Boniface VIII. to Sixtus IV. (1484), *ud are classified in books and titles. These two collections

And “com- munes. ”

were included in the edition of Jean Chappuis in 1500; they passed into the later editions, and are considered as forming part of the Corpus juris canonici. As such, and without receiving any complementary authority, they have been corrected and re- edited, like the others, by the Correctores romani. They are cited, like the decretals, with a further indication of the collection to which they belong: Extrav. Jo. XXII., or inter comm(unes~).

Thus was closed, as the canonists say, the Corpus juris canonici; but this expression, which is familiar to us nowadays, is only a bibliographical term. Though we find in the 15th century, for example, at the council of Basel the pu l’j’ ar u’ expression corpus juris, obviously suggested by the canonici.” Corpus juris civilis, not even the official edition of Gregory XIII. has as its title the words Corpus juris canonici, and we do not meet with this title till the Lyons edition of 167 1.

The history of the canonical collections forming the Corpus juris would not be complete without an account of the labours of which they were the object. We know that the universities of the middle ages contained a Faculty /lˆ,”„ y of Decrees, with or without a Faculty of Laws, i.e. law. civil law. The former made doctores decretorum, the latter doctores legum. The teaching of the magistri consisted in oral lessons (lecturae) directly based on the text. The short remarks explanatory of words in the text, originally written in the margin, became the gloss which, formed thus by successive additions, took a permanent form and gfosses. was reproduced in the manuscripts of the Corpus, and later in the various editions, especially in the official

Roman edition of 1582; it thus acquired by usage a kind of semi-official authority. The chief of the glossatores of the Decretum of Gratian were Paucapalea, the first disciple of the master, Rufinus (1160-1170), John of Faenza (about 1170), Joannes Teutonicus (about 1210), whose glossary, revised and completed by Bar- tholomeus Brixensis (of Brescia) became the glossa ordinaria decreti. For the decretals we may mention Vincent the Spaniard and Bernard of Botone (Bernardus Parmensis, d. 1263), author of the Glossa ordinaria. That on the Liber Sextus is due to the famous Joannes Andreae (c. 1340); and the one which he began for the Clementines was finished later by Cardinal Zabarella (d. 1417). The commentaries not so entirely concerned with the text were called Apparatus; and Summae was the name given to general treatises. The first of these works are of capital importance in the formation of a systematic canon «sum- law. Such were the Summae of the first disciples of mae." Gratian: Paucapalea (1150), 1 Rolando Bandinelli 2 (afterwards Alexander III., c. 1150), Rufinus 3 (c. 1165), Etienne of Tournai 4 (Stephanus Tornacensis, c. 1168), John of Faenza (c. 1 1 70), Sicard, bishop of Cremona (c. 11 80), and above all Huguccio (c. 1180). For the Decretals we should mention: Bernard of Pavia 6 (c. 1195), Sinibaldo Fieschi (Innocent IV., c. 1240), Henry of Susa (d. 1271), commonly called (cardinalis) Hostiensis, whose Summa Hostiensis or Summa aurea is a work of the very highest order; Wilhelmus Durantis or Durandus, Joannes Andreae, Nicolas de Tudeschis (abbas siculus), &c. The isth century produced few original treatises; but after the council of Trent the Corpus juris was again commented on by distinguished canonists, e.g. the Jesuit Paul Laymann (1575— 1635), the Portuguese Agostinho Barbosa (1590-1649), Manuel Gonzalez Tellez (d. 1649) and Prospero Fagnani (1 598-1687), who, although blind, was secretary to the Congregation of the Council. But as time goes on, the works gradually lose the character of commentaries on the text, and develop into ex- positions of the law as a whole.

1 Edited by Schulte, Die Summa des Paucapalea (Giessen, 1890).

2 Edited by Thaner, Die Summa Magistri Rolandi (Innsbruck, 1874) ; _ later by Gietl, Die Sentenzen Rolands (Freiburg im B., 1891).

8 Edited by H. Singer, Die Summa Decretorum des Magister Rufinus (Paderborn, 1902).

4 Edited by Schulte, Die Summe des Stephanus Tornacensis (Giessen, 1891).

6 He made a Summa of his own collection, ed. E. Laspeyres, Bernardi

Papiensis Summa Decretalium (Mainz, i860). The com- mentaries of Innocent IV. and Henry of Susa have been frequently published.

We can mention here only the chief editions of the Corpus. The council of Trent, as we know, ordered that the official books Editions °^ tne R° man Church — sacred books, liturgical books,

&c. — should be issued in official and more correct editions; the compilations of ecclesiastical law were also re- vised. The commission of the Correctores romani, x established

about 1563 by Pius IV., ended its work under Gregory ™rt ” Cor ~ XIII. , and the official edition, containing the text and romani.” tne glosses, appeared at Rome in 1582. Richter’s

edition (2 vols., Leipzig, 1839) remains valuable, but has been greatly surpassed by that of E. Friedberg (Leipzig, ••instltu- 1879-1881). Many editions contain also the Institu- tiones tiones composed at the command of Paul IV. (1555- Latux- 1559) by Giovanni Paolo Lancelotti, a professor of ott ‘ Bologna, on the model of the Institutes of Justinian.

The work has merits, but has never been officially approved.

Though the collections of canon law were to receive no more additions, the source of the laws was not dried up; decisions of councils and popes continued to appear; but there was no attempt made to collect them. Canonists obtained the recent texts as they could. Moreover, it was an epoch of trouble: the great Schism of the West, the profound divisions which were its result, the abuses which were to issue in the Reforma- tion, were conditions little favourable for a reorganization of the ecclesiastical laws. Thus we are brought to the third period.

3. After the Council of Trent. — The numerous important decrees made by the council of Trent, in the second part of its sessions, called dc reformalione, are the starting-point of the canon law in its latest stage, jus novissimum; it is this which is still in force in the Roman Church. It has in no way undermined the official status of the Corpus juris; but it has completed the legislation of the latter in many important respects, and in some >jases reformed it.

The law during this period, as abstracted from the texts and compilations, suggests the following remarks. The laws are

formulated in general terms, and the decisions in F ‘ na/ particular cases relegated to the sphere of juris-

thelaw. prudence; and the canonists have definitely lost the

function which fell to them in the 12th and 13th centuries: they receive the law on authority and no longer have to deduce it from the texts. The legislative power is powerfully centralized in the hands of the pope: since the reforming decrees of the council of Trent it is the pontifical constitutions alone which have made the common law; the ecumenical council, doubtless, has not lost its power, but none were held until that of the Vatican (1870), and this latter was unable to occupy itself with matters of discipline. Hence the separation, increasingly marked, between the common law and the local laws, which cannot derogate from the common law except by concession of the Holy See, or by right of a lawfully authorized custom. This centralization, in its turn, has greatly increased the tendency towards unity and uniformity, which have reached in the present practice of the Roman Church a degree never known before, and considered by some to be excessive.

If we now consider the laws in themselves, we shall find that the dispersed condition of the legislative documents has not

been modified since the closure of the Corpus juris; n'/fh"' " on t ' le contrar y, the enormous number of pontifical

constitutions, and of decrees emanating from the

Roman Congregations, has greatly aggravated the situation; moreover, the attempts which have been made to resume the interrupted process of codification have entirely failed. As regards the texts, the canon law of to-day is in a very similar position to that of English law, which gave rise to J. S. Mill's saying: " All ages of English history have given one

1 The history of this commission and the rules which it followed for editing the Decretum, will be found in Laurin, Introductio in corpus juris canonici, p. 63, or in the Prolegomena to Friedbcrg's edition of the Decretum.

of the texts.

another rendezvous in English law; their several products may be seen all together, not interfused, but heaped one upon another, as many different ages of the earth may be read in some perpendicular section of its surface." 2 Nothing has been abrogated, except in so far as this has been implicitly demanded by subsequent laws. From this result insoluble controversies and serious uncertainties, both in the study and practice of the law; and, finally, it has become impossible for most people to havˆ a first-hand knowledge of the actual laws.

For this third period, the most important and most consider- able of the canonical texts is the body of disciplinary decrees of the council of Trent (1 545-1 563). In consequence Decrees of the prohibition issued by Pius IV., they have not of the been published separately from the dogmatic texts Council of and other acts, and have not been glossed; 3 but their official interpretation has been reserved by the popes to the " Congregation of the cardinal interpreters of the Council of Trent," whose decisions form a vast collection of jurisprudence. Next in importance come the pontifical constitutions, which are collected together in the Bullarium; but this is a collection of private authority, if we except the coosXIV., officially published by tlons. him in 1747; further, the Bullarium is a compilation arranged in chronological order, and its dimensions make it rather unwieldy. In the third place come the decrees of the Roman Congregations, which have the force

of law. Several of these organs of the papal authority have published official collections, in which more place is devoted oMhˆ” to jurisprudence than to laws; several others have curia. only private compilations, or even none at all, among others the most important, viz. the Holy Office (see Curia Romana). The resulting confusion and uncertainty may be imagined.

These drawbacks were felt a long time back, and to this feeling we owe two attempts at a supplementary codification which were made in the 16th century, both of which are “Liber known under the name of Liber Septimus. The first septimus” was of private origin, and had as its author Pierre ˚Jˆ’ U Mathieu, the Lyons jurist (1563-1621); it appeared in 1590 at Lyons. It is a continuation of the Extravaganlcs communes, and includes a selection of papal constitutions, from Sixtus IV. (1471-1484) to Sixtus V. (1585-1590) inclusive, with the addition of a few earlier documents. It follows the order of the decretals. This collection has been of some service, and appears as an appendix in many editions of the Corpus juris; the chief reason for its failure is that it has no official sanction. The second attempt was official, but it came to nothing. It was connected with the movement of reform and revision which followed the council of Trent. Immediately after the publication of the official edition of the Corpus juris, Gregory XIII. appointed a committee of cardinals charged with the task of drawing up a Liber septimus. Sixtus V. hurried on its execution, which was rapidly proceeded with, mainly owing to Cardinal

Mathieu.

of Clement VIII.

Pinelli, who submitted the draft of it to Clement VIII. The pope had this Liber VII. printed as a basis for further researches; but after long deliberations the volume was suppressed, and the idea of a fresh codification was abandoned. The collection included the decrees of the council of Trent, and a number of pontifical constitutions, arranged in the order of the titles of the decretals. 4 But even had it been promulgated, it is doubtful whether it would have improved the situation. It would merely have added another collection to the previous ones, which were already too voluminous, without resulting in any useful abrogations.

2 Quoted by Hogan, Clerical Studies, p. 235.

3 There are innumerable editions of the council of Trent. That which is favoured by canonists is Richter’s edition (Leipzig, 1863), in which

each chapter de reformatione is followed by a selection of decisions of the S.C. of the council.

4 Republished by F. Sentis, from one of the few copies which have escaped destruction: Clementis Papae VIII. Decretales, quae vulgo nuncnpantur Liber septimus Decretalium Clementis VIII. (Freiburg sm 1)., 1870).

4. The Future Codification. — Neither Clement VIII. nor, at a later date, Benedict XIV., could have dreamt of the radical

reform at present in course of execution. Instead of toTcodi- accumulating the texts of the laws in successive collec- tlcatlon. tions, it is proposed entirely to recast the system of

editing them. This codification in a series of short articles was suggested by the example of the French codes, the history of which during the 19th century is well known. From all quarters the Catholic episcopate had submitted to the Vatican council petitions in this sense. ” It is absolutely clear,” said some French bishops, ” and has for a long time past been universally acknowledged and asserted, that a revision and reform of the canon law is necessary and most urgent. As matters now stand, in consequence of the many and grave changes in human affairs and in society, many laws have become useless, others difficult or impossible to obey. With regard to a great number of canons, it is a matter of dispute whether they are still in force or are abrogated. Finally, in the course of so many centuries, the number of ecclesiastical laws has increased to such an extent, and these laws have accumulated in such immense collections, that in a certain sense we can well say: We are crushed beneath the laws, obruimur legibus. Hence arise infinite and inextricable difficulties which obstruct the study of canon law; an immense field for controversy and litigation; a thousand perplexities of conscience; and finally contempt for the laws.” 1 We know how the Vatican council had to separate without approaching the question of canonical reform; but this general desire for a recasting of the ecclesiastical code was taken up again on the initiative of Rome. On the 19th of March 1904,

Pius X. published a Motu proprio, ” de ecclesioe legibus of Plus x. {M unum redigendis.” After briefly reviewing the

present condition of the canonical texts and collec- tions, he pointed

out its inconvenience, referred to the many requests from the episcopate, and decreed the preparation of a general code of canon law. This immense undertaking in- volved the codification of the entire canon law, drawing it up in a clear, short and precise form, and introducing any expedient modifications and reforms. For this purpose the pope appointed

a commission of cardinals, of which he himself became

president; also a commission of ” consultors ” resident at Rome, which asked for a certain amount of assistance from canonists at various universities and seminaries. Further, the assembled bishops of each province were invited to give their opinion as to the points in which they considered the canon law might profitably be modified or abrogated. Two consultors had the duty of separately drawing up a preliminary plan for each title, these projects being twice submitted for the deliberation of the commission (or sub-commission) of consultors, the version adopted by them being next submitted to the commission of cardinals, and the whole finally sent up for the papal sanction. These commissions started work at the end of 1904.

Local Law. — The common law of the Roman Church cannot by itself uniformly regulate all the churches of the different

nations; each of them has its own local law, which

we must briefly mention here. In theory, this law has as its author the local ecclesiastical authorities, councils or bishops; but this is true only for laws and regulations which are in harmony with the common law, merely completing or defining it. But if it is a question of derogating from the common law, the authority of the Holy See must intervene to legalize these derogations. This intervention takes the form either of ” iadults,” i.e. graceful concessions granted at the request of the episcopate, or of special approbation of conciliary resolutions. It would, however, be impossible to mention any compilations containing only local law. Whether in the case of national or provincial councils, or of diocesan synods, the chief object of the decrees is to reinforce, define or apply the law; the measures which constitute a derogation have only a small place in them. It is, then, only in a limited sense that we can see a local canon law in the councils of the various regional

1 Omnium concilii Vaticani . . . documentorum collectio, per Con- radum Martin (Paderborn, 1873), p. 152.

Method.

Local law.

churches. Having made this remark, we must distinguish between the countries which are still subject to the system of concordats and other countries.

In the case of the former, the local law is chiefly founded on the concordat {q.v.), including the derogations and privileges resulting from it. The chief thing to note is the countries existence, for these countries, of a civil-ecclesiastical subject to law, that is to say, a body of regulations made by the- con ” civil authority, with the consent, more or less explicit, cordats – of the Church, about ecclesiastical matters, other than spiritual; these dispositions are chiefly concerned with the nomination or confirmation by the state of ecclesiastics to the most important benefices, and with the administration of the property of the Church; sometimes also with questions of jurisdiction, both civil and criminal, concerning the persons or property of the Church. It is plain that the agreements under the concordats have a certain action upon a number of points in the canonical laws ; and all these points go to constitute the local concordatory law. This is the case for Austria, Spain, Portugal, Bavaria, the Prussian Rhine provinces, Alsace, Belgium, and, in America, Peru. Up to 1905 it was also the case in France, where the ancient local customs now continue, pending the reorganization of the Church without the concordat.

We do not imply that in other countries the Church can always find exemption from legislative measures imposed upon her by the civil authorities, for example, in Italy, Prussia and Russia; but here it is a situation de facto rather than dejure, which the Church tolerates for the sake of convenience; and these regula- tions only form part of the local canon law in a very irregular sense.

In other countries the episcopal assemblies lay down the local law. England has its council of Westminster (1852), the United States their plenary councils of Baltimore (1852, 1866, 1884), without mentioning the diocesan synods; and countries. the whole of Latin America is ruled by the special law of its plenary council, held at Rome in 1899. The same is the case with the Eastern Churches united to the Holy See; follow- ing the example of the famous council of Lebanon for the Maron- ites, held in 1730, and that of Zamosc for the Ruthenians, in 1720, these churches, at the suggestion of Leo XIII., have drawn up in plenary assembly their own local law: the Syrians at Sciarfa in 1888; the Ruthenians at Leopol in 1891; and a little later, the Copts. The

framing of local law will certainly be more clear and more easy when the general code of canon law has been published.

Bibliography. — For the texts and collections: the dissertations of Dom Coustant, De antiquis canonum cclllectionibus, deque variis epistolarum Rom. Pont, editionibus (Paris, 1721); P. de Marca, De veteribus collectionibus canonum (Paris, 1681); the brothers Peter and Jerome Ballerini, De antiquis turn editis turn ineditis collec- tionibus el collectoribus canonum ad Gratianum usque (Venice, 1757). This is the best of all these works; it is reproduced in Migne, P.L., vol. 56; C. Seb. Berardi, De variis sacrorum canonum collectionibus ante Gratianum (Turin, 1752) ; P. Quesnel, De codice canonum Ecclesioe Romanae; de variis fidei libellis in antiquo Rom. Reel, codice contentis; de primo usu codicis canonum Dionysii .Exigui in Gallicanis regionibus (Paris, 1675; with the critical notes of the brothers Ballerini, also in Migne, loc. cit.); and finally, Florent, De methodo atque auctoritate collectionis Gratiani (Paris, 1679), and Antonio Agustin, archbishop of Tarragona, De emendatione Gratiani (Tarragona, 1586) ; these have all been brought together in Gallandi, De vetustis canonum collectionibus dissertationum sylloge (Venice, 1778). The most complete work on the texts up to the 9th century is F. Maassen, Geschichte der Quellen und der Literatur des canonischen Rechts im Abendlande, vol. i. (all that has yet appeared, Gratz, 1870). For the period between the False Decretals and Gratian, there is no work of this sort, but the materials have been put together and published in part by M. P. Fournier. After Gratian, the classic work is Schulte, Geschichte der Quellen und Literatur des .canonischen Rechts von Gratian bis auf die Gegenwart (3 vols., Stuttgart, 1875 et: seq.). Manuals for the study of the sources: Ph. Schneider, Die Lehre von den Kirchenrechtsquellen (Regensburg, 1892); F. Laurin, Introductio in Corpus juris canonici (Freiburg, 1889); Tardif, Histoire des sources du droit canonique (Paris, 1887). Most of the German manuals on canon law devote considerable space to the history of the sources: see Phillips, vol. ii (3rd ed., 1857; French translation by the abbe Crouzet) ; Vering, 3rd ed. (Freiburg, 1893); Schulte, Das kaihalische Kirchenrecht, pt. i. (Giessen, i860), &c.

For the Greek Church : Pitra, Juris ecclesiae graecorum hisloria et monumenta (Rome, 1864); the later history of the Greek law: Zachariae, Historiae juris graecorum delineatio (Heidelberg, 1839); Mortreuil, Histoire du droit byzantin (Paris, 1843-1846) ; the recent

texts in the Conciliorum Collectio lacensis, vol. ii.; Acta et decreta s. conciliorum, quae ab episcopis rituum orientalium ab a, 1682 usque ad a. 1789 indeque ad a. i86g sunt celebrata (Freiburg, 1876). Short manual of Institutions: Jos. Papp-Szilagyi, Enchiridion juris eccl. orientalis catholicae (Magno-Varadini, 1862). For recent canonical texts: Richter's edition of the council of Trent (Leipzig, 1863); the Collectanea S.C. de Propaganda Fide (Rome, 1893); the Bullarium, a collection of papal acts and constitutions ; the editions of Cocquelines (28 vols., Rome, 1 733-1 756), and of Cherubini (19 vols., Luxemburg, 1727-1758), which are better than the enlarged reprint of Turin, which was unfinished (it goes up to 1730). The official edition of the Bullarium of Benedict XIV. (4 vols., Rome, 1754- 1758) has been reprinted several times and is of great importance; the continuation of the Bullarium since Benedict XIV. has been published by Barberi, Bullarii romani continuaiio, in 20 vols., going up to the fourth year of Gregory XVI. Every year, since 1854, has been printed a collection of pontifical acts, Acta Pii IX., Acta Leonis XIII., &c, which are the equivalents of the Bullarium. Dictionaries: Durand de Maillane, Dictionnaire canonique (Paris, 1786), re-edited by Andre under the title, Cours alphabetique et methodique de droit canonique, and by Wagner (Paris, 1894), has Gallican tendencies; Ferraris, Prompta bibliotheca canonica, &c, several new and enlarged editions; the best is that of Migne (1866), completed by Father Bucceroni, Ferraris Supplementum (Rome, 1899). Articles on canon law in Wetzer und Welte's Kirchenlexicon (2nd ed., Freiburg, 1880 et seq.) ; Hauck, Realencyklopddie fur prot. Theologie und Kirche (2nd ed., Leipzig, 1 877-1 888) ; Vacant-Mange- not's Dictionnaire de theologie catholique, in course of publication (Paris, 1899 et seq.). Periodicals: Analecta juris pontificii, ed. by Mgr. Chaillot (1863-1889); Analecta ecclesiastica (since 1893); Acta Sanctae sedis (since 1865); Archiv fur kathol. Kirchenrecht (since 1857); Le Canoniste contemporain (since 1878). (A. Bo.*)

Canon Law in England and in the Anglican Communion. — There were matters in which the local English and Irish canon law, even before the 16th century, differed from that obtaining on the western part of the European continent. Thus (1), it has been said that — whereas the continental canon law recognized a quadripartite division of Church revenue of common right between (a) the bishop, (b) the clergy, (c) the poor, (d) the fabric — the English law maintained a tripartite division — (a) clergy, (b) the poor, (c) the fabric. Lord Selborne (Ancient Facts and Fictions concerning Churches and Tithes, 2nd ed., 1892) denies that there was any division of tithe in England. (2) By the general canon law the burden of repairing the nave, as well

as the chancel of the church, was upon the parson or rector who collected the whole tithe. But the custom of England trans- ferred this burden to the parishioners, and some particular local customs (as in the city of London) placed even the burden of repair of the chancel on them. To meet this burden church rates were levied. (3) A church polluted by the shedding of blood, as by suicide or murder, was reconsecrated on the continent. In England the custom was (and is) simply to ” reconcile.” (4) A much more important difference, if the decision of the Irish court of exchequer chamber upheld in the House of Lords, where the peers were equally divided, correctly stated the English Canon law (Reg. v. Millis, 10 CI. & Fin., 534) was in regard to the essentials of marriage. By the general Western canon law before the council of Trent, the parties themselves were said to be the ” ministers of the Sacrament ” in the case of holy matrimony. The declared consent of the parties to take each other there and then con- stituted at once (although irregularly) holy matrimony. The presence of priest or witnesses was not necessary. In Reg. v. Millis, however, it was held that in England it was always otherwise and that here the presence of a priest was necessary. High authorities, however, have doubted the historical accuracy of this decision. (5) The addition of houses of priests to the pro- vincial synods seems peculiar to England and Ireland.

The historical position of the general canon law of the Catholic Church in the English provinces has, since the separation from Rome, been the subject of much consideration by English lawyers and ecclesiastics. The view taken by the king’s courts, and acquiesced in by the ecclesiastical courts, since Henry VIII., is that the Church of England was always an independent national church, subject indeed to the general principles of the

jus commune ecclesiasticum (Whitlock J. in Ever v. Owen, God- bolt’s Reports, 432), but unbound by any particular constitu- tions of council or pope; unless those constitutions had been ” received ” here by English councils, or so recognized by English courts (secular or spiritual) as to become part of the ecclesiastical custom of the realm. Foreign canon law never bound (so it has been taught) proprio vigore.

The sources of English ecclesiastical law (purely ecclesiastical) were therefore (1) the principles of the jus commune eccle- siasticum; (2) foreign particular constitutions received here, as just explained; (3) the constitutions and canons of English synods (cf. PhUl. Ecc. Law, part i. jzh. iv., and authorities there cited).

1. On the existence of this jus commune ecclesiasticum and that the

Church of England, in whatever sense independent, takes it over until she repeals it, see Escott v. Mastin, 4 Moo. P.C.C. 119. Lord Brougham, in delivering the judgment, speaks of the " common law prevailing for 1400 years over Christian Europe," and (p. 137) says that " nothing but express enactment can abrogate the common law of all Christendom before the Reformation of the Anglican Church."

2. As to foreign particular constitutions in England, there are a great number of them, of which, it has been and is admitted, that they have currency in England. However papal in their origin, post-Reformation lawyers have regarded them as valid, unless they can be shown to be contrary to the king's pre- rogative, or to the common or statute law of the realm. To this doctrine express statutory authority (as the events have happened) has been given by 25 Hen. VIII. c. 19, sect. 7. A striking example of the doctrine is furnished by the decree of Innocent III. in the Fourth Lateran Council against pluralities. This decree was enforced in the court of Arches against a pluralist clerk in 1848 (Burder v. Mavor, 1 Roberts, 614). The courts of common law from Lord Coke's time downwards have recog- nized this " constitution of the pope " (as the queen's bench called it in 1598). The exchequer chamber, in 1837, declared it to have "become part of the common law of the land" (Alstan v. Atlay, 7 A. and E. 289).

3. The particular constitutions of English synods are numer- ous and cover a large field. At least in legal theory, the only distinction between pre-Reformation and post-Reformation constitutions is in favour of the former — so long as they do not contravene the royal prerogative or the law of the land (see 25 Hen. VIII. c. 19). The most important are collected to- gether and digested (so far as regards England) in Lyndwood's Provinciale, a work which remains of great authority in English courts. These constitutions are again divided into two classes:

(a) provincial constitutions promulgated by provincial synods, usually in the name of the presiding archbishop or bishop; and

(b) decrees of papal legates, Otho in 1236 and Othobon (Otto- buono de' Fieschi, afterwards Pope Adrian V.) in 1269. Canons passed since 25 Hen. VIII. c. 19 have not the parliamentary confirmation which that act has been held to give to previous canons, and do not necessarily bind the laity, although made under the king's licence and ratified by him. This doctrine laid down by Lord Hardwicke in Middleton v. Croft (2 Stra. 1056) was approved in i860 in Marshall v. Bp. of Exeter (L.R, 3 H.L. 17). Nevertheless, there are many provisions in these post- Reformation canons which are declaratory of the ancient

usage and law of the Church, and the law which they thusrecord is bind- ing on the laity. The chief body of English post-Reformation canon law is to be found in the canons of 1603, amended in 1865 and 1888. The canons of 1640 are apparently upon the same footing as those of 1603; notwithstanding objections made at the time that they were void because convocation continued to sit after the dissolution of parliament. The opinion of all the judges taken at the time was in favour of the legality of this procedure. 13 Car. ii. c. 12 simply prpvided that these canons should not be given statutory force by the operation of that act.

In addition to the enactment of canons (strictly so-called) the English provincial synods since the Henrician changes have

legislated — in 1570 by the enactment of the Thirty-Nine Articles, in 1661 by approving the present Book of Common Prayer, and in 1873 by approving shorter forms of matins and evensong.

The distinction between pre-Henrician and post-Henrician procedure lies in the requirement, since 25 Hen. VIII., of the royal licence and confirmation. Apparently diocesan synods may still enact valid canons without the king's authority; but these bodies are not now called.

The prevailing legal view of the position of the Church of England in regard to canon law has been just stated, and that is the view taken by judicial, authority for the past three cen- turies. On the other hand, it is suggested by, e.g., the late Professor Maitland, that it was not, in fact, the view taken here in the later middle ages-ˆ-that in those ages there was no theory that " reception " here was necessary to validate papal decrees. It is said by this school of legal historians that, from the Con- quest down to Henry VIII., the Church of England was regarded by churchmen not as in any sense as separate entity, but as two provinces of the extra-territorial, super-national Catholic Church, and that the pope at this period was contemplated as the princeps of this Catholic Church, whose edicts bound everywhere, as those of Augustus had bound in the Roman empire.

It is right that this view should be stated, but it is not that of the writer of this article.

As to Ireland, in a national synod of the four Irish provinces held at Dublin before the four archbishops, in 1634, a hundred canons were

promulgated with the royal licence, containing much matter not dealt with by similar constitutions in England. In 171 1, some further canons were promulgated (with royal licence) by another national synod. Some forms of special prayer were appended to these canons.

In 1869 the Irish Church Act (32 and 33 Vict. c. 42) ” dis- established ” the Irish Church, sect. 19 repealed any act of parliament, law or custom whereby the bishops, clergy or laity of the said church were prohibited from holding synods or elect- ing representatives thereto for the purpose of making rules for the well-being and ordering of the said church, and enacted that no such law, &c, should hinder the said bishops, clergy and laity, by such representatives, lay and clerical, and so elected as they shall appoint, from meeting in general synod or convention and in such general synod or convention forming constitutions and providing for future representation of the members of the church in diocesan synods, general convention or otherwise. The Church of Ireland, so set free, created for herself new legislative authorities, unknown to the old canon law, viz. mixed synods of clergy and laity, and a system of representation by election, unknown to primitive or medieval times. Similar changes had, however, been introduced during the preceding century in some parts of the Anglican communion outside the British Isles (see infra). Sect. 20 of the same statute kept alive the old ecclesiastical law of Ireland by way of assumed contract (cf. Ecclesiastical Jurisdiction).

Under the provisions of this statute, the ” archbishops and bishops of the ancient Apostolic and Catholic Church of Ire- land ” (so they describe themselves), together with representa- tives of the clergy and laity, assembled in 1870, in ” General Convention,” to ” provide for the regulation ” of that church. This Convention declared that a General Synod of the arch- bishops and bishops, with representatives of the clergy and laity, should have chief legislative power in the Irish Church, with such administrative power as might be necessary and con- sistent with the church’s episcopal constitution. This General Synod was to consist of two Houses — -the House of Bishops and the House of Lay and Clerical Representatives. No question was to be carried unless there were in its favour a majority of the clerical and lay representatives, voting either conjointly or by orders, and also a majority of the bishops, should they desire to vote. This General Synod was given full power to alter or amend canons, or to repeal them, or to enact new ones. For any alteration or amendment of ” articles, doctrines, rites or nibrics,” a two-thirds majority of each order of the represen-

tative house was required and a year’s delay for consultation of the

diocesan synods. Provisions were made as to lay repre- sentation in the diocesan synods. The Convention also enacted some canons and a statute in regard to ecclesiastical tribunals (see Ecclesiastical Jurisdiction). It expressly provided that its own legislation might be repealed or amended by future general synods.

In 187 1 the General Synod attempted to codify its canon law in forty-eight canons which, ” and none other,” were to have force and effect as the canons of the Church of Ireland. Since 1871 the General Synod has, from time to time, put forth other canons.

The post-Reformation history of canon law in the Anglican communion in Scotland has differed from the story of that law in the last four centuries in Ireland. After the legislation under William and Mary disestablishing episcopacy in Scotland and subjecting its professors to civil penalties, little attention was given to canon law for many years. Synods of bishops at Edinburgh in 1724 and 1731 dealt with some disputed questions of ritual and ceremonial. In 1743 an assembly of five bishops enacted sixteen canons. A ” primus ” was to be chosen indiffer- ently from the bishops, but to have no other powers than those of convoking and presiding over synods. He was to hold office only during pleasure of the other bishops. Bishops were to be elected by the presbyters of the district. Such election was subject to the confirmation of the majority of the bishops. In 1811, a ” Code of Canons ” was enacted by a ” General Ecclesi- astical Synod,” consisting of the bishops, the deans (viz. presbyters appointed by the bishops in each diocese to defend the interests of the presbyters and now for the first time given ” decisive ” voice in synods) and certain clerical representatives from the ” districts ” or dioceses. Future synods, called for the purpose of altering the code, were to consist of two chambers. The first was to be composed of the bishops; the second to consist of

The canon law in Scotland before the 16th century was gener- ally that of the continent of Europe. The usages of the church were similar to those in France, and had not the insular character of those in England and Ireland. The canon law regulating marriage, legitimacy and succession was taken over by the Scottish secular courts (see Ecclesiastical Jurisdiction) and survived as part of the common law of the land almost un- impaired. Thus, the courts recognize marriages by verba de

praesenti or by verba de futuro cum copula — in this last matter following a decree of Gregory IX. — and also legitimation per subsequens matrimonium. But though one of the fontes juris Scotiae, canon law never was of itself authoritative in Scotland. In the canons of her national provincial councils (at whose yearly meetings representatives attended on behalf of the king) that country possessed a canon law of her own, which was recognized by the parliament and the popes, and enforced in the courts of law. Much of it, no doubt, was borrowed from the Corpus juris canonici and the English provincial canons. But the portions so adopted derived their authority from the Scottish Church. The general canon law, unless where it has been acknowledged by act of parliament, or a decision of the courts, or sanctioned by the canons of a provincial council, is only received in Scotland according to equity and expediency.

The " Protestant Episcopal Church in the United States " is the organization of the Anglican Communion in the American colonies before the separation. This communion was subject to " all the laws of the Church of England applicable to its situa- tion " (Murray Hoffman, A Treatise on the Law of the Protestant Episcopal Church, New York, 1850, p. 17). This body of law the Protestant Episcopal Church of the United States took over {op. cit. p. 41 et seq.; F. Vinton, A Manual Commentary on the General Canon Law and the Constitution of the Protestant Epis- copal Church, New York, 1870, p. 16 et seq.). Much, however, of the English post-Reformation canonical legislation was not applicable to the United States, because of different circum- stances, as e.g. a very large portion of the canons of 1603 (Vinton, p. 32). In 1789, a General Convention, consisting of clerical and lay deputies as well as of bishops, assumed for itself and provided for its successors supreme legislative power. The concurrence of both " orders," clerical and lay, was required for the validity of any vote. Since 1853 a lay deputy to the Convention has been required to be a communicant (ib. p. 102). Upon the American bishops numbering more than three, they became a separate " House " from the " Convention." The House of Bishops was given a right to propose measures to the " House of Deputies," and to negative acts of the House of Deputies, provided they complied with certain forms. Similar " constitutions " providing for representation of the laity have been adopted by the different dioceses (Hoffman, op. cit. p. 184 et seq.). Deacons are also admitted to a deciding voice in every diocese but New Jersey, where they may speak but not vote. A great body of legislation has been put forth by these bodies during the past century.

Since 1870, at least, the " Church of the Province of South Africa " has secured autonomy while yet remaining a part of the Anglican

Communion. By its constitution of that year the English Church in South Africa adopts the laws and usages of the Church of England, as far as they are applicable to an unestablished church, accepts the three creeds, the Thirty- Nine Articles, the Book of Common Prayer, the decisions of the undisputed general councils, the Authorized English Version of the Scriptures, disclaims the right of altering any of these standards of faith and doctrine, except in agreement with such alterations as may be adopted by a general synod of the Anglican Communion. But in interpreting these standards of faith and doctrine, the Church of the Province of South Africa is not bound by decisions other than those of its own Church courts, or such court as the Provincial Synod may recognize as a tribunal of appeal. The Provincial Synod is the legislative authority subject to a general synod of the Anglican Communion, provided such latter synod include representatives from the Church of South Africa. The Provincial Synod consists of (1) the House of Bishops, (2) the House of the Clergy, (3) the House of the Laity. No resolution can be passed which is not accepted by all three orders. Bishops are elected by the clergy with the assent of lay representatives, subject to the confirmation of the metropolitan and comprovincial bishops. The metropolitan is to be consecrated in England by the archbishop of Canterbury. He now bears the title of archbishop. All bishops are to enter into a contract to obey and maintain the constitution and canons

of the province. Canon 18 of the Code of 1870 recognizes the offices of catechist, reader and sub-deacon (Wirgman, The English Church and People in South Africa, p. 223 et seq.).

In the West Indies, Canada, Australia and New Zealand, provincial and diocesan synods or conventions have been formed on one or other of the types above mentioned and have enacted canons. (W. G. F. P.)

CANOPUS, or Canobus, an ancient coast town of Lower Egypt, a hundred and twenty stadia, or 15 m. east of Alexandria, the principal port in Egypt for Greek trade before the foundation of Alexandria, situated at the mouth of the westernmost (Canopic or Heracleotic) branch of the Nile, on the western bank. The channel, which entered the Mediterranean at the western end of the Bay of Aboukir, is entirely silted up, but on the shore at Aboukir there are extensive traces of the city with its quays, &c. Excavation has disclosed granite monuments with the name of Rameses II., but they may have been brought at a late period for the adornment of the place. It is not certain that Canopus was an old Egyptian town, but it appears in Herodotus as an ancient port. In the 9th year of Ptolemy Euergetes (239 B.C.) a great assembly of priests at Canopus passed an honorific

degree, inter alia, conferring the title ~Evepykrris ” Benefactor ” on the king. Two examples of this decree are known, inscribed in hieroglyphic, demotic and Greek. From it we learn that the native form of the name of Canopus was Karob. A temple of Osiris was built by Euergetes, but very near to Canopus was an older shrine, a temple of Heracles mentioned by Herodotus as an asylum for fugitive slaves. The decree shows that Heracles here stands for Ammon. Osiris was worshipped at Canopus under a peculiar form, a vase with a human head, and was identified with Canopus, the pilot of Menelaus, who was said to have been buried here: the name canopic has been applied, through an old misunderstanding, to the vases with human and animal heads in which the internal organs were placed by the Egyptians after embalming. In the Roman epoch the town was notorious for its dissoluteness. Aboukir means ” father Cyrus,” referring to a Coptic saint of that name. (F. Ll. G.)

CANOPY (through Fr. canape, from Med. Lat. canapeum, classical conopeum, a mosquito curtain, Gr- Kwvwtp, a gnat), the upper part or cover of a niche, or the projecting ornament over an altar or seat or tomb. Early English canopies are generally simple, with trefoiled or cinquefoiled heads; but in the later styles they are very rich, and divided into compartments with pendants, knots, pinnacles, &c. The triangular arrangement over an Early English and Decorated doorway is often called a canopy. The triangular canopies in the north of Italy are peculiar. Those in England are generally part of the arrangement of the arch mouldings of the door, and form, as it were, the hood- . moulds to them, as at York. The former are above and in- dependent of the door mouldings, and frequently support an arch with a tympanum, above which is a triangular canopy, as in the Duomo at Florence. Sometimes the canopy and arch project from the wall, and are carried on small jamb shafts, as at San Pietro Martire, at Verona. There is an extremely curious canopy, being a sort of horseshoe arch, surmounting and breaking into a circular arch, at Tournai. Similar canopies are often over windows, as at York, over the great west window, and lower tiers in the towers. These are triangular, while the upper windows in the towers have ogee canopies.

CANOSA (anc. Canusium), a town of Apulia, Italy, in the province of Bari, situated on the right bank of the Ofanto (anc. Aufidus), 505 ft. above sea-level, 15 m. S.W. of Barletta by rail. Pop. (1901) 24,230. It was rebuilt in 963 below the Roman city, which had been abandoned after its devastation by the Saracens in the 9th century. The former cathedral of S. Sabino (the bishopric passed in i8r8 to Andria), in the southern Romanesque style, was consecrated in 1101: it has five domes (resembling St Mark’s at Venice, except that it is a Latin cross,

instead of a Greek cross, in plan) and many ancient columns. The archiepiscopal throne and pulpit of the end of the nth century are also fine. On the south side of the building

is the detached mausoleum of Bohemund, son of Robert Guiscard, who died in mi, constructed partly in Byzantine, partly in the local style. It has fine bronze doors with long inscriptions; the exterior is entirely faced with cipollino (Carystian) marble. The conception of this mortuary chapel, which is unique at this period, was undoubtedly derived from the turbeh before a mosque; these turbehs are square, domed-roofed tombs in which the sultans and distinguished Mahommedans are buried (E. Bertaux, V Art dans l' Italic meridionale, Paris, 1904, i. 312). A medieval castle crowns the hill on the side of which the city stands. (See Canusium.) (T. As.)

CANOSSA, a ruined castle, 1890 ft. above sea -level, in Emilia, Italy, 12 m. S.W. of Reggio Emilia, commanding a fine view of the Apennines. It belonged to the countess Matilda of Tuscany (d. 1 11 5), and is famous as the scene of the penance performed by the emperor Henry IV. before Pope Gregory VII. in 1077. The castle was destroyed by the inhabitants of Reggio in 1255.

CANOVA, ANTONIO (1757-1822), Italian sculptor, was born on the 1st of November 1757, at Passagno, an obscure village situated amid the recesses of the hills of Asolo, where these form the last undulations of the Venetian Alps, as they subside into the plains of Treviso. At three years of age Canova was deprived of both parents, his father dying and his mother re- marrying. Their loss, however, was compensated by the tender solicitude and care of his paternal grandfather and grandmother, the latter of whom lived to experience in her turn the kindest personal attention from her grandson, who, when he had the means, gave her an asylum in his house at Rome. His father and grandfather followed the occupation of stone-cutters or minor statuaries; and it is said that their family had for several ages supplied Passagno with members of that calling. As soon as Canova 's hand could hold a pencil, he was initiated into the principles of drawing by his grandfather Pasino. The latter possessed some knowledge both of drawing and of architecture, designed well, and showed considerable taste in the execution of ornamental works. He was greatly attached to his art; and upon his young charge he looked as one who was to per- petuate, not only the family name, but also the

family profession. The early years of Canova were passed in study. The bias of his mind was to sculpture, and the facilities afforded for the gratification of this predilection in the workshop of his grandfather were eagerly improved. In his ninth year he executed two small shrines of Carrara marble, which are still extant. Soon after this period he appears to have been constantly employed under his grandfather. Amongst those who patronized the old man was the patrician family Falier of Venice, and by this means young Canova was first introduced to the senator of that name, who afterwards became his most zealous patron. .Between the younger son, Giuseppe Falier, and the artist a friendship commenced which terminated only with life. The senator Falier was induced to receive him under his immediate protection. It has been related by an Italian writer and since repeated by several biographers, that Canova was indebted to a trivial circumstance — the moulding of a lion in butter — for the warm interest which Falier took in his welfare. The anecdote may or may not be true. By his patron Canova was placed under Bernardi, or, as he is generally called by filiation, Torretto, a sculptor of considerable eminence, who had taken up a temporary residence at Pagnano, a village in the vicinity of the senator's mansion. This took place whilst Canova was in his thirteenth year; and with Torretto he continued about two years, making in many respects considerable progress. This master returned to Venice, where he soon afterwards died; but by the high terms in which he spoke of his pupil to Falier, the latter was induced to bring the young artist to Venice, whither he accordingly went, and was placed under a nephew of Torretto. With this instructor he continued about a year, studying with the utmost assiduity. After the termination of this engagement he began to work on his own account, and received from his patron an order for a group, " Orpheus and Eurydice." The first figure, which represents Eurydice in flames and smoke, in the act of leaving Hades, was completed towards the close

of his sixteenth year. It was highly esteemed by his patron and friends, and the artist was now considered qualified to appear before a public tribunal. The kindness of some monks supplied him with his first workshop, which was the vacant cell of a monastery. Here for nearly four years he laboured with the greatest perseverance and industry. He was also regular in his attendance at the academy, where he carried off several prizes. But he relied far more on the study and imitation of nature. From his contemporaries he could learn nothing, for their style was vicious. From their works, therefore, he re- verted to living models, as exhibited in every variety of situation. A large portion of his time was also devoted to anatomy, which science was regarded by him as " the secret of the art." He likewise frequented

places of public amusement, where he care- fully studied the expressions and attitudes of the performers. He formed a resolution, which was faithfully adhered to for several years, never to close his eyes at night without having produced some design. Whatever was likely to forward his advancement in sculpture he studied with ardour. On archaeo- logical pursuits he bestowed considerable attention. With ancient and modern history he rendered himself well acquainted and he also began to acquire some of the continental languages. Three years had now elapsed without any production coming from his chisel. He began, however, to complete the group for his patron, and the Orpheus which followed evinced the great advance he had made. The work was universally applauded, and laid the foundation of his fame. Several groups succeeded this performance, amongst which was that of " Daedalus and Icarus," the most celebrated work of his noviciate. The simplicity of style and the faithful imitation of nature which characterized them called forth the warmest admiration. His merits and reputation being now generally recognized, his thoughts began to turn from the shores of the Adriatic to the banks of the Tiber, for which he set out at the commencement of his twenty-fourth year.

Before his departure for Rome, his friends had applied to. the Venetian senate for a pension, to enable him to pursue his studies without embarrassment. The application was ultimately suc- cessful. The stipend amounted to three hundred ducats (about £60 per annum), and was limited to three years. Canova had obtained letters of introduction to the Venetian ambassador, the Cavaliere Zulian, and enlightened and generous protector of the arts, and was received in the most hospitable manner. His arrival in Rome, on the 28th of December 1780, marks a new era in his life. It was here he was to perfect himself by a study of the most splendid relics of antiquity, and to put his talents to the severest test by a competition with the living masters of the art. The result was equal to the highest hopes cherished either by himself or by his friends. The work which first established his fame at Rome was " Theseus vanquishing the Minotaur." The figures are of the heroic size. The victorious Theseus is repre- sented as seated on the lifeless body of the monster. The exhaustion which visibly pervades his whole frame proves the terrible nature of the conflict in which he has been engaged. Simplicity and natural expression had hitherto characterized Canova's style; with these were now united more exalted conceptions of grandeur and of truth. The Theseus was regarded with fervent admiration.

Canova's next undertaking was a monument in honour of Clement XIV.; but before he proceeded with it he deemed it necessary to request permission from the Venetian senate, whose servant he

considered himself to be, in consideration of the pension. This he solicited- in person, and it was granted. He returned immediately to Rome, and opened his celebrated studio close to the Via del Babuino. He spent about two years of unremitting toil in arranging the design and composing the models for the tomb of the pontiff. After these were completed, other two years were employed in finishing the monument, and it was finally opened to public inspection in 1787. The work, in the opinion of enthusiastic dilettanti, stamped the author as the first artist of modern times. After five years of incessant labour, he completed another cenotaph to the memory of Clement

XIII., which raised his fame still higher. Works now came rapidly from his chisel. Amongst these is Psyche, with a butter- fly, which is placed on the left hand, and held by the wings with the right. This figure, which is intended as a personification of man's immaterial part, is considered as in almost every respect the most faultless and classical of Canova's works. In two different groups, and with opposite expression, the sculptor has represented Cupid with his bride; in the one they are standing, in the other recumbent. These and other works raised his reputation so high that the most flattering offers were sent him from the Russian court to induce him to remove to St Petersburg, but these were declined.. " Italy," says he, in writing of the occurrence to a friend, " Italy is my country — is the country and native soil of the arts. I cannot leave her; my infancy was nurtured here. If my poor talents can be useful in any other land, they must be of some utility to Italy; and ought not her claim to be preferred to all others ? "

Numerous works were produced in the years 1795-1797, of which several were repetitions of previous productions. One was the celebrated group representing the " Parting of Venus and Adonis. ' ' This famous production was sent to Naples. The French Revolution was now extending its shocks over Italy; and Canova sought obscurity and repose in his native Passagno. Thither he retired in 1798, and there he continued for about a year, principally employed in painting, of which art also he had some knowledge. He executed upwards of twenty paintings about this time. One of his productions is a picture representing the dead body of the Saviour just removed from the cross, surrounded by the three Marys, S. John, Joseph of Arimathea, and, somewhat in the background, Nicodemus. Above appears the Father, with the mystic dove in the centre of a glory, and surrounded by a circle of cherubs. This composition, which was greatly

applauded, he presented to the parochial church of his native place. Events in the political world having come to a temporary lull, he returned to Rome; but his health being impaired from arduous application, he took a journey through a part of Germany, in company with his friend Prince Rezzonico. He returned from his travels much improved, and again com- menced his labours with vigour and enthusiasm.

Canova's sculptures have been distributed under three heads: — (1) Heroic compositions; (2) Compositions of grace and elegance; and (3) Sepulchral monuments and relievos. In noticing the works which fall under each of these divisions, it will be impossible to maintain a strict chronological order, but perhaps a better idea of his productions may thus be obtained. Their vast number, however, prevents their being all enumerated.

(1) His " Perseus with the Head of Medusa " appeared soon after his return. The moment of representation is when the hero, flushed with conquest, displays the head of the " snaky Gorgon," whilst the right hand grasps a sword of singular device. By a public decree, this fine work was placed in one of the stanze of the Vatican hitherto reserved for the most precious works of antiquity; but it would be a mistake to say that it wholly sustains this comparison, or that it rivals the earlier realization of the same subject in Italian art, that by Cellini. In 1802, at the personal request of Napoleon, Canova repaired to Paris to model a bust of the first consul. The artist was entertained with munificence, and various honours were conferred upon him. The statue, which is colossal, was not finished till six years after. On the fall of the great Napoleon, Louis XVIII. presented this statue to the British government, by whom it was afterwards given to the duke of Wellington. " Palamedes," " Creugas and Damoxenus," the " Combat of Theseus and the Centaur," and "Hercules and Lichas" may close the class of heroic compositions, although the catalogue might be swelled by the enumeration of various others, such as " Hector and Ajax," and the statues of Washington, King Ferdinand of Naples, and others. The group of " Hercules and Lichas " is considered as the most terrible conception of Canova's mind, and in its peculiar style as scarcely to be excelled.

(2) Under the head of compositions of grace and elegance, the statue of Hebe takes the first place in point of date. Four times

has the artist embodied in stone the goddess of youth, and each time with some variation. The only material improvement, however, is the substitution of a support more suitable to the simplicity of the art.

Each of the statues is, in all its details, in expression, attitude and delicacy of finish, strikingly elegant. The ” Dancing Nymphs ” maintain a character similar to that of the Hebe. The ” Graces ” and the ” Venus ” are more elevated. The ” Awakened Nymph ” is another work of uncommon beauty. The mother of Napoleon, his consort Maria Louisa (as Concord), to model whom the author made a further journey to Paris in 18 10, the princess Esterhazy and the muse Polymnia (Elisa Bonaparte) take their place in this class, as do the ideal heads, comprising Corinna, Sappho, Laura, Beatrice and Helen of Troy.

(3) Of the cenotaphs and funeral monuments the most splendid is the monument to the archduchess Maria Christina of Austria, consisting of nine figures. Besides the two for the Roman pontiffs already mentioned, there is one for Alfieri, another for Emo, a Venetian admiral, and a small model of a cenotaph for Nelson, besides a great variety of monumental relievos.

The events which marked the life of the artist during the first fifteen years of the period in which he was engaged on the above- mentioned works scarcely merit notice. His mind was entirely absorbed in the labours of his studio, and, with the exception of his journeys to Paris, one to Vienna, and a few short intervals of absence in Florence and other parts of Italy, he never quitted Rome. In his own words, ” his statues were the sole proofs of his civil existence.” There was, however, another proof, which modesty forbade him to mention, an ever-active benevolence, especially towards artists. In 181 5 he was commissioned by the Pope to superintend the transmission from Paris of those works of art which had formerly been conveyed thither under the direction of Napoleon. By his zeal and exertions, for there were many conflicting interests to reconcile, he adjusted the affair in a manner at once creditable to his judgment and fortunate for his country. In the autumn of this year he gratified a wish he had long entertained of visiting London, where he received the highest tokens of esteem. The artist for whom he showed particular sympathy and regard in London was Haydon, who might at the time be counted the sole representative of historical painting there, and whom he especially honoured for his cham- pionship of the Elgin marbles, then recently transported to England, and ignorantly depreciated by polite connoisseurs. Canova returned to Rome in the beginning of 1816, with the ransomed spoils of his country’s genius. Immediately after, he received several marks of distinction, — by the hand of the Pope himself his name was inscribed in ” the Golden Volume of the Capitol,” and he received the title of marquis of Ischia, with an annual pension of 3000 crowns, about £625.

He now contemplated a great work, a colossal statue of Religion. The model filled Italy with admiration; the marble was procured, and the chisel of the sculptor ready to be applied to it, when the jealousy of churchmen as to the site, or some other cause, deprived the country of the projected work. The mind of Canova was inspired with the warmest sense of devotion, and though foiled in this instance he resolved to consecrate a shrine to the cause. In his native village he began to make preparations for erecting a temple which was to contain, not only the above statue, but other works of his own; within its precincts were to repose also the ashes of the founder. Accordingly he repaired to Passagno in 1819. At a sumptuous entertainment which he gave to his workmen, there occurred an incident which marks the kindliness of his character. When the festivities of the day had terminated, he requested the shepherdesses and peasant- girls of the adjacent hamlets to pass in review before him, and to each he made a present, expending on the occasion about £400. We need not, therefore, be surprised that a few years afterwards, when the remains of the donor came to be deposited in their last asylum, the grief which the surrounding peasantry evinced was in natural expression so intense as to eclipse the studied solemnity of more pompous mourning.

After the foundation-stone of this edifice had been kid,

Canova returned to Rome; but every succeeding autumn he continued to visit Passagno, in order to direct the workmen, and encourage them with pecuniary rewards and medals. In the meantime the vast expenditure exhausted his resources, and compelled him to labour with unceasing assiduity notwithstand- ing age and disease. During the period which intervened between commencing operations at Passagno and his decease, he executed or finished some of his most striking works'. Amonpst these were the group " Mars and Venus," the colossal figure of Pius VI., the " Pieta," the " St John," the " recumbent Mag.lalen." The last performance which issued from his hand was a colossal bust of his friend , the Count Cicognara. In May 1 8 2 2 he paid a visit to Naples, to superintend the construction of wax moulds for an equestrian statue of the perjured Bourbon king Ferdinand. This journey materially injured his health, but he rallied again on his return to Rome. Towards the latter end of the year he paid his annual visit to the place of his birth, when he experienced a relapse. He proceeded to Venice, and expired there on the 13th of October 1822,

at the age of nearly sixty-five. His disease was one which had affected him from an early age, caused by the continual use of carving-tools, producing a depression of the ribs. The most distinguished funeral honours were paid to his remains, which were deposited in the temple at Passagno on the 25th of the same month.

Canova, in a certain sense, renovated the art of sculpture in Italy, and brought it back to that standard from which it had declined when the sense both of classical beauty and moderation, and of Titanic invention and human or superhuman energy as embodied by the unexampled genius of Michelangelo, had succumbed to the overloaded and flabby mannerisms of the 17th and 18th centuries. His finishing was refined, and he had a special method of giving a mellow and soft appearance to the marble. He formed his models of the same size as the work was intended to be. The prominent defect of Canova's attractive and highly trained art is that which may be summed up in the word artifici- ality, — that quality, so characteristic of the modern mind, which seizes upon certain properties of conception and execution in the art of the past, and upon certain types of beauty or emotion in life, and makes a compound of the two — regulating both by the standard of taste prevalent in contemporary " high society," a standard which, referring to cultivation and refinement as its higher term, declines towards fashion as the lower. Of his moral character a generous and unwearied benevolence formed the most prominent feature. The greater part of the vast fortune realized by his works was distributed in acts of this description. He established prizes for artists and endowed all the academies of Rome. The aged and unfortunate were also the objects of his peculiar solicitude. His titles were numerous. He was enrolled amongst thenobilityof severalstates, decora ted withvariousorders of knighthood, and associated in the highest professional honours.

See the Life of Canova by Memes; that by Missirini ; the Biografia "> y the Count Cicognara ; Canova et ses ouvrages, by Quatremere de Quincy (1834) ; Opere scelte di Antonio Canova, by Anzelmi (Naples, 1842) ; Canova, by A. G. Meyer (1898) ; and La Relazione del Canova con Napoli . . . memorie con documer.ti inediti, by Angelo Borzelli (1901). (W. M. R.)

CANOVAS DEL CASTILLO, ANTONIO (1828-1897), Spanish statesman, was born in Malaga on the 8th of February 1828. Educated in his native town, he went to Madrid in 1845, bent upon finding means to complete his literary and philosophical studies. His uncle, Don Serafin Estebanez Calderon, found him a situation as clerk in the Madrid-Aranjuez railway, but Canovas soon took to journalism and

literature, earning enough to support himself and pay for his law studies at the Madrid University. During this period he published his two best works — an historical novel, Las Campanas de Huesca, and the history of the decay of Spain from Philip III. to Charles II. under the house of Austria. He became a politician through his Junius-like letters to the " Murcielago " — The Bat, a satirical political journal— and by drawing up the manifesto of Manzanares in 1854 for Marshal O'Donnell, of whom he always remained a loyal adherent. Canovas entered the Cortes in 1854; he was made governor of Cadiz in 1857, sub-director of the state department in 1858,

under-secretary at the home office in i860, minister of the interior in 1864, minister of the colonies in 1865, minister oi finance in 1866, and was exiled by Marshal Narvaez in the same year, afterwards becoming a bitter opponent of all the reactionary cabinets until the revolution of 1868. He took no part in preparing that event. He sat in the Cortes Constituyentes of 1869 as a doctrinaire Conservative, combating all Radical and democratic reforms, and defending the exiled Bourbons; but he abstained from voting when the Cortes elected Amadeus king on the 16th of November 1870. He did not object to some of his political friends, like Silvela and Elduayen, entering the cabinets of King Amadeus, and in 1872 declared that his attitude would depend on the concessions which government would make to Conservative principles. After the abdication of Amadeus and the proclamation of the federal republic, Canovas took the lead of the propaganda in favour of the restoration of the Bourbons, and was their principal agent and adviser. He drew up the manifesto issued in 1874 by the young king Alphonso XII., at that time a cadet at Sandhurst; but he dissented from the military men who were actively conspiring to organize an Alphonsist pronunciamiento. Like Marshal Concha, marquis del Duero, he would have preferred to let events develop enough to allow of the dynasty being restored without force of arms, and he severely blamed the conduct of the generals when he first heard of the pronunciamiento of Marshal Campos at Sagunto. Sagasta thereupon caused Canovas to be arrested(3othof December 1874) ; but the next day the Madrid garrison also proclaimed Alphonso XII. king, and Canovas showed the full powers he had received from the king to assume the direction of affairs. He formed a regency ministry pending the arrival of his majesty, who con- firmed his appointment, and for six years Canovas was premier except during the short-lived cabinets of Marshal Jovellar in

1875 and Marshal Campos for a few months in 1879. Canovas was, in fact, the soul of the Restoration. He had to reconstruct a Conservative party out of the least reactionary parties of the days of Queen Isabella

and out of the more moderate elements of the revolution. With such followers he made the constitution of

1876 and all the laws of the monarchy, putting a limited franchise in the place of universal suffrage, curtailing liberty of conscience, rights of association and of meeting, liberty of the press, checking democracy, obliging the military to abstain from politics, con- ciliating the Carlists and Catholics by his advances to the Vatican, the Church and the religious orders, pandering to the protection- ists by his tariff policy, and courting abroad the friendship of Germany and Austria after contributing to the marriage of his king to an Austrian princess. Canovas crowned his policy by countenancing the formation of a Liberal party under Sagasta, flanked by Marshal Serrano and other Liberal generals, which took office in 1 88 1. He again became premier in 1883, and remained in office until November 1885; but he grew very un- popular, and nearly endangered the monarchy in 1885 by his violent repression of popular and press demonstrations, and of student riots in Madrid and the provinces. At the death of Alphonso XII. he at once advised the queen regent to send for Sagasta and the Liberals, and during five years he looked on quietly whilst Sagasta re-established universal suffrage and most of the liberties curtailed in 1876, and carried out a policy of free trade on moderate lines. In 1890 Canovas took office under the queen regent, and one of his first acts was to reverse the tariff policy of the Liberals, denouncing all the treaties of commerce, and passing in 1892 a highly protectionist tariff. This was the starting-point of the decline in foreign trade, the advance of foreign exchanges, the decay of railway traffic, and the monetary and financial crisis which continued from 1892 to 1898. Splits in the Conservative ranks forced Canovas to resign at the end of 1893, and Sagasta came in for eighteen months. Canovas resumed office in March 1895 immediately after the outbreak of the Cuban insurrection, and devoted most of his time and efforts, with characteristic determination, to the preparation of ways and means for sending 200,000 men to the West Indies to carry out his stern and unflinching policy of no surrender, no concessions and no reforms. He was making up his mind for another effort

to enable General Weyler to enforce the reforms that had been wrung from the Madrid government, more by American diplomacy than from a sense of the inevitable, when the bullet of an anarchist, in August 1897, at the baths of Santa Agueda, cut short his career. On the

whole, Canovas must be regarded as the greatest Spanish statesman of the close of the 19th century. He was not only a politician but also a man of the world, a writer of considerable merit, a scholar well versed in social, economic and philosophical questions, a great debater, a clever lecturer, a member of all the Madrid academies and a patron of art and letters. (A. E. H.)

CANROBERT, FRANCOIS CERTAIN (1809-1895), marshal of France, was born at St Cere (Lot) on the 27th of June 1809 and educated at St Cyr; he received a commission as sub-lieutenant in 1828, becoming lieutenant in 1833. He went to Algeria in 1835, served in the expedition to Mascara, at the capture of Tlemcen, and in 1837 became captain. In the same year he was wounded in the storm of Constantine, receiving the Legion of Honour for his conduct. In 1839 he was employed in organizing a battalion of the Foreign Legion for the Carlist Wars. In 1841 he was again serving in Africa. Promoted lieutenant-colonel in 1846 and colonel of the 3rd regiment in 1847, he commanded the expedition against Ahmed Sghir in 1848, and defeated the Arabs at the Djerma Pass. Transferred to the Zouaves, he defeated the Kabyles, and in 1849 displayed both courage and energy in reinforcing the blockaded garrison of Bou Sada, and in command of one of the attacking columns at Zaatcha (December 1849). For his valour on the latter occasion he received the rank of general of brigade and the commandership of the Legion of Honour. He led the expedition against Narah in 1850 and destroyed the Arab stronghold. Summoned to Paris, he was made aide-de-camp to the president, Louis' Napoleon, and took part in the coup d'etat of the 2nd of December 1851. In the Crimean War he commanded a division at the Alma, where he was twice wounded. He held a dormant commission entitling him to command in case of St Arnaud's death, and he thus succeeded to the chief command of the French army a few days after the battle. He was slightly wounded and had a horse killed under him at Inkerman, when leading a charge of Zouaves. Disagreements with the English commander-in-chief and, in general, the disappointments due to the prolongation of the siege of Sevastopol led to his resignation of the command, but he did not return to France, preferring to serve as chief of his old division almost up to the fall of Sevastopol. After his return to France he was sent on diplomatic missions to Denmark and Sweden, and made a marshal and senator of France (grand cross Legion of Honour, and honorary G.C.B.). He commanded the III. army corps in Lombardy in 1859, distinguishing himself at Magenta and Solferino. He successively commanded the camp at Chalons, the IV. army corps at Lyons and the army of Paris. In the Franco-German War he commanded the VI. army corps, which

won the greatest distinction in the battle of Gravelotte, where Canrobert commanded on the St Privat position. The VI. corps was amongst those shut up in Metz and included in the surrender of that fortress. After the war Canrobert was appointed a member of the superior council of war, and was also active in political life,, being elected senator for Lot in 1876 and for Charente in 1879 and again in 1885. He died at Paris on the 28th of January 1895 and his remains received a public funeral. His Souvenirs were published in 1898 at Paris. . CANT, ANDREW (1590 7-1663), a leader of the Scottish Covenanters. About 1623 the people of Edinburgh called him to be their minister, but he was rejected by James I. Ten years later he was minister of Pitsligo in Aberdeenshire, a charge which he left in 1638 for that of Newbattle in Mid-Lothian. In July of that year he went with other commissioners to Aberdeen in the vain attempt to induce the university and the presbytery of that city to subscribe the National Covenant, and in the following November sat in the general assembly at Glasgow which abolished episcopacy in Scotland. In 1 640 he was chaplain to the Scottish army and then settled as minister at Aberdeen. Though a stanch Covenanter, he was a zealous Royalist,

preaching before Charles I. in Edinburgh, and stoutly advocating the restoration of the monarchy in the time of the Commonwealth. Cant's frequent and bitter attacks on various members of his congregation led in 1660 to complaints laid before the magis- trates, in consequence of which he resigned his charge. His son Andrew was principal of Edinburgh University (1675-1685) .

CANT. (1) (Possibly through the Fr. fromLat. cantos, corner), in architecture, a term used where the corner of a square is cut off, octagonally or otherwise. Thus a bay window, the sides of which are not parallel, or at right angles to the spectator, is said to be canted. (2) (From the Lat. cantare, to sing, very early in use, in a depreciatory sense, of religious services), a word appear- ing in English in the 16th century 'for the whining speech of beggars; hence it is applied to thieves' or gipsies' jargon, to the peculiar language of any class or sect, to any current phrase or turn of language, and particularly to the hypocritical use of pious phraseology.

CANTABRI, an ancient tribe which inhabited the north coast of Spain near Santander and Bilbao and the mountains behind — a district hence known as Cantabria. Savage and untameable mountaineers, they long defied the Roman arms and made them- selves a name for wild freedom. They were first attacked by the Romans about 1 50 B.C. ; they were not subdued till Agrippa and Augustus had carried out a series of campaigns (29-19 B.C.) which ended in their partial

annihilation. Thenceforward their land was part of the province Hispania Tarraconensis with some measure of local self-government. They became slowly Roman- ized, but developed little town life and are rarely mentioned in history. They provided recruits for the Roman auxilia, like their neighbours the Asttires, and their land contained lead mines, of which, however, little is known.

CANTABRIAN MOUNTAINS (Span. Cordillera Cantabrica), a mountain chain which extends for more than 300 m. across northern Spain, from the western limit of the Pyrenees to the borders of Galicia, and on or near the coast of the Bay of Biscay. The Cantabrians stretch from east to west, nearly parallel to the sea, as far as the pass of Leitariegos, afterwards trending south- ward between Leon and Galicia. Their western boundary is marked by the valley of the river Mifio (Portuguese Minho), by the lower Sil, which flows into the Mifio, and by the Cabrera, a small tributary of the Sil. Some geographers regard the mountains of Galicia beyond the Mifio as an integral part of the same system ; others confine the name to the eastern half of the highlands between Galicia and the Pyrenees, and call their western half the Asturian Mountains. There are also many local names for the subsidiary ranges within the chain. As a whole, the Cantabrian Mountains are remarkable for their intricate ramifications, but almost everywhere, and especially in the east, it is possible to distinguish two principal ranges, from which the lesser ridges and mountain masses radiate. One range, or series of ranges, closely follows the outline of the coast; the other, which is loftier, forms the northern limit of the great tableland of Castile and Leon, and is sometimes regarded as a continuation of the Pyrenees. The coastal range rises in some parts sheer above the sea, and everywhere has so abrupt a declivity that the strearhs which flow seaward are all short and swift. The descent from the southern range to the high plateaus of Castile is more gradual, and several large rivers, notably the Ebro, rise here and flow to the south or west. The breadth of the Cantabrian chain, with all its ramifications, increases from about 60 m. in the east to about 115 m. in the west. Many peaks are upwards of 6000 ft. high, but the greatest altitudes are attained in the central ridges on the borders of Leon, Oviedo, Palencia and Santander. Here are the Pefia Vieja (8743 ft.), Prieta (8304 ft.) and E'spinguete (7898 ft.); an unnamed summit in the Penas de Europa, to which range the Pefia Vieja also belongs, rises on the right bank of the Sella to a height of 8045 ft. ; farther west the peaks of Manipodre, Ubifia, Rubia and Cuifia all exceed 7000 ft. A conspicuous feature of the chain, as of the adjacent tableland, is the number of its parameras, isolated plateaus shut in by lofty mountains or even by precipitous walls of rock. At the south-western extremity of

the chain is el Vierzo, once a

lake-bed, now a valley drained by the upper Sil and enclosed by mountains which bifurcate from the main range south of the pass of Leitariegos — the Sierra de Justredo and Montafias de Leon curving towards the east and south-west, the Sierra de Picos, Sierra del Caurel and other ranges curving towards the west and south-east. The Cantabrians are rich in coal and iron; an account of their geological structure is given under Spain. They are crossed at many points by good roads and in their eastern half by several railways. In the west, near the pass of Pajares, the railway from Leon to Gijon passes through the Perruca tunnel, which is 2 m. long and 4200 ft. above sea-level; the railway descends northward through fifty-eight smaller tunnels. The line from Leon to Orense also traverses a remark- able series of tunnels, bridges and deep cuttings.

CANTACUZINO, Cantacuzen or Cantactjzene, the name of a family which traces its origin to the Byzantine emperors and writers of the same name (see under John V., Cantacuzene) . The founder of the family, Andronik, migrated to Rumania in 1633, and from his two sons Constantine and Gheorge sprang the two principal lines which afterwards branched into numerous families of nobles and high dignitaries, including hospodars (rulers) of Walachia and Moldavia. The Cantacuzinos were represented in every branch of administration and in the world of letters. Under their influence the Rumanian language and literature in the 17th century reached their highest development. Among the more prominent members of the family the following may be mentioned.

CANTAGALLO, an inland town of the state of Rio de Janeiro, Brazil, about 100 m. by rail N.E. of the port of Rio de Janeiro, with which it is connected by the Cantagallo railway. Pop. (1890) of the municipality, 26,067, of whom less than one-fourth live in the town. Cantagallo is situated in the fertile Parahyba valley and is the commercial centre of a rich coffee-producing district. There are exhausted gold placer mines in its vicinity, but they were not rich enough to cause any considerable develop- ment in mining. Coffee production is the principal industry, but sugar-cane is grown to a limited extent, and some attention is given to the raising of cattle and swine. The district is an excellent fruit region.

CANTAL, a department of central France, formed from Haute-Auvergne, the southern portion of the old province of Auvergne. It is bounded N. by the department of Puy-de- D6me, E. by Haute-Loire, S.E. by Lozere, S. by Aveyron and Lozere, and W. by Correze and Lot. Area 2231 sq. m. Pop. (1906) 228,690. Cantal is situated in the middle of the central

plateau of France. It takes its name from the Monts du Cantal, a volcanic group occupying its central region, and continued towards the north and east by ranges of lower altitude. The Plomb du Cantal, the culminating summit of the department, attains a height of 6096 ft.; and its neighbours, the Puy Mary and the Puy Chavaroche, attain a height of 5863 and 5722 ft. respectively. Immediately to the east of this central mass lies the lofty but fertile plateau of Planeze, which merges into the Monts de la Margeride on the eastern border. The valley of the Truyere skirts the Planeze on the south and divides it from the Monts d'Aubrac, at the foot of which lies Chaudesaigues, noted for its thermal springs, the most important in the department. Northwards the Monts du Cantal are connected with the Monts Dore by the volcanic range of Cezallier and the arid plateaus of Artense. In the west of the department grassy plateaus and beautiful river valleys slope gently down from the central heights. Most of the streams of the department have their sources in this central ridge and fall by a short and rapid course into the rivers which traverse the extensive valleys on either side. The principal rivers are the Alagnon, a tributary of the Allier; the Celle and Truyere, tributaries of the Lot; and the Cere and Rue, tributaries of the Dordogne. The climate of the depart- ment varies considerably in the different localities. In the alluvial plain between Murat and St Flour, and in the south- west in the arrondissement of Aurillac, it is generally mild and dry; but in the northern and central portions the winters are long and severe and the hurricanes peculiarly violent. The cold and damp of the climate in these districts are great obstacles to the cultivation of wheat, but rye and buckwheat are grown in considerable quantities, and in natural pasture Cantal is extremely rich. Cattle are accordingly reared with profit, especially around Salers and in the Monts d'Aubrac, while butter and Roquefort cheese are made in large quantities. Large flocks of sheep pasture in the Monts d'Aubrac and elsewhere in the department; goats are also reared. The inhabitants are simple and primitive and accustomed to live on the scantiest fare. Many of them migrate for part of the year to Paris and the pro- vinces, where they engage in the humblest occupations. The principal articles of food are rye, buckwheat and chestnuts. The internal resources of the department are considerable; but the difficulty of land-carriage

prevents them being sufficiently developed. The hills and valleys abound with game and the streams with fish. Cantal produces a vast variety of aromatic and medicinal plants; and its mineral products include coal, antimony and lime. The department has no prominent manu- factures. Live-stock, cheese, butter and coal are the principal exports; coal, wine, cereals, flour and earthenware are im- ported. The department is served by the railways of the Orleans and Southern companies, the construction of which at some points demanded considerable engineering skill, notably in the case of the viaduct of Garabit spanning the gorge of the Truyere. Cantal is divided into four arrondissements — Aurillac, Mauriac, Murat and St Flour — 23 cantons and 267 communes. It belongs to the region of the XIII. army corps and to the acad6mie (educational division) of Clermont-Ferrand. Its bishopric is at St Flour and depends on the archbishopric of Bourges. Its court of appeal is at Riom. The capital is Aurillac (

CANTARINI, SIMONE (161 2-1648), called Simone da Pesaro, painter and etcher, was born at Oropezza near Pesaro in 161 2. He was a disciple of Guido Reni and a fellow-student of Domeni-, chino and Albano. The irritability of his temper and his vanity were extreme; and it is said that his death, which took place at Verona in 1648, was occasioned by chagrin at his failure in a portrait of the duke of Mantua. Others relate that he was poisoned by a Mantuan painter whom he had injured. His pictures, though masterly and spirited, are deficient in originality. Some of his works have been mistaken for examples of Guido Reni, to whom, indeed, he is by some considered superior in the extremities of the figures. Among his principal paintings are “St Anthony,” at Cagli; the “Magdalene,” at Pesaro; the “Transfiguration,” in the Brera Gallery, Milan; the “Portrait

of Guido,” in the Bologna gallery; and ” St Romuald,” in the Casa Paolucci. His most celebrated etching is ” Jupiter, Neptune and Pluto, honouring the arms of Cardinal Borghese.”

CANTATA (Italian for a song or story set to music), a vocal composition accompanied by instruments and generally con- taining more than one movement. In the 16th century, when all serious music was vocal, the term had no reason to exist, but with the rise of instrumental music in the 1 7th century cantatas began to exist under that name as soon as the instrumental art was definite enough to be embodied in sonatas. From the middle of the 17th till late in the 18th

century a favourite form of Italian chamber music was the cantata for one or two solo voices, with accompaniment of harpsichord and perhaps a few other solo instruments. It consisted at first of a declamatory narrative or scene in recitative, held together by a primitive aria repeated at intervals. Fine examples may be found in the church music of Carissimi; and the English vocal solos of Purcell (such as Mad Tom and Mad Bess) show the utmost that can be made of this archaic form. With the rise of the Da Capo aria the cantata became a group of two or three arias joined by recitative. Handel's numerous Italian duets and trios are examples on a rather large scale. His Latin motet Silete Venti, for soprano solo, shows the use of this form in church music.

The Italian solo cantata naturally tended, when on a large scale, to become indistinguishable from a scene in an opera. In the same way the church cantata, solo or choral, is indis- tinguishable from a small oratorio or portion of an oratorio. This is equally evident whether we examine the unparalleled church cantatas of Bach, of which nearly 200 are extant, or the Chandos Anthems of Handel. In Bach's case many of the larger cantatas are actually called oratorios; and the Christmas Oratorio is a collection of six church cantatas actually intended for performance on six different days, though together forming as complete an artistic whole as any classical oratorio.

The essential point, however, in Bach's church cantatas is that they formed part of a church service, and moreover of a service in which the organization of the music was far more coherent than is possible in the Anglican church. Many of Bach's greatest cantatas begin with an elaborate chorus followed by a couple of arias and recitatives, and end with a plain chorale. This has often been commented upon as an example of Bach's indifference to artistic climax in the work as a whole. But no one will maintain this who realizes the place which the church cantata occupied in the Lutheran church service. The text was carefully based upon the gospel or lessons for the day; unless the cantata was short the sermon probably took place after the first chorus or one of the arias, and the congregation joined in the final chorale. Thus the unity of the service was the unity of the music; and, in the cases where all the movements of the cantata were founded on one and the same chorale-tune, this unity has never been equalled, except by those 16th-century masses and motets which are founded upon the Gregorian tones of the festival for which they are written.

In modern times the term cantata is applied almost exclusively to choral, as distinguished from solo vocal music. There has, . perhaps, been only one kind of cantata since Bach which can be recognized as

an art form and not as a mere title for works otherwise impossible to classify. It is just possible to recognize as a distinct artistic type that kind of early 19th-century cantata in which the chorus is the vehicle for music more lyric and song- like than the oratorio style, though at the same time not exclude ing the possibility of a brilliant climax in the shape of a light order of fugue. Beethoven's Glorreiche Augenblick is a brilliant " pot-boiler " in this style; Weber's Jubel Cantata is a typical specimen, and Mendelssohn's Walpargisnacht is the classic. Mendelssohn's " Symphony Cantata," the Lobgesang, is a hybrid work, partly in the oratorio style. It is preceded by three sym- phonic movements, a device avowedly suggested by Beethoven's ninth symphony; but the analogy is not accurate, as Beet- hoven's work is a symphony of which the fourth movement is a choral finale of essentially single design, whereas Mendelssohn's " Symphony Cantata " is a cantata with three symphonic

preludes. The full lyric possibilities of a string of choral songs were realized at last by Brahms in his Rinaldo, set to a text which Goethe wrote at the same time as he wrote thai of the Walpurgisnacht. ■ The point of Brahms's work (his only experiment in this genre) has naturally been lost by critics who expected in so voluminous a composition the qualities of an elaborate choral music with which it has nothing whatever to do. Brahms has probably said the last word on this subject; and the remaining types of cantata (beginning with Beethoven's Meeres-stille, and including most of Brahms's and many notable English small choral works) are merely so many different ways of setting to choral music a poem which is just too long to be comprised in one movement. (D. F. T.)

CANTEEN (through the Fr. cantine, from Ital. cantina, a cellar), a word chiefly used in a military sense for an official sutler's shop, where provisions, &c, are sold to soldiers. The word was formerly applied also to portable equipments for carry- ing liquors and food, or for cooking in the field. Another sense of the word, which has survived to the present day, is that of a soldier's water-bottle, or of a small wooden or metal can for carying a workman's liquor, &c.

CANTEMIR, the name of a celebrated family of Tatar origin, which came from the Crimea in the 17th century and settled in Moldavia.

Constantine Cantemir became a prince of Moldavia, 1685- 1693. He was a good and conscientious ruler, who protected the people from the rapacity of the tax-gatherers and introduced peace into his country. He was succeeded on the throne by his son Antioch, who ruled twice, 1696-1700 and 1705-1707.

His youngest brother, Demetrius or Demeter Cantemir (b. October 26, 1673), was made prince of Moldavia in 1710; he ruled only one year, 1710-1711, when he joined Peter the Great in his campaign against the Turks and placed Moldavia under Russian suzerainty. Beaten by the Turks, Cantemir emigrated to Russia, where he and his family finally settled. He died at Kharkov in 1723. He was known as one of the greatest linguists of his time, speaking and writing eleven languages, and being well versed in Oriental scholarship. He was a voluminous and original writer of great sagacity and deep penetration, and his writings range over many subjects. The best known is his History of the Growth and Decay of the Ottoman Empire. He also wrote a history of oriental music, which is no longer extant; the first critical history of Moldo-Walachia; the first geographical, ethnographical and economic description of Moldavia, De- scriptio Moldaviae, under the name of Historia Hieroglyphica, to which he furnished a key, and in which the principal persons are represented by animals; also the history of the two ruling houses of Brancovan and Cantacuzino; and a philosophical treatise on the old theme of the disputation between soul and body, written in Greek and Rumanian under the title Divanul Lumii.

The latter's son, Antioch Cantemir (born in Moldavia, 1700; died in Paris, 1744), became in 1731 Russian minister in Great Britain, and in 1736 minister plenipotentiary in Paris. He brought to London the Latin MS. from whence the English translation of his father's history of the Turkish empire was made by N. Tindal, London, 1756, to which he added an exhaustive biography and bibliography of the author (pp. 455-460). He was a Russian poet and almost the first author of satires in modern Russian literature.

Bibliography. — Operele Principelui D. Cantemir, ed. Academia Romana (1872 foil.); A. Philippide, Introducere in istoria limbei si literal, romane (Iasi, 1888), pp. 192-202; O. G. Lecca, Familiile boeresti romane (Bukarest, 1898), pp. 144-148; M. Gaster, Chrestom. romana, i. 322, 359 (in Cyrillic). (M. G.)

CANTERBURY, CHARLES MANNERS-SUTTON, ist Vis- count (1780-1845), speaker of the House of Commons, was the elder son of Charles Manners-Sutton (q.v.), afterwards archbishop of Canterbury, and was born on the 29th of January 1780. Educated at Eton and Trinity College, Cambridge, he graduated B.A. in 1802, and was called to the bar at Lincoln's Inn in 1806. At the general election of this year he was returned to parliament

in the Tory interest as member for Scarborough, and in 1809 became judge-advocate-general in the ministry of Spencer Perceval. He retained this position until June 181 7, when he was elected speaker in succession to Charles Abbot, created Baron Colchester, refusing to exchange this office in 1827 for that of home secretary. In 1832 he abandoned Scarborough and was returned to parliament as one of the members for the university of Cambridge. Before the general election of 1832 Manners-Sutton had intimated his desire to retire from the position of speaker and had been voted an annuity of £4000 a year. The ministry of Earl Grey, however, reluctant to meet the reformed House of Commons with a new and inexperienced occupant of the chair, persuaded him to retain his office, and in 1833 he was elected speaker for the seventh time. Some feeling had been shown against him on this occasion owing to his Tory proclivities, and the Whigs frequently complained that outside the House he was a decided partisan. The result was that when a new parliament met in February 1835 a sharp contest ensued for the speakership, and Manners-Sutton was defeated by James Abercromby, afterwards Lord Dunfermline. In March 1835 the retiring speaker was raised to the peerage as Baron Bottesford and Viscount Canterbury. In 1835 he was appointed high commissioner for Canada, but owing to domestic reasons he never undertook the appointment. He died in London on the 21st of July 1845 and was buried at Addington. His first wife was Lucy (d. 1815), daughter of John Denison of Ossington, by whom he had two sons and a daughter. Both his sons, Charles John (1812-1869), and John Henry Thomas (1814-1877), succeeded in turn to the viscounty. By his second wife, Ellen (d. 1845), widow of John Home-Purves, he had a daughter.

CANTERBURY, a city and county of a city, the metropolis of an archdiocese of the Church of England, and a municipal, county and parliamentary borough of Kent, England, 62 m. E.S.E. of London by the South-Eastern & Chatham railway. Pop. (1901) 24,889. It lies on the river Stour, which here debouches from a beautiful narrow valley of the North Downs, the low but abrupt elevations of which command fine views of the city from the west and south, while the river presently enters upon the flat belt of land which separates the elevated Isle of Thanet from the rest of Kent. This belt represents the existence, in early historic times, of a sea-strait, and Fordwich, little more than 2 m. north-east of Canterbury, was once accessible for shipping. The city surrounds the precincts of the great cathedral.

The Cathedral. — It was to Canterbury, as the capital of jEthelberht,

the fourth Saxon king of Kent, that in 597 Augustine and his fellow-missionaries came from Rome, and their settle- ment by /Ethelberht in his capital became the origin of its position, held ever since, as the metropolis of the Church of England. ˆEthelberht, whose queen, Bertha, was already a Christian, gave the missionaries a church whose mythical founder was King Lucius. Augustine was a Benedictine and established the monastery of that order attached to the cathedral; this foundation was set upon a firm basis after the Norman Conquest by Archbishop Lanfranc, who placed its charge (as distinct from that of the diocese) in the hands of a prior.

Preparatory to the description of the cathedral, the principal epochs in the history of its erection may be noted. The Romano- British church occupied by St Augustine, of basilica oAtM? J 01 ™, remained long in use, though it was largely building, rebuilt by Archbishop Odo, c. 950; after further vicissitudes it was destroyed by fire in 1067. Arch- bishop Lanfranc, taking up his office in 1070, undertook the building of an entirely new church, but under Anselm (c. 1100) Prior Ernulf rebuilt the eastern part, and his successor Conrad carried on the work. A fire destroyed much of this part of the building in n 74, and from that year the architect, William of Sens, took up the work of rebuilding until n 78, when, on his suffering serious injury by falling from a scaffold, another William, commonly distinguished as the Englishman, carried on the work and completed it in 1184. In 1376 Archbishop Sudbury entered upon the construction of a new nave, and Prior Chillenden continued this under Archbishop Courtenay. The

building of the central tower was undertaken c. 1495 by Prior Goldstone, with the counsel of Selling, his predecessor, and Archbishop Morton.

This Perpendicular tower is the most notable feature of the exterior. It rises in two storeys to a height of 235 ft. from the ground, and is known variously as Bell Harry tower Exterior from the great bell it contains, or as the Angel steeple from the gilded figure of an angel which formerly adorned the summit. The Perpendicular nave is flanked at the west front by towers, whose massive buttresses, rising in tiers, serve to enhance by contrast the beautiful effect of the unbroken straight lines of Bell Harry tower. The south-western of these towers is an original Perpendicular structure by Prior Goldstone, while the north-western was copied from it in 1834- 1840, replacing a Norman tower which had carried a spire until 1705 and had become unsafe. The north-west and south-west transepts are included in Chillenden's Perpendicular reconstruction; but east of these earlier work is met with. The south-east transept exhibits Norman work; the

projecting chapel east of this is known as Anselm's tower. The cathedral terminates eastward in a graceful apsidal form, with the final addition of the circular eastern chapel built by William the Englishman, and known as the Corona or Becket's Crown. St Andrew's tower or chapel on the north side, corresponding to Anselm's on the south, is the work of Ernulf. From this point westward the various monastic buildings adjoin the cathedral on the north side, so that the south side is that from which the details of the exterior must be examined.

When the nave of the cathedral is entered, the complete separation of the interior into two main parts, not only owing to the distinction between the two main periods of i a t e rior building; but by an actual structural arrangement, is realized as an unusual and, as it happens, a most impressive feature. In most English cathedrals the choir is separated from the nave by a screen ; at Canterbury not only is this the case, but the separation is further marked by a broad flight of steps leading up to the screen, the choir floor (but not its roof) being much higher than that of the nave. Chillenden, in rebuilding the nave, retained only the lower parts of some of the early Norman walls of Lanfranc and the piers of the central tower arches. These piers were encased or altered on Perpendicular lines. In the choir, the late 12th-century work of the two Williams, the notable features are its great length, the fine ornamentation and the use of arches both round and pointed, a remarkable illustration of the transition between the Norman and Early English styles; the prolific use of dark marble in the shafts and mouldings strongly contrasting with the light stone which is the material principally used; and, finally, the graceful incurve of the main arcades and walls at the eastern end of the choir where it joins the chapel of the Trinity, an arrangement necessitated by the preservation of the earlier flanking chapels or towers of St Anselm and St Andrew. From the altar eastward the floor of the church is raised again above that of the choir. The choir screen was built by Prior de Estria, c. 1300. The organ is not seen, being hidden in the triforium and played from the choir. There are several tombs of archbishops in the choir. The south-east transept serves as the chapel of the King's school and exhibits the work of William of Sens in alteration of that of Ernulf. Anselm's chapel or tower, already mentioned, may be noticed again as containing a Decorated window (1336). This style is not common in the cathedral.

Behind the altar is Trinity Chapel, in the centre of which stood the celebrated shrine of St Thomas of Canterbury. The priory owed its chief fame to the murder of Archbishop Becket's Becket (1170) in the church, his canonization as St shrine. Thomas of Canterbury, and the

resort of the Christian PUgrim- world on pilgrimage to his shrine. Miracles were ages ‘ almost immediately said to be worked at his grave in the crypt and at the well in which his garments had been washed; and from the time when Henry II. did his penance for the murder in the church, and the battle of Alnwick was gained over the Scots a few days afterwards — it was supposed as a result — the

fame of the martyr’s power and the popularity of his worship became established in England. On the rebuilding of the cathedral after the fire of 1174, a magnificent shrine was erected for him in Trinity Chapel, which was built for the purpose, and became thronged for three centuries by pilgrims and worshippers of all classes, from kings and emperors downward. Hence- forward the interests of the city became bound up in those of the cathedral, and were shown in the large number of hostels for the accommodation of pilgrims, and of shops containing wares especially suited to their tastes. A pilgrimage to Canter- bury became not only a pious exercise, but a favourite summer excursion; and the poet Chaucer, writing in the 14th century, gives an admirable picture of such pilgrimages, with the manners and behaviour of a party of pilgrims, leisurely enjoying the journey and telling stories on the road. The English language even preserved two words originating in these customs — a ” canterbury,” or a ” canterbury tale,” a phrase used for a fiction, and a ” canter,” which is a short form for a ” Canterbury gallop,” an allusion to the easy pace at which these pilgrimages were performed. The shrine with its vast collected wealth was destroyed, and every reminiscence connected with it as far as possible effaced, by King Henry VIII.‘s commissioners in 1538. But some of the beautiful old windows of stained glass, illustrat ing the miracles wrought in connexion with the saint, are pre- served. The north-west transept was the actual scene of Becket’s murder; the spot where he fell is shown on the floor, but this part of the building is of later date than the tragedy.

Close to the site of the shrine is the fine tomb of Edward the Black Prince, with a remarkable portrait effigy, and above it his helmet, shield and other equipment. There is also in this chapel the tomb of King Henry IV. The Corona, at the extreme east of the church, contains the so-called St Augustine’s chair in which the archbishops are enthroned. It is of marble, but its name is not deserved, as it dates probably from c. 1 200. The western part of the crypt, beneath the choir, is the work of Ernulf, and perhaps incorporates some of

Lanfranc's work. The chapel of St John or St Gabriel, beneath Anselm's tower, is still used for service, in which the French language is used; it was devoted to this purpose in 1561, on behalf of French Protestant refugees, who were also permitted to carry on their trade as weavers in the crypt. The eastern and loftier part of the crypt, with its apsidal termination, is the work of William the Englishman. Here for some time lay the body of Becket, and here the celebrated penance of Henry II. was performed.

The chief entrance to the precincts is through an ornate gate- way at the south-west, called Christchurch gateway, and built by Prior Goldstone in 1517. Among the remains of buildings. tne monastic buildings there may be mentioned the Norman ruins of the infirmary, the fine two-storeyed treasury and the lavatory tower, Norman in the lower part and Perpendicular in the upper. The cloisters are of various dates, containing a little rich Norman work, but were very largely rebuilt by Prior Chillenden. The upper part of the chapter- house is also his work, but the lower is by Prior de Estria. The library is modern. The site of the New Hall of the monastery is covered by modern buildings of King's school, but the Norman entry-stair is preserved-— a magnificent example of the slyle, with highly ornate arcading.

The principal dimensions of the cathedral are: length (out- side) 522 ft., nave 178 ft., choir 180 ft. The nave is 71 ft. in breadth and 80 ft. in height.

The archbishop of Canterbury is primate of all England; the

ecclesiastical province of Canterbury covers England

and " Ce an< ˆ Wales south of Cheshire and Yorkshire; and the

diocese. diocese covers a great part of Kent with a small part

of Sussex. The following is a list of archbishops of

Canterbury: —

655

603

I.

Augustine, 597 to 605.

6.

Deusdedit (Frithona),

2.

Lawrence (Laurentius), 605

to 664.

to 619.

7-

Theodore, 668 to 690.

3-

Mellitus, 619 to 624.

8.

Brethwald (Bcrhtuald)

4-

Justin. 624 to 627.

to 731.

5-

Honorius, 627 to 653.

9-

Taetwine. 731 to 734.

10.

II.

12.

13- 14.

15-

16.

17- 18. 19. 20. 21. 22.

23-

24.

25-

26.

27-

28.

29. 30.

3i-

32.

33- 34- 35- 36.

37-

38- 39- 40. 41.

42- 43- 44.

45- 46.

47-

Nothelm, 734 to 740. 59.

Cuthbert, 740 to 758.

Breogwine, 759 to 762. 60.

Jaenberht, 763 to 790.

vEthelhard, 790 to 803. 61.

Wulfred, 803 to 829.

Fleogild, 829 to 830. 62.

Ceolnoth, 8Jo to 870.

ˆthelred, 870 to 889. 63.

Plegemund, 889 to 914. 64.

.3ithelm, 914 to 923. 65.

Wulfelm, 923 to 942.

Odo, 942 to 959. 66.

/Elsine, 959. 67.

Dunstan, 960 to 988.

ˆEthelgar, 988 to 989. 68.

Sigeric, 990 to 994.

/Elfric, 995 to 1005. 69.

Alphege “(/Elfeah), 1005 to

1012. 70.

Lyfmg, 1013 to 1020. 71.

/Ethelnoth, 1020 to 1038. Eadsige, 1038 to 1050. 72.

Robert of Jumieges, 105 1 to

1052. 73.

Stigand, 1052 to 1070. 74.

Lanfranc, 1070 to 1089. Anselm, 1093 to 1109. 75.

Ralph de Turbine, 11 14 to 76.

1 122. 77.

William de Corbeuil (Cur- 78.

bcllio), 1 123 to 1 136. Theobald, 1 139 to 1161. 79.

Thomas Becket, 1 162 to 1170. Richard, ii74to 1184. 80.

Baldwin, 1 185 to U90. 81.

Reginald Fitz-Jocelyn, 1191. Hubert Walter, 1 193 to 1205. 82. Stephen Langton, 1207 to 8v

1228. 84.

Richard Wethershed, 1229

to 1231. 85.

EdmundRich (deAbbendon)

1234 to 1240. 86.

Boniface of Savoy, 1241 to

1270. 87.

Robert Kilwardby, 1273 to

1278. 88.

John Peckham, 1279 to 1292. 89. Robert Winchelsea, 1293 to

1313. 90.

Walter Reynolds, 13 13 to

1327. 91.

Simon de Meopham, 1328 to

1333- 92-

John Stratford, 1333 to 1348. John de Ufford, 1348 to 1349. 93. Thomas Bradwardin, 1349. Simon Islip, 1349 to 1366. 94.

Simon Langham, 1366 to

1368- 95-

William Whittlesea, 1368 to 1374. 96.

Simon Sudbury, 1375 to

1381.

William Courtenay, 1381 to

1396.

Thomas Arundel, 1396 to

1414.

Henry Chicheley, 1414 to

H43- John Stafford, 1443 to 1452. John Kemp, 1452 to 1454. Thomas Bourchier, 1454 to

i486. John Morton, i486 to 1500. Henry Dean (Dene), 1501 to

1503-

William Warham, 1503 to

1532.

Thomas Cranmer, 1533 to

1556.

Reginald Pole, 1556 to 1558. Matthew Parker, 1559 to

1575-

Edmund Grindal, 1575 to

I583- John Whitgift, 1583 to 1604. Richard Bancroft, 1604 to

1610.

George Abbot, 1610 to 1633. William Laud, 1633 to 1645. William Juxon, 1660 to 1663. Gilbert Sheldon, 1663 to

1677.

William Sancroft, 1678 to

1691.

John Tillotson, 1691 to 1694. Thomas Tenison, 1694 to

I7I5- William Wake, !7i6to 1737. John Potter, 1737 to 1747. Thomas Herring, 1747 to

1757-

Matthew Hutton, 1757 to

1758.

Thomas Seeker, 1758 to

1768.

Frederick Cornwallis, 1768

to 1783. John Moore, 1783 to 1805. Charles Manners -Sutton,

1805 to 1828. William Howley, 1828 to

1848.

John Bird Sumner, 1848 to ˆ 1862. Charles Thomas Longley,

1862 to 1868. Archibald Campbell Tait,

1868 to 1882. Edward White Benson, 1882

to 1896. Frederick Temple, 1896 to

1903.

Randall Thomas Davidson.

The archbishop has a seat at Lambeth Palace, London. There are fragments in Palace Street of the old archbishop's palace which have been incorporated with a modern palace.

Other Ecclesiastical Foundations. — Canterbury naturally abounded in religious foundations. The most important, apart from the cathedral, was the Benedictine abbey of St Augustine. This was erected on a site granted by King ˆEthelberht outside his capital, in a tract called Longport. Augustine dedicated it to St Peter and St Paul, but Archbishop Dunstan added the sainted name of the founder to the dedication, and in common use it came to exclude those of the apostles. The site is now occupied by St Augustine's Missionary College, founded in 1844 when the property was acquired by A. J. B. Beresford Hope. Some ancient remnants are preserved, the principal being the entrance gateway (1300) , with the cemetery gate, dated a century later, and the guest hall, now the refectory; but the scanty ruins of St Pancras' chapel are of high interest, and embody Roman material. The chapel is said to have received its dedica- tion from St Augustine on account of the special association of St Pancras with children, and in connexion with the famous story of St Gregory, whose attention was first attracted to Britain

when he saw the fair-faced children of the Angles who had been brought to Rome, and termed them ” not Angles but angels.”

There were lesser houses of many religious orders in Canterbury, but only two, those of the Dominicans near St Peter’s church in St Peter’s Street, and the Franciscans, also in St Peter’s Street, have left notable remains. The Dominipan refectory is used as a chapel. Among the many churches, St Martin’s, Longport, is of the first interest. This was the scene of the earliest work of Augustine in Canterbury, and had seen Christian service before his arrival. Its walk contain Roman masonry, but whether it is in part a genuine remnant of a Romano-British Christian church is open to doubt. There are Norman, Early English and later portions; and the font may be in part pre- Norman, and is indeed associated by tradition with the baptism of ˆEthelberht himself. St Mildred’s church exhibits Early English and Perpendicular work, and the use of Roman material is again visible here. St Paul’s is of Early English origin; St Dunstan’s, St Peter’s and Holy Cross are mainly Decorated and Perpendicular. The village of Harbledown, on the hill west of Canterbury on the London road, from the neighbourhood of which a beautiful view over the city is obtained, has many associations with the ecclesiastical life of Canterbury. It is mentioned by Chaucer in his pilgrimage under the name, appro- priate to its site, of ” Bob up and down.” The almshouses, which occupy the site of Lanfranc’s hospital for lepers, include an ancient hall and a chapel in which the west door and northern nave arcade are Norman, and are doubtless part of Lanfranc’s buildings. The neighbouring parish church is in great part rebuilt. Among the numerous charitable institutions in Canter- bury there are several which may be called the descendants of medieval ecclesiastical foundations.

City Buildings, &c. — The old city walls may be traced, and the public walk called the Dane John (derived probably from donjon) follows the summit of a high artificial mound within the lines. The cathedral is finely seen from this point. Only the massive turreted west gate, of the later part of the 14th century, remains out of the former six city gates. The site of the castle is not far from the Dane John, and enough remains of the Norman keep to show its strength and great size. Among other buildings and institutions there may be mentioned the guildhall in High Street, of the early part of the 18th century; the museum, which includes a fine collection of local, including many Roman, relics; and the school of art, under municipal management, but founded by the painter T. Sidney Cooper (d. 1902), who was a resident at Harbledown. A modern statue of a muse commemorates the poet Christopher Marlowe (1564- iS93)i a native of the city; and a pillar indicates the place where a number of persons were burnt at the

stake in the reign of Mary.

The King's school, occupying buildings adjacent to the cathedral, developed out of the early teaching furnished by the monastery. It was refounded by Henry VIII. in 1541 (whence its name), and is managed on the lines of ordinary public schools. It has about 250 boys; and there is besides a junior or prepara- tory school. The school is still connected with the ecclesiastical foundation, the dean and chapter being its governors.

A noted occasion of festivity in Canterbury is the Canterbury cricket-week, when the Kent county cricket eleven engages in matches with other first-class teams, and many visitors are attracted to the city.

Canterbury has a considerable agriculture trade, breweries, tanneries, brickworks and other manufactures. The parlia- mentary borough returns one member. The city is governed by a mayor, 6 aldermen and 18 councillors. Area, 3955 acres.

History of the City. — The existence of a Romano-British town on the site of Canterbury has already been indicated. It was named Durovernum, and was a flourishing county town on the road from the Kentish ports to London. Mosaic pavements and other remains have been found in considerable abundance. The city, known by the Saxons as Cantwaraburh, the town of the men of Kent, was the metropolis of ˆEthelberht's kingdom. At the time of the Domesday survey Canterbury formed part of the royal demesne and was governed by a portreeve as it had been

before the Conquest. In the 13th and 14th centuries, two bailiffs presided over the burghmote, assisted by a larger and smaller council. Henry II., by an undated charter, confirmed former privileges and granted to the citizens that no one should implead them outside the city walls and that the pleas of the crown should be decided according to the customs of the city. In 1256 Henry III. granted them the city at an annual fee farm of £60, also the right of electing their bailiffs. Confirmations of former charters with additional liberties were granted by later sovereigns, and Henry VI. incorporated Canterbury, which he called " one of our most ancient cities," under the style of the mayor and commonalty, the mayor to be elected by the burgesses. James I. in 1609 confirmed these privileges, giving the burgesses the right to be called a body corporate and to elect twelve alder- men and a common council of twenty-four. Charles II., after calling in the charters of corporations, granted a confirmation in 1684. Canterbury was first represented in parliament in 1283, and it continued to return

two members until 1885, when the number was reduced to one. A fair was granted by Henry VI. to the citizens to be held in the city or suburbs on the 4th of August and the two days following; other fairs were in the hands of the monasteries; the corn and cattle markets and a general market have been held by prescription from time immemorial. Canterbury was a great centre of the silk- weaving trade in the 17 th century, large numbers of Walloons, driven by persecution to England, having settled there in the reign of Elizabeth. In 1676 Charles II. granted a charter of incorporation to the Walloon congregation under style of the master, wardens and fellowship of weavers in the city of Canterbury. The market for the sale of corn and hops was regulated by a local act in 1801.

See A. P. Stanley, Historical Memorials of Canterbury (London, 1855); J- Brent, Canterbury in the Olden Time (Canterbury, 1879); J. W. Legg and W. H. St J. Hope, Inventories of Christchurch, Canterbury (London, 1902) ; Victoria County History, Kent.

CANTHARIDES, or Spanish Flies, the common blister- beetles (Cantharis vesicatoria) of European pharmacy. They are bright, iridescent, golden-green or bluish-coloured beetles (see Coleoptera), with the breast finely punctured and pubescent, head and thorax with a longitudinal channel, and elytra with two slightly elevated lines. The insect is from half-an-inch to an inch in length, and from one to two lines broad, the female being broader in the abdomen and altogether larger than the male. It is a native of the south of Europe, being found in Spain, France, Germany, Italy, Hungary and the south of Russia, and it is also obtained in Siberia. The Spanish fly is also occasionally found in the south of England. The insects feed upon ash, lilac, privet and jasmine leaves, and are found more rarely on elder, rose, apple and poplar trees. Their presence is made known by a powerful disagreeable odour, which penetrates to a considerable distance. They are collected for use at late evening or early morning, while in a dull bedewed condition, by shaking them off the trees or shrubs into cloths spread on the ground; and they are killed by dipping them into hot water or vinegar, or by expos- ing them for some time over the vapour of vinegar. They are then dried and put up for preservation in glass-stoppered bottles; and they require to be very carefully guarded against mites and various other minute insects, to the attacks of which they are peculiarly liable. It has been shown by means of spectroscopic observations that the green colour of the elytra, &c, is due to the presence of chlorophyll; and that the varia- tions of the spectral bands are sufficient, after the lapse of many years, to indicate with some certainty the kind of leaves on which the insects were feeding shortly before they were killed.

Cantharides owe their value to the presence of a peculiar chemical principle, to which the name cantharidin has been given. It is most abundant in large full-grown insects, while in very young specimens no cantharidin at all has been found. From about one-fourth to rather more than one-half per cent, of cantharidin has been obtained from different samples; and it has been ascertained that the elytra or wing-sheaths of the insect, which alone are used in pharmacy, contain more of the active principle than the soft parts taken together; but

apparently cantharidin is most abundant in the eggs and generative organs.

Cantharidin constitutes from £ to 1 % of cantharides. It has the formula G0H12O4, and on hydrolysis is converted into cantharinic acid, G0H44O5. It crystallizes in colourless plates and is readily soluble in alcohol, ether, &c, but not in water. The British Pharmacopeia contains a large number of preparations of cantharides, but the only one needing special mention is the tinc- ture, which is meant for internal administration; the small dose is noteworthy, five minims being probably the maximum for safety. The external action of cantharides or cantharidin is extremely characteristic. When it is applied to the skin there are no obvious consequences for some hours. Thereafter the part becomes warm and painful, owing to marked local vascular dilatation. This is the typical rubefacient action. Soon afterwards there is an accumulation under the epidermis of a serum derived from the dilated blood-vessels. The numerous small blisters or vesicles thus derived coalesce, forming a large sac full of ” blister-fluid.” The drug is described as a counter-irritant, though the explanation of this action is very doubtful. Ap- parently there is an influence on the afferent nerves of the part which causes a reflex contraction— some authors say dilatation — of the vessels in the internal organs that are under the control of the same segment of the nervous system as that supplying the area of skin from which the exciting impulse comes. When applied in this fashion a certain quantity of the cantharides is absorbed.

Taken internally in any but minute doses, the drug causes the most severe gastro-intestinal irritation, the vomited and evacuated matters containing blood, and the patient suffering agonizing pain and extreme depression. The further character- istic symptoms are displayed in the genito-urinary tract. The drug circulates in the blood

in the form of an albuminate and is slowly excreted by the kidneys. The effect of large doses is to cause great pain in the renal region and urgent wish to micturate. The urine is nevertheless small in amount and contains albumen and blood owing to the local inflammation produced in the kidney by the passage of the poison through that organ. The drug often has a marked aphrodisiac action, producing priapism, or in the female sex the onset of the catamenia or abortion.

Cantharides is used externally for its counter-irritant action. There are certain definite contra-indications to its use. It must not be employed in cases of renal disease, owing to the risks attendant upon absorption. It must always be employed with caution in the case of elderly persons and children ; and it must not be applied to a paralysed limb (in which the power of healing is deficient), nor to parts upon which the patient lies, as other- wise a bed-sore is likely to follow its use. The drug is admini- stered internally in certain cases of impotence and occasionally in other conditions. Its criminal employment is usually intended to heighten sexual desire, and has frequently led to death.

The toxic symptoms have already been detailed, the patient usually dying from arrest of the renal functions. The treatment is far from satisfactory, and consists in keeping up the strength and diluting the poison in the blood and in the urine by the administration of bland fluids, such as soda-water, milk and plain water, in quantities as large as possible. External warmth should also be applied to the regions specially affected by the drug.

A very large number of other insects belonging to the same family possess blistering properties, owing to their containing cantharidin. Of these the most remarkable is the Telini ” fly ” of India (Mylabris cichorii), the range of which extends from Italy and Greece through Egypt and central Asia as far as China. It is very rich in cantharidin, yielding fully twice as much as ordinary cantharides. Several green-coloured beetles are, on account of their colour, used as adulterants to cantharides, but they are very easily detected by examination with the eye, or, if powdered, with the microscope.

CANTICLES. The Old Testament book of Canticles, or the Song of Solomon, is called in Hebrew The Song of Songs (that is, the choicest of songs), or, according to the full title which stands as the first verse of the book, The choicest of the songs of Solomon. In the Western versions the book holds the third place among

the so-called Solomonic writings, following Proverbs and Ecclesi- astes. In Hebrew Bibles it stands among the Megilloth, the five books

of the Hagiographa which have a prominent place in the Synagogue service. In printed Bibles and in German MSS. it is the first of these because it is read at the Passover, which is the first great feast of the sacred year of the Jews.

No part of the Bible has called forth a greater diversity of opinions than the Song of Solomon, and this for two reasons. In the first place, the book holds so unique a position in the Old Testament, that the general analogy of Hebrew literature is a very inadequate key to the verbal difficulties, the artistic structure, and the general conception and purpose of the poem. In point of language the departures from ordinary Hebrew are almost always in the direction of Aramaic. Many forms unique in Biblical Hebrew are at once explained by the Aramaic dialects, but not a few are still obscure. The philological difficulties of the book are, however, less fundamental than those which lie in the unique character of the Song of Solomon in point of artistic form, and in the whole atmosphere of thought and feeling in which it moves. Even in these respects it is not absolutely isolated. Parallels to the peculiar imagery may be found in the book of Hosea, in Ezekiel xvi. and xxiii. and above all in the 45th Psalm; but such links of union to the general mass of the Old Testament literature are too slight to be of material assistance in the solution of the literary problem of the book. Here, again, as in the lexical difficulties already referred to, we are tempted or compelled to argue from the distant and insecure analogy of other Eastern literatures, or are thrown back upon traditions of uncertain origin and ambiguous authority.

The power of tradition has been the second great source of confusion of opinion about the Song of Solomon. To tradition we owe the title, which apparently indicates Solomon as the author and not merely as the subject of the book. The authority of titles in the Old Testament is often questionable, and in the present case it is certain on linguistic grounds that the title is not from the hand that wrote the poem; while to admit that it gives a correct account of the authorship is to cut away at one stroke all the most certain threads of connexion between the book and our historical knowledge of the Old Testament people and literature.

To tradition, again, we owe the prejudice in favour of an allegorical interpretation, that is, of the view that from verse to verse the Song sets forth the history of a spiritual and not merely of an earthly love. To apply such an exegesis to Canticles is to violate one of the first principles of reasonable interpretation. True allegories are never without internal marks of their allegorical design. The language of symbol is not so perfect that a long chain of spiritual ideas can be

developed without the use of a single spiritual word or phrase; and even were this possible it would be false art in the allegorist to hide away his sacred thoughts behind a screen of sensuous and erotic imagery, so complete and beautiful in itself as to give no suggestion that it is only the vehicle of a deeper sense. Apart from tradition, no one, in the present state of exegesis, would dream of allegoriz- ing poetry which in its natural sense is so full of purpose and meaning, so apt in sentiment, and so perfect in imagery as the lyrics of Canticles. We are not at liberty to seek for allegory except where the natural sense is incomplete. This is not the case in the Song of Solomon. On the contrary, every form of the allegorical interpretation which has been devised carries its own condemnation in the fact that it takes away from the artistic unity of the poem and breaks natural sequences of thought. 1 The allegorical interpretation of the Song of Solomon had its rise in the very same conditions which forced a deeper

1 An argument for the allegorical interpretation has been often drawn from Mahommedan mysticism — from the poems of Hafiz, and the songs still sung by dervishes. See Jones, Poeseos Asiaticae Com. pt. iii. cap. 9; Rosenmuller's remarks on howth's Praelectio,xxxi., and Lane's Modern Egyptians, ch. xxiv. But there is no true analogy between the Old Testament and the pantheistic mysticism of Islam, and there is every reason to believe that, where the allegory takes a form really analogous to Canticles, the original sense of these songs was purely erotic. .

sense, now universally discarded, upon so many other parts of scripture. Yet strangely enough there is no evidence that the Jews of Alexandria extended to the book their favourite methods of interpretation. The arguments which have been adduced to prove that the Septuagint translation implies an allegorical exegesis are inadequate; 1 and Philo does not mention the book. Nor is there any allusion to Canticles in the New Testa- ment. The first trace of an allegorical view identifying Israel with the " spouse " appears to be in the Fourth Book of Ezra, near the close of the ist Christian century (v. 24, 26; vii. 26). Up to this time the canonicity of the Canticles was not unquestioned; and the final decision as to the sanctity of the book, so energetic- ally carried through by R. Aqiba, when he declared that " the whole world is not worth the day on which the Song of Songs was given to Israel; for all the scriptures (or Hagiographa) are holy, but the Canticles most holy," must be understood as being at the same time a

victory of the allegorical interpretation over the last remains of a view which regarded the poem as simply erotic. 2

The form in which the allegorical theory became fixed in the synagogue is contained in the Midrash Chazita and in the Targum, which is a commentary rather than a translation. The spouse is Israel, her royal lover the divine king, and the poem is ex- plained as tracing the great events of the people's history from the Exodus to the Messianic glory and final restoration. 3

The authority of Origen, who, according to Jerome, surpassed himself in his commentary of ten volumes on this book, estab- lished the allegorical theory in the Christian church in the two main forms in which it has since prevailed. The bridegroom is Christ, the bride either the church or the believing soul. The latter conception is, of course, that which lends itself most readily to purposes of mystical edification, and which has made Canticles the manual in all ages of a wide-spread type of religious contemplation. But the other view, which identifies the bride with the church, must be regarded as the standard of orthodox exegesis. Of course the allegorical principle admitted of very various modifications, and readily adapted itself to new religious developments, such as the rise of Mariolatry. Within the limits of the orthodox traditions the allegory took various colours, according as its mystical or its prophetical aspect was insisted on. Among medieval commentators of the former class S. Bernard holds a pre-eminent place; while the second class is represented by Nicolaus de Lyra, who, himself a converted Jew, modified the Jewish interpretation so as to find in the book an account of the processus ecclesiae under the Old and New Testa- ments. The prophetic exegesis reached its culminating point in the post-Reformation period, when Cocceius found in the Canticles a complete conspectus of church history. But the relaxation of traditional authority opened the door to still stranger vagaries of interpretation. Luther was tempted to understand the book of the political relations of Solomon and his people. Others detected the loves of Solomon and Wisdom — a view which found a supporter in Rosenmiiller.

The history of the literal interpretation begins with the great " commentator "of the Syrian Church, Theodorus of Mopsuestia (died 429), who condemned equally the attempt to find in the book a prophecy of the blessings given to the church, and the idea even at that time expressed in some quarters that the book is immoral. Theodorus regarded the Canticles as a poem written by Solomon in answer to the complaints of his people about his Egyptian marriage; and this was one of the heresies charged upon him after his death,

which led to his condemnation

1 Repeated recently by Scholz, Rommentar, pp. iii. and iv.

2 The chief passages of Jewish writings referring to this dispute are Mishna Jadaim, iii. 5 and Tosifta Sanhedrin, xii. For other passages see Gratz's Commentary, p. 115, and in control of his criticism the introduction to the commentary of Delitzsch.

3 The text of the Targum in the Polyglots and in Buxtorf's Rabbinic Bible is not complete. The complete text is given in the Venice editions, and in Lagarde's Hagiographa Chaldaice (Lipsiae, '873). The Polyglots add a Latin version. A German version is given by Riedel in his very useful book, Die Auslegung des Hohen- liedes (1898), which also reviews the interpretation of Canticles by Hippolytus, Origen and later Greek writers.

at the second council of Constantinople (553 A.D.). A literal interpretation was not again attempted till in 1544 Chateillon (Castellio or Castalion) lost his regency at Geneva for proposing to expel the book from the canon as impure. Grotius (Annot. in V.T., 1644) took up a more moderate position. Without denying the possibility of a secondary reference designed by Solomon to give his poem a more permanent value, he regards the Canticles as primarily an bapLcxTVS (conjugal prattle) between Solomon and Pharaoh's daughter. The distinction of a primary and secondary sense gradually became current not only among the Remonstrants, but in England (Lightfoot, Lowth) and even in Catholic circles (Bossuet, 1693). In the actual understanding of the book in its literal sense no great progress was made. Solomon was still viewed as the author, and for the most part the idea that the poem is a dramatic epithalamium was borrowed from Origen and the allegorists, and applied to the marriage of Pharaoh's daughter.

From Grotius to Lowth the idea of a typical reference designed by Solomon himself appears as a mere excrescence on the natural interpretation, but as an excrescence which could not be removed without perilling the place of Canticles in the canon, which, indeed, was again assailed by Whiston in 1723. But in his notes on Lowth 's lectures, J. D. Michaelis, who regarded the poem as a description of the enduring happiness of true wedded love long after marriage, proposed to drop the allegory altogether, and to rest the canonicity Of the book, as of those parts of Proverbs which treat of conjugal affection, on the moral picture it presents (i758).

Then came Herder's exquisite little treatise on Solomon's Songs of Love, the Oldest and Sweetest of the East (1778). Herder, possessing delicacy of taste and sympathetic poetical genius, delighted in the Canticles as the transparently natural expression of innocent and tender love. He expressed the idea that the poem is simply a sequence of independent songs without inner unity, grouped so as to display various phases and stages of love in a natural order, culminating in the placid joys of wedded life. The theory of Herder, which refuses to acknowledge any con- tinuity in the book, was accepted by Eichhorn on the part of scholars, and with some hesitation by Goethe on the part of the poets. Commentaries based on this view are those of Dopke (1820), Magnus (1842), Noyes (1846).

The prevalent view of the 19th century, however, recognizes in the poem a more or less pronounced dramatic character, and following Jacobi (1771) distinguishes the shepherd, the true love of the Shulamite, from King Solomon, who is made to play an ignominious part. Propounded by Staudlin (1792) and Ammon (1795), this view was energetically carried out by Umbreit (1820), and above all by Ewald, whose acuteness gave the theory a new development, while his commanding influence among Hebrew scholars acquired for it general recognition. Ewald assumed a very simple dramatic structure, and did not in his first publica- tion (1826) venture to suppose that the poem had ever been acted on a stage. His less cautious followers have been generally tempted to dispose of difficulties by introducing more complicated action and additional interlocutors (so, for example, Hitzig, 1855; Ginsburg, 1857; Renan, i860); while Bottcher (1850) did his best to reduce the dramatic exposition to absurdity by introducing the complexities and stage effects of a modern operetta. Another view is that of Delitzsch (1851 and 1875) and his followers, who also plead for a dramatic form — though without supposing that the piece was ever acted — but adhere to the traditional notion that Solomon is the author, who cele- brates his love to a peasant maiden, whom he made his wife, and in whose company the proud monarch learned to appreciate the sweetness of a true affection and a simple rustic life.

In view of the prevalence of the " dramatic " theory of Canticles during the 19th century, and its retention by some comparatively recent writers (Oettli, Driver, Adeney, Harper), it seems desirable that this theory should be presented in some detail. A convenient summary of the form it assumed in the hands of Ewald (the shepherd-hypothesis) and of Delitzsch (the king-hypothesis) is given by Driver (Literature of the Old

Testament, ch. x. § 1). The following presentation of the theory, on the general lines of Ewald, gives that form of it which Robertson Smith was able to accept in 1876.

The centre of attraction is throughout a female figure, and the unity of this figure is the chief test of the unity of the book. In the long canto, i. i-ii. 7, the heroine appears in a royal palace (i. 4) among the daughters of Jerusalem, who are thus presumably ladies of the court of Zion. At i. 9, an additional interlocutor is introduced, who is plainly a king, and apparently Solomon (i. 9, 12). He has just risen from table, and praises the charms of the heroine with the air of a judge of beauty, but without warmth. He addresses her simply as “my friend” (not as English version, “my love”). The heroine, on the contrary, is passionately in love, but nothing can be plainer than that the object of her affection is not the king. She is not at home in the palace, for she explains (i. 6) that she has spent her life as a peasant girl in the care of vineyards. Her beloved, whom she knows not where to find (i. 7), but who lies constantly on her heart and is cherished in her bosom like a spray of the sweet henna flowers which Oriental ladies delight to wear (i. 13, 14), is like herself a peasant — a shepherd lad (i. 7) — with whom she was wont to sit in the fresh greenwood under the mighty boughs of the cedars (i. 16, 17). Even before the king’s entrance the ladies of the court are impatient at so silly an affection, and advise her, ” if she is really so witless,” to begone and rejoin her plebeian lover (i. 8). To them she appeals in ii. 5, 6, where her self- control, strung to the highest pitch as she meets the compliments of the king with reminiscences of her absent lover, breaks down in a fit of half-delirious sickness. The only words directed to the king are those of i. 12, which, if past tenses are substituted for the presents of the English version, contain a pointed rebuff. Finally, ii. 7 is, on the plainest translation, a charge not to arouse love till it please. The moral of the scene is the spontaneity of true affection.

Now, at viii. 5, a female figure advances leaning upon her beloved, with whom she claims inseparable union, — “for love is strong as death, its passion inflexible as the grave, its fire a divine flame which no waters can quench or floods drown. Yea, if a man would give all his wealth for love he would only be contemned.” This is obviously the sentiment of ii. 7, and the suitor, whose wealth is despised, must almost of necessity be identified with the king of chapter i., if, as seems reasonable, we place viii. n, 12 in the mouth of the same speaker — “King Solomon has vineyards which bring him a princely revenue, and enrich even the farmers. Let him and them keep their

wealth; my vineyard is before me" (i.e. I possess it in present fruition). The last expression is plainly to be connected with i. 6. But this happiness has not been reached without a struggle. The speaker has proved herself an impregnable fortress (ver. 10), and, armed only with her own beauty and innocence, has been in his eyes as one that found peace. The sense is that, like a virgin fortress, she has compelled her assailant to leave her in peace. To these marks of identity with the heroine of ch. i. are to be added that she appears here as dwelling in gardens, there as a keeper of vineyards (i. 6, and viii. 13), and that as there it was her brethren that prescribed her duties, so here she apparently quotes words in which her brothers, while she was still a child, speculated as to her future conduct and its reward (viii. 8, 9).

If this analysis of the commencement and close of the book is correct, it is certain that the poem is in a sense dramatic, that is, that it uses dialogue and monologue to develop a story. The heroine appears in the opening scene in a difficult and painful situation, from which in the last chapter she is happily ex- tricated. But the dramatic progress which the poem exhibits scarcely involves a plot in the usual sense of that word. The words of viii. 9, 10 clearly indicate that the deliverance of the heroine is due to no combination of favouring circumstances, but to her own inflexible fidelity and virtue.

The constant direction of the maiden's mind to her true love is partly expressed in dialogue with the ladies of the court (the daughters of Jerusalem), who have no dramatic individuality, »nd whose only function in the economy of the piece is to give

the heroine opportunity for a more varied expression of her feelings. In i. 8 we found them contemptuous. In chapter iii. they appear to be still indifferent; for when the heroine relates a dream in which the dull pain of separation and the uneasy consciousness of confinement and danger in the unsympathetic city disappear for a moment in imagined reunion with her lover, they are either altogether silent or reply only by taking up a festal part song describing the marriage procession of King Solomon (iii. 6-1 1), which stands in jarring' contrast to the feelings of the maiden. 1 A second dream (v. 2-8), more weird and melancholy, and constructed with that singular psycho- logical felicity which characterizes the dreams of the Old Testa- ment, gains more sympathy, and the heroine is encouraged to describe her beloved at large (v. 10-vi. 3). The structure of these dialogues is so simple, and their purpose is so strictly limited to the exhibition of the character and affection of the maiden, that it is only natural to find them supplemented by a free use of pure monologue, in which the heroine recalls the happiness of past days, or expresses

her rising hope of reunion with her shepherd, and restoration to the simple joys of her rustic life. The vivid reminiscence of ii. 8-17 takes the form of a dialogue within the main dialogue of the poem, a picture within a picture — the picture of her beloved as he stood at her window in the early spring time, and of her own merry heart as she laugh- ingly answered him in the song with which watchers of the vineyards frighten away the foxes. It is, of course, a fault of perspective that this reminiscence is as sharp in outline and as strong in colour as the main action. But no one can expect perspective in such early art, and recollection of the past is clearly enough separated from present reality by ii. 16, 17. The last monologue (vii. 10-viii. 3), in which the hope of immediate return with her lover is tempered by maidenly shame, and a maiden's desire for her mother's counsel, is of special value for a right appreciation of the psychology of the love which the poem celebrates, and completes a picture of this flower of the northern valleys which is not only firm in outline, but delicate in touch. The subordinate action which supports the portraiture of the maiden of Galilee is by no means easy to understand.

We come next to chapter vi., which again sings the praises of the heroine, and takes occasion in this connexion to introduce, with the same want of perspective as we observed in ch. ii., a dialogue descriptive of Solomon's first meeting with the maiden. We learn that she was an inhabitant of Shulem or Shunem in Issachar, whom the king and his train surprised in a garden on the occasion of a royal progress through the north. Her beauty drew from the ladies of the court a cry of admiration. The maiden shrinks back with the reply — "I was gone down into my garden to see its growth. ... I know not how my soul hath brought me among the chariots of princes"; but she is commanded to turn and let herself be seen in. spite of her bashful protest — " Why do ye gaze on the Shulamite as at a dance of Mahanaim (a spectacle)?" Now the person in whose mouth this relation is placed must be an eye-witness of the scene, and so none other than the king. But in spite of the verbal repetition of several of the figures of ch. iv. . . . the tone in which the king now addresses the Shulamite is quite changed. She is not only beautiful but terrible, her eyes trouble him, and he cannot endure their gaze. She is unique among women, the choice and only one of her mother. The unity of action can only be maintained by ignoring vii. 1-9, and taking the words of Solomon in chapter vi. in their obvious sense as implying that the king at length recognizes in the maiden qualities of soul unknown in the harem, a character which compels respect, as well as a beauty that inflames desire. The change of feeling which was wrought in the daughters of Jerusalem in the previous scene now

extends to Solomon himself, and thus the glad utterances of vii. 10, seq.,

1 Ewald and others make this song a distinct scene in the action of the poem, supposing that the author here exhibits the honourable form of espousal by which Solomon thought to vanquish the scruples of the damsel. This view, however, seems to introduce a com- plication foreign to the plan of the book.

have a sufficient motive, and the dinouement is no longer violent and unprepared.

The nodus of the action is fully given in chapter i., the final issue in chapter viii. The solution lies entirely in the character and constancy of the heroine, which prevail, in the simplest possible way, first over the ladies of the court and then over the king.

The attractiveness of the above theory cannot be denied; but it may be asked whether the attraction does not lie in the appeal to modern taste of a story which is largely the product of modern imagination. It supposes a freedom of intercourse between lovers inconceivable for the East. The initial situation of the maiden in the harem of Solomon is left as a problem for the reader to discover, until he comes to its supposed origin in vi. n ; the expedient might be granted in the case of one of Browning's Men and Women, but seems very improbable in the present case. The more elaborate dramatic theories can find no parallel in Semitic literature to the " drama " of Canticles, the book of Job being no exception to this statement; whilst even the simpler theories ask us to believe that the essential parts of the story — the rape of the Shulamite, the change in Solomon's disposition, her release from the harem — are to be supplied by the reader from obscure and disputable references. More serious still is the fact that any progress of action from first to last is so difficult to prove. In the first chapter we listen to a woman speaker desiring to be kissed by the man who has brought her into his chambers, and speaking of "our bed"; in the last we leave her " leaning upon her beloved." The difficulties of detail are equally great. To suppose that all the male love-making, by hypothesis unsuccessful, belongs to Solomon, whilst the heroine addresses her passionate words to the continuously absent shepherd, is obviously unconvincing; yet, if this shepherd speaks in iv. 8-v. i , how are we to explain his appearance in the royal harem? This and other difficulties

were acknowledged by Robertson Smith, notably the presence of vii. 1-9, which he proposed to set aside as an interpolation, because of its sensuality and of the difficulty of working it into the dramatic scheme. The fact that this passage has subse- quently become the central element in the new interpretation of the book is, perhaps, a warning against violent measures with difficulties.

Attention has already been drawn to Herder's proposal, accepted by some later writers, including Diestel and Reuss, to regard the book as a collection of detached songs. This received new and striking confirmation from the anthropological data supplied by J. G. Wetstein (1873), Prussian consul at Damascus. His observations of the wedding customs of Syrian peasants led him to believe that Canticles is substantially a collection of songs originally sung at such festivities. Wetstein's contribution was republished shortly afterwards by Delitzsch, in an appendix to his Commentary:, but it received little attention. The first amongst Old Testament scholars to perceive its importance seems to have been Stade, who accepted Wetstein's view in a footnote to his History 0} the Jewish People (ii. p. 197), published in 1888; to Budde, however, belongs the distinction of the systematic and detailed use of Wetstein's suggestions, especially in his Commentary (1898). This interpretation of the book is accepted by Kautzsch (1896), Siegfried (1898), Cheyne (1899), and other eminent scholars. The last-named states the theory tersely as follows: " The book is an anthology of songs used at marriage festivals in or near Jerusalem, revised and loosely connected by an editor without regard to temporal sequence " (Ency. Bibl. 691). The character of the evidence which has contributed to the acceptance of this view may be indicated in Wetstein's own statements : —

" The finest time in the life of the Syrian peasant consists of the first seven days after his wedding, in which he and his young wife play the part of king (melik) and queen (melika), both being so treated and served by their village and the invited communities of the neighbourhood. The majority of the greater village weddings fall in the month of March, the finest of the Syrian year. The winter rains being over, and the sun still refreshing, not oppressive as in the following months, the weddings are celebrated in the open

air on the village threshing-floor, which at this time of the year is with few exceptions a flowery mead. . . . We pass over the wedding- day itself with its displays, the sword-dance of the bride, and the great feast. On the morrow, bridegroom and bride awake as king and queen. Already before sunrise they receive the leader of the bridesmen, as their vizier, and the bridesmen themselves; the latter thereupon fetch

the threshing-board and bring it to the threshing- floor, singing a rousing song of battle or love, generally both. There it is erected as a throne, and after the royal couple have taken their seats and the necessary formalities are gone through, a great dance in honour of the young couple begins; the accompanying song is concerned only with themselves, its principal element being the inevitable wasf, i.e. a description of the physical perfections of both and their ornaments. The eulogy of the queen is more moderate, and praises her visible, rather than veiled, charms; this is due to the fact thˆt she is to-day a married woman, and that the wasf sung on the previous day during her sword-dance has left nothing to desire. This wasf is the weak element in Syrian wedding-songs according to our taste; its comparisons are to us frequently too clumsy and reveal the stereotyped pattern. It is the same with the little collection of charming wedding-songs and fragments of them which has been received into the canon of the Old Testament under the name of Canticles; the wasf (iv.vii.) is considerably below the rest in poetical value. With this dance begin the sports, lasting seven days, begun in the morning on the first, shortly before midday on the other days, and continuing far into the night by the light of the fires that are kindled; on the last day alone all is over by sunset. During the whole week both royalties are in marriage attire, must do no work and have no cares ; they have only to look down from the merteba (throne) on the sports carried on before them, in which they themselves take but a moderate part; the queen, however, occa sionally gives a short dance to attract attention to her bridal attire.” ‘

For the general application of these and the related customs to the interpretation of the book, reference should be made to Budde’s Commentary, which recognizes four wasfs, viz. iv. 1-7 (describing the bride from head to breasts), v. 10-16 (the bride- groom), vi. 4-7 (similar to and partly repeating iv. 1-7), and vii. 1-9, belonging to the sword-dance of the bride, her physical charms being sung from feet to head (cf . vii. 1 ; ” Why look ye on the Shulamite as (on) a dance of camps?” i.e. a war-dance). This dance receives its name from the fact that she dances it with a sword in her hand in the firelight on the evening of her wedding-day, and amid a circle of men and women, whilst such a was} as this is sung by the leader of the choir. The passage relating to the litter of Solomon (iii. 6-1 1) — an old difficulty with the dramatizers— relates to the erection of the throne on the threshing-floor. 2 The terms ” Solomon ” and ” the Shulamite ” are explained as figurative references to the famous king, and to Abishag the Shulamite, ” fairest among women,” on the lines of the use of ” king ” and ” queen ” noted above. Other songs of Canticles are

referred by Budde to the seven days of festivities. It need hardly be said that difficulties still remain in the analysis of this book of wedding-songs; whilst Budde detects 23 songs, besides fragments, Siegfried divides the book into io. 3 Such differences are to be expected in the case of a collection of songs, some admittedly in dialogue form, all concerned with the common theme of the love of man and woman, and without any external indication of the transition from one song to the next.

Further, we must ask whether the task has been complicated by any editorial rearrangement or interpolation; the collector of these songs has certainly not reproduced them in the order of their use at Syrian weddings. Can we trace any principle, or even any dominant thought in this arrangement? In this connexion we touch the reason for the reluctance of some scholars to accept the above interpretation, viz. the alleged marks of

1 Wetstein, Zeitschrift f. Ethn., 1873, pp. 270-302; quoted and condensed by Budde as above in Comm. p. xvii. ; for a fuller reproduction of Wetstein in English see Harper, The Song of Songs, pp. 74-

76.

2 For the connexion of the threshing-floor with marriage through the idea of sexual fertility, we may compare many primitive ideas and customs, such as those described by Frazer (The Golden Bough, ii. p. 181 f., 186).

3 Castelli (// Canticodei Cantici, 1892) has written a very attractive little book on Canticles (quite apart from the Wetstein development) regarded as ” a poem formed by a number of dialogues mutually related by a certain succession”; they require for their under- standing nothing but some indication of the speaker at each tran- sition (such as we find in codex A of the Septuagint).

literary unity which the book contains (e.g. Driver, loc. tit.). These are (1) general similarity of treatment, seen in the use of imagery (the bride as a garden, iv. 12; vi. 2, 3), the frequent references to nature and to particular places, and the recurrence of descriptions of male and female beauty; (2) references to ” Solomon ” or ” the king,” to ” the Shulamite ” and to ” the daughters of Jerusalem ” (from which, indeed, the dramatic theory has found its chief inspiration) ; (3)

indications that the same person is speaking in different places (cf. the two dreams of a woman, and the vineyard references, i. 6; viii. 12); (4) repetitions of words and phrases especially of the refrains, ” disturb not love” (ii. 7; iii. 5; viii. 4), and “until the day break ” (ii. 17; iv. 6). But of these (1) is no more than should be expected, since the songs all relate to the same subject, and spring from a common world of life and thought of the same group of people; (2) finds at least a partial parallel and explana- tion in the use of ” king ” and ” queen ” noted above; whilst (3) and (4) alone seem to require something more than the work of a mere collector of the songs. It is, of course, true that, in recurrent ceremonies, the same thought inevitably tends to find expression in the same words. But this hardly meets the case of the refrains, whilst the reference to the vineyard at be- ginning and end does suggest some literary connexion. It is to be noted that the three refrains ” disturb not love ” severally follow passages relating to the consummation of the sexual relation, whilst the two refrains ” until the day break ” appear to form an invitation and an answer in the same connexion, whilst the ” Omnia vincit Amor ” passage in the last chapter forms a natural climax (cf. Haupt’s translation). So far, then, as this somewhat scanty evidence goes, it may point to some one hand which has given its semblance of unity to the book by underlining the joy of consummated love — to which the vineyard and garden figures throughout allude — and by so arranging the collection that the descriptions of this joy find their climax in viii. 6-7. 1

Whatever conclusion, however, may be reached as to the present arrangement of Canticles, the recognition of wedding- songs as forming its nucleus marks an important stage in the interpretation of the book; even Rothstein (1902), whilst attempting to resuscitate a dramatic theory, ” recognizes . . . the possibility that older wedding-songs (as, for instance, the wasfs) are worked up in the Song of Songs ” (Hastings’ D.B. p. 504b). The drama he endeavours to construct might, indeed, be called ” The Tokens of Virginity,” since he makes it culminate in the procedure of Deut. xxii. 13 f., which still forms part of the Syrian ceremonies. But his reconstruction is open to the same objection as all similar attempts, in that the vital moments of the dramatic action have to be supplied from without. Thus between v. 1 and v. 2, the baffled king is supposed to have dis- appeared, and to have been replaced by the happy lover; between viii. 7 and viii. 8, we are required to imagine ” the bridal night and its mysteries “; whilst between viii. 9 and viii. 10, we must suppose the evidence that the bride has been found a virgin is exhibited. He also attempts, with considerable ingenuity, to trace the legend involved in the supposed

drama to the fact that Abishag remained a virgin in regard to David (1 Kings i. 4) whilst nothing is said of her marriage to Solomon. 2

On the view accepted above, Canticles describes in a number

1 On the erotic meaning of many of the figures employed see the notes of Haupt in The American Journal of Semitic Languages (July 1902); also G. Jacob, Das Hohelied (1902), who rightly protests against the limitation in the Cotnm. of Budde and Siegfried (p. 10) of all the songs to the marriage relation. Haupt thinks that the songs were not originally composed for weddings, though used there (p. 207, op. cit.). Diestel had pointed out, in another connexion (B.L. 125), that nothing is said in the book of the blessing of children, the chief end of marriage from a Hebrew standpoint.

2 Rothstein's criticism of Budde turns chiefly on the latter's admission of redactional elements, introducing " movement and action," and may be summed up in the statement that "Budde himself by the characteristics he assigns to the redactor points the way again past his own hypothesis to the dramatical view of the Song " (loc. cit. 594b). A. Harper, " The Song of Songs " [Cambridge Bible), also criticizes Budde at length in favour of the conventional dramatical theory (Appendix).

of separate poems the central passion of human life, and is wholly without didactic tendencies. Of its earliest history as a book we have no information. It is already included in the Hebrew canon (though its right to be there is disputed) when the first explicit mention of the book occurs. We have no evidence, therefore, of the theory of interpretation prevalent at the time of its incorporation with the other books of the canon. It seems, however, fair to infer that it would hardly have found acceptance but for a Solomonic theory of authorship and a " religious " theory of meaning. The problem raised by its present place in the canon occurs in relation to mistaken Jewish theories about other books also; it suggests, at least, that divine inspiration may belong to the life of a people rather than to the letter of their literature. Of that life Canticles portrays a central element — the passion of love — in striking imagery and graceful language, however far its oriental standard of taste differs from that of the modern West.

From the nature of the book, it is impossible to assign a precise date for its origin; the wedding-songs of which it chiefly consists must belong to the folklore of more than one century. The only evidence we possess as to date is drawn from the char- acter of the Hebrew in

which the book is written, which shows frequent points of contact with new Hebrew. 3 On this ground, we may suppose the present form of the work to date from the Greek period, i.e. after 332 B.C. This is the date accepted by most recent writers, e.g. Kautzsch, Cheyne, Budde, Rothstein, Jacob, Haupt. This late date finds some confirmation in the fact that Canticles belongs to the third and latest part of the Old Testament canon, and that its canonicity was still in dispute at the end of the 1st century a.d. The evidence offered for a north Israelite origin, on the ground of linguistic parallels and topographical familiarity (Driver, loc. cit.), does not seem very convincing; Haupt, however, places the compilation of the book in the neighbourhood of Damascus.

Literature. — Most of the older books of importance are named above; Ginsburg, The Song of Songs (1857), gives much informa- tion as to the history of the ‘exegesis of Canticles; Diestel’s article, ” Hohes Lied,” in Schenkel’s Bibel Lexikon (1871), reviews well the history of interpretation prior to Wetstein; cf. also Riedel, Die Auslegung des Hohenliedes in der jiidischen Gemeinde und der griechischen Kirche (1898). The most important commentary is that by Budde, in Marti’s Kurzer Hand-Commentar {Die fiinf Megilloth) (1898), where references to the literature of the 19th century are given. To his list add Siegfried, ” Prediger und Hohes- lied,” in Nowack’s Handkommentar (1898); Cheyne’s article “Canticles,” in the Encyclopaedia Biblica (1899); Dalman, Palas- linischer Diwan (1901), parallels to the songs; Rothstein’s article, ” Song of Songs,” in Hastings’ Dictionary of the Bible (1902); G. Jacob, Das Hohelied auf Grund arabischer und anderer Parallelen von neuem Untersucht (1902) ; A. Harper, The Song of Songs (1902); Haupt, ” The Book of Canticles,” in The American Journal of Semitic Languages (July 1902) ; Scholz, Kommentar uber das Hohelied und Psalm 45 (1904) (written from the Roman Catholic dogmatic standpoint of allegorical interpretation, with a vigorous criticism of other positions). No commentator in English, except Haupt, in the article named above, has yet worked on the lines of the above anthology theory. Haupt gives valuable notes, with a translation and rearrangement of the separate songs.

(W. R. S.; H. W. R.*)

CANTILEVER (a word of doubtful origin, probably derived from ” lever,” in its ordinary meaning, and ” cant,” an angle or edge, or else from modern Lat. quanta libra, of what weight), a building term for a stone, iron or wooden bracket, considerably greater in length than depth, used to support a gallery, &c; and for a system of bridge-

building (see Bridges).

CANTILUPE, THOMAS DE (c. 1218-1282), English saint and prelate, was a son of William de Cantilupe, the 2nd baron (d. 1 251), one of King John's ministers, and a nephew of Walter de Canti- lupe, bishop of Worcester. He was educated at Paris and Orleans, afterwards becoming a teacher of canon law at Oxford and chancellor of the university in 1262. During the Barons' War Thomas favoured Simon de Montfort and the baronial party. He represented the barons before St Louis of France

3 E.g. the late form of the relative pronoun used throughout except in title ; foreign words, Persian and Greek ; Aramaic words and usages (details in the Comm. or in E.B. 693).

at Amiens in 1264; he was made chancellor of England in February 1265, but was deprived of this office after Montfort's death at Evesham, and lived out of England for some time. Returning to England, he was again chancellor of Oxford Uni- versity, lectured on theology, and held several ecclesiastical appointments. In 1 274 he attended the second council of Lyons, and in 1275 he was appointed bishop of Hereford. Cantilupe was now a trusted adviser of Edward I. ; he attended the royal councils, and even when differing from the king did not forfeit his favour. The archbishop of Canterbury, Robert Kilwardby, was also his friend; but after Kilwardby's death in 1279 a series of disputes arose between the bishop and the new archbishop, John Peckham, and this was probably the cause which drove Cantilupe to visit Italy. He died at Orvieto, on the 25th of August 1282, and he was canonized in 1330. Cantilupe appears to have been an exemplary bishop both in spiritual and secular affairs. His charities were large and his private life blameless; he was constantly visiting his diocese, correcting offenders and discharging other episcopal duties; and he compelled neighbour- ing landholders to restore estates which rightly belonged to the see of Hereford. In 1905 the Cantilupe Society was founded to publish the episcopal registers of Hereford, of which Cantilupe's is the first in existence.

See the Ada Sanctorum, Boll., 1st October; and the Register of Thomas de Cantilupe, with introduction by W. W. Capes (1906).

CANTILUPE, WALTER DE id. 1265), bishop of Worcester, came of a

family which had risen by devoted service to the crown. His father and his elder brother are named by Roger of Wendover among the " evil counsellors " of John, apparently for no better reason than that they were consistently loyal to an unpopular master. Walter at first followed in his father's footsteps, entering the service of the Exchequer and acting as an itinerant justice in the early years of Henry III. But he also took minor orders, and, in 1236, although not yet a deacon, received the see of Worcester. As bishop, he identified himself with the party of ecclesiastical reform, which was then led by Edmund Rich and Robert Grosseteste. Like his leaders he was sorely divided between his theoretical belief in the papacy as a divine institution and his instinctive condemnation of the policy which Gregory IX. and Innocent IV. pursued in their dealings with the English church. At first a court favourite, the bishop came at length to the belief that the evils of the time arose from the unprincipled alliance of crown and papacy. He raised his voice against papal demands for money, and after the death of Grosseteste (1253) was the chief spokesman of the nationalist clergy. At the parliament of Oxford (1258) he was elected by the popular party as one of their representatives on the committee of twenty-four which undertook to reform the administration; from that time till the outbreak of civil war he was a man of mark in the councils of the baronial party. During the war he sided with Montfort and, through his nephew, Thomas, who was then chancellor of Oxford, brought over the university to the popular side. He was present at Lewes and blessed the Mont- fortians before they joined battle with the army of the king; he entertained Simon de Montfort on the night before the final rout of Evesham. During Simon's dictatorship, the bishop appeared only as a mediating influence; in the triumvirate of " Electors " who controlled the administration, the clergy were represented by the bishop of Chichester. Walter de Cantilupe died in the year after Evesham (1266). He was respected by all parties, and, though far inferior in versatility and force of will to Grosseteste, fully merits the admiration which his moral character inspired. He is one of the few constitutionalists of his day whom it is impossible to accuse of interested motives.

See the Chronica Maiora of Matthew Paris (" Rolls " series, ed. Luard) ; the Chronicon de Bellis (ed. Halliwell, Camden Society) ; and the Annates Monastici (" Rolls " series, ed. Luard) ; also T. F. Tout in the Political History of England, vol. iii. (1905).

CANTO (from the Lat. cantus, a song), one of the divisions of a long poem, a convenient division when poetry was more usually sung by the minstrel to his own accompaniment than read. In -*iusic, the

canto, in a concerted piece, is that part to which the

air is given. In modern music this is nearly always the soprano. The old masters, however, more frequently allotted it to the tenor. Canto fermo, or cantus firmus, is that part of the melody which remains true to the original motive, while the other parts vary with the counterpoint; also in Church music the simple straight- forward melody of the old chants as opposed to canto figurato, which is full of embellishments of a florid character (see Plain Song).

CANTON, JOHN (1718-1772), English natural philosopher, was born at Stroud, Gloucestershire, on the 31st of July 1718. At the age of nineteen, he was articled for five years as clerk to the master of a school in Spital Square, London, with whom at the end of that time he entered into partnership. In 1750 he read a paper before the Royal Society on a method of making artificial magnets, which procured him election as a fellow of the society and the award of the Copley medal. He was the first in England to verify Benjamin Franklin's hypothesis of the identity of lightning and electricity, and he made several import- ant electrical discoveries. In 1762 and 1764 he published experiments in refutation of the decision of the Florentine Academy, at that time generally accepted, that water is incom- pressible; and in 1768 he described the preparation, by calcining oyster-shell with sulphur, of the phosphorescent material known as Canton's phosphorus. His investigations were carried on without any intermission of his work as a schoolmaster. He died in London on the 22nd of March 1772.

CANTON (more correctly Kwang-chow Fu), a large and populous commercial city of China, in the province of Kwang- tung, situated on the eastern bank of the Pearl river, which at Canton is somewhat broader than the Thames at London Bridge, and is navigable 300 m. into the interior. The Pearl river has an additional course of 80 m. to the sea, the first part of which lies through a rich alluvial plain. Beyond this rises a range of hills terminating in abrupt escarpments along the course of the river. The bold shore thus formed compresses the stream at this point into a narrow pass, to which the Chinese have given the name of Hu-mun, or Tiger's Gate. This the Portuguese translated into Boca Tigre, whence the designation of " the Bogue," by which it is commonly known among Europeans. When viewed from the hills on the north, Canton appears to be little more than an expanse of reddish roofs relieved by a few large trees, — two pagodas shooting up within the walls, and a five-storeyed tower near the northern gate, being the most conspicuous objects. These hills rise 1 200 ft. above the river. Little or no vegetation is seen on them; and their acclivities, covered for miles with graves and tombs, serve as the

necropolis of this vast city. Three or four forts are built on the points nearest the northern walls. Facing the city on the opposite side of the river is the suburb and island of Honan. The part of Canton enclosed by walls is about 6 m. in circumference, and has a partition wall, running east and west, and dividing the city into two unequal parts. The northern and larger division is called the old, and the southern the new city. Including the suburbs, the city has a circuit of nearly 10 m. The houses stretch along the river for 4 m., and the banks are almost entirely concealed by boats and rafts. The walls of the city are of brick, on a foundation of sandstone and granite, are 20 ft. thick, and rise to an average height of 25 ft. On the north side the wall rises to include a hill which it there meets with, and on the other three sides the city is surrounded by a ditch, which is filled by the rising tide, when, for a time, the revolting mass of filth that lies in its bed is concealed from view. There are twelve outer gates — four of which are in the partition wall, and two water gates, through which boats pass from east to west across the new city. The gates are all shut at night, and in the daytime a guard is stationed at them to preserve order. The streets, amounting in all to upwards of 600, are long, straight, and very narrow. They are mostly paved and are not as dirty as those of some of the other cities in the empire; in fact, considering the habits of the people and the inattention of the government to these matters, Canton may be said to be a well- governed and comparatively cleanly city. The houses are in general small, seldom consisting of more than two storeys, the

ground floor serving as a shop, and the rest of the house, with the court behind, being used as a warehouse. Here are to be found the productions of every quarter of the globe ; and the merchants are in general attentive, civil, expert men of business, and generally assiduous.

The temples and public buildings of Canton are numerous, but none of them presents features worthy of special remark. There are two pagodas near the west gate of the old city, and 124 temples, pavilions, halls and other religious edifices within the city. One of the pagodas called the Kwangtah, or Plain Pagoda, is a Mahommedan mosque, which was erected by the Arabian voyagers who were in the habit of visiting Canton about ten centuries ago. It rises in an angular tapering tower to the height of 160 ft. Theotherisanoctagonalpagodaofninestoreys, 170 ft. in height, and was

first erected more than thirteen centuries ago. A Buddhist temple at Honan, opposite the foreign factories, and named in Chinese Hai-ch'wang-sze, or the Temple of the Ocean Banner, is one of the largest in Canton. Its grounds, which cover about seven acres, are surrounded by a wall, and are divided into courts, gardens and a burial-ground, where are deposited the ashes of priests, whose bodies are burned. There a re about 175 priests connected with this establishment. Besides the Hai-ch'wang-sze the most noteworthy temples in and about the city are those of the Five Hundred Gods and of Longevity, both in the western suburbs; the Tatar City Temple and the Temple of the Five Genii. The number of priests and nuns in Canton is not exactly known, but they probably exceed 2000, nine-tenths of whom are Buddhists. The temples are gloomy- looking edifices. The areas in front of them are usually occupied by hucksters, beggars and idlers, who are occasionally driven off to make room for the mat-sheds in which the theatrical performances got up by the wealthy inhabitants are acted. The principal hall, where the idol sits enshrined, is lighted only in front, and the inner apartments are inhabited by a class of men almost as senseless as the idols they serve.

The residences of the high officers of government are all within the walls of the old city. The residence of the governor- general used to be in the south-west corner of the new city, but it was utterly destroyed by the bombardment in 1856. The site remained desolate until i860, when it was taken possession of by the French authorities, who erected a Roman Catholic cathedral upon it. The residence of the commander-in-chief is in the old city, and is said to be one of the best houses in Canton. There are four prisons in the city, all large edifices. For the space of 4 or J m. opposite Canton boats and vessels are ranged parallel to each other in such close order as to resemble a floating city; and these marine dwellings are occupied by numerous families, who reside almost constantly on the water. In the middle of the river lie the Chinese junks, some of them of from 600 to 1000 tons burden, which trade to the north and to the Strait Settlements. The various gilds and associations among the people and the merchants from other provinces have public halls each for its own particular use. The number of these buildings is not less than 1 50. Canton was long the only seat of British trade with China, and was no doubt fixed upon by the Chinese government for the European trade, as being the most distant from the capital Peking.

Formerly only a limited number of merchants, called the hong or security merchants, were allowed to trade with foreigners. They were commonly men of large property and were famed for integrity in their transactions. All foreign cargoes passed through the hands of these

merchants, and by them also the return cargoes were furnished. They became security for the payment of customs duties, and it was criminal for any other merchant to engage in the trade with foreigners.

Although it is in the same parallel of latitude as Calcutta, the climate of Canton is much cooler, and is considered superior to that of most places situated between the tropics. The extreme range of the thermometer is from 38° to ioo° F., though these extremes are rarely reached. In ordinary years the winter minimum is about 42 and the maximum in summer 06°. The hot season is considered to last from May to October;

during the rest of the year the weather is cool. In shallow vessels ice sometimes forms at Canton; but so rarely is snow seen that when in February 1835 a fell to the depth of 2 in. occurred, the citizens hardly knew its proper name. Most of the rain falls during May and June, but the amount is nothing in comparison with that which falls during a rainy season in Calcutta. July, August and September are the regular monsoon months, the wind coming from the south-west with frequent showers, which allay the heat. In the succeeding months the northerly winds begin, with some interruptions at first, but from October to January the temperature is agreeable, the sky clear and the air invigorating. Few large cities are more generally healthy than Canton, and epidemics rarely prevail there.

Provisions and refreshments of all sorts are abundant, and in general are excellent in quality and moderate in price. It is a singular fact that the Chinese make no use of milk, either in its natural state or in the form of butter or cheese. Among the delicacies of a Chinese market are to be seen horse-flesh, dogs, cats, hawks, owls and edible birds'-nests. The business between foreigners and natives at Canton is generally transacted in a jargon known as " pidgin English," the Chinese being extremely ready in acquiring a sufficient smattering of English words to render themselves intelligible.

The intercourse between China and Europe by the way of the Cape of Good Hope began in 1517, when Emanuel, king of Portugal, sent an ambassador, accompanied by a fleet of eight ships, to Peking, on which occasion the sanction of the emperor to establish a trade at Canton was obtained. It was in 1596, in the reign of Queen Elizabeth, that the English first attempted to open an intercourse with China, but ineffectually, for the two ships which were despatched on this mission were lost on the outward voyage, and it was not till about 1634 that English ships visited Canton. Unfortunately at this time a misunder-

standing having occurred with the Chinese authorities owing to the treachery of the Portuguese, a rupture and a battle took place, and it was with difficulty that peace was again restored. In 1673 China was again visited by an English ship which was subsequently refused admission into Japan, and in 1677 a factory was established at Amoy. But during an irruption of the Tatars three years later this building was destroyed, and it was not till 1 685 that the emperor permitted any trade with Europeans at that port. Upon the union of the two East India Companies in London, an imperial edict was issued, restricting the foreign commerce to the port of Canton.

Tea was first imported into England about the year 1667, and in 1689 a customs duty of 5s. per lb was for the first time imposed. From this date to 1834 the East India Company held a monopolv of the trade at Canton, and during this period the prosperity of the port increased and multiplied, notwithstanding the ob- structions which were constantly thrown in the way of the ” barbarians ” by the Chinese government. The termination of the Company’s monopoly brought no alteration in the conduct of the native authorities, whose oppressions became before long so unbearable that in 1839 war was declared on the part of Great Britain. In 1841, while the forces under Sir Hugh (afterwards Lord) Gough were preparing to capture Canton, Captain Elliott entered into negotiations with the Chinese, and consented to receive a pecuniary ransom in lieu of occupying the city. Mean- while the war was carried on in central China, and finally re- sulted in the conclusion of the Nanking treaty in August 1842, under the terms of which four additional ports, viz. Shanghai, Ningpo, Fu-chow and Amoy, were thrown open to foreign trade, and foreigners were granted permission to enter the city of Canton, from which they had hitherto been excluded. This latter provision of the treaty, however, the Chinese refused to carry out; and after endless disputes about this and other improper acts of the Chinese government, war was again declared in 1856, the immediate cause of which was an insult offered to the British flag by the capture of certain Chinese on board the ” Arrow,” a small craft trading under English colours. The outbreak of hostilities was followed by the pillage and destruction of the foreign “factories” in December 1856 by a Chinese mob,

and twelve months later Canton was taken by assault by a force under Sir Charles Straubenzee, which had been sent out from England for the purpose. From this time until October 1861 the city was occupied

by an English and French garrison, and the administration of affairs was entrusted to an allied com- mission, consisting of two English officers and one French officer, acting under the English general. Since the withdrawal of this garrison, the city of Canton has been freely open to foreigners of all nationalities, and the English consul has his residence in the Yamun formerly occupied by the allied commissioners, within the city walls.

On the conclusion of peace it became necessary to provide a foreign settlement for the merchants whose ” factories ” had been destroyed, and after some consultation it was determined to fill in and appropriate as the British settlement an extensive mud flat lying to the westward of the old factory site, and known as Sha-mien or ” The Sand Flats.” This site having been leased, it was converted into an artificial island by building a massive embankment of granite in an irregular oval form. Between the northern face of the site and the Chinese suburb a canal of 100 ft. in width was constructed, thus forming an island of about 2850 ft. in length and 950 ft. in greatest breadth. The expense of making this settlement was 325,000 Mexican dollars, four-fifths of which were defrayed by the British government and one-fifth by the French government. The British portion of the new settlement was laid out in eighty* two lots; and so bright appeared the prospect of trade at the time of their sale that 9000 dollars and upwards was paid in more than one instance for a lot with a river frontage, measuring 12,645 sq. ft. The depression in trade, however, which soon followed acted as a bar to building, and it was not until the British consulate was erected in 1865 that the merchants began to occupy the settle- ment in any numbers. The British consulate occupies six lots, with an area of 75,870 sq. ft. in the centre of the site, overlooking the river, and is enclosed with a substantial wall. A ground-rent of 15,000 cash (about £3) per mow (a third of an acre) is annually paid by the owners of lots to the Chinese government.

The Sha-mien settlement possesses many advantages. It is close to the western suburb of Canton, where reside all the wholesale dealers as well as the principal merchants and brokers ; it faces the broad channel known as the Macao Passage, up which the cool breezes in summer are wafted almost uninter- ruptedly, and the river opposite to it affords a safe and com- modious anchorage for steamers up to 1000 tons burden. Steamers only are allowed to come up to Canton, sailing vessels being restricted to the anchorage at Whampoa. There is daily communication by steamer with Hong-Kong, and with the Portuguese colony of Macao which lies near the mouth of the river. Inland communication by steam is now open by the west river route to the

cities of Wuchow and Nanking. The opening of these inland towns to foreign trade, which has been effected, cannot but add considerably to the volume of Canton traffic. The native population is variously estimated at from 1,500,000 to 2,000,000, the former being probably nearer the truth. The foreign residents number about 400. Canton is the headquarters of the provincial government of Kwangtung and Kwangsi, generally termed the two Kwang, at the head of which is a governor-general or viceroy, an office which next to that of Nanking is the most important in the empire. It possesses a mint built in 1889 by the then viceroy Chang Chih-tung, and equipped with a very complete plant supplied from England. It turns out silver subsidiary coinage and copper cash. Con- tracts have been entered into to connect Canton by railway with Hong-Kong (Kowlun), and by a grand trunk line with Hankow on the Yangtsze. It is connected by telegraph with all parts. The value of the trade of Canton for the year 1904 was £13,749,582, £7,555,090 of which represented imports and £6,194,490 exports. (R. K. D.)

CANTON, a city of Fulton county, Illinois, U.S.A., in the W. part of the state, 12 m. N. of the Illinois river, and 28 m. S.W. of Peoria. Pop. (1890) 5604; (1900) 6564 (424 foreign-born) ; (1910) 10,453. Canton is served by the Chicago, Burlington &

Quincy, the Toledo, Peoria & Western, and the Illinois Central Electric Interurban railways. About 1 m. from the centre of the city are the Canton Chautauqua grounds. The city has a public library. Canton is situated in a rich agricultural region, for which it is a supply point, and there are large coal-mines in the vicinity. Among the manufactures are agricultural imple- ments (particularly ploughs), machine-shop and foundry products (particularly mining-cars and equipment), flour, cigars, cigar- boxes, brooms, and bricks and tile. The municipal water-works are supplied from a deep artesian well. Canton was laid out in 1825; it was incorporated as a town in 1837 and as a village in 1849, an d was chartered as a city in 1854.

CANTON, a village and the county-seat of St Lawrence county, New York, U.S.A., 17 m. S.E. of Ogdensburg, on the Grasse river. Pop. (1890) 2580; (1900) 2757; (1905) 3083; (1910) 2701. The village is served by the Rome, Watertown & Ogdens- burg division of the New York Central & Hudson River railway. Canton is the seat of St Lawrence University (co-educational; chartered in 1856; at first Universalist, afterwards unsectarian), having a college of letters and science, which developed from an academy, opened in 1859; a theological school (Universalist), opened in 1858; a law school, established in 1869, discontinued in 1872 and re-established in

Brooklyn, New York, in 1903 as the Brooklyn Law School of St Lawrence University; and a state school of agriculture, established in 1906 by the state legislature and opened in 1907. In 1907-1908 the university had 52 instructors, 168 students in the college of letters and science, 14 students in the theological school, 287 in the law school and 13 in the agricultural school. The Clinton Liberal Institute (Universalist, 1832), which was removed in 1879 from Clinton to Fort Plain, New York, was established in Canton in 1 901. The Grasse river furnishes water-power, and the village has saw-, planing- and flour-mills, and plant for the building of small boats and launches. The village corporation owns a fine water-supply system. Canton was first settled in 1800 by Daniel Harrington of Connecticut and was incorporated in 1845. It was for many years the home of Silas Wright, who was buried here.

CANTON, a city and the county-seat of Stark county, Ohio, U.S.A., on Nimisillen Creek, 60 m. S. by E. of Cleveland. Pop. (1890) 26,189; (io° °) 30,667, of whom 4018 were foreign-born; and (1910) 50,217. It is served by the Pennsylvania, the Baltimore & Ohio, and the Wheeling & Lake Erie railways, and is connected by an interurban electric system with all the important cities and towns within a radius of 50 m. It lies at an elevation of about 1030 ft. above sea-level, in a wheat-growing region, in which bituminous coal, limestone, and brick and potter's clay abound. Meyer's Lake in the vicinity is a summer attraction. The principal buildings are the post-office, court- house, city hall, an auditorium with a seating capacity of 5000, a Masonic building, an Oddfellows' temple, a Y.M.C.A. building and several handsome churches. On Monument Hill, in West Lawn Cemetery, in a park of 26 acres — a site which President McKinley had suggested for a monument to the soldiers and sailors of Stark county-ˆ- there is a beautiful monument to the memory of McKinley, who lived in Canton. This memorial is built principally of Milford (Mass.) granite, with a bronze statue of the president, and with sarcophagi containing the bodies of the president and Mrs McKinley, and has a total height, from the first step of the approaches to its top, of 163 ft. 6 in., the mausoleum itself being 98 ft. 6 in . high and 7 8 ft. 9 in . in diameter ; it was dedicated on the 30th of September 1907, when an address was delivered by President Roosevelt. Another monument commemorates the American soldiers of the Spanish-American War. Among the city's manufactures are agricultural imple- ments, iron bridges and other structural iron work, watches and watch-cases, steel, engines, safes, locks, cutlery, hardware, wagons, carriages, paving-bricks, furniture, dental and surgical chairs, paint and varnish, clay-working machinery and saw-mill machinery. The value of the factory product in 1905 was

$10,591,143, being iO‘6 % more than the product value of 1900. Canton was laid out as a town in 1805, became the county-seat

in 1808, was incorporated as a village in 1822 and in 1854 was chartered as a city.

CANTON (borrowed from the Ital. cantone, a corner or angle), a word used for certain divisions of some European countries. In France, the canton, which is a subdivision of the arrondisse- ment, is a territorial, rather than an administrative, unit. The canton, of which there are 2908, generally comprises, on an average, about twelve communes, though very large communes are sometimes divided into several cantons. It is the seat of a justice of the peace, and returns a member to the conseil d’arrondissement (see France). In Switzerland, canton is the name given to each of the twenty-two states comprising the Swiss confederation (see Switzerland).

In heraldry, a ” canton ” is a corner or square division on a shield, occupying the upper corner (usually the dexter). It is in area two-thirds of the quarter (see Heraldry).

CANTONMENT (Fr. cantonnement, from cantonner, to quarter; Ger. Ortsunterkunjt or Quarlier). When troops are distributed in small parties amongst the houses of a town or village, they are said to be in cantonments, which are also called quarters or billets. Formerly this method of providing soldiers with shelter was rarely employed on active service, though the normal method in ” winter quarters,” or at seasons when active military operations were not in progress. In the field, armies lived as a rule in camp (?.».), and when the provision of canvas shelter was impossible in bivouac. At the present time, however, it is unusual, in Europe at any rate, for troops on active service to hamper themselves with the enormous trains of tent wagons that would be required, and cantonments or bivouacs, or a combina- tion of the two have therefore taken the place, in modern warfare, of the old long rectilinear lines of tents that marked the resting- place and generally, too, the order of battle of an 18th-century army. Th’e greater part of an army operating in Europe at the present day is accommodated in widespread cantonments, an army corps occupying the villages and farms found within an area of 4 m. by 5 or 6. This allowance of space has been ascertained by experience to be sufficient, not only for comfort, but also for subsistence for one day, provided

that the density of the ordinary civil population is not less than 200 persons to the square mile. Under modern conditions there is little danger from such a dissemination of the forces, as each fraction of each army corps is within less than two hours' march of its concentration post. If the troops halt for several days, of course they require cither a more densely populated country from which to requisition supplies, or a wider area of cantonments. The difficulty of controlling the troops, when scattered in private houses in parties of six or seven, is the principal objection to this system of cantonments. But since Napoleon introduced the " war of masses " the only alternative to cantoning the troops is bivouacking, which if prolonged for several nights is more injurious to the well-being of the troops than the slight relaxation of discipline necessitated by the cantonment system, when the latter is well arranged and policed. The troops nearest the enemy, however, which have to be maintained in a state of constant readiness for battle, cannot as a rule afford the time either for dispersing into quarters or for rallying on an alarm, and in western Europe at any rate they are required to bivouac. In India, the term " cantonment " means more generally a military station or standing camp. The troops live, not in private houses, but in barracks, huts, forts or occasionally camps. The large cantonments are situated in the neighbourhood of the North-Western frontier, of the large cities and of the capitals of important native states. Under Lord Kitchener's redistribution of the Indian army in 1903, the chief cantonments are Rawalpindi, Quetta, Peshawar, Kohat, Bannu, Nowshera, Sialkot, Mian Mir, Umballa, Muttra, Ferozepore, Meerut, Lucknow, Mhow, Jubbulpore, Bolarum, Poona, Secunderabad and Bangalore.

CANTU, CESARE (1804-1895), Italian historian, was born at Brivio in Lombardy and began his career as a teacher. His firsL literary essay (1828) was a romantic poem entitled Algiso, la Lega Lombarda (new ed., Milan, 1876), and in the following year he produced a Storia di Como in two volumes (Como, 1829). The

death of his father then left him in charge of a large family, and he worked very hard both as a teacher and a writer to provide for them. His prodigious literary activity led to his falling under the suspicions of the Austrian police, and he was mixed up in a political trial and arrested in 1833. While in prison writing materials were denied him, but he managed to write on rags with a tooth-pick and candle smoke, and thus composed the novel Margherita Pusterla (Milan, 1838). On his release a year later, as he was interdicted from teaching, literature became his only resource. In 1836 the Turinese publisher, Giuseppe Pomba, commissioned him to write a universal history, which his vast reading enabled him to do. In six years the work was completed in

seventy-two volumes, and immediately achieved a general popularity; the publisher made a fortune out of it, and Cantu's royalties amounted, it is said, to 300,000 lire (£12,000). Just before the revolution of 1848, being warned that he would be arrested, he fled to Turin, but after the " Five Days " he returned to Milan and edited a paper called La Guardia Nazionale. Between 1849 and 1850 he published his Storia degli Italiani (Turin, 1855) and many other works. In 1857 the archduke Maximilian tried to conciliate the Milanese by the promise of a constitution, and Cantu was one of the few Liberals who accepted the olive branch, and went about in company with the archduke. This act was regarded as treason and caused Cantu much annoy- ance in after years. He continued his literary activity after the formation of the Italian kingdom, producing volume after volume until his death.. For a short time he was member of the Italian parliament; he founded the Lombard historical society, and was appointed superintendent of the Lombard archives. He died in March 1895. His views are coloured by strong religious and political prejudice, and by a moralizing tendency, and his historical work has little critical value and is for the most part pure book-making, although he collected a vast amount of material which has been of use to other writers. In dealing with modern Italian history he is reactionary and often wilfully inaccurate. Besides the above-mentioned works he wrote Gli Eretici in Italia (Milan, 1873); Cronisloria dell' Indipendenza italiana (Naples, 1872-1877); II Conciliatore e i Carbonari (Milan, 1878), &c. (L.V.*)

CANUSIUM (Gr. Kavwwv, mod. Canosa), an ancient city of Apulia, on the right bank of the Aufidus (Ofanto), about 12 m. from its mouth, and situated upon the Via Traiana, 85 m. E.N.E. of Beneventum. It was said to have been founded by Diomede, and even at the time of Horace (Sat. i. 10. 30) both Greek and Latin were spoken there. The legends on the coins are Greek, and a very large number of Greek vases have been found in the necropolis. The town came voluntarily under Roman sover- eignty in 318 B.C., afforded a refuge to the Roman fugitives after Cannae, and remained faithful for the rest of the war. It revolted in the Social War, in which it would appear to have suffered, inasmuch as Strabo (vi. 283) speaks of Canusium and Arpi as having been, to judge from the extent of their walls, the greatest towns in the plain of Apulia, but as having shrunk considerably in his day. Its importance was maintained, however, by its trade in agricultural products and in Apulian wool (which was there dyed and cleaned), by its port (probably Cannae) at the mouth of the Aufidus, and by its position on the high-road. It was a municipium under the early empire, but was converted into a colonia under Antoninus Pius

by Herodes Atticus, who provided it with a water-supply. In the 6th century it was still the most important city of Apulia. Among the ancient buildings which are still preserved, an amphitheatre, an aqueduct and a city gate may be mentioned.

See N. Jacobone, Ricerche sulla storia e la topografia di Canosa Antica (Canosa di Puglia, 1905). (T. As.)

CANUTE (Cnut), known as “the Great” (c. 995-1035), king of Denmark and England, second son of King Sweyn Forkbeard and his first wife, the daughter of the Polish prince, Mieszko, was born c. 995. On the death of his father he was compelled to quit England by a general rising of the Anglo-Saxons, on which occasion in a fit of rage, for he was not naturally cruel, he abandoned his hostages after cutting off their hands, ears

and noses. In the following year, 1015, he returned with a great fleet manned by a picked host, ” not a thrall or a freedman among them.” He speedily succeeded in subduing all England except London, now the last refuge of King ˆEthelred and his heroic son, Edmund Ironside. On the death of ˆEthelred (23rd of April 1016) Canute was elected king by an assembly of notables at Southampton; but London clung loyally to Edmund, who more than once succeeded in raising the western shires against Canute. Edmund indeed approved himself the better general of the two, and would doubtless have prevailed, but for the treachery of his own ealdormen. This was notably the case at the great battle of Assandun, in which by the desertion of Eadric an incipient Anglo-Saxon victory was converted into a crushing defeat. Nevertheless, the antagonists were so evenly matched that the great men on both sides, fearing that the interminable war would utterly ruin the land, arranged a con- ference between Canute and Edmund on an island in the Severn, when they agreed to divide England between them, Canute retaining Mercia and the north, while Edmund’s territory com- prised East Anglia and Wessex with London. On the death of Edmund, a few months later (November 1016), Canute was unanimously elected king of all England at the beginning of 1017. The young monarch at once showed himself equal to his responsibilities. He did his utmost to deserve the confidence of his Anglo-Saxon subjects, and the eighteen years of his reign were of unspeakable benefit to his adopted country. He identi- fied himself with the past history of England and its native dynasty by wedding

Emma, or yElgifu, to give her her Saxon name (the Northmen called her Alfifa), who came over from Normandy at his bidding, Canute previously repudiating his first wife, another ˆElgifu, the daughter of the ealdorman jElfhem of Deira, who, with her sons, was banished to Denmark. In 1018 Canute inherited the Danish throne, his elder brother Harold having died without issue. He now withdrew most of his army from England, so as to spare as much as possible the susceptibilities of the Anglo-Saxons. For the same reason he had previously dispersed all his warships but forty. On his return from Denmark he went a step farther. In a remark- able letter, addressed to the prelates, ealdormen and people, he declared his intention of ruling England by the English, and of upholding the laws of King Edgar, at the same time threatening with his vengeance all those who did not judge righteous judgment or who let malefactors go free. The tone of this document, which is not merely Christian but sacerdotal, shows that he had wisely resolved, in the interests of law and order, to form a close alliance with the native clergy. Those of his own fellow-countrymen who refused to co-operate with him were summarily dismissed. Thus, in 102 1, the stiff necked jarl Thorkil was banished the land, and his place taken by an Anglo-Saxon, the subsequently famous Godwin, who became one of Canute's chief counsellors. The humane and conciliatory character of his government is also shown in his earnest efforts to atone for Danish barbarities in the past. Thus he rebuilt the church of St Edmundsbury in memory of the saintly king who had perished there at the hands of the earlier Vikings, and with great ceremony transferred the relics of St Alphege from St Paul's church at London to a worthier resting-place at Canterbury. His work of reform and reconciliation was in- terrupted in 1026 by the attempt of Olaf Haraldson, king of Norway, in conjunction with Anund Jakob, king of Sweden, to conquer Denmark. Canute defeated the Swedish fleet at Stangebjerg, and so seriously injured the combined squadrons at the mouth of the Helgeaa in East Scania, that in 1028 he was able to subdue the greater part of Norway " without hurling a dart or swinging a sword." But the conquest was not per- manent, the Norwegians ultimately rising successfully against the tyranny of Alfifa, who misruled the country in the name of her infant son Sweyn. Canute also succeeded in establishing the dominion of Denmark over the southern shores of the Baltic, in Witland and Samland, now forming part of the coast of Prussia. Of the details of Canute's government in Denmark proper we know but little. His most remarkable institution

was the Tinglid, a military brotherhood, originally 3000 in number, composed of members of the richest and noblest families, who not

only formed the royal bodyguard, but did garrison duty and defended the marches or borders. They were subject to strict discipline, embodied in written rules called the Viderlog or Vederlag, and were the nucleus not only of a standing army but of a royal council. Canute is also said to have endeavoured to found monasteries in Denmark, with but indifferent success, and he was certainly the first Danish king who coined money, with the assistance of Anglo-Saxon mint-masters. Of his alliance with the clergy we have already spoken. Like the other great contemporary kingdom-builder, Stephen of Hungary, he clearly recognized that the church was the one civilizing element in a world of anarchic barbarism, and his submission to her guidance is a striking proof of his perspicacity. But it was no slavish submission. When, in 1027, he went to Rome, with Rudolf III. of Burgundy, to be present at the coronation of the emperor Conrad II., it was quite as much to benefit his subjects as to receive absolution for the sins of his youth. He persuaded the pope to remit the excessive fees for granting the pallium, which the English and Danish bishops had found such a grievous burden, substituting therefor a moderate amount of Peter's pence. He also induced the emperor and other German princes to grant safe-conducts to those of his subjects who desired to make the pilgrimage to Rome.

Canute died at Shaftesbury on the 12th of November 1035 in his 40th year, and was buried at Winchester. He was cut off before he had had the opportunity of developing most of his great plans; yet he lived long enough to obtain the title of "Canute the Wealthy" {i.e. "Mighty"), and posterity, still more appreciative, has well surnamed him " the Great." A violent, irritable temper was his most salient defect, and more than one homicide must be laid to his charge. But' the fierce Viking nature was gradually and completely subdued; for Canute was a Christian by conviction and sincerely religious. His humility is finely illustrated by the old Norman poem which describes how he commanded the rising tide of the Thames at Westminster to go back. The homily he preached to his courtiers on that occasion was to prepare them for his subsequent journey to Rome and his submission to the Holy Sec. Like his father Sweyn, Canute loved poetry, and the great Icelandic skalder, ThorarLovtunge and Thormod Kolbrunarskjold, were as welcome visitors at his court as the learned bishops. As an administrator Canute was excelled only by Alfred. He possessed in an eminent degree the royal gift of recognizing greatness, and the still more useful faculty of conciliating enemies. No English king before him had levied such heavy taxes, yet never were taxes more cheerfully paid; because the people felt that every penny of the money was used for the benefit of the country. According to the

Knytlinga Saga King Canute was huge of limb, of great strength, and a very goodly man to look upon, save for his nose, which was narrow, lofty and hooked; he had also long fair hair, and eyes brighter and keener than those of any man living.

See Danmarks Riges Hislorie. Old Tiden og den aeldre Middelalder , pp. 382-406 (Copenhagen, 1897-1905); Freeman, Norman Conquest (Oxford, 1870-1875); Steenstrup, Normannerne (Copenhagen, 1876-1882). (R. N. B.)

CANUTE VI. (1163-1202), king of Denmark, eldest son of Valdemar I., was crowned in his seventh year (1170), as his father's co-regent, so as to secure the succession. In 1182 he succeeded to the throne. During his twenty years' reign Den- mark advanced steadily along the path of greatness and pros- perity marked out for her by Valdemar I., consolidating and extending her dominion over the North Baltic coast and adopt- ing a more and more independent attitude towards Germany. The emperor Frederick I.'s claim of overlordship was haughtily rejected at the very outset, and his attempt to stir up Duke Bogislav of Pomerania against Denmark's vassal, Jaromir of Riigen, was defeated by Archbishop Absalon, who destroyed 465 of Bogislav's 500 ships in a naval action off Strela (Stralsund) in 1 184. In the following year Bogislav did homage to Canute on the deck of his long-ship, off Jomsborg in Pomerania, Canute

henceforth styling himself king of the Danes and Wends. This victory led two years later to the voluntary submission of the two Abodrite princes Niklot and Borwin to the Danish crown, where- upon the bulk of the Abodrite dominions, which extended from the Trave to the Warnow, including modern Mecklenburg, were divided between them. The concluding years of Canute's reign were peaceful, as became a prince who, though by no means a coward, was not of an overwhelmingly martial temperament. In 1 197, however, German jealousy of Denmark's ambitions, especially when Canute led a fleet against the pirates of Esthonia, induced Otto, margrave of Brandenburg, to invade Pomerania, while in the following year Otto, in conjunction with Duke Adolf of Holstein, wasted the dominions of the Danophil Abodrites. The war continued intermittently till 1201, when Duke Valdemar, Canute's younger brother, conquered the whole of Holstein, and Duke Adolf was subsequently captured at Hamburg and sent in chains to Denmark. North Albingia, as the district between

the Eider and the Elbe was then called, now became Danish territory. Canute died on the 1 2th of November 1202. Undoubtedly he owed the triumphs of his reign very largely to the statesmanship of Absalon and the valour of Valdemar. But he was certainly a prudent and circumspect ruler of blameless life, possessing, as Arnold of Lubeck (c. 1160- 1212) expresses it, ” the sober wisdom of old age even in his tender youth.”

See Danmarks Riges Histnrie. Oldtiden og den aeldre Middelalder (Copenhagen, 1897-1905), pp. 721-735. (R. N. B.)

CANVAS, a stout cloth which probably derives its name from cannabis, the Latin word for hemp. This would appear to indi- cate that canvas was originally made from yarns of the hemp fibre, and there is some ground for the assumption. This fibre and that of flax have certainly been used for ages for the produc- tion of cloth for furnishing sails, and for certain classes of cloth used for this purpose the terms ” sailcloth ” and ” canvas ” are synonymous. Warden, in his Linen Trade, states that the manufacture of sailcloth was established in England in 1590, as appears by the preamble of James I., cap. 23: — ” Whereas the cloths called Mildernix and Powel Dailies, whereof sails and other furniture for the navy and shipping are made, were heretofore altogether brought out of France and other parts beyond sea, and the skill and art of making and weaving of the said sailcloths never known or used in England until about the thirty-second year of the late Queen Elizabeth, about what time and not before the perfect art or skill of making or weaving of the said cloths was attained to, and since practised and continued in this realm, to the great benefit and commodity thereof.” But this, or a similar cloth of the same name had been used for centuries before this time by the Egyptians and Phoenicians. Since the introduction of the power loom the cloth has undergone several modifications, and it is now made both from flax, hemp, tow, jute and cotton, or a mixture of these, but the quality of sailcloth for the British government is kept up to the original standard. All flax canvas is essentially of double warp, for it is invariably intended to withstand some pressure or rough usage.

In structure it is similar to jute tarpaulin; indeed, if it were not for the difference in the fibre, it would be difficult to say where one type stopped and the other began. ” Bagging,” ” tarpaulin ” and ” canvas ” form an ascending series of cloths *o far as fineness is concerned, although the finest tarpaulins are finer than some of the lower canvases. The cloth may be natural colour, bleached or dyed, a very common colour being tan. It has an enormous number of different uses other than naval.

Amongst other articles made from it are: — receptacles for photographic and other apparatus; bags for fishing, shooting, golf and other sporting implements; shoes for cricket and other games, and for yachting; travelling cases and hold-alls, letter-bags, school-bags and nose-bags for horses. Large quantities of the various makes of flax and cotton canvases are tarred, and then used for covering goods on railways, wharves, docks, etc.

Sail canvas is, naturally, of a strong build, and is quite different

from the canvas cloth used for embroidery purposes, often called ” art canvas.” The latter is similar in structure to cheese cloths and strainers, the chief difference being that the yarns for art canvas are, in general, of a superior nature. All kinds of vegetable fibres are used in their production, chief among which are cotton, flax and jute. The yarns are almost invariably two or more ply, an arrangement which tends to obtain a uniform thickness — a very desirable element in these open-built fabrics. The plain weave A in the figure is extensively used for these fabrics, but in many cases special weaves are used which leave the open spaces well ‘,” defined. Thus weave B is often employed, ” while the ” imitation gauze ” weaves, C and D, are also largely utilized in the production of these embroidery cloths. Weave B is known as the hopsack, and probably owes its name to being originally used for the making of bags for hops. The cloth for this purpose is now called ” hop pocketing,” and is of a structure u u

between bagging and tarpaulin. Another class of canvas, single warp termed ■” artists’ canvas,” is used, as its name implies, for paintings in oils. It is also much lighter than sail canvas, but must, of necessity, be made of level yarns. The best qualities are made of cream or bleached flax line, although it is not unusual to find an admixture of tow, and even of cotton in the commoner kinds. When the cloth comes from the loom, it undergoes a special treatment to prepare the surface for the paint.

CANVASS (an older spelling of ” canvas “), to sift by shaking in a sheet of canvas, hence to discuss thoroughly; as a political term it means to examine carefully the chances of the votes in a prospective election, and to solicit the support of the electors.

CANYNGES, Canynge, WILLIAM (c. 1399-1474), English merchant, was born at Bristol in 1399 or 1400, a member of a wealthy family of merchants and cloth-manufacturers in that city. He entered, and in due course greatly extended, the family business, becoming one of the richest Englishmen of his day. Canynges was five times mayor of, and

twice member of parliament for, Bristol. He owned a fleet of ten ships, the largest hitherto known in England, and employed, it is said, 800 seamen. By special license from the king of Denmark he enjoyed for some time a monopoly of the fish trade between Iceland, Finland and England, and he also competed successfully with the Flemish merchants in the Baltic, obtaining a large share of their business. In 1456 he entertained Margaret of Anjou at Bristol, and in 1461 Edward IV. Canynges undertook at his own expense the great work of rebuilding the famous Bristol church of St Mary, Redcliffe, and for a long time had a hundred workmen in his regular service for this purpose. In 1467 he himself took holy orders, and in 1469 was made dean of Westbury. He died in 1474. The statesman George Canning and the first viscount Stratford de Redcliffe were descendants of his family.

See Pryce, Memorials of the Canynges Family and their Times (Bristol, 1854).

CANYON (Anglicized form of Span, canon, a tube, pipe or cannon; the Spanish form being also frequently written), a type of valley with huge precipitous sides, such as the Grand Canyons of the Colorado and the Yellowstone livers, and the gorge of the Niagara river below the falls, due to rapid stream erosion in a ” young ” land. A river saws its channel vertically down- wards, and a swift stream erodes chiefly at the bottom. In rainy regions the valleys thus formed are widened out by slope- wash and the resultant valley-slopes are gentle, but in arid regions there is very little side-extension of the valleys and the river cuts its way downwards, leaving almost vertical cliffs above the stream. If the stream be swift as in the western plateau of North America, the cutting action will be rapid. The ideal conditions for developing a canyon are: great altitude and slope causing swift streams, arid conditions with absence of side- wash, and hard rock horizontally bedded which will hold the walls up.

CANZONE, a form of verse which has reached us from Italian literature, where from the earliest times it has been assiduously cultivated. The word is derived from the Provencal canso, a song, but it was in Italian first that the form became a literary one, and was dedicated to the highest uses of poetry. The canzone-strophe consists of two parts, the opening one being distinguished by Dante as the fronte, the closing one as the sirma. These parts are connected by

rhyme, it being usual to make the rhyme of the last line of the fronte identical with that of the first line of the sirma. In other respects the canzone has great liberty, as regards number and length of lines, arrange- ment of rhymes and conduct of structure. An examination of the best Italian models, however, shows that the tendency of the canzone-strophe is to possess 9, 10, n, 13, 14 or 16 verses, and that of these the strophe of 14 verses is so far the most frequent that it may almost be taken as the type. In this form it resembles an irregular sonnet. The Vita Nuova contains many examples of the canzone, and these are accompanied by so many explanations of their form as to lead us to believe that the canzone was originally invented or adopted by Dante. The following is the proemio or fronte of one of the most cele- brated canzoni in the Vita Nuova (which may be studied in English in Dante Gabriel Rossetti's translation) : —

" Donna pietosa e di novella etate, Adorna assai di gentilezza umane, Era la ov' io chiamava spesso Morte. Veggendo gli occhi mlei pien di pietate, Ed ascoltando le parole vane, Si mosse con paura a pianger forte ; Ed altro donne, che si furo accorte Di me per quella che meco piangia, Fecer lei partir via Ed apprissarsi per farmi sentire. Quel dicea : ' Non dormire ' ; E qual dicea : ' Perche s} te sconforte? ' Allor lasciai la nuova fantasia, Chiamando il nome della donna mia."

The Canzoniere of Petrarch is of great authority as to the form of this species of verse. In England the canzone was introduced at the end of the sixteenth century by William Drummond of Hawthornden, who has left some very beautiful examples. In German poetry it was cultivated by A. W. von Schlegel and other poets of the Romantic period. It is doubtful, however, whether it is in agreement with the genius of any language but Italian, and whether the genuine " Canzone toscana " is a form which can be reproduced elsewhere than in Italy. (E. G.)

CAPE BRETON, the north-east portion of Nova Scotia, Canada, separated from the mainland by a narrow strait, known as the Gut of Canceau or Canso. Its extreme length from north to south is about no m., greatest breadth about 87 m., and area 3120 sq. m. It juts out so far into the Atlantic that it has been called " the long wharf of Canada," the distance to the west coast of Ireland being less by a thousand miles than from New York. A headland on the east coast is also known as Cape Breton, and is said by some to be the first land made by Cabot on his voyage in 1497-1498. The large, irregularly-shaped, salt-water lakes of Bras d'Or communicate with the sea by two channels on the north-east; a short ship canal connects them with St Peter's bay on the south, thus dividing the island into two parts.

Except on the north-west, the coast-line is very irregular, and indented with numerous bays, several of which form excellent harbours. The most important are Aspy, St Ann's, Sydney, Mira, Louisburg, Gabarus, St Peter's and Mabou; of these, Sydney Harbour, on which are situated the towns of Sydney and North Sydney, is one of the finest in North America. There are numerous rivers, chiefly rapid hill streams not navigable for any distance; the largest are the Denys, the Margaree, the Baddeck and the Mira. Lake Ainslie in the west is the most extensive of several fresh-water lakes. The surface of the island is broken in several places by ranges of hills of moderate elevation, well wooded, and containing numerous picturesque glens and gorges; the northern promontory consists of a plateau, rising at Cape North to a height of 1800 ft. This northern projection

is formed of Laurentian gneiss, the only instance in Nova Scotia of this formation, and is fringed by a narrow border of carboni- ferous rocks. South of this extends a Cambrian belt, a continua- tion of the same formation on the Atlantic coast of Nova Scotia. On various portions of the west coast, and on the south side of the island at Seacoal Bay and Little River (Richmond county), valuable seams of coal are worked. Still more important is the Sydney coal-field, which occupies the east coast from Mira Bay to St Ann's. The outcrop is plainly visible at various points along the coast, and coal has been mined in the neighbour- hood from a very early period. Since 1893 the operations have been greatly extended, and over 3,000,000 tons a year are now shipped, chiefly to Montreal and Boston. The coal is bituminous, of good quality and easily worked, most of the seams dipping at a low angle. Several have been mined for some distance beneath the ocean. Slate, marble, gypsum and limestone are quarried, the latter, which is found in unlimited quantities, being of great value as a flux in the blast-furnaces of Sydney. Copper and iron are also found, though not in large quantities.

Its lumber, agricultural products and fisheries are also im- portant. Nearly covered with forest at the time of its discovery, it still exports pine, Oak, beech, maple and ash. Oats, wheat, turnips and potatoes are cultivated, chiefly for home consump- tion; horses, cattle and sheep are reared in considerable numbers; butter and cheese are exported. The Bras d'Or lakes and the neighbouring seas supply an abundance of cod, mackerel, herring and whitefish, and the fisheries employ over 7000 men. Salmon are caught in several of the rivers, and trout in almost every stream, so that it is visited by large numbers of tourists arid sportsmen from the other provinces and from the United States. The Intercolonial railway has been extended to Sydney, and crosses the Gut of Canso on a powerful ferry. From the same strait

a railway runs up the west coast, and several shorter lines are controlled by the mining companies. Of these the most important is that connecting Sydney and Louisburg. Numerous steamers, with Sydney as their headquarters, ply upon the Bras d'Or lakes. The inhabitants are mainly of Highland Scottish descent, and Gaelic is largely spoken in the country districts. On the south and west coasts are found a number of descendants of the original French settlers and of the Acadian exiles (see Nova Scotia), and in the mining towns numbers of Irish are employed. Several hundred Mic Mac Indians, for the most part of mixed blood, are principally employed in making baskets, fish-barrels and butter-firkins. Nearly the whole population is divided between the Roman and Presbyterian creeds, and the utmost cordiality marks the relations between the two faiths. The population is steadily increasing, having risen from 27,580 in 1851 to over 100,000 in 1906.

There is some evidence in favour of early Norse and Icelandic voyages to Cape Breton, but they left no trace. It was probably visited by the Cabots in 1497-1498, and its name may either have been bestowed in remembrance of Cap Breton near Bayonne, by the Basque sailors who early frequented the coast, or may commemorate the hardy mariners of Brittany and Normandy.

In 1629 James Stewart, fourth Lord Ochiltree, settled a small colony at Baleine, on the east side of the island; but he was soon after taken prisoner with all his party by Captain Daniell of the French Company, who caused a fort to be erected at Great Cibou (now St Ann's Harbour). By the peace of St Germain in 1632, Cape Breton was formally assigned to France; and in 1654 it formed part of the territory granted by patent to Nicholas Denys, Sieur de Fronsac, who made several small settlements on the island, which, however, had only a very temporary success. When by the treaty of Utrecht (1713) the French were deprived of Nova Scotia and Newfoundland, they were still left in posses- sion of Cape Breton, and their right to erect fortifications for its defence was formally acknowledged. They accordingly transferred the inhabitants of Plaisance in Newfoundland to the settlement of Havre a. l'Anglois, which soon after, under the name of Louisburg, became the capital of Cape Breton (or He Royale, as it was then called), and an important military post.

Cod-fishing formed the staple industry, and a large contraband trade

in French wines, brandy and sugar, was carried on with the English colonies to the south. In 1745 it was captured by a force of volunteers from New England, under Sir William Pepperell (1696-1759) aided by a British fleet under Commodore Warren (1703-1752). By the treaty of Aix-la-Chapelle, the town was restored to France; but in 1758 was again captured by a British force under General Sir Jeffrey Amherst and Admiral Boscawen. On the conclusion of hostilities the island was ceded to England by the treaty of Paris; and on the 7th of October 1763 it was united by royal proclamation to the government of Nova Scotia. In 1784 it was separated from Nova Scotia, and a new capital founded at the mouth of the Spanish river by Governor Desbarres, which received the name of Sydney in honour of Lord Sydney (Sir Thomas Townshend), then secretary of state for the colonies. There was immediately a considerable influx of settlers to the island, which received another important accession by the immigration of Scottish Highlanders from 1800 to 1828. In 1820, in spite of strong opposition, it was again annexed to Nova Scotia. Since then, its history has been uneventful, chiefly centring in the development of the mining industry.

Bibliography. — Historical: Richard Brown, A History of the Island of Cape Breton (1869), and Sir John Bourinot, Historical and Descriptive Account of Cape Breton (1892), are both excellent. See also Denys, Description geogr. et hist, des cdtes de V Amirique sep- tentrionale (1672) ; Pichon, Letlres et memoires du Cap Breton (1760). General: Reports of Geological Survey, 1872 to 1 882-1 886, and 1895 to 1899 (by Robb, H. Fletcher and Faribault); H. Fletcher, The Sydney Coal Fields, Cape Breton, N.S. (1900); Richard Brown, The Coal Fields of Cape Breton (1871 ; reprinted, 1899).

CAPE COAST, a port on the Gold Coast, British West Africa, in 5 5′ N., i° 13′ W., about 80 m. W. of Accra. Pop. (1901) 28,948, mostly Fantis. There are about 100 Europeans and a colony of Krumen. The town is built on a low bank of gneiss and micaceous slate which runs out into the sea and affords some protection at the landing-place against the violence of the surf. (This bank was the Caoo Corso of the Portuguese, whence the English corruption of Cape Coast.) The castle faces the sea and is of considerable size and has a somewhat imposing appearance. Next to the castle, used as quarters for military officers and as a prison, the principal buildings are the residence of the district commissioner, the churches and schools of various denominations, the government schools and the colonial hospital. Many of the wealthy natives live in brick-built residences. The streets are hilly, and the town is surrounded on the east and north by high ground, whilst on the west is a lagoon. Fort Victoria lies west of the town, and Fort

William (used as a light- house) on the east.

The first European settlement on the spot was that of the Portuguese in 1610. In 1652 the Swedes established themselves here and built the castle, which they named Carolusburg. In 1659 the Dutch obtained possession, but the castle was seized in 1664 by the English under Captain (afterwards Admiral Sir) Robert Holmes, and it has not since been captured in spite of an attack by De Ruyter in 1665, a French attack in 1757, and various assaults by the native tribes. Next to Elmina it was considered the strongest fort on the Guinea Coast. Up to 1876 the town was the capital of the British settlements on the coast, the administration being then removed to Accra. It is still one of the chief ports of the Gold Coast Colony, and from it starts the direct road to Kumasi. In 1905 it was granted municipal government. In the courtyard of the castle are buried George Maclean (governor of the colony 1830-1843) and his wife (Laetitia Elizabeth Landon). The graves are marked by two stones bearing respectively the initials" L. E. L." and " G. M." The land on the east side of the town is studded with disused gold-diggers' pits. The natives are divided into seven clans called companies, each under the rule of recognized captains and possessing distinct customs and fetish.

See A. Ffoulkes, " The Company System in Cape Coast Castle," in Jnl. African Soc. vol. viL, 1908 ; and Gold Coast.

v. 8

CAPE COLONY (officially, " Province or the Cape of Goob Hope "), the most southern part of Africa, a British possession since 1806. It was named from the promontory on its south- west coast discovered in 1488 by the Portuguese navigator Diaz, and near which the first settlement of Europeans (Dutch) was made in 1652. From 1872 to 1910 a self-governing colony, in the last-named year it entered the Union of South Africa as an original province. Cape Colony as such then ceased to exist. In the present article, however, the word " colony " is retained. The " provinces " referred to are the colonial divisions existing before the passing of the South Africa Act 1909, except in the sections Constitution and Government and Law and Justice, where the changes made by the establishment of the Union are set forth. (See also South Africa.)

Boundaries and Area. — The coast-line extends from the mouth of the Orange (28 38′ S. 16° 27′ E.) on the W. to the mouth of the Umtamvuna river (31 4′ S. 30 12′ E.) on the E., a distance of over 1300 m. Inland the Cape is bounded E. and N.E. by Natal, Basutoland,

Orange Free State and the Transvaal; N. by the Bechuanaland Protectorate and N. W. by Great Namaqua- land (German S.W. Africa). From N.W. to S.E. the colony has a breadth of 800 m., from S.W. to N.E. 750 m. Its area is 276,995 sq. m. — more than five times the size of England. Walfish Bay (q.v.) on the west coast north of the Orange river is a detached part of Cape Colony.

Physical Features. — The outstanding orographic feature of the country is the terrace-formation of the land, which rises from sea-level by well-marked steps to the immense plateau which forms seven-eighths of South Africa. The coast region varies in width from a few miles to as many as fifty, being narrowest on the south-east side. The western coast line, from the mouth of the Orange to the Cape peninsula, runs in a general south-east direction with no deep indentations save just south of 33 S. where, in Saldanha Bay, is spacious and sheltered anchorage. The shore is barren, consisting largely of stretches of white sand or thin soil sparsely covered with scrub. The Cape peninsula, which forms Table Bay on the north and False Bay on the south, juts pendant beyond the normal coast line and consists of an isolated range of hills. The scenery here becomes bold and picturesque. Dominating Table Bay is the well-known Table Mountain (3549 ft.), flat-topped and often covered with a ” table-cloth ” of cloud. On its lower slopes and around Table Bay is built Cape Town, capital of the colony. Rounding the storm- vexed Cape of Good Hope the shore trends south-east in a series of curves, forming shallow bays, until at the saw-edged reefs of Cape Agulhas (Portuguese, Needles) in 34 51′ 15″ S. 20 E. the southernmost point of the African continent is reached. Hence the coast, now very slightly indented, runs north by east until at Algoa Bay (25 45′ E.) it takes a distinct north-east bend, and so continues beyond the confines of the colony. Along the southern and eastern shore the country is better watered, more fertile and more picturesque than along the western seaboard. Cape Point (Cape of Good Hope) stands 840 ft. above the sea ; Cape Agulhas 455 ft. Farther on the green-clad sides of the Uiteniquas Mountains are plainly visible from the sea, and as the traveller by boat proceeds eastward, stretches of forest are seen and numbers of mountain streams carrying their waters to the ocean. In this part of the coast the only good natural harbour is the spacious estuary of the Knysna river in 23 5′ E. The entrance, which is over a bar with 14 ft. minimum depth of water, is between two bold sandstone cliffs, called the Heads.

Off the coast are a few small islands, mainly mere rocks within the bay. None is far from the mainland. The largest are Dassen Island, 20 m. S. of Saldanha Bay, and Robben Island, at the entrance to Table

Bay. St Croix is a rock in Algoa Bay, upon which Diaz is stated to have erected a cross. A number of small islands off the coast of German South- West Africa, chiefly valuable for their guano deposits, also belong to Cape Colony (see Angra Pequena) .

Ocean Currents.— OS the east and south shores of the colony the Mozambique or Agulhas current sweeps south-westward with force sufficient to set up a back drift. This back drift or

counter current flowing north-east is close in shore and is taken advantage of by vessels going from Cape Town to Natal. On the west coast the current runs northwards. It is a deflected stream from the west drift of the ” roaring forties ” and coming from Antarctic regions is much colder than the Agulhas current. Off the southern point of the continent the Agulhas current meets the west drift, giving rise to alternate streams of warm and cold water. This part of the coast, subject alike to strong westerly and south- easterly winds, is often tempestuous, as is witnessed by the name,

corruption of a Hottentot word meaning dry, arid. Having crossed the Little Karroo, from which rise minor mountain chains, a second high range has to be climbed. This done the traveller finds himself on another tableland — the Great Karroo. It has an average width of 80 m. and is about 350 m. long. Northwards the Karroo (q.v.) is bounded- by the ramparts of the great inner tableland, of which only a comparatively small portion is in Cape Colony. This sequence of hill and plain — namely (1) the coast plain, (2) first range of hills, (3) first plateau (Little Karroo),

Eng-lish Miles

50 100 200

Courses of intermittent riuers shown thus: Railways shown thus:-

Pret?riai

JT R Ayfr Johannesburg

_A|L

•’- ••’-•-1 IˆBechuan aˆˆflknˆdl

H § i • *ˆ

1 lip iˆrdoou ; , < -f]N, V"

C-r eat Namaquajj 1 _ A — r# > #/.«

tm

Heilbron”ˆ Croonstad

Land ˆ

3mm

NollutW.i

SftTx ‘ B “uTH m ail la;n dhSfa

“!£

jugs’*”””

ˆ J Vfc ˆ BritsUgE

fe- 4ˆ imb ˆy N!S#feL&

BethleheiSv»-H*_ \ 1Lˆ#§JM?

O R A NX E \ R IpERWrlˆ

-3

it >

ˆffuzburi

jjBeAar”

1″ >-

£pnng;foii$£m i_R*

*Mk- o’jf ”

-fl 9Burgheraffif>

Yd*?®

«HS§S

ˆ.faipplaal

ˆ = = – ■ ,jMalmeSbiifS

Simon sTo-.vn’i

tˆˆˆB

tfrf:

ˆ ‘.

Longitude East 25° of Greenwich

Cabo Tormentoso, given to the Cape of Good Hope, and to the many wrecks off the coast. The most famous was that of the British troopship ” Birkenhead,” on the 26th of February 1852, off Danger Point, midway between Cape of Good Hope and Cape Agulhas.

Mountains and Tablelands. — It has been stated that the land rises by well-marked steps to a vast central plateau. Beyond the coast plain, which here and there attains a height of 600 ft.; are mountain ranges running parallel to the shore. These mountains are the supporting walls of successive terraces. When the steep southern sides of the ranges nearest the sea are ascended the hills are often found to be flat-topped with a gentle slope northward giving on to a plateau rarely more than > 40 m. wide. This plateau is called the Southern or Little Karroo, Karroo being a

(4) second range of hills, (5) second plateau (the Great Karroo), (6) main chain of mountains guarding, (7) the vast interior tableland — is

characteristic of the greater part of the colony but is not clearly marked in the south-east and north-west borders. The innermost, and most lofty, chain of mountains follows a curve almost identical with that of the coast at a general distance of 120 m. from the ocean. It is known in different places under different names, and the same name being also often given to one or more of the coast ranges the nomenclature of the mountains is confusing (see the map) . The most elevated portion of the inner- most range, the Drakensberg (q.v.) follows the curve of the coast from south to north-east. Only the southern slopes of the range are in Cape Colony, the highest peaks — over 10,000 ft. — being in Basutoland and Natal. Going westward from the Drakensber

the rampart is known successively as the Stormberg, Zuurberg, Sneeuwberg and Nieuwveld mountains. These four ranges face directly south. In the Sneeuwberg range is Compass Berg, 8500 ft. above the sea, the highest point in the colony. In the Nieuwveld are heights of over 6000 ft. The Komsberg range, which joins the Nieuwveld on the east, sweeps from the south to the north-west and is followed by the Roggeveld mountains, which face the western seaboard. North of the Roggeveld the interior plateau approaches closer to the sea than in southern Cape Colony. The slope of the plateau being also westward, the mountain rampart is less elevated, and north of 32° S. few points attain 5000 ft. The coast ranges are here, in Namaqualand and the district of Van Rhyns Dorp, but the outer edges of the inner range. They attain their highest point in the Kamies Berg, 5511 ft. above the sea. Northward the Orange river, marking the frontier of the colony, cuts its way through the hills to the Atlantic.

From the Olifants river on the west to the Kei river on the east the series of parallel ranges, which are the walls of the terraces between the inner tableland and the sea, are clearly traceable. Their general direction is always that of the coast, and they are cut across by rugged gorges or kloofs, through which the mountain streams make their way towards the sea. The two chief chains, to distinguish them from the inner chain already described, may be called the coast and central chains. Each has many local names. West to east the central chain is known as the Cedarberg, Groote Zwarteberg (highest point 6088 ft.),

Groote river, Winterhoek (with Cockscomb mountain 5773 ft. high) and Zuurberg ranges. The Zuurberg, owing to the north-east trend of the shore, becomes, east of Port Elizabeth, a coast range, and the central chain is represented by a more northerly line of hills, with a dozen different names, which are a south-easterly spur of the Sneeuwberg. In this range the Great Winter Berg attains a height of 7800 ft.

The coast chain is represented west to east by the Olifants mountains (with Great Winterhoek, 6618 ft. high), Drakenstein, Zonder Einde, Langeberg (highest point 5614 ft.), Attaquas, Uiteniquas and various other ranges. In consequence of the north-east trend of the coast, already noted, several of these ranges end in the sea in bold bluffs. From the coast plain rise many short ranges of considerable elevation, and on the east side of False Bay parallel to Table Bay range is a mountain chain with heights of 4000 and 5000 ft. East of the Kei river the whole of the country within Cape Colony, save the narrow seaboard, is mountainous. The southern part is largely occupied with spurs of the Stormberg; the northern portion, Griqualand East and Pondoland, with the flanks of the Drakensberg. Several peaks exceed 7000 ft. in height. Zwart Berg, near, the Basuto-Natal frontier, rises 7615 ft. above the sea. Mount Currie, farther south, is 7296 ft. high. The Witte Bergen (over 5000 ft. high) are an inner spur of the Drakensberg running through the Herschel district.

That part of the inner tableland of South Africa- which is in the colony has an average elevation of 3000 ft., being higher in the eastern than in the western districts. It consists of wide rolling treeless plains scarred by the beds of many rivers, often dry for a great part of the year. The tableland is broken by the Orange river, which traverses its whole length. North of the river the plateau slopes northward to a level sometimes as low as 2000 ft. The country is of an even more desolate character than south of the Orange (see Bechuanaland) . Rising from the plains are chains of isolated flat-topped hills such as the Karree Bergen, the Asbestos mountains and Kuruman hills, compara- tively unimportant ranges.

Although the mountains present bold and picturesque outlines on their outward faces, the general aspect of the country north of the coast-lands, except in its south-eastern corner, is bare and monotonous. The flat and round-topped hills (kopjes) , which are very numerous on the various plateaus, scarcely afford relief to the eye, which searches the sun-scorched landscape, usually in vain, for running water. The absence of water and of large trees is one of the most abiding impressions of the traveller. Yet the vast

arid plains are covered with shallow beds of the richest soil, which only require the fertilizing power of water to render them available for pasture or agriculture. After the periodical rains, the Karroo and the great plains of Bushmanland are converted into vast fields of grass and flowering shrubs, but the summer sun reduces them again to a barren and burnt-up aspect. The pastoral lands or velds are distinguished according to the nature of their herbage as ” sweet ” or ” sour.” Shallow sheets of water termed vleis, usually brackish, accumulate after heavy rain at many places in the plateaus; in the dry seasons these spots, where the soil is not excessively saline, are covered with rich grass and afford favourite grazing land for cattle. Only in the southern coast-land of the colony is there a soil and moisture supply suited to forest growth.

Rivers. — The inner chain of mountains forms the watershed of the colony. North of this great rampart the country drains to the Orange (q.v.), which flows from east to west nearly across the continent. For a considerable distance, both in its upper and lower courses, the river forms the northern frontier of Cape Colony. In the middle section, where both banks are in the colony, the Orange receives from the north-east its greatest tributary, the Vaal (q.v.). The Vaal, within the boundaries of the colony, is increased by the Harts river from the north-east and the Riet river from the south-east, whilst just within the colony the Riet is joined by the Modder. All these tributaries of the Orange flow, in their lower courses, through the eastern part of Griqualand West, the only well-watered portion of the colony north of the mountains. From the north, below the Vaal confluence, the Nosob, Molopo and Kuruman, intermittent streams which traverse Bechuanaland, send their occasional surplus waters to the Orange. In general these rivers lose them- selves in some vlei in the desert land. The Molopo and Nosob mark the frontier between the Bechuanaland Protectorate and the Cape; the Kuruman lies wholly within the colony. From the south a number of streams, the Brak and Ongers, the Zak and Olifants Vlei (the two last uniting to form the Hartebeest), flow north towards the Orange in its middle course. Dry for a great part of the year, these streams rarely add anything to the volume of the Orange.

South of the inner chain the drainage is direct to the Atlantic or Indian Oceans. Rising at considerable elevations, the coast rivers fall thousands of feet in comparatively short courses, and many are little else than mountain torrents. They make their way down the mountain sides through great gorges, and are noted in the eastern part of the country for their extremely sinuous course. Impetuous and magnificent streams after heavy rain, they become in the summer

mere rivulets, or even dry up altogether. In almost every instance the mouths of the rivers are obstructed by sand bars. Thus, as is the case of the Orange river also, they are, with rare exceptions, unnavigable.

Omitting small streams, the coast rivers running to the Atlantic are the Buffalo, Olifants and Berg. It may be pointed out here that the same name is repeatedly applied throughout South Africa to different streams, Buffalo, Olifants (elephants') and Groote (great) being favourite designations. They all occur more than once in Cape Colony. Of the west coast rivers, the Buffalo, about 125m. long, the most northern and least important, flows through Little Namaqualand. The Olifants (150 m.), which generally contains a fair depth of water, rises in the Winterhoek mountains and flows north between the Cedarberg and Olifants ranges. The Doom, a stream with a somewhat parallel but more easterly course, joins the Olifants about 50 m. above its mouth, the Atlantic being reached by a semicircular sweep to the south-west. The Berg river (125 m.) rises in the district of French Hoek and flows through fertile country, in a north-westerly direction, to the sea at St Helena Bay. It is navigable for a few miles from its mouth.

On the south coast the most westerly stream of any size is the Breede (about 165 m. long), so named from its low banks and broad channel. Rising in the Warm Bokkeveld, it pierces the mountains by Mitchell's Pass, flows by the picturesque towns of Ceres and Worcester, and receives, beyond the last-named place,

the waters which descend from the famous Hex River Pass. The Breede thence follows the line of the Langeberg mountains as far as Swellendam, where it turns south, and traversing the coast plain, reaches the sea in St Sebastian Bay. From its mouth the river is navigable by small vessels for from 30 to 40 m. East of the Breede the following rivers, all having their rise on the inner mountain chain, are passed in the order named:- — Gouritz (200 m.), 1 Gamtoos (290 m.), Sunday (190 m.),GreatSalt (230 m.), Kei (150 m.), Bashee (90 m.) and Umzimvuba or St John's (140 m.).

The Gouritz is formed by the junction of two streams, the Gamka and the Olifants. The Gamka rises in the Nieuwveld not far from Beaufort West, traverses the Great Karroo from north to south, and forces a

passage through the Zwarteberg. Crossing the Little Karroo, it is joined from the east by the Olifants (115 m.), a stream which rises in the Great Karroo, being known in its upper course as the Traka, and pierces the Zwarteberg near its eastern end. Thence it flows west across the Little Karroo past Oudtshoorn to its junction with the Gamka. The united stream, which takes the name of Gouritz, flows south, and receives from the west, a few miles above the point where it breaks through the coast range, a tributary (125 m.) bearing the common name Groote, but known in its upper course as the Buffels. Its headwaters are in the Komsberg. The Touws (90 m.), which rises in the Great Karroo not far from the sources of the Hex river, is a tributary of the Groote river. Below the Groote the Gouritz receives no important tributaries and enters the Indian Ocean at a point 20 m. south-west of Mossel Bay.

The Gamtoos is also formed by the junction of two streams, the Kouga, an unimportant river which rises in the coast hills, and the Groote river. This, the Groote river of Cape Colony, has its rise in the Nieuwveld near Nels Poort, being known in its upper course as the Salt river. Flowing south-east, it is joined by the Kariega on the left, and breaking through the escarpment of the Great Karroo, on the lower level changes its name to the Groote, the hills which overhang it to the north-east being known as Groote River Heights. Bending south, the Groote river passes through the coast chain by Cockscomb mountain, and being joined by the Kouga, flows on as the Gamtoos to the sea at St Francis Bay.

Sunday river does not, like so many of the Cape streams, change its name on passing from the Great to the Little Karroo and again on reaching the coast plain. It rises in the Sneeuwberg north-west of Graaff Reinet, flows south-east through one of the most fertile districts of the Great Karroo, which it pierces at the western end of the Zuurberg (of the coast chain), and reaches the ocean in Algoa Bay.

Great Salt river is formed by the junction of the Kat with the Great Fish river, which is the main stream. Several small streams rising in the Zuurberg (of the inner chain) unite to form the Great Fish river which passes through Cradock, and crossing the Karroo, changes its general direction from south to east, and is joined by the Kooner (or Koonap) and Kat, both of which rise in the Winterberg. Thence, as the Great Salt river, it winds south to the sea. Great Fish river is distinguished for the sudden and great rise of its waters after heavy rain and for its exceedingly sinuous course. Thus near Cookhouse railway station it makes an almost circular bend of 20 m., the ends being scarcely 2 m. apart, in which distance it falls 200 ft. Although,

like the other streams which cross the Karroo, the river is sometimes dry in its upper course, it has an estimated annual discharge of 51,724,000,000 cubic ft.

The head-streams of the Kei, often called the Great Kei, rise in the Stormberg, and the river, which resembles the Great Fish in its many twists, flows in a general south-east direction through mountainous country until it reaches the coast plain. Its mouth is 40 m. in a direct line north-east of East London. In

1 The distances given after the names of rivers indicate the length of the river valleys, including those of the main upper branch. In nearly all instances the rivers, owing to their sinuous course, are much longer.

the history of the Cape the Kei plays an important part as long marking the boundary between the colony and the independent Kaffir tribes. (For the Umzimvuba and other Transkei rivers see Kaffraria.)

Of the rivers rising in the coast chain the Knysna (30 m.), Kowie (40 m.), Keiskama (75 m.) and Buffalo (45 m.) may be mentioned. The Knysna rises in the Uiteniquas hills and is of importance as a feeder of the lagoon or estuary of the same name, one of the few good harbours on the coast. The banks of the Knysna are very picturesque. Kowie river, which rises in the Zuurberg mountains near Graham's Town, is also noted for the beauty of its banks. At its mouth is Port Alfred. The water over the bar permits the entrance of vessels of 10 to 12 ft. draught. The Buffalo river rises in the hilly country north of King William's Town, past which it flows. At the mouth of the river, where the scenery is very fine, is East London, third in importance of the ports of Cape Colony.

The frequency of " fontein " among the place names of the colony bears evidence of the number of springs in the country. They are often found on the flat-topped hills which dot the Karroo. Besides the ordinary springs, mineral and thermal springs are found in several places.

Lakes and Caves. — Cape Colony does not possess any lakes properly so called. There are, however, numerous natural basins which, filled after heavy rain, rapidly dry up, leaving an incrustation of salt on the ground, whence their name of salt pans. The largest, Commissioner's Salt Pan, in the. arid north- west district, is 18 to 20 m. in circumference. Besides these pans there are in the interior plateaus many shallow pools or ■vleis whose extent varies according to the

dryness or moisture of the climate. West of Knysna, and separated from the seashore by a sandbank only, are a series of five vleis, turned in flood times into one sheet of water and sending occasional spills to the ocean. These vleis are known collectively as ” the lakes.” In the Zwarteberg of the central chain are the Cango Caves, a remarkable series of caverns containing many thousand of stalactites and stalagmites. These caves, distant 20 m. from Oudtshoorn, have been formed in a dolomite limestone bed about 800 ft. thick. There are over 120 separate chambers, the caverns extending nearly a mile in a straight line.

Climate. — The climate of Cape Colony is noted for its healthi- ness. Its chief characteristics are the dryness and clearness of the atmosphere and the considerable daily range in tempera- ture; whilst nevertheless the extremes of heat and cold are rarely encountered. The mean annual temperature over the greater part of the country is under 65° F. The chief agents in determining the climate are the vast masses of water in the southern hemisphere and the elevation of the land. The large extent of ocean is primarily responsible for the lower temperature of the air in places south of the tropics compared with that experienced in countries in the same latitude north of the equator. Thus Cape Town, about 34 S., has a mean temperature, 63° F., which corresponds with that of the French and Italian Riviera, in 41 to 43 N. For the dryness of the atmosphere the elevation of the country is responsible. The east and south-east winds, which contain most moisture, dissipate their strength against the Drakensberg and other mountain ranges which guard the interior. Thus while the coast-lands, especially in the south- east, enjoy an ample rainfall, the winds as they advance west and north contain less and less moisture, so that over the larger part of the country drought is common and severe. Along the valley of the lower Orange rain does not fall for years together. The drought is increased in intensity by the occasional hot dry wind from the desert region in the north, though this wind is usually followed by violent thunderstorms.

Whilst the general characteristics of the climate are as here outlined, in a country of so large an area as Cape Colony there are many variations in different districts. In the coast-lands the daily range of the thermometer is less marked ihsLn in the interior and the humidity of the atmosphere is much greater. Nevertheless, the west coast north of the Olifants river is practic- ally rainless and there is great difference between day and night

GEOLOGY]

temperatures, this part of the coast sharing the characteristics of the interior plateau. The division of the year into four seasons is not clearly marked save in the Cape peninsula, where excep- tional conditions prevail. In general the seasons are but two— • summer and winter, summer lasting from September to April and winter filling up the rest of the year. The greatest heat is experienced in December, January and February, whilst June and July are the coldest months. In the western part of the colony the winter is the rainy season, in the eastern part the chief rains come is summer. A line drawn from Port Elizabeth north-west across the Karroo in the direction of Walfish Bay roughly divides the regions of the winter and summer rains. All the country north of the central mountain chain and west of 23° E., including the western part of the Great Karroo, has a mean annual rainfall of under 12 in. East of the 23° E. the plateaus have a mean annual rainfall ranging from 12 to 25 in. The western coast- lands and the Little Karroo have a rainfall of from 10 to 20 in.; the Cape peninsula by exception having an average yearly rainfall of 40 in. (see Cape Town). Along the south coast and in the south-east the mean annual rainfall exceeds 25 in., and is over 50 in. at some stations. The rain falls, generally, in heavy and sudden storms, and frequently washes away the surface soil. The mean annual temperature of the coast region, which, as stated, is 63° F. at Cape Town, increases to the east, the coast not only trending north towards the equator but feeling the effect of the warm Mozambique or Agulhas current.

On the Karroo the mean maximum temperature is 77 F., the mean minimum 40 , the mean daily range about 27 . In summer the drought is severe, the heat during the day great, the nights cool and clear. In.winter frost at night is not uncommon. The climate of the northern plains is similar to that of the Karroo, but the extremes of cold and heat are greater. In the summer the shade temperature reaches no F., whilst in winter nights 12 of frost have been registered. The hot westerly winds of summer make the air oppressive, though violent thunderstorms > in which form the northern districts receive most of their scanty rainfall, occasionally clear the atmosphere. Mirages are occasion- ally seen. The keen air, accompanied by the brilliant sunshine, renders the winter climate very enjoyable. Snow seldom falls in the coast region, but it lies on the higher mountains for three or four months in the year, and for as many days on the Karroo. Violent hailstorms, which do great damage, sometimes follow periods of drought. The most disagreeable feature of the climate of the colony

is the abundance of dust, which seems to be blown by every wind, and is especially prevalent in the rainy season.

That white men can thrive and work in Cape Colony the history of South Africa amply demonstrates. Ten generations of settlers, from northern Europe have been born, lived and died there, and the race is as strong and vigorous as that from which it sprang. Malarial fever is practically non-existent in Cape Colony, and diseases of the chest are rare. (F. R. C.)

Geology. — The colony affords the typical development of the

geological succession south of the Zambezi. The following

general arrangement has been determined : —

Table of Formations.

Post-Cretaceous and Recent.

Cretaceous fPondoland Cretaceous Series \ c re t a ceous

System ˆUitenhage Series ‘ J

fStormberg Series T

Beaufort Series I Carboniferous

Ecca Series f to Jurassic

Dwyka Series J

(Witteberg Series ~|

S eVe M d unl e rn Sandstone De ~ Series J

flncludes several independent! ˆ rcnaean to Pre-Cape Rocks-! unfossiliferous formations of f- SilurianC) t pre-Devonian age J

The general structure of the colony is simple. It may be regarded as a shallow basin occupied by the almost horizontal rocks of the Karroo. These form the plains and plateaus of the

interior. Rocks of pre-Cape age rise from beneath them on the north and west; on the south and east the Lower Karroo and Cape systems are bent up into sharp folds, beneath which, but in quite limited areas, the pre-Cape rocks emerge. In the folded regions the strike conforms

to the coastal outline on the south and east.

Pre-Cape rocks occur in three regions, presenting a different development in each: —

North.

West.

South.

Matsap Series

Nieuwerust Beds

Cango Beds

Ongeluk Volcanic Series

»

Griquatown Series

Ibiquas Beds

Campbell Rand Series

Black Reef Series

Pniel Volcanic Series

Keis Series

Namaqualand Schists

Namaqualand Schists and

Malmesbury

Malmesbury Beds

Beds

The pre-Cape rocks are but little understood. They no doubt represent formations of widely different ages, but all that can be said is that they are greatly older than the Cape System. The hope that they will yield fossils has been held out but not yet fulfilled. Their total thickness amounts to several thousand feet. The rocks have been

greatly changed by pressure in most cases and by the intrusion of great masses of igneous material, the Namaqualand schists and Malmesbury beds being most altered.

The most prominent member of the Cango series is a coarse conglomerate; the other rocks include slates, limestone and porphyroids. The Ibiquas beds consist of conglomerates and grits. Both the Cango and Ibiquas series have been invaded by granite of older date than the Table Mountain series. The Nieuwerust beds contain quartzite, arkose and shales. They rest indifferently on the Ibiquas series or Malmesbury beds.

The pre-Cape rocks of the northern region occur in the Camp- bell Rand, Asbestos mountains, Matsap and Langebergen, and in the Schuftebergen. They contain a great variety of sediments and igneous rocks. The oldest, or Keis, series consists of quart- zites, quartz-schists, phyllites and conglomerates. These are overlain, perhaps unconformably. by a great thickness of lavas and volcanic breccias (Pniel volcanic series, Beer Vley and Zeekoe Baard amygdaloids), and these in turn by the quartzites, grits and shales of the Black Reef series. The chief rocks of the Campbell Rand series are limestones and dolomites, with some interbedded quartzites. Among the Griquatown series of quart- zites, limestones and shales are numerous bands of jasper and large quantities of crocidolite (a fibrous amphibole); while at Blink Klip a curious breccia, over 200 ft. thick, is locally developed. Evidences of one of the oldest known glaciations have been found near the summit in the district of Hay. The Ongeluk volcanic series, consisting of lavas and breccias, conform- ably overlies the Griquatown series; while the grits, quartzites and conglomerates of the Matsap series rest on them with a great discordance.

Rocks of the Cape System have only been met with in the southern and eastern parts of South Africa. The lowest member (Table Mountain Sandstone) consists of sandstones with sub- ordinate bands of shale. It forms the upper part of Table Mountain and enters largely into the formation of the southern mountainous folded belt. It is unfossiliferous except for a few obscure sheils obtained near the base. A bed of conglomerate is regarded as of glacial origin.

The Table Mountain Sandstone passes up conformably into a sequence of sandstones and shales (Bokkeveld Beds), well exposed in the Cold and Warm Bokkevelds. The lowest beds contain many fossils, including Phacops, Homalonotus, Lepto- coelia, Spirifer, Chonetes, Orthothetes, Orthoceras, Bellerophon. Many of the species are common to the Devonian rocks of the Falkland Islands, North and

South America and Europe, with perhaps a closer resemblance to the Devonian fauna of South America than to that of any other country.

The Bokkeveld beds are conformably succeeded by the sand- stones, quartzites and shales of the Witteberg series. So far

imperfect remains of plants (Spirophyton) are the only fossils, and these are not sufficient to determine if the beds belong to the Devonian or Carboniferous System.

The thickness of the rocks of the Cape System exceeds 5000 ft.

The Karroo System is par excellence the geological formation of South Africa. The greater part of the colony belongs to it, as do large tracts in the Orange Free State and Transvaal. It includes the following well-defined subdivisions: —

Feet. f Volcanic Beds .... 4000 I Cave Sandstone 800

Stormberg Series

Red Beds 1400-

. . 2000

■Jurassic

Beaufort Series

Ecca Series

Dwyka Series

■ Trias

5000

[Permian 2600]

Carboniferous

I Molteno Beds

(Burghersdorp Beds

< Dicynodon Beds

(Pareiasaurus Beds

I Shales and Sandstones)

■j Laingsburg Beds [

(Shales)

(Upper Shales 600

} Conglomerates . . – . . 1000 (Lower Shales …. 700 j

In the southern areas the Karroo formation follows the Cape System conformably; in the north it rests unconformably on very much older rocks. The most remarkable deposits are the conglomerates of the Dwyka series. These afford the clearest evidences of glaciation on a great scale in early Carboni- ferous times. The deposit strictly resembles a consolidated modern boulder clay. It is full of huge glaciated blocks, and in different regions (Prieska chiefly) the underlying pavement is remarkably striated and shows that the ice was moving south- ward. The upper shales contain the small reptile Mesosaurus tenuidens.

Plants constitute the chief fossils of the Ecca series; among others they include Glossopteris, Gangamopteris, Phyllotheca. The Beaufort series is noted for the numerous remains of remark- able and often gigantic reptiles it contains. The genera and species are numerous, Dicynodjm, Oudenodon, Pareiasaurus being the best known. Among plants Glossopteris occurs for the last time. The Stormberg series occurs in the mountainous regions of the Stormberg and Drakensberg. The Molteno beds contain several workable seams of coal. The most remarkable feature of the series is the evidence of volcanic activity on an extensive scale. The greater part of the volcanic series is formed by lava streams of great thickness. Dykes and intrusive sheets, most of which end at the folded belt, are also numerous. The age of the intrusive sheets met with in the Beaufort series is usually attributed to the Stormberg period. They form the kopjes, or characteristic flat-topped hills of the Great Karroo. The Storm- berg series contains the remains of numerous reptiles. A true crocodile, Notochampsa, has been discovered in the Red Beds and Cave Sandstone. Among the plants, Thinnfeldia and Taeniopteris are common. Three genera of fossil fishes, Clei- throlepis, Semionotus and Ceratodus, ascend from

the Beaufort series into the Cave Sandstone.

Cretaceous rocks occur only near the coast. The plants of the Uitenhage beds bear a close resemblance to those of the Wealden. The marine fauna of Sunday river indicates a Neocomian age. The chief genera are Hamites, Baculites, Crioceras, Olcostephanus and certain Trigoniae.

The superficial post-Cretaceous and Recent deposits are widely spread. High-level gravels occur from 600 to 2000 ft. above the sea. The remains of a gigantic ox, Bubalus Baini, have been obtained from the alluvium near the Modder river. The recent deposits indicate that the land has risen for a long period. (W. G.*)

Fauna. — The fauna is very varied, but some of the wild animals common in the early days of the colony have been exterminated (e.g. quagga and blaauwbok), and others (e.g. the lion, rhinoceros, giraffe) driven beyond the confines of the Cape. Other game have been so reduced in numbers as to require special protection. This class includes the elephant (now found only in the Knysna and neighbouring forest regions), buffalo and zebra (strictly pre- served, and confined to much the same regions as the elephant),

eland, oribi, koodoo, haartebeest and other kinds of antelope and gnu. The leopard is not protected, but lingers in the mountain- ous districts. Cheetahs are also found, including a rare woolly variety peculiar to the Karroo. Both the leopards and cheetahs are commonly spoken of in South Africa as tigers. Other carnivora more or less common to the colony are the spotted hyena, aard-wolf (or Proteles), silver jackal, the Otocyon or Cape wild dog, and various kinds of wild cats. Of ungulata, besides a few hundreds of rare varieties, there are the springbuck, of which great herds still wander on the open veld, the steinbok, a small and beautiful animal which is sometimes coursed like a hare, the klipspringer or ” chamois of South Africa,” common in the mountains, the wart-hog and the dassie or rock rabbit. There are two or three varieties of hares, and a species of jerboa and several genera of mongooses. The English rabbit has been introduced into Robben Island, but is excluded from the main- land. The ant-bear, with very long snout, tongue and ears, is found on the Karroo, where it makes inroads on the ant-heaps which dot the plain. There is also a scaly ant-eater and various species of pangolins, of arboreal habit, which live on ants. Baboons are found in the mountains and forests, otters in the rivers. Of reptiles there are the crocodile, confined to the Transkei rivers, several kinds of snakes, including the cobra di capello and puff adder, numerous lizards and various tortoises, including the

leopard tortoise, the largest of the continental land forms. Of birds the ostrich may still be found wild in some regions. The great kori bustard is sometimes as much as 5 ft. high. Other game birds include the francolin, quail, guinea- fowl, sand-grouse, snipe, wild duck, wild goose, widgeon, teal, plover and rail. Birds of prey include the bearded vulture, aasvogel and several varieties of eagles, hawks, falcons and owls. Cranes, storks, flamingoes and pelicans are found in large variety.

Parrots are rarely seen. The greater number of birds belong to the order Passeres; starlings, weavers and larks are very common, the Cape canary, long-tailed sugar bird, pipits and wagtails are fairly numerous. The English starling is stated to be the only European bird to have thoroughly established itself in the colony. The Cape sparrow has completely acclimatized itself to town life and prevented the Englishsparrow obtaining a footing.

Large toads and frogs are common, as are scorpions, tarantula spiders, butterflies, hornets and stinging ants. In some districts the tsetse fly causes great havoc. The most interesting of the endemic insectivora is the Chrysochloris or ” golden mole,” so called from the brilliant yellow lustre of its fur. There are not many varieties of freshwater fish, the commonest being the baba or cat-fish and the yellow fish. Both are of large size, the baba weighing as much as 70 lb. The smallest variety is the culper or burrowing perch. In some of the vleis and streams in which the water is intermittent the fish preserve life by burrowing into the ooze. Trout have been introduced into several rivers and have become acclimatized. Of sea fish there are more than forty edible varieties. The snock, the steenbrass and geelbeck are common in the estuaries and bays. Seals and sharks are also common in the waters of the Cape. Whales visit the coast for the purpose of calving.

Of the domestic animals, sheep, cattle and dogs were possessed by the natives when the country was discovered by Europeans. The various farm animals introduced by the whites have thriven well (see below, Agriculture).

Flora. — The flora is rich and remarkably varied in the coast districts. On the Karroo and the interior plateau there is less variety. In all, some 10,000 different species have been noted in the colony, about 450 genera being peculiar to the Cape. The bush of the coast districts and lower hills consists largely of heaths, of which there are over 400 species. The heaths and the rhenoster or rhinoceros wood, a plant 1 to 2 ft. high resembling heather, form the characteristic features of the

flora of the districts indicated. The prevailing bloom is pink coloured. The deciduous plants lose their foliage in the dry season but revive with the winter rains. Notable among the flowers are the arum lily and the iris. The pelargonium group, including many varieties of geranium, is widely represented. In

the eastern coast-lands the vegetation becomes distinctly sub- tropical. Of pod-bearing plants there are upwards of eighty genera: Cape ” everlasting ” flowers (generally species of Helichrysum) are in great numbers. Several species of aloe are indigenous to the Cape. The so-called American aloe has also been naturalized. The castor-oil plant and many other plants of great value in medicine are indigenous in great abund- ance. Among plants remarkable in their appearance and structure may be noted the cactus-like Euphorbiae or spurge plants, the Stapelia or carrion flower, and the elephant’s foot or Hottentots’ bread, a plant of the same order as the yam. Hooks, thorns and prickles are characteristic of many South African plants.

Forests are confined to the seaward slopes of the coast ranges facing south. They cover between 500 and 600 sq. m. The forests contain a great variety of useful woods, affording excellent timber; among the commonest trees are the yellow wood, which is also one of the largest, belonging to the yew species; black iron wood; heavy, close-grained and durable stinkhout; melkhout, a white wood used for wheel work; nieshout; and the assegai or Cape lancewood. Forest trees rarely exceed 30 ft. in height and scarcely any attain a greater height than 60 ft. A characteristic Cape tree is Leucadendron argenteum or silver tree, so named from the silver-like lustre of stem and leaves. The so-called cedars, whence the Cedarberg got its name, exist no longer. Among trees introduced by the Dutch or British colonists the oak, poplar, various pines, the Australian blue-gum (eucalyptus) and wattle flourish. The silver wattle grows freely in shifting sands and by its means waste lands, e.g. the Cape Flats, have been reclaimed. The oak grows more rapidly and more luxuriantly than in Europe. There are few indigenous fruits; the kei apple is the fruit of a small tree or shrub found in Kaffraria and the eastern districts, where also the wild and Kaffir plums are common; hard pears, gourds, water melons and species of almond, chestnut and lemon are also native. Almost all the fruits of other countries have been introduced and flourish. On the

Karroo the bush consists of dwarf mimosas, wax-heaths and other shrubs, which after the spring rains are gorgeous in blossom (see Karroo). The grass of the interior plains is of a coarse character and yellowish colour, very different from the meadow grasses of England. The " Indian " doab grass is also indigenous.

With regard to mountain flora arborescent shrubs do not reach beyond about 4000 ft. Higher up the slopes are covered with small heath, Bruniaceae, Rutaceae, &c. All plants with per- manent foliage are thickly covered with hair. Above 6000 ft. over seventy species of plants of Alpine character have been found.

Races and Population. — The first inhabitants of Cape Colony of whom there is any record were Bushmen and Hottentots (q.v.). The last-named were originally called Quaequaes, and received the name Hottentots from the Dutch. They dwelt chiefly in the south-west and north-west parts of the country; elsewhere the inhabitants were of Bantu negroid stock, and to them was applied the name Kaffir. When the Cape was dis- covered by Europeans, the population, except along the coast, was very scanty and it is so still. The advent of Dutch settlers and a few Huguenot families in the 17th century was followed in the 19th century by that of English and German immigrants. The Bushmen retreated before the white races and now few are to be found in the colony. These live chiefly in the districts bordering the Orange river. The tribal organization of the Hottentots has been broken up, and probably no pure bred representatives of the race survive in the colony.

Half-breeds of mixed Hottentot, Dutch and Kaffir blood now form the bulk of the native population west of the Great Fish river. Of Kaffir tribes the most important living north of the Orange river are the Bechuanas, whilst in the eastern province and Kaffraria live the Fingoes, Tembus and Pondos. The Amaxosa are the principal Kaffir tribe in Cape Colony proper. The Griquas (or Bastaards) are descendants of Dutch-Hottentot half-castes. They give their name to two tracts of country. During the slavery period many thousands of negroes were

imported, chiefly from the Guinea coast. The negroes have been largely assimilated by the Kaffir tribes. (For particulars of the native races see their separate articles.) Of the white races in the Colony the French element has been completely absorbed in the Dutch. They and the German settlers are mainly pastoral people. The Dutch, who have retained in a debased form their own language, also engage largely in agriculture and viticulture. Of fine physique and hardy constitution,

they are of strongly independent character; patriarchal in their family life; shrewd, slim and courageous; in religion Protestants of a somewhat austere type. Education is somewhat neglected by them, and the percentage of illiteracy among adults is high. They are firm believers in the inferiority of the black races and regard servitude as their natural lot. The British settlers have developed few characteristics differing from the home type. The British element of the community is largely resident in the towns, and is generally engaged in trade or in professional pursuits; bet in the eastern provinces the bulk of the farmers are English or German; the German farmers being found in the district between King William's Town and East London, and on the Cape Peninsula. Numbers of them retain their own language. The term " Africander " is some- times applied to all white residents in Cape Colony and throughout British South Africa, but is often restricted to the Dutch-speaking colonists. " Boer," i.e. farmer, as a synonym for " Dutch," is not in general use in Cape Colony.

Besides the black and white races there is a large colony of Malays in Cape Town and district, originally introduced by the Dutch as slaves. These people are largely leavened -with foreign elements and, professing Mahommedanism, religion rather than race is their bond of union. They add greatly by their picturesque dress to the gaiety of the street scenes. They are generally small traders, but many are wealthy. There are also a number of Indians in the colony. English is the language of the towns; elsewhere, except in the eastern provinces, the taal or vernacular Dutch is the tongue of the majority of the whites, as it is of the natives in the western provinces.

The first census was taken in 1865 when the population of the colony, which then had an area of 195,000 sq. m., and did not include the comparatively densely-populated Native Territories, was 566,158. Of these the Europeans numbered 187,400 or about 33 % of the whole. Of the coloured races the Hottentots and Bushmen were estimated at 82,000, whilst the Kaffirs formed about 50% of the population. Since 1865 censuses have been taken — in 1875, 1891 and 1904. In 1875 Basutoland formed part of the colony; in 1891 Transkei, Tembuland, Griqualand East, Griqualand West and Walfish Bay had been incorporated, and Basutoland had been disannexed; and in 1904 Pondoland and British Bechuanaland had been added. The following table gives the area and population at each of the three periods.

1875- .

1891.

1904.

Area, sq. m.

Pop.

Area, sq. m.

Pop.

Area, sq. m.

Pop.

201,136

849,160

260,918

1,527,224

276,995

2,409,804

The 1875 census gave the population of the colony proper at 720,984, and that of Basutoland at 128,176. The colony is officially divided into nine provinces, but is more conveniently treated as consisting of three regions, to which may be added the detached area of Walfish Bay and the islands along the coast of Namaqualand. The table on the next page shows the distribution of population in the various areas.

The white population, which as stated was 187,400 in 1865 and 579,741 in 1904, was at the intermediate censuses 236,783 in 1875 and 376,987 in 1891. The proportion of Dutch descended whites to those of British origin is about 3 to 2. No exact comparison can be made showing the increase in the native population owing to the varying areas of the colony, but the natives have multiplied more rapidly than the whites; the increase in the numbers of the last-named being due, in consider- able measure, to immigration. The whites who form about 25 %

of the total population are in the proportion of 4 to 6 in the colony proper. The great bulk of the people inhabit the coast region. The population is densest in the south-west corner (which includes Cape Town, the capital) where the white outnumbers

Population (1904).

Area in sq. m.

White.

Coloured.

Total.

Per

sq. m.

Cape Colony Proper . British Bechuanaland. Native Territories Walfish Bay and Islands .

Total

206,613

51,424

18,310

648

553,452 9,368

16,777 144

936,239

75,104

817,867

853

1,489,691

84,472

834,644

997

7-21

1-64

45-5°

i-5°

276,995

579,741

1,830,063

2,409,804

870

the coloured population. Here in an area of 171 1 sq. m. the inhabitants exceed 264,000, being 154 to the sq. m. The urban population, reckoning as such dwellers in the nine largest towns and their suburbs, exceeds 331,000, being nearly 25 % of the total population of the colony proper. Of the coloured inhabit- ants at the 1904 census 15,682 were returned as Malay, 8489 as Indians, 85,892 as Hottentots, 1 4168 as Bushmen and 6289 as Griquas. The Kaffir and Bechuana tribes numbered 1,114,067 individuals, besides 310,720 Fingoes separately classified, while 279,662 persons were described as of mixed race. Divided by sex (including white and black) the males numbered (1904) 1,218,940, the females 1,190,864, females being in the proportion of 97-70 to 100 males. By race the proportion is: — whites, 82-16 females to every 100 males (a decrease of 10 % compared with 189 1); coloured, 103-22 females to every 100 males. Of the total population over 14 years old — 1,409,975— the number married was 7 3 8 , 5 63 or over 50%. Among the white population this percentage was only reached in adults over 17.

The professional, commercial and industrialoccupationsemploy about jth of the white population. In 1904 whites engaged in such pursuits numbered respectively only 32,202, 46,750 and 67,278, whereas 99,319 were engaged in domestic employment, and 111,175 in

agricultural employment, while 214,982 (mostly children) were dependants. The natives follow domestic and agricultural pursuits almost exclusively.

Registration of births and deaths did not become compulsory till 1895. Among the European population the birth-rate is about 33-00 per thousand, and the death-rate 14-00 per thousand. The birth-rate among the coloured inhabitants is about the same as with the whites, but the death-rate is higher — about 25-00 per thousand.

Immigration and Emigration.— From 1873 to 1884 only 23,337 persons availed themselves of the government aid to immigrants from England to the Cape, and in 1886 this aid was stopped. The total number of adult immigrants by sea, however, steadily increased from 11,559 in 1891 to 38,669 in 1896, while during the same period the number of departures by sea only increased from ,8415 to 17,695, and most of this increase took place in the last year. But from 1896 onwards the uncertainty of the political position caused a falling off in the number of immigrants, while the emigration figures still continued to grow; thus in 1900 there were 29,848 adult arrivals by sea, as compared with 21,163 departures. Following the close of the Anglo-Boer War the immigration figures rose in 1903 to 61,870, whereas the departures numbered 29,615. This great increase proved transitory; in 1904 and 1905 the immigrants numbered 32,282 and 33,775 respectively, while in the same years the emigrants numbered 33,651 and 34,533. At the census of 1904, 21-68 % of the Euro- pean population was born outside Africa, persons of Russian extraction constituting the strongest foreign element.

Provinces. — The first division of the colony for the purposes of administration and election of members for the legislative council was into two provinces, a western and an eastern, the western being largely Dutch in sentiment, the eastern chiefly British. With the growth of the colony these provinces were found to be inconveniently large, and by an act of government,

1 This is an overstatement. The director of the census estimated the true number of Hottentots at about 56,000.

which became law in 1874, the country was portioned out into seven provinces; about the same time new fiscal divisions were formed within them by the reduction of those already existing. The seven provinces are named from their geographical position: western, north-western, south-western, eastern, north-eastern, south-eastern and midland. In general usage the distinction made is into western and

eastern provinces, according to the area of the primary division. Griqualand West on its incorporation with the colony in 1880 became a separate pro- vince, and when the crown colony of British Bechuanaland was taken over by the Cape in 1895 it also became a separate province (see Griqualand and Bechuanaland). For electoral purposes the Native Territories (see Kaffraria) are included in the eastern province.

Chief Towns.— With the exception of Kimberley the principal towns (see separate notices) are on the coast. The capital, Cape Town, had a population (1904) of 77,668, or including the suburbs, 169,641. The most important of these suburbs, which form separate municipalities, are Woodstock (28,990), Wynberg (18,477), and Claremont (14,972). Kimberley, the centre of the diamond mining industry, 647 m. up country from Cape Town, had a pop. of 34,331, exclusive of the adjoining municipality of Beaconsfield (9378). Port Elizabeth, in Algoa Bay, had 32,959 inhabitants, East London, at the mouth of the Buffalo river, 25,220. Cambridge (pop. 3480) is a suburb of East London. Uitenhage (pop. 12,193) is 21 m. N.N.W. of Port Elizabeth. Of the other towns Somerset West (2613), Somerset West Strand (3059), Stellenbosch (4969), Paarl (11,293), Wellington (4881), Ceres (2410), Malmesbury (3811), Caledon (3508), Worcester (7885), Robertson (3244) and Swellendam (2406) are named in the order of proximity to Cape Town, from which Swellendam is distant 134 m. Other towns in the western half of the colony are Riversdale (2643), Oudtshoorn (8849), Beaufort West (5478), Victoria West (2762), De Aar (3271), and the ports of Mossel Bay (4206) and George (3506). Graaff Reinet (10,083), Middleburg (6137), Cradock (7762), Aberdeen (2553), Steyns burg (2250) and Colesberg (2668) are more centrally situated, while in the east are Graham's Town (13,887), King William's Town (9506), Queenstown (9616), Molteno (2725), Burghersdorp (2894),' Tarkastad (2270), Dordrecht (2052), Aliwal North (5566), the largest town on the banks of the Orange, and Somerset East (5216). Simon's Town (6643) in False Bay is a station of the British navy. Maf eking (2713), in the extreme north of the colony near the Transvaal frontier, Taungs (2715) and Vryburg (2985) are in Bechuanaland. Kokstad (2903) is the capital of Griqualand East, Umtata (2342) the capital of Tembuland.

Port Nolloth is the seaport for the Namaqualand copper mines, whose headquarters are at O'okiep (2106). Knysna, Port Alfred and Port St Johns are minor seaports. Barkly East and Barkly West are two widely separated towns, the first being E.S.E. of Aliwal North and Barkly West in Griqualand West. Hopetown and Prieska are on the south side of the middle course of the Orange river. Upington (2508) lies further

west on the north bank of the Orange and is the largest town in the western part of Bechuanaland. Indwe (2608) is the centre of the coal-mining region in the east of the colony. The general plan of the small country towns is that of streets laid out at right angles, and a large central market square near which are the chief church, town hall and other public buildings. In several of the towns, notably those founded by the early Dutch settlers, the streets are tree-lined. Those towns for which no population figures are given had at the 1904 census fewer than 2000 inhabitants.

Agriculture and Allied Industires.—Ovnxig to the scarcity of water over a large part of the country the area of land under cultivation is restricted. The farmers, in many instances, are pastoralists, whose wealth consists in their stock of cattle, sheep and goats, horses, and, in some cases, ostriches. In the lack of adequate irrigation much fertile soil is left untouched.

The principal cereal crops are wheat, with a yield of 1,701,000

bushels in 1904, oats, barley, rye, mealies (Indian corn) and Kaffir corn (a kind of millet). The principal wheat-growing districts are in the south-western and eastern provinces. The yield per acre is fully up to the average of the world's yield, computed at twelve bushels to the acre. The quality of Cape wheat is stated to be unsurpassed. Rye gives its name to the Roggeveld, and is chiefly grown there and in the lower hills of Namaqualand. Mealies (extensively used as food for cattle and horses) are very largely grown by the coloured population and Kaffir corn almost exclusively so. Oats are grown over a wider area than any other crop, and next to mealies are the heaviest crop grown. They are often cut whilst still tender, dried and used as forage being known as oat hay (67,742,000 bundles of about 57 lb each were produced in 1904). The principal vege- tables cultivated are potatoes, onions, mangold and beet, beans and peas. Farms in tillage are comparatively small, whilst those devoted to the rearing of sheep are very large, ranging from 3000 acres to 15,000 acres and more. For the most part the graziers own the farms they occupy.

The rearing of sheep and other live-stock is one of the chief occupations followed. At the census of 1904 over 8,465,000 woolled

and 3,353,000 other sheep were enumerated. There were 2,775,000 angora and 4,386,000 other goats, some 2,000,000 cattle, 250,000 horses and 100,000 asses. These figures showed in most cases a large decrease compared with those obtained in 1 89 1, the cause being largely the ravages of rinderpest. Lucerne and clover are extensively grown for fodder. Ostrich farms are maintained in the Karroo and in other parts of the country, young birds having been first enclosed in 1857. A farm of 6000 acres supports about 300 ostriches. The number of domesticated ostriches in 1904 was 357,000, showing an increase of over 200,000 since 1891. There are large mule-breeding establishments on the veld.

Viticulture plays an important part in the life of the colony. It is doubtful whether or not a species of vine is indigenous to the Cape. The first Dutch settlers planted small vineyards, while the cuttings of French vines introduced by the Huguenots about 1688 have given rise to an extensive culture in the south- western districts of the colony. The grapes are among the finest in the world, whilst the fruit is produced in almost unrivalled abundance. It is computed that over 600 gallons of wine are ■ produced from 1000 vines. The vines number about 80,000,000, and the annual output of wine is about 6,000,000 gallons, besides 1,500,000 gallons of brandy. The Cape wines are chiefly those known as Hermitage, Muscadel, Pontac, Stein and Hanepoot. The high reputation which they had in the first half of the 19th century was afterwards lost to a large extent. Owing to greater care on the part of growers, and the introduction of French-American resistant stocks to replace vines attacked by the phylloxera, the wines in the early years of the 20th century again acquired a limited sale in England. By far the greater part of the vintage has been, however, always consumed in the colony. The chief wine-producing districts are those of the Paarl, Worcester, Robertson, Malmesbury, Stellenbosch and the Cape, all in the south-western regions. Beyond the colony proper there are promising vine stocks in the Gor- donia division of Bechuanaland and in the Umtata district of Tembuland.

Fruit culture has become an important industry with the facilities afforded by rapid steamers for the sale of produce in Europe. The trees whose fruit reaches the greatest perfection and yield the largest harvest are the apricot, peach, orange and apple. Large quantities of table grapes are also grown. Many millions of each of the fruits named are produced annually. The pear, lemon, plum, fig and other trees likewise flourish. Cherry trees are scarce. The cultivation of the olive was begun in the western provinces, c. 1900. In the Oudtshoorn, Stockenstroom, Uniondale, Piquetberg and other districts tobacco is

grown. The output for 1904 was 5,309,000 lb.

Flour-milling is an industry second only in importance to that of diamond mining (see below). The chief milling centres are Port Elizabeth and the Cape district. In 1904 the output

of the mills was valued at over £2,200,000, more than 7,000,000 bushels of wheat being ground.

Forestry is a growing industry. Most of the forests are crown property and are under the care of conservators. Fisheries were little developed before 1897 when government experiments were begun, which proved that large quantities of fish were easily procurable by trawling. Large quantities of soles are obtained from a trawling ground near Cape Agulhas. The collec- tion of guano from the islands near Walfish Bay is under govern- ment control.

Mining. — The mineral wealth of the country is very great. The most valuable of the minerals is the diamond, found in Griqualand West and also at Hopetown, and other districts along the Orange river. The diamond-mining industry is almost entirely under the control of the De Beers Mining Company. From the De Beers mines at Kimberley have come larger numbers of diamonds than from all the other diamond mines of the world combined. Basing the calculation on the figures for the ten years 1 896- 1 90 5, the average annual production is slightly over two and a half million carats, of the average annual value of £4,250,000, the average price per carat being £1 : 13 : 3. From the other districts alluvial diamonds are obtained of the average annual value of £2 5o,ooo-£40o,ooo. They are finer stones than the Kimberley diamonds, having an average value of £3:2:7 per carat.

Next in importance among mineral products are coal and copper. The collieries are in the Stormberg district and are of considerable extent. The Indwe mines are the most productive. The colonial output increased from 23,000 tons in 1891 to 188,000 tons in 1904. The copper mines are in Namaqualand, an average of 50,000 to 70,000 tons of ore being mined yearly. Copper was the first metal worked by white men in the colony, operations beginning in 1852.

Gold is obtained from mines on the Madibi Reserve, near Mafeking — the outcrop extending about 30 m.— and, in small quantities, from mines in the Knysna district. In the Cape and Paarl districts are valuable stone and granite quarries. Asbestos is mined near Prieska, in which neighbourhood there are also nitrate beds. Salt is produced in several districts, there being large pans in the Prieska, Hopetown and

Uitenhage divisions. Tin is obtained from Kuils river, near Cape Town. Many other minerals exist but are not put to industrial purposes.

Trade. — The colony has not only a large trade in its own commodities, but owes much of its commerce to the transit of goods to and from the Transvaal, Orange River Colony and Rhodesia. The staple exports are diamonds, gold (from the Witwatersrand mines), wool, copper ore, .ostrich feathers, mohair, hides and skins. The export of wool, over 23,000,000 lb in i860, had doubled by 1871, and was over 63,473,000 lb in 1905 when the export was valued at £1,887,459. In the same year (1905) 471,024 ft) of ostrich feathers were exported valued at £1,081,187. The chief imports are textiles, food stuffs, wines and whisky, timber, hardware and machinery. The value of the total imports rose from £13,612,405 in 1895 to £33,761,831 in 1903, but dropped to £20,000,913 in 1905. The exports in 1895 were valued at £16,798,137 and rose to £23,247,258 in 1899. The dislocation of trade caused by the war with the Boer Republics brought down the exports in 1900 to £7,646,682 (in which year the value of the gold exported was only £336,795). They rose to £10,000,000 and £16,000,000 in 1901 and 1902 respectively, and in 1905 had reached £33,812,210. (This figure included raw gold valued at £20,731,159.) About 75 % of the imports come from the United Kingdom or British colonies, and nearly the whole of the exports go to the United Kingdom. The tonnage of ships entered and cleared at colonial ports rose from 10,175,903 in 1895 to 22,518,286 in 1905. In that year x 9 rths of the tonnage was British. It is interesting to compare the figures already given with those of earlier days, as they illustrate the growth of the colony over a longer period. In 1836 the total trade of the country was under £1,000,000, in i860 it had risen to over £4,500,000, in 1874 it exceeded £10,500,000. It remained at about this

figure until the development of the Witwatersrand gold mines. The consequent great increase in the carrying trade with the Transvaal led to some neglect of the internal resources of the colony. Trade depression following the war of 1899-1902 turned attention to these resources, with satisfactory results. The value of imports for local consumption in 1906 was £12,847,188, the value of exports, the produce of the colony being £15,302,854. A ” trade balance-sheet ”

for 1906 drawn up for the Cape Town chamber of commerce by its president showed, however, a debtor account of £18,751,000 compared with a credit account of £17,931,000, figures representing with fair accuracy the then economic condition of the country.

Cape Colony is a member of the South African Customs Union. The tariff, revised in 1906, is protective with a general ad valorem rate of 15% on goods not specifically enumerated. On machinery generally there is a 3% ad valorem duty. Books, engravings, paintings, sculptures, &c, are on the free list. There is a rebate of 3 % on most goods from the United Kingdom, machinery from Great Britain thus entering free.

Communications. — There is regular communication between Europe and the colony by several lines of steamships. The British mails are carried under contract with the colonial govern- ment by packets of the Union-Castle Steamship Co., which leave Southampton every Saturday and Cape Town every Wednesday. The distance varies from 5866 m. to 6146 m., according to the route followed, and the mail boats cover the distance in seventeen days. From Cape Town mail steamers sail once a week, or oftener, to Port Elizabeth (436 m., two days) East London (543 m., three days) and Durban (823 m., four or five days); Mossel Bay being called at once a fortnight. Steamers also leave Cape Town at frequent and stated intervals for Port Nolloth.

Steamers of the D.O.A.L. {Deutsche Ost Afrika Linie), starting from Hamburg circumnavigate Africa, touching at the three chief Cape ports. The western route is via Dover to Cape Town, the eastern route is via the Suez Canal and Natal. Several lines of steamers ply between Cape Town and Australian ports, and others between Cape Colony and India.

There are over 8000 m. of roads in the colony proper and rivers crossing main routes are bridged. The finest bridge in the colony is that which spans the Orange at Hopetown. It is 1480 ft. long and cost £114,000. Of the roads in general it may be said that they are merely tracks across the veld made at the pleasure of the traveller. The ox is very generally used as a draught animal in country districts remote from railways; sixteen or eighteen oxen being harnessed to a wagon carrying 3 to 4 tons. Traction-engines have in some places sup- planted the ox-wagon for bringing agricultural produce to market. The ” Scotch cart,” a light two-wheeled vehicle is also much used.

Railways. — Railway construction began in 1859 when a private company built a line from Cape Town to Wellington. This line, 64 m.

long, was the only railway in the colony for nearly fifteen years. In 1871 parliament resolved to build railways at the public expense, and in 1873 (the year following the conferment of responsible government on the colony) a beginning was made with the work, £5,000,000 having been voted for the purpose. In the same year the Cape Town-Wellington line was bought by the state. Subsequently powers were again given to private companies to construct lines, these companies usually receiving subsidies from the government, which owns and works the greater part of the railways in the colony.

The plan adopted in 1873 was to build independent lines from the seaports into the interior, and the great trunk lines then begun determined the development of the whole system. The standard gauge in South Africa is 3 ft., 6 in. and all railways mentioned are of that gauge unless otherwise stated.

The railways, which have a mileage exceeding 4000, are classi- fied under three great systems: — the Western, the Midland and the Eastern.

The Western system — the southern section of the Cape to Cairo route — starts from Cape Town and runs by Kimberley

(647 m.) to Vryburg (774 m.), whence it is continued by the Rhodesia Railway Co. to Mafeking (870m.), Bulawayo (1360m.), the Victoria Falls on the Zambezi (1623 m.) and the Belgian Congo frontier, whilst a branch from Bulawayo runs via Salisbury to Beira, 2037 m. from Cape Town. From Fourteen Streams, a station 47 m. north of Kimberley, a line goes via Klerksdorp to Johannesburg and Pretoria, this being the most direct route between Cape Town and the Transvaal. (Distance from Cape Town to Johannesburg, 955 m.)

The Midland system starts from Port Elizabeth, and the main line runs by Cradock and Naauwpoort to Norval's Pont on the Orange river, whence it is continued through the Orange River Colony and the Transvaal by Bloemfontein to Johannesburg (714 m. from Port Elizabeth) and Pretoria (741 m.). From Kroonstad, a station midway betweenBloemfontein and Johannes- burg, a railway, opened in 1906, goes via Ladysmith to Durban, and provides the shortest railway route between Cape Town and Port Elizabeth and Natal. From Port Elizabeth a second line (186 m.) runs by Uitenhage and Graaff Reinet, rejoining the main line at Rosmead, from which a junction line (83 m.) runs eastwards, connecting with the Eastern system at Stormberg. From Naauwpoort another junction line (69 m.) runs north-west, connecting the Midland with the Western system at De Aar, and

affords an alternative route to that via Kimberley from Cape Town to the Transvaal. (Distance from Cape Town to Johannesburg via Naauwpoort, 1012 m.)

The Eastern system starts from East London, and the principal line runs to Springfontein (314 m.) in the Orange River Colony, where it joins the line to Bloemfontein and the Transvaal. (Distance from East London to Johannesburg, 665 m.) From Albert junction (246 m. from East London) a branch, originally the main line, goes east to Aliwal North (280 m.).

The west to east connexion is made by a series of railways running for the most part parallel with the coast. Starting from Worcester, 109 m. from Cape Town on the western main line a railway runs to Mossel Bay via Swellendam and Rivers- dale. From Mossel Bay another line runs by George, Oudt- shoorn and Willowmore to Klipplaat, a station on the line from Graaff Reinet to Port Elizabeth. (Distance from Cape Town 666 m.) From Somerset East a line (164 m.) goes via King William's Town to Blaney junction on the eastern main line and 31m. from East London. The Somerset East line crosses, at Cookhouse station, the Midland main line from Port Elizabeth to the north, and by this route the distance between Port Elizabeth and East London is 307 m. Before the completion in 1905 of the Somerset East-King William's Town line, the nearest railway connexion between the two seaports was via Rosmead and Stormberg junction — a distance of 547 m. From Sterkstroom junction on the eastern main line a branch railway goes through the Transkei to connect at Riverside, the frontier station, with the Natal railways. It runs via the Indwe coal-mines (66 m. from Sterkstroom), Maclear (173 m.) and Kokstad. From Kokstad to Durban is 232 m. The eastern system is also connected with the Transkei by another railway. From Amabele, a station 51 m. from East London, a line goes east to Umtata (180 m. distant). Thence the line is continued to Port St Johns (307 m. from East London), whence another line 142 m. long goes to Kokstad.

Besides the main lines there are many smaller lines. Thus all the towns within a 50 m. radius of Cape Town are linked to it by railway. Longer branches run from the capital S.E. to Caledon (87 m.) and N.W. via Malmesbury (47 m.), and Piquetberg (107 m.) to Graaf Water (176 m.). A line runs N.W. across the veld from Hutchinson on the western main line via Victoria West to Carnarvon (86 m.). From De Aar junction, a line (in m.) goes N.W. via Britstown to Prieska on the Orange river. From Port Elizabeth a line (35 m.) runs east to Grahams- town, whence another line (43 m.) goes south-east to Port Alfred at the mouth of the Kowie river. Another line (179 m.) on a two-foot

gauge runs N.W. from Port Elizabeth via Humans- dorp to Avontuur.

A line; unconnected with any other in the colony, runs from

Port Nolloth on the west coast to the O'okiep copper mines (92 m.). It has a gauge of 2 ft. 6 in.

The railways going north have to cross, within a comparatively short distance of the coast, the mountains which lead to the Karroo. The steepest gradient is on the western main line. Having entered the hilly district at Tulbagh Road, where the railway ascends 500 ft. in 9 m., the Hex River Pass is reached soon after leaving Worcester, 794 ft. above the sea. In the next 36 m. the line rises 2400 ft., over 20 m. of that distance being at gradients of 1 in 40 to 1 in 45. The eastern line is the most continuously steep in the colony. In the first 18 m. from East London the railway rises 1000 ft.; at Kei Road, 46 m. from its starting-point, it has reached an altitude of 2332 ft., at Cathcart (109 m.) it is 3906 ft. above the sea, and at Cypher- gat, where it pierces the Stormberg, 204 m. from East London, the rails are 5450 ft. above the sea. From Sterkstroom to Cyphergat, 15 m., the line rises 1044 ft. The highest railway station in the colony is Krom Hooghte, 5543 ft., in the Zuurberg, on the branch line connecting the Eastern and Western systems. The capital expended on government railways to the end of 1905 was £29,973,024, showing a cost per mile of £10,034. The gross earnings in 1905 were £4,047,065 (as compared with £3,390,093 in 1895); the expenses £3,076,920 (as compared with £1,596,013 in 1895). Passengers conveyed in 1905 numbered 20,611,384, and the tonnage of goods 1,836,946 (of 2000 lb).

Posts and Telegraphs. — Direct telegraphic communication between London and Cape Town was established on Christmas day 1879. Cables connect the colony with Europe (1) via Loanda and Bathurst, (2) via St Helena, Ascension and St Vincent; with Europe and Asia (3) via Natal, Zanzibar and Aden, and with Australia (4) via Natal, Mauritius and Coces.

An overland telegraph wire connects Cape Town and Ujiji, on Lake Tanganyika, via Rhodesia and Nyasaland. Other lines connect Cape Town with all other South African states, while within the colony there is a complete system of telegraphic communication, over 8000

m. of lines being open in 1906. The telephone service is largely developed in the chief towns. The telegraph lines are owned and have been almost entirely built, at a cost up to 1906 of £865,670, by the government, which in 1873 took over the then existing lines (781 m.).

The postal service is well organized, and to places beyond the reach of the railway there is a service of mail carts, and in parts of Gordonia (Bechuanaland) camels are used to carry the mails. Since 1890 a yearly average of over 50,000,000 has passed through the post. Of these about four-fifths are letters.

Constitution and Government. — Under the constitution estab- lished in 1872 Cape Colony enjoyed self-government. The legis- lature consisted of two chambers, a Legislative Council and a House of Assembly. Members of the Legislative Council or Upper House represented the provinces into which the colony was divided and were elected for seven years; members of the House of Assembly, a much more numerous body, elected for five years, represented the towns and divisions of the provinces. At the head of the executive was a governor appointed by the crown. By the South Africa Act 1909 this constitution was abolished as from the establishment of the Union of South Africa in 1910. Cape Colony entered the Union as an original province, being represented in the Union parliament by eight members in the Senate and fifty-one in the House of Assembly. The qualifi- cations of voters for the election of members of the House of Assembly are the same as those existing in Cape Colony at the establishment of the Union, and are as follows: — Voters must be born or naturalized British subjects residing in the Cape province at least twelve months, must be males aged 21 (no distinction being made as to race or colour) , must be in possession of property worth £75, or in receipt of salary or wages of not less than £50 a year. No one not an elector in 1892 can be registered as a voter unless he can sign his name and write his address and occupation. A share in tribal occupancy does not qualify for a vote. A voter of non-European descent is not qualified for election to parliament (see further South Africa) . The number

of registered electors in 1907 was 152,135, of whom over 20,000 were non-Europeans.

For provincial purposes there is a provincial council consisting of the same number of members as are elected by the province to the House of Assembly. The qualifications of voters for the council are the same as for the House of Assembly. All voters, European and non-European, are eligible for seats on the council, but any councillor who becomes a

member of parliament thereupon ceases to be a member of the provincial council. The council passes ordinances dealing with direct taxation within the province for purely local purposes, and generally controls all matters of a merely local or private nature in the province. The council was also given, for five years following the establishment of the Union, control of elementary education. All ordinances passed by the council must have the sanction of the Union government before coming into force. The council is elected for three years and is not subject to dissolution save by effluxion of time. The chief executive officer is an official appointed by the Union government and styled administrator of the province. The administrator holds his post for a period of five years. He is assisted by an executive committee consisting of four persons elected by the provincial council but not necessarily members of that body.

To the provincial council is entrusted the oversight of the divisional and municipal councils of the province, but the powers of such subordinate bodies can also be varied or withdrawn by the Union parliament acting directly. Divisional councils, which are elected triennially, were established in 1855. In 1908 they numbered eighty-one. The councils are presided over by a civil commissioner who is also usually resident magistrate. They have to maintain all roads in the division; can nominate field cornets (magistrates); may borrow money on the security of the rates for public works; and return three members yearly to the district licensing court. Their receipts in 1908 were £269,000; their expenditure in the same period was £283,000. The electors to the divisional councils are the owners or occupiers of immovable property. Members of the councils must be registered voters and owners of immovable property in the division valued at not less than £500.

Municipalities at the Cape date from 1836, and are now, for the most part, subject to the provisions of the General Municipal Act of 1882. Certain municipalities have, however, obtained special acts for their governance. In 1907 there were 119 municipalities in the province. Under the act of 1882 the municipalities were given power to levy annually an owner's rate assessed upon the capital value of rateable property, and a tenant's rate assessed upon the annual value of such property. No rate may exceed 2d. in the £ on the capital value or 8d. in the £ on the annual value. The receipts of the municipalities in 1907 amounted to £1,430,000. During the same period the expenditure amounted to £1,539,000.

Law and Justice. — The basis of the judicial system is the Roman-Dutch law, which has been, however, modified by legislation of the

Cape parliament. In each division of the province there is a resident magistrate with primary jurisdiction in civil and criminal matters. The South Africa Act 1909 created a Supreme Court of South Africa, the supreme court of the Cape of Good Hope, which sits at Cape Town, becoming a provincial division of the new supreme court, presided over by a judge-president. The two other superior courts of Cape Colony, namely the eastern districts court which sits at Graham's Town, and the high court of Griqualand which sits at Kimberley, became local divisions of the Supreme Court of South Africa. Each of these courts consists of a judge-president and two puisne judges. The provincial and local courts, besides their original powers, have jurisdiction in all matters in which the government of the Union is a party and in all matters in which the validity of any provincial ordinance shall come into question. From the decisions of these courts appeals may be made to the appellate division of the Supreme Court. The judges of the divisional courts go on circuit twice a year. In addition, since 1888 a special court has been held at

Kimberley for trying cases relating to illicit diamond buying (" I.D.B."). This court consists of two judges of the supreme court and one other member, hitherto the civil com- missioner or the resident magistrate of Kimberley. The Trans- keian territories, which fall under the jurisdiction of the eastern district court, are subject to a Native Territories Penal Code, which came into force in 1887. Besides the usual magistrates in these territories, there is a chief magistrate, resident at Cape Town, with two assistants in the territories.

Religion. — Up to the year 1876 government provided an annual grant for ecclesiastical purposes which was divided among the various churches, Congregationalists alone declining to receive state aid. From that date, in accordance with the provisions of the Voluntary Act of 1875, grants were only con- tinued to the then holders of office. The Dutch Reformed Church, as might be anticipated from the early history of the country, is by far the most numerous community. Next in number of adherents among the white community come the Anglicans — Cape Colony forming part of the Province of South Africa. In 1847 a bishop of Cape Town was appointed to preside over this church, whose diocese extended not only over Cape Colony and Natal, but also over the Island of St Helena. Later, however, separate

bishops were appointed for the eastern province (with the seat at Graham's Town) and for Natal. Subsequently another bishopric, St John's, Kaffraria, was created and the Cape Town diocesan raised to the rank of archbishop. Of other Protestant bodies the Methodists outnumber the Anglicans, eight-ninths of their members being coloured people. The Roman Catholics have bishops in Cape Town and Graham's Town, but are comparatively few. There are, besides, several foreign missions in the colony, the most important being the Moravian, London and Rhenish missionary societies. The Moravians have been established since 1732.

The following figures are extracted from the census returns of 1904: — Protestants, 1,305,453; Roman Catholics, 38,118; Jews, 19,537; Mahommedans, 22,623; other sects, 4297; "no religion," 1,016,255. In this last category are placed the pagan natives. The figures for the chief Protestant sects were: — Dutch Reformed Church, 399,487; Gereformeerde Kerk, 6209; Lutherans, 80,902; Anglicans, 281,433; Presbyterians, 88,660; Congregationalists, 112,202; Wesleyan and other Methodists, 290,264; Baptists, 14,105. Of the Hottentots 77%, of the Fingoes 50%, of the mixed races 89%, and of the Kaffirs and Bechuanas 26% were returned as Christians.

Education. — There is a state system of primary education controlled by a superintendent-general of education and the education department which administers the parliamentary grants. As early as 1839 a scheme of public schools, drawn up by Sir John Herschel, the astronomer, came into operation, and was continued until 1865, when a more comprehensive scheme was adopted. In 1905 an act was passed dividing the colony into school districts under the control of popularly elected school boards, which were established during 1905-1906. These boards levy, through municipal or divisional councils, a rate for school purposes and supervise all public and poor schools. The schools are divided into public undenominational elementary schools; day schools and industrial institutions for the natives; mission schools to which government aid for secular instruction is granted; private farm schools, district boarding schools, training schools for teachers, industrial schools for poor whites, &c. In 1905 2930 primary schools of various classes were open. Education is not compulsory, but at the 1904 census 95% of the white population over fourteen years old could read and write. In the same year 186,000 natives could read and write, and 53,000 could read but not write. There are also numbers of private schools receiving no government aid. These include schools maintained by the German community, in which the medium of instruction is German.

The university of the Cape of Good Hope, modelled on that of London, stands at the head of the educational system of the colony. It arose out of and superseded the board of public examiners (which had been constituted in 1858), was established

in 1874 and was granted a royal charter in 1877. It is governed by a chancellor, a vice-chancellor (who is chairman of the university council) and a council consisting (1909) of 38 members, including representatives of Natal. The university is empowered to grant degrees ranking equally with those of any university in Great Britain. Originally only B.A., M.A., LL.B., LL.D., M.B., and M.D. degrees were conferred, but degrees in literature, science and music and (in 1908) in divinity were added. The number of students who matriculated rose from 34 in 1875 to 118 in 1885, 242 in 1895 and 539 in 1905. The examina- tions are open to candidates irrespective of where they have studied, but under the Higher Education Act grants are paid to seven colleges that specially devote themselves to preparing students for the graduation courses. These are the South African College at Cape Town (founded in 1829), the Victoria College at Stellenbosch, the Diocesan College at Rondebosch, Rhodes University College, Graham's Town, Gill College at Somerset East, the School of Mines at Kimberley and the Huguenot Ladies' College at Welling- ton. Several denominational colleges, receiving no govern- ment aid, do the same work in a greater or less degree, the best known being St Aidan's (Roman Catholic) College and Kingswood (Wesleyan) College, both at Graham's Town. Graaff Reinet College, Dale College, King William's Town, and the Grey Institute, Port Elizabeth, occupy the place of high schools under the education department. The Theological Seminary at Stellenbosch prepares theological students for the ministry of the Dutch Church. At Cape Town is a Royal Observa- tory, founded in 1829, one of the most important institutions of its kind in the world. It is under the control of a royal astro- nomer and its expenses are defrayed by the British admiralty.

Defence. — The Cape peninsula is fortified with a view to repelling attacks from the sea. Simon's Town, which is on the east side of the peninsula, is the headquarters of the Cape and West Coast naval squadron. It is strongly fortified, as is also Table Bay. Port Elizabeth is likewise fortified against naval attack. A strong garrison of the British army is stationed in the colony, with headquarters at Cape Town. The cost of this garrison is borne by the imperial government. For purposes of local defence a force named the Frontier Armed and Mounted Police was organized in 1853, and a permanent colonial force has been maintained since that date. It is now known as the Cape Mounted Riflemen and is about 700 strong. Its ordinary duty is

to preserve order in the Transkeian territories. The Cape Mounted Police, over 1600 strong, are also available for the defence of the colony and are fully armed. There are numerous volunteer corps, which receive a capitation grant from the govern- ment. By a law passed in 1878 every able-bodied man between eighteen and fifty is liable to military service without as well as within the limits of the state. There is also a volunteer naval force.

Revenue, Debt, &*c. — The following table shows the total receipts (including loans) and payments (including that under Loan Acts) of the colony in various financial years, from 1880 to 1905: —

Year ending 30th June.

Receipts.

Payments.

Total.

Loans (included in total).

1880 1885 1890

1895 1900

1905

£3,55 £3,814,947

5,571,907

5,416,611

6,565,752

13,856,247

5,6oi

£496,795

i,Hl,857

26,441

128,376

5,214,290

£3,742,665

4,211,832 5,327,496 5,388,157 7-773,230

10,914,784

The colony had a public debt of £42,109,561 on the 31st of December 1905, including sums raised for corporate bodies, harbour boards, &c, but guaranteed in the general revenue. The greater part of the loans were issued at 3! or 4% interest. Nearly the whole of the loans raised have been spent on railways, harbours, irrigation and other public works. The value of assessed property for divisional council purposes was returned in 1905 at £87,078,268. The total revenue of the divisional councils increased from £160,558 in 1901 to £273,543 in 1905, and the

expenditure from £170,892 in 1901 to £243,241 in 1905. The receipts from municipal rates and taxes rose from £520,587 in 1901 to £700,103 in 1905; the total municipal receipts in the same period from £978,867 to £1,752,105. At the end of 1905 the total indebtedness of the municipalities was £5,775,420, and the value of assessed property within the municipal bounds £53,948,224.

Banks.-— The following table gives statistics of the banks under trust laws: —

31st

December.

Including Head Offices.

Circulation, Colony only.

Assets and

Liabilities,

Colony only.

Capital Subscribed.

Capital Paid up.

Reserve.

1890

1895 1900

1905

£5,780,610

7,189,090

12,166,800

11,510,900

£1,558,612

2,382,003 6,508,308 4,456,925

£850,489

1,008,837 1,810,621 2,948,428

£740,210

612,266

1, 3 6 i,637

1,065,251

£9,221,661

11,864,152

20,537,343 20,749,988

Standard Time, Money, Weights and Measures. — Since 1903 a standard time has been adopted throughout South Africa, being that of

30 or two hours east of Greenwich. In other words noon in South Africa corresponds to 10.0 a.m. in London. The actual difference between the meridians of Greenwich and Cape Town is one hour fourteen minutes. The monetary system is that of Great Britain and the coins in circulation are exclusively British. Though all the standard weights and measures are British, the following old Dutch measures are still used: — Liquid Measure: Leaguer = about 128 imperial gallons; half aum = i5ˆ imperial gallons; anker = 75 imperial gallons. Cap- acity: Muid = 3 bushels. The general surface measure is the old Amsterdam Morgen, reckoned equal to 2-11654 acres; 1000 Cape lineal feet are equal to 1033 British imperial feet. The Cape ton is 2000 lb.

The Press. — The first newspaper of the colony, written in Dutch and English, was published in 1824, and its appearance marked an era not only in the literary but in the political history of the colony, since it drew to a crisis the disputes which had arisen between the colonists and the governor, Lord Charles Somerset, who had issued a decree prohibiting all persons from convening or attending public meetings. Its criticisms on public affairs soon led to its suppression by the governor, and a memorial from the colonists to the king petitioning for a free press was the result. This boon was secured to the colony in 1828, and the press soon became a powerful agent, characterized by public spirit and literary ability. In politics the newspapers are divided, principally on racial lines, appealing either' to the British or the Dutch section of the community, rarely to both sides. There are about one hundred newspapers in English or Dutch published in the colony.

The chief papers are the Cape Times, Cape Argus, South African News (Bond), both daily and weekly; the Diamond Fields Advertiser (Kimberley) and the Eastern Province Herald (Port Elizabeth). Ons Land and Het Dagblad are Dutch papers published at Cape Town. (F. R. C.)

History

Discovery and Settlement. — Bartholomew Diaz, the Portuguese navigator, discovered the Cape of Good Hope in 1488, and Vasco da Gama in 1497 sailed along the whole coast of South Africa on his way to India. The Portuguese, attracted by the riches of the East, made no permanent settlement at the Cape. But the Dutch, who, on the decline of the Portuguese power, established themselves in the East, early saw the importance of the place as a station where their vessels might take in water and provisions. They did not, however, establish any post at

the Cape until 1652, when a small garrison under Jan van Riebeek were sent there by the Dutch East India Company. Riebeek landed at Table Bay and founded Cape Town. In 1671 the first purchase of land from the Hottentots beyond the limits of the fort built by Riebeek marked the beginning of the Colony proper. The earliest colonists were for the most part people of low station or indifferent character, but as the result of the investigations

of a commissioner sent out in 1685 a better class of immigrants was introduced. About 1686 the European population was increased by a number of the French refugees who left their country on the revocation of the edict of Nantes. The influence of this small body of immigrants on the character of the Dutch settlers was marked. The Huguenots, however, owing to the policy of the Company, which in 1701 directed that Dutch only should be taught in the schools, ceased by the middle of the 18th century to be a distinct body, and the knowledge of French disappeared. Advancing north and east from their base at Cape Town the colonists gradually acquired — partly by so-called contracts, partly by force — all the land of the Hot- tentots, large numbers of whom they slew. Besides those who died in warfare, whole tribes of Hottentots were destroyed by epidemics of smallpox in 1713 and in 1755. Straggling remnants still main- tained their independence, but the mass of the Hottentots took service with the colonists as herdsmen, while others became hangers-on about the company's posts and grazing-farms or roamed about the country. In 1 7 8 7 the Dutch government passed a law subjecting these wanderers to certain restrictions. The effect of this law was to place the Hottentots in more immediate dependence upon the farmers, or to compel them to migrate northward beyond the colonial border. Those who chose the latter alternative had to encounter the hostility of their old foes, the Bushmen, who were widely spread over the plains from the Nieuwveld and Sneeuwberg mountains to the Orange river. The colonists also, pressing forward to those territories, came in contact with these Ishmaelites — the farmers' cattle and sheep, guarded only by a Hottentot herdsman, offering the strongest temptation to the Bushman. Reprisals followed; and the position became so desperate that the extermination of the Bushmen appeared to the government the only safe alternativeˆ " Commandoes " or war-bands were sent out against them, and they were hunted down like wild beasts. Within a period of six years, it is said, upwards of 3000 were either killed or captured. Out of the organization of these commandoes, with their field- commandants and field-cornets, has grown the common system of local government in the Dutch-settled districts of South Africa. It was not to the hostility of the natives, nor to the hard struggle with

nature necessary to make agriculture profitable on Karroo or veld, that the slow progress made by the colonists was due, so much as to the narrow and tyrannical policy adopted by the East India Company, which closed the colony against free immigration, kept the whole of the trade in its own hands, combined the administrative, legislative and judicial powers in one body, prescribed to the farmers the nature of the crops they were to grow, demanded from them a large part of their produce, and harassed them with other exactions tending to discourage industry and enterprise. (See further South Africa, where the methods and results of Dutch colonial government are considered in their broader aspects.) To this mischievous policy is ascribed that dislike to orderly government, and that desire to escape from its control, which characterized for many genera- tions the ” boer ” or farmer class of Dutch settlers — qualities utterly at variance with the character of the Dutch in their native country. It was largely to escape oppression that the farmers trekked farther and farther from the seat of government. The company, to control the emigrants, established a magistracy at Swellendam in 1745 and another at Graaff Reinet in 1786. The Gamtoos river had been declared, c. 1740, the eastern frontier of the colony, but it was soon passed. In 1 780, however, the Dutch, to avoid collision with the warlike Kaffir tribes advancing south and west from east central Africa, agreed with them to make the Great Fish river the common boundary. In 1795 the heavily taxed burghers of the frontier districts, who were afforded no protection against the Kaffirs, expelled the officials of the East India Company, and set up independent governments at Swellendam and Graaff Reinet. In the same

year, Holland having fallen under the revolutionary government of France, a British force under General Sir James Craig was sent to Cape Town to secure the colony for the prince of Orange — a refugee in England — against the French. The governor of Cape Town at first refused to obey the instructions from the prince, but on the British proceeding to take forcible possession he capitulated. 1 His action was hastened by the fact that the Hottentots, deserting their former masters, flocked to the British standard. The burghers of Graaff Reinet did not surrender until a force had been sent against them, while in 1799 and again in 1801 they rose in revolt. In February 1803, as a result of the peace of Amiens, the colony was handed over to the

Batavian Republic, which introduced many needful reforms, as had the British during their eight years' rule. (One of the first acts of General Craig had been to abolish torture in the administration of justice.) War having again broken out, a British force was once more sent to the Cape. After an engagement (Jan. 1806) on the shores of Table Bay the Dutch garrison of Cape Castle sur- rendered to the British under Sir David Baird, and in 1814 the colony was ceded outright by Holland to the British crown. At that time the colony extended to the line of mountains guard- ing the vast central plateau, then called Bushmansland, and had an area of about 1 20,000 sq. m. and a population of some 60,000, of whom 27,000 were whites, 17,000 free Hottentots and the rest slaves. These slaves were mostly imported negroes and Malays. Their introduction was the chief cause leading the white settlers to despise manual labour.

The First and Second Kafir Wars. — At the time of the cession to Great Britain the first of several wars with the Kaffirs had been fought. (The numerous minor conflicts which since 1789 had taken place between the colonists and the Kaffirs — the latter sometimes aided by Hottentot allies — are not reckoned in the usual enumeration of the Kaffir wars.) The Kaffirs, who had crossed the colonial frontier, had been expelled from the district between the Sunday and Great Fish rivers known as the Zuurveld, which became a sort of neutral ground. For some time previous to 181 1 the Kaffirs, however, had taken possession of the neutral ground and committed depredations on the colonists. In order to expel them from the Zuurveld, Colonel John Graham took the field with a mixed force in December 181 1, and in the end the Kaffirs were driven beyond the Fish river. On the site of Colonel Graham's headquarters arose the town which bears his name. In 1817 further trouble arose with the Kaffirs, the immediate cause of quarrel being an attempt by the colonial authorities to enforce the restitution of some stolen cattle. Routed in 1818 the Kaffirs rallied, and in the early part of 1819 poured into the colony in vast hordes. Led by a prophet- chief named Makana, they attacked Graham's Town on the 22nd of April, then held by a handful of white troops. Help arrived in time and the enemy were beaten back. It was tfien arranged that the land between the Fish and Keiskamma rivers should be neutral territory.

The British Settlers of 1820. — The war of 1817-19 led to the first introduction of English settlers on a considerable scale, an event fraught with far-reaching consequences. The then governor, Lord Charles Somerset, whose treaty arrangements with the Kaffir chiefs had proved unfortunate, desired to erect a barrier against the Kaffirs by settling white colonists in the border district. In 1820, on the

advice of Lord Charles, parlia- ment voted £50,000 to promote emigration to the Cape, and 4000 British were sent out. These people formed what was known as the Albany settlement, founding Port Elizabeth and making Graham's Town their headquarters. Intended primarily as a measure to secure the safety of the frontier, and regarded by the British government chiefly as a better means of affording a livelihood to a few thousands of the surplus population, this emigration scheme accomplished a far greater work than its authors contemplated. The new settlers, drawn from every part of the British Isles and from almost every grade of society,

1 It is stated that Colonel R. J. Gordon (the explorer of the Orange river), who commanded the Dutch forces at the Cape, chagrined by the occupation of the country by the British, committed suicide.

retained, and their descendants retain, strong sympathy with their native land. In course of time they formed a valuable counterpoise to the Dutch colonists, and they now constitute the most progressive element in the colony. The advent of these immigrants was also the means of introducing the English language at the Cape. In 1825, for the first time, ordinances were issued in English, and in 1827 its use was extended to the conduct of judicial proceedings. Dutch was not, however, ousted, the colonists becoming to a large extent bilingual.

Dislike of British Rule. — Although the colony was fairly prosperous, many of the Dutch farmers were as dissatisfied with British rule as they had been with that of the Dutch East India Company, though their ground of complaint was not the same. In 1792 Moravian missions had been established for the benefit of the Hottentots, 2 and in 1799 the London Missionary Society began work among both Hottentots and Kaffirs. The championship of Hottentot grievances by the missionaries caused much dissatisfaction among the majority of the colonists, whose views, it may be noted, temporarily prevailed, for in 181 2 an ordin- ance was issued which empowered magistrates to bind Hottentot children as apprentices under conditions differing little from that of slavery. Meantime, however, the movement for the abolition of slavery was gaining strength in England, and the missionaries at length appealed from the colonists to the mother country. An incident which occurred in 1815-1816 did much to make permanent the hostility of the frontiersmen to the British. A farmer named Bezuidenhout refused to obey a summons issued on the complaint of a Hottentot, and firing on the party sent to arrest him, was himself killed by the return fire. This caused a miniature rebellion, and on its suppression five ringleaders were publicly hanged at the spot — Slachters Nek — where they had sworn to expel " the

English tyrants.” The feeling caused by the hanging of these men was deepened by the circumstances of the execution — for the scaffold on which the rebels were simultaneously swung, broke down from their united weight and the men were afterwards hanged one by one. An ordinance passed in 1827, abolishing the old Dutch courts of landroost and heemraden (resident magistrates being substituted) and decreeing that henceforth all legal proceedings should be con- ducted in English; the granting in 1828, as a result of the representations of the missionaries, of equal rights with whites to the Hottentots and other free coloured people; the imposition (1830) of heavy penalties for harsh treatment of slaves, and finally the emancipation of the slaves in 1834, 3 — all these things increased the dislike of the farmers to the government. Moreover, the inadequate compensation awarded to slave- owners, and the suspicions engendered by the method of payment, caused much resentment, and in 1835 the trekking of farmers into unknown country in order to escape from an unloved govern- ment, which had characterized the 18th century, recommenced. Emigration beyond the colonial border had in fact been con- tinuous for 150 years, but it now took on larger proportions.

The Third Kaffir War. — On the eastern border further trouble arose with the Kaffirs, towards whom the policy of the Cape government was marked by much vacillation. On the nth of December 1834 a chief of high rank was killed while resisting a commando party. This set the whole of the Kaffir tribes in a blaze. A force of 10,000 fighting men, led by Macomo, a brother of the chief who was killed, swept across the frontier, pillaged and burned the homesteads and murdered all who dared to resist. Among the worst sufferers were a colony of freed Hottentots who, in 1829, had been settled in the Kat river valley by the British authorities. The fighting power of the colony was scanty, but the governor, Sir Benjamin D’Urban (

2 From 1737 to 1744 George Schmidt, “The apostle to the Hottentots,” had a mission at Genadendal — ” The Vale of Grace.”

‘ Masters were allowed to keep their ex-slaves as ” apprentices ” until the 1st of December 1838.

territory was invaded, and after nine months’ fighting the Kaffirs were

completely subdued, and a new treaty of peace concluded (on the 17th of September). By this treaty all the country as far as the river Kei was acknowledged to be British, and its inhabitants declared British subjects. A site for the seat of government was selected and named King Wiliam's Town.

The Great Trek. — The action of Sir Benjamin D'Urban was not approved by the home government, and on the instruction of Lord Glenelg, secretary for the colonies, who declared that " the great evil of the Cape Colony consists in its magnitude," the colonial boundary was moved back to the Great Fish river, and eventually (in 1837) Sir Benjamin was dismissed from office. "The Kaffirs," in the opinion of Lord Glenelg, " had an ample justification for war; they had to resent, and endeav- oured justly, though impotently, to avenge a series of encroach- ments " (despatch of the 26th of December 1835). This attitude towards the Kaffirs was one of the many reasons given by the Trek Boers for leaving Cape Colony. The Great Trek, as it is called, lasted from 1836 to 1840, the trekkers, who numbered about 7000, founding communities with a republican form of government beyond the Orange and Vaal rivers, and in Natal, where they had been preceded, however, by British emigrants. From this time Cape Colony ceased to be the only civilized com- munity in South Africa, though for long it maintained its pre- dominance. Up to 1856 Natal was, in fact, a dependency of the Cape (see South Africa). Considerable trouble was caused by the emigrant Boers on either side of the Orange river, where the new comers, the Basutos and other Kaffir tribes, Bushmen and Griquas contended for mastery. The Cape government endeavoured to protect the rights of the natives. On the advice of the missionaries, who exercised great influence with all the non-Dutch races, a number of native states were recognized and subsidized by the Cape government, with the object — not realized — of obtaining peace on this northern frontier. The first of these " Treaty States " recognized was that of the Griquas of Griqualand West. Others were recognized in 1843 and 1844 — in the last-named year a treaty was made with the Pondoes on the eastern border. During this period the condition of affairs on the eastern frontier was deplorable, the government being unable or unwilling to afford protection to the farmers from the depredations of the Kaffirs. Elsewhere, however, the colony was making progress. The change from slave to free labour proved to be advantageous to the farmers in the western provinces; an efficient educational system, which owed its initiation to Sir John Herschel, the astronomer (who lived in Cape Colony from 1834 to 1838), was adopted; Road Boards were established and did much good work; to the staple industries — the growing of wheat, the rearing of

cattle and the making of wine — was added sheep- raising; and by 1846 wool became the most valuable export from the country. The creation, in 1835, of a legislative council, on which unofficial members had seats, was the first step in giving the colonists a share in the government.

The War of the Axe. — Another war with the Kaffirs broke out in 1846 and was known as the War of the Axe, from the murder of a Hottentot, to whom an old Kaffir thief was manacled, while being conveyed to Graham's Town for trial for stealing an axe. The escort was attacked by a party of Kaffirs and the Hottentot killed. The surrender of the murderer was refused, and war was declared in March 1846. The Gaikas were the chief tribe engaged in the war, assisted during the course of it by the Tambukies. After some reverses the Kaffirs were signally defeated on the 7th of June by General Somerset on the Gwangu, a few miles from Fort Peddie. Still the war went on, till at length Sandili, the chief of the Gaikas, surrendered, followed gradually by the other chiefs; and by the beginning of 1848 the Kaffirs were again subdued, after twenty-one months' fighting.

Extension of British Sovereignty. — In the last month of the war (December 1847) Sir Harry Smith reached Cape Town as governor of the colony, and with his arrival the Glenelg policy was reversed. By proclamation, on the 1 7th of December, he extended the frontier of the colony northward to the Orange

river and eastward to the Keiskamma river, and on the 23rd, at a meeting of the Kaffir chiefs, announced the annexation of the country between the Keiskamma and the Kei rivers to the British crown, thus reabsorbing the territory abandoned by order of Lord Glenelg. It was not, however, incorporated with the Cape, but made a crown dependency under the name of British Kaffraria. For a time the Kaffirs accepted quietly the new order of things. The governor had other serious matters to contend with, including the assertion of British authority over the Boers beyond the Orange river, and the establishment of amicable relations with the Transvaal Boers. In the colony itself a crisis arose out of the proposal to make it a convict station.

The Convict Agitation and Granting of a Constitution.- — In 1848 a circular was sent by the 3rd Earl Grey, then colonial secretary, to the governor of the Cape (and to other colonial governors), asking him to ascertain the feelings of the colonists regarding the reception of a certain class of convicts, the intention being to send to South Africa Irish peasants who had been driven into crime by the famine of 1845.

Owing to some misunderstanding, a vessel, the ” Neptune, ” was despatched to the Cape before the opinion of the colonists had been received, having on board 289 convicts, among whom were John Mitchell, the Irish rebel, and his colleagues. When the news reached the Cape that this vessel was on her way, the people of the colony became violently excited; and they established an anti-convict association, by which they bound themselves to cease from all intercourse of every kind with persons in any way connected ” with the landing, supplying or employing convicts.” On the 19th of September 1849 the ” Neptune ” arrived in Simon’s Bay. Sir Harry Smith, confronted by a violent public agitation, agreed not to land the convicts, but to keep them on board ship in Simon’s Bay till he received orders to send them elsewhere. When the home government became aware of the state of affairs orders were sent directing the ” Neptune ” to proceed to Tasmania, and it did so after having been in Simon’s Bay for five months. The agitation did not, however, pass away without other important results, since it led to another movement, the object of which was to obtain a free representative government for the colony. This concession, which had been previously promised by Lord Grey, was granted by the British government, and, in 1854, a constitu- tion was established of almost unprecedented liberality.

The Kaffir War of 1850-1853.— The anti-convict agitation had scarcely ceased when the colony was once again involved in war. The Kaffirs bitterly resented their loss of independence, and ever since the last war had been secretly preparing to renew the struggle. Sir Harry Smith, informed of the threatening attitude of the natives, proceeded to the frontier, and summoned Sandili and the other chiefs to an interview. Sandili refused obedience; upon which, at an assembly of other chiefs (October 1850), the governor declared him deposed from his chiefship, and appointed an Englishman, Mr Brownlee, a magistrate, to be temporary chief of the Gaika tribe. The governor appears to have believed that the measures he took would prevent a war and that Sandili could be arrested without armed resistance. On the 24th of December Col. Geo. Mackinnon, being sent with a small force with the object of securing the chief, was attacked in a narrow defile by a large body of Kaffirs, and compelled to retreat with some loss. This was the signal for a general rising of the Gaika tribe. The settlers in the military villages, which had been established along the frontier, assembled in fancied security to celebrate Christmas Day, were surprised, many of them murdered, and their houses given to the flames. Other disasters followed in quick succession. A small patrol of military was cut off to a man. The greater part of the Kaffir police

deserted, many of them carrying off their arms and accoutrements. Emboldened by success, the enemy in immense force surrounded and attacked Fort Cox, where the governor was stationed with an inconsider- able force. More than one unsuccessful attempt was made to relieve Sir Harry; but his dauntless spirit was equal to the occasion. At the head of 150 mounted riflemen, accom- panied by Colonel Mackinnon, he dashed out of the fort,

and, through a heavy fire of the enemy, rode to King William's Town — a distance of 1 2 m. Meantime, a new enemy appeared. Some 900 of the Kat river Hottentots, who had in former wars been firm allies of the British, threw in their lot with their hereditary enemies — the Kaffirs. They were not without excuses. They complained that while doing burgher duty in former wars — the Cape Mounted Rifles consisted largely of Hottentot levies — they had not received the same treatment as others serving in defence of the colony, that they got no com- pensation for the losses they had sustained, and that they were in various ways made to feel they were a wronged and injured race. A secret combination was formed with the Kaffirs to take up arms to sweep the Europeans away and establish a Hottentot republic. Within a fortnight of the attack on Colonel Mackinnon the Kat river Hottentots were also in arms. Their revolt was followed by that of the Hottentots at other missionary stations; and part of the Hottentots of the Cape Mounted Rifles followed their example, including the very men who had escorted the governor from Fort Cox. But numbers of Hottentots remained loyal and the Fingo Kaffirs likewise sided with the British.

After the confusion caused by the sudden outbreak had sub- sided, and preparations had been made, Sir Harry Smith and his gallant force turned the tide of war against the Kaffirs. The Amatola mountains were stormed; and the paramount chief Kreli, who all along covertly assisted the Gaikas, was severely punished. In April 1852 Sir Harry Smith was recalled by Earl Grey, who accused him — unjustly, in the opinion of the duke of Wellington — of a want of energy and judgment in conducting the war, and he was succeeded by Lieutenant-General Cathcart. Kreli was again attacked and reduced to submission. The Amatolas were finally cleared of the Kaffirs, and small forts erected among them to prevent their reoccupation. The British

commanders were hampered throughout by the insufficiency of their forces, and it was not till March 1853 that this most sanguinary of Kaffir wars was brought to a conclusion, after a loss of many hundred British soldiers. Shortly afterwards, British Kaffraria was made a crown colony. The Hottentot settlement at Kat river remained, but the Hottentot power within the colony was now finally crushed.

The Great Amaxosa Delusion. — From 1853 the Kaffir tribes on the east gave little trouble to the colony. This was due, in large measure, to an extraordinary delusion which arose among the Amaxosa in 1856, and led in 1857 to the death of some 50,000 persons. This incident is one of the most remarkable instances of misplaced faith recorded in history. The Amaxosa had not accepted their defeat in 1853 as decisive and were preparing to renew the struggle with the white men. At this juncture, May 1856, a girl named Nongkwase told her father that on going to draw water from a stream she had met strangers of commanding aspect. The father, Mhlakza, went to see the men, who told him that they were spirits of the dead, who had come, if their behests were obeyed, to aid the Kaffirs with their invincible power to drive the white man from the land. Mhlakza repeated the message to his chief, Sarili, one of the most powerful Kaffir rulers. Sarili ordered the commands of the spirits to be obeyed. These orders were, at first, that the Amaxosa were to destroy their fat cattle. The girl Nongkwase, standing in the river where the spirits had first appeared, heard unearthly noises, interpreted by her father as orders to kill more and more cattle. At length the spirits commanded that not an animal of all their herds was to be left alive, and every grain of corn was to be destroyed. If that were done, on a given date myriads of cattle more beautiful than those destroyed would issue from the earth, while great fields of corn, ripe and ready for harvest, would instantly appear. The dead would rise, trouble and sickness vanish, and youth and beauty come to all alike. Unbelievers and the hated white man would on that day utterly perish. The people heard and obeyed. Sarili is believed by many persons to have been the instigator of the prophecies. Certainly some of the principal chiefs regarded all that was done simply as the preparation for a last struggle with the whites, their plan being to throw the whole Amaxosa nation fully armed and in a famishing condition upon the colony.

There were those who neither believed the predictions nor looked for success in war, but destroyed their last particle of food in unquestioning obedience to their chief's command. Either in faith that reached the sublime, or in obedience equally great, vast numbers of the people acted. Great kraals were also prepared for the promised cattle, and huge skin sacks to hold the milk that was soon to be more

plentiful than water. At length the day dawned which, according to the prophecies, was to usher in the terrestrial paradise. The sun rose and sank, bat the expected miracle did not come to pass. The chiefs who had planned to hurl the famished warrior host upon the colony had committed an incredible blunder in neglecting to call the nation together under pretext of witnessing the resurrection. This error they realized too late, and endeavoured by fixing the re- surrection for another day to gather the clans, but blank despair had taken the place of hope and faith, and it was only as starving suppliants that the Amaxosa sought the British. The colonists did what they could to save life, but thousands perished miserably. In their extremity many of the Kaffirs turned cannibals, and one instance of parents eating their own child is authenticated. Among the survivors was the girl Nongkwase; her father perished. A vivid narrative of the whole incident will be found in G. M. Theal's History and Geography of South Africa (3rd ed., London, 1878), from which this account is condensed. The country depopulated as the result of this delusion was afterwards peopled by European settlers, among whom were members of the German legion which had served with the British army in the Crimea, and some 2000 industrious North German emigrants, who proved a valuable acquisition to the colony.

Sir George Grey's Governorship. — In 1854 Sir George Grey became governor of the Cape, and the colony owed much to his wise administration. The policy, imposed by the home govern- ment, of abandoning responsibility beyond the Orange river, was, he perceived, a mistaken one, and the scheme he prepared in 1858 for a confederation of all South Africa (q.v.) was rejected by Great Britain. By his energetic action, however, in support of the missionaries Moffat and Livingstone, Sir George kept open for the British the road through Bechuanalandto the far interior. To Sir George was also due the first attempt, missionary effort apart, to educate the Kaffirs and to establish British authority firmly among them, a result which the self-destruction of the Amaxosa rendered easy. Beyond the Kei the natives were left to their own devices. Sir George Grey left the Cape in 1861. During his governorship the resources of the colony had been increased by the opening up of the copper mines in Little Nama-qualand, the mohair wool industry had been established and Natal made a separate colony. The opening, in November 1863, of the railway from Cape Town to Wellington, begun in 1859, and the construction in i860 of the great breakwater in Table Bay, long needed on that perilous coast, marked the beginning in the colony of public works on a large scale. They were the more or less direct result of the granting to the colony of a large share in its own government. In 1865

the province of British Kaffraria was incorporated with the colony, under the title of the Electoral Divisions of King William's Town and East London. The transfer was marked by the removal of the prohibition of the sale of alcoholic liquors to the natives, and the free trade in intoxicants which followed had most deplorable results among the Kaffir tribes. A severe drought, affecting almost the entire colony for several years, caused great depression of trade, and many farmers suffered severely. It was at this period (1869) that ostrich-farming was successfully established as a separate industry.

Whether by or against the wish of the home government, the limits of British authority continued to extend. The Basutos, who dwelt in the upper valleys of the Orange river, had subsisted under a semi-protectorate of the British government from 1843 to 1854; but having been left to their own resources on the abandonment of the Orange sovereignty, they fell into a long exhaustive warfare with the Boers of the Free State. On the urgent petition of their chief Moshesh, they were proclaimed British subjects in 1868, and their territory became part of the

colony in 1871 (see Basutoland). In the same year the south- eastern part of Bechuanaland was annexed to Great Britain under the title of Griqualand West. This annexation was a con- sequence of the discovery there of rich diamond mines, an event which was destined to have far-reaching results. (F. R. C.)

Development of Modern Conditions. — The year 1870 marks the dawn of a new era in South Africa. From that date the develop- ment of modern South Africa may be said to have fairly started, and in spite of political complications, arising from time to time, the progress of Cape Colony down to the outbreak of the Transvaal War of 1 899 was steadily forward. The discovery of diamonds on the Orange river in 1867, followed immediately afterwards by the discovery of diamonds on the Vaal river, led to the rapid occupa- tion and development of a tract of country which had hitherto been but sparsely inhabited. In 1870 Dutoitspan and Bult- fontein diamond mines were discovered, and in 1871 the still richer mines of Kimberley and De Beers. These four great deposits of mineral wealth are still richly productive, and con- stitute the greatest industrial asset which the colony possesses. At

the time of the beginning of the diamond industry, not only the territory of Cape Colony and the Boer Republics, but all South Africa, was in a very depressed condition. Ostrich-farm- ing was in its infancy, and agriculture but little developed. The Boers, except in the immediate vicinity of Cape Town, were a primitive people. Their wants were few, they lacked enterprise, and the trade of the colony was restricted. Even the British colonists at that time were far from rich. The diamond industry therefore offered considerable attractions, especially to colonists of British origin. It was also the means at length of demonstrat- ing the fact that South Africa, barren and poor on the surface, was rich below the surface. It takes ten acres of Karroo to feed a sheep, but it was now seen that a few square yards of diamond-iferous blue ground would feed a dozen families. By the end of 187 1 a large population had already gathered at the diamond fields, and immigration continued steadily, bringing new-comers to the rich fields. Among the first to seek a fortune at the diamond fields was Cecil Rhodes.

In 1858 the scheme of Sir George Grey for the federation of the various colonies and states of South Africa had been rejected, as has been stated, by the home authorities. In 1 8 74 the 4th earl of Carnarvon, secretary of state for the colonies, who had been successful in aiding to bring about the federation of Canada, turned his attention to a similar scheme for the confederation of South Africa. The representative government in Cape Colony had been replaced in 1872 by responsible, i.e. self-government, and the new parliament at Cape Town resented the manner in which Lord Carnarvon propounded his suggestions. A resolu- tion was passed (June 11, 1875) stating that any scheme in favour of confederation must in its opinion originate within South Africa itself. James Anthony Froude, the distinguished historian, was sent out by Lord Carnarvon to further his policy in South Africa. As a diplomatist and a representative of the British government, the general opinion in South Africa was that Froude was not a success, and he entirely failed to induce the colonists to adopt Lord Carnarvon's views. In 1876, Fingoland, the Idutywa reserve, and Noman's-land, tracts of country on the Kaffir frontier, were annexed by Great Britain, on the understanding that the Cape government should provide for their government. Lord Carnarvon, still bent on confederation, now appointed Sir Bartle Frere governor of Cape Colony and high commissioner of South Africa.

Frere had no sooner taken office as high commissioner than he found himself confronted with serious native troubles in Zululand and on the Kaffir frontier of Cape Colony. In 1877 there occurred an outbreak on the part of the Galekas and the Gaikas. A considerable force of

imperial and colonial troops was employed to put down this rising, and the war was subsequently known as the Ninth Kaffir war. It was in this war that the famous Kaffir chief, Sandili, lost his life. At its conclusion the Transkei, the territory of the Galeka tribe, under. Kreli, was annexed by the British. In the meantime Lord Carnarvon had resigned his position in the British cabinet, and the scheme for

confederation which he had been pushing forward was abandoned. As a matter of fact, at that time Cape Colony was too fully occupied with native troubles to take into consideration very seriously so great a question as confederation. A wave of feeling spread amongst the different Kaffir tribes on the colonial frontier, and after the Gaika-Galeka War there followed in 1879 a rising in Basutoland under Moirosi, whose cattle-raiding had for some time past caused considerable trouble. His stronghold was taken after very severe fighting by a colonial force, but, their defeat notwithstanding, the Basutos remained in a restless and aggressive condition for several years. In 1880 the colonial authorities endeavoured to extend to Basutoland the Peace Preservation Act of 1878, under which a general disarmament of the Basutos was attempted. Further fighting followed on this proclamation, which was by no means successful, and although peace was declared in the country in December 1882, the colonial authorities were very glad in 1884 to be relieved of the administration of a country which had already cost them £3,000,000. The imperial government then took over Basutoland as a crown colony, on the understanding that Cape Colony should contribute for adminis- trative purposes £18,000 annually. In 1880, Sir Bartle Frere, who by his energetic and statesmanlike attitude on the relations with the native states, as well as on all other questions, had won the esteem and regard of loyal South African colonists, was recalled by the 1st earl of Kimberley, the liberal secretary of state for the colonies, and was succeeded by Sir Hercules Robinson. Griqualand West, which included the diamond fields, was now incorporated as a portion of Cape Colony.

Origin of the Afrikander Bond. — The Boer War of 1881, with its disastrous termination, naturally reacted throughout South Africa; and as one of the most important results, in the year 1882 the first Afrikander Bond congress was held at Graaff Reinet. The organization of the Bond developed into one * embracing the Transvaal, the Orange Free State and Cape Colony. Each country had a provincial committee with district committees, and branches were distributed throughout the whole of South Africa. At a later date the Bond in the Cape Colony dissociated itself from its Republican branches. The general lines of policy which this organization endeavoured to promote may best be

gathered from De Patriot, a paper published in the colony, and an avowed supporter of the organization. The following extracts from articles published in 1882 will illustrate, better than anything else, the ambition entertained by some of the promoters of this remarkable organization.

” The Afrikander Bond has for its object the establishment of a South African nationality by spreading a true love for what is really our fatherland. No better time could be found for establishing the Bond than the present, when the consciousness of nationality has been thoroughly aroused by the Transvaal war.” . . .” The British government keep on talking about a confederation under the British flag, but that will never be brought about. They can be quite certain of that. There is just one obstacle in the way of confederation, and that is the British flag. Let them remove that, and in less than a year the confederation would be established under the Free Afrikander flag.” ” After a time the English will realize that the advice given them by Froude was the best — they must just have Simon’s Bay as a naval and military station on the way to India, and give over all the rest of South Africa to the Afrikanders.” . _. . ” Our principal weapon in the social war must be the destruction of English trade by our establishing trading companies for ourselves.” ...” It is the duty of each true Afrikander not to spend anything with the English that he can avoid.”

De Patriot afterwards became imperialist, but Ons Land, another Bond organ, continued in much the same strain.

In addition to having its press organs, the Bond from time to time published official utterances less frank in their tone than the statements of its press. Some of the Articles of the Bond’s original manifesto are entirely praiseworthy, e.g. those referring to the administration of justice, the honour of the people, &c; such clauses as these, however, were meaningless in view of the enlightened government which obtained in Cape Colony, and for the true ” inwardness ” of this document it is necessary to note Article 3, which distinctly speaks of the promotion of South Africa’s independence (Zelfstandigheid). If the Bond aroused

disloyalty and mistaken aspirations in one section of the Cape

inhabitants, it is equally certain that it caused a great wave of loyal and patriotic enthusiasm to pass through another and more enlightened section. A pamphlet written in 1885 for an associa- tion called the Empire League by Mr Charles Leonard, who afterwards consistently championed the cause of civil equality and impartial justice in South Africa, maintained as follows: — ■ ” (1) That the establishment of the English government here was beneficial to all classes; and (2) that the withdrawal of that government would be disastrous to every one having vested interests in the colony. . . . England never can, never will, give up this colony, and we colonists will never give up England. . . . Let us, the inhabitants of the Cape Colony, be swift to recognize that we are one people, cast together under a glorious flag of liberty, with heads clear enough to appreciate the freedom we enjoy, and hearts resolute to maintain our true privileges; let us desist from reproach- ing and insulting one another, and, rejoicing that we have this goodly land as a common heritage, remember that by united action only can we realize its grand possibilities. We belong both of us to a home-loving stock, and the peace and prosperity of every home in the land is at stake. On our action now depends the question whether our children shall curse or bless us; whether we shall live in their memory as promoters of civil strife, with all its miserable conse- quences, or as joint architects of a happy, prosperous and united state. Each of us looks back to a noble past. United, we may ensure to our descendants a not unworthy future. Disunited, we can hope for nothing but stagnation, misery and ruin. Is this a light thing ? ”

It is probable that many Englishmen reading Mr Leonard’s manifesto at the time regarded it as unduly alarming, but sub- sequent events proved the soundness of the views it expressed. The fact is that, from 1881 onwards, two great rival ideas came into being, each strongly opposed to the other. One was that of Imperialism — full civil rights for every civilized man, whatever his race might be, under the supremacy and protection of Great Britain. The other was nominally republican, but in fact exclusively oligarchical and Dutch. The policy of the extremists of this last party was summed up in the appeal which President Kruger made to the Free State in February 1881, when he bade them ‘ ‘ Come and help us. God is with us. It is his will to unite us as a people ” — ” to make a united South Africa free from British authority.” The two actual founders of the Bond party were Mr Borckenhagcn, a German who was residing in Bloem- f ontein, and Mr Reitz, afterwards state secretary of the Transvaal. Two interviews have been recorded which show the true aims of these two promoters of the Bond at the outset. One occurred between Mr Borckenhagen and Cecil

Rhodes, the other between Mr Reitz and Mr T. Schreiner, whose brother became, at a later date, prime minister of Cape Colony. In the first interview Mr Borckenhagcn remarked to Rhodes: ” We want a united Africa,” and Rhodes replied: ” So do I.” Mr Borckenhagen then continued: “There is nothing in the way; we will take you as our leader. There is only one small thing: we must, of course, be independent of the rest of the world.” Rhodes re- plied: ” You take me cither for a rogue or a fool. I should be a rogue to forfeit all my history and my traditions; and I should be a fool, because I should be hated by my own countrymen and mistrusted by yours.” But as Rhodes truly said at Cape Town in 1898, ” The only chance of a true union is the over- shadowing protection of a supreme power, and any German, Frenchman, or Russian Would tell you that the best and most liberal power is that over which Her Majesty reigns.” The other interview took place at the beginning of the Bond’s existence. Being approached by Mr Reitz, Mr T. Schreiner objected that the Bond aimed ultimately at the overthrow of British rule and the expulsion of the British flag from South Africa. To this Mr Reitz replied: ” Well, what if it is so?” Mr- Schreiner expostulated in the following terms: ” You do not suppose that that flag is going to disappear without a tremendous struggle and hard fighting?” ” Well, I suppose not, but even so, what of that?” rejoined Mr Reitz. In the face of this testimony with reference to two of the most prominent of the Bond’s promoters, it is impossible to deny that from its beginning the great under- lying idea of the Bond was an independent South Africa.

Mr Hofmeyr’s Policy. — In 1882 an act was passed in the Cape legislative assembly, empowering members to speak in

the Dutch language on the floor of the House, if they so desired. The intention of this act was a liberal one, but the moment of its introduction was inopportune, and its effect was to give an additional stimulus to the policy of the Bond. It was prob- ably also the means of bringing into the House a number of Dutchmen, by no means well educated, who would not have been returned had they been obliged to speak English. By this act an increase of influence was given to the Dutch leaders. The head of the Afrikander Bond at this time in Cape Colony, and the leader of Dutch opinion, was Mr J. H. Hofmeyr, a man of undoubted ability and astuteness. Although he was recognized leader of the Dutch party in Cape Colony, he consistently refused to take office, preferring to direct the policy and the action of others from an independent position. Mr Hofmeyr sat in the house of assembly as member for Stellenbosch, a strong Dutch constituency. His influence over the Dutch members was supreme, and in addition to directing the policy of the Bond within the Cape Colony, he

supported and defended the aggressive expansion policy of President Kruger and the Transvaal Boers. In 1883, during a debate on the Basutoland Dis-annexation Bill, Rhodes openly charged Mr Hofmeyr in the House with a desire to see a ” United States of South Africa under its own flag.” In 1884 Mr Hofmeyr led the Bond in strongly supporting the Transvaal Boers who had invaded Bechuanaland (g.v.), proclaiming that if the Bechuanaland freebooters were not per- mitted to retain the territories they had seized, in total disregard of the terms of the conventions of 1881 and 1884, there would be rebellion among the Dutch of Cape Colony. Fortunately, however, for the peace of Cape Colony at that time, Sir Charles Warren, sent by the imperial government to maintain British rights, removed the invading Boers from Stellaland and Goshen — two so-called republics set up by the Boer freebooters — in March 1885 and no rebellion occurred. Nevertheless the Bond party was so strong in the House that they compelled the ministry under Sir Thomas Scanlen to resign in 1884. The logical and constitutional course for Mr Hofmeyr to have followed in these circumstances would have been to accept office and himself form a government. This he refused to do. He preferred to put in a nominee of his own who should be entirely dependent on him. Mr Upington, a clever Irish barrister, was the man he selected, and under him was formed in 1884 what will always be known in Cape history as the “Warming-pan” ministry. This action was denounced by many British colonists, who were sufficiently loyal, not only to Great Britain, but also to that constitution which had been conferred by Great Britain upon Cape Colony, to desire to see the man who really wielded political power also acting as the responsible head of the party. It was Mr Hofmeyr’s refusal to accept this responsibility, as well as the nature of his Bond policy, which won for him the political sobriquet of the ” Mole.” Open and responsible exercise of a power conferred under the constitution of the country, Englishmen and English colonists would have accepted and even welcomed. But that subterranean method of Dutch policy which found its strongest expression in Pretoria, and which operated from Pretoria to Cape Town, could not but be resented by loyal colonists. From 1881 down to 1898, Mr Hofmeyr practically determined how Dutch members should vote, and also what policy the Bond should adopt at every juncture in its history. In 1895 he resigned his seat in parliament — an action which made his political dictator- ship still more remarkable. This influence on Cape politics was a demoralizing one. Other well-known politicians at the Cape subsequently found it convenient to adapt their views a good deal too readily to those held by the Bond. In justice to Mr Hofmeyr, however, it is only fair to say that after the Warren expedition in 1885, which was at least evidence

that. Great Britain did not intend to renounce her supremacy in South Africa altogether, he adopted a less hostile or anti-British attitude. The views and attitude of Mr Hofmeyr between i88r and 1884 — when even loyal British colonists, looking to the events which followed Majuba, had almost come to believe that Great Britain had little desire to maintain her supremacy — can scarcely be wondered at.

Rhodes and Dutch Sentiment.— Recognizing the difficulties of the position, Cecil Rhodes from the outset of his political career showed his desire to conciliate Dutch sentiment by considerate treatment and regard for Dutch prejudices. Rhodes was first returned as member of the House of Assembly for Barkly West in 1880, and in spite of all vicissitudes this constituency remained loyal to him. He supported the bill permitting Dutch to be used in the House of Assembly in 1882, and early in 1884 he first took office, as treasurer-general, under Sir Thomas Scanlen. Rhodes had only held this position for six weeks when Sir Thomas Scanlen resigned, and in August of the same year he was sent by Sir Hercules Robinson to British Bechuanaland as deputy-com- missioner in succession to the Rev. John Mackenzie, the London Missionary Society's representative at Kuruman, who in the previous May had proclaimed the queen's authority over the district. Rhodes's efforts to conciliate the Boers failed — hence the necessity for the Warren mission. In 1885 the territories of Cape Colony were farther extended, and Tembuland, Bomvana- land and Galekaland were formally added to the colony. In 1886 Sir Gordon Sprigg succeeded Sir Thomas Upington as prime minister.

South African Customs Union. — The period from 1878 to 1885 in Cape Colony had been one of considerable unrest. In this short time, in addition to the chronic troubles with the Basutos — which led the Cape to hand them over to the imperial authorities — there occurred a series of native disturbances which were followed by the Boer War of 1881, and the Bechuanaland dis- turbances of 1884. In spite, however, of these drawbacks, the development of the country proceeded. The diamond industry was flourishing. In 1887 a conference was held in London for " promoting a closer union between the various parts of the British empire by means of an imperial tariff of customs." At this conference it is worthy of note that Mr Hofmeyr pro- pounded a sort of " Zollverein " scheme, in which imperial customs were to be levied

independently of the duties payable on all goods entering the empire from abroad. In making the proposition he stated that his objects were ” to promote the union of the empire, and at the same time to obtain revenue for the purposes of general defence.” The scheme was not at the time found practicable. But its authorship, as well as the sentiments accompanying it, created a favourable view of Mr Hofmeyr’s attitude. In the year 1888, in spite of the failure of statesmen and high commissioners to bring about political confederation, the members of the Cape parliament set about the establishment of a South African Customs Union. A Customs Union Bill was passed, and this in itself constituted a considerable development of the idea of federation. Shortly after the passing of the bill the Orange Free State entered the union. An endeavour was also made then, and for many years afterwards, to get the Transvaal to join. But President Kruger, consistently pursuing his own policy, hoped through the Delagoa Bay railway to make the South African Republic entirely in- dependent of Cape Colony. The endeavour to bring about a customs union which would embrace the Transvaal was also little to the taste of President Kruger’s Hollander advisers, interested as they were in the schemes of the Netherlands Railway Company, who owned the railways of the Transvaal.

Diamonds and Railways. — Another event of considerable commercial importance to the Cape Colony, and indeed to South Africa, was the amalgamation of the diamond-mining companies, chiefly brought about by Cecil Rhodes, Alfred Beit and ” Barney ” Barnato, in 1889. One of the principal and most beneficent results of the discovery and development of the diamond mines was the great impetus which it gave to railway extension. Lines were opened up to Worcester and Beaufort West, to Graham’s Town, Graaff Reinet and Queens- town. Kimberley was reached in 1885. In 1890 the line was extended northwards on the western frontier of the Transvaal as far as Vryburg in Bechuanaland. In 1889 the Free State entered into an arrangement with the Cape Colony whereby the main trunk railway was extended to Bloemfontein, the Free State receiving half the profits. Subsequently the Free State bought

at cost price the portion of the railway in its own territory. In 1891 the Free State railway was still farther extended to Viljoen’s Drift on the Vaal river, and in 1892 it reached Pretoria and Johannesburg.

Rhodes as Prime Minister: Native Policy. — In 1889 Sir Henry Loch was appointed high commissioner and governor of Cape Colony in succession to Sir Hercules Robinson. In 1890 Sir Gordon Sprigg, the premier of the colony, resigned, and a Rhodes government was

formed. Prior to the formation of this ministry (see table at end of article), and while Sir Gordon Sprigg was still in office, Mr Hofmeyr approached Rhodes and offered to put him in office as a Bond nominee. This offer was declined. When, however, Rhodes was invited to take office after the downfall of the Sprigg ministry, he asked the Bond leaders to meet him and discuss the situation. His policy of customs and railway unions between the various states, added to the personal esteem in which he was at this time held by many of the Dutchmen, enabled him to undertake and to carry on successfully the business of government.

The colonies of British Bechuanaland and Basutoland were now taken into the customs union existing between the Orange Free State and Cape Colony. Pondoland, another native terri- tory, was added to the colony in 1894, and the year was marked by the Glen Grey Act, a departure in native policy for which Rhodes was chiefly responsible. It dealt with the natives resid- ing in certain native reserves, and in addition to providing for their interests and holdings, and in other ways protecting the privileges accorded to them, the principle of the duty of some degree of labour devolving upon every able-bodied native enjoy- ing these privileges was asserted, and a small labour tax was levied. 1 This is in many respects the most statesmanlike act dealing w"ith natives on the statute-book; and in the session of 1895 Rhodes was able to report to the Cape parliament that the act then applied to 160,000 natives. In 1905 the labour clauses of this act, which had fallen into desuetude, were repealed. The clauses had, however, achieved success, in that they had caused many thousands of natives to fulfil the conditions requisite to claim exemption.

In other respects Rhodes's native policy was marked by com- bined consideration and firmness. Ever since the granting of self-government the natives had enjoyed the franchise. An act passed in 1892, at the instance of Rhodes, imposed an educa- tional test on applicants for registration, and made other pro- visions, all tending to restrict the acquisition of the franchise by " tribal " natives, the possible danger arising from a large native vote being already obvious (see section Constitution).

Rhodes opposed the native "liquor traffic, and at the risk of offending some of his supporters among the brandy-farmers of the western provinces, he suppressed it entirely on the diamond mines, and restricted it as far as he was able in the native reserves and territories. Nevertheless the continuance of this traffic on colonial farms, as well as to some extent in the native territories and reserves, is a black spot in the annals of the Cape Colony. The Hottentots have been terribly

demoralized, and even partially destroyed by it in the western province.

Another and little-known instance of Rhodes's keen insight in dealing with native affairs — an action which had lasting results on the history of the colony — may be given. After the native territories east of the Kei had been added to Cape Colony, a case of claim to inheritance came up for trial, and in accordance with the law of the colony, the court held that the eldest son of a native was his heir. This decision created the strongest resent- ment among the people of the territory, as it was in distinct

1 The act enjoined that " every male native residing in the district, exclusive of natives in possession of lands under ordinary quit-rent titles, or in freehold, who, in the judgment of the resident magistrate, is fit for and capable of labour, shall pay to the public revenue a tax of ten shillings per annum unless he can show to the satisfaction of the magistrate that he has been in service beyond the borders of the district for at least three months out of the previous twelve, when he will be exempt from the tax for that year, or unless he can show that he has been employed for a total period of three years, when he will be exempt altogether."

contradiction to native tribal law, which recognized the great son, or son of the chief wife, as heir. The government were threatened with a native disturbance, when Rhodes tele- graphed his assurance that compensation should be granted, and that such a decision should never be given again. This assur- ance was accepted and tranquillity restored. At the close of the next session (that of 1894), after this incident had occurred, Rhodes laid on the table a bill drafted by himself, the shortest the House had ever seen. It provided that all civil cases were to be tried by magistrates, an appeal to lie only to the chief magis- trate of the territory with an assessor. Criminal cases were to be tried before the judges of supreme court on circuit. The bill was passed, and the effect of it was, inasmuch as the magistrates administered according to native law, that native marriage customs and laws (including polygamy) were legalized in these territories. Rhodes had retrieved his promise, and no one who has studied and lived amongst the Bantu will question that the action taken was both

beneficent and wise.

During 1895 Sir Hercules Robinson was reappointed governor and high commissioner of South Africa in succession to Sir Henry Loch, and in the same year Mr Chamberlain became secretary of state for the colonies.

Movement for Commercial Federation. — With the development of railways, and. the extension of trade between Cape Colony and the Transvaal, there had grown up a closer relationship on political questions. Whilst premier of Cape Colony, by means of the customs union and in every other way, Rhodes en- deavoured to bring about a friendly measure of at least com- mercial federation among the states and colonies of South Africa. He hoped to establish both a commercial and a railway union, and a speech which he made in 1894 at Cape Town admirably describes this policy : — •

" With full affection for the flag which I have been born under, and the flag I represent, I can understand the sentiment and feeling of a republican who has created his independence, and values that before all; but I can say fairly that I believe in the future that I can assimilate the system, which I have been connected with, with the Cape Colony, and it is not an impossible idea that the neighbouring republics, retaining their independence, should share with us as to certain general principles. If I might put it to you, I would say the principles of tariffs, the principle of railway connexion, the principle of appeal in law, the principle of coinage, and in fact all those principles which exist at the present moment in the United States, irrespective of the local assemblieswhich exist in each separate state in that country."

To this policy President Kruger and the Transvaal govern- ment offered every possible opposition. Their action in what is known as the Vaal River Drift question will best illustrate the line of action which the Transvaal government believed it ex- pedient to adopt. A difficulty arose at the termination of the agreement in 1894 between the Cape government railway and the Netherlands railway. The Cape government, for the purposes of carrying the railway from the Vaal river to Johannesburg, had advanced the sum of £600,000 to the Netherlands railway and the Transvaal government conjointly; at the same time it was stipulated that the Cape government should have the right to fix the traffic rate until the end of 1894, or until such time as the Delagoa Bay-Pretoria line was completed. These rates were fixed by the Cape government at 2d. per ton per mile, but at the beginning of 1895 the rate for the 52 m. of railway from the Vaal river to Johannesburg was raised by the Netherlands railway to no less a sum

than 8d. per ton per mile. It is quite evident from the action which President Kruger subsequently took in the matter that this charge was put on with his approval, and with the object of compelling traffic to be brought to the Trans- vaal by the Delagoa route, instead of as heretofore by the colonial railway. In order to compete against this very high rate, the merchants of Johannesburg began removing their goods from the Vaal river by waggon. Thereupon President Kruger arbitrarily closed the drifts (fords) on the Vaal river, and thus prevented through waggon traffic, causing an enormous block of waggons on the banks of the Vaal. A protest was then made by the Cape government against the action of the Transvaal, on the ground that it was a breach of the London Convention.

President Kruger took no notice of this remonstrance, and an' appeal was made to the imperial government; whereupon the latter entered into an agreement with the Cape government, to the effect that if the Cape would bear half the cost of any expedition which should be necessary, assist with troops, and give full use of the Cape railway for military purposes if required, a protest should be sent to President Kruger on the subject. These terms were accepted by Rhodes and his colleagues, of whom Mr W. P. Schreiner was one, and a protest was then sent by Mr Chamberlain stating that the government would regard the closing of the drifts as a breach of the London Convention, and as an unfriendly action calling for the gravest remonstrance. President Kruger at once reopened the drifts, and undertook that .he would issue no further proclamation on the subject except after consultation with the imperial government.

On the 29th of December 1895 Dr Jameson (q.v.) made his famous raid into the Transvaal, and Rhodes's complicity in this movement compelled him to resign the premiership of Cape Colony in January 1896, the vacant post being taken by Sir Gordon Sprigg. As Rhodes's complicity in the raid became known, there naturally arose a strong feeling of resentment and astonishment among his colleagues in the Cape ministry, who had been kept in complete ignorance of his connexion with any such scheme. Mr Hofmeyr and the Bond were loud in their denunciation of him, nor can it be denied that the circumstances of the raid greatly embittered againstEngland the Dutch element in Cape Colony, and influenced their subsequent attitude towards the Transvaal Boers.

In 1897 a native rising occurred under Galeshwe, a Bantu chief, in Griqualand West. Galeshwe was arrested and the rebellion repressed. On cross-examination Galeshwe stated that Bosman, a magistrate of the Transvaal, had supplied ammunition to him, and urged him to

rebel against the govern- ment of Cape Colony. There is every reason to suppose that this charge was true, and it is consistent with the intrigues which the Boers from time to time practised among the natives.

In 1897 Sir Alfred Milner was appointed high commissioner of South Africa and governor of Cape Colony, in succession to Sir Hercules Robinson, who had been created a peer under the title of Baron Rosmead in August 1896.

Mr Schreiner' s Policy. — In 1898 commercial federation in South Africa advanced another stage, Natal entering the cus- toms union. A fresh convention was drafted at this time, and under it " a uniform tariff on all imported goods consumed within such union, and an equitable distribution of the duties collected on such goods amongst the parties to such union, and free trade between the colonies and state in respect of all South African products," was arranged. In the same year, too, the Cape parliamentary election occurred, and the result was the return to power of a Bond ministry under Mr W. P. Schreiner. From this time, until June 1900, Mr Schreiner remained in office as head of the Cape government. During the negotiations (see Transvaal) which preceded the war in 1899, feeling at the Cape ran very high, and Mr Schreiner's attitude was very freely discussed. As head of a party, dependent for its position in power on the Bond's support, his position was undoubtedly a trying one. At the same time, as prime minister of a British colony, it was strongly felt by loyal colonists that he should at least have refrained from openly interfering between the Trans- vaal and the imperial government during the course of most difficult negotiations. His public expressions of opinion were hostile in tone to the policy pursued by Mr Chamberlain and Sir Alfred Milner. The effect of them, it was believed, might conceivably be to encourage President Kruger in persisting in his rejection of the British terms. Mr Schreiner, it is true, used directly what influence he possessed to induce President Kruger to adopt a reasonable course. But however excellent his in- tentions, his publicly expressed disapproval of the Chamberlain- Milner policy probably did more harm than his private influence with Mr Kruger could possibly do good. On the nth of June 1899, shortly after the Bloemfontein conference, from which Sir Alfred Milner had just returned, Mr Schreiner asked the high

commissioner to inform Mr Chamberlain that he and his col- leagues agreed in regarding President Kruger's Bloemfontein proposals as " practical, reasonable and a considerable step in the right direction." Early in June, however, the Cape Dutch politicians began to realize that President Kruger's attitude was not so reasonable as they had endeavoured to persuade themselves, and Mr Hofmeyr, accompanied by Mr Herholdt, the Cape minister of agriculture, visited Pretoria. On arrival, they found that the Transvaal Volksraad, in a spirit of defiance and even levity, had just passed a resolution offering four new seats in the Volksraad to the mining districts, and fifteen to exclusively burgher districts. Mr Hofmeyr, on meeting the executive, freely expressed indignation at these proceedings. Unfortunately, Mr Hofmeyr's influence was more than counter- balanced by an emissary from the Free State, Mr Abraham Fischer, who, while purporting to be a peacemaker, practically encouraged the Boer executive to take extreme measures. Mr Hofmeyr's established reputation as an astute diplomatist, and as the trusted leader for years of the Cape Dutch party, made him as powerful a delegate as it was possible to find. If any emissary could accomplish anything in the way of persuading Mr Kruger, it was assuredly Mr Hofmeyr. Much was looked for from his mission by moderate men of all parties, and by none more so, it is fair to believe, than by Mr Schreiner. But Mr Hofmeyr's mission, like every other mission to Mr Kruger to induce him to take a reasonable and equitable course, proved entirely fruitless. He returned to Cape Town disappointed, but probably not altogether surprised at the failure of his mission. Meanwhile a new proposal was drafted by the Boer executive, which, before it was received in its entirety, or at least before it was clearly understood, elicited from Mr Schreiner a letter on the 7 th of July to the South African News, in which, referring to his government, he said: —

" While anxious and continually active with good hope in the cause of securing reasonable modifications of the existing repre- sentative system of the South African Republic, this government is convinced that no ground whatever exists for active interference in the internal affairs of that republic."

This letter was precipitate and unfortunate. On the nth of July, after seeing Mr Hofmeyr on his return, Mr Schreiner made a personal appeal to President Kruger to approach the imperial government in a friendly spirit. At this time an incident occurred which raised the feeling against Mr Schreiner to a very high pitch. On the 7th of July 500 rifles and 1,000,000 rounds of ammunition were landed at Port Elizabeth, consigned to the Free State government, and forwarded to Bloemfontein. Mr Schreiner's attention was called to this consignment

at the time, but he refused to stop it, alleging as his reason that, inasmuch as Great Britain was at peace with the Free State, he had no right to interdict the passage of arms through the Cape Colony. The British colonist is as capable of a grim jest as the Transvaal Boer, and this action of Mr Schreiner's won for him the nickname " Ammunition Bill." At a later date he was accused of delay in forwarding artillery and rifles for the defence of Kimberley, Mafeking and other towns of the colony. The reason he gave for delay was that he did not anticipate war; and that he did not wish to excite unwarrantable suspicions in the minds of the Free State. His conduct in both instances was perhaps technically correct, but it was much resented by loyal colonists.

On the 28th of July Mr Chamberlain sent a conciliatory despatch to President Kruger, suggesting a meeting of delegates to consider and report on his last franchise proposals, which were complex to a degree. Mr Schreiner, on the 3rd of August, tele- graphed to Mr Fischer begging the Transvaal to welcome Mr Chamberlain's proposal. At a later date, on receiving an inquiry from the Free State as to the movements of British troops, Mr Schreiner curtly refused any information, and referred the Free State to the high commissioner. On the 28th of August Sir Gordon Sprigg in the House of Assembly moved the adjourn- ment of the debate, to discuss the removal of arms to the Free State. Mr Schreiner, in reply, used expressions which called down upon him the severest censure and indignation, both in

the colony and in Great Britain. He stated that, should the storm burst, he would keep the colony aloof with regard both to its forces and its people. In the course of the speech he also read a telegram from President Steyn, in which the president repudiated all contemplated aggressive action on the part of the Free State as absurd. The speech created a great sensation in the British press. It was probably forgotten at the time (though Lord Kimberley afterwards publicly stated it) that one of the chief reasons why the Gladstone government had granted the retrocession of the Transvaal after Majuba, was the fear that the Cape Colonial Dutch would join their kinsmen if the war continued. What was a danger in 1881, Mr Schreiner knew to be a still greater danger in 1899. At the same time it is quite obvious, from a review of Mr Schreiner's conduct through the latter half of 1899, that he took an entirely mistaken view of the Transvaal situation. He evinced, as premier of the Cape Colony, the same inability to understand the Uitlanders' grievances, the same futile belief in the eventual fairness of President Kruger, as he had shown when giving evidence before the British South Africa Select Committee into the causes of the Jameson Raid. Actual experience taught him that President Kruger was beyond

an appeal to reason, and that the protestations of President Steyn were insincere. War had no sooner commenced with the ultimatum of the Transvaal Republic on the 9th of October 1899, than Mr Schreiner found himself called upon to deal with the conduct of Cape rebels. The rebels joined the invading forces of President Steyn, whose false assurances Mr Schreiner had offered to an indignant House of Assembly only a few weeks before. The war on the part of the Republics was evidently not to be merely one of self-defence. It was one of aggression and aggrandisement. Mr Schreiner ultimately addressed, as prime minister, a sharp remonstrance to President Steyn for allowing his burghers to invade the colony. He also co-operated with Sir Alfred Milner, and used his influence to restrain the Bond.

The War of i8gg-igo2} — The first shot actually fired in the war was at Kraipan, a small railway station within the colony, 40 m. south of Mafeking, a train being derailed, and ammuni- tion intended for Colonel Baden-Powell seized. The effect of this was entirely to cut off Mafeking, the northernmost town in Cape Colony, and it remained in a state of siege for over seven months. On the 16th of October Kimberley was also isolated. Proclamations by the Transvaal and Free State annexing portions of Cape Colony were actually issued on the 18th of October, and included British Bechuanaland and Griqualand West, with the diamond fields. On the 28th of October Mr Schreiner signed a proclamation issued by Sir Alfred Milner as high commissioner, declaring the Boer annexations of territory within Cape Colony to be null and void.

Then came the British reverses at Magersfontein (on the nth of December) and Stormberg (on the 10th of December). The effect of these engagements at the very outset of the war, occur- ring as they did within Cape Colony, was to offer every inducement to a number of the frontier colonial Boers to join their kinsmen of the republics. The Boers were prolific, and their families large. Many younger sons from the colony, with nothing to lose, left their homes with horse and rifle to join the republican forces.

Meanwhile the loyal Cape colonists were chafing at the tardy manner in which they were enrolled by the imperial authorities. It was not until after the arrival of Lord Roberts and Lord Kitchener at Cape Town on the 10th of January 1900 that these invaluable, and many of them experienced, men were freely invited to come forward. So strongly did Lord Roberts feel on the subject, that he at once made Colonel Brabant, a well-known and respected colonial veteran and member of the House of Assembly, a brigadier-general, and started recruiting loyal colonists in earnest. On the 15th of February

Kimberley was relieved by General French, and the Boer general, Cronje, evacuated Magersfontein, and retreated towards Bloemfontein. Cecil Rhodes was shut up in Kimberley during the whole of the siege, and his presence there undoubtedly offered an additional 1 See also Transvaal.

incentive to the Boers to endeavour to capture the town, but his unique position and influence with the De Beers workmen enabled him to render yeoman service, and infused enthusiasm and courage into the inhabitants. The manufacture of a big gun, which was able to compete with the Boer " Long Tom," at the De Beers workshops, under Rhodes's orders, and by the ingenuity of an American, Mr. Labram, who was killed a few days after its completion, forms one of the most striking incidents of the period.

With the relief of Mafeking on the 17th of May, the Cape rebellion ended, and the colony was, at least for a time, delivered of the presence of hostile forces.

On the 20th of March Mr (afterwards Sir James) Rose-Innes, a prominent member of the House of Assembly, who for several years had held aloof from either party, and who also had defended Mr Schreiner's action with regard to the passage of arms to the Free State, addressed his constituents at Claremont in support of the annexation of both republics; and in the course of an eloquent speech he stated that in Canada, in spite of rebellions, loyalty had been secured from the French Canadians by free institutions. In South Africa they might hope that a similar policy would attain a similar result with the Boers. In June, Mr Schreiner, whose recent support of Sir Alfred Milner had incensed many of his Bond followers, resigned in consequence of the refusal of some of his colleagues to support the disfranchise- ment bill which he was prepared, in accordance with the views of the home government, to introduce for the punishment of Cape rebels. The bill certainly did not err on the side of severity, but disfranchisement for their supporters in large numbers was more distasteful to the Bond extremists than any stringency towards individuals. Sir Gordon Sprigg, who after a political crisis of considerable delicacy, succeeded Mr Schreiner and for the fourth time became prime minister, was able to pass the Bill with the co-operation of Mr Schreiner and his section.

Towards the end of the year 1900 the war entered on a new phase, and took the form of guerilla skirmishes with scattered forces of marauding Boers. In December some of these bands entered the Cape Colony and endeavoured to induce colonial Boers to join them. In this endeavour they met at first with little or no success; but as the year 1901 progressed and the Boers still managed to keep the various districts in a ferment, it was deemed necessary by the authorities to proclaim martial law over the whole colony, and this was done on the 9th of October 1901.

On the 4th of January 1901 Sir Alfred Milner was gazetted governor of the Transvaal and Orange River Colony, being shortly afterwards created a peer as Lord Milner, and Sir Walter Hely-Hutchinson, governor of Natal, was appointed his successor as governor of the Cape Colony. The office of high commissioner in South Africa was now separated from the governorship of the Cape and associated with that of the Transvaal — an indication of the changed conditions in South Africa. The division of the colonists into those who favoured the Boer states and those firmly attached to the British connexion was reflected, to the detriment of the public weal, in the parties in the Cape parliament. Proposals were made to suspend the constitution, but this drastic course was not adopted. The Progressive party, the name taken by those who sought a permanent settlement under the British flag, lost their leader, and South Africa its foremost statesman by the death, in May 1902, of Cecil Rhodes, a few weeks before the end of the war.

After the War. — The acknowledgment of defeat by the Boers in the field, and the surrender of some 10,000 rebels, did not weaken the endeavours of the Dutch to obtain political supremacy in the colony. Moreover, in the autumn of 1902 Sir Gordon Sprigg, the prime minister, nominally the leader of the Progres- sives, sought to maintain his position by securing the support of the Bond party in parliament. In the early part of 1903 Mr Chamberlain included Cape Town in his visit to South Africa, and had conferences with the political leaders of all parties. Reconciliation between the Bond and British elements in the colony was, however, still impossible, and the two parties con-

centrated their efforts in a struggle for victory at the coming election. Mr Hofmeyr, who had chosen to spend the greater part of the war period in Europe, returned to the Cape to re- organize the Bond. On the other side Dr Jameson came forward as the leader of the Progressives. Parliament was dissolved in September 1903. It had passed, since the war, two measures of importance — one (1902)

restricting alien immigration, the other (1903) ratifying the first customs convention between all the South African colonies. This convention was notable for its grant of preferential treatment (in general, a rebate of 25% on the customs already levied) to imports from the United Kingdom.

The election turned on the issue of British or Bond supremacy. It was fought on a register purged of the rebel voters, many of whom, besides being disfranchised, were in prison. The issue was doubtful, and each side sought to secure the support of the native voters, who in several constituencies held the balance of power. The Bondsmen were more lavish than their opponents in their promises to the natives and even invited a Kaffir journal- ist (who declined) to stand for a seat in the Assembly. In view of the agitation then proceeding for the introduction of Chinese coolies to work the mines on the Rand, the Progressives declared their intention, if returned, to exclude them from the colony, and this declaration gained them some native votes. The polling (in January and February 1 904) resulted in a Progressive majority of five in a house of 95 members. The rejected candidates included prominent Bond supporters like Mr Merriman and Mr Sauer, and also Sir Gordon Sprigg and Mr A. Douglass, another member of the cabinet. Mr W. P. Schreiner, the ex-premier, who stood as an Independent, was also rejected.

The Jameson Ministry. — On the 18th of February Sir Gordon Sprigg resigned and was succeeded by Dr L. S. Jameson, who formed a ministry wholly British in character. The first task of the new government was to introduce (on the 4th of March) an Additional Representation Bill, to rectify — in part — the disparity in electoral power of the rural and urban districts. Twelve new seats in the House of Assembly were divided among the larger towns, and three members were added to the legislative council. The town voter being mainly British, the bill met with the bitter opposition of the Bond members, who declared that its object was the extinction of their parliamentary power. In fact, the bill was called for by the glaring anomalies in the distribution of seats by which a minority of voters in the country districts returned a majority of members, and it left the towns still inadequately represented. The bill was supported by two or three Dutch members, who were the object of violent attack by the Bondsmen. It became law, and the elections for the additional seats were held in July, after the close of the session. They resulted in strengthening the Progressive majority both in the House of Assembly and in the legislative council — where the Progressives previously had a majority of one only.

At the outset of its career the Jameson ministry had to face a serious financial situation. During the war the supplying of the army in the field had caused an artificial inflation of trade, and the Sprigg ministry had pursued a policy of extravagant expendi- ture not warranted by the finances of the colony. The slow recovery of the gold-mining and other industries in the Transvaal after the war was reflected in a great decline in trade in Cape Colony during the last half of 1903, the distress being aggravated by severe drought. When Dr Jameson assumed office he found an empty treasury, and considerable temporary loans had to be raised. Throughout 1904, moreover, revenue continued to shrink — compared with 1903 receipts dropped from £11,701,000 to £9,913,000. The government, besides cutting down official salaries and exercising strict economy, contracted (July 1904) a loan for £3 ,000,000. It also passed a bill imposing a graduated tax (6d. to is. in the £) on all incomes over £1000. A substantial excise duty was placed on spirits and beer, measures of relief for the brandy-farmers being taken at the same time. The result was that while there was a deficit on the budget of 1904- 1905 of £731,000, the budget of 1 905-1 906 showed a surplus of £5161. This small surplus was obtained notwithstanding a further shrinkage in revenue.

Dr Jameson's programme was largely one of material develop- ment. In the words of the speech opening the 1905 session of parliament, " without a considerable development of our agri- cultural and pastoral resources our position as a self-sustaining colony cannot be assured." This reliance on its own resources was the more necessary for the Cape because of the keen rivalry of Natal and Delagoa Bay for the carrying trade of the Trans- vaal. The opening up of backward districts by railways was vigorously pursued, and in other ways great efforts were made to assist agriculture. These efforts to help the. country districts met with cordial recognition from the Dutch farmers, and the release, in May 1904, of all rebel prisoners was another step towards reconciliation. On the exclusion of Chinese from the colony the Bond party were also in agreement with the ministry. An education act passed in 1905 established school boards on a popular franchise and provided for the gradual introduction of compulsory education. The cultivation of friendly relations with the neighbouring colonies was also one of the leading objects of Dr Jameson's policy. The Bond, on

its side, sought to draw closer to Het Volk, the Boer organization in the Transvaal, and similar bodies, and at its 1906 congress, held in March that year at Ceres, a resolution with that aim was passed, the design being to unify, in accordance with the original conception of the Bond, Dutch sentiment and action throughout South Africa.

Native affairs proved a source of considerable anxiety. In January 1905 an inter-colonial native affairs commission re- ported on the native question as it affected South Africa as a whole, proposals being made for an alteration of the laws in Cape Colony respecting the franchise exercised by natives. In the opinion of the commission the possession of the franchise by the Cape natives under existing conditions was sure to create in time an intolerable situation, and was an unwise and dangerous thing. (The registration of 1905 showed that there were over 23,000 coloured voters in the colony.) The commission proposed separate voting by natives only for a fixed number of members of the legislature — the plan adopted in New Zealand with the Maori voters. The privileged position of the Cape native was seen to be an obstacle to the federation of South Africa. The discussion which followed, based partly on the reports that the ministry contemplated disfranchising the natives, led, however, to no immediate results.

Another disturbing factor in connexion with native affairs was the revolt of the Hottentots and Hereros in German South- West Africa (q.v.). In 1904 and the following years large numbers of refugees, including some of the most important chiefs, fled into British territory, and charges were made in Germany that sufficient control over these refugees was not exercised by the Cape government. This trouble, however, came to an end in September 1907. In that month Morenga, a chief who had been interned by the colonial authorities, but had escaped and recommenced hostilities against the Germans, was once more on the British side of the frontier and, refusing to surrender, was pursued by the Cape Mounted Police and killed after a smart action. The revolt in the German protectorate had been, nearly a year before the death of Morenga, the in- direct occasion of a ” Boer raid ” into Cape Colony. In Novem- ber 1906 a small party of Transvaal Boers, who had been em- ployed by the Germans against the Hottentots, entered the colony under the leadership of a man named Ferreira, and began raiding farms and forcibly enrolling recruits. Within a week the filibusters were all captured. Ferreira and four companions were tried for murder and convicted, February 1907, the death sentences being commuted to terms of penal servitude.

As the result of an inter-colonial conference held in Pieter- maritzburg

in the early months of 1906, a new customs con- vention of a strongly protective character came into force on the 1st of June of that year. At the same time the rebate on goods from Great Britain and reciprocating colonies was in- creased. The session of parliament which sanctioned this change was notable for the attention devoted to irrigation and railway schemes. But one important measure of a political

character was passed in 1906, namely an amnesty act. Under its provisions over 7000 ex-rebels, who would otherwise have had no vote at the ensuing general election, were readmitted to the franchise in 1907.

While the efforts made to develop the agricultural and mineral resources of the country proved successful, the towns continued to suffer from the inflation — over-buying, over-building and over-speculation— which marked the war period. As a conse- quence, imports further declined during 1906-1907, and receipts being largely dependent on customs the result was a consider- ably diminished revenue. The accounts for the year ending 30th of June 1907 showed a deficit of £640,455. The decline in revenue, £4,000,000 in four years, while not a true reflection of the economic condition of the country — yearly becoming more self-supporting by the increase in home produce — caused general disquietude and injuriously affected the position of the ministry. In the session of 1907 the Opposition in the legis- lative council brought on a crisis by refusing to grant supplies voted by the lower chamber. Dr Jameson contested the con- stitutional right of the council so to act, and on his advice the governor dissolved parliament in September. Before its dissolu- tion parliament passed an act imposing a profit tax of 10% on diamond- and copper-mining companies earning over £50,000 per annum, and another act establishing an agricultural credit bank.

Mr Merriman, Premier.— The elections for the legislative council were held in January 1908 and resulted in a Bond victory. Its supporters, who called themselves the South African party, the Progressives being renamed Unionists, obtained 17 seats out of a total of 26. Dr Jameson thereupon resigned (31st of January), and a ministry was formed with Mr J. X. Merriman as premier and treasurer, and Mr J. W. Sauer as minister of public works. Neither of these politicians was a member of the Bond, and both had held office under Cecil Rhodes and W. P. Schreiner. They had, however, been the leading parliamentary exponents of Bond policy for a considerable time. The elections for the legislative assembly followed in April and, partly in consequence of the reinfranchisement of the ex-rebels, resulted in a decisive majority

for the Merriman ministry. There were returned 69 members of the South African party, Zi Unionists and 5 Independents, among them the ex-premiers Sir Gordon Sprigg and Mr Schreiner. The change of ministry was not accompanied by any relief in the financial situation. While the country districts remained fairly prosperous (agri- cultural and pastoral products increasing), the transit trade and the urban industries continued to decline. The depression was accentuated by the financial crisis in America, which affected adversely the wool trade, and in a more marked degree the diamond trade, leading to the partial stoppage of the Kimberley mines. (The ” slump ” in the diamond trade is shown by a comparison of the value of diamonds exported from the Cape in the years 1907 and 1908; in 1907 they were valued at £8,973,148, in 1908 at £4,796,655.) This seriously diminished the revenue returns, and the public accounts for the year 1907- 1908 showed a deficit of £996,000, and a prospective deficit for the ensuing year of an almost equal amount. To balance the budget, Mr Merriman proposed drastic remedies, including the suspension of the sinking fund, the reduction of salaries of all civil servants, and taxes on incomes of £50 per annum. Partly in consequence of the serious economic situation the renewed movement for the closer union of the various South African colonies, formally initiated by Dr Jameson in 1907, received the support of the Cape parliament. During 1907-1908 a national convention decided upon unification, and in 1910 the Union of South Africa was established (see South Aerica: History).

Leading Personalities. — The public life of Cape Colony has produced many men of singular ability and accomplishments. The careers of Cecil Rhodes, of Jan Hendrik Hofmeyr, and of Dr L. S. Jameson have been sufficiently indicated (see also their separate biographies). Sir Gordon Sprigg, four times premier, was associated with the Cape parliament from 1873 to T904, and was once more elected to that assembly in 1908. In and out of office his zeal was unflagging, and if he lacked those

qualities which inspire enthusiasm and are requisite in a great leader, he was at least a model of industry. Among other prominent politicians were Sir James Rose-Innes, Mr J. X. Merriman and Mr W. P. Schreiner. The two last named both held the premiership; their attitude and views have been indicated in the historical sketch. Sir James Rose-Innes, a lawyer whose intellectual gifts and patriotism

have never been impugned, was not a ” party man,” and this made him, on more than one occasion, a somewhat difficult political ally. On the native question he held a consistently strong attitude, defending their rights, and uncompromisingly opposing the native liquor traffic. In 1001 he went to the Transvaal as chief justice of that colony. Sir Thomas Fuller, a Cape Town representative, though he remained outside office, gave staunch support to every en- lightened liberal and progressive measure which was brought forward. A man of exceptional culture and eloquence, he made his influence felt, not only in politics, but in journalism and the best social life of the Cape peninsula. From 1902 to 1908 he held the office of agent-general of the colony in London.

In literature, the-colony has produced at least two authors whose ‘works have taken their place among those of the best English writers of their day. The History of South Africa, by Mr G. McCall Theal, will remain a classic workˆ of reference. The careful industry and the lucidity which characterize Mr Theal’s work stamp him as a historian of whom South Africa may well be proud. In fiction, Olive Schreiner (Mrs Cronwright- Schreiner) produced, while still in her teens, the Story of an African Farm, a work which gave great promise of original literary genius. Unfortunately, she, in common with the rest of South Africa, was subsequently swept into the seething vortex of contemporary politics and controversy. In music and painting there have been artists of talent in the Cape Colony, but the country is still too young, and the conditions of life too disturbed, to allow such a development as has already occurred in Australia.

Governors at the Cape since Introduction of Responsible Government 1870. Sir Henry Barkly. 1877. Sir Bartle Frere. 1880. Sir Hercules Robinson. 1889. Sir Henry Loch.

1895. Sir Hercules Robinson (Lord Rosmead). 1897. Sir Alfred Milner. 1901. Sir Walter Hely-Hutchinson.

Prime Ministers.

1872. Mr J. C. Molteno. 1890. Mr C. J. Rhodes.

1878. Mr J. Gordon Sprigg. 1896. Sir J. Gordon Sprigg.

1881. Mr T. C. Scanlen. 1898. Mr W. P. Schreiner.

1884. Mr Upington. 1900. Sir J. Gordon Sprigg.

1886. Sir J. Gordon Sprigg. 1904. Dr L. S. Jameson.

1908. Mr J. X. Merriman.

(A. P. H.; F. R. C.) Bibliography — The majority of the books concerning Cape Colony deal also with South Africa as a whole (see South Africa: Bibliography) . The following list gives books specially relating to the Cape. For ethnography see the works mentioned under Bushmen, Hottentots, Kaffirs and Bechuana.

(a) Descriptive accounts, geography, commerce and economics:" — The best early accounts of the colony are found in de la Caille's Journal historique du voyage fait au Cap de Bonne Esperance (Paris, 1763), the Nouvelle Description du Cap de Bonne Esperance (Amsterdam, 1778); F. le Vaillant's Voyage dans Vinterieur de I'Afrique (Paris, 1790), and Second Voyage (Paris, an III. [1794-1795]) ; C. P. Thunberg's " Account of the Cape of Good Hope " in vol. xvi. of Pinkerton's Travels (London, 1814); A. Sparman's Voyage to the Cape of Good Hope . . . 1772-1776 (translated into English from the Swedish, London, I785) — an excellent work; and'W. Paterson's A Narrative of Four Journeys . . . 1777-1779 (London, 1789). P. Kolbe or Kolben's Present State of the Cape of Good Hope (English translation from the German, London, 1 731) is less trustworthy. Sir J. Barrow's Account of Travels into the Interior of Southern Africa in 1797-1798 (2 vols., London, 1 801-1804); H. Lichtenstein's Travels in Southern Africa in 1803-1806 (translated from the German, 2 vols., London, 1812-1815), and W. J. Burchell's Travels in the Interior of Southern Africa (2 vols., London, 1 822-1 824) are standard works. Burchell's book contains the best map of the Cape published up to that time. W. P. Greswell's Geography of Africa south of the Zambesi (Oxford, 1892) deals specially with Cape Colony; the Illustrated Official Handbook of the Cape and South Africa (Cape Town,

1893) includes chapters on the zoology, flora, productions and resources of the colony. A. R. E. Burton, Cape Colony To-day (Cape Town, 1907), a useful guide to the country and its resources. A Statistical Register is issued yearly by the Cape government. The Census of the Colony, 1904: General Report (Cape Town, 1905) and previous census reports contain much valuable matter.

(b) Special subjects : — For detailed information on special subjects consult The Natives of South Africa (London, 1901); R. Wallace, Farming Industries of Cape Colony (London, 1896) ; A. R. E. Burton, Cape Colony for the Settler (London, 1903) ; The Agricultural Journal of the Cape of Good Hope ; Gardner F. Williams, The Diamond Mines of South Africa, revised ed. (New York, 1905), an authoritative work by a former manager of the De Beers mine; A. W. Rogers, An

Introduction to the Geology of Cape Colony (London, 1905) and " The Campbell Rand and Griquatown Series in Hay," Trans. Geol. Soc. S. Africa, vol. ix. (1906) ; Reports, Geological Commission of theCape of Good Hope (1896 et seq.) ; Science in South Africa (Cape Town, 1905); H. A. Bryden, Kloof and Karoo; sport, legend and natural history in Cape Colony (London, 1889) ; South African Education Yearbook (Cape Colony edition, Cape Town, 1906 et seq.). For books dealing with Roman-Dutch law, see South Africa.

(c) History: — H. C. V. Leibbrandt, Precis of the Archives of the Cape of Good Hope (15 vols., vols, v.-vii. contain van Riebeek's Journal, Cape Town, 1896-1902); The Rebellion of 1815, generally known as Slachter's Nek (Cape Town, 1902) ; G. M. Theal, Chronicles of Cape Commanders . . . 1651-1691 . . . (Cape Town, 1882), and Records of the Cape Colony from February 1793 to April 1831, from MS. in the Record Office, London (36 vols., Cape Town, 1897-1905) ; History of South Africa under the Administration of the Dutch East India Company, 1652 to 179s (2 vols., London, 1897) ; History of South Africa from 1795 to 1834 (London, 1891); E. B. Watermeyer, Three Lectures on the Cape . . . under the . . . Dutch East India Company (Cape Town, 1857) ; A. Wilmot and J. C. Chase, History of the . . . Cape . . . from its Discovery to … 1868 (Cape Town, 1869); Lady Anne Barnard, South Africa a Hundred, Years Ago: Letters -written from the Cape, 1797-1801 (London, 1901), a vivid picture of social life, &c. ; Mrs A. F. Trotter, Old Cape Colony . . . Her Men and Houses from 1652 to 1806 (London, 1903); C. T. Campbell, British South Africa, 1795-1825 (London, 1897), the story of the British settlers of 1820. Consult also J. Martineau's Life of Sir Bartle Frere; the Autobiography of Sir Harry Smith; P. A. Molteno's Life and Times of Sir John Charles Molteno (first premier of Cape Colony) (2 vols., London, 1900); A Wilmot's Life of Sir Richard Southey (London,-. 1 904), and G. C. Henderson's Sir George Grey (London, 1907). B. Worsfold's Lord Milner's Work in South Africa, 1897-1902 (London, 1906), is largely concerned with Cape politics. For Blue-books, &c, relating to the colony published by the British parliament, see the Colonial Office List (London, yearly) (F. R. C.)

CAPEFIGUE, JEAN-BAPTISTE HONORS RAYMOND (1801- 1872), French historian and biographer, was born at Marseilles in 1 80 1. At the age of twenty he went to Paris to study law; but he soon deserted law for journalism. He became editor of the Quotidienne, and was afterwards connected, either as editor or leading contributor, with the Temps, the Messager des Chambres, the Revolution de 1848 and other papers. During the ascendancy of the Bourbons he held a post in the foreign office, to which is due the royalism of some of his newspaper

articles. Indeed all Capefigue's works receive their colour from his legitimist politics; he preaches divine right and non-re- sistance, and finds polite words even for the profligacy of Louis XV. and the worthlessness of his mistresses. He wrote bio- graphies of Catherine and Marie de' Medici, Anne and Maria Theresa of Austria, Catherine II. of Russia, Elizabeth of England, Diana of Poitiers and Agnes Sorel — for he delighted in passing from " queens of the right hand " to " queens of the left." His historical works, besides histories of the Jews from the fall of the Maccabees to the author's time, of the first four centuries of the Christian church, and of European diplomatists, extend over the whole range of French history. He died at Paris in December 1872.

The general catalogue of printed books for the Bibliotheque Nationale contains no fewer than seventy-seven works (145 volumes) published by Capefigue during forty years. Of these only the Histoire de Philippe- Auguste (4 vols., 1829) and the Histoire de la reforme, de la ligue et du regne de Henri IV (8 vols., 1834-1835) perhaps deserve still to be remembered. For Capefigue's style bears evident marks of haste, and although he had access to an exception- ally large number of sources of information, includingthe state papers, neither his accuracy nor his judgment was to be trusted.

CAPEL (of Hadham), ARTHUR CAPEL, Baron (fl. 1640- 1649), English royalist, son of Sir Henry Capel of Rayne Hall,

Essex, and of Theodosia, daughter of Sir Edward Montagu of Broughton, Northamptonshire, was elected a member of the Short and Long Parliaments in 1640 for Hertfordshire. He at first supported the opposition to Charles's arbitrary government, but soon allied himself with the king's cause, on which side his sympathies were engaged, and was raised to the peerage by the title of Baron Capel of Hadham on the 6th of August 1641. On the outbreak of the war he was appointed lieutenant-general of Shropshire, Cheshire and North Wales, where he rendered useful military services, and later was made one of the prince of Wales's councillors, and a commissioner at the negotiations at Uxbridge in 1645. He attended the queen in her flight to France in 1646, but disapproved of the prince's journey thither, and retired to Jersey, subsequently aiding in the king's escape to the Isle of Wight. He was one of the chief leaders in the second Civil War, but met with no success, and on the 27th of August, together with Lord Norwich, he

surrendered to Fairfax at Colchester on promise of quarter for life. 1 This assurance, however, was after- wards interpreted as not binding the civil authorities, and his fate for some time hung in the balance. He succeeded in escaping from the Tower, but was again captured, was condemned to death by the new ” high court of justice ” on the 8th of March 1649, and was beheaded together with the duke of Hamilton and Lord Holland the next day. He married Elizabeth, daughter and heir of Sir Charles Morrison of Cassiobury, Hertfordshire, through whom that estate passed into his family, and by whom besides four daughters he had five sons, the eldest Arthur being created earl of Essex at the Restoration. Lord Capel, who was much beloved, and who was a man of deep religious feeling and exemplary life, wrote Daily Observations or Meditations: Divine, M or all, published with some of his letters in 1654, and reprinted, with a short life of the author, under the title Excellent Con- templations, in 1683.

CAPEL CURIG, a tourist resort in Carnarvonshire, North Wales, 141 m. from Bangor. It is a collection of a few houses, too scattered to form a village properly so called. At the Roberts hotel is shown on a window pane the supposed signature of Wellington. The road from Bettws y coed, past the Swallow Falls to Capel Curig, and thence to Llanberis and Carnarvon, is very interesting, grand and lonely. Excellent fishing is to be had here, chiefly for trout. In summer, coaching tours discharge numbers of visitors daily; the railway station is Bettws (London & North- western railway). Capel Curig means “chapel of Curig,” a British saint mentioned in Welsh poetry. The place is a centre for artists, geologists and botanists, for the ascent of Snowdon, Moel Siabod, Glydyr Fawr, Glydyr Fach, Tryfan, &c, and for visiting Llyn Ogwen, Llyn Idwal, Twll du (Devil’s Kitchenl . Nant Ffrancon and the Penrhyn quarries.

CAPELL, EDWARD (1713-1781), English Shakespearian critic, was born at Troston Hall in Suffolk on the nth of June 17 13. Through the influence of the duke of Grafton he was appointed to the office of deputy-inspector of plays in 1737, with a salary of £200 per annum, and in 1745 he was made groom of the privy chamber through the same influence. In 1760 appeared his Prolusions; or Select Pieces of Ancient Poetry, a collection which included Edward III., placed by Capell among the doubtful plays of Shakespeare. Shocked at the inaccuracies which had crept into Sir Thomas Hanmer’s edition of Shakespeare, he projected an entirely new edition, to be carefully collated with the original copies. After spending three years in collecting, and comparing scarce folio and quarto editions, he published his own edition in 10 vols. 8vo (1768), with an introduction

written in a style of extraordinary quaintness, which was after- wards appended to Johnson's and Steevens's editions. Capell published the first part of his commentary, which included notes on nine plays with a glossary, in 1774. This he afterwards recalled, and the publication of the complete work, Notes and Various Readings of Shakespeare (1779-1783), the third volume of which bears the title of The School of Shakespeare, was com- pleted, under the superintendence of John Collins, in 1783, two

1 Gardiner's Hist, of the Civil War, iv. 206 ; cf . article on Fairfax by C. H. Frith in the Diet, of Nat. Biog.

years after the author's death. It contains the results of his unremitting labour for thirty years, and throws considerable light on the history of the times of Shakespeare, as well as on the sources from which he derived his plots. Collins asserted that Steevens had stolen Capell's notes for his own edition, the story being that the printers had been bribed to show Steevens the sheets of Capell's edition while it was passing through the press. Besides the works already specified, he published an edition of Antony and Cleopatra, adapted for the stage with the help of David Garrick in 1758. His edition of Shakespeare passed through many editions (1768, 1771, 1793, 1799, 1803, 1813). Capell died in the Temple on the 24th of February 1781.

CAPELLA, MARTIANUS MINNEUS FELIX, Latin writer, according to Cassiodorus a native of Madaura in Africa, flourished during the 5th century, certainly before the year 439. He appears to have practised as a lawyer at Carthage and to have been in easy circumstances. His curious encyclopaedic work, entitled Satyricon, or De Nuptiis Philologiae et Mercurii et de septem Artibus liberalibus libri noiiem, is an elaborate allegory in nine books, written in a mixture of prose and verse, after the manner of the Menippean satires of Varro. The style is heavy and involved, loaded with metaphor and bizarre expressions, and verbose to excess. The first two books contain the allegory proper — the marriage of Mercury to a nymph named Philologia. The remaining seven books contain expositions of the seven liberal arts, which then comprehended all human knowledge. Book iii. treats of grammar, iv. of dialectics, v. of rhetoric, vi. of geometry, vii. of arithmetic, viii. of astronomy, ix. of music. These abstract discussions are linked on to the original allegory by the device of personifying each science as a courtier of Mercury and Philologia. The work was a complete encyclopaedia of the liberal culture of the time, and was in high repute during the middle ages. The author's chief sources were Varro, Pliny, Solinus, Aquila Romanus, and Aristides Quintilianus. His prose resembles that of Apuleius (also a native of Madaura), but is

even more difficult. The verse portions, which are on the whole correct and classically constructed, are in imitation of Varro and are less tiresome.

A passage in book viii. contains a very clear statement of the heliocentric system of astronomy. It has been supposed that Copernicus, who quotes Capella, may have received from this work some hints towards his own new system.

Editio princeps, by F. Vitalis Bodianus, 1499; the best modern edition is that of F. Eyssenhardt (1866) ; for the relationof Martianus Capella to Aristides Quintilianus see H. Deiters, Studien zu den griechischen Musikern (1881). In the nth century the German monk Notker Labeo translated the first two books into Old High German.

CAPE MAY, a city and watering-place of Cape May county, New Jersey, U.S.A., on the Atlantic coast, 2 m. E.N.E. of Cape May, the S. extremity of the state, and about 80 m. S. by E. of Philadelphia. Pop. (1890) 2136; (1900) 2257; (1905) 3006; (1910) 2471. Cape May is. served by the Maryland, Delaware & Virginia (by ferry to Lewes, Delaware), the West Jersey & Seashore (Pennsylvania system), and the Atlantic City (Reading system) railways, and, during the summer season, by steamboat to Philadelphia. The principal part of the city is on a peninsula (formerly Cape Island) between the ocean and Cold Spring inlet, which has been dredged and is protected by jetties to make a suitable harbour. The further improvement of the inlet and the harbour was authorized by Congress in 1907. On the ocean side, along a hard sand beach 5 m. long, is the Esplanade. There are numerous hotels and handsome cottages for summer visitors, who come especially from Philadelphia, from New York, from the South and from the West. Cape May offers good bathing, yachting and fishing, with driving and hunting in the wooded country inland from the coast. At Cape May Point is the Cape May lighthouse, 145 ft. high, built in 1800 and rebuilt in 1859. In the city are canneries of vegetables and fruit, glass-works and a gold-beating establishment. Fish and oysters are exported. Cape May was named by Cornelis Jacobsen Mey, director of the Prince Hendrick (Delaware) river for the West India Company of

Holland, who took possession of the river in 1623, and planted the short-lived colony of Fort Nassau 4 m. below Philadelphia, near the

present Gloucester City, N.J. Cape May was settled about 1699, — a previous attempt to settle here made by Samuel Blommaert in 1631 was unsuccessful. It was an important whaling port early in the 18th century, and became prominent as a watering-place late in that century. It was incorporated as the borough of Cape Island in 1848, and chartered as the city of Cape Island in 1851 ; in 1869 the name was changed to Cape May.

CAPENA, an ancient city of southern Etruria, frequently mentioned with Veii and Falerii. Its exact site is, however, un- certain. According to Cato it was a colony of the former, and in the wars between Veii and Romeitappears as dependent upon Veii, after the fall of which town, however, it became subject to. Rome. Out of its territory the tribus Stellatina was formed in 367 B.C. In later republican times the city itself is hardly mentioned, but under the empire a municipium Capenatium foederatum is frequently mentioned in inscriptions. Of these several were found upon the hill known as Civitucola, about 4 m. north-east of the post station of ad Vicesimum on the ancient Via Flaminia, a site which is well adapted for an ancient city. It lies on the north side of a dried-up lake, once no doubt a volcanic crater. Remains of buildings of the Roman period also exist there, while, in the sides of the hill of S. Martino which lies on the north-east, 1 rock-cut tombs belonging to the 7th and 6th centuries B.C. but used in Roman times for fresh burials, were excavated in 1859-1864, and again in 1904. Inscriptions in early Latin and in local dialect were also found (W. Henzen, Bullettino deW Istituto, 1864, 143; R. Paribeni, Notizie degli Scavi, 1905, 301). Similar tombs have also been found on the hills south of Civitucola. G. B. de Rossi, however, supposed that the games of which records (fragments of the fasti ludorum) were also discovered at Civitucola, were those which were celebrated from time immemorial at the Lucus Feroniae, with which he therefore proposed to identify this site, placing Capena itself at S. Oreste, on the south-eastern side of Mount Soracte. But there are difficulties in the way of this assumption, and it is more probable that the Lucus Feroniae is to be sought at or near Nazzano, where, in the excavation of a circular building which some conjecture to have been the actual temple of Feronia, inscriptions relating to a municipality were found. Others, however, propose to place Lucus Feroniae at the church of S. Abbondio, 1 m. east of Rignano and 4 m. north- north-west of Civitucola, which is built out of ancient materials. On the Via Flaminia, 26 m. from Rome, near Rignano, is the Christian cemetery of Theodora.

See R. Lanciani, Bullettino dell' Istituto, 1870, 32; G. B. de Rossi, Annali dell' Istituto, 1883, 254; Bullettino Crisliano, 1883, 115; G.

Dennis, Cities and Cemeteries of Etruria (London, 1883), i. 131; E. Bormann, Corpus Inscriptionum Latinarum (Berlin, 1888), xi. 571 ; H Nissen, Italische Landeskunde (Berlin, 1902), ii. 369; R. Paribeni, in Monumenti dei Lincei, xvi. (1906), 277 seq. (T. As.)

CAPER, FLAVIUS, Latin grammarian, flourished during the 2nd century. He devoted special attention to the early Latin writers, and is highly spoken of by Priscian. Caper was the author of two works — De Lingua Latina and De Dubiis Generibus. These works in their original form are lost; but two short treatises entitled De Orthographia and De Verbis Dubiis have come down to us under his name, probably excerpts from the original works, with later additions by an unknown writer.

See F. Osann, De Flavio Capro (1849), and review by W. Christ in Philologus, xviii. 165-170 (1862), where several editions of other important grammarians are noticed; G. Keil, ” De Flavio Grammatico,” in Dissertationes Halenses, x. (1889); text in H. Keil’s Grammatici Latini, vii.

CAPERCALLY, or Caperkally, 2 a bird’s name commonly derived from the Gaelic capull, a horse (or, more properly, a

1 Some writers wrongly speak as though the two hills were identical.

2 This is the spelling of the old law-books, as given by Pennant, the zoologist, who, on something more than mere report, first in- cluded this bird among the British fauna. The only one of the ” Scots Acts,” however, in which the present writer has been able to ascertain that the bird is named is No. 30 of James VI. (1621), which was passed to protect ” powties, partrikes, moore foulles, blakcoks, gray hennis, termigantis, quailzies, capercailzies,” &c.

mare), and coille, a wood, but with greater likelihood, according •to the opinion of Dr M’Lauchlan, from cabher, an old man (and, by metaphor, an old bird), and coille, the name of Tetrao urogallus, the largest of the grouse family (Tetraonidae), and a species which was formerly indigenous to Scotland and Ireland. The word is frequently spelt otherwise, as capercalze, capercailzie (the z, a letter unknown in Gaelic, being pronounced like y), and caper- caillie, and the English name of wood-grouse or cock-of-the-wood has been often applied to the same bird. The earliest notice of it as an inhabitant of North Britain seems to be by Hector Boethius, whose works were published in 1526, and it can then be traced through various Scottish writers, to whom, however, it was evidently but little known, for about 200

years, or may be more, and by one of them only, Bishop Lesley, in ˆ78, was a definite habitat assigned to it: — ” In Rossia quoque Louguhabria [Lochaber], atque aliis montanis locis ” (De Origine Moribus et rebus gestis Scotorum. Romae: ed. 1675, p. 24). Pennant, during one of his tours in Scotland, found that it was then (1769) still to be met with in Glen Moriston and in The Chisholm’s country, whence he saw a cock-bird. We may infer that it became extinct about that time, since Robert Gray (Birds of the West of Scotland, p. 229) quotes the Rev. John Grant as writing in 1794: ” The last seen in Scotland was in the woods of Strath- glass about thirty-two years ago.” Of its existence in Ireland we have scarcely more details. If we may credit the Pavones sylvestres of Giraldus Cambrensis with being of this species, it was once abundant there, and Willughby (1678) was told that it was known in that kingdom as the “cock-of-the-wood.” A few other writers mention it by the same name, and John Rutty, in 1772, says (Nat. Hist. Dublin, i. p. 302) that ” one was seen in the county of Leitrim about the year 17 10, but they have entirely disappeared of late, by reason of the destruction of our woods.” Pennant also states that about 1760 a few were to be found about Thomastown in Tipperary, but no later evidence is forthcoming, and thus it would seem that the species was exterminated at nearly the same period in both Ireland and Scotland.

When the practice of planting was introduced, the restoration of this fine bird to both countries was attempted. In Ireland the trial, of which some particulars are given by J. Vaughan Thompson (Birds of Ireland, ii. 32), was made at Glengariff, but it seems to have utterly failed, whereas in Scotland, where it was begun at Taymouth, it finally succeeded, and the species is now not only firmly established, but is increasing in numbers and range. Mr L. Lloyd, the author of several excellent works on the wild sports and natural history of Scandinavia, supplied the stock from Sweden, but it must be always borne in mind that the original British race was wholly extinct, and no remains of it are known to exist in any museum.

This species is widely, though intermittently, distributed on the continent of Europe, from Lapland to the northern parts of Spain, Italy and Greece, but is always restricted to pine- forests, which alone afford it food in winter. Its bones have been found in the kitchen-middens of Denmark, proving that country to have once been clothed with woods of that kind. Its remains have also been recognized from the caves of Aquitaine. Its eastern or southern limits in Asia cannot be precisely given, but it certainly inhabits the forests of a great part of Siberia. On the Stannovoi Mountains, however, it is replaced by a distinct though nearly allied species, the T. urogalloides of Dr von

Middendorff, 3 which is smaller with a slenderer bill but longer tail.

The cock-of-the-wood is remarkable for his large size and dark plumage, with the breast metallic green. He is polygamous, and in spring mounts to the topmost bough of a tall tree, whence he challenges all comers by extraordinary sounds and gestures; while the hens, which are much smaller and mottled in colour, timidly abide below the result of the frequent duels, patiently submitting themselves to the victor. While this is going on it is the practice in many countries, though generally in defiance

3 Not to be confounded with the bird so named previously by Prof. Nilsson, which is a hybrid.

of the law, for the so-called sportsman stealthily to draw nigh, and with well-aimed gun to murder the principal performer in the scene. The hen makes an artless nest on the ground, and lays therein from seven to nine or even more eggs. The young are able to fly soon after they are hatched, and towards the end of summer and beginning of autumn, from feeding on the fruit and leaves of the bilberries and other similar plants, which form the undercovert of the forests, get into excellent condition and become good eating. With the first heavy falls of snow they betake themselves to the trees, and then, feeding on the pine-leaves, their flesh speedily acquires so strong a flavour of turpentine as to be distasteful to most palates. The usual method of pursuing this species on the continent of Europe is by encouraging a trained dog to range the forest and spring the birds, which then perch on the trees; while he is baying at the foot their attention is so much attracted by him that they permit the near approach of his master, who thus obtains a more or less easy shot. A considerable number, however, are also snared. Hybrids are very frequently produced between the capercally and the black grouse (T. tetrix), and the offspring has been described by some authors under the name of T. medius, as though a distinct species. (A. N.)

CAPERN, EDWARD (1819-1894), English poet, was born at Tiverton, Devonshire, on the 21st of January 1819. From an early age he worked in a lace factory, but owing to failing eyesight he had to abandon this occupation in 1847 and he was in dire distress until he secured an appointment to be ” the Rural Postman of Bideford,” by which name he is usually known. He occupied his leisure in writing

occasional poetry which struck the popular fancy. Collected in a volume and published by subscription in 1856, it received the warm praise of the reviews and many distinguished people. Poems, by Edward Capern, was followed by Ballads and Songs (1858), The Devonshire Melodist (a collection of the author's songs, some of them to his own music) and Wayside Warbles (1865), and resulted in a civil list pension being granted him by Lord Palmerston. He died on the 5th of June 1894.

CAPERNAUM (Kairepvaov/x; probably, "the village of Nahum ") , an ancient city of Galilee. More than any other place, it was the home of Jesus after he began his mission; there he preached, called several of his disciples, and did many works, but without meeting with much response from the inhabitants, over whom he pronounced the heavy denunciation: — " And thou, Capernaum, which art exalted unto heaven, shalt be brought down to hell." The site of the city has been a matter of much dispute, — one party, headed by Dr E. Robinson, maintaining an identification with Khan Minyeh at the north-west corner of the Sea of Galilee, and another, represented especially by Sir C. W. Wilson, supporting the claims of Tell Hum, midway between Khan Minyeh and the mouth of the Jordan. Khan Minyeh is beautifully situated in a " fertile plain formed by the retreat of the mountains about the middle of the western shore " of the Sea of Galilee. Its ruins are not very extensive, though they may have been despoiled for building the great Saracenic Khan from which they take their name. In the neighbourhood is a water- source, Ain et-Tabighah, an Arabic corruption of Heptapegon or Seven Springs (referred to by Josephus as being near Capernaum). Tell Hum lies about 3 m. north of Khan Minyeh, and its ruins, covering an area of " half a mile long by a quarter wide," prove it to have been the site of no small town. It must be admitted that if it be not Capernaum it is impossible to say what ancient place it represents. But it is doubtful whether Tell Hum can be considered as a corruption of Kefr Nahum, the Semitic name which the Greek represents: and there is not here, as at Khan Minyeh, any spring that can be equated to the Heptapegon of Josephus. On the whole the probabilities of the two sites seem to balance, and it is practically impossible without further discoveries to decide between them. The sites of the neighbouring cities of Bethsaida and Chorazin are probably to be sought respectively at El-Bateiha, a grassy plain in the north-east corner of the lake, and at Kerazeh, 2 m. north of Tell Hum. According to the so-called Pseudo-Methodius there was a tradition

that Antichrist would be born at Chorazin, educated at Bethsaida and rule at Capernaum — hence the curse of Jesus upon these cities.

On the site of Capernaum see especially W. Sanday in Journal of Theological Studies, vol. v. p. 42. (R. A. S. M.)

CAPERS, the unexpanded flower-buds of Capparis spinosa, prepared with vinegar for use as a pickle. The caper plant is a trailing shrub, belonging to the Mediterranean region, resembling in habit the common bramble, and having handsome flowers of a pinkish white, with four petals, and numerous long tassel-like stamens. The leaves are simple and ovate, with spiny stipules. The plant is cultivated in Sicily and the south of France ; and in commerce capers are valued according to the period at which the buds are gathered and preserved. The finest are the young tender buds called ” nonpareil,” after which, gradually increasing in size and lessening in value, come ” superfine,” ” fine,” ” capucin ” and ” capot.” Other species of Capparis are similarly employed in various localities, and in some cases the fruit is pickled.

CAPET, the name of a family to which, for nearly nine centuries, the kings of France, and many of the rulers of the most powerful fiefs in that country, belonged, and which mingled with several of the other royal races of Europe. The original significance of the name remains in dispute, but the first of the family to whom it was applied was Hugh, who was elected king of the Franks in 987. The real founder of the house, however, was Robert the Strong (q.v.), who received- from Charles the Bald, king of the Franks, the countships of Anjou and Blois, and who is sometimes called duke, as he exercised some military authority in the district between the Seine and the Loire.- According to Aimoin of Saint- Germain-des-Pr6s, and the chronicler, Richer, he was a Saxon, but historians question this statement. Robert’s two sons, Odo or Eudes, and Robert II., succeeded their father successively as dukes, and, in 887, some of the Franks chose Odo as their king. A similar step was taken, in 922, in the case of Robert II., this too marking the increasing irritation felt at the weakness of the Carolingian kings. When Robert died in 923, he was succeeded by his brother-in-law, Rudolph, duke of Burgundy, and not by his son Hugh, who is known in history as Hugh the Great, duke of France and Burgundy, and whose domain extended from the Loire to the frontiers of Picardy. When Louis V., king of the Franks, died in 987, the Franks, setting aside the Carolingians, passed over his brother Charles, and elected Hugh Capet, son of Hugh the Great, as their king, and crowned him at Reims. Avoiding the pretensions which had been made by the Caro- lingian kings, the Capetian kings were content, for a time, with a more modest position, and the story of the growth of their power belongs to the history of France. They had to combat the feudal nobility, and later, the younger branches of the royal house

established in the great duchies, and the main reason for the permanence of their power was, perhaps, the fact that there were few minorities among them. The direct line ruled in France from 987 to 1328, when, at the death of King Charles IV., it was succeeded by the younger, or Valois, branch of the family. Philip VI., the first of the Valois kings, was a son of Charles I., count of Valois and grandson of King Philip III. (see Valois). The Capetian- Valois dynasty lasted until 1498, when Louis, duke of Orleans, became king as Louis XII., on the death of King Charles VIII. (see Orleans). Louis XII. dying childless, the house of Valois-Angouleme followed from Francis I. to the death of Henry III. in 1589 (see Angouleme), when the last great Capetian family, the Bourbons (q.v.) mounted the throne.

Scarcely second to the royal house is the branch to which belonged the dukes of Burgundy. In the 10th century the duchy of Burgundy fell into the hands of Hugh the Great, father of Hugh Capet, on whose death in 956 it passed to his son Otto, and, in 965, to his son Henry. In 1032 Robert, the second son of Robert the Pious, king of the Franks, and grandson of Hugh Capet, founded the first ducal house, which ruled until 1361. For two years the duchy was in the hands of the crown, but in 1363, the second ducal house, also Capetian, was founded by Philip the Bold, son of John II., king of France. This branch

of the Capetians is also distinguished by its union with the Habsburgs, through the marriage of Mary, daughter of Charles the Bold, duke of Burgundy, with Maximilian, afterwards the emperor Maximilian I. Of great importance also was the house of the counts of Anjou, which was founded in 1246, by Charles, son of the French king Louis VIII., and which, in 1360, was raised to the dignity of a dukedom (see Anjou). Members of this family sat upon the thrones of two kingdoms. The counts and dukes of Anjou were kings of Naples from 1265 to 1442. In 1308 Charles Robert of Anjou was elected king of Hungary, his claim being based on the marriage of his grandfather Charles II., king of Naples and count of Anjou, with Maria, daughter of Stephen V., king of Hungary. A third branch formed the house of the counts of Artois, which was founded in 1238 by Robert, son of King Louis VIII. This house merged in that of Valois in 1383, by the marriage of Margaret, daughter of Louis, count of Artois, with Philip the Bold, duke of Burgundy. The throne of Navarre was also filled by the Capetians. In 1284 Jeanne, daughter and heiress of Henry I., king of

Navarre, married Philip IV., king of France, and the two kingdoms were united until Philip of Valois became king of France as Philip VI. in 1328, when Jeanne, daughter of King Louis X., and heiress of Navarre, married Philip, count of Evreux (see Navarre).

In the 13th century the throne of Constantinople was occupied by a branch of the Capetians. Peter, grandson of King Louis VI., obtained that dignity in 121 7 as brother-in-law of the two previous emperors, Baldwin, count of Flanders, and his brother Henry. Peter was succeeded successively by his two sons, Robert and Baldwin, from whom in 1261 the empire was re- covered by the Greeks.

The counts of Dreux, for two centuries and a half (ii3 2_I 377)> and the counts of Evreux, from 1307 to 1425, also belonged to the family of the Capets,- — other members of which worthy of mention are the Dunois and the Longuevilles, illegitimate branches of the house of Valois, which produced many famous warriors and courtiers.

CAPE TOWN, the capital of the Cape Province, South Africa, in 33° 56′ S., 18° 28′ E. It is at the north-west extremity of the Cape Peninsula on the south shore of Table Bay, is 6181 m. by sea from London and 957 by rail south-west of Johannesburg. Few cities are more magnificently situated. Behind the bay the massive wall of Table Mountain, 2 m. in length, rises to a height of over 3500 ft., while on the east and west projecting mountains enclose the plain in which the city lies. The mountain to the east, 3300 ft. high, which projects but slightly seawards, is the Devil's Peak, that to the west the Lion's Head (over 2000 ft. high), with a lesser height in front called the Lion's Rump or Signal Hill. The city, at first confined to the land at the head of the bay, has extended all round the, shores of the bay and to the lower spurs of Table Mountain.

The purely Dutch aspect which Cape Town preserved until the middle of the 19th century has disappeared. Nearly all the stucco-fronted brick houses, with flat roofs and cornices and wide spreading stoeps, of the early Dutch settlers have been replaced by shops, warehouses and offices in styles common to English towns. 01 the many fine public buildings which adorn the city scarcely any date before i860. The mixture of races among the inhabitants, especially the presence of numerous Malays, who on all festive occasions appear in gorgeous raiment, gives additional animation and colour to the street scenes. The mosques with their cupolas and minarets, and houses built in Eastern fashion contrast curiously with the Renaissance style of most of the modern buildings, the medieval aspect of the castle and the quaint appearance of the Dutch houses still standing.

Chief Public Buildings. — The castle stands near the shore at the head of the bay. Begun in 1666 its usefulness as a fortress has long ceased, but it serves to link the city to its past. West of the castle is a large oblong space, the Parade Ground. A little farther west, at the foot of the central jetty is a statue of Van Riebeek, the first governor of the Cape. In a line with the jetty is Adderley Street, and its continuation Government

Avenue. Adderley Street and the avenue make one straight road a mile long, and at its end are " the Gardens," as the suburbs built on the rising ground leading to Table Mountain are called. The avenue itself is fully half a mile long and is lined on either side with fine oak trees. In Adderley Street are the customs house and railway station, the Standard bank, the general post and telegraph offices, with a tower 120 ft. high, and the Dutch Reformed church. The church dates from 1699 and is the oldest church in South Africa. Of the original building only the clock tower (sent from Holland in 1727) remains. Government Avenue contains, on the east side, the Houses of Parliament, government house, a modernized Dutch building, and the Jewish synagogue; on the west side are the Anglican cathedral and grammar schools, the public library, botanic gardens, the museum and South African college. Many of these buildings are of considerable architectural merit, the material chiefly used in their construction being granite from the Paarl and red brick. The botanic gardens cover 14 acres, contain over 8000 varieties of trees and plants, and afford a magnificent view of Table Mountain and its companion heights. In the gardens, in front of the library is a statue of Sir George Grey, governor of the Cape from 1854 to 1861. The most valuable portion of the library is the 5000 volumes presented by Sir George Grey. In Queen Victoria Street, which runs along the west side of the gardens, are the Cape University buildings (begun in 1906), the law courts, City club and Huguenot memorial hall. The Anglican cathedral, begun in 1901 to replace an unpretentious building on the same site, is dedicated to St George. It lies between the library and St George's Street, in which are the chief newspaper offices, and premises of the wholesale merchants. West of St George's Street is Greenmarket Square, the centre of the town during the Dutch period. From the balcony of the town house, which overlooks the square, proclamations were read to the burghers, summoned to the spot by the ringing of the bell in the small- domed tower. Still farther west, in Riebeek Square, is the old slave market, now used as a church and school for coloured people.

Facing the north side of the Parade Ground are the handsome municipal buildings, completed in 1906. The most conspicuous feature is the clock tower and belfry, 200 ft. high. The hall is 130 ft. by 62,

and 55 ft. high. Opposite the main entrance is a statue of Edward VII. by William Goscombe John, unveiled in 1905. The opera house occupies the north-west corner of the Parade Ground. Plein Street, which leads south from the Parade Ground, is noted for its cheap shops, largely patronized on Saturday nights by the coloured inhabitants. In Sir Lowry Road, the chief eastern thoroughfare, is the large vegetable and fruit market. Immediately west of the harbour are the con- vict station and Somerset hospital. They are built at the town end of Greenpoint Common, the open space at the foot of Signal Hill. Cape Town is provided with an excellent water supply and an efficient drainage system.

The Suburbs. — The suburbs of Cape Town, for natural beauty of position, are among the finest in the world. On the west they extend about 3 m., by Green Point to Sea Point, between the sea and the foot of the Lion's Rump; on the east they run round the foot of the Devil's Peak, by Woodstock, Mowbray, Rondebosch, Newlands, Claremont, &c, to Wynberg, a distance of 7 m. Though these are managed by various municipalities, there is practically no break in the buildings for the whole distance. All the parts are connected by the suburban railway service, and by an electric tramway system. A tramway also runs from the town over the Kloof, or pass between Table Mountain and the Lion's Head, to Camp's Bay, on the west coast south of Sea Point, to which place it is continued, the tramway thus completely circling the Lion's Head and Signal Hill. Of the suburbs mentioned, Green Point and Sea Point are seaside resorts, Woodstock being both a business and residential quarter. Woodstock covers the ground on which the British, in 1806, defeated the Dutch, and contains the house in which the articles of capitulation were signed. Another seaside suburb is Milnerton on the north-east shores of Table Bay at the mouth of the Diep river. Near Maitland, and 3 m. from the city, is the Cape Town observatory, built in

1820 and maintained by the British government. Rondebosch, 5 m. from the city, contains some of the finest of the Dutch mansions in South Africa. Less than a mile from the station is Groote Schuur, a typical specimen of the country houses built by the Dutch settlers in the 17th century. The house was the property of Cecil Rhodes, and was bequeathed by him for the use of the prime minister of Federated South Africa. The grounds of the estate extend up the slopes of Table Mountain. At Newlands is Bishop's Court, the home of the archbishop

of Cape Town. More distant suburbs to the south-east are Con- stantia, with a famous Dutch farm-house and wine farm, and Muizenberg and Kalk Bay, the two last villages on the shore of False Bay. At Muizenberg Cecil Rhodes died, 1902. Facing the Atlantic is Hout's Bay, 10 m. south-south-west of Wynberg.

Most of the suburbs and the city itself are exposed to the south- east winds which, passing over the flats which join the Cape Peninsula to the mainland, reach the city sand-laden. From its bracing qualities this wind, which blows in the summer, is known as the " Cape Doctor." During its prevalence Table Mountain is covered by a dense whitish-grey cloud, overlapping its side like a tablecloth.

The Harbour. — Table Bay, 20 m. wide at its entrance, is fully exposed to north and north-west gales. The harbour works, begun in i860, afford sheltered accommodation for a large number of vessels.- From the west end of the bay a breakwater extends north-east for some 4000 ft. East of the breakwater and parallel to it for 2700 ft. is the South pier. From breakwater and pier arms project laterally. In the area enclosed are the Victoria basin, covering 64 acres, the -Alfred basin of 8| acres, a graving dock 529 ft. long and a patent slip for vessels up to 1500 tons. There is good anchorage outside the Victoria basin under the lee of the breakwater, and since 1904 the foreshore east of the south pier has been reclaimed and additional wharfage provided. Altogether there are 2J m. of quay walls, the wharfs being provided with electrical cranage. Cargo can be transferred direct from the ship into railway trucks. Vessels of the deepest draught can enter into the Victoria basin, the depth of water at low tide ranging from 24 to 36 ft.

Trade and Communication. — The port has a practical mono- poly of the passenger traffic between the Cape and England. Several lines of steamers — chiefly British and German — maintain regular communication with Europe, the British mail boats taking sixteen days on the journey. By its railway connexions Cape Town affords the quickest means of reaching, from western Europe, every other town in South Africa. In the import trade Cape Town is closely rivalled by Port Elizabeth, but its export trade, which includes diamonds and bar gold, is fully 70% of that of the entire colony. In 1898, the year before the beginning of the Anglo-Boer war, the volume of trade was: — Imports £5,128,292, exports £15,881,952. In 1904, two years after the conclusion of the war the figures were: — imports £9,070,757; exports £17,471,760. In 1907 during a period of severe and prolonged trade depression the imports had fallen to £5,263,930, but the exports owing entirely to the increased output of gold from the Rand mines

had increased to £37,994,658; gold and diamonds represented over £37,000,000 of this total. The tonnage of ships entering the harbour in 1887 was 801,033. I n 1904 it had risen to 4,846,012 and in 1907 was 4,671,146. The trade of the port in tons was 1,276,350 in 1899 and 1,413,471 in 1904. In 1907 it had fallen to 658,721.

Defence. — Cape Town, being in the event of the closing of the Suez Canal on the main route of ships from Europe to the East, is of considerable strategic importance. It is defended by several batteries armed with modern heavy guns. It is garrisoned by Imperial and local troops, and is connected by railway with the naval station at Simon's Town on the east of the Cape Peninsula.

Population. — The Cape electoral division, which includes Cape Town, had in 1865 a population of 50,064, in 1875 57,319, in 1891 97,238, and in 1904 213,167, of whom 120,475 were whites. Cape Town itself had a population in 1875 of 33,000, in 1891 of 51,251 and in 1904 of 77,668. Inclusive of the nearer suburbs the population was 78,866 in 1891 and 170,083 in 1904. Of the

inhabitants of the city proper 44,203 were white (1904). Of the coloured inhabitants 6561 were Malays; the remainder being chiefly of mixed blood. The most populous suburbs in 1904 were Woodstock with 28,990 inhabitants, and Wynberg with 18,477.

History and Local Government.— Cape Town was founded in 1652 by settlers sent from Holland by the Netherlands East India Co., under Jan van Riebeek. It came definitely into the possession of Great Britain in 1806. Its political history is indistinguishable from that of Cape Colony (g.v.). The town was granted municipal institutions in 1836. (Among the councillors returned at the election of 1904 was Dr Abdurrahman, a Mahom- medan and a graduate of Edinburgh, this being, it is believed, the first instance of the election of a man of colour to any Euro- pean representative body in South Africa.) The municipality owns the water and lighting services. The municipal rating value was, in 1880 £2,054,204, in 1901 £9,475,260, in 1908 (when the rate levied was 3d. in the £) £14,129,439. The total rateable value of the suburbs, not included in the above figures, is over £8,000,000. Rates are based on capital, not annual, value. The control of the port is vested in the Harbour and Railway Board of the Union.

Cape Town is the seat of the legislature of the Union of South Africa, of the provincial government, of the provincial division of the Supreme Court of South Africa, and of the Cape University; also of an

archbishop of the Anglican and a bishop of the Roman Catholic churches.

CAPE VERDE ISLANDS (Ilhas do Cabo Verde), an archipelago belonging to Portugal; off the West African coast, between ■17 13′ and 14 47′ N. and 22° 40′ and 25 22′ W. Pop. (1905) about 138,620; area, 1475 sq. m. The archipelago consists of ten islands: — Santo Antao (commonly miswritten St Antonio), Sao Vicente, Santa Luzia, Sao Nicolao, Sal, Boa Vista, Maio, Sao Thiago (the St Jago of the English), Fogo, and Brava, besides four uninhabited islets. It forms a sort of broken crescent, with the concavity towards the west. The last four islands constitute

nSanto Antao

CAPE VERDE Is.

the leeward (Sotavento) group and the other six the windward (Barlavento). The distance between the coast of Africa and the nearest island (Boa Vista) is about 300 m. The islands derive their name, frequently but erroneously written ” Cape Verd,” or ” Cape de Verd ” Islands, from the African promontory off which they lie, known as Cape Verde, or the Green Cape. The entire archipelago is of volcanic origin, and on the island of Fogo there is an active volcano. No serious eruption has taken place since 1680, and the craters from which the streams of basalt issued have lost their outline.

Climate. — The atmosphere of the islands is generally hazy, especially in the direction of Africa. With occasional exceptions during summer and autumn, the north-east trade is the prevailing wind, blowing most strongly from November to May. The rainy season is during August, September and October, when there is thunder and a light variable wind from south-east or south-west. The Harmattan, a very dry east wind from the African continent, occasionally makes itself felt. The heat of summer is high, the thermometer ranging from 80° to 90° Fahr. near the sea. The unhealthy season is the period during and following the rains, when vegetation springs up with surprising rapidity, and there is much stagnant water, poisoning the air on the lower grounds. Remittent fevers are then common. The people of all the islands are also subject in May to an endemic of a bilious nature called locally levadias, but the cases rarely assume a dangerous form,

and recovery is usually attained in three or four days without medical aid. On some of the islands rain has occasionally not fallen for three years. The immediate consequence is a failure of the crops, and this is followed by the death of great numbers from starvation, or the epidemics which usually break out afterwards.

Flora. — Owing largely to the widespread destruction of timber for fuel, and to the frequency of drought, the flora of the islands is poor when compared with that of the Canaries, the Azores or Madeira. It is markedly tropical in character; and although some seventy wild-flowers, grasses, ferns, &c., are peculiar to the archipelago, the majority of plants are those found on the neighbouring African littoral. Systematic afforestation has not been attempted, but the Portuguese have introduced a few trees, such as the baohab, eucalyptus and dragon-tree, besides many plants of economic value. Coffee-growing, an industry dating from 1790, is the chief resource of the people of Santo Antao, Fogo and Sao Thiago; maize, millet, sugar-cane, manioc, excellent oranges, pumpkins, sweet potatoes, and, to a less extent, tobacco and cotton are produced. On most of the islands coco-nut and date palms, tamarinds and bananas may be seen; orchil is gathered; and indigo and castor-oil are pro- duced. Of considerable importance is the physic-nut (Jalropha curcas), which is exported.

Fauna. — Quails are found in all the islands; rabbits in Boa Vista, Sao Thiago and Fogo; wild boars in Sao Thiago. Both black and grey rats are common. Goats, horses and asses are reared, and goatskins are exported. The neighbouring sea abounds with fish, and coral fisheries are carried on by a colony of Neapolitans in Sao Thiago. Turtles come from the African coast to lay their eggs on the sandy shores. The Ilheu Branco, or White Islet, between Sao Nicolao and Santa Luzia, is remarkable as containing a variety of puffin unknown elsewhere, and a species of large lizard (Macroscinctus coctei) which feeds on plants.

Inhabitants. — The first settlers on the islands imported negro slaves from the African coast. Slavery continued in full force until 1854, when the Portuguese government freed the public slaves, and ameliorated the conditions of private ownership. In 1857 arrangements were made for the gradual abolition of slavery, and by 1876 the last slave had been liberated. The transporta- tion of convicts from Portugal, a much-dreaded punishment, was continued until the closing years of the 19th century. It was the coexistence of these two forms of servitude, even more than the climate, which prevented any large influx of Portuguese colonists. Hence the blacks and mulattoes far outnumber the white inhabitants. They are, as a rule, taller than the Portuguese, and are of fine physique, with regular features but

woolly hair. Slavery and the enervating climate have left their mark on the habits of the people, whose indolence and fatalism are perhaps their most obvious qualities. Their language is a bastard Portuguese, known as the lingua creoula. Their religion is Roman Catholicism, combined with a number of pagan beliefs and rites, which are fostered by the curandeiros or medicine men. These superstitions tend to disappear gradually before the advance of education, which has progressed considerably since 1867, when the first school, a lyceum, was opened in Ribeira Brava, the capital of Sao Nicolao. On all the inhabited islands, except

Santa Luzia, there are churches and primary schools, conducted by the government or the priests. The children of the wealthier classes are sent to Lisbon for their education.

Government.— The archipelago forms one of the foreign provinces of Portugal, and is under the command of a governor- in-chief appointed by the crown. There are two principal judges, one for the windward and another for the leeward group, the former with his residence at Sao Nicolao, and the latter at Praia; and each island has a military commandant, a few soldiers, and a number of salaried officials, such as police, magistrates and custom-house directors. There is also an ecclesiastical establish- ment, with a bishop, dean and canons.

Industries. — The principal industries, apart from agriculture, are the manufacture of sugar, spirits, salt, cottons and straw hats and fish-curing. The average yearly value of the exports is about £60,000; that of the imports (including £200,000 for coal), about £350,000. The most important of the exports are coffee, physic-nuts, millet, sugar, spirits, salt, live animals, skins and fish. This trade is principally carried on with Lisbon and the Portuguese possessions on the west coast of Africa, and with passing vessels. The imports consist principally of coal, textiles, food-stuffs, wine, metals, tobacco, machinery, pottery and vegetables. Over 3000 vessels, with a total tonnage exceeding 3,500,000, annually enter the ports of the archipelago; the majority call at Mindello, on Sao Vicente, for coal, and do not receive or discharge any large quantities of cargo.

Santo Antao (pop. 25,000), at the extreme north-west of the archipelago, has an area of 265 sq. m. Its surface is very rugged and mountainous, abounding in volcanic craters, of which the chief is the Topoda Coroa (7300 ft.) , also known as the Sugar-loaf. Mineral springs exist in many places. The island is the most picturesque, the healthiest, and, on its north-western slope, the best watered and most fertile of the archipelago. The south-eastern slope, shut out by lofty

mountains from the fertilizing moisture of the trade- winds, has an entirely different appearance, black rocks, white pumice and red clay being its most characteristic features. Santo Antao produces large quantities of excellent coffee, besides sugar and fruit. It has several small ports, of which the chief are the sheltered and spacious Tarrafal Bay, on the south-west coast, and the more frequented Ponta do Sol, on the north-east, 8 m. from the capital, Ribeira Grande, a town of 4500 inhabitants. Cinchona is cultivated in the neighbourhood. In 1780 the slaves on Santo Antao were declared free, but this decree was not carried out. About the same time many white settlers, chiefly from the Canaries, entered the island, and introduced the cultivation of wheat.

Sao Vicente, or St Vincent (8000), lies near Santo Antao, on the south-east, and has an area of 75 sq. m. Its highest point is Monte Verde (2400 ft.). The whole island is as arid and sterile as the south-eastern half of Santo Antao, and for the same reason. It was practically uninhabited until 1795; in 1829 its population numbered about 100. Its harbour, an extinct crater on the north coast, with an entrance eroded by the sea, affords complete shelter from every wind. An English speculator founded a coaling station here in 1851, and the town of Mindello, also known as Porto Grande or St Vincent, grew up rapidly, and became the commercial centre of the archipelago. Most of the business is in English hands, and nine- tenths of the inhabitants understand English. Foodstuffs, wood and water are imported from Santo Antao, and the water is stored in a large reservoir at Mindello. Sao Vicente has a station for the submarine cable from Lisbon to Pernambuco in Brazil.

Santa Luzia, about 5 m. south-east, has an area of 18 sq. m., and forms a single estate, occupied only by the servants or the family of the proprietor. Its highest point is 885 ft. above sea-level. On the south-west it has a good harbour, visited by whaling and fishing boats. Much orchil was formerly gathered, and there is good pasturage for the numerous herds of cattle. A little to the south are the uninhabited islets of Branco and Razo.

Sao Nicolao, or Nicolau (12,000), a long, narrow, crescent-shaped island with an area of 126 sq. m., lies farther east, near the middle of the archipelago. Its climate is not very healthy. Maize, kidney- beans, manioc, sugar-cane and vines are cultivated; and in ordinary years grain is exported to the other islands. The interior is moun- tainous, and culminates in two peaks which can be seen for many leagues ; one has the shape of a sugar-loaf, and is near the middle of the island ; the other, Monte Gordo, is near the west end, and has a height of 4280 ft.

All the other islands of the group can be seen from Sao Nicolao in clear weather. Vessels frequently enter Pre- guica, or Freshwater Bay, near the south-east extremity of the island, for water and fresh provisions ; and the custom-house is here. The island was one of the first colonized; in 1774 its inhabitants numbered 13,500, but famine subsequently caused a great decrease. The first capital, Lapa, at the end of a promontory on the south,

was abandoned during the period of Spanish ascendancy over Portugal (1580-1640) in favour of Ribeira Brava (4000), on the north coast, a town which now has a considerable trade.

Sal (750), in the north-east of the archipelago, has an area of 75 sq. m. It was originally named Lane, or Lhana (" plain "), from the flatness of the greater part of its surface. It derives its modern name from a natural salt-spring, but most of the salt produced here is now obtained from artificial salt-pans. Towards the close of the 17th century it was inhabited only by a few shepherds, and by slaves employed in the salt-works. In 1705 it was entirely abandoned, owing to drought and consequent famine; and only in 1808 was the manufacture of salt resumed. A railway, the first built in Portuguese territory, was opened in 1835. The hostile Brazilian tariffs of 1889 for a time nearly destroyed the salt trade. Whales, turtles and fish are abundant, and dairy-farming is a prosperous industry. There are many small harbours, which render every part of the island easily accessible.

Boa Vista (2600), the most easterly island of the archipelago, has an area of 235 sq. m. It was named Sao Christovao by its discoverers in the 15th century. Its modern name, meaning " fair view," is singularly inappropriate, for with the exception of a few coco-nut trees there is no wood, and in the dry season the island seems nothing but an arid waste. The little vegetation that then exists is in the bottom of ravines, where corn, beans and cotton are cultivated. The springs of good water are few. The coast is indented by numerous shallow bays, the largest of which is the harbour of the capital, Porto Sal-Rei, on the western side (pop. about 1000). A chain of heights, flanked by inferior ranges, traverses the middle of Boa Vista, culminating in Monte Gallego (1250 it.), towards the east. In the north-western angle of the island there is a low tract of loose sand, which is inundated with water during the rainy season; and here are some extensive salt-pans, where the sea-water is evaporated by the heat of the sun. Salt and

orchil are exported. A good deal of fish is taken on the coast and supplies the impoverished islanders with much of their food.

Maio (1000) has an area of 70 sq. m., and resembles Sal and Boa Vista in climate and configuration, although it belongs to the Sota- vento group. Its best harbour is that of Nossa Senhora da Luz, on the south-west coast, and is commonly known as Porto Inglez or English Road, from the fact that it was occupied until the end of the 18th century by the British, who based their claim on the marriage-treaty between Charles II. and Catherine of Braganza (1662). The island is a barren, treeless waste, surrounded by rocks. Its inhabitants, who live chiefly by the manufacture of salt, by cattle-farming and by fishing, are compelled to import most of their provisions from Sao Thiago, with which, for purposes of local administration, Maio is included.

Sao Thiago (63,000) is the most populous and the largest of the Cape Verde Islands, having an area of 350 sq. m. It is also one of the most unhealthy, except among the mountains over 2000 ft. high. The interior is a mass of volcanic heights, formed of basalt covered with chalk and clay, and culminating in the central Pico da Antonia (4500 ft.), a sharply pointed cone. There are numerous ravines, fur- rowed by perennial streams, and in these ravines are grown large quantities of coffee, oranges, sugar-cane and physic-nuts, besides a variety of tropical fruits and cereals. Spirits are distilled from sugar-cane, and coarse sugar is manufactured. The first capital of the islands was Ribeira Grande, to-day called Cidade Velha or the Old City, a picturesque town with a cathedral and ruined fort. It was built in the 15th century on the south coast, was made an episcopal see in 1532, and became capital of the archipelago in 1592. In 1712 it was sacked by a French force, but despite its poverty and unhealthy situation it continued to be the capital until 1770, when its place was taken by Praia on the south-east. Praia (often written Praya) has a fine harbour, a population of 21,000 and a considerable trade. It contains the palace of the governor-general, a small natural history museum, a meteorological observatory and an important station for the cables between South America, Europe and West Africa. It occupies a basalt plateau, overlooking the bay (Porto da Praia) , and has an attractive appearance, with its numerous coco j nut trees and the peak of Antonia rising in the background above successive steps of tableland. Its unhealthiness has been mitigated by the partial drainage of a marsh lying to the east.

Fogo (17,600) is a mass of volcanic rock, almost circular in shape and measuring about 190 sq. m. In the centre a still active volcano, the Pico do Cano, rises to a height of about 10,000 ft. Its crater, which

stands within an older crater, measures 3 m. in circumference and is visible at sea for nearly 100 m. It emits smoke and ashes at intervals; and in 1680, 1785, 1799, 1816, 1846, 1852 and 1857 it was in eruption. After the first and most serious of these outbreaks, the island, which had previously been called Sao Felippe, was renamed Fogo, i.e. ” Fire.” The ascent of the mountain was first made in 1819 by two British naval officers, named Vidal and Mudge. The island is divided, like Santo Antao, into a fertile and a sterile zone. Its northern half produces fine coffee, beans, maize and sugar-cane ; the southern half is little better than a desert, with oases of cultivated land ‘near its few springs. Sao Felippe or Nossa Senhora da Luz (3000), on the west coast, is the capital. The islanders claim to be the aristocracy of the archipelago, and trace their descent from the priginal Portuguese settlers. The majority, however, are negroes or

mulattoes. Drought and famine, followed by severe epidemics, have been especially frequent here, notably in the years 1 887-1 889.

Brava (9013), the most southerly of the islands, has an area of 23 sq. m. Though mountainous, and in some parts sterile, it is very closely cultivated, and, unlike the other islands, is divided into a multitude of small holdings. The desire to own land is almost uni- versal, and as the population numbers upwards of 380 per sq. m., and the system of tenure gives rise to many disputes, the peasantry are almost incessantly engaged in litigation. The women, who are locally celebrated for their beauty, far outnumber the men, who emigrate at an early age to America. These emigrants usually return richer and better educated than the peasantry of the neighbouring islands. To the north of Biava lie a group of reefs among which two islets (Ilheus Seccos or Ilheus do Rombo) are conspicuous. These are usually known as the Ilheu de Dentro (Inner Islet) and the Ilheu de Fora (Outer Islet). The first is used as a shelter for whaling and fishing vessels, and as pasturage for cattle ; the second has supplied much guano for export.

History. — The earliest known discovery of the islands was made in 1456 by the Venetian captain Alvise Cadamosto (q.v.), who had entered the service of Prince Henry the Navigator. The archipelago was granted by King Alphonso V. of Portugal to his brother, Prince Ferdinand, whose agents completed the work of discovery. Ferdinand was an absolute monarch, exercising a commercial monopoly. In 1461 he sent an expedition to recruit slaves on the coast of Guinea and thus to people the islands, which were almost certainly uninhabited at the time. On his death in 1470 his privileges reverted to the crown, and were bestowed by John II. on Prince Emanuel, by whose acces- sion to the throne in 1495 the archipelago finally became part of the royal

dominions. Its population and importance rapidly increased; its first bishop was consecrated in 1532, its first governor-general appointed about the end of the century. It was enriched by the frequent visits of Portuguese fleets, on their return to Europe laden with treasure from the East, and by the presence of immigrants from Madeira, who introduced better agricultural methods and several new industries, such as dyeing and distillation of spirits. The failure to maintain an equal rate of progress in the 18th and 19th centuries was due partly to drought, famine and disease — in particular, to the famines of 1730-1733 and 1831-1833 — and partly to gross misgovernment by the Portuguese officials.

The best general account of the islands is given in vols, xxiii. and xxvii. of the Boletim of the Lisbon Geographical Society (1905 and 1908), and in Madeira, Cabo Verde, e Guine, by J. A. Martins (Lisbon, 1 89 1) . Official statistics are published in Lisbon at irregular intervals. See also Uber die Capverden (Leipzig, 1884) and Die Vulcane der Capverden (Graz, 1882), both by C. Dolter. A useful map, entitled Ocean Atlantico Norte, Archipelago do Cabo Verde, was issued in 1900 by the Commissao de Cartographia, Lisbon.

CAPGRAVE, JOHN (1393-1464), English chronicler and hagiologist, was born at Lynn in Norfolk on the 21st of April 1393. He became a priest, took the degree of D.D. at Oxford, where he lectured on theology, and subsequently joined the order of Augustinian hermits. Most of his life he spent in the house of the order at Lynn, of which he probably became prior; he was certainly provincial of his order in England, which involved visits to other friaries, and he made at least one journey to Rome. He died on the 1 2 th of August 1464.

Capgrave was an indefatigable student, and was reputed one of the most learned men of his age. The bulk of his works are theological: sermons, commentaries and lives of saints. His reputation as a hagiologist rests on his Nova legenda Angliae, or Catalogus of the English saints, but this was no more than a recension of the Sanctilogium which the chronicler John of Tinmouth, a monk of St Albans, had completed in 1366, which in its turn was largely borrowed from the Sanctilogium of Guido, abbot of St Denis. The Nova legenda was printed by Wynkyn de Worde in 1516 and again in 1527. Capgrave's historical works are The Chronicle of England (from the Creation to 1417), written in English and unfinished at his death, and the Liber de illustribus Henricis, completed between 1446 and 1453. The latter is a collection of lives of German emperors (918-1198), English kings (1 100-1446) and other famous Henries in various parts of the world (1031-1406). The portion devoted to Henry

VI. of England is a contemporary record, but consists mainly of ejaculations in praise of the pious king. The accounts of the

other English Henries are transferred from various well-known chroniclers. The Chronicle was edited for the ” Rolls ” Series by Francis Charles Hingeston (London, 1858); the Liber de illustrious Henricis was edited (London, 1858) for the same series by F. C. Hingeston, who published an English translation the same year. The editing of both the works is very uncritical and bad.

See Potthast, Bibliotheka Med. Aev.; and U. Chevalier, Repertoire des sources hist. Bio-bibliographie, s.v.

CAP HAITIEN, Cape Haitten or Haytien, a seaport of Haiti, West Indies. Pop. about 15,000. It is situated on the north coast, 90 m. N. of Port au Prince, in 19 46′ N. and 72° 14′ W. Its original Indian name was Guarico, and it has been known, at various times, as Cabo Santo, Cap Francais and Cape Henri, while throughout Haiti it is always called Le Cap. It is the most picturesque town in the republic, and the second in importance. On three sides it is hemmed in by lofty mountains, while on the fourth it overlooks a safe and commodious harbour. Under the French rule it was the capital of the colony, and its splendour, wealth and luxury earned for it the title of the ” Paris of Haiti.” It was then the see of an archbishop and possessed a large and flourishing university. The last remains of its former glory were destroyed by the earthquake of 1842 and the British bombard- ment of 1865. Although now but a collection of squalid wooden huts, with here and there a well-built warehouse, it is the centre of a thriving district and does a large export trade. It was founded by the Spaniards about the middle of the 1 7th century, and in 1687 received a large French colony. In 1695 it was taken and burned by the British, and in 1 791 it suffered the same fate at the hands of Toussaint L’Ouverture. It then became the capital of King Henri Christophe’s dominions, but since his fall has suffered severely in numerous revolutions.

CAPILLARY ACTION. 1 A tube, the bore of which is so small that it will only admit a hair (Lat. capitta), is called a capillary tube. When such a tube of glass, open at both ends, is placed vertically with its lower end immersed in water, the water is observed to rise in the tube, and to stand within the tube at a higher level than the water outside. The action between the capillary tube and the water has been

called capillary action, and the name has been extended to many other phenomena which have been found to depend on properties of liquids and solids similar to those which cause water to rise in capillary tubes.

The forces which are concerned in these phenomena are those which act between neighbouring parts of the same substance, and which are called forces of cohesion, and those which act between portions of matter of different kinds, which are called forces of adhesion. These forces are quite insensible between two portions of matter separated by any distance which we can directly measure. It is only when the distance becomes exceed- ingly small that these forces become perceptible. G. H. Quincke (Pogg. Ann. cxxxvii. p. 402) made experiments to determine the greatest distance at which the effect of these forces is sensible, and he found for various substances distances about the twenty-thousandth part of a millimetre.

Historical. — According to J. C. Poggendorff (Pogg. Ann. ci. p. 551), Leonardo da Vinci must be considered as the discoverer of capillary phenomena, but the first accurate observations of the capillary action of tubes and glass plates were made by Francis Hawksbee (Physico-Mechanical Experiments, London, 1709, pp. 139-169 ; and Phil. Trans., 1711 and 1712), who ascribed the action to an attraction between the glass and the liquid. He observed that the effect was the same in thick tubes as in thin, and concluded that only those particles of the glass which are very near the surface have any influence on the phenomenon. Dr James Jurin {Phil. Trans., 17 18, p. 739, and 1719, p. 1083) showed that the height at which the liquid is suspended depends on the section of the tube at the surface of the liquid, and is independent of the form of the lower part of the tube. He considered that the suspension of the liquid is due

1 In this revision of James Clerk Maxwell's classical article in the ninth edition of the Encyclopaedia Britannica, additions are marked by square brackets.

to " the attraction of the periphery or section of the surface of the tube to which the upper surface of the water is contiguous and coheres." From this he showed that the rise of the liquid in tubes of the same substance is inversely proportional to their radii. Sir Isaac Newton devoted the 31st query in the last edition of his Opticks to molecular forces, and instanced several examples of the cohesion of liquids, such as the suspension of mercury in a barometer tube at more than double the height at which it usually stands. This arises from its adhesion to the tube, and the upper part of the mercury sustains a consider- able tension, or negative pressure, without the separation of its parts. He

considered the capillary phenomena to be of the same kind, but his explanation is not sufficiently explicit with respect to the nature and the limits of the action of the attractive force. It is to be observed that, while these early speculators ascribe the phenomena to attraction, they do not distinctly assert that this attraction is sensible only at insensible distances, and that for all distances which we can directly measure the force is alto- gether insensible. The idea of such forces, however, had been distinctly formed by Newton, who gave the first example of the calculation of the effect of such forces in his theorem on the alteration of the path of a light-corpuscle when it enters or leaves a dense body.

Alexis Claude Clairault (Theorie de la figure de la terre, Paris, 1808, pp. 105, 128) appears to have been the first to show the necessity of taking account of the attraction between the parts of the fluid itself in order to explain the phenomena. He did not, however, recognize the fact that the distance at which the attraction is sensible is not only small but altogether insensible. J. A. von Segner (Comment. Soc. Reg. Gblting. i. (1751) p. 301) introduced the very important idea of the surface-tension of liquids, which he ascribed to attractive forces, the sphere of whose action is so small ” ut nullo adhuc sensu percipi potuerit.” In attempting to calculate the effect of this surface-tension in determining the form of a drop of the liquid, Segner took account of the curvature of a meridian section of the drop, but neglected the effect of the curvature in a plane at right angles to this section.

The idea of surface-tension introduced by Segner had a most important effect on the subsequent development of the theory. We may regard it as a physical fact established by experiment in the same way as the laws of the elasticity of solid bodies. We may investigate the forces which act between finite portions of a liquid in the same way as we investigate the forces which act between finite portions of a solid. The experiments on solids lead to certain laws of elasticity expressed in terms of coefficients, the values of which can be determined only by experiments on each particular substance. Various attempts have also been made to deduce these laws from particular hypotheses as to the action between the molecules of the elastic substance. We may therefore regard the theory of elasticity as consisting of two parts. The first part establishes the laws of the elasticity of a finite portion of the solid subjected to a homogeneous strain, and deduces from these laws the equations of the equilibrium and motion of a body subjected to any forces and displace- ments. The second part endeavours to deduce the facts of the elasticity of a finite portion of the substance from hypo- theses as to the motion of its constituent molecules and the forces acting between them. In like

manner we may by experiment ascertain the general fact that the surface of a liquid is in a state of tension similar to that of a membrane stretched equally in all directions, and prove that this tension depends only on the nature and temperature of the liquid and not on its form, and from this as a secondary physical principle we may deduce all the phenomena of capillary action. This is one step of the investigation. The next step is to deduce this surface-tension from a hypothesis as to the molecular constitution of the liquid and of the bodies that surround it. The scientific importance of this step is to be measured by the degree of insight which it affords or promises into the molecular constitution of real bodies by the suggestion of experiments by which we may discriminate between rival molecular theories.

In 1756 J. G. Leidenfrost {De aquae communis nonnullis qualitatibus tractatus, Duisburg) showed that a soap-bubble tends to contract, so that if the tube with which it was blown is left open the bubble will dimmish in size and will expel through the tube the air which it contains. He attributed this force, however, not to any general property of the surfaces of liquids, but to the fatty part of the soap which he supposed to separate itself from the other constituents of the solution, and to form a thin skin on the outer face of the bubble.

In 1787 Gaspard Monge (Memoires de V Acad, des Sciences, 1787, p. 506) asserted that ” by supposing the adherence of the particles of a fluid to have a sensible effect only at the surface itself and in the direction of the surface it would be easy to deter- mine the curvature of the surfaces of fluids in the neighbourhood of the solid boundaries which contain them ; that these surfaces would be lintearіae of which the tension, constant in all directions, would be everywhere equal to the adherence of two particles, and the phenomena of capillary tubes would then present nothing which could not be determined by analysis.” He applied this principle of surface-tension to the explanation of the apparent attractions and repulsions between bodies floating on a liquid.

In 1802 John Leslie (Phil. Mag., 1802, vol. xiv. p. 193) gave the first correct explanation of the rise of a liquid in a tube by considering the effect of the attraction of the solid on the very thin stratum of the liquid in contact with it. He did not, like the earlier speculators, suppose this attraction to act in an up- ward direction so as to support

the fluid directly. He showed that the attraction is everywhere normal to the surface of the solid. The direct effect of the attraction is to increase the pressure of the stratum of the fluid in contact with the solid, so as to make it greater than the pressure in the interior of the fluid. The result of this pressure if unopposed is to cause this stratum to spread itself over the surface of the solid as a drop of water is observed to do when placed on a clean horizontal glass plate, and this even when gravity opposes the action, as when the drop is placed on the under surface of the plate. Hence a glass tube plunged into water would become wet all over were it not that the ascending liquid film carries up a quantity of other liquid which coheres to it, so that when it has ascended to a certain height the weight of the column balances the force by which the film spreads itself over the glass. This explanation of the action of the solid is equivalent to that by which Gauss afterwards supplied the defect of the theory of Laplace, except that, not being expressed in terms of mathe- matical symbols, it does not indicate the mathematical relation between the attraction of individual particles and the final result. Leslie's theory was afterwards treated according to Laplace's mathematical methods by James Ivory in the article on capillary action, under "Fluids, Elevation of," in the supple- ment to the fourth edition of the Encyclopaedia Brilannica, published in 1819.

In 1804 Thomas Young (Essay on the " Cohesion of Fluids, " Phil. Trans., 1805, p. 65) founded the theory of capillary pheno- mena on the principle of surface-tension. He also observed the constancy of the angle of contact of a liquid surface with a solid, and showed how from these two principles to deduce the pheno- mena of capillary action. His essay contains the solution of a great number of cases, including most of those afterwards solved by Laplace, but his methods of demonstration, though always correct, and often extremely elegant, are sometimes rendered obscure by his scrupulous avoidance of mathematical symbols. Having applied the secondary principle of surface-tension to the various particular cases of capillary action, Young proceeded to deduce this surface-tension from ulterior principles. He supposed the particles to act on one another with two different kinds of forces, one of which, the attractive force of cohesion, extends to particles at a greater distance than those to which the repulsive force is confined. He further supposed that the attractive force is constant throughout the minute distance to which it extends, but that the repulsive force increases rapidly as the distance diminishes. He thus showed that at a curved part of the surface, a superficial particle would be urged towards

the centre of curvature of the surface, and he gave reasons for

concluding that this force is proportional to the sum of the curvatures of the surface in two normal planes at right angles to each other.

The subject was next taken up by Pierre Simon Laplace (Mecanique celeste, supplement to the tenth book, pub. in 1806). His results are in many respects identical with those of Young, but his methods of arriving at them are very different, being conducted entirely by mathematical calculations. The form into which he threw his investigation seems to have deterred many able physicists from the inquiry into the ulterior cause of capillary phenomena, and induced them to rest content with deriving them from the fact of surface-tension. But for those who wish to study the molecular constitution of bodies it is necessary to study the effect of forces which are sensible only at insensible distances; and Laplace has furnished us with an example of the method of this study which has never been surpassed. Laplace investigated the force acting on the fluid contained in an infinitely slender canal normal to the surface of the fluid arising from the attraction of the parts of the fluid outside the canal. He thus found for the pressure at a point in the interior of the fluid an expression of the form

£ = K+iH(i/R+i/R'), where K is a constant pressure, probably very large, which, however, does not influence capillary phenomena, and therefore cannot be determined from observation of such phenomena; H is another constant on which all capillary phenomena depend; and R and R' are the radii of curvature of any two normal sections of the surface at right angles to each other.

In the first part of our own investigation we shall adhere to the symbols used by Laplace, as we shall find that an accurate knowledge of the physical interpretation of these symbols is necessary for the further investigation of the subject. In the Supplement to the Theory of Capillary Action, Laplace deduced the equation of the surface of the fluid from the condition that the resultant force on a particle at the surface must be normal to the surface. His explanation, however, of the rise of a liquid in a tube is based on the assumption of the constancy of the angle of contact for the same solid and fluid, and of this he has nowhere given a satisfactory proof. In this supplement Laplace gave many important applications of the theory, and compared the results with the experiments of Louis Joseph Gay Lussac.

The next great step in the treatment of the subject was made by C. F. Gauss (Principia generalia Theoriae Figurae Fluidorum in statu Aequilibrii, Gottingen, 1830, or Werke, v. 29, Gottingen, 1867). The

principle which he adopted is that of virtual velo- cities, a principle which under his hands was gradually trans- forming itself into what is now known as the principle of the conservation of energy. Instead of calculating the direction and magnitude of the resultant force on each particle arising from the action of neighbouring particles, he formed a single expression which is the aggregate of all the potentials arising from the mutual action between pairs of particles. This ex- pression has been called the force-function. With its sign reversed it is now called the potential energy of the system. It consists of three parts, the first depending on the action of gravity, the second on the mutual action between the particles of the fluid, and the third on the action between the particles of the fluid and the particles of a solid or fluid in contact with it.

The condition of equilibrium is that this expression (which we may for the sake of distinctness call the potential energy) shall be a minimum. This condition when worked out gives not only the equation of the free surface in the form already established by Laplace, but the conditions of the angle of contact of this surface with the surface of a solid.

Gauss thus supplied the principal defect in the great work of Laplace. He also pointed out more distinctly the nature of the assumptions which we must make with respect to the law of action of the particles in order to be consistent with observed phenomena. He did not, however, enter into the explanation of particular phenomena, as this had been done already by Laplace, but he pointed out to physicists the advantages of the

method of Segner and Gay Lussac, afterwards carried out by Quincke, of measuring the dimensions of large drops of mercury on a horizontal or slightly concave surface, and those of large bubbles of air in transparent liquids resting against the under side of a horizontal plate of a substance wetted by the liquid.

In 1 83 1 Simeon Denis Poisson published his Nouvette Thiorie de faction capillaire. He maintained that there is a rapid variation of density near the surface of a liquid, and he gave very strong reasons, which have been only strengthened by subsequent discoveries, for believing that this is the case. He proceeded to an investigation of the equilibrium of a fluid on the hypothesis of uniform density, and

arrived at the conclusion that on this hypothesis none of the observed capillary phenomena would take place, and that, therefore, Laplace's theory, in which the density is supposed uniform, is not only insufficient but erroneous. In particular he maintained that the constant pressure K, which occurs in Laplace's theory, and which on that theory is very large, must be in point of fact very small, but the equation of equilibrium from which he concluded this is itself defective. Laplace assumed that the liquid has uniform density, and that the attraction of its molecules extends to a finite though insensible distance. On these assumptions his results are cer- tainly right, and are confirmed by the independent method of Gauss, so that the objections raised against them by Poisson fall to the ground. But whether the assumption of uniform density be physically correct is a very different question, and Poisson rendered good service to science in showing how to carry on the investigation on the hypothesis that the density very near the surface is different from that in the interior of the fluid.

The result, however, of Poisson's investigation is practically equivalent to that already obtained by Laplace. In both theories the equation of the liquid surface is the same, involving a constant H, which can be determined only by experiment. The only difference is in the manner in which this quantity H depends on the law of the molecular forces and the law of density near the surface of the fluid, and as these laws are unknown to us we cannot obtain any test to discriminate between the two theories.

We have now described the principal forms of the theory of capillary action during its earlier development. In more recent times the method of Gauss has been modified so as to take account of the variation of density near the surface, and its language has been translated in terms of the modern doctrine of the conservation of energy. 1

J. A. F. Plateau {Statique exptrimentale et theorique des liquides), who made elaborate study of the phenomena of surface- tension, adopted the following method of getting rid of the effects of gravity. He formed a mixture of alcohol and water of the same density as olive oil, and then introduced a quantity of oil into the mixture. It assumes the form of a sphere under the action of surface-tension alone. He then, by means of rings of iron-wire, disks and other contrivances, altered the form of certain parts of the surface of the oil. The free portions of the surface then assume new forms depending on the equilibrium of surface-tension. In this way he produced a great many of the forms of equilibrium of a liquid under the action of surface-

tension alone, and compared them with the results of mathe- matical investigation. He also greatly facilitated the study of liquid films by showing how to form a liquid, the films of which will last for twelve or even for twenty-four hours. The debt which science owes to Plateau is not diminished by the fact that, while investigating these beautiful phenomena, he never h”mself saw them, having lost his sight in about 1840.

G. L. van der Mensbrugghe (M6m. de V Acad. Roy. de Belgique, xxrvii., 1873) devised a great number of beautiful illustrations

1 See Enrico Betti, Teoria della Capillaritd : Nuovo Cimento (1867); a memoir by M. Stahl, ” Ueber einige Punckte in der Theorie der Capillarerscheinungen,” Pogg. Ann. cxxxix. p. 239 (1870); and J. D. Van der Waal’s Over de Continuiteit van den Gase.n Vloeistoftoestand. A good account of the subject from a mathematical point of view will be found in Tameb Challis’s “‘Report on the Theory of Capillary Attraction,” Brit. Ass. Report, iv. p. 235 (1834).

of the phenomena of surface-tension, and showed their connexion with the experiments of Charles Tomlinson on the figures formed by oils dropped on the clean surface of water.

Athanase Dupre in his 5th, 6th and 7th Memoirs on the Mechanical Theory of Heat (Ann. de Chimie et de Physique, 1866- i868> applied the principles of thermodynamics to capillary phenomena, and the experiments of his son Paul were exceedingly ingenious and well devised, tracing the influence of surface- tension in a great number of very different circumstances, and deducing from independent methods the numerical value of the surface-tension. The experimental evidence which Dupre obtained bearing on the molecular structure of liquids must be very valuable, even if our present opinions on this subject should turn out to be erroneous.

F. H. R. Ludtge {Pogg. Ann. cxxxix. p. 620) experimented on liquid films, and showed how a film of a liquid of high surface- tension is replaced by a film of lower surface-tension. He also experimented on the effects of the thickness of the film, and fame to the conclusion that the thinner a film is, the greater is its tension. This result, however, was tested by Van der Mens- brugghe, who found that the tension is the same for the same liquid whatever be the thickness, as long as the film does not burst. [The continued coexistence of various thicknesses, as evidenced by the colours in the same film, affords an instan- taneous proof of this conclusion.] The phenomena of very thin liquid films deserve the most careful study, for it is in this way that we are

most likely to obtain evidence by which we may test the theories of the molecular structure of liquids.

Sir W. Thomson (afterwards Lord Kelvin) investigated the effect of the curvature of the surface of a liquid on the thermal equilibrium between the liquid and the vapour in contact with it. He also calculated the effect of surface-tension on the pro- pagation of waves on the surface of a liquid, and determined the minimum velocity of a wave, and the velocity of the wind when it is just sufficient to disturb the surface of still water.

Theory of Capillary Action

When two different fluids are placed in contact, they may either diffuse into each other or remain separate. In some cases diffusion takes place to a limited extent, after which the result- ing mixtures do not mix with each other. The same substance may be able to exist in two different states at the same tem- perature and pressure, as when water and its saturated vapour are contained in the same vessel. The conditions under which the thermal and mechanical equilibrium of two fluids, two mixtures, or the same substance in two physical states in contact with each other, is possible belong to thermodynamics. All that we have to observe at present is that, in the cases in which the fluids do not mix of themselves, the potential energy of the system must be greater when the fluids are mixed than when they are separate.

It is found by experiment that it is only very close to the bounding surface of a liquid that the forces arising from the mutual action of its parts have any resultant effect on one of its particles. The experiments of Quincke and others seem to show that the extreme range of the forces which produce capillary action lies between a thousandth and a twenty-thousandth part of a millimetre.

We shall use the symbol e to denote this extreme range, beyond which the action of these forces may be regarded as insensible. If x denotes the potential energy of unit of mass of the substance, we may treat x as sensibly constant except within a distance e of the bounding surface of the fluid. In the interior of the fluid it has the uniform value xo- In like manner the density, p, is sensibly equal to the constant quantity Po, which is its value in the interior of the liquid, except within a distance e of the bounding surface. Hence if V is the volume of a mass M of liquid bounded by a surface whose area is S, the integral

M. = jfjpdxdydz (1)

where the integration is to be extended throughout the volume

V, may be divided into two parts by considering separately the thin shell or skin extending from the outer surface to a depth e, within which the density and other properties of the liquid vary with the depth, and the interior portion of the liquid within which its properties are constant.

Since e is a line of insensible magnitude compared with the dimensions of the mass of liquid and the principal radii of curva- ture of its surface, the volume of the shell whose surface is S and thickness e will be Se, and that of the interior space will be V-Se.

If we suppose a normal v less than t to be drawn from the surface S into the liquid, we may divide the shell into elementary shells whose thickness is dv, in each of which the density and other properties of the liquid will be constant.

The volume of one of these shells will be Sdv. Its mass will be

Spdv. The mass of the whole shell will therefore be SJ pdv, and

that of the interior part of the liquid (V — Sc)p . We thus find for the whole mass of the liquid

M = v P0 -sr e (p„-p)ˆ (2)

To find the potential energy we have to integrate

E = jffxpdxdydz (3)

Substituting xp for p in the process we have just gone through, we find

E = Vxopo— SI (xopo — xp)dv (4)

J Multiplying equation (2) by xo, and subtracting it from (4),

E-M X o = sf(x-Xo)pd* (5)

In this expression M and xo are both constant, so that the varia- tion of the right-hand side of the equation is the same as that of the energy E, and expresses that part of the energy which depends on the area of

the bounding surface of the liquid. We may call this the surface energy.

The symbol x expresses the energy of unit of mass of the liquid at a depth v within the bounding surface. When the liquid is in contact with a rare medium, such as its own vapour or any other gas, x is greater than xo, and the surface energy is positive. By the principle of the conservation of energy, any displacement of the liquid by which its energy is diminished will tend to take place of itself. Hence if the energy is the greater, the greater the area of the exposed surface, the liquid will tend to move in such a way as to diminish the area of the exposed surface, or, in other words, the exposed surface will tend to diminish if it can do so consistently with the other conditions. This tendency of the surface to contract . itself is called the surface-tension of liquids.

Dupre has described an arrangement by which the surface- tension of a liquid film may be illustrated. A piece of sheet metal

is cut out in the form AA (fig. 1). A very fine slip of metal is laid on it in the position BB, and the whole is dipped into a solution of soap, or M. Plateau's glycerine mixture. When it is taken out the rectangle AACC if filled up by a liquid film. This film, however, tends to contract on itself, and the loose strip of metal BB will, if it is let go, be drawn up towards AA, provided it is sufficiently light and smooth.

Let T be the surface energy per unit of area ; then the energy of a surface of area S will be ST. If, in the rectangle AACC, AA = «, and AC = b, its area is S = ab, and its energy Tab. Hence if F is the force by which the slip BB is pulled towards AA,

F = ˆTai = Ta,

Fig. 1.

(6)

or the force arising from the surface-tension acting on a length a of the strip is Ta, so that T represents the surface-tension acting transversely on every unit of length of the periphery of the liquid surface. Hence if we write

T = f (x — Xo)pdv,

(7)

we may define T either as the surface-energy per unit of area, or as the surface-tension per unit of contour, for the numerical values of these two quantities are equal.

If the liquid is bounded by a dense substance, whether liquid or solid, the value of x may be different from its value when the liquid has a free surface. If the liquid is in contact with another liquid, let us distinguish quantities belonging to the two liquids by suffixes. We shall then have

Ei — MiXoi = S| Hxi — Xm)pidn, J

E 2 — M2X02 = SJ ‘(xs — X«)/-2 < 2"2-

(8) (9)

Adding these expressions, and dividing the second member by S, we obtain for the tension of the surface of contact of the two liquids

Ti.j =) Hxi — xm)pidpi + i 2 (X2 — x

If this quantity is positive, the surface of contact will tend to contract, and the liquids will remain distinct. If, however, it were negative, the displacement of the liquids which tends to enlarge the surface of contact would be aided by the molecular forces, so that the liquids, if not kept separate by gravity, would at length become thoroughly mixed. No instance, however, of a phenomenon of this kind has been discovered, for those liquids which mix of themselves do so by the process of diffusion, which is a molecular motion, and not by the spontaneous puckering and replication of the bounding surface as would be the case if T were negative.

It is probable, however, that there are many cases in which the integral belonging to the less dense fluid is negative. If the denser body be solid we can often demonstrate this; for the liquid tends to spread itself over the surface of the solid, so as to increase the area of the surface of contact, even although in so doing it is obliged to increase the free surface in opposition to the surface-tension. Thus water spreads itself out on a clean surface of glass. This shows

that) (x — Xo)pdv must be negative for water in contact with glass. J

On the Tension of Liquid Films. — The method already given for the investigation of the surface-tension of a liquid, all whose dimensions are sensible,. fails in the case of a liquid film such as a soap-biibble. In such a film it is possible that no part of the liquid may be so far from

the surface as to have the potential and density corresponding to what we have called the interior of a liquid mass, and measurements of the tension of the film when drawn out to different degrees of thinness may possibly lead to an estimate of the range of the molecular forces, or at least of the depth within a liquid mass, at which its properties become sensibly uniform. We shall therefore indicate a method of investigating the tension of such films.

Let S be the area of the film, M its mass, and E its energy ; a the mass, and e the energy of unit of area ; then

M = S

E = Se (12)

Let us now suppose that by some change in the form of the boundary of the film its area is changed from S to S + dS. If its tension is T the work required to effect this increase of surface will be TdS, and the energy of the film will be increased by this amount. Hence

TdS = <2E = S

But since M is constant,

dM = Sd(x +

Eliminating dS from equations (13) and (14), and dividing by S, we find

T = e_ff £' •••■•• (15)

In this expression

If we take the axis of z normal to either surface of the film, the radius of curvature of which we suppose to be very great compared with its thickness c, and if p is the density, and x the energy of unit of mass at depth z, then

a = \ pdz, (16)

J and

e = fxpdz (17)

Both p and x are functions of z, the value of, which remains the same when z — c is substituted for z. If the thickness of the film is greater than 2e, there will be a stratum of thickness c — 2e in the middle of

the film, within which the values of p and x will be po and Xo- In the two strata on either side of this the law, according to which p and x depend on the depth, will be the same as in a liquid mass of large dimensions. Hence in this case

e = (c-2«)xoPu + 2f xpiv (19)

J da de . de

To" 90 ' Tc = xm ' ■■Ta = x< "

T = 2f xpdv-2xof pdv = 2((x — xo)pdv. . . (20)

J -* ■ >

Hence the tension of a thick film is equal to the sum of the tensions of its two surfaces as already calculated (equation 7). On the hypothesis of uniform density we shall find that this is true for films whose thickness exceeds e.

The symbol x is defined as the energy of unit of mass of the substance. A knowledge of the absolute value of this energy is not required, since in every expression in which it occurs it is under the

form x — Xo, that is to say, the differehce between the energy in two different states. The only cases, however, in which we have experimental values of this quantity are when the substance is either liquid and surrounded by similar liquid, or gaseous and surrounded by similar gas. It is impossible to make direct measurements of the properties of particles of the substance within the insensible distance « of the bounding surface.

When a liquid is in thermal and dynamical equilibrium with its vapour, then if p' and x' are the values of p and x fo£ the vapour, and po and xo those for the liquid,

x'-Xo = JL-£(l/p'-l/po) (21)

where J is the dynamical equivalent of heat, L is the latent heat of unit of mass of the vapour, and p is the pressure. At points in the liquid very near its surface it is probable that x is greater than Xo, and at points in the gas very near the surface of the liquid it is probable

that x is less than %', but this has not as yet been ascer- tained experimentally. We shall therefore endeavour to apply to this subject the methods used in Thermodynamics, and where these fail us we shall have recourse to the hypotheses of molecular physics.

We have next to determine the value of x in terms of the action between one particle and another. Let us suppose that the force between two particles m and m' at the distance / is

F = wo(/) + cr), (22)

being reckoned positive when the force is attractive. The actual force between the particles arises in part from their mutual gravita- tion, which is inversely as the square of the distance. This force is expressed by m m' C/~ 2 . It is easy to show that a force subject to this law would not account for capillary action. We shall, therefore, in what follows, consider only that part of the force which depends on {f), where (/) is a function of/ which is insensible for all sensible values of /, but which becomes sensible and even enormously great when / is exceedingly small.

If we next introduce a new function of/ and write

//*(/)#- H(/) (23)

then m m' 11(f) will represent— (1) The work done by the attractive force on the particle m, while it is brought from an infinite distance from m' to the distance / from m' ; or (2| The attraction of a particle to on a narrow straight rod resolved in the direction of the length of the rod, one extremity of the rod being at a distance / from m, and the other at an infinite distance, the mass of unit of length of the rod being m'. The function II(/) is also insensible for sensible values of/, but for insensible values of/ it may become sensible and even very great. If we next write

f g fll{f)df = K*) (24)

then 2irmcn/'(s) will represent — (1) The work done by the attractive force while a particle m is brought from an infinite distance to a distance z from an infinitely thin stratum of n' the substance whose mass per unit of area is \ a; (2) The attraction of a particle m placed 'Q* at a distance z from the plane surface of an infinite solid whose density is a.

Let us examine the case in which the particle m is placed at a distance z from a curved stratum of the substance, whose principal radii of

curvature are Ri and R2. Let P (fig. 2) be the particle and PB a normal to the surface. Let the plane of the paper be a normal section of the surface of the stratum at the point B, making an angle o> with the section whose radius of curvature is Ri. Then if O is the centre of curvature in the plane of the paper, and BO = u,

sin'w

Fig. 2.

+

Ri T R<

Let POQ = 0, PO = r, PQ=/, BP=z,

f = u?+r 2 — 2ur cos

The element of the stratum at Q may be expressed by

(25)

(26)

or expressing dd in terms of df by (26), aur~ l f df do>.

Multiplying this by m and by ir(/), we obtain for the work done by the attraction of this element when m is brought from an infinite distance to Pi,

mcrur~ s fll(f)dfda>.

Integrating with respect to / from f = z to f = a, where a is a line very great compared with the extreme range of the molecular force, but very small compared with either of the radii of curvature, we obtain for the work

(in our 1 (iA (z) — ˆ (a)) doi,

Jm

and since ˆ(a) is an insensible quantity we may omit it. We may also write

ur" 1 = 1 +zw _1 + &c,

since z is very small compared with u, and expressing u in terms of w

by (25), we find

f 27r , 1 \ S , 1 /cos 2 w , sin 2 . J oto-ˆ(z) j I +z(

X

+

~)\^^ m ^\ l+ Hi+w)-

Ri ˆRz

This then expresses the work done by the attractive forces when a particle m is brought from an infinite distance to the point P at a distance z from a stratum whose surface-density is

To find the work done when m is brought to the point P in the neighbourhood of a solid body, the density of which is a function of the depth v below the surface, we have only to write instead of

27rmf 2 pt(z)dz + irm (g-+jˆ) j z pzˆp{z)dz

This expres- a particle m

where, in general, we must suppose p a function of z.

sion, when integrated, gives (1) the work done on

while it is brought from an infinite distance to the point P, or (2)

the attraction on a long slender column normal to the surface and

terminating at P, the mass of unit of length of the column being m.

In the form of the theory given by Laplace, the density of the liquid

was supposed to be uniform. Hence if we write

K=2w(

the pressure of a column of the fluid itself terminating at the surface will be

P 2 jK-|-|H(i/R I -l-i/R 2)|,

and the work done by the attractive forces when a particle m is

brought to the surface of the fluid from an infinite distance will be

wp(K+|H(i/R 1 + i/R 2)|;

If we write „

j z +(z)dz = 6(z), then 2Trmp8(z) will express the work done by- the attractive forces, while a particle m is brought from an infinite distance to a distance z from the plane surface of a mass of the substance of density p and infinitely thick. The function 0(z) is insensible for all sensible values of z. For insensible values it may become sensible, but it must remain finite even when z = o, in which case 0(o) = K.

If x' is the potential energy of unit of mass of the substance in vapour, then at a distance z from the plane surface of the liquid

X = x' — 2tp$(z). At the surface

X = x' — 27rp0(o). At a distance z within the surface

X=x'-4*7>l?(o)-t-2xp0(s).

If the liquid forms a stratum of thickness c, then

X = x' -4*-p0(o) +2,rp0(z) +2irp0(r -c). The surface-density of this stratum is a = cp. The energy per unit of area is

e = Cxpdz = cp(x'-'\Trpe(o))+2Trp i re(z)dz+2irp i re(c-z)dz. J J J

Since the two sides of the stratum are similar the last two terms are equal, and

e = cp(x'-4'rp0(o))+4>rp 2 J' O 0(z)

-£ = P< Tc = p (x ' -4tp0(o))+4*-p 2 0©. . Hence the surface-tension

T = e –

de,

c6© — 00 (o) -J z 2~ z dz '

de

-*«,

Remembering that 0(o) is a finite quantity, and that -r = ■

we find

T = 4TP 2 PW(z)

When c is greater than e this is equivalent to 2H in the equation of

Laplace. Hence the tension is the same for all films thicker than «, the range of the molecular forces. For thinner films

■ˆ = 47rp 2 ci/’(c).

Hence if ˆ(c) is positive, the tension and the thickness will increase together. Now 2wmp4’(c) represents theattractionbetweenaparticle m and the plane surface of an infinite mass of the liquid, when the distance of the particle outside the surface is c. Now, the force between the particle and the liquid is certainly, on the whole, attractive; but if between any two small values of c it should be repulsive, then for films whose thickness lies between these values the tension will increase as the thickness diminishes, but for all other cases the tension will diminish as the thickness diminishes.

We have given several examples in which the density is as- sumed to be uniform, because Poisson has asserted that capillary

phenomena would not take place unless the density varied rapidly near the surface. In this assertion we think he was mathematically wrong, though in his own hypothesis that the density does actually vary, he was probably right. In fact, the quantity 4irp 2 K, which we may call with van der Waals the molecular pressure, is so great for most liquids (5000 atmospheres for water), that in the parts near the surface, where the molecular pressure varies rapidly, we may expect considerable variation of density, even when we take into account the smallness of the compressibility of liquids.

The pressure at any point of the liquid arises from two causes, the external pressure P to which the liquid is subjected, and the pressure arising from the mutual attraction of its molecules. If we suppose that the number of molecules within the range of the attraction of a given molecule is very large, the part of the pressure arising from attraction will be proportional to the square of the number of molecules in unit of volume, that is, to the square of the density. Hence we may write

p = P + Ap\ where A is a constant [equal to Laplace's intrinsic pressure K. But this equation is applicable only at points in the interior, where p is not varying.]

[The intrinsic pressure and the surface-tension of a uniform mass are perhaps more easily found by the following process. The former can be found at once by calculating the mutual attraction of the parts of a large mass which lie on opposite sides of an imaginary plane interface. If the density be a, the attraction between the whole of one side and a layer upon the other distant z from the plane and of thickness dz is 2ir(i i ip(z)dz, reckoned per unit of area. The expression for the intrinsic pressure is thus simply

K = 2*rf" Mz)dz (28)

In Laplace's investigation a is supposed to be unity. We may call the value which (28) then assumes Ko, so that as above

Ko = 2ir/""iKz)eZz (29)

The expression for the superficial tension is most readily found with the aid of the idea of superficial energy, introduced into the subject by Gauss. Since the tension is constant, the work that must be done to extend the surface by one unit of area measures the tension, and the work required for the generation of any surface is the product of the tension and the area. From this consideration we may derive Laplace's expression, as has been done by Dupre (Theorie mecanique de la chaleur, Paris, 1869), and Kelvin (" Capillary Attraction," Proc. Roy. Inst., January 1886. Reprinted, Popular Lectures and Addresses, 1889). For imagine a small cavity to be formed in the interior of the mass and to be gradually expanded in such a shape that the walls consist almost entirely of two parallel planes. The distance between the planes is supposed to be very small compared with their ultimate diameters, but at the same time large enough to exceed the range of the attractive forces. The work required to produce this crevasse is twice the product of the tension and the area of one of the faces. If we now suppose the crevasse produced by direct separation of its walls, the work necessary must be the same as before, the initial and final configurations being identical; and we recognize that the tension may be measured by half the work that must be done per unit of area against the mutual attraction in order to separate the two portions which lie upon opposite sides of an ideal plane to a distance from one another which is outside the range of the forces. It only remains to calculate this work.

If ffi, 01 represent the densities of the two infinite solids, their mutual attraction at distance z is per unit of area

2x<7icr/ 2 °° xj/(z)dz (30)

or 2ir

/>(z)rfz = 0(z) (31)

The work required to produce the separation in question is thus

2irai

and for the tension of a liquid of density

T = «£”«(*)& (33)

The form of this expression may be modified by integration by parts. For

f9(z)dz=6(z).z-fzˆ) -dz = 8(z).z+fzt(z)dz.

Since 9(o) is finite, proportional to K, the integrated term vanishes at both limits, and we have simply

j”0(z)dz=f°zUz)dz (34)

and

T = ™ 2 f”zMz)dz (35)

In Laplace’s notation the second member of (34), multiplied by 2w, is represented by H.

As Laplace has shown, the values for K and T may also be ex- pressed in terms of the function , with which we started. Integrating by parts, we get

f+(z)dz = zMz)+lz 3 U(z)+ifz 3 {z)dz, fz+(z)dz = izˆ(z) +|z 4 II (z) + \fz%(z)dz.

In all cases to which it is necessary to have regard the integrated terms vanish at both limits, and we may write

/; +{ Z)dz – if; 2 ˆ(z)dz, /; «*() = i/; «(*)& ; (36)

so that

Ko = y j~“z^(z)dz, To = I J%V(z)dz (37)

A few examples of these formulae will promote an intelligent comprehension of the subject. One of the simplest suppositions open to us is that

/strong > */. (38)

From this we obtain

1I(z) = j8-VP*, ^(z) = /T 3 (/Sz-f l)«-P«, . . (39)

Ko = 47r/r 4 , T„ = 37r/S- 6 (40)

The range of the attractive force is mathematically infinite, but practically of the order /3 -1 , and we see that T is of higher order in this small quantity than K. That K is in all cases of the fourth order and T of the fifth order in the range of the forces is obvious from (37) without integration.

An apparently simple example would be to suppose (z) = z”. We get

gn + l z n + 3

II W”-^ + T”^”) = n + 3 .« + i ‘

^ ” n + 4.n + 3 .n + ll •••••• (41)

The intrinsic pressure will thus- be infinite whatever n may be. If « + 4 be positive, the attraction of infinitely distant parts contributes to the result; while if w + 4 be negative, the parts in immediate contiguity act with infinite power. For the transition case, discussed by William Sutherland (Phil. Mag. xxiv. p. 113, 1887), of « + 4 = o, Ko is also infinite. It seems therefore that nothing satisfactory can be arrived at under this head.

As a third example, we will take the law proposed by Young, viz. (z) = 1 from z = o to z = a,) , ■.

ij > (z) = 0 from z = a to z = oo; J • • ■ • \4 2 > and corresponding therewith,

II(z) = 0— z from z = o to z = a,) ,.

II(z) = o from z = a to 2 = 00, \ ‘ ‘ * 43y -z i)-§(a s -z 3) i

from z = to z — a, \ ... (44) i//(z) = o from z = a to z = oo,)
Equations (37) now give

K ° = yj z3

T > * f" 1J TO 5 / ,N

T = gJ o zyz = — (46)

The numerical results differ from those of Young, who finds that " the contractile force is one-third of the whole cohesive force of a stratum of particles, equal in thickness to the interval to which the primitive equable cohesion extends," viz. T = |aK; whereas according to the above calculation T = ˆaK. The discrepancy seems to depend upon Young having treated the attractive force as operative in one direction only. For further calculations on Laplace's principles, see Rayleigh, Phil. Mag., Oct. Dec. 1890, or Scientific Papers, vol. iii. P- 397-1

On Surface-Tension

Definition. — The tension of a liquid surface across any line drawn on the surface is normal to the line, and is the same for all directions of the line, and is measured by the force across an element of the line divided by the length of that element.

Experimental Laws of Surf ace-Tension. — 1. For any given liquid surface, as the surface which separates water from air, or oil from water, the surface-tension is the same at every point of the surface and in every direction. It is also practically inde- pendent of the curvature of the surface, although it appears from the mathematical theory that there is a slight increase of tension where the mean curvature of the surface is concave, and a slight diminution where it is convex. The amount of this increase and diminution is too small to be directly measured, though it has a certain theoretical importance in the explanation of the equilibrium of the superficial layer of the liquid where it is inclined to the horizon.

2. The surface-tension diminishes as the temperature rises, and when the temperature reaches that of the critical point at which the distinction between the liquid and its vapour ceases, it has been observed by Andrews that the capillary action also vanishes. The early writers on capillary action supposed that the diminution of capillary action was due simply to the change of density corresponding to the rise of temperature, and, there-

fore, assuming the surface-tension to vary as the square of the

density, they deduced its variations from the observed dilatation of the liquid by heat. This assumption, however, does not appear to be verified by the experiments of Brunner and Wolff on the rise of water in tubes at different temperatures.

3. The tension of the surface separating two liquids which do not mix cannot be deduced by any known method from the tensions of the surfaces of the liquids when separately in contact with air.

When the surface is curved, the effect of the surface-tension is to make the pressure on the concave side exceed the pressure on the convex side by T (1/R1 +1/R2), where T is the intensity of the surface-tension and Ri, R2 are the radii of curvature of any two sections normal to the surface and to each other.

If three fluids which do not mix are in contact with each other, the three surfaces of separation meet in a line, straight or curved. Let (fig. 3) be a point in this line, and let the plane of the paper

be supposed to be normal to the line at the point 0. The three angles between the tangent planes to the three surfaces of separation at the point are completely determined by the tensions of the three surfaces. For if in the triangle abc the side ab is taken so as to represent on a given scale the tension of the surface of contact of the fluids a and b, and if the other sides be and ca are taken so as to represent on the same scale the tensions of the surfaces between b and c and between c and a respectively, then the condition of equilibrium at O for the corresponding tensions R, P and Q is that the angle ROP shall be the supplement of abc, POQ of bca, and, therefore, QOR of cab. Thus the angles at which the surfaces of separation meet are the same at all parts of the line of concourse of the three fluids. When three films of the same liquid meet, their tensions are equal, and, therefore, they make angles of 120 with each other. The froth of soap-suds or beaten-up eggs cqnsists of a multitude of small films which meet each other at angles of 120°. If four fluids, a, b, c, d, meet in a point O, and if a tetrahedron ABCD is formed so that its edge AB represents the tension of the surface of contact of the liquids a and b, BC that of 6 and c, and so on; then

if we place this tetrahedron so that the face ABC is normal to the tangent at O to the line of concourse of the fluids abc, and turn it so that the edge AB is normal to the tangent plane at to the surface of contact of the fluids a and b, then the other three faces of the tetrahedron will be normal to the tangents at O to the other three lines of concourse of the liquids, and the other five edges of the tetrahedron will be normal to the tangent planes at to the other five surfaces of contact.

If six films of the same liquid meet in a point the corresponding tetrahedron is a regular tetrahedron, and each film, where it meets the others, has an angle whose cosine is— . Hence if we take two nets of wire with hexagonal meshes, and place one on the other so that the point of concourse of three hexagons of one net coincides with the middle of a hexagon of the other, and if we then, after dipping them in Plateau's liquid, place them horizontally, and gently raise the upper one, we shall develop a system of plane laminae arranged as the walls and floors of the cells are arranged in a honeycomb. We must not, however, raise the upper net too much, or the system of films will become unstable.

When a drop of one liquid, B, is placed on the surface of another, A, the phenomena which take place depend on the re- lative magnitude of the three surface-tensions corresponding to the surface between A and air, between B and air, and between A and B. If no one of these tensions is greater than the sum of the other two, the drop will assume the form of a lens, the angles which the upper and lower surfaces of the lens make with the free surface of A and with each other being equal to the external angles of the triangle of forces. Such lenses are often seen formed by drops of fat floating on the surface of hot

water, soup or gravy. But when the surface-tension of A exceeds the sum of the tensions of the surfaces of contact of B with air and with A, it is impossible to construct the triangle of forces, so that equilibrium becomes impossible. The edge of the drop is drawn out by the surface-tension of A with a force greater than the sum of the tensions of the two surfaces of the drop. The drop, therefore, spreads itself out, with great velocity, over the surface of A till it covers an enormous area, and is reduced to such extreme tenuity that it is not probable that it retains the same properties of surface-tension which it has in a large mass. Thus a drop of train oil will spread itself over the surface of the sea till it shows the colours of thin plates. These rapidly descend in

Newton's scale and at last disappear, showing that the thickness of the film is less than the tenth part of the length of a wave of light. But even when thus attenuated, the film may be proved to be present, since the surface-tension of the liquid is considerably less than that of pure water. This may be shown by placing another drop of oil on the surface, This drop will not spread out like the first drop, but will take the form of a flat lens with a distinct circular edge, showing that the surface-tension of what is still apparently pure water is now less than the sum of the tensions of the surfaces separating oil from air and water.

The spreading of drops on the surface of a liquid has formed the subject of a very extensive series of experiments by Charles Tomlinson; van der Mensbrugghe has also written a very complete memoir on this subject (Sur la tension superficielle des liquides, Bruxelles, 1873).

When a solid body is in contact with two fluids, the surface of the solid cannot alter its form, but the angle at which the surface of contact of the two fluids meets the surface of the solid depends on the values of the three surface-tensions. If a and b are the two fluids and c the solid then the equi- librium of the tensions at the point O depends only on that of thin components parallel to the surface, because the surface-tensions normal to the surface are balanced by the resistance of the solid. Hence b oc

if the angle ROQ (fig. 4) at which the surface of contact OP meets the solid is denoted by a,

Tbc — T ca — Tab COS 0 = 0,

Whence

COS a = (Tb <,~T OT)/Ta6. a

As an experiment on the angle of contact only gives Fig. 4. us the difference of the surface-tensions at the solid surface, we cannot determine their actual value. It is theoretic- ally probable that they are often negative, and may be called surface-pressures.

The constancy of the angle of contact between the surface of a fluid and a solid was first pointed out by Dr Young, who states that the angle of contact between mercury and glass is about 140°. Quincke makes it 128 52'.

If the tension of the surface between the solid and one of the fluids exceeds the sum of the other two tensions, the point of contact will not be in equilibrium, but will be dragged towards the side on which the tension is greatest. If the quantity of the first fluid is small it will stand in a drop on the surface of the solid without wetting it. If the quantity of the second fluid is small it will spread itself over the surface and wet the solid. The angle of contact of the first fluid is 180° and that of the second is zero.

If a drop of alcohol be made to touch one side of a drop of oil on a glass plate, the alcohol will appear to chase the oil over the plate, and if a drop of water and a drop of bisulphide of carbon be placed in contact in a horizontal capillary tube, the bisulphide of carbon will chase the water along the tube. In both cases the liquids move in the direction in which the surface-pressure at the solid is least.

[In order to express the dependence of the tension at the interface of two bodies in terms of the forces exercised by the bodies upon themselves and upon one another, we cannot do better than follow the method of Dupre. If T12 denote the interfacial tension, the energy corresponding to unit of area of the interface

is also T12, as we see by considering the introduction (through a fine tube) of one body into the interior of the other. A comparison with another method of generating the interface, similar to that previously employed when but one body was in question, will now allow us to evaluate T12.

The work required to cleave asunder the parts of the first fluid which he on the two sides of an ideal plane passing through the interior, is per unit of area 2T1, and the free surface produced is two units in area. So for the second fluid the corresponding work is 2T2. This having been effected, let us now suppose that each of the units of area of free surface of fluid (1) is allowed to approach normally a unit area of (2) until contact is estab- lished. In this process work is gained which we may denote by 4T'i2, 2T'i2 for each pair. On the whole, then, the work expended in producing two units of interface is 2Ti-f-2T 2 — 4.T'i 2 , and this, as we have seen, may be equated to 2T12. Hence

T 12 = T 1 + T 2 -2T' 12 (47)

If the two bodies are similar,

Ti = T 2 = T' 12 ; and Ti2 = o, as it should do.

Laplace does not treat systematically the question of inter- facial tension, but he gives incidentally in terms of his quantity H a relation analogous to (47).

If 2T'i2 > Ti + T 2 , T12 would be negative, so that the interface would of itself tend to increase. In this case the fluids must mix. Conversely, if two fluids mix, it would seem that T'12 must exceed the mean of Ti and T 2 ; otherwise work would have to be expended to effect a close alternate stratification of the two bodies, such as we may suppose to constitute a first step in the process of mixture (Dupre, Thiorie mecanique de la chaleur, p. 372; Kelvin, Popular Lectures, p. 53).

The value of T'i 2 has already been calculated (32). We may write

T'i 2 =7T0-i(r2j" e(z)dz-lircn(r i j'^ z 4 (z)dz; . . (48)

and in general the functions 8, or , must be regarded as capable of assuming different forms. Under these circumstances there is no limitation upon the values of the interfacial tensions for three fluids, which we may denote by T12, T23, T31. _ If the three fluids can remain in contact with one * T *3 another, the sum of any two of the 3 y/^ quantities must exceed the third, and

by Neumann's rule the directions of the interfaces at the common edge Tii~ must be parallel to the sides of a F IG – 5- triangle, taken proportional to T12,

T23, T31. If the above-mentioned condition be not satisfied, the triangle is imaginary, and the three fluids cannot rest in contact, the two weaker tensions, even if acting in full concert, being incapable of balancing the strongest. For instance, if T 3 i > Ti2-|-T23, the second fluid spreads itself indefinitely upon the interface of the first and third fluids.

The experimenters who have dealt with this question, C. G. M. Marangoni, van der Mensbrugghe, Quincke, have all arrived at results inconsistent with the reality of Neumann's triangle. Thus Marangoni says (Pogg. Annalen, cxliii. p. 348, 1871): — "Die gemeinschaftliche Oberflache zweier Fliissig- keiten hat eine geringere Oberflachenspannung als die Differenz der Oberflachenspannung der Fliissigkeiten selbst (mit Aus- nahme des Quecksilbers)." Three pure bodies (of which one may be air) cannot accordingly remain in contact. If a drop of oil stands in lenticular form upon a surface of water, it is because the water-surface is already contaminated with a greasy film.

On the theoretical side the question is open until we intro- duce some limitation upon the generality of the functions. By far the simplest supposition open to us is that the functions are the same in all cases, the attractions differing merely by coefficients analogous to densities in the theory of gravitation. This hypothesis was suggested by Laplace, and may conveni- ently be named after him. It was also tacitly adopted by Young, in connexion with the still more special hypothesis

which Young probably had in view, namely that the force in each case was constant within a limited range, the same in all cases,

and vanished outside that range.

As an immediate consequence of this hypothesis we have from (28)

K = K„

T=-LV (50)

where Ko, T are the same for all bodies.

But the most interesting results are those which Young (Works, vol. i. p. 463) deduced relative to the interfacial tensions of three bodies. By (37), (48),

T‘12 =

so that by (47), (50),

Ti2 = (

According to (52), the interfacial tension between any two bodies is proportional to the square of the difference of their densities. The densities

T31 = (ai —

= Ti 2 +T 2 3+2(o- 1 — 02) (o- 2 — o- 3)Tc;

so that T31 necessarily exceeds the sum of the other two inter- facial tensions. We are thus led to the important conclusion that according to this hypothesis Neumann’s triangle is neces- sarily imaginary, that one of three fluids will always spread upon the interface of the other two.

Another point of importance may be easily illustrated by this theory, viz. the dependency of capillarity upon abruptness of transition. ” The reason why the capillary force should disappear when the transition between two liquids is sufficiently gradual will now be evident. Suppose that the transition from o to a is made in two equal steps, the thickness of the inter- mediate layer of density \

P- 3I5-)

According to Laplace’s hypothesis the whole energy of any number of contiguous strata of liquids is least when they are

arranged in order of density, so that this is the disposition favoured by the attractive forces. The problem is to make the sum of the interfacial tensions a minimum, each tension being proportional to the square of the difference of densities of the two contiguous liquids in question. If the order of stratification differ from that of densities, we can show that each step of approximation to this order lowers the sum of tensions. To this end consider the effect of the abolition of a stratum o-„ + i, contiguous to cr„ and o- n+2 . Before the change we have (cr n — (r„ + i) 2 +(cr B+1 —

2(

Hence, if

So far the results of Laplace's hypothesis are in marked accordance with experiment; but if we follow it out further, discordances begin to manifest themselves. According to (52)

VT 31 = VT I2 +VT23 (53)

a relation not verified by experiment. What is more, (52) shows that according to the hypothesis T12 is necessarily positive;

so that, if the preceding argument be correct, no such thing as mixture of two liquids could ever take place.

There are two apparent exceptions to Marangoni's rule which call for a word of explanation. According to the rule, water, which has the lower surface-tension, should spread upon the surface of mercury; whereas the universal experience of the laboratory is that drops of water standing upon mercury retain their compact form without the least tendency to spread. To Quincke belongs the credit of dissipating the apparent exception. He found that mercury specially prepared behaves quite differently from ordinary mercury, and that a drop of water deposited thereon spreads over the entire surface. The ordinary behaviour is evidently the result of a film of grease, which adheres with great obstinacy.

The process described by Quincke is somewhat elaborate; but there is little difficulty in repeating the experiment if the mistake

be avoided of using a free surface already contaminated, as almost inevitably happens when the mercury is poured from an ordinary bottle. The mercury should be drawn from underneath, for which purpose an arrangement similar to a chemical wash bottle is suitable, and it may be poured into watch-glasses, previously dipped into strong sulphuric acid, rinsed in distilled water, and dried over a Bunsen flame. When the glasses are cool, they may be charged with mercury, of which the first part is rejected. Operating in this way there is no difficulty in obtaining surfaces upon which a drop of water spreads, although from causes that cannot always be traced, a certain proportion of failures is met with. As might be expected, the grease which produces these effects is largely volatile. In many cases a very moderate preliminary warming of the watch-glasses makes all the difference in the behaviour of the drop.

The behaviour of a drop of carbon bisulphide placed upon clean, water is also, at first sight, an exception to Marangoni's rule. So far from spreading over the surface, as according to its lower surface-tension it ought to do, it remains suspended in the form of a lens. Any dust that may be lying upon the surface is not driven away to the edge of the drop, as would happen in the case of oil. A simple modification of the experi- ment suffices, however, to clear up the difficulty. If after the deposition of the drop, a little lycopodium be scattered over the surface, it is seen that a circular space surrounding the drop, of about the size of a shilling, remains bare, and this, however often the dusting be repeated, so long as any of the carbon bisulphide remains. The interpretation can hardly be doubtful. The Carbon bisulphide is really spreading all the while, but on account of its volatility is unable to reach any considerable distance. Immediately surrounding the drop there is a film moving outwards at a high speed, and this carries away almost instantaneously any dust that may fall upon it. The pheno- menon above described requires that the water-surface be clean. If a very little grease be present, there is no outward flow and dust remains undisturbed in the immediate neighbourhood of the drop.]

On the Rise of a Liquid in a Tube. — Let a tube (fig. 6) whose internal radius is r, made of a solid substance c, be dipped into

a liquid a. Let us suppose that the angle of contact for this liquid with the solid c is an acute angle. This implies that the ten- sion of the free surface of the solid c is greater than that of the surface of contact of the solid with the liquid a. Now con- sider the

tension of the free surface of the liquid a. All round its edge there is a tension T acting at an angle a with the vertical. The circumference of the edge is 2irr, so that the resultant of this tension is a force 27rrT cos a acting vertically upwards on the liquid. Hence

the liquid will rise in the tube till the weight of the vertical column between the free surface and the level of the liquid in the vessel balances the resultant of the surface-tension. The upper surface of this column is not level, so that the height of the column cannot be directly measured, but let us assume that h is the mean height of the column, that is to say, the height of a column of equal weight, but with a flat top. Then if r is the radius of the tube at the top of the column, the volume of the suspended column is irr 2 h, and its weight is wpgr 2 h, when p is its density and g the intensity of gravity. Equating this force with the resultant of the tension

irpgr 2 h = 2TrrTc.OS a,

or

h — 2T cos alpgr. Hence the mean height to which the fluid rises is inversely as the radius of the tube. For water in a clean glass tube the angle of contact is zero, and

h = 2T/pgr.

For mercury in a glass tube the angle of contact is 128 52', the cosine of which is negative. Hence when a glass tube is dipped into a vessel of mercury, the mercury within the tube stands at a lower level than outside it.

Rise of a Liquid between Two Plates. — When two parallel plates are placed vertically in a liquid the liquid rises between them. If we now suppose fig. 6 to represent a vertical section perpendicular to the plates, we may calculate the rise of the liquid. Let / be the breadth of the plates measured perpendicularly to the plane of the paper, then the length of the line which bounds the wet and the dry parts of the plates inside is I for each surface, and on this the tension T acts at an angle a to the vertical. Hence the resultant of the surface-tension is 2/ T cos o. If the distance between the inner surfaces of the plates is a, and if the mean height of the film of fluid which rises between them is h, the weight of fluid raised is pghla. Equating the forces

—

pghla = 2IT cos a, whence

h = 2T cos a/pga. This expression is the same as that for the rise of a liquid in a tube, except that instead of r, the radius of the tube, we have a the distance of the plates.

Form of the Capillary Surface. — The form of the surface of a liquid acted on by gravity is easily determined if we assume that near the part considered the line of contact of the surface of the liquid with that of the solid bounding it is straight and horizontal, as it is when the solids which constrain the liquid are bounded by surfaces formed by horizontal and parallel generating lines. This will be the case, for instance, near a flat plate dipped into the liquid. If we suppose these generating lines to be normal to the plane of the paper, then all sections of the solids parallel to this plane will be equal and similar to each other, and the section of the surface of the liquid will be of the same form for all such sections.

Let us consider the portion of the liquid between two parallel sections distant one unit of length. Let ~P t , P 2 (fig. 7) be two points of the surface; 6 lt 2 the inclination of the surface to the horizon at P! and P 2 ; y h y 2 the heights of P! and P 2 above the level of the liquid at a distance from all solid bodies. The pressure at any point of the liquid which p

is above this level is negative t,* — "^"(y T unless another fluid as, for in- stance, the air, presses on the upper surface, but it is only

Fig. 7.

the difference of pressures with which we have to do, because two equal pressures on opposite sides of the surface produce no effect.

We may, therefore, write for the pressure at a height y p = -pgy,

where p is the density of the liquid, or if there are two fluids the excess of the density of the lower fluid over that of the upper

one.

The forces acting on the portion of liquid PiP 2 A 2 Ai are — first, the horizontal pressures, —§pgyl and %pgy\ second, the surface-tension T acting at Pi and P 2 in directions inclined 0i and 2 to the horizon. Resolving horizontally we find — TCcosflz-cosflO +kpW-yi 2) =0,

whence

cos 2 = cos 61 +

gpyi 2

2T

‘ 2T’

or if we suppose Pi fixed and P 2 variable, we may write cos 8 = constant — igpy 2 /T.

This equation gives a relation between the inclination of the curve to the horizon and the height above the level of the liquid. Resolving vertically we find that the weight of the liquid raised above the level must be equal to T(sin 2 — sin 0i), and this is therefore equal to the area P 1 P 2 A 2 Ai multiplied by gp. The form of the capillary surface is identical with that of the ” elastic curve,” or the curve formed by a uniform spring originally straight, when its ends are acted on by equal and

opposite forces applied either to the ends themselves or to solid pieces attached to them. Drawings of the different forms of the curve may be found in Thomson and Tait’s Natural Philosophy, vol. i. p. 455.

We shall next consider the rise of a liquid between two plates of different materials for which the angles of contact are 01 and a 2 , the distance between the plates being a, a small quantity. Since the plates are very near one another we may use the following equation of the surface as an approximation: —

y = h 1 +Ax+Bx\ h = h 1 +ha+Ba i , whence

cot ai= —A, cot d2 = A+2Ba T(cos <*!+ cos a 2) = pga(hi + %Aa+lBa 2),

whence we obtain T

h

-cot o 2)

(cos ai + cosa 2) + -; (2 cot ai- pga 6

ht = — (cos ai + cos a 2) + -r (2 cot 02 — cot ai). pga 6

Let X be the force which must be applied in a horizontal direction to either plate to keep it from approaching the other, then the forces acting on the first plate are T + X in the negative direction, and T sin di + ˆgpAi 2 in the positive direction. Hence

X = |gpAi 2 — T(i ˆsin ai).

For the second plate

X = Jgpfc 2 2 — T(i— sin 02).

Hence

X = igp(/*i 2 + W)-Tji-!(sin aj + sin a,)},

or, substituting the values of hi and h 2 ,

1 T 2

X = Acos Oi + COS o 2) 2

2 Pga 1

— T{l —J (sin ai + sin oj) — tV(cos cn + cos a 2)(cot ai + cot 02)},

the remaining terms being negligible when a is small. The force, therefore, with which the two plates are drawn together consists first of a positive part, or in other words an attraction, varying inversely as the square of the distance, and second, of a negative part of repulsion independent of the distance. Hence in all cases except that in which the angles ai and a 2 are supplementary to each other, the force is attractive when a is small enough, but when cos 0.1 and cos ct 2 are of different signs, as when the liquid is raised by one plate, and depressed by the other, the first

term may be so small that the repulsion indi- cated by the second term comes into play. The fact that a pair of plates which repel one another at a certain distance may attract one another at a smaller distance was deduced by Laplace from theory, and verified by the observations of the abbe Haiiy.

A Drop between Two Plates.— If a small quantity of a liquid which wets glass be introduced between two glass plates slightly inclined to each other, it will run towards that part where the glass plates are nearest together. When the liquid is in equi librium it forms a thin film, the outer edge of which is all of the same thickness. If d is the distance between the plates at the edge of the film and II the atmospheric pressure, the pressure

of the liquid in the film is II — -g > ar >d if A is the area of the

film between the plates and B its circumference, the plates will be pressed together with a force

2AT cos a , -r,ˆ ■

= hBT sin a,

a

and this, whether the atmosphere exerts any pressure or not. The force thus produced by the introduction of a drop of water between two plates is enormous, and is often sufficient to press certain parts of the plates together so powerfully as to bruise them or break them. When two blocks of ice are placed loosely together so that the superfluous water which melts from them may drain away, the remaining water draws the blocks together with a force sufficient to cause the blocks to adhere by the process called Regelation.

[An effect of an opposite character may be observed when the fluid is mercury in place of water. When two pieces of flat glass are pressed together under mercury with moderate force they cohere, the mercury leaving the narrow crevasses, even although the alternative is a vacuum. The course of events is more easily followed if one of the pieces of glass constitutes the bottom, or a side, of the vessel containing the mercury.]

In many experiments bodies are floated on the surface of water in order that they may be free to move under the action of slight horizontal forces. Thus Sir Isaac Newton placed a magnet in a

floating vessel and a piece of iron in another in order to observe their mutual action, and A. M. Ampere floated a voltaic battery with a coil of wire in its circuit in order to observe the effects of the earth's magnetism on the electric circuit. When such floating bodies come near the edge of the vessel they are drawn up to it, and are apt to stick fast to it. There are two ways of avoiding this inconvenience. One is to grease the float round its water-line so that the water is depressed round it. This, however, often produces a worse disturbing effect, because a thin film of grease spreads over the water and increases its surface-viscosity. The other method is to fill the vessel with water till the level of the water stands a little higher than the rim of the vessel. The float will then be repelled from the edge of the vessel. Such floats, however, should always be made so that the section taken at the level of the water is as small as possible.

[The Size of Drops. — The relation between the diameter of a tube and the weight of the drop which it delivers appears to have been first investigated by Thomas Tate {Phil. Mag. vol. xxvii. p. 176, 1864), whose experiments led him to the conclusion that " other things being the same, the weight of a drop of liquid is proportional to the diameter of the tube in which it is formed." Sufficient time must of course be allowed for the formation of the drops; otherwise no simple results can be expected.. In Tate's experiments the period was never less than 40 seconds.

The magnitude of a drop delivered from a tube, even when the formation up to the phase of instability is infinitely slow, cannot be calculated a priori. The weight is sometimes equated to the product of the capillary tension (T) and the circumference of the tube (2ira), but with little justification. Even if the tension at the circumference of the tube acted vertically, and the whole of the liquid below this level passed into the drop, the calculation would still be vitiated by the assumption that the internal pressure at the level in question is atmospheric. It would be necessary to consider the curvatures of the fluid surface at the edge of attachment. If the surface could be treated as a cylindrical prolongation of the tube (radius a), the pressure would be T/a, and the resulting force acting downwards upon the drop would amount to one-half (-TraT) of the direct upward pull of the tension along the circumference. At this

rate the drop would be but one-half of that above reckoned. But the truth is that a complete solution of the statical problem for all forms up to that at which instability sets in, would not suffice for the present purpose. The detachment of the drop is a dynamical effect, and it is influenced by collateral circumstances. For example, the bore of the tube is no longer a matter of indifference, even though the attachment of the drop occurs entirely at the outer edge. It appears that when the external diameter exceeds a certain value, the weight of a drop of water is sensibly different in the two extreme cases of a very small and of a very large bore.

But although a complete solution of the dynamical problem is impracticable, much interesting information may be obtained from the principle of dynamical similarity. The argument has already been applied by Dupre (Theorie mecanique de la chaleur, Paris, 1869, p. 328), but his presentation of it is rather obscure. We will assume that when, as in most cases, viscosity maybe neglected, the mass (M) of a drop depends only upon the density (cr), the capillary tension (T), the acceleration of gravity (g), and the linear dimension of the tube (a). In order to justify this assumption, the formation of the drop must be sufficiently slow, and certain restrictions must be imposed upon the shape of the tube. For example, in the case of water delivered from a glass tube, which is cut off square and held vertically, a will be the external radius; and it will be necessary to suppose that the ratio of the internal radius to a is constant, the cases of a ratio infinitely small, or infinitely near unity, being included. But if the fluid be mercury, the flat end of the tube remains unwetted, and the formation of the drop depends upon the internal diameter only.

The ” dimensions ” of the quantities on which M depends are: —

<7 = (Mass) 1 (Length)" 3 ,

T = (Force) 1 (Length)” 1 = (Mass) 1 (Time)- 2 ,

g = Acceleration = (Length) 1 (Time) -2 , of which M, a mass, is to be expressed as a function. If we assume

M« T x .g». a ! .a u ,

we have, considering in turn length, time and mass,

y — 3z+w = o, 2x+2y = o, x+z = i; so that

y——x, z = i- x, u = 3~2x. Accordingly

MˆWjrV- 1

i Kg”” 2) Since * is undetermined, all that we can conclude is that M is of the form

(I)

M = T« F /T\

g V«

where F denotes an arbitrary function.

Dynamical similarity requires that T/gca 2 be constant; or, if g be supposed to be so, that o 2 varies as T/

If Tate’s law be true, that ceteris paribus M varies as a, it follows from (1) that F is constant. For all fluids and for all similar tubes similarly wetted, the weight of a drop would then be proportional not only to the diameter of the tube, but also to the superficial tension, and it would be independent of the density.

Careful observations with special precautions to ensure the cleanliness of the water have shown that over a considerable range, the departure from Tate’s law is not great. The results give material for the determination of the function Fin (1).

T/9c7a 2

gM/Ta

2-58

4-13

1-16

3-97

0-708

3‘8o

0-441

373

0-277

378

0-220

3-90

0-I69

4-06

In the preceding table, applicable to thin-walled tubes, the first column gives the values of T/gaa 2 , and the second column those of gM/Ta, all the quantities concerned being in C.G.S. measure, or other consistent system. From this the weight of a drop of any liquid of which the density and surface tension are known, can be calculated. For many purposes it may suffice to treat F as a constant, say 3-8. The formula for the weight of a drop is then simply

Mg = 3 -8Ta, (2)

in which 3-8 replaces the 2-jr of the faulty theory alluded to earlier (see Rayleigh, Phil. Mag., Oct. 1899).]

Phenomena arising from the Variation of the Surface-tension. — Pure water has a higher surface-tension than that of any other substance liquid at ordinary temperatures except mercury. Hence any other liquid if mixed with water diminishes its surface-tension. For example, if a drop of alcohol be placed on the surface of water, the surface-tension will be diminished from 80, the value for pure water, to 25, the value for pure alcohol. The surface of the liquid will therefore no longer be in equilibrium, and a current will be formed at and near the surface from the alcohol to the surrounding water, and this current will go on as long as there is more alcohol at one part of the surface than at another. If the vessel is deep, these currents will be balanced by counter currents below them, but if the depth of the water is only two or three millimetres, the surface-current will sweep away the whole of the water, leaving a dry spot where the alcohol was dropped in. This phenomenon was first described and explained by James Thomson, who also explained a pheno- menon, the converse of this, called the ” tears of strong wine.”

If a wine-glass be half-filled with port wine the liquid rises a little up the side of the glass as other liquids do. The wine, however, contains alcohol and water, both of which evaporate, but the alcohol faster than the water, so that the superficial layer becomes more watery. In the middle of the vessel the superficial layer recovers its strength by diffusion from below, but the film adhering to the side of the glass becomes more watery, and therefore has a higher surface-tension than the surface of the stronger wine. It therefore creeps up the side of the glass dragging the strong wine after it, and this goes on till the quantity of fluid dragged up collects into a drop and runs down the side of the glass.

The motion of small pieces of camphor floating on water arises from the gradual solution of the camphor. If this takes place more rapidly on one side of the piece of camphor than on the other side, the surface-tension becomes weaker where there is most camphor in solution, and the lump, being pulled unequally by the surface-tensions, moves off in the direction of the strongest tension, namely, towards the side on which least camphor is dissolved.

If a drop of ether is held near the surface of water the vapour of ether condenses on the surface of the water, and surface-currents are formed flowing in every direction away from under the drop of ether.

If we place a small floating body in a shallow vessel of water and wet one side of it with alcohol or ether, it will move off with great velocity and skim about on the surface of _the water, the part wet with alcohol being always the stern.

The surface-tension of mercury is greatly altered by slight changes in the state of the surface. The suj face-tension of pure mercury is so great that it is very difficult to keep it clean, for every kind of oil or grease spreads over it at once.

But the most remarkable effects of change of surface-tension are those produced by what is called the electric polarization of the surface. The tension of the surface of contact of mercury and dilute sulphuric acid depends on the electromotive force acting between the mercury and the acid. If the electromotive force is from the acid to the mercury the surface-tension increases; if it is from the mercury to the acid, it diminishes. Faraday observed that a large drop of mercury, resting on the flat bottom of a

vessel containing dilute acid, changes its form in a remarkable way when connected with one of the electrodes of a battery, the other electrode being placed in the acid. When the mercury

is made positive it becomes dull and spreads itself out; when it is made negative it gathers itself together and becomes bright again. G. Lippmann, who has made a careful investigation of the subject, finds that exceedingly small variations of the electromotive force produce sensible changes in the surface-tension. The effect of one of a DanielPs cell is to increase the tension from 30-4 to 40-6. He has constructed a capillary electrometer by which differences of electric potential less than o-oi of that of a DanielPs cell can be detected by the difference of the pressure required to force the mercury to a given point of a fine capillary tube. He has also constructed an apparatus in which this variation in the surface-tension is made to do work and drive a machine. He has also found that this action is reversible, for when the area of the surface of contact of the acid and mercury is made to increase, an electric current passes from the mercury to the acid, the amount of electricity which passes while the surface increases by one square centimetre being sufficient to decompose -000013 gramme of water.

[The movements of camphor scrapings referred to above afford a useful test of the condition of a water surface. If the contamination exceed a certain limit, the scrapings remain quite dead. In a striking form of the experiment, the water is contained, to the depth of perhaps one inch, in a large flat dish, and the operative part of the surface is limited by a flexible hoop of thin sheet brass lying in the dish and rising above the water-level. If the hoop enclose an area of (say) one-third of the maximum, and if the water be clean, camphor fragments floating on the interior enter with vigorous movements. A touch of the finger will then often reduce them to quiet; but if the hoop be ex- panded, the included grease is so far attenuated as to lose its effect. Another method of removing grease is to immerse and remove strips of paper by which the surface available for the contamination is in effect increased.

The thickness of the film of oil adequate to check the camphor movements can be determined with fair accuracy by depositing a

weighed amount of oil (such as -8 mg.) upon the surface of water in a large bath. Calculated as if the density were the same as in a normal state, the thickness of the film is found to be about two millionths of a millimetre.

Small as is the above amount of oil, the camphor test is a comparatively coarse one. Conditions of a contaminated surface may easily be distinguished, upon all of which camphor fragments spin vigorously. Thus, a shallow tin vessel, such as the lid of a biscuit box, may be levelled and filled with tap-water through a rubber hose. Upon the surface of the water a little sulphur is dusted. An application of the finger for 20 or 30 seconds to the under surface of the vessel will then generate enough heat to lower appreciably the surface-tenfion, as is evidenced by the opening out of the dust and the formation of a bare spot perhaps if in. in diameter. When, however, the surface is but very slightly greased, a spot can no longer be cleared by the warmth of the finger, or even of a spirit lamp, held underneath. And yet the greasing may be so slight that camphor fragments move with apparently unabated vigour.

The varying degrees of contamination to which a water surface is subject are the cause of many curious phenomena. Among thesr is the superficial viscosity of Plateau. In his experiments a long compass needle is mounted so as to swing in the surface of the liquid under investigation. The cases of ordinary clean water and alcohol are strongly contrasted, the motion of the needle upon the former being comparatively sluggish. Moreover, a different behaviour is observed when the surfaces are slightly dusted over. In the case of water the whole of the surface in front of the needle moves with it, while on the other hand the dust floating on alcohol is scarcely disturbed until the needle actu- ally strikes it. Plateau attributed these differences to a special quality of the liquids, named by him " superficial viscosity." It has been proved, however, that the question is one of con- tamination, and that a water surface may be prepared so as to behave in the same manner as alcohol.

Another consequence of the tendency of a moderate con- tamination to distribute itself uniformly is the calming effect

of oil, investigated by B. Franklin. On pure water the propa- gation of waves would be attended by temporary extensions and contractions of the surface, but these, as was shown by O. Reynolds, are resisted when the surface is contaminated.

Indeed the possibility of the continued existence of films, such as constitute foam, depends upon the properties now under consideration. If, as is sometimes stated, the tension of a vertical film were absolutely the same throughout, the middle parts would of necessity fall with the acceleration of gravity. In reality, the tension adjusts itself automatically to the weight to be supported at the various levels.

Although throughout a certain range the surface-tension varies rapidly with the degree of contamination, it is remarkable that, as was first fully indicated by Miss Pockels,the earlier stages of contamination have little or no effect upon surface-tension. Lord Rayleigh has shown that the fall of surface-tension begins when the quantity of oil is about the half of that required to stop the camphor movements, and he suggests that this stage may correspond with a complete coating of the surface with a single layer of molecules.]

On the Forms of Liquid Films which are Figures of Revolution. — A soap bubble is simply a small quantity of soap-suds spread out so as to expose a large surface to the air. The bubble, in fact, has two surfaces, an outer and an inner g * ”* ca surface, both exposed to air. It has, therefore, a bubble. certain amount of surface-energy depending on the area of these two surfaces. Since in the case of thin films the outer and inner surfaces are approximately equal, we shall consider the area of the film as representing either of them, and shall use the symbol T to denote the energy of unit of area of the film, both surfaces being taken together. If T’ is the energy of a single surface of the liquid, T the energy of the film is 2T’. When by means of a tube we blow air into the inside of the bubble we in- crease its volume and therefore its surface, and at the same time we do work in forcing air into it, and thus increase the energy of the bubble.

That the bubble has energy may be shown by leaving the end of the tube open. The bubble will contract, forcing the air out, and the current of air blown through the tube may be made to deflect the flame of a candle. If the bubble is in the form of a sphere of radius r this material surface will have an area

S = 4x»-2 (1)

If T be the energy corresponding to unit of area of the film the surface-energy of the whole bubble will be

ST = 4«- 2 T (2)

The increment of this energy corresponding to an increase of the radius from r to r + dr is therefore

TdS = 8wrTdr (3)

Now this increase of energy was obtained by forcing in air at a pressure greater than the atmospheric pressure, and thus increasing the volume of the bubble.

Let II be the atmospheric pressure and 11 + p the pressure of the air within the bubble. The volume of the sphere is

V = fxH (4)

and the increment of volume is

dM = -KrHr \ . (5)

Now if we suppose a quantity of air already at the pressure II + i>, the work done in forcing it into the bubble i&pdV. Hence the equation of work and energy is

pdV = Tds (6)

or

4irpr 2 dr = 8-n-rdrT (7)

or

p = 2T/r (8)

This, therefore, is the excess of the pressure of the air within the bubble over that of the external air, and it is due to the action of the inner and outer surfaces of the bubble. We may conceive this pressure to arise from the tendency which the bubble has to contract, or in other words from the surface-tension of the bubble.

If to increase the area of the surface requires the expenditure

of work, the surface must resist extension, and if the bubble in contracting can do work, the surface must tend to contract. The surface must therefore act like a sheet of india-rubber when extended both in length and breadth, that is, it must exert surface-tension. The tension of the sheet of india-rubber, however, depends on the extent to which it is stretched, and may be different in different directions, whereas the tension of the surface of a liquid remains the same however much the film is extended, and the tension at any point is the same in all directions.

The intensity of this surface-tension is measured by the stress which it exerts across a line of unit length. Let us measure it in the case of the spherical soap-bubble by consider- ing the stress exerted by one hemisphere of the bubble on the other, across the circumference of a great circle. This stress is balanced by the pressure p acting over the area of the same great circle: it is therefore equal to irr^p. To determine the intensity of the surface-tension we have to divide this quantity by the length of the line across which it acts, which is in this case the circumference of a great circle nrr. Dividing irr 2 p by this length we obtain \pr as the value of the intensity of the surface-tension, and it is plain from equation 8 that this is equal to T. Hence the numerical value of the intensity of the surface-tension is equal to the numerical value of the surface-energy per unit of surface. We must remember that since the film has two surfaces the surface-tension of the film is double the tension of the surface of the liquid of which it is formed.

To determine the relation between the sur- face-tension and the pressure which balances it when the form of the surface is not spherical, let us consider the following case:—

Let fig. 9 represent a section through the axis Cc of a soap-bubble in the form of a Non- figure of revolution bounded by two

spherical circular disks AB and ab, and having soap- the meridian section APa. Let PQ

bubble. ke animaginarysectionnormaltothe axis. Let the radius of this section PR by y, and let PT, the tangent at P, make an angle a with the axis.

Let us consider the stresses which are exerted across this imaginary section by the lower part on the upper part. If the

internal pressure exceeds the external pressure by p, there is in the first place a force iryˆp acting upwards arising from the pressure p over the area of the section. In -the next place, there is the surface-tension acting downwards, but at an angle a with the vertical, across the circular section of the bubble itself, whose circumference is 2iry, and the downward force is therefore 2iryT cos a.

Now these forces are balanced by the external force which acts on the disk ACB, which we may call F. Hence equating the forces which act on the portion included between ACB and PRQ

wy 2 p — 2iryT cos a— — F (9).

If we make CR = s, and suppose 3 to vary, the shape of the bubble of course remaining the same, the values of y and of a will change, but the other quantities will be constant; In studying these variations we may if we please take as our inde- pendent variable the length s of the meridian section AP reckoned from A. Differentiating equation 9 with respect to 5 we obtain, after dividing by 2ir as a common factor,

,. dv „ dy , „ da

P y- d —T cos aˆ + Ty sin a-ˆ = 0.

(10).

Now

dy ■ , .

Ts = sma (“)-

The radius of curvature of the meridian section is

w – ds da

(12)-

The radius of curvature of a normal section of the surface at

right angles to the meridian section is equal to the part of the normal cut off by the axis, which is

R 2 = PN = y/cosa (13).

Hence dividing equation 10 by y sin a, we find

p = T{i/R 1 + i/R s) (14).

This equation, which gives the pressure in terms of the principal radii of curvature, though here proved only in the case of a surface of revolution, must be true of all surfaces. For the curvature of any surface at a given point may be completely defined in terms of the positions of its principal normal sections and their radii of curvature.

Before going further we may deduce from equation 9 the nature of all the figures of revolution which a liquid film can assume. Let us first determine the nature of a curve, such that if it is rolled on the axis its origin will trace out the meridian section of the bubble. Since at any instant the rolling curve is rotating about the point of contact with the axis, the line drawn from this point of contact to the tracing point must be normal to the direction of motion of the tracing point. Hence if N is the point of contact, NP must be normal to the traced curve. Also, since the axis is a tangent to the rolling curve, the ordinate PR is the perpendicular from the tracing point P on the tangent. Hence the relation between the radius vector and the perpen- dicular on the tangent of the rolling curve must be identical with the relation between the normal PN and the ordinate PR of the traced curve. If we write r for PN, then y = r cos a, and equation 9 becomes

y V pr V wp- This relation between y and r is identical with the relation between the perpendicular from the focus of a conic section on the tangent at a given point and the focal distance of that point, provided the transverse and conjugate axes of the conic are 2a and 26 respectively, where

a = -— , and 6 2 = —7. p irp

Hence the meridian section of the film may be traced by the focus of such a conic, if the conic is made to roll on the axis.

On the different Forms of the Meridian Line. — 1. When the conic is an ellipse the meridian line is in the form of a series of waves, and the film itself has a series of alternate swellings and contractions as represented in figs. 9 and 10. This form of the film is called the unduloid.

1 a. When the ellipse becomes a circle, the meridian line becomes a straight line parallel to the axis, and the film passes into the

form of a cylinder of revolution.

ib. As the ellipse degenerates into the straight line joining its foci, the contracted parts of the unduloid become narrower, till at last the figure becomes a series of spheres in contact.

In all these cases the internal pressure exceeds the external by 2T/0 where a is the semi-transverse axis of the conic. The resultant of the internal pressure and the surface-tension is equivalent to a tension along the axis, and the numerical value of this tension is equal to the force due to the action of this pressure on a circle whose diameter is equal to the conjugate axis of the ellipse.

2. When the conic is a parabola the meridian line is a cate- nary (fig. n); the internal pressure is equal to the external pressure, and the tension along the axis is equal to 2ttTot where m is the distance of the vertex from the focus.

3. When the conic is a hyperbola the meridian line is in the form of a looped curve (fig. 12). The corresponding figure of the film is called the nodoid. The resultant of the internal pressure and the surface-tension is equivalent to a pressure along the axis equal to that due to a pressure p acting on a circle whose diameter is the conjugate axis of the hyperbola.

When the conjugate axis of the hyperbola is made smaller and smaller, the nodoid approximates more and more to the series of spheres touching each other along the axis. When the conjugate axis of the hyperbola increases without limit, the loops of the nodoid are crowded on one another, and each becomes more nearly a ring of circular section, without, however, ever

reaching this form. The only closed surface belonging to the series is the sphere.

These figures of revolution have been studied mathematically by C. W. B. Poisson, 1 Goldschmidt, 2 L. L. Lindelof and F. M. N. Moigno, 3 C. E. Delaunay, 4 A. H. E. Lamarle, 5 A. Beer, 6 and V. M. A. Mannheim, 7 and have been produced experimentally by Plateau 8 in the two different ways already described.

S1$S > SL

Fig. 10. — Unduloid. Fig. ii. — Catenoid. Fig. 12. — Nodoid.

The limiting conditions of the stability of these figures have been studied both mathematically and experimentally. We shall notice only two of them, the cylinder and the catenoid.

Stability of the Cylinder. — The cylinder is the limiting form of the unduloid when the rolling ellipse becomes a circle. When the ellipse differs infinitely little from a circle, the equation of the meridian line becomes approximately y = a + c sin (x/a) where c is small. This is a simple harmonic wave-line, whose mean distance from the axis is a, whose wave-length is 2ira, and whose amplitude is c. The internal pressure corresponding to this unduloid is as before p = T/a. Now consider a portion of a cylindric film of length x terminated by two equal disks of radius r and containing a certain volume of air. Let one of these disks be made to approach the other by a small quantity dx. The film will swell out into the convex part of an unduloid, having its largest section midway between the disks, and we have to determine whether the internal pressure will be greater or less than before. If A and C (fig. 13) are the disks, and if

x the distance between the

”

A

A, C,

C

c,

Bj

B

B,

disks,

disks is equal to ■kt half the wave-length of the harmonic curve, the disks will be at the points where the curve is at its mean distance from the axis, If Ai, Ci are the so that the distance

between them is less than vr, the curve

Fig. 13. and the pressure will therefore be T/r as before.

must be produced beyond the disks before it is at its mean distance from the axis. Hence in this case the mean distance is less than r, and the pressure will be greater than T/r. If, on the other hand, the disks are at A 2 and C 2 , so that the distance between them is greater than 7ir, the curve will reach its mean distance from the axis before it reaches the disks. The mean distance will therefore be greater than r, and the pressure will be less than T/r. Hence if one of the disks be made to approach the other, the internal pressure will be increased if the distance between the disks is less than half the circumference of either, and the pressure will be diminished if the distance is greater than this quantity. In the same way we may show that if the distance between the disks is increased, the pressure will be diminished or increased according as the distance is less or more than half the circumference of either.

Now let us consider a cylindric film contained between two equal fixed disks. A and B, and let a third disk, C, be placed midway between. Let C be slightly displaced towards A. If AC and CB are each less than half the circumference of a disk the pressure on C will increase on the side of A and diminish on the side of B. The resultant force on C will therefore tend to oppose the displacement and to bring C back to its original

1 Nouvelle tkeorie de faction capillaire (1831).

2 Determinatio superficiei minimae rotatione curvae data duo puncta jungentis circa datum axem ortae (Gottingen, 1831).

3 Lecons de calcul des variations (Paris, 1861).

4 ” Sur la surface de revolution dont la courbure moyenne est constante,” Liouville’s Journal, vi.

6 ” Theorie geometrique des rayons et centres de courbure,” Bullet, de VAcad. de Belgique, 1857.

6 Tractatus de Theoria Mathematica Phaenomenorum in Liquidis actioni gravitatis detractis observatorum (Bonn, 1857).

7 Journal de I’Institut, No. 1260.

8 Statique experimentale et theorique des liquides, 1873.

position. The equilibrium of C is therefore stable. It is easy to show that if C had been placed in any other position than the middle, its equilibrium would have been stable. Hence the film is stable as regards longitudinal displacements. It is also stable as regards displacements transverse to the axis, for the film is in a state of tension, and any lateral displacement of its middle parts would produce a resultant force tending to restore the film to its original position. Hence if the length of the cylindric film is less than its circumference, it is in stable equilibrium. But if the length of the cylindric film is greater than its circumference, and if we suppose the disk C to be placed midway between A and B, and to be moved towards A, the pressure on the side next A will diminish, and that on the side next B will increase, so that the resultant force will tend to increase the displacement, and the equilibrium of the disk C is therefore unstable. Hence the equilibrium of a cylindric film whose length is greater than its circumference is unstable. Such a film, if ever so little disturbed, will begin to contract at one secton and to expand at another, till its form ceases to resemble a cylinder, if it does not break up into two parts which become ultimately portions of spheres.

Instability of a Jet of Liquid. — When a liquid flows out of a vessel through a circular opening in the bottom of the vessel, the form of the stream is at first nearly cylindrical though its diameter gradually diminishes from the orifice downwards on account of the increasing velocity of the liquid. But the liquid after it leaves the vessel is subject to no forces except gravity, the pressure of the air, and its own surface-tension. Of these gravity has no effect on the form of the stream except in drawing asunder its parts in a vertical direction, because the lower parts are moving faster than the upper parts. The resistance of the air produces little disturbance until the velocity becomes very great. But the surface-tension, acting on a cylindric column of liquid whose length exceeds the limit of stability, begins to produce enlargements and contractions in the stream as soon as the liquid has left the orifice, and these inequalities in the figure of the column go on increasing till it is broken up into elongated fragments. These fragments as they are falling through the air continue to be acted on by surface-tension. They therefore shorten themselves, and after a series of oscilla- tions in which they become alternately elongated and flattened, settle down into the form of spherical drops.

This process, which we have followed as it takes place on an individual portion of the falling liquid, goes through its several phases at different distances from the orifice, so that if we examine different portions of the stream as it descends, we shall find next the orifice the unbroken column, then a series of contractions and enlargements, then elongated drops, then flattened drops, and so on till the drops become spherical.

[The circumstances attending the resolution of a cylindrical jet into drops were admirably examined and described by F. Savart (" Memoire sur la constitution des veines liquides lancees par des orifices circulaires en minces parois," Ann. d. Chim. t. liii., 1833) and for the most part explained with great sagacity by Plateau. Let us conceive an infinitely long circular cylinder of liquid, at rest (a motion common to every ,part of the fluid is necessarily without influence upon the stability, and may therefore be left out of account for convenience of concep- tion and expression), and inquire under what circumstances it is stable or unstable, for small displacements, symmetrical about the axis of figure.

Whatever the deformation of the originally straight boundary of the axial section may be, it can be resolved by Fourier's theorem into deformations of the harmonic type. These com- ponent deformations are in general infinite in number, of very wave-length and of arbitrary phase; but in the first stages of the motion, with which alone we are at present concerned, each produces its effect independently of every other, and may be considered by itself. Suppose, therefore, that the equation of the boundary is

$$r = a - a \cos kz, \quad (1)$$

where a is a small quantity, the axis of z being that of symmetry

The wave-length of the disturbance may be called X, and is connected with k by the equation $fe = 2ir/X$. The capillary tension endeavours to contract the surface of the fluid; so that the stability, or instability, of the cylindrical form of equilibrium depends upon whether the surface (enclosing a given volume) be greater or less respectively after the displacement than before. It has been proved by Plateau (vide supra) that the surface is

greater than before displacement if ka > i, that is, if X < 2ira; but less if ka27ra. Accordingly, the equilibrium is stable if X be less than the circumference; but unstable if X be greater than the circumference of the cylinder. Disturbances of the former kind lead to vibrations of harmonic type, whose amplitudes always remain small; but disturbances, whose wave-length exceeds the circumference, result in a greater and greater departure from the cylindrical figure. The analytical expression for the motion in the latter case involves exponential terms, one of which (except in case of a particular relation be- tween the initial displacements and velocities) increases rapidly, being equally multiplied in equal times. The coefficient (q) of the time in the exponential term (e”’) may be considered to measure the degree of dynamical instability; its reciprocal i/q is the time in which the disturbance is multiplied in the ratio 1: e.

The degree of instability, as measured by q, is not to be determined from statical considerations only; otherwise there would be no limit to the increasing efficiency of the longer wave-lengths. The joint operation of superficial tension and inertia in fixing the wave-length of maximum instability was first considered by Lord Rayleigh in a paper (Math. Soc. Proc, November 1878) on the ” Instability of Jets.” It appears that the value of q may be expressed in the form

! = vg).FN (2)

where, as before, T is the superficial tension, p the density, and F is given by the following table: —

Va\

F(ka).

VaK

F(ka).

•05

•1536

•4

•3382

•1

•2108

•5

•3432

•2

•2794

•6

•3344

•3

•3182

•8

•2701

•9

■2015

The greatest value of F thus corresponds, not to a zero value of Wa 2 , but approximately to kV =-4858, or to X = 4- 508X20. Hence the maximum instability occurs when the • wave-length of disturbance is about half as great again as that at which instability first commences.

Taking for water, in C.G.S. units, T=8i, p= 1, we get for the case of maximum instability

J

- = -ii5

r|

(3),

3 ~8iX-343′

if d be the diameter of the cylinder. Thus, if d=\, q~ 1 = 115; or

for a diameter of one centimetre the disturbance is multiplied 2 7 times in about one-ninth of a second. If the disturbance be multiplied 1000 fold in time, t, 3log<. 10=6-9, so that t—'-jgd. For example, if the diameter be one millimetre, the disturbance is multiplied 1000 fold in about one-fortieth of a second. In view of these estimates the rapid disintegration of a fine jet of water will not cause surprise.

The relative importance of two harmonic disturbances de- pends upon their initial magnitudes, and upon the rate at which they grow. When the initial values are very small, the latter consideration is much the more important; for, if the disturb- ances be represented by a.\eiˆ, aieiJ, in which ‘ _ 9 (; and this ratio decreases without limit with the time, whatever be the initial (finite) ratio

may gain the preponderance in case its magnitude be sufficiert to produce disintegration in a less time than that required by the other disturbances present.

The application of these results to actual jets presents no great difficulty. The disturbances by which equilibrium is upset are impressed upon the fluid as it leaves the aperture, and the con- tinuous portion of the jet represents the distance travelled during the time necessary to produce disintegration. Thus the length of the continuous portion necessarily depends upon the character of the disturbances in respect of amplitude and wave-length. It may be increased considerably, as F. Savart showed, by a suit- able isolation of the reservoir from tremors, whether due U.. external sources or to the impact of the jet itself in the vessel placed to receive it. Nevertheless it does not appear to be possible to carry the prolongation very far. Whether the residuary disturbances are of external origin, or are due to friction, or to some peculiarity of the fluid motion within the reservoir, has not been satisfactorily determined. On this point Plateau’s explanations are not very clear, and he sometimes expresses himself as if the time of disintegration depended only upon the capillary tension, without reference to initial disturb- ances at all.

Two laws were, formulated by Savart with respect to the length of the continuous portion of a jet, and have been to a certain extent explained by Plateau. For a given fluid and a given orifice the length is approximately proportional to the square root of the head. This follows at once from theory, if it can be assumed that the disturbances remain always of the same character, so that the

time of disintegration is constant. When the head is given, Savart found the length to be proportional to the diameter of the orifice. From (3) it appears that the time in which a disturbance is multiplied in a given ratio varies, not as d, but as d%. Again, when the fluid is changed, the time varies as p'T – *. But it may be doubted whether the length of the continuous portion obeys any very simple laws, even when external disturbances are avoided as far as possible.

When the circumstances of the experiment are such that the reservoir is influenced by the shocks due to the impact of the jet, the disintegration usually establishes itself with complete regularity, and is attended by a musical note (Savart) . The impact of the regular series of drops which is at any moment striking the sink (or vessel receiving the water), determines the rupture into similar drops of the portion of the jet at the same moment passing the orifice. The pitch of the note, though not absolutely definite, cannot differ much from that which corresponds to the division of the jet into wave-lengths of maximum instability; and, in fact, Savart found that the frequency was directly as the square root of the head, inversely as the diameter of the orifice, and independent of the nature of the fluid — laws which follow immediately from Plateau's theory.

From the pitch of the note due tp a jet of given diameter, and issuing under a given head, the wave-length of the nascent divisions can be at once deduced. Reasoning from some observations of Savart, Plateau finds in this way 4-38 as the ratio of the length of a division to the diameter of the jet. The diameter of the orifice was 3 millims., from which that of the jet is deduced by the introduction of the coefficient -8. Now that the length of a division has been estimated a priori, it is perhaps preferable to reverse Plateau's calculation, and to exhibit the frequency of vibration in terms of the other data of the problem. Thus

, V (2M , .

frequency =^^ (4)

But the most certain method of obtaining complete regularity of resolution is to bring the reservoir under the influence of an external vibrator, whose pitch is approximately the same as that proper to the jet. H. G. Magnus (Pogg. Ann. cvi., 1859) employed a Neef's hammer, attached to the wooden frame which supported the reservoir. Perhaps an electrically main- tained tuning-fork is

still better. Magnus showed that the most important part of the effect is due to the forced vibration of that side of the vessel which contains the orifice, and that but little,

of it is propagated through the air. With respect to the limits of pitch, Savart found that the note might be a fifth above, and more than an octave below, that proper to the jet. Accord- ing to theory, there would be no well-defined lower limit; on the other side, the external vibration cannot be efficient if it tends to produce divisions whose length is less than the circum- ference of the jet. This would give for the interval defining the upper limit ir: 4-508, which is very nearly a fifth. In the case of Plateau's numbers (ir: 4-38) the discrepancy is a little greater.

The detached masses into which a jet is resolved do not at once assume and retain a spherical form, but execute a series of vibrations, being alternately compressed and elongated in the direction of the axis of symmetry. When the resolution is effected in a perfectly periodic manner, each drop is in the same phase of its vibration as it passes through a given point of space; and thence arises the remarkable appearance of alter- nate swellings and contractions described by Savart. The interval from one swelling to the next is the space described by the drop during one complete vibration,and is therefore (as Plateau shows) proportional ceteris paribus to the square root of the head.

The time of vibration is of course itself a function of the nature of the fluid and of the size of the drop. By the method of dimen- sions alone it may be seen that the time of infinitely small vibrations varies directly as the square root of the mass of the sphere and inversely as the square root of the capillary tension; and it may be proved that its expression is

'-'(»#).

(5)

V being the volume of the vibrating mass.

In consequence of the rapidity of the motion some optical device is necessary to render apparent the phenomena attending the disintegration of a jet. Magnus employed a rotating mirror, and

also a rotating disk from which a fine slit was cut out. The readiest method of obtaining instantaneous illumination is the electric spark, but with this Magnus was not successful. The electric spark had, however, been used successfully for this purpose some years before by H. Buff (Liebigs Ann. lxxviii. 1851), who observed the shadow of the jet on a white screen. Preferable to an opaque screen is a piece of ground glass, which allows the shadow to be examined from the farther side (Lord Rayleigh). Further, the jet may be very well observed directly, if the illumination is properly managed. For this purpose it is necessary to place it between the source of light and the eye. The best effect is obtained when the light of the spark is somewhat diffused by being passed (for example) through a piece of ground glass.

The spark may be obtained from the secondary of an induction coil, whose terminals are in connexion with the coatings of a Leyden jar. By adjustment of the contact breaker the series of sparks may be made to fit more or less perfectly with the formation of the drops. A still greater improvement may be effected by using an electrically maintained fork, which performs the double office of controlling the resolution of the jet and of interrupting the primary current of the induction coil. In this form the experiment is one of remarkable beauty. The jet, illuminated only in one phase of transformation, appears almost perfectly steady, and may be examined at leisure. In one experiment the jet issued horizontally from an orifice of about half a centimetre in diameter, and almost immediately assumed a rippled outline. The gradually increasing amplitude of the disturbance, the formation of the elongated ligament, and the subsequent transformation of the ligament into a spherule, could be examined with ease. In consequence of the trans- formation being in a more advanced stage at the forward than at the hinder end, the ligament remains for a moment connected with the mass behind, when it has freed itself from the mass in front, and thus the resulting spherule acquires a backwards relative velocity, which of necessity leads to a collision. Under ordinary circumstances the spherule rebounds, and may be thus reflected backwards and forwards several times between the adjacent masses. Magnus showed that the stream of spherules

may be diverted into another path by the attraction of a powerfully electrified rod, held a little below the place of resolution.

Very interesting modifications of these phenomena are observed

when a jet from an orifice in a thin plate (Tyndall has shown that a pinhole gas burner may also be used with advantage) is directed obliquely upwards. In this case drops which break away with different velocities are carried under the action of gravity into different paths; and thus under ordinary circum- stances a jet is apparently resolved into a " sheaf," or bundle of jets all lying in one vertical plane. Under the action of a vibrator of suitable periodic time the resolution is regularized, and then each drop, breaking away under like conditions, is projected with the same velocity, and therefore follows the same path. The apparent gathering together of the sheaf into a fine and well-defined stream is an effect of singular beauty.

In certain cases where the tremor to which the jet is subjected is compound, the single path is replaced by two, three or even more paths, which the drops follow in a regular cycle. The explanation has been given with remarkable insight by Plateau. If, for example, besides the principal disturbance,which determines the size of the drops, there be another of twice the period, it is clear that the alternate drops break away under different conditions and therefore with different velocities. Complete periodicity is only attained after the passage of a pair of drops ; and thus the odd series of drops pursues one path, and the even series another.

Electricity, as has long been known, has an extraordinary influence upon the appearance of a fine jet of water ascending in a nearly perpendicular direction. In its normal state the jet resolves itself into drops, which even before passing the summit, and still more after passing it, are scattered through a consider- able width. When a feebly electrified body (such as a stick of sealing-wax gently rubbed upon the coat sleeve) is brought into its neighbourhood, the jet undergoes a remarkable transforma- tion and appears to become coherent; but under more powerful electrical action the scattering becomes even greater than at first. The second effect is readily attributed to the mutual repulsion of the electrified drops, but the action of feeble electricity in producing apparent coherence was long unexplained.

It was shown by W. von Beetz that the coherence is apparent only, and that the place where the jet breaks into drops is not perceptibly shifted by the electricity. By screening the various parts with metallic plates in connexion with earth, Beetz further proved that, contrary to the opinion of earlier observers, the seat of sensitiveness is not at the root of the jet where it leaves the

orifice, but at the place of resolution into drops. An easy way of testing this conclusion is to excite the extreme tip of a glass rod, which is then held in succession to the root of the jet, and to the place of resolution. An effect is observed in the latter, and not in the former position.

The normal scattering of a nearly vertical jet is due to the rebound of the drops when they come into collision with one another. Such collisions are inevitable in consequence of the different velocities acquired by the drops under the action of the capillary force, as they break away irregularly from the. continuous portion of the jet. Even when the resolution "is regularized by the action of external vibrations of suitable frequency, as in the beautiful experiments of Savart and Plateau, the drops must still come into contact before they reach the summit of their parabolic path. In the case of a continuous jet, the equation of continuity shows that as the jet loses velocity in ascending, it must increase in section. When the stream consists of drops following one another in single file, no such increase of section is possible; and then the constancy of the total stream requires a gradual approximation of the drops, which in the case of a nearly vertical direction of motion cannot stop short of actual contact. Regular vibration has, however, the effect of postponing the collisions and consequent scattering of the drops, and in the case of a direction of motion less nearly vertical, may prevent them altogether.

Under moderate electrical influence there is no material

change in the resolution into drops, nor in the subsequent motion of the drops up to the moment of collision. The difference begins here. Instead of rebounding after collision, as the unelectrified drops of clean water generally, or always, do, the electrified drops coalesce, and then the jet is no longer scattered about. When the electrical influence is more powerful, the repulsion between the drops is sufficient to prevent actual contact, and then, of course, there is no opportunity for amalgamation.

These experiments may be repeated with extreme ease, and with hardly any apparatus. The diameter of the jet may be about -jV m -> an< i it mav issue from a glass nozzle. The pressure may be

such as to give a fountain about 2 ft. high. The change in the sound due to the falling drops as they strike the bottom of the sink should be noticed, as well as that in the appearance of the jet.

The actual behaviour of the colliding drops becomes apparent under instantaneous illumination, e.g. by sparks from a Leyden jar. The jet should be situated between the sparks and the eye, and the observation is facilitated by a piece of ground glass held a little beyond the jet, so as to diffuse the light; or the shadow of the jet may be received on the ground glass, which is then held as close as possible on the side towards the observer.

In another form of the experiment, which, though perhaps less striking to the eye, lends itself better to investigation, the collision takes place between two still unresolved jets issuing horizontally from glass nozzles in communication with reservoirs containing water. One at least of the reservoirs must be insulated. In the absence of dust and greasy contamination, the obliquely colliding jets may rebound from one another without coalescence for a considerable time. In this condition there is complete electrical insulation between the jets, as may be proved by the inclusion in the circuit of a delicate galvanometer, and a low electro-motive force. But if the difference of potential exceed a small amount (1 or 2 volts), the jets instantaneously coalesce. There is no reason to doubt that in the case of the fountain also, coalescence is due to differences of potential between colliding drops.

If the water be soapy, and especially if it contain a small proportion of milk, coalescence ensues without the help of electricity. In the case of the fountain the experiment may be made by leading tap-water through a Woulfe's bottle in which a little milk has been placed. As the milk is cleared out, the scattering of the drops is gradually re-established.

In attempting to explain these curious phenomena, it is well to consider what occurs during a collision. As the liquid masses approach one another, the intervening air has to be squeezed out. In the earlier stages of approximation the obstacle thus arising may not be important; but when the thickness of the layer of air is reduced to the point at which the colours of thin plates are visible, the approximation must be sensibly resisted by the viscosity of the air which still remains to be got rid of. No change in the capillary conditions can arise until the interval is reduced

to a small fraction of a wave-length of light; but such a reduction, unless extremely local, is strongly opposed by the remaining air. It is true that this opposition is temporary. The question is whether the air can everywhere be squeezed out during the short time over which the collision extends.

It would seem that the forces of electrical attraction act with peculiar advantage. If we suppose that upon the whole the air cannot be removed, so that the mean distance between the opposed surfaces remains constant, the electric attractions tend to produce an instability whereby the smaller intervals are diminished while the larger are increased. Extremely local contacts of the liquids, while opposed by capillary tension which tends to keep the surfaces flat, are thus favoured by the electrical forces, which moreover at the small distances in question act with exaggerated power.

A question arises as to the mode of action of milk or soap turbidity. The observation that it is possible for soap to be in excess may here have significance. It would seem that the surfaces, coming into collision within a fraction of a second of their Wrth, would still be subject to further contamination from the

interior. A particle of soap rising accidentally to the surface would spread itself with rapidity. Now such an outward movement of the liquid is just what is required to hasten the removal of intervening air. It is obvious that the effect would fail if the contamination of the surface had proceeded too far previously to the collision.

This view is confirmed by experiments in which other gases are substituted for air as the environment of colliding jets. Oxygen and coal-gas were found to be without effect. On the other hand, the more soluble gases, carbon dioxide, nitrous oxide, sulphur dioxide, and steam, at once caused union.]

Stability of the Catenoid. — When the internal pressure is equal to the external, the film forms a surface of which the mean curvature at every point is zero. The only surface of revolution having this property is the catenoid formed by the revolution of a catenary about its directrix. This catenoid, however, is in stable equilibrium only when the portion considered is such that the tangents to the catenary at its extremities intersect before they reach the directrix.

To prove this, let us consider the catenary as the form of equilibrium of a chain suspended between two fixed points A and B. Suppose the chain hanging between A and B to be of very great length, then the tension at A or B will be very great. Let the chain be hauled in over a peg at A. At first the tension will diminish, but if the process be continued the tension will reach a minimum value and will afterwards increase to infinity as the chain between A and B approaches to the form of a straight line. Hence for every tension greater than the minimum tension there are two catenaries passing through A and B. Since the tension is measured by the height above the directrix these two catenaries have the same directrix. Every catenary lying between them has its directrix higher, and every catenary lying beyond them has its directrix lower than that of the two catenaries.

Now let us consider the surfaces of revolution formed by this system of catenaries revolving about the directrix of the two catenaries of equal tension. We know that the radius of curvature of a surface of revolution in the plane normal to the meridian plane is the portion of the normal intercepted by the axis of revolution.

The radius of curvature of a catenary is equal and opposite to the portion of the normal intercepted by the directrix of the catenary. Hence a catenoid whose directrix coincides with the axis of revolution has at every point its principal radii of curvature equal and opposite, so that the mean curvature of the surface is zero.

The catenaries which lie between the two whose direction coincides with the axis of revolution generate surfaces whose radius of curvature convex towards the axis in the meridian plane is less than the radius of concave curvature. The mean curvature of these surfaces is therefore convex towards the axis. The catenaries which lie beyond the two generate surfaces whose radius of curvature convex towards the axis in the meridian plane is greater than the radius of concave curvature. The mean cur- vature of these surfaces is, therefore, concave towards the axis.

Now if the pressure is equal on both sides of a liquid film, and if its mean curvature is zero, it will be in equilibrium. This is the case with the two catenoids. If the mean curvature is convex towards the axis the film will move from the axis. Hence if a film in the form of the catenoid which is nearest the axis is ever so

slightly displaced from the axis it will move farther from the axis till it reaches the other catenoid.

If the mean curvature is concave towards the axis the film will tend to approach the axis. Hence if a film in the form of the catenoid which is nearest the axis be displaced towards the axis, it will tend to move farther towards the axis and will collapse. Hence the film in the form of the catenoid which is nearest the axis is in unstable equilibrium under the condition that it is exposed to equal pressures within and without. If, however, the circular ends of the catenoid are closed with solid disks, so that the volume of air contained between these disks and the film is determinate, the film will be in stable equilibrium however large a portion of the catenary it may consist of.

Fig. 14.

The criterion as to whether any given catenoid is stable or not may be obtained as follows: —

Let PABQ and ApqB (fig. 14) be two catenaries having the same directrix and intersecting in A and B. Draw Pp and Qq touching both catenaries, Pp and Qq will intersect at T, a point in the directrix; for since any catenary with its directrix is a similar figure to any other catenary with its directrix, if the directrix of the one coincides with that of the other the centre of

, similitude must lie on the

■'/ common directrix. Also,

since the curves at P and p are equally inclined to the directrix, P and p are corresponding points and the line P p must pass through the centre of similitude. Similarly Qq must pass through the centre of similitude. Hence T, the point of intersection of Pp and Qq, must be the centre of similitude and must be on the common directrix. Hence the tangents at A and B to the upper catenary must intersect above the directrix, and the tangents at A and B to the lower catenary must intersect below the directrix. The condition of stability of a catenoid is therefore that the tangents at the extremities of its generating catenary must intersect before they reach the directrix.

Stability of a Plane Surface. — We shall next consider the limiting conditions of stability of the horizontal surface which separates a heavier fluid above from a lighter fluid below. Thus, in an experiment of F. Duprez (" Sur un cas particulier de l'equilibre des liquides," Nouveaux Mem. del' Acad, de Belgique, 1851 et 1853) , a vessel containing olive oil is placed with its mouth down- wards in a vessel containing a mixture of alcohol and water, the mixture being denser than the oil. The surface of separation is in this case horizontal and stable, so that the equilibrium is estab- lished of itself. Alcohol is then added very gradually to the mixture till it becomes lighter than the oil. The equilibrium of the fluids would now be unstable if it were not for the tension of the surface which separates them, and which, when the orifice of the vessel is not too large, continues to preserve the stability of the equilibrium.

When the equilibrium at last becomes unstable, the destruc- tion of equilibrium takes place by the lighter fluid ascending in one part of the orifice and the heavier descending in the other. Hence the displacement of the surface to which we must direct our attention is one which does not alter the volume of the liquid in the vessel, and which therefore is upward in one part of the surface and downward in another. The simplest case is that of a rectangular orifice in a horizontal plane, the sides being a and b. Let the surface of separation be originally in the plane of the orifice, and let the co-ordinates x and y be measured from one corner parallel to the sides a and b respectively, and let 2 be measured upwards. Then if p be the density of the upper liquid, and a that of the lower liquid, and P the original pressure at the surface of separa- tion, then when the surface receives an upward displacement 2, the pressure above it will be P — pgz, and that below it will be P — crgz, so that the surface will be acted on by an upward pressure (p — o-) g2. Now if the displacement z be everywhere very small, the curvature in the planes parallel to xz and yz will be d 2 z/dx 2 and d 2 z/dy 2 respectively, and if T is the surface-tension the whole upward force wilt be

T (3? +3?) +(p -* > ** ■'

If this quantity is of the same sign as 2, the displacement will be increased, and the equilibrium will be unstable. If it is of the opposite sign from 2, the equilibrium will be stable. The limiting condition may be found by putting it equal to zero. One form of the solution of the equation, and that which is applicable to the case of a rectangular orifice, is

2 = C sin px sin qy. Substituting in the equation we find the condition

I +«• stable. (£ 2 +2 2)T-(p-

That the surface may coincide with the edge of the orifice, which is a rectangle, whose sides are a and b, we must have

pa = m-K , qb = nir, when m and n are integral numbers. Also, if m and n are both unity, the displacement will be entirely positive, and the volume of the liquid will not be constant. That the volume may be constant, either norm must be an even number. We have, tnerefore, to consider the conditions under which

(7ft 2 tl 2 \ aT+F 2) T -(p-°)g

cannot be made negative. Under these conditions the equilibrium is stable for all small displacements of the surface. The smallest

admissible value of ■

ˆb 2 1S a 2 ˆb 2 ‘

where a is the longer side of the rectangle. Hence the condition of stability is that

»*(&+$ T-(p-<0*

V (p

is a positive quantity. When the breadth b is less than

ttT

“)g

the length a may be unlimited.

When_the orifice is circular of radius a, the limiting value of

/T a is A|— 2, where 2 is the least root of the equation

5 Ji(z) = i- R + ?7 ;

3 +&c.,=o.

6 2-4 2 -6 2 -8

The least root of this equation is

2 = 3-83171.

If h is the height to which the liquid will rise in a capillary tube of unit radius, then the diameter of the largest orifice is

2a = 3-8 3 i7VTiI) = 5-4l88VW- Duprez found from his experiments

2o = 5-485VW.

[The above theory may be well illustrated by a lecture experiment. A thin-walled glass tube of internal diameter equal to 145 mm. is ground true at the lower end. The upper end is contracted and is fitted with a rubber tube under the control of a pinch-cock. Water is sucked up from a vessel of moderate size, the rubber is nipped, and by a quick motion the tube and vessel are separated, preferably by a downward movement of the latter. The inverted tube, with its suspended water, being held in a clamp, a beaker containing a few drops of ether is brought up from below until the free surface of the water is in contact with ether vapour. The lowering of tension, which follows the condensation of the vapour, is then strikingly shown by the sudden precipitation of the water.]

Effect of Surface-tension on the Velocity of Waves. — When a series of waves is propagated on the surface of a liquid, the surface-tension has the effect of increasing the pressure at the crests of the waves and diminishing it in the troughs, wave-length is X, the equation of the surface is

, . x y = 6 sin 27rr-

The pressure due to the surface tension T is

If the

_ T rf 2 ^_4£ 2 i dx > \ 2

Ty.

This pressure must be added to the pressure due to gravity gpy. Hence the waves will be propagated as if the intensity of gravity had been

f'i + ^-p

instead of g. Now it is shown in hydrodynamics that the velocity of propagation of waves in deep water is that acquired by a heavy body falling through half the radius of the circle whose circumference is the wave-length, or

" 27T 27T + pX (l)

This velocity is a minimum when _

and the minimum value is

For waves whose length from crest to crest is greater than X, the principal force concerned in the motion is that of gravitation.

For waves whose length is less than X the principal force concerned is that of surface-tension. Lord Kelvin proposed to distinguish the latter kind of waves by the name of ripples.

When a small body is partly immersed in a liquid originally at rest, and moves horizontally with constant velocity V, waves are propagated through the liquid with ' various velocities according to their respective wave-lengths. In front of the body the relative velocity of the fluid and the body varies from V where the fluid is at rest, to zero at the cutwater on the front surface of the body. The waves produced by the body will travel forwards faster than the body till they reach a distance from it at which the relative velocity of the body and the fluid is equal to the velocity of propagation corresponding to the wave-length. The waves then travel along with the body at a constant distance in front of it. Hence at a certain distance in front of the body there is a series of waves which are stationary with respect to the body. Of these, the waves of minimum velo- city form a stationary wave nearest to the front of the body. Between the body and this first wave the surface is comparatively smooth. Then comes the stationary wave of minimum velocity, which is the most marked of the series. In front of this is a double series of stationary waves, the gravitation waves forming a series increasing in wave-length with their distance in front of the body, and the surface-tension waves or ripples diminishing in wave-length with their distance from the body, and both sets of waves rapidly diminishing in amplitude

with their distance from the body.

If the current-function of the water referred to the body considered as origin is \f/, then the equation of the form of the crest of a wave of velocity w, the crest of which travels along with the body, is

d

where ds is an element of the length of the crest. To integrate this equation for a solid of given form is probably difficult, but it is easy to see that at some distance on either side of the body, where the liquid is sensibly at rest, the crest of the wave will approximate to an asymptote inclined to the path of the body at an angle whose sine is w/V, where w is the velocity of the wave and V is that of the body.

The crests of the different kinds of waves will therefore appear to diverge as they get farther from the body, and the waves themselves will be less and less perceptible. But those whose wave-length is near to that of the wave of minimum velocity will diverge less than any of the others, so that the most marked feature at a distance from the body will be the two long lines of ripples of minimum velocity. If the angle between these is 20, the velocity of the body is w sec 6, where w for water is about 23 centimetres per second.

[Lord Kelvin's formula (1) may be applied to find the surface-tension of a clean or contaminated liquid from observations upon the length of waves of known periodic time, travelling over the surface. If v—\/t we have

T =ˆicothˆ:iˆ (2)

2irr ! X 4.T 2 v '

h denoting the depth of the liquid. In observations upon ripples the factor involving h may usually be omitted, and thus in the case of water (p=i)

T=-

(3)

X s gX2 2XT 2 4W 2

simply. The method has the advantage of independence of what may occur at places where the liquid is in contact with solid bodies.

The waves may be generated by electrically maintained tuning-forks from which dippers touch the surface; but special arrangements are needed for rendering them visible. The obstacles are (1) the smallness of the waves, and (2) the changes which occur at speeds too rapid for the eye to follow. The second obstacle is surmounted by the aid of the stroboscopic method of observation, the light being intermittent in the period of vibration, so that practically only one phase is seen. In order to render visible the small waves employed, and which we may regard as deviations of a plane surface from its true figure, the

method by which Foucault tested reflectors is suitable. The

following results have been obtained

Clean „ 74 .

Greasy to the point where camphor motions nearly cease . 53-0

Saturated with olive oil ˆj.q

Saturated with sodium oleate 25-0

(Phil. Mag. November 1890) for the tensions of various water-surfaces at 18 C, reckoned in C. G. S. measure.

The tension for clean water thus found is considerably lower than that (81) adopted by Quincke, but it seems to be entitled to confidence, and at any rate the deficiency is not due to contamination of the surface.

A calculation analogous to that of Lord Kelvin may be applied to find the frequency of small transverse vibrations of a cylinder of liquid under the action of the capillary force. Taking the case where the motion is strictly in two dimensions, we may write as the polar equation of the surface at time t

r = a + an cosndcospt, ... (4)

where p is given by

ˆ = („3_„ } J. (5)

If n = 1 , the section remains circular, there is no force of restitution, and p — o. The principal vibration, in which the section becomes elliptical, corresponds to n—2.

Vibrations of this kind are observed whenever liquid issues from an elliptical or other non-circular hole, or even when it is poured from the lip of an ordinary jug; and they are super- posed upon the general progressive motion. Since the phase of vibration depends upon the time elapsed, it is always the same at the same point in space, and thus the motion is steady in the hydrodynamical sense, and the boundary of the jet is ; a fixed surface. In so far as the vibrations may be regarded as isochronous, the distance between consecutive corresponding points of the recurrent figure, or, as it may be called, the wave length of the figure, is directly proportional to the velocity of the jet, i.e. to the square root of the head. But as the head in- creases, so do the lateral velocities which go to form the transverse vibrations. A departure from the law of isochronism may then be expected to develop itself.

The transverse vibrations of non-circular jets allow us to solve a problem which at first sight would appear to be of great difficulty. According to Marangoni the diminished surface-tension of soapy water is due to the formation of a film. The formation cannot be instantaneous, and if we could measure the tension of a surface not more than xˆtt of a second old, we might expect to find it undisturbed, or nearly so, from that proper to pure water. In order to carry out the experiment the jet is caused to issue from an elliptical orifice in a thin plate, about 2 mm. by 1 mm., under a head of 15 cm. A comparison under similar circumstances shows that there is hardly any difference in the wave-lengths of the patterns obtained with pure and with soapy water, from which we conclude that at this initial stage, the surface-tensions are the same. As early as 1869 Dupre had arrived at a similar conclusion from experi- ments upon the vertical rise of fine jets.

A formula, similar to (5), may be given for the frequencies of vibration of a spherical mass of liquid under capillary force. If, as before, the frequency be PI2YI, and a the radius of the sphere, we have

$• = »(*- 1) (n + 2)ˆ (6)

n denoting the order of the spherical harmonic by which the

deviation from a spherical figure is expressed. To find the fadius of the sphere of water which vibrates seconds, put P—2U., T = 8i, p = i, « = 2. Thus 12 = 2.54 cms., or one inch very nearly.]

Tables of Surface-Tension In the following tables the units of length, mass and time are the centimetre, the gramme and the second, and the unit of force is that which if it acted on one gramme for one second would communicate to it a velocity of one centimetre per second: —

Table of Surface-Tension at 20

C. (Quincke).

Liquid.

Specific Gravity.

Tension of surface separating the liquid from

Angle of contact with glass in presence of

Air.

Water.

Mercury.

Air.

Water.

Mercury.

Water .... Mercury .... Bisulphide of Carbon Chloroform ., Alcohol .... Olive Oil ... . Turpentine

Hydrochloric Acid . Solution of Hyposul- phite of Soda . . .

i

1 13-5432 1-2687 1-4878 0-7906 0-9136 0-8867 0-7977

i-i

1-1248

81 540 32-1 30-6 25-5 36-9 29-7 31-7 70-1

77-5

418 41-75 29-5

20-56

n-55

27-8

418

372-5

399

399

335

250-5

284

377 442-5

25° 32′ 51° 8′ 32° 16′

25°‘l2′ 21° 50′

37 : 44′

36° 20′ 23° 20′

26°8′

13° 8′

17°’

37 44′

42° 46′

26° 8′

47° 2′ 10° 42′

Olive Oil and Alcohol, 12-2. Olive oil and aqueous alcohol (sp. g. 25-5). 6-8, angle 87° 48’.

9231, tension of free surface

Quincke has determined the surface-tension of a great many substances near their point of fusion or solidification. His method was that of observing the form of a large drop standing on a plane surface. If K is the height of the flat surface of the drop, and k that of the point where its tangent plane is vertical, then

T = i(K-£)V-

Quincke finds that for several series of substances the surface-tension is nearly proportional to the density, so that if we call

Surface-Tensions of Liquids at their Point of Solidification. From Quincke.

Substance.

Platinum ....

Gold

Zinc

Tin

Mercury ....

Lead

Silver

Bismuth

Potassium .... Sodium .... Antimony ....

Borax

Carbonate of Soda Chloride of Sodium Water . . . . . Selenium ....

Sulphur

Phosphorus . . . Wax

Temperature of

Surf ace-

Solidification.

Tension

2000 ° C.

1658

1200°

983

36o°

860

230°

587

-40°

577

330°

448

1000°

419

265°

382

58°

364

90°

253

432°

244

1000°

212

1000°

206

114

0°

86-2

21 K

70-4

111°

41-3

43

41-1

68°

33-4

(K-ky— iTIgp the specific cohesion, we may state the general results of his experiments as follows: —

The bromides and iodides have a specific cohesion about half that of mercury. The nitrates, chlorides, sugars and fats, as also the metals lead, bismuth and antimony, have a specific cohesion nearly equal to that of mercury. Water, the carbonates and sulphates, and probably phosphates, and the metals platinum, gold, silver, cadmium, tin and copper have a specific cohesion double that of mercury. Zinc, iron and palladium, three times that of mercury, and sodium, six times that of mercury.

Relation of Surface-tension to Temperature

It appears from the experiments of B runner and of Wolf on the ascent of water in tubes that at the temperature f centigrade T =75-20 (1—0-00187/) (Brunner); = 76-08 (1 — o-oo2/-(-o-ooooo4i5i 2), for a tube -02346cm. diameter

(Wolf) ; = 77 – 34(I — o-ooi8U), for a tube -03098 cm. diameter (Wolf). Lord Kelvin has applied the principles of Thermodynamics to determine the thermal effects of increasing or diminishing the area of the free surface of a liquid, and has shown that in order to keep the temperature constant while the area of the surface increases by unity, an amount of heat must be supplied

to the liquid which is dynamically equivalent to the product of the absolute temperature into the de- crement of the surface-tension per degree of temperature. We may call this the latent heat of surface- extension.

It appears from the experiments of C. Brunner and C. J. E. Wolf that at ordinary temperatures the latent heat of extension of the surface of water is dynamically equivalent to about half the mechanical work done in producing the surface-extension.

References. — Further information on some of the matters discussed above will be found in Lord Rayleigh's Collected Scientific Papers (1901). In its full extension the subject of capillarity is very wide. Reference may be made to A. W. Reinold and Sir A. W. Riicker (Phil. Trans. 1886, p. 627); Sir W. Ramsay and J. Shields (Zeitschr. physik. Chem. 1893, 12, p. 433) ; and on the theoretical side, see papers by Josiah Willard Gibbs; R. Eotvos (Wied. Ann., 1886, 27, p. 452) ; J. D. Van der Waals, G. Bakker and other writers of the Dutch school. (J. C. M.; R.)

CAPISTRANO, GIOVANNI DI (1386-1456), Italian friar, theologian and inquisitor, was born in the little village of Capis- trano in the Abruzzi, of a family which had come to Italy with the Angevins. He lived at first a wholly secular life, married, and became a successful magistrate; he took part in the con- tinual struggles of the small Italian states in such a way as to compromise himself. During his captivity he was practically ruined and lost his young wife. He then in despair entered the Franciscan order and at once gave himself up to the most rigorous asceticism, violently defending the ideal of strict observance. He was charged with various missions by the popes Eugenius IV. and Nicholas V., in which he acquitted himself with implacable violence. As legate or inquisitor he persecuted the last Fraticelli of Ferrara, the Jesuati of Venice, the Jews of Sicily, Moldavia and Poland, and, above all, the Hussites of Germany, Hungary and Bohemia; his aim in the last case was to make conferences impossible between the representatives of Rome and the Bohemians, for every attempt at conciliation seemed to him to be conniving at heresy. Finally, after the taking of Con- stantinople, he succeeded in gathering troops together for a crusade against tne Turks (1455), which at least helped to raise the siege of Belgrade, which was being blockaded by Mahommed II. He died shortly afterwards (October 23, 1456), and was canonized in 1690. Capistrano, in spite of this restless life, found time to work both in the lifetime of his master St Bernardino of Siena and after, at the reform of the order of the minor Franciscans, and to uphold both in his writings and his speeches the most advanced theories upon the papal supremacy as opposed to that of the councils.

See E. Jacob, Johannes von Capistrano, vol. i. : " Das Leben und Wirken Capistrans; " vol. ii..- "Die handschriftlichen Aufzeichnungen von Reden und Tractaten Capistrans," (1st series, Breslau, 1903-1905). (P. A.)

CAPITAL (Lat. caput, head), in architecture, the crowning

member of the column, which projects on each side as it rises, in order to support the abacus and unite the square form of the latter with the circular shaft. The bulk of the capital may either be convex, as in the Doric capital; concave, as in the bell of the Corinthian capital; or bracketed out, as in the Ionic capital. These are the three principal types on which all capitals are based. The capitals of Greek, Doric, Ionic and Corinthian orders are given in the article Order.

From the prominent position it occupies in all monumental buildings, it has always been the favourite feature selected for ornamentation, and consequently it has become the clearest indicator of any style.

The two earliest capitals of importance are those which are based on the lotus (fig. 1) and papyrus (fig. 2) plants respectively, and these, with the palm tree capital, were the chief types em- ployed by the Egyptians down to the 3rd century B.C., when,

under the Ptolemaic dynasties, various river plants were employed decoratively and the lotus capital goes through

Fig. i. — Lo- tus Capital from Karnak.

Fig. 2. — Papyrus Capital from Karnak.

various modifications (fig. 3). Some kind of volute capital is shown in the Assyrian bas-reliefs, but no Assyrian capital has ever been found; those exhibited as such in the British Museum are bases.

The Persian capital belongs to the third class above mentioned, the brackets are carved with the lion (fig. 4) or the griffin pro- jecting right and left to support and lessen the bearing of the architrave, and on their backs carry other brackets at right angles to support the cross timbers. The profuse decoration underneath the bracket capital in the palace of Xerxes and

Fig. 3. — Modified Lotus Capital from Philae.

Fig. 4. — Persian Capital from Persepolis.

elsewhere, serves no structural function, but gives some variety to the extenuated shaft.

The earliest Greek capital is that shown in the Temple-fresco at Cnossus in Crete (1600 B.C.) ; it was of the first type — convex, and was probably moulded in stucco: the second is represented by the richly carved example of the columns (fig. 5) flanking the tomb of Agamemnon in Mycenae (c. 1100 B.C.), also convex, carved with the chevron device, and with an apophyge on which the buds of some flowers are sculptured. The Doric capital of the temple of Apollo at Syracuse (c. 700 B.C.) follows, in which the

echinus moulding has become a more definite form: this in the Parthenon reaches its culmination, where the convexity is at the top and bottom with a delicate uniting curve. The sloping side of

Fig. 5. — Early Greek Capital from the Tomb of Agamemnon,

Mycenae.

the echinus becomes flatter in the later examples, and in the Colosseum at Rome forms a quarter round.

In the Ionic capital of the Archaic temple of Diana at Ephesus (560 B.C.) the width of the abacus is twice that of its depth, consequently the earliest Ionic capital known was virtually a

Fig. 6. — Corinthian Capital from the Tholos of Epidaurus.
bracket capital. A century later, in the temple on the Ilissus, published in Stuart and Revett, the abacus has become square. One of the most beautiful Corinthian capitals is that from the Tholos of Epidaurus (400 b.c) (fig. 6) ; it illustrates the transition between the earlier Greek capital of Bassae and the Roman version of the temple of Mars Ultor (fig. 7).

The foliage of the Greek Corinthian capital was based on the Acan- thus spinosus, that of the Roman on the Acan- thus mollis; the capital of the temple of Vesta and other examples at Pompeii are carved with foliage of a different type.

Byzantine capitals are of endless variety;

Fig. 7.-

-Roman Capital from the Temple of Mars Ultor, Rome.

the Roman composite capital would seem to have been the favourite type they followed at first; subsequently, the block of stone was left rough as it came from the quarry, and the sculptor, set to carve it, evolved

new types of design to his own fancy, so that one rarely

mil

Fig. 8.— Byzantine Capitals from the central portal of St Mark's, Venice.

meets with many repetitions

of the same design. One of the most remarkable is the capital in which the leaves are carved as if blown by the wind; the finest example being in Sta Sophia, Thessa- lonica; those in St Mark's, Venice (fig. 8) specially attracted Ruskin's fancy. Others are found in St Apolli- nare-in-classe, Ravenna. The Thistle and Pine capital is

Fig. 9. — Byzantine Capital from the Church of S. Vitale, Ravenna.

Fig. 11. — Cushion Capital.

Fig. 10. — Byzantine Capital from the Church of S. Vitale, Ravenna.

found in St Mark's, Venice; St Luke's, Delphi; the mosques of Kairawan and of Ibn Tulun, Cairo, in the two latter cases

Fig. 12.-

-Romanesque Capitals from the Cloister of Monreale, near Palermo, Sicily.

being taken from Byzantine churches. The illustration of the capital in S. Vitale, Ravenna (figs. 9 and 10) shows above it the dosseret required to carry the arch, the springing of which was much wider than the abacus of the capital.

The Romanesque and Gothic capitals throughout Europe present

the same variety as in the Byzantine and for the same

'Fig. 14.

Fig. 13.— Gothic Capitals from Wells Cathedral.

reason, that the artist evolved his conception of the design trom the block he was carving, but in these styles it goes further on account of the clustering of columns and piers.

The earliest type of capital in Lombardy and Germany is that which is known as the, cushion-cap, in which the lower portion of the cube block has been cut away to meet the circular shaft (fig. 11). These early types were generally painted at first with various geometrical designs, afterwards carved.

In Byzantine capitals, the eagle, the lion and the lamb are occasionally carved, but treated conventionally.

In the Romanesque and Gothic styles, in addition to birds and beasts, figures ' are frequently introduced into capitals, those in the Lombard work being rudely carved and verging on the grotesque; later, the sculpture reaches a higher standard; in the cloisters of Monreale (fig. 12) the birds being 1 wonderfully true to nature. In England and France (figs. 13 and 14), the figures introduced into the capitals are sometimes full of character. These capitals, however, are not equal to those oftheEarlyEnglish school, in which the foliage is conven- tionally treated as if it had been copied from metal work, and is of infinite variety, being found in small village churches as well as in cathedrals.

Reference has only been made to the leading examples of the Roman capitals; in the Renaissance period (fig. 15) the feature became of the greatest importance in the Byzantine and

-Gothic Capitals from Amiens Cathedral.

Fig. 15. — Italian Renaissance Capital from S. Maria dei Miracoli, Venice.

and its variety almost as great as Gothic styles. The pilaster, which

was employed so extensively in the Revival, called for new combinations in the designs for its capitals. Most of the ornament can be traced to Roman sources, and although less vigorous, shows much more delicacy and refinement in its carving. (R. P. S.)

CAPITAL (i.e. capital stock or fund) , in economics, generally, the accumulated wealth either of a man or a community, that is available for earning interest and producing fresh wealth. In social discussion it is sometimes treated as antithetical to labour, but it is in reality the accumulated savings of labour and of the profits accruing from the savings of labour. It is that portion of the annual produce reserved from consumption to supply future wants, to extend the sphere of production, to improve industrial instruments and processes, to carry out works of public utility, and, in short, to secure and enlarge the various means of progress necessary to an increasing community. It is the increment of wealth or means of subsistence analogous to the increment of population and of the wants of civilized man. Hence J. S. Mill and other economists, when seeking a graphic expression of the service of capital, have called it " abstinence." The labourer serves by giving physical and mental' effort in order to supply his means of consumption. The capitalist, or labourer-capitalist, serves by abstaining from consumption, by denying himself the present enjoyment of more or less of his means of consumption, in the prospect of a future profit. This quality, apparent enough in the beginnings of capital, applies equally to all its forms and stages; because whether a capitalist stocks his warehouse with goods and produce, improves land, lends on mortgage or other security, builds a factory, opens a mine, or orders the construction of machines or ships, there is the element of self-deprival for the present, with the risk of ultimate loss of what is his own, and what, instead of saving and embodying income productive form, he might choose to consume. On this ground rests the justification of the claims of capital to its industrial rewards, whether in the form of rent, interest or profits of trade and investment.

To any advance in the arts of industry or the comforts of life, a rate of production exceeding the rate of consumption, with consequent accumulation of resources, or in other words, the formation of capital, is indispensable. The primitive cultivators of the soil, whether those of ancient times or the pioneers who formed settlements in the forests of the New World, soon discovered that their labour would be rendered more effective by

implements and auxiliary powers of various kinds, and that until the produce from existing means of cultivation exceeded what was necessary for their subsistence, there could be neither labour on their part to produce such implements and auxiliaries, nor means to purchase them. Every branch of industry has thus had a demand for capital within its own circles from the earliest' times. The flint arrow-heads, the stone and bronze utensils of fossiliferous origin, and the rude implements of agriculture, war and navigation, of which we read in Homer, were the forerunners of that rich and wonderful display of tools, machines, engines, furnaces and countless ingenious and costly appliances, which represent so large a portion of the capital of civilized countries, and without the pre-existing capital could not have been developed. Nor in the cultivation of land, or the production simply of food, is the need of implements, and of other auxiliary power, whether animal or mechanical, the only need immediately experienced. The demands on the surplus of produce over con- sumption are various and incessant. Near the space of reclaimed ground, from which the cultivator derives but a bare livelihood, are some marshy acres that, if drained and enclosed, would add considerably in two or three years to the produce; the forest and other natural obstructions might also be driven farther back with the result, in a few more years, of profit; fences are necessary to allow of pasture and field crops, roads have to be made and farm buildings to be erected; as the work proceeds more artificial investments follow, and by these successive outlays of past savings in improvements, renewed and enhanced from generation to generation, the land, of little value in its natural state either to the owner and cultivator or the community, is at length

brought into a highly productive condition. The history of capital in the soil is substantially the history of capital in all other spheres. No progress can be made in any sphere, small or large, without reserved funds possessed by few or more persons, in small or large amounts, and the progress in all cases is adven- tured under self-deprival in the meanwhile of acquired value, and more or less risk as to the final result.

Capital is necessarily to be distinguished from money, with which in ordinary nomenclature it is almost identical. Wealth may be in other things than money; oxen, wives, tools, have at different stages of civilization represented the recognized form of capital ; and modern usage only treats capital as meaning the command of money because money is the ordinary form of it

nowadays. The capital of a country can scarce be said to be less than the whole sum of its investments in a productive form, and possessing a recognized productive value.

Adam Smith's distinction of " fixed " and " circulating " capital in the Wealth of Nations (book ii. c. i.) cannot fail to be always useful in exhibiting the various forms and conditions under which capital is employed. Yet the principal pheno- mena of capital are found to be the same, whether the form of investment be more or less permanent or circulable. The machinery in which capital is " fixed," and which yields a profit without apparently changing hands, is in reality passing away day by day, until it is worn out, and has to be replaced. So also of drainage and other land improvements. When the natural forests have been consumed and the landowners begin to plant trees on the bare places, the plantations while growing are a source of health, shelter and embellishment— they are not without a material profit throughout their various stages to maturity — and when, at the lapse of twenty or more years, they are ready to be cut down, and the timber is sold for useful purposes, there is a harvest of the original capital expended as essentially as in the case of the more rapid yearly crops of wheat or oats. The chief distinction would appear to rest in the element of time elapsing between the outlay of capital and its return. Capital may be employed in short loans or bills of exchange at two or three months, in paying wages of labour for which there may be return in a day or not in less than a year or more, or in operations involving within themselves every form of capital expenditure, and requiring a few years or ninety-nine years for the promised fructification on which they proceed. But the common characteristic of capital is that of a fund yield- ing a return and reproducing itself whether the time to this end be long or short. The division of expenditure or labour (all expenditure having a destination to labour of one kind or another) into " productive " and " unproductive " by the same authority (book ii. c. 3) is also apposite both for purposes of political economy and practical guidance, though economists have found it difficult to define where " productive expenditure " ends and " unproductive expenditure " begins. Adam Smith includes in his enumeration of the " fixed capital " of a country " the acquired and useful abilities of all the inhabitants "; and in this sense expenditure on education, arts and sciences might be deemed expenditure of the most productive .value, and yet be wanting in strict commercial account of the profit and loss. It must be admitted that there is a

personal expendi- ture among all ranks of society, which, though not in any sense a capital expenditure, may become capital and receive a pro- ductive application, always to be preferred to the grossly un- productive form, in the interest both of the possessors and of the community.

The subject in its details is full of controversies, and a discussion of it at any length would embrace the whole field of economics. The subject will be found fully dealt with in every important economic work, but the following may be specially consulted: — J. S. Mill, Principles of Political Economy; J. E. Cairns, Some Leading Principles of Political Economy; F. A. Walker, Political Economy; A. Marshall, Principles of Economics ; E. Bohm v. Bawerk, Capital and Interest; K. Marx, Capital; J. B. Clark, Capital and its Earn- ings; see also the economic works of W. H. Mallock (Critical Ex- amination of Socialism, 1908, &c.) for an insistence on the importance of " ability," or brain-work, as against much of modern socialist theorizing against " capitalism."

CAPITAL PUNISHMENT

CAPITAL PUNISHMENT. By this term is now meant the infliction of the penalty of death for crime under the sentence of some properly constituted authority, as distinguished from killing the offender as a matter of self-defence or private ven- geance, or under the order of some self-constituted or irregular tribunal unknown to the law, such as that of the Vigilantes of California, or of lynch law (q.v.) . In the early stages of society a man-slayer was killed by the " avenger of blood " on behalf of the family of the man killed, and not as representing the authority of the state (Pollock and Maitland, Hist. Eng. Law, ii. 447.) This mode of dealing with homicide survives in the vendetta of Corsica and of the Mainotes in Greece, and in certain of the southern states of North America. The obligation or inclination to take vengeance depends on the fact of homicide, and not on the circumstances in which it was committed, i.e. it is a part of the lex talionis. The mischief of this system was alleviated under the Levitical law by the creation of cities of refuge, and in Greece and Italy, both in Pagan and Christian times, by the recognition of the right of sanctuary in temples and churches. A second mode of dealing with homicide was that known to early Teutonic and early Celtic law, where the relatives of the deceased, instead of the life of the

slayer, received the wer of the deceased, i.e. a payment in proportion to the rank of the slain, and the king received the blood-wite for the loss of his man. But even under this system certain crimes were in Anglo-Saxon law bot-less, i.e. no compensation could be paid, and the offender must suffer the penalty of death. In the laws of Khammurabi, king of Babylon (2285-2242 B.C.), the death penalty is imposed for many offences. The modes for executing it specially named are burning, drowning and impalement {Oldest Code of Laws, by C. H. W. Johns, 1903). Under the Roman law, ” capital ” punishment also included punishments which deprived the offender of the status of Roman citizen {capitis deminutio, capitis amissio), e.g. condemna- tion to servitude in the mines or to deportation to an island {Dig. 48. 19).

United Kingdom. — The modes of capital punishment in England under the Saxon and Danish kings were various: British and hanging, beheading, burning, drowning, stoning, and foreign precipitation from rocks. The principle on which this laws and variety depended was that where an offence was met ° s ‘ such as to entitle the king to outlaw the offender, he forfeited all, life and limb, lands and goods, and that the king might take his life and choose the mode of death. William the Conqueror would not allow judgment of death to be exe- cuted by hanging and substituted mutilation; but his successors varied somewhat in their policy as to capital punishment, and by the 13th century the penalty of death became by usage (with- out legislation) the usual punishment for high and petty treason and for all felonies (except mayhem and petty larceny, i.e. theft of property worth less than is.); see Stephen, Hist. Cr. Law, vol. i. 458; Pollock and Maitland, Hist. Eng. Law, vol. ii. 459. It therefore included all the more serious forms of crime against person or property, such as murder, manslaughter, arson, high- way robbery, burglary (or hamesucken) and larceny; and when statutory felonies were created they were also punishable by death unless the statute otherwise provided. The death penalty was also extended to heretics under the writ de heretico com- burendo, which was lawfully issuable under statute from 1382 (5 Ric. II. stat. s) until 1677 (29 Chas. II. c. 9). For this purpose the legislature had adopted the civil law of the Roman Empire, which was not a part of the English common law (Stephen, Hist. Cr. Law, vol. ii. 438-469).

The methods of execution by crucifixion (as under the Roman law), or breaking on the wheel (as under the Roman Dutch law

and the Holy Roman Empire), were never recognized by the common law, and would fall within the term ” cruel and unusual punishments ” in the English Bill of Rights, and in the United States would seem to be unconstitutional (see Wilkinson v. Utah, 1889, 136 U.S. 436, 446).

The severity of barbarian and feudal laws was mitigated, so far as common-law offences were concerned, by the influence of

the Church as the inheritor of Christian traditions and Roman jurisprudence. The Roman law under the empire did not allow the execution of citizens except under the Lex Porcia. But the right of the emperors to legislate per rescriptum principis enabled them to disregard the ordinary law when so disposed. The 83rd novel of Justinian provided that criminal causes against clerics should be tried by the judges, and that the convicted cleric should be degraded by his bishop before his condemnation by the secular power, and other novels gave the bishops considerable influence, if not authority, over the lay judiciary. In western Europe the right given by imperial legislation in the Eastern Empire was utilized by the Papacy to claim privilege of clergy, i.e. that clerks must be remitted to the bishop for canonical punishment, and not subjected to civil condemnation at all. The history of benefit of clergy is given in Pollock and Maitland, Hist. English Law, vol. i. pp. 424-440, and Stephen, Hist. Cr. Law, vol. iii. 459, 463. By degrees the privilege was extended not only to persons who could prove ordination or show a genuine tonsure, but all persons who had sufficient learning to be able to read the neck- verse (Ps. Ii. v. 1). Before the Reformation the ecclesiastical courts had ceased to take any effective action with respect to clerks accused of offences against the king’s laws; and by the time of Henry VII. burning on the hand under the order of the king’s judges was substituted for the old process of compurgation in use in the spiritual courts.

The effect of the claim of benefit of clergy is said to have been to increase the number of convictions, though it mitigated the punishment; and it became, in fact, a means of showing mercy to certain classes of individuals convicted of crime as a kind of privilege to the educated, i.e. to all clerks whether seculai or religious (25 Edw. III. stat. 3); and it was allowed only in case of a first conviction, except in the case of clerks who could produce their letters of orders or ,a certificate of ordination. To prevent a second claim it was the practice to brand murderers with the letter M, and other felons with the Tyburn T, and Ben Jonson was

in 1598 so marked for manslaughter.

The reign of Henry VIII. was marked by extreme severity in the execution of criminals — as during this time 72,000 persons are said to have been hanged. After the formation of English settlements in America the severity of the law was mitigated by the practice of reprieving persons sentenced to death on condition of their consenting to be transported to the American colonies, and to enter into bond service there. The practice seems to have been borrowed from Spain, and to have been begun in 1597 (39 Eliz. c. 4). It was applied by Cromwell after his campaign in Ireland, and was in full force immediately after the Restoration, and is recognized in the Habeas Corpus Act 1677, and was used for the Cameronians during Claverhouse's campaign in south-west Scotland. In the 1 8th century the courts were empowered to sentence felons to transportation (see Deportation) instead of to execution, and this state of the law continued until 1857 (6 Law Quarterly Review, p. 388). This power to sentence to transportation at first applied only to felonies with benefit of clergy; but in 1705, on the abolition of the necessity of proving capacity to read, all criminals alike became entitled to the benefit previously reserved to clerks. Benefit of clergy was finally abolished in 1827 as to all persons not having privilege of peerage, and in 1841 as to peers and peeresses. Its beneficial effect had now been exhausted, since no clergyable offences remained capital crimes.

At the end of the 18th century the criminal law of all Europe was ferocious and indiscriminate in its administration of capital punishment for almost all forms of grave crime; and yet owing to poverty, social conditions, and the inefficiency of the police, such forms of crime were far more numerous than they now are. The policy and righteousness of the English law were questioned as early as 1766 by Goldsmith through the mouth of the vicar of Wakefield: " Nor can I avoid even questioning the validity of that right which social combinations have assumed of capitally punishing offences of a slight nature. In cases of murder their right is obvious, as it is the duty of us all from the law of self-defence to cut off that mar. who has shown a disregard for the

life of another. Against such all nature rises in arms; but it is not

so against him who steals my property." He adds later: " When by indiscriminate penal laws the nation beholds the same punishment affixed to dissimilar degrees of guilt, the people are led to lose all sense of distinction in the crime, and this distinction is the bulwark of all morality."

The opinion expressed by Goldsmith was strongly supported by Bentham, Romilly, Basil Montaguand Mackintoshin England, and resulted in considerable mitigation of the severity of the law. In 1800 over 200 and in 1819 about 180 crimes were capital. As the result of the labour of these eminent men and their disciples, and of Sir Robert Peel, there are now only four crimes (other than offences against military law or naval discipline) capitally punishable in England — high treason, murder, piracy with violence, and destruction of public arsenals and dockyards (The Dockyards, &c, Protection Act 1772). An attempt to abolish the death penalty for this last offence was made in 1837, but failed, and has not since been renewed. In the case of the last two offences sentence of death need not be pro- nounced, but may be recorded (4 Geo. IV. c. 48). Since 1838 it has in practice been executed only for murder; the method being by hanging.

The change in the severity of the law is best illustrated by the following statistics: —

Years.

Death Sentences.

Sentences Executed.

For all

Crimes.

For Murder.

For all Crimes.

For Murder.

1831

1833 l

1838 1 1862 !

1601

931

116

29

H

9

25 28

52

33

6

15

12 6

5 15

During the twelve years from 1893 to 1904, 788 persons were committed for trial for murder, being an average of 65. The highest number was in 1893 (82) and the lowest in 1900 (51). Of those tried in 1904, 28 (26 males and 2 females) were convicted of murder, 16 (all males) were executed; 9 males and 2 females had their sentences commuted to penal servitude for life.

In Scotland capital punishment can be imposed only for treason, murder and offences against 10 Geo. IV. c. 38, i.e. wilful shooting, stabbing, strangling or throwing corrosives with intent to murder, maim, disfigure, disable, or do grievous bodily harm, in all cases where if death had ensued the offence would have been murder. Prior to 1 88 7 rape, robbery, wilful fire-raising and incest, and many other crimes-, were also capital offences; but in practice the pains of law were re- stricted at the instance of the prose- cution. The method is by hanging.

In Ireland capital punishment may be inflicted for the same offences as in England, except offences under the Dockyards Pro- tection Act 1772, and it is carried out in the same manner.

Offences under Military Law. — Thus far only crimes against the ordinary law of the land have been dealt with. But both the Naval Discipline Act of 1866 and the Army Act empower courts-martial to pass sentence for a number of offences against military and naval laws. Such sentences are rarely if ever passed where an ordinary court is within reach, or except in time of war. The offences extend from traitorous communication with the enemy and cowardice on the field to falling asleep while acting as a sentinel on active service. It is for the authority confirming a sentence of death by court-martial to direct the mode of execution, which both in the British and United States armies is usually by shooting or hanging. During the Indian Mutiny some mutineers were executed by being blown from the mouth of cannon. As to the history of military punishments see Clode, Military and Martial Law.

1 Each of these years followed upon legislation mitigating severity of punishment

British Colonies and Possessions.— Under the Indian Penal Code sentence of death may be passed for waging war against the king (s. 121) and for murder (s. 302). If the murder is com mitted by a man under sentence of transportation for life the death penalty must be imposed (s. 303). In other cases it is alternative. This code has been in substance adopted in Ceylon, in Straits Settlements and Hong-Kong, and in the Sudan. In most of the British colonies and possessions the death penalty may be imposed only in the case of high treason, wilful murder and piracy with violence. But in New South Wales and Victoria sentence of death may be passed for rape and criminal abuse of girls under ten. In Queensland the law was the same until the passing of the Criminal Code of 1899.

Under the Carfadian Criminal Code of 1892 the death sentence may be imposed for treason (s. 657), murder (s. 231), rape (s. 267), piracy with violence (s. 127), and upon subjects of a friendly power who levy war on the king in Canada (s. 68) . But the judge is bound by statute to report on all death sentences, and the date of execution is fixed so as to give time for considering the report. The sentence is executed by hanging. In South Africa the criminal law is based on the Roman-Dutch law, under which capital punishment is liable for treason {crimen perduellionis or laesae majestatis), murder and rape (van Leeuwen, c. 36). In the Cape Colony rape is still capital (R. v. Nonosi, 1885 ; 1 Buchanan, 1898). In Natal rape may be punished

by hanging (act no. 22, 1898). Though the Roman-Dutch modes of executing the sentence by decapitation or breaking on the wheel have not been formally abolished, in practice the sentence in the Cape Colony is executed by hanging. In the Transvaal hanging is now the sole mode of executing capital punishment (Criminal Procedure Code, 1903, s. 244). The Roman-Dutch law as to crime and punishments has been superseded in Ceylon and British Guiana by ordinance.

Austria-Hungary. — In Austria capital punishment was in 1787 for a time abolished, but was reintroduced in 1795 for high treason, and in 1803 for certain other crimes. Under the penal code' still in force in 1906 it might be inflicted for the offences in the table given below, but not on offenders who were under twenty when they committed the offence. The annexed table indicates that the full sentence was sparingly executed. Under a Penal Code drafted in 1906, however, only two offences were made capital, viz. high treason against the person of the emperor and the graver cases of murder. The sentence is executed by hanging.

Crimes Punishable by Death.

1853 to 1873.

1875 to 1900.

1901 to 1903.

Con- demned.

Executed.

Con- demned.

Executed.

Con- demned.

Executed.

High treason

Murder, s. 136 .... Killing by robbers, s. 141 . Public violence, ss. 85, 87 . Incendiarism, s. 167 Criminal use of explosives (explosives law, s. 4).

4

880

12

5

102

3

1

2085

35 1

81 1

180

3

9

Belgium. — Under the Belgian Penal Code of 1867 the death penalty is retained for certain forms of high treason, and for assassination and parricide by poisoning. It may not be pronounced on a person under eighteen. The sentence is executed publicly by the guillotine. No execution seems to have taken place since 1863.

Denmark. — Sentence of death may be imposed for most forms of high treason, aggravated cases of murder, rape and piracy. It is executed publicly by the axe. Offenders under eighteen are not liable.

Finland. — In Finland the death penalty is alleged not to have been inflicted since 1824. It may be imposed for the assassination of the grand duke or grand duchess of the head of a friendly state, and wilful murder of other persons.

France. — Under the ancien regime in France, 115 crimes had become capital in 1789. The mode of execution varied, but in some cases it was effected by breaking on the wheel or burning,

and was coupled with mutilation. Under the Penal Code of 1810, as amended in or after 1832, even so late as 1871, thirty offences were capital, one being perjury against a prisoner resulting in his condemnation to death (art. 361). At present it may be imposed for wounding a public official with intent to murder (art. 233), assassination, parricide, poisoning, killing to commit a crime or escape from justice (arts. 302, 304). But juries freely exercise the power of acquitting in capital cases, or of defeating the capital sentence by finding extenuating circum- stances in more than seven-eighths of the cases, which compels the court to reduce the punishment by one or more degrees, i.e. below the penalty of death. And in recent times the prerogative of mercy has been continually exercised by the president, even in gross cases where public opinion demanded the extreme penalty. The sentence is executed in public by the guillotine.

Germany. — In many of the states of Germany capital punishment had been abolished (Brunswick, Coburg, Nassau, Oldenburg in 1849; Saxe-Meiningen, Saxe-Weimar, 1862; Baden, 1863; Saxony, 1868). But it has been restored by the Imperial Criminal Code of 1872, in the case of attempts on the life of the emperor, or of the sovereign of any federal state in which the offender happens to be (s. 80), and for deliberate homicide (s. 211) — as opposed to intentional homicide without deliberation — and for certain treasonable acts committed when a state of siege has been proclaimed. The sentence is executed by beheading (s. 13).

Holland. — In Holland there have been no executions since i860. Capital punishment (by hanging) was abolished in 1870, and was not reintroduced in the Penal Code of 1886.

Italy. — Capital punishment was abolished in Tuscany as far back as 1786, and from Italy has come the chief opposition to the death penalty, originated by Beccaria, and supported by many eminent jurists. Under the Penal Code of 1888 the death penalty was abrogated for all crimes, even for regicide. The cases of homicide in Italy are very numerous compared with those in England, amounting in 1905 to 105 per million as com- pared with 27 per million in the United Kingdom.

Japan. — The penalty of death is executed by hanging within a

prison. It may be imposed for executing or contriving acts of violence against the mikado or certain of his family, and for seditious violence with the object of seizing the territory or subverting the government or laws of Japan, or conspiring with foreign powers to commence hostilities against Japan. It is inflicted for certain forms of homicide, substantially wilful murder in the first degree.

Norway. — Under Norwegian law, up to 1905, sentence of death might be passed for murder with premeditation, but the court might as an alternative decree penal servitude for life. Sentence of death had also to be passed in cases where a person under sentence of penal servitude for life committed murder or culpable homicide, or caused bodily injuries in circumstances warranting a sentence of penal servitude for life, or committed robbery or the graver forms of wilful fire-raising. The sentence was carried out by decapitation (see Beheading); but there had been no execution since 1876. The new Norwegian Code, which came into force on the 6th of January 1905, abolished capital punishment.

Portugal. — There has been considerable objection in Portugal to capital punishment, and it was abolished in 1867.

Rumania. — Capital punishment was abolished in 1864.

Russia. — In 1750, under the empress Elizabeth, capital punishment was abolished; but it was restored later and was freely inflicted, the sentence being executed by shooting, beheading or hanging. According to a Home Office Return in England in 1907 the death penalty is abolished, except in cases where the lives of the emperor, empress or heir to the throne are concerned.

Spain. — Under the Spanish Penal Code of 1870 the following crimes are capital: — inducing a foreign power to declare war against Spain, killing the sovereign, parricide and assassination. The method employed is execution in public by the garrote. But the death sentence is rarely imposed, the customary penalty for murder being penal servitude in chains for life, while a parricide is imprisoned in chains " in perpetuity until death."

Sweden. — The severity of the law in Sweden was greatly mitigated so far back as 1777. Under the Penal Code of 1864 the penalty of death may be imposed for certain forms of treason, including attempts on the life of the sovereign or on the independence of Sweden, and for premeditated homicide

(assassinat) , and in certain cases for offences committed by persons under sentence of imprisonment for life. In 1901 a bill to abolish capital punishment was rejected by both houses of the Swedish parliament.

Switzerland. — Capital punishment was abolished in Switzerland in 1874 by Federal legislation; but in 1879, in consequence of a plebiscite, each canton was empowered to restore the death penalty for offences in its territory. The Federal govern- ment was unwilling to take this course, but was impelled to it by the fact that, between 1874 and 1879, cases of premeditated murder had considerably increased. Seven of the cantons out of twenty-two have exercised the power given to restore capital punishment. But there do not seem to have been any cases in which the death penalty has been inflicted; and on the assassination of the empress of Austria at Geneva in 1898 it was found that the laws of the canton did not permit the execu- tion of the assassin. The canton of Zug imposes the lowest minimum penalty known, i.e. three years' imprisonment for wilful homicide, the maximum being imprisonment for life.

United Stales of America. — Under the Federal laws sentence of death may be passed for treason against the United States and for piracy and for murder within the Federal jurisdiction. But for the most part the punishment of crime is regulated by the laws of the constituent states of the Union.

The death penalty was abolished in Michigan in 1846 except for treason, and wholly in Wisconsin in 1853. In Maine it was abolished in 1876, re-enacted in 1883, and again abolished in 1887. In Rhode Island it was abolished in 1852, but restored in 1882, only in case of murder committed by a person under sentence of imprisonment for life (Laws, 1896, c. 277, s. 2). In all the other states the death penalty may still be inflicted: in Alabama, Delaware, Georgia, Maryland, and West Virginia, for treason, murder, arson and rape; in Alaska, Arizona, Kansas, New Jersey, Mississippi, Montana, New York, North Dakota, Oregon, and South Dakota, for treason and murder; in Colorado, Idaho, Illinois, Iowa, Massachusetts, Minnesota, Nebraska, New Hampshire, New Mexico, Nevada, Ohio, Okla- homa, Pennsylvania, Utah and Wyoming, for murder only; in Kentucky and Virginia, for treason, murder and rape ; in Vermont, for treason, murder and arson; in Indiana, for treason, murder, and for arson if death result; in California, for treason, murder and train-wrecking; in North Carolina, for murder, rape, arson and

burglary; in Florida, Missouri, South Carolina, Tennessee and Texas, for murder and rape; in Arkansas and Louisiana, for treason, murder, rape, and administering poison or use of dangerous weapons with intent to murder. Louisiana is cited by Girardin (le droit de punir) as a state in which the death penalty was abolished in 1830. Under the influence of the eminent jurist, E. Livingston, who framed the state codes, the legislature certainly passed a resolu- tion against capital punishment. But since as early as 1846 it has been there lawful, subject to a power given to the jury, to bring in a verdict of guilty, " but no capital punishment," which had the effect of imposing a sentence of hard labour for life. In certain states the jury has, under local legislation, the right to award the sentence. The constitutionality of such legislation has been doubted, but has been recognized by the courts of Illinois and Iowa. Sentence of death is executed by hanging, except in seven of the states, where it is carried out by "electrocution" (q.v.).

With the mitigation of the law as to punishment, agitation against the theory of capital punishment has lost much of its force. But many European and American writers, and some English writers and associations, advocate the ˆoao?"" total abolition of the death punishment. The ultimate abolition. argument of the opponents of capital punishment is that society has no right to take the life of any one of its members on

any ground. But they also object to capital punishment: (i) on religious grounds, because it may deprive the sinner of his full time for repentance; (2) on medical grounds, because homicide is usually if not always evidence of mental disease or irresponsi- bility; (3) on utilitarian grounds, because capital punishment is not really deterrent, and is actually inflicted in so few instances that criminals discount the risks of undergoing it; (4) on legal grounds, i.e. that the sentence being irrevocable and the evidence often circumstantial only, there is great risk of gross injustice in executing a person convicted of murder; (5) on moral grounds, that the punishment does not fit the case nor effect the refor- mation of the offender. It is to be noted that the English Children Act 1908 expressly forbids the pronouncing or recording the sentence of death against any person under the age of sixteen (s. 103).

The punishment is probably retained, partly from ingrained habit, partly from a sense of its appropriateness for certain crimes, but also that the ultima ratio may be available in cases of sufficient gravity to the commonweal. The apparent dis- crepancy between the number of trials and convictions for murder is not in England any evidence of hostility on the part of juries to capital punishment, which has on the whole lessened rather than increased since the middle of the 19th century. It is rarely if ever necessary in England, though common in America, to question the jurors as to their views on capital punishment. The reasons for the comparatively small number of convictions for murder seem to be: (1) that court and jury in a capital case lean in favorem vitae, and if the offence falls short of the full gravity of murder, conviction for manslaughter only results; (2) that in the absence of a statutory classification of the degrees of murder, the prerogative of mercy is exercised in cases falling short of the highest degree of gravity recognized by lawyers and by public opinion; (3) that where the conviction rests on cir- cumstantial evidence the sentence is not executed unless the circumstantial evidence is conclusive; (4) that charges of in- fanticide against the mothers of illegitimate children are treated mercifully by judge and jury, and usually terminate in acquittal, or in a conviction of concealment of birth; (5) that many persons tried as murderers are obviously insane; (6) that coroners' juries are somewhat recklessly free in returning inquisitions of murder without any evidence which would warrant the conviction of the person accused.

The medical doctrine, and that of Lombroso with respect to criminal atavism and irresponsibility, have probably tended to incline the public mind in favour of capital punishment, and Sir James Stephen and other eminent jurists have even been thereby tempted to advocate the execution of habitual criminals. It certainly seems strange that the community should feel bound carefully to preserve and tend a class of dangerous lunatics, and to give them, as Charles Kingfley says, " the finest air in England and the right to kill two gaolers a week."

The whole question of capital punishment in the United Kingdom was considered by a royal commission appointed in 1864, which reported in 1866 (Pari. Pap., 1866, 10,438). The commission took the opinions of all the judges of the supreme courts in the United Kingdom and of many other eminent persons, and collected the laws of other countries so far as this was ascertainable. The commissioners differed on the question of the expediency of

abolishing or retaining capital punishment, and did not report thereon. But they recommended: (1) that it should be restricted throughout the United Kingdom to high treason and murder; (2) alteration of the law of homicide so as to classify homicides according to their gravity, and to confine capital punishment to murder in the first degree; (3) modifica- tion of the law as to child murder so as to punish certain cases of infanticide as misdemeanours; (4) authorizing judges to direct sentence of death to be recorded; (5) the abolition — since carried out— of public executions.

Authorities. — Beccaria, Dei Delitte e delle Pene (1 790) ; Bentham, Rationale of Punishment; Lammasch, Grundris des Strafrechts (Leipzig, 1902); Olivecrona, De la peine de mort; Mittermaier, Capital Punishment; Report of the Royal Commission on Capital Punishment (Pari. Pap., 1866, No. 10,438); Oldfield, The Penalty of

Death (1901) ; Pollock and Maitland, History of English Law, Pike, History of Crime; Sir J. F. Stephen, History of Crime in England; S. Walpole, History of England, vol. i. p. 191 ; vol. iv. p. 74; Andrews' Old Time Punishments; A Century of Law Reform (London, 1901) ; Lecture ii. by Sir H. B. Poland; Howard Association Publications. (W. F. C.)

CAPITO (or Kopfel), WOLFGANG [Fabricius] (1478-1541), German reformer, was born of humble parentage at Hagenau in Alsace. He was educated for the medical profession, but also studied law, and applied himself so earnestly to theology that he received the doctorate in that faculty also, and, having joined the Benedictines, taught for some time at Freiburg. He acted for three years as pastor in Bruchsal, and was then called to the cathedral church of Basel (1515). Here he made the acquaintance of Zwingli and began to correspond with Luther. In 1519 he removed to Mainz at the request of Albrecht, arch- bishop of that city, who soon made him his chancellor. In 1523 he settled at Strassburg, where he remained till his death in November 1541. He had found it increasingly difficult to reconcile the new religion with the old, and from 1524 was one of the leaders of the reformed faith in Strassburg. He took a prominent part in the earlier ecclesiastical transactions of the 1 6th century, was present at the second conference of Zurich and at the conference of Marburg, and along with Martin Bucer drew up the Confessio Tetrapolitana. Capito was always more concerned for the " unity of the spirit " than for dogmatic formularies, and from his

endeavours to conciliate the Lutheran and Zwinglian parties in regard to the sacraments, he seems to have incurred the suspicions of his own friends; while from his intimacy with Martin Cellarius and other divines of the Socinian school he drew on himself the charge of Arianism. His principal works were: — Institutionum Hebraicarum libri duo; Enarrationes in Habacuc et Hoseam Prophetas; a life of Oecolampadius and an account of the synod of Berne (1532).

CAPITULARY (Med. Lat. capitularium) , a series of legislative or administrative acts emanating from the Merovingian and Carolingian kings, so called as being divided into sections or chapters (capitula). With regard to these capitularies two questions arise: (1) as to the means by which they have been handed down to us; (2) as to their true character and scope.

(1) As soon as the capitulary was composed, it was sent to the various functionaries of the Frankish empire, archbishops, bishops, missi and counts, a copy being kept by the chancellor in the archives of the palace. At the present day we do not possess a single capitulary in its original form; but very frequently copies of these isolated capitularies were included in various scattered manuscripts, among pieces of a very different nature, ecclesiastical or secular. We find, therefore, a fair number of them in books which go back as far as the 9th or 10th centuries. In recent editions in the case of each capitulary it is carefully indicated from what manuscripts it has been collated.

These capitularies make provisions of a most varied nature; it was therefore found necessary at quite an early date to classify them into chapters according to the subject. In 827 Ansegisus, abbot of St Wandrille at Fontenelle, made such a collection. He embodied them in four books: one of the ecclesiastical capitularies of Charlemagne, one of the ecclesiastical capitularies of Louis the Pious, one of the secular capitularies of Charlemagne, and one of the secular capitularies of Louis, bringing together similar provisions and suppressing duplicates. This collection soon gained an official authority, and after 829 Louis the Pious refers to it, citing book and section.

After 827 new capitularies were naturally promulgated, and before 858 there appeared a second collection in three books, by an author calling himself Benedictus Levita. His aim was, he said, to complete the work of Ansegisus, and bring it up to date by continuing it from 827 to his own day; but the author has not

only borrowed prescriptions from the capitularies; he has introduced other documents into his collection, fragments of Roman laws, canons of the councils and especially spurious provisions very similar in character to those of the same date found in the False Decretals. His contemporaries did not notice these spurious documents, but accepted the whole collection as

authentic, and incorporated the four books of Ansegisus and the three of Benedictus Levita into a single collection in seven books. The serious historian of to-day, however, is careful not to use books v., vi. and vii. for purposes of reference.

Early editors chose to republish this collection of Ansegisus and Benedictus as they found it. It was a distinguished French scholar, Etienne Baluze, who led the way to a fresh classification. In 1677 he brought out the Capitularia regum francorum, in two folio volumes, in which he published first the capitularies of the Merovingian kings, then those of Pippin, of Charles and of Louis the Pious, which he had found complete in various manu- scripts. After the date of 840, he published as supplements the unreliable collection of Ansegisus and Benedictus Levita, with the warning that the latter was quite untrustworthy. He then gave the capitularies of Charles the Bald, and of other Carolingian kings, either contemporaries or successors of Charles, which he had discovered in various places. A second edition of Baluze was published in 1780 in 2 volumes folio by Pierre de Chiniac.

The edition of the Capitularies made in 1835 by George Pertz, in the Monumenla Germaniae (folio edition, vol. i., of the Leges) was not much advance on that of Baluze. A fresh revision was required, and the editors of the Monumenta decided to reissue it in their quarto series, entrusting the work to Dr Alfred Boretius. In 1883 Boretius published his first volume, containing all the detached capitularies up to 827, together with various appendices bearing on them, and the collection of Ansegisus. Boretius, whose health had been ruined by overwork, was unable to finish his work; it was continued by Victor Krause, who collected in vol. ii. the scattered capitularies of a date posterior to 828. Karl Zeumer and Albrecht Werminghoff drew up a detailed index of both volumes, in which all the essential words are noted. A third volume, prepared by Emil Seckel, was to

include the collection of Benedictus Levita.

(2) Among the capitularies are to be found documents of a very varied kind. Boretius has divided them into several classes: —

(a) The Capitula legibus addenda. — These are additions made by the king of the Franks to the barbarian laws promulgated under the Merovingians, the Salic law, the Ripuarian or the Bavarian. These capitularies have the same weight as the law which they complete; they are particular in their application, applying, that is to say, only to the men subject to that law. Like the laws, they consist chiefly of scales of compensation, rules of procedure and points of civil law. They were solemnly promulgated in the local assemblies where the consent of the people was asked. Charlemagne and Louis the Pious seem to have made efforts to bring the other laws into harmony with the Salic law. It is also to be noted that by certain of the capitularies of this class, the king adds provisions affecting, not only a single law, but all the laws in use throughout the kingdom.

(b) The Capitula ecclesiastica. — These capitularies were elaborated in the councils of the bishops; the kings of the Franks sanctioned the canon of the councils, and made them obligatory on all the Christians in the kingdom.

(c) The Capitula per se scribenda. — These embodied political decrees which all subjects of the kingdom were bound to observe. They often bore the name of edictum or of constitutio, and the provisions made in them were permanent. These capitularies were generally elaborated by the king of the Franks in the autumn assemblies or in the committees of the spring assemblies. Frequently we have only the proposition made by the king to the committee, capitula tractanda cum comitibus, episcopis, et abbatibus, and not the final form which was adopted.

(d) The Capitula missorum, which are the instructions given by Charlemagne and his successors to the missi sent into the various parts of the empire. They are sometimes drawn up in common for all the missi of a certain year — capitula missorum generalia; sometimes for the missi sent only on a given circuit — capitula missorum specialia. These instructions sometimes hold good only for the circuit of the missus; they have no general application and are merely temporary.

(e) With the capitularies have been incorporated various documents; for instance, tne rules to be observed in administer-

ing the king's private domain (the celebrated capitulary de villis^ which is doubtless a collection of the instructions sent at various times to the agents of these domains); the partitions of the kingdom among the king's sons, as, the Divisio regnorum of 806, or the Ordinatio imperii of 817; the oaths of peace and brotherhood which were taken on various occasions by the sons of Louis the Pious, &c.

The merit of clearly establishing these distinctions belongs to Boretius. He has doubtless exaggerated the difference between the Capitula missorum and the Capitula per se scribenda; among the first are to be found provisions of a general and permanent nature, and among the second temporary measures are often included. But the idea of Boretius is none the less fruitful. In the capitularies there are usually permanent provisions and temporary provisions intermingled; and the observation of this fact has made it possible more clearly to understand certain institutions of Charlemagne, e.g. military service.

After the reign of Louis the Pious the capitularies became long and diffuse. Soon, from the 10th century onwards, no provision of general application emanates from the kings. Hence- forth the kings only regulated private interests by charters; it was not until the reign of Philip Augustus that general provisions again appeared; but when they did so, they bore the name of ordinances (ordonnances) .

There were also capitularies of the Lombards. These capitu- laries formed a continuation of the Lombard laws, and are printed as an appendix to these laws by Boretius in the folio edition of the Monumenta Germaniae, Leges, vol. iv.

Authorities.- — Boretius, Die Capitularien im Longobardenreich (Halle, 1864); and Beitrage zur Capitularienkritih (Leipzig, 1874); G. Seeliger, Die Kapitularien der Karolinger (Munich, 1893). See also the histories of institutions or of law by Waitz, Brunner, Fustel de Coulanges, Viollet, Esmein. (C. Pf.)

CAPITULATION (Lat. capitulum, a little head or division; capitulare, to treat upon terms) , an agreement in time of war for the surrender to a hostile armed force of a particular body of troops, a town or a territory. It is an ordinary incident of war,

and therefore no previous instructions from the captor's government are required before finally settling the conditions of capitulation. The most usual of such conditions are freedom of religion and security of private property on the one hand, and a promise not to bear arms within a certain period on the other. Such agreements may be rashly concluded with an inferior officer, on whose authority the enemy are not in the actual position of the war entitled to place reliance. When an agreement is made by an officer who has not the proper authority or who has exceeded the limits of his authority, it is termed a sponsion, and, to be binding, must be confirmed by express or tacit ratification. Article 35 of the Hague Convention (1899) on the laws and the customs of war lays down that " capitulations agreed on between the contracting parties must be in accordance with the rules of military honour. When once settled they must be observed by both the parties."

In another sense, capitulation is the name given to an arrangement by which foreigners are withdrawn, for most civil and criminal purposes, from the jurisdiction of the state making the capitulation. Thus in Turkey arrangements termed capitula- tions (q.v.), and treaties confirmatory of them, have been made between the Porte and other states by which foreigners resident in Turkey are subject to the laws of their respective countries. The term is also applied by French writers to the oath which on his election the Holy Roman emperor used to make to the college of electors; this related chiefly to such matters as regalian rights, appeals from local jurisdictions, the rights of the pope, &c.

CAPITULATIONS (from Lat. caput, or its Low-Latin diminutive capitulum, as indicating the form in which these acts were set down in " chapters "; the Gr. equivalent cephaleosis, (ce$aXaiw

Franks, subjects of the emperor Charlemagne, as should visit the East with the authorization of their emperor. After the break-up of the Frank empire, similar concessions were made to some of the practically independent Italian city states that grew up on its ruins. Thus, in 1098, the prince of Antioch granted a charter of this nature to the city of Genoa; the king of Jerusalem extended the same privilege to Venice in 1 1 23 and to Marseilles in 1136. Salah-ud-din (Saladin), sultan of Babylon (Cairo), granted a

charter to the town of Pisa in 1173. The Byzantine emperors followed this example, and Genoa, Pisa and Venice all obtained capitulations. The explanation of the practice is to be found in the fact that the sovereignty of the state was held in those ages to apply only to its subjects; foreigners were excluded from its rights and obligations. The privilege of citizenship was considered too precious to be extended to the alien, who was long practically an outlaw. But when the numbers, wealth and power of foreigners residing within the state became too great, it was found to be politic to subject them to some law, and it was held that this law should be their own. When the Turkish rule was substituted for that of the Byzantine emperors, the system already in existence was continued; the various non-Moslem peoples were allowed their semi-autonomy in matters affecting their personal status, and the Genoese of Galata were confirmed in their privileges. But the first capitula- tion concluded with a foreign state was that of 1535 granted to the French. Lest it should be imagined that this was a concession wrested by the victorious Christian monarch from the decadent Turk, it should be borne in mind that Turkey was then at the height of her power, and that Francis I. had shortly before sustained a disastrous defeat at Pavia. His only hope of assist- ance lay in Suleiman I., whose attack on Vienna had been checked by the victorious Charles V. The appeal to Suleiman on the ground of the common interest of France and Turkey in over- coming Charles V.'s overweening power was successful; the secret mission of Frangipani, an unofficial envoy who could be disowned in case of failure, paved the way for De la Forest's embassy in 1534, and in 1536 the capitulations were signed. 1 They amounted to a treaty of commerce and a treaty allowing the establishment of Frenchmen in Turkey and fixing the jurisdiction to be exercised over them: individual and religious liberty is guaranteed to them, the king of France is empowered to appoint consuls in Turkey, the consuls are recognized as competent to judge the civil and criminal affairs of French subjects in Turkey according to French law, and the consuls may appeal to the officers of the sultan for their aid in the execution of their sentences. This, the first of the capitulations, is practi- cally the prototype of its successors. Five years later, similar capitulations were concluded with Venice. The capitulations were at first held to be in force only during the lifetime of the sultan by whom they were granted; thus in 1569 Sultan Selim II. renewed the French capitulations granted by his predecessor. In 1583 England obtained her first capitulation, until which time France had been

the official protector of all Europeans estab- lished in Turkey. Later on, England claimed to protect the subjects of other nations, a claim which is rejected in the French capitulations of 1597, 1604 and 1607, the last-named of which explicitly lays down that the subjects of all nations not repre- sented at Constantinople by an ambassador shall be under French protection. In 1613 Holland obtained her first capitula- tion, with the assistance of the French ambassador, anxious to help a commercial rival of England. In 1673 the French, represented by the marquis de Nointel, succeeded in obtaining the renewal of the capitulations which, for various reasons, had remained unconfirmed since 1607. Louis XIV. had been anxious to secure the protectorate of all Catholics in Turkey, but was obliged to content himself with the recognition of his right to protect all Latins of non-Turkish nationality; his claims for the restoration to the Catholics of the Holy Places usurped by the Greeks was also rejected, the sultan only undertaking to promise to restore their churches to the Jesuit Capuchins. An important

1 LaForest, a knight of St John of Jerusalem, was the first resident ambassador of France at Constantinople. He died in 1537.

commercial gain was the reduction of the import duties from 5 t0 3%; and all suits the value of which exceeded 4000 aspres in which French subjects sued, or were sued by, an Ottoman subject, were to be heard not by the ordinary tribunals but at the Porte itself. Later, France's friendship secured for Turkey a successful negotiation of the peace of Belgrade in 1 739, and the result was the capitulation of 1740; this is no longer limited in duration to the sultan's lifetime but is made perpetual, and, moreover, declares that it cannot be modified without the assent of the French. It conferred on the French ambassador pre- cedence over his colleagues. Austria had obtained capitulations in 1 7 18, modified in 1784; Russia secured similar privileges- in 1784. In the course of the 18th century nearly every European power had obtained these, and such newly-established countries as the United States of America, Belgium and Greece followed in the 19th century.

The chief privileges granted under the capitulations to foreigners resident in Turkey are the following: liberty of residence, inviolability of domicile, liberty to travel by land and sea, freedom of commerce, freedom of religion, immunity from local jurisdiction save under certain safeguards, ex- clusive extra-

territorial jurisdiction over foreigners of the same nationality, and competence of the forum of the defendant in cases in which two foreigners are concerned (though the Sublime Porte has long claimed to exercise jurisdiction in criminal cases in which two foreigners of different nationality are concerned — the capitulations are silent on the point and the claim is resisted by the powers) .

The same system has been followed by such countries as Persia, China, Japan and Siam.

The practical result of the capitulations in Turkey is to form each separate foreign colony into a sort of imperium in imperio, and to hamper the local jurisdiction very considerably. As the state granting the capitulations progresses in civilization it chafes under these restraints in its sovereignty. Turkey's former vassals, Rumania and Servia, though theoretically bound to respect the capitulations so long as they formed part of Turkey, had practically abrogated them long before securing their independence through the treaty of Berlin in 1878. The same may be said of Bulgaria. Japan was liberated from the burden of the capitulations some years ago.

The extra-territorial jurisdiction exercised by the foreign powers over their subjects in Turkey and other countries where capitulations exist is regulated by special legislative enactments; in the case of the United Kingdom by orders in council.

In Turkey the capitulations are practically the only treaties in force with the powers, since the expiration about 1889 of the commercial treaties, concluded in 1861-1862. As they all contain the " most-favoured nation " clause, the privileges in any one apply to all the powers, though not always claimed. Thus America and Belgium claim under their treaties with Turkey the right to try all their subjects, even if accused of offences against Ottoman subjects — a claim recently made by Belgium in the case of the Belgian subject Joris, accused of participation in the bomb outrage of 1905 at Yildiz. One peculiar privilege granted in the capitulations of 1675 (Art. 74) authorizes the king of England to buy in Turkey with his own money two cargoes of figs and raisins, in fertile and abundant years and not in times of dearth or scarcity, and provides that after a duty of 3%, has been paid thereon no obstacle or hindrance shall be given thereto.

CAPIZ, a town and the capital of the province of Capiz, Panay,

Philippine Islands, on the Capiz or Panay river, about 4 m. from its mouth on the N. coast. Pop. (1903) 18,525. Capiz has a large and beautiful Roman Catholic church (of stone), a Protestant church (with a hospital) and good government buildings, and is the seat of the provincial high school. Alcohol of a superior quality is manufactured in large quantities from the fermented juice of the nipa palm, which grows plentifully in the neighbouring swamps. Fishing and the weaving of fabrics of cotton, hemp and pineapple fibre are important industries. Rice and sugar are raised in abundance. Tobacco, Indian corn

and cacao are produced to a limited extent; and rice, alcohol, sugar and copra are exported. Coasting vessels ascend the river to the town. The language is Visayan.

CAPMANY Y MONTPALAU, ANTONIO DE (1742-1813), Spanish polygraph, was born at Barcelona on the 24th of Novem- ber 1742. He retired from the army in 1770, and was subse- quently elected secretary of the Royal Academy of History at Madrid. His principal works are — Memorias histdricas sobre la marina, commercio, y artesde la antigua ciudad de Barcelona (4 vols. 1779-1792); Teatro historico-critico de la elocuencia Espanola (1786); Filiosofia de la elocuencia (1776), and Cuestiones criticas sobre varios puntos de historia economica, polltica, y militar (1807). Capmany died at Barcelona on the 14th of November 1813. His monograph on the history of his birthplace still preserves much of its original value.

CAPO D'ISTRIA, GIOVANNI ANTONIO [Joannes], 1 Count (1776-1831), Russian statesman and president of the Greek republic, was born at Corfu on the nth of February 1776. He belonged to an ancient Corfiot family which had immigrated from Istria in 1373, the title of count being granted to it by Charles Emmanuel, duke of Savoy, in 1689. The father of Giovanni, Antonio Maria Capo d'Istria, was a man of consider- able importance in the island, a stiff aristocrat of the old school, who in 1798, after the treaty of Campo Formio had placed the Ionian Islands under French rule, was imprisoned for his oppo- sition to the new regime, his release next year being the earliest triumph of his son's diplomacy. On the establishment in 1800, under Turkish suzerainty, of the septinsular republic — a settle-

ment negotiated at Constantinople by the elder Capo d'Istria — Giovanni, who had meanwhile studied medicine at Padua, entered the government service as secretary to the legislative council, and in one capacity or another exercised for the next seven years a determining voice in the affairs of the republic. At the begin- ning of 1807 he was appointed "extraordinary military governor " to organize the defence of Santa Maura against Ali Pasha of Iannina, an enterprise which brought him into contact with Theodoros Kolokotrones and other future chiefs of the war of Greek independence, and awoke in him that wider Hellenic patriotism which was so largely to influence his career.

Throughout the period of his official connexion with the Ionian government, Capo d'Istria had been a consistent upholder of Russian influence in the islands; and when the treaty of Tilsit (1807) dashed his hopes by handing over the Ionian republic to Napoleon, he did not relinquish his belief in Russia as the most reliable ally of the Greek cause. He accordingly refused the offers made to him by the French government, and accepted the invitation of the Russian chancellor Romanzov to enter the tsar's service. He went to St Petersburg in 1809, and was appointed to the honorary post of attache to the foreign office, but it was not till two years after, in 181 1, that he was actually employed in diplomatic work as attache to Baron Stackelberg, the Russian ambassador at Vienna. His knowledge of the near East was here of great service, and in the following year he was attached, as chief of his diplomatic bureau, to Admiral Chichagov, on his mission to the Danubian principalities to stir up trouble in the Balkan peninsula as a diversion on the flank of Austria,' and to attempt to supplement the treaty of Bucharest by an offensive and defensive alliance with the Ottoman empire. The Moscow campaign of 181 2 intervened; Chichagov was disgraced in con- sequence of his failure to destroy Napoleon at the passage of the Beresina; but Capo d'Istria was not involved, was made a councillor of state and continued in his diplomatic functions. During the campaign of 1813 he was attached to the staff of Barclay de Tolly and was present at the battles of Liitzen, Bautzen, Dresden and Leipzig. With the advance of the allies he was sent to Switzerland to secure the withdrawal of the republic from the French alliance. Here, in spite of his instruc- tions to guarantee the neutrality of Switzerland, he signed on his

1 After his election to the Greek presidency in 1827, Capo d'Istria, whose baptismal names were Giovanni Antonio, signed himself Joannes Capodistrias, the form by which he is very

commonly known.

own responsibility the proclamation issued by Prince Schwarzenberg, stating the intention of the allied troops to march through the country. His motive was to prevent any appearance of disagreement among the allies. The emperor Alexander, to whom he hastened to make an explanation in person, endorsed his action.

Capo d'Istria was present with the allies in Paris, and after the signing of the first peace of Paris he was rewarded by the tsar with the order of St Vladimir and his full confidence. At the congress of Vienna his influence was conspicuous; he represented the tsar on the Swiss committee, was associated with Rasumovsky in negotiating the tangled Polish and SaxOn questions, and was the Russian plenipotentiary in the discussions with the Baron vom Stein on the affairs of Germany. His Memoire sur V empire germanique, of the 9th of February 18 15, presented to the tsar, was based on the policy of keeping Germany weak in order to secure Russian preponderance in its councils. It was perhaps from a similar motive that, after the Waterloo campaign, he strenuously opposed the proposals for the dismemberment of France. It was on his advice that the due de Richelieu persuaded Louis XVIII. to write the autograph letter in which he declared his intention of resigning rather "than submit to any diminution of the territories handed down to him by his ancestors. 2 The treaty of the 20th of November 181 5, which formed for years the basis of the effective concert of Europe, was also largely his work.

On the- 26th of September 181 5, after the proclamation of the Holy Alliance at the great review on the plain of Vertus, Capo d'Istria was named a secretary of state. On his return to St Petersburg, he shared the ministry of foreign affairs with Count Nesselrode, though the latter as senior signed all documents. Capo d'Istria, however, had sole charge of the newly acquired province of Bessarabia, which he governed conspicuously well. In 1818 he attended the emperor Alexander at the congress of Aix-la-Chapelle, and in the following year obtained leave to visit his home. He travelled by way of Venice, Rome and Naples, his progress -exciting the liveliest apprehensions of the powers, notably of Austria. The " Jacobin " pose of the tsar was notorious, his all-embracing ambition hardly less so; and Russian travellers in Italy, notably the emperor's former tutor, Cesar de Laharpe, were little careful in the expression of their sympathy for the ideals of the Carbonari. In Metternich's eyes Capo d'Istria,

” the coryphaeus of liberalism,” was responsible for the tsar’s vagaries, the fount of all the ills of which the times were sick; and, for all the count’s diplomatic reticence, the Austrian spies who dogged his footsteps earned their salaries by reporting sayings that set the reactionary courts in a flutter. For Metternich the overthrow of Capo d’lstria’s influence became a necessity of political salvation. At Corfu Capo d’Istria became the repository of all the grievances of his countrymen against the robust administration of Sir Thomas Maitland. At the congress of Vienna the count had supported the British pro- tectorate over the Ionian Islands, the advantages of which from the point of view of trade and security were obvious; but the drastic methods of ” King Tom’s ” government, symbolized by a gallows for pirates and other evil-doers in every popular gathering place, offended his local patriotism. He submitted a memorandum on the subject to the tsar, and before returning to Russia travelled via Paris to England to lay the grievances of the Ionians before the British government. His reception was a cold one, mainly due to his own disingenuousness, for he refused to show British ministers the memorandum which he had already submitted to the Russian emperor, on the ground that it was intended only for his own private use. The whole thing seemed, rightly or wrongly, an excuse for the intervention of Russia in affairs which were by treaty wholly British.

On his return to St Petersburg in the autumn of 1819, Capo d’Istria resumed his influence in the intimate counsels of the tsar. The murder of the Russian agent, Kotzebue, in March, had shaken but not destroyed Alexander’s liberalism, and it was Capo d’Istria who drew up the emperor’s protest against the Carlsbad decrees and the declaration of his adherence to con- stitutional views (see Alexander I.). In October 1820 Capo

2 The letter was written by Michael Stourdza and copied by Loui?

d’Istria accompanied the tsar to the congress at Troppau. The events of the year — the murder of the due de Berry in March, the Revolutions in Spain and in Naples — had produced their effect. Alexander was, in Metternich’s exultant language, “a changed man,” and Capo d’Istria apparently shared his conver- sion to reactionary principles. The Austrian chancellor now put

forth all his powers to bring Alexander under his own influence, and to overthrow Capo d'Istria, whom he despised, distrusted and feared. In 1821 Alexander Ypsilanti's misguided raid into the Danubian principalities gave him his opportunity. The news reached the tsar at the congress of Laibach, and to Capo d'Istria was entrusted the task of writing the letter to Ypsilanti in which the tsar repudiated his claim, publicly pro- claimed that he had the sympathy and support of Russia. For a while the position of Capo d'Istria was saved; but it was known that he had been approached by the agent of the Greek Hetairia before Ypsilanti, and that he had encouraged Ypsilanti to take up the ill-fated adventure which he himself had refused ; he was hated at the Russian court as an upstart Greek, and Metternich was never weary of impressing on all and sundry that he was " using Russian policy for Greek ends." At last nothing but long habit and native loyalty to those who had served him well, prevented Alexander from parting with a minister who had ceased to possess his confidence. Capo d'Istria, anticipating his dismissal, resigned on the eve of the tsar's departure for the congress of Verona (1822), and retired into private life at Geneva.

On the nth of April 1827, the Greek national assembly at Troezene elected Capo d'Istria president of the republic. The vote was a triumph for the Russian faction, for the count, even after his fall, had not lost the personal regard of the emperor Alexander, nor ceased to consider himself a Russian official. He accepted the offer, but was in no hurry to take up the thank- less task. In July he visited the emperor Nicholas I. at Tsarskoye Selo, receiving permission to proceed and instructions as to the policy he should adopt, and he next made a tour of the courts of Europe in search of moral and material support. The news of the battle of Navarino (20th of October 1827) hastened his arrival; the British frigate " Warspite " was placed at his disposal to carry him to Greece, and on the 19th of January 1828 he landed at Nauplia.

Capo d'Istria 's rule in Greece had to contend against immense difficulties — the utter poverty of the treasury, the barbarism of the people but recently emancipated, the continued presence of Ibrahim Pasha, with an unbroken army, in the south of the Morea. His strength lay in his experience of affairs and in the support of Russia; but he was by inheritance an aristocrat and by training an official, lacking in broad human sympathy, and therefore little fitted to deal with the wild and democratic elements of the society it was his task to control. The Greeks could understand the international status given to them by his

presidency, and for a while the enthusiasm evoked by his arrival made him master of the situation. He thoroughly represented Greek sentiment, too, in his refusal to accept the narrow limits which the powers, in successive protocols, sought to impose on the new state (see Greece). But the Russian administrative system by which he sought to restrain the native turbulence was bound in the end to be fatal to him. The wild chiefs of the revolution won over at first by their inclusion in his government, were offended by his European airs and Russian uniform, and alienated by his preference for the educated Greeks of the Phanar and of Corfu, his promotion of his brothers Viaro and Agostino to high commands causing special offence. Dissatisfac- tion ended in open rebellion; the islands revolted; Capo d'Istria called in the aid of the Russian admiral; and Miaoulis, the hero of the Greek war at sea, blew up the warships under his command to prevent their falling into the hands of the government. On land, so far as the president was concerned, the climax was reached with the attempt to coerce the Mavromichales of the Maina, the bravest and most turbulent of the mountain clans, whose chief .Petros Mavromichales, commonly known as Petrobey, had played a leading part in the War of Independence. The result was an insurrection in the Maina (Easter, 1830), and the I

imprisonment of those of the Mavromichales, including Petrobey, who happened to be in the power of the government. At the news of their chieftain's imprisonment the Mainots, who had for a while been pacified, once more flew to arms and threatened to march on Nauplia; but negotiations were opened, and on the advice of the Russian minister Petrobey consented to make his submission to the president. Unhappily, when he was brought under guard to the appointed interview, Capo d'Istria, in a moment of irritation and weariness, refused to see him. Maddened with rage at this insult from a man who had not struck a blow for Greece, the proud old chief, on his way back to prison, called out to two of his kinsmen, his son George and his brother Constantine, " You see how I fare," and passed on. Accord- ing to the code of the Maina this was a command to take revenge. Next day, the gth of October 1831, the two placed themselves at the door of the church where Capo d'Istria was accustomed to worship. As he passed in Constantine shot him down, and as he fell George thrust a dagger into his heart.

Authorities. — Carl W. P. Mendelssohn-Bartholdy's Graf Jo'hann Kapodistrias (Berlin, 1864) is based on all the sources, printed and unprinted, available at the time of publication, and contains

an excellent guide to these. This may be supplemented by the historical sections of F. de Marten's Recueil des trailes conclus par la Russie, &c. (1874, &c). A sketch of Capo d'lstria's activity as president will be found in W. Alison Phillips's The War of Greek Independence (London, 1897). Many of Capo d'lstria's despatches, &c, are published in the collections of diplomatic correspondence mentioned in the bibliography of the article Europe: History. Under the Russian title " Zapiska grapha Joanna Capodistrias " is published in the series of the Imperial Russian Historical Society,vol.iii. p. 163 (St Petersburg, 1868) theApercude ma carribre publique, written by Capo d'Istria for presentation to the emperor Alexander, and dated at Geneva Jf December 1826. Of unpublished materials may be mentioned the letters of Capo d'Istria to Sir Richard Church.vol. xvi. of the Church Papers in the British Museum (Add. MSS. 36453- 36571). See further bibliography to chapter vi. of vol. x. of the Cambridge Modern History (1907). (W. A. P.)

CAPODISTRIA, a town and seaport of Austria, in Istria, 15 m. S.W. of Trieste by rail. Pop. (1900) 10,711, mostly Italians. It is situated on a small island, which occupies the end of a large bay in the Gulf of Trieste, and which is connected with the mainland by a causeway half a mile in length. Capodistria is an old town with small streets, and has preserved remarkably well its Italian, almost its Venetian character. The most noteworthy buildings are the cathedral, the town-hall and the Loggia or the old law-court, all situated in the principal square. In addition to the extraction of salt from the sea in the extensive salt works near the town, fishing and shipbuilding are the other principal occupations of the population. Trade is chiefly in sea-salt, wine and oil. Capodistria is usually identified with the town of Aegida, mentioned by Pliny, which appears by an inscription to have afterwards received (in the 6 th century) the name of Justinopolis from Justin II. When at the beginning of the 13th century Istria fell into the hands of the patriarchs of Aquileia, they made this town the capital of the whole province. Thence it acquired its actual name, which means the capital of Istria. It was captured by the Venetians in 1279, and passed into Austrian possession in 1797.

CAPONIER (from the Fr. caponniere, properly a capon-cote or house), in fortification, a work constructed in the ditch of a ' fort. Its fire (musketry, machine-guns, case shot, &c.) sweeps the bottom of the ditch and prevents an enemy from establishing himself in it. The term is used in a military sense as early as in

the late 17th century. In various bastioned systems of fortification a caponier served merely as a covered means of access to outworks, the bastion trace providing for the defence of the ditch by fire from the main parapet.

CAPPADOCIA, in ancient geography, an extensive inland district of Asia Minor. In the time of Herodotus the Cappa* docians occupied the whole region from Mount Taurus to the Euxine. That author tells us that the name of the Cappadocians (Katpatouka) was applied to them by the Persians, while they were termed by the Greeks " Syrians," or " White Syrians " (Leucosyri). Under the later kings of the Persian empire the

were divided into two satrapies or governments, the one comprising the central and inland portion, to which the name of Cappadocia continued to be applied by Greek geographers, while the other was called Cappadocia Kara Uovrov, or simply Pontus (q.v.). This division had already come about before the time of Xenophon. As after the fall of the Persian government the two provinces continued to be separate, the distinction was perpetuated, and the name Cappadocia came to be restricted to the inland province (sometimes called Great Cappadocia), which alone will be considered in the present article.

Cappadocia, in this sense, was bounded S. by the chain of Mount Taurus, E. by the Euphrates, N. by Pontus, and W. vaguely by the great central salt " Desert " (Axylon). But it is impossible to define its limits with accuracy. Strabo, the only ancient author who gives any circumstantial account of the country, greatly exaggerated its dimensions; it was in reality about 250 m. in length by less than 150 in breadth. With the exception of a narrow strip of the district called Melitene, on the east, which forms part of the valley of the Euphrates, the whole of this region is a high upland tract, attaining to more than 3000 ft., and constituting the most elevated portion of the great tableland of Asia Minor (q.v.) . The western parts of the province, where it adjoins Lycaonia, extending thence to the foot of Mount Taurus, are open treeless plains, affording pasture in modern as in ancient times to numerous flocks of sheep, but almost wholly desolate. But out of the midst of this great upland level rise detached groups or masses of mountains, mostly of volcanic origin, of which the loftiest are Mount Argaeus (still called by the Turks Erjish Dagh), (13,100 ft.), and Hassan Dagh to the southwest (8000 ft.).

The eastern portion of the province is of a more varied and broken character, being traversed by the mountain system called by the Greeks Anti-Taurus. Between these mountains and the southern chain of Taurus, properly so called, lies the region called in ancient times Cataonia, occupying an upland plain surrounded by mountains. This district in the time of Strabo formed a portion of Cappadocia and was completely assimilated; but earlier writers and the Persian military system regarded the Cataonians as a distinct people.

Cappadocia contained the sources of the Sarus and Pyramus rivers with their higher affluents, and also the middle course of

the Halys (see Asia Minor) , and the whole course of the tributary of Euphrates now called Tokhma Su. But as no one of these rivers was navigable or served to fertilize the lands along its torrential course, none has much importance in the history of the province.

The kingdom of Cappadocia, which was still in existence in the time of Strabo, as a nominally independent state, was divided, according to that geographer, into ten districts. Of these Cataonia has been described; the adjoining district of Melitene, which did not originally form part of Cappadocia at all, but was annexed to it by Ariarathes I., was a fertile tract adjoining the Euphrates; its chief town retains the name of Malatia. Cilicia was the name given to the district in which Caesarea, the capital of the whole country was situated, and in which rose the conspicuous Mount Argaeus. Tyanitis, the region of which Tyana was the capital, was a level tract in the extreme south, extend- ing to the foot of Mount Taurus. Garsauritis appears to have comprised the western or south-western districts adjoining Lycaonia; its chief town was Archelais. Laviansene or Laviniane was the country south and south-east of Sivas, through which ran the road from Sebastea to Caesarea: Sargarausene lay south of the above, and included Uzun Yaila and the upper basin of the Tokhma Su; Saravene lay west of Laviansene and included the modern district of Ak Dagh; Chamanene lay west again of the above along the middle course of the Halys: Morimene was the north-western district extending along the edge of the central desert as far south as Melegob.

The only two cities of Cappadocia considered by Strabo to deserve that appellation were Mazaca, the capital of the kingdom under its native monarchs (see Caesarea-Mazaca) ; and Tyana, not far from the foot of the Taurus, the site of which is marked by

a great mound at a place called Kiz (or Ekuz) Hissar, about 12 m. south-west of Nigdeh. Archelais, founded by Archelaus, the last king of the country, subsequently became a Roman colony, and a place of some importance. It is now Akserai.

Several localities in the Cappadocian country were the sites of famous temples. Among these the most celebrated were those of Comana (q.v.) and Venasa in Morimene, where a male god was served by over 3000 hieroduli. The local sanctity of Venasa has been perpetuated by the Moslem veneration for Haji Bektash, the founder of the order of dervishes to which the Janissaries used in great part to belong. Cappadocia was remarkable for the number

of its slaves, which constituted the principal wealth of its monarchs. Large numbers were sent to Rome but did not enjoy a good reputation. The Cappadocian peasants are still in the habit of taking service in the West of the peninsula and only returning to their homes after long absences; their labour is now much valued by employers, as they are a strong sober folk. The province was celebrated for its horses, as well as for its vast flocks of sheep; but from its elevation above the sea, and the coldness of its climate, it could never have been rich and fertile.

History. — Nothing is known of the history of Cappadocia before it became subject to the Persian empire, except that the country was the home of a great " Hittite " power centred at Boghaz-Keui (see Pteria), which has left monuments at many places, e.g. Nevsheher, Fraktin, Gorun, Malatia, various points about Albistan and Derendeh, Bulgur Maden, Andaval and Tyana. Possibly the princes of the last named city were inde- pendent. With the decline of the Syro-Cappadocians after their defeat by Croesus, Cappadocia was left in the power of a sort of feudal aristocracy, dwelling in strong castles and keeping the peasants in a servile condition, which later made them apt for foreign slavery. It was included in the third Persian satrapy in the division established by Darius, but long continued to be governed by rulers of its own, none apparently supreme over the whole country and all more or less tributary to the Great King. Thoroughly subdued at last by the satrap Datames, Cappadocia recovered independence under a single ruler, Ariarathes (hence called Ariarathes I.), who was a contemporary of Alexander the Great, and maintained himself on the throne of Cappadocia after the fall of the Persian monarchy.

The province was not visited by Alexander, who contented himself with the tributary acknowledgment of his sovereignty made by Ariarathes before the conqueror's departure from Asia Minor; and the continuity of the native dynasty was only in- terrupted for a short time after Alexander's death, when the kingdom fell, in the general partition of the empire, to Eumenes. His claims were made good in 322 by the regent Perdiccas, who crucified Ariarathes; but in the dissensions following Eumenes's death, the son of Ariarathes recovered his inheritance and left it to a line of successors, who mostly bore the name of the founder of the dynasty/ Under the fourth of the name Cappadocia came into relations with Rome, first as a foe espousing the cause of Antiochus the Great, then as an ally against Perseus of Macedon. The kings henceforward threw in their lot with the Republic as

against the Seleucids, to whom they had been from time to time tributary. Ariarathes V. marched with the Roman proconsul Crassus against Aristonicus, a claimant to the throne of Pergammum, and their forces were annihilated (130 B.C.). The imbroglio which followed his death ultimately led to interference by the rising power of Pontus and the intrigues and wars which ended in the failure of the dynasty. The Cappadocians, supported by Rome against Mithradates, elected a native lord, Ariobarzanes, to succeed (93 B.C.); but it was not till Rome had disposed at once of the Pontic and Armenian kings that his rule was established (63 B.C.). In the civil wars Cappadocia was now for Pompey, now for Caesar, now for Antony, now against him. The Ariobarzanes dynasty came to an end and a certain Archelaus reigned in its stead, by favour first of Antony, then of Octavian, and maintained tributary independence till a.d. 17, when the emperor Tiberius, on Archelaus's death in disgrace, reduced Cappadocia at last to a province. Vespasian in a.d. 70

joined Armenia Minor to it and made the combined province a frontier bulwark. It remained, under various provincial redistributions, part of the Eastern Empire till late in the nth century, though often ravaged both by Persians and Arabs. But before it passed into Seljuk hands (1074), and from them ultimately to the Osmanlis, it had, already become largely Armenian in religion and speech; and thus we find the southern part referred to as " Hermeniorum terra " by crusading chroniclers. At this day the north-east and east parts of the province are largely inhabited by Armenians. The native kings had done much to Hellenize Cappadocia, which had previously received a strong Iranian colour; but it was left to Christianity to com- plete their work. Though pre-Hellenic usages long survived in the local cults and habits, a part of the people has remained more or less Hellenic to this day, in spite of its envelopment by Moslem conquerors and converts. The tradition of its early church, illuminated by the names of the two Gregories and Basil of Caesarea, has been perpetuated by the survival of a native Orthodox element throughout the west and north-west of the province; and in the remoter valleys Greek speech has never wholly died out. Its use has once more become general under Greek propagandist influence, and the Cappadocian " Greeks " are now a flourishing community.

Bibliography. — W. Wright, Empire of the Hittites (1884); G. Perrot and C. Chipiez, Hist, de fart dans V antiquite, vol. iv. (1886); A. H. Sayce, Hittites (1892) (see also Pteria) ; J. G. Droysen, Gesch. des Hellenismus (3rd ed., 1878); A. Holm, Gesch. Griech. (Eng. trans., 1886) ; Th. Reinach, Mithridate Eupator (1890) ; E. R. Bevan, House of Seleucus (1902) ; Th. Mommsen, Provinces of the Roman Empire (Eng. trans., 1886) ; J. Marquardt, Rom. Staatsver- waltung, i. (1874) ; W. M. Ramsey, Hist. Geog. of Asia Minor (1890) ; C. Ritter, Erdkunde, xviii. xix. (1858-1859); D. G. Hogarth and J. A. R. Munro, Mod. and Anc. Roads in E. Asia Minor (R. G. S. Supp. Papers, iii. 1893); G. Perrot, Souvenirs d'un voyage dans VA. Mineure (1864); H. J. v. Lennep, Travels in Asia Minor (1870); E. Chantre, Mission en Cappadocie (1898) ; H. F. Tozer, Turkish Armenia (1881); H. C. Barkley, Ride Through A. M. and Armenia (1891); Lord Warkworth, Notes of a Diary in As. Turkey (1898); M. Sykes, Bar id-Islam (1904). (E. H. B. ; D. G. H.)

CAPPEL, a French family which produced some distinguished jurists and theologians in the 15th and 16th centuries. In 1491, Guillaume Cappel, as rector of the university of Paris, protested against a tithe which Innocent VIII. claimed from that body. His nephew, Jacques Cappel (d. 1541), the real founder of the family, was himself advocate-general at the parlement of Paris, and in a celebrated address delivered before the court in 1537, against the emperor Charles V., claimed for Francis I. the counties of Artois, Flanders and Charolais. He left nine chil- dren, of whom three became Protestants. The eldest, Jacques (1529-1586), sieur du Tilloy, wrote several treatises on juris- prudence. Louis (1534-1586), sieur de Moriambert, the fifth son, was a most ardent Protestant. In 1570 he presented a confession of faith to Charles IX. in the name of his co-re- ligionists. He disputed at Sedan before the due de Bouillon with the Jesuit, Jean Maldonat (1534-1583), and wrote in de- fence of Protestantism. The seventh son, Ange (1537-1623), seigneur du Luat, was secretary to Henry IV., and enjoyed the esteem of Sully. Among those who remained Catholic should be mentioned Guillaume, the translator of Machiavelli. The eldest son Jacques also left two sons, famous in the history of Pro- testantism: — Jacques (1570-1624), pastor of the church founded by himself on his fief of le Tilloy and afterwards at Sedan, where he became professor of Hebrew, distinguished as historian, philologist and exegetical scholar; and Louis (see below).

On the protest of Guillaume Cappel, see Du Bellay, Historia

Universitatis Parisicnsis, vol. y. On the family, see the sketch by another Jacques Cappel, " De Capellorum gente," in the Commentarii et notae criticae in Vetus Testamentum of Louis Cappel, his father (Amsterdam, 1689). Consult Eugene and Emile Haag, La France protestante, vol. iii. (new edition, 1881).

CAPPEL, LOUIS (1585-1658), French Protestant divine and scholar, a Huguenot whose descent is traced above, was born at St Elier, near Sedan, in 1585. He studied theology at Sedan and Saumur; and Arabic at Oxford, where he spent two years. At the age of twenty-eight he accepted the chair of

Hebrew at Saumur, and twenty years afterwards was appointed professor of theology. Amongst his fellow lecturers were Moses Amyraut and Josue de la Place. As a Hebrew scholar he made a special study of the history of the Hebrew text, which led him to the conclusion that the vowel points and accents are not an original part of the Hebrew language, but were inserted by the Massorete Jews of Tiberias, not earlier than the 5th century A.D., and that the primitive Hebrew characters are those now known as the Samaritan, while the square characters are Aramaic and were substituted for the more ancient at the time of the captivity. These conclusions were hotly contested by Johannes Buxtorf, being in conflict with the views of his father, Johannes Buxtorf senior, notwithstanding the fact that Elias Levita had already disputed the antiquity of the vowel points and that neither Jerome nor the Talmud shows any acquaintance with them. His second important work, Critica Sacra, was distasteful from a theological point of view. He had completed it in 1634; but owing to the fierce opposition with which he had to contend, he was only able to print it at Paris in 1650, by aid of a son, who had turned Catholic. The various readings in the Old Testament text and the differences between the ancient versions and the Massoretic text convinced him that the idea of the integrity of the Hebrew text, as commonly held by Pro- testants, was untenable. This amounted to an attack on the verbal inspiration of Scripture. Bitter, however, as was the opposition to his views, it was not long before his results were accepted by scholars.

Cappel was also the author of Annotationes et Commentarii in Vetus Testamentum, Chronologia Sacra, and other biblical works, as well as of several other treatises on Hebrew, among which are the Arcanum Punctuationis revelatum (1624) and the Diatriba de veris et antiquis Ebraeorum Uteris (1645). His Commentarius de Capellorum gente, giving an account of the family to which he

belonged, was published by his nephew James Cappel (1 639-1 722), who, at the age of eighteen, became professor of Hebrew at Saumur, but, on the revocation of the edict of Nantes, fled to England, where he died in 1722. See Herzog-Hauck, Realencyklopddie.

CAPPELLO, BIANCA (1548-1587), grand duchess of Tuscany, was the daughter of Bartolommeo Cappello, a member of one of the richest and noblest Venetian families, and was famed for her great beauty. At the age of fifteen she fell in love with Pietro Bonaventuri, a young Florentine clerk in the firm of Salviati, and on the 28th of November 1563 escaped with him to Florence, where they were married and she had a daughter named Pellegrina. The Venetian government made every effort to have Bianca arrested and brought back, but the grand duke Cosimo de' Medici intervened in her favour and she was left unmolested. However she did not get on well with her husband's family, who were very poor and made her do menial work, until at last her beauty attracted Francesco, the grand duke's son, a vicious and unprincipled rake. Although already married to the virtuous and charming Archduchess Giovanna of Austria, he seduced the fair Venetian and loaded her with jewels, money and other presents. Bianca's accommodating husband was given court employment, and consoled himself with other ladies; in 1572 he was murdered in the streets of Florence in consequence of some amorous intrigue, though possibly Bianca and Francesco were privy to the deed. On the death of Cosimo in 1 574 Francesco succeeded to the grand duchy; he now installed Bianca in a fine palace close to his own and outraged his wife by flaunting his mistress before her. As Giovanna had borne Francesco no sons, Bianca was very anxious to present him with an heir, for otherwise her position would remain very insecure. But although she resorted to all sorts of expedients, even to that of trying to pass off a changeling as the grand duke's child, she was not successful. In 1578 Giovanna died; a few days later Francesco secretly married Bianca, and on the 10th of June, 1579, the marriage was publicly announced. The Venetian government now put aside its resentment and was officially represented at the magnificent w r edding festivities, for it saw in Bianca Cappello an instrument for cementing good relations with Tuscany. But the long expected heir failed to come, and Bianca realized that if her husband were to die before her she was lost, for his family, especially his brother Cardinal

Ferdinand, hated her bitterly, as an adventuress and interloper. In October 1587 both the grand duke and his wife died of colic within a couple of days of each other. At the time poison was suspected, but documentary evidence has proved the suspicion to be unfounded.

See S. Romanin, Lezioni di storia Veneta, vol. ii. (Florence, 1875) ; G. E. Saltini, Tragedie Medicee domestiche (Florence, 1898).

(L.V.*)

CAPPERONNIER, CLAUDE (1671-1744), French classical scholar, the son of a tanner, was born at Montdidier on the 1st of May 1671. He studied at Amiens and Paris, and took orders in the Church of Rome, but devoted himself almost entirely to classical studies. He declined a professorship in the university of Bale, and was afterwards appointed (1722) to the Greek chair in the College de France. He published an edition of Quintilian (1725) and left behind him at his death an edition of the ancient Latin Rhetoricians, which was published in 1756. He furnished much material for Robert Estienne's Thesaurus Linguae Latinae. His nephew, Jean Capperonnier (1716-1775), his successor in the chair of Greek at the College de France, was also a distin- guished scholar, and published valuable editions of classical authors — Caesar, Anacreon, Plautus, Sophocles.

CAPPONI, GINO, Marquis (1792-1876), Italian statesman and historian, was born on the 13th of September 1702. The Capponi family is one of the most illustrious Florentine houses, and is mentioned as early as 1250; it acquired great wealth as a mercantile and banking firm, and many of its members distinguished themselves in the service of the republic and the Medicis (see Capponi, Piero), and later in that of the house of Lorraine. Gino was the son of the Marquis Pier Roberto Capponi, a nobleman greatly attached to the reigning grand duke of Tuscany, Ferdinand III. When that prince was deposed by the French in 1799 the Capponi family followed him into exile at Vienna, where they remained until he exchanged his rights to the grand duchy for a German principality (1803). The Capponi then returned to Florence, and in 181 1 Gino married the marchesina Giulia Riccardi. Although the family were very anti-French Gino was chosen with other notables to pay homage to Napoleon in Paris in 1 813. On the fall of Napoleon Ferdinand returned to

Tuscany (September 1814), but the restora- tion proved less reactionary there than in any other part of Italy. Young Capponi was well received at court, but not being satisfied with the life of a mere man of fashion, he devoted himself to serious study and foreign travel. After sundry journeys in Italy he again visited Paris in 1818, and then went to England. He became deeply interested in English institutions, and care- fully studied the constitution, the electoral system, university life, industrial organization, &c. At Edinburgh he met Francis Jeffrey, the editor of the Edinburgh Review, and conceived a desire to found a similar review in Italy. Besides knowing Jeffrey he made the acquaintance of many prominent statesmen and men of letters, including Lord John. Russell, the duke of Bedford, Dugald Stewart, Ugo Foscolo, &c. This visit had a great effect in forming his character, and while it made him an ardent Anglophil, he realized more and more the distressing conditions of his own country. He returned to Italy in 1820, and on reaching Florence he set to work to found a review on the lines of the Edinburgh, which should attract the best literary talent. This he achieved with the help of the Swiss G. P. Vieusseux, and the result was the Antologia. He contributed largely to its columns, as well as to those of the Archivio Storico, another of Vieusseux's ventures. Capponi began to take a more active interest in politics, and entered into communication with the Liberals of all parts of Italy. He had discussed the possibility of liberating Italy with Prince Charles Albert of Savoy-Carignano, to whom he had ijtfroduced the Milanese revolutionist Count Confalonieri (?.».). But the collapse of the rising of 1821 and the imprisonment of Confalonieri made Capponi despair of achieving anything by revolution, and he devoted himself to the economic development of Tuscany and to study. At his beautiful villa of Varramista he collected materials for a history of the Church; his work was interrupted

by family troubles and by increasing blindness, but although by 1844 he had completely lost his sight he continued to work by means of amanuenses. In 1847 he again plunged into politics and discussed plans for an Italian alliance against Austria. When the grand duke Leopold II. decided in 1848 to grant his people a constitution, Capponi was made a member of the commission to draw it up, and he eventually became prime minister. During his short tenure of office he conducted foreign affairs with great skill, and made every effort to save the Italian situation after the defeat of Charles Albert on the Mincio. In October 1848 he

resigned; soon afterwards the grand duke fled, anarchy followed, and then in 1849 he returned, but with an escort of Austrian soldiery. The blind statesman thanked God that he could not see the hated white uniforms in Florence. He returned to his studies and commenced his great Storia della Repubblica di Firenze; but he followed political affairs with great interest, and helped to convince Lord John Russell, who stayed with him in 1859, of the hopelessness of the grand duke's position. On Leopold's second flight (27th of April 1859) a Tuscan assembly was summoned, and Capponi elected member of it. He voted for the grand duke's deposition and for the union of Tuscany with Piedmont. King Victor Emmanuel made him senator in i860. His last years were devoted almost exclusively to his Florentine history, which was published in 1875 and achieved an immediate success. This was Capponi's swan song, for on the 3rd of February 1876 he died at the age of eighty-four.

Capponi was one of the best specimens of the Tuscan landlord class. " He represents," wrote his biographer Tabarrini, " one of the most striking personalities of a generation, now wholly passed away, which did not resign itself to the beatitudes of 181 5, but wished to raise Italy from the humble state to which the European peace of that year had condemned her; and he succeeded by first raising the character of the Italians in the opinion of foreigners, so as to deserve their esteem and respect." He knew nearly all the most interesting people in Italy, besides many distinguished foreigners: Giuseppe Giusti, the poet, A. Manzoni, the novelist, Niccolo Tommaseo, Richard Cobden, A. von Reumont, the historian, were among those whom he entertained at his palace or his villas, and many were the struggling students and revolutionists to whom he gave assistance. As a historian his reputation rests on his Storia della Repubblica di Firenze (Florence, 1875); it was the first comprehensive Italian book on the subject based on documents and written in a modern critical spirit, and if the chapters on the early history of the city are now obsolete in view of recent discoveries, yet, as a whole, it remains a standard work. Besides his history a large number of essays and pamphlets have been published in his Scritti Inediti.

See M. Tabarrini, Gino Capponi (Florence, 1879) ; and A. voa Reumont, Gino Capponi (Gotha, 1880). (L. V.*)

CAPPONI, PIERO (144 7-1496), Florentine statesman and warrior. He was at first intended for a business career, but Lorenzo de' Medici, appreciating his ability, sent him as am- bassador to

various courts, where he acquitted himself with distinction. On the death of Lorenzo (1492), who was succeeded by his son, the weak and incapable Piero, Capponi became one of the leaders of the anti-Medicean faction which two years later expelled him from Florence. Capponi was then made chief of the republic and conducted public affairs with great skill, notably in the difficult negotiations with Charles VIII. of France, who had invaded Italy in 1494 and in whose camp the exiled Medici had taken refuge. In November Charles, on his way to Naples, entered Florence with his army, and immediately began to behave as though he were the conqueror of the city, because he had entered it lance in rest. The signory was anxious to be on good terms with him, but when he spoke in favour of the Medici their temper changed at once, and the citizens were ordered to arm and be prepared for all emergencies. Tumults broke out between French soldiers and Florentine citizens, barricades were erected and stones began to fly from the windows. This alarmed Charles, who lowered his tone and said nothing more

about conquered cities or the Medici. The Florentines were willing to pay him a large sum of money, but in settling the amount further disagreements arose. Charles, who was full of the Medici's promises, made exorbitant demands, and finally presented an ultimatum to the signory, who rejected it. " Then we shall sound our trumpets," said the king, to which Capponi replied " And we shall toll our bells," and tore up the ultimatum in the king's face. Charles, who did not relish the idea of house-to-house fighting, was forced to moderate his claims, and concluded a more equitable treaty with the republic. On the 28th of November he departed, and Capponi was appointed to reform the government of Florence. But being more at home in the camp than in the council chamber, he was glad of the opportunity of leading the armies of the republic against the Pisan rebels. He proved a most capable general, but while besieging the castle of Soiana, he was killed on the 25th of September 1496. His death was greatly regretted, for the Florentines recognized in him their ablest statesman and warrior.

See under Savonarola, Florence, Medici, Charles VIII. The " Vita di Piero di Gino Capponi," by V. Acciaiuoli (published in the Archivio Storico Italiano, series 1, vol. iv. part 2", 1853), is the

chief contemporary authority; see also P. Villari, Savonarola, vol. i. (Florence, 1 887) , and Gino Capponi, Storia della Repubblica di Firenze, vol. ii. (Florence, 1875). (L. V.*)

CAPRAIA (anc. Capraria, from Lat. capra, wild-goat), an island of Italy, off the N.W. coast (the highest point 1466 ft. above sea-level), belonging to the province of Genoa, 42 m. S.S.E. of Leghorn by sea. Pop. (1901) 547. It is of volcanic origin, and is partly occupied by a penal agricultural colony. It pro- duces wine, and is a centre of the anchovy fishery. It became Genoese in 1527 and was strongly fortified. In 1796 it was occupied for a short time by Nelson. About 20 m. to the north is the island of Gorgona (highest point 836 ft.), also famous for its anchovies.

CAPRERA, an island off the N.E. coast of Sardinia, about 1 m. in length. It is connected by a bridge with La Madda- lena. Its chief interest lies in its connexion with Garibaldi, who first established himself there in 1854, and died there on the 2nd of June 1882. His tomb is visited on this anniversary by Italians from all parts. Roman remains, including a bust of Maximian, have been found upon the island.

CAPRI (anc. Capreae), an island on the S. side of the Bay of Naples, of which it commands a fine view; it forms part of the province of Naples, and is distant about 20 m. S. of the town of Naples. Pop. (1901) of the commune of Capri, 3890, of Anacapri, 2316. It divides the exits from the bay into two, the Bocca Grande, about 16 m. wide, between Capri and Ischia, and the Bocca Piccola, 3 m. wide between Capri and the extreme south-west point of the peninsula of Sorrento. It is 4 m. in length and the greatest width is 15 m., the total area being 55 sq. m. The highest point is the Monte Solaro (1920 ft.) on the west, while at the east end the cliffs rise to a height of 900 ft. sheer from the sea. The only safe landing-place is on the north side. There are two small towns, Capri (45*.ft.) and Anacapri (980 ft.), which until the construction of a carriage road in 1874 were connected only by a flight of 784 steps (the substructures of which at least are ancient). The island lacks water, .and is dusty during drought, but is fertile, producing fruit, wine and olive oil; the indigenous flora comprises 800 species. The fishing industry also is important. But the prosperity of the island depends mainly upon foreign visitors (some 30,000 annually), who are attracted by the remarkable beauty of the scenery (that of the coast being especially fine), the views of the sea and of the Bay of Naples, and the purity of the air. The famous Blue Grotto, the most

celebrated of the many caves in the rocky shores of the island, was known in Roman times, but lost until 1826, when it was rediscovered. Another beautiful grotto has green instead of blue refractions; the effect in both cases is due to the light t entering by a small entrance.

The high land in the west of the island and the somewhat less elevated region in the east are formed of Upper Tithonian and Lower Cretaceous limestones, the latter containing Rudistes.

The intervening depression, which seems to be bounded on the west by a fault, is filled to a large extent by sandstones and marls of Eocene age. A superficial layer of recent volcanic tuffs occurs in several parts of the island. The Blue Grotto is in the Tithonian limestones; it shows indications of recent changes of level. ,.,

The earliest mythical inhabitants (though some have localized the Sirens here) are the Teleboi from Acarnania under their king Telon. Neolithic remains were found in 1882 in the Grotta delle Felci, a cave on the south coast. In historical times we find the island occupied by Greeks. It subsequently fell into the hands of Neapolis, and remained so until the time of Augustus, who took it in exchange for Aenaria (Ischia) and often resided there. Tiberius, who spent the last ten years of his life at Capri, built no fewer than twelve villas there; to these the great majority of the numerous and considerable ancient remains on the island belong. All these villas can be identified with more or less certainty, the best preserved being those on the east extremity, consisting of a large number of vaulted substructures and the foundations perhaps of a pharos (lighthouse). One was known as Villa Jo vis, and the other eleven were probably named after other deities. The existence of numerous ancient cisterns shows that in Roman as in modern times rain-water was largely used for lack of springs. After Tiberius's death the island seems to have been little visited by the emperors, and we hear of it only as a place of banishment for the wife and sister of Commodus. The island, having been at first the property of Neapolis, and later of the emperors, never had upon it any community with civic rights. Even in imperial times Greek was largely spoken there, for about as many Greek as Latin inscriptions have been found. The medieval town was on the north side at the chief landing-place (Marina Grande), and to it belonged the church of S. Costanzo, an early Christian building. It was abandoned in the 15th century on account of the inroads of pirates, and the inhabitants took refuge higher up at the two towns of Capri and Anacapri.

In 1806 the island was taken by the English fleet under Sir Sidney Smith, and strongly fortified, but in 1808 it was retaken by the French under Lamarque. In 1813 it was restored to Ferdinand I. of the Two Sicilies.

See J. Beloch, Campanien (Breslau, 1890), 278 seq.; G. Feola, Rapporto sullo stato dei ruderi Augusto-Tiberiani — MS. inedito, publicato dal Dott. Ignazio Cerio (Naples, 1894); F. Furchheim, Bibliografia dell' Isola di Capri e della provincia Sorrentina (Naples, 1899); C. Weichhardt, Das Schloss des Tiberius und andere Romer- bauten auf Capri (Leipzig, '1900). (T. As.)

CAPRICCIO, or Caprice (Ital. for a sudden motion or fancy), a musical term for a lively composition of an original and fantastic nature, not following a set musical form, although the first known, written for the harpsichord, partook of the nature of a fugue. The word is also used for pieces of a fanciful type, in the nature of transcriptions and variations.

CAPRICORNUS ('.'The Goat"), in astronomy, the tenth sign of the zodiac (q.v.), represented by the symbol!? intended to denote the crooked horns of this animal. The word is derived from Lat. caper, a goat, and cornu, a horn. It is also a constella- tion of the southern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.); Ptolemy and Tycho Brahe catalogued 28 stars, Hevelius gave 29. It was represented by the ancients as a creature having the forepart a goat, and the hindpart a fish, or sometimes simply as a goat. An interesting member of this constellation is a-Capricorni, a pair of stars of 3rd and 4th magnitudes, each of which has a companion of the 9th magnitude.

CAPRIFOLIACEAE, a natural order of plants belonging to the sympetalous or higher division of Dicotyledons, that namely which is characterized by having the petals of the flower united. The plants are mainly shrubs and trees; British representatives are Sambticus (elder) , Viburnum (guelder-rose and wayfaring tree), Lonicera (honeysuckle) (see fig.); Adoxa (moschatel), a small herb with a creeping stem and small yellowish-green flowers, is occasionally found on damp hedge-banks; Linnaea, a slender creeping evergreen with a thread-like stem and pink bell-shaped

CAPRIVI DE CAPRERA DE MONTECUCCOLI

flower, a northern plant, occurs in fir-forests and plantations in the north of England and Scotland. The leaves are opposite, simple as in honeysuckle, or compound as in elder; they have usually no stipules. The flowers are regular as in Viburnum

Flowering shoot of Lonicera Caprifolium, slightly reduced. 1 , Fruit slightly reduced; 2, horizontal plan of arrangement of flower.

and Sambucus, more rarely two-lipped as in Lonicera; the sepals and petals are usually five in number and placed above the ovary, the five stamens are attached to the corolla-tube, there are three to five carpels, and the fruit is a berry as in honeysuckle or snowberry (Symphoricarpus), or a stone fruit, with several, usually three, stones, as in Sambucus.

In Sambucus and Viburnum the small white flowers are massed in heads; honey is secreted at the base of the styles and, the tube of the flower being very short, is exposed to the visits of flies and insects with short probosces. The flowers of Lonicera, which have a long tube, open in the evening, when they are sweet-scented and are visited by hawk-moths. The order contains about 250 species, chiefly natives of the north temperate zone and the mountains of the tropics. Several genera afford ornamental plants; such are Lonicera, erect shrubs or twiners with long-tubed white, yellow or red flowers; Symphoricarpus, a North American shrub, with small whitish pendulous flowers and white berries; Diervilla (also known as Weigelia), and Viburnum, including V. Opulus, guelder rose, in the cultivated forms of which the corolla has become enlarged at the expense of the essential organs and the flowers are neuter.

CAPRIVI DE CAPRERA DE MONTECUCCOLI, GEORG LEO VON, Count (1 831-1899), German soldier and statesman, was born on the 24th of February 183 1 at Charlottenburg. The family springs from Carniola, and the name was originally written Kopriva; in the 18th century one branch settled in Wernigerode, and several members entered the Prussian service; the father of the chancellor held a high judicial post, and was made a life member of the Prussian House of Lords. Caprivi was educated in Berlin, and entered the army in 1849; he took part in the campaign of 1866, being attached to the staff of the 1st army. In 1870 he served as chief of the staff to the 10th army corps, which formed

part of the 2nd army, and took part in the battles before Metz as well as in those round Orleans, in which he highly distinguished himself. One of the most delicate strategical problems of the whole war was the question of whether to change the direction of the 10th corps on the morning of the 1 6th of August before Vionville, and in this, as well as in the

actual manoeuvres of the corps on that day, Caprivi, as representative of, and counsellor to, his chief, General v. Voigts-Rhetz, took a leading part. At the battle of Beaune-la-Rolande, the turning-point of the Orleans campaign, the- 10th corps bore the brunt of the fighting. After the peace he held several important military offices, and in 1883 was made chief of the admiralty, in which post he had to command the fleet and to organize and represent the department in the Reichstag. He resigned in 1888, when the command was separated from the representation in parliament, and was appointed commander of the 10th army corps. Bismarck had already referred to him as a possible successor to himself, for Caprivi had shown great administrative ability, and was unconnected with any political party; and in March 1890 he was appointed chancellor, Prussian minister president and foreign minister. He was quite unknown to the public, and the choice caused some surprise, but it was fully justified. The chief events of his administration, which lasted for four years, are narrated elsewhere, in the article on Germany. He showed great ability in quickly mastering the business, with which he was hitherto quite unacquainted, as he himself acknowledged; his speeches in the Reichstag were admirably clear, dignified and to the point. His first achievement was the conclusion in July 1890 of a general agreement with Great Britain regarding the spheres of influence of the two countries in , Africa. Bismarck had supported the colonial parties in Germany in pretensions to which it was impossible for Great Britain to give her consent, and the relations between the two powers were in consequence somewhat strained. Caprivi adopted a conciliatory attitude, and succeeded in negotiating terms with Lord Salisbury which gave to Germany all she could reasonably expect. But the abandonment of an aggressive policy in East Africa and in Nigeria, and in the withdrawal of German claims to Zanzibar (in exchange for Heligoland) aroused the hostility of the colonial parties, who bitterly attacked the new chancellor. Caprivi had, however, by making the frontiers of the Congo Free State and German East Africa meet, ” cut ” the Cape to Cairo connexion of the British, an achievement which caused much

dismay in British colonial circles, regular treaties having been obtained from native chiefs over large areas which the chancellor secured for Germany. In Nigeria also Caprivi by the 1890 agreement, and by another concluded in 1893, made an excellent bargain for his country, while in South-West Africa he obtained a long but narrow extension eastward to the Zambezi of the German protectorate (this strip of territory being known as " Caprivi's Finger ") . In his African policy the chancellor proved far-sighted, and gained for the new protectorates a period for internal development and consolida- tion. The Anglo-German agreement of 1890 was followed by commercial treaties with Austria, Rumania, &c. ; by concluding them he earned the express commendation of the emperor and the title of count, but he was from this time relentlessly attacked by the Agrarians, who made it a ground for their distrust that he was not himself a landed proprietor; and from this time he had to depend much on the support of the Liberals and other parties who had been formerly in opposition. The reorganization of the army caused a parliamentary crisis, but he carried it through successfully, only, however, to earn the enmity of the more old-fashioned soldiers, who would not forgive him for shortening the period of service. His position was seriously compromised by the failure in 1892 to carry an education bill which he had defended by saying that the question at issue was Christianity or Atheism, and he resigned the presidency of the Prussian ministry, which was then given to Count Eulenburg. In 1894, a difference arose between Eulenburg and Caprivi concerning the bill for an amendment of the criminal code (the Umsturs Vorlage), and in October the emperor dismissed both. Caprivi's fall was probably the work of the Agrarians, but it was also due to the fact that, while he showed very high ability in conducting the business of the country, he made no attempt to secure his personal position by forming a party either in parlia- ment or at court. He interpreted his position rather as a soldier; he did his duty, but did not think of defending himself. He

suffered much from the attacks made on him by the followers of Bismarck, and he was closely associated with the social ostracism of that statesman; we do not know, however, in regard either to this or to the other events of his administration, to what extent Caprivi was really the author of the policy he carried out, and to

what extent he was obeying the orders of the emperor. With a loyalty which cannot be too highly praised, he always refused, even after his abrupt dismissal, to justify himself, and he could not be persuaded even to write memoirs for later publication. The last years of his life were spent in absolute retirement, for he could not return even to the military duties which he had left with great reluctance at the orders of the emperor. He died unmarried on the 6th of February 1899, at the age of sixty-eight. See R. Arndt, Die Reden des Grafen v. Caprivi (Berlin, 1894), with a biography. (J. W. He.)

CAPRONNIER, JEAN BAPTISTE (1814-1891), Belgian stained-glass painter, was born in Brussels in 18 14, and died there in 1891. He had much to do with the modern revival of glass-painting, and first made his reputation by his study of the old methods of workmanship, and his clever restorations of old examples, and copies made for the Brussels archaeological museum. He carried out windows for various churches in Brussels, Bruges, Amsterdam and elsewhere, and his work was commissioned also for France, Italy and England. At the Paris Exhibition of 1855 he won the only medal given for glass- painting.

CAPSICUM, a genus of plants, the fruits of which are used as peppers (see Cayenne Pepper for botany, &c). As used in medicine, the ripe fruit of the capsicum mimum (or fruiescans), containing the active principle capsaicin (cap- sacutin), first isolated by Thresh in 1876, has remarkable physiological properties. Applied locally to the skin or mucous membrane, it causes redness and later vesication. Internally in small doses it stimulates gastric secretions and causes dilatation of the vessels; but if used internally in excess for a long period it will cause subacute gastritis. In single doses in excess it causes renal irritation and inflammation and strangury. The adminis- tration of capsicum is valuable in atony of the stomach due to chronic alcoholism, its hot stimulating effect not only increasing the appetite but to a certain degree satisfying the craving for alcohol. It is also useful in the flatulency of the aged, where it prevents the development of gas, and has a marked effect on anorexia. It has been used in functional torpidity of the kidney. Externally capsicum plaster placed over the affected muscles is useful in rheumatism and lumbago. Capsicum wool, known as calorific wool, made by dissolving the oleoresin of capsicum in ether and pouring it on to absorbent cotton-wool, is useful in rheumatic affections.

CAPSTAN (also spelt in other forms, or as ” capstock ” and ” cable stock,” connected with the O. Fr. capestan or cabestan, from Lat. capistrum, a halter, capere, to take hold of; the conjecture that it came from the Span, cabra, goat, and estanto, standing, is untenable), an appliance used on board ship and on dock walls, for heaving-in or veering cables and hawsers, whether of iron, steel or hemp. It differs from a windlass, which is used for the same purposes, in having the axis on which the rope is wound vertical instead of horizontal. The word seems to have come into English (14th century) from French or Spanish ship- men at the time of the Crusades. The earlier forms were of a comparatively simple character, made of wood with an iron spindle and worked by manual labour with wooden capstan bars. As heavier cables were supplied to ships, difficulty was found, when riding at anchor, in holding, checking and – veering cable. A cable-holder (W. H. Harfield’s) was tested in H.M.S. ” New- castle ” (wooden frigate) in 1870 and proved effective; its first development in 1876 was the application in the form of a windlass secured to the deck, driven by a messenger chain from the capstan, fitted in H.M.S. ” Inflexible ” (fig. 1).

The capstans and engine are shown at A, A, A, and the windlass B is driven by messenger chains C, C. The four cables (dotted line D, D) lead to their respective cable-holders, fitted with a brake, and by these means each cable-holder can be connected

Fig. 1.

to the main driving shaft, and any cable hove-in or veered independently of the other; by using steam power instead of manual, the previous slow motion was obviated. In H.M.S. ” Col- ling wood ” steam power was used to work the windlass” directly by means of worm gearing; the windlass was divided into two parts, so that ; the one on the port side could be worked independently of that on the starboard, and vice versa. An independent capstan in both ships, arranged to take either of the cables, could be worked by hand or steam. In

the ” Collingwood’s ” windlass the cables remained on their holders, and could be hove-in or veered without being touched. Napier’s patent windlass for merchant ships (1906) resembles an appliance fitted in the earlier second-class cruisers of the British navy (1890 to 1900). Two cable wheels or cable-holders are mounted loose on a horizontal axle, one on each side of a worm wheel which is tightly keyed on the middle part of the axle. A

vertical steam engine with two cylinders, placed one on each side of the framing, drives a second horizontal axle which is connected by a set of bevel gears to an upright worm shaft, which works the worm wheel. This worm wheel can be connected by means of sliding bolts to one or both of the cable wheels, enabling one or both cables to be hove-in or veered as necessary. A brake, of Napier's self-holding differential type, is fitted to each cable wheel, and is controlled by hand wheels on the aft side of the windlass. For warping pur- poses, warping drums are fitted (made portable if required). A third central capstan, fitted forward of the windlass, is con- nected to the upright worm shaft by a horizontal shaft and bevel wheels. It can also be worked by manual labour with capstan bars. Fig. 2 represents the arrangement of the capstans on the forecastle of a battleship, fitted by Napier Brothers. Deep-

FlG. 2. — Elevation looking aft.

bodied capstans have been superseded by low drum-headed ones, over which the guns may be fired. The three capstans or cable-holders of cast steel, capable of taking 2\ in. cables, are fitted on vertical spindles, which pass down through the main and armoured decks to the platform one, where the steam engine and gearing are placed. The gearing consists of worm and wheel gears, so arranged that the three capstans can be worked singly or in conjunction, when heaving-in or veering, and the brakes (of the type previously mentioned) are controlled by a portable hand wheel fitted on the aft side of each. The cable-holders can be used for riding at anchor (see Cable). The middle line capstan E is keyed to vertical spindles and can be coupled up to the capstan engine, by clutch and drop bolts in the capstan engine room; it is fitted with a cable-holder, to take either the. port or starboard cables, and in addition is provided with portable whelps, enabling it to be used for warping. It can also be worked by manual labour with capstan bars, a drum-head E', fitted on the spindle on the main deck, enabling additional capstan bars to be used if required.

To avoid carrying steam pipes aft, the after capstan is worked

Fig. 3.

-Napier Brothers' capstan.

by an electric motor which is kept below the water-line. Napier Brothers' capstan (fig. 3) is for warping purposes, for working the stern anchor with wire hawser and for coaling. It is placed on the upper deck, and is fitted with a drum-head for capstan bars, with pawls and pawl rim on the deck plate, the pawls A being lifted and placed on their rests B when working with the motor. The upper portion of the capstan, together with its drum-head, is portable, being fixed to the centre boss with keys and gun-metal screws. The centre boss is keyed to the spindle, which passes through the deck and carries at its lower end a coupling for connecting to the worm wheel gear. For working by motor, the additional security of two drop bolts is provided. The gearing consists of a single worm and worm wheel, working in an oil-bath, the worm shaft being coupled direct to the motor spindle. The motor is of the semi-enclosed type, the working and live parts being protected by a perforated metallic covering; it is worked off a 100-volt circuit, at a speed under full load conditions of 300 revolutions per minute. The motor is of a 4-pole type and

compound wound, the shunt winding limiting the speed on light load to not more than 1000 revolutions per minute. A frictional break is provided, pulled off by means of a shunt- excited magnet. The controller is of the reversing drum type, with not less than four steps in either direction, and is fitted with a magnetic blow-out. The control is effected by a remov- able hand wheel on a portable pedestal, fitted on top with a circular dial plate and indi- cating pointer; the hand wheel reverses the current as well as graduates the speed in either direction. All capstans of the British navy, after being fitted on board ship, are tested for lifting power and speed; with foremost (steam) capstans, the steam being at 1 50 lb pressure, the anchor is usually let go in 16 to 25 fathoms water, and the speed ascertained by observing the time taken to heave-in not less than a length of cable, 75 ft.; the length must be hove-in in three minutes, or at the rate of 25 ft. per minute. With the after capstan (motor) of first-class battleships and cruisers, a weight is used instead of an anchor, the test being to lift 9 tons at the rate of 25 ft. per minute. Capstans on dock walls in British government dockyards are usually driven by hydraulic or air pressure, conveyed through pipes to small engines underneath the capstans. (J. W. D.)

CAPSULE (from the Lat. capsula, a small box), a term in botany for a dry seed vessel, as in the poppy, iris, foxglove, &c, containing one or more cells. When ripe the capsule opens and scatters the seed (see Botany). The word is used also for a small gelatinous case enclosing a dose of medicine, and for a metal cap or cover on bottles and jars. In anatomy the term is used to denote a cover or envelope partly or wholly surrounding a structure. Every diarthrodial joint possesses a fibrous or ligamentous capsule, lined with synovial membrane, attached to the adjacent ends of the articulating bones. The term is particularly applied to the sac which encloses the crystalline lens of the eye ; to Glisson's capsule, a thin areolar coat of fibrous tissue lying inside the tunica serosa of the liver; to the glomerular capsules in the kidney substance; to the suprarenal capsules, two small flattened organs in the epigastric region; and to the internal and external capsules of the brain (see Brain, fig. 14 and explanation).

CAPTAIN (derived from Lat. caput, head, through the Low Lat. capitanus), a chief or leader, in various connexions, but particularly a grade officer in the army or navy.

At sea the name of captain is given to all who command ships whether they belong to the military navy of their country or not, or whether they hold the substantive rank or not. Thus a lieutenant when in command of a vessel is addressed as captain.

In France a naval lieutenant is addressed as mon capitaine, because he has that comparative rank in the army. The master of a merchant ship is known as her captain. But the name is also used in the strict sense of foreman, or head man, to describe many of the minor or " petty " officers of a British or American man-of-war — the captain of a top, of the forecastle, or of a gun. The title " post captain " in the British navy means simply full captain, and is the equivalent of the French capitaine de vaisse.au. It had its origin in the fact that captains appointed to a ship of twenty guns and upwards were included in, or " posted " on, the permanent list of captains from among whom the admirals were chosen. The captain of the fleet is an officer who acts as chief of the staff to an admiral commanding a large force. The position is equivalent to flag rank, but is held by a captain. Staff captain is the highest grade of the officers entrusted with the nayigation of a ship or fleet.

The military rank of captain (Fr. capitaine, Ger. Hauptmann, or

in the cavalry, Rittmeister) , which was formerly the title of an officer of high rank corresponding to the modern general officer or colonel, has with the gradual subdivision and articulation of armies, come to be applied to the commanders of companies or squadrons, and in general to officers of the grade equivalent to this command (see Officers).

The title of ” captain-general ” was formerly used in the general sense of a military commander-in-chief, and is still similarly used in Spain. In the Spanish army there are eight captains-general, each of whom has command of a ” region ” corresponding to an army corps district. The same title was formerly given to the Spanish governors of the colonial provinces in the New World. The official title of the governor of Jamaica is ” captain-general and governor-in-chief.”

CAPTAL (Lat. capitalis, ” first,” ” chief “), a medieval feudal title in Gascony. According to Du Cange the designation captal {capital, captau, capitau) was applied loosely to the more illustrious nobles of Aquitaine, counts, viscounts, &c, probably as capitales domini, ” principal lords,” though he quotes more fanciful explanations. As an actual title the word was used only by the lords of Trene, Puychagut, Epernon and Buch. It is best known in connexion with the famous soldier, Jean de Grailly, captal of Bush (d. 1376), the ” captal de Buch” par excellence, immortalized by Froissart as the confidant of the Black Prince and the champion of the English cause against France. His active part in the war began in 1364, when he ravaged the country between Paris and Rouen, but was beaten by Bertrand du Guesclin at Cocherel and taken prisoner. Re- leased next year, he received the seigniory of Nemours and took the oath of fealty to the French king, Charles V., but soon resigned his new fief and returned to his allegiance to the English king. In 1367 he took part in the battle of Navarette, in which Du Guesclin was taken prisoner, the captal being entrusted with his safe-keeping. In 1371 Jean de Grailly was appointed constable of Aquitaine, but was taken prisoner next year and interned in the Temple at Paris where, resisting all the tempting offers of the French king, he remained till his death five years later.

CAPTION (Lat. captio, a taking or catching), a term still used in law, especially Scots, for arrest or apprehension. From the obsolete sense of a catching at any possible plea or objection comes the adjective ” captious,” i.e. sophistical or fault-finding. The term also has an old legal use, to signify the part of an

indictment, &c, which shows where, when and by what authority it is taken, found or executed; so its opening or heading. From this is derived the modern sense of the heading of an article in a book or newspaper.

CAPTIVE (from Lat. capere, to take), one who is captured in warfare. As a term of International Law, it has been displaced by that of " prisoner of war." The position and treatment of captives or prisoners of war is now dealt with fully in chapter ii. of the regulations annexed to the Hague Convention respecting the Laws and Customs of War on Land, of the 18th of October 1907.

See Peace Conference and War ; also Sir T.Barclay, supplement to Problems of International Practice and Diplomacy, for comparison of texts of 1899 and 1907.

CAPTURE (from Lat. capere, to take; Fr. prise maritime; Ger. Wegnahme), in international law, the taking possession by a belligerent vessel of an enemy or neutral merchant or non-fighting ship. If an enemy ship is captured she becomes forthwith lawful prize (q.v.); when a neutral ship, the belligerent commander, in case her papers are not conclusive, has a right to search her. If he finds contraband on board or the papers or cargo or circumstances excite any serious suspicion in his mind, which the master of the ship has been unable to dispel, he places an officer and a few of his crew on board and sends her to the nearest port where there is a prize court for trial. The word is also used for the vessel thus captured (see Blockade, Contraband). (T. Ba.)

CAPUA (anc. Casilinum) , a town and archiepiscopal see of Campania, Italy, in the province of Caserta, 7 m. W. by rail from the town 01 Caserta. Pop. (1001) 14,285. It was erected in 856 by Bishop Landulf on the site of Casilinum (q.v.) after the destruction of the ancient Capua by the Saracens in 840, but it only occupies the site of the original pre-Roman town on the left (south) bank of the river.

The cathedral of S. Stefano, erected in 856, has a handsome atrium and a lofty Lombard campanile, and a (modernized) interior with three aisles; both it and the atrium have ancient

granite columns. The Romanesque crypt, with ancient columns, has also been restored. It has a fine paschal candlestick, and the fragments of a pulpit with marble mosaic of the 13th century. There are also preserved in the cathedral a fine Exultet roll and an evangelarium of the end of the 12th century, bound in bronze decorated with gold filigree and enamels. The mosaics of the beginning of the 12th century in the apses of the cathedral and of S. Benedetto, were destroyed about 1720 and 1620 respectively. The small church of S. Marcello was also built in 856. In 1232-1240 Frederick II. erected a castle to guard the Roman bridge over the Volturno, composed of a triumphal arch with two towers. This was demolished in 1557. The statues with which it was decorated were contemporary imitations of classical sculptures. Some of them are still preserved in the Museo Campano (E. Bertaux, L' 'Art dans I'ltalie miridionale, Paris, 1904, i. 707). The Museo Campano also contains a considerable collection of antiquities from the ancient Capua.

Capua changed hands frequently during the middle ages. One of the most memorable facts in its history is the terrible attack made on it in 1501 by Caesar Borgia, who had entered the town by treachery, in which 5000 lives were sacrificed. It remained a part of the kingdom of Naples until the 2nd of November i860, when, a month after the battle of the Volturno, it surrendered to the Italian troops. (T. As.)

CAPUA (mod. 5. Maria di Capua Vetere), the chief ancient city of Campania, and one of the most important towns of ancient Italy, situated 16 m. N. of Neapolis, on the N.E. edge of the Campanian plain. Its site in a position not naturally defensible, together with the regularity of its plan, indicates that it is not a very ancient town, though it very likely occupies the site of an early Oscan settlement. Its foundation is attributed by Cato to the Etruscans, and the date given as about 260 years before it was " taken " by Rome (Veil. i. 7). If this be referred, not to its capture in the second Punic War (211 B.C.) but to its submission to Rome in 338 B.C., we get about 600 B.C. as the date of its foundation, a period at which the Etruscan power was at its highest, and which may perhaps, therefore, be accepted. 1 The origin of the name is probably Campus, a plain, 2 as the adjective Campanus shows, Capuanus being a later form stig- matized as incorrect by Varro (De L. L. x. 16). The derivation from Kairvs (a vulture, Latinized into Volturnum by some authorities who tell us that this was the original name), and that from caput (as though the name had been given it as the " head " of the twelve Etruscan cities of

Campania), must be rejected.

1 G. Patroni, in Atti del Congresso Inlernazionale di Scienze Sloriche (Rome, 1904), v. 217, is inclined to place it considerably earlier.

2 Livy iv. 37, ” Vulturnum Etruscorum urbem quae nunc Capua est, ab Samnitibus captam (425 B.C.) Capuamque ab duce eorum Capye, vel, quod propius vero est, a campestri agro appellatam.”

The Etruscan supremacy in Campania came to an end with the Samnite invasion in the latter half of the 5th century B.C. (see Campania); these conquerors, however, entered into alliance with Rome for protection against the Samnite mountain tribes, and with Capua came the dependent communities Casilinum, Calatia, Atella, so that the greater part of Campania now fell under Roman supremacy. The citizens received the civitas sine suffragio. In the second Samnite War they provetfun trustworthy, so that the Ager Falenrus on the right bank of the Volturnus was taken from them and distributed among citizens of Rome, the tribus Falerna being thus formed; and in 318 the powers of the native officials (meddices) were limited by the appointment of officials with the title praefecti Capuam Cumas (taking their name from the most important towns of Campania); these were at first mere deputies of the praetor urbanus, but after 123 B.C. were elected Roman magistrates, four in number; they governed the whole of Campania until the time of Augustus, when they were abolished. In 312 B.C. Capua was connected with Rome by the construction of the Via Appia, the most important of the military highways of Italy. The gate by which it left the Servian walls of Rome bore the name Poita Capena — perhaps the only case in which a gate in this enceinte bears the name of the place to which it led. At what time the Via Latina was prolonged to Casilinum is doubtful (it is quite possible that it was done when Capua fell under Roman supremacy, i.e. before the construction of the Via Appia); it afforded a route only 6 m. longer, and the difficulties in connexion with its construction were much less; it also avoided the troublesome journey through the Pomptine Marshes (see T. Ashby in Papers of the British School at Rome, i. 217, London, 1902). The importance of Capua increased steadily during the 3rd century, and at the beginning of the second Punic War it was considered to be only slightly behind Rome and Carthage themselves, and was able to furnish 30,000 infantry and 4000 cavalry. Until after the defeat of Cannae it remained faithful to Rome, but, after a vain demand that one of the consuls should

always be selected from it, it transferred its allegiance to Hannibal, who made it his winter- quarters, with bad results to the morale of his troops (see Punic Wars) . After a long siege it was taken by the Romans in 2 1 1 b .c. and severely punished; its magistrates and communal organiza- tion were abolished, the inhabitants losing their civic rights, and its territory became Roman state domain. Parts of it were sold in 205 and 199 B.C., another part was divided among the citizens of the new colonies of Volturnum and Liternum established near the coast in 194 B.C., but the greater portion of it was reserved to be let by the state. Considerable difficulties occurred in preventing illegal encroachments by private persons, and it became necessary to buy a number of them out in 162 B.C. It was, after that period, let, not to large but to small proprietors. Frequent attempts were made by the democratic leaders to divide the land among new settlers. Brutus in 83 B.C. actually succeeded in establishing a colony, but it was soon dissolved; and Cicero's speeches De Lege Agraria were directed against a similar attempt by Servilius Rullus in 63 B.C. In the meantime the necessary organization of the inhabitants of this thickly- populated district was in a measure supplied by grouping them round important shrines, especially that of Diana Tifatina, in connexion with which a pagus Dianae existed, as we learn from many inscriptions; a pagus Herculaneus is also known. The town of Capua belonged to none of these organizations, and was entirely dependent on the praefecti. It enjoyed great prosperity, however, owing to its spelt, which was worked into groats, wine, roses, spices, unguents, &c, and also owing to its manufactures, especially of bronze objects, of which both the elder Cato and the elder Pliny speak in the highest terms {De agr. 13s; Hist. Nat. xxiv. 95). Its luxury remained proverbial; and Campania is especially spoken of as the home of gladiatorial combats. From the gladiatorial schools of Campania came Spartacus and his followers in 73 B.C. Julius Caesar as consul in 59 B.C. succeeded in carrying out the establishment of a colony in connexion with his agrarian law, and 20,000 Roman citizens were settled in this territory. The number of colonists was increased by Mark

Antony, Augustus (who constructed an aqueduct from the Mons Tifata, and gave the town of Capua estates in the district of Cnossus in Crete to the value of 12 million sesterces —

£120,000), and Nero. In the war of a.d. 69 it took the side of Vitellius. Under the later empire it is not often mentioned; but in the 4th century it was the seat of the consularis Campaniae and its chief town, though Ausonitjs puts it behind Mediolanum (Milan) and Aquileia in his ordo nobilium urbium. Under Constantine we hear of the foundation of a Christian church in Capua. In a.d. 456 it was taken and destroyed by Genseric, but must have been soon rebuilt: it was, however, finally destroyed by the Saracens in 840 and the church of S. Maria Maggiore, founded about 497, alone remained. It contains 52 ancient marble columns, but was modernized in 1766. The site was only occupied in the late middle ages by a village which has, however, outgrown the medieval Capua in modern days.

Remains. — No pre-Roman remains have been found within the town of Capua itself, but important cemeteries have been discovered on all sides of it, the earliest of which go back to the 7th or 6th century B.C. The tombs are of various forms, partly chambers with frescoes on the walls, partly cubical blocks of peperino, hollowed out, with grooved lids. The objects found within them consist mainly of vases of bronze (many of them without feet, and with incised designs of Etruscan style) and of clay, some of Greek, some of local manufacture, and of paintings. On the east of the town, in the Patturelli property, a temple has been discovered with Oscan votive inscriptions, some of them inscribed upon terra-cotta tablets, others on cippi, while of a group of 1 50 tufa statuettes (representing a matron holding one or more children in her lap) three bore Latin inscriptions of the early imperial period. The site of the town being in a perfectly flat plain, without natural defences, it was possible to lay it out regularly. Its length from east to west is accurately determined by the fact that the Via Appia, which runs from north-west to south-east from Casilinum to Calatia, turns due east very soon after passing tie so-called Arco Campano (a triumphal arch of good brickwork, once faced with marble, with three openings, erected in honour of some emperor unknown), and continues to run in this direction for 5413! English feet (= 6000 ancient Oscan feet). The west gate was the Porta Romana; remains of the east gate (the name of which we do not know) have been found. This fact shows that the main street of the town was perfectly orientated, and that before the Via Appia was con- structed, i.e. in all probability in pre-Roman times. The width of the town from north to south cannot be so accurately deter- mined as the line of the north and south walls is not known, though it can be

approximately fixed by the absence of tombs (Beloch fixes it at 4000 Oscan feet = 3609 English feet), nor is it absolutely certain (though it is in the highest degree probable, for Cicero praises its regular arrangement and fine streets) that the plan of the town was rectangular. Within the town are remains of thermae on the north of the Via Appia and of a theatre opposite, on the south. The former consisted of a large crypto- porticus round three sides of a court, the south side being open to the road; it now lies under the prisons. Beloch (see below) attributes this to the Oscan period; but the construction as shown in Labruzzi's drawing (v. 17) 1 is partly of brick- work and opus reticulatum, which may, of course, belong to a restoration. The stage of the theatre had its back to the road; Labruzzi (v. 18) gives an interesting view of the cavea. It appears from inscriptions that it was erected after the time of Augustus. Other inscriptions, however, prove the existence of a theatre as early as 94 B.C., so that the existence of another elsewhere must be assumed. We know that the Roman colony was divided into regions and possessed a capitolium, with a temple of Jupiter, within the town, and that the market-place, for unguents especially, was called Seplasia; we also hear of an aedes alba, probably the original senate house, which stood in an open space known as albana. But the sites of all these are quite uncertain. Outside the town on the north is the amphitheatre, built in the

1 For these drawings see T. Ashby, " Dessins inedits de Carlo Labruzzi," in Melanges de V&cole frangaise, 1903, 414.

time of Augustus, restored by Hadrian and dedicated by Antoninus Pius, as the inscription over the main entrance recorded. The exterior was formed by 80 Doric arcades of four storeys each, but only two arches now remain. The keystones were adorned with heads of divinities. The interior is better preserved; beneath the arena are subterranean passages like those in the amphitheatre at Puteoli. It is one of the largest in existence; the longer diameter is 185 yds., the shorter 152, and the arena measures 83 by 49 yds., the corresponding dimensions in the colosseum at Rome being 205, 170, 93 and 58 yds. To the east are considerable remains of baths — a large octagonal building, an apse against which the church of S. Maria delle Grazie is built, and several heaps of debris. On the Via Appia, to the south-east of the east gate of the town, are two large and well-preserved tombs of the Roman period, known as le Carceri vecchie and la Conocchia. To the east of the amphitheatre an ancient road, the Via Dianae, leads north to the Pagus Dianae, on

the west slopes of the Mons Tifata, a community which sprang up round the famous and ancient temple of Diana, and probably received an independent organization after the abolition of that of Capua in 2 1 1 B.C. The place often served as a base for attacks on the latter, and Sulla, after his defeat of C. Norbanus, gave the whole of the mountain to the temple. Within the territory of the pagus were several other temples with their magistri. After the restoration of the community of Capua, we find magistri of the temple of Diana still existing, but they were probably officials of Capua itself. The site is occupied by the Benedictine church of S. Angelo in Formis 2 which dates from 944, and was reconstructed by the abbot Desiderius (afterwards Pope Victor III.) of Monte Cassino in 1073, with interesting paintings, dating from the end of the nth century to the middle of the 1 2th, in which five different styles may be distinguished. They form a complete representation of all the chief episodes of the New Testament (see F. X. Kraus, Jahrbuch d. k. preuss. Kunst- sammlungen, xiv.). Deposits of votive objects (favissae), removed from the ancient temple from time to time as new ones came in and occupied all the available space, have been found, and considerable remains of buildings belonging to the Vicus Dianae (among them a triumphal arch and some baths, also a hall with frescoes, representing the goddess herself ready for the chase) still exist.

The ancient road from Capua went on beyond the Vicus Dianae to the Volturnus (remains of the bridge still exist) and then turned east along the river valley to Caiatia and Telesia. Other roads ran to Puteoli and Cumae (the so-called Via Campana) and to Neapolis, and as we have seen the Via Appia passed through Capua, which was thus the most important road centre of Campania (q.v.).

See Th. Mommsen in Corpus Inscrip. Lat. x. (Berlin, 1883), p. 365 seq. ; J. Beloch, Campanien (Breslau, 1890), 295 seq.; Ch. Hiilsen in Pauly-Wissowa, Realencyclopadie (Stuttgart, 1899), ”’• : 555- (T. As.)

CAPUCHIN MONKEY, the English name of a tropical American monkey scientifically known as Cebus capucinus; the plural, capuchins, is extended to embrace all the numerous species of the same genus, whose range extends from Nicaragua to Paraguay. These monkeys, whose native name is sapajou, are the typical representatives of the family Cebidae, and belong to a s-ub-family in which the tail is generally prehensile. From the other genera of that group (Cebinae) with prehensile tails

capuchins are distinguished by the comparative shortness of that appendage, and the absence of a naked area on the under surface of its extremity. The hair is not woolly, the general build is rather stout, and the limbs are of moderate length and slenderness. The name capuchin is derived from the somewhat cowl-like form assumed by the thick hair on the crown of the head of the sapajous. In their native haunts these monkeys go about in troops of considerable size, frequenting the summits of the tall forest-trees, from which they seldom, if ever, descend. In addition to fruits of various kinds, they consume tender shoots and buds, insects, eggs and young birds. Many of the

2 The name comes from the aqueduct (forma) erected by Augustus for the supply of Capua, remains of which still exist.

species are difficult to distinguish, and very little is known of their habits in a wild state, although several members of the group are common in captivity (see Primates). (R. L.*)

CAPUCHINS, an order of friars in the Roman Catholic Church, the chief and only permanent offshoot from the Franciscans. It arose about the year 1520, when Matteo di Bassi, an " Obser- vant " Franciscan, became possessed of the idea that the habit worn by the Franciscans was not the one that St Francis had worn; accordingly he made himself a pointed or pyramidal hood and also allowed his beard to grow and went about bare- footed. His superiors tried to suppress these innovations, but in 1528 he obtained the sanction of Clement VII. and also the permission to live as a hermit and to go about everywhere preaching to the poor; and these permissions were not only for himself, but for all such as might join him in the attempt to restore the most literal observance possible of St Francis's rule. Matteo was soon joined by others. The Observants opposed the movement, but the Conventuals supported it, and so Matteo and his companions were formed into a congregation, called the Hermit Friars Minor, as a branch of the Conventual Fran- ciscans, but with a vicar of their own, subject to the jurisdiction of the general of the Conventuals. From their hood (capuche) they received the popular name of Capuchins. In 1529 they had four houses and held their first general chapter, at which their special rules were drawn up. . The eremitical idea was abandoned, but the life was

to be one of extreme austerity, simplicity and poverty — in all things as near an approach to St Francis's idea as was practicable. Neither the monasteries nor the congregation should possess anything, nor were any devices to be resorted to for evading this law; no large provision against temporal wants should be made, and the supplies in the house should never exceed what was necessary for a few days. Everything was to be obtained by begging, and the friars were not allowed even to touch money. The communities were to be small, eight being fixed as the normal number and twelve as the limit. In furniture and clothing extreme simplicity was enjoined and the friars were to go bare-footed without even sandals. Besides the choral canonical office, a portion of which was recited at midnight, there were two hours of private prayer daily. The fasts and disciplines were rigorous and frequent. The great ex- ternal work was preaching and spiritual ministrations among the poor. In theology the Capuchins abandoned the later Franciscan school of Scotus, and returned to the earlier school of Bonaventura (q.v.). The new congregation at the outset of its history underwent a series of severe blows. The two founders left it, Matteo di Bassi to return to the Observants, while his first companion, on being superseded in the office of vicar, became so insubordinate that he had to be expelled. The case of the third vicar, Bernardino Ochino (q.v.), who became a Calvinist, 1543, and married, was even more disastrous. This mishap brought the whole congregation under the suspicion of heretical tendencies and the pope resolved to suppress it; he was with difficulty induced to allow it to continue, but the Capuchins were forbidden to preach. In a couple of years the authorities were satisfied as to the soundness of the general body of Capuchin friars, and the permission to preach was restored. The congregation at once began to multiply with extraordinary rapidity, and by the end of the 16th century the Capuchins had spread all over the Catholic parts of Europe, so that in 16 10 they were freed from their dependence on the Conventual Franciscans and became an independent order, with a general of their own. They are said to have had at that time 1 500 houses divided into fifty provinces. They were one of the chief factors in the Catholic Counter-reformation, working assiduously among the poor, preaching, catechizing, confessing in all parts, and impressing the minds of the common people by the great poverty and austerity of their life. By these means they were also extraordinarily successful in making converts from Pro- testantism to Catholicism. Nor were the activities of the Capuchins confined to Europe. From an early

date they under- took missions to the heathen in America, Asia and Africa, and at the middle of the 17th century a Capuchin missionary college

was founded in Rome for the purpose of preparing their subjects for foreign missions. A large number of Capuchins have suffered martyrdom for the Gospel. This activity in Europe and else- where continued until the close of the 18th century, when the number of Capuchin friars was estimated at 31,000.

Like all other orders, the Capuchins suffered severely from the secularizations and revolutions of the end of the 18th century and the first half of the 19th; but they survived the strain, and during the latter part of the 19th century rapidly recovered ground. At the beginning of the present century there were fifty provinces with some 500 monasteries and 300 hospices or lesser houses; and the number of Capuchin friars, including lay- brothers, was reckoned at 9500. In England there are ten or twelve Capuchin monasteries, and in Ireland three. The Capuchins now/possess the church of the Portiuncula at Assisi. . The Capuchins still keep up their missionary work and have some 200 missionary stations in all parts of the world — notably India, Abyssinia and the Turkish empire. Though ” the poorest of all orders,” it has attracted into its ranks an extraordinary number of the highest nobility and even of royalty. The celebrated Father Mathew, the apostle of Temperance in Ireland, was a Capuchin friar. Like the Franciscans the Capuchins wear a brown habit.

The Capuchines are Capuchin nuns. They were founded in 1538 in Naples. They lived according to the rules and regu- lations of the Capuchin friars, and so austere was the life that they were called ” Sisters of Suffering.” The order spread to France and Spain, and a few convents still exist.

In order fully to grasp the meaning of the Capuchin reform, it is necessary to know the outlines of Franciscan history (see Francis- cans). There does not appear to be any modern general history of the Capuchin order as a whole, though there are histories of various provinces and of the foreign missions. The references to all this literature will be found in the article ” Kapuzinerorden ” in Wetzer und Welte, Kirchenlexicon (2nd ed.), which is the best general sketch on the subject. Shorter sketches, with the needful references, are given in Max Heimbucher, Orden und Kongregationen (1896), i. § 44, and in Herzog-Hauck, Realencyklopadie (3rd ed.), art. ” Kapuziner. Helyot’s Hist, des

ordres religieux (1792), vii. c. 24 and c. 27, gives an account of the Capuchins up to the end of the 17th century. (E. C. B.)

CAPUS, ALFRED (1858-), French author, was born at Aix, in Provence, on the 25th of November 1858. In 1878 he published, in collaboration with L. Vonoven, a volume of short stories, and in the next year the two produced a one-act piece, Le Mari malgrS lui, at the Theatre Cluny . He had been educated as an engineer, but became a journalist, and joined the staff of the Figaro in 1894. His novels, Qui perd gagne (1890), Faux Depart (1891), Annies d'avenlures (1895), which belong to this period, describe the struggles of three young men at the beginning of their career. From the first of these he took his first comedy, Brignol et sa fille (Vaudeville, 23rd November 1894). Among his later plays are Innocent (1896), written with Alphonse Allais; P elites j dies (1897); Rosine (1897); Mariage bourgeois (1898); Les Maris de Leontine (1900); La Bourse ou la vie (1900); La Veine (1901); La Petite Fonctionnaire (1901); Les Deux JEcoles (1902) ; La Chdtelaine(igo2) ; L' Adversaire (1903), with Emmanuel Arene, which was produced in London by Mr George Alexander as The Man of the Moment, and Notre Jeunesse (1904), the first of his plays to be represented at the Theatre Francais; Monsieur PiUgois (1905); and, in collaboration with Lucien Descaves, L' Attentat (1906).

See fidouard Quet, Alfred Capus (1904), with appreciations by various authors, in the series of Celebrites d'aujourdhui.

CAPYBARA, or Carpincho (Hydrochaerus capybara), the largest living rodent mammal, characterized by its moderately long limbs, partially-webbed toes, of which there are four in front and three behind, hoof-like nails, sparse hair, short ears, cleft upper lip and the absence of a tail. The dentition is peculiar on account of the great size and complexity of the last upper molar, which is composed of about twelve plates, and exceeds in length the three teeth in front. The front surface of the incisors has a broad, shallow groove. Capybaras are aquatic rodents, frequenting the banks of lakes and rivers, and

being sometimes found where the water is brackish. They generally associate in herds, and spend most of the day in covert

on the banks, feeding in the evening and morning. When disturbed they make for the water, in which they swim and dive with expertness, often remaining below the surface for several minutes. Their usual food consists of water-plants and bark, but in cultivated districts they do much harm to crops. Their cry is a low, abrupt grunt. From five to eight is the usual number in a litter, of which there appears to be only one in the year; and the young are carried on their parent's back when in the water. Extinct species of capybara occur in the tertiary deposits of Argentina, some of which were considerably larger than the living form. Capybaras belong to the family Caviidae, the leading characteristics of which are given in Rodentia. When full-grown the entire length of the animal is about 4 ft., and the girth 3 ft. Their geographical range extends from Guiana to the river Plate. Capybaras can be easily tamed; numbers are killed on land by jaguars and in the water by caimans — the alligators of South America.

CAR (Late Lat. carra), a term originally applied to a small two-wheeled vehicle for transport (see Carriage), but also to almost anything in the nature of a carriage, chariot, &c, and to the carrying-part of a balloon. With some specific qualifica- tion (tram-car, street-car, railway-car, sleeping-car, motor-car, &c.) it is combined to serve as a general word instead of carriage or vehicle. From Ireland comes the " jaunting-car," which is in general use, both in the towns, where it is the commonest public carriage for hire, and in the country districts, where it is employed to carry the mails and for the use of tourists. The gentry and more well-to-do farmers also use it as a private carriage in all parts of Ireland. The genuine Irish jaunting-car is a two-wheeled vehicle constructed to carry four persons besides the driver. In the centre, at right angles to the axle, is a " well " about 18 in. deep, used for carrying parcels or small luggage, and covered with a lid which is usually furnished with a cushion. The " well " provides a low back to each of the two seats, which are in the form of wings placed over each wheel, with foot boards hanging outside the wheel on hinges, so that when not in use they can be turned up over the seats, thus reducing the width of the car (sometimes very necessary in the narrow country roads) and protecting the seats from the weather. The passengers on each side sit with their backs to each other, with the " well " between them. The driver sits on a movable box-seat, or " dicky," a few inches high, placed across the head of the " well," with a footboard to which there is usually no splash-board attached. A

more modern form of jaunting-car, known as a ” long car,” chiefly used for tourists, is a four-wheeled vehicle constructed on the same plan, which accommodates as many as eight or ten passengers on each side, and two in addition on a high box-seat beside the driver. In the city of Cork a carriage known as an ” inside car ” is in common use. It is a two-wheeled covered carriage in which the pas- sengers sit face to face as in a wagonette. In remote country districts the poorer peasants still sometimes use a primitive form of vehicle, called a ” low-backed car,” a simple square shallow box or shelf of wood fastened to an axle without springs. The two wheels are solid wooden disks of the rudest construction, generally without the protection of metal tires, and so small in diameter that the body of the car is raised only a few inches from the ground.

CARABINIERS, originally mounted troops of the French army, armed with the carabine (carbine). In 1690 one company of carabiniers was maintained in each regiment of cavalry. Their duties were analogous to those of grenadiers in infantry regiments — scouting, detached work, and’, in general, all duties requiring special activity and address. They fought mounted and dismounted alike, and even took part in siege warfare in the trenches. At the battle of Neerwinden in 1693 all the cara- binier companies present were united in one body, and after the action Louis XIV. consolidated them into a permanent regiment with the name Royal Carabiniers. This was one of the old regiments which survived the French Revolution, at

which time the title was changed to ” horse grenadiers “; it is represented in the French army of to-day by the nth Cuirassiers. The carabiniers (6th Dragoon Guards) of the British army date from 1685, and received the title from being armed with the carabine in 1692. Regimen tally therefore they were one year senior to the French regiment of Royal Carabiniers, and as a matter of fact they took part as a regiment in the battle of Neerwinden. Up to 1745 their title was ” The King’s Cara- biniers “; from 1745 to 1788 they were called the 3rd Irish Horse, and from 1788 they have borne their present title. In the German army, one carabinier regiment alone (2nd Saxon Reiter regiment) remains of the cavalry corps which formerly in various states bore the title. In Italy the gendarmerie are called cara- binieri.

CARABOBO, the smallest of the thirteen states of Venezuela, bounded N. by the Caribbean Sea, E. by the state of Aragua, S. by Zamora and W. by Lara. Its area is 2985 sq. m., and its

population, according to an official estimate of 1905, is 221,891. The greater part of its surface is mountainous with moderately elevated valleys of great fertility and productiveness, but south of the Cordillera there are extensive grassy plains conterminous with those of Guarico and Zamora, on which large herds of cattle are pastured. The principal products of the state are cattle, hides and cheese from the southern plains, coffee and cereals from the higher valleys, sugar and agua r diente from the lower valleys about Lake Valencia, and cacao, coco-nuts and coco-nut fibre from the coast. Various minerals are also found in its south-west districts, about Nirgua. The capital is Valencia, and its princi- pal towns are Puerto Cabello, Montalban (estimated pop. in 1904 7500), 30 m. W.S.W. of Valencia; Nirgua (pop. in 1891 8394), an important commercial and mining town 365 m. S.W. of Valencia, 2500 ft. above sea level; and Ocumare (pop. in 1891 7493), near the coast i8| m. E. of Puerto Cabello, celebrated for the fine quality of its cacao. Carabobo is best known for the battle fought on the 24th of June 1821 on a plain at the southern exit from the passes through the Cordillera in this state, between the revolutionists under Bolivar and the Spanish forces under La Torre. It was one of the four decisive battles of the war, though the forces engaged were only a part of the two armies and numbered 2400 revolutionists (composed of 1500 mounted ttaneros known as the ” Apure legion,” and 900 British), and 3000 Spaniards. The day was won by the British, who drove the Spaniards from the field at the point of the bayonet, although at a terrible loss of life. The British legion was afterwards acclaimed by Bolivar as ” Salvadores de mi Patria.” The Spanish forces continued the war until near the end of 1823, but their operations were restricted to the districts on the coast.

CARACAL, the capital of the department of Romanatzi, Rumania; situated in the plains between the lower reaches of the Jiu and Olt rivers, and on the railway from Corabia, beside the Danube, to Hermannstadt in Transylvania. Pop. (1900) 12,055. Caracal has little trade, except in grain. Its chief buildings are the prefecture, school of arts and crafts and several churches. There are some ruins of a tower, built in a.d. 217 by the Roman emperor Caracalla, after whom the place is named. In 1596 Michael the Brave of Walachia defeated the Turks near Caracal.

CARACAL (Lynx caracal), sometimes called Persian lynx, an animal widely distributed throughout south-western Asia, and over a large portion of Africa. It is somewhat larger than a fox, of a uniform reddish brown colour above, and whitish beneath,

with two white spots above each of the eyes, and a tuft of long black hair at the tip of the ears; to these it owes its name, which is derived from Turkish words signifying ” black-ear.” There is little information as to the habits of this animal in a wild state. Dr W. T. Blanford considers that it dwells among grass and bushes rather than in forests. Its prey is said to consist largely of gazelles, small deer, hares and peafowl and other birds. The caracal is easily tamed, and in some parts of India is trained to capture the smaller antelopes and deer and such birds as the crane and pelican. According to Blyth, it is a favourite amusement among the natives to let loose a couple of tame caracals

among a flock of pigeons feeding on the ground, when each will strike down a number of birds before the flock can escape. Frequent reference is made in Greek and Roman literature to the lynx, and from such descriptions as are given of it there is little doubt that the caracal, and not the European lynx, was referred to. In South Africa, where the caracal abounds, its hide is made by the Zulus into skin-cloaks, known- as karosses. According to W. L. Sclater, these when used as blankets are said to be beneficial in cases of rheumatism; an ointment prepared from the fat of the animal being employed for the same purpose. The North African caracal has been separated as Lynx, or Caracal, berberorum, but it is best regarded as a local race.

CARACALLA (or Caracallus), MARCUS AURELIUS ANTONINUS (186-217), Roman emperor, eldest son of the emperor Septimius Severus, was born at Lugdunum (Lyons) on the 4th of April 186. His original name was Bassianus; his nickname Caracalla was derived from the long Gallic tunic which he wore and introduced into the army. He further received the imperial title of Marcus Aurelius Antoninus at the time when his father declared himself the adopted son of M. Aurelius. After the death of Severus (211) at Eboracum (York) in Britain, Caracalla and his brother Geta, who had accompanied their father, returned to Rome as colleagues in the supreme power. In order to secure the sole authority, Caracalla barbarously murdered his brother in his mother’s arms, and at the same time put to death some 20,000 persons, who were suspected of favour- ing him, amongst them the jurist Papinianus. An important act of his reign (212) was the bestowal of the rights of Roman citizenship upon all free

inhabitants of the empire, although the main object of Caracalla was doubtless to increase the amount of revenue derived from the tax on inheritances or legacies to which only Roman citizens were liable. His own extravagances and the demands of the soldiery were a perpetual drain upon his resources, to meet which he resorted to taxes and extortion of every description. He spent the remainder of his reign wandering from place to place, a mode of life to which he was said to have been driven by the pangs of remorse. Handing over the reins of government to his mother, he set out in 213 for Raetia, where he carried on war against the Alamanni; in 214 he attacked the Goths in Dacia, whence he proceeded by way of Thrace to Asia Minor, and in 2 1 5 crossed to Alexandria. Here he took vengeance for the bitter sarcasms of the inhabitants against himself and his mother by ordering a general massacre of the youths capable of bearing arms. In 216 he ravaged Mesopotamia because Arta- banus, the Parthian king, refused to give him his daughter in marriage. He spent the winter at Edessa, and in 217, when he recommenced his campaign, he was murdered between Edessa and Carrhae on the 8th of April at the instigation of Opellius (Opilius) Macrinus, praefect of the praetorian guard, who succeeded him. Amongst the numerous buildings with which Caracalla adorned the city, the most famous are the thermae, and the triumphal arch of Septimius Severus in the forum.

Authorities. — Dio Cassius lxxvii., lxxviii. ; Herodian iii. 10, iv. 14; lives of Caracalla, Severus and Geta, in Scriptores Historiae Augustae; Eutropius viii. 19-22; Aurelius Victor, De Caesanbus, 20-23; E P iL 2 °- 2 3; Zosimus i. 9-10 ; H. Schiller, Geschchte der romischenKaiserzeil (1883), 738 ff.;Pauly-‘Wissow3L,Realencyclopadte, ii. 2434 S. (von Rohden).

CARACAS, the principal city and the capital of the United States of Venezuela, situated at the western extremity of an elevated valley of the Venezuelan Coast Range known as the plain of Chacao, (s\ m. S.S.E. of La Guaira, its port on the Caribbean coast, in lat’. io° 30′ N., long. 67 4′ W. The plain is about 11 m. long by 3 m. wide, and is separated from the coast by a part of the mountain chain which extends along almost the entire water front of the republic. It is covered with well-cultivated plantations. The Guaira river, a branch of the Tuy, traverses the plain from west to east, and flows past the city on the south. Among its many small tributaries are the Catuche, Caroata and Anauco, which flow down through the city from the north and give it a natural surface drainage. The city is built at the narrow

end of the valley and at the foot of the

Cerro de Avila, and stands from 2887 to 3442 ft. above sea level, the elevation of the Plaza de Bolivar, its topographical centre, being 3025 ft. Two miles north-east is the famous Silla de Caracas, whose twin summits, like a gigantic old-fashioned saddle (silla), rise to an elevation of 8622 ft.; and the Naiguete, still farther eastward, overlooks the valley from a height of 9186 ft. The climate of Caracas is often described as that of perpetual spring. It is subject, however, to extreme and rapid variations in temperature, to alternations of dry and humid winds (the latter, called catias, being irritating and oppressive), to chilling night mists brought up from the coast by the westerly winds, and to other influences productive of malaria, catarrh, fevers, bilious disorders and rheumatism. The maximum and minimum temperatures range from 84° to 48 F., the annual mean being about 66°, and the daily variation is often as much as 1 5 . The city is built with its streets running between the cardinal points of the compass and crossing each other at right angles. Two intersecting central streets also divide the city into four sections, in each of which the streets are methodically named and numbered, as North 3rd, 5th, 7th, &c, or West 2nd, 4th, 6th, &c, according to direction and location. This method of numeration dates from the time of Guzman Blanco, but the common people adhere to the names bestowed upon the city squares in earlier times. The streets are narrow, but are clean and well-paved, and are lighted by electricity and gas. There are several handsome squares and public gardens, adorned with statues, trees and shrubbery. The principal square is the Plaza de Bolivar, the conventional centre of the city, in which stands a bronze equestrian statue of Bolivar, and on which face the cathedral, archbishop's residence, Casa Amarilla, national library, general post office and other public offices. The Inde- pendencia Park, formerly called Calvario Park, which occupies a hill on the west side of the city, is the largest and most attractive of the public gardens. Among the public edifices are the capitol, which occupies a whole square, the university, of nearly equal size, the cathedral, pantheon, masonic temple (built by the state in the spendthrift days of Guzman Blanco), national library, opera-house, and a number of large churches. The city is generously provided with all the modern public services, including two street car lines, local and long distance telephone lines, electric power and light, and waterworks. The principal water supply is derived from the Macarao river, 15 m. distant. Railway

connexion with the port of La Guaira was opened in 1883 by means of a line 23 m. long. Another line (the Gran Ferro- carril de Venezuela) passes through the mountains to Valencia, mm. distant, and two short lines run to neighbouring villages, one to Petare and Santa Lucia, and the other to El Valle. The archbishop of Venezuela resides in Caracas and has ecclesiastical jurisdiction over the dioceses of Ciudad Bolivar, Calabozo, Barquisimeto, Merida and Maracaibo. There are no manu- factures of note.

Caracas was founded in 1567 by Diego de Losada under the pious title of Santiago de Leon de Caracas, and has been successively capital of the province of Caracas, of the captaincy- general of Caracas and Venezuela, and of the republic ‘ of Venezuela. It is also one of the two chief cities, or capitals, of the Federal district. It was the birthplace of Simon Bolivar, and claims the distinction of being the first colony in South America to overthrow Spanish colonial authority. The city was almost totally destroyed by the great earthquake of 1812. In the war of independence it was repeatedly subjected to pillage and slaughter by both parties in the strife, and did not recover its losses for many years. In 18 10 its population was estimated at 50,000; seventy-one years later the census of 1881 gave it only 55,638. In 1891 its urban population was computed to be 72,429, which in 1904 was estimated to have increased to about

90,000.

CARACCI, LODOVICO, AGOSTINO, and ANNIBALE, three

celebrated Italian painters, were born at Bologna in 1555, 1557,

and 1560 respectively. Lodovico, the eldest, son of a butcher,

was uncle to the two younger, Agostino and Annibale, sons of a

I tailor, and had nearly finished his professional studies before the

others had begun their education. From being a reputed dunce, while studying under Tintoretto in Venice, he gradually rose, by an attentive observation of nature and a careful examination of the works of the great masters. preserved at Bologna, Venice,

Florence and Parma, to measure himself with the teachers of his day, and ultimately projected the opening of a rival school in his native place. Finding himself unable to accomplish his design without assistance, he sent for his two nephews, and induced them to abandon their handicrafts (Agostino being a goldsmith, and Annibale a tailor) for the profession of painting. Agostino he first placed under the care of Fontana, retaining Annibale in his own studio ; but he afterwards sent both to Venice and Parma to copy the works of Titian, Tintoretto and Correggio, on which his own taste had been formed. On their return, the three relatives, assisted by an eminent anatomist, Anthony de la Tour, opened, in 1589, an academy of painting under the name of the Incamminati (or, as we might paraphrase it, the Right Road), provided with numerous casts, books and bassi-rilievi, which Lodovico had collected in his travels. From the affability and kindness of the Caracci, and their zeal for the scientific education of the students, their academy rose rapidly in popular estimation, and soon every other school of art in Bologna was deserted and closed. They continued together till, at the invitation of Cardinal Farnese, Annibale and Agostino went to Rome in 1600 to paint the gallery of the cardinal's palace. The superior praises awarded to Agostino inflamed the jealousy of Annibale, already kindled by the brilliant reception given by the pupils of the Incamminati to Agostino's still highly celebrated picture of the " Communion of St Jerome," and the latter was dismissed to Parma to paint the great saloon of the Casino. Here he died in 1602, when on the eve of finishing his renowned painting of "Celestial, Terrestrial and Venal Love." Annibale continued to work alone at the Farnese gallery till the designs were completed; but, dis- appointed at the miserable remuneration offered by the cardinal, he retired to Naples, where an unsuccessful contest for a great work in the church of the Jesuits threw him into a fever, of which he died in 1609. Lodovico always remained at his academy in Bologna (excepting for a short visit to his cousin at Rome), though invited to execute paintings in all parts of the country. He died in 1619, and was interred in the church of Santa Maria Maddalena. The works of Lodovico are numerous in the chapels of Bologna. The most famous are — The " Madonna standing on the moon, with St Francis and St Jerome beside her, attended by a retinue of angels"; "John the Baptist," "St Jerome," "St Benedict " and " St Cecilia "; and the "Limbo of the Fathers." He was by far the most amiable of the three painters, rising superior to all feelings of jealousy towards his rivals, and though he received large sums for his productions, yet, from his almost unparalleled liberality

to the students of the academy, he died poor. With skill in painting Agostino combined the greatest proficiency in engraving (which he had studied under Cornelius de Cort) and high accomplishments as a scholar. He died not untroubled by remorse for the indecencies which, in accordance with the corruption of the time, he had introduced into some of his engravings. The works of Annibale are more diversified in style than those of the others, and comprise specimens of painting after the manner of Correggio, Titian, Paolo Veronese, Raphael and Michelangelo. The most distinguished are the ■' Dead Christ in the lap of the Madonna "; the " Infant and St John"; "St Catherine"; "St Roch distributing alms" (now in the Dresden gallery) ; and the " Saviour wailed over by the Maries," at present in possession of the earl of Carlisle. He frequently gave great importance to the landscape in his com- positions. The reputation of Annibale is tarnished by his jealousy and vindictiveness towards his brother, and the licen- tiousness of his disposition, which contributed to bring him to a comparatively early grave.

The three Caracci were the founders of the so-called Eclectic school of painting, — the principle of which was to study in the works of the great masters the several excellences for which they had been respectively pre-eminent, and to combine these in the productions of the school itself; for instance, there was to be the

design of Raphael, the power oi Michelangelo, the colour of Titian, and so on.

See A. Venturi, i" Caracci e la loro scuola, 1895. (W. M. R.)

CARACCIOLO, FRANCESCO, Prince (1732-1799), Neapolitan admiral and revolutionist, was born on the 18th of January 1732, of a noble Neapolitan family. He entered the navy and learned his seamanship under Rodney. He fought with distinction in the British service in the American War of Inde- pendence, against the Barbary pirates, and against the French at Toulon under Lord Hotham. The Bourbons placed the greatest, confidence in his skill. When on the approach of the French to Naples King Ferdinand IV. and Queen Mary Caroline fled to Sicily on board Nelson's ship the " Vanguard " (December 1798), Caracciolo escorted them on the frigate " Sannita." He was the only prominent Neapolitan trusted by the king, but even the admiral's loyalty was shaken by Ferdinand's cowardly flight. On reaching Palermo Caracciolo asked permission to return to Naples to look after his own private affairs (January 1799). This was granted,

but when he arrived at Naples he found all the aristocracy and educated middle classes infatuated with the French revolutionary ideas, and he himself was received with great enthusiasm. He seems at first to have intended to live a retired life; but, finding that he must either join the Republican party or escape to Procida, then in the hands of the English, in which case even his intimates would regard him as a traitor and his property would have been confiscated, he was induced to adhere to the new order of things and took command of the republic's naval forces. Once at sea, he fought actively against the British and Neapolitan squadrons and prevented the landing of some Royalist bands. A few days later all the French troops in Naples, except 500 men, were recalled to the north of Italy.

Caracciolo then attacked Admiral Thurn, who from the " Minerva " commanded the Royalist fleet, and did some damage to that vessel. But the British fleet on the one hand and Cardinal Fabrizio Ruffo's army on the other made resistance impossible. The Republicans and the 500 French had retired to the castles, and Caracciolo landed and tried to escape in disguise. But he was betrayed and arrested by a Royalist officer, who on the 29th of June brought him in chains on board Nelson's flagship the " Foudroyant." It is doubtful whether Caracciolo should have been included in the capitulation concluded with the Republicans in the castles, as that document promised life and liberty to those who surrendered before the blockade of the forts, whereas he was arrested afterwards, but as the whole capitulation was violated the point is immaterial. Moreover, the admiral's fate was decided even before his capture, because on the 27 th of June the British minister, Sir W. Hamilton, had communicated to Nelson Queeji Mary Caroline's wish that Caracciolo should be hanged. As soon as he was brought on board, Nelson ordered Thurn to summon a court martial composed of Caracciolo's former officers, Thurn himself being a personal enemy of the accused. The court was held on board the " Foudroyant," which was British territory — a most indefensible proceeding. Caracciolo was charged with high treason; he had asked to be judged by British officers, which was refused, nor was he allowed to summon witnesses in his defence. He was condemned to death by three votes to two, and as soon as the sentence was communicated to Nelson the latter ordered that he should be hanged at the yard-arm of the " Minerva " the next morning, and his body thrown into the sea at sundown: Even the cus- tomary twenty-four hours' respite for confession was denied him, and his

request to be shot instead of hanged refused. The sentence was duly carried out on the 30th of June 1799.

Caracciolo was technically a traitor to the king whose uniform he had worn, but apart from the wave of revolutionary enthusiasm which had spread all over the educated classes of Italy, and the fact that treason to a government like that of the Neapolitan Bourbons could hardly be regarded as a crime, there was no necessity for Nelson to make himself the executor of the revenge of Ferdinand and Mary Caroline. His greatest offence, as Captain Mahan remarks {Life of Nelson, i. 440), was

committed against his own country by sacrificing his inalienable character as the representative of the king of Great Britain to his secondary and artificial character as delegate of the king of Naples. The only explanation of Nelson's conduct is to be found in his infatuation for Lady Hamilton, whose low ambition made her use her influence over him in the interest of Queen Mary Caroline's malignant spite.

Authorities. — Besides the general works on Nelson and Naples, such as P. Colletta's Storia del Reame di Napoli (Florence, 1848), there is a large amount of special literature on the subject. Nelson and the Neapolitan Jacobins (Navy Records Society, l903),contains all the documents on the episode, including those incorrectly tran- scribed by A. Dumas in his Borbcni di Napoli (Naples, 1862-1863), with an introduction defending Nelson by H. C. Gutteridge; the work contains a bibliography. The case against Nelson is set forth by Professor P. Villari in his article " Nelson, Caracciolo, e la Repub- blica Napolitana " (Nuova Antologia, 16th February 1899); Captain A. T. Mahan has replied in " The Neapolitan Republic and Nelson's Accusers" (English Historical Review, July 1899), "Nelson at Naples " (ibid., October 1900), and "Nelson at Naples" (Athenaeum, 8th July 1899) ; see also F. Lemmi, Nelson e Caracciolo (Florence, 1898); C. Giglioli, Naples in 1799 (London, 1903); Freiherr von Helfert, Fabrizio Ruffo (Vienna, 1882); H. Huffer, Die neapoli- tanische Republik des Jahres 1799 (Leipzig, 1884). (L. V.*)

CARACOLE (a Fr. word, the origin of which is doubtful, mean- ing the wheeling about of a horse; in Spanish and Portuguese caracol

means a snail with a spiral shell), a turn or wheeling in horsemanship to the left or right, or to both alternately, so that the movements of the horse describe a zig-zag course. The term has been used loosely and erroneously to describe any display of fancy riding. It is also used for a spiral staircase in a tower.

CARACTACUS, strictly Caratacus, the Latin form of a Celtic name, which survives in Caradoc and other proper names. The most famous bearer of the name was the British chieftain who led the native resistance to the Roman invaders in a.d. 48-51, and was finally captured and sent to Rome (Tac. Ann. xii. 33, Dio. lx.). Two old camps on the Welsh border are now called Caer Caradoc, but the names seem to be the invention of anti- quaries and not genuinely ancient memorials of the Celtic hero.

CARADOC SERIES, in geology, the name introduced by R. I. Murchison in 1839 for the sandstone series of Caer Caradoc in Shropshire, England. The limits of Murchison's Caradoc series have since been somewhat modified, and through the labours of C. Lapworth the several members of the series have been precisely defined by means of graptolitic zones. These zones are identical with those found in the rocks of the same age in North Wales, the Bala series (q.v.), and the terms Bala or Caradoc series are used indifferently by geologists when referring to the uppermost substage of the Ordovician System. The Ordovician rocks of the Caradoc district have been sub- divided into the following beds, in descending order: the Trinudeus shales, Acton Scott beds, Longville flags, Chatwell and Soudley sandstones, Harnage shales and Hoar Edge grits and limestone. In the Corndon district in the same county the Caradoc series is represented by the Marrington group of ashes and shales and the Spy Wood group beneath them; these two groups of strata are sometimes spoken of as the Chirbury series. In the Breidden district are the barren Criggeon shales with ashes and flows of andesite.

In the Lake district the Coniston limestone series represents the Upper Caradocian, the lower portion being taken up by part of the great Borrowdale volcanic series of rocks. The Coniston limestone series contains the following subdivisions : —

Ashgill group (Ashgill shales and Staurocephalus limestone).

Kiesley limestone.

Sleddale group (Applethwaite beds = Upper Coniston limestone conglomerate; Yarlside rhyolite; stye end beds = Lower Coniston limestone.

Roman Fell group (Corona beds).

The Dufton shales and Drygill shales are equivalents of the Sleddale group.

Rocks of Caradoc age are well developed in southern Scotland ; in the Girvan district they have been described as the Ardmillan series with the Drummock group and Barren Flagstone group in the upper Oortion, and the Whitehouse, Ardwell and Balclatchie groups in the lower part. Similarly, two divisions, known as the Upper and Lower

Hartfell series, are recognized in the southern and central area, in Peeblesshire, Ayrshire and Dumfriesshire.

In Ireland the Caradoc or Bala series is represented by the limestones of Portraine near Dublin and of the Chair of Kildare; by the Ballymoney series of Wexford and Carnalea shales of Co. Down. In the Lough Mask district beds of this age are found, as in Wales, interstratified with volcanic lavas and tuffs. Other localities are known in counties Tyrone, Meath and Louth, also in Lambay Island.

See Ordovician System; also C. Lapworth, Ann. and Mag. Nat. Hist., 5th series, vol. vi., 1880; Geol. Mag., 1889; C. Lapworth and W. W. Watts, Proc. Geol. Assoc, xiii., 1894; J. E. Marr, Geol. Mag., 1892; J. E. Marr and T. Roberts, Q. J. G. S., 1885; B. N. Peach and J. Home, " Silurian Rocks of Great Britain," vol. I., 1899 (Mem. Geol. Survey). (J. A. H.)

CARALES (Gr. KdpaXts, mod. Cagliari, q.v.), the most important ancient city of Sardinia, situated on the south coast of the island. Its foundation is generally attributed to the Carthaginians, and Punic tombs exist in considerable numbers near the present cemetery on the east and still more on the rocky plateau to the north-west of the town. It first appears in Roman history in the Second Punic War, and probably obtained full Roman civic rights from Julius Caesar. In imperial times it was the most important town in the island, mainly owing to its fine sheltered harbour, where a detachment of the classis Misenas was stationed. In the 4th and 5th centuries it was probably the seat of the praeses

Sardiniae. It is mentioned as an important harbour in the Gothic and Gildonic wars. It was also the chief point of the road system of Sardinia. Roads ran hence to Olbia by the east coast, and through the centre of the island, to Othoca (Oristano) direct, and thence to Olbia (probably the most frequented route), through the mining district to Sulci and along the south and west coasts to Othoca. The hill occupied by the Pisan fortifications and the medieval town within them must have been the acropolis of the Carthaginian settlement; it is impossible to suppose that a citadel presenting such natural advantages was not occupied. The Romans, too, probably made use of it, though the lower quarters were mainly occupied in imperial times. A. Taramelli (Notizie degli Scavi, 1905, 41 seq.) rightly points out that the nucleus of the Roman muni- cipium is probably represented by the present quarter of the Marina, in which the streets intersect at right angles and Roman remains are frequently found in the subsoil. An inscription found some way to the north towards the amphitheatre speaks of paving in the squares and streets, and of drains constructed under Domitian in a. d. 83 (F. Vivanet in Notizie degli Scavi, 1897, 279). The amphitheatre occupies a natural depression in the rock just below the acropolis, and open towards the sea with a fine view. Its axes are 95! and 79 yds., and it is in the main cut in the rock, though some parts of it are built with concrete. Below it, to the south, are considerable remains of ancient reservoirs for rain-water, upon which the city entirely depended. This nucleus extended both to the east and to the west; in the former direction it ran some way inland, on the east of the castle hill. Here were the ambulationes or public promenades con- structed by the pro-consul Q. Caecilius Metellus before a.d. 6 (Corp. Inscrip. Lat. x., Berlin, 1883, No. 7581). Here also, not far from the shore, the. remains of Roman baths, with a fine coloured mosaic pavement, representing deities riding on marine monsters, were found in 1907. To the east was the necropolis of Bonaria, where both Punic and Roman tombs exist, and where, on the site of the present cemetery, Christian catacombs have been discovered (F. Vivanet in Notizie degli Scavi, 1892, 183 seq.; G. Pinza in Nuovo Bullettino di Archeologia Cristiana, 1901, 61 seq.). But the western quarter seems to have been far more important; it extended along the lagoon of S. Gilla (which lies to the north-west of the town, and which until the middle ages was an open bay) and on the lower slopes of the hill which rises above it. The chief discoveries which have been made are noted by Taramelli (loc. cit.) and include some important buildings, of which a large Roman house

(or group of houses) is the only one now visible (G. Spano in Notizie degli Scavi, 1876, 148, 173; 1877, 285; 1880, 105, 405). Beyond this quarter begins an extensive Roman necropolis extending along the edge of the hill north-east of the high road leading to the north-west; the most

important tomb is the so-called Grotta delle Vipere, the rock-hewn tomb of Cassius Philippus and Atilia Pomptilla, the sides of which are covered with inscriptions {Corpus Inscr. Lat. x., Berlin, 1883 , Nos. .7 563-7 578) . Other tombs are also to be found on the high ground near the Punic tombs already mentioned. The latter are hewn perpendicularly in the rock, while the Roman tombs are chambers excavated horizontally.. In the lagoon itself were found a large number of terra cottas, made of local clay, some being masks of both divinities and men (among them grotesques) others representing hands and feet, others various animals, and of amphorae of various sizes and other vases. Some of the amphorae contained animals' bones, possibly the remains of sacrifices.. These objects are of the Punic period; ' they were all found in groups, and had apparently been arranged on a platform of piles in what was then a bay, in readiness for shipment (F. Vivanet in Notizie degli Scavi, 1893, 255). It is probable that the acropolis of Carales was occupied even in prehistoric times; but more abundant traces of prehistoric settlements (pottery and fragments of obsidian, also kitchen middens, containing bones of animals and shells of molluscs used for human food) have been found on the Capo S. Elia to the south-east of the modern town (see A. Taramelli in Notizie degli Scavi, 1904, 19 seq.). An inscription records the existence of a temple of Venus Erycina on this promontory in Roman times. The museum contains an interesting collection of objects from many of the sites mentioned, and also from other parts of the island; it is in fact the most important in Sardinia, and is especially strong in prehistoric bronzes (see Sardinia). For the Roman inscriptions see C. I. L. cit., Nos. 7552-7807. (T.As.) CARAN D'ACHE, the pseudonym (meaning " lead-pencil ") of Emmanuel Poire (1858-1909), French artist and illustrator, who was born and educated at Moscow, being the grandson of one of Napoleon's officers who had settled in Russia. He determined to be a military painter, and when he arrived in Paris from Russia he found an artistic adviser in Detaille He served five years in the army,

where the principal work allotted to him was the drawing of uniforms for the ministry of war. He embellished a short-lived journal, La Vie militaire, with a series of illustra- tions, among them being some good-tempered caricatures of the German army, which showed how accurately ht was acquainted with military detail. His special gift lay in pictorial anecdote, the story being represented at its different stages with irresistible effect, in the artist's own mannered simplicity. Much of his work was contributed to La Vie parisienne, Le Figaro illustrS, La Caricature, Le Chat noir, and he also issued various albums of sketches, the Carnet de cheques, illustrating the Panama scandals, Album de croquis militaires et d'histoire sans legendes, Histoire de Marlborough, &c, besides illustrating a good many books, notably the Prince Kozakokoff of Bemadaky. He died on the 26th of February 1909.

A collection of his work was exhibited at the Fine Art Society's rooms in London in 1898. The catalogue contained a prefatory note by M. H. Spielmann.

CARAPACE (a Fr. word, from the Span, carapacho, a shield or armour), the upper shell of a crustacean, tortoise or turtle. The covering of the armadillo is called a carapace, as is also the hard case in which certain of the Infusoria are enclosed.

CARAPEGUA, an interior town of Paraguay, 37 m. S.E. of Asuncion on the old route between that city and the missions. Pop. (est.) 13,000 (probably the population of the large rural district about the town is included in this estimate). The town (founded in 1725) is situated in a fertile country producing cotton, tobacco, Indian corn, sugar-cane and mandioca. It has two schools, a church and modern public buildings.

CARAT (Arab. Qirdt, weight of four grains; Gr. Kepariov, little horn, the fruit of the carob or locust tree), a small weight (originally in the form of a seed) used for diamonds and precious stones, and a measure for determining the fineness of gold. The exact weight of the carat, in practice, now varies slightly in different places. In 1877 a syndicate of London, Paris and Amsterdam jewellers fixed the weight at 205 milligrammes (3-163 troy grains). The South African carat, according to

Gardner Williams (general manager of the De Beers mines), is equal to 3- 174 grains (The Diamond Mines of South Africa, 1902). 1 The fineness of gold is measured by a ratio with 24

carats as a standard; thus 2 parts of alloy make it 22-carat gold, and so on. CARAUSIUS, MARCUS AURELIUS, tyrant or usurper in Britain, a.d. 286-293, was a Menapian from Belgic Gaul, a man of humble origin, who in his early days had been a pilot. Having entered the Roman army, he rapidly obtained promotion, and was stationed by the emperor Maximian at Gessoriacum (Bononia, Boulogne) to protect the coasts and channel from Frankish and Saxon pirates. He at first acted' energetically, but was subsequently accused of having entered into partnership with the barbarians and was sentenced to death by the emperor. Carausius thereupon crossed over to Britain and proclaimed himself an independent ruler. The legions at once joined him; numbers of Franks enlisted in his service; an increased and well-equipped fleet secured him the command of the neighbouring seas. In 289 Maximian attempted to recover the island, but his fleet was damaged by a storm and he was defeated. Maxi- mian and Diocletian were compelled to acknowledge the rule of Carausius in Britain; numerous coins are extant with the heads of Carausius, Diocletian and Maximian, bearing the legend " Carausius et fratres sui." In 292 Constantius Chlorus besieged and captured Gessoriacum (hitherto in possession of Carausius), together with part of his fleet and naval stores. Constantius then made extensive preparations to ensure the reconquest of Britain, but before they were completed Carausius was murdered by Allectus, his praefect of the guards (Aurelius Victor, Caesares, 39; Eutropius ix. 21, 22; Eumenius, Pahe- gyrici ii. 12, v. 12). A Roman mile-stone found near Carlisle (1895) bears the inscription IMP. C[aes] M. AUR[elius] MAUS. The meaning of MAUS is doubtful, but it may be an anticipation of ARAUS (see F. J. Haverfield in Cumberland and Westmoreland Antiquarian Soc. Transactions, 1895, p. 437).

A copper coin found at Richborough, inscribed Domino Carausio Ces., must be ascribed to a Carausius of later date, since the type of the reverse is not found until the middle of the 4th century at the earliest. Nothing is known of this Carausius (A. J. Evans in Numismatic Chronicle, 1887, " On a coin of a second Carausius Caesar in Britain in the Fifth Century ").

See J. Watts de Peyster, The History of Carausius, the Dutch Augustus (1858); P. H. Webb, The Reign and Coinage of Carausius

(1908).

CARAVACA, a town of south-eastern Spain, in the province of

Murcia; near the left bank of the river Caravaca, a tributary of the Segura. Pop. (1900) 15,846. Caravaca is dominated by the medieval castle of Santa Cruz, and contains several convents and a fine parish church, with a miraculous cross celebrated for its healing power, in honour of which a yearly festival is held on the 3rd of May. The hills which extend to the north are rich in marble and iron. Despite the lack of railway com- munication, the town is a considerable industrial centre, with large iron-works, tanneries and manufactories of paper, chocolate and oil.

CARAVAGGIO, MICHELANGELO AMERIGHI (or Merigi) DA (1569-1609), Italian painter, was born in the village of Caravaggio, in Lombardy, from which he received his name. He was originally a mason's labourer, but his powerful genius directed him to painting, at which he worked with immitigable energy and amazing force. He despised every sort of idealism whether noble or emasculate, became the head of the Naturalisti (unmodified imitators of ordinary nature) in painting, and adopted a style of potent contrasts of light and shadow, laid on with a sort of fury, indicative of that fierce temper which led the artist to commit a homicide in a gambling quarrel at Rome. To avoid the consequences of his crime he fled to Naples and to Malta, where he was imprisoned for another attempt to avenge a quarrel. Escaping to Sicily, he was attacked by a party sent in pursuit of him, and severely wounded. Being pardoned, he set out for Rome; but having been arrested by mistake before his arrival, and afterwards released, and left to shift for himself in excessive heat, and still suffering from wounds and hardships,

he died of fever on the beach at Pontercole in 1609. His best pictures are the " Entombment of Christ," now in the Vatican; " St Sebastian," in the Roman Capitol; a magnificent whole- length portrait of a grand-master of the Knights of Malta, Alof de Vignacourt, and his page, in the Louvre; and the Borghese " Supper at Emmaus."

CARAVAGGIO, POLIDORO CALDARA DA (1495 or 1492- iS43)j a celebrated painter of frieze and other decorations in the Vatican. His merits were such that, while a mere mortar-carrier to the artists engaged in that work, he attracted the admiration of Raphael, then e'mployed on his great pictures in the Loggie of

the palace. Polidoro's works, as well as those of his master, Maturino of Florence, have mostly perished, but are well known by the fine etchings of P. S. Bartoli, C. Alberti, &c. On the sack of Rome by the army of the Constable de Bourbon in 1527, Polidoro fled to Naples. Thence he went to Messina, where he was much employed, and gained a considerable fortune, with which he was about to return to the mainland of Italy when he was robbed and murdered by an assistant, Tonno Calabrese, in 1543. Two of his principal paintings are a Crucifixion, painted in Messina, and " Christ bearing the Cross " in the Naples gallery.

CARAVAN (more correctly Karwan), a Persian word, adopted into the later Arabic vocabulary, and denoting, throughout Asiatic Turkey and Persia, 1 a body of traders travelling together for greater security against robbers (and in particular against Bedouins, Kurds, Tatars and the like, whose grazing-grounds the proposed route may traverse) and for mutual assistance in the matter of provisions, water and so forth. These precautions are due to the absence of settled government, inns and roads. These conditions having existed from time immemorial in the major part of western Asia, and still existing, caravans always have been the principal means for the transfer of merchandise. In these companies camels are generally employed for the transport of heavy goods, especially where the track, like that between Damascus and Bagdad, for example, lies across level, sandy and arid districts. The camels are harnessed in strings of fifty or more at a time, a hair-rope connecting the rear of one beast with the head of another; the leader is gaily decorated with parti-coloured trappings, tassels and bells; an unladen ass precedes the file, for luck, say some, for guidance, say others. Where the route is rocky and steep, as that between Damascus and Aleppo, mules, or even asses, are used for burdens. The wealthier members ride, where possible, on horseback. Every man carries arms; but these are in truth more for show than for use, and are commonly flung away in the presence of any serious robber attack. Should greater peril than ordinary be anticipated, the protection of a company of soldiers is habitually pre-engaged, — an expensive, and ordinarily a useless adjunct. A leader or director, called Karawan-Bashi (headman), or, out of compliment, Karawan-Seraskier (general), but most often simply designated Rats (chief), is before starting appointed by common consent. His duties are those of general manager, spokesman, arbitrator and so forth; his remuneration is indefinite. But in the matter of sales or purchases, either on the way or at the

destination, each member of the caravan acts for himself.

The number of camels or mules in a single caravan varies from forty or so up to six hundred and more; sometimes, as on the reopening of a long-closed route, it reaches a thousand. The ordinary caravan seasons are the months of spring, early summer and later autumn. Friday, in accordance with a recommendation made in the Koran itself, is the favourite day for setting out, the most auspicious hour being that immediately following noonday prayer. The first day's march never does more than just clear the starting-point. Subsequently each day's route is divided into two stages, — from 3 or 4 a.m. to about 10 in the forenoon, and from between 2 and 3 p.m. till 6 or even 8 in the evening. Thus the time passed daily on the road averages from

1 In Arabia proper it is rarely employed in speech and never in writing, strictly Arabic words such as Rikb (" assembled riders ") or Qafila (" wayfaring band ") being in ordinary use.

ten to twelve hours, and, as the ordinary pace of a laden camel does not exceed 2 m. an hour, that of a mule being t\, a distance varying from 23 to 28 m. is gone over every marching day. But prolonged halts of two, three, four and even more days often occur. The hours of halt, start and movement, the precise lines of route, and the selection or avoidance of particular localities are determined by common consent. But if, as sometimes happens, the services of a professional guide, or those of a military officer have been engaged, his decisions are final. While the caravan is on its way, the five stated daily prayers are, within certain limits, anticipated, deferred or curtailed, so as the better to coincide with the regular and necessary halts, — a practice authorized by orthodox Mahommedan custom and tradition.

Two caravans are mentioned in Genesis xxxvii.; the route on which they were passing seems to have coincided with that nowadays travelled by Syrian caravans on their way to Egypt. Other allusions to caravans may be found in Job, in Isaiah and in the Psalms. Eastern literature is full of such references.

The yearly pilgrim-bands, bound from various quarters of the Mahommedan world to their common destination, Mecca, are sometimes, but inaccurately, styled by European writers caravans; their proper designation is Hajj, a collective word for pilgrimages and pilgrims. The two principal pilgrim-caravans start yearly, the one from Damascus, or, to speak more exactly,

from Mozarib, a village station three days' journey to the south of the Syrian capital, the other from Cairo in Egypt. 2 This latter was formerly joined on its route, near Akaba of the Red Sea, by the North African Hajj, which, however, now goes from Egypt by sea from Suez; the former gathers up bands from Anatolia, Kurdistan, Mesopotamia and Syria. Besides these a third, but smaller Hajj of Persians, chiefly sets out from Suk-esh-Sheiukh, in the neighbourhood of Meshed Ali, on the lower Euphrates; a fourth of negroes, Nubians, etc., unites at Yambu on the Hejaz coast, whither they have crossed from Kosseir in Upper Egypt; a fifth of Indians and Malays, centres at Jidda; a sixth and seventh, of southern or eastern Arabs arrive, the former from Yemen, the latter from Nejd.

The Syrian Hajj is headed by the pasha of Damascus, either in person or by a vicarious official of high rank, and is further accompanied by the Sorrah Amir or " Guardian of the Purse," a Turkish officer from Constantinople. The Egyptian company is commanded by an amir or ruler, appointed by the Cairene government, and is accompanied by the famous " Mahmal," or sacred pavilion. The other bands above mentioned have each their own amir, besides their mekowwams or agents, whose business it is to see after provisions, water and the like, and are not seldom encumbered with a numerous retinue of servants and other attendants. Lastly, a considerable force of soldiery accompanies both the Syrian and the Egyptian Hajj.

No guides properly so-called attend these pilgrim-caravans, the routes followed being invariably the same, and well known. But Bedouin bands generally offer themselves by way of escort, and not seldom designedly lead their clients into the dangers from which they bargain to keep them safe. This they are the readier to do because, in addition to the personal luxuries with which many of the pilgrims provide themselves for the journey, a large amount of wealth, both in merchandise and coins, is habitu- ally to be found among the travellers, who, in accordance with Mahommedan tradition, consider it not merely lawful but praiseworthy to unite mercantile speculation with religious duty. Nor has any one, the pasha himself or the amir and the military, when present, excepted, any acknowledged authority or general control in the pilgrim-caravans; nor is there any orderly subdivision of management or service. The pilgrims do, indeed, often coalesce in companies among themselves for mutual help, but necessity, circumstance or caprice governs all details, and thus it happens that numbers, sometimes as many as a third of

the entire Hajj, yearly perish by their own negligence or by misfortune,— dying, some of thirst, others of fatigue and sickness, others at the hand of robbers on the way. In fact the principal

2 The Syrian and Egyptian hajj have been able, since 1908, to travel by the railway from Damascus to the Hejaz.

routes are in many places lined for miles together with the bones of camels and men.

The numbers which compose these pilgrim caravans are much exaggerated by popular rumour; yet it is certain that the Syrian and Egyptian sometimes amount to 5000 each, with 25,000 or 30,000 camels in train. Large supplies of food and water have to be carried, the more so at times that the pilgrim season, following as it does the Mahommedan calendar, which is lunar, falls for years together in the very hottest season. Hence, too, the journey is usually accomplished by night marches, the hours being from 3 to 4 p.m. to 6 or 7 a.m. of the following day. Torches are lighted on the road, the pace is slower than that of an ordinary caravan, and does not exceed 2 m. an hour.

See Mecca and Mahommedan Religion.

CARAVANSERAI, a public building, for the shelter of a caravan (g.v.) and of wayfarers generally in Asiatic Turkey. It is commonly constructed in the neighbourhood, but not within the walls, of a town or village. It is quadrangular in form, with a dead wall outside; this wall has small windows high up, but in the lower parts merely a few narrow air-holes. Inside a cloister-like arcade, surrounded by cellular store-rooms, forms the ground floor, and a somewhat lighter arcade, giving access to little dwelling-rooms, runs round it above. Broad open flights of stone steps connect the storeys. The central court is open to the sky, and generally has in its centre a well with a fountain-basin beside it. A spacious gateway, high and wide enough to admit the passage of a loaded camel, forms the sole entrance, which is furnished with heavy doors, and is further guarded within by massive iron chains, drawn across at night. The entry is paved with flagstones, and there are stone seats on each side. The court

itself is generally paved, and large enough to admit of three or four hundred crouching camels or tethered mules; the bales of merchandise are piled away under the lower arcade, or stored up in the cellars behind it. The upstairs apartments are for human lodging; cooking is usually carried on in one or more corners of the quadrangle below. Should the caravanserai be a small one, the merchants and their goods alone find place within, the beasts of burden being left outside. A porter, appointed by the municipal authority of the place, is always present, lodged just within the gate, and sometimes one or more assistants. These form a guard of the building and of the goods and persons in it, and have the right to maintain order and, within certain limits, decorum; but they have no further control over the temporary occupants of the place, which is always kept open for all arrivals from prayer-time at early dawn till late in the evening. A small gratuity is expected by the porter, but he has no legal claim for payment, his maintenance being provided for out of the funds of the institution. Neither food nor provender is supplied.

Many caravanserais in Syria, Mesopotamia and Anatolia, have considerable architectural merit; their style of construction is in general that known as Saracenic; their massive walls are of hewn stone; their proportions apt and grand. The portals especially are often decorated with intricate carving; so also is the prayer-niche within. These buildings, with their belongings, are works of charity, and are supported, repaired and so forth out of funds derived from pious legacies, most often of land or rentals. Sometimes a municipality takes on itself to construct and maintain a caravanserai; but in any case the institution is tax-free, and its revenues are inalienable. When, as sometimes happens, those revenues have been dissipated by peculation, neglect or change of times, the caravanserai passes through downward stages of dilapidation to total ruin (of which only too many examples may be seen) unless some new charity intervene to repair and renew it.

Khans, i.e. places analogous to inns and hotels, where not lodging only, but often food and other necessaries or comforts may be had for payment, are sometimes by inaccurate writers confounded with caravanserais. They are generally to be found within the town or village precincts, and are of much smaller dimensions than caravanserais. The khan of Asad Pasha at Damascus is a model of constructive skill and architectural beauty.

CARAVEL, or Carvel (from the Gr. napafiot, a light ship, through the Ital. carabella and the Span, carabas), a name applied at different times and in different countries to ships of very varying appearance and build, as in Turkey to a ship of war, and in France to a small boat used in the herring fishery. In the 1 5th and 1 6th centuries, caravels were much used by the Portuguese and Spanish for long voyages. They were roundish ships, with a double tower at the stern, and a single one in the bows, and were galley rigged. Two out of the three vessels in which Columbus sailed on his voyage of discovery to America were " caravels." Carvel, the older English form, is now used only in the term " carvel-built," for a boat in which the planking is flush with the edges laid side to side, in distinction from " clinker-built," where the edges overlap.

CARAVELLAS, a small seaport of southern Bahia, Brazil, on the Caravellas river a few miles above its mouth, which is dangerously obstructed by sandbars. Pop. (1890) of the municipality 5482, about one-half of whom lived in the town. Caravellas was once the centre of a flourishing whale fishery, but has since fallen into decay. It is the port of the Bahia & Minas railway, whose traffic is comparatively unimportant.

CARAWAY, the fruit, or so-called seed, of Carum Carui, an umbelliferous plant growing throughout the northern and central parts of Europe and Asia, and naturalized in waste places in England. The plant has finely-cut leaves and compound umbels of small white flowers. The fruits are laterally com- pressed and ovate, the mericarps (the two portions into which the ripe fruit splits) being subcylindrical, slightly arched, and marked with five distinct pale ridges. Caraways evolve a pleasant aromatic odour when bruised, and they have an agreeable spicy taste. They yield from 3 to 6 % of a volatile oil, the chief constituent of which is cymene aldehyde. Cymene itself is present, having the formula CH 3 C6H4CH 2 ; also carvone CioHhO, and limonene, a terpene. The dose of the oil is -5-3 minims. The plant is cultivated in north and central Europe, and Morocco, as well. as in the south of England, the produce of more northerly latitudes being richer in essential oil than that grown in southern regions. The essential oil is largely obtained by distillation for use in medicine as an aromatic stimulant and carminative, and as a flavouring material in cookery and in liqueurs for drinking. Caraways are, however, more extensively consumed entire in certain kinds of cheese, cakes and bread, and they form the basis of a popular article of confectionery known as caraway comfits.

CARBALLO, a town of north-western Spain, in the province of Corunna; on the right bank of the river Allones, 20 m. S.W. of the city of Corunna. Pop. (1900) 13,032. Carballois the central market of a thriving agricultural district. At San Juan de Carballo, on the opposite bank of the Allones, there are hot sulphurous springs.

CARBAZOL, C12H9N, a chemical constituent of coal-tar and crude anthracene. From the latter it may be obtained by fusion with caustic potash when it is converted into carbazol-potassium, which can be easily separated by distilling off the anthracene. It may be prepared synthetically by passing the vapours of diphenylamine or aniline through a red-hot tube; by heating diorthodiaminodiphenyl with 25 % sulphuric acid to 200 C. for 15 hours; by heating orthoaminodiphenyl with lime; or by heating thiodiphenylamine with copper powder. It is also obtained as a decomposition product of brucine or strychnine, when these alkaloids are distilled with zinc dust. It is easily soluble in the common organic solvents, and crystallizes in plates or tables melting at 238 C. It is a very stable compound, possessing feebly basic properties and characterized by its ready sublimation. It distils unchanged, even when the opera- tion is carried out in the presence of zinc dust. On being heated with caustic potash in a current of carbonic acid, it gives carbazol carbonic acid C^HgN-COOH; melted with oxalic acid it gives carbazol blue. It dissolves in concentrated sulphuric acid to a clear yellow solution. The potassium salt reacts with the alkyl iodides to give N-substituted alkyl derivatives. It gives the pine-shaving reaction, in this respect resembling pyrrol (q.v.).

CARBIDE, in chemistry, a compound of carbon with another element. The introduction of the electric furnace into practical chemistry was followed by the preparation of many metallic carbides previously unknown, some of which, especially calcium carbide, are now of great commercial importance. Carbides of the following general formulae have been obtained by H. Moissan (M denotes an atom of metal and C of carbon) : —

M 3 C = manganese, iron ; M 2 C = molybdenum ; M 3 C 2 = chro- mium ; MC = zirconium ; M 4 C 3 = beryllium, aluminium ; M 2 C 3 = uranium; MC 2 = barium, calcium, strontium,

lithium, thorium, &c; MC 4 = chromium.

The principal methods for the preparation of carbides may be classified as follows: — (1) direct union at a high temperature, e.g. lithium, iron, chromium, tungsten, &c; (2) by the reduc- tion of oxides with carbon at high temperatures, e.g. calcium, barium, strontium, manganese, chromium, &c; (3) by the reduction of carbonates with magnesium in the presence of carbon, e.g. calcium, lithium; (4) by the action of metals on acetylene or metallic derivatives of acetylene, e.g., sodium, potassium. The metallic carbides are crystalline solids, the greater number being decomposed by water into a metallic hydrate and a hydro- carbon; sometimes hydrogen is also evolved. Calcium carbide owes its industrial importance to its decomposition into acetylene; lithium carbide behaves similarly. Methane is yielded by alum- inium and beryllium carbides, and, mixed with hydrogen, by manganese carbide. The important carbides are mentioned in the separate articles on the various metals. The commercial aspect of calcium carbide is treated in the article Acetylene.

CARBINE (Fr. carabine, Ger. Karabiner), a word which came into use towards the end of the 16th century to denote a form of small fire-arm, shorter than the musket and chiefly used by mounted men. It has retained this significance, through all subsequent modifications of small-arm design, to the present day, and is now as a rule a shortened and otherwise slightly modified form of the ordinary rifle (

CARBO, the name of a Roman plebeian family of the gens Papiria. The following are the most important members in Roman history: —

1. Gaius Papirius Carbo, statesman and orator. He was associated with C. Gracchus in carrying out the provisions of the agrarian law of Tiberius Gracchus (see Gracchus). When tribune of the people (131 B.C.) he carried a law extending voting by ballot to the enactment and repeal of laws; another proposal, that the tribunes should be allowed to become candidates for the same office in the year immediately following, was defeated by the younger Scipio Africanus. Carbo was suspected of having been concerned in the sudden death of Scipio (129), if not his actual murderer. He subsequently went over to the optimates, and (when consul in 1 20) successfully defended Lucius Opimius, the murderer of Gaius Gracchus, when he was impeached for the

murder of citizens without a trial, and even went so far as to say that Gracchus had been justly slain. But the optimates did not trust Carbo. He was impeached by Licinius Crassus on a similar charge, and, feeling that he had nothing to hope for from the optimates and that his condemnation was certain, he com- mitted suicide.

See Livy, Epit. 59; Appian, Bell. Civ. i. 18; Veil. Pat. ii. 4; Val. Max. iii. 7. 6; A. H. J. Greenidge, History of Rome (1904).

2. His son, Gaius Papirius Carbo, surnamed Arvina, was a staunch supporter of the aristocracy, and was put to death by the Marian party in 82. He is known chiefly for the law (Plautia Papiria) carried by him and M. Plautius Silvanus when tribunes of the people in 90 (or 89), whereby the Roman franchise was offered to every Italian ally domiciled in Italy at the time when the law was enacted, provided he made application personally within sixty days to the praetor at Rome (see Rome: History, II. " The Republic," Period C). The object of the law was to conciliate the states at war with Rome and to secure the loyalty of the federate states. Like his father, Carbo was an orator of distinction.

See Cicero, Pro Archia, 4; Veil. Pat. ii. 26; Appian, Bell. Civ.

3. Gnaeus Papirius Carbo (c. 130-82 B.C.), nephew of (1). He was a strong supporter of the Marian party, and took part in the blockade of Rome (87). In 85 he was chosen by Cinna as his colleague in the consulship, and extensive preparations werd made for carrying on war in Greece against Sulla, who had announced his intention of returning to Italy. Cinna and Carbo declared themselves consuls for the following year, and large bodies of troops were transported across the Adriatic; but when Cinna was murdered by his own soldiers, who refused to engage in civil war, Carbo was obliged to bring them back. In 82 Carbo, then consul for the third time with the younger Marius, fought an indecisive engagement with Sulla near Clusium, but was defeated with great loss in an attack on the camp of Sulla's general, Q. Caecilius Metellus Pius [see under Metellus (6)] near Faventia. Although he still had a large army and the Samnites remained faithful to him, Carbo was so disheartened by his failure to relieve Praeneste, where the younger Marius had taken refuge, that he decided to leave Italy. He first fled to Africa, thence to the island of Cossyra (Pentellaria), where he was arrested, taken in chains before Pompey at Lilybaeum and put to death.

See Appian, Bell. Civ. i. 67-98; Livy, Epit. 79, 84, 88, 89; Plutarch, Pompey, 5, 6, 10, and Sulla, 28; Cicero, ad Fam. ix. 21; Eutropius, v. 8, 9; Orosius, v. 20; Valerius Maximus, v. 3. 5, ix. 13. 2; art. Sulla, L. Cornelius.

CARBOHYDRATE, in chemistry, the generic name for compounds empirically represented by the formula C x (H 2 0) y . They are essentially vegetable products, and include the sugars, starches, gums and celluloses (q.v.).

CARBOLIC ACID or Phenol (hydroxy-benzene), C 6 H 6 OH, an acid found in the urine of the herbivorae, and in small quantity in castoreum (F. Wohler, Ann., 1848, 67, p. 360). Its principal commercial source is the fraction of coal-tar which distils between 150 and 200 C, in which it was discovered in 1834 by F. Runge. In order to obtain the phenol from this distillate, it is treated with caustic soda, which dissolves the phenol and its homologues together with a certain quantity of naphthalene and other hydrocarbons. The solution is diluted with water, and the hydrocarbons are thereby precipitated and separated. The solution is then acidified, and the phenols areliberated and form an oily layer on the surface of the acid. This layer is separated, and the phenol recovered by a process of fractional distillation. It may be synthetically prepared by fusing potassium benzene sulphonate with caustic alkalis (A. Kekule, A. Wurtz) ; by the action of nitrous acid on aniline; by passing oxygen into boiling benzene containing aluminium chloride (C. Friedel and J. M. Crafts, Ann.Chim. Phys., 1888 (6) 14, p. 43s); by heating phenol carboxylic acids with baryta; and, in small quantities by the oxidation of benzene with hydrogen peroxide or nascent ozone (A. R. Leeds, Ber., 1881, 14, p. 976).

It crystallizes in rhombic needles, which melt at 42-5-43° C, and boil at 182-183° C; its specific gravity is 1-0906 (o° C). It has a characteristic smell, and a biting taste; it is poisonous, and acts as a powerful antiseptic. It dissolves in water, 1 5 parts of water dissolving about one part of phenol at 16-1 7 C, but it is miscible in all proportions at about 70° C. ; it is volatile in steam, and is readily soluble in alcohol, ether, benzene, carbon bisul- phide, chloroform and glacial acetic acid. It is also readily soluble in solutions of the caustic alkalis, slightly soluble in aqueous ammonia solution, and almost insoluble in sodium carbonate solution. When exposed in the moist condition to the air it gradually acquires a red colour. With ferric chloride it gives a violet coloration, and with bromine water a white precipitate of

tribromphenol.

When phenol is passed through a red-hot tube a complex decomposition takes place, resulting in the formation of benzene, toluene, naphthalene, &c. (J. G. Kramers, Ann., 1877, 189, p. 129). Chromium oxychloride reacts violently on phenol, producing hydroquinone ether, 0(C 6 H40H) 2 ; chromic acid gives phenoquinone, and potas- sium permanganate gives paradiphenol, oxalic acid, and some salicylic acid (R. Henriques, Ber., 1888, 21, p. 1620). In alkaline solution, potassium permanganate oxidizes it to inactive tartaric acid and carbon dioxide (O. Doebner, Ber., 1891, 24, p. 1755). When distilled over lead oxide, it forms diphenylene oxide, (C 6 H 4) 2 ; and

when heated with oxalic acid and concentrated sulphuric acid, it forms aurin, G9H14O3. It condenses with aceto-acetic ester, in the presence of sulphuric acid, to /5-methyl coumarin (H. v. Pechmann and J. B. Cohen, Ber., 1884, 17, p. 2188).

The hydrogen of the hydroxy! group in phenol can be replaced by metals, by alkyl groups and by acid radicals. The metallic derivatives (phenolates, phenates or carbolates) of the alkali metals are obtained by dissolving phenol in a solution of a caustic alkali, in the absence of air. Potassium phenolate, C 6 H 6 OK, crystallizes in fine needles, is very hygroscopic and oxidizes rapidly on exposure. Other phenolates may be obtained from potassium phenolate by precipitation. The alkyl derivatives may be obtained t>y heating phenol with one molecular proportion of a caustic alkali and of an alkyl iodide. They are compounds which greatly resemble the mixed ethers of the aliphatic series. They are not decomposed by boiling alkalis, but on heating with hydriodic acid they split into their components. Anisol, phenyl methyl ether, C 6 H5-0-CH 3 , is prepared either by the above me'thod or by the action of diazo- methane on phenol, C 6 H50H +CH 2 N2 = N 2 + C 6 H 6 -G-CH 3 (H. v. Pechmann, Ber., 1895, 28, p. 857); by distilling anisic acid (para- methoxy benzoic acid) with baryta or by boiling phenyl diazonium chloride with methyl alcohol. It is a colourless pleasant-smelling liquid which boils at 154-3° C. Phenetol, phenyl ethyl ether, CeHs-O-CjHs, a liquid boiling at 172° C, may be obtained by similar methods. A. Hantzsch (Ber., 1901, 34, p. 3337) has shown that in the action of

alcohols on diazonium salts an increase in the molecular weight of the alcohol and an accumulation of negative groups in the aromatic nucleus lead to a diminution in the yield of the ether produced and to the production of a secondary reaction, resulting in the formation of a certain amount of an aromatic hydrocarbon.

The acid esters of phenol are best obtained by the action of acid chlorides or anhydrides on phenol or its sodium or potassium salt, or by digesting phenol with an acid in the presence of phosphorus oxychloride (F. Rasinski, Jour. f. prak. Chem., 1882 [2] , 26, p. 62). Phenyl acetate, C 6 H 6 -0-COCH 3 , a colourless liquid of boiling point 193° C, may be prepared by heating phenol with acetamide. When heated with aniline it yields phenol and acetanilide. Phenyl benzoate, CcHU-O-COCeHs. prepared from phenol and benzoyl chloride, crystallizes in monoclinic prisms, which melt at 68-69° C. and boil at 314° C.

Phenol is characterized by the readiness with which it forms substitution products; chlorine and bromine, for example, react readily with phenol, forming ortho- and para- chlor- and bromphenol, and, by further action, trichlor and tribrom-phenol. Iodphenol is obtained by the action of iodine and iodic acid on phenol dissolved in a dilute solution of caustic, potash. Nitrophenols are readily obtained by the action of nitric acid on phenol. By the action of dilute nitric acid, ortho- and para-nitrophenols are obtained, the ortho-compound being separated from the para-compound-by distil- lation in a current of steam. Ortho-nitrophenol, C 6 H4-OH-NC>2(l-2), crystallizes in yellow needles which melt at 45° C. and boil at 2I4°C. Para-nitropbenol, C 6 H4-OH-N0 2 (l-4), crystallizes in long colourless needles which melt at H4°C. Meta-nitrophenol, C 6 H4-OH-NGy(i-_3), is prepared from meta-nitraniline by diazotizing the base and boiling the resulting diazonium salt with water. By nitrating phenol with concentrated nitric acid, no care being taken to keep the temperature of reaction down, trinitrophenol (picric acid) is obtained (see Picric Acid). By the reduction of nitro-phenols, the corresponding aminophenols are obtained, and of these, the meta- and para-deriva- tives are the most important. Para-aminophenol, C6H 4 -OH-NH 2 (l-4) melts at 148° C, with decomposition. Its most important derivative is phenacetin. Meta-aminophenol, C 6 H 4 -OH-NH 2 (l-3),and dimethyl meta-aminophenol, C 6 H 4 -OH-N(CH 3)2(l-3), are extensively employed in the manufacture of the important dyestuffs known as the rhoda- mines. The aminophenols also find application as

developers in photography, the more important of these developers being amidol, the hydrochloride of diaminophenol, ortol, the hydrochloride of para-methylaminophenol,C G H4-OH-NHCH 3 -HCl(l 4), rodinal, para aminophenol, and metol, the sulphate of a methylaminophenol sulphonic acid. Meta-aminophenol is prepared by reducing meta- nitrophenol, or by heating resorcin with ammonium chloride and ammonia to 200° C. Dimethyl-meta-aminophenol is prepared by heating meta-aminophenol with methyl alcohol and hydrochloric acid in an autoclave; by sulphonation of dimethylaniline, the sul- phonic acid formed being finally fused with potash ; or by nitrating dimethylaniline, in the presence of sulphuric acid at 0° C. In the latter case a mixture of nitro-compounds is obtained which can be separated by the addition of sodium carbonate. The meta-nitro- compound, which is precipitated last, is then reduced, and the amino group so formed is replaced by the hydroxyl group by means of the Sandmeyer reaction. Dimethyl-meta-aminophenol crystallizes in small prisms which melt at 87° C. It condenses with phthalic anhydride to form rhodamine, and with succinic anhydride to rhodamine S.

Phenol dissolves readily in concentrated sulphuric acid, a mixture of phenol-ortho- and -para-sulphonic acids being formed. These acids may be separated by conversion into their potassium salts, which are then fractionally crystallized, the potassium salt of the para-acid separating first. The ortho-acid, in the form of its aqueous solution, is sometimes used as an antiseptic, under the name of

aseptol. A thiophenol, C 6 H 6 SH, is known, and is prepared by the action of phosphorus pentasulphide on phenol, or by distilling a mixture of sodium benzene sulphonate and potassium sulphydrate. It is a colourless liquid, which possesses a very disagreeable smell, and boils at 168° C.

Various methods have been devised for the quantitative determina- tion of phenol. J. Messinger and G. Vortmann (Ber., 1890, ? 3, p. 2753) dissolve phenol in caustic alkali, make the solution iv, to known volume, take an aliquot part, warm it to 60° C, and add decinormal iodine solution until the liquid is of a deep yellow colour. The mixture is then cooled, acidified by means of sulphuric acid, and titrated with decinormal sodium thiosulphate solution. S. B. Schryver (Jour, of Soc. Chem. Industry, 1899, 18, p. 553) adds excess of sodamide to a solution of the phenol in a suitable solvent, absorbs the liberated

ammonia in an excess of acid, and titrates the excess of acid. See also C. E. Smith, Amer. Jour. Pharm., 1898, 369.

Pharmacology and Therapeutics. — Carbolic acid is an efficient parasiticide, and is largely used in destroying the fungus of ringworm and of the skin disease known as pityriasis versicolor. When a solution of the strength of about 1 in 20 is applied to the skin it produces a local anaesthesia which lasts for many hours. If concentrated, however, it acts as a caustic. It never produces vesication. The drug is absorbed through the unbroken skin — a very valuable property in the treatment of such conditions as an incipient whitlow. A piece of cotton wool soaked in strong carbolic acid will relieve the pain of dental caries, but is useless in other forms of toothache. Taken inter- nally, in doses of from one to three grains, carbolic acid will often relieve obstinate cases of vomiting and has some value as a gastric antiseptic.

Toxicology. — Carbolic acid is distinguished from all other acids so-called — except oxalic acid and hydrocyanic acid — in that it is a neurotic poison, having a marked action directly upon the nervous system. In all cases of carbolic acid poisoning the nervous influence is seen. If it be absorbed from a surgical dressing there are no irritant symptoms, but when the acid is swallowed in concentrated form, symptoms of gastro-intestinal irritation occur. The patient becomes collapsed, and the skin is cold and clammy. The breathing becomes shallow, the drug killing, like nearly all neurotic poisons (alcohol, morphia, prussic acid, &c), by paralysis of the respiratory centre, and the patient dying in a state of coma. The condition of the urine is of the utmost importance, as it is often a clue to the diagnosis, and in surgical cases may be the first warning that absorption is occur- ring to an undue degree. The urine becomes dark green in colour owing to the formation of various oxidation products such as pyrocatechin. Fifteen grains constitute an exceedingly dangerous dose for an adult male of average weight. Other symptoms of undue absorption are vertigo, deafness, sounds in the ears, stupefaction, a subnormal temperature, nausea, vomiting and a weak pulse (Sir Thomas Fraser).

The antidote in cases of carbplic acid poisoning is any soluble sulphate. Carbolic acid and sulphates combine in the blood to form sulpho-carbolates, which are innocuous. The symptoms of nerve-poisoning are due to the carbolic acid (or its salts) which circulate in the blood after all the sulphates in the blood have been used up in the formation of sulpho-carbolates (hence,

during administration of carbolic acid, the urine should frequently be tested for the presence of free sulphates; as long as these occur in the urine, they are present in the blood and there is no danger). The treatment is therefore to administer an ounce of sodium sulphate in water by the mouth, or to inject a similar quantity of the salt in solution directly into a vein or into the subcutaneous tissues. Magnesium sulphate may be given by the mouth, but is poisonous if injected intravenously. If the acid has been swallowed, wash out the stomach and give chalk, the carbolate of calcium being insoluble. Alkalis which form soluble carbolates are useless. Give ether and brandy sub- cutaneously and apply hot water-bottles and blankets if there are signs of collapse.

CARBON (symbol C, atomic weight 12), one of the chemical non-metallic elements. It is found native as the diamond (q.v.), graphite (q.v.), as a constituent of all animal and vegetable tissues and of coal and petroleum. It also enters (as carbonates) into the composition of many minerals, such as chalk, dolomite,

calcite, witherite, calamine and spathic iron ore. In combination with oxygen (as carbon dioxide) it is also found to a small extent in the atmosphere. It is a solid substance which occurs in several modifications, differing very much in their physical properties. Amorphous carbon is obtained by the destructive distillation of many carbon compounds, the various kinds differing very greatly as regards physical characters and purity, according to the substance used for their preparation. The most common varieties met with are lampblack, gas carbon, wood charcoal, animal charcoal and coke. Lampblack is prepared by burning tar, resin, turpentine and other substances rich in carbon, with a limited supply of air; the products of combustion being conducted into condensing chambers in which cloths are suspended, on which the carbon collects. It is further purified by heating in closed vessels, but even then it still contains a certain amount of mineral matter and more or less hydrocarbons. It is used in the manufacture of printer's ink, in the preparation of black paint and in calico printing. Gas carbon is produced by the destructive distillation of coal in the manufacture of illuminating gas (see Gas: Manufacture), being probably formed by the decomposition of gaseous hydrocarbons. It is a very dense form

of carbon, and is a good conductor of heat and electricity. It is used in the manufacture of carbon rods for arc lights, and for the negative element in the Bunsen battery.

Charcoal is a porous form of carbon; several varieties exist. Sugar charcoal is obtained by the carbonization of sugar. It is purified by boiling with acids, to remove any mineral matter, and is then ignited for a long time in a current of chlorine in order to remove the last traces of hydrogen. Animal charcoal (bone black) is prepared by charring bones in iron retorts. It is a very impure form of carbon, containing on the average about 80% of calcium phosphate. It possesses a much greater decolorizing and absorbing power than wood charcoal. A variety of animal charcoal is sometimes prepared by calcining fresh blood with potassium carbonate in large cylinders, the mass being purified by boiling out with dilute hydrochloric acid and subsequent reheating. Wood charcoal is a hard and brittle black substance, which retains the external structure of the wood from which it is made. It is prepared (where wood is plentiful) by stacking the wood in heaps, which are covered with earth or with brushwood and turf, and then burning the heap slowly in a limited supply of air. The combustion of the wood is conducted from the top downwards, and from the ex- terior towards the centre; great care has to be taken that the process is carried out slowly. The disadvantage in this process is that the by-products, such as pyroligneous acid, acetone, wood spirit, &c, are lost; as an alternative method, wood is frequently carbonized in ovens or retorts and the volatile products are condensed and utilized.

Charcoal varies considerably in its properties, depending upon the particular variety of wood from which it is prepared, and also upon the process used in its manufacture. It can be made at a temperature as low as 300 C, and is then a soft, very friable material possessing a low ignition point. When made at higher temperatures it is much more dense, and its ignition point is considerably higher. Charcoal burns when heated in air, usually without the formation of flame, although a flame is apparent if the temperature be raised. It is characterized by its power of absorbing gases; thus, according to J. Hunter [Phil. Mag., 1863 (4), 25, p. 363], one volume of charcoal absorbs (at 0° C. and 760 mm. pressure) 171-7 ccs. of ammonia, 86-3 ccs. of nitrous oxide, 67-7 ccs. of carbon monoxide, 21-2 ccs. of carbon dioxide, 17-9 ccs. of oxygen, 15 -2 ccs. of nitrogen, and 4-4 ccs. of hydrogen [see also J. Dewar, Ann. Chim. Phys., 1904 (8), 3, p. 5]. It also has the power of absorbing colouring matters from solution.

Charcoal is used as a fuel and as a reducing agent in metallurgical processes.

The element carbon unites directly with hydrogen to form acetylene when an electric arc is passed between carbon poles in an atmosphere of hydrogen (M. Berthelot) ; it also unites directly with fluorine, producing, chiefly, carbon tetrafluoride CF_4. It burns when heated in an atmosphere of oxygen, forming carbon dioxide, and when heated in sulphur vapour it forms carbon bisulphide (q.v.). When heated with nitrogenous substances, in the presence of carbonated or caustic alkali, it forms cyanides. It combines directly with silicon, at the temperature of the electric furnace, yielding carborundum, SiC; and H. Moissan has also shown that it will combine with

many metals at the temperature of the electric furnace, to form carbides {q.v.).

The specific heat of carbon varies with the temperature the following values having been obtained by H. F. Weber (Jahres-berichte, 1874, p. 63) : —

Diamond.

Graphite.

Porous wood carbon.

t°.

Sp. Ht.

t°.

Sp. Ht.

t°.

Sp. Ht.

-5°-5

0-0635

-50-3

0-1138

0-23

0-1653

— io-6

0-0955

-io-7

0-1437

0-99

0-1935

+ io-7

0-1128

+ I0-8

0-1604

0—223

0-2385

85-5

0-1765

61-3

0-1990

206- 1

0-2733

201-6

0-2966

606 -7

0-4408

641-9

0-4454

985-0

0-4589

977-0

0-4670

The atomic weight of carbon has been determined by J. B. A. Dumas and by J. S. Stas [Ann. Chim. Phys., 1841 (3), 1, p. 1; Jahresb., 1849, 223] by estimating the amount of carbon dioxide formed on burning graphite or diamond in a current of oxygen, the value obtained being 12-0 (0 = 16). Confirmatory evidence has also been obtained by O. L. Erdmann and R. F. Marchand (Jour. Prak. Chem., 1841, 23, p. 159; see also F. W. Clarke, Jahresb., 1881, p. 7).

Compounds. — Three oxides of carbon are known, namely, carbon suboxide, Cs02, carbon monoxide, CO, and carbon dioxide, C0 2 . Carbon suboxide, C3O2, is formed by the action of phosphorus pent- ox' de on ethyl malonate (O. Dielsand B. Wolf, Tier., 1906, 39, p. 689), CH 2 (COOC 2 H 6)2 = 2G>H4+2H 2 0+C30 2 . At ordinary temperatures it is a colourless gas, possessing a penetrating and suffocating smell. It liquefies at 7° C. It is an exceedingly reactive compound, com- bining with water to form malonic acid, with hydrogen chloride to form malonyl chloride, and with ammonia to form malonamide. When kept for some time in sealed tubes it changes to a yellowish liquid, from which a yellow flocculent substance gradually separates, and finally it suddenly solidifies to a dark red mass, which appears to be a polymeric form . I ts vapour density agrees with the molecular formula C3O2, and this formula is also confirmed by exploding the gas with oxygen and measuring the amount of carbon dioxide produced (see Ketenes).

Carbon monoxide, CO, is found to some extent in volcanic gases. It was first prepared in 1776 by J. M. F. Lassone (Mem. Acad. Paris) by heating zinc oxide with carbon, and was for some time considered to be identical with hydrogen. Cruikshank concluded that it was an oxide of carbon, a fact which was confirmed by Clement and J. B. Desormes (Ann. Chim. Phys., 1801, 38, p. 285). It may be prepared by passing carbon dioxide over red-hot carbon, or red-hot iron; by heating carbonates (magnesite, chalk, &c.) with zinc dust or iron; or by heating many metallic oxides with carbon. It may also be prepared by heating formic and oxalic acids (or their salts) with concentrated sulphuric acid (in the case of oxalic acid, an equal volume of carbon dioxide is

produced) ; and by heating potassium ferrocyanide with a large excess of concentrated sulphuric acid, K4Fe(CN) 6 +6H 2 S04+6H 2 0=2K2S04.+FeS04 , + 3(NH4)2S04-f-6CO. It is a colourless, odourless gas of specific gravity 0-967 (air = 1). It is one of the most difficultly liquefiable gases, its critical temperature being —139-5° C., and its critical pressure 35-5 atmos. The liquid boils at — 190° C, and solidifies at —211° C. (L. P. Cailletet, Comptes rendus, 1884, 99, p. 706). It is only very slightly soluble in water. It burns with a characteristic pale blue flame to form carbon dioxide. It is very poisonous, uniting with the haemoglobin of the blood to form carbonyl-haemoglobin. It is a powerful reducing agent, especially at high temperatures. It is rapidly absorbed by an ammoniacal or acid (hydrochloric acid) solution of cuprous chloride. It unites directly with chlorine, forming carbonyl chloride or phosgene (see below), and with nickel and iron to form nickel and iron car- bonyls (see Nickel and Iron). It also combines directly with potassium hydride to form potassium formate (see Formic Acid). The volume composition of carbon monoxide is established by exploding a mixture of the gas with oxygen, two volumes of the gas combining with one volume of oxygen to form two volumes of carbon dioxide. This fact, coupled with the determination of the vapour density of the gas, establishes the molecular formula CO.

Carbon dioxide, CO2, is a gas first distinguished from air by van Helmont (1 577-1 644), who observed that it was formed in fermenta- tion processes and during combustion, and gave to it the name gas sylvestre. J. Black (Edin. Phys. and Lit. Essays, 1755) showed that it was a constituent of the carbonated alkalis and called it ” fixed air.” T. O. Bergman, in 1774, pointed out its acid character, and A. L. Lavoisier (1781-1788) first proved it to be an oxide of carbon by burning carbon in the oxygen obtained from the decomposition of mercuric oxide. It is a regular constituent of the atmosphere, and is found in many spring waters and in volcanic gases; it also occurs in the uncombined condition at the Grotto del Cane (Naples) and in the Poison Valley (Java). It is a constituent of the minerals cerussite, malachite, azurite, spathic iron ore, calamine, strontianite, witherite, calcite aragonite, limestone, &c. It may be prepared by burning carbon in excess of air or oxygen, by the direct decomposition of many carbonates by heat, and by the decomposition of carbonates

with mineral acids, M 2 COj + 2HCl = 2MCl + H 2 0 + C0 2 . It is also formed in ordinary fermentation processes, in the combustion of all carbon compounds (oil, gas, candles, coal, &c), and in the process of respiration.

It is a colourless gas, possessing a faint pungent smell and a slightly acid taste. It does not burn, and does not support ordinary combustion, but the alkali metals and magnesium, if strongly heated, will continue to burn in the gas with formation of oxides and liberation of carbon. Its specific gravity is 1-529 (air = i). It is readily condensed, passing into the liquid condition at 0° C. under a pressure of 35 atmospheres. Its critical temperature is 31 -35° C, and its critical pressure is 72-9 atmos. The liquid boils at —78-2° C. (i atmo.), and by rapid evaporation can be made to solidify to a snow-white solid which meltsat —65° C. (see Liquid Gases). Carbon dioxide is moderately soluble in water, its coefficient of solubility at 0° C. being 1-7977 (R. Bunsen). It is still more soluble in alcohol. The solution of the gas in water shows a faintly acid reaction and is supposed to contain carbonic acid, H 2 C03. The gas is rapidly absorbed by solutions of the caustic alkalis, with the production of alkaline carbonates (g.».), and it combines readily with potassium hydride to form potassium formate. It unites directly with ammonia gas to form ammonium carbamate, NH2COONH4. It may be readily recognized by the white precipitate which it forms when passed through lime or baryta water. Carbon dioxide dissociates, when strongly heated, into carbon monoxide and oxygen, the reaction being a balanced action; the extent of dissociation for varying temperatures and pressures has been calculated by H. Le Chatelier (Zeil. Phys. Chem., 1888, 2, p. 782; see H. Sainte-Claire Deville, Comptes renins, 1863, 56, p. 195 et seq.). The volume composition of carbon dioxide is determined by burning carbon in oxygen, when it is found that the volume of carbon dioxide formed is the same as that of the oxygen required for its production, hence carbon > dioxide contains its own volume of oxygen. Carbon dioxide finds industrial application in the preparation of soda by the Solvay process, in the sugar industry, in the manufacture of mineral waters, and in the artificial production of ice.

Carbonyl chloride (phosgene), COCl 2 , was first obtained by John Davy {Phil. Trans., 1812, 40, p. 220). It may be prepared by the direct union of carbon monoxide and chlorine in sunlight

(Th. Wilm and G. Wischin, Ann., 1868, 14, p. 150) ; by the action of phosphorus pentoxide on carbon tetrachloride at 200-210° C. (G. Gustavson, Ber., 1872, 5, p. 30), 4CCU + P4O10 = 2C0 2 + 4P0C1 S + 2C0C1 2 ; by the oxidation of chloroform with chromic acid mixture (A. Emmerlingand B. Lengyel, Ber., 1869, 2, p. 54), 4CHCl 3 + 30 2 = iCOCl 2 4-2H 2 0 + 2Cl 2 ; or most conveniently by heating carbon tetrachloride with fuming sulphuric acid (H. Erdmann, Ber., 1893, 26, p. 1993), 2S0 3 -fCCl4 = S 2 6 Cl 2 + COCl 2 .

It is a colourless gas, possessing an unpleasant pungent smell. Its vapour density is 3-46 (air = 1). It may be condensed to a liquid, which boils at 8° C. It is readily soluble in benzene, glacial acetic acid, and in many hydrocarbons. Water decomposes it violently, with formation of carbon dioxide and hydrochloric acid. It reacts with alcohol to form chlorcarbonic ester and ultimately diethyl carbonate (see Carbonates), and with ammonia it yields urea (q.v.). It is employed commercially in the production of colouring matters (see Benzophenone), and for various synthetic processes.

Carbon oxysulphide, COS, was first prepared by C. Than in 1867 (Ann. Suppl., 5, p. 236) by passing carbon monoxide and sulphur vapour through a tube at a moderate heat. It is also formed by the action of sulphuretted hydrogen on the isocyanic esters, 2CONC 2 H 6 + H 2 S = COS + CO(NHC 2 H 6) 2 , by the action of concen- trated sulphuric acid on the isothiocyanic esters, RNCS + H 2 = COS + RNH 2 , or of dilute sulphuric acid on the thiocyanates. In the latter reaction various other compounds, such as carbon dioxide, carbon bisulphide and hydrocyanic acid, are produced. They are removed by passing the vapours in succession through concentrated solutions of the caustic alkalis, concentrated sulphuric acid, and triethyl phosphine; the residual gas is then purified by liquefaction (W. Hempel, Zeit. angew. Chemie, 1901, 14, p. 865). It is also formed when sulphur trioxide reacts with carbon bisulphide at I oo° C, CS2 + 3S0 3 = COS + 4S0 2 , and by the decomposition of ethyl potassium thiocarbonate with hydrochloric acid, C0(0C 2 H 6)SK + HC1 = C0S + KCI + C 2 H50H. It is a colourless, odourless gas, which burns with a blue flame and is decomposed by heat. Its vapour density is 2-1046 (air = 1). The liquefied gas boils at —47° C. under atmospheric pressure. It is soluble in water; the aqueous solution gradually decomposes on standing, forming carbon dioxide and sulphuretted hydrogen. It is easily soluble in solutions of the caustic alkalis, provided they are not too concentrated, forming solutions of alkaline carbonates and

sulphides, C0S-|-4KH0 = K 2 C03 + K 2 S-|-2H 2 0.

CARBONADO, a name given in Brazil to a dark massive form of impure diamond, known also as ” carbonate ” and in trade simply as carbon. It is sometimes called black diamond. Generally it is found in small masses of irregular polyhedral form, black, brown or dark-grey in colour, with a dull resinoid lustre; and breaking with a granular fracture, paler in colour,

and in some cases much resembling that of fine-grained steel. Being slightly cellular, its specific gravity is rather less than that of crystallized diamond. It is found almost exclusively in the state of Bahia in Brazil, where it occurs in the cascalho or diamond-bearing gravel. Borneo also yields it in small quantity. Formerly of little or no value, it came into use on the introduction of Leschot’s diamond-drills, and is now extremely valuable for mounting in the steel crowns used for diamond-boring. Having no cleavage, the carbon is less liable to fracture on the rotation of the drill than is crystallized diamond. The largest piece of carbonado ever recorded was found in Bahia in 1895, and weighed 3150 carats. Pieces of large size are, however, relatively less valuable than those of moderate dimensions, since they require the expenditure of much labour in reducing them to fragments of a suitable size for mounting in the drill- heads. Ilmenite has sometimes been mistaken in the South African mines for carbonado. (F. W. R.*)

CARBONARI (an Italian word meaning ” charcoal-bumers “), the name of certain secret societies of a revolutionary tendency which played an active part in the history of Italy and France early in the 19th century. Societies of a similar nature had existed in other countries and epochs, but the stories of the derivation of the Carbonari from mysterious brotherhoods of the middle ages are purely fantastic. The Carbonari were probably an offshoot of the Freemasons, from whom they differed in important particulars, and first began to assume importance in southern Italy during the Napoleonic wars. In the reign (1808-18 15) of Joachim Murat a number of secret societies arose in various parts of the country with the object of freeing it from foreign rule and obtaining constitutional liberties; they were ready to support the Neapolitan Bourbons or Murat, if either had fulfilled these aspirations. Their watch- words were freedom and independence, but they were not agreed as to any particular form of government to be afterwards established. Murat’s minister of police was a certain Malghella (a Genoese), who favoured the

Carbonari movement, and was indeed the instigator of all that was Italian in the king's policy. Murat himself had at first protected the sectarians, especially when he was quarrelling with Napoleon, but later, Lord William Bentinck entered into negotiations with them from Sicily, where he represented Great Britain, through their leader Vin- cenzo Federici (known as Capobianco), holding out promises of a constitution for Naples similar to that which had been established in Sicily under British auspices in 1812. Some Carbonarist disorders having broken out in Calabria, Murat sent General Manhes against the rebels; the movement was ruth- lessly quelled and Capobianco hanged in September 1813 (see Greco, Intorno al tentativo dei Carbonari di Citeriore Calabria nel 18 13). But Malghella continued secretly to protect the Carbonari and even to organize them, so that on the return of the Bourbons in 1815 King Ferdinand IV. found his kingdom swarming with them. The society comprised nobles, officers of the army, small landlords, government officials, peasants and even priests. Its organization was both curious and mysterious, and had a fantastic ritual full of symbols taken from the Christian religion, as well as from the trade of charcoal-burning, which was extensively practised in the mountains of the Abruzzi and Calabria. A lodge was called a vendita (sale), members saluted each other as buoni cugini (good cousins), God was the " Grand Master of the Universe," Christ the " Honorary Grand Master," also known as " the Lamb," and every Carbonaro was pledged to deliver the Lamb from the Wolf, i.e. tyranny. Its red, blue and black flag was the standard of revolution in Italy until substituted by the red, white and green in 1831.

When King Ferdinand felt himself securely re-established at Naples he determined to exterminate the Carbonari, and to this end his minister of police, the prince of Canosa, set up another secret society called the Calderai del Contrappeso (braziers of the counterpoise), recruited from the brigands and the dregs of the people, who committed hideous excesses against supposed Liberals, but failed to exterminate the movement. On the

contrary, Carbonarism flourished and spread to other parts of Italy, and countless lodges sprang up, their adherents comprising persons in all ranks of society, including, it is said, some of royal blood, who had patriotic sentiments and desired to see Italy free

from foreigners. In Romagna the movement was taken up with enthusiasm, but it also led to a certain number of murders owing to the fiery character of the Romagnols, although its criminal record is on the whole a very small one. Among the foreigners who joined it for love of Italy was Lord Byron. The first rising actively promoted by the Carbonari was the Nea- politan revolution of 1820. Several regiments were composed entirely of persons affiliated to the society, and on the 1st of July a military mutiny broke out at Monteforte, led by two officers named Morelli and Silvati, to the cry of " God, the King and the Constitution." The troops sent against them, under General Pepe, himself a Carbonaro, sympathized with the mutineers, and the king, being powerless to resist, granted the constitution (13th of July), which he swore on the altar to observe. But the Carbonari were unable to carry on the govern- ment, and after the separatist revolt of Sicily had broken out the king went to the congress of Laibach, and obtained from the emperor of Austria the loan of an army with which to restore the autocracy. He returned to Naples early in 1821 with 50,000 Austrians, defeated the constitutionalists under Pepe, dismissed parliament, and set to work to persecute all who had been in any way connected with the movement.

A similar movement broke out in Piedmont in March 1821. Here as in Naples the Carbonari comprised many men of rank, such as Santorre di Santarosa, Count San Marzano, Giacinto dj Collegno, and Count Moffa di Lisio, all officers in the army, and they were more or less encouraged by Charles Albert, the heir-presumptive to the throne. The rising was crushed, and a number of the leaders were condemned to death or long terms of imprisonment, but most of them escaped. At Milan there was only the vaguest attempt at conspiracy; but Silvio Pellico, Maroncelli and Count Confalonieri were implicated as having invited the Piedmontese to invade Lombardy, and were condemned, to pass many years in the dungeons of the Spielberg.

The French revolution of 1830 had its echo in Italy, and Car- bonarism raised its head in Parma, Modena and Romagna the following year. In the papal states a society called the San- fedisti or Bande della Santa Fede had been formed to checkmate the Carbonari, and their behaviour and character resembled those of the Calderai of Naples. In 1831 Romagna and the Marches rose in rebellion and shook off the papal yoke with astonishing ease. At Parma the duchess, having rejected the demand for a constitution, left the city and returned under Austrian protection.

At Modena, Duke Francis IV., the worst of all Italian tyrants, was expelled by a Carbonarist rising, and a dictatorship was established under Biagio Nardi on the 5th of February. Francis returned with an Austrian force and hanged the conspirators, including Ciro Menotti. The Austrians occupied Romagna and restored the province to the pope, but though many arrests of Carbonari were made there were no executions. Among those implicated in the Carbonarist movement was Louis Napoleon, who even in after years, when he was ruling France as Napoleon III., never quite forgot that he had once been a conspirator, a fact which influenced his Italian policy. The Austrians retired from Romagna and the Marches in July 1831, but Carbonarism and anarchy having broken out again, they returned, while the French occupied Ancona. The Carbonari after these events ceased to have much importance, their place being taken by the more energetic Giovane Italia Society presided over by Mazzini.

In France, Carbonarism began to take root about 1820, and was more thoroughly organized than in Italy. The example of the Spanish and Italian revolutions incited the French Car- bonari, and risings occurred at Belfort, Thouars, La Rochelle and other towns in 1821, which though easily quelled revealed the nature and organization of the movement. The Carbonarist lodges proved active centres of discontent until 1830, when, after

contributing to the July revolution of that year, most of their members adhered to Louis Philippe's government.

The Carbonarist movement undoubtedly played an important part in the Italian Risorgimento, and if it did not actively contribute to the wars and revolutions of 1848-49, 1859-60 and 1866, it prepared the way for those events. One of its chief merits was that it brought Italians of different classes and provinces together, and taught them to work in harmony for the overthrow of tyranny and foreign rule.

Bibliography. — Much information on the Carbonari will be found in R. M. Johnston's Napoleonic Empire in Southern Italy (2 vols., London, 1904), which contains a full bibliography; D. Spadoni's Sctte, cospirazioni, e cospiratori (Turin, 1904) is an excellent monograph ; Memoirs of the Secret Societies of Southern Italy, said to be by one Bertoldi or Bartholdy (London, 1821, Ital. transl. by A. M. Cavallotti, Rome, 1904) ; Saint-Edme, Constitution et organisa- tion des Carbonari ; P. Colletta, Storia del Reame di Napoli (Florence, 1848); B. King, A History of

Italian Unity (London, 1899), with bibliography. (L. V.*)

CARBONATES. (1) The metallic carbonates are the salts of carbonic acid, H_2CO_3. Many are found as minerals, the more important of such naturally occurring carbonates being cerussite (lead carbonate, $PbCO_3$), malachite and azurite (both basic copper carbonates), calamine (zinc carbonate, $ZnCO_3$), witherite (barium carbonate, $BaCO_3$), strontianite (strontium carbonate, $SrCO_3$), calcite (calcium carbonate, $CaCO_3$), dolomite (calcium magnesium carbonate, $CaCO_3$-$MgCO_3$), and sodium carbonate, Na_2CO_3. Most metals form carbonates (aluminium and , chromium are exceptions), the alkali metals yielding both acid and normal carbonates of the types $MHCO_3$ and M_2CO_3 (M = one atom of a monovalent metal); whilst bismuth, copper and magnesium appear only to form basic carbonates. The acid carbonates of the alkali metals can be prepared by saturating an aqueous solution of the alkaline hydroxide with carbon dioxide, MOH-j-CO_2 = MHCO3, and from these acid salts the normal salts may be obtained by gentle heating, carbon dioxide and water being produced at the same time, 2MHCO3 = M_2CO_3 +H_2O + CO_2. Most other carbonates are formed by precipitation of salts of the metals by means of alkaline carbonates. All carbonates, except those of the alkali metals and of thallium, are insoluble in water; and the majority decompose when heated strongly, carbon dioxide being liberated and a residue of an oxide of the metal left. The alkaline carbonates undergo only a very slight decomposition, even at a very bright red heat. The carbonates are decomposed by mineral acids, with formation of the corre-sponding salt of the acid, and liberation of carbon dioxide. Many carbonates which are insoluble in water dissolve in water containing carbon dioxide. The individual carbonates are described under the various metals.

(2) The organic carbonates are the esters of carbonic acid, H_2CO_3, and of the unknown ortho-carbonic acid, $C(OH)_4$. The acid esters of carbonic acid of the type HO -CO OR are not known in the free state, but J. B. Dumas obtained barium methyl carbonate by the action of carbon dioxide on baryta dissolved in methyl alcohol {Ann., 1840, 35, p. 283).

Potassium ethyl carbonate, KO-CO-OC_2H_5, is obtained in the form of pearly scales when carbon dioxide is passed into an alcoholic solution of potassium ethylate, CO_2 + KOC_2H_6 = KO-CO-OC_2H_6. It is not very stable, water decomposing it into alcohol and the alkaline carbonate. The normal esters may be

prepared by the action of silver carbonate on the alkyl iodides, or by the action of alcohols on the chlorcarbonic esters. These normal esters are colourless, pleasant- smelling liquids, which are readily soluble in water. They show all the reactions of esters, being readily hydrolysed by caustic alkalis, and reacting with ammonia to produce carbamic esters and urea. By heating with phosphorus pentachloride an alkyl group is eliminated and a chlorcarbonic ester formed. Dimethylcarbonate, $CO(OCH_3)_2$, is a colourless liquid, which boils at 90-6° C, and is prepared by heating the methyl ester of chlorcarbonic acid with lead oxide. Diethylcarbonate, $CO(OC_2H_5)_2$, is a colourless liquid, which boils at 125-8° C. ; its specific gravity is 0-978 (20°) [H. Kopp]. When it is heated to 120° C. with sodium ethylate it decomposes into ethyl ether and sodium ethyl carbonate (A. Geuther, Zeit. f. Chemie, 1868).

Ortho-carbonic ester, $C(OC_2H_5)_4$, is formed by the action of

sodium ethylate on chlorpicrin (H. Bassett, Ann., 1864, 132, p. 54),

$CCl_3NO_2 + 4C_2H_5ONa = C(OC_2H_5)_4 + NaNO_2 + 3NaCl$. It is an ethereal-

1 smelling liquid, which boils at 158-159° C, and has a specific

gravity of 0-925. When heated with ammonia' it yields guanidine, and on boiling with alcoholic potash it yields potassium carbonate.

Chlorcarbonic ester, $Cl\text{-}CO\text{-}OC_2H_5$, is formed by the addition of well-cooled absolute alcohol to phosgene (carbonyl chloride). It is a pungent-smelling liquid, which fumes strongly on exposure to air. It boils at 93-1° C., and has a specific gravity of 1-144 (15°C.). When heated with ammonia it yields urethane. Sodium amalgam converts it into formic acid; whilst with alcohol it yields the normal carbonic ester. It is easily broken down by many substances (aluminium chloride, zinc chloride, &c.) into ethyl chloride and carbon dioxide.

Percarbonates. — Barium percarbonate, $BaCO_4$, is obtained by passing an excess of carbon dioxide into water containing barium

peroxide in suspension; it is fairly stable, and yields hydrogen peroxide when treated with acids (E. Merck, Abs. J.C.S., 1907, ii. p. 859). Sodium percarbonates of the formulae Na 2 C04, Na2C2C>6, Na 2 C0 6 , NaHCCh (two isomers) are obtained by the action of gaseous or solid carbon dioxide on the peroxides Na 2 02, Na 2 03, NaH0 2 (two isomers)in the presence of water at a low temperature (R.Wolffenstein and E.Peltner, Ber., 1908,41, pp. 275,280). Potassium percarbonate, K2C2O0, is obtained in the electrolysis of potassium carbonate at — 10 to — 15 .

CARBON BISULPHIDE, CS 2 , a chemical product first dis- covered in 1796 by W. A. Lampadius, who obtained it by heating a mixture of charcoal and pyrites. It may be more conveniently prepared by passing the vapour of sulphur over red hot char- coal, the unccndensed gases so produced being led into a tower containing plates over which a vegetable oil is allowed to flow in order to absorb any carbon bisulphide vapour, and then into a second tower containing lime, which absorbs any sulphuretted hydrogen. The crude product is very impure and possesses an offensive smell; it may be purified by forcing a fine spray of lime water through the liquid until the escaping water is quite clear, the washed bisulphide being then mixed with a little colourless oil and distilled at a low temperature. For further methods of purification see J. Singer (Journ. of Soc. Chem. Ind., 1889, p. 93), Th. Sidot (Jahresb., 1869, p. 243), E. Allary (Bull, de la Soc. Chitn., 1881, 35, p. 491), E. Obach (Jour. prak. Chem., 1882 (2), 26, p. 282).

When perfectly pure, carbon bisulphide is a colourless, some- what pleasant smelling, highly refractive liquid, of specific gravity 1-2661 (18%°) (J- W. Briihl) or 1-29215 (o7 4 °) (T. E. Thorpe). It boils at 46-04° C. (T. E. Thorpe, Journ. Chem. Soc, 1880, 37, p. 364). Its critical temperature is 277-7° C., and its critical pressure is 78*1 atmos. (J. Dewar, Chem. News, 1885, 51, p. 27). It solidifies at about -116° C, and liquefies again at about- no°C. (K.Olszewski, Jahresb., 1883, p. 75). Itisamono- molecular liquid (W. Ramsay and J. Shields, Jour. Chem. Soc, 1893, 63, p. 1089). It is very volatile, the vapour being heavy and very inflammable. It burns with a pale blue flame to form carbon dioxide and sulphur dioxide. It is almost insoluble in water, but mixes in all proportions with absolute alcohol, ether, benzene and various oils. It is a good solvent for sulphur, phosphorus, wax, iodine, &c. It dissociates when heated to a sufficiently high temperature. A mixture of carbon bisulphide vapour and nitric oxide burns with a very intense blue-coloured flame, which is

very rich in the violet or actinic rays. When, heated with water in a sealed tube to 150° C. it yields carbon dioxide and sulphuretted hydrogen. Zinc and hydrochloric acid reduce it to tri-thioformaldehyde (CH 2 S) 3 (A. Girard, Comptes rendus, 1856, 43, p. 396). When passed through a red-hot tube with chlorine it yields carbon tetrachloride and sulphur chloride (H. Kolbe). Potassium, when heated, burns in the vapour of carbon bisulphide, forming potassium sulphide and liberating carbon. In contact with chlorine monoxide it forms carbonyl chloride and thionyl 'chloride (P. Schiitzen- berger, Ber., 1869, 2, p. 219). When passed with carbon dioxide through a red-hot tube it yields carbon oxysulphide, COS (C. Winkler), and when passed over sodamide it yields am- monium thiocyanate. A mixture of carbon bisulphide vapour and sulphuretted hydrogen, when passed over heated copper, gives, amongst other products, some methane.

Carbon bisulphide slowly oxidizes on exposure to air, but by the action of potassium permanganate or chromic acid it is readily oxidized to carbon dioxide and sulphuric acid. By the action of aqueous alkalis, carbon bisulphide is converted into a mixture of an alkaline carbonate and an alkaline thiocarbonate (J. Berzelius,

Pogg.ˆreM.,i825,6,p. 444),6KHO+3CS2 = K 2 C0 3 +2K2CS3+3H 2 0; on the other hand, an alcoholic solution of a caustic alkali converts it into a xanthate (A. Vogel, Jahresb., 1853, p. 643),

CS 2 + KHO + R-OH = H 2 + RO-CS-SK. Aqueous and alcoholic solutions of ammonia convert carbon bi- sulphide into ammonium dithiocarbamate, which readily breaks down into ammonium thiocyanate and- sulphuretted hydrogen (A. W. Hofmann),

CS 2 +2NH 8 -}NH 2 -CSS-NH4->H 2 S+NH4CNS. Carbon bisulphide combines with primary amines to form alkyl dithiocarbamates, which when heated lose sulphuretted hydrogen and leave a residue of a dialkyl thio-urea,

CS 2 +2R-NH 2 -ˆR-NH-CSS-NH 3 R->CS(NHR) 2 +H 2 S; or if the aqueous solution of the dithiocarbamate be boiled with mercuric chloride or silver nitrate solution, a mustard oil (g.».) is formed,

R-NH-CSS-NH 3 R+HgCl 2 ˆHg(R-NH-CSS)2-ˆ2RNCS+HgS-t-H 2 S. Carbon bisulphide is used as a solvent for caoutchouc, for extracting essential oils, as a germicide, and as an insecticide.

Carbon mono sulphide, CS, is formed when a silent electric discharge is passed through a mixture of carbon bisulphide vapour and hydrogen or carbon monoxide (S. M. Losanitsch and M. Z. Jovitschitsch, Ber., i897 > 30, P- 135)-

CARBONDALE, a city of Lackawanna county, Pennsylvania, U.S.A., on the Lackawanna river, 16 m. N.E. of Scranton. Pop. (1890) 10,833; (1900) 13,536, of whom 2553 were foreign- born; (1910 census) 17,040. Carbondale is served by the Erie, the Delaware & Hudson (which has machine shops here), and the New York, Ontario & Western railways. The city lies near the upper end of the Lackawanna valley, and the scenery of the surrounding mountains makes it a summer resort of some importance. It has a public library, a small park, an emergency hospital and the Carbondale city private hospital. Carbondale is situated in one of the richest anthracite coal regions of the state, and its principal interest is in coal. Among its manu- factures are foundry and machine shop products, sheet-iron, silk, glass, thermometers and hydrometers, bobbins and re- frigerating machines. The value of the city's factory products increased from $1,146,181 in 1900 to $2,315,695 in 1905, or 102%. The settlement of the place began in 1824 with the opening of the coal mines, and Carbondale was chartered as a city in 1851.

CARBONIC ACID, in chemistry, properly H 2 C0 3 , the acid assumed to be formed when carbon dioxide is dissolved in water; its salts are termed carbonates. The name is also given to the neutral carbon dioxide from its power of forming salts with oxides, and on account of the acid nature of its solution; and, although not systematic, this use is very common.

CARBONIFEROUS SYSTEM, in geology, the whole of the great series of stratified rocks and associated volcanic rocks which occur above the Devonian or Old Red Sandstone and below the Permian or Triassic systems, belonging to the Carboniferous period. The name was first applied by W. D. Conybeare in 1 82 1 to the coal-bearing strata of England and Wales, including the related grits and limestones immediately beneath them. The term is a relic of that early period in the history of strati- graphy when each group of strata was supposed to be distin- guished by some peculiar lithological character. In this case the carbonaceous beds — coal-seams — naturally appealed most strongly to the imagination, and the name is a good one, not- withstanding the fact that coal-seams occupy but a small fraction of the total thickness of the Carboniferous system; and although subsequent

investigations have demonstrated the existence of coal in other geological formations, in none of these does it play so prominent a part. The stratified rocks of this system include marine limestones, shales and sandstones; estuarine, lagoonal and fresh-water shales, sandstones and marls with beds of coal, oil-bearing rocks, gypsum and salt.

In many parts of the world there is no sharp line of demar- cation between the Devonian and the Carboniferous rocks; neither can the fossil faunas and floras be clearly separated at any well-defined line; this is true in Britain, Belgium, Russia, Westphalia and parts of North America. Again, at the summit of the Carboniferous series, both the rocks and their fossil contents merge gradually into those of the succeeding Permian

system, as in Russia, Bohemia, the Saar region and Texas. This has led certain geologists to classify the Devonian, Car-boniferous and Permian into one grand system; E. Renevier in 1874 proposed to include these three into a single ” Carbon- ique ” system, later he retained only the two latter groups.

There seems to be sufficient reason, however, to maintain each of these groups as a separate system and limit the term Carboni-ferous (fiarboniferien) in the manner indicated above. At the same time it must be remembered that there is in India, South Africa, the Urals, in Australasia and parts of North America an important series of rocks, with a ” Permo-Carboniferous ” fauna, which constitutes a passage formation between the Car-boniferous, sensu stricto, and Jurassic rocks.

Stratigraphy. — No assemblage of stratified rocks has received such careful and detailed examination as the Carboniferous system ; consequently our knowledge of the stratigraphical sequence in isolated local areas, where the coals have been exploited, is very full.

In Europe, the system is very completely developed in the British Isles, where was made the first successful attempt at a classification of its various members, although at a somewhat earlier date Omalius d’Halloy had recognized a terrain bituminifere or coal-bearing series in the Belgian region.

The area within which the Carboniferous rocks of Britain occur is sufficiently extensive to contain more than one type of the system, and thus to cast much light on the varied geographical conditions under which these rocks were accumulated. In prosecuting the study of this part of British geology it is soon discovered, and it is essential to bear in mind, that, during the Carboniferous period, the land whence the chief supplies of sediment were derived rose mainly to the north and north-west, as it seems to have done from very early geological time. While therefore the centre and south of England lay under clear water of moderate depth, the north of the country and the south of Scotland were covered by shallow water, which was continually receiving sand and mud from the adjacent northern land. Hence vertical sections of the Carboniferous formations of Britain differ greatly according to the districts in which they are taken.

The Coal-Measures and Millstone Grit are usually grouped together in the Upper Carboniferous, the Carboniferous Limestone series constituting the Lower Carboniferous.

In addition to the above broad subdivisions, Murchison and Sedgwick, when working upon the rocks of Devonshire and Cornwall, recognized, with the assistance of W. Lonsdale, another phase of sedimentation. This comprised dark shales, with grits and thin limestones and thin, impure coals, locally called ” culm ” (q.v.). These geologists appropriated the term ” culm ” for the whole of this tacies in the west of England, and subsequently traced the same type on the European continent, where it is widely developed in the western centre.

Besides the considerable exposed area of Carboniferous rocks in Great Britain, there is as much or more that is covered by younger formations; this is true particularly of the eastern side of England and the south-eastern counties, where the coal-measures have already been found at Dover.

From England, Carboniferous rocks can be followed across northern and central France, into Germany, Bohemia, the Alps, Italy and Spain. In Russia this system occupies some 30,000 sq. m., and it extends northward at least as far as Spitzbergen. Carboni- ferous rocks are present in North and South Africa, and in India and Australasia ; in China they cover thousands of square miles, and in

Millstone Grit.

the United States ahd British North America they occupy no less than 200,000 sq. m. ; they are known also in South America.

The subjoined table expresses the typical subdivisions which can be recognized, with modifications, in the United Kingdom.

Upper: Red and grey sandstones, marls and clays

with occasional breccias, thin coals and limestones

with Spirorbis, workable coals in the South Wales,

Coal J Bristol, Somerset and Forest of Dean coalfields.

Measures. 1 Middle: Sandstones, marls, shales and the most

important of the British coals.

Lower: Flaggy hard sandstones (ganister) , shales and thin coal seams.

Grits (coarse and fine), shales, thin coal seams and occasional thin limestones. The fossil plants connect this group with the coal-measures ; the marine fossils have, to some extent, a Carboniferous limestone aspect.

Upper black shales with thin limestones (Pendleside group) connecting this series with the Millstone grit above.

The thick, main or scaur limestone (mountain lime- stone) of the centre and south of England, Wales and Ireland, which splits up in the Yorkshire dales (Yoredale group) into a succession of stout limestone beds between beds of sandstone and shale, and becomes increasingly detrital in character as it is traced northwards.

Lower limestone shales of the south and centre of England with marine fossils, and the Calciferous Sandstone group of Scotland with marine, estuarine and terrestrial fossils. (See Bernician, Tuedian and Avonian.) At an early period, owing to the immense commercial importance of the coal seams, it became the practice to distinguish a ” produc- tive ” [flotzfuhrend, terrain houiller) and an “unproductive,” barren (flotzleerer) Lower Carboniferous; these two groups correspond in North America to the ” Carboniferous ” and ” Sub-Carboniferous ” respectively, or, as they are now sometimes styled, the ” Pennsyl- vanian ” and ”

Mississippian." But it was soon discovered that the " productive " beds were not regularly restricted to the upper or younger division, and, as E. Kayser points out, the real state of the matter is more accurately represented by the subjoined tabular scheme.

Carboniferous

Limestone

Series.

Continental Type of Deposit.

Marine Type of Formation.

Upper Carboni- ferous

Upper Productive Carboni- ferous

Younger Carboniferous limestone and the Fusu- lina limestone of Russia and Western North America

Lower Carboni- ferous

Lower Productive Carboni- ferous

Culm (in part)

Lower Carboni- ferous lime- stone series

While the continental type of deposit, with its coal beds, was the earliest to be formed in certain areas, and the marine series came on later, in other regions this order was reversed. Itshould be observed, however, that the repeated intercalation of marine deposits within the continental series and the frequent occurrence of thin coaly layers in the marine series makes any hard and fast distinction of this kind impossible.

■ The so-called " unproductive " or barren strata, that is, those without workable coals, are not always limestones; quite as often they are shales, red sandstones and red marls.

In subdividing the strata of the Carboniferous system and correlat- ing the major divisions in different areas, just as in other great systems, use has to be made of the fossii contents of the rocks; stratigraphical units, based on lithology, are useless for this purpose. The groups of organisms utilized for zoning and

correlation by differ- ent workers include brachiopods, pelecypods, cephalopods, corals, fishes and plants; and the results of the comparison of the faunas and floras of different areas where Carboniferous rocks occur are generalized in the table below.

The relative value of any group of animals or plants for the correlation of distant areas must vary greatly with the varying condition? of sedimentation and with the precise definition of the zonal species and with many other factors. It is found that the sub- divisions in this system demanded by palaeobotanists do not always coincide with those acknowledged by palaeozoologists ; nevertheless there is general agreement as to the main divisional lines.

Breaks in the Stratigraphic Sequence. — The sequence of Carboni- ferous strata is not everywhere one of unbroken continuity. From central France eastward towards the Carpathians only later portions of the system are found. These generally rest upon crystalline rocks, but in places they contain evidence of the denuded surfaces of Lower Carboniferous, as in the basin of Charleroi, where the equivalent of

the Millstone Grit contains fragments of chert which can only have come from the waste of the earlier limestones. This unconformity is generally found about the same horizon in the continental Culm areas, and it occurs again in the western part of the English Culm.

In the eastern border of the Rhenish Schiefergebirge the Permian rests unconformably upon Lower Carboniferous rocks. In the

Tabular Statement of the Principal Subdivisions of the Carboniferous System.

en

3

O

Ih

‘3

U

U

a. a.

» u

O u.

European Development.

America.

Predominant Plant Types.

Ouralien and Stephanien (marine type) (continental type)

e S

‘2

>

w

a c

0)

Ferns and Annularias

Moscovien and Westphalien (marine type) (continental type)

Sigillarias

and Calamites

3

O

&

‘a

t-i

a U

u

CO ■-<

3 u

O +->

si u 3

Dinantien and Culm II II (marine pelagic, (marine littoral) including con- tinental de- posits in some areas)

a

‘3.

.£•

“53

en

‘33

m

is

Lycopods

United States, in Missouri, Pennsylvania, West Virginia, Kentucky, Ohio and elsewhere, there is an unconformable junction between the Lower and Upper Carboniferous, representing an interval of time during which the lower member was strongly eroded; it has even been proposed to regard the Mississippian (Lower Carboniferous) as a distinct geological period, mainly on account of this break in the succession.

Thickness of Carboniferous Rocks. — The great variety of conditions under which the sediments and limestones were formed naturally produced corresponding inequalities in the thickness. In the Eurasian land area the greatest thickness of

Carboniferous rocks is in the west; in North America it is in the east. In Britain the Carboniferous limestone series is 2000-3500 ft. thick; in the Ural mountains it is over 4500 ft. ; the Culm in Moravia is credited with the enormous thickness of over 42,000 ft. The Upper Carboniferous in Lancashire is from 12,000 to 13,000 ft.; elsewhere in Britain it is thinner. In western Germany this portion attains a thickness of 10,000 ft. In Pennsylvania the sandstone and shale, at its maximum, reaches 4400 ft., but even within the limits of the state this formation has thinned out to no more than 300 ft. in places. In Colorado the Lower Carboniferous is only 400-500 ft. thick; while the limestones of the Mississippi basin amount to 1500 ft. and in Virginia are 2000 ft. thick.

Life of the Carboniferous Period. — We have seen that in the Carboniferous rocks there are two phases of sedimentation, the one marine, the other continental; corresponding with these there are two distinct faunal facies.

(1) Fauna of the Marine Strata. — Numerically, the most important inhabitants of the clear Carboniferous seas were the crinoids, corals, Foraminifera and brachiopods. Each of these groups contributed at one place or another towards the upbuilding of great masses of limestone. For the first time in the earth's history we find Foramini- fera taking a prominent part in the marine faunas; the genus Fusulina was abundant in what is now Russia, China, Japan, North America; Valvulina had a wide range, as also had Endothyra and Archaediscus • Saccammina is a form well known in Britain and Belgium, and many others have been described ; some Carboniferous genera are still extant. Radiolaria are found in cherts in the Culm of Devonshire and Cornwall, in Russia, Germany and elsewhere. Sponges are represented by spicules and anchor ropes. Corals, both reef-builders and others, flourished in the clearer waters; rugose forms are represented by Amplexoid, Zaphrentid and Cyathophyllid types, and by Lithostrotion and Phillipsastraea; common tabulate forms are Chaetetes, Chladochonus, Michelinia, &c. Amongst the echinoderms crinoids were the most numerous individually, dense submarine thickets of the long-stemmed kinds appear to have flourished in many places where-their remains consolidated into thick beds of rock; prominent genera are Cyathocrinus, Woodocrinus, Actinocrinus ; sea-urchins, Archaeocidaris , Palaeechinus, &c., were present ; while the curious extinct Blastoids, which included the groups of Pentremitidae and Codasteridae, attained their maximum development.

Annelids (Spirorbis, Serpulites, &c.) are common fossils on certain horizons. The Bryozoa were also abundantinsomeregions (Polypora, Fenestella), including the remarkable form known as Archimedes.

Brachiopods occupied an important place; most typical were the Productids, some of which reached a great size and had very thick shells. Other common genera are Spirifer, Chonetes, Athyris, Rhynchonellids and Terebratulids, Discina and Crania. Some

species had an almost world-wide range with only minor variations; such are Productus semireticulatus, P. cora, P. pustulosus; Orthotetes (Streptorhynchus) crenistria, Dielasma hastata, and many others.

Pelecypods among the true mollusca were increasing in numbers and importance {Aviculopecten, Posidonomya) ; Nucula, Carboni- cola, Edmondia. Conocardium, Modiola, Gasteropods also were numerous (Murchisonia, Euomphalus, Naticopsis). The Pteropods were well represented by Conularia and Belle- rophon. Amongst the Cephalopods, the most striking feature is the rise and development of the Goniatites {Glyphioceras, Gastrioceras, &c.) ; straight-shelled forms still lived on in some variety (Orthoceras, Actinoceras), along with numerous nautiloids.

Trilobites during this period sank to a very subordinate position, but Ostracods (Cythere, Kirkbya, Beyrichia) were abundant.

Many fish inhabited the Carboniferous seas and most of these were Elasmobranchs, sharks with crushing pavement teeth (Psammodus), adapted for grinding the shells of brachiopods, crustaceans, &c. Other sharks had piercing” teeth (Cladoselache and Cladodus); some, the petalodonts, had peculiar cycloid cutting teeth. The Arthrodirans, so prominent during the Devonian period, disappeared before the close of the Carboniferous. Most of the sharks lived in the sea continuously, but the ganoids frequenting the coastal waters appear to have migrated inland. About 700 species of Carboniferous fish have been described largely from teeth, spines and dermal ossicles.

(2) Flora and Fauna of the Lagoonal or Continental Facies.- The strata deposited during this period are the earliest in which the remains of plants take a prominent place. The fossil plants which are found in the upper beds of the preceding Devonian system

are so closely related to those in the Lower Carboniferous, that from a palaeobotanical standpoint the two form one indivisible period.

In the Lower Carboniferous the flora was composed of six great groups of plants, viz. the Equisetales (Horse-tails), the Lycopodiales (Club mosses), the Filicales (Ferns) and Cycadofilices, the Spheno- phyllales and Cordaitales. These six groups were the dominant types throughout the period, but during Upper Carboniferous time three other groups arose, the Coniferales, the Cycadophyta, and the Ginkgoales (of which Ginkgo biloba is the only modern representa- tive). Algae and fungi also were present, but there were no flowering plants. The true ferns, including tree ferns with a height of upwards of 60 ft., were associated with many plants possessing a fern-like habit (Cycadofilices) and others whose affinities have not yet been definitely determined. The fronds of some of these Carboniferous ferns are almost identical with those of living species. Probably many of the ferns were epiphytic. Pecopteris, Cyclopteris, Neuro- pteris, Alethopteris , Sphenopteris are common genera; Megaphyton and Caulopteris were tree ferns. Our modern diminutive ” horse- tails ” with scaly leaves were represented in the Carboniferous period by gigantic calamites, often with a diameter of I to 2 ft. and a height of 50 to 90 ft. The Carboniferous forerunners of the tiny club-moss were then great trees with dichotomously branching stems and crowded linear leaves, such as Lepidodendron (with its fruit cone called Lepidostrobus), Halonia, Lepidophloios and Sigillaria, the largest plants of the period, with trunks sometimes 5 ft. in diameter and 100 ft. high. The roots of several of these forms are known as Stigmaria. Sphenophyllum was a slender climbing plant with whorls of leaves, which was probably related both to the calamites and the lycopods. Cordaites, a tall plant (20-30 ft.) with yucca-like leaves, was related to the cycads and conifers; the catkin-like inflorescence, which bore yew-like berries, is called Cardiocarpus. Many large trees which have been looked upon as conifers on account of their wood structure may perhaps belong more properly to the Cordaitales. True coniferous trees (Walchia) do appear at the top of the coal measures.

The animals preserved in the continental type of Carboniferous deposit naturally differ markedly from the fossil remains of the purely marine portions of the system. The inhabitants of the waters of this geographical phase include mollusca, which are supposed to have lived in brackish or fresh water, such as

Anthracomya, Naiadites, Carbonicola, and many forms of Crustacea, e.g. (Bairdia Carbonia), phyllopods (Estheria), phyllocarids (Acanthocaris, Dithyrocaris) , schizopods {Anlhrapalaemon) , Eurypterids (Eurypterus, Glypto- scorpius). Fishes were abundant, many of the smaller ganoids are beautifully preserved in an entire condition, other larger forms are represented by fin spines, teeth and bones; Ctenodus, Uronemus, Acanthodes, Cheirodus, Gyracanthus are characteristic genera.

Frequently a temporary return of marine conditions permitted the entombment of such salt water genera as Lingula, Orbiculoidea, Productus in the thin beds known as ” marine bands.”

Remains of air-breathing insects, myriapods and arachnids show that these forms of life were both well developed and individually numerous. Among the insects we find the Orthoptera, Neuroptera, Hemiptera and Coleoptera represented ; cockroaches were particu- larly abundant; crickets, beetles, locusts, walking-stick insects, mayflies and bugs are found, but’ there were neither flies, moths, butterflies nor bees, which is no more than we should expect from

the conditions of plant life. Many insects, &c, have been obtained from the coalfields of Saarbriick and Commentry, and from the hollow trunks of fossil trees in Nova Scotia. Certain British coal-fields have yielded good specimens : A rchaeoptilus, from the Derby- shire coalfield, had a spread of wing extending to more than 14 in. ; some specimens (Brodia) still exhibit traces of brilliant wing colours. In the Nova Scotian tree trunks land snails {Archaeozonites, Dendro- pupa) have been found.

In the later Carboniferous rocks the earliest amphibians make their appearance in considerable numbers; they were all Stego-cephalians (Labyrinthodonts) with long bodies, a head covered with bony plates and weak or undeveloped limbs. The largest were about 7 or 8 ft. long, the smallest only a few inches. Some were probably fluviatile in habit (Loxomma,Anthracosaurus,Ophiderpeton) ; others may have been terrestrial (Dendrerpeton, Hylerpeton) . Certain footprints

in the coal measures of Kansas have been supposed to belong to lacertilian or dinosaurian forms.

The Physical Conditions during the Period. — In western Europe the advent of the Carboniferous period was accompanied by the production of a series of synclines which permitted the formation of organic limestones, free from the sediments which generally char- acterized the concluding phasesof the preceding Devonian deposition. The old land area still existed to the north, but doubtless much reduced in height; against this land, detrital deposits still continued to be formed, as in Scotland ; while over central Ireland and central and northern England the clearer waters of the sea furnished a suitable home for countless corals, brachiopods and foraminifera and great beds of sea lilies ; sponges flourished in many parts of the sea, and their remains contributed largely to the formation of the beds of chert. This clearer water extended from Ireland across north-central England and through South Wales and Somerset into Belgium and Westphalia; but a narrow ridge of elevated older rocks ran across the centre of England towards Belgium at this time.

Traced eastward into north Germany, Thuringia and Silesia, the limestones pass into the detrital culm formations, which owe their existence to a southern uplifted massif, the complement of the synclines already mentioned. Sediments approaching to the culm type, with similar flora and fauna, were deposited in synclinal hollows in parts of France and Spain.

Thus western Europe in early Carboniferous time was occupied by a series of constricted, gulf-like seas; and on account of the steady progress of intermittent warping movements of the crust, we find that the areas of clearer water, in which the limestone-building organisms could exist, were repeatedly able to spread, thus forming those thin limestones found interbedded with shale and sandstone which occur typically in the Yoredale district of Yorkshire and in the region to the north, and also in the culm deposits of central Europe. The spread of these limestones was repeatedly checked by the steady influx of detritus from the land during the pauses in movements of depression. Looking eastward, towards central and northern Russia, we find a wider and much more open sea ; but the continental type of deposit prevailed in the northern portion, and here, as in Scotland, we find coal-beds amongst the sediments (Moscow basin). Farther south in the Donetz basin the coals only appear at the close of the Lower Carboniferous.

In North America, the crustal movements at the beginning of the period are less evident than in Europe, but a marked parallelism exists; for in the east, irt the Appalachian tract, we find detrital sediments prevailing, while the open sea, with great deposits of lime- stone, lay out towards the west in the direction of that similar open sea which lay towards the east of Europe and extended through Asia.

The close of the early Carboniferous period was marked by an augmentation of the orogenic movements. The gentler synclines and anticlines of the earlier part of the period became accentuated, giving rise to pronounced mountain ridges, right across Europe.

This movement commenced in the central and western part of the continent and continued throughout the whole Carboniferous period. The mountains then formed have been called the " Palaeozoic Alps " by E. Kayser, the " Hercynian Mountains " by M. Bertrand. The most western range extended from Ireland through Wales and the south of England to the central plateau of France; this was the " Armorican range " of E. Suess. The eastern part of the chain passed from South France through the Vosges, the Black Forest, Thuringia, Harz, the Fichtelgebirge, Bohemia, the Sudetes, and possibly farther east; this constitutes the " Varischen Alps" of Suess.

The sea had gained somewhat at the beginning of the Carboniferous period in western Europe, but the effect of these movements, com- bined with the rapid formation of detrital deposits from the rising land areas, was to drive the sea steadily from the north towards the south, until the open sea (with limestones) was relegated to what is now the Mediterranean and to Russia and thence eastward. Similar events were meanwhile happening in North America, for the seas were steadily filled with sediments which drove them from the north- east towards the south-west, and doubtless those movements which at the close of this period uplifted the Appalachian mountains were already operative in the same direction.

The folding of the Ural mountains began in the earlier part of this period and was continued, after its close, into the Permian; and there are traces of uplifts in central Asia and Armenia.

None of these movements appears to have affected the southern hemisphere.

The net result of the orogenic movements was, that at the close of the period there existed a great northern continental mass, embracing Europe, North Asia and North America ; and a great southern continental mass, including South America, Africa, Australia and India. Between these land masses lay a great Mediterranean sea — the ” Tethys ” of Suess.

The conditions under which the beds of coal were formed will be found described under that head ; it will be sufficient to notice here that some coal seams were undoubtedly formed by jungle or swamp- like growths on the site of the deposit, and it is equally true that others were formed by the transport and deposition of vegetable detritus. The main point to observe in this connexion is that large tracts of land in many parts of the world were at a critical level as regards the sea, a condition highly favourable to frequent extensive incursions of marine waters over the low-lying areas in a period of extreme crustal instability.

Vulcanicity. — In intimate relationship with the mountain-building orogenic crustal movements was the prevalence of volcanic activity during the earlier part of this period. In the Lower Carboniferous rocks of Scotland intercalated volcanic rocks are strikingly abundant, and now form an important feature in the geology of the southern portion of that country. Of these rocks Sir Archibald Geikie says; ‘ ‘ Two great phases or types of volcanic action during Carboniferous time may be recognized — (1) Plateaus, where the volcanic materials discharged copiously from many scattered openings now form broad tablelands or ranges of hills, sometimes many hundreds of square miles in extent and 1500 ft. or more in thickness; (2) Puys, where the ejections were often confined to the discharge of a small amount of fragmentary materials from a single independent vent.” The plateau type was most extensively developed during the formation of the Calciferous Sandstone ; the puy type was of somewhat later date. Basic lavas, with andesites, trachytes, tuffs and agglomerates are the most common Scottish rocks of this period. Similar erup- tions, but on a much smaller scale, took place in other parts of Great Britain.

Granites, porphyries and porphyrites belonging to this period occur in the Saxon Erzgebirge, the Harz, Thiiringerwald, Vosges, Brittany, Cornwall and Christiania. Porphyrites and tuffs are known in the French Carboniferous. In China, at the close of the period, there were enormous eruptions of melaphyre, porphyrite and quartz-porphyry. In North America, the principal region of

volcanic activity lay in the west ; great thicknesses of igneous rocks occur in the Lower Carboniferous rocks of British Columbia, and from the middle of the period until near its close volcanoes were active from Alaska to California. Igneous rocks of this period are found also in Australasia.

Climate. — That the vegetation during this period was unusually exuberant there can be no doubt, and that a general uniformity of climatic conditions prevailed is shown not only by the wide distribu- tion of coal measures, but by the uniformity of plant types over the whole earth. It is well, however, to guard against an over-estima- tion of this exuberance; it must be borne in mind that the physio- graphic conditions were peculiarly favourable to the preservation of plant remains, conditions that do not appear to have obtained so completely in any other period. The climate, we may assume from the distribution of land and water, was generally moist, and it was probably mild if not warm; conditions favourable to the growth of certain types of plants. But there is no good evidence for an excess of carbon dioxide in the atmosphere — an assumption founded on the luxuriance of the vegetation, coupled with the fact that vulcanicity was active and wide-ranging. Carbon dioxide may have been present in the air in greater abundance in earlier periods than it is at present, but there is no reason to suppose that the percentage was appreciably higher in the Carboniferous period than it is now.

The occurrence of red deposits in western Australia, Scotland, the Ural mountains, in Michigan, Montana and Nova Scotia, &c, associated in some instances with the formation of gypsum and salt, clearly points to the existence of areas of excessive evaporation, such as are found in land-locked waters in regions where something like desert conditions prevail. The xerophytic structures found in some of the plants might seem to corroborate this vjew ; but similar structures are assumed by many plants when dwelling in brackish marshes and morasses.

The abundance of corals in some of the Carboniferous seas and possibly also the large size of some of the Productids and foraminifera may be taken as evidence of warm or temperate waters.

In spite of the bulk of the evidence being in favour of geniality of climate, it is necessary to observe that certain deposits have been recognized as glacial; in the culm of the Frankenwald, in the coal basins of central France, and in central England, certain con-

glomeratic beds have baen assigned, somewhat doubtfully, to this origin. They have also been regarded as the result of torrential action. Glacial deposits certainly do exist in the Permo-carboni- ferous formations, which are described under that head, but in the true Carboniferous system glaciation may be taken as not proven. The foreign boulders of granite, gneiss, &c, found in the coal- measures of some districts, are quite as likely to have been dropped by rafts of vegetation as to have been carried by floating icebergs.

Economic Products. — Foremost among the useful products of the Carboniferous rocks is the coal (a.v.) itself; but associated with the coal seams in Great Britain, North America and elsewhere, are very important beds of ironstone, fire-clay, terra-cotta clay, and occasionally oil shale and alum shale. Oil and gas are of importance in the Lower Carboniferous Pocono sandstone of West Virginia and in the Berea grit of Ohio, where brine also occurs.

In the Carboniferous Limestone series, the purer kinds of limestone are used for the manufacture of lime, bleaching powder and similar products, also as a flux in the smelting of iron ; some of the less pure varieties are used in making cement. The beds of chert are utilized in the pottery industry, and some of the harder and more crystalline limestones are beautiful marbles, capable of taking a high polish.

The sandstones are used for building, and for millstones and grind- stones. Within the Carboniferous rocks, but due to the action of various agencies long after their deposition, are important ore formations; such are the Rio Tinto ores of Spain, the lead and zinc ores and some haematite of the Pennine and Mendip hills and other British localities, and many ore regions in the United States.

References.. — For a good general account of the Carboniferous system, see A. Geikie, Text Book of Geology, vol. ii. (4th ed., 1903) ; and for the American development see T. C. Chamberlin and R. D. Salisbury, Geology, vol. ii. (1906). These two works give abundant references to the literature of the subject. See also, Recent Additions to Geological Literature, published annually by

the Geological Society of London since 1 893; and Neues Jahrbuch fur Mineralogie (Stuttgart). (J. A. H.)

CARBORUNDUM, a silicide of carbon formed by the action of carbon on sand (silica) at high temperatures, which on account of its great hardness is an important abrasive, and also has possible applications in the metallurgy of iron and steel. Its name was derived from carbon and corundum (a form of alumina) , from a mistaken view as to its composition. It was first ob- tained accidentally in 189 1 by Acheson in America, when he was experimenting with the electric furnace in the hope of pro- ducing artificial diamonds. The experiments were followed up in an incandescence furnace, which on a larger scale is now employed for the industrial manufacture of the product. A full description of the process has been given in the Journ. Soc. Chem. Industry, 1897, vol. xvi. p. 863. The furnace is rectangular, about 16 ft. long and 5 ft. wide by 5 ft. high, with massive brick end walls 2 ft. thick, through which are built the carbon poles, consisting of bundles of 60 parallel 3-in. carbon rods, each 3 ft. in length, with a copper rod let into the outer end to connect it with a copper cap, which in turn is connected with one of the terminals of the generating dynamo. The spaces between the carbons of the electrode are packed tightly with graphite. In preparing the furnace for use, transverse iron screens are placed temporarily across each end, the space between these and the end walls being rammed with fine coke, and that in the interior is filled to the level of the centre of the carbon poles with the charge, consisting of 34 parts of coke, with 54 of sand, 10 of sawdust and 2 of salt. A longitudinal trench is then formed in the middle, and in this is arranged a cylindrical pile of frag- ments of coke about J in. or more in diameter, so that they form a core, about 21 in. in diameter, connecting the carbon poles in the end waifs. Temporary side walls are then built up, the iron screens are removed, and a further quantity of charge is heaped up about 3 ft. above the top of the furnace. An alternating current of about 1700 amperes at 190 volts is now switched on; as the mass becomes heated by the passage of the current the resistance diminishes, and the current is regulated until after about 2 hours or less from starting it is maintained constant at about 6000 amperes and 125 volts. Carbon monoxide is given off and burns freely around the sides and top of the furnace, tinged yellow after a time by the sodium in the salt mixed with the charge. Meanwhile a shrinkage takes place, which is made good by the addition of a further quantity of charge until the operation is

complete, usually in about 36 hours from the commencement. The current is then switched off, and the side walls, after cooling for a day, are taken down, the comparatively unaltered charge from the top is removed, and the products are carefully extracted. These consist of the inner carbon core, which at the temperature of the furnace will have been for the most part converted into graphite, then a thin black crust of graphite mixed with car- borundum, next a layer of nearly pure crystallized carborundum about a foot in thickness, then grey amorphous carbide of silicon

mixed with increasing proportions of unaltered charge, and lastly, on the outside, the portion of the charge which had never reached the temperature necessary for reaction, and which is altered only by the intrusion of salt from the inner part of the furnace. Special precautions are taken in making and breaking the intense current here used (amounting at the end to about 750 kilowatts, or 1000 E.H.P.), a water-regulator consisting of removable iron plates dipped in salt water being used for the purpose. In such a furnace as that above described the charge weighs about 14 tons, the yield of carborundum is about 3 tons, and the expenditure of energy about 3-9 kilowatt-hours (5-2 H. P. -hours) per pound of finished product. The carborundum thus produced is crystalline, greenish, bluish or brownish in colour, sometimes opaque, but often translucent, resisting the action of even the strongest acids, and the action of air or of sulphur at high temperatures. The crude product can therefore be treated with hot sulphuric acid to purify it. In hardness it nearly equals the diamond, and it is used for tool-grinding in the form of vitrified wheels (mixed with powdered porcelain and iron, pressed into shape and fired in a kiln). Carborundum paper, made like emery paper, is now largely used in place of garnet paper in American shoe factories, and finds a market in other directions. The amorphous carbide, which was at first a waste product, has been tried, it is reported, with success as a lining for steel furnaces, as it is said not to be affected by iron or iron oxide at a white heat. (W. G. M.)

CARBOY (from the Pers. qarabah, a flagon), a large globular glass vessel or bottle, encased in wicker or iron-work for pro- tection, used chiefly for holding vitriol, nitric acid and other corrosive liquids.

CARBUNCLE (Lat. carbunculus, diminutive of carbo, a glowing coal), in mineralogy, a garnet (

CARCAGENTE, or Carcajente, a town of eastern Spain, in the province of Valencia; near the right bank of the river Jucar, at the junction between the Valencia-Murcia and Carcagente- Denia railways. Pop. (1900) 12,262. Carcagente is a pictur- esque town, of considerable antiquity. Various Roman remains have been found in its neighbourhood. It is surrounded by groves of orange, palm and mulberry trees, and contains many Moorish houses, whose old-fashioned blue-tiled cupolas contrast with the chimneys of the silk mills and linen factories opened in modern times. An important local industry is the cultivation of rice, for which the moist and warm climate of the low-lying Jucar valley is well suited.

CARCAR, a town of the province of Cebu, island of Cebu, Philippine Islands, on the Carcar river near its mouth at the head of Carcar Bay, 23 m. S.W. of Cebu, the capital. It is connected with Cebu by a railway, and a branch of this railway extending across the island to Barili and Dumanjug was projected in 1908. Carcar has some coast trade. The surrounding country

is rugged, and produces Indian corn and sugar in considerable quantity. The language is Cebu-Visayan. Carcar was founded in 1624.

CARCASS, the dead body of an animal. As a butcher's term, the word means the body of an animal without the head, ex- tremities and offal. It is also used of a hollow iron case filled with combustibles, and fired from a howitzer to set fire to buildings, ships, &c, the flames issuing through holes pierced in the sides. The word is common in various forms to Romanic languages, but the ultimate origin is obscure. Possible deriva- tions are from the Lat. caro, flesh, and Ital. casso or cassa, chest, or from a Med. Gr. rapucunov, a quiver, for which the Fr. is carquois, and Port, carcaz.

CARCASSONNE, a city of south-western France, capital of the department of Aude, 57 m. S.E. of Toulouse, on the Southern railway between that city and Narbonne. Pop. (1906) 25,346. Carcassonne is divided by the river Aude into two distinct towns, the Ville Basse and the Cite, which are connected by two bridges, one modern, the other dating from the i3th'century. The Cite

occupies the summit of an abrupt and isolated hill on the right bank of the river. Its dirty and irregular streets are inhabited by a scanty population of workpeople, and its interest lies mainly in its ancient fortifications (see Fortification and Siegecraft) which, for completeness and strength, are unique in France and probably in Europe. They consist of a double line of ramparts, of which the outer measures more than 1600 yds. in circumference. These are protected at frequent intervals by towers, and can be entered only by two gates, one to the east, the other to the west, both of which are themselves elaborately fortified (see Gate). In the interior, and to the north of the western gate, a citadel adjoins the fortifications. A portion of the inner line is attributed to the Visigoths of the 6th century; the rest, including the castle, seems to belong to the nth or 12th century, while the outer circuit has been referred mainly to the end of the 13th. The old cathedral of St Nazaire dates from the nth to the 14th centuries. The nave was begun in 1096 and is Romanesque in style; the transept and choir, which contain magnificent stained glass of the Renaissance period, are of Gothic architecture. Both the fortifications and the church were restored by Viollet-le-Duc between 1850 and 1880. On the left bank of the Aude, between it and the Canal du Midi, lies the new town, clean, well-built and flourishing, with streets intersecting each other at right angles. It is surrounded by boulevards occupying the site of its ramparts, and is well provided with fountains, public squares and gardens planted with fine plane-trees. The most interesting buildings are the cathedral of St Michel, dating from the 13th century but restored in modern times, and St Vincent, a church of the 14th century, remarkable for the width of its nave.

Carcassonne is the seat of a bishop, a prefect and a court of assizes, and has tribunals of first instance and of commerce, a chamber of commerce and a branch of the Bank of France. It also has a lycee for boys, training-colleges, theological semi- naries, a library and a museum rich in paintings. The old cloth industry is almost extinct. The town is, however, an important wine-market, and the vineyards of the vicinity are the chief source of its prosperity, which is enhanced by its port on the Canal du Midi. Tanning and leather-dressing, distilling, the manufacture of agricultural implements, furniture and corks, cooperage and the preparation of preserved fruits, are prominent industries.

Carcassonne occupies the site of Carcaso, an ancient city of Gallia Narbonensis, which belonged to the Volcae Tectosages. It was a place of some importance at the time of Caesar’s in- vasion, but

makes almost no appearance in Roman history. On the disintegration of the empire, it fell into the hands of the Visigoths, who, in spite of the attacks of the Franks, especially in 585, retained possession till 724, when they were expelled by the Arabs, destined in turn to yield before long to Pippin the Short. From about 819 to 1082 Carcassonne formed a separate countship, and from the latter date till 1247 a viscount- ship. Towards the end of the nth century the viscounts of

Carcassonne assumed the style of viscounts of Beziers, which town and its lords they had dominated since the fall of the Carolingian empire. The viscounty of Carcassonne, together with that of Beziers, was confiscated to the crown in 1247, as a result of the part played by the viscount Raymond Roger against Simon de Montfort in the Albigensian crusade, during which in 1209 the city was taken by the Crusaders (see Albi- genses). A revolt of the city against the royal authority was severely punished in 1262 by the expulsion of its principal inhabitants, who were, however, permitted to take up their quarters on the other side of the river. This was the origin of the new town, which was fortified in 1347. During the religious wars, Carcassonne several times changed hands, and it did not recognize Henry IV. till 1596.

See E. E. Viollet-le-Duc, La Cite de Carcassonne (Paris, 1858); L. Fedie, Histoire de Carcassonne (Carcassonne, 1887).

CARDAMOM, the fruit of several plants of the genera Elettaria and Amomum, belonging to the natural order Zingiberaceae, the principal of which is Elettaria Cardamomum, from which the true officinal or Malabar cardamom is derived. The Malabar cardamom plant is a large perennial herb with a thick fleshy root-stock, which sends up flowering stems, 6 to 12 ft. high. The large leaves are arranged in two rows, have very long sheaths enveloping the stem and a lanceolate spreading blade 1 to 25 ft. long. The fruit is an ovate-triangular, three-celled, three-valved capsule (about \ in. long, of a dirty yellow colour) enclosing numerous angular seeds, which form the valuable part of the plant. It is a native of the mountainous parts of the Malabar coast of India, and the fruits are procured either from wild plants or by cultivation throughout Travancore, western Mysore, and along the western Ghauts. A cardamom of much larger size found growing in Ceylon was formerly regarded as belonging to a distinct species, and described as such under the name of Elettaria major; but it is now known to be only a variety of the Malabar cardamom. In commerce, several varieties are distin-

guished according to their size and flavour. The most esteemed are known as ” shorts,” a name given to such capsules as are from a quarter to half an inch long and about a quarter broad. Following these conre ” short-longs ” and ” long-longs,” also distinguished by their size, the largest reaching to about an inch in length. The Ceylon cardamom attains a length of an inch and a half and is about a third of an inch broad, with a brownish pericarp and a distinct aromatic odour. Among the other plants, the fruits of which pass in commerce as cardamoms, are the round or cluster cardamom, Amomum Cardamomum, a native of Siam and Java; the bastard cardamom of Siam, A. xan- thioides — the Bengal cardamom, which is the fruit of A. subu- latum, a native of Nepal; the Java cardamom, produced by A. maximum; and the Korarima cardamom of Somaliland. The last-named is the product of a plant which is unknown botani- cally. Cardamoms generally are possessed of a pleasant aromatic odour, and an agreeable, spicy taste. On account of their flavour they are much used with other medicines, and they form a principal ingredient in curries and compounded spices. In the north of Europe they are much used as a spice and flavouring material for cakes and liqueurs; and they are very extensively employed in the East for chewing with betel, &c.

CARDAN [Ital. Cardano], GIROLAMO [Geronymo or Hieronimo] (1501-1576), Italian mathematician, physician and astrologer, born at Pavia on the 24th of September 1501, was the illegitimate son of Facio Cardano (1444-1524), a learned jurist of Milan, himself distinguished by a taste for mathematics. He was educated at the university of Pavia, and subsequently at that of Padua, where he graduated in medicine. He was, however, excluded from the College of Physicians at Milan on account of his illegitimate birth, and it is not surprising that his first book should have been an exposure of the fallacies of the faculty. A fortunate cure of the child of the Milanese senator Sfondrato now brought him into notice, and the interest of his patron procured him admission into the medical body. About this time (1539) he obtained additional celebrity by the publica- tion of his Practica arithmeticae generalis, a work of great merit

for the time, and he became engaged in a correspondence with Niccolo Tartaglia, who had discovered a solution of cubic

equations. This discovery Tartaglia had kept to himself, but he was ultimately induced to communicate it to Cardan under a solemn promise that it should never be divulged. Cardan, however, published it in his comprehensive treatise on algebra (Artis magnae sive de regulis Algebrae liber unus) which appeared at Nuremberg in 1545 (see Algebra: History). Two years previously he had published a work even more highly regarded by his contemporaries, his celebrated treatise on astrology. As a believer in astrology Cardan was on a level with the best minds of his age; the distinction consisted in the comparatively cautious spirit of his inquiries and his disposition to confirm his assertions by an appeal to facts, or what he believed to be such. A very considerable part of his treatise is based upon observations carefully collected by himself, and seemingly well calculated to support his theories so far as they extend. Numerous instances of his belief in dreams and omens may be collected from his writings, and he especially valued himself on being one of the five or six celebrated men to whom, as to Socrates, had been vouchsafed the assistance of a guardian daemon.

In 1547 he was appointed professor of medicine at Pavia. The publication of his works on algebra and astrology at this juncture had gained for him a European renown, and procured him flattering offers from Pope Paul III. and the king of Denmark, both of which he declined. In 1551 his reputation was crowned by the publication of his great work, De Subtilitate Rerum, which embodied the soundest physical learning of his time and simultaneously represented its most advanced spirit of speculation. It was followed some years later by a similar treatise, De Varietate Rerum (1557), the two making in effect but one book. A great portion of this is occupied by endeavours, commonly futile, to explain ordinary natural phenomena, but its chief interest for us consists in the hints and glimpses it affords of principles beyond the full comprehension of the writer himself, and which the world was then by no means ready to entertain. The inorganic realm of Nature he asserts to be animated no less than the organic; all creation is progressive development; all animals were origin- ally worms; the inferior metals must be regarded as conatus naturae towards the production of gold. The indefinite varia- bility of species is implied in the remark that Nature is seldom content with a single variation from a customary type. The oviparous habits of birds are explained by their tendency to favour the perpetuation of the species, precisely in the manner of modern naturalists. Animals were not created for the use of man,

but exist for their own sakes. The origin of life depends upon cosmic laws, which Cardan naturally connects with his favourite study of astrology. The physical divergencies of man- kind arise from the effects of climate and the variety of human circumstances in general. Cardan's views on the dissimilarity of languages are much more philosophical than usual at his time; and his treatise altogether, though weak in particular details, is strong in its pervading sense of the unity and omnipotence of natural law, which renders it in some degree an adumbration of the course of science since the author's day. It was attacked by J. C. Scaliger, whom Cardan refuted without difficulty.

The celebrity which Cardan had acquired led in the same year (1551) to his journey to Scotland as the medical adviser of Archbishop Hamilton of St Andrews. The archbishop was supposed to be suffering from consumption, a complaint which Cardan, under a false impression, as he frankly admits, had represented himself as competent to cure. He was of great service to the archbishop, whose complaint proved to be asth- matical; but the principal interest attaching to his expedition is derived from his account of the disputes of the medical faculty at Paris, and of the court of Edward VI. of England. The Parisian doctors were disturbed by the heresies of Vesalius, who was beginning to introduce anatomical study from the human subject. Cardan's liberality of temper led him to sympathize with the innovator. His account of Edward VI. 's disposition and understanding is extremely favourable, and is entitled to credit as that of a competent observer without bias towards either side

of the religious question. He cast the king's nativity, and indulged in a number of predictions which were effectually confuted by the royal youth's death in the following year.

Cardan had now attained the summit of his prosperity, and the rest of his life was little but a series of disasters. His principal misfortunes arose from the crimes and calamities of his sons, one of whom was an utter reprobate, while the tragic fate of the other overwhelmed the father with anguish. This son, Giovanni Battista, also a physician, had contracted an imprudent marriage with a girl of indifferent character, Brandonia Seroni, who subsequently proved unfaithful to him. The injured husband revenged himself with poison; the deed was detected, and the exceptional severity of the punishment seems to justify Cardan in attributing it to the rancour of his medical rivals, with whom he had never at any time been on good terms. The blow all but

crushed him; his reputation and his practice waned; he addicted himself to gaming, a vice to which he had always been prone; his mind became unhinged and filled with distempered imaginations. He was ultimately banished from Milan on some accusation not specified, and although the decree was ultimately rescinded, he found it advisable to accept a professorship at Bologna (1562). While residing there in moderate comfort, and mainly occupied with the composition of supplements to his former works, he was suddenly arrested on a charge not stated, but in all probability heresy. Though he had always been careful to keep on terms with the Church, the bent of his mind had been palpably towards free thought, and the circumstance had probably attracted the attention of Pius V., who then ruled the Church in the spirit, as he had formerly exercised the func- tions, of an inquisitor. Through the intercession, as would appear, of some influential cardinals, Cardan was released, but was deprived of his professorship, prohibited from teaching and publishing any further, and removed to Rome, where he spent his remaining years in receipt of a pension from the pope. It seems to have been urged in his favour that his intellect had been disturbed by grief for the loss of his son — an assertion to which his frequent hallucinations lent some countenance, though the existence of any serious derangement is disproved by the lucidity and coherence of his last writings. He occupied his time at Rome in the composition of his commentaries, De Vita Propria, which, along with a companion treatise, De Libris Propriis, is our principal authority for his biography. Though he had burned much, he left behind him more than a hundred MSS., not twenty of which have been printed. He died at Rome on the 21st of September 1576.

Alike intellectually and morally, Cardan is one of the most interesting personages connected with the revival of science in Europe. He had no especial bent towards any scientific pursuit, but appears as the man of versatile ability, delighting in research for its own sake. He possessed the true scientific spirit in perfection; nothing, he tells us, among the king of France's treasures appeared to him so worthy of admiration as a certain natural curiosity which he took for the horn of a unicorn. It has been injurious to his fame to have been compelled to labour, partly in fields of research where no important discovery was then attainable, partly in those where his discoveries could only serve as the stepping-stones to others, by which they were inevitably eclipsed. His medical career serves as an illustration of

the former case, and his mathematical of the latter. His medical knowledge was wholly empirical; restrained by the authority of Galen, and debarred from the practice of anatomy, nothing more could be expected than that he should stumble on some fortunate nostrums. As a mathematician, on the other hand, he effected important advances in science, but such as merely paved the way for discoveries which have obscuredhis own. From his astrology no results could be expected; but even here the scientific character of his mind is displayed in his common- sense treatment of what usually passed for a mystical and occult study. His prognostications are as strictly empirical as his prescriptions, and rest quite as much upon the observations which he supposed himself to have made in his practice. As frequently is the case with men incapable of rightly ordering

their own lives, he is full of wisdom and sound advice for others; his ethical precepts and practical rules are frequently excellent. To complete the catalogue of his accomplishments, he is no contemptible poet.

The work of Cardan's, however, which retains most interest for this generation is his autobiography, De Vita Propria. In its clearness and frankness of self-revelation this book stands almost alone among records of its class. It may be compared with the autobiography of another celebrated Italian of the age,Benvenuto Cellini, but is much more free from vanity and self - consciousness, unless the extreme candour with which Cardan reveals his own errors is to be regarded as vanity in a more subtle form. The general impression is highly favourable to the writer, whose impetuosity and fits of reckless dissipation appear as mere exaggerations of the warmth of heart which imparted such strength to his domestic affections, and in the region of science imparted that passionate devotion to research which could alone have enabled him to persevere so resolutely and effect such marked advances in such multifarious fields of inquiry.

Cardan's autobiography has been most ably condensed, and at the same time supplemented by information from the general body of his writings and other sources, by Henry Morley (Jerome Cardan, 1854, 2 vols). His capital treatises, De Subtilitate and De

Varietate Rerum, are combined and fully analysed in vol. ii. of Rixner and Siber's Leben und Lehrmeinungen beruhmter Physiker am Ende des xvi. und am Anfange des xvii. Jahrhunderts (Sulzbach, 1820). Cardan's works were edited in ten volumes by Sponius (Lyons, 1663). A biography was prefixed by Gabriel Naude, whose un- reasonable depreciation has unduly lowered Cardan's character with posterity. (R. G.)

CARDENAS (San Juan de Dios de Cdrdenas) , a maritime town of Cuba, in Matanzas province, about 75 m. E. of Havana, on the level and somewhat marshy shore of a spacious bay of the northern coast of the island, sheltered by a long promontory. Pop. (1907) 24,280. It has railway communication with the trunk railway of the island, and communicates by regular steamers with all the coast towns. The city lies between the sea and hills. There are broad streets, various squares (including the Plaza de Colon, with a bronze statue of Columbus given to the city by Queen Isabel II. and erected in 1862) and substantial business buildings. Cardenas is one of the principal sugar- exporting towns of Cuba. The shallowness of the harbour necessitates lighterage and repeated loading of cargoes. The surrounding region is famed for its fertility. A large quantity of asphalt has been taken from the bed of the harbour. A flow of fresh water from the bed of the harbour is another peculiar feature; it comes presumably from the outlets of subterranean rivers. There is a large United States business element, which has been, indeed, prominent in the city ever since its foundation. At El Varadero, on a peninsula at the mouth of the bay, there is fine sea-bathing on a long beach, and El Varadero is a winter resort. Cardenas was founded in 1828, and in 1861 already had 12,910 inhabitants. In 1850 General Narciso Lopez landed here on a filibustering expedition, and held the town for a few hours, abandoning it when he saw that the people would not rise to support him in his efforts to secure Cuban independence. On the nth of May 1898 an American torpedo-boat and revenue cutter here attacked three Spanish gun-boats, and Ensign Worth Bagley (1874-1898) was killed — the first American naval officer to lose his life in the Spanish-American War.

CARDIFF, a city, municipal, county and parliamentary borough, seaport and market-town, and the county town of Glamorganshire, South Wales, situated on the Taff, 1 m. above its outflow, 1455 m. from London by the Great Western railway via Badminton, 405 m. W. of Bristol and 45J m. E.S.E. of Swansea. Cardiff is also the terminus of both the Taff Vale and the

Rhymney railways, the latter affording the London & North-Western railway access to the town. The Barry line from Barry dock joins the Great Western and Taff Vale railways at Cardiff, and the Cardiff Railway Company (which owns all the docks) has a line from Pontypridd via Llanishen to the docks. The Glamorganshire canal, opened in 1794, runs from Cardiff to Merthyr Tydfil, with a branch to Aberdare. The increase of the population of Cardiff during the 19th century was phenomenal;

from 1870 inhabitants in 1801, and 6187 in 1831 it grew to 32,954 in 1861. The borough, which originally comprised only the parishes of St John's and St Mary's, was in 1875 and 1895 extended so as to include Roath and a large part of Llandaff, known as Canton, on the right of the Taff. The whole area was united as one civil parish in 1903, and the population in 1901 was 164,333, of whom only about 8% spoke Welsh.

Probably no town in the kingdom has a nobler group of public buildings than those in Cathays Park, which also com- mands a view of the castle ramparts and the old keep. On opposite sides of a fine avenue are the assize courts and new town hall (with municipal offices), which are both in the Renais- sance style. The Glamorgan county council has also a site of one acre in the park for offices.

The University College of South Wales and Monmouthshire, founded in 1883, under the principalship of J. Viriamu Jones, for some time carried on its work in temporary buildings, pending the erection of the commodious and imposing building from the plans of Mr W. D. Caroe, in Cathays Park, where the registry of the university of Wales (of which the college is a constituent) is also situated. The Drapers' Company has given £15,5°° towards building a library, in addition to previous donations to the engineering department and the scholarship fund of the college. The college has departments for arts, pure and applied science and technology, medicine, public health, music, and for the training of men and women teachers for elementary and secondary schools. Its library includes the Salesbury collection of books relating to Wales. Aberdare Hall is a hostel for the women students. The Baptist theological college of Pontypool was removed to Cardiff in 1895.

The public library and museum were founded in 1863, but in 1882 were removed to a new building which was enlarged in 1896. The library is especially rich in books and MSS. relating to

Wales and in Celtic literature generally. These comprise the Welsh portion of the MSS. which belonged to Sir Thomas Phillipps of Middlehill (including the Book of Aneurin — one of the ” Four ancient books of Wales “), purchased for £3500. A catalogue of the printed books in the Welsh department, which soon became a standard work of reference, was published in 1898, while a calendar of the Welsh MSS. was issued by the Historical MSS. Commission in 1903. There are six branch libraries, while a scheme of school libraries has been in operation since 1899. The chief features of the museum are collections of the fossils, birds and flora of Wales and of obsolete Welsh domestic appliances, casts of the pre-Norman monuments of Wales, and reproductions of metal and ivory work illustrating various periods of art and civilization. There is also a unique collection of Swansea and Nantgarw china. The fine arts department contains twenty-seven oil paintings by modern English and continental artists bequeathed by William Menelaus of Dowlais in 1883, the Pyke-Thompson collection of about 100 water-colour paintings presented in 1899, and some 3000 prints and drawings relating to Wales. In 1905 Cardiff was selected by a privy council committee to be the site of a state-aided national museum for Wales, the whole contents of the museum and art gallery, together with a site in Cathays Park, having been offered by the corporation for the purpose. A charter providing for its government was granted on the 19th of March 1907. In Cathays Park there is also a ” gorsedd ” or bardic circle of huge monoliths erected in connexion with the eisteddfod of 1899.

The other public buildings of the town include the infirmary founded in 1837, the present buildings being erected in 1883, and subsequently enlarged; the sanatorium, the seamen’s hospital, the South Wales Institute of Mining Engineers (which has a library) built in 1894, the exchange, an institute for the blind, a school for the deaf and dumb, and one of the two prisons for the county (the other being at Swansea). There are a technical school, an intermediate school for boys and another for girls, a ” higher-grade ” and a pupil teachers’ school. A musical festival is held triennially.

In the business part the buildings are also for the most part imposing and the thoroughfares spacious, while the chief

suburban streets are planted with trees. The Taff is spanned by two bridges, one a four-arched bridge rebuilt in 1858-1859 leading to Llandaff, and the other a cantilever with a central swinging span of 190 ft. 8 in.

In virtue of its being the shire-town, Cardiff acquired in 1535 the right to send one representative to parliament, which it did until 1832, from which date Cowbridge and Llantrisant have been joined with it as contributory boroughs returning one member. The great sessions for the county were during their whole existence from 1542 to 1830 held at Cardiff, but the assizes (which replaced them) have since then been held at Swansea and Cardiff alternately, as also are the quarter sessions for Glamorgan. The borough has a separate commission of the peace, having a stipendiary magistrate since 1858. It was granted a separate court of quarter sessions in 1890, it was con- stituted a county borough in 1888, and, by letters patent dated the 28th of October 1905, it was created a city and the dignity of lord mayor conferred on its chief magistrate. The corporation consists of ten aldermen and thirty councillors, and the area of the municipal borough is 8408 acres.

Under powers secured in 1884, the town obtains its chief water supply from a gathering ground near the sources of the Taff on the old red sandstone beyond the northern out-crop of the mineral basin and on the southern slopes of the Brecknock Beacons. Here two reservoirs of a combined capacity of 668 million gallons have been constructed, and a conduit some 36 m. long laid to Cardiff at a total cost of about £1,250,000. A third reservoir is authorized. A gas company, first incorporated in 1837, supplies the city as well as Llandaff and Penarth with gas, but the corporation also supplies electric power both for lighting and working the tramways, which were purchased from a private company in 1898. The city owned in 1905 about 290 acres of parks and " open spaces," the chief being Roath Park of 100 acres (including a botanical garden of 15 acres), Llandaff fields of 70 acres, and Cathays Park of 60 acres, which was acquired in 1900 mainly with the view of placing in it the chief public buildings of the town.

Commerce and Industries. — Edward II. 's charter of 1324 indicates that Cardiff had become even then a trading and shipping centre of some importance. It enjoyed a brief existence as a staple town from 1327 to 1332. During the reigns of Eliza- beth and James I. it was notorious as a resort of pirates, while

some of the ironfounders of the district were suspected of secretly supplying Spain with ordnance. It was for centuries a " head port," its limits extending from Chepstow to Llanelly; in the 18th century it sank to the position of " a creek " of the port of Bristol, but about 1840 it was made independent, its limits for customs' purposes being defined as from the Rumney estuary to Nash Point, so that technically the "port of Cardiff" includes Barry and Penarth as well as Cardiff proper. Down to the end of the 1 8th century there was only a primitive quay on the river side for shipping purposes. Coal was brought down from the hills on the backs of mules, and iron carried in two-ton wagons. In 1798 the first dock (12 acres in extent) was constructed at the terminus of the Glamorgan canal from Merthyr. The com- mercial greatness of Cardiff is due to the vast coal and iron deposits of the country drained by the Taff and Rhymney, between whose outlets the town is situated. But a great impetus to its development was given by the 2nd marquess of Bute, who has often been described as the second founder of Cardiff. In 1830 he obtained the first act for the construction of a dock which (now known as the West Bute dock) was opened in 1839 and measures (with its basin) 19J acres. The opening of the Taff Vale railway in 1840 and of the South Wales railway to Cardiff in 1850 necessitated further accommodation, and the trustees of the marquess (who died in 1848) began in 1851 and opened in 1855 the East Bute dock and basin measuring 46J acres. The Rhymney railway to Cardiff was completed in 1858 and the trade of the port so vastly increased that the shipment of coal and coke went up from 4562 tons in 1839 to 1,796,000 tons in i860. In 1864 the Bute trustees unsuccessfully sought powers for con- structing three additional docks to cost two millions sterling, but

under the more limited powers granted in 1866, the Roath basin (12 acres) was opened in 1874, and (under a substituted act of 1882) the Roath dock (33 acres) was opened in 1887. All these docks were constructed by the Bute family at a cost approaching three millions sterling. Still they fell far short of the requirements of the district for in 1865 the Taff Vale Railway Company opened a dock of 26 acres under the headland at Penarth, while in 1884 a group of colliery owners, dissatisfied with their treatment at Cardiff, obtained powers to construct docks at Barry which are now 114 acres in extent. The Bute trustees in 1885 acquired the Glamorgan canal and its dock, and in the following year obtained an act for vesting their various docks and the canal in a company now known as the Cardiff Railway Company. The South Bute

dock of 50J acres, authorized in 1894 and capable of accommodat- ing the largest vessels afloat, was opened in 1907, bringing the whole dock area of Cardiff (including timber ponds) to about 210 acres. There are also ten private graving and floating docks and one public graving dock. There is ample equipment of fixed and movable staiths and cranes of various sizes up to 70 tons, the Lewis-Hunter patent cranes being largely used for shipping coal owing to their minimizing the breakage of coal and securing its even distribution. The landing of foreign cattle is permitted by the Board of Trade, and there are cattle lairs and abattoirs near the Cardiff wharf. The total exports of the Cardiff docks in 1906 amounted to 8,767,502 tons, of which 8, 433, 629 tons were coal, coke and patent fuel, 151,912 were iron and steel and their manufactures, and 181,076 tons of general merchandise. What Cardiff lacks is a corresponding import trade, for its imports in 1906 amounted to only 2,108,133 tons, of which the chief items were iron ore (895,610 tons), pit-wood (303,407), grain and flour (298,197). Taking " the port of Cardiff " in its technical sense as including Barry and Penarth, it is the first port in the kingdom for shipping cleared to foreign countries and British possessions, second in the kingdom for its timber imports, and first in the world for shipment of coal.

The east moors, stretching towards the outlet of the Rhymney river, have become an important metallurgical quarter. Copper works were established here in 1866, followed long after by tin-stamping and enamel works. In 1888 the Dowlais Iron Company (now Messrs Guest, Keen & Nettlefold, Ltd.) acquired here some ninety acres on which were built four blast furnaces and six Siemens' smelting furnaces. There are also in the city several large grain mills and breweries, a biscuit factory, wire and hemp roperies, fuel works, general foundries and engineering works. At Ely, 35 m. out of Cardiff, there are also breweries, a small tin works and large paper works. The newspapers of Cardiff include two weeklies, the Cardiff Times and Weekly Mail, founded in 1857 and 1870 respectively, two morning dailies, the South Wales Daily News and Western Mail, established in 1872 and 1869 respectively, and two evening dailies.

History and Historic Buildings. — In documents of the first half of the 12th century the name is variously spelt as Kairdif, Cairti and Kardid. The Welsh form of the name, Caerdydd (pronounced Caerdeeth, with the accent on the second syllable) suggests that the name means " the fort of (Aulus ?) Didius," rather than Caer Daf (" the fortress on the Taff "), which is nowhere found (except

in Leland), though Caer Dyv once existed as a variant. No traces have been found of any pre-Roman settlement at Cardiff. Excavations carried out by the marquess of Bute from 1889 onward furnished for the first time conclusive proof that Cardiff had been a Roman station, and also revealed the sequence of changes which it had subsequently undergone. There was first, on the site occupied by the present castle, a camp of about ten acres, probably constructed after the conquest of the Silures a.d. 75-77, so as to command the passage of the Taff, which was here crossed by the Via Maritima running from Gloucester to St David's. In later Roman times there were added a series of polygonal bastions, of the type found at Caer- went. To this period also belongs the massive rampart, over 10 ft. thick, and the north gateway, one of the most perfect Roman gateways in Great Britain. After the departure of the Romans the walls became ruinous or were partly pulled down,

perhaps by sea rovers from the north. In this period of anarchy the native princes of Glamorgan had their principal demesne, not at the camp but a mile to the north at Llystalybont, now merely a thatched farmhouse, while some Saxon invaders threw up within the camp a large moated mound on which the Normans about the beginning of the 12th century built the great shell- keep which is practically all that remains of their original castle. Its builder was probably Robert, earl of Gloucester, who also built Bristol castle. Then or possibly even earlier the old rampart was for two-thirds of its circuit buried under enormous earthworks, the remainder being rebuilt. It was in the keep, and not, as tradition says, in the much later ” Black Tower ” (also called ” Duke Robert’s Tower “), that Robert, duke of Normandy, was imprisoned by order of his brother Henry I. from 1 108 until his death in 1134. Considerable additions of later date, in the Decorated and Perpendicular styles, are due to the Despensers and to Beauchamp, earl of Warwick, while the present residential part is of various dates ranging from the 15th century down to the last half of the 19th, when a thorough restoration, including the addition of a superbly ornamented clock-tower, was carried out. The original ditch, about 20 yds. wide, still exists on three sides, but it is now converted into a ” feeder ” for the docks and canal. Geoffrey of Monmouth was at one time chaplain of the castle, where he probably wrote some of his works. The scene of the ” sparrow-hawk ” tourna- ment, described in Geraint and Enid, one of the Arthurian romances, is laid at Cardiff.

On the conquest of the district by the Normans under Fitz Hamon, Cardiff became the caput of the seigniory of Glamorgan, and the castle the residence of its lords. The castle and lordship descended by heirship, male and female, through the families of De Clare, Despenser, Beauchamp and Neville to Richard III., on whose fall they escheated to the Crown, and were granted later, first to Jasper Tudor, and finally by Edward VI. in 1550 to Sir William Herbert, afterwards created Baron Herbert of Cardiff and earl of Pembroke. Through the daughter and grand- daughter of the 7 th earl the castle and estates became the property of the 1st marquess of Bute (who was created Baron Cardiff in 1776), to whose direct descendant they now belong.

The town received its earliest known grant of municipal privileges sometime before 1147 from Fitz Hamon's successor and son-in-law Robert, earl of Gloucester. In 1284 the inhabit- ants petitioned the burgesses of Hereford for a certified copy of the customs of the latter town, and these furnished a model for the later demands of the growing community at Cardiff from its lords, while Cardiff in turn furnished the model for the Glamorgan towns such as Neath and Kenfig. In 1324 Edward II. granted a number of exemptions to Cardiff and other towns in South Wales, and this grant was confirmed by Edward III. in 1350, Henry IV. in 1400, Henry VI. in 1452, and Edward IV. in 1465.

Its most important early charter was that granted in 1340 by Hugh le Despenser, whereby the burgesses acquired the right to nominate persons from whom the constable of the castle should select a bailiff and other officers, two ancient fairs, held on the 29th of June and 19th of September, were confirmed, and extensive trading privileges were granted, including the right to form a merchant gild. A charter granted in 1421 by Richard de Beauchamp provided that the town should be governed by twelve elected aldermen, but that the constable of the castle should be mayor. In 1581 Queen Elizabeth granted a confirmatory charter to the mayor and bailiffs direct without reference to the lord of the castle. The town was treated as a borough by prescription until 1608, when James I. confirmed its status by express incorporation, adding also to its rights of self-government, and granting it a third fair (on the 30th of November) . In 1687 the town surrendered this charter to James II., who in a substituted one, which, however, was never acted upon, reserved to the Crown the right of removing any member of the corporation from office. The first step towards the modern improvement of the town was taken in 1774; when a special act

was obtained for the purpose. Nineteen private acts and provisional orders were obtained during the 19th century.

Among the many early English kings who visited or passed through Cardiff was Henry II., on whom in 1171, outside St Piran's chapel (which has long since disappeared) , was urged the duty of Sunday observance. About n 53, Ivor Bach (or the Little), a neighbouring Welsh chieftain, seized the castle and for a time held William, earl of Gloucester, and the countess prisoners in the hills. In 1404 Owen Glendower burnt the town, except the quarters of the Friars Minors. In 1645, after the battle of Naseby,

Charles I. visited the town, which until then had been mainly Royalist, but about a month later was taken by the Parliamentarians. In 1648, a week after the Royalists had been decisively defeated by Colonel Horton at St Fagan's, 4 m. west of Cardiff, Cromwell passed through the town on his way to Pembroke.

Outside the north-west angle of the castle, Richard de Clare in 1256 founded a Dominican priory, which was burnt by Glendower in 1404. Though rebuilt, the building fell into decay after the Dissolution. The site was excavated in 1887. Outside the north-east angle a Franciscan friary was founded in 1280 by Gilbert de Clare,which at the Dissolution became the residence of a branch of the Herbert family. Its site was explored in 1896. The only other building of historic interest is the church of St John the Baptist, which is in the Perpendicular style, its fine tower having been built about 1443 by Hart, who also built the towers of Wrexham and St Stephen's, Bristol. In the Herbert chapel is a fine altar tomb of two brothers of the family. A sculptured stone reredos by W. Goscombe John was erected in 1896. The original church of St Mary's, at the mouth of the river, was swept away by a tidal wave in 1607: Wordsworth took this as a subject for a sonnet.

In 1555 Rawlins White, a fisherman, was burnt at Cardiff for his Protestantism, and in 1679 two Catholic priests were executed for recusancy. Cardiff was the birthplace of Christo- pher Love (b. 1618), Puritan author, and of William Erbury, sometime vicar of St Mary's in the town, who, with his curate, Walter Cradock, were among thefounders of Welsh nonconformity.

As to Roman Cardiff see articles by J. Ward in the Archaeologia for 1901 (vol. lvii.), and in Archaeologia Cambrensis for 1908. As to the castle and the Black and Gray Friars see Archaeologia Cambrensis, 3rd series, viii. 251 (reprinted in Clark's Medieval Military Architecture), 5th series, vi. 97; vii. 283; xvii. 55; 6th series, i. 69. The charters of Cardiff and " Materials for a History of the County Borough from the Earliest Times " were published by order of the corporation in Cardiff Records (5 vols., 1898, sqq.). See also a Handbook of Cardiff and District, prepared for the use of the British Association, 1891; Cardiff, an Illustrated Handbook, 1896; the Annual Report of the Cardiff Chamber of Commerce; the Calendar of the University College. (D. Ll. T.)

CARDIGAN, JAMES THOMAS BRUDENELL, 7 th Earl oe

(1797-1868), English lieutenant-general, son of the 6th earl of Cardigan (the title dating from 1661), was born at Hambleden, Bucks, on the 16th of October 1797. He studied for several terms at Christ Church, Oxford; and in 18 18 entered parliament. He entered the army in 1824 as cornet in the 8th Hussars, and was promoted within eight years, by purchase, to be lieutenant-colonel in the 15th Hussars. With this regiment he made himself one of the most unpopular of commanding officers. He gave the reins to his natural overbearing and quarrelsome temper, treating his men with excessive rigour and indulging in unscrupulous licentiousness. Within two years he held 105 courts-martial, and made more than 700 arrests, although the actual strength of his regiment was only 350 men. In consequence of one of his numerous personal quarrels, he left the regiment in 1834; but two years later, at the urgent entreaty of his father, he was appointed to the command of the nth Hussars. He played the same part as before, and was censured for it; but he was allowed to retain his post, and the discipline and equipment of his regiment, in which he took great pride, and on which he spent large sums of money, received high commendation from the duke of Wellington. He succeeded to the peerage on the death of his father in August 1837. In September 1840 Lord Cardigan fought a duel, on Wimbledon common, with one of his own

officers. The latter was wounded, and Lord Cardigan, was tried before the House of Lords on a charge of feloniously shooting his adversary. But the trial was a mere sham, and on a trivial technical ground he was acquitted. In 1854, at the outbreak of the Crimean War, he was appointed to the command of the light cavalry brigade, with the rank of major-general, and he spent a very large sum in the purchase of horses and on the equipment of his regiment. He took a prominent part in the early actions of the campaign, and displayed throughout the greatest personal courage and the greatest recklessness in exposing his men. In the charge of the light brigade at Balaklava (q.v.) he was the first man to reach the line of the Russian guns; and Cardigan and his men alike have been credited by the bitterest critics of the charge with splendid daring and unquestioning obedience to orders. At the close of the war he was created K.C.B., and was appointed inspector-general of cavalry, and this post he held till i860. In

1863 he engaged without success in legal proceedings against an officer who had published an account of Balaklava which the earl held to contain a reflection on his military character. He attained the rank of lieutenant-general in 1861. He was twice married, in 1826 and 1858, but had no children. On his death, which took place on the 28th of March 1868, the family titles (including the English barony of Brudenell, cr. 1628) passed to his relative, the second marquess of Ailesbury.

CARDIGAN (Aberteifi), a seaport, market-town and municipal borough, and the county town of Cardiganshire, Wales, picturesquely situated on the right bank of the Teifi about 3 m. above its mouth. Pop. (1901) 3511. It is connected by an ancient stone bridge with the suburb of Bridgend on the southern or Pembroke bank of the river. It is the terminal station of the Whitland-Cardigan branch of the Great Western railway. Owing to the bar at the estuary of the Teifi, the shipping trade is inconsiderable, but there are brick-works and foundries in the town ; and as the centre of a large agricultural district, Cardigan market is well attended. There is a curious local custom of mixing ” culm,” a compound of clay and small coal, in the streets. The town has for the most part a modern and prosperous ap- pearance. Two bastions with some of the curtain wall of the ancient castle remain, whilst the dwelling-house known as Castle Green contains part of a drum tower, and some vaulted chambers of the 13 th century. The chancel of the Priory church of St Mary is an interesting specimen of early Perpen- dicular work, and the elaborate tracery of its fine east window contains some fragments of ancient stained glass. It is the only existing portion of a Benedictine house which was originally founded by Prince Rhys ap Griffith in the 12th century.

Although a Celtic settlement doubtless existed near the mouth of the Teifi from an early period, it was not until Norman times that Cardigan became a place of importance. Its castle was first erected by Roger de Montgomery about the year 1001, and throughout the 12th and 13th centuries this stronghold of Cardigan played no small part in the constant warfare between Welsh and English, either side from time to time gaining possession of the castle and the small town dependent on it. In 1136 the English army under Randolf, earl of Chester, was severely defeated by the Welsh at Crug Mawr, now called Bank-y- Warren, a rounded hill 2 m. north-east of the town. During the latter part of the 12 th century the castle became the residence of Rhys ap Griffith, prince and justiciar of South Wales (d. n 96), who kept

considerable state within its walls, and entertained here in 1 188 Archbishop Baldwin and Giraldus Cambrensis during their preaching of the Third Crusade. In 1284 Edward I. spent a month in the castle, settling the affairs of South Wales. This famous pile was finally taken and destroyed by the Parliamen- tarian Major-General Laugharne in 1645. The lordship, castle and town of Cardigan formed part of the dower bestowed on Queen Catherine of Aragon by King Henry VII. Henry VIII. 's charter of 1542 confirmed earlier privileges granted by Edward I. and other monarchs, and provided for the government of the town by a duly elected mayor, two bailiffs and a coroner. In Jt887 the assizes and quarter sessions were removed hence to

Lampeter, which has a more central position in the county. Cardigan was declared a parliamentary borough in 1536, but in 1885 its representation was merged in that of the county.

CARDIGANSHIRE (Ceredigion, Sir Aberteifi), a county of South Wales, bounded N. by Merioneth, E. by Montgomery, Radnor and Brecon, S. by Carmarthen and Pembroke, and W. by Cardigan Bay of the Irish Sea. It has an area of 688 sq. m., so that it ranks fifth in size of the Welsh countries. The whole of Cardiganshire is hilly or undulating, with the exception of the great bogs of Borth and Tregaron, but the mountains generally have little grandeur in their character; Plinlimmon itself, on the boundary of the county with Montgomeryshire, in spite of its elevation of 2463 ft., being singularly deficient in boldness of outline. Of other hills, only Tregaron Mountain (1778 ft.) exceeds 1500 ft. in height. Of the rivers by far the most im- portant is the Teifi, or Tivy, which rises above Tregaron in Llyn Teifi, one of a group of tiny lakes which are usually termed the Teifi Pools, and flows southward through the county as far as Lampeter, forming from this point onwards its southern boundary. A succession of deep pools and rushing shallows, the Teifi has from the earliest times been celebrated for the quantity and quality of its salmon, which are netted in great numbers on Cardigan Bar. Trout and sewin (a local species of sea-trout) are also plentiful, so that the Teifi is much frequented by anglers. This river is also believed to have been the last British haunt of the beaver (afangc, lost-llydan) , for the slaying of which a very heavy penalty was exacted by the old royal laws of Wales. Giraldus Cambrensis, Michael Drayton, and other writers allude to this circumstance, though at what date the beaver became extinct in these waters is quite uncertain. On the Teifi may frequently be observed fishermen in coracles. Other rivers worthy of mention are the Dovey (Dyfi), separating Cardigan

from Merioneth in the extreme north; the Rheidol and the Ystwyth, which rise in Plinlimmon; and the Aeron, which has its source in Llyn Eiddwen, a pool in the hilly district known as Mynydd Bach. All these streams flow westward into Cardigan Bay.

The valley of the Teifi presents many points of great beauty and interest between Llandyssul and the sea. The rapids of Henllan, the falls of Cenarth and the wooded cliffs of Coed- more constitute some of the finest scenery in South Wales. The valley of the Aeron is well wooded and fertile, while the Rheidol contains amidst striking surroundings the famous cascade spanned by the Devil's Bridge, which is known to the Welsh as Pont-ar-Fynach (the Monks' Bridge).

Geology. — The rocks of Cardiganshire consist of shales, slates and grits which have been folded and uptilted so that nowhere do they retain their original horizontality. They belong entirely to the Ordovician and Silurian periods; they have yielded few fossils, and much work remains to be done upon them, before the strati- graphical subdivisions can be clearly denned. Many metalliferous lodes occur in the rocks, and the lead mines have long been famous; it was from the profits of his mining speculations, carried on chiefly in this county, that the celebrated Sir Hugh Myddleton was enabled to carry out his gigantic project for supplying London with water by means of the New River. Copper and zinc ores have also been obtained. Tregaron is the centre of the mining district, and the Lisburne, Goginan and Cwm Ystwyth mines are among the most important.

The slates have been worked at Devil's Bridge, Corris, Strata Florida, Goginan, &c. Glacial drift occupies some of the lower ground, and peaty bogs are common on the mountains. A small tract of blown sand lies at the mouth of the river Dovey.

Industries. — The climate on the coast is mild and salubrious, but that of the hill country is cold, bleak and rainy. The cultivated crops consist of oats, wheat, barley, turnips and potatoes; and in the lower districts on the coast, especially in the neighbourhood of Cardigan, Aberaeron and Llanrhystyd, good crops are raised. The uplands are mostly covered by wild heathy pastures, which afford good grazing for Welsh mountain sheep and ponies. The country has long been celebrated for its breed of " Cardiganshire cobs," for which high prices are often obtained from English dealers, who frequent the local horse fairs, especially Dalis Fair

at Lampeter. Cattle, sheep, pigs, butter, oats, wool, flannel and coarse slates form the principal

articles of export. Hand-looms are by no means uncommon in the remote parts of the country, and clog-making of alder wood meets a local demand. The North Cardiganshire lead-mines, of which the Lisburne, Goginan and Cwm Ystwyth mines are the most noted, have been famous, and are said to have been worked by the Romans. Some of the lead raised is very rich in silver, and in the 1 7th century so great was the amount of silver obtained that a mint for coining it was erected by virtue of letters patent at Aberystwyth.

Communications. — The railways within the county are the Cambrian, by means of which access is given to Aberystwyth from all parts of the kingdom; and the former Manchester & Milford line, which runs south from Aberystwyth by Lampeter to Pencader, and has been acquired by the Great Western railway. The lower valley of the Teifi, or Tivyside, is reached by means of two branch lines of the Great Western railway— one from Whitland to Cardigan, and the other from Pencader to Llandyssul and Newcastle-Emlyn.

Population and Administration. — The area of the administrative county is 443,071 acres, with a population in 1891 of 63,467, andin 1901 of 60,237. The municipal boroughs are Aberystwyth (pop. 8013), Cardigan (3511) and Lampeter (1722). Aberaeron and New Quay are urban districts. Other towns are Tregaron (1509), an ancient but decayed market- town in a wild boggy district; Aberaeron (1331), a small seaport, and Llandyssul (2801,) a rising place on the Teifi with woollen factories. In modern times several small watering-places have sprung up on the coast, notably at Borth, New Quay, Tresaith, Aberporth and Gwbert. Quarter sessions are held at Lampeter, and here also are held the assizes for the county, which lies in the South Wales circuit. The county returns one member of parliament, and has no parliamentary borough. Ecclesiastically it lies wholly in the diocese of St David's, and contains sixty-six parishes.

History. — In spite of its poverty and sparse population, Cardiganshire has never ceased to play a prominent part in all

Welsh political, literary and educational movements. The early history of the district is obscure, but at the time of the Roman invasion it was tenanted by the Dimetae, a Celtic tribe, within whose limits was comprised the greater portion of the south-west of Wales. After the departure of the Romans, the whole basin of the Teifi eventually fell into the power of Ceredig, son of Cunedda Wledig of North Wales; and the . district, peopled with his subjects and nearly co-extensive with the existing shire, obtained the name of Ceredigion, later corrupted into Cardigan. During the 5th and 6th centuries Ceredigion was largely civilized by Celtic missionaries, notably by St David and St Padarn, the latter of whom founded a bishopric at Llanbadarn Fawr, which in the 8th century became merged in the see of St David's. Two important local traditions, evidently based on fact, are associated with this remote era: — the inundation of the Cantref-y-Gwaelod and the synod of Llanddewi Brefi. The Cantref-y-Gwaelod (the lowland Hundred), a large tract of flat pasture-land containing sixteen townships, and protected from tˆ.e inrcad of the sea by sluices, was suddenly submerged at an uncertain date about the year 500. The legend of its destruc- tion declares that Seithenyn, the drunken keeper of the sluices, carelessly let in the waters of the bay, with the result that the land was lost for ever, and Prince Gwyddno and his son Elphin, with all their subjects, were forced to migrate to the wild region of Snowdon. This tale has ever been a favourite theme with Welsh bards, so that " the sigh of Gwyddno when the wave turned over his land " remains a familiar figure of speech through- out Wales. In support of this story it may be mentioned that there are indications of submerged dwellings and roads (e.g. the Sam Cynfelin and Sarn Badrig) between the mouth of the Dovey and Cardigan Head. The famous synod of Brefi, an historical fact clouded by miraculous details, probably took place early in the 6th century, when at a largely attended meeting of the Welsh clergy held at Brefi, near the source of the Teifi, St David's eloquence for ever silenced the champions of the Pelagian heresy. In the 10th and nth centuries the coast of Ceredigion suffered much from the inroads of the Danes, and in later times of the

Normans and Flemings; but on the whole the native inhabitants seem tc have maintained a successful resistance. By the close of the nth century most of Ceredigion had been reduced by the Normans, and during the 12th and 13th centuries it formed a favourite battle ground between the Welsh princes and the English forces. By the Statutes of Rhuddlan (1284) Edward I.

constituted Ceredigion out of the former principality of Wales a shire on the English model, dividing the new county into six hundreds and fixing the assizes at Carmarthen. By the act of Union in the reign of Henry VIII., the boundaries of the county were subsequently enlarged to their present size by the addition of certain outlying portions of the Marches round Tregaron and Cardigan, and the assizes were assigned to the county town. During the rebellion of Owen Glendower in the opening years of the 15th century, the county was again disturbed, and Owen for a short time actually held a court in Aberystwyth Castle. In the year 1485, according to local tradition, Henry of Richmond marched through South Cardiganshire on his way to Bosworth Field, and he is stated to have raised recruits round Llanarth, where the old mansion of Wern, still standing, is pointed out as his halting-place on this occasion. Under Henry VIII. Cardiganshire was for the first time empowered to send a representative member to parliament, and under Mary the same privilege was extended to the boroughs. During the Great Rebellion the county — which possessed at least three leading Parliamentarians in the persons of Sir John Vaughan, of Crosswood, afterwards chief justice of the common pleas; Sir Richard Pryse, of Gogerddan; and James Philipps, of Cardigan Priory — seems to have been less Royalist in its sympathies than other parts of Wales. At this time the castles of Cardigan and Aberystwyth, both held in the name of King Charles, were reduced to ruins by the Cromwellian army. In the 18th century the Methodist movement found great support in the county; in fact, Daniel Rowland (1713-1790), curate of Llangeitho, was one of the chief leaders of this important revival. The 19th century witnessed the foundation of two important educational centres in the county: — St David's College at Lampeter (1827), and one of the three colleges of the university of Wales at Aberystwyth (1872). In the years 1842-1843 the county was much disturbed by the Rebecca Riots, during which a large number of turnpike gates were destroyed by local mobs. Forty-five years later it was affected by the Welsh agrarian agitation against payment of tithe, which produced some scenes of violence against the dis- training police, especially in the district round Llangranog.

Chief amongst the county families of Cardigan is that of Lloyd, descendants of the powerful Cadifor ap Dinawal, lord of Castle Howell, in the 12th century. Certain branches of this family, such as the Lloyds of Millfield (Maes-y-felin), the Lloyds of Llanlyr and the Lloyds of Peterwell, are extinct, but others are still

flourishing. The family of Vaughan of Crosswood, or Trawscoed (now represented by the earl of Lisburne), has held its family estates in the male line for many centuries. A representa- tive in the female line of the ancient house of Pryse, long prominent in the annals of the county, still possesses the old family seat of Gogerddan. Other families worthy of mention are Lloyd of Bronwydd, Powell of Nanteos and Johnes of Hafod and Llanfair-Clydogau.

Antiquities. — Scattered over all parts of the county are numerous British or early medieval tumuli and camps. Traces of the ancient Roman road, the Via Occidentalis — called by the Welsh Sarn Helen, a corruption of Sarn Lleon, Road of the Legion — are to be found in the eastern districts of the county; and at Llanio are to be seen what are perhaps the remains of the Roman military station of Loventium. There are also various inscribed and incised stones, of which good examples exist in the churchyards of Llanbadarn Fawr and Llanddewi Brefi. In buildings of interest Cardiganshire is singularly deficient. Besides the ruins of Aberystwyth and Cardigan Castles, and of Strata Florida Abbey, there is a large cruciform church of the 12th century at Llanbadarn Fawr; whilst the massive parish church of Llanddewi Brefi once formed part of the minster of a prebendal college founded by Bishop Beck of

St David's towards the close of the 13th century. Tregaron, Llanwenog, Llandyssul and Llanarth own parish churches with western towers of early date, but for the most part the ecclesi- astical structures of Cardiganshire are small in size and mean in appearance, and many of them were entirely rebuilt during the latter half of the 19th century. The little church of Eglwys Newydd, near the Devil's Bridge, contains one of Sir Francis Chantrey's masterpieces, a white marble group in memory of Mariamne Johnes (1818), the daughter of Thomas Johnes, of Hafod (1748-1816), the translator of Froissart.

Customs, etc. — The old Welsh costume, customs and super- stitions are fast disappearing, although theˆ linger in remote districts such as the neighbourhood of Llangeitho. The steeple-crowned beaver hat has practically vanished, although it was in general use within living memory; but the short petticoat and

overskirt (pais-a-gwn-bdch) , the frilled mob-cap, little check shawl and buckled shoes are still worn by many of the older women. Of peculiarly Welsh customs, the bidding (gwahoddiad) is not quite extinct in the county. The bidding was a formal invitation sent by a betrothed pair through a bidder (gwahoddwr) to request the presence and gifts of all their neighbours at the forthcoming marriage. All presents sent were duly registered in a book with a view to repayment, when a similar occasion should arise in the case of the donors. When printing became cheap and common, the services of the professional bidder were often dispensed with, and instead printed leaflets were circulated. The curious horse wedding (priodas ceffylau) at which the man and his friends pursued the future bride to the church porch on horseback, and then returned home at full gallop, became obsolete before the end of the 19th century. Of the practices connected with death, the wake, or watching of the corpse, alone remains; but the habit of attending funerals, even those of strangers, is still popular with both sexes, so that a funeral pro- cession in Cardiganshire is often a very imposing sight. Nearly all the old superstitions, once so prevalent, concerning the fairies (tylwyth teg) and fairy rings, goblins (bwbachod), and the teulu, or phantom funeral, are rapidly dying out; but in the corpse candle (canwll corph), a mysterious light which acts as a death-portent and is traditionally connected with St David, are still found many believers.

Authorities. — Sir S. R. Meyrick, History and Antiquities of Cardiganshire (London, 1806); Rev. G. Eyre Evans, Cardiganshire and its Antiquities (Aberystwyth, 1903); E. R. Horsfall-Turner, Walks and Wanderings in_County Cardigan (Bingley).

CARDINAL (Lat. cardinalis), in the Roman Church, the title of the highest dignitaries next to the pope. The cardinals constitute the council or senate of the sovereign pontiff, his auxiliaries in the general government of the Church; it is they who act as ad- ministrators of the Church during a vacancy of the Holy See and elect the new pope. Together they constitute a spiritual body called the Sacred College. The dignity of cardinal is not an essential part of the legal constitution of the Church; it is a reflection of and participation in the sovereign dignity of the Head of the Church, by the chief clergy of the Church of Rome. The present position is the result of a long process of evolution, of which there are several interesting survivals.

The name is derived from cardo, hinge; like many other words (the word pope in particular) it was originally of a more general application, before it was reserved exclusively to the members of the Sacred College, and the word is still used adjectivally in the sense of pre-eminent or that on which everything else ” hinges.” As early as the 6th century we find mentioned, in the letters of St Gregory, cardinal bishops and priests. This expression signifies clergy who are attached to their particular church in a stable relation, as a door is attached to a building by its hinges (see Thomassin, Vetus et nova discipl. vol. 1, lib. ii. cap. 113-115). Moreover, this sense is still preserved in the present day in the expressions incardinatio, excardinatio, which signify the act by which a bishop permanently attaches a foreign cleric to his diocese, or allows one of his own clergy to leave his diocese in order to belong to another. For a long time, too, the superior clergy, and especially the canons of cathedrals or the heads of v. 11

important churches, were cardinales (see examples in Du Cange, Glossarium, s.v.). Gradually, however, this title was confined by usage to the Roman cardinals, until Pius V., by his constitution of the 15th of February 1568, reserved it to them exclusively.

The grouping of the cardinals into a body called the Sacred College, the College of Cardinals, is connected, in the case at least of cardinal priests, with the ancient presbyterium, which existed in each church from the earliest times. sacred The Sacred College as such was not, however, de- college. finitively .constituted until the uniting of the three orders of cardinals into a single body, the body which was to elect the pope; and this only took place in the 12th century. Up till that time the elements remained distinct, and there were separate classes: the ” Roman ” bishops, i.e. bishops of sees near Rome, presbyters of the ” titles ” (tituli) of Rome, and deacons of the Roman Church. Nowadays, the Sacred College is still composed of three orders or categories: cardinal bishops, cardinal priests, and cardinal deacons. But the process of evolu- tion has not been the same in the case of all these orders.

Cardinal bishops are the bishops of suburbicarian churches, situated in the immediate neighbourhood of Rome. Very early we find them assisting the pope in his ritual functions and in dealing with important business; bishops. they formed a kind of permanent synod (cf. the cvpoSos hSruuovaa of Constantinople): and they also took the place of the pope in the ceremonies of the

liturgy, excepting the most important ones, and especially in the service of the cathedral at Rome, the Lateran. A passage from the life of Stephen II. (a.d. 769), in the Liber Pontificalis (ed. Duchesne, i. p. 478), shows clearly that they were seven in number and served for a week in turn: Hie constituit ut omni dominico die a septem Episcopis cardinalibus hebdomadariis, qui in ecclesia Salvatoris (the Lateran) observant, missarum solemnia super altare Beati Petri celebrarentur. They were called " cardinal bishops of the Lateran church," as recorded by St Peter Damian in. 1058 (Ep. 1, lib. ii.). Their sees are the same to-day as they were then: Ostia, Porto, Santa Rufina (Sylva Candida), Albano, Sabina, Tusculum (Frascati) and Palestrina. From time immemorial the bishop of Ostia has had the privilege of sacring the pope, and on this ground he enjoys the right of wearing the " pallium "; he is ex officio dean of the suburbicarian bishops, and consequently dean of the Sacred College. His episcopal see having been in ruins for a long time, that of Velletri has been joined to it. The second rank belongs to the bishop of Porto, who is ex officio vice- dean of the Sacred College; his episcopal see being also in ruins Calixtus II. added to it that of Santa Rufina, thus reducing the number of suburbicarian bishoprics and cardinal bishops to six; this number was adhered to by Sixtus V., and has not varied since.

The second order of cardinals is that of the cardinal priests. It represents and is a continuation of the ancient presbyterium; but in Rome the process of evolution was different from that in the other episcopal towns. In the latter, priests. the division into parishes was but slowly accom- plished; there is no authority for their existence before the year 1000; the bishop with the higher clergy, now developed into the chapter, were in residence at the cathedral, which formed, as it were, the one parish in the town. At Rome, on the contrary (and doubtless at Alexandria), certain churches, to which were at- tached certain districts, were at an early date entrusted to one or more priests. These churches, in which the liturgy was cele- brated, or certain sacraments administered, were called tituli (titles). According to the Liber Pontificalis (ed. Duchesne, i. pp. 122, 126, 164), the titles of Rome, numbering twenty-five, were already established as early as the 1st century; this seems hardly probable, but it was certainly the case in the 5th century. The priest serving one of these churches was the priest of that title, and, similarly, the church which he served was that priest's title. When several priests were attached to the same church, only the first, or

principal one, had the title; he alone was the presbyter cardinalis. This practice explains how it is that the Roman presbyterium did not give rise to a cathedral chapter, but to cardinal priests, each attached to his title. As the higher

clergy of Rome gradually acquired a more important status, the relations between the cardinal priest and the church of which he bore the title became more and more nominal; but they have never entirely ceased. Even to-day every cardinal priest has his title, a church in Rome of which he is the spiritual head, and the name of which appears in his official signature, e.g. " Herbertus tituli sanctorum Andreae et Gregorii sanctae romanae ecclesiae presbyter cardinalis Vaughan." When the attachment of the cardinal priest to his title had become no more than a tradition, the number of cardinal titles, which in the nth century had reached twenty-eight, was increased according to need, and it was held an honour for a church to be made titulary. The last general rearrangement of the titular churches was begun by Clement VIII. and completed by Paul V. ; Leo XIII. made a title of the church of San Vitale. To-day, according to the Gerarchia Pontificia the cardinal titles number fifty- three; since the highest possible number of cardinal priests is fifty, and this number is never reached, it follows that there are always a certain number of vacant titles. The first title is that of San Lorenzo in Lucina, and the cardinal priest of the oldest standing takes the name of " first priest," protopresbyter.

The third order of cardinals is that of the cardinal deacons. For a long time the Roman Church, faithful to the example of the primitive church at Jerusalem (Acts vi.), had only deacons seven deacons. Their special function was the ad- ministration of her temporal property, and particularly works of charity. Between them were divided at an early date the fourteen districts (regiones) of Rome, grouped two by two so as to constitute the seven ecclesiastical districts. Now the charitable works were carried on in establishments called diaconiae, adjoining churches which were specially appropriated to each diaconia. The connexion between the names (diaconus) and (diaconia) and the presence of a church in connexion with each diaconia gradually

established for the deacons a position analogous to that of priests. In the 8th century Pope Adrian found sixteen diaconiae and founded two others (Lib. Pont. ed. Duchesne, i. p. 509); in the 12th century the cardinal deacons, who then numbered eighteen, were no longer distin- guished by an ecclesiastical district, as they had formerly been, but by the name of the church connected with some diaconia (loc. cit. p. 364). By the time of Sixtus V. the connexion between a cardinal deacon and his diaconia was merely nominal. Sixtus reduced the number of cardinal deacons to fourteen; and this is still the number to-day. Except that his church is called a diaconia, and not a title, the cardinal deacon is in this respect assimilated to the cardinal priest; but he docs not mention his diaconia in his official signature: e.g. "Joannes Henri cus diaconus cardinalis Newman." There are at present sixteen diaconiae, the chief being that of Santa Maria in Via lata; the cardinal deacon of longest standing takes the name of " first deacon," protodiaconus.

Cardinals can pass from one order, title or see to another, by a process of " option." When a suburbicarian see falls vacant,_ the cardinals resident at Rome have the right of " opting " for it in order of rank, — that is to say, of claiming it in consistory and receiving their promotion to it. In the same wuy cardinal deacons can pass after ten years to the order of priests, while retaining after their passage the rank in the Sacred College given them by the date of their promotion.

With the exception of the classes resulting from the order to which they belong, there are no distinctions between the rights of the various cardinals. As to the ordination obligatory upon them, it is that indicated in their title; cardinal bishops must naturally be bishops; for cardinal priests it is enough to have received the priesthood, though many of them are actually bishops; similarly, it is enough for cardinal deacons to have received the diaconate, though most of them are priests; cases have occurred, however, even in quite recent times, of cardinals who have only received the diaconate, e.g. Cardinal Mertel.

There is one cardinal chosen by the pope from among the Sacred College to whom is entrusted the administration of the_ common property; this is the cardinal camerlengo or chamberlain (camerarius). His office is an important one, for during the vacancy of the Holy See it is He who exercises all external authority, especially that connected with the Conclave.

The number of the cardinals reaches a total of 70: six cardinal

bishops, fifty cardinal priests and fourteen cardinal deacons. This number was definitively fixed by Sixtus V. (constit. Number Postquam, 5th December 1586); but the Sacred Col- and lege never reaches its full number, and there are always distribu- tee or so " vacant hats," as the saying goes. Though °"' the rule laid down by Sixtus V. has not been modified since, before him the number of cardinals was far from being constant. For a long time it varied in the neighbourhood of twenty; in 1331 John XXII. said that there were twenty cardinals; in 1378 they were reckoned at 23. Their number increased during the Great Schism because there were several rival obediences. The councils of Constance and Basel reduced the number of cardinals to 24; but it did not rest at that for long, and in the 1 6th century was more than doubled. In 1517 Leo X., in order to introduce strong supporters of himself into the Sacred College, created 31 cardinals at the same time. The highest number was reached under Pius IV., when the cardinals numbered as many as 76.

The composition of the Sacred College is subject to no definite law; but the necessity for giving a first representation to different interests, especially in view of the election of the popes, has for a long time past thrown open the Sacred College to representatives of the episcopate of the Catholic nations. From the nth century onwards are to be found cases in which the pope summoned to its ranks persons who did not belong to the Roman Church, particularly abbots, who were not even required to give up the direction of their monasteries. In the following century occur a few cases of bishops being created cardinals without having to leave their see, and of cardinals upon whom were conferred foreign bishoprics (cf. Thomassin, loc. cit. cap. 114, n. 9). Of the cardinals created by the popes of Avignon the majority were French, and in 133 1 John XXII. remarks that 17 cardinals were French out of the 20 who then existed. The councils of Constance and Basel forbade that more than a third of the cardinals should belong to the same country. After the return of the popes to Rome and after the Great Schism, the ancient customs were soon resumed; the cardinals were for the most part Italians, the entire number of cardinals' hats conferred on the other Catholic nations only amounting to a minority. The non-Italian cardinals, with rare exceptions, are not resident in Rome; together with the rank of cardinal they receive a dispensation from residing in curia; they are none the less, as cardinals, priests or deacons of the Roman Church.

The reform of the College of Cardinals inaugurated by the councils of Constance and Basel, though without much immediate success, was not only concerned with the number and nationality of the cardinals ; it also dealt with conditions fj ons , of age, learning and other qualifications: men of the most honourable character, aged not less than thirty, were to be chosen; at least a third were to be chosen from among the graduates of the universities; persons of royal blood and princes were not to be admitted in too great numbers, and lastly, relatives of the pope were to be set aside. Moreover, in order to secure the effectiveness of these reforms, selection of the new cardinals was to be made by the votes of the members of the Sacred College given in writing. This mode of control was perhaps excessive, and the reform consequently remained ineffective. Up to the middle of the 16th century there were still instances of unfortunate and even scandalous appointments to the car- dinalate of very young men, of relatives or favourites of the popes and of men whose qualifications were by no means eccles- iastical. In the Sacred College as elsewhere nepotism and an exaggerated estimate of temporal interests were rife. At last a real reform was effected. The council of Trent (sess. xxiv. cap. i. de reform.) requires for cardinals all the qualifications prescribed by law for bishoDS- Sixtus V. defined these still more clearly, and his regulations are still in force: a cardinal must, in the year of his promotion, be of the canonical age required for his reception into the order demanded by his ranx-. i.e. 22 for the diaconate, 23 for the priesthood and 30 for the episcopate, and if not already ordained he must take orders in the year of his appointment. Men of illegitimate birth are

excluded, as well as near relatives of the pope (with one exception) and of the cardinals; the personal qualities to be most sought for are learning, holiness and an honourable life. All these recommendations have been, on the whole, well observed, and are so better than ever in the present day. We may add that the religious orders have had a certain number of representa- tives, four, at least, in the Sacred College, since Sixtus V., several of whom, as we know, became popes. As to the cardinals' hats granted at the request of the heads of Catholic states, they are subject to negotiations analogous to those concerning nominations to the episcopate, though entailing no concordatory

agreement, strictly speaking, on the part of the popes.

The creation of cardinals (to use the official term) is in fact nowadays the function of the pope alone. It is accomplished Creation by the publication of the persons chosen by the pope in secret consistory (g.v.). No other formality is essential; and the provision of Eugenius IV., which required the reception of the insignia of the cardinalate for the pro- motion to be valid, was abrogated before long, and definitely annulled by the declaration of Pius V. of the 2 6th of January 1 5 7 1 . Similarly neither the consent nor the vote of the Sacred College is required. It is true that a Roman Ceremoniale of 1338 (Thomas- sin, loc. cit. cap. 114, n. 12) still enjoins upon the pope to consult the Sacred College, on the Wednesdays during Ember days, as to whether it is necessary to nominate new cardinals, and if so, how many; but this is only a survival of the ritual of the ancient form of ordination. The injunctions of the councils of Constance and Basel as to the written vote of the cardinals became before very long a dead letter, but there still remains a relic of them. In the consistory, when the pope has nominated those whom he desires to raise to the purple, he puts to the cardinals present the question: “Quid vobis videtur?” The cardinals bend the head as a sign of their consent, and the pope then continues: ” Itaque, auctoritate omnipotentis Dei, sanctorum Apostolorum Petri etPauli,et Nostra, creamus et publicamus sanctae romanae Ecclesiae cardinales N. et N., etc.”

The new dignitary, who has been warned of his nomination several weeks in advance by ” biglietto ” (note) from the office of the secretary of state, is then officially informed of it by a ceremoniarius of the pope; he at once waits upon the pope, to whom he is presented by one of the cardinals. The pope first invests him with the rochet and red biretta, but there is no formal ceremony. The conferring of the cardinal’s red hat takes place a few days later in a public consistory; while placing the hat on his head the pope pronounces the following words: ” Ad laudem omnipotentis Dei et Sanctae Sedis ornamentum, accipe galerum rubrum, insigne singularis dignitatis cardinalatus, per quod designatur quod usque ad mortem et sanguinis effusio- nem inclusive pro exaltatione sanctae fidei, pace et quiete populi christiani, augmento et statu sacrosanctae romanae Ecclesiae, te intrepidum exhibere debeas, in nomine Patris et Filii et Spiritus Sancti.” While pronouncing the last words the pope makes the sign of the cross three times over the new cardinal. The public consistory is immediately followed by a secret con- sistory, to

accomplish the last ceremonies. The pope begins by closing the mouth of the new cardinal, who is led before him, as a symbol of the discretion he should observe; after this he bestows on him the cardinal's ring, assigns him a title or diaconia; and finally, after going through the formality of consulting the Sacred College, finishes with the symbolic ceremony of the opening of the mouth, signifying the right and duty of the new cardinal to express his opinion and vote in the matters which it will fall to him to consider.

When the cardinals are resident abroad and appointed at the request of the heads of their state, a member of the Noble Guard is sent 'on the same day that the consistory is held to take the new dignitary the cardinal's "calotte"; after a few days the red biretta is brought to him by a Roman prelate, with the powers of an ablegatus; the biretta is conferred on him with great pomp by the head of the state. But the conferring of the red hat always takes place at the hands of the pope in a public consistory.

Cardinals In

Sometimes, after nominating the cardinals, the pope adds that he also appoints a certain number of others, whose names he does not divulge, but reserves the right of publishing at a later date. These cardinals, whose names he con- ceals " in his breast," are for that reason called cardinals petto. " in pectore (Ital. in petto). This practice seems to go back to Martin V., who may have had recourse to this expedient in order to avoid the necessity of soliciting the votes of the cardinals; but for a long time past the popes have only resorted to it for quite other reasons. If the pope dies before making known the cardinals in petto, the promotion is not valid; if he publishes them, the cardinals take rank from the day on which they were reserved in pectore, the promotion acting retrospectively, even in the matter of emoluments. This method has sometimes been used by the popes to ensure to certain prelates who had merit, but were poor, the means of paying the expenses of their promotion. In March 1875 Pius IX. announced the nomi- nation of several cardinals in petto, whose names would be given in his will. It was pointed out to the pope that this posthumous publication would not be a pontifical act, and ran the risk of being contested, or even declared invalid; Pius IX. gave way before this reasoning, and published the names in a subsequent consistory (Sept. 17).

The dignity of the cardinals is a participation in that of the

sovereign pontiff, and as such places them above all the other ecclesiastical dignitaries and prelates. This rank, Dignity. however, has not always been assigned to them; but was attributed to the cardinal bishops before it was to the rest. Their common prerogative was definitively estab- lished when they became the sole electors of the pope, at a period when the papacy, under pontiffs like Innocent III.,' shone with its most brilliant lustre. For example, at the council of Lyons in 1245 all the cardinals took precedence of the arch- bishops and bishops. It was in 1 245, or perhaps the year before, that Innocent IV. granted the cardinals the privilege of wearing the red hat; as to the scarlet robe which still forms their costume of ceremony, it was already worn by cardinals performing the functions of legate; and the use was soon extended to all. As to their civil relations, cardinals were assimilated by the Catholic kings to the rank of princes of the blood royal, cardinals being the highest in the Church, after the pope, just as princes of the blood royal are the first in the kingdom after the king. Of the many ecclesiastical privileges enjoyed by the cardinals, we will mention only two: the real, though nowadays restricted, jurisdiction which they exercise over the churches forming their title or diaconia; and the official style of address conferred on them by Urban VIII. (10th of June 1630), of Eminence, Eminentissimo signore.

The most lofty function of the cardinals is the election of the pope (see Conclave). But this function is necessarily inter- mittent, and they have many others to fulfil sede Functio ns. plena. On those rare occasions on which the pope officiates in person, they carry out, according to their respective orders, their former functions in the ritual. But they are, above all, the assistants of the pope in the administration of the Church; they fill certain permanent offices, such as those of chancellor, penitentiary, &c; or again, temporary missions, such as that of legate a latere; they have seats in the councils and tribunals which deal with the affairs of the Church, and the Roman congregations of cardinals (see Curia Romana) .

Bibliography. — All works on canon law contain a treatise on the cardinals. See particularly, for the history, Thomassin, Vetus et nova discipl., torn. I., lib. ii., cap. 113-115. For history and law, Phillips, Kirchenrecht, vol. vi. ; Hinschius, System des kathol, Kirchen- rechts, vol. i. p. 312. For the canonical aspect, Ferraris, Prompta bibliolheca, s.v. " Cardinales;" Bouix, De curia romana (Paris, 1859), pp. 5-141; Card, de Luca, Relatio curiae romanae, disc. 5. For details of the ceremonies and costume, Grimaldi, Les

Congrega- tions romaines (Sienna, 1890), p. 99 et seq. ; Barbier de Montault, he Costume et les usages ecclesiastiques (Paris), s.d. For a list of the names of the cardinals, according to their titles, see De Mas-Latrie, Tresor de chronologie, col. 2219-2264; and in the chronological order of their promotion, from St Leo IX. to Benedict XIV., ibid. 1177- 1242; also Dictionnaire des cardinaux (Paris, 1856). (A. Bo.*)

CARDINAL VIRTUES (Lat. cardo, a hinge; the fixed point on which anything turns), a phrase used for the principal virtues on which conduct in general depends. Socrates and Plato (see Republic, iv. 427) take these to be Prudence, Courage (or Fortitude), Temperance and Justice. It is noticeable that the virtue of Benevolence, which has played so important a part in Christian ethics and in modern altruistic and sociological theories, is omitted by the ancients. Further, against the Platonic list it may be urged (1) that it is arbitrary, and (2) that the several virtues are not specifically distinct, that the basis of the division is unsound, and that there is overlapping. It is said that St Ambrose was the first to adapt the Platonic classifica- tion to Christian theology. By the Roman Catholic Church these virtues are regarded as natural as opposed to the theological virtues, Faith, Hope and Charity. Some authors, combining the two lists, have spoken of the Seven Cardinal Virtues. In English literature the phrase is found as far back as the Cursor Mundi (1300) and the Ayenbile of Inwit (134°)-

See B. Jowett, Republic of Plato (Eng. trans., Oxford, 1887, Introd. p. lxiii) ; Plato, Protagoras (329-330) ; Aristotle, Nicomachean Ethics, vi. 13. 6; Th. Ziegler, Gesch. d. chr. Eth. (2nd ed.) ; H. Sidgwick, History of Ethics (5th ed.), pp. 44, 133, 143; and Methods of Ethics, p. 375.

CARDING, the process of using the ” card ” (Lat. carduus, a thistle or teasel) for combing textile fibrous materials. The practice of carding is of such great antiquity that its origin cannot be traced. It consists in combing or brushing fibres until they are straight and placed in parallel lines; in doing this, imperfect fibres are separated from perfect ones, all impurities are removed, and the sound fibres are in condition for further treatment. The teasels once used have long given place to hand

cards, and these in turn to what, in the rudest form, were known as ” stock cards,” namely, two wire brushes, each 4 in. broad by 1 2 in. long, and having teeth bent at a uniform angle. One was nailed upon a bench with the teeth sloping from the operator, the other was similarly secured upon a two-handled bar with the teeth sloping towards the operator. The material to be treated was thinly spread upon the fixed card, and the movable one drawn by hand to and fro over it. When sufficiently carded, a rod furnished with parallel projecting needles, called a ” needle stick,” was pushed amongst the card teeth to strip the fibres from the comb. The strip thus procured was rolled into a sliver and spun. James Hargreaves, the inventor of the spinning jenny, suspended the movable comb by passing two cords over pulleys fixed in the ceiling and attached balance weights to opposite ends of the cords. This enabled him to lengthen the cards, to apply two or three to the same stock and to manipulate the top one with less labour, as well as to produce more and better work. In May of 1748, Daniel Bourn, of Leominster, patented a machine in which four parallel rollers were covered with cards, and set close together. Fibres were fed to the first rotating roller, each in turn drew them from the preceding one, and a grid was employed to remove the carded material from the last roller. This introduced the principle of carding with revolvin g cylinders whose surfaces were clothed with cards working point to point. In December of the same year Lewis Paul, of Birmingham , the inventor of drawing rollers, patented two types of carding engines. In one, parallel rows of spaced cards were nailed upon a cylinder which was revolved by a winch handle. Beneath the cylinder a concave trough had a card fixed on the inside, so that as the fibres passed between the two series of teeth they were combed. This was the origin of “flat-carding,” namely, nailing strips of stationary cards upon transverse pieces of wood and adjusting the strips or flats by screws to the cylinder. In 1762, the father of Sir Robert Peel, with the assistance of Har- greaves, erected and used a cylinder carding engine which differed in some important particulars from Bourn’s invention. But although roller-carding and flat-carding are the only principles in use at the present time, to Sir Richard Arkwright belongs the merit of introducing an automatic carding engine, for between the years 1773 and 1775 he combined the various improvements of his predecessors, entirely remodelled the

machine, and added parts which made the operation con- tinuous. So successful were these cards that some of them were

in use at the beginning of the present century. Not- withstanding the numerous and important changes that have been made since Arkwright's time, carding remains essen- tially the same as established by him. (See Cotton-Spinning Machinery.) (T. W. F.)

CARDIOID, a curve so named by G. F. M. M. Castillon (1708-1701), on account of its heart-like form (Gr. KapSla, heart). It was mathematically treated by Louis Carre in 1705 and Koersma in 1741. It is a particular form of the limacon (q.v.) and is generated in the same way. It may be regarded as an epicycloid in which the roiling and fixed circles are equal in diameter, as the inverse of a parabola for its focus, or as the caustic pro- duced by the reflection at a spherical surface of rays emanating from a point on the circumference. The polar equation to the cardioid is r = a(i--cosd). There is symmetry about the initial line and a cusp at the origin. The area is -fra 2 , i.e. if times the area of the generating circle; the length of the curve is 8a. (For a figure see Limacon.)

CARDO NA (perhaps the anc. Udura), a town of north-eastern Spain, in the province of Barcelona; about 55 m. N.W. of Barcelona, on a hill almost surrounded by the river Cardoner, a branch of the Llobregat. Pop. (1900) 3855. Cardona is a picturesque and old-fashioned town, with Moorish walls and citadel, and a 14th-century church. It is celebrated for the extensive deposit of rock salt in its vicinity. The salt forms a mountain mass about 300 ft. high and 3 m. in circumference, covered by a thick bed of a reddish-brown clay, and apparently resting on a yellowish-grey sandstone. It is generally more or less translucent, and large masses of it are quite transparent. The hill is worked like a mine; pieces cut from it are carved by artists in Cardona into images, crucifixes and many articles of an ornamental kind.

CARDOON, Cynara cardunculus (natural order Compositae), a perennial plant from the south of Europe and Barbary, a near relation of the artichoke. The edible part, called the chard, is composed of the blanched and crisp stalks of the inner leaves. Cardoons are found to prosper on light deep soils. The seed is sown annually about the middle of May, in shallow trenches, like those for celery, and the plants are thinned out to 10 or 12 in. from each other in the lines. In Scotland it is preferable to sow the seed singly in small plots, placing them in a mild temperature, and transplanting them into the trenches after they have attained a height of 8 or 10 in. Water must be copiously

supplied in dry weather, both to prevent the formation of flower-stalks and to increase the succulence of the leaves. In autumn the leaf-stalks are applied close to each other, and wrapped round with bands of hay or straw, only the points being left free. Earth is then drawn up around them to the height of 15 or 18 in. Sometimes cardoons are blanched by a more thorough earthing up, in the manner of celery, but in this case the operation must be carried on from the end of summer. During severe frost the tops of the leaves should be defended with straw or litter. Besides the common and Spanish cardoons, there are the prickly- leaved Tours cardoon, the red-stemmed cardoon and the Paris cardoon, all of superior quality, the Paris being the largest and most tender. The common artichoke is also used for the production of chard.

CARDS, PLAYING. As is the case with all very ancient pastimes, the origin of playing-cards is obscure, many nations having been credited with the invention, but the generally accepted view is that they come from Asia. In the Chinese dictionary, Ching-tsze-tung (1678), it is said that cards were invented in the reign of Seun-ho, n 20 a.d., for the amusement of his concubines. There is a tradition that cards have existed in India from time immemorial — very ancient ones, round in form, are preserved in museums — and that they were invented by the Brahmans. Their invention has also been assigned to the Egyptians, with whom they were said to have had a religious meaning, and to the Arabs. A very ingenious theory, founded on numerous singular resemblances to the ancient game of chess

{chaturanga, the four angas or members of an army), has been advanced that they were suggested by chess (see ” Essay on the Indian Game of Chess,” by Sir William Jones, in his Asiatic Researches, vol. ii.).

The time and manner of the introduction of cards into Europe are matters of dispute. The 3 8th canon of the council of Worces- ter (1240) is often quoted as evidence of cards having been known in England in the middle of the 13th century; but the games de rege et regina there mentioned are now thought to have been a kind of mumming exhibition (Strutt says chess). No queen is found in the earliest European cards. In the wardrobe accounts of Edward

I. (1278), Walter Stourton is paid 8s. sd. ad opus regis ad ludendum ad quatuor reges, a passage which has been thought to refer to cards, but it is now supposed to mean chess, which may have been called the " game of four kings," as was the case in India (chaturaji). If cards were generally known in Europe as early as 1278, it is very remarkable that Petrarch, in his dialogue that treats of gaming, never once mentions them; and that, though Boccaccio, Chaucer and other writers of that time notice various games, there is not a single passage in them that can be fairly construed to refer to cards. Passages have been quoted from various works, of or relative to this period, but modern research leads to the supposition that the word rendered cards has often been mistranslated or interpolated. An early mention of a distinct series of playing cards is the entry of Charles or Charbot Poupart, treasurer of the household of Charles VI. of France, in his book of accounts for 1392 or 1393, which runs thus: Donnt a Jacquemin Gringonneur , peintre, pour trois jeux de cartes, dor eta diver sescouleurs, ornis de plusieurs devises, pour porter devers le Seigneur Roi, pour son Abatement, cinquante-six sols parisis. This, of course, refers only to the painting of a set or pack of cards, which were evidently already well known. But, according to various conjectural interpretations of documents, the earliest date of the mention of cards has been pushed farther back by different authorities. For instance, in the account-books of Johanna, duchess of Brabant, and her husband, Wenceslaus of Luxemburg, there is an entry, under date of the 14th of May 1379, as follows: " Given to Monsieur and Madame four peters, two florins, value eight and a half moutons, wherewith to buy a pack of cards" (Quartspel met te copen). This proves their introduction into the Netherlands at least as early as 1379. In a British Museum MS. (Egerton, 2, 419) mention is made of a game of cards {qui ludus cartarum appellatur) in Germany in 1377. The safe conclusion with regard to their introduction is that, though they may possibly have been known to a few persons in Europe about the middle of the 14th century, they did not come into general use until about a half-century later. Whence they came is another question that has not yet been answered satisfactorily. If we may believe the evidence of Covelluzzo of Viterbo (15th century) cards were introduced into Italy from Arabia. On the authority of a chronicle of one of his ancestors he writes: " In the year 1379 was brought into Viterbo the game of cards, which comes from the country of the Saracens, and is with them called naib." The Crusaders, who were inveterate gamblers, may have been the instruments of their

introduction (see Istoria della citta di Viterbo, by F. Bussi, Rome, 1743). According to other authorities, cards came first to Spain from Africa with the Moors, and it is significant that, to this day, playing cards are called in Spain naipes (probably a corruption of the Arabic Nabi, prophet) . Taken in connexion with the statement of Covelluzzo, this fact would seem to prove the wide popularity of the game of naib, or cards, among the Arab tribes. The meaning of the word (prophet) has been suggested to refer to the fortune-telling function of cards, and the theory has been advanced that they were used by the Moorish gypsies for that purpose. Gypsies are, however, not known to have appeared in Spain before the 15th century, at a time when cards were already well known. In regard to the word naib, the Italian language still preserves the name naibi, playing cards.

Towards the end of the 14th century cards seem to have become common, for in an edict of the provost of Paris, 1397,

working-people are forbidden to play at tennis, bowls, dice, cards or nine-pins on working days. From an omission of any mention of cards in an ordonnance of Charles V. in 1369, forbidding certain other games, it may be reasonably concluded that cards became popular in France between that date and the end of the century. In Italy it is possible that they were generally known at a somewhat earlier date. In the 15th century they were often the object of the attacks of the clergy. In 1423 St Bernardino of Siena preached a celebrated sermon against them at Bologna, in which, like the English Puritans after him, he attributed their invention to the devil. Cards in Germany are referred to in a manuscript of Nuremberg about 1384, which illustrates the rapid spread of the new game throughout Europe. In form the earliest cards were generally rectangular or square, though sometimes circular.

Not long after their introduction, cards began to be used for other purposes than gaming. In 1 509 a Franciscan friar, Thomas Murner, published an exposition of logic in the form of a pack of cards, and a pack invented in 1651 by Baptist Pendleton purported to convey a knowledge of grammar. These were soon followed by packs teaching geography and heraldry, the whole class being called ” scientiall cards.” Politics followed, and in England satirical and historical sets appeared, one of them designed to reveal the plots of the Popish agitators. The first mention of cards in the New World is found in the letters of Herrera, a companion of Cortes, who describes the interest manifested by the Aztecs in the card games of the Spanish

soldiers.

Early in the 15th century the making of cards had become a regular trade in Germany, whence they were sent to other countries. Cards were also manufactured in Italy at least as early as 1425, and in England before 1463; for by an act of parliament of 3 Edw. IV. the importation of playing cards is forbidden, in consequence, it is said, of the complaints of manu- facturers that importation obstructed their business. No cards of undoubted English manufacture of so early a date have been discovered; and there is reason to believe, notwithstanding the act of Edward IV., that the chief supplies came from France or the Netherlands. In the reign of Elizabeth the importation of cards was a monopoly; but from the time of James I. most of the cards used in this country were of home manufacture. A duty was first levied on cards in the reign of James I.; since when they have always been taxed.

It has been much disputed whether the earliest cards were printed from wood-blocks. If so, it would appear that the art of wood-engraving, which led to that of printing, may have been developed through the demand for the multiplication of imple- ments of play. The belief that the early card-makers or card-painters of Ulm, Nuremberg and Augsburg, from about 1418-1450, were also wood-engravers, is founded on the assumption that the cards of that period were printed from wood-blocks. It is, however, clear that the earliest cards were executed by hand, like those designed for Charles VI. Many of the earliest wood-cuts were coloured by means of a stencil, so it would seem that at the time wood-engraving was first introduced, the art of depicting and colouring figures by means of stencil plates was well known. There are no playing cards engraved on wood to which so early a date as 1423 (that of the earliest dated wood-engraving generally accepted) can be fairly assigned; and as at this period there were professional card-makers established in Germany, it is probable that wood-engraving was employed to produce cuts for sacred subjects before it was applied to cards, and that there were hand-painted and stencilled cards before there were wood-engravings of saints. The German Briefmaler or card-painter probably progressed into the wood- engraver; but there is no proof that the earliest wood-engravers were the card-makers.

It is undecided whether the earliest cards were of the kind now common, called numeral cards, or whether they were tarocchi or tarots, which are still used in some parts of France, Germany and

Italy, but the probability is that the tarots were the earlier. A pack of tarots consists of seventy-eight cards, four suits of

numeral cards and twenty-two emblematic cards, called atutti or atouts (= trumps). Each suit consists of fourteen cards, ten of which are the pip cards, and four court (or more properly coat cards), viz. king, queen, chevalier and valet. The atouts are numbered from i to 2 1 ; the unnumbered card, called the fou, has no positive value, but augments that of the other atouts (see Acadimie desjeux, Corbet, Paris, 1814, for an account of the mode of playing tarocchino or tarots).

The marks of the suits on the earliest cards (German) are hearts, bells, leaves and acorns. No ace corresponding to the earliest known pack has been discovered; but other packs of about the same date have aces, and it seems unlikely that the suits commenced with the deuces.

Next in antiquity to the marks mentioned are swords, batons, cups and money. These are the most common on Italian cards of the late 15 th century, and are used both in Italy and in Spain. French cards of the 16th century bear the marks now generally used in France and England, viz. coeur (hearts), trifle (clubs), pique (spades) and carreau (diamonds).

The French tr'efle, though so named from its resemblance to the trefoil leaf, was in all probability copied from the acorn; and the pique similarly from the leaf (grun) of the German suits, while its name is derived from the sword of the Italian suits. It is not derived from its resemblance to a pike head, as commonly supposed. In England the French marks are used, and are named — hearts, clubs (corresponding to trifle, the French symbol being joined to the Italian name, bastoni), spades (corresponding to the French pique, but having the Italian name, spade = swords) and diamonds. This confusion of names and symbols is accounted for by Chatto thus — " If cards were actually known in Italy and Spain in the latter part of the 14th century, it is not unlikely that the game was introduced into this country by some of the English soldiers who had served, under Hawkwood and other free captains, in the wars of Italy and Spain. However this may be, it seems certain that the earliest cards commonly used in this

country were of the same kind, with respect to the marks of the suits, as those used in Italy and Spain."

About the last quarter of the 15th century, packs with animals, flowers and human figures, for marks of the suits, were engraved upon copper; and later, numerous variations appeared, dictated by the caprice of individual card-makers; but they never came into general use.

The court cards of the early packs were king, chevalier and knave. The Italians were probably the first to substitute a queen for the chevalier, who in French cards is altogether superseded by the queen. The court cards of French packs received fanciful names, which varied from time to time.

Authorities. — Abbe Rive, Eclaircissements sur I'invention des cartes a jouer (Paris, 1780) ; J. G. I. Breitkopf, Versuch den Ursprung der Spielharten zu erforschen (Leipzig, 1784) ; Samuel Weller Singer, Researches into the History of Playing Cards, with Illustrations of the Origin of Printing and Engraving on Wood (London, 1816); G. Peignot, Analyse critique et raisonnee de toutes les recherches publiees jusqu'a ce jour, sur I'origine des cartes d, jouer (Dijon, 1826); M. C. Leber, Etudes historiques sur les cartes a jouer, principalement sur les cartes frangaises (Paris, 1842); William Andrew Chatto, Facts and Speculations on the Origin and History of Playing Cards (London, 1848); P. Boiteau D'Ambly, Les Cartes d, jouer et la' cartomancie (Paris, 1854), translated into English with additions under the title of The History of Playing Cards, with Anecdotes of their use in Conjuring, Fortune-telling, and Card-sharping, edited by the Rev. E. S. Taylor, B.A. (London, 1865); W. Hughes Wiltshire, M.D., A Descriptive Catalogue of Playing and other Cards in the British Museum, printed by order of the trustees (London, 1876); Origine des cartes a jouer, by R. Merlin (Paris, 1869); The Devil's Picture Books, by Mrs J. K. Van Rensselaer (New York, 1890) ; Bibliography of Works in English on Playing Cards and Gaming, by F. Jessel (London, 1905) ; and especially Les Cartes a. jouer, by Henri Rene d'Allemagne (Paris, 1906) (an exhaustive account).

CARDUCCI, BARTOLOMMEO (1560-1610), Italian painter, better known as Carducho, the Spanish corruption of his Italian patronymic, was born in Florence, where he studied architecture and sculpture under Ammanati, and painting under Zuccaero. The latter master he accompanied to Madrid, where he painted

the ceiling of the Escorial library, assisting also in the production of the frescos that adorn the cloisters of that famous palace.

He was a great favourite with Philip III., and lived and died in Spain, where most of his works are to be found. The most celebrated of them is a Descent from the Cross, in the church of San Felipe el Real, in Madrid.

His younger brother Vincenzo (1 568-1638), was born in Florence, and was trained as a painter by Bartolommeo, whom he followed to Madrid. He worked a great deal for Philip III. and Philip IV., and his best pictures are those he executed for the former monarch as decorations in the Prado. Examples of his work are preserved at Toledo, at Valladolid, at Segovia, and at several other Spanish cities. For many years he laboured in Madrid as a teacher of his art, and among his pupils were Giovanni Ricci, Pedro Obregon, Vela, Francisco Collantes, and other distinguished representatives of the Spanish school during the 17th century. He was also author of a treatise or dialogue, De las Excelencias de laPintura, which was published in 1633.

CARDUCCI, GIOSUE (1836-1907), Italian poet, was born at Val-di-Castello, in Tuscany, on the 27th of July 1836, his father being Michele Carducci, a physician, of an old Florentine family, who in his youth had suffered imprisonment for his share in the revolution of 1831. Carducci received a good education. He began life as a public teacher, but soon took to giving private lessons at Florence, where he became connected with a set of young men, enthusiastic patriots in politics, and in literature bent on overthrowing the reigning romantic taste by a return to classical models. These aspirations always constituted the mainsprings of Carducci's poetry. In i860 he became pro- fessor at Bologna, where, after in 1865 astonishing the public by a defiant Hymn to Satan, he published in 1868 Levia Gravia, a volume of lyrics which not only gave him an indisputable position at the head of contemporary Italian poets, but made him the head of a school of which the best Italian men of letters have been disciples, and which has influenced all. Several other volumes succeeded, the most important of which were the Decennalia (1871), the Nuove Poesie (1872), and the three series of the Odi Barbare (1877-1889).

Carducci had been brought into more fraternal contact with the aims of the younger generation by the efforts of Angelo Sommaruga who became, about 1880, the publisher of a group of

young unknown writers all destined to some, and a few to great, accomplishment. The period of his prosperity was a strange one for Italy. The first ten years of the newly constituted kingdom had passed more in stupor than activity; original contributions to literature had been scarce, and publishers had preferred bringing out inferior translations of not always admirable French authors to encouraging the original work of Italians — work which it must be confessed was generally mediocre and entirely lifeless. Sommaruga's creation, a literary review called La Cronaca Bizantina, gathered together such beginners as Giovanni Marradi,Matilde Serao,Edoardo Scarf oglio, Guido Magnoni and Gabriele d' Annunzio. In order to obtain the sanction of what he considered an enduring name, the founder turned to Giosue Carducci, then living in retirement at Bologna, discontented with his fate, and still not generally known by the public of his own country. The activity of Sommaruga exercised a great influence on Giosue Carducci. Within the next few years he published the three admirable volumes of his Confessioni e Batlaglie, the Qa Ira sonnets, the Nuove Odi Barbare, and a considerable number of articles, pamphlets and essays, which in their collected edition form the most living part of his work. His lyrical production, too, seemed to reach its perfection in those five years of tense, unrelenting work; for the Canzone di Legnano, the Odes to Rome and to Monte Mario, the Elegy on the urn of Percy Bysshe Shelley, the ringing rhymes of the Inter- mezzo, in which he happily blended the satire of Heine with the lyrical form of his native poetry — all belong to this period, together with the essays on Leopardi and on Parini, the admirable discussions in defence of his Qa Ira, and the pamphlet called Eterno Femminino regale, a kind of self-defence, undertaken to explain the origin of the Alcaic metre to the queen of Italy, which marks the beginning of the last evolution in Carducci's work (1881). The revolutionary spirits of the day, who had always

looked upon Giosue Carducci as their bard and champion, fell away from him after this poem written in honour of a queen, and the poet, wounded by the attitude of his party, wrote what he intended to be his defence and his programme for the future in pages that will remain amongst the noblest and most powerful of contemporary literature. From that time Carducci appears in a new form, evolved afterwards in his last Odes, II Piemonte, Li

Bicocca di San Giacomo, the Ode to the daughter of Francesco Crispi on her marriage, and the one to the church where Dante once prayed, Alia Chiesetta dei Polenta, which is like the withdrawing into itself of a warlike soul weary of its battle.

For a few months in 1876 Carducci had a seat in the Italian Chamber. In 1881 he was appointed a member of the higher council of education. In 1890 he was made a senator. And in 1906 he was awarded the Nobel prize for literature. He died at Bologna on the 16th of February 1907. By his marriage in 1859 he had two daughters, who survived him, and one son, who died in infancy.

The same qualities which placed Carducci among the classics of Italy in his earlier days remained consistently with him in later life. His thought flows limpid, serene, sure of itself above an undercurrent of sane and vigorous if pagan philosophy. Patriotism, the grandeur of work, the soul-satisfying power of justice, are the poet's dominant ideals. For many years the national struggle for liberty had forced the best there was in heart and brain into the atmosphere of political intrigue and from one battlefield to another; Carducci therefore found a poetry emasculated by the deviation into other channels of the intellectual virility of his country. On this mass of patriotic doggerel, of sickly, languishing sentimentality as insincere as it was inane, he grafted a poetry not often tender, but always violently felt and thrown into a mould of majestic form; not always quite expected or appreciated by his contemporaries, but never commonplace in structure; always high in tone and free in spirit. The adapta- tion of various kinds of Latin metres to the somewhat sinewless language he found at his disposal, whilst it might have been an effort of mere pedantry in another, was a life-giving and strength- ening inspiration in his case. Another of his characteristics, which made him peculiarly precious to his countrymen, is the fact that his poems form a kind of lyric record of the Italian struggle for independence. The tumultuous vicissitudes of all other nations, however, and the pageantry of the history of all times, have in turns touched his particular order of imagina- tion. The more important part of his critical work which belongs to this later period consists of his Conversazioni critiche, his Storia filosofica della letteratura Italiana, and a masterly edition of Petrarch. That he should have had the faults of his qualities is not remarkable. Being almost a pioneer in the world of criticism, his essays on the authors of other countries, though appearing in the light of discoveries to

his own country, absorbed as it had hitherto been in its own vicissitudes, have little of value to the general student beyond the attraction of robust style. And in his unbounded admiration for the sculptural lines of antique Latin poetry he sometimes relapsed into that fascination by mere sound which is the snare of his language, and against which his own work in its great moments is a reaction.

CARDWELL, EDWARD (1787-1861), English theologian, was born at Blackburn in Lancashire in 1787. He was educated at Brasenose College, Oxford (B.A. 1809; M.A. 1812; B.D. 1819; D.D. 183 1), and after being for several years tutor and lecturer, was appointed, in 1814, one of the examiners to the university. In 1825 he was chosen Camden professor of ancient history; and during his five years' professorship he published an edition of the Ethics of Aristotle, and a course of his lectures on The Coinage of the Greeks and Romans. In 183 1 he succeeded Archbishop Whately as principal of St Alban's Hall. He published in 1837 a student's edition of the Greek Testament, and an edition of the Greek and Latin texts of the History of the Jewish War, by Josephus, with illustrative notes. But his most important labours were in the field of English church history. He projected an extensive work, which was to embrace the entire synodical history of the church in England, and was to be

founded on David Wilkins's Concilia Magnae Britanniae et Hiberniae. Of this work he executed some portions only. The first published was Documentary Annals of the Reformed Church of England from 1546 to 1716, which appeared in 1839. It was followed by a History of Conferences, &c, connected with the Revision of the Book of Common Prayer (1840). On 1842 appeared Synodalia, a Collection of Articles of Religion, Canons, and Proceedings of Convocation from 1547 to 1717, completing the series for that period. Closely connected with these works is the Reformatio Legum Ecclesiasttcarum (1850), which treats of the efforts for reform during the reigns of Henry VIII., Edward VI., and Elizabeth. Cardwell also published in 1854 a new edition of Bishop Gibson's Synodus Anglicana. He was one of the best men of business in the university, and held various important posts, among which were those of delegate of the press, curator of the university galleries, manager of the Bible department of the press, and private secretary to successive chancellors of the university- He established the Wolvercot paper mill. He died at Oxford on the 23rd of May 1861.

CARDWELL, EDWARD CARDWELL, Viscount (1813-1886), English statesman, was the son of a merchant of Liverpool, where he was born on the 24th of July 1813. After a brilliant career at Oxford, where he gained a double first-class, he entered parliament as member for Clitheroe in 1842, and in 1845 was made secretary to the treasury. He supported Sir Robert Peel's free-trade policy, and went out of office with him. In 1847 he was elected for Liverpool, but lost his seat in 1852 for having supported the repeal of the navigation laws. He soon found another constituency at Oxford, and upon the formation of Lord Aberdeen's coalition ministry became president of the Board of Trade, although debarred by the jealousy of his Whig colleagues from a seat in the cabinet. In 1854 he carried, almost without opposition, a most important and complicated act consolidating all existing shipping laws, but in 1855 resigned, with his Peelite: colleagues, upon the appointment of Mr Roebuck's Sevastopol inquiry committee, declining the offer of the chancellorship of the Exchequer pressed upon him by Lord Palmerston. In 1858 he moved the famous resolution condemnatory of Lord Ellen-borough's despatch to Lord Canning on the affairs of Oude, which for a time seemed certain to overthrow the Derby govern- ment, but which ultimately dissolved into nothing. He obtained a seat in Lord Palmerston's cabinet of 1859, and after filling the uncongenial posts of secretary for Ireland and chancellor of the duchy of Lancaster (1861), became secretary for the colonies in 1864. Here he reformed the system of colonial defence, refusing to keep troops in the colonies during time of peace unless their expense was defrayed by the colonists; he also laid the founda-tion of federation in Canada and, rightly or wrongly, censured Sir George Grey's conduct in New Zealand. Resigning with his friends in 1866, he again took office in 1868 as secretary for war. In this post he performed the most memorable actions of his life by the abolition of purchase and the institution of the short service system and the reserve in the army, measures which excited more opposition than any of the numerous reforms effected by the Gladstone government of that period, but which were entirely justified by their successful working afterwards. On the resignation of the Gladstone ministry in 1874 he was raised to the peerage as Viscount Cardwell of Ellerbeck, but took no further prominent part in politics. His mental faculties, indeed, were considerably impaired during the last few years of his life, and he died at Torquay on the 15th of February 1886. He was not a showy, hardly even a prominent politician, but effected far more than many more conspicuous men. The great administrator

and the bold innovator were united in him in an exceptional degree, and he allowed neither character to pre- ponderate unduly.

CARDWELL, a town of Cardwell county, Queensland, Australia, on Rockingham Bay, about 800 m. direct N.W. by N. of Brisbane. Pop. of town and district (1901) 3435. It has one of the best harbours in the state, easy of access in all weathers, with a depth ranging from 4 to 10 fathoms. Various minerals, including gold and tin, exist in the district; and there are preserve and sauce

factories, and works for meat extract and tinning. The dugong fishery is carried on, and the oil is extracted. There are large timber forests in the district, and much cedar is exported.

CAREW, GEORGE (d. about 1613), English diplomatist and historian, second son of Sir Wymond Carew of Antony, was educated at Oxford, entered the Inns of Court, and passed' some years in continental travel. At the recommendation of Queen Elizabeth, who conferred on him the honour of knighthood, he was appointed secretary to Sir Christopher Hatton, and after- wards, having been promoted to a* mastership in chancery, was sent as ambassador to the king of Poland. In the reign of James he was employed in negotiating the treaty of union with Scotland, and for several years was ambassador to the court of France. On his return he wrote a Relation of the State of France, with sketches of the leading persons at the court of Henry IV. It is written in the classical style of the Elizabethan age, and was appended by Dr Birch to his Historical View of the Negotiations between the Courts of England, France and Brussels, from i§g2 to 1617. Much of the information regarding Poland contained in De Thou's History of His Own Times was furnished by Carew.

CAREW, RICHARD (1555-1620), English poet and antiquary, was born on the 17th of July 1555, at Antony House, East Antony, Cornwall. At the age of eleven, he entered Christ Church, Oxford, and when only fourteen was chosen to carry on an extempore debate with Sir Philip Sidney, in presence of the earls of Leicester and Warwick and other noblemen. From Oxford he removed to the Middle Temple, where he spent three years, and then went abroad. By his marriage with Juliana Arundel in 1577 he added

Coswarth to the estates he had already inherited from his father. In 1586 he was appointed high-sheriff of Cornwall; he entered parliament in 1584; and he served under Sir Walter Raleigh, then lord lieutenant of Cornwall, as treasurer. He became a member of the Society of Antiquaries in 1589, and was a friend of William Camden and Sir Henry Spelman. His great work is the Survey of Cornwall, published in r6o2, and reprinted in 1769 and 181 1. It still possesses interest, apart from its antiquarian value, for the picture it gives of the life and interests of a country gentleman of the days of Elizabeth. Carew's other works are: — a translation of the first five Cantos of Tasso's Gerusalemme (1594), printed in the first instance without the author's knowledge, and entitled Godfrey of Balloigne, or the Recouerie of Hierusalam ; The Examination of Men's Wits (1594), a translation of an Italian version of John Huarte's Examen de Ingenios; and An Epistle concerning the Excellences of the English Tongue (T605). Carew died on the 6th of November 1620.

His son, Sir Richard Carew (d. 1643?), was the author of a True and Readie Way to learn the Latine Tongue, by writers of three nations, published by Samuel Hartlib in 1654.

CAREW, THOMAS (1 595-1645?), English poet, was the son of Sir Matthew Carew, master in chancery, and his wife, Alice Ingpenny, widow of Sir John Rivers, lord mayor of London. The poet was probably the third of the eleven children of his parents, and was born at West Wickham in Kent, in the early part of 1595, for he was thirteen years of age in June 1608, when he matriculated at Merton College, Oxford. He took his degree of B.A. early in 161 1, and proceeded to study at the Middle Temple. Two years later his father complained to Sir Dudley Carleton that he was doing little at the law. He was in conse- quence sent to Italy, as a member of Sir Dudley's household, and when the ambassador returned from Venice, he seems to have kept Thomas Carew with him, for he is found in the capacity of secretary to Sir Dudley Carleton, at the Hague, early in 1616. From this office he was dismissed in the autumn of that year for levity and slander; he had great difficulty in finding another situation. In August 1618 his father died, and Carew entered the service of Lord Herbert of Cherbury, in whose train he started for France in March 1619, and it is believed that he travelled in Herbert's company until that nobleman returned to England, at the close of his diplomatic missions, in April 1624. Carew " followed the court before he was of it," not receiving the definite appointment of gentleman of the privy chamber

until 1628. While Carew held this office, he displayed his tact and presence of mind by stumbling and extinguishing the candle he was holding to light Charles I. into the queen's chamber, because he saw that Lord St Albans had his arm round her majesty's neck. The king suspected nothing, and the queen heaped favours on the poet. Probably in 1630, Carew was made " server " or taster-in-ordinary to the king. To this period may be attributed his close friendship with Sir John Suckling,' Ben Jonson and Clarendon; the latter says that Carew was " a person of pleasant and facetious wit." Donne, whose celebrity as a court-preacher lasted until his death in 1631, exercised a powerful if not entirely healthful influence over the genius of Carew. In February 1633 a masque by the latter, entitled Coelum Britanicum, was acted in the banqueting-house at Whitehall, and was printed in 1634. The close of Carew's life is absolutely obscure. It was long supposed that he died in 1639, and this has been thought to be confirmed by the fact that the first edition of his Poems, published in 1640, seems to have a posthumous character. But Clarendon tells us that " after fifty years of life spent with less severity and exactness than it ought to have been, he died with the greatest remorse for that licence." If Carew was more than fifty years of age, he must have died in or after 1645, and in fact there were final additions made to his Poems in the third edition of 1651. Walton tells us that Carew in his last illness, being afflicted with the horrors, sent in great haste to " the ever-memorable " John Hales (1584-1656); Hales " told him he should have his prayers, but would by no means give him then either the sacrament or absolution."

Carew's poems, at their best, are brilliant lyrics of the purely sensuous order. They open to us, in his own phrase, " a mine of rich and pregnant fancy." His metrical style was influenced by Jonson and his imagery still more clearly by Donne, for whom he had an almost servile admiration. His intellectual power was not comparable with Donne's, but Carew had a lucidity and directness of lyrical utterance unknown to Donne. It is perhaps his greatest distinction that he is the earliest of the Cavalier song-writers by profession, of whom Rochester is the latest, poets who turned the disreputable incidents of an idle court-life into poetry which was often of the rarest delicacy and the purest melody and colour. The longest and best of Carew's poems, " A Rapture," would be more widely appreciated if the rich flow of its imagination were restrained by greater reticence of taste.

The best edition of Carew's Poems is that prepared by Arthur Vincent in 1899. (E. G.)

CAREY, HENRY (d. 1743), English poet and musician, reputed to be an illegitimate son of George Savile, marquess of Halifax, was born towards the end of the 17th century. His mother is supposed to have been a schoolmistress, and Carey himself taught music at various schools. He owed his knowledge of music to Olaus Linnert, and later he studied with Roseingrave and Geminiani. He wrote the words and the music of The Contrivances; or More Ways than One, a farce produced at Drury Lane in 171 5. His Hanging and Marriage; or The Dead Man's Wedding was acted at Lincoln's Inn Fields in 1722. Chrononhotonthologos (1734), described as "The most Tragical Tragedy that ever was tragedized by any Company of Tra- gedians," was a successful burlesque of the bombast of the contemporary stage. The best of his other pieces were A Wonder; or the Honest Yorkshireman (1735), a ballad opera, and the Dragon of Wantley (1737), a burlesque opera, the music of which was by J. F. Lampe. He was the author of Namby- Pamby, a once famous parody of Ambrose Philips's verses to the infant daughter of the earl of Carteret. Carey is best remem- bered by his songs. " Sally in our Alley " (printed in his Musical Century) was a sketch drawn after following a shoemaker's 'prentice and his sweetheart on a holiday. The present tune set to these words, however, is not the one written by Carey, but is borrowed from an earlier song, " The Country Lasse," which is printed in The Merry Musician (vol. hi., c. 1716). It has been claimed for him that he was the author of " God save the King " (see National Anthems). He died in London on the 4th of

October 1743, and it was asserted, without justification, that he had committed suicide. Edmund Kean, the tragedian, was one of his great-grandchildren.

The completest edition of his poems is Poems on Several Occasions (1729). His dramatic works were published by subscription in 1743.

CAREY, HENRY CHARLES (1793-1879), American econo- mist, was born in Philadelphia on the 15th of December 1793. At the

age of twenty-eight he succeeded his father, Mathew Carey (1760-1839) — an influential economist, political reformer, editor, and publisher, of Irish birth, but for many years a resident of Philadelphia — as a member of the publishing firm of Carey & Lea, which was long the most conspicuous in America. He died in Philadelphia on the 13th of October 1879.

Among Mathew Carey's many writings had been a collection (1822) of Essays on Political Economy, one of the earliest of American treatises favouring protection, and Henry C. Carey's life-work was devoted to the propagation of the same theory. He retired from business in 1838, almost simultaneously with the appearance (183 7-1 840) of his Principles of Political Economy. This treatise, which was translated into Italian and Swedish, soon became the standard representative in the United States of the school of economic thought which, with some interruptions, has since dominated the tariff system of that country. Carey's first large work on political economy was preceded and followed by many smaller volumes on wages, the credit system, interest, slavery, copyright, &c; and in 1858-1859 he gathered the fruits of his lifelong labours into The Principles of Social Science, in three volumes. This work is a most comprehensive as well as mature exposition of his views. In it Carey sought to show that there exists, inde- pendently of human wills, a natural system of economic laws, which is essentially beneficent, and of which the increasing prosperity of the whole community, and especially of the work- ing classes, is the spontaneous result — capable of being defeated only by the ignorance or perversity of man resisting or impeding its action. He rejected the Malthusian doctrine of population, maintaining that numbers regulate themselves sufficiently in every well-governed society, and that their pressure on sub- sistence characterizes the lower, not the more advanced, stages of civilization. He denied the universal truth, for all stages of cultivation, of the law of diminishing returns from land.

His fundamental theoretic position relates, to the antithesis of wealth and value. Carey held that land, as we are concerned with it in industrial life, is really an instrument of production which has been formed as such by man, and that its value is due to the labour expended on it in the past — though measured, not by the sum of that labour, but by the labour necessary under existing conditions to bring new land to the same stage of productiveness. He studied the occupation and reclamation of land with peculiar advantage as an American, for whom the traditions of first

settlement were living and fresh, and before whose eyes the process was indeed still going on. The diffi- culties of adapting a primitive soil to the work of yielding organic products for man's use can be lightly estimated only by an inhabitant of a country long under cultivation. It is, in Carey's view, the overcoming of these difficulties by arduous and continued effort that entitles the first occupier of land to his property in the soil. Its present value forms a very small pro- portion of the cost expended on it, because it represents only what would be required, with the science and appliances of our time, to bring the land from its primitive into its present state. Property in land is therefore only a form of invested capital — a quantity of labour or the fruits of labour permanently incor- porated with the soil; for which, like any other capitalist, the owner is compensated by a share of the produce. He is not rewarded for what is done by the powers of nature, and society is in no sense defrauded by his sole possession. The so-called Ricardian theory of rent is a speculative fancy, contradicted by all experience. Cultivation does not in fact, as that theory supposes, begin with the best, and move downwards to the poorer soils in the order of their inferiority. The light and dry higher lands are first cultivated; and only when population has become

dense and capital has accumulated, are the low-lying lands, with their greater fertility, but also with their morasses, inundations, and miasmas, attacked and brought into occupation. Rent, regarded as a proportion of the produce, sinks, like all interest on capital, in process of time, but, as an absolute amount, increases. The share of the labourer increases, both as a pro- portion and an absolute amount. And thus the interests of these different social classes are in harmony. But, Carey pro- ceeded to say, in order that this harmonious progress may be realized, what is taken from the land must be given back to it. All the articles derived from it are really separated parts of it, which must be restored on pain of its exhaustion. Hence the producer and the consumer must be close to each other; the products must not be exported to a foreign country in exchange for its manufactures, a nd thus go to enrich as manure a foreign soil. In immediate exchange value the landowner may gain by such exportation, but the productive powers of the land will suffer.

Carey, who had set out as an earnest advocate of free trade, accordingly arrived at the doctrine of protection: the "co-ordinating power" in society must intervene to prevent private advantage from working public mischief. He attributed his

conversion on this question to his observation of the effects of liberal and protective tariffs respectively on American prosperity. This observation, he says, threw him back on theory, and led him to see that the intervention referred to might be necessary to remove (as he phrases it) the obstacles to the progress of younger communities created by the action of older and wealthier nations. But it seems probable that the influence of List's writings, added to his own deep-rooted and hereditary jealousy and dislike of English predominance, had something to do with his change of attitude (see Protection).

CAREY, WILLIAM (1761-1834), English Oriental scholar, and the pioneer of modern missionary enterprise, was born at Paulerspury, Northamptonshire, on the 17th of August 1761. When a youth he worked as a shoemaker; but having joined the Baptists when he was about twenty-one, he devoted much of his time to village preaching. In 1787 he became pastor of a Baptist church in Leicester, and began those energetic move- ments among his fellow religionists which resulted in the for- mation of the Baptist Missionary Society, Carey himself being one of the first to go abroad. On reaching Bengal in 1793, he and his companions lost all their property in the Hugh; but having received the charge of an indigo factory at Malda, he was soon able to prosecute the work of translating the Bible into Bengali. In 1799 he quitted Malda for Serampore, where he established a church, a school, and a printing-press for the publication of the Scriptures and philological works. In 1801 Carey was appointed professor of Oriental languages in a college founded at Fort William by the marquess of Wellesley. From this time to his death he devoted himself to the preparation of numerous philological works, consisting of grammars and dictionaries in the Mahratta,, Sanskrit, Punjabi, Telinga, Bengali and Bhotanta dialects. The Sanskrit dictionary was unfortun- ately destroyed by a fire which broke out in the printing establish- ment. From the Serampore press there issued in his lifetime over 200,000 Bibles and portions in nearly forty different lan- guages and dialects, Carey himself undertaking most of the literary work. He died on the 9th of June 1834.

See Lives by J. Culross (1881) and G. Smith (1884).

CARGILL, DONALD (1610-1681), Scottish Covenanter, wa? born in 1610. Tip was educated at St Andrews, and afterwards attached himself to the Protesters. After his appointment to one of the churches in Glasgow, he openly resisted the measures of

the government. Compelled to remain at a distance from his charge, he ventured back to celebrate the Communion, and was arrested, but was liberated at the instance of some of his private friends. He was afterwards wounded at the battle of Bothwell Bridge, and fled to Holland, where he remained a few months. On his return he joined Richard Cameron in publishing the Sanquhar declaration, and boldly excommunicated the king and his officials. He was soon afterwards apprehended, and brought to Edinburgh, where he was beheaded on the 27th of July 1681.

CARGO (Span, for “loading,” from Lat. carrus, car), a ship- load, or the goods (or even, less technically, persons) carried on board a ship; and so, by analogy, a term used for any Jarge amount. The maritime law affecting the cargo of a ship is dealt with in the articles Average, Affreightment, Insurance, Salvage, Bottomry, Lien; and the specialities of cargo-ships under Ship.

CARIA, an ancient district of Asia Minor, bounded on the N. by Ionia and Lydia, on the W. and S. by the Aegean Sea, and on the E. by Lycia and a small part of Phrygia. The coast-line consists of a succession of great promontories alternating with deep inlets. The most important inlet, the Ceramic Gulf, or Gulf of Cos, extends inland for 70 m., between the great mountain promontory terminating at Myndus ori the north, and that which extends to Cnidus and the remarkable headland of Cape Krio on the south. North of this is the deep bay called in ancient times the Gulf of Iasus (now known as the Gulf of Mendeliyah), and beyond this again was the deeper inlet which formerly extended inland between Miletus and Priene, but of which the outer part has been entirely filled up by the alluvial deposits of the Maeander, while the innermost arm, the ancient Latmic Gulf, is now a lake. South of Cape Krio again is the gulf known as the Gulf of Doris, with several subordinate inlets, bounded on the south by the rugged promontory of Cynossema (mod. Cape Alupo). Between this headland and the frontier of Lycia is the sheltered bay of Marmarice, noted in modern times as one of the finest harbours of the Mediterranean.

Almost the whole of Caria is mountainous. The two great masses of Cadmus (Baba-dagh) and Salbacum (Boz-dagh), which are in fact portions of the great chain of Taurus (see Asia Minor) , form

the nucleus to which the whole physical framework of the country is attached. From these lofty ranges there extends a broad tableland (in many parts more than 3000 ft. high), while it sends down offshoots on the north towards the Maeander, and on the west towards the Aegean. Of these ranges the summit of Mt Latmus alone reaches 4500 ft.

The coast is fringed by numerous islands, in some instances separated only by narrow straits from the mainland. Of these the most celebrated are Rhodes and Cos. Besides these are Syme, Telos, Nisyros, Calymnos, Leros and Patmos, all of which have been inhabited, both in ancient and modern times, and some of which contain excellent harbours. Of these Nisyros alone is of volcanic origin; the others belong to the same lime- stone formation with the rocky headlands of the coast. The country known as Caria was shared between the Carians proper and the Caunians, who were a wilder people, inhabiting the district between Caria and Lycia. They were not considered to be of the same blood as the Carians, and were, therefore, excluded from the temple of the Carian Zeus at Mylasa, which was common to the Carians, Lydians and Mysians, though their language was the same as that of the Carians proper. Herodotus (i. 172) believed the Caunians to have been aborigines, the Carians having been originally called Leleges, who had been driven from the Aegean islands by the invading Greeks. This seems to have been a prevalent view among the Greek writers, for Thucydides (i. 8) states that when Delos was “purified” more than half the bodies found buried in it were those of ” Carians.” Modern archaeological discovery, however, is against this belief; and the fact that Mysus, Lydus and Car were regarded as brothers indicates that the three populations who worshipped together in the temple of Mylasa all belonged to the same stock. Homer (//. x. 428-429) distinguishes the Leleges (g.v.) from the Carians, to whom is ascribed the invention of helmet-crests, coats of arms, and shield handles.

A considerable number of short Carian inscriptions has been found, most of them in Egypt. They were first noticed by Lepsius at Abu-Simbel, where he correctly inferred that they were the work of the Carian mercenaries of Psammetichus. The language, so far as it has been deciphered, is “Asianic” and not Indo-European.

The excavations of W.R. Paton at Assarlik (Journ. Hell. Studies, 1887) and of F. Winter at Idrias have resulted in the discovery

of Late-Mycenaean and Geometric pottery. Caria, however, figured but little in history. It was absorbed into the kingdom of Lydia, where Carian troops formed the bodyguard of the king. Cnidus and Halicarnassus on the coast were colonized by Dorians. At Halicarnassus (q.v.) the Mausoleum, the monument erected by Artemisia to her husband Mausolus, about 360 B.C., was excavated by Sir C. T. Newton in 1857-1858. Cnidus (g.v.) was excavated at the same time, when the " Cnidian Lion," now in the British Museum, was found crowning a tomb near the site of the old city (C. T. Newton, History of Discoveries at Cnidus, Halicarnassus and Branchidae). On the border-land between Caria and Lydia lay other Greek cities, Miletus, Priene, and Magnesia (see articles s.v.), colonized in early times by the Ionians. Inland was Tralles (mod. Aidin), which also had an Ionic popula- tion, though it never belonged to the Ionic confederacy (see Tralles). The excavations of the English in 1868-1869, of the French under O. Rayet and A. Thomas in 1873, and more recently of the Germans under Th. Wiegand and Schrader in 1895-1898 have laid bare the site of the Greek Priene, and the same has been done for the remains of Magnesia ad Maeandrum by French excavators in 1842-1843 and the German expedition under K. Humann in 1891-1893. A German expedition under Th. Wiegand carried on excavations at Miletus (see articles on these towns).

In the Persian epoch, native dynasts established themselves in Caria and even extended their rule over the Greek cities. The last of them seems to have been Pixodarus, after whose death the crown was seized by a Persian, Orontobates, who offered a vigorous resistance to Alexander the Great. But his capital, Halicarnassus, was taken after a siege, and the principality of Caria conferred by Alexander on Ada, a princess of the native dynasty. Soon afterwards the country was incorporated into the Syrian empire and then into the kingdom of Pergamum.

See W. M. Ramsay, " Historical Geography of Asia Minor " {R.G.S. iv., 1890); W. Ruge and E. Friedrich, Archaologische Karte von Kleinasien (1899) ; Perrot and Chipiez, History of Art in Phrygia, Lydia, Caria and Lycia (Eng. trans., 1892); A. H. Sayce, "The Karian Language and Inscriptions" {T.S.B.A. ix. 1, 1887); P. Kretschmer, Einleitung in die Geschichte der griechischen Sprache, PP- 376-384 (1896). For the coinage see Numismatics. (A. H. S.)

CARIACO, or San Felipe de Austria, a town on the north coast of Venezuela, 40 m. east of the city of Cumani at the head of the

gulf bearing the same name. Pop. (1908, estimate) 7000. It stands a short distance up the Cariaco river and its port immediately on the coast is known as Puerto Sucre. The surrounding district produces cotton, tobacco, cacao, cattle and fruit, and there is considerable trade through Puerto Sucre, although that port has no regular connexion with foreign ports.

CARIBBEE ISLANDS, a name chiefly of historical importance, sometimes applied to the whole of the West Indies, but strictly comprehending only the chain of islands stretching from Porto Rico to the coast of South America. These are also known as the Lesser Antilles, and the bulk of them are divided into the two groups of the Leeward and Windward Islands.

CARIBS, the name, used first by Columbus (from Cariba, said to mean "a valiant man"), of a South American people, who, at the arrival of the Spanish, occupied parts of Guiana and the lower Orinoco and the Windward and other islands in what is still known as the Caribbean Sea. They were believed to have had their original home in North America, spreading thence through the Antilles southward to Venezuela, the Guianas, and north-east Brazil. This view has been abandoned, as Carib tribes, the Bakairi and Nahuquas, using an archaic type of Carib speech and primitive in habits, have been met by German explorers in the very heart of Brazil. It may thus be assumed that the cradle of the race was the centre of South America; their first migrating movements being to Guiana and the Antilles. A cruel, ferocious and warlike people, they made a stout resist- ance to the Spaniards. They were cannibals, and it is to them that we owe that word, Columbus's Caribal being transformed into Cannibal in apparent reference to the canine voracity of the Caribs. They are physically by no means a powerful race, being distinguished by slight figures with limbs well formed but

lacking muscle, and with a tendency to be pot-bellied, due apparently to their habit of drinking paiwari (liquor prepared from the cassava plant) in great quantities. Their colour is a red cinnamon, but varies with different tribes. Their hair is thick, long, very black, and generally cut to an even edge, at right angles to the neck, round the head. The features are strikingly Mongoloid. Among the true Caribs a 2-in. broad belt of cotton is

knitted round each ankle, and just below each knee of the young female children. All body-hair in both sexes is pulled out, even to the eye-brows. Among the women the lower lips are often pierced, pins of wood being passed through and forming a sort of chevaux de frise round the mouth. Some- times a bell-shaped ornament is hung by men to a piece of string passed through the lower lip. The Carib government was patriarchal. Though the women did most of the hard work, they were kindly treated. Polygamy prevailed. Very little ceremony attended death. The Caribs of the West Indies, known as "Red" and "Black," the first pure, the second mixed with negro blood, after a protracted war with the British were transported in 1 796 to the number of 5000 from Dominica and St Vincent to the island of Ruatan near the coast of Honduras. A few were subsequently allowed back to St Vincent, but the majority are settled in Honduras and Nicaragua.

CARICATURE (Ital. caricatura, i.e. " ritratto ridicolo," from caricare, to load, to charge; Fr. charge), a general term for the art of applying the grotesque to the purposes of satire, and for pictorial and plastic ridicule and burlesque. The word, " cari- catura " was first used as English by Sir Thomas Browne (1605-1682), in his Christian Morals, a posthumous work; it is next found, still in its Italian form, in No. 537 of the Spectator; it was adopted by Johnson in his dictionary (1757), but does not appear in Bailey's dictionary, for example, as late as 1773; and it only assumed its modern guise towards the end of the 1 8th century, when its use and comprehension became general.

Little that is not conjectural can be written concerning caricature among the ancients. Few traces of the comic are discoverable in Egyptian art — such papyri of a satirical tendency as are known to exist appearing to belong rather to the class of ithyphallic drolleries than to that of the ironical grotesque. Among the Greeks, though but few and dubious data are extant, it seems possible that caricature may not have been altogether unknown. Their taste for pictorial parody, indeed, has been sufficiently proved by plentiful discoveries of pottery painted with burlesque subjects. Aristotle, moreover, who disapproved of grotesque art, condemns in strong terms the pictures of a certain Pauson, who, alluded to by Aristophanes, and the subject of one of Lucian's anecdotes, is hailed by Champfleury as the doyen of caricaturists. That the grotesque in graphic art con- ceived in the true spirit of intentional caricature was practised by the Romans is evident from the curious frescoes uncovered at Pompeii and Herculaneum; from the mention in Pliny of certain painters

celebrated for burlesque pictures; from the curious fantasies graven in gems and called Grylli; and from the number of ithyphallic caprices that have descended to modern times. But in spite of these evidences of Greek and Roman humour, in spite of the famous comic statuette of Cara- calla, and of the more famous graffito of the Crucifixion, the caricaturists of the old world must be sought for, not among its painters and sculptors, but among its poets and dramatists. The comedies of Aristophanes and the epigrams of Martial were, to the Athens of Pericles and the Rome of Domitian, what the etchings of Gillray and the lithographs of Daumier were to the London of George III. and the Paris of the Citizen King.

During the middle ages a vast mass of grotesque material was accumulated, but selection becomes even more difficult than with the scarce relics of antiquity. With the building of the cathedrals originated a new style of art; a strange mixture of memories of paganism and Christian imaginings was called into being for the adornment of those great strongholds of urban Catholicism, and in this the coarse and brutal materialism of the popular humour found its largest and freest expression. On missal-marge and sign-board, on stall and entablature, in

gargoyle and initial, the grotesque displayed itself in an infinite variety of forms. The import of this inextricable tangle of imagery, often obscene and horrible, often quaint and fantastic, is difficult, if not impossible, to determine. We recognize the prevalence of three great popular types or figures, each of which may be credited with a satirical intention — of Reynard the Fox, the hero of the famous medieval romance; of the Devil, that peculiarly medieval antithesis of God; and of Death, the sar- castic and irreverent skeleton. The popularity of the last is evidenced by the fact that no fewer than forty-three towns in England, France and Germany are enumerated as possessing sets of the Dance of Death, that grandiose all-levelling series of caprices in the contemplation of which the middle ages found so much consolation. It was reserved for Holbein (1498-1554), seizing the idea and resuming all that his contemporaries thought and felt on the subject, to produce, in his fifty-three magnificent designs of the Danse Macabre, the first and perhaps the greatest set of satirical moralities known to the modern world.

It is in the tumult of the Renaissance, indeed, that caricature in its modern sense may be said to have been born. The great

popular movements required some such vehicle of comment or censure; the perfection to which the arts of design were attaining supplied the means; the invention of printing ensured its dissemination. The earliest genuine piece of graphic irony that has been discovered is a caricature (1499) relating to Louis XII. and his Italian war. But it was the Reformation that produced the first full crop of satirical ephemerae, and the heads of Luther and Alexander VI. are therefore the direct ancestors of the masks that smirk and frown from the "cartoons" of Punch and the Charivari. Fairly started by Lucas Cranach, a friend of Luther, in his Passionate of Christ and Antichrist (1521), caricature was naturalized in France under the League, but only to pass into the hands of the Dutch, who supplied the rest of Europe with satirical prints during the whole of the next century. A curious reaction is visible in the work of Pieter Breughel (1510-1570) towards the grotesque diablerie and macaberesque morality of medieval art, the last original and striking note of which is caught in the compositions of Jacques Callot (1593-1635), and, in a less degree, in those of his followers, Stefano della Bella (1610—1664) and Salvator Rosa (1615-1673). On the other hand, however, Callot, one of the greatest masters of the grotesque that ever lived, in certain of his Caprices, and in his two famous sets of prints, the Miseres de la guerre, may be said to anticipate certain productions of Hogarth and Goya, and so to have founded the modern school of ironic genre.

In England one of the earliest caricatures extant is that in the margin of the Forest Roll of Essex, 5, ed. 1, now at the Record Office; it is a grotesque portrait of "Aaron fil Diabole" (Aaron, son of the devil), probably representing Cok, son of Aaron. It is dated 1277. Another caricature, undated, appears on a Roll containing an account of the tallages and fines paid by Jews, 17. Henry III., belonging to 1233 (Exch. of Receipt, Jews' Roll, No. 8). It is an elaborate satirical design of Jews and devils, arranged in a pediment. During the 16th century, caricature can hardly be said to have existed at all, — a grotesque of Mary Stuart as a mermaid, a pen and ink sketch of which is yet to be seen in the Rolls Office, being the only example of it known. The Great Rebellion, however, acted as the Reformation had done in Germany, and Cavaliers and Roundheads caricatured each other freely. At this period satirical pictures usually did duty as the title-pages of scurrilous pamphlets; but one instance is known of the employment during the war of a grotesque allegory as a banner, while the end of the Commonwealth produced a satirical

pack of playing cards, probably of Dutch origin. The Dutch, indeed, as already has been stated, were the great purveyors of pictorial satire at this time and during the early part of the next century. In England the wit of the victorious party was rather vocal than pictorial;. in France the spirit of caricature was sternly repressed; and it was from Holland, bold in its republican freedom, and rich in painters and etchers, that issued the flood of prints and medals which illustrate, through cumbrous allegories and elaborate

symbolization, the principal political passages of both the former countries, from the Restoration (1660) to the South Sea Bubble (1720). The most distinguished of the Dutch artists was Romain de Hooghe (1638-17 20), a follower of Callot, who, without any of the weird power of his master, possessed a certain skill in grouping and faculty of grotesque suggestiveness that made his point a most useful weapon to William of Orange during the long struggle with Louis XIV.

The 1 8th century, however, may be called emphatically the age of caricature. The spirit is evident in letters as in art; in the fierce grotesques of Swift, in the coarser charges of Smollett, in the keen ironies of Henry Fielding, in the Aristophanic tendency of Foote's farces, no less than in the masterly moralities of Hogarth and the truculent satires of Gillray. The first event that called forth caricatures in any number was the prosecution (1710) of Dr Sacheverell; most of these, however, were importa- tions from Holland, and only in the excitement attendant on the South Sea Bubble, some ten years later, can the English school be said to have begun. Starting into active being with the ministry of Walpole (17 21), it flourished under that statesman for some twenty years, — the " hieroglyphics," as its prints were named, graphically enough, often circulating on fans. It con- tinued to increase in importance and audacity till the reign of Pitt (1757-1761), when its activity was somewhat abated. It rose, however, to a greater height than ever during the rule of Bute (1761-1763), and since that time its influence has extended without a check. The artists whose combinations amused the ■ public during this earlier period are, with few exceptions, but little known and not greatly esteemed. Among them were two amateurs, Dorothy, wife of Richard Boyle, 3rd earl of Burlington,

and General George Townshend (after- wards 1st Marquess Townshend); Goupy, Boitard and Liotard were Frenchmen; Vandergucht and Vanderbank were Dutch- men. This period witnessed also the rise of William Hogarth (169 7- 1 7 64). As a political caricaturist Hogarth was not successful, save in a few isolated examples, as in the portraits of Wilkes and Churchill; but as a moralist and social satirist he has not yet been equalled. The publication, in 1732, of his Modern Midnight Conversation may be said to mark an epoch in the history of caricature. Mention must also be made of Paul Sandby (1725-1809), who was not a professional caricaturist, though he joined in the pictorial hue-and-cry against Hogarth and Lord Bute, and who is best remembered as the founder of the English school of water-colour; and of John Collet (1723- said to have been a pupil of Hogarth, a kindly and indus-

trious humorist, rarely venturing into the arena of politics. During the latter half of the century, however, political caricature began to be somewhat more skilfully handled than of old by James Sayer, a satirist in the pay of the younger Pitt, while social grotesques were pleasantly treated by Henry William Bunbury (1750-1811) and George Moutard Woodward. These personalities, however, interesting as they are, are dwarfed into insignificance by the great figure of James Gillray (1757-1815), in whose hands political caricature became almost epic for grandeur of conception and far-reaching suggestiveness. It is to the works of this man of genius, indeed, and (in a less degree) to those of his contemporary, Thomas Rowlandson (1756-1827), an artist of great and varied powers, that historians must turn for the popular reflection of all the political notabilia of the end of the 1 8th and the beginning of the 19th centuries. England may be said to have been the chosen home of caricature during this period. In France, timid and futile under the Monarchy, it had assumed an immense importance under the Revolution, and a cloud of hideous pictorial libels was the result; but even the Revolution left no such notes through its own artists, though Fragonard (1732-1806) himself was of the number, as came from the gravers of Gillray and Rowlandson. In Germany caricature did not exist. Only in Spain was there to be found an artist capable of entering into competition with the masters of the satirical grotesque of whom England could boast. The works of Francesco Goya y Lucientes (1746-1828) are described by Theophile Gautier as ” a mixture of those of Rembrandt,

Watteau, and the comical dreams of Rabelais,” and Champfleury

discovers analogies between him and Honore Daumier, the greatest caricaturist of modern France.

The satirical grotesque of the 18th century had been characterized by a sort of grandiose brutality, by a certain vigorous obscenity, by a violence of expression and intention, that appear monstrous in these days of reserve and restraint, but that doubtless sorted well enough with the strong party feelings and fierce political passions of the age. After the downfall of Napoleon (181 5), however, when strife was over and men were weary and satisfied, a change in matter and manner came over the carica- ture of the period. In connection with this change, the name of George Cruikshank (1792-1878), an artist who stretches hands on the one side towards Hogarth and Gillray, and on the other towards Leech and Tenniel, deserves honourable mention. Those of Cruikshank's political caricatures which were designed for the squibs of William Hone (1779-1842) are, comparatively speaking, uninteresting; his ambition was that of Hogarth — the production of " moral comedies." Much of his work, there- fore, may be said to form a link in the chain of development through which has passed that ironical genre to which reference has already been made. In 1829, however, began to appear the famous series of lithographs, signed H. B., the work of John Doyle (1798-1868). These jocularities are interesting otherwise than politically; thin and weakly as they are, they inaugurated the style of later political caricature. In France, meanwhile, with the farcical designs of Edme Jean Pigal (b. 1794) and the realistic sketches of Henri Monnier (1805-1872), the admirable portrait-busts of Jean Pierre Dantan the younger (1800-1869) and the fine military and low-life drolleries of Nicolas Toussaint Charlet (1792-1845) were appearing. Up to this date, though journalism and caricature had sometimes joined hands (as in the case of the Craftsman and the Anti-Jacobin, and particularly in Les Revolutions de France et de Brabant and Les Actes des Apdtres), the alliance had been but brief; it was reserved for Charles Philipon (1802-1862), who may be called the father of comic journalism, to make it lasting. The foundation of La Caricature, by Philipon in 1831, suppressed in 1835 after a brief but glorious career, was followed by Le Charivari (December 1832), which is perhaps the most jenowned of the innumerable enterprises of this extraordinary man. Among the artists he assembled round him, the highest place is held by Honore Daumier (1808-1879), a draughtsman of great skill, and a caricaturist of immense vigour and audacity. Another of Philipon's band was Sulpice Paul

Chevalier (1801-1866), better known as Gavarni, in whose hands modern social caricature, advanced by Cruikshank and Charlet, assumed its present guise and became elegant. Mention must also be made of Grandville (J. I. I. Gerard) (1803-1847), the illustrator of La Fontaine, and a modern patron of the medieval skeleton; of Charles Joseph Travies de Villers, the father of the famous hunchback ” Mayeux “; and of Amedee de Noe, or ” Cham,” the wittiest and most ephemeral of pictorial satirists. In 1840 the pleasantries of ” H. B. ” having come to an end, there was founded, in imitation of this enterprise of Philipon, the comic journal which, under the title of Punch, or the London Charivari, has since become famous all over the world. Among its early illustrators were John Leech (1817-1864) and Richard Doyle (1824-1883), whose drawings were full of the richest grotesque humour.

In 1862 Carlo Pellegrini, in Vanity Fair, began a series of portraits of public men, which may be considered the most remarkable instances of personal caricature in England.

For the later developments of caricature, it is convenient to take them by countries in the following sections : —

Great Britain. — During the later 19th century the term caricature, somewhat loosely used at all times, came gradually to cover almost every form of humorous art, from the pictorial wit and wisdom of Sir John Tenniel to the weird grotesques of Mr S. H. Sime, from the eay pleasantries of Randolph Caldecott to the graceful but sedate fancies of Mr Walter Crane. It is made to embrace alike the social studies, satirical and sympathetic, of Du Maurier and Keene, the political cartoons of Mr Harry Furniss and Sir F. C. Gould, the unextenuating likenesses of ” Ape,” and ” Spy,” and ” Max,” the

subtle conceits of Mr Linley Sambourne, the whimsicalities of Mr E. T. Reed, the exuberant burlesques of Mr J. F. Sullivan, the frank buffooneries of W. G. Baxter. Of these diverse forms of graphic humour, some have no other object than to amuse, and therefore do not call for serious notice. The work of Mr Max Beerbohm (” Max “) has the note of originality and extravagance too; while that of ” Spy ” (Mr Leslie Ward) in Vanity Fair, if it

does not rival the occasional brilliancy of his predecessor ” Ape ” (Carlo Pellegrini, 1839-1889), maintains a higher average of merit. The pupil, too, is much more genial than the master, and he is content if his pencil evokes the comment, ” How ridiculously like!” Caricature of this kind is merely an entertainment. Here we are concerned rather with those branches of caricature which, merrily or mordantly, reflect and comment upon the actual life we live. In treating of recent caricature of this kind, we must give the first place to Punch. Mr Punch’s outlook upon life has not changed much since the ‘seventies of the last century. His influence upon the tone of caricature made itself felt most appreciably in the days of John Leech and Richard Doyle. Their successors but follow in their steps. In their work, says a clever German critic, is to be found no vestige of the ” sour bilious temper of John Bull ” that pervaded the pictures of Hogarth and Rowlandson. Charles Keene (1823-1891) and Du Maurier (1834- 1896), he declares, are not caricaturists or satirists, but amiable and tenderly grave observers of life, friendly optimists. The characterization is truer of Keene, perhaps, than of Du Maurier. Charles Keene’s sketches are almost always cheerful ; almost without exception they make you smile or laugh. In many of Du Maurier’s, on the other hand, there is an underlying serious- ness. While Keene looks on at life with easy tolerance, an amused spectator, Du Maurier shows himself sensitive, emotional, sym- pathetic, taking infinite delight in what is pretty and gay and charming, but hurt and offended by the sordid and the ugly. Thus while Keene takes things dispassionately as they come, seeing only the humorous side of them, we find Du Maurier ever and anon attacking some new phase of snobbishness or philistinism or cant. For all his kindliness in depicting congenial scenes, he is at times as unrelenting a satirist as Rowlandson. The other Punch artists, whose work is in the same field, resemble Keene in this respect rather than Du Maurier. Mr Leonard Raven-Hill recalls Charles Keene not merely in temperament but in technique; like Keene, too, he finds his subjects principally in bourgeois life. Mr J. Bernard Partridge, though, like Du Maurier, he has an eye for physical beauty, is a spectator rather than a critic of life, yet he has made his mark as a ” cartoonist.” Phil May (d. 1903), a modern Touch- stone, is less easily classified. Though he wears the cap and bells, he is alive to the pity of things ; he sees the pathos no less than the humour of his street-boys and ” gutter-snipes.” He is, however, a jester primarily: an artist, too, of high achievement. Two others stand out as masters of the art of social

caricature — Frederick Barnard and Mr J. F. Sullivan. Barnard's illustrations to Dickens, like his original sketches, have a lively humour — the humour of irrepressible high spirits — and endless invention. High spirits and invention are characteristics also of Mr Sullivan. It is at the British artisan and petty tradesman — at the grocer given to adulteration and the plumber who outstays his welcome — that he aims his most boisterous fun. He rebels, too, delightfully, against red tape and all the petty tyrannies of officialdom. In political caricature Sir John Tenniel (q.v.) remained the leading artist of his day. The death of Abraham Lincoln, Bismarck's fall from power, the tragedy of Khartum — to subjects such as these, worthy of a great painter, Tenniel has brought a classic simplicity and a sense of _ dignity unknown previously to caricature. It is hard to say in which field Tenniel most excels — whether in those ingenious parables in which the British Lion and the Russian Bear, John Chinaman, Jacques Bonhomme and Uncle Sam play their part — or in the ever-changing scenes of the great parliamentary Comedy — or in sombre dramas of Anarchy, Famine or Crime — or in those London extravaganzas in which the symbolic personalities of Gog and Magog, Father Thames and the Fog Fiend, the duke of Mudford and Mr Punch himself, have become familiar. Subjects similar to these have been treated also for many years by Mr Linley Sambourne in his fanciful and often beautiful designs. In the field of humorous portraiture also, as in cartoon-designing, Mr Sambourne has made his mark, and he may be said almost to have originated, in a small.way, that practice of illustrating the doings of parliament with comic sketches in which Mr Furniss, Mr E. T. Reed and Sir F. C. Gould were his most notable successors. Mr Furniss satirized the Royal Academy as effectively as the Houses of Parliament, but he has been above all the illustrator of parliament — the creator of Mr Gladstone's collars, the thief of Lord Randolph Churchill's inches, the immortalizer of so many otherwise obscure politicians who has worked the House of Commons and its doings into so many hundreds of eccentric designs. But Mr Furniss was never, like Sir F. C. Gould (of the Westminster Gazette), a politician first and a caricaturist afterwards. Gould is an avowed partisan, and his caricatures became the most formidable weapons of the Radical party. Caustic, witty and telling, not specially well drawn, but drawn well enough — the likenesses un- failingly caught and recognizable at a glance — his " Picture Politics " won him a place unique in the ranks of caricaturists. There is no evidence of such strenuousness in the work of Mr E. T. Reed (of

Punch). In his parliamentary sketches, as in his ” Animal Land ” and ” Prehistoric Peeps,” Mr Reed is a wholly irresponsible humorist and parodist. One finds keen satire, however, in those ” Ready- made Coats of Arms,” in which he turned at once his heraldic lore and his insight into character to excellent account. In his more serious picture in which he has drawn a parallel between the tricoteuses awaiting with grim enjoyment the fall of the guillotine and those modern English gentlewomen who flock to the Old Bailey as to the play, we have the true Hogarthian touch. Mr Gunning King, Mr F.H.Townshend, Mr C. E. Brock, Mr Tom Browne, are among the younger humorists who have advanced to the front rank. Though there have been some notable competitors with Punch, there has never been a really ” good second.” In Matt Morgan the Tomahawk (1865-1867) could boast an original cartoonist after Tenniel’s style, but without Tenniel’s power and humour. Morgan’s Tomahawk cartoons gained in effect from an ingenious method of printing in two colours. In Fred Barnard, W. G. Baxter, and Mr J. F. Sullivan, Judy (founded in 1867) possessed a trio of pictorial humorists of the first rank, and in W. Bowcher a political cartoonist thoroughly to the taste of those hot and strong Conservatives to whom Punch’s faint Whiggery was but Radicalism in disguise. His successor, Mr William Parkinson, was not less loyal to Tory ideas, though more urbane in his methods. Fun has had cartoonists of high merit in Mr Gordon Thomson and in Mr John Proctor, who worked also for Moonshine (founded in 1879, now extinct). Moonshine afterwards enlisted the services of Alfred Bryan, to whose clever pencil the Christmas number of the World was indebted for many years. Ally Sloper, founded in 1884, is notable only as the widely circulated medium for W. G. Baxter’s wild humours, kept up in the same spirit by Mr W. F. Thomas, his successor. Pick-me-up could once count a staff which rivalled at least the social side of Punch; Mr Raven-Hill, Phil May, Mr Maurice Greiffenhagen and Mr Dudley Hardy all contributed in their time to its sprightly pages, while Mr S. H. Sime made it the vehicle for his ” squint-brained ” imaginings. The’Will o’ the Wisp, the Butterfly and the Unicorn, kindred ventures, though on different lines, all met with an early death. Lika Joko, founded in 1894 by Mr Harry Furniss, who in that year abandoned Punch, and afterwards Fair Game, were also short-lived. To this brief list of purely comic or satirical journals should be added the names of several daily and weekly publications — and among monthlies the Idler, with its caricatures by Mr Scott Rankin, Mr Sime and Mr Beerbohm — which have made a special feature of humorous

art. Among these are the Graphic, whose Christmas numbers were first brightened by Randolph Caldecott; the Daily Graphic, enlivened sometimes by Phil May and Mr A. S. Boyd ; Vanity Fair, with its grotesque portraits; Truth, to whose Christmas numbers Sir F. C. Gould contributed some of his best and most ambitious work, printed in colours; the Sketch, with Phil May and others; Black and White, with Mr Henry Meyer; the Pall Mall Gazette, first with Sir F. C. Gould, and later with Mr G. R. Halkett. The St Stephen's Review, whose crudely powerful cartoons, the work of Tom Merry, were so popular, ceased publication in 1892. A tribute should be paid in conclusion to the coloured cartoons of the Weekly Freeman and other Irish papers, often remarkable for their humour and talent. (See also Cartoon and Illustration.)

France. — In that peculiar branch of art which is based on irony, fun, oddity and wit, and in which Honore Daumier (1808-1879), next to " Gavarni " (1804-1866), remains the undisputed master, France— as has already been shown — can produce an unbroken series of draughtsmen of strong individuality. Though " Cham " died in 1879, Eugene Giraud in 1881, " Randon " in 1884, " Andre Gill " in 1885, " Marcelin " in 1887, Edouard de Beaumont in 1888, Lami in 1891, Alfred Grevin in 1892, and " Stop " in 1899, a new group arose under the leadership of " Nadar " (b. 1820) and Etienne Carjat (b. 1828). Mirthful or satirical, and less philosophical than of yore, neglecting history for incident, and humanity for the puppets of the day, their drawings, which illustrate daily events, will perpetuate the manner and anecdotes of the time, though the illustra- tions to newspapers, or prints which need a paragraph of explanation, show nothing to compare with the Propos de Thomas Virelocque by " Gavarni." Quantity perhaps makes up for quality, and some of these artists deserve special mention. " Draner " (b. 1833) and " Henriot " (b. 1857) are journalists, carrying on the method first introduced by " Cham " in the Vnivers Illustre: realistic sketches, with no purpose beyond the droll illustration of facts, amusing at the time, but of no value to the print-collector. M. J. L. Forain, born at Reims in 1852, studied at the Ecole des Beaux Arts under Jean Leon Ger6me and J. B. Carpeaux. He first worked for the Courrier Francais in 1887, and afterwards for Figaro; he was then drawn into the polemical work of politics. Though he has created some great types of flunkeydom, the explanatory story is more to him than the picture, which is often too sketchy, though masterly. Reduced reproductions of his work have been issued in volumes, a common form of popularity never attempted with Daumier's

fine lithographs. M. A. L. Willette, born at Chalons-sur-Marne in 1857, a son of Colonel Willette, the aide-de-camp to Marshal Bazaine, worked for four years in Alexandre Cabanel's studio, and so gained an artistic training which alone would have distinguished him from his fellows, even without the delightful poetical fancy and Watteau- like grace which are somewhat unexpected amid the ugliness of

modern life. His work has the value, no doubt, of deep and various meaning, but it has also intrinsic artistic worth. M. Willette is, in fact, the ideal delineator of the more voluptuous and highly spiced aspects of contemporary life. " Caran d'Ache," a native of Moscow, born in 1858, borrowed from the German caricaturists — mainly from W. Busch — his methods of illustrating " a story without words." He makes fun even of animals, and is a master of canine physiog- nomy. His simple and unerring outline is a method peculiarly his own; now and again his wit rises to grandiloquence, as in his Bellona, rushing on an automobile through massacre and con- flagrations, and in his Itpopee (Epic) of shadows thrown on a sheet. Among his followers may be included A. Guillaume and Gerbault. M. C. L. Leandre, born at Champsecret (Orne), in 1862, is, like "Andre Gill," a draughtsman of monstrosities; he can get a perfect likeness of a face while exaggerating some particular feature, gives his figure a hump-back, as Dantan did in his statuettes, and has a facial dexterity which sometimes does scant justice to his very original wit. At the same time he has a true sense of beauty. M. Theophile A. Steinlen, born at Lausanne in 1859, went to Paris in 1 88 1. He should be studied in his illustrations to Bruant. He knows the inmost core of the Butte-Montmartre, and depicts it with realistic and brutal relish. M.Albert Robida,born at Compiegne in 1848, collaborated with Decaux in 1871 to found La Caricature; he is a paradoxical seer of the possible future and a curiosity-hunter of the past. Old Paris has no secrets from him ; he knows all the old stones and costumes of the middle ages, and has illustrated Rabelais ; and for fertility of fancy he reminds us of Gustave Dore, but with a sense of movement so vibrant as to be almost distressing. " Bac," born at Vienna in 1859, has infused a strain of the Austrian woman into the Parisienne ; representing her merely as a pleasure- and love-seeking creature, as the toy of an evening, he has recorded her peccadilloes, her witcheries and

her vices. Others who have shot folly, as it flies are M. Albert Guillaume, who illustrated the Exhibi- tion of 1900 in a series of remarkable silhouettes; ” Mars “; ” Henri Somm”; Gerbault; and Griin. M. Huard depicts to perfection the country townsfolk in their elementary psychology. M. Hermann Paul, M. Forain’s not unworthy successor on the Figaro, is a cruel satirist, who in a single face can epitomize a whole class of society, and could catalogue the actors of the comedie humaine in a series of drawings. M. Jean Veber loves fantastic subjects, the gnomes of fairy-tales and myths ; but he has a biting irony for contemporary history, as in the Butcher’s Shop, where Bismarck is the blood-stained butcher. M. Abel Faivre, a refined and charming painter, is a whimiscal humorist with the pencil. He shows us monstrous women, fabulously hideous, drawing them with a sort of realism which is droll by sheer ugliness. Henri de Toulouse-Lautrec startles us by extraordinary dislocations, scrawled limbs and inexplicable anatomy; he has left an inimitable series of sketches of Mme Yvette Guilbert when she was at her thinnest. M. Felix Vallotton reproduces crows in blots of black with a Japanese use of the brush. M. G. Jeanniot, a notable illustrator, sometimes amuses himself by contributing to Le Rire, Le Sourire, Le Pompon, L’Assiette au Beurre, &c, drawing the two types he most affects: the fashionable world and soldiers. M. Ibels, Capiello and many more might be enumerated, but it is impossible to chronicle all the clever humorous artists of the illustrated papers.

It is the frequent habit of French caricaturists to employ a nom-de-guerre. We therefore give here a list of the genuine names represented by the pseudonyms used above, together with others familiar to the public :—

Piff ”

” Andre Gill ” ” Bac (” Cab

” Saro “) . . . ” Caran d’Ache ” ” Cham ” ... “Crafty” . . . ” Draner ” (and ” Paf ” Faustin “... ” Gavarni “... ” Gedeon “... ” Grandville ” ” Henriot” (and ” Henri Somm ” “Job” . . ” Marcelin ” . ” Mars ” . ” Moloch ” . ” Montbard ” ” Nadar ” ” Pasquin ” ” Pepin ” ” Randon ” . “Sahib” . . ” Said ” . . ” Sem ” . . ” Stop ” . .

and

= L. A. Gosset de Guine (1840-1885).

= Ferdinand Bach (b. 1859).

= Emmanuel Poire.

= Comte Amedee de Noe (b. 1818).

= Victor Gerusez (b. 1840).

= Jules Renard (b. 1833).

= Faustin Betbeder (b. 1847).

= S. G. Chevalier (1804-1866).

= Gedeon Baril (b. 1832).

= J. I. I. Gerard (1803-1847).

= Henri Maigrot (b. 1857).

= Henri Sommier (b. 1844).

=J. O. de Breville (b. 1858).

= fimile Planat (1825-1887).

= Maurice Bonvoisin (b. 1849).

= Colomb (b. 1849).

= C. A. Loye (1841-1905).

= Felix Tournachon (b. 1820).

= Georges Coutan (b. 1853).

= Ed. Guillaume (b. 1842).

= Gilbert (1814-1845).

= L. E. Lesage (b. 1847).

= Alphonse Levy (b. 1845).

= George Goursat.

= L. P. Morel-Retz (b. 1825).

Germany. — During the later 19th century German caricature flourished principally in the comic papers Kladderadatsch of Berlin and Fliegende Blatter of Munich; the former a political paper with

little artistic value, in which the ideas alone are clever, whilst the illustrations are merely a more or less clumsy adjunct to the text, while the Fliegende Blatter, on the contrary, has artistic merit as well as wit. Wilhelm Busch (b. 1832), the most brilliant German draughtsman of the last generation, made his debut with an illustrated poem " The Peasant and the Miller," and won a world-wide reputa- tion with the following works: Pater Filucius, Die Fromme Helene, Max und Moritz, Der heilige Antonius, Maler Kleksel, Balduin Bdhlamm, Die Erlebnisse Knopps des Junggesellen. Busch stands alone among the caricaturists of his nation, inasmuch as he is both the author and the illustrator of these works, his witty doggerel supplying Germany with household words. The drawings that accompany the text are amazing for the skill and directness with which he hits the vital mark. A flourish or two and a few touches are enough to set before us figures of intensely comical aspect. This distinguishes Busch from Adolf Oberlander (1845), who became the chief draughtsman on Fliegende Blatter. Busch's drawings would have no meaning apart from the humorous words. Oberlander works with the pencil only. Men, animals, trees, objects, are en- dowed by him with a mysterious life of their own. Without the help of any verbal joke, he achieves the funniest results simply by seeing and accentuating the comical side of everything. His drawings are caricature in the strict sense of the word, its principle being the exaggeration of some natural characteristic. The new generation of contributors to Fliegende Blatter do not work on these lines. Busch and Oberlander were both offshoots of the romantic school; they made fun of modern novelties. Hermann Schlittgen, Meggendorfer, H. Vogel-Plauen, Rene Reinicke, Adolf Hengeler and Fritz Wahle are the sons of a self-satisfied time, triumphing in its own chic, elegance and grace; hence they do not parody what they see, but simply depict it. The wit lies exclusively in the text ; the illustrations aim merely at a direct representation of street or drawing-room scenes. It is this which gives to Fliegende Blatter its value as a pictorial record of the history of German manners. Its pages are a permanent authority on the subject for those who desire to see the social aspects of Germany during the last quarter of the 19th century onwards. At the same time a f alling-off inthe.brilliancy of this periodical was

perceptible. Its fun became domestic and homely; it has faithfully adhered to the old technique of wood- engraving, and made no effort to keep pace with the modern methods of reproduction. German caricature, to live and flourish, was not keeping pace with the development of the art ; it had to take into its service the gay effects of colour, and derive fresh inspiration from the sweeping lines of the ornamental draughtsman. This led to the appearance of three new weekly papers : Jugend, Das Narren-schiff and Simplicissimus. Jugend, started in 1896 by Georg Hirth in Munich, collected from the first a group of gifted young artists, more especially Thony, Bernhard Pankok and Julius Diez, who based their style on old German wood-engraving; Fidus, who lavished the utmost beauty of line in unshaded pen-and-ink work; Rudolf Wilke, whose grotesques have much in common with Forain's clever drawings; Angelo Jank and R. M. Eichler, who work with a delightful bonhomie. Among the draughtsmen on the Narrenschiff (The Ship of Fools), Hans Baluschek is worthy of mention as having made the types of Berlin life all his own ; and while this paper gives us for the most part inoffensive satire on society, Simplicissimus, first printed at Munich and then at Zurich, under the editorship of Albert Langen, shows a marked Socialist and indeed Anarchist tendency, subjecting to ridicule and mockery everything that has hitherto been held as unassailable by such weapons; it reminds us of the scathing satire of Honore Daumier in La Caricature at the time of Louis Philippe. Thomas Theodor Heine (1867) is unsurpassed in this style for his power of expression and variety of technique. We must admire his delicate draughtsmanship, or again, his drawing of the figure with the heavy line of heraldic ornament, and his broad and monumental grasp of the grotesque. His laughter is often insolent, but he is more often the preacher, scourge in hand, who ruthlessly unveils all the dark side of life. Next to him come Paul, an incomparable limner of student life and the manners and customs of the Bavarian populace; E. Thony, a wonderfully clever cari- caturist of the airs and assumption of the Prussian Junker and the Prussian subaltern; J. C. Eugh and F. von Regnieck, who make fun of the townsman and political spouter in biting and searching satire. The standard of caricature is at the present time a high one in Germany; indeed, the modern adoption of the pen-line, which has arisen since the impressionists in oil-painting repudiated line, had its origin in the influence of caricature.

United States. — The proverbial irreverence of the American

mind even towards its most cherished personages and ideals has made it particularly responsive to the appeal of caricature. At first an importation, it developed but slowly; then it burst into luxuriant growth, sometimes exceeding the limits of wise and careful cultiva- tion. In the early period of American caricature, almost the only native is F. O. C. Darley (1822-1888), an illustrator of some im- portance; the other names include the engraver Paul Revere (chiefly famous for a picturesque exploit in the War of Independence) ; a Scotsman, William Charles; the Englishmen, Matt Morgan and E. P. Bellew; and the Germans, Thomas Nast and Joseph Keppler.

The name of Thomas Nast overshadows and sums up American political caricature. Nast, who was born in Bavaria in 1840, was

brought to America at the age of six; and his training and all his interests were strongly American. At fourteen he was an illustrator on Leslie's Weekly, and was sent at twenty to England to illustrate the famous Sayers-Heenan prize-fight. He then went as recorder of Garibaldi's campaign of i860. He returned to America known only as an illustrator. The Civil War did not awaken his latent genius till 1864, when he published a cartoon of fierce irony against the political party which opposed Lincoln's re-election and advocated peace measures with the Southern confederacy. This cartoon not only made Nast famous, but may be said to contain the germ of American caricature; for all that had gone before was too crude in technique to pass muster even as good caricature.

The magnificent corruption of Tammany Hall under the leader- ship of William M. Tweed, the first of the great municipal"' bosses," gave Nast a subject worth attacking. Siegfried, earnest but light- hearted, armed with the mightier sword of the pen of ridicule, assailed the monster ensconced in his treasure-cave, and after a long battle won a brilliant victory. Nast did not always rely on a mere picture to carry his thrust ; often his cartoon consisted of only a minor figure or two looking at a large placard on which a long and poignantly-worded attack was delivered in cold type. At other times the most ingenious pictorial subtlety was displayed. This long series sounds almost the whole gamut of caricature, from downright ridicule to the most lofty

denunciation. A very happy device was the representation of Tweed's face by a money-bag with only dollar marks for features, a device which, strangely enough, made a curiously faithful likeness of the " boodle "loving despot. When, finally, Tweed took to flight, to escape imprisonment, he was recog nized and caught, it is said, entirely through the wide familiarity given to his image in Nast's cartoons.

When Nast retired from Harper's Weekly, he was succeeded by Charles Green Bush (born 1842; died 1909). With even greater technical resources, he poured forth a series of cartoons of remarkable evenness of skill and interest; he soon left weekly for daily journalism. He never won, single-handed, such a battle as Nast's, but his drawings have a more general, perhaps a more lasting interest. When he left Harper's Weekly he was succeeded by W. A. Rogers, who composed many ingenious and telling cartoons.

The vogue which, through Nast, Harper's Weekly gave to caricature, prepared the way for the first purely comic weekly paper, Puck, founded by two Germans, and for long published in a German as well as an English edition — a journal which has cast its influence generally in favour of the Democratic party. It is worth noting that not only the founders "but the spirit of American caricature have been rather German than English, the American comic papers more closely resembling Fliegende Blatter, for example, than Punch. One of the founders of Puck was Joseph Keppler (1838-1894), long its chief caricaturist.

The Republican party soon found a champion in Judge, a weekly satirical paper which resembles Puck closely in its crudely coloured pages, though somewhat broader and less ambitious in the spirit and execution of its black-and-white illustrations. These two papers have kept rather strictly to permanent staffs, and have furnished the opening for many popular draughtsmen, such as Bernhard Gillam (d. 1896), and his brother, Victor; J. A. Wales (d. 1886); E. Zimmerman, whose extremely plebeian and broadly treated types often obscure the observation and Falstaffian humour displayed in them ; Grant Hamilton ; Frederick Opper, for many years devoted to the trials of suburban existence, and later concerned_ in combating the trusts; C. J. Taylor, a graceful technician; H. Smith ; Frank A. Nankivell, whose pretty athletic girls are prone to attitudinizing; J. Mortimer Flagg; F. M. Howarth; Mrs Frances O'Neill Latham, whose personages are singularly well modelled and alive; and

Miss Baker Baker, a skilful draughtswoman of animals.

A stimulus to genuine art in caricature was given by the establish- ment (1883) of the weekly Life, edited by J. A. Mitchell, a clever draughtsman as well as an original writer. It is to this paper that America owes the discovery and encouragement of its most remark- able artist humorist, Charles Dana Gibson, whose technique has developed through many interesting phases from exceeding delicacy to a sculpturesque boldness of line without losing its rich texture, and without becoming monotonous. Mr Gibson is chiefly beloved by his public for his almost idolatrous realizations of the beautiful American woman of various types, ages and environments. _ His works are, however, full of the most subtle character-observations, and American men of all walks of life, and foreigners of every type, impart as much importance and humour to his pages as his ” Gibson girls ” give radiance. His admitted devotion to Du Maurier, in reverence for the beautiful woman beautifully attired, has led some critics to set him down as a mere disciple, while his powerful indi- viduality has led others to accuse him of monotony; but a serious examination of his work has seemed to reveal that he has gone beyond the genius of Du Maurier in sophistication, if not in variety, of subjects and treatment. As much as any other artist Mr Gibson has studiously tried new experiments in the new fields opened by modernized processes of photo-engraving, and has been an important influence in both English and American line-illustration.

Among other students of society, particular success has been achieved by C. S. Reinhart (1844-1896), Charles Howard Johnson (d. 1895), H. W. M’Vickar, S, W. van Schaick, A. E. Sterner, W. H.

Hyde, W. T. Smedley and A. B. Wenzell, each of them strongly individual in manner and often full of verve and truth.

Life, and other comic papers, including for many years Truth, also brought forward caricaturists of distinct worth and a marked tendency to specialization. F. E. Atwood (d. 1900) was ingenious in cartoons lightly allegorical ; Oliver Herford has shown a fascina- tion elusive of analysis in his drawings as in his verse ; T. S. Sullivant has made a quaintly intellectual application of the old-world devices of large heads, small bodies, and the like ; Peter Newell has developed individuality both in treatment and in humour; E. W. Kemble is noteworthy among the exploiters of negro life; and H. B. Eddy, Augustus Dirk, Robert L. Wagner, A.

Anderson, F. Sarka and J. Swinnerton have all displayed marked individuality.

In distinction from the earlier period, the modern school of American caricature is strongly national, not only in subject, but in origin, training and in mental attitude, exception being made of a few notable figures, such as Michael Angelo Woolf, born in England, and of a somewhat Cruikshankian technique. He came to America while young, and contributed a long series of what may be called slum-fantasies, instinct alike with laughter and sorrow, at times strangely combining extravagant melodrama with a most plausible and convincing impossibility. His drawings must always lie very close to the affections of the large audience that welcomed them. American also by adoption is Henry Mayer, a German by birth, who has contributed to many of the chief comic papers of France, England, Germany and America.

Entirely native in every way is the art of A. B. Frost (b. 1851), a prominent humorist who deals with the life of the common people. His caricature (he is also an illustrator of versatility and importance) is distinguished by its anatomical knowledge, or, rather, anatomical imagination. Violent as the action of his figures frequently is, it is always convincing. Such triumphs as the tragedy of the kind- hearted man and the ungrateful bull-calf; the spinster's cat that ate rat poison, and many others, force the most serious to laughter by their amazing velocity of action and their unctuousness of ex- pression. Frost is to American caricature what " Artemus Ward " has been to American humour, and his field of publication has been chiefly the monthly magazine.

The influence of the weekly periodicals has been briefly traced. A later development was the entrance of the omnivorous daily newspaper into the field of both the magazine and the weekly. For many years almost every newspaper has printed its daily car- toon, generally of a political nature. Few of the cartoonists have been able to keep up the pace of a daily inspiration, but C. G. Bush has been unusually successful in the attempt. Yet an occasional success atones for many slips, and the cartoonists are known and eagerly watched. The most influential has doubtless been Homer C. Davenport, whose slender artistic resources have been eked out by a vigour and mercilessness of assault rare even in American annate. He has a Rabelaisian complacency and skill in making a portrait magnificently repulsive, and his caricatures are a vivid example 6f the school of cartoonists who believe in

slashing rather than merely prodding or tickling the object of attack. Charles Nelan (1859-1904) frequently scored, and in the wide extent of the United States one finds keen wits busily assailing the manifold evils of life. Noteworthy among them are: Thos. E. Powers, H. R. Heaton, Albert Levering, Clare Angell and R. C. Swayne.

Scandinavia. — Caricature flourishes also in the Scandinavian countries, but few names are known beyond their borders. Professor Hans Tegner of Denmark is an exception ; his illustrations to Hans Andersen (English edition, 1900) have carried his name wherever that_ author is appreciated, yet his reputation was made in the Danish Punch, which was founded after the year 1870 but has long ceased to exist. Alfred Schmidt and Axel Thiess have contributed notable sketches to Puk and its successor Klockhaus, but in point of style they scarcely carry on the tradition of their predecessor, Fritz Jiirgensen. Among humorous artists of Norway, Th. Kittelsen perhaps holds the leading place, and in Sweden, Bruno Liljefors, best known as a brilliant painter of bird life.

Bibliography. — Rules for Drawing Caricature, with an Essay on Comic Painting, by Francis Grose (8vo, London, 1788) ; Historical Sketch of the Art of Caricaturing, by J. Peller Malcolm (4to, London, 1 8 13) ; History of Caricature and Grotesque in Literature and Art, by Thomas Wright (8vo, London, 1865) ; Musee de la caricature, by Jaime; (a) Histoire de la caricature antique; (b) Histoire de la caricature au moyen age et sous la renaissance; (c) Histoire de la caricature sous la reforme et la ligue; (d) Histoire de la caricature sous la republique, V empire, et la restauration; (e) Histoire de la caricature moderne (5 vols.), by Champfleury (i.e. Jules Fleury), (8vo, Paris) ; Le Musee secret de la caricature, by Champfleury (i.e. Jules Fleury), (8vo, Paris); L' Art du rire et de la caricature, by Arsene Alexandre (8vo, Paris); Caricature and other Comic Art, by James Parton (sm. 4to, New York, 1878) ; Le Miroir de la vie: la Caricature, by Robert de la Sizeranne (8vo, Paris, 1902), (tracing the aesthetic development of the art and spirit of caricature) ; La Caricature d, travers les siecles, by Georges Veyrat (4to, Paris) ; La Caricature et les caricaturistes, by Emile Bagaud (with a preface by Ch. Leandre), (fo., Paris); Le Rire et la caricature, by Paul Gaultier (with a preface by Sully Prudhomme), (8vo, Paris, 1906), (a work of originality, dwelling not only on the aesthetic but on the essentially

pessimistic side of satiric art) ; English Caricaturists and Graphic Humorists of the Nineteenth Century, by Graham Everitt {i.e. William Rodgers Richardson), (4to, London, 1886), (a careful and interesting survey) ; La Caricature en Angleterre, by Augustin Filva (8vo, Paris, 1902), (an able criticism from the point of view of psycho-sociology) ; The History of Punch, by M. H. Spielmann (8vo, London, 1895), (dealing with caricature art of England during the half-century covered by the book) ; Magazine of Art, passim, for biographies of English caricaturists — ” Our Graphic Humorists “; Social Pictorial Satire, by George du Maurier (i2mo, London, 1898); Les Mxurs et la caricature en France, by J. Grand-Carteret (8vo, Paris, 1885) ; La Caricature et Vhumeur frangais au XIX’ siecle, by Raoul Deberdt (8vo, Paris) ; Les Maitres de la caricature francaise en XIX’ siecle, by Armand Dayot (Paris) ; Nos humoristes, by Ad. Brisson (4to, Paris, 1900); Les Mxurs et la caricature en Allemagne, &c, by J. Grand-Carteret (8vo, Paris, 1885). See also biographies of Charles Keene, H. Daumier, John Leech, &c, indicated under those names. (M. H. S.)

CARIGARA, a town of the province of Leyte, island of Leyte, Philippine Islands, on Carigara Bay, 22 m. W. of Tacloban, the capital. Pop. (1903) 19,488, including that of Capoocan (3106), annexed to Carigara in the same year. Carigara is open to coast trade, exports large quantities of hemp, raises much rice, and manufactures cotton and abaca fabrics. It also has important fisheries.

CARIGNANO, a town of Piedmont, Italy, in the province of Turin, 1 1 m. S. by steam tramway from the town of Turin. Pop. (1901) town, 4672, commune, 7104. It has a handsome church (S. Giovanni Battista) erected in 17 56-1 766 by the architect Benedetto Alfieri di Sostegno (1700-1767), uncle of the poet Alfieri. S. Maria delle Grazie contains the tomb of Bianca Palaeologus, wife of Duke Charles I. of Savoy, at whose court Bayard was brought up. The town passed into the hands of the counts of Savoy in 1418.

Carignano was erected by Charles Emmanuel I. of Savoy into a principality as an appanage for his third son, Thomas Francis (1596-1656), whose descendant, Charles Albert, prince of Carignano, became king of Sardinia on the extinction of the elder line

of the house of Savoy with the death of Charles Felix in 1831. The house of Carignano developed two junior branches, those of Soissons and Villafranca. The first of these, which became extinct in 1734, was founded by Eugene Maurice, second son of Thomas, by his wife Marie de Conde, countess of Soissons, who received his mother's countship as his appanage. In 1662 the town of Yvois in the Ardennes was raised by Louis XIV. into a duchy in his favour, its name being changed at the same time to Carignan. The famous Prince Eugene was the second son of the first duke of Carignan. The branch of Villafranca started with Eugene Marie Louis (d. 1785), second son of Louis Victor of Carignano, whose grandson Eugene (1816-1888), afterwards an admiral in the Italian navy, was created prince of Savoy- Carignano, by King Charles Albert in 1834. He had contracted a morganatic marriage, and in 1888, on the occasion of his silver wedding, the title of countess of Villafranca was bestowed upon his wife, his eldest son, Filiberto, being at the, same time created count of Villafranca, and his younger son, Vittorio, count of Soissons.

CARILLON, an arrangement for playing tunes upon a set of bells by mechanical means. The word is said to be a Fr. form of Late Lat. or Ital. quadriglio, a simple dance measure on four notes or for four persons (Lat. quattuor) ; and is used sometimes for the tune played, sometimes (and more commonly in England) for the set of bells used in playing it. The earliest medieval attempts at bell music, as distinct from mere noise, seem to have consisted in striking a row of small bells by hand with a hammer, and illustrations in MSS. of the 12th and 13th centuries show this process on three, four or even eight bells. The introduction of mechanism in the form either of a barrel (see Barrel-Organ) set with pegs or studs and revolving in connexion with the machinery of a clock, or of a keyboard struck by hand {carillon a clavier), made it possible largely to increase the number of bells and the range of harmonies. In Belgium, the home of the carillon the art of the carillonneur was at one time brought to great perfection and held in high esteem (see Bell); but even there it is gradually giving way to mechanism. In England

manual skill has never been much employed, though keyboards on the continental model have been introduced, e.g. at the Manchester town hall, at Eaton Hall, and elsewhere; carillon music being mainly confined to hymn tunes at regular intervals (generally three hours), or chimes at the hours and intervening quarters. The " Cambridge " and " Westminster " chimes are very familiar; and more recently chimes have been composed by Sir

John Stainer for Freshwater in the Isle of Wight (" Tenny- son" Chimes), and by Sir Charles Stanford for " Bow Bells " in London.

CARINI, a town in the province of Palermo, Sicily, 13 m. by rail W.N.W. of Palermo. Pop. (1901) 13,931. On the coast are some ruins of the ancient Hyccara, the only Sican settlement (probably a fishing village) on the coast. It was stormed and taken by the Athenians in 415 B.C., and the inhabitants, among them the famous courtesan Lais, sold as slaves. At La Grazia Christian catacombs have been found (Not.degliScavi, 1899, 362).

CARINTHIA (Ger. Kdrnten) , a duchy and crownland of Austria, bounded E. by Styria, N. by Styria and Salzburg, W. by Tirol, and S. by Italy, Gorz and Gradisca and Carniola. It has an area of 4005 sq. m. Carinthia is for the most part a mountainous region, divided by the Drave, which traverses it from west to east into two parts. To the north of the valley of the Drave the duchy is occupied by the Hohe Tauern and the primitive Alps of Carinthia and Styria, which belong to the central zone of the Eastern Alps. The Hohe Tauern contains the massifs of the Gross Glockner (12,455 ft-), the Hochriarr (10,670 ft.) and the Ankogel (11,006 ft.), and is traversed by the saddles of the Hochthor and the Malnitzer Tauern, which separates these groups from one another. To the east of the Hohe Tauern stretches the group of the primitive Alps of Carinthia and Styria, namely the Pollaer Alps with the glacier-covered peak of the Hafner Eck (10,041 ft.) ; the Stang Alps with the highest peak the Eisenhut (8007 ft.); the Saualpe with the highest peak the Grosse Saualpe (6825 ft.); and finally the Koralpen chain or the Stainzer Alps (7023 ft.) separated from the preceding group by the Lavant valley. The country south of the Drave is occupied by several groups of the southern limestone zone, namely the Carnic Alps, the Julian Alps, the Karawankas and the Steiner Alps. The Carnic Alps are divided by the Gail valley into the South Carnic group and the northern Gailthal Alps. They are traversed by the Pontebba or Pontafel Pass, through which passes one of the principal Alpine roads from Italy to Austria. The road is covered by the fortress of Malborgeth, where Captain Hensel with a handful of men met with a heroic death defending the place against an overwhelming French force in the campaign of 1809. A similar fate overtook, on the same day, the 18th of May 1809, Captain Hermann von Hermannsdorf and his small garrison, who were defending the Predil fort. This fort covers the road which traverses the Predil Pass in the Julian Alps and is the principal road leading from Carinthia to the Coastland. Commemorative monuments have

been erected in both places. The Gailthal Alps end with the Dobratsch or Villacher Alp (7107 ft.), situated to the south-west of Villach {q.v.), which is celebrated as one of the finest views in the whole eastern Alps. South of Hermagor, the principal place of the Gail valley, is the chain of mountains which is famous as being the only place where the beautiful Wulfenia Carinthiaca is found. The highest peaks in the Karawankas are the Grosse Mittagskogel (7033 ft.), the Och Obir (7023 ft.) and the Petzen (6934 ft.). The Ursula Berg (5563 ft.) ends the group of the Karawankas, which are continued by the Steiner Alps.

The principal river is the Drave, which flows from west to east through the length of the duchy, and receives in its course the waters of all the other streams, except the Fella, which reaches the Adriatic by its junction with the Tagliamento. Its principal tributaries are the Gail on the right, and the Moll, the Lieser, the Gurk with the Glan, and the Lavant on the left. Carinthia possesses a great number of Alpine lakes, which, unlike the other Alpine lakes, lie in the longitudinal valleys. The principal lakes are: the Millstatter-see (8| sq. m. in extent, 908 ft. deep, at an altitude of 1902 ft.), the Worther-see (17 sq. m. in extent, 212 ft. deep, at an altitude of 1438 ft,), the Ossiach-see (ioj sq. m.

in extent, 1 50 ft. deep, at an altitude of 1 599 ft.) , and the elongated Weissen-see (4I m. long, 309 ft. deep, at an altitude of 3037 ft.).

The climate is severe in the north and north-west parts, but the south and south-east districts are milder, while the most favoured part is the Lavant valley. Of the total area only 1 3 • 7 1 % is arable land, 10-50% is occupied by meadows and gardens, 5-18% by pastures, while 44-24% is covered by forests, almost exclusively pine-forests. Cattle-rearing is well developed, and the horses bred in Carinthia enjoy a good reputation. The mineral wealth of Carinthia is great, and consists in lead, iron, zinc and coal. Iron ore is extracted in the region of the Saualpe, and is worked in the foundries of St Leonhard, St Gertraud, Pravali, Hirt, Treibach and Eberstein. About two-thirds of the total production of lead in Austria is extracted in Carinthia, the principal places being Bleiberg and Raibl. The metallurgic industries are well developed, and consist in the production of

iron, steel, machinery, small-arms, lead articles, wire-cables and rails. The principal manufacturing places are Pravali, Briickl, Klagenfurt, Lippitz- bach, Wolfsberg, St Veit and Buchscheiden near Feldkirchen. The manufacture of small-arms is concentrated at Ferlach. Other trades are the manufacture of paper, leather, cement and the exploitation of forests.

The population of Carinthia in 1900 was 367,344, which corresponds to 91 inhabitants per sq. m. According to nationality, 71-54% were Germans, and 28-39% Slovenes, mostly settled in the districts adjoining the Slovene province of Carniola. Over 94 % of the population were Roman Catholics. The local diet, of which the bishop of Gurk is a member ex officio, is composed of 37 members, and Carinthia sends 10 deputies to the Reichsrat at Vienna. For administrative purposes, the province is divided into seven districts, and an autonomous municipality, Klagenfurt (pop. 24,314), the capital. Other principal places are: Villach (9690), Wolfsberg (4852), St Veit (4667), an old town, the former capital of Carinthia up to 1518, Pravali (4047), Travis (3640), a favourite summer-resort and tourist place, Bleiberg (3435), Volkermarkt (2606) and Spittal (2564).

Carinthia is so called from the Carni, a Celtic people, and in the time of Augustus it formed part of Noricum. After the fall of the Roman empire, it was the nucleus of the kingdom of Carentania, which was founded by Samo, a Frankish adventurer, but soon fell to pieces after his death. Under Charlemagne it constituted a margravate, which in 843 passed into the hands of Louis the German, whose grandson Arnulf was the first to bear the title of duke of Carinthia. The duchy was held by various families during the nth, 12th and 13th centuries, and at length in 1335 was bestowed by Louis the Bavarian on the dukes of Austria. It was divided into Upper or Western Carinthia and Lower or Eastern; of these the former fell to France in 1809, but was reconquered in 1813. It was created a separate crown- land in 1849.

See Aelschker. Geschichte Kdrntens (Klagenfurt, 1885).

CARINUS, MARCUS AURELIUS, Roman emperor, a.d. 283-284, was the elder son of the emperor Carus, on whose accession he was appointed governor of the western portion of the empire. He fought with success against the German tribes, but soon left the defence of the Upper Rhine to his legates and returned to Rome, where he abandoned himself to all kinds of debauchery and excess. He also celebrated the ludi Romani on a scale of

unexampled magnificence. After the death of Carus, the army in the East demanded to be led back to Europe, and Numerianus, the younger son of Carus, was forced to comply. During a halt at Chalcedon, Numerianus was murdered, and Diocletian, commander of the body-guards, was proclaimed emperor by the soldiers. Carinus at once left Rome and set out for the East to meet Diocletian. On his way through Pannonia he put down the usurper M. Aurelius Julianus, and encountered the army of Diocletian in Moesia. Carinus was successful in several engagements, and at the battle on the Margus (Morava), according to one account, the valour of his troops had gained the day, when he was assassinated by a tribune whose wife he had seduced. In another account, the battle is represented as having resulted in a complete victory for Diocletian. Carinus

has the reputation of having been one of the worst of the emperors.

Vopiscus, Carinus (mainly the recital of his crimes) ; Aurelius Victor, De Caesaribus, 38, Epit. 38; Eutropius ix. 18-20; Zonaras xii. 30; Orosius vii. 25; Pauly-Wissowa, Realencyclopddie, ii. 24 ff. (Henze) .

CARIPE, a small town of Venezuela in the state of Bermudez, about 53 m. E.S.E. of Cumana. It is the chief station of the Capuchin missions to the Chayma Indians, founded toward the close of the 17th century, and stands 2635 ft. above sea -level, in a fertile valley of the Sierra Bergantin, long celebrated for its cool, invigorating climate. The locality is also celebrated for the extensive system of caves in the limestone rocks found in its vicinity, which were described by Humboldt in his Personal Narrative. The principal cave, known aslhe Cueva del Guacharo, extends inward a distance of 2800 ft. with a height of 70-80 ft. These caves are frequented by a species of night-hawk, called guacharo, which nests in the recesses of the rocks. The young are killed in great numbers for their oil. Caripc itself has a population of only 580, but the valley and neighbouring stations have about ten times that number. Caripe should not be confounded with Rio Caribe, a town and port on the Caribbean coast a short distance east of Carupano, which has a population of about6ooo.

CARISBROOKE, a town in the Isle of Wight, England, 1 m. S. of Newport. Pop. (1991) 3993. The valley of the Lugley brook separates the village from the steep conical hill crowned by the castle, the existence of which has given Carisbrooke its chief

fame. There are remains of a Roman villa in the valley, but no reliable mention of Carisbrooke occurs in Saxon times, though it has commonly been identified with the Saxon Wiht- garaburh captured by Cerdic in 530. Carisbrooke is not mentioned by name in the Domesday Survey, butBowcombe, its principal manor, was a dependency of the royal manor of Amesbury, and was obtained from the king by William Fitz Osbern in exchange for three Wiltshire manors. The castle is mentioned in the Survey under Alvington, and was probably raised by William Fitz Osbern, who was made first lord of the Isle of Wight. From this date lordship of the Isle of Wight was always associated with ownership of the castle, which thus became the seat of government of the island. Henry I. bestowed it on Richard de Redvers, in whose family it continued until Isabella de Fortibus sold it to Edward I., after which the government was entrusted to wardens as representatives of the crown. The keep was added to the castle in the reign of Henry I., and in the reign of Elizabeth, when the Spanish Armada was expected, it was surrounded by an elaborate pentagonal fortification. The castle was garrisoned by Baldwin de Redvers for the empress Maud in 1 136, but was captured by Stephen. In the reign of Richard II. it was unsuccessfully attacked by the French; Charles I. was im- prisoned here for fourteen months before his execution. After- wards his two youngest children were confined in the castle, and the Princess Elizabeth died there. In 1904 the chapel of St Nicholas in the castle was reopened and reconsecrated, having been rebuilt as a national memorial of Charles I. The remains of the castle are extensive and imposing, and the keeper's house and other parts are inhabited, but the king's apartments are in ruins. Within the walls is a well 200 ft. deep; and another in the centre of the keep is reputed to have been still deeper. The church of St Mary, Carisbrooke, has a beautiful Perpendicular tower, and contains transitional Norman portions. Only the site can be traced of the Cistercian priory to which it belonged. This was founded shortly after the Conquest and originated from the endowment which the monks of Lyre near Evreux held in Bowcombe, including the church, mill, houses, land and tithes of the manor. Richard II. bestowed it on the abbey of Mount- grace in Yorkshire. It was restored by Henry IV., but was dissolved by act of parliament in the reign of Henry V., who bestowed it on his newly-founded charter-house at Sheen. Carisbrooke formerly had a considerable market, several milk. and valuable fisheries, but it never acquired municipal or repre- sentative rights, and was important only as the site of the castle.

See Victoria County History — Hampshire; William Westall, ffistory of Carisbrooke Castle (1850).

CARISSIMI, QIACOMO (c. 1604-1674), one of the most celebrated masters of the Italian, or, more accurately, the Roman school of music, was born about 1604 in Marino (near Rome). Of his life almost nothing is known. At the age of twenty he became chapel-master at Assisi, and in 1628 he obtained the same position at the church of St Apollinaris belonging to the Collegium Germanicum in Rome, which he held till his death on the 12th of January 1674, at Rome. He seems never to have left Italy. The two great achievements generally ascribed to him are the further development of the recitative, lately introduced by Monteverde, and of infinite importance in the history of dramatic music; and the invention of the chamber-cantata, by which Carissimi superseded the madrigals formerly in use. His position in the history of church music and vocal chamber music is somewhat similar to that of Cavalli in the history of opera. It is impossible to say who was really the inventor of the chamber-cantata; but Carissimi and Luigi Rossi were the composers who first made this form the vehicle for the most intellectual style of chamber-music, a function which it continued to perform until the death of Alessandro Scarlatti, Astorga and Marcello. Of his oratorios Jephthah has been published by Novello & Co., and is well known; this work and others are important as definitely establishing the form of oratorio unaccompanied by dramatic action, which has maintained its hold to the present day. He also may claim the merit of having given greater variety and interest to the instrumental accompaniments of vocal composi- tions. Dr Burney and Sir John Hawkins published specimens of his compositions in their works on the history of music; and Dr Aldrich collected an almost complete set of his compositions, at present in the library of Christ Church, Oxford. The British Museum also possesses numerous valuable works by this great Italian master. Most of his oratorios are in the Bibliotheque Nationale at Paris.

CARLETON, WILLIAM (1794-1869), Irish novelist, was born at Prillisk, Clogher, Co. Tyrone, on the 4th of March 1794. His father was a tenant farmer, who supported a family of fourteen children on as many acres, and young Carleton passed his early

life among scenes precisely similar to those he after- wards delineated with so much power and truthfulness. His father was remarkable for his extraordinary memory, and had a thorough acquaintance with Irish folklore; the mother was noted throughout the district for the sweetness of her voice. The beautiful character of Honor, the miser's wife, in Fardorougha, is said to have been drawn from her.

The education received by Carleton was of a very humble description. As his father removed from one small farm to another, he attended at various places the hedge-schools, which used to be a notable feature of Irish life. The admirable little picture of one of these schools is given in the sketch called " The Hedge School " included in Traits and Stories of Irish Peasantry. Most of his learning was gained from a curate named Keenan, who taught a classical school at Donagh (Co. Monaghan) , which Carleton attended from 1814 to 1816. Before this Carleton had resolved to prosecute his education as a poor scholar at Munster, with a view to entering the church; but in obedience to a warning dream, the story of which is told in the Poor Scholar, he returned home, where he received the unbounded veneration of the neighbouring peasantry for his supposed wonderful learning. An amusing account of this phase of his existence is given in the ittle sketch, " Denis O'Shaughnessy." About the age of nineteen he undertook one of the religious pilgrimages then common in Ireland. His experiences as a pilgrim, narrated in " The Lough Derg Pilgrim," made him resign for ever the thought of entering the church, and he eventually became a Protestant. His vacillating ideas as to a mode of life were determined in a definite direction by the reading of Gil Bias. He resolved to cast himself boldly upon the world, and try what fortune had in store for him. He went to Killanny, Co Louth, and for six months acted as tutor in the family of a farmer named Piers Murphy, and after some other experiments he set out for Dublin, and arrived in the metropolis with 2s 9d. in his pocket. He first sought occupation as a bird-

stuffer, but a proposal to use potatoes and meal as stuffing failed to recommend him. He then determined to become a soldier, but the colonel of the regiment in which he desired to enlist persuaded him — Carleton had applied in Latin: — to give up the idea. He obtained some teaching and a clerkship in a Sunday School office, began to contribute to the journals, and his paper " The Pilgrimage to Lough Derg," which was published in the Christian Examiner, excited great attention. In 1830 appeared the

first series of Traits and Stories of the Irish Peasantry (2 vols.), which at once placed the author in the first rank of Irish novelists. A second series (3 vols.), containing, among other stories, “Tubber Derg, or the Red Well,” appeared in 1833, and Tales of Ireland in 1834. From that time till within a few years of his death Carleton’s literary activity was incessant. ” Fardorougha the Miser, or the Convicts of Lisnamona ” appeared in 1837-1838 in the Dublin University Magazine. Among his other famous novels are: Valentine McClutchy, the Irish Agent, or Chronicles of the Castle Cumber Property (3 vols., 1845); The Black Prophet, a Tale of the Famine, in the Dublin University Magazine (1846), printed separately in the next year; The Emigrants of Ahadarra (1847); Willy Reilly and his dear Colleen Baum (in The Inde- pendent, London, 1850); and The Tithe Proctor (1849), the violence of which did his reputation harm among his own countrymen. Some of his later stories, The Squanders of Castle Squander (1852) for instance, are defaced by the mass of political matter with which they are overloaded. In spite of his very considerable literary production Carleton remained poor, but his necessities were relieved in 1848 by a pension of £200 a year granted by Lord John Russell in response to a memorial on Carleton’s behalf signed by numbers of distinguished persons in Ireland. He died at Sandford, Co. Dublin, on the 30th of January 1869.

Carleton’s best work is contained in the Traits and Stories of the Irish Peasantry. He wrote from intimate acquaintance with the scenes he described; and he drew with a sure hand a series of pictures of peasant life, unsurpassed for their appreciation of the passionate tenderness of Irish home life, of the buoyant humour and the domestic virtues which would, under better circumstances, bring prosperity and happiness. He alienated the sympathies of many Irishmen, however, by his unsparing criticism and occasional exaggeration of the darker side of Irish character. He was in his own words the ” historian of their habits and manners, their feelings, their prejudices, their super- stitions and their crimes.” (Preface to Tales of Ireland.)

During the last months of his life Carleton began an autobiography which he brought down to the beginning of his literary career. This forms the first part of The Life of William Carleton … (2 vols., 1896), by D. J. O’Donoghue, which contains full information about his life, and a list of his scattered writings. A selection from his stories (1889), in the ” Camelot Series,” has an introduction by Mr W. B. Yeats. He must not be confused with

Will Carleton (b. 1845), the American author of Farm Ballads (1873).

CARLETON PLACE, a town and port of entry of Lanark county, Ontario, Canada, 28 m. S.W. of Ottawa, on the Mississippi river, and at the junction of the main line and Brockville branch of the Canadian Pacific railway. It has abundant water-power privileges, and extensive railway-repair shops and woollen mills. Pop. (1901) 4059.

CARLILE, RICHARD (1 790-1 843), English freethinker, was born on the 8th of December 1790, at Ashburton, Devonshire, the son of a shoemaker. Educated in the village school, he was apprenticed to a tinman against whose harsh treatment he frequently rebelled. Having finished his apprenticeship, he obtained occupation in London as a journeyman tinman. Influenced by reading Paine's Rights of Man, he became an uncompromising radical, and in 1817 started pushing the sale of the Black Dwarf, a new weekly paper, edited by Jonathan Wooler, all over London, and in his zeal to secure the dissemination of its doctrines fre- quently walked 30 m. a day. In the same year he also printed and sold 25,000 copies of Sou they 's Wat Tyler, reprinted the suppressed Parodies of Hone, and wrote himself, in imitation of them, the Political Litany. This work cost him eighteen weeks imprisonment. In 181 8 he published Paine's works, for which

and for other publications of a like character he was fined £1500, and sentenced to three years' imprisonment in Dorchester gaol. Here he published the first twelve volumes of his periodical the Republican. The publication was continued by his wife, who was accordingly sentenced to two years' imprisonment in 182 1. A public subscription, headed by the duke of Wellington, was now raised to prosecute Carlile's assistants. At the same time Carlile's furniture and stock-in-trade in London were seized, three years were added to his imprisonment in lieu of payment of his fine, his sister was fined £500 and imprisoned for a year for publishing an address by him, and nine of his shopmen received terms of imprisonment varying from six months to three years. In 1825 the government decided to discontinue the prosecutions. After his release m that year Carlile edited the Gorgon, a weekly paper, and conducted free discussions in the London Rotunda. For refusing to give sureties for good behaviour after a prosecution arising out of a refusal to pay church rates, he was again imprisoned for three years, and a similar resistance cost him ten weeks' more imprisonment in 1834-1835. He died on the 10th of February 1843, after having spent in all nine years and four months in prison.

CARLINGFORD, CHICHESTER SAMUEL FORTESCUE, Baron

(1823-1898), British statesman, son of Chichester Fortes- cue (d. 1826), M.P. for Louth in the Irish parliament, was born in January 1823. He came of an old family settled in Ireland since the days of Sir Faithful Fortescue (1581-1666), whose uncle, Lord Chichester, was lord deputy. The history of the family was written by his elder brother Thomas (1815-1887), who in 1852 was created Baron Clermont. The future Lord Carlingford, then Mr Chichester Fortescue, went to Christ Church, Oxford, where he took a first in classics (1844) and won the chancellor's English essay (1846); and in 1847 ne was elected to parliament for Louth as a Liberal. He became a junior lord of the treasury in 1854, and subsequently held minor offices in the Liberal administrations till in 1865 he was made chief secretary for Ireland under Lord Russell, a post which he again occupied under Gladstone in 1868-1870; he then became president of the Board of Trade (1871-1874), and later lord privy seal (1881-1885) and president of the council (1883-1885). He was raised to the peerage in 1874. He parted from Gladstone on the question of Irish Home Rule, but in earlier years he was his active supporter on Irish questions. His influence in society was due largely to his wife, Frances (18 21-1879), previously the wife of the 7th Earl Waldegrave, whom he married in 1863. In 1887 his brother, Lord Clermont, died, and Carlingford inherited his peerage; but on his own death without issue on the 30th of January 1898 both titles became extinct.

CARLINGFORD, a small market town and port of Co. Louth, Ireland, in the north parliamentary division. Pop. (1901) 606. It is beautifully situated on the western shore of Carlingford Lough, at the foot of Carlingford Mountain (1935 ft.), facing the fine heights of the Mourne Mountains across the lough in Co. Down. It has a station on the railway connecting Greenore and Newry, owned by the London & North- Western railway of England. It was formerly a place of great importance, as attested by numerous remains. King John's Castle (1210) commands the lough from an isolated rock. There are other remains of the castellated houses erected during the Elizabethan and previous wars. A Dominican monastery was founded in 1305, and com- bines ecclesiastical and military remains. The town received several charters between the reigns of Edward II. and James II., was represented in the Irish parliament until the Union, and possessed a mint from 1467. The lough is a typical rock-basin hollowed out by glacial action, about 4 fathoms deep at its entrance, but increasing to four times that depth within. The

oyster-beds are valuable.

CARLI-RUBBI, GIOVANNI RINALDO, Count of (1720-1795), Italian economist and antiquarian, was born at Capo d' Istria, in 1720. At the age of twenty-four he was appointed by the senate of Venice to the newly established professorship of astronomy and navigation in the university of Padua, and entrusted with the superintendence of the Venetian marine. After filling

these offices for seven years with great credit, he resigned them, in order to devote himself to the study of antiquities and political economy. His principal economic works are his Delle monete, e della instituzione delle zecche d' Italia; his Ragionamento sopra i bilanci economici delle nazioni (1759), in which he maintained that what is termed the balance of trade between two nations is no criterion of the prosperity of either, since both may be gainers by their reciprocal transactions; and his Sul liber commercio dei grani (17 71), in which he argues that free trade in grain is not always advisable. Count Carli's merits were appreciated by Leopold of Tuscany, afterwards emperor, who in 1765 placed him at the head of the council of public economy and of the board of public instruction. In 1769 he became privy councillor, in 1771 president of the new council of finances. He died at Milan in February 1795. During his leisure he completed and published his Antichita Italiche, in which the literature and arts of his country are ably discussed. Besides the above, he published many works on antiquarian, economic and other subjects, including L' Uomo libero, in confutation of Rousseau's Contrat Social; an attack upon the abbe Tartarotti's assertion of the existence of magicians; Observazioni sulla musica antica e moderna; and several poems.

CARLISLE, EARLS OF. This English title has been held by two families, being created for James Hay in 1622, and being extinct in that line on the death of his son in 1660, and then being given in 166 1 to Charles Howard, and descending to the present day in the Howard family.

James Hay, 1st earl of Carlisle (d. 1636), was the son of Sir James Hay of Kingask (a member of a younger branch of the Enroll family) , and of Margaret Murray, cousin of George Hay, afterwards 1st earl of Kinnoull. He was knighted and taken into favour by James VI. of Scotland, brought into England in 1603, treated as a " prime favourite " and made a gentleman of the bedchamber. In 1604 he was sent on a mission to France and

pleaded for the Huguenots, which annoyed Henry IV. and caused a substantial reduction of the present made to the English envoy. On the 21st of June 1606 he was created by patent a baron for life, with precedence next to the barons, but without a place or voice in parliament, no doubt to render his advancement less unpalatable to the English lords. The king bestowed on him numerous grants, paid his debts, and secured for him a rich bride in the person of Honora, only daughter and heir of Edward, Lord Denny, afterwards earl of Norwich. In 1610 he was made a knight of the Bath, and in 1613 master of the wardrobe, while in 161 5 he was created Lord Hay of Sawley, and took his seat in the House of Lords. He was sent to France next year to negotiate the marriage of Princess Christina with Prince Charles, and on his return, being now a widower, married in 1617 Lady Lucy Percy (1599-1660), daughter of the 9th earl of Northumberland, and was made a privy councillor. In 1618 he resigned the mastership of the wardrobe for a large sum in compensation. He was created Viscount Doncaster, and in February 1619 was despatched on a mission to Germany, where he identified himself with the cause of the elector palatine and urged James to make war in his support. In 1621 and 1622 he was sent to France to obtain peace for the Huguenots from Louis XIII. , in which he was unsuccessful, and in September 1622 was created earl of Carlisle. Next year he went to Paris on the occa- sionof Prince Charles's journey to Madrid, andagainin 1624 to join Henry Rich, afterwards Lord Holland, in negotiating the prince's marriage with Henrietta Maria, when he advised James without success to resist Richelieu's demands on the subject of religious toleration. On the 2nd of July 1627 Lord Carlisle obtained from the king a grant of all the Caribbean Islands, including Barbados, this being a confirmation of a former concession given by James I. He was also a patentee and councillor of the plantation of New England, and showed great zeal and interest in the colonies. He became gentleman of the bedchamber to King Charles I. after his accession. In 1628, after the failure of the expedition to Rhe, he was sent to make a diversion against Richelieu in Lor- raine and Piedmont; he counselled peace with Spain and the

vigorous prosecution of the war with France, but on his return home found his advice neglected. He took no further part in public life, and died in March 1636. Carlisle was a man of good

sense and of accommodating temper, with some diplomatic ability. His extravagance and lavish expenditure, his " double suppers " and costly entertainments, were the theme of satirists and wonder of society, and his debts were said at his death to amount to more than £80,000. " He left behind him," says Clarendon, " a reputation of a very fine gentleman and a most accomplished courtier, and after having spent, in a very jovial life, above £400,000, which upon a strict computation he received from the crown, he left not a house or acre of land to be remembered by."

The charms and wit of his second wife, Lucy, countess of Carlisle, which were celebrated in verse by all the poets of the day, including Carew, Cartwright, Herrick and Suckling, and by Sir Toby Matthew in prose, made her a conspicuous figure at the court of Charles I. There appears no foundation for the scandal which made her the mistress successively of Strafford and of Pym. Strafford valued highly her sincerity and services, but after his death, possibly in consequence of a revulsion of feeling at his abandonment by the court, she devoted herself to Pym and to the interests of the parliamentary leaders, to whom she communicated the king's most secret plans and counsels. Her greatest achievement was the timely disclosure to Lord Essex of the king's intended arrest of the five members, which enabled them to escape. But she appears to have served both parties simultaneously, betraying communications on both sides, and doing considerable mischief in inflaming political animosities. In 1647 sne attached herself to the interests of the moderate Presbyterian party, which assembled at her house, and in the second Civil War showed great zeal and activity in the royal cause, pawned her pearl necklace for £1500 to raise money for Lord Holland's troops, established communications with Prince Charles during his blockade of the Thames, and made herself the intermediary between the scattered bands of royalists and the queen. In consequence her arrest was ordered on the 21st of March 1649, and she was imprisoned in the Tower, whence she maintained a correspondence in cipher with the king through her brother, Lord Percy, till Charles went to Scotland. According to a royalist newsletter, while in the Tower she was threatened with the rack to extort information. She was released on bail on the 25th of September 1650, but appears never to have regained her former influence in the royalist counsels, and died soon after the Restoration, on the 5th of November 1660.

The first earl was succeeded by James, his only surviving son by

his first wife, at whose death in 1660 without issue, the peerage became extinct in the Hay family.

Charles Howard, 1st earl of Carlisle in the Howard line (1629-1685), was the son and heir of Sir William Howard, of Naworth in Cumberland, by Mary, daughter of William, Lord Eure, and great-grandson of Lord William Howard, ” Belted Will ” (1563-1640), and was born in 1629. In 1645 he became a Protestant and supported the government of the common-wealth, being appointed high sheriff of Cumberland in 1650. He bought Carlisle Castle and became governor of the town. He distinguished himself at the battle of Worcester on Crom- well’s side, was made a member of the council of state in 1653, ‘ chosen captain of the protector’s body-guard and selected to carry out various public duties. In 1655 he was given a regiment, was appointed a commissioner to try the northern rebels, and a deputy major-general of Cumberland, Westmorland and North-umberland. In the parliament of 1653 he sat for Westmorland, in those of 1654 and 1656 for Cumberland. In 1657 he was included in Cromwell’s House of Lords and voted for the pro- tector’s assumption of the royal title the same year. In 1659 he urged Richard Cromwell to defend his government by force against the army leaders, but his advice being refused he used his influence in favour of a restoration of the monarchy, and after Richard’s fall he was imprisoned. In April 1660 he sat again in parliament for Cumberland, and at the Restoration was made

cuslos rotulorum of Essex and lord-lieutenant of Cumberland and Westmorland. On the 20th of April 1661 he was created Baron Dacre of Gillesland, Viscount Howard of Morpeth, and earl of Carlisle; the same year he was made vice-admiral of North-umberland, Cumberland and Durham, and in 1662 joint com-missioner for the office of earl marshal. In 1663 he was appointed ambassador to Russia, Sweden and Denmark, and in 1668 he carried the Garter to Charles XI. of Sweden. In 1667 he was made lieutenant-general of the forces and joint commander-in- chief of the four northernmost counties. In 1672 he became lord-lieutenant of Durham, and in 1673 deputy earl marshal. In 1678 he was appointed governor of Jamaica, and reappointed governor of Carlisle. He died on the 24th of February 1685, and was buried in York Minster. He married Anne (d. 1696), daughter of Edward, 1st Lord Howard of Escrick; his eldest son Edward (c. 1646-1692) succeeded him as 2nd earl of Carlisle, the title descending to his son Charles (1674-1738) and grandson Henry (1694-1758).

Frederick Howard, 5th earl (1748-1825), son of the 4th earl, was born in 1748. During his youth he was chiefly known as a man of pleasure and fashion; and after he had reached thirty years of age, his appointment on a commission sent out by Lord North to attempt a reconciliation with the American colonies was received with sneers by the opposition. The failure of the embassy was not due to any incapacity on the part of the earl, but to the unpopularity of the government from which it received its authority. He was, indeed, considered to have displayed so much ability that he was entrusted with the vice- royalty of Ireland in 1780. The time was one of the greatest difficulty; for while the calm of the country was disturbed by the American rebellion, it was drained of regular troops, and large bands of volunteers not under the control of the government had been formed. Nevertheless, the two years of Carlisle's rule passed in quietness and prosperity, and the institution of a national bank and other measures which he effected left per- manently beneficial results upon the commerce of the island. In 1789, in the discussions as to the regency, Carlisle took a prominent part on the side of the prince of Wales. In 1791 he opposed Pitt's policy of resistance to the dismemberment of Turkey by Russia; but on the outbreak of the French Revolution he left the opposition and vigorously maintained the cause of war. In 181 5 he opposed the enactment of the Corn Laws; but from this time till his death, in 1825, he took no important part in public life. Carlisle was the author of some political tracts, a number of poems, and two tragedies, The Father's Revenge and The Stepmother, which received high praise from his contemporaries. His mother was a daughter of the 4th Lord Byron, and in 1798 he was appointed guardian to Lord Byron, the poet, who lampooned him in English Bards and Scotch Reviewers.

George Howard, 6th earl (17 73-1 848), eldest son of the 5th earl, entered parliament as Lord Morpeth in 1795 as a Whig. He was appointed to the Indian board in 1806, when the "Ministry of all the Talents " took office, but resigned in 1807, though he remained prominent in the House of Commons. After his elevation to the House of Lords (1825), he held various cabinet offices under Canning and Grey. He made some minor con- tributions to literature and left the reputation of an amiable scholar.

George William Frederick Howard, 7th earl (1802-1864), was born in London on the 18th of April 1802. He was the eldest son of the 6th earl by his wife Lady Georgiana Cavendish, eldest

daughter of the duke of Devonshire. He was educated at Eton and Christ Church, Oxford, where (as Lord Morpeth) he earned a reputation as a scholar and writer of graceful verse, obtaining in 182 1 both the chancellor's and the Newdigate prizes for a Latin and an English poem. In 1826 he accompanied his uncle, the duke of Devonshire, to Russia, to attend the coronation of the tsar Nicholas, and became a great favourite in society at St Petersburg. At the general election of the same year he was returned to parliament as member for the family borough of Morpeth. In one of his earliest speeches he undertook,

at the risk of forfeiting the good opinion of the Liberal party, the defence of the Russian emperor against severe attacks made on him in reference to the suppression of the Polish insurrection of 1830. In the agitation for parliamentary reform he took the side of Earl Grey; and after the dissolution of parliament, which took place about that time, he was elected member for Yorkshire. This seat he held till after the passing of the Reform Bill in 1832. He was then returned for the West Riding; and in 1835 he was appointed by Lord Melbourne chief secretary for Ireland, a position at that time of great difficulty, O'Connell being then at the height of his reputation. This post he held for about six years (being included in the cabinet in 1839), winning great popularity by his amiable manners and kindly disposition. Losing his seat at the election of 1841, he visited the United States, but in 1846 he was again returned for the West Riding, and was made chief commissioner of woods and forests in Lord John Russell's cabinet. Succeeding to the peerage in 1848, he became chancellor of the duchy of Lancaster in 1850. The great event of his life, however, was his appointment by Lord Palmer- ston to the lord-lieutenancy of Ireland in 1855. This office he continued to hold till February 1858, and again from June 1850 till within a few months of his death. His literary tastes and culture were displayed in various popular lectures and in several published works. Among these may be mentioned a lecture on The Life and Writings of Pope (1851); The Last of the Greeks, a tragedy (1828); a Diary in Turkish and Greek Waters (1854), the fruit of travels in the East in 1853 and 1854; and a volume of Poems, published after his death. In 1866 appeared his Viceregal Speeches, collected and edited by J. Gaskin. He took warm interest in the reformation of juvenile criminals, and established on his own

estate one of the best conducted reforma- tories in the country. Lord Carlisle died at Castle Howard on the 5th of December 1864. He was never married, and was succeeded in the peerage by his brother, the Rev. William George Howard (d. 1889), as 8th earl.

George James Howard, 9th earl, born in 1843, was the son of Charles, fourth son of the 6th earl. He was educated at Eton and Trinity, Cambridge, and, then being only Mr Howard, married in 1864 Rosalind, daughter of the 2nd Lord Stanley of Alderley. He sat in parliament as a Liberal in 1879-1880, and again from 1881 to 1885; and succeeded his uncle in the peerage in 1889. His wife, a more active Liberal politician than himself, took a prominent part in the temperance movement and other advanced causes; and Lord Carlisle became best known as an art patron and an artist of considerable ability, whose landscape painting had considerable affinity to the work of Giovanni Costa. His position as a connoisseur was recognized by his being made one of the trustees of the National Gallery. His son, Viscount Morpeth (b. 1867), had a distinguished career at Oxford, and after various defeats in other constituencies was returned to parliament for South Birmingham as a Unionist supporter of Mr Chamberlain in 1904.

CARLISLE, a city, municipal and parliamentary borough, and the county town of Cumberland, England, 299 m. N.N.W. of London, and 8 m. S. of the Scottish border. Pop. (1901) 45,480. It lies on the south bank of the river Eden, a little below the point where it debouches upon the Solway Plain, 8 m. above its mouth in the Solway Firth, at the junction of two tributaries from the south, the Caldew and the Petteril. The city grew Up originally on and about the two slight eminences of the penin- sula enclosed between these three streams. To the north of the Eden lies the suburb of Stanwix, connected with the city by a handsome bridge (1812-1815). The rivers are not navigable, and a canal opened in 1823, connecting the city with Port Carlisle on the Solway Firth, was unsuccessful, and was converted into a railway. Silloth, on the Irish Sea, is the nearest port of importance (21 m.). Carlisle, however, is one of the principal railway centres in Great Britain. The London & North- Western and the Midland railways of England, and the Caledonian, North British and Glasgow & South-Western of Scotland, here make a junction for through traffic between England and Scotland; and the city is further served by the North

Eastern (from Newcastle) and the Maryport & Carlisle railways.

Carlisle is the seat of a bishop. Bede, in his life of St Cuthbert, alludes to a monastery here, and the saint was also believed to have founded a convent and school. But all was swept away by the Northmen, and though William Rufus, who rehabilitated the town, doubtless made provision for an ecclesiastical founda- tion, it was left for Henry I., in 1133, to create a bishopric out of the house of Augustinian canons, founded in 1102. This was the sole episcopal chapter of regular canons of St Augustine in England. It was dissolved in 1540. Between 1156 and 1204 the bishop's throne was unoccupied, but thereafter there was a continuous succession. The diocese covers the whole of Westmorland, and practically of Cumberland, with Furness and the adjacent district in the north of Lancashire. The cathedral as it stands is a fine cruciform building with a central tower, but it is incomplete. Of the Norman nave, built by ˆEthelwold, the first prior and bishop, only two bays are standing, the remainder having been destroyed by the Parliamentarians in 1646. The south transept, and the lower part of the tower piers, are also of this period. Remarkable distortion is seen in the nave arches, owing to the sinking of the foundations. The thinness of the aisle walls, and the rude masonry of the founda- tions of the original apse which have been discovered, point to native, not Norman, workmanship. The choir is ornate and beautiful, and the huge Decorated east window, with its wonderful elaborate tracery, is perhaps the finest of its kind extant. The reconstruction of the Norman choir was begun in the middle of the 13 th century, but the work was almost wholly destroyed by fire in 1292. The north transept and the tower also suffered. Building began again c. 1352, and the present tower, erected with some difficulty on the weak foundations of the Norman period, dates from 1400-1419. The conventual buildings are scanty, including little more than a Perpendicular gateway and refectory. A stone inscribed with runes, and a well, are among the objects of interest within the cathedral. Among the numerous memorials is one to Archdeacon Paley; and a stained-glass window com- memorates the five children of Archibald Campbell Tait, dean of the cathedral, and afterwards archbishop of Canterbury. Of the two eminences within the three rivers, the cathedral occupies one, the castle the other. It was moated and very strong; but has been so far altered that only the keep is of special interest. A tower in which Mary, queen of Scots, was imprisoned was taken down in 1835. The castle serves as barracks. Fragments of the old city walls are seen on the western side over against the river Caldew. At Carlisle are the county gaol and the Cumberland infirmary, in connexion

with which there is a sea- side convalescent institution at Silloth. Other notable public buildings are the city hall, the court-houses, museum and art gallery. The grammar school, of very early foundation, received endowment from Henry VIII. Industries include the manu- facture of cotton and woollen goods, and there are iron foundries, breweries, tanneries and large railway works. There is also a considerable agricultural trade. The parliamentary borough returns one member. The municipal borough is under a mayor, 10 aldermen and 30 councillors. Area, 2025 acres.

This was the Romano-British Luguvallium, probably rather a town than a fort, being one of the few towns as distinct from forts in.the north of Britain. It lay a mile south of Hadrian's wall. There are no traces above ground in situ; but many inscriptions, potsherds, coins and other such-like relics have been discovered.

Carlisle (Caer Luel, Karliol) is first mentioned in 685, when under the name of Luel it was bestowed by Ecgfrith on St Cuthbert to form part of his see of Lindisfarne. It was then a thriving and populous city, and when St Cuthbert visited it in 686 he was shown with pride the ancient walls and a Roman fountain of marvellous construction. Nennius, writing in the 9th century, mentions it in a list of British cities under the name of Caer Luadiit, Caer Ligualid or Caer Lualid, but about this time it was either wholly or in part destroyed by the Danes, and vanishes completely from history until in 1092 it was re-estab- lished as the political centre of the district by William Rufus,

who built the castle and sent husbandmen.to dwell there and till the land. During the centuries of border-strife which followed, the history of Carlisle centres round that of the castle, which formed the chief bulwark against the Scots on the western border, and played an important part in the history of the country down to the rebellion of the young Pretender in 1745. In 1292 a great fire destroyed nearly all the buildings and muniments of the city, so that no original charter is extant before that date. A charter from Edward I., dated 1293, however, exemplifies two earlier grants. The first, from Henry II., confirmed the liberties and customs which the city had theretofore enjoyed, granting in addition a free gild merchant, with other privileges. This grant is exemplified in the second

charter, from Henry III., dated 1251. By a writ dated 5 Henry III. the citizens were allowed to hold the city direct from the king, paying a fee-farm rent of £60, instead of the former rent of £50, paid by the medium of the sheriff. A charter from Edward II., dated 1316, grants to the citizens the city, the king's mills in the city, and the fishery in the Eden, at a fee-farm rent of £80 a year. A charter from Edward III. in 1352 enumerates the privileges and liberties hitherto enjoyed by the citizens, including a market twice a week, on Wednesday and Saturday; a fair for sixteen days at the feast of the Assumption of the Virgin (r 5th of August); free election of a mayor, bailiffs and two coroners; and the right to hold their markets in the place called " Battailholm." It also mentions that the city was greatly impoverished by reason of the devastations of the Scots and by pestilence. Confirmations of former privileges were issued by Richard II., Henry IV. and Henry VI. A charter from Edward IV. in 1461, after reciting the damage sustained by the city through fire, reduced the fee- farm rent from £80 to £40, and granted to the citizens the fishery called the sheriff's net, free of rent. Further confirmations were granted by later sovereigns. Although the city had been under the jurisdiction of a mayor and bailiffs at least as early as 1290, the first charter of incorporation was granted by Elizabeth in 1566; it established a corporation under the style of " a mayor, eleven worshipful persons, and twenty-four able persons." A charter of James I. confirmed former liberties, and in 1638 Charles I. granted a charter under which the town continued to be governed until 1835. It declared Carlisle a city by itself, and established a corporation consisting of a mayor, 1 1 aldermen, 24 capital citizens, 2 bailiffs, 2 coroners and a recorder; the mayor, the recorder and 2 senior aldermen to be justices of the peace, and the mayor to be clerk of the market; other officers were a common clerk, a sword-bearer and three serjeants-at-mace. Two charters from Charles II. in 1664 and 1684 were never accepted. The latter granted a three days' fair or market on the first Wednesday in June. Much valuable information relating to the early history and customs of Carlisle is furnished both by the Dormont Book, which contains an elaborate set of bye-laws dated 1561, and by the records of the eight craft gilds — weavers, smiths, tailors, tanners, shoemakers, skinners, butchers and merchants. The defensive and offensive warfare in which the citizens were constantly engaged until the union of the crowns of England and Scotland left little time for the development of commercial pursuits, and Fuller, writing in the 17th century, says that the sole manufacture, that of fustian, though established

shortly after the Restoration, had met with scant encouragement. In 1750 the manufacture of coarse linen cloth was established, and was followed in a few years by the introduction of calico stamperies. The commercial prosperity of Carlisle, however, began with the railway development of the 19th century. In 1 283 the citizens of Carlisle were summoned to send two representatives to parliament, but no return is recorded. From 1295 Carlisle continued to return two members until the Redistribution Act of 1885. At the time of the Scottish wars Edward I. held two parliaments at Carlisle — in 1300 and in 1307.

See Victoria County History, Cumberland; R. S. Ferguson, Some Municipal Records of the City of Carlisle (Cumberl. and Westm. Antiq. and Archaeol. Soc, Carlisle and London, 1887), and Royal Charters of Carlisle (ditto, Carlisle, &c, 1894) ; Mandell Creighton, Carlisle in " Historic Towns " series (London, 1889).

CARLISLE, a borough and the county-seat of Cumberland county, Pennsylvania, U.S.A., 18 m. W. by S. of Harrisburg and 118 m. W. by N. of Philadelphia. Pop. (1890) 7620;

(1900) 9626 (1148 being negroes); (1910) 10,303. It is served by the Cumberland Valley (controlled by the Pennsylvania railway) and the Gettysburg & Harrisburg railways. The borough is pleasantly situated in the central part of the fertile Cumberland Valley, which is here 12 m. wide. Mount Holly Springs and Boiling Springs are near, and are important summer attractions. In Carlisle is Dickinson College, founded in 1 783 by Presbyterians, and named in honour of John Dickinson (q.v.), a benefactor of the college; it was reorganized in 1833 as a Methodist Epis- copal College, and is now divided into the college, the school of law (founded in 1834) and Conway Hall, the preparatory department. President James Buchanan and Chief Justice R. B. Taney were graduates. Here are also Metzger College for young ladies, and a well-known United States Indian industrial school, established in 1879 through the efforts of Lieutenant (later Brigadier- General) Richard Henry Pratt (b. 1840), its superin- tendent until 1904 ; the school pays especial attention to industrial and agricultural training, and its athletic organizations are famous. A great effort is made to preserve and develop Indian arts and crafts; the instruction given by Mrs Angel Decora Dietz, a Winnebago, in colour work and design, decorating leather, making beadwork and weaving rugs, is particularly noteworthy. On the initiative of the pupils the Leupp

Indian Art School was built on the campus in 1906-1907, all materials being purchased with the funds of the athletic association and all work being done by the students. The building is named in honour of Francis Ellington Leupp (b. 1849), U.S. commissioner of Indian affairs in 1905. Carlisle is prominent for the manu- facture of boots and shoes, and has machine shops and manufac- tories of carriages, ribbons, railway frogs and switches, carpets and paper boxes. In 1905 the value of all the factory products was $1,985,743, of which $1,078,401 was the value of boots and shoes. The place was laid out as a town in 1751, was named from Carlisle, Cumberland, England, and was incorporated as a borough in 1872. In 1753 Benjamin Franklin, with two other commissioners, negotiated a treaty with the Ohio Indians here. During the War of Independence the Americans kept here for secure confinement a number of British prisoners, among them Major John Andre, and in 1 794 Carlisle was the head- quarters of George Washington during the Whisky Rebellion. On the night of the 1st of July 1863 Carlisle was bombarded by Confederate troops.

CARLOFORTE, a town of Sardinia, in the province of Cagliari, the capital of the small island (6 by 5 m.) of San Pietro (anc. Accipitrum or ‘lepaKovvijeros) off the west coast of Sardinia. Pop.

(1901) 7693. It lies on the east coast of the island, 6 m. west by sea from Portoscuso, which is 47 m. west by rail from Cagliari. It was founded in 1737 by Charles Emmanuel III. of Savoy, who planted a colony of Genoese, whose dialect and costume still prevail. In 1798 it was attacked by the Tunisians and 933 inhabitants taken away as slaves. They were ransomed after five years and the place fortified. It is now a centre of the tunny fishery, and there are manganese mines also. The coral banks, which were once important, are now exhausted. Three m. to the south-east is the island of S. Antioco.

CARLOMAN (828-880), king of Bavaria and Italy, was the eldest son of Louis the German, king of the East Franks. In 856 he undertook the defence of the eastern frontier of Bavaria against the Bohemians and Moravians, and won considerable fame in various campaigns. . He married a daughter of Ernest, count of the Bohemian mark, and in conjunction with his father-in-law resisted the authority of his father in 861. For some years he alternated between rebellion and submission to his father, but in 865 an arrangement was made by which he became possessed of

Bavaria and Carinthia as his expectant share of the kingdom of Louis. During the troubles between Louis and his two younger sons Carloman remained faithful to his father, and carried on the war with the Moravians so successfully that in 870 their territory was completely under the power of the

Franks; and when peace was made at Forchheim in 874, they recognized the Frankish supremacy. In 875 the emperor Louis II. died, having named his cousin Carloman as his successor in Italy. Carloman crossed the Alps to claim his inheritance, but was cajoled into returning by the king of the West Franks, Charles the Bald. In 876, on his father's death, Carloman became actually king of Bavaria, and after a short campaign against the Moravians he went again to Italy in 877 and was crowned king of the Lombards at Pavia; but his negotiations with Pope John VIII. for the imperial crown were fruitless, and personal illness added to the outbreak of an epidemic in his army com- pelled him to return to Bavaria. Stricken with paralysis, Carloman was unable to prevent his brother Louis from seizing Bavaria; so making a virtue of necessity, he bequeathed the whole of his lands to Louis. He died on the 22nd of September 880 at Ottingen, where he was buried, leaving an illegitimate son, afterwards the emperor Arnulf.

See " Annates Fuldenses," "Annates Bertiniani," ReginovonPrum, " Chronicon," all in the Monumenta Germaniae historica. Scriptores, Bandi. (Hanover and Berlin, 1 826 -1892) ; E. Miihlbacher,Z)JeiCARLOMAN, the name of three Frankish princes. Carloman (d. 7 54) , mayor of the palace under the Merovingian kings, was a son of Charles Martel, and, together with his brother, Pippin the Short, became mayor on his father's death in 741, administering the eastern part of the Frankish kingdom. He was successful in extending the power of the Franks in various wars with his troublesome neighbours, and was not less zealous in seeking to strengthen and reform the church in the lands under his rule. In 747 Carloman laid down his office and retired to a monastery which he founded on Monte Soracte, but troubled by the number of his visitors, he subsequently entered a monastery on Monte Casino. He died at Vienne on the 17th of August 754. Carloman (751-771), king of the Franks, was a son of King Pippin the Short, and consequently a brother of Charlemagne. The brothers became joint kings of the Franks on Pippin's death in 768, and some trouble which broke out

between them over the conduct of the war in Aquitaine was followed by Carlo- man's death at Samoussy on the 4th of December 771. He married Gerberga, a daughter of Desiderius, king of the Lombards, who, together with her children, vanished from history soon after her husband's death.

Carloman (d. 884), king of France, was the eldest son of King Louis II., the Stammerer, and became king, together with his brother Louis III., on his father's death in 870. Although some doubts were cast upon their legitimacy, the brothers obtained recognition and in 880 made a division of the kingdom, Carloman receiving Burgundy and the southern part of France. In 882 he became sole king owing to his brother's death, but the kingdom was in a very deplorable condition, and his power was very circumscribed. Carloman met his death while hunting on the 1 2th of December 884. See E. Lavisse, Histoire de France, tome ii. (Paris, 1903).

CARLOS I. (1 863-1 908), king of Portugal, the third sovereign of Portugal of the line of Braganza-Coburg, son of King Louis I. and Maria Pia, daughter of King Victor Emmanuel of Italy, was born on the 28th of September 1863. When about twenty years of age he spent a considerable time in travelling, visiting England in 1883. On the 22nd of May 1886 he married Marie Amelie, daughter of Philippe, due d'Orleans, comte de Paris, and on the death of his father (19th of October 1889) he suc- ceeded to the throne of Portugal. In that year the British government found it necessary to make formal remonstrances against Portuguese encroachments in South Africa, and relations between the two countries were greatly strained for some time. The king's attitude during this critical period was one of concilia- tion, and his temperate, though firm, speech on opening the Cortes in January 1890 did much to strengthen the party of peace. In 1900-1901 also his friendly attitude towards Great Britain was shown by cordial toasts at a banquet to the officers of the British fleet at Lisbon. King Carlos distinguished himself as a patron of science and literature, and was himself an artist

of some repute. In March 1894 he took a very active part in the celebration of the 500th anniversary of the birth of Prince Henry the Navigator, and a year later he decorated the Portuguese poet, Joao de Deus, with much honour at Lisbon. He took a great personal interest in deep-sea soundings and marine explora- tion,

and published an account of some of his own investiga- tions, the results themselves being shown at an oceanographic exhibition opened by him on the 12th of April 1897. In May 1907 the king suspended the constitution of Portugal and temporarily appointed Senhor Franco as dictator with a view to carrying out certain necessary reforms. Some discontent was aroused by this proceeding; this was increased by Franco's drastic measures, and on the 1st of February 1908 King Carlos and his elder son, Louis, duke of Braganza (1887-1908), were assassinated whilst driving through the streets of Lisbon. The king was succeeded by his only surviving son, Manuel, duke of Beja (b. 1889), who took the title of Manuel II.

See S. M. El Rei D. Carlos I. e sua obra artislica e scientificˆ (Lisbon, 1908).

CARLOS, DON (1 545-1 568), prince of Asturias, was the son of Philip II. king of Spain, by his first wife Maria, daughter of John III., king of Portugal, and was born at Valladolid on the 8th of July 1545. His mother died a few days after his birth, and the prince, who was very delicate, grew up proud, wilful and indolent, and soon began to show signs of insanity. In 1559 he was be- trothed to Elizabeth, daughter of Henry II., king of France, a lady who a few months later became the third wife of his father; in 1560 he was recognized as the heir to the throne of Castile, and three years later to that of Aragon. Other brides werethensuggestedfortheprince; Mary, queen of Scots, Margaret, another daughter of Henry II., and Anne, a daughter of the emperor Maximilian II.; but meanwhile his mental derangement had become much more acute, and his condition could no longer be kept secret. In 1562 he met with an accident which was followed by a serious illness, and after his recovery he showed more obvious signs of insanity, while his conduct both in public and in private was extremely vicious and disorderly. He took a marked dislike to the duke of Alva, possibly because he wished to proceed to the Netherlands instead of the duke, and he exhibited a morbid antipathy towards his father, whose murder he even contemplated. At length in January 1568, when he had made preparations for flight from Spain, he was placed in con- finement by order of Philip, and on the 24th of July of the same year he died. This event is still enveloped in some mystery. Philip has been accused of murdering his son, and from what is known of the king's character this supposition is by no means improbable. It is known that the king appointed commissioners to try the prince, and he may have been put to death for treason

in accordance with their verdict. It has also been suggested that his crime was heresy, and that his death was due to poison, and other solutions of the mystery have been put forward. On the other hand, it should be remembered that the health of Carlos was very poor, and that his outrageous behaviour in captivity would have undermined a much stronger constitution than his own. Consequently there is nothing strange or surprising in his death from natural causes, and while no decisive verdict upon this question can be given, Philip may perhaps be granted the benefit of the doubt. By some writers the sad fate and early death of Carlos have been connected with the story of his unlaw- ful attachment to his promised bride, Elizabeth, who soon became his stepmother, and whose death followed so quickly upon his own. There is circumstantial evidence for this tale. The loss of an affianced bride, followed by hatred between supplanted and supplanter, who were father and son, then the increasing infirmity of the slighted prince, and finally the almost simultaneous deaths of the pair.. But mature historical research dismisses this story as a fable. It has, however, served as the subject for romance. Schiller and Alfieri, J. G. de Campristron in Andronic, and Lord John Russell have made it the subject of dramas, and other dramas based upon the life of Don Carlos have been written by Thomas Otway, M. A. Ch6nier, J. P. de Montalvan, and D. X. de Enciso.

See C. V. de Saint Real, Don Carlos, nouvelle historique (Paris, 1672). This gives the story of the attachment of Carlos and Eliza- beth, which has been refuted by L. von Ranke, Zur Gesckichte des don Carlos (Vienna, 1829) ; and J. A. Llorente, Histoire critique de V Inquisition (French translation, Paris, 1817). See also L. P. Gachard, Don Carlos et Philippe II (Brussels, 1863) ; C. de Moiiy, Don Carlos et Philippe II (Paris, 1863); M. Budiuger, Don Carlos, Haft und Tod (Vienna, 1891); L. A. WarnkSnig, Don Carlos, Leben, Verhaftung und Tod (Stuttgart, 1864); W. Maurenbrecher, Don Carlos (Berlin, 1876) ; and W. H. Prescott, History of the Reign of Philip II. vol. ii. (London, 1855, 1859).

CARLOS, DON (1788-1855), the first of the Carlist claimants of the throne of Spain, was the second surviving son of King Charles IV. and his wife, Louisa Maria of Parma. He was born on the 29th of March 1788, and was christened Carlos Maria Isidro. From

1808 till 1814 he was a prisoner in France at Valencay with his brothers, who had been imprisoned by Napoleon when he seized the whole royal family of Spain at Bayonne. After his return he lived quietly as a prince at Madrid. In September 1816 he married Maria Francesca de Asis, daughter of King John VI. of Portugal, and sister of the second wife of his elder brother King Ferdinand VII. Though he took no part in the government of Spain, except to hold a few formal offices, Don Carlos was known for the rigid orthodoxy of his religious opinions, the piety of his life, and his firm belief in the divine right of kings to govern despotically. During the revolutionary troubles of 1820-1823 he was threatened by the extreme radicals, but no attack was made on him. When the revolutionary agitation was put down by French intervention in 1823, Don Carlos continued to behave as the affectionate brother and loyal subject of Ferdinand VII. The family affection between them was undoubtedly sincere, and was one of the very few amiable traits in the character of the elder brother. Towards the close of Ferdinand's reign Don Carlos was forced against his own will into the position of a party leader, or rather into the position of a prince whom a great party was forced to take as its leader. The extreme clericals among the Spaniards, who were the partisans of despotism because they rightly considered it as most favourable to the church, began to be discontented with King Ferdinand, who seemed wanting in energy. When the king showed his intention to alter the law of succession in order to secure the crown for his daughter Isabella, the clericals (in the Spanish phrase, " apostolicos ") banded to protect the rights of Don Carlos. There can be no question that if he had been disposed to place himself at the head of an insurrection he would have been followed, and might have put Ferdinand under restraint. But Don Carlos held his principles honestly. He considered rebellion as a sin in a prince as much as in other men, and as wicked when made by " apostolicos " as by liberals. He would do no more than assert his rights, and those of his children, in words. His wife and her sister, the princess of Beira, widow of his first cousin the infante Pedro, were less scrupulous. They were actively engaged in intrigues with the " apostolicos." In March 1833 the princess of Beira was informed by the king that her brother Don Miguel, then regent in Portugal, desired her presence, and that she must pay him a visit. On the 1 6th of March Don Carlos left for Portugal with his wife, in company with the princess, after an interview with his brother the king which is said to have been friendly. In the following month he was called upon by the king to swear allegiance to the

infanta Isabella, afterwards queen. Don Carlos refused, in respectful terms but with great firmness, to renounce his rights and those of his sons, in a public letter dated the 29th of April. The death of his brother on the 29th of September 1833 gave him an opportunity to vindicate his claims without offence to his principles, for in his own opinion and that of his partisans he was now king. But he was entangled in the civil war of Portugal and was shut off from Spain. He did, and perhaps could do, nothing to direct the Spaniards who rose on his behalf, and had proclaimed him king as Charles V. When the Miguelite party was beaten in Portugal, Don Carlos escaped to England on the 1st of June 1834 in H.M.S. " Donegal." His stay in England was short. On the 2nd of July he passed over to France, where he was actively aided by the legitimist party, and on the nth

he joined his partisans at Elizondo in the valley of Bastan, in the western Pyrenees. On the 27 th of October of this year he was deprived of his rights as infante by a royal decree, con- firmed by the Cortes on the 15th of January 1837. Don Carlos remained in Spain till the defeat of his party, and then escaped to France on the 14th of September 1839. During these years he accompanied his armies, without displaying any of the qualities of a general or even much personal courage. But he endured a good deal of hardship, and was often compelled to take to hiding in the hills. On these occasions he was often carried over difficult places on the back of a stout guide commonly known as the royal jackass (burro real). The semblance of a court which he main- tained was torn by incessant personal intrigues, and by con- flicts between his generals and the ecclesiastics who exercised unbounded influence over his mind. The defeat of his cause, which had many chances of success, was unquestionably due to a very large extent to his want of capacity, his apathy, and his increasing absorption in practices of puerile piety. His first wife having died in England, Don Carlos married her elder sister, the princess of Beira, in Biscay in October 1837. After his flight from Spain, Don Carlos led a life of increasing insignificance. He abdicated in May 1845, took a title of count of. Molina, and died at Trieste on the 10th of March 1855.

By his first marriage, Don Carlos had three sons, Charles (1818-1861), John (1822-1887), and Ferdinand (1824-1861). Charles succeeded to the claims of his father, and was known to his partisans as Don Carlos VI., but was more commonly known as the count of Montemolin. In 1846, when the marriage of queen Isabella was being negotiated, the Austrian government endeav-

oured to arrange an alliance between her and the count of Montemolin. But as he insisted on the complete recognition of his rights, the Spanish government refused to hear of him as a candidate. The Carlists took up arms on his behalf between 1846 and 1848, but the count, who had been expelled from France by the police, did not join them in the field. In April i860 he and his brother Ferdinand landed at San Carlos de la Rapita, at the mouth of the Ebro, in company with a feather- headed officer named Ortega, who held a command in the Balearic islands. They hoped to profit by the fact that the bulk of the Spanish army was absent in a war with Morocco. But no Carlist rising took place. The men who had been brought from the islands by Ortega deserted him. Montemolin and his brother, together with their devoted partisan General Elio, who had accompanied them from exile, lurked in hiding for a fortnight and were then captured. Ortega was shot, but the princes saved their lives, and that of Elio, by making an abject surrender of their claims. When he had been allowed to escape and had reached Cologne, the count of Montemolin publicly retracted his renunica- tion on the 15th of June, on the ignominious ground that it had been extorted by fear. Montemolin and his brother Ferdinand died within a fortnight of one another in January 1861 without issue.

The third brother, John, who had advanced his own claims before his brother's retraction, now came forward as the repre- sentative of the legitimist and Carlist cause. As he had shown a disposition to accept liberalism, and to make concessions to the spirit of the age, he was unpopular with the party. On the 3rd of October 1868 he made a formal renunciation in favour of his son Charles (Don Carlos VII.) , who is separately noticed below.

See Hermann Baumgarten, Gesckichte Spaniens (Leipzig, 1861); H. Butler Clarke, Modern Spain (Cambridge, 1906), which containsa useful bibliography.

CARLOS, DON (Charles Maria de los Dolores Juan Isidore Joseph Francis Quirin Antony Michael Gabriel Raphael) (i848-i909),princeof Bourbon, claimant,as Don Carlos VII., to the throne of Spain, was born at Laibach on the 30th of March 1848, being the eldest surviving son of Don Juan (John) of Bourbon and of the archduchess Maria Beatrix, daughter of Francis IV., duke of Modena. Don Carlos was the grandson of the first pretender, noticed above. He married in February 1867, at Frohsdorf , Princess Marguerite, daughter of the duke of Parma and niece of the comte de Chambord, who was born on the 1st

of January 1847, and who bore him a son, Don Jaime, in 1870, and three daughters. Don Carlos boldly asserted his pretensions to the throne of Spain two years after the revolution of 1868 had driven Queen Isabella II. and the other branch of the Bour- bons into exile. His manifesto, addressed to his brother Alphonso, namesake of his rival, Alphonso XII., found an echo in the fanatical priesthood and peasantry of many provinces of the Peninsula, but little support among the more enlightened middle classes, especially in the towns. The first rising was started in Catalonia by the brother of the pretender, who himself entered Spain by way of Vera, in the Basque provinces, on the 21st of May 1872. The troops of King Amadeus under General Moriones, a progressist officer, who was one of Spain's ablest and most popular commanders, surprised and very nearly cap- tured the pretender at Oroquista, sending him a fugitive to France in headlong flight with a few followers. For more than a year he loitered about in the French Pyrenees, the guest of old noble houses who showed him much sympathy, while the French authorities winked at the fact that he was fomenting civil war in Spain, where his guerilla bands, many of them led by priests, committed atrocities, burning, pillaging, shooting prisoners of war, and not unfrequently ill-using even foreign residents and destroying their property. When the Federal Republic was proclaimed on the abdication of King Amadeus, the Carlists had overrun Spain to such an extent that they held all the interior of Navarre, the three Basque provinces, and a great part of Catalonia, Lower Aragon, and Valencia, and had made raids into the provinces of Old Castile and Estremadura. Don Carlos re-entered Spain on the 15th of July 1873, just before the Carlists took Estella, in Navarre, which became, with Tolosa and Durango in the Basque provinces, his favourite residence. He displayed very lax morals and an apathy which displeased his staff and partisans. Don Carlos was present at some fights around Estella, and was in the neighbourhood of Bilbao during its famous siege of three months in 1874 until its relief by Marshals Serrano and Concha on the 2nd of May. He was also present at the battle near Estella on the 27th of June 1874, in which Marshal Concha was killed and the liberals were repulsed with loss. Twice he lost golden opportunities of making a rush for the capital — in 1873, during the Federal Republic, and after Concha's death. From the moment that his cousin Alphonso XII. was proclaimed king at

Sagunto, at Valencia, in Madrid, and at Logroiio, by General Campos, Daban, Jovellar, Primo de Rivera, and Laserna, the star of the pretender was on the wane. Only once, a few weeks after the Alphonsist restoration, the army of Don Carlos checked the Liberal forces in Navarre, and surprised and made prisoners half a brigade, with guns and colours, at Lacar, almost under the eyes of the new king and his headquarters. This was the last Carlist success. The tide of war set in favour of Alphonso XII., whose armies swept the Carlist bands out of central Spain and Catalonia in 1875, while Marshal Quesada, in the upper Ebro valley, Navarre, and Ulava, prepared by a series of successful operations the final advance of 180,000 men, headed by Quesada and the king, which defeated the Carlists at Estella, Pefia Plata, and Elgueta, thus forcing Don Carlos with a few thousand faithful Carlists to retreat and surrender to the French frontier authorities in March 1876.

The pretender went to Pau, and there, singularly enough, issued his proclamations bidding temporary adieu to the nation and to his volunteers from the same chateau where Queen Isabella, also a refugee, had issued hers in 1868. From that date Don Carlos became an exile and a wanderer, travelling much in the Old and New World, and raising some scandal by his mode of life. He fixed his residence for a time in England, then in Paris, from which he was expelled at the request of the Madrid govern- ment, and next in Austria, before he took up his abode at Viarreggio in Italy. Like all pretenders, he never gave in, and his pretensions, haughtily reasserted, often troubled the courts and countries whose hospitality he enjoyed. His great dis- appointment was the coldness towards him of Pope Leo XIII. , and the favour shown by that pontiff for Alphonso XII. and his godson, Alphonso XIII. Don Carlos had two splendid chances

of testing the power of his party in Spain, but failed to profit by them. The first was when he was invited to unfurl his flag on the death of Alphonso XII., when the perplexities and un- certainties of Castilian politics reached a climax during the first year of a long minority under a foreign queen-regent. The second was at the close of the war with the United States and after the loss of the colonies, when the discontent was so widespread that the Carlists were able to assure their prince that many Spaniards looked upon his cause as the one untried solution of the national difficulties. Don Carlos showed his usual lack of decision; he wavered between the advice of those who told him to unfurl his standard with a view to rally all the discontented and dis-

appointed, and of those who recommended him to wait until a great pronunciamienio, chiefly military, should be made in his favour — a day-dream founded upon the coquetting of General Weyler and other officers with the Carlist senators and deputies in Madrid. Afterwards the pretender continued to ask his partisans to go en organizing their forces for action some day, and to push their propaganda and preparations, which was easy enough in view of the indulgence shown them by all the governments of the regency and the open favour exhibited by many of the priesthood, especially in the rural districts, the religious orders, and the Jesuits, swarming all over the kingdom. After the death of his first wife in 1893, Don Carlos married in the following year Princess Marie Bertha of Rohan. He died on the 18th of July 1909. His son by his first wife, Don Jaime, was educated in Austrian and British military schools before he entered the Russian army, in which he became a colonel of dragoons.

CARLOW, a county of Ireland in the province of Leinster, bounded N. by the counties Kildare and Wicklow, E. by Wicklow and Wexford, S. by Wexford, and W. by Queen's county and Kilkenny. Excepting Louth, it is the smallest county in Ireland, having an area of 221,424 acres, or about 346 sq. m. The surface of the county is in general level or gently undulating, and of pleasing appearance, except the elevated tract of land known as the ridge of Old Leighlin (Gallows Hill Bog, 974 ft.), forming the beginning of the coal-measures of Leinster, and the south-eastern portion of the county bordering on Wexford, where the wild and barren granitic elevations of Knockroe (1746 ft.) and Mount Leinster (2610 ft.) present a bolder aspect. Glacial deposits, which overspread the lower grounds, sometimes afford good examples of the ridge-forms known as eskers, as in the neighbourhood of Bagenalstown. There are no lakes nor canals in the county, nor does it contain the source of any important river; but on its western side it is intersected from north to south by the Barrow, which is navigable throughout the county and affords means of communication with the port of Waterford; while on the eastern border the Slaney, which is not navigable in any part of its course through the county, passes out of Carlow into Wexford at Newtownbarry.

Carlow is largely a granite county; but here the Leinster Chain does not form a uniform moorland. The mica-schists and Silurian slates of its eastern flank are seen in the diversified and hilly country on the pass over the shoulder of Mt. Leinster, between

Newtownbarry and Borris. The highland drops west- ward to the valley of the Barrow, Carlow and Bagenalstown lying on Carboniferous Limestone, which here abuts upon the granite. On the west of the hollow, the high edge of the Castle- comer coalfields rises, scarps of limestone, grit, and coal-measures succeeding one another on the ascent. Formerly clay-ironstone was raised from the Upper Carboniferous strata.

The soil is of great natural richness, and the country is among the most generally fertile in the island. Agriculture is the chief occupation of the inhabitants, but is not so fully developed as the capabilities of the land would suggest; in effect, the extent of land under tillage shows a distinctly retrograde movement, being rather more than half that under pasture. The pasture land is of excellent quality, and generally occupied as dairy farms, the butter made in this county maintaining a high reputation in the Dublin market. The farms are frequently large, and care is given to the breeding of cattle. Sheep and poultry, however, receive the greatest attention. The staple trade of the county is

in corn, flour, meal, butter and provisions, which are exported in large quantities. There are no manufactures. The sandstone of the county is frequently of such a nature as to split easily into layers, known in commerce as Carlow flags.

Porcelain clay exists in the neighbourhood of Tullow; but no attempt is made to turn this product to use.

The Great Southern & Western railway from Kildare to Wexford follows the river Barrow through the county, with a branch from Bagenalstown to Kilkenny, while another branch from the north terminates at Tullow.

As regards population (41,964 in 1891; 37,748 in 1901), the county shows a decrease among the more serious of Irish counties, and correspondingly heavy emigration returns. Of the total, about 89% are Roman Catholics, and nearly the whole are rural. Carlow (pop. 6513), Bagenalstown (1882), and Tullow (1725) are the only towns. The county is divided into seven baronies, and contains forty-four civil parishes and parts of parishes. It belongs to the Protestant diocese of Dublin and the

Roman Catholic diocese of Kildare and Leighlin. The assizes are held at Carlow, and quarter sessions at that town and also at Bagenalstown and Tullow. One member is returned to parliament.

Carlow, under the name of Catherlogh, is among the counties generally considered to have been created in the reign of John. Leinster was confirmed as a liberty to William Marshal, earl of Pembroke, by John, and Carlow, among other counties in this area, had the privileges of a palatinate on descending to one of the earl's heiresses. The relics of antiquity in the county comprise large cromlechs at Browne's Hill near Carlow and at Hacketstown, and a rath near Leighlin Bridge, in which were found several urns of baked earth, containing only small quantities of dust. Some relics of ecclesiastical and monastic buildings exist, and also the remains of several castles built after the English settlement. Old Leighlin, where the 12th century cathedral of St Lazerian is situated, is merely a village, although until the Union it returned two members to the Irish parliament.

CARLOW, the county town of Co. Carlow, Ireland, on the navigable river Barrow. Pop. of urban district (1901) 6513. It is 56 m. S.W. of Dublin by the Great Southern & Western railway. The castle (supposed to have been founded by Hugh de Lacy, appointed governor of Ireland in n 79, but sometimes attributed to King John), situated on an eminence overlooking the river, is still a chief feature of attraction in the general view of the town, although there is not much of the original building left. It consisted of a hollow quadrangle, with a massive round tower at each angle. The principal buildings are the Roman Catholic College of St Patrick (1793), a plain but spacious building in a picturesque park adjoining the Roman Catholic cathedral of the diocese of Kildare and Leighlin; the Protestant parish church, with a handsome steeple of modern erection ; the court-house, where the assizes are held, an octagonal stone building with a handsome Ionic portico ; and other county buildings. The cathedral, in the Perpendicular style, has a highly ornamented west front, and a monument to Bishop James Doyle (d. 1834). The Wellington Bridge over the river Barrow connects Carlow with the suburb of Graigue. Two m. N.E. of the town is one of the finest cromlechs in Ireland, and 3 m. to the west is the notable church, of Norman and pre-Norman date, of Killeshin in Queen's county. The industries of Carlow consist of brewing and flour-milling, and a considerable trade is carried on in the sale of butter and eggs.

Carlow was of early importance. In the reign of Edward III. the king's exchequer was removed thither, and £500, a large sum at that period, applied towards surrounding the town with a strong wall. In the early part of the reign of Queen Elizabeth the castle was taken, and the town burned by the Irish chieftain, Rory Oge O'More. When summoned to surrender by Ireton, the Commonwealth general, during the war of 1641, Carlow submitted without resistance. In the insurrection of 1798 the castle was attacked by an undisciplined body of insurgents. They were speedily repulsed, and suffered severe loss, no quarter being given; and, in the confusion of their flight, many of the

insurgents took refuge in houses, which the king's troops immediately set on fire. Carlow obtained a charter of incorporation as early as the 13th century, and was reincorporated, with enlarged privileges, by James I. The corporation, which was styled " The Sovereign, Free Burgesses and Commonalty of the Borough of Catherlogh," was authorized to return two members to the Irish parliament. The town returned one member to the Imperial parliament until 1885.

CARLSBAD, or Kaiser-Karlsbad (Czech, Karlovy Vary), a town and celebrated watering-place of Bohemia, Austria, 116 m. W.N.W. of Prague by rail. Pop. (1900) 14,640. It is situated at an altitude of 1227 ft. and lies in the beautiful narrow and winding valley of the Tepl at its junction with the Eger, being hemmed in by precipitous granite hills, covered with magnificent forests of pine. The town is spread on both banks of the river and in the valley of the Eger, its houses being built up the mountain sides in tier above tier of terraces approached by long flights of steps or steep and tortuous roads. This irregularity of site and plan, together with the varied form and high-pitched roofs of the houses, makes the place very picturesque. Among the principal buildings of Carlsbad are the Catholic parish church, built in 1732-1736 in rococo style; the gorgeous Russian church, finished in 1897; the English church; and a handsome synagogue. In the first rank of the other buildings stands the famous Muhlbrunnen Colonnade, erected between 1871 and 1878, which, with its 103 monolithic granite Corinthian columns, is a fine example of modern classical architecture; the Kurhaus (1865); the magnificent Kaiserbad, built in 1895 in the French Renaissance style, and several other bathing establishments; the Sprudel Colonnade, an imposing iron and glass structure, built in 1879, within which rises the Sprudel, the principal spring of Carlsbad; and several hospitals and hospices for poor patients. Both banks

of the Tepl are provided with quais, planted with trees, which constitute the chief pro- menades of the centre of the town; and there are, besides, a municipal park and several public gardens.

The mineral springs, to which Carlsbad owes its fame, rise from beneath a very hard kind of rock, known as Sprudelschale or Sprudeldecke, beneath which it is believed that there exists a large common reservoir of the hot mineral water, known as the Sprudelkessel. Several artificial apertures in the rock have been made for the escape of the steam of this subterranean cauldron, which, owing to the incrustations deposited by the water, require to be cleared at regular intervals. Altogether there are seventeen warm springs, with a temperature varying from 164 F. to 107-7° F., and two cold ones. The oldest, best- known, and at the same time the most copious spring is the Sprudel, a hot geyser with a temperature of 164° F., which gushes up in jets of i| ft. thick to a height of about 35 ft., and delivers about 405 gallons of water per minute. Other springs are the Muhlbrunnen, with a temperature of 121° F., which is after the Sprudel the most used spring; the Neubrunnen (138° F.); the Kaiser-Karl-Quelle (112 F.); the Theresien- brunnen (134° F.), &c. The warm springs belong to the class of alkaline-saline waters and have all the same chemical com- position, varying only in their degree of temperature. The chemical composition of the Sprudel, taken to a thousand parts of water, is: 2-405 sulphate of soda, 1-298 bicarbonate of soda, 1-042 chloride of soda, o- 186 sulphate of potash, o- 166 bicarbonate of magnesia, o-or2 bicarbonate of lithium, and 0-966 carbonic acid gas. They contain also traces of arsenic, antimony, selenium, rubidium, t'n and organic substances. The water is colourless and odourless, with a slightly acidulated and salt taste, and has a specific gravity of 1-0053 at 64-4° F. The waters are used both for drinking and bathing, and are very beneficent in cases of liver affections, biliary and renal calculi, diabetes, gout, rheumatism, and uric acid troubles. They are very powerful in their effect and must not be used except under medical direction, and during the cure, a carefully-regulated diet must be observed, coupled with a moderate amount of exercise in the open air. The number of visitors in igor was 51,454; in 1756 it was only 257; in 1828 it was 3713; and it attained 14,182 in 1869, and 34,396 in 1890.

CARLSBAD DECREES

Carlsbad is encircled by mountains, covered with beautiful forests of pine, which are made accessible by well-kept paths. Just above the town towers the Hirschensprung (1620 ft.), a little farther the Freundschaftshohe (1722 ft.); the Franz- Josefs-Hohe (1663 ft.); and the Aberg (1980 ft.). On the opposite bank of the Tepl lies the Rudolfshohe (1379 ft.); the Dreikreuzberg (1805 ft.); the Konig Otto's Hohe (i960 ft.); and the Ewiges Leben (2086 ft.), with the Stephaniewarte, a tower, 98 ft. high, built in 1889, which commands a superb view. The town is the centre of the porcelain and stoneware industry of Bohemia, and manufactures a special liqueur (Karlsbader Bitter), besides various objects from the Sprudel rock and con- fectionery. It exported, in 1901, 2j millions of bottles of mineral water, and 160,000 lb of Sprudel salt, i.e. salt obtained by evaporation from the water of the Sprudel.

Many interesting places are to be found near Carlsbad. To the north is the village of Dallwitz, with a porcelain factory, a handsome castle and beautiful oaks extolled by Theodor Korner, under which he composed in 181 2 his touching elegy on the downfall of Germany. To the east is the watering-place of Giesshiibl-Puchstein with celebrated springs, which contain alkaline waters impregnated with carbonic acid gas. To the west in the valley of the Eger, the village of Aich, with a porcelain factory, and a little farther the much-visited Hans Heiling's Rock, a wild and romantic spot, with which a very touching legend is connected: To the south-east the ruined castle of Engelhaus, situated on a rock of phonolite, 2340 ft. high, built probably in the first part of the 13 th century and destroyed by the Swedes in 1635. At the foot of the mountain lies the actual village of Engelhaus.

According to legend the springs of Carlsbad were discovered during a hunting expedition by the emperor Charles IV., who built the town, which derives its name from him, on both banks of the Tepl. But the hot springs were already known two centuries before, as is indicated by the name of the river Tepl (warm), under which name the river was known in the 12th century. Besides, on the same spot stood already in the 13th century a place called Vary, which means the Sprudel. The truth is, that the emperor Charles IV., after being cured here, built about 1358 a castle in the neighbourhood and accorded many privileges to the town. It obtained its charter as a town in 1370; the fame of the waters spread and it was created a royal free town in 1 707 by the emperor Joseph I. The waters were used

only for bathing purposes until 1520, when they began to be prescribed also for drinking. The first Kurhaus was erected in 1 71 1 near the Muhlbrunnen, and was replaced by a larger one, built in 1 76 1 by the empress Maria Theresa. Carlsbad was nearly completely destroyed by fire in 1604, and another great fire raged here in 1759. It also suffered much from inundations, especially in 1582 and 1890. In August 1819 a meeting of the ministers of the German courts took place here under the presidency of Prince Metternich, when many reactionary measures, embodied in the so-called " Carlsbad Decrees " (see below), were agreed upon and introduced in the various states of the German Confederation.

Among the extensive literature of the place see Mannl, Carlsbad and its Mineral Springs (Leipzig, 1850); Cartellieri, Karlsbad als Kurort (Karlsbad, 1888); Friedenthal, Der Kurort Karlsbad Topographisch und Medizinisch (Karlsbad, 1895).

CARLSBAD DECREES (Karlsbader Beschlusse), the name usually given to a series of resolutions (Beschlusse) passed by a conference of the ministers and envoys of the more important German states, held at Carlsbad from the 6th to the 31st of August 1819. The occasion of the meeting was the desire of Prince Metternich to take advantage of the consternation caused by recent revolutionary outrages (especially the murder of the dramatist Kotzebue by Karl Sand) to persuade the German governments to combine in a system for the suppression of the Liberal agitation in Germany. The pretended urgency of the case served as the excuse for only inviting to the conference those states whose ministers happened to be visiting Carlsbad at the time. The conferences were, therefore, actually attended by

the representatives of Austria, Prussia, Saxony, Bavaria, Wtirttemberg, Hanover, Baden, Nassau and Mecklenburg; at the fourth conference (August 9th) Baron von Fritsch, minister of state for Saxe-Weimar, who " happened to be present " at Carlsbad on that day, attended by special invitation. Prince Metternich presided over the conferences, and Friedrich von Gentz acted as secretary.

The business to be discussed, as announced in Metternich's opening address, was twofold: (1) Matters of urgeift importance necessitating immediate action; (2) Questions affecting the fundamental constitution of the German Confederation, demanding more careful and prolonged discussion. To the first class belonged (a) the urgent necessity for a uniform system of press

regulation in Germany; (b) the most urgent measures in regard to the supervision of universities and schools; (c) measures in view of the already discovered machinations of the political parties. To the second class belonged (a) the more clear definition of article XIII. of the Act of Confederation (i.e. state constitutions); (b) the creation of a permanent federal supreme court; (c) the creation of a federal executive organization (Bundes- Executions Ordnung) armed with power to make the decrees of the diet and the judgments of the high court effective; (d) the facilitation of commercial intercourse within the con- federation in accordance with article XIX. of the Act of Con- federation (Beilage A. zum ersten Protokoll, Martens, iv. p. 74).

These questions were debated in twenty-three formal conferences. On the issues raised by the first class there was practical unanimity. All were agreed that the state of Germany demanded disciplinary measures, and as the result of the deliberations it Was determined to lay before the federal diet definite proposals for (1) a uniform press censorship over all periodical publications; (2) a system of ” curators ” to supervise the education given in universities and schools, with disciplinary enactments against professors and teachers who should use their position for purposes of political propaganda; (3) the erection of a central commission at Mainz, armed with inquisitorial powers, for the purpose of unmasking the widespread revolutionary conspiracy, the exist- ence of which was assumed.

On the questions raised under the second class there was more fundamental difference of opinion, and by far the greater part of the time of the conference was occupied in discussing the burning question of the due interpretation of article XIII. The controversy raged round the distinction between ” assemblies of estates,” as laid down in the article, and ” representative assemblies,” such as had been already established in several German states. Gentz, in an elaborate memorandum (Nebenbeilage zum siebenten Protokoll, iv. p. 102), laid down that representation by estates was the only system compatible with the conservative principle, as the ” outcome of a well-ordered civil society, in which the relations and rights of the several estates are due to the peculiar position of the classes and corporations on which they are based, which have been from time to time modified by law without detracting from the essentials of the sovereign power “; whereas representative assemblies are based on ” the sovereignty of the people.” In answer to this, Count Wintzingerode, on behalf of the king of Wurttemberg,

placed on record (N ebenbeilage 2 zum neunten Protokoll, p. 147) a protest, in which he urged that to insist on the system of estates would be to stereotype caste distinctions foreign to the whole spirit of the age, would alienate public opinion from the governments, and — if enforced by the central power — would violate the sovereign independence of those states which, like Wurttemberg, had already established representative constitutions.

Though the majority of the ministers present favoured the Austrian interpretation of article XIII. as elaborated by Gentz, they were as little prepared as the representative of Wurttemberg to agree to any hasty measures for strengthening the federal government at the expense of the jealously guarded prerogatives of the minor sovereignties. The result was that the constitutional questions falling under the second class were reserved for further discussion at a general conference of German ministers to be summoned at Vienna later in the year. The

effective Carlsbad resolutions, subsequently issued as laws by the federal diet, were therefore only those dealing with the curbing of the ” revolutionary ” agitation. For the results of their operation see Germany: History.

The acts, piotocols and resolutions of the conference of Carlsbad are given in M. de Martens’s Nouveau Recueil general de traites, &c, t. 4, pp. 8-166 (Gottingen, 1846). An interesting criticism of the Carlsbad Decrees is appended (p. 166), addressed by Baron Hans von Gagern, Luxemburg representative in the federal diet, to Baron von Pfcssen, Mecklenburg plenipotentiary at the conference of Carlsbad. (W. A. P.)

CARLSTADT, Karlstadt or Karolostadt (1480-1541), German reformer, whose real name was Andreas Rudolf Boden- stein, was born at Carlstadt in Bohemia. He entered the university of Erfurt in the winter term of 1499-1500, and re- mained there till 1503, when he went to Cologne. In the winter term of 1 504-1 505 he transferred himself to the newly founded university of Wittenberg, where he soon established his repu- tation as a teacher of philosophy, and a zealous champion of the scholastic system of Thomas Aquinas, against the revised nominalism

associated with the name of Occam. In 1508 he was made canon of the Allerheiligenstift, a collegiate church incorporated in the university; and in 1510 he became doctor of theology and archdeacon, his duties being to preach, to say mass once a week and to lecture before the. university; in 1513 he was appointed ordinary professor of theology. In 151 5 he went to Rome, where with a view to becoming provost of the Aller- heiligenstift he studied law, taking his degree as doctor juris utriusque. His experiences in the papal city produced upon him the same effect as upon Luther, and when in 1516 he returned to Germany it was as an ardent opponent of the Thomist philosophy and as a champion of the Augustinian doctrine of the impotence of the human will and salvation through Divine grace alone. The 151 theses of Carlstadt, dated the 16th of September 1516, discovered by Theodor Kolde (" Wittenberger Disputations- thesen " in Zeitschrift fiir Kirchengeschichte, xi. p. 448, &c), prove that, so far from owing his change of view to Luther's influence, he was at this time actually in advance of Luther. The two reformers were, in fact, never friends; though from the end of 1 5 16 onwards the development of each was considerably influenced by the other.

In the spring of 1518, in reply to Eck's Obelisci, an attack on Luther's 95 theses, Carlstadt published a series of theses, maintaining the supremacy of the Holy Scriptures (which he regarded as verbally inspired) over ecclesiastical tradition and the authority of the fathers, and asserting the liability of general councils to error. Eck challenged him to a public disputation, in which Luther also took part, and which lasted from the 27th of June to the 15th of July 1519. In this dialectical warfare Carlstadt was no match for Eck; but the dispute only served to confirm him in his revolt from the dominant theology, and in three violent polemical treatises against Eck he proclaimed the doctrine of the exclusive operation of grace in the justification of believers.

This attitude led him in 1520, by a logical development, to an open attack on all those ecclesiastical practices in which the doctrine of justification by works had become crystallized; e.g. indulgences and the abuse of holy water and consecrated salt. At the same time he appeared as the first of modern biblical critics, denying the Mosaic authorship of the Pentateuch and classing the Scriptures into three categories of different value in accordance with the degrees of certainty as to their traditional origin. He still, however, maintained the doctrine of verbal inspiration, and

attacked Luther for rejecting the epistle of James. In 1520 Carlstadt's name was included in the papal bull ex-communicating Luther; after a momentary hesitation he decided to remain firm in his protestant attitude, published an appeal from the pope to a general council, and attacked the corruptions of the papacy itself in a treatise on " the holiness of the pope " {Von papstlicher Heiligkeit, October 17th, 1520).

In May 1521 Carlstadt went to Denmark, on the invitation of King Christian II., to assist in the reform of the church; but his disposition was anything but conciliatory, and, though his influence is traceable in the royal law of the 26th of May 1521

abolishing the celibacy of the clergy, he was forced, by the hostility of nobles and clerics alike, to leave after a few weeks' stay. In June he was back in Wittenberg, busy with tracts on the Holy Sacrament (he still believed in the corporeal presence) and against the celibacy of the clergy (de coelibatu). Carlstadt has been unjustly accused of being responsible for the riots against the Mass fomented by the Augustinian friars and the students; as a matter of fact, he did his best to keep the peace, pending a decision by the elector of Saxony and the authorities of the university, and it was not till Christmas day that he himself publicly communicated the laity under both species. The next day he announced his engagement to a young lady of noble family, Anna von Mochau.

From this moment Carlstadt was accepted as the leader of Protestantism in Wittenberg; and, at his instance, auricular confession, the elevation of the Host and the rules for fasting were abolished. On the 19th of January he was married, in the presence of many of the university professors and city magistrates. A few days later the property of the religious corporations was confiscated by the city and, after pensions had been assigned to their former members, was handed over to charitable foundations. A pronouncement of Carlstadt's against pictures and images, supported by the town, also led to iconoclastic excesses.

The return of Luther early in March, however, ended Carl- stadt's supremacy. The elector Frederick the Wise was stren- uously opposed to any alteration in the traditional services, and at his command Luther restored communion in one kind and the elevation of the Host. Carlstadt himself, though still pro- fessor, was deprived of all influence in practical affairs, and devoted

himself entirely to theological speculation, which led him ever nearer to the position of the mystics. He now denied the necessity for a clerical order at all, called himself " a new layman," doffed his ecclesiastical dress, and lived for a while as a peasant with his wife's relations at Segrena. In the middle of 1523, however, he went to Orlamunde, a living held by him with his canonry, and there in the parish church reformed the services according to his ideas, abolishing the Mass and even preaching against the necessity for sacraments at all. He still continued occasionally to lecture at Wittenberg and to fulminate against Luther's policy of compromise.

All this brought him into violent conflict with the elector, the university and Luther himself. His professorship and living were confiscated and, in September 1524, he went into exile with his wife and child. He was now exposed to great privations and hardships, but found opportunity for polemical writing, proclaiming for the first time his disbelief in the " Real Presence." He preached wherever he could gain a hearing, and visited Strassburg, Heidelberg, Zurich, Basel, Schweinfurth, Kitzingen and Nordlingen, before he found a more permanent resting-place at Rothenburg on the Tauber. He was here when the Peasants' War broke out, and was sent as a delegate to reason with the insurgents. His admonitions were unsuccessful, and he only succeeded in bringing himself under suspicion of being in part responsible for their excesses. When Rothenburg was taken by the margrave of Anspach (28th June 1525) Carlstadt had to fly for his life. His spirit was now broken, and from Frankfort he wrote to Luther humbly praying him to intercede for him with the elector. Luther agreed to do so, on receiving from Carlstadt a recantation of his heterodox views on the Lord's Supper, and as the result the latter was permitted to return to Wittenberg (1525). He was not, however, allowed to lecture, and he lived as a peasant, first at Segrena and afterwards at Bergwitz, cultivating small properties, in which he had invested the remnant of his fortune, with such poor success that at the end of 1526 he had to eke out a living as a pedlar in the little town of Kemberg. This was endurable; but not so the demand presently made upon him to take up the cudgels against Zwingli and Oecolampadius. Once more he revolted; to agree with " Dr Martin's opinions on the sacrament " was as difficult as flying like a bird; he appealed to the elector to allow him to leave Saxony; but the elector's conscience was in Luther's

keeping, and Carlstadt had to fly ignominiously in order to avoid imprisonment. He escaped to Holstein, where in March 1529 he stayed with the Anabaptist Melchior Hofmann. Expelled by the authorities, he took refuge in East Friesland, where he remained till the beginning of 1530 under the protection of a nobleman in sympathy with the Helvetic reformers. His preaching gave him great influence, but towards the close of the year persecution again sent him on his travels. He ultimately reached Zurich, where the recommendations of Bucer and Oecolampadius secured him a friendly reception by Zwingli, who procured him employment. After Zwingli's death he remained in close intercourse with the Zurich preachers, who defended him against renewed attacks on Luther's part; and finally, in 1534, on Bullinger's recommendation, he was called to Basel as preacher at the church of St Peter and professor at the university. Here he remained till his death on the 24th of December 1541.

During these latter years Carlstadt's attitude became more moderate. His championship of the town council against the theocratic claims of Antistes Myconius and the ecclesiastical council, in the matter of the control of the university, was perhaps in consonance with his earlier views on the relations of clergy and laity. He was, however, also instrumental in restoring the abolished doctorate of theology and other degrees; and, despatched on a mission to Strassburg in 1536, to take part in a discussion on a proposed compromise in the matter of the Lord's Supper between the theologians of Strassburg and Wittenberg, he displayed a conciliatory attitude which earned him the praise of Bucer. Carlstadt's historical significance lies in the fact that he was one of the pioneers of the Reformation. But he was a thinker and dreamer rather than a man of affairs, and though he had the moral and physical courage to carry his principles to their logical conclusions (he was the first priest to write against celibacy, and the first to take a wife), he lacked the balance of mind and sturdy common sense that inspired Luther's policy of consideration for " the weaker brethren " and built up the Evangelical Church on a conservative basis. But though Carl- stadt was on friendly terms, and corresponded with Munzer and other Anabaptists, he did not share their antinomian views, nor was he responsible for their excesses. His opinion as to the relation of faith and " good works " was practically that ex- pressed in articles XL and XII. of the Church of England. In reply to Luther's violent onslaught on him in his Wider die himmlischen Propheten he issued from

Rothenburg his Anzeig etlicher Hauptartikel christlicher Lehre, a compendious exposition of his views, in which he says: ” Those who urge to good works do so, not that the conscience may be justified by works, but that their freedom may redound to God’s glory and that their neighbours may be fired to praise God.”

SeeC.F. Jaeger, Andreas Bodenstein’yon Karlstadt (Stuttgart, 1 856) ; Hermann Barge, Andreas Bodenstein von Karlstadt, vol. i. (Leipzig, I905)-

CARLYLE, ALEXANDER (1722-1805), Scottish divine, was born on the 26th of January 1722, in Dumfriesshire, and passed his youth and early manhood at Prestonpans, where he wit- nessed the battle of 1745. He was educated at Edinburgh (M.A. 1743), Glasgow and Leiden. From 1748 until his death on the 28th of August 1805 he was minister at Inveresk in Mid- lothian, and during this long career rose to high eminence in his church not only as leader of the moderate or ” broad ” Church section, but as moderator of the General Assembly 1770 and dean of the Chapel Royal in 1789. His influence was enhanced by his personal appearance, which was so striking as to earn him the name of ” Jupiter Carlyle “; and his auto- biography (published i860), though written in his closing years and not extending beyond the year 1770, is abundantly interesting as a picture of Scottish life, social and ecclesiastical, in the 18th century. Carlyle’s memory recalled the Porteous Riots of 1736, and less remotely his friendship with Adam Smith, David Hume, and John Home, the dramatist, for witnessing the performance of whose tragedy Douglas he was censured in 1757. He was distinctly a ion vivant, but withal an upright, conscientious and capable minister.

CARLYLE, JOSEPH DACRE (1750-1804), British orientalist, was born in 1759 at Carlisle, where his father was a physician. He went in 1775 to Cambridge, was elected a fellow of Queens’ College in 1779, taking the degree of B.D. in 1793. With the assistance of a native of Bagdad known in England as David Zamio, then resident at Cambridge, he attained great proficiency in Arabic literature; and after succeeding Dr Paley in the chancellorship of Carlisle, he was appointed, in 1795, professor of Arabic in Cambridge University. His translation from the Arabic of Yusuf ibn Taghri Birdi, the Rerum Egypticarum Annates, appeared in 1792, and in 1796 a volume of Specimens of Arabic Poetry, from the earliest times to the fall of the Caliphate, with some account of the authors. Carlyle was appointed chap- lain by Lord Elgin to the embassy at

Constantinople in 1799, and prosecuted his researches in Eastern literature in a tour through Asia Minor, Palestine, Greece and Italy, collecting in his travels several valuable Greek and Syriac MSS. for a projected critical edition of the New Testament, collated with the Syriac and other versions — a work, however, which he did not live to complete. On his return to England in 1801 he was presented by the bishop of Carlisle to the living of Newcastle-on-Tyne, where he died on the 12th of April 1804. After his death there appeared a volume of poems descriptive of the scenes of his travels, with prefaces extracted from his journal. Among other works which he left unfinished was an edition of the Bible in Arabic, completed by H. Ford and published in 1 8 1 1 .

CARLYLE, THOMAS (1795-1881), British essayist, historian and philosopher,born on the 4th of December 1 795 at Ecclefechan, in Annandale, was the eldest of the nine children of James Carlyle by his second wife, Janet Aitken. The father was by trade a mason, and afterwards a small farmer. He had joined a sect of seceders from the kirk, and had all the characteristics of the typical Scottish Calvinist. He was respected for his integrity and independence, and a stern outside covered warm affections. The family tie between all the Carlyles was unusually strong, and Thomas regarded his father with a reverence which found forcible expression in his Reminiscences. He always showed the tenderest love for his mother, and was the best of brothers. The narrow means of his parents were made sufficient by strict frugality. He was sent to the parish school when seven, and to Annan grammar-school when ten years old. His pugnacity brought him into troubles with his fellows at Annan; but he soon showed an appetite for learning which induced his father to educate him for the ministry. He walked to Edinburgh in November 1809, and entered the university. He cared little for any of the professors, except Sir John Leslie, from whom he learned some mathematics. He acquired a little classical knowledge, but the most valuable influence was that of his contemporaries. A few lads in positions similar to his own began to look up to him as an intellectual leader, and their correspondence with him shows remarkable interest in literary matters. In 1814 Carlyle, still looking forward to the career of a minister, obtained the mathematical mastership at Annan. The salary of £60 or £70 a year enabled him to save a little money. He went to Edinburgh once or twice, to deliver the discourses required from students of divinity. He does not seem, however,

to have taken to his profession very earnestly. He was too shy and proud to see many of the Annan people, and found his chief solace in reading such books as he could get. In 1816 he was appointed, through the recommendation of Leslie, to a school at Kirkcaldy, where Edward Irving, Carlyle's senior by three years, was also master of a school. Irving's severity as a teacher had offended some of the parents, who set up Carlyle to be his rival. A previous meeting with Irving, also a native of Annan, had led to a little passage of arms, but Irving now welcomed Carlyle with a generosity which entirely won his heart, and the rivals soon became the closest of friends. The intimacy, affection- ately commemorated in the Reminiscences, was of great im- portance to Carlyle's whole career. " But for Irving," he says, " I had never known what the communion of man with man means." Irving had a library, in which Carlyle devoured Gibbon and much French literature, and they made various excursions

together. Carlyle did his duties as a schoolmaster punctiliously, but found the life thoroughly uncongenial. No man was less fitted by temperament for the necessary drudgery and worry. A passing admiration for a Miss Gordon is supposed to have suggested the " Blumine " of Sartor Resarlus; but he made no new friendships, and when Irving left at the end of 1818 Carlyle also resigned his post.

He had by this time resolved to give up the ministry. He has given no details of the intellectual change which alienated him from the church. He had, however, been led, by whatever process, to abandon the dogmatic system of his forefathers, though he was and always remained in profound sympathy with the spirit of their teaching. A period of severe struggle followed. He studied law for a time, but liked it no better than schoolmastering. He took a pupil or two, and wrote articles for the Edinburgh Encyclopaedia under the editorship of Brewster. He occasionally visited his family, and their unfailing confidence helped to keep up his courage. Meanwhile he was going through a spiritual crisis. Atheism seemed for a time to be the only alternative to his old creed. It was, however, profoundly repugnant to him. At last, one day in June 1821, after three weeks' total sleeplessness, he went through the crisis afterwards described quite " literally " in Sartor Resartus. He cast out the

spirit of negation, and henceforth the temper of his misery was changed to one, not of " whining," but of " indignation and grim fire-eyed defiance." That, he says, was his spiritual new-birth, though certainly not into a life of serenity. The conversion was coincident with Carlyle's submission to a new and very potent influence. In 1819 he had begun to study German, with which he soon acquired a very remarkable familiar- ity. Many of his contemporaries were awakening to the im- portance of German thought, and Carlyle's knowledge enabled him before long to take a conspicuous part in diffusing the new intellectual light. The chief object of his reverence was Goethe. In many most important respects no two men could be more unlike; but, for the present, Carlyle seems to have seen in Goethe a proof that it was possible to reject outworn dogmas without sinking into materialism. Goethe, by singularly different methods, had emerged from a merely negative position into a lofty and coherent conception of the universe. Meanwhile, Carlyle's various anxieties were beginning to be complicated by physical derangement. A rat, he declared, was gnawing at the pit of his stomach. He was already suffering from the ailments, whatever their precise nature, from which he never escaped. He gave vent to his irritability by lamentations so grotesquely exaggerated as to make it difficult to estimate the real extent of the evil.

Irving's friendship now became serviceable. Carlyle's con- fession of the radical difference of religious opinion had not alienated his friend, who was settling in London, and used his opportunities for promoting Carlyle's interest. In January 1822 Carlyle, through Irving's recommendation, became tutor to Charles and Arthur Buller, who were to be students at Edinburgh. Carlyle's salary was £200 a year, and this, with the proceeds of some literary work, enabled him at once to help his brother John to study medicine and his brother Alexander to take up a farm. Carlyle spent some time with the elder Bullers, but found a life of dependence upon fashionable people humiliating and unsatisfactory. He employed himself at inter- vals upon a life of Schiller and a translation of Wilhelm Meisler. He received £50 for a translation of Legendre's Geometry; and an introduction, explaining the theory of proportion, is said by De Morgan to show that he could have gained distinction as an expounder of mathematical principles. He finally gave up his tutorship in July 1824, and for a time tried to find employment in London. The impressions made upon him by London men of letters were most unfavourable. Carlyle felt by this time conscious of having a

message to deliver to mankind, and his comrades, he thought, were making literature a trade instead of a vocation, and prostituting their talents to frivolous journalism. He went once to see Coleridge, who was then delivering his oracular utterances at Highgate, and the only result was the

singularly vivid portrait given in a famous chapter in his life of Sterling. Coleridge seemed to him to be ineffectual as a philosopher, and personally to be a melancholy instance of genius running to waste. Carlyle, conscious of great, abilities, and impressed by such instances of the deleterious effects of the social atmo- sphere of London, resolved to settle in his native district. There he could live frugally and achieve some real work. He could, for one thing, be the interpreter of Germany to England. A friendly letter from Goethe, acknowledging the translation of Wilhelm Meisler, reached him at the end of 1824 and greatly encouraged him. Goethe afterwards spoke warmly of the life of Schiller, and desired it to be translated into German. Letters occasionally passed between them in later years, which were edited by Professor Charles Eliot Norton in 1887. Goethe received Carlyle's homage with kind complacency. The gift of a seal to Goethe on his birthday in 183 1 " from fifteen English friends," including Scott and Wordsworth, was suggested and carried out by Carlyle. The interest in German, which Carlyle did so much to promote, suggested to him other translations and reviews during the next few years, and he made some preparations for a history of German literature. British curiosity, however, about such matters seems to have been soon satisfied, and the demand for such work slackened.

Carlyle was meanwhile passing through the most important crisis of his personal history. Jane Baillie Welsh, born 1801, was the only child of Dr Welsh of Haddington, She had shown precocious talent, and was sent to the school at Haddington where Edward Irving (q.v.) was a master. After her father's death in 1819 she lived with her mother, and her wit and beauty attracted many admirers. Her old tutor, Irving, was now at Kirkcaldy, where he became engaged to a Miss Martin. He visited Haddington occasionally in the following years, and a strong mutual regard arose between him and Miss Welsh. They contemplated a marriage, and Irving endeavoured to obtain a release from his previous engagement. The Martin family held him to his word, and he took a final leave of Miss Welsh in 1822. Meanwhile he had brought Carlyle from Edinburgh and introduced him to the Welshes. Carlyle was attracted by the brilliant abilities of the

young lady, procured books for her and wrote letters to her as an intellectual guide. The two were to perform a new variation upon the theme of Abelard and Helo'ise. [A good deal of uncertainty long covered the precise character of their relations. Until 1909, when Mr. Alexander Carlyle published his edition of the " love-letters," the full material was not accessible; they had been read by Carlyle's biographer, Froude, and also by Professor Charles Norton, and Norton (in his edition of Carlyle's Early Letters, 1886) declared that Froude had distorted the significance of this corre- spondence in a sense injurious to the writers. The publica- tion of the letters certainly seems to justify Norton's view.] Miss Welsh's previous affair with Irving had far less im- portance than Froude ascribes to it; and she soon came to regard her past love as a childish fancy. She recognized Carlyle's vast intellectual superiority, and the respect gradually deepened into genuine love. The process, however, took some time. Her father had bequeathed to her his whole property (£200 to £300 a year). In 1823 she made it over to her mother, but left the whole to Carlyle in the event of her own and her mother's death. She still declared that she did not love him well enough to become his wife. In 1824 she gradually relented so far as to say that she would marry if he could achieve inde- pendence. She had been brought up in a station superior to that of the Carlyles, and could not accept the life of hardship which would be necessary in his present circumstances. Carlyle, accustomed to his father's household, was less frightened by the prospect of poverty. He was determined not to abandon his vocation as a man of genius by following the lower though more profitable paths to literary success, and expected that his wife should partake the necessary sacrifice of comfort. The natural result of such discussions followed. The attraction became stronger on both sides, in spite of occasional spasms of doubt.

An odd incident precipitated the result. A friend of Irving's, Mrs Basil Montague, wrote to Miss Welsh, to exhort her to sup- press her love for Irving, who had married Miss Martin in 1823. Miss Welsh replied by announcing her intention to marry Carlyle ; and then told him the whole story, of which he had previously been ignorant. He properly begged her not to yield to the impulse without due consideration. She answered by coming at once to his father's house, where he was staying; and the marriage was

finally settled. It took place on the 17th of October 1826.

Carlyle had now to arrange the mode of life which should enable him to fulfil his aspiration. His wife had made over her income to her mother, but he had saved a small sum upon which to begin housekeeping. A passing suggestion from Mrs Carlyle that they might live with her mother was judiciously abandoned. Carlyle had thought of occupying Craigenputtock, a remote and dreary farm belonging to Mrs Welsh. His wife objected his utter incapacity as a farmer; and they finally took a small house at Comely Bank, Edinburgh, where they could live on a humble scale. The brilliant conversation of both attracted some notice in the literary society of Edinburgh. The most important connexion was with Francis, Lord Jeffrey, still editor of the Edinburgh Review. Though Jeffrey had no intellectual sympathy with Carlyle, he accepted some articles for the Review and became warmly attached to Mrs Carlyle. Carlyle began to be known as leader of a new " mystic " school, and his earnings enabled him to send his brother John to study in Germany. The public appetite, however, for " mysticism " was not keen. In spite of support from Jeffrey and other friends, Carlyle failed in a candidature for a professorship at St Andrews. His brother, Alexander, had now taken the farm at Craigenputtock, and the Carlyles decided to settle at the separate dwelling-house there, which would bring them nearer to Mrs Welsh. They went there in 1828, and began a hard struggle. Carlyle, indomitably determined to make no concessions for immediate profit, wrote slowly and carefully, and turned out some of his most finished work. He laboured " passionately " at Sartor Resartus, and made articles out of fragments originally intended for the history of German literature. The money difficulty soon became more pressing. John, whom he was still helping, was trying unsuccessfully to set up as a doctor in London; and Alexander's farming failed. In spite of such drawbacks, Carlyle in later years looked back upon the life at Craigenputtock as on the whole a comparatively healthy and even happy period, as it was certainly one of most strenuous and courageous endeavour. Though often absorbed in his work and made both gloomy and irritable by his anxieties, he found relief in rides with his wife, and occasionally visiting their relations. Their letters during temporary separations are most affectionate. The bleak climate, however, the solitude, and the necessity of managing a household with a single servant, were excessively trying to a delicate woman, though Mrs Carlyle concealed from her husband the extent of her sacrifices.

The position was gradually becoming untenable. In the autumn of 1831 Carlyle was forced to accept a loan of £50 from Jeffrey, and went in search of work to London, whither his wife followed him. He made some engagements with publishers, though no one would take Sartor Resartus, and returned to Craigenputtock in the spring of 1832. Jeffrey, stimulated per- haps by his sympathy for Mrs Carlyle, was characteristically generous. Besides pressing loans upon both Thomas and John Carlyle, he offered to settle an annuity of £100 upon Thomas, and finally enabled John to support himself by recommending him to a medical position. 1 Carlyle's proud spirit of independence made him reject Jeffrey's help as long as possible; and even his acknowledgment of the generosity (in the Reminiscences) is tinged with something disagreeably like resentment. In 1834 he applied to Jeffrey for a post at the Edinburgh Observatory. 1 John Aitken Carlyle (1801-1879) finally settled near the Carlyles in Chelsea. He began an English prose version of Dante's Divine Comedy — which has earned him the name of " Dante Carlyle " — but only completed the translation of the Inferno (1849). The work included a critical edition of the text and a valuable intro- duction and notes.

Jeffrey naturally declined to appoint a man who, in spite of some mathematical knowledge, had no special qualification, and administered a general lecture upon Carlyle's arrogance and eccentricity which left a permanent sense of injury.

In the beginning of 1833 the Carlyles made another trial of Edinburgh. There Carlyle. found materials in the Advocates' Library for the article on the Diamond Necklace, one of his most perfect writings, which led him to study the history of the French Revolution. Sartor Resartus was at last appearing in Fraser's Magazine, though the rate of payment was cut down, and the publisher reported that it was received with " unqualified dissatisfaction." Edinburgh society did not attract him, and he retreated once more to Craigenputtock. After another winter the necessity of some change became obvious. The Carlyles resolved to " burn their ships." They went to London in the summer of 1834, and took a house at 5 (now 24) Cheyne Row, Chelsea, which Carlyle inhabited till his death; the house has since been bought for the public. Irving, who had welcomed him on former occasions, was just dying, — a victim, as Carlyle thought, to fashionable cajoleries. A few young men were beginning to show appreciation. J. S. Mill had made Carlyle's acquaintance in the previous visit to London, and had corre- sponded with him. Mill had introduced Ralph Waldo Emerson, who visited

Craigenputtock in 1833. Carlyle was charmed with Emerson, and their letters published by Professor Norton show that his regard never cooled. Emerson's interest showed that Carlyle's fame was already spreading in America. Carlyle's connexion with Charles Buller, a zealous utilitarian, introduced him to the circle of " philosophical radicals."

Carlyle called himself in some sense a radical; and J. S. Mill, though not an intellectual disciple, was a very warm admirer of his friend's genius. Carlyle had some expectation of the editorship of the London Review, started by Sir W. Molesworth at this time as an organ of philosophical radicalism. The combination would clearly have been explosive. Meanwhile Mill, who had collected many books upon the French Revolution, was eager to help Carlyle in the history which he was now beginning. He set to work at once and finished the first volume in five months. The manuscript, while entrusted to Mill for annotation, was burnt by an accident. Mill induced Carlyle to accept in compensation £100, which was urgently needed. Carlyle took up the task again and finished the whole on the 12th of January 1837. " I can tell the world," he said to his wife, " you have not had for a hundred years any book that comes more direct and flamingly from the heart of a living man. Do what you like with it, you "

The publication, six months later, of the French Revolution marks the turning-point of Carlyle's career. Many readers hold it to be the best, as it is certainly the most characteristic, of Carlyle's books. The failure of Sartor Resartus to attract average readers is quite intelligible. It contains, indeed, some of the most impressive expositions of his philosophical position, and some of his most beautiful and perfectly written passages. But there is something forced and clumsy, in spite of the flashes of grim humour, in the machinery of the Clothes Philosophy. The mannerism, which has been attributed to an imitation of Jean Paul, appeared to Carlyle himself to be derived rather from the phrases current in his father's house, and in any case gave an appropriate dialect for the expression of his peculiar idiosyncrasy. But it could not be appreciated by readers who would not take the trouble to learn a new language. In the French Revolution Carlyle had discovered his real strength. He was always at his best when his imagination was set to work upon a solid frame- work of fact. The book shows a unique combination: on the one hand is the singularly shrewd insight into character and the vivid realization of the picturesque; on the

other is the “mysticism” or poetical philosophy which relieves the events against a background of mystery. The contrast is marked by the humour which seems to combine a cynical view of human folly with a deeply pathetic sense of the sadness and suffering of life. The convictions, whatever their value, came, as he said, ” flamingly from the heart.” It was, of course, impossible for Carlyle to satisfy modern requirements of matter-of-fact accuracy.

He could not in the time have assimilated all the materials even then extant, and later accumulations would necessitate a complete revision. Considered as a ” prose epic,” or a vivid utterance of the thought of the period, it has a permanent and unique value.

The book was speedily successful. It was reviewed by Mill in the Westminster and by Thackeray in The Times, and Carlyle, after a heroic struggle, was at last touching land. In each of the years 1837 to 1840 he gave a course of lectures, of which the last only (upon ” Hero Worship “) was published; they materially helped his finances. By Emerson’s management he also received something during the same period from American publishers. At the age of forty-five he had thus become inde- pendent. He had also established a position among the chief writers of the day. Young disciples, among whom John Sterling was the most accepted, were gathering round him, and he became an object of social curiosity. Monckton Milnes (Lord Houghton) , who won universal popularity by the most genuine kindliness of nature, became a cordial friend. Another important intimacy was with the Barings, afterwards Lord and Lady Ashburton. Carlyle’s conversational powers were extraordinary; though, as he won greater recognition as a prophet, he indulged too freely in didactic monologue. In his prophetic capacity he published two remarkable books: Chartism (1829), enlarged from an article which Lockhart, though personally approving, was afraid to take for the Quarterly; and Past and Present (1843), in which the recently published Mediaeval Chronicle was taken as a text for the exposure of modern evils. They may be regarded as expositions of the doctrine implicitly set forth in the French Revolution. Carlyle was a ” radical ” as sharing the sentiments of the class in which he was born. He had been profoundly moved

by the widely-spread distresses in his earlier years. When the yeomanry were called out to suppress riots after the Peace, his sympathies were with the people rather than with the authorities. So far he was in harmony with Mill and the ” philo- sophical radicals.” A fundamental divergence of principle, however, existed and was soon indicated by his speedy separation from the party and alienation from Mill himself. The Revolu- tion, according to him, meant the sweeping away of effete beliefs and institutions, but implied also the necessity of a reconstructive process. Chartism begins with a fierce attack upon the laissez faire theory, which showed blindness to this necessity. The prevalent political economy, in which that theory was embodied, made a principle of neglecting the very evils which it should be the great function of government to remedy. Carlyle’s doctrines, entirely opposed to the ordinary opinions of Whigs and Radicals, found afterwards an expositor in his ardent disciple Ruskin, and have obvious affinities with more recent socialism. At the time he was as one crying in the wilderness to little practical purpose. Liberals were scandalized by his apparent identification of ” right ” with ” might,” implied in the demand for a strong government; and though he often declared the true inter- pretation to be that the right would ultimately become might, his desire for strong government seemed too often to sanction the inverse view. He came into collision with philanthropists, and was supposed to approve of despotism for its own sake.

His religious position was equally unintelligible to the average mind. While unequivocally rejecting the accepted creeds, and so scandalizing even liberal theologians, he was still more hostile to simply sceptical and materialist tendencies. He was, as he called himself, a ” mystic “; and his creed was too vague to be put into any formula beyond a condemnation of atheism. One corollary was the famous doctrine of ” hero worship ” first ex- pounded in his lectures. Any philosophy of history which emphasized the importance of general causes seemed to him to imply a simply mechanical doctrine and to deny the efficacy of the great spiritual forces. He met it by making biography the essence of history, or attributing all great events to the ” heroes,” who are the successive embodiments of divine revelations. This belief was implied in his next great work, the Life and Letters of Oliver Cromwell, published in 1845. The great Puritan hero was a man after his own heart, and the portrait

drawn by so sympathetic a writer is not only intensely vivid, but

a very effective rehabilitation of misrepresented character. The " biographical " view of history, however, implies the weakness, not only of unqualified approval of all Cromwell's actions, but of omitting any attempt to estimate the Protector's real relation to the social and political development of the time. The ques- tion, what was Cromwell's real and permanent achievement, is not answered nor distinctly considered. The effect maybe partly due to the peculiar form of the book as a detached series of documents and comments. The composition introduced Carlyle to the " Dryasdust " rubbish heaps of which he here and ever afterwards bitterly complained. A conscientious desire to unearth the facts, and the effort of extracting from the dullest records the materials for graphic pictures, made the process of production excessively painful. For some years after Cromwell Carlyle wrote little. His growing acceptance by publishers, and the inheritance of her property by Mrs Carlyle on her mother's death in 1842, finally removed the stimulus of money pressure. He visited Ireland in 1846 and again in 1849, when he made a long tour in company with Sir C. Gavan Duffy, then a young member of the Nationalist party (see Sir C. G. Duffy's Conversations with Carlyle, 1892, for an interesting narrative). Carlyle's strong convictions as to the misery and misgovernment of Ireland recommended him to men who had taken part in the rising of 1848. Although the remedies acceptable to a eulogist of Cromwell could not be to their taste, they admired his moral teaching; and he received their attentions, as Sir C. G. Duffy testifies, with conspicuous courtesy. His aversion from the ordinary radical- ism led to an article upon slavery in 1849, to which Mill replied, and which caused their final alienation. It was followed in 1850 by the Latterday Pamphlets, containing "sulphurous" denunciations of the do-nothing principle. They gave general offence, and the disapproval, according to Froude, stopped the sale for years. The Life of Sterling (d. 1844), which appeared in 1851, was intended to correct the life by Julius Hare, which had given too much prominence to theological questions. The subject roused Carlyle's tenderest mood, and the Life is one of the most perfect in the language.

Carlyle meanwhile was suffering domestic troubles, unfortunately not exceptional in their nature, though the exceptional intellect and characters of the persons concerned have given them unusual prominence. Carlyle's constitutional irritability made him intensely sensitive to petty annoyances. He suffered the torments of dyspepsia; he was often sleepless, and the

crowing of " demon-fowls " in neighbours' yards drove him wild. Composition meant for him intense absorption in his work; solitude and quiet were essential; and he resented inter- ruptions by grotesque explosions of humorously exaggerated wrath. Mrs Carlyle had to pass many hours alone, and the management of the household and of devices intended to shield him from annoyances was left entirely to her. House-cleanings and struggles with builders during the construction of a " sound-proof room " taxed her energy, while Carlyle was hiding himself with his family in Scotland or staying at English country houses. Nothing could be more affectionate than his behaviour to his wife on serious occasions, such as the death of her mother, and he could be considerate when his attention was called to the facts. But he was often oblivious to the strain upon her energies, and had little command of his temper. An unfortunate aggra- vation of the difficulty arose from his intimacy with the Ash- burtons. Lady Ashburton, a woman of singular social charm and great ability, appreciated the author, but apparently ac- cepted the company of the author's wife rather as a necessity than as an additional charm. Mrs Carlyle was hurt by the fine lady's condescension and her husband's accessibility to aristo- cratic blandishments. Carlyle, as a wise man, should have yielded to his wife's wishes; unluckily, he was content to point out that her jealousy was unreasonable, and, upon that very insufficient ground, to disregard it and to continue his intimacy with the Ashburtons on the old terms. Mrs Carlyle bitterly resented his conduct. She had been wiling to renounce any aspirations of her own and to sink herself in his glory, but she

naturally expected him to recognize her devotion and to value her society beyond all others. She had just cause of complaint, and a remarkable power, as her letters prove, of seeing things plainly and despising sentimental consolations. She was child- less, and had time to brood over her wrongs. She formed a little circle of friends, attached to her rather than to her husband; and to one of them, Giuseppe Mazzini, she confided her troubles in 1846. He gave her admirable advice; and the alienation from her husband, though it continued still to smoulder, led to no further results. A journal written at the same time gives a painful record of her sufferings, and after her death made Carlyle conscious for the first time of their full extent. The death of Lady Ashburton in

1857 removed this cause of jealousy; and Lord Ashburton married a second wife in 1858, who became a warm friend of both Carlyles. The cloud which had separated them was thus at last dispersed. Meanwhile Carlyle had become absorbed in his best and most laborious work. Soon after the completion of the Cromwell he had thought of Frederick for his next hero, and had in 1845 contemplated a visit to Germany to collect materials. He did not, however, settle down finally to the work till 185 1. He shut himself up in his study to wrestle with the Prussian Dryasdusts, whom he discovered to be as wearisome as their Puritan predecessors and more voluminous. He went to Scotland to see his mother, to whom he had always shown the tenderest affection, on her deathbed at the end of 1853. He returned to shut himself up in the " sound-proof room." He twice visited Germany (1852 and 1858) to see Frederick's battlefields and obtain materials; and he occasion- ally went to the Ashburtons and his relations in Scotland. The first two volumes of Frederick the Great appeared in 1858, and succeeding volumes in 1862, 1864 and 1865. The success was great from the first, though it did little to clear up Carlyle's gloom. The book is in some respects his masterpiece, and its merits are beyond question. Carlyle had spared no pains in research. The descriptions of the campaigns are admirably vivid, and show his singular eye for scenery. These narratives are said to be used by military students in Germany, and at least convince the non-military student that he can understand the story. The book was declared by Emerson to be the wittiest ever written. Many episodes, describing the society at the Prussian court and the relations of Frederick to Voltaire, are unsurpassable as humorous portraiture. The effort to fuse the masses of raw material into a well-proportioned whole is perhaps not quite successful; and Carlyle had not the full sympathy with Frederick which had given interest to the Cromwell. A hero-worshipper with half-concealed doubts as to his hero is in an awkward position. Carlyle's general con- ception of history made him comparatively blind to aspects of the subject which would, to writers of other schools, have a great importance. The extraordinary power of the book is undeniable, though it does not show the fire which animated the French Revolution. A certain depression and weariness of •spirit darken the general tone. . During the later labours Mrs Carlyle's health had been break- ing. Carlyle, now that happier relations had been restored, did his best to give her the needed comforts; and in spite of his immersion in Frederick, showed her all possible attention in later years. She had apparently recovered from an almost hopeless

illness, when at the end of 1865 he was elected to the rectorship of the university of Edinburgh. He delivered an address there on the 2nd of April 1866, unusually mild in tone, and received with general applause. He was still detained in Scotland when Mrs Carlyle died suddenly while driving in her carriage. The immediate cause was the shock of an accident to her dog. She had once hurt her mother's feelings by refusing to use some wax candles. She had preserved them ever since, and by her direction they were now lighted in the chamber of death. Carlyle was overpowered by her loss. His life thenceforward became more and more secluded, and he gradually became incapable of work. He went to Mentone in the winter of 1866 and began the Reminis- cences. He afterwards annotated the letters from his wife, published (1883) as Letters and Memorials. He was, as Froude v. 12

says, impressed by the story of Johnson's "penance" at Uttoxeter, and desired to make a posthumous confession of his shortcomings in his relations to his wife. A few later utterances made known his opinions of current affairs. He joined the committee for the defence of Governor Eyre in 1867; he also wrote in 1867 an article upon " shooting Niagara," that is, upon the tendency of the Reform Bill of that year; and in 1870 he wrote a letter defending the German case against France. The worth of his Frederick was acknowledged by the Prussian Order of Merit in 1874. In the same year Disraeli offered him the Grand Cross of the Bath and a pension. He declined very courteously, and felt some regret for previous remarks upon the minister. The length of his literary career was now softening old antipathies, and he was the object of general respect. His infirmities enforced a very retired life, but he was constantly visited by Froude, and occasionally by his disciple Ruskin. A small number of other friends paid him constant attention. His conversation was still interesting, especially when it turned upon his recollections, and though his judgments were sometimes severe enough, he never condescended to the scandalous. His views of the future were gloomy. The world seemed to be going from bad to worse, with little heed to his warnings. He would sometimes regret that it was no longer permissible to leave it in the old Roman fashion. He sank gradually, and died on the 4th of February 1 88 1 . A place in Westminster Abbey was offered, but he was buried, according to his own desire, by the side of his parents at Ecclefechan. He left Craigenputtock, which had become his own property, to found bursaries at the university of Edinburgh. He

gave his books to Harvard College.

Carlyle's appearance has been made familiar by many portraits, none of them, according to Froude, satisfactory. The statue by Boehm on the Chelsea Embankment, however, is characteristic; and there is a fine painting by Watts in the National Portrait Gallery. J. McNeill Whistler's portrait of him is in the possession of the Glasgow corporation.

During Carlyle's later years the antagonism roused by his attacks upon popular opinions had subsided; and upon his death general expression was given to the emotions natural upon the loss of a remarkable man of genius. The rapid publication of the Reminiscences by Froude produced a sudden revulsion of feeling. Carlyle became the object of general condemnation. Froude's biography, and the Memorials of Mrs Carlyle, published soon afterwards, strengthened the hostile feeling. Carlyle had appended to the Reminiscences an injunction to his friends not to publish them as they stood, and added that no part could ever be published without the strictest editing. Afterwards, when he had almost forgotten what he had written, he verbally em- powered Froude to use his own judgment: Froude accordingly published the book at once, without any editing, and with many inaccuracies. Omissions of a few passages written from memory at a time of profound nervous depression would have altered the whole character of the book. Froude in this and the later publications held that he was giving effect to Carlyle's wish to imitate Johnson's " penance." No one, said Boswell, should persuade him to make his lion into a cat. Froude intended, in the same spirit, to give the shades as well as the lights in the portrait of his hero. His admiration for Carlyle probably led him to assume too early that his readers would approach the story from the same point of view, that is, with an admiration too warm to be repelled by the admissions. Moreover, Froude's characteristic desire for picturesque effect, unchecked by any painstaking accuracy, led to his reading preconceived impressions into his documents. The result was that Carlyle was too often judged by his defects, and regarded as a selfish and eccentric misanthrope with flashes of genius, rather than as a man with many of the highest qualities of mind and character clouded by constitutional infirmities. Yet it would be difficult to speak too strongly of the great qualities which underlay the superficial defects. Through long years of poverty and obscurity Carlyle showed unsurpassed fidelity to his vocation and superiority to the lower temptations which have ruined so many literary careers, His ambition might

be interpreted as selfishness, but certainly

showed no coldness of heart. His unstinted generosity to his brothers during his worst times is only one proof of the singular strength of his family affections. No one was more devoted to such congenial friends as Irving and Sterling. He is not the only man whom absorption in work and infirmity of temper have made into a provoking husband, though few wives have had Mrs Carlyle's capacity for expressing the sense of injustice. The knowledge that the deepest devotion underlies misunderstandings is often a very imperfect consolation; but such devotion clearly existed all through, and proves the defect to have been relatively superficial.

The harsh judgments of individuals in the Reminiscences had no parallel in his own writings. He scarcely ever mentions a contemporary, and was never involved in a personal controversy. But the harshness certainly reflects a characteristic attitude of mind. Carlyle was throughout a pessimist or a prophet denouncing a backsliding world. His most popular contemporaries seemed to him to be false guides, and charlatans had ousted the heroes. The general condemnation of " shams " and cant had, of course, particular applications, though he left them to be inferred by his readers. Carlyle was the exponent of many of the deepest convictions of his time. Nobody could be more in sympathy with aspirations for a spiritual religion and for a lofty idealism in political and social life. To most minds, however, which cherish such aspirations the gentler optimism of men like Emerson was more congenial. They believed in the progress of the race and the triumph of the nobler elements. Though Carlyle, especially in his earlier years, could deliver an invigorat- ing and encouraging, if not a sanguine doctrine, his utterances were more generally couched in the key of denunciation, and betrayed a growing despondency. Materialism and low moral principles seemed to him to be gaining the upper hand; and the hope that religion might survive the " old clothes " in which it had been draped seemed to grow fainter. The ordinary mind complained that he had no specific remedy to propose for the growing evils of the time; and the more cultivated idealist was alienated by the gloom and the tendency to despair. To a later generation it will probably appear that, whatever the exaggera- tions and the

misconceptions to which he was led, his vehement attacks at least called attention to rather grave limitations and defects in the current beliefs and social tendencies of the time. The mannerisms and grotesque exaggerations of his writings annoyed persons of refinement, and suggest Matthew Arnold's advice to flee " Carlylese " as you would flee the devil. Yet the shrewd common-sense, the biting humour, the power of graphic description and the imaginative " mysticism " give them a unique attraction for many even who do not fully sympathize with the implied philosophy or with the Puritanical code of ethics. The letters and autobiographical writings, whether they attract or repel sympathy, are at least a series of documents of profound interest for any one who cares to study character, and display an almost unique idiosyncrasy. (L. S.)

The chief authorities for Carlyle's life are his own Reminiscences, the Letters of Jane Welsh Carlyle, the Love Letters of Thomas Carlyle and Jane Welsh (ed. A. Carlyle), and the four volumes of J. A. Froude's biography; Froude was Carlyle's literary executor. Prof. C. E. Norton s edition of the Reminiscences and his collection of Carlyle's Early Letters correct some of Froude's inaccuracies. A list of many articles upon Carlyle is given by Mr Ireland in Notes and Queries, sixth series, vol. iv. Among other authors may be noticed Henry James, sen., in Literary Remains; Prof. Masson, Carlyle, Personally and in his Writings ; Conway, Thomas Carlyle ; Larkin, The Open Secret of Carlyle's Life; Mrs Oliphant in Mac- millan's Magazine for April 1881; G. S. Venables in Fortnightly Review for May 1883 and November 1884. A good deal of con- troversy has arisen relating to Froude's treatment of the relations between Carlyle and his wife, and during 1903-1904 this was pushed to a somewhat unsavoury extent. Those who are curious to pry into the question of Carlyle's marital capacity, and the issues between Froude's assailants and his defenders, may consult New Letters and Memorials of Jane Welsh Carlyle, with introduction by Sir James Crichton-Browne ; My Relations with Carlyle, by J. A. Froude; The Nemesis of Froude, by Sir J. Crichton-Browne and Alexander Carlyle; and articles in the Contemporary Review (June, July, August, 1903), and Nineteenth Century and After (May, July, 1903). See also Herbert Paul's Life of Froude (1905). The precise truth in

these matters is hardly recoverable, even if it concerns posterity: and though Froude was often inaccurate, he was given full authority by Carlyle, he had all the unpublished material before him, and 1 he was dead and unable to reply to criticism when the

later attacks were made.

CARMAGNOLA, FRANCESCO BUSSONE, Count of (1390- 1432), Italian soldier of fortune, was born at Carmagnola near' Turin, and began his military career when twelve years old under Facino Cane, a condottiere then in the service of Gian Galeazzo Visconti, duke of Milan. On the death of the latter his duchy was divided among his captains, but his son and heir, Filippo Maria, determined to reconquer it by force of arms. Facino Cane being dead, Visconti applied to Carmagnola, then in his thirtieth year, and gave him command of the army. That general's success was astonishingly rapid, and soon the whole duchy was brought once more under Visconti's sway. But Filippo Maria, although he rewarded Carmagnola generously, feared that he might become a danger to himself, and instead of giving him further military commands made him governor of Genoa. Carmagnola felt greatly aggrieved, and failing to obtain a personal interview with the duke, threw up his commission and offered his services to the Venetians (1425). He was well received in Venice, for the republic was beginning to fear the ambitions of the Visconti, and the new doge, Francesco Foscari, was anxious to join the Florentines and go to war with Milan. Carmagnola himself represented the duke's forces as much less numerous than they were supposed to be, and said that the moment was an opportune one to attack him. These arguments, combined with the doge's warlike temper, prevailed; Carmagncla was made captain-general of St Mark in 1426, and war was declared. But while the republic was desirous of rapid and conclusive operations, it was to the interest of Carmagnola, as indeed to all other soldiers of fortune, to make the operations last as long as possible, to avoid decisive operations, and to liberate all prisoners quickly. Consequently the campaign dragged on interminably, some battles were won and others lost, truces and peace treaties were made only to be broken, and no definite result was achieved. Carmagnola's most important success was the battle of Maclodio (1427), but he did not follow it up. The republic, impatient of- his dilatoriness, raised his emoluments and promised him immense fiefs including the lordship of Milan, so as to increase his ardour, but in vain. At the same time Carmagnola was perpetually receiving messengers from Visconti, who offered him great rewards if he would abandon the Venetians. The general trifled with his past as with his present employers, believing in his foolish vanity that he held the fate of both in his hand. But the Venetians were dangerous masters to

trifle with, and when they at last lost all patience, the Council of Ten determined to bring him to justice. Summoned to Venice to discuss future operations on the 29th of March 1432, he came without suspicion. On his arrival at the ducal palace he was seized, imprisoned and brought to trial for treason against the republic. Although the doge befriended him he was condemned to death and beheaded on the 5th of May. A man of third-rate ability, his great mistake was that he failed to see that he could not do with a solvent and strong government what he could with bankrupt tyrants without military resources, and that the astute Visconti meant to ruin him for his abandonment. Bibliography. — The best account of Carmagnola is Horatio Brown's essay in his Studies in Venetian History (London, 1907) ; see also A. BatListella, 77 Conte di Carmagnola (Genoa, 1889) ; E. Ricofti, Storia delle Compagnie di Ventura (Turin, 1845). Alessandro Manzoni (q.v.) made this episode the subject of a poetical drama, II Conte di Carmagnola (1826). (L. V.*)

CARMAGNOLA, a town of Italy, in the province of Turin, 18 m. by rail S. of Turin. Pop. (1901) 2447 (town), 11,721 (commune). It is the junction where the lines for Savona and Cuneo diverge; it is also connected with Turin by a steam tramway via Carignano. Carmagnola is a place of medieval origin. The town was captured by the French in 1 796.

CARMAGNOLE (from Carmagnola, the town in Italy), a word first applied to a Piedmontese peasant costume, well known in the south of France, and brought to Paris by the revolutionaries

of Marseilles in 1798. It consisted of a short skirted coat with rows of metal buttons, a tricoloured waistcoat and red cap, and became the popular dress of the Jacobins. The name was then given to the famous revolutionary song, composed in 1792, the tune of which, and the wild dance which accompanied it, may have also been brought into France by the Piedmontese. The original first verse began: —

" Monsieur Veto (i.e. Louis XVI.) avait promis D'etre fidele a sa patrie."

and each verse ends with the refrain : —

” Vive le son, vive le son, Dansons la Carmagnole,

Vive le son

Du Canon.”

The words were constantly altered and added to during the Terror and later; thus the well-known lines,

” Madame Veto avait promis De faire egorger tout Paris

On lui coupa la tete,” &c., were added after the execution of Marie Antoinette. Played in double time the tune was a favourite march in the Revolutionary armies, until it was forbidden by Napoleon, on becoming First Consul.

CARMARTHEN (Caerfyrddin), a municipal borough, contributory parliamentary borough (united with Llanelly since 1832), and county town of Carmarthenshire, and a county of itself, finely situated on the right bank of the Towy, which is here tidal and navigable for small craft. Pop. (1901) 10,025. It is the terminal station of a branch of the London & North-Western railway coming southward from Shrewsbury, and is a station on the main line of the Great Western running to Fishguard; it is also the terminus of a branch-line of the Great Western running to Newcastle-Emlyn. The station buildings lie on the left bank of the river, which is here spanned by a fine old stone bridge. There are works for the manufacture of woollens and ropes, also tanneries, but it is as the central market of a large and fer- tile district that Carmarthen is most important. The weekly Saturday market is well attended, and affords interesting scenes of modern Welsh agricultural life. From the convenient and accessible position of the town, the gaol and lunatic asylum serving for the three south-western counties of Wales — Cardigan, Pembroke and Carmarthen — have been fixed here. Although historically one of the most important towns in South Wales, Carmarthen can boast of very few ancient buildings, and the general aspect of the town is modern. A well-preserved gateway of red sandstone and portions of two towers of the castle are included in the buildings of the present gaol, and the old parish church of St Peter contains some interesting monuments, amongst them being the altar tomb (of the 16th century) of Sir Rhys ap Thomas, K.G., and his wife, which was removed hither for safety at the Reformation from the desecrated church of the neighbouring Priory of St John. Some vestiges of this celebrated monastic house, which formerly

owned the famous Welsh MS. known as the ” Black Book of Carmarthen,” are visible between the present Priory Street and the river. Of the more recent erections in the town, mention may be made of the granite obelisk in memory of General Sir Thomas Picton (1758-1815) and the bronze statue of General Sir William Nott (1784-1846).

Carmarthen is commonly reputed to occupy the site of the Roman station of Maridunum, and its present name is popularly associated with the wizard-statesman Merlin, or Merddyn, whose memory and prophecies are well remembered in these parts of Wales and whose home is popularly believed to have been the conspicuous hill above Abergwili, known as Merlin’s Hill. Another derivation of the name is to be found in Caer-mor-din, signifying ” a fortified place near the sea.” In any case, the antiquity of the town is undisputed, and it served as the seat of government for Ystrad Tywi until the year 877, when Prince Cadell of South Wales abandoned Carmarthen for Dinefawr, near Llandilo, probably on account of the maritime raids of the Dane? and Saxons. Towards the close of the nth century a

castle was built here by the Normans, and for the next two hundred years town and castle were frequently taken and retaken by Welsh or English. On the annexation of Wales, Edward I. established here his courts of chancery and exchequer and the great sessions for South Wales. Edward III., by the Statute Staple of 1353, declared Carmarthen the sole staple for Wales, ordering that every bale of Welsh wool should be sealed or ” cocketed ” here before it left the Principality. The earliest charter recorded was granted in 1201 under King John; a charter of James I. in 1604 constituted Carmarthen a county of itself; and under a charter by George III. in 1764, which had been specially petitioned for by the citizens, the two separate jurisdictions of Old and New Carmarthen were fused and hence- forth ” called by the name of Our Borough of Carmarthen.” In 1555 Bishop Farrar of St David’s was publicly burned for heresy under Queen Mary at the Market Cross, which was ruth- lessly destroyed in 1846 to provide a site for General Nott’s statue. In 1646 General Laugharne took and demolished the castle in the name of the parliament, and in 1649 Oliver Cromwell resided at Carmarthen on his way to Ireland. In 1684 the duke of Beaufort with a numerous train made his state entry into Carmarthen as lord-president of Wales and the Marches. With the rise of Llanelly the industrial importance of Carmarthen has tended to decline; but owing to its central position, its close connexion with the bishops

of St David's and its historic past the town is still the chief focus of all social, political and ecclesiastical movements in the three counties of Cardigan, Pembroke and Carmarthen. Carmarthen was created a parliamentary borough in 1536.

CARMARTHENSHIRE- (Sir Gaerfyrddin, colloquially known as Sir Gdr), a county of South Wales bounded N. by Cardigan, E. by Brecon and Glamorgan, W. by Pembroke and S. by Carmarthen Bay of the Bristol Channel. The modern county has an area of 918 sq. m., and is therefore the largest in size of the South Welsh counties. Almost the whole of its surface is hilly and irregular, though the coast-line is fringed with extensive stretches of marsh or sandy burrows. Much of the scenery in the county, particularly in the upper valley of the Towy, is exceedingly beautiful and varied. On its eastern borders adjoining Breconshire rises the imposing range of the Black Mountains (Mynydd Du) , sometimes called the Carmarthenshire Beacons, where the Carmarthen Van attains an elevation of 2632 ft. Mynydd Mallaen in the wild districts of the north-east corner of the county is 1430 ft. in height, but otherwise few of the numberless rounded hills with which Carmarthenshire is thickly studded exceed 1000 ft. The principal river is the Towy (Tywi), which, with its chief tributaries, the Gwili, the Cothi and the Sawdde, drains the central part of the county and enters the Bay at Llanstephan, 9 m. below Carmarthen. Coracles are frequently to be observed on this river, as well as on the Teifi, which separates Carmarthenshire from Cardiganshire on the north. Other streams are the Taf, which flows through the south-western portion of the county and reaches the sea at Laugharne; the Gwendraeth, with its mouth at Kidwelly; and the Loughor, or Llwchwr, which rises in the Black Mountains and forms for several miles the boundary between the counties of Carmarthen and Glamorgan until it falls into Carmarthen Bay at Loughor. All these rivers contain salmon, sewin (gleisiad) and trout in fair numbers, and are consequently frequented by anglers. With the exception of the Van Pool in the Black Mountains the lakes of the county are inconsiderable in size.

Geology.— The oldest rocks in Carmarthenshire come to the surface in the Vale of Towy at Llanarthney and near Carmarthen; they consist of black shalesof Tremadoc (Cambrian) age, and are succeeded by conglomerates, sandstones and shales, with beds of volcanic ash and lava, of Arenig (Ordovician) age, which have been brought up along a belt of intense folding and faulting which follows the Towy from Llangadock to Carmarthen and

extends westwards to the edge of the county at Whitland. The Llandeilo shales, flags and lime- stones and occasional volcanic ashes, which follow, are well developed at Llangadock and Llandeilo and near Carmarthen, and are famed for their trilobites, Asaphus tyrannus and Ogygia Buchi. Shales and mudstones and iirmersistent limestones of Bala age come next in ‘ order, and, bounding the Vale of Towy on the north, extend as a

narrow belt north-westwards towards the Presley hills. Except for the foregoing deposits the great area between the Teifi and the Towy, of which little is known, is made up of a monotonous succession of greatly folded slates and shales with interbedded conglomerates and sandstones which give rise to scarps, ridges and moorlands ; they appear to be of Llandovery age.

South of the Towy a narrow belt of steeply dipping and even inverted Silurian sandstones and mudstones (Upper Llandovery, Wenlock and Ludlow) extends south-westwards from Llandovery to Llanarthney, where they disappear under the Old Red Sandstone. This formation, which consists of red marls and sandstones with occasional thin impure limestones (cornstones) , extends from near Llandovery to beyond Carmarthen Bay; its upper conglomeratic beds cap the escarpment of the Black Mountains (2460 ft.) on the south-eastern borders of the county. To the south the scarps and moorlands of the Carboniferous Limestone and Millstone Grit form the north-western rim of the South Wales coalfield. The rest of the county is occupied by the rich Coal-Measures of the Gwendraeth Valley and Llanelly districts. All the rocks in the county are affected by powerful folds and faults. Glacial deposits are plentiful in the valleys south of the Towy, striae abound on the Millstone Grit and show that the ice-sheet rose far up the slopesof the Black Mountains. Coal is the chief mineral, the iron-ore is no longer worked; the Carboniferous Limestone is burnt at Llandybie; fire-bricks are manufactured from the Millstone Grit, and a few lead-veins are found in the Ordovician rocks.

Industries. — The climate is mild, except in the upland regions, but the annual rainfall is very heavy. With the exception of its south-eastern portion, which forms part of the great South Welsh coalfield, Carmarthenshire may be considered wholly as an

agricultural county. The attention of the farmers is devoted to stock-raising and dairy-farming rather than to the growth of cereals, whilst the large tracts of unenclosed hill-country form good pastures for sheep and ponies. The soil varies much, but in the lower valleys of the Towy and Taf it is exceedingly fertile. Outside agriculture the gathering of cockles at the estuaries of the Towy and Taf gives employment to a large number of persons, principally women; Ferryside and Laugharne being the chief centres of the cockling industry. The local textile factories at Pencader, Penboyr, Llangeler, and in the valley of the Loughor are of some importance. Gold has been found near Caio in the Cothi valley, but the yield is trifling. There are lead-mines in various places, but none of great value. The really important industries are restricted to the populous south-eastern district, where coal-mining, iron-founding and the smelting of tin and copper are carried on extensively at Llanelly, Pembrey, Tirydail, Garnant, Pontardulais, Ammanford and other centres.

Communications. — The Great Western railway traverses the lower part of the county, whilst a branch of the London & North-Western enters it at its extreme north-eastern point by a tunnel under the Sugar Loaf Mountain, and has its terminal station at Carmarthen. A branch line of the Great Western connects Llanelly with Llandilo by way of Ammanford, and another branch of the same railway runs northward from Carmarthen to Newcastle-Emlyn on the Teifi, joining the Aberystwyth branch, formerly the Manchester & Milford line, at Pencader.

Population and Administration. — The area of the county is 587,816 acres, and the population in 1891 was 130,566 and in 1901 it was 135,325. The municipal boroughs are Carmarthen (pop. 9935), Kidwelly (2285) and Llandovery (1809). Urban districts are Ammanford, Llanelly, Burry Port, Llandilo and Newcastle – Emlyn. The principal towns are Carmarthen, Llanelly (2 5,61 7), Llandilo or Llandeilo Fawr (1934), Llangadock (1578), Llandovery, Kidwelly, Pembrey (7513) and Laugharne (1439). The county is in the South Wales circuit, and assizes are held at Carmarthen. The borough of Carmarthen has a commission of the peace and separate quarter sessions. The county is divided into two parliamentary divisions, the eastern and western, and it also includes the united boroughs of Car- marthen and Llanelly, thus returning three members in all to parliament. The ancient county, which contains 75 parishes and part of another, is wholly in the diocese of St David's.

History. — Carmarthenshire originally formed part of the lands of the Dimetae conquered by the Romans, who constructed military roads and built on the Via Julia the important station of Maridunum upon or near the site of the present county town.

After the retirement of the Roman forces this fortified town became known in course of time as Caerfyrddin, anglicized into Carmarthen, which subsequently gave its name to the county. During the 5th and 6th centuries Carmarthenshire, or Ystrad Tywi, was the scene of the labours of many Celtic missionaries, notably of St David and St Teilo, who brought the arts of civilization as well as the doctrines of Christianity to its rude inhabitants. In the 9th century the whole of Ystrad Tywi was annexed to the kingdom of Roderick the Great (Rhodri Mawr), who at his death in 877 bequeathed the principality of South Wales to his son, Cadell. The royal residence of the South W'elsh princes was now fixed at Dynevor {Dinefawr) on the Towy near Llandilo. CadelPs son, Howell the Good (Hywel Dda), was the first to codify the ancient laws of Wales at his palace of Ty Gwyn Ar Daf, the White Lodge on the banks of the Taf, near the modern Whitland. In 1080, during the troubled reign of Rhys ap Tudor, the Normans first appeared on the shores of Car- marthen Bay, and before the end of King Henry I.'s reign had constructed the great castles of Kidwelly, Carmarthen, Laug- harne and Llanstephan near the coast. From this period until the death of Prince Llewelyn (1282) the history of Carmarthen- shire is national rather than local. By the Statutes of Rhuddlan (1284) Edward I. formed the counties of Cardigan and Car- marthen out of the districts of Ceredigion and Ystrad Tywi, the ancient possessions of the house of Dinefawr, which were now formally annexed to the English crown. Nearly a third of the present county, however, still remained under the jurisdiction of the Lords Marchers, and it was not until the Act 27 Henry VIII. that these districts, including the commots of Kidwelly, Iscennen and Carnwillion, were added to Edward I.'s original shire. The prosperity of the new county increased considerably under Edward III., who named Carmarthen the chief staple- town in Wales for the wool trade. The revolt of Owen Glendower had the effect of disturbing the peace of the county for a time, and the French army, landed at Milford on his behalf, was warmly received by the people of Carmarthenshire. In the summer of 1485 Sir Rhys ap Thomas, of Abermarlais and Dinefawr, marched through the county collecting recruits for Henry of Richmond, for which service he was created a knight of the Garter and made

governor of all Wales. At the Reforma- tion the removal of the episcopal residence from distant St David's to Abergwili, a village barely two miles from Carmarthen, brought the county into close touch with the chief Welsh diocese, and the new palace at Abergwili will always be associated with the first Welsh translations of the New Testament and the Prayer Book, made by Bishop Richard Davies (1500-1581) and his friend William Salesbury, of Llanrwst (16th century). In the early part of the 17 th century the county witnessed the first religious revival recorded in Welsh annals, that led by Rhys Prichard (d. 1644), the Puritan vicar of Llandovery, whose poetical works, the Canwyll y Cymry (" the Welshman's Candle ") are still studied in the principality. At the time of the Civil Wars, Richard Vaughan, earl of Carbery, the patron of Jeremy Taylor, was in command of the royal fortresses and troops, but made a very feeble and half-hearted resistance against the parliamentarian forces. During the following century the great Welsh spiritual and educational movement, which later spread over all Wales, had its origin in the quiet and remote parish of Llanddowror, near Laugharne, where the vicar, the celebrated and pious Griffith Jones (1684-1761), had become the founder of the Welsh circulating charity schools. Other prominent members of this important Methodist revival, likewise natives of Carmarthenshire, were William Williams of Pantycelyn, the well-known hymn-writer (1716-1791), and Peter Williams, the Welsh Bible commentator (1722-1796). The county was deeply implicated in the Rebecca Riots of 1 842-1 843.

Foremost amongst the county families of Carmarthenshire is Rhys, or Rice, of Dynevor Castle, near Llandilo, a modern castellated house standing in a beautiful park which contains the historic ruin of the old Dinefawr fortress. The present Lord Dynevor, the direct lineal descendant of the princes of South Wales, is the head of this family. Almost opposite Dynevor

Castle (formerly known as Newtown), on the left bank of trie Towy, stands Golden Grove (Gelli Aur), once the seat of the Vaughans, earls of Carbery, whose senior line and titles became extinct early in the 18th century. The famous old mansion has been replaced by a modern Gothic structure, and is now the property of Earl Cawdor. Golden Grove contains the " Hirlas

Horn," the gift of King Henry VII. to Dafydd ap Evan of Llwyndafydd, Cardiganshire, perhaps the most celebrated of Welsh historical relics. Other families of importance, extinct or existing, are Johnes, formerly of Abermarlais and now of Dolaucothi; Williams (now Drummond) of Edwinsford; Lloyd of Forest; Lloyd of Glansevin; Stepney of Llanelly and Gwynne of Taliaris.

Antiquities. — Carmarthenshire contains few memorials of the Roman occupation, but it possesses various camps and tumuli of the British period, and also a small but perfect cromlech near Llanglydwen on the banks of the Taf . Of its many medieval castles the most important still in existence are: Kidwelly; Laugharne; Llanstephan, a fine pile of the 1 2 th century on a hill at the mouth of the Towy; Carreg Cennen, an imposing Norman fortress crowning a cliff not far from Llandilo; and Dynevor Castle, the ancient seat of Welsh royalty, situated on a bold wooded height above the Towy. The remains of the castles at Carmarthen, Dryslllwyn, Llandovery and Newcastle-Emlyn are inconsiderable. Of the monastic houses Talley Abbey (Tal-y-Llychau, a name drawn from the two small lakes in the neighbourhood of its site) was founded by Rhys ap Griffith, prince of South Wales, towards the close of the 12th century for Benedictine monks; Whitland, or Albalanda, also a Benedictine house, was probably founded by Bishop Bernard of St David's early in the 12th century, on a site long associated with Welsh monastic life; and the celebrated Augustinian Priory of St John at Carmarthen was likewise established in the 12 th century. Very slight traces of these three important religious houses now exist. The parish churches of Carmarthenshire are for the most part small and of no special architectural value. Of the more noteworthy mention may be made of St Peter's at Carmarthen, and of the parish churches at Laugharne, Kidwelly, Llangadock, Abergwili and Llangathen, the last named of which contains a fine monument to Bishop Anthony Rudd (d. 161 5). Many of these churches are distinguished by tall massive western towers, usually of the 12 th or 13th centuries. Besides Golden Grove and Dynevor the county contains some fine historic houses, prominent amongst which are Abergwili Palace, the official residence of the bishops of St David's since the Reformation, burnt down in 1902, but rebuilt on the old lines; Aberglasney, a mansion near Llangathen, erected by Bishop Rudd and once inhabited by .the poet John Dyer (1700-1758); Court Henry, an ancient seat of the Herbert family; and Abermarlais, once the

property of Sir Rhys ap Thomas.

Customs, &*c. — The old Welsh costume, folklore and customs have survived longer in Carmarthenshire than perhaps in any other county of Wales. The steeple-crowned beaver hat, now practically extinct, was often to be seen in the neighbourhood of Carmarthen as late as 1890, and the older women often affect the pais-a-gvm bach, the frilled mob-cap and the small plaid shawl of a previous generation. Curious instances of old Welsh superstitions are to be found amongst the peasantry of the more remote districts, particularly in the lovely country in the valleys of the Towy and Teifi, where belief in fairies, fairy-rings, goblins and " corpse-candles " still lingers. The curious mumming, known as " Mari Lwyd " (Blessed Mary), in which one of the performers wears a horse's skull decked with coloured ribbands, was prevalent round Carmarthen as late as 1885. At many parish churches the ancient service of the "Pylgain " (a name said to be a corruption of the Latin pulli canhts) is held at daybreak or cock-crow on Christmas morning. A species of general catechism, known as pwnc, is also common in the churches and Nonconformist chapels. The old custom of receiving New Year's gifts of bread and cheese, or meal and money (calenig), still flourishes in the rural parishes. The " bidding " before marriage (as in Cardiganshire) was formerly universal and is not yet altogether discontinued, and

bidding papers were printed at Llandilo as late as 1900. The, horse weddings (priodas cejjylau) were indulged in by the farmeir class in the neighbourhood of Abergwili as late as 1880.

Authorities. — T. Nicholas, Annals and Antiquities of the Counties of Wales (London, 1872) ; W. Spurrell, Carmarthen and its Neighbour- hood (Carmarthen, 1879); J. B. D. Tyssen and Alcwyn C. Evans, Royal Charters, &c., relating to the Town and . County of Carmarthen (Carmarthen, 1878).

CARMATHIANS (Qarmathians, Karmathians), a Mahom- medan sect named after Hamdan Qarmat, who accepted the teaching of the Isma'ilites (see Mahommedan Religion: Sects) from Hosain ul-AhwazI, a missionary of Ahmed, son of the Persian Abdallah ibn Maimun, toward the close of the 9th century. This was in the Sawad of Irak, which was inhabited by a people little attached to Islam. The object of Abdallah ibn Maimun had been to undermine Islam and the Arabian power by a secret society with various degrees, which offered induce- ments to all classes and

creeds and led men on from an interpreta- tion of Islam to a total rejection of its teaching and a strict personal submission to the head of the society. For the political history of the Carmathians, their conquests and their decay, see Arabia: History; Caliphate (sect. C. §§ 16, 17, 18, 23); and Egypt: History (Mahommedan period).

In their religious teaching they claimed to be Shi'ites; i.e. they asserted that the imamate belonged by right to the descend- ants of Ali. Further, they were of the Isma'ilite branch of these, i.e. they acknowledged the claim to the imamate of Isma'il the eldest son of the sixth imam. The claim of Isma'il had been passed over by his father and many Shi'ites because he had been guilty of drinking wine. The Isma'ilites said that as the imam could do no wrong, his action only showed that wine-drinking was not sinful. Abdallah taught that from the creation of man there had always been an imam sometimes known, sometimes hidden. Isma'il was the last known; a new one was to be looked for. But while the imam was hidden, his doctrines were to be taught by his missionaries (dd'is). Hamdan Qarmat was one of these, Ahmed ibn Abdallah being nominally the chief. The adherents of this party were initiated by degrees into the secrets of its doctrines and were divided into seven (afterwards nine) classes. In the first stage the convert was taught the existence of mystery in the Koran and made to feel the necessity of a teacher who could explain it. He took an oath of complete submission and paid a sum of money. In the second stage the earlier teachers of Islam were shown to be wrong in doctrine and the imams alone were proved to be infallible. In the third it was taught that there were only seven imams and that the other sects of the Shi'ites were in error. In the fourth the disciple learnt that each of the seven imams had a prophet, who was to be obeyed in all things. The prophet of the last imam was Abdallah. The doctrine of Islam was that Mahomet was the last of the prophets. In the fifth stage the uselessness of tradition and the temporary nature of the precepts and practices of Mahomet were taught, while in the sixth the believer was induced to give up these practices (prayer, fasting, pilgrimage, &c). At this point the Carmathian had completely ceased to be a Moslem. In the remaining degrees there was more liberty of opinion allowed and much variety of belief and teaching existed.

The last contemporary mention of the Carmathians is that of Nasir ibn Khosrau, who visited them in a.d. 1050. In Arabia they ceased to exercise influence. In Persia and Syria their work was

taken up by the Assassins (q.v.). Their doctrines are said, however, to exist still in parts of Syria, Persia, Arabia and India, and to be still propagated in Zanzibar.

See Journal asiatique (1877), vol. i. pp. 377-386. (G. W. T.)

CARMAUX, a town of southern France, in the department of Tarn, on the left bank of the Cerou, 10 m. N. of Albi by rail. Pop. (1906) 8618. The town gives its name to an important coal- basin, and carries on the manufacture of glass.

CARMEL, the mountain promontory by which the seacoast of Palestine is interrupted south of the Bay of Acre, 32° 50′ N., 35° E. It continues as a ridge of oolitic limestone, broken by ravines and honeycombed by caves, running for about 20 m.

in a south-easterly direction, and finally joining the mountains of Samaria. Its maximum height is at x Esfia, 1760 ft. It was included in the territory of the tribe of Asher. No great political event is recorded in connexion with it; it appears throughout the Old Testament ” either as a symbol or as a sanctuary “; its name means ” garden-land.” Its fruitfulness is referred to by Isaiah and by Amos; Micah describes it as wooded, to which was no doubt due its value as a hiding-place (Amos ix. 3). It is now wild, only a few patches being cultivated; most of the mountain is covered with a thick brushwood of evergreens, oaks, myrtles, pines, &c, which is gradually being cleared away. That the cultivation was once much more extensive is indicated by the large number of rock-hewn wine and olive presses. Vines and olives are now found at ‘Esfia only. The outstanding position of Carmel, its solitariness, its visibility over a wide area of country, and its fertility, marked it out as a suitable place for a sanctuary from very ancient times. It is possibly referred to in the Palestine lists of Thothmes III. as Rosh Kodsu, ” the holy headland.” An altar of Jehovah existed here from early times; it was destroyed when the Phoenician Baal claimed the country under Jezebel, and repaired by Elijah (1 Kings xviii. 30) before the great sacrifice which decided the claims of the con- tending deities. ‘The traditional site of this sacrifice is at El-Muhrafca, at the eastern end of the ridge. The Druses still visit this site, where is a dilapidated structure of stones, as a holy place for sacrifice. On the bank of

the Kishon below is a mound known as Tell el-Jtusis, ” the Priest’s mound,” but the connexion that has been sought between this name and the slaughter of the priests of Baal is hardly justifiable. Other sites on the hill are traditionally connected with Elijah, and some melon-like fossils are explained as being fruits refused to him by its owner, who was punished by having them turned to stone. Elisha was stationed here for a time. Tacitus describes the hill as the site of an oracle, which Vespasian consulted. Iamblichus in his life of Pythagoras speaks of it as a place of great sanctity forbidden to the vulgar. A grove of trees, called the ” Trees of the Forty ” [Martyrs] , still remains, no doubt in former times a sacred grove. So early as the 4th century Christian hermits began to settle here, and in 1207 the Carmelite order was organized. The monastery, founded at the fountain of Elijah in 1209, has had many vicissi- tudes: the monks were slaughtered or driven to Europe in 1238 and the building decayed; it was visited and refounded by St Louis in 1252; again despoiled in 1291; once more rebuilt in 1631, and, in 1635 (when the monks were massacred), sacked and turned into a mosque. Once more the monks established themselves, only to be murdered after Napoleon’s retreat in 1799. The church and the monastery were entirely destroyed in 182 1 by ‘Abd Allah, pasha of Acre, on the plea that the monks would favour the revolting Greeks; but it was shortly afterwards rebuilt by order from the Porte, partly at ‘Abd Allah’s expense and partly by contributions raised in Europe, Asia and Africa by Brother Giovanni Battista of Frascati. The villages with which the mountain was once covered have been to a large extent depopulated by the Druses. (R. A. S. M.)

CARMELITES, in England called White Friars (from the white mantle over a brown habit), one of the four mendicant orders. The stories concerning the origin of this order, seriously put forward and believed in the 17th and 18th centuries, are one of the curiosities of history. It was asserted that Elias established a community of hermits on Mount Carmel, and that this community existed without break until the Christian era and was nothing else than a Jewish Carmelite order, to which belonged the Sons of the Prophets and the Essenes. Members of it were present at St Peter’s first sermon on Pentecost and were converted, and built a chapel on Mount Carmel in honour of the Blessed Virgin Mary, who, as well as the apostles, enrolled herself in the order. In 1668 the Bollandist Daniel Papen- broek (1628-1714), in the March volumes of the Acta Sanctorum,

rejected these stories as fables. A controversy arose and the Carmelites had recourse to the Inquisition. In Spain they succeeded in getting the offending volumes of the Acta censured, but in Rome they were less successful, and so hot did the

controversy become that in 1698 a decree was issued imposing silence upon both parties, until a formal decision should be promulgated — which has not yet been done.

The historical origin of the Carmelites must be placed at the middle of the 12th century, when a crusader from Calabria, named Berthold, and ten companions established themselves as hermits near the cave of Elias on Mount Carmel. A Greek monk, Phocas, who visited the Holy Land in 1185, gives an account of them, and says that the rains of an ancient building existed on Mount Carmel; but though it is likely enough that there had previously been Christian monks and hermits on the spot, it is impossible to place the beginning of the Carmelite institute before Berthold. About 12 10 the hermits on Carmel received from Albert, Latin patriarch of Jerusalem, a rule com- prising sixteen articles. This was the primitive Carmelite rule. The life prescribed was strictly eremitical: the monks were to live in separate cells or huts, devoted to prayer and work; they met only in the oratory for the liturgical services, and were to live a life of great silence, seclusion,, abstinence and austerity. This rule received papal approbation in 1226. Soon, however, the losses of the Christian arms in Palestine made Carmel an unsafe place of residence for western hermits, and so, c. 1240, they migrated first to Cyprus and thence to Sicily, France and England. In England the first establishment was at Alnwick and the second at Aylesford, where the first general chapter of the order was held in 1247, and St Simon Stock, an English anchorite who had joined the order, was elected general. During his generalate the institute was adapted to the conditions of the western lands to which it had been transplanted, and for this purpose the original rule had to be in many ways altered: the austerities were mitigated, and the life was turned from eremitical into cenobitical, but on the mendicant rather than the monastic model. The polity and government were also organized on the same lines, and the Carmelites were turned into mendicants and became one of the four great orders of Mendicant Friars, in England distinguished as the ” White Friars ” from the white mantle worn over the dark brown habit. This change was made and the new rule approved in 1247, and under this form the Carmelites spread all over western Europe and became exceed-

ingly popular, as an order closely analogous to the Dominicans and Franciscans. In the course of time, further relaxations of the rule were introduced, and during the Great Schism the Carmelites were divided between the two papal obediences, rival generals being elected, — a state of things that caused still further re- laxations. To cope with existing evils Eugenius IV. approved in 143 1 of a rule notably milder than that of 1247, but many houses clung to the earlier rule; thus arose among the Carmel- ites the same division into "observants" and "conventuals" that wrought such mischief among the Franciscans. During the 15th and 16th centuries various attempts at reform arose, as among other orders, and resulted in the formation of semi- independent congregations owing a titular obedience to the general of the order. The Carmelite friars seem to have flourished especially in England, where at the dissolution of the monasteries there were some 40 friaries. (See F. A. Gasquet, English Monas- tic Life, table and maps; Catholic Dictionary, art. "Carmelites.") There were no Carmelite nunneries in England, and indeed until the middle of the 15 th century there were no nuns at all anywhere in the order.

Of all movements in the Carmelite order by far the most important and far-reaching in its results has been the reform initiated by St Teresa. After nearly thirty years passed in a Carmelite convent in Avila under the mitigated rule of 1431, she founded in the same city a small convent wherein a rule stricter than that of 1247 was to be observed. This was in 1562. In spite of opposition and difficulties of all kinds, she succeeded in establishing a number, not only of nunneries, but. (with the co-operation of St John of the Cross, q.v.) also of friaries of the strict observance; so that at her death in 1582 there were of the reform 15 monasteries of men and 17 of women, all in Spain. The interesting and dramatic story of the movement should be sought for in the biographies of the two protagonists; as also

an account of the school of mystical theology founded by them, without doubt the chief contribution made by the Carmelites to religion (see Mysticism). Here it must suffice to say that the idea of the reform was to go behind the settlement of 1247 and to restore and emphasize the purely contemplative character of primitive Carmelite life: indeed provision was made for the

reproduction, for such as desired it, of the eremitical life led by Berthold and his companions. St Teresa's additions to the rule of 1247 made the life one of extreme bodily austerity and of prolonged prayer for all, two hours of private prayer daily, in addition to the choral canonical office, being enjoined. From the fact that those of the reform wore sandals in place of shoes and stockings, they have come to be called the Discalced, or bare-footed, Carmelites, also Teresians, in distinction to the Calced or older branch of the order. In 1580 the reformed monasteries were made a separate province under the general of the order, and in 1593 this province was made by papal act an independent order with its own general and government, so that there are now two distinct orders of Carmelites. The Discalced Carmelites spread rapidly all over Catholic Europe, and then to Spanish America and the East, especially India and Persia, in which lands they have carried on to this day extensive missionary undertakings. Both observances suffered severely from the various revolutions, but they both still exist, the Dis- calced being by far the most numerous and thriving. There are in all some 2000 Carmelite friars, and the nuns are much more numerous. In England and Ireland there are houses, both of men and of women, belonging to each observance.

Authorities. — A full account is given by Helyot, Hist, des ordres religieux (1792), i. cc. 40-52; shorter accounts, continued to the end of the 19th century and giving references to all literature old and new, may be found in Max Heimbucher, Orden u. Kongregationen (1897), ii. §§ 92-96; Wetzer u. Welte, Kirchenlexicon (ed. 2), art. " Carmelitenorden " ; Herzog-Hauck, Realencyklopddie (ed. 3), art. " Karmeliter." The story of St Teresa's reform will be found in lives of St Teresa and in her writings, especially the Foundations. Special reference may be made to the works of Zimmerman, a Carmelite friar, Carmel in England (1899), and Monumenta historica Carmelitana, i. (1905 foil.). (E. C. B.)

CARMICHAEL, GERSHOM (c. 1672-1729), Scottish philo- sopher, was born probably in London, the son of a Presbyterian minister who had been banished by the Scottish privy council for his religious opinions. He graduated at Edinburgh Univer- sity in 1691, and became a regent at St Andrews. In 1694 he was elected a master in the university of Glasgow— an office that was converted into the professorship of moral philosophy in 1727, when the system of masters was abolished at Glasgow. Sir William Hamilton regarded him as " the real founder of the

Scottish school of philosophy." He wrote Breviuscula Inlroductio ad Logicam, a treatise on logic and the psychology of the intellectual powers; Synopsis Theologiae Naturalis; and an edition of Pufendorf, De Officio Hominis et Civis, with notes and supplements of high value. His son Frederick was the author of Sermons on Several Important Subjects and Sermons on Christian Zeal, both published in 1753.

CARMINE, a pigment of a bright red colour obtained from cochineal (q.v.). It may be prepared by exhausting cochineal with boiling water and then treating the clear solution with alum, cream of tartar, stannous chloride, or acid oxalate of potassium; the colouring and animal matters present in the liquid are thus precipitated. Other methods are in use; sometimes white of egg, fish glue, or gelatine are added before the precipitation. The quality of carmine is affected by the temperature and the degree of illumination during its preparation — sunlight being requisite for the production of a brilliant hue. It differs also according to the amount of alumina present in it. It is some- times adulterated with cinnabar, starch and other materials; from these the carmine can be separated by dissolving it in ammonia. Good carmine should crumble readily between the fingers when dry. Chemically, carmine is a compound of car- minic acid with alumina, lime and some organic acid. Carmine is used in the manufacture of artificial flowers, water-colours, rouge, cosmetics and crimson ink, and in the painting of minia-

tures. " Carmine lake " is a pigment obtained by adding freshly precipitated alumina to decoction of cochineal.

CARMONA, a town of south-western Spain, in the province of Seville; 27 m. N.E. of Seville by rail. Pop. (1900) 17,215. Carmona is built on a ridge overlooking the central plain of Andalusia, from the Sierra Morena, on the north, to the peak of San Cristobal, on the south. It has a thriving trade in wine, olive oil, grain and cattle; and the annual fair, which is held in April, affords good opportunity of observing the costumes and customs of southern Spain. The citadel of Carmona, now in ruins, was formerly the principal fortress of Peter the Cruel (1350-1369), and contained a spacious palace within its defences. The principal entrance to the town is an old Moorish gateway; and the gate on the road to Cordova is partly of Roman construction. Portions of the ancient college of San Teodomir are of Moorish architecture, and the tower of the church of San Pedro is an imitation of the Giralda at Seville.

In 1881 a large Roman necropolis was discovered close to the town, beside the Seville road. It contains many rock-hewn sepulchral chambers, with niches for the cinerary urns, and occasionally with vestibules containing stone seats (triclinia). In 1881 an amphitheatre, and another group of tombs, all belong- ing to the first four centuries a.d., were disinterred near the original necropolis, and a small museum, maintained by the Carmona archaeological society, is filled with the mosaics, inscriptions, portrait-heads and other antiquities found here.

Carmona, the Roman Carmo, was the strongest city of Further Spain in the time of Julius Caesar (100-44 B.C.), and its strength was greatly increased by the Moors, who surrounded it with a wall and ornamented it with fountains arid palaces. In 1247 Ferdinand III. of Castile took the city, and bestowed on it the motto Sicut Lucifer lucet in Aurora, sic in Wandalia Carmona (" As the Morning-star shines in the Dawn, so shines Carmona in Andalusia ").

For an account of the antiquities of Carmona, see Estudios arqueo- logicos e historicos, by M. Sales y Ferre (Madrid, 1887).

CARNAC, a village of north-western France, in the depart- ment of Morbihan and arrondissement of Lorient, 9 m. S.S.W. of Auray by road. Pop. (1906) 667. Carnac has a handsome church in the Renaissance style of Brittany, but it owes its celebrity to the stone monuments in its vicinity, which are among the most extensive and interesting of their kind (see Stone Monuments). The most remarkable consist of long avenues of menhirs or standing stones; but there is also a profusion of other erections, such as dolmens and barrows, throughout the whole district. About half a mile to the north-west of the village is the Menec system, which consists of eleven lines, numbers 874 menhirs, and extends a distance of 3376 ft. The terminal circle, whose longest diameter is 300 ft., is somewhat difficult to make out, as it is broken by the houses and gardens of a little hamlet. To the east-north-east there is another system at Kermario (Place of the Dead), which consists of 855 stones, many of them of great size — some, for example, 18 ft. in height — arranged in ten lines and extending about 4000 ft. in length. Still further in the same direction is a third system at Kerlescan (Place of Burning), composed of 262 stones, which are distributed into thirteen lines, terminated by an irregular circle, and alto- gether extend over a distance of 1000 ft. or more. These three systems seem once to have formed a continuous series; the menhirs, many of which

have been broken up for road-mending and other purposes, have diminished in number by some thou- sands in modern times. The alignment of Kermario points to the dolmen of Kercado (Place of St Cado), where there is also a barrow, explored in 1863; and to the south-east of Menec stands the great tumulus of Mont St Michel, which measures 377 ft. in length, and has a height of 65 ft. The tumulus, which is crowned with a chapel, was excavated by Rene Galles in 1862; and the contents of the sepulchral chamber, which include several jade and fibrolite axes, are preserved in the museum at Vannes. About a mile east of the village is a small piece of moorland called the Bossenno, from the bocenieu or mounds with which it is covered; and here, in 1874, the explorations of

James Miln, a Scottish antiquary, brought to light the remains of a Gallo-Roman town. The tradition of Carnac is that there was once a convent of the Templars or Red Cross Knights on the spot; but this, it seems, is not supported by history. Similar traces were also discovered at Mane Bras, a height about 3 m. to the east. The rocks of which these various monuments are composed is the ordinary granite of the district, and most of them present a strange appearance from their coating of white lichens. Carnac has an interesting museum of antiquities.

See W. C. Lukis, Guide to the Principal Chambered Barrows and other Prehistoric Monuments in the Islands of the Morbihan, &c. (Ripon, 1875); Rene Galles, Foziilles du Mont Saint Michel en Carnac (Vannes, 1864) ; A. Fouquet, Des monuments celtiques et des ruines romaines dans le Morbihan (Vannes, 1853) ; James Miln, Archaeological Researches at Carnac in Brittany: Kermario (Edin- burgh, 1 881); and Excavations at Carnac: The Bossenno and the Mont St Michel (Edinburgh, 1877).

CARNARVON, EARLDOM OF. The earldom of Carnarvon was created in 1628 for Robert Dormer, Baron Dormer of Wyng (c. 1610-1643), who was killed at the first battle of Newbury whilst fighting for Charles I., and it became extinct on the death of his son Charles, the 2nd earl, in 1709. From 1714 to 1789 it was held by the family of Brydges, dukes of Chandos and mar- quesses of Carnarvon, and in 1793 Henry Herbert, Baron Por- chester (1741-1811), was created earl of Carnarvon.

His great-grandson, Henry Howard Molynetjx Herbert, 4th earl of Carnarvon (1831-1890), was born on the 24th of June 1831. He succeeded to the title in 1849, on the death of his father, Henry John George, the 3rd earl (1800-1849). Soon after taking his degree at Oxford he began to play a prominent part in the deliberations" of the House of Lords. In 1858 he was under secretary for the colonies, and in 1866 secretary of state. In this capacity he introduced in 1867 the bill for the federation of the British North American provinces which set so many political problems at rest; but he had not the privilege of passing it, having, before the measure became law, resigned, owing to his distaste for Disraeli's Reform Bill. Resuming office in 1874, he endeavoured to confer a similar boon on South Africa, but the times were not ripe. In 1878 he again resigned, out of opposition to Lord Beaconsfield's policy on the Eastern question; but on his party's return to power in 1885 he became lord- lieutenant of Ireland. His short period of office, memorable for a conflict on a question of personal veracity between himself and Mr Parnell as to his negotiations with the latter in respect of Home Rule, was terminated by another premature resignation. He never returned to office, and died on the 29th of June 1890. As a statesman his career was marred by extreme sensitiveness; but he was beloved as a man of worth and admired as a man of culture. He was high steward of the university of Oxford, and president of the Society of Antiquaries. The 4th earl was succeeded by his son, George Edward Stanhope Molyneux (b. 1866).

CARNARVON, a market town and municipal borough, and the county town of Carnarvonshire, north Wales, 68| m. W. of Chester by the London & North-Western railway. Pop. (1901) 9760. It stands very nearly on the site of Caer Seint, capital of the Segontiaci, and was fortified in 1098 by Hugh Lupus, earl of Chester, after Roman occupation, a fort, baths and villa, with coins and pottery, having been exhumed here. As the castle was begun only in 1284, Edward II., supposed to have been born in its Eagle Tower on the extreme west, can only have been born outside. The castle is an irregular oblong building on the west of the town, surrounded by walls and having thirteen polygonal towers. There is still much of the town wall extant. The parish church (Llanbeblig) is some half-mile out of the town, the institutions of which include a town and county hall, a training college, and a gaol for Anglesey and Carnarvonshire jointly. Manufactures in the town are scanty, but Llanberis and Llanllyfni export hence slates, " sets " and copper ore. A steam ferry unites

Carnarvon and Tan y foel, Anglesey, while a summer service of steamers runs to Menai Bridge, Bardsey, &c. The borough forms part of a district return- ing a member to parliament since 1536. To this district the

Reform Act added Bangor. The county quarter sessions and assizes are held in the town, which has a separate commission of the peace, but no separate court of quarter sessions. Three weekly Welsh (besides English) newspapers are published here.

CARNARVONSHIRE (Welsh Caer'narfon, for Caer yn Arfon), a county of north Wales, bounded N. by the Irish Sea, E. by the county of Denbigh, S.E. by Merioneth, S. by Tremadoc and Cardigan Bays, S.W. by Carnarvon Bay, W. by the Menai Straits (separating the county from Anglesey), and N.W. by Conway Bay. Area, 565 sq. m. There is, owing to the changed bed of the Conwy stream, a small detached part of the county on the north coast of Denbighshire, stretching inland for some 2 1 m. between Old Colwyn and Llandulas. About half the whole length of the county is a peninsula, Lleyn, running south-west into the Irish Sea, and forming Cardigan Bay on the south and Carnarvon Bay on the north. The county is rich in minerals, e.g. lead, copper, some gold. Its slate quarries are many and good. Its mountains include the highest in England and Wales, the summit of Snowdon (Wyddfa or Eryri) being 3560 ft. The principal mountains occupy the middle of the county and include Carnedd Llewelyn (3484 ft.), Carnedd Dafydd (3426), Glydyr Fawr (3279) and Glydyr Fach (3262), Elidr Fawr (3029), Moel Siabod (2860), Moel Hebog or Hebawg (2566). The valleys vary from the wildness of Pont Aberglaslyn gorge to .the quiet of Nant Gwynnant. Those of Beddgelert and Llanberis — at the south and north base of Snowdon respectively — are famous, while that of the Conwy, from Llanrwst to Conway (Conwy), is well set off by the background of Snowdonia.

The largest stream is the Conwy, tidal and navigable for some 12 m. from Deganwy; this rises in Llyn Conwy, in the south- east, divides Carnarvon from Denbigh (running nearly due north) for some 30 m., and falls into the sea at Deganwy. The Seint (wrongly spelled Seiont) is a small stream rising in Snowdon and falling into the sea at Carnarvon, to which it gave its old name Segontium (Kaer Seint yn Arvon in the Mabinogion). The Swallow Falls are near Nant Ffrancon (the stream of the Beaver or Afanc, a mythological animal). Nant Ffrancon leads north-west from near Capel Curig and Bettws y coed and past Bethesda, reaching the

sea in Beaumaris Bay. The lakes, numerous and occasionally large, include: Llyn Peris and Llyn Padarn at Llanberis, north of Snowdon; Llyn Ogwen, north of Glydyr Fawr; Llyn Cowlyd and Llyn Eigiau, both north of Capel Curig; Llyn Llydaw, on Snowdon; Llyn Cwellyn, west of .Snowdon; Llyn Gwynnant, east of Snowdon; Llyniau (Nant y lief or) Nantlle, near Llanllyfni; Llyn Conway.

The greater part of the county, including the mountainous Snowdon district and nearly all the eastern portion of the promontory of Lleyn, is occupied by rocks of Ordovician age, the Arenig, Bala and Llandeilo series. These are dark slates and thin-bedded grits with enormous masses of interbedded igneous rocks, lavas and ashes, the product of contemporaneous volcanoes. At the base of Snowdon are Bala grits and slates, above them lie three beds of felspathic porphyry, which are in turn succeeded by a great mass of calcareous and sandy volcanic ashes, while upon the summit are the remnants of a lava sheet. The whole mountain is part of a syncline, the beds dipping into it from the north-west and south-east.

Next to the Ordovician, the Cambrian rocks are the most important; they are found in three separate areas; the largest is in the north-west, and extends from Bangor to Bethesda, through Llyn Cwellyn and Llanwada to the coast near Clynnogfawr. The second area lies west of Tremadoc, which has given its name to the upper division of the Cambrian system. The third forms the promontory south of Llanenga. Cambrian slates are extensively quarried at Penrhyn, Llanberis and Dinorwic. Pre-Cambrian schists and igneous rocks occupy a strip, from 2 to 3 m. wide, along the coast from Neirn to Bardsey Island. A very small area of the Denbighshire Silurian enters this county near Conway near the eastern border; it com- prises Tarannon shale and Wenlock beds with graptolites.

The striking headland of the Great Orme as well as Little Orme's Head is composed of carboniferous limestone, containing corals and large Productus shells. A narrow strip of the same formation runs along the Menai Straits for several miles south of the tubular bridge. At the southern extremity of the limestone a small patch of coal measures is found.

Glacial drift — gravel, boulders and clay — is abundant along the northern coast, and in the neighbourhood of Snowdon it is an important feature in the landscape ; massive moraines, perched

blocks, striated stones and other evidences of ice action are common. On

Moel Trygarn and on the western flanks of Snowdon marine shells have been found in the drift up to an elevation of 1400 ft. above sea-level. Blown sand occurs along the coast near Conway, south- west of Carnarvon and on the south coast. Several hollows and pipes in the carboniferous limestone about Orme's Head contain clays and sands of mixed origin, including Upper Carboniferous, Triassic and drift materials. The igneous rocks, especially those cf volcanic origin, constitute one of the most striking geological features of the county; they comprise felsites, rhyolites, quartz porphyries, enstatite diabases, andesite tuffs, diabases and granite.

The climate is cold and damp in winter, except in the peninsula, Lleyn, and on the mild coast. Arable land, but a small propor- tion of the surface, is mostly in the Conwy valley or near the sea. Principal crops are oats, barley and potatoes, with some little wheat. The valley soil (alluvial) is often fertile, chiefly as meadow and enclosed pasture. Dairy and sheep-farming occupy most farmers. The small mountain ponies, especially of Llanbedr (Conwy Vale), are famous, and Welsh ponies were known for staying power even to Arrian (Cynegetics) . Agriculture still too much follows the old routine, besides losing by the influx of labour into the towns or to the mining industry and "set works "(stone).

The county is served by the London & North-Western railway; its terminus is Afon Wen, within 4 m. of Pwllheli. Between these stations plies the Cambrian, which runs along the Cardigan Bay coast and terminates at Pwllheli. The North Wales Narrow Gauge line runs from Dinas, south of Carnarvon, to Snowdon Ranger, 4 m. from Beddgelert. The main line of the London & North-Western runs along the northern coast, with branches from Llandudno junction to Blaenau Festiniog, along the Denbighshire side of the Conwy stream; from Menai Bridge to Carnarvon (thence continuing to Llanberis, or, by another line, to Afon Wen). The chief ports are Portmadoc, Pwllheli, Car- narvon, Port Dinorwic and Bangor. Near Portmadoc is Criccieth, with a castle resorted to by visitors; Pwllheli is also a summer resort, and a

tramway runs thence to within a short distance of Abeisoch, another favourite watering-place. Nefyn (some 6 m. from Pwllheli) , still unserved by rail or tram, was the scene of a royal tournament in the 15th century, and is another bathing resort; near are Carreg Llam and Pistyll farm (see Bardsey).

The area of the ancient county is 361,156 acres, with a population in 1901 of 126,883. The area of the administrative county is 365,986 acres. The inhabitants practically all speak Welsh (slightly differing, especially in Lleyn, from that of Anglesey). Over 80 is the percentage in Carnarvonshire, as against over 90 for Anglesey. The county is divided into two parliamentary divisions, south (Eifion) and north (Arfon).

The Carnarvon district of boroughs is formed of Bangor city, Carnarvon, Conway, Criccieth, Nefyn and Pwllheli. There are four municipal boroughs: Bangor (pop. 11,269), Carnarvon (9760), Conway (4681) and Pwllheli (3675). Other urban districts are: Bethesda (5281), Bettws y coed '1070), Criccieth (1406), Llandudno (9279), Llanfairfechan (2769), Penmaenmawr (3503) and Ynyscynhaiarn (4883). Carnarvon, where assizes are held, is in the north Wales circuit. Except a few parishes (in and near Llandudno) in St Asaph diocese, Carnarvonshire is in the diocese of Bangor, and contains sixty-one ecclesiastical parishes or districts, with parts of four others. Bangor, Carnar- von, Pwllheli and Llandudno are the principal towns, with Criccieth, Nefyn, Portmadoc and Tremadoc.

Carnarvonshire was occupied by the Segontiaci, with difficulty subdued by Ostorius Scapula and C. Suetonius Paulinus (Paullinus). From here Agricola crossed to conquer Anglesey. Relics of British forts and camps have been discovered. Caerhun (Caer Rhun) and Carnarvon (Caer Seint) are respectively the old Conovium and Segontium of Britannia Secunda. The county was part of Gwynedd kingdom, until Edward I. in 1 277 restricted that to Snowdon proper. The early fortresses at Deganwy, Dinorwic, Dinas Dinlle, &c, and the later castles of Conwy (Conway), Carnarvon, Criccieth and Dolbadarn, bear witness to the warlike character of its inhabitants.

See Edw. Breese, Kalendar of Gwynedd (London, 1874).

CARNATIC, or Karnatak (Kannada, Karnata, Karnataka- desa), a name given by Europeans to a region of southern India, between the Eastern Ghats and the Coromandel coast, in the presidency of

Madras. It is ultimately derived, according to Bishop Caldwell {Grammar of the Dravidian Languages), from kar, ” black,” and nadu x ” country,” i.e. ” the black country,” ” a term very suitable to designate the ‘black cotton soil,’ as it is called, of the plateau of the Southern Deccan.” Properly the name is, in fact, applicable only to the country of the Kanarese extending between the Eastern and Western Ghats, over an irregular area narrowing northwards, from Palghat in the south to Bidar in the north, and including Mysore. The extension of the name to the country south of the Karnata was probably due to the Mahommedan conquerors who in the 16th century over- threw the kingdom of Vijayanagar, and who extended the name which they found used of the country north of the Ghats to that south of them. After this period the plain country of the south came to be called Karnata Payanghat, or ” lowlands,” as distinguished from Karnata Balaghat, or ” highlands.” The misapplication of the name Carnatic was carried by the British a step further than by the Mahommedans, it being confined by them to the country below the Ghats, Mysore not being included. Officially, however, this name is no longer applied, ” the Carnatic ” having become a mere geographical term. Adminis- tratively the name Carnatic (or rather Karnatak) is now applied only to the Bombay portion of the original Karnata, viz. the districts of Belgaum, Dharwar and Bijapur, part of North Kanara, and the native states of the Southern Mahratta agency and Kolhapur.

The region generally known to Europeans as the Carnatic, though no longer a political or administrative division, is of great historical importance. It extended along the eastern coast about 600 m. in length, and from 50 to 100 m. in breadth. It was bounded on the north by the Guntur circar, and thence it stretched southward to Cape Comorin. It was divided into the Southern, Central and Northern Carnatic. The region south of the river Coleroon, which passes the town of Trichinopoly, was called the Southern Carnatic. The principal towns of this division were Tanjore, Trichinopoly, Madura, Tranquebar, Negapatam and Tinnevelly. The Central Carnatic extended from the Coleroon river to the river Pennar; its chief towns were Madras, Pondicherry, Arcot, Vellore, Cuddalore, Pulicat, Nellore, &c. The Northern Carnatic extended from the river Pennar to the northern limit of the country; and the chief town was Ongole. 1 The Carnatic, as above defined, comprehended within its limits the maritime provinces of Nellore, Chingleput, South Arcot, Tanjore, Madura and Tinnevelly, besides the inland districts of

North Arcot and Trichinopoly. The popula- tion of this region consists chiefly of Brahmanical Hindus, the Mahommedans being but thinly scattered over the country. The Brahmans rent a great proportion of the land, and also fill different offices in the collection of the revenue and the administration of justice. Throughout the country they appropriate to themselves a particular quarter in every town, generally the strongest part of it. Large temples and other public monuments of civilization abound. The temples are commonly built in the middle of a square area, and enclosed by a wall 15 or 20 ft. high, which conceals them completely from the public view, as they are never raised above it.

At the earliest period of which any records exist, the country known as the Carnatic was divided between the Pandya and Chola kingdoms, which with that of Chera or Kerala formed the three Tamil kingdoms of southern India. The Pandya kingdom practically coincided in extent with the districts of Madura and Tinnevelly; that of the Cholas extended along the Coromandel coast from Nellore to Pudukottai, being bounded on the north by the Pennar river and on the south by the Southern Vellaru. The government of the country was shared for centuries with these dynasties by numerous independent or semi-independent chiefs, evidence of whose perennial internecine conflicts is

1 As a geographical term, Carnatic is not now applied to the district north of Pennar.

preserved in the multitudes of forts and fortresses the deserted ruins of which crown almost all the elevated points. In spite, however, of this passion of the military classes for war the Tamil civilization developed in the country was of a high type. This was largely due to the wealth of the country, famous in the earliest times as now for its pearl fisheries. Of this fishery Korkai (the Greek KoXxci), now a village on the Tambraparni river in Tinnevelly, but once the Pandya capital, was the centre long before the Christian era. In Pliny's day, owing to the silting up of the harbour, its glory had already decayed and the Pandya capital had been removed to Madura (Hist. Nat. vi. cap. xxiii. 26), famous later as a centre of Tamil literature. The Chola kingdom, which four centuries before Christ had been recognized as

independent by the great Maurya king Asoka, had for its chief port Kaviripaddinam at the mouth of the Cauvery, every vestige of which is now buried in sand. For the first two centuries after Christ a large sea-borne trade was carried on between the Roman empire and the Tamil kingdoms ; but after Caracalla's massacre at Alexandria in a.d. 215 this ceased, and with it all intercourse with Europe for centuries. Henceforward, until the 9th century, the history of the country is illustrated only by occasional and broken lights. The 4th century saw the rise of the Pallava power, 1 which for some 400 years encroached on, without extinguishing, the Tamil kingdoms. When in a.d. 640 the Chinese traveller Hsiian Tsang visited Kanchi (Conjevaram), the capital of the Pallava king, he learned that the kingdom of Chola (Chu-li-ya) embraced but a small territory, wild, and inhabited by a scanty and fierce population; in the Pandya kingdom (Malakuta), which was under Pallava suzerainty, literature was dead, Buddhism all but extinct, while Hinduism and the naked Jain saints divided the religious allegiance of the people, and the pearl fisheries continued to flourish. The power of the Pallava kings was shaken by the victory of Vikramaditya Chalukya in a.d. 740, and shattered by Aditya Chola at the close of the 9th century. From this time onward the inscriptional records are abundant. The Chola kingdom, which in the 9th century had been weak, now revived, its power culminating in the victories of Rajaraja the Great, who defeated the Chalukyas after a four years' war, and, about a.d. 994, forced the Pandya kings to become his tributaries. A magnificent temple at Tanjore, once his capital, preserves the records of his victories engraved upon its walls. His career of conquest was continued by his son Rajendra Choladeva I., self-styled Gangaikonda owing to his victorious advance to the Ganges, who succeeded to the throne in a.d. 1018. The ruins of the new capital which he built, called Gangaikonda Chola- puram, still stand in a desolate region of the Trichinopoly district. His successors continued the eternal wars with the Chalukyas and other dynasties, and the Chola power continued in the ascendant until the death of Kulottunga Chola III. in 1278, when a disputed succession caused its downfall and gave the Pandyas the opportunity of gaining for a few years the upper hand in the south. In 13 10, however, the Mahommedan invasion under Malik Kafur overwhelmed the Hindu states of southern India in a common ruin. Though crushed, however, they were not extinguished; a period of anarchy followed, the struggle between the Chola kings and the Mussulmans issuing in the establishment at Kanchi of a usurping Hindu dynasty which ruled

till the end of the 14th century, while in 1365 a branch of the Pandyas succeeded in re-establishing itself in part of the kingdom of Madura, where it survived till 1623. At the beginning of the 15th century the whole country had come under the rule of the kings of Vijayanagar; but in the anarchy

1 The Pallavas are supposed by some authorities to be identical with the Pahlavas (Parthians of Persia), who, with the Sakas and Yavanas, settled in western India about a.d. 100. Mr Vincent Smith, however, who in the 1st edition (1904) of his Early History of India maintained this view, says in the 2nd edition (1908, p. 423) that "recent research does not support this hypothesis," and that " it seems more likely that the Pallavas were a tribe, clan or caste which was formed in the northern part of the existing Madras Presidency." The evidence points to their having been a race distinct fronrthe Tamils.

that followed the overthrow of the Vijayanagar empire by the Mussulmans in the 16th century, the Hindu viceroys (nayakkas) established in Madura, Tanjore and Kanchi made themselves independent, only in their turn to become tributary to the kings of Golconda and Bijapur, who divided the Carnatic between them. Towards the close of the 17th century the country was reduced by the armies of Aurangzeb, who in 1692 appointed Zulfikar Ali nawab of the Carnatic, with his seat at Arcot. Meanwhile, the Mahratta power had begun to develop; in 1677 Sivaji had suppressed the last remnants of the Vija- yanagar power in Vellore, Gingee and Kurnool, while his brother Ekoji, who in 1674 had overthrown the Nayakkas of Tanjore, established in that city a dynasty which lasted for a century. The collapse of the Delhi power after the death of Aurangzeb produced further changes. The nawab Saadet-allah of Arcot (1710-1732) established his independence ; his successor Dost Ali (1732-1740) conquered and annexed Madura in 1736, and his successors were confirmed in their position as nawabs of the Carnatic by the nizam of Hyderabad after that potentate had established his power in southern India. After the death of the nawab Mahommed Anwar-ud-din (1 744-1 749), the succession was disputed between Mahommed Ali and Husein Dost. In this quarrel the French and English, then competing for influence in the Carnatic, took opposite sides. The victory of the British established Mahommed Ali in power over part of the Carnatic till his death in 1795. Meanwhile, however, the country had been exposed to other troubles. In 1741 Madura, which the nawab Dost Ali (1732-1740) had added to his dominions in 1736, was

conquered by the Mahrattas; and in 1743 Hyder Ali of Mysore overran and ravaged the central Carnatic. The latter was reconquered by the British, to whom Madura had fallen in 1758; and, finally, in 1801 all the possessions of the nawab of the Carnatic were transferred to them by a treaty which stipulated that an annual revenue of several lakhs of pagodas should be reserved to the nawab, and that the British should undertake to support a sufficient civil and military force for the protection of the country and the collection of the revenue. On the death of the nawab in 1853 it was determined to put an end to the nominal sovereignty, a liberal establishment being provided for the family.

The southern Carnatic, when it came into the possession of the British, was occupied by military chieftains called poligars, who ruled over the country, and held lands by doubtful tenures. They were unquestionably a disorderly race; and the country, by their incessant feuds and plunderings, was one continued scene of strife and violence. Under British rule they were reduced to order, and their forts and military establishments were destroyed.

See India: History. For the various applications of the name Carnatic see the Imperial Gazetteer of India (Oxford, 1908), s.v. ; for the results of the latest researches in the early history of the country see V. A. Smith, Early History of India (2nd ed., Oxford, 1908), and Robert Sewell, A Forgotten Empire (Vijayanagar), (London, 1900).

CARNATION (Dianthus Caryophyllus, natural order Caryophyllaceae), a garden flower, a native of southern Europe, but occasionally found in an apparently wild state in England. It has long been held in high estimation for the beauty and the delightful fragrance of its blossoms. The varieties are numerous, and are ranged under three groups, called bizarres, flakes and picotees. The last, from their distinctness of character, are now generally looked upon as if they were a different plant, whereas they are, in truth, but a seminal development from the carnation itself, their number and variety being entirely owing to the assiduous endeavours of the modern florist to vary and to improve them.

The true carnations, as distinguished from picotees, are those which have the colours arranged in longitudinal stripes or bars of variable width on each petal, the ground colour being white. The

bizarres are those in which stripes of two distinct colours occur on the white ground, and it is on the purity of the white ground and the clearness and evenness of the striping that the technical merit of each variety rests. There are scarlet bizarres

marked with scarlet and maroon, crimson bizarres marked with crimson and purple, and pink and purple bizarres marked with those two colours. The flakes have stripes of only one colour on the white ground; purple flakes are striped with purple, scarlet flakes with scarlet, and rose flakes with rose colour. The selfs, those showing one colour only, as white, yellow, crimson, purple, &c, are commonly called cloves.

The picotee has the petals laced instead of striped with a distinct colour; the subgroups are red-edged, purple-edged, rose-edged and scarlet-edged, all having white grounds; each group divides into two sections, the heavy-edged and the light- edged. In the heavy-edged the colour appears to be laid on in little touches, passing from the edge inwards, but so closely that they coalesce into one line of colour from ˆ t0 iV ˚i an mcn broad, and more or less feathered on the inner edge, the less feathered the better; the light-edged display only a fine edge, or ” wire ” edge, of colour on the white ground. Yellow picotees are a group of great beauty, but deficient in correct marking.

During the decade 1898-1908 a new American race of carnations became very popular with British growers. As the plants flower chiefly during the winter — from October till the end of March — they are known as ” winter flowering ” or ” perpetual “; they are remarkable for the charming delicacy and colouring of the blossoms and for the length of the flower-stalks. This enables them to be used with great effect during the dullest months of the year for all kinds of floral decorations. These varieties are propagated by layers or cuttings or ” pipings.”

” Marguerite ” carnations are lovely annuals remarkable for their beautifully fringed blossoms. They are easily raised from seeds every year, and should be treated like half-hardy annuals.

What trade growers call ” jacks ” are seedling carnations with single flowers of no great value or beauty. Thousands of these are

raised every year for supplying " grass " (as the foliage is called) to put with choicer varieties. Costermongers take advantage of the ordinary householders' ignorance of plants by selling " jacks " as choice varieties at a high price.

Carnations are usually propagated by " layering " the non-flowering shoots about the second or third week in July, in the open air; but almost at any period when proper shoots can be obtained under glass. Cuttings or " pipings " are also inserted in rich but very gritty soil in cold frames, or in beds with gentle bottom heat in greenhouses. The rooted layers may be removed and potted or planted out towards the end of September, or early in October, the choice sorts being potted in rather small pots and kept in a cold frame during winter, when damp is dangerous.

New varieties can only be obtained from carefully saved seeds, or when a " sport " is produced — i.e. when a shoot with a flower differing entirely in colour from that of the parent plant appears unexpectedly. " Malmaison " carnations arose in this way, and are largely cultivated in greenhouses.

The soil for carnations and picotees should be a good turfy loam, free from wireworm, and as fibry as it can be obtained; to four parts of this add one part of rotten manure and one of leaf-mould, with sufficient sharp sand to keep it loose. A moderate addition of old lime rubbish will also be an advantage. This should be laid up in a dry place, and frequently turned over so as to be in a free friable condition for use towards the end of February or early in March.

Carnations are subject to several diseases, the worst being the "rust" (Uromyces Caryophilinus) , " leaf -spot " and maggot. The first two are checked or prevented by spraying the plants with sulphide of potassium (1 oz. to 10 gallons of water), taking care to avoid the painted woodwork; while the only way to deal with the carnation maggot is to pierce the centre of attacked plants with a needle, and to destroy the eggs whenever they are observed.

Descriptive lists of the best varieties may be had from all the leading nurserymen.

CARNEA, one of the great national festivals of Sparta, held in honour of Apollo Carneus. Whether Carneus (or Carnus) was originally an old Peloponnesian divinity subsequently identified

with Apollo, or merely an ” emanation ” from him, is uncertain; but there seems no reason to doubt that Carneus means ” the god of flocks and herds ” (Hesychius, s.v. Kapvos), in a wider sense, of the harvest and the vintage. The chief centre of his worship was Sparta, where the Carnea took place every year from the 7th to the 15th of the month Carneus (= Metageitnion, August). During this period all military operations were sus- pended. The Carnea appears to have been at once agrarian, military and piacular in character. In the last aspect it is supposed to commemorate the death of Carnus, an Acarnanian seer and favourite of Apollo, who, being suspected of espionage, was slain by one of the Heraclidae during the passage of the Dorians from Naupactus to Peloponnesus. By way of punish- ment, Apollo visited the army with a pestilence, which only ceased after the institution of the Carnea. The tradition is prob- ably intended to explain the sacrifice of an animal (perhaps a later substitute for a human being) as the representative of the god.

The agrarian and military sides of the festival are clearly distinguished. (1) Five unmarried youths (Kapvearai) were chosen by lot from each [tribe] for four years, to superintend the proceedings, the officiating priest being called ayrjTrjS (” leader “). A man decked with garlands (possibly the priest himself) started running, pursued by a band of young men called aTO.(j)v \ohpbiJOL (” running with bunches of grapes in their hands “) ; if he was caught, it was a guarantee of good fortune to the city; if not, the reverse. (2) In the second part of the festival nine tents were set up in the country, in each of which nine citizens, repre- senting the phra tries (or obae), feasted together in honour of the god (for huts or booths extemporized as shelters compare the Jewish feast of Tabernacles; and see W. Warde Fowler in Classical Review, March 1908, on the country festival in Tibullus ii. 1). According to Demetrius of Scepsis (in Athenaeus iv. 141), the Carnea was an imitation of life in camp, and everything was done in accordance with the command of a herald. In regard to the sacrifice, which doubtless formed part of the ceremonial, all that is known is that a ram was sacrificed at Thurii. Other indications point to the festival having assumed a military char- acter at an early date, as might have been expected among the warlike Dorians, although some scholars deny this. The general meaning of the agrarian ceremony is clear, and has numerous parallels in north European harvest-customs, in which an animal (or man disguised as an animal) was pursued by the reapers, the animal if caught being usually killed; in any case, both the man and the

animal represent the vegetation spirit. E. H. Binney in Classical Review (March 1905) suggests that the story of Alcestis was performed at the Carnea (to which it may have become attached with the name of Apollo) as a vegetation drama, and ” embodied a Death and Resurrection ceremony.”

The great importance attached to the festival and its month is shown in several instances. It was responsible for the delay which prevented the Spartans from assisting the Athenians at the battle of Marathon (Herodotus vi. 106), and for the despatch of a small advance guard under Leonidas to hold Thermopylae instead of the main army (Herodotus vii. 206). Again, when Epidaurus was attacked in 419 by Argos, the movements of the Spartans under Agis against the latter were interrupted until the end of the month, while the Argives (on whom, as Dorians, the custom was equally binding), by manipulating the calendar, avoided the necessity of suspending operations (see Grote, Hist, of Greece, ch. 56; Thucydides v. 54).

See S. Wide, Lakonische Kulte (1893), an d article ” Karneios ” in Roscher’s Lexikon ; L. Couve in Daremberg and Saglio’s Dictionnaire des antiquites; W. Mannhardt, Mythologische Forschungen (1883), p. 170, and Wald- und Feldkulte (2nd ed., 1905), ii. 254; L. R. Farnell, Cults of the Greek States, iv. (1907) ; G. Schomann, Griechische Altertiimer (ed. J. H. Lipsius, 1902); J. G. Frazer on Pausanias, iii. 13, 3; H. Usener in Rheinisches Museum, liii. (1898), p. 377; J. Vtirtheim in Mnemosyne, xxxi. (1903), p. 234.

CARNEADES (214-129 B.C.), Greek philosopher, founder of the Third or New Academy, was born at Cyrene. Little is known of his life. He learned dialectics under Diogenes the Stoic, and under Hegesinus, the third leader, of the Academy in descent from Arcesilaus. The chief objects of his study, however,

were the works of Chrysippus, opposition to whose views is the mainspring of his philosophy. ” If Chrysippus had not been,” he is reported to have said, ” I had not been either.” In 155, together with Diogenes the Stoic and Critolaus the Peripatetic, he was sent on an embassy to Rome to justify certain depreda- tions committed by the Athenians in the territory of Oropus. On this occasion he delivered two speeches on successive days, one in favour of justice, the other against it. His powerful reasoning excited among the Roman youth an enthusiasm for philosophical speculations, and the elder Cato insisted on Carneades and his companions being dismissed from the city.

Carneades, practically a 5th-century sophist, is the most important of the ancient sceptics. Negatively, his philosophy is a polemic against the Stoic theory of knowledge in all its aspects. All our sensations are relative, and acquaint us, not with things as they are, but only with the impressions that things produce upon us. Experience, he says, clearly shows that there is no true impression. There is no notion that may not deceive us; it is impossible to distinguish between false and true impressions; therefore the Stoic avTacria KaTaXtirmK-q (see Stoics) must be given up. There is no criterion of truth. Carneades also assailed Stoic theology and physics. In answer to the doctrine of final cause, of design in nature, he points to those things which cause destruction and danger to man, to the evil committed by men endowed with reason, to the miserable condition of humanity, and to the misfortunes that assail the good man. There is, he concludes, no evidence for the doctrine of a divine superintending providence. Even if there were orderly connexion of parts in the universe, this may have resulted quite naturally. No proof can be advanced to show that this world is anything but the product of natural forces. Carneades further attacked the very idea of God. He points out the contra- diction between the attributes of infinity and individuality. Like Aristotle, he insists that virtue, being relative, cannot be ascribed to God. Not even intelligence can be an attribute of the divine Being. Nor can he be conceived of as corporeal or incorporeal. If corporeal, he must be simple or compound; if a simple and elementary substance, he is incapable of life and thought; if compound, he contains in himself the elements of dissolution. If incorporeal, he can neither

act nor feel. In fact, nothing whatever can be asserted with certainty in regard to God. The general line of argument followed by Carneades anticipates much in modern thought.

The positive side of his teaching resembles in all essentials that of Arcesilaus (q.v.). Knowledge being impossible, a wise man should practise ewoxv (suspension of judgment). He will not even be sure that he can be sure of nothing. Ideas or notions are never true, but only probable; nevertheless, there are degrees of probability, and hence degrees of belief, leading to action. According to Carneades, an impression may be probable in itself; probable and uncontradicted (airepiffTraaros, lit. " not pulled aside," not distracted by synchronous sensations, but shown to be in harmony with them) when compared with others ; probable, uncontradicted, and thoroughly investigated and confirmed. In the first degree there is a strong persuasion of the propriety of the impression made; the second and third degrees are produced by comparisons of the impression with others associated with it, and an analysis of itself. His views on the summum bonum are not clearly known even to his disciple and successor Clitomachus. He seems to have held that virtue consisted in the direction of activity towards the satisfaction of the natural impulses. Carneades left no written works; his opinions seem to have been systematized by Clitomachus.

See A. Geffers, De Arcesilae Successoribus (1845); C. Gouraud, De Carneadis Vita et Placitis (1848); V. Brochard, Les Sceptigues grecs (1887); C. Martha, " Le Philosophe Carneade a Rome," in Revue des deux mondes, xxix. (1878), and the histories of philosophy ; also Academy, Greek.

CARNEGIE, ANDREW (1837-), American "captain of industry " and benefactor, was born in humble circumstances in Dunfermline, Scotland, on the 25th of November 1837. In 1848 his father, who had been a Chartist, emigrated to America, settling in Allegheny City, Pennsylvania. The raw Scots lad

started work at an early age as a bobbin-boy in a cotton factory, and a few years later was engaged as a telegraph clerk and operator. His capacity was perceived by Mr T. A. Scott of the Pennsylvania railway, who employed him as a secretary; and in 1859, when Scott became vice-president of the company, he made Carnegie superintendent of the western division of the line. In this post he was responsible for several improvements in the service; and when the Civil War opened he accompanied Scott,

then assistant secretary of war, to the front. The first sources of the enormous wealth he subsequently attained were his introduction of sleeping-cars for railways, and his purchase (1864) of Storey Farm on Oil Creek, where a large profit was secured from the oil-wells. But this was only a preliminary to the success attending his development of the iron and steel industries at Pittsburg. Foreseeing the extent to which the demand would grow in America for iron and steel, he started the Keystone Bridge works, built the Edgar Thomson steel-rail mill, bought out the rival Homestead steel works, and by 1888 had under his control an extensive plant served by tributary coal and iron fields, a railway 425 m. long, and a line of lake steamships. As years went by, the various Carnegie companies represented in this industry prospered to such an extent that in 1901, when they were incorporated in the United States Steel Corporation, a trust organized by Mr J. Pierpont Morgan, and Mr Carnegie himself retired from business, he was bought out at a figure equivalent to a capital of approximately £100,000,000.

From this time forward public attention was turned from the shrewd business_ capacity which had enabled him to accumulate such a fortune to the public-spirited way in which he devoted himself to utilizing it on philanthropic objects. His views on social subjects, and the responsibilities which great wealth involved, were already known in a book entitled Triumphant Democracy, published in 1886, and in his Gospel of Wealth (1900). He acquired Skibo Castle, in Sutherlandshire, Scotland, and made his home partly there and partly in New York; and he devoted his life to the work of providing the capital for purposes of public interest, and social and educational advance- ment. Among these the provision of public libraries in the United States and United Kingdom (and similarly in other English-speaking countries) was especially prominent, and ” Carnegie libraries ” gradually sprang up on all sides, his method being to build and equip, but only on condition that the local authority provided site and maintenance, and thus to secure local interest and responsibility. By the end of 1908 he had distributed over £10,000,000 for founding libraries alone. He gave £2,000,000 in 1901 to start the Carnegie Institute at Pittsburg, and the same amount (1902) to found the Carnegie Institution at Washington, and in both of these, and other, cases he added later to the original endowment. In Scotland he gave £2,000,000 in 1901 to establish a trust for providing funds for assisting education at the Scottish universities, a benefaction which resulted in his being

elected lord rector of St Andrews University. He was a large benefactor of the Tuskegee Institute under Booker Washington for negro education. He also established large pension funds — in 1901 for his former employes at Homestead, and in 1905 for American college professors. His benefactions in the shape of buildings and endowments for education and research are too numerous for detailed enumera- tion, and are noted in this work under the headings of the various localities. But mention must also be made of his founding of Carnegie Hero Fund commissions, in America (1904) and in the United Kingdom (1908), for the recognition of deeds of heroism; his contribution of £500,000 in 1903 for the erection of a Temple of Peace at The Hague, and of £150,000 for a Pan-American Palace in Washington as a home for the International Bureau of American republics. In all his ideas he was dominated by an intense belief in the future and influence of the English- speaking people, in their democratic government and alliance for the purpose of peace and the abolition of war, and in the progress of education on unsectarian lines. He was a powerful supporter of the movement for spelling reform, as a means of promoting

the spread of the English language. Mr Carnegie married in 1887 and had one daughter. Among other publications by him were An American Four-in-hand in Britain (1883), Round the World (1884), The Empire of Business (1902), a Life of James Watt (1905) and Problems of To-day (1908).

CARNEGIE, a borough of Allegheny county, Pennsylvania, U.S.A., 6 m. S.W. of Pittsburg. Pop. (1900) 7330 (1816 being foreign-born); (1910) 10,009. It is served by the Pittsburg, Cin- cinnati, Chicago & St Louis, the Pittsburg, Chartiers & Youg- hiogheny, and the Wabash Pittsburg Terminal railways, and the Pittsburg street railway. Carnegie is situated in the beautiful valley of Chartiers Creek, and is in one of the coal and natural gas districts of the state. In the borough are a Carnegie library and St Paul's orphan asylum. Among the borough's manu- factures are steel, lead, glass, ploughs and enamel- and tin-ware. There are alkaline and lithia mineral springs here. In 1894 Carnegie, named in honour of Andrew Carnegie, was formed by the union of the boroughs Chartiers and Mansfield.

CARNELIAN, a red variety of chalcedony, much used as an ornamental stone, especially for seals. The old name was cornelian, said to have been given in reference either to the horny appearance of the stone (Lat. cornu, ” horn “) or to its resemblance in colour to the berry of the cornel; but the original word was corrupted to carnelian, probably in allusion to its reddish colour (carneus, ” flesh-coloured “). Some carnelian, however, is brown, yellow or even white. Certain kinds of brown and bright red chalcedony, much resembling carnelian, pass under the name of sard (q.v.). The Hebrew odem was probably a red stone, either carnelian, sard or jasper. All carnelian is translucent and is thus distinguished from jasper of similar colour, which is always opaque. The red colour of typical carnelian is due to the presence of ferric oxide. This is often developed artificially by exposure to sunshine, or to artificial heat, whereby any ferric hydrate in the stone becomes more or less dehydrated; or the stone is treated with a solution of an iron salt, like ferrous sulphate, and then heated, when ferric oxide is formed in the pores of the stone. An opaque white surface is sometimes produced artificially on a red carnelian: this is said to be done by coating the stone with carbonate of soda and then placing it on a red-hot iron; or by using a mixture of potash, white lead and certain vegetable juices, and heating it on charcoal. Inscriptions and figures in white on red carnelian (” burnt carnelian “) are well known from the East. Much carnelian comes from India, being mostly derived from agate-gravels, resulting from the disintegration of the Deccan traps, in the neighbourhood of Ratanpur, near Broach. A good deal of the carnelian now sold, however, is Brazilian agate, artificially stained. (See Agate.)

CARNESECCHI, PIETRO (1508-1567), Italian humanist, was the son of a Florentine merchant, who under the patronage of the Medici, and especially of Giovanni de’ Medici as Pope Clement VII., rapidly rose to high office at the papal court. He came into touch with the new learning at the house of his maternal uncle, Cardinal Bernardo Dovizzi, in Rome. At the age of twenty-five he held several rich livings, had been notary and protonotary to the Curia, and was first secretary to the pope, in which capacity he conducted the correspondence with the nuncios (among them Pier Paolo Bergerio in Germany) and a host of other duties. By his conduct at the conference with Francis I. at Marseilles he won the favour of Catherine de’ Medici and other influential personages at the French court, who in later days befriended

him. He made the acquaintance of the Spanish reformer Juan de Valdes at Rome, and got to know him as a theologian at Naples, being especially drawn to him through the appreciation expressed by Bernardino Ochino, and through their mutual friendship with the Lady Julia Gonzaga, whose spiritual adviser he became after the death of Valdes. He became a leading spirit in the literary and religious circle that gathered round Valdes in Naples, and that aimed at effecting from within the spiritual reformation of the church. Under Valdes' influence he whole-heartedly accepted Luther's doctrine of justification by faith, though he repudiated a policy of schism.

When the movement of suppression began, Carnesecchi was impli- cated. For a time he found shelter with his friends in Paris, and from 1552 he was in Venice leading the party of reform in that city. In 1557 he was cited (for the second time) before the tribunal in Rome, but refused to appear. The death of Paul IV. and the accession of Pius IV. in 1559 made his position easier, and he came to live in Rome. With the accession of Pius V. (Michael Ghislieri) in 1565 the Inquisition renewed its activities with fiercer zeal than ever. Carnesecchi was in Venice when the news reached him, and betook himself to Florence, where, think-ing himself safe, he was betrayed by Cosimo, the duke, who wished to curry favour with the pope. From July 1566 he lay in prison over a year. On the 21st of September 1567 sentence of degrada- tion and death was passed on him and sixteen others, ambassadors from Florence vainly kneeling to the pope for some mitigation, and on the 1st of October he was publicly beheaded and then burned.

CARNIOLA (Ger. Krain), a duchy and crown-land of Austria, bounded N. by Carinthia, N.E. by Styria, S.E. and S. by Croatia, and W. by Gorz and Gradisca, Trieste and Istria. It has an area of 3856 sq. m. Carniola is for the most part a moun- tainous region, occupied in the N. by the Alps, and in the S. by the Karst (q.v.) or Carso Mountains. It is traversed by the Julian Alps, the Karawankas and the Steiner Alps, which belong all to the southern zone of the Eastern Alps. The highest point in the Julian Alps is formed by the three sugar-loaf peaks of the Triglav or Terglou (9394 ft.), which offers one of the finest views in the whole of the Alps, and which bears on its northern declivity the only glacier in the province. The Triglav is the dividing range between the Alps and the Karst Mountains, and its huge mass also forms the barrier between three races: the German, the Slavonic and the Italian. Other high peaks are the Mangart (8784

ft.) and the Jaluz (8708 ft.). The Karawankas, which form the boundary between Carinthia and Carniola, have as their highest peak the Stou or Stuhlberg (7344 ft.), and are traversed by the Loibl Pass (4492 ft.). They are continued by the Steiner or Santhaler Alps, which have as their highest peak the Grintouz or Grintovc (8393 ft.). This peak is situated on the threefold boundary of Carinthia, Carniola and Styria, and affords a magnificent view of the whole Alpine neighbouring region. The southern part of Carniola is occupied by the following divisions of the northern ramifications of the Karst Mountains: the Birnbaumer Wald with the highest peak, the Nanos (4275 ft.), and the Krainer Schneeberg (5890 ft.) ; the Hornwald with the highest peak, the Hornbuchl (3608 ft.), and the Uskokengebirge (3874 ft.). The portion of Carniola belonging to the Karst region presents a great number of caves, subterranean streams, funnels and similar phenomena. Amongst the best-known are the grottos of Adelsberg, the larger ones of, Planina and the Kreuzberghohle near Laas.

With the exception of the Idria and the Wippach, which as tributaries of the Isonzo belong to the basin of the Adriatic, Carniola belongs to the watershed of the Save. The Save or Sau rises within the duchy, and is formed by the junction at Radmannsdorf of its two head-streams the Wurzener Save and the Wocheiner Save. Its principal affluents are the Kanker and the Steiner Feistritz on the left, and the Zeyer or Sora, the Laibach and the Gurk on the right. The most remarkable of these rivers is the Laibach, which rises in the Karst region under the name of Poik, takes afterwards a subterranean course and traverses the Adelsberg grotto, and appears again on the surface near Planina under the name of Unz. Shortly after this it takes for the second time a subterranean course, to appear finally on the surface near Oberlaibach. The small torrent of Rothwein, which flows into the Wurzener Save, forms near Veldes the splendid series of cascades known as the Rothwein Fall. Amongst the principal lakes are the Wochein, the Weissenfels, the Veldes, and the seven small lakes of the Triglav; while in the Karst region lies the famous periodical lake of Zirknitz, known to the Romans as Locus Lugens or Lugea Palus.

The climate is rather severe, and the southern part is exposed to the cold north-eastern wind, known as the Bora. The mean

annual temperature at Laibach is 48-4° F., and the rainfall amounts to 72 ins. Of the total area only 14-8% is under cultivation, and the crops do not suffice for the needs of the province; forests occupy 44-4%, 17-2% are meadows, 15-7% are pastures, and 1-17% of the soil is covered by vineyards. Large quantities of flax are grown, while the timber trade is of considerable importance. Fish and game are plentiful, and the silkworm is bred in the warmer districts. The principal mining product is mercury, extracted at Idria, while iron and copper ore, zinc and coal are also found. The industry is not well developed, but the weaving of linen and lace is pursued as a household industry.

Carniola had in 1900 a population of 508,348, which corresponds to 132 inhabitants per sq. m. Nearly 95% were Slovenes and 5 % Germans, while 99 % of the population belonged to the Roman Catholic Church. The local diet, of which the bishop of Laibach is a member ex officio, is composed of thirty-seven members, and Carniola sends eleven deputies to the Reichsrat at Vienna. For administrative purposes the province is divided into eleven districts and one autonomous municipality, Laibach (pop. 36,547), the capital. Other important places are Oberlai- bach (5882), Idria (5772), Gurkfeld (5294), Zirknitz (5266), Adelsberg (3636), Neurnarktl (2626), Krainburg (2484) and Gottschee (2421).

Carniola derives its modern name from the Slavonic word Krajina (frontier). During the Roman Empire it formed part of Noricum and Pannonia. The Slavonic population settled here during the end of the 6th and the beginning of the 7 th century. Conquered by Charlemagne, the most of the district was bestowed on the duke of Friuli; but in the 10th century the title of margrave of Carniola began to be borne by a family resident in the castle of Kieselberg near Krainburg. Various parts of the present territory were, however, held by other lords, such as the duke of Carinthia and the bishop of Freising. Towards the close of the 14th century all the separate portions ha4 come by in- heritance or bequest into the hands of Rudolph IV. of Austria, who took the title of duke of Carniola; and since then the duchy has remained a part of the Austrian possessions, except during the short period from 1809 to 1813, when it was incorporated with the French Illyrian Provinces. In 1849 it became a separate crown-land.

See Dimitz, GeschicMe Krains von der altesten Zeit bis 1813 (4 vols., Laibach, 1874-1876).

CARNIVAL (Med. Lat. carnelevarium, from caro, carnis, flesh, and levare, to lighten or put aside; the derivation from valere, to say farewell, is unsupported), the last three days pre- ceding Lent, which in Roman Catholic countries are given up to feasting and merry-making. Anciently the carnival was held to begin on twelfth night (6th January) and last till midnight of Shrove Tuesday. There is little doubt that this period of licence represents a compromise which the church always inclined to make with the pagan festivals and that the carnival really represents the Roman Saturnalia. Rome has ever been the headquarters of carnival, and though some popes, notably Clement IX. and XL and Benedict XIIL, made efforts to stem the tide of Bacchanalian revelry, many of the popes were great patrons and promoters of carnival keeping. Paul II. was notable in this respect. In his time the Jews of Rome were compelled to pay yearly a sum of 1 130 golden florins (the thirty being added as a special memorial of Judas and the thirty pieces of silver), which was expended on the carnival. A decree of Paul II., minutely providing for the diversions, orders that four rings of silver gilt should be provided, two in the Piazza Navona and two at the Monte Testaccio — one at each place for the burghers and the other for the retainers of the nobles to practise riding at the ring. The pope also orders a great variety of races, the expenses of which are to be paid from the papal exchequer — one to be run by the Jews, another for Christian children, another for Christian young men, another for sexagenarians, a fifth for asses, and a sixth for buffaloes. Under Julius III. we have long accounts of bull-hunts— or rather bull-baits — in the Forum, with gorgeous descriptions of the magnificence of the dresses,

and enormous suppers in the palace of the Conservatori in the capitol, where seven cardinals, together with the duke Orazio Farnese, supped at one table, and all the ladies by themselves at another. After the supper the whole party went into the courtyard of the palace, which was turned into the semblance of a theatre, ” to see a most charming comedy which was admir- ably played, and lasted so long that it was not over till ten o’clock!” Even the austere and rigid Paul IV. (ob. 1559) used to keep carnival by inviting all the Sacred College to dine with him. Sixtus V., who was elected in 1585, set himself to the keeping of carnival after a different fashion. Determined to repress the lawlessness and crime incident to the period, he set up gibbets in

conspicuous places, as well as whipping-posts, the former as a hint to robbers and cut-throats, the latter ip store for minor offenders. We find, further, from the provisions made at the time, that Sixtus reformed the evil custom of throw- ing dirt and dust and flour at passengers, permitting only flowers or sweetmeats to be thrown.

The later popes for the most part restricted the public festivi- ties of the carnival to the last six or seven days immediately preceding Ash Wednesday. The municipal authorities of the city, on whom the regulation of such matters now depends, allow ten days. The carnival sports at Rome anciently consisted of three divisions: (1) the races in the Corso (formerly called the Via Lata, and taking its present name from them), which appear to have been from time immemorial a part of the festivity; (2) the spectacular pageant of the Agona; (3) that of the Testaccio.

Of other Italian cities, Venice used in old times to be the principal home, after Rome, of carnival. To-day Turin, Milan, Florence, Naples, all put forth competing programmes. In old times Florence was conspicuous for the licentiousness of its carnival; and the Canti Camascialeschi, or carnival songs, of Lorenzo de' Medici show to what extent the licence was carried. The carnival in Spain lasts four days, including Ash Wednesday. In France the merry-making is restricted almost entirely to Shrove Tuesday, or mardi gras. In Russia, where no Ash Wednesday is observed, carnival gaieties last a week from Svnday to Sunday.

CARNIVORA, the zoological order typified by the laˆer carnivorous placental land mammals of the present day, such as lions, tigers and wolves, but also including species like bears whose diet is largely vegetable, as well as a number of smaller flesh-eating species, together with the seals and their relatives, and an extinct Tertiary group. Apart from this distinct group (see Creodonta) , the Carnivora are characterized by the follow- ing features. They are unguiculate, or clawed mammals, with never less than four toes to each foot, of which the first is never opposable to the rest; the claws, or nails, being more or less pointed although occasionally rudimentary. The teeth com- prise a deciduous and a permanent series, all being rooted, and the latter divisible into the usual four series. In front there is a series of small pointed incisors, usually three in number, on each side of both jaws, of which the first is always the smallest and the- third the largest, the difference being most marked in the upper

jaw; these are followed by strong conical, pointed, recurved canines; the premolars and molars are variable, but generally, especially in the anterior part of the series, more or less compressed, pointed and trenchant; if the crowns are fiat and tuberculated, they are never complex or divided into lobes by deep inflexions of enamel. The condyle of the lower jaw is a transversely placed half-cylinder working in a deep glenoid fossa of corresponding form. The brain varies much in size and form, but the hemispheres are never destitute of convo- lutions. The stomach is always simple and pyriform; the caecum is either absent or short and simple; and the colon is not sacculated or much wider than the small intestine. Vesiculae seminales are never developed, but Cowper's glands may be present or absent. The uterus is two-horned, and the teats are abdominal and variable in number; while the placenta is deciduate, and almost always zonary. The clavicle is often absent, and when present never complete. The radius and ulna are distinct; the scaphoid and lunar of the tarsus are united –

there is never an os centrale in the adult; and the fibula is distinct.

The large majority of the species subsist chiefly on animal food, though many are omnivorous, and a few chiefly vegetable-eaters. The more typical forms live altogether on recently- killed warm-blooded animals, and their whole organization is thoroughly adapted to a predaceous mode of life. In conformity with this manner of obtaining their subsistence, they are generally bold and savage in disposition, though some are capable of being domesticated, and when placed under favourable circumstances exhibit a high degree of intelligence.

I. FlSSIPEDIA

The typical section of the group, the Carnivora Vera.Fissipedia or Carnassidentia, includes all the existing terrestrial members of the order, together with the otters and sea-otters. In this section the fore-limbs never have the first digit, or the hind- limbs the first and fifth digits, longer than the others; and the incisors are § on each side, with very rare exceptions. The cerebral hemispheres are more or less elongated; always with three or

four convolutions on the outer surface forming arches above each other, the lowest surrounding the Sylvian fissure. In the cheek-series there is one specially modified tooth in each jaw, to which the name of " sectorial " or " carnassial " is applied. The teeth in front of this are more or less sharp- pointed and compressed; the teeth behind broad and tuber- culated. The characters of the sectorial teeth deserve special attention, as, though fundamentally the same throughout the group, they are greatly modified in different genera. The upper sectorial is the most posterior of the teeth which have pre- decessors, and is therefore reckoned as the last premolar { p. 4 of the typical dentition). It consists of a more or less compressed blade supported on two roots and an inner lobe supported by a distinct root (see fig. 1). The blade when fully developed has three -cusps (1, 2 and 3), but the anterior is always small, and often absent. The middle cusp is conical, high and pointed;

Fig. 1. — Left upper sectorial or carnassial teeth of Carnivora. I, Felis; II, Canis; III, Ursus. 1, anterior, 2, middle, and 3, posterior cusp of blade ; 4, inner cusp supported on distinct root ; 5, inner cusp, posterior in position, and without distinct root, characteristic of the Ursidae.

and the posterior cusp has a compressed, straight, knife-like edge. The inner cusp. (4) varies in extent, but is generally placed near the anterior end of the blade, though sometimes median in position. In the Ursidae alone both the inner cusp and its root are wanting, and there is often a small internal and posterior cusp (5) without root. In this family also the sectorial is rela- tively to the other teeth much smaller than in other Carnivora. The lower sectorial (fig. 2) is the most anterior of the teeth without predecessors in the milk-series, and is therefore reckoned the first molar. It has two roots supporting a crown, consisting when fully developed of a compressed bilobed blade (1 and 2), a heel (4), and an inner tubercle (3). The cusps of the blade, of which the hinder (2) is the larger, are separated by a notch, generally prolonged into a linear fissure. In the specialized Felidae (I) the blade alone is developed, both heel and inner

tubercle being absent or rudimentary. In Metes (V) and Ursus (VI) the heel is greatly developed, broad and tuberculated. The blade in these cases is generally placed obliquely, its flat or convex (outer) side looking forwards, so that the two lobes or cusps are almost side by side, instead of anterior and posterior. The inner tubercle (3) is generally a conical pointed cusp, placed

to the inner side of the hinder lobe of the blade. The special characters of these teeth are more disguised in the sea-otter than in any other species, but even here they can be traced.

Fig. 2. — Left lower sectorial or carnassial teeth of Carnivora, I, Felis; II, Canis; III, Herpestes; IV, Lutra; V, Meles; VI, Ursus. 1, Anterior cusp of blade; 2, posterior cusp of blade; 3, inner tubercle; 4, heel. It will be seen that the relative size of the two roots varies according to the development of the portion of the crown they respectively support.

The toes are nearly always armed with large, strong, curved and sharp claws, ensheathing the terminal phalanges and held • firmly in place by broad plates of bone reflected over their attached ends from the bases of the phalanges. In the Felidae these claws are “retractile”; the terminal phalange with the claw attached, folding back in the fore-foot into a sheath by the outer or ulnar side of the middle phalange of the digit, and retained in this position when at rest by a strong elastic ligament. In the hind-foot the terminal joint or phalange is retracted on to the top, and not the side of the middle phalange. By the action of the deep flexor muscles the terminal phalanges are straightened, the claws protruded from their sheath, and the soft ” velvety ” paw becomes suddenly converted into a formid- able weapon of offence. The habitual retraction of the claws preserves their points from wear.

The land Carnivora are best divided into two subgroups or sections — (A) the Aeluroidea, or Herpestoidea, and (B) the Arctoidea; the recognition of a third section, Cynoidea, being rendered untenable by the evidence of extinct forms.

(A) Aeluroidea. — In this section, which comprises the cats {Felidae), civets (Viverridae). and hyenas (Hyaenidae), the tympanic bone is more or less ring-like, and forms only a part of the outer wall of the tympanic cavity; an inflated alisphenoid bulla is developed; and the external auditory meatus is short. In the nasal chamber the maxillo-turbinal is small and doubly folded, and does not cut off the naso-turbinal and adjacent bones from the nasal aperture. The carotid canal in the skull is short or absent. Cowper’s glands are present, as is a prostate gland and a caecum, as well as a duodenal-jejunal flexure in the intestine, but an os penis is either wanting or small.

The members of the cat tribe, or Felidae, are collectively

character- ized by the following features. An alisphenoid is lacking on the lower aspect of the skull. In existing forms the usual cat tribe dental formula is i. J, c. \, p. |, m. \ ; the upper molar being rudimentary and placed on the inner side of the carnassial, but the first premolar may be absent, while, as an abnormality, there may be a small second lower molar, which is constantly present in

some of the extinct forms. The auditory bulla and .the tympanic are divided by an internal partition. The paroccipital process is separate from, or only extends to a slight degree upon the auditory bulla. The thoracic vertebrae number 13; the feet are digitigrade, with five front and four hind toes, of which the claws are retractile ; and the metatarsus is haired all round. Anal glands are present.

As regards the teeth, when considered in more detail, the incisors are small, and the canines large, strong, slightly recurved, with trenchant edges and sharp points, and placed wide apart. The pre- molars are compressed and sharp-pointed; the most posterior in the upper jaw (the sectorial) being a large tooth, consisting of a compressed blade, divided into three unequal cusps supported by two roots, with a small inner lobeplaced near the front and supported by a distinct root (fig. I, I). The upper molar is a small tubercular tooth placed more or less transversely at the inner side of the hinder end of the last. In the lower jaw the molar (sectorial) is reduced to the blade, which is large, trenchant, compressed and divided into two subequal lobes (fig. 2, I). Occasionally it has a rudimentary heel, but never an inner tubercle. The skull generally is short and rounded, though proportionally more elongated in the larger forms; with the facial portion short and broad, and the zygomatic arches wide and strong. The auditory bullae are large, rounded and smooth. Vertebrae: C. 7, D. 13, L. 7, S. 3, Ca. 13-29. Clavicles better developed than in other Carnivora, but not articulating with either the shoulder-bones or sternum. Of the five front toes, the third and fourth are nearly equal and longest, the second slightly, and the fifth considerably shorter. The first is still shorter, not reaching the metacarpophalangeal articulation of the second. In the hind-feet the third and fourth toes are the longest, the second and fifth some- what shorter and nearly equal, while

the first is represented only by the rudimentary metatarsal bone. The claws are large, strongly curved, compressed, very sharp, and exhibit the retractile condition in the highest degree. The tail varies greatly in length, being in some species a mere stump, in others neariy as long as the body. The ears are of moderate size, more or less triangular and pointed ; and the eyes rather large, with the iris mobile, and with a pupillary aperture which contracts under the influence of light in some species to a narrow vertical slit, in others to an oval, and in some to a circular aperture. The tongue is thickly covered with sharp, pointed, re-curved horny papillae ; and the caecum is small and simple.

As in structure so in habits, the cat may be considered the most specialized of all Carnivora, although they exhibit many features connecting them with extinct types. All the members of the group feed almost exclusively on warm-blooded animals which they have themselves killed, but one Indian species, Felis viverrina, is said to prey on fish, and even fresh-water molluscs. Unlike dogs, they never associate in packs, and rarely hunt their prey on open ground, but from some place of concealment wait until the unsuspecting victim comes within reach, or with noiseless and stealthy tread, crouching close to the ground for concealment, approach near enough to make the fatal spring. In this manner they frequently attack and kill animals considerably exceeding their own size. They are mostly nocturnal, and the greater number, especially the smaller species, more or less arboreal. None are aquatic, and all take to the water with reluctance, though some may habitually haunt the banks of rivers or pools, because they more easily obtain their prey in such situations. The numerous species are widely diffused over the greater part of the habitable world, though most abundant in the warm latitudes of both hemispheres. None are, however, found in the Australian region, or in Madagascar. Although the Old World and New World cats (except perhaps the northern lynx) are all specifically distinct, no common structural character has been pointed out by which the former can be separated from the latter. On the contrary, most of the groups into_ which the family may be divided have representatives in both hemispheres.

Notwithstanding the considerable diversity in external appearance and size between different members of this extensive family, the structural differences are but slight. The principal differences are to be found in the form of the cranium, especially of the nasal and adjoining bones, the completeness of the bony orbit posteriorly, the development of the first upper premolar

and of the inner lobe of the upper sectorial, the length of the tail, the form of the pupil, and the condition and coloration of the fur, especially the presence or absence of tufts or pencils of hair on the external ears.

In the typical genus Felis, which includes the great majority of the species, and has a distribution coextensive with that of the family, the upper sectorial tooth has a distinct inner cusp, the claws are completely contractile, the tail is long or moderate, and the ears do not carry distinct tufts of hair. As regards the larger species, the lion (F. leo), tiger (F. tigris), leopard (F. pardus), ounce or snow- leopard (F. undo) and clouded leopard (F. nebulosa) are described in separate articles. Of other Old World species it must suffice to mention that the Tibetan Fontanier's cat (F. tristis), and the Indian marbled cat (F. marmorata), an ally of the above-mentioned clouded leopard, appear to be the Asiatic representatives of the American ocelots. The Tibetan Pallas's cat (F. man-id) has been made the type of a distinct genus, Trichaelurus , in allusion to its long coat. One of the largest of the smaller species is the African serval, q.v. (F. serval), which is yellow with solid black spots, has long limbs, and a relatively short tail. Numerous " tiger-cats " and " leopard-

cats," such as the spotted F. bengalensis and the uniformly chestnut F. badia, inhabit tropical Asia; while representative species occur in Africa. The jungle-cat (F. chaus), which in its slightly tufted ears and shorter tail foreshadows the lynxes, is common to both continents. Another African species (F. ocreata) appears to have been the chief progenitor ot the European domestic cat, which has, however, apparently been crossed to some extent with the ordinary wild cat (F. catus). Of the New World species, F. concolor, the puma or couguar, commonly called " panther " in the United States, is about the size of a leopard, but of a uniform brown colour, spotted only when young, and is extensively distributed in both North and South America, ranging between the parallels of 60 ° N. and 50 S., where it is represented by numerous local races, varying in size and colour. F. onca, the jaguar, is a. larger and more powerful animal than the last, and more resembles the leopard in its colours; it is also found in both North and South America, although with a less extensive range, reaching northwards only as far as Texas, and southwards nearly to Patagonia (see Jaguar). F. pardalis and several allied smaller, elegantly-spotted species inhabiting the intratropical regions of America, are commonly confounded under the name of ocelot or tiger-cat. F. yaguarondi,

rather larger than the domestic cat, with an elongated head and body, and of a uniform brownish-grey colour, ranges from northern Mexico to Paraguay; while the allied F. eyra is a small cat, weasel-like in form, having an elongated head, body and tail, and short limbs, and is of a uniform light reddish-brown colour. It is a native of South America and Mexico. F. pajeros is the Pampas cat.

The typical lynxes, as represented by Lynx borealis (L, lynx), the southern L. pardina, and the American L. rufa, are a northern group common to both hemispheres, and characterized by their tufted ears, short tail, and the presence of a rudimentary heel to the lower carnassial tooth. As a rule, they are more or less spotted in winter, but tend to become uniformly-coloured in summer. They are con- nected with the more typical cats by the long-tailed and uniformly red caracal, Lynx {Caracal) caracal, of India, Persia and Africa, and the propriety of separating them from Felis may be open to doubt (see Lynx and Caracal).

However this may be, there can be no doubt of the right of the hunting-leopard or chita (cheeta), as, in common with the leopard, it is called in India, to distinction from all the other cats as a distinct genus, under the name of Cynaelurus jubatus. From all the other Felidae this animal, which is common to Asia and Africa, is dis- tinguished by the inner lobe of the upper sectorial tooth, though supported by a distinct root, having no salient cusp upon it, by the tubercular molar being more in a line with the other teeth, and by the claws being smaller, less curved and less completely retractile, owing to the feebler development of the elastic ligaments. The skull is short and high, with the frontal region broad and elevated in consequence of the large development of air-sinuses. The head is small and round, the body light, the limbs and tail long, and the colour pale yellowish-brown with small solid black spots (see Cheeta).

The family Viverridae, which includes the civet-cats, genets and mongooses, is nearly allied to the Felidae, but its members have a fuller dentition, and exhibit certain other structural //-««, differences from the cats, to the largest of which they (” vettrlbe . make no approach in the matter of bodily size. As a rule,

there is an alisphenoid canal ; the cheek-dentition is p. 3 or 4

3 or 4 1 or 2 m ” -> ‘ ˆ e bulla is small and the tympanic large, with a low

division between them; and the paroccipital process is leaf-like and spread over the bulla. The number of dorsal vertebrae, except in the aberrant Proteles, is 13 or 14; the claws may be either completely or partially retractile or non-retractile; generally each foot has five toes, but there may be four in front and five behind, the reverse of this, or only four on each foot ; the gait may be either digitigrade or partially plantigrade; and the metatarsus may be either hairy or naked inferiorly. Anal, and in some cases also perineal, glands are developed. The family is limited to the warmer parts of the Old World.

Considerable difference of opinion prevails with regard to the serial position of the fossa, or foussa (Cryptoprocta ferox) , of Mada- gascar, some writers considering that its affinities are so close to the Felidae that it ought not to be included in the present family at all. Others, on the contrary, see no reason to separate it from the Viverrinae or more typical representatives of the civet-tribe. As a medium course, it may be regarded as the sole representative of a special subfamily — Cryptoproctinae — of the Viverridae. The sub- family and genus are characterized by possessing a total of 36 teeth, arranged as i. f , c. \, p. f , m. . The teeth generally closely resemble those of the Felidae, the first premolar of both jaws being very minute and early deciduous; the upper sectorial has a small inner lobe, quite at the anterior part ; the molar is small and placed transversely; and the lower sectorial has a large trenchant bilobed blade, and a minute heel, but no inner tubercle. The skull is gener- ally like that of Felis, but proportionally longer and narrower, with the orbit widely open behind. Vertebrae: C. 7, D. 13, L. 7, S. 3, Ca. 29. Body elongated. Limbs moderate in size. Feet sub- plantigrade, with five well-developed toes on each, carrying sharp, compressed, retractile claws. Ears moderate. Tail long and

cylindrical. The foussa is a sandy-coloured animal with an exceed- ingly long tail (see Foussa).

The more typical members of the group, constituting the subfamily Viverrinae, are characterized by their sharp, curved and largely retractile claws, the presence of five toes to each foot, and of perineal and one pair of anal glands, and a tympanic bone which retains to a great extent the primitive ring-like form, so

that the external auditory meatus has scarcely any inferior lip, its orifice being close to the tympanic ring. The first representatives of the subfamily are the civet-cats, or civets (Viverra and Viverricula) , and the genets (Genetta), in all of which the dentition is i. §, c. \, p. J, m. f ; total 40. The skull is elongated, with the facial portion small and compressed, and the orbits well-defined but incomplete behind. Vertebrae: C. 7, D. 13, L. 7 (or D. 14, L. 6), S. 3, Ca. 22-30. Body elongated and compressed. Head pointed in front; ears rather small. Ex- tremities short. Feet small and rounded. Toes short, the first on fore and hind feet much shorter than the others. Palms and soles covered with hair, except the pads of the feet and toes, and in some species a narrow central line on the under side of the sole, extending backwards nearly to the heel. Tail moderate or lone. The pair of large glands situated on the perineum (in both sexes) secretes an oily substance of a peculiarly penetrating odour. In the true civets, which include the largest members of the group, the teeth are stouter and less compressed than in the other genera; the second upper molar being especially large, and the auditory bulla smaller and more pointed in front; the body is shorter and stouter; the limbs are longer; the tail shorter and tapering. The under side of the tarsus is completely covered with hair, and the claws are longer and less retractile. Fur rather long and loose, and in the middle line of the neck and back especially elongated so as to form a sort of crest or mane. Pupil circular when contracted. Perineal glands greatly developed. These characters apply especially to V. civetta, the African civet, or civet-cat, as it is commonly called, an animal rather larger than a fox, and an inhabitant of intratropical Africa. V. zibetta, the Indian civet, of about equal size, approaches in many respects, especially in the characters of the teeth and feet and absence of the crest of elongated hair on the back, to the next section. It inhabits Bengal, China, the Malay Peninsula and adjoining islands. V. tangalunga is a smaller but nearly allied animal from the same part of the world. From these three species and the next the civet of commerce, once so much admired as a perfume in England, and still largely used in the East, is obtained. The animals are kept in cages, and the odoriferous secretion collected by scraping the interior of the perineal follicles with a spoon or spatula. The single representative of the genus Viverricula resembles in many respects the genets, but agrees with the civets in having the whole of the under side of the tarsus hairy; the alisphenoid canal is gener- ally absent. V. malaccensis, the rasse, inhabiting India, China, Java and Sumatra, is an elegant little animal which

affords a favourite perfume to the Javanese. The genets (Genetta) are smaller animals, with more elongated and slender bodies, and shorter limbs than the civets. The skull is elongated and narrow; and the auditory bulla large, elongated and rounded at both ends. The teeth are compressed and sharp-pointed, with a lobe on the inner side of the third, upper premolar not present in the previous genera. Pupil contracting to a linear aperture. Tail long, slender, ringed. Fur short and soft, spotted or cloudy. Under side of the metatarsus with a narrow longitudinal bald streak. Genetta vulgaris, or G. genetta, the common genet, is found in France south of the river Loire, Spain, south-western Asia and North Africa. G. felina, senegalensis , tigrina, victoriae and partialis are other named species, all African in habitat.

The Malagasy fossane (Fossa daubentoni), which has but little markings on the fur of the adult, differs by the absence of a scent- pouch and the presence of a couple of bare spots on the under surface of the metatarsus. The beautiful linsangs (Linsanga or Prionodon), ranging from the eastern Himalaya to Java and Borneo, are repre- sented by two or three species, easily recognizable by the broad transverse bands of blackish brown and yellow with which the body and tail are marked. They are specially distinguished by having only one pair of upper molars, thereby resembling the cats, with which, in correlation with their arboreal habits, they agree in their highly retractile claws, and the hairy surface of the under side of the metatarsus. About 15 in. is the length of the type species. In West Africa the linsangs are represented by Poiana richardsoni, a small species with a spotted genet-like coat, and also with a narrow naked stripe on the under surface of the metatarsus, as in genets.

Here may be placed the two African spotted palm-civets of the genus Nandinia, namely N. binotata from the west and N. gerrardi from the east forest-region. In common with the true palm-civets, they ha-ˆe a dentition numerically identical with that of Viverra and Genetta, but the cusps of the hinder premolars and molars are much less sharp and pointed. They are peculiar in that the wall of the inner chamber of the auditory bulla never ossifies, while the paroccipital process is not flattened out and spread over the bulla. In this respect they resemble the Miocene European genus Amphictis, as they do in the form of their teeth, so that they may be regarded as nearly related to the ancestral Viverridae, and forming in some degree a connecting link between the present and the next sub- family. Nandinia is also peculiar in possessing a kind of rudimentary

marsupial pouch. Apparently Eupleres goudoti, of Madagascar, which has been generally classed in the Herpestinae, is a nearly related animal, characterized by the reduction of its dentition, due to insectivorous habits (fig. 3) ; the canines being small, the anterior premolars canine-like, and the hinder premolars molariform. It is a uniformly-coloured creature of medium size.

The palm-civets, or paradoxures, constituting the Asiatic genus Paradoxurus, have, as already stated, the following dental formula, viz. i. I, c. \, p. f, m. I, total 40; the cusps of the molars being low and blunted, and these teeth in the upper jaw much broader than in the civets. The head is pointed in front, with small rounded ears; the limbs are of medium length, with the soles of the feet almost completely naked, and fully retractile claws; while the long tail is not prehensile and clothed with hair of moderate length.

Fig. 3. — Skull of Eupleres goudoti.

Spots are the chief type of marking. The vertebrae number C. 7, D. 13, L. 7, S. 3, Ca. 29-36. Numerous relatively large species ranging from India to Borneo, Sumatra and Celebes, with one in Tibet, • represent the genus. Nearly allied are Arctogale leucotis, with a wide distribution, and A . trivirgata, of Java, both longitudin- ally striped species, with small and slightly separated molars, and a prolonged bony palate (see Palm-Civet).

The binturong (Arctictis binturong) has typically the same dental formula as the last, but the posterior upper molar and the first lower premolar are often absent. Molars small and rounded, with a dis- tinct interval between every two, but formed generally on the same pattern as Paradoxurus. Vertebrae: C 7, D. 14, L. 5, S. 3, Ca. 34. Body elongated ; head broad behind, with a small pointed face, long and numerous whiskers, and small ears, rounded, but clothed with a pencil of long hairs. Eyes small. Limbs short, with the soles of the feet broad and entirely naked. Tail very long and prehensile. Fur long and harsh. Caecum extremely small. The binturong inhabits southern Asia from Nepal through the Malay Peninsula to the islands of Sumatra and Java. Although structu- rally agreeing closely with the paradoxures, its tufted ears, long, coarse and dark hair, and prehensile tail give it a very different external appearance. It is slow and cautious in its movements, chiefly if not entirely arboreal, and appears to feed on vegetables as well as animal substances (see Binturong).

Hemigale is another modification of the paradoxure type, represented by H. hardwickei of Borneo, an elegant-looking animal, smaller and more slender than the paradoxures, of light grey colour, with transverse broad dark bands across the back and loins.

Cynogale also contains one Bornean species, C. bennetti, a curious otter-like modification of the viverrine type, having semi-aquatic habits, both swimming in the water and climbing trees, living upon fish, crustaceans, small mammals, birds and fruits. The number and general arrangement of the teeth are as in Paradoxurus, but the premolars are peculiarly elongated, compressed, pointed and re- curved, though the molars are tuberculated. The head is elongated, with the muzzle broad and depressed, the whiskers are very long and abundant, and the ears small and rounded. Toes short and slightly webbed at the base. Tail short, cylindrical, covered with short hair. Fur very dense and soft, of a dark-brown colour, mixed with black and grey.

In the mongoose group, or Herpestinae, the tympanic or anterior portion of the auditory bulla is produced into an ossified external auditory meatus of considerable length; while the paroccipital process never projects below the bulla, on the hinder surface of which, in adult animals, it is spread out and completely lost. The toes are straight, with long, unsheathed, non-retractile claws.

In the typical mongooses or ichneumons, Herpestes, the dental

formula is i. f , c. \, p. j- ;? , m. |; total 40 or 36; the molars

having generally strongly-developed, sharply-pointed cusps. The skull is elongated and constricted behind the orbits. The face is short and compressed, with the frontal region broad and arched. Post-orbital processes of frontal and jugal bones well developed, generally meeting so as to complete the circle of the orbit behind. Vertebrae: C. 7, D. 13, L. 7, S. 3, Ca. 21-26. Head pointed in front. Ears short and rounded. Body long and slender. Extremities short. Five toes on each foot, the first, especially that on the hind- foot, very short. Toes free, or but slightly palmated. Soles of fore-feet and terminal portion of those of hind-pair naked; under surface of metatarsus clothed with hair. Tail long or moderate, generally thick at the base, and sometimes covered with more or less elongated hair. The longer hairs covering the body and tail almost always ringed. The genus is common to the warmer parts of

Asia and Africa, and while many of the species, like the Egyptian H. ichneumon and the ordinary Indian mongoose, H. mungo, are pepper-and-salt coloured, the large African H. albicauda has the terminal two-thirds of the tail clothed with long white hairs (see Ichneumon).

The following distinct African and Malagasy generic representatives of the subfamily are recognized, viz. Helogale, with § premolars, and containing the small South African H. parvula and a variety of the same. Bdeogale crassicauda and two allied tropical African species differ from Herpestes in having only four toes on each foot. The orbit is nearly complete, and the tail of moderate length and rather bushy. In Cynictis, which has the orbit completely closed, there are five front and four hind toes; and the skull is shorter and broader than in Herpestes, rather contracted behind the orbits, the face short, and the anterior chamber of the auditory bulla very large. The front claws are elongated. Includes only C. penicillata from South Africa.

All the foregoing herpestines have the nose short, with its under surface flat, bald, and with a median longitudinal groove. The remaining forms have the nose more or less produced, with its under side convex, and a space between the nostrils and the upper lip covered with closely pressed hairs, and without any median groove. The South African Rhynchogale muelleri, a reddish animal with five toes to each foot and 1 (abnormally f) premolars, alone represents the first genus. The cusimanses (Crossarchus), which differ by having only | premolars, and thus a total of 36 teeth, include, on the other hand, several species. The muzzle is elongated, the claws on the fore-feet are long and curved, the first front toe is very short; the under surface of the metatarsus naked; and the tail shorter than the body, tapering. Fur harsh. Includes C. ob- scurus, the cusimanse, a small burrowing animal from West Africa, of uniform dark-brown colour, C. fasciatus, C. zebra, C. gambianus and others. Lastly, we have Suricata, a more distinct genus than any of the above. The dental formula is as in the last, but the teeth of the molar series are remarkably short in the antero-posterior direction, corresponding with the shortness of thj skull generally. Orbits complete behind. Vertebrae: C. 7, D. 15, L. 6, S. 3, Ca. 20. Though the head is short and broad, the nose is pointed and rather

produced and movable, while the ears are very short. Body shorter and limbs longer than in Herpestes. Toes 4-4. Claws on fore-feet very long and narrow, arched, pointed and subequal. Hind-feet with shorter claws, soles hairy. Tail rather shorter than the body. One species only is known, the meerkat or suricate, 5. tetradactyla, a small grey-brown animal, with dark transverse stripes on the hinder part of the back, from South Africa.

The names Galidictis, Galidia and Hemigalidia indicate three generic modifications of the Herpestinae, all inhabitants of Madagascar. The best-known, Galidia elegans, is a lively squirrel-like little animal with soft fur and a long bushy tail, which climbs and jumps with agility. It is of a chestnut-brown colour, the tail being ringed with darker brown. Galidictis vittata and G. striata chiefly differ from the ichneumons in their coloration, being grey with parallel longitudinal stripes of dark brown.

Considerable diversity of opinion prevails with regard to the serial position of the aard-wolf, or maned jackal (Proteles cristatus), of southern and eastern Africa, some authorities making it the representative of a family by itself, others referring it to the Hyaenidae, while others again regard it as a modified member of the Viverridae. After all, the distinction either way cannot be very great, since the two families just named are intimately connected by marks of the extinct Ictitherium. With the Viverridae it agrees in having the auditory bulla divided, while in the number of dorsal vertebrae it is hyena-like. The cheek-teeth are small, far apart, and almost rudimentary in character (see fig. 4), and the canines

long and rather slender. The dental formula is i.%, c.\, p.m. ■

3 or 4′

total 30 or 32. Vertebrae :_ C. 7, D. 15, L. 5, S. 2, Ca. 24. The fore-feet with five toes; the first, though short, with a distinct claw. The hind-feet with four subequal toes; all, like those of the fore-foot, furnished with strong, blunt, non-retractile claws (see Aard-Wolf). The hyenas or hyaenas {Hyaenidae) differ from the preceding family (Viverridae) in the absence of a distinct vertical partition Hyena between the two halves of the auditory bulla; and are

tribe. further characterized by the absence of an alisphenoid

canal, the reduction of the molars to \ , and the presence of 15 dorsal vertebrae. The dental formula in the existing forms (to which alone all these remarks apply) is i. f, c. \, p. f, m.\; total 34; the teeth, especially the canines and premolars, being very large, strong and conical. Upper sectorial with a large, distinctly trilobed blade and a moderately developed inner lobe placed at the anterior extremity of the blade. Molar very small, and placed trans- versely close to the hinder edge of the last, as in the Felidae. Lower sectorial consisting of little more than the bilobed blade. Zygomatic arches of skull very wide and strong; and sagittal crest high, giving attachment to very powerful biting muscles. Orbits incomplete behind. Vertebrae: C. 7, D. 15, L. 5, S. 4, Ca. 19. Limbs rather long, especially the anterior pair, digitigrade, four subequal toes on each, with stout non-retractile claws, the first toes being represented by rudimentary metacarpal and metatarsal bones. Tail rather

short. A large post-anal median glandular pouch, into which the largely developed anal scent glands pour their secretion.

The three well-characterized species of Hyaena are divisible into two sections, to which some zoologists assign generic rank. In the typical species the upper molar is moderately developed and three- rooted; and an inner tubercle and heel more or less developed on the lower molar. Ears large and pointed. Hair long, forming a mane on the back and shoulders. Represented firstly by H. striata,

I Fig. 4. — Skull and Dentition of Aard-Wolf (Proteles cristatus).

the striped hyena of northern and eastern Africa and southern Asia ; and H. brunnea of South Africa, in some respects intermediate between this and the next section. In the second section, forming the subgenus Crocuta, the upper molar is extremely small, two- or one- rooted, often deciduous; the lower molar without trace of inner tubercle, and with an extremely small heel. Ears moderate, rounded. Hair not elongated to form a mane. The spotted hyena, Hyaena (Crocuta) crocuta, of which, like the striped species, there are several local races, represents this group, and ranges all over Africa south of the Sahara. In dental characters the first section inclines more to the Viverridae, the second to the Felidae; or the second may be considered as the more specialized form, as it certainly is in its visceral anatomy, especially in that of the reproductive organs of the female. (See Hyena.)

(B) Arctoidea. — So far as the auditory region of the skull is concerned, the existing representatives of the dog tribe or Canidae are to a great extent intermediate between the cat and civet group (AeluroiJea) on the one hand, and the typical representatives of the bear and weasel group on the other. They were consequently at one time classed in an intermediate group — the Cynoidea; but fossil forms show such a complete transition from dogs to bears as to demonstrate the artificial character of such a division. Consequently, the dogs are in- cluded in the bear-group. In this wider sense the Arctoidea will be characterized by the tympanic bone being disk-shaped and forming the whole of the outer wall of the tympanic cavity; the large size of the external auditory meatus or tube; and the large and branching maxillo-turbinal bone, which cuts off the naso-turbinal and two adjacent bones from the anterior nasal chamber. The tympanic bulla has no internal partition. There is a large carotid canal. Cowper's glands are lacking; and there is a large penial bone.

From all the other members of the group the Canidae are broadly distinguished (in the case of existing forms) by the large and well- developed tympanic bulla, with which the paroccipital Don tribe process is in contact. An alisphenoid canal is present. The feet are digitigrade, usually with five (in one instance four) front and always four hind-toes. The molars — generally J— have tall cusps, and the sectorials are large and powerful (figs. I and 2). The intestine has both a duodeno-jejunal flexure and a caecum. A prostate gland is present; but there are no glands in the vasa deferentia; the penial bone is grooved; and anal glands are generally developed. The distribution of the family is cosmo-politan. The normal dentition is i. |, c. {, p. |, m. f; total 42; thus differing from the typical series only by the loss of the last pair of upper molars (present in certain extinct forms). In the characters of the teeth the group is the most primitive of all Carnivora. Typi-cally the upper sectorial (fig. I, II) consists of a stout blade, of which the anterior cusp is almost obsolete, the middle cusp large, conical and pointed backwards, and the posterior cusp in the form of a compressed ridge; the inner lobe is very small, and placed at the fore part of the tooth. The first molar is more than half the antero- posterior length of the sectorial, and considerably wider than long; its crown consists of two prominent conical cusps, of which the anterior is the larger, and a low, broad inward prolongation, support- ing two more or less distinct cusps and a raised inner border. The second molar

resembles the first in general form, but is considerably smaller. The lower sectorial (fig. 2, II) is a large tooth, with a strong compressed bilobed blade, the hinder lobe being considerably the larger and more pointed, a small but distinct inner tubercle

placed at the hinder margin of the posterior lobe of the blade, and a broad, low, tuberculated heel, occupying about one-third of the whole length of the tooth. The second molar is less than half the length of the first, with a pair of cusps placed side by side anteriorly, and a less distinct posterior pair. The third is an extremely small and simple tooth with a subcircular tuberculated crown and single root.

Views differ in regard to the best classification of the Canidae, some writers adopting a number of generic groups, while others con- sider that very few meet the needs of the case. In retaining the old genus Canis in the wide sense, that is to say, inclusive of the foxes, Professor Max Weber is followed. The best cranial character by which the different members of the family may be distinguished is that in dogs, wolves and jackals the post-orbital process of the frontal bone is regularly smooth and convex above, with its extremity bent downwards, whereas in foxes the process is hollowed above, with its outer margin (particularly of the anterior border) somewhat raised. This modification coincides in the main with the division of the group into two parallel series, the Thooids or Lupine forms and Alopecoids or Vulpine forms, characterized by the presence of frontal air-sinuses in the former, which not only affects the external form but to a still greater degree the shape of the anterior part of the cranial cavity, and the absence of such sinuses in the latter. The pupil of the eye when contracted is round in most members of the first group, and vertically elliptical in the others, but more observations are required before this character can be absolutely relied upon. The form and length of the tail is often used for the purposes of classification, but its characters do not coincide

Fig. 5. — The African Hunting-Dog (Lycaon pictus).

with those of the cranium, as many of the South American Canidae have the long bushy tails of foxes and the skulls of wolves.

The most aberrant representative of the thooid series is the African hunting-dog {Lycaon pictus, fig. 5), which differs from the other members of this series by the teeth being rather more massive and rounded, the skull shorter and broader, and the presence of but four toes on each limb, as in Hyena. The hunting-dog, from south and east Africa, is very distinct externally from all other Canidae; being nearly as large as a mastiff, with large, broadly ovate erect ears and a singular colouring, often consisting of un- symmetrical large spots of white, yellow and black. It presents some curious superficial resemblances to Hyena crocuta, perhaps a case of mimetic analogy, and hunts its prey in large packs. Several local races, one of which comes from Somaliland, differing in size and colour, are recognized (see Hunting-Dog). Nearly related to the hunting-dog are the dholes or wild dogs of Asia, as represented by the Central Asian Cyon primaevus and the Indo-Malay C. javanicus. They have, however, five front-toes, but lack the last lower molar; while they agree with Lycaon and Speothos in that the heel of the lower sectorial tooth has only a single compressed cutting cusp, in place of a large outer and a smaller inner cusp as in Canis. Dholes are whole-coloured animals, with short heads; and hunt in packs. The bush-dog (Speothos, or Icticyon venations) of Guiana is a small, short-legged, short-tailed and short-haired

species characterized by the molars being only :

-; the carnassial

having no inner cusp. The long-haired raccoon-dog (Nyctereutes procyonoides) of Japan and China agrees essentially in everything but general appearance (which is strangely raccoon-like) with Canis. The typical group of the latter includes some of the largest members of the family, such as the true wolves of the northern parts of both Old and New Worlds (C. lupus, &c), and the various breeds of the domestic dog (C ‘. famtiiaris) , the origin of which is still involved in

obscurity. Some naturalists believe it to be a distinct species, descended from one that no longer exists in a wild state; others have sought to find its progenitors in some one of the wild or half- wild races, either of true dogs, wolves or jackals ; while others again believe that it is derived from the mingling of two or more wild species or races. It is probably the earliest animal domesticated by man, and few if any other species have undergone such an extra- ordinary amount of variation in size,

form and proportion of limbs, ears and tail, variations which have been perpetuated and increased by careful selective breeding (see Dog). The dingo or Australian dog is met with wild, and also as the domestic companion of the aboriginal race of the country, by whom it appears to have been originally introduced. It is nearly related to a half-wild dog in- habiting Java, and also to the pariah dogs of India and other eastern countries. Dogs were also in the possession of the natives of New Zealand and other islands of the Pacific, where no placental mammals exist naturally, on their discovery by Europeans in the 18th century. The slender-jawed C. simensis of Abyssinia and the South American C. jubatus and C. antarcticus are also generally placed in this group. On the other hand, the North American coyote (C. latrans), with its numerous subspecies, and the Old World jackals, such as the Indo- European C. aureus, the Indian C. pallipes, and the African C. lupaster, C. anthus, C. adustus, C. variegatus and C. mesomelas (the black-backed jackal), although closely related to the wolves, have been placed in a separate group under the name of Lupulus. Again, Thous (or Lycalopex) , is a group proposed for certain South American Canidae, locally known as foxes, and distinguished from all the foregoing by their fox-like aspect and longer tails, although with skulls of the thooid type. Among these are the bright-coloured colpeo, C. magellanicus, the darker C. thous, C. azarae, C. griseus, C. cancrivorus and C. brasiliensis. Some of these, such as C. azarae and C griseus, show a further approximation to the fox in that the pupil of the eye forms a vertical slit. More distinct from all the pre- ceding are the members of the alopecoid or vulpine section, which are unknown in South America. The characteristic feature of the skull has been already mentioned. In addition to this, reference may be made to the elliptical (in place of circular) pupil of the eye, and the general presence of ten (rarely eight) teats instead of a smaller number. The typical groups constituting the subgenus (or genus) Vulpes, is represented by numerous species and races spread over the Old World and North America. Foremost among these is the European fox (C. vulpes — otherwise Vulpes alopex, or V. vulpes), represented in the Himalaya by the variety C. v. montanus and in North Africa by C. v. niloticus, while the North American C. pennsyl- vanicus or fulvus, can scarcely be regarded as more than a local race. On the other hand, the Asiatic C. bengalensis and C. corsac, and the North American C. velox (kit-fox) are smaller and perfectly distinct species. From all these the North American C. cinereo-argenlatus (grey fox) and C. littoralis are distinguished by having

a fringe of stiff hairs in the tail, whence they are separated as Urocyon. Again, the Arctic fox (C. lagopus), of which there is a blue and a white phase, has the tail very full and bushy and the soles of the feet thickly haired, and has hence been distinguished as Leucocyon. Lastly, we have the elegant little African foxes known as fennecs (Fennecus), such as C. zerda and C. famelicus of the north, and the southern C. chama, all pale-coloured animals, with enormously long ears, and correspondingly inflated auditory bullae to the skull (see Wolf, Jackal, Fox).

Whatever differences of opinion may obtain among naturalists as to the propriety of separating generically the foxes from the wolves and dogs, there can be none as to the claim of the long-eared fox {Otocyon megalotis) of south and east Africa to represent a genus by itself. In this animal the dental formula is i. \, c. \, p. %,

m. , 1 total 46 or 48. The molar teeth being in excess of almost

all other placental mammals with a differentiated series of teeth. They have the same general characters as in Canis, with very pointed cusps. The lower sectorial shows little of the typical character, having five cusps on the crown-surface; these can, however, be identified as the inner tubercle, the two greatly reduced and obliquely placed lobes of the blade, and two cusps on the heel. The skull generally resembles that of the smaller foxes, particularly the fennecs. The auditory bullae are very large. The hinder edge of the lower jaw has a peculiar form, owing to the great development of an ex- panded, compressed and somewhat inverted subangular process. Vertebrae: C. 7, D. 13, L. 7, S. 3, Ca. 22. Ears very large. Limbs rather long, with the normal number of toes. The two parietal ridges on the skull remain widely separated, so that no sagittal crest is formed. The animal is somewhat smaller than an ordinary fox. In the year 1880 Professor Huxley suggested that in the long- eared fox we have an animal nearly representing the stock from which have been evolved all the other representatives of the dog and fox tribe. One of the main grounds for arriving at this conclusion was the fact that this animal has very generally four true molars in each jaw, and always that number in the lower jaw ; whereas three is the maximum number of these teeth to be met with in nearly all placental mammals, other than whales, manatis, armadillos and certain others. The additional molars in Otocyon were regarded as survivals from a primitive type when a larger number was the

rule. Palaeontology has, however, made great strides since 1880, and the idea that the earlier mammals had more teeth than their descendants has riot only received no confirmation, but has been practically disproved. Consequently Miss Albertina Carlsson had a comparatively easy task (in a paper published in the Zoologisches Jahrbuch for 1905) in demonstrating that the long-eared fox is a specialized, and to some extent degraded, form rather than a primitive type. This, however, is not all, for the lady points outs that, as was suggested years previously by the present writer, the creature is really the descendant of the fossil Cants curvipalatus of northern India. This is a circumstance of considerable interest from a distributional point of view, as affording one more instance of the intimate relationship between the Tertiary mammalian fauna of India and the existing mammals of Africa

In regard to the members of the dog-tribe as a whole, it may be stated that they are generally sociable animals, hunting their prey in packs. Many species burrow in the ground; none habitually climb trees. Though mostly carnivorous, feeding chiefly on animals they have chased and killed themselves, many, especially among the smaller species, eat garbage, carrion, insects, and also fruit, berries and other vegetable substances. The upper surface of the tail of the fox has a gland covered with coarse straight hair. This gland, which emits an aromatic odour, is found in all Canidae, with possibly the exception of Lycaon pictus. Although the bases of the hair covering the gland are usually almost white, the tips are always black; this colour being generally extended to the surrounding hairs, and often forming dark bars on the buttocks. The dark spot on the back of the tail is particularly conspicuous, notably in such widely separated species as the wolves, Azara's dog and the fennec.

Although its existing representatives ate very different, the bear-family or Ursidae, as will be more fully mentioned in the sequel, was in past times intimately connected with the Canidae. Bear tribe. \ n common with the next two families, the modern Ursidae are characterized by the very small tympanic bulla, and the broad paroccipital process, which is, however, inde- pendent of the bulla. The feet are more or less completely planti- grade and five-toed. The intestine has neither duodeno jejunal flexure

nor a caecum; the prostate gland is rudimentary; but glands occur in the vasa deferentia; and the penial bone is cylin- drical. As distinctive characteristics of the Ursidae, may be men- tioned the presence of an alisphenoid canal on the base of the skull ; the general absence of a perforation on the inner side of the lower end of the humerus ; the presence of two pairs of upper and three of lower molars, which are mostly elongated and low-cusped ; and the non-cutting character and fore-and-aft shortening of the upper sectorial, which has no inner root and one inner cusp (fig. 1, III.). Anal glands are apparently wanting. The short tail, bulky build, completely plantigrade feet and clumsy gait are features eminently characteristic of the bears.

The great majority of existing bears may be included in the typical genus Ursus, of which, in this wide sense, the leading char- acteristics will be as follows. The dentition is i. $, c. {, p. f , m. § «= 42 ; but the three anterior premolars, above and below, are one-rooted, rudimentary and frequently wanting. Usually the first (placed close to the canine) is present, and after a considerable interval the third, which is situated close to the other teeth of the cheek-series. The fourth (upper sectorial) differs essentially from the corresponding tooth of other Carnivora in that the inner lobe is not supported by a distinct root; its sectorial characters being very slightly marked. The crowns of both true molars are longer than broad, with flattened, tuberculated, grinding surfaces; the second having a large backward prolongation or heel. The lower sectorial has a small and indistinct blade and greatly developed tubercular heel ; the second molar is of about the same length, but with a broader and more flattened tubercular crown; while the third is smaller. The milk-teeth are comparatively small, and shed at an early age. The skull is more or less elongated, with the orbits small and incomplete behind, and the palate prolonged considerably behind the last molar. Vertebrae : C. 7, D. 14, L. 6, S. 5, Ca. 8-10. Body heavy. Feet broad, com- pletely plantigrade; the five toes on each well developed, and armed with long compressed and moderately curved, non-retractile claws, the soles being generally naked. Tail very short. Ears moderate, erect, rounded, hairy. Fur generally long, soft and shaggy.

Bears are animals of considerable bulk, and include among them the largest members of the order. Though the species are not numerous, they are widely spread over the earth, although absent from Africa south of the Sahara and Australasia. As a rule, they are omnivorous, or vegetable feeders, even the polar bear,

which subsists for most of the year on flesh and fish, eating grass in summer. On the other hand, many of the brown bears live largely on salmon in summer. Among the various species the white polar bear of the Arctic regions, Ursus (Thalassarctus) maritimus, differs from the rest by its small and low head, small, narrow and simple molars, and the presence of a certain amount of hair on the soles of the feet. The typical group of the genus is represented by the brown bear (U. arctus) of Europe and Asia, of which there are many local races, such as the Syrian V. a. syriacus, the Himalayan U. a. isabellinus, the North Asiatic U. a. collaris, and the nearly allied Kamchadale race, which is of great size. In Alaska the group is represented by

huge bears, which ean scarcely claim specific distinctness from U. arctus ; and if these are ranked only as races, it is practically impossible to regard the Rocky Mountain grizzly bear (U.horribilis) as of higher rank, although it naturally differs more from the Asiatic animal. On the other hand, the small and light-coloured U. pruinosus of Tibet may be allowed specific rank. More distinct is the North American black bear U. americanus, and its white relative U. kermodei of British Columbia; and perhaps we should affiliate to this group the Himalayan and Japanese black bears (U. torguatus and u. japonicus). Very distinct is the small Malay sun-bear U. (Helarctus) malayanus, characterized by its short, smooth fur, extensile tongue, short and wide head, and broad molars. Finally, the spectacled bear of the Andes, U. (Tremarctus) ornatus, which is also a broad-skulled black species, differs from all the rest in having a perforation, or foramen, on the inner side of the lower end of the humerus. A second genus, Melursus, represented by the Indian sloth-bear (M. ursinus), differs from the preceding in having only two pairs of upper incisors, the small size of the cheek-teeth, and the extensile lips. Ants, white-ants, ifruits and honey form the chief food of this shaggy black species,-— a diet which accounts for its feeble dentition (see Bear).

The parti-coloured bear or giant panda (Aeluropus melanoleucus, fig, 6) of eastern Tibet and north-west China forms in some degree a connecting link between the bears and the true panda, although placed by Professor E. R. Lankester in the same family ‘as the latter. In the number of the teeth, and to some extent in the character of the molars, as well as in the abbreviated tail, Aeluropus resembles the bears, but in the structure of the sectorial tooth, the presence of an extra radial carpal bone, and the osteology generally, it is more like the panda. In the absence

of an alisphenoid canal to the

Fig. 6. — The Parti-coloured Bear, or Giant Panda

(Aeluropus melanoleucus).

skull it differs both from the latte» and the bears, and thereby resembles the raccoons; while in having a perforation at the lower end of the humerus, it agrees with the spectacled bear, the panda and raccoons. The dentition is i. f, c. \, p. f, m. f ; total 40; premolars increasing in size from first to last, and two-rooted except the first; the first upper molar with quadrate crown, broader that long; and the second larger than the first. Skull with the zygo- matic arches and sagittal crest immensely developed, ascending branch of lower jaw veryhigh, giving great space for attachment of temporal muscle, and facial portion short. Bony palate not extend- ing behind the last molar. No alisphenoid canal. Feet bear-like, but soles more hairy, and perhaps less completely plantigrade. Fur long and thick; and tail extremely short. Humerus with a perforation on the inner side of the lower end; a very large extra radial carpal bone. The colour of this strange animal is black and white (fig. 6).

With the panda (Aelurus fulgens) we reach an undoubted repre- sentative of the Procyonidae, or raccoon tribe, differing, however, from all the rest except the doubtful Aeluropus, in its Asiatic habitat. If the latter be included, the family may be defined as follows. Molars 1, except in Aeluropus, with blunt or sharp cusps; no ali- sphenoid canal, except in Aelurus; humerus generally with a foramen; feet plantigrade; tail, except in Aeluropus, long and generally ringed.

In the panda the dentition is i. f , c. \, p. f, m. |; total 38; the first lower molar being minute and deciduous, and the upper molars broad with numerous and complicated cusps. Vertebrae: C. 7, D. 14, L. 6, S. 3, Ca. 18. Skull high and compressed, with an ali- sphenoid canal, a short facial portion, and the ascending bran-h of the lower jaw, as in Aeluropus, very tall. Face cat-like, with moderate, erect, pointed ears. Claws blunt. Tail cylindrical and

ringed. Fur long and thick. Extra radial carpal bone moderate. The panda is a bright golden red animal, with black under-parts, ranging from the eastern Himalaya to north-western China,

where it is represented by a distinct race. Fossil species occur in the later Tertiary deposits of Europe (see Panda).

The raccoons (Procyon) are the first and typical representatives of the American section of the family, in which an alisphenoid canal is always wanting. In this genus the dentition is i. %, c. \, p. J, m. § ; total 40 ; the upper molars being broad and tuberculated ; the upper sectorial (like that of Aeluropus and Aelurus) having three outer cusps and a broad bicuspid inner lobe, giving an almost quadrate form to the crown. First upper molar with a large tuberculated crown, rather broader than long; second considerably smaller, with transversely oblong crown. Lower sectorial (first molar) with an extremely small and ill-defined blade, placed transversely in front, and a large inner tubercle and heel ; second molar as long as the first, but narrower behind, with five obtuse cusps. Vertebrae: C. 7, D. 14, L. 6, S. 3, Ca. 16-20. Body stout. Head broad behind, but with a pointed muzzle. In walking the entire sole not applied to the ground, as it is when the animal is standing. Toes, especially of the fore-foot, very free, and capable of being spread wide apart ; claws compressed, curved and pointed. Tail moderately long, cylindrical, thickly covered with hair, ringed, non-prehensile. Fur long, thick and soft. The common raccoon {Procyon lolor) of North America is the type of this genus; it is replaced in South America by P. cancrivorus (see Raccoon). The cacomistles (Bassariscus) are nearly allied to Procyon, but of more slender and elegant propor- tions, with sharper nose, longer tail, and more digitigrade feet, and teeth smaller and more sharply cusped. The typical B. astuta is from the southern parts of the United States and Mexico, while B. (Wagneria) annulata is Mexican and Central American.

The name Bassaricyon has been given to a distinct modification of the procyonine type of which at present two species are known, one from Costa Rica and the other from Ecuador respectively, named B. gabbi and B. atteni. They much resemble the kinkajou in external appearance, but the skull and teeth are more like those of Procyon and Nasua. In the coatis, Nasua, the dentition is as in Procyon, but the upper canines are larger and more strongly com- pressed, and the molars smaller; while the facial portion of the skull is more elongated and harrow. Vertebrae: C. 7, D. 14, L. 6, S. 3, Ca. 22-23. Body elongated and rather compressed. Nose prolonged into a somewhat upturned, obliquely-truncated, mobile snout. Tail long, non-prehensile, tapering and ringed. Coatis, or coati-mundis, live in small troops

of eight to twenty, are chiefly arboreal, and feed on fruits, young birds, eggs, insects, &c. The two best-known species are JV. narica of Mexico and Central America, and N. rufa of South America from Surinam to Paraguay (see Coati). In the kinkajou (q.v.), an animal long known as Cercoleptes caudi- volvulus, but whose designation it has been proposed to change to the unclassical Potos flavus, the dentition is i. f, c. \, p. f, m. 1 = 36. Molars with low flat crowns, very obscurely tuberculated. Skull short and rounded, with flat upper surface. Vertebrae: C. 7, D. 14, L. 6, S. 3, Ca. 26-28. Clavicles present, but in a very rudimentary condition. Head broad and round. Ears short. Body long and musteline. Limbs short. Tail long, tapering and prehensile. Fur short and soft. Tongue long and very extensile.

The last existing family of the land Carnivora is that typified by the martens and weasels, and hence known as the Mustelidae. Weasel ■ The group is characterized by the absence of an alisphenoid tribe. canal in the skull, the reduction of the molars to § or even

i , the medium size of the sectorial tooth in each jaw, the absence or presence of a perforation in the humerus, and the presence of anal glands. The family is cosmopolitan in distribution, with the exception of Australasia and Madagascar.

The first section of the family, forming the subfamily Mustclinae, is typically characterized by the short and partially webbed toes, furnished with short, compressed, sharp, curved and often partially retractile claws. The upper molar is always of moderate size and elongated in the transverse direction. In the martens and sables (Mustela) the dentition is i. jj, c. \, p. f, m. \; total 38; the upper sectorial having its inner lobe close to the anterior edge of the tooth; and the upper molar being nearly as large as the sectorial. Lower sectorial with small inner tubercle. Vertebrae: C. 7, D. 14, L. 6, S. 3, Ca. 18-23. Body long and slender. Limbs short, partially digitigrade, with the feet rounded and the toes short, with com- pressed, acute, semi-retractile claws. Tail moderate or long, more or less bushy. One species, M. martes, the pine-marten, is British ; the remainder inhabit the northern regions of Europe, Asia and America. Many of the species, as the sable (M. zibellina), yield fur of great value (see Marten).

The dentition of Putorius differs from that of Mustela chiefly in the absence of the anterior premolars of both jaws. The teeth are more sharply cusped, and the lower sectorial wants the inner

tubercle. External characters generally similar to those of the martens, but the body longer and more slender, and the limbs even shorter. All the species are small animals, of active, bloodthirsty and courageous disposition, living chiefly on birds andˆsmall mammals, and rather terrestrial than arboreal, dwelling among rocks, stones and out- buildings. Some of the species, as the stoat or ermine {P. ermineus), inhabiting cold climates, undergo a seasonal change of colour, being

brown in summer and white in winter, though the change does not affect the whole of the fur, the end of the tail remaining black in all seasons. This is a large genus, having a very extensive geographical range throughout the Old and New Worlds, and includes the animals commonly known as weasels, polecats, ferrets and minks (q.v,).

In the glutton (Gulo luscus) the dentition is i. f, c. \, p: f, m. §'; total 38 ; the crowns of the teeth being stout, and the upper molar much smaller than the sectorial. Lower sectorial large, with small heel and no inner tubercle. The dentition, though really but a modification of that of the weasels, presents a general resemblance to that of hyena. Vertebrae: C. 7, D. 15, L. 5, S. 3, Ca. 15. Body and limbs stoutly made; feet large and powerful, subplantigrade, with large, compressed, much-curved and sharp-pointed claws. Soles of the feet (except the pads of the toes) covered with thick bristly hairs. Ears very small, nearly concealed by the fur. Eyes small. Tail short, thick and bushy. Fur full, long and rather coarse. The one species, the wolverine or glutton, is an inhabitant of the forest regions of northern Europe/ Asia and America, and much resembles a small bear in appearance. If is a very powerful animal for its size, climbs trees and lives on squirrels, hares, beavers, reindeer, and is said to attack even horses and cows.

The South American grison and tayra represent the genus Galictis, in which the dentition is i. f, c. \, p. \, rri. §; total 34; the molars being small but stout, and the upper sectorial with the inner lobe near the middle of the inner border. Lower sectorial with heel small, and inner tubercle small or absent. Bodv long; limbs short, with non-retractile claws and naked soles.' Head broad and depressed. Tail of moderate length. ■ The species include the grison (G. vittata), G. allamandi, and' the tayra (G. barbara) ; the last, which extends northward into Central

America, being sub- generically separated as Galera. Nearly allied to these is the smaller and more weasel-like Lyncodon patagonicus. All the foregoing South American carnivores display a marked tendency to being darker on the lower than on the upper surface. The same feature obtains in the African and Indian ratels, or honey-badgers, con- stituting the genus Mellivora, distinguished from all the other members of the family by having only a single pair of lower molars, the dentition being i. §, c. \, p. f , m. \ ; total 32 ; the upper sectorial is large, with its inner cusp at the anterior end of the blade, the molar much smaller and transversely extended, having a small outer and a larger rounded inner lobe. Heel of lower sectorial very small, scarcely one-fourth of the whole length of the tooth, with but one cusp. Vertebrae: C. 7, D. 14, L. 4, S. 4, Ca. 15. Body stout, depressed; limbs short, strong; head depressed; nose rather pointed; ears rudimentary. Tail short. M. indica, from India, and M. ratel, from south and west Africa, have nearly the same general appearance and size, being rather larger than a common badger, and may be only races of the same species. Their coloration is peculiar, all the upper surface of the body, head and tail being ash-grey, while the lower parts, separated by a distinct longitudinal boundary line, are black. They live chiefly on the ground, into which they burrow, but can also climb trees. They feed on small mammals, birds, reptiles and insects, and are partial to honey.

In the Indo-Malay ferret-badger, Helictis, the dentition is i. \,c.\, p. i, m. \; total 38. Upper sectorial with a large bicusped inner lobe, molar smaller, wider transversely than in the ahtero-posterior direction. Lower sectorial with heel about one-third the length of the tooth. Skull elongated, rather narrow and depressed; facial portion especially narrow; infraorbital foramen very large. Head rather small and produced in front, with an elongated, obliquely truncated, naked snout and small ears. Body elongated, limbs short. Tail short or moderate, bushy. Several species are described, such as H, orientalis, moschata,, nipalensis, and subaurantiaca, from eastern Asia, all small animals, climbing trees with agility and living on fruits and berries as well as on small mammals and birds.

The African striped zorilles, or Muis-honds {Ictonyx), have a dental formula of i. f, c. }, p. f, m, \; total 34; the teeth much resembling those of the polecats, and the upper molar being smaller than the sectorial, and narrow from before backwards. Lower sectorial with a small narrow heel and distinct inner tubercle. General form of body musteline. Limbs short, fore-feet

large and broad, with five stout, nearly straight, blunt and non-retractile claws, of which the first and fifth are considerably shorter than the others. Tail moderate, with longer hairs towards the end, giving it a bushy appearance. Hair generally long and loose. The best- known species of this- genus, the Cape polecat, Ictonyx capensis (or Zorilla zorilla), is about the size of a polecat, but conspicuous by its broad, longitudinal bands of dark-brown, alternating with white. Its odour is said to be as offensive as that of the American skunks. From the Cape of Good Hope it ranges as far north as Senegal. Another species, J. lybicus, from Sennaar, has been described. The small striped polecat of southern Africa, Poecilogale albinucha, represents a genus by itself, and is a shorter-haired animal.

The skunks of America are very similar to the two genera last mentioned in their colouring, and with the latter serve to form a connecting link with the more typical Mustelinae, and the badger group, or Melinae, in which the feet are elongated, with straight toes and non-retractile, slightly curved, subcom pressed, blunt claws, especially large on the forefoot. In all cases the upper molar is

larger than the sectorial, and in the more typical genera is much longer than broad.

In the North American skunks of the genus Mephitis the dentition is i. |, c. }, p. §, m. i; total 34. Upper molar larger than the sectorial, subquadrate, rather broader than long; lower sectorial with heel less than half the length of the whole tooth. Bony palate terminating posteriorly opposite the hinder border of the last molar. Facial portion of skull short and somewhat truncated in front. Vertebrae: C. 7, D. 16, L. 6, S. 2, Ca. 21. Head small. Body elongated. Limbs moderate, subplantigrade. Ears short and rounded. Tail long, abundantly clothed with long fine hair. Anal glands largely developed; their secretion, which can be discharged at the will of the animal, has an intolerably offensive odour and has rendered skunks proverbial. The South American species, which have only two upper premolars, and differ in some other characters, are generically separated under the name of Conepatus; while the small North American arboreal skunks are distinguished as Spilogale (see Skunk).

Passing on to the more typical members of the badger group, we have first the genus Arctonyx, with the dentition i. jj, c. {, p. i, m. I ; Badger total 38. The incisor line is curved, the outer teeth being Mbe? placed posteriorly to the others : lower incisors inclined forwards. First premolars often rudimentary or absent ; upper molar much larger than the sectorial, longer in the antero-posterior direction than broad; lower sectorial with a very large, low, tuberculated heel. Skull elongated and depressed; face long, narrow and concave above; bony palate extending as far backwards as the level of the glenoid fossa; and palatal bones dilated. Suborbital foramina very large. Vertebrae: C. 7, D. 16, L. 4, S. 4, Ca. 20. Snout long, naked, mobile and truncated, with large terminal nostrils, much like those of a pig. Eyes small; ears very small and rounded. Body compressed, rather than depressed. Limbs of moderate length, and partially digitigrade in walking. Tail moderate, tapering. A full soft under-fur, with longer bristly hairs interspersed. The longest-known species is A. collaris, the bhalu-soor (bear-pig) or bali-soor (sand-pig) of the natives of the mountains of north-eastern India, Burma and Borneo. It is rather larger than the badger, higher on its legs, and very pig-like in general aspect, of a light grey colour, with flesh-coloured snout and feet; nocturnal and omnivorous. Other species or local varieties have been described from north China and Burma.

In the genus Mydaus the dentition is as the last, but the cusps of the teeth are more acutely pointed. Skull elongated, face narrow and produced. Suborbital foramen small, and the palate, as in all the succeeding genera of this group, produced backwards about midway between the last molar and the glenoid fossa. Vertebrae: C. 7, D. 14-15, L. 6-5, S. 3, Ca. 12. Head pointed in front; snout produced, mobile, obliquely truncated, the nostrils being inferior. Limbs rather short and stout. Tail extremely short, but clothed with rather long bushy hair. Anal glands largely developed, and emitting an odour like that of the skunks. One species, M. meliceps, the teledu, a small burrowing animal from the mountains of Java, at an elevation of 7000 or more ft. above the sea-level; and a second (M. marchei) from the Philippines.

In the true badger of the genus Melts the dentition is i. \, c. {, p. I, w. J; total 38. The first premolar in both jaws is extremely minute and often deciduous; while the upper molar is much larger than the sectorial, subquadrate, and as broad as long. Lower sectorial with a broad, low, tuberculated heel, more than half the length of the whole tooth. The postglenoid process of the skull so strongly developed, and the glenoid fossa so deep, that

the condyle of the lower jaw is firmly held in place after the soft parts are removed. Vertebrae: C. 7, D. 15, L. 5, S, 3, Ca. 18. Muzzle pointed. Ears very short. Body stout, broad. Limbs short, strong, subplanti- grade. Tail short. Typified by the common badger (M. taxus or M. meles)ol Europe and northern Asia, still found in many parts of England, where it lives in woods, is nocturnal, burrowing and very omnivorous, feeding on mice, reptiles, insects, fruit, acorns and roots. Other nearly allied species, M. leucurus and M. chinensis, are found in continental Asia, and M . anakuma in Japan.

In the nearly-allied genus Taxidea the dental formula is as in Meles, except that the rudimentary anterior premolars appear to be always wanting in the upper, jaw. The upper sectorial is much larger in proportion to the other teeth; and the upper molar about the same size as the sectorial, triangular, with the apex turned back- wards. Heel of lower sectorial less than half the length of the tooth. Skull very wide in the occipital region ; the lambdoidal crest greatly developed, and the sagittal but slightly, contrary to what obtains in Meles. Vertebrae: C. 7. D. 15. L. 5, S. 3, Ca. (?). Body stoutly built and depressed. Tail short. The animals of this genus are peculiar to North America, where they represent the badgers of the Old World, resembling them much in appearance and habits. T. americana is the common American badger of the United States, T. berlandieri, the Mexican badger, being a local variety.

The third and last subfamily is that of the otters, or Lutrinae, in which the feet (with the exception of the hind pair in the sea-otter) Qtter are short and rounded, with the toes webbed, and the

much depressed. The upper posterior cheek-teeth are large and quadrate. The kidneys are conglomerate. Habits aquatic.

In the true otter of the genus Lutra the dentition is i. f , c. \, p. J, m. i; total 36. Upper sectorial with a trenchant tricusped blade, and a very large inner lobe, hollowed on the free surface, with a raised sharp edge, extending along two-thirds or more of the length of the blade. Upper molar large, with a quadricuspidate crown, broader than long. Skull broad and depressed, contracted immediately behind the orbits ; with the facial portion very short and the brain-case large. Vertebrae : C.7, D. 14.-15, L. 6-5, S. 3, Ca. 20-26. Body very long. Ears short and rounded. Limbs short. Feetcom- . pletely webbed, with well-developed claws on all the

toes. Tail long, thick at the base and tapering, rather depressed. Fur short and close.

Otters are more or less aquatic, living on the margins of rivers, lakes, and in some cases the sea; are expert divers and swimmers, and feed chiefly on fish. They have an extensive geographical range, and so much resemble each other in outward appearance, especially in the nearly uniform brown colouring, that in some cases the species are by no means well-defined. The Brazilian otter (L. brasiliensis) is a very large species from Brazil, Demerara and Surinam, with a prominent ridge along each lateral margin of the tail. In two small species the feet are only slightly webbed; claws exceedingly small or altogether wanting on some of the toes; the first upper premolar very small, sometimes wanting; and the molars very broad and massive. The species in question are L. inunguis of South Africa, and L. leptonyx or cinerea of India, Java and Sumatra, and have been separated as a distinct genus, Aonyx.

The sea-otter, Latax (or Enhydra) lutra, with a dentition of i. §, c. \, p. i, m. I, total 32, differs from other Carnivora in having but two incisors on each side of the lower jaw, the one corresponding to the first (very small in the true otters) being absent. Though the molar teeth generally resemble those of Lutra in their proportions, they differ in the exceeding roundness and massiveness of their crowns and bluntness of their cusps. Feet webbed; fore-feet short, with five subequal toes, with short compressed claws; hind-feet very large, depressed and fin-like, their phalanges flattened as in seals. The fifth toe the longest and stoutest, the rest gradually diminishing in size to the first, all with moderate claws. Tail moderate, cylindrical (see Otter). /

II. PlNNIPEDIA

The second suborder is formed by the seals, walruses and eared seals, which differ from the rest of the Carnivora mainly in the limbs being modified for aquatic progression; the two upper segments being very short and partially enveloped in the general integument of the body, while the third, especially in the hind extremities, is elongated, expanded and webbed. There are always five well-developed digits on each limb. In the hind-limb the two marginal digits (first and fifth) are stouter and generally larger than the others. The teeth also differ from those of the more typical Carnivora. The incisors are always fewer than $. The chsek series consists generally of four pre- molars and one

molar of uniform characters, with never more than two roots, and with conical, more or less compressed, pointed crowns, which may have accessory cusps, placed before or behind the principal one, but are never broad and tuber- culated. The milk-teeth are small, simple and shed or absorbed at an early age, usually either before or within a few days after birth. The brain is relatively large, the cerebral hemispheres broad in proportion to their length, and with numerous and complex convolutions. There is a very short caecum; the kidneys are divided into numerous distinct lobules. There are no Cowper's glands. Teats two or four, abdominal. No clavicles. Tail always short. Eyes large and exposed, with flat cornea. The nostrils close by the elasticity of their walls, and are opened at will by muscular action.

The members of this group are aquatic, spending the greater part of their time in the water, swimming and diving with great facility, feeding mainly on fish, crustaceans and other marine animals, and progressing on land with difficulty, but always coming on shore for the purpose of bringing forth their young. They are generally marine, but occasionally ascend large rivers, and some inhabit inland seas and lakes, as the Caspian and Baikal. Though not numerous in species, they are widely distributed over the world, but occur most abundantly on the coasts of lands situated in cold and temperate zones.

As mentioned in the article CREODONTA,thetrUeseals(PAocJrfae) , together with the walruses, may be directly descended from the primitive Creodont Carnivora. The eared seals, on the other hand, show signs of affinity with the bears; but as they are of earlier geological age than the latter, they cannot be derived from that group.

The true seals (family Phocidae) are the most completely adapted for aquatic life of all the Pinnipedia. When on land the hind-limbs are extended backwards and take no part in progression, Seals. which is effected by a series of jumping movements

produced by the muscles of the trunk, in some species aided by the fore-limbs. The soles of the feet are hairy. There is no pinna to the ear, and no scrotum, the testes being abdominal. The

upper incisors have simple, pointed crowns, and vary in number in the different groups. All have well developed canines and g teeth of the cheek series. In those species of which the milk-dentition is known, there are three milk molars, which precede the second, third, and fourth permanent molars; the dentition is therefore p. \, m. \, the first premolar having as usual no milk predecessor. The skull has no post-orbital process and no alisphenoid canal. The fur is stiff and adpressed, without woolly under-fur.

In the typical group, or subfamily Phocinae, the incisors are 3. All the feet have five well-developed claws with the toes on the hind- feet subequal, the first and fifth not greatly exceeding the others in length, the interdigital membrane not extending beyond them. In the genus Halichoerus the dentition is i. f , c. {, p. % , m. \ ; total 34. Molars with large, simple, conical, recurved, slightly compressed crowns, having sharp anterior and posterior edges, but without accessory cusps, except sometimes the two hinder ones of the lower jaw. With the exception of the last one or two in the upper jaw and the last in the lower jaw, all are single-rooted. Vertebrae:

C. 7, D. 15, L. 5, S. 4, Ca. 14. Includes only one species H. grypus, the grey seal of the coasts or Scandinavia and the British Isles.

In Phoca the dental formula is as in the last, but the teeth are smaller and more pointed. Molars with two roots (except the first in each jaw). Crowns with accessory cusps. Vertebrae: C. 7, D. 14-15, L. 5, S. 4, Ca. 11-14. Head round and short. Fore-feet short with five strong, subcompressed, slightly curved, subequal, rather sharp claws. On the hind-feet the claws much narrower and less curved. The species of this genus are widely distributed throughout the northern hemisphere, and include P. barbata, the bearded seal ; P. groenlandica, the Greenland seal; P. vitulina, the common seal; P. hispida, the ringed seal of the north Atlantic; P. caspica, from the Caspian and Aral Seas; and P. sibirica, from Lake Baikal. (See Seal).

The members of the second subfamily, Monachinae,' have incisors I ; and the molars two-rooted, except the first. On the hind-feet the first and fifth toes greatly exceeding the others in length, with nails rudimentary or absent. In the genus Monachus, the dentition is i. I, c. \, p. \, m. \ ; total 32. Crowns of molars strong, conical, compressed, hollowed on the inner side, with a strongly-marked lobed cingulum, especially on the inner side,

and slightly developed accessory cusps before and behind. The first and last upper and the first lower molar smaller than the others. Vertebrae: C. 7,

D. 15, L. 5, S. 2, Ca. 11. All the nails of both fore and hind feet very small and rudimentary. Represented by M. albiventer, the monk-seal of the Mediterranean and adjacent parts of the Atlantic, and the West Indian M. tropicalis. ,

The other genera of this section have the same dental formula, but are distinguished by the characters, of the cheek-teeth and the feet. They are all inhabitants of the shores of the southern hemisphere.

In Ogmorhinus all the teeth of the cheek-series have three distinct pointed cusps, deeply separated from each other, of which the middle or principal cusp is largest and slightly recurved ; the other two are nearly equal in size, and have their tips directed towards the middle one. Skull much elongated. One species, 0-< leptonyce, the sea-leopard, widely distributed in the Antarctic and southern temperate seas. In Lobodon the molars have compressed elongated crowns, with a principal recurved cusp, rounded and somewhat bulbous at the apex, and one anterior, and one, two or three posterior distinct accessory cusps. One species, L. carcinophagus, the crab- eating seal. In the third genus, Leptonychoies, represented by 'L. weddelli, the molars are small, with ■ simple, subcompressed, conical crowns, and a broad cingulum, but no distinct accessory cusps. Finally in the white seal (Onimatophoca rossi) all the teeth are very small, those of the cheek-series with pointed, recurved crowns, and small posterior and still less developed anterior accessory cusps. Orbits very large. Nails rudimentary on front and absent on hind-feet. The skull bears a considerable resemblance to that of the next subfamily. >

The presence of two pairs of upper and one pair of lower incisors is characteristic of the members of the subfamily Cystophorinae, in which the teeth of the cheek-series are generally one-rooted. The nose of the males has an appendage capable of being inflated. First and fifth toes of hind-feet greatly exceeding the others in length, with prolonged cutaneous lobes, and rudimentary or no nails. In the typical genus Cystophora the dentition is i. ‘{, c. \,~p. \, m. \; total 30 ; the last molar having generally two distinct roots. Beneath (he skin over the face of the male, and connected with the nostrils, is a sac capable of

inflation, when it forms a kind. of hood covering the upper part of the head. Nails present, thpugh small on the hind-feet. Represented by C. cristata, the hooded or bladder-nosed seal of the Polar Seas. In Macrorhinus the dentition is numerically the same as in the last, but the molars are of simpler character and all one-rooted. All the teeth, except the canines, very small rela-

tively to the size of the animal. Hind-feet without nails. Vertebrae: C. 7, D. 15, L. 5, S. 4, Ca. 11. Nose of adult male produced into a short tubular proboscis, ordinarily flaccid, but capable of dilatation and elongation under excitement. One species, M. leoninus, the elephant-seal, or " sea elephant " of the whalers, the largest of the whole family, attaining the length of nearly 20 ft. Formerly abundant in the Antarctic Seas, and also found on the coast of California.

The next family is that of the walruses, or Odobaenidae, the single generic representative of which is in some respects intermediate between the Phocidae and Otariidae, but has a completely aberrant dentition. Walruses have no external ears, as Walrus. in the Phocidae; but when on land the hind-feet are turned forwards and used in progression, though less completely than in the Otariidae. The upper canines are developed into immense tusks, which descend a long distance below the lower jaw. All the other teeth, including the lower canines, are much alike, small, simple and one-rooted, the molars with flat crowns. The skull is without post-orbital process, but has an alisphenoid canal. In the young the dentition is *'• li c. I, p. ˆnd m. I, but many of these teeth are, however, lost early or remain through life in a rudimentary state, concealed by the gums. The teeth which are usually developed functionally are *. J, c. {, p. |, m. i; total 18. Vertebrae: C. 7, D. 14, L. 6, S. 4, Ca. 9. Head round. Eyes rather small. Muzzle short and broad, with a group of long, very stiff, bristly whiskers on each side. The remainder of the hair-covering very short and closely pressed. Tail rudi- mentary. Fore-feet with subequal toes, carrying five minute flattened nails. Hind-feet with subequal toes, the fifth slightly the largest, with cutaneous lobes projecting beyond the ends as in Otaria; first and fifth with minute flattened nails; second, third and fourth with large, elongated, subcompressed pointed nails. The two species are Odobaenus rosmarus, of the Atlantic, and the closely allied 0. obesus, of the Pacific. (See Walrus.)

The third and last family of the Pinnipedia, and thus of existing Carnivora, is the Otariidae, which includes the eared seals, or

sea- lions and sea-bears. In all these animals, when on land, the hind-feet are turned forwards under the body, and *«”*«’*■ aid in supporting and moving the trunk as in ordinary quadrupeds. There are small external ears. Testes suspended in a distinct external scrotum. Skull with post-orbital processes and alisphenoid canal. Soles of feet naked. By many naturalists these seals are arranged in a number of generic groups, but as the differences between them are not very great, they may all be included in the

typical genus Otaria. The dental formula is i. \,c. }, p. |, m. * or2 ;

total 34 or 36. The first and second upper incisors are small, with the summits of their crowns divided by deep transverse grooves into an anterior and a posterior cusp of nearly equal height; the third large and canine-like. Canines large, conical, pointed, recurved. Molars and premolars usually f, of which the second, third and fourth are preceded by milk-teeth shed a few days after birth; sometimes (as in fig. 7) a sixth upper molar (occasionally developed

Fig. 7. — Skull and dentition of Australian Sea-Bear (Otaria forsteri) .

on one side and not the other) ; all with similar characters, generally single-rooted; crown moderate, compressed, pointed, with a single principal cusp, and sometimes a cingulum, and more or less developed anterior and posterior accessory cusps. Vertebrae: C. 7, D. 15, L. 5, S. 4, Ca. 9-10. Head rounded. Eyes large; ears small, narrow and pointed. Neck long. Skin of the feet extended far beyond the nails and ends of the digits, with a deeply-lobed margin. The nails small and often quite rudimentary, especially those of the first and fifth toes of both feet; the best-developed and most constant being the three middle claws of the hind-foot, which are elongated, compressed and curved.

Sea-bears and sea-lions are widely distributed, especially in the temperate regions of both hemispheres, though absent from the coasts of the North Atlantic. They spend more of their time on shore, and range inland to greater distances than the true seals, especially at the breeding-time, though they are obliged to return to the water to seek their food. They are gregarious and poly-gamous, and the males usually much larger than the females.

Some possess, in addition to the stiff, close, hairy covering common to the group, a fine, dense, woolly under-fur. The skins of these, when

dressed and deprived of the longer harsh outer hairs, constitute the ” sealskin ” of commerce. The species include O. stelleri, the northern sea-lion, the largest of the genus, from the North Pacific; about 10 ft. in length; O. jubata, the southern sea-lion, from the Falkland Islands and Patagonia; O. calif orniana, from California; O. ursina, the sea-bear or fur-seal of the North Pacific, the skins of which are imported in immense numbers from the Pribiloff Islands; O. antarctica or pusitta, from the Cape of Good Hope ; ! and O- forsteri, from Australia and various islands in the southern hemisphere. (See Seal-Fisheries.)

Little is known as to the past history of the sea-lions and sea-bears, but a skull has been obtained from the Miocene strata of Oregon, which Mr F. W. True states to be considerably larger than any existing sea-lion skull; its basal length when entire being probably about 20 in. The name Pontoleon magnus has been pro- posed for this fossil sea-lion, as the character of the skull and teeth do not agree precisely with those of any living member of the group. If, however, all the modern eared seals are included in the genus Otaria, there is apparently no reason to exclude the fossil species.

Extinct Carnivora

Modern Carnivora are undoubtedly the descendants of the Creodonta (q.v.), an extinct early Tertiary suborder. It has been observed that as the Miocene is approached, some of these Carnivora Creodonta, or Primitiva, begin to assume more and more of the characteristics of the Carnivora Vera, till at last it is difficult to determine where the one group ends and the other commences. The creodont genera Stypolophus and Proviverra show some of these modern characters; but it is not till we reach the European Oligo- cene genus Amphictis, with the dental formula i. f, c. |, p. J, m. f, that we meet a type in which the fourth upper premolar and the first lower molar assume the truly sectorial character of the Carnivora Vera, while the teeth behind them are proportionally reduced in size. From the Amphictidae

are probably descended the Viverridae, the connecting genus being the African Nandinia, which, as already mentioned, retains the imperfectly ossified bulla of the ancestral forms. In another direction, Amphictis, through the Old World Lower Pliocene genus Ictitherium, has given rise to the Hyaenidde. The Felidae have apparently an ancestral type in the creodont Palaeonictis, which has been regarded as the direct ancestor of the sabre-toothed cats, or Machaerodontinae (see Machaerodus) ; but it is possible that Palaeonictis may be off the direct line, and that the Felidae are sprung from Amphictis. Be this as it may, from another group of creodonts, represented by Vulpavus (Miacis), Viverravus (Didymictis), and Uintacyan, is probably derived the Oligocene Cynodictis, with a dental formula like that of Canis or Cyon, a perforation to the humerus, and an apparently undivided auditory bulla; and from Cynodictis the transition is easy to the Canidae. It should be mentioned, however, that there is a group of North American Oligocene dog-like animals, such as Dapheenus, Protemnocyon, and Temnocyon, which agree with Cyon in the short- ness of the jaws, and with that genus and Speothos in the cutting-heel of the lower sectorial. Possibly these genera may be nearly related to Cyon. Other dog-like North American types are (Migohinis, Enhydrocyon and Hyaenocyon.

By means of the Amphicyonidae, as represented by the Middle Tertiary genera Proamphicyon, Pseudampkicym, and A'mphicyon, in which there were three upper molars, we have a transition from the Cynodictis-type to the bear-group ; one of the later intermediate forms being the Lower Pliocene Old World Hyaenarctus, in which the two upper molars are squared and foreshadow those of Ursus itself. In some unknown manner Hyaenarctus appears to be related to Aeluropus. An allied type is found in Arctotherium of the South American Pleistocene,

By the loss of the third lower molar and certain modifications, of the other teeth and skull, the Miocene genus Plesictis may be derived

from Cynodictis, its dental formula being i. |, c. \, p. \, m* —

Now Plesictis is nothing more than a generalized representative of the Mmtelidm. We have thus traced three out of tb* four modern aretoid families to the Cynodictis-type. The Procytmiiae, or fourth family (apart from the Asiatic A elurus and Aelumpms) arecdnnected with the last-named genus through the North American Oligocene Phlaeocyon, which is stated to be in alwast

every respect inter- mediate betˆ-eˆa Procyon and Cynodietiisi while the living Bas- sariscus fe stated to show closer sjjgas; of affinity with Cynodictis than, w.hyli Phlaeocyon.

To deal with fossil representatives of living genera, or extinct genera nearly related to groups still existing, would here be im- practicable. It may bej stated, however, that aberrant groups like ihe otters are linked. \&p with more normal types by means of extinct forms (in this particular instance by the Miocene Potamotherium) , so that the gajrjˆ in the phylogeny of the Caratvora are comparatively few.

Vffl%$ATURE. — The above article fe based on that by Sir W. H. ˆbowep- in the 94b. edition of this Encyclopaedia. The principal wofk* on Carnivora are the following: W. H. Flower, ” On the Value of the Base of the Cranium in the Classification of the- Carhi- vora,” Proc. Zool. Soc. London, 1869; T. H. Huxley, “Cranial and

Dental Characters of the CanidaSe,” Proc. Zool. Soc. London, 1880; St G. Mivart, ” On the Classification and Distribution of the Aelu- roidea ... and Arctoidea,” Proc. Zool. Soc. London, 1882 and 1885; E. R. Lankester, “On the Affinities of Aeluropus,” Trans. Linn. Soc. London, vol. “viii. part iv.) 1901; Miss A. Carlssort, ” t)ber die systematische SteHung vort Nandinia,” Zool. Jahrb. Syst., vol, , xiii. , 1900, and ” 1st Otbcyon die Ausgangsform des Hunde- geschlechts oder nicht?” op. cit: vol. xxii., 1905; }. L. Wortman and W. D. Matthew, “The Ancestry of Certain Members of the Canidae, Viverridae, and Procyonidae,” Bull. Amer. Mus., vol. xii., 1899. (R. L.* >

CARNOT, LAZARE HIPPOLYTE (1801-1888), French states- man, the second son of L. N. M. Carnot (q.v.), was born at Saint- Omer on the 6th of October 1801. Hippolyte Carnot lived at first in exile with his father, returning to France only in 1823. Unable then to enter active political life, he turned to literature and philosophy, publishing in 1828 a collection of Chants helie- niques translated from the German of W. Miiller, and in 1830 an Expose” de la’ doctrine. Saint-Simonienne, and collaborating in the Sain t-Simoniah journal Le Productew. He also paid several visits to England and travelled in other countries of Europe. In March 1839, after the dissolution of the chamber by Louis Philippe, he was elected deputy for Paris (re-elected in 1842 and in 1846), and sat/ in the group, of the Radical Left, being one of the leaders of the party hostile to Louis Philippe. On the 24th of

February 1848 he pronounced in favour of the republic. Lamartine chbse him as minister of education in the provisional government, Carnot set to work to organize the primary school systems, proposing a law for obligatory and free primary instruction, and another for the secondary education of girls. But he declared himself against purely secular schools, holding that " the minister . and the schoolmaster are the two columns on which rests the edifice of the republic." By this attitude he alienated both* the Right and the Republicans of the Extreme Left, and was forced to resign on the 5th of July 1848. He was one of those who protested against the coup d'etat of the 2nd of December 185 1, but was not proscribed by Louis Napoleon. He refused to sit in the Corps Ugislatif until 1864, in order not to have to take the oath to the emperor. From 1864 to 1869 he was in the republican opposition, taking a very active part. He was defeated at the election 0I1869. Oil the 8th of February 187 1 he was named deputy for the Seine et Oise, and participated in the drawing 1 up'of thˆCbitstitutionalLaws of 1875. On the 16th of December ˆ87 5; he was named by the National Assembly senator for life. He died on the 16th of March 1888, three months after the election of his elder son, M. F. S. Carnot (q.v.), to the presidency of the republic. He had published Le Minist'ere de V instruction puhtique el des cultes du 24'jemier au ˆjuillel 1848, (1849), Mimoires sur Laz&eCarnot (2 vols., 1 861- 1864), M emoires &e> Bartnt (with David Angers, 4 vols ._, 1842-1843). His second son,' Marie Adolphe Carnot (b. 1839), became a distinguished mining-engineer arid director of the Ecole des Mines (1899), his studies in analytical chemistry placing him in the front rank of French scientists. He was made a member of the Academy of Sciences in 1895.

See Vermorel, Les Hommes de 1848 (3rd ed., 1869); E. Spuller, Histoire parlementaire de la Seconde Republique (1891); P. de. la Gorce, Histoire du Second Empire (1894 et seq.).

CAEtfOf, LA2ARE NICOLAS MARGUERITE (1753-1823), French general, was born at Nolay in Burgundy in' 1.7,53. He received his training as an engineer at Mezieres, becoming an officer of the. Corps de G6nie in 1773 and a captain ten years later. He had' then just published his first work, an Essai sur les mctpnines en general. In 1784 he wrote an essay. on balloons, and his JEloge of Vauban, read by him publicly, won him the com mendation of Prince Henry of Prussia. But as the result of a controversy with. Montalembert, Carnot abandoned the official, or Vauban,',theories ;of the art of fortification, and went over to the

“perpendicular ” school of Montalembert. He was conse- qutently imprisoned, on the pretext of having fought a duel, and only released when selected to accompany Prince Henry of Prussia in a: visit to Vauban’s fortifications. In 1791 he married. The Revolution drew him into political life, and he wbs- elected & deputy for the ! Pas de Calais. In the Assembly he

took a prominent part in debates connected with the army. Carnot was a stern and sincere republican, and voted for the execution of the king. In the campaigns- of 1792 and 1793 he was continually employed as a commissioner in military matters, his greatest service being in April 1793 on the north-eastern frontier, where the disastrous battle of Neerwinden: and the subsequent defection of Dumouriez had thrown everything into confusion. After doing what was possible to infuse energy into the operations of the French forces, he returned, to Paris and was made a member of the Committee of Public Safety. He was charged with duties corresponding to those of the modern chief of the general staff and adjutant-general. As a member of the committee he signed its decrees and was thus at least technically responsible for the acts of the Reign of Terror. His energies were, however, directed to the organization, not yet of victory,; but of defence. His labours were incessant; practically every military document in the archives of the committee was Carnot’s own work, and he was repeatedly in the field with the armies. His part in Jourdan’s great victory at Wattignies was so im- portant that the credit of the day has often been assigned to Carnot. The winter of 1 793-1 794 was spent in new preparations, in instituting a severe discipline in the new and ill-trained troops of the republic, and in improvising means and jr\aterial of wan He continued to visit the armies at the front, and to inspire them with energy. He acquiesced in the fall of Robespierre in 1794, but later defended Barere and others among his colleagues, declaring that he himself had constantly signed papers without reading them, as it was physically impossible to do, so in the press of business. When Carnot’s arrest was demanded in May 1795, a deputy cried ” Will you dare to lay hands on the man who has organized victory?”’ Carnot had just accepted pro- motion to the rank of major in the engineers. Throughout 1793, when he had been the soul of the national defence, and 1794, in which year he had ” organized victory ” in fourteen armies, he was a simple

captain.

Carnot was elected one of the five Directors in November 1795, and continued to direct the war department during the campaign of 1796! Late in 1796 he was made a member (rst class) of the Institute, which he had helped to establish. He was for two periods president of the Directory, but on the coup d'Hat of the 18th Fructidor (1797) was fbrced to take refuge abroad. He returned to France after the 18th Brumaire (1799) and was re-elected to the Institute in 1800. Early in 1800 he became minister of war, and he accompanied Moreau in the early part of the Rhine campaign. His chief work was, however, in reducing the expenses of the armies. Contrary to the usual, custom he refused to receive presents from contractors, and he effected much-needed reforms in every part of the military administra- tion. He tendered his resignation later in the year, but it was long before the First Consul would accept it. From 1801 he lived in retirement with his family, employing himself chiefly iii scientific pursuits. As a senator he consistently opposed the increasing monarchism of Napoleon, who, however, gave him in 1809 a pension and commissioned him to write a work on fortification for the school of Metz. In these years he had published De la correlation des figures de geomUrie (1801), Geo-nˆtrie de position (1803), and Principesfondamentauxdel'equilibre et du mouvement (1803), all of which were translated into German. His great work on fortification appeared at Paris in 1810 {De la defense de places fortes) , and was translated for the use of almost every army in Europe. He took Montalembert as his ground- work. Without sharing Montalembert's antipathy to the bas- tioned trace, and his predilection for high masonry caponiers, he followed out the principle of retarding the development of the attack, and provided for the most active defence. To facilitate sorties in great force he did away with a counterscarp wall, providing instead a long gentle slope from the bottom Of the ditch to the crest of the glacis. This, he imagined, would compel an assailant to maintain large forces in the advanced trenches, which he proposed to attack by vertical fire from mortars. Along the front of his fortress was ibujilt a heavy detached wall, loop-holed for fire, and sufficiently! high' to be ft

most formidable obstacle. This " Carnot wall," and, in general, Carnot's principle of active defence, played a great part in the rise of modern fortification.

He did not seek employment in the field in the aggressive wars of Napoleon, remaining a sincere republican, but in 1814, when France itself was once more in danger, Carnot at once offered his services. He was made a general of division, and Napoleon sent him to the important fortress of Antwerp as governor. His defenee of that place was one of the most brilliant episodes of the campaign of 1814. On his return to Paris he addressed a political memoir to the restored king of France, which aroused much attention both in France and abroad. He joined Napoleon during the Hundred Days and was made minister of the interior, the office carrying with it the dignity of count, and on the 2nd of June he was made a peer of France. On the second Restoration he' was proscribed. He lived thenceforward in Magdeburg, occupying himself still with science. But his health rapidly declined, and he died at Magdeburg on the 2nd of August 1823. His remains were solemnly removed to the Pantheon in 1889. Long before this, in 1836, Antwerp had erected a statue to its defender of 1814. In 1837 Arago pronounced his eloge before the Academie des Sciences. The sincerity of his patriotism and his political convictions was proved in 1801-1804 and in 1814. The memory of his military career is preserved in the title, given to him in the Assembly, of " The organizer of victory." His sons, Sadi and L. Hippolyte, are separately noticed.

Authorities. — Baron de B . . ., Vie privee, politique, et morale de L. N. M. Carnot (Paris, 1816) ; Serieys, Carnot, sa vie politique et privee (Paris, 1816) ; Mandar, Notice biographique sur le general Carnot, &c. (Paris, 1818); W. Korte, Das Leben L. N. M. Carnots (Leipzig, 1820) ; P. F. Tissot, Memoires historiques et militaires sur Carnot (Paris, 1824); Arago, Biographie de Carnot (Paris, 1850); Hippolyte Carnot, Memoires sur Carnot (Paris, 1863); C. Remond, Notice biographique sur le grand Carnot (Dijon 1880) ; A. Picaud, Carnot, I'organisateur de la victoire (Paris, 1885 and 1887); A. Burdeau, Une Famille de patriotes (Paris, 1888) ; L. Hennet, Lazare Carnot (Paris, 1888); G. Hubbard, Une Famille republicaine (Paris, 1888); M. Dreyfous, Les Trois Carnot (Paris, 1888); M. Bonnal, Carnot, d'apres les archives, &c. (Paris, 1888) ; and memoir by E. Charavaray in La Grande Encyclopedia.

CARNOT, MARIE FRANCOIS SADI (1837-1894), fourth president of the third French Republic, son of L. Hippolyte Carnot, was born at Limoges on the nth of August 1837. He ; was educated as a civil engineer, and after having highly dis- tinguished himself at the Ecole Polytechnique and the Ecole des Ponts et Chaussees, obtained an appointment in the public service. His hereditary

republicanism recommended him to the government of national defence, by which he was entrusted in 1870 with the task of organizing resistance in the departments of the Eure, Calvados and Seine Inferieure, and made prefect of the last named in January 1871. In the following month he was elected to the National Assembly by the department Cote d'Or. In August 1878 he was appointed secretary to the minister of public works. In September 1 880 he became minister, and again in April 1885, passing almost immediately to the ministry of finance, which he held under both the Ferry and the Freycinet administrations until December 1886. When the Wilson scandals occasioned the downfall of Grevy in December 1887, Carnot's high character for integrity marked him out as a candidate for the presidency, and he obtained the support of Clemenceau and of all those who objected to the candidatures of men who have been more active in the political arena, so that he was elected by 616 votes out of 827. He assumed office at a critical period, when the republic was all but openly attacked by General Boulanger. President Carnot's ostensible part during this agitation was mainly confined to augmenting his popularity by well-timed appearances on public occasions, which gained credit for the presidency and the republic. When early in 1889, Boulanger was finally driven into exile, it fell to President Carnot's lot to appear at the head of the state on two occasions of especial interest, the celebration of the centenary of 1789 and the opening of the Paris Exhibition of that year. The perfect success of both was regarded, not unreasonably, as a popular ratification of the republic, and though continually

harassed by the formation and dissolution of ephemeral ministries, by socialist outbreaks, and the beginnings of anti-Semitism, Carnot had but one serious crisis to surmount, the Panama scandals of 1892, which, if they greatly damaged the prestige of the state, increased the respect felt for its head, against whose integrity none could breathe a word. Carnot seemed to be arriving at the zenith of popularity, when on the 24th of June 1894, after delivering at a public banquet at Lyons a speech in which he appeared to imply that he nevertheless would not seek re-election, he was stabbed by an Italian anarchist named Caserio and expired almost immediately. The horror and grief excited by this tragedy were boundless, and the president

was honoured with a splendid funeral in the Pantheon, Paris.

His son, Francois Carnot, was first elected deputy for the Cote d'Or in 1902.

See E. Zevort, Histoire de la Troisieme Republique, tome iv., " La Presidence de Carnot " (Paris, 1901).

CARNOT, SADI NICOLAS LEONHARD (1796-183 2), French physicist, elder son of L. N. M. Carnot, was born at Paris on the 1st of June 1796. He was admitted to the Ecole Polytechnique in 1812, and late in 1814 he left with a commission in the Engineers and with prospects of rapid advancement in his profession. But Waterloo and the Restoration led to a second and final proscription of his father ; and though not himself cashiered, Sadi was purposely told off for the merest drudgeries of his service. Disgusted with an employment which afforded him neither leisure for original work nor opportunities for acquir- ing scientific instruction, he presented himself in 1819 at the examination for admission to the staff corps (etat-major) and obtained a lieutenancy. He then devoted himself with astonish- ing ardour to mathematics, chemistry, natural history, tech- nology and even political economy. He was an enthusiast in music and other fine arts; and he habitually practised as an amusement, while deeply studying in theory, all sorts of athletic sports, including swimming and fencing. He became captain in the Engineers in 1827, but left the service altogether in the following year. His naturally feeble constitution, further weakened by excessive study, broke down finally in 1832. An attack of scarlatina led to brain fever, and he had scarcely recovered when he fell a victim to cholera, of which he died in Paris on the 24th of August 1832. He was one of the most original and profound thinkers who have ever devoted them- selves to science. The only work he published was his Reflexions sur la puissance motrice du feu et sur les machines propres a developper celte puissance (Paris, 1824). This contains but a fragment of his scientific discoveries, but it is sufficient to put. him in the very foremost rank, though its full value Was not recognized until pointed out by Lord Kelvin in 1848 and 1849. Fortunately his manuscripts had been preserved, and extracts were appended to a reprint of his Puissance motrice by his brother, L. H. Carnot, in 1878. These show that he had not only realized for himself the true nature of heat, but had noted down for trial many of the best modern methods of finding its mechanical equivalent, such as those of J. P. Joule with the

perforated piston and with the friction of water and mercury. Lord Kelvin's experiment with a current of gas forced through a porous plug is also given. " Carnot's principle " is fundamental in the theory of thermodynamics (q.v.).

CARNOUSTIE, a police burgh and watering-place of Forfar- shire, Scotland. Pop. (1901) 5204. It lies on the North Sea, io| m. E.N.E. of Dundee by the North British railway. Bathing and golfing are good. Barry Links, a triangular sandy track occupying the south-eastern corner of the shire, are used as a camping and manoeuvring ground for the artillery and infantry forces of the district, and occasionally of Scotland. Its most extreme point is called Buddon Ness, off which are the dangerous shoals locally known as the Roaring Lion, in consequence of the deep boom of the waves. On the Ness two lighthouses have been built at different levels, the lights of which are visible at 13 and 16 m.

CARNUNTUM (Kapvovs in Ptolemy), an important Roman fortress, originally belonging to Noricum, but after the 1st

century a.d. to Pannonia. It was a Celtic town, the name, which is nearly always found with K on monuments, being derived from Kar, Karn (" rock," " cairn "). Its extensive ruins may still be seen near Hainburg, between Deutsch-Alten- burg and Petronell, in lower Austria. Its name first occurs in history during the reign of Augustus (a.d. 6), when Tiberius made it his base of operations in the campaigns against Maro- boduus (Marbod). A few years later it became the centre of the Roman f brtifica tions along the Danube from Vindobona (Vienna) to Brigetio (O-Szony), and (under Trajan or Hadrian) the permanent quarters of the XIV legion. It was also a very old mart for the amber brought to Italy from the north. It was created a municipium by Hadrian (Aelium Carnuntum). Marcus Aurelius resided there for three years (172-175) during the war against the Marcomanni, and wrote part of his Medita- tions. Septimius Severus, at the time governor of Pannonia, was proclaimed emperor there by the soldiers (193)1 I n the 4th century it was destroyed by the Germans, and, although partly restored by Valentinian I., it never regained its former importance, and Vindobona became the chief military centre. It was finally destroyed by the Hungarians in the middle ages.

A special society (Carnuntumverein) exists for the exploration of the numerous ruins, the results of which will be found in J. W. Kubitschek and S. Frankfurter, Fiihrer durch Carnuntum (3rd ed.,

1894) ; see also E.' von Sacken, " Die romische Stadt Carnuntum," in Sitzungsberichte der k. : Akad. der Wissenschaften, ix. (Vienna, 1852); article by Kubitschek in Pauly-Wissowa's Realencyclopddie, iii. part ii. (1899); Corpus Inscriptiontim Latinarum, iii., part i. P- 550.

CARNUTES (Carnuti, Carnutae, Kapvovrlvot. in Plutarch), a Celtic people of central Gaul, between the Sequana (Seine)' and the Liger (Loire). Their territory corresponded to the dioceses of Chartres, Orleans and Blois, that is, the greater part of the modern departments of Eure-et-Loir, Loiret, Loir-et-Cher. It was regarded as the political and religious centre of the Gallic nation. The chief towns were Cenabum (not Genabum; Orleans) and Autricum (Chartres). According to Livy (v. 34) the Carnutes were one of the tribes which accompanied Bellovesus in his invasion of Italy during the reign of Tarquinius Priscus. In the time of Caesar they were dependents of the Remi, who on one occasion interceded for them. In 52 they joined in the rebellion of Vercingetorix. As a punishment for the treacherous murder of some Roman merchants and one of Caesar's commissariat officers at Cenabum, the town was burnt and the inhabitants put to the sword or sold as slaves. During the war they sent 12,000 men to relieve Alesia, but shared in the defeat of the Gallic army. Having attacked the Bituriges Cubi, who appealed to Caesar for assistance, they were forced to submit. Under Augustus, the Carnutes, as one of the peoples of Lugdunensis, were raised to the rank of civitas soda or foederata, retaining their own institutions, and only bound to render military service to the emperor. Up to the 3rd century Autricum (later Carnutes, whence Chartres) was the capital, but in 275 Aurelian changed Cenabum from a vicus into a civitas and named it Aurelianum or Aurelianensis urbs (whence Orleans).

See Caesar, Bell. Gall. v. 25, 29, vii. 8, n, 75, viii. 5, 31 ; Strabo iv. pp. 191-193; R. Boutrays, Urbis gentisque Carnutum historia (1624); A. Desjardins, Geographic historique de la Gaule, ii. (1876— 1893); article and bibliography in La Grande Encyclopedie ; T. R. Holmes, Caesar's Conquest of Gaul (1899), p. 402, on Cenabum.

CARO, ANNIBALE (1507-1566), Italian poet, was born at Civita Nuova, in Ancona, in 1507/ He became tutor in the family of Lodovico Gaddi, a rich Florentine, and then secretary to his brother Giovanni, by whom he was presented to a valuable ecclesiastical preferment at Rome. At Gaddi's death, he entered

the service of the Farnese family, and became confidential secretary in succession to Pietro Lodovico, duke of Parma, and to his sons, duke Ottavio and cardinals Ranuccio and Alexander. Caro's most important work was his translation of the Aeneid (Venice, 158a; Paris, 1760). He is also the author of Rime, Canzoni, and sonnets, a comedy named Gli Straccioni, and two clever jeux d' esprit, one in praise of figs, La Ficheide, and another in eulogy of the big nose of Leoni Ancona, president of the Academia della- 'Vertfi. Caro's poetry is distinguished by very

considerable ability, and particularly by the freedom and grace of its versification; indeed he may be said to have brought the verso sciolto to the highest development it has reached in Italy. His prose works consist of translations from Aristotle, Cyprian and Gregory Nazianzen; and of letters, written in his own name and in those of the cardinals Farnese, which are remarkable both for the baseness they display and for their euphemistic polish and elegance. His fame has been greatly damaged by the virulence with which he attacked Lodovico Castelvetro in one of his canzoni, and by his meanness in denouncing him to the Holy Office as translator of some of the writings of Melanchthon. He died at Rome about 1566.

CARO, ELME MARIE (1826-1887), French philosopher, was born on the 4th of March 1826 at Poitiers. His father, a pro- fessor of philosophy, gave him an excellent education at the Stanislas College and the Ecole Normale, where he graduated in 1848. After being professor of philosophy at several provincial universities, he received the degree of doctor, and came to Paris in 1858 as master of conferences at the ficole Normale. In 1861 he became inspector of the Academy of Paris, in 1864 professor of philosophy to the Faculty of Letters, and in 1874 a member of the French Academy. He married Pauline Cassin, the authoress of the PechS de Madeleine and other well-known novels. He died in Paris on the 13th of July 1887. In his philosophy he was mainly concerned to defend Christianity against modern Positivism. The philosophy of Cousin influenced him strongly, but his strength lay in exposition and criticism rather than in original thought. Besides important contributions to La France and the Revue des deux mondes, he wrote Le Mysticisme au X VHP siecle (1852-1854), L'Idee de Dieu{ 1 864) , LeMaterialisme et la science

(1868), Le Pessimisms au XIX' sii.de (1878), Jours d'ipreuves (1872), M. Littrt et le positivisme (1883), George Sand (1887), Milanges et portraits (1888), La Philosophic de Goethe (2nd ed., 1880).

CAROL (O. Fr. carole), a hymn of praise, especially such as is sung at Christmas in the open air. The origin of the word is obscure. Diez suggests that the word is derived from chorus. Others ally it with corolla, a garland, circle or coronet, 1 the earliest sense of the word being apparently " aring " or " circle," " a ring dance." Stonehenge, often called the Giants' Dance, was also frequently known as the Carol; thus Harding, Chron. lxx. x., " Within (the) Giauntes Carole, that so they hight, The (Stone hengles) that nowe so named been." The Celtic forms, often cited as giving the origin of the word, are derivatives of the English or French. The crib set up in the churches at Christmas was the centre of a dance, and some of the mostfamous of Latin Christmas hymns were written to dance tunes. These songs were called Wiegenlieder in German, noils in French, and carols in English. They were originally modelled on the songs written to accompany the choric dance, which were probably the starting-point of the lyric poetry of the Germanic peoples. Strictly speaking, there- fore, the word should be applied to lyrics written to dance measures; in common acceptation it is applied to the songs written for the Christmas festival. Carolling, i.e. the combined exercise of dance and song, found its way from pagan ritual into the Christian church, and the clergy, however averse they might be from heathen survivals, had to content themselves in this, as in many other cases, with limiting the practice. The third council of Toledo (589) forbade dancing in the churches on the vigils of saints' days , and secular dances in church were forbidden by the council of Auxerre in the next year. Even as late as 1209 it was necessary for the council of Avignon to forbid theatrical dances and secular songs in churches. Religious dances persisted longest on Shrove Tuesday, and a Castanet dance by the choristers round the lectern is permitted three times a year in the cathedral of Seville. The Christmas festival, which synchronized with and

1 In architecture, the term " carol " (also wrongly spelled " carrel " or " carrol ") is used, in the sense of an enclosure, of a small chapel or oratory enclosed by screens, and also sometimes of the rails of the screens themselves. It is more particularly applied to the separate seats near the windows of a cloister (q.v.), used by the monks for the purposes of study, &c. The term " carol " has,

by a mistake, been sometimes used of a scroll bearing an inscription of a text, &c.

superseded the Latin and Teutonic feasts of the winter solstice, lent itself especially to gaiety. The ” crib ” of the Saviour was set up in the churches or in private houses, in the traditional setting of the stable, with earthen figures of the Holy Family, the ox and the ass; and carols were sung and danced around it. The ” rocking of the cradle ” was the occasion of dialogue between Joseph and Mary which was not without elements of comedy, and gave rise to lullabies such as the well-known German Dormi fili. The adoration of the shepherds and the visit of the Magi also provided matter for dramatic and choral representation. The singing of the carol has survived in places where the institution of the ” crib,” said to have been originated by St Francis of Assisi to inculcate the doctrine of the incarna- tion, has been long in disuse, but in the West Riding of Yorkshire the children who go round carol-singing still carry ” milly- boxes ” (My Lady boxes) containing figures which represent the Virgin and Child.

That carol-singing early became a pretext for the asking of alms is obvious from an Anglo-Norman carol preserved in the British Museum (MS. Reg. 16 E. viii.), Seigneurs ore entendey a nus, which is little more than a drinking song. Carols were an important element in the mystery plays of the Nativity, and one of these, included in the Marguerites de la Marguerite des princesses, tres-illustre reine de Navarre (Lyons, 1 547) , incidentally gives evidence of the connexion of dancing and carol-singing, for the shepherds and shepherdesses open their chorus at the manger with “Dansons, chantons, faisons rage.” There is a long English carol relating the chief incidents of the life of Christ, which is a curious example of the mixture of the sacred and pro- fane common in this species of composition. It begins ” To- morrow shall be my dancing day,” and has for refrain — ” Sing, oh ! my love, oh ! my love, my love, my love; This have I done for my true love.”

There are extant numerous carols dating from the 1 5th century which have the characteristic features of folksong. The famous Cherry-tree Carol, ” Joseph was an old man,” is based on an old legend which is related in the Coventry mystery plays. ” I saw three ships come sailing in,” and ” The Camel and the Crane,” though of more modern date, preserve curious legends. Numerous entries in the household accounts of the Tudor sovereigns show that carol-singing was popular throughout the 1

6th century, and the literature of Christmas was enriched in the next century by poems which are often included in collec- tions of carols, though they were probably written to be read rather than sung. Milton, Crashaw, Southwell, Ben Jonson, George Herbert and George Wither all produced Christmas poems, but the richest collection by any one poet is to be found in the poems of Herrick, whose ” Come, bring with a noise ” is a typical carol of the jovial kind, and may well have been written to a dance tune. Among 18th-century religious carols perhaps the most famous is Charles Wesley’s ” Hark, how all the welkin rings,” better known in the variant, ” Hark, the herald angels sing.” The artificial modern revival of carol-singing has pro- duced a quantity of new carols, the best of which are perhaps mostly derived from medieval Latin Christmas hymns. Among the many modern Christmas poems one of the most striking is Swinburne’s ” Three Damsels in the Queen’s Chamber,” which is, however, a ballad rather than a carol.

The earliest printed collection of carols was issued by Wynkyn de Worde in 1521. It contained the famous Boar’s Head carol, Caput apri defero, Reddens laudes Domino, which in a slightly altered form is sung at Queen’s College, Oxford, on the bringing in of the boar’s head. Modern collections of ancient carols are derived chiefly from three tracts belonging to the collection of Anthony a. Wood, preserved in the Bodleian library, from a 15th-century MS. (Sloane 2593), a 16th-century MS. with the music (Add. 5665), and other MSS. in the British Museum, and from oral tradition. In the 18th century T. Bloomer of Birmingham published a number of carols in the form of broad- sides. Among the numerous collections of French carols is Noei Borguignon de Gui Bardzai (1720), giving the words and the music of thirty-four noels, many of them very free in character.

The term noil passed into the English carol as a favourite refrain, ” nowell,” and seems to have been in common use in France as an equivalent for vivat.

Among the more important modern collections of Christmas carols are: Songs and Carols (1847), edited by T. Wright for the Percy Society from Sloane MS. 2593 ; W. Sandys, Christmastide, its History, Festivities and Carols (1852); Christmas with the

Poets (edited by V. H., 4th ed., 1872); T. Helmore and J. M. Neale, Carols for Christmastide (1853-1854), with music; R. R. Chope, Carols (new and complete edition, 1894), a tune-book for church use, with an introduction by S. Baring-Gould; H. R. Bramley, Christmas Carols, New and Old, the music by Dr Stainer; A. H. Bullen, Carols and Poems (1885) ; J. A. Fuller Maitland and W. S. Rockstro, Thirteen Carols of the Fifteenth Century, from a Trinity Coll., Cambridge, MS. (1891). See also Julian's Dictionary of Hymnology, s.v. " Carol "; E. Cortet, Essai sur les f&tes religieuses (1867).

CAROLINE (1683-1737), wife of George II., king of Great Britain and Ireland, was a daughter of John Frederick, margrave of Brandenburg-Ansbach (d. 1686). Born at Ansbach on the 1st of March 1683, the princess passed her youth mainly at Dresden and Berlin, where she enjoyed the close friendship of Sophie Charlotte, wife of Frederick I. of Prussia; she married George Augustus, electoral prince of Hanover, in September 1705. The early years of her married life were spent in Hanover. She took a continual interest in the approaching accession of the Hanoverian dynasty to the British throne, was on very friendly terms with the old electress Sophia, and corresponded with Leibnitz, whose acquaintance she had made in Berlin. In October 17 14 Caroline followed her husband and her father-in- law, now King George I., to London. As princess of Wales she was accessible and popular, and took the first place at court, filling a difficult position with tact and success. When the quarrel between the prince of Wales and his father was attaining serious proportions, Caroline naturally took the part of her husband, and matters reached a climax in 1717. Driven from court, ostracized by the king, deprived even of the custody of their children, the prince and princess took up their residence in London at Leicester House, and in the country at Richmond. They managed, however, to surround themselves with a distinguished circle; Caroline had a certain taste for literature, and among their attendants and visitors were Lord Chesterfield, Pope, Gay, Lord Hervey and his wife, the beautiful Mary Lepel. A formal reconciliation with George I. took place in 1720. . In October 1727 George II. and his queen were crowned. During the rest of her life Queen Caroline's influence in English politics was very chiefly exercised in support of Sir Robert Walpole; she kept this minister in power, and in control of church patron- age. She was exceedingly tolerant, and the bishops appointed by her were remarkable rather for learning than for orthodoxy. During the

king's absences from England she was regent of the kingdom on four occasions. On the whole, Caroline's relations with her husband, to whom she bore eight children, were satis- factory. A clever and patient woman, she was very complaisant towards the king, flattering his vanity and acknowledging his mistresses, and she retained her influence over him to the end. She died on the 20th of November 1737.

Caroline appears in Scott's Heart of Midlothian; see also Lord Hervey, Memoirs of the Reign of George II., ed. by J.W. Croker (1884) ; W. H. Wilkins, Caroline the Illustrious (1904) ; and A. D. Greenwood, Lives of the Hanoverian Queens of England, vol. i. (1909).

CAROLINE AMELIA AUGUSTA (1768-1821), queen of George IV. of Great Britain, second daughter of Charles William Ferdinand, duke of Brunswick- Wo'lfenbiittel, was born on the 17th of May 1768. She was brought up with great strictness, and her education did not fit her well for her subsequent station in life. In 1795 she was married to the then prince of Wales (see George IV.), who disliked her and separated from her after the birth of a daughter in January 1796. The princess resided at Blackheath; and as she was thought to have been badly treated by her profligate husband, the sympathies of the people were strongly in her favour. About 1806 reports reflecting on her conduct were circulated so openly that it was deemed necessary for a commission to inquire into the circumstances. The princess was acquitted of any serious fault, but various

improprieties in her conduct were pointed out and censured. In 1814: she left England and travelled on the continent, residing principally in Italy. On the accession of George in 1820, orders were given that the English ambassadors should prevent the recognition of the princess as queen at any foreign court. Her name also was formally omitted from the liturgy. These acts stirred up a Strong feeling in favour of the princess among the English people generally, and she at once made arrangements for returning to England and claiming her rights. She rejected a proposal that she should receive an annuity of £50,000 a year on condition of renouncing her title and remaining abroad. Further efforts at compromise proved unavailing; Caroline arrived in England on the 6th of June, and one month later a bill to dissolve her marriage with the king on the ground of adultery was brought into the House of Lords. The trial began on the 17th of August 1820, and on the 10th of November the bill, after passing

the third- reading, was abandoned. The public excite- ment had been intense, the boldness of the queen's counsel, Brougham and Denman, unparalleled, and the ministers felt that the smallness of their majority was Virtual defeat. The queen was allowed to assume her title, but she was refused admit- tance to Westminster Hall on the coronation day, July 19, 1821. Mortification at this event seems to have hastened her death, which took place on the 7th of August of the same year.

See A Queen -of Indiscretions', the Tragedy of Caroline of Brunswick, Queen of England, translated by F? Chapman from the Italian of Graziano Paolo Clerici (London, 1907); with numerous portraits, &c. Of, contemporary authorities the Creevy Papers (1905) throw the most interesting sidelights on the subject,,

CAROLINE ISLANDS,, a widely-scattered archipelago in the Pacific Ocean, E> of the Philippines and N. of New Guinea, included in Micronesia; between 5 and io° N., and 135° and 165° ,E;,. belonging to Germany. They fall into three main groups, the Western, Central and Eastern Carolines, the central being the most numerous, while the western include the Pelew group. The total land area is about 380 sq. m., and out of this, 307 sq. m. is covered by the four main islands, Ponape and KUsaie in the eastern group, Trukror Hogolu in the central, and Yap in the westernt These islands are Of considerable elevation (the highest point of Ponape approaches 3000 ft.), but the rest are generally low coral islets. The climate is equable and moist, but healthy; but the islands are subject to heavy storms. The total population is estimated at 36,000. The natives, who are Microhesian hybrids of finer physique than their kinsmen of the Pelew Islands, have acomparatively high mental standard, being careful agriculturists, and peculiarly clever boatbuilders and navigators. The Germans divide the whole archipelago into two administrative districts, eastern and western, having the seats of government at Ponape and Yap respectively. The principal article of export is copra. The islands were discovered (at least in part) by the Portuguese Diego da Rocha in 1527, and called by him the Sequeira Islands. In 1686 Admiral Francesco Lazeano, who made further explorations, renamed them the Carolines in honour of Charles II. of Spain. The islands were subsequently visited by a few travellers; but the natives have only in modern times been reconciled to the presence of foreigners; an early visit of missionaries (1731) resulted in one of several murderous attacks on white men which darken the history of the islands; and it was

only in 1875 that Spain, claiming the group, made some attempt to assert her rights. These were contested by Germany, whose flag was hoisted on Yap, and the- matter was referred to the arbitration of Pope Leo XIII. in 1885. He decided in favour of Spain, but gave Germany free trading rights; and in 1899 Germany took over the administration of the islands from Spain, paying 25,000,000 pesetas (nearly £1,000,000 sterling).

Ancient Stone Buildings. — In Ponape and Kusaie, massive stone structures, similar to those which occur in several other parts of the Pacific Ocean, have long been known to exist. They have been closely explored by Herr Kubary, Mr F. J. Moss, and later Mr ■ F. W. Christian. None of the colossal structures hitherto described appears to have been erected by the present Melanesian

or Polynesian peoples, white their nidi diffusion, extending as far as Easter Island, within 400 m. of the ; New World, poiilts to the occupation of the Pacific lands by a prehistoric race which had made some advance in general culture. The Funafuti borings (1897) show almost beyond doubt that Polynesia is an area of comparatively recent subsidence. Hence the land con nexions must have formerly been much easier and; far more continuous than at present. The dolmen-builders of the New Stone Age are now known to have long occupied both Korea and Japan, from which advanced Asiatic lands they may have found little difficulty in spreading over the Polynesian world, just as in the extreme west they were, able to range over Scandi- navia, Great Britain and Ireland. To.Neolithic man, still perhaps represented by some of the more light-coloured and more regular- featured Polynesian groups, may therefore not unreasonably be attributed these astonishing remains, which assume so many different forms according to the nature of the locality, but seem generally so out of proportion with the present restricted areas on which they stand. With the gradual subsidence of these areas their culture would necessarily degenerate, although echoes of sublime theogonies and philosophies are still heard in the oral traditions and folklore of many Polynesian groups./ In the islet of Lele, close to Kusaie, at the eastern extremity of Micronesia, the ruins present the appearance of a citadel with cyclopean ramparts built of large basaltic blocks. There are also numerous canals, and

what look like artificial harbours constructed amid the shallow lagoons.

In Poaape the remains are of a somewhat similar character, but on a much larger scale, and with this difference, that while those of Lele all stand on the land, those of Ponape are built in the water. The whole island is strew with natural basaltic prisms, some of great size: and of this material, brought by boats or rafts from a distance of 30 m. and put together without any mortar, but sustained by their own weight, are built all the massive walls and other structures on the east side of the island. The walls of the main building near the entrance of Metalanim harbour form a massive quadrangle 200 ft. on all sides, with inner courts, vault and raised, platform with walls 20 to 40 ft. high and from 8 to 18 ft. thick. Some of the blocks are, 2$ ft. long and 8 ft. in circumference, and many of them weigh from 3 to 4 tons. There are also numerous canals from 30 to 100 ft. wide, while a large number of islets, mainly artificial, covering an area of 9 sq. m., have all been built up out of the shallow waters of the lagoon round about the ; entrance of the harbour, with high sea-walls composed of the same huge basaltic prisms. In some places the wails of this ” Pacific Venice ” are now submerged to some depth, as if the land had subsided since the construction of these extensive works. Elsewhere huge break- waters had been constructed, the fragments of which may still be seen stretching away for a distance of from 2 to 3 m. Most observers, such as Admiral Sir Cyprian Bridge and Mr Le Hunte, agree that these structures could not possibly be the work of any of the present Polynesian peoples, and attribute them to a now extinct prehistoric race, the men of the New Stone Age from the Asiatic mainland. .- ‘

Stone Money. — The inhabitants of Yap are noted for possessing the most extraordinary currency, if it can , be so called, in the whole world. Besides the ordinary shell money, there is a sort of stone coinage, consisting of huge calcite or limestone discs or wheels from 6 in. to 1 2 ft. in diameter, and weighing Up to nearly 5 tons. These are all quarried in the Pelew Islands, 2po,ni.‘to the south, and are now brought to Yap in European vessels. But some were in the island long before the arrival of the whites, and must consequently have been brought ‘by native vessels or oh rafts. The stones, which are rather tokens than money, do not cirdulate, but are piled up round about the chief ‘s treasure- house, and appear to be regarded as public property, although it is hard to say what particular use they can serve.

They appear to be kept rather for show and ornament than for use.

See F. W. Christian, The Caroline Islands (London, 1899); G. Volkens, ” (Jber die Karolinen Insel Yap,” in Verhandlungen Gesellschaft Erdkunde Berlin., xxviii. X1901); J. S. Kubary, ; Ethno*

graphische Beiirage . iw Keniniss des Kurolinen-Archipel (Leiden, 1 889-1892); De Abrade, Historia del conflicts de las Carolinas, &c. (Madrid, 1886).

CAROLINGIANS, the name of a family (so called from Charlemagne, its most illustrious member) which gained the throne of France a.d. 751. It appeared in history in 613, its origin being traced. to Arnulf (Arnoul), bishop of Metz, and Pippin, long called Pippin of Landen, but more correctly Pippin the Old or Pippin I. Albeit of illustrious descent, the genealogies which represent Arnulf as an Aquitanian noble, and his family as connected— by more or less complicated devices — with the saints honoured in Aquitaine, are worthless, dating from the time of Louis the Pious in the 9th century. Arnulf was one of the Austrasian nobles who appealed to Clotaire II., king of Neustria, against Brunhilda, and it was in reward for his services that he received from Clotaire the bishopric of Metz (613). Pippin, also an Austrasian noble, had taken a prominent part in the revolution of 613. These two men Clotaire took as his counsellors; and when he decided in 623 to confer the kingdom of Austrasia upon his son Dagobert, they were appointed mentors to the Austrasian king, Pippin with the title of mayor of the palace. Before receiving his bishopric, Arnulf had had a son Adalgiselus, afterwards called Anchis; Pippin’s daughter, called Begga in later documents, was married to Arnulf ‘s son, and of this union was born Pippin II. Towards the end of the 7th century Pippin II., called incorrectly Pippin of Heristal, secured a preponderant authority in Austrasia, marched at the head of the Austrasians against Neustria, and gained a decisive victory at Tertry, near St Quentin (687). From that date he may be said to have been sole master of the Frankish kingdom, which he governed till his death (714). In Neustria Pippin gave the mayoralty of the palace to his son Grimoald, and afterwards to Grimoald’s son Theode- bald; the mayoralty in Austrasia he gave to his son Drogo, and subsequently to Drogo’s children, Arnulf and Hugh. Charles Martel, however, a son of Pippin by a concubine Chalpa’ida, seized the mayoralty in both kingdoms,

and he it was who continued the Carolingian dynasty. Charles Martel governed from 714 to 741 , and in 751 his son Pippin III. took the title of king. The Carolingian dynasty reigned in France from 751 to 987, when it was ousted by the Capetian dynasty. In Germany descendants of Pippin reigned till the death of Louis the Child in 911; in Italy the Carolingians maintained their position until the deposition of Charles the Fat in 887. Charles, duke of Lower Lorraine, who was thrown into prison by Hugh Capet in 991, left two sons, the last male descendants of the Carolingians, Otto, who was also duke of Lower Lorraine and died without issue, and Louis, who after the year 1000 vanishes from history.

See P. A. F. Gerard and L. A. Warnkonig, Histoire des Carolingiens (Brussels, 1862) ; H. E. Bonnell, Anfange des Karoling. Houses (Berlin, 1866) ; J. F. Bohmer and E. Miihlbacher, Regesten d. Kaiserreichs unter d. Karolingern (Innsbruck, 1889 seq.); E. Muhl- bacher, Deutsche Gesch. unter d. Karolingern (Stuttgart, 1896); F. Lot, Les Derniers Carolingiens (Paris, 1891). (C. Pf.)

CAROLDS-DURAN, the name adopted by the French painter Charles Auguste Emile Durand (1837-), who was born at Lille on the 4th of July 1837. He studied at the Lille Academy and then went to Paris, and in 1861 to Italy and Spain for further study, especially devoting himself to the pictures of Velasquez. His subject picture ‘ ‘ Murdered, ” or ” The Assassina- tion ” (1866), was one of his first successes, and is now in the Lille museum, but he became best known afterwards as a portrait- painter, and as the head of one of the principal ateliers in Paris, where some of the most brilliant artists of a later generation were his pupils. His” Lady with the Glove “(1869), a portrait of his own wife, ‘was bought for the Luxembourg. In 1889 he was made a commander of the Legion of Honour. He became a member of the Acad6mie des Beaux-arts in 1904, and in the next year was appointed director of the French academy at Rome in succession to Eugene Guillaume.

CARORA, an inland town of the state of Lara, Venezuela, on the Carora, a branch of the Tocuyo river, about 54 m. W. by S. of the city of Barquisimeto, and 11 28 ft. above sea-level. Pop. (1908 estimate) 6000. The town is comparatively well-built

and possesses a fine parish church, and a Franciscan convent and hermitage. It was founded in 1754, and its colonial history shows considerable prosperity, its population at that time numbering 9000 to 10,000. The neighbouring country is devoted principally to raising horses, mules and cattle; and in addition to hides and leather, it exports rubber and other forest products.

CARP, the typical fish of a large family (Cyprinidae) of Ostariophysi, as they have been called by M. Sagemehl, in which the air-bladder is connected with the ear by a chain of small bones (so-called Weberian ossicles). The mouth is usually more or less protractile and always toothless; the lower pharyngeal bones, which are large and falciform, subparallel to the branchial arches, are provided with teeth, often large and highly specialized, in one, two or three series (pharyngeal teeth), usually working against a horny plate attached to a vertical process of the basi- occipital bone produced under the anterior vertebrae, mastica- tion being performed in the gullet. These teeth, adapted to various requirements, vary according to the genus, being conical, hooked, spoon-shaped, molariform, &c.

The species are extremely numerous, about 1400 being known, nearly entirely confined to fresh water, and feeding on vegetable substances or small animals. They are dispersed over the whole world with the exception of South America, Madagascar, Papuasia, and Australasia. Remains of several of the existing genera have been found in Oligocene and later beds of Europe, Sumatra and North America. One member of the Cyprinidae is at present known to be viviparous, but no observations have as yet been made on its habits. It is a small barbel discovered in Natal by Max Weber, and described by him under the name Barbus viviparus.

The Cyprinidae 1 are divided into four subfamilies: — Catostominae (mostly from North America, with a few species from China and eastern Siberia), in which the maxillary bones take a share in the border of the mouth, and the pharyngeal teeth are very numerous and form a single, comb-like series; Cyprininae, the great bulk of the family, more or less conforming to the type of the carp; Cobitinae, or loaches (Europe, Asia, Abyssinia), which are dealt with in a separate article (see Loach) ; and the Homalopterinae (China and south-eastern Asia), mountain forms allied to the loaches, with a quite rudimentary air-bladder.

For descriptions of other Cyprinids than the carp, see Gold- fish,

Barbel, Gudgeon, Rtjdd, Roach, Chub, Dace, Minnow, Tench, Bream, Bleak, Bitterling, Mahseer.

The carp itself, Cyprinus carpio, has a very wide distribution, having spread, through the agency of man, over nearly the whole of Europe and a part of North America, where" it lives in lakes, ponds, canals, and slow-running rivers with plenty of

The Common Carp, vegetation. The carp appears to be a native of temperate Asia and perhaps also of south-eastern Europe, and to have been introduced into other parts in the 12th and 13th century; it was first mentioned in England in 1496. The acclimatization of the carp in America has been a great success, especially in the northern waters, where, the growth continuing throughout the entire year, the fish soon attains a remarkable size. The presence of carp in Indo-China and the Malay Archipelago is probably also to be ascribed to human agency. In the British Isles the

1 The name of the fishes of the genus Cyprinus is derived from the island of Cyprus, the ancient sanctuary of Venus; this name is supposed to have arisen from observations of the fecundity and vivacity of carp during the spawning period.

carp seldom reached a length of 25 ft., and a weight of 20 lb, whilst examples of that size are quite frequent on the continent, and others measuring 4! ft. and weighing 60 lb or more are on record. The fish is characterized by its large scales (34 to 40 in the lateral line), its long dorsal fin, the first ray of which is stiff and serrated, and the presence of two small barbels on each side of the mouth. But it varies much in form and scaling, and some most aberrant varieties have been fixed by artificial selection, the principal being the king-carp or mirror-carp, in which the scales are enlarged and reduced in number, forming more or less regular longitudinal series on the sides, and the leather-carp, in which the scales have all but disappeared, the fish being covered with a thick, leathery skin. Deformed examples are not of rare occurrence.

Although partly feeding on worms and other small forms of animal life, the carp is principally a vegetarian, and the great development of its pharyngeal apparatus renders it particularly adapted to a graminivorous regime. The longevity of the fish has probably been much exaggerated, and' the statements of carp of 200 years living in the ponds of Pont-Chartrain and other places

in France and elsewhere do not rest on satisfactory evidence.

A close ally of the carp is the Crucian carp, Cyprinus carassius, chiefly distinguished by the absence of barbels. It inhabits Europe and northern and temperate Asia, and is doubtfully indigenous to Great Britain. It is a small fish, rarely exceeding a length of 8 or 9 in. It has many varieties. One of these, remarkable for its very short, thick head and deep body, is the so-called Prussian carp, C. gibelio, often imported into English ponds, whilst the best known is the goldfish (q.v.), C. auralus, first produced in China. (G. A. B.)

CARPACCIO, VITTORIO, or Vittore (c. 1465-c. 1522), Italian painter, was born in Venice, cf an old Venetian family. The facts of his life are obscure, but his principal works were executed between 1490 and 1519; and he ranks as one of the finest precursors of the great Venetian masters. The date of his birth is conjectural. He is first mentioned in 1472 in a will of his uncle Fra Ilario, and Dr Ludwig infers from this that he was born c. 1455, on the ground that no one could enter into an inheritance under the age of fifteen; but the inference ignores the possibility of a testator making his will in prospect of the beneficiary attaining his legal age. Consideration of the youthful style of his earliest dated pictures (" St Ursula " series, Venice, 1490) makes it improbable that at that time he had reached so mature an age as thirty-five; and the date of his birth is more probably to be guessed from his being about twenty-five in 1490. What is certain is that he was a pupil (not, as sometimes thought, the master) of Lazzaro Bastiani, who, like the Bellini and Vivarini, was the head of a large atelier in Venice, and whose own work is seen in such pictures as the " S. Veneranda " at Vienna, and the " Doge Mocenigo kneeling before the Virgin " and " Madonna and Child " (formerly attributed to Carpaccio) in the National Gallery, London. In later years Carpaccio appears to have' been influenced by Cima da Conegliano (e.g. in the " Death of the Virgin," 1508, at Ferrara). Apart from the " St Ursula " series, his scattered series of the " Life of the Virgin " and " Life of St Stephen," and a " Dead Christ " at Berlin, may be specially mentioned.

For an authoritative and detailed account, see the Life and Works of Vittorio Carpaccio, by Pompeo Molmenti and Gustav Ludwig, Eng. trans,, by R. H. Cust (1907); and the criticism by Roger Fry, " A Genre Painter and his Critics," in the Quarterly Review (London, April 1908).

CARPATHIAN MOUNTAINS 2 (Lat. Monies Sarmatici; Med. Lat. Monies Nivium), the, eastern wing of the great central mountain system of Europe. With the exception of the extreme southern and south-eastern ramifications, which belong to Rumania, the Carpathians lie entirely within Austrian and

8 The name is derived from the Slavonic word Chrb, which means mountain-range. As Chrawat, it was first applied to the inhabitants of the region, whence it passed in the form Krapat or Karpa as the name of mountain system. In official Hungarian

documents of the 13th and 14th centuries the Carpathians are named Thorchal or Tarczal, and also Monies Nivium.

Hungarian territory. They begin on the Danube near Pressburg, surround Hungary and Transylvania in a large semicircle, the ‘•oncavity of which is towards the south-west, and end on the Danube near Orsova. The total length of the Carpathians is over 800 m., and their width varies between 7 and 230 m., the greatest width of the Carpathians corresponding with its highest altitude. Thus the system attains its greatest breadth in the Transylvanian plateau, and in the meridian of the Tatra group. It covers an area of 72,600 sq. m., and after the Alps is the most extensive mountain system of Europe. The Car- pathians do not form an uninterrupted chain of mountains, but consist of several orographically and geologically distinctive groups; in fact they present as great a structural variety as the Alps; but as regards magnificence of scenery they cannot compare with the Alps. The Carpathians, which only in a few places attain an altitude of over 8000 ft., lack the bold peaks, the extensive snow-fields, the large glaciers, the high waterfalls and the numerous large lakes which are found in the Alps. They are nowhere covered by perpetual snow, and glaciers do not exist, so that the Carpathians, even in their highest altitude, recall the middle region of the Alps, with which, how- ever, they have many points in common as regards appearance, structure and flora. The Danube separates the Carpathians from the Alps, which they meet only in two points, namely, the Leitha Mountains at Pressburg, and the Bakony Mountains at Vacz (Waitzen), while the same river separates them from the Balkan Mountains at Orsova. The valley of the March and Oder separates the Carpathians from the Silesian and Moravian chains, which belong to the middle wing of the great central mountain system of Europe. The Carpathians separate Hungary and Transylvania from Lower Austria, Moravia, Silesia, Galicia, Bukovina and Rumania, while its ramifications fill the whole northern part of Hungary, and form the quadrangular mass of the Transylvanian plateau. Unlike the other wings of the great central system of Europe, the Carpathians, which form the watershed between the northern seas and the Black Sea, are sur- rounded on all sides by plains, namely the great Hungarian plain on the south-west, the plain of the Lower Danube (Rumania) on the south, and the Galician plain on the north-east.

The Carpathian system can be divided into two groups: the Carpathians proper, and the mountains of Transylvania. The Carpathians proper consist of an outer wall, which forms the frontier between Hungary and the adjacent provinces of Austria, and of an inner wall which fills the whole of Upper Hungary, and forms the central group. The outer wall is a complex, roughly circular mass of about 600 m. extending from Pressburg to the valley of the Viso, and the Golden Bistritza, and is divided by the Poprad into two parts, the western Carpathians and the eastern or wooded Carpathians. Orographically, therefore, the proper Carpathians are divided into: (a) the western Carpathians, (b) the eastern or wooded Carpathians, and ©

the central groups.

(a) The western Carpathians, which begin at the Porta Uunganca on the Danube, just opposite the Leitha Mountains, and extend to the Poprad river, are composed of four principal groups : Usages. ˆ ˆ {ttle Carpathians (also called the Pressburg group) with the highest peak Bradlo (2670 ft.) ; the White Carpathians or Miava group, with the highest peak Javornik (3325 ft.), and the Zemerka (3445 ft.); the Beskid proper or western Beskid group, which extends from a little west of the Jablunka pass to the river Poprad, with the highest peaks, Beskid (3115 ft.), Smrk (4395 ft.), Lissa Hora (4350 ft.) and Ossus (5106 ft.): and the Magura or Arva Magura group, which extends to the south of Beskid Mountains, and contains the Babia Gora (5650 ft.), the highest peak in the whole western Carpathians. .

(6) The eastern or wooded Carpathians extend from the river Poprad to the sources of the river Viso and the Golden Bistritza, whence the Transylvanian Mountains begin, and form the link between these mountains and the central groups or High Carpathians. They are a monotonous sandstone range, covered with extensive forests, which up to the sources of the rivers Ung and San are also called the eastern Beskids, and are formed of small parallel ranges. The northern two-thirds of this range has a mean altitude of 3250 ft., and only in its southern portion it attains a mean altitude of 5000 ft. The principal peaks are Rusky Put (4264 ft.), Popadje (5690 ft.), Bistra (5936 ft.), Pop Ivan (6214 ft.), Tomnatik (5035 ft.), Giumaleu (6077 ft.) and Cserna Gora (6505 ft.), the culminating peak of the

whole range. To the eastern Carpathians belongs also the range of mountains extending between the Laborcza and the Uppei 1

heiss, called Vihorlat, which attains in the peak of the same name an altitude of 3495 ft. As indicated by its name, which means burnt, it is of volcanic origin, and plays an important part in the folklore and in the superstitious legends of the Hungarian people.

(c) The central groups or the High Carpathians extend from the confluence of the rivers Arva and Waag to the river Poprad, and include the highest group of the Carpathian system. They consist of the High Tatra group (see Tatra Mountains), where is found the Gerlsdorfer or Franz Josef peak (Hung. Gerlachfalm-Csucs), with an altitude of 8737 ft., the highest peak in the whole Carpathian Moun- tains. On its west are the Liptauer Magura, with the highest peak the Biela Szkala (6900 ft.), and on its east are the Zipser Magura, which have a mean altitude of 3000 ft. South of the central groups lies a widely extending mountain region, which fills the whole ot northern Hungary, and is known as the Hungarian highland. It is composed of several groups, which are intersected by the valleys of numerous rivers, and which descend in sloping terraces towards the Danube and the Hungarian plain. The principal groups are: the Neutra or Galgoc Mountains (4400 ft.), between the rivers Waag and Neutra ; the Low or Nizna Tatra, which extends to the south of the High Tatra, and has its highest peaks, the Djumbir (6700 ft.) and the Kralova Hola (6400 ft.); this group is continued towards the east up to the confluence of the Gollnitz with the Hernad, by the so-called Carpathian foot-hills, with the highest peak the Zelesznik (2675 ft.). West of the Low Tatra extend the Fatra group, with the highest peak, the Great Fatra (5825 ft.), to the south and east of which lie the Schemnitz group, the Ostrowsky group, and several other groups, all of which are also called the Hungarian Ore Moun- tains, on account of their richness in valuable ores. South-east of the Low Tatra extend the Zips — Gomor Ore Mountains, while the most eastern group is the Hegyalja Mountains, between the Topla, Tarcza and Hernad rivers, which run southward from Epenes to Tokaj. In their northern portion, they are also called S6var Moun- tains, and reach in their highest peak, Simonka, an altitude of 3350 ft., while their southern portion, which ends with the renowned Tokaj Hill (1650 ft.), is also called Tokaj Mountains. The smaller groups of the Hungarian highland are: on the south-west the Neograd Mountains (2850), whose offshoots reach the Danube; to the east of them extends the Matra group, with the highest peak the Sasko (3285 ft.). The Matra group is of volcanic origin, rising abruptly in the great Hungarian plain, and

constitutes one of the most beautiful groups of the Carpathians; lastly, to its east extend the thickly- wooded Bukk Mountains (3100 ft.).

Throughout the whole of the Carpathian system there are numerous mountain lakes, but they cannot compare with the Alpine lakes either in extension or beauty. The largest and most Lakes . numerous are found in the Tatra Mountains. These lakes are called by the people ” eyes of the sea,” through their belief that they are in subterranean communication with the sea.

The western and central Carpathians are much more accessible than the eastern Carpathians and the Transylvanian Mountains. The principal passes in the western Carpathians are: Passes . Strany, Hrozinkau, Wlara, Lissa and the Jablunka pass (1970 ft.), the principal route between Silesia and Hungary, crossed by the Breslau-Budapest railway; and the Jordanow pass. In the central Carpathians are: the road from Neumarkt to Kesmark through the High Tatra, the Telgart pass over the Kralova Hola from the Poprad to the Gran, and the Tylicz pass from Bartteld to Tarnow. In the eastern Carpathians are: the Dukla pass, the Mezo-Laborcz pass crossed by the railway from Tokaj to Przemysl ; the Uszok pass, crossed by the road from Ungvar to Sambor; the Vereczke pass, crossed by the railway from Lemberg to Munkacs; ■ the Delatyn or K6r6smez6 pass (3300 ft.), also called the Magyar route, crossed by the railway from Kolomea to Debreczen; and the Stiol pass in Bukovina.

The Carpathians consist of an outer zone of newer beds and an inner zone of older rocks. Between the two zones lies a row of Klippen, while towards the Hungarian plain the inner Qeology. zone is bordered by a fringe of volcanic eruptions of Tertiary age. The outer zone is continuous throughout the whole extent of the chain, and is remarkably uniform both in composition and structure. It is formed almost entirely of a succession of sand-stones and shales of Cretaceous and Tertiary age— the so-called Carpathian Sandstone — and these are thrown into a series of iso- clinal folds dipping constantly to the south. The folding of this zone took place during the Miocene period. The inner zone is not con- tinuous, and is much more complex in structure. It is visible only in the west and in the east, while in the central Carpathians, between the Hernad and the headwaters of the Theiss, it is lost beneath the modern deposits of the Hungarian plain. In the western Carpathians the inner zone consists of a foundation of Carboniferous and older rocks, which were folded

and denuded before the deposition of the succeeding strata. In the outer portion of the zone the Permian and Mesozoic beds are crushed and folded against the core of ancient rocks; in the inner portion of the zone they rest upon the old founda- tion with but little subsequent disturbance. In the eastern Car- pathians also, the Permian and Mesozoic beds are not much folded except near the outer margin of the zone. The Klippen are isolated

hills, chiefly of Jurassic limestone, rising up in the midst of the later and softer deposits on the inner border of the sandstone zone. Their relations to the surrounding beds are still obscure. They may be ” rootless ” masses brought upon the top of the later beds by thrustplanes. They may be the pinched-up summits of sharp anticlinals, which in the process of folding have been forced through the softer rocks which lay upon them. Or, finally, they may have been islands rising above the waters, in which were deposited the later beds which now surround them. The so-called Klippen of the Swiss Alps are now usually supposed to rest upon thrustplanes, but they are not strictly analogous, either in structure or in position, with those of the Carpathians. Of all the peculiar features of the Carpathian chain, perhaps the most remarkable is the fringe of volcanic rocks which lies along its inner margin. The outbursts began in the later part of the Eocene period, and continued into the Pliocene, outlasting the period of folding. They appear to be associated with faulting upon the inner margin of the chain. Trachytes, rhyolites, andesites and basalts occur, and a definite order of succession has’ been made out in several areas; but this order is not the same throughout the chain.

The Carpathians, like the Alps, form a protective wall to the regions south of them, which enjoy a much milder climate than those Climate situated to the north. The vegetation of these regions is Flora. ‘ naturally subjected to the different climateric conditions. Pˆ The mountains themselves are mostly covered with forests,

”” ‘ and their vegetation presents four -zones: that of the beech extends to an altitude of 4000 ft.; that of the Scottish fir to 1000 ft. higher. Above this grows a species bf pine, which becomes dwarfed and disappears at an altitude of about 6000 ft., beyond which is a zone of lichen and moss covered or almost bare rock. The highest parts in the High Tatra and in the Transylvanian Mountains have a flora similar to that of the Alps, more specially that of the middle region. Remarkable is the sea-shore flora, which is found in the numerous salt-impregnated lakes, ponds and marshes in Transylvania. As regards the fauna, the Carpathians still contain numerous bears, wolves and lynxes, as well as birds of prey. It presents a characteristic feature in its mollusc fauna, which contains many species not found in the neighbouring regions, and only found in the Alpine region. Cattle and sheep are pastured in great numbers on its slopes.

The Carpathian system is richer in metallic ores than any other mountain system of Europe, and contains large quantities of gold, silver, copper, iron, lead, coal, petroleum, salt, zinc, &c, besides a great variety of useful mineral. A great number of mineral springs and thermal waters are found in the Carpathians, many of which have become frequented watering-places.

The systematic and scientific exploration of’ the Carpathians dates only from the beginning of the 19th century. The first ascen- Hlstorv s ‘ on °ˆ t ‘ 1 ˆ Lomnitzer peak in the High Tatra was made by one David or Johann Frohlich in 1615. The first account of the Tatra Mountains was written by Georg Buchholz, a resident of Kesmark in 1664. The English naturalist, Robert Townson, explored the Tatra in 1793 and 1794, and was the first to make a few reliable measurements. The results of his exploration appeared in his book, Travels in Hungary, published in 1797. But the first real important work was undertaken by the Swedish naturalist, Georg Wahlenberg (1780-1851), who in 1813 explored the central Carpathians as a botanist, but afterwards also made topo- graphical and geological studies of the system. The results of all the former explorations were embodied by A. von Sydow in an extensive Work published in 1827. During the 19th century the measurements of the various parts of the Carpathians was under- taken by the ordnance survey of the Austrian army, which published their first map of the central Carpathians in 1870. A great stimulus to the study of this mountain system was given by the foundation of the Hungarian Carpathian Society in 1873, an ” a great deal of information has been added to our knowledge since. In 1 880 two new Carpathian

societies were formed: a Galician and a Transylvanian.

Authorities. — F.W. Hildebrandt, Karpatkenbilder (G \og?.u,i863); E. Sagorski and G. Schneider, Flora Carpatorum Centralium (2 vols., Leipzig, 1891); Muriel Dowie, A Girl m the Carpathians (London, 1891) ; Orohydrographisches Tableau der Karpathen (Vienna, 1886), in six maps of scale 1; 750,000; V. Uhlig, ” Bau und BildderKarpaten,” in Bau und Bild Osterreichs (Vienna, 1903). (0. Br.; P. La.)

CARPATHUS (Ital. Scarpanto), an island about 30 m. south- west of Rhodes, in that part of the Mediterranean which was called, after it, the Carpathian Sea (Carpathium Mare). It was both in ancient and medieval times closely connected with Rhodes; it was held by noble families under Venetian suzerainty, notably the Cornari from 1306 to 1540, when it finally passed into the possession of the Turks. From its remote position Carpathus has preserved many peculiarities of dress, customs and dialect, the last resembling those of Rhodes and Cyprus.

See L. Ross, Reisen aufden gr. Inseln (Halle, 1840-1845) ; T. Bent, Journal of Hellenic Studies, vi. ‘(51885), p. 235; R. M. Dawkins, A nnual of British School at A then$,”\x. and x.

CARPEAUX, JEAN BAPTISTE (1827-1875), French sculptor, was born at Valenciennes, France, on the nth of May 1827. He was the son of a mason, and passed his early life in extreme poverty. In 1842 he came to Paris, and after working for two years in a drawing-school, was admitted to the Ecole des Beaux- Arts on the 9th of September 1854. The Grand Prix de Rome was awarded to his statue of ” Hector bearing in his arms his son Astyanax.” His first work exhibited at the Salon, in 1853, did not show the spirit of an innovator, and was very unlike the work of his master Rude. At Rome he was fascinated by Donatello, and yet more influenced by Michelangelo, to whom he owes his feeling for vehement and passionate action. He sent from Rome a bust, ” La Palombella,” 1856; and a ” Nea- politan Fisherman,” 1858. This work was again exhibited in the Salon of 1859, and took a second-class medal; but it was not executed in marble till 1863. In his last year in Rome he sent home a dramatic group, ” Ugolino and his Sons,” and exhibited at the same time a ” Bust of Princess Mathilde.” This gained him a second-class medal and the favour of the Imperial family. In 1864 he executed the ” Girl with a Shell,” the companion figure to the young fisherman; and although in 1865 he did not exhibit at the Salon, busts of ” Mme.

A. E. Andre," of " Giraud " the painter, and of " Mile. Benedetti " showed that he was not idle. He was working at the same time on the decorations of the Pavilion de Flore, of which the pedimerft alone was seen at the Salon, though the bas-relief below is an even better example of his style. After producing a statue of the prince imperial, Carpeaux was made chevalier of the Legion of Honour in 1866. Two years later he received an important commission to execute one of the four groups for the facade of the new opera house. His group, representing " Dancing," 1869, was greeted with indignant protests; it is nevertheless a sound work, full of movement, with no fault but that of ex- ceeding the limitations prescribed. In 1869 he exhibited a " Bust of M. Gamier," and followed this up with two pieces intended for his native city: a statue of Watteau, and a bas- relief, " Valenciennes repelling Invasion." During the Commune he came to England, and made a " Bust of Gounod " in 187-1. His last important work was a fountain, the " Four Quarters of the World," in which the globe is sustained by four female figures personifying Europe, Asia, Africa and America. This fountain is now in the Avenue de l'Observatoire in Paris. Car- peaux, though exhausted by illness, continued designing in- defatigably, till he died at the Chateau de Becon, near Courbevoie, on the 12th of October 1875, after being promoted to the higher grade of the Legion of Honour. Many of his best drawings have been presented by Prince Stirbey to the city of Valenciennes.

See Ernest Chesneau, Carpeaux, sa vie et son ceuvre (Paris, 1880); Paul Foucart, Catalogue du Musie Carpeaux, Valenciennes (Paris, 1882); Jules Claretie, J. Carpeaux (1882); Francois Bournand, /. B. Carpeaux (1893).

CARPENTARIA, GULF OF, an extensive arm of the sea deeply indenting the north coast of Australia, between io° 40′ and 1 7 40′ S., and 135 30′ and 142 ° E. Its length is 480 m. and its extreme breadth (E. to W.) 420 m. It is bounded E. by Cape York Peninsula, and W. by the Northern Territory of South Australia. Near its southern extremity is situated a group bf islands called Wellesley; and towards the western side are the Sir Edward Pellew Islands, the Groote Eylandt and others. A large number of rivers find their way to the gulf, and some are of considerable size. On the eastern side there is the Mitchell river; at the south-east corner the Gilbert, the Norman, the Flinders, the Leichhardt and the Gregory; and on the west the Roper river. Jan Carstensz, who undertook a voyage of dis- covery in this part of the globe in 1623, gave the name of Carpen- tier to a small river near Cape

Duyfhen in honour of Pieter Carpentier, at that time governor-general of the Dutch East Indies; and after the second voyage of Abel Tasman in 1644, the gulf, which he had successfully explored, began to appear on the charts under its present designation.

CARPENTER, LANT (1780- 1840), English Unitarian nunister, was born at Kidderminster on the 2nd of September 1780, the

son of a carpet manufacturer. After some months at a non-conformist academy at Northampton, he proceeded to Glasgow University, and then joined the ministry. After a short time as assistant master at a Unitarian school near Birmingham, he was in 1802 appointed librarian at the Liverpool Athenaeum. In 1805 he became pastor of a church in Exeter, removing in 181 7 to Bristol. At both Bristol and Exeter he was also engaged in school work, among his Bristol pupils being Harriet and James Martineau. Carpenter did much to broaden the spirit of English Unitarianism. The rite of baptism seemed to him a superstition, and he substituted for it a form of infant dedication. His health, undermined by his constant labours, broke down in 1839, and he was ordered to travel. He was drowned on the night of the 5th of April 1840, having been washed overboard from the steamer in which he was travelling from Leghorn to Marseilles.

CARPENTER, MATtY (1807-1877), English educational and social reformer, was born on the 3rd of April 1807 at Exeter, where her father, Dr Lant Carpenter, was Unitarian minister. In 1817 the family removed to Bristol, where Dr Carpenter was called to the ministry of Lewin's Mead Meeting. As a child Mary Carpenter was unusually earnest, with a deep religious vein and a remarkable thoroughness in everything she undertook. She was educated in her father's school for boys, learning Latin, Greek and mathematics, and other subjects at that time not generally taught to girls. She early showed an aptitude for teaching, taking a class in the Sunday school, and "afterwards helping her father with his pupils. When Dr Carpenter gave up his school in 1829, his daughters opened a school for girls under Mrs Carpenter's superintendence. In 1833 the raja Rammohun Roy visited Bristol, and inspired Miss Carpenter with a warm interest in India; and Dr Joseph Tuckerman of Boston about the same time aroused her

sympathies for the con- dition of destitute children. Her life-work began with her taking part in organizing, in 1835, a “Working and Visiting Society,” of which she was secretary for twenty years. In 1843 her interest in negro emancipation Was aroused by a visit fronTDr S. G. Howe. Her interest in general educational work was also growing. A bill introduced in this year “to make provision for the better education of children in manufacturing districts,” as a first instalment of a scheme of national education, failed to pass, largely owing to Nonconformist opposition, and private effort became doubly necessary. So-called ” Ragged Schools ” sprang up in many places, and Miss Carpenter conceived the plan of starting one in Lewin’s Mead. To this was added a night- school for adults. In spite of many difficulties this was rendered a success, chiefly owing to Miss Carpenter’s unwearied enthusiasm and remarkable organizing power. In 1848 the closing 1 of their own private school gave Miss Carpenter more leisure for philan- thropic and literary work. She published a memoir of Dr Tuckerman, and a series of articles on ragged schools, which appeared in the Inquirer and were afterwards collected in book form. This was followed in 1851 by Reformatory Schools for the Children of the Perishing and Dangerous Classes, and for Juvenile Offenders. She sketched out three classes of schools as urgently needed: — (1) good free day-schools; (2) feeding industrial schools; (3) reformatory schools. This book drew public attention to her work, and from that time onwards she was drawn into personal intercourse with leading thinkers and workers. She was consulted in the drafting of educational bills, and invited to give evidence before House of Commons com- mittees. To test the practical value of her theories, she herself started a reformatory school at Bristol, and in 1852 she published Juvenile Delinquents, their Condition and Treatment, which largely helped on the passing of the Juvenile Offenders Act in 1854. Now that the principle of reformatory schools was established, Miss Carpenter returned to her plea for free day- schools, contending that the ragged schools were entitled to pecuniary aid from the annual parliamentary grant. At the Oxford meeting of the British Association (i860) she read a paper on this subject, and, mainly owing to her instigation, a conference on ragged schools in relation to government grants v. 13

for education was held at Birmingham (186 1). In 1866 Miss Carpenter was at last able to carry out a long-cherished plan of visiting India, where she found herself an honoured guest. She

visited Calcutta, Madras and Bombay, inaugurated the Bengal Social Science Association, and drew up a memorial to the governor-general dealing with female education, reformatory schools and the state of gaols. This visit was followed by others in 1868 and 1869. Her attempt to found a female normal school was unsuccessful at the time, owing to the inadequate previous education of the women, but afterwards such colleges were founded by government. A start, however, was made with a model Hindu girls' school, and here she had the co-operation of native gentlemen. Her last visit to India took place in 1875, two years before her death, when she had the satisfaction of seeing many of her schemes successfully established. At the meeting of the prison congress in 1872 she ; read a paper on " Women's Work in the Reformation of Women Convicts." Her work now began to attract attention abroad. Princess Alice of Hesse summoned her to Darmstadt to organize a Women's Congress. Thence she went to Neuchatel to study the prison system of Dr Guillaume, and in 1873 to America, where she was enthusiastically received. Miss Carpenter watched with interest the increased activity of women during the busy 'seventies. She warmly supported the movement for their higher education, and herself signed the memorial to the university of London in favour of admitting them to medical degrees. She died at Bristol on the 14th of June 1877, having lived to see the accom- plishment of nearly all the reforms for which she had worked and hoped. (A. Z.)

CARPENTER, WILLIAM BENJAMIN (1813-1885), English physiologist and naturalist, was bom at Exeter on the 29th of October 1813. He was the eldest son of Dr Lant Carpenter. He attended medical classes • at University College, London, and then went to Edinburgh, where he took the degree of M.D. in 1839. The subject of his graduation thesis, " The Physiological Inferences to be Deduced from the Structure of the Nervous System of Invertebrated Animals," indicates a line' of research which had fruition in his Principles of General and Comparative Physiology. His work in comparative neurology was recognized in 1844 by his election to the Royal Society, which awarded him a Royal medal in 1861; and Ms appointment as Fullerian professor of physiology in the Royal Institution in 1845 enabled him to exhibit his powers as a teacher and lecturer, Ms gift of ready speech and luminous interpretation placing him in the front rank of exponents, at a time when the popularization of science was in its infancy. His manifold labours as investigator,

author, editor, demonstrator and lecturer knew no cessation through life; but in assessing the value of his work, prominence should be given to his researches in marine zoology, notably in the lower organisms, as Foraminifera and Crinoids. These researches gave an impetus to deep-sea exploration, an outcome of which was in 1868 the ” Lightning/’ and later the more famous ” Challenger,” expedition. He took a keen and laborious interest in the evidence adduced by Canadian geologists as to the organic nature of the so-called Eozaon Canadense, discovered in the Laurentian strata, and at the time of his death had nearly finished a monograph on the subject, defending the now discredited theory of its animal origin. He was an adept in the use of the microscope, and his popular treatise on The Microscope and its Revelations (1856) has stimulated a host of observers to the use of the ” added sense ” with which it has endowed man. In 1856 Carpenter became registrar of the university of London, and held the office for twenty-three years; on Ms resignation in 1879 he was made a C.B. in recogmtion of Ms services to edu- cation generally. Biologist as he was, Carpenter nevertheless made reservations as to the extension of the doctrine of evolution to man’s intellectual and spiritual nature. In Ms Principles of Mental Physiology he asserted both the freedom of the will and the existence of the ” Ego,” and one of Ms last public engage- ments was the reading of a paper in support of miracles. He died in London, from injuries occasioned by the accidental upsetting of a spirit-lamp, on the 19th of November 1885.

CARPENTRAS, a town of south-eastern France, capital of an arrondissement in the department of Vaucluse 16 m. N.E. of Avignon by rail. Pop. (1906) town, 7775; commune, 10,721. The town stands on the left bank of the Auzon on an eminence, the summit of which is occupied by the church of St Siffrein, for- merly a cathedral, and the adjoining law-court. ‘St Siffrein, in its existing state, dates from the 15th and 16th centuries and is Gothic in style, but it preserves remains of a previous church of Romanesque architecture. The rich sculpture of the southern portal and the relics and works of art in the interior are of some interest. The law-court, built in 1640 as the bishop’s palace,

contains in its courtyard a small but well-preserved triumphal arch of the Gallo-Roman period. Other important buildings are the hospital, an imposing structure of the 18th century, opposite which is a statue of its founder, Malachie d'Inguimbert, bishop of Carpentras; and the former palace of the papal legate, which dates from 1640. Of the old fortifications the only survival is the Porte d'Orange, a gateway surmounted by a fine machicolated tower. Their site is now occupied by wide boule- vards shaded by plane-trees. Water is brought to the town by an aqueduct of forty -eight arches, completed in 1734.

Carpentras is the seat of a sub-prefect and of a court of assizes, and has a tribunal of first instance, communal college for girls and boys, a large library and a museum. Felt hats, confection-ery, preserved fruits and nails are its industrial products, and there are silk-works, tanneries and dye-works. There is trade in silk, wool, fruit, oil, &c. The irrigation-canal named after the town flows to the east of it (see Vaucluse).

Carpentras is identified with Carpentoracte, a town of Gallia Narbonensis mentioned by Pliny, which appears to have been of some importance during the Roman period. Its medieval history is full of vicissitudes; it was captured and plundered by Vandal, Lombard and Saracen. In later times, as capital of the Comtat Venaissin, it was frequently the residence of the popes of Avignon, to whom that province belonged from 1228 till the Revolution. Carpentras was the seat of a bishopric from the 5th century till 1805.

CARPENTRY, the art and work of a carpenter (from Lat. earpentum, a carriage), a workman in wood, especially for build-ing purposes. The labour of the sawyer is applied to the division of large pieces of timber or logs into forms and sizes to suit the purposes of the carpenter and joiner. His working-place is called a sawpit, and his most important tool is a pit-saw. A cross-cut saw, axes, dogs, files, compasses, lines, lampblack, blacklead, chalk and a rule may also be regarded as necessary to him. But this method of sawing timber is now only used in remote country places, and in modern practice logs, &c, are converted into planks and small pieces at saw-mills, which are equipped with modern machinery to drive all kinds of circular saws by electricity, steam or gas.

Carpentry or carpenters' work has been divided into three principal branches — descriptive, constructive and mechanical.

The first shows the lines or method for forming every species of work by the rules of geometry; the second comprises the practice of reducing the timber into particular forms, and joining the forms so produced in such a way as to make a complete whole according to the intention or design; and the third displays the relative strength of the timbers and the strains to which they are subjected by their disposition. Here we have merely to describe the practical details of the carpenter's work in the operations of building. He is distinguished from the joiner by his operations being directed to the mere carcass of a building, to things which have reference to structure only. Almost every- thing the carpenter does to a building is absolutely necessary to its stability and efficiency, whereas the joiner does not begin his operations until the carcass is complete, and every article of joiners' work might at any time be removed from a building without undermining it or affecting its most important qualities. Certainly in the practice of building a few things do occur regard- ing which it is difficult to determine to whose immediate province they belong, but the distinction is sufficiently broad for general purposes.

The carpenter frames or combines separate pieces of timber by scarfing, notching, cogging, tenoning, pinning and wedging, &c. The tools he uses are the rule, axe, adze, saws, mallet, hammers, chisels, gouges, augers, pincers, set squares, bevel, compasses, gauges, level, plumb rule, jack, trying and smooth- ing planes, rebate and moulding planes, and gimlets and wedges

Fig. 1. — Lapped Joint.

ˆ•wroudWr von plate

dc& < ^^^^^^^P"?ˆ

elevation

ˆhˆtesˆbefts

o. ©

Tˆr

plan

Figs. 3, 4 and 5. — Scarf Joints.

The carpenter has little labour to put on to the stuff; his chief work consists in fixing and cutting the ends of timbers, the labour in preparing the timber being done by machinery.

Joints. — The joints in carpentry are various, and each is designed according to the thrust or strain put upon it. Those principally used are the following: lap, fished, scarf, notching, cogging, dovetailing, housing, halving, mortice and tenon, stub

tenon, dovetailed tenon, tusk tenon, joggle, bridle, foxtail wedging, mitre, birdsmouth, built-up, dowel. Illustrations are given of the most useful joints in general use, and these, together with the descriptions, will enable a good idea to be formed of their respective merits and methods of application.

The lapped joint (fig. 1) is used for temporary structures in lengthening timbers and is secured with iron straps and bolts; a very common use of the lap joint is seen in scaffolding secured with cords and wedges.

The fished joint (fig. 2) is used for lengthening beams and is constructed by butting the ends of two pieces of timber together with an iron plate on top and bottom, and bolting through the timber; these iron connecting-plates are usually

about 3 ft. long and \ in. and i in. in thickness. This joint provides a good and cheap method of accomplishing its purpose. The scarf joint (figs. 3, 4 and 5) is used for length- ening beams, and is made by cutting and notching the ends of timbers and lapping and fitting and bolting through. This method cuts into the tim- ber, but is very strong neat; in addition for extra strong work an iron fish-plate is used as in the fished joint.

The ends of floor joints and rafters are usually notched (fig. 6) over plates to obtain a good bearing and bring them to the re- quired levels. Where one timber crosses another as in pur- lins, rafters, wood floor girders, plates, &c, both timbers are notched so as to fit over each other; this cog- ging (fig. 7) serves instead of fastenings. The timbers are held together with a spike. In this way they are not weakened, and the joint is a very good one for keeping them in position. Dovetailing (fig. 8) is used for connecting angles of timber together, such as lantern curbs or

linings, and is the strongest 1 ~ v \Ti‘ form. When an

^^^ end of timber is

Fig. 9.— Housing. Fig. 10.— Halving. kt entire i y into

another timber it is said to be housed (fig. 9). Where timbers cross one another and require to be flush on one or both faces, sinkings are cut in each so as to fit over each other (halving) ; these can either be square (fig. 10), bevelled (fig. 11) or dove-tailed sinkings (fig. 12). The end of one piece of timber cut so as to leave a third of the thickness forms a tenon, and the piece of timber which is to be joined to it has a mortice or slot cut

Fig. 7.— Cogging.

Fig. 8. — Dovetail.

Fig. 11. — Bevelled Halving. Fig. 12. — Dovetailed E-‘.vIng,

1

Fig. 13. — Mortice and Tenon.

6

IT*

J*

Fig. 15. — Dovetailed Tenon.

Fig. 17. — -Bridle Joint.

through it to receive the tenon; the two are then wedged or pinned with wood pins (fig. 13).

A stub tenon or joggle (fig. 14) is used for fixing a post to a sill; a sinking is cut in the sill and a tenon is cut on the foot of the post to fit into the sinking to keep the post from sliding.

The purpose of a dove- tailed tenon (fig. 15) is to hold two pieces of wood together with mortice and tenon so that it can be

Fig. 14. — Stub Tenon or Joggle.

Fig. 16. — Tusk Tenon.

Fig. 18. — Foxtail Wedging.

..oor •ill a] >oard3

Fig. 19. — Dowelling.

taken apart when necessary. The tenon is cut dovetail shape, and a long mortice permits the wide part of the tenon to go through, and it is secured with wood wedges. Where the floor joists or rafters are trimmed round fires, wells, &c, the tusk tenon joint (fig. 16) is used for securing the trimmer joist. It is formed by cutting a tenon on the trimmer joist and passing it through the side of the trimming joist and fixing it with a wood key. Where large timbers are tusk tenoned together, the tenons do not pass right through, but are cut in about 4 in. and spiked. A bridle joint or birdsmouth (fig. 17) is formed by cutting one end of timber either V shape or segmental, and morticing the centre of this shaped end. Similar sinkings are cut on the adjoining timber to fit one into the other; these are secured with pins and also various other forms of fastenings. Foxtail wedging (fig. 18) is a method very similar to mortice and tenon. But the tenon does not go through the full thickness of the timber; and also on the end of the tenon are inserted two wedges, so that when the tenon is driven home the wedges split it and wedge tightly into the mortice. This joint is used mostly in joinery. The mitre is a universal joint, used for connecting angles of timber as in the case of picture frames. Built-up joints involve a system of lapping and bolting and fishing, as in the case of temporary structures, for large spans of centering for arches, and for derrick cranes. Dowels are usually 3 or 4 in. long and driven into a circular hole in the foot of a door frame or post; the other

end is let into a hole in the sill (fig. 19).

Centering. — Cen- tering is temporary timber or framing erected so as to carry concrete floors or arches of brick or stone, &c; when the work has set the centering is removed gradually. The centering for concrete floors is usually composed of scaffold boards resting on wood bearers (fig. 20). One wood bearer rests along on top of the steel joists; through this bearer long bolts are suspended, and to the bottom of these bolts a second bearer is

fixed, and on the bottom bearer the scaffold boards rest. Another method, not much used now, is to fit the boards to the size of the floor and prop them up on legs, but among other disadvantages this process takes up much space and is more costly.

Turning piece is a name given to centering required for turning an arch over (fig. 21); it is only 4! in. wide on the soffit or bed, and is generally cut out of a piece of 3 or 4 in. stuff, the top edge being made circular to the shape of the arch. It is kept

Fig. 20.-

-Method of supporting Centering for Concrete.

Elevertiori

Fig. 21.

cJedien

in position whilst the arch is setting with struts from ground or sills and is nailed to the reveals, a couple of cross traces being wedged between. In the case of a semicircular or elliptical arch with 4J in. soffit this turning piece would be constructed of ribs cut out of 4 in. stuff with ties and braces. Or the ribs could be cut out of 1 in. stuff, in which case there must be one set of ribs outside and one inside secured with ties and braces; each

set of ribs when formed of thin stuff is made of two thicknesses nailed together so as to lap the joints. For spans up to 15 ft. the thin ribs would be used, and for spans above 1 5 ft. ribs out of 4 in. stuff and upwards. For arches with 9 in. soffit and upwards, whether segmental or semicircular or elliptical, the centres are formed with the thin ribs and laggings up to 15 ft. span; above 15 ft. with 4 in. ribs and upwards (fig. 22). The

Fig. 22. — Centering for Stone Arch.

c£cnon

lower member of centres is called the tie, and is fixed so as to tie the extremities together and to keep the centre from spreading. Where the span is great, these ties, instead of being fixed straight, are given a rise so as to allow for access or traffic underneath. Braces are necessary to support the ribs from buckling in, and must be strong enough and so arranged as to

withstand all stresses. Laggings are small pieces or strips of wood nailed on the ribs to form the surface on which to build the arch, and are spaced 1 in. apart for ordinary arches; for gauged arches they are nailed close together and the joints planed off. When centres are required to be taken down, the wedges upon which the centre rests are first removed so as to allow the arch to take its bearing gradually. Centres for brick sewers and vault arching are formed in the same way as previously men- tioned, with ribs and laggings, but the thickness of the timbers depends upon the weight to be carried.

Floors. — For ordinary residential purposes floors are chiefly constructed of timber. Up to about the year 1895 nearly

Fig. 23.— Single Floor.

every modern building was constructed with wood joists, but because of evidence adduced by fire brigade experts and the serious fires that have occurred fire-resisting floors have been introduced. These consist of steel girders and joists, filled in with concrete or various patented brick materials in accordance with such by-laws as those passed by the London County Council and other authorities, The majority of the floors of public

buildings, factories, schools, and large residential flats are now constructed of fire-resisting materials. There are two descrip- tions of flooring, single and double.

Single flooring (fig. 23) consists of one row of wood joists resting on a wall or partition at each end without any inter- mediate support, and receiving the floor boards on the flo”rine- “PP er surface and the ceiling on the underside. Joists should never be less than 2 in. thick, or they are liable to split when the floor brads are driven in; the thickness varies

ˆdowelled heading joint.

Fig. 24. — Floor pugged to resist passage of sound.

from 2 to 4 in. and the depth from 5 to 1 1 in. (see By-laws, below) ; the distance between each joist is usually 1 2 in. in the clear, but greater strength is obtained in a floor by having deep

joists and placing them closer together. These floors are made firm and prevented from buckling by the use of strutting as mentioned hereafter.

The efficiency of single flooring is materially affected by the necessity which constantly occurs in practice of trimrhing round fireplaces and flues, and round well holes such as lifts, staircases, &c. Trimming is a method of supporting the end of a joist by tenoning it into timber crossing it; the timber so tenoned is called the trimmer joist, and the timber morticed for the tenon of the trimmer is called the trimming joist, while the intermediate timbers tenoned into the trimmer are known as the trimmed

joists. This system has to be resorted to when it is impossible to get a bearing on the wall.

A trimmer requires for the most part to be carried or supported at one or both ends by the trimming joists, and both the trimmer and the trimming joists are necessarily made stouter than if they had to bear no more than their own share of the stress. In the usual practice the trimmer and trimming joists are 1 in. thicker

than the common joists, but there are special regulations and by-laws set out in the various districts and boroughs (see By- laws, below) to which attention must be given.

The principal objection to single flooring is that the sound passes through from floor to floor, so that, in some cases, conversaˆ tion in one room can almost be understood in another. To stop

Jfeas;

eating

f-^^tg^^

f tlfisi

Yzzˆ ?** —

daimi w%h

Mijfpltfto

floor -y

Fig. 26.

the sound from passing through floors the remedy is to pug them (fig. 24). This consists in using rough boarding resting on fillets nailed to the sides of the joists about half-way up the depth of the joists, and then filling in on top of the boarding with slag wool usually 3 in. thick. Also to further prevent sound from

Fig. 27. — Construction of a Medieval Floor.

passing through floors the flooring should be tongued and the ceiling should have a good thick floating coat; in poor work the stuff on ceilings is very stinted. In days gone by, ceiling joists were put at right angles to the floor joists, but this took up head room and was costly, and the arrangement is obsolete. ‘

Fig. 28. — Herring-bone Strutting.

Fig. 29. — Solid Strutting.

Double flooring (fig. 25) consists of single fir joists trimmed into steel girders; in earlier times a double floor consisted of fir joists called binding, bridging and ceiling joists, but these are very little used now and the single fir flooring, joists and steel girders have taken their place. Steel girders span from wall to wall, and on their flanges are bolted wood plates to receive the ends of the single joists which are notched over plates and run at right angles to the

girders (fig. 26). The bearings of the joists on the wall also rest on wall plates, so as to get a level bed, and are some- times notched over them. Wall plates, which are usually 4ˆ in. X 3 in. and are bedded on walls in _ motar, take the ends of joists and distri- || bute the weight along the wall. The plates bolted on the side of girders are of sizes to suit the width of the flanges.

The medieval floor (fig. 27) consisted of the framed floor with wood girders, binding, bridging and ceiling joists ; and the under- side of all the timbers was usually wrought, the girders and binders being boldly moulded and the other timbers either square or stop chamfered.

Flooring is strengthened by the use of strutting, either herring-bone (fig. 28) or solid (fig. 29). Herring-bone strutting consists of

two pieces of timber, usually 2 in. X 2 in., fixed diagonally between each joist in continuous rows, the rows being about 6 ft. apart. Solid strutting consists of i| in. boards, nearly the same depth as the joists and fitted tightly between the joists, and nailed in continuous rows 6 ft. apart. Where heavy weights are likely to be put on floors long bolts are passed through the centre of joists at the side of strutting; since this draws the strutting tightly together and does not produce any forcing stress on the walls, it is undoubtedly the best method.

Floors are usually constructed to carry the following loads (including weight of floor) : —

Residences, ii cwt. per foot super of floor space. Public buildings, I J cwt. per foot super of floor space. Factories, 2\ to 4 cwt. per foot super of floor space. Local By-laws. — With regard to floor joists in domestic buildings, the following are required in the Hornsey district, in the north of London. The size of every common bearing floor joist up to 3 ft. long in clear shall be 3 in. X 2 J in. ; from 3 ft. to 6 ft. in clear it shall be aJ in. X 3 in.; from 6 ft. to 8 ft., 6J in. X 2j in.; from 8 ft. to 12 ft., 7 in.X2i in., and so on according to the clear span. The Hornsey by-laws with regard to trimmers are as follows: — A trimmer joist shall not receive more than six common joists, and the thickness of a trimming joist receiving a trimmer at not more than 3 ft. from one end and of every trimmer joist shall be fth of an inch greater than the thickness for a common joist of the same bearing for every common joist carried by a trimmer. For example, if the common joists are 7 in.X2§ in. and the trimmer has six joists trimmed into same, the size of trimmer would have to be 7 in.X3i in. The Hornsey council also requires that the floor boards shall not be less than f ths of an inch thick.

There is little difference in the requirements of the various localities. For example, the regu- lations of the Croydon council require that every common bearing joist for lengths up to 3 ft. 4 in. in clear shall be 3 in.X2j in.; for lengths between 3 ft. 4 in. and 5 ft. 4 in., 4 in. X2 in.; for lengths between 5 ft. 4 in. and 7 ft. 4 in., 4 in. X3 in.; and so on according to the clear span. The Croydon by-laws with regard to trimmers are as follows: — A trimmer joist shall not receive more than six common joists, and the thickness of a trimming joist shall be i\ in. thicker than that for common joists of the same bearing, and the thickness of a trimmer joist shall be I in. thicker for every joist trimmed into same than the common joist. For example, if the common joists

are 4 in. X3 in. the trim- ming joists would have to be 4 in.X4§ in., and the trimmer joist would have to be 4 in.X4i in.

Partitions. — Partitions are screens used to divide large floor spaces into smaller rooms and are sometimes constructed to carry the floors above by a system of trussing. They are built of various materials; those in use now are common stud partitions, bricknogged partitions, and solid deal and hardwood partitions, 4§ in. brick walls or bricks laid on their sides, so making a 3 in. partition, and various patent partitions such as coke breeze concrete or hollow br'.ck partitions (see Brickwork), iron and wire partitions, and plaster slab partitions (see Plaster- work).

There are two kinds of stud or quarter partitions, common and trussed.

Common partitions (fig. 30) simply act as a screen to divide

Con\vr\or\ partition

Fig. 30. — Common Partition, one room from another, and do not carry any weight. They weigh about 25 lb per foot superficial including Commoa plastering on both sides, and are composed of 4 in. X 3 partitions. in. head and sill and 4 in. X 2 in. upright studs; 4 in. X 2 in, nogging pieces are fitted between the studs to keep them from bending in, and are placed parallel with the head,. usually 4 ft. apart. Where door-openings occur in these partitions the studs next the opening are 4 in. X 3 hi. Should the floor boards have been laid, the sill of the partition would be laid direct on them, but if the partitions are erected at the time of building the structure the sill should either rest directly over a joist, if parallel with it, or at right angles to the joists; should the position of the sill come between two joists, that is, parallel with them, then short pieces called bridging pieces of 4 in. X 2 in. stuff are wedged between the two joists and nailed to carry the sill.

Trussed partitions (fig. 31) are very similar to the last, but they are so built as to carry their o*i weight and also Trussed to Support floors, and in addition have braces; the par titions. head and sill are larger, and calculated according to the clear bearing and the weight put upon them. There are

trussed -parMorˆ

Fig. 31. — Trussed Partition, two forms of trussing, namely, queen post (fig. 32) and king post (fig. 33).

Bricknogged partitions are formed in the same manner as the common stud partition, except that the studs are placed usually 18 or 27 in. apart in the clear instead of 12 in., and the 18 and 27 in. widths being multiples of a brick dimension, they are filled in with brickwork 4! in. thick and Brick- always built in cement. These are used to prevent nagged sound from passing from one room to another, and pa ons ‘ also to prevent fire from spreading, and are vermin-proof. Another method is to fill the space between the studs with coke breeze concrete instead of brickwork.

Timber partitions have the advantages that they are light and cheap and substantial, and the disadvantages that they are not fire-resisting or sound-resisting or vermin-proof; they should never be erected in damp positions such as the

detail aY F

Fig. 32. — Queen Post Trussed Partition.

lower floors of buildings.

Solid wood parti- tions are used in offices and class- rooms of schools, the upper portions usually being glazed; where these partitions enclose a staircase VzAˆcfeicft] C% E

secforx Fig. 33. — King Post Trussed Partition.

in a public building the London Building Act requires them to be of 2 in. hardwood, with only small panels of fire-resisting glass.

Timber Work. — Half timber work consists of a framework of timber; the upper storeys of suburban and country residences are often thus treated, and the spaces between the timbers are filled in with brickwork and plastered inside, and rough cast outside, though sometimes tiles are hung on the outside. In some instances in country places there is no filling between the timbers, and both sides are lath and plastered, and in others the timbers are solid, or facing pieces are simply plugged to the walls, the joints being pinned with hardwood pins. Half timber work (fig. 34) well designed has a very pleasing, homely and rural effect. The best and most durable wood to use is English

oak worked smooth on the external face and usually painted; the by-laws of various authorities differ considerably as to the method of construction and in the restrictions as to its use. Some very fine early examples are to be seen in England, as at Holborn Bars, London, in the old parts of Bristol, and at Moreton Old Hall, near Congleton, Cheshire (see House, Plate IV. fig. 13).

Timber-framed permanent buildings are not used in the towns of England, not being allowed by the by-laws. In some English villages timber bungalows are allowed, plastered inside, and either rough cast outside, or with tiles, or with sheet iron painted.

/fonV elevation Fig. 34. — Half Timber Construction.

At the garden city of Letchworth, in Hertfordshire, there are a few timber-framed bungalows (erected about 1904 and originally intended to be used as week-end cottages), the outsides of which are covered with sheet iron and painted. Other instances of the temporary use of this kind of building are found in soldiers' barracks, offices and chapels.

In America and the British colonies this class of building is very largely erected on the outskirts of the cities. In American practice in framing the walls of wooden buildings two distinct methods are used and are distinguished as " braced " and " balloon."

The Braced (fig. 35) was the only kind in use previous to about the year 1850. In this method of framing the sills, posts, girts and plates are made of heavy timber morticed and pinned together and braced with 4 in. X 4 in. or 4 in. X 6 in. braces and common studding. To frame a building in this way it is necessary to cut all the pieces and make all the mortice holes on the ground, and then fit them together and raise a whole side at a time or at least one storey of it. The common studs are only one storey high.

The Balloon frame (fig. 36) is composed of much smaller scantlings and is more rapidly erected and less expensive. The method is to first lay the sill, generally 4 in. X 6 in., halved at the angles. After the floor is laid, the corner posts, usually 4 in. X 6 in., are erected and temporarily secured in place with the aid of stays. The common studs are then set

up and spiked to the sill, and a temporary board nailed across their face on the inside. These common studs are , the full height from sill to roof plate, and the second tier of floor joists are supported by notching a ij in. X 7 m – board, called a false girt or ribbon, into their inside edge at the height to receive the floor joists. The ends of the joists are also placed against a stud and spiked. The tops of the studs are cut to a line, and a 2 in. X 4 in. plate is spiked on top, an additional 2 in. X 4 in. plate being placed on the top of

Fig. 35.— Braced Frame.

the last breaking joint. Should the studs not be long enough to reach the plate, then short pieces are fished on with pieces of wood spiked on both sides. The diagram shows a portion of the framework of a two-storey house constructed in the manner described. In the balloon frame the timbers are held together entirely by nails and spikes, thus permitting them to be put up rapidly. The studs are doubled where windows or openings occur. In both these methods dwarf brick foundations should be built, upon which to rest the sill. For buildings of a superior kind a combination of the braced and balloon frames is sometimes adopted.

The sides of frame buildings are covered with siding, which is fastened to a sheathing of rough boards nailed to the studs. The siding may consist of matched boards placed diagonally, or of clapboards or weather boards — which are thin boards thicker at one edge than the other, and arranged horizontally with the thick edge downwards and overlapping the thin edge of the board below. Shingles or wooden tiles are also employed.

Authorities. — The following are the principal publications on carpentry: T. Tredgold, Carpentry; Peter Nicholson, Carpenter and Joiner; J. Newlands, Carpenter's Assistant; J. Gwilt, Encyclopaedia of Architecture; Rivington, Building Construction (elementary and advanced) ; E. L. Tarbuck, Encyclopaedia of Practical Carpentry and Joinery; A. W. Pugin, Details of Ancient Timber Houses; Beresford Pite, Building Construction; J. P. Allen, Building Construction; H. Adams, Notes on Building; C. F. Mitchell, Building Construction (elementary and advanced) ; Burrell, Building Construction ; F. E. Kidder, Building Construction (U.S.A.) ; E. E. Viollet le Due, Dic- tionnaire; J. K. Krafft, V Art de la charpente. (J. Bt.)

Fig. 36. — Balloon Frame.

CARPET, the name given to any kind of textile covering for the ground or the floor, the like of which has also been in use on couches and seats and sometimes even for wall or tent hangings or curtains. In modern times, however, carpet usually means a patterned fabric woven with a raised surface of tufts (either cut or looped), and used as a floor covering. Other floor coverings are and have been made also without such a tufted surface, and of these some are simple shuttle-woven materials plain or enriched with needlework or printed with patterns; others are woyen after the manner of tapestry-weaving (see Tapestry) or in imitation of it, and a further class of carpets is made of felt (see Felt). This last material is entirely different from that of shuttle or tapestry weaving. Although carpet weaving by hand is, and for centuries has been, an Oriental industry, it has also been, and is still, pursued in many European countries. Carpet-weaving by steam-driven machinery is solely European in origin, and was not brought to the condition of meeting a widespread demand until the 19th century.

In connexion with the word ” carpet ” (Lat. carpita, rug; O. Fr. carpite) notice may be taken of the Gr. Tcnnjs and the Lat. tapetium, whence also comes the Fr. tapis (the History. present word for ” carpet “) as well as our own word ” tapestry.” This latter, though now more particularly descrip- tive of hangings and curtains woven in a special way, was, in later medieval times, indiscriminately applied to them and to stuffs used as floor and seat coverings. From a very early period classical writers make mention of them. In ancient Egypt, for instance, floor and seat coverings were used in temples for religious ceremonies by the priests of Amen Ra; later on they

CARPET

Plate I.

\ linen covering over- wrought ;t in loops of coloured wools.

■man of the 3rd or 4th century A.D. Albert Museum, South Kensington.)

Imf-J -~ ■«:#’

■ “*”•■»’ •—”’•-

Fig. 2. — PART OF A LINEN COVERING OVER- WROUGHT WITH ORNAMENT IN LOOPS OF DARK-BROWN WOOL.

Egypto-Roman of the 3rd or 4th century A.r>, (Victoria and Albert Museum, South Kensington.)

Fig. 3. CUT PILL TURKEY CARPET, i8m CENTURY, EXEMPLIFYING SUCH CHARACTERISTIC ANGULAR TREAT- MENT OF QUASI-BOTANICAL FORMS AS IS USUALLY FOUND IN CARPETS AND RUGS MADE IN ASIA MINOR. FROM DESIGNS OF PERSIAN OR MOSIL ORIGIN. (Victoria and Albert Museum, South Kensington.)

Plate II.

CARPET

Fio. 5.— CARPET OF STOUT FLAX OR HEMP WOVEN AND THEN COMPLETELY COVERED WITH ORNAMENT WORKED IN CLOSE NEEDLE STITCHES IN COLOURED THREADS.

were used to garnish the palaces of the Pharaohs. If one may judge from rare remains of decorative textiles, in the museum at Cairo especially, dating from at least 1480 B.C., such Egyptian fabrics were of linen inwoven with coloured wools in a tapestry-weaving manner, and were not tufted or piled textures. Taken from the palace at Nineveh is a large marble slab carved in low relief with a geometrical pattern surrounded by a border of lotus flowers and buds, evidently a copy of an Assyrian floor cover or rug about 705 B.C., such as was also woven probably in the tapes try- weaving manner. On the other- hand, its design equally well suggests patchwork — a method of needlework in vogue with Egyptians, at least 900 years B.C., for ornamental purposes, as indicated by the elaborately patterned canopy which covered the bier of an Egyptian queen — the hiother-in- law of Shishak who took Jerusalem some three or four years after the death of Solomon — and is preserved in the museum at Cairo. In the Odyssey, tapetia are frequently mentioned, but these again, whether floor coverings or hangings, are more likely to have been flat-textured and not piled fabrics. On the tomb of Cyrus was spread a ” covering of Babylonian tapestry, the carpets under- neath of the finest wrought purple ” (Arrian vi. 29). Athenaeus (bk. v. ch. 27) gives from Callixenus the Rhodian (c.

280 B.C.) an account of a banquet given by Ptolemy Philadelphus at Alexandria, and describes ” the purple carpets of finest wool, with the pattern on both sides,” as well as “handsomely embroidered rugs very beautifully elaborated with figures “; these again were probably not piled fabrics but kindred td the hangings in the palace of Ptolemy Philadelphus decorated with’ portraits, which were likely to have been of tapestry-weaving, and would be nearly the same in appearance on both sides of the fabric. Of corresponding tapestry woven work are Egypto- Roman specimens dating from the 2nd or 3rd century a.d., a considerable collection of which is in the Victoria and Albert’ Museum at South Kensington. Front about the same period date bits of hangings or coverings woven in linen, over-wrought in a method of needlework with ornament of compact loops of worsted (Plate I. figs. 1 and 2). These are the earliest extant specimens of textiles presenting a tufted or piled surface very kindred to that of woven pile carpets of much later date. But the modus operandi in producing the earlier only remotely corresponds with that of the later — though making a surface of loops by means of needlework as in the Coptic or Egypto- Roman specimens of Plate I. figs. 1 and 2 seems to be a step in a progress towards the introduction at an apparently later date of tufts into loom weavings such as we find in 16th-century tufted or piled carpets.

The simple traditional Oriental method of making these latter is briefly as follows: — The foundation is a warp of strong cotton Method of °r hempen or woollen or silk threads, the number of making which is regulated by the breadth of the carpet and piled tne fineness or coarseness to be given to its pile.

carpe s. g nor t lengths of coloured wool or goats’ or camels’ hair or silk are knotted on to each of the warp threads so that the two ends of each twist or tuft of coloured yarn, of whatever material it is, project in front. Across the width of the warp and above the range of tufts a weft thread is run in; another line or row of tufts is then knotted, and above this another weft thread is run in across the warps, and so on. These rows of tufts and weft as made are compressed together by means of a blunt fork or rude comb-like instrument, and thus a compact textile with a pile or tufted surface is produced; the projecting tufts are then carefully clipped to an even surface. In the East the rude wooden frames in which the warp-threads are stretched either stand upright upon, or are level with, the ground. They are easily transported and put together, and the weaving in them is done chiefly by wandering

groups of weavers. The local surroundings, often those of rocky arid districts, in which Kurdish and other families weave carpets are well illustrated in Oriental Rugs by J. H. Mumford. For making pile carpets and rugs two traditional knots are in use; the first is termed the Turkish or Ghiordes knot, from Ghiordes, an old city not far from Brusa. It is in vogue principally throughout Asia

; Minor, as far east as Kurdistan and the Caucasus, but it is also used farther south-east in parts of Persia and India. The yard of the pile is knotted in short lengths upon the warp-threads so that the two outstanding ends of each knot alternate with every two threads of the warp. The second traditional knot is the Persian or Sehna knot, which, though better calculated to produce a close, fine, even, velvety surface, has in many parts of Persia been abandoned for the Ghiordes knot, which is a trifle more easily tied. The Persian or Sehna knot is tied so that from every space between the warp- threads one end of the knot protrudes. The number of knots to the inch tied according to either the Turkish or Persian method is determined I by the size and closeness of the warp-threads and the size and number of weft- threads thrown across after each row of knots. i The patterns of the fabrics made by country weavers are usually taken by them from old rugs. But in towns where weaving is conducted under more organized conditions new patterns are often devised, and are traced sometimes upon great cardboards, on which the stitches, or knots, are indicated by squares each painted in its proper colour. In some of the Persian carpets and rugs made at Sehna, Kirman and Tabriz, the warp is of silk, a material that contributes to fine compact pile textures.

There is much uncertainty as to the period when cut pile carpets were first made in the East. Their texture is certainly akin to that of fustian and velvet; while that of the . o a < e0 /> finer Persian carpets, which were not made much original earlier than about the 15th century, is practically not. otle 1 distinguishable from velvet, having long or heavy pile. textures – : Fustian, the English name for a cut short pile textile, is derived from Fostat (old Cairo), and such material is likely to have been made there, as soon as anywhere else, by Saracens, especially ; during the propitious times of the Fatimite Khalifs, who for more than two centuries previously to the 13th century were noted for the encouragement they gave to all sorts of arts and manu- factures. It seems that velvet came into use in Europe not much earlier than the 14th century, and various French church inven- tories of

the time contain entries of " tapis veins (cut pile carpets) d'aultre mer, & mettre par terre " (see Essai sur I'histoire des tapis- series et tapis, by W. Chocqueel, Paris, 1863, pp. 22-23). It is an open question if the making of cut pile carpets in Persia or by Saracens elsewhere preceded that of fustians and velvets or whether the developments in making the three proceeded pari passu.

The making of carpets with a flat surface, however, is probably far older than that of cut pile carpets, and characteristic of one such old method is that in the making of Soumak car- pets (Plate II. fig. 5), the ornament of which done in °J!JtJ", close needle stitches with coloured threads completely surface. conceals the stout flax or hemp web which is the essential material of these carpets. Soumak is a distortion of Shemaka, a Caucasian town in the far east of Asia Minor. But so-called Soumak carpets are made in other districts, and the particular needlework used in them is practically of the same kind as that on a smaller scale used for the well-known Persian Nakshe or woman's trousering, and again that used on a still smaller scale in the ornamentation of valuable Kashmir shawls. Quilted and chain-stitched cotton prayer and bath rugs from Persia are referred to in the article on Embroidery.

Another method of making carpets with a flat surface is that of tapestry- weaving (see Plate II. fig. 4), which, according to existing and well-authenticated specimens of considerable antiquity (already referred to), appears to be the oldest of any historic process of ornamental weaving (see Tapestry).

Very broadly considered, the traditional designs or patterns of Oriental carpets fall into two classes: the one, prevailing to a much larger extent than the other, seems to reflect juotires la the austerity of the Sunni or orthodox Mahommedans traditional in making patterns with abstract geometric and designs in angular forms, stiff interlacing devices, cryptic signs 0rhn jf J and symbols and the like; whilst the other suggests the freer thought of the Shiah or unorthodox sect, in

designs of ingenious blossom and leafy scrolls, conventional arabesques, botanical and animal forms, and cartouches enclosing Kufic inscriptions (see the splendid example known as

the Ardebil carpet, Plate III. fig. 7, and another in Plate IV. fig. 9). Types of the more austere design occur in carpets from Afghan- istan, Turkestan, Bokhara and Asia Minor, N.W. India and even Morocco, the other types of freer design being almost special to Persian rugs and carpets.

Next in historic importance to Persia, Turkestan and Asia Minor is India, where the making of cut pile carpets— known as Kalin and Kalicha— was presumably introduced Indian by the Mahommedans during the latter part of the carpets. ˆ centU ry. But the industry did not apparently attain importance until after the founding of the Mogul dynasty by Baber early in the 16th century. The designs mainly derived from those of Persian carpets of that period do not as a rule rise to the excellence of their prototypes. Historical centres of Indian carpet making are in Kashmir, the Punjab and Sind, and at Agra, Mirzapur, Jubbulpore, Warangal in the Deccan, Malabar and Masulipatam. Velvets are richly embroidered in gold and silver thread at Benares and Murshidabad and used as ceremonial carpets, and silk pile carpets are made atTanjore and Salem. For the most part the best of the Indian woollen pile carpets have been produced by workers of repute engaged by princes, great nobles and wealthy persons to carry on the craft in their dwellings and palaces. These groups of highly skilled workers as part of the household staff were paid fixed salaries, but they were also allowed to execute private orders. During the 19th century the carpet industry was developed in govern- ment gaols. Produced in great quantities the prison-made carpets as a rule are less well turned out, and the competition set up betewen them and the rugs and carpets of private factories has had a somewhat detrimental effect upon the industry generally. Older in origin than the cut pile carpets are those of thinner and fiat surface texture, which from almost immemorial times have been woven in cotton with blue and white or blue and red stripes in the simplest way. These are called daris and satranjis, and are made chiefly in Benares and northern India. They are also made in the south and by such aborigines retaining primitive habits as the Todas of the Nilgiri Hills, a fact which points to the age of this particular method of making ground or floor coverings.

A condition that has always controlled the designs of Oriental carpets is their rectangular shape, more often oblong than square. As a rule, there is a well-schemed border, controlling enclosing the main portion or field over which the designs ot details of the pattern are symmetrically distributed. Oriental

simpler patterns in the field of a carpet or rug consist carpets. ˆ repe titions of the same device or of a small number of different devices (see Plate II. fig. 4)- Richer patterns display more organic pattern in the construction, of which the leading and continuous features are expressed as diversified bands, scrolls and curved stems; amongst these latter are very varied devices which play either predominant or subordinate parts in the whole effect of the design (Plate III. fig- 7)- Angular and simplified treatments of these elaborate designs are rendered in many Asia Minor or Turkey carpets (Plate I. fig. 3); but the typical flowing and more graceful versions are of Persian origin (see Plate III. fig. 7. and pla te IV. fig. 9), usually of the 16th century. Mingled in such intricate stem designs or " arabesques " are details many of which have been derived on the one hand from Sassanian and even from far earlier Mesopotamian emblematical ornament based on cheetahs seizing gazelles, on floral forms, blossoms and buds so well con- ventionalized in Assyrian decoration, and on the other hand from Tatar and Chinese sources. The style, strong in suggestion of successive historical periods, seems to have been matured in Mosil engraved and damascened metal work of the 12 th and 13th centuries before its occurrence in Persian carpet designs, the finest of which were produced about the reign of Shah Abbas. A good deal earlier than this period are carpets designed chiefly according to the simpler taste of the Sunnites, and such as these

appear to be mentioned by Marco Polo (1256-1323) when writing that " in Turcomania they weave the handsomest carpets in the world." He quotes Conia (Konieh in Anatolia), Savast (Sivas in Asia Minor), some 300 m. north-east of Konieh, and Cassaria (Kaisaria or Caesaraea in Anatolia) as the chief weaving centres. It is the carpets from such places rather than from Persia that appear to have been the first Oriental ones known in European countries.

Entries of Oriental carpets are frequent in the inventories of European cathedral treasures. In England, for instance, carpets are said to have been first employed by Queen Eleanor Cgrpets /a of Castile and her suite during the latter part of the Europe , 13th century, who had them from Spain, where their manufacture was apparently carried on by Saracens or Moors in the southern part of the country. On the other hand, Pierre Dupont, a master carpet-maker of the Savonnerie (see below), gives his opinion in 1632 that the introduction of carpet- making into France was due to the Saracens after their defeat by Charles Martel in a.d. 726.

But more historically precise is the record in the book of crafts (Livre des metiers) by Etienne Boileau, provost of the merchants in Paris (1258-1268), of ” the tapicers or makers of lapis sarrasinois, 1 who say that their craft is for the service only of churches or great men like kings and nobles.” In the 13th and 14th centuries Saracen weavers of rich and ornamental stuffs were also employed at Venice, which was a chief centre for importing Oriental goods, including carpets, and distributing them through western Europe. Dr Bode, in his Vorderasiatische Knupfteppiche, instances Oriental carpets with patterns mainly of geometric and angular forms represented in frescoes and other paintings byDomenico di Bartolo (1440), Niccolo di Buonaccorso (1450), Lippo Memmi (1480) and others. Of greater interest perhaps, and especially as throwing light upon the trade, in, if not the making of, carpets in England somewhat in the method of contemporary Turkey carpets, is the specimen represented in Plate III. fig. 6. This may have been made in England, where foreign workmen, especially Flemings, were from early times often encouraged to settle in order to develop industries, amongst which pile carpet-making probably and tapestry-weaving certainly were included. The earliest record of tapestry-weaving works in England is that of William Sheldon’s at Barcheston, Warwickshire, in 1509, and, besides wall hangings, carpets of tapestry-weaving were also possibly made there. 2 The cut pile carpet belonging to Lord Verulam (Plate III. fig. 6) was perhaps made at Norwich. It has a repeating and simply contrived continuous pattern of carnations and intertwining stems with a large lozenge in the centre bearing the royal arms of England with the letters E. R. (Elizabeth Regina) and the date 1570. It also has the arms of the borough of Ipswich and those of the family of Harbottle. The sequence or continuity of its border pattern fails in the corners at one end of the rug or carpet in a way very common to many Asia Minor and Spanish carpets (see Plate I. fig. 3, Plate II. fig. 4, and Plate IV. fig. 10) ; not, however, to the majority of Persian carpets (see Plate III. fig. 7, and Plate IV. fig. 8). A large cut pile carpet in the Victoria and Albert Museum has a repeating pattern of star devices, rather Moorish in style, with the inscription on one end of the border, ” Feare God and Keep His Commandments, made in the yeare 1603,” and in the field the shield of arms of Sir Edward Apsley of Thakeham, Sussex, impaling those of his wife, Elizabeth Elmes of Lifford, Northamp- tonshire. This may have been made in England. A carpet of very similar design, especially in its border, is to be seen in a painting by Marc Gheeraedts of the conference at old

Somerset House of English and Spanish plenipotentiaries (1604), now in the National Portrait Gallery, London. A more important and

1 The tapissiers sarrasinois were apparently the makers of piled or velvety carpets, and have always been written about in contra-distinction to the tapissiers de haute lisse or tapissiers nostrez, who it appears did not weave piled or velvety material, but made tapestry- woven hangings and coverings for furniture.

2 In Hakluyt's Voyages mention is made of directions having been given to Morgan Hubblethorne, a dyer, to proceed (about 1579) to Persia to learn the arts of dyeing and of making carpets.

finer carpet belongs to the Girdlers' Company (Plate IV. fig. 8), and is of Persian design, into which are introduced the arms of the company, shields with eagles, and white panels with English letters, the monogram of Robert Bell the master in 1634, but this was made at Lahore x to his order.

Before dealing with later phases of the carpet industry in England, mention may now be made of Spanish carpets, of European as distinct from Saracenic or Persian J£ˆi S , design; the making of them dates at least from the end of the 15th century or the beginning of the 16th century. It is only within recent years that specimens of them have been obtained for public collections, and at present little is known of the factories in Spain whence they came. A large and most interesting series is shown in the Victoria and Albert Museum, and a portion of one of the earlier of the Spanish cut pile carpets in that museum is given in Plate IV. fig. 10. The inner repeating pattern has suggestions of a lingering Moorish influence, but a superior version of it with better definition is to be seen in extant bits of Spanish shuttle-woven silks of the 16th century. The border of distorted dragon-like creatures is of a Renaissance style, and this style is more pronounced in other Spanish carpets having borders of poorly treated Italian 16th- century pilaster ornament. Beside cut pile, many Spanish carpets of the 17th and 18th centuries have looped and flat surfaces, and bear Spanish names and inscriptions; many too are of needlework in tent or cross stitch.

Another interesting class of very fine pile carpets that has also become known comparatively recently to collectors is the so-called Polish carpets, generally made of silk pile for carpets. ˆ e ornament, which is distinctively Oriental, and of gold and silver thread textile for the ground, very much after the manner of early 17th-century Brusa fabrics. Many of these carpets are in the Czartoryski collection at Cracow. They are discussed by Dr Bode in his treatise on Oriental carpets already referred to. European coats of arms of the persons for whom they were made are often introduced into them, sometimes different in workmanship from that of the carpets, though there are specimens in which the workmanship is the same throughout. The details of their designs consist for the most part of arabesques and long curved serrated leaves similar to such as are commonly used in Rhodian pottery decoration of the 16th century, though more typical of those so frequent in 17th-century Turkish ornament. Various considerations lead to the conclusion that these so-called Polish carpets were probably made in either Constantinople or Damascus (tapete Damaschini frequently occur in Venetian inventories of the 16th century) rather than, as has been thought, by the Persian workmen employed at the Mazarski silk factory which lasted for a short period only during the 1 8th century at Sleucz in Poland.

The European carpet manufactory, of which a continuous history for some two hundred and fifty years is recorded with exceptional completeness, is that which has been Carpets maintained under successive regimes, royal, imperial “France”. anc * republican, in France — at the Hotel des Gobelins in Paris. Seventy years before its organization under Colbert in 1667 as a state manufactory {Manufacture Royale des Meubles de la Couronne), Henry IV. had founded royal art work- shops for all sorts of decorative work, at the Louvre; and here in 1604 a workroom was established for making Oriental carpets by the side of that which existed for making tapis flamands. In 1610 letters patent were granted to the Sieur Fortier, who has been reputed to be the first inventor in France of the art of making in silk and wool real Turkey and other piled carpets with grounds of gold thread, which must have been sumptuous fabrics probably resembling the so-called Polish carpets of this date. Some ten years later it is recorded that Pierre Dupont and Simon Lourdet started a pile carpet (tapis veloutes) manufactory at Chaillot (Paris) in large premises which had been used for the manufacture of soap — whence the name of ” Savonnerie.” To

this converted manufactory were transferred in 163 1 the carpet-

1 The Royal Factory at Lahore was established by Akbar the Great in the 16th century.

makers from the Louvre, and under the direct patronage of the crown it continued its operations for many years at Chaillot. It was not until 1828 that the making of tapis de la Savonnerie (pile carpets of a fine velvety character) was transferred to the H6tel des Gobelins. Here, in contradistinction to the Savonnerie, carpets are made others which, like those of Beauvais (where a manufactory of hangings and carpets was established by Colbert in 1664), are tapis ras or non-piled carpets, being of tapestry-weaving, as also are those made by old-established firms at Aubusson and at Felletin, where the manufacture was flourishing, at the former place in 1732 and at the latter in 1737.

Returning now to England, there are evidences towards the end of the 17 th century, if not earlier, that Walloon and Flemish makers of Turkey pile carpets had settled and set up works in different parts of the country. A protective charter, for instance, was granted in 1 701 by William III. to weavers in Axminster and Wilton. The ultimate celebrity of the pile carpet industry at Wilton was due mainly to the interest taken in it during the earlier part of the 18th century by Henry, earl of "Pembroke and Montgomery, who in the course of his travels abroad collected certain French and Walloon carpet-makers to work for him in Wiltshire — over them he put two Frenchmen, Antoine Dufossy and Pierre Jemale. More notable, however, than these is Pere Norbert, who naturalized himself as an Englishman, changed his name to Parisot, and started a manufactory of pile carpets and a training school in the craft at Fulham about 1751. In 1753 he wrote and published " An account of the new manufactory of Tapestry after the manner of that at the Gobelins, and of carpets after the manner of that at Chaillot {i.e. Savonnerie) now undertaken at Fulham by Mr Peter Parisot." Two refugee French carpet-makers from the Savonnerie had arrived in London in 1750, and started weaving a specimen carpet in Westminster. Parisot, having found them out, induced the duke of Cumberland to furnish funds for their removal to better workrooms at Paddington. The carpet when finished was presented by the duke to the princess dowager of Wales. Parisot quarrelled with his two employees, enticed others to come over, and then removed the carpet works from Paddington to Fulham. A worker, J. Baptiste Grignon, writing to " Mr Parisot in Foulleme Manu- factory,"

mentions the marked preference ” shown by the English court for velvet,” and how much a “chair-back he had worked in the manner of the Savonnerie had been admired.” Correspondence published in the Nouvelles Archives de I’ art francais (1878) largely relates to the efforts of the French govern- ment to stop the emigration to England of workers from the Gobelins and the Savonnerie. Parisot’s Fulham works were sold up ini755. He then tried to start a manufactory at Exeter, but apparently without success, as in 1756 his Exeter stock was sold in the Great Piazza auction rooms, Covent Garden. Joseph Baretti (Dr Johnson’s friend), writing from Plymouth on the 18th of April 1760, alludes to his having that morning visited the Exeter manufactory of tapisseries de Gobelins ” founded by a distinguished anti-Jesuit — the renowned Father Nobert.” Previously to this a Mr Passavant of Exeter 2 had received in 1 7 58 a premium from the Society of Arts of London for making a carpet in ” imitation of those brought from the East and called Turky carpets.” Similar premiums had been awarded by the society in 1757 to a Mr Moore of Chiswell Street, Moorfields, and to a Mr Whitty of Axminster. In 1759 a society’s premium was won by Mr Jeffer of Frome. In the Transactions of the Society, vol. i., dated 1783, it is stated that by their rewards, the manu- facture of ” Turky carpets is now established in different parts of the kingdom, and brought to a degree of elegance and beauty which the Turky carpets never attained.” Such records as these convey a fair notion of the sporadic attempts which im- mediately preceded a systematic manufacture of pile carpets in this country. Whilst the Wilton industry survived, that actually

2 A wealthy serge-maker of Swiss nationality, who had been settled for some years in Exeter, and bought up the plant of Parisot’s Exeter works. (See Bulletin de la societe de I’histoire de V art francais, p. 97, vol. 1875 to 1878.)

carried on at Axminster died towards the end of the 18th century, and the name of Axminster like that of Savonnerie carpets now perpetuates the memory of a locally deceased manufactory, much as in a parallel way Brussels carpets seem to owe their name to the renown of Brussels as an important centre in the 15th and 16th centuries for tapestry-weaving.

Before the existence of steam-driven carpet-making machinery in England, employers, following the example set by the French, applied the Jacquard apparatus, for regulating and °*™ e/y> facilitating the weaving of patterns, to the hand ‘ manufacture of carpets. This was early in the 19th century; a great acceleration in producing English carpets oc c.urred, severely threatening the industry as pursued (largely for lapis ras) at Tournai in Belgium, at Nimes, Abbeville, Aubusson, Beauvais, Tourcoing and Lannoy in France. The severity of I he competition, however, was still more increased when English enterprise, developing the inventions of Erastus B. Bigelow (1814-1870) of America and Mr William Wood of England, took the lead in perfecting Jacquard weaving carpet looms worked by steam, which resulted in the setting up of many power- loom carpet manufactories in the United Kingdom. It was not until 1880 that French pile carpet manufacturers began to adopt similar carpet power-looms, importing them from England.

These machines for weaving pile carpets, either looped (boucli) as in Brussels, or cut (veloute) as in Wilton or Axminster carpets, were similar in all respects to such as had been in use by the important English manufacturers— Crossleyof Halifax, Templeton of Glasgow, Humphreys of Kidderminster, Southwell of Bridg-north, and others. A so-called tapestry carpet weaving-loom was invented by Richard Whytock of Edinburgh in 1832, but it was not brought to sufficient completeness for sustained manufacture until 1855. The essential feature of Mr Whytock’s process was that the warp-threads were dyed and parti-coloured, in such a way that when woven the several points of colour formed the pattern of the whole fabric. Although the name ” tapestry ” is used, the texture of these wares has but a remote likeness to that of hand-made tapestry hangings and carpets such as those of the Gobelins and Aubusson manufactories, nor is it the same as the texture of Brussels carpets. Machine-made tapestry carpets are also called ” ingrain ” carpets, because the wool or worsted is dyed in the grain, i.e. before manufacture. Germany in her manufacture of carpets resorts chiefly to the ” ingrain ” process, but in common with Holland and Belgium she produces pile (looped and cut) carpets from power-looms. In the United States of America there are many similar and very important carpet manufactories; and Austria produces fine cut pile carpets (velcuUs), the designs of which are largely derived from those of the Aubusson tapestry- woven carpets (tapis ras).

Lengths or pieces of felt and other substantial material are freqjuently made for floor and stair carpeting, and are often

printed with patterns. These of course come into quite another class technically. The technological aspects of the several branches of carpet manufacture by machinery are treated in the articles on Textile-Printing and Weaving. Briefly, the products of carpet manufacture practically fall into three main divisions: (1) Pile carpets (tapis moquettes) which are either looped (bouM) or cut (velouti) ; (2) flat surface carpets {tapis ras) as in hand tapestry- Woven material; and (3) printed stuffs used for carpeting.

Whilst the production of carpets by steam power predomi- nates in Europe and the United States of America, and at one time appeared to be giving the coup de grdce to haad-made tne cra ft °f making carpets by hand, there has been in carpets. recent times a revival in this latter, and many carpets of characteristic modern design, several of them made in England, are due to the influence of the late William Morris, who devoted much of his varied energies to tapestry weaving and pile carpet weaving by hand, both of which crafts are being fostered as cottage industries in parts of Ireland, as well as in England. At the same time leading English carpet manufactures continue to produce hand j made carpets as

occasion requires. In France a much more systematic existence of tapestry weaving and pile carpet making by hand has been maintained and is of course attributable to the perennial activity of the state tapestry works in Paris (at the Gobelins workshops) and in Beauvais, and of corresponding works managed by private enterprise at Aubusson and elsewhere.

Designing patterns for English carpet manufacture is now more organized than it was, and greater thought and invention are given to devising ornament suitable to the purpose of floor coverings. Before 1850 and for a few years later, rather rude realistic representations of animals and botanical forms (decadent versions of Savonnerie designs) were often wrought in rugs and carpets, and survivals of these are still to be met with, but the lessons that have been subsequently derived fromintelligent study of Oriental designs have resulted in the definite designing of conventional forms for surface patterns. The early movement in this direction owes much to the teaching of Owen Jones, and in its later and rather freer phases the Morris influence has been powerful. Schools of art at Glasgow, at Manchester, Bir- mingham and elsewhere in the United Kingdom have trained and continue to train designers, whose work has

contributed toithe formation of an English style with a new note, which, as a French writer puts it, has created a sensation in France, in Germany, in fact in all Europe and America.

France retains that facility of execution and liveliness in invention which have been nurtured for over three hundred years by systematic . governmental solicitude for education in decorative design and enterprise in perfecting manufacture. Her Aubusson arid Savonnerie carpets have maintained a style of design in form and colour entirely different from any that clearly throws back to Oriental principles, and many of the designs for the finer and larger of these carpets are schemed with large central oval panels, garlands of flowers and fantastic frames very much on the plan of what is frequently to be seen in the decoration of ceilings. At the same time the style called I'art nouveau has become developed. It largely grows from very fanciful dispositions of free-growing natural forms, as well as curiously curved and tenuous forms, many of which are bone-like and fibre-like in character, flat in treatment and rather thin and washy in colour, and its influence has slightly percolated into designs for pile carpets. This style, sometimes intermixed with the more robust, less fantastic and rather fuller-coloured English style, has found followers in England, America and Germany, but the bulk of the designs now used in power carpet looms seems to be mainly of Oriental descent.

The more important art museums in Europe contain collections of Oriental carpets, and the history of many is fairly well established. The subject has become one of serious study, the results of which have been published and elucidated by means of well-executed coloured reproductions of carpets and rugs preserved in both public and private collections.

Bibliography.t(i) An Account of the New Manufactory 0} Tapestry after the manner of that at the Gobelins; and of Carpets after the manner of that at ChaUlot, &c, now undertaken at Fulham, by Mr Peter Parisot (London, Dodsley, 1753, 8vo). This is prob- ably the only account of carpet-making in England during the 1 8th century; it is of peculiar interest in that respect, and as containing a statement that " the Manufacture of Chaillot is altogether of wool, and worked in the manner of Velvet. All sorts of Figures of Men and Animals may be imitated in this work; but Fruits and Flowers answer better; and the properest employment for this Art is to make Carpets and all sorts of Skreens." (2) Essai sur Vhistoire el la situation actuelle de Vindustrie des tapisseries

et tapis, by W. Chocqueel (Paris, 1863). (3) Vol. xi. of Reports on the Paris Uni- versal Exhibition of 1867, containing ” Report on Carpets, Tapestry and other stuffs for Furniture,” by Matthew Digby Wyatt, F.S.A. (1868). In reviewing the modern products shown at the exhibition, Sir Digby Wyatt discusses at some length the aesthetics of carpet design. (4) British Manufacturing Industries, edited by G. Phillips Bevan, ” Carpets,” by Christopher Fresser (London, I 876). (5) Altorientalische Teppichmuster nach Bildern und Originalen des xv.-xvi. Jahrhunderts, by Julius Lessing (Berlin, 1877). Numerous references are made in this illustrated work to the carpet designs that occur in paintings by Italian and Flemish masters. (6) Eastern Carpets, by Vincent J. Robinson, with water-colour drawings by E. Julia Robinson (London, 1882, large 4to). In this publication,

CARPET

Plate III.

Fig. 6.—CLT PILE WORSTED CARPET,

BEARING ROYAL ARMS OF ENGLAND WITH E. R. (ELIZAISETH REGINA); DATE 15Ja

7— VERY FINE CUT PILE PERSIAN CARPET KNOWN AS THE HOLY CARPET OF THE MOSQUE AT ARDED1L.

CARPET

IF?

• I l ll mn i uMM ‘iii imwu i n nun .n 1

JT PILE CARPET OF PERSIAN RE, 16th CENTURY.

<€**&

■*

►#-i

lll»JiiSilL.

♦►*.-;

Igplp

Miˆ

Fig. 8.— FINE CUT PILE LAHORE CARPET (r. 1664) BELONGING TO C.IRDLERS' COMPANY IN LONDON. OF PERSIAN DESIGN.

VJBˆ>->

Fig. 10— CUT PILE CARPET OF SPANISH MANUFACTURE, EARLY 16th CENTURY.

which precedes by nine or ten years the more learned works by Riegl and Bode, there are two examples, one ascribed to the manufactory at Alcaraz in La Mancha, and one to the supposed manufactory of the 17th century at Warsaw. By the light of later and more com- plete investigations Mr Robinson's ascriptions are scarcely borne out. (7) Oriental Carpets, by Herbert Coxon (London, 1884, 8vo). (8) Altorientalische Teppiche, by Alois Riegl (Leipzig, 1 891); a useful book of reference (containing thirty-six illustrations) of manufacturing, archaeological and artistic interest. (9) Jahrbuch der kunsthistorischen Sammlungen des Allerhochsten Kaiserhauses, vol. xiii. (Wien, 1892). Containing an important and finely illus- trated article, " Altere orientalische Teppiche aus dem Besitze des Allerhochsten Kaiserhauses," by Alois Riegl, in the course of which comparisons are made between the designs in Persian MS. illustra- tions, in engraved metal work and those of carpets. (10) Oriental Carpels, published by the Austrian Commercial Museum (English edition by C. Purdon Clarke) (Vienna, 1 892-1 896). This contains a series of monographs by I. M. Stockel, Smyrna; Dr William Bode, Berlin; Vincent Robinson, London; M. Gerspach, Paris; T. A. Churchill, Tehran; Sir George Birdwood, London; C. Purdon Clarke, London ; and Alois Riegl, Vienna, and a preface by A. von Scala, Vienna. (11) Ancient Oriental Carpets, a supplement to the above, four parts containing twenty-five plates with text (Leipzig, 1906, large folio). (12) Vorderasiatische Knupfteppiche aus Slterer Zeit, by Wilhelm Bode (Leipzig, 1901). This learned treatise gives inter alia suggestive notes upon the production of the so-called Polish carpets and of Spanish carpets. (13) Ein prientalischer Teppich vom Jahre 1202 und die dltesten orientalischen Teppiche, by Alois Riegl (Berlin, 1895). A coloured illustration is given of a pile curtain with a triple niche design and an Armenian

inscription that it was made by Gorzi the Artist ” to the glory of the church of St Hripsime — an Armenian martyr. The date 651 appears in the inscription, but Riegl adduces valid reasons fbr reading it as the equivalent of a.d. 1202. Another pile carpet of conventional garden design, probably not of earlier manufacture than 14th century, is also illustrated and carefully discussed, especially in connexion with the appearance in it of well-authenticated Sassanid devices — streams with fishes and birds, &c. (14) Report on Carpets at the Paris Exhibition of iqoo, by Ferdinand Leborgne (1901, 8vo). (15) Oriental Rugs, by John Kimberly Mumford (London, 1901), con- tains twenty-four colour- plate and autotype reproductions of rugs and eight photo-engravings of phases of the rug industry — amongst which latter are: “A Nomad Studio,” “Kurdish Girls at the Loom,” ” Boy Weavers of Tabriz,” and a ” Rug Market in Iran/’

(16) Rugs, Oriental and Occidental, by Rosa Belle Holt (Chicago, 1901), well illustrated, with colour-plate reproductions of various types of rugs, including less known Chinese and Navajo specimens.

(17) The Art Workers’ Quarterly, vol. iii. No. 11, July 1904; article on the pile carpet belonging to the Worshipful Company of Girdlers of the City of London, by A. F. Kendrick, with a colour-plate of this remarkable carpet, made to the order of the master of the com- pany in 1634 at Lahore. (18) Journal of Indian Art and Industry: Indian Carpets and Rugs (parts 87 to 94) (London, 1905 and 1906). Upwards of ninety-nine illustrations of many varieties of Indian and Persian carpets are given in this publication, a large number showing debased versions of fine designs/ e.g. some from the Punjab, Warangal, Mirzapur and Elura; those from Yarkand exhibit Tatar and Chinese influences. (19) A History of Oriental Carpets before 1800, by F. R. Martin, published by the State Printing Office in Vienna (Bernard Quaritch, London, 1906). This contains a series of excellent reproductions in colours of Oriental carpets, many of which, being presents to kings of Sweden by the shah of Persia in the 17th century, are to be seen in the castles of Stock- holm and Copenhagen — others are in the Imperial Museum at Constantinople or belong to private owners. (A. S. C.)

CARPET-BAGGER, a political slang term for a person who stands as a candidate for election in a locality in which he is a stranger. It is particularly used of such a candidate sent down by the central party prganization. The term was first vised in the

western states of America of speculative bankers who. were said to have started business with no other property than “what they could carry in a carpet-bag, and absconded when they failed. The term became of general use in American politics in the reconstruction period after the Civil War, as a term of contempt for the northern political adventurers in the South who, by the help of the negro vote, gained control of the- ad- ministration.

CARPET-KNIGHT, properly one who has been knighted in time of peace on the carpet before the king’s throne, and. not on the field of battle as an immediate reward for valour. It, is used as a term of reproach for a soldier who stays at home, and avoids active service and its hardships, with a particular reference to the carpet of a lady’s chamber, in which such a fainiant soldier lingers. ■■’■’■”■.. • !

CARPI, GIROLAMO DA (1501-155(5), Italian historical and portrait painter, born at Ferrara, was one of Benvenuto Garo-falo’s best pupils. Becoming infatuated with the work of Cor-reggio, he quitted Ferrara, and spent several years in copying that master’s paintings at Parma, Modena and elsewhere, succeeding in aping his mannerisms so well as to be able to dispose of his own works as originals l?y Correggio. It is probable that not a few pictures yet attributed to the great painter are in reality the work of his parasite. Da Carpi’s best paintings are a Descent of the Holy Spirit, in the chur,ch of St Francis at Rovigo; a Madonna, an Adoration of the Magi, and a St Catharine, at Bologna; and the St George and the St Jerome, at Ferrara.

CARPI, UGO DA, Italian 15th-century painter, was Jong held the inventor of the art of printing in chiaroscuro, afterwards brought to such perfection by Parmigiano and by Baltasar Peruzzi of Siena. The researches of Michael Huber (1727-1804) and Johann Gottlob Immanuel Breitkopf (1710-1794) have proved, however, that this art was known and practised in Germany by Johann Ulrich Pilgrim (Wachtlin) and Nikolaus Alexander Mair (1450- c. 1520), at, least as early as 1499, while the date of the oldest of Da Carpi’s prints is 1 5 1 8. Printing in chiaroscuro is performed by using several blocks. Da Carpi usually employed three-ˆ- one for the outline and darker shadows, another for the lighter shadows, and a third for the half-tint. By means of them he printed engravings after several pictures and after some of the cartoons of Raphael. Of these a Sybil, a Descent from the Cross, and a History of Simon the Sorcerer are the most remarkable.

CARPI, a Dacian tribe established upon the lower Danube from the 1st century B.C. They rose to considerable power during the 3rd century a.d., and claiming to be superior to the Goths accordingly demanded that their incursions into Roman territory likewise should be bought off by tribute. When this was refused they invaded in force, but were beaten back by the emperor Philip. After this they joined with the Goths in their successful inroads until both nations were defeated by Claudius Gothicus. Later, after repeated defeats under Diocletian and Galerius, they were taken under Roman protection and the greater part established in the provinces of Pannonia and Moesia; some were left beyond the Danube, and they are last heard of as allies of the Huns and Sciri in the time of Theodosius I. Ptolemy speaks of Harpii and a town Harpis. This was no doubt the form the name assumed in the mouths of their Germanic neighbours, Bastarnae and Goths. (E, H. ,M.)

CARPI, a town and episcopal see of Emilia, Italy, in the province of Modena, 9 m. N.N.W. by rail from the town of Modena. Pop. (1905) 7118 (town), 27,135 (commune). It is the junction of a branch line to Reggio nell' Emilia via Correggio, and the centre of a fertile agricultural district. Carpi contains several Renaissance buildings of interest, the facade of the old cathedral (an early Romanesque building iii origin, with some early 15th-century frescoes), the new cathedral (after 15 13), perhaps the nave of S. Niccolo and a palace, all being by Baldassare Peruzzi: while the prince's palace, (with a good court and a chapel containing frescoes by Bernardino Loschi of Parma, 1480ˆ-1540) and the colonnades opposite the theatre are also good. • These, and the fortifications, are all due to Alberto Pio of Carpi, a pupil of Aldus Manutius, expelled in 1525 by Charles V., the principality being given to the house of Este. ■

. CARPINI, JOANNES DE PLANO, the first noteworthy Euro- pean explorer of the Mongol empire (in the 13th century), and the author of the earliest important W'estern work on northern and central Asia, Russian Europe, and other regions of the Tatar dominion. He appears to have been a native of Umbria, where a place formerly called Pian del Carpine, but now Piano della Magione, stands near Perugia, on the road to Cortona. He was one of the companions and disciples of 'his countryman St Francis of Assisi, and from sundry indications: can hardly have been younger than the latter, born in 1182. Joannes bore a high repute in the order, and took a foremost part in the

propagation of its teaching in northern Europe, holding suc- cessively the offices of warden (custas) in Saxony, and of provincial (minister) of Germany, and afterwards of Spain, perhaps of Barbary, and of Cologne. He was in the last post at the time of the great Mongol invasion of eastern Europe and of the disastrous battle of Liegnitz (April 9, 1241), which threatened to cast European Christendom beneath the feet of barbarous hordes. The dread of the Tatars was, however, still on men's mind four years later, when Pope Innocent IV. despatched the first formal Catholic mission to the Mongols (1245), partly to protest against the latter's invasion of Christian lands, partly to gain trustworthy information regarding the hordes and their purposes; behind there may have lurked the beginnings of a policy much developed in after-time— that of opening diplomatic intercourse with a power whose alliance might be invaluable against Islam.

At the head of this mission the pope placed Friar Joannes, at this time certainly not far from sixty-five years of age; and to his discretion nearly everything in the accomplishment of the mission seems to have been left. The legate started from Lyons, where the pope then resided, on'Easter day (April 16, 1245), accompanied by another friar, one Stephen of Bohemia, who broke down at Kanev near Kiev, and was left behind. After seeking counsel of an old friend, Wenceslaus, king of Bohemia, Carpini was joined at Breslau by another Minorite, Benedict the Pole, appointed to act as interpreter. The on- ward journey lay by Kiev; the Tatar posts were entered at Kanev; and thence the route ran across the Dnieper (Neper, Nepere, in Carpini and Benedict)

to the Don and Volga (Ethil in Benedict; Carpini is the first Western to give us the modern name). Upon the last-named stood the Ordu or camp of Batu, the famous conqueror of eastern Europe, and the supreme Mongol commander on the western frontiers of the empire, as well as one of the most senior princes of the house of Jenghiz. Here the envoys, with their presents, had to pass between two fires, before being presented to the prince (beginning of April 1246). Batu ordered them to proceed onward to the court of the supreme khan in Mongolia; and on Easter day once more (April 8, 1246) they started on the second and most formidable part of their journey — " so ill," writes the legate, " that we could scarcely sit a horse; and throughout all that Lent our food had been nought but millet with salt and water, and with only snow melted in a kettle for drink." Their bodies were tightly bandaged to enable them to endure the excessive fatigue of this enormous ride, which led them across the Jaec or Ural river, and north of the Caspian and the Aral to the Jaxartes or Syr Daria (quidam fluvius magnus cujus nomen ignoramus) , and the Mahommedan cities which then stood on its banks; then along the shores of the Dzungarian lakes; and so forward, till, on the feast of St Mary Magdalene (July 22), they reached at last the imperial camp called Sir a Orda (i.e. Yellow Pavilion), near Karakorum and the Orkhon river — this stout-hearted old man having thus ridden something like 3000 m. in 106 days.

Since the death of Okkodai the imperial authority had been in interregnum. Kuyuk, Okkodai's eldest son, had now been designated to the throne; his formal election in a great Kurultai, or diet of the tribes, took place while the friars were at Sira Orda, along with 3000 to 4000 envoys and deputies from all parts of Asia and eastern Europe, bearing homage, tribute and presents. They afterwards, on the 24th of August, witnessed the formal enthronement at another camp in the vicinity called the Golden Ordu, after which they were presented to the emperor. It was not till November that they got their dismissal, bearing a letter to the pope in Mongol, Arabic and Latin, which was little else than a brief imperious assertion of the khan's office as the scourge of God. Then commenced their long winter journey homeward; often they had to lie on the bare snow, or on the ground scraped bare of snow with the traveller's foot. They reached Kiev on the 9th of June 1247. There, and on their further journey, the Slavonic Christians welcomed them as risen from the dead, with festive hospitality. Crossing the Rhine at Cologne, they found the pope still at Lyons, and there delivered their report and the

khan's letter.

Not long afterwards Friar Joannes was rewarded with the archbishopric of Antivari in Dalmatia, and was sent as legate to St Louis. The date of his death may be fixed, with the help of the Franciscan Martyr ology and other authorities, as the 1st of August 1252; hence it is clear that John did not long survive the hardships of his journey.

He recorded the information that he had collected in a work, variously entitled in the MSS. Historia Mongalorum quos nos Tartaros appellamus, and Liber Tartarorum, or Tatarorum. This treatise is divided into eight ample chapters on the country, climate, manners, religion, character, history, policy and tactics of the Tatars, and on the best way of opposing them, followed by a single (ninth) chapter on the regions passed through. The book thus answers to its title. Like some other famous medieval itineraries it shows an entire absence of a traveller's or author's egotism, and contains, even in the last chapter, scarcely any personal narrative. Carpini was not only an old man when he went cheerfully upon this mission, but was, as we know from accidental evidence in the annals of his order, a fat and heavy man (vir gravis et corpulentus) , insomuch that during his preachings in Germany he was fain, contrary to Franciscan precedent, to ride a donkey. Yet not a word approaching more nearly to complaint than those which we have quoted above appears in his narrative. His book, both as to personal and geographical detail, is inferior to that written a few years later by a younger brother of the same Order, Louis IX. 's most noteworthy envoy to the Mongols, William of Rubrouck or Rubruquis. But in spite of these defects, due partly to his conception of his task, and in spite of the credulity with which he incorporates the Oriental tales, sometimes of childish absurdity, from which Rubruquis is so free, Friar Joannes' Historia is in many ways the chief literary memorial of European overland expansion before Marco Polo. It first revealed the Mongol world to Catholic Christendom; its account of Tatar manners, customs and history is perhaps the best treatment of the subject by any Christian writer of the middle ages. We may especially notice, moreover, its four name-lists: — of the nations conquered by the Mongols; of the nations which had up to this time (1245-1247) successfully resisted; of the Mongol princes; and of the witnesses to the truth of his narrative, including various merchants trading in Kiev whom he had met. All these catalogues, unrivalled in Western medieval literature, are of the utmost historical value.

To the accuracy of Carpini's statements upon Mongol life, a modern educated Mongol, Galsang Gomboyev, has borne detailed and interesting testimony (see MSlanges asiat. tiris du Bullet. Hist. Philol. de I' Acad. Imp. de St Pitersbourg, ii. p. 650, 1856).

The book must have been prepared immediately after the return of the traveller, for the Friar Salimbeni, who met him in France in the year of his return (1247), gives us these interesting particulars: — " He was a clever and conversable man, well lettered, a great discourser, and full of a diversity of experience. ... He wrote a big book about the Tattars (sic) , and about other marvels that he had seen, and whenever he felt weary of telling about the Tattars, he would cause that book of his to be read, as I have often heard and seen " (" Chron. Fr. Salimbeni Parmensis" in Monum. Histor.ad Prov. et Placent. pertinentia, Parma, 1857).

For a long time the work was but partially known, and that chiefly through an abridgment in the vast compilation of Vincent of Beauvais (Speculum Historiale) made in the generation following the traveller's own, and printed first in 1473. Hakluyt (1598) and Bergeron (1634) published portions of the original work; but the complete and genuine text was not printed till 1838, when it was put forth by the late M. D'Avezac, an editorial masterpiece, embodied (1839) in the 4th volume of the Recueil de voyages et de mSmoires of the Geographical Society of Paris.

Joannes' companion, Benedictus Polonus, also left a brief narrative taken down from his oral relation. This was first published by M. D'Avezac in the work just named.

The following four MSS. may be noticed: (1) " Corpus," i.e. Corpus Christi College, Cambridge, No. 181 ; (2) " Petau," i.e. Leiden University, 77 (formerly 104)— both these are certainly earliei

than 1300; (3) " Colbert," i.e. Paris, National Library, Fonds Lat. 2477, of about 1350; (4) " London-Luraley," i.e. London, British Museum, MSS. Reg. 13 A xiv., pf late 13th century. Three other MSS. certainly exist; yet six more are perhaps to be found, but none of these possesses the value of those given above. Besides the editions referred to in the body of the article, we may also

men- tion (1) P. Girolamo Golubovich, Biblioteca bio-bibliografica della Terra Santa e dell' Oriente Francescano (1906), vol. i. (1215-1300), pp. 190-213; (2) William of Rubruck . . . with . . . John of Pian de Carpine, edited by W. W. Rockhill, Hakluyt Society (1900), especi- ally pp. 1-39; (3) C. Raymond Beazley, Dawn of Modern Geography, ii. (1901), 279-317, 375-380; iii. 85, 544, 553; and Carpini and Rubruquis, Hakluyt Society (1903), especially pp. vii.-xviii. 43-144, 249-295. (H. Y.;C. R. B.)

CARPOCRATES, a Gnostic of the 2nd century, about whose life and opinions comparatively little is known. He is said to have been a native of Alexandria and by birth a Jew. His family, however, seem to have been converted to Christianity. With Epiphanes, his son, he was the leader of a philosophic school basing its theories mainly upon Platonism, and striving to amalgamate Plato's Republic with the Christian ideal of human brotherhood. The image of Jesus was crowned along with those of Pythagoras, Plato and Aristotle. Carpocrates made especial use of the doctrines of reminiscence and pre- existence of souls. He regarded the world as formed by inferior spirits who are out of harmony with the supreme unity, knowledge of which is the true Gnosis. The souls which remember their pre-existing state can attain to this contemplation of unity, and thereby rise superior to all the ordinary doctrines of religion or life. Jesus is but a man in whom this reminiscence is unusually strong, and who has consequently attained to unusual spiritual excellence and power. To the Gnostic the things of the world are worthless; they are to him matters of indifference. From this position it easily followed that actions, being merely external, were morally indifferent, and that the true Gnostic should abandon himself to every lust with perfect indifference. The express declaration of these antinomian principles is said to have been given by Epiphanes. The notorious licentiousness of the sect was the carrying out of their theory into practice.

CARPZOV (Latinized Carpzovius) , the name of a family, many of whose members attained distinction in Saxony in the 17 th and 18th centuries as jurists, theologians and statesmen. The family traced its origin to Simon Carpzov, who was burgomaster of Brandenburg in the middle of the 16th century, and who left two sons, Joachim (d. 1628), master-general of the ordnance in the service of the king of Denmark, and Benedikt (1565-1624), an eminent jurist.

Benedikt Carpzov was born in Brandenburg on the 22nd of Uctooer 1565, and after studying at Frankfort and Witten- berg, and visiting other German universities, was made doctor of laws at Wittenberg in 1590. He was admitted to the faculty of law in 1592, appointed professor of institutions in 1599, and promoted to the chair Digesti infortiati et novi in 1601. In 1602 he was summoned by Sophia, widow of the elector Christian I. of Saxony, to her court at Colditz, as chancellor, and was at the same time appointed councillor of the court of appeal at Dresden. After the death of the electress in 1623 he returned to Wittenberg, and died there on the 26th of November 1624, leaving five sons. He published a collection of writings entitled Disputationes juridicae.

Benedikt Carpzov (1595-1666), second of the name, was the second son of the preceding, and like him was a great lawyer. He was born at Wittenberg on the 27th of May 1595, was at first a professor at Leipzig, obtained an honourable post at Dresden in 1639, became ordinary of the faculty of jurists at Leipzig in 1645, and was named privy councillor at Dresden in 1653. Among his works which had a very extensive influence on the administration of justice, even beyond the limits of Saxony, are Definitiones forenses (1638), Practica nova Imperialis Saxonica rerum criminalium (16351), Opus decisionum illustrium Saxoniae (1646), Processus juris Saxonici (1657), and others. He did much, both by his writings and by his official work, to systematize the body of German jurisprudence which had resulted from the intersection of the common law of Saxony with the Roman and

Canon laws. His last years were spent at Leipzig, and his time was entirely devoted to sacred studies. He read the Bible through fifty- three times, studying also the comments of Osiander and Cramer, and making voluminous notes. These have been allowed to remain in manuscript. He died at Leipzig on the 30th of August 1666.

Johann Benedikt Carpzov (1607-1657), fourth son of the first Benedikt, was born at Rochlitz in 1607. He became professor of theology at Leipzig in 1643, made himself chiefly known by his Isagoge in Libros Ecclesiarum Luther anarum Symbolicos (published in 1665), and died at Leipzig on the 22nd of October 1657, leaving five sons, all of whom attained some literary eminence.

August Carpzov (1612-1683), fifth son of the first Benedikt,

distinguished himself as a diplomatist. Born at Colditz on the 4th of June 1612, he studied at the universities of Wittenberg, Leipzig and Jena, and in 1637 was appointed advocate of the court of justice (Hofgerichi) at Wittenberg. Entering the service of Frederick William II., duke of Saxe-Altenburg, he took part in the negotiations which led to the peace of Westphalia in 1648, and was appointed chancellor by the duke in 1649. From 1672 to 1680 he was chief minister of Ernest I. and Frederick I., dukes of Saxe-Coburg-Gotha, and died at Coburg on the 19th of November 1683. August, who was a man of earnest piety, wrote Der gekreuzigte Jesus (1679) and some treatises on jurisprudence.

Johann Gottlob Carpzov (1679-1767), grandson of Johann Benedikt, was born at Dresden in 1679. He was educated at Wittenberg, Leipzig and Altdorf, became a learned theologian, and in 1719 was appointed professor of Oriental languages at Leipzig. In 1730 he was made superintendent and first pastor at Lubeck. His most important works were the Introductio in libros canonicos bibliorum Veteris Testamenti (17 21), Critica sacra V. T. (1728), and Apparatus Historico-criticus Antiquitatum V. Test. (1748). He died at Lubeck on the 7th of April 1767.

Johann Benedikt Carpzov (1720-1803), great-grandson of the first Johann Benedikt, was born at Leipzig, became professor of philosophy there in 1747, and in the following year removed to Helmstadt as professor of poetry and Greek. In 1 749 he was named also professor of theology. He was author of various philological works, wrote a dissertation on Mencius, and published an edition of Musaeus. He died on the 28th of April 1803.

On the family of Carpzov, see Dreyhaupt, Beschreibung des Saalkreises, Beilagen zu Theil 2. S. 26.

CARRANZA, BARTOLOME' (1503-1576), Spanish theologian, sometimes called de Miranda or de Carranza y Miranda, younger son of Pedro Carranza, a man of noble family, was born at Miranda d'Arga, Navarre, in 1503. He studied (1515-1520) at Alcala, where Sancho Carranza, his uncle, was professor; entering (1520) the Dominican order, and then (1521-1525) at Salamanca and at Valladolid, where from 1527 he was teacher of theology. No Spaniard save Melchior Canus rivalled him in learning; students from all parts of Spain flocked to hear him. In 1 530 he was denounced to the Inquisition as limiting the papal power and leaning to opinions of Erasmus, but the process failed; he was made professor of philosophy and (1 533-1 539) regent in

theology. In 1539, as representative to the chapter-general of his order he visited Rome; here he was made doctor of theo- logy, and while he mixed with the liberal circle associated with Juan de Valdes, he had also the confidence of Paul III. Return- ing to Valladolid, he acted as censor (cualificador) of books (including versions of the Bible) for the Inquisition. In 1540 he was nominated to the sees of Canaria and of Cusco, Peru, but declined both. Charles V. chose him as envoy to the council of Trent (1546). He insisted on the imperative duty of bishops and clergy to reside in their benefices, publishing at Venice (1547) his discourse to the council De necessaria residentia personali, which he treated as juris divini. His Lenten sermon to the council, on justification, caused much remark. He was made provincial of his order for Castile. Charles sent him to England (1554) with his son Philip on occasion of the marriage with Mary. He became Mary's confessor, and laboured earnestly for the re-establishment of the old religion, especially in Oxford.

In 1557 Philip appointed him to the archbishopric of Toledo; he accepted with reluctance, and was consecrated at Brussels on the 2 7 th of February 1558. He was at the deathbed of Charles V. (21st of September) and gave him extreme unction; then raised a curious controversy as to whether Charles, in his last moments, had been infected with Lutheranism. The same year he was again denounced to the Inquisition, on the ground of his Comen- larios sobre el Catechismo (Antwerp, i558),which in 1563, however, was approved by a commission of the council of Trent. He had evidently lost favour' with Philip, by whose order he was arrested at Tordelaguna (1559) and imprisoned for nearly eight years, and the book was placed on the Index. The process dragged on. Carranza appealed to Rome, was taken thither in December 1 566, and confined for ten years in the castle of St Angelo. The final judgment found no proof of heresy, but compelled him to abjure sixteen errors, rather extorted than extracted from his writings, suspended him from his see for five years, and secluded him to the Dominican cloister of Sta Maria sopra Minerva. Seven days after his abjuration he died, on the 2nd of May 1576. He was succeeded in his see by the inquisitor-general, Caspar Quiroga. Yet the Spanish people honoured him as a saint; Gregory XIII. placed a laudatory inscription on his tomb in the church of Sta Maria. His real crime was not heresy but

reform. His Summa Conciliorum ei Pontificum (Venice, 1546) has been often reprinted (as late as 1821), and has permanent value.

See P. Salazar de Miranda, Vida (1788); H. Laugwitz, Bartholomdus Carranza (1870); J. A. Llorente, Hist. Inquisition in Spain (English abridgment, 1826); Hefele in I. Goschler's Diet, encyclopedias de la thiol, cath. (1858). (A. Go.*)

CARRARA, or Carraresi, a powerful family of Longobard origin which ruled Padua in the 14th century. They take their name from the village of Carrara near Padua, and the first recorded member of the house is Gamberto (d. before 970). In the wars between Guelphs and GhibeUines the Carraresi at first took the latter side, but they subsequently went over to the Guelphs. This brought them into conflict with Ezzelino da Romano; Jacopo da Carrara was besieged by Ezzelino in his castle of Agna, and while trying to escape Was drowned. Another Jacopo led the Paduans in 131 2 against Cangrande della Scala, lord of Verona, and though taken prisoner managed to negotiate a peace in 13 18. To put an end to the perpetual civil strife the Paduans elected him their lord, and he seems to have governed well, leaving the city at his death (1324) to his nephew Marsiglio. a man famed for his cunning. But Cangrande was bent on acquiring Padua, and Marsiglio, unable to resist, gave it over to him and was appointed its governor. Cangrande died in 13 19, being succeeded by his nephew Martino, and Marsiglio soon began to meditate treachery; he negotiated with the Venetians in 1336, and in the following year he secretly in- troduced Venetian troops into Padua, arrested Alberto della Scala, Martino 's brother, then in charge of the town, and thus regained the lordship. He died in 1338, and was succeeded by his relative Ubertino, a typical medieval tyrant, who earned an unenviable notoriety for his murders and acts of treachery, but was also a patron of the arts; he built the Palazzo dei Principi, the castle of Este, constructed a number of roads and canals, and protected commerce. He died in 1345. His distant kinsman Marsiglietto da Carrara succeeded to him, but was immediately assassinated by Jacopo da Carrara, a prince famed as the friend of Petrarch. In 1350 Jacopo was murdered by Guglielmo da Carrara, and his brother Jacopino succeeded, reigning together with his nephew Francesco.

In 1355 Francesco (il Vecchio) rose against his uncle and imprisoned him. Francesco changed the traditional policy of his house by quarrelling with the Venetians, in the hope of obtaining more advantages from the Visconti of Milan. When the

former were at war with Hungary over Dalmatia in 1356 and asked Carrara to help them, he refused. Their resentment was all the more bitter when at the instance of the pope he mediated between them and Hungary and brought about peace on terms unfavourable to the republic. He received Feltre, Belluno and Cividale from the Hungarian king, but

in 1369 a frontier dispute led to war between him and Venice, After some defeats, Venice was victorious and dictated peace; Carrara had to pay a huge indemnity and ask the republic's pardon (1373). In 1378 he joined the league against Venice formed by Genoa, Hungary and the Scala, and took part in the siege of Chioggia. But the Venetians were victorious, and by the peace of Turin Carrara found himself in the status quo ante, but he bought Treviso from Austria, to whom Venice had given it in the day of her trouble. In 1385 the Venetians set the Scala against Carrara, who thereupon allied himself with the treacherous Gian Galeazzo Visconti. The Scala were expelled from Verona, but Carrara and Visconti quarrelled over the division of the spoils. Visconti was determined to capture Padua as well as Verona, and made an alliance with Venice and the house of Este for the purpose. Francesco, seeing that the situation Was hopeless, surrendered to Visconti, in whose hands he remained a prisoner until his death in 1392.

Francesco Novello, his son, resisted bravely, but was compelled to surrender owing to dissensions in Padua itself. He was forced to renounce his dominions, and received a castle near Asti, but he escaped to France, and after a series of romantic adventures succeeded in making peace with Venice, who was becoming alarmed at the restless ambition and treachery of Visconti; in 1390 he raised a small armed force and seized Padua, where he was enthusiastically welcomed by the citizens, and for several years reigned there in peace. But in 1399 Visconti recommenced his wars of conquest, which were to have included Padua had not death cut short his schemes in 1402. Carrara then allied himself with Guglielmo Scala, seized Verona, and tried to capture Vicenza. But the Vicentini had always hated the Carraresi, and after a short siege gave themselves over to Venice. This led to a war between that republic and Padua, for now that Visconti was dead the Venetians had no longer any reason to protect Carrara. Padua and Verona were besieged ; the latter, defended by Novello's son Jacopo, was soon captured. Novello himself, besieged in his capital, although repeatedly offered favourable terms, held out for some months hoping for help from Florence

and also from certain Venetian nobles with whom he was intriguing. Hunger, plague,- the treachery of his captains and internal discontent at last forced him to surrender (November 1405). He and his sons Francesco III. and Jacopo were conveyed to Venice, and at first treated with consideration; but when their intrigues with Venetian traitors for the overthrow of the republic came to light, they were tried, condemned, and strangled in prison (1406). Novello's other son Marsiglio made a desperate attempt to recover Padua in 1435, but was discovered and killed. With him the house of Carrara ceased from troubling.

Bibliography. — G. Gattaro, " Istoria Padovana," in Muratori's Rer. It. Script, xvii., a very full account; P. P. Vergerius, Vitae Carrarensium, ibid. xii.. untrustworthy; Verci, Storia della Marca Trivigjana (Venice, 1789); P. Litta, Le Famiglie celebri italiane, vol. iii. (Milan, 1831) ; W. Lenel, Studien zur Geschichte Paduas und Veronas im XIII. Jahrh. (Strassburg, 1893) ; G. Cittadella, Storia della Dominazione Carrarese in Padova (Padua, 1842) ; and Horatio Brown's brilliant essay on " The Carraresi " in his Studies in Venetian History (London, 1907). (L. V.*)

CARRARA, a town of Tuscany, Italy, in the province of Massa e Carrara, 390 ft. above sea-level, 3 m. by rail N.N.E. of Avenza, which is 16m. E.S.E. of Spezia. Pop. (1881) 26, 325; (1905) town, 38,100; commune, 48,493- The cathedral (1272- 1385) is a fine Gothic building dating from the period of Pisan supremacy; the other churches, and indeed all the principal buildings of the town, are constructed of the local marble, to which the place owes its importance. The Accademia di Belle Arti contains several Roman antiquities found in the quarries, and some modern works by local sculptors. A large theatre was inaugurated in 1892. Some of the quarries were worked in Roman times (see Luna), but were abandoned after the downfall of the western empire, until the growth of Pisan architecture and sculpture in the 12th and 13th centuries created a demand for it. The quarries now pxJend over almost the whole of the Apuan Alps, and some 600 of them are being worked, of whici.

345, with 4400 workmen, are at Carrara itself, and 50 (700 men) at Massa. The amount exported in 1899 was 180,000 tons. The quarries are served by a separate railway, with several branch

lines.

CARREL, JEAN BAPTISTE NICOLAS ARMAND (1800-1836), French publicist, was born at Rouen on the 8th of May 1800. His father was a merchant in good circumstances, and he received a liberal education at the college of Rouen, afterwards attending the military school at St Cyr. He had an intense admiration for the great generals of Napoleon, and his uncompromising spirit, bold uprightness and independent views marked him as a man to be suspected. Entering the army as sub-lieutenant he took a secret but active part in the unsuccessful conspiracy of Belfort. On the outbreak of war with Spain in 1823, Carrel, whose sympathies were altogether with the liberal cause, sent in his resig- nation, and succeeded in effecting his escape to Barcelona. He enrolled himself in the foreign legion and fought gallantly against his former comrades. Near Figuieres the legion was compelled to surrender, and Carrel became the prisoner of his old general, Damas. There was considerable difficulty about the terms of capitulation, and one council of war condemned Carrel to death. Fortunately some informality prevented the sentence being executed, and he was soon afterwards acquitted and set at liberty. His career as a soldier being then finally closed, Carrel resolved to devote himself to literature. He came to Paris and began as secretary to Augustin Thierry, the historian. His services were found to be of great value, and he not only obtained admirable training in habits of composition, but was led to in- vestigate for himself some of the most interesting portions of English history. His first work of importance (he had already written one or two historical abstracts) was the History of the Counter Revolution in England, an exceedingly able political study of the events which culminated in the Revolution of 1688. He gradually became known as a skilful writer in various periodi cals; but it was not till he formed his connexion with the National that he became a power in France. The National was at first conducted by Thiers, Mignet and Carrel in con- junction; but after the revolution of July, Thiers and Mignet assumed office, and the whole management fell into the hands of Carrel. Under his direction this journal became the first political organ in Paris. His judgment was unusually clear, his principles solid and well founded, his sincerity and honesty beyond question; and to these qualities he united an admirable style, lucid, precise and well balanced. As the defender of democracy he had fre- quently to face serious dangers. He was once in Ste Pedagie, and several times before the tribunal to answer for his journal. Nor was he in

less danger from private enmities. Before his last fatal encounter he was twice engaged in duels with editors of rival papers. The dispute which led to the duel with Emile de Girardin was one of small moment, and might have been amicably arranged had it not been for some slight obstinacy on Carrel's part. The meeting took place on the morning of the 22nd of July 1836. De Girardin was wounded in the thigh, Carrel in the groin. The wound was at once seen to be dangerous, a nd Carrel was conveyed to the house of a friend, where he died after two days' suffering.

His works, with biographical notice by Littre, were published in five volumes (Paris, 1858), A fine estimate of his character will be found in Mill's Dissertations, vol. i.

CARRERA, JOSE MIGUEL (1785-1821), the principal leader in the early fighting for the independence of Chile, was born at Santiago on the 15th of October 1785. Sent to Spain for a military career, he served in the Spanish army in the Napoleonic war, but returned to Chile in July 1811, where his vigorous character and military experience enabled him by means of a series of coup d'etats to place himself at the head of the nationalist government. Though at first he laboured patriotically to establish a stable administration, to promote education, and to organize the Chilean forces, his selfish arrogant spirit produced dissensions between himself and other patriots, and it was his rivalry with Bernardo O'Higgins that led to the defeat of the nationalist forces at Rancagua in 1814. In the expedition of

1817, led by Jose de San Martin and Bernardo O'Higgins, which resulted in the liberation of Chile, Carrera had no share, owing to his hostility to the leaders, but he attempted to procure in the United States materials for a fresh enterprise of his own. The Argentine government, however, suspicious of his intentions, would not allow him to go to Chile, and Carrera, enraged by this treatment and by the execution of his brothers at Mendoza by the San Martin party, proceeded to organize rebellion in Ai gentina, but was eventually captured and shot at Mendoza on the 4th of September 1821.

See A. Valdes, Revolution Chilena y Campar.as de la Independencia (Santiago, 1888), which is practically a vindication of Carrera's

career; also P. B. Figueroa, Diccionario biografico de Chile, 1550-1887 (Santiago, 1888), and J. B. Suarez, Rasgos biograficos de

homores

notables de Chile (Valparaiso, 1886), both giving biographical sketches of prominent, characters in Chilean history.

CARRIAGE, a term which in its widest signification is used, as its derivation permits, for any form of ” carrying “; thus, a person’s ” carriage ” is still spoken of in the sense of the way he bears himself. But it is more specifically the general term for all vehicular structures employed for the purposes of trans- port of merchandise and movable goods and of human beings. Such vehicles are generally mounted on wheels, but the sledge and the litter are types of the exception to this rule. Within this definition a vast variety of forms is included, ranging from the coster’s barrow and rude farm-cart up to the luxuriously ap- pointed sleeping-cars of railways and the state carriages of royal personages. A narrower application, however, limits the term to such vehicles as are used for the conveyance of persons and are drawn by horses, and it is with carriages in this restricted sense that we are here concerned. Tramcars, railway carriages and motor-cars are dealt with in other articles.

History. — A wheeled carriage appears to have been in very general use in Egypt at an early period, called a car or chariot (q.v.); in the Bible the word is usually translated “chariot.” The bodies of these chariots were small, usually containing only two persons standing upright. They were very light, and could be driven at great speed. They were narrow, and therefore suitable to Eastern cities, in which the streets were very narrow, and to mountainous roads, which were often only 4 ft. wide. From Egypt the use of chariots spread into other countries, and they were used in war in large numbers on the great plains of Asia. We read of the 900 chariots of Jabin, king of Canaan; how David took 700 chariots from the kings of Syria and 1000 from the king of Zobah. Solomon had 1400 chariots, and his merchants supplied northern Syria and the surrounding countries with chariots brought out of Egypt at 600 shekels (about £50) apiece. From the ancient sculptures preserved from Nineveh and Babylon, some of which are in the British Museum, we observe the use of chariots continued for the purpose of hunting as well as for war. Homer describes the chief warriors on both sides at the siege of Troy as going into battle and fighting from their chariots. The Roman nation as it increased in power adopted the car, though chiefly for purposes of show and state. A beautiful marble model of one of these still exists at the Vatican in Rome: a copy of it and the

horses drawing it is in the museum at South Kensington. The war chariots used by the Persians were larger; the idea seems to have been to form a sort of turret upon the car, from which several warriors might shoot or throw their spears. These chariots were provided with curved blades projecting from the axle-trees. Alexander the Great, king of Macedon, invading Asia was met upon the banks of the river Indus by King Porus, in whose army were a number of elephants and also several thousand chariots. On Alexander's return from India towards Persia, he travelled in a chariot drawn by eight horses, followed by an innumerable number of others covered with rich carpets and purple coverlets. After Alexander's death a funeral car was prepared to convey his body from Baby- lon to Alexandria in Egypt, and this car has perhaps never been excelled in the annals of coach-building. It was designed by the celebrated architect Hieronymus, and took two years to build. It was 18 ft. long and 12 ft. wide, on four massive wheels, and drawn by sixty-four mules, eight abreast. The car was composed

of a platform, with a lofty roof, supported by eighteen columns, and was profusely adorned with drapery, gold and jewels; round the edge of the roof was a row of golden bells; in the centre was a throne, and before it the coffin; around were placed the weapons of war and the armour that Alexander had used.

The Romans established the use of carriages as a private means of conveyance, and with them carriages attained great variety of form as well as richness of ornamentation. In all times the employment of carriages depended greatly on the condition of the roads over which they had to be driven, and the establishment of good roads, such as the Appian Way, constructed 331 B.C., and others, greatly facilitated the development of carriage travelling among the Romans. In Rome itself, and probably also in other large towns, it was necessary to restrict travelling in carriages to a few persons of high rank, owing to the narrowness and crowded state of the streets. For the same reason the transport of goods along the streets was forbidden between sunrise and sunset. For long journeys and to convey large parties the reda and carruca appear to have been mostly used, but what their construction and arrangements"were is not known. During the empire the carriage which appears in

representations of public ceremonials is the carpentum. It is very slight, with two wheels, sometimes covered, and generally drawn by two horses. If a carriage had four horses they Were yoked abreast, among the Greeks and Romans, not in two pairs as now. From the carruca are traced the modern European names, — the English carriage, the French carrosse and the Italian carrozza. The sir pea was a very ancient form of vehicle, the body of which was of osier basket-work. It originated with the Gauls, by whom it was named lenna, and by them it was employed for the conveyance of persons and goods in time of peace, and baggage during war. With its name are connected the modern French banne, banneton, vannerie and panier, — all indicating basket-work.

The ancient Britons used a car for warlike purposes which was evidently new to the Romans. It was open in front, instead of at the back as in their cars; and the pole, which went straight out between the horses, was broad, so that the driver could walk along, and if needful drive from the end. Above all, it possessed a seat, and was called essedum from this peculiarity. For war purposes this car was provided with scythes projecting from the ends of the axle-trees. Cicero, writing to a friend in Britain, remarks ” that there appeared to be very little worth bringing away from Britain except the chariots, of which he wished his friend to bring him one as a pattern.”

The Roman vehicles were sometimes very splendidly ornamented with gold and precious stones; and covered carriages seem more and more to have become appendages of Roman pomp and magnificence. Sumptuary laws were enacted on account of the public extravagance, but they were little regarded, and were altogether abrogated by the emperor Alexander Severus. Suetonius states that Nero took with him on his travels no less than a thousand carriages.

On the introduction of the feudal system the use of carriages was for some time prohibited, as tending to render the vassals less fit for military service. Men of all grades and professions rode on horses or mules, and sometimes the monks and women on she-asses. Horseback was the general mode of travelling; and hence the members of the council, who at the diet and on other occasions were employed as ambassadors, were called Rittmeister. In this manner also great lords made their public entry into cities.

Covered carriages (see Coach) were known in the beginning of the 15 th century, but their use was confined to ladies of the first rank; and as it was accounted a reproach for men to ride in them, the electors and princes sometimes excused their non- attendance at meetings of the state by the plea that their health would not permit them to ride on horseback. Covered carriages were for a long time forbidden even to women; but about the end of the 15th century they began to be employed by the emperor, kings and princes in journeys, and afterwards on state occasions. In 1474 the emperor Frederick III. visited Frankfort in a close carriage, and again in the following year in a very

magnificent covered carriage. Shortly afterwards carriages began to be splendidly decorated; that, for instance, of the electress of Brandenburg at the tournament held at Ruppin in 1 509 was gilded all over, and that of the duchess of Mecklen- burg was hung with red satin. When Cardinal Dietrichstein made his entrance into Vienna in 16 n, forty carriages went to meet him; and in the same year the consort of the emperor Matthias made her public entrance on her marriage in a carriage covered with perfumed leather. The wedding carriage of the first wife of the emperor Leopold, who was a Spanish princess, cost, together with the harness, 38,000 florins. Those of the emperor are thus described: ” In the imperial coaches no great magnificence was to be seen; they were covered over with red cloth and black nails. The harness was black, and m the whole work there was no gold. The panels were of glass, and on this account they were called the imperial glass coaches. On festivals the harness was ornamented with red silk fringes. The imperial coaches were distinguished only by their having leather traces; but the ladies in the imperial suite were obliged to be contented with carriages the traces of which were made of ropes.” At the magnificent court of Duke Ernest Augustus at Hanover, in 1681, there were fifty gilt coaches with six horses each. The first time that ambassadors appeared in coaches on a public solemnity was at the imperial commission held at Erfurt in 16 13. Soon after this time coaches became common all over Germany, not-withstanding various orders and admonitions to deter vassals from using them. These vehicles appear to have been of very rude construction. Beckmann describes a view he had seen of Bremen, painted by John Landwehr in 1661, in which was represented a long quadrangular carriage, apparently not suspended by straps, and covered with a canopy supported by four pillars, but without curtains. In the side was a small door, and in front a low seat or

box; the coachman sat upon the horses; and the dress of the persons within proved them to be burgomasters. At Paris in the 14th, 15 th and even 16th cen- turies, the French monarchs rode commonly on horses, the servants of the court on mules, and the princesses and principal ladies sometimes on asses. Persons even of the highest rank sometimes sat behind their equerry on the same horse. Car- riages, however, were used at a very early period in France; for there is still extant an ordinance of Philip the Fair, issued in 1294, by which citizens' wives are prohibited from using them. It appears, however, that about 1550 there were only three carriages at Paris, — one belonging to the queen, another to Diana of Poitiers, and the third to Rene de Laval, a very cor- pulent nobleman who was unable to ride on horseback. The coaches used in the time of Henry IV. were not suspended by straps (an improvement referred to the time of Louis XIV.), though they were provided with a canopy supported by four ornamental pillars, and with curtains of stuff or leather. ■ Occasional allusion is made to the use of some kinds of vehicles in England during the middle ages. In The Squyr of Low Degree, a poem of a period anterior to Chaucer, a description of a sump- tuous carriage occurs:

" To-morrow ye shall on hunting fare

And ride, my daughter, in a chare.

It shall be cover'd with velvet red,

And cloth of fine gold all about your head,

With damask white and azure blue

Well diaper'd with lilies new."

Chaucer himself describes a chare as

" With gold wrought and pierrie."

When Richard II. of England, towards the end of the 14th century, was obliged to fly before his rebellious subjects, he and all his followers were on horseback, while his mother alone used a carriage. The oldest carriages used in England were known as chares, cars, chariots, caroches and whirlicotes; but these became less fashionable when Ann, the wife of Richard II., showed the English ladies how gracefully she could ride on the side-saddle, Stow, in his Survey of London, remarking, " so was

riding in those whirlicotes and chariots forsaken except at coronations and such like spectacles."

CARRIAGE

403

There were curious sumptuary laws enacted during the 16th century in various Italian cities against the excessive use of silk, velvet, embroidery and gilding, on the coverings of coaches and the trappings of horses. In 1564 Pope Pius IV. exhorted the cardinals and bishops not to ride in coaches, according to the fashion of the times, but to leave such things to women, and themselves ride on horseback. The use of coaches in Germany in the 16th century was not less common than in Italy. The current of trade, especially from the East, had for a long time poured into those two countries towards Holland, enriching all the cities in its progress. Macpherson, in his History of Commerce, says that Antwerp possessed 500 coaches in 1560. France and England appear to have been behind the rest of Europe at this period.

The first coach in England was made in 1555 for the earl of Rutland by Walter Rippon, who also made a coach in 1556 for Queen Mary, and in 1564 a state coach for Queen Elizabeth. That one of the carriages used by Queen Elizabeth could be opened and closed at pleasure may be inferred from her causing at Warwick during one of her progresses — " every part and side of her coach to be opened that all her subjects present might behold her, which most gladly they desired."

Coaches of the type now properly so-called were first known in England about the year 1580, and were introduced, according to Stow, from Germany by Henry Fitzalan, 12th earl of Arundel. By the beginning of the 17th century the use of coaches had become so prevalent in England that in 1601′ the attention of parliament was drawn to the subject, and a bill " to restrain the excessive use of coaches " was introduced, which, however, was rejected on the second reading. Their use told severely on the occupation of the Thames watermen, and Taylor the poet and waterman complained bitterly both in prose and verse against the new-fangled practice: —

" Carroaches, coaches, jades, and Flanders mares Doe rob us of our shares, our wares, our fares. Against the ground we stand and knock our heels Whilest all our profit runs away on

wheeles."

The sneers of wits and watermen notwithstanding, coaches became so common, that in the early part of the 17 th century they were estimated to number more than 6000 in London and its surrounding country.

We now arrive gradually at the modern conception of carriage-building. No trace of glass windows or complete doors for coaches seems to have existed up to 1650. But plain and rude as was the first coach of Louis XIV., it was in his reign, which lasted till 1 715, that the most rapid progress was made. The credit for this is equally due to Germany, Italy, France and England. There is very little mention made by historians of steel springs, but they were first applied to wheel carriages about 1670, prior to which bodies were suspended by long straps from the four corners to pillars erected upon the under carriage. The great advantage of the introduction of springs was speedily recognized as reducing vibration, enabling carriages to be built much lighter and lessening the draught for the horses. In the diary of Samuel Pepys there are many amusing and interesting references to the art of coach-building, which was beginning to attract much attention at that period.

In the French Encyclopedic (1772) by Diderot there are elaborate descriptions of the art of coach-building, the workshops and tools used, and plates of the different carriages in use. The 1 8th century is remarkable for the rapid development which took place, more especially in the manufacture of state carriages of a sumptuous and ornate character, which were largely in demand by the various courts of Europe. One of the most beautiful of these is that belonging to the imperial family of Vienna, which was built in 1696, and is shaped with all the curves that are familiar to us in cabinets and furniture of the style of Louis XIV. The panels are beautifully painted with nymphs in the style of Rubens. There is an unusual quantity of plate glass in the panels, and on the centre of the roof is a large imperial crown. In 1757 was built the elaborate state coach of the city of London, and in 1761 the royal state coach of England, built for

King George III. (see Coach). During the reigns of George II. and George III. all English manufactures had received an immense impulse from the energy of the men of the time, in which they were much encouraged by the action of the Society of Arts in offering money prizes for improvements; and in these coach-

builders largely participated.

In the year 1804 Obadiah Elliot patented his plan for hanging vehicles upon elliptical springs, thus dispensing with the heavy wood and iron perch and cross beds, invariably used in four-wheeled carriages up to that time. Elliot was rewarded by the grant of a gold medal by the Society of Arts, and extensive orders for the carriages of a lighter character, which he was thus enabled to produce.

Of carriages much in fashion and characteristic of this period may be mentioned the ” curricle,” a cabriolet (see below) on two wheels, driven with a pair of horses, the balance being secured by an ornamental bar across the horses’ backs, connected by a leather brace to a spring under the pole. For lack of perfect safety this was gradually superseded by the ” gentleman’s cabriolet,” for one horse, on C springs, fitted with folding leather hood and platform behind, on which stood a youthful trim servant in top-boots, popularly termed a ” tiger.” To produce this satisfactorily, the best coach-building talent was required, and to work it a horse of exceptional strength and breeding was needful, but when complete this equipage had a distinction never surpassed. During this period the pair-horse ” mail phaeton ” was introduced, and has enjoyed a long period of popularity. As a travelling carriage with the needful appoint- ments the ” britzska,” having a straight body with ogee curves at front and back, with single folding hood, and hung on C springs, was a distinctive and popular feature among carriages of the period from 1824 until after 1840. Of two- wheeled vehicles the ” stanhope ” and ” tilbury ” gigs, the ” dog cart ” and ” tandem cart,” came into use during these years, and have afforded facilities of agreeable locomotion to many thousands of people at a moderate cost. But the greatest improvement of this period was the introduction of the ” brougham.” Several attempts had been made to arrive at a light carriage of this description, but it was not until 1839 that a carriage was produced to a design adopted by Lord Brougham, and called after him. The ” vic- toria ” was known as a carriage for public hire in continental cities for several years before being adopted as a fashionable carriage by the wealthy classes. In 1869 the prince of Wales brought one from Paris of the cab shape, and Baron Rothschild brought one from Vienna of the square shape, examples speedily followed. In various elegant and artistic forms, either as an elliptic or C spring, it has since become a most popular and convenient carriage.

Public carriages for hire, or hackney (q.v.) coaches, were first established in London in 1625. In 1635 the number was restricted to fifty. Still they increased, notwithstanding the opposition of the court and king, who thought they would break up the roads, till in 1650 there were as many as 300. In Paris they were introduced during the minority of Louis XIV. by Nicholas Sauvage, who lived in the rue St Martin at the sign of St Fiacre, from which circumstance hackney carriages in Paris have since been called fiacres. In 1694 the number in London had increased to 700. Many of these were old private coaches of the nobility and gentry, and it was not until 1790 that coaches on a smaller scale were built specially for hackney purposes (see Coach).

We are told that in 1673 there were stage coaches from London to York, to Chester and to Exeter, having each forty horses on the road, and carrying each six inside-passengers. The coach occupied eight days travelling to Exeter. In 1706 a coach went from London to York every Monday, Wednesday and Friday, performing the journey in four days. In the same year there was a coach from London to Birmingham starting on Monday and arriving on Wednesday. In 1754 a coach was started from Manchester called the flying coach, which was advertised to reach London in four days and a half. In 1784 coaches became universal at the speed of 8 m. an hour.

In the year 1786 the prince of Wales, afterwards George IV., began to erect the pavilion at Brighton, and this led to a great increase of traffic, so that in 1820 no less than 70 coaches daily visited and left Brighton. The number continued to increase, until in 1835 there were as many as 700 mail coaches throughout Great Britain and Ireland. The system of road construction introduced by Mr McAdam during this time was of great value in facilitating this development.

Notwithstanding the competition of the sedan-chair (q.v.), the hackney-coach held its place and grew in importance, till it was supplanted about 1820 by the cabriolet de place, now shortened into ” cab ” (q.v.), which had previously held a most important place in Paris. In that city the cabriolet came into great public favour about the middle of the 18th century, and in the year 1813 there were n 50 such vehicles plying in the Parisian streets.

The original cabriolet was a kind of hooded gig, inside which the driver sat, besides whom there was only room left for a single passenger. For hackney purposes Mr Boulnois introduced a four-wheeled cab to carry two persons, which was followed by one to carry four persons, introduced by Mr Harvey, the proto- type of the London ” four-wheeler.”

The hansom patent safety cab (1834) owes its invention to J. A. Hansom (q.v.), the architect of the Birmingham town-hall. This has passed through many stages of improvement with which the name of Forder of Wolverhampton is conspicuously associated.

The prototype of the modern ” omnibus ” first began plying in the streets of Paris on the 18th of March 1662, going at fixed hours, at a stated fare of five sous. Soldiers, lackeys, pages and livery servants were forbidden to enter such conveyances, which were announced to be pour la plus grande commodite et libertt des personnes de merite. In the time of Charles X. the omnibus system in reality was established; for no exclusion, of any class or condition of person who tendered the proper fare was permitted in the vehicles then put on various routes, and the fact of the carriages being thus ” at the service of all ” gave rise to the present name. The first London omnibus was started in July 182Q by the enterprising Mr Shillibeer. The first omnibuses were drawn by three horses abreast and carried twenty-two passengers, all inside. Though appearing unwieldy they were light of draught and travelled speedily. They were, however, too large for the convenience of street traffic, and were superseded by others carrying twelve passengers inside. In 1849 an outside seat along the centre of the roof was added. The London General Omnibus Company was founded in 1856; since then continual improvements in this system of public conveyance have been introduced.

Modern Private Carriages.— At the accession of Queen Victoria the means of travelling by road and horse-power, in the case of public coaches, had reached in England its utmost limits of speed and convenience, and the travelling-carriages; of the nobility and the wealthy were equipped with the completest and most elaborate contrivances to secure personal comfort and safety. More particularly was this the case as regards continental tours, which had become indispensable to all who had at their command the means for this costly educational and pleasurable experience. Concurrently with this development the style and character of court equipages had also reached a consummate

degree of splendour and artistic excellence. Not only was this the case in points of decoration, in which livery colour and heraldic devices were effectively employed, but also in the beauty of outline and skilful structural adaptation, in which respect carriages of that period made greater demands upon the capacity of the builder and the skill of the workman than do those of the present day. For this attainment the art of coachmaking was indebted to a very few leading men, whose genius has left its impress upon the art, and is still jealously cherished by those who in early life had experience of their achievements. The early portion of Queen Victoria's reign was an age of much emulation; the best-equipped carriages of that period, dis- tinctive of noble families and foreign embassies, with their graceful outline and superb appointments, and harnessed to a splendid breed of horses — all harmoniously blended, perfect in

symmetry and adaptation— gave to the London season, more especially on drawing-room days, and at other times in Hyde Park, an attractiveness unequalled in any other capital. After the death of the prince consort, the pageantry of that period very much declined and, except as an appendage of royalty, full- dress carriages have since been comparatively few, though there are hopes of a revival in this direction. Meanwhile, owing to the rapid development of railways and the wide extension of commerce, the demand for carriages greatly increased. The larger types gave place to others of a lighter build and more general utility, in which in some cases an infusion of American ideas made its appearance. In accordance with the universal rule of supply meeting the demand, Mr Stenson, an ironmaster of Northampton, was successful in producing a mild forging steel, which proved for some years, until the manufacture ceased, very conducive to the object of securing lightness with strength. In the early 'seventies the eminent mechanician, Sir Joseph Whitworth, in the course of his scientific studies in the perfecting of artillery, succeeded in manufacturing a steel of great purity, perfectly homogeneous and possessing marvellous tenacity and strength, known as " fluid compressed steel." Incidentally carriage-building was able to participate in the results of this discovery. Two firms well known to Sir Joseph were asked to test its merits as a material applicable to this industry. In this test much difficulty was experienced, the nature of the steel not being favourable to welding, of which so much is required in the making of coach ironwork; but after much perseverance by skilful hands this was at length accomplished, and for some years

there existed not a little rivalry in the use of this material, more especially in the case of carriages on the C and under- spring principle, which for lightness, elegance and luxurious riding left nothing to be desired. Many of these carriages may be referred to to-day as rare examples of constructive skill. Unfortunately, the original cost of the material, still more of the labour to be expended upon it, and the difficulty of educating men into the art of working it, were effectual barriers to its general adoption. The idea, however, had taken hold, and attention was given by other firms to the manufacture of the steel now in general use, admitting of easier application, with approximate, if not equal, results.

From C and under-spring carriages there arose another application of springs which was very prominently before the public during this period, by means of which it was professed that two drawbacks recognized in the C and under-spring carriages were obviated, which were caused by the perch or bar which passes under the body holding the front and hind parts in rigid connexion, and yet making use of a form of spring to which the same terms may be applied. These objections are the weight of the perch, and the limitation which it causes to the facility of turning, which in narrow roads and crowded thoroughfares is an inconvenience. The objection to weight is, however, minimized by the introduction of steel, and as the more advanced builders almost always construct the perch with a

Fig. 1. forked arch in front, allowing the wheels to pass under, the difficulty of a limited lock is in a great measure overcome (fig. 1). It must be noted, however (and this cannot be too emphatically stated), that the so-called C springs above referred to are not at all the same in action as the C spring proper; they are but an elongation of the ordinary elliptic spring in the form of the letter C (fig. 2), without adding anything to, but rather lessening their elasticity, and entirely ignoring the principle of suspension

by leather braces over the C spring proper, by which alone the advantage of superior ease is to be obtained.

Another improvement which stamps the period under review is

the introduction of indiarubber for the tires of wheels. To produce a carriage as nearly as possible free from noise and rattle has always been the aim of high-class coachmaking. A structure composed of wood, iron and glass, with axle-trees,

doors, windows, lamps and other parts, in use upon the road in all weathers, must from time to time require some attention with this object. To meet this difficulty, the introduction of indiarubber has been received by carriage-users as a great boon! It was about the year 1852 that Mr Reading, who at that time was known as a builder of invalid carriages, conceived the idea of encircling wheels with that material, but his method only admitted of its use on vehicles travelling slowly over good roads. This was improved upon at a later date by Uriah Scott, who, taking advantage of the tempering capacity of indiarubber by the chemical action of sulphur, produced an inner rim of such density as to hold bolts, by which it could be secured through the felloe, forming a base for the outer covering of soft pliable rubber. This system was attended with satisfactory results, and was in favour for some years with persons whose health needed such provision. Another method, originated by Mr Mulliner of Liver- pool in the early 'seventies, was to screw on iron flanges to the outer and inner sides of the felloes, having a kind of lip to press into the indiarubber filling the intervening space; but the cost of this — £36 per set — rendered its adoption prohibitive. Mean- while another invention by Uriah Scott, afterwards improved upon by an American patentee, came into use; this was known as the " rubber-cushioned axle," cylindrical rings being introduced between the axle-box and hub of the wheel, thus insulating the body of the carriage from the concussion of the road. This, however, necessitated the cutting away of so much of the timber of the hub as to impair its durability, and had, therefore, after a few years' experience, to be abandoned in favour of an invention by a Parisian builder, who introduced indiarubber bearings between the spring and axle-tree. This was thoroughly practi- cable, and met with general acceptance, and it is still used in conjunction with iron and steel tires. In 1890 the pneumatic tire was first applied to road carriages. Its bulky appearance is a great drawback, contrasting strongly with the qualities which distinguish a graceful equipage; and in spite of its practical advantages it never became popular in England or America. In Paris and its neighbourhood and many parts of France, pneumatic tires are to be seen in frequent use both on public and private conveyances. In another form the indiarubber

_, , v tire has become of almost universal applica-

\ tion. Owing to an ingenious invention of

Mr Carment, what appeared to be an in- superable difficulty in rolling a grooved tire was overcome (fig. 3). This so simplified the application as to bring the cost within practicable limits. The grooved tire is now

Fig. 3.

made in several sections, in some of which the inward projection for securing the rubber is dispensed with, this being kept in position by wires running through the whole length, and electrically welded at the point of contact. Whatever be the method chosen for securing the tire, the best tires, both for durability and ease, are those in which the rubber provided is most resilient in its nature.

For the lifting and lowering of the hoods of victorias and other such carriages* and the opening and closing of landaus, there are now many automatic contrivances, of which the simplest are the most to be preferred. The quarter-light or five-glass landau is a carriage which has been greatly improved. The complicated adjustments of pillars, windows and roof have been .replaced by one simple parallel movement. The first public exhibition of a finished carriage on this principle was by an English firm at the Paris Exhibition of 1876 (fig. 4).

In the matter of style certain types of carriages have passed through marked changes. Extreme lightness was at one time considered by many the one desideratum both as to appearance and actual weight, in providing which ease of movement and comfortable seating of the occupants became secondary considerations—though to these extremes builders of repute were always opposed. Still, when at the International Exhibition of Paris 1889, it was seen that the Parisian builders had suddenly, gone in the opposite direction, the world of fashion in carriages was taken by surprise. From being built upon easy, flowing, graceful lines, it was seen, with some revulsion of feeling, that

Fig. 4.

these were to be displaced by the deep, full-bodied victoria, brougham and landau. Only by slow degrees did this characteristic find acceptance with English connoisseurs, and then only in

a modified form, though eventually in a greater or less degree it is now the prevailing style.

While the better types of English carriages are still pre- eminent in their constructive qualities, and represent the well-known characteristics of individual firms, some emulation may be excited by the elegant taste and careful workmanship which French builders display in points of finish, both internally and externally. Of the various types of carriages now in vogue, the victoria, in its many varieties of form, is the most popular, accompanied, a's of necessity, by the double victoria, sociable, brougham, landaulet and landau. Four-in-hand coaches for private use, as well as the " road " coaches, are built on a smaller scale than formerly; 6 ft. 8 in. may now be taken as the standard height of the roof from the ground. Owing to the encouragement given by the Four-in-hand and Coaching Clubs, the ascendancy of this style of driving is still preserved to Great Britain; and in association with it the char-a-banc, mail phaeton, wagonette, and four-wheel dog-cart retain their popularity. Of two- wheeled vehicles the polo-cart and ralli-cart are most in favour, to which may be added the governess-car, which is found con- venient for many purposes not implied by its name. For a few years an effort was made, but with very indifferent success, to bring into fashion the tandem-cart, which may again be con- sidered almost obsolete in England.

: America has long held a prominent position in connexion with the carriage industry. In all the chief cities manufactories on a colossal scale are to be found, producing thousands of vehicles annually and equipped with the most perfect labour-saving machinery; and as vehicles of any particular pattern — many of small value — are required, not singly, but in large numbers, much economy is exercised in their manufacture. It is remarkable that, as a contrast to the popular buggy, wagon and rockaway of the United States, which are to be found in infinite variety, carriage establishments of the wealthy are not considered complete unless furnished with some of a European character, selected from the

most eminent firms of London or Paris, in addition to others of their own manufacture. In Paris preference is given to an excess

of bulk, with elaborate scroll ornamentation and diminu- tive windows, forming indeed, by reason of its exaggeration, a distinctive class. In respect of workmanship and finish, carriages by the best-known American builders leave nothing to be desired.

The International Exhibition of Paris 1900 brought together examples from various continental countries, in some of which a preference for curvilinear outline was displayed, but the best examples followed very closely the well-known English styles. In the French section it was interesting to find a revival of the once all-prevailing chariot, barouche and britzska, suspended on C and under-springs, with perch, but with ideas of lightness somewhat out of proportion to their general character.

Coach-making, or the carriage-manufacturing industry, is a combination of crafts rarely united in one trade, embracing as it does work in such divers materials as wood, iron, steel, brass, cloth, silk, leather, oils and colours, glass, ivory, hair, indiarubber, &c. Many divisions of labour and numerous highly-skilled artisans are consequently employed in the various stages in the construction of a high-class carriage. The workmen include body-makers, who build up the parts in which persons sit; carriage-makers, who make and fit together all the under parts of the vehicle on which the body rests; wheelwrights, joiners and fitters; several classes of smiths, for special work connected with the strengthening of the body frame- work by means of long edge plates, the construction of under works, tiring and wheels, manufacture of springs, axle-trees, &c. Painting is an important part- of the business, those professing it being divided into body, carriage and heraldry painters. Trimmers are needed who fit up the upholstery of the interior, and budget trimmers who sew on the patent leather covering to dasher wings, &c.

A very great deal in the coach-making industry depends upon the selection of materials. Ash is the kind of wood required in the framework both of body and carriage. The quality best suited for the body is that of full-grown mild and free nature ; for the carriage that which is strong and robust ; that for carriage-poles should be of younger growth, straight and tough in quality. An important con- sideration is the seasoning of this timber. Planks of various thick- nesses are required, varying from 1 1 in. to 6 in., the time required for seasoning being one year for every inch of thickness. After the framework is made, the body is panelled with | in. mild Honduras mahogany, plain and free from grain,

every joint and groove care- fully coated with ground white lead to exclude water. The roof is covered with i in. wide pine boards, unless when superseded by an American invention, by which, in order to obtain the needful width frequently of 5 ft. or upwards, boards are cut from the circumference of the tree, instead of through its diameter; three thicknesses of very thin wood are then glued together under pressure, the grain of the centre running across the outer plies, the whole forming a solid covering without joints. Birch and elm of I in. thickness also enter into the construction in many carriages; for floor and lining boards pine is the material used.

Wheel-making is a very important branch of the business, in which, owing to the increased lightness now required, many modern improvements have been introduced. The timber used in an ordinary carriage wheel is wych elm for the naves, heart of oak for the spokes, and ash for the felloes. American hickory has of late years been also largely used for spokes in exceptionally light wheels, as well as the American method of making the rim in two sections of straight-grained ash or hickory bent to the required circle. This method has much to recommend it, more especially for wheels with indiarubber tires, in which the wood felloes are not required to be nearly so deep as for steel tires. One well-known feature in light wheels is the ” Warner nave,” which is a solid iron casting with mortices to receive the spokes, and being of small diameter gives the wheel a light appearance.

For springs the finest quality of steel is made from Swedish ore, but the ordinary English spring steel by the best makers leaves nothing to be desired. To secure the most perfect elasticity it is important that the tapering down of the ends of each plate should be done by hand labour on the anvil, and that the plates should not be more than \ in. in thickness. To obtain cheapness wholesale spring-makers adopt the method of squeezing the ends of spring plates between eccentric rollers, and so produce the tapered form, which, however, is too short and gives a lumpy and unsightly appear- ance to the spring when put together, so that by this they lose much of their pliability.

The iron mounting of coach work requires the skill of experienced smiths, and gives scope for much taste and judgment in shaping the work, and providing strength suited to the relative strain to which it will be subjected. Axle-trees are not made by coach- builders, but by firms who make it their special business. They are of two kinds, the ” mail,” which are secured to the

wheel by three

bolts passing through the nave, and the “collinge” (invented in 1792), the latter made secure by gun- metal cone-shaped collets and nuts. The axle boxes which are wedged into the nave are of three kinds, cast, chilled and wrought iron, in all cases case-hardened, the first being the cheapest and the last the most costly. Many attempts have been made to improve upon the collinge axle-tree, but none of them has got far beyond the experimental stage.

No branch of coach-building contributes more to the elegance of the vehicle than that of painting. To obtain the needful perfection the work has to pass through several stages before reaching the finishing colour, which must be of the finest quality. The varnish used is copal, of which there are two kinds, the one for finishing the body, the other the carriage. In first-class work as many as eighteen or twenty coats will be required to complete the various stages. After a carriage has been in use about twelve months, it is practicable to revive the brilliant gloss on the panels by hand-polishing with the aid of rottenstone and oil, a process which requires a specially trained man to do successfully.

The trimming of the interior of a carriage requires much skill and judgment on the part of the workmen in providing really comfortable, well-fitted seats and neatness of workmanship. In the middle of the 19th century figured tabaret or satin were much used, but for many years past morocco has been almost universally preferred. Silk lutestring spring curtains, Brussels or velvet pile carpet, complete the interior, unless are added neat morocco covered trays with mirror, &c, for ladies’ convenience. Electric light is now frequently used for the interior, and can be applied with much neatness and efficiency. Road lamps, door handles, polished silver or brass furniture, are supplied to the coach-builder by firms whose special business it is to make them. Lever brakes are now a very ordinary requirement. Much judgment is needful to make them efficient, and careful workmanship to prevent rattle. Indiarubber is the best material for blocks applied to steel tires, and cast iron for indiarubber tires. The ” Bowden wire ” recently introduced is in some cases a convenient and light alternative to the long bar connecting the handle with the hind cross levers, and has the advantage of passing out of sight through the interior of the body. (J. A. M’N.)

CARRICKFERGUS, a seaport and watering-place of Co. Antrim,

Ireland, in the east parliamentary division; on the northern shore of Belfast Lough, 95 m. N.E. of Belfast by the Northern Counties (Midland) railway. Pop. of urban district (1901) 4208. It stretches for about 1 m. along the shore of the Lough. The principal building is the castle, originally built by John de Courci towards the close of the 12th century, and subsequently much enlarged. It stands on a projecting rock above the sea, and was formerly a place of much strength. It is still maintained as an arsenal, and mounted with heavy guns. The ancient donjon or keep, 90 ft. in height, is still in good preservation. The town walls, built by Sir Henry Sidney, are still visible on the west and north, and the North Gate remains. The parish church of St Nicholas, an antiquated cruciform structure with curious Elizabethan work in the north transept, and monuments of the Chichester family, was originally a chapel or oratory dependent on a Franciscan monastery. The entrance to a subterranean passage between the two establishments is still visible under the communion-table of the church. The gaol, built on the site of the monastery above mentioned, was formerly the county of Antrim prison. The court-house, which adjoins the gaol, is a modern building. The town has some trade in domestic produce, and in leather and linen manufactures, there being several flax spinning-mills and bleach-works in the immediate neighbourhood. Distilling is carried on. The harbour admits vessels of 500 tons. The fisheries are valuable, especially the oyster fisheries. At Duncrue about 2 m. from the town, rock salt of remarkable purity and in large quantity is found in the Triassic sandstone. The neighbouring country is generally hilly, and Slieve True (1100 ft.) commands a magnificent prospect.

In 1182, John de Courci, to whom Henry II. had granted all the parts of Ulster he could obtain possession of by the sword, fixed a colony in this district. The castle came in the 13th century into possession of the De Lacy family, who, being ejected, invited Edward Bruce to besiege it (1315)- After a desperate resistance the garrison surrendered. In 1386, the town was burned by the Scots, and in 1400 was destroyed by the combined Scots and Irish. Subsequently, it suffered much by famine and the occasional assaults of the neighbouring Irish chieftains, whose favour the townsmen were at length forced to secure by the payment of an annual tribute. In the reign of Charles I.many Scottish Covenanterssettledinthe neighbourhood

to avoid the persecution directed against them. In the civil wars, from 1641, Carrickfergus was one of the chief places of refuge for the Protestants of the county of Antrim; and on the 10th of June 1642, the first Presbytery held in Ireland met here. In that year the garrison was commanded by General Robert Munro, who, having afterwards relinquished the cause of the English parliament, was surprised and taken prisoner by Sir Robert Adair in 1648. At a later period Carrickfergus was held by the partisans of James II., but surrendered in 1689 to the forces under King William's general Schomberg; and in 1690 it was visited by King William, who landed here on his expedition to Ireland. In 1760 it was surprised by a French squadron under Commodore Thurot, who landed with about 1000 men, and, after holding the place for a few days, evacuated it on the approach of the English troops. Eighteen years later Paul Jones, in his ship the " Ranger," succeeded in capturing the " Drake," a British sloop-of war, in the neighbouring bay; but he left without molesting the town. In the reign of Queen Elizabeth the town obtained a charter, and this was confirmed by James I., who added the privilege of sending two burgesses to the Irish parliament. The corporation, however, was super- seded, under the provisions of the Municipal Reform Act of 1840, by a board of municipal commissioners. Carrickfergus was a parliamentary borough until 1885; and a county of a town till 1898, having previously (till 1850) been the county town of county Antrim. But its importance was sapped by the vicinity of Belfast, and its historical associations are now its chief interest.

CARRICKMACROSS, a market town of Co. Monaghan, Ireland, in the south parliamentary division, 68 m. N.W. of Dublin on a branch of the Great Northern railway. Pop. of urban district (1901) 1874. It has a pleasant, elevated site, a considerable agricultural trade, and a famous' manufacture of lace, which is carried on in various conventual establishments. There are some remains of an Elizabethan castle, a seat of the earls of Essex, which was destroyed during the wars of 1641; the ruins of the old church of St Finbar commemorate the same disastrous period.

CARRICK-ON-SHANNON, a market town and the county town of Co. Leitrim, Ireland, in the south parliamentary division, beautifully situated on the left bank of the upper Shannon, between Loughs Allen and Boderg, close to the confluence of the Boyle. Pop. (1901) 1118. It is on the Sligo branch of the Midland

Great Western railway, 90 m. W.N.W. of Dublin, the station being across the river in county Roscommon. Though having so small a population it is the largest town in the county, is the seat of the assizes, and has quays and some river trade. The surrounding country, with its waterways, loughs and woods, is of considerable beauty.

CARRICK-ON-SUIR, a market town of Co. Tipperary, Ireland, in the east parliamentary division, on the north (left) bank of the Suir, 14! m. W.N.W. from Waterford by the Waterford & Limerick line of the Great Southern & Western railway. Pop. of urban district (1901) 5406. It was formerly a walled town, and contains some ancient buildings, such as the castle, erected in 1309, formerly a seat of the dukes of Ormonde, now belonging to the Butler family, a branch of which takes the title of earl from the town. On the other side of the river, connected by a bridge of the 14th century, and another of modern erection, stands the suburb of Carrickbeg, in county Waterford, where an abbey was founded in 1336. The woollen manufactures for which the town was formerly famous are extinct. A thriving export trade is carried on in agricultural produce, condensed milk is manu- factured, and slate is extensively quarried in the neighbour- hood, while some coal is exported from the neighbouring fields. Dredging has improved the navigable channel of the river, which is tidal to this point and is lined with quays.

CARRIER, JEAN BAPTISTE (1756-1794), French Revolu- tionist and Terrorist, was born at Yolet, a village near AuriUac in Upper Auvergne. In 1790 he was a country attorney (coun- sellor for the baittiage of Aurillac) and in 1792 he was chosen deputy to the National Convention. He was already known as one of the influential members of the Cordeliers club and of

that of the Jacobins. After the subjugation of Flanders he was one of the commissioners nominated in the close of 1792 by the Convention, and sent into that country In the following year he took part in establishing the Revolutionary Tribunal. He voted for the death of Louis XVI., was one of the first to call for the arrest of the duke of Orleans, and took a prominent part in the overthrow of the Girondists (on the 31st of May). After a mission into Normandy, Carrier was sent, early in October 1793, to Nantes, under orders from the Convention to suppress the revolt which was raging there, by the most severe measures. Nothing loth, he established a revolutionary tribunal, and formed a body of desperate men, called the Legion of Marat, for the purpose of

destroying in the swiftest way the masses of prisoners heaped in the jails. The form of trial was soon dis- continued, and the victims were sent to the guillotine or shot or cut down in the prisons en masse. He also had large numbers of prisoners put on board vessels with trap doors for bottoms, and sunk in the Loire. This atrocious process, known as the Noyades of Nantes, gained for Carrier a reputation for wanton cruelty. Since in his mission to Normandy he had been very moderate, it is possible that, as he was nervous and ill when sent to Nantes, his mind had become unbalanced by the atrocities committed by the Vendean and royalist armies. Naturally, the stories told of him are not all true. He was recalled by the Committee of Public Safety on the 8th of February 1794, took part in the attack on Robespierre on the 9th Thermidor, but was himself brought before the Revolutionary Tribunal on the nth and guillotined on the 16th of November 1794.

See Comte Fleury, Carrier & Nantes, 1793-1794 (Paris, 1897); Alfred Lallie, /. B. Carrier, representant du Cantal a. la Convention 1756-1704 d'apres de nouveaux documents (Paris, 1901). These works, and the others of Lallie, are inspired by strong royalist sympathies and are not altogether to be accepted.

CARRIER, a general term for any person who conveys the goods of another for hire, more specifically applied to the trades- men, now largely superseded by the railway system, who convey goods in carts or wagons on the public roads. In jurisprudence, however, the term is collectively applied to all conveyers of property, whether by land or water; and in this sense the changes and enlargements of the system of transit throughout the world have given additional importance to the subject. The law by which carriers, both by land and sea, are made responsible for the goods entrusted to them, is founded on the praetorian edict of the civil law, to which the ninth title of the fourth book of the Pandect is devoted. The edict itself is contained in these few words, " nautae, caupones, stabularii, quod cujusque salvum fore receperint, nisirestituent, in eos judicium dabo." The simplicity of the rule so announced has had a most beneficial influence on the commerce of the world. Throughout the great civilized region which took its law directly from Rome, and through the other less civilized countries which followed the same commercial code, it laid a foundation for the principle that the carrier's engagement to the public is a contract of indemnity. It bound him in the general case, to deliver what he had been entrusted with, or its value,— thus sweeping away all secondary questions

or dis cussions as to the conditions of mere or less culpability on his part under which loss or damage may have occurred; and it left any limitations of this general responsibility to be separately adjusted by special contract.

The law of England recognizes a distinction between a common and a private carrier. The former is one who holds himself out to the public as ready to carry for hire from place to place the goods of such persons as choose to employ him. The owner of a stage-coach, a railway company, the master of a general ship, a wharf-finger carrying goods on his own lighters are common carriers; and it makes no difference that one of the termini of the journey is out of England. It has been held, however, that a person who carries. only passengers is not a common carrier; nor of course is a person who merely engages to carry the goods of particular individuals or to carry goods upon any particular occasion. A common carrier is subject at law to peculiar liabilities. He is bound to carry the goods of any person who offers to pay bis

hire, unless there is a good reason to the contrary, as, for example, when his carriage is full, or the article is not such as he is in the habit of conveying. He ought to carry the goods in the usual course without unnecessary deviation or delay. To make him liable there must be a due delivery of the goods to him in the known course of his business. His charge must be reasonable; and he must not give undue preference to any customer or class of customers. The latter principle, as enforced by statute, has come to be of great importance in the law of railway companies. In respect of goods entrusted to him, the carrier's liability, unless limited by a special contract, is, as already stated, that of an insurer. There is no question of negligence as in the case of injury to passengers, for the warranty is simply to carry safely and securely. The law, however, excepts losses or injuries occasioned immediately "by the act of God or the king's enemies ' ' — words which have long had a strict technical significa- tion. It would appear that concealment without fraud, on the part of the customer, will relieve the carrier from his liability for negligence, but not for actual misfeasance. Fraud or deceit by the customer (e.g., in misrepresenting the real value of the goods) will relieve the carrier from his liability. The responsibility of the carrier ceases only with the delivery of the goods to the proper

consignee. By the Carriers' Act 1830 the liability of carriers for gold, silver, &c. (in general " articles of great value in small compass ") is determined. Should the article or parcel exceed £10 in value, the carrier is not to be liable for loss unless such value is declared by the customer and the carrier's increased charge paid. Where the value is thus declared, the carrier may, by public notice, demand an increased charge, for which he must, if required, sign a receipt. Failing such receipt or notice, the carrier must refund the increased charge and remain liable as at common law. Except as above no mere notice or declaration shall affect a carrier's liability; but he may make special con- tracts with his customers. The carriage of goods by sea" is subject to special: regulations (see Affreightment). The carriage of goods by railway and canal is subject to the law of common carrier, except where varied by particular statutes, as the Railway and Canal Traffic Acts 1854 to 1804 and the Regula- tion of Railways Acts 1840 to 1893. The effect of these acts is to prevent railway companies as common carriers from limiting by special contract their liability to receive, forward and deliver goods, unless the conditions embodied in the special contract are reasonable, and the contract is in writing and signed by, or oh behalf of, the sender. A railway company must provide reason- able facilities for forwarding passengers' luggage; where luggage is taken into the carriage with a passenger, the company is responsible for it only in so far as loss or damage is due to the passenger's interference with the company's exclusive control of it. As carriers of passengers companies are bound, in the absence of any special contract, to exercise due care and diligence, and are responsible for personal injuries only when they have been occasioned by negligence or want of skill. Where there has been contributory negligence on the part of the passengej, i.e. where he might, by the exercise of ordinary care, have avoided the consequences of the defendants' negligence — he is not entitled to recover. By the act of 1846 (commonly called Lord Campbell's Act), when a person's death has been caused by such negligence as would have entitled him to an action had he survived, an action may be maintained against the party re- sponsible for the negligence on behalf of the wife, husband, parent or child of the deceased. Previously such cases had been governed by the maxim actio personalis moritur cum persona.

CARRIERS, MORITZ (1817-1895), German philosopher arid historian, was born at Griedel in Hesse Darmstadt on the 5th of March 1817. After studying at Giessen; GOttingen and Berlin, he

spent a few years in Italy studying the fine arts, and established himself in 1842 at Giessen as a teacher of philosophy. In T&$'i he was appointed professor at the university of Munich, where he lectured mainly on aesthetics. He died in Munich on the' 19th of January 1895. An avowed enemy of Ultramontanism, he contributed in no small degree to making the idea of 'German unity more palatable to the South Germans. Carrrere identified

himself with the school of the younger Fichte as one who held the theistic view of the world which aimed at reconciling the contra- dictions between deism and pantheism. Although no obstinate adherent of antiquated forms and prejudices, he firmly upheld the fundamental truths of Christianity. His most important works are: Aesthetik (Leipzig, 1859; 3rd ed., 1885), supplemented by Die- Kwist im Zusammenhang der Kidturentwicklung und der Ideate der Menschheit (3rd ed., 187 7-1886); Die philosophische Weltanschauung der Reformationszeit (Stuttgart, 1847; 2 nd ed., Leipzig, 1886), and Die sittliche Weltordnung (Leipzig, 1877; 2nd ed., 1891), in which he recognized both the immutability of the laws of nature and the freedom of the will. He described his view of the world and life as " real-idealism." His essay ;pn Cromwell (in Lebensskizzen, 1890), which may be considered his political confession of faith, also deserves mention. His com- plete works were published at Leipzig,'i4 vols., in 1886-1894.

See S. P. V. Lind in Ziitschrift f. Philos: (cvi* 1895, pp. 93-101); W. Christ in Allgemeine deutsche Biographic (1903).

CARRINGTON, CHARLES ROBERT WYNN-CARINGTON»

1ST Earl (1843-ˆ), English statesman, son of the 2nd Baron Carrington (d. 1868), was educated at Eton arid Trinity, Cambridge, and sat in the House of Commons as a Liberal for High Wycombe from 1865 till he succeeded to the title in 1868. He was governor of New South Wales 1885-1890, lord chamber- lain 1892-1895; and became president of the board of agriculture in 1905, having a seat in the cabinet in Sir H. Campbell-Banner- man's and Mr Asquith's ministries. He was created Earl Carrington and Viscount Wendover in 1895. The Carrington barony was conferred in 1796 on Robert Smith (1752-1838), M.P. for Nottingham, a member of a famous banking family, the title being suggested by one held from 1643 to 1706 in another family of Smith in no way connected. The 2nd baron married as his second wife one of the two daughters of Lord Willoughby de

Eresby, and their son, through her, became in 1879 joint hereditary lord great chamberlain of England. The 2nd Baron took the surname of Carrington, afterwards altered to Carington, instead of Smith.

CARRINGTON, RICHARD CHRISTOPHER (18.26-1875), English astronomer, son of a brewer at Brentford, was born in London on the 26th of May 1826. Though intended for the Church, his studies and tastes inclined him to astronomy, and with a view to gaining experience in the routine of an observatory he accepted the post of observer in the university of Durham. Finding, however, that there was little chance of obtaining instruments suitable for the work which he wished to undertake, he resigned that appointment and established in 1853 an observatory of his own at Redhill. Here he devoted three years to a survey of the zone of the heavens within 9 degrees of the North Pole, the results of which are contained in his Redhill Catalogue of 3735 Stars. But his name is chiefly perpetuated through his investigation of the motions of sun-spots, by which he determined the elements of the sun's rotation and made the important discovery of a systematic drift of the photosphere, causing the rotation-periods of spots to lengthen with increase of solar latitude. Hedied on the 27th of November 1875.

For further information see Month. Notices Roy. Astr. Society, xiv. 13, xviii. 23, 109, xix. 140, 161, xxxvi. 137; Memoirs Roy. Astr. Soc., xxvii. 139; The Times, Nov. 22 and Dec. 7, 1875; Roy. Society's Cat.Scient. Papers, vols. i. and vii.; Introductions to Works.

; CARROCCIO, a war chariot drawn by oxen, used by the medieval republics of Italy. It was a rectangular platform on which' the "standard of the city and an altar were erected; priests held services on the altar before the battle, and the trumpeters beside them encouraged the fighters to the fray. In battle the carroccio was surrounded by the bravest warriors in the army and itserved both asa r'allying-pointand&s thepalladlum of the city's honour; its capture by the enemy was regarded as an irretriev- able defeat and humiliation: It was first employed by the Milanese in 1038, and played a great part in the wars of the Lombard' league against the emperor Frederick Barbarossa. r It was afterwards adopted by other '"cities, and first appears on -a

Florentine battlefield in 1228. The Florentine carroccio was usually followed by a smaller car bearing the martinella, a bell to ring out military signals. When war was regarded as likely the martinella was attached to the door of the church of Santa Maria in the Mercato Nuovo in Florence and rung to warn both citizens and enemies. In times of peace the carroccio was in the keeping of some great family which had distinguished itself by signal services to the republic.

Accounts of the carroccio will be found in most histories of the Italian republics; see for instance, M. Villani's Chronache, vi. 5 (Florence, 1825-1826) ; P. •.Villari, The Two First Centuries of Florentine History, vol. i. (Engl, transl., London, 1894); Gino Capponi, Storia delta Repubblica di Firenze, vol. i. (Florence, 1875).

CARRODUS, JOHN TIPLADY (1836-1895), English violinist, was born on the 20th of January 1836, at Keighley, in Yorkshire. He made his first appearance as a violinist at the age of nine, and had the advantage of studying between the ages of twelve and eighteen at Stuttgart, with Wilhelm Bernhard Molique. On his return to England in 1853 Costa got him engagements in the leading orchestras. He was a member of the Covent Garden opera orchestra from 1855, made his debut as a solo player at a concert given on the 22nd of April 1863 by the Musical Society of London, and succeeded Sainton as leader at Covent Garden in 1869. He died at Hampstead on the 13th of July 1895. For many years he had led the Philharmonic orchestra and those of the great provincial festivals. He published two violin solos and a " Morceau de salon," and was a very successful teacher.

CARROLL, CHARLES (1737-1832), American political leader, of Irish ancestry, was born at Annapolis, Maryland, on the 19th of September 1737. He was educated abroad in French Jesuit colleges, studied law at Bourges, Paris and London, and in February 1765 returned to Maryland, where an estate known as " Carrollton," in Frederick county, was settled upon him; he always signed his name as " Charles Carroll of Carrollton," Before and during the War of Independence, he was a whig or patriot leader, and as such was naturally a member of the various local and provincial extra-legal bodies — committees of correspondence,committees of observation,council of safety, provincial convention (1774-1776) and constitutional convention

(1776). From 1777 until 1800 he was a member of the Maryland senate. In April- June 1776 he, with Samuel Chase and Benjamin Franklin, was a member of the commission fruitlessly sent by the continental congress to Canada for the purpose of persuading the Canadians to join the thirteen revolting colonies. From 1776 to 1779 he sat in the continental congress, rendering important services as a member of the board of war, and signing on the 2nd of August 1776 the Declaration of Independence, though he had not been elected until the day on which that document was adopted. He out-lived all of the other signers. He was a member of the United States Senate from 1789 to 1792. From 1801 until his death, at Baltimore, on the 14th of November 1832, he lived in retirement, his last public act being the formal ceremony of starting the construction of the Baltimore and Ohio railway (July 4, 1828). In politics, after the formation of parties, he was a staunch Federalist. Of unusual ability, high character and great wealth, he exercised a powerful influence, particularly among his co-religionists of the Roman Catholic faith, and he used it to secure the independence of the colonies and to establish a stable central government.

See the Life by Kate Mason Rowland (1898).

CARROLL, JOHN (1735-1815), American Roman Catholic prelate, was born at Upper Marlborough, Prince George's county, Maryland, on the 8th of January 1735, the son of wealthy Catholic parents and a cousin of Charles Carroll " of Carrollton." He was educated at St Omer's in Flanders, becoming a novitiate in the Society of Jesus in 1753, and then at the Jesuit college in Liege, being ordained priest in 1769 and becoming professor of philosophy and theology. In 17 71 he became a professed father of the Society of Jesus and professor at Bruges. As tutor to the son of Lord Stourton, he travelled through Europe in 1772- 1773. After the papal brief of the 21st of July 1773 suppressed the Society of Jesus, he accompanied its English members then

in Flanders to England. In 1774 he returned to America; and set to work at a mission at Rock Creek, Montgomery county, Maryland, where his mother lived. He shared the feeling for independence growing among the American colonists, foreseeing that it would mean greater religious freedom. In 1776, at the request of the continental congress, he accompanied Benjamin Franklin, Charles Carroll and Samuel Chase on their mission to secure the aid or neutrality of the French-Canadians, and though unsuccessful it gained for him the friendship of Franklin. In 1783

he took a prominent part in the petition to Rome to take the control of the American church away from London; and on Franklin's recommendation, Carroll was named prefect apostolic, the American church being recognized as a distinct body in a decree issued by Cardinal Antonelli on the 9th of June 1 784. In the summer of 1785 he began his visitations; in 1786 he induced the general chapter to authorize a Catholic seminary (now Georgetown University) ; and at the same session it was voted that the condition of the church required a bishop, accountable directly to the pope (and not to the Congregation of the Propaganda) and chosen by the American clergy. Consent to this course was given by AJntonelli in a letter of the 12th of July 1 788. The clergy met at Whitemarsh, Maryland, and Baltimore was adopted as the episcopal seat, Carroll being chosen as bishop; and on the 6th of November 1789 Pius VI. issued a bull to that effect, Carroll being consecrated at Lulworth Castle, England, on the 15th of August 1790.

On his return from England the bishop saw Georgetown College completed (1791), thanks to moneys he had received from English Catholics. His first synod met on the 7th of Novem- ber 1791; and on the 16th he issued the " Circular on Christian Marriage," which attacked marriage by any save " lawful pastors of our church." In 1795 the Rev. Leonard Neale (1746- 181 7) was appointed his coadjutor. In 1799, after the death of Washington, Bishop Carroll bade his clergy hold the 22nd of February 1800 as a day of mourning, and on that day delivered in his pro-cathedral a memorial discourse which attracted much attention. Already in 1802 he was pressing for the creation of new sees in his diocese, and the Louisiana Purchase of 1803 gave added weight to this request; in September 1805 the Propaganda made him administrator apostolic of the diocese of New Orleans, to which he appointed John Olivier as vicar general; and in 1808 Pius VII. divided Carroll's great diocese into four sees, Boston, New York, Philadelphia and Bardstown (Kentucky), suffragan to the metropolitanate of Baltimore, of which Carroll actually became archbishop by the assumption of the long delayed pallium on the 18th of August 181 1, having consecrated three suffragans in the autumn of 1810. In 1811 ecclesiastical jurisdiction over the Danish and Dutch West Indies was bestowed upon him. Carroll was now an old man, and th6 shock of the war of 181 2, which as a staunch Federalist he had opposed until its actual declaration, together with the action of the Holy See in appointing to the sees of Philadelphia and New York other candidates than' those of his

recommendation, weighed on his mind He died in Georgetown on the 3rd of December 1815. He may well be reckoned the greatest figure in the Roman Catholic Church of the United States. His position in the church had never been easy, partly because he had been a prominent member of the Society of Jesus. The great size of his diocese had made it unwieldy; and his struggle to secure the independence of the American church had been a difficult one. As a defender of papal and episcopal authority he had, especially in Philadelphia and Baltimore, to deal with churches whose trustees insisted that they and their parishes alone could choose priests, that bishop or prefect could not object to their choice. Akin to this difficulty was the desire of Catholics of different nationalities to have separate churches, a desire often created or encouraged by intriguing and ambitious priests. Besides these and other internal annoyances, Carroll had to meet the deep-seated distrust of his church in communities settled almost exclusively by Protestants.

See John Gilmary Shea, History of the Catholic Church in the United States, vol. ii. (1763-1815), (Akron and New York, 1888):

and Daniel Brent, Biographical Sketch of the Most Rev. John Carroll, First Archbishop of Baltimore, with Select Portions of His Writings, edited by John Carroll Brent (Baltimore, 1843).

CARRONADE, a piece of ordnance invented, by the applica- tion of an old principle of gun construction, to serve as a ship's gun. The inventor was the antiquary General Robert Melville (1728-1809). He designed the piece in 1759, and called it the " smasher," but it was not adopted in the British navy till 1779, and was then known as the " carronade," from the Carron works on the Carron river in Stirlingshire, Scotland, where it was first cast by Mr Gascoigne. The carronade had a powder chamber like many of the earliest guns known, and was similar to a mortar. It was short, light, had a limited range, but was destructive at close quarters. Carronades were added to the existing arma- ments of guns proper or long guns. A 38-gun frigate carried ten carronades, and was therefore armed with 48 pieces of ordnance. As the official classifications were not changed, they were misleading guides to the real strength of British ships, which always carried more pieces than they were described as carrying.

The same remark applies to French and American ships when the use of the carronade extended from the British to other navies.

CARROT. Wild carrot, Daucus carota, a member of the natural order Umbelliferae, grows wild in fields and on roadsides and sea-shores in Britain and the north temperate Zone generally of the Old World. It is an annual and resembles the cultivated carrot, except in the root, which is thin and woody. It is the origin of the cultivated carrot, which can be developed from it in a few generations. M. Vilmorin succeeded in producing forms with thick fleshy roots and the biennial habit in four generations. In the cultivated carrot, during the first season of growth, the stem remains short and bears a rosette of graceful, long-stalked, branched leaves with deeply cut divisions and small, narrow ultimate segments. During this period the plant devotes its energies to storing food, chiefly sugar, in the so-called root, which consists of the upper part of the true root and the short portion of the stem between the root and the lowest leaves. A transverse section of the root shows a central core, generally yellow in colour, and an outer red or scarlet rind. The core represents the wood of an ordinary stem and the outer ring the soft outer tissue (bast and cortex). In the second season the terminal bud in the centre of the leaf-rosette grows at the expense of the stored nourishment and lengthens to form a furrowed, rather rough, branched stem, 2 or 3 ft. high, and bearing the flowers in a compound umbel. The umbel is characterized by the fact that the small leaves (bracts) which surround it, resemble the foliage leaves on a much reduced scale, and ultimately curve inwards, the whole inflorescence forming a nest-like structure. The flowers are small, the outer white, the central ones often pink or purplish. The fruit consists of two one-seeded portions, each portion bearing four rows of stiff spinous projections, which cause the fruits when dropped to cling together, and in a natural condition help to spread the seed by clinging to the fur of animals. On account of these projections the seeds cannot be sown evenly without previous rubbing with sand or dry ashes to separate them. As usual in the members of the order Umbelliferae, the wall of the. fruit is penetrated lengthwise by canals containing a characteristic oil.

Carrots vary considerably in the length, shape and colour of their roots, and in the proportion of rind to core. The White Belgian, which gives the largest crops, has a very thick root which is white, becoming pale green above, where it projects above ground. For nutritive purposes it is inferior to the red varieties.

The carrot delights in a deep sandy soil, which should be well drained and deeply trenched. The ground should be prepared and manured in autumn or winter. For the long- rooted sorts the soil should be at least 3 ft. deep, but the Short Horn varieties may be grown in about 6 in. of good compost laid on the top of a less suitable soil. Peat earth may be usefully employed in lightening the soil. Good carrots of the larger sorts may be grown in unfavourable soils by making large holes 18 in. deep with a crowbar, and filling them up with sandy compost

in which the seeds are to be sown. The main crop is sown at the end of March or beginning of April. After sowing, it is only necessary to thin the plants, and keep them clear of weeds. The roots are taken up in autumn and stored during winter in a cool shed or cellar.

CARRYING OVER, or Continuation, a stock exchange term for the operation by which the settlement of a bargain transacted for money or for a given account, may for a consideration (called either a ” contango ” or a ” backwardation “) be postponed from one settling day to another. Such a continuation is equivalent to a sale ” for the day ” and a repurchase for the succeeding account, or to a purchase ” for the day ” and a resale for the succeeding account. The price at which such transac- tions are adjusted is the ” making-up ” price of the day. (See Account and Stock Exchange.)

CARSIOLI (mod. Car soli), an ancient city of Italy, on the Via Valeria, 42 m. E. by N. of Rome. It was founded in the country of the Aequi between 302 and 298 B.C., just after the establish- ment of Alba Fucens, no doubt as a stronghold to guard the road to the latter. It is mentioned in 2 1 1 B.C. as one of the twelve out of thirty Latin colonies which protested their inability to furnish more men or money for the war against Hannibal. We find it used in 168 B.C. like Alba Fucens as a place of confinement for political prisoners. It was sacked in the Social War, but prob- ably became a municipium after it, though we hear but little of it. The modern town of Carsoli first appears in a diploma of a.d. 866, but the old site does not seem to have been abandoned until the 13 th century. It is now occupied only by vineyards, and lies about 2100 ft. above sea-level, in a plain surrounded by mountains, now called Piano del Cavaliere. The line of the city walls (originally in tufa, and reconstructed in limestone), built of rectangular blocks, can be traced, and so can the scanty remains of several buildings, including the podium or base, of a temple,

and also the ancient branch road from the Via Valeria (which itself keeps just south-east of Carsioli), traversing the site from north to south. The forty-third milestone of the Via Valeria still lies at or near its original site; it was set up by Nerva in a.d. 97. One mile to the north-west of Carsioli are the remains of an ancient aqueduct consisting of a buttressed wall of concrete crossing a valley.

See G. J. PfeifTer and T. Ashby in Supplementary Papers of the American School in Rome, i. (1905), 108 seq. (T. As.)

CARSON, CHRISTOPHER ["Kit"] (1809-1868), American hunter and scout, was born in Madison county, Kentucky, on the 24th of December 1809. When he was a year old his parents removed to Howard county, Missouri, then a frontier settlement, and the boy was early trained in the hardships and requirements of pioneer life. He served for a while as a saddler's apprentice, and after 1826 devoted himself to the life of a professional guide and hunter. He was hunter for the garrison at Bent's Fort on the Arkansas river in what is now Bent county, Colorado, from 1832 to 1840, and accompanied John C. Fremont on his exploring expeditions of 1842 and 1843-1844, and on his California expedition in 1845-1846. Carson took part in the Mexican War, and, after the rush to the Pacific Coast began, engaged as a guide to convoy emigrants and drovers across the plains and mountains. In 1854 he became Indian agent at Taos, New Mexico, in which position, through his knowledge of the Indian traits and language, he was able to exercise for many years a restraining influence over the warlike Apaches and other tribes. During the Civil War he rendered invaluable services to the Federal cause in the south-west as chief scout in charge of the various bodies of irregular scouts and rangers participating in the constant border warfare that characterized the conflict in that part of the Union. In March 1865 he was breveted brigadier-general of volunteers for gallantry in the battle of Valverde (on the 21st of February 1862) and for distinguished services in New Mexico, and after the war resumed his position as Indian agent, which he held until his death at Fort Lyon, Colorado, on the 23rd of May 1868. " Kit " Carson occupies in the latter period of American pioneer history a position somewhat similar to that held by Daniel Boone and David Crockett at an earlier period, as the typical frontier

hero and Indian fighter, and his hairbreadth escapes and personal prowess are the subject of innumerable stories.

See Charles Burdett, Life of Kit Carson, the Great Western Hunter and Guide (New York, 1859; new ed., 1877) ; and De Witt C. Peters, The Life and Adventures of Kit Carson, the Nestor of the Rocky Mountains, from Facts Narrated by Himself (New York, 1858).

CARSON CITY, the capital of Nevada, U.S.A., and the county- seat of Ormsby county, about 120 m. N.E. of Sacramento, Cali- fornia. Pop. (1890) 3950; (1900) 2100; (1910) 2466. It is served by the Virginia and Truckee railway, which has repair shops here, and by stage to Lake Tahoe, 12 m. W. of the city. It is pictur- esquely situated in Eagle valley, near the east base of the Sierra Nevada, at an elevation of 4720 ft. above the sea. Within 1 m. of the city are Shaws Hot Springs. The city is a distribut- ing point for the neighbouring mining region. Among the public buildings are the capitol, the United States government building, a United States mint, and a state orphans' home; in the vicinity are the state prison and a United States govern- ment school for Indians. The industrial interests of the city are principally in mining, lumbering and agriculture. It has an excellent supply of mountain spring water. Carson City (named in honour of Christopher Carson) was settled in 1851 as a trading post, was laid out as a town in 1858, was made the capital of the state and the county seat of the newly erected county in 1861, and was chartered as a city in 1875.

CARSTARES (or Carst airs), WILLIAM (1640-1715), Scottish clergyman, was born at Cathcart, near Glasgow, on the nth of February 1649, the son of the Rev. John Carstares, a member of the extreme Covenanting party of Protestors. He was educated at the university of Edinburgh, and then passed over to Utrecht, where he commenced his lifelong friendship with the prince of Orange, and began to take an active part in the politics of his country. The government disliked Carstares for several reasons. He was the intimate of William; he had been the bearer of messages between the disaffected in Scotland and Holland; and he was believed to be concerned with Sir James Steuart (I 63S- i7is) in the authorship of a pamphlet — An Account of Scotland's Grievances by reason of the D. of Lauderdale's Ministrie, humbly tendered to his Sacred Majesty. Accordingly, on his return to England, at the close of 1674, he was committed to the Tower; the following year he was transferred to Edinburgh Castle, and it

was not till August 1679 that he was released. After this he visited Ireland, and then became pastor to a Non- conformist congregation at Cheshunt. During 1682 he was in Holland, but in the following year he was again in London, and was implicated in the Rye House Plot. On its discovery he was examined before the Scottish Council; though the torture of the thumb-screw was applied, he refused to utter a word till he was assured that his admissions would not be used in evidence, and in the disclosures he then made he displayed great discretion. On his return to Holland he was rewarded by William's still warmer friendship, and the post of court chaplain; and after the Revolution he continued to hold this office, under the title of royal chaplain for Scotland. He was the confidential adviser of the king, especially with regard to Scottish affairs, and rendered important service in promoting the Revolution Settle- ment. On the accession of Anne, Carstares retained his post as royal chaplain, but resided in Edinburgh, having been elected principal of the university. He was also minister of Greyfriars', and afterwards of St Giles', and was four times chosen moderator of the general assembly. He took an important part in pro- moting the Union, and was consulted by Harley and other lead- ing Englishmen concerning it. During Anne's reign, the chief object of his policy was to frustrate the measures which were planned by Lord Oxford to strengthen the Episcopalian Jacobites — especially a bill for extending the privileges of the Episcopalians and the bill for replacing in the hands of the old patrons the right of patronage, which by the Revolution Settlement had been vested in the elders and the Protestant heritors. On the ac- cession of George I., Carstares was appointed, with five others, to welcome the new dynasty in the name of the Scottish Church. He was received graciously, and the office of royal chaplain was

again conferred upon him. A few months after he was struck with apoplexy, and died on the 28th of December 17 15.

See State-papers and Letters addressed to William Carstares, to which is prefixed a Life by M'Cormick (1774); Story's Character and Career of William Carstares (1874) ; Andrew Lang's History of Scotland (1907).

CARSTENS, ARMUS JACOB (1754-1798), German painter, was born in Schleswig, and in 1776 went to Copenhagen to study. In 1783 he went to Italy, where he was much impressed by the work of Giulio Romano. He then settled in Lubeck as a portrait painter, but was helped to visit Rome again in 1792, and gradually

produced some fine subject and historical paintings, e.g. “Plato’s Symposium ” and the ” Battle of Rossbach ” — which made him famous. He was appointed professor at Berlin, and in 1795 a great exhibition of his works was held in Rome, where he died in 1798. Carstens ranks as the founder of the later school of German historical painting.

CARSULAE, an ancient city of Umbria, on the Via Flaminia, 19 m. N. of Narnia (mod. Narni) and 24 m. S.S.W. of Mevania (mod. Bevagna). It is little mentioned in ancient literature. The town was a municipium. The Via Flaminia is well preserved and enters the north gate of the town, the archway of which still stands. Remains of buildings may also be seen upon the site, and the outline of an amphitheatre is visible. The town of Cesi, 3 m. to the south-east, has polygonal walls, and may perhaps be regarded as an Umbrian city which was destroyed by the Romans, Carsulae being constructed in its stead. The medieval city, as so often happened in Italy, returned to the pre-Roman site.

See G. Gamurrini in Notizie degli Scavi (1884), 149; for the tombs, L. Lanzi, in Notizie degli Scavi (1902), 592.

CART (A.S. crat, Gaelic cairt; connected with “car”), a general term for various kinds of vehicles (see Carriage), in some cases for carrying people, but more particularly for trans- porting goods, for agricultural or postal purposes, &c, or for carriers. Though constructed in various ways, the simplest type for goods is two- wheeled, topless and springless; but as a general term ” cart ” is used in combination with some more specific qualification (dog-cart, donkey-cart, road-cart, polo-cart, &c), when it is employed for pleasure purposes. The ” dog-cart,” so called because originally used to convey sporting dogs, is a more or less elevated two-wheeled carriage, generally with seats back to back, in front and behind; the ” governess-cart ” (presumably so called from its use for children), a very low two-wheeled pony-carriage, has two side seats facing inwards; the ” tax-cart,” a light two-wheeled farmer’s cart, was so called because formerly exempted from taxation as under the value of £21.

CARTAGENA, or Carthagena, a city, seaport, and the capital of the department of Bolivar, Colombia, South America, on the Caribbean coast, in io° 25′ 48″ N., 75° 34′ W. Pop. (1905, official estimate) 14,000. The population of Cartagena is largely composed of blacks and mixed races, which form the

predominant type on the lowland plains of northern Colombia. The well-to-do whites of Cartagena usually have country houses on the Turbaco hills, where the temperature is much lower than on the coast. The mean annual temperature in the city is 82 , and the port is classed as very unhealthful, especially for unac-climatized foreigners. The harbour, which is the best on the north coast of South America, is formed by an indentation of the coast- line shut in by two long islands lying parallel to the mainland. It covers an area of about 62-5 sq. m. and affords deep and secure anchorages and ample facilities for loading and unloading large vessels. The city itself has no modern quays, and large vessels do not approach within a mile of its landing-stages, but the railway pier (lengthened 120 ft. in 1898) on the mainland opposite permits the mooring of vessels alongside. There were formerly two entrances to the harbour — the Boca Grande (large mouth) between the low sandy island or peninsula on which the city stands and the island of Tierra Bomba, and the Boca Chica (small mouth) at the south end of the latter island. The Boca Grande was filled with stone after the city had been captured three times, because of the ease with which an enemy's ships could pass through it at any time, and the narrow and more

easily defended Boca Chica, 7 m. farther south, has since been

used.

The city occupies a part of the upper island or peninsula facing the northern end of the harbour, and is separated from the main-land on the east by a shallow lagoon-like extension of the' bay which is bridged by a causeway passing through the extra-mural suburb of Xixirriani on another island. The old city, ˆibout f m. long, north and south, and § m. wide, is enclosed by a heavy wall, in places 40 ft. thick, and is defended by several formidable-, looking forts, which have long been dismantled, but are still in a good state of preservation. At the mainland end of the causeway leading from the city is the fort of San Felipe, about 100 ft. above sea-level, adapted as a distributing reservoir in the city's water- works; and behind it are verdure-covered hills rising to an elevation of 500 ft., forming a picturesque background to the grey walls and red-tiled roofs of the city. The streets ate narrow, irregular and roughly paved, but are lighted by

electricity; tramway lines run between the principal points of the city and suburbs. The houses are built with thick walls of stone and brick round open courts, in the Moorish style, and their iron-barred doors and windows give them the appearance of being a part of the fortifications. Among the numerous churches, the largest and most imposing is the Jesuit church of San Juan de Dios, with its double towers and celebrated marble pulpit; an old monastery adjoins. Cartagena is an episcopal see, and its cathedral dates from colonial times. The city was once the head-quarters of the Inquisition in South America, and the edifice which it occupied, now private property, is an object of much interest. The water supply of the city was formerly obtained from rainwater tanks on the walls or by carriage from springs a few miles inland. But in 1906 an English company received a concession to bring water by pipes from springs on the Turbaco hills, 300 ft. above the sea.

The commercial importance of Cartagena declined greatly during the period of civil disorders which followed the war for independence, but in later years has revived. In the reign of Philip II. the Spaniards had opened a canal (" El Dique ") through some marshes and lagoons into a small western outlet of the Magdalena, which gave access to that river at Calamar, about 81 m. above the bar at its mouth; during Cartagena's decline, this was allowed to fill up; it was reopened in 1846 for a short time and then was obstructed again by river floods; but in 1881 it was reopened for steam navigation. Towards the end of the 19th century a railway, 65 m. long, was built between Cartagena and Calamar. Imports consist of cotton, linen and woollen fabrics, hardware, cutlery and machinery, kerosene, glass and earthenware; and the exports of cattle, sugar; tobacco, coffee, coco-nuts and fibre, dividivi and dye-woods, vegetable ivory, rubber, hides and skins, medicinal forest products, gold, silver and platinum. The aggregate value of the exports in 1906 was $3,788,094 U. S. gold.

Cartagena was founded in 1 533 by Pedro de Heredia. In 1 544 it was captured by pirates, who plundered the town; in 1585 by Sir Francis Drake, who exacted a large ransom; and in 1697 by the French, who obtained from it more than £1,000,000. In 1741 Admiral Vernon unsuccessfully besieged the town. It was taken by Bolivar in 181 5, but was surrendered to the royalists in the same year. It was recaptured by the republicans on the 2 5th of September 1821, and thereafter remained in their possession. It figured prominently in the political agitations and revolutions

which followed, and underwent a siege in the civil war of 1885. It was an important naval station under Spanish colonial rule, and is the principal naval station of Colombia.

CARTAGENA, or Carthagena, a seaport of south-eastern Spain, in the province of Murcia; in 37 36′ N. and o° 58′ W., at the terminus of a branch railway from the city of Murcia, and on the Mediterranean Sea. Pop. (1900) 99,871. Cartagena is fortified, and possesses an arsenal and naval dockyards. To- gether with Ferrol and San Fernando near Cadiz, the other great naval stations of Spain, it is governed by an admiral with the title of captain-general. It has also an episcopal see. ■

The city stands on a hill separated by a little plain from the

harbour; towards the north and east it communicates with a fertile valley; on the south and west it is hemmed in by high mountains. Its grey houses have a neglected, almost a dilapi dated appearance, from the friable stone of which they are constructed; and there are no buildings of antiquarian interest or striking architectural beauty, except, perhaps, the ruined citadel and the remnants of the town walls. The wide streets are traversed by a system of tramways, which pass through modern suburbs to the raining district about two leagues inland, and on the west a canal enables small vessels to enter the town without using the port. The harbour, the largest in Spain after that of Vigo, and the finest on the east coast, is a spacious bay, deep, except near its centre, where there is a ledge of rock barely S ft., under water. It is dominated, on the seaward side, by four hills, and approached by a narrow entrance, with forts on either hand; a breakwater affords shelter on the east, and on the west is the : Arsenal Basin, often regarded,as the original harbour of the Carthaginians and Romans. The island called La Escom- brera, the ancient Scombraria {i.e. ” mackerel fishery “), 2§ m. south,, protects Cartagena from, the violence, of wind and waves.

The mines near the city are very productive, and thousands of men and beasts are employed in transporting lead, iron, copper, zinc and sulphur to the coast ,The industrial and commercial progress of Cartagena was much hindered, during the first half of the 19th century; by the prevalence of epidemic diseases, the abandonment of the arsenal, 1 and rivalry with the neighhpur- ing port of Alicante. Its sanitary condition, though still defective, was improved by the drainage of the adjacent Almajar Marsh; and after 1870; when the population had dwindled to about

26,000, Cartagena advanced rapidly in size and wealth. The opening of the railway enabled it to compete successfully with Alicante, and revived the mining and metallurgical industries, whole considerable sums were expended on bringing the coast and, land defences up to date, and adding new quays, docks and other harbour works. As a naval station, Cartagena suffered severely in 1898 from the maritime disasters of the Spanish-American 1 War; and its commerce was much affected when, at the beginning of the same year, Porman, or Portman, a mining village on a well-sheltered bay about n m. east, was declared by royal order an independent port. Vessels go to Porman to land coke and coal, and to load iron ore and lead. From Cartagena the principal exports are metallic ores, esparto grass, wine, cereals and fruit. Esparto grass, which grows freely in the vicinity, is the spartum, or Spanish broom, which gave the town its Roman designation of Carthago Spartaria. It is still used locally for making shoes, ships' cables, mats and a kind of spun cloth. Timber is largely imported from the United States, Sweden and Russia; coal from Great Britain; dried codfish from Norway and Newfoundland. In 1904, exclusive of coasters and small craft trading with north-west Africa, 662 ships of 604,208 tons entered the port of Cartagena, 259 being British and 1 50 Spanish ; while 90 vessels were accommodated at Porman.

Cartagena was founded about the year 243 B.C. by the Carthaginian Hasdrubal, and was called Carthago Nova or New Carthage, to distinguish it from the African city of Carthage. It was conveniently situated opposite to the Carthaginian territory in Africa, and was early noted for its harbour. Its silver and gold mines were the source of great wealth both to the Carthaginians and to the Romans. In 210 B.C. this important place, the headquarters and treasure city of the Punic army, was stormed and taken with great slaughter by P. Scipio. The city continued to flourish under the Romans, who made it a colony, with the name Colonia Victrix Julia Nova Carthago. In a.d. 425 it was pillaged and nearly destroyed by the Goths. Cartagena was a bishopric from about 400 to 1289, when the see was removed to Murcia. Under the Moors it became an independent principality, which wasdestroyed by Ferdinand II. of Castile in 1243, restored by the Moors, and finally conquered by James I. of Aragon in 1276. It was rebuilt by Philip II. of Spain (1527-1598) for the sake of its harbour. In 1585 it was sacked by an English fleet under Sir Francis Drake. In 1706, /in the War of the Spanish Succession, it was occupied by Sir John Leake; and in the next

year it was retaken by the duke of Berwick. On the 5th of November 1823 it capitulated to the French. In consequence of the insurrection in Spain, Cartagena was in 1844 again the scene of warfare. On the 23rd of August 1873 it was bombarded by the Spanish fleet under Admiral LoboS; on the nth of October a battle took place off the t6wn, between the ships of the government and the rebels, and on the 12th of January 1874 Cartagena was occupied by the government troops.

See Biblioteca historica de Cartagena, by G. Vicent y Portillo (Madrid, 1889, & c -) ! Fechos y fechas de Cartagena, by I. Martinez Rito (Cartagena, 1894) ; and Serie de los obispos de Cartagena, by P. Diaz Casson (Madrid, 1895).

CARTAGO, the capital of the province of Cartago, in Costa Rica, Central America; 13 m. E.S.E. of San Jose by the trans-continental railway. Pop. (1900)4536. Cartago is built 4930 ft. above sea-level, on the fertile and beautiful plateau of San Jose, andatthe southern baseof the volcano Irazu(n, 200ft.). Some of its older buildings, especially the churches, are of considerable interest; but all bear marks of the volcanic disturbances from which the town has suffered on many occasions — notably in 1723, when it was nearly overwhelmed by the bursting of the flooded crater of Irazu, and in 1841, when it was shattered by an earthquake. There are hot mineral springs much frequented by invalids at Bella Vista, a suburb connected with the town by a tramway 3 m. long. The local trade is chiefly in coffee of fine quality, which is readily cultivated in the rich volcanic soil of the neighbourhood. Cartago is said to have been in existence as early as 1522; it was probably named in 1563 by the Spaniard Vazquez de Coronado, to whom its foundation is often ascribed. Though several times plundered by buccaneers, it retained its importance as the capital of Costa Rica until 1823, when it is said by tradition to have contained 30,000 inhabitants. Its prosperity rapidly diminished after the transference of the seat of government to San Jose, in 1823, but somewhat revived with the development of railways after 187-1. ■ ‘

CARTE, THOMAS (1686- 17 54), English historian, was born at Dusmoon, near Clifton. He was educated at Oxford, and was first brought into notice by his controversy with Dr Henry Chandler

regarding the Irish massacre, in which he defended Charles I. His attachment to the Stuarts also caused him to remain a non-juror, and on the discovery of the plot of Atterbury, whose secretary he was, he was forced to flee to France. There he collected materials for an English edition of De Thou and Rigault, which were purchased and published by Dr Mead. Being recalled to England through the influence of Queen Caroline, he published, in 1738, A General Account of the Necessary Materials for a History of England. The first volume of his General History of England, which is only of value for its vast and careful collection of facts, was published in 1747. By the insertion in it of the statement that the king's evil had been cured by the Pretender, Carte forfeited the favour of most of his patrons. He, however, continued to publish; and the 2nd volume appeared in 1750, the 3rd in 1752, the 4th in 1755.- He published also a Life of James, duke of Osmond, containing a collection of letters, &c. (3 vols., 1735-1736; new ed., in 6 vols., Oxford, 1851), and a History of the Revolutions of Portugal, with letters of Sir R. Southwell during his embassy there (London, 1740). His papers became the property of the university of Oxford, and were deposited in the Bodleian library.

CARTER, ELIZABETH (1717-1806), English poet and trans- lator, daughter of the Rev. Nicholas Carter, was born at Deal, in Kent, on the 16th of December 171 7. Dr Carter educated his children, boys and girls, alike; but Elizabeth's slowness tired his patience, and it was only by great perseverance that she conquered her natural incapacity for learning, She studied late at night and early in the morning, taking snuff and chewing green tea to keep herself awake; thus causing severe injury to her health. She learned Greek and Latin, and Dr Johnson said concerning a celebrated scholar that he " understood Greek better than any one whom he had ever known except Elizabeth Carter." She learned also Hebrew, French, German, Italian, Spanish, Portuguese, and lastly some Arabic. She

studied astronomy, ancient geography, and ancient and modern history. Edward Cave was a friend of Dr Carter, and in 1734 some of Elizabeth's verses, signed " Eliza," appeared in the Gentleman's Magazine, to which she contributed for many years. In 1738 Cave published her Poems upon Particular Occasions; in 1739 she translated from the French an attack on Pope's Essay on Man by J. P. de Crousaz; and in the same year appeared her translation from the Italian of Algarotti's New- tonianismo per le Dame, under the title of Sir Isaac Newton's Philosophy explained

for the use of the Ladies, in six Dialogues on Light and Colour. Her translation of Epictetus (1758) was undertaken in 1749 to please her friends, Thomas Seeker (after- wards archbishop of Canterbury) and his niece, Catherine Talbot, to whom the translation was sent, sheet by sheet, as it was done. In 1762 Miss Carter printed a second collection of Poems on Several Occasions. Her letters to Miss Talbot contain an account of a tour on the continent undertaken in 1763 in company with Edward and Elizabeth Montagu and William Pulteriey, 1st earl of Bath. Dr Carter, from 1762 to his death in 1774, lived with his daughter in a house at Deal, which she had purchased. An annuity was settled on her by Sir William Pulteney and his wife, who had inherited Lord Bath's fortune; and she had another annuity from Mrs Montagu. Among Miss Carter's friends and correspondents were Samuel Johnson, Bishop Butler, Richard Savage, Horace Walpole, Samuel Richardson, Edmund Burke, Hannah More, and Elizabeth Vesey > who was a leader of literary society. She died in Clarges Street, Piccadilly, on the 19th of February 1806.

Her Memoirs were published in 1807; her correspondence with Miss Talbot and Mrs Vesey in 1809; and her letters to Mrs Montagu in 1817. See also A Woman of Wit and Wisdom (1906), a biography by Alice C. C. Gaussen.

CARTERET, SIR GEORGE (c. 1610-1680), English politician, was born between 1609 and 161 7 on the island of Jersey, where his family had long been prominent landholders. He was the son of Helier de Carteret of St Ouen, and in his youth was trained to follow the sea. In 1639 he became comptroller of the English navy. During the Civil War he was active in behalf of the king. In 1643 he succeeded by reversion from his uncle, Sir Philip Carteret, to the post of bailiff of Jersey, and in the same year was appointed by the king lieutenant-governor of the island. After subduing the Parliamentary party in the island, he was commissioned (1644) a vice-admiral of Jersey and "the maritime parts adjacent," and by virtue of that office he carried on from there an active privateering campaign in the Royalist cause. Parliament branded him as a pirate and excluded him specifically from future amnesty. His rule in Jersey was severe, but profit- able to the island; he developed its resources and made it a refuge for Royalists, among whom in 1646 and again in 1649-1650 was Prince Charles, who created Carteret a knight and baronet. In 1650, in consideration of Carteret's services, Charles granted to him " a certain island and adjacent islets near Vir- ginia, in America," which were to be called New Jersey; but no

settlement upon this grant was made. In 165 1 Carteret, after a seven weeks' siege, was compelled to surrender Jersey to a Parliamentary force; he then joined the Royalist exiles in France, where for a time he held a command in the French navy. He returned toEngland at theRestoration, became a privy councillor, sat in parliament for Portsmouth, and also served as vice-chamberlain of the royal household, a position to which he had been appointed in 1647. From 1661 to 1667 he was treasurer of the navy. He rendered valuable service during the Dutch War, but his lax methods of keeping accounts led to his being censured by parliament. In 1667 he became a deputy treasurer of Ireland. He continued nevertheless in the royal favour, and subsequently •was appointed one of the commissioners of the admiralty and a member of the board of trade and plantations. He belonged to that group of courtiers interested in the colonization of America, and was one of the eight to whom Charles II. granted the country of the Carolinas by the charters of 1663 and 1665. In 1664 James, duke of York, granted that part of his American territory between the Hudson and Delaware rivers to Sir George Carteret

and John, Lord Berkeley, and in Carteret's honour this tract received the name of New Jersey. Sir George's relative, Philip Carteret (d. 1682), was sent over as governor in 1665, but was temporarily deposed in 1672 by the discontented colonists, who chose James Carteret (perhaps a natural son of Sir George) as " president." Philip Carteret was restored to his office in 1674. In this year Lord Berkeley disposed of his share of the grant, which finally fell under the control of William Penn and his associates. With them Carteret agreed (1676) upon a boundary line which divided the colony into East and West Jersey. He died in January 1680, and two years later his heirs disposed of his New Jersey holdings to Penn and other Quakers.

CARTESIANISM, 1 the general name given to the philosophy developed principally in the works of Descartes, Malebranche and Spinoza. It is impossible to exhibit the full meaning of these authors except in connexion, for they are all ruled by one and the same thought in different stages of its evolution. It may be true that Malebranche and Spinoza were prepared, the former by the study of Augustine, the latter by the study of Jewish philosophy,to draw from Cartesian principles consequences

which Descartes never anticipated. But the foreign light did not alter the picture on which it was cast, but only let it be seen more clearly. The consequences were legitimately drawn. It may be shown that they lay in the system from the first, and that they were evolved by nothing but its own immanent dialectic. At the same time it is not likely that they would ever have been brought into such clear consciousness, or expressed with such consistency, except by a philosopher whose circumstances and character had completely detached him from all the convictions and prejudices of the age. In Malebranche, Cartesianism found an interpreter whose meditative spirit was fostered by the cloister, but whose speculative boldness was restrained by the traditions of the Catholic church. In Spinoza it found one who was in spirit and position more completely isolated than any monk, who was removed from the influence of the religious as well as the secular world of his time, and who in his solitude seemed scarcely ever to hear any voice but the voice of philosophy. It is because Cartesianism found such a pure organ of expression that its development is, in some sense, complete and typical. Its principles have been carried to their ultimate result, and we have before us all the data necessary to determine their value.

The Philosophy of Descartes. — Descartes was, in the full sense of the word, a partaker of the modern spirit. He was equally moved by the tendencies that produced the Reformation, and the tendencies that produced the revival of letters and science. Like Erasmus and Bacon, he sought to escape from a tran- scendent and unreal philosophy of the other world, to the know- ledge of man and the world he lives in. But like Luther, he found within human experience, among the matters nearest to man, the consciousness of God, and therefore his renunciation of scholasticism did not end f either in materialism or in that absolute distinction between faith and reason which inevitably leads to the downfall of faith. What was peculiar to Descartes, however, was the speculative interest which made it impossible for him to rest in mere experience, whether of things spiritual or of things secular, which made him search, both in our conscious- ness of God and our consciousness of the world, for the links by which they are bound to the consciousness of self. In both _. . . cases it is his aim to go back to the beginning, to retrace ot doubt the unconscious process by which the world of ex- perience was built up, to discover the hidden logic that connects the different parts of the structure of belief, to substitute a reasoned system, all whose elements are inter- dependent, for an unreasoned

congeries of opinions. Hence his first step involves reflection, doubt and abstraction. Turning the eye of reason upon itself, he tries to measure the value of that collection of beliefs of which he finds himself possessed; and the first thing that reflection seems to discover is its accidental and unconnected character. It is a mass of incongruous materials, accumulated without system and untested. Its elements have been put together under all kinds of influences, without any con- dor biographical details seeDEScARTES; Malebranche; Spinoza,

scious intellectual process, and therefore we can have no assur- ance of them. In order that we may have such assurance we must unweave the web of experience and thought which we have woven in our sleep, that we may begin again at the beginning and weave it over again with ” clear and distinct ” consciousness of what we are doing. De omnibus dubitandum est. We roust free ourselves by one decisive effort from the weight of custom, prejudice and tradition with which our consciousness of the world has been overlaid, that in that consciousness in its simplest an<" most elementary form we may find the true beginning of know- ledge. The method of doubt is at the same time a«method of abstraction, by which Descartes rises above the thought of th» particular objects of knowledge, in order that he may find th>; primary truth in which lies the very definition of knowledge, o< the reason why anything can be said to be true. First disappears the whole mass of dogmas and opinions as to God and man which are confessedly received on mere authority. Then tho supposed evidence of sense is rejected, for external reality is not immediately given in sensation. It is acknowledged by all thai the senses often mislead us as to the nature of things without us, and perhaps they may also mislead us as to there being anything without us at all. Nay, by an effort, we can even carry doubf beyond this point; we can doubt even mathematical truth. When, indeed, we have our thoughts directed to the geometrical demonstration, when the steps of the process are immediately before our minds, we cannot but assent to the proposition that the angles of a triangle are equal to two right angles; but when we forget or turn away our thoughts from such demon- stration, we can imagine that God or some powerful spirit is playing upon our minds to deceive them, also that even our most certain judgments may be illusory. In this na'ive manner does Descartes express the idea that there are necessities of thought prior to, and presupposed in the truth of geometry. He is seeking to strip thought of all the " lendings " that seem to

come to it from anything but itself, of all relation to being that can be supposed to be given to it from without, that he may discover the primary unity of thought and being on .which all knowledge depends. And this he finds in pure self- certainty consciousness. Whatever I abstract from, I cannot of the abstract from self, from the " I think " that, as Kant linking puts it, accompanies all our ideas; for it was in fact the se ' very independence of this universal element on the particulars that made all our previous abstraction possible. Even doubt rests on certitude; alone with self I cannot get rid of this self. By an effort of thought I separate my thinking self from all that I think, but the thinking self remains, and in thinking I am. Cogito, ergo sum:" I think, therefore I am." The objective judgment of self-consciousness is bound up with or involved in the very faculty of judging, and therefore remains when we abstract from all other objective judgments. It is an assertion involved in the very process by which we dismiss all other assertions. Have we not then a right to regard it as a primitive unity of thought and being, in which is contained, or out of which may be developed; the very definition of truth ?

The sense in which Descartes understood his first principle becomes clearer when we look at his answers to the objections made against it. On the one hand it was challenged by those who asked, _.„ like Gassendi, why the argument should be based especi- , ...” . ally on thought, and why we might not say with as good *J es ° a right, ambulo, ergo sum: ” I walk, therefore I am.” « CMfto Descartes explains that it is only as referred to conscious-erjl £s UBI » ness that walking is an evidence of my existence ; but if I say, ” I am conscious of walking, therefore I exist,” this is equivalent to saying, ” I think in one particular way, therefore I exist.” But it is not thinking in a particular way, but thinking in general that is coextensive with my existence. I am not .always conscious of walking or of any other special state or object, but I am always conscious, for except in consciousness there is no ego or self, and where there is consciousness there is always an ego. ‘ ‘ Do I then always think, even in sleep?” asks the objector; and Descartes exposes himself to the criticisms of Locke, by maintaining that it is im- possible that there should ever be an interval in the activity of consciousness, and by insisting that as man is essentially a thinking substance, the child thinks, or is self-conscious, even in its mother’s womb. The difficulty disappears when we observe that the question as to the conditions under which self-consciousness is developed in

the individual human subject does not affect the nature of self-consciousness in itself or in its relation to knowledge. The force of Descartes's argument really lies in this, that the world as an intelli- gible world exists only for a conscious self, and that therefore the unity of thought and being in self-consciousness is presupposed in all knowledge. Of this self it is true to say that it exists only as it thinks, and that it thinks always. Cogito, ergo sum is, as Descartes points out, not a syllogism, but the expression of an identity which is discerned by the simple intuition of the mind. 1 If it were other- wise, the major " omne quod cogitat existit " would require to have been known before the minor " cogito "; whereas on the contrary it is from the immediate consciousness of being as contained in self-consciousness that that major can alone be derived. Again, when Hobbes and others argued that thinking is or may be a property of a material substance, Descartes answers that the question whether the material and the thinking substance are one does not meet us at the outset, but can only be solved after we have considered what is involved in the conception of these different substances respec- tively. 2 In other words, to begin by treating thinking as a quality of a material substance, is to go outside of the intelligible world for an explanation of the intelligible world. It is to ask for something prior to that which is first in thought. If it be true that the conscious- ness of self is that from which we cannot abstract, that which is involved in the knowledge of anything, then to go beyond it and seek for a reason or explanation of it in anything else is to go beyond the beginning of knowledge; it is to ask for a knowledge before knowledge.

Descartes, however, is himself unfaithful to this point of view ; for, strictly taken, it would involve the consequence, not only that there is nothing prior to the pure consciousness of self, but that there can be no object which is not in necessary relation to it. Hence there can be no absolute opposition between thought and anything else, no opposition which thought itself does not transcend. But Descartes commits the error of making thought the property of a substance, a res cogitans, which as such can immediately or directly apprehend nothing but thoughts or ideas; while, altogether outside of these thoughts and ideas, there is another substance characterized by the property of extension, and with which thought has nothing to do. Matter in space is

thus changed, in Kantian language, into a ” thing in itself,” an object out of all relation to the subject; and on the other hand, mind seems to be shut up in the magic circle of its own ideas, without any capacity of breaking through the circle or apprehending any reality but itself. Between thought and being, in spite of their subjective unity in self-conscious- ness, a great gulf seems still to be fixed, which cannot be crossed unless thought should become extended, or matter think. But to Descartes the dualism is absolute, because it is a presupposition with which he starts. Mind cannot go out of itself, cannot deal with anything but thought, without ceasing to be mind; and matter must cease to be matter ere it can lose its absolute externality, its nature as having partes extra partes, and acquire the unity of mind. They are opposed as the divisible and the indivisible, and there is no possible existence of matter in thought except a representative existence. The ideal (or, as Descartes calls it, objective) existence of matter in thought and the real (or, as Descartes calls it, formal) existence of matter out of thought are absolutely different and independent things.

It was, however, impossible for Descartes to be content with a subjective idealism that confined all knowledge to the tauto- logical expression of self-consciousness ” I am I,” Proof of ” What I perceive I perceive.” If the individual is to of God. fi n(ˆ m ms self-consciousness the principle of all know- ledge, there must be something in it which transcends the distinction of self and not self, which carries him beyond the limit cf his own individuality. What then is the point where the subjective consciousness passes out into the objective, from which it seemed at first absolutely excluded? Descartes answers that it is through the connexion of the consciousness of self with the consciousness of God. It is because we find God in our minds that we find anything else. The proof of God’s existence is therefore the hinge on which the whole Cartesian philosophy turns, and it is necessary to examine the nature of it somewhat closely.

Descartes, in the first place, tries to extract a criterion of truth out of the cogito, ergo sum. Why am I assured of my own existence ? It is because the conception of existence is at once and immediately involved in the consciousness of self. I can logically distin- guish the two elements, but I cannot separate them; whenever I clearly and distinctly conceive the one, I am forced to think the other along with it. But this gives me a rule for all judgments

1 Resp. ad secundas objectiones, p. 74, — quoting from the Elzevir edition.

2 Resp. ad tertias object, p. 94.

whatever, a principle which is related to the cogito, ergo sum as the formal to the material principle of knowledge. Whatever we cannot separate from the clear and distinct conception of anything, necessarily belongs to it in reality; and on the other hand, whatever we can separate from the clear and distinct conception of anything, does not necessarily belong to it in reality. Let us therefore set an object clearly before us, let us sever it in thought so far as is possible from all other objects, and we shall at once be able to determine what properties and relations are essential and what are not essential to it. And if we find empirically that any object manifests a property or relation not involved in the clear and distinct conception of it, we can say with certainty that such property or relation does not belong to it except by arbitrary arrangement, or, in other words, by the external combination of things which in their own nature have no affinity or connexion.

Now, by the application of this principle, we might at once assure ourselves of many mathematical truths; but, as has been already shown, there is a point of view from which we may doubt even these, so long as the idea of a God that deceives us is not excluded. If it is not certain that there is a God that cannot lie, it is not certain that there is an objective matter in space to which mathematical truth applies. But the existence of God may be proved in two ways. In the first place, it may be proved through the principle of causality, which is a self-evident truth. We have in our mind many ideas, and according to the principle of causality, all these ideas must be derived from something that contains a ” formal ” reality which corresponds to their ” objective ” reality, i.e. which contains at least as much reality in its existence out of thought as they contain in their existence in thought. Now we might derive from ourselves not only the ideas of other minds like ourselves, but possibly also of material objects, since these are lower in the scale of existence than ourselves, and it is conceivable that the idea of them might be got by omitting some of the qualities which distinguish ourselves. But the idea of God, of a being who is eternal and immutable, all-powerful, all-wise, and all-good, cannot be derived from our own limited and imperfect existence. The origin, therefore, must be sought in a being who contains

actually in himself all that is contained in our idea of him.

It was objected by some of the critics of Descartes that the idea of God as the infinite Being is merely negative, and that it is derived from the finite simply by abstracting from its conditions. r

Descartes answers that the case is just the reverse — the Descartes * infinite is the positive idea, and the finite is the negative, m f ta “. and therefore the former is the presupposition of the latter. P”y sics – As Kant, at a later date, pointed out that space is not a general conception, abstracted from the ideas of particular spaces, and representing the common element in them, but that, on the contrary, the ideas of particular spaces are got by the limitation of the one infinite space that is prior to them, so Descartes maintains in general that the idea of the finite is had only by limitation of the infinite, and not the idea of the infinite by abstraction from the particular determinations of the finite. It is a necessary consequence of this that the self-consciousness of a finite being is bound up with the consciousness of the infinite. Hence the idea of God is not merely one among other ideas which we have, but it is the one idea that is necessary to our very existence as thinking beings, the idea through which alone we can think ourselves, or anything else. ” I ought never to suppose,” says Descartes, ” that my conception of the infinite is a negative idea, got by negation of the finite, just as I conceive repose to be merely negation of movement, and darkness merely the negation of light. On the contrary, I see manifestly that there is more reality in the infinite than in the finite substance, and that therefore I have in me the notion of the infinite, even in some sense prior to the notion of the finite, or, in other words, that the notion of myself in some sense presupposes the notion of God ; for how could I doubt or desire, how could I be conscious of anything as a want, how could I know that I am not altogether perfect, if I had not in me the idea of a being more perfect than myself, by com- parison with whom I recognize the defects of my own existence?” 3 Descartes then goes on in various ways to illustrate the thesis that the consciousness of a defective and growing nature cannot give rise to the idea of infinite perfection, but on the contrary presupposes it. We could not think of a series of approximations unless there were somehow present to us the idea of the completed infinite as the goal we aim at. If we had not the consciousness of ourselves as finite in relation to the infinite, either we should not be conscious of

3 Meditatio tertia, p. 21.

ourselves at all, or we should be conscious of ourselves as infinite. The image of God is so impressed by him upon us, that we " con- ceive that resemblance wherein the idea of God is contained by the same faculty whereby we are conscious of ourselves." In other words, our consciousness of ourselves is at the same time conscious- ness of our finitude, and hence of our relation to a being who is infinite.

The principle which underlies the reasoning of Descartes is, that to be conscious of a limit, is to transcend it. We could not feel the limits either upon our thought or upon our existence, we could not doubt or desire, if wc did not already apprehend something beyond these limits. Nay, we could not be conscious of our existence as individual selves if we were not conscious of that which is not ourselves, and of a unity in which both self and not-self are included. Our individual life is therefore to us as self-conscious beings a part of a wider universal life. Doubt and aspiration are but the mani- festation of this essential division and contradiction of a nature which, as conscious of itself, is at the same time conscious of the whole in which it is a part. And as the existence of a self and its consciousness are one, so we may say that a thinking being is not only an individual, but always in some sense identified with that universal unity of being to which it is essentially related..

If Descartes had followed out this line of thought, he would have been led at once to the pantheism of Spinoza, if not beyond it. As it is, he is on the verge of contradiction with himself when he speaks of the consciousness of God as in some sense prior to the con- sciousness of self. How can anything be prior to the first principle of knowledge? It is no answer to say that the consciousness of God is the principium essendi, while the consciousness of self is the principium cognoscendi. For, if the idea of God is prior to the idea of self, knowledge must begin where existence begins, with God. The words "in some sense," with which Descartes qualifies, his assertion of the priority of the idea of God, only betray his hesitation and his partial consciousness of the contradiction in which, he is involved. Some of Descartes's critics presented this difficulty to him in another form, and accused him of reasoning in a circle when he said that it is because God cannot lie that we are certain that our clearand

distinct ideas do not deceive us. The very existence of the conscious self, the cogito, ergo sum, which is the first of all truths and therefore prior in certitude to the existence of God, is believed only because of the clearness and distinctness with which we appre- hend it. How then, they argued, could God's truthfulness be our security for a principle which we must use in order to prove the being of God ? The answer of Descartes is somewhat lame. We cannot doubt any self-evident principle, or even any truth based on a self-evident principle, when we are directly contemplating it in all the necessity of its evidence ; it is only when we forget or turn away from this evidence, and begin to think of the possibility of a deceitful God, that a doubt arises which cannot be removed except by the conviction that God is true. 1 It can scarcely be said that this is a dignus vindice nodus, or that God can fitly appear as_ a kind of second-best resource to the forgetful spirit that has lost its direct hold on truth and its faith in itself. God, truth, and thehuman spirit are thus conceived as having merely external and accidental relations with each other. What Descartes, however, is really ex- pressing in this exoteric way is simply that beneath and beyond all particular truths lies the great general truth of the unity of thought and existence. In contemplating particular truth, we may not consciously relate it to this unity, but when we have to defend ourselves against scepticism we are forced to realize this relation. The ultimate answer to any attack upon a special aspect or element of truth must be to show that the fate of truth itself, the very possibility of knowledge, is involved in the rejection of it, and that wc cannot doubt it without doubting reason itself. But to doubt reason is, in the language of Descartes, to doubt the truthfulness of God, for, in his view, the idea of God is involved in the very con- stitution of reason. Taken in this way then, the import of Descartes's answer is, that the consciousness of self, like every other particular truth, is not at first seen to rest on the consciousness of God, but that when we realize what it means we see that it does so rest. But if this be so, then in making the consciousness of self his first principle of knowledge, Descartes has stopped short of the truth. It can only be the first principle if it is understood, not. as the consciousness of the individual self, but in a sense in which the consciousness of self is identical with the consciousness of God.

Descartes, however, is far from a clear apprehension of the] ultimate unity of thought and being, which nevertheless he strives to find in God. Beginning with an absolute separation of

the', res cogitans from the res extensa, he is continually falling back into dualism just when he seemed to have escaped from it. Even in God the absolute unity, idea and reality fall asunder; our idea of God is not God in us, it is only an idea of which God's existence is the cause. But the category of causality, if it forms a bridge between different things, as here between knowing and being, at the same time repels them from each other. It is a category of external relation which may be adequate to express the relation of the finite to the finite, but not the relation of the finite to the infinite. We cannot conceive God as the cause of our idea of him, without making God a purely

1 Resp. quarlae, p. 234.

objective and therefore finite existence. Nor is the case better when we turn to the so-called ontological argument,- — that existence is necessarily involved in the idea of God, just as the property of having its angles equal to two right angles is involved in the idea of a triangle. If indeed we understood this as meaning that thought transcends the distinction between itself and existence, and that therefore existence cannot be a thing in itself out of thought, but must be an intelligible world that exists as such only for the thinking being, there is some force in the argument. But this meaning we cannot find in Descartes, or to find it we must make him inconsistent with himself. He was so far from having quelled the phantom " thing in itself," that he treated matter in space as such a thing, and thus confused externality of space with externality to the mind. On this dualistic basis, the ontological argument becomes a manifest paralogism, and lies open to all the objections that Kant brought against it. That the idea of God involves existence, proves only that God, if he exists at all, exists by the necessity of his being. But the link that shall bind thought to existence is still wanting, and, in consistency with the other presuppositions of Descartes, it cannot be supplied.

But again, even if we allow to Descartes that God is the unity of thought and being, we must still ask what kind of unity ? Is it a mere generic unity, reached by abstraction, and therefore leaving out all the distinguishing characteristics of the particulars under it ? Or is it a concrete unity to which the particular elements are sub- ordinated, but in which they are nevertheless included ? To answer this question, we need only look at the relation of the finite to the infinite, as it is expressed in that passage already quoted, and in many others. Descartes always speaks of the

infinite as a purely affirmative or positive existence, and of the finite in so far as it is distinguished from the infinite, as purely negative, or in other words as a nonentity. ” I am,” he says, ” a mean between God and nothing, between the Supreme Being and not-being. In so far as I am created by God, there is nothing in. me that can deceive me or lead me into error. But on the other hand, if I consider myself as participating in nothingness or not-being, inasmuch as I am not myself the Supreme Being, but in many ways defective, I find myself exposed to an infinity of errors. Thus error as such is not something real that depends on God, but simply a defect; I do not need to explain it by means of any special faculty bestowed on me by God, but merely by the fact that the faculty for discerning truth from error with which he has endowed me, is not infinite.” 2 But if we follow out this principle to its logical result, we must say not only that error is a consequence of finitude, but also that the very existence of the finite as such is an error or illusion. All finitude, all determination, according to the well-known Spinozistic aphorism, is negation, and negation cannot constitute reality. To know the reality of things, therefore, we have to abstract from their limits, or in other words, the only reality is the infinite. Finite being, qua finite, has no existence, and finite self-consciousness, consciousness of a self in opposition to or limited by a not-self, is an illusion. But Descartes does not thus reason. He does not see ” anything in the nature of the infinite which should exclude the existence of finite things.” ” What,” he asks, ” would become of the power of that imaginary infinite if it could create nothing ? Perceiving in ourselves the power of thinking, we can easily conceive that there should be a greater intelligence elsewhere. And even if we should suppose that intelligence increased ad infinitum, we need not fear that our own would be lessened. And the same is true of all other attributes which we ascribe to God, even of his power, provided only that we do not suppose that the power in us is not subjected to God’s will. In all points, therefore, he is infinite without any exclusion of created things.” 3 The truth of this view we need notdispute; the question is as to its consistency with Cartesian principles. It may be a higher idea of God to conceive him as revealing himself in and to finite creatures; but it is a different idea from that which is implied in Descartes’s explanations of error. It is an inconsistency that brings Descartes nearer to Christianity, and nearer, it may also be said, to a true metaphysic; but it is not the less an inconsistency with his fundamental principles, which necessarily disappears in their subsequent development. To conceive the finite as

constituted not merely by the absence of some of the positive elements of the infinite, but as, in necessary unity with the infinite; to conceive the infinite as not merely that which has no limits or determinations, but as that which is self-determined and self-manifesting, which through all finitude and manifestation returns upon itself, may not be erroneous. But it would not be difficult to show that the adoption of such a conception involves the rejection or modification of almost every doctrine of the Cartesian system.

In connexion with this inconsistency we may notice the very different relations in which Descartes conceives mind on the one side and matter on the other, to stand towards God, who yet M , . . is the cause of both, and must therefore, by the principle aaana of causality, contain in himself all that is in both. Matter ma er ‘ and mind are to Descartes absolute opposites. Whatever can be asserted of mind can be denied of matter, whatever can be asserted of matter can be denied of mind. Matter is passive, mind is active; matter is extended, and therefore divisible ad infinitum;

Meditatio quarta, p. 26.

Resp. ad sec. object, p. 75.

mind is an indivisible unity. In fact, though of this Descartes is not conscious, the determination of the one is mediated by its opposition to the other; the ideas of object and subject, the self and not-self, are terms of a relation distinguishable but inseparable. But in the idea of God we must find a unity which transcends this difference in one way or another, whether by combining the two under a higher notion, or, as it would be more natural to expect on Cartesian principles, by abstracting equally from the particular characteristics of both. Descartes really does neither, or rather he acts partly on the one principle and partly on the other. In his idea of God he abstracts from the properties of matter but not from those of mind. ” God,” he says, ” contains in himself formaliter all ‘that is in mind, but only eminenter all that is in matter “; x or, as he elsewhere expresses it more popularly, he is mind, but he is only the creator of matter. And for this he gives as his reason, that matter as being divisible and passive is essentially imperfect. Ipsa natura corporis multas

imperfectiones involvit, and, therefore, ” there is more analogy between sounds and colours than there is between material things and God.” But the real imperfection here lies in the abstractness of the Cartesian conception of matter as merely extended, merely passive ; and this is balanced by the equal abstract- ness of the conception of mind or self -consciousness as an absolutely simple activity, a pure intelligence without any object but itself. If matter as absolutely opposed to mind is imperfect, mind as absolutely opposed to matter is equally imperfect. _ In fact they are the elements or factors of a unity, and lose all meaning when severed from each other, and if we are to seek this unity by abstraction, we must equally abstract from both.

The result of this one-sidedness is seen in the fact that Descartes, who begins by separating mind from matter, ends by finding the essence of mind in pure will, i.e. in pure formal self-deter- Reason mma ti on . Hence God’s will is conceived as ! absolutely a ” ‘ arbitrary, not determined by any end or law, for all laws, even the necessary truths that constitute reason, _ spring from God’s determination, and do not precede it. ” He is the author of the essence of things no less than their existence,” and his will has no reason but his will. In man there is an intelligence with eternal laws or truths involved in its structure, which so far limits his will. ” He finds the nature of good and truth already determined by God, and his will cannot be moved by anything else.” His highest freedom consists in having his will determined by a clear perception of the nature of good and truth, and “he is never in- different except when he is ignorant of it, or at least does not see it so clearly as to be lifted above’ the possibility of doubt.” 2 In- difference of will is to him ” the lowest grade of liberty,” yet, on the other hand, in nothing does the image of God in him show itself more clearly than in the fact that his will is not limited by his clear and distinct knowledge, but is ” in a manner infinite.” For ” there is no object of any will, even the infinite will of God, to which our will does not extend.” 3 Belief is a free act, for as we can yield our assent to the obscure conceptions presented by sense and the imagination, and thus allow ourselves to be led into error, so on the other hand we can refuse to give this assent, or allow ourJ selves to be determined by anything but the clear and distinct ideas of intelligence. That which makes it possible for us to err is that also in which the divine image in us is most clearly seen. We cannot have the freedom of God whose will creates the object of his know- ledge;

but in reserving our assent for the clear and distinct perceptions of intelligence, we, as it were, re-enact for ourselves the divine law, and repeat, so far as is possible to finite beings, the transcendent act of will in which truth and good had their origin.

The inherent defect of this view is the divorce it makes between the form and the matter of intelligence. It implies that reason or self- consciousness is one thing, and that truth is another and quite different thing, which has been united to it by the arbitrary will of God. The same external conception of the relation of truth to the mind is involved in the doctrine of innate ideas. It is true_ that Descartes did not hold that doctrine in the coarse form in which it was attributed to him by Locke, but expressly declares that he has " never said or thought at any time that the mind_ required innate ideas which were separated from the faculty of thinking. He had simply used the word innate to distinguish those ideas which are derived from that faculty, and not from external objects or the determination of the will. Just as when we say generosity is innate in certain families, and in certain others diseases,_ like the gout or the stone, we do not mean to imply that infants in their mother's womb are affected with these complaints." 4 Yet Descartes, as we have seen, does not hold that these truths are involved in the very nature of intelligence as such, so that we cannot conceive a self- conscious being without them. On the contrary, we are to regard the divine intelligence as by arbitrary act determining that two and two should be four, or that envy should be a vice. We are "not to conceive eternal truth flowing from God as rays from the sun." s In other words, we are not to conceive all particular truths as different aspects of one truth. It is part of the imperfection of man's finite nature that he " finds truth and good determined for

1 Resp. ad sec. object, pp. 72-73. 2 Resp. Sextae, 160-163. 3 Principia, i. 35. 4 Notaein Programme, p. 184.

5 Epistolae, i. 110, V. 14

him." It is something given, — given, indeed, along with his very faculty of thinking, but still given as an external limit to it. It belongs not to his nature as spirit, but to his finitude as man.

After what has been said, it is obvious that the transition from God to matter must be somewhat arbitrary and external. God's truthfulness is pledged for the reality of that of which we _ have clear and distinct ideas; and we have clear and "i . distinct ideas

of the external world so long as we conceive “LStf” it simply as extended matter, infinitely divisible, and w moved entirely from without, — so long, in short, as we conceive it as the direct opposite of mind, and do not attribute to it any one of the properties of mind. ” Omnes proprietates, quas in ea clare percipimus, ad hoc unum reducuntur, quod sit partibilis et mobilis, secundum partes.” We must, therefore, free ourselves from the obscure and confused modes of thought which arise whenever we attribute any of the secondary qualities, which exist merely in our sensations, to the objects that cause these sensations. The subjec- tive character of such qualities is proved by the constant change which takes place in them, without any change of the object in which they are perceived. A piece of wax cannot lose its extension ; but its colour, its hardness, and all the other qualities whereby it is presented to sense, may be easily altered. What is objective in all this is merely an extended substance, and the modes of motion or rest through which it is made to pass. In like manner we must separate from our notion of matter all ideas of actio in distans,- — e.g. we must explain weight not as a tendency to the centre of the earth or an attraction of distant particles of matter, but as a consequence of the pressure of other bodies, immediately surrounding that which is felt to be heavy. 6 For the only conceivable actio in distans is that which is mediated by thought, and it is only in, so far as we suppose matter to have in it a principle of activity like thought, that we can accept such explanations of its motion. Again, while we must thus keep our conception of matter clear of all elements that do not belong to it, we must also be careful not to take away from it those that do belong to it. It is a defect of distinctness in our ideas when we conceive an attribute as existing apart from its substance, or a substance without its attribute; for this is to treat elements that are only separated by a ” distinction of reason,” as if they were distinct things. The conception of the possibility of a vacuum or empty space arises merely from our confusing the possible separation of any mode or form of matter from matter in general with the impossible separation of matter in general from its own essential attribute. Accordingly, in his physical philosophy, Descartes attempts to explain everything on mechanical principles, Starting with the hypothesis that a certain quantity of motion has been impressed on the material universe by God at the first, a quantity which can never be lost or diminished, and tha f space is an absolute plenum in which motion propagates itself in circles.

It is unnecessary to follow Descartes into the detail of the theory of vortices. It is more to the purpose to notice the nature of the reasons by which he is driven to regard such a mechanical explanation of the universe as necessary. A real or sub- na } erial stantive existence is, in his view, a res completa, a thing un v ˆ rse a that can be conceived as a whole in itself without relations m ff" aa " to any other thing. Now matter and mind are, he s " thinks, such complete existences, so long as we conceive them, as pure intelligence must conceive them, as abstract opposites of each other; and do not permit ourselves to be confused by those mixed modes of thought which are due to sense or imagination. Descartes does not see that in this very abstract opposition there is a bond of union between mind and matter, that they are correlative opposites, and therefore in their separation res incompletae. In other words, they are merely elements of reality substantiated by abstract thought into independent realities. He indeed partly retracts his assertion that mind and matter severed from each other are res completae, when he declares that neither can be conceived as existing apart from God, and that therefore, strictly speaking, God alone is a substance. But, as we have seen, he avoids the necessary inference that in God the opposition between mind and matter is reconciled or transcended, by conceiving God as abstract self consciousness or will, and the material world not as his necessary manifestation, but simply as his creation, — as having its origin in an act of bare volition and that only. His God is the God of mono- theism and not of Christianity, and therefore the world is to God always a foreign matter which he brings into being, and acts on from without, but in which he is not revealed.

It is a natural consequence of this view that nature is essentially dead matter, that beyond the motion it has received from God at the beginning, and which it transmits from part to part without increase or diminution, it has no principle of

Animals automata.

activity in it. Every trace of vitality in it must be explained away as a mere false reflection upon it of the nature of mind. The world is thus " cut in two with a hatchet," and there is no attraction to overcome the mutual repulsion of its severed parts. Nothing can be admitted in the material half that savours of self-determination, all its energy must be communicated, not self-originated; there is no room for gravitation, still less for magnetism or chemical affinity, in this theory. A fortiori, animal

life must be

6 Resp. Sextae, pp. 165-166.

completelyexplained away. The machine may be very complicated , but it is still, and can be nothing but, a machine. If we once ad- mitted that matter could be anything but mechanical, we should be on the way to admit that matter could become mind. When a modern physical philosopher declares that everything, even life and thought, is ultimately reducible to matter, we cannot always be certain that he means what he seems to say. Not seldom the materialist soi-disant, when we hear his account of the properties of matter, turns out to be something like a spiritualist in disguise; but when Descartes asserted that everything but mind is material, and that the animals are automata, there is no such dubiety of interpretation. He said what he meant, and meant what he said, in the hardest sense his words can bear. His matter was not even gravitating, much less living; it had no property except that of retaining and transmitting the motion received from without by pressure and impact. And his animals were automata, not merely in the sense of being governed by sensation and instinct, but precisely in the sense that a watch is an automaton. Henry More cries out against the ruthless conseq uence with which he develops his principles to this result. ” In this,” he says, ” I do not so much admire the penetrative power of your genius as I tremble for the fate of the animals. What I recognize in you is not only subtlety of thought, but a hard and remorseless logic with which you arm yourself as with a sword of steel, to take away life and sensation with one blow, from almost the whole animal kingdom.” But Descartes was not the man to be turned from the legitimate result of his principles by a scream. ” Nee moror astutias et sagacitates canum et vulpium, nee quaecunque alia propter cibum, venerem, aut metum a brutis fiunt. Profiteor enim me posse perfacile ilia omniaut a solamembrorum conformations, profecta explicare.” 1

The difficulty reaches its height when Descartes attempts to explain the union of the body and spirit in man. Between two Nature of substances which, when clearly and distinctly conceived, sensation. ^° no *- i m p’y each other, there can be none but an artificial unity, — a unity of composition that still

leaves them external to each other. Even God cannot make them one in any higher sense. 2 And as it is impossible in the nature of mind to see any reason why it should be embodied, or in the nature of matter to see any reason why it should become the organ of mind, the union of the two must be taken as a mere empirical fact. When we put on the one side all that belongs to intelligence, and on the other all that belongs to matter, there is a residuum in our ideas which we cannot reduce to either head. This residuum consists of our appetites, our passions, and our sensations, including not only the feelings of pain and pleasure, but also the perceptions of colour, smell, taste, of hardness and softness, and all the other qualities apprehended by touch. These must be referred to the union of mind with body. They are subjective in the sense that they give us no information as to the nature either of things or of mind. Their function is only to indicate what things are useful or hurtful to our composite nature as such, or in other words what things tend to confirm or dissolve the unity of mind and body. They indicate that something is taking place in our body, or without it, and so stimulate us to some kind of action, but what it is that is taking place they do not tell us. There is no resemblance in the sensation of pain produced by great heat to the rending of the fibres of our body that causes it. But we do not need to know the real origin of our sensation to prevent us going too near the fire. Sensation leads us into error only when we are not conscious that its office is merely practical, and when we attempt to make objective judgments by means of its obscure and confused ideas, e.g. when we say that there is heat in our hands or in the fire. And the remedy for this error is to be found simply in the clear conviction of the subjectivity of sensation.

These views of the nature of sense, however, at once force us to ask how Descartes can consistently admit that a subjective result Theory of sucn as sensation, a result in mind, should be produced occasional ˆY matter, and on the other hand how an objective result, causes. a resu ‘t in matter, should be effected by mind. Descartes explains at great length, according to his modification of the physiology of the day, that the pineal gland, which is the im- mediate organ of the soul, is acted on by the nerves through the ” animal spirits,” and again by reaction upon these spirits produces motions in the body. It is an obvious remark that this explanation either materializes mind, or else puts for the solution the very problem to be solved. It was therefore in the spirit of Descartes, it was only making explicit what is involved in many

of his expressions, when Geulincx, one of his earliest followers, formulated the theory of occasional causes. The general approval of the Cartesian school proved that this was a legitimate development of doctrine. Yet it tore away the last veil from the absolute dualism of the system, which had so far stretched the antagonism of mind and matter that no mediation remained possible, or what is the same thing, remained possible only through an inexplicable will of God. The intrusion of such a Deus ex machina into philosophy only showed that philosophy by its violent abstraction had destroyed the unity of the known and intelligible world, and was, therefore, forced to seek that unity in the region of the unknown and unintelligible. If our light be darkness, then in our darkness we must seek for light ;

Epist. i. 66, 67,.

2 Princ. i. 60,

if reason be contradictory in itself, truth must be found in unreason The development of the Cartesian school was soon to show what is the necessary and inevitable end of such worship of the unknown.

To the ethical aspect of his philosophy, Descartes, unlike Spinoza, only devoted a subordinate attention. In a short treatise, however, he discussed the relation of reason to the passions. After Ethics we have got over the initial difficulty, that matter should give rise to effects in mind, and mind in matter, and have admitted that in man the unity of mind and body turns what in the animals is mere mechanical reception of stimulus from without and reaction upon it into an action and reaction mediated by sensation, emotion and passion, another question presents itself. How can the mere natural movement of passion, the nature of which is fixed by the original constitution of our body, and of the things that act upon it, be altered or modified by pure reason ? For while it is obvious that morality consists in the determination of reason by itself, it is not easy to conceive how the same being who is determined by passion from without should also be determined by reason from within. How, in other words, can a spiritual being maintain its character as self-determined, or at least determined only by the clear and distinct ideas of the reason which are its innate forms, in the presence of this foreign element of passion that seems to make it the slave of external impressions? Is reason able to crush this intruder, or to turn it into a servant ? Can the passions be annihil- ated, or can

they be spiritualized? Descartes could not properly adopt either alternative; he could not adopt the ethics of asceticism, for the union of body and mind is, in his view, natural ; and hence the passions which are the results of that union are in themselves good. They are provisions of nature for the protection of the unity of soul and body, and stimulate us to the acts necessary for that purpose. Yet, on the other hand, he could not admit that these passions are capable of being completely spiritualized; for so long as the unity of body and soul is regarded as merely external and accidental, it is impossible to think that the passions which arise out of this unity can be transformed into the embodiment and expression of reason.

Descartes, indeed, points out that every passion has a lower and a higher form, and while in its lower or primary form it is based on the obscure ideas produced by the motion of the animal spirits, in its higher form it is connected with the clear and distinct judg- ments of reason regarding good and evil. If, however, the unity of soul and body be a unity of composition, there is an element of obscurity in the judgments of passion which cannot be made clear, an element in desire that cannot be spiritualized. If the mind be external to the passions it can only impose upon them an external rule of moderation. On such a theory no ideal morality is possible to man in his present state; for, in order to the attainment of such an ideal morality, it would be necessary that the accidental element obtruded into his life as a spiritual being by his connexion with the body should be expelled. What can be attained under present con- ditions is only to abstract so far as is possible from external things, and those relations to external things into which passion brings us. Hence the great importance which Descartes attaches to the dis- tinction between things in our power and things not in our power. What is not in our power includes all outward things, and therefore it is our highest wisdom to regard them as determined by an absolute fate, or the eternal decree of God. We cease to wish for the im- possible; and therefore to subdue our passions we only need to convince ourselves that no effort of ours can enable us to secure their objects. On the other hand, that which is within our power, and which, therefore, we cannot desire too earnestly, is virtue. But virtue in this abstraction from all objects of desire is simply the harmony of reason with itself, the drapajia of the Stoic under a slight change of aspect. Thus in ethics, as in metaphysics, Descartes ends not with a reconciliation of the opposed elements, but with a dualism, or at best, with a unity

which is the result of abstraction.

The Philosophy of Malebranche. — Malebranche was prepared, by the ascetic training of the cloister and the teaching of Augustine, to bring to clear consciousness and expression many of the tendencies that were latent and undeveloped in the philosophy of Descartes. To use a chemical metaphor, the Christian Platonism of the church father was a medium in which Cartesian- ism could precipitate the product of its elements. Yet the medium was, as we shall see, not a perfect one, and hence the product was not quite pure. Without metaphor, Malebranche, by his previous habits of thought, was well fitted to detect and develop the pantheistic and ascetic elements of his master's philosophy. But he was not well fitted to penetrate through the veil of popular language under which the discordance of that philosophy with orthodox Christianity was hidden. On the contrary, the whole training of the Catholic priest, and especially his practical spirit, with that tendency to compromise which a practical spirit always brings with it, enabled him to conceal from himself as well as from others the logical result of his principles. And we

do not wonder even when we find him treating as a ” miserable ” the philosopher who tore away the veil.

Malebranche saw ” all things in God.” In other words, he taught that knowledge is possible only in so far as thought is the expression, not of the nature of the individual subject as such, but of a universal life in which he and all other rational beings partake. ” No one can feel my individual pain; every one can see the truth which I contemplate — why is it so ? The reason is that my pain is a modification of my substance, but truth is the common good of all spirits.” 1 This idea is ever present to Malebranche, and is repeated by him in an endless variety of forms of expression. Thus, like Descartes, but with more decision, he tells us that the idea of'the infinite is prior to the idea of the finite. ” We conceive of the infinite being by the very fact that we conceive of being without thinking whether it be finite or no. But in order that we may think of a finite being, we must necessarily cut off or deduct something from the general notion of being, which consequently we must previously possess. Thus the mind does not apprehend anything whatever, except in and through the idea that it has of the infinite; and so far is it from being the case that this idea is formed by the confused assemblage of all the ideas of particular things as the philosophers maintain, that, on the contrary, all these particular ideas are only participations in the general idea of the infinite, just as God does not derive his being from the creatures, but all the creatures are imperfect participations of the divine Being.” 2 Again, he tells us, in the same chapter, that ” when we wish to think of any particular thing, we first cast our view upon all being, and then apply it to the consideration of the object in question. We could not desire to see any particular object unless we saw it already in a confused and general way, and as there is nothing which we cannot desire to see, so all objects must be in a manner present to our spirit.” Or, as he puts it in another place, ” our mind would not be capable of representing to itself the general ideas of genera and species if it did not see all things as contained in one; for every creature being an individual we cannot say that we are apprehending any created thing when we think the general idea of a triangle.”

The main idea that is expressed in all these different ways is

simply this, that to determine any individual object as such, we

must relate it to, and distinguish it from, the whole of which

. it is a part ; and that, therefore, thought could never

Jl n/ / apprehend anything if it did not bring with itself the

1 at “*ea of the intelligible world as a unity. Descartes had mind to a i rea dy expressed this truth in his Meditations, but human ˆ e h a d deprived it of its full significance by making a ledxe’ distinction between the being and the idea of God, the

‘ former of which, in his view, was only the cause of the

latter. Malebranche detects this error, and denies that there is any idea of the infinite, which is a somewhat crude way of saying that there is no division between the idea of the infinite and its reality. What Reid asserted of the external world, that it is not represented by an idea in our minds, but is actually present to them, Malebranche asserted of God. No individual thing, he tells us — and an idea is but an individual thing — could represent the infinite. On the contrary, all individual things are represented through the infinite Being, who contains them all in his substance ” tres efficace, et par consequence tres intelligible.” 3 We know God by himself, material things only by their ideas in God, for they are ” unintelligible in themselves, and we can see them only in the being who contains them in an intelligible manner.” And thus, unless we in some way ” saw God, we should be able to see nothing else.” _ The vision of God or in God, therefore, is an ” intellectual intuition ” in which seer and seen, knower and known, are one. Our knowledge of things is our participation in God’s knowledge of them.

When we have gone so far with Malebranche, we are tempted to ask why he does not follow out his thought to its natural conclusion. If the idea of God is not separable from his existence, if it is through the idea of him that all things are known, and through his existence that all things are, then it would seem necessarily to follow that our consciousness of God is but a part of God’s consciousness of himself, that our consciousness of self and other things is but God’s conscious- ness of them, and lastly, that there is no existence either of ourselves or other things except in this consciousness. To understand Male- branche is mainly to understand how he stopped short of results that

seemed to lie so directly in the line of his thought.

To begin with the last point, it is easy to see that Malebranche only asserts unity of idea and reality in God, to deny it everywhere

1 Morale, i. 1, §2. 2 Recherche, iii. pt. ii. ch. vi. 3 Recherche, ch. viL

else, which with him is equivalent to asserting it in general snd denying it in particular. To him, as to Descartes, the opposition between mind and matter is absolute. Material things cannot come into our minds nor can our minds go out of themselves " pour se promener dans les cieux." 4 Hence they are in themselves absolutely unknown; they are known only in God, in whom are their ideas, and as these ideas again are quite distinct from the reality, they " might be presented to the mind without anything existing." That they exist out of God in another manner than the intelligible manner of their existence in God, is explained by a mere act of His will, that is, it is not explained at all. Though we see all things in God, therefore, there is no connexion between his existence and theirs. The " world is not a necessary emanation of divinity; God is perfectly self-sufficient, and the idea of the infinitely perfect Being can be conceived quite apart from any other. The existence cf the creatures is due to the free decrees of God." 5 Malebranche, therefore, still treats of external things as " things in themselves," which have an existence apart from thought, even the divine thought, though it is only in and through the divine thought they can be known by us. " To see the material world, or rather to judge that it exists (since in itself it is invisible), it is necessary that God should reveal it to us, for we cannot see the result of his arbitrary will through necessary reason." 6

But if we know external things only through their idea in God, how do we know ourselves? Is it also through the idea of us in God? Here we come upon a point in which Malebranche diverges very far from his master. We do not, he says, properly know ourselves at all as we know God or even external objects. We are conscious of ourselves by inner sense (sentiment interieur), and from this we know that we are, but we do not know what we are. " We know the existence of our soul more distinctly than of our body, but we have not so perfect a knowledge of our soul as of our body." This is shown by the fact that from our idea of body as extended substance, we can at once see what are its possible

modifications. In other words, we only need the idea of extended substance to see that there is an inexhaustible number of figures and motions of which it is capable. The whole of geometry is but a development of what is given already in the conception of extension. But it is not so with our consciousness of self, which does not enable us to say prior to actual experience what sensations or passions are possible to us. We only know what heat, cold, light, colour, hunger, anger and desire are by feeling them, Our knowledge extends as far as our experience and no further. Nay, we have good reason to believe that many of these modificatiors exist in our soul only by reason of its accidental association with a body, and that if it were freed from that body it would be capable of far other and higher ex- periences. " We know by feeling that our soul is great, but perhaps we know almost nothing of what it is in itself." The informations of sense have, as Descartes taught, only a practical but no theoretical value; they tell us nothing of the external world, the real nature of which we know not through touch and taste and sight, but only through our idea of extended substances; while of the nature of the soul they do not tell us much more than that it exists and that it is not material. And in this latter case we have no idea, nothing better than sense to raise us above its illusions. It is clear from these statements that by self-consciousness Malebranche means consciousness of desires and feelings, which belong to the individual as such, and not consciousness of self as thinking. He begins, in fact, where Descartes ended, and Identifies the consciousness of self as thinking, and so transcending the limits of its own particular being, with the consciousness or idea of God. And between the consciousness of the finite in sense and the consciousness of the infinite in thought, or in other words, between the consciousness of the universal and the consciousness of the individual, he sees no connexion. Malebranche is just one step from the pantheistic conclusion that the consciousness of finite individuality as such is illusory, and that as all bodies are but modes of one infinite extension, so all souls are but modes of one infinite thought. But while he willingly accepts this result in regard to matter, his religious feelings prevent him from accepting it in relation to mind. He is driven, therefore, to the inconsistency of holding that sense and feeling, through which in his view we apprehend the finite as such, give us true though imperfect knowledge of the soul, while the knowledge they give us of body is not only imperfect but false. 7 Thus the finite spirit is still allowed to be a substance, distinct from the infinite, though it holds its

substantial existence on a precarious tenure. It is left hanging, we may say, on the verge of the infinite, whose attraction must soon prove too strong for it. Ideas are living things, and often remould the minds that admit them in spite of the greatest resistance of dead' custom and traditionary belief. In the grasp of a logic that overpowers him the more easily in that he is unconscious of its tendency, Malebranche is brought within one step of the pan- theistic conclusion, and all his Christian feeling and priestly training can do is just to save him from denial of the personality of man.

But even this denial is not the last word of pantheism. When the principle that the finite is known only in relation to the infinite, the individual only in relation to the universal, is interpreted as

4 Recherche, ch. i. 6 Entretien, i. § 5.

6 Morale, i. 2, § 5.

7 Recherche, iii. pt. ii. ch. vii., § 4.

meaning that the infinite and universal is complete in itself without the finite and individual, when the finite and individual is treated as a mere accidental existence due to the " arbitrary will of God/' it ceases to be possible to conceive even God as a spirit. Did Malebranche realize what he was saying when he declared that God was " being in general," but not any particular being? At any rate we can see that the same logic that leads him almost to deny the reality of finite beings, leads him also to seek the divine nature in something more abstract and general even than thought. If we must abstract from all relation to the finite in order to know God as he is, is it not necessary for us also to abstract from self-consciousness, for self-consciousness has a negative element in it that is something definite, and therefore limited? We do not wonder, therefore, when we find Malebranche saying that reason does not tell us that God is a spirit, but only that he is an infinitely perfect being, and that he must be conceived rather as a spirit than as a body simply because spirit is more perfect than body. "When we call God a spirit,' it is not so much to show positively what he is, as to signify that he is not material." But as we ought not to give "him

a bodily form like man's, so we ought not to think of his spirit as similar to our own spirits, although we can conceive nothing more perfect. 1 " It is necessary rather to believe that as 1 he contains in himself the properties of matter without being material, so he comprehends in himself the perfections of created spirits Without being a Spirit as we alone can conceive spirits, and that his true name is ' He who is,' i.e. Being without restriction, Being infinite and universal." 1 Thus the essentially self-revealing God of Christianity gives way to pure spirit, and pure spirit in its turn to the eternal and in- comprehensible substance of which we can say nothing but that it is. The divine substance contains' in it, indeed, everything that is in creation, but it contains them entinenter in some incomprehensible form that is reconcilable with its infinitude. But we' have no adequate name by which to call it except Being. The curious metaphysic of theology by which, in his later writings, Malebranche tried to make room for the incarnation by supposing that the finite creation, which as finite is unworthy of God, was made worthy by union with Christ, the divine Word,' shows that Malebranche had some indistinct sense of the necessity of reconciling his philosophy with his theology ; but it shows also the necessarily artificial nature of the combination. The result of the union of Such incongruous elements was something which the theologians at orice recognized as heterodox and the philosophers as illogical. •

There was another doctrine of Malebranche which brought him into trouble with the theologiansˆ and which was the main subject of his long controversy with Arnaiild. This was his denial of particular providence. As Leibnitz niaintained that this is thd best of all possible worlds, and that its evils are to be explained by the negative nature of the finite, so Malebranche, with a slight change of expression, derived evil from the nature of particular or individual existence. It is not conformable to the nature of God to act by any but universal laws, and these universal laws necessarily i involve particular evil consequences, though their ultimate result is the highest possible good. The question why there should be any particular existence, any existence but God, seeing such existence necessarily involves evil, remains insoluble so long as' the purely pantheistic view of God is maintained; and it is this view which is really at the bottom' of the assertion that he can have no particular volitions. To the coarse and anthropomorphic conception of particular providence Malebranche may be right in Objecting, but on the other hand, it

cannot be doubted that any theoryin which the universal is absolutely opposed to the particular, the infinite to the finite, is unchristian as Well as unphilosophical. For under this dualistic presupposition, there seem to be only two possible alter- natives open to thought: either the ‘particular and finite must, be treated as something independent of the universal and infinite, which involves an Obvious contradiction, or else it must be regarded as absolute nonentity. We find Malebranche doing the one or the other as occasion requires. Thushe vindicates the freedom of man’s will on the ground that the universal will of God does not completely determine the particular volitions of man; and then becoming conscious of the difficulty involved in this conception, he tries, like Descartes, to explain the particular will as something merely negative, a defect, and not a positive existence.

But to understand fully Malebranche’s view of freedom and the ethical system connected with it, we must notice an important alteration which he makes in the Cartesian theory of the Reason relation of will and intelligence. To Descartes, as we have and will. seerl| t ji e ultimate essence of mind lay in pure abstract self-determination or will, and hence he based even moral and in- tellectual truth on the arbitrary decrees of God. With Malebranche, on the other hand, abstraction goes a step further ; and the absolute is sought not in the subject as opposed to the object, not iti pure formal self-determination as. opposed to that which is determined, but in a unity that transcends this difference. With him, therefore, will ceases to be regarded as the essence of intelligence, and sinks into a property or separable attribute of it.” As we can conceive an extended substance without actual movement, so, he says, we can conceive a thinking substance without actual volition. But ” matter

i ‘ Re-cherthe, ch. ix.

or extension without motion would be entirely useless and incapable of that variety of forms for which it is made ; and we cannot, there- fore, suppose, that an all-wise Being would create it in this way. In like manner, if a spiritual or thinking substance were without will, ‘it is clear that it would be quite useless, for it would not be attracted towards the objects of its perception, and would not love the good for which it is made. We cannot therefore conceive an intelligent being so to fashion it.” 2 Now

God need not be conceived as creating at all, for he is self-sufficient; but if he be a creator of spirits, he must create them for himself. ” God cannot will that there should exist a spirit that does not love him, or that loves him less than any other good.” 3 The craving for good in general, for an absolute satisfaction, is a natural love of God that is common to all. ” The just, the wicked, the blessed, and the damned all alike love God with this love.” Out of this love of God arises the love we have to ourselves and to others, which are the natural inclinations that belong to all created spirits. For these inclinations are but the elements of the love which is in God, and which therefore he inspires in all his creatures. ”” II s’aime, ii nous aime, il aime toutes ses creatures ; il >fte fait done point d’esprits qu’il ne les porte a l’aimer, a s/ aimer, et a aimer toutes les creatures.” 4 Stripping this thought of its, theological vesture, what is expressed here is simply that as a spiritual being each man is consciou”s of his own limited and indi- vidual existence, as well as of the limited and individual existence of other beings like himself, only in relation to the whole in which they are parts, so he can find his own good only in the good of the whole, and he is in contradiction with himself so long as he rests in any. good short of that. His love of happiness, his ‘ natural inclinations both selfish and social, may be therefore regarded as an undeveloped form of the love of God; and the ideal state of his inclinations is that in which the love of self and of others are ex- plicitly referred to that higher affection, or in which his love does not proceed from a part to the whole, but from the whole to the parts. ‘The question of morals to’Malebranche is the question how these natural inclinations are related to the particular passions. Sensation and passion arise out of the connexion of body and soul, and their use is only to urge us to attend to the wants of the former. We can scarcely hear without a smile the simple monastic legend which Malebranche weaves together about the original ;1 nature of the passions and their alteration by the Fall. ‘ ‘ It is visibly a disorder that a spirit capable of knowing and loving God should be obliged to occupy itself with the needs of the body.’ “A being altogether occupied with what passes in his body and with the infinity of objects that surround it cannot be thinking on the things that are truly good.” 5 Hence the necessity of an immediate and instinctive warning from the senses in regard to the relations of things to our organism, and also of pains and pleasures which may induce us to attend to this warning. ” Sensible pleasure is the mark that nature has attached to the use of certain things in order that without having the trouble of examining them by reason, we may

employ them, for the preservation of the body, but not in order that we may love them." 6 Till the Fall the mind was merely united to the body, not subjected to it, and the influence of these pleasures and pains was only such as to make men attend to their bodily wants, but not to occupy the mind, or fill it with sensuous joys and sorrows, or trouble its contemplation of that which is really g6od. Our moral aim should therefore be to restore this state of things, to weaken our union with the body and strengthen our union with God. And to encourage us in pursuing this aim we have to remember. that union with God is natural to the spirit, and that, while even the condition of union with the body is artificial, the condition of subjection to the body is wholly unnatural to it. Our primary tendency is towards the supreme good, and we only love the objects of our passions in so far as we " determine towards particular, and therefore false goods, the love that God gives us for himself." The search for happiness is really the search for God in disguise, and even the levity and inconstancy with which men rush from one finite good to another, is a proof that they were made for the infinite. Furthermore, this natural love of God, or inclination for good in general, " gives us the power of suspending our consent in regard to those particular goods which do not satisfy it." 7 If we refuse to be led by the obscure and confused vpice of instinctive feelingi ?which arises from and always tends to confirm our union with the body, and wait for the light of reason which arises from and always tends to confirm our union with God, we have done all that is in our power, the rest is God's work. " If we only judge precisely of that which we see clearly, we shall never be deceived. For then it will not be we that judge, but the universal reason that judges in us." 8 And as our love, even of particular goods, is a confused love of the supreme good, so the clear vision of God in- evitably brings with it the love of him. " We needs must love the highest when we see it." When it is the divine reason that speaks in us it is the divine love that moves us, " the same love wherewith God loves himself and the things he has made." 9

The general result of the ethics of Malebranche is ascetic. The

2 Recherche,i. pt. i. ch. i. 4 Recherche, iv. ch. i. 6 Recherche, v. ch. iv. 8 Morale, pt. i. ch. i, § 9.

3 Recherche, i. pt. i. ch. iv.

6 Entretien, iv.

7 Recherche, iv. ch. i.

- Recherche, iv. ch. v.

passions, like the senses, have no relation to the higher life of the soul ; their value is only in relation to the union of soul and body, a union which is purely accidental or due to the arbitrary will of God, The more silently they discharge their provisional function, and the less they disturb or interfere with the pure activity of spirit; the more nearly they approach to the only perfection that is possible for them. Their ideal state is to remain or become again simple instincts that act mechanically like the circulation of the blood. Universal light of reason casts no ray into the obscurity of sense ; its universal love cannot embrace any of the objects of particular passion. It is indeed recognized by Malebranche that sensation in man is mixed with thought, that the passions in him are forms of the love of good in general. But this union of the rational with the sensuous nature is regarded merely as a confusion which is to be cleared up, not in a higher unity of the two elements, but simply by the withdrawal of the spirit from contact with that which darkens and defiles it. Of a transformation of sense into thought, of passion into duty : — an elevation of the life of sense till it becomes the embodiment and expression of the life of reason — Malebranche has no conception. Hence the life of reason turns with him to mysticism in theory and to asceticism in practice. His universal is abstract and opposed to the particular; instead of explaining it, it explains it away.

A certain tender beauty as of twilight is spread over the world as we view it through the eyes of this cloistered philosopher, and we do not at first see that the, softness and ideality of the picture is due to the gathering darkness. Abstraction seemsonly to be purifyT ing, and not destroying, till it has done its perfect work. Male- branche conceived himself to be presenting to the world only the purest and most refined expression of Christian ethics arid theology. But if we obey his own continual advice to think clearly and Ais tinctly , if we divest his system of all the sensuous and imaginative forms in which he has clothed it, and reduce it to the naked simplicity of its central thought, what we find is not a God that reveals himself in the finite, and to the finite, but the

absolute substance which has no revelation, and whose existence is the negation of all but itself. Thus to tear away the veil, however, there was needed a stronger, simpler, and freer spirit—a spirit less influenced by opinion, less inclined to practical compromise, and gifted with a stronger ” faith in the whispers of the lonely muse “of speculation than Malebranche.

The Philosophy of Spinoza. — It is a remark of Hegel’s that Spinoza, as a Jew, first brought into European thought the idea of an absolute unity in which the difference of finite and infinite is lost. Some later writers have gone further, and attempted to show that the main doctrines by which his philosophy is distinguished from that of Descartes were due to the direct influences of Jewish writers like Maimonides, Gersoriides, arid Hasdai Crescas, rather than to the necessary development of Cartesian ideas. And it is undoubtedly true that many points of similarity with such writers, reaching down even to verbal coincidence, may be detected in the works of Spinoza, although it is not so easy to determine how much he owed to their teaching. His own view of his obligations is sufficiently indicated by the fact, that while in his ethics he carries on a continual polemic against Descartes, and strives at every point to show that his own doctrines are legitimately derived from Cartesian principles, he only once refers to Jewish philosophy as containing an obscure and unreasoned anticipation of these doctrines. ” Quod quidam Hebraeorum quasi per nebulam vidisse videntUr qui scilicet statuunt Deum Dei intellectum resque ab ipso intellectas unum et idem esse. ” 1 It may be that the undeveloped pantheism and rationalism of the Jewish philosophers had a deeper influence than he himself was aware of, in emancipating him from the traditions of the synagogue, and giving to his mind its first philosophical bias. In his earlier work there are Neoplatonic ideas and expressions which in the Ethics are rejected or re’moulded into a form more suitable to the spirit of Cartesianism. But the question, after all, has little more than a biographical interest. In the Spinozistic philosophy there are few differences from Descartes which cannot be traced to the necessary development of Cartesian principles; and the comparison of Malebranche shows that a similar development might take place under the most diverse intellectual conditions. What is most remarkable in Spinoza is just the freedom and security with which these principles are followed out to their last result. His Jewish origin and his breach with Judaism completely isolated him from every influence but that of the thought that possesses him. And no

scruple or hesitation, no respect for the institutions or feelings of his time interferes with his speculative consequence. ‘ He ■ i l Eth. ii. schol. 7. ■ .■•»-..

Geo- metrical .methott applied to meta- physics.

exhibits tb us the almost perfect type of a mind without super-stitions, which has freed itself from all but reasoned and intelligent convictions,ˆ or,;ih, the Cartesian phrase, “clear and distinct ideas”; and when he fails, it is not by any inconsistency, or arbitrary stopping short of the necessary conclusions of his logic, but by 1 the essential defect of his principles.

Spinoza takes his idea of method from mathematics, and after the manner of Euclid, places at the head of each book of his Ethics a certain number of definitions, axioms, and postulates which £re supposed to be intuitively certain, and to form a sufficient, basis for all that follows. Altogether there are twehty-sevin definitions, twenty axioms, and eight, postulates. If Spinoza is regarded as the’ most consequent of philosophers it cannot be because he has based his system upon so many fragmentary views of truth; it must be because a deeper unity has been discerned in the system than is visible tin the first aspect of it. We must, therefore, to a certain;; extent distinguish between the form and the matter of his thought, though it is also true that the defective form itself involves a defect in the ihatter. ‘

: What in the first instance recommends the geometrical method to Spinoza is, not only its apparent exactness and the necessity of its sequence, but, so to speak, its disinterestedness, Confusion of thought arises from the fact that we put ourselves, our desires and feelings and interests, into our view of things; that we dq not regard them as they are in themselves, in their essential nature, but Took for sqmfe final cause, that is, some relation to ourselves, by which they may be explained. For this reason, he says, ” the truth might for ever have remained hid from the human race, if mathematics, which looks not to the final cause of figures, but to their essential nature and the properties involved in it, had not set another type of knowledge before them.” To understand things is to see how all that is true of them flows from the clear and distinct idea expressed in their definition, and ultimately, it is to see how all truth flows from the’ essentia Dei as all geometrical truth flows from the idea of quantity. To take a mathematical view of the universe, therefore, is to raise ourselves above all consideration of the end or tendency of

things, above the fears and hopes of mortality into the region of tr uth and necessity. “When I turned my mind to this subject,” he says in the beginning of his treatise on politics, ” I did not propose to myself any novel or strange aim, but simply to demonstrate by certain arid indubitable reason those things which agree best with practice. And in order that I might inquire into the matters of this science with the same freedom of mind with which we are wont to treat lines and surfaces in mathematics, I determined not to laugh or to weep over the actions of men, but simply to understand them; and to contemplate their affections and passions, such as love, hate, anger h envy, arrogance, pity and all other disturbances of soul not as vices of human nature, but as properties pertaining to it in the same way as heat, cold, storm, thunder pertain to the nature of the atmosphere. For these, though troublesome, are yet necessary) and have certain causes through which we may come to understand them, and thus, by contemplating them in their truth, gain for our rninds as much joy as by the knowledge of things that are pleasing to the senses.” All our errors as to the nature of things arise from our judging them from the point of view of the part and not of the whole, from a point of view determined by their relation to our own individual being, and not from a point of view determined by the nature of the things themselves ; or, to put the same thing in another way, from the point of view of sense and imagination, and not from the point of view of intelligence. Mathematics shows us the in- adequacy of such knowledge when it takes us out of ourselves into things, and when it presents these things to us as objects of universal intelligence apart from all special relation to our individual feelings. And Spinoza only wishes that the same universality and freedom of thought which belongs to mathematics, because its objects do not interest the passions, should be extended to those objects that do interest them. ‘ Purity from interest is the first condition of the philosbpher’s’being; : he must get beyond the illusion of sense and passion that makes our own lives so supremely important and interesting to us simply because they are our own. He must look at the present as it were through an inverted telescope of reason, that will reduce it to its due proportion and place in the sum of things. To the heat of passion and the higher heat of imagination, Spinoza has only one advice — “Acquaint yourself with God and be at peace.” Look not to the particular but to the universal, view things not under the form of the finite and temporal, but sub, quadam, specte deternitatis.
,’.’.. .’■,’..’,’

. The illusion, of the, finite — the illusion of sense,, imagination and passion! which, in Bacon's language, tends to make men judge of things ex analogia hominis and not ex analogiq universi, <;„_„ the which raises the individual life, and even the present moment of the individual life, with its passing feelings, into the standard for measuring tjip universe — this, in the eyes of Spinoza,, is the source of all error and evil to man. On the other hand,, his highest good is to live the universal life of reason, or what is. the' same- thing, to view all things from

source of error.

their centre in God, and to be moved only by the passion for good in general, " the intellectual love of God." In the treatise De Etnenda- tione Intellectus, Spinoza takes up this contrast in the first instance from its moral side. " All our felicity or infelicity is founded on the nature of the object to which we are joined by love." To love the things that perish is to be in continual trouble and disturbance of passion; it is to be full of envy and hatred towards others who possess them; it is to be ever striving after that which, when we attain it, does not satisfy us; or lamenting over the loss of that which inevitably passes away from us; only " love to an object that is infinite and eternal feeds the soul with a changeless and unmingled joy." But again our love rests upon our knowledge; if we saw things as they really are we should love only the highest object. It is because sense and imagination give to the finite an independence and substantiality that do not belong to it, that we waste our love upon it as if it were infinite. And as the first step towards truth is to understand our error, so Spinoza proceeds to explain the defects of common sense, or in other words, of that first and unreflected view of the world which he, like Plato, calls opinion. Opinion is a kind of knowledge derived partly from hearsay, and partly from experientia vaga. It consists of vague and general con- ceptions of things, got either from the report of 6thers or from an experience which has not received any special direction from in- telligence. The mind that has not got beyond the stage of opinion takes things as they present themselves in its individual experience ; and its beliefs grow up by association of whatever happens to have been found together in that experience. And as the combining principle of the elements of opinion is individual and

not Universal, so its conception of the world is at once fragmentary and accidental. It does not see things in their connexion with the unity of the whole, and hence it cannot see them in their true relation to each other. ” I assert expressly,” says Spinoza, ” that the mind has no adequate conception either of itself or of external things, but only a confused knowledge of them, so long as it perceives them only in the common order of nature, i.e. so long as it is externally determined to contem- plate this or that object by the accidental concourse of things, and so long as it is not internally determined by the unity of thought in which it considers a number of things to understand their agreements, differences and contradictions.” l

There are two kinds of errors which are usually supposed to exclude each other, but which Spinoza finds to be united in opinion.

These are the errors of abstraction and imagination; Vices o tne f ormer ex pi a i ns ; rs vice by defect, the latter its vice tin”d k y excess. On the one hand, opinion is abstract and one- imaeiaa- s ‘ c ‘ e< ˆ > ‘t ‘ s defective in knowledge and takes hold of t/ „ ‘ things only at one point. On the other hand, and just

because of this abstractness and one-sidedness, it is forced to give an artificial completeness and independence to that which is essentially fragmentary and dependent. The word ‘* abstract ” is misleading, in so far as we are wont to associate with abstraction the idea of a mental effort by which parts are separated ‘ from a given whole; but it may be applied without violence to any imperfect conception, in which things that are really elements of a greater whole are treated as if they were res completae, independent objects, complete in themselves. And in this sense the ordinary conscious- ness of man is often the victim of abstractions when it supposes itself most of all to be dealing with realities. The essences and substances of the schoolman may delude him, but he cannot think these notions clearly without seeing that they are only abstract elements of reality, and that they have a meaning only in relation to the other elements of it. But common sense remains unconscious of its abstractness because imagination gives a kind of substantiality to the fragmentary and limited, and so makes it possible to conceive it as an independent reality. Pure intelligence seeing the part as it is in itself could never see it but as a part. Thought, when it rises to clearness and distinct- ness in regard to any finite object, must at once discern its relation to other finite objects and to the

whole, — must discern, in Spinozistic language, that it is ” modal ” and not ” real.” But though it is not possible to think the part as a whole it is possible to picture it as a whole. The limited image that fills the mind’s eye seems to need nothing else for its reality. We cannot think a house clearly and distinctly in all the connexion of its parts with each other without seeing its necessary relation to the earth on which it stands, to the pressure of the atmosphere, &c. The very circumstances by which the possibility of such an existence is explained make it im- possible to conceive it apart from other things. But nothing hinders me from resting on a house as a complete picture by itself. Imagination represents things in the externality of space and time, and is subjected to no other conditions but those of space and time. Hence it can begin anywhere and stop anywhere. For the same cause it can mingle and confuse together all manner of inconsistent forms- can imagine a man with a horse’s head, a candle blazing in vacuo, a speaking tree, a man changed into an animal. There may be ele- ments in the nature of these things that would prevent such com- binations; but these elements are not necessarily present to the ordinary consciousness, the abstractness of whose conceptions leaves it absolutely at the mercy of imagination or accidental association. To thought in this stage anything is possible that can be pictured.

l Eth. i. schoi. 29. ‘ ”

On the other hand, as knowledge advances, this freedom of combination becomes limited, ” the less the mind understands and the more it perceives the greater is its power of fiction, and the more it understands the narrower is the limitation of that power. For just as in the moment of consciousness we cannot imagine that we do not think, so after we have apprehended the nature of body we cannot conceive of a fly of infinite size, and after we know the nature of a soul we cannot think of it as a square, though we may use the words that express these ideas.” 2 Thus, according to Spinoza, the range of possibility narrows as knowledge widens, until to perfected knowledge posibility is lost in necessity.

From these considerations it follows that all thought is imperfect that stops short of the absolute unity of all things. Our first imperfect notion of things as isolated from each other, or connected only by co-existence and succession, is a mere IfsufHcl- imagination of things. It is a fictitious substantiation e ? cy , of . of isolated moments in the eternal Being. Knowledge, ,* ,’ so far

as it deals with the finite, is engaged in a continual v ”’ ua ‘- process of self-correction which can never be completed, for at every step there is an element of falsity, in so far as the mind rests in the contemplation of a certain number of the elements of the world, as if they constituted a complete whole by themselves, whereas they are only a part, the conception of which has to be modified at the next step of- considering its relation to the other parts. Thus we rise from individuals of the first to individuals of the second order, and we cannot stop short of” the idea of ” all nature as one individual whose parts vary through an infinite number of modes, without change of the whole individual.” 3 At first we think of pieces of matter as independent individuals, either because we can picture them separately, or because they preserve a certain proportion or relation of parts through their changes. But on further considera- tion, these apparent substances sink into modes, each of which is dependent on all the others. All nature is bound together by necessary law, and not an atom could be other than it is without the change of the whole world. Hence it is only in the whole world that there is any true individuality or substance. And the same principle applies to the minds of men. Their individuality is a mere semblance caused by our abstraction from their conditions. Isolate the individual man, and he will not display the character of a think- ing being at all. _ His whole spiritual life is bound up with his rela- tions to other minds, past and present. He has such a life, only in and through that universal life of which he is so infinitesimal a part that his own contribution to it is as good as nothing. ” Vis qua homo in existendo perseverat limitata est, et a potentia causarum externarum infinite superatur.” 4 What can be called his own? His body is a link in a cyclical chain of movement which involves all the matter of the world, and which as a whole remains without change through all. His mind is a link in a great movement of thought, which makes him the momentary organ and expression of one of its phases. His verv consciousness of self is marred by a false abstraction, above which he must rise ere he can know himself as he really is.

” Let us imagine,”’ says Spinoza in his fifteenth letter, ” a little worm living in blood which has vision enough to discern the particles of blood, lymph, &c, and reason enough to observe how one particle is repelled by another with which it comes into contact, or com- municates a part of its motion to it. Such a worm would live in the blood as we do in this part of the universe, and would regard each particle of it, not as a part, but

as a whole, nor could it know how all the parts are influenced by the universal nature of the blood, and are obliged to accommodate themselves to each other as is required by that nature, so that they co-operate together according to a fixed law. For if we suppose that there are no causes outside of the blood which could communicate new motions to it, and no space beyond the blood, nor any other bodies to which its particles could transfer their motion, it is certain that the blood as a whole would always maintain its present state, and its particles would suffer no other variations than those which may be inferred from the given relation of the motion of the blood to lymph, chyle, &c. And thus in that case the blood would require to be considered always as a whole and not as a part. But since there are many other causes which influence the laws of the nature of blood, and are in turn influenced thereby, other motions and other variations must arise in the blood which are not due to the proportion of motion in its constituents but also to the relation between that motion and external causes. And there- fore we cannot consider the blood as a whole, but only as a part of a greater whole."

"Now we can think, and indeed ought to think, of all natural bodies in the same manner in which we have thought of this blood, for all bodies are surrounded by other bodies, and reciprocally determine and are determined by them, to exist and operate in a fixed and definite way, so as to preserve the same ratio of motion and rest in the whole universe. Hence it follows that every body, in so far as it exists under a certain definite modification, ought to be considered as merely a part of the whole universe which agrees with its whole, and thereby is in intimate union with all the other parts ; and since the nature of the universe is not limited like that of the blood, but absolutely infinite, it is clear that by this nature,

8 De Emend, viii. § 58. 3 Eth. ii. lemma, 7 schol. * Eth. iv. 3.

with its infinite powers, the parts are modified in an infinite number of ways, and compelled to pass through an infinity of variations. Moreover, when I think of the universe as a substance, I conceive of a still closer union of each part with the whole; for, as I have elsewhere shown, it is the nature of

substance to be infinite, and therefore every single part belongs to the nature of the corporeal substance, so that apart therefrom it neither can exist nor be con- ceived. And as to the human mind, I think of it also as of part of nature, for I think of nature as having in it an infinite power of thinking, which, as infinite, contains in itself the idea of all nature, and whose thoughts run parallel with all existence."

From this point of view it is obvious that our knowledge of things cannot be real and adequate, except in so far as it is determined by The whole tne ‘^ ea °^ tne wno ‘ e ‘ an < ^ proceeds from the whole to the dominates P arts > A knowledge that proceeds from part to part the oarts mus t always be imperfect; it must remain external to its object, it must deal in abstractions or mere entia rationis, which it may easily be led to mistake for realities. Hence Spinoza, like Plato, distinguishes reason whose movement is regres- sive (from effect to cause, from variety to unity) from scientia intuitiva, whose movement is progressive, which " proceeds from the adequate idea of certain of God's attributes to an adequate knowledge of the nature of things." x The latter alone deserves to be called science in the highest sense of the term. " For in order that our mind may correspond to the exemplar of nature, it must develop all its ideas from the idea that represents the origin and source of nature, so that that idea may appear as the source of all other ideas." 2 The regressive mode of knowledge has its highest value in preparing for the progressive. The knowledge of the finite, ere it can become perfectly adequate, must be absorbed and lost in the knowledge of the infinite.

In a remarkable passage in the Ethics, Spinoza declares that the defect of the common consciousness of men lies not so much in their PI He ignorance, either of the infinite or of the finite, as in their

thlnvs incapacity for bringing the two thoughts together, so as

modes of to P ut tne ‘ atter m ‘ ts proper relation to the former. Infinite ˆU are ready to confess that God is the cause both of the substance, existence and of the nature of things created, but they do not realize what is involved in this confession — and hence they treat created things as if they were substances, that is, as if they were Gods. " Thus while they are contemplating finite things, they think of nothing less than of the divine nature; and again when they turn to consider the divine nature, they think of

nothing less than of their former fictions on which they have built up the knowledge of finite things, as if these things could contribute nothing to our understanding of the divine nature. Hence it is not wonderful that they are always contradicting themselves." 3 As Spinoza says elsewhere, it belongs to the very nature of the human mind to know God, for unless we know God we could know nothing else. The idea of the absolute unity is involved in the idea of every particular thing, yet the generality of men, deluded by sense and imagination, are unable to bring this implication into clear conscious- ness, and hence their knowledge of God does not modify their view of the finite. It is the business of philosophy to correct this defect, to transform our conceptions of the finite by relating it to the infinite, to complement and complete.the partial knowledge produced by individual experience by bringing it into connexion with the idea of the whole. And the vital question which Spinoza himself prompts us to ask is how far and in what way this transformation is effected in the Spinozistic philosophy.

There are two great steps in the transformation of knowledge by the idea of unity as that idea is conceived by Spinoza. The first step involves a change of the conception of individual finite things by which they lose their individuality, their character as independent substances, and come to be regarded as modes of the infinite. But secondly, this negation of the finite as such is not conceived as implying the negation of the distinction between mind and matter. Mind and matter still retain that absolute opposition which they had in the philosophy of Descartes, even after all limits have been removed. And therefore in order to reach the absolute unity, and transcend the Cartesian dualism, a second step is necessary, by which the independent substantiality of mind and matter is with drawn, and they are reduced into attributes of the one infinite substance. Let us examine these steps successively.

The method by which the finite is reduced into a mode of the infinite has already been partially explained. Spinoza follows to its Aoollca- legitimate result the metaphysical or logical principles of Hon to ' Descartes and Malebranche. According to the former, nature of as we nave seen, the finite presupposes the infinite, and, matter. indeed, so far as it is real, it is identical with the infinite. The infinite is absolute reality, because it is pure affirma- tion, because it is that which negationem nullam involvit. The finite is distinguished from it simply by its limit, i.e. by its wanting some- thing which the infinite has. At this point

Spinoza takes up the argument. If the infinite be the real, and the finite, so far as it is distinguished therefrom, the unreal, then the supposed substantiality or individuality of finite beings is an illusion. In itself the finite is but an abstraction, to which imagination has given an apparent

1 Eth. ii. 40, schol. 2. 2 Dr Emend, vii. § 42. l Eih. ii. schol. 10.

independence. All limitation or determination is negative, and in order to apprehend positive reality we must abstract from limits. By denying the negative, we reach the affirmative; by annihilating finitude in our thought, and so undoing the illusory work of the imagination, we reach the indeterminate or unconditioned being which alone truly is. All division, distinction and relation are but entia rationis. Imagination and abstraction can give to them,_as they can give to mere negation and nothingness, ” a local habitation and a name,” but they have no objective meaning, and in the highest knowledge, in the scientia intuitiva, which deals only with reality, they must entirely disappear. Hence to reach the truth as to matter, we must free ourselves from all such ideas as figure or number, measure or time, which imply the separation and relation of parts. Thus in his 50th letter, in answer to some question about figure, Spinoza says, ” to prove that figure is negation, and not anything positive, we need only consider that the whole of matter conceived indefinitely, or in its infinity, can have no figure; but that figure has a place only in finite or determinate bodies. He who says that he perceives figure, says only that he has before his mind a limited thing and the manner in which it is limited. But this limitation does not pertain to a thing in its ‘ esse,’ but contrariwise in its ‘ non-esse ‘ (i.e. it signifies, not that some positive quality belongs to the thing, but that something is wanting to it). Since, then, figure is but limitation, and limitation is but negation, we cannot say that figure is anything.” The same kind of reasoning is else- where (Epist. 29) applied to solve the difficulties connected with the divisibility of space or extension. Really, according to Spinoza, extension is indivisible, though modally it is divisible. In other words, parts ad infinitum may be taken in space by the abstracting mind, but these parts have no separate existence. You cannot rend space, or take one part of it out of its connexion with other parts. Hence arises the impossibility of asserting either that there is an infinite number of parts in space, or that there is not. The solution of the antinomy is that neither alternative is true. There are many things “quae nullo numero explicari possunt,” and to understand

these things we must abstract altogether from the idea of number. The contradiction arises entirely from the applica- tion of that idea to the infinite. We cannot say that space has a finite number of parts, for every finite space must be conceived as itself included in infinite space. Yet, on the other hand, an infinite number is an absurdity; it is a number which is not a number. We escape the difficulty only when we see that number is a category inapplicable to the infinite, and this to Spinoza means that it is not applicable to reality, that it is merely an abstraction, or ens imaginationis.

The same method which solves the difficulties connected with the nature of matter is applied to mind. Here also we reach the reality, or thing in itself, by abstracting from all determination. Nature of All conceptions, therefore, that involve the independence mu1 d; of the finite, all conceptions of good, evil, freedom and responsibility disappear. When W. Blyenburg accuses Spinoza of making God the author of evil, Spinoza answers that evil is an ens rationis that has no existence for God. " Evil is not something posi- tive, but a state of privation, and that not in relation to the divine, but simply in relation to the human intelligence. It is a conception that arises from that generalizing tendency of our minds, which leads us to bring all beings that have the external form of man under one and the same definition, and to suppose that they are all equally capable of the highest perfection we can deduce from such a definition. When, therefore, we find an individual whose works are not consistent with this perfection, straightway we judge that he is deprived of it, or that he is diverging from his own nature, — a judgment we should never make if we had not thus referred him to a general definition, and supposed him to be possessed of the nature it defines. But since God does not know things abstractly, or through such general definitions, and since there cannot be more reality in things than the divine intelligence and power bestows upon them, it manifestly follows that the defect which belongs to finite things, cannot be called a privation in relation to the intelligence of God, but only in relation to the intelligence of man." 4 Thus evil and good vanish when we consider things sub specie aeternitatis, because they are categories that imply a certain independence in finite beings. For the idea of a moral standard implies a relation of man to the absolute good, a relation of the finite to the infinite, in which the finite is not simply lost and absorbed in the infinite. But Spinoza can admit no such relation. In the presence of the infinite the finite

disappears, for it exists only by abstraction and negation; or it seems to us to exist, not because of what is present to our thoughts, but because of what is not present to them. As we think ourselves free because we are conscious of our actions but not of their causes, so we think that we have an individual existence only because the infinite intelligence is not wholly but only partially realized in us. But as we cannot really divide space, though we can think of a part of it, so neither can we place any real division in the divine intelli- gence. In this way we can understand how Spinoza is able to speak of the human mind as part of the infinite thought of God, and of the human body as part of the infinite extension of God, while yet he asserts that the divine substance is simple, and not made up of parts.

Eph$. 32.

So far. as they exist, they must be conceived as parts of the divine substance, but when we look directly at that divine substance their separate existence altogether disappears. >■ >• ,

It has, however, been already mentioned that this ascending movement of abstraction does not at once and directly bring s id and Spinoza to the absolute unity of substance. The prin-

° ciple that ” determination is negation,” and that there-

‘ oaay ‘ fore the absolute reality is to be found only in the

indeterminate, would lead us to expect this conclusion; but the Cartesian dualism prevents Spinoza from reaching it. lylind and matter, are so absolutely opposed, that even when we take away all limit and determination from both, they still . retain their distinctness. Raised to infinity, they still refuse to be identified. We are forced, indeed, to take, from them their substantial or sub- stantive existence, for there can be no other substance, but God, wiio includes all reality in himself. But though reduced to attributes of a common substance, the difference of thought and extension is insoluble. The independence of individual finite things disappears whenever we substitute thought for imagination, but even to pure intelligence, extension remains extension, and thought remains si za’s thought. Spinoza seems therefore reduced to a dilemma ;

P nQ he cannot surrender either the unity or the duality of

*? “^ things, yet he cannot relate them to each other. The only

Descartes’ dualism.

Q , course left open to him is to conceive each attribute in its turn as the whole substance, and to regard their difference as the difference of expression. As; the patriarch was called by the two names of Jacob and Israel, under different aspects, each of which included the whole reality of the man, so our minds apprehend the absolute substance in two ways, each of which expresses its whole nature. 1 In this way the extremes of absolute identity and absolute difference seem tobe reconciled. There is a complete parallelism of thought and extension, ” ordo et connexio idearum idem est ac ordo et connexio rerum,”’ yet there is also a complete independence and absence of relation between theni, for each is the whole. A thing in one expression cannot lie related to itself in another expression. Hence in so far as we look at the substance under the attribute of thought, we must take no account of extension, and in so far as we look at it under the attribute of extension, we must equally refuse to take any account of thought. This parallelism may be best illustrated by Spinoza’s account of the relation of the human soul and body. The soul is the idea of the body, and the body is the object of the soul, whatever is in the one really is in the other ideally; yet this relation of object and subject does not imply any connexion. The motions and changes of the body have to be accounted for partly by itself, partly by the influence of other bodies; and the thoughts of the soul in like manner have to be accounted for partly by what God thinks as constituting the individual mind, and partly by what he thinks as constituting the minds of other individuals. But to account for thought by the motions of the body, or for the motions of the body by! .thought, is to attempt to bridge the impassable gulf: between thought and extension. : It involves the double absurdity of accounting for a thing by itself, and of accounting for it by that which has nothing in common with it.

In one point of view, this theory of Spinoza deserves the highest praise for that very characteristic which probably excited most _ , , odium against it at the time it was first published, namely, .ap ooza s j ts exa i ta ti on of matter. It is the mark of an imperfect ih ii spiritualism to hide its eyes from outward nature, and to

Idealism. s h r i n k from the material as impure and defiling. But its horror and fear are proofs of weakness ; it flies from an enemy it cannot overcome. Spinoza's bold identification of spirit and matter, God and nature, contains in it the germ of a higher idealism than can be found in any philosophy that asserts the claims of the former at the expense of the latter. A system that begins by making nature godless, will inevitably end, as Schelling once said, in making God unnatural. The expedients by which Descartes keeps matter at a distance from God, were intended to maintain his pure spirituality; but their ultimate effect was seen in his reduction of the spiritual nature to. mere will. As Christianity has its superiority over other religions in this, that it does not end with the opposition of the human to the divine, the natural to the spiritual, but ultimately reconciles them, so a true idealism must vindicate its claims by absorbing materialism into itself; It was, therefore, a true instinct of philosophy that led Spinoza to raise matter to the co-equal of spirit, and at the same time to protest against the Cartesian conception of rhatter as mere inert mass, moved only by impulse from without. "What were a God that only impelled the world from without?" says Goethe. "It becomes him to stir it by an inward energy, to involve nature in himself, himself in nature, so that that which lives and* moves and has a being in him can never feel the want of his power or his spirit." ,:■..• >;

While, however, Spinoza thus escapes some of the inconsequences of Descartes, the contradiction that was implicit in the Cartesian system between the duality and the unity, the attributes and the substance, in his system becomes explicit. When so great emphasis is laid upon the unity of substance, it becomes more diffioult to explain the difference of the attributes. The result is, that Spinoza

l Epist. 27.

*Eth. ii. 7.

is forced to account for it, not by the nature of substance itself, but by the inature of the intelligence to Which it is revealed. '■ By substance," he says, ■" I understand that which Is in itself, ^ „ jca f and is conceived through itself. By attribute I understand difficulties the same thing, nisi quod attributum dicatur respectu Ig intellectus substantiae certum talem naturam tribuentis." 3 solnoza's Hence we are naturally led with J. E. Erdmann to think \,, of the intelligence dividing the substance as a kind of >. "

prism that breaks the white: light into different colours, ** yscs ‘ through each of which the same world is seen, only with a different aspect. But if the intelligence in itself is but a mode of one of the attributes, how can it be itself the source of their distinction? : • ...

The key to this difficulty is that Spinoza has really, and almost in spite of his logical principles, two’ opposite conceptions of substance, between which he alternates without ever bringing them to a uniˆy. On the one handy in accordance with the principle that determination is negation, substance must be taken as that which is utterly in- determinate, like the Absolute of the Buddhist, which we can char- acterize only by denying of it everything that we assert of the finite. In. this view, no predicate can be applied univocally to God and to the creatures; he differs from them, not only in existence, but in essence. 4 If we follow out this view to its legitimate result, God is withdrawn into his own absolute unity, and no difference of attributes can be ascribed to him, except in respect of something else than himself. It is owing to the defects of our intelligence that he appears under different forms or expressions ; in himself he is pure being, without form or expression at all.: But, on the other hand, it is to be observed, that while Spinoza really proceeds by abstraction and negation, he does not mean to do so. The abstract is to him the unreal and imaginary, and what he means by substance is not simply Being in general, the conception that remains when we omit all that distinguishes the particulars, but the absolute totality of things conceived as a unity in which all particular existence is included and subordinated. Hence at a single stroke the indeter- minate passes into the most determinate Being, the Being with no attributes at all into the Being constituted by an infinite number of attributes. And while, under the former conception, the defect of our intelligence seemed to be that it divided the substance, or saw a difference of attributes in its absolute unity,’ under the second conception its defect lies in its apprehending only two out of the infinite multitude of these attributes.

To do justice to Spinoza, therefore, we must distinguish between the actual effect of his logic and its effect as he conceived it. The actual effect of his logic is to dissolve ail in the ultimate abstraction of Being, from which we can find no way back to the concrete. But his intent was simply to relate all the parts to that absolute unity which is the presupposition of all thought and being, and so to arrive atˆthe most ■concrete and complete idea

of the reality of things. He failed to see what is involved in his own principle that determination is negation; for if affirmation is impossible without negation, then the attempt to divorce the two from eaeh other, the attempt to find a purely affirmative being, must necessarily: end in the barest of all abstractions being confused with the unity of all things. But even when the infinite substance is defined as the negative of the finite, the idea of the finite becomes an essential element in the conception of the infinite. Even the Pantheist, who says that God is what finite things are not, in spite of himself recog- nizes that God has a relation to finite things. Finite things may in his eyes have no positive relation to God, yet they have a negative relation ; it is through their evanescence and transitoriness, through their nothingness, that the eternal, the infinite reality alone is revealed to him. Spinoza is quite conscious of this process, conscious that he reaches the affirmation of substance by a negation of what he conceives as the purely negative and unreal existence of finite things, but as he regards the assertion of the finite as merely an illusion due to our imagination, so he regards the correction of this illusion, the negation of the finite as a movement of reflection which belongs merely to our intelligence, and has nothing to do with the nature of substance in itself. We find the true affirmation by the negation of the negative, but in itself affirmation has nd relation to negation. Hence his absolute being is the dead all-absorbing substance and not the self-revealing spirit. It is the being without determination, and not the being that determines itself. There is no reason in the nature of substance why it should have either attributes or modes ; neither individual finite things nor the general distinction of mind and matter can be deduced from it. The descending movement of thought is not what Spinoza himself said it should be, an evolution, but simply an external and empirical process by which the elements dropped in the ascending movement of abstraction are taken up again with a merely nominal change. For the sole difference in the conception of mind and matter as well as in the conception of individual minds and bodies which is made by their reference to the idea of God, is that they lose their substantive character and become adjectives. Aristotle objected to Plato that his ideas were merely alcrBrfri. itiia, that is, that his idealization of the world was merely superficial, and left the things idealized very much what they were before to the sensuous consciousness ; and the same may be

3 Epist.27.

said of Spinoza’s negation of finite things. It was an externat and imperfect negation, which did not transform the idea of thefinite, but merely substituted the names of attributes and modes for the names of general and individual substances.

The same defective logic, by which the movement of. thought in determining the substance is regarded as altogether external to the subgtance itself, is seen again in Spinoza’s conceptions of the relations of the attributes to each other. Adopting the Cartesian opposition of mind and matter, he does not see, any more than Descartes, that in their opposition they are correlative. r if he did see it (as seems possible from a passage in his earliest treatise), 1 he regarded the correlation as merely subjective, merely belonging to our thought. They are to him only the two attributes which we happen, to know out of the infinite number belonging to God. There is no necessity that the substance should manifest itself in just these attributes and no others, for abstract substance is equally receptive of all determinations, and equally indifferent to them all. Just because the unity is merely generic, the differences are accidental, and do not form by their union any complete whole. If Spinoza had seen that matter in itself is the correlative opposite 1 of mind in itself, he need not have sought by abstracting f torn the difference of these elements to reach a unity which is manifested in that very difference, and his absolute would have been not substance but spirit. ;This idea he never reached, but we find him approximating to it in two ways. On the one hand, he condemns the Cartesian conception of matter as passive and self external, or infinitely divisible — as, in short, the mere opposite of thought. 2 And sometimes he insists on the parallelism of extension and thought at the expense of their opposition in a way that almost anticipates the assertion by Leibnitz of the essential identity of mind and matter. On the other hand, he recognizes that this parallelism is not complete. Thought is not like a picture; it is conscious, and conscious not only. of itself, but of extension. It transcends therefore the absolute distinction between itself and other attributes. It is. only because he cannot rid himself of the phantom of an extended matter as a thing in itself, which is entirely different from the idea of it, that Spinoza i$; pre vented from recognizing in mind that unity that transcends all distinctions, even its own distinction from matter. As it is, his main reason for saying that

intelligence is not an attribute of God, but merely a mode, seems to be this, that the thought of God must be conceived as producing its own object, i.e. as transcending the dis- tinction of subject and object which is necessary to our intelligence. 3 But this argument of itself points to a concrete quite as much as to ah abstract unity. It is as consistent with the idea of absolute spirit as with that of absolute substance. Spinoza's deliberate and formal doctrine is undoubtedly the latter; but. he constantly employs expressions Which imply the former, as when he speaks of God as causa sui. The higher idea inspires him, though his consciousness only embraces the lower idea.

The ethical philosophy of Spinoza is determined by the. same principles and embarrassed by the same difficulties as his meta- _. , physics. In it also we find the same imperfect conception Spiaoza s of the re i at ; on f t h e positive to the negative elements, ethl fi al and, as a consequence, the same confusion of the highest system. un j tv f thought, the affirmation that subordinates and transcends all negation with mere abstract affirmation. Or, to put the same thing in ethical language, Spinoza teaches a morality which is in every point the opposite of asceticism, a morality of self- assertion or self-seeking, and not of self-denial. The conatus sese conservandi is to him the supreme principle of virtue; 4 yet this self- seeking is supposed, under the guidance of reason, to identify itself with the love of man and the love of God, and to find blessedness not in the reward of virtue, but in virtue itself. It is only confusion of thought and false mysticism that could object to this result on the ground of the element of self still preserved in the amor Dei intellectualis. For it is just the power of identifying himself with that which is wider and higher than his individual being that makes morality possible to man. But the difficulty lies in this, that Spinoza will not admit the negative element, the element of mortifica- tion or sacrifice, into morality at all, even as a moment of transition. For him there is no dead self; by which we may rise to higher things, no losing of life that we may find it. For the negative is nothing, it is evil in the only sense in which evil exists, and cannot be the source of good. The higher affirmation of our own being, the higher seeking of ourselves which is identical with the love of God, must therefore be regarded as nothing distinct in kind from that first seeking of our natural self which in Spinoza's view belongs to us in common with the animals, and indeed in common with all, beings whatever. It must be regarded merely as a direct development and extension

of the same thing. The main interest of the Spinozistic •ethics therefore lies in observing by what steps he accomplishes this transition, while excluding altogether the idea of a real division of the higher and the lower life, the spirit and flesh, and of a conflict in which the former is day-eloped through the sacrifice of the latter.

Finite creatures exist only as modes of the divine substance, only so far as they partake in the infinite, or what is the same thing with Spinoza, in the purely affirmative or self -affirming nature of God.

1 Traclatus de Deo et homine. ii. 19. 3 Eth. i.'schol. 17.

2 Epist. 29, 76. 4 Eth. iv. schol. 22.

They therefore must also be self -affirming. They can never limit themselves; their limit lies in this, that they are not identified with the infinite substance which expresses itself also in other modes. In other words, the limit of any finite creature, that which makes it finite, lies without it, and its own existence, so far as it goes, must be pure self-assertion and self-seeking. " Unaquaeque res quantum in se est ih suo esse perseverare conatur," and this conatus is its very essence or inmost nature. 6 In the animals this conatus takes the form of appetite, in man of desire, which is " appetite with the consciousness of it." 6 But this constitutes no essential difference between appetite and desire, for "whether a man be conscious of his appetite or no, the appetite remains one and the same thing." 7 Man therefore; like the animals, is purely self-asserting and self- seeking. He can neither know nor will anything but his own being, or if he knows of wills anything el'se, it must be something involved in his own being. If he knows other beings, or seeks their good, it must be because their existence and their good are involved in His own. If he loves and knows God it must be because he cannot know himself without knowing God, or find his supreme good anywhere but in God.

What at first makes the language difficult to us is the identification of will arid intelligence. Both are represented as affirming their objects. Descartes had prepared the way for this when he treated the will as the faculty of judging or giving assent to certain com- binations of ideas, and distinguished it from the purely intellectual faculties by which the ideas are apprehended. By this distinction he had, as he supposed, secured a place for

human freedom. Admit- ing that intelligence is under a law of necessity, he claimed for the Will a certain latitude Or liberty of indifference, a power of giving or withholding assent in all cases where the relations of ideas were not absolutely clear and distinct. Spinoza points out that there is no ground for such a distinction, that the acts of apprehension and judgment cannot be separated from each other. “In the mind there is,’ nd volition, i.e. no affirmation or negation which is not immediately involved in the idea it apprehends,” and therefore ” intellect and will are one and the same thing.” 8 If, then, there is no freedom except, the liberty of indifference, freedom is impossible. Man, like all other beings and things, is under an absolute law of necessity. All the actions of his will, as well as of his intelligence, are but different forms of the self-assertive tendency to which he cannot but yield, because it is one with his very being, or only ideally distinguishable therefrom. There is, however, another idea of liberty. Liberty as the opposite of necessity is an absurdity — it is impossible for either God or man; but liberty as the opposite of slavery is possible, and it is actually possessed by God. The divine liberty consists in this, that God acts from the necessity of his own nature alone, ‘and is not in any way determined from without. And the great question of ethics is, How far can man partake in this liberty? At first it would seem impossible that he should partake in it. He is a finite ‘being, whose power is infinitely surpassed by the power of other beings to which he is related. His body acts only as it is acted oil, arid his mind cannot therefore apprehend his body,’ except as affected by other things. His self-assertion and self-seeking are therefore confused with the asserting and seeking of other things, arid are never pure. His thought and activity cannot be understood except through the influence of other things which lie outside of his consciousness, and upon which his will has no influence. ” He cannot know clearly and distinctly either himself or anything else; how then can he know his own good or determine himself by the idea of it ?

The answer is the answer of Descartes, that the apprehension of any finite thing involves the adequate idea of the infinite and eternal nature of God. 9 ‘ This is the primary object of intelligence, in which alone is grounded the possibility of knowing either ourselves or anything else. In so far as our knowledge is determined by this idea, 6r by the ideas of other things, which are referred to this idea and seen in its light, in so far its action flows from an internal and not an external

necessity. In so far, on the other hand, as we are determined by the affections of the body, ideas in which the nature of our own body and the nature of other things are confused together, in so far we are determined by an external necessity. Or to put the same thing in what has been shown to be merely another way of expression, in so far as we are determined by pure intelligence we art free, but ?n so far as we are determined by opinion and imagination we are slaves.

From these premises it is easy to see what form the opposition of reason and passion must necessarily take with Spinoza. The passions belong to bur nature as finite; they are grounded on, or rather are but another form of inadequate ideas ; but we are free only in so far as our ideas either immediately are, or can be made, adequate. Our idea of God is adequate ex vi termini; our ideas of the affections of our body are inadequate, but can be made adequate in so far as they are referred to the idea of God. And as the idea of God is purely affirmative, this reference to the idea of God implies the elimination of the negative element from the ideas of the affections of the body, ” for nothing that is positive in a false idea is removed 1 by the presence of truth as such.” u Brought into

5 Eth. iii. 6, 7. 8 Eth. ii. 49.

6 Eth. iii. 9. 9 Eth. ii. 45.

7 Eth. iii.Def. Affect. 10 Eth. iv. 1.

contact with the idea of God, all ideas become true and adequate, by the removal of the negative or false element in them. The idea of God is, as it were, the touchstone which distinguishes the gold from the dross. It enables us to detect the higher spiritual element in the natural passions, and to sever the element belonging to that pure love of self which is identical with the love of perfection from the elements belonging to that impure love of our own finite individuality as such which is identical with the love of evil.

The imperfection in Spinoza’s development of this principle has already been indicated. It is in fact the same imperfection which Implicit runs through his whole system. Just as he supposed that

dim- tne ideas of finite things were at once made consistent

cutties. w ‘ tn tne i(lea. of the infinite when he had named them modes, so here his conception of the change through which selfish natural desire must pass in order to become spiritual is far too superficial and external. Hence he has no sympathy with asceticism, but treats it, like Bentham, as a torva et tristis superstitio. Joy is the “transition from less to greater perfection,” and cannot be but good ; pain is the “transition from greater to less perfection,” and cannot be but evil. The revolt against the medieval opposition of the nature and spirit is visible in many of his sayings. ” No Deity who is not envious can delight in my weakness or hurts, or can regard as virtues those fears and sighs and tears which are the signs of the mind’s weakness; but contrariwise, the greater is our joy, the greater is our progress to perfection, and our participation in the divine nature.” 1 “A free man thinks of nothing less than death, his wisdom is a meditation not of death but of life.” 2 The same idea, combining with the idea of necessity, leads him to con- demn repentance and pity, as well as pride and humility. Un- consciously, Spinoza reproduces the principle of asceticism, while in words he utterly rejects’ it. For though he tells us that pure self-complacency is the highest thing we can hope, yet from this self-complacency all regard to the finite individuality of the subject is eliminated. ” Qui Deum amat, conari non potest ut Deus ipsum contra amet.” In like manner, he absolutely condemns all hatred, envy, rivalry and ambition, as springing out of an over-estimate of those finite things which one only can possess, while the highest good is that which is enjoyed the more easily and fully the greater the num- ber of participants. Yet Spinoza’s exaltation of the social life, and of the love that binds it together, is too like the Buddhist’s universal charity that embraces all creatures, and all creatures equally. Both are based on an abstraction from all that is individual, only the Buddh- ist’s abstraction goes a step further, and erases even the distinction between man and the animals. Spinoza felt the pressure of this all- levelling logic when he said, ” I confess I cannot understand how spirits express God more than the other creatures, for I know that between the finite and the infinite there is no proportion, and that the distinction between God and the most excellent of created things differs not a whit from the distinction between him and the lowest and meanest of them.” 3 As Pope said, God is “as full and perfect in a hair as a heart ” ; in all finite things there is a ray of divinity, and in nothing more than a ray. Yet in another epistle Spinoza

contradicts this view, and declares that, while he does not consider it necessary to " know Christ after the flesh, he does think it is necessary to know the eternal Son of God, i.e. God's eternal wisdom, which is manifested in all things, but chiefly in the mind of man, and most of all in Christ Jesus." 4 In the Ethics the distinction of man and the animals is treated as an absolute distinction, and it is asserted with doubtful consistency that the human soul cannot all be destroyed along with the body, for that there is something of it which is eternal. Yet from this eternity we must, of course, eliminate all notion of the consciousness of the finite self as such. At this point, in short, the two opposite streams of Spinoza's thought, the positive method he intends to pursue, and the negative or abstracting method he really does pursue, meet in irreconcilable contradiction. The finite must be related to the infinite so as to preserve all that is in it of reality ; and therefore its limit or the negative element in it must be abstracted from. But it turns out that, with this abstraction from a negative element involved in the existence of the finite, the positive also disappears, and God is all in all in a sense that absolutely excludes the existence of the finite. " The mind's intellectual love of God," says Spinoza, " is the very love wherewith God loves himself, not in so far as he is infinite, but in so far as he can be expressed by the essence of the human mind, considered under the form of eternity; i.e. the mind's intellectual love of God is part of the infinite love wherewith God loves himself." s This double "in so far," which returns so frequently in' Spinoza, just conceals for a moment the contradiction of two streams of thought, one of which must be swallowed up by the other, if they are once allowed to meet.

We have n&w reviewed the main points of the system, which was the ultimate result of the principles of Descartes. The importance of this first movement of modern philosophy lies in its assertion and exhibition of the unity of the intelligible world with itself and with the mind of man. In this point of

1 Eih. iv. schol. 45. 4 Epist. 21.

2 Eth. iv. 67.

3 Epist. 57. 5 Eth. v. 36-

view, it was the philosophical counterpart of Protestantism; but, like Protestantism in its earliest phase, it passed rapidly from the doctrine that God is, without priest or Ge _ er .« authority,

present to man's spirit, to the doctrine import- that man's spirit is as nothing before God. The anceofthe object was too powerful for the subject, who effaced Ca ˆ eslan himself before God that he might be strong towards men. But in this natural movement of feeling and thought it was forgotten that God who effaced the world and the finite spirit by his presence could not be a living God. Spinoza gives the ultimate expression to this tendency, and at the same time marks its limit, when he says that whatever reality is in the finite is of the infinite. But he is unsuccessful in showing that, on the principles on which he starts, there can be any reality in the finite at all. Yet even if the finite be an illusion, still more if it be better than an illusion, it requires to be accounted for. Spinoza accounts for it neither as illusory nor as real. It was reserved for the following generation of philosophers to assert, in different ways, the reality of the finite, the value of experience and the futility of abstractions. Spinoza had declared that true knowledge consists in seeing things under the form of eternity, but it is impossible that things can be seen under the form of eternity unless they have been first seen under the form of time. The one-sided assertion of individuality and difference in the schools of Locke and Leibnitz was the natural complement of the one-sided assertion of universality and unity in the Cartesian school. But when the individualistic tendency of the 18th century had exhausted itself, and produced its own refutation in the works of Kant, it was inevitable that the minds of men should again turn to the great philosopher, who, with almost perfect insight working through imperfect logic, first formulated the idea of a unity presupposed in and transcending the difference of matter and mind, subject and object.

See the Histories of Philosophy, especially those by Hegel, Feuerbach, Erdmann and Fischer; F. Bouillier, Histoire de la philosophic cartesienne (1854); Olle-Laprune, Philosophic de Male- branche; E. Saisset, Precurseurs et disciples de Descartes (1862). The German treatises on Spinoza are too numerous to mention. Jacobi's Letters on Spinoza, which were the beginning of a true interpretation of his philosophy, are still worth reading. We may also mention C. Schaarschmidt, Descartes und Spinoza (1850); C. Sigwart, Spinozas neuentdeckter Tractat von Cott, dem Menschen, und dessen Gliickseligketi (1866). Both these writers have published German translations of the Tractatus de Deo. See also Trendelen- burg, Historische Beilrdge zur Philosophic (1867); R. Avenarius, Uber die beiden ersten Phasen des spinozischen Pantheismus (1868) ; M. Joel, Zur Genesis der Lehre

Spinozas (1871) ; R. Willis, Benedict de Spinoza: his Ethics, Life and Influence on Modern Religious Thought (1870) ; F. Pollock, Spinoza, his Life and Philosophy (1880) ; J. Martineau, Types of Ethical Theory (1885); J. Caird, Spinoza (in Blackwood's Philosophical Series) ; H. H. Joachim, A Study of the Ethics of Spinoza (1901) ; R. Adamson, The Development of Modern Philosophy (1903); also articles Descartes, Malebranche, and Spinoza. (E. C.)

CARTHAGE (Phoenician Kart-hadshat, "New City"; Gr. Kapxˆ Scbv, Lat. Carthago or Carchedon), one of the most famous cities of antiquity, on the north coast of Africa; it was founded about 822 B.C. by the Phoenicians, destroyed for the first time by the Romans in 146 B.C., rebuilt by the Romans, and finally destroyed by the Arabs in a.d. 698. It was situated in the heart of the Sinus Uticensis (mod. Gulf of Tunis), which is protected on the west by the promontory of Apollo (mod. Ras Ali el Mekki), and on the east by the promontory of Mercury or Cape Bon (mod. Ras Addar). Its position naturally formed a sort of bastion on the inner curve of the bay between the Lake of Tunis on the south and the marshy plain of Utica (Suk- hara) on the north. Cape Gamart, the Arab village of Sidi-bu- Said and the small harbour of Goletta (La Goulette, Halk el Wad) form a triangle which represents the area of Carthage at its greatest, including its extramural suburbs. Of this area the highest point is Sidi-bu-Said, which stands on a lofty cliff about 490 ft. high. On Cape Gamart (Kamart) was the chief cemetery; the citadel, Byrsa, was on the hill on which to-day stand the convent of Les Peres Blancs (White Fathers) and the cathedral of St Louis. The harbours lay about three- fifths of a mile south of Byrsa, near the modern hospital of the Khram, at

Cartagenna. The tongue of land, which runs from the harbours as far as Goletta, to the mouth of the Catadas which connects the Lake of Tunis with the sea, was known as taenia (ribbon, band) or ligula (diminutive of lingua, tongue). The isthmus connecting the peninsula of Carthage with the mainland was roughly estimated by Polybius as 25 stades (about 15,000 ft.); the peninsula itself, according to Strabo, had a circumference of 360 stades (41 m.). The distance between Gamart and Goletta is about 6 m.

From Byrsa, which is only 105 ft. above the sea, there is a fine view; thence it is possible to see how Carthage was able at once to dominate the sea and the gently undulating plains which stretch westward as far as Tunis and the line of the river Bagradas (mod. Mejerda). On the horizon, on the other side of the Gulf of Tunis, rise the chief heights of the mountain-chain which was the scene of so many fierce struggles between Carthage and Rome, between Rome and the Vandals: — the Bu-Kornaitn ■(" Two- Horned Mountain "), crowned by the ruins of the temple of Saturn Balcaranensis; Jebel Ressas, behind which lie the ruins of Neferis; Zaghwan, the highest point in Zeiigitana; Hammam-Lif, Rades (Ghades, Gades, the ancient Maxula) on the coast, and 10 m. to the south-west the " white " Tunis (\ewc6s Tvvrjs of Diodorus) and the fertile hills of Ariana. All round Byrsa, alike on the plain and on the slopes, are fields of barley, vineyards and patches of cactus, interrupted only by huge heaps of rubbish and excavation-mounds, the haunts of green lizards, and by houses and villages built of materials drawn for many a century from the ancient ruins.

The ancient harbours were distinguished as the military and the commercial. The remains of the latter are to be seen in a partially ruined artificial lagoon which originally, according to Beule, had an area of nearly 60 acres; there were, however, in addition a large quay for unloading freight along the shore, and huge basins or outer harbours protected by jetties, the remains of which are still visible at the water-level. The military harbour, known as Cothon, communicated with the commercial by means of a canal now partially ruined; it was circular in shape, surrounded by large docks 16ˆ ft. wide, and capable of holding 220 vessels, though its area was only some 22 acres. In the centre was an islet from which the admiral could inspect the whole fleet. 1

Among the other ruins which have been identified are the circus or hippodrome, traversed by the railway at the north of the village of Duar-es-Shat; the forum, between Cothon and Byrsa, where stood the Curia, the regular place of assembly of the senate, and near which were the moneychangers' shops, the tribunal, the temple of Apollo, and in the Byzantine period the baths of Theodora. Three main streets led from the forum to Byrsa.

The hill of St Louis, the ancient citadel of Byrsa, has a circuit of 4525 ft. It appears to have been surrounded at least at certain

points by several lines of fortifications. It was, however, dismantled by P. Scipio Africanus the younger, in 146 B.C., and was only refortified by Theodosius II. in a.d. 424 ; subsequently its walls were again renewed by Belisarius in 553. On the plateau of Byrsa have been found the most ancient of the Punic tombs, huge cisterns in the eastern part, and near the chapel of St Louis the foundations of the famous temple of Eshmun (see below), and the palace of the Roman proconsul.

About 325 ft. from the railway station of La Malga are the still imposing ruins of the amphitheatre. Near by, at the spot called Bir el Jebana, Pere Delattre has discovered four cemeteries, one of which contains the tombs of state officials or servants of the imperial government. Rather more than half a mile north- west of Byrsa are the huge cisterns of La Malga, which, at the time of the Arab geographer, Idrlsl, still comprised twenty-four parallel covered reservoirs, 325 ft. by 71$- ft.; of these fourteen only remain.

1 The whole question of these harbours has been fully discussed by Cecil Torr, Otto Meltzer, R. Ohler, S. Gsell, M. de Roquefeuil; see Aug. Audollent, Carthage romaine, pp. 198 seq.; Revue archeol.. 3rd series, xxiv. ; Jahrbiich f. class. PMlqlogie, vols, cxlvii., cxlix. ; also Classical Review, vols, v., vii., viii.

On the hill of the Petit Seminaire, which is separated from Byrsa by a valley, Pere Delattre has discovered a Christian basilica, the baths of Gargilius, large graves with several levels of tombs, and much debris of sculpture, which, however, is insufficient to enable us to say that this is the site of the temple of Tanit or Juno Caelestis. The quarter of Dermeche, near the sea, whose name recalls the Latin Thermis or Thermas, is re- markable for the imposing remains of the baths {thermae) of Antoninus. In one place called Douimes was the Ceramicus where excavation has discovered a graceful basilica, proto-Punic tombs, potters' ovens with numerous terra-cotta moulds which were abandoned after the siege in 146 B.C., and finally a Roman palace with superb marble statues. Farther on are huge reser- voirs of Borj-Jedid which are sufficiently well-preserved to be used again.

Behind the small fort of Borj-Jedid is the plateau of the Odeum where the theatre and fine marble statues of the Roman period have been laid bare; beyond is the great Christian basilica of Damus-el-Karita (perhaps a corruption of Domus Caritatis); in the direction of Sidi-bu-Saiid is the platea nova, the huge stairway of

which, like so many other Carthaginian buildings, has of late years been destroyed by the Arabs for use as building material; on the coast near St Monica is the necropolis of Rabs where Delattre dug up fine anthropoid sarcophagi of the Punic period.

In the quarter of Megara (Magaria, mod. La Marsa) it would seem that there never were more than isolated buildings, villas in the midst of gardens. At Jebel Khaui (Cape Kamart) there is a great necropolis, the sepulchral chambers of which were long ago rifled by Arabs and Vandals. This cemetery had a Jewish quarter.

We must mention finally the gigantic remains in the western plain of the Roman aqueduct which carried water from Jebel Zaghwan (Mons Zeugitanus) and Juggar (Zucchara) to the cisterns of La Malga. From "the nymphaeum of Zaghwan to Carthage this aqueduct is 61 Roman miles (about 56 English miles) long; in the plain of Manuba its arches are nearly 49 ft. high.

Though several famous travellers visited and described the ruins of Carthage during the first thirty years of the 19th century, such as Major Humbert, Chateaubriand, Estrup, no scientific investigations took place till 1833 In that year Captain Falbe, Danish consul at Tunis, made a plan of the ruins so far as they were visible. In 1837 there was formed in Paris, on the initiative of Dureau de la Malle, a Societe pour les fouilles de Carthage ; under the auspices of this body Falbe and Sir Grenville Temple undertook researches, and a little later Sir Thomas Read, English consul, following the example of the Genoese and the Pisans, carried away to England the mosaics, columns and statues of the baths of Antoninus. The Abbe Bour- gade, chaplain of the church of St Louis erected in 1841, collected together Punic stelae and other antiquities from the surrounding plain; these formed the nucleus of the magnificent museum subse- quently formed by Pere Delattre at the instigation of Cardinal Lavigerie. Between 1856 and 1858 Nathan Davis made excavations on the supposed site of the Odeum, and in 1859 Beule undertook his celebrated investigations on Byrsa. Among other explorers were A. Daux in 1866; von Maltzan in 1870; E. de Sainte-Marie in 1874; Ch. d'Herisson in 1883; E. Babelon and S. Reinach in 1884; Vernaz in 1885 ; Gauckler in 1903. Of these the majority were sent officially by the French government. But their attempts were partial, disjointed and without any systematic plan; they were entirely superseded by the brilliant and persevering work of R. P. Delattre. The Musee Lavigerie, the result of his labours, contains

a vast archaeological treasure, the interest of which is doubled by the fact that it stands in the very midst of the ancient site. Un- ‘ fortunately Delattre’s work suffered too often from the absence of a cordial understanding with the directors of the antiquities depart- ment, La Blanchere and P. Gauckler, who, having themselves undertaken excavations, transported their finds to the Bardo museum, by the help of the public funds at their disposal.

The main authority for the topography and the history of the excavations is Aug. Audollent’s Carthage romaine (Paris, 1901). A topographical and archaeological map of the site was published under the direction of Colonel Dolot and with the assistance of Delattre and Gauckler by the Ministere de l’lnstruction Publique in

1907.

History. — The history of Carthage falls into four periods: (1) from the foundation to the beginning of the wars with the Sicilian Greeks in 550 B.C.; (2) from 550 to 265, the first year of the Punic Wars; (3) the Punic Wars to the fall of Carthage in

146 B.C.; (4) the periods of Roman and Byzantine rule down to the destruction of the city by the Arabs in a.d. 6g8.

(1) Foundation to 550 B.C. — From an extremely remote period Phoenician sailors had visited the African coast and had had commercial relations with the Libyan tribes who inhabited the district which forms the modern Tunis. In the 16th century B.C. the Sidonians already had trading stations on the coast; with the object of competing with the Tyrian colony at Utica they established a trading station calted Cambe or Caccabe on the very site afterwards occupied by Carthage. Near Borj-Jedid unmisr takable traces of this early settlement have been found, though nothing is known of its history. According to the classical tradi- tion Carthage was founded about 850 B.C. by Tyrian emigrants led by Elissa or Elissar, the daughter of the Tyrian kitig Muttonl., fleeing from the tyranny of her brother Pygmalion. According to the story, Elissa subsequently received the name of Dido, i.e. ” the fugitive.” Cambe welcomed the new arrivals, who

bought from the mixed Libyo-Phoenician peoples of the neighbourhood, tributaries of the Libyan king Japon, a piece of land on which to build a “new city,” Kart-hadshat, whence the Greek andlRornari forms of the name. The story goes that Dido, having obtained ” as much land as could be contained by the skin of an ox,” proceeded to cut the skin of a slain ox into strips narrow enough to extend round the whole of the hill, which afterwards from this episode gained the name of Byrsa. This last detail obviously arose from a mere play on words by which Bvpaa “hide,” ” skin,” is confused with the Phoenician bosra, borsa, ” citadel,” ” fortress.” In memory of its Tyrian origin, Carthage paid an annual tribute to the temple of Melkarth at Tyr, and under the Roman empire coins were struck showing Dido fleeing in a galley;, or presiding over the building of Byrsa. On the Vatican Virgil there is a representation in miniature of workmert shaping marble blocks and columns for Dido’s palace.

The early history of Carthage is very obscure. It is only in the 6th century that real history begins. By this time the city is unquestionably a considerable capital with a domain divided into the three districts of Zeugitana (the environs of Carthage and the peninsula of C. Bon), Byzacium (the shore of the Syrtes), and the third comprising the emporia which stretch in the form of a crescent to the centre of the Great Syrtis as far as Cyrenaica. The first contest against the Greeks arose from a boundary question between the settlements of Carthage and those of the Greeks of Cyrene. The limits were eventually fixed and marked by a monument known as the “Altar of Philenae.” The de- struction of Tyre by Nebuchadrezzar (q.v.), in the first half of the 6th century, enabled Carthage to take its place as mistress of the Mediterranean. The Phoenician colonies founded by Tyre and Sidon in Sicily and Spain, threatened by the Greeks, sought help from Carthage, and from this period dates the Punic 1 supremacy in the western Mediterranean. The Greek colonization of Sicily was checked, while Carthage established herself on all the Sicilian coast and the neighbouring islands as far as the Balearic Islands and the coast of Spaini The inevitable conflict between Greece and Carthage broke out about 550.

(2) Wars with the Greeks. — In 550, the Carthaginians, led by the suffetes Malchus, conquered almost all Sicily and expelled the Greeks. In 536 they defeated the Phocaeans and the Massaliotes before Alalia on the Corsican coast. But Malchus, having failed ‘ in Sardinia, was banished by the stern Carthaginian senate and swore to avenge himself. He laid siege to Carthage itself, and,

after having sacrificed his son Carthalo to his lust for vengeance, entered the city as a victor. He ruled until he was put to death by the party which had supported him. Mago, son of Hanno, succeeded Malchus, as suffetes and general-in-chief . He was the true founder of the Carthaginian military power. He conquered Sardinia and the Balearic Islands, where he founded Port Mahon (Portus Magonis), and so increased the power of Carthage that he was able to force commercial treaties upon the Etruscans, and the Greeks of both Sicily and Italy. -The first agreement between Carthage and Rome was made in 509, \jne year after the expulsion of the Tarquins, in the consulship of 1 i.e. ” of the Poeni (Phoenicians).” !: <

Junius Brutus and Marcus Horatius. The text is preserved by Polybius {Hist. iii. 22-23). It assigned Italy to the Romans and the African waters to Carthage, but left Sicily as a dangerous neutral zone.

Mago was succeeded as commander-in-chief by his elder son, Hasdrubal (c. 500), who was thrice chosen suffetes;, he died in Sardinia about 485. His brother Hamilcar, having collected a fleet of 200 galleys for the conquest of Sicily, was defeated by the combined forces of Gelo of Syracuse and Theron of Agrigentum under the ; walls of Himera in 480, the year in which the Persian fleet wast defeated at Salamis (some say the two battles were simultaneous); it is said that 150,000 Carthaginians were taken prisoners, The victory is celebrated by Pindar (Pyth.L). .’■’;■•;.

Thesetwo leaders of the powerful house of the Barcidae each left three sons. Those of Hasdrubal were HannibaL Hasdrubal and Sapho; those of Hamilcar, Himilco, Hanno and Gisco. All, under various titles, succeeded to the authority which it had already enjoyed.. About 460 Hanno ,9 passing beyond the Pillars of Hercules (Straits of Gibraltar), founded settlements along the West African coast in the modern Senegal and- Guinea, and even in Madeira and the Canary Islands.

In .Sicily the war lasted for. a century with varying success. In 406 Hannibal and Himilco destroyed Agrigentum and threatened Gela, but the Carthaginians were forced back on their strc-ngholds in the south-west by Dionysius the Elder, Dionysius the Younger, Timoleon and Agathocles successively, whose cause was aided by a terrible plague and civil troubles in Carthage itself, A certain Hanno, unquestionably of the Barcide house, attempted to seize the supreme power, but his partisans were

overwhelmed and he himself suffered the most cruel punishment. Profiting by these troubles, Timoleon defeated the Carthaginians at Crimissus in 340, and compelled them to sue for peace. This peace was not of long duration; Agathocles crossed to Africa and besieged Carthage, which was then, handicapped by the conspiracy of Bomilcar. Bomilcar was crucified, and Agathocles having been obliged to return to Sicily, his general Eumarcus was compelled to carry his army out of Africa, where it had maintained itself for three years (August 31Q to October 307), After the death of Agathocles, the Car- thaginians re-established their supremacy in Sicily, and Mago even offered assistance to Rome against the invasion of Pyrrhus G?$o). Pyrrhus crossed to Sicily in 27 7 , and. was preparing to emulate Agathocles by sailing to Africa when he was compelled to return to Italy (see Sicily: History).

Delivered from these daxigers and more arrogant than before, Carthage claimed the monopoly of Mediterranean waters, and seized every foreign ship found between Sardinia and the Pillars of Hercules. ” At Carthage,” said Polybius, ” no one is blamed, however he may have acquired his wealth.” The sailors took the utmost care to conceal the routes which they followed; there is a story that a Carthaginian ship, pursued by a Roman galley as far as the Atlantic, preferred to be driven out of her course and sunk rather than reveal the course to the Cassiterides, whither she was bound in quest of tin. The owner being saved, the senate made good his losses from the public treasury (Strabo, iii. 5- “)•

(3) Wars with Rome?— The first Punic War lasted twenty- seven years (268ˆ241) ; it was fought by Carthage for the defence of her Sicilian possessions and her supremacy in the Tyrrhenian Sea. The Romans, victorious at the naval battles of Mylae (Melazzo) and Ecnomus (260 and 256), sent M. Atilius Regulus with an army to Africa. But the Carthaginians, by the help of the Spartan Xanthippus, were successful, and Regulus was captured. The fighting was then transferred to Sicily, where Hasdrubal was defeated at Panormus (250); subsequently the Romans failed before Lilybaeum and were defeated at Drepanum, but their victory at the Aegates Islands ended the war (241).

2 The identification of this Hatlnb with the son of Hamilcar is conjectural; see Hann6. ■

‘For the military side of these wars see Punic Wars ; Hannibal ; Hasdrubal.

Carthage' now desired to disband her forces, but the- mercenaries claimed their arrears of pay, and on being refused revolted under Spendius and Matho, pillaged the suburbs oi Carthage and laid siege to the city itself. Only the genius of Hamikar Barca raised the siege; the mercenaries were caught in the defile of the Axey where they were cut down without mercy. This War, which all bat ruined Carthage, is known to the Roman historians; as the bellum itiexpiabik. ■;

This peril averted, Carthage undertook the conquest of Spain. It was the wofk of Hamilcar, and lasted nine years up to the day of ' Hamilcar's death, sword in hand, in 228. His son-in-law, Hasdrubal Pulcher, built Carthagena in 227 and concluded with Rome a treaty by which the Ebro was adopted as the boundary of the Carthaginian sphere. On his death the soldiers chose for themselves as leader Hannibal, son of Hamilcar. At this period Carthage, with a : population of perhaps 1,000,000, was ill the enjoyment of extraordinary prosperity alike in its internal industries and in its foreign trade. The manufacture of woven goods, especially, was a flourishing industry; the Greek writer Polemo records a special treaty dealing with Carthaginian fabrics which were a recognized luxury throughout the ancient world. In Sicily, Italy and Greece the . Carthaginians sold especially black slaves, ivory, metals, precious stones and all the products of Central Africa, which came thence by caravan. In Spain they sought copper and silver, and it was by them that the modern mines of Huelva, as also those of Osca and Cartha- gena, were first exploited. The district round Carthage, with its amazing fertility, was the granary of the city, as it was later that of Rome. Mago had drawn up a treaty dealing with agri- culture and' rural economy generally, which was subsequently brought to Rome and translated into Latin by Decimus Silanus by order of the senate (J. P. Mahaffy, " The Work of Mago," in Hermathena, xv. pp. 29-35).

In the midst of this prosperity the Second War with Rome broke out. At this time the genius of Carthage is incarnate in Hannibal; his campaigns in Spain, Italy and Africa have won the admiration of military experts of all periods. The war became inevitable in 219 when Hannibal captured Saguntum, which was in alliance with Rome. Passing 'thrbugh Spain and Gaul, Hannibal resolved

to carry the war into the heart of Italy (218-217). The battles of the Ticinus, Trebia and Trasimene Lake are but stages in the wonderful progress which culminated in the battle of Cannae (August 2, 216). The road to Rome was now open to him, but he did not profit by his advantage, while the Carthaginian senate, to its shame, withheld all further support. His brother Hasdrubal with his relieving army was defeated at the Metaurus in 207; the Romans recovered their hold in Spain, and, seeing that Hannibal was unable to move in Italy, carried the war back to Africa. Hearing that Scipio had taken Utica (203) and defeated Hasdrubal and Syphax, king of Numidia, Hannibal returned from Italy, but With a hastily levied army was defeated at Zama (October 19; 202). The sub' sequent peace was disastrous to Carthage, which lost its fleet and all save its African possessions.

After the Second War Carthage soon revived. The population is Said still to have numbered 700,000, and despite its humiliation, the city never ceased to inspire alarm at Rome. The Numidian ptirice Massinissa, rival of Syphax and a Roman protege, took advantage of a clause in the treaty of 202, which forbade Carthage to make war without the consent of the Roman senate, to extend his possessions at the expense of Carthage. In response to a protest from Carthage an embassy including M. Porcius Cato the Elder was sent to inquire into the matter, and Cato was so impressed with the city as a whole that on returning to Rome he never made a speech without concluding with the warning " Delenda est Carthago."

At this time there were three political parties in Carthage: (1) that which upheld the Roman alliance, (2) that which advocated the Numidian alliance, and (3) the popular party. These three were led respectively by Hanno, Hannibal Passer, Hasdrubal and Carthalo. The popular faction, which was turbulent and exasperated by the bad faith of the Romans, expelled the

Numidian party and declared' war in 149 on Massinissa, who was victorious at Oroscope. Rome then intervened, determined finally to destroy her now enfeebled rival. War was declared on the pretext that Carthage had engaged in war with Massinissa without the sanction of Rome. The third Punic War lasted three years, and; after a heroic resistance the city fell in 146: The last champions of liberty entrenched themselves under Hasdrubal in the temple of Eshmun, the site of which is now occupied by the chapel of St Louis. The Roman troops were let loose to plunder and burn. The thick bed of cinders, blackened stones, broken

glass, fragments of metal twisted by fire, half-calcined bones, which is found to-day at a depth of 13 to 16 ft. under the remains of Roman Carthage between Byrsa and the harbours, bears grim witness, in accord with the accounts of Polybius and Appian, to the terrible fate which overtook this part of the city. Before long a commission arrived from Rome to decide the fate of the province of Carthage. In the city itself, temples, houses and fortifications were levelled to the ground, the site was dedicated with solemn imprecations to the infernal gods, and all human habitation throughout the vast ruined area was expressly forbidden!

Constitutional History. — The narrative must here be interrupted by an account of the political and religious development of Phoenician Carthage|. . Carthage was an aristocratic republic based on wealth rather than on birth. Indeed, the popular party, which included certain noble families such as the Barcidae, Was always powerful, and thus government by demagogues was not infrequent. So Aristotle, wrkingabout 330, emphasizes the importance of great wealth in Carthaginian politics. The government was in fact a plutocracy. The aristocratic , party was represented by the. two suffetes and the ‘senate; the democratic by the popular assembly. The stiff etefe (Sofelim) presided in the senate and controlled the civil administration; the office was annual, but there was no limit to re-election. Hannibal was elected for twenty-two years. The senate, which, like that of Tyre, was composed of 300 members, exercised ultimate control over all public affairs, decided on peace and war, nominated the Commission of Ten, which was charged with aiding and controlling the suffetes. This commission was subsequently replaceoˆ by a council of one hundred, called by the Greeks gerousia. . This tribunal, which maintained law and order and called the generals to account, gradually became a tyrannical inquisitiom Frequently it met at night in the Temple of Eshmun On Byrsa, in secret sessions described by Aristotle as ovaobnu ruv

The popular assembly was composed, not of all. the citizens, but of the timuchi (Gr. ti/ˆ, txav), i.e. those who possessed a certain property-qualification. The election of the suffetes had to be ratified by this assembly. The two bodies were almost always in opposition, and this was one of the chief causes of the ruin of Carthage.

The army was recruited externally by senators who were sent to

the great emporia or trade-centres, even to the most remote, to contract with local princes for men and officers. The payments, agreed upon in this' way, were frequently in arrears; hence the terrible revolts such as that of the " bellum inexpiabile."; It was not till the 3rd century that Carthage, in imitation of the kings of Syria and Egypt, began to make use of elephants in war. The elephant used was the African type {elephas capensis), which was smaller than the Asiatic (elephas indicus), though, with longer ears. In addition to the mercenaries, the army contained a bgion com- posed of young men belonging to the best families in the state; this force was important as a nursery of officers.

Religion. — The religion of Carthage was that of the Phoenicians. Over an army of' minor deities (alonim and baalim) towered the trinity of great gods composed of Baal- Amnion or Moloch (identi- fied by the Romans with Cronus or .Saturn) ; Tanit, the virgin goddess of the heavens and the moon, the Phoenician Astarte, and known as Juno Caelestis in the Roman period; Eshmun, the pro- tecting deity and protector of the acropolis, generally identified with Aesculapius. There were also special cuits: of Iolaus or Tammuz- Adonis, whom the Romans identified to some extent with Mercury; of the god Patechus or Pygmaeus, a deformed and repulsive monster like the Egyptian Ptah, whose images were placed on the prows of ships to frighten the enemy ; and lastly of the Tyrian Melkarth, whose functions were analogous to those of Hercules. The statue of this god was carried to Rome after the siege of 146 (Pliny, Nat. Hist, xxxvi. 12. 39). From inscriptions we know the names of other minor deities, which are perhaps only other names of the same gods, e.g. Rabbat Umma, " the great mother "; Baalat haedrat, " mistress of the sanctuary "; Ashtoreth (Astarte), Illat, Sakon, Tsaphon, Sid, Aris (? Ares).

From the close of the 4th century B.C. the intimate relations between the Carthaginians and the Sicilian Greeks began to introduce Hellenic elements into this religion. In the forum of Carthage was a temple to Apollo containing a colossal statue, which was transported

to Rome. The Carthaginians once at least sent offerings to Delphi, and Tanit approximated to some extent to Demeter; hence on the

coins we find the head of Tanit or the Punic Astarte crowned with ears of corn, in imitation of the coins of the Greek Sicilian colonies. The symbol of Tanit is the crescent moon ; in her temple at Carthage was preserved a famous veil or peplus which was venerated as the city's palladium. On the innumerable votive stelae which have been unearthed, we find invocations to Tanit and Baal-Ammon, as two associate deities (Beol irapeSpoi). The usual formula in these inscriptions is, " To the great lady Tanit, the manifestation [reflex, face] of Baal (Tanit-Pene-Baal) and to our lord Baal-Ammon, the vow of Bomilcar, son of Mago, son of Bomilcar, because they have heard his prayer" (Corp. inscr. semit. vol. i. pp. 276 f. ; Audollent, Carth. Rom. p. 369).

Baal-Ammon or Moloch, the great god of all Libya, is represented as an old man with ram's horns on his forehead ; the ram is frequently found with his statues. He appears also with a scythe in his hand (" falcem ferens senex pingitur," St Cyprian, De idol, vanit, 11). At Carthage children were sacrificed to him, and in his temple there was a colossal bronze statue in the arms of which were placed the children who were to be sacrificed (Diod. Sic. xx. 14; Justin xviii. 6, xix. 1; Plut. De superstit. 13, De sera num. vindic. 6.). _ The children slipped one by one from the arms into a furnace amid the plaudits of fanatical worshippers. These sacrifices persisted even under Roman rule; Tertullian states that even in his time they took place in secret (Apolog. cix. ; cf. Delattre, " Inscript, de Carth.," in Bulletin epigraphique, iv. p. 317; Audollent, op. cit. p. 398).

(4) Roman Period. — In 122 B.C., twenty-four years after the destruction of the city by Scipio Aemilianus, the Roman senate, on the proposal of Rubrius, decided to plant a Latin colony on the site. C. Gracchus and Fulvius Flaccus were entrusted with the foundation of the new city, which was christened Colonia Junonia, and placed under the protection of Juno Caelestis, the new name for the Punic Tanit. But its prosperity was obstructed both by unpropitious omens and by the very recollection of the ancient feud, and fifty years later Marius, proscribed by Sulla, found the ruins practically deserted. In the neighbourhood were the scattered remnants of the old Punic population, who, according to Athenaeus (Deipnosoph. v. 50), had actually had the assurance to send ambassadors to Mithra- dates the Great assuring him of their support against Rome. Ultimately M. Minucius Rufus passed a law abrogating that of 122 and suppressing the Colonia Junonia.

Julius Caesar, pursuing the lost supporters of Pompey, encamped on the ruins of the city, and there, according to tradition, had a dream which induced him to re-establish the abandoned colony. Returning to Rome, he despatched thither the poor citizens who were demanding land from him. Later on Augustus sent new colonists, and, henceforward, the machinery of administration was regularly centred there (Appian viii. 136; Dio Cass. lxxx. 1; Audollent, op. cit. p. 46). The proconsuls of the African province had hitherto lived at Utica; in 14-13 B.C. C. Sentius Saturninus transferred his headquarters to Carthage, which was henceforth known as Colonia Julia Carthago. Several inscriptions use this name, as also the bronze coins which bear the heads of Augustus and Tiberius, and were struck at first in the name of the suffetes, afterwards in that of duumviri.

Pomponius Mela and Strabo already describe Carthage as among the greatest and most wealthy cities of the empire. Herodian puts it second to Rome, and such is the force of tradi- tion that the Roman citizens resident in Carthage boasted of its Punic past, and loved to recall its glory. Virgil in the Aeneid celebrated the misfortunes of Dido, whom the colonists ultimately identified with Tanit-Astarte; a public Dido-cult grew up, and the citizens even pretended to have discovered the very house from which she had watched the departure of Aeneas. The religious character of these legends, coupled with the city's resumption of its old role as mistress of Africa, and its inde- pendent spirit, reawakened the old distrust, and even up to the invasions of the Vandals the jealous rivalry of Rome forbade the reconstruction of the city walls.

The revolt of L. Clodius Macer, legate of Numidia, in a.d. 68 was warmly supported by Carthage, and one of the coins of this short-lived power bears the symbol of Carthage personified. At the moment of the accession of Vitellius, Piso, governor of the province of Africa, was in his turn proclaimed emperor at Carthage. A little later, under Antoninus Pius, we read of a fire

which devastated the quarter of the forum; about the samo time, i.e. under Hadrian and Antoninus, there was built the famous Zaghwan aqueduct, which poured more than seven million gallons of water a day into the reservoirs of the Mapalia (La Malga); the cost of this gigantic work was defrayed by a special tax which pressed heavily on the inhabitants as late as the reign of Septimius Severus; allusions to it are made on the coin-types of this emperor (E. Babelon, Rivista italiana di numismatica, 1903,

p. 157).

In the early history of Christianity Carthage played an auspicious part, in virtue of the number of its disciples, the energy and learning of their leaders, the courage and eloquence of its teachers, the persecutions of which it was the scene, the number of its councils and the heresies of which it witnessed the birth, propagation or extinction (see Carthage, Synods of). The labours of Delattre have filled the St Louis museum at Carthage with memorials of the early Church. From the end of the 2nd century there was a bishop of Carthage; the first was Agrippinus, the second Optatus. At the head of the apologists, whom the persecutions inspired, stands Tertullian. In 202 or 203, in the amphitheatre, where Cardinal Lavigerie erected a cross in commemoration, occurred the martyrdom of Perpetua and Felicitas. Tertullian was succeeded (248) by a no less famous bishop Cyprian. About this time the proconsul Gordian had himself proclaimed (239) emperor at Thysdrus (El Jem). Shortly afterwards Sabinianus, aspiring to the same dignity, was besieged by the procurator of Mauretania; the inhabitants gave him up and thus obtained a disgraceful pardon (R. Cagnat, L'armie romaine d'Afrique, p. 52; Audollent, op. cit. p. 73). Peace being restored, the persecution of the Christians was renewed by an edict of the emperor Decius (250). Cyprian escaped by hiding, and subsequently caused the heresy of Novatian to be condemned in the council of 251. In 257, in a new persecution under Valerian, Cyprian was beheaded by the proconsul Galerius Maximus.

About 264 or 265 a certain Celsus proclaimed himself emperor at Carthage, but was quickly slain. Probus, like Hadrian and Severus, visited the city, and Maximian had new baths constructed. Under Constantius Chlorus, Maxentius proclaimed himself emperor in Africa; this caused great excitement in Carthage, and the garrison, which was hostile to the pre- tender, compelled L. Domitius Alexander to assume the purple. Domitius was, however, captured by Maxentius and strangled at Carthage. About 311 there arose the famous Donatist heresy, supported by 270 African bishops (see Donatists and Constantine I.). At the synod of Carthage in 411 this heresy was condemned owing to the eloquence of Augustine. Two years later the Carthaginian sectaries even ventured upon a political rebellion under the leadership of Heraclianus, who proclaimed himself emperor and actually dared to make a descent on Italy itself, leaving his son-in-law Sabinus in command at Carthage. Being defeated he fled

precipitately to Carthage, where he was put to death (413). Donatism was followed by Pelagianism (see Pelagius), also of Carthaginian origin, and these religious troubles were not settled when in May 429 the Vandals, on the appeal of Count Boniface, governor of Africa, crossed the Straits of Gibraltar and invaded Mauretania. Gen- seric, who was hailed with one accord by all the different sectaries as the champion of their several views, appeared in 439 before the walls of Carthage, which had been hastily rebuilt after five hundred years by the order of Theodosius II. The priest Salvianus has left a splendid picture of Carthage at this moment (de Gubern. vii. 16). It had 500,000 inhabitants, and 22 basilicas (several of which have been discovered by Delattre). Genseric entered almost without a blow (October 19, 439), and gave over the city to plunder before departing for his attack on Italy. From this time Carthage became, in the hands of the Vandals, a mere pirate stronghold, such as Tunis and Algiers were sub- sequently to become. Once, in 470, the fleet of the Eastern empire under the orders of Basiliscus appeared in the Bay of Carthage, but Genseric succeeded in setting fire to the attacking ships and from Byrsa watched their entire annihilation.

Byzantine Rule. — Under Genseric's successors (see Vandals), Carthage was still the scene of many displays of savage brutality, though Thrasamund built new baths and a basilica. Ultimately Gelimer, the last Vandal king, was defeated at Ad Decimum by the Byzantine army under Belisarius, who entered Carthage unopposed (September 14, 533). The restored city now received the name of Colonia Justiniana Carthago; Belisarius rebuilt the walls and entrusted the government to Solomon. New basilicas and other monuments were erected, and Byzantine Carthage re- covered for a century the prosperity of the Roman city.

At length the Arabs, having conquered Cyrenaica and Tri- politana (647), and founded Kairawan (670), arrived before Carthage. In 697 Hasan ibn en-Noman, the Gassanid governor of Egypt, captured the city almost without resistance. But the garrison left by the Arabs was quite unable to defend itself against the patrician Joannes, who retook the city and hastily put it in a state of defence. Hasan returned furious with anger, defeated the Byzantines again, and decreed the entire destruction

of the city. His orders were fulfilled; and in 698 Carthage finally disappears from history. Once again only does the name appear in the middle ages, when the French king, Louis IX., at the head of the eighth crusade, disembarked there on the 17th of July 1270. He died, however, of the plague on the 25thof August without having recovered northern Africa for civilization.

Bibliography. — I. Ancient. — (a) Polybius, Diodorus Siculus, Livy, Appian, Justin, Strabo; (i) for the Christian period, Tertullian, Cyprian, Augustine; (c) for the Byzantine and Vandal, Procopius and Victor de Vita. All the references to the topography of Roman and Byzantine Carthage are collected in Audollent, Carthage romaine (1901), pp. 775-825, which also contains a full list of modern works (pp. 13-32, and p. 835).

II. Modern. — The most important are: Falbe, Recherches sur V emplacement de Carthage (Paris, 1833); Dureau de la Malle, Topo- graphie de Carthage (Paris, 1835); Nathan Davis, Carthage and her Remains (London, 1861); Beule, Fouilles d. Carthage (Paris, 1861); Victor Guerin, Voyage archeologique dans la regence de Tunis (Paris, 1862); E. de Sainte Marie, Mission d, Carthage (Paris, 1884); C. Tissot, Geographie comparee de la province romaine d'Afrique (Paris, 1884-1888, 2 vols.); E. Babelon, Carthage (Paris, 1896); Otto Meltzer, Geschichte der Karthager (Berlin, 1879-1896, 2 vols.); Paul Monceaux, Les Africains, etude sur la litterature latine de I'Afrique; Les Paiens (Paris, 1898) ; Histoire litteraire de I'Afrique chretienne (Paris, 1901-1909, 3 vols.) ; Pallu de Lessert, Vicaires et comtes d'Afrique (Paris, 1892); Pastes des provinces africaines sous la domination romaine (Paris, 1 896-1901, 2 vols.) ; R. Cagnat, L'Armee romaine d'Afrique (Paris, 1892); C. Diehl, L'Afrique byzantine, histoire de la domination byzantine en Afrique (Paris, 1896); Aug. Audollent, Carthage romaine (Paris, 1901); A. J. Church and A. Gilman, Carthage in " Story of the Nations " series (1886). For the numerous publications of PereDelattre scattered in various periodicals see Etude sur les diver ses publications du R. P. Delattre, by Marquis dAnselme de Puisaye (Paris, 1895); Miss Mabel Moore's Carthage of the Phoenicians (London, 1905) contains a useful summary of Delattre's excavations. See further for the discussion of particular points: " Chronique archeologique africaine," published by Steph. Gsell, in the Revue africaine of Algiers, 1893, and following years; and in the Melanges d' archeologie et d'histoire de I'&ole francaise de Rome, vol. xv. (1895 and following years); Dr Carton, " Chronique archeologique nord-africaine," in the Revue tunisienne. (E. B.*)

CARTHAGE, a city and the county-seat of Jasper county, Missouri, U.S.A., on the Spring river, about 950 ft. above sea-level, and about 150 m. S. by E. of Kansas City. Pop. (1890) 7981; (1900) 9416, of whom 539 were negroes; (1910 census) 9483. It is served by the St Louis & San Francisco, the Missouri Pacific, and the St Louis, Iron Mountain & Southern railways, and is connected with Webb City and Joplin, Mo., and Galena, Kan., by the electric line of the Southwest Missouri railway. The town is built on high ground underlain by solid limestone, and has much natural and architectural beauty. It is the seat of the Carthage Collegiate Institute (Presbyterian). A Chautauqua assembly and a county fair are held annually. In the vicinity there are valuable lead, zinc and coal mines, and quarries of Carthage "marble," with which the county court house is built. Carthage is a jobbing centre for a fruit and grain producing region; live-stock (especially harness horses) is raised in the vicinity; and among the city's manufactures are lime, flour, canned fruits, furniture, bed springs and mattresses, mining and quarrying machinery, ploughs and woollen goods.

In 1905 the factory products were valuedatfi, 179,661. Natural gas for domestic use and for factories is piped from the Kansas gas fields. The municipality owns and operates the electric-lighting plant. Carthage, founded in 1833, was laid out as a town and became the county-seat in 1842, was incorporated as a town in 1868, was chartered as a city in 1873, and in 1890 became a city of the third class under the general (state) law. On the 5th of July 1861 about 3500 Confederates under General James E. Rains and M. M. Parsons, accompanied by Governor Claiborne Fox Jackson (1807-1862), and 1500 Union troops under Colonel Franz Sigel, were engaged about 7 m. north of the city in an indecisive skirmish which has been named the battle of Carthage. .

CARTHAGE, SYNODS OF. During the 3rd, 4th, and 5th centuries the town of Carthage (q.v.) in Africa served as the meeting-place of a large number of church synods, of which, however, only the most important can be treated here.

1. In May 251 a synod, assembled under the presidency of Cyprian to consider the treatment of the lapsi (those who had fallen away from the faith during persecution), excommunicated Felicissimus and five other Novatian bishops (Rigorists), and declared that the lapsi should be dealt with, not with indiscriminate severity, but according to the degree of individual guilt. These decisions were confirmed by a synod of Rome in the

autumn of the same year. Other Carthaginian synods concerning the lapsi were held in 252 and 254.

; See Hefele, 2nd ed., i. pp. in sqq. (English translation, i. pp. 93 sqq.); Mansi, i. pp. 863 sqq., 905 sqq.; Hardouin, i. pp. 133 sqq!, 147 sqq.; Cyprian, Epp. 52, 54, 55, 68.

2. Two synods, in 255 and 256, held under Cyprian, pro- nounced against the validity of heretical baptism, thus taking direct issue with Stephen, bishop of Rome, who promptly repudiated them, and separated himself from the African Church. A third synod, September 256, unanimously reaffirmed the position of the other two. Stephen ‘s pretensions to authority as ” bishop of bishops ” were sharply resented, and for some time the relations of the Roman and African Churches were severely strained.

See Hefele, 2nd ed., i. pp. 117-119 (English translation, i. pp. 99 sqq.); Mansi, i. pp. 921 sqq., 951 sqq.; Hardouin, i. pp. 153 sqq.; Cyprian, Epp. 69-75.

3. The Donatist schism (see Donatists) occasioned a number of important synods. About 348 a synod of Catholic bishops, who had met to record their gratitude for the effective official repression of the ” Circumcelliones ” (Donatist terrorists), declared against the rebaptism of any one who had been baptized in the name of the Trinity, and’ adopted twelve canons of clerical discipline.

See Hefele, 2nd. ed., i. pp. 632-633 (English translation, ii. pp. 184-186) ; Mansi, iii. pp. 143 sqq. ; Hardouin, i. pp. 683 sqq.

4. The ” Conference of Carthage ” (see Donatists), held by imperial command in 41 1 with a view to terminating the Donatist schism, while not strictly a synod, was nevertheless one of the most important assemblies in the history of the African church, and, indeed of the whole Christian church.

See Hefele, 2nd ed., ii. pp. 103-104 (English translation, ii. pp. 445-446) ; Mansi, iv. pp. 7-283 ; Hardouin, i. pp. 1043-1190.

5. On the 1st of May 418 a great synod (” A Council of Africa,” St Augustine calls it), which assembled under the presidency of Aurelius, bishop of Carthage, to take action concerning the errors of Caelestius, a disciple of Pe’agius (q.v.), denounced the Pelagian doctrines of human nature, original sin, grace and perfectibility, and fully approved the contraryviews of Augustine.

Prompted by the reinstatement by the bishop of Rome of a deposed African priest, the synod enacted that ” whoever appeals to a court on the other side of the sea (meaning Rome) may not again be received into communion by any one in Africa ” (canon 17).

See Hefele, 2nd ed., ii. pp. 116 sqq. (English translation, ii. pp. 458 sqq.); Mansi, iii. pp. 810 sqq., iv. pp. 377 sqq., 451 sqq.; Hardouin, i. pp. 926 sqq.

6. The question of appeals to Rome occasioned two synods, one in 419, the other in 424. The latter addressed a letter to

the. bishop of Rome, Gelestine, protesting against his claim to appellate jurisdiction, and urgently requesting the immediate recall of his legate, and advising him to send no more judges to Africa. ‘ :

See Hefele, 2nd ed., ii. pp. 120 sqq., 137 sqq, (English translation, ii. pp.462 sqq., 480 sqq.) ; Mansi, iii. pp. 835 sqq., iv. pp, 401 sqq., 477 sqq- J Hardouin, i. pp. 943 sqq., 1241 sqq. (T. F. C.)

CARTHUSIANS, an order of monks founded by St Bruno (#.?.■); In 1084 Bruno and his six companions presented themselvep before the bishop of Grenoble and explained to him their desire to lead an ascetical life in a solitary place. He ‘pointed out, to them a desolate spot named Chartreuse, on the mountains near Grenoble, rocky and precipitous, and snow-covered during a great portion of the year, and told them they might there carry out their design. They built themselves three huts and an oratory, and gave themselves up to a life of prayer and silence and extreme austerity. After a few years Bruno was summoned to Rome by Urban II., as an adviser in the government of the Church, c. 1090; but after a year or, so he obtained permission to withdraw from Rome, and was able to found in the forests of Calabria near Squillace a second, and later on a third and a fourth monastery, on the same lines as the Chartreuse. On one of these south Italian foundations Bruno died in noi. On leaving the Chartreuse he had appointed a successor as superior, and the

institute steadily took more settled shape and further development. Peter the Venerable, abbot of Cluny, writing about forty years later, speaks thus of the mode of life of the earliest Carthusians: —

” Warned by the negligence and lukewarmness of many of the older monks, they adopted for themselves and for their followers greater precaution against the artifices of the Evil One. As remedy against pride and vain-glory they chose a dress more poor and contemptible than that of any other religious body ; so that it is horrible to look on these garments, so short, scanty, coarse and dirty are they. In order to cut up avarice by the toots, they en- closed around their cells a certain quantity of land, more or less, according to the fertility of the district ; and they would not accept a foot of land beyond that limit if you were to offer them the whole world. For the same motive they limit the quantity of their cattle, oxen, asses, sheep and goats. And in order that they might have no motive for augmenting their possessions, either of land or animals, they ordained that in every one of their monasteries there should be no more than twelve monks, with their prior 1 the thirteenth, eighteen lay brothers and a few paid servants. , To, mortify the flesh they always wear hair shirts of the severest kind, and their fasting is wellnigh continuous. They always eat bread of unbolted meal, and take so much water with thefr wine that it has hardly any flavour of wine left. They never eat meat, whether in health or ill. They never buy fish, but they accept it if it is given to them for charity. They may eat cheese and eggs only on Sundays and Thursdays. On Tuesdays and Saturdays they eat cooked vegetables. On Mondays, Wednesdays and Fridays they take only bread and water. They eat once a day only, save during the octaves of Christmas, Easter, Pentecost, Epiphany and other solemnities. They live in separate little houses like the ancient m.oijks of Egypt, and they occupy themselves continually with reading, prayer and the labour of their hands, especially the writing of books; Thgy i recite the prayers for minor canonical hours in their own dwellings, when warned by the bell of the church; but they all .assemble in church for matins and vespers. On feast days they eat twice, and sing all the offices in the church, and eat in the refectory. They do not say mass save on festivals and Sundays. They boil the vegetables served out t<» them in their own dwellings, and never drink wine save with their food." (Migne, Patrol. Lat. clxxxjx.,943.)

In its broad outlines this description of primitive Carthusian life

has remained true, even to the present day: the regulations as to food are not quite so stringent, and the habit is now an ordinary religious habit of white serge. It was not until n 70 that the Carthusians were formally; constituted a separate religious order by papal act. Owing to its very nature, the institute never had any great expansion: at the middle of the •13th century there were some 50 Charterhouses; at the beginning of the 18th there were 17c, 75 being iri. France.

There was no written rule before 1130, when Guigo, the fifth prior of the Grande Chartreuse, reduced to writing the body of customs that had been the basis of Carthusian life (Migne, Patrol. Lat. cliii. 631); enlargements and modifications of this code were made in 1259, 1367, 1509 and 1681: this last form of the statutes is the present Carthusian rule.

The life is very nearly eremitical: except on Sundays and feasts, the Carthusians meet only three times a day in the church 1 — for the Midnight Office, for Mass and for Vespers; once a week, on Sundays (and feasts) they have their meal in the refectory, and once a week they have recreation together and a walk outside enclosure. All the rest of their time is passed iri solitude in their hermitages, which are built quite separate from one another. Each hermitage is a house, containing living-room; bedroom and oratory, workshop and store-room, and has a small garden attached. The monks are supplied with such tools as they wish to employ in workshop and garden, and with such books as they need from the library. The Carthusian goes to bed every evening at 7 and is called about n, when he says in his private oratory the Officium B. Mariae Virginis. Towards midnight all repair to the church for Matins and Lauds, which are celebrated with extraordinary solemnity and prolixity, so as to last from 2 to 3 hours, according to the office. They then return to bed until 5, when they again go to the church for the daily High Mass, still celebrated according to the phase of liturgical and ritual development of the nth century. The private Masses are then said, and the monks betake themselves to work or study. At 10 in summer, n in winter, 12 on feast days, they have their dinner, alone except on Sundays and feasts; the dinner is supplied from the common kitchen through a small window. On many days of the year there is but one meal; meat is never eaten, even in sickness — this has always been an absolute rule among the Carthusians. In the afternoon they again assemble in the church for Vespers; the lesser portions of the canonical office, as well as the Office of the Blessed Virgin and the Office of the Dead, are

said privately in the oratories.;

.This manner of life has been kept up almost without variation for eight centuries: among the Carthusians there have never bˆen any, of those revivals and reforms that are so striking a feature in the history of other orders — ” never reformed, because never deformed.” The Carthusians have always lived thus wholly cut off from the outer world, each one in almost entire isolation. They introduced and have kept up in western Europe a life resembling that of the early Egyptian monks, as under St Anthony’s guidance monasticism passed from the utter individualism of the first hermits to the half eremitical, half cenobitical life of the Lauras (see Monasticism). Owing to certain resemblances in external matters to the Benedictine rule and practice, the Carthusians have sometimes been regarded as one of the offshoots from the Benedictines; but this view is not tenable, the whole Carthusian conception, idea and spirit being quite different from the Benedictine.

The superiors of the Charterhouses are priors, not abbots, and the prior of the Grande Chartreuse is the superior general of the order. A general chapter of the priors is held annually at the Grande Chartreuse. The Carthusians have always flourished most in France, but they had houses all over western Europe; some of the Italian Certose, as those at Pa via, Florence and Naples, are renowned for their wonderful beauty.

The first English Charterhouse was established in 11 78 at Witham by Selwood Forest, and at the Dissolution there were nine, the most celebrated being those at Sheen in Surrey and at Smithfield in London (for list see Catholic Dictionary, art. ” Car. thusians”). The Carthusians were the only order that made any corporate resistance to the ecclesiastical policy of Henry VnL The community of the London Charterhouse stood firm, and the prior and several of the monks were put to death in 1535 under circumstances of barbarous cruelty. In Mary’s reign a community was reassembled at Sheen, and on het death it emigrated, fifteen in number, to Flanders, and finally settled in Nieuport; it maintained itself as an English community for a considerable time, but gradually dwindled, and the last ol the old English Carthusian stock died in 183 1. There is now one Charterhouse in England established at Parkminster in Sussex in 1883; the community numbers so choir-monks, but it is almost wholly made up of foreigners, including many of those recently expelled from France.

At the French Revolution the monks were driven from the

Grande Chartreuse, but they returned in 1816; they were again driven out under the Association Laws of 1901, and the community of the Grande Chartreuse is now settled in an old Certosa near Lucca. Of late years the community at the Grande Chartreuse had consisted of some 40 choir-monks and 20 lay brothers. Before the recent expulsions from France there were in all some 20 Charterhouses.

There have been since the middle of the 13th. century a very few convents of Carthusian nuns, not more than ten; in recent times there have been but two or three, one situated. a few miles from the Grande Chartreuse. The rule resembles that of the monks, but the isolation, solitude and silence are much less stringent. The habit of the Carthusians, both monks and nuns,, is white. ■ • ‘: ‘

A word may be added as to the famous liqueur., known as Chartreuse, made by the monks. At the Revolution the property of the Carthusians was confiscated, and on their restoration they recovered only the barren desert in which the monastery stood, and for it they had to pay rent. Thus they were for some years in want even of the needful means of subsistence. Then < the liqueur was invented as a means of supplying the wants of the community; it became a great commercial success and produces a large yearly income. This income the monks have not spent on themselves, nor does it accumulate. _ The first charge is the maintenance of the Grande Chartreuse and the other Charterhouses, and out of it have been built and established the new monasteries of the order, as at Diisseldorf, Parkminster and elsewhere; but by far the largest portion has been' spent; on religious and charitable purposes in France and all over the world, — churches, schools, hospitals, almshouses, foreign missions. One thing is certain: the profits made no difference at all to the secluded and austere life of the monks of the Grande Chartreuse.

Authorities. — The most comprehensive historical work on the Carthusian order is B. Troinby, Storia del patriarca S. Brunone-e del suo ordine (10 vols., 1773). References to other histories, old and new, will be found in Max Heimbucher, Orden u.

Kongregation'en (1896), i. § 36; Wetzer und Welte, Kirchenlexicon (ed. 2), art. " -Karthauserorden "; Herzog-Hauck, Realencyklopddie (ed. 3), art, " Karthauser." For the English Carthusians, see E. Margaret Thompson, Somerset Carthusians (1895), and Dom L. Hendriks, London Charterhouse (1889). The best study on St Bruno and the foundation of the order is Hermann Lobbel, " Dei* Stifter des Kafthauser-Ordens," 1899 (vol. v. No. I of Kirchengeschichtlicke Studien, Miinster) ; and the best account of the actual life is by Algar Thorold (Dublin Review, April 1892), who spent some months in the noviciate at the Grande Chartreuse. A little tract (anonymous) translated from French, The Carthusians, 1902 (Orphans Press, Buckley Hall, Rochdale), gives precise infdrmation on the history, spirit and life of the Carthusians. '-(E, C. B.)' .

CARTIER, SIR GEORGES ETIENNE, Bart. (1-814-1873), Canadian statesman, was born in the province of Quebec on the 6th of September 1814. Called to the bar in 1835, he soon gained a large practice. He took part in the rebellion of 1837, and was forced for a time to fly the country. In 1848 he was elected to the Canadian parliament. His youthful ebullition of 1837 was soon repented of, and he became a loyal subject of the British crown. So greatly had he changed that in 1854 he became a leading member of the reconstructed Liberal- Conservative party. In 1855 he was appointed provincial secretary, and in 1857 attorney-general for Lower Canada. From 1858 to 1862 he and Sir John Macdonald were joint prime ministers of Canada, and their alliance lasted till the death of Cartier. He took the chief part in promoting many useful measures, such as the abolition of seigneurial tenure in Lower Canada (see Quebec), and the codification of the civil law of that province (1857-1864). Above all he favoured the con- struction of railways, and to his energy and fearless; optimism are largely due the eventual success of the Grand Trunk railway, and the resolve to construct the Canadian Pacific. In the face of great opposition, he carried his native province into federation (1864-1867), which would have been impossible without his aid. In the first cabinet of Sir John Macdonald he sat as minister of militia and defence, and carried in 1868 an important act estab- lishing the land forces of Canada on a sound basis. Though a

devout Catholic, he became involved in a political quarrel with his church, and was defeated by clerical influence at the general election of 1872. Another seat was found for him, but his health failed and he died on the 20th of May 1873.

The Life, by Alfred O. De Celles (Toronto, 1904), may be supplemented by the sketch in Dent's Canadian Portrait Gallery (Toronto, 1880). , ... (W. L. G.)

CARTIER, JACQUES (1491-1557), French navigator, dis- coverer of the Canadian river St Lawrence, was born at St Malo in Brittany. Of his early life nothing is known. On the suppres- sion by Admiral Chabot of the trade to Brazil, an expedition consisting of two ships and sixty-one men was despatched from St Malo under Cartier on the 20th of April 1 534, to look for a north-west passage, to the East. Cartier reached Newfoundland on /the ioth of May, and at once entered the strait of Belle Isle) then knowtl to the fishermen as the bay of Castles. While the ships renewed their supply of wood and water in Belles Amours harbour on the north side of the strait, the long-boats discovered that the coast farther west was barren, rocky and uninviting. In view of this Cartier set sail on Monday, the 15th of June, for the south side of the, strait, by following which he was led down almost the whole west coast of Newfoundland. Off St George's Bay a storm drove the ships outinto the gulf, ;but on resuming his course Cartier fell in with the Bird Rocks. The island south of these he named Brion Island, after Chabot. Cartier mistook our, Magdalen and Prince Edward Islands for the main shore on the south side of this inland sea. Following the coast of New Brunswick northward he was greatly disappointed to discover Chaleur Bay was not a strait. During a ten days' stay in Gaspe Harbour Cartier made friends with' a tribe of Huron-Iroquois Indians from Quebec, two of whom he carried off with him. A mirage deceived him into thinking the passage up the river south of Anticosti was a bay; whereupon he proceeded to coast the southern, eastern and northern shores of Anticosti. On dis- covering the passage between this island and the Quebec shore a council was held, at which it was decided to postpone the exploration of this strait until the following year. Heading eastward along the Quebec shore, Cartier soon regained the Strait of Belle Isle and, entering the Atlantic on the 15th of August, reached St Malo in safety on the 5th of September.

Cartier set sail again from St Malo with three vessels on the 16th of May 1536, and passing through the strait of Belle Isle anchored on the 9th of August in Pillage Bay, opposite Anticosti. The next day he named this the bay of St Lawrence. In course of time the name spread to the gulf and finally to the river. Proceeding through the passage north of Anticosti, Cartier anchored on the 1st of September at the mouth of the Saguenay,

whichVthe two Indians who had passed the winter in France informed him was the name of a kingdom ” rich and wealthy in precious stones.” Again on reaching the island of Orleans, so named after the third son of Francis L, they told Cartier he was now in the kingdom of Canada, in reality the Huron-Iroquois word lor village. Leaving his two larger vessels in the St Charles, which there enters the St Lawrence, Cartier set off westward with the bark and the long-boats. The former grounded in Lake St Peter, buti in the latter he reached, on the 2nd of October, the Huron-Iroquois village of Hochelaga on the site of the city of Montreal., Further progress was checked by the Lachine Rapid. From the top of Mount Royal, a name still in use, Cartier beheld the St Lawrence and the Ottawa stretching away to the west. On his return to the St Charles, where during the winter twenty-five men died of scurvy, Cartier sought further. information about the rich country called Saguenay, which he was informed could be reached more easily by way of the Ottawa. In order to give Francis I. authentic information of this northern Mexico, Cartier seized the chief and eleven of the headmen of the village and carried them off to France. This time he passed south of Anticosti and, entering the Atlantic through Cabot Strait, reached St Malo on the 16th of July

1537- • ‘■ ‘

Francis I. was, unable to do anything further until the spring of 1 541, when Carrier set sail with five vessels and lookup

his quarters at Cap Rouge, 9 m. above Quebec. A soldier, the seigneur de Roberval, had been chosen to lead the men to the conquest of Saguenay; but when he did not arrive, Cartier made a fresh examination of the rapid of Lachine, preparatory to sending the men up the river Ottawa. Roberval at length set sail in April 1542, but on reaching St John’s, Newfoundland, met Cartier on his way back to France. In the summer of 1543, Cartier was sent out to bring home Roberval, whose attempt to make his way up the Ottawa to this mythical Saguenay had proved futile. From 1544 until his death at St Malo, on the 1st of September 1557, Cartier appears to have done little else than give technical advice in nautical matters and act as Portuguese interpreter.

A critical edition of Carrier's Brief Recit de la navigation faicte is isles de Canada (1545), from the MSS., has been published by the university of Toronto. The best English version is that by James Phinney Baxter, published at Portland, Maine, in 1906. (H. P. B.)

CARTILAGE (Lat. cartilaga, gristle), the firm elastic and gristly connective tissue in vertebrates. (See Connective Tissues and Joints.)

CARTOON (Ital. cartone, pasteboard), a term used in pictorial art in two senses. (1) In painting, a cartoon is used as a model for a large picture in fresco, oil or tapestry, or for statuary. It was also formerly employed in glass and mosaic work. When cartoons are used in fresco-painting, the back of the design is covered with black-lead or other colouring matter; and, this side of the picture being applied to the wall, the artist passes over the lines of the design with a point, and thus obtains an impression. According to another method the outlines of the figures are pricked with a needle, and the cartoon, being placed against the wall, is " pounced," i.e. a bag of black colouring-matter is drawn over the perforations, and the outlines are thus transferred to the wall. In fresco-painting, the portions of the cartoon containing figures were formerly cut out and fixed (generally in successive sections) upon the moist plaster. Their contour was then traced with a pointed instrument, and the outlines appeared lightly incised upon the plaster after the portion of the cartoon was withdrawn. In the manufacture of tapestries upon which it is wished to give a representation of the figures of cartoons, these figures are sometimes cut out, and laid behind or under the woof, to guide the operations of the artist. In this case the cartoons are coloured.

Cartoons have been executed by some of the most distinguished masters; the greatest extant performances in this line of art are those of Raphael. They are seven in number, coloured in distemper; and at present they adorn the Victoria and Albert Museum, in South Kensington, having been removed thither from their former home, the palace of Hampton Court. With respect to their merits, they count among the best of Raphael's productions; Lanzi even pronounces them to be in beauty superior to anything else the world has ever seen. Not that they all present features of perfect loveliness, and limbs of faultless symmetry, — this is far from being the case; but in harmony of design, in the universal adaptation of means to one great end, and in the grasp of soul which they display, they stand among the foremost works of the

designing art. The history of these cartoons is curious. Leo X. employed Raphael in design- ing (in 1515-1516) a series of Scriptural subjects, which were first to be finished in cartoons, and then to be imitated in tapestry by Flemish artists, and used for the decoration of the Sistine Chapel. Two principal sets of tapestries were accordingly executed at Arras in Flanders; but it is supposed that neither Leo nor Raphael lived to see them. The set which went to Rome was twice carried away by invaders, first in 1 527 and afterwards in 1798. In the first instance they were restored in a perfect state; but after their return in 1814 one was wanting — the cupidity of a Genoese having induced him to destroy it for the sake of the precious metal which it contained. Authorities differ as to the original number of cartoons, but there appear to have been twenty-five, — some by Raphael himself, assisted by Gian- francesco Penni, others by the surviving pupils of Raphael. The cartoons after which the tapestries were woven were not,

it would seem, restored to Rome, but remained as lumber about the manufactory in Arras till after the revolution of the Low Countries, when seven of them which had escaped destruc- tion were purchased by Charles I., on the recommendation of Rubens. They were found much injured, " holes being pricked in them for the weavers to pounce the outlines, and in other parts they were almost cut through by tracing." It has never been ascertained what became of the other cartoons. Three tapestries, the cartoons of which by Raphael no longer exist, are in the Vatican,— representing the stoning of St Stephen, the conversion of St Paul, and St Paul in prison at Philippi.

Besides the cartoons of Raphael, two, to which an extra- ordinary celebrity in art-history attaches, were those executed in competition by Leonardo da Vinci and by Michelangelo — the former named the Battle of the Standard, and the latter the Cartoon of Pisa — soldiers bathing, surprised by the approach of the enemy. Both these great works have perished, but the general design of them has been preserved. In recent times some of the most eminent designers of cartoons have been masters of the German school, — Cornelius, -Kaulbach, Steinle, Fuhrich, &c; indeed, as a general rule, these artists appear to greater advantage in their cartoons than in the completed paintings of the same compositions. In England cartoon-work developed con- siderably in 1843 and 1844, when a competition was held for the decoration of the new Houses of Parliament. Dyce and Maclise left examples of uncommon mark in this line. The cartoon by

Fred. Walker, A.R.A., made to advertise the dramatic version of Wilkie Collins's Woman in White, is now at the Tate Gallery; and cartoons by Ford Madox Brown are in the Victoria and Albert Museum, South Kensington. (W. M. R.)

(2) " Cartoon " is also a term now applied to the large political drawings in the humorous or satirical papers of the day. At an earlier period satirical prints were styled " caricatures," and were issued separately. Gillray, Rowlandson, the three Cruikshanks, Heath and others were popular favourites in this class of design. Even the insignificant little cuts by Robert Seymour in Figaro in London, the diableries in The Fly, and the vulgar and rancorous political skits identified with the flood of scurrilous little papers of the time, were dignified by the same term. The long series of Political Sketches by " H. B." (John Doyle) were the first examples of unexaggerated statement, and fair and decorous satire. With the advent of Punch and its various rivals {The Peep-Show, The Great Gun, Diogenes and the like), the general tone was elevated. Punch at first adopted the word " pencilling " to describe the " big cut," which dealt variously with political and social topics. But when in 1843 there was held in West- minster Hall the great exhibition of " cartoons " from which selection was to be made of designs for the decoration in fresco of the new Houses of Parliament, Punch jocularly professed to range himself alongside the great artists of the day; so that the " mad designe " of the reign of Charles I. became the " cartoon " of that of Queen Victoria. John Leech's drawing in No. 105 of that journal was the first caricature to be called a cartoon: it was entitled " Substance and Shadow: the Poor ask for Bread, and the Philanthropy of the State accords — an Exhibition." Later, Punch dropped the word for a while, but the public took it up. Vet theNew English Dictionary curiously attributes the first use of it to Miss Braddon in 1863.

In England the cartoon, no longer a weapon of venomous attack, has come to be regarded as a humorous or sarcastic comment upon the topic uppermost in the nation's mind, a witty or saturnine illustration of views already formed, rather than as an instrument for the manufacture of public opinion. It has almost wholly lost its rancour; it has totally lost its ferocity — the evolutionary result of peace and contentment, for satire in its more violent and more spontaneous form is but the outcome of the dissatisfaction or the rage of the multitude. The cartoon, it is agreed, must be suggestive; it must present a clear idea lucidly and, if possible, laughably worked out; and, however reserved or

restrained it may be, or even, when occasion demands (as in the case of Sir John Tenniel and some of his imitators) , however epic in intuition, it must always figure, so to say, as a leading

article transformed into a picture. (See Caricature and Illustration.) (M. H. S.)

CARTOUCHE (a French word adapted from the Ital. cartoccio, a roll of paper, Med Lat. carta, for charta, paper), originally a roll of paper, parchment or other material, containing the charge of powder and shot for a firearm, a cartridge (?.».), which itself is a corruption of cartouche. The term was applied in architecture to various forms of ornamentation taking the shape of a scroll, such as the volute of an Ionian capital. It was particularly used of a sculptured tablet in the shape of a partly unrolled scroll on which could be placed an inscription or device. Such ” cartouches ” are used for titles, &c, on engravings of maps, plans, and the like. The arms of the popes and ecclesiastics of high birth were borne on an oval cartouche; and it is thus particularly applied, in Egyptian archaeology, for the oblong device with oval ends, enclosing the names of royal personages on the monuments. It is properly an oval formed by a rope knotted at one end. An amulet of similar shape, as the symbol of the ” name,” was worn by men and women as a protection against the blotting out of the name after death.

CARTRIDGE (corruption of Fr. cartouche), a case, of brass or other metal, cardboard, silk, flannel, &c, containing an explosive charge, and usually the projectile also, for small arms and ordnance (see Ammunition).

CARTWRIGHT, EDMUND (1743-1823), English inventor, younger brother of Major John Cartwright (

CARTWRIGHT, JOHN (1 740-1824), English parliamentary reformer, was born at Marnham in Nottinghamshire on the 17th of September 1740, being the elder brother of Edmund Cartwright, inventor of the power-loom. He was educated at Newark grammar school and Heath Academy in Yorkshire, and at the age of eighteen entered the navy. He was present, in his first year of service, at the capture of Cherbourg, and served in the following year in the action between Sir Edward Hawke and Admiral Conflans. Engaged afterwards under Sir Hugh Palliser

and Admiral Byron on the Newfoundland station, he was appointed to act as chief magistrate of the settlement; and the duties of this post he discharged for five years (1765-1770).

Ill-health necessitated his retirement from active service for a time in 1771. When the disputes with the American colonies began, he saw clearly that the colonists had right on their side, and warmly supported their cause. At the beginning of the war he was offered the appointment of first lieutenant to the duke of Cumberland, which would have put him on the path of certain promotion. But he declined to fight against the cause which he felt to be just. In 1774 he published his first plea on behalf of the colonists, entitled American Independence the Glory and Interest of Great Britain. In the following year, when the Nottinghamshire Militia was first raised, he was appointed major, and in this capacity he served for seventeen years. He was at last illegally superseded, because of his political opinions. In 1776 appeared his first work on reform in parliament, which, with the exception of Earl Stanhope's pamphlets (1774), appears to have been the earliest publication on the subject. It was entitled, Take your Choice — a second edition appearing under the new title of The Legislative Rights of the Commonalty vindi- cated. The task of his life was thenceforth chiefly the attainment of universal suffrage and annual parliaments. In 1778 he con- ceived the project of a political association, which took shape in 1780 as the " Society for Constitutional Information," including among its members some of the most distinguished men of the day. From this society sprang the more famous " Corresponding Society." Major Cartwright worked unweariedly for the pro- motion of reform. He was one of the witnesses on the trial of his friends, Home Tooke, John Thelwall and Thomas Hardy, in 1794, and was himself indicted for conspiracy in 1819. He was found guilty in the following year, and was condemned to pay a fine of £100. He died in London on the 23rd of September 1824. He had married in 1780, but had no children. In 183 1 a monu- ment from a design by Macdowell was erected to him in Burton Crescent where he had lived.

The Life and Correspondence of Major Cartwright, edited by his niece F. D. Cartwright, was published" in 1826.

CARTWRIGHT, PETER (1785-1872), American Methodist Episcopal preacher, was born on the 1st of September 1785 in

Amherst county, Virginia. His father, a veteran of the War of Independence, took his family to Kentucky in 1790, and lived near Lancaster until 1793, and then until 1802 in Logan county near the Tennessee line. Peter received little education, and was a gambler at cards and horse-racing until 1801, when he heard John Page preach. In June he was received into the church; in May 1802 was licensed as a regular exhorter, becoming known as the " Kentucky Boy "; in the autumn of 1802 was licensed to form the Livingston circuit around the mouth of the Cumberland river; in 1806 was ordained deacon by Bishop Asbury, and in 1808 presiding elder by Bishop McKendree, under whose direc- tion he had studied theology. He was presiding elder of the Wabash district in 1812, and of Green river district in 1813-1816, and, after four years on circuit in Kentucky and two as presiding elder of the Cumberland district, was transferred in 1823 to the Illinois .conference, in which he was presiding elder of various districts until 1869. Up to 1856 he preached some 14,600 times, received some 10,000 persons into the church, and baptized some 1 2,000 persons. He died near Pleasant Plains, Sangamon county, Illinois, on the 25th of September 1872. He was a typical back- woods preacher, an able, vigorous speaker, and a racy writer.

See the Autobiography of Peter Cartwright, the Backwoods Preacher edited by W. P. Strickland (New York, 1856).

CARTWRIGHT, SIR RICHARD JOHN (1835-), Canadian statesman, was born in Kingston, Canada, on the 4th of December 1835, son of the Rev. R. D. Cartwright, chaplain to H.M. Forces. In 1863 he entered the Canadian parliament as a Conservative, but soon after federation in 1867 quarrelled with his party on the question of their financial policy, which he considered extravagant. By 1870 the breach was complete, and in 1873 he became finance minister of the Liberal ministry of the Hon. Alexander Mackenzie. His honesty and economy were undoubted, but the latter quality was sometimes pushed to extremes. From 1878 to 1896 he was the chief financial critic on the side of the Liberal opposition, and on the accession of Sir

Wilfrid Laurier to power in 1896 he became minister of trade and commerce. In 1898-1899 he represented Canada on the Anglo-American joint high commission at Quebec. In 1904 failing

health led to his retirement to the senate. He acted in Sir Wilfrid Laurier's absence at the Imperial Conference 1907 as acting premier.

CARTWRIGHT, THOMAS (c. 1535-1603), English Puritan divine, was born in Hertfordshire. He studied divinity at St John's College, Cambridge, but on Mary's accession had to leave the university, and found occupation as clerk to a counsellor-at- law. On the accession of Elizabeth, he resumed his theological studies, and was soon afterwards elected fellow of St John's and later of Trinity College. In 1564 he opposed John Preston in a theological disputation held on the occasion of Elizabeth's state visit, and in the following year helped to bring to a head the Puritan attitude on church ceremonial and organization. He was popular in Ireland as chaplain to the archbishop of Armagh (1565-1567), and in 1569 he was appointed Lady Margaret professor of divinity at Cambridge; but John Whitgift, on becoming vice-chancellor, deprived him of the post in December 1570, and — as master of Trinity — of his fellowship in September 1 5 7 1 . This was a natural consequence of the use which he made of his position; he inveighed bitterly against the hierarchy and constitution of the Anglican Church, which he compared unfavour- ably with the primitive Christian organization. So keen was the struggle between him and Whitgift that the chancellor, William Cecil, had to intervene. After his deprivation by Whitgift, Cartwright visited Beza at Geneva. He returned to England in 1572, and might have become professor of Hebrew at Cambridge but for his expressed sympathy with the notorious " Admonition to the Parliament " by John Field and Thomas Wilcox. To escape arrest he again went abroad, and officiated as clergyman to the English residents at Antwerp and then at Middelburg. In 1576 he visited and organized the Huguenot churches of the Channel Islands, and after revising the Rhenish version of the New Testament, again settled as pastor at Antwerp, declining the offer of a chair at St Andrews. In 1585 he returned without permission to London, was imprisoned for a short time, and became master of the earl of Leicester's hospital at Warwick. In 1590 he was summoned before the court of high commission and imprisoned, and in 1591 he was once more committed to the Fleet. But he was not treated harshly, and powerful influence soon secured his liberation. He visited Guernsey (1 595-1 598), and spent his closing years in honour and prosperity at Warwick, where he died on the 27th of December 1603. Cartwright was a man of much culture and originality, but exceedingly impulsive. His

views were distinctly Presbyterian, and he stoutly opposed the Brownists or Independents. He never conceived of a separa- tion between church and state, and would probably have refused to tolerate any Nonconformity with his reformed national Pres- byterian church. To him, however, the Puritanism of his day owed its systematization and much of its force.

CARTWRIGHT, WILLIAM (1611-1643), English dramatist and divine, the son of a country gentleman who had been reduced to keeping an inn, was born at Northway, Gloucestershire, in 161 1. Anthony a. Wood, whose notice of Cartwright is in the nature of a panegyric, gives this account of his origin, which is probably correct, although it is contradicted by statements made in David Lloyd's Memoirs. He was educated at the free school of Cirencester, at Westminster school, and at Christ Church, Oxford, where he took his M.A. degree in 1635. He became, says Wood, " the most florid and seraphical preacher in the uni- versity," and appears to have been no less admired as a reader in metaphysics. In 1642 he was made succentor of Salisbury cathedral, and in 1643 he was chosen junior proctor of the uni- versity. He died on the 29th of November of the same year. Cartwright was a " son " of Ben Jonson and an especial favourite with his contemporaries. The collected edition of his poems (1651) contains commendatory verses by Henry Lawes, who set some of his songs to music, by Izaak Walton, Alexander Brome, Henry Yaughan and others, and the king wore mourning on the day of his funeral. His plays are, with the exception of

The Ordinary, extremely fantastic in plot, and stilted and artificial in treatment. They are: The Royal Slave (1636), produced by the students of Christ Church before the king and queen, with music by Henry Lawes; The Lady Errant (acted, 1635-1636; printed, 1651); The Siege, or Love's Convert (printed 165 1). In The Ordinary (1635 ?) he produced a comedy of real life, in imitation of Jonson, representing pot-house society. It is reprinted in Dodsley's Old Plays (ed. Hazlitt, vol. xii.).

CARUCATE, or Caerucate (from the Med. Lat. carrucata, from carruca, a wheeled plough), a measure of land, based probably on the area that could be ploughed by a team of oxen in a year; hence " carucage " means a tax levied on each " caru- cate " of land (see Hide).

CARUPANO, a town and port of the state of Bermudez, Venezuela, 65 m. N.E. of the city of Cumana. Pop. (1908,

estimate) 8600. Carupano is situated on the Caribbean coast at the opening of two valleys, and is a port of call for several regular steamship lines. Its mean annual temperature is 8i° F., but the climate is healthy, because of its open situation on the coast. The country immediately behind the town is rough, but there is a considerable export of cacao, coffee, sugar, cotton, timber and rum.

CARUS, KARL GUSTAV (1789-1869), German physiologist and psychologist, distinguished also as an art critic and a land- scape painter, was born and educated at Leipzig. After a course in chemistry, he began the systematic study of medicine and' in 181 1 became a Privat docent. On the subject which he selected (comparative anatomy) no lectures had previously been- given at Leipzig, and Carus soon established a reputation as a medical teacher. In the war of 1813 he was director of the military hospital at Pfaffendorf, near Leipzig, and in 1814 professor to the new medical college at Dresden, where he spent the remainder of his life. He was made royal physician in 1827, and a privy councillor in 1862. He died on the 28th of July 1869. In philosophy Carus belonged to the school of Schelling, and his works are thoroughly impregnated with the spirit of that system. He regarded inherited tendency as a proof that the cell has a certain psychic life, and pointed out that individual differences are less marked in the lower than in the higher organisms. Of his many works the most important are:— Grundziige der vergleichenden Anatomie und Physiologie (Dresden, 1828); System der Physiologie (2nd ed., 184 7-1849); Psyche: zur Entwickelungsgeschichte der Seele (1846, 3rd ed. Stuttgart, i860); Physis, zur Geschichte des leiblichen Lebens (Stuttgart, 1851); Natur und Idee (Vienna, 1861); Symbolik des menschlichen Gestalts (Leipz., 1853, 2nd ed., 1857); Atlas der Kranioskopie (2nd ed. Leipz., 1864); Vergleichende Psychologie (Vienna, 1866).

See his autobiography, Lebenserinnerungen und Denkwilrdigkeiten (4 vols., 1865-1866) ; K. von Reichenbach, Odische Erwiederungen an die Herren Professoren Fortlage . . . und Hofrath Carus (1856). His England und Schottland im Jahre 1844 was translated by S. C. Davison (1846).

CARUS, MARCUS AURELIUS, Roman emperor a.d. 282-283, was born probably at Narbona (more correctly, Narona) in Illyria, but was educated at Rome. He was a senator, and had filled various civil and military posts before he was appointed prefect of the

praetorian guards by the emperor Probus, after whose murder at Sirmium he was proclaimed emperor by the soldiers. Although Carus severely avenged the death of Probus, he was himself suspected of having been an accessory to the deed. He does not seem to have returned to Rome after his accession, but contented himself with an announcement of the fact to the senate. Bestowing the title of Caesar upon his sons Carinus and Numerianus, he left Carinus in charge of the western portion of the empire, and took Numerianus with him on the expedition against the Persians which had been contemplated by Probus. Having defeated the Quadi and Sarmatians on the Danube, Carus proceeded through Thrace and Asia Minor, conquered Mesopotamia, pressed on to Seleucia and Ctesiphon, and carried his arms beyond the Tigris. But his hopes of further conquest were cut short by his death. One day, after a violent storm, it was announced that he was dead. His death was var- iously attributed to disease, the effects of lightning, or a wounc

received in a campaign against the Huns; but it seems more probable that he was murdered by the soldiers, who were averse from further campaigns against Persia, at the instigation of Arrius Aper, prefect of the praetorian guard. Carus seems to have belied the hopes entertained of him on his accession, and to have developed into a morose and suspicious tyrant.

CHs

A 0H

CARVACROL, or Cymophenol, Ci H 13 OH, or I I

C 3 H 7 (iso), a constituent of the ethereal oil of Origanum hirtum, oil of thyme, oil obtained from pepperwort, and wild bergamot. It may be synthetically prepared by the fusion of cymol sulphonic acid with caustic potash; by the action of nitrous acid on i-methyl-2-amino-4-propyl benzene; by prolonged heating of s parts of camphor with i part of iodine; or by heating carvol with glacial phosphoric acid. It is extracted from Origanum oil by means of a 10% potash solution. It is a thick oil which sets at — 20° C. to a mass of crystals of melting point o°C, and boiling point 236-23 7°C. Oxidation with ferric chloride converts it into dicarvacrol, whilst phosphorus pentachloride transforms it into chlorcymol.

CARVAJAL, ANTONIO FERNANDEZ *(d. 1659), a Portuguese Marano (q.v.) or Crypto- Jew, who came to England in the reign of Charles I. He was the first " endenizened " Jew in England, and by his extensive trade with the West Indies rendered considerable services to the Commonwealth. Besides his commercial value to Cromwell, Carvajal was politically useful also, for he acted as " intelligencer." When Manasseh ben Israel in 1655 petitioned for the return of the Jews who had been expelled by Edward I., Carvajal took part in the agitation and boldly avowed his Judaism. Carvajal may be termed the founder of the Anglo-Jewish community. He died in 1659.

See Lucien Wolf, " The First English Jew," Trans. Jewish Historical Society, ii. 14.

CARVAJAL, LUISA DE (1568-1614), Spanish missionary in England, was born at Jaraicejo in Estremadura on the 2nd of January 1 568. Her father, Don Francisco de Carvajal, was the head of an old and wealthy family which produced many men of note. Her mother, Dona Maria, belonged to the powerful house of Mendoza. Both were people of pious character. The mother died in 1572 from a fever contracted while visiting the poor, and the father took the disease from his wife, and died of it. Luisa and a brother were left to the care of their grand-aunt Maria Chacon, governess of the young children of Philip II. On her death they passed to the care of their maternal uncle, Francisco Hurtado de Mendoza, count of Almazan. The count, who was named viceroy of Navarre by Philip II., was an able public servant in whom religious zeal was carried to the point of inhuman asceticism. His

niece attracted his favour by her manifest disposition to the religious life; she sent her own share of dinner to the poor, ate broken meats, wore a chain next her skin, and invited humiliation; and at the age of seven- teen she was instructed by the count to make a surrender of her will to two female servants whom he set over her, and by whom she was repeatedly scourged while naked, trampled upon and otherwise ill-treated. But when Luisa came of age she refused to enter a religious house, and decided to devote herself to the conversion of England. The execution of the Jesuit emissary priest, Henry Walpole, in 1596 had moved her deeply, and she prepared herself by learning English and by the study of divinity. A lawsuit with her brother caused temporary delay, but she secured her share of the family fortune, which she devoted to founding a college for English Jesuits at Lou vain; it was transferred to Watten near Saint Omer in 1612, and lasted till the suppression of the Order. In 1605 she was allowed to go to England. She established herself under the protection of the Spanish ambassador, whose house was in the Barbican. From this place of safety she carried on an active and successful propa- ganda. She made herself conspicuous by her attentions to the Gunpowder Plot prisoners, and won converts, partly by persuasion, partly by helping women of the very poorest class in childbirth,

and taking charge of the children. Her activity attracted the attention of the authorities, and she was arrested in 1608. But the protection of the Spanish ambassador Zuniga, and the desire of King James I. to stand well with Spain, secured her release. In 1 613, while staying at a house in Spitalfields, where she had in fact set up a disguised nunnery, she was arrested with all the inmates by the pursuivants of Abbot, archbishop of Canterbury, who had been on the watch for some time. Her release was again secured by the new Spanish ambassador Gondomar, who played with effect on the weakness of King James. By this time, however, the Spanish authorities had begun to discover that she was a political danger to them, and recalled her. Luisa, who had hoped for the crown of martyrdom, was bitterly dis- appointed, and resisted the order. Before she could be forced to obey she died in the Spanish ambassador's house on her birthday, the 2nd of January 1614. Her body remained as an object of admiration for months till it was carried back to Spain. The original authority for the life of Luisa de Carvajal is La Vida y Virtudes de la Venerable Virgen Dona Luisa de Carvajal y Mendoza (Madrid, 1632), by the Licentiate Lorenzo Munoz. It is founded on her own

papers collected by her English confessor Michael Wal- pole. It is largely autobiographical, and contains some examples of her verse. The Vida y Virtudes is summarized by Sou they in his Letters from Spain and Portugal (1808). A life was written by Lady Georgiana Fullerton (1873), in which much that is shocking to modern sentiment is concealed. See also Quatre Portraits defemmes, by La Comtesse R. de Courson (Paris, 1895). There are several references to Luisa de Carvajal in the Records of the English Province of the Society of Jesus, by Henry Foley (1877-1883). (D. H.)

CARVER, JOHN (iS7 S ?i62i), one of the " Pilgrim Fathers," first governor of the Plymouth colony in America, was born, probably in Nottinghamshire, England, about 1575. Owing to religious persecution at home he took refuge in Holland about 1607, and eventually became a deacon in the church at Leiden of which John Robinson was the pastor. In 1620 he emigrated to America in the " Mayflower," and founded the Plymouth colony. Before leaving England he had probably been elected governor; after the signing of the famous " Com pact " this election was confirmed; and on the 23rd of March 1620 (1621 N.S.) Carver was re-elected for the ensuing year. Early in April, however, he died from the effects of sunstroke.:

CARVER, JONATHAN (c. 1725-1780), American traveller, was born probably in Canterbury, Connecticut. The date usually given for his birth, 1732, is now considered too late, since he was apparently married in 1746. In early life he followed the trade of a shoemaker and subsequently served with the pro- vincial forces in the French and Indian wars. According to his " Journal " he conceived the idea, after the peace of 1763, of exploring Great Britain's newly acquired territory in the north-west. He is said to have set out in 1766, journeyed west- ward by way of the Straits of Mackinac and the Fox and Wisconsin rivers to the Mississippi, viewed the Falls of St Anthony, lived for some time among the Indians, and received from them a grant of 100 sq. m. of territory between the Missis- sippi and St Croix rivers. Returning east in 1768 by way of the north shore of Lake Superior he proceeded in 1769 to England, where he presented a letter of introduction to Benjamin Franklin, and made vain efforts to interest the board of trade in his in- vestigations. In 1778 there was published in London what purported to be his own narrative of his explorations under the title of Travels through the Interior Parts of North America in the Years 1766, 1767 and 1768. It had an immediate success, was translated into French, German and

Dutch, and was long generally accepted as a truthful narrative of his travels and observations, and as one of the highest authorities on the manners, customs and language of the Indians of the northern Mississippi valley. Carver died in London on the 31st of January 1780, having married a second time in England although his first wife was still living in America.

Soon after his death a new edition of the Travels was brought out by the well-known Quaker physician and author, Dr John Coakley Lettsom (1744-1815), who “edited” the work and furnished a biographical introduction. Some doubt seems to have been early entertained as to the real authorship of the

work, Oliver Wolcott in 1792 writing to Jedediah Morse, the geographer, that Carver was too unlettered to have written it, and that in his belief the book was the work of some literary hack. Careful investigation of Indian life and north-western history, notably by H. R. Schoolcraft in 1823, William H. Keating in his narrative of Major Long’s Expedition (1824), and Robert Greenhow in his History of Oregon (1844), showed a remarkable similarity between the Travels and the accounts of several French authorities, but these criticisms were scarcely noticed by later writers. Finally Professor E. G. Bourne, in a paper contributed to the American Historical Review for January 1906, proved beyond dispute that the bulk of Carver’s alleged narrative was merely a close paraphrase of Charlevoix’s Journal, La Hontan’s New Voyages to North America, and James Adair’s History of the American Indians. Professor Bourne’s theory is that the entire book was probably the work of the facile Dr Lettsom, whose personal relations with Carver are known to have been intimate, the ” journal ” alone, which constituted an inconsiderable part of the whole, having been, in part, founded on Carver’s random notes and recollections.

See also J. G. Godfrey, Jonathan Carver; His Travels in the North-west, 1766-1768 (No. 5 of the Parkman Club Publications, Milwaukee, Wis., 1896), and Daniel S. Durrie, ” Captain Jonathan Carver and the Carver Grant,” in vol. vi. of the Wisconsin Historical Society’s Collections (1872).

CARVING. To carve (A.S. ceorfan: connected with Gr. ypa.4>tiv)

is to cut, whatever the material; but apart from the domestic sense of carving meat, the word is more parti- cularly associated with the art of sculpture. The name of sculptor (see Sculpture) is commonly reserved for the great masters of the art, especially in stone and marble, while that of carver is given to the artists or workmen who execute the sub- ordinate decorations of architecture. The word is also specially applied to sculpture in ivory (q.v.) and its substitutes, and in wood (see Wood-Carving) and other soft materials (see also Gem.)

CARVING AND GILDING, two allied operations which for- merly were the most prominent features in the important industry of frame-making. The craftsmen who pursued the occupation were known as " carvers and gilders," and the terms still continue to be the recognized trade-name of frame-making, although very little of the ornamentation of frame-work is now accomplished by carving, and much of the so-called gilt orna- ment is produced without the use of gold. The trade has to do primarily with the frames of pictures, engravings and mirrors, but many of the light decorative fittings of houses, finished in " composition " and gilt work, are also entrusted to the carver and gilder. Fashion in picture frames, like all fashions, fluctuates greatly. Mouldings of the prevailing sizes and patterns are generally manufactured in special factories, and supplied in lengths to carvers and gilders ready for use. A large proportion of ' such mouldings, especially those of a cheaper and inferior quality, are made in Germany. What is distinctively known as a " German " moulding is a cheap imitation of gilt work made by lacquering over the surface of a white metallic foil. German artisans are also very successful in the preparation of imitation of veneers of rosewood, mahogany, walnut and other orna- mental woods. The more expensive mouldings are either in wood (such as oak or mahogany), in veneers of any expensive ornamental wood, or real gilt.

A brief outline of the method of making a gilt frame, enriched with composition ornaments, may be taken as a characteristic example of the operations of the frame-maker. The foundation of such a frame is soft pine wood, in which a moulding of the required size and section is roughly run. To prevent warping the moulding is, or ought to be, made from two or more pieces of wood glued together. The moulding is " whitened up," or prepared for gilding by covering it with repeated coatings of a mixture of finely powdered whiting and size. When a sufficient thickness of the whitening mixture has been applied, the whole surface is carefully smoothed off with pumice-stone and glass-

paper, care being taken to keep the angles and curves clear and bharp. Were a plain gilt moulding only desired, it would now be ready for gilding; but when the frame is to be enriched

it first receives the composition ornaments. Composition, or " compo," is a mixture of fine glue, white resin, and Unseed oil well boiled together, with as much rolled and sifted whiting added as makes the whole into a doughy mass while hot. This composition is worked in a hot state into moulds of boxwood, and so pressed in as to take up every ornamental detail. On its removal from the mould all superfluous matter is trimmed away, and the ornament, while yet soft and plastic, is laid on the moulding, and fitting into all the curves, &c, is fixed with glue. The ornamental surface so prepared quickly sets and becomes very hard and brittle. When very large bold ornaments are wanted for frames of unusual size they are moulded in papier mdche. Two methods of laying on gold — oil-gilding and water-gilding — are practised, the former being used for frames broken up with enrichments. For oil-gilding the moulding is prepared with two coats of fine thin size to fill the pores of the wood, and afterwards it receives a coat of oil gold-size, which consists of a mixture of boiled linseed oil and ochre. When this gold- size is in a " tacky " or " sticky " condition, gold-leaf is laid on and carefully pressed over and into all parts of the surface; and when covered with a coat of finish-size the gilding is complete. Water-gilding is applied to plain mouldings and all considerable unbroken surfaces, and

CARY, ALICE (1820-1871), and PHOEBE (1824-1871), American poets, were born at Mount Healthy, near Cincinnati, Ohio, respectively on the 26th of April 1820 and the 4th of September 1824. Their education was largely self-acquired, and their work in literature was always done in unbroken com- panionship. Their poems were first collected in a volume entitled Poems of Alice and Phoebe Carey [sic] (1850). In 1850- 1851 they removed to New York, where the two sisters, befriended by Rufus W.Griswold (1815-1857), the gM

See Mrs Mary Clemmer Ames's Memorial of Alice' and Phoebe Carey (New York, 1873).

CARY, ANNIE LOUISE (1842-), American singer, was born in Wayne, Maine, on the 22nd of October 1842. She studied in Milan, and made her debut as an operatic contralto in Copen- hagen in 1868. She had a successful European career for several

years, singing in Stockholm, Paris and London, and made her New York first appearance in 1870. She only once re- turned to Europe for a brilliant Russian tour, and until she retired in 1882, on her marriage to Charles M. Raymond, she was the most popular singer in America.

CARY, HENRY FRANCIS (1772-1844), English author and translator, was born at Gibraltar on the 6th of December 1772, the son of a captain in the army. He was educated at the grammar schools of Rugby, Sutton Coldfield and Birmingham,

and at Christ Church, Oxford, which he entered in i7go. He took holy orders, and was presented in 1797 to the vicarage of Abbott's Bromley in Staffordshire. This benefice he held till his death. In 1800 he was also presented to the vicarage of Kingsbury in Warwickshire. While still at school he had become a regular contributor to the Gentleman's Magazine, and had published a volume of Sonnets and Odes. At Christ Church he devoted much time to the study of French and Italian literature; and the fruits of these studies appeared in the notes to his classic translation of Dante. The version of the Inferno was published in 1805, together with the original text. Soon afterwards Cary moved to London, where he became reader at Berkeley chapel, and subsequently lecturer at Chiswick and curate of the Savoy. His version of the whole Divina Commedia did not appear till 1814. It was published at Cary's own expense, as the publisher refused to undertake the risk, owing to the failure incurred over the Inferno. The translation was brought to the notice of Samuel Rogers by Thomas Moore. Rogers made some additions to an article on it by Ugo Foscolo in the Edinburgh Review. This article, and praise bestowed on the work by Coleridge in a lecture at the Royal Institution, led to a general acknowledg- ment of its merit. Cary's Dante thus gradually took its place among standard works, passing through four editions in the translator's lifetime. It has the great merits of accuracy, idiomatic vigour and readableness; it preserves the sincerity and vividness of the original; and, although many rivals have since appeared in the field, it still holds an honourable place. Its blank verse, however, cannot represent the close woven texture and the stately music of the terza rima of the original. In 1824 Cary published a translation of The Birds of Aristophanes, and, about

1834, of the Odes of Pindar. In 1826 he was appointed assistant-librarian in the British Museum, a post which he held for about eleven years. He resigned because the appointment of keeper of the printed books, which should have been his in the ordinary course of promotion, was refused him when it fell vacant. In 1841 a crown pension of £200 a year, obtained through the efforts of Samuel Rogers, was conferred on him. Cary's Lives of the early French Poets, and Lives of English Poets (from Johnson to Henry Kirke White) , intended as a continuation of Johnson's Lives of the Poets, were published in a collected form in 1846. He died in London on the 14th of August 1844, and was buried in Westminster Abbey.

A memoir was published by his son, Henry Cary, in 1847.

CARYATIDES (Latinized from the Greek; the plural of Caryatis, i.e. a woman of Caryae in Laconia), in architecture, the term given to the draped female figures used for piers or supports, as found in the porticos of the Erechtheum and of the Treasury of Cnidus at Delphi (see Greek Art, fig. 17).

CARYL, JOSEPH (1602-1673), English Nonconformist divine, was born in London in 1602. He graduated at Exeter College, Oxford, and became preacher at Lincoln's Inn. He frequently preached before the Long Parliament, and was a member of the Westminster Assembly in 1643. By order of the parliament he attended Charles I. in Holmby House, and in 1650 he was sent with John Owen to accompany Cromwell to Scotland. In 1662 he was ejected from his church of St Magnus near London Bridge, but continued to minister to an Independent congregation in London till his death in March 1673, when John Owen succeeded him. His piety and learning are displayed in his ponderous commentary on Job (12 vols., 4to., 1651-1666; 2nd ed., 2 vols., fol. 1676-1677).

CARYOPHYLLACEAE, a botanical order of dicotyledonous plants, containing about 60 genera with 1300 species, and widely distributed, especially in temperate, alpine and arctic regions. The plants are herbs, sometimes becoming shrubby at the base, with opposite, simple, generally uncut leaves and swollen nodes. The main axis ends in a flower (definite inflor- escence), and flower-bearing branches are borne one on each side by which the branching is often continued (known technic- ally as a dichasial cyme). The flowers are regular, with four or five sepals which are free or joined to form a tube in their lower portion, the same

number of petals, free and springing from below

the ovary, twice as many stamens, inserted with the petals, and a pistil of two to five carpels joined to form an ovary con- taining a large number of ovules on a central placenta and bearing

Fig. I. ˆ-Stitch wort (Stellaria Holostea). 1, Flower cut vertically; 2, seed; 3, same cut vertically; 4, same cut horizontally.

two to five styles; the ovary is one-celled or incompletely partitioned at the base into three to five cells; honey is secreted at the base of the stamens. The fruit is a capsule containing a large number of small seeds and opening by apical teeth; the seed contains a floury endosperm and a curved embryo. The order is divided into two well-defined tribes which are

Fig. 2. — I, Flowering shoot of Pink (Dianthus) ; 2, horizontal plan of flower; 3, flower in vertical section.

distinguished by the character of the flower and the arrangements for ensuring pollination.

Tribe I. Alsineae: the sepals are free and the flowers are open, with spreading petals, and the honey which is secreted at the base of the stamens is exposed to the visits of short-tongued

insects colour.

Fig. 3.

o, Pistil of Cerastiutn hirsu- tum cut vertically; o, uni- locular or monothecal ovary; p, free central placenta; g, ovules; s, styles

such as flies and small bees; the petals are white in It includes several British genera, Cerastiutn (mouse- ear chickweed), Stellaria (fig. 1) (stitchwort and chickweed) , A r en aria (sandwort), S agin a (pearl wort), Spergula (spurrey) and Spergularia (sandwort spurrey).

Tribe II. Sileneae: the sepals are joined below to form a narrow tube, in which stand the long claws of the petals and the stamens, partly closing the tube and rendering the honey in-

accessible to all but long-tongued insects such as the larger bees and Lepidoptera. The flowers are often red. It includes several British genera: — Dianthus (pink) fig. 2, Silene (catchfiy, bladder b. The same cut horizontally, campion), Lychnis (campion, L. and the halves separated so as Flos-Cuculi is ragged robin), and to show the interior of the Githago or Agrostemma (corn cavity of the ovary with the cockle). Several, such as Lychnis free central placenta p, covered . .'. „., „ ,

with ovules g vesperhna, Mlene nutans and

others, are night-flowering, open- ing their flowers and becoming scented in the evening or at night, when they are visited by night-flying moths.

The plants of this order are of little or no economic value, soap-wort, Saponaria officinalis, forming a lather in water was formerly officinal. Dianthus (carnation and pink) Gypsophila, Lychnis and others, are garden plants.

CASABIANCA, RAPHAEL, Comte de (1738-1825), French general, was descended from a noble Corsican family. Ill 1769 he took the side of France against Genoa, then mistress of the island. In 1793, having entered the service of the revolutionary government, he was appointed lieutenant-general in Corsica in place of Pascale Paoli, who was outlawed for intrigues with England. For his defence of Calvi against the English he was appointed general of division, and he served in Italy from 1794 to 1798. After the 18th of Brumaire he entered the senate and was made count of the empire in 1806. In 1814 he joined the party of Louis XVIII., rejoined Napoleon during the Hundred Days, and in 18 19 succeeded again in entering the chamber of peers.

His nephew, Louis de Casabianca (176 2-1 798), entered the French navy, served in the convoy of the French troops sent to aid the revolted American colonies, and took part in various naval actions off the North American coast. He became captain in 1792, represented Corsica in the Convention, and then received command of the Orient, which at the battle of the Nile bore the flag of Admiral Brueys. When the latter was killed, Casa- bianca, though badly wounded, fought the burning ship to the end, and perished with most of the crew. His son, Giacomo Jocante, a boy of ten years of age, refused to leave the ship and died in trying to save his father. This heroic act was the sub- ject of several poems, including the well-known ballad by Mrs. Hemans.

CASABLANCA {Bar el Baida, ” the white house “), a seaport on the Atlantic coast of Morocco, in 33 27′ N., 7° 46′ W. It is a wool and grain port for central Morocco, chiefly for the provinces of Tadla and Shawia. Third in importance of the towns on the Moorish coast, unimpeded by bar or serious rocks, the roadstead is exposed to the north-west winds. There is anchorage for steamers in 5 to 6 fathoms. Vessels were loaded and discharged by lighters from the beach. In May 1907 the construction began of harbour works which afford sheltered accommodation for ships at all states of the tide. The value of the foreign trade of the port for the period 1897-1907 was about £750,000 a year. A railway to Ber Reshid, the first section of a line intended to tap the rich agricultural region of which Casa- blanca is the port, was opened in September 1908, being the first

railway built in Morocco. The population, about 20,000, includes numerous foreign merchants, Franciscan and Protestant missions, and a consular corps. Built by the Portuguese upon the site of the once prosperous town of Anfa, which they had destroyed in 1468, Casablanca was held by them for some time, till trouble with the natives compelled them to abandon it. In August 1907, in consequence of the murder of a number of French and Spanish workmen engaged on the harbour works, the town was bombarded and occupied by the French (see Morocco : History) .

CASALE MONFERRATO, a town and episcopal see of Pied- mont, Italy, in the province of Alessandria, 21 m. N.N.W. by rail from the town of Alessandria. Pop. (1901) 18,874 (town); 31,370 (commune). It lies in the plain on the right bank of the Po, 377 ft. above sea-level, and is a junction for Mortara, Vercelli. Chivasso and Asti; it is also connected by steam tramways with Alessandria, Vercelli and Montemagno. The fine Lombard Romanesque cathedral, originally founded in 742, was rebuilt in the early 12th century and consecrated in 1106; it suffered from restoration in 1706, but has been brought back to its original form. It contains some good pictures. The church of S. Domenico is a good Renaissance edifice, and there are some fine palaces. The church of S. Ilario is said to occupy the site of a pagan temple, but the name of the ancient town (if any) which occupied this site is not known. About 10 m. distant is the Sacro Monte di Crea, with eighteen chapels on its slopes con- taining terra-cotta groups of statues, resembling those at Varallo. Casale Monferrato was given by Charlemagne to the church of Vercelli, but obtained its liberty from Frederick I. (Barbarossa). It was sacked by the

troops of Vercelli, Alessandria and Milan in 12 1 5, but rebuilt and fortified in 1220. It fell under the power of its marquises in 1292, and became the chief town of a small state. In 1 536 it passed to the Gonzagas of Mantua, who fortified it very strongly. It has since been of considerable importance as a fortress: it successfully resisted the Austrians in 1849, and was strengthened in 1852. There is a large Portland cement factory here.

CASAMARI, a Cistercian abbey in the province of Rome, 6 m. E.S.E. of Veroli. It marks the site of Cereatae, the birth- place of Marius, afterwards known, as inscriptions attest, as Cereatae Marianae, having been separated perhaps by the triumvirs, from the territory of Arpinum. We find it under the early empire as an independent community. The abbey is a fine example of Burgundian early-Gothic (1203-1217), paralleled in Italy by Fossanuova alone (which is almost con- temporary with it), and is very well preserved.

See C. Enlart, " Origines frangaises de l'architecture gothique en Italie " {Bibliotheque des ecoles francdises d'Athenes et de Rome, fasc. 66), (Paris, 1894).

CASANOVA DE SEINGALT, GIOVANNI JACOPO (1725-1798), Italian adventurer, was born at Venice in 1725. His father belonged to an ancient and even noble family, but alienated his friends by embracing the dramatic profession early in life. He made a runaway marriage with Zanetta Farusi, the beautiful daughter of a Venetian shoemaker; and Giovanni was their eldest child. When he was but a year old, his parents, taking a journey to London, left him in charge of his grandmother, who, perceiving his precocious and lively intellect, had him educated far above her means. At sixteen he passed his ex- amination and entered the seminary of St Cyprian in Venice, from which he was expelled a short time afterwards for some scandalous and immoral conduct, which would have cost him his liberty, had not his mother managed somehow to procure him a situation in the household of the Cardinal Acquaviva. He made but a short stay, however, in that prelate's establishment, all restraint being irksome to his wayward disposition, and took to travelling. Then began that existence of adventure and intrigue which only ended with his death. He visited Rome, Naples, Corfu and Constantinople. By turns journalist, preacher, abb€, diplomatist, he was nothing very long, except homme a bonnes fortunes, which profession he cultivated till the end of his days. In 1755, having returned to Venice, he was denounced as a spy and

imprisoned. On the 1st of November 1756 he

succeeded in escaping, and made his way to Paris. Here he was made director of the state lotteries, gained much financial reputation and a considerable fortune, and frequented the society of the most notable French men and women of the day. In 1759 he set out again on his travels. He visited in turn the Netherlands, South Germany, Switzerland — where he made the acquaintance of Voltaire, — Savoy, southern France, Florence— whence he was expelled, — and Rome, where the pope gave him the order of the Golden Spur. In 1761 he returned to Paris, and for the next four or five years lived partly here, partly in England, South Germany and Italy. In 1764 he was in Berlin, where he refused the offer of a post made him by Frederick II. He then travelled by way of Riga and St Petersburg to Warsaw, where he was favourably received by King Stanislaus Poniatowski. A scandal, followed by a duel, forced him to flee, and he returned by a devious route to Paris, only to find a lettre de cachet awaiting him, which drove him to seek refuge in Spain. Expelled from Madrid in 1769, he went by way of Aix — where he met Cagliostro — to Italy once more. From 1774, with which year his memoirs close, he was a police spy in the service of the Venetian inquisitors of state; but in 1782, in consequence of a satirical libel on one of his patrician patrons, he had once more to go into exile. In 1785 he was appointed by Count Waldstein, an old Paris acquaintance, his librarian at the chateau of Dux in Bohemia. Here he lived until his death, which probably occurred on the 4th of June 1 798.

The main authority for Casanova's life is his Memoires (12 vols., Leipzig, 1826-1838; later ed. in 8 vols., Paris, 1885), which were written at Dux. They are clever, well written and, above all, cynical, and interesting as a trustworthy picture of the morals and manners of the times. Among Casanova's other works may be mentioned Confutazione della storia del governo Veneto dAmelot dela Houssaye (Amsterdam, 1769), an attempt to ingratiate himself with the Venetian government ; and the Histoire of his escape from prison (Leipzig, 1788; reprinted Bordeaux, 1884; Eng. trans, by P. Villars, 1892). Ottmann's Jacob Casanova (Stuttgart, 1900) contains a bibliography.

CASAS GRANDES (" Great Houses "), a small village of Mexico, in the state of Chihuahua, situated on the Casas Grandes or San Miguel river, about 35 m. S. of Llanos and 150 m. N.W. of the city of Chihuahua. The railway from Ciudad Juarez to Terrazas passes through the town. It is celebrated for the ruins of early aboriginal buildings still extant, about half a mile from its present site. They are built of " sun-dried blocks of mud and gravel, about 22 in. thick, and of irregular length, gener- ally about 3 ft., probably formed and dried in situ." The walls are in some places about 5 ft. thick, and they seem to have been plastered both inside and outside. The principal edifice extends 800 ft. from north to south, and 250 ft. east to west; its general outline is rectangular, and it appears to have consisted of three separate piles united by galleries or lines of lower buildings. The exact plan of the whole is obscure, but the apartments evidently varied in size from mere closets to extensive courts. The walls still stand at many of the angles with a height of from 40 to 50 ft., and indicate an original elevation of several storeys, perhaps six or seven. At a distance of about 450 ft. from the main building are the substructions of a smaller edifice, consisting of a series of rooms ranged round a square court, so that there are seven to each side besides a larger apartment at each corner. The age of these buildings is unknown, as they were already in ruins at the time of the Spanish Conquest. The whole district of Casas Grandes is further studded with artificial mounds, from which are excavated from time to time large numbers of stone axes, metates or corn-grinders, and earthern vessels of various kinds. These last have a white or reddish ground, with ornamentation in blue, red, brown or black, and are of much better manufacture than the modern pottery of the country. Similar ruins to those of Casas Grandes exist near the Gila, the Salinas, and the Colorado and it is probable that they are all the erections of one people. Bancroft is disposed to assign them to the Moquis.

See vol. iv. of H. H. Bancroft's The Native Races of the Pacific States of North America, of which the principal authorities are the Noticias del Estado de Chihuahua of Escudero, who visited the ruins in 1819; an article in the first volume of the Album Mexicano, the

author of which was at Casas Grandes in 1842; and the Personal Narrative of Explorations and Incidents in Texas, New Mexico, California, Sonora and Chihuahua (1854), by John Russell Bartlett, who explored the locality in 1851.

CASAUBON, FLORENCE ESTIENNE MERIC (1590-1671), English classical scholar, son of Isaac Casaubon, was born at Geneva on the 14th of August 1599. At an early age he joined his father in England, and completed his education at Eton and Oxford (B.A. 1618). His defence of his father against the attacks of certain Catholics (Pietas contra maledicos patrii Nominis el Religionis Hostes, 1621), secured him the notice and favour of James I., who conferred upon him a prebendal stall in Canterbury cathedral. He also vindicated his father's literary reputation against certain impostors who had published, under his name, a work on The Origin of Idolatry (Vindicatio Patris adversus Impostor es, 1624). During the Civil War he lived a retired life, and after its conclusion refused to acknowledge the authority of Cromwell, who, notwithstanding, requested him to write an " impartial " history of the events of the period. In spite of the tempting inducements held out, he declined, and also refused the post of inspector of the Swedish universities offered him by Queen Christina. After the Restoration, he wasreinstated in his benefice, and devoted the rest of his life to literary work. He died at Canterbury on the 14th of July 1671. Meric Casaubon's reputation was overshadowed by that of his father; but his editions of numerous classical authors, and especially of the Meditations of Marcus Aurelius (also English translation, new ed. by W. H. D. Rouse, 1900), were highly valued. Among his other works may be mentioned: De Quatuor Unguis Com- mentatio (1650), Of the Necessity of Reformation (1664), On Credulity and Incredulity in Things natural, civil and divine (1668).

CASAUBON, ISAAC (1559-1614), French (naturalized English) classical scholar, was born at Geneva, on the 18th of February 1 SS9, of French refugee parents. On the publication of the edict of January 1562, the family returned to France and settled at Crest in Dauphin6, where Arnaud Casaubon, Isaac's father, became minister of a Huguenot congregation. Till he was nine- teen, Isaac had no other instruction than what could be given him by his father during the years of civil war. Arnaud was away from home whole years together in the Calvinist camp, or the family were flying to the hills to hide from the fanatical bands of armed Catholics who patrolled the country. Thus it was in a cave in the mountains of Dauphine, after the massacre of St Bartholomew, that Isaac received his first lesson in Greek, the text-book being Isocrates ad Demonicum.

At nineteen Isaac was sent to the Academy of Geneva, where he read Greek under Francis Portus, a native of Crete. Portus died in

1581, having recommended Casaubon, then only twenty- two, as his successor. At Geneva he remained as- professor of Greek till 1596. Here he married twice, his second wife being Florence, daughter of the scholar-printer, Henri Estienne. Here, without the stimulus of example or encouragement, with few books and no assistance, in a city peopled with religious refugees, and struggling for life against the troops of the Catholic dukes of Savoy, Casaubon made himself a consummate Greek scholar and master of ancient learning. His great wants at Geneva were books and the sympathy of learned associates. He spent all he could save out of his small salary in buying books, and in having copies made of such classics as were not then in print. Henri Estienne, Theodore de Beza (rector of the university and professor of theology), and Jacques Lect (Lectius), were indeed men of superior learning. But Henri, in those last years of his life, was no longer the Estienne of the Thesaurus; he was never at home, and would not suffer his son- in-law to enter his library. "He guards his books," writes Casaubon, "as the griffins in India do their gold!" Beza was engrossed by the cares of administration, and retained, at most, an interest for theological reading, while Lect, a lawyer and diplomatist, had left classics for the active business of the council. The sympathy and help which Casaubon's native city could not afford him, he endeavoured to supply by cultivating the acquaintance of the learned of other countries. Geneva, as the

metropolis of Calvinism, received a constant succession of visitors. The continental tour of the young Englishman of biith was not complete without a visit to Geneva. It was there that Casaubon made the acquaintance of young Henry Wotton, the poet and diplomatist, who lodged in his house and borrowed his money. Of more consequence to Isaac Casaubon was the acquaintance of Richard Thomson (" Dutch " Thomson), fellow of Clare College, Cambridge; for it was through Thomson that the attention of Joseph Scaliger, settled in 1593 at Leiden, was directed to Casaubon. Scaliger and Casaubon first ex- changed letters in 1594. Their intercourse, which was wholly by letter, for they never met, passes through the stages of civility, admiration, esteem, regard and culminates in a tone of the tenderest affection and mutual confidence. Influential French men of letters, the Protestant Jacques Bongars, the Catholic Jacques de Thou, and

the Catholic convert Philippe Canaye, sieur du Fresne, aided him by presents of books and encouragement, and endeavoured to get him invited, in some capacity, to France.

This was effected in 1596, in which year Casaubon accepted an invitation to the university of Montpellier, with the title of conseiller du roi and professeur stipendie aux langues et bonnes lettres. In Montpellier he never took root. He held the professorship there only three years, with several prolonged absences. The hopes raised by his brilliant reception were disappointed; he was badly treated by the authorities, by whom his salary was only paid very irregularly, and, finally, not at all. He was not, at any time, insensible to the attractions of teaching, and his lectures at Montpellier were followed not only by the students, but by men of mature age and position. But the love of know- ledge was gradually growing upon him, and he began to perceive that editing Greek books was an employment more congenial to his peculiar powers than teaching. At Geneva he had first tried his hand on some notes on Diogenes Laertius, on Theo- critus and the New Testament, the last undertaken at his father's request. His debut as an editor had been a complete Strabo (1587), of which he was so ashamed afterwards that he apologized for its crudity to Scaliger, calling it " a miscarriage." This was followed by the text of Polyaenus, an editio princeps, 1589; a text of Aristotle, 1590; and a few notes contributed to Estienne's editions of Dionysius oi Halicarnassus and Pliny's Epistolae. It is not till we come to his edition of Theophrastus's Characteres (1592), that we have a specimen of that peculiar style of illustrative commentary, at once apposite and profuse, which distinguishes Casaubon among annotators. At the time of his removal to Montpellier he was engaged upon what is the capital work of his life, his edition of, and commentary on, Athenaeus.

In 1598 we find Casaubon at Lyons, superintending the passage of his Athenaeus through the press, for which he had been unable to find facilities at Montpellier. Here he lived in the house of Meric de Vicq, surintendant de la justice, a Catholic, but a man of acquirements, whose connexions were with the circle of liberal Catholics in Paris. In the suite of De Vicq Casaubon made a flying visit to Paris, and was presented to Henry IV. The king was very gracious, and said something about employing Casaubon's services in the " restoration " of the fallen university of Paris. Full of hope he returned to Montpellier. In January 1599, he received a summons to repair to Paris. But the terms of the letter missive were so vague that, though it bore the sign manual,

Casaubon hesitated to act upon it. However, he resigned his chair at Montpellier, but instead of hastening to Paris, he lingered more than a year at Lyons, in De Vicq's house, where he hoped to meet the king, who was expected to visit the south. Nothing more was heard about the professorship, but instead he was summoned by De Vicq, who was then in Paris, to come to him in all haste on an affair of importance. The business proved to be the Fontaine- bleau Conference. Casaubon allowed himself to be persuaded to sit as one of the referees who were to adjudicate on the challenge sent to Du Plessis Mornay by Cardinal Duperron. By so doing he placed himself in a false position, as Scaliger said: " Non debebat Casaubon interesse colloquio Plessiaeano; erat asinus inter simias, doctus inter imperitos " {Scaliger ana 2 a).

The issue was so contrived that the Protestant party could not but be pronounced to be in the wrong. By concurring in the decision, which was unfavourable to Du Plessis Mornay, Casaubon lent the prestige of his name to a court whose verdict would without him have been worthless, and confirmed the suspicions already current among the Reformed churches that, like his friend and patron, Canaye du Fresne, he was meditating abjura- tion. From this time forward he became the object of the hopes and fears of the two religious parties; the Catholics lavishing promises, and plying him with arguments; the Reformed ministers insinuating that he was preparing to forsake a losing cause, and only higgling about his price. We now know enough of Casaubon's mental history to know how erroneous were these computations of his motives. But, at the time, it was not possible for the immediate parties to the bitter controversy to understand the intermediate position between Genevan Calvin- ism and Ultramontanism to which Casaubon's reading of the fathers had conducted him.

Meantime the efforts of De Thou and the liberal Catholics to retain him in Paris were successful. The king repeated his invitation to Casaubon to settle in the capital, and assigned him a pension. No more was said about the university. The recent reform of the university of Paris had closed its doors to all but Catholics; and though the chairs of the College de France were not governed by the statutes of the imiversity, public opinion ran so violently against heresy, that Henry IV. dared not appoint a Calvinist to a chair, even if he had desired to do so. But it was designed that Casaubon should succeed to the post of sub-librarian of the royal library when it should become vacant, and a patent of the reversion was made out in his favour. In

November 1604, Jean Gosselin died in extreme old age; and Casaubon succeeded him as sub-librarian, with a salary of 400 livres in addition to his pension.

In Paris Casaubon remained till 16 10. These ten years were the brightest period of his life. He had attained the reputation of being, after Scaliger, the most learned man of the age, — an age in which learning formed the sole standard of literary merit. He was placed above penury, though not in easy circumstances. He had such facilities for religious worship as a Huguenot could have, though he had to go out of the city to Hablon, and afterwards to Charenton, for them. He enjoyed the society of men of learning, or of men who took an interest in learned publications. He had the best opportunities of seeing men of letters from foreign countries as they passed through Paris. Above all, he had ample facilities for using Greek books, both printed and in MS., the want of which he had felt painfully at Geneva and Montpellier, and which no other place but Paris could at that period have supplied.

, In spite of all these advantages we find Casaubon restless, and ever framing schemes for leaving Paris, and settling elsewhere. It was known that he was open to offers, and offers came to him from various quarters, — from Nimes, from Heidelberg, from Sedan. His friends Lect and Giovanni Diodati wished, rather than hoped, to get him back to Geneva. The causes of Casaubon's discomfort in Paris were various, but the principal source of uneasiness lay in his religion. The life of any Huguenot in Paris was hardly secure at that time, for it was doubtful if the police of the city was strong enough to protect them against any sudden uprising of the fanatical mob, always ready to re-enact the St Bartholomew. But Casaubon was exposed to persecution of another sort. Ever since the Fontainebleau Conference an impression prevailed that he was wavering. It was known that he rejected the outre anti-popery opinions current in the Reformed churches; that he read the fathers, and wished for a church after the pattern of the primitive ages. He was given to understand that he could have a professorship only by re- cantation. When it was found that he could not be bought, he was plied by controversy. Henry IV., who liked Casaubon personally, made a point of getting him to follow his own ex- ample. By the king's orders Duperron was untiring in his efforts to convert him. Casaubon's knowledge of the fathers was that of a scholar, Duperron's that of an adroit polemist; and the

scholar was driven to admit that the polemist was often too hard for him. These encounters mostly took place in the king's library, over which the cardinal, in his capacity of aumonier, exercised some kind of authority; and it was therefore impossible for Casaubon to avoid them. On the other hand, the Huguenot theologians, and especially Pierre du Moulin, chief pastor of the church of Paris, accused him of conceding too much, and of having departed already from the lines of strict Calvinistic orthodoxy.

When the assassination of Henry IV. gave full rein to the Ultramontane party at court, the obsessions of Duperron became more importunate, and even menacing. It was now that Casaubon began to listen to overtures which had been faintly made before, from the bishops and the .court of England. In October 1610 he came to England in the suite of the ambassador, Lord Wottonof Marley (brotherof Casaubon'searlyfriend), an official invitation having been sent him by Richard Bancroft, archbishop of Canterbury. He had the most flattering reception from James I., who was perpetually sending for him to discuss theological matters. The English bishops were equally delighted to find that the great French scholar was an Anglican ready made, who had arrived, by independent study of the Fathers, at the very via media between Puritanism and Romanism, which was becoming the fashion in the English Church. Casaubon, though a layman, was collated to a prebendal stall in Canterbury, and a pension of £300 a year was assigned him from the exchequer. Nor were these merely paper figures. When Sir Julius Caesar made a difficulty about payment, James sent a note in his own hand: " Chanceler of my excheker, I will have Mr Casaubon paid before me, my wife, and my barnes." He still retained his appointments in France, and his office as librarian. He had obtained leave of absence for a visit to England, where his permanent settlement was not contemplated. In order to retain their hold upon him, the government of the queen regent refused to allow his library to be sent over. It required a special request from James himself to get leave for Madame Casaubon to bring him a part of his most necessary books. Casaubon continued to speak of himself as the servant of the regent, and to declare his readiness to return when summoned to do so.

Meanwhile his situation in London gradually developed unforeseen sources of discomfort. Not that he had any reason to complain of his patrons, the king and the bishops. James continued to the last to delight in his company, and to be as liberal as the state of his finances allowed. John Overall had received him and his whole family into the deanery of St Paul's, and entertained him there for a year. Overall and Lancelot Andrewes, then bishop of Ely, were the most learned men of a generation in which extensive reading was more general among the higher clergy than it has ever been since. These two were attracted to Casaubon by congenial studies and opinions. With the witty and learned bishop of Ely in particular Casaubon was always happy to spend such hours as he had to spare from the labours of the study. Andrewes took him to Cambridge, where he met with a most gratifying reception from the notabilities of the university. They went on together to Downham, where Casaubon spent six weeks of the summer of 161 1, in which year he became naturalized. In 1613 he was taken to Oxford by Sir Henry Savile, where, amid the homage and feasting of which he was the object, his principal interest was for the MSS. treasures of the Bodleian. The honorary degree which was offered him he declined.

But these distinctions were far from compensating the serious inconveniences of his position. Having been taken up by the king and the bishops, he had to share in their rising unpopularity. The courtiers looked with a jealous eye on a pensioner who enjoyed frequent opportunities of taking James I. on his weak side — his love of book talk — opportunities which they would have known how to use. Casaubon was especially mortified by Sir Henry Wotton's persistent avoidance of him, so inconsistent with their former intimacy. His windows were broken by the roughs at night, his children pelted in the streets by day. On one occasion he himself appeared at Theobalds with a black eye,

having received a blow from some ruffian's fist in the street. The historian Hallam thinks that he had "become personally unpopular "; but these outrages from the vulgar seem to have arisen solely from the cockney's antipathy to the Frenchman. Casaubon, though he could make shift to read an English book, could not speak English, any more than Mme Casaubon. This deficiency not only exposed him to insult and fraud, but restricted his social intercourse. It excluded him altogether from the circle of the " wits "; either this or some other cause prevented him from being acceptable in the circle of the lay learned — the " antiquaries." William Camden, the antiquary and

historian, he saw but once or twice. Casaubon had been imprudent enough to correct Camden's Greek, and it is possible that the ex-head- master of Westminster kept himself aloof in silent resentment of Casaubon's superior learning. With Robert Cotton and Henry Spelman he 'was slightly acquainted. Of John Selden we find no mention. Though Sir Henry Savile ostensibly patronized him, yet Casaubon could not help suspecting that it was Savile who secretly prompted an attempt by Richard Montagu to forestall Casaubon's book on Baronius. Besides the jealousy of the natives, Casaubon had now to suffer the open attacks of the Jesuit pamphleteers. They had spared him as long as there were hopes of getting him over. The prohibition was taken off, now that he was committed to Anglicanism. Not only Joannes Eudaemon, Heribert Rosweyd and Scioppius (Gaspar Schoppe), 1 but a respectable writer, friendly to Casaubon, Andreas Schott of Antwerp, gave currency to the insinuation that Casaubon had sold his conscience for English gold.

But the most serious cause of discomfort in his English residence was that his time was no longer his own. He was perpetually being summoned out of town to one or other of James's hunting residences that the king might enjoy his talk. He had come over from Paris in search of leisure, and found that a new claim on his time was established. The king and the bishops wanted to employ his pen in their literary warfare against Rome. They compelled him to write first one, then a second, pamphlet on the subject of the day, — the royal supremacy. At last, ashamed of thus misappropriating Casaubon's stores of learning, they set him upon a refutation of the Annals of Baronius, then in the full tide of its credit and success. Upon this task Casaubon spent his remaining strength and life. He died in great suffering on the 1st of July 1614. His complaint was an organic and congenital malformation of the bladder; but his end was hastened by an unhealthy life of over-study, and latterly by his anxiety to acquit himself creditably in his criticism on Baronius. He was buried in Westminster Abbey. The monument by which his name is there commemorated was erected in 1632 by his friend Thomas Morton when bishop of Durham.

Besides the editions of ancient authors which have been mentioned, Casaubon published with commentaries Persius, Suetonius, the Scriptores Historiae Augustae. The edition of Polybius, on which he had spent vast labour, he left unfinished. His most ambitious work was his revision of the text of the Deipnosophistae of Athenaeus, with commentary. The Theo-

phrastus perhaps exhibits his most characteristic excellences as a commentator. The Exercitationes in Baronium are but a fragment of the massive criticism which he contemplated; it failed in bringing before the reader the uncritical character of Baronius's history, and had only a moderate success, even among the Protestants. His correspondence (in Latin) was finally collected by Van Almeloveen (Rotterdam, 1709), who prefixed to the letters a careful life of Isaac Casaubon. But this learned Dutch editor was acquainted with Casaubon's diary only in extract. This diary, Ephemerides, of which the MS. is preserved in the chapter library of Canterbury, was printed in 1850 by the Clarendon Press. It forms the most valuable record we possess of the daily life of a scholar, or man of letters, of the 16th century. (M. P.)

A few minor changes have been made in the above article, compared with its form in the 9th edition. The most complete account

1 Eudaemon was a Cretan, Rosweyd a Dutch, Jesuit; Schoppe, a German philologist and critic.

of Casaubon is the full biography by Mark Pattison (1875), of which a second and revised edition, by H. Nettleship, was published in 1892; the most recent work on the subject is Isaac Casaubon, sa vie et son temps, by L. J. Nazelle (1897); there is a monograph on the Fontainebleau conference by J. A. Lalot (1889). Casaubon is the subject of one of St Beuve's Causeries, the 30th of July i860 (a notice of the Oxford edition of the Ephemerides). See also the article in E. Haag's La France Protestante (1882), and J. E. Sandys, Hist, of Class. Schol. vol. ii. (ed. 1908), pp. 204 foil.

CASCADE MOUNTAINS, a continuation northward of the Sierra Nevada, some 500 m. across the states of Oregon and Washington, U.S.A., into British Columbia. In American territory the range lies from 100 to 150 m. from the coast.' The Cascades are separated on the S. from the Sierras by deep valleys near Mt. Shasta in California, while on the N, somewhat below the international boundary of 49 N., they approach the northern Rockies, mingling with these in inextricable confusion, although their name is given also to the much-broken, river- dissected,

central mountain plateau that crosses British Columbia from S.E. to N.W. Geologically the Sierras and Cascades are very different, though their exact relations are not yet clearly determined; topographically they are also different. The Cascades are in general a comparatively low, broad mass sur- mounted by a number of imposing peaks in Oregon and Washington. Especially north of the Columbia river, the range widens out into a plateau. There are no notable elevations in British Columbia. Evidences of volcanic activity in com- paratively recent geologic time are abundant throughout the length of the range, and all the highest summits are volcanic cones, covered with snow fields and, in a number of instances, with glaciers. The grandest peaks are Shasta (14,380 ft.) at the southern end, and Rainier (or Tacoma, 14,363 ft.) in Washington, two of the most magnificent mountains of America. Other notable summits are Mt. Pitt (9760), Mt. Scott (9122), Diamond Peak (8807), Mt. Thielsen (9250), Mt. Jefferson (10,200) and Mt. Hood (11,225), in Oregon; and Stuart (9470), St Helens (10,000), Baker (10,827) and Adams (12,470), in Washington. The Fraser river in the far north, the Columbia at the middle, and the Klamath in the south cut athwart the range to the Pacific, and many minor streams descend the range to swell their waters, while some drain directly from the flanks of the mountains into Puget Sound and Gray's Harbor. The Columbia has cut almost to the sea-level through the great mountain mass, the Dalles being only about 100 ft. above the sea. It is to the Cascades of the tremendous rapids at this point that the mountains owe their name. The slopes of the Cascades, particularly on the west, which has a very much moister climate than the eastern slope, are clothed with magnificent forests, chiefly of coniferous evergreens: firs, pine, tamarack and cedar. The Douglas fir, the " Oregon pine " of commerce, often attaining a height of 250 ft., is one of the most beautiful trees in the world. There are also a variety of deciduous trees, but in the aggregate they are unimportant. In 1910 the mountain forests were largely included in ten national forest reserves, with a total area of nearly 16,000,000 acres, extending from the northern boundary of Washington to the southern boundary of Oregon. The magnificent forest cloak, splendid peaks, great open mountain plateau pastures, and exquisite lakes embosomed in mountain fastnesses and forest gloom,, give variety to the scenery, which is often grand, and throughout the range inde- scribably beautiful, though perhaps not equal to the Sierra Nevada in splended light and colour. Large game — deer, bears, mountain sheep and goats, wolves and panthers — still abound. Two great railway

systems, the Great Northern and the Northern Pacific, cross the Cascades through noteworthy tunnels; that on the former line is 2J m. long, that on the latter a little less than 2 m.

See Oregon and Washington; also G. O. Smith and F. C. Calkins, A Geological Reconnaissance across the Cascade Range near the Forty-Ninth Parallel (Washington, D.C., 1904), being U.S. Geological Survey Bulletin 253.

CASE, JOHN (d. 1600), English Aristotelian scholar and physician, was born at Woodstock. He was educated at Oxford,

and elected to a fellowship at St John's College, which he was obliged to resign in consequence of his Roman Catholic sympathies. He subsequently opened a philosophical school in Oxford, which was largely attended. He enjoyed a great reputation as a logician and dialectician, and was in addition an authority on music and a distinguished physician. He is described as " a man of an innocent, meek, religious and studious life," an agreeable conversationalist, an enthusiastic teacher, and a great favourite with his pupils. Most of his works were commentaries on various treatises of Aristotle (Organon, Ethics, Politics, Oeconomics, Physics) under curious titles; they enjoyed a large circulation during his time, and were frequently reprinted. He was also the author of The Praise of Musicke (1586), dedicated to Sir Walter Raleigh.

CASE. (1) (From Lat. casus, that which falls or happens; coder e, to fall), a word used in various senses traceable to the derivation. In grammar, the " cases " are the various forms in the declension of a noun, adjective or pronoun, the Latin word being a translation of the Greek XTtocns, falling, applied by Aristotle to the variations from the simple form of the word, whether noun, verb or adjective (of which the adverb would be a 7TT&J(ris). Later grammarians confined the term to nouns, and included the nominative. In law, " case " is the common term for a cause or suit brought before a court of justice. Certain particular legal usages may also be noted. Action on the case means an action for the recovery of damages for an injury to the person or property, where the act done was not immediately injurious (see Contract; Tort). A case stated is a statement of facts drawn up by one court for the opinion of another on a point of law. A special case is a statement of facts agreed to on behalf of two or more litigant parties, and submitted for the opinion of a court of justice as to the law bearing upon the facts so stated. A leading case is a

decision which settles some point of importance. In the legal systems of the United Kingdom and of the United States decided cases are considered authoritative for courts of at least equal jurisdiction with those in which the judgments were given, but on the continent of Europe the rule is, following that of the Roman law, that they are instructive but not authoritative.

(2) (O. Fr. casse, mod. chdsse, Lat. capsa, from capere, to hold; cf. ” cash “), a box, sheath or covering. The term is applied to the natural protective covering of seed-vessels, and of a pupa or chrysalis. It is also used of a box containing instruments, pistols, swords, &c, and sometimes of the contents. In building, a ” case ” is the facing where the backing may be of inferior material; the framework in which a window or door is hung; or the wall surrounding a stair, ” staircase ” properly signifying the whole structure of walls and stairs. In bookbinding, a ” case ” means the boards and back in which the books are bound; and in typography, the tray, divided into partitions, containing the type ready for the compositor’s use.

CASEMATE (Ital. casa, a house, and matta, dull or dim), an armoured vault or chamber, or in field fortification, a bomb-proof shelter; in architecture, a hollow moulding, chiefly employed in cornices.

CASEMENT (from a Lat. form casamentum), in architec- ture, a frame in wood or metal, which holds the glass of a window, and is hung by hinges either at the top, bottom or sides.

CASERTA, a town and episcopal see of Campania, Italy, the capital of the province of Caserta, situated 21 m. N. by E. of Naples by rail via Accerra, and 23 m. via Aversa. Pop. (1901) town, 19,180; commune, 33,373. The modern town (229 ft.) was a mere village belonging to the Caetani family of Sermoneta, who were counts of Caserta, until its purchase from them by Charles IV. of Naples, and the erection of the royal palace, begun by Luigi Vanvitelli (van Wittel) in 1752, but not completed until 1774 for Charles’s son Ferdinand IV. It forms a rectangle, the south front being 830 ft. long and 134 ft. high, with 37 windows in each storey. The interior is richly decorated with marbles, almost all of which, except the white Carrara marble, are Neapolitan or Sicilian. The staircase, the chapel

and the theatre are especially sumptuous. The extensive gardens which occupy the hillside behind the palace are adorned with fountains and cascades; the botanical garden contains many trees from northern climates. Two miles north is S. Leucio, a village founded by Ferdinand IV. in 1789, with a royal casino, and large silk factories which are still active. The old town (Caserta Vecchia) lies high (13 10 ft.) about 3 m. to the north-east. It was founded in the 9th century by the Lombards of Capua. The cathedral has not suffered fromrestoration. It was completed in 1153. It is a copy of that of Sessa Aurunca, and preserves the type of the Latin basilica. The campanile, Sicilian in style, was completed in 1234, while the dome, which betrays similar motives, is even later. Its pulpit is decorated with the richest polychrome mosaic that can be found anywhere in Sicily or south Italy, and is quite Moslem in its brilliance. It is indeed remarkable to find these motives in a church so far inland (Bertaux, L'Art dans Vltalie mtridionale, Paris, 1904, i. 353, &c). There are also the ruins of the old walls.

CASE-SHOT, a projectile used in ordnance for fighting at close quarters. It consists of a thin metal case containing a large number of bullets or other small projectiles (see Ammunition). Case-shot was formerly called " canister," though the term now used occurs as early as 1625.

CASH. (1) (From O. Fr. casse, mod. caisse, a box or chest; cf. " case "), a term which, originally meaning a box in which money is kept, is now commonly applied to ready money or coin. In commercial and banking usage " cash " is sometimes confined to specie; it is also, in opposition to bills, drafts or securities, applied to bank-notes. Hence " to cash " means to convert cheques and other negotiable instruments into coin. In book-keeping, in such expressions as " petty cash," " cash-book," and the like, it has the same significance, and so also in " cash-payment " or ready-money payment as opposed to " credit," however the payment may be made, by coin, notes or cheque.

The " cash on delivery " or " collect on delivery " system, known as C.O.D., is one whereby a tradesman can, through a delivery agency, send goods to a customer, and have the money due to him collected on the delivery of the same, with a guarantee from the carrier that, if no money be collected, the goods shall be returned. The function of such an agency is performed in the

United States of America by the express companies (see Express). In most countries of the continent of Europe the post office acts as such an agent, as in Germany (where the system is known as Post-Nachnahme) and in France (contre remboursement) . It is also in use in India, where it is known as ” value payable,” and was introduced in 1877 in Australia. The advantages of the system are obvious, from the point of view bo’th of the customer, who can, by post or telegram, order and obtain speedy delivery from large towns, and of the tradesman, whose area of trade is indefinitely extended. The system does away with credit or the delay and inconvenience of paying in advance. The success of the large ” catalogue ” houses in America has been mainly due to the system as operated by the express companies. At various times, notably in 1904, it has been proposed that the General Post Office of the United Kingdom should adopt the system. The consistent opposition of the retail traders in large urban centres other than the large stores, and of the country shopkeeper generally, has been sufficient to secure the refusal of the postmaster-general to the proposed scheme, but a commencement was made in 1908 for orders not exceeding £20 between the United Kingdom and Egypt, Cyprus and Malta, and certain British post offices in Turkey and Tangier.

(2) (From Tamil kasil, Sinhalese kasi, a small coin, adopted by Portuguese as caixa, a box, and similarly assimilated in English to ” cash ” above), a name given by English residents in the East to native coins of small value, and particularly to the copper coinage of China, the native name for which is isien. This, the only coin minted by the government, should bear a fixed ratio of 1000 cash to one tael of silver, but in practice there is no such fixed value. It is the universal medium of

exchange throughout China for all retail transactions. The tsien is a round disk of copper alloy, with a square hole punched through the centre for stringing. A ” string of cash ” amounts to 500 or 1000 cash, strung in divisions of 50 or 100.

CASHEL, a city of Co. Tipperary, Ireland, in the east parliamentary division, 5 m. S.E. of Goold’s Cross and Cashel station on the main line of the Great Southern & Western railway, 96 m. S.W. from Dublin. Pop. of urban district (1901) 2938. The town, which lies at the base of the Rock of Cashel, is of somewhat poor appearance, but contains several public buildings. There are also the cathedral church of St John the Baptist (c. 1780), the deanery house (once the bishop’s palace), and a Roman Catholic church.

Cashel gives name to a Roman Catholic archdiocese.

The Rock of Cashel is the object of chief interest in the place. This elevation of limestone formation rises abruptly from the plain to a height of about 300 ft. and is a commanding object for many miles around. Its summit is occupied by one of the most interesting assemblages of ruins in Ireland, consisting of the remains of St Patrick's cathedral, a round tower, Cormac's chapel, and an ancient cross. The chapel, which is said to have been erected by King Cormac M'Carthy in the 12th century, combines the ancient form of high stone roof, having chambers between the pitch and the vault-, with the richest Norman decoration; the chancel arch being of especial magnificence. The cathedral, of the 13th century, is cruciform in design, with lancet windows and pointed arches, and contains many interesting sculptures and tombs. In the adjoining cemetery there stands, on a rude pedestal, whereon the kings of Munster were crowned, the " Cross of Cashel," with an effigy of St Patrick and a portrayal of the Crucifixion sculptured on its sides. The round tower, situated at the north-east angle of the cathedral, is 80 ft. high with a circumference of 50 ft., and unlike the neighbouring ruins is built, not of the limestone of the " Rock," but of freestone. Of the defences of the Rock a massive guard- tower and portions of the wall remain. At the base of the Rock is Hore Abbey, a Cistercian foundation (1272), exhibiting a similar style of architecture to that of the cathedral on the Rock; and within the town is a Dominican priory (1243), of which the east window is a beautiful example of the style of the period. From the Rock itself an extensive prospect is commanded over the rich Golden Vale backed by the Galtee Mountains, the Devil's Bit, and other ranges; the clustering roofs of the city providing a picturesque foreground.

The history of Cashel belongs to the early period of Irish chronology. Legend states that the vision of an angel blessing the Rock, seen by two swineherds early in the 5th century, led Core Mac Luighdheach, king of Munster, to establish a strong- hold here. It became one of the principal seats of the kings of Munster, but in 1101 it was given over to the church by King Murkertagh O'Brien. It afterwards became noteworthy as the place where Henry II. received the homage of O'Brien, king of Limerick, and still later, where Edward Bruce held his Irish parliament. The cathedral was burnt in 1495 by the earl of Kildare. Cashel was taken by storm during the wars of 1647. It was reduced from an archbishopric to a bishopric in 1839, and was disfranchised, on

account of corrupt practice, in 1870, having previously returned one member to parliament.

CASHEW NUT, the fruit of the cashew, cadju or acajou tree, Anacardium occidentale (nat. ord. Anacardiaceae) , a native of the West Indian Islands. The fruit is kidney-shaped, about an inch in length, and the kernel is enclosed in two coverings, the outer of which is smooth, grey and leathery. Inside this external rind is a dark-coloured layer, containing an excessively acrid juice. The kernels have a bland, oily, pleasant taste. They are much eaten, both raw and roasted, in the tropical regions in which the tree is cultivated, and they yield a light- coloured, sweet-tasted oil, said to be equal to olive oil for culinary purposes. The fruit-stalk, immediately under the fruit, is swollen and fleshy, and assumes a pear-like shape. This swollen portion of the stalk has a pleasant acid taste, and is eaten under

Anacardium occidentale, Cashew Nut plant, belonging to the nat. ord. Anacardiaceae.

Branch (reduced), bearing flowers and fruit. The fruit- stalks are enlarged in a pear- like form, bearing the nut (the true fruit) at their apex.

Flower expanded.

Stamen and pistil, with the ‘ calyx; one fertile stamen longer than the others.

4. Stamen separated.

5. Nut constituting the fruit.

6. Nut opened longitudinally.

7. Seed separated from the

nut.

8. Cotyledons opened to show the

radicle a, and the plumule.

the name of cashew apple. By fermentation it yields an alcoholic beverage, from which a spirit for drinking is distilled in the West Indies and Brazil. The stem of the tree yields a gum analogous to gum arabic.

CASHIBO, or Carapache (" bat "), a tribe of South American Indians of Pannoan stock, living in scanty numbers on the west side of the Ucayali, Peru. They are a wild, savage people who have always been foremost in attacks on the Jesuits. They joined Juan Santos in 1744 in the destruction of missions.

CASHIER. (1) (Adapted from the Fr. caissier, one in charge of the caisse, or money-box), one who has charge of the payment or receiving of money in a business house. The " cashier " may be a high executive official of a .banking or mercantile house — thus the name of chief cashier of the Bank of England appears on all notes issued during his occupation of the post — or he may be merely a clerk, who receives payment for goods sold, and has the right to give receipts for the same.

(2) (In origin ultimately the same as " quash," to annul, from Lat. quassare, to dash or break to pieces, a frequenta- tive of qualere, to shake, but also connected in form and meaning with cassare, to make, cassus, empty or void), a military term, meaning originally to disband, and probably adopted from the Dutch in the 16th century. The word in various forms is used in the same sense in most European languages. It is now used in English for the dismissal of a commissioned officer from the army and navy for particularly serious offences, in the words

of the Army Act, 1881, s. 16, for " behaving in a scandalous manner unbecoming an officer and a gentleman." " Cashiering " involves not merely the loss of the commission, but also a per- manent disqualification from serving the state in any capacity.

CASH REGISTER, a species of calculating machine adapted for use in connexion with the cash-tills of shops, in order to provide a record of the money received. Such machines are made in great variety and widely used. Sometimes the records are constituted by holes punched in a roll of paper; in other cases they are shown on dials by the aid of adding mechanism. A common form has a number of keys, each representing a particular sum and each attached to a counting mechanism which records how many times it has been used. By pressing appropriate combinations of these keys the amount of any purchase can be registered, and the

combined records of all thecountingmechanism give the total that has been passed through the machine in any selected period. Each key when pressed also raises an indicator which informs the customer how much he has to pay. In their more elaborate forms these cash registers may have a separate money-drawer for each assistant employed in the shop, thus enabling the proprietor to ascertain how many customers each man has served and how much money he has taken, and also to fix responsibility for mistakes, bad money, &c. The machines are also made to deliver a printed receipt for each purchase, showing the amount, date and assistant concerned, and they may be arranged to keep separate records of credit sales, money received on account, and money paid out.

CASILINUM (mod. Capua), an ancient city of Campania, Italy, 3 m. N.W. of the ancient Capua. Its position at the point of junction of the Via Appia and Via Latina, and at their crossing of the river Volturnus by a three-arched bridge, which still exists, gave it considerable importance under the Roman republic; and while the original pre-Roman town, which was doubtless dependent on the neighbouring Capua, stood entirely on the left (S.) bank, surrounded on three sides by the river, the Roman city extended to the right bank also; remains of it have been found at some 25 ft. below the modern ground-level, the river-bed having risen considerably. In the Second Punic War it was occupied by Fabius Cunctator in 217 B.C., taken by Hanni- bal a.fter a gallant defence by troops from Praeneste and Perusia in the winter of 216-215, DU t recaptured in the following year, serving the Romans as their base of operations against Capua. It lost its independence and became a praefectura. Caesar conducted a colony thither in 59 B.C., which was renewed by Antony in 44 B.C. The veterans took Octavian's side after Caesar's death, but it seems to have been united with Capua before the time of Vespasian, and it does not occur in the list of independent communities given by Pliny, who indeed (Hist. Nat. iii. 70) speaks of the morientis Casilini reliquiae, and only its position at the junction of the roads redeemed it from utter insignificance. (T. As.)

CASIMIR III., called "The Great," king of Poland (1310- 1370), the son of Wladislaus Lokietek, king of Poland, and Jadwiga, princess of Kalisch, was born at Kowal in Kujavia in 13 10. Casimir belongs to that remarkable group of late medieval sovereigns who may be called the fathers of modern diplomacy, inasmuch as they relegated warfare to its proper place as the

instrument of politics, and preferred the council- chamber to the battle-field. He was educated at the court of Charles Robert of Hungary, who had married Casimir's beautiful sister Elizabeth, and who gave his brother-in-law an excellent education under Italian masters. In his youth Casimir was considered frivolous and licentious; while his sudden flight from the field of Plowce, the scene of his father's great victory over the Teutonic knights, argued but poorly for his personal courage. When, therefore, he ascended the Polish throne in 1333, the future of his country, which then consisted of little more than the lately reunited provinces of Great and Little Poland, seemed dark indeed ; especially as she was still at war with the Teutonic Order and with John of Luxemburg, king of Bohemia, who claimed the crown of Poland also. Fortunately Casimir was a man of penetrating genius. His father had been a hero who

trusted entirely to his sword, yet the heroic struggle of a lifetime had barely sufficed to keep at bay the numerous and potent foes with which Poland was environed. Casimir recognized from the first that further fighting against tremendous odds was unprofitable. A careful, calculating dynastic policy, which aimed at the establishment of an equilibrium by means of prudent compromises and defensive alliances, was, he rightly judged, the best guarantee for the future safety and glory of Poland. Casimir began by tying the hands of the Teutonic Order by the truce of Thorn; he induced the king of Bohemia to relinquish his claims to the Polish throne by consenting to leave him a free hand in Silesia (conference of Trencsen, early in 1335); and subsequently he attended the celebrated congress of Visegrad (November 12-December 3, ˆ35), where Charles Robert entertained him and the king of Bohemia magnificently. At this congress the differences between Casimir and John of Bohemia were finally adjusted; peace was made between the king of Poland and the Teutonic Order on the basis of the cession of Pomerania, Kulm, and Michalow to the knights, who retroceded Kujavia and Dobrzyn; and the kings of Hungary and Poland further agreed to assist each other in the acquisition of the south-eastern border province of Halicz, or Red Russia (very nearly correspond- ing to the modern Galicia), in case the necessity for intervention should arise. The Holy See, jealous of the growing power of the house of Luxemburg, attempted to set aside the decrees of the congress of

Visegrad, by urging Casimir to take up arms against the knights once more; but Casimir prudently refrained from hostilities, and ultimately compensated himself in the south- east for his losses in the north. To guarantee still further the integrity of Poland, Casimir, who had no male issue, concluded a compact with Charles Robert whereby he recognized Louis, Charles Robert's son, as the successor to the Polish crown; Louis on his part contracting to confirm the privileges of the Polish gentry and clergy, and to rule Poland through natives only.

In 1340 the death of George II. of Halicz, and the ravaging of that fruitful border principality by the Tatars, induced Casimir and Charles Robert to establish their joint influence there, and in 1344 the Red Russian boyar, Demetrius Detko, was appointed starosta, or governor, in the names of the two kings. Nine years later Lubart of Lithuania, who also had claims upon Red Russia, disputed the sway of Poland in that principality. Hungary coming to the assistance of Poland, Lubart was defeated and taken prisoner; but Casimir, anxious to avoid a bloody war with Lithuania's Tatar allies, came to a compromise with Lubart whereby Poland retained Halicz with Lemberg, while Vladimir, Belz, and Brzesc fell to the share of Lithuania. With the Teutonic knights, still Poland's most dangerous foe, Casimir preserved peaceful relations throughout his reign. He kept them within due bounds by using the influence of the Luxemburgers against them at the papal, court; but the disputes between Poland and the order were ultimately settled by the peace of Kalisz (July 23, 1343), when the knights engaged for the first time to pay tribute to the Pob'sh crown. John of Bohemia was also a con- stant "thorn in the side of Casimir. Silesia, now split up into seventeen principalities, was the bone of contention between them ; and when Casimir suddenly invaded that country, took Wschowa, and made Prince Charles of Bohemia a prisoner, war between the two kingdoms actually broke out and Casimir was besieged in Cracow by the Czechs. But his Hungarian allies hastened to his assistance, and the mediation of the Holy See restored peace in 1346. The death of the adventurous John at Crecy, and the election of his son as emperor, still further improved the situation. Charles IV., a cautious sovereign with many cares, was as anxious for the maintenance of peace as Casimir himself. Thus the relations between them were never very seriously disturbed.

Throughout his reign Casimir never neglected the great work of domestic reform, greatly aided by Jaroslaw Skotowicki, archbishop of Gnesen, formerly a professor at Bologna. The first

result of their joint labours was the much-needed codification of the laws of Great and Little Poland in 1347. This was followed by the establishment of a supreme court of appeal in 1357.

Towards everything like disorder, tyranny, or aristocratic oppression, Casimir was always inexorably severe; all dis- turbers of the peace were remorselessly put to death as the worst enemies of their country and he enjoyed in consequence the honourable title of " the Peasants' King." The lawlessness of the nobility was most noticeable in the province of Great Poland, where outrageous acts of violence were of everyday occurrence. To remedy the evil, Casimir drew up and pro- mulgated the severe statute of Great Poland, which went to the very root of the matter and greatly strengthened the hands of the king's justices. Casimir also did much for education. Stimulated by the example of Charles IV., who had founded the university of Prague in 1348, Casimir on the 12th of May 1364 established and richly endowed the first university of Cracow, which had five professors of Roman law, three of Canon law, two of physics, and one master of arts. The security of the kingdom was sensibly promoted by the erection of a cordon of fortresses on its north-eastern borders, and a blow was given to foreign interference when Casimir succeeded in gaining dominant influence over the independent Polish principality of Masovia, which had hitherto gravitated between Bohemia and the Teutonic Order.

Casimir's last political act was the conclusion of a fresh alliance with Louis of Hungary against Charles IV. at Buda in 1369. He died on the 5th of November 1370 from the effects of an injury received while hunting. Though married three times Casimir left no sons; but he had the satisfaction of knowing that his domains would pass into the hands of a nephew every whit as capable and sagacious as himself.

See Jan Leniek, The Congress of Visegrad (Pol.), (Lemberg, 1884) ; J. K. Kochanowski, Casimir the Great (Pol.), (Warsaw, 1900); Kazimierz J. Gorzycki, The Annexation of Red Russia by Casimir the Great (Pol.), (Lemberg, 1889) ; Stanislaw Kryzanowski, The Embassy of Casimir the Great to Avignon (Pol.), (Cracow, 1900). (R. N. B.)

CASIMIR IV., king of Poland (1427-1492), second son of Wladislaus II. Jagiello, was appointed while still a lad grand-duke of Lithuania by his father, and crowned king of Poland at Cracow in June 1447, three years after the death of his elder

brother, Wladislaus III., at the battle of Varna. The cause of this long interregnum was the disinclination of the Lithuanians to part with their prince till their outstanding differences with Poland, relating chiefly to the delimitation of the frontiers of the two states, had been settled. Casimir's reign of forty-five years was epoch-making for Poland. He was without doubt one of the greatest" statesmen of his age, concealing beneath a simple exterior and homely habits a profound political sagacity and an unerring common-sense, and possessing in a high degree those useful qualities of patience, moderation, and tenacity, which characterized nearly all the princes of the house of Jagiello. Throughout life he steadily followed two guiding principles — the preservation of the political union between Poland and Lithuania at whatever cost, and the recovery of the lost lands of old Poland. It was.due entirely to his steadfast adherence to these principles that Poland in the course of the 15 th century rose to the rank of a great power; but by a singular irony of fate, Casimir, in consequence of his unswerving efforts to make his country glorious and prosperous, entirely forfeited the popularity of his Polish subjects, whose true interests he under- stood far better than they did themselves. Thus his refusal to sacrifice Polish to Lithuanian or Lithuanian to Polish interests caused bo th Poles and Lithuanians to accuse the far-seeing monarch of' partiality and favouritism; while his anti-German policy, on which the future safety of the dual state depended, could only be carried through by the most humiliating concessions to patrician pride and greed. His difficulties were moreover considerably enhanced by the fact that he was not of an essentially martial temperament, and could not therefore appeal to the heroic side of the Polish character.

The great triumph of Casimir's reign was the final subjugation of the Teutonic Order, a triumph only accomplished after a harassing and desultory thirteen years' war, during which Casimir's own subjects gave him more trouble than all his enemies. The pretext of the rupture was the attempt of the

knights to crush the Prussian diet, which, bearing as it did most of the burdens, claimed fairly enough a proportionate share in the government of the Prussian provinces. Excommunicated by the pope and placed under the ban of the Empire, the Prussian

cities and gentry naturally turned to their nearest neighbour, Poland, for protection. In October 1453 they placed themselves beneath the overlordship of Casimir; on the 4th of February 1454 formally renounced their ancient allegiance to the Order; and some weeks later captured no fewer than fifty-seven towns and castles. On the 6th of March 1454 Casimir issued a manifesto directing the incorporation of the Prussian provinces with Poland, but granting them at the same time freedom from taxation and full autonomy. But except in the border province of Great Poland, the acquisition of this new territory excited little interest and no enthusiasm in Poland generally. The local diets granted subsidies with a niggard hand, and for the conduct of the war the king soon had to depend almost entirely on Hussite mercenaries, who frequently turned against him when their wages were not paid. The Polish gentry on the other hand exhibited far less energy in the field than in the council chamber; they were defeated again and again by the knights, and showed themselves utterly incapable of taking fortresses. No wonder then if in the earlier years of the war the Order recovered its lost ground, and the king, irritated beyond endurance by the suicidal parsimony of the estates, threatened to retire to the forests of Lithuania. But manlier counsels prevailed, the struggle was resumed, and after the bloody victory of Puck (September 17, 1462) the scales of fortune inclined decisively to the side of Poland. Finally the Holy See intervened, and by the second peace of Thorn (October 14, 1466) all West Prussia, as it is now called, was ceded to Poland, while East Prussia was left in the hands of the knights, who held it as a fief of the Polish crown.

The intervention of the Curia, which hitherto had been hostile to Casimir because of his steady and patriotic resistance to papal aggression, was due to the permutations of European politics. The pope was anxious to get rid of the Hussite king of Bohemia, George Podebrad, as the first step towards the formation of a league against the Turk. Casimir was to be a leading factor in this combination, and he took advantage of it to procure the election of his son Wladislaus as king of Bohemia. But he would not commit himself too far, and his ulterior plans were frustrated by the rivalry of Matthias Corvinus, king of Hungary, who even went so far as to stimulate the Teutonic Order to rise against Casimir. The death of Matthias in 1490 was a great relief to Poland, and Casimir employed the two remaining years of his reign in consolidating his position still further. He expired rather suddenly while hunting at Troki in Lithuania in June 1492.

The feature of Casimir's character which most impressed his contemporaries was his extraordinary simplicity and sobriety. He, one of the greatest monarchs in Europe, habitually wore plain Cracow cloth, drank nothing but water, and kept the most austere of tables. His one passion was the chase. Yet his liberality to his ministers and servants was proverbial, and his vanquished enemies he always treated with magnificent generosity. Casimir's married life was singularly happy; His consort, Elizabeth of Austria, " the mother of the Jagiellos," bore him six sons and seven daughters, and by her affection and good counsel materially relieved the constant anxieties and grievous burdens of his long and arduous reign.

See Jan Dlugosz, Opera (Cracow, 1887) ; August Sokolowski, Illus- trated History of Poland (Pol.), vol. ii. (Vienna, 1904). (R. N. B.)

CASIMIR-PERIER, JEAN PAUL PIERRE (1847-1907), fifth president of the French Republic, was born in Paris on the 8th of November 1847, being the grandson of Casimir Pierre Pener (q.v.) the famous premier of Louis Philippe. He entered public life as secretary to his father, A. V.L. C. Perier, who was minister of the interior under the presidency of Thiers. In 1874 he was elected general councillor'.of the Aube, and was sent by the same department to the chamber of deputies in the general elections of 1876, and he was always re-elected until his presidency. In spite of the traditions of his family, Casimir-Perier joined the

group of Republicans on the Left, and was one of the 363 on the Seize-Mai (1877). If he refused to vote the expulsion of the princes in 1883, and resigned as deputy upon the enactment of the law, it was only owing to personal connexions with the family of Orleans. On the 17th of August 1883 he became under-secretary of state for war, and retained that position until the 7 th of January 1885. From 1890 to 1892 he was vice-president of the chamber, then in 1893 president. On the 3rd of December he became prime-minister, holding the department of foreign affairs, resigned in May 1894, and was re-elected president of the chamber. On the 24th of June 1894, after the assassination of President Carnot, he was elected president of the republic by 45 1 votes against 195 for Henri Brisson and 97 for Charles Dupuy. His presidency lasted only six months. The resignation of the Dupuy ministry on the 14th of January 1895 was followed the next day by that of the president. Casimir-Perier explained his action by the fact that he found himself ignored by the ministers, who did

not consult him before taking decisions, and did not keep him informed upon political events, especially in foreign affairs. From that time he definitely and absolutely abandoned politics, and devoted himself to business — especially mining. At the trial of Dreyfus at Rennes, Casimir-Perier's evidence, as opposed to that of General Mercier, was of great value to the cause of Dreyfus. He died on the nth of March 1907.

CASINO (diminutive of casa, a house), the Italian name for a pleasure-house in a garden, which has been extended to a place of public amusement at pleasure resorts, in which concerts, theatrical performances and public balls are given, and which usually contains a cafi-restaurant and gaming saloons. " Casino " as an architectural term is still employed in France, and the subject is given in competitive programmes in the French schools of design. In the 18th century in England many Italian examples were built in the parks of country mansions, and Sir William Chambers in his treatise on civil architecture publishes plates of the casinos he had built at Marino, near Dublin, Wilton near Salisbury, and Birdshall, Yorkshire.

Casino or Cassino is also the name given to a game of cards of obscure origin, played with a full whist-pack. The object is to take as many cards as possible, particularly such as have special value. It may be played by two, three or four persons, partners sitting opposite one another. The player at the dealer's right is called the pony {pone), the one at his left the eldest hand. The dealer (selected by the cut of the lowest card) deals four cards to each player by twos and also, just before dealing to himself, four to the table, face upwards. The eldest hand begins the game by playing a card in one of three ways. Either he may take one of the exposed cards on the table by matching it with one from his own hand; or he may put one of his cards upon one of the table hand and call the sum of the pips (called building); or thirdly, failing to do either of these things, he must trail, ix. lay a card face upwards on the table beside the exposed cards, and the player at his left then plays in his turn. When each player has played out all four of his cards the dealer deals four more all round, and the game proceeds until the pack is exhausted. The game either (1) ends at this juncture, the player having secured the most points winning; or (2) the side or player first securing 21 points wins; or (3) the points secured in a given number of deals may determine the winner. The points and their respective values are as follows : — Big (or Great) Casino (ten of diamonds) , 2 ; Little Casino (deuce of spades), 1; Cards (greatest number),

3; Spades (greatest number), 1; Aces, 1 each or 4 together; Sweepsˆ 1 each. Thus, without sweeps, the maximum points in one deal are n. A sweep is a play that clears the table of all exposed cards. The game then proceeds by the next player placing a card on the table face upwards.

" Building," referred to above, is done as follows. Should a 3 lie exposed on the table, a player may place a 4 upon it, saying, " I build a 7," and, if it is not disturbed before his next turn, he may then take the two cards with another 7 from his hand. It follows that no combination may be built unless the builder holds the proper card in his hand. But a build may be increased. Thus, in the case cited above, another player may put a 2 upon the two cards which make 7 and say, " I build 9," in which case the original

builder loses control of the build unless he also holds a 9 in his hand or can himself increase the build again; for instance, adding an ace and calling 10. In the old way of playing the ace counted 1, the deuce 2, and so on as at whist, excepting that all court cards counted 10. But in the popular variation called Royal Casino, now almost universally played, the ace counts either I or 14, the king 13, the queen 12 and the knave II. In this manner the opportunities for simple and increased building are greatly multiplied, resulting in a much livelier game.

If a player has made a build he must take it in on his next play, unless he can take some other card. He cannot have two builds on the table at the same time, nor increase another build if he already has one of his own. Double Builds cannot be increased, e.g. if a player combines a 3 and 4 lying on the table and places a 7 from his hand upon them, saying, " I build sevens," this build can be taken only with a 7, and cannot be built upon further. Of course in the case cited the builder must still have another 7 in his hand. In playing partners each may take in the other's builds, or may build to a card that has been declared by his partner; e.g. if his partner has built an 8 that has been captured by an opponent, he may build another 8 with a card from his own hand to the 8 that he knows to be in his partner's hand, even though he has no 8 himself. In trailing, i.e. laying down a card without matching or building, one usually plays small cards, avoiding

aces and (if Big and Little Casino have not yet been played) tens and deuces, as well as any cards one has reason to think will be of service to the enemy. High cards are usually played last, as they are stronger in taking com- binations. Such rules are, however, quite general, each situation calling for special treatment. In the last round all cards remaining on the table become the property of the player taking the last trick. A good memory and keen powers of observation are essential in playing this game.

In Twenty-One-Point Casino nothing is scored until the end of the deal. A second or third deal is usually necessary before one side scores the requisite 21. In the final deal each side keeps a mental count of the points made, and as soon as 21 are scored the game is claimed and the points shown. But if , when added to those already scored in previous deals, they make more or less than 21, the claimant loses the game. In counting out cards count first, followed by spades, Big Casino, Little Casino, aces and sweeps, in that order.

Spade Casino is a variation in which the usual 11 points count as in the regular game, and, in addition, each spade counts I, excepting the knave of spades, which counts 2, making 24 points in all. These are scored on a cribbage-board, each point being marked as it is made. The game is for 61 points, or once round the board and into the game-hole.

CASINUM, an ancient town of Italy, probably of Volscian origin. Varro states that the name was Sabine, and meant forum vetus, and also that the town itself was Samnite,but he is probably wrong. When it came under Roman supremacy is not known, but it probably received the citizenship in 188 B.C. It was the most south-easterly town in Lalium adjectum, situated on the Via Latina about 40 m. N.W. of Capua. It appears occasionally in the history of the Hannibalic War. Varro possessed a villa near it, in which later on Mark Antony held his orgies. Towards the end of the republic it was a praefectura, and under the empire it appears as a colony (perhaps founded by the triumvirs) , though in two (not local) inscriptions it is called municipium. Strabo speaks of it as an important town; Varro mentions the olive-oil of its district as especially good. The older Volscian Casinum must have stood on the hill (1715 ft.) above the Roman town (148 f t.) , where considerable remains of fortifications in Cyclopean masonry, of finely cut blocks of limestone, still exist. The site is now occupied by the Benedictine monastery of Monte Cassino

(q.v.) founded by St Benedict himself in 5 29. A number of Roman inscriptions from Casinum are preserved there. The wall which runs south-west and west starting from the west side of the monastery, for a total length of about 300 yds., is not so clearly traceable on the other side of the hill, though there is one fragment under the east side of the monastery; but it seems to have defended the summit and was perhaps the original acropolis. The Roman town lay at the foot of the mountain, close to the Via Latina. The amphitheatre, erected by Ummidia Quadratilla (whose passion for actors is mentioned by Pliny, Epist. vii. 24, on the occasion of her death at the age of about eighty), is still existing: it is built of opus reticulatum and the five entrances are by arches of larger blocks of stone; it is approximately circular in plan. The external walls are 50 ft. high. The seats in the interior have disappeared. Above it on the hillside is a theatre of opus reticulatum, less well preserved. Close by is a building v. is

converted into the Cappella del Crocefisso, originally perhaps a tomb in the Via Latina; it is a chamber in the form of a Greek cross, constructed of large masses of travertine, with a domed roof of the same material. On the opposite bank of the Rapido are theruins called Monticelli, attributed to the villa of Varro, apartof which was frequently drawn by the architects of the 16th century (T. Ashby in Papers of the British School at Rome, ii. 19). The medieval town of S. Germano, which resumed the name Cassino in 187 1, lies a little to the north. The cathedral was founded in the 8th century, but the present building was constructed in the 1 7 th century. The church of S . Maria delle Cinque Tcrri contains twelve ancient marble columns; above the town is a picturesque medieval castle. (T. As.)

CASIRI, MIGUEL (1710-1791), a learned Maronite, was bcrn at Tripoli (Syria) in 1 7 10. He studied at Rome, where he lectured on Arabic, Syriac, Chaldee, philosophy and theology. In 1748 he went to Spain, and was employed in the royal library at Madrid. He was successively appointed a member of the Royal Academy of History, interpreter of oriental languages to the king, and joint-librarian at the Escorial. In 1763 he became principal librarian, a post which he appears to have held till his death in 1791. Casiri published a work entitled Bibliotheca Arabico-Hispana Escurialensis (2 vols., Madrid, 1760-1770). It is a catalogue of above 1800 Arabic MSS., which he found in the library of the Escorial; it also contains a number of quota- tions from Arabic works on history. The MSS. are classified according

to subjects; the second volume gives an account of a large collection of geographical and historical MSS., which contain valuable information regarding the wars between the Moors and the Christians in Spain. Casiri's work is not yet obsolete, but a more scientific system is adopted in Hartwig Derenbourg's incomplete treatise, Les Manuscrits arabes de V Escorial (Paris, 1884).

CASKET, a small box or coffer, commonly used for jewels, money, papers, or other objects of value. The etymology is doubtful. It is possibly a diminutive of " cask," a barrel for wine or other liquor. The Spanish casco meant also a skull, helmet, or rind of an onion, and is probably connected with cascar, tobreak open, Latin quassare, Trench casser, to break, shake. The French casque, casquet, of the same origin is only used of a helmet, and the sense of " small chest " is not found in languages other than English. Skeat suggests that the word is a corruption of French cassette, diminutive of casse, box, Latin capsa, from capere, to hold, contain, cf. English " case ." History and literature are full of references to the often disconcerting contents of these famous receptacles. The " Casket Letters " (q.v.) are one of the mysteries of history. Hsopagnon's casket plays an important part in Moliere's L'Avare; Bluebeard gives his too-curious wife the keys of his caskets filled with precious stones; the contents of Sainte-Croix's casket brought about the trial and condemnation of the marquise de Brinvilliers, the poisoner. This very ancient piece of furniture was no doubt derived from the chest, which was the original wardrobe. It was often an object of great value, covered with ivory, enamel, or stamped leather, enriched with precious metals, or encrusted with jewels. One which belonged to St Louis and is preserved in the Louvre is covered with enamelled shields of arms and other decorations. In the 16th and 17th centuries secret hiding-places were some- times in the thickness of the lid or in a false bottom. The word is now little used — the natural result of the desuetude of the object; but auctioneers occasionally announce that they will sell a " casket of jewels," and undertakers, especially in the United States, frequently use it as a grandiose synonym for " coffin."

CASKET LETTERS'. This is the name generally given to eight letters, and a sequence of irregular sonnets, all described as originally in French, and said to have been addressed by Mary, queen of Scots, to the earl of Bothwell, between January and April 1 566-1 567. The nature of these -documents — authentic, forged, or partly forged, partly genuiifie%has been the theme of

much discussion. If authentic throughout, they afford perfect proof of Mary's complicity in the murderiof her husband, Henry, Lord Darnley. The topic is so perplexing, and possibilities

are so delicately balanced, that inquirers may change their views, and modify or reverse their opinions, on the appearance of each fresh document that is brought to light; or even upon a new consideration of existing evidence. Controversy centres round a very long and singular undated epistle called " The Glasgow Letter " or " Letter II." If Mary wrote all of this, or even wrote some compromising parts of it, she was certainly guilty. But two questions remain to be settled — (i) did her accusers at one time possess another version of this letter which if it existed was beyond doubt a forgery ? and (2) is not part of Letter II. a forged interpolation, based on another document, not by Mary ?

The whole affair has been obscured and almost inextricably entangled, as we shall see, by the behaviour of Mary's accusers. Of these Maitland of Lethington was consenting to Darnley's murder; the earl of Morton had, at least, guilty foreknowledge; the regent Moray (Mary's natural brother) had " looked through his fingers " at the crime, and for months remained on intimate terms with the criminals. He also perjured himself when putting before Elizabeth's commission of inquiry at Westminster (December 1568) a copy of the confession of Hepburn of Bowton (Cotton MSS. British Museum. Caligula C.I. fol. 325). This is attested as a "true copy," but Moray, who had been present when Bowton was examined (December 8, 1567), knew that the copy presented at Westminster (December 1 568) had been mutilated because the excised passages were damning to Lething- ton and the earl of Morton, accomplices in the crime of Darnley's murder, and accomplices of Moray in his prosecution of his sister. (See in Cambridge University Library, MS. Oo. 47, fol. s et seq. Compare the MS. copy of the confession in the British Museum, Cotton MSS. Caligula, C.I. fol. 325, printed in Anderson's Collections, vol. ii. pp. 183-188.)

If Moray the righteous could act thus, much more might the murderer Morton perjure himself in his averment that there had been no tampering with the Casket Letters in his custody. We cannot, in short, believe Mary's accusers on their oaths. When

they all went, in October-December 1568, to York and London to accuse their queen — and before that, in their pro- clamations — they contradicted themselves freely and frequently; they put in a list of dates which made Mary's authorship of Letter II. impossible; and they rang the changes on Scots translations of the alleged French originals, and on the French itself. For example, when Moray, after Mary was in Elizabeth's power (May 16, 1568), wished Elizabeth to have the matter tried, he in May-June 1568 sent John Wood to England with Scots translations of the letters. Wood was to ask, " if the French originals are found to tally with the Scots translations, will that be reckoned good evidence?" It was as easy to send copies of the French, and thus give no ground for the suspicion that the Scots letters were altered on the basis of information acquired between May and October 1568, and that the French versions were made to fit the new form of the Scots copies. Another source of confusion, now removed, was the later publication in France of the letters in French. This French did not correspond with French copies of some of the originals recently discovered in Cecil's MSS. and elsewhere. But that is no ground of suspicion, for the published French letters were not copies of the alleged originals, but translations of Latin translations of them, from the Scots (see T. F. Henderson, The Casket Letters, 1890). German historians have not made matters more clear by treating the Letters on the principle of " the higher criticism " of Homer and the Bible. They find that the documents are of composite origin, partly notes from Mary to Darnley, partly a diary of Mary's, and so on; all combined and edited by some qne who played the part of the legendary editorial committee of Peisis- tratus (see Homer), which compiled the Iliad and Odyssey out of fragmentary lays ! From all these causes, and others, arise confusion and suspicion.

So much information unknown to older disputants such as Goodali, the elder Tytler, Chalmers, and Malcolm Laing, and in certain cases unknown even to Froude and Skelton, has accrued, that the question can now best be studied in The Casket Letters,

by T. F. Henderson (1880; second issue, 1890, being the more accurate); in The Mystery of Mary Stuart, by Andrew Lang (4th edition, 1904), and in Henderson's criticism of that book, in his Mary, Queen of Scots (1905) (Appendix A). The conclu- sion arrived at here is that of Henderson, but it is reached independently.

The history of the letters must be given in summary. Hen- derson,

in The Casket Letters (1889), was the first to publish and use as evidence a document of which the existence was made known in the fifth report of the royal commission on historical manuscripts. It is a sworn statement of the earl of Morton, written in 1568. A silver casket (originally Mary's property, but then in the possession of Bothwell) was placed in his hands on the 20th of June, and was inspected by several nobles and gentlemen on the 21st of June 1567. Morton denies that the contents, the letters, sonnets, and some other papers, had been in any way tampered with. But if Moray could knowingly submit garbled evidence, Morton's oath is of no value if un-corroborated.

Mary was, on the 21st of June 1567, a prisoner in Loch Leven Castle. A messenger was at once sent from Edinburgh to London with a letter from Lethington and a verbal message. By the 1 2th of July, de Silva, the Spanish ambassador, reports on the authority of the French ambassador that du Croc, French envoy to Scotland, avers that Mary's Scottish enemies have autograph letters of hers proving her guilt, and himself possesses copies. Of these copies no more is heard, and they cannot be found. According to de Silva, Elizabeth said that she did not believe in the Letters, and that Lethington, who wrote to Cecil on the 21st of June, and sent a verbal message by the bearer, " had behaved badly in the matter," — whether that of the letters, or in general. On what evidence she based that opinion, if she really held it, is unknown. In December 1567 the Scottish parliament was informed that the letters were signed by Mary (they are unsigned), but the phrase is not used in the subsequent act of parliament. The letters were exhibited and apparently were read, probably read aloud. Mary's party in September 1568 declared that they were garbled, and that the handwriting was not hers. In the end of July 1567 the earl of Moray, Mary's brother, passing through London from France, told de Silva, as de Silva reported to his government, that there was proof of Mary's guilt in a letter of three double sheets of paper signed by her.

According to Moray's version of the letter, Mary was to try to poison Darnley in a house on the way between Glasgow and Edinburgh where he and she were to stop. Clearly Lord Livingstone's house, Callendar, where they did rest on their journey, is intended. If this failed, Mary would put Darnley "in the house where the explosion was arranged for the night upon which one of the servants was to be married." No such arrangement had been made, as the confessions of the murderers,

at which Moray was present, clearly prove. It may be said that de Silva means " the house in which the explosion was afterwards arranged." But the earl of Lennox, Darnley's father, understood Moray to mean that as early as January 21-22, 1567, the house of Kirk o' Field, where Darnley was slain, had already been mined. Moray's version of the letter made Mary tell Bothwell to poison or put away his wife. No such matters occur in Letter II.; Moray spoke, he said, on the authority of " a man who had read the letter." A similar account of this letter is given in a document of Darnley's father, the earl of Lennox (Cambridge University Library MSS. Oo. 7. 47; f. 17 b.). Can we suppose that "the man who had read the letter" invented much of its contents, and told them to Moray, who told de Silva, and told Darnley's father, Lennox, then in or near London ?

At this point comes in the evidence — unknown to Froude, Skelton, Hosack, and Henderson in his book The Casket Letters— of a number of documents, notes of information, and indictments of Mary, written for or by the earl of Lennox. These MSS are in the University Library of Cambridge, and were transcribed by Father Stevenson. His transcripts were brought to light by Father Pollen, S- J-, who lent them, with his own notes on them,

to Andrew Lang for use in his book, The Mystery of Mary Stuart (1Q00-1904).

Not one of the Lennox documents is dated; all but one are endorsed in an English hand of the period. It may be conjectured that they were selected by Lennox from his papers, and lent by him to some one who was writing against Mary. Among them (Cambridge University MSS. Oo. 7. 47. fol. 17 b.) is a long indictment of Mary, in which Lennox describes a wicked letter of hers. As has been said, he closely follows Moray's version reported by de Silva in July 1567. Lennox also gives several stories of cruel words of Mary spoken to Darnley in the hearing of her servants.

Now, on the nth of June 1568, Lennox was in the company of John Wood, a creature of Moray's, and Wood, as we saw, brought copies of the Scots renderings of the Letters into England in May-June 1568. It was argued by Andrew Lang that Wood was likely

to show these letters to Lennox; and that as Lennox follows Moray's version of Mary's long and murderous letter, and does not follow Letter II., the murderous letter (a forgery) was then part of the dossier of Mary's accusers. Again, as Lennox's indictment of Mary (Cambridge Oo. 7. 47. fol. 17 b.) is rife in " reports and sayings of Mary's servants " about her cruel words to Darnley, and as Lennox had not these reports on the nth of June 1568, for on that day he wrote to Scotland asking his friends to discover them and send them to him, the indictment (Oo. 7. 47) must have been composed long after the nth of June. This must be so, for Lennox's letters of the nth of June were intercepted by his foes, the Hamiltons, and were found in the Hamilton Muniment Room. Thus answers to his inquiries were delayed. (The letters of Lennox were published in Miscellany of the Maitland Club, vol. iv.)

Henderson, on the other side, believes that Wood " indu- bitably " showed to Lennox the Scots copies of the Casket Letters about the nth of June 1568. But Lennox, he says, could not quote Letter II. in his indictment against Mary, and had to rest on Moray's version of July 1567, because Lennox's indictment was completed, and even laid before Elizabeth, as early as the 28th of May 1568. Henderson seeks to prove that this is so by quoting from Chalmers's Mary Queen of Scots (vol. ii. p. 289) the statement that Lennox and his wife on that day presented to Elizabeth a " Bill of Supplication "; and (though he submits that the indictment [Oo. 7. 47] is a draft for the Bill) he strengthens his case by heading the indictment, which he publishes, Bill of Supplication. The document, in fact, is unendorsed, and without a title, and there is not a word of " supplication " in it. It is a self-contradictory history of the relations between Mary and Darnley.

Henderson's contention therefore seems erroneous. Lennox could not begin to prepare an English indictment against Mary till she was in England and in Elizabeth's power. He could not hear of this fact — Mary's arrival in England (May 16, 1568) — before, say, the 19th of May; and between the 19th of May and the 28th of May he could not write for and receive from Scotland " the reports and sayings of her servants." He did not possess them on the nth of June, when he asked for them; he did not get them at once, for his letters were intercepted; the indictment (Oo. 7. 47) is rich in them; therefore that paper is not the " Bill of Supplication" of the 28th of May.

Thus the question remains, why, if Wood about the nth of June

showed to Lennox Letter II. in Scots, did Lennox follow Moray's erroneous version of July 1567 ? Because in June 1568 that version, forged, was in the Scots collection of the Casket Letters ? If so, there was time for Lennox to lend to the accusers certain notes which a retainer of his, Thomas Crawford of Jordan Hill, swore (December 9, 1568) that he had made for Lennox (about January 22, 1567) of secret conversations between Darnley and Mary. Lennox (June 11, 1568) asked Crawford for his reminiscences, not of Darnley's reports of his talks with Mary, but of Crawford's own interview with her as she entered Glasgow to visit Darnley, probably on the 21st of January 1567. It follows that Lennox possessed Crawford's written notes of the Darnley and Mary conversations. If he had not possessed

them on the nth of June 1568, he must have asked Crawford for his reminiscences of these talks. But he did not ask.

Crawford's evidence was all-important, because it corroborated Mary's own account of her interviews with Darnley in Letter II. That part of the letter then, it is argued by many, is a forged interpolation based on Crawford's notes and memories. The force of this contention lies in the close verbal identities between Crawford's account of the Darnley-Mary interviews (see Crawford's Declaration of December 9, 1568, in Lang's Mystery of Mary Stuart, pp. 428-431; from State Papers Scotland, Elizabeth vol. xiii. No. 14. Record Office) and the correspond- ing passages in Letter II. (Mystery of Mary Stuart, pp. 396-398). The verbal identities can only be explained in one of the following ways. Either Letter II. is here based on Crawford; or Crawford has copied Letter' II. by way of corroborating it (a fatal step, if the case came before a modern English court of justice); or Darnley's memory of his conversation with Mary was so fresh, when he dictated his recollection of it to Crawford on 2ist-22nd January 1567, that he reported speeches in almost the very same words as Mary used in writing Letter II. Henderson prefers the hypothesis that Lennox had lost Crawford's notes ; and that the identities are explained by the "remarkably good memories of Crawford and Mary, or by the more likely supposition that Crawford, before preparing his declaration for the conference " (at Westminster, December 1568) "refreshed his memory by the letter." (Letter II., Mary Queen of Scots, p. 650.)

Mary did not need a particularly good memory; if she wrote, she wrote unchecked her recollections of the day's talk. But no human memory of a conversation reported on the 22nd of

January 1567, could be so nearly " word perfect " as Crawford's must have been two years later. If Crawford " refreshed his memory by the letter," he exposed himself, and the entire case, by copying whole passages, often with few verbal changes. If he had access to his original notes of the 21st and 22nd of January 1567, then he was safe — that is, if Darnley's memory of the conversations tallied so exactly with Mary's. Whether that could be, Darnley dictating while still hot from the exciting inter- change of words which he meant to report, is a question for psychologists. Experiments made by a person who possesses a good memory seem to show that the thing is very possible, especially if Darnley revised Crawford's notes.

Thus the probabilities are delicately balanced. But if any one compares Crawford's whole declaration with Letter II. in Scots, he will find that Crawford has sources of information not yielded by Letter II. ; while Letter II. abounds in matter spoken by Mary and Darnley which could not be borrowed by the hypothetical forger from Crawford's Declaration, for it does not contain the facts. These facts, again, in Letter II., are worthless to a forger, because they concern matters never alluded to in any of the records; never employed in any indictment (though Lennox's are copious in private talk between Darnley and Mary, " reports of her servants "), and totally useless for the purposes of the accusers. Here is one of several examples. Letter II. has, and Crawford has not, the statement that Darnley " showed me, amongst other talk, that he knew well enough that my brother had revealed to me what he (Darnley) had spoken at Stirling. Of this he (Darnley) denies half, and above all that he (the brother?) ever came to his (Darnley's) chamber."

Nothing is known about this matter. The Lennox papers are full of reports of bitter words that passed between Darnley and Mary at Stirling (December 1566), where Darnley was sulking apart while the festivities of the baptism of his son (later James VI.) were being held. But nothing is said in the Lennox papers of words spoken by Darnley to Mary's brother (probably Lord Robert of Holyrood) and revealed by Lord Robert to Mary. Lord Robert was the only friend of Darnley in Mary's entourage; and he even, according to the accusers, warned him of his danger in Kirk o' Field, to which they said that a Casket Letter (III.) referred. The reference is only to be seen by willing eyes.

Is it credible that a forger, using Crawford's Declaration, which is silent as to Mary's brother at Stirling, should have superfluously

added what is not to any purpose ? Could he have combined

with Crawford's matter the passage " he (Darnley) showed me almost all that is in name of the Bishop and Sutherland, and yet I have never touched a word of what you (Bothwell) showed me . . . and by complaining of the Bishop, I have drawn it all out of him. "

Who but Mary herself could have written about this unknown affair of the Bishop, and what had the supposed forger to gain by inventing and adding these references to affairs unconnected with the case?

There remains what looks like absolute proof that, in essence, Crawford's Declaration and Letter Il.are independent documents. We are not aware that this crucial point has been noticed by the earlier critics of the Letters. In Letter II. (paragraph 7, p. 398, in Lang's Mystery of Mary Stuart, 1901) Mary writes, " I asked why he (Darnley) would pass away in the English ship. He denies it, and swears thereunto; but he grants that he spoke unto the men." Here Crawford's declaration has, " She asked him why he would pass away in the English ship. He answered that he had spoken with the Englishman, but not of mind to go away with him. And, if he had, it had not been without cause, considering how he was used. For he had neither [means] to sustain himself nor his servants, and need not make further rehearsal thereof, seeing she knew it as well as he." (Mystery of Mary Stuart, p. 429.)

It may seem to the reader doubtful whether these complaints are words of Darnley's, or an indignant addition by his friend Crawford. But Mary, in Letter II., shows that the complaints and the self-defence are Darnley's own. It was in paragraph 7 that she wrote about the English ship; she did not then give Darnley's remonstrances, as Crawford does. But in paragraph 18 (Mystery, p. 406) Mary returns to the subject, and writes, " He (Darnley) spoke very bravely at the beginning, as the bearer will show you, upon the subject of the Englishmen, and of his depart- ing; but in the end he returned to his humility."

Thus it is certain that Darnley had reported to Crawford his brave words and reproaches of Mary, which Crawford gives in the

proper place. But Letter II. omits them in that place (para- graph 7); and only on her second day of writing, in paragraph 18, does Mary's mind recur to Darnley's first brave words — " he spoke very bravely at the beginning," about his wrongs, " but in the end he returned again to his humility. ' '

Here is proof positive that Crawford does not copy Letter II., but gives Darnley's words as reported to him by Darnley — ■ words that Darnley was proud of, — while Mary, returning on the second day of writing to the topic, does not quote Darnley's brave words, but merely contrasts his speaking " very bravely at the beginning" with his pitiful and craven later submission; " he has ever the tear in his eye," with what follows. (Mystery, paragraph 12, p. 402.)

When we add to these and other proofs the strange lists of memoranda in the middle of the pages of the letter, and the breach in internal chronology which was apparently caused by Mary's writing, on her second day, on the clean verso of a page on the other side of which she had written some lines during her first night in Glasgow; when we add the dramatic changes of her mood, and the heart-breaking evidence of a remorse not stifled by lawless love, we seem compelled to believe that she wrote the whole of Letter II.; that none of it is forged.

In The Mystery of Mary Stuart the evidence for an early forged letter was presented with confidence; the interpolation of forgeries based on Crawford's declaration was more dubiously suggested. That position the writer now abandons. It may be asked why, after being with Wood on the nth of June, did Lennox still rely on Moray's version of Mary's letter? The reply may be that the Scots versions were regarded as a great secret; that Lennox was a married man; and that though Lennox in June knew about Mary's letters, doubtless from Wood, or from common report (Bishop Jewell in a letter of August 1567 mentions that he had heard of them), yet Wood did not show to him the Scots copies. Lennox quotes Letter II. later, in an indictment to be read to the commission sitting at York (October 1568). But, on the other hand, as Lennox after meeting Wood wrote to

Crawford for his reminiscences of his own interview with Mary (January 21, 1567), and as these reminiscences were only useful as corroborative of Mary's account in Letter II., it seems that Wood had either shown Lennox the letters or had spoken of their

contents. In that case, when Lennox later quotes Moray's version, not Letter II. itself, he is only acting with the self- contradictory stupidity which pervades his whole indictment (Oo. 7. 47. fol. 17 b.).

The letters are not known to have been seen by any man — they or the silver casket — after the death of the earl of Gowrie (who possessed them). In May 1584 Bowes, the English ambassador to Holyrood, had endeavoured to procure them for Elizabeth, " for the secrecy and benefit of the cause." Conceivably the letters fell into the hands of James VI. and were destroyed by his orders. (A. L.)

CASLON, the name of a famous family of English typefounders. William Caslon (1692-1766), the first of the name, was born at Cradley, Worcestershire, and in 17 16 started business in London as an engraver of gun locks and barrels, and as a bookbinder's tool-cutter. Being thus brought into contact with printers, he was induced to fit up a type foundry, largely through the encouragement of William Bowyer. The distinction and legi- bility of his type secured him the patronage of the leading printers of the day in England and on the continent. The use of Caslon types, discontinued about the beginning of the 19th century, was revived about 1845 at the suggestion of Sir Henry Cole, and used for printing the Diary of Lady Willoughby (a pseudo- 17th-century story) by the Chiswick Press. The head- line on this page is " Caslon Old Face." He died on the 23rd of January 1766. His son, William Caslon (1720-1778), who had been partner with his father for some years, continued the business.

CASPARI, KARL PAUL (1814-1892), German Lutheran theologian and orientalist, was born of Jewish parents at Dessau, Anhalt, on the 8th of February 18 14. He studied at Leipzig and Berlin, became a Christian in 1838, and in 1857 was appointed professor of theology at Christiania, having declined invitations to Rostock and Erlangen. He died at Christiania on the nth of April 1892. Caspari is best known as the author of an Arabic grammar (Grammatica Arabica, 2 vols., 1844-1848; new edition, Arabische Grammatik, edited by A. Miiller; 5th ed. 1887). He also wrote commentaries on the prophetical books of the Old Testament, dogmatic and historical works on baptism, and from 1857 helped to edit the Theologisk Tidskrift for den evan- gelisk-lutherske Kirke i Norge. His writings include: Beitrage zur Einleitung in Jesaja (1848), and Alte und neue Quellen zur Geschichte des Tauf

symbols und der Glaubensregel (1879).

CASPIAN SEA (anc. Mare Caspium or Mare Hyrcanium; Russian, Kaspiyskoe M ore, formerly Hvalynskoe More; Persian, Darya-i-Kkyzyr or Gurzem; Tatar, Ak-denghiz; the Sikim and Jurjan of the ancient Eastern geographers), an inland sea between Europe and Asia, extending from 36° 40′ to 47° 20′ N. lat., and from 46 50′ to 55 10′ E. long. Its length is 760 m. from N. to S., and its breadth 100 to 280 m., and its. area reaches 169,330 sq. m., of which 865 sq. m. belong to its islands. It fills the deepest part of a vast depression, sometimes known as the Aralo-Caspian depression, once an inland sea, the Eurasian Mediterranean or Sarmatian Ocean. At the present time its surface lies 86 ft. below the level of the ocean, or 96- 7 ft. according to the Aral-Caspian levelling 1 and 242-7 ft. below the level of the Aral.

Hydrography and Shores. — The hydrography of the Caspian Sea has been studied by von Baer, by N. Ivashintsev (1819-1871) in 1862-1870, by O. Grimm, N. I. Andrusov (1895), and by J. B. Spindler (1897), N. von Seidlitz and N. Knipovich (1904) since the last quoted date. Its basin is divided naturally into three sections — (1) A northern, forming in the east the Gulf of Mortvyi Kultuk or Tsarevich Bay. This is the shallowest part, barely reaching a depth of 20 fathoms. It is being gradually

1 By the triangulation of 1840 its level was found to be 84 ft. below the level of the Black Sea. The Caucasus triangulation of 1 860- 1 870 gave 89 ft.

silted up by the sedimentary deposits brought down by the rivers Volga, Ural and Terek. The western shore, from the delta of the Volga to the mouth of the Kuma, a distance of 170 m., is gashed by thousands of narrow channels or lagoons, termed limans, from 12 to 30 m. in length, and separated in some cases by chains of hillocks, called bugors, in others by sandbanks. These channels are filled, sometimes with sea-water, sometimes with overflow water from the Volga and the Kuma. The coast- line of the Gulf of Mortvyi Kultuk on the north-east is, on the other hand, formed by a range of low calcareous hills, constituting the rampart of the Ust-Urt plateau, which intervenes between the Caspian and the Sea of Aral. On the south this gulf is backed by

the conjoined peninsulas of Busachi and Manghishlak, into which penetrates the long, narrow, curving bay or fjord of Kaidak or Kara-su. (2) South of the line joining the Bay of Kuma with the Manghishlak peninsula, in 44° 10′ N. lat, the western shore is higher and the water deepens considerably, being over one-half of the area 50 fathoms, while the maximum depth (between 41° and 42° N. lat.) reaches 437 fathoms. This, the middle section of the Caspian, which extends as far as the Apsheron peninsula, receives the Terek and several smaller streams (e.g. Sulak, Samur), that drain the northern slopes of the Caucasus. At Derbent, just north of 42 lat., a spur of the Caucasus approaches so close to the sea as to leave room for only a narrow passage, the Caspiae Pylae or Albanae Portae, which has been fortified for centuries. The eastern shore of this section of the sea is also formed by the Ust-Urt plateau, which rises 550 ft. to 750 ft. above the level of the Caspian; but in 42 N. lat. the Ust-Urt recedes from the Caspian and circles round the Gulf of Kara-boghaz or Kara-bugaz (also called Aji-darya and Kuli-darya). This subsidiary basin is separated from the Caspian by a narrow sandbar, pierced by a strait i|- m. long and only 115 to 170 yds. wide, through which a current flows continuously into the gulf at the rate of i| to 5 m. an hour, the mean velocity at the surface being 3 m. an hour. To this there exists no compensating outflow current at a greater depth, as is usually the case in similar situations. The area of this lateral basin being about 7100 sq. m., and its depth but comparatively slight (35 to 36 ft.), the evaporation is very appreciable (amounting to 3-2 ft. per annum), and sufficient, according to von Baer, to account for the perpetual inflow from the Caspian. South of the Kara-Boghaz Bay the coast rises again in another peninsula, formed by an extension of the Balkhan Mountains. This marks (40° N. lat.) the southern boundary of the middle section of the Caspian. This basin may be, on the whole, considered as a continuation of the synclinal depression of the Manych, which stretches along the northern foot of the Caucasus from the Sea of Azov. It is separated from (3), the southern and deepest section of the Caspian, by a sub- marine ridge (30 to 150 fathoms of water), which links the main range of the Caucasus on the west with the Kopet-dagh in the Transcaspian region on the east. This section of the sea washes on the south the base of the Elburz range in Persia, sweeping round from the mouth of the Kura, a little north of the Bay of Kizil-agach, to Astarabad at an average distance of 40 m. from the foot of the mountains. A little east of the Gulf of Enzeli, which resembles the Kara-boghaz, though on a much smaller scale, the Sefid-rud pours into the

Caspian the drainage of the western end of the Elburz range, and several smaller streams bring down the precipitation that falls on the northern face of the same range farther to the east. Near its south-east corner the Caspian is entered by the Atrek, which drains the mountain ranges of the Turkoman (N.E.) frontier of Persia. Farther north, on the east coast, opposite to the Bay of Kizil-agach, comes the Balkhan or Krasnovodsk Bay. In the summer of 1894 a subterranean volcano was observed in this basin of the Caspian, in 38 10′ N. lat. and 52 37′ E. long. The depth in this section ranges from 300 to 500 fathoms, with a maximum of 602 fathoms.

Drainage Area and Former Extent. — The catchment area from which the Caspian is fed extends to a very much greater distance on the west and north than it does on the south and east. From

the former it is entered by the Volga, which is estimated to drain an area of 560,000 sq. m., the Ural 96,000 sq. m., the Terek 59,000 sq. m., the Sulak 7000 sq. m., the Samur 4250 sq. m.; as compared with these, there comes from the south and east the Kura and Aras, draining the south side of the Caucasus over 87,250 sq. m., and the Sefid-rud and the Atrek, both rela- tively short. Altogether it is estimated (by von Dingelstedt) that the total discharge of all the rivers emptying into the Caspian amounts annually to a volume equal to 174-5 cub. m – Were there no evaporation, this would raise the surface of the sea 55 ft. annually. In point of fact, however, the entire volume of fresh water poured into the Caspian is only just sufficient to compensate for the loss by evaporation. Indeed in recent times the level appears to have undergone several oscillations. From the researches of Philippov it appears that during the period 1851-1888 the level reached a maximum on three separate occasions, namely in 1868-1869, 1882 and 1885, while in 1853 and 1873 it stood at a minimum; the range of these oscillations did not, however, exceed 3 ft. 6J in. The Russian expedition which investigated the Kara-boghaz in 1896 concluded that there is no permanent subsidence in the level of the sea. In addition to these periodical fluctuations, there are also seasonal oscillations, the level being lowest in January and highest in the summer.

The level of the Caspian, however, was formerly about the same as the existing level of the Black Sea, although now some 86 ft. below it. This is shown by the evidences of erosion on the face of the rocks which formed the original shore-line of its southern basin, those evidences existing at the height of 65 to 80 ft. above

the present level. That a rapid subsidence did take place from the higher level is indicated by the fact that between it and the present level there is an absence of indications of erosive energy. There can be no real doubt that formerly the area of the Caspian was considerably greater than it is at the present time. – Nearly one hundred and fifty years ago Pallas had his attention arrested by the existence of the salt lakes and dry saline deposits on the steppes to the east of the Caspian, and at great distances from its shores, and by the presence in the same localities of shells of the same marine fauna as that which now inhabits that sea, and he suggested the obvious explanation that those regions must formerly have been covered by the waters of the sea. And it is indeed the fact that large portions of the vast region comprised between the lower Volga, the Aral- Irtysh water-divide, the Dzungarian Ala-tau, and the outliers of the Tian-shan and Hindu-kush systems are actually covered with Aralo-Caspian deposits, nearly always a yellowish-grey clay, though occasionally they assume the character of a more or less compact sandstone of the same colour. These deposits attain their maximum thickness of 90 ft. east of the Caspian, and have in many parts been excavated and washed away by the rivers (which have frequently changed their beds) or been transported by the winds, which sweep with unmitigated violence across those wide unsheltered expanses. The typical fossils unearthed in these deposits are shells of species now living in both the Caspian and the Aral, though in the shallow parts of both seas only, namely (according to Ivan V. Mushketov [1850-1902]) Cardium edule, Dreissena polymorpha, Neritina liturata, Adacna vitrea, Hydrobia stagnalis, in the Kara-kum desert, and Lithoglyphus caspius, Hydrobia stagnalis, Anodonta ponderosa and the sponge Metchnikovia tuberculata, in the Kizil- kum desert. The exact limits of the ancient Aralo-Caspian sea are not yet settled, except in the north-west, where the Ergeni Hills of Astrakhan constitute an unmistakable barrier. North- wards these marine deposits are known to exist 80 m. away from Lake Aral, though they do not cross the Aral-Irtysh water- divide, so that this sea will not probably have been at that time connected with the Arctic, as some have supposed. The eastern limits of these deposits lie about 100 m. from Lake Aral, though Severtsov maintained that they penetrate into the basin of Lake Balkash. Southwards they have been observed without a break for 160 m. from Lake Aral, namely in the Sary-kamysh depression (the surface of which lies below the level of the Caspian) and up

the Uzboi trench for ioo m. from the latter sea. How far they reach up the present courses of the Oxus (Amu-darya) and Jaxartes (Syr-darya) is not known. Hence, it is plain that in late Tertiary, and probably also in Post-Tertiary, times the Aralo-Caspian Sea covered a vast expanse of territory and embraced very large islands (e.g. Ust-Urt) , which divided it into an eastern and a western portion, communicating by one or two narrow straits only, such as on the south the Sary-kamysh depression, and on the norththe lineof thelakes of Chumyshty and Asmantai. More than this, the Caspian was also, it is pretty certain, at the same epoch, and later, in direct communication with the Sea of Azov, no doubt by way of the Manych depression; for in the limans or lagoons of the Black Sea many faunal species exist which are not only identical with species that are found in the Caspian, but also many which, though not exactly identical, are closely allied. As examples of the former may be named—Archaeobdella, Clessinia variabilis, Neritina liturata, Gmelina, Gammarus moeoticus, Pseudocuma pectinata, Paramysis Baeri, Mesomysis Kowalevskyi and M. intermedia, Limnomysis Benedeni and L. Bra,ndti, and species of the ichthyological fauna Gobius, Clupea and Acipenser; while as illustrating the latter class the Black Sea contains Dreissenia bugensis (allied to D. rostriformis and D. Grimmi), Cardium ponticum (to C. caspium), C. color alum (to Monodacna edentula), Amphicteis antiqua (to A. Kowalevskyi) and Bythotrephes azovicus (to B. socialis).

In the opinion of Russian geologists the separation of the Caspian from the great ocean must have taken place at a com- paratively recent geological epoch. During the early Tertiary age it belonged to the Sarmatian Ocean, which reached from the middle Danube eastwards through Rumania, South Russia, and along both flanks of the Caucasus to the Aralo-Caspian region, and westwards had open communication with the great ocean, as indeed the ancient geographers Eratosthenes, Strabo and Pliny believed it still had in their day. This communication began to fail, or close up presumably in the Miocene period; and before the dawn of Pliocene times the Sarmatian Ocean was broken up or divided into sections, one of which was the Aralo-Caspian sea already discussed. During the subsequent Ice Age the Caspian flowed over the steppes that stretch away to the north, and was probably still connected with the Black Sea (itself as yet

unconnected' with the Mediterranean), while northwards it sent a narrow gulf or inlet far up the Volga valley, for Aralo-Caspian deposits have been observed along the lower Kama in 56° N. lat. Eastwards' it penetrated up the Uzboi depression between the Great and Little Balkhan ranges, so that that depression, which is strewn (as mentioned above) with Post-Tertiary marine deposits, was not (as is sometimes supposed) an old bed of the Oxus, but a gulf of the Caspian. After the great ice cap had thawed and a period of general desiccation set in, the Caspian began to shrink in area, and simultaneously its connexions with the Black Sea and the Sea of Aral were severed.

Fauna. — The fauna of this sea has been studied by Eichwald, Kowalevsky, Grimm, Dybowski, Kessler and Sars. At the present time it represents an intermingling of marine and fresh- water forms. To the former belongs the herring {Clupea), and to the latter, species of Cyprinus, Perca and Silurus, also a lobster. Other marine forms are Rhizopoda (Rotalia and Textillaria), the sponge Amorphina, the Amphicteis worm, the molluscs Cardium edule and other Cardidae, and some Amphipods (Cumacea and Mysidae,), but they are forms which either tolerate variations in salinity or are especially characteristic of brackish waters. But there are many species inhabiting the waters of the Caspian whichare not foundelsewhere. These include Protozoa, three sponges, Vermes, twenty-five Molluscs, numerous Amphipods, fishes of the genera Gobius, Benthophilus and Cobitis, and one mammal (Phoca caspia). This last, together with some of the Mysidae and the species Glyptonotus entomon, exhibits Arctic characteristics, which has suggested the idea of a geologic- ally recent connexion between the Caspian and the Arctic, an idea of which no real proofs have been as yet discovered. The Knipovich expedition in 1904 found no traces of organic life below the depth cf 220 fathoms except micro-organisms and a

single Oligochaete; but above that level there exist abundant evidences of rich pelagic life, more particularly from the surface down to a depth of 80 fathoms.

Fisheries.— No other inland sea is so richly stocked with fish as the Caspian, especially off the mouths of the large rivers, the Volga, Ural, Terek and Kura. The fish of greatest economic value are sturgeon (four species), which yield great quantities of caviare and isinglass, the herring, the salmon and the lobster. The annual catch of the entire sea is valued at an average of one million sterling. Some 50,000 persons are engaged in this

industry off the mouth of the Volga alone. Seals are hunted in Krasnovodsk Bay.

Salinity. — The proportion of salt in the water of the Caspian, though varying in different parts and at different seasons, is generally much less than the proportion in oceanic water, and even less than the proportion in the water of the Black Sea. In fact the salinity of the Caspian is only three-eights of that of the ocean. In the northern section, which receives the copious volumes brought down by the Volga, Ural and Terek, the salinity is so slight (only 0-0075% i n the surface layers) that the water is quite drinkable, its specific gravity being not higher than 1-0016. In the middle section the salinity of the surface layers increases to 0-015%, though it is of course greater along the shores. The concentration of the saline ingredients proceeds with the greatest degree of intensity in the large bays on the east side of the sea, and more especially in that of Kara-boghaz, where it reaches 16-3% (Spindler expedition). The bottom of this almost isolated basin is covered for an area of 1300 sq. m. with a deposit of Epsom salts (sulphate of magnesia), 7 ft. thick, amounting to an estimated total of 1,000,000,000 tons. While the proportion of common salt to sulphate of magnesia is as n to 1 in the water of the Black Sea and as 2 to 1 in the Caspian water generally, it is as 12-8 to 5-03 in the Kara-boghaz. The salinity of the surface water of the southern section of the Caspian averages 1 • 5 %.

Climate. — The temperature of the air over the Caspian basin is remarkable for its wide range both geographically and seasonally. The January isotherm of 15 F. skirts its northern shore; that of 40 crosses its southern border. But the winter extremes go far below this range: during the prevalence of north-east winds the thermometer drops to -20 , or even lower, on the surrounding steppes, while on the Ust-Urt plateau a temperature of -30° is not uncommon. Again, the July isotherm of 75 crosses the middle section of the Caspian, nearly coinciding with the January isotherm of 25 , while that of 8o° skirts the southern shore of the sea, nearly coinciding with the January curve of 40°,. so that the mean annual range over the northern section of the sea is 60° and over the southern section 40 . The former section, which is too shallow to store up any large amount of heat during the summer, freezes for three or four months along the shores, effectually stopping navigation on the lower Volga, but out in the middle ice appears only when driven there by northerly winds.

The prevalent winds of the Caspian blow from the south-east,

usually between October and March, and from the north and north-west, commonly between July and September. They sometimes continue for days together with great violence, rendering navigation dangerous and driving the sea-water up over the shores. They also, by heaping up the water at the one end of the sea or the other, raise the level temporarily and locally to the extent of 4 to 8 ft. The currents of the Caspian were investigated by the Knipovich expedition; it detected two of special prominence, a south-going current along the west shore and a north-going current along the east shore. As a consequence of this the temperature of the water is higher on the Asiatic than on the European side. The lowest temperature obtained was 35° -24 on the bottom in shallow water, the highest 70 -7 on the surface. But in March the temperature, as also the salinity, was tolerably uniform throughout all the layers of water. Another interesting fact ascertained by the same expedition is that the amount of oxygen contained in the water decreases rapidly with the depth: off Derbent in the middle section of the sea the amount diminished from 5-6 cc. per litre at a depth of 100 metres

(330 ft.) to 0-32 cc. per litre at a depth of 700 metres (say 2300 ft.). At the same spot samples of water drawn from the bottom were found to contain 0-3 cc. of sulphuretted hydrogen per litre. In the southern section of the sea the decrease is not so rapid. In this latter section Spindler ascertained in July 1897 that the temperature of the surface water 60 m. from Baku was 72-9°, but that below 10 fathoms it sank rapidly, and at 200 fathoms and below it was constant at 21-2°.

Navigation. — The development of the petroleum industry in the Apeshron peninsula (Baku) and the opening (1886) of the Transcaspian railway have greatly increased the traffic across the Caspian Sea. A considerable quantity of raw cotton is brought from Ferghana by the latter route and shipped at Krasnovodsk for the mills in the south and centre of Russia, as well as for countries farther west. And Russia draws her own supplies of petroleum, both for lighting and for use as liquid fuel, by the sea route from Baku. Other ports in addition to those just mentioned are Astrakhan, on the Volga; Petrovsk, Derbent and Lenkoran, on the west shore; Enzeli or Resht, and Astarabad, on the Persian coast; and Mikhailovsk, on the east coast. The Russians keep a

small naval flotilla on the Caspian, all other nations being debarred from doing so by the treaty of Turk- manchai (1828).

At various times and by various persons, but more particularly by Peter the Great, the project has been mooted of cutting a canal between the Volga and the Don, and so establishing unrestricted water communication between the Caspian and the Black Sea; but so far none of these schemes has taken practical shape. In 1900 the Hydrotechnical Congress of Russia discussed the plan of constructing a canal to connect the Caspian more directly with the Black Sea by cutting an artificial waterway about 22 ft. deep and 180 ft. wide from Astrakhan to Taganrog on the Sea of Azov.

See works quoted under Aral ; also von Baer, ” Kaspische Studien,” in Bull. Sci. St-Petersbourg (1855-1859), and in Erman's Archiv russ. (1 855-1 856); Radde, Fauna und Flora des siidwest-lichen Kaspigebietes (1886); J. V. Mushketov, Turkestan (St Peters- burg, 1886), with bibliographical references; Ivashintsev, Hydro- graphic Exploration of the Caspian Sea (in Russian), with atlas (2 vols., 1866); Philippov, Marine Geography of the Caspian Basin (in Russian, 1877); Memoirs of the Aral-Caspian Expedition of 1876-1877 (2 vols., in Russian), edited by the St Petersburg Society of Naturalists; Andrusov, ” A Sketch of the Development of the Caspian Sea and its Inhabitants,” in Zapiski of Russ. Geog. Soc.: General Geog. vol. xxiv. ; Eichwald, Fauna Caspio-Caucasica (1841); Seidlitz, “Das Karabugas Meerbusen,” in Globus, with map, vol. lxxvi. (1899); Knipovich, ” Hydrobiologische Unter-suchungert des Kaspischen Meeres,” in Petermanns Mitteilungen, vol. 1. (1904); and Spindler, in Izvestia of Russ. Geog. Soc. vol. xxxiv. (P. A. K.;J. T. Be.)

CASS, LEWIS (1782-1866), American general and statesman, was born at Exeter, New Hampshire, on the 9th of October 1782. He was educated at Phillips Exeter Academy, joined his father at Marietta, Ohio, about 1799, studied law there in the office of Return Jonathan Meigs (1765-1825), and was admitted to the bar at the age of twenty. Four years later he became a member of the Ohio legislature. During the War of 1812 he served under General William Hull, whose surrender at Detroit he strongly condemned, and under General W. H. Harrison, and rose from the rank of colonel of volunteers to be major-general of Ohio militia and finally to be a brigadier-general in the regular United States army. In 18 13 he was appointed governor of the territory of Michigan, the area of which was much larger than that of the present state. This position gave him the chief control of Indian

affairs for the territory, which was then occupied almost entirely by natives, there being only 6000 white settlers. During the eighteen years in which he held this post he rendered valuable services to the territory and to the nation; he extinguished the Indian title to large tracts of land, instituted surveys, constructed roads, and explored the lakes and sources of the Mississippi river. His relations with the British authorities in Canada after the War of 18 1 2 were at times very trying, as these officials persisted in searching American vessels on the Great Lakes and in arousing the hostility of the Indians of the territory against the American government. To those experiences was largely due the antipathy

for Great Britain manifested by him in his later career. Upon the reorganization of President Jackson's cabinet in 183 1 he became secretary of war, and held this office until 1836. It fell to him, therefore, to direct the conduct of the Black Hawk and Seminole wars. He sided with the president in his nullification controversy with South Carolina and in his removal of the Indians from Georgia, but not in his withdrawal of the govern- ment deposits from the United States Bank.

In 1836 General Cass was appointed minister to France, and became very popular with the French government and people. In 1842, when the Quintuple Treaty was negotiated by representa- tives of England, France, Prussia, Russia and Austria for the suppression of the slave trade by the exercise of the right of search, Cass attacked it in a pamphlet entitled " An Examination of the Questions now in Discussion between the American and British Government Concerning the Right of Search," and presented to the French government a formal memorial which was probably instrumental in preventing the ratification of the treaty by France. In this same year the Webster-Ashburton treaty between Great Britain and the United States was con- cluded, and, as England did not thereby relinquish her claim of the right to search American vessels, Cass, after having taken such a decided stand in this controversy, felt himself in an awkward position, and resigned his post. His attitude on this question made him very popular in America, and he was a strong, but unsuccessful, candidate for the Democratic nomination for the presidency in 1844. From 1845 to 1848 and from 1849 to 1857 he was a member of the United States Senate, and in 1846 was a leader of those demanding the " re-annexation " of all the Oregon country south of 54 40′ or war with England, and was one of the fourteen who voted against the ratification of the compromise with England at the 49th parallel. He loyally supported Polk's

administration during the Mexican War, opposed the Wilmot Proviso, and advocated the Compromise Measures of 1850 and the Kansas-Nebraska Bill of 1854. In his famous " Nicholson letter " of December 1847 he made what was probably the earliest enunciation of the doctrine of " popular sovereignty," namely, that the people of the territories should decide for themselves whether or not they should have slavery.

In 1848 he received the Democratic nomination for the presidency, but owing to the defection of the so-called " Barnburners " (see Free-Soil Party) he did not receive the united support of his party, and was defeated by the Whig candidate, Zachary Taylor. His name was again prominent before the Democratic convention of 1852, which, however, finally nominated Franklin Pierce. On account of his eminently conservative attitude on all questions concerning slavery, General Cass has been accused of pandering to the southern Democrats in order to further his political aspirations. His ideas of popular sovereignty, however, were not inconsistent with the vigorous Democratic spirit of the west, of which he was a typical representative, and it is not clear that he believed that the application of this principle would result in the extension of slavery. As the west became more radically opposed to slavery after the troubles in Kansas, Cass was soon out of sympathy with his section, and when the Republicans secured control of the legislature in 1857 they refused to return him to the Senate. President Buchanan soon afterward made him secretary of state, and in this position he at last had the satisfaction of obtaining from the British government an acknowledgment of the correctness of the American attitude with regard to the right of search (or " visitation," as Great Britain euphemistically termed it). In December i860 he retired from the cabinet when the president refused to take a firmer attitude against secession by reinforcing Fort Sumter, and he remained in retirement until his death at Detroit, Michigan, on the 17th of June 1866. He wrote for the North American and the American Quarterly Reviews, and published Inquiries Concerning the History, Traditions and Languages of Indians Living Within the United States (1823), and France: Its King, Court and Government (1840).

See W. T. Young, Life and Public Services of General Lewis Cass (Detroit, 1852); W. L. G. Smith, Life and Times of Lewis Cass

(New York, 1856). The best biography is by A. G. McLaughlin, Lewis Cass (revised edition, Boston, 1899), in the ” American Statesmen ” series.

CASSABA, a town of Asia Minor, in the sanjak of Manisa, 63 m. E. of Smyrna, with which it is connected by rail. Pop. estimated at 23,000, of which two-thirds are Mussulman; but the estimate is probably excessive. It has considerable local trade, and exports the products of the surrounding district. Cotton is the most important article, and there are ginning factories in the town; the silkworm is largely raised and exported; and the ” melons of Cassaba ” are sent not only to Smyrna but to Constantinople. There are fragments of marbles built into the houses, but the modern town does not seem to occupy any ancient site of importance.

CASSA6NAC, BERNARD ADOLPHE GRANIER DE (1806- 1880), French journalist, was born at Averon-Bergelle in the department of Gers on the nth of August 1806. In 1832 he began his career as a Parisian journalist, contributing ardent defences of Romanticism and Conservatism to the Revue de Paris, the Journal des Dibats, and to La Presse. Then he founded a political journal, L’Upoque (1845-1848), in which his violent polemics in support of Guizot brought him notoriety and not a few duels. In 1851, in the Constitutionnel, he declared himself openly an imperialist; and in 1852 was elected as ” official candidate ” by the department of Gers. As journalist and deputy he actively supported an absolutist policy. He de- manded the restoration of religion, opposed the laws in favour of the press, and was a member of the club of the rue de l’Arcade. In March 1868 he accused the Liberal deputies of having received money from the king of Prussia for opposing the emperor, and when called upon for proof, submitted only false or trivial documents. After the proclamation of the republic (4th of September 1870) he fled to Belgium. He returned to France for the elections of 1876, and was elected deputy. He continued to combat all the republican reforms, but with no advantage to his party. He died on the 31st of January 1880. In addition to his journalistic articles he published various historical works, now unimportant.

His son, Paul Adolphe Marie Prosper Granier de Cassagnac (1843-1904), while still young was associated with his father in both politics and journalism. In 1866 he became editor of the

Conservative paper Le Pays, and figured in a long series of political duels. On the declaration of war in 1870 he volunteered for service and was taken prisoner at S6dan. On his return from prison in a fortress in Silesia he continued to defend the Bonapartist cause in Le Pays, against both Republicans and Royalists. Elected deputy for the department of Gers in 1876, he adopted in the chamber a policy of obstruc- tion "to discredit the republican regime." In 1877 he openly encouraged MacMahon to attempt a Bonapartist coup d'etat, but the marshal's refusal and the death of the prince imperial foiled his hopes. He now played but a secondary r61e in the chamber, and occupied himself mostly with the direction of the journal L'AutoritS, which he had founded. He was not re-elected in 1902, and died in November 1904. His sons took over L'AutoritS and the belligerent traditions of the family.

CASSANA, NICCOLO (1659-1714), often called Nicoletto, Italian painter, was born at Venice, and became a disciple of his father, Giovanni Francesco Cassana, a Genoese, who had been taught the art of painting by Bernardino Strozzi (" il Prete Genovese ")• Having painted portraits of the Florentine court, and also of some of the English nobility, Nicoletto was invited to England, and introduced to Queen Anne, who sat to him for her likeness, and conferred on him many marks of favour. He died in London in 17 14, having given way to drinking in his later years. Cassana was a man of the most vehement temper, and would wallow on the ground if provoked with his work. One of his principal paintings is the " Conspiracy of Catiline," now in Florence.

CASSANDER (c. 350-297 B.C.), king of Macedonia, eldest son of Antipater, first appears at the court of Alexander at Babylon,

where he defended his father against the accusations of his enemies. Having been passed over by his father in favour of Polyperchon as his successor in the regency of Macedonia, Cassander allied himself with Ptolemy Soter and Antigonus, and declared war against the regent. Most of the Greek states went over to him, and Athens also surrendered. He further effected an alliance with Eurydice, the ambitious wife of King Philip Arrhidaeus of Macedon. Both she and her husband, however, together with Cassander's brother, Nicanor, were soon after slain by Olympias. Cassander at once marched against Olympias, and, having forced her to surrender in Pydna, put her to death (316). In 310 or 309 he also murdered Roxana and Alexander, the wife and son of Alexander the Great, whose natural son Heracles he

bribed Polyperchon to poison. He had already connected himself with the royal family by mar- riage with Thessalonica, Alexander the Great's half-sister, and, having formed an alliance with Seleucus, Ptolemy and Lysimachus, against Antigonus, he became, on the defeat and death of Antigonus in 301, undisputed sovereign of Macedonia. He died of dropsy in 297. Cassander was a man of literary taste, but violent and ambitious. He restored Thebes after its destruction by Alexander the Great, transformed Therma into Thessalonica, and built the new city of Cassandreia upon the ruins of Potidaea.

See Diod. Sic. xviii., xix., xx. ; Plutarch, Demetrius, 18. 31, Phocion, 31; also Macedonian Empire.

CASSANDER (or Cassant), GEORGE (15 13-1566), Flemish theologian, born at Pitthem near Bruges, went at an early age to Louvain and was teaching theology and literature in 1541 at Bruges and shortly afterwards at Ghent. About 1549 he removed to Cologne, where, after a profound study of the points of difference between the Catholic and reformed churches, he devoted himself to the project of reunion, thus anticipating the efforts of Leibnitz. In 1561 he published anonymously De Officiis pii ac publicae tranquillitatis vere amantis viri in hoc dissidio religionis (Basel), in which, while holding that no one, on account of abuses, has a right utterly to subvert the Church, he does not disguise his dislike of those who exaggerated the papal claims. He takes his standpoint on Scripture explained by tradition and the fathers of the first six centuries. At a time when controversy drowned the voice of reason, such a book pleased neither party; but as some of the German princes thought that he could heal the breach, the emperor Ferdinand asked him to publish his Consultatio de Articulis Fidei inter Catholicos et Protestantes Controversis (1565), in which, like Newman at a later date, he tried to put a Catholic interpretation upon Protestant formularies. While never attacking dogma, and even favouring the Roman church on the ground of authority, he criticizes the papal power and makes reflections on practices. The work, attacked violently by the Louvain theologians on one side, and by Calvin and Beza on the other, was put on the Roman Index in 1617. He died at Cologne on the 3rd of February 1 566. The collected edition of his works was published in 1616 at Paris. (E. Tn.)

CASSANDRA, in Greek legend, daughter of Priam and Hecuba. She was beloved of Apollo, who promised to bestow on her the

spirit of prophecy if she would comply with his desires. Cassandra accepted the proposal; but no sooner had she obtained the gift than she laughed at the tempter, and refused to fulfil her promise. Apollo revenged himself by ordaining that her predictions should be discredited (Apollodorus iii. 12. 5) ; and hence it was in vain that on the arrival of Helen she prophesied the ruin of Troy. On the capture of that city she was ravished by Ajax, the son of Oileus, in the temple of Minerva (Strabo vi. p. 264). In the distribution of the booty, Cassandra fell to the lot of Agamemnon; but again her foresight was useless, for he would not believe her prediction that he should perish in his own country. The prophecy was fulfilled, for both were slain through the intrigues of Clytaemnestra (Odyssey, xi. 421 ff.). It is to be noticed that there is no mention in Homer of her prophetic gifts. Together with Apollo, she was worshipped under the name of Alexandra.

CASSANO ALL' IONIO, a town of Calabria, Italy, in the province of Cosenza; its railway station (6 m. S. of the town) is 37 m. N. by E. from the town of Cosenza, while it is 6 m. W. of Sibari, on the line between Metaponto and Reggio. Pop. 6842. It is very finely situated, 820 ft. above sea-level: the rock above it is crowned by a medieval castle commanding beautiful views: a tower is still pointed out as that from which the stone was thrown which killed Milo, but this rests on an erroneous identification of Cassano with the ancient Compsa (q.v.). There are warm sulphurous springs here which are used for baths.

CASSAVA, the name given to the farinaceous root of two species of Euphorbiaceous plants, the bitter cassava, Manihot utilissima, and the sweet cassava, M. Aipi, both highly im- portant sources of food starches; Manihot is given as the native Brazilian name in Spanish writings of the 16th century. They are herbaceous or semi-shrubby perennials with very large fleshy, cylindrical, tapering roots as much as 3 ft. long and 6 to 9 in. in diameter, and filled with milky juice. The slender stems,

Cassava or Manioc {Manihot utilissima), less than half nat. size.

1, An inflorescence showing at a 3, Stamens and fleshy disc of male

a fruit which will presently flower.

separate into five one-seeded 4, Seed with its appendage (stro-

parts, about f nat. size. phiole or caruncle).

2, Pistil of female flower.

S to o ft. high, bear large spreading long-stalked leaves, with the blade divided nearly to the base into three to seven long narrow segments. The plants are probably natives of South America, but the bitter cassava, which is the more important of the two in an economic sense, has been introduced into most tropical regions, and is extensively cultivated in west tropical Africa and the Malay Archipelago, from which, as well as from Brazil and other South American states, its starch in the form of tapioca is a staple article of export. The sap of the bitter cassava root contains hydrocyanic acid, and the root, being therefore highly poisonous, cannot be eaten in a fresh condition; while on the other hand the sweet cassava is perfectly innocuous, and is employed as a table vegetable. Exposure to heat dissi- pates the poisonous principle, and the concentrated juice is in that state used as the basis of cassareep and other sauces. From the bitter cassava roots many different food preparations are made in Brazil. The roots are preserved for use by being simply

cleaned, sliced and dried; from such dried slices manioc or cassava meal, used for cassava cakes, &c, is prepared by rasping. The starch also is separated and used for food under the name of Brazilian arrowroot; and this, when agglomerated into pellets on hot plates, forms the tapioca {q.v.) of commerce. Cassava starch has a stellate hilum, which readily distinguishes it under the microscope from other starches.

CASSEL, a town of northern France in the department of Nord, 34 m. N.W. of Lille by rail. Pop. (1906) 1844. It stands on an isolated hill (515 ft.) from which portions of France, Belgium and England can be seen, with 32 towns and 100 villages, including St Omer, Dunkirk, Ypres and Ostend. The former hotel de ville (1634), the hotel de la Noble Cour, once the seat of the jurisdiction of maritime Flanders, now the town-hall, and the hotel des dues d'Halluin are the historic buildings of the town. Cassel has a communal college. Its industrial establish- ments include tanneries, oil-mills, salt refineries and breweries, and there is trade in cattle and butter.

The town, supposed to occupy the site of Castellum Menapiorum, was a Roman station, as numerous remains of the Gallo-Roman period attest, and an important centre of roads. It is frequently mentioned in the wars of the middle ages, and was the scene of important battles in 107 1, when Robert, count of Flanders, vanquished his rival Arnulf; 1328, when Philip of Valois defeated the Flemish; and 1677, when William of Orange was defeated by Philip, duke of Orleans, brother of Louis XIV. General D. R. Vandamme (1770-1830) was born in the town.

CASSEL, or Kassel, a city of Germany, capital of the former electorate of Hesse-Cassel, and, since its annexation by Prussia in 1866, capital of the province of Hesse-Nassau. Pop. (1885) 64,083; (1905) 120,446. It is pleasantly situated, in a hilly and well-wooded country, on both sides of the river Fulda, over which a stone bridge leads to the lower new town, 124 m. by rail N.N.E. from Frankfort-on-Main. The river is navigable for barges, and railways connect the town with all parts of Germany. The streets of the old town are narrow and crooked, and contain many picturesque gabled houses, generally of the 17th century, but those of the upper and lower new town; and the three suburbs, are not surpassed by any in Germany. The principal streets are the Konigs-strasse (5100 ft. long and 60 broad), the Schone Aussicht, and the Stande-platz (180 ft. broad with four rows of linden trees). The large Friedrichs-platz is 1000 by 450 ft. in area. In it stands a marble statue of the landgrave Frederick II. There is a fine view from the open side. The former residence of the electors {Residenzschloss) fronts this square, as well as the Museum Fridericianum, with a facade of Roman-Ionic columns. The museum contains various valuable collections of curiosities, interesting mosaics, coins, casts, a library of 230,000 volumes, and valuable manuscripts. In the cabinet of curiosities there is a complete collection of clocks and watches from the earliest to the present time. Among these is the so-called Egg of Nuremberg, a watch made about 1500 by Peter Henlein. Among other public places and build- ings worthy of notice are the Roman Catholic church, with a splendid interior; the Konigs-platz, with a remarkable echo; the Karls-platz, with the statue of the landgrave Charles; and the Martins-platz, with a large church — St Martin's — with twin towers, containing the burial-vaults of the Hessian princes. The gallery of paintings, housed in a handsome building erected in 1880 on the Scheme Aussicht, contains one of the finest small collections in Europe, especially rich in the works of Rem- brandt, Frans Hals and Van Dyck.

The town contains numerous educational institutions, includ- ing a technical college, a school of painting, a celebrated classical school, which the emperor William II. attended, and a military academy. The descendants of the French refugees who founded the upper new town have a church and hospital of their own. There are three Roman Catholic churches, an English church, and two synagogues. Music is much cultivated, and there is an opera with a first-rate orchestra, of which Ludwig Spohr was 1 at one time conductor. The opera-house or theatre was built

by Jerome Napoleon, but in 1906 money was voted for a new building on the Auetor. A new Rathaus (town-hall) has been erected. There are also the Bose Museum, containing collections of pictures and antiquities of Hessian origin, museums of natural history and ethnography, an industrial exhibition hall, and an industrial art school. A handsome Gothic Lutheran church was erected in 1892-1897, a post office (Renaissance) in 1881, and new administrative offices and law courts in 1876-1880. The municipal (or Murhard) library, in the Hanau park, contains 118,000 volumes. The most noticeable of the modern public monuments are those to the emperor William I. (1898), to the musician Spohr (1883), and the Lowenbrunnen (1881). In the Karlsaue, a favourite public promenade lying just below the Schone Aussicht, are the Orangerie and the marble baths. Cassel is the headquarters of the XI. German army corps, and has a large garrison. It is a favourite residence for foreigners and retired officers and government officials. The industries embrace engine-building, the manufacture of railway carriages and plant, scientific instruments, porcelain, tobacco and cigars, lithography, jute-spinning, iron-founding, brewing and gardening.

On a slope of the Habichtswald Mountains, 3 m. W. of Cassel, and approached by an avenue, is the summer palace of Wilhelms-hohe, erected in 1787-1794. Napoleon III. resided here, as a prisoner of war, after the battle of Sedan. The surrounding gardens are adorned with fountains, cascades, lakes and grottos, the principal fountain sending up a jet of water 180 ft. high and 12 in. in diameter. Here also is an interesting building called the Lowenburg, erected in 1 793-1 796 in the style of a fortified castle, and containing among other things portraits of Tudors and Stuarts. The principal curiosity is the Karlsburg cascade, which is placed in a broad ravine, thickly wooded on both sides. A staircase of 900 steps leads to the top. On one of the landings is a huge rudely-carved stone figure of the giant Enceladus, and at the top is an octagon building called the Riesenschloss, surmounted by a colossal copper figure of the Farnese Hercules, 31 ft. high, whose club alone is sufficiently capacious to accommodate from eight to ten persons. In differ- ent parts of the park, and especially from the Octagon, charming views are obtained. The park was first formed by the landgrave Frederick II., the husband of Mary, daughter of George II. of England, and was finished by his successor the landgrave William, after whom it was named.

The earliest mention of Cassel is in 913, when it is referred to as Cassala. The town passed from the landgraves of Thuringia to the landgraves of Hesse in the 13 th century, becoming one of the principal residences of the latter house in the 15th century. The burghers accepted the reformed doctrines in 1527. The fortifications of the town were restored by the landgrave Philip the Magnanimous and his son William IV. during the 16th century, and it was greatly improved by the landgrave Charles (1654-1730), who welcomed many Huguenots who founded the upper new town. In 1762 Cassel was captured by the Germans from the French; after this the fortifications were dismantled and New Cassel was laid out by the landgrave Frederick II. In 1807 it became the capital of the kingdom of Westphalia; in 1813 it was bombarded and captured by the Russian general Chernichev; in 1830, 1831 and 1848 it was the scene of violent commotions; from 1850 to 1851 it was occupied by the Prussians, the Bavarians and the Austrians; in 1866 it was occupied by the Prussians, and in 1867 was made the capital of the newly .formed Prussian province of Hesse-Nassau.

See Piderit, Geschichte derllaupt- und Residenzstadt Kassel (Kassel, 1882); Fr. Miiller, Kassel seit 70 Jahren (2 vols., 2nd ed., Kassel, 1893); and Hessler, Die Residenzstadt Kassel und ihre Umgebung (Kassel, 1902),

CASSELL, JOHN (1817-1865), British publisher, was born in Manchester on the 23rd of January 181 7. His father was the landlord of a public-house, and John was apprenticed to a joiner. He was self-educated, gaining by his own efforts a considerable acquaintance with English literature and a knowledge of French. He came to London in 1836 to work at his trade, but his energies at this time were chiefly centred in the cause of temperance,

for which he was an active worker. In 1847 he established himself as a tea and coffee merchant, and soon after started a publishing business with the aim of supplying good literature to the working classes. From the offices of the firm, which became in 1859 Messrs. Cassell, Petter, Galpin & Co., were issued the Popular Educator (1852-1855), the Technical Educator (1870-1872), the Magazine of Art (1878-1903), CasseWs Magazine (from 1852), and numerous editions of standard works. A special feature of Cassell's popular books was the illustration. At the time of the Crimean War he procured from Paris the cuts used in L' Illustration, and by printing them in his Family Paper (begun in 1853) secured a large circulation for it. The firm was

converted in 1883 into a limited liability company, under the name of Cassell & Company, Limited. John Cassell died in London on the 2nd of April 1865.

, CASSIA (Lat. cassia, Gr. naaia), the aromatic bark derived from Cinnamomum cassia. The greater part of the supply coming from China, it is sometimes termed Chinese cinnamon. The bark is much thicker than that of true cinnamon; the taste is more pungent and the flavour less delicate, though somewhat similar to that of cinnamon. The properties of cassia bark depend on the presence of a volatile oil — the oil of cassia, which is imported in a fairly pure state as an article of commerce from Canton. Cassia bark is in much more extensive demand on the continent of Europe than in Great Britain, being preferred to cinnamon by southern nations. The chief use of both the oil and bark is for flavouring liqueurs and chocolate, and in cooking generally. When ground as a spice it is difficult to distinguish cassia from cinnamon (q.v.), and it is a common practice to substitute the cheap common spice for the more valuable article. Cassia Buds, which have a pleasing cinnamon flavour, are believed to be the immature fruits of the tree which yields Chinese cinnamon. They are brought in considerable quantities from Canton, and used as a spice and in confectionery. Cassia pulp, used as a laxative, is obtained from the pods of Cassia fistula, or pudding pipe tree, a native of Africa which is cultivated in both the East and West Indies. Some confusion occasionally arises from the fact that Cassia is the generic name of an extensive genus of leguminous plants, which, in addition to various other medicinal products, is the source of the senna leaves which form an important article of materia medica.

CASSIA, VIA, an ancient high-road of Italy, leading from Rome through Etruria to Florentia (Florence); at the nth mile the Via Clodia (see Clodia, Via) diverged north-north-west, while the Via Cassia ran to the east of the Lacus Sabatinus and then through the place now called Sette Vene, where a road, probably the Via Annia, branched off to Falerii, through Sutrium (where the Via Ciminia, running along the east edge of the Lacus Ciminius, diverged from it, to rejoin it at Aquae Passeris, north of the modern Viterbo 1), Forum Cassii, Volsinii, Clusium and Arretium, its line being closely followed by the modern high-road from Rome to Florence. The date of its construction is uncertain: it cannot have been earlier than 187 B.C., 2 when the consul C. Flaminius constructed a road from Bononia to Arretium (which must have coincided with the portion of the later Via

Cassia). It is not, it is true, mentioned by any ancient authorities before the time of Cicero, who in 45 B.C. speaks of the existence of three roads from Rome to Mutina, the Flaminia, the Aurelia and the Cassia. A milestone of a.d. 124 mentions repairs to the road made by Hadrian from the boundary of the territory of Clusium to Florence, a distance of 86 m.

See Ch. Hiilsen in Pauly-Wissowa, Realencyclopadie, iii. 1669.

(T. As.)

CASSIANUS, JOANNES EREMITA, or Joannes Massixiensis (?36o-?435), a celebrated recluse, one of the first founders of monastic institutions in western Europe, was probably born in

1 The Via Traiana Nova, or the {viae) tres Traianae, mentioned in inscriptions with the Cassia and Clodia as under the same curator, are not certainly identifiable.

2 Having regard to the military importance of Arretium during the Punic wars, it is difficult to believe that no direct road existed to this point before 187 B.C.

Provence about 360, but he spent the early part of his life in the monastery of Bethlehem with his friend Germanus, and his affinities were always Eastern rather than Western. In company with Germanus he visited Egypt, and dwelt for several years among the ascetics of the desert near the banks of the Nile. In 403 he repaired to Constantinople, where he received ordination as deacon at the hands of Chrysostom. At Marseilles (after 410) he founded two religious societies — a convent for nuns, and the abbey of St Victor, which during his time is said to have contained 5000 inmates. In later times his regulations enjoyed a high reputation, and were adopted by the monks and nuns of Port Royal. He was eventually canonized; and a festival in his honour long continued to be celebrated at Marseilles on the 25th of July. Cassianus was one of the first and most prominent of the Semi-Pelagians, maintaining that while man is by nature sinful, he yet has some good remaining in him, and that, while the immediate gift of God's grace is necessary to salvation, conversion may also be begun by the exercise of man's will. He further asserted that God is always willing to bestow his grace on

all who seek it, though, at the same time, it is true that he sometimes bestows it without its being sought. These views have been held by a very large part of the church from his time, and embrace much of the essence of Arminianism. The style of Cassianus is slovenly, and shows no literary polish, but its direct simplicity is far superior to the rhetorical affectations which disfigure most of the writings of that age. At the request of Castor, bishop of Apt, he wrote two monumental and influential treatises on the monastic life. The De Institutione Coenobiorum (twelve books) describes the dress, the food, the devotional exercises, the discipline and the special spiritual dangers of monastic life in the East (gluttony, unchastity, avarice, anger, gloom, apathy, vanity and pride). The Collationes Patrum, a series of dialogues with the pious fathers of Egypt, deal with the way in which these dangers (and others, e.g. demons) may be avoided or overcome. At the desire of Leo (then arch- deacon of Rome) he wrote against Nestorius his De Incarnatione Domini in seven books.

Editions. — Douay (1616) by Alardus Gazaus, with excellent notes; Migne's Patrol. Lat. vols. xlix. and 1. ; M. Petschenig in the Vienna Corpus Script. Eccles. Lat. (2 vols., 1886-1888). See A. Harnack, History of Dogma, v. 246 ff., 253 ff . ; A. Hoch, Die Lehre d. Joh. Cassian von Natur und Gnade (Freiburg, 1895) ; W. Moeller, History of the Chr. Church, i. 368-370.

CASSINI, the name of an Italian family of astronomers, four generations of whom succeeded each other in official charge of the observatory at Paris.

Giovanni Domenico Cassini (1625-1712), the first of these, was born at Perinaldo near Nice on the 8th of June 1625. Educated by the Jesuits at Genoa, he was nominated in 1650 professor of astronomy in the university of Bologna; he observed and wrote a treatise on the comet of 1652; was employed by the senate of Bologna as hydraulic engineer ; and appointed by Pope Alexander VII. inspector of fortifications in 1657, and subsequently director of waterways in the papal states. His determinations of the rotation-periods of Jupiter, Mars and Venus in 1665-1667 enhanced his fame; and Louis XIV. applied for his services in 1669 at the stately observatory then in course of erection at Paris. The pope (Clement IX.) re- luctantly assented, on the understanding that the appointment was to be temporary; but it proved to be irrevocable. Cassini was naturalized as a French subject in 1673, having begun work at

the observatory in September 167 1. Between 167 1 and 1684 he discovered four Saturnian satellites, and in 1675 the division in Saturn's ring (see Saturn) ; made the earliest sustained observations of the zodiacal light, and published, in Les Elements de I'astronomie verifies (1684), an account of Jean Richer's (1630-1696) geodetical operations in Cayenne. Certain oval curves which he proposed to substitute for Kepler's ellipses as the paths of the planets were named after him " Cassinians." He died at the Paris observatory on the nth of September 171 2.

A partial autobiography left by Giovanni Domenico Cassini was published by his great-grandson, Count Cassini, in his Memoires pour servir a I'histoire des sciences (1810). See also C. Wolf, Histoire

de V observatoire de Paris (1902); Max. Marie, Histoire des sciences, t. iv. p. 234; R. Wolf, Geschichte der Astronomie, p. 450, &c.

Jacques Cassini (1677-1756), son of Domenico Cassini, was born at the Paris observatory on the 8th of February 1677. Admitted at the age of seventeen to membership of the French Academy of Sciences, he was elected in 1696 a fellow of the Royal Society of London, and became maitre des comptes in 1706. Having succeeded to his father's position at the obser- vatory in 171 2, he measured in 17 13 the arc of the meridian from Dunkirk to Perpignan, and published the results in a volume entitled De la grandeur et de la figure de la terre (1720) (see Geodesy). He wrote besides Elemens d' astronomie (1740), and died on the 18th of April 1756 at Thury, near Clermont. The first tables of the satellites of Saturn were supplied by him in 1716.

See C. Wolf, Histoire de V observatoire de Paris; Max. Marie, Histoire des sciences, vii. 214; R. Wolf, Geschichte der Astronomie, p. 451; J. C. Houzeau, Bibl. astronomique ; J. Delambre, Histoire de I'astronomie au XVIII' siecle, pp. 250-275 (unfairly depreciatory) ; J. F. Montucla, Hist, des mathematiques , iv. 145, 248.

Cesar Francois Cassini, or Cassini de Thury (1714-1784), son of Jacques Cassini, was born at the observatory of Paris on the 17th of June 1714. He succeeded to his father's official employments, continued the hereditary surveying operations, and began in 1744 the construction of a great topographical map of France. The post of director of the Paris observatory was created for his*

benefit in 1771, when the establishment ceased to be a dependency of the Academy of Sciences. Cassini de Thury died at Thury on the 4th of September 1784. His chief works are: — Meridienne de I' observatoire de Paris (1744), Description gHometrique de la terre (1775), and Description geometrique de la France (1784).

See C. Wolf, Histoire de V observatoire de Paris, p. 287 ; Max. Marie, Histoire des sciences, viii. 158; J. Delambre, Histoire de I'astronomie au XVIII" siecle, pp. 275-309; R. Wolf, Geschichte der Astronomie, p. 451 ; J. J. de Lalande, Bibliographic astronomique.

Jacques Dominique Cassini, Count (1748-1845), son of Cesar Francois Cassini, was born at the observatory of Paris on the 30th of June 1748. He succeeded in 1784 to the directorate of the observatory; but his plans for its restoration and re- equipment were wrecked in 1793 by the animosity of the National Assembly. His position having become intolerable, he resigned on the 6th of September, and was thrown into prison in 1794, but released after seven months. He then withdrew to Thury, where he died, aged ninety-seven, on the 18th of October 1845. He published in 1770 an account of a voyage to America in 1768, undertaken as the commissary of the Academy of Sciences with a view to testing Pierre Leroy's watches at sea. A memoir in which he described the operations superintended by him in 1787 for connecting the observatories of Paris and Greenwich by longitude-determinations appeared in 1791. He visited England for the purposes of the work, and saw William Herschel at Slough. He completed his father's map of France, which was published by the Academy of Sciences in 1793. It served as the basis for the Atlas National (1791), showing France in depart- ments. Count Cassini's Mimoires pour servir a I'histoire de I' observatoire de Paris (1810) embodied portions of an exten- sive work, the prospectus of which he had submitted to the Academy of Sciences in 1774. The volume included his Eloges of several academicians, and the autobiography of his great- grandfather, the first Cassini.

See J. F. S. Devic, Histoire de la vie et des travaux de J. D. Cassini (j85i); J. Delambre, Histoire de I'astronomie au XVIII' siecle, pp. 3 9"3 I 3; Phil. Mag. 3rd series, vol. xxviii. p. 412; C. Wolf, Histoire de V observatoire de Paris (1902), p. 234 et passim. (A. M. C.)

CASSIODORUS (not Cassiodorius) , the name of a Syrian family

settled at Scyllacium (Squillace) in Bruttii, where it held an influential position in the 5th century a.d. Its most important member was Flavius Magnus Aurelius Cassiodorus Senator (c. 490-585), historian, statesman, and monk. ” Senator ” (not a title) is the name used by himself in his official corre- spondence. His father held the offices of comes privatarum and sacrarum largitionum (controller of the emperor’s private revenue and the public exchequer) under Odoacer, and subsequently

attached himself to Theodoric, by whom he was appointed corrector (governor) of Bruttii and Lucania, and praefectus praetorio. The son at an early age became consiliarius (legal assessor) to his father, and (probably in 507) quaestor, an official whose chief duty at that time consisted in acting as the mouth-piece of the ruler, and drafting his despatches. In 514 he was ordinary consul, and at a later date possibly corrector of his native province. At the death of Theodoric (526) he held the office of magister officiorum (chief of the civil service). Under Athalaric he was praefectus praetorio, a post which he retained till about 540, after the triumphal entry of Belisarius into Ravenna, when he retired from public life. With the object of providing for the transmission of divine and human knowledge to later ages, and of securing it against the tide of barbarism which threatened to sweep it away, he founded two monasteries — Vivarium and Castellum — in his ancestral domains at Squillace (others identify the two monasteries). The special duty which he enjoined upon the inmates was the acquisition of knowledge, both sacred and profane, the latter, however, being subordinated to the former. He also collected and emended valuable MSS., which his monks were instructed to copy, and superintended the translation of various Greek works into Latin. He further amused himself with making scientific toys, such as sun-dials and water-clocks. As he is stated to have written one of his treatises at the age of ninety-three, he must have lived till after 580. Whether he belonged to the Benedictine order is uncertain.

The writings of Cassiodorus evince great erudition, ingenuity and labour, but are disfigured by incorrectness and an affected artificiality, and his Latin partakes much of the corruptions of the age. His works are (1) historical and political, (2) theo- logical

and grammatical.

1. (a) Variae, the most important of all his writings, in twelve books, published in 537. They contain the decrees of Theodoric and his successors Amalasuntha, Theodahad and Witigis; the regula- tions of the chief offices of state ; the edicts published by Cassiodorus himself when praefectus praetorio. It is the best source of our knowledge of the Ostrogothic kingdom in Italy (ed. T. Mommsen in Monumenta Germaniae Historical Auctores Antiquissimi, xii., 1894; condensed English translation by T. Hodgkin, 1886).

(b) Chronica, written at the request of Theodoric's son-in-law Eutharic, during whose consulship (519) it was published. It is a dry and inaccurate compilation from various sources, unduly partial to the Goths (ed. T. Mommsen in Mon. Germ. Hist.: Auct. Ant. xi. pt. i., 1893).

(c) Panegyrics on Gothic kings and queens (fragments ed. L. Traube in Mon. Germ. Hist.: Auct. Ant. xii.).

2. (a) De Anima, a discussion on the nature of the soul, at the conclusion of which the author deplores the quarrel between two such great peoples as the Goths and Romans. It seems to have been published with the last part of the Variae.

(b) Institutions divinarun et humanarum litterarum, an encyclo- paedia of sacred and profane literature for the monks, and a sketch of the seven liberal arts. It further contains instructions for using the library, and precepts for daily life.

(c) A commentary on the Psalms and short notes (complexiones) on the Pauline epistles, the Acts, and the Apocalypse.

(d) De Orthographia, a compilation made by the author in his ninety-third year from the works of twelve grammarians, ending wjth his contemporary Priscian (ed. H. Keil, Grammatici Latini, vii.).

The Latin translations of the Antiquities of Josephus and of the ecclesiastical histories of Theodoret, Sozomen and Socrates, under the title of Historia Tripartita (embracing the years 306-439), were carried out under his supervision.

Of his lost works the most important was the Historia Gothorum, written with the object of glorifying the Gothic royal house and

proving that the Goths and Romans had long been connected by ties of friendship. It was published during the reign of Athalaric, and appears to have brought the history down to the death of Theodoric. His chief authority for Gothic history and legend was Ablavius (Ablabius). The work is only known to us in the meagre abridgment of Jordanes (ed. T. Mommsen, 1882).

Complete Works. — ■ Editio princeps, by G. Fornerius (Paris, 157°); J- Garet (Rouen, 1679; Venice, 1729), reprinted in J. P. Migne, Patrologia Latina, lxix., lxx. On Cassiodorus generally ,_ see Anecdoton Holder i, excerpts from a treatise of Cassiodorus, edited by H. Usener (Bonn, 1877), which throws light on questions connected with his biography; T. Mommsen, preface to his edition of the Variae; monographs by A. Thorbecke (Heidelberg, 1867) and A. Fianz (Breslau, 1872); T. Hodgkin, Italy and her Invaders, iii. p. 280, iv. p. 348; A. Ebert, Allgemeine Geschichte. der Litteratur des

Mittelalters, i. ; Teuffel-Schwabe, Hist, of Roman Literature (Eng trans.), § 483; G. A. Simcox, Hist, of Latin Literature (1884); W. Ramsay in Smith's Dictionary of Greek and Roman Biography; J. B. Bury's edition of Gibbon's Decline and Fall, iv. 180, 522; R. W. Church in the Church Quarterly Review, x. (1880); J. E. Sandys in Hist, of Classical Scholarship (2nd ed., 1906); A. Olleris, Cassiodore, conservateur des livtes de I'antiquite latine (Paris, 1891); G. Minasi, M. A. Cassiodoro . . . ricerche storico-critiche (Naples, 1895) ; and C. Cipolla in Memorie delta r. Accademia delle scienze di Torino (2nd ser. xliii. pt. 2, 1893); L. M. Hartmann in Pauly- Wissowa's Realencyclopadie, iii. pt. 2 (1899), with note on the musical section of Cassiodorus' Institutiones by C. von Jan.

CASSIOPEIA, in Greek mythology, the wife of Cepheus, and mother of Andromeda; in astronomy, a constellation of the northern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.). Ptolemy catalogued 13 stars in this constellation, Tycho Brahe 46, and Hevelius 37. Its most interesting stars are: — Nova Cassiopeiae, a " new " star, which burst out with extraordinary brilliancy in 1572, when it was observed by Tycho Brahe, but gradually diminished in brightness, ultimately vanishing in about eighteen months; a-Cassiopeiae and R-Cassiopeiae are variable stars, the former irregular, the latter having a long period; -q-Cassiopeiae, a binary star, having components of magnitudes 3! and 75; a-Cassiopeiae, a double star, one being white and of magnitude 5, the other blue

and of magnitude 75.

CASSITERIDES (from the Gr. Kaaalrepos, tin, i.e. ” Tin- islands “), in ancient geography the name of islands regarded as being situated somewhere near the west coasts of Europe. Hero- dotus (430 B.C.) had dimly heard of them. Later writers, Posidonius, Diodorus, Strabo and others, call them smallish islands off (Strabo says, some way off) the north-west coast of Spain, which contained tin mines, or, as Strabo says, tin and lead mines — though a passage in Diodorus derives the name rather from their nearness to the tin districts of north-west Spain. While geographical knowledge of the west was still scanty and the secrets of the tin-trade were still successfully guarded by the seamen of Gades and others who dealt in the metal, the Greeks knew only that tin came to them by sea from the far west, and the idea of tin-producing islands easily arose. Later, when the west' was better explored, it was found that tin actually came from two regions, north-west Spain and Cornwall. Neither of these could be called ” small islands ” or described as off the north-west coast of Spain, and so the Cassiterides were not identified with either by the Greek and Roman geographers. Instead, they became a third, ill-understood source of tin, conceived of as distinct from Spain or Britain. Modern writers have perpetuated the error that the Cassiterides were definite spots, and have made many attempts to identify them. Small islands off the coast of north-west Spain, the headlands of that same coast, the SciUies, Cornwall, the British Isles as a whole, have all in turn been suggested. But none suits the conditions. Neither the Spanish islands nor the SciUies contain tin, at least in serious quantities. Neither Britain nor Spain can be called ” small islands off the north-west of Spain.” . It seems most probable, therefore, that the name Cassiterides represents the first vague knowledge of the Greeks that tin was found overseas somewhere in or off western Europe.

Authorities. — Herodotus iii. 115; Diodorus v. 21, 22, 38; Strabo ii. 5, iii. 2, 5, v. 11; Pliny, Nat. Hist, iv. 119, vii. 197, xxxiv. 156-158, are the chief references in ancient literature. T. R. Holmes, Ancient Britain (1907), appendix, identifies the Cassiterides with the British Isles. (F. J. H.)

CASSITERITE (from the Gr. Kcurmrepos, tin), the minera- logical name for tin-stone, the common ore of tin. It con- sists of tin dioxide, or stannic oxide (Sn0 2), and crystallizes in the tetragonal system. The crystals are usually 4-sided or 8-sided

prisms, striated vertically, and terminated by pyramids (fig. 1). Twins, with characteristic re-entrant angles, such as figs. 2 and 3, are common. Certain slender prismatic crystals, with an acute 8-sided pyramid, are known in Cornwall as ” spar- able tin,” in allusion to their resemblance to sparable nails, whilst very slender crystals are termed needle-tin. Occasionally the mineral occurs in fibrous forms, which pass under the name ©f

” wood-tin,” and these, though not unknown in the matrix, are generally found as rolled pebbles. By the disintegration of tin-bearing rocks and vein-stones, the cassiterite passes into the beds of streams as rolled fragments and grains, or even sand, and is then known as stream tin or alluvial tin. This detrital tin-ore was probably used as a source of the metal before the primitive miners had learnt to attack the solid tin-bearing rocks.

Pure cassiterite may be colourless, or white, as seen in certain specimens from the Malay Peninsula; but usually the mineral is brown or even black, the colour being referred to the presence of ferric oxide or other impurity. Occasionally the tin-stone is red. In microscopic sections the colour is often seen to be dis- posed in zones, following the contour of the crystal. A brown variety, with rather resinous lustre, is termed ” rosin tin.” The usual lustre of crystals of cassiterite is remarkably splendent, even adamantine. The mineral has a high refractive index, and strong bi-refringence. Certain transparent yellow and brown specimens, cut as gem-stones, exhibit considerable brilliancy.

Fig. 1.

s\

s.

^

I.

/

K: .

J-.

/ ! 5..

-^*

i'~

Fig. 2. Fig. 3.

The hardness of cassiterite is 6-5, so that it cannot be scratched with a knife, and is nearly as hard as quartz. Its specific gravity is about 7; and in consequence of this high density, the tin- stone is readily separated during the process of dressing, from all the associated minerals, except wolframite, which may, however, be removed by magnetic separators.

Cassiterite usually occurs as veins or impregnations in granitic rocks, and is especially associated with the quartz-mica rock called greisen. The usual associates of the tin-stone are quartz, tourmaline, apatite, topaz, beryl, fluorite, lithia-mica, wolframite, chalcopyrite, &c. The presence of fluorine in many of these minerals has led to the opinion that the tin has been derived in many cases from an acid or granitic magma by the action of fluorine-bearing vapours, and that cassiterite may have been formed by the interaction of tin fluoride and water vapour. Cassiterite occurs as a pseudomorph after orthoclase felspar in some of the altered granite of Cornwall, and it has occasionally been found as a cementing material in certain brecciated lodes.

Among the localities yielding cassiterite may be mentioned Cornwall, Saxony, Bohemia, Brittany, Galicia in Spain; the Malay peninsula, and the islands of Banca and Billiton; New South Wales, Queensland and Tasmania. Fine examples of wood-tin, occurring with topaz, are found in Durango in Mexico. Deposits of cassiterite under rather exceptional conditions are worked on a large scale in Bolivia; and it is notable that cassi- terite is found in Liassic limestone near Campiglia Marittima in Tuscany. Cassiterite has been worked in the York region, Alaska. (F. W. R.*)

CASSIUS, the name of a distinguished ancient Roman family, originally patrician. Its most important members are the following.

1. Spurius Cassius, surnamed Vecellinus (Vicellinus, Viscel-

lintis), Roman soldier and statesman, three times consul, and author of the first agrarian law. In his first consulate (502 B.C.) he defeated the Sabines; in his second (493) he renewed the league with the Latins, and dedicated the temple of Ceres

in the Circus; in his third (486) he made a treaty with the conquered Hernici. The account of his agrarian law is confused and contradictory; it is clear, however, that it was intended to benefit the needy plebeians (see Agrarian Laws). As such it was violently opposed both by the patricians and by the wealthy plebeians. Cassius was condemned by the people as aiming at kingly power, and hurled from the Tarpeian rock. Another account says he was tried by the family council and put to death by his own father, who considered his proposal prejudicial to the patrician interest. According to Livy, his proposal to bestow a share of the land upon the Latins was regarded with great suspicion. According to Mommsen (Romische For- schungen, ii.), the whole story is an invention of a later age, founded upon the proposals of the Gracchi and M. Livius Drusus, to which period belongs the idea of sharing public land with the Latins. J

See Livy ii. 33, 41; Dion Halic. v. 49, viii. 69-80; Cicero, Pro Balbo, 23 (53), De Republica, ii. 27 (49), 35 (60) ; Val. Max. v. 8. 2.

The following Cassii are all plebeians. It is suggested that the sons of Spurius Cassius either were expelled from, or voluntarily left, the patrician order, in consequence of their father's execution.

2. Gaius Cassius Longinus, consul 73 b.c. With his colleague, Terentius Varro Lucullus, he passed a law {lex Terentia Cassia) , the object of which was to give authority for the purchase of corn at the public expense, to be retailed at a fixed price at Rome. It is doubtful "whether this Cassius (who is often called by the additional name Varus) is identical with the Varus who was proscribed by the triumvirs, and put to death at Minturnae (43). According to Orosius he was killed at the battle of Mutina.

See Cicero, In Verrem, iii. 70, 75, y. 21; Livy, Epit. 96; Appian, Bell. Civ. iv. 28 ; Orosius v. 24. ,

3. Gaius Cassius Longinus, prime mover in the conspiracy against Julius Caesar. Little is known of his early life. In 53 B.C. he served in the Parthian campaign under M. Licinius Crassus, saved

the remnants of the army after the defeat at Carrhae, and for two years successfully repelled the enemy. In 49 B.C. he became tribune of the plebs. The outbreak of the civil war saved him from being brought to trial for extortion in Syria. He at first sided with Pompey, and as commander of part of his fleet rendered considerable service in the Medi- terranean. After Pharsalus he became reconciled to Caesar, who made him one of his legates. In 44 B.C. he became praetor peregrinus with the promise of the Syrian province for the ensuing year. The appointment of his junior, M. Junius Brutus, as praetor urbanus deeply offended him, and he was one of the busiest conspirators against Caesar, taking an active part in the actual assassination. He then left Italy for Syria, raised a con- siderable army, and defeated P. Cornelius Dolabella, to whom the province had been assigned by the senate. On the formation of the triumvirate, Brutus and he, with their combined armies, crossed the Hellespont, marched through Thrace, and encamped near Philippi in Macedonia. Their intention was to starve out the enemy, but they were forced into an engagement. Brutus was successful against Octavian, but Cassius, defeated by M. Antonius (Mark Antony), gave up all for lost, and ordered his freedman to slay him. He was lamented by Brutus as " the last of the Romans," and buried at Thasos. A man of consider- able ability, he was a good soldier, and took an interest in litera- ture, but in politics he was actuated by vanity and ambition. His portrait in Shakespeare's Julius Caesar, though vivid, is scarcely historical.

See Plutarch, Brutus, passim, Crassus, 27, 29, Caesar, 62, 69; Dio Cassius xl. 28, xlii. 13, xliv. 14, xlvii. 20; Veil. Pat. ii. 46, 56, 58, 69, 70, 87; Cicero, Philippics, xi. 13, 14, ad Alt. v. 21, xiv. 21, ad Fam. xi. 3, 15, 16; Appian, Bell. Civ. ii. 111, 113, iii. 2, 8, iv. 60-62, 87, 90, 111-113, I 3 2 '> Caesar, Bell Civ. iii. 101.

4. Quintus Cassius Longinus, the brother or cousin of the murderer of Caesar, quaestor of Pompey in Further Spain in 54 B.C. In 49, as tribune of the people, he strongly supported the cause of Caesar, by whom he was made governor of Further Spain. He treated the provincials with great cruelty, and his

appointment (48) to take the field against Juba, king of Numidia, gave him an excuse for. fresh oppression. The result was an

unsuccessful insurrection at Corduba. Cassius punished the leaders with merciless severity, and made the lot of the provincials harder than ever. At last some of his troops revolted under the quaestor M. Marcellus, who was proclaimed governor of the province. Cassius was surrounded by Marcellus in Ulia. Bogud, king of Mauretania, and M. Lepidus, proconsul of Hither Spain, to whom Cassius had applied for assistance, negotiated an arrange- ment with Marcellus whereby Cassius was to be allowed to go free with the legions that remained loyal to him. Cassius sent his troops into winter quarters, hastened on board ship at Malaca with his ill-gotten gains, but was wrecked in a storm at the mouth of the Iberus (Ebro). His tyrannical government of Spain had greatly injured the cause of Caesar.

See Dio Cassius xli. 15, 24, xlii. 15, 16, xliii. 29; Livy, Epit. Ill; Appian, B.C. ii. 33, 43; Bellum Alexandrinum, 48-64.

5. Gaius Cassius Longinus (1st century a.d.), Roman jurist, consul in 30, proconsul of Asia 40-41, and governor of Syria under Claudius 45-5°- On his return to Rome his wealth and high character secured him considerable influence. He was banished by Nero (65) to Sardinia, because among the images of his ancestors he had preserved that of the murderer of Caesar. He was recalled by Vespasian, and died at an advanced age. As he was consul in 30, he must have been born at the latest in the year 3 B.C. Cassius was a pupil of Masurius Sabinus, with whom he founded a legal school, the followers of which were called Cassiani. His chief work was the Libri Juris Civilis in ten books, which was used by the compilers of the Digest of Justinian.

See tacitus, Annals, xvi. 7-9; Suetonius, Nero, 37; Dio Cassius lix. 29; Teuffel-Schwabe, Hist, of Roman Literature, § 298, 3.

CASSIUS, AVIDIUS (d. a.d. 175), Roman general, a Syrian by birth, lived during the reign of Marcus Aurelius. He especially distinguished himself during the Parthian War (a.d. 162-165), at the conclusion of which he was apparently appointed military governor of Asia, though the actual extent of his jurisdiction is doubtful. In 172 he was sent to Egypt, where he put down a dangerous rising of the Bucolici, the robber herdsmen of the delta of the Nile, after which he returned to Syria. In 175 the emperor Aurelius fell ill, and his wife Faustina, to secure her position in case of his death, offered her hand and the throne to the successful general. A rumour of Aurelius's death having reached Syria, Cassius, without waiting for confirmation, pro-

claimed himself emperor; when the report proved false, it was too late for him to draw back, and he accordingly prepared for war. The senate declared him a public enemy, although Aurelius even then expressed the hope that he might have the opportunity of pardoning him. Deploring the necessity for taking up arms against his trusted officer, Aurelius set out for the east. While in Illyria, he received the news that Cassius had been slain by his own officers. The murderers offered his head to Aurelius, who refused to admit them, and ordered its

immediate burial.

See Dio Cassius lxxi. 2-4, 17, 22-28, 30, 31; Fronto, Letters, 1. 6; Lives of Marcus Aurelius, Verus and Comraodus in the Scrip tores Historiae Augustae, and the special biography of Avidius Cassius in the same by Vulcacius Gallicanus. The various letters and docu- ments in the last-named are generally considered spurious, and the portions of the narrative founded on them consequently untrust- worthy. See also article in Pauly-Wissowa's Realencyclopadie, ii. pt. 2 (1896).

CASSIUS, GAIUS, Latin poet, general and politician, called Parmensisfrom his birthplace Parma, was one of the murderers of Julius Caesar, and after his death joined the party of Brutus and his namesake Cassius the conspirator. In 43 B.C. he was in command of the fleet on the coast of Asia, but after the battle of Philippi joined Sextus Pompeius in Sicily. When Pompeius, having been defeated in a naval engagement at Naulochus by the fleet of Octavian under Agrippa, fled to Asia, Cassius went over to Antony, and took part in the battle of Actium (31). He afterwards fled to Athens, where he was soon put to death by Octavian, whom he had offended by writing an abusive letter (Suetonius, Augustus, 4) . Cassius is credited with satires, elegies, epigrams and tragedies. Some hexameters with the title Cassii

Orpheus are by Antonius Thylesius,an Italian of the 17 th century. Horace appears to have thought well of Cassius as a poet, for he asks Tibullus whether he intends to compete with the opuscula (probably the elegies) of Cassius {Epistles, i. 4. 3). The story in the Horace scholia, that L. Varius Rufus published his famous tragedy Thyestes from an MS. which he found amongst the papers of Cassius after his death, is due to a confusion of Cassius's murderer, Q. Attius Varus, with the tragedian (Appian, B.C. v. 2, 139; Cicero, ad Fam. xii. 13; Veil. Pat. ii. 87; Orosius, vi. 19; see also the diffuse treatise of A. Weichert, Be L. Varii et

Cassii Parmensis Vita et Carminibus, 1836). Cassius Parmensis must not be confused with Cassius Etruscus (Horace, Satires, i. 10. 60), an improviser, who is said to have used enough paper to furnish his funeral pyre.

CASSIVELAUNUS, or Cassivellaunus, a British chieftain, ruler of the country north of the Thames, who led the native tribes against Julius Caesar on his second expedition (54 B.C.) (see Britain). After several indecisive engagements, Caesar took the camp of Cassivelaunus, who was obliged to make peace on condition of paying tribute and giving hostages. But these promises were not meant to be kept, and it appears certain that the tribute was never paid. According to Bede {Hist. Eccles. i. 2) , the remains of Cassivelaunus's entrenchment were visible seven or eight centuries later.

See Caesar, B.G. v. 11-22; Dio Cassius xl. 2, 3; Orosius vi. 9. 6; Eutropius vi. 17; Polyaenus, Strategemata, viii. 23. For the etymology of the name (which is Celtic in origin, and appears later as Caswallon) see J. Rhys, Celtic Britain, pp. 289-290 (1904); C. I. Elton, Origins of English History (1890) ; and Stock's edition of Caesar, De Bello Gallico (1898).

CASSOCK (Fr. casaque, a military cloak), a long-sleeved, close-fitting robe worn by the clergy and others engaged in ecclesiastical functions. The name was originally specially applied to the dress worn by soldiers and horsemen, and later to the long garment worn in civil life by both men and women. As an ecclesiastical term the word " cassock " came into use somewhat late (as a translation of the old names of subtanea, vestis talaris, toga talaris, or tunica talaris), being mentioned in canon 74 of 1604; and it is in this sense alone that it now survives. The origin of the word has been the subject of much specu- lation. It is derived through the French from the Italian casacca, which Florio {Q. Anna's New World of Words, 1611) translates as " a frock, a horseman's cote, a long cote; also a habitation or dwelling," and it is usually held that this in turn is derived from casa, a house (cf. the derivation of " chasuble," q.v.). This, however, though possible is uncertain. A Slav origin for the word has been suggested (Hatzfeld and Darme- steter, Die. gen. de la languefranqaise) , and the Cossack horseman may have given to the West both the garment and the name. Or again, it may be derived from casequin (Ital. casecchino) , rather than vice versa, and this in turn from an Arabic kazayand (Pers. kashayand), a padded jerkin; the word kasagdn occurring in Mid. High Ger. for

a riding-cloak, and gasygan in O. Fr. for a padded jerkin (Lagarde in Gbtt. gelehrte Anzeiger, April 15, 1887, p. 238).

The cassock, though part of the canonical costume of the clergy, is not a liturgical vestment. It was originally the out- of-doors and domestic dress of lay-people as well as clergy, and its survival among the latter when the secular fashions had changed is merely the outcome of ecclesiastical conservatism. In mild weather it was the outer garment; in cold weather it was worn under the tabard or chimere {q.v.) ; sometimes in the middle ages the name ” chimere ” was given to it as well as to the sleeveless upper robe. In winter the cassock was often lined with furs varying in costliness with the rank of the wearer, and its colour also varied in the middle ages with his ecclesiastical or academic status. In the Roman Catholic Church the sub- tanea (Fr. soutane, Ital. sottana) must be worn by the clergy whenever they appear, both in ordinary life (except in Protestant countries) and under their vestments in church. It varies in colour with the wearer’s rank: white for the pope, red (or black edged with red) for cardinals, purple for bishops, black for the lesser ranks: members of religious orders, however,

whatever their rank, wear the colour of their religious habit. In the Church of England the cassock, which with the gown is prescribed by the above-mentioned canon of 1604 as the canonical dress of the clergy, has been continuously, though not univer- sally, worn by the clergy since the Reformation. It has long ceased, however, to be their every-day walking dress and is now usually only worn in church, at home, or more rarely by clergy within the precincts of their own parishes. The custom of wearing the cassock under the vestments is traceable in England to about the year 1400.

The old form of English cassock was a double-breasted robe fastened at the shoulder and probably girdled. The continental, single-breasted cassock, with a long row of small buttons from neck to hem, is said to have been first introduced into England by Bishop Harris of Llandaff (1720-1738). The shortened form of cassock which survives in the bishop’s ” apron ” was formerly widely used also by the continental clergy. Its use was for- bidden in Roman Catholic countries by Pope Pius IX., but it is

still worn by Roman Catholic dignitaries as part of their out-of-door dress in certain Protestant countries.

See the Report of the sub-committee of Convocation on the Ornaments 0} the Church and its Ministers (London, 1908), and authorities there cited.

CASSONE, in furniture, the Italian name for a marriage coffer. The ancient and once almost universal European custom of providing a bride with a chest or coffer to contain the household linen, which often formed the major part of her dowry, produced in Italy a special type of chest of monumental size and artistic magnificence. The cassoni of the people, although always large in size, were simple as regards ornament; but those of the nobles and the well-to-do mercantile classes were usually imposing as regards size, and adorned with extreme richness. The cassone was almost invariably much longer than the English chest, and even at a relatively early period it assumed an artistic finish such as was never reached by the chests of northern Europe, except in the case of a few of the royal corbeilles de mariage made by such artists as Boulle for members of the house of France. Many of the earlier examples were carved in panels of geometrical tracery, but their characteristic ornament was either intarsia or gesso, or a mixture of the two. Bold and massive feet, usually shaped as claws, lioncels, or other animals are also exceedingly characteristic of cassoni, most of which are of massive and sarcophagus-like proportions with moulded lids, while many of them are adorned at their corners with figures sculptured in high relief. The scroll-work inlay is commonly simple and graceful, consisting of floral or geometrical motives, or arabesques. The examples coated with gilded gesso or blazoned with paintings are, however, the most magnificent. They were often made of chestnut, and decorated with flowers and foliage in a relief which, low at first, became after the Renaissance very high and sharp. The panels of the painted cassoni frequently bore representations of scriptural and mythological subjects, or incidents derived from the legends of chivalry. Nor was heraldry forgotten, the arms of the family for which the chest ■was made being perhaps emblazoned upon the front. These chests rarely bear dates or initials, but it is often possible to determine their history from their armorial bearings.

CASSOWARY {Casuarius), a genus of struthious birds, only inferior in size to the emeu and ostrich, and, according to Sir R. Owen, approximating more closely than any other living birds to

the extinct moas of New Zealand. The species are all characterized by short rudimentary wings, bearing four or five barbless shafts, a few inches long, and apparently useless for purposes of flight, of running, or of defence; and by loosely webbed feathers, short on the neck, but of great length on the rump and back, whence they descend over the body forming a thick hair-like covering. They possess stout limbs, with which they kick in front, and have the inner toe armed with a long powerful claw. The common cassowary {Casuarius galeatus) stands 5 ft. high, and has a horny, helmet-like protuberance on the crown of its head; the front of the neck is naked and provided with two brightly-coloured wattles. It is a native of the Island of Ceram,

where it is said to live in pairs, feeding on fruits and herbs, and occasionally on small animals. The mooruk, or Bennett's cassowary {Casuarius Bennettii), is a shorter and more robust bird, approaching in the thickness of its legs to the moas. It differs further from the preceding species in having its head crowned with a horny plate instead of a helmet. It has only been found in New Britain, where the natives are said to regard it with some degree of veneration. When captured by them shortly after being hatched, and reared by the hand, it soon becomes tame and familiar; all the specimens which have reached Europe alive have been thus domesticated by the natives. The adult bird in the wild state is exceedingly shy and difficult of approach, and, owing to its great fleetness and strength, is rarely if ever caught. It eats voraciously, and, like the ostrich, will swallow whatever comes in its way. (See Emeu.)

CAST (from the verb meaning " to throw "; the word is Scand. in origin, cf. Dan. kaste, and Swed. kasta; " cast " in Middle Eng. took the place of the A.S. weorpan, cf. Ger. werfen), a throw, or that which is thrown, or that into which something is thrown. From these three meanings come the main uses of the word; for the throwing of dice, with the figurative sense of a chance or opportunity, as in " at the last cast "; for the throwing of a fisherman's line in fly-fishing; for hounds spreading out in search of a lost scent ; or, with the further meaning of a twisted throw or turn, for a slight squint in the eye. " Cast " is applied to a measure of herrings or other fish, being the amount taken in two hands to be thrown into a vessel, and similarly to a potter's measure for a certain quantity of clay; in fishing, to the casting line of gut with fly attached; to the hard refuse thrown out of the crop of a bird of prey, and to the coils of earth thrown up by earth-worms. From the old method, in making calculations, of

using counters, which were thus ” thrown ” up into a heap, is probably derived the meaning of ” cast ” for the ” casting up ” of figures in an account. Further, the Word is found for a mould for the casting of metals, and more particularly for the copy of an original statue or relief taken from a mould; similarly, of fossils, for the mineral filling of the empty mould left by the organism. Special uses of the word are also found in the theatrical term for the assignment of particular parts to the actors and actresses in a play, and in the many figurative senses of a type or stamp, as of features or characters.

CASTAGNO, ANDREA DEL (1390-1457), Italian painter of the Florentine school, was born in 1390, probably at Castagno, in the district of Mugello, and died in August 1457. He imitated Masaccio and the naturalists of his time in boldness of attitude, but was deficient in grace and colouring. His name was for about four centuries burdened with the heinous charge of murder; it was said that he treacherously assassinated his colleague, Domenico Veneziano, in order to monopolize the then recent secret of oil painting as practised in Flanders by the Van Eycks. This charge has, however, been proved to be an untruth; Domenico died four years after Andrea. The latter is commonly called ” Andrea (or Andreino) degP Impiccati ” (of the Hanged Men); this was in consequence of his being commissioned in 1435 to paint, in the Palazzo del Podesta. in Florence, the fallen leaders of the Peruzzi and Albizzi — not (as currently said) the men of the Pazzi conspiracy, an event which did not occur until 1478, long after this painter’s death. One of his principal works now extant (most of them have perished) is the equestrian figure of Nicola di Tolentino, in the cathedral of Florence.

CASTALIA, or Fons Castalius, a celebrated fountain in Greece, now -called the Fountain of St John, which rises in a chasm of Mount Parnassus, in the neighbourhood of Delphi. It was sacred to Apollo and the Muses, and its water was used in the religious purifications of the ” Pythian Pilgrims.” From its connexion with the Muses it is sometimes 1 referred to by late Greek writers {e.g. Lucian, Jup. Trag. 30) and Latin poets {e.-g. Ovid, Am.L 15. 36) as a source of inspiration, and this has passed into a commonplace of modern literature. According to some authorities the nymph Castalia was the daughter of Achelous; according to others the water of the spring was derived from the Boeotian Cephissus.

CASTANETS (Fr. castagnettes, Ger. Kastagnetten, Span. castanuelas) , instruments of percussion, introduced through the Moors by way of Spain into Europe from the East, used for marking the rhythm in dancing. Castanets, always used in pairs, one in each hand, consist of two pear or mussel-shaped bowls of hard wood, hinged together by a silk cord, the loop being passed over the thumb and first finger. The two halves are then struck against each other by the other fingers in single, double or triple beats, giving out series of hollow clicks of indefinite musical pitch. When intended for use in the orchestra the pair of castanets is mounted one at each end of a wooden stick about 8 in. long, which facilitates the playing. Castanets are also sometimes used in military bands and are then specially constructed. The two halves are kept open by a slight spring fixed to a frame attached to the hoop of a side drum, and the instrument is worked by the drummer with an ordinary drum-stick. An instance of the use of castanets in opera occurs in the Habanera in Carmen. A quaint description of castinatts is given in Harleian MS. 2034 (f. 208) at the British Museum (before 1688) with a pencil sketch which tallies very well with the above. The MS. is by Randle Holme and forms part of the Academy of Armoury. Castanets (/cporaXa) were used by the ancient Greeks, and also by the Romans (Lat. crotalum, crotala) to accompany the dances in the Dionysiac and Bacchanalian rites.

CASTE (through the Fr. from Span, and Port, casta, lineage, Lat. castus, pure). There are not many forms of social organiza- tion on a large scale to which the name ” caste ” has not been applied in a good or in a bad sense. Its Portuguese origin simply suggests the idea of family; but before the word came to be extensively used in modern European languages, it had been for some time identified with the Brahmanic division of Hindu society into classes. The corresponding Hindu word is varna, or colour, and the words gati, kula, gotra, pravara and karana are also used with different shades of meaning. Wherever, therefore, a writer has seen something which reminds him of any part of the extremely indeterminate notion, Indian caste, he has used the word, without regard to any particular age, race, locality or set of social institutions. Thus Palgrave 1 maintains that the colleges of operatives, which inscriptions prove to have existed in Britain during the Roman period, were practically castes, because by the Theodosian code the son was compelled to follow the father’s employment, and marriage into a family involved adoption of the

family employment. But these collegia opificum seem to be just the forerunners of the voluntary associations for the regulation of industry and trade, the frith- gilds, and craft-gilds of later times, in which, no doubt, sons had great advantages as apprentices, but which admitted qualified strangers, and for which intermarriage was a matter of social feeling. The history of the formation of gilds shows, in fact, that they were really protests against the authoritative regulation of life from without and above. In the Saxon period, at any rate, there was nothing resembling caste in the strict sense. ” The ceorl who had thriven so well as to have five hides of land rose to the rank of a thegn; his wergild became 1200 shillings; the value of his oath and the penalty of trespass against him increased in proportion; his descendants in the third generation became gesithcund. Nor was the character of the thriving defined; it might, so far as the terms of the custom went, be either purchase, or inheritance, or the receipt of royal bounty. The successful merchant might also thrive to thegn-right. The thegn himself might also rise to the rank, the estimation and status of an earl.” 2 It has been said that early German history is, as regards this matter, in contrast with English, and that true castes are to be found in the military associations (Genossen- schafteti) which arose from the older class of Dienstmannen, and in which every member — page, squire or knight — must prove his knightly descent; the Bauernstand, or rural non-military population; the Biirgerstand, or merchant-class. The ministry of the Catholic Church in the West, was, however, never restricted

1 History of Rise and Progress of the English Constitution, i. 332.

2 Stubbs’ Constitutional History of England, i. p. 162.

by blood relation. There is no doubt that at some time or other professions were in most countries hereditary. Thus Prescott’ tells us that in Peru, notwithstanding the general rule that every man should make himself acquainted with the various arts, ” there were certain individuals carefully trained to those occupations which minister to the wants of the more opulent classes. These occupations, like every other calling and office in Peru, always descended from father to son. The division of castes was in this particular as precise as that which existed in Hindustan or Egypt.” Again, Zurita 4 says that in Mexico no one could carry on trade except by right of inheritance, or by public permission. The Fiji carpenters form a separate caste, and in the Tonga Islands all the trades, except tattoo-markers, barbers and

club-carvers are hereditary, — the separate classes being named matabooles, mooas and tooas. Nothing is more natural than that a father should teach his son his handicraft, especially if there be no organized system of public instruction; it gives the father help at a cheap rate, it is the easiest introduc- tion to life for the son, and the custom or reputation of the father as a craftsman is often the most important legacy he has to leave. The value of transmitted skill in the simple crafts was very great; and what was once universal in communities still survives in outlying portions of communities which have not been brought within the general market of exchange. But so long as this process remains natural, there can be no question of caste, which implies that the adoption of a new profession is not merely unusual, but wrong and punishable. Then, the word caste has been applied to sacred corporations. A family or a tribe is consecrated to the service of a particular altar, or all the altars of a particular god. Or a semi-sacred class, such as the Brehons or the Bards, is formed, and these, and perhaps some specially dignified professions, become hereditary, the others remaining free. Thus in Peru, the priests of the Sun at Cuzco transmitted their office to their sons; so did the Quipu-camayoc*, or public registrars, and the amantas and haravecs, the learned men and singers. 6 In many countries political considerations, or distinctions of race, have prevented intermarriage between classes. Take, for example, the patricians and the plebeians at Rome, or the Sxaprtarat, Acucawes or xepioucoi, and the EtXcoTSS at Sparta. In Guatemala it was the law that if any noble married a plebeian woman he should be degraded to the caste of mazequal, or plebeian, and be subject to the duties and services imposed on that class, and that the bulk of his estate should be sequestered to the king. 6 In Madagascar marriage is strictly forbidden between the four classes of Nobles, Hovas, Zarahovas and Andevos, — the lowest of whom, however, are apparently mere slaves. In a sense slavery might be called the lowest of castes, because in most of its forms it does permit some small customary rights to the slave. In a sense, too, the survival in European royalty of the idea of ” equality of birth ” (Ebenbiir-tigkeit) is that of a caste conception, and the marriage of one of the members of a European royal family with a person not of royal blood might be described as an infraction of caste rule.

Caste in India is a question of more than historical interest. It is the great obstacle to government in accordance with modern

3 History of Peru, 1. 143.

4 Rapport sur les differentes classes de chefs dans la nouvelle Espagne (1840), p. 223.

6 Something like this is to be found in the Russian notion of chin, or status according to official hierarchy of ranks, as modified by the custom of myestnichestvo, by which no one entering the public service could be placed beneath a person who had been subject to his father's orders. Hereditary nobility at one time belonged to every servant, military or civil, above a certain rank, and a family remaining out of office for two generations lost its rights of nobility; but in 1854 the privilege was confined to army colonels and state councillors of the 4th class. At one time, therefore, the razryadniya knighi, or special registers, superseded by Peter the Great's barkhatnaya kniga, or Velvet Book, contained a complete code of social privilege and pre- cedence. Peter's " tabel rangakh " contained fourteen classes. The subject is treated of in the 1600 articles of the ninth volume of the Russian Code Svod Zakonov. The Russian Nobility, though de- prived of their exemptions from conscription, personal taxation and corporal punishment, still retain many advantages in the public service.

6 Juarros, Hist, of Guatemala, Tr. (London, 1823).

ideas, and to the work of native religious reformers as well as of Christian missionaries. By some writers caste has been regarded as the great safeguard of social tranquillity, and therefore as the indispensable condition of the progress in certain arts and industries which the Hindus have made. Others, such as James Mill, have denounced it as fatal to the principle of free competi- tion and opposed to individual happiness. The latter view assumes a state of facts which was denied by Colebrooke, one of the highest authorities on Indian matters. Writing in 1798 he says, 1 after pointing out that any person unable to earn a sub- sistence by the exercise of his profession may follow the trade of a lower caste or even of a higher: " Daily observation shows even Brahmans exercising the menial profession of a Sudra. We are aware that every caste forms itself into clubs or lodges, consisting of the several individuals of that caste residing within a small distance, and that these clubs or lodges govern themselves by particular rules or customs or by-laws. But though

some restrictions and limitations, not founded on religious prejudices, are found among their by-laws, it may be received as a general maxim that the occupation appointed for each tribe is entitled merely to a preference. Every profession, with few exceptions, is open to every description of persons; and the discouragement arising from religious prejudices is not greater than what exists in Great Britain from the effects of municipal and corporation laws. In Bengal the numbers of people actually willing to apply to any particular occupation are sufficient for the unlimited extension of any manufacture." This was corroborated by Elphinstone, 2 who states that, during a long experience of India, he never heard of a single case of degradation from caste; and it is illustrated by the experience of the Indian army, in which men of all castes unite. 3

The ordinary notion of modern caste is that it involves certain restrictions on marriage, on profession, and on social intercourse, especially that implied in eating and drinking together. How far intermarriage is permitted, what are the effects of a marriage permitted but looked on as irregular, what are the penalties of a marriage forbidden, whether the rules protecting trades and occupations are in effect more than a kind of unionism grown inveterate through custom, by what means caste is lost, and in what circumstances it may be regained, — these are questions on which very little real or definite knowledge exists. Sir H. Risley regards the absolute prohibition of mixed marriages as now the essential and most prominent characteristic. It is very remark- able that the Vedas, on which the whole structure of Brahmanic faith and morals professes to rest, give no countenance to the later regulations of caste. The only passage bearing on the subject is in the Purusha Sukta, the 90th Hymn of the 10th Book of the Rigveda Samhita. " When they divided man, how many did they make him? What was his mouth? what his arms? what are called his thighs and feet? The Brahmana was his mouth, the Raganya was made his arms, the Vaisya became his thighs, the Sudra was born from his feet." Martin Haug finds in this a subtle allegory that the Brahmans were teachers, the Kshatriyas the warriors of mankind. But this is opposed to the simple and direct language of the Vedic hymns, and to the fact that in the accounts of creation there the origin of many things besides classes of men is attributed in the same fanciful manner to parts of the divine person. It is in the Puranas and the Laws of Manu, neither of which claims direct inspiration, where they

1 Life and Essays of H. T. Colebrooke, i. p. 104.

2 History of India.

3 “The crudities and cruelties of the caste system need not blind us to its other aspects. There is no doubt that it is the main cause of the fundamental stability and contentment by which Indian society has been braced up for centuries against the shocks of politics and the cataclysms of Nature. It provides every man with his place, his career, his occupation, his circle of friends. It makes him, at the outset, a member of a corporate body: it protects him through life from the canker of social jealousy and unfulfilled aspirations; it ensures him companionship and a sense of com- munity with others in like case with himself. The caste organization is to the Hindu his club, his trade union, his benefit society, his philanthropic society. An Indian without caste, as things stand at present, is not quite easy to imagine.” (Sidney Low, Vision of India, 1906, ch. xv. p. 263).

differ from the letter of the Veda, that the texts are to be found on which all that is objectionable in caste has been based. Even in the Vishnu Purana, however, the legend of caste speaks of the four classes as being at first ” perfectly inclined to conduct springing from religious faith.” It is not till after the whole human race has fallen into sin that separate social duties are assigned to the classes. The same hymn speaks of the evolution of qualities of Brahma. Sattva, or goodness, sprang from the mouth of Brahma; Rajas, or passion, came from his breast; Tamas, or darkness, from his thighs; others he created from his feet. For each one of these gunas, dr primitive differences of quality, a thousand couples, male and female, have been created, to which the distinct heavens, or places of perfection of Prajapati, Indra, Maruts and Gandharvas are assigned. To the gunas are related the yugas, or ages: 1st, the Krita, or glorious age of truth and piety, in which apparently no distinctions, at least no grades of excellence were known; 2nd, the Treta, or period of knowledge; 3rd, the Dvapara, or period of sacrifice; 4th, the Kali, or period of darkness. Bunsen supposes there may be an historical element in the legend that Pururava, a great conqueror of the Treta age, founded caste. The yugas are hardly periods of historical chronology, but there is no doubt that the Vayu Purana assigns the definite origin of caste to the Treta period. ” The perfect beings of the first age, some tranquil, some fiery, some active and some distressed, were again born in the Treta, as Brahmans, &c, governed by the good and bad actions per- formed in former

births." The same hymn proceeds to explain that the first arrangement did not work well, and that a second was made, by which force, criminal justice and war were declared to be the business of the Kshatriyas; officiating at sacrifices, sacred study and the receipt of presents to belong to the Brahmans; traffic, cattle and agriculture to the Vaisyas; the mechanical arts and service to the Sudras. The Ramayana hymn suggests that in the fourgreatperiodsthecastessuccessivelyarrive at the state of dharma or righteousness. Thus, a Sudra cannot, even by the most rigorous self-mortification, become righteous in the period proper to the salvation of the Vaisyas. As the hymn speaks in the Dvapara age, it speaks of the salvation of Sudras as future, and not yet possible. Wholly in opposition to the story of a fourfold birth from Brahma is the legend that the castes sprang from Manu himself, who is removed by several generations of gods and demi-gods from Brahma. Then, again, the Santi- parvan alleges that the world, at first entirely Brahmanic, was separated into castes merely by the evil works of man. Castehood consists in the exercise of certain virtues or vices. Munis, or persons born indiscriminately, frequently rise to the caste of Brahmans, and the offspring of Brahmans sink to a lower level. The serpent observes: " If a man is regarded by you as being a Brahman only in consequence of his conduct, then birth is vain, until action is shown." But this change of caste takes place only through a second, birth, and not during the life which is spent in virtue. Another poetical conception of caste birth is expressed in the Harivamsa. The Brahmans were formed from an imperish- able element (Akshara), the Kshatriyas from a perishable element (Kshara), the Vaisyas from alteration, and the. Sudras from a modification of smoke.

The general result of the foregoing texts is that several contra-dictory accounts have been given of the origin of caste, and that these are for the most part unintelligible. Caste is described as a late episode in creation, and as born from different parts of different gods, from the mortal Manu, from abstract principles, and from non-entity. It is also described as coeval with creation, as existing in perfection during the Krita period, and subsequently falling into sin. It is also said that only Brahmans existed at first, the others only at later periods. Then the rationalistic theories of the Santiparvan upse* the very foundation of caste,viz. hereditary transmission of the caste character. 4 It seems clear that when the Vedas were composed, many persons who were not Brahmans acted as priests, and

saints, the " preceptors of gods," by their " austere fervour," rose from a lower rank to the dignity of Brahmanhood. Originally, indeed, access to the gods by prayer ' Muir's Sanskrit Texts, vol. i. (1868).

and sacrifice was open to all classes of the community. As the Brahmans grow in political importance, they make religion an exclusive and sacred business. We find them deciding questions of succession to the throne, and enforcing their decisions. While in the earlier literature there are several instances of Brahmans receiving instruction from the hands of Kshatriyas, in the Puranas and Manu death is made to overtake Kshatriyas who are not submissive to the Brahmans; and in one case Visvamitra, the son of Gadhi, actually obtains Brahmanhood as a reward for his submission. It seems certain that many of the ancient myths were expressly manufactured by the Brahmans to show their superiority in birth and in the favour of Heaven to the Kshatriyas — a poetical effect which is sometimes spoiled by their claiming descent from their rivals. This brings us to a consideration of the theories which have been started to account for the appear- ance of Brahmanic caste, as it is stereotyped in the Laws of Manu. James Mill, who invariably underestimated the influence on history of " previous states of society," suggested that the original division must have been the work of some inspired individual, a legislator or a social reformer, who perceived the advantages which would result from a systematic division of labour. The subordination of castes he accounts for by the superstitious terror and the designing lust of power which have so frequently been invoked to explain the natural supremacy of the religious class. Because the ravages of war were dreaded most after the calamities sent by heaven, he finds that the military class properly occupy the second place. This arrange- ment he apparently contemplates as at no time either necessary or wholesome, and as finally destroyed by the selfish jealousies of caste, and by the degradations which the multiplication of trades made inevitable. Heeren 1 and Klaproth have contended that the division into castes is founded on an original diversity of race, and that the higher castes are possessed of superior beauty. The clear complexion and regular features of the Brah- mans are said to distinguish them as completely from the Sudras as the Spanish Creoles were distinguished from the Peruvians. " The

high forehead, stout build, and light copper colour of the Brahmins and other castes allied to them, appear in strong contrast with the somewhat low and wide heads, slight make, and dark bronze of the low castes" (Stevenson, quoted by Max M tiller, Chips, ii. p. 32 7). 2 This explanation is, however, generally conjoined with that founded on the tradition of conquest by the higher castes. There is no doubt that the three castes of lighter colour (traivarnika) , the white Brahmans, the red Kshatriyas, the yellow Vaisyas, are, at least in the early hymns and Brah- manas, spoken of as the Aryas, the Sanskrit-speaking conquerors, in contradistinction to the dark cloud of the Turanian aborigines Dasyus. In fact arya, which means noble, is derived from arya, which means householder, and was the original name of the largest caste, now called Vaisyas. The great Sanscrit scholar, Rudolf von Roth (1821-1895), in his Brahma und die Brahmanan 3 held that the Vedic people advanced from their home in the Punjab, drove the aborigines into the hills, and took possession of the country lying between the Ganges, the Jumna and the Vindhya range. " In this stage of complication and disturbance," he said, " power naturally fell into the hands of those who did not possess any direct authority," i.e. the domestic priests of the numerous tribal kings. The Sudras he regarded as a con- quered race, perhaps a branch of the Aryan stock, which immi- grated at an earlier period into India, perhaps an autochthonous

1 Ideen, i. 610.

2 The idea of a conquering white race is strangely repeated in the later history of India. The Rajputs and Brahmans are succeeded by the Mussulmans, the Turks, the Afghans. There was an aristocracy of colour under the Mogul dynasty. But under an Indian climate it could not last many generations. The Brahmans of southern India were as black as the lowest castes; the Chandalas are said to be descended from Brahmans. According to Manu the Chandala must not dwell within town; his sole wealth must be dogs and asses; his clothes must consist of the mantles of deceased persons; his dishes must be broken pots. Surely this vituperative description must apply to an aboriginal race.

3 Zeitschrift der deutschen morgenldndischen Gesellschaft, Band i. (quoted by Muir, ubi supra).

Indian tribe. The latter hypothesis is opposed to the fact that, while the Sudra is debarred from sharing three important Vedic

sacrifices, the Bhagasata Purana expressly permits him to sacrifice " without mantras," and imposes on him duties with reference to Brahmans and cows which one would not expect in the case of a nation strange in blood. But unless a previous subordination of castes among the conquering race be supposed, it seems difficult to see why the warrior-class, who having contributed most to the conquest must have been masters of the situation, should have consented to degradation below the class of Brahmans. The position of the Sudra certainly suggests conquest. But are there sound historical reasons for supposing that Brahmans and Sudras belonged to different nations, or that either class was confined to one nation? The hypothesis was held in a somewhat modified form by Meiners,« who supposed that instead of one conquest there may have been two successive immigrations, — the first immigrants being subdued by the second, and then forming an intermediate class between their conquerors and the aborigines; or, if there were no aborigines, the mixture of the two immigrant races would form an intermediate class. In the same way Talboys Wheeler 5 suggested that the Sudra may be the original conquerors of the race now represented by the Pariahs. Most of these explanations seem rather to describe the mode in which the existing institutions of caste might be transplanted from one land to another from a motherland to its colonies, and altered by its new conditions. Military conquest, though it often introduces servitude, does not naturally lead to the elevation of the priesthood. It is unscientific to assume large historical events, or large ethnological facts, or the existence of some creator of social order. 6

As Benjamin Constant 7 points out, caste rests on the religious idea of an indelible stain resting on certain men, and the social idea of certain functions being committed to certain classes. The idea of physical purity was largely developed under the Mosaic legislation; in fact the internal regulations of the Essenes (who were divided into four classes) resemble the frivolous prohibitions of Brahmanism. As the daily intercourse of men in trade and industry presents numberless occasions on which the stain of real or fancied impurity might be caught, the power of the religious class who define the rules of purity and the penalties of their violation becomes very great. Moreover, the Hindus are deeply religious, and therefore naturally prepared for Purohiti or priest-rule. They were also passionately a ttached to their national hymns, some of which had led them to victory, while others were associated with the benign influences of

nature. Only the priest could chant or teach these hymns, and it was believed that the smallest mistake in pronunciation would draw down the anger of the gods. But however favourable the con- ditions of spiritual dominion might be, it seems to have been by no more natural process than hard fighting that the Brahmans finally asserted their supremacy. We are told that Parasurama, the great hero of the Brahmans, ” cleared the earth thrice seven times of the Kshatriya caste, and filled with their blood the five large lakes of Samauta.” Wheeler thinks that the substitution of blood-sacrifices for offerings of parched grain, clarified butter and soma wine marks an adaptation by the Brahmans of the great military banquets to the purposes of political supremacy. It is not, therefore, till the Brahmanic period of Indian history, which ends with the coming of Sakya Muni, in 600 B.C., that we find the caste-definitions of Manu realized as facts. These are — ” To Brahmans he (i.e. Brahma) assigned the duties of reading

1 De Origine Castarum (Gottingen).

6 History of India, vol. i. (1867-1871).

6 For a characteristic appreciation of caste see Comte, Cours de philosophie positive, vi. c. 8. He regards the hereditary transmission of functions under the rule of a sacerdotal class as a necessary and universal stage of social progress, greatly modified by war and colonization. The morality of caste was, he contends, an improve- ment on what preceded ; but its permanence was impossible, because ” the political rule of intelligence is hostile to human progress.” The seclusion of women and the preservation of industrial inventions were features of caste ; and the higher priests were also magistrates, philosophers, artists, engineers, and physicians.

6 De la religion, ii. 8.

the Vedas, of teaching, of sacrificing, of assisting others to sacrifice, of giving alms if they be rich, and if indigent of receiving gifts.” l The duties of the Kshatriya are ” to defend the people, to give alms, to sacrifice, to read the Veda, to shun the allurements of sensual gratification.” The duties of a Vaisya are ” to keep herds of cattle, to bestow largesses, to sacrifice, to read

the scripture, to carry on trade, to lend at interest, and to cultivate land." These three castes (the twice born) wear the sacred thread. The one duty of a Sudra is " to serve the before-mentioned classes without depreciating their worth." 2 The Brahman is entitled by primogeniture to the whole universe; he may eat no flesh but that of victims; he has his peculiar clothes. He is bound to help military and commercial men in distress. He may seize the goods of a Sudra, and whatever the latter acquires by labour or succession beyond a certain amount. The Sudra is to serve the twice born; and even when emancipated cannot be anything but a Sudra. He may not learn the Vedas, and in sacrifice he must omit the sacred texts. A Sudra in distress may turn to a handicraft; and in the same circumstances a Vaisya may stoop to service. Whatever crime a Brahman might commit, his person and property were not to be injured; but whoever struck a Brahman with a blade of grass would become an inferior quadruped during twenty-one trans- migrations. In the state the Brahman was above all the ministers; he was the raja's priest, exempt from taxation, the performer of public sacrifices, the expounder of Manu, and at one time the physician of bodies as well as of souls. He is more liable than less holy persons to pollution, and his ablutions are therefore more frequent. A Kshatriya who slandered a Brahman was to be fined 100 panas (a copper weight of 200 grains); a Vaisya was fined 200 panas; a Sudra was to be whipped. A Brahman slandering any of the lower castes pays 50, 25 or 12 panas. In ordinary salutations a Brahman is asked whether his devotion has prospered ; a Kshatriya, whether he has suffered from his wounds; a Vaisya whether his health is secure; a Sudra whether he is in good health. 3 In administering oaths a Brahman is asked to swear by his veracity; a Kshatriya by his weapons, house or elephant; a Vaisya by his kine, grain or goods; a Sudra by all the most frightful penalties of perjury. The Hindu mind is fertile in oaths; before the caste assembly the Dhurm, or caste custom, is sometimes appealed to, or the feet of Brahma, or some cow or god or sacred river, or the bel (the sacred creeper), or the roots of the turmeric plant. The castes are also distinguished by their modes of marriage. Those peculiar to Brahmans seem to be — 1st, Brahma, when a daughter, clothed only with a single robe, is given to a man learned in the Veda whom her father has voluntarily invited and respectfully receives; 2nd, Devas or Daiva, when a daughter, in gay attire is given, when the sacrifice is already begun, to the officiating

1 The great mass of the Brahmans were in reality mendicants, who lived on the festivals of birth, marriage, and death, and oh the fines exacted for infractions of caste rule. Others had establishments called Muths, endowed with'.Jagir villages. There were two distinct orders of officiating priests — the Purohita, or family priest, who performed all the domestic rites, and probably gave advice in secular matters, and the Guru, who is trie head of a religious sect, making tours of superintendence and exaction, and having the power to degrade from caste and to restore. In some cases the Guru is recog- nized as the Mehitra or officer of the caste assembly, from whom he receives Huks, or salary, and an exemption from house and stamp taxes, and service as begarree (Steele's Law and Customs of Hindoo Castes within the Pekhan Provinces, 1826; later edition, 1868). Expulsion from caste follows on a number of moral offences (e.g. assault, murder, &c), as well as ceremonial offences (e.g. eating prohibited food, eating with persons of lower caste, abstaining from funeral rites, having connexion with a low-caste woman). Exclusion means that it is not allowed to eat with or enter the houses of the members of the caste, the offender being in theory not degraded but dead. For some heinous offences, i.e. against the express letter of the Shasters, no readmission is possible. , But generally this depends on the ability of the out-caste to pay a fine, and to supply the caste with an expiatory feast of sweetmeats. He has also to go through the Sashtanyam, or prostration of eight members, and to drink the Panchakaryam, i.e. drink of the five products of the cow (Description of People of India, Abbe J. A. Dubois, Missionary in Mysore, Eng. Trans., London, 1817; edition by Pope, Madras, 1862).

2 Manu. x. 88-90. s Wheeler ii. 533.

priest. The primitive marriage forms of Rashasas or Rachasa, when a maiden is seized by force from home, while she weeps and calls for help, is said to be appropriate to Kshatriyas. To the two lower castes the ceremony of Asura is open, in which the bridegroom, having given as much wealth as he can afford to the father and paternal kinsman and to the damsel herself, takes her voluntarily as his bride. A Kshatriya woman on her marriage with a Brahman must hold an arrow in her hand; a Vaisya woman marrying one of the sacerdotal or military classes must hold a whip; a Sudra woman marrying one of the upper castes must hold the skirt of a mantle.

How little the system described by Manu applies to the exist- ing

castes of India may be seen in these facts — (1) that there is no artisan caste mentioned by Manu; (2) that eating with another caste, or eating food prepared by another caste, is not said by him to involve loss of caste, though these are now among the most frequent sources of degradation. The system must have been profoundly modified by the teaching of Buddha: " As the four rivers which fall into the Ganges lose their names as soon as they mingle their waters with the holy river, so all who believe in Buddha cease to be Brahmans, Kshatriyas, Vaisyas, and Sudras." After Buddha, Sudra dynasties ruled in many parts of India, and under the Mogul dynasty the Cayets, a race of Sudras, had almost a monopoly of public offices. But Buddha did not wish to abolish caste. Thus it is related that a Brahman Pundit who had embraced the doctrines of Buddha nevertheless found it necessary, when his king touched him, to wash from head to foot. 4 Alexander the Great found no castes in the Punjab, but Megasthenes had left an account of the ryots and tradesmen, the military order and the gymnosophists (including the Buddhist Germanes) whom he found in the country of the Ganges. 5 From his use of the word gymnosophist it is probable that Megasthenes confounded the Brahmans with the hermits or fakirs; and this explains his statement that any Hindu might become a Brahman. Megasthenes spent some time at the court of Sandracottus (Chandragupta Maurya), a con- temporary of Seleucus Nicator. All the later Greeks 6 follow his statement and concur in enumerating seven Indian castes — sophists, agriculturists, herdsmen, artisans, warriors, in- spectors, councillors. On the revival of Brahmanism it was found that the second and third castes had disappeared, and that the field was now occupied by the Brahmans, the Sudras, and a host of mixed castes, sprung from the original twelve, Unulum and Prutilum, left-hand and right-hand, which were formed by the crossing of the four original castes. Manu himself gives a list of these impure castes, and the Ain-i-Akbari (1556- 1605) makes the positive statement that there were then 50c tribes bearing the name of Kshatriya, while the real caste no longer existed. Most of these subdivisions are really trade- organizations, many of them living in village-communities, which trace descent from a pure caste. Thus in Bengal there are the Vaidya or Baidya, the physicians, who, Manu says, originated in the marriage of a Brahman father and a Vaisya mother.

As Colebrooke said, Brahmans and Sudras enter into all trades, but Brahmans (who are profoundly ignorant even of their own

scriptures) have succeeded in- maintaining their monopoly of Vedic learning, which really means a superficial acquaintance with the Puranas and Manu. Though they have succeeded in excluding others from sacred employment, only a portion of the caste are actually engaged in religious ceremonies, in sacred study, or even in religious begging. Many are privates in the army, many water-carriers, many domestic servants. And they have, like other castes, many subdivisions which prevent intimate association and intermarriage. The ideal Brahman is gone: the priest " with his hair and beard clipped, his passions sub- dued, his mantle white, his body pure, golden rings in his ear." But the hold which caste has on the Hindu minds may, perhaps, be most clearly seen in the history of the Christian missions and in comparatively recent times. The Jesuits Xavier and Fra dei

4 Travels of Fah Hian, c. 27. 6 Strabo, Ind. sec. 59.

6 Arrian, Indie, c. II, 12; Diod. Sic. ii. c. 40, 41; and Strabo xv. 1.

Nobili did everything but become Brahmans in order to convert the south of India — they put on a dress of cavy or yellow colour, they made frequent ablutions, they lived on vegetables and milk, they put on their foreheads the sandalwood paste used by the Brahmans — and Gregory XV. published a bull sanctioning caste regulations in the Christian churches of India. The Danish mission of Tranquebar, the German mission of the heroic Schwarz, whose headquarters were Tanjore, also permitted caste to be retained by their followers. Even the priests of Buddha, whose life was a protest against caste, re-erected the system in the island of Ceylon, where the radis or radias were reduced to much the same state as the Pariahs. 1 Protestant missions have made but little progress, even in recent years. The number of native converts to Christianity rose from 1,246,000 in 1872 to 2,664,000 in 1901; these figures, however, are by themselves rather misleading, for Christianity appears to have touched the higher classes in India not at all, only the out-castes.

It is still the general law that to constitute a good marriage the parties must belong to the same caste, but to unconnected families. Undoubtedly, however, the three higher castes were

always permitted to intermarry with the caste next below their own, the issue taking the lower caste or sometimes forming a new class. A Sudra need not marry a wife of the same caste or sect as himself. In 187 1 it was decided by the judicial committee of the privy council that a marriage between a zemindar (land-owner) of the Malavar class, a subdivision of the Sudra caste, with a woman of the Vellala class of Sudras is lawful. Generally also a woman may not marry beneath her own caste. The feeling is not so strong against a man marrying even in the lowest caste, for Manu permits the son of a Brahman and a Sudra mother to raise his family to the highest caste in the seventh generation. The illegitimacy resulting from an invalid marriage does not render incapable of caste; at least it does not so disqualify the lawful children of the bastard. On a forfeiture of caste by either spouse intercourse ceases between the spouses: if the out-caste be a sonless woman, she is accounted dead, and funeral rites are performed for her; if she have a son, he is bound to maintain her. It is remarkable that the professional concubinage of the dancing-girl does not involve degradation, if it be with a person of the same caste. This suggests that whatever may be the function of caste, it is not a safe guardian of public morality. The rules as to prohibited degrees in marriage used to be very strict, but they are now relaxed. An act of 1856 legalized re- marriage by widows in all the castes, with a conditional forfeit- ure of the deceased husband's estate, unless the husband has expressly sanctioned the second marriage. The later Indian Marriage Act was directed against the iniquitous child marriages; it requires a minimum age. In many ways the theoretical inferiority of the Sudra absolves him from the restraints which the letter of the law lays on the higher castes. Thus a Sudra may adopt a daughter's or sister's son, though this is contrary to the general rule that the adopter should be able to marry the mother of the adopted person. The rule requiring the person adopted to be of the same caste and gotra or family as the adopter is also dispensed with in the case of Sudras. In fact, it is only a married person whom a Sudra may not adopt. As regards inheritance the Sudra does not come off so well in competition with the other castes. " The sons of a Brahamana in the several tribes have four shares or three or two or one; the children of a Kshatriya have three portions or two or one; and those of a Vaisya take two parts or one." This refers to the case per- mitted by law, and not unknown in practice, of a Brahman having four wives of different castes, a Kshatriya three, and so on. But all sons of inferior caste are excluded from property coming by gift to the father; and a Sudra

son is also excluded from land acquired by purchase. It must be recollected, how- ever, that under an act of 1850, loss of caste no longer affects the capacity to inherit or to be adopted. In cases of succession ab intestato on failure of the preceptor, pupil, and fellow-student (heirs called by the Hindu law after relatives), a priest, or any Brahman, many succeed. Where a Sudra is the only son of a 1 Irving, Theory and Practice of Caste (London, 1859).

Brahman, the Sapinda, or next of kin, would take two-thirds of the inheritance; where he is the only son of any other twice- born father, the Sapinda would take one-half. Possibly, the rule of equal division among sons of equal caste did not at first apply to Brahmans, who, as the eldest sons of God, would perhaps observe the custom of primogeniture among themselves. On the other hand it was laid down in the judicial committee in 1869, contrary to the collected opinions of the Pundits of the Sudder court, that, in default of lawful children, the illegitimate children of the Sudra caste inherit their putative father's estate, and, even if there be lawful children, are entitled to maintenance out of the estate. It had previously been decided by Sir Edward Ryan in 1857 that the illegitimate children of a Rajput, or of any other member of a superior caste, have no right of inheritance even under will, but a mere right to maintenance, provided the children are docile. It seems then that the Kshatriya and Vaisya castes, though in one sense non-existent, still control Hindu succession.

With regard to Persia the Zend Avesta speaks of a fourfold division of the ancient inhabitants of Iran into priests, warriors, agriculturists and artificers; and also of a sevenfold division corre- sponding to the seven amschespands, or servants of Ormuzd. This was no invention of Zoroaster, but a tradition from the golden age of Jemshid or Diemschid. The priestly caste of Magi was divided into Herbeds or disciples, Mobeds or masters, and Destur Mobeds or complete masters. The last-named were alone entitled to read the liturgies of Ormuzd; they alone predicted the future and carried the sacred costi, or girdle, havan, or cup, and barsom, or bunch of twigs. The Zend word baresma is supposed to be connected with Brahma, or sacred element, of which the symbol was a bunch of kusa grass, generally called veda. The Persian and Hindu religions are further connected by the ceremony called Homa in the one and Soma in the other. Haug, in his Tract on the Origin of Brahmanism (quoted by Muir, ubi supra), maintains that the division in the Zend Avesta of the followers of Ahura Mazxia into

Atharvas, Rathaesvas, and Vastrya was precisely equivalent to the three superior Indian castes. He also asserts that only the sons of priests (Atharvas) could become priests, a rule still in force among the Parsis. The Book of Daniel rather suggests that the Magi were an elective body; and as regards the secular classes there does not seem to be a trace of hereditary employment or religious subordination. There is a legend in the Dabistan of a great conqueror, Mahabad, who divided the Abyssinians into the usual four castes; and Strabo mentions a similar classification of the Iberians into kings, priests, soldiers, husbandmen and menials.

At one time it was the universal opinion that in Egypt there were at least two great castes, priests and warriors, the functions of which were transmitted from father to son, the minor professions grouped under the great castes being also subject to hereditary transmission. This opinion was held by Otfried Miiller, 2 Meiners of Gottingen, and others. Doubts were first suggested by Rossellini, and after Champollion had deciphered the hieroglyphic inscriptions, J. J. Ampere 3 boldly announced that there were in Egypt no castes strictly so called; that in particular the professions of priest, soldier, judge, &c, were not hereditary; and that the division of Egyptian society was merely that which is generally found in certain stages of social growth between the liberal professions and the mechanical arts and trades. No difference of colour, or indeed of any feature, has been observed in the monumental pictures of the different Egyptian castes. From an inspection of numerous tombs, sarcophagi, and funeral stones, which frequently enumerate the names and professions of several kinsfolk of the deceased, Ampere concluded that sacerdotal and military functions were sometimes united in the same person, and might even be combined with civil functions; that intermarriage might certainly take place between the sacred and military orders; and that the members of the same natural family did frequentlyadoptthedifferentoccupations which had been supposed to be the exclusive property of the castes. The tombs of Bern Hassan show in a striking manner the

2 Manual of Archaeology. 3 Revue des deux mondes, 15th September 1848.

Egyptian tendency to accumulate, rather than to separate, employments. Occasionally families were set apart for the worship of a particular divinity. An interesting " section " of Egyptian society is afforded by a granite monument preserved in the museum at Naples. Nine figures in bas-relief represent the deceased, his father, three brothers, a paternal uncle, and the father and two brothers of his wife. Another side contains the mother, wife, wife's mother and maternal aunts. The deceased is described as a military officer and superintendent of buildings; his elder brother as a priest and architect; his third brother as a provincial governor, and his father as a priest of Ammon. The family of the wife is exclusively sacerdotal. Egyptian caste, therefore, permitted two brothers to be of different castes, and one person to be of more castes than one, and of different castes from those to which his father or wife belonged. The lower employments, commerce, agriculture, even medicine, are never mentioned on the tombs. The absolute statements about caste in Egypt, circulated by such writers as Reynier and De Goguet, have, no doubt, been founded on passages in Herodotus (ii. 143, 164), who mentions seven classes, and makes war an hereditary profession; in Diodorus Siculus (i. 2-8), who mentions five classes and a hereditary priesthood; and in Plato, who, anxious to illustrate the principle of compulsory division of labour, on which his republic was based, speaks in the Timaeus of a total separation of the six classes — priests, soldiers, husbandmen, artisans, hunters and shepherds. Heeren (ii. 594) does not hesitate to ascribe the formation of Egyptian caste to the meeting of different races. According to the chronology constructed by Bunsen the division into castes began in the period 10,000- 9000, and was completed along with the introduction of animal worship and the improvement of writing under the third dynasty in the 6th or 7th century of the Old Empire. The Scholiast of Apollonius Rhodius, on the authority of Dicaearchus, in the Second Book of Hellas, mentions a king, Sesonchosis, who, about 3712 B.C., "enacted that no one should abandon his father's trade, for this he considered as leading to avarice." Bunsen conjectures that this may refer to Sesostoris, the lawgiver of Manetho's third or Memphite dynasty, the eighth from Menes, who introduced writing, building with hewn stone, and medicine; possibly, also, to Sesostris, who, Aristotle says (Polit. vii. 1), introduced caste to Crete. He further observes that in Egypt there was never a conquered indigenous race. There was one nation with one language and one religion; the public panegyrics embraced the, whole people; every Egyptian was the

child and friend of the gods. The kings were generally warriors, and latterly adopted into the sacerdotal caste. Intermarriage was the rule, except between the swineherds and all other classes. " Every shepherd is an abomination unto the Egyptians " (Gen. xlvi. 34). The comprehensive essay by Sir H. H. Risley in the introductory volumeof the Indian Census Report for 1901 is the best recent account of caste in India. See also, besides the works mentioned in the text, Sir Denzil Ibbetson's Report on the Punjab Census (1881); W. Crooke, Things Indian (1905) and other books by this author on Indian religion and caste; Senart, Les Castes dans I'Inde (1896); Jogendra Nath Bhattacharya, Hindu Castes and Sects (1896). There is an interesting chapter on the subject in Sidney Low's Vision of India (1906). See also India, Indian Law, and Hinduism.

CASTEL, LOUIS BERTRAND (1688-1757), French mathe- matician, was born at Montpellier on the nth of November 1688, and entered the order of the Jesuits in 1703. Having studied literature, he afterwards devoted himself entirely to mathematics and natural philosophy. He wrote several scien- tific works, that which attracted most attention at the time being his Optique des couleurs (1740), or treatise on the melody of colours. He endeavoured to illustrate the subject by a clavecin oculaire, or ocular harpsichord; but the treatise and the illustration were quickly forgotten. He also wrote Mathe- matique universelle (1728) and Traite de physique sur la pesanteur universelle des corps (1 724). He also published a critical account of the system of Sir Isaac Newton in French in 1743.

CASTELAR Y RIPOLL, EMILIO (1832-1899), Spanish states- man, was born at Cadiz on the 8th of September 1832. At the age of seven he lost his father, who had taken an active part in

the progressist agitations during the reign of Ferdinand VII., and had passed several years as an exile in England. He at- tended a grammar-school at Sax. In 1848 he began to study law in Madrid, but soon elected to compete for admittance at the school of philosophy and letters, where he took the degree of doctor in 1853. He was an obscure republican student when the Spanish revolutionary movement of 1854 took place, and the young liberals and democrats of that epoch decided to hold a meeting in the largest theatre of the capital. On that occasion Castelar delivered his maiden speech, which at once placed him in the van of the advanced politicians of the reign of Queen Isabella. From that moment he took an active part in politics, radical

journalism, literary and historical pursuits. Castelar was compromised in the first rising of June 1866, which was concerted by Marshal Prim, and crushed, after much bloodshed, in the streets by Marshals O'Donnell and Serrano. A court-martial condemned him in contumaciam to death by " garote vil," and he had to hide in the house of a friend until he escaped to France. There he lived two years until the successful revolution of 1868 allowed him to return and enter the Cortes for the first time — as deputy for Saragossa. At the same time he resumed the professorship of history at the Madrid university. Castelar soon became famous by his rhetorical speeches in the Constituent Cortes of 1869, where he led the republican minority in advocating a federal republic as the logical outcome of the recent revolution. He thus gave much trouble to men like Serrano, Topete and Prim, who had never harboured the idea of drifting into advanced democracy, and who had each his own scheme for re-establishing the monarchy with certain constitutional restrictions. Hence arose Castelar's constant and vigorous criticisms of the successive plans mooted to place a Hohenzollern, a Portuguese, the duke of Montpensier, Espartero and finally Amadeus of Savoy on the throne. He attacked with relentless vigour the short-lived monarchy of Amadeus, and contributed to its downfall. •

The abdication of Amadeus led to the proclamation of the federal republic. The senate and congress, very largely composed of monarchists, permitted themselves to be dragged along into democracy by the republican minority headed by Salmeron, Figueras, Pi y Margall and Castelar. The short-lived federal republic from the nth of February 1873 to the 3rd of January 1874 was the culminating point of the career of Castelar, and his conduct during those eleven months was much praised by the wiser portion of his fellow-countrymen, though it alienated from him the sympathies of the majority of his quondam friends in the republican ranks.

Before the revolution of 1868, Castelar had begun to dissent from the doctrines of the more advanced republicans, and particularly as to the means to be employed for their success. He abhorred bloodshed, he disliked mob rule, he did not approve of military pronunciamienlos. His idea would have been a parliamentary republic on the American lines, with some traits of the Swiss constitution to keep in touch with the regionalist and provincialist inclinations of many parts of the peninsula. He would have placed at the head of his commonwealth a president

and Cortes freely elected by the people, ruling the country in a liberal spirit and with due respect for conservative principles, religious traditions and national unity. Such a statesman was sure to clash with the doctrinaires, like Salmeron, who wanted to imitate French methods; with Pi y Margall, who wanted a federal republic after purely Spanish ideas of decentralization; and above all with the intransigent and gloomy fanatics who became the leaders of the cantonal insurrections at Cadiz, Seville, Valencia, Malaga and Cartagena in 1873.

At first Castelar did his best to work with the other republican members of the first government of the federal republic. He accepted the post of minister for foreign affairs. He even went so far as to side with his colleagues, when serious difficulties arose between the new government and the president of the Cortes, Senor Martos, who was backed by a very imposing commission composed of the most influential conservative members of the last parliament of the Savoyard king, which had

suspended its sittings shortly after proclaiming the federal republic. A sharp struggle was carried on for weeks between the executive and this commission, at first presided over by Martos, and, when he resigned, by Salmeron. In the background Marshal Serrano and many politicians and military men steadily advocated a coup d'etat in order to avert the triumph of the republicans. The adversaries of the executive were prompted by the captain-general of Madrid, Pavia, who promised the co-operation of the garrison of the capital. The president, Salmeron, and Marshal Serrano himself lacked decision at the last moment, and lost time and many opportunities by which the republican ministers profited. The federal republicans became masters of the situation in the last fortnight of April

1873, and turned the tables on their adversaries by making a pacific bloodless pronunciamiento.

The battalions o,f the militia that had assembled in the bull- ring near Marshal Serrano's house to assist the anti-democratic movement were disarmed, and their leaders, the politicians and generals, were allowed to escape to France or Portugal. The Cortes were dissolved, and the federal and constituent Cortes of

the republic convened, but they only sat during the summer of 1873, long enough to show their absolute incapacity, and to convince the executive that the safest policy was to suspend the session for several months.

This was the darkest period of the annals of the Spanish revolution of 1873-1874. Matters got to such a climax of disorder, disturbance and confusion, from the highest to the lowest strata of Spanish society, that the president of the executive, Figueras, deserted his post and fled the country. Pi y Margall and Salmeron, in successive attempts to govern, found no support in the really important and influential elements of Spanish society. Salmeron had even to appeal to such well-known reactionary generals as Pavia, Sanchez, Bregna and Moriones, to assume the command of the armies in the south and in the north of Spain. Fortunately these officers responded to the call of the executive. In less than five weeks a few thousand men properly handled sufficed to quell the cantonal risings in Cordoba, Sevilla, Cadiz and Malaga, and the whole of the south might have been soon pacified, if the federal republican ministers had not once more given way to the pressure of the majority of the Cortes, composed of " Intransigentes " and radical republicans. The president, Salmeron, after showing much indecision, resigned, but not until he had recalled the general in command in Andalusia, Pavia. This resignation was not an unfortunate event for the country, as the federal Cortes not only made Castelar chief of the executive, though his partisans were in a minority in the Parliament, but they gave him much liberty to act, 'as they decided to suspend the sittings of the house until 2nd January

1874. This was the turning-point of the Spanish revolution, as from that day the tide set in towards the successive developments that led to the restoration of the Bourbons.

On becoming the ruler of Spain at the beginning of September 1873, Castelar at once devoted his attention to the reorganization of the army, whose numbers had dwindled down to about 70,000 men. This force, though aided by considerable bodies of local militia and volunteers in the northern and western provinces, was insufficient to cope with the 60,000 Carlists in arms, and with the still formidable nucleus of cantonalists around Alcoy and Cartagena. To supply the deficiencies Castelar called out more than 100,000 conscripts, who joined the colours in less than six weeks. He selected his generals without respect of politics, sending Moriones to the Basque provinces and Navarre

at the head of 20,000 men, Martinez Campos to Catalonia with several thousand, and Lopez Dominguez, the nephew of Marshal Serrano, to begin the land blockade of the last stronghold of the cantonal insurgents, Cartagena, where the crews of Spain's only fleet had joined the revolt.

Castelar next turned his attention to the Church. He renewed direct relations with the Vatican, and at last induced Pope Pius IX. to approve his selection of two dignitaries to occupy vacant sees as well as his nominee for the vacant archbishopric of Valencia, a prelate who afterwards became archbishop of

Toledo, and remained to the end a close friend of Castelar. He put a stop to all persecutions of the Church and religious orders, and enforced respect of Church property. He attempted to restore some order in the treasury and administration of finance, with a view to obtain ways and means to cover the expense of the three civil wars, Carlist, cantonal and Cuban. The Cuban insurgents gave him much trouble and anxiety, the famous Virginius incident nearly leading to a rupture between Spain and the United States. Castelar sent out to Cuba all the reinforcements he could spare, and a new governor-general, Jovellar, whom he peremptorily instructed to crush the mutinous spirit of the Cuban militia, and not allow them to drag Spain into a conflict with the United States. Acting upon the instruc- tions of Castelar, Jovellar gave up the filibuster vessels, and those of the crew and passengers who had not been summarily shot by General Bttrriel. Castelar always prided himself on having terminated this incident without too much damage to the prestige of Spain.

At the end of 1873 Castelar had reason to be satisfied with the results of his efforts, with the military operations in the peninsula, with the assistance he was getting from the middle classes and even from many of the political elements of the Spanish revolution that were not republican. On the other hand, on the eve of the meeting of the federal Cortes, he could indulge in no illusions as to what he had to expect from the bulk of the republicans, who openly dissented from his conservative and conciliatory policyj and announced that they would reverse it on the very day the Cortes met. Warnings came in plenty, and no less a personage than the man he had made captain-general of Madrid, General Pavia, suggested that, if a conflict arose between Castelar and the majority of the Cortes, not only the garrison of Madrid and its chief, but all the armies in the field and their generals, were disposed to stand by the president. Castelar knew

too well what such offers meant in the classic land of pronunciamientos, and he refused so flatly that Pavia did not renew his advice. The sequel is soon told. The Cortes met on the 2nd of January 1874. The intransigent majority refused to listen to a last eloquent appeal that Castelar made to their patriotism and common sense, and they passed a vote of censure. Castelar resigned. The Cortes went on wrangling for a day and night until,' at daybreak on the 3rd of January 1874, General Pavia forcibly ejected the deputies, closed and dissolved the Cortes, and called up Marshal Serrano to form a provisional government.

Castelar kept apart from active politics during the twelve months that Serrano acted as president of the republic. Another pronunciamiento finally put an end to it in the last week of December 1874, when Generals Campos at Sagunto, Jovellar at Valencia, Primo de Rivera at Madrid, and Laserna at Logrofio, proclaimed Alphonso XII. king of Spain. Castelar then went into voluntary exile for fifteen months, at the end of which he was elected deputy for Barcelona. He sat in all subsequent parliaments, and just a month before his death he was elected as representative of Murcia. During that period he became even more estranged from the majority of the republicans. Bitter experience had shown him that their federal doctrines and revolutionary methods could lead to nothing in harmony with the aspirations of the majority of Spaniards. He elected, to use his own words, to defend and to seek the realization of the substance of the programme of the Spanish revolution of 1868 by evolution, and legal, pacific means. Hence the contrast between his attitude from 1876 to 1886, during the reign of Alphonso XII., when he stood in the front rank of the Opposition, to defend the reforms of that revolution against Sefior Canovas, and his attitude from 1886 to 1891. In this latter period Castelar acted as a sort of independent auxiliary of Sagasta and of the Liberal party. As soon as Castelar saw universal suffrage re- established he solemnly declared in the Cortes that his task was accomplished, his political mission at an end, and that he proposed to devote the remainder of his life to those literary, historical, philosophical, and economic studies which he had never neglected even in the busiest days of his political career. Indeed, it was his extraordinary activity and power of

assimilation in such directions that allowed him to keep his fellow-countrymen so well informed of what was going on in the outer world. His literary and journalistic labours occupied much of his time, and were his chief means of subsistence. He left unfinished a history of Europe in the 19th century. The most conspicuous of his earlier works were: — A History of Civilization in the First Five Centuries of Christianity, Recollec- tions of Italy, Life of Lord Byron, The History of the Republican Movement in Europe, The Redemption of Slaves, The Religious Revolution, Historical Essays on the Middle Ages, The Eastern Question, Fra Filippo Lippi, History of the Discovery of America, and some historical novels. Castelar died near Murcia on the 25th of May r8oo, at the age of 66. His funeral at Madrid was an imposing demonstration of the sympathy and respect of all classes and parties. (A. E. H.)

CASTELFRANCO NELL' EMILIA, a town of Emilia, Italy, in the province of Bologna, 16 m. N.W. by rail from the town of Bologna. Pop. (1901) 3163 (town), 13,484 (commune). The churches contain some pictures by later Bolognese artists. Just outside the town is a massive fort erected by Uijban VIII. in 1628, on the frontier of the province of Bologna, now used as a prison. Castelfranco either occupies or lies near the site of the ancient Forum Gallorum, a place on the Via Aemilia between Mutina and Bononia, where in 43 B.C. Octavian and Hirtius defeated Mark Antony.

CASTELFRANCO VENETO, a town and episcopal see of Venetia, Italy, in the province of Treviso, 16 m. W.' by rail from the town of Treviso. Pop. (1901) 5220 (town), 12,551 (com- mune). The older part of the town is square, surrounded by medieval walls and towers constructed by the people of Treviso in 1 2 18 (see Cittadella). It was the birthplace of the painter Giorgio Barbarelli (II Giorgione, 1477-1512), and the cathedral contains one of his finest works, the Madonna with SS. Francis and Liberalis (1504), in the background of which the towers of the old town may be seen.

CASTELL, EDMUND (1606-1685), English orientalist, was born in 1606 at Tadlow, in Cambridgeshire. At the age of fifteen heentered Emmanuel College, Cambridge, but afterwards changed his residence to St John's, on account of the valuable library there. His great work was the compiling of his Lexicon Hepta- glotton Hebraicum, Chaldaicum, Syriacum, Samaritanum, A ethiopi- cum, Arabicum, et Persicum (1669). Over this book he

spent eighteen years, working (if we may accept his own statement) from sixteen to eighteen hours a day; he employed fourteen assistants, and by an expenditure of £12,000 brought himself to poverty, for his lexicon, though full of the most unusual learning, did not find purchasers. He was actually in prison in 1667 because he was unable to discharge his brother's debts, for which he had made himself liable. A volume of poems dedicated to the king brought him preferment. He was made prebendary of Canterbury and professor of Arabic at Cambridge. Before undertaking the Lexicon Heptaglotton, Castell had helped Dr Brian Walton in the preparation of his Polyglott Bible. His MSS. he bequeathed to the university of Cambridge. He died in 1685 at Higham Gobion, Bedfordshire, where he was rector.

The Syriac section of the Lexicon was issued separately at Gottingen in 1788 by J. D. Michaelis, who offers a tribute to Castell's learning and industry. Trier published the Hebrew section in I 790-1 792.

CASTELLAMMARE DI STABIA (anc. Stabiae), a seaport and episcopal see of Campania, Italy, in the province of Naples, 17 m. S.E. by rail from the town of Naples. Pop. (1901) town, 26,378; commune, 32,589. It lies in the south-east angle of the Bay of Naples, at the beginning of the peninsula of Sorrento, and owing to the sea and mineral water baths (12 different springs) and its attractive situation, with a splendid view of Vesuvius and fine woods on the hills behind, it is a favourite resort of foreigners in spring and autumn and of Neapolitans in summer. The castle from which it takes its name, on the hill to the south of the town, was built by the emperor Frederick II. There are three large churches of the late 18th century. There are a large royal dockyard and a small-arms factory;

there are also iron works, cotton, flour and macaroni mills. The value of imports (chiefly coal, wheat, scrap-iron and cheese) for 1904 was £1,239,048, and the value of exports (chiefly macaroni and green fruit) £769,100. There is also a sponge trade, but the former coral trade is depressed. The. port was cleared by 420 vessels of 477,713 tonnage in 1905. An electric tramway along the coast road to Sorrento was opened in 1905.

CASTELLESI, ADRIANO (c. 1460?ˆ. 1521?), known also as Corneto from his birthplace, Italian cardinal and writer, was sent by Innocent VIII. to reconcile James III. of Scotland with his subjects. While in England he was appointed (1503), by Henry

VII., to the see of Hereford, and in the following year to the more lucrative diocese of Bath and Wells, but he never resided in either. Returning to Rome, he became secre tary to Alexander VI. and was made by him cardinal (May 31, 1 503) . A man of doubtful reputation, Alexander's confidant and favourite, he paid the pope a large sum for his elevation. He bought a vigna in the Borgo near the Vatican, and thereon erected a sumptuous palace after designs by Bramante; and it was here, in the summer of 1503, that he entertained the pope and Cesare Borgia at a banquet that went on till nightfall despite the unhealthy season of the year, when ague in its most malignant form was rife. Of the three, Cardinal Adrian was the first to fall ill, the pope succumbing a week after. The story of the poisoning of the pope is to be relegated to the realm of fiction. Soon after the election of Leo X. the cardinal was implicated in the conspiracy of Cardinal Petrucci against the pope, and confessed his guilt; but, pardon being offered only on condition of the payment of 25,000 ducats, he fled from Rome and was subsequently deposed from the cardinalate. As early as 1504 he had presented his palace (now the Palazzo Giraud-Torlonia) to Henry VII. as a residence for the English ambassador to the Holy See; and on his flight Henry VIII., who had quarrelled with him, gave it to Cardinal Campeggio. Adrian first fled to Venice. Of his subsequent history nothing is known for certain. It is said that he was murdered by a servant when on his way to the conclave that elected Adrian VI. As a writer, he was one of the first to restore the Latin tongue to its pristine purity; and among his works are De Vera Philosophia ex quatuor docto- ribus ecclesiae (Bologna, 1507), De Sermone Latino (Basel, 1513), and a poem, De Venatione (Venice, 1534).

See Polydore Vergil, Anglicae kistoriae, edited by H. Ellis (London, 1844); and A. Aubery, Histoire generate des cardinaux (Paris, 1642). (E. Tn.)

CASTELLI, IGNAZ FRANZ (1781-1862), Austrian dramatist, was born at Vienna on the 6th of March 1781. He studied law at the university, and then entered the government service. During the Napoleonic invasions his patriotism inspired him to write stirring war songs, one of which, Kriegslied fiir die oster- reichische Jirmee, was printed by order of the archduke Charles and distributed in thousands. For this Castelli was proclaimed by Napoleon in the Moniteur, and had to seek refuge in Hungary. In 1815 he accompanied the allies into France as secretary to Count Cavriani, and, after his return to Vienna, resumed his official post in connexion with the estates of Lower Austria. In 1842 he

retired to his property at Lilienfeld, where, sur- rounded by his notable collections of pictures and other art treasures, he for the rest of his life devoted himself to literature. Castelli's dramatic talent was characteristically Austrian; his plays were well constructed and effective and satirized unspar- ingly the foibles of the Viennese. But his wit was too local and ephemeral to appeal to any but his own generation, and if he is remembered at all to-day it is by his excellent Gedichte in niederosterreichischer Mundart (1828). He died at Lilienfeld on the 5 th of February 1862.

Castelli's Gesammelle Gedichte appeared in 1835 in 6 vols.; a selection of his Werke in 1843 in 15 vols. (2nd ed", 1848), followed by 6 supplementary volumes in 1858. His autobiography, Memoirer. tneincs Lebens, appeared in 1861-1862 in 4 vols.

CASTELLO, BERNARDO (1557-1629), Genoese portrait and historical painter, born at Albaro near Genoa, was the intimate friend of Tasso, and took upon himself the task of designing the figures of the Gemsalemme Liberata, published in 1592;

some of these subjects were engraved by Agostino Caracci. Besides painting a number of works in Genoa, mostly in a rapid and superficial style, Castello was employed in Rome and in the court of the duke of Savoy.

CASTELLO, GIOVANNI BATTISTA (1500 ?-i 569?), Italian historical painter, was born near Bergamo in 1500 or perhaps 1 509, and is hence ordinarily termed II Bergamasco. He belongs, however, to the school of Genoa, but does not appear to have had any family relationship with the other two painters named Castello, also noticed here. He was employed to decorate the Nunziata di Portoria in Genoa, the saloon of the Lanzi Palace at Gorlago, and the Pardo Palace in Spain. His best-known works are the " Martyrdom of St Sebastian," and the picture of " Christ as Judge of the World " on one of the vaultings of the Annunziata. He was an architect and sculptor as well as painter. In 1567 he was invited to Madrid by Philip II., and there he died, holding the office of architect of the royal palaces. The date of death (as of birth) is differently stated as 1569 or

CASTELLO, VALERIO (1625-1659), Italian painter, was the youngest son of Bernardo Castello (q.v.). He surpassed his father, and particularly excelled in painting battle-scenes. He painted the ” Rape of the Sabines,” now in the Palazzo Brignole, Genoa, and decorated the cupola of the church of the Annunziata in the same city. In these works he is regarded by his admirers as combining the fire of Tintoretto with the general style of Paolo Veronese.

CASTELLO BRANCO, CAMILLO, Visconde de Correia Botelho (1825-1890), Portuguese novelist, was born out of wedlock and lost his parents in infancy. He spent his early years “in a village in Traz-os-Montes. He learnt to love poetry from Camoens and Bocage, while Mendes Pinto gave him a lust for adventure, but he dreamed more than he read, and grew up undisciplined and proud. He studied in Oporto and Coimbra with much irregularity, and since his disdain for the intrigues and miseries of politics in Portugal debarred him from the chance of a government post, he entered the career of letters to gain a livelihood. After a spell of journalistic work in Oporto and Lisbon he proceeded to the Episcopal seminary in the former city with a view of studying for the priesthood, and during this period wrote a number of religious works and translated Chateau- briand. He actually took minor orders, but his restless nature prevented him from following one course for long ‘and he soon returned to the world, and henceforth kept up a feverish literary activity to the end. He was created a viscount in 1885 in recognition of his services to letters, and when his health finally broke down and he could no longer use his pen, parliament gave him a “pension for life. When, having lost his sight, and suffering from chronic nervous disease, he died by his own hand in 1890, it was generally recognized that Portugal had lost ‘ the most national of her modern writers.

Apart from his plays and verses, Castello Branco’s works may be divided into three sections. The first comprises his romances of the imagination, of which Os mysterios de Lisboa, in the style of Victor Hugo, is a fair example. The second includes his novels of manners, a style of which he was the creator and remained the chief exponent until the appearance of Crime de Padre Amaro of Eca de Queiroz. In these he is partly idealist and partly realist, and describes to perfection the domestic and social life of Portugal in the early part of the 19th century. The third division

embraces his writings in the domain of history, bio- graphy and literary criticism. Among these may be cited Noites de Lamego, Cousas leves e pesadas, Cavar em ruinas, Memorias do Bispo do Grao Para and Bohemia do Espirito.

In all, his publications number about two hundred and sixty, belonging to many departments of letters, but he owes his great and lasting reputation to his romances. Notwithstanding the fact that his slender means obliged him to produce very rapidly to the order of publishers, who only paid him from £30 to £60 a book, he never lost his individuality under the pressure. Knowing the life of the people by experience and not from books, he was able to fix in his pages a succession of strongly

marked and national types, such as the brazileiro, the oldfidalgo of the north, and the Minho priest, while his lack of personal acquaintance with foreign countries and his relative ignorance of their literatures preserved him from the temptation, so danger- ous to a Portuguese, of imitating the classical writers of the larger nations. Among the most notable of his romances are Romance de un Homem Rico, his favourite, Retrato de Ricardina, Amor de Perdicao, and the magnificent series entitled Novellas do Minho. Many of his novels are autobiographical, like Onde estd a felicidade, Memorias do Carcere and Vinganca. ■ Castello Branco is an admirable story-teller, largely because he was a brilliant improvisatore, but he does not attempt character study. Nothing can exceed the richness of his vocabulary, and no other Portuguese author has shown so profound a knowledge of the popular language. Though nature had endowed him with the poetic temperament, his verses are mediocre, but his best plays are cast in bold lines and contain really dramatic situations, while his comedies are a triumph of the grotesque, with a mordant vein running through them that recalls Gil Vicente.

The collected works of Caraillo Castello Branco are published by the Companhia Editora of Lisbon, and his most esteemed books have had several editions. The Diccionario Bibliographico Portuguez, vol. ix. p. 7 et seq., contains a lengthy but incomplete list of his pub- lications. See Romance do Romancista, by A. Pimentel, a badly put together but informing biography; also a study on the novelist by J. Pereira de Sampaio in A Geracao Nova (Oporto, 1886) ; Dr Theo- philo Braga, As Modernas Ideias na litteratura Portugueza (Oporto, 1892); Padre Senna Freitas, Perfil de Camillo Castello Branco (S. Paulo, 1887) ; and Paulo Osorio, Camillo, a sua vida, seu genio, a sua obra (Oporto, 1908). (E. Pr.)

CASTELLO BRANCO, an episcopal city and the capital of an administrative district formerly included in the province of Beira, Portugal; 1560 ft. above the sea, on the Abrantes-Guarda railway. Pop. (1900) 7288. Numerous Roman remains bear witness to the antiquity of Castello Branco, but its original name is unknown. The city is dominated by a ruined castle, and partly enclosed by ancient walls; its chief buildings are the cathedral and episcopal palace. Cloth is manufactured, and there is a flourishing local trade in cork, wine and olive oil. The administrative district of Castello Branco, which comprises the valleys of the Zezere, Ocreza and Ponsul, right-hand tributaries of the Tagus, coincides with the south-eastern part of Beira; pop. (1900)ˆ216,608; area, 2582 sq. m.

CASTELLON DE LA PLANA, a maritime province of eastern Spain, formed in 1833 of districts formerly included in Valencia, and bounded on the N. by Teruel and Tarragona, E. by the Mediterranean Sea, S. by Valencia, and W. by Teruel. Pop. (1900) 310,828; area, 2495 sq. m. The surface of the province is almost everywhere mountainous, and flat only near the coast and along some of the river valleys. Even on the coast the Atalayas de Alcala, and the Desierto de las Palmas form two well-defined though not lofty ridges. The Mijares or Millares is the principal river, flowing east-south-east from the highlands of Teruel, between the Sierras of Espina and Espadan towards the south, and the peak called Pefia Golosa (5945 ft.) towards the north, until it reaches the sea a little south of the capital, also called Castellon de la Plana. The Monlleo, a left-hand tributary of the Mijares; the Bergantes, which flows inland to join the Guadalope in Teruel; the Cenia, which divides Castellon from Tarragona; and a variety of lesser streams, render the province abundantly fertile. No considerable inlet breaks the regularity of the coast-line, and there is no first-class harbour. The climate is cold and variable in the hilly districts, temperate in winter and very warm in summer in the lowlands. Agricul- ture, fruit-growing, and especially the cultivation of the vine and olive, employ the majority of the peasantry ; stock-farming and sea-fishing are also of importance. Lead, zinc, iron and other ores have been discovered in the province; but in 1903, out of 1 29 mining concessions registered, only two were worked, and their output, lead and zinc, was quite insignificant. The local industries are mainly connected with fish-curing, paper, porcelain, woollens, cotton, silk, esparto, brandy and oils. Wine, oranges and oil are exported to foreign countries and

other parts of Spain. The important Barcelona-Valencia railway skirts the coast, passing through the capital; and the Calatayud-Sagunto line crosses the southern extremity of the province. Elsewhere the roads, which are generally indifferent, form the sole means of communication. Castellon (29,904), Villarreal (16,068), the port of Burriana (12,962), and Peniscola (3142), a town of some historical interest, are described in separate articles. The other chief towns are Alcala de Chisbert (6293), Almazora (7076), Benicarlo (7251), Maella (7335), Onda (6595), Segorbe (7045), Vail de Uxo (8643), Villafames (6708) and Vinaroz (8625).

CASTELLON DE LA PLANA, the capital of the province described above, on the Barcelona- Valencia railway, 4 m. from the Mediterranean Sea. Pop. (1900) 29,904. The broad and fertile plain in which Castellon is built is watered artificially by a Moorish aqueduct, largely cut through the solid rock, and supplied by the estuary of the Mijares, 5 m. south-east. The town is partly encircled by ancient walls; and, although most of its public buildings are modern, it contains several convents of early foundation, a curious old bell- tower, 150 ft. high, and a parish church chiefly noteworthy for a painting in the interior by Francisco Ribalta, who was born here in the middle of the 16th century. Castellon has a brisk trade, its manufactures comprising porcelain, leather, silk, linen, brandy and cork goods. Its harbour, El Grao de Castellon, about 4 m. east, is annually entered by some 200 small vessels. A light railway, which traverses the numerous and profitable orange plantations on the south-west, connects it with the towns of Almazora, Villarreal, Burriana and Onda. Under its Moorish rulers Castellon occupied a hill to the north of its present site; its removal to the plain by James I. of Aragon (1213-1276) gave the town itsiull name, ” Castellon of the Plain.”

CASTELNAU, MICHEL DE, Sieur de la Mauvissiere (c. 1520-1592), French soldier and diplomatist, ambassador to Queen Elizabeth, was born in Touraine about 1520. He was one of a large family of children, and his grandfather, Pierre de Castelnau, was equerry to Louis XII. Endowed with a clear and penetrating intellect and remarkable strength of memory, he received a careful education, to complete which he travelled in Italy and made a long stay at

Rome. He then spent some time in Malta, afterwards entered the army, and made his first acquaintance with war in the campaigns of the French in Italy. His abilities and his courage won for him the friendship and pro- tection of the cardinal of Lorraine, who took him into his service. In 1557 a command in the navy was given to him, and the cardinal proposed to get him knighted. This, however, he de- clined, and then rejoined the French army in Picardy. Various delicate missions requiring tact and discretion were entrusted to him by the constable de Montmorency, and these he discharged so satisfactorily that he was sent by the king, Henry II., to Scotland with despatches for Mary Stuart, then betrothed to the dauphin (afterwards Francis II.). From Scotland he passed into England, and treated with Queen Elizabeth respecting her claims on Calais (1559), a settlement of which was effected at the congress of Cateau-Cambresis. He was next sent as am- bassador to the princes of Germany, for the purpose of prevailing upon them to withdraw their favour from the Protestants. This embassy was followed by missions to Margaret of Parma, governess of the Netherlands, to Savoy, and then to Rome, to ascertain the views of Pope Paul IV. with regard to France. Paul having died just before his arrival, Castelnau used his influence in favour of the election of Pius IV. Returning to France, he once more entered the navy, and served under his former patron. It was his good fortune, at Nantes, to discover the earliest symptoms of the conspiracy of Amboise, which he immediately reported to the government.

After the death of Francis II. (December 1560) he accom- panied the queen, Mary Stuart, to Scotland, and remained with her a year, during which time he made several journeys into England, and attempted to bring about a reconciliation between Mary and Queen Elizabeth. The wise and moderate counsels which he offered to the former were unheeded. In 1562, in

consequence of the civil war in France, he returned there. He was employed against the Protestants in Brittany, was taken prisoner in an engagement with them and sent to Havre, but was soon after exchanged. In the midst of the excited passions of his countrymen, Castelnau, who was a sincere Catholic, main- tained a wise self-control and moderation, and by his counsels rendered valuable service to the government. He served at the siege of Rouen, distinguished himself at the battle of Dreux, took Tancarville, and contributed in 1563 to the recapture of Havre from the English.

During the next ten years Castelnau was employed in various important missions:— first to Queen Elizabeth, to negotiate a peace; next to the duke of Alba, the new governor of the Netherlands. On this occasion he discovered the project formed by the prince of Conde and Admiral Coligny to seize and carry off trie royal family at Monceaux (1567). After the battle of St Denis he was again sent to Germany to solicit aid against the Protestants; and on his return he was rewarded for his services with the post of governor of Saint-Diziej, and a company of orderlies. At the head of his company he took part in the battles of Jarnac and Moncontour. In 1572 he was sent to England by Charles IX. to allay the excitement created by the massacre of St Bartholomew, and the same year he was sent to Germany and Switzerland. Two years later he was reappointed by Henry III. ambassador to Queen Elizabeth, and he remained at her court for ten years. During this period he used his influence to promote the marriage of the queen with the duke of Alencon, with a view especially to strengthen and maintain the alliance of the two countries. But Elizabeth made so many promises only to break them that at last he refused to accept them or communicate them to his government. On his return to France he found that his chateau of La Mauvissiere had been destroyed in the civil war; and as he refused to recognize the authority of the League, the duke of Guise deprived him of the governorship of Saint-Dizier. He was thus brought almost to a state of destitution. But on the accession of Henry IV., the king, who knew his worth, and was confident that although he was a Catholic he might rely on his fidelity, gave him a command in the army, and entrusted him with various confidential missions.

Castelnau died at Joinville in 1592. His MSmoires rank very high among the original authorities for the period they cover, the eleven years between 1559 and 1570. They were written during his last embassy in England for the benefit of his son; and they possess the merits of clearness, veracity and im- partiality. They were first printed in 1621; again, with additions by Le Laboureur, in 2 vols, folio, in 1659; and a third time, still further enlarged by Jean Godefroy, 3 vols, folio, in 1731. Castelnau translated into French the Latin work of Ramus, On the Manners and Customs of the Ancient Gauls. Various letters of his are preserved in the Cottonian and Harleian collections in the British Museum.

His grandson, Jacques de Castelnau (1620-1658), distin- guished himself in the war against Austria and Spain during the ministries of Richelieu and Mazarin, and died marshal of France.

See Hubault, Ambassade de Castelnau en Angleterre (1856); Relations politiques de la France . . . avec l'£cosse au seizieme siicle, edited by J. B. A. T. Teulet (1862); and De la Ferriere, Les Projets de mariage d' Elisabeth (1883).

CASTELNAUDARY, a town of south-western France, capital of an arrondissement in the department of Aude, 22 m. W.N.W. of Carcassonne, on the Southern railway between that city and Toulouse. Pop. (1906) 6650. It is finely situated on an elevation in the midst of a fertile and well-cultivated plain; and its commercial facilities are greatly increased by the Canal du Midi, which widens out, as it passes the town, into an extensive basin surrounded with wharves and warehouses for the timber used in the upkeep of the canal. The principal buildings are the law court, the hotel de ville, and the church of St Michel, dating from the 14th century; none of these offers any feature of unusual interest. There are a number of flour-mills, as well as manufactories of earthenware, tiles and blankets; an extensive

trade is maintained in lime, gypsum, timber, grain, fruits, wine, wool, cattle and farm implements, and the building of canal boats forms an important industry. The public institutions include the sub-prefecture, tribunals of first instance and of commerce, a communal college and a farm school.

Castelnaudary probably represents the ancient town of Soslomagus, taken during the 5th century by the Visigoths, who, it is conjectured, rebuilt the town, calling it Castrum Novum Arianorum, whence the present name. Early in the 13th century the town was the scene of several struggles during the war against the Albigenses, between Simon IV., count of Mont- fort, and Raymond VI., count of Toulouse, and their supporters. In 1229 it was deprived of its ramparts, and after these had been rebuilt, it was captured and burned by the Black Prince in 1355, but again rebuilt in 1366. In 1632 it was the scene of a cavalry engagement in which the rebel Henry II., duke of Montmorency, was defeated and captured by the royal troops.

CASTELSARRASIN, a town of south-western France, capital of an arrondissement in the department of Tarn-et- Garonne, 12 m. W. of Montauban on the Southern railway. Pop. (1906) town, 3189;

commune, 7496. Castelsarrasin, situated on the – left bank of the lateral canal of the Garonne and about a mile from the right bank of that river, is surrounded by promenades occupying the site of the old fortifications. Its chief building is the brick-built church of St Sauveur, which dates from the 13th century. The administrative buildings are modern. The town has a sub-prefecture, a tribunal of first instance, and a communal college. The principal industrial establishment is the metal- foundry of Sainte-Marguerite, where copper, tin and other metals are worked; there are also flour-mills, saw- mills and dye-works. Trade is in cattle, agricultural produce, wine, baskets and game.

The name Castelsarrasin appears in the 13th century, when the village of Villelongue was replaced by the present bastide. Castrum Cerrucium, Castel-sur-Azine (from the neighbouring stream, Azine) and Castellum Sarracenum are suggested derivations, no one of which can be adopted with certainty.

CASTI, GIOVANNI BATTISTA (1721-1803), Italian poet, was born of humble parents at Montefiascone, in the states of the church, in 1721. He rose to the dignity of canon in the cathedral of his native place, but gave up his chance of church preferment to satisfy his gay and restless spirit by visiting most of the capitals of Europe. In 1782, on the death of Metastasio, he was appointed Poeta Cesario, or poet-laureate of Austria, in which capacity he applied himself with great success to the opera bouffe; but in 1796 he resigned this post, in order that he might not be hampered by political relations; and he spent the close of his life as a private gentleman at Paris, where he died in 1803. Casti is best known as the author of the Novelle galanti, and of Gli Animali parlanti, a poetical allegory, over which he spent eight years (1794-1802), and which, notwithstanding its tedious length, excited so much interest that it was translated into French, German and Spanish, and (very freely and with additions) into English, in W. S. Rose's Court and Parliament of Beasts (Lond., 1819). Written during the time of the Revolution in France, it was intended to exhibit the feelings and hopes of the people and the defects and absurdities of various political systems. The Novelle Galanti is a series of poetical tales, in the ottava rima — a metre largely used by Italian poets for that class of compositions. The sole merit of these poems consists in the harmony and purity of the style, and the liveliness and sarcastic power of many passages. They are, however, characterized by the grossest licentiousness; and there is no originality of plot — that, according to the custom of Italian novelists, being taken from

classical mythology or other ancient legends. Among the other works of Casti is the Poema Tartaro, a mock-heroic satire on the court of Catherine II., with which he was personally acquainted.
CASTIGLIONE, BALDASSARE (1478-1529), Italian diplomatist and man of letters, was born at Casanatico near Mantua, and was educated at Milan under the famous professors Merula and Chalcondyles. In 1496 he entered the service of Lodovico Sforza, duke of Milan, returning to Mantua in 150″ "yhen Lodovico was

carried prisoner into France. In 1504 he was attached to the court of Guidobaldo Malatesta, duke of Urbino, and in 1506 he was sent by that prince on a mission to Henry VII. of England, who had before conferred on Federigo Malatesta, " the Good Duke," the most famous mercenary of his age, the order of the Garter. Guidobaldo dying childless in 1508, the duchy of Urbino was given to Francesco Maria della Rovere, for whom Castiglione, envoy at the court of Leo X. (Medici), obtained the office of generalissimo of the Papal troops. Charged with the arrangement of the dispute between Clement VII. (Medici) and Charles V., Castiglione crossed, in 1524, into Spain, where he was received with highest honours, being afterwards naturalized, and made bishop of Avila. In 1527, however, Rome was seized and sacked by the Imperialists under Bourbon, and in July of the same year the surrender of the castle of Sant' Angelo placed Clement in their hands. Castiglione had been tricked by the emperor, but there were not wanting accusations of treachery against himself. He had, however, placed fidelity highest among the virtues of his ideal " courtier," and when he died at Toledo in iS2grit was said that he had died of grief and shame at the imputation. The emperor mourned him as " one of the world's best cavaliers." A portrait of him, now at the Louvre, was painted by Raphael, who disdained neither his opinion nor his advice.

Castiglione wrote little, but that little is of rare merit. His verses, in Latin and Italian, are elegant in the extreme; his letters (Padua, 1769-1771) are full of grace and finesse. But the book by which he is best remembered is the famous treatise, II Cortegiano, written in 1514, published at Venice by Aldus in 3.528, and translated into English by Thomas Hoby as early as 1 561. This book, called by the Italians II Libro d'oro, and remarkable for its easy force and undemonstrativeˆ elegance of style no less than for the nobility and manliness of its theories (see the edition by V. Cian, Florence, 1894), describes the Italian gentleman of the Renaissance under his brightest and fairest aspect, and gives a charming picture of the court of Guidobaldo

da Montefeltre, duke of Urbino, " confessedly the purest and most elevated court in Italy." In the form of a discussion held in the duchess's drawing-room — with Elizabetta Gonzaga, Pietro Bembo, Bernardo Bibbiena, Giuliano de' Medici, Emilia Pia, and Ceretino the Unique among the speakers — the question, What constitutes a perfect courtier? is debated. With but few differences, the type determined on is the ideal gentleman of the present day.

See P. L. Ginguene, Histoire litteraire de V Italic, vi., vii. ; J. A. Symonds, The Renaissance in Italy (London, 1875) ; C. Hare, Courts and Camps of the Italian Renaissance (1908) ; Julia Cart-wright, B. Castiglione, the Perfect Courtier (1908), with good biblio- graphy.

CASTIGLIONE, CARLO OTTAVIO, Count (1784-1849), Italian philologist, was born at Milan of an ancient family. His principal work was done in connexion with the Arabic and other Oriental languages, but he also performed good service in several other departments. In 1819 he published Monete cufiche del Museo di Milano, and assisted Cardinal Mai in his Ulphilae partium ineditarum in Ambrosianis palimpsestis repertarum ediiio. A learned Memoire geographique et numismatique sur la partie orientate de la Barbarie appelee Afrikia par les Arabes appeared in 1826, and established his reputation. In 1829 he published by himself the Gothic version of the second epistle of Paul to the Corinthians ; and this was followed by the Gothic version of the epistle to the Romans, the first epistle to the Corinthians, and the epistle to the Ephesians in 1834, by Galatians, Philippians, and 1 Thessalonians in 1835, and by 2 Thessalonians in 1839. He died at Genoa oh the 10th of April 1849.

His Life, by Biondelli, appeared at Milan in 1856.

CASTIGLIONE, GIOVANNI BENEDETTO (1616-1670), called in Italy II Grechetto, and in France Le Benedette, Italian painter of the Genoese school, was born in Genoa, and studied for some time under Vandyck. He painted portraits, historical pieces and landscapes, but chiefly excelled in fairs, markets and rural scenes with animals. Noah and the animals entering the

Ark was a favourite subject of his. His paintings are to be found in Rome, Venice, Naples, Florence, and more especially Genoa and Mantua. He also executed a number of etchings, which are spirited, free and full of taste; “Diogenes searching for a Man ” is one of the principal of these. The etchings are remarkable for light and shade, and have even earned for Cas- tiglione the name of ” a second Rembrandt.” The Presepio (Nativity of Jesus) in the church of San Luca, Genoa, ranks among his most celebrated paintings, and the Louvre contains eight characteristic examples. In his closing years he lived in Mantua, painting for the court; here he received his name of ” Grechetto,” from the classic air of his pastorals, and here he died of gout in 1670. His brother Salvatore and his son Fran- cesco excelled in the same subjects; and it is thought that many paintings which are ascribed to Benedetto are only copies after him, or perhaps originals by his son or brother.

CASTIGLIONE DELLE STIVIERE, a town of Lombardy, Italy, in the province of Mantua, 20 m. N.W. of Mantua by road. Pop. (1901) 4122 (town), 5940 (commune). It has an old castle, much altered and restored, especially by the Gonzaga family of Mantua in the 16th century. During the War of the Spanish Succession, the French under the duke of Vendome occupied it; and during the siege of Mantua in 1796, the Austrians under Wurmser were defeated here by the French under Augereau, who was later created by Napoleon duke of Castiglione.

CASTIGLIONE OLONA, a town of Lombardy, Italy, in the province of Como, 27 m. N.E. of Milan by rail. Pop. (1901) 1806. The choir of the collegiate church, erected about 1428 by Cardinal Branda Castiglione, contains fine frescoes by Masolino of Florence: there are other works by the same master in the baptistery. The tomb of the cardinal (1443) is good. The church of S. Sepolcro, in the lower part of the town, has two large stone figures of saints on its facade (of the end of the 13th century) and, within, painted wooden figures and the tomb of Guido Castiglione (d. 1485) with fine sculptures of the school of Amadeo. The palace erected by Cardinal Castiglione has good terra-cotta decorations.

CASTILE, or Castiixe {Castillo), an ancient kingdom of Spain, occupying the central districts of the Iberian Peninsula; and bounded on the N. by the Bay of Biscay, N.E. by the Basque Provinces and Navarre, E. by Aragon, S.E. by Valencia and Murcia, S. by Andalusia, W. by Estremadura and Leon, and N.W. by Asturias. Pop. (1900) 3,708,713; area, 55,307 sq. m. The name

Castile is commonly said to be derived from the numerous frontier forts (caslillos) erected in the middle ages as a defence against the Moors. The northern part of the kingdom, which was first freed from Moorish rule, is called Old Castile (Castilla la Vieja); the southern, acquired later, is called New Castile (Castilla la Nueva). These two divisions, with a third known as North Castile, now rank as military districts or captaincies-general; but the term " North Castile," which covers the northern extremity of Old Castile, is not generally used. In 1833 Old Castile was divided into the pro- vinces of Avila, Burgos, Logrono, Palencia, Santander, Segovia, Soria and Valladolid; while New Castile was similarly divided into Ciudad Real, Cuenca, Guadalajara, Madrid and Toledo. The modern progress of commerce, communications, &c. in these thirteen provinces is described in the separate articles upon each of them.

Castile extends for about 300 m. from north to south, and 160 m. from east to west. It consists of a vast central plateau, with an average altitude of about 2500 ft. This plateau has a natural frontier of high mountains on all sides, except on the borders of Leon and Murcia; it is also bisected by the Sierra de Guadarrama and Sierra de Gredos, which extend in a south- westerly direction across the central districts, and form the dividing line between Old and New Castile. Geographically it includes also the high plains of Leon, towards the north-west, and of Murcia on the south-east. The existing frontier is marked on the north by the Cantabrian Mountains (q.v.); on the east by the Sierra de la Demanda with its offshoots, and by the

Serrania de Cuenca; on the south by the Sierra Morena; and on the west by various minor, ranges which link together the three more or less parallel chains of the Sierra de Gredos, Sierra de Guadalupe and Sierra Morena. Three great rivers, the Douro, which traverses Old Castile, with the Tagus and Guadiana, which respectively drain the central and southern regions of New Castile, flow westward into Portugal, and finally reach the Atlantic; while the Ebro, which rises in the north of the king- dom, skirts the north-eastern frontier on its way to the Medi- terranean. These rivers are described under their own names.

The climate of Old Castile is healthy, but liable to severe cold and heat. Snow falls early and lies late in the mountains, and there is a heavy rainfall in the north-west. Nev/ Castile has a still more rigorous climate, for although the mean annual tem- perature is about 59 Fahr., the summer heat in the valleys is peculiarly

oppressive, and the highlands are swept by scorching or icy gales, laden with dust. The rainfall rarely exceeds 10 in. in a year.

In both the Castiles the central plateau has a naturally fertile soil, for after rain a luxuriant vegetation appears; but drought is common, owing to the insufficient volume of the rivers, and the failure of the Spaniards to extend the fine system of irrigation which the Moors originated. Certain districts, indeed, in which a layer of heavy loam underlies the porous and friable surface, are able to retain the moisture which elsewhere is absorbed. Such land is found in Palencia, and in the Mesa de Ocafia, where it yields abundant crops; and many of the northern mountains are well wooded. But vast tracts of land are useless except as pasture for sheep, and even the sheep are driven by the severe winters to migrate yearly into Estremadura (q.v.). The normal Castilian landscape is an arid and sterile steppe, with scarcely a tree or spring of water; and many even of the villages afford no relief to the eye, for they are built of sunburnt unbaked bricks, which share the dusty brownish-grey tint of the soil. Especially characteristic is the great plain of La Mancha (q.v.),

The transformation of Castile from a small county in the north of what is now Old Castile into an independent monarchy, was one of the decisive events in the reconquest of Spain from the Moors. The successful resistance offered by Asturias to the invaders had been followed by the liberation of Galicia and Leon, when Ferdinand I. of Castile (1035-1065), by his marriage with Sancha, widow of the last king of Leon, was enabled to unite Leon and Castile in a single kingdom, with its capital at Burgos. New territories were annexed on the south, until, after the capture of Toledo in 1085, and the consequent formation of a New Castile, the kingdom comprised the whole of central Spain. Thenceforward its history is inseparable from that of the whole country; and it is therefore described in full, together with the language and literature of Castile, under Spain (q.v.).

Castilian, which is the literary language of Spain, and with certain differences, of Spanish America, is spoken in Old and New Castile, Aragon, Estremadura, and the greater part of Leon; in Andalusia it is subject to various modifications of accent and pronunciation. As there is little, if any, difference of racial origin, character and physical type, among the in- habitants of this region, except in Andalusia, and, to a less extent, in Estremadura, the Castilian is justly regarded as the typical Spaniard. Among

the Castilian peasantry, where education and foreign influence have never penetrated deeply, the national character can best be studied. Its intense pride, its fatalistic indolence and ignorance, its honesty and its bigotry, tempered by a keen sense of humour, are well-known characteristics. Apart from the peasant class, Castilians have contributed more to the development of Spanish art and literature than the in- habitants of any other region except, perhaps, Andalusia, which claims to be regarded as supreme in architecture and painting. Of the two great Spanish universities, Alcala de Henares belonged in all respects to Castile, and Salamanca rose to equality with Paris, Oxford or Bologna, under the purely Castilian influence of Alphonso X. (1252-1284).

For a general description of Castile and its inhabitants, antiquities, commerce, &c., see Castilla la Nueva, three illustrated volumes in

the series Espana, by T. M. Quadrado and V. de la Fuente (Barcelona, 1885-1886), and the Quia del antiguo reino de Castilla, by E.Valverde y Alvarez (Madrid, 1886), which deals with the provinces of Burgos, Santander, Logrono, Soria, Avila and Segovia. For the history, see in addition to the works cited under Spain (section History), Cronicas de los reyes de Castilla, by C. Rosell (Madrid, 1875-1877, 2 vols.) ; Coleccion de las cronicas y memorias de los reyes de Castilla (Madrid, 1779-1787, 7 vols.); and Historia de las communidades de Castilla (Madrid, 1897).

CASTILHO, ANTONIO FELICIANO DE (1800-1875), Portu- guese man of letters, was born at Lisbon. He lost his sight at the age of six, but the devotion of his brother Augusto, aided by a retentive memory, enabled him to go through his school and university course with success; and he acquired an almost complete mastery of the Latin language and literature. His first work of importance, the Cartas de Echo e Narciso (1821), belongs to the pseudo-classical school in which he had been brought up, but his romantic leanings became apparent in the Primavera (1822) and in Amor e Melancholia (1823), two volumes of honeyed and prolix bucolic poetry. In the poetic legends A noite de Castello (1836) and Cuimes do bardo (1838) Castilho appeared as a full-blown Romanticist. These books exhibit the defects and qualities

of all his work, in which lack of ideas and of creative imagination and an atmosphere of artificiality are ill compensated for by a certain emotional charm, great purity of diction and melodious versification. Belonging to the didactic and descriptive school, Castilho saw nature as all sweetness, pleasure and beauty, and he lived in a dreamland of his imagination. A fulsome epic on the succession of King John VI. brought him an office of profit at Coimbra. On his return from a stay in Madeira, he founded the Revista Universal Lisbonense, in imitation of Herculano's Panorama, and his profound knowledge of the Portuguese classics served him well in the introduction and notes to a very useful publication, the Livraria Classica Portugueza (1845-1847, 25 vols.), while two years later he established the " Society of the Friends of Letters and the Arts." A study on Camoens and treatises on metri- fication and mnemonics followed from his pen. His praise- worthy zeal for popular instruction led him to take up the study of pedagogy, and in 1850 he brought out his Leitura Repentina, a method of reading which was named after him, and he became government commissary of the schools which were destined to put it into practice. Going to Brazil in 1854, he there wrote his famous " Letter to the Empress." Though Castilho's lack of strong individuality and his over-great respect for authority prevented him from achieving original work of real merit, yet his translations of Anacreon, Ovid and Virgil and the Chave do Enigma, explaining the romantic incidents that led to his first marriage with D. Maria de Baena, a niece of the satirical poet Tolentino, and a descendant of Antonio Ferreira, reveal him as a master of form and a purist in language. His versions of Goethe's Faust and Shakespeare's Midsummer Night's Dream, made without a knowledge of German and English, scarcely added to his reputation. When the Coimbra question arose in 1865, Garrett was dead and Herculano had ceased to write, leaving Castilho supreme, for the moment, in the realm of letters. But the youthful Anthero de Quental withstood his claim to direct the rising generation and attacked his superannuated leadership, and after a fierce war of pamphlets Castilho was dethroned. The rise of Joao de Deus reduced him to a secondary position in the Portuguese Parnassus, and when he died ten years later much of his former fame had preceded him to the tomb.

See also " Memorias de Castilho" in the Institute of Coimbra; •Innocencio da Silva in Diccionario bibliographico Portuguez, i. 130 and viii. 132 : Latino Coelho's study in the Revista contemporanea de Portugal e Brazil, vols. i. and ii. ; Dr Theophilo

Braga, Historia do Romantismo (Lisbon, 1880). (E. Pr.)

CASTILLEJO, CRIST6BAL DE (1490-1556), Spanish poet, was born at Ciudad Rodrigo in 1490. In 1518 he left Spain with Ferdinand of Austria, afterwards emperor, whose private secretary he eventually became. While residing at Vienna in 1 5 28-1 530 he wrote the Historia de Piramo y Tisbe, and dedi- cated it to Anna von Schaumberg, with whom he had a platonic love-affair. He seems to have visited Venice, to have been

neglected by his patron, to have fallen ill in 1540, and to have passed his last years in poverty. He died on the 12 th of June 1556, and was buried at Vienna. Castillejo's poems are inter- esting, not merely because of their intrinsic excellence, but also as being the most powerful protest against the metrical innova- tions imported from Italy by Boscan and Garcilaso de la Vega. He adheres to the native quintillas or to the coplas de pie quebrado, and only abandons these traditional forms when he indulges in caustic parody of the new school — as in the lines Contra los que dejan los metros castellanos. He excels by virtue of his charming simplicity and his ingenious wit, always keen, sometimes licentious, never brutal. The urbane gaiety of his occasional poems is delightfully spontaneous, and the cynical humour which informs the Dialogo de las condiciones de las mujeres and the Didlogo de la vida de la corte is impregnated with the Renaissance spirit. Castillejo is the Clement Marot of Spain. His plays are lost; the best text of his verses is that printed at Madrid in 1792.

CASTILLO S0L6RZAN0, ALONSO DE (is8 4 ?-i647?), Spanish novelist and playwright, is stated to have been baptized at Tordesillas near Valladolid on 1st October 1584. Nothing is known of his youth, and he is next heard of at Madrid in 1619 as a man of literary tastes. While in the service of the marquis de Villar, he issued his first work, Donaires del Parnaso (1624-1625), two volumes of humorous poems; his Tardes entretenidas (1625) and Jornadas alegres (1626) proved that he was a novelist by vocation. Shortly afterwards he joined the household of the marquis ds los Velez, viceroy of Valencia, and published in quick succession three clever picaresque novels: La Nina de los embustes, Teresa de Manzanares (1634), Las Aventuras del Bachiller Trapaza (1637), and a continuation entitled La Garduna ds Sevilla y Anzuelo de las bolsas (1642). To these shrewd cynical stories he owes his reputation. He followed the marquis de los Velez in his disastrous campaign in Catalonia,

and accompanied him to Rome, where the defeated general was sent as ambassador. Castillo Solorzano's death occurred (probably at Palermo) before 1648, but the exact date is uncertain. His prolonged absence from Madrid prevented him from writing as copiously for the stage as he would other- wise have done; but he was popular as a playwright both at home and abroad. His Marques del Cigarral and El Mayorazgo figurdn are the sources respectively of Scarron's Don Jophet d'Armenie and L'Hiritier ridicule. Among his numerous remain- ing works may be mentioned Las Harpias en Madrid (1633), Fiestas del Jar din (1634), Los Alivios de Casandra (1640) and the posthumous Quinta de Laurel (1649); the witty observation of these books forms a singular contrast to the prim devotion of his Sagrario de Valencia (1635). His versatility and graceful style deserve the highest praise. (J. F.-K.)

CASTLE (Lat. castellum, a fort, diminutive of castra, a camp; Fr. chateau and chdtel), a small self-contained fortress, usually of the middle ages, though the term is sometimes used of pre-historic earthworks (e.g. Hollingbury Castle, Maiden Castle), and sometimes of citadels (e.g. the castles of Badajoz and Burgos) and small detached forts d' arret in modern times. It is also often applied to the principal mansion of a prince or nobleman, and in France (as chateau) to any country seat, this use being a relic of the feudal age. Under its twofold aspect of a fortress and a residence, the medieval castle is inseparably connected with the subjects of fortification (see Fortification and Siegecraft) and architecture (q.v.). An account of Roman and pre-Roman castella in Britain will be found under Britain.

The word " castle " (caslel) was introduced into English shortly before the Norman Conquest to denote a type of fortress, then new to the country, brought in by the Norman knights whom Edward the Confessor had sent for to defend Hereford- shire against the inroads of the Welsh. Richard's castle, of which the earthworks remain and which has given its name to a parish, was erected at this period on the border of Hereford- shire and Shropshire by Richard Fitz Scrob. The essential feature of this type was a circular mound of earth surrounded by a dry ditch and flattened at the top. Around the crest of

Section

From Clark's Medieval Military Architecture, permission of Bernard Quaritch.

Fig. i. — Plan of Laughton en-le Morthen.

its summit was placed a timber palisade. This moated mound was styled in French molte (latinized mota), a word still common in French place-names. It is clearly depicted at the time of the Conquest in the Bayeux tapestry, and was then familiar on the mainland of western Europe. A description of this earlier castle is given in the life of John, bishop of Terouanne {Acta Sanctorum, quoted by G. T. Clark, Medieval Mil. Architecture): — " The rich and the noble of that region being much given to feuds and bloodshed, fortify themselves . . . and by these strongholds subdue their equals and oppress their inferiors. They heap up a mound as high as they are able, and dig round it as broad a ditch as they can. . . . Round the summit of the mound they construct a palisade of timber to act as a wall. . . .

Inside the palisade they erect a house, or rather a citadel, which looks down on the whole neighbourhood." St John, bishop of Terou- anne, died in 1130, and this castle of Merchem, built by " a lord of the town many years be- fore " may be taken as typical of the practice of the nth century. But in addition to the mound, the citadel of the for- tress, there was usually appended to it a bailey or basecourt (and some- times two) of semilunar b y or horseshoe shape, so that the mound stood d cheval on the line of the enceinte. The rapidity and ease with which it was possible to construct castles of this type made them characteristic of the Conquest period in England and of the Anglo-Norman settlements in Wales, Ireland and the Scottish lowlands. In later days a stone wall replaced the timber palisade and produced what is known as the shell-keep, the type met with in the extant castles of Berkeley, Alnwick and Windsor.

But the Normans introduced also two other types of castle. The one was adopted where they found a natural rock strong- hold which, only needed adaptation, as at Clifford, Ludlow, the Peak and Exeter, to produce a citadel; the other was a type wholly distinct, the high rectangular tower of masonry, of which the Tower of London is the best-known example, though that of Colchester was probably constructed in the nth century also. But the latter type belongs rather to the more settled conditions of the 1 2th century when haste was not a necessity, and in the first half of which the fine extant keeps of Hedingham and Rochester were erected. These towers were originally sur- rounded by palisades, usually on earthen ramparts, which were replaced later by stone walls. The whole fortress thus formed was styled a castle, but sometimes more precisely " tower and castle," the former being the citadel, and the latter the walled enclosure, which preserved more strictly the meaning of the Roman castellum.

Reliance was placed by the engineers of that time simply and solely on the inherent strength of the structure, the walls of which defied the battering-ram, and could only be undermined at the cost of much time and labour, while the narrow apertures were constructed to exclude arrows or flaming brands.

At this stage the crusades, and the consequent opportunities, afforded to western engineers of studying the solid fortresses of the Byzantine empire, revolutionized the art of castle- building, which henceforward follows recognized principles. Many castles were built in the Holy Land by the crusaders of the 1 2th century, and it has been shown (Oman, Art of War: the Middle Ages, p. 529) that the designers realized, first, that a

second line of defences should be built within the main enceinte, and a third line or keep inside the second line; and secondly, that a wall must be flanked by projecting towers. From the Byzan-

Fig. 2. — Vertical section of rectangular Norman Keep (Tower of London).

tine engineers, through the crusaders, we derive, therefore, the cardinal principle of the mutual defence of all the parts of a fortress. The donjon of western Europe was regarded as the fortress, the outer walls

as accesspry defences; in the East each envelope was a fortress in itself, and the keep became merely the last refuge of the garrison, used only when all else had been captured. Indeed the keep, in several crusader castles, is no more than a tower, larger than the rest, built into the enceinte and serving with the rest for its

“°S!r

From Oman’s History of the Art of War, by permission of Methuen & Co.

Fig- 3-”

-Berkeley Castle, late Norman Shell-Keep.

iSss* v

flanking defence, while the fortress was made strongest on the most exposed front. The idea of the flanking towers (which were of a type very different from the slight projections of the shell-keep and rectangular tower) soon penetrated to Europe, and Alnwick Castle ,‘MTi/’. 'Crfi«>v;’—.

(1140-1150) shows the influence of the new system. But the finest of all castles of the middle ages was Richard Cceur de Lion’s fortress of Chateau Gaillard (1197) on the Seine near Les Andelys. Here the innermost ward was protected by an elaborate system of strong appended defences, which included a strong

From Oman’s History of the Art of War. Fig. 4. — Krak-des-Chevaliers : Plan.

tete-de-pont covering the Seine bridge (see Clark, i. 384, and Oman, P- 533)- The castle stood upon high ground and consisted of three distinct enceintes or wards besides the keep, which was in this case merely a strong tower forming part of the inner- most ward. The donjon was rarely defended a outrance, and it

gradually sank in importance as the outer ” wards ” grew stronger. Round instead of rectangular towers were now becoming usual, the finest examples of their employment as keeps being at Conisborough in England and at Coucy in France.

Against

Fig. 5. — Krak-des-Chevaliers : View.

the relatively feeble siege artillery of the 13th century a well-built fortress was almost proof, but the mines and the battering ram of the attack were more formidable, and it was realized that corners in the stonework of the fortress were more vulnerable than a uniform curved surface. Chateau Gaillard fell to Philip Augustus in 1204 after a strenuous defence, and the success of the assailants was largely due to the wise and skilful employ-

A. High Angle Tower K. Entrance Gale

D.B Smaller Side Towers L The Counterscarp

C.C. D.D. Corner Towers M The Keep

li OuterEnocinte.orLowerCourt N The Escarpment

f. The Well O. Postern Tower

CTl.BuUtlingsinthelouierCwrt V PosternGcle

L The Moat R.H Parapet Wat's

S. Gale from the Escarpment T T, Flanking Towers

V Outer Tower

X Connecting Wall

V TheStockodeintheWuer 22 The Great Ditches

Fig. 6. — Chateau Gaillard.

ment of mines. An angle of the noble keep of Rochester was undermined and brought down by John in 1215.

The next development was the extension of the principle of successive lines of defence to form what is called the " concentric " castle, in which each ward was placed wholly within another which enveloped it; places thus built on a flat side (e.g. Caerphilly Castle) became for the first time more formidable

than strongholds perched upon rocks and hills such as Chateau Gaillard, where the more exposed parts indeed possessed many

successive lines of defence, but at other points, for want of room, it was impossible to build more than one or, at most, two walls. In these cases, the fall of the inner ward by surprise, escalade, vive force, or even by regular siege (as was sometimes feasible), en- tailed the fall of the whole castle.

The adoption of the con- centric system precluded any such mischance, and thus, even though siege- engines improved during the 13th and 14th cen- turies, the defence, by the massive strength of the concentric castle in some cases, by natural inaccessi- bility of position in others, maintained itself superior to the attack during the latter middle ages. Its final fall was due to the introduction of gunpowder as a propellant. " In the 14th century the change

begins, in the 15th it is fully developed, in the 16th the feudal fastness has become an anachronism."

The general adoption of cannon placed in the hands of the central power a force which ruined the baronial fortifications in a few days of firing. The possessors of cannon were usually private individuals of the middle classes, from whom the prince hired the mat-Oriel and the technical workmen. A typical case will be found in the history of Brandenburg and Prussia (Carlyle, Frederick the Great, bk. iii. ch. i.), the impregnable castle of Friesack, held by an intractable feudal noble, Dietrich von

Fig. 7. — Coucy: Plan.

Coucy

Quitzow, being reduced in two days by the elector Frederick I, with " Heavy Peg " (Faule Crete) and other guns hired and borrowed (February 1414). The beginnings of orderly govern- ment in Brandenburg thus depended upon the guns, and the taking of Friesack is, in Carlyle's phrase, " a fact memorable to every Prussian man." In England, the earl of Warwick in 1464

reduced the strong fortress of Bamborough in a week, and in Germany, Franz von Sickingen's stronghold of Landstuhl, formerly impregnable on its heights, was ruined in one day by the artillery of Philip of Hesse (1523). Very heavy artillery was

used for such work, of course, and against lighter natures, somp castles and even fortified country-houses or castellated mansions

managed to make a stout stand

g W Cˆˆ~ ““V

Great

From Clark’s Med. Mil. Arch.

Fig. 9. — Beaumaris Castle: Plan.

t*r-ˆ**”ˆ *’* t *ˆ5 even as late as the

j”L ˆ| ˆ| ˆˆ \ Rebellion in England.

/ CkMTI t“‘i’ˆjr V T ne castle thus ceases to be

(t ˆg (f* ■”*. I| y ˆjj e foj-fj-ess { small and ill- governing local magnates, and its later history is merged in that of modern fortification. But an interesting transitional type between the medieval stronghold and the modern fortress is found in the coast castles erected by Henry VIII., especially those at Deal, Sandown and Walmer (c. 1540), which played some part in the events of the 17th century, and of which Walmer Castle is still the official residence of the lord warden of the Cinque Ports. Viollet-le-Duc, in his Annals of a Fortress (English trans.), gives a full and interesting account of the repeated renovations of the fortress on his imaginary site in the valley of the Doubs, the construction by Charles the Bold of artillery towers at the angles of the castle, the protection of the masonry by earthen outworks, boulevards and demi-boulevards, and, in the 17th century, the final service of the medieval walls and towers as a pure enceinte de surete. Here and there we find old castles serving as forts d’ arret or block-houses in mountain passes and defiles, and in some few cases, as at Dover, they formed the nucleus of purely military places of arms, but normally the castle falls into ruins, becomes a peaceful mansion, or is merged in the fortifications of the town which has grown up around it. In the Annals of a Fortress the site of the feudal castle is occupied by the citadel of the walled town, for once again, with the development of the middle class and of commerce, and industry, the art of the engineer came to be displayed chiefly in the fortification . of cities. The baronial “castle” assumes pari passu the form of a mansion, retaining indeed for long some capacity for defence,

but in the end losing all military character- istics save a few which survived as ornaments. Examples .of such castellated mansions are seen in Wingfield Manor,Derbyshire, and Hurstmonceaux, Sussex, erected in the 15 th century, and

themselves from the resentment of the despoiled natives, built strongholds and castles on their estates, and these were multiplied so rapidly during the troubled reign of King Stephen that the ” adulterine ” (i.e. un- authorized) castles are said by one writer to have amounted to n 15.

In the first instance, when the interest of the king and of his barons was identical, the former had only retained in his hands the castles in the chief towns of the shires, which were entrusted to his sheriffs or constables. But the great feudal re- volts under the Conqueror and his sons showed how formidable an obstacle to the ruleof the king was the existenceof such fortresses

From Oman’s History of the Art of War. Fig. 11. — Caerphilly Castle:

Plan.

in private hands, while the people hated them from the first for the oppressions connected with their erection and maintenance. It was, therefore, the settled policy of the crown to strengthen the royal castles and increase their number, while jealously keeping in check those of the barons. But in the struggle between Stephen and the empress Maud for the crown, which became largely a war of sieges, the royal power was relaxed and there was an outburst of castle-building, without permission, by the barons. These in many cases acted as petty sovereigns, and such was their tyranny that the native chronicler describes the castles as ” filled with devils and evil men.” These excesses paved the way for the pacification at the close of the reign, when it was provided that all unauthorized castles constructed during its course should be destroyed. Henry II., in spite of his power, was warned by the great revolt against him that he must still rely on castles, and the massive keeps of Newcastle and of Dover date from this period.

Under his sons the importance of the chief castles was recog- nized as so great that the struggle for their control was in the forefront of every contest. When Richard made vast grants at his accession to his brother John, he was careful to reserve the

possession of certain castles, and when John rose against the king's minister, Longchamp, in 1 191, the custody of castles was the chief point of dispute throughout their negotiations, and Lincoln was besieged on the king's behalf, as were Tickhill, Windsor and Marlborough subsequently, while the siege of Nottingham had to

From Clark's Med. Mil. Arch.

Fig. 10. — Beaumaris Castle:

nearly all older castles which survived were continually improved and altered to serve as residences. (C. F. A.)

Influence of Castles in English History. — Such strongholds as existed in England at the time of the Norman Conquest seem to have offered but little resistance to William the Norman, who, in order effectually to guard against invasions from without as well as to awe his newly-acquired subjects, immediately began to erect castles all over the kingdom, and likewise to repair and augment the old ones. Besides, as he had parcelled out the lands of the English amongst his followers, they, to protect

From CKrk's Med. Mil. Arch.

Fig. 12. — Caerphilly Castle: View.

be completed by Richard himself on his arrival. To John, in turn, as king, the fall of Chateau Gaillard meant the loss of Rouen and of Normandy with it, and when he endeavoured to repudiate the newly-granted Great Charter, his first step was to prepare the royal castles against attack and make them his centres of resistance. The barons, who had begun their revolt by besieging that of Northampton, now ascailed that of Oxford as well and

seized that of Rochester. The king recovered Rochester after a severe struggle and captured Tonbridge, but thenceforth there was a war of sieges between John with his mercenaries and Louis of France with his Frenchmen and the barons, which was specially notable for the great defence of Dover Castle by Hubert de Burgh against Louis. On the final triumph of the royal cause, after John's death, at the battle of Lincoln, the general

pacification was accompanied by a fresh issue of the Great Charter in the autumn of 1217, in which the precedent of Stephen's reign was followed and a special clause inserted that all " adulterine " castles, namely those which had been constructed or rebuilt since the breaking out of war between John and the barons, should be immediately destroyed. And special stress was laid on this in the writs addressed to the sheriffs.

In 1223 Hubert de Burgh, as regent, demanded the surrender to the crown of all royal castles not in official custody, and though he succeeded in this, Falkes de Breaute, John's mercenary, burst into revolt next year, and it cost a great national effort and a siege of nearly two months to reduce Bedford Castle, which he had held. Towards the close of Henry's reign castles again asserted, in the Baron's War, their importance. The Provisions of Oxford included a list of the chief royal castles and of their appointed castellans with the oath that they were to take; but the alien favourites refused to make way for them till they were forcibly ejected. When war broke out it was Rochester Castle that successfully held Simon de Montfort at bay in 1264, and in Pevensey Castle that the fugitives from the rout of Lewes were able to defy his power. Finally, after his fall at Evesham, it was in Kenilworth Castle that the remnant of his followers made their last stand, holding out nearly five months against all the forces of the crown, till their provisions failed them at the close of

1266.

Thus for two centuries after the Norman Conquest castles had proved of primary consequence in English political struggles, revolts and warfare. And, although, when the country was again torn by civil strife, their military importance was of small account, the crown's historic jealousy of private fortification was still seen in the need to obtain the king's licence to " crenellate " (i.e. embattle) the country mansion.

Bibliography. — G. T. Clark, Medieval Military Architecture in England (2 vols.), includes a few French castles and is the standard work on the subject, but inaccurate and superseded on some points by recent research; Professor Oman's Art of War in the Middle Ages is a wide survey of the subject, but follows Clark in some of his errors; Mackenzie, The Castles of England (1897), valuable for illustrations; Deville, Histoire du Chateau-Gaillard (1829) and Chdteau d' Argues (1839); Viollet-le-Duc's Essay on

the Military Architecture of the Middle Ages was translated by M. Macdermott in i860. More recent studies will be found in J. H. Round's Geoffrey de Mandeville (1891); "English Castles" (Quarterly Review, July 1894); and " Castles of the Conquest " (Archeologia, lviii., 1902); St John Hope's " English Castles of the 10th and nth Centuries " (Archaeol. Journal, lx., 1902); Mrs Armitage's "Early Norman Castles of England " (Eng. Hist. Review, xix. 1904), and her papers in Scot. Soc. Ant. Proc. xxxiv., and The Antiquary, July, August, 1906; G. Neilson's " The Motes in Norman Scotland " (Scottish Review, lxiv., 1898); G. H. Orpen, " Motes and Norman Castles in Ireland " (Eng. Hist. Review, xxi., xxii., 1906-1907). (J. H. R.)

CASTLEBAR, a market town and the county town of Co. Mayo, Ireland, in the west parliamentary division, on the river and near the lough of the same name, on the Manulla and Westport branch of the Midland Great Western railway. Pop. of urban district (1901) 3585. The county court buildings and other public offices occupy a square, and there is a pleasant mall shaded by fine trees. There are some breweries, and trade in linens and agricultural produce. The castle, which gives its name to the town, was a fortress of the De Burgh family; but the town itself was founded in the reign of James I., and received a charter from him in 16 13. In 164 1 the castle was held for the parliament by Sir Henry Bingham, but he was forced to surrender to Lord Mayo, and fell a victim, with all his garrison, to the fury and treachery of the besiegers. The massacre was afterwards avenged in 1653 by the execution of Sir Theobald Burke (by that time Lord Mayo), who had been in command along with his father at the siege. In 1798 the town was occupied for some

weeks by the French under General J. J. Humbert, who had defeated the English under Luke Hutchison in a conflict which is jocularly styled the " Castlebar Races." The town returned two members to the Irish parliament until the Union. Four miles N.E. of Castlebar is Turlough, with a round tower 70 ft. high and 57 ft. in circumference, and other remains.

CASTLECONNELL, a village of Co. Limerick, Ireland, on the left bank of the Shannon, 8 m. N.E. of Limerick on the Great Southern & Western railway. It possesses a spa which was once considerably frequented, but is famous as a centre for the salmon fishing on the lower Shannon. Castleconnell is so intimately connected with this sport that it has given its name to a favourite pattern of fly-rod, in which a movable splice takes the place of

the usual metal joint. The beautiful rapids of Doonas (avoided by a canal) are in the neighbourhood, and the surrounding scenery is generally attractive. There are remains of a castle from which the town took its name, which was the seat of the kings of Thomond, and was blown up by General Ginkel at the time of the siege of Limerick (1690).

CASTLE DONINGTON, a town in the Loughborough parliamentary division of Leicestershire, England, 123 J m. N.N.W. from London, on the Trent Junction and Western branch of the Midland railway. Pop. (1901) 2514. It lies on the flank of the hills overlooking the Trent and Soar valleys. There are slight remains of the castle. The church of St Luke is a fine building of Early English and later date. Donington Park, a neighbour- ing mansion, was offered to refugees during the French Revolu- tion in 1830, and Charles X. availed himself of this retreat. Hosiery, silk and baskets are manufactured. Castle Donington is 2f m. west of Kegworth station on the Midland main line. Kegworth (pop. 2078), on the Soar, has a hosiery and knitting industry.

CASTLE DOUGLAS, a burgh of barony and police burgh of Kirkcudbrightshire, Scotland. Pop. (1901) 3018. It is situated on Carlingwark Loch, 195 m. S.W. of Dumfries by the Glas- gow & South- Western railway. Its auction marts for sheep and cattle sales are the largest in the south-west of Scotland; at an autumn sale as many as 15,000 sheep and 1400 cattle are disposed of in one day. The leading industries comprise the making of agricultural implements and mineral waters, besides tanning. The Macmillan Free Church perpetuates the memory of John Macmillan (d. 1753), the Cameronian, who helped to found the Reformed Presbyterian Church. He had been chaplain to Murray of Broughton, and afterwards became minister of Balmaghie, about 3J m. N.W. of Castle Douglas. The town is the chief centre of business in East Galloway, and it is also resorted to in midsummer for its beautiful scenery and excellent fishing. Till 1765 it was only a village under the name of Causewayhead, but the discovery of marl in the lake brought it some prosperity, and it was purchased in 1792 by Sir William Douglas and called after him. Since then its progress has been continuous. Carlingwark Loch contains several islets, on one of which is a crannog, or ancient lake dwelling.

CASTLEFORD, an urban district in the Osgoldcross parliamentary division of the West Riding of Yorkshire, England, on the river Aire near its junction with the Calder, 9 m. S.E. of

Leeds, on the North-Eastern and Lancashire & Yorkshire railways. Pop. (1901) 17,386. Large glass-bottle and earthen- ware-jar works, chemical works, and neighbouring collieries employ the inhabitants. Here was the Roman village or fort of Lagecium or Legeolium; and though visible remains are wanting, a number of relics have been discovered.

CASTLE-GUARD, an arrangement under the feudal system, by which the duty of finding knights to guard royal castles was imposed on certain baronies, and divided among their knight's fees. The greater barons provided for the guard of their castles by exacting a similar duty from their knights. In both cases the obligation was commuted very early for a fixed money payment, which, as " castle-guard rent " lasted on to modern times.

See J. H. Round, " Castle-Guard," in Archaeological Journal, vol. lix., and " Castle-ward and Coinage," in The Commune of London. (J. H. R.)

CASTLEMAINE, a town of Talbot county, Victoria, Australia, 78 m. by rail N.N.W. of Melbourne. Pop. (1001) 5704. The gold-mines here were among the first discovered in the colony, and dredging for gold is carried on in Barker's and Forrest creeks, at the junction of which the town stands. Slate and flagstone are largely quarried in the district, which also produces wine and much fruit, especially apples. Castlemaine has a reputation as a health resort in cases of pulmonary complaints.

CASTLE RISING, a village of Norfolk, England, 4 m. by road N.E. of King's Lynn. The Norman castle for which it is famous stands on slightly elevated ground overlooking, to the west, the low marshy coast of the Wash. Its site is enclosed by artificial ramparts of earth and a dyke which is crossed by an ancient bridge. The keep is square and massive, and fairly perfect, and it is not difficult to reconstruct the arrangement of the rooms. In some parts, especially the entrance, the Norman carving is very rich. The foundations of a small chapel with apsidal eastern termination have been discovered outside the castle. The village of Castle Rising is the decayed remnant of a town of no little importance. Its church of St Laurence is late Norman, with much rich ornamentation; it shows traces of considerable alterations in

the Early English period, but is an admirable example of the earlier style.

It is a matter of dispute whether Rising was or was not an early Saxon settlement; in Domesday Book the manor is given as having belonged to Archbishop Stigand, from whom it had passed to Odo of Bayeux, whose estates were confiscated in 1088. Granted to William de Albini, whose son built Rising Castle, it passed first to Robert de Montalt, and then by sale to Isabel, queen of England, in 1332, remaining in the possession of the crown until Henry VIII. exchanged it for other lands with the duke of Norfolk. In 1269 an inquisition found that the lord had the return of all writs. In 1275 Robert de Montalt died seised of the manor and vill with the assize of bread and ale. An inquisition of 1379, although it makes no mention of the borough, states that the lord has the rents of assizes, and perquisites of the courts with view of frank-pledge. A mayor is first mentioned in 1343, and a borough existed in the 15th century. A survey of 1589-1590 declared that Castle Rising was an ancient borough by prescription according to the grant made to Hugh de Albini by Henry III. In 1 589-1 590 the recorder was chosen by the lord of the manor. The mayor, the only member of the corporation, whose sole duty was the holding of the assize of bread and ale, was chosen by the burgesses and presented at the court leet for confirmation. Castle Rising became a parliamentary borough in 1558, but was disfranchised in 1832 and the corporation abolished in 1835, although a mayor was elected for special purposes until 1883. Having no manufactures, the trade of the town depended entirely on its fairs and markets; but these have been long obsolete.

CASTLETON, a village in the High Peak parliamentary division of Derbyshire, England, 17 m. W.S.W. of Sheffield, and 2 m. from Hope station on a branch of the Midland railway. Pop. (1901) 547. Lying itself at an elevation of about 600 ft., it is surrounded on the north, west and south by hills from 1400 to 1700 ft. in height, rising sharply, and in parts precipitously. The village is celebrated for its situation in the midst of the wild Peak country, for the caves and mines in the neighbourhood, and for the Castle of the Peak, the ruins of which are strongly placed on a cliff immediately above the village. The Peak Cavern or Devil's Hole, penetrating this cliff, is the most magnificent in Derbyshire. For many generations the entrance to this cave has served as a workshop, held free of rent, to families employed in rope and twine making. Speedwell Cavern is not far distant, at the

entrance to the fine pass of Winnats, by which Castleton and the Vale of Hope are approached from the west. The beauties of this cavern, in which occurs the so-called bottomless pit, are in part readily accessible by boat, but the approach to the inner or Cliff cavern is so difficult that it has rarely been explored. Among several other caves is that known as the Blue John Mine, from the decorative fluorspar called ” Blue John ” which is obtained here. The church of St Edmund, v. 16

Castleton, retains a fine Norman chancel arch, and the vestry Gontains a valuable library. At Brough near Castleton was a Roman fort, established to hold in check the hillmen of the Peak. It was connected by roads with Buxton, Manchester and Rotherham. The Castle of the Peak, or Peveril Castle, is famous through Sir Walter Scott’s novel Peveril of the Peak. Early earthworks, which, extending from below the castle in a semi- circle, enclosed the town, can still in great part be traced. Before the Conquest the site was held by Gernebern and Hundinc, and was granted by the Conqueror to William Peverell, by whom the castle was built. On the forfeiture of William Peverell, grandson of the first holder, it was granted by Henry II. to Prince John who, in 1204, made Hugh Nevill governor of the castle. In 1216 William Ferrers, earl of Derby, took it from the rebellious barons, and was made governor by Henry III., who in 1223 granted a charter for a weekly market at the town. In 1328 the castle was given to John of Gaunt on his marriage with Blanche of Lancaster, and thus became parcel of the duchy of Lancaster. The castle has often been used as a prison, and from its position was almost impregnable.

CASTLETOWN (Manx, Bully Cashtel), a town of the Isle of Man, 10 m. S.W. of Douglas, by the Isle of Man railway. Pop. (1901) 1975. It is picturesquely situated on both sides of a small harbour formed by the outflow of the Silver Burn into Castletown Bay. It was the legal capital of the island until 1862. In the centre of the town stands Castle Rushen, which is said to owe its foundation to the Danish chief, Guthred, in 947-960, though the existing building, which is remarkably well preserved, probably dates from the 14th century. Until the 1 8th century it was the residence of the lords of Man, and until 1 89 1 served as a prison. The massive keep is square, and is surrounded by an outer wall, with towers and a moat. The council chamber and court-house were built in 1644. In the neighbourhood of the castle is the old House of Keys, where the members of the Manx parliament held their sessions until the removal of the seat of government to

Douglas. A lofty Doric column commemorates Cornelius Smelt, lieutenant-governor of the island (d. 1832), near which there is a remarkable sun-dial with thirteen faces, dating from 1720. King William's College, situated a mile to the north-east of the town, was opened in 1833; but a complete restoration was rendered necessary by fire in 1844, and it was subsequently enlarged. It is the chief educational establishment in the island. At Hango Hill near the town William Christian, receiver-general, who had surrendered the castle, and with it the island, to the parliamentary forces in 1651, was executed in 1663 at the instance of the countess of Derby, who had undertaken to defend it for the king. A small shipping trade is maintained.

CASTOR and POLLUX (Gr. UoXvSevKtis) , in Greek and Roman mythology, the twin sons of Leda, and brothers of Helen and Clytaemnestra. They were also known under the name of Dioscuri (AuxxKopoi, later AioaKovpoi, children of Zeus), for, according to later tradition, they were the children of Zeus and Leda, whose love the god had won under the form of a swan. In some versions Leda is represented as having brought forth two eggs, from one of which were born Castor and Pollux, from the other Helen. In another account, Zeus is the father of Pollux and Helen, Tyndareus (king of Sparta) of Castor and Clytaemnestra. In Homer, Castor, Pollux and Clytaemnestra are said to be the children of Tyndareus and Leda, Helen the daughter of Leda by Zeus. The Dioscuri were specially rever- enced among people of Dorian race, and were said to have reigned at Sparta, where also they were buried. They were also worshipped, especially in Athens, as lords and protectors (ii.va.Kes, avaKTes). Sailors in a storm prayed to them (Horace, Odes, i. 3) and sacrificed a white lamb, whereupon they were wont to appear in the form of fire at the masthead (probably referring to the phenomenon of St Elmo's fire), and the storm ceased. Later, they were confounded with the Samothracian Cabeiri. In battle they appeared riding on white horses and gave victory to the side they favoured. They were the patrons of hospitality, and founded the sacred festival called Theoxenia.

They presided over public games, Castor especially as the horse-tamer, Pollux as the boxer; .but both are represented as riding on horseback or driving in a chariot. In Sparta their ancient symbol

was two parallel beams (Sonava), connected by cross-bars, which the Spartans took with them into the field (Plutarch, De Fraterno Amove, i; Herodotus v. 75); later, they were repre- sented by two amphorae with snakes twined round them. Their most important exploits were the invasion of Attica, to rescue their sister Helen from Theseus; their share in the hunting of the Calydonian boar (see Meleager) and the Argonautic expedition, and their battle with the sons of Aphareus, brought about by a quarrel in regard to some cattle, in which Castor, the mortal (as the son of Tyndareus), fell by the hand of Idas. Pollux, finding him dead after the battle, implored Zeus to be allowed to die with him; this being impossible by reason of his immortality, Pollux was permitted to spend alternately one day among the gods, the other in Hades with his brother. Accord- ing to another fable, the god marked his approval of their love by placing them together in the sky, as the Twins or the morning and evening star (Hyginus, Poet. Astronom. ii. 22). Like the Asvins of the Veda, the bringers of light in the morning sky, with whom they have been identified, the Dioscuri are repre- sented as youthful horsemen, naked or wearing only a light chlamys. Their characteristic attribute is a pointed egg-shaped cap, surmounted by a star.

Though their worship was perhaps most carefully observed among people of Dorian origin, Castor and Pollux were held in no small veneration at Rome. It was the popular belief in that city from an early period that the battle of Lake Regillus had been decided by their interposition (Dion. Halic. vi. 13). They had fought, it was said, armed and mounted, at the head of the legions of the commonwealth, and had afterwards carried the news of the victory with incredible speed to the city. The well in the Forum at which they alighted was pointed out, and near it rose their ancient temple, in which the senate often held its sittings. On the 15 th of July, the supposed anniversary of the battle, a great festival with sumptuous sacrifices was cele- brated in their honour, and a solemn parade of the Roman knights (transvectio equitum), who looked upon the Dioscuri as their patrons, took place. (Apollodorus iii. 10. 7, 11. 2; Homer, Odyssey, xi. 299; Hyginus, Fab. 77. 155; Pindar, Nem. x. 60, 80 and schol. ; Diod. Sic. iv. 43; Plutarch, Theseus, 32, 33; Theocritus, Idyll, xxii.)

See Maurice Albert, Le Culte de Castor et Pollux en Italie (1883), with special descriptions and representations in art, on coins, vases and statues; S. Eitrem, ” Die gottlichen ZwilHnge bei den Griechen ” (treating of the divine beings mentioned in pairs in

Greek mythology) , in Videnskabs-Selskab Skrifter (Christiania, 1902) ; W. R. Paton, De Cultu Dioscurorum apud Graecos (Bonn, 1894); L. Myriantheus, Asvins oder arische Dioskuren (Munich, 1876); J. R. Harris, The Dioscuri in the Christian Legends (1903), and The Cult of the Heavenly Twins (1906) ; W. Helbig, " Die Castores als Schutzgotter des romischen Equitatus," in Hermes, xl. (1905) ; C. Jaisle, Die Dio- skuren als Retter zur See bei Griechen und Rbmern, und ihr Fortleben in christlichen Legenden (Tubingen, 1907) ; L. Preller, Griechische und romische Mythologie; articles by A. Purtwangler in Roscher's Lexikon der Mythologie, and by M. Albert in Daremberg and Saglio's Pictionnaire des antiquites.

CASTOR OIL, the fixed oil obtained from the seeds of the castor oil plant or Palma Christi, Ricinus communis, belonging to the natural order Euphorbiaceae. The botanical name is from Lat. ricinus, a tick, from the form and markings of the seed. The plant is a native of tropical Africa, but it has been introduced, and is now cultivated in most tropical and in the warmer temperate countries. In size it varies from a shrubby plant to a tree of from 30 to 40 ft. in height according to the climate in which it grows, being arborescent in tropical latitudes. On account of its very large beautiful palmate-peltate leaves, which sometimes measure as much as 2 ft. in diameter, it is cultivated as an ornamental plant. In the south of England, with the habit of an annual, it ripens its seeds in favourable seasons; and it has been known to come to maturity as far north as Christiania in Norway. Plants are readily grown from seed, which should be sown singly in small pots and placed in heat early in March I he

young plants are kept under glass till early in June when they are hardened and put out. The fruit consists- of a three-celled capsule, covered externally with soft yielding prickles, and each cell develops a single seed. The seeds of the different cultivated varieties, of which there are a great number, differ much in'size and in external markings; but average seeds are of an oval laterally compressed form, with their longest diameter about four lines. They have a shining, marble-grey and brown, thick, leathery outer coat, within which is a thin dark-coloured brittle coat. A large distinct leafy embryo lies in the middle of a dense, oily tissue (endosperm). The seeds contain a toxic substance, which makes them actively poisonous; so much so that three have been known to kill an adult.

The oil is obtained from the seeds by two principal methods —

expression and decoction— the latter process being largely used in India, where the oil, on account of its cheapness and abundance is extensively employed for illuminating as well as for other domestic and medicinal purposes. The oil exported from Calcutta to Europe is prepared by shelling and crushing the seeds between rollers. The crushed mass is then placed in hempen cloths and pressed in a screw or hydraulic press. The oil which exudes is mixed with water and heated till the water boils, and the mucilaginous matter in the oil separates as a scum. It is next strained, then bleached in the sunlight, and stored for exportation. A considerable quantity of castor oil of an excellent quality is also made in Italy; and in California the manufacture is conducted on an extensive scale. The following is an outline of the process adopted in a Californian factory. The seeds are submitted to a dry heat in a furnace for an hour or thereby, by which they are softened and prepared to part easily with their oil. They are then pressed in a large powerful screw-press, and the oily' matter which flows out is caught, mixed with an equal proportion of water, and boiled to purify it from mucilaginous and albuminous matter. After boiling about an hour, it is allowed to cool, the water is drawn off, and the oil is transferred to zinc tanks or clarifiers capable of holding from 60 to 100 gallons. In these it stands about eight hours, bleaching in the sun, after which it is ready for storing. By this method 100 lb of good seeds yield about 5 gallons of pure oil.

Castor oil is a viscid liquid, almost colourless when pure, possessing only a slight odour, and a mild yet highly nauseous and disagreeable taste. Its specific gravity is -96, a little less than that of water, and it dissolves freely in alcohol, ether and glacial acetic acid. It contains palmitic and several other fatty acids, among which there is one — ricinoleic acid— peculiar to itself. This occurs in combination with glycerin, constituting the greater part of the bulk of the oil.

The active principle to which the oil owes its purgative properties has not been isolated. It is, indeed, probable that it is formed in the intestine, as a result of some decomposition as yet unknown. The dose is from a drachm to an ounce. The pharmacopoeial mixture is best avoided, being almost uniquely nauseous. By far the best way to administer the oil is in capsules. It acts in about five hours, affecting the entire length of the bowel, but not increasing the flow of bile except in very large doses. The mode of its action is unknown. The oil will purge when rubbed into the skin or injected per rectum. It is an

invaluable drug in temporary constipation and whenever a mild action is essential, as in pregnancy. It is extremely useful for children and the aged, but must not be employed in cases of chronic constipation, which it only aggravates, whilst relieving the symptoms.

GASTRIN, MATTHIAS ALEXANDER (1813-1853), Finnish ethnologist and philologist, was born at Tervola, in the parish of Kemi in Finland, on the 20th of November (December 2, 1813). His father, Christian Castren, parish minister at Rovaniemi, died in 1825; and Matthias passed under the protection of his Uncle, Mathias Castren, the kindly and learned incumbent of Kemi. At the age of twelve he was sent to school at Uleaborg, and there he helped to maintain himself by teaching the younger children. On his removal to the Alexander University at Helsingf ors in 1830, he first devoted himself to Greek and Hebrew

with the intention of entering the church; but his interest was soon excited by the language of his native country, and he even began before his course was completed to lay the foundations of a work on Finnish mythology. The necessity of personal explorations among the still unwritten languages of cognate tribes soon made itself evident; and in 1838 he joined a medical fellow-student, Dr. Ehrstrom, in a journey through Lapland. In the following year he travelled in Russian Karelia at the expense of the Literary Society of Finland; and in 1841 he undertook, in company with Dr Elias Lonnrot, the great Finnish philologist, a third journey, which ultimately extended beyond the Ural as far as Obdorsk, and occupied a period of three years. Before starting on this last expedition he had published a translation into Swedish of the Finnish epic of Kalevala; and on his return he gave to the world his Elementa grammatices Syrjaenae and Elemehia grammatices Tscheremissae, 1844. No sooner had he recovered from the illness which his last journey had occasioned than he set out, under the auspices of the Academy of St Petersburg and the Helsingfors University, on an exploration of the whole government of Siberia, which resulted in a vast addition to previous knowledge, but seriously affected the health of the adventurous investigator. The first-fruits of his collections were published at St Petersburg in 1849 in the form of a Versuch einer ostjakischen Sprachlehre. In 1850 he published a treatise De

affixis personalibus linguarum Altaicarum, and was appointed professor at Helsingfors of the new chair of Finnish language and literature. The following year saw him raised to the rank of chancellor of the university; and he was busily engaged in what he regarded as his principal work, a Samoyedic grammar, when he died on the 7th of May 1853.

Five volumes of his collected works appeared from 1852 to 1858, containing respectively — (1) Reseminnen fr&n aren 1838-1844; (2) Reseberdttelser och bref aren 1845-1849; (3) Forelasningar i Finsk mythologi; (4) Ethnologiska forelasningar bfver Altaiska folken; and (5) Smarre afhandlingar och akademiska dissertationer. A German translation was published by Anton Schiefner, who was also entrusted by the St Petersburg Academy with the editing of his manuscripts, which had been left to the Helsingfors University and which were subsequently published.

CASTRENSIS, PAULUS, an Italian jurist of the 14th century. He studied under Baldus at Perugia, and was a fellow-pupil with Cardinal Zabarella. He was admitted to the degree of doctor of civil law in the university of Avignon, but it is uncertain when he first undertook the duties of a professor. A tradition, which has been handed down by Panzirolus, represents him as having taught law for a period of fifty-seven years. He was professor at Vienna in 1396, at Avignon in 1394, and at Padua in 1429; and, at different periods, at Florence, at Bologna and at Perugia. He was for some time the vicar-general of Cardinal Zabarella at Florence, and his eminence as a teacher of canon law may be inferred from the language of one of his pupils, who styles him ” famosissimus juris utriusque monarca.” His most complete treatise is his readings on the Digest, and it appears from a passage in his readings on the Digcstum Veins that he delivered them at a time when he had been actively engaged for forty-five years as a teacher of civil law. His death is generally assigned to 1436, but it appears from an entry in a MS. of the Digestum Vetus, which is extant at Munich, made by the hand of one of his pupils who styles him ” praeceptor meus,” that he died on the 20th of July 1441.

CASTRES, a town of south-western France, capital of an arrondissement in the department of Tarn, 29 m. S.S.E. of Albi on a branch line of the Southern railway. Pop. (1906) town, 19,864; commune, 28,272. Castres, the busiest and most populous town of its department, is intersected from north to south by the Agout; the river is fringed by old houses the upper stories of

which project over its waters. Wide boulevards traverse the west of the town, which is also rendered attractive by numerous fountains fed by a fine aqueduct hewn in the rock. The church of St Benoit, once a cathedral, and the most im- portant of the churches of Castres, dates only from the 17th and 18th centuries. The hotel de ville, which contains a museum and the municipal library, occupies the former bishop's palace,

designed by Jules Mansart in the 17th century; the Romanesque tower beside it is the only survival of an old Benedictine abbey. The town possesses some old mansions of which the hotel de Nayrac, of the Renaissance, is of most interest. Castres has a sub-prefecture, tribunals of first instance and of commerce, a board of trade-arbitrators, a chamber of commerce, a branch of the bank of France and two hospitals. There are also communal colleges for boys and girls, a school of artillery and school of draughtsmanship. The industrial establishments include manufactories of earthenware and porcelain and metal-foundries, and tanning, leather-dressing, turnery, the making of wooden shoes and furniture, the weaving of woollen and other fabrics, dyeing, and the manufacture of machinery, paper and parchment are carried on.

Castres grew up round a Benedictine abbey, which is believed to have been founded in the 7th century. It was a place of considerable importance as early as the 12th century, and ranked as the second town of the Albigenses. During the Albigensian crusade it surrendered of its own accord to Simon de Montfort; and in 1356 it was raised to a countship by King John of France. On the confiscation of the possessions of the D'Armagnac family, to which it had passed, it was' bestowed by Louis XL on Boffilo del Giudice, but the appointment led to so much disagreement that the countship was united to the crown by Francis I. in 1519. In the wars of the latter part of the 16th century the inhabitants sided with the Protestant party, fortified the town, and established an independent republic. They were brought to terms, however, by Louis XIII., and forced to dismantle their fortifications; and the town was made the seat of the chambre de I' edit, or chamber for the investigation of the affairs of the Protestants, afterwards transferred to Castelnaudary (in 1679). The bishopric of Castres, which had been established by Pope John XXII. in 13 1 7, was abolished at the Revolution.

CASTRO, INEZ DE (d. 1355), mistress, and perhaps wife, of Peter I. (Pedro), king of Portugal, called Cotto de Garza, i.e. "Heron's

Neck," was born in Spanish Galicia, in the earlier years of the 14th century. Tradition asserts that her father, Don Pedro Fernandez de Castro, and her mother, Dona Aldonca Soares de Villadares, a noble Portuguese lady, were unmarried, and that Inez and her two brothers were consequently of bastard birth. Educated at the semi-Oriental provincial court of Juan Manuel, duke of Penafiel, Inez grew up side by side with Costanca, the duke's daughter by a scion of the royal house of Aragon, and her own cousin. After refusing several crowned heads in marriage, Costanca was at last persuaded to accept the hand of the infante Dom Pedro, son of Alphonso the Proud, king of Portugal. In 1341 the two girls left Penafiel; Costanca's marriage was celebrated in the same year, and the young infanta and her cousin went to reside at Lisbon, or at Coimbra, where Dom Pedro conceived that luckless and furious passion for Inez which has immortalized them.

The morality of the age was lax, and more especially so in Spain and Portugal, where the looseness of the marriage tie and the example of the Moors encouraged polygamy. Pedro's connexion par amours with Inez would of itself have aroused no opposition. He might even have married her, after the death of his wife in childbirth in 1345. According to his own assurance he did marry her in 1354. But by that time the rising power of the Castro family had created the most brutal hatred among their rivals, both in Spain and Portugal. Alvaro Gonzales, Pedro Coelho, and Diogo Lopes Pacheco persuaded the king, Alphonso, that his throne was in danger from an alliance between his son and the Castros, and with all the brutality of the age they urged the king to remove the danger by murdering the poor woman. The old kin 5 listened, refused, wavered and ended by yielding. He went ia secret to the palace at Coimbra, where Inez and the in ante resided, accompanied by his three familiars, and by others who agreed with them. The beauty and tears of Inez disarmed his resolution, and he turned to leave her; but the gentlemen about him had gone too far to recede. Inez was stabbed to death and was buried immediately in the church of Santa Clara.

The infante raised at once the flag of revolt against his father, and was only appeased by the concession of a large share in the government. The three murderers of Inez were sent out of the

kingdom by Alphonso, who knew his son too well not to be aware that the vengeance would be tremendous as the crime. They took refuge in Castile. In 1357, however, Alphonso died, and the infante was crowned king of Portugal. Peter the Cruel, his nephew, reigned over Castile; and the murderers were given up' as soon as required. Diogo Lopes escaped through the gratitude of a beggar to whom he had formerly done a kindness; but Coelho and Gonzales were executed, with horrible tortures, in the very presence of the king.

The story of the exhumation and coronation of the corpse of Inez has often been told. It is said that to the dead body, crowned and robed in royal raiment, and enthroned beside the king, the assembled nobles of Portugal paid homage as to their queen, swearing fealty on the withered hand of the corpse. The gravest doubts, however, exist as to the authenticity of this story ; Fernao Lopes, the Portuguese Froissart, who is the great authority for the details of the death of Inez, with some of the actors in which he was acquainted, says nothing of the ghastly ceremony, though he tells at length the tale of the funeral honours that the king bestowed upon his wife. Inez was buried at Alcobaca with extraordinary magnificence, in a tomb of white marble, surmounted by her crowned statue; and near her sepulchre Pedro caused his own to be placed. The monument, after re- peatedly resisting the violence of curiosity, was broken into in 1 8 10 by the French soldiery; the statue was mutilated, and the yellow hair was cut from the broken skeleton, to be preserved in reliquaries and blown away by the wind. The children of Inez shared her habit of misfortune. From her brother, however, Alvaro Perez de Castro, the reigning house of Portugal directly descends.

See Fernao Lopes, Chronica del Rey Dom Pedro (1735) ; Camoens, Os Lusiadas; Antonio Ferreira's Ines de Castro, — the first regular tragedy of the Renaissance after the Sofonisba of Trissino; Luis Velez de Guevara, Reinar despues de morir, an admirable play ; and Ferdinand Denis, Chronigues chevaleresgues de I'Espagne et du Portugal. _

CASTRO, JOAO DE (1500-1548), called by Camoens Castro Forte, fourth viceroy of the Portuguese Indies, was the son of Alvaro de Castro, civil governor of Lisbon. A younger son, and destined therefore for the church, he became at an early age a brilliant humanist, and studied mathematics under Pedro Nunez, in company with the infante Dom Luis, son of Emanuel the First,

with whom he contracted a life-long friendship. At eighteen he went to Tangier, where he was dubbed knight by Duarte de Menezes the governor, and there he remained several years. In 1535 he accompanied Dom Luis to the siege of Tunis, where he had the honour of refusing knighthood and reward at the hands of the great emperor Charles V. Returning to Lisbon, he received from the king the small commandership of Sao Pablo de Salva terra in 1538. He was exceedingly poor, but his wife Lenor de Coutinho, a noble Portuguese lady, admired and appreciated her husband sufficiently to make light of their poverty. Soon after this he left for the Indies in company with his uncle Garcia de Noronha, and on his arrival at Goa enlisted among the aventureiros, " the bravest of the brave," told off for the relief of Diu. In 1540 he served on an expedition under EstevSo da Gama, by whom his son, Alvaro de Castro, a child of thirteen, was knighted, out of compliment to him. Returning to Portugal, Joao de Castro was named commander of a fleet, in 1543, to clear the European seas of pirates; and in 1545 he was sent, with six sail, to the Indies, in the room of Martin de Sousa, who had been dismissed the viceroyalty. The next three years were the hardest and most brilliant, as they were the last, of his life — years of battle and struggle, of glory and sorrow, of suffering and triumph. Valiantly seconded by his sons (one of whom, Fernao, was killed before Diu) and by Joao Masca- renhas, Joao de Castro achieved such popularity by the over- throw of Mahmud, king of Gujarat, by the relief of Diu, and by the defeat of the great army of the Adil Khan, that he could contract a very large loan with the Goa merchants on

the simple security of his moustache. These great deeds were followed by the capture of Broach, by the complete subjugation of Malacca, and by the passage of Antonio Moniz into Ceylon; and in 1547 the great captain was appointed viceroy by Joao III., who had at last accepted him without mistrust. He did not live long to fill this charge, expiring in the arms of his friend, St Francis Xavier, on the 6th of June 1548. He was buried at Goa, but his remains were afterwards exhumed and conveyed to Portugal, to be reinterred under a splendid monument in the convent of Bemfica.

See Jacinto Freire de Andrade, Vida de D. Jo&o de Castro (Lisbon, 1651), English translation by Sir Peter Wyche (1664); Diogo de Couto, Decadas da Asia, vi. The Roteiros or logbooks of Castro's voyages in the East (Lisbon, 1833, 1843 and 1872) are of great interest.

CASTROGIOVANNI (Arab. Kasr-Yani, a corruption of Castrum Ennae), a town and episcopal see of the province of Caltanisetta, Sicily, 95 m. by rail S.E. of Palermo, and 56 m. W. of Catania, situated 2605 ft. above sea-level, almost in the centre of the island, and commanding a magnificent view of the interior. Pop. (iqoi) 25,826. Enna Was one of the cities of the Sicels, and the statement of Stephanus Byzantinus that it was colonized by Syracuse in 664 B.C. is improbable. The question is dis- cussed by E. Pais, Atakta (Pisa, 1801), 63. It does not appear in history before the time of Dionysius I. of Syracuse, who, after unsuccessful attempts, finally acquired possession of it by treachery about 397 B.C. Its natural position rendered it a fortress of great importance, and it is frequently mentioned in subsequent history. In 134-132 it was the headquarters of the slave. revolt, and was only reduced by treachery. Cicero speaks of it as a place of some importance, but in imperial times it seems to have been of little account. In a.d. 837 the Saracens attempted to take it, but without success; and it was again only by treachery that they were able to take it in 859. In 1087 it fell into the hands of the Normans; and the existing remains of fortifications are entirely medieval. There are indeed no remains of earlier days. The cathedral, founded in 1307, is of some interest. There are no remains of the famous temple of Demeter, from which Verres, as Cicero tells us, re- moved the bronze statue of the goddess. The lake of Pergus, where Persephone, according to one of the myths, was carried off by Hades, lies 4 m. to the south. The myth itself must have had some local origin, but has had so much Greek detail grafted upon it that the very names of the earlier Sicel deities have been displaced.

CASTRO URDIALES, a seaport of northern Spain, in the province of Santander, situated on the bay of Biscay and at the head of a branch railway connected with the Bilbao-San- tander line. Pop. (1870) about 3500; (1900) 14,191. Castro Urdiales is a modern town, although its castle and parish church date from the middle ages. It was destroyed by the French in 1813, but speedily rebuilt and fortified. Its rapid rise in popu- lation and prosperity dates from the increased development of iron-mining and railway communication which took place after 1879. Its chief industries are iron-mining, fishing, and the preservation of fish, especially sardines, in oil. Between 1894 and 1904 the exports of iron ore rose from 277,200 tons to 516,574 tons.

CASTRO Y BELLVIS, GUILLEN DE (1 569-1 631), Spanish dramatist, was a Valencian by birth, and early enjoyed a re-

putation as a man of letters. In 1591 he became a member of a local literary academy called the Nocturnos. At one time a captain of the coast-guard, at another the protege of Benavente, viceroy of Naples, who appointed him governor of Scigliano, patronized by Osuna and Olivares, Castro was nominated a knight of the order of Santiago in 1623. He settled at Madrid in 1626, and died there on the 28th of July 1631 in such poverty that his funeral expenses were defrayed by charity. He pro- bably made the acquaintance of Lope de Vega at the festivals (1620-1622) held to commemorate the beatification and canon- ization of St Isidore, the patron saint of Madrid. On the latter occasion Castro's octavas were awarded the first prize. Lope de Vega dedicated to him a celebrated play entitled Las Almenas

de Toro (1619), and when Castro's Comedias were published in 1618-1621 he dedicated the first volume to Lope de Vega's daughter. The drama that has made Castro's reputation is Las Mocedades del Cid (1599?), to the first part of which Corneille was largely indebted for the materials of his tragedy. The two parts of this play, like all those by Castro, have the genuine ring of the old romances; and, from their intense nationality, no less than for their primitive poetry and flowing versification, were among the most popular pieces of their day. Castro's Fuerza de la costumbre is the source of Love's Care, a play as- cribed to Fletcher. He is also the reputed author of El Prodigio de los Monies, from which Calder6n derived El Mdgico prodigioso. Las Mocedades del Cid (Toulouse, 1890) and Ingratitud de amor (Philadelphia, 1899) have been well edited by E. Merimee and H. A. Rennert respectively.

CASTRUCCIO CASTRACANI DEGLI ANTELMINELLI (1281- 1328), duke of Lucca, was by birth a Lucuhese, and by descent and training a Ghibelline. Being exiled at an early age with his parents and others of their faction by the Guelphs, then in the ascendant, and orphaned at nineteen, he served as a con- dottiere under Philip IV. of France in Flanders, later with the Visconti in Lombardy, and in 13 13 under the Ghibelline chief, Uguccione della Faggiuola, lord of Pisa, in central Italy. He assisted Uguccione in many enterprises, including the capture of Lucca (1314) and the victory over the Florentines at Monte- catini (1315). An insurrection of the Lucchese having led to the

expulsion of Uguccione and his party, Castruccio regained his freedom and his position, and the Ghibelline triumph was presently assured. Elected lord of Lucca in 13 16, he warred incessantly against the Florentines, and was at first the faithful ndviser and stanch supporter of Frederick of Austria, who made him imperial vicar of Lucca in 1320. After the battle of Muhlbach he went over to the emperor Louis the Bavarian, whom he served for many years. In 1325 he defeated the Florentines at Altopascio, and was appointed by the emperor duke of Lucca, Pistoja, Volterra and Luni, and two years later he captured Pisa, of which he was made imperial vicar. But, subsequently, his relations with Louis seem to have grown less friendly and he was afterwards excommunicated by the papal legate in the interests of the Guelphs. At his death in 1328 the fortunes of his young children were wrecked in the Guelphic triumph.

Niccolo Machia velli's Life of Castruccio is a mere romance; it was translated into French, with notes, by Dreux de Radier in 1753. See Niccolo Negrini, Vita di Castruccio (Modena, 1496) ; Winkler s Castruccio, Herzog von Lucca (Berlin, 1897); also Gino Capponi's Storia di Firenze, and G. Sforza, Castruccio Castracani degli Antel- minelli in Lunigiana (Modena, 1891); S. de Sismondi, Histoire des republiques italiennes (Brussels, 1838).

CASTRUM MINERVAE (mod. Castro), an ancient town of the Sallentini in Calabria, 10 m. south of Hydruntum, with an ancient temple of Minerva, said to have been founded by Ido- meneus, who formed the tribe of the Sallentini from a mixture of Cretans, Illyrians and Italian Locrians. It is also said to have been the place where Aeneas first landed in Italy,the port of which he named Partus Veneris. The temple had lost some of its importance in Strabo's day.

CASUARINA, a genus of trees containing about 30 species, chiefly Australian, but a few Indo-Malayan. The long whip-like green branches are longitudinally grooved, and bear at the nodes whorls of small scale-leaves, the shoots resembling those of Equisetum (horse-tail). The flowers are unisexual; the stamin- ate are borne in spikes, each flower consisting of a central stamen which is surrounded by two scale-like perianth-leaves. The pistillate are borne in dense spherical heads; each flower stands in the axil of a bract and consists of two united carpels flanked by a pair of bracteoles; the long styles hang out beyond the bracts, and the one-chambered ovary contains two ovules. In the fruit the bracteoles form two woody valves between which is a

nut; the aggregate of fruits resemble small cones. Pollen is transferred by the wind to the long styles. The pollen- tube does not penetrate the ovule through the micropyle but enters at the opposite end — the chalaza. This anomaly was

discovered by Dr M. Treub (see Annal. Jardin Bolan.Buitenzorg, x. 1891), and is associated with a peculiar development of the ovule, and an increased number and peculiar form of the embryo- sacs (nacrospores). Treub proposed to separate Casuarina as a distinct group of Angiosperms, and suggested the following arrangement : —

r ˆ Dicotyledons.

Angiosperma&j Por °£ amae J Monocotyledons.

[Chalazogamae (Casuarina).

The names of the two subdivisions recall the manner of entrance of the pollen-tube. More recent investigations, chiefly by Nawaschin and Miss Benson, on members of the orders Betu- laceae, Fagaceae, Juglans and Ulmus, showed a recurrence in a greater or less degree of the various anomalies previously observed in Casuarina, and suggest that the affinity of Casuarina is with these orders of Dicotyledons.

The wood is very hard, and several species are valuable timber trees. From a fancied resemblance of the wood to that of the oak these trees are known as ” oaks,” and the same species has different names in different parts such as ” she-oak,” ” swamp-oak,” “shingle-oak,” “river-oak,” “iron-wood,” “beef-wood,” &c.

See J. H. Maiden, Useful Native Plants of Australia (London and Sydney, 1889).

CASUISTRY (from the Lat. casus, a point of law), the art of bringing general moral principles to bear on particular actions. It is, in short, applied morality; anybody is a casuist who reflects about his duties and tries to bring them into line with some intelligible moral standard. But morality at different times has worn very different dresses. It has sometimes been thought of as an outward law, sometimes as an inward disposi- tion; and each of these rival conceptions has developed a casuistical method of its own. Believers in law have put their trust in authority or logic; while believers in disposition chiefly look to our instinctive faculties— conscience, common-sense or sentiment. The legal is

the older group, and to it the name of casuist is often exclusively reserved, generally with the implica- tion that its methods are too purely technical to commend themselves to mankind at large. But common-sense and con- science are quite as definite guides as logic or authority; and there seems no good reason for refusing to give the name of casuistry to their operations.

The casuistry of primitive man is uncompromisingly legal. His morality is not yet separated from his religion ; and religion for him means the cult of some superior being — the king or priest of his tribe — whose person is charged with a kind of sacred electricity. ” His divinity is a fire, which, under proper restraints, confers endless blessings; but if rashly touched, or allowed to break bounds, it burns or destroys what it touches. Hence the disastrous effects supposed to follow a breach of taboo; the offender has thrust his hand into the divine fire, which shrivels up and consumes him on the spot ” (Frazer, The Golden Bough, i. 169). Elaborate rules are accordingly drawn up to secure the maximum of benefit, and the minimum of inconvenience, from this sacred fire; and in the application of these rules does savage casuistry consist. At a higher stage of civilization the god is no longer present in person but issues to his worshippers categorical commands. These logic must seize upon and develop as far as they will go; for the breach of some trifling consequence of a rule might mean the loss of the deity’s favour. Hence the rise of sacred books among most Eastern peoples. On the Jewish Decalogue, for instance, follows the law, and on the law the rabbinical schools. Some of these will be stricter, and some laxer; but on the whole all tend to ” aggravate ” the law — down to the point of forbidding the faithful to wear a girdle, or to kill a noxious insect on the Sabbath. Though indeed we might look nearer home than the Talmud for similar absur- dities; most Puritan communities could furnish strange freaks of Sabbatarian casuistry. Nor have the Catholics been one whit behind them. Their scholastic doctors gravely discuss whether — since water is the ” matter ” of baptism — a soul can be made regenerate by milk, or rose-water or wine.

At the opposite pole stood ancient Greece. Here ceremonial

casuistry found no place, because there were no sacred books. ”

Among the Greeks writing never attained the consecration of religion. No system of doctrine and observance, no manuals containing authoritative rules of morality, were ever transmitted in documentary form. In conduct they shrank from formulae. Unvarying rules petrified action; the need of flexibility, of perpetual adjustment, was strongly felt" (Butcher, The Greek Genius, p. 182). For this reason their interest in ethical speculations was all the keener; their great thinkers were endlessly engaged in settling what the relation ought to be between duty and self-interest. Ought one to swallow up the other — and, if so, which should prevail ? Or was it possible to patch up a compromise between them? The great Stoic philosophers took the austerest line, and held that duty should always and everywhere be our only law. But it was one thing to enunciate such magnificent theories in a lecture, and quite another to apply them in the market-place. Casuistry came to the aid of average human nature — that is to say, pupils began to confront the master with hard cases taken from daily life. And more than one master was disposed to make large — even startlingly large — concessions to the exigencies of practice. This concrete side of moral philosophy came specially into evidence when Stoicism was transplanted to Rome. Cicero's De Officiis abounds in the kind of question afterwards so warmly discussed by Dr Johnson and his friends. Is it ever right to tell a lie? May a lawyer defend a client whom he knows to be guilty? In selling my goods, is it enough not to disguise their shortcomings, or ought I candidly to admit them? Seneca even made the discussion of such problems into a regular discipline, claiming that their concrete character gave an interest in morality to those who had no love for abstractions; while they prevented those who had from losing themselves in the clouds. And M. Thamin maintains that, if his heroes did not form great characters, at any rate they taught the Roman child to train its conscience. But, then, Cicero and Seneca took common-sense as their guide. They decided each problem on its merits, looking more to the spirit than to the letter, and often showing a practical sagacity worthy of Johnson himself. Quite in the great doctor's spirit is Cicero's counsel to his son, to hear what the philosophers had to say, but to decide for himself as a man of the world. Such advice could not be grateful to the philosophers themselves — then a definite professional class, not unlike the " spiritual directors " of a later Rome, who earned their bread by smoothing away the doubts of the scrupulous on all matters intellectual and moral. Their great weapon was their logic; and a logician, as Pascal says, must be very unfortunate or

very stupid if he cannot manage to find exceptions to every conceivable rule. In their hands casuistry became the art of finding such exceptions. From the Greek sophists they borrowed ingenious ways of playing off one duty against another, or duty in general against self-interest — leaving the doubter in the alternative of neglecting the one and being a knave, or neglecting the other and being a fool. Or else they raised a subtle distinction between the act and the intention. To get drunk for the sake of the drink was the mark of a beast; but wine was a powerful stimulant to the brain, and to fuddle oneself in order to think great thoughts was worthy of a sage. No doubt these airy paradoxes were not always seriously taken; but it is significant that a common Roman proverb identified ” philosophizing ” {philosophatur) with thinking out some dirty trick.

Christianity swept the whole discussion on to a higher plane. All the stress now fell on the disposition, not on the outward act. The good deeds of a just man were a natural consequence of his justice; whereas a bad man was no whit the better, because he now and then deviated into doing right. Actions, in short, were of no account whatever, apart from the character that produced them. ” All things are lawful unto me,” said St Paul,

but all are not expedient.” And St Augustine sums the whole matter up in the famous phrase: ” Have charity, and do as thou wilt.” Narrow-minded Christian consciences, however, could not stay long on this level; law was so very much more satisfying a guide than vague, elusive charity. And law in

plenty was forthcoming, so soon as the Church developed the discipline of public confessions followed by appropriate penances for each fault. At first the whole proceeding was informal and impulsive enough; but by the 7th century it had grown thoroughly stereotyped and formal. Libri Poenitentiales began to appear — detailed lists of all possible sins, with the forfeit to be exacted from each. As public penance finally decayed, and auricular confession took its place, these were superseded by the Summae de Poenitentia, — law-books in the strictest sense. These were huge digests of all that popes, councils, primitive fathers had decided on every kind of question pertaining to the confessional — what exactly is a sin, what kind of questions the priests must ask, under what conditions he could give absolution. As such, they were eagerly welcomed by the clergy; for a single magistrate, sitting in secret without appeal, necessarily grasps at whatever will lighten his burden of responsibility. Nor was their

complexity a stumbling-block. The medieval mind was only too prone to look on morality as a highly technical art, quite as difficult as medicine or chancery law — a path where wayfaring men were certain to err, with no guide but their unsophisticated conscience. What could they possibly do but cling to their priest with a “blind and unexpressed faith” ?

Against this state of things the Reformation was a violent protest. Catholicism increasingly took for granted that a man imperilled his soul by thinking for himself; Protestantism replied that he could certainly lose it, if he left his thinking to another. For it is to the individual conscience that God speaks; through the struggles of the individual conscience He builds up a strong and stable Christian character ” A man may be a heretic in the truth,” says Milton in his Areopagitica (1644), ” if he believes things only because his pastor says so, or the Assembly so determines, without knowing other reason, though his belief be true, yet the very truth he holds becomes his heresy. There is not any burden that some would not gladlier post off to another than the charge and care of their religion. A wealthy man, addicted to his pleasures and his profits, finds religion to be a traffic so entangled, and of so many piddling accounts, that of all mysteries he cannot skill to keep a stock going upon that trade. What does he therefore but resolve to give over toiling, and find himself some factor, to whose care and conduct he may commit the whole managing of his religious affairs — some divine of note and estimation that must be. To him he adheres, resigns the whole warehouse of his religion with all the locks and keys into his custody, and indeed makes the very person of that man his religion. So that a man may say his religion is now no more within himself, but is become a dividual moveable, which goes or comes near him, according as that good man frequents the house. ”

Twelve years after the Areopagitica appeared Pascal’s Provincial Letters (1656-1657). These deal with the casuists of the Counter-Reformation in the spirit of Milton, laying espe- cial stress on the artificiality of their methods and the laxity of their results. Not, of course, that they meant deliberate evil; Pascal expressly credits them with good intentions. But they were drawn, almost to a man, from Italy or Spain, the two countries least alive to the spirit of the Reformation; and most of them were Jesuits, the order that set out to be nothing Protestantism was, and everything that Protestantism was not. Hence they were resolutely opposed to any idea of reform; for to begin making

changes in the Church's system would be a tacit admission that Luther had some show of reason on his side. On the other hand, they would certainly lose their hold on the laity, unless some kind of change were made; for many of the Church's rules were obsolete, and others far too severe to impose on the France of Montaigne or even the Spain of Cervantes. Thus caught between two fires the casuists developed a highly ingenious method, not unlike that of the Roman Stoics, for eviscerating the substance of a rule while leaving its shadow carefully intact. The next step was to force the confessors to accept their lax interpretation of the law; and this was accomplished by their famous theory of probabilism — first taught in Spain about 1580. This made it a grave sin in the priest to refuse absolution, whenever there

was some good reason for giving it even when there were other and better reasons for refusing it. This principle does not deserve all the abuse that has been lavished upon it. It secured uniformity in the confessional, and thereby protected the penitent from the caprices of individual priests; and by de-priving these of responsibility, it forced the penitent back on himself. But the gain was more than counterbalanced by the evil. The less the Church could expect from its penitents, the more it was driven to trust to the miraculous efficiency of sacra- mental grace. Once get a sinner to confession, and the whole work was done. However bad his natural disposition, the magical words of absolution would make him a new man. As for most penitents, all they cared for was to scrape through by the skin of their teeth. Casuistry might insist that it only proposed to fix the minimum of a minimum, and beg them for their soul's sake to aim a little higher. Human nature seldom resists the charms of a fixed standard — least of all when it is applied by a live judge in a visible court. If the priest must be satisfied with little, why be at the trouble of offering more? For this reason, probabilism found vigorous opponents in Bossuet and other eminent divines; and various of its excesses were condemned by the popes during the latter half of the 17th century. After a long eclipse it was finally re-established, though in a very modified form, by Alfonso Liguori about the middle of the 18th century.

In Protestant countries casuistry shrank and dwindled, though works on the subject continued to be written both in Germany

and England during the 17 th century. The best known of the Anglican books is Jeremy Taylor's Ductor Dubitantium (1660). But the Protestant casuist never pretended to speak authoritatively; all he did was to give his reasons, and leave the decision to the conscience of his readers. " In all this discourse," says Bishop Sanderson, one of the best of the English writers, " I take it upon me not to write edicts, but to give my advice." Very soon, however, these relics of casuistry were swept away by the rising tide of common-sense. The 18th century loved to discuss hard cases of conscience, as a very cursory glance at Fielding's novels (1742-1751) or Boswell's Life of Johnson (1791) will show. But the age was incurably suspicious of attempts to deal with such difficulties on any kind of technical system. Pope was never tired of girding at " Morality by her false guardians drawn, Chicane in furs, and casuistry in lawn ";

while Fielding has embodied the popular conception of a casuist in Parson Thwackum and Philosopher Square, both of whom only take to argument when they want to reason themselves out of some obvious duty. Still more outspoken is the Savoy- ard vicar in the Emile (1762) of Jean Jacques Rousseau: " Whence do I get my rules of action? I find them in my heart. All I feel to be good is good; all I feel to be evil is evil. Conscience is the best of casuists; it is only when men wish to cheat it that they fly to logical quibbles." Extravagant as this sentiment sounds, it paved the way to better things. The great object of 17th-century moralists had been to find some general principle from which the whole of ethics could be deduced; common-sense, by turning its back on abstract principles of every kind, forced the philosophers to come down to the solid earth, and start by inquiring how the world does make up its mind in fact. During the last two centuries de- duction has gone steadily out, and psychology come in. Ethics have become more distinctively a science, instead of an awkward hybrid between a science and an art; their business has been to investigate what moral conduct is, not to lay down the law as to what it ought to be. Hence they deliberately refuse to engage in casuistry of the old-fashioned sort. Further, it is increasingly felt that ethical judgments do not depend on reason alone, but involve every element in our character; and that the real problem of practical morality is to establish a harmonious balance between the intelligence and the feelings — to make a man's " I think this is right " correspond with his " I feel that it is so." Whether systematic training can do anything to make the attainment of this balance easier is a

question that has lately engaged the attention of many educational reformers ; and whatever future casuistry may still have before it would seem to lie along the lines indicated by them.

There is'an excellent study of the ancient casuists by M. Raymond 'Thamin, Un Probleme moral dans I'antiguite (Paris, 1884). For the Roman Catholic casuists see Dollinger und Reusch, Moralstreitig- keiten im siebzehnten Jahrhundert (2 vols., N6rdlingen, 1889), and various articles (" Casuistik," " Ethik," " Moralsysteme," &c.) in Wetzer and Welte's Kirchenlexicon (Freiburg, 1 880-1 896). See also the editions of Pascal's Provincial Letters, by John de Soyres (with English notes, Cambridge, 1880), and A. Molinier (2 vols., Paris, 1891). The Anglican casuists are discussed in Whewell, Lectures on Moral Philosophy (London, 1862). For general reflec- tions on the subject see the appendix to Jowett's edition of the Epistle to the Romans (London, 1855). Most modern text-books on ethics devote some attention to the matter — notably F. H. Bradley in his Ethical Studies (London, 1876). See also Hastings Rashdall, Theory of Good and Evil (2 vols., Oxford, 1907). (St, C).

CASUS BELLI, the technipal term for cases in which a state holds itself justified in making war, if a certain course to which it objects is persisted in. Interference with the full exercise of a nation's rights or independence, an affront to its dignity, an unredressed injury, are instances of casus belli. Most of the new compulsory treaties of arbitration entered into by Great Britain and other states exclude from their application cases affecting the "vital interests" or "national honour " of the contracting states. These may therefore be considered as a sort of definition of casus belli in so far as the high contracting parties to them are concerned.

CAT, 1 properly the name of the well-known domesticated feline animal usually termed by naturalists Felis domestica, but in a wider sense employed to denote all the more typical members of the family Felidae. According to the New English Dictionary, although the origin of the word " cat " is unknown, yet the name is found in various languages as far back as they can be traced. In old Western Germanic it occurs, for instance, so early as from a.d. 400 to 450; in old High German it is chazza or catero, and in Middle German kattaro. Both in Gaelic and in old French it is cat, although sometimes taking the form of chafer in the latter; the Gaelic designation of the European wild cat being cat fiad- haich. In Welsh and Cornish the name is cath. If Martial's cattae refer to

this animal, the earliest Latin use of the name dates from the 1st century of our era. In the work of Palladius on agriculture, dating from about the year a.d. 350, reference is made to an animal called catus or cattus, as being useful in

1 The word “cat ” is applied to various objects, in all cases an application of the name of the animal. In medieval si£gecraft the ” cat ” (Med. Lat. chattus or gattus, chatta or gatta, in Fr. chat or chat- chasteil) was a movable pent-house used to protect besiegers when approaching a wall or gateway, for the purpose of sapping, mining or direct attack, or to cover a ram or other battering-engine. The word is also sometimes applied to a heavy timber fitted with iron spikes or projections to be thrown down upon besiegers, and to the large work known as a. ” cavalier.” ” Cat ” or ” cat-head,” in nautical usage, is the projecting beam on the bows of a ship used to clear the anchor from the sides of the vessel when weighed. The stock of the anchor rests on the cat-head when hung outside the ship. The name is also used of a type of a vessel, now obsolete, and formerly used in the coal and timber trade on the north-east coast of England; it had a deep waist and narrow stem; it is still applied to a small rig of sailing boats, with a single mast stepped far forward, with a fore and aft sail. Among other objects also known by the name of ” cat ” is the small piece of wood pointed at either end used in the game of tip-cat, and the instrument of punish- ment, generally known as the ” cat o’ nine tails.” This consists of a handle of wood or rope, about 18 in. long, with nine knotted cords or thongs. The multiplication of thongs for purposes of flogging is found in the old Roman flagellum, a scourge, which had sometimes three thongs with bone or bronze knots fastened to them. The ” cat ” was the regular instrument with which floggings were per- formed in the British army and navy. Since the abolition of flogging in the services, the use of the cat is now restricted to certain classes of offenders in military prisons (Army Act 1881, § 133). In the English criminal law, where corporal punishment is ordered by the court for certain criminal offences, the ” cat ” is used only where the prisoner is over sixteen years of age. It may not be used except when actually ordered in the sentence, and must be of a pattern approved by a secretary of state. Further floggings are Inflicted with the ” cat ” upon convicted prisoners for breaches of discipline in prison. They must be ordered by the visitors of the prison and confirmed by the home secretary.

granaries for catching mice. This usage, coupled with the existence of a distinct term in Gaelic for the wild species, leaves little doubt that the word " cat " properly denotes only the domesticated species. This is confirmed by the employment in Byzantine Greek of the term Karros or Karra to designate domesticated cats brought from Egypt. It should be added that the aiXoupos of the Greeks, frequently translated by the older writers as " cat," really refers to the marten-cat, which appears to have been partially domesticated by the ancients and em- ployed for mousing.

As regards the origin of the domesticated cats of western Europe, it is well known that the ancient Egyptians were in the habit of domesticating (at least in some degree) the Egyptian race of the African wild cat (Felis ocreata maniculata) , and also of embalming its remains, of which vast numbers have been found in tombs at Beni Hasan and elsewhere in Egypt. These Egyptian cats are generally believed by naturalists to have had a large share in the parentage of the European breeds, which have, however, in many cases been crossed to a greater or less extent with the European wild cat (F. catus).

One of the features by which the Egyptian differs from the European wild cat is the longer and less bushy tail; and it has been very generally considered that the same feature is character- istic of European domesticated cats. According, however, to Dr E. Hamilton, " the measurement of a number of tails of the [European] wild cat and of the domestic cat gives a range between n in. and 14J in., the longer length being quite as often found in the wild cats as in the domestic. The bushy appearance depends entirely on the length of the fur, and accords with the thick fur of the rest of the body of the wild cat, while in the domestic race the fur both on the body and tail is thinner and softer."

Possibly those domesticated cats with unusually short and bushy tails may have a larger share of European wild-cat blood; while, conversely, such wild cats as show long tails may have a cross of domesticated blood.

More importance was attached by Dr A. Nehring of Berlin (SB. Ges. Naturfor., Berlin, 1887) to the colour of the soles of the hind-feet as a means of determining the relationship of the

domesticated cat of Europe. According to his observations, in the Egyptian wild cat the pads of the toes are wholly black, while the black extends back either continuously or in long stripes as far as the calcaneum or heel-bone. In the European wild cat, on the other hand, the black is limited to a small round spot on the pads, while the colour of the hair as far back as the heel-bone is yellowish or yellowish-grey. Since in all domesticated cats retaining the colouring of the wild species the soles of the hind-feet correspond in this particular with the Egyptian rather than with the European wild cat, the presumption is in favour of their descent from the former rather than from the latter.

Later, Dr Nehring (op. cit. 1889) came to the conclusion that the domesticated cat has a dual parentage, one stock coming' from south-eastern Asia and the other from north-eastern Africa; in other words, from a domesticated Chinese cat (itself derived from a wild Chinese species) on the one hand, and from the Egyptian cat on the other. The ordinary domesticated cats of Europe are, however, mainly of African origin, although they have largely crossed, especially in Germany (and probably also in Great Britain), with the wild cat. The same author was likewise of opinion that the domestication or taming of various species of wild cats took place chiefly among nationalities of stationary or non-nomadic habits who occupied themselves with agricultural pursuits, since it would be of vital importance that their stores of grain should be adequately protected from the depredations of rats and mice.

The foregoing opinibn as to the dual parentage of our domesticated cats receives support from observations made many years ago by E. Blyth, which have recently been endorsed and amplified by R. I. Pocock (Proc. Zool. Soc. London, 1907). According to these observations, two distinct types of so-called tabby cats are recognizable. In the one the pattern consists of narrow vertical stripes, and in the other of longitudinal or obliquely longitudinal

stripes, which, on the sides of the body, tend to assume a spiral or sub-circular arrangement characteristic of the blotched tabby. This latter type appears to be the true " tabby "; since that word denotes a pattern like that of watered silk. One or other of these types is to be found in cats of almost all breeds, whether Persian, short-haired or Manx; and there appear to be no intermediate stages between them. Cats of the striped type are no doubt descended from the European and North African wild cats; but

the origin of cats exhibiting the blotched pattern appears to be unknown. As it was to a cat of the latter kind that Linnaeus gave the name of Felis catus, Pocock urges that this title is not available for the European wild cat, which he would call Felis sylvestris. Without accepting this proposed change in nomenclature, which is liable to lead to confusion without any compensating advantage, it may be suggested that the blotched tabby type represents Dr Nehring's presumed Chinese element in the cat's parentage, and that the missing wild stock may be one of the numerous phases of the leopard-cat (F. bengalensis) , in some of which an incipient spiral arrangement of the markings may be noticed on the shoulder.

As to the introduction of domesticated cats into Europe, the opinion is very generally held that tame cats from Egypt were imported at a relatively early date into Etruria by Phoenician traders; and there is decisive evidence that these animals were established in Italy long before the Christian era. The progeny of these cats, more or less crossed with the indigenous species, thence gradually spread over Europe, to become mingled at some period, according to Dr Nehring's hypothesis, with an Asiatic stock. The earliest written record of the introduction of domesticated cats into Great Britain dates from about a.d. 936, when Hywel Dda, prince of South Wales, enacted a law for their protection. " The Romans," writes Dr Hamilton, " were probably the original introducers of this cat, and as the final evacuation of Britain by that nation took place under the emperor Valentinian about a.d. 436, the period of its introduc- tion may certainly be dated some 500 years previous to the Welsh chronicle and even much earlier." It is added that the remains of cats from Roman villas at Silchester and Dursley are probably referable to the domesticated breed.

Before proceeding to notice some of the different types of domesticated cats, a few lines may be devoted to the wild European species, F. catus. Beyond stating that in colour it conforms very closely to the striped phase of domesticated tabby, it will be unnecessary to describe the species. Its geographical range was formerly very extensive, and included Great Britain, France, the Netherlands, Switzerland, Germany, Bohemia, Hungary, Poland, Transylvania, Galicia, the Caucasus as far as the Caspian, southern Russia, Italy, Spain, Greece, Rumania, Bulgaria, Servia, and portions of central and northern Asia. " At the present time," observes Dr Hamilton, " the wild cat has become almost extinct in many of the above districts. Examples

may perhaps occasionally still be found in the uninhabited forests of Hungary and Transylvania, and occasionally in Spain and Greece, as well as in the Caucasus and in some of the Swiss cantons, but the original race has in most countries interbred with the domestic cat wherever the latter has penetrated." In Great Britain wild cats survive only in some of the Scottish forests, and even there it is difficult to decide whether pure-bred specimens are extant. Remains of the wild cat occur in English caverns; while from those of Ireland (where the wild species has apparently been unknown during the historic period) have been obtained jaws and teeth which it has been suggested are referable to the Egyptian rather than to the European wild cat. Such a determination is, however, extremely hazardous, even if it be admitted that the remains of cats from the rock-fissures of Gibraltar pertain to Felis ocreata.

The favourite haunts of the wild cat are mountain forests where masses or rocks or cliffs are interspersed with trees, the crevices in these rocks or the hollow trunks of trees affording sites for the wild cat's lair, where its young are produced and reared. In the Spanish plains, however, the young are often produced in nests built in trees, or among tall bamboos j'd

CAT

Plate I.

Fig. i.— SKINS OF THE BLOTCHED DOMESTIC CAT, SHOWING SOME OF THE VARIATIONS TO WHICH THE PATTERN IS LIABLE. (Cf. Fig. 5 on Plate II.)

Fig. 2.— SKINS OF THE STRIPED DOMESTIC CAT, GIV- ING THE "TICKED" BREED AND A PARTIALLY ALBINO SPECIMEN. (Cf. Fig. 4 011 Plate II.)

Fig. 3.-SKINS OF THE EUROPEAN WILD CAT, FROM ROSS-SHIRE, SCOTLAND. (Cf. Fig. 1 on Plate II.)

Note —Of the two types of colouration found in modern domestic cats, the striped type obviously corresponds to the original wild cat as seen in various parts of North Europe to-day. The origin of the blotched as a special type is wholly unknown.

(Photos from Plates VIII., IX., and X., P. Z. S., 1907, by permission of the Zoological Society of London.)

cane-brakes. ” To fight like a wild cat ” is proverbial, and wild cats are described as some of the most ferocious and untamable of all animals. How far this untamable character lends sup- port to the view of the origin of our domesticated breeds has not yet been determined. Hares, rabbits, field-mice, water- rats, rats, squirrels, moles, game-birds, pigeons, and small birds, form the chief food of the wild cat.

Apart from the above-mentioned division of the striped members of both groups into two types according to the pattern of their markings, the domesticated cats of western Europe are divided into a short-haired and a long-haired group. Of these, the former is the one which bears the closest relationship to the wild cats of Africa and of Europe, the latter being an importation from the East. The striped (as distinct from the blotched) short-haired tabby is probably the one most nearly allied to the wild ancestors, the stripes being, however, to a great extent due to the European wild cat. In one direction the tabby shows a tendency to melanism which culminates in complete blackness, while in the other direction there is an equally marked tendency to albinism; grey cats, which may be regarded as tabbies whose stripes have disappeared, forming the connecting link between the tabby and the white cat. A mixture of the melanistic with the albinistic type will of course give rise to parti-coloured cats. A third colour-phase, the ” erythristic ” or red, is represented by the sandy cat, the female of which takes the form of the ” tortoise-shell,” char- acterized, curiously enough, by the colour being a blend of black, white, and sandy. The so-called orange tabby is one phase of the erythristic type.

As to long-haired cats, there appear originally to have been two closely-allied strains, the Angora and the Persian, of which the former has been altogether replaced in western Europe by the latter. That these long-haired cats have an ancestry, to some extent at any rate distinct from the ordinary short-haired breeds, is practically certain, and it has been suggested that they/ are derived from the ” manul ” cat, or Pallas’s cat (Felis manul), of

the deserts of central Asia, which is a long-haired and bushy-tailed species with comparatively slight striping. The fact that in tabby Persians the body-markings are never so strong as in the short-haired breeds is in some degree con- firmatory of this, as suggesting descent from a nearly whole- coloured type. At the present day, however, Persians exhibit nearly all the colour and pattern types of the short-haired breeds, the " orange Persian " representing the erythristic phase.

Turning to the tailless or so-called Manx cats, in which the tail should be represented merely by a tuft of hair without any remnant of bone, it seems that the strain is to be met with in many parts of Russia, and there is a very general opinion that it originally came from Japan or some other far eastern country. Throughout Japan, China, Siam, and the Malay countries, normal long-tailed cats are indeed seldom seen. Instead of these are cats with more or less abbreviated tails, showing in greater or less degree a decided kink or bend near the tip. In other cases the tail is of the short curling type of that of a bulldog; some- times it starts quite straight, but divides in a fork-like manner near the tip; and in yet other instances it is altogether wanting, as in the typical Manx cats. These kink-tailed or tailless cats are moreover smaller in size than the ordinary short-tailed breeds, with rather longer hair, whose texture approaches that of rabbit- fur, and a cry said to be like that of the jungle-cat (F. chaus) of India and Africa, and more dog-like habits. Unless the jungle- cat, which is a nearly whole-coloured species, can claim the position, the ancestry of these Manx-Malay cats is still unknown. Kink-tailed cats, it should be added, are also known from Madagascar.

Among the domesticated cats of India a spotted type of colouring, with a more or less decided tendency for the spots to coalesce into stripes, is very noticeable; and it is probable that these cats are derived from the spotted Indian desert-cat (F. ornata), with a certain amount of crossing from other species. The so-called F. torquata of India is probably based on cats of

this type which have reverted to the wild state. Other Indian cats with a tawny or fulvous type of colouring are probably the more or less modified descendants of the jungle-cat. From the same stock may be derived the Abyssinian breed, in which the ears are relatively large and occasionally tipped with long hairs (thus recalling the tufted ears of the jungle-cat). The colour is typically reddish-brown, each individual hair being " ticked " like that of a wild rabbit, whence the popular name of " bunny cat." Another

African breed is the Mombasa cat, in which the hair is reported to be unusually short and stiff.

By far the most remarkable of all the Old World domesticated breeds is, however, the royal Siamese cat, which almost certainly has an origin quite distinct from that of the ordinary European breeds; this being rendered evident not only by the peculiar type of colouring, but likewise by the cry, which is quite un-mistakable. Siamese cats may have the tail either straight or kinked, but whether the latter feature belongs of right to the breed, or has been acquired by crossing with the ordinary black and tabby kink-tailed cats of the country, is not known. In the royal Siamese breed the head is rather long and pointed, the body also elongated with relatively slender limbs, the coat glossy and close, the eyes blue, and the general colour some shade of cream or pink, with the face, ears, feet, under-parts, and tail chocolate or seal-brown. There is however a wholly chocolate-coloured strain in which the eyes are yellow. The most remarkable feature about the breed is that the young are white. " The kittens," observes a lady writer, " are born absolutely white, and in about a week a faint pencilling comes round the ears, and gradually all the points come. At four or five months they are lovely, as generally they retain their baby whiteness, which contrasts well with their almost black ears, deep-brown markings, and blue eyes." In constitution these cats are extremely delicate. The blue eyes and the white coat of the kitten indicate that the Siamese breed is a semi-albino, which when adult tends towards melanism, such a combination of characters being apparently unknown in any other animal. If the frequent presence of a kink in. the tail be an inherent feature, the breed is evidently related to the other kink-tailed Malay cats which, as already stated, have a cry differing from that of European cats. Should this be so, then if the ordinary Malay cats are the descendants of the jungle-cat, we shall have to assign the same ancestry to the Siamese breed.

Although definite information on this point is required, it seems probable that the southern part of North America and South America possessed certain native domesticated breeds of cats previous to the European conquest of the country; and if this be so, it will be obvious that these breeds must be derived from indigenous wild species. One of these breeds is the Para- guay cat, which when adult weighs only about three pounds, and is not more than a quarter the size of an ordinary cat. The body is elongated, and the hair, especially on the tail, short, shiny and

close. This small size and elongated form suggest origin from the jaguarondi (F. jaguar ondi), a chestnut-coloured wild species; but information appears to be lacking with regard to the colouring of the domesticated breed. Another South American breed is said to be free from the hideous ” cater- wauling ” of the ordinary cat. In old days New Mexico was the home of a breed of hairless cats, said to have been kept by the ancient Aztecs, but now well-nigh if not completely extinct. Although entirely naked in summer, these cats developed in winter a slight growth of hair on the back and the ridge of the tail.

Literature. — St George Mivart, The Cat (London, 1881); R. Lydekker, “Cats,” in Allen’s Naturalists’ Library (1888); F. Hamilton, The Wild Cat of Europe (London. 1896) ; Frances Simpson, The Book of the Cat (London, 1903). (R. L.*)

CATABOLISM, or Katabolism (Gr. Kara, down, /SoXˆ, a throw), the biological term for the reverse of anabolism, namely the breaking down of complex into simpler substances, destructive metabolism (see Physiology).

CATACLYSM (Gr. kotcucXuctjuos, a deluge), a great flood or deluge (q.v.). The term is used in geology to denote an

overwhelming catastrophe which has produced sudden changes in the earth’s surface; and also, figuratively, of any great and violent change which sweeps away the existing social or political order.

CATACOMB, a subterranean excavation for the interment of the dead or burial-vault. In this sense the word ” catacomb ” has gained universal acceptance, and has found a place in most modern languages. The original term, catacumbae, however, had no connexion with sepulture, but was simply the name of a particular locality in the environs of Rome. It was derived from the Greek Kara and Kvufiri, ” a hollow,” and had reference to the natural configuration of the ground. In the district that bore this designation, lying close to the Appian Way, the basilica of San Sebastiano was erected, and the extensive burial-vaults beneath that church — in which, according to tradition, the bodies of the apostles St Peter and St Paul rested for a year and seven months

previous to their removal to the basilicas which bear their names — were, in very early times, called from it coemeterium ad catacumbas, or calacumbas alone. From the celebrity of this cemetery as an object of pilgrimage its name became extensively known, and in entire forgetfulness of the origin of the word, catacumbae came to be regarded as a generic appellation for all burial-places of the same kind. This extension of the term to Christian burial-vaults generally dates from the 9th century, and obtained gradual currency through the Christian world. The original designation of these places of sepulture is crypta or coemeterium.

The largest number of Christian catacombs belong to the 3rd and the early part of the 4th centuries. The custom of sub- terranean interment gradually died out, and entirely ceased with the sack of Rome by Alaric, a.d. 410. ” The end of the catacomb graves,” writes Mommsen (Cont. Rev., May 187 1), ” is intimately connected with the end of the powerful city itself. . . . Poverty took the place of wealth, . . . the traditions of the Christian tomb-architects sank into utter insignificance, and the. expanse of the wasted Campagna now offered room enough to bury the few bodies, without having to descend as once far down below the surface of the earth.” The earliest account of the catacombs, that of St Jerome narrating his visits to them when a schoolboy at Rome, about a.d. 354, shows that interment in them was even then rare if it had not been altogether discontinued; and the poet Prudentius’s description of the tomb of the Christian martyr Hippolytus, and the cemetery in which it stood, leads us to the same conclusion. With the latter part of the 4th century a new epoch in the history of the catacombs arose — that of religious reverence. In the time of Pope Damasus, a.d. 366-384, the catacombs had begun to be regarded with special devotion, and had become the resort of large bands of pilgrims, for whose guidance catalogues of the chief burial-places and the holy men buried in them were drawn up. Some of these lists are still extant. 1 Pope Damasus himself displayed great zeal in adapting thecatacombs to their new purpose, restoring the works of art on the walls, and renewing the epitaphs over the graves of the martyrs. In this latter work he employed an engraver named Furius Philocalus, the exquisite beauty of whose characters enables the smallest fragment of his work to be recognized at a glance. This gave rise to extensive alterations in their con- struction and decoration, which has much lessened their value as authentic memorials of the religious art of the 2nd and 3rd

centuries. Subsequent popes manifested equal ardour, with the same damaging results, in the repair and adornment of the catacombs, and many of the paintings covering their walls, which have been assigned to the period of their original construc- tion, are really the work of these later times. The catacombs

1 The most importan t of these lists are the two Itineraries belonging to the first half of the 7th century, in the Salzburg library. One still earlier, but less complete, appears in the Notitia Urbis Romae, under the title Index Coemeteriorum. Another Itinerary, preserved at Einsiedeln, printed by Mabillon, dates from the latter half of the same century. That found in the works of William of Malmesbury (Hardy's ed. vol. ii. pp. 539-544) appears to be copied from it, or both may be from the* same source. De Rossi gives a comparative table of these Itineraries and other similar lists.

shared in the devastation of Rome by the Goths under Vitiges in the 6th century and by the Lombards at a later period; and partly through the spoliation of these barbarian invaders, partly through the neglect of those who should have been their guardians, they sank into such a state of decay and pollution that, as the only means of preserving the holy remains they enshrined from further desecration, Pope Paul I., in the latter part of the 8th century, and Pope Paschal, at the beginning of the 9th, entered upon the work of the translation of the relics, which was vigorously carried on by successive pontiffs until the crypts were almost entirely despoiled of their dead. The relics having been removed, the visits of pilgrims naturally ceased, and by degrees the very existence of those wonderful subterranean cemeteries was forgotten. Six centuries elapsed before the accidental discovery of a sepulchral chamber by some labourers digging for pozzolana earth (May 31, 1578) revealed to the amazed inhabitants of Rome " the existence," to quote a contemporary record, " of other cities concealed beneath their own suburbs." Baronius, the ecclesiastical historian, was one of the first to visit the new discovery, and his Annals in more than one place evidence his just appreciation of its importance. The true " Columbus of this subterranean world," as he has been aptly designated, was the indefatigable Antonio Bosio (d. 1629), who devoted his life to the personal investigation of the catacombs, the results of which were given to the world in 1632 in a huge folio, entitled Roma sotterranea, profusely illustrated with rude but faithful plans and engravings. This was

republishe'd in a Latin translation with considerable alterations and omissions by Paolo Aringhi in 1631; and a century after its first appearance the plates were reproduced by Giovanni Bottari in 1737, and illustrated with great care and learning. Some additional discoveries were described by Marc Antonio Boldetti in his Osservazioni, published in 1720; but, writing in the interests of the Roman Church with an apologetic, not a scientific object, truth was made to bend to polemics, and little addition to our knowledge of the catacombs is to be gained from his otherwise important work. The French historian of art, Seroux d'Agincourt, 1825, by his copious illustrations, greatly facilitated the study of the architecture of the catacombs and the works of art contained in them. The works of Raoul Rochette display a comprehensive knowledge of the whole subject, extensive reading, and a thorough acquaintance with early Christian art so far as it could be gathered from books, but he was not an original investigator. The great pioneer in the path of inde- pendent research, which, with the intelligent use of documentary and historical evidence, has led to so vast an increase in our acquaintance with the Roman Catacombs, was Padre Marchi of the Society of Jesus. His work, Monumenti delle arti christiane primitive, is the first in which the strange misconception, received with unquestioning faith by earlier writers, that the catacombs were exhausted sand-pits adapted by the Christians to the purpose of interment, was dispelled, and the true history of their formation demonstrated. Marchi's line of investigation was followed by the Commendatore De Rossi, and his brother Michele, the former of whom was Marchi's fellow-labourer during the latter part of his explorations; and it is to them that we owe the most exhaustive scientific examination of the whole subject. The Catacombs of Rome are the most extensive with which we are acquainted, and, as might be expected in the centre of the Christian world, are in many respects the most remarkable. No others have been so thoroughly examined and illustrated. These may, therefore, be most appropriately selected for descrip- tion as typical examples.

Our description of the Roman Catacombs cannot be more appropriately introduced than by St Jerome's account of his visits to them in his youth, already referred to, which, after the lapse of above fifteen centuries, presents a o /p 0nJe . most accurate picture of these wonderful subterranean . labyrinths. " When I was a boy," he writes, " receiving my education in Rome, I and my schoolfellows used, on Sundays, to make the circuit of the

sepulchres of the apostles and martyrs. Many a time did we go down into the catacombs. These are

excavated deep in the earth, and contain, on either hand as you enter, the bodies of the dead buried in the wall. It is all so dark there that the language of the prophet (Ps. lv. 15). seems to be fulfilled, ‘ Let them go down quick into hell.’ Only occasionally is light let in to mitigate the horror of the gloom, and then not so much through a window as through a hole. You take each step with caution, as, surrounded by deep night, you recall the words of Virgil — •

“Horror ubique animos, simul ipsa silentia terrent.” 1

In complete agreement with Jerome’s vivid picture the visitor to the Roman Catacombs finds himself in a vast labyrinth of narrow galleries, usually from 3 to 4 ft. in width, interspersed with small chambers, all excavated at successive levels, in the

they reach seven storeys), and communicate with one another by stairs cut out of the living rock. Light and air are introduced by means of vertical shafts (luminaria) running up to the outer air, and often serving for several storeys. The drawing (fig. 3) from Northcote gives a very correct idea of these galleries, with the tiers of graves pierced in the walls. The doorways which are seen interrupting the lines of graves are those of the family sepulchral chambers, or cubicula, of which we shall speak more particularly hereafter.

The graves, or loculi, as they are commonly designated, were, in the Christian cemeteries, with only a few exceptions (Padre Marchi produces some from the cemetery of St Ciriaca, Monam. •rimitiv. tav. xiv. xliii. xliv.), parallel with the length of the

mmam

‘&■£>.

‘ A.

1, 2,

Entrance from the Basilica of St Agnes. Ancient staircases leading to the first storey.

3. Corridors from the staircases.

4. Two ruined staircases leading to the

lower storey.

5. Steps of the rock.

Fig. 1. — Plan of part of the Cemetery of Sant' Agnese. (From Martigny.)

6.

Air-shafts, or luminaria.

13-

7-

Ruined vault.

8.

Blind ways.

14-17.

9-

Passages built up or ruined.

18-32.

10.

Passages obstructed by landslips.

33-

11.

Unfinished passage.

34-

12.

Passages destitute of tombs.

35-

strata of volcanic rock subjacent to the city and its environs, and constructed originally for the interment of the Christian dead. The galleries are not the way of access to the cemeteries, but are themselves the cemeteries, the dead being buried in long low horizontal recesses, excavated in the vertical walls of the passages, rising tier above tier like the berths in a ship, from a few inches above the floor to the springing of the arched ceiling, to the number of five, six or even sometimes twelve ranges. These galleries are not arranged on any definite plan, but, as will be seen from the plan (fig. 1), they intersect one another at different angles, producing an intricate network which it is almost impossible to reduce to any system. They generally run in straight lines, and as a rule preserve the same level. The different storeys of galleries lie one below the other (fig. 2) to the number of four or five (in one part of the cemetery of St Calixtus

1 Hieron., Comment, in Ezech. lib. xx. c. 40. The translation is Dean Burgon's.

Narrow apertures between adjoining

galleries. Arcosolia.

Cubicula. [two chairs.

Chapel with vestibule and apse, and Double chapel with three chairs. Large chapel in five divisions.

gallery. In the pagan cemeteries, on the other hand, the sepulchral recess as a rule entered the rock like an oven at right angles to the corridor, the body being introduced endways. The plan adopted by the Christians saved labour, economized space, and consulted reverence in the deposition of the corpse. These loculi were usually constructed for a single body only. Some, however, were formed to contain two, three, or four, or even more corpses. Such recesses were known respectively as bisomi, trisomi, quadrisomi, &c, terms which often appear in the sepulchral inscriptions. After the introduction of the body the loculi were closed with the greatest care, either with slabs of marble the whole length of the aperture, or with huge tiles, three

being generally employed, cemented together with great exactness so as to prevent the escape of the products of decomposition (fig. 4). Where any epitaph was set up — an immense number are destitute of any inscription at all — it is always painted or engraved on these slabs or tiles. In the earlier interments the

epitaph is usually daubed on the slab in red or black paint. In later examples it is incised in the marbles, the letters being rendered clearer by being coloured with vermilion. The enclosing slab very often bears one or more Christian symbols, such as the

Fig. 2. — Section of Galleries at different levels. (From Seroux d'Agincourt.)

dove, the anchor, the olive-branch, or the monogram of Christ (figs, s, 6). The palm branch, which is also of frequent occurrence, is not an indisputable mark of the last resting-place of a martyr, being found in connexion with epitaphs of persons dying natural deaths, or those prepared by persons in their lifetime, as well as in those of little children, and even of pagans. Another frequent concomitant of these catacomb interments, a small glass vessel containing traces of the sediment of a red fluid, embedded in the cement of the loculus (fig. 7), has no better claim. The red matter proves to be the remains of wine, not of blood; and the conclusion of the ablest archaeologists is that

Fig. 3. — View of a Gallery.

the vessels were placed where they are found, after the eucharistic celebration or agape on the day of the funeral or its anniversary, and contained remains of the consecrated elements as a kind of religious charm. Not a few of the slabs, it is discovered, have done double duty, bearing a pagan inscription on one side and a Christian one on the other. These are known as opisthographs. The bodies were interred wrapped in linen

cloths, or swathed in bands, and were frequently preserved by embalming. In the case of poorer interments the destruction of the body was, on the contrary, often accelerated by the use of quicklime.

Interment in the wall-recess or loculus, though infinitely the most common, was not the only mode employed in the catacombs.

ssSaiES

Fig. 4. — Loculi. (From de Rossi.)

Other forms of very frequent recurrence are the table-tomb and arched tomb, or arcosolium. From the annexed woodcuts it will be seen that these only differ in the form of the surmounting recess. In each case the arched tomb was formed by an oblong chest, either hollowed out of the rock, or built of masonry, and closed with a horizontal slab. But in the table-tomb (fig. 8) the recess above, essential for the introduction of the corpse, is square, while in the arcosolium (fig. 9), a form of later date, it is semicircular. Sarcophagi are also found in the catacombs, but are

Figs. 5 and 6. — Loculi. (From de Rossi.)

of rare occurrence. They chiefly occur in the earlier cemeteries, and the costliness of their construction confined their use to the wealthiest classes — e.g. in the cemetery of St Domitilla, herself a member of the imperial house. Another unfrequent mode of interment was in graves like those of modern times, dug in the floor of the galleries (Marchi, u.s., tav. xxi. xxvi.). Table-tombs and arcosolia are by no means rare in the corridors of the catacombs, but they belong more generally to the cubicula, or family vaults, of which we now proceed to speak.

These cubicula are small apartments, seldom more than 12 ft. square, usually rectangular, though sometimes circular or

Fig. 7. — Glass Bottles. (From Bosio.)

polygonal, opening out of the main corridors. They are not unfrequently ranged regularly along the sides of the galleries, the doors of entrance, as may be seen in a previous illustration (fig. 3), following one another in as orderly succession as the bedchamber doors in the passage of a modern house. The roof is sometimes

flat, but is more usually vaulted, and sometimes rises into a cupola. Both the roof and the walls are almost universally coated with stucco and covered with fresco paintings — in the earlier works merely decorative, in the later always symbolical or historical. Each side of the cubiculum, except that of the entrance, usually contains a recessed tomb, either a table-tomb or an arcosolium. That facing the entrance was the place of greatest honour, where in many instances the remains of a martyr were deposited, whose tomb, according to primitive usage, served as an altar for the celebration of the eucharist. This was sometimes, as in the Papal crypt of St Calixtus

(fig. 10), protected Stem; :.” _ …ˆ – >’ from irreverence by lattice work (tran- sennae) of marble. The cubiculum was originally designed for the reception of a very limited number of dead. But the natural de- sire to be buried near one’s relatives caused new tombs to be cut in the walls, above and around and behind the

original tombs, the walls being thus completely honeycombed with loculi, sometimes as many as seventy, utterly regardless of the paint- ings originally depicted on the walls. Another motive for multiplying the number of graves operated when the cubiculum contained the remains of any noted saint or martyr. The Christian antiquary has cause continually to lament the destruction of works of art due to this craving. One of the most perfect examples of early Christian pictorial decoration, the so-called “Dispute with the Doctors,” in the catacomb of Calixtus, the ” antique style of beauty ” of which is noticed by Kugler, has thus suffered irreparable mutilation, the whole of the lower part of the picture having been destroyed by the excavation of a fresh grave-recess (Bottari, vol. ii. tav. 15). The plates of De Rossi, Perret, and, indeed, all illustrations of the catacombs, exhibit frequent examples of the same destructive superstition. The illustrations (figs. 11 and 12), taken from De Rossi’s great work, representing two of the cubicula in the cemetery of St Calixtus, show the general arrangement of the loculi and the

Fig. 8.— Table-tomb.

Fig. 9. — Arcosolia. (From Bosio.)

character of the frescoes which ornament the walls and roof. These paintings, it will be seen, are simply decorative, of the same style as the wall-paintings of the baths, and those of Pompeii.

Each cubiculum was usually the burying-place of some one family, all the members of which were interred in it, just as in the chantry-chapels connected with medieval churches. In them

was celebrated the funeral-feast on the day of burial and on its anniversary, as well as the eucharist, which was the invariable accompaniment of funerals in the primitive church (Bingham,

Fig. 10. — Restoration of the Papal Crypt, Cemetery of St Calixtus. (From de Rossi.)

Orig. Eccl. bk. xxiii. c. iii. 12). The funeral-banquet descended to the Christian church from pagan times, and was too often profaned by heathen licence. St Augustine, in several passages, inveighs against those who thus by ” gluttony and insobriety buried themselves over the buried,” and ” made themselves

Fig. 1 1 . — Cubiculum in Cemetery of St Calixtus. (From de

Rossi.)

drunk in the chapels of the martyrs, placing their excesses to the score of religious reverence for the dead " (August., De Mar. Eccl. Cathol. c. 34; Contr. Faust, lib. xx. c. 21; Confess, lib. vi. c. 2). Some curious frescoes representing these funeral-feasts, found in the cubicula which were the scene of them, are

reproduced by Bosio (pp. 355, 391) and others. A romantic air has been thrown over these burial chapels by the notion that they were the places of worship used by the Christians in times of

Fig. 12. — Cubiculum in the Cemetery of St Calixtus. (From de Rossi.)

persecution. This to a certain extent is doubtless true, as in the case of the chapel of Santa Priscilla, where the altar or stone coffin of a martyr remains, with a small platform behind it for the priest or bishop to stand upon. But that they can have been so used to any large extent is rendered impossible by their limited dimensions, as none of them could hold more than fifty or sixty persons. In some of the catacombs, however, there are larger halls and connected suites of chapels which may possibly have been constructed for the purpose of congregational worship during the dark periods when the public exercise of the Christian religion was made penal. The most remarkable of these is in the cemetery of Sant' Agnese (see plan, fig. 13). It consists of five rectangular compartments, three on one side of the corridor

Fig. 13. — Plan of a supposed Church, Catacomb of Sant' Agnese. (From Marchi.)

and two on the other, connected by a passage intersecting the gallery at right angles. Two of the five compartments are supposed to have been assigned to male, and two to female worshippers, the fifth, at the extremity of the whole, being reserved for the altar and its ministers. In the centre of the end-wall stands a stone chair (fig. 14), considered to have been the episcopal cathedra, with a bench for the clergy on each side. There is no trace of an altar, which may, Marchi thinks, have been portable. The walls of the compartments are occupied by arched sepulchral recesses, above and below which are tiers of

ordinary graves or loculi. The arrangements are certainly such as indicate a congregational purpose, but the extreme narrowness

of the suite, and still more of the passage which connects the two divisions, must have rendered it difficult for any but a small number to take any intelligent part in the services at the same time. Although the idea of the use of the catacombs for religious worship may have been pressed too far, there can be no doubt that the sacred rites of the church were celebrated within them. We have already spoken of the eucharistic cele- brations of which the cubicula were the scene; and still existing baptisteries prove that the other sacrament was also administered there. The most remark- able of these baptisteries is that in the catacomb of San Pontianus (fig. 15). Ten steps lead down to a basin of sufficient depth for immersion, supplied by a spring. Some of the subterranean Fig. 14. — Bishop's chambers contain armed seats and Chair. Catacomb of benches cut out of the tufa rock. These Sant ' Agnese. are supposed by Marchi and others to indicate schoolrooms, where the catechumens were instructed by the bishop or presbyters. But this theory wants verification. It is impossible not to : be struck with the remarkable analogy between these rock-hewn chairs and those discovered in the Etruscan tombs, of the purpose of which no satisfactory explanation has been given. Very exaggerated statements have been made as to the : employment of the catacombs as dwelling-places by the Christians in times of persecution. We have, however, sufficient Theories oi evidence that they were used as places of refuge from the use of the fury of the heathen, in which the believers — thecata- especially the bishops and clergy, who would naturally be the first objects of attack — might secrete themselves until the storm had blown over. This was a purpose for which they were

Baptistery of San Pontianus. (From Perret.)'

admirably adapted both by the intricacy of their labyrinthine passages, in which any one not possessing the clue would be inevitably lost, and the numerous small chambers and hiding-places at different levels which might be passed unperceived in the dark by the pursuers. As a rule also the catacombs had

more than one entrance, and frequently communicated with an arenariaor sand-quarry; so that while one entrance was carefully watched, the pursued might escape in a totally different direction by another. But, to quote J. H. Parker, " the catacombs were never intended, nor fit for, dwelling-places, and the stories of persons living in them for months are probably fabulous. According to modern physicians it is impossible to live many days in the caves of pozzolana in which many of the catacombs are excavated." Equally exaggerated are the statements as to the linear and lateral extent of the catacombs, and their intercommunication with one another. Without resorting to this exaggeration, Mommsen can speak with perfect truth of the " enormous space occupied by the burial vaults of Christian Rome, not surpassed even by the cloacae or sewers of Republican Rome," but the data are too vague to warrant any attempt to define their dimensions. Marchi has estimated the united length of the galleries at from 800 to ooo m., and the number of interments at between 6,000,000 and 7,000,000; Martigny's estimate is 587 m.; and Northcote's, lower still, at " not less than 350 m." The idea of general intercommunication is negatived by the fact that the chief cemeteries are separated by low ground or valleys, where any subterranean galleries would be at once filled with water.

It now remains to speak of the history of these subterranean burial-places, together with the reasons for, and mode of, their construction. From the period of the rediscovery of the catacombs in the 16th century till comparatively recent times a gigantic fallacy prevailed, repeated by writer after writer, identifying the Christian burial-places with disused sand-pits. It was accepted as an unquestionable fact by every one who undertook to describe the catacombs, that the Christians of Rome, finding in the labyrinthine mazes of the exhausted arenariae, which abounded in the environs of the city, whence the sand used in building had been extracted, a suitable place for the interment of their martyred brethren, where also the sacred rites accompanying the interment might be celebrated without fear of interruption, took possession of them and used them as cemeteries. It only needed a comparison of the theory with the visible facts to refute it at once, but nearly three centuries elapsed before the independence of the arenariae and the catacombs was established. The discovery of this inde- pendence is due to Marchi. Starting with the firmest belief in the old traditional view, his own researches by degrees opened his eyes

to the truth, now universally recognized, that the cata- combs were exclusively the work of the Christians, and were constructed for the interment of the dead. It is true that a catacomb is often connected with the earlier sand-quarry, and starts from it as a commencement, but the two are excavated in different strata, suitable to their respective purposes, and their plan and construction are so completely unlike as to render any confusion between them impossible.

The igneous formation of which the greater part of the Roman Campagna is, in its superior portion, composed, contains three strata known under the common name of tufa, — the ” stony,” ” granular,” and ” sandy ” tufa, — the last being commonly known as pozzolana. 1 The pozzolana is the material required for building purposes, for admixture with mortar; and the sandpits are naturally excavated in the stratum which supplies it. The stony tufa (tufa litoide) is quarried as building-stone. The granular tufa is useless for either purpose, containing too much earth to be employed in making mortar, and being far too soft to be used as stone for building. Yet it is in this stratum, and in this alone, that the catacombs are constructed; their engineers avoiding with equal care the solid stone of the tufa litoide and the friable pozzolana, and selecting the stratum of medium hardness, which enabled them to form the vertical walls of their galleries, and to excavate the loculi and cubicula without severe labour and also without fear of their falling in. The annexed illustration (fig. 16) from Marchi’s work, when compared with that of the catacomb of Sant’ Agnese already given, presents

1 In Rome the three strata are known to geologists as tufa litoide, tufa granolare and pozz r ‘ZT r ‘

to the eye the contrast between the wide winding Inegulai passages of the sand-pit, calculated for the admission of a hone and cart, and the narrow rectilinear accurately-defined galleries of the catacomb. The distinction between the two is also plainly exhibited when for some local or private reasons an ancient arenaria has been transformed into a cemetery. The modifications required to strengthen the crumbling walls to support the roof and to facilitate the excavation of loculi-, involved so much labour that, as a rule, after a few attempts, the idea of utilizing an old quarry for burial purposes was abandoned.

Another equally erroneous idea was that these vast buri;l- places

of the early Christians remained entirely concealed from the eyes of their pagan neighbours, and were constructed not only without the permission of the municipal authorities but without their cognizance. Nothing can be farther from the truth. Such an idea is justly stigmatized by Mommsen as ridiculous, and reflecting a discredit as unfounded as it is unjust on the imperial police of the capital. That such vast excavations should have, been made without attracting attention, and that such an immense number of corpses could have been carried to burial in perfect secrecy is utterly impossible. Nor was there any reason; why secrecy should have been desired. The decent burial of the dead was a matter especially provided for by the Roman laws. No particular mode was prescribed. Interment was just as legal as cremation,and had, in fact, been universally prac- tised by the Romans until the later days of the republic. 2 The bodies, of the ScipiosandNasos were buried in still existing cata- combs; and if the Christians pre- ferred to adopt that which Minu- cius Felix calls "the better, and more ancient custom of inhumation" (Octavius, c. 2), there was absolutely nothing, to quote the words of Northcote (Roma sotterran. pp. 56, 61), " either in their social or religious position to interfere with their freedom of action. The law left them entire liberty, . . . and the faithful did but use their liberty in the way that suited them best, burying their dead according to a fashion to which many of them had been long accustomed, and which enabled them at the same time to follow in death the example of him who was also their model in life." Interment in rock-hewn tombs, " as the manner of the Jews is to bury," had been practised in Rome by the Jewish settlers for a considerable period anterior to the. rise of the Christian Church. A Jewish catacomb, now lost, was discovered and described by Bosio (Rom. sott. p. 141), and others are still accessible. They are to be distinguished from Christian catacombs only by the character of their decorations, the absence of Christian symbols and the language of their inscriptions. There would, therefore, be nothing extraordinary in the fact that a community, always identified in the popular heathen mind with the Jewish faith, should adopt the mode of interment belonging to that religion. Nor have we the slightest trace of any official interference with Christian burials, such as would render secrecy necessary or desirable. Their funerals were as much under the protection of the law, which not only invested the tomb itself with a sacred character, but included in its protection the area in which it stood, and the cella memoriae or chapel connected with it, as those of their heathen fellow-citizens, while the same shield

would be thrown over the burial-clubs, which, as we learn from Tertullian

- Cicero is our authority for the burial of Marius, and for Sulla's being the first member of the Gens Cornelia whose dead body was burnt (De Legg. ii. 22).

Fig. 16. — Arenaria beneath the Cemetery of Calixtus.

(Apolog. c. 39), were common among the early Christians, as over those existing among the heathen population of Rome.

We may then completely dismiss the notion of there being any studied secrecy in connexion with the early Christian cemeteries, and proceed to inquire into the mode of their formation. formation. Almost without exception, they had their origin in small burial areas, the property of private persons or of families, gradually ramifying and receiving additions of one subterranean storey after another as each was required for inter- ments. The first step would be the acquisition of a plot of ground either by gift or purchase for the formation of a tomb. Christians were not beyond the pale of the law, and their faith presented no hindrance to the property being secured to them in perpetuity. To adapt the ground for its purpose as a cemetery, a gallery was run all round the area in the tufa rock at a convenient depth below the surface, reached by staircases at the corners. In the upright walls of these galleries loculi were cut as needed to receive the dead. When these first four galleries were full others were mined on the same level at right angles to them, thus gradually converting the whole area into a net-work of corridors. If a family vault was required, or a burial chapel for a martyr or person of distinction, a small square room was excavated by the side of the gallery and communicating with it. When the original area had been mined in this way as far as was consistent with stability, a second storey of galleries was begun at a lower level, reached by a new staircase. This was succeeded by a third, or a fourth, and sometimes even by a fifth. When adjacent burial areas belonged to members of the same Christian confraternity, or by gift or purchase fell into the same hands, communications were opened between the respective cemeteries, which thus spread laterally, and gradually acquired that enormous extent

which, ” even when their fabulous dimensions are reduced to their right measure, form an immense work.” 1 This could only be executed by a large and powerful Christian community unimpeded by legal enactments or police regulations, ” a living witness of its immense development corresponding to the importance of the capital.” But although, as we have said, in ordinary times there was no necessity for secrecy, yet when the peace of the Church was broken by the fierce and often protracted persecutions of the heathen emperors, it became essential to adopt precautions to conceal the entrance to the cemeteries, which became the temporary hiding-places of the Christian fugitives, and to baffle the search of their pursuers. To these stormy periods we may safely assign the alterations which may be traced in the staircases, which are sometimes abruptly cut off, leaving a gap requiring a ladder, and the formation of secret passages communicating with the arenariae, and through them with the open country.

When the storms of persecution ceased and Christianity had become the imperial faith, the evil fruits of prosperity were not slow to appear. Cemetery interment became a regular trade in the hands of the fossores, or grave-diggers, who appear to have established a kind of property in the catacombs, and whose greed of gain led to that destruction of the religious paintings with which the walls were decorated, for the quarrying of fresh loculi, to which we have already alluded. Monumental epitaphs record the purchase of a grave from the fossores, in many cases during the lifetime of the individual, not unfrequently stating the price. A very curious fresco, found in the cemetery of Calixtus, preserved by the engravings of the earlier investigators (Bottari, torn. ii. p. 126, tav. 99), represents a ” fossor ” with his lamp in his hand and his pick over his shoulder, and his tools lying about him. Above is the inscription, ” Diogenes Fossor in Pace depositus.”

It is unnecessary to enter on any detailed description of the frescoes which cover the walls and ceilings of the burial-chapels in the richest abundance. It must suffice to say that the earliest examples are only, to be distinguished from the mural decorations employed by their pagan contemporaries (as seen at Pompeii and

1 Mommsen’s chosen example of an ancient burial-chamber, extending itself into a catacomb, or gathering subterranean additions round it till a catacomb was established, is that of the

cemetery of St Domitilla, traditionally identified with a granddaughter of Vespasian, and the catacomb of Santi Nereo ed Achilleo on the Appian and Ardeatine way.

elsewhere) by the absence of all that was immoral or idolatrous, and that it was only very slowly and timidly that any distinctly religious representations were introduced. These were at first purely symbolical, meaningless to any but a %j£"' Christian eye, such as the Vine, the Good Shepherd, the Sheep, the Fisherman, the Fish, &c. Even the personages of ancient mythology were pressed into the service of early Christian art, and Orpheus, taming the wild beasts with his lyre, symbolized the peaceful sway of Christ; and Ulysses, deaf to the Siren's song, represented the Believer triumphing over the allurements of sensual pleasure. The person of Christ appeared but rarely, and then commonly simply as the chief personage in an historical picture. The events depicted from the fife of Christ are but few, and always conform rigidly to the same traditional type. The most frequent are the miracle at Cana, the multiplication of the loaves and fishes, the paralytic carrying his bed, the healing of the woman with the issue of blood, the raising of Lazarus,

Fig. 17. — Fresco Ceiling. (From Bosio.) The subjects, beginning at the top and going to the right, are — (1) The paralytic carrying his (5) Jonah swallowed by the fish.

(6) Jonah vomited forth.

(7) Moses striking the rock.

(8) Noah and the dove. In the centre, the Good

Shepherd.

bed.

(2) The seven baskets full of

fragments.

(3) Raising of Lazarus.

(4) Daniel in the lions' den.

Zacchaeus, and the triumphal entry into Jerusalem. The Crucifixion, and subjects from the Passion, are never represented.

The cycle of Old Testament subjects is equally limited. The most common are the history of Jonah as a type of the Resurrec- tion, the Fall, Noah receiving the dove with the olive branch, Abraham's sacrifice of Isaac, Moses taking off his shoes, David with the sling, Daniel in the lions' den, and the Three Children in the fiery furnace. The mode of representation is always con- ventional, the treatment of the subject no less than its choice being dictated by an authority to which the artist was compelled to bow. All the more valuable of these paintings have beiin produced in J. H. Parker's series of photographs taken in the catacombs by the magnesium light. 2 Wilpert's great work, in which these frescoes are reproduced in colours, now enables the student even better to distinguish the styles of different centuries and follow the course of artistic development or decay. Beyond Rome and its suburbs the most remarkable Christian catacombs are those in the vicinity of Naples, described by Pelliccia (De Christ. Eccl. Polit. vol. iv. Dissert. 5), and in separate treatises by Bellerman and Schultze. Plans of them are also given by Agincourt in his great work on Christian art. These

2 Parker's invaluable series of Roman photographs may be seen at the library of the Victoria and Albert museum, at the Ashmolean museum and the Bodleian library, Oxford.

catacombs differ materially from those of Rome. They were certainly originally stone-quarries, and the hardness of the rock

has made the construction practicable of wide, lofty combs of corr idors and spacious halls, very unlike the narrow Naples. galleries and contracted chambers in the Roman

cemeteries. The mode of interment, however, is the same as that practised in Rome, and the loculi and arcosolia differ by little in the two. The walls and ceilings are covered

Fig. 18. — Fresco Ceiling. (From Bosio.) The subjects, beginning at the bottom and going to the right, are — (i) Moses striking the rock. (4) Abraham's sacrifice.

(2) Noah and the dove. (5) The miracle of the loaves.

(3) The three children in the furnace.

with fresco paintings of different dates, in some cases lying one over the other. This catacomb contains an unquestionable example of a church, divided into a nave and chancel, with a rude stone altar and bishop's seat behind it.

At Syracuse also there are very extensive catacombs known as " the Grottos of St John." They are also figured by Agincourt, S racuse anc ˆ described by Denon (Voyage en Sicile et Malte) and Fiihrer. There is an entire underground city with several storeys of larger and smaller streets, squares and cross ways, cut out of the rock; at the intersection of the cross ways

Catacombs of St John, Syracuse.

are immense circular halls of a bottle shape, like a glass-house furnace, lighted by air shafts. The galleries are generally very narrow, furnished on each side with arched tombs, and com- municating with family sepulchral-chambers closed originally

by locked doors, the marks of the hinges and staples being still visible. The walls are in many places coated with stucco adorned with frescoes, including palms, doves, labara and other Christian symbols. The ground-plans (figs. 19, 20), from Agincourt, of the catacomb and of one of the cir- cular halls, show how widely this cemetery differs in arrangement from the Roman catacombs. The fre- quency of blind passages and of circular chambers will be noticed, as well as the very large number of bodies in the cruciform recesses, apparently amounting in one in- stance to nineteen. Agincourt re- marks that this cemetery " gives an idea of a work executed with design and leisure, and with means very

Fig. 20. — Plan of Circular Hall, Catacombs of St John, Syracuse. (From Agincourt.)

Malta.

Egypt

different from those at command in producing the catacombs of Rome."

Denon also describes catacombs at Malta near the ancient capital of the island. The passages were all cut in a close- grained stone, and are very narrow, with arched ceilings, running very irregularly, and ramifying in all direc- tions. The greater part of the tombs stand on either side of the galleries in square recesses

(like the table-tombs of the Roman catacombs), and are rudely fashioned to imitate sarcophagi. The interments are not nearly so numerous as in other catacombs, nor are there any vestiges of painting, sculpture or inscriptions.

At Taormina in Sicily is a Saracenic catacomb, also T ,,,,,,,,,,,, n j i_ a • m . . Taormina.

figured by Agincourt. The mam corridor is 12 ft.

wide, having three or more ranges of loculi on either side, running

longitudinally into the rock, each originally closed by a stone

bearing an inscription.

Passing to Egypt, a small Christian catacomb at Alexandria is described and figured by de Rossi. 1 The loculi here also are set end- ways to the passage. The walls are abundantly deco- rated with paintings, one of a liturgical character. But the most extensive catacombs at Alexandria are those of Egypto-Greek origin, from the largest of which, according to Strabo (lib. xvii. p. 79 5), the quarter where it is placed had the name of the Necropolis. The plan, it will be seen, is remarkable for its regularity (figs. 21, 22). Here, too, the graves run endways into the rock. Other catacombs in the vicinity of the same city are described by Pocock and other travellers, and are figured by Agincourt.

Subterranean cemeteries of the general character of those described are very frequent in all southern and eastern countries. A vast necropolis in the environs of Saida, ancient Sidon, is described in Renan's Mission en Phi- nicie, and figured in Tho- bois's plates. It consists of a series of apartments approached by staircases,

1 Bulletino di archaeologia cristiana, 1865. See also Authorities, below.

Fig. 21. — Plan of Catacomb at Alexandria. (From Agincourt.)

Sidon

Fig. 22. — Section of a Gallery in Cata- comb at Alexandria. (From Agincourt.)

the sides pierced with sepulchral recesses running lengthwise into the rock.

The rock-hewn tombs of Etruria scarcely come under the category of catacombs, in the usual sense, being rather independent family burial-places, grouped together in a necropolis. They are, however, far too remarkable to be altogether passed over. These sepulchres are usually hollowed out of the face of low cliffs on the side of a hill. They often rise tier above tier, and are some- times all on the same level ” facing each other as in streets, vnd branching off laterally into smaller lanes or alleys “; and

Rock- tombs of Etruria.

Fig. 23. — Plan of a Tomb at Cervetri. (From Dennis.)

occasionally forming ” a spacious square or piazza surrounded by tombs instead of houses ” (Dennis, Cities and Cemeteries of Etruria, ii. 31). The construction of the tombs commonly keeps up the same analogy between the cities of the living and those of the dead. Their plan is for the most part that of a house, with a door of entrance and passage leading into a central chamber or atrium, with others of smaller size opening from it, each having a stone-hewn bench or triclinium on three of its sides, on which the dead, frequently a pair of corpses side by side, were laid as if at a banquet. These benches are often hewn in the form of couches with pillows at one end, and the legs carved in relief. The ceilings have the representation of beams and rafters cut in the rock. In some instances arm-chairs, carved out of the living rock, stand between the doors of the chambers, and the walls above are decorated with the semblance of suspended shields. The walls are often covered with paintings in a very simple archaic style, in red and black. As a typical example of the Etruscan tombs we give the plan and section (figs. 23, 24) of the Grotta delta Sedia at Cervetri from Dennis (pp. 32,135). The tombs in some instances form subterranean groups more analogous to the general idea of a catacomb. Of this nature is the very remarkable cemetery at Poggio Gaiella, near Chiusi, the

ancient Clusium, of a portion of the principal storey of which the woodcut (fig. 25) is a plan. The most re- markable of these sepulchral chambers is a large circular hall about 25 ft. in diameter, supported by a huge cylindrical pillar

Fig. 24.-

-Section of the Tomb of the Seats and Shields, Cervetri. (From Dennis.)

hewn from the rock. Opening out of this and the other chambers, and connecting them together, are a series of low winding passages or cuniculi, just large enough for a man to creep through on all fours. No plausible suggestion has been offered as to the purpose of these mysterious burrows, which cannot fail to remind us of the labyrinth which, according to Varro's description as quoted by Pliny {Hist. Nat. lib. xxxvi. c. 19, § 4), was the distinguishing mark of Porsena's tomb, and which have led some adventurous archaeologists to identify this sepulchre with that of the great king of Etruria (Dennis, u.s., pp. 393 ff.). (E. V.; O. M. D.)

Modern Discoveries. — In 1873 was discovered, near the cemetery of St Domitilla, the semi-subterranean basilica of Santi Nereo ed Achilleo, 100 ft. by 60 ft. This is now covered with a roof, and the fallen columns have been raised up. The lower

FlG. 25.— Plan of a portion of the principal storey in the Poggio Gajella. (From Dennis.)

part of a pillar, which once supported a baldachino over the altar, still preserves the name Acilleus, and beneath it a bas-relief of the martyr, with his hands bound, receiving his death-blow from the executioner. The base of a similar column has only feet in the same attitude, and probably bore the name Neretjs. In a grave in the apse was found a large fragment of an inscrip- tion, composed by Pope Damasus, but set up by his successor Siricius, which, from the note-book of a Salzburg pilgrim of the 8th century, can be completed thus: —

Militiae nomen dederant saevum Officium pariter spectantes juss Praeceptis pulsante metu servi Mira fides rerum subito posue Conversi f ugiunt ducis impia castr Projiciunt clypeos faleras tel Confessi gaudent Christi portar Credite per Damasum possit quid

ˆ<ˆv ue gerebant ATYR>ˆanni RE parˆV ati

RE FVRORIiVˆm A BELIXQVVNi AQ. CI1VESTA E TRIVMFOS GLORIA CHRISTI

Nereus (see Rom. xvi. 15) and Achilleus, said to have been baptized by St Peter, refused to do the bidding of Domitian as praetorians, and entering the service of Flavia Domitilla, suffered martyrdom with their mistress Petronilla, of the Aurelian family closely connected with the Flavii, and the spiritual daughter of St Peter, who was buried in a sarcophagus with the inscription: —

AVRELIAE • PETRONILLAE • FIL • DVLCISSIMAE

This is now in St Peter's, but was probably originally behind the apse of this basilica, for there is a fresco of her in an arccsolium, with a matron named Veneranda. The original entrance to the cemetery leads directly into a spacious corridor with no loculi, but recesses for sarcophagi, and decorations of the classical style of the 2nd century. From this a wide staircase leads directly down to a chamber, discovered in March 1881, of a very early date. Within an arcosolium is a tablet set up by " Aurelius Ampliatus and his son Gordian, to Aurelia Bonifatia, his in- comparable, wife, a woman of true chastity, who lived 25 years, 2 months, 4 days, and 2 hours." The letters are of the 2nd century; but above the arcosolium was found a stone with great letters, 5 or 6 in. high: "Ampliati, the tomb of Ampli- atus." Now Ampliatus is a servile name: how comes it to be set up with such distinction in the sepulchre of the Flavii ? Romans xvi. 8 supplies the answer: " Salute Ampliatus, most

beloved to me in the Lord." De Rossi thinks the identification well grounded (Bulleitino, 1881, p. 74). Epitaphs of members of the Flavian family have been found here, and others stating that they are put up "Ex indulgentia flaviae domitillae vespasiani neptis." So that De Rossi did not hesitate to com- plete an inscription on a broken stone thus: —

De Rossi began his excavations in the cemetery of Santa Priscilla in 1851, but for thirty years nothing but what had been described by Bosic came to light. In 1880 he unearthed a portion near the Cappella Greca, and found galleries that had not been touched since they were filled in during the Diocletian perse- cution. The

loculi were intact and the epitaphs still in their places, so that " they form a kind of museum, in which the development, the formulae, and the symbolic figures of Christian epigraphy, from its origin to the end of the 3rd or 4th century, can be notified and contemplated, not in artificial specimens as in the Lateran, but in the genuine and living reality of their original condition." (Bullelt., 1884, p. 68). Many of the names mentioned in St Paul's Epistles are found here: Phoebe, Prisca, Aquilius, Felix Ampliatus, Epenetus, Olympias, Onesimus, Philemon, Asyncritus, Lucius, Julia, Caius, Timotheus, Tychicus, Crescens, Urbanus, Hermogenes, Tryphaena and Trypho(sa) on the same stone. Petrus, a very rare name in the catacombs, is found here several times, both in Greek and in Latin. The neighbouring Coemeterium Ostrianum was anciently known as " Fons S. Petri," " ubi Petrus baptizavit," " ubi Petrus prius sedit." This cemetery derives its name from Priscilla, mother of Pudens, who is said to have given hospitality to St Peter the Apostle. We are reminded of St Paul, and of his friends Aquila and Prisca, by a monument erected by an imperial freedman who was praepositvs tabernacvlorvm — chief tentmaker. In 1888 a corridor was discovered which had at one time been isolated from the rest of the cemetery. It had no loculi, but recesses in the wall to receive sarcophagi. At the end of the corridor there was a large chamber, 23 ft. by 13 ft., once lined with marble and the ceiling covered with mosaic, a few fragments of which still remain. The only tomb here was a sarcophagus, of which the broken front bears the letters which show it to have been the epitaph of one of the Acilian family: — acilio glabrioni filio

In the vicinity are fragments of the epitaphs of Manius Acilius and Priscilla, of Quintus Acilius and Caia Acilia in Greek, another Greek inscription " Acilius Rufinus mayest thou live in God." After careful examination of the nine Acillii, who were consuls, De Rossi concludes that this was the resting-place of that Acilius Glabrio, consul with Trajan, a.d. 91, who in the year of his consulate was compelled by Domitian to fight with beasts in the arena, and then banished and put to death in 95. The question of his Christianity seems settled by the discovery of the sepulchre of these Christian Acilii. From this crypt a staircase led up to the basilica in which Pope Silvester was buried, and the whole plan of which was laid bare by De Rossi. The tomb of St Silvester could be identified, and that of Pope Siricius " at his feet," as the pilgrim noted (Bullett., 1890, pp. 106-119).

Just before De Rossi's death, Mgr. Wilpert discovered in the

Cappella Greca a painting of the " Fractio Panis " or eucharistic feast, which he cleansed from the dust with which it had been covered. The picture of the Blessed Virgin and Child, which De Rossi ascribed to the 2nd, if not to the 1st century, has received an unexpected proof of its antiquity. In 1890 the floor of the gallery in which it stands was excavated, and another floor was found to be 6 ft. below its supposed level. The loculi in this lower portion were intact, with inscriptions of the 2nd century still in their places, proving that the niche in which that picture was painted must have been considerably older than the lpwering of

the floor. A flight of iron steps enables the visitor now to examine this venerable specimen of early Christian art.

After the death of De Rossi, one of his pupils, H. Stevenson, since dead, discovered in 1896 a small subterranean basilica in the catacomb of Santi Pietro e Marcellino on the Via Labicana, with pious acclamations on the plaster similar to those in the Papal crypt in St Calixtus. Near the well-known subterranean chapel in the Coemeterium Ostrianum was discovered by Mgr. Crostarosa, in 1877, another chapel, in which Signor Armellini found traces of St Emerentiana, foster-sister of St Agnes. Near this a whole region of galleries has been brought to light with loculi intact.

Explorations conducted in the cemetery of Domitilla in 1897-1898 brought to light a fine double crypt with frescoes representing Christ seated between six male and female saints; also an inscription relating to a new saint (Eulalius) in a cubiculum of the 3rd century. In 1899-1900 were discovered two opposite cubicula in the catacomb of Santi Pietro e Marcellino. These were unknown to Bosio, and are both covered with frescoes, the vault being in one case decorated with the scene which represents Christ seated among the apostles and pronouncing sentence upon the defunct. An inscription discovered in 1900 on the site of the ancient cemetery of St Ciriaca, and dating from a.d. 405, states that one Euryalus bought a site ad mensam beati marlyris Laurentii from a certain fossor whose name has been erased. This is interesting as an example of what was known as memoriae damnatio or the blotting out of a name on account of some dishonourable action. From the end of the 4th to the first half of the 5th century, the fossores had the privilege of selling sites, which frequently led to grave abuses. In 1901-1902 excavations in the cemetery of Santa Priscilla, near the Cappella Greca, revealed a polygonal chamber. This may have originally been the nymphaeum of the great villa of the Acilii Glabriones, the

hypogaeum of which was discovered by De Rossi near this spot in 1888. It may have been used as a burial-place for martyrs, and Professor Marucchi is inclined to see in it the sepulchral chapel of Pope Marcellinus, who died in a.d. 304 during the persecutions of Diocletian. In 1902, in that part of the Via Ardeatina which passes between the cemeteries of Calixtus and Domitilla, was discovered a crypt with frescoes and the sanctuary of a martyr: it is thought that this, rather than a neighbouring crypt brought to light in 1897, may prove to be the sepulchral crypt of SS. Marcus and Marcellianus. In a cubiculum leading out of a gallery in the vicinity there was also discovered an interesting impression in plaster of an inscription of the mother of Pope Damasus, beginning:

hic damasi mater posvit lavren [tia membra] .

In the same year building operations in the Via di Sant' Onofrio revealed the presence of catacombs beneath the foundations: examination of the loculi showed that no martyrs or illustrious persons were buried here.

In 1903 a new cemetery with frescoes came to light on the Via Latina, considered by Marucchi to have belonged to a heretical sect. In the same year the Jewish cemetery on the Via Portuense, known to Bosio but since forgotten, was rediscovered. The subterranean basilica of SS. Felix and Adauctus, discovered by Boldetti and afterwards choked up with ruins, was cleared again: the crypt, begun by Damasus and enlarged by Siricius, contains frescoes of the 6th- 7 th centuries.

A good plan of the catacombs at Albano (at the 1 5th milestone of the Appian way), discovered by Boldetti and described by De Rossi, has been published by Marucchi (Nuovo Bulletino di archeologia cristiana, 1902, pp. 89 ff.). In 1904 a small sub-terranean cemetery was discovered at Anagnia. Catacombs have also been recently discovered on the site of Hadrumetum near Sousse in Tunisia. (* W. R. B.; O. M. D.)

Authorities. — The classical work on the catacombs of Rome is G. B. De Rossi's Roma sotterranea, on which most of the accounts in other languages than Italian have been based. The fine volume by Mgr. Wilpert, Le Pitture delle catacombe romane (Rome, 1903), in which all the important frescoes are reproduced in colours, is to be regarded as an addition to the Roma sotterranea. All new

discoveries made by the active Commissione di archeologia sacra are chronicled with as little delay as possible in the Nuovo Bulletino de archeologia cristiana published in Rome.

The most recent accounts of the catacombs are to be found in the following books: — Armellini, Gli Antichi Cimiteri cristiani di Roma'e d' Italia (Rome, 1893); O. Marucchi, Le Catacombe romane (Rome, 1903; also translated into French), Manuale di epigrafia cristiana (Milan, 1904) ; M. Besnier, Les Catacombes de Rome (Paris, 1909).

Among the older works are: Bosio, Roma sotterranea, Severano's edition (1632), and Aringhi's edition (1651) ; Boldetti, Osservazioni sopra i cimiteri dei santi martiri (Rome, 1720); Bottari, Sculture e pitture sagre, &c. (Rome, 1737-1754); Seroux d'Agincourt, Histoire de Vart par les monuments (Paris, 1823; German ed., 1840); G. Marchi, Monumenti delle arti cristiane primitive (Rome, 1844) ; Raoul Rochette, Tableau des catacombes de Rome (2nd ed., Paris, 1853); Perret, Les Catacombes de Rome (Paris, 1855)— a sumptuous folio work, but not always accurate , Roller, Les Catacombes de Rome (Paris, 1881); V. Schultze, Die Katakomben (Leipzig, 1882).

Works written in English are: Northcote and Brownlow, Roma sotterranea (London, 1869; based upon De Rossi); Wharton Marriott, The Testimony of the Catacombs (London, 1870); J. H. Parker, The Archaeology of Rome: the Catacombs; Smith and Cheetham, Dictionary of Christian Antiquities, s.v. " Catacombs "; R. Lanciani, Pagan and Christian Rome (London, 1892); W. Lowry, Christian Art and Archaeology, ch. ii. (London, 1901 ; a useful introduction to the subject) ; H. Gee, " The Church in the Cata- combs," in W. Lefroy's Lectures in Ecclesiastical History (1896); Th. Mommsen, in the Contemporary Review, May 1871.

Accounts of the catacombs will also be found in the encyclopaedias and manuals published under the following names: Martigny, Perate, F. X. Kraus (Realencyklopddie and Geschichte der christlichen Kunst), Reusens, V. Schultze and C. M. Kauffmann, and in the large new Dictionnaire d'archeologie chretienne et liturgie, published at Paris under the editorship of Dom F. Cabrol.

The catacombs at Naples are described in C. F. Bellermann, Vber die dltesten christlichen Begrdbnisstdtten und besonders die Kata- komben zu Neapel (Hamburg, 1839) ; Armellini, as above, and V. Schultze, Die Katakomben von San Gennaro dei Pvveri in Neapel (Jena, 1877).

For the catacombs in Malta, A. A. Caruana, Ancient Pagan Tombs and Christian Cemeteries in the Islands of Malta (Malta, 1898), and A. Mayr, " Die altchristlichen Begrabnisstatten auf Malta," in Rbmische Quartalschrift, vol. xv. pp. 216 and 352 (Rome, 1901), may be consulted.

The fullest account of the Sicilian catacombs is given by J. Ftihrer, Forschungen zur Sicilia sotterranea (Munich, 1897) ; and D. C. Barrecca, Le Catacombe di San Giovanni in Siracusa (Syracuse, 1906).

A catacomb of the 5th century, discovered at Kertch in South Russia, is described by J. Kulakovsky in Materials for Russian Archaeology (St Petersburg, 1896; a publication of the Russian Imperial Archaeological Commission), but it is written in Russian, as also is the account by V. Latyshev, in Vizantieski Vremennik, vol. vi. pp. 337 ff. (St Petersburg, 1899).

The catacombs at Hadrumetum (Sousse) are described by A. F. Leynard, Les Catacombes d'Hadrumete, deuxieme campagne de fouilles (1904-1905). See also Revue Tunisienne (1905), p. 250.

For the catacombs of Alexandria, Neroutsos Bey, L'Ancienne Alexandrie, may be consulted in addition to De Rossi's article mentioned in the text. (O. M. D.)

CATAFALQUE (a word of unknown origin, occurring in various forms in many European languages, meaning a funeral scaffold or temporary stage), a movable structure of wood sometimes richly decorated, erected temporarily at funeral ceremonies in a church to receive the coffin or effigy of the deceased; also an open hearse or funeral car.

CATALANI, ANGELICA (1780-1849), Italian opera-singer, daughter of a tradesman at Sinigaglia, was educated at the convent of Santa Lucia at Gubbio, where her magnificerit soprano voice, of extraordinary compass and purity, soon became famous. In 1795 she made her debut on the stage at Venice, and from that moment every impresario in Europe was anxious to

engage her. For nearly thirty years she sang at all the great houses, receiving very large fees; her first appearance in London being at the King's theatre in 1806. She remained in England, a prima donna without a serious rival, for seven years. Then she was given the management of the opera in Paris, but this resulted in financial failure, owing to the incapacity and extravagance of her husband, Captain Valabregue, whom she married in 1806. But her continental tours continued to be enormously successful, until she retired in 1828. She settled at Florence in 1830, where she founded a free singing school for girls; and her charity and kindness were unbounded. She died of cholera in Paris on the 12 th of June 1849.

CATALEPSY (from Gr. KaraXTjˆts, a seizure), a term applied to a nervous affection characterized by the sudden suspension of sensation and volition, accompanied with a peculiar rigidity of the whole or of certain muscles of the body. The subjects of catalepsy are in most instances females of highly nervous temperament. The exciting cause of an attack is usually mental emotion operating either suddenly, as in the case of a fright, or more gradually in the way of prolonged depression. The symptoms presented vary in different cases, and even in the same individual in different attacks. Sometimes the typical features of the disease are exhibited in a state of complete insensibility, together with a statue-like appearance of the body which will retain any attitude it may be made to assume during the continuance of the attack. In this condition the whole organic and vital functions appear to be reduced to the lowest possible limit consistent with life, and to such a degree as to simulate actual death. At other times considerable mental excitement will accompany the cataleptic symptoms, and the patient will sing or utter passionate exclamations during the fit, being all the while quite unconscious. The attack may be of short duration, passing off within a few minutes. It may, however, last for many hours, and in some rare instances persist for several days; and it is conceivable that in such cases the appearances presented might be mistaken for real death, as is alleged to have occasion ally happened. Catalepsy belongs to the class of functional nervous disorders (see Muscle and Nerve: Pathology) in which morbid physical and psychical conditions are mixed up. Al- though it is said to occur in persons in perfect health, careful inquiry will usually reveal some departure from the normal state, as is shown by the greater number of the recorded cases. More particularly is this true of females, in whom some form of menstrual

derangement is generally found to have preceded ; the cataleptic affection. Catalepsy is sometimes associated with epilepsy and with grave forms of mental disease. In ordinary cases, however, the mental phenomena bear close resemblance to those witnessed in hysteria. In many of the subjects of catalepsy there appears to be a remarkable weakness of the will, whereby the tendency to lapse into the cataleptic state is not resisted but rather in some measure encouraged, and attacks may thus be induced by the most trivial circumstances.

CATALOGUE (a Fr. adaptation of the Gr. KaraXoyos, a register, from naraKeyeiv, to enrol or pick out), a list or enumeration, generally in alphabetical order, of persons, things, &c, and particularly of the contents of a museum or library. A catalogue raisonnee is such a list classified according to subjects or on some other basis, with short explanations and notes. (See also articles Bibliography and Bibliology, and Libraries.)

CATALONIA (Cataluna), a captaincy -general, and formerly a province of Spain, formerly also a principality of the crown of Aragon; bounded on the N. by the Pyrenees, W. by Aragon, S. by Valencia, and E. by the Mediterranean Sea. Pop. (1900) 1,966,382; area, 12,427 sq. m. . The triangular territory of Catalonia forms the north-eastern corner of the Iberian Peninsula. A full account of the physical features, and of the modern development of commerce, communications, &c, in this area is given in the articles on the four provinces Barcelona, Gerona, Lerida and Tarragona, into which Catalonia was divided in 1833.

The coast, which is partly sandy, partly rocky, extends about 240 m.; its chief harbours are those of the capital, Barcelona, of Matar6, of Rosas and of Tarragona. The surface is much broken by spurs of the Pyrenees, the direction of which is generally south. Running south-west to north-east, and united on the north with one of the offsets of the Pyrenees, is the range of the Sierra Llena, which bisects Catalonia, and forms its central watershed. The principal rivers are the Ter, the Llobre- gat, and the Ebro (q.v.), which all run into the Mediterranean. None of them is navigable. The climate, in spite of frequent mists and rains, sudden changes of temperature, and occasional great mid-day heat, is healthy and favourable to vegetation. The dwarf-palm, orange, lime, and olive grow in the warmer tracts; and on the higher grounds the thorn-apple, pomegranate, myrtle, esparto and heaths flourish. These is much woodland.

but meadows and pastures are rare. Maize, millet, rye, flax, liquorice and fruits of all sorts — especially nuts, almonds, oranges, figs, walnuts and chestnuts — are produced. Wheat sufficient for one-fourth of the population is grown, and the vine is extensively cultivated. Few cattle, but numbers, of sheep, goats and swine are reared. Game is plentiful, and the fisheries on the coast are excellent. The wines are for the most part rough and strong, though some are very good, especially when matured. They are much used to adulterate those of Oporto, or, after undergoing the blending operation termed compage, are passed off as Bordeaux wines in France. The best of them, priorato, is chiefly known in England, under the disguise of second or third-rate port; it was much used in the military hospitals of America during the Civil War.

The Catalonians are a frugal, sharp-witted, and industrious ‘ people, having much national pride, and a strong revolutionary spirit. They are distinct in origin from the other inhabitants of Spain, from whom they differ in their dialect and costume. In their great energy and their love of enterprise they resemble the Basques. Irrigation, careful husbandry and railroad communications have much developed the resources of their country, in themselves excellent; and there are many manufacturing towns and industrial establishments.

Catalonia was one of the first of the Roman possessions in Spain, and formed the north-eastern portion of Hispania Tarraconensis. About 470 it was occupied by the Alans and Goths. It was conquered by the Moors in 7 1 2, but these invaders were in turn dispossessed by the Spaniards and the troops of Charlemagne in 788. Catalonia was subsequently ruled by French counts, who soon, however, made themselves independent of France. By the marriage of Count Raymond Berenger IV. of Barcelona with Petronilla of Aragon, Catalonia became annexed to Aragon; but this union was frequently severed. In 1640, when Philip IV. attempted to deprive Catalonia of its rights and privileges, it gave itself up to Louis XIII. of France. It was restored to Spain in 1659, and was once more occupied by the French from 1694 to 1697. Under Philip V. Catalonia, in 1714, was deprived of its cortes and liberties. From 1808 to 1813 it was held by France. It was the scene of civil war in 1823, and of important revolutionary

operations in the Carlist wars.

The history and literature of Catalonia have been closely studied, and in many cases the results of research are published in the Catalan language. See Cataluna, sus monumentos y artes, su naturaleza e historia (2 vols, of the illustrated series Espana), by P. Pifferrer, F. Pi Margall, and A. A. Pijoan (Barcelona, 1884) ; Historia de Cataluna, by V. Balaguer (11 vols., Madrid, 1886, &c); Historia de Cataluna, by A. Bori y Fontesta (Barcelona, 1898) ; Origines historicos de Cataluna, by J. Balari y Jovany (Barcelona, 1899) ; Coleccio dels monografias de Catalunya, by J. Reig y Vilardell (Barce- lona, 1890); Historia del derecho en Catalonia, Mallorca y Valencia, by B. Oliver (Madrid, I876-1880); and Antigua marina catalana, by F. de Bofarull y Sans (Barcelona, 1898). The Revista catalana (Catalan Review), published at Barcelona from 1889, contains many valuable papers on local affairs. See also Spain : sections Language, Literature and History, and Barcelona.

CATALPA, in botany, a genus belonging to the family Bignoni- aceae and containing about ten species in America and eastern Asia. The best known is Catalpa bignonioides, a native of the eastern United States which is often cultivated in parks and gardens. It is a stately tree with large heart-shaped pointed leaves and panicles of white bell-shaped flowers streaked with yellow and brown purple.

CATALYSIS (from the Gr. /card, down, and \bttv, to loosen), in chemistry, the name given to chemical actions brought about by a substance, termed the ” catalyst,” which is recovered unchanged after the action. The term was introduced by Berzelius, who first studied such reactions. It is convenient to divide catalytic actions into two groups: — (1) when the catalyst first combines with one of the reaction components to form a compound which immediately reacts with the other components, the catalyst being simultaneously liberated, and free to react with more of the undecomposed firet component; and (2), when the catalyst apparently reacts by mere contact. The theory of catalysis is treated under Chemical Action; in this article mention will be made of some of the more interesting examples.

A familiar instance of a catalytic action is witnessed when a mixture of potassium chlorate and manganese dioxide is heated to 3S°° > oxygen being steadily liberated, and the manganese dioxide being unchanged at the end of the reaction. The action

may be explained as follows: — part of the chlorate reacts with the manganese dioxide to form potassium permanganate, chlorine and oxygen, the chlorine subsequently reacting with the permanganate to produce manganese dioxide, potassium chloride and oxygen, thus

$$2KC10\ 3\ \text{-i-}2Mn0\ 2 = 2KMn0\ 4 + Cl\ 2 + 02 = 2KCl\text{-r-}2Mn0\ 2 + 30\ 3\ .$$

This explanation is supported by the facts that traces of chlorine are present in the gas, and the pink permanganate can be recognized when little dioxide is used. Other oxides bring about the same decomposition at temperatures below that at which the chlorate yields oxygen when heated alone; but since such substances as kaolin, platinum black and some other finely powdered compounds exercise the same effect, it follows that the explanation given above is not quite general. Another example is Deacon's process for the manufacture of chlorine by passing hydrochloric acid gas mixed with air over heated bricks which had been previously impregnated with a copper sulphate solution. The nitrous gases employed in the ordinary chamber process of manufacturing sulphuric acid also act catalytically. Mention may be made of the part played by water vapour in conditioning many chemical reactions. Thus sodium will not react with dry chlorine or dry oxygen; carbon, sulphur and phosphorus will not burn in perfectly dry oxygen, neither does nitric oxide give red fumes of the peroxide. In organic chemistry many catalytic actions are met with. In the class of reaction known as " con- densations," it may be found that the course of the reaction is largely dependent upon the nature of some substance which acts catalytically. One of the most important is the Friedel and Craft's reaction, in which an aromatic compound combines with an alkyl haloid in the presence of aluminium, zinc or ferric chloride. It seems in this, as in other cases, that addition compounds are first formed which subsequently react with the re-formation of the catalyst. The formation of benzoin from benzaldehyde in the presence of potassium cyanide is another example; this action has been investigated by G. Bredig and Stern (Zeit. Elektrochem., 1904, 10, p. 582).

The second class of catalytic actions, viz. those occasioned by the presence of a metal or some other substance which under- goes no change, is of especial interest, and has received much attention. The accelerating influence of a clean platinum plate on the rate of combination of hydrogen and oxygen was studied by

Faraday. He found that with the pure gases the velocity of reaction increased until the mixture exploded. The presence of minute quantities of carbon monoxide, carbon disulphide, sulphuretted hydrogen and hydrochloric acid inhibited the action; in the case of the first two gases, there is no alteration of the platinum surface, since the plate brings about combination when removed to an atmosphere of pure hydrogen and oxygen; with the last two gases, however, the surface is altered, since the plate will not occasion the combination when placed in the pure gases. M. Bodenstein (Zeit. phys. Chem., 1904, 46, p. 725) showed that combination occurs with measurable velocity at ordinary temperatures in the presence of compact platinum. More energetic combination is observed if the metal be finely divided, as, for instance, by immersing asbestos fibres in a solution of platinum chloride and strongly heating. The " spongy " platinum so formed brings about the combination of ammonia and oxygen to form water and nitric acid, of nitric oxide and hydrogen to form ammonia (see German Patent, 1905, 157,287), and of sulphur dioxide and oxygen to form sulphur trioxide. The last reaction, which receives commercial applica- tion in the contact process of sulphuric acid manufacture, was studied by M. Bodenstein and W. Pohl (Zeit. Elektrochem., 1905, n, p. 373), who found that the equilibrium followed the law of mass-action (see also F. W. Kiister, Zeit. anorg. Chem., 1904, 42, p. 4S3, R. Lucas, Zeit. Elektrochem., 1905, n, p. 457). Other metals, such as nickel, iron, &c, can also react as catalysts.

The use of finely divided nickel (obtained by reducing the oxide in a current of pure hydrogen at a temperature of 350°) has been carefully studied by P. Sabatier and J. B. Senderens; a summary of their results is given in the Ann. Chim. Phys., 1905 (viii.) 4, PP- 3 19-488. Of special interest is the condensation of acetylene. If this gas mixed with hydrogen be passed over the reduced nickel in the cold, the temperature may rise to as high as 1 50°, the acetylene disappearing and becoming replaced by a substance like petroleum. If the nickel be maintained at 200 , and the gases circulated for twenty-eight hours, a product, condensible to a yellow liquid having a beautiful fluorescence and boiling at 45°, is obtained. This substance closely resembles ordinary Pennsylvanian petroleum. If acetylene be passed alone over nickel heated to 20o°-3oo°, a mixture, boiling at 6o°-7o° and

having a green colour by diffused and a red by transmitted light, was obtained. This substance closely resembles Caucasian petroleum. The decomposition of carbon monoxide according to the reaction 2CO^C + C02 is purely catalytic in the presence of nickel and cobalt, and also in the presence of iron, so long as the amount of carbon dioxide present does not exceed a certain amount (R. Schenck and W. Heller, Ber., 1905, 38, pp. 2132, 2139). It is of interest that finely divided aluminium and magnesium decompose methane, ethane, and ethylene into carbon and hydrogen in the same way as nickel. Charcoal at 3 50° also reacts catalytically; for example, Senderens found that ethyl alcohol was decomposed by animal charcoal into methane, ethylene, hydrogen, carbon monoxide and a little carbon dioxide, and propyl alcohol gave propylene, ethane, carbon monoxide and hydrogen, while G. Lemoine obtained from ethyl alcohol and wood charcoal a mixture of acetaldehyde and hydrogen.

CATAMARAN (a Tamil word, from catla, to tie, and maram wood) , a surf -boat or raft used by the natives of Madras and along the Coromandel Coast in India. It is usually made of three tree trunks lashed together, the centre trunk being the largest and longest, and having one end bent upward to form a kind of prow. Catamarans of a larger size are in use in the West Indies and South America. The name is also given to two boats lashed together. Apparently through an erroneous connexion with cat, the name has been applied to a noisy scolding woman.

CATAMARCA, an Andean province of the Argentine Republic, lying W. of Santiago del Estero and Tucuman and extending to the Chilean frontier, with Los Andes andSaltaontheN., Cordoba on the S.E., and Rioja on the S. Pop. (189s) 90,161; (1904, estimate) 103,082; area, 47,531 sq. m. The surface of the province is extremely broken, the Andes forming its western boundary, and the Aconquija, Ancaste, Ambato, Gulampaja and other ranges traversing it from north to south. It is com- posed very largely of high plateaus with a general slope southward broken by a few fertile valleys. The greater part of the province is arid and barren, being sheltered from the moist, eastern winds by the high mountain barriers of Aconquija and Ancaste. The rivers are small, and some of them are lost in the barren, sandy wastes. Others, especially in the foothills of the high sierras, are utilized to irrigate the fertile valleys. The climate of some of the low, sheltered valleys is extremely hot and unhealthy, but on the open plateaus it is peculiarly dry and bracing and is probably beneficial in the treatment of pulmonary diseases. The mineral

resources of the province include gold, silver, copper, lead, nickel, iron, coal and malachite, but of these only copper and silver are mined, and these chiefly in the Andalgala district. Salt deposits also exist, but are worked only to a limited extent. Cereals, alfalfa and fruit are grown. Large numbers of cattle, fattened in the alfalfa fields of Pucara, Tinogasta and Copacabana, are driven into northern Chile across the San Francisco pass (13,124 ft. above sea level) and mules are bred for the Bolivian market. Wine of an excellent quality is produced and exported. Tanning leather is another industry of the province, some of the trees growing in the Catamarca forests being rich in tannin. Catamarca is traversed by the Northern Central railway between Cordoba and the city of Catamarca, its capital, which passes around the southern extremity of the Sierra de Ancaste and makes a long detour to Chumbicha, near the Rioja

frontier. The more important towns, after Catamarca, the capital, are Andalgala and Tinogasta with populations (esti- mated, 1904) of 5000 to 6000 each. Belen is the oldest Spanish settlement in the province and was founded in 155°, being called Barco at first. The population is largely mixed with Indian blood.

CATAMARCA (San Fernando de Catamarca), capital of the above province on the Rio del Valle de Catamarca, 230 m. (318 m. by rail) N.N.W. of Cordoba. Pop. (1895) 7397; (1905, estimate) 8000, with a large percentage of mestizos. Catamarca is connected by railways with Rioja and Patquia and with Cordoba. The city stands in a narrow, picturesque valley at the foot of the Sierra de Ambato, 1772 ft. above sea level. The valley is highly fertile, partially wooded, and produces fruit in abundance, wine and some cereals. In the city are flour mills and tanneries, and among its exports are leather, fruit, wine, flour, and a curious embroidery for which the women of Cata- marca have long been famous. There is a fine church, 220 by 90 ft., and a national college occupies the old Merced convent. The alameda is one of the prettiest in the Argentine Republic, having a reservoir of two acres surrounded by shrubbery and walks. Catamarca was founded in 1685 by Fernando de Mendoza because the town of Chacra, the former provincial capital, a few miles north of Catamarca, had been found unhealthy and subject to inundations. Previous to the selection of Chacra as the provincial capital, the seat of government was at San Juan de Londres, founded in 1558 and named after the capital of England by order of Philip II. in honour of his marriage with Queen Mary. The arid surroundings of Londres led to its partial abandonment and it is

now a mere village. Cholla, a suburb of Catamarca, is inhabited wholly by Calchaqui Indians, a remnant of the original inhabitants of this region.

CATANIA (Gr. Katane, Rom. Catina 1), a city and episcopal see of Sicily, the chief town of the province of Catania, on the east coast, 59 m. by rail S. of Messina, and 151 m. by rail S.E. of Palermo (102 m. direct). Pop. (1881) 100,417; (1905) 157,722. The principal buildings are handsome, and the main streets, meeting in the Piazzo del Duomo, are fine. The cathedral of S. Agatha, containing the relics of the saint, retains its three original Norman apses (1091), but is otherwise a large baroque edifice. The monument of Don Ferrando d'Acunea, a Spanish viceroy of Sicily, is a fine early Renaissance work (1494). In the west portion of the town is the huge Benedictine abbey of S. Nicola (now suppressed), the buildings of which occupy an area of about 2 1 acres and contain the museum, a library, observatory, &c. The church, dating, like the rest of the buildings, from 1693-1735, is the largest in Sicily, and the organ, built in 1760 by Donato del Piano, with 72 stops and 2916 pipes, is very fine. The university, founded in 1444, has regained some of its former importance. To the south near the harbour is the massive Castell' Ursino, erected in 1232 by Frederick II. Remains of several ancient buildings exist, belonging in the main to the Roman period. The theatre, covered by a stream of lava, and built partly of small rectangular blocks of the same material, though in the main of concrete, has been superimposed upon the Greek building, some foundations of which, in calcareous stone, of which the seats are also made, still exist. It is 106 yds. in diameter, and is estimated to have accommodated 7000 spectators. Close to it are the remains of the so-called Odeum, of similar plan to the theatre but without a stage, and to the north is the church of S. Maria Rotonda, originally a Roman domed structure, perhaps part of a bath. To the north, in the Piazza Stesicoro, is the amphitheatre, a considerable portion of which has been uncovered, including the two corridors which ran round the whole building and gave access to the seats, while a part of the arcades of the exterior has been excavated and left open; the pillars are made of blocks of lava, and the arches of brick. The external diameters of the amphitheatre are 410 and 348 ft., while the corresponding diameters jof the arena are 233 and 167 ft. It is thus the third largest Roman amphitheatre known, being surpassed only by that at Verona and the Colosseum. Remains 1 This is the form vouched for by the

inscriptions.

of many other Roman buildings also exist beneath the modern town, among the best preserved of which may be noted the public baths {Thermae Achilleae) under the cathedral, and those under the church of S. Maria dell' Indirizzo. The number of baths is remarkable, and gives some idea of the luxury of the place in Roman times. Their excellent preservation is accounted for by their burial under the lava. The majority were excavated by Prince Ignazio Biscari (1719-1786), who formed an important private collection of antiquities. Of the ancient city walls no authenticated remains exist.

Catania has a considerable export trade in sulphur, pumice stone, asphalt, oranges and lemons, almonds, filberts, cereals, wine (the total production of wine in the province amounted to 28,600,000 gallons in 1905) and oil. The total value of exports in 1905 was £1,647,075, and of imports £1,326,055, the latter in- cluding notably coal, almost entirely from the United Kingdom, and wheat, from Russian ports. The harbour is a good one, and has been considerably enlarged since 1872; £128,000 was voted in 1905 towards the completion of the harbour works by the Italian government. Sulphide of carbon is produced here; and there are large dyeworks, and a factory for making bed-stuffing from seaweed.

The ancient Catina was founded in 729 B.C. by colonists from Naxos, perhaps on the site of an earlier Sicel settlement — the name is entirely un-Greek, and may be derived from k&tivov, which in the Sicel language, as catinum in Latin, meant a basin, and would thus be descriptive of the situation of the town. Charondas, a citizen of Catina, is famous as its lawgiver, but his date and his birthplace are alike uncertain; the fragments preserved of his laws show that they belong to a somewhat primitive period. The poet Stesichorus of Himera died here. Very little is heard of Catina in history until 476 B.C., when Hiero I. removed its inhabitants to Leontini, repeopled it with 5000 Syracusans and 5000 Peloponnesians, and changed its name to Aetna. In 461 B.C., however, with the help of Ducetius and the Syracusans, the former inhabitants recovered possession of their city and revived the old name. Catina was, however, an ally of

Athens during the Syracusan expedition (415-413 B.C.), and served as the Athenian base of operations in the early part of the war. In 403 b.c. it was taken by Dionysius of Syracuse, who plundered the city, sold the inhabitants into slavery and replaced them with Campanian mercenaries. In the First Punic War it was one of the first cities of Sicily to be taken by the Romans (263 B.C.). Marcellus constructed a gymnasium here out of the booty of Syracuse. In 123 B.C. there was an eruption of Etna so violent that the tithe on the territory of Catina payable to Rome was remitted for ten years. It appears to have been a flourishing city in the 1st century B.C., but to have suffered from the ravages of Sextus Pompeius. It became a Roman colonia under Augustus, and it is from this period that the fertile plain, hitherto called the plain of Leontini, begins to be called the plain of Catina. It seems to have been at this time the most important city in the island, to judge from the language of Strabo and the number of inscriptions found there. In a.d. 251 a lava stream threatened the town and entered the amphitheatre, which in the time of Theodoric had fallen into ruins, as is clear from the fact that he permitted the use of its fallen stones to build the city wall. It was recovered by Belisarius in 535, sacked by the Saracens in 902 and taken by the Normans. The latter founded the cathedral; but the town was almost entirely destroyed by earthquake in n 70, and devastated by Henry VI. in 11 97. It became the usual residence of the Aragonese viceroys of the 13 th and 14th centuries. In 1669 an eruption of Etna partly filled up the harbour, but spared the town, which was, however, almost entirely destroyed by the earthquake of 1693. Since that catastrophe it has been rebuilt, and has not further suffered from its proximity to Etna.

See A. Holm, Das alte Catania (Liibeck, 1873). (T. As.)

CATANZARO, a town and episcopal see of Calabria, Italy, capital of the province of Catanzaro, n 25 ft. above sea-level. Pop. (1901) 22,799 (town); 32,005 (commune). The station for the town (Catanzaro Sala) is situated on a branch line connecting

the two main lines along the east and west coasts of Calabria, 6 rri. N. by W. of Catanzaro Marina on the east coast, and 20 m. E. of S. Eufemia Biforcazione, on the west coast line. The town enjoys a comparatively cool climate in summer, and commands fine views. Numerous wealthy families reside here, and the town has a trade in olive-oil, silk and velvet. The castle, built by Robert Guiscard, has been modernized, and so has the cathedral. The see was founded in n 21. The provincial museum

contains antiquities and especially coins from the ancient cities of Magna Graecia, and a few pictures.

CATAPHYLL (Gr. Kara, down, vX\ov, leaf), a botanical term for the early leaf-forms produced in the lower part of a shoot, such as bud-scales, or scales on underground stems.

CATAPULT (Lat. catapulta, Gr. KaTaire\ri] s) , a generic name for warlike engines of the cross-bow type used by the ancients. Although engines of war appear on Assyrian remains, and are mentioned in 2 Chronicles xxvi. 15, it appears that Greek armies, even of the 5th century, did not possess them, and the first record of a large siege train in classical literature is of the year 399 B.C., when Dionysius I. of Syracuse, contemplating an expedition against Carthage, provided himself with engines. From Sicily siege engines found their way some years later into Greece; they were used by Philip of Macedon at the siege of Byzantium in 340, and thereafter, as a natural consequence of the regularizing or professionalizing of armies, artillery, as we may call it, came into prominence and called into existence technical corps to work it.

The war engines of the Romans, during the republic and early principate, are of the same type as those of Alexander's successors in Greece. They are usually classed as (a) catapults and (b) ballistae (Xt0oj36Xoi) . The former were smaller and were used with arrows for what is now called direct fire (i.e. at low angles of elevation) ; the latter were large siege engines discharg- ing heavy bolts or stones at a high angle of elevation, like the modern howitzer. They were, of course, principally siege engines, but the smaller natures of cata- pult appear in field warfare from time to time, and eventually, during the early principate, they are found as part of the regula- tion equipment of infantry units. Both were constructed on the same principle.

The essential parts of the cata- pult (see illustration) were the frame, the propelling gear, the _ˆ~ trough (corresponding to the _.- modern barrel) and the pedestal. The frame consisted of two hori- zontal beams forming top and bottom sills, and four strong upright bars mortised into them.

compartments, resembling narrow windows, between these four uprights carried the propelling and laying gear. The pro- pelling gear occupied the two outer " windows." In each a thick skein of cord or sinews was fastened to the top and bottom sills and

tightly twisted. Two stiff wooden arms were inserted in the two skeins, and a specially strong bowstring joined the tips of these arms. In the middle compartment was the hinged fore-end of the trough, which was at right angles to the frame and at the back of it. The trough could be laid for elevation by a movable prop, the upper end of which was hinged to the trough, while the lower ran up and down a sort of trail fastened to the pedestal. The whole equipment was laid for " line " by turning the frame, and with it the trough, prop and trail by a pivot in the head of the pedestal. Sliding up and down in the trough was a block, fitted with a trigger mechanism, through which passed the middle of the bowstring. The pedestal was a strong and solid upright resting upon, and strutted to, a framework on the ground; its upper end, as mentioned above, took the pivot of the frame and the head of the trail.

The three open spaces or

On coming into action the machine was laid for direction and elevation. The block and with it the bowstring was next forced back against the resistance of the twisted skeins to the rear end of the trough, this being effected by a windlass attachment. The trigger being then pressed or struck with a hammer, the bowstring was released from the block, the stiff arms were violently brought back to the frame by the untwisting of the skeins, and the arrow was propelled through the centre " window " with great velocity. A small machine of the type described weighed about 85 lb, and sent a " three-span " (26-in.) arrow weighing \ lb at an effective man-killing velocity somewhat over 400 yds.

The ballista was considerably larger and more expensive than this. In Scipio's siege train, at the attack of New Carthage (Livy xxvi. 47. 5), the number of the ballistae was only one-sixth that of the catapults. In the ballista the rear end of the trough (which projected in front of the frame) always rested upon the ground, or rather was fixed to the framework of the pedestal — which was a heavy trestle construction — and the trough was thus restricted to the angle of elevation, giving the maximum range (45°). Even so the range was not appreciably greater than that of a catapult, and in the case of the largest ballistae (ninety-

pounder) it was much less. These enormous engines, which, once in position, could not be laid on any fresh target, were used for propelling beams and stones rather than for shooting arrows, that is, more for the destruction of material than for man-killing effect. The skeins that supplied the motive force of all these engines were made of the sinews of animals, twisted rawhide, horsehair rope, and, in at least one celebrated case, of women's hair. In 146 B.C., the authorities of Carthage having surrendered their engines to the Romans in the vain hope of staying their advance, new ones were hurriedly constructed, and the women and virgins of the city cut off their hair to supply the needed skeins.

The modern implement known as a " catapult " is formed by a forked stick, to the forks of which are attached the ends of a piece of elastic. To the middle of this elastic a pocket is fitted to contain a bullet or small stone. In use the forked stick is held in the left hand and the pocket drawn back with the right. Aim is taken and, the pocket being released, the missile flies through the fork of the stick. Though classed as a toy, this weapon can do considerable execution among birds, &c, when skilfully used. The name of " catapult " has also been given to a bowling machine which is used for cricket practice.

CATARACT (from the Lat. form cataracta of the Gr. Karapplumrs, a floodgate, or waterfall, properly something which rushes down), a downpour of water, a waterfall. The earliest use in English is of a floodgate or portcullis, and this survives in the name of a disease of the eye (see Eye: Eye Diseases), in which the crystalline lens becomes opaque, and forms an apparent grating over the eye. The term is also used of a device to regulate the strokes in certain types of steam-engine.

CATARGIU (or Catargi), LASCAR (1823-1859), Rumanian statesman, was born in Moldavia in November 1823. He belonged to an ancient Walachian family, one of whose members had been banished in the 17 th century by Prince Matthew Bassaraba, and had settled in Moldavia. Under Prince Gregory Ghica (1849-1856), Catargiu rose to be prefect of police at Jassy. In 1857 he became a member of the Divan ad hoc of Moldavia, a commission elected in accordance with the treaty of Paris (1856) to vote on the proposed union of Moldavia and Walachia. His strongly conservative views, especially on agrarian reform, induced the Conservatives to support him as a candidate for the throne in 1859. During the reign of Prince Cuza (1850- 1866),

Catargiu was one of the Opposition leaders, and received much assistance from his kinsman, Barbu Catargiu (b. 1807), a noted journalist and politician, who was assassinated at Bucharest on the 20th of June 1862. On the accession of Prince Charles in May 1866, Lascar Catargiu became president of the council, or prime minister; but, finding himself unable to co- operate with his Liberal colleagues, I. C. Bratianu and C. A. Rosetti, he resigned in July. After eight more ministerial changes, culminating in the anti-dynastic agitation of 1870-

187 1, Catargiu formed, for the first time in Rumanian history, a stable Conservative cabinet, which lasted until 1876. , His policy, which averted revolution and revived the popularity of the crown, was regarded as unpatriotic and reactionary by the Liberals, who resumed office in 1876; and a proposal to impeach the whole Catargiu cabinet was only withdrawn in 1878. Catargiu remained in opposition until 1889, when he formed another cabinet, taking the portfolio of the Interior; but this administration fell after seven months. In the Florescu ministry of March 1891 he occupied the same position, and in December he again became president of the council, retaining office until 1895. During this period he was responsible for several useful reforms, chiefly financial and commercial; He died suddenly at Bucharest on the nth of April 1899.

CATARRH (from the Gr. naTapptiv, to flow down), a term principally employed to describe a state of irritation of the mucous membrane of, the respiratory passages, or what is called in popular language a ” cold.” It is the result of infection by a micro-organism in one or more of various predisposing con- ditions, damp, chill, fatigue, &c. The complaint usually begins as a nasal catarrh or coryza (Gr. icdpvs, head), with a feeling of weight about the forehead and some degree of difficulty in breathing through the nose, increased on lying down. Fits of sneezing accompanied with a profuse watery discharge from the nostrils and eyes soon follow, while the sense of smell and to some extent that of taste become considerably impaired. There is usually present some amount of sore throat and of bronchial irritation, causing hoarseness and cough. Sometimes the vocal apparatus becomes so much inflamed (laryngeal catarrh) that temporary loss of voice results. There is always more or less feverishness and discomfort, and frequently an extreme sensitive- ness to cold; After two or three days the symptoms begin to abate, the discharge from the nostrils and chest becoming thicker and of purulent character, and producing when dislodged

considerable relief to the breathing. On the other hand the catarrh may assume a more severe aspect and pass into some form of pulmonary inflammation (see Bronchitis) or influenza (q.v.).

When the symptoms are first felt it is well to take a good purge, and to encourage free perspiration by a hot bath, some diaphoretic drug, as spirits Of nitrous ether, being taken before retiring to bed. Some of the older school of physicians still pin their faith to a dose of Dover's powder. When the cold mani- fests itself by aches and pains in back and limbs, aspirin taken three or four times in the first twenty-four hours will often act like magic. Locally a snuff made of menthol 1 part, ammonium chloride 3 parts and boracic acid 2 parts will relieve the discomfort of the nose. Also, remembering the microbic origin of the disease, gargling and nasal syringing should be re- peated at intervals. As soon as the attack shows signs of Sub- siding, a good tonic and, still better, a change of air are very helpful.

The term catarrh is used in medical nomenclature in a wider sense to describe a state of irritation of any mucous surface in the body, which is accompanied with an abnormal discharge of its natural secretion, hence the terms gastric catarrh, intes- tinal catarrh, &c.

See also Respiratory System : Pathology, and Digestive Organs, Pathology of.

CATARRHINE APE, the term used to describe those apes which have the nostrils approximated, the aperture pointing downward, and the intervening septum narrow; distinguishing features of both the lower " doglike " apes (Cynomorpha) and the higher " manlike " apes (AnthropOmorpha). The Catarrhini are restricted entirely to the Old World, arid include the gorilla, the chimpanzee and orang-utan.

CATASTROPHE (Gr. KaraaTpcxpri, from KaraorpefaLv, to over- turn), a term of the ancient Greek drama for the change in the plbt which leads up to the conclusion. The word is thus used of any sudden change, particularly of a violent or disastrous nature, and in geology of a cataclysm or great convulsion of the earth's surface.

CATAUXI, a numerous cannibal tribe of South American Indians of the Purus river district, Brazil. They are a fine war- like race, with remarkably clear complexions and handsome features; round wrists and ankles they wear rings of twisted hair. They cultivate mandioc, and make pottery and bark canoes.

CATAWBAS (from the Choctaw for "divided"), a tribe of North American Indians of Siouan stock; formerly the dominant people of South Carolina. Some of their divisions extended into North Carolina. They are now almost extinct, but were at one time able to send nearly 2000 "braves" into battle. In the American War of Independence they furnished a valuable contingent to the South Carolina troops. They then occupied a number of small towns on the Catawba river, but they after- wards leased their land and ' removed to the territory of the Cherokees, with whom they had been formerly at war. There, however, they did not long remain, but returned to a reservation in their original district. Their affinities have not been Very clearly made out, and by Albert Gallatin they were grouped with the Cherokees, Choctaws, Muskogees and Natchez. A vocabulary of sixty of their words was published by Horatio Hale in vol. ii. of the Transactions of the American Ethnological Society in 1848; and a much fuller list — about 300 — collected by Oscar M. Lieber, the geologist, in 1856, made its appearance in vol. ii. of Collections of the South Carolina Historical Society, 1858. Of the one hundred Catawbas still said to be surviving, few, if any, can claim to be full-blooded. They are in the Catawba Reservation in York county, South Carolina. The name is familiar in connexion with the white American wine, the praises of which have been sung by Longfellow. The grape from which the wine is obtained was first discovered about 1801, near the banks of the Catawba river, and named by Major Adlum in 1828, but it is now cultivated extensively in Illinois, Ohio and New York, and especially on the shores of Lake Erie. See also Handbook of American Indians (Washington, 1907).

CATCH THE TEN, sometimes Called Scotch Whist, a game played with a pack of 36 cards, from ace, king, queen to six in each suit, the ace being highest both in play and cutting. In trumps, however, the knave ranks highest. Any number from two to eight may play. If an even number, partners are cut for; if odd, each plays for himself. An odd number of players sit as they like; four players sit as at whist; six playing in two sides sit so that no two

partners shall be next each other; six playing three sides sit so that two opponents shall divide each pair; eight are arranged in alternate pairs. After cutting, the cards are dealt according to the number of players. The last card is turned up for the trump. When five or seven play, the six of spades is usually omitted; when eight play, the four sixes are thrown out. The eldest hand leads any card he chooses and all must follow suit if able, the penalty for a revoke being the loss of the game. The tricks are not kept separate but gathered in by one player for his side. At the end of the deal there are six hands of six cards on the table. The players first play out the first two hands, next the second two and finally the last two, the trump card remaining on the table until the first four hands are played out. The game is 41 points, the object of the play being to win the cards which have a special value. These are, with their values: knave of trumps n, ace of trumps 4, king bf trumps 3, queen of trumps 2, ten of trumps 10. All other cards have no counting value. As the ten can be taken by any other honour the object is to " catch the ten."

CATECHISM (from Gr. Karnxt 1v, teach by word of mouth) , a compendium of instruction (particularly of religious instruction) ' arranged in the form of questions and answers. The custom : of catechizing, common to all civilized antiquity, was followed i in the schools of Judaism and in the Early Church, where it helped to preserve the Gospel narrative (see Catechumen) .

The catechism as we know it is intended primarily for children and uneducated persons. Its aim is to instruct, and it differs from a creed or confession in not being in the first instance an act of worship or a public profession of belief. The first regular catechisms seem to have grown out of the usual oral teaching

of catechumens; and to have been compiled in the 8th and 9th centuries. Among them the work of Notker Labeo and of Kero, both monks of St Gall, and that of Ottfried of Weissenburg in Alsace deserve mention. But it is not until the first stirrings of revolt against the hierarchy, which preceded the Reformation, that they became at all widespread or numerous. The Waldenses of Savoy and France, the Brethren (small communities of evangelical dissenters from the medieval faith) of Germany, and the Unitas Fratrum of Bohemia all used the same catechism (one that was first printed in 1498, and which continued to be pub- lished till 1530) for the instruction of their children. It was based on St Augustine's Enchiridion, and considers (a) Faith, i.e. the Creed, (b) Hope, i.e. the Lord's Prayer, and © Love, i.e. the Decalogue.

The age of the Reformation gave a great stimulus to the production of catechisms. This was but natural at a time when the invention of printing had thrown the Bible open to all, and carried the war of religious opinion from the schools into the streets. The adherents of the ” old ” and the ” new ” religions alike had to ‘ justify their views to the unlearned as well as to the learned, and to give in simple formulas their reasons for the faith that was in them. Moreover, in the uni- versal unrest and oversetting of all authority, Christianity itself was in danger of perishing, not only as the result of the: cultured paganism of the Renaissance, but also through the brutish ignorance of the common folk, deprived now of their traditional religious restraints. To the urgency of this peril the reformers were fully alive; and they sought its remedy in education. “Let the people be taught,” said Luther, “let schools be opened for the poor, let the truth reach them in simple words in their own mother tongue, and they will believe.”

Catechisms of the Chief Religious Communions. — (a) Evangelical (Lutheran and Reformed) .—It was the ignorance of the peasantry, as revealed by the horrors of the Peasants’ War of 1524-25, and his pastoral visitation of the electorate of Saxony 1 525-1 527, that drew the above exclamation from Luther, and impelled him to produce his two famous catechisms (1520). In 1520 he had brought out a primer of religion dealing briefly with the Decalogue, the Creed and the Lord’s Prayer; and Justus Jonas, Johannes Agricola and other leaders had done something of the same kind. Now all these efforts were superseded by Luther’s Smaller Catechism meant for the people themselves and especially for children, and by his Larger Catechism intended for clergy and schoolmasters. These works, which did much to mould the character of the German people, were set among the doctrinal standards of the Lutheran Church and powerfully influenced other compilations. The Smaller Catechism, with the Augsburg Confession, was made the Rule of Faith in Denmark in 1537.

In this same year (1537) John Calvin at Geneva published his catechism for children. It was called Instruction and Confession of Faith for the Use of the Church of Geneva (a reprint edited by A. Rilliet and T. Dufour Was published in 1878), and explained the Decalogue, the Apostles’ Creed, the Lord’s Prayer and the Sacraments. Though it was meant, as he said, to give expression to a simple piety rather than to exhibit a profound knowledge of religious truth, it was the work of a man who knew little of the

child mind, and, though it served as an admir- able and transparent epitome of his famous Institutes, it was too long and too minute for the instruction of children. Calvin came to see this, and in 1542, after his experience in Strassburg, drafted a new one which was much more suitable for teaching purposes, though, judged by modern standards, still far beyond the theological range of childhood. It was used at the Sunday noon instruction of children, on which Calvin laid much stress, and was adopted and similarly used by the Reformed Church of Scotland. The Reformed churches of the Palatinate, on the other hand, used the Heidelberg Catechism (1562-1563), "sweet-spirited, experiential, clear, moderate and happily-phrased," mainly the work of two of Calvin's younger disciples, Kaspar Olevianus and Zacharias Ursinus. The Heidelberg Catechism, set forth by order of the elector, is perhaps the most widely accepted symbol of the Calvinistic faith, and is noteworthy for its

emphasis on the less controversial aspects of the Genevan theo- logy. As revised by the synod of Dort in 1619, this catechism became the standard of most of the Reformed churches of central Europe, and in time of the Dutch and German Reformed churches of America. Other compilations were those of Oecolam- padius (Basel, 1526), Leo Juda (Zurich, 1534), and Bullinger (Zurich, 1555). In France, after Calvin's day, the Reformed church used besides Calvin's book the catechisms of Louis Capell (1610), and Charles Drelincourt (1642), and at the present time Bonnefon's Nouveau Catechisme iUmentaire (14th ed., 1900) seems most in favour. In Scotland both Calvin's Geneva Catechism and then the Heidelberg Catechism were translated by order of the General Assembly and annotated. In 1592 these were superseded by that of John Craig, for a time the colleague of John Knox at the High Church, Edinburgh.

Since 1648 the standard Presbyterian catechisms have been those compiled by the Westminster Assembly, presented to parliament in 1647, and then authorized by the General Assembly of the Church of Scotland (July 1648) and by the Scottish parliament (January 1649). The Larger Catechism is " for such as have made some proficiency in the knowledge of the Christian religion," but is too detailed and minute for memorizing, and has never received anything like the reception accorded to the Shorter

Catechism, which is ” for such as are of weaker capacity.” The work was done by a committee presided over first by Herbert Palmer, master of Queens’, Cambridge, and then by Anthony Tuckney, master of Emmanuel. The scriptural proof texts were added at the request of the English parliament. In his negotiations with the parliament in 1648 Charles I. offered to license the printing of the catechism, but, as the negotiations were broken off, this was not done. The Shorter Catechism, after a brief introduction on the end, rule and essence of religion, is divided into two parts: — I. The doctrines we are to believe (1) concerning the nature of God, (2) concerning the decrees of God and their execution — (a) in creation and providence, (b) in the covenant of works, (c) in the covenant of grace; II. The duties we are to perform (1) in regard to the moral law, (2) in regard to the gospel — (a) inward duties, i.e. faith and repentance, (b) outward duties as to the Word, the sacraments and prayer. It has 107 questions and answers, while that of the Anglican Church has but 24, grouping as it does the ten com- mandments and also the petitions of the Lord’s Prayer, instead of dealing with them singly. Though the Shorter Catechism, closely associated as this has been from the first with Scottish public elementary education, has had very great influence in forming and training the character of Presbyterians in Scotland, America and the British colonies, it is, like most other catechisms drawn up by dogmatic theologians, more admirable as an epitome of a particular body of divinity than as an instruction for the young and the unlearned. Its use is now generally preceded by something more adapted to the child-mind, and this is true also in other communions and in the case of other catechisms.

(b) Roman Catholic. — There was no universal catechism published by the Latin Church before the council of Trent, but several provincial councils, e.g. in Germany and Scotland (where Archbishop Hamilton’s catechism appeared in 1552 and was ordered to be read in church by the parish priest), moved in self-defence along the lines already adopted by the reformers. The council of Trent in 1563 resolved on an authoritative work which was finally carried through by two small papal commis- sions, and issued in 1566 by Pius V. (Eng. trans, by Donovan, Dublin, 1829). Being uncatechetical in form and addressed to the clergy rather than to the people, it missed its intention, and was superseded by others of less exalted origin, especially by those of the Jesuit Peter Canisius, whose Summa Doctrinae et Institu- tion’s Christianae (1554) and its shorter form (1556) were

already in the field. The catechisms of Bellarmine (1603) and Bossuet (1687) had considerable vogue, and a summary of the former known as Schema de Parvo was sanctioned by the Vatican council of 1870. But the Roman Catholic Church as a whole has never had any one official catechism, each bishop being allowed to settle the matter for his own diocese. In England

the Roman Catholic bishops have agreed on the use of what is known as "The Penny Catechism," which is very lucid and well constructed.

(c) Orthodox Eastern Church. — Peter Mogilas, metropolitan of Kiev, drew up in 1643 the Orthodox Confession of the Catholic and Apostolic Eastern Church. This bulwark against the encroachments of the Jesuits and the Reformed Church was standardized by the synod of Jerusalem in 1672. A smaller catechism was drawn up by order of Peter the Great in 1723. The catechisms of Levshin Platon (1762) and V. D. Philaret (1839), each in his day metropolitan of Moscow, are bulky compilations which cannot be memorized, though there is a short introductory catechism prefaced to Philaret's volume (Eng. trans, in Blackmore's Doctrine of the Russian Church, 1845). These works are not to any extent in the hands of the people, but are used by the Russian clergy and schoolmasters as guides in giving instruction. The Coptic and Armenian churches also have what H. Bonar describes as " mere pretences at catechisms."

(d) Anglican.— The catechism of the Church of England is included in the Book of Common Prayer between the Orders for Baptism and Confirmation. It has two parts: (i.) the bap- tismal covenant, the Creed, the Decalogue and the Lord's Prayer, drawn up probably by Cranmer 1 and Ridley in the time of Edward VI., and variously modified between then (1549) and 1 661; (ii.) the meaning of the two sacraments, written on the suggestion of James I. at the Hampton Court Conference in 1604 by John Overall, then dean of St Paul's, and afterwards bishop successively of Coventry and Lichfield and of Norwich. This supplement to what had become known as the Shorter Catechism established its use as against the longer one, King Edward Vlth's Catechisme,. which had been drawn up in 1553 by John Ponet or Poynet, bishop of Winchester, and then revised and enlarged in 1570 by Alexander Nowell, Overall's predecessor as dean of St Paul's. The Anglican catechism with occasional modification, especially in the sacramental section, is used not only in the Church of England but in the Episcopal churches of Ireland,

Scotland, the British dominions and the United States of America. By the rubric of the Prayer Book and by the 59th canon of 1603 the clergy are enjoined to teach the catechism in church on Sundays and holidays after the second lesson at Evening Prayer. This custom, long fallen into disuse, has largely been revived during recent years, the children going to church for a special afternoon service of which catechizing is the chief feature. Compared with the thoroughness of most other catechisms this one seems very scanty, but it has a better chance of being memorized, and its very simplicity has given it a firm hold on the inner life and conscience of devout members of the Anglican communion throughout the world.

(e) Other Communions. — Almost every section of the church, e.g. the Wesleyan Methodist, has its catechism or catechisms, but in addition to those already enumerated only a few need be mentioned. The Socinians embodied their tenets in the larger and smaller works drawn up by Fausto Sozzini and Schmalz, and published at Rakow in Poland in 1605 ; 2 modern Unitarians have modern catechisms. The Quakers or Friends possess a kind of catechism said to have been written by George Fox in 1660, in which father and son are respectively questioner and answerer, and an interesting work by Robert Barclay, in which texts of Scripture form the replies. Congregationalists for some time used Isaac Watts's Catechisms for Children and Youth (1730), since superseded by the manuals of J. H. Stowell, J. H. Riddette and others. In 1898 the National Council of the Evangelical Free Churches in England and Wales published

1 Cranmer had published a separate and larger catechism on the basis of the work of Justus Jonas in 1548; note also Allen's Catechisme, A Christen Jnstruccion of the Principall Poinles of Christes Religion (1551).

2 A Latin edition in 1609 was dedicated to James I. of England. The British Houses of Parliament passed a resolution ordering all copies of it to be publicly burned, and again in 1652 when another edition appeared. An English translation, probably by John Bidle, was printed in Amsterdam and widely circulated.

an Evangelical Free Church Catechism, the work of a committee

(convened by Rev. Hugh Price Hughes) comprising Congregationalists, Baptists, Methodists (Wesleyan, Primitive and others), and Presbyterians, and thus representing directly or indirectly the beliefs of sixty or seventy millions of avowed Christians in all parts of the world, a striking example of inter-denominational unity. More remarkable still in some respects is The School Catechism, issued in 1907 by a conference of members of the Reformed churches in Scotland, which met on the invitation of the Church of Scotland. In its compilation representatives of the Episcopal Church in Scotland co-operated, and the book though " not designed to supersede the distinctive catechisms officially recog- nized by the several churches for the instruction of their own children," certainly " commends itself as suitable for use in schools where children of various churches are taught together."

Catechisms have a strong family likeness. In the main they are expositions of the Creed, the Lord's Prayer and the Decalogue, and thus follow a tradition that has come down from the days when Cyril of Jerusalem delivered his catechetical Lectures. Even when (as in the Shorter Westminster Catechism and the School Catechism) the Creed is simply printed as an appendix, or where (as in the Free Church Catechism) it is not mentioned at all, its substance is dealt with. The order in which these three main themes are treated is by no means constant. The Heidelberg and Westminster Catechisms are of a more logical and independent character. The former is based on the Epistle to the Romans, and deals with the religious life as (1) Repentance, (2) Faith, (3) Love. Under these heads it discusses respectively the sin and misery of men, the redemption wrought by Christ (here are included the Creed and the Sacraments), and the grateful service of the new life (the Decalogue).

It may be noted that Sir Oliver Lodge has adopted the catechetical form in his book, The Substance of Faith Allied with Science (1907), which is described as " a catechism for parents and teachers."

See Ehrenfeuchter, Geschichte des Katechismus (1857); P. Schaff, History of the Creeds of Christendom (3 vols., 1876-1877); Mitchell, Catechisms of the Second Reformation (1887); C. Achelis, Lehrbuch der prakt. Theologie (2 vols., 1898); L. Pullan, History of the Book of Common Prayer, pp. 207-208 ; E. A. Knox, Pastors and Teachers (1902), chs. iii. and iv. ; W. Beveridge, A Short History of the West- minster Assembly (1904), ch. x. (A. J. G.)

CATECHU, or Cutch (Malay, kachu), an extract obtained from several plants, its chief sources being the wood of two species of acacia (A catechu and A. sumo), both natives of India. This extract is known as black catechu. A similar extract, known in pharmacy as pale catechu (Catechu pallidum), and in general commerce as gambir, or terra japonica, is produced from the leaves of Uncaria gambir and U. acida, cinchonaceous plants growing in the East Indian Archipelago. A third product to which the name catechu is also applied, is obtained from the fruits of the areca or betel palm, Areca catechu.

Ordinary black catechu is usually imported in three different forms. The first and best quality, known as Pegu catechu, is obtained in blocks externally covered with large leaves; the second and less pure variety is in masses, which have been moulded in sand; and the third consists of large cubes packed in coarse bags. The wood of the two species of Acacia yielding catechu is taken for the manufacture when the trees have attained a diameter of about 1 ft. The bark is stripped off and used for tanning, and the trunk is split up into small fragments, which are covered with water and boiled. When the extract has be- come sufficiently thick it is cast into the forms in which the catechu is found in commerce. Catechu so prepared is a dark brown, or, in mass, almost black, substance, brittle, and having generally a shining lustre. It is astringent, with a sweetish taste. In cold water it disintegrates, and in boiling water, alcohol, acetic acid and strong caustic alkali it is completely dis- solved. Chemically it consists of a mixture of a peculiar variety of tannin termed catechu-tannic acid with catechin or catechuic acid, and a brown substance due to the alteration of both these principles. Catechu-tannic acid is an amorphous body soluble in cold water, while catechin occurs in minute, white, silky, needle-shaped crystals, which do not dissolve in cold water. A very minute proportion of quercetin, a principle yielded by quercitron bark, has been obtained from catechu.

Gambir, which is similar in chemical composition to ordinary

catechu, occurs in commerce in the form of cubes of about an inch in size, with a pale brown or yellow colour, and an even earthy fracture. For the preparation of this extract the plants above mentioned are stripped of their leaves and young twigs, and these are boiled down in shallow pans. The juice is strained off, evaporated, and when sufficiently concentrated is cast into shallow boxes, where, as it hardens and dries, it is cut into small

cubes.

Gambir and catechu are extensively employed in dyeing and tanning. For dyeing they have been in use in India from the most remote period, but it was only during the 19th century that they were placed on the list of European dyeing substances. Catechu is fixed by oxidation of the colouring principle, catechin, on the cloth after dyeing or printing; and treated thus it yields a variety of durable tints of drabs, browns and olives with different mordants (see Dyeing). The principal consumption of catechu occurs in the preparation of fibrous substances exposed to water, such as fishing-lines and nets, and for colouring stout canvas used for covermg boxes and portmanteaus under the name of tanned canvas. Black catechu is official in most pharma- copoeias except that of Great Britain, in which pale catechu is the official drug. The actions and uses of the two are similar, but black catechu is the more powerful. The dose is from five to twenty grains. The pulvis catechu compositus contains catechu and kino, and may be given in doses twice as large as those named. The drug has the actions and uses of tannic acid, but owing to the relative insolubility of catechu-tannic acid, it is more valuable than ordinary tannic acid in diarrhoea, dysentery and intestinal haemorrhage.

CATECHUMEN (Lat. catechumenus, Gr. narrixov pews, instructed, from Karrixtiv, to teach orally), an ecclesiastical term applied to those receiving instruction in the principles of the Christian religion with a view to baptism. As soon as Christianity became a missionary religion, it was found necessary to make arrangements for giving instruction to new converts. At the beginning the Apostles themselves seem to have under- taken this duty, and the instruction was apparently given after baptism, for in Acts ii. 41, 42, we are told that ” they that gladly received the word were baptized . . . and they continued stedfastly in the Apostles’ teaching.” There are two instances in the New Testament where reference is made to individual instruction in this technical sense. Luke (i. 4) in dedicating the third Gospel to Theophilus tells him that his aim in writing the book was ” that thou mightest have certainty in the things in which thou has been instructed” (Karr\xn

With the development of Christianity the instruction became more definite and formal. It is probable that the duty of instructing converts was assigned to ” the teachers,” who are ranked by Paul immediately after the Apostles and prophets (1

Cor. xii. 28), and occupied an important position in the Christian ministry. In the Didache, or Teaching of the Apostles, we have an excellent illustration of the teaching which was given to candidates for baptism in early times. There can be little doubt that the Didache was used as a manual for cate- chumens for several centuries. Athanasius (Festal Epistles, 39), for instance, says that " it was appointed by the Fathers to be read by those who are just recently coming to us, and wish to be instructed in the word of godliness " (jcarr;xe?(X0ai top rfjs tixrefitias \6yov). The instruction prescribed by the Didache is very largely ethical, and stands in striking contrast to the more elaborate doctrinal teaching which came into vogue in later days. The Shepherd of Hermas too is another book which seems to have been used for the purpose of catechesis, for Eusebius says that it " was deemed most necessary for those who have need of elementary instruction " (Eccles. Hist. iii. 3-6).

With the rise of theological controversy and the growth of heresy catechetical instruction became of vital importance to the Church, and much greater importance was attached to it. After the middle of the 4th century it was regarded as essential that the candidate for baptism should not only be acquainted

with the spiritual truths and ethical demands which form the basis of practical Christianity, but should also be trained in theology and the interpretation of the creeds. Two books have been preserved which throw a striking light upon the trans- formation which had taken place in the conception of catechesis; (i) the Catechetical Lectures of Cyril of Jerusalem; (2) the De rudibus Catechizandis of Augustine. Cyril's Lectures may be termed the Pearson on the Creed of the 4th century. He takes each article separately, discusses it clause by clause, explains the meaning of each word, and justifies each statement from Scripture. Augustine's treatise was written at the request of a catechist, named Deogratias, who had asked him for advice. After replying to the question of Deogratias, and giving sundry counsels as to the best method of interesting catechumens, Augustine concludes by giving a model catechetical lecture, in which he covers the whole of biblical history, beginning from the opening chapters of Genesis, and laying particular stress on the doctrinal parts of Scripture. Cyril and Augustine differ, as we

should expect, in the doctrines which thfcy select for emphasis, but they both agree in requiring a knowledge of sound doctrine on the part of the candidates.

In spite of the numerous references to catechumens in Patristic literature, our knowledge of the details of the system is often very deficient, and upon some points there is considerable diversity of opinion amongst experts. The following are the most important questions which come under consideration.

1. The Classification of Catechumens. — Bingham and many of the older writers held that there were four classes of catechumens, representing different stages in the process of instruction: (a) ” The inquirers ” whose interest in Christianity had been sufficiently aroused to make them desire further information, and who received private and individual instruction from the teachers before they were admitted into the second class, (b) ” The hearers ” (audientes) , who were admitted into the Church for the purpose of listening to sermons and exhortations, (c) The prostrati or genu flectentes, who were allowed also to take part in the prayers, (d) The electi or competentes, who had completed the period of probation and were deemed ready to receive baptism. Modern scholars, however, for the most part, deny that there is sufficient basis to justify this elaborate classification, and think that its advocates have confused the catechumenate with the system of penance. The evidence does not seem to warrant more than two classes, (a) the audientes, who were in the initial stages of their training, (6) the competentes, who were qualified for baptism.

2. The Relation of Catechumens to the Church. — Catechumens were allowed of course to attend church services, but at a certain point were dismissed with the words ” Ite catechumeni, missa est.” The moment at which the dismissal took place cannot be exactly deter- mined, and it is not clear whether the catechumens were allowed to remain for a portion of the Communion service, and if so, whether as spectators or as partial participants. A passage in Augustine seems to imply that in some way they shared in the Sacrament, ” that which they (the catechumens) receive, though it be not the Body of Christ, is yet an holy thing and. more holy than the common food which sustains us, because it is a Sacrament ” (De peccatorum meritis, ii. 42). The explanation of these words has occasioned considerable controversy. Many scholars hold (and this certainly seems the most natural interpretation) that consecrated bread was taken

from the Eucharist and given to the catechumens. Bingham, however, maintains that the reference is not to the consecrated bread, but to salt, which was given to them as a symbol " that they might learn to purge and cleanse their souls from sin."

3. The Duration of the Training.- — Various statements with regard to the duration of the catechumenical training are found in ecclesi- astical authorities. The Apostolical Constitutions, for instance, fix it at three years ; 1 the synod of Elvira at two. 2 The references in the Fathers, however, imply that for practical purposes it was limited to the forty days of Lent. Very probably, however, the forty days of actual instruction were preceded by a period of probation.

4. The Relation between the Catechumenate and Baptism. — Cate- chetical instruction was designed as a preliminary to baptism. There were two directions, however, in which this purpose was enlarged : (a) We have no reason to suppose that when infant baptism was introduced, those who had been baptized in infancy were excluded from the catechetical training, or that instruction was deemed unnecessary in their case, though as a matter of fact we have no definite reference to their admission. The custom of postponing baptism, which was very general in the 4th and 5th centuries, probably made such cases more rare than is generally supposed, and so accounts for the absence of any allusion to them

1 Apost. Constit. viii. 2.

: Canon 42.

in connexion with the catechumenate, (6) We have no reason to

suppose that the instruction given in the famous catechetical schools of Alexandria and Carthage was restricted to candidates for baptism. There is no doubt that '■ catechetical " is used in a much wider sense when applied to the lectures of Origen than when used of the addresses of Cyril of Jerusalem. The " instruction " of Origen was given to all classes of Christians, and not merely to those who were in the initial stages.

5. Characteristics of the Catechumenical Training.— Besides in- struction there were some other important features connected with the catechumenate. (a) The duty of confession was impressed on the candidates, (b) The ceremony of exorcism was

often per- formed in order to free the catechumen from evil spirits, (c) At a certain point in the training the creed and the doctrine of the Sacra- ments were delivered to the candidates by the bishop with much impressive ceremonial.; This teaching constituted the ” holysecret ” or ” mystery ” (disciplina arcani) of Christianity, and could only be imparted to those who were qualified to receive it. The acquisition of this arcanum was regarded as the most essential element in the catechetical discipline, and marked off its possessors from the rest of the world. There can be little doubt that this conception of the ” Holy Secret ” came into the Church originally from the Greek mysteries, and that much of the ceremonial connected with the catechumenate and baptism was derived from the same source.

Authorities. — Cyril, Catecheses; Gregory of Nyssa, Oratio Catechetica; Chrysostom, Catecheses ad iuuminandos ; Augustine, De rudibus Catechizandis ; Mayer, Geschichte des Katechumenats . . . in den ersten sechs Jahrhunderten (1868) ; S. Cheetham, The Mysteries, Pagan and Christian. (H. T. A.)

CATEGORY (Gr. Ka-nryopia, ” accusation “), a term used both in ordinary language and, in philosophy with the general significance of “class” or “group.” In popular language it is used for any large group of similar things, and still more generally as a mere synonym for the word ” class.” The word was introduced into philosophy as a technical term by Aristotle, who, however, several times used it in its original sense of “accusation.” He also used the verb KarriyoptZv, to accuse, in the specific logical sense, to predicate; id Karnyopovnevov becomes the predicate; and K

Our knowledge of Hindu philosophy, and of the relations in which it may have stood to Greek speculation, scarcely enables us to give decisive answers to various questions that natur- Hlada ally arise on observation of their many resemblances (see „/,;ˆ c „„ fc an article by Richard Garbe in Monist, iv. 176-193). Yet pa ” osn “”‘y- the similarity between the two is so striking that, if not historically connected, they must at least be regarded as expressions of similar philosophic needs. The Hindu classification to which we specially refer is that of Kanada, who lays down six categories, or classes of existence, a seventh being generally added by the commentators. The term employed is Padartha, meaning ” signification of a word.” This is in entire harmony with the Aristotelian doctrine, the cate- gories of which may with truth be described as significations of simple terms, to (card urtStplav o-utjttXoktjp Xˆopeca. The six categories of Kanada are

Substance, Quality, Action, Genus, In- dividuality, and Concretion or Co-inherence. To these is added Non-Existence, Privation or Negation. Substance is the permanent substance in which Qualities exist. Action, belonging to or inhering in substances, is that which produces change, Genus belongs to substance, qualitiesand actions; there are higher and lower genera. Individuality, found only in substance, is that by which a thing is self -existent and marked off from others. Concretion or Co-inherence denotes inseparable or necessary connection, such as that between substance and quality. Under these six classes, ykvq toD ovtos, Kanada then proceeds to range the facts of the universe. 3 ■: Within Greek philosophy itself there were foreshadowings of the Aristotelian doctrine, but nothing so important as to warrant the conclusion that Aristotle was directly influenced by it. areek Doubtless the One and Many, Beingand Non-Being, of the phiiosoohv Eleatic dialectic, with their subordinate oppositions, may be called categories, but they are not so in the Aristotelian sense and have little or nothing in common with the later system. Their

3 For details of this and other Hindu systems see H. T. Colebrooke, Miscellaneous Essays (1837; new ed., E. B. Cowell, 1873); H. H. Wilson, Essays and Lectures on the Religions of the Hindus (1861- 1862); Monier Williams, Indian Wisdom (4th ed., 1893); A. E. Gough's Vaiseshika-Sutras (Benares, 1873), and Philosophy of the Upanishads (London, 1882,' 1891) ; Max Muller, Sanskrit Literature, and particularly his appendix to Thomson's Laws of Thought.

starting-point and results are wholly diverse. Nor does it appear necessary to do more than ' mention the Pythagorean' table of principles, the number of which is supposed to. have given rise to the decuple arrangement adopted by Aristotle. The two classifications have nothing in common; no term in the one list appears in. the other; and there is absolutely nothing in the Pythagorean principles which could have led to the theory of the categories. 1

One naturally turns to Plato when endeavouring to discover the genesis of any Aristotelian doctrine, and undoubtedly there are in Plata. tne Platonic writings many detached discussions in

which

the matter of the categories is touched upon. Special terms also are anticipated at various times, e.g. miAriit in the Theaetetus, roietv and vao-xav in the Gorgias, and vp6s ti in the Sophist. 2 But there does, not seem to be anything in Plato which one could say gave occasion directly and of itself to the Aristotelian doctrine ; and even when we take a more comprehensive view of the Platonic system and inquire what in it corresponds to the widest definition of categories, say as ultimate elements of thought and existence, we receive no very definite answer. The Platonic dialectic never worked out into system, and only in two dialogues do we get anything like a list of ultimate or root-notions. In the Sophist, Being, Rest and Motion (rb 6v abrb nal oTaois kb.1 Wcijois are laid down as piyiara rav ya>Siv. % To these are presently added the Same and the Other (rabrbv Kai darepov), and out of the con- sideration of all five some light is cast upon the obscure notion of Non-Being (to /h) 6v). In the same dialogue (262 seq.) is found the important distinction of ivo/jia and pfjp.a, noun and verb. The Philebus presents us with a totally distinct classification into four elements — the Infinite, the Finite, the Mixture or Unity of both and the Cause of this unity (rd itrupov, to -nipas, ij o-bwufa, 1) atria) . It is at once apparent that, however these classifications are related to one another and to the Platonic system, they lie in a different field from that occupied by the Aristotelian categories, and can hardly be' said to have anything in common with them.

The Aristotelian doctrine is most distinctly formulated in the short treatise Karrtyoplat, which generally occupies the first place Aristotle, among the books of the Organon. The authenticity of the treatise was doubted in early times by some of the commentators, and the doubts have been revived by such scholars as L. Spengel and Carl Prantl. On the other hand, C. A. Brandis, H. Bonitz, and Ed. Zeller are of opinion that the tract is substantially Aristotle's. The matter is hardly one that can be decided either pro or con with anything like certainty; but this is of little moment, for the doctrine of the categories, even of the ten categories, does not stand or fall with only one portion of Aristotle's works.

It is surprising that there should yet be so much uncertainty as to the real significance of the categories, and that we should be in nearly complete ignorance as to the process of thought by which, Aristotle was led to the doctrine. On both points it is difficult to

extract from the matter before us anything approaching a satis- factory solution. The terms employed to denote the categories have been scrutinized with the utmost care, but they give little help. The most important — k. rod 6yros or-nJ! obirlas, yivij rod ovtos or rcoc ovrwv, yivq simply, Td Trp&ra or ra koivc. irpwra, ai vrCiatis, or at Siiupiaeis — only indicate that the categories are general classes into which Being as such may be divided, that they are summa genera. The expressions yivq rS > v Karriyoplwv and o-xˆp-ara f&v k. , which are used frequently, seem to lead to another and somewhat different view. Karqyopla being taken to mean that which is predi- cated, y'arri t&v k. would signify the most general classes of predicates) the framework into the divisions of which all predicates must Come. To this interpretation there are objections. The categories rriust be carefully distinguished from predicables; in the scholastic phrase- ology the former refer to first intentions, the latter to second intentions, i.e. the one denote real, the other logical connexion. Further, the categories cannot without careful explanation be defined as predi- cates; they are this and something more. The most important category, obala, in one of its aspects cannot be predicate at all.

In the KaTiryoplai Aristotle prefixes to his enumeration a gram- matico-logical disquisition on homonyms and synonyms, and on the elements of the proposition, i.e. subject and predicate. He draws attention to the fact that things are spoken of either in the connexion known as the proposition, e.g. " a man runs," or apart from such connexion, e.g. " man " and " runs." He then proceeds, " Of things spoken of apart from their connexion in a proposition (rap Kara p.r/Seplav trvp.Tr\oKi)v Xeyopivav) , each signifies either Substance (obala), or Quantity (iroabv), or Quality (iroibv), or Relation (rpbs ti), or Where (i.e. Place, ttov), or When (i.e. Time, trori), or Position (ic«ff0cu) , or Possession (?x«' /) . or Action (woitiv) , or Passion (irdaxa-v) • obala, the first category, is subdivided into rpwrrj obala or primary substance, which is denned to be rbSe ti, the singular thing in which properties inhere, and to which predicates are attached, and Stbrepai

1 The supposed origin of that theory in the treatise trtpl tov ravrbs, ascribed to Archytas (q.i.), has been proved to be an error. The treatise itself dates in all probability from the Neo-Pythagorean schools of the 2nd century a.d.

- Prantl, Ges. der Logik, i. 74-75; F. A. Trendelenburg, Kate- gorienlehre, 209. n.

‘ Soph. 254 d.

obalai, genera or species which can be predicated of primary substances, and are therefore obala only in a secondary sense. Nevertheless, they too, after a certain fashion, signify the singular thing, robe n (K. p. 3 b 12, 13). It is this doctrine of irpiirri obala that has raised doubts with regard to the authenticity of the Kortˆ yoplai. But the tenfold classification, which has also been captiously objected to, is given in an acknowledged writing of Aristotle’s (see Topica, i. 9, p. 103 b 20). 1 At the same time it is at least remarkable that in two places where the enumeration seems intended to be complete (Met. p- 1017 a 25; An. Pos. i. 22, p. 83 a 21), only eight are mentioned, Ixˆ-v and KeiaBai being omitted. In other passages 6 six, five, four, and three are given, frequently with some addition, suGh as Kai

The full import of the categories will never be adequately reached from the point of view taken up in the Karˆyopiai, which bears all the marks of an early and preliminary study. For true understand- ing we must turn to the Metaphysics, where the doctrine is handled at large. The discussion of Being in that work starts with a distinction that at once gives us a clue, rd lv is spoken of in many ways ; of these four are classified — to 6v Kara avp.Pef3riKbs, t6 bv us dX»j0es, ri > &v bvvapa fcai tv(pyela, and tA iv Kara ra axhp.aTa t&v KaTrryoplav. It is evident from this that the categories can be regarded neither as purely logical nor as purely metaphysical elements. They indicate the general forms or ways in which Being can be predicated ; they are determinations of Being regarded as an object of thought, and consequently as matter of speech. It becomes apparent also why the analysis of the categories starts from the singular thing, for it is the primary form under which all that is becomes object of knowledge, and the other categories modify or qualify this real individual. II

The categories then are not to be regarded as heads of predicates, the framework into which predicates can be thrown. They are real determinations of Being— allgemeine Bestimmtheiten, as Hegel calls them. They are not summa genera of existences, still less are they to be explained as a classification of namable things in general. The objections Mill has taken to the list are entirely irrelevant, and would only have significance if the categories were really— what they are not— an exhaustive division of concrete existences. Grote’s view (Aristotle, i. 108) that Aristotle

drew up his list by examining Various popular propositions, and throwing the different predicates into genera, " according as they stood in different logical relation to the subject," has no foundation. The relation of the predicate category to the subject is not entirely a logical one ; it is a relation of real existence, and wants the essential marks of the propositional form. The logical relations of to 6v are provided for otherwise than by the categories.

Aristotle has given no intimation of the course of thought by which he was led to his tenfold arrangement, and it seems hopeless to dis- cover it. Trendelenburg in various essays has worked out the idea that the root of the matter is to be found in grammatical considera- tions, that the categories originated from investigations into gram- matical functions, and that a correspondence will be found to obtain between categories and parts of speech. Thus, Substance corre- sponds to noun substantive, Quantity and Quality to the adjective, Relation partly to the comparative degree and perhaps to the pre- position, When and Where to the adverbs of time and place. Action to the active, Passion to the passive of the verb, Position (icei<70eu) to the intransitive verb, ix*iv to the peculiar Greek perfect. That there should be a very close correspondence between the categories and grammatical elements is by no means surprising; that the one were deduced from the other is both philosophically and historically improbable. Reference to the detailed criticisms of Trendelenburg by Ritter, Bonitz, and Zeller will be sufficient.

Aristotle has also left us in doubt on another point. Why should there be only ten categories? and why should these be the ten? Kant and Hegel, it is well known, signalize as the great defect in the Aristotelian categories the want of a principle, and yet some of Aristotle's expressions would warrant the inference that he had a principle, and that he thought his arrangement exhaustive. The leading idea of all later attempts at reduction to unity of principle,

4 Against this passage even Prantl can raise no objection of any moment; see Ges. der Logik, i, 206. n.

'See Bonitz, Iridex Aristotilicus, s.v., and Prantl, Ges. der Logik, i. 207.

the division into substance and accident, was undoubtedly not overlooked by Aristotle, and Fr. Brentano * has collected with great diligence passages which indicate how the complete list might have been deduced from this primary distinction. His tabular arrangements (pp. 175, 177) are particularly deserving of attention. The results, however, are hardly beyond the reach of doubt.

There was no fundamental change in the doctrine of the categories from the time of Aristotle to that of Kant, and only two proposed Later reclassifications are of such importance as to require

Qreek.

notice. The Stoics adopted a fivefold arrangement of

highest classes, ytvLKurara. to ov or ri, Being, or some what in general, was subdivided into iiroK.dii.eva or subjects, iroid or qualities in general, which give definiteness to the blank subject, iriit Ixovto., modes which further determine the subject, and trpbs n x

Plotinus, after a lengthy critique of Aristotle's categories, sets out a twofold list, to iv, idvi)ais, vrcura, rairdrris, ˆTepoTijj are the primitive categories (tp&to. yevij) of the intelligible sphere. viala, irpos n, irota, -Koabv, Kiv-qcns are the categories of the sensible world. The return to the Platonic classification will not escape notice.

Modern philosophy, neglecting altogether the dry and tasteless treatment of the Aristotelian doctrine by scholastic writers, gave a Modern new > a wider and deeper meaning to the categories.

... . They now appear as ultimate or root notions, the meta- P sop y. ph vs ; ca [or thought elements, which give coherence and consistency to the material of knowledge, the necessary and universal relations which obtain among the particulars of experience. There was thus to some extent a return to Platonism, but in reality, as might easily be shown, the new interpretation was, with due allow- ance for difference in point of view, in strict harmony with the true doctrine of Aristotle. The modern theory dates in particular from the time of Kant, who may be said to

have reintroduced the term into philosophy. Naturally there are some anticipations in earlier thinkers. The Substance, Attribute and Mode of Cartesianism can hardly be classed among the categories ; nor does Leibnitz's chance suggestion of a fivefold arrangement into Substance, Quantity, Quality, Action and Passion, and Relations, demand any particular notice. Locke, too, has a classification into Substances, Modes and Relations, but in it he has manifestly no intention of drawing up a table of categories. What in his system corresponds most nearly to the modern view of these elements is the division of kinds of real predication. In all judgments of knowledge we predicate either (1) Identity or Diversity, (2) Relation, (3) Co-existence, or necessary connexion, or (4) Real existence. From this the transition was easy to Hume's important classification of philosophical relations into those of Resemblance, Identity, Time and Place, Quantity or Number, Quality, Contrariety, Cause and Effect.

These attempts at an exhaustive distribution of the necessary relations of all objects of knowledge indicate the direction taken by modern thought, before it received its complete expression from Kant.

The doctrine of the categories is the very kernel of the Kantian system, and, through it, of later German philosophy. To explain it fully would be to write the history of that philosophy. Kant. -p ne ca t e g or ies are called by Kant Root-notions of the

Understanding (Stammbegriffe des Verstandes), and are briefly the specific forms of the a priori or formal element in rational cognition. It is this distinction of matter and form in knowledge that marks off the Kantian from the Aristotelian doctrine. To Kant knowledge was only possible as the synthesis of the material or a posteriori with the formal or a priori. The material to which a priori forms of the understanding were applied was the sensuous content of the pure intuitions, Time and Space. This content could not be known by sense, but only by intellectual function. But the understanding in the process of knowledge makes use of the universal form of synthesis, the judgment; intellectual function is essentially of the nature of judgment or the reduction of a manifold to unity through a conception. The specific or type forms of such function will, therefore, be expressed in judgments; and a complete classification of the forms of judgments is the key by which one may hope to discover the system of categories. Such a list of judgments Kant thought

he found in ordinary logic, and from it he drew up his well-known scheme of the twelve categories. These forms are the deter- minations of all objects of experience, for it is only through them that the manifold of sense can be reduced to the unity of conscious- ness, and thereby constituted experience. They are a priori con- ditions, subjective in one sense, but objective as being universal, necessary and constitutive of experience.

The table of logical judgments with corresponding categories is as follows : —

1 Brentano, Bedeutung des Seienden nach A., pp. 148-178.

- For detailed examination of the Stoic categories, see Prantl, Ges. d. Logik, i. 428 sqq.; Zeller, Ph. d. Griech. iii. 1, 82, sqq.; Tren- delenburg, Kateg. p. 217.

I r Unity.

Of Quantity (P'-alg.

II. Of Quality

III. Of Relation

IV. Of Modality "

Reality.

Negation.

Limitation.

Inherence and Subsistence

(Substance and Accident). Causality and Dependence

(Cause and Effect). Community (Reciprocity). Possibility and Impossibility. Existence and Non-Existence. Necessity and Contingency.

Judgments. Categories.

Universal . Particular . Singular. Affirmative Negative Infinite . Categorical

Hypothetical

Disjunctive Problematical Assertoric . Apodictic .

Kant, it is well known, criticizes Aristotle severely for having drawn up his categories without a principle, and claims to have disclosed the only possible method by which an exhaustive classification might be obtained. What he criticized in Aristotle is brought against his own procedure by the later German thinkers, particularly Fichte and Hegel. And in point of fact it cannot be denied that Kant has allowed too much completeness to the ordinary logical distribution of propositions; he has given no proof that in these forms are contained all species of synthesis, and in consequence he has failed to show that in the categories, or pure conceptions, are contained all the modes of a priori synthesis. Further, his principle has so far the unity he claimed for it, the unity of a single function, but the specific forms in which such unity manifests itself are not themselves accounted for by this principle. Kant himself hints more than once at the possibility of a completely rational system of the categories, at an evolution from one single movement of thought, and in his Remarks on the Table of the Cate- gories gave a pregnant hint as to the method to be employed. From any complete realization of this suggestion Kant, however, was precluded by one portion of his theory. The categories, although the necessary conditions under which alone an object of experience can be thrown, are merely forms of the mind's own activity; they apply only to sensuous and consequently subjective material. Outside of and beyond them lies the thing-in-itself, which to Kant represented the ultimately real. This subjectivism was a distinct hiatus in the Kantian system, and against it principally Fichte and Hegel directed criticism. It was manifest that at the root of the whole system of categories there lay the synthetizing unity of self- _. .. consciousness, and it was upon this unity that Fichte fixed c

as giving the possibility of a more complete and rigorous deduction of the pure notions of the understanding. Without the act of the Ego, whereby it is self-conscious, there could be no knowledge, and this 'primitive act or function must be, he saw, the position or affirmation of itself by the Ego. The first principle then must be that the Ego posits itself as the Ego, that Ego = Ego, a principle which is un- conditioned both in form and matter, and therefore capable of standing absolutely first, of being the prius in a system. Meta- physically regarded this act of self-position yields the categories of Reality. But, so far as matter is

concerned, there cannot be affirmation without negation, omnis determinatio est negatio. The determination of the Ego presupposes or involves the Non-Ego. The form of the proposition in which this second act takes to itself expression, the Ego is not = Not-Ego, is unconditioned, not derivable from the first. It is the absolute antithesis to the primitive thesis. The category of Negation is the result of this second act. From these two propositions, involving absolutely opposed and mutually destructive elements, there results a third which reconciles both in a higher synthesis. The notion in this third is determination or limita- tion ; the Ego and Non-Ego limit, and are opposed to one another. From these three positions Fichte proceeds to evolve the categories by a series of thesis, antithesis and synthesis.

In thus seizing upon the unity of self-consciousness as the origin for systematic development, Fichte has clearly taken a step in advance of, and yet in strict harmony with, the Kantian doctrine. For, after all that can be said as to the demon- strated character of formal logic, Kant's procedure was empirical, and only after the list of categories had been drawn out, did he bring forward into prominence what gave them coherence and reality. The peculiar method of Fichte, also, was nothing but a consistent application of Kant's own Remark on the Table of the Categories. Fichte's doctrine, however, is open to some of the objec- tions advanced against Kant. His method is too abstract and external, and wants the unity of a single principle. The first two of his fundamental propositions stand isolated from one another, not to be resolved into a primitive unity. With him, too, the whole stands yet on the plane of subjectivity. He speaks, indeed, of the universal Ego as distinct from the empirical self-consciousness ; but the universal does not rise with him to concrete spirit. Nevertheless the Wissenschaftslehre contains the only real advance in the treatment of the categories from the time of Kant to that of Hegel. 3 This, of

- It does not seem necessary to do more than refer to the slight alterations made on Kant's Table of Categories by J. G. von Herder (in the Metakritik), by Solomon Malmon (in the Propadeutik zu einer

course, does not imply that there were not certain elements in

Schelling, particularly in the Transcendental Idealism, that are of value in the transition to the later system; but on the whole it is only in Hegel that the whole matter of the Kantian categories has been assimilated and carried to a higher stage. The Hegelian philo- sophy, in brief, is a system of the categories ; and, as it is not intended here to expound that philosophy, it is impossible to give more than a few general and quite external observations as to the Hegelian mode of viewing these elements of thought. With Kant, as has been seen, the categories were still subjective, not as being forms of the indi- vidual subject, but as having over against them the world of noumena to which they were inapplicable. Self-consciousness, which was, even with Kant, the nodus or kernel whence the categories sprang, was nothing but a logical centre, — the reality was concealed. There was thus a dualism, to overcome which is the first step in the Hegelian system. The principle, if there is to be one, must be universally applicable, all-comprehensive. Self-consciousness is precisely the principle wanted ; it is a unity, an identity, containing in itself a multiplicity. The universal in absolute self-consciousness is just pure thinking, which in systematic evolution is the categories; the particular is the natural or multiform, the external as such; the concrete of both is spirit, or self-consciousness come to itself. The same law that obtains among the categories is found adequate to an explanation of the external thing which had so sadly troubled Kant. The categories themselves are moments of the universal of thought, type forms, or definite aspects which thought assumes; determina- tions, Bestimmungen, as Hegel most frequently calls them. They evolve by the same law that was found to be the essence of ultimate reality — i.e. of self-consciousness. The complete system is pure thought, the Universal par excellence.

After the Hegelian there can hardly be said to have been a philo- sophical treatment of the categories in Germany which is not more or less a criticism of that system. It does not seem necessary to mention the unimportant modifications introduced by Kuno Fischer, J. E. Erdmann, or others belonging to the school. In the strongly- opposed philosophy of J. F. Herbart the categories can hardly be said to hold a prominent place. They are, with him, the most general notions which are psychologically formed, and he classifies them as follows: — (i) Thing, either as product of thought or as given in experience; (2) Property, either qualitative or quantitative;

(3) Relation; (4) The Negated. Along with these he posits as

categories of inner process — (1) Sensation, (2) Cognition, (3) Will,

(4) Action. Joh. Fr. L. George (1 81 1-1 873), ‘ who in the main follows Schleiermacher, draws out a table of categories which shows, in some points, traces of Herbartian influence. His arrangement by enneads, or series of nine, is fanciful, and wanting in inner principle.

The most imposing of more recent attempts at a reconstruction of the categories is that of F. A. Trendelenburg. To him the first _ . . principle, or primitive reality, is Motion, which is both . ” real as external movement, and ideal as inner construction.

” The necessary conditions of Motion are Time and Space,

which are both subjective and objective. From this point onwards are developed the mathematical (point, line, &c.) and real (causality, substance, quantity, quality, &c.) categories which appear as involved in the notion of motion. Matter cannot be regarded as a product of motion; it is the condition of motion, we must think something moved. All these categories, ” under the presupposition of motion as the first energy of thought, are ideal and subjective relations; as also, under the presupposition of motion as the first energy of Being, real and objective relations.” 2 A serious difficulty presents itself in the next category, that of End (Zweck), which can easily be thought for inner activity, but can hardly be reconciled with real motion. Trendelenburg solves the difficulty only empiric- ally, by pointing to the insufficiency of the merely mechanical to account for the organic. The consideration of Modality effects the transition to the forms of logical thought. On the whole, Trendelen- burg’s unique fact of motion seems rather a blunder. There is much more involved than he is willing to allow, and motion per se is by no means adequate to self-consciousness. His theory has found little favour.

Hermann Ulrici works out a system of the categories from a psychological or logical point of view. To him the fundamental Ulrlcl ˆ act °ˆ philosophy is the distinguishing activity (unter-

scheidende Tdtigkeit) of thought. Thought is only possible by distinction, difference. The fixed points in the relations of objects upon which this activity turns are the categories, which may be called the forms or laws of thought. They are the aspects of things, notions under which things must be brought, in order to

become

neuen Theorie des Denkens), by J. F. Fries (in the Neue Kritik der Vernunft), or by Schopenhauer, who desired to reduce all the cate- gories to one — that of Causality. We should require a new philo- sophical vocabulary even to translate the extraordinary compounds in which K. C. F. Krause expounds his theory of the categories. Notices of the changes introduced by Antonio Rosmini-Serbati, and of Vincenzo Gioberti's remarkable theory, will be found in Ragnisco's work referred to below.

J System der Metaphysik (1844).

! Logiscks Untersuchungen, i. 376-377.

objects of thought. They are thus the most general predicates or heads of predicates. The categories cannot be completely gathered from experience, nor can they be evolved a priori; but, by attending to the general relations of thought and its purely indefinite matter, and examining what we must predicate in order to know Being, we may attain to a satisfactory list. Such a list is given in great detail in the System der Logik (1852), and in briefer, preciser form in the Compendium der Logik (2nd ed., 1872); it is in many points well deserving of attention.

The definition of the categories by the able French logician Charles Bernard Renouvier in some respects resembles that of Ulrici. To him the primitive fact is Relation, of which all the cate-
.

gories are but forms. ‘ ‘ The categories, ‘ ‘ he says, ‘ ‘ are the Kenouv er, primary and irreducible laws of knowledge, the funda- Hamttton mental relations which determine its form and regulate its MU[‘ movements." His table and his criticism of the Kantian theory are both of interest. 3 The criticism of Kant's categories by Cousin and his own attempted classification are of no importance. Of little more value is the elaborate table drawn out by Sir W. Hamilton. 4 The generalized category of the Conditioned has but little meaning, and the subordinate categories evolve themselves by no principle, but are arranged after a formal and quite arbitrary manner. They are never brought into connexion with thought itself, nor could they be shown to spring from its nature and relations. J. S Mill presented, "as a substitute for the abortive classification of Existences, termed the categories of Aristotle," the following as an

enumeration of all nameable things: — (1) Feelings, or states of consciousness; (2) The minds which experience these feelings;

(3) Bodies, or external objects which excite certain of those feelings;

(4) Successions and co-existences, likenesses and unlikenesses, between feelings or states of consciousness. 5 This classification proceeds on a quite peculiar view of the categories, and is here presented only for the sake of completeness.

By modern psychologists the subject has been closely investigated. Professor G. F. Stout {Manual of Psychology, vol. ii. pp. 312 foil.) defines categories as ” forms of cognitive consciousness, Modern universal principles or relations presupposed either in all os ycholo- cognition or in all cognition of a certain kind.” He then Vrf_

Authorities. — Besides those quoted above, see Eduard v. Hartmann, Kategorienlehre (Leipzig, 1896), and ” Begriff der Kategorialfunktion,” in Zeitschr. f. Philos. und phil. Krit. cxv. (1899), pp. 9-19; E. Konig in the same periodical cxiii. (1889), pp. 232-279, and cxiv. (1899), pp. 78-105; F. A. Trendelenburg, Geschichte der Kategorienlehre (1846); P. Ragnisco Storia critica delle categorie (2 vols., Florence, 1871); W. Winaeloand Vom System der Kate- gorien (Tubingen, 1900) ; R. Eisler, Worterbuch der philosophischen Begriffe (Berlin, 1899), pp. 400-409; S. Joda, Studio critico su le categorie (Naples, 1881); H. Vaihinger, Die transcendentale Deduktion der Kategorien (Halle, 1902) ; H. W. B. Joseph, Introduction to Logic (Oxford, 1906), ch. iii. ; F. H. Bradley, Principles of Logic (1883); B. Bosanquet’s Knowledge and Reality (1885, 2nd ed. 1892) ; histories of philosophy. For further authorities see works quoted under Aristotle and Kant, and in J. M. Baldwin’s Diet. Philos. Psych. vol. iii. pt. 2, p. 685. (R. Ad.; X.)

CATENARY (from Lat. catena, a chain), in mathematics, the curve assumed by a uniform chain or string hanging freely between two supports. It was investigated by Galileo, who erroneously determined it to be a parabola; Jungius detected Galileo’s error, but the true form was not discovered until 1691, when James Bernoulli published it as a problem in the Ada Erudilorum. Bernoulli also considered the cases when (1) the chain was of variable density, (2) extensible, (3) acted upon at each point by a force directed to a fixed centre. These curves attracted much

attention and were discussed by John Bernoulli, Leibnitz, Huygens, David Gregory and others.

3 Essais de critique generate (2nd ed.), La Logique, i. pp. 184, 190,

207-225.

- Discussions, p. 577.

s Logic, i. 83; cf. Bain, Ded. Log., App. C.

S 1 ˆ

CATERAN— CAT-FISH

The mechanical properties of the curves are treated in the article MECHANlcs.where various forms are illustrated. The simple catenary is shown in the figure. The cartesian equation referred to the axis

and directrix is y — c cosh (x/c) or y = %c{e* : / cj re~ x / c) ; other forms are s = c sinh (x/c) and y 1 = c i --s i , s being the arc measured from the vertex; the intrinsic equation is s = c tan ii. The radius of curva- ture and normal are each equal to c sec 2

The surface formed by revolving the catenary about its directrix is named the alysseide. It is a minimal surface, i.e. the catenary solves the problem : to find a curve joining two given points, which when revolved about a line co-planar with the points traces a surface of minimum area (see Variations, Calculus of). T- The involute of the catenary is called the tractory, tractrix or antifriction curve ; it has a cusp at the vertex of the catenary, and is asymptotic to the directrix. The cartesian equation is

- V (c 2 3′ 2)+Jclog [jc V (c*-?)\l\c+yl (c*+f)}] , and the curve has the geometrical property that the length of its tangent is constant. It is named the tractory, since a weight placed on the ground and drawn along by means of a flexible string by a

f>erson travelling in a straight line, the weight not being in this ine, describes the curve in question. It is named the antifriction curve, since a pivot and step having the form of the surface generated by revolving the curve about its vertical axis wear away equally (see Mechanics: Applied).

CATERAN (from the Gaelic ceathairne, a collective word meaning ” peasantry “), the band of fighting men of a Highland clan; hence the term is applied to the Highland, and later to any, marauders or cattle-lifters.

CATERHAM, an urban district in the Wimbledon parlia- mentary division of Surrey, England, 20 m. S. of London by the South-Eastern & Chatham railway. Pop. (1901) 9486. It lies in a healthy, hilly district, and has grown in modern times from a village into a large residential town. There are large barracks’ in the neighbourhood, and the Metropolitan lunatic asylum is close to the town.

CATERPILLAR, the popular name of the larva of various insects, particularly of butterflies and moths (see Lepidoptera, Hexapoda, Metamorphosis). The word appears first in the form cater pyl (Promptorium Parvulorum, about the middle of the 15th century). This may be the original form, with the addition of -ar or er; if so, it represents the O. Fr. chate pelose or chatepeleuse, i.e. “hairy-cat ” (chat, cat, and pelouse, hairy, Lat. pilosus), a name applied to the hairy caterpillar, and also according to Cotgrave to a weevil. The use of ” cat ” in this connexion is paralleled by the Swiss name for a caterpillar, teufelskatz, and the popular English name for the blossom of the willow, ” catkin,” somewhat resembling a caterpillar (cf. ” palmer “) ; the modern French is chenille, Latin canicula, a little dog. The termination of the word seems to have been early connected with ” piller,” a robber, plunderer from the de- structive habits of the larva, cf. Joel i. 4 — ” That which the palmer-worm hath left, hath the locust eaten.” The spelling ” caterpillar,” a 17th century corruption, has been the usual form since Johnson.

CATESBY, ROBERT (1573-1605), English conspirator, son of Sir William Catesby of Lapworth in Warwickshire, a prominent recusant who was a descendant of Sir William Catesby, speaker of the House of Commons in 1484, executed by Henry VII. after the battle of Bosworth, was born in 1573, and entered Gloucester Hall (now Worcester College), Oxford, in 1586. He possessed a considerable estate, and was said to be wild and extravagant in his youth. In 1596 he was one of those arrested on suspicion during an illness of Queen Elizabeth. In 1601 he took part in the rebellion of Essex, was wounded in the fight and imprisoned, but finally pardoned on the payment of an enormous fine, to obtain which he was forced to sell a portion of his property. In 1602 he despatched Thomas Winter and the Jesuit Tesimond alias

Greenway to Spain to induce Philip III. to organize an

invasion of England, and in 1603, after James's accession, he was named as an accomplice in the "Bye Plot." Catesby was a man of great beauty of person, " above 2 yards high," says Father Gerard, "and though slender, yet as well-proportioned to his height as any man one should see." He possessed a clear head and unflinching courage, and with a strong determination and fascinating manner mastered the minds of his associates and overpowered all opposition. He was, however, headstrong, wilful and imprudent, fit for action, but incapable of due delibera- tion, and entirely wanting in foresight. Exasperated by his personal misfortunes and at the repressive measures under which his co-religionists were suffering, and blinded by a religious zeal which amounted to fanaticism, he was now to be the chief in- stigator of the famous Gunpowder Plot, which must in any event have brought disaster upon the Roman Catholic cause. The idea of some great stroke seems to have first entered his mind in May 1603. About the middle of January 1604 he imparted his scheme of blowing up the Parliament House to his cousin Thomas Winter, subsequently taking in Guy Fawkes and several other conspirators and overcoming all fears and scruples. But it was his determination, from which he would not be shaken, not to allow warning to be given to the Roman Catholic peers that was the actual cause of the failure of the plot. A fatal mistake had been made in imparting the secret to Francis Tresham (q.v.), in order to secure his financial assistance; and there is scarcely any doubt that he was the author of the cele- brated letter to his brother-in-law, Lord Monteagle, which betrayed the conspiracy to the government, on the 26th of October. On receiving the news of the letter on the 28th, Catesby exhibited extraordinary coolness and fortitude, and refused to abandon the attempt, hoping that the government might despise the warning and still neglect precautions; and his confidence was strengthened by Fawkes's report that nothing in the cellar had been touched or tampered with. On the 2nd of November his resolution was shaken by Tresham's renewed entreaties that he would flee, and his positive assurance that Salisbury knew everything. On the evening of the 3rd, however, he was again, through Percy's insistence, persuaded to stand firm and hazard the great stroke. The rest of the story is told in the article Gunpowder Plot. Here it need only be said that Catesby, after the discovery of the conspiracy, fled with his fellow-plotters, taking refuge ultimately at Holbeche in Stafford- shire, where on the night of the 8th of November he was

over- taken and killed. He had married Catherine, daughter of Thomas Leigh of Stoneleigh, Warwickshire, and left one son, Robert, who inherited that part of the family estate which had been settled on Catesby's mother and was untouched by the attainder, and who is said to have married a daughter of Thomas Percy.

CAT-FISH, the name usually applied to the fishes of the family Siluridae, in allusion to the long barbels or feelers about the mouth, which have been compared to the whiskers of a cat. The Siluridae are a large and varied group, mostly inhabitants of fresh waters; some of them by their singular form and armature are suggestive of the Devonian mailed fishes, and were placed at one time in their vicinity by L. Agassiz. Even such authorities as T. H. Huxley and E. D. Cope were inclined to ascribe ganoid affinities to the Siluridae; but this view has gradually lost ground, and most modern ichthyologists, if not all, have adopted the conclusions of M. Sagemehl, who has placed the Siluridae near the carps' and Characinids in the group Ostariophysi. The Silurids and Cyprinids may be regarded as two parallel series derived from some common stock which cannot have been very different from the existing Characinids. In spite of the archaic appearance of some of its members, the family Siluridae does not appear to extend far back in time, its oldest known representative being the Bucklandium diluvii of the Lower Eocene (London Clay) of Sheppey. A great number of forms were placed by Cuvier and his successors in the family Siluridae, which has since been broken up by T. Gill and other American authors into several families, united under the name of Nemato-gnathi. A middle course appears the more reasonable to the

present writer, who has divided the Silwidae of Cuvier into three families, with the following definitions: —

Silwidae — ribs attached to strong parapophyses; operculum well developed.

Loricariidae— ribs, sessile; parapophyses absent; operculum more or less developed.

Aspredinidae — ribs sessile; strong parapophyses; operculum

absent.

These three families may be denned among the Ostariophysi by having the parietal bones fused with the supraoccipital, no symplectic, the body naked or with bony scutes, the mouth usually toothed, with barbels, and usually an adipose dorsal fin.

The Siluridae embrace more than one thousand species, spread over the fresh waters of all parts of the world, but mostly from between the tropics. They are absent from western Europe and north-west Africa,, and from North America west of the Rocky Mountains, but this deficiency has been made good by now, the introduction of Amiurus nebulosus and allied species in various parts of continental Europe and California having proved a success. Only a few forms are marine {Plotosus, Arius, Galeichthys) .

The species which has given the name to the whole family is the " Wels " of the Germans, Silurus glanis, the largest European fresh-water fish, inhabiting the greater part of Europe from the Rhine eastwards and north of the Alps. Its head is large and broad, its mouth wide, furnished with six barbels, of which those

Fig. 1. — The " Wels " {Silurus glanis).

of the upper jaw are very long. Both jaws and the palate are armed with broad bands of small closely-set teeth, which give the bones a rasp-like appearance. The eyes are exceedingly small. The short body terminates in a long, compressed, muscular tail, and the whole fish is covered with a smooth, scaleless, slippery skin. Specimens of 4 and 5 ft. in length, and of 50 to 80 lb in weight, are of common occurrence, and the fish grows to 10 ft., with a weight of 400 lb, in the Danube. Its food consists chiefly of other bottom-feeding fishes, and in inland countries it is considered one of the better class of food fishes. Stories about children having been found in the stomach of very large individuals are probably inventions. An allied species (S. aristotelis) is found in Greece.

The Clarias and Heterobranchus of Africa and south-eastern Asia have an elongate, more or less eel-shaped body, with long dorsal and anal fins, and are known to be able to live a long time out of water, being provided with an accessory dendritic breath- ing organ situated above the gills. Some species live in burrows during the dry season, crawling about at night in search of food.

The common Nile species, the ” Harmoot” (Clarias lazera), occurs abundantly in the Lake of Galilee and was included in, if not chiefly aimed at, by the Mosaic law which forbade the Jews to eat scaleless fishes, a prohibition which has been extended to eels in spite of the obvious presence of minute scales in the latter.

The Saccobranchus of India and Ceylon, a genus more nearly related to Silurus, have also an accessory organ for breathing atmospheric air. It consists of a long sac behind the gill-cavity, extending far back on each side of the body under the muscles.

In the majority of the Siluridae, called by A. Giinther the Proteropterae, a section extremely numerous in species, and represented throughout the tropics, the dorsal fin consists of a v. 17

short-rayed and an adipose portion, the former belonging to the abdominal vertebral column; the anal is always much shorter than the tail. The gill-membranes are not confluent with the skin of the isthmus; they have a free posterior margin. When a nasal barbel is present, it belongs to the posterior nostril. This section includes among many others the genus Bagrus, of which the bayad (B. bayad) and docmac {B. docmac) frequently come under the notice of travellers on the Nile; they grow to a length of s ft. and are eaten.

Of the ” cat-fishes ” of North America {Amiurus), locally called ” bull-heads ” or ” horned-pouts,” with eight barbels, some twenty species are known. Some of them are valued as food, especially one which is abundant in the ponds of New England, and capable of easy introduction into ” other localities {A . nebulosus). Others which inhabit the great lakes (ˆ4. nigricans) and the Mississippi (A. ponderosus) often exceed the weight of 100 lb. Platystoma and Pimelodus people the rivers and lakes of tropical America, and many of them are conspicuous in this fauna by the ornamentation of their body, by long spatulate snouts, and by their great size.

The genus Arius is composed of a great number of species and has the widest distribution of all Silurids, being represented in almost all tropical countries which are drained by large rivers. Most of the species live in salt water. They possess six barbels, and their head is extensively osseous on its upper surface; their dorsal and pectoral spines are generally developed into powerful

weapons. Bagarius,- one of the largest Silurids of the rivers of India and Java, exceeding a length of 6 ft., differs from Arius in having eight barbels and the head covered with skin.

R. Semon has made observations in Queensland on the habits of Arius australis, which builds nests in the sandy bed of the Burnett river. These nests consist of circular basin-like excavations about 20 in. in diameter, at the bottom of which the eggs are laid and covered over by several layers of large stones. In the marine and estuarine species of Arius, Galeichthys and Osteogeniosus, the male, more rarely the female, carries the eggs in the mouth and pharynx; these eggs, few in number, are remarkably large, measuring as much as 17 or 18 millimetres in diameter in Arius commusonii, a fish 3 or 4 ft. in length.

The common North American Amiurus nebulosus also takes care of its eggs, which are deposited beneath protecting objects at the bottom of the water, failing which both parents join in excavating a sort of nest in the mud. The male watches over the eggs, and later leads the young in great schools near the shore, seemingly caring for them as the hen for her chickens.

In the Siluridae Stenobranchiae of Giinther the dorsal fin consists of an adipose portion and a short-rayed fin which belongs to the abdominal vertebral column, and, like the adipose fin, may be sometimes absent. The gill-membranes are confluent with the skin of the isthmus. The Silurids belonging to this section are either South American or African. Among the former we notice specially the genus Doras, which is distinguished by having a series of bony scutes along the middle of the side. The narrow-

Fig. 2. — Synodontis xiphias.

ness of their gill-openings appears to have developed in them a habit which has excited the attention of all naturalists who have visited the countries bordering upon the Atlantic rivers of tropical America, viz. the habit of travelling during seasons of drought from a piece of water about to dry up to ponds of greater capacity. These journeys are occasionally of such a length that the fish have to travel all night; they are so numerous

that the Indians fill many baskets of them. J. Hancock supposes

that the fish carry a small supply of water with them in their gill-cavity, which they can easily retain by closing their branchial apertures. The same naturalist adds that they make regular nests, in which they cover up their eggs with care and defend them — male and female uniting in this parental duty until the eggs are hatched. Synodontis is an African genus and common in the Nile, where the various species are known by the name of ” Shal.” They frequently occur among the representations of animals left by the ancient Egyptians. The upper part of their

accuse them of entering and ascending the urethra of persons while bathing, causing inflammation and sometimes death. Some certainly live parasitically in the gill-cavity of large Silurids, and F. Silvestri has observed Stegophilus insidiosus to suck the blood in the gills of Plalystoma coruscans, a Silurid growing to a length of 6 ft. The mailed cat-fish of the South American genus Callichlhys

Fig. 3. — -Malopterurus eleclricus.

head is protected by strong osseous scutes, and both the dorsal and pectoral fins are armed with powerful spines. Their mouth is small, surrounded by six barbels, which are more or less fringed with a membrane or with branched tentacles.

The curious fact of some species of Synodontis having the lower parts darker than the upper, some being whitish above and blackish beneath, appears to be connected with their habit of swimming in a reversed position, the Belly turned upwards. This habit, known to the ancient Egyptians, who have frequently represented them in that attitude, has been described by E. Geoff roy, who says they nearly constantly swim on their back, moving quite freely forwards and sidewards; but if alarmed, they revert to the normal position to escape more rapidly.

The electric cat- or sheath-fishes {Malopterurus) have been referred to the same section. Externally they are at once recognized by the absence of a rayed dorsal fin, of which only a rudiment remains as a small interneural spine concealed below the skin. The entire fish is covered with soft, villose skin, an osseous defensive armour having become unnecessary in consequence of the development of a powerful electric apparatus, the strength of which, however, is exceeded by that of the electric eel and the large species of Torpedo.

The electric organ of Malopterurus differs essentially from that of other fishes provided with such batteries, being part of the tegumentary system instead of being derived from the muscles. It consists of rhomboidal cells of a fine gelatinous substance immediately under the skin. It is put into action by a single ganglionic cell at the anterior extremity of the spinal cord. Contrary to what takes place in other electric fishes, the current proceeds from the head to the tail.

The electric cat-fish, which grows to a length of 3 ft. in the Congo, has a wide distribution in Africa, extend- ing from the Nile to the Zambezi and from the Senegal to the Congo. It was well known to the ancient Egyptians, who have depicted it in their mural paintings and elsewhere, and ah account of its electric properties was given by an Arab physician of the 12th century; then as now the fish was known under the suggestive name of Raad or Raash, which means " thunder."

Giinther's Siluridae Branchicolae comprise the smallest and least developed members of the family; they are referred to two genera only from South America, Stego- philus and Vandellia, the smallest of which does not exceed the length of 2 in. Their body is soft, narrow, cylindrical and elongate; the dorsal and anal fins short; the vent far behind the middle of the length of the body; gill- membranes confluent with the skin of the isthmus. Each maxillary is provided with a small barbel; and the gill-covers are armed with short stiff spines. Their small size notwith- standing, these Silurids are well known to the Brazilians, who

Fig. 4. — Callichthys armatus, from the upper Amazons.

builds regular nests of grass on leaves, sometimes placed in a hole scooped out in the bank, in which they cover their e&gs and defend them, male and female sharing in this parental duty. In the allied Corydoras a lengthy courtship takes place, followed by an embrace, during which the female receives the seminal fluid in a sort of pouch formed by the folded membranes of her ventral fins; immediately after, five or six eggs are produced and received in the pouch, to be afterwards carefully placed in a secluded spot. This operation is repeated many times, until the total number of eggs, about 250, have been deposited. In accordance with these pairing habits, the pectoral spines of the male, which are used in amplexation, are larger and stronger than those of the female. These fish are mono- gamous, and both parents remain by the side of the nest, furiously attacking any

assailant.

The allied family Loricariidae

Fig. 5. — Loricaria lanceolata, from the upper Amazpns. is entirely confined to the fresh waters of Central and South America. C. T. Regan, who has recently published an elaborate monograph of them, recognizes 189 species, referred to 17 genera. Many of them are completely mailed; but all have in common a short-rayed dorsal fin, with the

ventrals below or rarely in front of it. Their gill-openings are reduced to a short slit. The first group of this section comprises alpine forms of the Andes, without any armature, and with a very broad and pendent lower lip. They have been referred to several genera (Stygogenes, Arges, Brontes, Astro- blepus), but are collectively called ” prenadillas ” by the natives, who state that they live in subterranean craters within the bowels of the volcanoes of the Andes, and are ejected with streams of mud and water during eruptions. These fishes may, however, be found in surface waters at all times, and their appearance in great quantities in the low country during volcanic

Fig. 6. — Abdomen of Aspredo batrachus, with the ova attached; at a the ova are removed, to show the spongy structure of the skin, and the processes filling the interspaces between the ova.

eruptions can be accounted for by numbers being killed by the sulphuretted gases which escape during an eruption and by their being swept down with the torrents of water issuing from the volcano. The lowland forms have their body encased in large scutes, either rough, scale-like, and arranged in four or five series {Chaetostomus) , or polished, forming broad rings round the slender and depressed tail (Loricaria, fig. 5). They are mostly of small size.

In certain of the mailed genera the secondary sexual differences may be very pronounced, and have given rise to many nominal species. The shape of the snout may differ according to the sex, and its margin may be beset with tentacles in the male, whilst it frequently happens that the head of the latter is margined with spines or bristles which are either absent or considerably shorter

in the female.

The Aspredinidae, which are also closely related to the Siluridae,

are represented by four genera and eighteen species from South America. Aspredo batrachus (fig. 6), of the Guianas, the largest form, reaching to about a foot in length, deserves notice from the manner in which the female carries her eggs attached to the belly and paired fins, in a single layer, each egg being connected with the skin by a cup-shaped pedunculate base supplied with blood-vessels and coated with a layer of epithelium, the forma- tion of which is still unexplained. (G. A. B.)

CATGUT, the name applied to cord of great toughness and tenacity prepared from the intestines of sheep, or occasionally from those of the horse, mule and ass. Those of the cat are not employed, and therefore it is supposed that the word is properly kitgut, kit meaning ” fiddle,” and that the present form has arisen through confusion with kit —cat. The substance is used for the strings of harps and violins, as well as other stringed musical instruments, for hanging the weights of clocks, for bow-strings, and for suturing wounds in surgery. To prepare it the intestines are cleaned, freed from fat, and steeped for some time in water, after which their external membrane is scraped off with a blunt knife. They are then steeped for some time in an alkaline ley, smoothed and equalized by drawing out, subjected to the antiseptic action of the fumes of burning sulphur, if necessary dyed, sorted into sizes, and twisted together into cords of various numbers of strands according to their uses. The best strings for musical instruments are imported from Italy (” Roman strings “) ; and it is found that lean and ill-fed animals yield the toughest gut.

CATHA, the khat of the Arabs, a shrub widely distributed and much cultivated in Arabia and tropical Africa from, Abyssinia to the Cape. The dried leaves are used for the preparation of a kind of tea and also as tobacco. The plant is a member of the natural order Celastraceae, a family of shrubs and trees found in temperate and tropical climates and represented in Britain by the spindle-tree (Euonymus europaem).

CATHARS (Cathari or Cathakists), a widespread heretical sect of the middle ages. They were the debris of an early Christianity, scattered in the 10th to 14th centuries over East and West, having their analogues in the Mahommedan world as well. In the

East they were called Bogomils (q.v.) and Paulicians; in the West, Patarenes, Tixerands (i.e. Weavers), Bulgars, Concorricii, Albanenses, Albigeois, &c; in both, Cathars and Manicheans. This article relates to the Western Cathars, as they appear (1) in the Cathar Ritual written in Provencal and preserved in a 13th-century MS. in :Lyons, published by Cledat, Paris, 1888; (2) in Bernard Gui's Practica inquisitionis haereticae pravitatis, edited by Canon C. Douais, Paris, 1886; and (3) in the prods verbal of the inquisitors' reports. Some were downright dualists, and believed that there are two gods or principles, one. of good and the other of evil, both eternal; but as a rule they subordinated the evil to the good. All were universalists in so far as they believed in the ultimate salvation of all men. 1

Their tenets were as follows: — The evil god, Satan, who inspired the malevolent parts of the Old Testament, is god and lord of this world, of the things that are seen and are temporal, and especially of the outward man which is decaying, of the earthen vessel, of the body of death, of the flesh which takes us captive under the law of sin and desire. This world is the only true purgatory and hell, being the antithesis of the world eternal, of the inward man renewed day by day, of Christ's peace and kingdom which are not of this world. Men are the result of a primal war in heaven, when hosts of angels incited by Satan or Lucifer to revolt were driven out, and were imprisoned in terrestrial bodies created for them by the adversary. But there are also celestial bodies, bodies spiritual and not natural. These the angel souls left behind in heaven, and they are buildings from God, houses not made with hands, tunics eternal.

1 Acertain Peter (Doc. Doat., 22, p. 98) declared that could he but get hold of the false and perfidious God of the Catholics who created a thousand men in order to save a single one and damn all the rest, he would break him to pieces and tear him asunder with his nails and spit in his face.

Imprisoned in the garment of flesh, burdened with its sin, souls long to be clothed upon with the habitations they left in heaven. So long as they are at home in the body, they are absent from the Lord. They would fain be at home with the Lord, and absent from the body, for which there is no place in heaven since flesh and

blood cannot inherit the kingdom of God, nor corruption inherit incorruption. There is no resurrection of the flesh. The true resurrection is the spiritual baptism bequeathed by Christ to the boni homines. How shall man escape from his prison-house of flesh, and undo the effects of his fall? For mere death brings no liberation, unless a man is become a new creation, a new Adam, as Christ was; unless he has received the gift of the spirit and become a vehicle of the Paraclete. If a man dies unreconciled to God through Christ, he must pass through another cycle of imprisonment in flesh; perhaps in a human, but with equal likelihood in an animal's body. For when after death the powers of the air throng around and persecute, the soul flees into the first lodging of clay that it finds. 1 Christ was a life-giving spirit, and the boni homines, the " good men," as the Cathars called themselves, are his ambas- sadors. They alone have kept the spiritual baptism with fire which Christ instituted, and which has no connexion with the water baptism of John; for the latter was an unregenerate soul, who failed to recognize the Christ, a Jew whose mode of baptism with water belongs to the fleeting outward world and is opposed to the kingdom of God. It would be interesting to trace Bardesanes and the Syriac Hymn of the Soul in all this.

The Catbars fell into two classes, corresponding to the Baptized and the Catechumens of the early church, namely, the Perfect, who had been "consoled," i.e. had received the gift of the Paraclete; and the credentes or Believers. The Perfect formed the ordained priesthood, were women no less than men, and controlled the church; they received from the Believers un-questioning obedience, and as vessels of election in whom the Holy Spirit already dwelt, they were adored by the faithful, who were taught to prostrate themselves before them whenever they asked for their prayers. For none but the Consoled had received into their hearts the spirit of God's Son, which cries " Abba, Father." They alone were become adopted sons, and so able to use the Lord's Prayer, which begins, " Our Father, which art in heaven." The Perfect alone knew God and could address him in this prayer, the only one they used in their ceremonies. The mere credens could at best invoke the living saint, and ask him to pray for him.

All adherents of the sect seem to have kept three Lents in the year, as also to have fasted Mondays, Wednesdays and Fridays of each week; in these fasts a diet of bread and water was usual. But a credens under probation for initiation, which lasted at least

one and often several years, fasted always. The rlife of a Perfect was so hard, and, thanks to the inquisitors, so fraught with danger, that most Believers deferred the rite until the death-bed, as in the early centuries many believers deferred baptism. The rule imposed complete chastity." A husband at initiation left his wife, committing her " to God and the gospel" ; a wife her husband. A male Perfect could not lay his hand on a woman without incurring penance of a three-days' fast. All begetting of children is evil, for Adam's chambering with Eve was the forbidden fruit. It is good for a man not to touch a woman; a man's relations with his own wife are merely a means of fornication, and marriage and concubinage are indistinguishable as against the kingdom of God, in which there is no marrying or giving in marriage. Those only have been redeemed from earth who were virgins, undefiled with women. The passages of the New Testament which seem to connive at the married relation were interpreted by the Cathars as spoken in regard of Christ and the church. The Perfect must also leave his father and mother, and his children, for a man's foes are they of his own household. The family must be sacri-

1 Here we have a doctrine of metempsychosis which seems of Indian origin (see Asceticism). But Julius Caesar {de B.C. vi. 13) attests this belief among the ancient Druids of Gaul.

ficed to the divine kinship. He that loveth father or mother more than Christ is not worthy of him, nor he that loveth more his son or daughter. The Perfect takes up his cross and follows after Christ.

Next he must abstain from all flesh diet except fish. He may not even eat cheese or eggs or milk, for they, like meat, are produced per viam generatianis seu coitus. Everything that is sexually begotten is impure. Fish were supposed to be born in the water without sexual connexion, and on the basis of this old physiological fallacy the Cathars equally with the Catholic framed their rule of fasting. And there was yet another reason why the Perfect should not eat animals, for a human soul might be doing time in its body. Nor might a Perfect or one in course of probation kill anything, for the Mosaic commandment applies to all life. He might riot lie nor take an oath, for the precept " Swear not at all " was, like the rest of the gospel, taken seriously. This was the chief of their " anarchist doctrines." 2

The Cathar rites, which remain to us in a manual of the sect,

“recall,” says the Abbe Guiraud, no too favourable a witness, “those of the primitive church with a truth and precision the more striking the nearer we go back to the apostolic age.” The medieval inquisitor saw in them an aping of the rites of the Catholic church as he knew them; but they were really, says the same authority, ” archaeological vestiges (i.e. survivals) of the primitive Christian liturgy. In the bosom of medieval society they were the last witness to a state of things that the regular development of Catholic cult had amplified and modified. They resemble the erratic blocks which lost amid alien soils recall, where we find them, the geological conditions of earlier ages. This being so, it is of the deepest interest to study the Cathar cult, since through its rites we can get a glimpse of those of the primitive church, about which want of documents leaves us too often in the dark.”

The central Cathar rite was consolamentum, or baptism with spirit and fire. The spirit received Was the Paraclete derived from God and sent by Christ, who said, ” The Father is greater than I.” Of a consubstantial Trinity the Cathars naturally had never heard. Infant baptism they rejected because it was un- scriptural, and because all baptism with water was an appanage of the Jewish demiurge Jehovah, and as such expressly rejected by Christ.

The consolamentum removes original sin, undoes the sad effects of the primal fall, clothes upon us our habitation which is from heaven, restores to us the lost tunic of immortality. A Consoled is an angel walking in the flesh, whom the thin screen of death alone separates from Christ and the beatific vision. The rite was appointed by Christ, and has been handed down from generation to generation by the boni homines.

The long probation called ” abstinence ” which led up to it is a survival of the primitive catechumenate with its scrutinies. The prostrations of the credens before the Perfect were in their manner and import identical with the prostrations of the cate- chumen before the exorcist. We find the same custom in the Celtic church of St Columba. Just as at the third scrutiny the early catechumen passed a last examination in the Gospels, Creed and Lord’s Prayer, so after their year of abstinence the credens receives creed and prayer; the allocution with which the elder ” handed on ” this prayer is preserved, and of it the Abb6 Guiraud remarks that, if it were not in a Cathar ritual, one might believe it to be of Catholic origin. It is so Christian in tone, he quaintly

remarks elsewhere, that an inquisitor might have used it quite as well as a heretic. In it the Perfect addresses the postulant, as in the corresponding Armenian rite, by the name of Peter; and explains to him from Scripture the indwelling of the spirit in the Perfect, and his adoption as a son by God. The Lord's Prayer is then repeated by the postulant after the elder, who explains it clause by clause; the words panis

2 The Abbe Guiraud remarks that in refusing to take oaths the Cathars " contraried the social principles on which the constitutions of all states repose," and congratulates himself that society is not yet so thoroughly " laicized " as to have given up oaths in the most important acts of social life.

superstantialis being interpreted not of the material but of the spiritual bread, which consists of the Words of Life. '

There followed the Renunciation, primitive enough in form, but the postulant solemnly renounced, not Satan and his works and pomp, but the harlot church of the persecutors, whose prayers were more deadly than desirable. He renounced the cross which its priests had signed on him with their chrism, their sham baptisms and other magical rites. Next followed the spiritual baptism itself, consisting of imposition of hands, and holding of the Gospel on the postulant's head. The elder begins a fresh allocution by citing Matt, xxviii. 19, Mark xvi. 15, 16, John iii. 3 (where the Cathars' text must originally have omitted in v. 5 the words " of water and," since their presence contradicts their argument). Acts ix. 17, 18, viii. 14-17, ar e then cited; also John xx. 21-23, Matt. xvi. 18,19, Matt, xviii. 18-20, for the Perfect one receives in this rite power to bind and loose. The Perfect's vocation is then defined: he must not commit adultery nor homicide, nor lie, nor swear any oath, nor pick and steal, nor do unto another that which he would not have dene unto himself. He shall pardon his wrongdoers, love his enemies, pray for them that calumniate and accuse him, offer the other cheek to the smiter, give up his mantle to him that takes his tunic, neither judge nor condemn. Asked if he will fulfil each of these, the postulant answers: " I have this will and determination. Pray God for me that he give me his strength."

The next episode of the rite exactly reproduces the Roman (onfiteor as it stood in the 2nd century; " the postulant 'says: 1 Partite nobis. For all the sins I have committed, in word or thought or deed, I come for pardon to God and to the church and to you all.' And the Christians shall say: ' By God and by us and by the church may they be pardoned thee, and we pray God that he pardon you them.' "

Theie follows the act of " consoling." The elder takes the Gospel off the white cloth, where it has lain all through the ceremony, and places it on the postulant's head, and the other good men present place their right hands on his head; they shall say the parcias (spare), and thrice the " Let us adore the Father and Son and Holy Spirit," and then pray thus: " Holy Father, welcome thy servant in thy justice and send upon him thy grace and thy holy spirit." Then they repeat the " Let us adore," the Lord's Prayer, and read the Gospel (John i. 1-17).

This was the vital part of the whole rite. The credens is now a Perfect one. He is girt with the sacred thread round his naked body under the breasts. Where the fear of the persecutor was absent he was also clad in a black gown. The Perfect ones present give him the kiss of peace, and the rite is over. This part of the rite answers partly to the Catholic confirmation of a baptized person, partly to the ordination of a pope of Rome or, Alexandria. The latter in being ordained had the Gospel laid on their heads, and the same feature occurs in old Gallican and Coptic rites of ordaining a bishop.

Thus the Cathar ritual, like that of the Armenian dissenters (see Paulicians), reflects an age when priestly ordination was pot yet differentiated from confirmation. " Is it not curious," says the Abbe Guiraud, " to remark that the essential rite of the consolamentum is in effect nothing but the most ancient form of Christian ordination?"

The Cathar Eucharist was equally primitive, and is thus described by a contemporary writer in a 13th-century MS. of the Milan Library: — " The Benediction of bread is thus performed by the Cathars. They all, men and women, go up to a table, and standing up say the ' Our Father.' 1 And he who is prior among them, at the close of the Lord's Prayer, shall take hold of the bread and say: ' Thanks be to the God of our Jesus Christ. May the Spirit be with us all.' And after that he breaks and distributes to all. And such bread is called bread blessed, al- though no one

believes that out of it is made the body of Christ.

1 Cf. S. Gregorii Ep. ix. 12 (26) : ” Mos apostolorum fuit ut ad ipsam solummodo orationem oblationis hostiam consecrarent. ” (” The custom of the apostles was to use no other prayer but the Lord’s in consecrating the host of the offering.”)

The Albanenses, however, deny that it can be blessed or sanctified, because it is corporeal ” (i.e. material).

As Tertullian relates of his contemporaries in the 2nd century, so the Cathars would reserve part of their bread of blessing and keep it for years, eating of it occasionally though only after saying the Benedicite. The Perfect kept it wrapped up in a bag of pure white cloth, tied round the neck, 2 and sent it long distances to regions which through persecution they could not enter. On the death-bed it could even, like the Catholic Viaticum, take the place of the rite of Consolamentum, if this could not be performed. Once a month this solemn rite of breaking bread was held, the credentes assisting. The service was called apparettamentum, because a table was covered with a white cloth and the Gospel laid on it. The Perfect were adored, and the kiss of peace was passed round.

The influence of Catharism on the Catholic church was enormous. To counteract it celibacy was finally imposed on the clergy, and the great mendicant orders evolved; while the constant polemic of the Cathar teachers against the cruelty, rapacity and irascibility of the Jewish tribal god led the church to prohibit the circulation of the Old Testament among laymen. The sacrament of ” extreme unction ” was also evolved by way of competing with the death-bed consolamentum.-

Authorities — J. J. I. Dollinger, Beitrage zur SektengescMchte Miinehen, 1890); Jean Guiraud, Questions d’histoire (Paris, 1906); F. C. Conybeare, The Key of Truth (Oxford, 1898); Henry C. Lea, History of the Inquisition (New York, 1888) ; C. Douais, L’ Inquisition (Paris, 1906), and his Les Heretiques du midi au XIII” siecle (Paris, 1891); Les Albigeois (Paris, 1879); also Practica Inquisitionis (of Bernard Gui or Guidon), (Paris, 1886) ; L. Cledat, Le Nouveau Testa- ment, traduit au XIII” siecle en langue provencale, suivi d’un rituel cathare (Paris, 1887) ; E. Cunitz in Beitrage zu den theol. Wissensch. (1852), vol. iv. ; P. van Limborch, Liber Sententiarum Inquis. Tholos. 1307-1323 (Amsterdam, 1692) ; Hahn, Gesch. der Kelzer im M. A. (Stuttgart,

1845) ; Ch. Schmidt, Histoirert doctrine de la secte des Cathares (Paris, 1849); A. Lombard, Pauliciens bulgares et Bons-Hbmmes (Geneva, 1879); Fredericq, Corpus documentorum haer. pravitatis Neerlandicae (Gent, 1 889-1 896); Felix Tocco, ” Nuovi documenti ” in Archiv. di studi ital. (1901), and bis L'Eresia nel medio evo (Florence, 1881) ; P. Flade, Das romische Inqtiisitions-verfahren in Deutschland (Leipzig, 1902); Ch. Molinier, ” Rapport sur une mission en Italie,” in Archives scientifiques de Paris, torn. 14 (1888) ; C. H. Haskins, ” Robert le Bougre,” in American Hist. Rev. (1902). (F. C. CO

CATHAY, the name by which China (q.v.) was known to medieval Europe and is still occasionally referred to in poetry, as in Tennyson's ” Better fifty years of Europe than a cycle of Cathay.” It is derived from Khita'i, or Khitat, the name which was properly that of the kingdom established by the Khitan conquerors in the northern provinces of China about a.d. 907, which after the fall of this dynasty in 11 25 remained attached to their former territory, and was subsequently applied by the nations of Central Asia to the whole of China. Thus ” Kitai ” is still the Russian name for China. The name penetrated to Europe in the 13th century with the fame of the conquests of Jenghiz Khan. After the discovery of southern China by European navigators Cathay was erroneously believed to be a country to the north of China, and it was the desire to reach it that sent the English adventurers of the 16th century in search of the north-east passage.

CATHCART, SIR GEORGE (1794-1854), English soldier, third son of the 1st Earl Cathcart, was born in London on the 12 th of May 1 794. He was educated at Eton and Edinburgh University. In 1810 he entered the army, and two years later accompanied his father to Russia as aide-de-camp. With him he joined the Russian headquarters in March 18 13; and he was present at all the great battles of that year in Germany, and of the following year in France, and also at the taking of Paris. The fruits of his careful observation and critical study of these operations appeared in the Commentaries on the war in Russia and Germany 1812-1813, a plain soldier-like history, which he published in 1850. After the peace of 1814 he accompanied his father to the congress of Vienna. He was present at Quatre Bras and at Waterloo, as an aide-de-camp to the duke of Wellington, and remained on the staff till the army of occupation quitted France. 2 Cf. Duchesne, Origines, ed. 1898, p. 177.

Reappointed almost immediately, he accompanied the duke to the congresses of Aix-la-Chapelle and Verona, and in 1826 to Prussia. Promoted lieutenant-colonel in 1826, he was placed on half-pay in 1834. He was recalled to active service in 1838, and sent as commander of the King's Dragoon Guards to Canada, where he played an important part in suppressing the rebellion and pacifying the country. In 1844 he returned to England, and two years later was appointed deputy-lieutenant of the Tower, a post which he held up to the time of his promotion to major-general in 1851. In March 1852 he succeeded Sir Harry Smith as governor and commander-in-chief at the Cape, and brought the Kaffir war, then in progress, to a successful conclu- sion. He promulgated the first constitution of Cape Colony, and conducted operations against the Basuto. Cathcart was made a K.C.B. and received the thanks of both Houses for his services (1853). In December 1853 he was made adjutant-general of the army, but never entered upon his duties, being sent out to the Crimean War as soon as he arrived in England. He was even given a dormant commission entitling him to the chief command in case of accident to Lord Raglan, and the highest hopes were fixed on him as a scientific and experienced soldier. But these hopes were not to be fulfilled; for he fell at the battle of Inkerman (November 5, 1854). His remains, with those of other officers, were buried on Cathcart's Hill. Sir George Cathcart married in 1824 Lady Georgiana Greville, who survived him, and by whom he had a family.

See Colburn's United Service Magazine, January 1855; Corre- spondence of the Hon. Sir George Cathcart relative to Kaffraria (1856) ; A. W. Kinglake's Invasion of the Crimea, vol. v.

CATHCART, WILLIAM SCHAW CATHCART, ist Earl (1755-1843), English soldier and diplomatist, was born at Peter- sham on the 17th of September 1755, and educated at Eton. In 1 771 he went to St Petersburg, where his father, Charles, 9th Baron Cathcart (1721-1776), a general in the army, was ambassador. From 1773 to 1777 he studied law, but after succeeding to the barony in 1776 he obtained a commission in the cavalry. Proceeding to America in 1777, he had before the close of his first campaign twice won promotion on the field of battle. In 1778 he further distinguished himself in outpost work, and at the battle of Monmouth he commanded an irregular corps, the " British Legion," with conspicuous success; for a time also he acted as

quartermaster-general to the forces in America. He returned home in 1780, and in February 1781 was made captain and lieutenant-colonel in the Coldstream Guards, He was elected a representative peer for Scotland in 1788, and in 1792 he became colonel of the 29th foot. He served with distinction in the campaigns in the Low Countries, 1793-1795, in the course of which he was promoted major-general; and in 1 80 1 he was made a lieutenant-general, having in the meanwhile received the appointments of vice-admiral of Scotland (1795), privy councillor (1798), and colonel of the 2nd Life Guards (1797). From 1803 to 1805 Lord Cathcart was commander-in- chief in Ireland, and in the latter year he was sent by Pitt in command of the British expedition to Hanover (see Napoleonic Campaigns). After the recall of this expedition Cathcart commanded the forces in Scotland until 1807, when he was placed in charge of the expedition to Copenhagen, which sur- rendered to him on the 6th of September. Four weeks later he was created Viscount Cathcart of Cathcart and Baron Greenock of Greenock in the peerage of the United Kingdom, resuming the Scottish command on his return from the front. On the ist of January 181 2 he was promoted to the full rank of general, and a few months later he proceeded to Russia as am- bassador and military commissioner. In the latter capacity he served with the headquarters of the allies throughout the War of Liberation (1812-1814); his success in the delicate and difficult task of maintaining harmony and devotion to the common cause amongst the generals of many nationalities was recognized after the war by his elevation to the earldom (July 1814). He then went to St Petersburg, and continued to hold the post of am- bassador until 1820, when he returned to England. He died at his estate near Glasgow on the 16th of June 1843.

His son, Charles Murray Cathcart, 2nd earl (1783-1859), succeeded to the title in 1843. He entered the 2nd Life Guards in 1800, and saw active service under Sir James Craig in the Mediterranean, 1805-1806. In 1807 he became by courtesy Lord Greenock. He took part in the Walcheren expedition of 1809 as a major, and as a lieutenant-colonel served at Barossa, Salamanca and Vittoria. He had already gained staff experience, and he now served under Graham in Holland, 18 14, as quarter- master-general. He was present at Waterloo, and for his ser- vices received the C.B. and several foreign orders. During the peace he became deeply interested in scientific pursuits, and a new mineral discovered by him in 1841 was named Greenockite. His

later military services included the chief command in Canada during a period of grave unrest (1846-1849). He retired from active service in 1859, becoming a full general just before his death. The title passed to his son and grandson as 3rd and 4th earls.

CATHCART, a parish situated partly in Renfrewshire and partly in Lanarkshire, Scotland. The Renfrewshire portion has the larger area (2387 acres), but the smaller population (737s), the area of the Lanarkshire portion being 745 acres and the population (1901) 20,983. The industries include paper-making, dyeing and sandstone quarrying, but limestone and coal have also been worked. The parish includes the town of Cathcart (pop. 4808), and the villages of Old and New Cathcart, but much of it, though outside the city boundaries, is practically continu- ous with some of the southern suburbs of Glasgow, with which there is conimunication by electric tram and the Caledonian railway's circular line. The White Cart flows through the parish. In the 12th century Cathcart became a barony of the Cathcarts, who derived the title of their lordship (1460) and earldom (1814) from it. On the Queen's Knowe, a hillock near the ruins of Cathcart Castle, a memorial marks the spot where Queen Mary watched the progress of the battle of Langside (1568), the site of which lies within the parish.

CATHEDRAL, more correctly " cathedral church " {ecclesia cathedralis), the church which contains the official " seat " or throne of a bishop — cathedra, one of the Latin names for this, giving us the adjective " cathedral." The adjective has gradu- ally, for briefness of speech, assumed the character of a sub- stantive, but though an instance of this (strictly incorrect) use of the word as a substantive has been found as far back as 1587, it became common only at the end of the 18th, or first half of the 19th, century. One of the earliest instances of the term ecclesia cathedralis is said to occur in the acts of the council of Tarragona in 516. Another name for a cathedral church is ecclesia mater, indicating that it is the mother church. As being the one important church, it was also known as ecclesia major. This is the formal expression used by Archbishop Walter Gray of York (1216-1255), anditis preserved in modern times by the name of " La Majeure," by which the old cathedral church of Marseilles is popularly known. Again, as the chief house of God, the cathedral church was the Domus Dei, and from this name the German Domkirche, or Dom, is derived, as also the Swedish Domkyrka, and the Italian Duomo.

History and Organization. — It was early decreed that the cathedra of a bishop was not to be placed in the church of a village, but only in that of a city. There was no difficulty as to this on the continent of Europe, where towns were numerous, and where the cities were the natural centres from which Christianity was diffused among the people who inhabited the surrounding districts. In the British islands, however, the case was different; towns were few, and owing to other causes, instead of exercising jurisdiction over definite areas or districts, many of the bishops were bishops of tribes or peoples, as the bishops of the south Saxons, the west Saxons, the Somersaetas and others. The cathedra of such a bishop was often migratory, and was at times placed in one church, and then another, and sometimes in the church of a village. In 1075 a council was held in London, under the presidency of Archbishop Lanfranc, which, reciting the decrees of the council of Sardica held in 347 and that of Laodicea held in 360 on this matter, ordered the

bishop of the south Saxons to remove his see from Selsey to Chichester; the Wilts and Dorset bishop to remove his cathedra from Sherborne to Old Sarum, and the Mercian bishop, whose cathedra was then at Lichfield, to transfer it to Chester. Traces of the tribal and migratory system may still be noted in the designations of the Irish see of Meath (where the result has been that there is now no cathedral church) and Ossory, the cathedral church of which is at Kilkenny. Some of the Scottish sees were also migratory.

By the canon law the bishop is regarded as the pastor of the cathedral church, the parochia of which is his diocese. In view of this, canonists speak of the cathedral church as the one church of the diocese, and all others are deemed chapels in their relation to it.

Occasionally two churches jointly share the distinction of containing the bishop's cathedra. In such case they are said to be con-cathedral in relation to each other. Instances of this occurred in England before the Reformation in the dioceses of Bath and Wells, and of Coventry and Lichfield. Hence the double titles of those dioceses. In Ireland an example occurs at Dublin, where Christ Church and St Patrick's are jointly the cathedral churches

of that diocese. In France the bishop of Couserans (a see suppressed at the Revolution) had two con-cathedral churches at St Lizier, and the bishop of Sisteron (a see also suppressed) had a second throne in the church of Forcalquier which is still called "La Con-cathedrale." Other instances might be named. In the case of York the collegiate churches of Beverley, Ripon and Southwell were almost in the same position, but although the archbishop had a stall in each he had no diocesan cathedra in them, and the chapters were not united with that of the metropolitical church in the direct government of the diocese, or the election of the archbishop, nor had they those other rights which were held to denote the cathedral character of a church.

Cathedral churches are reckoned as of different degrees of dignity: (1) the simple cathedral church of a diocesan bishop, (2) the metropolitical church to which the other diocesan cathedral churches of a province are suffragan, (3) the primatial church under which are ranged metropolitical churches and their provinces, (4) patriarchal churches to which primatial, metro-political, and simple cathedral churches alike owe allegiance. The title of " primate " was occasionally conferred on metro-politans of sees of great dignity or importance, such as Canterbury, York, Rouen, &c, whose cathedral churches remained simply metropolitical. Lyons, where the cathedral church is still known as " La Primatiale," and Lund in Sweden, may be cited as instances of churches which were really primatial. Lyons had the archbishops of Sens and Paris and their provincial dioceses subject to it till the Revolution, and Lund had the archbishop of Upsala and his province subject to it. As with the title of primate, so also that of " patriarch " has been conferred on sees such as Venice and Lisbon, the cathedral churches of which are patriarchal in name alone. The cathedral church of St John Lateran, the cathedral church of the pope as bishop of Rome and patriarch of the West, alone in western Europe possesses potentially a patriarchal character. Its formal designation is " Patriarchate Basilica, Sacrosancta Romana Cathcdralis Ecclesia Lateranensis."

The removal of a bishop's cathedra from a church deprives that church of its cathedral dignity, although often the name clings in common speech, as for example at Antwerp, which was deprived of its bishop at the French Revolution.

The history of the body of clergy attached to the cathedral church is obscure, and as in each case local considerations affected its

development, all that can be attempted is to give a general outline of the main features which were more or less common to all. Originally the bishop and cathedral clergy formed a kind of religious community, which, in no true sense a monastery, was nevertheless often called a monasterium. The word had not the restricted meaning which it afterwards acquired. Hence the apparent anomaly that churches like York and Lincoln, which never had any monks attached to them,, have

inherited the name of minster or monastery. In these early communities the clergy often lived apart in their own dwellings, and were not infrequently married. In the 8th century, however, Chrodegang, bishop of Metz (743-766), compiled a code of rules for the clergy of the cathedral churches, which, though widely accepted in Germany and other parts of the continent, gained little acceptance in England. According to Chrodegang's rule the cathedral clergy were to live under a common roof, occupy a common dormitory and submit to the authority of a special officer. The rule of Chrodegang was, in fact, a modification of the Benedictine rule. Gisa, a native of Lorraine, who was bishop of Wells from 1061 to 1088, introduced it into England, and imposed its observance on the clergy of his cathedral church, but it was not followed for long there, or elsewhere in England.

During the two centuries, roughly bounded by the years 900 and 1 100, the cathedral clergy became more definitely organized, and were also divided into two classes. One was that of a monastic establishment of some recognized order of monks, very often that of the Benedictines, while the other class was that of a college of clergy, living in the world, and bound by no vows, except those of their ordination, but governed by a code of statutes or canons. Hence the name of " canon " given to them. In this way arose the distinction between the monastic and secular cathedral churches. In England the monastic cathedral churches were Bath, Canterbury, Carlisle, Coventry, Durham, Ely, Norwich, Rochester, Winchester and Worcester, all of them Benedictine except Carlisle, which was a church of Aug'ustinians, The secular churches were Chichester, Exeter, Hereford, Lichfield, Lincoln, St Paul's (London), Salisbury, Wells, York, and the four Welsh cathedral churches. In Ireland all were secular except Christ Church, Dublin (Augustinian), and Down (Benedictine), and none, even in their earliest days, were ever, it is believed, churches of recognized orders of monks, except the two named. In Scotland St Andrew's was Augus- tinian, Elgin (or Moray), Glasgow and Aberdeen were always secular, and ordered

on the models of Lincoln and Salisbury. Brechin had a community of Culdees till 1372, when a secular chapter was constituted. The cathedral church of Galloway, at Whithorn, of English foundation, was a church of Praemon- stratensians. In Germany, as in England, many of the cathedral churches were monastic. In Denmark all seem to have been Benedictine at first, except Borglum, which was Praemon- stratensian till the Reformation. The others were changed to churches of secular canons. In Sweden, Upsala was originally Benedictine, but was secularized about 1250, and it was ordered that each of the cathedral churches of Sweden should have a chapter of at least fifteen secular canons. In France monastic chapters were very common, but nearly all the monastic cathedral churches there had been changed to churches of secular canons before the 17th century. One of the latest to be so changed was that of Seez, in Normandy, which was Augustinian till 1547, when Pope Paul III. dispensed the members from their vows, and constituted them a chapter of secular canons. The chapter of Senez was monastic till 1647, and others perhaps even later, but the majority were secularized about the time of the Reformation.

In the case of monastic cathedral churches there were no dignitaries, the internal government was that of the order to which the chapter belonged, and all the members kept perpetual residence. The reverse of this was the case with the secular chapters; the dignities of provost, dean, precentor, chancellor, treasurer, &c, soon came into being, for the regulation and good order of the church and its services, while the non-residence of the canons, rather than their perpetual residence, became the rule, and led to their duties being performed by a body of " vicars," who officiated for them at the services of the church.

Abroad, the earliest head of a secular church seems to have been the provost (praepositus, Probst, &c), who was charged, not only with the internal regulation of the church, and oversight of the members of the chapter and control of the services, but was also the steward or seneschal of the lands and possessions of the church. The latter often mainly engaged his attention,

to the neglect of his domestic and ecclesiastical duties, and complaints were soon raised that the provost was too much

mixed in worldly affairs, and was too frequently absent from his spiritual duties. This led, in many cases, to the institution of a new officer called the " dean," who had charge of that portion of the provost's duties which related to ths internal discipline of the chapter and the services of the church. In some cases the office of provost was abolished, but in others it was continued, the provost, who was also occasionally archdeacon as well, remaining head of the chapter. This arrangement was most commonly followed in Germany. In England the provost was almost un- known. Bishop Gisa introduced a provost as head of the chapter of Wells, but the office was afterwards subordinated to the other dignities, and the provost became simply the steward of certain of the prebendal lands. The provost of the collegiate church of Beverley was the most notable instance of such an officer in England, but at Beverley he was an external officer with no authority in the government of the church, no stall in the choir and no vote in chapter. The provost of Eton, introduced by Henry VI., occupied a position most nearly approaching that of a foreign cathedral provost. In Germany and in Scandinavia, and in a few of the cathedral churches in the south of France, the provost was the ordinary head of the cathedral chapterˆ but the office was not common elsewhere. As regards France, of one hundred and thirty-six cathedral churches existing at the Revolution, thirty-eight only, and those either on the borders of Germany or in the extreme south, had a provost as the head of the chapter. In others the provost existed as a subordinate officer. There were two provosts at Autun, and Lyons and Chartres had four each, all as subordinate officers.

The normal constitution of the chapter of a secular cathedral church comprised four dignitaries (there might be more), in addition to the canons. The dean (decanus) seems to have derived his designation from the Benedictine dean who had ten monks under his charge. The dean, as already noted, came into existence to supply the place of the provost in the internal manage- ment of the church and chapter. In England the dean was the head of all the secular cathedral churches, and was originally elected by the chapter and confirmed in office by the bishop. He is president of the chapter, and in church has charge of the due performance of the services, taking specified portions of them by statute on the principal festivals. He sits in the chief stall in the choir, which is usually the first on the right hand on enter- ing the choir at the west. Next to the dean (as a rule) is the precentor {primicerius, cantor, &c), whose special duty is that of

regulating the musical portion of the services He presides in the dean's absence, and occupies the corresponding stall on the left side, although there are exceptions to this rule, where, as at St Paul's, the archdeacon of the cathedral city ranks second and occupies what is usually the precentor's stall. The third dignitary is the chancellor (scholasticus, icoldtre, capiscol, magistral, &c), who must not be confounded with the chancellor of the diocese. The chancellor of the cathedral church is charged with the oversight of its schools, ought to read divinity lectures, and superintend the lections in the choir and correct slovenly readers. He is often the secretary and librarian of the chapter. In the absence of the dean and precentor he is president of the chapter. The easternmost stall, on the dean's side of the choir, is usually assigned to him. The fourth dignitary is the treasurer (custos, sacrista, cheficier). He is guardian of the fabric, and of all the furniture and ornaments of the church, and his duty was to provide bread and wine for the eucharist, and candles and incense, and he regulated such matters as the ringing of the bells. The treasurer's stall is opposite to that of the chancellor. These four dignitaries, occupying the four corner stalls in the choir, are called in many of the statutes the " quatuor majores personae " of the church. In many cathedral churches there were additional dignitaries, as the praelector, subdean, vice-chancellor, succentor-canonicorum, and others, who came into existence to supply the places of the other absent dignitaries, for non-residence was the fatal blot of the secular churches, and in this they contrasted very badly with the

monastic churches, where all the members were in continuous residence. Besides the dignitaries there were the ordinary canons, each of whom, as a rule, held a separate prebend or endowment, besides receiving his share of the common funds of the church. For the most part the canons also speedily became non-resident, and this led to the distinction of resi- dentiary and non-residentiary canons, till in most churches the number of resident canons became definitely limited in number, and the non-residentiary canons, who no longer shared in the common funds, became generally known as prebendaries only, although by their non-residence they did not forfeit their position as canons, and retained their votes in chapter like the others. This system of non-residence led also to the institution of vicars choral, each canon having his own vicar, who sat in his stall in his absence, and when the canon was present, in the stall immediately below, on the second form. The vicars had no place

or vote in chapter, and, though irremovable except for offences, were the servants of their absent canons whose stalls they occupied, and whose duties they performed. Abroad they were often called demi-prebendaries, and they formed the has chceur of the French churches. As time went on the vicars Were themselves often incorporated as a kind of lesser chapter, or college, under the supervision of the dean and chapter.

There was no distinction between the monastic cathedral chapters and those of the secular canons, in their relation to the bishop or diocese. In both cases the chapter was the bishop's consilium which he was bound to consult on all important matters and without doing so he could not act. Thus, a judicial decision of a bishop needed the confirmation of the chapter before it could be enforced. He could not change the service books, or " use " of the church or diocese, without capitular consent, and there are many episcopal acts, such as the appointment of a diocesan chancellor, or vicar general, which still need confirmation by the chapter, but the older theory of the chapter as the bishop's council in ruling the diocese has become a thing of the past, not in England only, but on the continent also. In its corporate capa- city the chapter takes charge sede vacante of a diocese. In Eng- land, however (except as regards Salisbury and Durham), this custom has never obtained, the two archbishops having, from time immemorial, taken charge of the Vacant dioceses in their respec- tive provinces. When, however, either of the sees of Canterbury or York is vacant;' the chapters of those churches take charge, not only of the diocese, but of the province as well, and incidentally, therefore, of any of the dioceses of the province which may be vacant at the same time.

All the English monastic cathedral chapters were dissolved by Henry VIII., and, except Bath and Coventry, were refounded by him as churches of secular chapters, with a dean as the head, and a certain number of canons ranging from twelve at Canterbury and Durham to four at Carlisle, and with certain subordinate officers as minor canons, gospellers, epistolers, &c. The precentor- ship in these churches of the "New Foundation," as they are called, is not, as in the secular churches of the " Old Foundation," a dignity, but is merely an office held by one of the minor canons.

English cathedral churches, at the present day, may be classed under four heads: (i) the old secular cathedral churches of the " Old Foundation," enumerated in the earlier part of this article;

(2) the churches of the ” New Foundation ” of Henry VIII. , which are the monastic churches already specified, with the exception of Bath and Coventry; (3) the cathedral churches of bishoprics founded by Henry VIII., viz. Bristol, Chester, Gloucester, Oxford and Peterborough (the constitution of the chapters of which corresponds to those of the New Foundation) ; (4) modern cathedral churches of sees founded since 1836, viz. (a) Manchester, Ripon and Southwell, formerly collegiate churches of secular canons; (b) St Albans and South wark, originally monastic churches; (c) Truro, Newcastle and Wakefield, formerly parish churches, (d) Birmingham and Liverpool, originally district churches. The ruined cathedral church of the diocese of Sodor (i.e. the Southern Isles) and Man, at Peel in the latter island, appears never to have had a chapter of clergy attached to it.

AUTHORiTlES.-*-Frances, De ecdesiis cathedraUbus (Venice, 1698) ; Bordenave. L’Estat des eglises cathedrales (Paris, 1643) ; Van Espen, Supplement III., cap. 5 ; Hericourt, Les Loix ecclesiastiques de France (Paris, 1756); La France ecclesiastique (Paris, 1790); Daugaard, OmdeDanskeKlostre i Middelalderen (Copenhagen, 1830) ; Hinschius, Das Kirchenrecht der Katholiken u. Protestanten in Deutschland, u. (Berlin, 1878); Walcott, Cathedralia (London, 1865); Freeman, Cathedral Church of Wells (London, 1870); Benson, The Cathedral (London, 1878); Bradshaw and Wordsworth, Lincoln Cathedral Statutes (Camb., 1894). (T. M. F.)

Architecture— From the architectural point of view there is no special treatment as regards dimensionsrbr style for a cathedral other than that required for a church or abbey, as there are cases when the former are comparatively small buildings (like the old cathedral at Athens), and some parish churches and abbeys are larger than many cathedrals. In recent times, indeed, some English abbeys or minsters, such as those of Ripon, Manchester,

St Albans and

Southwell, partly on account of their dimensions, have been raised to the rank of cathedrals, in consequence of the demand for additional sees ; others, such as those of Bristol, Gloucester,

Ox- ford, Chester and Peterborough, be- came cathedrals only on the dis- solution of the monasteries by Henry VIII.

Underthe head- ings Nave, Aisle, Choir, Apse, Chevet, and Lady-Chapel, the principal arrange- ments of the plan of a cathedral are dealt with, and its architectural features-, such as TowERandSpiRE, Porch, Trifor- ium, Clerestory and Vault, are separately de- fined; while in the article Architec- ture the evolution of the various styles in England, France, Germany, Italy and Spain, is set forth. It is only necessary here to deal with the development of the eastern end of English and foreign cathedrals, as it was in those that the greatest changes from the middle of the nth century to the close of the 1 6th century took place.

The earliest extended development of the eastern end of the cathedral is that which was first set out in Edward the Confessor's church at Westminster, probably borrowed from the ancient church of St Martin at Tours; in this church, dating probably from the 10th century, two new elements are found, (1) the carry- ing of the choir aisle round a circular apse so as to provide a processional aisle round the eastern end of the church, and (2) five apsidal chapels, constituting the germ of the chevet, which transformed the eastern terminations of the French cathedrals in the 12th and 13th centuries. It is only within recent times that the foundations of the early church at Tours with its choir aisle and chapels have been traced under the existing church.

Fig. 1. — Plan of Canterbury Cathedral.

In Edward the Confessor's church (1050) there were probably only three chapels and a processional aisle; in the next example at Gloucester (1089) were also three chapels, two of which, on the north and south sides of the aisle, still remain; the same is found in Canterbury (1096-1107) and Norwich (1089-1119), the eastern chapel in all three cases having been taken down to make way for the Lady-chapel in Gloucester and Norwich, and for the Trinity chapel in Canterbury cathedral (fig. 1). The semicircular aisle is said to have existed in the Anglo-Norman cathedral of Winchester, but the eastern end being square, two chapels were arranged filling the north and south ends, and an apsidal chapel projecting beyond the east wall. This semi- circular processional aisle with chevet chapels was the favourite type of plan in the Anglo-Norman cathedrals, and was followed up to about the middle of the 12th century, when the English builders in some

cases returned to the square east end instead of the semicircular apsidal termination. The earliest example of this exists in Romgey Abbey (c. 1 130), where the processional

mm

Fig. 2. — Plan of Salisbury Cathedral.

path crosses behind the presbytery, there being eastern apsidal chapels in the axis of the presbytery aisle and a central rectangular chapel beyond. A similar arrangement is found in Hereford cathedral, and exists in Winchester, Salisbury (fig. 2), Durham, St Albans, Exeter, Ely, Wells and Peterborough, except that in all those cases (except Wells) the eastern chapels are square ended; in Wells cathedral the most eastern chapel (the Lady- chapel) has a polygonal termination; in Durham (fig. 3), the eastern chapels are all in one line, constituting the chapel of the nine altars, which was probably borrowed from the eastern end of Fountains Abbey. It should be noted that in some of the above the original design has been transformed in rebuilding; thus in St Albans, Durham, York and Exeter cathedrals, there was no eastern ambulatory but three parallel apses, in some cases rectangular externally. In Southwell, Rochester, Ely and Chester, there was no processional path or ambulatory round the east end; in Carlisle no eastern chapels; and in Oxford only one central apse. In Ely cathedral (fig. 4) the great central tower built by the first Norman abbot (108 2- 1094) fell down in 132 1, carrying with it portions of the adjoining bays of the nave, transept and choir; instead of attempting to rebuild the tower.

Alan of Walsingham conceived the idea of obtaining a much larger area in the centre of the cathedral, and instead of rebuilding the piers of the tower he took as the base of his design a central octagonal space, the width of which was equal to that of nave and aisles, with wide arches to nave, transepts and choir, and smaller arches across the octagonal sides; from shafts in the eight pier angles, ribs in wood project forward and carry a smaller octagon on which the lantern rests. Internally the effect of this central octagon is of great beauty and originality, and it is the only instance of such a feature in English Gothic architecture. (See Architecture, Plate VIII., fig. 82.)

The earliest example of the chevet is probably to be found in the church of St Martin at Tours; this was followed by others

From Rickman's Styles oj Architecture.

Fig. 3. — Plan of Durham Cathedral.

at Tournus, Clermont-Ferrand, Auxerre, Chartres, Le Mans and other churches built during the great church-building period of the nth century. In the still greater movement in the 1 2th century, when the episcopacy, supported by the eman- cipated communes, undertook the erection of cathedrals of greater dimensions and the reconstruction of others, in some cases they utilized the old foundations, as in Chartres (fig. 5), Coutances and -Auxerre cathedrals, while in others (as at Le Mans) they extended the eastern termination, much in the same way as in many of the early examples in England, with this important difference, that when the apsidal east end was given up (about the middle of the 1 2th century) in favour of the square east end in England, the French, on the other hand, developed it by doubling the choir aisles and adding to the number of extra chapels; thus in Canterbury, Norwich and Gloucester, there were only three apsidal chapels in the chevet, whereas in Noyon (1150), Soissons (noo), Reims (1212), Tours, Seez, Bayeux (1230), Clermont (1275), Senlis, Limoges, Albi and Narbonne cathedrals there were five; in Amiens, Le Mans and Beauvais, there were seven apsidal chapels, and in Chartres cathedral nine. Double aisles round the choir, of which there

are no examples in England, are found in the cathedrals of Paris, Bourges arid Le Mans; the cathedral of Sens (fig. 6) (1144-1168) possesses one feat- ure which is almost unique, viz. the coupled columns of the alternate bays of nave and choir and of the apse; and these were introduced into the chapel of the Trinity in Canter- bury cathedral, probably from the designs of William of Sens, by his suc- cessor William the * Englishman. The square east end found no favour in Fra nee — Laon, Poiters and Dol be- ing the only cathe- dral examples; and of the triapsal arrangement, viz. with apses in the axes of the choir aisle and a central apse, the only ex- ample is that of the cathedral of Autun. The immense de- velopment given to

the eastern limb _ ,,, ,.,,.,,.

of the French Fig. 4 .-Plan of Ely Cathedral.

cathedrals was some- times obtained at the expense of the nave, so that, notwithstanding the much greater dimensions compared with English examples, in the latter the naves are much longer and consist of more bays than those in France.

In one of the French cathedrals, Bourges, there is no transept; on the other hand there are many examples in which this part of the church is emphasized by having aisles on each side, as at Laon, Soissons, Chartres, Reims, Amiens, Rouen and Clermont cathe- drals. Transept aisles in England are found in Ely, York, Wells and Winchester cathe- drals, in the last being carried round the south and north ends of the transept; aisles on the east side of the transept only, in some cases probably for

Fig. 5. — Plan of Chartres Cathedral.

additional altars, exist in Durham, Salisbury, Lichfield, Peter- borough and Ripon cathedrals; and on the north side only in Hereford cathedral. In Rouen cathedral, east of the transept aisles, there are apsidal chapels, which with the three chapels in the chevet make up the usual number. The cathedral of Poitiers has been referred to as an example of a square east end, but a sort of compromise has been made by the provision of three segmental apses, and there are no windows in the east front; the most remarkable divergence from the usual design is found here in the absence of any triforium or clerestory, owing to the fact that the vault of the aisles is nearly as high as that of the nave, so that it constitutes an example of what in Germany (where there are many) are called H alien Kirchen; the light being obtained through the aisle windows only gives a gloomy effect to the nave. Another departure from the usual plan is that found in Albi cathedral (1350), in which there are no aisles, their place being taken by chapels between the buttresses which were required to resist the thrust of the nave vault, the widest in France. The cathedral is built in brick and externally has the appearance of a fortress. In the cathedrals of the south- west of France, where the naves are covered with a series of domes — as at Cahors, Angouleme and St Front de Perigueux —

Fig. 6. — Plan of Sens Cathedral.

FlG. 7. — Plan of Angouleme Cathedral.

the immense piers required to carry them made it necessary to dispense with aisles. The cathedral of Angouleme (fig. 7) consists of a nave covered with three domes, a transept of great length with lofty towers over the north and south ends, and an apsidal choir with four chevet chapels. In St Front de Perigueux (1150), based on St Mark's at Venice, the plan consists of nave, transept and choir, all of equal dimensions, each of them, as well as the crossing, vaulted over with a dome, while qriginally there was a simple apsidal choir.

Returning now to the great cathedrals in the north of France, we give an illustration (fig. 8) of Amiens cathedral (from Viollet le Due's Dictionnaire raisonne) which shows the disposition of a cathedral, with its nave-arches, triforium, clerestory windows and vault, the flying buttresses which were required to carry the thrust of the vault to the outer buttresses which flanked the aisle walls, and the lofty pinnacles which surmounted them. In this case there was no triforium gallery, owing to the greater height given to the aisles. In Notre Dame at Paris the triforium was nearly as high as the aisles; in large towns this feature gave increased accommodation for the congregation, especially on the occasion of great fetes, and it is found in Noyon, Laon, Senlis and Soissons cathedrals, built in the latter part of the 12th century; later it was omitted, and a narrow passage in the thickness of the wall only represented the triforium; at a still later period the aisles were covered with a stone

pavement of slight fall so as to allow of loftier clerestory windows.

The cathedrals in Spain follow on the same lines as those in France. The cathedral of Santiago de Compostela is virtually a copy of St Sernin

at Toulouse, con- \J\ ˆf?

sistfng of nave and aisles, tran- septs and aisles, and a choir with chevet of five chapels; at Leon there is a chevet with five apsidal chapels, and at Toledo an east end with double aisles round the apse with originally seven small apsi- dal chapels, two of them rebuilt at a very late period. At Leon, Barce- lona and Toledo the processional passage round the apse with apsidal chapels recalls the French disposi- tion, there being a double aisle around the

latter, but in Leon and Toledo cathedrals the east end is masked externally by other buildings, so that the beauty of the chevet is entirely lost. At Avila and Salamanca (old cathedral) the triapsal arrangement is adopted, and the same is found in the German cathedrals, with one important excep- tion, the cathedral of Cologne, which was based on that of Amiens, the comparative height of the former, however, being so exaggerated that scale has been lost, and externally it has the appearance of an overgrown monster.

Under the headings Vault, Flying Buttress, Pinnacle, Clerestory and Triforium, definitions are given of these chief components of a cathedral or church; but as their design varies materially in almost every example, without a very large number of drawings it would be impossible to treat them more in detail. The perspective view, taken from Viollet le Due's dictionary, of the interior of the nave of Amiens cathedral illustrates the principal features, viz. the vault (in this case quadripartite, with flying buttresses and pinnacle), the triforium (in this case limited to a narrow passage in the thickness of the wall), and the nave-arches,, with the side aisles, beneath the windows of which is the decorative arcade. (R. P. S.)

CATHELINEAU, JACQUES (1759-1793), French Vendean chieftain during the Revolution, was born at Tin-en-Manges, in the country now forming the department of Maine-et-Loire. He became well known in the country of Anjou, over which he travelled as a pedlar and dealer in contraband goods. His physical strength and his great piety gave him considerable ascendancy over the peasants, who surnamed him " the saint of Anjou." In the first years of the Revolution, Cathelineau listened to the exhortations of Catholic priests and royalist emigres, and joined the insurrection provoked by them against the revolutionary government. Collecting a band of peasants and smugglers, he took the chateau of Gallais, where he cap- tured a cannon, christened by the Vendeans the " Missionary "; he then took the towns of Chemille, Cholet, Vihicrs and Chalonnes (March 1793). His companions committed atrocities which brought upon them terrible reprisals on the part of the

Fig. 8. — Perspective of Amiens Cathedral.

Republicans. Meanwhile Cathelineau's troops increased, and he combined with the other Vendean chiefs, such as N. Stofflet and Gigot d'Elbee, taking the towns of Beaupreau, Fontenay and Saumur. The first successes of the Vendeans were due to the fact that the Republicans had not expected an insurrection. When the resistance to the insurgents became more serious, differences arose among their leaders. To avoid these rivalries, it is thought that Cathelineau was named generalissimo of the rebels, though his authority over the undisciplined troops was not increased by the new office. In 1793 all the Royalist forces tried to capture Nantes. Cathelineau entered the town in spite of the resistance of General J. B. C. Canclaux, but he was killed, and the Vendean army broke up. Numerous relatives of Cathelineau also perished in the war of La Vendee. His grandson, Henri de Cathelineau, figured in the war of 1870 between France and Germany (see also Vendee; Chouans).

See C Port, Vie'deJ. Cathelineau (1882) ; " La Legende de Cathelineau " in the review La Revolution francaise, vol. xxiv. ; Les Origines de la' Vendee (Paris, 1888, 2 vols.); Dictionnaire historique de Maine-et- Loire; Cretineau-Joly, Histoire de la Vendee militaire; Th. Muret, Vie populaire de Cathelineau (1845). (R. A.*)

CATHERINE, SAINT. The Roman hagiology contains the record of six saints of this name. 1. St Catherine of Alex- andria, Virgin and Martyr, whose day of commemoration recurs on the 25th of November, and in some places on the 5th of March. 2. St Catherine or Sweden, a daughter of St Bridget, who died abbess of Watzen in March 138 1, and is commemorated on the 22nd of that month. 3. St Catherine or Siena, 1347- 1380, whose festal day is observed on the 30th of April. 4. St Catherine op Bologna, 1413-1463, a visionary, abbess of the convent of the Poor Clares in Bologna, canonized by Pope Benedict XIII. , and commemorated throughout the Franciscan order on the 9th of March. 5. St Catherine or Genoa, 1 who belonged to the noble family of Fieschi, was born about 1447 , spent her life and her means in succouring and attending on the sick, especially in the time of the plague which ravaged Genoa in 1497 and 1 501, died in that city in 1510, was beatified by Clement V. in 1675 and canonized by Clement XII. in 1737; her name was placed in the calendar on the 22 nd of July by Benedict XIV. 6. St Catherine de' Ricci, of Florence, daughter of a wealthy merchant prince, was born in 1522, became a nun in the convent of the Dominicans at Prato in 1536, and died in 1589. She was famous during her life-

time for the weekly ecstasy of the Passion, during which in a trance she experienced the sufferings of the Holy Virgin contemplating the Passion of her Son. She was canonized in 1746 by Benedict XIV., who fixed her festal day on the 13 th of February. In Celtic and English martyrologies (November 2 5) there is also commemorated St Catherine Audley (c. 1400), a recluse of Ledbury, Hereford, who was reputed for piety and clairvoyance.

Of two of these saints, St Catherine of Alexandria, the St Catherine par excellence, and St Catherine of Siena, something st more must be said. Of the former history has little or

Catherine, nothing to tell. The Maronite scholar, Joseph Simon virgin and Assemani (1687-1768), first identified her with the ™ yr ‘ royal and wealthy lady of Alexandria (Eusebius, Hist. Eccl. viii. 14) who, for refusing the solicitations of the emperor Maximinus, was deprived of her property and banished. But Rufinus {Hist. Eccl. viii. 17) called this lady Dorothea, and the old Catherine legend, as recorded in the Roman martyrology and by Simeon Metaphrastes, has quite other features. Accord- ing to it Catherine was the daughter of King Konetos, eighteen years old, beautiful and wise. During the persecution under Maximinus she sought an interview with the emperor, upbraided him for his cruelties, and adjured him to give up the worship of false gods. The angry tyrant, unable to refute her arguments himself, sent for pagan scholars to argue with her, but they were discomfited. Catherine was then scourged and cast into prison, and the empress was sent to reason with her; but the dauntless virgin converted not only the empress but the Roman

1 See the study in Baron Fr. von Hugel’s Mystical Element in Religion (1909).

general and his soldiers who had accompanied her. Maximinus now ordered her to be broken on the wheel; but the wheel was shattered by her touch. The headsman’s axe proved more fatal, and the martyr’s body was borne by angels to Mount Sinai, where Justinian I. built the famous monastery in her honour. Another development of the legend is that in which, having rejected many offers of marriage, she was taken to heaven in vision and betrothed to Christ by the Virgin Mary.

Of all these marvellous incidents very little, by the universal admission of Catholic scholars, has survived the test of modern

criticism. That St Catherine actually existed there is, indeed, no evidence to disprove; and it is possible that some of the elements in her legend are due to confusion with the story of Hypatia (?.! >.), the neo-pla tonic philosopher of Alexandria, who was done to death by a Christian mob. To the men of the middle ages, in any case, St Catherine was very real; she was ranked with the fourteen most helpful saints in heaven, and was the constant theme of preachers and of poets. Her festival was celebrated in many places with the utmost splendour, and in certain dioceses in France was a holy day of obligation as late as the beginning of the 17 th century. Numberless chapels were dedicated to her, and in nearly all churches her statue was set up, the saint being repre- sented with a wheel, her instrument of torture, and sometimes with a crown and a book. The wheel being her symbol she was the patron saint of wheelwrights and mechanics; as the confounder of heathen sophistry she was invoked by theologians, apologists, preachers and philosophers, and was chosen as the patron saint of the university of Paris; as the most holy and illustrious of Christian virgins she became the tutelary saint of nuns and virgins generally. So late as the 16th century, Bossuet delivered,a panegyric upon her, and it was the action of Dom Deforis, the Benedictine editor of his works, in criticizing the accuracy of the data on which this was based, that first dis- credited the legend. The saint's feast was removed from the Breviary at Paris about this time, and the devotion to St Catherine has since lost its earlier popularity. See Leon Clugnet's article in the Catholic Encyclopaedia, vol. iii. (London, 1908).

St Catherine of Siena was the youngest of the twenty-five children of Giacomo di Benincasa, a dyer, and was born, with a twin-sister who did not survive her birth, on the st 25th of Sfarch 1347. A highly sensitive and imagin- Catherine ative child, she very early began to practise asceticism o/sle '"- and see visions, and at the age of seven solemnly dedicated her virginity to Christ. She was attracted by what she had heard of the desert anchorites, and in 1363-1364, after much struggle, persuaded her parents to allow her to take the habit of the Dominican tertiaries. For a while she led at home the life of a recluse, speaking only to her confessor, and spending all her time in devotion and spiritual ecstasy. Her innate humanity and sound sense, however, led her gradually to return to her place in the family circle, and she began also to seek out and help the poor and the sick. In 1368 her father died, and she assumed the care of her mother Lapa. During the following years she became known to an increasingly

wide circle, especially as a peacemaker, and entered into correspondence with many friends. Her peculiarities excited suspicion, and charges seem to have been brought against her by some of the Dominicans to answer which she went to Florence in 1374, soon returning to Siena to tend the plague-stricken. Here first she met the Dominican friar, Raimondo of Capua, her confessor and biographer.

The year 1375 found Catherine entering on a wider stage. At the invitation of Piero Gambacorti, the ruler of the republic of Pisa, she visited that city and there endeavoured to arouse enthusiasm for the proposed crusade, urging princes and presi- dents, commanders and private citizens alike to join in " the holy passage." To this task was added that of trying to keep Pisa and Lucca from joining the Tuscan League against the pope. It was at Pisa, in the church of Santa Cristina, on the fourth Sunday in Lent (April 1), while rapt in ecstasy after the communion, that Catherine's greatest traditional glory befell her, viz. the stigmata or impression on her hands, feet and heart, of the wounds corresponding with those received by Christ at his

crucifixion. The marks, however, were at her prayer not made visible. There is no need to doubt the reality of Catherine's exaltation, but it should be remembered that she and her circle were Dominicans, and that the stigmata of St Francis of Assisi were considered the crowning glory of the saint, and hitherto the exclusive boast of the Franciscans. The tendency observable in many of the austerities and miracles attributed to St Catherine to outstrip those of other saints, particularly Francis, is especially remarkable in this marvel of the stigmata, and so acute became the rivalry between the two orders that Pope Sixtus IV., himself a Franciscan, issued a decree asserting that St Francis had an exclusive monopoly of this particular wonder, and making it a censurable offence to represent St Catherine receiving the stigmata.

In the year 1376, the 29th of Catherine's life, Gregory XI. was living and holding the papal court at Avignon. He was the last of seven French popes in succession who had done so, and had perpetuated for seventy-three years what ecclesiastical writers are fond of terming "the Babylonian captivity of the church." To

put an end to this absenteeism, and to bring back the papacy to Italy was the cherished and anxious wish of all good Italians, and especially of all Italian churchmen. Petrarch had urgently pressed Urban V., Gregory's immediate predecessor, to accomplish the desired change; and Dante had at an earlier date laboured to bring about the same object. But these and all the other influences which Italy had striven to bring to bear on the popes had hitherto failed to induce them to return. In these circumstances Catherine determined to try her powers of persuasion and argument, attempting first by correspondence to reconcile Gregory and the Florentines, who had been placed under an interdict, and then going in person as the representative of the latter to Avignon, where she arrived on the 18th of June. Gregory empowered her to treat for peace, but: the Florentine ambassadors were first tardy and then faithless. Nothing daunted, Catherine herself besought Gregory, who, indeed, was himself so minded, to return, and he did so, in September (taking the sea route from Marseilles to Genoa), though perhaps intending only to make a temporary stay in Italy. Catherine went home by land and stayed for a month in Genoa with Madonna Orietta Scotti, a noble lady of that city, at whose house Gregory had a long colloquy with her, which encouraged him to push on to Rome. To this year, 1376, belongs the admission to Catherine's circle of disciples of Stefano di Corrado Maconi, a Sienese noble distinguished by a character full of charm and purity, and her healing of the bitter feud between his family and the Tolomei. Another family quarrel, that of the Salimbeni at Rocca D'Orcia, was ended by her intervention in 1377. This year also she turned the castle of Belcaro, which had been given to her, into a monastery.

Meanwhile the returned pope was not having an easy time. Besides perpetuating the strife with his enemies he was alienating his friends, and finding it increasingly difficult to pay his mer- cenaries. He vented his anger upon Catherine, who reproved him for minding temporal rather than spiritual things, but in the beginning of 1378 sent her on an embassy to Florence and especially to the Guelph party. While she was urging the citizens to make peace with the pope there came the news of his death. During the troubles that ensued in Florence Catherine nearly lost her life in a popular tumult, and sorely regretted not winning her heart's desire, " the red rose of martyrdom." Peace was signed with the new pope, Urban VI., and Catherine, having thus accomplished her second great political task, went home

again to Siena. Thence on the outbreak of the schism Urban summoned her to Rome, whither, somewhat reluctantly, she journeyed with her now large spiritual family in November. Once arrived she gave herself heartily to Urban's cause, and wore her slender powers out in restraining his impatient temper, quieting the revolt of the people of Rome, and trying to win for Urban the support of Europe. After prolonged and continual suffering she died on the 29th of April 1380.

Catherine of Siena lived on not only in her writings but in her dis- ciples. During her short course she gathered round her a devoted

company of menand women trained to labour for the reformation of the individual, the church and the state. , Her death naturally broke up the fellowship, but its members did not cease their activity and kept up what mutual correspondence was possible. Among them were.Fra Raimondo, who became master-general of the Dominicans, William Flete, an ascetically-minded Englishman from Cambridge, Stefano Maconi, who joined the Carthusians and ultimately became prior-general, and the two secretaries, Neri di Landoccio and Fran- cesco Malavolti. The last of her band, Tommaso Caffarini, died in 1434, but the work Was taken up, though in other shape, by Savon- arola, between Francis of Assisi and whom Catherine forms the connecting link.

Catherine's works consist of (1) a treatise occupying a closely-printed quarto volume, which Fra Raimondo describes as "a dialogue between a soul, which asked four questions of the Lord, and the same Lord, who made answer and gave instruction in many most useful truths," (2) letters, and (3) prayers. The dialogue is entitled, The Book of Divine Doctrine, given in person by God the Father, speaking to the mind of the most glorious and holy virgin Catherine of Siena, and written down as she dictated it in the vulgar tongue, she being- the while entranced, and actually hearing what God spoke in her. The work is declared to have been dictated by the saint in her father's house in Siena, a little before she went to Rome, and to have been completed on the 13th of October 1378. The book opens with a passage on the essence of mysticism, the union of the soul with God in love, and the bulk of it is a compendium of the spiritual teachings scattered throughout her letters. There is more monologue than dialogue. The book has a significant place in the history of Italian literature. " In a language which is singularly poor in mystical works it stands with the Divina Commedia as one of the two

supreme attempts to express the eternal in the symbolism of a day, to paint the union of the soul with the supra-sensible while stiHimprisoned in the flesh." The prayers (twenty-six in all) are mostly mystical outpourings repeating the aspirations found in her other writings. Of more interest are the letters, nearly four hundred in number, and addressed to kings, popes, cardinals, bishops, con- ventual bodies, political corporations and private individuals. Their historical importance, their spiritual fragrance and their literary value combine to put their author almost on a level with Petrarch as a 14th century letter-writer. Her language is the purest Tuscan of the golden age of the Italian vernacular, and with sponr taneous eloquence she passes to and fro between spiritual counsel, domestic advice and political guidance.

Authorities.— The sources for the personal life of Catherine of Siena are (1) the Vita or Legenda, Fra Raimondo's biography written 1384-1395, first published in Latin at Cologne, 1553, and widely translated; (2) the Processus, a collection of testimonies and letters by those of her followers who survived in 141 1, and had to justify the reverence paid to the memory of one yet uncanonized; (3) the Supplementum to Raimondo's Vita, compiled by Tommaso Caffarini in 1414; (4) the Legenda abbreviata, Caffarini's summary of the Vita, translated into beautiful Italian by Stefano Maconi; (5) the Letters, of which the standard edition is that of Girolamo Gigli (2 vols., Siena, 1713, Lucca, 172 1). A selection of these has been published in English by V. D. Scudder (London, 1905). A complete biblio- graphy is given in E. G. Gardner's Saint Catherine of Siena (London, 1907), a monumental study dealing with the religion, history and literature of the 14th century in Italy as they centre " in the work and personality of one of the most wonderful women that have ever lived."

CATHERINE I. (1683-1727), empress of Russia. The true character and origin of this enigmatical woman were, until quite recently, among the most obscure problems of Russian history. It now appears that she came of a Lithuanian stock, and was one of the four children of a small Catholic yeoman, Samuel Skovronsky; but her father died of the plague while she was still a babe, the family scattered, and little Martha was adopted by Pastor Gliick, the Protestant superintendent of the Marienburg district. Frau Gluck finally rid herself of the girl by marrying her to a Swedish dragoon called Johan. A few months later, the Swedes were compelled by the Russians to evacuate Marienburg, and Martha became one of the prisoners of war of Marshal Sheremetev, who

sold her to Prince Menshikov, at whose house, in the German suburb of Moscow, Peter the Great first beheld and made love to her in his own peculiar fashion. After the birth of their first daughter Catherine, Peter made no secret of their relations. He had found, at last, the woman he wanted, and she soon became so indispensable to him that it was a torment to be without her. The situation was regulated by the reception of Martha into the Orthodox Church, when she was rechristened under the name of Catherine Alekseyevna, the tsarevich Alexius being her godfather, by the bestowal upon her of the title Gosudaruinya or sovereign (17 10),

and, finally (1711), by her public marriage to the tsar, who divorced the tsaritsa Eudoxia to make room for her. Henceforth the new tsaritsa was her husband's inseparable companion. She was with him during the campaign of the Pruth, and Peter always attributed the successful issue of that disastrous war to the courage and sang-froid of his consort. She was with him, too, during his earlier Caspian campaigns, and was obliged on this occasion to shear off her beautiful hair and wear a close-fitting fur cap to protect her from the rays of the sun.

By the ukaz of 1722 Catherine was proclaimed Peter's suc- cessor, to the exclusion of the grand-duke Peter, the only son of the tsarevich Alexius, and on the 7th of May 1724 was solemnly crowned empress-consort in the Uspensky cathedral at Moscow, on which occasion she wore a crown studded with no fewer than 2564 precious stones, surmounted by a ruby, as large as a pigeon's egg, supporting a cross of brilliants. Within a few months of this culminating triumph, she was threatened with utter ruin by the discovery of a supposed liaison with her gentleman of the bedchamber, William Mons, a handsome and unscrupulous upstart, and the brother of a former mistress of Peter. A danger- ously familiar but perfectly innocent flirtation is, however, the worst that can fairly be alleged against Catherine on this occasion. So Peter also seemed to have thought, for though Mons was decapitated and his severed head, preserved in spirits, was placed in the apartments of the empress, she did not lose Peter's favour, attended him during his last illness, and closed his eyes when he expired (January 28, 1725). She was at once raised to the throne by the party of progress, as

represented by Prince Menshikov and Count Tolstoy, whose interests and perils were identical with those of the empress, before the reactionary party had time to organize opposition, her great popularity with the army powerfully contributing to her success. The arch-prelates of the Russian church, Theodosius, archbishop of Novgorod, and Theophanes, archbishop of Pskov, were also oil her side for very much the same reason, both of them being unpopular innovators who felt that, at this crisis, they must stand or fall with Tolstoy and Menshikov.

The great administrative innovation of Catherine's reign was the establishment of the Verkhomy Tainy Sovyet, or supreme privy council, by way of strengthening the executive, by concentrating affairs in the hands of a few persons, mainly of the party of Reform (Ukazoi February 26, 1726). As to the foreign policy of Catherine I. (principally directed by the astute Andrei Osterman) , if purely pacific and extremely cautious, it was, never- theless, dignified, consistent and independent. Russia, by the mere force of circumstances, now found herself opposed to Eng- land, chiefly because Catherine protected Charles Frederick, duke of Holstein, and George I. found that the Schleswig-Holstein question might be reopened to the detriment of his Hanoverian possessions. Things came to such a pass that, in the spring of 1726, an English squadron was sent to the Baltic and cast anchor before Reval. The empress vigorously protested, and the fleet was withdrawn, but on the 6th of August Catherine acceded to the anti-English Austro-Spanish league. Catherine died on the 16th of May 1727. Though quite illiterate, she was an un- commonly shrewd and sensible woman, and her imperturbable good nature under exceptionally difficult circumstances, testifies equally to the soundness of her head and the goodness of her heart.

See Robert Nisbet Bain, The Pupils of Peter the Great, chs. ii.-iii. (London, 1807): The First Romanovs, ch. xiv. (London, 1905). v (R. N. B.)

CATHERINE II. (1720-1796), empress of Russia, was the daughter of Christian Augustus, prince of Anhalt-Zerbst, and his wife, Johanna Elizabeth of Holstein-Gottorp. The exact date and place of her birth have been disputed, but there appears to be no reason to doubt that she was right in saying that she was born at Stettin on the 2nd of May 1729. Her father, who succeeded to the principality of Anhalt-Zerbst in 1746 and died in 1747, was a general in th* Prussian service, and, at the time of her birth, was military command? nv at Stettin. Her baptismal name was Scphia

Augusta Frederic?.. In accordance

with the custom then prevailing in German princely families, she was educated chiefly by French governesses and tutors. In 1744 she was taken to Russia, to be affianced to the grand- duke Peter, the nephew of the empress Elizabeth (q.v.) , and her recognized heir. The princess of Anhalt-Zerbst was the daughter of Christian Albert, bishop of Liibeck, younger brother of Frederick IV., duke of Holstein-Gottorp, Peter's paternal grand- father. The choice of her daughter as wife of the future tsar was the result of not a little diplomatic management in which Frederick the Great took an active part, the object being to strengthen the friendship between Prussia and Russia, to weaken the influence of Austria and to ruin the chancellor Bestuzhev, on whom Elizabeth relied, and who was a known partisan of the Austrian alliance. The diplomatic intrigue failed, largely through the flighty intervention of the princess of Anhalt- Zerbst, a clever but very injudicious woman. But Elizabeth took a strong liking to the daughter, and the marriage was finally decided on. The girl bad spared no effort to ingratiate herself, not only with the empress, but with the grand-duke and the Russian people. She applied herself to learning the language with such zeal that she rose at night and walked about her bedroom barefoot repeating her lessons. The result was a severe attack of congestion of the lungs in March 1744. During the worst period of her illness she completed her conquest of the good-will of the Russians by declining the religious services of a Protestant pastor, and sending for Simon Todorskiy, the orthodox priest who had been appointed to instruct her in the Greek form of Christianity. When she wrote her memoirs she represented herself as having made up her mind when she came to Russia to do whatever had to be done, and to profess to believe whatever she was required to believe, in order to be qualified to wear the crown. The consistency of her character throughout life makes it highly probable that even at the age of fifteen she was mature enough to adopt this worldly-wise line of conduct. Her father, who was a convinced Lutheran, was strongly opposed to his daughter's conversion, and supplied her with books of controversy to protect her Protestantism. She read them, and she listened to Todorskiy, and to other advisers who told her that the Russian crown was well Worth a mass, or that the differences between the Greek and Lutheran churches were mere matters of form. On the 28th of June 1744 she was received into the Orthodox Church at Moscow, and was renamed Catherine Alexeyevna. On the

following day she was formally betrothed, and was married to the archduke on the 21st of August 1745 at St Petersburg.

At that time Catherine was essentially what she was to remain till her death fifty-one years later. It was her boast that she was as " frank and original as any Englishman." If she meant that she had a compact character, she was right. She had decided on her line in life and she followed it whole-heartedly. It was her determination to become a Russian in order that she might the better rule in Russia, and she succeeded. She acquired a full command of all the resources of the language, and a no less complete understanding of the nature of the Russian people. It is true that she remained quite impervious to religious in- fluences. The circumstances of her conversion may have helped to render her indifferent to religion, but their influence need not be exaggerated. Her irreligion was shared by multitudes of contemporaries who had never been called upon to renounce one form of Christianity and profess belief in another in order to gain a crown. Her mere actions were, like those of other and humbler people, dictated by the conditions in which she lived. The first and the most important of them was beyond all question the misery of her married fife. Her husband was a wretched creature. Nature had made him mean, the smallpox had made him hideous, and his degraded habits made him loathsome. And Peter had all the sentiments of the worst kind of small German prince of the time. He had the conviction that his princeship entitled him to disregard decency and the feelings of others. He planned brutal practical jokes, in which blows had always a share. His most manly taste did not rise above the kind of military interest which has been defined as " corporal's

mania," the passion for uniforms, pipeclay, buttons, the " tricks of parade and the froth of discipline." He detested the Russians, and surrounded himself with Holsteiners. For ten years the marriage was barren, and the only reason for supposing that the future tsar Paul (g.v.), who was born on the 2nd of October 1754, was the son of Peter, is the strong similarity of their characters. Living in the grossly animal court of the empress Elizabeth, bound to a husband whom she could not but despise and detest, surrounded by suitors, and entirely uninfluenced by religion, Catherine became and remained perfectly immoral in her sexual

relations to men. The scandalous chronicle of her life was the commonplace of all Europe. Her male favourites were as openly paraded as the female favourites of King Louis XV. It may be said once and for all that her most trusted agents while she was still grand-duchess, and her chief ministers when she became empress, were also her lovers, and were known to be so.

For some time after the marriage, the young couple were controlled by the empress Elizabeth, who appointed court officials to keep a watch on their conduct; but before long these custodians themselves had become the agents of Catherine's pleasures and ambition. After the birth of Paul she began to take an active part in political intrigues. Her abilities forced even her husband to rely on her judgment. When in difficulty he ran to her and flattered her with the name of Madame La Ressource — Madame Quick Wit — which did not prevent him from insulting and even kicking her when the immediate need of her help was over. In 1 7 58 he endeavoured to turn the empress Elizabeth against her, and for a time Catherine was in danger. She faced the peril boldly, and reconquered her influence over the sovereign, but from this time she must have realized that when the empress was dead she would have to defend herself against her husband. That Peter both hated and dreaded her was notorious. The empress Elizabeth died on the 5th of January 1762. The grand duke succeeded without opposition as Peter III. His behaviour to his wife continued to be brutal and menacing, and he went on as before offending the national sentiment of the Russian people. In July he committed the insane error of retiring with his Hol- steiners to Oranienbaum, leaving his wife at St Petersburg. On the 13th and 14th of that month a " pronunciamiento " •of the regiments of the guard removed him from the throne and made Catherine empress. The history of this revolt is still obscure. It has naturally been said that she organized the mutiny from the first, and some plausibility is conferred on this belief by the fact that the guards were manipulated by the four Orlov brothers. The eldest, Gregory, was her recognized chief lover, and he was associated with his brother Alexis in the office of favourite. On the other hand, there does not appear to have been any need for organization. The hatred felt for Peter III. was spontaneous, and Catherine had no need to do more than let it be known that she was prepared to profit by her husband's downfall. Peter, who behaved with abject cowardice, was sent to a country house at Ropcha, where he died on the 15 th or 18th of July of official " apoplexy." The truth is

not known, and Frederick the Great at least professed long afterwards to believe that Catherine had no immediate share in the murder. She had no need to speak. Common-sense must have shown the leaders of the revolt that they would never be safe while Peter lived, and they had insults to avenge.

The mere fact that Catherine II., a small German princess without hereditary claim to the throne, ruled Russia from 1762 to 1796 amid the loyalty of the great mass of the people, and the respect and admiration of her neighbours, is sufficient proof of the force of her character. Her title to be considered a great reforming ruler is by no means equally clear. Voltaire and the encyclopaedists with whom she corresponded, and on whom she conferred gifts and pensions, repaid her by the grossest flattery, while doing their best to profit by her generosity. They made her a reputation for " philosophy," and showed the sincerity of their own love of freedom by finding excuses for the partition of Poland. There is a very great difference between Catherine II. as she appears in the panegyrics of the encyclopaedists and Catherine as she appears in her correspondence and in her acts.

Her foreign admirers amused her, and were useful in spreading her reputation. The money they cost her was a small sum in comparison to the £12,000,000 she lavished on her long series of lovers, who began with Soltykov and Stanislaus Poniatowski (q.v.) before she came to the throne, and ended with the youthful Platon Zubov, who was tenant of the post at her death. She spent money freely on purchasing works of art and curios. Yet she confessed with her usual candour that she had no taste for painting, sculpture or music. Her supposed love of literature does not appear to have amounted to more than a lively curiosity, which could be satisfied by clipping into a great number of books. She had a passion for writing, and produced not only a mass of letters written in French, but pamphlets and plays, comic and serious, in French and Russian. One on the history of Oleg, the more or less legendary Varangian, who was guardian to the son of Rurik, was described by her as an " imitation of Shakespeare." The scheme is not unlike that of a " chronicle play." Her letters are full of vivacity, of colour, and at times of insight and wit, but she never learnt to write either French or German correctly. The letters to Voltaire attributed to her are not hers, and were probably composed for her by Andrei Shuvalov. The philosophers and encyclopaedists who, by the mouth of Diderot, complimented Catherine on being superior to such female affectations as modesty and chastity, flattered her to some extent

even here. She enforced outward decency in her house- hold, was herself temperate in eating and drinking, and was by no means tolerant of disorderly behaviour on the part of the ladies of her court. They flattered her much more when they dwelt on her philanthropy and her large share of the enlightenment of the age. She was kind to her servants, and was very fond of young children. She was rarely angry with people who merely contradicted her or failed to perform their service in her household. But she could order the use of the knout and of mutilation as freely as the most barbarous of her predecessors when she thought the authority of the state was at stake, and she did employ them readily to suppress all opinions of a heterodox kind, whether in matters of religion or of politics, after the beginning of the French Revolution. Her renowned toleration stopped short of allowing the dissenters to build chapels, and her passion for legislative reform grew cold when she found that she must begin by the emancipation of the serfs. There were exceptions even to her personal kindness to those about her. She dropped her German relations. She kept a son born to her shortly before the palace revolution of 1762, whose paternity could not be attributed to Peter, at a distance, though she provided for him. He was brought up in a private station under the name of Bobrinski. She was a harsh mother to her son Paul. It seems highly probable that she intended to exclude him from the succession, and to leave the crown to her eldest grandson Alexander, afterwards the emperor Alexander I. Her harshness to Paul was probably as much due to political distrust as to what she saw of his character. Whatever else Catherine may have been she was emphatically a sovereign and a politician who was in the last resort guided by the reason of state. She was resolved not to allow her authority to be disputed by her son, or shared by him. As a ruler, Catherine professed a great contempt for system, which she said she had been taught to despise by her master Voltaire. She declared that in politics a capable ruler must be guided by " circumstances, conjectures and conjunctions." Her conduct was on the surface very unstable. In a moment of candour she confessed that she was a great commenceuse — that she had a mania for beginning innumerable enterprises which she never pursued. This, however, is chiefly true of her internal administration, and even there it should be qualified. Many of her beginnings were carried on by others and were not barren. Her foreign policy was as consistent as it could be considering the forces she had to contend against. It was steadily aimed to secure the greatness and the safety of Russia. There can be no

question that she loved her adopted country sincerely, and had an affection for her people, and an opinion of their great qualities which she did not hesitate to express in hyperbolical terms. Her zeal for the reputation of the Russians

was almost comically shown by the immense trouble she took to compile an answer to the Voyage en Sibirie of the French astronomer Chappe d'Auteroche. The book is in three big quartos, and Catherine's answer — which was never finished — is still larger. Chappe d'Auteroche had discovered that Siberia was not a paradise, and had observed that the Russians were dirty in their habits, and that masters whipped their servants, male and female. Her patriotism was less innocently shown by her conquests. Yet it may be doubted whether any capable ruler of Russia could have abstained from aggressions at the expense of the rights of the Saxon family in Courland, of Poland, and of Turkey (see Russia: History). It does seem now to be clearly proved that the partition of Poland was not suggested by her, as has been frequently asserted. Catherine would have preferred to control the country through a vassal sovereign of the type of Stanislaus Poniatowski, the old lover whose election she secured in 1763. Poland was incapable of maintaining its independence at the time of the first partition (1772), and the division of the unhappy country was forced on by Austria and Prussia. In the case of the second partition in 1793, she did show herself to be very unscrupulous. Her opposition to the reform of the Polish government was plainly due to a wish to preserve an excuse for further spoliation, but her conduct was less cruel and base than that of Prussia.

Catherine had adhered to her husband's policy of a Prussian alliance. While Frederick the Great lived she was impressed by his ability. But the Prussian alliance became hateful to her, and her later correspondence with Grimm overflows with contempt of his successor Frederick William II., who is always spoken of by her as " Brother Gu." Her exasperation with the affectations of the Prussian king was unquestionably increased by her discovery that he would not be induced to apply himself to a crusade against the French Revolution, which by employing all his forces would have left Russia free to annex the whole of what remained of Poland. But at least she did not enter into a solemn engagement to defend the Poles who were engaged in reforming their constitution, and then throw them over in order to share in the plunder of their country.

Catherine's Turkish policy was at first marked by a certain grandiosity. When the Turks declared war in 1768 in order to support Poland, which they looked upon as a necessary buffer state, she retaliated by the great Greek scheme. For a time it was a pet idea with her to revive the Greek empire, and to plant the cross,with the double-headed Russian eagle, at Constantinople. She formed a corps of Greek cadets, caused her younger grandson to be christened Constantine, and began the policy of presenting Russia to the Christian subjects of the Porte as their deliverer. In pursuit of this heroic enterprise, which excited the loud admiration of Voltaire, she sent a fleet under Alexis Orlov into the Mediterranean in 1770. Orlov tempted the Greeks of the Morea to take up arms, and then left them in the lurch. When Catherine found herself opposed by the policy of France and England, and threatened by the jealousy of Prussia and Austria, she dropped the Greek design, observing to Voltaire that the descendants of the Spartans were much degenerated. The introduction into the treaty of Kuchuk-Kainarji of 1774 of a clause by which the Porte guaranteed the rights of its Christian subjects, 'and of another giving Russia the right to interfere on behalf of a new Russian church in Constantinople, advertised the claim of the tsars to be the natural protectors of the Orthodox in the Ottoman dominions; but when she took up arms again in 1788 in alliance with Joseph II. (q.v.), it was to make a mere war of conquest and partition. The Turkish wars show the weak side of Catherine as a ruler. Though she had mounted the throne by a military revolt and entered on great schemes of conquest, she never took an intelligent interest in her army. She neglected it in peace, allowed it to be shamefully administered in war, and

could never be made to understand that it was not in her power to improvise generals out of her favourites. It is to her credit that she saw the capacity of Suvarov, yet she never had as much confidence in him as she had in Potemkin, who may have been a man of genius, but was certainly no general. She

took care never to have to deal with a disciplined opponent) except the Swedes, who beat her, but who were very few.

It was the misfortune of Catherine that she lived too long. She disgraced herself by living with her last lover, Zubov, when she was a woman of sixty-seven, trusting him with power and lavishing public money on him. The outbreak of the French Revolution stripped off the varnish of philosophy and philanthropy which she had assumed in earlier years. She had always enter* tained aquiet contempt for the French writers whom she flattered and pensioned, and who served her as an advertising agency in the west. When the result of their teaching was seen in Paris, good-natured contempt was turned to hatred. She then became a persecutor in her own dominions of the very ideas she had encouraged in former years. She scolded and preached a crusade, without, however, departing from the steady pursuit of her own interests in Poland, While endeavouring with transparent cunning to push Austria and Prussia into an invasion of France with all their forces. Her health began to break down, and it appears to be nearly certain that towards the end she suffered from hysteria of a shameful kind. It is plain that her intellect had begun to: fail just before her death, for she allowed the reigning favourite, Platon Zubov, to persuade her to despatch his brother Valerian, with the rank of field marshal and an army of 20,000 men, on a crack-brained scheme to invade India by way of Persia and Tibet. The refusal of the king of Sweden to marry into her family unless- the bride would become a Lutheran is said to have thrown her iaito a convulsion of rage which hastened her death. On the 9th of November 1796, she was seized by a fit of apoplexy, and died on the evening of the 10th.

All other accounts of Catherine II. have been superseded by Waliszewski's two volumes, Le Roman d'uneimperatrice (Paris, 1893) and Autour d'un Trone: Catherine II., ses collaborateurs, ses amis, ses favoris (Paris, 1894). The original sources for the history of her policy and her character are to be found in the publications of the Imperial Russian Historical Society, vols, i.-cix. (St Petersburg), begun in 1867; her private and official correspondence will be found in vols, i., ii., iv., v., vi., vii., viii.,

ix., x., xiii., xiv., xv., xvii., xx., xxiii., xxxii., xxxiii., xxxvi., xlii., xliii., xlvii., xlviii., Ii., lvii., lxvii., lxviii., lxxxvii., xcvii., xcviii., cvii., cxv., cxviii.

CATHERINE DE' MEDICI (1510-1589), queen of France, the wife of one French king and the mother of three, was born at Florence in 1519. She was a daughter of Lorenzo II. de' Medici and a French princess/Madeleine de la Tour d'Auvergne. Having lost both her parents at an early age, Catherine was sent to a convent to be educated; and she was only fourteen when she was married (1533) at Marseilles to the duke of Orleans, after- wards Henry II. It was her uncle, Pope Clement VII., who arranged the marriage with Francis I. Francis, still engaged in his lifelong task of making head against Charles V., was only too glad of the opportunity to strengthen his influence in the Italian peninsula, while Clement, ever needful of help against his too powerful protector, was equally ready to hold out a bait. During the reign of Francis, Catherine exercised no in- fluence in France. She was young, a foreigner, a member of a state that had almost no weight in the great world of politics, had not given any proof of great ability, and was thrown into the shade by more important persons. For ten years after her marriage she had no children. In consequence, a divorce began to be talked of at court; and it seemed not impossible that Francis, alarmed at the possible extinction of the royal house, might listen to such a proposal. But Catherine had the happiness of bringing him grandchildren ere he died. During the reign of her husband, too (1547-1559), Catherine lived a quiet and passive, but observant life. Henry being completely under the influence of his mistress, Diane de Poitiers, she had little authority. In 1552, when the king left the kingdom for the campaign of Metz, she was nominated regent, but with very limited powers. This continued even after the accession of her son Francis II. Francis was under the spell of Mary Stuart, and she, little disposed to meddle with politics on her own account, was managed by her uncles, the cardinal of Lorraine and the duke of Guise. The queen-mother, however, soon grew weary of the domination of the Guises, and entered upon a course of secret opposition. On the 1st of April 1560 she placed in the

chancellorship Michel de l'Hopital (q.v.), who advocated the

policy of conciliation.

On the death of Francis (5th of December 1560), Catherine became regent during the minority of her second son, Charles IX., and now found before her a career worthy of the most soaring ambition. She was then forty-one years old, but, although she was the mother of nine children, she was still very vigorous and active. She retained her influence for more than twenty years in the troubled period of the wars of religion. At first she listened to the moderate counsels of l'Hdpital in so far as to avoid siding definitely with either party, but her character and the habits of policy to which she had been accustomed, rendered her incapable of any noble aim. She had only one virtue, and that was her zeal for the interests of her children, especially of her favourite third son, the duke of Anjou. Like so many of the Italians of that time, who were almost destitute of a moral sense, she looked upon statesmanship in particular as a career in which finesse, lying and assassination were the most admirable, because the most effective weapons. By habit a Catholic, but above all things fond of power, she was determined to prevent the Protestants from getting the upper hand, and almost equally resolved not to allow them to be utterly crushed, in order to use them as a counterpoise to the Guises. This trimming policy met with little success: rage and suspicion so possessed men's minds, that she could no longer control the opposing parties, and one civil war followed another to the end of her life. In 1 567, after the " Enterprise of Meaux," she dismissed l'Hopital and joined the Catholic party. But, having failed to crush the Piotestant rebellion by arms, she resumed in 1570 the policy of peace and negotiation. She con- ceived the project of marrying her favourite son, the duke of Anjou, to Queen Elizabeth of England, and her daughter Margaret to Henry of Navarre. To this end she became reconciled with the Protestants, and allowed Coligny to return to court and to re-enter the council. Of this step she quickly repented. Charles IX. conceived a great affection for the admiral and showed signs of taking up an independent attitude. Catherine, thinking her influence menaced, sought to regain it, first by the murder of Coligny, and, when that had failed, by the massacre of St Bartholo- mew (q.v.). The whole of the responsibility for this crime, therefore, rests with Catherine; unlike the populace, she had not even the excuse of fanaticism. This responsibility, however, weighed but lightly on her; while her son was overwhelmed with remorse, she calmly enjoyed her short-lived triumph. After the death of Charles in 1574, and the

succession of Anjou under the name of Henry III., Catherine pursued her old policy of compromise and concessions; but as her influence is lost in that of her son, it is unnecessary to dwell upon it. She died on the 5th of January 1589, a short time before the assassination of Henry, and the consequent extinction of the House of Valois. In her taste for art and her love of magnificence and luxury, Catherine was a true Medici; her banquets at Fontainebleau in 1564 were famous for their sumptuousness. In architecture especially she was well versed, and Philibert de l'Orme relates that she discussed with him the plan and decoration of her palace of the Tuileries. Catherine's policy provoked a crowd of pamph- lets, the most celebrated being the Discours merveilleux de la vie, actions et deportemens de la reine Catherine de MSdicis, in which Henri Estienne undoubtedly collaborated.

See Lettres de Catherine de Medicis, edited by Hector de la Ferriere (Paris, 1880, seq.) , in the Collection de documents inedits sur Vhistoire de France; A. von Reumont, Die Jugend Caterinas de' Medici (1854; French translation by A. Baschet, 1866); H. Bouchot, Catherine de Medicis (Paris, 1899). For a more complete biblio- graphy see Ernest Lavisse, Histoire de France (vol. v., by H. Le- monnier, and vol. vi., by J. H. Mariejol, 1904-1905). See also Miss E. Sichel's books, Catherine de' Medici and the French Reformation (1905), and The Later Years of Catherine de' Medici (1908).

CATHERINE OF ARAGON (1485-1536), queen of Henry VIII. of England, daughter of Ferdinand and Isabella of Spain, was born on the 15th or 16th of December 1485. She left Spain in 1 501 to marry Arthur, prince of Wales, eldest son of King Henry VII., and landed at Plymouth on the 2nd of October. The wed-

ding took place on the 14th of November in London, and soon afterwards Catherine accompanied her youthful husband to Wales, where, in his sixteenth year, the prince died on the 2nd of April 1502. On the 25 th of June 1503, she was formally betrothed to the king's second son, Henry, now prince of Wales, and a papal dispensation for the alliance was obtained. The marriage, however, did not take place during the lifetime of Henry VII. Ferdinand endeavoured to cheat the English king of the marriage portion agreed upon, and Henry made use of the presence of the unmarried princess in England to extort new conditions, and especially to secure the marriage of his daughter Mary to the archduke Charles, grandson of Ferdinand, and after-

wards Charles V. Catherine was thus from the first the unhappy victim of state politics. Writing to Ferdinand on the 9th of March 1509, she describes the state of poverty to which she was reduced, and declares the king's unkindness impossible to be borne any longer. 1 On the old king's death, however, a brighter prospect opened, for Henry VIII. decided immediately on marrying her, the wedding taking place on the nth of June and the coronation on the 24th. Catherine now enjoyed a few years of married happiness; Henry showed himself an affectionate husband, and the alliance with Ferdinand was maintained against France. She was not without some influence in state affairs. During Henry's invasion of France in 15.13 she was made regent; she showed great zeal and ardour in the preparations for the Scottish expedition, and was riding towards the north to put herself at the head of the troops when the victory of Flodden Field ended the campaign. The following year an affectionate meeting took place between the king and queen at Richmond on the return of the former. Ferdinand's treachery, however, in making a treaty with France roused Henry's wrath, and his angry reproaches fell upon his unfortunate wife; but she took occasion in 1520, during the visit of her nephew Charles V. to England, to urge the policy of gaining his alliance rather than that of France. Immediately on his departure, on the 31st of May 1520, she accompanied the king to France, on the celebrated visit to Francis I., called from its splendour the Field of the Cloth of Gold; but in 1522 war was declared against France and the emperor again welcomed to England. In 1521 she is represented by Shakespeare as pleading for the unfortunate duke of Buckingham.

These early years of happiness and of useful influence and activity had, however, been gradually giving way to gloom and disappointment. Between January 1510 and November 1518 Catherine gave birth to six children (including two princes), who were all stillborn or died in infancy except Mary, born in 15 16, and rumour did not fail to ascribe this series of disasters to the curse pronounced in Deuteronomy on incestuous unions. In 1526 the condition of Catherine's health made it highly improb- able that she would have more children. No woman had ever reigned in England, alone and in her own right, and to avoid a fresh dispute concerning the succession, and the revival of the civil war, a male heir to the throne was a pressing necessity. The act of marriage, which depended for its validity on the decision of the ecclesiastical courts, had, on account of the numerous

dissolutions and dispensations granted, not then attained the security since assured to it by the secular law. For obtaining dissolutions of royal marriages the facilities were especially great. Pope Clement VII. himself permitted such a dissolution in the case of Henry's own sister Margaret, in 1528, proposed later as a solution of the problem that Henry should be allowed two wives, 2 and looked not unfavourably, with the same aim, on the project for marrying the. duke of Richmond to Mary, a brother to a sister. 3 In Henry's case also the irregularity of a union, which is still generally reprobated and forbidden in Christendom, and which it was very doubtful that the pope had the power to legalize, provided a moral justification for a dissolu- tion which in other cases did not exist. It was not therefore the immorality of the plea which obstructed the papal decree in

1 Cal. of State Pap., England and Spain, i. 469.

2 Letters and Papers, iv. 6627, 6705, and app. 261.

3 lb. iv. 5072.

Henry's favour, but the unlucky imprisonment at this time of Clement VII. at the hands of Charles V., Catherine's nephew, which obliged the pope, placed thus "between the hammer and the anvil," to pursue a policy of delay and hesitation. Nor was the immorality of Henry's own character the primary cause of the project of divorce. Had this been so, a succession of mis- tresses would have served as well as a series of single wives. The real occasion was the king's desire for a male heir. But, however clear this may be, the injustice done to Catherine was no less cruel and real. Rumours, probably then unfounded, of an intended divorce had been heard abroad as early as 1524. But the creation in 1525 of the king's illegitimate son Henry, as duke of Richmond — the title borne by his grandfather Henry VII — and the precedence granted to him over all the peers as well as the princess Mary, together with the special honour paid at this time by the king to his own half-sister Mary, were the first real indications of the king's thoughts. In 1526, and perhaps earlier, Wolsey had been making tentative inquiries at Rome on the subject. In May 1527 a collusive and secret suit was begun before the cardinal, who, as legate, summoned the king to defend himself from the charge of

cohabitation with his brother's wife; but these proceedings were dropped. On the 22nd of June Henry informed Catherine that they had been living in mortal sin and must separate. During Wolsey's absence in July at Paris, where he had been commissioned to discuss vaguely the divorce and Henry's marriage with Renee, daughter of Louis XII., Anne Boleyn is first heard of in connexion with the king, his affection for her having, however, begun probably as early as 1523, and the cardinal on his return found her openly installed at the court. In October 1528 the pope issued a commission to Cardinal Campeggio and Wolsey to try the cause in England, and bound himself not to revoke the case to Rome, confirming his promise by a secret decretal commission which, however, was destroyed by Campeggio. But the trial was a sham. Campeggio was forbidden to pronounce sentence without further reference to Rome, and was instructed to create delays, the pope assuring Charles V. at the same time that the case should be ultimately revoked to Rome. 1

The object of all parties was now to persuade Catherine to enter a nunnery and thus relieve them of further embarrassment. While Henry's envoys were encouraged at Rome in believing that he might then make another marriage, Henry himself gave Catherine assurances that no other union would be contemplated in her lifetime. But Catherine with courage and dignity held fast to her rights, demanded a proper trial, and appealed not only to the bull of dispensation, the validity of which was said to be vitiated by certain irregularities, but to a brief granted for the alliance by Pope Julius II. Henry declared the latter to be a forgery, and endeavoured unsuccessfully to procure a declaration of its falsity from the pope. The court of the legates accordingly opened on the 31st of May 1529, the queen appearing before it on the 18th of June for the purpose of denying its jurisdiction. On the 21st both Henry and Catherine presented themselves before the tribunal, when the queen threw herself at Henry's feet and appealed for the last time to his sense of honour, recalling her own virtue and helplessness. Henry replied with kindness, showing that her wish for the revocation of the cause to Rome was unreasonable in view of the paramount influence then exercised by Charles V. on the pope. Catherine nevertheless persisted in making appeal to Rome, and then withdrew. After her departure Henry, according to Cavendish, Wolsey's biographer, praised her virtues to the court. " She is, my lords, as true, as obedient, as conformable a wife as I could in my

phantasy wish or desire. She hath all the virtues and qualities that ought to be in a woman of her dignity or in any other of baser estate." On her refusal to return, her plea was overruled and she was adjudged contumacious, while the sittings of the court continued in her absence. Subsequently the legates paid her a private visit of advice, but were unable to move her from her resolution. Finally, however, in July 1529, the case was, according to her wish, and as the result of the treaty of Barcelona x Cal. of State Pap., England and Spain, iii. pt. ii. 779.

and the pope's complete surrender to Charles V., revoked by the pope to Rome: a momentous act, which decided Henry's future attitude, and occasioned the downfall of the whole papal authority in England. On the 7th of March 1530 Pope Clement issued a brief forbidding Henry to make a second marriage, and ordering the restitution of Catherine to her rights till the cause was determined; while at the same time he professed to the French ambassador, the bishop of Tarbes, his pleasure should the marriage with Anne Boleyn have been already made, if only it were not by his authority. 2 The same year Henry obtained opinions favourable to the divorce from the English, French and most of the Italian universities, but unfavourable answers from Germany, while a large number of English peers and ecclesiastics, including Wolsey and Archbishop Warham, joined in a memorial to the pope in support of Henry's cause.

Meanwhile, Catherine, while the great question remained unsolved, was still treated by Henry as his queen, and accompanied him in his visits in the provinces and in his hunting expeditions. On the 31st of May 1531 she was visited by thirty privy councillors, who urged the trial of the case in England, but they met only with a firm refusal. On the 14th of July Henry left his wife at Windsor, removing himself to Woodstock, and never saw her again. In August she was ordered to reside at the Moor in Hertfordshire, and at the same time separated from the princess Mary, who was taken to Richmond. In October she again received a deputation of privy councillors, and again refused to withdraw the case from Rome. In 1532 she sent the king a gold cup as a new year's gift, which the latter returned, and she was forbidden to hold any communication with him. Alone and helpless in confronting Henry's absolute power, her cause found champions and sympathizers among the people, among the court preachers, and in the House of Commons, while Bishop Fisher had openly taken her part in the legatine trial. Subsequently Catherine was removed to Bishops Hatfield, while Henry and Anne B oleyn

visited Francis I. Their marriage, anticipating any sentence of the nullity of the union with Catherine, took place after their return about the 25 th of January 1 533, in consequence of Anne's pregnancy. On the 10th of May Cranmer, for whose consecration as archbishop of Canterbury Henry had obtained bulls from Rome, opened his court, and declared on the 23rd the nullity of Catherine's marriage and the validity of Anne's. On the 10th of August the king caused proclamation to be made forbidding her the style of queen ; but Catherine refused resolutely to yield the title for that of princess- doWager. Not long afterwards she was removed to Buckden in Huntingdonshire. Here her household was considerably reduced, and she found herself hemmed in by spies, and in fact a prisoner. In July she had refused Henry the loan of a certain rich cloth, which had done service at the baptism of her children, for the use of Anne Boleyn's expected infant; and on the birth of Elizabeth and the refusal of Mary to give up the title of princess, the latter's household was entirely dismissed and she herself reduced to the position of attendant in Elizabeth's retinue. A project for removing Catherine from Buckden to Somersham, an unhealthy solitude in the isle of Ely, with a still narrower maintenance, was only prevented by her own determined resist- ance. The attempt in November to incriminate the queen in connexion with Elizabeth Barton failed. She passed her life now in religious devotions, taking strict precautions against the possibility of being poisoned. On the 23rd of March 1534 the pope pronounced her marriage valid, but by this time England had thrown off the papal jurisdiction, the parliament had trans- ferred Catherine's jointure to Anne Boleyn, and the decree had no effect on Catherine's fortunes. She refused to swear to the new act of succession, which declared her marriage null and Anne's infant the heir to the throne, and soon afterwards she was re- moved to Kimbolton, where she was well treated. On the 21st of May she was visited by the archbishop of York and Tunstall, bishop of Durham, who threatened her with death if she per- sisted in her refusal, but only succeeded in confirming her re- solution. She was kept in strict seclusion, separated from Mary 5 Cal. of State Pap., Foreign and Dom., iv. 6290.

and from all outside communications, and in December 1535 her health gave way, her death taking place on the 8th of January 1536, not without suspicions of poison, which, however, may be dismissed. She was buried by the king's order in Peterborough

cathedral. Before her death she dictated a last letter to Henry, according to Polydore Vergil, expressing her forgiveness, begging his good offices for Mary, and concluding with the astounding assurance — " I vow that mine eyes desire you above all things." The king himself affected no sorrow at her death, and thanked God there was now no fear of war.

Catherine is described as " rather ugly than otherwise; of low stature and rather stout; very good and very religious; speaks Spanish, French, Flemish, English; more beloved by the islanders than any queen that has ever reigned." She was a woman of considerable education and culture, her scholarship and knowledge of the Bible being noted by Erasmus, who dedicated to her his book on Christian Matrimony in 1526. She endured her bitter and undeserved misfortunes with extra- ordinary courage and resolution, and at the same time with great womanly forbearance, of which a striking instance was the compassion shown by her for the fallen Wolsey.

Bibliography. — See the article in Diet, of Nat. Biog. by J. Gairdner, and those on Henry VIII. and Wolsey, where the case is summed up very adversely to Henry, and The Divorce of Catherine of Aragon, by J. A. Froude (1891), where it is regarded from the contrary aspect ; Henry VIII., by A. F. Pollard (1905); Cambridge Mod. History (1903), ii. 416 et seq. and bibliographies, p. 789; The Wives of Henry VIII., by M. Hume (1905). (P. C. Y.)

CATHERINE OF BRAGANZA (1638-1705), queen consort of Charles II. of England, daughter of John IV. of Portugal, and of Louisa de Gusman, daughter of the duke of Medina Sidonia, was born on the 15/25 of November 1638 at Villia Vicosa. She was early regarded as a useful medium for contracting an alliance with England, more necessary than ever to Portugal after the treaty of the Pyrenees in 1659 whereby Portugal was ostensibly abandoned by France. Negotiations for the marriage began during the reign of Charles I., were renewed immediately after the Restoration, and on the 23rd of June, in spite of Spanish opposition, the marriage contract was signed, England securing Tangier and Bombay, with trading privileges in Brazil and the East Indies, religious and commercial freedom in Portugal and two million Portuguese crowns (about £300,000) ; while Pfjftugal obtained military and naval support against Spain and liberty of worship for Catherine. She reached England on the 13th of May 1662, but was not visited by Charles at Portsmouth till the 20th.

The next day the marriage was solemnized twice, accord- ing to the Roman Catholic and Anglican usages. Catherine possessed several good qualities, but had been brought up. in a conventual seclusion and was scarcely a wife Charles would have chosen for himself. Her personal charms were not potent enough to wean Charles away from the society of his mistresses, and in a few weeks after her arrival she became aware of her painful and humiliating position as the wife of the selfish and licentious king. On the first presentation to her of Lady Castlemaine, Charles's mistress en litre, whom he insisted on making lady of her bedchamber, she fainted away. She withdrew from the king's society, and in spite of Clarendon's attempts to moderate her resentment, declared she would return to Portugal rather than consent to a base compliance. To overcome her resistance nearly the whole of her Portuguese retinue was dismissed. She was helpless, and the violence of her grief and anger soon changed to passive resistance, and then to a complete forbearance and complaisance which gained the king's regard and favour. In the midst of Charles's debauched and licentious court, she lived neglected and retired, often deprived of her due allowance, having no ambitions and taking no part in English politics, but keeping up rather her interest in her native country.

As the prospect diminished of her bearing children to Charles, several schemes were set on foot for procuring a divorce on various pretexts. As a Roman Catholic and near to the king's person Catherine was the special object of attack by the inventors of the Popish Plot. In 1678 the murder of Sir Edmund Berry Godfrey was ascribed to her servants, and Titus Oates accused

her of a design to poison the king. These charges, of which the absurdity was soon shown by cross-examination, nevertheless placed the queen for some time in great danger. On the 28th of November Oates accused her of high treason, and the Commons passed an address for her removal and that of all the Roman Catholics from Whitehall. A series of fresh depositions were sent in against her, and in June 1679 it was decided that she must stand her trial; but she was protected by the king, who in this instance showed unusual chivalry and earned her gratitude. On the 17 th of November Shaftesbury moved in the House of Lords for a divorce to enable the king to marry a Protestant and have legitimate issue; but he received little support, and the bill was opposed by Charles, who continued to show his wife "extraordinary affection." During the winter the calumnies

against the queen were revived by Fitzharris, who, however, before his execution in 1681 confessed to their falsity; and after the revival of the king's influence subsequent to the Oxford parlia- ment, the queen's position was no more assailed.

During Charles's last illness in 1685 she showed great anxiety for his reconciliation with the Romish Church, and it was probably effected largely through her influence. She exhibited great grief at his death. She afterwards resided at Somerset House and at Hammersmith, where she had privately founded a convent. She interceded with great generosity, but ineffectu- ally, for Monmouth the same year. On the 10th of June 1688 she was present at the birth of the prince of Wales and gave evidence before the council in favour of the genuineness of the child. She was still in England at the Revolution, having delayed her return to Portugal to prosecute a lawsuit against the second earl of Clarendon, formerly her chamberlain. She maintained at first good terms, with William and Mary; but the practice of her religion aroused jealousies, while her establishment at Somerset House was said to be the home of cabals against the government; and in 1691 she settled for a short time at Euston. She left England finally with a train of one hundred persons in March 1692, travelling through France and arriving at Lisbon on the 20th of January 1693. She took up her residence at the palace of Bemposta, built by herself, near Lisbon. In 1703 she supported the Methuen Treaty, which cemented still further the alliance between Portugal and England, and in 1704 she was appointed regent of Portugal during the illness of her brother King Pedro II., her administration being distinguished by several successes gained over the Spaniards. She died on the 31st of December 1705, bequeathing her great wealth, the result of long hoarding, after the payment of divers charitable legacies, to King Pedro; and was buried with great ceremony and splendour at Belem.

See L. C. Davidson, Catherine of Braganza (1908).

CATHERINE OF VALOIS (1401-1437), queen of Henry V. of England, daughter of Charles VI. of France by his wife Isabel of Bavaria, was born in Paris on the 27th of October 1401. The lunacy of her father and the depravity of her mother were serious drawbacks to Catherine, and her only education was obtained in a convent at Poissy. About 1408 a marriage was suggested between the princess and Henry, prince of Wales, afterwards Henry V., who renewed this proposal after he became king in March 1413. In addition to the hand of Catherine, however, the

English king asked for a large dowry both in money and lands, and when these demands were rejected war broke out. Once or twice during short intervals of peace the marriage project was revived, and was favoured by Queen Isabel. When peace was eventually made at Troyes in May 1420 Henry and Catherine were betrothed, and the marriage took place at Troyes on the 2nd of June 1420. Having crossed to England with Henry, the queen was crowned in Westminster Abbey on the 23rd of February 1421, and in the following December gave birth to a son, afterwards King Henry VI. She joined Henry in France in May 1422, returning to England after his death in the succeeding August. Catherine's name soon began to be coupled with that of Owen Tudor, a Welsh gentleman, and in 1428 Humphrey, duke of Gloucester, secured the passing of an act to prevent her from marrying without the

consent of the king and council. It appears, however, that by this time Catherine and Tudor were already married. They lived in obscurity till 1436, when Tudor was imprisoned, and Catherine retired to Bermondsey Abbey, where she died on the 3rd of January 1437. Her body was buried in the Lady chapel of Westminster Abbey, and when the chapel was pulled down during the reign of Henry VII., was placed in Henry V.'s tomb. It lay afterwards under the Villiers monument, and in 1878 was re-buried in Henry V.'s chantry. By Tudor Catherine had three sons and a daughter. Her eldest son by this marriage, Edmund, was created earl of Richmond in 1452, and was the father of Henry VII.

See Agnes Strickland, Lives of the Queens of England, vol. iii. (London, 1877).

CATHETUS (Gr. Kadtros, a perpendicular line), in architecture the eye of the volute, so termed because its position is determined, in an Ionic or voluted capital, by a line let down from the point in which the volute generates.

CATHOLIC (Gr. /cafloXixos, general, universal), a designation adopted in the 2nd century by the Christian Church to indicate Christendom as a whole, in contrast with individual churches. With this idea went the notions that Christianity had been

diffused throughout the whole earth by the apostles, and that only what was found everywhere throughout the church could be true. The term thus in time became full of dogmatic and political meaning, connoting, when applied to the church, a universal authoritative and orthodox society, as opposed to Gnostic and other " sects " (cf. the famous canon of Vincent of Lerins A.D. 434; quod ubique, quod semper, quod ab omnibus creditum est). The term " Catholic " does not occur in the old Roman symbol; but Professor Loofs includes it in his recon- struction, based on typical phrases in common use' at the time of the ante-Nicene creeds of the East. In the original form of the Nicene creed itself it does not occur; but in the creed of Jerusalem (348), an amplification of the Nicene symbol, we find " one Holy Catholic Church," and in the revision by Cyril of Alexandria (362) " Catholic and Apostolic Church " (see Creeds). Thus, though the word " Catholic " was late in finding its way into the formal symbols of the church, it is clear that it had long been in use in the original sense defined above. It must be borne in mind, however, that the designation " Catholic " was equally claimed by all the warring parties within the church at various times; thus, the followers of Arius and Athanasius alike called themselves Catholics, and it was only the ultimate victory of the latter that has reserved for them in history the name of Catholic, and branded the former as Arian.

With the gradual development and stereotyping of the creed it was inevitable that the term " Catholic " should come to imply a more narrowly defined orthodoxy. In the Eastern churches, indeed, the conception of the church as the guardian of " the faith once delivered to the saints " soon overshadowed that of interpretation and development by catholic consent, and, though they have throughout claimed the title of Catholic, their chief glory is that conveyed in the name of the Holy Orthodox Church. In the West, meanwhile, the growth of the power of the papacy had tended more and more to the inter- pretation of the word " catholic " as implying communion with, and obedience to, the see of Rome (see Papacy); the churches of the East, no less than the heretical sects of the West, by repudiating this allegiance, had ceased to be Catholic. This identification of " Catholic " with " Roman " was accentuated by the progress of the Reformation. The Reformers themselves, indeed, like other dissidents and reformers before them, did not necessarily repudiate the name of Catholic; they believed, in fact, in Catholicism, i.e. the universal sanction of their beliefs, as firmly as did the adherents of " the

old religion “; they included the Catholic creeds, definitions formulated by the universal church, in their service books; they too appealed, as the fathers of Basel and Constance had done, from the papal monarchy to the great ecclesiastical republic. The Church of England at least, emphasizing her own essential catholicity, retained in her translations of the ancient symbols the word

“catholic” instead of replacing it by “universal.” But the appeal to the verbally inspired Bible was stronger than that to a church hopelessly divided; the Bible, and not the consent of the universal church, became the touchstone of the reformed orthodoxy; in the nomenclature of the time, ” evangelical ” arose in contradistinction to ” Catholic,” while, in popular parlance, the ” protest ” of the Reformers against the ” corrup- tions of Rome ” led to the invention of the term ” Protestant,” which, though nowhere assumed in the official titles of the older reformed churches, was early used as a generic term to include them all.

” Catholic ” and ” Catholicism ” thus again changed and narrowed their meaning; they became, by universal usage, identified definitely with ” Romanist ” and the creed and obedience of Rome. Even in England, where the church retained most strongly the Catholic tradition, this distinction of “Protestant” and ” Catholic ” was clearly maintained, at least till the ” Catholic revival ” in the Church of England of the 19th century. On the continent of Europe the equivalent words (e.g. Ger. Katholik, Katholizismus; Fr. catholique, catholicisme) are even more definitely associated with Rome; they have lost the sense which they still convey to a considerable school of Anglicans. The dissident ” Catholic ” churches are forced to qualify their titles: they are ” Old Catholics ” {Alt-Katholiken) or ” German Catholics “■■ (Deutsch-Katholiken). The Church of Rome alone, officially and in popular parlance, is ” the Catholic Church ” (katholische Kirche, Sglise catholique), a title which she proudly claims as exclusively her own, by divine right, by the sanction of immemorial tradition, and by reason of her perpetual protest against the idea of ” national ” churches, consecrated by the Reformation (see Church History, and Roman Catholic Church).’ The additional qualification of “Roman” she tolerates, since it proclaims her doctrine of the see of Rome as the keystone of Catholicism; but to herself she is “the Catholic Church,” and her members are “Catholics.”

Yet to concede this claim and surrender without qualification the word ” Catholic ” to a connotation which is at best only universal in theory, is to beg several very weighty questions. The doctrine of the Catholic Church, i.e. the essential unity and interdependence of ” all God’s faithful people scattered throughout the world,” is common to all sections of Christians. The creed is one; it is the interpretation that differs. In a somewhat narrower sense, too, the Church of England at least has never repudiated the conception of the Catholic Church as a divinely instituted organization for the safe-guarding and proclamation of the Christian revelation. She deliberately retained the Catholic creeds, the Catholic ministry and the appeal to Catholic antiquity (see England, Church or). A large section of her members, accordingly, laying stress on this side of her tradition, prefer to call themselves ” Catholics.” But, though the invention of the terms ” Roman Catholic ” and ” Roman Catholicism ” early implied the retention by the English Church of her Catholic claim, her members were never, after the Reforma- tion, called Catholics; even the Caroline divines of the 17th century, for all their ” popish practices,” styled themselves Protestants, though they would have professed their adherence to ■” the Catholic faith ” and their belief in ” the Holy Catholic Church.”

Clearly, then, the exact meaning of the term varies according to those who use it and those to whom it is applied. To the Romanist ” Catholic ” means ” Roman Catholic “; to the high Anglican it means whatever is common to the three ” historic ” branches into which he conceives the church to be divided — Roman, Anglican and Orthodox; to the Protestant pure and simple it means either what it does to the Romanist, or, in expansive moments, simply what is ” universal ” to all Christians. In a yet broader sense it is used adjectivally of mere wideness or universality of view, as when we speak of a man as ” of catholic sympathies ” or ” catholic in his tastes.”

The name of Catholic Epistles is given to those letters (two of Peter, three of John, one of James, one of Jude) incorporated in the New Testament which (except 2 and 3 John) are not, like

those of St Paul, addressed to particular individuals or churches, but to a larger and more indefinite circle of readers, (See Bible:

New Testament, Canon.)

The title of Catholicus (mdoXwos) seems to have been used under the Roman empire, though rarely, as the Greek equivalent of consularis and praefectus. Thus Eusebius (Hist, ecck viii. 23) speaks of the catholicus of Africa (koˆoXuov rr)s ‘Aˆpurfjs); As an ecclesiastical title it was used to imply, not universal (ecumenical), but a great and widespread jurisdiction. Thus the bishop of the important see of Seleucia (Bagdad), though subordinate to the patriarch of Antioch, had the title of Catholicus and power to consecrate even archbishops; and on the division of the see there were two Catholici under the patriarch of Antioch. In Ethiopia, too, there were Catholici with less extensive powers, subject to the patriarch of Alexandria. The title now survives, however, only as that of the head of the Armenian Church (g.v.). A bishop’s cathedral church is, how- ever, in Greek the Catholicon.

An isolated use of the word ” catholic “as a secular legal term survives in Scots law; a catholic creditor is one whose debt is secured over several or over all of the subjects belonging to the debtor.

CATHOLIC APOSTOLIC CHURCH, THE, a religious com- munity often called ” Irvingites,” though neither actually founded nor anticipated by Edward Irving (q.v.). Irving’s relation to this community Was, according to its rriernbers, somewhat similar to that of John the Baptist to the early Christian Church, i.e. he was the forerunner and prophet of the coming dispensation, not the founder of a new sect; and indeed the only connexion which Irving seems to have had with the existing organization of the Catholic Apostolic body was in ” fostering spiritual persons who had been driven out of other congregations for the exercise of their spiritual gifts.” Shortly after Irving’s trial and deposition (1831), certain persons were, at some meetings held for prayer, designated as ” called to be apostles of the Lord” by certain others claiming prophetic gifts. In the year 1835, six months after Irving’s death, six others were similarly designated as ” called ” to complete the number of the ” twelve,” who were then formally ” separated,” by the pastors of the local congregations to which they belonged, to their higher office in the universal church on the 14th of July 1835. This separation is understood by the community not as “in any sense being a schism or separation from the one Catholic Church, but a separation to a special work of blessing and intercession on behalf of it.” The twelve were

afterwards guided to ordain others — twelve prophets, twelve evangelists, and twelve pastors, ” sharing equally with them the one Catholic Episcopate,” and also seven deacons for administering the tem- poral affairs of the church catholic. The apostles were the channels of the Holy Ghost and the mysteries of God, and the authoritative interpreters of “prophetic utterance”; their teaching was brought home to the people by the ” evangelists.” The function of the prophets was to explain scripture and exhort to holiness, that of the ” pastors ” is explained by their title. The central episcopacy of forty-eight was regarded as ” indicated by prophecy,” being foreshown in the forty-eight boards of the Mosaic tabernacle. For ecclesiastical purposes the church uni- versal is under their charge in twelve tribes; for Christendom is considered to be divided into twelve portions or tribes, each tribe being under the special charge of an apostle and his co- ministers, and the seat of the Apostolic College being at Albury, near Guildford. This is an ideal outline which has never been fulfilled. There has never been a ” central episcopacy ” of forty-eight. The ” apostles ” alone always held the supreme authority, though, as their number dwindled, ” coadjutors ” were appointed to assist the survivors, and to exercise the functions of the ” apostolate.” The last ” apostle ” died on the 3rd of February 1901.

For the service of the church a comprehensive book of liturgies and offices was provided by the ” apostles.” It dates from 1842 and is based on the Anglican, Roman and Greek liturgies. Lights, incense, vestments, holy water, chrism, and other

adjuncts of worship are in constant use. The ceremonial inits completeness may be seen in the church in Gordon Square, London, and elsewhere. The daily worship consists of ” matins ” with ” proposition ” (or exposition) of the sacrament at 6 a.m., prayers at 9 a.m. and 3 p.m., and ” vespers ” with ” proposition ” at 5 p.m. On all Sundays and holy days there is a ” solemn celebration of the eucharist ” at the high altar; on Sundays this is at 10 a.m. On other days .” low celebrations ” are held in the side-chapels, which with the chancel in all churches correctly built after apostolic directions are separated or marked off from the nave by open screens with gates. The community has always laid great stress on symbolism, and in the eucharist, while reject- ing both transubstantiation and consubstantiation, holds strongly to a real (mystical) presence. It emphasizes also the ” pheno- mena ” of Christian experience and deems miracle and mystery to be of the essence of a spirit-filled church.

Each congregation is presided over by its ” angel ” or bishop (who ranks as angel-pastor in the Universal Church) ; under him are four-and-twenty priests, divided into the four ministries of “elders, prophets, evangelists and pastors,” and with these are the deacons, seven of whom regulate the temporal affairs of the church — besides whom there are also ” sub-deacons, acolytes, singers, and door-keepers.” The understanding is that each elder, with his co-presbyters and deacons, shall have charge of 500 adult communicants in his district; but this has been but partially carried into practice. This is the full constitution of each particular church or congregation as founded by the “restored apostles,” each local church thus ” reflecting in its government the government of the church catholic by the angel or high priest Jesus Christ, and His forty-eight presbyters in their fourfold ministry (in which apostles and elders always rank first), and under these the deacons of the church catholic.” The priesthood is supported by tithes; it being deemed a duty on the part of all members of the church who receive yearly incomes to offer a tithe of their increase every week, besides the free- will offering for the support of the place of worship, and for the relief of distress. Each local church sends ” a tithe of its tithes ” to the ” Temple,” by which the ministers of the Uni- versal Church are supported and its administrative expenses defrayed; by these offerings, too, the needs of poorer churches are supplied. It claims to have among its clergy many of the Roman, Anglican and other churches, the orders of those ordained by Greek, Roman and Anglican bishops being recog- nized by it with the simple confirmation of an ” apostolic act.” The community has not changed recently in general constitution or doctrine. It does not publish statistics, and its growth during late years is said to have been more marked in the United States and in certain European countries, such as Germany, than in Great Britain. There are nine congregations enumerated in The Religious Life of London (1904).

For further details of doctrines, ritual, &c, see R. N. Bosworth, Restoration of Apostles and Prophets, Readings on the Liturgy, The Church and Tabernacle, and The Purpose of God in Creation and Redemption (6th ed., 1888) ; G. Miller, History and Doctrines of Irvingism (1878).

CATILINE [Lucius Sergius Catilina] (c. 108-62 B.C.), a member of an ancient but impoverished patrician family of Rome, the prime mover in the conspiracy known by his name. He appears in history first as a supporter of Sulla, and during the proscription

he was conspicuous for his greed and cruelty. He slew his inoffensive brother-in-law with his own hand, and tortured and mutilated the much-loved Marius Gratidianus. He was believed to have made away with his wife and his son to win the profligate and wealthy Aurelia Orestilla; it was even suspected that he had been guilty of an intrigue with the Vestal Fabia. In 77 he was quaestor, in 68 praetor, and in 67-66 governor of Africa. His extortions and subsequent impeachment by P. Clodius Pulcher having disqualified him as a candidate for the consulship, he formed a conspiracy, in which he was joined by young men of all classes, even Crassus and Caesa?, according to rumour, being implicated. The new consuls were to be murdered on. 'the 1st of January; bi't the plot. — the

execution of which was deferred till the 5th of February — failed in consequence of the impatience of Catiline, who gave the signal too hastily. Soon after, Catiline, having bribed both judges and accuser, was acquitted in the trial for extortion. His scheme was forthwith immensely widened. The city was to be fired, and those who opposed the revolution were to be slain; all debts were to be cancelled; and there was to be a proscription of all the wealthy citizens. Among the conspirators were many men of the first rank and influence. Arms and money were collected, soldiers were enlisted, and the assistance of the slaves was sought. But Catiline's hopes were again disappointed; once more he failed to obtain the consulship (64); and, moreover, it soon became apparent that one of the new consuls, Cicero, was myste- riously able to thwart all the schemes of the conspirators. He was, in fact, informed of every detail, through Fulvia, the mis- tress of Curius, one of the plotters,who was himself soon persuaded to turn informer. The other consul, C. Antonius, in whom Catiline hoped to find a supporter, was won over and got out of the way by Cicero, who resigned the province of Macedonia in his favour. Before the next comitia consularia assembled, the orator had given so impressive a warning of the danger which was impending, that Catiline was once more rejected (63), and the consuls were invested with absolute authority. Catiline now resolved upon open war; preparations were set on foot throughout Italy, especially in Etruria, where the standard of revolt was raised by the centurion C. Manlius (or Mallius), one of Sulla's veterans. A plan to murder Cicero in his own house on the

morning of the 7th of November was frustrated. On the next day Cicero at- tacked Catiline so vigorously in the senate (in his first Catilinarian oration) that he fled to his army in Etruria. Next day Cicero awoke the terror of the people by a second oration delivered in the forum, in consequence of which Catiline and Manlius were declared public enemies, and the consul Antonius was despatched with an army against them. Meanwhile the imprudence of the conspirators in Rome brought about their own destruction. Some deputies from the Allobroges, who had been sent to Rome to obtain redress for certain grievances, were approached by P. Lentulus Sura, the chief of the conspirators, who endeavoured to induce them to join him. After considerable hesitation, the deputies decided to turn informers. The plot was betrayed to Cicero, at whose instigation documentary evidence was obtained, implicating Lentulus and others. They were arrested, proved guilty, and on the 5th of December condemned to death and strangled in the underground dungeon on the slope of the Capitol. This act, which was opposed by Julius Caesar and advocated by Cato Uticensis (and, indirectly, by Cicero), was afterwards vigorously attacked as a violation of the constitution, on the ground that the senate had no power of life and death over a Roman citizen. Thus a heavy blow was dealt to the cause of Catiline, who, in the beginning of 62, saw his legions, only partially armed and diminished by desertion, shut in between those of Metellus Celer and C. Antonius. Near Pistoria he hazarded battle with the forces of the latter, but was completely defeated in a desperate encounter. He himself, fighting with the utmost bravery, rushed into the ranks of the enemy and met his death.

Such was the conspiracy of Catiline and the character of its author, as we find them in the speeches of Cicero, and the histories of Sallust and Dio Cassius (see also Plutarch, Cicero; Veil. Pat. ii. 35; Florus iv. 1; Appian, B.C. ii. 6; Eutropius vi. 15). It must not be forgotten, however, that our authorities were all members of the aristocratic party. Some of the incidents given as facts by Dio Cassius are manifest absurdities; and Cicero paid more regard to the effect than to the truthfulness of an accusation. We find him at one time admitting that Catiline had almost persuaded him of his honesty and merit, and even seeking a political union with him; at another, when his alliance had been rejected and an election was at hand, declaiming against him as a murderer and a profligate. Lastly, though Sallust's vivid narrative is consistent throughout, it is obvious that he cherished

very bitter feelings against the democratic party. Nevertheless, we cannot regard Catiline as an honest

enemy of the oligarchy, or as a disinterested champion of the provincials. It is held by some historians that there was at the time on the part of many of the Roman nobles a determination to raise themselves to power, despite the opposition of the senate: others with greater probability maintain that Catiline's object was simply the cancelling of the huge debts which he and his friends had accumulated. Catiline, by his bravery, his military talents, his vigorous resolution, and his wonderful power over men, was eminently qualified as a revolutionary leader. He is the subject of tragedies by Ben Jonson and P. Crebillon, and of the Rome sauvee of Voltaire.

See P. Merimee, Etudes sur la guerre sociale et la conjuration de Catiline (1844); E. Hagen, Catilina (1854), with introductory discussion of the authorities; E. S. Beesley, " Catiline as a Party Leader" {Fortnightly Review, June 1865), in defence of Catiline; C. John, Die Entstehungsgesckichte der catilinarischenVerschworung (1876), a critical examination of Sallust's account; E. von Stern, Catilina und die Parteikdmpfe in Rom 66-63 (r 883), with bibliography in preface ; C. Thiaucourt, Etude sur la conjuration de Catiline (1887), a critical examination of Sallust's account and of his object in writing it; J. E. Blondel, Histoire economique de la conjuration de Catiline (1893), written from the point of view of a political econo- mist; Gaston Boissier, La Conjuration de Catiline (1905), and Cicero and his Friends (Eng. trans.) ; Tyrrell and Purser's ed. of Cicero's Letters (index vol. s.v. " Sergius Catilina ") ; J. L. Strachan Davidson, Cicero (1894), ch. v.; Warde Fowler's Caesar (1892); see also art. Rome: History, The Re-public.

CATINAT, NICOLAS (1637-1712), marshal of France, entered the Gardes Franchises at an early age and distinguished himself at the siege of Lille in 1667. He became a brigadier ten years later, marichal de camp in 1680, and lieutenant-general 1688. He served with great credit in the campaigns of 1676-1678 in Flanders, was employed against the Vaudois in 1686, and after taking part in the siege of Philipsburg at the opening of the War of the League of Augsburg, he was appointed to command the French troops in the south-eastern theatre of war. In 1690 he conquered Savoy, and in 1691 Nice; the battle of Staffarda, won by him over the duke of Savoy in 1 690, and tnat of Marsaglia in 1693, were amongst the greatest victories of the time. In 1696

Catinat forced the duke to make an alliance with France. He had in 1693 been made a marshal of France. At the be- ginning of the war of the Spanish Succession, Catinat was placed in charge of operations in Italy, but he was much hampered by the orders of the French court and the weakness of the forces for their task. He suffered a reverse at Carpi (1701) and was soon afterwards superseded by Villeroy, to whom he acted as second- in-command during the campaign of Chiari. He died at St Gratienin 1712. His memoirs were published in 1819.

See E. de Broglie, Catinat, 1637-1712 (Paris, 1902).

CATLIN, GEORGE (1796-1872), American ethnologist, was born at Wilkes-Barre, Pennsylvania, in 1796. He was educated as a lawyer and practised in Philadelphia for two years; but art was his favourite pursuit, and forsaking the law he established himself at New York as a portrait painter. In 1832, realizing that the American Indians were dying out, he resolved to rescue their types and customs from oblivion. With this object he spent many years among the Indians in North and South America. He lived with them, acquired their languages, and studied very thoroughly their habits, customs and mode of life, making copious notes and many studies for paintings. In 1840 he came to Europe with his collection of paintings, most of which are now in the National Museum, Washington, as the Catlin Gallery; and in the following year he published the Manners, Customs and Condition of the North American Indians in two volumes, illustrated with 300 engravings. This was followed in 1844 by The North American Portfolio, containing 25 plates of hunting scenes and amusements in the Rocky Mountains and the prairies of America, and in 1848 by Eight Years' Travels and Residence in Europe. In 1861 he published a curious little volume, in " manugraph," entitled The Breath of Life, on the advantage of keeping one's mouth habitually closed, especially during sleep; and in 1868, Last Rambles amongst the Indians of the Rocky Mountains and the Andes. He died in Jersey City, New Jersey, on the 22nd of December 1872.

CATO, DIONYSIUS, the supposed author of the Dionysii Catonis Disticha de Moribus ad Filium. The name usually given is simply Cato, an indication of the wise character of the maxims

inculcated, but Dionysius is added on the authority of a MS. declared by Scaliger to be of great antiquity. This MS. also contains Priscian's translation of the Periegesis of the geographer Dionysius Periegetes; this has probably led to the Disticha also being attributed to him. In the middle ages the author on the Disticha was supposed to be Cato the Elder, who wrote a Carmen de Moribus, but extracts from this in Aulus Gellius show that it was in prose. Nothing is really known of the author or date of the Disticha; it can only be assigned to the 3rd or 4th century a.d. It is a small collection of moral apophthegms, each consisting of two hexameters, in four books. They are monotheistic in character, not specially Christian. The diction and metre are fairly good. The book had a great reputation in the middle ages, and was translated into many languages; it is frequently referred to by Chaucer, and in 1483 a translation was issued from Caxton's press at Westminster.

Editions by F. Hauthal (1869), with full account of MSS. and early editions, and G. Nemethy (1895), with critical notes; see also F. Zarncke, Der deutsche Cato (1852), a history of middle age German translations; J. Nehab, Der altenglische Cato (1879); E. Bischoff, Prolegomena zum sogenannten Dionysius Cato (1893), in which the name is discussed; F. Plessis, Poesie latine (1909) , 663; for medieval translations and editions see Teuffel, Hist, of Roman Lit. § 398, 3.

CATO, MARCUS PORCIUS (234-149 B.C.), Roman statesman, surnamed " The Censor," Sapiens, Priscus, or Major (the Elder), to distinguish him from Cato of Utica, was born at Tusculum. He came of an ancient plebeian family, noted for some military services, but not ennobled by the discharge of the higher civil offices. He was bred, after the manner of his Latin forefathers, to agriculture, to which he devoted himself when not engaged in military service. But, having attracted the notice of L. Valerius Flaccus, he was brought to Rome, and became success- ively quaestor (204), aedile (199), praetor (198), and consul (195) with his old patron. During his term of office he vainly opposed the repeal of the lex Oppia, passed during the Second Punic War to restrict luxury and extravagance on the part of women. Meanwhile he served in Africa, and took part in the crowning campaign of Zama (202) . He held a command in Sardinia, where he first showed his strict public morality, and again in Spain, which he reduced to subjection with great cruelty, and gained thereby the honour of a triumph (194). In the year 191 he acted as military tribune in the war against Antiochus III. of Syria, and

played an important part in the battle of Thermopylae, which finally delivered Greece from the encroachments of the East. His reputation as a soldier was now established; hence- forth he preferred to serve the state at home, scrutinizing the conduct of the candidates for public honours and of generals in the field. If he was not personally engaged in the prosecution of the Scipios (Africanus and Asiaticus) for corruption, it was his spirit that animated the attack upon them. Even Africanus, who refused to reply to the charge, saying only, " Romans, this is the day on which I conquered Hannibal," and was absolved by acclamation, found it necessary to retire self-banished to his villa at Liternum. Cato's enmity dated from the African campaign when he quarrelled with Scipio for his lavish distribu- tion of the spoil amongst the troops, and his general luxury and extravagance.

Cato had, however, a more serious task to perform in opposing the spread of the new Hellenic culture which threatened to destroy the rugged simplicity of the conventional Roman type. He conceived it to be his special mission to resist this invasion. It was in the discharge of the censorship that this determination was most strongly exhibited, and hence that he derived the title (the Censor) by which he is most generally distinguished. He revised with unsparing severity the lists of senators and knights, ejecting from either order the men whom he judged unworthy of it, either on moral grounds or from their want of the prescribed means. The expulsion of L. Quinctius Flamininus for wanton cruelty was an example of his rigid justice. His regulations against luxury were very stringent. He imposed a heavy tax

upon dress and personal adornment, especially of women, and upon young slaves purchased as favourites. In 181 he supported the lex Orchia (according to others, he first opposed its introduc- tion, and subsequently its repeal), which prescribed a limit to the number of guests at an entertainment, and in 169 the lex Voconia, one of the provisions of which was intended to check the accumu- lation of an undue proportion of wealth in the hands of women. Amongst other things he repaired the aqueducts, cleansed the sewers, prevented private persons drawing off public water for their own use, ordered the demolition of houses which encroached on the public way, and built the first basilica in the forum near the curia. He raised the amount paid by the publican for the right of farming the taxes, and at the same time diminished the contract prices for the construction of public works.

From the date of his censorship (184) to his death in 149, Cato held no public office, but continued to distinguish himself in the senate as the persistent opponent of the new ideas. He was struck with horror, along with many other Romans of the graver stamp, at the licence of the Bacchanalian mysteries, which he attributed to the fatal influence of Greek manners; and he vehemently urged the dismissal of the philosophers (Carneades, Diogenes and Critolaus), who came as ambassadors from Athens, on account of the dangerous nature of the views expressed by them. He had a horror of physicians, who were chiefly Greeks. He procured the release of Polybius, the historian, and his fellow- prisoners, contemptuously asking whether the senate had nothing more important to do than discuss whether a few Greeks should die at Rome or in their own land. It was not till his eightieth year that he made his first acquaintance with Greek literature. Almost his last public act was to urge his countrymen to the Third Punic War and the destruction of Carthage. In 157 he was one of the deputies sent to Carthage to arbitrate between the Carthaginians and Massinissa, king of Numidia. The mission was unsuccessful and the commissioners returned home. But Cato was so struck by the evidences of Carthaginian pros- perity that he was convinced that the security of Rome depended on the annihilation of Carthage. From this time, in season and out of season, he kept repeating the cry: " Delehda est Carthago."

To Cato the individual life was a continual discipline, and public life was the discipline of the many. He regarded the individual householder as the germ of the family, the family as the germ of the state. By strict economy of time he accom- plished an immense amount of work; he exacted similar appli- cation from his dependents, and proved himself a hard husband, a strict father, a severe and cruel master. There was little difference apparently, in the esteem in which he held his wife and his slaves; his pride alone induced him to take a warmer interest in his sons. To the Romans themselves there was little in this behaviour which seemed worthy of censure; it was respected rather as a traditional example of the old Roman manners. In the remarkable passage (xxxix. 40) in which Livy describes the character of Cato, there is no word of blame for the rigid discipline of his household.

Cato perhaps deserves even more notice as a literary man than as a statesman or a soldier. He was the first Latin prose writer of any importance, and the first author of a history of Rome in Latin. His treatise on agriculture (De Agricultura or De Re

Rustica) is the only work by him that has been preserved; it is not agreed whether the work we possess is the original or a later revision. It contains a miscellaneous collection of rules of good husbandry, conveying much curious information on the domestic habits of the Romans of his age. His most important work, Origines, in seven books, related the history of Rome from its earliest foundations to his own day. It was so called from the second and third books, which described the rise of the different Italian towns. His speeches, of which as many as 150 were collected, were principally directed against the young free-thinking and loose-principled nobles of the day. He also wrote a set of maxims for the use of his son (Praecepta ad Filium), and some rules for everyday life in verse (Carmen de Moribus). The collection of proverbs in hexameter verse,

extant under the name of Cato, probably belongs to the 4th century a.d. (See Cato, Dionysius.)

Authorities. — There are lives of Cato by Cornelius Nepos, Plutarch and Aurelius Victor, and many particulars of his career and character are to be gathered from Livy and Cicero. See also F D. Gerlach, Marcus Porcius Cato der Censor (Basel, 1869) i G. Kurth, Caton I'ancien (Bruges, 1872); J. Cortese, De M. Porcii Catonis vita, operibus, et lingua (Turin, 1883) ; F. Marcucci, Studio critico suite Opere di Catone il Maggiore (1902). The best edition of the De Agricultura is by H. Keil (1884-1891), of the fragments of the Origines by H. Peter (1883) in Historicorum Romanorum Frag- menta, of the fragments generally by H. Jordan (i860); see also J. Wordsworth, Fragments and Specimens of Early Latin (1874) ; M. Schanz, Geschichte der romischen Litteratur (1898); article in Smith's Dictionary of Greek and Roman Biography; Mommsen, Hist, of Rome (Eng. trans.), bk. iii. ch. xi and xiv. ; Warde Fowler, Social Life at Rome (1909).

CATO, MARCUS PORCIUS (95-46 B.C.), Roman philosopher, called Uticensis to distinguish him from his great-grandfather, " the Censor." On the death of his parents he was brought up in the house of his uncle, M. Livius Drusus. After fighting with distinction in the ranks against Spartacus (72 B.C.), he became a military tribune (67), and served a campaign in Mace- donia, but he never had any enthusiasm for the military pro- fession. On his

return he became quaestor, and showed so much zeal and integrity in the management of the public accounts that he obtained a provincial appointment in Asia, where he strengthened his reputation. Though filled with disgust at the corruption of the public men with whom he came in contact, he saw much to admire in the discipline which Lucullus had enforced in his own eastern command, and he supported his claims to a triumph, while he opposed the inordinate pretensions of Pompey. When the favour of the nobles gained him the tribuneship, he exerted himself unsuccessfully to convict L. Licinius Murena (2), one of their chief men, of bribery. Cicero, who defended Murena, was glad to have Cato's aid when he urged the execution of the Catilinarian conspirators. Cato's vote on this matter drew upon him the bitter resentment of Julius Caesar, who did his utmost to save them.

Cato had now become a great power in the state. Though possessed of little wealth and no family influence, his unflinchˆ ing resolution in the cause of the ancient free state rendered him a valuable instrument in the hands of the nobles. He vainly opposed Caesar's candidature for the consulship in 59, and his attempt, in conjunction with Bibulus, to prevent the passing of Caesar's proposed agrarian law for distributing lands amongst the Asiatic veterans, proved unsuccessful. Nevertheless, although his efforts were ineffectual, he was still an obstacle of sufficient importance for the triumvirs to desire to get rid of him. At the instigation of Caesar he was sent to Cyprus (58) with a mission to depose its king, Ptolemy (brother of Ptolemy Auletes), and annex the island. On his return two years later he continued to struggle against the combined powers of the triumvirs in the city, and became involved in scenes of violence and riot. He succeeded in obtaining the praetorship in 54, and strenuously exerted himself in the hopeless and thank- less task of suppressing bribery, in which all parties were equally interested. He failed to attain the consulship, and had made up his mind to retire from the arena of civic ambition when the civil war broke out in 49. Feeling that the sole chance for the free state lay in conceding an actual supremacy to Pompey, whom he had formerly vigorously opposed, he did not scruple to support the unjust measures of the nobles against Caesar. At the outset of the war he was entrusted with the defence of Sicily, but finding it impossible to resist the superior forces of C. Scribonius Curio, who had landed on the island, he joined Pompey at Dyrrhachium. When his chief followed Caesar to Thessaly he was left behind in charge of the

camp, and thus was not present at the battle of Pharsalus. After the battle, when Pompey abandoned his party, he separated himself from the main body of the republicans, and conducted a small remnant of their forces into Africa. After his famous march through the Libyan deserts, he shut himself up in Utica, and even after the decisive defeat at Thapsus (46), in spite of

the wishes of his followers, he determined to keep the gates closed till he had sent off his adherents by sea. While the embarkation was in progress he continued calm and dignified; when the last of the transports had left the port he cheerfully dismissed his attendants, and soon afterwards stabbed himself.

He had been reading, we are told, in his last moments Plato's dialogue on the immortality of the soul, but his own philosophy had taught him to act upon a narrow sense of immediate duty without regard to the future. He conceived that he was placed in the world to play an active part, and when disabled from carrying out his principles, to retire gravely from it. He had lived for the free state, and it now seemed his duty to perish with it. In politics he was a typical doctrinaire, abhorring compromise and obstinately blind to the fact that his national ideal was a hopeless anachronism. From the circumstances of his life and of his death, he has come to be regarded as one of the most distinguished of Roman philosophers, but he composed no works, and bequeathed to posterity no other instruction than that of his example. The only composition by him which we possess is a letter to Cicero {Ad FaiH. xv. 5), a polite refusal of the orator's request that he would endeavour to procure him the honour of a triumph. The school of the Stoics, which took a leading part in the history of Rome under the earlier emperors, looked to him as its saint and patron. It continued to wage war against the empire, hardly less openly than Cato himself had done, for two centuries, till at last it became actually seated on the imperial throne in the person of Marcus Aurelius. Immediately after his death Cato's character became the subject of discussion; Cicero's panegyric Cato was answered by Caesar in his Anticafo. Brutus, dissatisfied with Cicero's work, pro- duced another on the same subject; in Lucan Cato is repre- sented as a model of virtue and disinterestedness.

See Life by Plutarch, and compare Addison's tragedy. Modern biographies by H. Wartmann (Zurich, 1859), an d F. D. Gerlach (Basel, 1866); I C. W. Oman, Seven Roman Statesmen of the Later Republic, Cato ... (1902); Mommsen, Hist, of Rome (Eng. trans.),

bk. v. ch. v.; article in Smith's Dictionary of Classical Biography; Gaston Boissier, Cicero and his Friends (Eng. trans., 1897), esp. pp. 277 foil.; Warde Fowler, Social Life at Rome (1909).

CATO, PUBLIUS VALERIUS, Roman poet and grammarian, was born about 100 B.C. He is of importance as the leader of the " new " school of poetry (poetae novi, veonepoi, as Cicero calls them). Its followers rejected the national epic and drama in favour of the artificial mythological epics and elegies of the Alexandrian school, and preferred Euphorion of Chalcis to Ennius. Learning, that is, a knowledge of Greek literature and myths, and strict adherence to metrical rules were regarded by them as indispensable to the poet. The veonepoi were also determined opponents of Pompey and Caesar. The great influence of Cato is attested by the lines: — " Cato grammaticus, Latina Siren, Qui solus legit ac facit poetas." 1

Our information regarding his life is derived from Suetonius (De Grammaticis, xi). He was a native of Cisalpine Gaul, and lost his property during the Sullan disturbances before he had attained his majority. He lived to a great age, and during the latter part of his life was in very reduced circumstances. He was at one time possessed of considerable wealth, and owned a villa at Tusculum which he was obliged to hand over to his creditors. In addition to grammatical treatises, Cato wrote a number of poems, the best-known of which were the Lydia and Diana. In the Indignatio (perhaps a short poem) he defended himself against the accusation that he was of servile birth. It is probable that he is the Cato mentioned as a critic of Lucilius in the lines by an unknown author prefixed to Horace, Satires, i. 10.

Among the minor poems attributed to Virgil is one called Dirae (or rather two, Dirae and Lydia). The Dirae consists of imprecations against the estate of which the writer has been deprived, and where he is obliged to leave his beloved Lydia ; in the Lydia, on the other hand, the estate is regarded with envy as the possessor of his charmer. Joseph Justus Scaliger was the first to attribute the poem (divided into two by F. Jacobs) to Valerius Cato, on the ground

1 " Cato, the grammarian, the Latin siren, who alone reads aloud the works and makes the reputation of poets."

that he had lost an estate and had .written a Lydia. The question has been much discussed ; the balance of opinion is in favour of the Dirae being assigned to the beginning of the Augustan age, although so distinguished a critic as O. Kibbeck supports the claims of Cato to the authorship. The best edition of these poems is by A. F. Nake (1847), with exhaustive commentary and excursuses; a clear account of the question will be found in M. Schanz's Geschichle der romischen Litteratur; for the " new " school of poetry see Mommsen, Hist, of Rome, bk. v. ch. xii. ; F. Plessis, Poesie latine (1909), 188.

CATS, JACOB (1577-1660), Dutch poet and humorist, was born at Brouwershaven in Zeeland on the 10th of November 1577. Having lost his mother at an early age, and being adopted with his three brothers by an uncle, Cats was sent to school at Zierikzee. He then studied law at Leiden and at Orleans, and, returning to Holland, he settled at the Hague, where he began to practise as an advocate. His pleading in defence of A wretched creature accused of witchcraft brought him many clients and some reputation. He had a serious love affair about this time, which was broken off on the very eve of marriage by his catching a tertian fever which defied all attempts at cure for some two years. For medical advice and change of air Cats went to England, where he consulted the highest authorities in vain. He returned to Zeeland to die, but was cured mysteriously by a strolling quack. He married in 1602 a lady of some property, Elisabeth von Valkenburg, and thenceforward lived at Gryps-kerke in Zeeland, where he devoted himself to farming and poetry. His best works are: Emblemata or Minnebeelden with Maegdenplicht (16 18); Spiegel van den ouden en nieuwen Tijt (1632); Houwelijck . . . (1625); Selfstrijt (1620); Ouderdom, Buitem leven . . . en Hofgedachten op Sorgvliet (1664); and Gedachlen op slapelooze nachten (1661). Ini62i,on the expiration of the twelve years' truce with Spain, the breaking of the dykes drove him from his farm. He was made pensionary (stipendiary magistrate) of Middelburg; and two years afterwards of Dort. In 1627 Cats came to England on a mission to Charles I., who made him a knight. In 1636 he was made grand pensionary of Holland, and in 1648 keeper of the great seal; in 1631 he resigned his offices, but in 1657 he was sent a second time to England on what proved to be an unsuccessful mission to Crom- well. In the seclusion of his villa of Sorgvliet (Fly-from-Care), near the Hague, he lived from this time till his death, occupied in the composition

of his autobiography (Eighty-two Years of My Life, first printed at Leiden in 1734) and of his poems. He died on the 1 2th of September 1660, and was buried by torchlight, and with great ceremony, in the Klooster-Kerk at the Hague. He is still spoken of as ” Father Cats ” by his countrymen.

Cats was contemporary with Hooft and Vondel and other distinguished Dutch writers in the golden age of Dutch literature, but his Orangist and Calvinistic opinions separated him from the liberal school of Amsterdam poets. He was, however, intimate with Constantin Huygens, whose political opinions were more nearly in agreement with his own. For an estimate of his poetry see Dutch Literature. Hardly known outside of Holland, among his own people for nearly two centuries he enjoyed an enormous popularity. His diffuseness and the antiquated character of his matter and diction, have, however, come to be regarded as difficulties in the way of study, and he is more renowned than read. A statue to him was erected at Brouwershaven in 1829.

See Jacob Cats, Complete Works (1 790-1 800, 19 vols.), later editions by van Vloten (Zwolle, 1858-1866; and at Schiedam, 1869-1870); Pigott, Moral Emblems, with Aphorisms, &c, from Jacob Cats (i860); and P. C. Witsen Gejisbek, Het Leven en de Verdienstenivan Jacob Cats (1829). Southey has a very complimentary reference to Cats in his ” Epistle to Allan Cunningham.’

CAT’S-EYE, a name given to several distinct minerals, their common characteristic being that when cut with a convex surface they display a luminous band, like that seen by reflection in the eye of a cat. (1) Precious cat’s-eye, oriental cat’s-eye or chrysoberyl cat’s-eye. This, the rarest of all, is a chatoyant variety of chryso- beryl (q.v.), showing in the finest stones a very sharply defined line of light. One of the grandest known specimens was in the Hope collection of precious stones, exhibited for many years at the Victoria and Albert Museum. (2) Quartz cat’s-eye. This

is the common form of cat’s-eye, in which the effect is due to the inclusion of parallel fibres of asbestos. Like the chrysoberyl, it is obtained chiefly from Ceylon, but though coming from the East it is often called “occidental cat’s-eye” — a term intended simply to distinguish it from the finer or “oriental” stone. It is readily distinguished by its inferior density, its specific gravity being only 2-65, whilst that of oriental cat’s-eye is as high as 3-7. A

greenish fibrous quartz, cut as cat's-eye, occurs at Hof and some other localities ro Bavaria. (3) Crocidolite cat's-eye, a beautiful golden brown mineral, with silky fibres, found in Griqualand West, and much used in recent years as an ornamental stone, sometimes under the name of " South African cat's-eye." It consists of fibrous quartz, coloured with oxide of iron, and results from the alteration of crocidolite (q.v.). It is often distinguished as " tigerVeye " (or more commonly " tiger-eye "), whilst a blue variety, less altered, is known as " hawk's-eye." By the action of hydrochloric acid the colour of tiger's-eye may to a large extent be removed, and a greyish cat's-eye obtained. (4) Corundum cat's-eye. In some asteriated corundum (see Asteria) the star is imperfect and may be reduced to a luminous zone, producing an indistinct cat's-eye effect. According to the colour of the corundum the stone is known as sapphire cat's-eye, ruby cat's-eye, topaz cat's-eye, &c. (F. W. R.*)

CATSKILL, a village and the county-seat of Greene county, New York, U.S.A., on the W. bank of the Hudson river, 33 m. S. of Albany. Pop. (1890) 4920; (1900) 5484; of whom 657 were foreign-born; (1910) 5:206. It is served by the West Shore railway, by several lines of river steamboats, and by the Catskill Mountain railway, connecting it with the popular summer resorts in the Catskill mountains. A ferry connects with Catskill station (Greendale) on the east side of the Hudson. The village is in a farming country, and manufactures woollen goods and bricks, but it is best known as a summer resort, and as the principal gateway to thebeautiful Catskill Mountain region. The Recorder, a weekly newspaper, was established here in 1792 as the Packet. The first settler on the present site of Catskill was Derrick Teunis van Vechten, who built a house here in 1680. The village was not incorporated until 1806.

See J. D. Pinckney, Reminiscences of Catskill (Catskill, 1868).

CATSKILL (formerly Kaatskil) MOUNTAINS, a group of moderate elevation pertaining to the Alleghany Plateau, and not properly included in the Appalachian system of North America because they lack the internal structures and the general parallel- ism of topographic features which characterize the Appalachian ranges. The group contains many summits above 3000 ft. elevation and half a dozen approaching 4000, Slide Mountain (4205 ft.), and Hunter Mountain (4025 ft.), being the only ones exceeding that figure. The bottom lands along the creeks which drain the mountains, together with rolling uplands rising to elevations of

from 1500 to 2000 ft., are under cultivation, the mountain slopes being forested or devoted to grazing. The pure and cool atmosphere attracts summer visitors, for whose accom- modation many hotels have been built, some of which have become celebrated. Stoney Clove and Kaaterskill Clove are pic- turesque gorges, the former being traversed by a railway, and the latter containing three cascades having a total fall of about 300 ft. The growing need of New York City for an increased water- supply has driven her engineers to the Catskills, where several great reservoirs have been projected to supplement those of the Croton watershed.

CATTANEO, CARLO (1801-1869), Italian philosopher and patriot. A republican in his convictions, during his youth he had taken part in the Carbonarist movement in Lombardy. He devoted himself to the study of philosophy, hoping to re- generate the Italian people by withdrawing them from romanticism and rhetoric, and turning their attention to the positive sciences. He expounded his ideas in a review founded by him at Milan in 1837, called // Politecnico. But when the revolution of 1848 broke out he threw himself heart and soul into the fray, and became one of the leading spirits of the insurrection against the Austrians, known as the Five Days of Milan (March 18-22, 1848). Together with Terzaghi, Cernuschi and Clerici he formed a

council of war which, having its headquarters at Casa Taverna, directed the operations of the insurgents. He was second to none in self-sacrificing energy and heroic resolution. When on the 18th of March Field Marshal Radetzky, feeling that the position of the Austrian garrison was untenable, sounded the rebels as to their terms, some of the leaders were inclined to agree to an armistice which would give time for the Piedmontese troops to arrive (Piedmont had just declared war), but Cattaneo insisted on the complete evacuation of Lombardy. Again on the 21st, Radetzky tried to obtain an armistice, and Durini and Borromeo were ready to grant it, for it would have enabled them to re- organize the defences and replenish the supplies of food and ammunition, which could only last another day. But Cattaneo replied: “The enemy having furnished us with munitions thus far, will continue to furnish them. Twenty-four hours of victuals and twenty-four hours of hunger will be many more hours than we shall need.

This evening, if the plans we have just arranged should succeed, the line of the bastions will be broken. At any rate, even though we should lack bread, it is better to die of hunger than on the gallows." On the expulsion of the Austrians the question arose as to the future government of Milan and Italy. Cattaneo was- an uncompromising republican and a federalist; so violent was his dislike of the Piedmontese monarchy that when he heard that King Charles Albert had been defeated by the Austrians, and that Radetzky was marching back to reoccupy Milan, he exclaimed: " Good news, the Pied- montese have been beaten. Now we shall be our own masters; we shall fight a people's war, we shall chase the Austrians out of Italy, and set up a Federal Republic." When the Austrians returned Cattaneo had to flee, and took refuge at Lugano, where he gave lessons, wrote his Storia della Rivoluzione del 1848, the Archivio triennale delle cose d' Italia (3 vols., 1850-1855), and then early in i860 he started the Politecnico once more. He bitterly attacked Cavour for his unitarian views, and for the cession of Nice and Savoy. In i860 Garibaldi summoned him to Naples to take part in the government of the Neapolitan provinces, but he would not agree to the union with Piedmont without local autonomy. After the union of Italy he was frequently asked to stand for parliament, but always refused because he could not conscientiously take the oath of allegiance to the monarchy. In 1868 the pressure of friends overcame his resistance, and he agreed to stand, but at the last moment he drew back, still unable to take .the oath, and returned to Lugano, where he died in 1 869. As a writer Cattaneo was learned and brilliant, but far too bitter a partisan to be judicious, owing to his narrowly republican views; his ideas on local autonomy were perhaps wise, but, at a moment when unity was the first essential, inopportune.

Bibliography. — A. and J. Mario, Carlo Cattaneo (Florence, 1884) ; E. Zanoni, Carlo Cattaneo nella vita e nelle opere (Rome, 1898); see also his own Opere edite ed inedite (7 vols., Florence, 1881-1892), Scritti politici ed epistolari (3 vols., Florence, 1892-1901), Scritti storici, letterari (Milan, 1898, &c).

CATTARO (Serbo-Croatian Kotor), the chief town of an administrative district in Dalmatia, Austria. Pop. (1900) of town, 3021; of commune, 5418. Cattaro occupies a narrow ledge between the Montenegrin Mountains and the Bocche di Cattaro, a winding and beautiful inlet of the Adriatic Sea. This inlet expands into five broad gulfs, united by narrower channels, and forms one of the finest natural harbours in Europe. Teodo, on the

outermost gulf, is a small naval port. Cattaro is strongly fortified, and about 3000 troops are stationed in its neighbourhood. On the seaward side, the defensive works include Castelnuovo (Erceg Novi), which guards the main entrance to the Bocche. On the landward side, the long walls running from the town to the castle of San Giovanni, far above, form a striking feature in the landscape; and the heights of the Krivoscie or Crevoscia (Krivosije), a group of barren mountains between Montenegro, Herzegovina and the sea, are crowned by small forts. Cattaro is divided almost equally between the Roman Catholic and Orthodox creeds. It is the seat of a Roman Catholic bishop, y.'ith a small cathedral, a collegiate church and several convents.

The transit trade with Montenegro is impeded by high tariffs on both sides of the frontier. Foreign visitors to Montenegro usually land at Cattaro, which is connected by steamer with Trieste and by road with Cettigne. The railway from Ragusa terminates at Zelenika, near Castelnuovo.

There are many interesting places on the shores of the Bocche. Castelnuovo is a picturesque town, with a dismantled 14th-century citadel, which has, at various times, been occupied by Bosnians, Turks,. Venetians, Spaniards, Russians, French, English and Austrians. The orthodox convent of St Sava, standing amid beautiful gardens, was founded in the 16th cen- tury, and contains many fine specimens of 17th-century silver- smiths' work. There is a Benedictine monastery on a small island opposite to Perasto (Perast), 8 m. east of Castelnuovo. Perasto itself was for a time an independent state in the 14th century. Rhizon, the modern hamlet of Risano, close by, was a thriving " Illyrian " city as early as 229 B.C., and gave its name to the Bocche, then known as Rhizonicus Sinus. Rhizon submitted to Rome in 168 B.C., and about the same time Ascrivium, or Ascruvium, the modern Cattaro, is first mentioned as a neighbouring city., Justinian built a fortress above Ascrivium in a.d. 535, after expelling the Goths, and a second town probably grew up on the heights round it, for Constantine Porphyro. genitus, in the 10th century, alludes to " Lower Cattaro " (rd Karw AeKarepa). The city was plundered by the. Saracens in 840, and by the Bulgarians in 1102. In the next year it was ceded to Servia by the Bulgarian tsar Samuel, but revolted, in alliance with Ragusa, and only submitted in 1184, as a protected state, preserving intact its republican institutions, and its right to conclude treaties and engage in war. It was already an epis- copal see, and, in the 13th century, Dominican and Franciscan

monasteries were established to check the spread of Bogomilism. In the 14th century the commerce of Cattaro rivalled that of Ragusa, and provoked the jealousy of Venice. The downfall of Servia in 1389 left the city without a guardian, and, after being seized and* abandoned by Venice and Hungary in turn, it passed under Venetian rule in 1420. It was besieged by the Turks iD 1538 and 1657, visited by plague in 1572, and nearly destroyed by earthquakes in 1563 and 1667. By the treaty of Campo-Formio in 1797 it passed to Austria; but in 1805, by the treaty of Pressburg, it was assigned to Italy, and was united in 1810 with the French empire. In 1814 it was restored to Austria by the congress of Vienna. The attempt to enforce compulsory military service, made and abandoned in 1869, but finally successful in 1881, led to two short-lived revolts among the Krivoscians, during which Cattaro was the Austrian head- quarters.

See G. Gelcich (Gelcic), Memorie storiche suite Bocche di Cattaro (Zara, 1880). ”

CATTEGAT, or Kattegat (Scand. ” cat’s-throat “), a strait forming part of the connexion between the Baltic and the North Seas. It lies north and south between Sweden and Denmark, and connects north with the Skagerrack and south through the Sound, the Great Belt and the Little Belt with the Baltic Sea. Its length is about 150 m. and its extreme breadth about 90 m.

CATTERMOLE, GEORGE (1800-1868), English painter, chiefly in water-colours, was born at Dickleburgh, near Diss, Norfolk, in August 1800. At the age of sixteen he began working as an architectural and topographical draughtsman; afterwards he contributed designs to be engraved in the annuals then so popular; thence he progressed into water-colour painting, becoming an associate of the Water-Colour Society in 1822, and a full member in 1833. In 1850 he withdrew from active connexion with this society, and took to painting in oil. His most fertile period was between 1833 and 1850. At the Paris exhibition of 1855 he received one of the five first-class gold medals awarded to British painters. He also enjoyed professional honours in Amsterdam and in Belgium. He died on the 24th of July 1868. Among his leading works are ” The Murder of the Bishop of Liege ” (15th century), ” The Armourer relating the Story of the Sword,” ” The Assassination of the Regent Murray by Hamilton of Bothwellhaugh,” and (in oil) “A Terrible Secret.”

CATTLE

He was largely employed by publishers, illustrating the Waverley Novels and the Historical Annual of his brother the Rev. Richard Cattermole (his scenes from the wars of Cavaliers and Roundheads in this series are among his best engraved works), and many other volumes besides. Cattermole was a painter of no incon- siderable gifts, and of great facility in picturesque resource; he was defective in solidity of form and texture, and in realism or richness of colour. He excelled in rendering scenes of chivalry, of medievalism, and generally of the romantic aspects of the past.

CATTLE (Norman Fr. catel, from Late Lat. capitate, wealth or property, a word applied in the feudal system to movable property and particularly to live stock, and surviving in its wider meaning as ” chattel ” or ” chattle “), a general term for the cows and oxen of agricultural use. For the zoological account, see Bovidae, and the subordinate articles there referred to; for details concerning dairy-farming, see Dairy.

Oxen appear to have been among the earliest of domesticated animals, as they undoubtedly were among the most important agents in the growth of early civilization. They are mentioned in the oldest written records of the Hebrew and Hindu peoples, and are figured on Egyptian monuments raised over 3000 years B.C.; while remains of domesticated specimens have been found in Swiss lake-dwellings along with the stone implements and other relics of Neolithic man. In infant communities a man’s wealth was measured by the number and size of his herds — Abraham, it is said, was rich in cattle — and oxen for a long period formed, as they still do among many savage or semi-savage tribes, the favourite medium of exchange between individuals and com- munities. After the introduction of a metal coinage into ancient Greece, this method of exchange was commemorated by stamping the image of an ox on the new money; while the connexion be- tween cattle and coin as symbols of wealth has left its mark on the languages of Europe, as is seen in the Latin word pecunia and the English ” pecuniary,” derived from pecus, cattle. The value attached to cattle in ancient times is further shown by the Bull figuring among the signs of the zodiac; in its worship by the ancient Egyptians under the title of Apis; in the venera- tion which has always been paid to it by the Hindus, according to whose sacred legends it was the first animal created by the three divinities directed by the supreme Deity to furnish the earth with

animated beings; and in the important part it played in Greek and Roman mythology. The Hindus were not allowed to shed the blood of the ox, and the Egyptians could only do so in sacrificing to their gods. Both Hindus and Jews were for- bidden to muzzle it when treading out the corn; to destroy it wantonly was a crime among the Romans, punishable with exile.

Breeds. — There exist in Britain four interesting remnants of what were at one time numerous enclosed herds of ancient forest cattle, 1 with black or red points, in parks at Chillingham, Cadzow, Vaynol (near Bangor, North Wales) and Chartley. A few of the last have been removed to Woburn. Other repre- sentatives of old stock are — a resuscitated white Welsh breed with black points, derived from white specimens born of black Welsh cows; several herds of a white polled breed with black points; a herd of the ancient Polled Suffolk Dun, an excellent milking breed; a White Belted Galloway and a White Belted Welsh breed; the old Gloucester breed at Badminton, with a white rump, tail and underlinej related to the now extinct Glamorgan breed; the Shetland breed; and a few herds of Dutch cattle preserved for their superior milking powers.

The prominent breeds of cattle in the British Isles 2 comprise the Shorthorn, Lincolnshire Red Shorthorn, Hereford, Devon, South Devon, Sussex, Welsh, Longhorn, Red Polled, Aberdeen- Angus, Galloway, West Highland, Ayrshire, Jersey, Guernsey, Kerry and Dexter.

The Shorthorn, Lincolnshire Red Shorthorn, Hereford, Devon, South Devon, Sussex, Longhorn and Red Polled breeds are native to .England; the Aberdeen- Angus, Galloway, Highland

1 Rev. J. Storer, The Wild White Cattle of Great Britain (1879).

2 See Wallace's Farm Live Stock of Great Britain (1907), Low's Breeds of the Domestic Animals of the British Isles (1 842, illustrated, and 1845), and E. V. Wilcox's Farm Animals (1907), an American work.

and Ayrshire breeds to Scotland; and the Kerry and Dexter breeds to Ireland. The Jersey and Guernsey breeds — often spoken of as Channel Islands cattle — belong to the respective islands whose names they bear, and great care is taken to keep them isolated from each other. The term Alderney is obsolete, the cattle of Alderney being mainly a type of the Guernsey breed.

Among breeds well known in the United States 2 and not mentioned above, the more important are the Holsteins, large black and white cattle highly valued for their abundant milk production, and the Dutch Belted breed, black with a broad white band round the body, also good milkers.

The Shorthorn 3 is the most widely distributed of all the breeds of cattle both at home and abroad. No census of breeds has ever been taken in the United Kingdom, but such an enumeration would show the Shorthorn far to exceed in numbers any other breed, whilst the great majority of cross-bred cattle contain Shorthorn blood. During the last quarter of the 18th century the brothers Charles Colling (1751-1836) and Robert Colling (1749-1820), by careful selection and breeding, improved the cattle of the Teeswater district in the county of Durham. If the Shorthorn did not originate thus, it is indisputable that the efforts of the Collings 4 had a profound influence upon the fortunes of the breed. It is still termed the Durham breed in most parts of the world except the land of its birth, and the geographical name is far preferable, for the term ” shorthorn ” is applicable to a number of other breeds. Other skilled breeders turned their attention to the Shorthorns and established famous strains, the descendants of which can still be traced. By Thomas Booth, of Killerby and Warlaby in Yorkshire (1777), the “Booth”, strains of Shorthorns were originated; by Thomas Bates, of Kirklevington in Yorkshire, the ” Bates ” families 5 (1800).

The Shorthorn is sometimes spoken of as the ubiquitous breed, its striking characteristic being the ease with which it adapts itself to varying conditions of soil, climate and manage- ment. It is also called the ” red, white and roan.” The roan colour is very popular, and dark red has its supporters, as in the case of the Lincolnshire Red Shorthorns; white is not in favour, especially abroad. The Shorthorn breed is more noted for its beef-making than for its milk-yielding properties, although the non-pedigree milking Shorthorn of the north of England is an excellent cow with dual-purpose qualifications of the first order. An effort is being made to restore milking qualities to certain strains of pedigree blood.

The culmination of what may be termed the Booth and Bates period was in the year 187s, when the sales took place of Lord Dunmore’s and William Torr’s herds, which realized extraordinary prices. In that black year of farming, 1879, prices were declining, and they continued to do so till within the last

few years of the close of the 19th century, when there' set in a gradual revival, stimulated largely by the commercial prosperity of the country. The result of extremely high prices when line-bred animals were in fashion was a tendency to breed from all kinds of animals that were of the same tribe, without selection. A deterioration set in, which was aggravated by the overlooking of the milking prop- erties. Shorthorn breeders came to see that change of blood was necessary. Meanwhile, for many years breeders in Aberdeenshire had been holding annual sales of young bulls and heifers from their herds. The late Amos Cruickshank began his annual sales in the 'forties, and the late W. T. Talbot-Crosbie had annual sales from his Shorthorn herd in the south-west of Ireland for a number of years. Many Aberdeen farmers emigrated to Canada, and bought Shorthorn calves in their native county to take with them. The Cruickshanks held their bull sales at that time, and many of their animals were bought by the small breeders in Canada. This continued until 1875, when the Cruickshanks had so much private demand that they discontinued their public sales. Subsequently, when Cruickshank sold his herd privately

3 Shorthorn Society of Great Britain and Ireland (1822). Sec. E. J. Powell, 12 Hanover Square, London, W.

4 C. J. Bates, " The Brothers Colling," Jour. Roy.Agric. Soc. (1899). 6 C. J. Bates, Thomas Bates and the Kirklevington Shorthorns: a

Contribution to the History of Pure Durham Cattle (Newcastle-upon- Tyne, 1897).

to James Nelson & Sons for exportation, the animals could not all be shipped, and W. Duthie, of Collynie, Aberdeenshire, bought some of the older cows, whilst J. Deane Willis, of Baptdn Monar, Wilts, bought the yearling heifers. Duthie thereupon resumed the sales that the Cruickshanks had relinquished, his averages being £30 in 1892, about £50 in 1893-1894, and £80 in 1895. These prices advanced through English breeders requiring a little change of blood, and also through the increasing tendency to exhibit animals of great substance, or rather to feed animals for show. The success of this movement strengthened the demand,

whilst an inquiry for his line of blood arose in the United States and Canada. A faithful contemporary history of the Shorthorn breed is to be found in Thornton's Circular, published quarterly since 1868; see also J. Sinclair, History of Shorthorn Cattle (1907); R. Bruce, Fifty Years among Shorthorns (1907); A. H. Sanders, Shorthorn Cattle (Chicago, 1901).

The Lincolnshire Red Shorthorns are the best dual-purpose cattle — for milk and meat — that possess a pedigree record, in the United Kingdom, and their uniform cherry red colour has brought them into high favour in tropical countries for crossing with the native breeds.

The Hereford breed is maintained chiefly in Herefordshire and the adjoining counties. Whilst a full red is the general colour of the body, the Herefords are distinguished by their white face, white chest and abdomen, and white mane. The legs up to the knee or hock are also often white. As a protection against the sun in a hot climate dark spots on the eyelids or round the orbits are valuable. The horns are moderately long. Herefords, though they rear their own calves, have acquired but little fame as dairy cattle. They are very hardy, and produce beef of excellent quality. Being docile, they fatten easily and readily, and as graziers' beasts they are in high favour.

When the Bates' Shorthorn bubble burst in America about 1877, the Hereford gradually replaced the Shorthorn of the western ranches, and it is now the most numerous ranch animal in the United States and Canada. The bulls beat the bulls of all other breeds in " rustling " capacity.

In America the ranch-bred Herefords have got too small in the bone in recent years, and Shorthorns, chiefly of the Scottish type, are being introduced to increase their size by crossing. In the " feed lot " a well-bred Hereford steer feeds more quickly than either a Shorthorn or an Aberdeen-Angus.

In Queensland, Hereford cattle bred from the " Lord Wilton " strain by Robert Christison of Lammermoor have for years been triumphant as beef-producers in competition with the Shorthorn. When these are quartered in the ordinary butchers' fashion, the hind-quarters outweigh the fore-quarters, which is a reversal of the prevailing rule.

North Devons. — The " Rubies of the West," as they are termed

from their hue, are reared chiefly in Devon and Somerset. The colour is a whole red, its depth or richness varying with the individual, and in summer becoming mottled with darker spots. The Devons stand somewhat low; they are neat and compact, and possess admirable symmetry. Although a smaller breed than the Shorthorn or the Hereford, they weigh better than either. The horns of the female are somewhat slender, and often curve neatly upwards. Being fine-limbed, active animals, they are well adapted for grazing the poor pastures of their native hills, and they turn their food to the best account, yielding excellent beef. They have not yet attained much celebrity as milch kine, for, though their milk is of first-class quality, with a few notable exceptions, its quantity is small. Latterly, however, the milking qualities have received more attention from breeders, whose object is to qualify the Devon as a dual-purpose breed.

The South Devon or South Hams cattle are almost restricted to that southern part of the county of Devon known as the Hams, whence they are also called " Hammers." With a somewhat ungainly head, lemon-yellow hair, yellow skin, and large but hardly handsome udder, the South Devon breed more resembles the Guernsey, with which it is supposed to be connected, than the trim-built cattle of the hills of North Devon. The cows are large, heavy milkers, and produce excellent butter. They

'are rarely seen outside their locality except when they appear in the showyards.

The Sussex breed resembles the North Devon in many respects, but it is bigger, less refined in appearance, less graceful in outline, and of a deeper brown-chestnut colour than the " dainty Devon," as the latter may well be called when compa/ed with them. As a hardy race, capable of thriving on pcor rough pastures, the Sussex are highly valued in their native districts, where they were rapidly improved before the end of the 19th century. They are essentially a beef-producing breed, the cows having little reputation as milkers. By stall-feeding they can be ripened for the butcher at an early age. Sussex cattle are said to " die well," that is, to yield a large proportion of meat in the best parts of the carcase.

In the Welsh breed of cattle black is the prevailing colour, and the horns are fairly long. They do not mature very rapidly, but some of them grow eventually into great ponderous beasts, and their beef is of prime quality. The cows often possess

considerable reputation as milkers. As graziers' beasts Welsh cattle are well known in the midland counties of England, where, under the name of " Welsh runts," large herds of bullocks are fattened on the pastures or " topped up " in the yards in winter.

All the remaining strains of Welsh cattle were recognized as one breed in 1904, when the Welsh Black Cattle Society united into one register the Herd Books Of North and South Wales.

The Longhorn or •" Dishley " breed of cattle is one of the most interesting historically. It was with Longhorns that Robert Bakewell, of Dishley, Leicestershire (1726-1795), showed his remarkable skill as an improver of cattle in the middle of the 1 8th century. 1 At one period Longhorns spread widely over England and Ireland, but, as the Shorthorns extended their domain, the Longhorns made way for them. They are big, rather clumsy animals, with long drooping horns, which are very objectionable in these days of cattle transport by rail and sea. They are slow in coming to maturity, but are very hardy. The bullocks feed up to heavy weights, and the cows are fair milkers. No lover of cattle can view these quaint creatures without a feeling of satisfaction that the efforts made to resusci- tate a breed which has many useful qualities to commend it have been successful, and that the extinction which threatened it in the 'eighties of last century is no longer imminent. In 1907 there were twenty-two Longhorn herds containing about four hundred registered cattle located mainly in the English midlands and Man.

The Red Poll breed, though old, has only come into promi- nence within recent years. They were known as the East Anglian Polls, and later as the Norfolk and Suffolk Polled cattle, being confined chiefly to these two counties. They are symmetrically built, of medium size, and of uniformly red colour. They have a tuft of hair on the poll. As dairy cattle, they are noted for the length of the period during which they continue in milk. Not less are they valued as beef -producers, and, as they are hardy and docile, theyfatten readily and mature fairly early. Hence, like the Lincolnshire Red Shorthorn, they may claim to be a dual-purpose breed. As beef cattle they are always seen to advantage at the Norwich Christmas cattle show, held annually in November.

The Aberdeenˆ- Angus, a polled, black breed, the cows of which are often termed " Doddies," belongs to Aberdeenshire and adjacent parts of Scotland, but many herds are maintained in

England and some in Ireland. The steers and heifers fed for the butcher attain great weight, make first-class show beasts, and yield beef of excellent quality. The cross between the Short- horn and the Aberdeen- Angus is a favourite in the meat markets and at fat-stock competitions.

The Galloways are named from the district, Kirkcudbright and Wigtonshire, in the south-west of Scotland,, to which they are native. Like the Aberdeen-Angus cattle, they are hornless, and normally of a black colour. But, with a thicker hide and shaggy hair, suited to a wet climate, they have a coarser appearance thai? the Aberdeen-Angus, the product of a less humid region, though

1 Housman, ” Robert Bakewell,” Jour. Roy. Agric. Soc. (1894).

CATTLE

V.

c

Plate H

CATTLE

r

j j

a j

< ■

o

X

o is

s

_J

CATTLE

Plate III.

B3

<

q

<

c

03

<

Plate IV,

CATTLE

o a

&

o u

Pi

w ►J

<

u

D

<

►J

W

<

E

u

D

<

f- y, w

fa

rt

o

-G

t/>

l«

a

o

m

rfl

w as

.a

«

o

2

ns

S3

a

-

o

O

u

u

JS

>

H

w

t/)

>5

a!

u

u

o

CATTLE

54i

it approaches the latter in size* Galloways yield superior beef, but mature less rapidly than the Aberdeen-Angus. They make admirable beasts for the grazier, and the cross between the Galloway and the white Shorthorn bull, known as a ■" Blue Grey," is much sought after by the grazier and the butcher.

The West Highland or Kyloe breed are perhaps the most hardy and picturesque of British cattle. Their home is amidst the wild romantic scenery of the Highlands and the Western Isles of Scotland, though Highland bullocks with long, spreading curved horns may be seen in English parks. They have not made much progress towards early maturity, but their slowly ripened beef is of the choicest quality. The colour of their thick shaggy hair varies from white and light dun to tawny yellow of many shades, and black.

The Ayr shires are the dairy breed of Scotland, where they have considerably overstepped the limits of the humid western county whence they take their name. They are usually of a white and

brown colour, the patches being well defined. The neat, shapely, upstanding horns are characteristic. The Ayrshires are under medium size and move gracefully, and the females display the wedge-shape typical of dairy cows. They are a hardy breed, and, even from poor pastures, give good yields of milk, especially useful for cheese-making purposes. The milking powers of the breed are being improved under a system of milk-testing and records supported by the Highland and Agricultural Society.

The Jerseys are graceful, deer-like cattle, whose home is in the island of Jersey, where, by means of stringent regulations against the importation of cattle, the breed has been kept pure for many generations. As its milk is especially rich in fat (so rich that it requires to be diluted with a little water before it can be safely fed to calves), the Jersey has attained a wide reputation as a butter-producing breed. It is a great favourite in England, where many pure-bred herds exist. The colours most preferred are ” whole ” fawns of many shades. The light silver-grey, which was in high repute in England in the early ‘seventies of the 19th century, is out of favour. Browns and brindles are rarely seen. The grey zone surrounding the black muzzle gives the appearance designated ” mealy-mouthed.” The horns are short, and generally artificially curved inwards; the bones are fine. The best milch cows have a yellowish circle round the eye, and the skin at the extremity of the tail is of a deep yellow, almost orange colour. The cows are gentle and docile when reared in close contact with human beings, but the bulls, despite their small size, are often fierce.

Guernsey cattle are native to the islands of Guernsey, Alderney, Sark and Herm. They are kept pure by importation restrictions. Herds of pure-bred Guernseys also exist in the Isle of Wight and in various counties of England and Scotland. They have not the refined and elegant appearance of the Jerseys, which, however, they exceed in size. They are usually of a rich yellowish-brown colour, patched with white, in some cases their colour almost meriting the appellation of ” orange and lemon.” The yellow colour inside the ears is a point always looked for by judges. The cows, large-bellied and narrow in front, are truly wedge- shaped, the greatly developed udder adding to the expanse of the hinder part of the body. They yield an abundance of milk, rich in fat, and are excellent butter-producers. The horns are yellow at the base, curved, and not coarse. The nose is flesh- coloured and free from black markings.

The Canadian breed, black with a narrow brown stripe down the back and a light ring round the muzzle, are descended from old Brittany cattle imported into Canada by French settlers three hundred years ago, and are in consequence related to the Channel Islands cattle. They are remarkably hardy and good milkers, and it is claimed they produce butter fat at 2 c. a lb less cost than any other breed.

The Kerry is a breed of small black cattle belonging to the south-west of Ireland, whence they have spread into many parts, not only of their native land, but of England as well. Although they are able to subsist on the roughest and scantiest of fare, and are exceedingly hardy, the cows are, nevertheless, excellent milkers, and have acquired celebrity as a dairy breed. The

colour is black, but the cows sometimes have a little white on the udder. The horns are white, with black tips, and are turned upwards. The Kerry is active and graceful, long and lithe in body, and light-limbed. On the rich pastures of England it has increased considerably in size.

The Dexter breed is reputed to take its name from one Dexter, agent of Maude, Lord Hawarden, who is credited with having established it by selection and breeding from the best mountain types of the Kerry. Until recently it was called the Dexter- Kerry. It is smaller and more compact than the Kerry, shorter in the leg, and intoed before and behind. Whilst valuable as a beef-making animal, it is equally noted for its milk-producing capacity. Black is the usual colour, but red is also recognized, with, in either case, a little white. When of a red colour, the appearance of the animal has been aptly compared to that of a grand Shorthorn viewed through the wrong end of a telescope. The Kerry and the Dexter are readily distinguishable. The Kerry has a gay, light, deer-like head and horn, light limbs and thin skin. The Dexter has coarser limbs, a square body, flat back, thick shoulder, short neck, and head and horn set on low.

A herd of Dexter-Shorthorns was founded by Major Barton at Straffan, Ireland, in i860, in which prominent characteristics of the two breeds have been permanently blended so that they breed true to type.

As milk-producers, and therefore as dairy cattle, certain strains of the Shorthorn (registered as well as non-pedigree), the Lincolnshire Red Shorthorn, South Devon, Longhorn, Red Polled,

Ayrshire, Jersey, Guernsey, Kerry and Dexter breeds have acquired eminence. Such breeds as the Shorthorn, Lincolnshire Red Shorthorn, South Devon, Welsh, Red Polled and Dexter are claimed as useful beef-makers as well as milk-producers, and are classified as dual-purpose animals. The others belong to the beef-producers. As regards colour, red is characteristic of the Lincolnshire Shorthorn, the Hereford, Devon, Sussex and Red Polled. Black is the dominating colour of the Welsh, Aberdeen-Angus, Galloway, Kerry and Dexter. A yellowish hue is seen in the West Highland, Guernsey and South Devon breeds. Various shades of fawn colour are usual in Jersey cattle and also appear among Highlanders. The Herefords, though with red bodies, have white faces, manes, and dewlaps, whilst white prevails to a greater or less extent in the Shorthorn, Longhorn and Ayrshire breeds. The Shorthorn breed is exceedingly variable in colour; pure-bred specimens may be red, or white, or roan, or may be marked with two or more of these colours, the roan resulting from a blending of the white and red. Black is not seen in a pure-bred Shorthorn. The biggest and heaviest cattle come from the beef -making breeds, and are often cross-bred. Very large or heavy beasts, if pure-bred, usually belong to one or other of the Shorthorn, Hereford, Sussex, Welsh, West High- land, Aberdeen-Angus and Galloway breeds. The Devon, Red Polled and Guernsey are medium-sized cattle; the Ayrshires are smaller, although relatively the bullocks grow larger than bulls or cows. The Jerseys are small, graceful cattle, but the smaller type of Kerries, the Dexters and the Shetlanders furnish the smallest cattle of the British Isles.

See generally the Herd Books of the various breed societies.

(W. Fr. ; R. W.)

Rearing and Feeding. 1 — A calf at birth scales from one- twelfth to one-fourteenth the weight of the dam. A sucking calf of one of the large breeds should gain 3 H> per day for the first month, 2-5 lb for the second, and 2 lb during the later calf period. Colostrum, or first-day milk after calving, contains more than five times the albuminoid compounds found in average cows' milk. In the course of three or four days it gradually becomes normal in composition, although the peculiar flavour remains a few days longer. Nature has specially prepared it for the young

1 See E. Wolff, Farm Foods, by H. H. Cousins (1895) ; A. D. Hall, Rothamsted Experiments (1965); R. Warington, Chemistry of the

Farm (15th ed., 1902); W. A. Henry, Feeds and Feeding (1907); H. W. Mumford, Beef Production (1907); H. P. Armsby, Animal Nutrition (2nd ed., 1906); T. Shaw, Animal Breeding (1903); R. Wallace, Farm Live Stock of Great Britain (4th ed., 1907).

calf with extremely nourishing and also laxative properties, and it is of practically no value for any other purpose. Normal cows' milk has an albuminoid ratio slightly narrower than i : 4- colostrum 1 : -71. [The ratio is arrived at by adding to the percentage of milk-sugar, possessing about the food equivalent of starch, the fat multiplied by 2-268, and dividing by the total albuminoids — all digestible.]

Common nutrient ratios for older animals are stated in the follow- ing table of food standards by Dr Emil Wolff : —

Food Consumed per Day.

Dry.

Digestible.

Live

Organic

Albu-

Fats.

Carbo-

Albuminoid

Weight.

Matter.

minoid.

Hydrates.

Ratio.

lb

lb

lb

lb

R >

lb

Calves, growing, 2 to 3 months

150

3-3

o-6

0-30

2-1

1 :4-7

Young cattle ,, 3 to 6 „

300

7-0

1-0

0-30

4-1

1 : 5

,, ,, 6 to 12 ,,

500

12-0

1-2

0-30

6-8

1 : 6

„ 12 to 18 „

700

16-8

1-4

0-28

9-1

1 :7

,, ,, 18 to 24 „

850

20-4

1-4

0-26

10-3

1 : 8

Oxen in complete rest . ...

1000

27-5

0-7

0-15

8-o

1 : 12

,, fattening, 1st period

1000

27-0

2-5

0-50

15-0

1 :6 5

f ,, ,, 2nd period

1000

26-0

30

0-70

14-8

1 =5-5

,, ,, 3rd period

1000

25-0

2-7

o-6o

14-8

1 : 6

Milch cows

1000

24-0

2-5

0-40

125

1 :5-4

Digestible albuminoid nitrogen is the scarcest and consequently the costliest ingredient in food-stuffs, but, since the introduction of vegetable proteid made by Mitchell's process from the castor bean, an easy and inexpensive means of balancing cattle food ratios is available. By this means the manurial value of the excrement is increased. The calculations necessary in arriving at a ratio are simplified by the employment of Jeffers's calculator (Flainsboro, N. J.).

There are three common methods of rearing calves. (1) The calf sucks its mother or foster-mother. This is the natural method and the best for the show-yard and for early fattening purposes; but it is the most expensive, and the calves, if not handled, grow up wild and dangerous. Store stock may be also raised by putting two calves to one cow and weaning at three months old; a second pair in turn yielding place to a single calf. (2) Full milk from the cow at about 90° F. is given alone until the latter part of the milk period; then the calf is trained to eat supple- mentary foods to preserve the calf-fat after weaning. A large calf at first receives daily three quarts of milk at three meals. The amount is increased to 2 gallons by the end of the fourth week, and to 2\ gallons at 3 months, when gradual weaning begins. Linseed cake meal is specially suitable for such calves. (3) The calf receives full milk from the mother for one to two weeks, or better, for three to four weeks; then it is slowly transferred to fortified separated milk or milk substitutes. Cod-liver oil, 2 oz. daily, is a good substitute for butter fat. In America cotton-seed oil, \ oz. to the quart of milk, or an equivalent of oleomargarine heated to 1 io° F. and churned with separated milk, has produced a live-weight-increase of 2 lb daily. Linseed simmered to a jelly and added to separated milk gives good results. Moderate amounts are easily digested. Oatmeal or maize meal containing 10 % of linseed meal does well, later, at less cost. Milksubstitutes and calf meals require close attention in preparation, and would not fetch the prices they do if feeders possessed the technical knowledge necessary to select and mix common foods. Ground cake or linseed meal is, after a time, better given dry than

cooked, being then better masticated and not so liable to produce in- digestion.

Grass or fine hay in racks is provided when the calf can chew the cud. As cattle get older, live-weight-increase grows less. Smithfield weights ‘ show that a good bullock up to a year old will increase 2 lb daily, a two-year-old if lb, and a three-year-old a little over \ lb.

Cattle feeding on a farm consume crude produce that is in- convenient to market, and make farmyard manure; but there is frequently no profit left. To secure the balance on the right

1 E. J. Powell, History of the Smithfield Club from 1798 to 1900

(1902).

side the inlaid price per live cwt. requires to be 5s. less than the sale price — say 32s. per cwt. for lean cattle, and 37s. per cwt. for the animal when sold fat and capable of producing 60% of dressed beef. The ordin ary animal yields only a bout 57%. A well-bred fattening bullock begins with 2 lb of cake and meal per day, increasing to 8 lb at the end of five months (6 lb on an average), and receives J cwt. of roots and 12 lb of straw; at an average cost of about 4s. 3d. per imperial stone or 50s. per cwt. of dressed carcase. Heifers feed faster than bullocks, and

age tells on the rate at which an animal will mature: a three- year- old will develop into prime beef more quickly and easily than a two-year-old. It is difficult to produce ” baby beef ” at a profit, and it can only be done with picked animals of the best flesh- producing breeds, which cannot be bought at a price per cwt. below the finished sale price, for animals producing baby beef must from start to finish (under two years old) be at all times fit to go to the fat market. It is true that a very young animal can give a better account of food than an older one, but this advantage is counterbalanced by the tendency to grow rather than to fatten. (See also Agriculture.)

In cold and stormy districts cattle thrive best in covered courts, but in a mild climate they do equally well in open yards with shelter-sheds. The more air they get the less liable they are to tuberculosis — example Lincolnshire and the drier south-eastern counties. The ideal method of house-feeding cattle is singly in boxes 10 ft. square, where they are undisturbed, and where the

best manure is made because it is not washed by rain.

On the finest British grazing lands two lots of cattle are fed in one season. The first is finished early in July, having, without artificial feeding, laid on eight to nine stones of beef. The second lot requires three or four pounds of undecorticated cotton cake each towards the end of September and in October when grass begins to fail. (R. W.)

CATULLUS, GAIUS VALERIUS 84-54 B.C.), the greatest lyric poet of Rome. As regards his names and the dates of his birth and death, the most important external witness is that of Jerome, in the continuation of the Eusebian Chronicle, under the year 87 B.C., " Gaius Valerius Catullus, scriptor lyricus Veronae nascitur," and under 57 B.C., "Catullus xxx. aetatis anno Romae moritur." There is no controversy a to the gentile name, Valerius. Suetonius, in his Life of Julius Caesar (ch. 73), mentions the poet by the names " Valerium Catullum." Other persons who had the cognomen Catullus belonged to the Valerian gens, e.g. M. Valerius Catullus Messalinus, a delator in the reign of Domitian, mentioned in the fourth satire of Juvenal (1. 113) : — " Et cum mortifero prudens Veiento Catullo." Inscriptions show, further, that Valerius was a common name in the native province of Catullus, and belonged to other inhabitants of Verona besides the poet and his family (Schwabe, Quaestiones Catullianae, p. 27). Scholars have been divided in opinion as to whether his praenomen was Gaius or Quintus, and in the best MSS. the volume is called simply Catulli Veronensis liver. For Gaius we have the undoubted testimony, not only of Jerome, which rests on the much earlier authority of Suetonius, but also that of Apuleius. In support of Quintus a passage was quoted from the Natural History of Pliny (xxxvii. 6, 81). But the praenomen Q. is omitted in the best MSS., and in other passages of the same author the poet is spoken of as " Catullus Veronensis." The mistake may have arisen from confusion with Q. Catulus, the colleague of Marius in the Cimbric War, himself also the author of lyrical poems. Allusions in fhe poems show that the date of his death given by Jerome (57 B.C.) is wrong, and that Catullus survived the second consulship of Pompey (55 B.C.) (cf. lv. 6, cxiii. 2), and was present in August of the

following year at the prosecution of Vatinius by Licinius Calvus (cf. liii.). The allusion in Hi. 3 —

” Per consulatum peierat Vatinius,”

does not prove that Catullus must have lived to see the consulship bestowed on Vatinius in the end of 47 B.C. but only that Vatinius, after being praetor in 55 B.C., was in the habit of boasting of the certainty of his attaining the consulship, as Cleopatra was in the habit of confirming her most solemn declarations by appealing to her hope of one day administering justice in the Capitol (cf. Haupt, ” Quaestiones Catullianae,” Opuscula, vol. i. 1875). There is then nothing to prove that Catullus lived beyond the month of August 54 B.C. Some of the poems (as xxxvii. and Mi.) may have been written during his last illness. If he died in 54 B.C. or early in 53 B.C., Catullus must either have been born later than 87 B.C., or have lived to a greater age than thirty. Catullus is described by Ovid as ” hedera iuvenalia cinctus Tempora ” {Amor. iii. 9. 61), — a description somewhat more suitable to a man who dies in his thirtieth year than to one who dies three or four years later. Further, the age at which a man dies is more likely to be accurately remembered than the particular date either of his death or of his birth, and the common practice of recording the age of the deceased in sepulchral inscriptions must have rendered a mistake about this less likely to occur. It seems, therefore, on the whole, most likely that Jerome’s words ” xxx. aetatis anno ” are correct, and that Catullus was born in 84 B.C.

The statement that he was born at Verona is confirmed by passages in Ovid and Martial. Pliny the elder, who was born at Como, speaks of Catullus in the preface to his Natural History, as his “countryman” (conterraneus) , and the poet speaks of Verona as his home, or at least his temporary residence, in more than one place. His occasional residence in his native place is further attested by the statement of Suetonius (Julius Caesar, 73), that ” Julius Caesar accepted the poet’s apology for his scurrilous verses upon him, invited him to dine with him on the same day, and continued his intimacy with his father as before.” As this incident could only have happened during the time that Julius Caesar was pro-consul, the scene of it must have been in the Cisalpine province, and at the house of the poet’s father, in or near Verona. The verses apologized for were those contained in poems xxix. and lvii., the former of which must have been written after Caesar’s invasion of Britain, so that this interview probably took place in the winter of 55-54 B.C. The fact that his father was the host of the great pro-consul, and lived on terms of intimacy with him, justifies the inference, that he was, in wealth and rank, one

of the principal men of the province. The only other important statement concerning the poet's life which rests on external authority is that of Apuleius, that the real name of the Lesbia of the poems was Clodia. Another,, which concerns the reputation which he enjoyed after his death, is given in the Life of A tticus by Cornelius Nepos (12.4). It is to the effect that he regarded Lucretius and Catullus as the two greatest poets of his own time.

The poems of Catullus ccnsist of 116 pieces, varying in length from 2 to 408 lines, the great mass of them being, however, short pieces, written in lyric, iambic or elegiac metre. The arrangement cannot be the poet's; it is neither chronological nor in accordance with the character of the topics. The shorter poems, lyric or iambic, are placed first, next the longer epithalamia, (most being written in hexameters) amongst which the Attis is inserted and then those written in the elegiac metre. But, though no chronological order is observed, yet internal evidence enables us to determine the occasions on which many of the poems were written, and the order in which they followed one another. They give a very vivid image of various phases of the poet's life, and of the strong feelings with which persons and things affected him. They throw much light also on the social life of Rome and of the provincial towns of Italy in the years preceding the outbreak of the second civil war. In this respect they may be compared with the letters of Cicero.

The poems extend over a period of seven or eight years, from 61 or 62 till 54 B.C. Among the earliest are those which record

the various stages of the author's passion for Lesbia. It is in connexion with this passion that he is generally mentioned, or alluded to, by the later Roman poets, such as Propertius, Ovid. Juvenal and Martial. Her real name, as we learn from Apuleius, was Clodia. The admiration of Catullus for Sappho, the Lesbian poetess, which is clearly indicated by the imitation of her language in his fifty-first and sixty-second poems, affords an obvious explanation of the Greek name which he gave to his Roman mistress. Clodia was the notorious sister of Publius Clodius Pulcher, and in the year 56 she charged M. Caelius Rufus, after tiring of him, as she had of Catullus, with an attempt to poison her. It was in defence of Rufus that Cicero described the spell she exercised over young men, in language which might have been applied to her previous relations with the youthful poet, as well as those with the youthful orator and politician.

Poems concerning Lesbia occur among both the earliest and the latest of those contained in the series. They record the various stages of passion through which Catullus passed, from absolute devotion and a secure sense of returned affection, through the various conditions of distrust and jealousy, attempts at renunciation, and short-lived ” amoris integrationes,” through the ” odi et amo ” state, and the later state of savage indignation against both Lesbia and his rivals, and especially against Caelius Rufus, till he finally attains, not without much suffering and loss, the last state of scornful indifference. Among the earliest of the poems connected with Lesbia, and among those written in the happiest vein, are ii. and iii., and v. and vii. The 8th, ” Miser Catulle, desinas ineptire,” perhaps the most beautiful of them all, expresses the first awakening of the poet to a sense of her unworthiness, before the gentler have given place to the fiercer feelings of his nature. His final renunciation is sent in a poem written after his return from the East, with a union of imaginative and scornful power, to his two butts, Furius and Aurelius (xi., ” Furi et Aureli, comites Catulli “), who, to judge by the way Catullus writes of them, appear to have been hangers-on upon him, who repaid the pecuniary and other favours they received by giving him grounds for jealousy, and making imputations on his character (cf. xv., xvi., xviii., xxiii.).

The intrigue of Caelius Rufus with Lesbia began in 59 or 58 B.C. It was probably in the earlier stages of this liaison that the 68th poem was written, from which it appears that Catullus, at the time living at Verona, and grieving for the recent death of his brother in the Troad, had heard of Lesbia’s infidelity, and, in consideration of her previous faithlessness in his favour, was not inclined to resent it very warmly. Two other poems in the series express the grief which Catullus felt for the death of his brother, — one, the 65th, addressed to the orator Hortensius, who is there, as in some of Cicero’s letters, called Hortalus or Ortalus, and sent to him along with the Coma Berenices (lxvi.), a translation of a famous elegy of Callimachus. The other poem referring to this event (ci.) must have been composed some years later, probably in 56 B.C., when Catullus visited his brother’s tomb in the Troad, on his return from Bithynia. Between 59 and 57 B.C. most of the lampoons on Lesbia and her numerous lovers must have been written (e.g. xxxvii., xxxix., &c). Some, too, of the poems expressive of his more tender feelings to her, such as viii. and lxxvi. belong also to these years; and among the poems written either during this period or perhaps in the early and

happier years of his liaison, some of the most charming of his shorter pieces, expressing the affection for his young friends Verannius and Fabullus (ix., xii., xiii.), may be included.

In the year 57 the routine of his life was for a short time broken by his accompanying the propraetor C. Memmius, the friend to whom Lucretius dedicates his great poem, as one of his staff, to the province of Bithynia. His object was probably to better his fortunes by this absence from Rome, as humorous complaints of poverty and debt (xiii., xxvi.) show that his ordinary means were insufficient for his mode of life. He frankly acknowledges the disappointment of these hopes, and still more frankly his disgust with his chief (x., xxviii.). Some of the most charming and perfect among the shorter poems express the delight with which the poet changed the dulness and sultry climate of the

province for the freedom and keen enjoyment of his voyage home in his yacht, built for him at Amastris on the Euxine, and for the beauty and peace of his villa on the shores of Lake Benacus, which welcomed him home " wearied with foreign travel." To this period and to his first return to Rome after his visit to his native district belong the poems xlvi., ci., iv., xxxi. and x., all showing by their freshness of feeling and vivid truth of expression the gain which the poet's nature derived from his temporary escape from the passions, distractions and animosities of -Roman society. Two poems, written in a very genial and joyous spirit, and addressed to his younger friend Licinius Calvus (xiv. and 1.), who is ranked as second only to himself among the lyrical poets of the age, and whose youthful promise pointed him out as likely to become one of the greatest of Roman orators, may, indeed, with most probability be assigned to these later years (xiv.). From the expression " Odissem te odio Vatiniano," in the third line of xiv., it may be inferred that the poem was written not earlier than December (the " Saturnalia ") of the year 56 B.C., as it was early in that year, as we learn from a letter of Cicero to his brother Quintus (ii. 4. i), that Calvus first announced his intention of prosecuting Vatinius. The short poem numbered liii. would be written in August 54 B.C. The poems which have left the greatest stain on the fame of Catullus — those " referta contumeliis Caesaris," the licentious abuse of Mamurra,and probably some of those personal scurrilities

addressed to women as well as men, or too frank confessions, which posterity would willingly have let die, may well have been written in the last years of his life, under the influence of the bitterness and recklessness induced by his experience. It cannot be determined with certainty whether the longer and more artistic pieces, which occupy the middle of the volume — the Epithalamiumin celebr&tionoi themarriageofManliusTorquatus, the 62nd poem, written in imitation of the Epithalamia of Sappho, ” Vesper adest: iuvenes, consurgite “; the Attis, and the Epic Idyll representing the marriage festival of Peleus and Thetis — belong to the earlier or the later period of the poet’s career. If the person addressed in the first part of the 68th is the Manlius of the Epithalamium, and the lines from 3 to 8—

” Naufragum ut eiectum . . . pervigilat,” refer to the death of Vinia, it would follow that the first Epitha- lamium was written some time before that poem, and thus belongs to the earlier time. While the translations of Sappho, —

” Ille mi par esse deo videtur,” and of Callimachus (Ixvi.), —

” Omnia qui magni dispexit lumina mundi,” belong to the earlier period, the Attis and the Peleus and Thetis; although perhaps suggested by the treatment of the same or similar subjects in Greek authors, are executed with such power and originality as declare them to be products of the most vigorous stage in the development of the poet’s genius. That his genius came soon to maturity is a reason for hesitation in assign L ing any particular time between 62 and 54 B.C. for the composition of the Attis and of that part of the Epithalamium (” Peliaco quondam prognatae vertice pinus “) which deals with the main subject of the poem. But the criticism of Munro in his edition of Lucretius, which shows similarities of expression that cannot be mere casual coincidences, between the Ariadne- episode in the Epithalamium of Catullus (from line 52 to 266) and the poem of Lucretius, leaves little doubt that that portion at least of the poem was written after the publication of the De rerum natura, in the winter of 55-54 B.C.

No ancient author has left a more vivid impression of himself on his writings than Catullus. Coming to Rome in early youth from a distant province, not at that time included within the limits of Italy, he lived as an equal with the men of his time of most intellectual activity and refinement, as well as of highest social and political eminence. Among those to whom his poems are

addressed, or who are mentioned in them, we find the names of Hortensius, Cicero, Cornelius Nepos, Licinius Calvus, Helvius Cinna and Asinius Pollio, then only a youth (xii. 8). Catullus brought into this circle the genius of a great poet, .the social

vivacity of a vigorous nature, the simplicity and sincerity of an unambitious, and the warmth of an affectionate disposition. He betrays all the sensitiveness of the poetic temperament, but it is never the sensitiveness of vanity, for he is characterized by the modesty rather than the self-confidence which accompanies genius, but the sensitiveness of a heart which gives and expects more sympathy and loyalty in friendship than the world either wants or cares to give in return. He shows also in some of his lighter pieces the fastidiousness of a refined taste, intolerant of all boorishness, pedantry, affectation and sordid ways of life. The passionate intensity of his temperament displays itself with similar strength in the outpourings of his animosity as of his love and affection. It was, unfortunately, the fashion of the time to employ in the expression of these animosities a licence of speech and of imputation which it is difficult for men living under different social conditions to understand, still more difficult to tolerate. Munro has examined the 29th poem —

" Qiiis hoc potest videre, quis potest pati," the longest and most important of the lampoons on Caesar and Mamurra, and shown with much learning and acuteness the motives and intention of Catullus in writing them. Had Julius Caesar really believed, as Suetonius, writing two hundred years afterwards, says he did, that " an eternal stigma had been cast upon him by the verses concerning Mamurra," we should scarcely apply the word magnanimity to his condonation of the offence. But these verses survive as a memorial not of any scandal affecting Julius Caesar which could possibly have been believed by his contemporaries, but of the licence of speech which was then indulged in, of the jealousy with which the younger members of the Roman aristocracy, who a little later fought on the side of Pompey, at that time regarded the ascend- ancy both of the " father-in-law and the son-in-law," and the social elevation of some of their instruments, and also, to a certain extent, of the deterioration which the frank and generous nature of Catullus underwent from the passions which wasted, and the faithlessness which marred his life.

The great age of Latin poetry extends from about the year 60 B.C. till the death of Ovid in 17 a.d. There are three marked divisions

in this period, each with a distinct character of its own: the first represented by Lucretius and Catullus, the second by Virgil and Horace, the last by Ovid. Force and sincerity are the great characteristics of the first period, maturity of art of the second, facility of the last. The educating influence of Greek art on the Roman mind was first fully experienced in the Cicer onian age, and none of his contemporaries was so susceptible of that influence as Catullus. With the susceptibility to art hi combined a large share of the vigorous and genial qualities of the Italian race. Like most of his younger contemporaries, he studied in the school of the Alexandrine poets, with whom the favourite subjects of art were the passion of love, and stories from the Greek mythology, which admitted of being treated in a spirit similar to that in which they celebrated their own experi- ences. It was under this influence that Catullus wrote the Coma Berenices, the 68th poem, which, after the manner of the Alex- andrines, interweaves the old tale of Protesilaus and Laodamia with the personal experiences of the poet himself, and the Epithalamium of Peleus and Thetis, which combines two pictures from the Greek mythology, one of the secure happiness of mar*- riage, the other of the passionate despair of love betrayed. In this last poem Catullus displays a power of creative pictorial imagination far transcending that displayed in any of the extant poetry of Alexandria. We have no means of determining what suggested the subject of the Attis to Catullus, whether the previous treatment of the subject by some Greek writer, some survival of the myth which he found still existing during his residence among the " Phrygii Campi," or the growth of various forms of Eastern^ superstition and fanaticism, at Rome, in the last age of the Republic. Whatever may have been its origin, it is the finest specimen we possess, in either Greek or Latin literature, of that kind of short poem more common in modern than ancient times, in which some situation or passion entirely alien to the writer, and to his own age, is realized with dramatic intensity.

But the genius of Catullus is 1 , perhaps, even happier in the direct expression of personal feeling than in artistic creation, or the reproduction of tales and situations from mythology. The warmth, intensity and sincerity of his own nature are the sources of the inspiration in these poems. The most elaborate and one of the finest of them is the Epithalamium in honour of the marriage

of a member of the old house of Manlius Torquatus with Vinia Aurunculeia, written in the glyconic in combination with the pherecratean metre. To this metre Catullus imparts a peculiar lightness and grace by making the trochee, instead of the spondee as in Horace's glyconics and pherecrateans, the first foot in the line. His elegiac metre is constructed with less smoothness and regularity than that of Ovid and Tibullus or even of Propertius, but as employed by him it gives a true echo to the serious and plaintive feelings of some of his poems, while it adapts itself, as it did later in the hands of Martial, to the epigrammatic terseness of his invective. But the perfec- tion of the art of Catullus is seen in his employment of those metres which he adapted to the Latin tongue from the earlier poets of Greece, the pure iambic trimeter, as in iv. —

" Phaselus ille quem videtis hospites," the scazon iambic, employed in viii. and xxxi.—

" Paeninsularum, Sirmio, insularumque," and the phalecian hendecasyllabic, a slight modification of the Sapphic line, which is his favourite metre for the expression of his more joyful moods, and of his lighter satiric vein. The Latin language never flowed with such ease, freshness and purity as in these poems. Their perfection consists in the entire absence of all appearance of effort or reflection, and in the fulness of life and feeling, which gives a lasting interest and charm to the most trivial incident of the passing hour. In reference to these poems Munro has said with truth and force: " A generation had yet to pass before the heroic attained to its perfection; while he (Catullus) had already produced glyconics, phalecians and iambics, each ' one entire and perfect chrysolite,' ' cunningest patterns ' of excellence, such as Latium never saw before or after, — Alcaeus, Sappho, and the rest then and only then having

met their match."

The work of Catullus has not come down to us intact, as is shown by lacunae and quotations in ancient writers which cannot now be found in his poems. Out of the MSS. only three have claims to intrinsic importance. The oldest and best appears to be the Bodleian (Canon. 30). But little inferior is the Sangermanensis (Par. 14137)- Of the third, the Romanus, we shall be better able to judge when its discoverer, Prof. W. G. Hale, has published his collation. None of these MSS. are older than the 14th century. One poem, 62, is, however, preserved in a MS. of the 9th century

(the Thuaneus, Par. 8071). Prof. R. Ellis's discovery of the Bodleian MS. and E. Baehrens's recognition of its value opened a new chapter in the history of the text. Ellis's contributions comprise an indispensable commentary (ed. 2, 1889), an elaborate critical edition (ed. 2, 1878) and an English translation (1871) in the metres of the original. The text in the Oxford series, published in 1905, is inferior to those specified below. Baehrens's edition, 2 volumes (text 1876, the second edition by K. P. Schulze is a misnomer; and Latin com- mentary 1885) is still of value. Amongst other editions with critical or explanatory notes or both may be mentioned those of A. Riese (1884), L. Schwabe (1886, with index verborum), B. Schmidt (1887), J. P. Postgate (1889, text differing little from that in the new Corpus Poetarum), E. Benoist and E. Thomas, with French translation by Rostand (2 vols., 1882-1890), S. G. Owen (1893, an edition de luxe), W. T. Merrill (1893, Boston, U.S.A., with succinct English notes), A. Palmer (1896, one of the best of this scholar's works) ; M. Haupt's text of the three poets Catullus, Tibullus and Propertius, edited by J. Vahlen, reached its sixth edition in 1904. Of the numerous contributions to the textual and literary criticism of the poems may be named the papers in M. Haupt's Opuscule, L. Schwabe's Quaes- tiones Catullianae (1862), B. Schmidt's Prolegomena, H.A.J. Munro's Criticisms and Elucidations of Catullus (1878; second edition by J. D. Duff, 1905). Translations into English verse by J. Cranstoun (1867), SirT. Martin (1861, 1876), R. Ellis (above); a recent version in prose with the Latin text by F. W, Cornish (1904). For further information see Teuffel's History of Roman Literature (tr. by Warre), § 214, or the more recent accounts by M. Schanz, Geschichte der rbmischen Litteratur, i. §§ 102-106, and Frederic Plessis, La Poesie latine (1909), pp. i43-! 73- (W. Y. S.; X.)

CATULUS, the name of a distinguished family of ancient Rome of 1 the gens Lutatia. The following are its most important members.

1. Gaius Lutatius Catulus, Roman commander during the First Punic War, consul 242 B.C. He was sent with a fleet of 200 ships to Sicilian waters, and almost without opposition occupied the harbours of Lilybaeum and Drepanum. A hurriedly equipped fleet sent out from Carthage under Hanno was inter- cepted by the praetor Publius Valerius Falto and totally defeated (battle of the Aegates Islands, March 10, 241). Catulus, who had been wounded at Drepanum, took no part in the operations, but on his return to Rome was accorded the honour of a triumph, which against his

will he shared with Valerius. (See Punic Wars: First, ad fin.).

2. Quintus Lutatius Catulus, Roman general and consul with Marius in 102 B.C. In the war against the Cimbri and Teutones he was sent to defend the passage of the Alps but found himself compelled to retreat over the Po, his troops having been reduced to a state of panic (see Marius, Gaius). In 101 the Cimbri were defeated on the Raudine plain, near Vercellae, by the united armies of Catulus and Marius. The chief honour being ascribed to Marius, Catulus became his bitter opponent. He sided with Sulla in the civil war, was included in the proscription list of 87, and when Marius declined to pardon him, committed suicide. He was distinguished as an orator, poet and prose writer, and was well versed in Greek literature. He is said to have written the history of his consul- ship and the Cimbrian War after the manner of Xenophon; two epigrams by him have been preserved, one on Roscius the celebrated actor (Cicero, De Nat. Deorum, i. 28), the other of an erotic character, imitated from Callimachus (Gellius xix. 9). He was a man of great wealth, which he spent in beautifying Rome. Two buildings were known as ” Monumenta Catuli “: the temple of Fortuna hujusce diei, to commemorate the day of Vercellae, and the Porticus Catuli, built from the sale of the Cimbrian spoils.

See Plutarch, Marius, Sulla; Appian, B.C. i. 74; Veil. Pat. ii. 21; Florus iii. 21; Val. Max. vi. 3, ix. 13; Cicero, De Oratore, iii, 3. 8, Brutus, 35.

3. Quintus Lutatius Catulus (c. 120-61 b.c), sometimes called Capitolinus, son of the above, consul in 102. He inherited his father’s hatred of Marius, and was a consistent though moderate supporter of the aristocracy. In 78 he was consul with Marcus Aemilius Lepidus, who after the death of Sulla proposed the overthrow of his constitution, the re-establishment of the distribution of grain, the recall of the banished, and other democratic measures. Catulus vigorously opposed this, and a temporary compromise was effected. But Lepidus, having levied troops in his province of Transalpine Gaul, returned to Rome at the head of an army. Catulus defeated him at the Mulvian bridge and near Cosa in Etruria, and Lepidus made his escape to Sardinia, where he died soon afterwards. In 67 and 66 Catulus unsuccessfully opposed, as prejudicial to constitutional freedom, the Gabinian “and Manilian laws, which conferred special powers upon Pompey (q.v.). He consistently opposed Caesar, whom he endeavoured to implicate in the Catilinarian

conspiracy. Caesar, in return, accused him of embezzling public money during the reconstruction of the temple on the Capitol, and proposed to obliterate his name from the inscription and deprive him of the office of commissioner for its restoration. Catulus's supporters rallied round him, and Caesar dropped the charge. Catulus was the last princeps senatus of republican times; he held the office of censor also, but soon resigned, being unable to agree with his colleague Licinius Crassus. Although not a man of great abilities, Catulus exercised considerable influence through his political consistency and his undoubted solicitude for the welfare of the state.

See Sallust, Catilina, 35- 49; Dio Cassius xxxvi. 13; Plutarch, Crassus; Suetonius, Caesar, 15.

CAUB, or Kaub, a town of Germany, in the Prussian province of Hesse-Nassau, on the right bank of the Rhine, 28 m. N.W. from Wiesbaden, on the railway from Frankfort-on-Main to Cologne. Pop. 2 200. It has a Roman Catholic and an Evangeli- cal church, and a statue of Bliicher. The trade mainly consists of the wines of the district. On a crag above the town stands the

imposing ruin of Gutenfels, and facing it, on a rock in the middle of the Rhine, the small castle Pfalz, or Pfalzgrafenstein, where, according to legend, the Palatine countesses awaited their confinement, but which in reality served as a toll-gate for merchandise on the Rhine.

Caub, first mentioned in the year 983, originally belonged to the lords of Falkenstein, passed in 1277 to the Rhenish Pala- tinate, and attained civic rights in 1324. Here Bliicher crossed the Rhine with the Prussian and Russian armies, on New Year's night 1813-1814, in pursuit of the French.

CAUCA, a large coast department of Colombia, South • America, lying between the departments of Bolivar, Antioquia, Caldas and Tolima on the E., and the Pacific Ocean and Panama on the W., and extending from the Caribbean Sea S. to the department of Narino. Pop. (1905, estimate) 400,000; area 26,930 sq. m. Although Cauca was deprived of extensive territories on the upper Caqueta and Putumayo, and of a large area bordering on

Ecuador in the territorial redistribution of 1905, it remained the largest department of the republic. The Western Cordillera, traversing nearly its whole length from south to north, and the Central Cordillera, forming a part of its eastern frontier, give a very mountainous character to the region. It in- cludes, besides, the fertile and healthful valley of the upper Cauca, the hot, low valley of the Atrato, and a long coastal plain on the Pacific. The region is rich in mines and valuable forests, but its inhabitants have made very little progress in agriculture because there are not adequate transportation facilities. The capital of the department is Popayan at its southern extremity, with an estimated population in 1905 of 10,000, other important towns are Cali (16,000), Buga, Cartago and Buenaventura.

CAUCASIA, or Caucasus, a governor-generalship of Russia, occupying the isthmus between the Black Sea and the Sea of Azov on the west and the Caspian Sea on the east, as well as portions of the Armenian highlands. Its northern boundary is the Kuma-Manych depression, a succession of narrow, half- desiccated lakes and river-beds, only temporarily filled with water and connecting the Manych, a tributary of the Don, with the Kuma, which flows into the Caspian. This depression is supposed to be a relic of the former post-Pliocene connexion between the Black Sea and the Caspian, and is accepted by most geographers as the natural frontier between Europe and Asia, while others make the dividing-line coincide with the principal water-parting of the Caucasus mountain system. The southern boundary of Caucasia is in part coincident with the river Aras (Araxes), in part purely conventional and political. It was shifted several times during the 19th century, but now runs from a point on the Black Sea, some 20 m. south of Batum, in a south-easterly and easterly direction to Mt. Ararat, and thence along the Aras to within 30 m. of its confluence with the Kura, where it once more turns south-east, and eventually strikes the Caspian at Astara(30° 35′ N.). This large territory, covering an area of 180,843 sc l- m -i an d having in 1897 9,248,695 inhabitants (51 persq. m.), may be divided into four natural zones or sections: — (i.) the plains north of the Caucasus mountains, comprising the administrative division of Northern Caucasia; (ii.) the Caucasus range and the highlands of Daghestan; (iii.) the valleys of the Rion and the Kura, between the Caucasus range and the highlands of Armenia; and (iv.) the highlands of Armenia.

(i.) The plains of Northern Caucasia, which include most of the provinces of Kuban and Terek and of the government of

Stavropol, slope gently downwards from the foot of the Caucasus range towards the Kuma-Manych depression. It is only in their centre that they reach altitudes of as much as 2000-2500 ft. e.g. in the Stavropol " plateau," which stretches northwards, separating the tributaries of the Kuban from those of the Terek and the Kuma. Towards the foothills of the Caucasus they are clothed' with thick forests, while in the west they merge into the steppes of south Russia or end in marshy ground, choked with reeds and rushes, in the delta of the Kuban. In the north and east they give place, as the Manych and the coasts of the Caspian are approached, to arid, sandy, stony steppes. The soil of these plains is generally very fertile and they support a population of nearly 2,800,000 Russians, composed of Cossacks and peasant immigrants, settled chiefly along the rivers and grouped in large, wealthy villages. They carry on agriculture —

wheat-growing on a large scale — with the aid of modern agricultural machines, and breed cattle and horses. Vines are extensively cultivated on the low levels, and a variety of domestic trades are prosecuted in the villages. The higher parts of the plains, which are deeply trenched by the upper tributaries of the rivers, are inhabited by various Caucasian races — Kabardians and Cherkesses (Cir- cassians) in the west, Ossetes in the middle, and several tribal elements from Daghestan, described under the general name of Chechens, in the east ; while nomadic Nogai Tatars and Turkomans occupy the steppes.

(ii.) The Caucasus range runs from north-west to south-east from the Strait of Kerch to the Caspian Sea for a length of 900 m., with a varying breadth of 30 to 140 m., and covers a surface of 12,000 sq. m. The orographical characteristics of the Caucasus are described in detail under that heading.

(iii.) The combined valleys of the Rion and the Kura, which inter- vene between the Caucasus and the Armenian highlands, and stretch their axes north-west and south-east respectively, embrace the most populous and most fertile parts of Caucasia. They correspond roughly with the governments of Kutais, Tiflis, Elisavetpol and Baku, and have a population of nearly 3,650,000. The two valleys are separated by the low ridge of the Suram or Meskes mountains.

Spurs from the Caucasus and from the Armenian highlands fill up the broad latitudinal depression between them. Above {i.e. west of) Tiflis these spurs so far intrude into the valley that it is

reduced to a narrow ‘strip in breadth. But below that city it suddenly widens out, an3 the width gradually increases through the stretch of 350 m. to the Caspian, until in the Mugan steppe along that sea it measures 100 m. in width. The snow-clad peaks of the main Caucasus, descending by short, steep slopes, fringe the valley on the north, while an abrupt escarpment, having the characteristics of a border ridge of the Armenian highlands, fronts it on the south. The floor of the valley slopes gently eastwards, from 1 200 ft. at Tiflis to 500 ft. in the middle, and to 85 ft. below normal sea-level beside the Caspian. But the uniformity of the slope is interrupted by a plateau (2000- 3000 ft. in altitude) along the southern foothills of the east central Caucasus, in the region known as Kakhetia, drained by the Alazan, a left-hand tributary of the Kura. The deep, short gorges and glens which seam the southern slopes of the Caucasus are inhabited by Ossetes, Tushes, Pshavs and Khevsurs in the west, and by various tribes of Lesghians in the east. In these high and stony valleys every available patch of ground is utilized for the cultivation of barley, even up to altitudes of 7000 and 8000 ft. above the level of the sea; but cattle-breeding is the principal resource of the moun- taineers, whose little communities are often separated from one another by passes, few of which are lower than 10,000 ft. The steppes along the bottom of the principal valley are for the most part too dry to be cultivated without irrigation. It is only in Kakhetia, where numerous mountain streams supply the fields and gardens of the plateau of Alazan, that wheat, millet and maize are grown, and orchards, vineyards and mulberry plantations are possible. Lower down the valley cattle-breeding is the chief source of wealth, while in the small towns and villages of the former Georgian kingdom various petty trades, exhibiting a high development of artistic taste and technical skill, are widely diffused. The slopes of the Armenian highlands are clothed with fine forests, and the vine is grown at their base, while on the wide-stretching steppes the Turko-Tatars pasture cattle, horses and sheep. The lower part of the Kura valley assumes the character of a dry steppe, the rainfall not reaching 14 in. annually at Baku, and it is still less in the Mugan steppe, though quite abun- dant in the adjacent region of Lenkoran. The vegetation of the steppe is on the whole scanty. Trees are generally absent, except for thickets of poplars, dwarf oaks and tamarisks along the course of the Kura, the delta of which is smothered under a jungle of reeds and rushes. The Mugan steppe is, however, in spite of its dryness, a more fertile region in virtue of the irrigation practised ; but the Kura has

excavated its bed too deeply to admit of that being done along its course. The Lenkoran district, sometimes called Talysh, on the western side of the Kizil-Agach bay, is blessed with a rich vegetation, a fertile soil, and a moist climate.

The inhabitants of the Kura valley consist principally of Iranian Tates and Talyshes, of Armenians and Lesghians, with Russians, Jews and Arabs.. This conjoint valley of the Rion-Kura was in remote antiquity the site of several Greek colonial settlements, later the seat of successive kingdoms of the Georgians, and for cen- turies it has formed a bulwark against hostile invasions from the south and east. It is still inhabited chiefly by Georgian tribes — Gurians, Imeretians, Mingrelians, Svanetians — in the basin of the Rion, and by Georgians intermingled with Armenians in the valley of the Kura, while the steppes that stretch away from the lower course of the latter river are ranged over by Turko-Tatars. Mingrelia and Imeretia (valley of Rion) are the gardens of Caucasia, but the high valleys of Svanetia, farther north on the south slopes of the Caucasus mountains, are wild and difficult of access. In the cultivated parts the land is so exceedingly fertile and productive that it sells for almost fabulous prices, and its vahie is still further enhanced by the discovery of manganese and copper mines in the basin of the Rion, and of the almost inexhaustible supplies of naphtha and petroleum at Baku in the Apsheron peninsula. The principal products of the soil are mentioned lower down, while the general

character of the vegetation is indicated under Caucasus : Western Caucasus. In the basin of the Rion, in that of the Chorokh (which runs off the Pontic highlands into the Black Sea south of Batura), and on the Black Sea littoral from Batum northwards toSukhum-kaleh, and beyond, the climate is extremely hot and the rainfall heavy (see under Climate below). It is in this valley that the principal towns (except Vladikavkaz at the north foot of the Caucasus) of Caucasia are situated, namely, Baku (179,133 inhabitants in 1900), Tiflis (160,645 in 1897), Kutais (32,492), and the two Black Sea ports of Batum (28,512) and Poti (7666).

(iv.) The highlands of Armenia are sometimes designated the Minor Caucasus, Little Caucasus and Anti-Caucasus. But to use such terms for what is not only an independent, but also an

older, orographical formation than the Caucasus tends to perpetuate confusion in geographical nomenclature. The Armenian highlands, which run generally parallel to the Caucasus, though at much lower elevations (5000-6000 ft.), are a plateau region, sometimes quite flat, sometimes gently undulating, clothed with luxuriant meadows and mostly cultivable. From it rise double or triple ranges connected by cross-ridges and spined with outer spurs. These double and triple ranges, which have a general elevation of 8500-10,000 ft., stretch from the south-east angle of the Black Sea, 400 m. south-eastwards to the Kara-dagh and Salavat mountains in north Persia, and the latter link them on to the Elburz mountains that skirt the southern end of the Caspian Sea. Various names are given to the different parts of the constituent ranges, or, perhaps more correctly, elongated groups of mountains. The Ajar, Akhalt-sikh and Meskes or Trialety groups in the west are succeeded farther east by the Somkhet, Murguz, Ganji and Karabakh sections, forming the southern rim of the Kura basin, while parallel with them, but farther south, run the Mokry, Miskhan, Akmangan and Paltapin ranges, marking the northern edge of the Aras drainage area. These two sets of parallel ranges are linked together transversely by the cross-ridges of Bezobdal, Pambak, Shah-dagh and Gok-cha. From this last branches off the highest range in the entire series, namely, the Zangezur, which soars up to 10,000 ft. above the left bank of the Aras. From it again there shoot away at right angles, one on each side, the ranges of the Dar-alagoz and Bergushet. These highlands exhibit very considerable evidences of volcanic activity both in remote geological periods and also since the Tertiary epoch. Large areas are overlain with trachyte, basalt, obsidian, tuff and pumice. The most conspicuous features of the entire region, Mount Ararat (16,930 ft.) and Mount Alagoz (13,440 ft.), are both solid masses of trachyte ; and both rise above the limits of perpetual snow. Extinct volcanoes are numerous in several of the ranges, e.g. Akmangan, Mokry, Karabakh and Egri-dagh (see below). It is in this region of the Armenian highlands that the largest lakes of Caucasia are situated, namely, the Gok-cha or Sevanga (540 sq. m. in area) at an altitude of 6340 ft., the Chaldir-gol (33 sq. m.) at 6520 ft., and several smaller ones, such as the gols of Khozapin, Khopchalu, Arpa, Topo- ravan and Tabiztskhur, all situated between 6500 and 7000 ft. above sea-level. The principal water-divide in this highland region is, however, the range of Egri-dagh (Ararat), which just south of 40° S. forms for 100 m. the boundary between Russian and Turkish Armenia, having Ararat

at its eastern extremity and the extinct volcano of Kessa-dagh (11,260 ft.) at its western. Its importance lies in the fact that it divides the streams which flow into the Black Sea and Caspian from those which make their way into the Persian Gulf. The Egri-dagh possesses a sharply defined crest, ranges at a general elevation of 8000 ft., is bare of timber, scantily supplied with water, and rugged and deeply fissured.

The transverse water-parting between the Black Sea and the Caspian begins on the south side of the main range of the Caucasus, at Mount Zikara (12,560 ft.), a little south-west of Kasbek, and runs south-west along the sinuous crests of the Racha, Suram or Meskes (3000-5000 ft.), Vakhan (10,000-11,000 ft.), Arzyan (7000- 10,000 ft.), and its continuation the Soganluk, thus linking the Caucasus ranges with those of the Armenian highlands. This line of heights separates the basins of the Chorokh and the Rion (Black Sea) from those of-the Aras and the Kura (Caspian Sea). North of the Caucasus ranges the water-divide between these two seas descends from Mount Elbruz along the Sadyrlar Mountains (11,000 ft.), and finally sinks into the Stavropol " plateau " (1600 ft.). But the main axis of the transverse upheavals would appear to be con- tinued in a north-eastern direction in the Andi and other parallel ranges of Daghestan, as stated under Caucasus.

The population in this region consists principally of Armenians, Tatars, Turks, Kurds, Ossetes, Greeks, with Persians, Tates and a few Russians (see particulars below).

Climate. — Owing in part to the great differences in altitude in different regions of Caucasia and in part to the directions in which the mountain ranges run, and consequently the quarters towards which their slopes face, the climate varies very greatly according to locality. Generally speaking, it may be character-ized as a climate of extremes on the Armenian highlands, in the Kura valley and in northern Caucasia, and as maritime and genial in Lenkoran, on the Black Sea coastlands, and in the

valley of the Rion. The greatest recorded range of temperature is at Erivan (altitude 3230 ft.), namely, of 64 between a January average of 14-9° and an August average of 78-8° F. At Sukhum-kaleh, on the Black Sea, the corresponding range is only 27-3°, between a January average of 48-8° and an August average of 76-1°. The highest mean temperatures for the whole year are those of Lenkoran (6o'3°) and of Sukhum-kaleh and Poti (about

58), and the lowest at Ardahan (5840 ft.), in the province of Kars, namely, 37-9°, and at Gudaur (7245 ft.), a few miles south of Kasbek, namely, 38-6°. The following table gives particulars of temperature averages at a few typical places: —

Place.

Altitude.

Annual Mean.

January Mean.

July Mean.

Stavropol

2030

47-0°

24-0°

70-0°

Vladikavkaz

2345

47-3° ■

23-4°

68-0°

Gudaur

7245

38-6°

20-3°

57-2°

Baku

on Caspian

58-0°

38-0°

8o-o°

Tiflis

1490

55-0°

32-o°

76-5°

Batum

on Black Sea

59-0°

42-0°

75-0°

Sochi

on Black Sea

56-3°

40-3°

76-1°

Lenkoran

on Caspian

60-3°

39-o°

8o-6°

Erivan

51-0°

15-0°

75-0°

In respect of precipitation the entire region of Caucasia may be divided into two strikingly contrasted regions, a wet and a dry. To the former belong the Black Sea littoral, where the rainfall averages 59 to 93 in. annually, and the valleys that open upon it or are exposed to winds blowing off it, in which the rainfall varies, however, from 20 in. (Abbas-tuman, Borzhom) to 60 (Kutais). In Lenkoran also the rainfall averages 40 to 50 in. in the year. Between 16 and 40 in. fall as a rule at the northern foot of the Caucasus (Mozdok, Pyatigorsk) and in the Kura valley (Tiflis, Novo-bayazet) . On the Armenian highlands and on the steppes north of Pyatigorsk the rainfall is less than 12 in. annually, and even in some places less than 8 in., e.g. at the foot of Ararat. Most rain falls at Batum and at Lenkoran in the autumn, in northern Caucasia and in Transcaucasia in spring and summer, but in the vicinity of the Sea of Azov in winter.

Flora and Fauna. — Plant-life, in such a mountainous country as Caucasia, being intimately dependent upon aspect and altitude, is treated under Caucasus. The wild animals of Caucasia are for the most part the same as those which frequent the mountainous parts of central Europe, though there is also an irruption of Asiatic forms, e.g. the tiger (in Lenkoran only), panther, hyaena and jackal. The more important of the carni- vores which haunt the forests, valleys and mountain slopes are the bear (Ursus arctos), wolf, lynx, wild cat and fox (Vulpes melanotus). The wild boar occurs around Borzhom. The aurochs (Bos urus) appears to exist still in the forests of the western Caucasus. Of interest for sportsmen, as well as serving as prey for the carnivores, are red deer, goats (Capra pallasil and C. aegagrus), chamois, roebuck, moufflon (Ovis musimon), argali or Asiatic wild sheep (O. Ammon), another species of sheep in O. gmelini, and fallow deer (Capreolus pigargtts) in northern Caucasus only. Rodents are numerous, the mouse (M us sylvaticus) is very destructive, and beavers are met with in places. The birds of prey are the same as these of central Europe, and include the sea eagle, alpine vulture {Gyps fulvus), buzzard, kites (Gypaetus barbatus and Milvus ater), hawks (e.g. Astur nisus) , goshawk (A . palumbarius) , fish-

hawk (Pandion haliaetus) and owls. Among the smaller birds may be enumer- ated finches, the siskin, bullfinch, pipit, titmcuse, wagtail, lark, fine-crested wren, hedge-sparrow, corn-wren, nut-hatch, starling, swallow, martin, swift, thrush, butcher bird, shrike, dipper, yellow-hammer, ortolan and a warbler (Accentor alpinus). The game birds consist of grouse, blackcock, moorhen, quail and partridge. The pheasant derives its name from the ancient name (Phasis) of the Rion.

In the seas and rivers about 190 species of fishes have been enumerated. Of these, 115 species are Mediterranean, 30 are com- mon to the Caspian Sea, and the remaining species are peculiar to the Black Sea. The most useful economically are several species of sturgeon and of herring, trout, barbel, chubb, bream, ray, sea-dace,

carp, anchovy. Insects abound, especially Coleopte.ra. Flies, lice, gadflies and mosquitoes are the worst of the insect plagues. There are several snakes, including the viper (Pelias berus).

Ethnology. — The population of Caucasia is increasing rapidly. In 1897 it numbered 9,291,090, of whom 4,886,230 were males and 4,404,867 were females. The most densely-peopled provinces were Kutais and Tiflis, each with 80 inhabitants to the square mile; the thinnest the Black Sea government (20I per sq. m.), Terek (31), and Kars (39). Of the total population 3,725,543 lived in northern Caucasia and 5,564,547 in Transcaucasia (including Daghestan). In the latter territorial division there exists a great disproportion between the sexes, namely, to every 100 males only 86 females; indeed in the Black Sea government there are only 65-5 females to every 100 males. Ethnologically the population belongs to a great variety of races. The older authorities asserted that these numbered as many as 150, or even 300; the more recent researches of Baron P. V. Uslar, F. Anton, von Schiefner, Zagursky, and others have greatly reduced this number; but even then there are not less than fifty represented.

According to the languages spoken the populations of Caucasia admit of being classified as follows, 1 according to Senator N. Trointsky, president of the Russian Census Committee for 1897.

Aryans 4,901,412

Slavs 3,183,870

Great Russians

Little Russians

White Russians

Poles

Germans 47.39 1

Greeks 100,299

Rumanians 7,232

French and Italians ! > 435

Lithuanians 6,687

Lithuanians proper

Letts

Iranians 315.695

Persians

Talyshes

Tates

Ossetes

Kurds 99,836

Armenians 1,116,461

1,829,793

i ; 3°5,463

19,642

25-117

5,121

i,5H

13,929

34,994

95,056

171,716

46,739

1,902,142

3,041

40,498 5,353

7,42.2

1,879,908

Gypsies . Semites Jews

Chaldaeans (Aisors) Ural-Altaians Finns

Esthonians . Turko- Tatars

Tatars

Osmanli Turks

Nogai Tatars

Turkomans

Bashkirs

Chuvashes

Kirghiz

Sarts

Karachais

Kumyks

Kara-papaks

Kalmucks

Caucasians .... 2,439,071 Georgians (including Imeretians, Gurians, Svanetians, Lazes, Mingrel-

ians, &c.) 1,352,455

Circassians

Cherkesses (Adigheh) and Kabardians

Abkhasians Chechens

Chechens proper Ingushes 2 . Kistines Lesghians

Avaro-Andians .

Darghis

Kurins

ydins .

Others

274,318

600,514

4,281

1,509,785

139,419

64,048

24,522

953

411

98

158

27,222

83,408

29,902

14,409

144,847 72,103

226,496

47,409

413

212,692 130,209

159,213

7,100

91,300

1 Premier Recensement general de la population de V empire de Russie, ed. N. Trointsky (St Petersburg, 1905, 2 vols.), in Russian and French.

2 Although the Ingushes speak a Chechen dialect, they have recently been proved to be, anthropologically, quite a distinct race.

Religion.— Most of the Russians and the Georgians belong to the Orthodox Greek Church (over 4,000,000 in all); but considerable numbers (estimated at nearly 122,000, though in reality probably a good many more) are Nonconformists of different denominations. The Georgian Lazes are, however, Mussulmans. The Armenians are Christians, mostly of the national Gregorian Church (979,566), though 34,000 are Roman Catholics. The Caucasian races (except the Gregorians) , together with the Turks and Tatars, are Mussulmans of the Sunnite sect (2,021,300), and the Iranian races mostly Mussulmans of the Shiite sect (884,100). The Kalmucks and other Mongolic tribes are Lamaists (20,300), and some of the Kurds profess the. peculiar tenets of the Yezids.

Industries. — The principal occupation of the settled inhabitants is agriculture and of the nomadic the breeding of live stock, including camels. The cultivation of the soil is, however, attended in many parts with great difficulties owing to the scanty rainfall and the very primitive implements still in use, and in the valley of the Kura heavy losses are frequently incurred from depredations by locusts. But where irrigation is employed the yield of crops is excellent. Rye and wheat are the most important crops harvested in northern Caucasia, but oats, barley and maize are also cultivated, whereas in Transcaucasia the principal crops are maize, rice tobacco and cotton. The rice is grown chiefly in the valley of the Kura and in Lenkoran; the tobacco in the Rion valley and on the Black Sea coastlands, also to some extent in Kuban; and the cotton in the eastern provinces.

Various kinds of fodder crops are grown in Transcaucasia, such as hay, rye-grass and lucerne. It is estimated that nearly 54,000 acres are under vineyards in northern Caucasia and some 2 78, 000 acres in Transcarcasia, the aggregate yield of wine being 30 million gallons annually. The best wine grows in Kakhetia, a district lying north-east and east of Tiflis; this district alone yields nearly 8 million gallons annually. Large numbers of mulberry trees are planted for rearing silkworms, especially in Kutais, Erivan, Elisavetpol (Nukha) and Baku (Shemakha); the groves occupy nearly 150,000 acres, and the winding of the silk gives employment to large numbers of the population. Melons and water-melons are also important objects of cultiva- tion. Sunflowers are very extensively grown for oil in the government of Kuban and elsewhere, and also some flax. Liquorice is an article of export. Many varieties of fruit are grown, especially good being the apricots, peaches, walnuts and hazel nuts. A limited area (not more than n 50 acres) of the Black Sea coast between Sukhum-kaleh and Batum is planted with the tea-shrub, which succeeds very well. In the same district bamboos, ramie-fibre and attar (otto) of roses are cultivated.

The mining industry is growing rapidly in importance in spite of costly and deficient means of communication, want of capital, and lack of general initiative. So far the principal developments of the industry have been in the governments of Kutais, Batum, Elisavetpol and Kuban. Copper ore is extracted above the Murgul river (some 30 m. south of Batum) , at Akhtala south of Tiflis, and at Kedabek in Elisavetpol; manganese to a consider- ably greater extent (over 400,000 tons annually) at Chiaturi in the Kvirila valley in Kutais. Steam coal of good quality is reported to exist about 30 m. inland from the open roadstead of Ochemchiri in Kutais, but it is not mined. About 50,000 tons of coal of very poor quality are, however, extracted annually, and the same quantity of salt in the Armenian highlands and in Kuban. Small quantities of quicksilver, sulphur and iron are obtained. But all these are insignificant in comparison with the mineral oil industry of Baku, which in normal times yields annually between ten and eleven million tons of crude oil (naphtha). A good deal of this is transported by gravitation from Baku to Batum on the Black Sea by means of a pipe laid overland. The refined oil is exported as kerosene or petroleum, the heavier refuse (mazut) is used as fuel. Naphtha is also obtained, though in much smaller quantities, in Terek and Kuban, in Tiflis and Daghestan. Numerous mineral springs (chalybeate and sulphurous) exist

both north and south of the Caucasus ranges, e.g. at Pyatigorsk,

Zhelesnovodsk, Essentuki, and Kislovodsk in Terek, and at Tiflis, Abbastuman and Borzhom in the government of Tiflis.

Manufacturing industry is confined to a few articles and commodities, such as cement, tea, tin cans (for oil), cotton goods, oil refineries, tobacco factories, flour-mills, silk-winding mills (especially at Shusha and Jebrail in the south of Elisavetpol), distilleries and breweries. On the other hand, the domestic industries are extensively carried on and exhibit a high degree of technical skill and artistic taste. Carpets (especially at Shusha) , silk, cotton and woollen goods, felts and fur cloaks are made, and small arms in Daghestan and at Tiflis, Nukha and Sukhum- kaleh; silversmiths' work at Tiflis, Akhaltsikh and Kutais; pottery at Elisavetpol and Shusha; leather shoe-making at Alexandropol, Nukha, Elisavetpol, Shusha and Tiflis; saddlery at Sukhum-kaleh and Ochemchiri on the Black Sea and at Temir- khan-shura in Daghestan; and copper work at Derbent and Alexandropol. But industries of every description were most seriously crippled by the spirit of turbulence and disorder which manifested itself throughout Transcaucasia in the years 1904- 1906, accentuated as they were further by the outbreak of the long-rooted racial enmities between the Armenians and the Tatars, especially at Baku in 1905.

Commerce. — The exports through the Black Sea ports of Batum, Poti and Novo-rossiysk average in value a little over £10,000,000 annually, though showing a tendency to increase slightly. By far the most important commodity is petroleum, fully one-half of the total value. In addition large quantities are shipped at Baku direct for the Volga and the Transcaspian port of Krasnovodsk. The export that comes next in value is silk, and after it may be named wheat, barley, manganese ore, maize, wool, oilcake, carpets, rye, oats, liquorice and timber. The import trade reaches nothing like the same value, and what there is is confined almost entirely to Batum. The annual average vahie may be put at not quite £2,000,000, machinery and tin-plate being a long way the most important items. There is further a small transit trade through Transcaucasia from Persia to the value of less than half a million sterling annually, and chiefly in carpets, cocoons and

silk, wool, rice and boxwood; and further a sea-borne trade between Persia and Caucasian ports (Baku and Petrovsk) to the value of over i§ millions sterling in all. The very extensive internal trade with Russia can only be mentioned.

Railways. — The principal approach to Caucasia from Russia by rail is the line that runs from Rostov-on-Don to Vladikavkaz at the foot of the central Caucasus range. Thence, or rather from the junction of Beslan, 14 m. north of Vladikavkaz, the main line proceeds east of Petrovsk on the Caspian, and from Petrovsk skirts the shore southwards as far as Baku, the distance from Vladikavkaz to Baku being 414 m. This railway, together with the driving roads over the Caucasus mountains via the Mamison pass (the Ossetic military road) and the Darial pass (the Georgian military road), and the route across the Black Sea to Poti or Batum are the chief means of communication between southern Russia and Transcaucasia. Baku and Batum (also Poti) are connected by another main line, 560 m. long, which traverses the valleys of the Kura and the Rion, south of the Caucasus. From Tiflis, nearly midway on this last line, a railway proceeds 30uth as far as Erivan (234 m.), with a branch to Kars (48 m.). The Erivan line is being continued into Persia, namely, to Tabriz via Julfa on the Aras.

History. — To the ancient Greeks Caucasia, and the mighty range which dominates it, were a region of mystery and romance. It was there that they placed the scene of the sufferings of Prometheus (vide Aeschylus, Prometheus Vinctus), and there, in the land of Colchis, which corresponds to the valley of the Rion, that they sent the Argonauts to fetch the golden fleece. Outside the domain of myth, the earliest connexion of the Greeks with that part of the world would appear to have been through the maritime colonies, such as Dioscurias, which the Milesians founded on the Black Sea coast in the 7th century B.C. For more than two thousand years the most powerful state in Caucasia was that

of Georgia (q.v.), the authentic history of which begins with its submission to Alexander the Great in 323 B.C. The southern portion of Transcaucasia fell during the 1st century B.C. under the sway of Armenia, and with that country passed under the dominion of Rome, and so eventually of the Eastern empire. During the 3rd century a.d. Georgia and Armenia were invaded and in great part occupied by the Khazars, and then for more than a thousand years the mountain fastnesses of this borderland between Europe and Asia were the refuge, or the resting-

place, of successive waves of migration, as people alter people and tribe after tribe was compelled to give way to the pressure of stronger races harassing them in the rear. The Huns, for instance, and the Avars appeared in the 6th century, and the Mongols in the 13th. In the 10th century bands of Varangians or Russified Scandinavians sailed out of the Volga and coasted along the Caspian until they had doubled the Apsheron peninsula, when they landed and captured Barda, the chief town of Caucasian Albania.

But, apart from Georgia, historical interest in Caucasia centres in the long and persistent attempts which the Russians made to conquer it, and the heroic, though unavailing, resistance offered by the mountain races, more especially the Circassian and Lesghian tribes. Russian aggression began somewhat early in the 18th century, when Peter the Great, establishing his base at Astrakhan on the Volga, and using the Caspian for bringing up supplies and munitions of war, captured Derbent from the Persians in 1722, and Baku in the following year. But these conquests, with others made at the expense of Persia, were restored to the latter power after Peter's death, a dozen years later. At that period the Georgians were divided into various petty principalities, the chief of which were Imeretia and Georgia (Kharthlia), owing at times a more or less shadowy allegiance to the sultan of the Ottoman Turks at Constantinople. In 1770, during the course of a war between Russia and Turkey, the Russians crossed over the Caucasus and assisted the Imere- tians to resist the Turks, and from the time of the ensuing peace of Kuchuk-kainarji the Georgian principalities looked to their powerful northern neighbour as their protector against the southern aggressors the Turks. In 1783 George XIII. , prince of Georgia and Mingrelia, formally put himself under the suzerainty of Russia, and after his death Georgia was converted (1801) into a Russian province. The same fate overtook Imeretia nine years later. Meanwhile the Russians had also subdued the Ossetes (1802) and the Lesghian tribes (1803) of the middle Caucasus. By the peace of Gulistan in 181 3 Persia ceded to Russia several districts in eastern Caucasia, from Lenkoran northwards to Derbent. Nevertheless the mountain tribes who inhabited the higher parts of the Caucasus were still independent, and their subjugation cost Russia a sustained effort of thirty years, during the course of which her military commanders were more than once brought almost to the point of despair by the tenacity, the devotion and the adroitness and daring which the mountaineers

displayed in a harassing guerilla warfare. The animating spirit of their resistance was Shamyl (Samuel), a chief and priest of the Lesghians, who, a Mahommedan, pro- claimed a ” holy war ” against the ” infidel ” aggressors. At first the Russians were able to continue their policy of conquest and annexation without serious check. After acquiring the northern edge of the Armenian plateau, partly from Persia in 1828 and partly from Turkey in 1829, Russia crushed a rising which had broken out in the Caspian coast districts of Daghestan on the north of the Caucasus. This took place during the years 1 831-183 2. The next seven years were occupied with the sub- jugation of the Abkhasians along the Black Sea coast, and of other Circassian tribes in the west. Meanwhile Shamyl had roused the Lesghian tribes farther east and begun his twenty years’ struggle for freedom, a struggle which called forth the sympathy and admiration of nearly the whole of Europe. More than once he escaped, in a manner that seemed little short of marvellous, out of the hands of the Russians when they held him closely invested in some mountain fastness, as at Himry in 1831, at Akhulgo in 1839, and again at the same stronghold in 1849.

The general who at last broke the back of the long opposition of the prophet-chief of the Lesghians was Prince Baryatinsky, who after three years of strenuous warfare succeeded in capturing Shamyl’s stronghold of Weden, and then in surrounding that chieftain himself on the inaccessible rocky platform of Gunib in the heart of Daghestan. There the hitherto indomitable champion of Caucasian independence was forced to surrender to the Russians on the 6th of September 1859. Nevertheless the spirit of resistance in these stubborn mountaineers was not finally broken until 1864, when the Russians eventually stifled all op- position in the difficult valleys and glens of the western Caucasus. But this was followed, during the next fourteen years, by the wholesale emigration of thousands upon thousands of Circassians, who sought an asylum in Turkish territory, leaving their native region almost uninhabited and desolate, a condition from which it has not recovered even at the present day. During the Russo- Turkish War of 1877-78 the self exiled Circassians and other Caucasian mountaineers, supported by a force of 14,000 Turks, made a determined attempt to wrest their native glens from the power of Russia; but, after suffering a severe defeat at the hands of

General Alkhazov, the Turks withdrew, and were accompanied by some 30,000 Abkhasians, who settled in Asia Minor. A few months later the Lesghians in Daghestan, who had risen in revolt, were defeated and their country once more reduced to obedience. By the ensuing peace of Adrianople, Russia still further enlarged her Transcaucasian territories by the acquisition of the districts of Kars, Batum and Ardahan. After a peaceful period of a quarter of a century the Armenian subjects of Russia in Transcaucasia were filled with bitterness and discontent by the confiscation of the properties of their national (Gregorian) church by the Russian treasury. Nor were their feelings more than half allayed by the arrangement which made their ecclesias tics salaried officers of the Russian state. This ferment of unrest, which was provoked in the years 1 903-1 904, was exacerbated in the winters that followed by the renewed outbreak of the century -long racial feud between the Tatars and the Armenians at Baku and other places. In fact, nearly the whole of the region between the Caucasus and the Perso-Turkish frontier on the south, from the Caspian Sea on the one side to the Black Sea on the other, was embroiled in a civil war of the most sanguinary and ruthless character, the inveterate racial animosities of the combatants being in both cases inflamed by religious fanaticism. Complete anarchy prevailed at the worst centres of disorder, as Baku and Batum, the imperial authorities being more powerless to preserve even the semblance of order than they were in the interior of Russia. Many of the oil wells at Baku were burned, and massacres took place at that town, at Shusha, at Erivan, at Tiflis, at Batum, at Jebrail and at other places. An end was put to these disorders only by the mutual agreement of the two contestants, alike horrified and exhausted by the fierce outburst of passion, in September 1905. (J. T. Be.)

CAUCASUS, a mountain range of Asia, wholly within the Russian empire, stretching north-west to south-east from the Strait of Kerch (between the Black Sea and Sea of Azov) to the Caspian Sea, over a length of 900 m., with a breadth varying from 30 to 140 m. In its general character and conformation the Caucasus presents a closer analogy with the Pyrenees than with the Alps. Its general uniformity of direction, its comparatively narrow width, and its well-defined limits towards both south and north are all features which it has in common with the former. The range of the Caucasus, like that of the Pyrenees, maintains for considerable distances a high average elevation, and is not cleft by deep trenches, forming natural passes across the range, such

as are common in the Alps. In both ranges, too, some of the highest summits stand on spurs of the main range, not on the main range itself; as Mont Perdu and Maladetta lie south of the main backbone of the Pyrenees, so Mount Elbruz and Kasbek, Dykh-tau, Koshtan-tau, Janga-tau and Shkara — all amongst the loftiest peaks of the Caucasus — stand on a subsidiary range north of the principal range or on spurs connecting the two. On the other hand, it is interesting to compare the arrangement of the drainage waters of the Caucasus with those of the Alps. In

both orographical systems the principal rivers start nearly all together from a central nucleus, and in both cases they radiate to opposite quarters of the compass; but whereas in the Alps the Rhone and the Rhine, flowing south-west and north-east respectively, follow longitudinal valleys, and the Aar and the Ticino, flowing north-west and south-east respectively, follow transverse valleys, in the Caucasus the streams which flow south-west and north-east, namely, the headwaters of the Rion and the Terek, travel along transverse valleys, and those of the Kura and the Kuban, flowing south-east and north-west respectively, traverse longitudinal valleys. For purposes of description it is convenient to consider the range in four sections, a western, a middle with two subsections, and an eastern.

1. Western Caucasus. This section, extending from the Strait of Kerch to Mount Elbruz in 42 40′ E., is over 420 m. long, and runs parallel to the north-east coast of the Black Sea and at only a short distance from it. Between the main range and the sea there intervene at least two parallel ranges separated by deep glens, and behind it a third subsidiary parallel range, likewise separated by a deep trough-like valley, and known as the Bokovoi Khrebet. All these ranges are shorn through transversely by numerous glens and gorges, and, the rainfall being heavy and the exposure favourable, they are densely clothed with vegetation. Many of the spurs or broken segments of ranges thus formed abut steeply upon the Black Sea, so that this littoral region is on the whole very rugged and not readily accessible, especially as the general elevations are considerable. The seaward flanking ranges run up to 4000 ft. and more, and in many places shoot out cliffs which overhang the coast some 2000-3000 ft. sheer, while the main range gradually ascends to 10,000-12,000 ft. as it advances eastwards, the principal peaks being Fisht (8040 ft.), Oshten (9210 ft.), Shuguz (10,640 ft.), and Psysh (12,425 ft.). And whereas the main range is built up of hard eruptive or crystalline rocks, the subsidiary chains are

composed of softer (Cretaceous and Tertiary) laminated formations, which easily become disintegrated and dislocated. The snow-line runs here at about 9000 ft. on the loftiest summits, and east of Oshten the crest of the main range is capped with perpetual snow and carries many hanging glaciers, while larger glaciers creep down the principal valleys. The passes lie at relatively great altitudes and are few in number, so that although the northern versants of the various ranges all have a tolerably gentle slope, communication between the Black Sea and the valley of the Kuban, and the low steppe country beyond, is the reverse of easy. The more important passes, proceeding from west to east, are Pshekh (5435 ft.) west of Oshten, and Shetlib (6060 ft.) east of Oshten, Pseashka (6880 ft.) east of Shuguz, Sanchar (7990 ft.) west of Psysh; and between the last-named mountain and Elbruz, facilitating communication between Sukhum-Kaleh (and the coast as far as Poti) and the upper valley of the Kuban, are the passes of Marukh (11,500 ft.), Klukhor (9450 ft.) and Nakhar (9615 ft.).

Flora. — The southern exposure of this littoral region, the shelter afforded against the bitter winds of the north by the lofty Caucasus range, and the copious rainfall all combine to foster a luxuriant and abundant vegetation. The most dis- tinguishing feature of the flora of this region is the predominance of arborescent growths; forests cover in fact 56% of the area, and are not only dense but laced together with climbing and twining plants. The commonest species of trees are such as grow in central Europe, namely, ash, fir, pine, beech, acacia, maple, birch, box, chestnut, laurel, holm-oak, poplar, elm, lime, yew, elder, willow, oak. The common box is especially prevalent, but the preponderating species are Coniferae, including the Caucasian species Pinus halepensis and P. insignis. The commonest firs are Abies nordmannia and A. orientalis. There are two native oaks, Quercus ponticus and Q. sessiliflora. A great variety of shrubs grow on these slopes of the western Caucasus, chiefly the following species, several of which are indigenous — Rhododendron ponticum, Azalea pontica, Aristotelia maqui, Agave

americana, Cephalaria tatarica, Cptoneaster pyracantha, Citrus aurantium, Diospyros ebenum, Ficus carica, Illicium anisatum,

Ligustrumcaucasicum, Punica granatum, Philadelphus coronarius, Pyrus salicifolia, Rhus cotinus and six species of Viburnum. Aquatic plants thrive excellently and occur in great variety. The following purely Caucasian species also grow on the coast — five species of spearwort, three of saxifrage, Aster caucasica, Dioscorea caucasica, Echinops raddeanus, Hedera colchica, Helle- borus caucasica and Peucedanum caucasicum. Here too are found many of the more beautiful open-air flowering plants of a shrubby character, e.g. magnolia, azalea, camellia, begonia and paulownia. Among the cultivated trees and shrubs the most valuable economically are the vine, peach, pomegranate, fig, olive (up to 1500 ft. above sea-level), chestnut, apricot, apple, pear, plum, cherry, melon, tea (on the coast between Sukhum- Kaleh and Batum), maize (yielding the staple food of the inhabi- tants), wheat (up to 6000 ft.), potatoes, peas, currants, cotton, rice, colza and tobacco. Before the Russian conquest the native inhabitants of this region were Kabardians, Circassians (Adigheh) and Abkhasians, also a Circassian race. But half a million of these people being Mahommedans, and refusing to submit to the yoke of Christian Russia, emigrated into Turkish territory

List of Peaks in the west central Caucasus, with their altitudes, names and dates of mountaineers

who have climbed them.

Altitude

Name of Pea

*• in Feet.

By whom ascended.

Date.

Elbruz, E. peak

• • • 18.345

D. W. Freshfield, A. W. Moore and C. Tucker

1868

Elbruz, W. peak

• ■ • 18,465

F. C. Grove, H. Walker and F. Gardiner

1874

11 ,,

,,

H. Woolley

1889

Donguz-orun .

14,600

G. Merzbacher and L. Purtscheller

1890

Donkin and H. Fox

1888

,,

ff

Helbling, Reichert and Weber .

1903

Shtavler

. ■ 13,105

Ficker, W. R. Rickmers, Scheck and Wigner

1903

Ledosht-tau

. . 12,580

Schuster and Wigner

1903

Hevai

• • 13,055

Schuster and Wigner

1903

Lakra-tau .

. • 12,185

Rolleston and Longstaff

1903

Ushba, N.E. peak

. . 15,400

Cockin

1888

Ushba, S.W. peak

. ■ i5,4 10

Helbling, Schulze, Reichert, Schuster and

Weber Distel, Leuchs and Pfann

1903

Ushba, both peaks

1903

Sultran-kol-bashi

• • 12,495

Grove, Walker and Gardiner

1874

Bak …

- • “,739

Collier, Solly and Newmarch

1894

Gulba

12,500

Freshfield

1887

Salynan-bashi

14,700

Cockin and H. W. Holder

1888

Shikildi-tau

■ • 14,170

Helbling, Reichert, Schulze and Weber

1903

Bshedukh

14,010

Distel, Leuchs and Pfann

1903

Ullu-tau-chana

13,800

Rolleston and Longstaff

1903

Adyr-su-bashi

• ■ H,335

Holder, Cockin and Woolley

1896

Sullu-kol-bashi

- • 13,970

Merzbacher and Purtscheller

1890

Tikhtengen .

• • 15,135

Rolleston and Longstaff

1903

Gestola .

• ■ 15,940

C. T. Dent and Donkin

1886

Tetnuld.

• • 15,920

Freshfield

1887

,,

Merzbacher and Purtscheller

1890

Adish or Katuyn-t

au . 16,295

Holder and Woolley

1888

Janga-tau, E. peak

• ■ 16,525

Cockin

1888

1, »»

Merzbacher and Purtscheller

1890

Janga-tau, E. a

nd W. W. peak.

peaks .

16,660

Helbling, Reichert, Schulze and Weber

1903

Shkara

17,040

Cockin

1888

Ailama .

■ • H,855

Woolley

1889

Ullu-auz

• • 15,350

V. Sella

1888

Dykh-tau ‘ .

■ • 17,050

Cockin, Holder and Woolley

1888

Koshtan-tau 2 .

• • 16,875

Woolley

1888

Mishirghi-tau, E. p

eak 16,350

Woolley

1889

Laboda

■ ■ 14,170

Dent and Woolley

t895

Tsikhvarga, E. pea

k ■ – 13,575

V. Sella

1890

,, W. pea

k • • 13,575

Holder and Cockin

1890

Karagom-khokh or

Burdshula .

• • I4, 2 95

Holder and Cockin

1890

Adai-khokh

• • 15,275

Holder and Cockin

1890

Tepli

■ • H,5io

V. Sella

1896

Kasbek

■ • i6,545

Freshfield, Moore and Tucker

1868

,,

Woolley

1889

1,

,,

Merzbacher

1890

,,

M

V. Sella

1S96

Giraarai-khokh

• ■ 15,670

Merzbacher

1890

Laila, N. peak Laila, middle peak

• ■ 13,045

Freshfield and Powell

1889

• • 13,155

V. Sella

1889

Laila, S. peak

■ ■ 13,105

Merzbacher and Purtscheller

1890

Khamkhakhi-khok

i 14,065

M. de Dechy

1884

1 Formerly the Koshtan-tau.

between 1864 and 1878, and the country where they had lived remained for the most part unoccupied until after the beginning of the 20th century. Then, however, the Russian government held out inducements to settlers, and these have been responded to by Russians, Greeks, Armenians and Rumanians, but the process of repeopling the long deserted territory is slow and difficult. The coast-line is remarkably regular, there being no deep bays and few seaports. The best accommodation that these latter afford consists of more or less open roadsteads, e.g. Novo-rossiysk, Gelenjik, Anapa, Sukhum-Kaleh, Poti and Batum. Along the coast a string of summer bathing resorts is springing up similar to those that dot the south-east coast of the Crimea. The most promising of these little seaside places are Anapa, Gelenjik and Gagry.

2. Middle Caucasus: (a) Western Half. — This sub-section, with a length of 200 m., reaches from Mount Elbruz to Kasbek and the Pass of Darial. It contains the loftiest summits of the entire range, fully a dozen exceeding Mont BJanc in altitude (see table below).

In addition to the peaks enumerated in the table, the following also exist between Elbruz and Kasbek all exceeding 13,000 ft. in altitude: Dong-osenghi, 14,265 ft.; Kurmychi, 13,310 ft.; Ullu-

kara-tau, 14,070 ft. ; Jailyk. 17,780 ft. Sarikol-bashi, 13,965 ft.; Dumala-tau 14,950 ft.; Sugan-tau, 14,730 ft. Tiutiu-bashi, 14,500 ft. ; Nuamkuam 13,975 ft-; Zurungal, 13,915 ft. Mala-tau, 14,950 ft.; Tiutiun-tau 15,115 ft.; Khrumkol-tau, 14,653 ft. Bubis-khokh, 14,500 ft. ; Giulchi, 14,680 ft.; Doppakh, 14,240 ft.; Nak-hashbita-khokh, 14,405 ft. ; Shan- khokh, 14,335 ft-I Mishirghi-tau (W. peak), 16,410 ft.; Fytnargyn-tau, I 3,79° ft-; Gezeh-tau, 14,140 ft.; and Kaltber, 14,460 ft.

The crest of the main range runs continuously at an altitude exceed- ing 10,000 ft., but even it is surpassed in elevation by the secondary range to the north, the Bokovoi Khrebet. These two ranges are connected by more than half a dozen short trans-verse spurs or necks, inclosing as many cirques or high cauldron

glens. Besides the Bokovoi Khrebet several other short subsidiary ranges branch off from the main range at acute angles, lifting up high montane glens between them; for instance, the two ranges in Svanetia, which divide, the one the river (glen) Ingur from the river (glen) Tskhenis-Tskhali.and the other the river (glen) Tskhenis- Tskhali from the rivers (glens) Lechkhum and Racha.Down all these glens glacier streams descend, until they find an opportunity to pierce through the flanking ranges, which they do in deep and picturesque gorges, and then race down the northern slopes of the mountains to enter the Terek or the Kuban, or down the southern versant to join the Rion or the Kura. Amongst all these high glens there is a remark- able absence of lakes and waterfalls; nor are there down in the lower valleys at the foot 6f the mountains, as one would naturally expect in a region so extensively glaciated, any sheets of water corresponding to the Swiss lakes. In this section of the Caucasus the loftiest peaks do not'

! Formerly the Dykh-tau.

as a rule rise on the main range, but in many cases on the short spurs that link it with the Bokovoi Khrebet and other subsidiary ranges.

" The central chain of the Caucasus," writes Mr Douglas W. Freshfield, 1 " consists of a number of short parallel or curved horse- shoe ridges, crowned with rocky peaks and enclosing basins filled by the neves of great glaciers. . . . On either side of the main chain the same succession is repeated, with one important difference. On the north the schists come first, sometimes rising into peaks and ridges in a state of ruin . . . but more often worn to rolling downs ; then the limestone range — writing-desk mountains that turn their steep fronts to the central snows; lastly low Cretaceous foothills, that sink softly into the steppe. But on the south side the crystal- line rocks are succeeded by a broad belt of slates, as to the age of which the evidence is at present conflicting and the opinion of geologists divided. East of Adai-khokh, by what seems a strange freak of nature, the granitic [main] range is rent over and over again to its base by gorges, the watershed being transferred to the parallel chain of clay slates . . . which has followed it from the Black Sea, attaining on

its way the height of 13,400 ft. in the Laila, and limiting the great parallel basins of the Rion, Ingur and Skenis Shali [= Tskhenis-Tskhali] ...” “At the base of the central core of the chain spread (to the north) broad, smooth, grassy downs, the pastures of the Turk and the Ossete. . . . Their ridges attain to 9000 to 10,000 ft. They are composed of friable crystalline schists. . . . Beyond these schists rises a broken wall of limestone, cleft to the base by gorges, through which flow the mountain torrents, and capped by pale precipitous battlements, which face the central chain at a height of 1 1,000 to 12,000 ft. Beyond, again, lies a broad furrow, or ‘ longitudinal fold,’ as geologists call it, parallel to the ridges, and then rises the last elevation, a belt of low calcareous hills, on which, here and there among the waves of beech forest, purple or blue with distance, a white cliff retains its local colour and shines like a patch of fresh snow. Beyond, once more beyond, spreads the Scythian steppe, not the dead level of Lombardy, but an expanse of long low modulations, which would be reckoned hills in our home counties, seamed by long shining ribbons, which mark the courses of the tributaries of the Terek. . . . Southwards too, immediately under the snows, we find ‘ crystalline schists,’ smooth grassy heights, separated by shallow trenches, which form the lesser undulations of the three basins, the drei Langenhochthaler Imeritiens of Dr Radde. These basins or ‘ longitudinal folds ‘ are enclosed on the south by the long high ridge of dark slates, which extends parallel to the crystalline [main] chain from the neighbourhood of Sukhum-Kale to the Krestovaya Gora [pass of Darial.] Behind this slate crest spreads a confused multitude of hills, Jurassic and Cre- taceous in their formation. . . . Their outer edge, distant some 30 to 40 m. from the snows, is marked by a limestone belt, lower and less continuous than that on the north, which frames the gorges of the Rion, and rises in the Kuamli (6352 ft.) and Nakarala (4.774 ft.) near Kutais, its best known elevations.” 2 It may be added that, south of the central watershed, the strata, both Mesozoic and Palaeozoic, are compressed, crumpled, faulted and frequently over- folded, with their apices pointing to the south.

Glaciers. — As a rule the snow-line runs at 0500 to 10,000 ft. on the northern face and 1000 ft. higher on the southern face. It is estimated that there are in all over nine hundred glaciers in this section of the range, and although they often rival those of the Alps in size, they do not descend generally to such low altitudes as the latter. The best known are the Bezingi or Ullu, between Dykh-tau and Janga-tau, io§ m. long, covering an area of 31 sq.

m., and descending to 6535 ft. above sea-level; Leksyr, situated south of Adyr-su-bashi, 7! m. long, 19 sq. m. in area, and creeping down to as low as 5690 ft., this being the lowest point to which any glacier descends on the south side of the range; Tseya or Zea, descending 6 m. from the Adai-khokh to an altitude of 6730 ft.; Karagom, from the same mountain, 9§ m. long, 14 sq. m. in area and reaching down to 5790 ft., the lowest on the north side; Dyevdorak or Devdorak, from Kasbek, 2|m. long, its lower end at 7 530 ft. ; Khaldeh or Geresho 41 m. long, from Shkara and Janga-tau; Tuyber from Tetnuld, 6Jm. long, area 21 sq. m., and reaching down to 6565 ft.; Tsanner or Zanner, the same length and the same area, but stopping short ■240 ft. higher, likewise given off by Tetnuld; while between that peak, Adish and Gestola originates the Adish or Lardkhat glacier, 5 m. long and terminating at 7450 ft. The total area covered by glaciers in the central Caucasus is estimated at 625 to 650 sq. m., the longest being the Maliev on Kasbek, 36 m, long; but according to the investigations of M. Rossikov several

1 Exploration of the Caucasus (2nd ed., 1902), 2 Op. oil. i. 35-36.

of the largest glaciers are shrinking or retreating, the Tseya at the rate of something like 40-45 ft- per annum.

Passes.— It is in this section that the entire mountain system is narrowest, and here it is that (apart from the “gate” at Derbent close beside the Caspian) the principal means of com- munication exist between north and south, between the steppes of southern Russia and the highlands of Armenia and Asia Minor. These means of communication are the passes of Darial and Mamison. Over the former, which lies immediately east of Kasbek, runs the Georgian military road (made 1811-1864) from Vladikavkaz to Tiflis, cutting through the mountains by a gorge (8 m. long) of singular beauty, shut in by precipitous mountain walls nearly 6000 ft. high, and so narrow that there is only just room for the carriage-road and the brawling river Terek side by side. The pass by which this road crosses the main range, farther south, is known as the Krestovaya Gora (Mountain of the Cross) and lies 7805 ft. above sea-level. The Mamison Pass, over which runs the Ossetic military road (made passable for vehicles in i889)from the Terek(below Vladikavkaz) to Kutais in the valley of the Rion, skirting the eastern foot of the Adai-khokh, lies at ah altitude of 9270 ft. and is situated a little south of the main range. Scarce

any of the remaining passes in this west-central region are better than mountain paths; horses can traverse the best of them only during a few weeks in the height of summer. They mostly range at altitudes of 9000* 12,500 ft., and between the pass of Nakhar in the west and that of Mamison in the east there is not a single pass below 10,000 ft. The best known in this section are the three Baksan passes of Chipei (10,800 and 10,720 ft.), Bassa (9950 ft.) and Donguz-orun (10,490 ft.), south of Elbruz; those of Becho (11,070 ft.), Akh-su (12,465 ft.), Bak (10,220 ft.), Adyr-su (12,305 ft.) and Be2ingi (10,090 ft.), between Elbruz and Dykh-tau; and those of Shari-vizk (11,560 ft.), Edena, Pasis-mta or Godivizk (11,270 ft.), Shtulu-vizk (10,860 ft.), Fytnargyn (11,130 ft.), between Dykh-tau and Adai-khokh; the Bakh-fandak (9570 ft.), between Adai-khohk and Kasbek; and the two Karaul passes (11,680 and 11,270 ft.) and Gurdzi-vizk (10,970 ft.), connecting the valley of the Urukh with that of the Rion. The most frequented pass in Svanetia is that of Latpari (9260 ft.) , situated in the first of the southern subsidiary ranges mentioned above, and thus connect- ing the valley of the Ingur with the valley of theTskhenis-Tskhali.

Flora. — In this section of the range again the southern slopes are clothed with vegetation of remarkable luxuriance and richness, more especially in the region of Svanetia (42°-43° E.). Not only are the plants bigger than they grow in the Alps, but the blossoms are more abundant. Here again forests of Coniferae predominate, especially on the northern and eastern slopes; and the other distinguishing features of the flora are gigantic male ferns (Aspidium filix-mas) , Paris incompleta (a member of the Trilliaceae), Usnea or tree-moss, box, holly (Ilex aguifolium), Lilium monadelphum and many of the familiar herbaceous plants which flower in English gardens, though here they grow to an altogether extraordinary size—" monkshoods, Cephalaria, Mulgedia and groundsels, among which men on horseback might play at hide and seek without stooping" (E. Levier). Other prominent species are Campanula, Pyrethrum, aconite, CephaSlis, speedwell, Alchemilla sericea, Centaur ea macrocephala, Primula grandis and a species of primrose. And the great height (13,000 ft.) at which the flowering plants blossom is not less remarkable than the great beauty and abundance of the flowers. Species which grow on both the northern and the southern slopes ascend ,2000 ft. higher on the latter than on the former. Walnuts grow up to an altitude of 5400 ft., the vine and mulberry up to 3250 ft., the lime and ash to

4000 ft. The forests extend to the upper end of the limestone gorges. Above that the crystalline schists are bare of tree vegetation. The upper limit of arborescent vegetation is considered to run at 7000-7500 ft., of shrubs such as rhododendrons at 8500 ft., and of pasture-lands up to 9000 ft. The principal cultivated varieties of plants in this section are wheat, rye, oats, barley, beans, millet and tobacco.

3. Middle Caucasus : (b) Eastern Part—In this sub-section, which stretches from Kasbek and the Darial gorge eastwards to

the Baba-dagh in 48 25′ E., a distance of 230 m., the Caucasus attains its greatest breadth. For the whole of that distance the main range keeps at an average elevation of 10,000 ft., though the peaks in many instances tower up 2000 to nearly 5000 ft. higher, the altitudes increasing towards the east. As the main range approaches the Caspian i ts granite core gradually disappears , giving place to Palaeozoic schists, which spread down both the northern and the southern slopes. The glaciers too decrease in the same proportion both in magnitude and in extent. Here the principal peaks, again found for the most part on the spurs and subsidiary ranges, are the Tsmiakom-khokh (13,570 ft.), Shan-tau (14,530 ft.), Kidenais-magali (13,840 ft.), Zilga-khokh (12,645 ft.), Zikari (12,565 ft.), Choukhi (12,110 ft.), Julti-dagh (12,430 ft.), Alakhun-dagh (12,690 ft.) and Maghi-dagh (12,445 ft.). . On the main range itself stand Borbalo (10,175 ft.), Great Shavi-kildeh (12,325 ft.), Murov (11,110 ft.), Ansal(n,740 ft.), Ginor-roso (11,120 ft.), while farther east come Trfanrdagh (13,765 ft.) and Bazardyuz or Kichen (14,727 ft.). In the same direction, but again outside the main range, lie Shah-dagh (13,955 ft.), Shalbuz (13,675 ft.) and Malkamud (12,750 ft.).

But the most noteworthy feature of this section is the broad highland region of Daghestan, which flanks the main range on the north, and sinks down both eastwards to the Black Sea and northwards to the valley of the Terek. On the north-west this rugged highland region is well denned by the distinctive trans-verse ridge of Andi, which to the east of Kasbek strikes off from the Caucasus range almost at right angles. The rest of the Daghestan region consists of a series of roughly parallel folds, of Jurassic or Cretaceous age, ranging in altitudes from 7500 up to

12,500 ft., separated from one another by deep gorge-like river glens which cut it up into a number of arid, treeless plateaus which have something of the appearance of independent ranges, or rather elongated tablelands of a mountainous character. The most prominent of these tablelands is Bash-lam, which stretches east and west between the Chanti Argun and the Andian Koisu, both tributaries of the Terek. Upon it rise the conspicuous peaks of Tebulos-mta (14,775 ft.), Tugo-mta (13,795 ft-), Komito-tavi or Kachu (14,010 ft.), Donos-mta (13,560 ft.), Diklos-mta (13,740 ft.), Kvavlos-mta or Kolos-mta (13,080 ft.), Motshekh-tsferi (13,140 ft.) and Galavanas-tsferi (13,260 ft.). Farther east come the Bogos tableland, stretching from south-south-west to east-north-east between the Andian Koisu and the Avarian Koisu and rising to over 13,400 ft. in several peaks, e.g. Antshovala(i3,44oft.), Botshokh-meer (13,515 ft.), Kosara-ku (13,420 ft.) and Addala-shuogchol-meer (13,580 ft.); and the Dyulty tableland, reaching 12,400 ft. between the Kara Koisu and the Kazikumukh Koisu. On some of these peaks again there is a considerable amount of glaciation, more particularly on the slopes of Diklos-mta, where the glaciers descend to 7700 ft. on the north side and to 8350 ft. on the south side. In this section of the Caucasus the passes run somewhat lower than those between Elbruz and Kasbek, though still at appreciable heights, fully equal to those that lead up from the Black Sea to the valley of the Kuban in the western section of the range. The best known are the Krestovaya Gora (7805 ft.) on the Georgian military road, south of Darial; Kodor (9300 ft.) and Satskheni, leading up from Telav in the upper valley of the Alazan; and Gudur (10,120 ft.) and Salavat (9280 ft.), carrying the Akhty military road from the valley of the Samur up past the Shah-dagh and the Bazar-dyusi to the valley of the Alazan.

The flora of this section bears a general resemblance to that farther west. Ample details will be found in Dr G. Radde's (1831-1903) monographs on Daghestan, quoted at the end of the present article.

4. The Eastern Section of the Caucasus gradually dies away east of Baba-dagH (11,930 ft.) towards the Caspian, terminating finally in the peninsula of Apsheron. It is, however, continued under the waters of the Caspian, as stated in the article on that sea, and reappears on its eastern side in the Kopet-dagh, which skirts the north-east frontier of Persia. In this section of the Caucasus no peak exceeds 9000 ft. in altitude

and the crest of the main range retains no snow. The most frequented pass, that of Alty-agach, necessitates a climb of not more than 4355 ft.

Slopes of Range. — Between the northern and the southern sides of the range there is quite as great a difference in climate, productions and scenery as there is between the Swiss and the Italian sides of the Alps. In the south-western valleys and on the south-western slopes of the Caucasus, where a heavy rainfall is combined with a warm temperature, magnificent forests clothe the mountain-sides and dip their skirts into the waters of the Black Sea. There not only the littoral from (say) Sukhum-Kaleh to Batum but the inland parts of the basin of the Rion will bear comparison with any of the provinces of Italy in point of fertility, and in richness and variety of products. But farther inland, upon proceeding eastwards towards Tiflis, a great change becomes noticeable on the other side of the transverse ridge of the Suram or Meskes mountains. Arid • upland plains and parched hillsides take the place of the rich verdure and luxuriant arborescent growth of Imeretia, Svanetia and Mingrelia, the districts which occupy the valleys of the Ingur and Rion and the tributaries of the latter. A very similar change likewise becomes noticeable in the higher regions of the Caucasus Mountains upon proceeding north of the pass of Mamison, which separates the head-waters of the Rion from those of the Ardon, an important tributary of the Terek. The valleys of the two streams last mentioned, and of others that flow in the same direction, are almost wholly destitute of trees, but where the bare rock does not prevail, the mountain slopes are carpeted with grass. Freshfield's description of the valley of the Terek above Kasbek will apply pretty generally to all the valleys that descend on that face of the range: " treeless valleys, bold rocks, slopes of forbidding steepness (even to eyes accustomed to those of the Alps), and stonebuilt villages, scarcely distinguishable from the neighbouring crags." But, austere and unattractive though these valleys are, the same epithets cannot be applied to the deep gorges by which in most cases the streams make their escape through the northern subsidiary range. These defiles are declared to be superior in grandeur to anything of the kind in the Alps. That of Darial (the Terek) is fairly well known, but those of the Cherek and the Urukh, farther west, are stated to be still more magnificent. And not only do the snow-clad ranges and the ice-panoplied peaks which tower up above them surpass the loftiest summits of the Alps in altitude; they also in many cases excel

them in boldness and picturesqueness of outline, and equal the most difficult of them in steepness and relative inaccessibility.

Hydrography. — Nearly all the larger rivers of Caucasia have their sources in the central parts of the Caucasus range. The short, steep, torrential streams of Mdzimta, Pzou, Bzyb and Kodor drain the country west of Elbruz. The Ingur, Tskhenis-Tskhali, Rion and its tributaries (e.g. the Kvirila) are longer, but also in part torrential; they drain the great glacier region between Elbruz and Kasbek. The Rion is the Phasis of the ancients and flows through the classic land of Colchis, associated with the legends of Medea and the Argonauts. The Lyakhva and Aragva, tributaries of the Kura, carry off the waters of the main range south of Kasbek, and other tributaries, such as the Yora and the Alazan, collect the surplus drainage of the main Caucasus range farther east. The other large river of this , region, the Aras, has its sources, not in the Caucasus range, but on the Armenian highlands a long way south-west of Ararat. The rivers which go down from the central Caucasus northwards have considerably longer courses than those on the south side of the range, partly as a consequence of the gentler versant and partly also because of the great distances to which the steppes extend across which they make their way to the sea. The most important of these are the Kuban and the Terek; but it is the latter that picks up most of the streams which have their sources among the central glaciers, e.g. the Malka, Baksan, Chegem, Cherek, Urukh, Ardon, all confined to deep narrow glens until they quit the mountains. The Kuma, which alone pursues an independent course through the stepoes, farther north than the

Terek, has its sources, not in the main ranges of the Caucasus, but in an outlying group of mountains near Pyatigorsk, the highest summit of which, Besh-tau, does not exceed 4600 ft. But its waters become absorbed in the sands of the desert steppes before they reach the Caspian. Of the streams that carve into chequers the elevated plateau or highland region of Daghestan four are known by the common name of. the Koisu, being distinguished inter se as the Andian Koisu, the Avarian Koisu, the Kara Koisu and the Kazikumukh Koisu, which all unite to form the Sulak. The only other stream deserving of mention in this province is the Samur. Both rivers discharge . their waters into

the Caspian; as also does the Zumgail, a small stream which drains the eastern extremity of the Caucasus range in the government of Baku.

Volcanic Evidences. — Ancient, but now extinct, volcanic upheavals are pretty common at the intersections of the main range with the transverse ranges; of these the most noteworthy are Elbruz and Kasbek. The town of Shemakha, near the eastern end of the system, was the scene of volcanic outbreaks as late as 1859, 1872 and 1902; while in the adjacent peninsula of Apsheron mud volcanoes exist in large numbers. All along the northern foot of the system hot mineral springs gush out at various places, such as Pyatigorsk, Zhelesnovodsk, Essentuki and Kislovodsk; and the series is continued along the north- eastern foot of the highlands of Daghestan, e.g. Isti-su, Eski- endery, Akhta.' In this connexion it may also be mentioned that similar evidences of volcanic -activity characterize the northern border of the Armenian highlands on the southern side of the Rion-Kura depression, in the mountains of Ararat, Alagoz, Akmangan, Samsar, Godoreby, Great and Little Abull, and in the mineral springs of Borzhom, Abbas-tuman, Sleptzov, Mikhailovsk and Tiflis. (J. T. Be.; P. A. K.)

Geology. — The general structure of the Caucasus is comparatively simple. The strata are folded so as to form a fan. In the centre of the fan, lies a band of crystalline rocks which disappears towards the east. Beneath it, on both sides, plunge the strongly folded Palaeozoic and Jurassic schists. On the northern flank the folded beds are followed by a zone of Jurassic and Cretaceous beds which rapidly assume a gentle inclination towards the plain. On the south the corresponding zone is affected by numerous secondary folds which involve the Sarmatian or Upper Miocene deposits. In the eastern part of the chain the structure is somewhat modified. The crystalline band is lost. The northern Mesozoic zone is very' much broader, and is thrown into simple folds like those of the Jura. The southern Mesozoic zone is absent, and the Palaeozoic zone sinks abruptly in a series of faulted steps to the plain of the Kura, beneath which no doubt the continuation of the Mesozoic zone is concealed.

The geological sequence begins with the granite and schists of the central zone, which form a band extending from Fisht on the west to a point some distance beyond Kasbek on the east. Then follow the Palaeozoic schists and slates. Fossils are extremely

rare in these beds ; Buthotrephis has long been known, and doubtful traces of Catamites and ferns have been found, but it was not until 1897 that undoubted Palaeozoic fossils were obtained. They appear to indicate a Devonian age. Upon the Palaeozoic beds rest a series of Mesozoic deposits, beginning with the Lias and ending with the Upper Cretaceous. Whether the series is continuous or not is a matter of controversy. F. Loewinson-Lessing states that there is a more or less marked discordance between the Lias and the Upper Jurassic and between the latter and the Cretaceous; E. Fournier

Kasbek

north are nearly horizontal but on the south are in part included in the folds— the Eocene and Miocene being folded, while the later beds, though sometimes elevated, are not affected by the folding. The final folding of the chain undoubtedly occurred at the close of the Miocene period. That there were earlier periods of folding is almost equally certain, but there is considerable difference of opinion as to their dates. The difference in character of the Jurassic beds on the two sides of the chain appears to indicate that a ridge existed

ˆ%£-” ~ u>

^^m

//////Al v /}’

W////A* * * r

////////£ ‘ * -

- K

<$> \%*fc.

ˆSv\ˆr v /v i

•»•

^^^.~Yˆ////////)y’f////A7

CO

-” ^^Si

^^S^^^ s ~/z/////////^c/.

O >£S

^B ^HBfifi&tal?”’’’’’’‘ 1 V

-^

^flHjiii«^y

**A

ʷ^p^^^m>

^fks^M-* m^vvyvv^ifl^Mfc^

&v *

^^^^^3^//f^

* ♦

V * *^^Zoy^

<0M *

X’^WgM

TU *Key

^”^Pfc

^<{XJpr~

>N

\^v*y ^’- ■ Vyy//>

*j/ CO

English Mile

AS/ A ^fP|

K14 m

9 50 100 200

vij *”

— U Quaternary t’-.’”.’:.v

Mˆm Emery Wattef Cretaceous wBm Metamorphic

V//\ T. r *; nr y I

Jurassic l» ♦ ♦! Plutonic & Volcanic

in that period. The last phase in the history of the Caucasus was marked by the growth of the great volcanoes of Elbruz and Kasbek, which stand upon the old rocks of the central zone, and by the outflow of sheets of lava upon the sides of the chain. The cones themselves are composed largely of acid andesites, but many of the lavas are augite andesites and basalts. There seem to have been two periods of eruption, and as some of the lavas have flowed over Quaternary gravels, the latest outbursts must have been of very recent date.

Near the northern foot of the Caucasus, especially in the neighbourhood of the hot mineral springs of Pyatigorsk, a group of hills of igneous rocks rises above the plain. They are laccolites of trachytic rock, and raised the Tertiary beds above them in the form of blisters. Subsequent denudation has removed the sedimentary covering and exposed the igneous core. (P. La.)

Bibliography. — Of the older works the following are still useful : A. von Haxthausen, Transkaukasia (2 vols., Leipzig, 1856); A. Petzholdt, Dtsr Kaukasus (2 vols., Leipzig, 1866-1867); M. G. von Thielmann, Travels in the Caucasus (Eng. trans., 2 vols., London, 1875) ; F. C. Grove, The Frosty Caucasus (London, 1875) ; G. Radde, Reisen im mingrelischen Hochgebirge (Tiflis, 1866) and Vier VorlrSge uber den Kaukasus (Gotha, 1874); E. Favre, Recherches geologiques dans la partie centrale de la chaine du Caucase (Geneva, 1875); Batsevich, Simonovich and others, Mat. dlya geologiy Kavkaza (Tiflis, 1873 seq.) ; O. Schneider, Naturwissenschaftliche Beitrage zur Kenntnis der Kaukasusldnder (Dresden, 1879), and J. Bryce, Trans- caucasia (London, 1878). The more important amongst the more recent books are D. W. Freshfield, Exploration of the Caucasus (2nd ed., 1902, 2 vols., London; A. F. Mummery, My Climbs in the Alps and Caucasus (London, 1895); H. Abich, Geologische Forschungen in den kaukasischen Landern (3 vols., Vienna, 1878- 1887), Aus kaukasischen Landern (2 vols., Vienna, 1896), and ” Ver-

gleichende Grundziige des Kaukasus wie der armenischen und nordpersischen Gebirge," in Mem. Acad. Sc. St-Petersb. (ser. 6,

S.

Vladikavkaz Lars '•—" _ m _ ■?—" i> "" Tiflis

zˆPlain of Vlarlikavka?, b = Upper Jurassic; c = Moraine terrace; d = Folded lias shales; e = Upper Jurassic; t = Paleozoic schists; ft ˆGreenstone dykes; h= Granite;

g'= Gneiss; - Andesites; k = Jurassic?; 1 = Pliocene (Nagelftuh); m = Miocene; n — Oligocene; r — Nullipore limestone & conglomerate.

F Lnewtnson-Lessinff

asserts that there exists a very strongly marked unconformity at the base of the Tithonian, and other writers have expressed other views. In general the Upper Jurassic beds are much more calcareous on the north flank of the chain than they are on the south. The Mesozoic beds are followed by the Tertiary deposits, which on the

Math, et Phys., vii. 359-534) ; R. von Erckert, Der Kaukasus und seine Volker (Leipzig, 1887); E. Chantre, Recherches anthropologiques dans le Caucase (4 vols., Lyons and Paris, 1885-1887); C. von Hahn, Aus dem Kaukasus (Leipzig, 1892), Kaukasische Reisen und Studien (Leipzig, 1896), and Bilder aus dem Kaukasus (Leipzig,

1900); V. Sella and D. Vallino, Nel Caucaso Centrale (Turin, 1890); K. Koch, Der Kaukasus (Berlin, 1882); C. Phillipps Woolley, Savage Svanetia (2 vols., London, 1883); E. Levier, A travers le Caucase (Paris, ed. 1905), especially valuable for botany; G. Merz- bacher, A us den Hochregionen des Kaukasus (2 vols., Leipzig, 1901) ; A. Fischer, Zwei Kaukasische Expeditionen (Berne, 1891); E. Fournier, Description geologique du Caucase central (Marseilles, 1896) ; G. Radde, Reisen an der persisck-russischen Grenze. Talysch und seine Bewohner (Leipzig, 1886), Die Fauna und Flora des sudwest- lichen Kaspigebiets (Leipzig, 1886), Karabagh (Gotha, 1890), and Aus den daghestanischen

Hochalpen (Gotha, 1887); and Count J. Zichy, Voyages au Caucase (2 vols., Budapest, 1897). F. Loewinson-Lessing has an account of the geology of the district along the military road from Vladikavkaz to Tiflis in the Guide des Excursions du VII' Congres geol. inlernat. (St Petersburg, 1897). N. Y. Dinnik writes on the fauna in Bull. Soc. Imperiale des Naturalistes de Moscou (1901) ; J. Mourier on the folk-tales in Contes et legendes du Caucase (1888) ; and on modern history G. Baumgarten, Sechzig Jahre des kauka- sischen Krieges (Leipzig, 1861). But a very great amount of most valuable information about the Caucasus is preserved in articles in encyclopaedias and scientific periodicals, especially the Izvestia and Zapiski of the Russian and Caucasian geographical societies, in P. P. Semenov's Geographical Dictionary (in Russian, 5 vols., St Petersburg, 1863-1884), and in the Russkiy encyklopedicheskiy slovar (1894), and in the Kavkazskiy kalendar (annually at Tiflis)-. See also G. Radde and E. Koenig, " Der Nordfuss des Daghestan und das vorlagernde Tiefland bis zur Kuma " (Erganzungsheft No. 117 to Petermanns Mitteilungen) , and " Das Ostufer des Pontus und seine kulturelle Entwickelung im Verlaufe der letzten 30 Jahre " (Ergan- zungsheft No. 112 of the same); by V. Dingelstedt in Scot. Geog. Mae. — " Geography of the Caucasus " (July 1889) ; " The Caucasian Highlands " (June 1895); "The Hydrography of the Caucasus" (June 1899); " The Riviera of Russia " (June 1904), " The Small Trades of the Caucasus " (March 1892); and " Caucasian Idioms " (June 1888). The best map is that of the Russian General Staff on the scale of 1 : 210,000 (ed. 1895-1901). (J. T. Be.; P. A. K.)

CAUCHOIS-LEMAIRE, LOUIS FRANCOIS AUGUSTE (1789- 1861), French journalist, was born in Paris on the 28th of August 1789. Towards the end of the First Empire he was proprietor of the Journal de la litterature et des arts, which he transformed at the Restoration into a political journal of Liberal tendencies, the Nainjaune, in which Louis XVIII. himself had little satirical articles secretly inserted. After the return from Elba the Nain jaune became Bonapartist and fell into discredit. It was sup- pressed at the second Restoration. Cauchois-Lemaire then threw himself impetuously into the Liberal agitation, and had to take refuge in Brussels in 1816, and in the following year at the Hague, whence he was expelled for publishing an Appel d, V opinion publique et aux- Etats GenSraux en faveur des palriotes franc,ais. Returning to France in 1819, he resumed the struggle against the ultra-royalist party with such temerity that he was

con- demned to one year's imprisonment in 1821 and fifteen months' imprisonment in 1827. After the revolution of July 1830 he refused a pension of 6000 francs offered to him by King Louis Philippe, on the ground that he wished to retain his independence even in his relations with a government which he had helped to establish. He made a bitter attack upon the Perier ministry in his journal Bon sens, and in 1836 was one of the founders of a new opposi tion journal, the Steele. He soon, however, abandoned journalism for history and, having no private means, in 1840 accepted the post of head of a department in the Royal Archives. Of a Histoire de la Revolution de Juillet, which he then undertook, he published only the first volume (1842), which contains a historical summary of the Restoration and a preliminary sketch of the democratic movement. He died in Paris on the 9th of August 1861.

CAUCHON, PIERRE (d. 1442), French bishop, was born near Reims in the latter half of the 14th century. We find him rector of the university of Paris in October 1397. In 1413 he joined the Burgundian faction, and was exiled by the parle- ment of Paris. But on the triumph of his party this decree was annulled, and Philip the Good, duke of Burgundy, gave him a canonry at Beauvais, sent him to the council of Constance, procured him the post of mattre des requites in 1418, and finally in 1420 had him made bishop of Beauvais. But the people were hostile to him, and he was driven from his bishopric in 1429; whereupon he attached himself to the English court, and in 143 1 endeavoured to procure the surrender of Reims to the English, so that Henry VI. might be crowned there. In this he

failed, and Henry was crowned in Paris on the 17th of December 143 1 by Henry Beaufort, cardinal bishop of Winchester, assisted by the bishops of Beauvais and Noyon. On the 24th of May 1430, Joan of Arc having been taken prisoner at Compiegne, within the limits of his diocese, Cauchon acted as her accuser, and demanded the right of judging her. Joan was taken to Rouen, whither Cauchon followed her, having been driven from Beauvais. He conducted the trial with marked partiality and malevolence, condemned the maid to imprisonment for life, and then, under pressure from the populace and the English, had recourse to fresh perfidies, declared Joan a relapsed heretic, excommunicated her, and handed her over to the secular arm on the 30th of May 1431. As, in consequence of this, it was im- possible for him to return to his own diocese, he obtained the bishopric of Lisieux in 1432 by favour of the king of England. He

assisted at the council of Basel in 1435, and died suddenly on the 18th of December 1442. Excommunicated posthumously by Pope Calixtus IV., his body was exhumed and thrown in the common sewer.

See Cerf, " Pierre Cauchon de Sommievre, chanoine de Reims et de Beauvais, evSque de Beauvais et de Lisieux, son origine, ses dignites, sa mort et sa sepulture," in the Transactions of the Academy of Reims (1896-1898).

CAUCHY, AUGUSTIN LOUIS, Baron (1789-1857), French mathematician, was born at Paris on the 21st of August 1789, and died at Sceaux (Seine) on the 23rd of May 1857. Having received his early education from his father Louis Francois Cauchy (1760-1848), who held several minor public appointments and counted Lagrange and Laplace among his friends, Cauchy entered Ecole Centrale du Pantheon in 1802, and proceeded to the Ecole Polytechnique in 1805, and to the Ecole des Ponts et Chauss6es in 1807. Having adopted the profession of an engineer, he left Paris for Cherbourg in 18 10, but returned in 1813 on account of his health, whereupon Lagrange and Laplace persuaded him to renounce engineering and to devote himself to mathematics. He obtained an appointment at the Ecole Polytechnique, which, however, he relinquished in 1830 on the accession of Louis Philippe, finding it impossible to take the necessary oaths. A short sojourn at Freiburg in Switzerland was followed by his appointment in 1831 to the newly-created chair of mathematical physics at the university of Turin. In 1833 the deposed king Charles X. summoned him to be tutor to his grandson, the duke of Bordeaux, an appointment which enabled Cauchy to travel and thereby become acquainted with the favourable impression which his investigations had made. Charles created him a baron in return for his services. Returning to Paris in 1838, he refused a proffered chair at the College de France, but in 1848, the oath having been suspended, he resumed his post at the Ecole Polytechnique, and when the oath was reinstituted after the coup d'etat of 185 1, Cauchy and Arago were exempted from it. A profound mathematician, Cauchy exercised by his perspicuous and rigorous methods a great influence over his contemporaries and successors. His writings cover the entire range of mathematics and mathematical physics.

Cauchy had two brothers: Alexandre Laurent (1792- 1857), who became a president of a division of the court of appeal in 1847, and .a judge of the court of cassation in 1849; and Eugene

Francois (1802-1877), a publicist who also wrote several mathematical works.

The genius of Cauchy was promised in his simple solution of the problem of Apollonius, i.e. to describe a circle touching three given circles, which he discovered in 1805, his generalization of Euler's theorem on poly hedra inl8n,andin several other elegant problems. More important is his memoir on wave-propagation which obtained the Grand Prix of the Institut in 1816. His greatest contributions to mathematical science are enveloped in the rigorous methods which he introduced. These are mainly embodied in his three great treatises, Cours d 'analyse de I'Hcole Polytechnique (1821); Le Calcul infinitesimal (1823) ; Lecons sur les applications du'calcul infinitesimal d la geometrie (1826-1828) ; and also in his courses of mechanics (fot the Ecole Polytechnique), higher algebra (for the Faculte dee- Sciences), and of mathematical physics (for the College de France) His treatises and contributions to scientific journals (to the numbei of 789) contain investigations on the theory of series (where he developed with perspicuous skill the notion of convergency) , on tht theory of numbers and complex quantities, the theory of groups and

substitutions, the theory of functions, differential equations and determinants. He clarified the principles of the calculus by develop- ing them with the aid of limits and continuity, and was the first to prove Taylor's theorem rigorously, establishing his well-known form of the remainder. In mechanics, he made many researches, substituting the notion of the continuity of geometrical displace- ments for the principle of the continuity of matter. In optics, he developed the wave theory, and his name is associated with the simple dispersion formula. In elasticity, he originated the theory of stress, and his results are nearly as valuable as those of S. D. Poisson. His collected works, CEuvres completes d'Augustin Cauchy, have been published in 27 volumes.

See C. A. Valson, Le Baron Augustin Cauchy: sa vie et ses travaux (Paris, 1868).

CAUCUS, a political term used in America of a special form of

party meeting, and in Great Britain of a system of party organization. The word originated in Boston, Massachusetts, in the early part of the 18th century, when it was used as the name of a political club, the ” Caucus ” or ” Caucas ” club. Here public matters were discussed, and arrangements made for local elections and the choosing of candidates for offices. The first mention of the club in contemporary documents occurs in the diary of John Adams in 1763, but William Gordon (History of the Independence of the United States of America, 1788) speaks of the Caucus as having been in existence some fifty years before the time of writing (1774), and describes the methods used for securing the election of the candidates the club had selected. The derivation of the word has been much disputed. It was early connected with ” caulkers,” and it was supposed referred to meetings of the caulkers in the dockyard at Boston in 1770, to protest against the action of the British troops, or with a contemptuous allusion to the lower class of workmen frequenting the club. This is, however, a mere guess, and does not agree with the earlier date at which the club is known to have existed, nor with the accounts given of it. That it was a fanciful classical name for a convivial club, derived from the late Greek kovkos, a cup, is far-fetched, and the most plausible origin is an Algonquin word kaw-kaiv-was, meaning to talk. Indian words and names have been popular in America as titles for societies and clubs; cf. ” Tammany ” (see Notes and Queries. sixth series, vols. xi. and xii.). In the United States “caucus” is used strictly of a meeting either of party managers or of party voters. Such might be a ” nominating caucus,” either for nominating candidates for office or for selecting delegates for a nominating convention. The caucus of the party in Congress nominated the candidates for the offices of president and vice- president from 1800 till 1824, when the convention system was adopted, and the place of the local ” nominating caucus ” is taken by the ” primaries ” and conventions. The word is used in America of the meetings of a party in Congress and other legislative bodies and elsewhere which decide matters of policy and plan campaigns. ” Caucus ” came first into use in Great Britain in 1878. The Liberal Association of Birmingham (see Liberal Party) was organized by Mr Joseph Chambeflain and Mr F. Schnadhorst on strict disciplinary lines, more particularly with a view to election management and the control of voters on the principle of ” vote as you are told.” This managing body of the association, known locally as the ” Six Hundred,” became the model for other Liberal associations throughout the country, and the Federation of

Liberal Associations was organized on the same plan. It was to this supposed imitation of the American political ” machine ” that Lord Beaconsfield gave the name ” caucus,” and the name came to be used, not in the American sense of a meeting, but of a closely disciplined system of party organization, chiefly used as a stock term of abuse applied by opponents to each other’s party machinery.

CAUDEBEC-EN-CAUX, a town of France, in the department of Seine-Inferieure, 27 m. W.N.W. of Rouen by the Ouest-Etat railway. Pop. (1006) 2141. It is situated on the right bank of the Seine, the tidal wave of which (mascaret) can be well seen at this point. The chief interest of the town lies in its church, a building of the 15th and the early 16th centuries. Round its top run balustrades formed of Gothic letters, which read as part of the Magnificat. Its west portal, the decoration of the spire of the tower, and its stained glass are among the features which ‘

make it one of the finest churches of the Rouen diocese. The town also possesses several old houses. Its industries include tanning and leather-currying, arid there is trade in grain. The port has a small trade in coal, live-stock and farm produce.

CAUDINE FORKS (Furculae Caudinae), a pass in Samnium, famous for the disaster which befell the Roman army in the second Samnite War (321 B.C.). Livy (ix, 2) describes it as formed by two narrow wooded gorges, between which lay a plain, grassy and well-watered, but entirely enclosed by mountains. Through this plain the road (later the Via Appia) led. The Romans, marching from Calatia to the relief of Luceria, entered the valley unopposed, but found the exit blocked by the enemy; on marching back they saw that the entrance and the hills surrounding the plain were also occupied, and there was no way of escape. The plain which lies west of Caudium (Montesarchio) seems, despite the older views, to be the only possible site for such a disaster to an army of as many as 40,000 men; and there is no doubt that the Romans wished to leave it by the defile on the east, through which later ran the Via Appia to Beneventum. The existence of three ancient bridges on the line of the modern road renders it impossible to suppose that its course can be essentially different from that of the ancient, though Hiilsen makes the two diverge considerably after passing Montesarchio. There are, however, two possible entrances — one on the north by Moiano, and one on the west by Arpaia; the former seems to answer better to Livy’s description (via alia per cavam rupem), while the latter

is the shortest route, having been, later on, followed by the Via Appia, and bore the name Furculae Caudinae in the middle ages.

See C. Hiilsen in Pauly-Wissowa, Realencyclopddie, iii.. (1802).

(T. As.)

CAUDLE (through the 0. Fr. caudel, from the Med. Lat. ■aldellum, a diminutive of caldum, a warm drink, from calidus, hot), a drink of warm gruel, mixed with spice and wine, formerly given to women in childbed.

CAUL (from O. Eng. calle, Fr. cale, a cap), a close-fitting woman's cap, especially one made of network worn in the 16th and 17th centuries; hence the membranous covering to the heart or brain, the omentum, or the similar covering to the intestines, and particularly, a portion of the amnion, which is sometimes found remaining round the head of a child after birth. To this, called in Scotland " sely how," holy or lucky hood, mai.y superstitions have been attached; it was looked on as a sign of good luck, and when preserved, was kept as a protection against drowning.

CAULAINCOURT, ARMAND AUGUSTIN LOUIS, Marquis de (1773-1827), French general and diplomatist, was born of a noble family. He early entered the army, did not emigrate in the revolution, but was deprived of his grade as captain in 1703 and served in the ranks. In 1795, through the protection of L. Hoche, he became captain again, was colonel in the Army of the Rhine in 1790-1800, and after the peace of Luneville (1801) was sent to St Petersburg to negotiate an understanding between Russia and France. On his return he was named aide-de-camp of the First Consul. He was employed to seize some agents of the English government in Baden in 1804, which led to the accusa- tion that he was concerned in the arrest of the due d'Enghien, an accusation against which he never ceased to protest. After the establishment of the empire he received various honours and the title of duke of Vicenza (1808). Napoleon sent him in 1807 as ambassador to St Petersburg, where Caulaincourt tried to maintain the alliance of Tilsit, and although Napoleon's ambition made the task a difficult one, Caulaincourt succeeded in it for some years. In 1811 he strongly advised Napoleon to renounce his proposed expedition to Russia. During the war he accom- panied the emperor, and was one of those whom Napoleon took along with him when he suddenly abandoned his army in Poland to return to Paris (December 181 2) . During the last years of the

empire, Caulaincourt was charged with all the diplomatic negotiations. He signed the armistice of Pleswitz, June 1813, represented France at the congress of Prague, in August 1813, at the congress of Chatillon, in February 18 14, and concluded the

treaty of Fontainebleau on the 10th of April 1814. During the first Restoration, Caulaincourt lived in obscure retirement. When Napoleon returned from Elba, he became minister of foreign affairs, and tried to persuade Europe of the emperor's peaceful intentions. After the second Restoration, Caulaincourt's name was on the list of those proscribed, but it was erased on the personal intervention of Alexander I. with Louis XVIII.

Caulaincourt's memoirs appeared under the title Souvenirs ■ du due de Vicence in 1837-1840. See A. Vandal, Napoleon et Alexandre (Paris, 1891-1895); Tatischeff, Alexandre I" et Napoleon (Paris, 1892); H. Houssaye, 1814 (Paris, 1888), and 1815 (Paris, 1893).

CAULICULUS (from Lat. caulis, a stalk), in architecture, the Stalks (eight in number) with two leaves from which rise the helices or spiral scrolls of the Corinthian capital to support the abacus.

CAULON (Gr. KavXwvia) ,' a town of the district of the Bruttii, Italy, on the east coast. Its exact site is uncertain (though the name has been given to a modern village), and depends on the identification of the river Sagras. It was the southernmost of the Achaean colonies, founded either by Croton or direct from Greece itself. In the 7th century it was allied with Croton and Sybaris, and its coins, which go back to 550 B.C., prove its importance. It took the side of Athens in the Peloponnesian War. In 388 B.C. it was destroyed by Dionysius, but soon after- wards restored. It was captured during the invasion of Pyrrhus by Campanian troops. Strabo speaks of it as deserted in his time. The erection of the lighthouse at Capo Stilo, on the site of one of the medieval guard towers of the coast, led to the discovery of a wall of Greek origin, and close by of a number of terra-cottas, belonging perhaps to a temple erected in honour of the deities of the sea. Other remains were found at Fontanelle, 2J m. away, including the fragment of a capital of an archaic Greek temple (P. Orsi in Notizie degli Scavi, 1891,61). These buildings may be connected

with the Caulon or a village dependent on it. (T. As.)

CAUSATION or Causality (Lat. causa, derived perhaps from the root cav-, as in caveo, and meaning something taken care of; corresponding to Gr. alrla), a philosophical term for the operation of causes and for the mental conception of cause as operative throughout the universe. The word " cause " is correlative to " effect." Thus when one thing B is regarded as taking place in consequence of the action of another thing A, then A is said to be the cause of B , and B the effect of A. The philosophical problems connected with causation are both metaphysical and psycho- logical. The metaphysical problem is part of the whole theory of existence. If everything is to be regarded as causally related with simultaneous and prior things or actions, it follows logically that the investigation of existence must, by hypothesis, be a regress to infinity, i.e. that we cannot conceive a beginning to existence. This explanation has led to the postulate of a First Cause, the nature of which is variously explained. The empirical school sees no difficulty in assuming a single event; but such a theory seems to deny the validity of the original hypothesis. Theologians assert a divine origin in the form of a personal self- existent creator, while some metaphysical schools, preferring an impersonal First Cause, substitute the doctrine of the Absolute (q.v.). All the explanations are alike in this respect, that at a certain point they pass from the sphere of the senses, the physical world, to a metaphysical sphere in which the data and the intellectual operation of cognizing them are of a totally different quality. For example, the causal connexion between drunken- ness and alcohol is not of the same observable character as that which is inferred between the infinite First Cause and the whole domain of sense-given phenomena.

A second metaphysical problem connected with causation arises when we consider the nature of necessity. It is generally assumed when two things are spoken of as cause and effect that their relation is a necessary one, or, in other words, that given the cause the effect must follow. The arguments connected with this problem belong to psychological discussions of causation. It is sufficient here to state that, in so far as causation is regarded as necessary connexion, it can form no part of a purely empirical theory of existence. The senses can say only that in all observed

cases B has followed A, and this does not establish necessary connexion. The idea of causation is a purely intellectual (a priori) one.

The psychological problems connected with causation refer (1) to the origin of the conception in our minds; (2) to the validity of the conception. As regards the origin of the concep- tion modern psychological analysis does not carry us beyond the doctrine of Locke contained in his chapter on ” Power ” (Essay, bk. ii. ch. 21), wherein he shows that the idea of power is got from the knowledge of our own activity. ” Bodies by their causes,” he says, ” do not afford us so clear and distinct an idea of active power as we have from reflection on the operation of our minds. ” Putting Locke’s doctrine into modern language, we may say that a man has the conception of cause primarily because he himself is a cause. The conception thus obtained we ” project,” that is, transfer to external objects, so far as we may find it useful to do so. Thus it is by a sort of analogy that we say that the sun is the ” cause ” of daylight. The rival theory to Locke’s is that of Hume (Treatise, bk. i.), who derives the conception from the unaided operation of custom. When one object, A, has been noticed frequently to precede another object, B, an association between A and B is generated; and by virtue of this association, according to Hume, we say that A is the cause of B. The weak- ness of this account is that many invariable successions, such as day and night, do not make us regard the earlier members of the successions as causing the later; while in numberless cases we assert a causal connexion between two objects from a single experience of them.

We may proceed now to consider the validity of the conception of causation, which has been attacked from two sides. From the side of absolute idealism it is argued that the conception of cause, as involving a transition in time, cannot be ultimately valid, since the time-relation is not ultimately real. Upon this view (ably stated in Professor Bosanquet’s Logic, bk. i. ch. 6) the more we know of causes and effects the less relevant becomes the time-relation and the nearer does the conception of cause and effect approach to another conception which is truly valid, the conception of ground and consequence. This means that* viewed from the standpoint of science, a draught of alcohol causes intoxication in no other sense than the triangularity of a triangle causes the interior angles to be equal to two right angles. This argument ceases to have cogency so soon as we deny its fundamental proposition that the time-relation is not ultimately real, but is irrelevant from the standpoint of science. This is a sheer assertion, contrary to all ordinary experience, which we have as much right to deny as the absolute idealists to amrm. It is

only plausible to those who are committed to the Hegelian view of reality as consisting of a static system of universals, a view which has long been discredited in Germany, its native land, and is fast losing ground in England. Against the Hegelians we must maintain that the common distinction between " ground " and " cause " is perfectly justifiable. Whereas "ground" is an appropriate term for the relations within a static, simultaneous system, "cause" is appropriate to the relations within a dynamic, successive system.

From the other side the validity of causation has been attacked in the interests of the naturalism of the mechanical sciences. J. S. Mill argues that, scientifically, the cause of anything is the total assemblage of the conditions that precede its appearance, and that we have no right to give the name of cause to one of them exclusively of the others. The answer to this is that Mill fails to recognize that cause is a conception which we find useful in our dealings with nature, and that whatever concep- tions we find useful we are justified in using. Among the conditions of an event there are always one or two that stand in specially close relation to it from our point of view; e.g. the draught of alcoholic liquor is more closely related to the man's drunkenness than is the attraction of the earth's gravity, though that also must co-operate in producing the effect. Such closely related conditions we find it convenient to single out by a term which expresses their analogy to the cause of causes, human volition.

These are the questions respecting causation which are matters of present controversy; there are in addition many other points which belong to the controversies of the past. Among the most important are Aristotle's classification of causes into material, formal, efficient and final, set forth in his Physics and elsewhere, and known as his doctrine of the Four Causes; Geulincx's Occasional Causes, meant as a solution of certain difficulties in the cosmology of Descartes; Leibnitz's law of Sufficient Reason; and Kant's explanation of cause and effect as an a priori category of the understanding, intended as an answer to Hume's scepticism, but very much less effective than the line of explanation suggested by Locke.

The following is a list of the various technical terms connected

with causation which have been distinguished by logicians and psychologists.

The four Aristotelian causes are: (i) Material cause (OXjj), the material out of which a thing is made; the material cause of a house is the bricks and mortar of which it is composed. (2) Formal cause (eldos, \6yos, rb ri r\v tlvax), the general external appearance, shape, form of a thing; the formal cause of a triangle is its triangularity. (3) Efficient cause (apxˆl rijs Kwt)s) , the alcohol which makes a man drunk, the pistol- bullet which kills. This is the cause as generally understood in modern usage. (4) Final cause (reXos, t6 ov evena), the object for which an action is done or a thing produced; the final cause of a commercial man's enterprise is to make his livelihood (see Teleology). This last cause was rejected by Bacon, Descartes and Spinoza, and indeed in ordinary usage the cause of an action in relation to its effect is the desire for, and expectation of, that effect on the part of the agent, not the effect itself. The Proxi- mate cause of a phenomenon is the immediate or superficial as opposed to the Remote or Primary cause. Plurality of Causes is the much criticized doctrine of J. S. Mill that a fact may be the uniform consequent of several different antecedents. Causa essendi means the cause whereby a change is what it is, as opposed to the causa cognoscendi, the cause of our knowledge of the event; the two causes evidently need not be the same. An object is called causa immanens when it produces its changes by its own activity; a causa transiens produces changes in some other object. Causa sui is a term applied to God by Spinoza to denote that he is dependent on nothing and has no need of any external thing for his existence. Vera causa is a term used by Newton in his Principia, where he says, " No more causes of natural things are to be admitted than such as are both true and sufficient to explain the phenomena of those things "; verae causae must be such as we have good inductive grounds to believe do exist in nature, and do perform a part in phenomena analogous to those we would render an account of.

CAUSEWAY, a path on a raised dam or mound across marshes or low-lying ground; the word is also used of old paved highways, such as the Roman military roads. " Causey " is still used dialectically in England for a paved or cobbled footpath. The word is properly " causey-way," from causey, a mound or dam, which is derived, through the Norman-French caucie (cf. modern chaussie), from the late Latin via calciata, a road stamped firm with the feet (calcare, to tread).

CAUSSES (from Lat. calx through local Fr. caous, meaning ” lime “), the name given to the table-lands lying to the south of the central plateau of France and sloping westward from the C6vennes. They form parts of the departments of Lozere, Aveyron, Gard, Herault, Lot and Tarn-et- Garonne. They are of limestone formation, dry, sterile and treeless. These characteristics are most marked in the east of the region, where the Causse de Sauveterre, the Causse Mejan, the Causse Noir and the Larzac flank the Cevennes. Here the Causse Mejan, the most deserted and arid of all, reaches an altitude of nearly 4200 ft. Towards the west the lesser causses of Rouergue and Quercy attain respectively 2950 ft. and 1470 ft. Once an uninter- rupted table-land, the causses are now isolated from one another by deep rifts through which run the Tarn, the Dourbie, the Jonte and other rivers. The summits are destitute of running water, since the rain as it falls either sinks through the permeable

surface soil or runs into the fissures and chasms, some of great depth, which are peculiar to the region. The inhabitants (Caussenards) of the higher causses cultivate hollows in the ground which are protected from the violent winds, and the scanty herbage permits of the raising of sheep, from the milk of which Roquefort cheeses are made. In the west, where the rigours of the weather are less severe, agriculture is more easily carried on.

CAUSSIN DE PERCEVAL, ARMAND-PIERRE (1795-1871), French orientalist, was born in Paris on the 13th of January 1795. His father, Jean Jacques Antoine Caussin de Perceval (1759-1835), was professor of Arabic in the College de France. In 1814 he went to Constantinople as a student interpreter, and afterwards travelled in Asiatic Turkey, spending a year with the Maronites in the Lebanon, and finally becoming dragoman at Aleppo. Returning to Paris, he became professor of vulgar Arabic in the school of living Oriental languages in 182 1, and also professor of Arabic in the College de France in 1833. In 1849 he was elected to the Academy of Inscriptions. He died at Paris during the siege on the 15 th of January 1871.

Caussin de Perceval published (1828) a useful Grammaire arabe vulgaire, which passed through several editions (4th ed., 1858), and edited and enlarged Elie Bocthor’s 1 Dictionnaire frangais-arabe (2 vols., 1828; 3rd ed., 1864); but his great reputation rests almost entirely on one book, the Essai sur I’histoire des Arabes avant Vlslamisme, pendant I’ipoque de Mahomet (3 vols.,

1847-1849), in which the native traditions as to the early history of the Arabs, down to the death of Mahommed and the complete subjection of all the tribes to Islam, are brought together with wonderful industry and set forth with much learn- ing and lucidity. One of the principal MS. sources used is the great Kitdb al-Aghdni (Book of Songs) of Abu Faraj, which has since been published (20 vols., Boulak, 1868) in Egypt; but no publication of texts can deprive the Essai, which is now very rare, of its value as a trustworthy guide through a tangled mass of tradition.

CAUSTIC (Gr. KauoriKos, burning), that which burns. In surgery, the term is given to substances used to destroy living tissues and so inhibit the action of organic poisons, as in bites, malignant disease and gangrenous processes. Such substances are silver nitrate (lunar caustic), the caustic alkalis (potassium and sodium hydrates), zinc chloride, an acid solution of mercuric nitrate, and pure carbolic acid. In mathematics, the " caustic surfaces " of a given surface are the envelopes of the normals to the surface, or the loci of its centres of principal curvature.

In optics, the term caustic is given to the envelope of luminous rays after reflection or refraction; in the first case the envelope is termed a catacaustic, in the second a diacaustic. Catacaustics are to be observed as bright curves when light is allowed to fall upon a polished riband of steel, such as a watch-spring, placed on a table, and by varying the form of the spring and moving the source of light, a variety of patterns may be obtained. The investigation of caustics, being based on the assumption of the rectilinear propagation of fight, and the validity of the experi- mental laws of reflection and refraction, is essentially of a geo- metrical nature, and as such it attracted the attention of the mathematicians of the 17th and succeeding centuries, more notably John Bernoulli, G. F. de l'H6pital, E. W. Tschirnhausen and Louis Carre.

The simplest case of a caustic curve is when the reflecting surface is a circle, and the luminous rays emanate from a point on the circumference. If in fig. 1 AQP be the reflecting circle (. .. having C as centre, P the luminous point, and PQ any ~ ust,cs incident ray, and we join CQ, it follows, by the law of the ,ˆ flec(/ 0/I equality of the angles of incidence and reflection, that the reflected ray QR is such that the angles RQC and CQPare equal; to determine the caustic, it is necessary to determine the envelope of this line. This may be readily accomplished geometrically or analytically, and it will be found that the

envelope is a cardioid (q.v.), i.e. an epicycloid in which the radii of the fixed and rolling circles are equal. When the rays are parallel, the reflecting surface

1 filie Bocthor (1784-1821) was a French orientalist of Coptic origin. He was the author of a Traiie des conjugaisons written in Arabic, and left his Dictionary in MS.

remaining circular, the question can be similarly, treated, and it is found that the caustic is an epicycloid in which the radius of the fixed circle is twice that of the rolling circle (fig. 2). The geometrical method is also applicable when it is required to determine the caustic

after any number of reflections at a spherical surface of rays, which are either parallel or diverge from a point on the circumference. In both cases the curves are epicycloids; in the first case the radii of the rolling and the fixed circles are a(2n-\)\a,n and o/2», and in the second, an/(2n + i) and a/(2rc + 1), Where a is the radius of the mirror and » the number of reflections.

The Cartesian equation to the caustic produced by reflection at a circle of rays diverging from any point was obtained by Joseph Louis Lagrange; it may be expressed in the form

. [(4t*-a”)(x i +y>) -2a?cx-aV\ > = 27aVy 2 (* 2 +^-c 2) 2 , where a is the radius of the reflecting circle, and c the distance of the luminous point from the centre of the circle. The polar form is [(u+p) cos \6\% + {(u-p) sin §0jt = (2fe)§, where p and^ are the re- ciprocals of c and a, and u the reciprocal of the radius vector of any point on the caustic. When c = a or =co the curve reduces to the cardioid or the two cusped epicycloid previously discussed. Other

a> c>Ha

by refrac- tion.

forms are shown in figs. 3, 4, 5, 6. These curves were traced by the Rev. Hammet Holditch (Quart. Jour. Math. vol. i.).

Secondary caustics are orthotomic curves having the reflected or refracted rays as normals, and consequently the proper caustic curve, being the envelope of the normals, is their evolute. It is usually the case that the secondary caustic is easier to determine than the caustic, and hence, when determined, it affords a ready means for deducing the primary caustic. It may be shown by geometrical considerations that the secondary caustic is a curve similar to the first positive pedal of the reflecting curve, of twice the linear dimensions, with respect to the luminous point. For a circle, when the rays emanate from any point, the secondary caustic is a limacon, and hence the primary caustic is the evolute of this curve.

The simplest instance of a caustic by refraction (or diacaustic) is when luminous rays issuing from a point are refracted at a straight

line. It may be shown geometric- ally that the secondary caustics caustic, if the second medium be less refrac- tive than the first, is an ellipse having the luminous point for a focus, and its centre at the foot of the perpendicular from the luminous point to the refracting line. The evolute of this ellipse is the caustic required. If the second medium be more highly refractive than the first, the secondary caustic is a hyperbola having the same focus and centre as before, and the caustic is the evolute of this curve. When the refracting curve is a circle and the rays emanate from any point, the locus of the secondary caustic is a Cartesian oval, and the evolute of this curve is the required dia- caustic. These curves appear to have been first discussed by Gergonne. For the caustic by refraction of parallel rays at a circle reference should be made to the memoirs by Arthur Cayley.

References. — Arthur Cayley's " Memoirs on Caustics " in the Phil. Trans, for 1857, vol. 147, and 1867, vol. 157, are especially to be consulted. Reference may also be made to R. S. Heath's Geometrical Optics and R. A. Herman's Geometrical Optics (1900).

CAUTERETS, a watering-place of south-western France in the department of Hautes-Pyrenees, 20 m. S. by W. of Lourdes by rail. Pop. (1906) 1030. It lies in the beautiful valley of the Gave de Cauterets, and is well known for its copious thermal

Fig. 6.

springs. They are chiefly characterized by the presence of sulphur and silicate of soda, and are used in the treatment of diseases of the respiratory organs, rheumatism, skin diseases and many other maladies. Their temperature varies between 75° and 137° F. The springs number twenty-four, and there are nine bathing establishments. Cauterets is a centre for ex- cursions, . the Monne (8935 ft.), the Cabaliros (7655 ft.), the Pic de Chabarrou (955° ft.), the Vignemale (10,820 ft.), and other summits being in its neighbourhood.

CAUTIN, a province of southern Chile, bounded N. by Arauco, Malleco and Bio-Bio, E. by Argentina, S. by Valdivia, and W. by the Pacific. Its area is officially estimated at 5832 sq. m. Cautin lies within the temperate agricultural and forest region of the south, and produces wheat, cattle, lumber, tan-bark and fruit. The state central railway from Santiago to Puerto Montt crosses the province from north to south, and the Cautin, or Imperial, and Tolten rivers (the latter forming its southern boundary) cross from east to west, both affording excellent transportation facilities. The province once formed part of the territory occupied by the Araucanian Indians, and its present political existence dates from 1887. Its population (1905) was 96,139, of whom a large percentage were European immigrants, principally Germans. The capital is Temuco, on the Rio Cautin; pop. (1895) 7078. The principal towns besides Temuco are Lautaro (3139) and Nueva Imperial (2179), both of historic interest because they were fortified Spanish outposts in the long struggle with the Araucanians.

CAUTLEY, SIR PROBY THOMAS (1802-1871), English engineer and palaeontologist, was born in Suffolk in 1802. After some years' service in the Bengal artillery, which he joined in 1819, he was engaged on the reconstruction of the Doab canal, of which, after it was opened, he had charge for twelve years (1831-1843). In 1840 he reported on the proposed Ganges canal, for the irrigation of the country between the rivers Ganges, Hindan and Jumna, which was his most important work. This project was sanctioned in 1841, but the work was not begun till 1843, and even then Cautley found himself hampered in its execution by the opposition of Lord Ellenborough. From 1845 to 1848 he was absent in England owing to ill-health, and on his return to India he was appointed director of canals in the North- western Provinces. After the Ganges canal was opened in 1854 he went back to England, where he was made K.CrB., and from 1858 to 1868 he occupied a seat on the council of India. He died at

Sydenham, near London, on the 25th of January 1871. In i860 he published a full account of the making of the Ganges canal, and he also contributed numerous memoirs, some written in collaboration with Dr Hugh Falconer, to the Proceedings of the Bengal Asiatic Society and the Geological Society of London on the geology and fossil remains of the Sivalik Hills.

CAUVERY, or ICweri, a river of southern India. Rising in Coorg, high up amid the Western Ghats, in 12 25′ N. lat. and 75 34′ E. long., it flows with a general south-eastern direction across the plateau of Mysore, and finally pours itself into the Bay of Bengal through two principal mouths in Tanjore district. Its total length is 472 m., the estimated area of its basin 27,700 sq. m. The course of the river in Coorg is very tortuous. Its bed is generally rocky; its banks are high and covered with luxuriant vegetation. On entering Mysore it passes through a narrow gorge, but presently widens to an average breadth of 300 to 400 yds. Its bed continues rocky, so as to forbid all navigation; but its banks are here bordered with a rich strip of cultivation. In its course through Mysore the channel is interrupted by twelve anicuts.or dams for the purpose of irrigation. From the most important of these, known as the Madadkatte, an artificial channel is led to a distance of 72 m., irrigating an area of 10,000 acres, and ultimately bringing a water-supply into the town of Mysore. In Mysore state the Cauvery forms the two islands of Seringapatam and Sivasamudram, which vie in sanctity with the island of Seringam lower down in Trichinopoly district. Around the island of Sivasamudram are the celebrated falls of the Cauvery, unrivalled for romantic beauty. The river here branches into two channels, each of which makes a descent of about 200 m.

in a succession of rapids and broken cascades. After entering the Madras presidency, the Cauvery forms the boundary between the Coimbatore and Salem districts, until it strikes into Trichinopoly district. Sweeping past the historic rock of Trichinopoly, it breaks at the island of Seringam into two channels, which enclose between them the delta of Tanjore, the garden of southern India. The northern channel is called the Coleroon (Kolidam) ; the other preserves the name of Cauvery. On the seaward face of its delta are the open roadsteads of Negapatam and French Karikal. The only navigation on any portion of its

course is carried on in boats of basket-work. It is in the delta that the real value of the river for irrigation becomes conspicuous. This is the largest delta system, and the most profitable of all the works in India. The most ancient irrigation work is a massive dam of unhewn stone, 1080 ft. long, and from 40 to 60 ft. broad, across the stream of the Cauvery proper, which is supposed to date back to the 4th century, is still in excellent repair, and has supplied a model to British engineers. The area of the ancient system was 669,000 acres, the modern about 1,000,000 acres. The chief modern work is the anicut across the Coleroon, 2250 ft. long, constructed by Sir Arthur Cotton between 1836 and 1838. The Cauvery Falls have been utilized for an electric installation, which supplies power to the Kolar gold-mines and light to the city of Mysore.

The Cauvery is known to devout Hindus as Dakshini Ganga, or the Ganges of the south, and the whole of its course is holy ground. According to the legend there was once born upon earth a girl named Vishnumaya or Lopamudra, the daughter of Brahma; but her divine father permitted her to be regarded as the child of a mortal, called Kavera-muni. In order to obtain beatitude for her adoptive father, she resolved to become a river whose waters should purify from all sin. Hence it is that even the holy Ganges resorts underground once in the year to the source of the Cauvery, to purge herself from the pollution contracted from the crowd of sinners who have bathed in her waters.

CAVA DEI TIRRENI, a town and episcopal see of Campania, Italy, in the province of Salerno, 6 m. N.W. by rail from the town of Salerno. Pop. (1901) town, 7611; commune, 23,415. It lies fairly high in a richly cultivated valley, surrounded by wooded hills, and is a favourite resort of foreigners in spring and autumn, and of the Neapolitans in summer. A mile to the south-west is the village of Corpo di Cava (1970 ft.), with the Benedictine abbey of La Trinita della Cava, founded in 1025 by St Alferius. The church and the greater part of the buildings were entirely modernized in 1796. The old Gothic cloisters are preserved. The church contains a fine organ and several ancient sarcophagi. The archives, now national property, include documents and MSS. of great value (e.g. the Codex Legum Longobardorum of 1004) and fine incunabula. The abbot is keeper, and also head of a boarding school.

See M. Morcaldi, Codex Diplomaticus Cavensis (Naples and Milan,

1873-1893)-

CAVAEDIUM, in architecture, the Latin name for the central hall or court within a Roman house, of which five species are described by Vitruvius. (1) The Tuscanicum responds to the greater number apparently of those at Pompeii, in which the timbers of the roof are framed together, so as to leave an open space in the centre, known as the compluvium; it was through this opening that all the light was received, not only in the hall itself, but in the rooms round. The rain from the roof was collected in gutters round the compluvium, and discharged from thence into a tank or open basin in the floor called the impluvium. (2) In the tetrastylon additional support was required in conse- quence of the dimensions of the hall; this was given by columns placed at the four angles of the impluvium. (3) Corinthian is the term given to the species where additional columns were required. (4) In the displuviatum the roofs, instead of sloping down towards the compluvium, sloped outwards, the gutters being on the outer walls; there was still an opening in the roof, and an impluvium to catch the rain falling through. This species of roof, Vitruvius states, is constantly in want of repair, as the water does not easily

run away, owing- to the stoppage in the rain-water pipes. (5) The testudinatum was employed when the hall was small and another floor was built over it; no example of this type has been found at Pompeii, and only one of the cavaedium displuviatum.

CAVAGNARI, SIR PIERRE LOUIS NAPOLEON (1841-1879), British military administrator, the son of a French general by his marriage with an Irish lady, was born at Stenay, in the department of the Meuse, on the 4th of July 1841 . He neverthe- less obtained naturalization as an Englishman, and entered the military service of the East India Company. After passing through the college at Addiscombe, he served through the Oudh campaign against the mutineers in 1858 and 1859. In 1861 he was appointed an assistant commissioner in the Punjab, and in 1877 became deputy commissioner of Peshawar and took part in several expeditions against the hill tribes. In 1878 he was attached to the staff of the British mission to Kabul, which the Afghans refused to allow to proceed. In May 1879, after the death of the amir Shere Ali, Cavagnari negotiated and signed the treaty of Gandamak with his successor, Yakub Khan. By this the Afghans agreed to admit a British resident at Kabul, and the post was conferred on Cavagnari, who also received the Star of India

and was made a K.C.B. He took up his residence in July, and for a time all seemed to go well, but on the 3rd of September Cavagnari and the other European members of the mission were massacred in a sudden rising of mutinous Afghan troops. (See Afghanistan.)

CAVAIGNAC, JEAN BAPTISTE (1762-1829), French politician, was born at Gourdon (Lot). He was sent by his department as deputy to the Convention, where he associated himself with the party of the Mountain and voted for the death of Louis XVI. He was constantly employed on missions in the provinces, and distinguished himself by his rigorous repression of opponents of the revolution in the departments of Landes, Basses-Pyrenees and Gers. With his colleague Jacques Pinet (1754-1844) he established at Bayonne a revolutionary tribunal with authority in the neighbouring towns. Charges of cruelty were preferred against him by a local society before the Convention in 1795, but were dismissed. He had represented the Convention in the armies of Brest and of the Eastern Pyrenees in 1793, and in 1795 he was sent to the armies of the Moselle and the Rhine. He filled various minor administrative offices, and in 1806 became an official at Naples in Murat's government. During the Hundred Days he was prefect of the Somme. At the restoration he was proscribed as a regicide, and spent the- last years of his life at Brussels, where he died on the 24th of March 1829. His second son was General Eugene Cavaignac (q.v.).

The eldest son, Eleonore Louis Godefroi Cavaignac (1801- 1845), was i like his father, a republican of the intransigeant type. He was bitterly disappointed at the triumph of the monarchical principle after the revolution of July 1830, in which he had taken part. He took part in the Parisian risings of October 1830, 1832 and 1834. On the third occasion he was imprisoned, but escaped to England in 1835. When he returned to France in 1841 he worked on the staff of La Rtforme, and carried on an energetic republican propaganda. In 1843 he became president of the Society of the Rights of Man, of which he had been one of the founders in 1832. He died on the 5th of May 1845. The re-cumbent statue (1847) °f Godefroi Cavaignac on his tomb at Montmartre (Paris) is one of the masterpieces of the sculptor Francois Rude.

Jean Baptiste's brother, Jacques-Marie, Vicomte Cavaignac (1773-1855), French general, served with distinction in the army under the republic and successive governments. He commanded

the cavalry of the XI. corps in the retreat from Moscow, and eventually became Vicomte Cavaignac and inspector-general of cavalry.

CAVAIGNAC, LOUIS EUGENE (1802-1857), French general, son of J. B. Cavaignac, was born at Paris on the 15th of October 1802. After going through the usual course of study for the military profession, he entered the army as an engineer officer in 1824, and served in the Morea in 1828, becoming captain in the following year. When the revolution of 1830 broke out

he was stationed at Arras, and was the first officer of his regiment to declare for the new order of things. In 1831 he was removed from active duty in consequence of his declared republicanism, but in 1832 he was recalled to the service and sent to Algeria. This continued to be the main sphere of his activity for sixteen years, and he won especial distinction in his fifteen months' command of the exposed garrison of Tlemcen, a command for which he was selected by Marshal Clausel (1836-1837), and in the defence of Cherchel (1840). Almost every step of his pro- motion was gained on the field of battle, and in 1844 the due d'Aumale himself asked for Cavaignac's promotion to the rank of marechal de camp. This was made in the same year, and he held various district commands in Algeria up to 1848, when the provisional government appointed him governor-general of the province with the rank of general of division. The post of minister of war was also offered to Cavaignac, but he refused it owing to the unwillingness of the government to quarter troops in Paris, a measure which the general held to be necessary for the stability of the new regime. On his election to the National Assembly, however, Cavaignac returned to Paris. When he arrived on the 17 th of May he found the capital in an extremely critical state. Several Smeutes had already taken place, and by the 22nd of June 1848 a formidable insurrection had been organized. The only course now open to the National Assembly was to assert its authority by force. Cavaignac, first as minister of war and then as dictator, was called to the task of suppressing the revolt. It was no light task, as the national guard was untrustworthy, regular troops were not at hand in sufficient numbers, and the insurgents had abundant time to prepare themselves. Variously estimated at from 30,000 to 60,000 men, well armed and organized, they had entrenched themselves at every step behind formidable barricades, and were ready. to

avail themselves of every advantage that ferocity and despair could suggest to them. Cavaignac failed perhaps to appreciate the political exigencies of the moment; as a soldier he would not strike his blow until his plans were matured and his forces sufficiently prepared. When the troops at last advanced in three strong columns, every inch of ground was disputed, and the government troops were frequently repulsed, till, fresh regiments arriving, he forced his way to the Place de la Bastille and crushed the insurrection in its headquarters. The contest, which raged from the 23rd to the morning of the 26th of June, was without doubt the bloodiest and most resolute the streets of Paris have ever seen, and the general did not hesitate to inflict the severest punishment on the rebels.

Cavaignac was censured by some for having, by his delay, allowed the insurrection to gather head; but in the chamber he was declared by a unanimous vote to have deserved well of his country. After laying down his dictatorial powers, he continued to preside over the Executive Committee till the election of a regular president of the republic. It was expected that the suffrages of France would raise Cavaignac to that position. But the mass of the people, and especially the rural population, sick of revolution, and weary even of the moderate republicanism of Cavaignac, were anxious for a stable govern- ment. Against the five and a half million votes recorded for Louis Napoleon, Cavaignac received only a million and a half. Not without chagrin at his defeat, he withdrew into the ranks of the opposition. He continued to serve as a representative during the short remainder of the republic. At the coup d'etat of the 2nd December 185 1 he was arrested along with the other members of the opposition; but after a short imprisonment at Ham he was released, and, with his newly-married wife, lived in retirement till his death, which took place at Ourne (Sarthe) on the 28th of October 1857.

His son, Jacques Marie Eugene Godefroi Cavaignac (1853-1905), French politician, was born in Paris on the 21st of May 1853. He made public profession of his republican prin- ciples as a schoolboy at the Lycee Charlemagne by refusing in 1867 to receive a prize at the Sorbonne from the hand of the prince imperial. He received the military medal for service in the Franco-Prussian War, and in 1872 entered the ficole

Polytechnique. He served as a civil engineer in Angouleme until 1881, when he became master of requests in the council of state. In the next year he was elected deputy for the arrondissement of Saint-Calais (Sarthe) in the republican interest. In 1885- 1886 he was under-secretary for war in the Henri Brisson ministry, and he served in the cabinet of Emile Loubet (1892) as minister of marine and of the colonies. He had exchanged his moderate republicanism for radical views before he became war minister in the cabinet of Leon Bourgeois (189 5 18 96). He was again minister of war in the Brisson sabinet in July 1898, when he read in the chamber a document which definitely incriminated Captain Alfred Dreyfus. On the 30th of August, however, he stated that this had been discovered to be a forgery by Colonel Henry, but he refused to concur with his colleagues in a revision of the Dreyfus prosecution, which was the logical outcome of his own exposure of the forgery. Resigning his port- folio, he continued to declare his conviction of Dreyfus's guilt, and joined the Nationalist group in the chamber, of which he became one of the leaders. He also was an energetic supporter of the Ligue de la Patrie Francaise. In 1899 Cavaignac was an unsuccessful candidate for the presidency of the republic. He had announced his intention of retiring from political life when he died at his country-seat near Flee (Sarthe) on the 25th of September 1905. He wrote an important book on the Formation de la Prusse contemporaine (2 vols., 1 891- 1898), dealing with the events of 1806-1813.

CAVAILLON, a town of south-eastern France in the depart- ment of Vauduse; 20 m. S.E. of Avignon by rail. Pop. (1906) town, 5760; commune, 9952. Cavaillon lies at the southern base of Mont St Jacques on the right bank of the Durance above its confluence with the Coulon. It has a hotel de ville of the 18th century, a church of the 12th century, dedicated to St Veran, and the mutilated remains of a triumphal arch of the Roman period. The town is an important railway junction and the commercial centre of a rich and well-irrigated plain, which pro- duces melons and other fruits, early vegetables (artichokes, tomatoes, celery, potatoes), and other products in profusion. Silk-worms are reared, and silk is an important article of trade. The preparation of preserved vegetables, fruits and other pro- visions, distilling, and the manufacture of straw hats and leather are carried on. Numerous minor relics of the Roman period have been found to the south of the present town, on the site of the ancient Cabellio, a place of some note in the territory of the Cavares. In medieval

and modern history the town has for the most part followed the fortunes of the Comtat Venaissin, in which it was included. Till the time of the Revolution it was the see of a bishop, and had a large number of monastic establishments.

CAVALCANTI, GUIDO (c. 1250-1300), Italian poet and philosopher, was the son of a philosopher whom Dante, in the Inferno, condemns to torment among the Epicureans and Atheists; but he himself was a friend of the great poet. By marriage with Beatrice, daughter of Farinata Uberti, he became head of the Ghibellines; and when the people, weary of continual brawls, aroused themselves, and sought peace by banishing the leaders of the rival parties, he was sent to Sarzana, where he caught a fever, of which he died. Cavalcanti has left a number of love sonnets and canzoni, which were honoured by the praise of Dante. Some are simple and graceful, but many are spoiled by a mixture of metaphysics borrowed from Plato, Aristotle and the Christian Fathers. They are mostly in honour of a French lady, whom he calls Mandetta. His Canzone d'Amore was extremely popular, and was frequently published; and his complete poetical works are contained in Giunti's collection (Florence, 1527; Venice, 1531-1532). He also wrote in prose on philosophy and oratory.

See D. G. Rossetti, Dante and his Circle (1874).

CAVALIER, JEAN (1681-1740), the famous chief of the Camisards (

•with his family, but his mother brought him up secretly in the Protestant faith. In his boyhood he became a shepherd, and about his twentieth year he was apprenticed to a baker. Threatened with prosecution for his religious opinions he went to Geneva, where he passed the year 1701; he returned to the Cevennes on the eve of the rebellion of the Camisards, who by the murder of the Abbe du Chayla at Pont-de-Monvert on the night of the 24th of July 1702 raised the standard of revolt. Some months later he became their leader. He showed himself possessed of an extraordinary genius for war, and Marshal Villars paid him the high compliment of saying that he was as courageous in attack as he was prudent in retreat, and that by his

extraordinary knowledge of the country he displayed in the management of his troops a skill as great as that of the ablest officers. Within a period of two years he was to hold in check Count Victor Maurice de Broglie and Marshal Montrevel, generals of Louis XIV., and to carry on one of the most terrible partisan wars in French history.

He organized the Camisard forces and maintained the most severe discipline. As an orator he derived his inspiration from the prophets of Israel, and raised the enthusiasm of his rude mountaineers to a pitch so high that they were ready to die with their young leader for the sake of liberty of conscience. Each battle increased the terror of his name. On Christmas day 1702 he dared to hold a religious assembly at the very gates of Alais, and put to flight the local militia which came forth to attack him. At Vagnas, on the 10th of February 1703, he routed the royal troops, but, defeated in his turn, he was com- pelled to find safety in flight. But he reappeared, was again defeated at Tour de Bellot (April 30) , and again recovered himself, recruits flocking to him to fill up the places of the slain. By a long series of successes he raised his reputation to the highest pitch, and gained the full confidence of the people. It was in vain that more rigorous measures were adopted against the Camisards. Cavalier boldly carried the war into the plain, made terrible reprisals, and threatened even Nimes itself. On the 1 6th of April 1704 he encountered Marshal Montrevel himself at the bridge of Nages, with 1000 men against 5000, and, though defeated after a desperate conflict, he made a successful retreat with two-thirds of his men. It was at this moment that Marshal Villars, wishing to put an end to the terrible struggle, opened negotiations, and Cavalier was induced to attend a conference at Pont d'Avene near Alais on the nth of May 1704, and on the 16th of May he made submission at Nimes. These negotiations, with the proudest monarch in Europe, he carried on, not as a rebel, but as the leader of an army which had waged an honourable war. Louis XIV. gave him a com- mission as colonel, which Villars presented to him personally, and a pension of 1200 livres. At the same time he authorized the formation of a Camisard regiment for service in Spain under his command.

Before leaving the Cevennes for the last time he went to Alais and to Ribaute, followed by an immense concourse of people. But Cavalier had not been able to obtain liberty of conscience, and his Camisards almost to a man broke forth in wrath against him, reproaching him for what they described as his treacherous

desertion. On the 21st of June 1704, with a hundred Camisards who were still faithful to him, he departed from Nimes and came to Neu-Brisach (Alsace), where he was to be quartered. From Dijon he went on to Paris, where Louis XIV. gave. him audience and heard his explanation of the revolt of the Cevennes. Returning to Dijon, fearing to be imprisoned in the fortress of Neu-Brisach, he escaped with his troop near Montbeliard and took refuge at Lausanne. But he was too much of a soldier to abandon the career of arms. He offered his services to the duke of Savoy, and with his Camisards made war in the Val d'Aosta. After the peace he crossed to England, where he formed a regiment of refugees which took part in the Spanish expedition under the earl of Peterborough and Sir. Cloudesley Shovel in May 1705. At the battle of Almansa the Camisards found themselves opposed to a French regiment, and without firing the two bodies rushed one upon the other. Cavalier wrote

later (July 10, 1707): "The only consolation that remains to me is that the regiment I had the honour to command never looked back, but sold its life dearly on the field of battle. I fought as long as a man stood beside me and until numbers overpowered me, losing also an immense quantity of blood from a dozen wounds which I received." Marshal Berwick never spoke of this tragic event without visible emotion.

On his return to England a small pension was given him and he settled at Dublin, where he published Memoirs of the Wars of the Cevennes under Col. Cavalier, written in French and trans- lated into English with a dedication to Lord Carteret (1726). Though Cavalier received, no doubt, assistance in the publica- tion of the Memoirs, it is none the less true that he provided the materials, and that his work is the most valuable source for the history of his life. He was made a general on the 27th of October 1735, and on the 25th of May 1738 was appointed lieutenant- governor of Jersey. Writing in the following year (August 26, 1739) he says: "I am overworked and weary; I am going to take the waters in England so as to be in a fit condition for the war against the Spaniards if they reject counsels of prudence." He was promoted to the rank of major-general on the 2nd of July 1739, and died in the following year. In the parochial register of St Luke's, Chelsea, there is an entry: " Burial a.d. 1740, May 18, Brigadier John Cavalier."

There is a story which represents him as the fortunate rival of Voltaire for the hand of Olympe, daughter of Madame Dunoyer,

author of the Lettres galantes. During his stay in England he married the daughter of Captain de Ponthieu and Marguerite de la Rochefoucauld, refugees living at Portarlington. Males- herbes, the courageous defender of Louis XVI., bears the follow- ing eloquent testimony to this young hero of the Cevennes: — ” I confess,” he says, ” that this warrior, who, without ever having served, found himself by the mere gift of nature a great general, — this Camisard who was bold to punish a crime in the presence of a fierce troop which maintained itself by little crimes — this coarse peasant who, when admitted at twenty years of age into the society of cultivated people, caught their manners and won their love and esteem, this man who, though accustomed to a stormy life, and having just cause to be proud of his success, had yet enough philosophy in him by nature to enjoy for thirty- five years a tranquil private life — appears to me to be one of the rarest characters to be found in history.”

For a more detailed account see F. Puaux, Vie de Jean Cavalier (1868); David C. A. Agnew, Protestant Exiles from France, ii. 54-66 (Lond., 1871); Charvey, Jean Cavalier: nouveaux documents inedits (1884). Eugene Sue popularized the name of the Camisard chief in Jean Cavalier ou les fanatiques des Cevennes (1840). (F. Px.)

CAVALIER, a horseman, particularly a horse-soldier or one of gentle birth trained in knightly exercises. The word is taken from one of the French words which derived ultimately from the Late Lat. caballarius, a horseman, from Lat. caballus, properly a pack-horse, which gave the Fr. cheval, a chevalier. This last word is the regular French for ” knight,” and is chiefly used in English for a member of certain foreign military or other orders, particularly of the Legion of Honour. Cavalier in English was early applied in a contemptuous sense to an overbearing swashbuckler — a roisterer or swaggering gallant. In Shakespeare (2 Henry IV. v. iii. 62) Shallow calls Bardolph’s companions ” cavaleros.”” Cavalier ” is chiefly associated with the Royalists, the supporters of Charles I. in the struggle with the Parliament in -the Great Rebellion. Here again it first appears as a term of reproach and contempt, applied by the opponents of the king. Charles in the Answer to the Petition (June 13, 1642) speaks of cavaliers as a ” word by what mistake soever it seemes much in disfavour.” Further quotations of the use of the word by the Parliamentary party are given in the New English Dictionary. It was soon adopted (as a title of honour) by the king’s party, who in return applied Roundhead to their opponents, and at the Restoration

the court party preserved the name, which survived till the rise of the term Tory (see Whig and Tory). The term " cavalier " has been adopted from the French as a term in fortification for a work of great command constructed in the

interior of a fort, bastion or other defence, so as to fire over the main parapet without interfering with the fire of the latter. A greater volume of fire can thus be obtained, but the great height of the cavalier makes it an easy target for a besieger's guns.

CAVALIERE, EMILIO DEL, 16th-century Italian musical composer, was born in Rome about 155° of a noble family. He held a post at the court of Ferdinand I. of Tuscany from 1588 to 1597, and during his residence at Florence was on terms of intimacy with J. Peri, 0. Rinuccini, G. Caccini and the rest of the Bardi circle. In 1597 he returned to Rome, and became connected with the Congregation of the Oratory founded by St Philip Neri. Here in 1 600 was performed Cavaliere's contribution to the musical reformation initiated by his circle of friends in Florence — La Rappresentazione di Anima e di Corpo, a sacred drama, which is regarded as the first example of what is now called oratorio. It is generally supposed that he was no longer living when the work was performed, but some authorities assign 1602 as the date of his death.

Cavaliere's style is more facile than that of Peri and Caccini, but he is inferior to them in depth of musical expression. He is, however, important as being the first to apply the new monodic style to sacred music, and as the founder of the Roman school of the 17th century which included Mazzocchi, Carissimi and Alessandro Scarlatti.

See also H. Goldschmidt, Studien zur Geschichte der italieniscJien Oper im 17. Jahrhundert, Band i.

CAVALLI, FRANCESCO (iS99?i676), Italian musical com poser, was born at Crema in 1599 or 1600. His real name was Pier Francesco Caletti-Bruni, but he is better known by that of Cavalli, the name of his patron, a Venetian nobleman. He became a singer at St Mark's in Venice in 161 7, second organist in 1639, first organist in 1665, and in 1668 maestro di cappella. He is,

however, chiefly important for his operas. He began to write for the stage in 1639 (Le Nozze di Teti e di Peleo), and soon established so great a reputation that he was summoned to Paris in 1660 to produce an opera (Serse) at the Louvre in honour of the marriage of Louis XIV. He visited Paris again in 1662, bringing out his Ercole Amante. His death occurred in Venice on the' 14th of January 1676. Twenty-seven operas of Cavalli are still extant, most of them being preserved in the library of St Mark at Venice. Monteverde had found opera a musico- literary experiment, and left it a magnificent dramatic spectacle. Cavalli succeeded in making opera a popular entertainment. He reduced Monteverde's extravagant orchestra to more practical limits, introduced melodious arias into his music and. popular types into his libretti. His operas have all the characteristic exaggerations and absurdities of the 17th century, but they have also a remarkably strong sense of dramatic effect as well as a great musical facility, and a grotesque humour which was characteristic of Italian grand opera down to the death of Alessandro Scarlatti.

CAVALLINI, PIETRO (c. 12 59-1344), Italian painter, born in Rome, was an artist of the earliest epoch of the modern Roman school, and was taught painting and mosaic by Giotto while employed at Rome; it is believed that he assisted his master in the mosaic of the Navicella or ship of St Peter, in the porch of the church of that saint. He also studied under the Cosmati. Lanzi describes him as an adept in both arts, and mentions with approbation his grand fresco of a Crucifixion at Assisi, still in tolerable preservation; he was, moreover, versed in architecture and in sculpture. According to George Vertue, it is highly probable that Cavallini executed, in 1279, the mosaics and other orna- ments of the tomb of Edward the Confessor in Westminster Abbey. He would thus be the " Petrus Civis Romanus " whose name is inscribed on the shrine; but a comparison of dates invalidates this surmise. He died in 1344, at the age of eighty -five, in the odour of sanctity, having in his later years been a man of eminent piety. He is said to have carved for the Basilica of San Paolo fuori le Mura, close to Rome, a crucifix which spoke in 1370 to a female saint. Some highly important works by Cavallini in the church of Santa Cecilia in Trastevere, Rome, have been recently discovered. '

CAVALLO, TIBERIUS (1749-1809), Anglo-Italian electrician and natural philosopher, was born on the 30th of March 1749 at Naples, where his father was a physician. In 177 1 he came to

England with the intention of pursuing a mercantile career, but he soon turned his attention to scientific work. Although he made several ingenious improvements in scientific instruments, his mind was rather imitative and critical than creative. He published numerous works on different branches of physics, including A Complete Treatise on Electricity (1777), Treatise on the Nature and Properties of Air and other permanently Elastic Fluids (1781), History and Practice of Aerostation (1785), Treatise on Magnetism (1787), Elements of Natural and Experimental Philosophy (1803), Theory and Practice of Medical Electricity (1780), and Medical Properties of Factitious Air (1798). He died in London on the 21st of December 1809.

CAVALLOTTI, FELICE (1842-1898), Italian politician, poet and dramatic author, was born at Milan on the 6th of November 1842. In i860 and 1866 he fought with the Garibaldian Corps, but first attained notoriety by bis anti-monarchical lampoons in the Gazzetta di Milano and in the Gazzettina Rosa between 1866 and 1872. Elected to parliament as deputy for Corteolona in the latter year, he took the oath of allegiance after having publicly impugned its validity. Eloquence and turbulent, com- bativeness in and out of parliament secured for him the leader- ship of the extreme Left on the death of Bertani in 1886. During his twelve years' leadership his party increased in number from twenty to seventy, and at the time of his death his parlia- mentary influence was greater than ever before. Though am- bitious and addicted to defamatory methods of personal attack which sometimes savoured of political blackmail, Cavallotti's eloquent advocacy of democratic reform, and apparent generosity of sentiment, secured for him a popularity surpassed by that of no contemporary save Crispi. Services rendered in the cholera epidemic of 1885, his numerous lawsuits and thirty-three duels, his bitter campaign against Crispi, and his championship of French interests, combined to enhance his notoriety and to increase his political influence. By skilful alliances with the marquis di Rudini he more than once obtained practical control of the Italian government, and exacted notable concessions to Radical demands. He was killed on the 6th of March 1898 in a duel with Count Macola, editor of the conservative Gazetta di Venezia, whom he had assailed with characteristic intemper- ance of language. By his death the house of Savoy lost a re- lentless foe, and the revolutionary elements in Italy a gifted, if not entirely trustworthy, leader. – (H. W. S.)

CAVALRY (Fr. cavalerie, Ger. Kavallerie or Reiterei, derived

ultimately from late Lat. caballus, horse), a word which came into use in military literature about the middle of the 16th century as applied to mounted men of all kinds employed for combatant purposes, whether intended primarily for charging in masses, in small bodies, or for dismounted fighting. By degrees, as greater refinement of terminology has become desirable, the idea has been narrowed down until it includes only " horsemen trained to achieve the purpose of their commander by the combined action of man and horse," and this definition will be found to cover the whole field of cavalry activity, from the tasks entrusted to the cavalry " corps " of 10,000 sabres down to the missions devolving on isolated squadrons and even troops.

History.— The evolution of the cavalry arm has never been uniform at any one time over the surface of the globe, but has always been locally modified by the conditions of B . each community and the stage of intellectual develop- use f ment to which at any given moment each had attained, mounted The first condition for the existence of the arm warrlors – being the existence of the horse itself, its relative scarcity or the reverse and its adaptability to its environment in each particular district have always exercised a preponderating influence on the development of cavalry organization and tactics. The indigenous horses of Europe and Asia being very small, the first application of their capabilities for war purposes seems everywhere to have been as draught animals for chariots, the construction of which implies not only the

existence of level surfaces, perhaps of actual roads, but a very considerable degree of mechanical skill in those who designed and employed them. The whole of the classical and Oriental mytho- logies, together with the earliest monuments of Egypt, Assyria and India, are convincing on this point. Nowhere can we find a trace either of description or delineation of animals physically capable of carrying on their backs the armed men of the period. All the earliest allusions to the use of the horse in war either point directly to the employment as a draught animal, or where not specific, as in the description of the war-horse in Job, they would apply equally well to one harnessed to a chariot as to one ridden under the saddle.

The first trace of change is to be found, according to Prof. Wm. Ridgeway (Origin and Influence of the Thoroughbred Horse, p. 243), in an Egyptian relief showing Nubians mounted on horses of an entirely different breed, taller and more powerful than any which had gone before them. These horses appear to have come from the vicinity of Dongola, and the strain still survives in the Sudan. The breed is traced into Arabia, where only second-rate horses had been reared hitherto, and thence to different parts of Europe, where eventually centres of cavalry activity developed. The first detailed evidence of the existence of organized bodies of mounted men is to be found in Xenophon, whose instructions for the breaking, training and command of a squadron remain almost as a model for modern practice. Their tactical employment, however, seems still to have been relatively insignificant, for the horses were still far too small and too few to deliver a charge with sufficient momentum to break the heavy armed and disciplined hoplites. The strain of ancient battle was of an entirely different order to that of modern fighting. In the absence of projectiles of sufficient range and power to sweep a whole area, the fighting was entirely between the front ranks of the opposing forces. When a front rank fighter fell, his place was immediately taken by his comrade in the rear, who took up the individual combat, excited by his comrade's fate but relatively fresh in mind and muscle. This process of feeding the fight from the rear could be protracted almost indefinitely. If then, as a consequence of a charge, a few mounted men did penetrate the ranks, they encountered such a crowd of well-protected and fresh swordsmen that they were soon pulled off their ponies and despatched. Now and again great leaders, Alexander, Hannibal and Scipio Africanus, for instance, succeeded in riding down their opponents, but in the main, and as against the Roman infantry in particular, mounted troops proved of very little service on the battlefield.

It was, however, otherwise in the sphere of strategy. There, information was of even greater importance, because harder to obtain, than it is nowadays, and the army which could push out its feelers to the greater distance, surround its enemy and intercept his communications, derived nearly the same advantages as it does at present. Hence both sides provided themselves with horsemen, and when these met, each in the performance of their several duties, charges of masses naturally ensued. This explains the value attaching in the old days to the possession of horse-flesh and the rapid spread of the relatively

new Dongola or African strain over the then known world.

The primitive instinct of aboriginal man is to throw stones or other missiles for purposes of defence (apes will throw anything they can find, but they never use sticks) ; hence, as the Romans penetrated ever farther amongst the barbarian tribes, their horsemen in first line found ever-increasing need for protection against projectiles. But the greater the weight of armour carried, the greater the demands upon the endurance of the horse. Then, as the weight-carrying breed was expensive and, with the decay of the Roman Empire, corruption and peculation spread, a limit was soon placed on the multiplication of charging cavalry, and it became necessary to fall back on the indigenous pony, which could only carry a rider from place to place, not charge. Thus there was a gradual levelling down of the mounted arms, the heavy cavalry becoming too heavy to gallop and the light not good enough for united action. Against such opponents, the lighter and better mounted tribesmen of

Asia found their task easy. They cut off the supplies of the marching infantry, filled up or destroyed the wells, &c, and thus demonstrated the strategic necessity of superior mobility.

With the decay of civilization discipline also disappeared, and, as discipline consists essentially in the spirit of self-sacrifice for the good of the community, its opposite, self-preservation, became the guiding principle. This in turn led to the increase of armour carried, and thence to the demand for heavier horses, and this demand working through several centuries led ulti- mately to the breeding of the great weight-carrying animals on whose existence that of medieval chivalry depended. These horses, however, being very costly and practically useless for general purposes, could only become the property of the wealthy, who were too independent to feel the need of combination, and preferred to live on the spoliation and taxation of the weak. This spoliation eventually impelled the weaker men to combine, and at first their combination took the form of the construction of fortified places, against which mounted men were powerless. On the other hand, expense put a limit to the area which fortifica- tions could enclose, and this again limited the supplies for the garrison". Horsemen sweeping the country for miles around had no difficulty in feeding themselves, and the surrender of all beleaguered places through starvation was ultimately inevitable, unless food could be introduced from allied towns in the vicinity. It was of no use to introduce fighting men only into a place

which primarily required food (cf. Lucknow, 1857) to protract its resistance. Hence some means had to be found to surround the supply-convoys with a physically impenetrable shield, and eighteen-foot pikes in the hands of powerful disciplined soldiers met the requirements. Against eight to ten ranks of such men the best cavalry in the world, relying only on their swords, were helpless, and for the time (towards the close of the 15th century) infantry remained masters of the field on the continent of Europe.

England meanwhile had developed on lines of her own. Thanks to her longbowmen and the military genius of her leaders, she might have retained indefinitely the command of the continent had it not been for the invention of gunpowder, which, though readily accepted by the English for sieges in France, proved the ultimate cause of their undoing. It was the French who developed the use of siege artillery most rapidly, and their cavalry were not slow to take the hint; unlike the longbow and the crossbow, the pistol could be used effectively from horseback, and presently the knights and their retainers, having the deepest purses, provided themselves with long pistols in addition to their lances and swords. These weapons sent a bullet through any armour which a foot-soldier could conveniently carry, or his commander afford, and if anything went wrong with their mechanism (which was complicated and uncertain) the speed of his horse soon carried the rider out of danger. A new form of attack against infantry, introduced by the French at Cerisoles, 1544, thus developed itself. A troop or squadron, formed in from twelve to sixteen ranks, trotted up to within pistol shot of the angle of the square to be attacked and halted; then each rank in suc- cession cantered off man by man to the left, discharging his pistol at the square as he passed, and riding back to his place behind the column to reload. This could be prolonged indefinitely, and against such tactics the infantry were powerless. The stakes carried by English archers to check the direct charge of horse-men became useless, as did also chevaux de frise, though the latter (which originated in the 14th century) continued to be employed by the Austrians against the swiftly-charging Turks till the close of the 17 th century. Thus it became necessary to devise some new impediment which, whilst remaining mobile, would also give cover and an advantage in the final hand-to- hand shock. The problem was solved in Bohemia, Poland and Moravia (Hussite wars, about 1420), where, distances being great and the country open, greater mobility and capacity in the convoys

became essential. Great trains of wagons were placed in charge of an infantry escort, of which a part had become possessed of firearms, and these moved across country in as many as twelve parallel lines drilled to form laagers, as nowadays

in South Africa. Again the cavalry proved helpless, and for nearly a century in central Europe the word " Wagenburg " (wagon-fortress) became synonymous with " army." Then an unfortunate inspiration came to the wagon-men. A large gun was relatively cheaper to manufacture, and more effective than a small one. To keep their assailants at a distance, they mounted wall-pieces of about one-inch bore on their wagons. For a moment the balance inclined in their favour, but the cavalry were quick to see their advantage in this new idea, and they immediately followed suit. They, too, mounted guns on wheels, and, as their mobility gave them choice of position, they were able to concentrate their fire against any side of the laager, and again ultimate surrender was the only way out of the defenders' dilemma.

The interesting problem thus raised was never finally solved, for the scene of action now shifted to western Europe, to the valley of the Po, and more particularly to the Netherlands, where fortresses were closer together and the clayey nature of the Rhine delta had already made paved roads necessary. Then, the Wagenburg being no longer needed for the short transits between one fortified town and another, the infantry reasserted themselves. Firearms having been much improved in the interval the spearmen (pikemen) had already (about 151 5) learnt to protect themselves by musketeers trained to take advantage of cover and ground somewhat in the same fashion as the modern skirmisher. These musketeers kept light guns at a distance from their pikemen, but dared not venture far out, as their fire was altogether inadequate to stop a rush of horsemen; when the latter threatened to intervene, they had to run for safety to the squares of pikemen, whom they assisted in turn by keeping the cavalry beyond pistol range. Hence the horsemen had to fall back upon more powerful guns, and these, being slow and requiring more train, could be most economically protected by infantry (see also Artillery).

Thus about the close of the 16th century western armies

differentiated themselves out into the still existing three types — cavalry, artillery and infantry. Moreover, each type ceatary was subdivided, the cavalry becoming heavy, medium progress. an d dragoons. At this period there was nothing to disturb the equilibrium of two contending forces except the characters of their respective leaders. The mercenary element had triumphed everywhere over the feudal levies. The moral qualities of all were on the same indifferent level, and battles in the open followed one recognized course. Neither army being able to outmarch the other, both drew up masses of pikes in parallel lines. The musketeers covered the deployment of the heavy guns on either side, the cavalry drew up on the wings and a strictly parallel fight ensued, for in the absence of a common cause for which men were willing to die, plunder was the ruling motive, and all control and discipline melted in the excitement of the contest.

It is to the growth of Protestantism that cavalry owes its next great forward leap. To sweep the battlefield, it was absolutely essential that men should be ready tc subordinate selfish considerations to the triumph of their cause. The Roman Catholicism of the day gave many loopholes for the evasion of clear duty, but from these the reformed faith was free, and it is to the reawakened sense of duty 'that Gustavus Adolphus appealed. This alone rendered combination amongst his subordinate leaders possible, and on this power of combination all his victories depended. Other cavalry soldiers, once let loose in the charge, could never be trusted to return to the field, the prospective plunder of the enemy's baggage being too strong a temptation; but the king's men could be depended on, and once brought back in formed bodies, they rode over the enemy's skirmishers and captured his batteries. Then the equilibrium of force was destroyed, and all arms combined made short work of the. opposing infantry alone (Breitenfeld, 1631). But the Swedish king perished with his work half done, and matters reverted to their former condition until the appearance of Cromwell, another great leader capable of animating his men with the spirit of devotion, again rendered the cavalry arm supreme. The essence

of his success lay in this, that his men were ready everywhere and always to lay down their lives for their common cause. Whether scouting 70 m. to the front of their army, or fighting dismounted to delay the enemy at defiles or to storm fortified strongholds, or charging home on the battlefield, their will power, focused on, and in turn dependent on, the personality of their great leader, dominated all human instincts of fear, rapacity

or selfishness. It is true that they had not to ride against the modern rifle, but it is equally true that there was no quick-firing artillery to carry terror through the enemy's army, and it was against masses of spearmen and musketeers, not then subjected to bursting shells or the lash of shrapnel and rifle bullets, that the final charges had always to be ridden home.

Each succeeding decade thereafter has seen a steady diminu- tion in the ultimate power of resistance of the infantry, and a corresponding increase in the power of fire preparation at the disposal of the supreme leader; and the chances of cavalry have fluctuated with the genius of that leader in the employment of the means at his disposal, and the topographical conditions existing within each theatre of war. During the campaigns in Flanders, with its multiplicity of fortresses and clayey soil, cavalry rapidly degenerated into mounted infantry, throwing aside sword and lance-proof armour, and adopting long muskets and heavier ammunition. Presently they abandoned the charge at a gallop and reverted to an approach at the trot, and if (as at Blenheim) their influence proved decisive on the field of battle, this was because the conditions were common to both combatants, and the personal influence of " Corporal John," as his soldiers called Marlborough, ensured greater steadiness and better co-operation.

When Frederick II. became king of Prussia (1740), he found his cavalry almost at the nadir of efficiency; even his cuirassiers drilled principally on foot. " They can Frederick manoeuvre," on foot, "with the same precision as 11.; reform my grenadiers, but unfortunately they are equally of the slow." His enemies the Austrians, thanks to their Pruss'aa wars against the Turks who always charged at a cavalry – gallop, had maintained greater dash and mobility, and at Moll- witz the Prussians only escaped disaster by the astounding rapidity of their infantry fire. In disgust the king then wrote, " Die Cavallerie is nicht einmal werth dasz sie der Teufel week holet," and he immediately set about their re- form with his usual energy and thoroughness. Three years after Mollwitz, the result of his exertions was apparent in the greatly increased importance the arm acquired on the battlefield, and the charge of the Bayreuth dragoons at Hohen- friedberg (June 4, 1745), who with 1500 horses rode over and dispersed 20 Austrian battalions, bringing in 2500 prisoners and 67 colours, will always rank as one of the most brilliant feats in military history. 1 The following years of peace (1745-1756) were devoted to the methodical preparation of the cavalry to

meet the requirements that Frederick's methods of war would make upon them, and it is to this period that the student should devote special attention. From the very outbreak of the Seven Years' War (1756) this training asserted its influence, and Rossbach (1757) and Zorndorf (1758) are the principal examples of what cavalry handled in masses can effect. At Rossbach General v. Seydlitz, at the head of 38 squadrons, practically began and ended the destruction of the French army, and at Zorndorf he saved the day for the Prussians by a series of the most brilliant charges, which successively destroyed the Russian right wing and centre. These battles so conclusively demonstrated the superiority of the Prussian cavalry that their enemies completely altered their tactical procedure. They now utilized their enormous numerical superiority by working in two separate armies, each almost as strong as the whole Prussian force. When the latter moved against either, the one threatened immediately threw up heavy entrenchments, against which cavalry were, of course, ineffective, whilst the other pursued its march. When Frederick, having more or less beaten his immediate opponent,

1 The loss of the regiment was twenty-eight killed and sixty-six wounded.

began to threaten the other army it entrenched likewise. Against these methods the Prussian army soon wore itself out, and though from time to time the cavalry locally distinguished itself, no further opportunities for great decisive blows presented themselves.

The increased demands made upon the mobility of the Prussian horsemen naturally resulted in the gradual rejection of everything which was not essential to their striking power. The long muskets and bayonets were laid aside, but the cuirass was retained for the melee, and by the close of the great struggle the various branches of the arm had differentiated themselves out into the types still adhered to, heavy cavalry, dragoons, hussars, whose equip- ment as regards essentials thenceforward hardly varied up to the latter years of the 19th century. The only striking difference lies in the entire rejection of the lance in the armament of the charging squadrons, and the reason is characteristic of the prin- ciples of the day. The Prussian cavalry

had realized that success was decided, not primarily by actual collision, but by the moral effect of the appearance of an absolutely closed wall of horse- men approaching the adversary at full speed. If the necessary degree of cohesion was attained, the other side was morally beaten before collision took place, and either turned to flight, or met the shock with so little resolution that it was ridden over without difficulty. In the former case any weapon was good enough to kill a flying enemy; in the latter, in the melee which then ensued, the crush in the ranks of the victors was still so great that the lance was a hindrance rather than a help.

In the years succeeding the war the efficiency of the Prussian cavalry sank very rapidly, the initial cause being the death of Seydlitz at the early age of fifty-two. His personality had alone dominated the discontent, lethargy and hopelessness created by ruthless financial economies. When he was gone, as always in the absence of a great leader, men adapted their lives to the line of least resistance. In thirty years the wreck was complete, and within the splendid squadrons which had been accustomed to manoeuvre with perfect precision at the highest speed, there were (as F. A. von der Marwitz in his Nachlass clearly shows) not more than seven thoroughly trained men and horses to each, the remainder being trained for little longer and receiving less atten- tion than is the case with modern 2nd line or auxiliary cavalry.

For the generation preceding the outbreak of the French Revolution, Frederick the Great's army, and especially his cavalry, had become the model for all Europe, but in the the mainspring of the excellence of his squadrons revolu- was everywhere overlooked. Seydlitz had manoeuvred tionary g re at masses of horsemen, therefore every one else must have great masses also; but no nation grasped the secret, viz. the unconditional obedience of the horse to its rider, on which his success had depended. Neither was it possible under the prevailing social conditions to secure the old stamp of horse, or the former attention to detail on the part of men and officers. In France, owing to the agricultural decay of the country, suitable remounts for charg- ing cavalry were almost unobtainable, and as this particular branch of the arm was almost exclusively commanded by the aristocracy it suffered most in the early days of the Revolution. The hussars, being chiefly recruited and officered by Alsatians and Germans from the Rhine provinces, retained their individuality and traditions much longer than the dragoons and cuirassiers, and, to the very close of the great wars,

we find them always ready to charge at a gallop; but the unsteadiness and poor horsemanship of the other branches was so great that up to 181 2, the year of their destruction, they always charged at a trot only, considering that the advantage of superior cohesion thus gained more than balanced the loss of momentum due to the slower pace.

Generally, the growth of the French cavalry service followed the universal law. The best big horses went to the heavy charging cavalry, viz. the cuirassiers, the best light horses to the hussars, and the dragoons received the remainder, for in principle they were only infantry placed on horseback for convenience of locomotion, and were not primarily intended for combined mounted action. Fortunately for them, their principal adversaries, the

Austrians, had altogether failed to grasp the lesson of the Seven Years' War. Writing in 17:80 Colonel Mack, a very capable officer, said, " Even in 1 760, the cavalry could not ride, could not manage to control their horses. Not a single squadron could keep its dressing at a gallop, and before they had gone fifty yards at least ten out of forty horses in the first rank would break out to the front," and though the veteran field marshal Lacy issued new regulations, their spirit seems always to have escaped the executive officers. The British cavalry was almost worse off, for economy had reduced its squadrons to mere skeletons, and the traditional British style of horsemanship, radically different from that in vogue in France, made their training for combined action even more difficult than elsewhere. Hence the history of cavalry during the earlier campaigns of the Revolution is marked by no decisive triumphs, the results are always in adequate when judged by the magnitude of the forces employed, and only the brilliant exploit of the 15th Light Dragoons (now Hussars) at VOlers en Couch6 (April 24, 1794) deserves to be cited as an instance of the extraordinary influence which even a few horsemen can exercise over a demoralized or untrained mob of infantry.

Up to the campaign of Poland (see Napoleonic Campaigns) French victories were won chiefly! by the brilliant infantry fighting, cavalry only intervening (as at Jena) to charge a beaten enemy and complete his destruction by pursuit. But after the terrible waste of life in the winter of 1806-7, and the appalling losses in battle, Napoleon introduced a new form of attack. The case-shot preparation of his artillery (see Artillery) sowed confusion and terror in the enemy's ranks, and the opportunity

was used by masses of cavalry. Henceforward this method dominated the Napoleonic tactics and strategy. The essential difference between this system arid the Frederician lies in this, that with the artillery available in the former period it was not possible to say in advance at what point, the intervention of cavalry would be necessary, hence the need for speed and precision of manoeuvre to ensure their arrival at the right time and place. Napoleon now selected beforehand the point he meant to overwhelm and could bring his cavalry masses within striking distance at leisure. Once placed, it was only necessary to induce them to run away in the required direction to over- whelm everything by sheer weight of men and horses* ■ This method failed at Waterloo because the ground was too heavy, the slope of it against the charge, and the whole condition of the horses too low for the exertion demanded of them.

The British cavalry from ,1793 to 1815 suffered from the same causes which at the beginning of the 20th century brought about its breakdown in the South African War. Over-sea transport brought the horses to land in poor condition, and it was rarely possible to afford them sufficient time to recover and become accustomed to the change in forage, the conditions of the particular theatre of operations, &c, before they had to be led against the enemy— hence a -heavy casualty roll and the introduction into the ranks of raw unbroken horses which interfered with the precision of manoeuvre of the remainder. Their losses (about 13% per annum) were small as compared with those of South Africa, but this is mainly accounted for by the fact that, operations being generally in the northern hemisphere, the change of climate was never so severe. Tactically, they suffered, like the Austrians and Prussians, from the absence of any conception of the Napoleonic strategy amongst their principal leaders. As it was not known where the great blow was to fall, they were distributed along the whole line, and thus became habituated to the idea of operating in relatively small bodies. This is the worst school for the cavalry soldier, because it is only when working in masses of forty to sixty squadrons that the cumulative consequences of small errors of detail become so apparent as to convince all ranks of the necessity of conforming accurately to established prescriptions. Nevertheless, they still retained the practice of charging at a gallop, and as a whole were by far the most efficient body of horsemen who survived at the close of the great wars.

In the reaction that then ensued all over Europe, cavalry

practically ceased to exist. The financial and agricultural exhaustion of all countries, and of Prussia in particular, was so complete that money was nowhere to be found for the great concentrations and manoeuvre practices which are mh' more essential to the efficiency of the cavalry than to century. that of the other arms. Hence a whole generation of officers grew up in ignorance of the fundamental principles which govern the employment of their arm. It was not till 1848 that the Prussians began again to unite whole cavalry divisions for drill and manoeuvre, and the soldiers of the older generation had not yet passed away when the campaigns of 1866 and 1870 brought up again the realities of the battle-field. Meanwhile the introduction of long-range artillery and small arms had entirely destroyed the tactical relation of the three arms on which the Napoleonic tactics and strategy had been based, and the idea gained ground that the battle-field would no longer afford the same opportunities to cavalry as before. The experiences gained by the Americans in the Civil War helped to confirm this preconception. If in battles waged between in- fantries armed only with muzzle-loading rifles, cavalry could find no opportunity to repeat past exploits, it was argued that its chances could not fail to be still further reduced by the breech- loader. But this reasoning ignored the principal factors of former successes. The mounted men in America failed not as a con- sequence of the armament they encountered, but because the war brought out no Napoleon to create by his skill the opportunity for decisive cavalry action, and to mass his men beforehand in confident anticipation. The same reasoning applies to the European campaigns of 1866 and 1870, and the results obtained by the arm were so small, in proportion to the numbers of squad- rons available and to their cost of maintenance as compared with the other arms, that a strong reaction set in everywhere against the existing institutions, and the re-creation of the dragoon, under the new name of mounted rifleman, was advocated in the hope of obtaining a cheap and efficient substitute for the cavalryman.

Later events in South Africa and in Manchuria again brought this question prominently to the front, but the essential difference between the old and new schools of thought has not been gener- ally realized. The " mounted rifle " adherents base their argu- ments on the greatly increased efficiency of the rifle itself. The

“■ cavalry ” school, on the other hand, maintains that, the weapons themselves being everywhere substantially equal in efficiency, the advantage rests with the side which can create the most favourable conditions for their employment, and that, funda- mentally, superior mobility will always confer upon its possessor the choice of the circumstances under which he will elect to engage. Where the two sides are nearly equally matched in mobility, neither side can afford the time to dismount, for the other will utilize that time to manoeuvre into a position which gives him a relative superiority for whichever form of attack he may elect to adopt, and this relative superiority will always more than suffice to eliminate any advantage in accuracy of fire that his opponent may have obtained by devoting his principal attention to training his men on the range instead of on the mounted manoeuvre ground.

Finally, the ” cavalry” school reasons that in no single cam- paign since Napoleon’s time have the conditions governing encounters been normal. Either the roadless and barren nature of the country has precluded of itself the rapid marching which forms the basis of all modern strategy, as in America, Turkey, South Africa and Manchuria, or the relative power of the infantry and artillery weapons, as in Bohemia (1866) and in France (1870) , has rendered wholly impossible the creation of the great tactical opportunity characteristic of Napoleon’s later method, for there then existed no means of overwhelming the enemy with a suffi- cient hail of projectiles to render the penetration of the cavalry feasible. The latest improvement in artillery, viz. the perfected shrapnel and the quick-firing guns, have, however, enormously facilitated the attainment of this primary fire superiority, and, moreover, it has simplified the procedure to such a degree that Napoleon is no longer needed to direct. The battles of the future will thus, in civilized countries, revert to the Napoleonic type,

and the side which possesses the most highly trained and mobile force of cavalry will enjoy a greater relative superiority over its adversary than at any period since the days of Frederick.

The whole experience of the past thus goes to show that no nation in peace has ever yet succeeded in maintaining a highly trained cavalry sufficiently numerous to meet all the demands of a great war. Hence at the outbreak of hostilities there has always been a demand for some kind of supplementary force which can relieve the regular squadrons of those duties of ob- servation and exploration which wear down the horses most rapidly and thus

render the squadrons ineffective for their culminating duty on the battle-field. This demand has been met by the enrolment of men willing to fight and rendered mobile by mounts of an inferior description, and the greater the urgency the greater has been the tendency to give them arms which they can quickly learn to Use. To make a man an expert swordsman or lancer has always taken years, but he can be taught to use a musket or rifle sufficiently for his immediate purpose in a very short time. Hence, to begin with, arms of this description have invariably been issued to him. But once these bodies have been formed, and they have come into collision with trained cavalry, the advantages of mobility, combined with the power of shock, have become so apparent to all, that insensibly the " dragoon" has developed into the cavalry soldier, the rate of this evolution being conditioned by the nature of the country in which the fighting took place.

This evolution is best seen in the American Civil War. The men of the mounted forces engaged had been trained to the use of the rifle from childhood, while the vast majority had never seen a sword, hence the formation of " mounted rifles ";and these " mounted rifles " developed precisely in accordance with the nature of their surroundings. In districts of virgin forests and marshland they remained " mounted rifles," in the open prairie country of the west they became cavalry pure and simple, though for want of time they never rivalled the precision of manoeuvre and endurance of modern Prussian or Austrian horse. In South Africa the same sequence was followed, and had the Boer War lasted longer it is certain that such Boer leaders as de Wet and de la Rey would have reverted to cavalry tactics of shock and cold steel at the earliest possible opportunity.

Therefore when we find, extending over a cycle of ages, the same causes producing the same effects, the natural conclusion is that the evolution of the cavalry arm is subject to a universal law which persists in spite of all changes of armament.

Employment of Cavalry. .■—It is a fundamental axiom of all military action that the officer commanding the cavalry of any force comprising the three arms of the service is in the strictest sense an executive officer under the officer commanding that particular force as a whole. The latter again is himself responsible to the political power he represents. When intricate political problems are at stake, it may be, and generally is, quite impractic able that any subordinate can share the secret

knowledge of the power to which he owes his allegiance.

The essence of the value of the cavalry soldier's services lies in this, that the demand is never made upon him in its supremest form until the instinct of the real commander realizes that the time has come. Whether it be to cover a retreat, and by the loss of hundreds to save the fives of tens of thousands, or to complete a victory with commensurate results in the opposite direction, the obligation remains the same — to stake the last man and horse in the attainment of the immediate object in view, the defeat of the enemy. This at once places the leader of cavalry in face of his principal problem. It is a matter of experience that the broader the front on which he can deliver a charge, the greater the chances of success. However strong the bonds of discipline may be, the line is ultimately, and at a certain nervous tension, only a number of men on horses, acting- and reacting on one another in various ways. When therefore, of two lines, moving to meet one another at speed, one sees itself overlapped to either hand, the men in the line thus over- lapped invariably and inevitably tend to open outwards, so as at least to meet their enemy on an equal frontage. Hence

every cavalry commander tries to strike at- the flank of his enemy, and the latter manoeuvres to meet him, and if both have equal mobility, local collision must ensue on an equal and parallel front. Therefore both strive to put every available man and horse in their first line, and if men and horses were invulnerable such a line would sweep over the ground like a scythe and nothing could withstand it. Since, however, bullets kill at a distance, and inequalities and unforeseen difficulties of the ground may throw hundreds of horses and riders, a working compromise has to be found to meet eventualities, and, other things being equal, victory inclines to the leader who best measures the risks and uncertainties of his undertaking, and keeps in hand a sufficient reserve to meet all chances.

Thus there has arisen a saying, which is sometimes regarded as axiomatic, that in cavalry encounters the last closed reserve always wins. The truth is really that he who has best judged the situation and the men on both sides finds himself in possession of the last reserve at the critical moment. The next point is, how to

ensure the presence of this reserve, and what is the critical moment. The battle-field is the critical moment in each phase of every campaign — not the mere chance locality on which a combat takes place, but the decisive arena on which the strategic consequences of all pre-existing conditions of national cohesion, national organization and of civilization are focussed. It is indeed the judgment-seat of nature, on which the right of the race to survive in the struggle for existence is weighed and measured in the most impartial scales.

Before, however, the final decision of the battle-field can be attained, a whole series of subordinate decisions have to be fought out, success in each of which conditions the result of the next series of encounters. Every commanding officer of cavalry thus finds himself successively called on to win a victory locally at any cost, and the question of economy of force does not concern him at all. Hence the same fundamental rules apply to all cavalry combats, of whatever magnitude, and condition the whole of cavalry tactics. Broadly speaking, if two cavalries of approxi- mately equal mobility manoeuvre against each other in open country, neither side can afford the loss of time that dismounting to fight on foot entails. Hence, assuming that at the outset of a campaign each side aims at securing a decisive success, both seek out an open plain and a mounted charge, sword in hand, for the decision. When the speed and skill of the combatants are approximately equal, collision ensues simultaneously along parallel fronts, and the threat of the overlapping line is the principal factor in the decision. The better the individual training of man and horse the less will be the chances of unsteadi- ness or local failures in execution, and the less the need of reserves; hence the force which feels itself the most perfect in the individual efficiency of both man and horse (on which therefore the whole ultimately depends) can afford to keep fewer men in reserve and can thus iifcrease the width of its first line for the direct collision. Careful preparation in peace is therefore the first guarantee of success in action. This means that cavalry, unlike infantry, cannot be expanded by the absorption of reserve men and horses on the outbreak of hostilities, but must be maintained at war strength in peace, ready to take the field at a moment's notice, and this is actually the standard of readiness attained on the continent of Europe at the present day.

Further, uniformity of speed is the essential condition for the execution of closed charges, and this obviously cannot be assured if big men on little horses and small men on big horses are in-

discriminately mixed up in the same units. Horses and men have therefore been sorted out everywhere into three categories, light, medium and heavy, and in periods when war was practically chronic, suitable duties have been allotted to each. It is clear, on purely mechanical grounds, that the greater the velocity of motion at the moment of collision the greater will be the chances of success, and this greater speed will be on the side of the bigger horses as a consequence of their longer stride. On the other hand, these horses, by reason of their greater weight, are used up much more rapidly than small ones. Hence, to ensure the greater speed at the moment of contact, it is necessary to save them as

much as possible to keep them fresh for the shock only, and this has been the practice of all great cavalry leaders all over the world, and has only been departed from under special circumstances, as by the Germans in France in 1870, when their cavalry prac- tically rode everywhere unopposed.

Collisions, however, must be expected by every body of troops large or small; hence each regiment — ultimately each squadron — endeavours to save its horses as far as this is com- patible with the attainment of the special object in view, and this has led everywhere and always to a demand for some inter- mediate arm, less expensive to raise and maintain than cavalry proper, and able to cover the ground with sufficient rapidity and collect the information necessary to ensure the proper direction of the cavalry commands. Originally this intermediate force received the designation of dragoons; but since under pressure of circumstances during long periods of war these invariably improved themselves into cavalry and became permanent units in the army organization, fresh names have had to be invented for them, of which Mounted Infantry and Mounted Rifles are the latest, and every improvement in firearms has led to an increased demand for their services.

It is now relatively easy to trace out the considerations which should govern the employment of his cavalry by the officer commanding a force of the three arms. Assuming for purposes of illustration an army numerically weak in cavalry, what course will best ensure the presence of the greatest number of sabres at the decisive point, i.e. on the battle-field? To push out cavalry screens far to the front will be to court destruction, nor is the information they obtain of much real service unless the means to act upon it at once is at hand. This can only be supplied economically by the use of strong advanced guards of infantry,

and such supplementary security and information as these may require will be best supplied by mounted infantry, the sacrifice of whom will disturb least the fighting integrity of the whole army.

Imagine an army of 300,000 men advancing by five parallel roads on a front of 50 m., each column (60,000 men, 2 army corps) being covered by a strong advance guard, coming in contact with a similarly constituted army movfcig in an opposite direction. A series of engagements will ensue, in each of which the object of the local commander will be to paralyse his opponent's will-power by a most vigorous attack, so that his superior officer following him on the same road will be free to act as he chooses. The front of the two armies will now be defined by a line of combats localized – each about a comparatively small area, and between them will be wide gaps which it will be the chief business of the directing minds on either side to close by other troops as soon as possible. Generally the call will be made upon the artillery for this purpose, since they can cover the re- quired distances far more rapidly than infantry. Now, as artillery is powerless when limbered up and always very vulnerable on the flanks of the long lines, a strong cavalry escort will have to be assigned to them which, trotting forward to screen the march, will either come in contact with the enemy's cavalry advancing with a similar object, or themselves find an'opportunity to catch the enemy's guns at a disadvantage. These are opportunities for the cavalry, and if necessary it must sacrifice itself to turn them to the best account. The whole course of the battle depends on success or failure in the early formation of great lines of guns, for ultimately the victor in the artillery duel finds himself in command of the necessary balance of guns which are needed to prepare the way for his final decisive infantry attack. If this latter succeeds, then any mounted men who can gallop and shoot will suffice for pursuit. If it fails, no cavalry, however gallant, has any hope of definitely restoring the combat, for against victorious infantry, cavalry, now as in the past, can but gain a little time. This time may indeed be worth the price at which it can be bought, but it will always be more economical to concentrate all efforts to prevent the emergency arising.

After the Franco-German War much was written about the possibility of vast cavalry encounters to be fought far in advance of the main armies, for the purpose of obtaining information, and ideas were freely mooted of wide-flung raids traversing

the enemy's communications, breaking up his depots, reserve formations, &c. But riper consideration has relegated these suggestions to the background, for it is now evident that such expeditions involve the dissemination of force, not its concentration. Austria and France for example would scarcely throw their numerically inferior cavalry against the Germans, and nothing would suit them better than that the latter should hurl their squadrons against the frontier guards, advanced posts, and, generally, against unbeaten infantry; nor indeed would the Germans stultify their whole strategic teaching by weakening themselves for the decisive struggle. It follows therefore that cavalry reconnaissance duties will be strictly local and tactical, and that arrangements will be made for procuring strategical information by wireless telegraphy, balloons, motor cars, bicycles, &c, and that on the whole that nation will be best served in war which has provided in peace a nucleus of mounted infantry capable of rapid expansion to fill the gap which history shows always to have existed between the infantry and the cavalry. Such troops need not be organized in large bodies, for their mission is to act by " slimness," not by violence. They must be the old " verlorene Haufe " (anglice, " forlorn hope ") of former days, men whose individual bravery and decision is of the highest order. But they can never become a " decision-compelling arm," though by their devotion they may well hope to obtain the grand opportunity for their cavalry, and share with them in harvesting the fruits of victory.

The great cavalry encounters of forty to sixty squadrons on either side, which it has been shown must arise from the necessity of screening or preventing the formation of the all-important artillery lines, will take their form mainly from the topographical conditions of the district, and since on a front of 60 to 100 m. these may vary indefinitely, cavalry must be trained, as indeed it always has been, to fight either on foot or on horseback as occasion requires. In either case, thoroughness of preparation in horsemanship (which, be it observed, includes horsemastership) is the first essential, for in the end victory will rest with the side which can put in the right place with the greatest rapidity the greatest number of sabres or rifles. In the case of rifles there is a greater margin of time available and an initial failure is not

irremediable, but the underlying principle is the same in either case; and since it is impossible to foretell exactly the conditions of the collision, all alike, according to the class to which they belong, must be brought up to the highest standard, for this alone guarantees the smooth and rhythmical motion required for covering long distances with the least expenditure of physical and nervous strength on the part both of horse and rider. As a consequence of successes gained in these preliminary encounters, opportunities will subsequently arise for the balance of fresh or rallied squadrons in hand to ride home upon masses of infantry disorganized and demoralized by the combined fire of infantry and artillery, and such opportunities are likely to be much more numerous at the outbreak of future wars than they have been in the past, because the enormous gain in range and rapidity of fire enables a far greater weight of metal to be concentrated on any chosen area within a given time. It cannot be too often reiterated that cavalry never has ridden over unshaken infantry of average quality by reason of its momentum alone, but that every successful cavalry charge has always owed its issue to a previously acquired moral superiority which has prevented the infantry from making adequate use of their means of defence. Nor will such charges entail greater losses than in the past, for, great though the increase of range of modern infantry weapons has been, the speed and endurance of cavalry has increased in a yet higher ratio; whereas in Napoleon's days, with an extreme range for musketry of 1000 yds., cavalry were expected only to trot 800 yds. and gallop for 200, nowadays with an extreme infantry range of under 4000 yds., the cavalry are trained to trot for 8000 yds. and gallop for 2000.

Neither the experiences in South Africa nor those in Manchuria seriously influenced the views of the leading cavalry experts as above outlined, for the conditions of both cases were entirely abnormal. No nation in western Europe can afford to mount

the whole of its able-bodied manhood, nor, with the restricted area of its possessions, could repeat the Boer tactics with useful effect; in Manchuria, the theatre of operation was so far roadless, and the motives of both combatants so distinct from any conceivable as a basis for European strategy, that time was always available to construct entrenchments and obstacles physically insuperable to mounted arms. In western Europe, with its extreme development of communications, such tactics are impractic- able, and under the system of compulsory service which is in force in all nations, an early decision must be sought

at any cost. This motive imposes a rapid-marching campaign in the Napole- onic style, and in such warfare there is neither time nor energy available for the erection of extemporised fortresses. Victory must therefore fall to the side that can develop the greatest fire power in the shortest time. The greatest factor of fire power is the long artillery lines, and as cavalry is the one arm which by its mobility can hamper or prevent the formation of such lines, on its success in this task all else must depend. Hence both sides will concentrate every available horse and man for this special purpose, and on the issue of the collisions this mutual concentra- tion must entail will hang the fate of the battle, and ultimately of the nation. But the cavalry which will succeed in this task will be the one in which the spirit of duty burns brightest, and the oath of allegiance, renewed daily on the cross of the sword, is held in the highest esteem.

Organization. — The existing organization of cavalry throughout the civilized world is an instance of the " survival of the fittest " in an extreme form. The execution of the many manoeuvres with the speed and precision which condition success is only possible by a force in which, as Frederick the Great said, " every horse and trooper has been finished with the same care that a watchmaker bestows upon each wheel of the watch mechanism." Uniformity of excellence is in fact the keystone of success, and this is only attainable where the mass is subdivided into groups, each of which requires superintendence enough to absorb the whole energy of an average commander. Thus it has been found by ages of experiment that an average officer, with the assistance of certain subordinates to whom he delegates as much or as little responsibility as he pleases, finds his time fully occupied by the care of about one hundred and fifty men and horses, each individual of which he must understand intimately, in character, physical strength and temper, for horse and man must be matched with the utmost care and judgment if the best that each is capable of is to be attained. The fundamental secret of the exceptional efficiency attained by the Prussian cavalry lies in the fact that they were the first to realize what the above implies. After the close of the Napoleonic Wars they made their squadron commanders responsible, not only for the training of the combatants of their unit, but also for the breaking in of remounts and the elementary teaching of recruits as well, and in this manner they obtained an intimate knowledge of their material which is almost unattainable by British officers owing to the conditions entailed by foreign service and frequent changes of garrisons.

Further, to obtain the maximum celerity of manoeuvre with the minimum exertion of the horses, the squadron requires to be subdivided into smaller units, generally known as troops, and experience has shown that with 128 sabres in the ranks (the average strength on parade, after deducting sick and young horses, and the N.c. officers required as troop guides, &c.) four troops best satisfy all conditions; as, with this number, the squadron will, under all circumstances of ground and surroundings, make any change of formation in less time and with greater accuracy than with any other number of subdivisions. The size of the unit next above the squadron, the regiment, is again fixed by the number of subordinates that an average commander can control, and the universal experience of all arms has settled this as not less than four and not more than eight. Experiments with eight and even ten squadrons have been tried both in Austria and Prussia, but only exceptional men have succeeded in controlling such large bodies effectively, and in the end the normal has been fixed at four or five squadrons in quarters, and three or four in the field. Of these, the larger number

is undoubtedly preferable, for, with the work of the quarter-Boaster and the adjutant to supervise, in addition, the regimental commander is economically applied to the best advantage. The essential point, however, is that the officer commanding the regiment does not interfere in details, but commands his four squadron commanders, his quartermaster, and his adjutant, and holds them absolutely responsible for results.

There is no unity of practice in the constitution of larger units. Brigades vary according to circumstances from two regiments to four, and the composition of divisions fluctuates similarly. The custom in the German cavalry has been to form brigades of two regiments and divisions of three brigades, but this practice arose primarily from the system of recruiting and has no tactical advantage. The territory assigned to each army corps provides men and horses for two regiments of cuirassiers or lancers (classed as heavy in Germany), two of dragoons, and two of hussars, and since it is clearly essential to ensure uniformity of speed and endurance within those units most likely to have to work together, it was impossible to mix the different classes. But

the views now current as to the tactical employment of cavalry contemplate the employment not only of divisions but of whole cavalry corps, forty to sixty squadrons strong, and these may be called on to fulfil the most various missions. The farthest and swiftest reconnaissances are the province of light cavalry, i.e. hussars, the most obstinate attack and defence of localities the task of dragoons, and the decisive charges on the battle-field essentially the duty of the heavy cavalry. It seems probable then that the brigade will become the highest unit the composition of which is fixed in peace, and that divisions and corps will be put together by brigades of uniform composition, and assigned to the several sections of the theatre of war in which each is likely to find the most suitable field for its special character. This was the case in the Frederician and Napoleonic epochs, when efficiency and experience in the field far outweighed considerations of administration and convenience in quarters.

Hitherto, horse artillery in Europe has always formed an integral portion of the divisional organization, but the system has never worked well, and in view of the technical evolution of artillery material is no longer considered desirable. As it is always possible to assign one or more batteries to any particular brigade whose line of march will bring it across villages, defiles, &c. (where the support of its fire will be essential), and on the battle-field itself responsibility for the guns is likely to prove more of a hindrance than a help to the cavalry commander, it is probable that horse artillery will revert to the inspection of its own technical officers, and that the sole tie which will be re- tained between it and the cavalry will be in the batteries being informed as to the cavalry units they are likely to serve with in war, so that the officers may make themselves acquainted with the idiosyncrasies of their future commanders. The same course will be pursued with the engineers and technical troops required for the cavalry, but it seems probable that, in accordance with a suggestion made by Moltke after the 1866 campaign, the supply columns for one or more cavalry corps will be held ready in peace, and specially organized to attain the highest possible mobility which modern technical progress can ensure.

The general causes which have led to the differentiation of cavalry into the three types — hussars, dragoons and heavy — have already been dealt with. Obviously big men on little horses cannot manoeuvre side by side with light men on big horses. Also, since uniformity of excellence within the unit is the prime condition of efficiency, and the greatest personal dexterity is

required for the management of sword or lance on horseback, a further sorting out became necessary, and the best light weights were put on the best light horses and called hussars, the best heavy weights on the best heavy horses and called lancers, the average of either type becoming dragoons and cuirassiers. In England, the lance not being indigenous and the conditions of foreign service making adherence to a logical system impossible, lancers are medium cavalry, but the difference of weights carried and type of horses is too small to render these distinctions of practical moment. In Germany, where every suitable horse

finds its place in the ranks and men have no right of individual selection, the distinctions are still maintained, and there is a very marked difference between the weights carried and the types of men and horses in each branch, though the dead weight which it is still considered necessary to carry in cavalries likely to manoeuvre in large masses hardly varies with the weight of the man or size of the horse.

Where small units only are required to march and scout, the kit can be reduced to a minimum, everything superfluous for the moment being carried on hired transport, as in South Africa. But when 10,000 horsemen have to move by a single road all transport must be left miles to the rear, and greater mobility for the whole is attained by carrying upon the horse itself the essentials for a period of some weeks. Still, even allowing for this, it is impossible to account for the extraordinary load that is still considered necessary. In India, the British lancer, averaging n st. per man, could turn out in marching order at 17 st. 8 lb (less forage nets). In Germany, the hussar, averaging 10 st. 6 lb, rode at 18 st., also without forage, and the cuirassier at 21 st. to 22 st. Cavalry equipment is, in fact, far too heavy, for in the interests of the budgets of the departments which supply saddlery, harness, &c, everything is made so as to last for many years. Cavalry saddles fifty years old frequently remain in good condition, but the losses in horse-flesh this excessive solidity entails are ignored. The remount accounts are kept separately, and few realize that in war it is cheaper to replace a horse than a saddle. In any case, the armament alone of the cavalry soldier makes great demands on the horses. His sword and scabbard weigh about 4 lb, carbine or rifle 7 lb to 9 lb, 120 rounds of ammunition with pouches and belts about 12ft, lance about 5 lb, and two days' forage and hay at the lowest 40 lb, or a gross total of 70 lb or s st., which with n st. for the man brings the total to 16 st.; add to this the lightest possible saddle, bridle, cloak and blanket,

and 17 st. 8 lb is approximately the irreducible minimum. It may be imagined what care and management of the horses is required to enable them under such loads to manoeuvre in masses at a trot, and gallop for distances of 5 m. and upwards without a moment for dismounting.

Reconnaissance and Scouting. — After 1870 public opinion, misled by the performances of the ” ubiquitous Uhlan ” and disappointed by the absence of great cavalry charges on the field of battle, came somewhat hastily to the conclusion that the day of ” shock tactics ” was past and the future of cavalry lay in acting as the eyes and ears of the following armies. But, as often happens, the fact was overlooked that the German cavalry screen was entirely unopposed in its reconnoitring expeditions, and it was not till long afterwards that it became apparent how very little these far-flung reconnaissances had contributed to the total success.

It has been calculated by German cavalry experts that not 1 % of the reports sent in by the scouts during the advance from the Saar to the Meuse, August 1870, were of appreciable import- ance to the headquarters, and that before the orders based upon this evidence reached the front, events frequently anticipated them. Generally the conviction has asserted itself, that it is impossible to train the short-service soldiers of civilized nations sufficiently to render their reports worth the trouble of collating, and if a few cases of natural aptitude do exist nothing can ensure that these particular men should be sufficiently well mounted to transmit their information with sufficient celerity to be of im- portance. It is of little value to a commander to know that the enemy was at a given spot forty-eight hours previously, unless the sender of the report has a sufficient force at his disposal to compel the enemy to remain there; in other words, to attack and hold him. Cavalry and horse artillery alone, however, cannot economically exert this holding power, for, whatever their effect against worn-out men at the close of a great battle, against fresh infantry they are relatively powerless. Hence, it is probable that we shall see a revival of the strategic advanced guard of all arms, as in the Napoleonic days, which will not only reconnoitre, but fix the enemy until the army itself can execute the manoeuvre designed to effect his destruction. The general situation of the

Plate I.

pr^

< -2i

!■'» « " '• '» \/) 3 I ,- '; ', \ 'i > : 1 I '

1

f- ?

ri#TO$!&& ^

' '. " v ■ $

«^P3£$«

5*.;

V. SW.

Plate II,

CAVALRY

.• ■&* > *•'

"'mm "aJ

!U' ^" *£*J*sS*;-. ; – !

BATTLE OF STAFFARDA, 1690. (From a contemporary engraving.)

m^*****-^

L1*RS&j

ACTION ON" THE BULGANAK, 1854. (From a lithograph by W. Simpson.)

GERMAN GUARD DRAGOONS. (Photo, Cebriider Haeckel.)

CAVALRY

57i

enemy's masses will, in western Europe, always be sufficiently fixed by the trend of his railway communications, checked by reports of spies, newspapers, &c, for, with neutral frontiers

everywhere within a few hours' ride for a motor cyclist, anything approaching the secrecy of the Japanese in Manchuria is quite unattainable, and, once the great masses begin to move, the only " shadowing " which holds out any hope of usefulness is that undertaken by very small selected parties of officers, per- fectly mounted, daring riders, and accustomed to cover distances of 100 m. and upwards. These will be supported by motor cars and advanced feelers from the field telegraphs, though probably the motor car would carry the eye-witness to his destination in less time than it would take to draft and signal a complete report. Tactical scouting, now as always, is invaluable for securing the safety of the marching and sleeping troops, and brigade, divisional and corps commanders will remain dependent upon their own squadrons for the solution of the immediate tactical problem before them; but, since both sides will employ mounted men to screen their operations, intelligence will generally only be won by fighting, and the side which can locally develop a marked fire superiority will be the more likely to obtain the information it requires. In this direction the introduction of the motor car and of cyclists is likely to exercise a most important influence, but, whatever may be the conveyance, it must be looked upon as a means of advance only, never of retreat. The troops thus conveyed must be used to seize villages or defiles about which the cavalry and guns can manoeuvre.

Formations and Drill. — Cavalry, when mounted, act exclusively by " shock " or more precisely by " the threat of their shock," for the immediate result of collision is actually decided some instants before this collision takes place. Experience has shown that the best guarantee for success in this shock is afforded by a two-deep line, the men riding knee to knee within each squadron at least. Perfect cavalry can charge in larger bodies without intervals between the squadrons, but, ordinarily, intervals of about 10 yds. between adjacent squadrons are kept to localize any partial unsteadiness due to difficulties of ground, casualties, &c. The obvious drawbacks of a two-deep line are that it halves the possible extent of front, and that if a front-rank horse falls the rear-rank horse generally tumbles over it also. To minimize the latter evil, the charge in two successive lines, 150 to 200 yds. apart, has often been advocated, but this has never stood the test of serious cavalry fighting; first, because when squadrons are galloping fast and always striving to keep the touch to the centre, if a horse falls the adjacent horses close in with such force that their sidelong collision may throw down more and always creates

violent oscillation; and secondly, be- cause owing to the dust raised by the first rank the following one can never maintain its true direction. It is primurily to avoid the danger and difficulty arising from the dust that the ranks in manoeuvre are closed to within one horse's length, as, when moving at speed, the rear rank is past before the dust has time to rise.

Of all formations, the line is the most difficult to handle, and, particularly, to conceal — hence various formations in column are necessary for the preliminary manoeuvres requisite to place the squadrons in position for the final deployment previous to the charge. Many forms of these columns have been tried, but, setting aside the columns intended exclusively for marching along roads, of which " sections " (four men abreast) is most usual in England, only these survive:—

Squadron column.

Double column of squadrons.

Half column.

In squadron column, the troops of the squadron formed are in line one behind the other at a distance equal to the front of the troop in line. The ideal squadron consists of 128 men formed in two ranks giving 64 files, and divided into four troops of 16 files —a larger number of troops makes the drill too complicated, a smaller number makes each troop slow and unhandy. When the squadron is weak, therefore, the troop should still be main- tained as near 16 files as possible, the number of troops being if

necessary reduced. Thus with only 32 files, two troops of 16 files would be better than four of only 8 files.

All other formations of the regiment or brigade are funda- mentally derived from the squadron column, only varying with the order in which the squadrons are grouped, and the intervals which separate them. Thus the regiment may move in line erf squadron columns at close interval, i.e. n paces apart or in double column as in the diagram. To form line for the charge, the squadrons open out, still in column, to full interval, i.e. the width they occupy when in line; and then on the command " Line to the front," each troop moves up to its place in line as shown in the diagram. When in line a large body of cavalry can no longer vary its direction without sacrificing its appearance of order, and

as above pointed out, it is this appearance of order which really decides the result of the chaige before the actual collision. Since, however, the enemy's movements may compel a change, an intermediate formation is provided, known as the

Regiment in Line

Line of Squadron Columns (Close interval)

I— £-1 i-iˆ-n i-Jˆ-1 iˆJ-i

csfea gˆi cˆH cslb

c£b 1ˆ3 r=5=°i i=£i '

Cˆ f'i iˆi rˆ.

mU mkt

Double Column

JˆJVJ%J$ 1 Orlg. the – i

Half Column Manoeuvres

*&(&.

j Original Una

Half Column.. HB

Intermediate... ...|H1IHI

Final Formation. ..£33

* = _!£._ J%.'±

■ — E fr ˆ T ˆ fr <°"0- u " 3fc-j|£—%_ˆ£ 'Original lint

" half column." When this formation is ordered, the troops within each squadron wheel half right or left, and each squadron is then able to form into column or line to the front as circum- stances demand, or the whole line can be formed into column of troops by continuing the wheel and in this formation gallop out into a fresh direction, re-forming line .by a simple wheel in the shortest possible time.,

Bibliography.— G. H. Elliot, Cavalry Literature (1893); v. Bismarck, Uses and Application of Cavalry in War (1818, English translation by Lieut.-Col. Beamish, 1855) ; G. T. Denison, A History of Cavalry (1877); Prince Kraft zu Hohenlohe-Ingelfingen, Letters on Cavalry and Conversations on Cavalry (English translations, 1880 and 1892); Colonel Mitchell, Considerations on Tactics (1854) and Thoughts on Tactics and Organization (1838) ; E. Nolan, Cavalry, its History and Tactics (1855); Roemer, Cavalry, its History, Manage- ment and Uses (New York, 1863); Maitland, Notes on Cavalry (1878) ; F. N. Maude, Cavalry versus Infantry and Cavalry, its Past and Future; C. von Schmidt, Instructions for the Training, Employˆ ment and Leading of Cavalry (English translation, 1881); V. Verdy du Vernois, The Cavalry Division (1873); Maj.-Gen. Walker, The Organization and Tactics of the Cavalry Division (1876); C. W. Bowdler Bell, Notes on the German Cavalry Regulations of 1886; F. de Brack, Light Cavalry Outposts (English translation) ; Dwyer, Seats and Saddles (1869); J. Jacob, Views and Opinions (1837); F. Hoenig, Die Kavallerie als Schlachtenkdrper (1884); Sir Evelyn Wood, Achievements of Cavalry (1893); H. T. Siborne, Wattrlot Letters; Desbriere and Sautai, La Cavalerie de 1740 & 1789 (1806); Warnery, Remarques sur la cavalerie (1781); v. Canitz, Histoire des exploits et des vicissitudes de la cavalerie prussienne dans les campagnes de Frederic II (1849); Cherfils, Cavalerie en campagne (1888),

Sendee de stireti stratSgique de la cavalerie (1874); Bonie, Tactique francaise, cavalerie en campagne, cavalerie au combat (1887-1888) ; Foucart, Campagne de Pologne, operations de la cavalerie, nov. 1806- jan. 1807 (1882), La Cavalerie pendant la campagne de Prusse (1880) ; De Galliffet, Projet d ‘instruction sur I’amploi de la cavalerie en liaison avec les autres armes (1880), Rapport sur les grandes manotuvres de cavalerie de 1870; Kaehler, Die preussische Reitersi 1806-1876 (French translation, La Cavalerie prussienne de 1806 & 1876) ; Cavalry Studies (translated from the French of Bonie and the German of Kaehler, with a paper on U.S. cavalry in the Civil War) ; v.Bernhardi, Cavalry in Future Wars (English translation, 1906) ; P. S., Cavalry in the Wars of the Future (translated from the French by T. Formby, 1905) ; D. Haig, Cavalry Studies (1907) ; v. Pelet Narbonne, Die Kavalleriedienst (1 90 1), Cavalry on Service

(English translation, 1906) ; Erziehung vnd Fuhrung von Kavallerie. The principal cavalry periodicals are the Revue de cavalerie, the Kavalleristische Monatshefte (Austrian), the Cavalry Journal (British), and the Journal of the U.S. Cavalry Association. (F. N. M.)

CAVAN, a county in the province of Ulster, Ireland, bounded N. by Fermanagh and Monaghan, E. by Monaghan and Meath, S. by Meath, Westmeath and Longford, and W> by Longford and Leitrim. The area is 477,399 acres, or about 746 sq. m. The surface of the county is uneven, consisting of hill and dale, without any great extent of level ground, but only in its northern extremity attaining a mountainous elevation. The barony of Tullyhaw, bordering on Fermanagh, a wild dreary mountain district, known as the kingdom of Glan or Glengavlin, contains the highest land in the county, reaching 2188 ft. in Cuilcagh, the place of inauguration for the Maguires, chieftains of Fermanagh, held in veneration by the peasantry, in connexion with legends and ancient superstitions. The remainder of the county is not deficient in wood, and contains numerous lakes, generally of small dimensions, but of much beauty, especially Lough Oughter, with its many inlets and islands formed by the Erne river, between the towns of Cavan and Killashandra. The county also shares with other counties the waters of Lough Gowna and Lough Sheelin, in which, as elsewhere in the county, the fishing is good. The chief river in the county is the Erne, which Originates in Lough Scrabby, one of the minor sheets of water communicating with Lough Gowna on the borders of Longford. The river takes a northerly direction by Killashandra and Belturbet, being enlarged during its course by. the Annalee and other smaller streams, and finally enters Lough Erne near the northern limit of the county. The other watefs, consisting of numerous lakes and their connecting streams, are mostly tributary to the Erne. A copious spring called the Shannon Pot, at the foot of the Cuilcagh Mountain, in the barony of Tullyhaw, is regarded as the source of the river Shannon. The Blackwater, a tributary of the Boyne, also rises in this county, near Bailieborough. Several mineral springs exist in this county, the chief of which is near the once frequented village of Swanlin- bar. In the neighbourhood of Belturbet, near the small lake of Annagh, is a carbonated chalybeate spring. There are several other springs of less importance; and the small Lough Leighs, or Lough-an-Leighaghs, which signifies the healing lake, on the summit of a mountain between Bailieborough and Kingscourt, is celebrated for its

antiscorbutic properties. The level of this lake never varies. It has no visible supply nor vent for its discharge; nor is it ever frozen during the severest winters.

Geology. — This elongated county includes on the north-west some of the highland of Millstone Grit and Coal-Measures that rises above Lough Allen. The beds below these are referred to the English Yoredale series, and include some flaggy sandstones. It is on this series that the Shannon rises, under the high outlier of grit on Cuilcagh. The Carboniferous Limestone then stretches down to Cavan town, a bold outlier of the higher strata being left above Ballyconnell. The river Erne forms, in the limestone area, a char- acteristic series of expansions and loops, with islands between them, known as Lough Oughter. At this point we pass on to the axis of underlying Silurian strata that runs from Longford to Donagha- dee in Co. Down, and the country becomes hilly and irregular, culminating about Cross Keys on the old Dublin coach-road. A patch of granite, indicating doubtless a core like that exposed at Newry, is seen in a hollow at Crossdoney. On the south side of this axis of older rocks, we reach Carboniferous shale and limestone at Lough Sheelin, and here enter on the great central plain. The extreme south-east of the county includes part of the Triassic outlier of Kingscourt. The coal-seams and concretions of clay-ironstone in the north-west area resemble those mentioned under the head of

Co. Roscommon. Anthracite, probably of inorganic origin, has been mined without permanent success in the Silurian beds near Kilnaleck, and is traceable freely, associated with veins of quartz and haematite, at Ballyjamesduff a little farther east.

Climate and Industries. ˆ-The climate suffers from the damp- ness arising from the numerous lakes and the nature of the soil, and from the boisterous winds which frequently prevail, more especially in the higher districts. The soil is generally a stiff clay, cold and watery, but capable of much improvement by drainage, for which its undulating surface affords facilities. Only about one-sixteenth of the total area is quite barren. Agriculture makes little progress; the extent of the farms being generally small. Oats and potatoes are the principal crops. Flax, once of some importance, is almost neglected. In the mountainous parts, however, where the land is chiefly under grazing, the farms are larger, and in stock-raising the county is progressing.

Cavan is not a manufacturing county. The bleaching of linen and

the distillation of whisky are both carried on to a small extent, but the people are chiefly employed in agri- cultural pursuits and in the sale of home produce. The soil in those districts not well adapted for tillage is peculiarly favourable for trees. The woods were formerly very considerable, and the timber found in the bogs is of large dimensions; but plantations are now chiefly found in demesnes, where they are extensive.

The county is not well served by railways. The Great Northern from Clones to Cavan, and the Midland Great Western from Mullingar in Westmeath to Cavan, form a through line from north to south. The Great Northern has branches to Belturbet from Ballyhaise, and to Cootehill from Ballybay; the Midland Great Western has a branch to Killashandra, and from Navan in Meath to Kingscourt, just within Cavan. The Cavan & Leitrim railway starts from Belturbet and soon leaves the county to the west.

Population and Administration. — The population (111,917 in 1891; 97,541 in 1901), of which about 80% are Roman Catholics, shows a decrease among the most serious of the Irish counties, and emigration returns are among the heaviest. The population is almost wholly rural, the only towns being the small ones of Cavan (pop. 2822, the county town), Cootehill (1509), Belturbet (1587) and Bailieborough (1004). The county is divided into eight baronies, and contains thirty-two parishes and parts of parishes. It is almost entirely within the Protestant and Roman Catholic dioceses of Kilmore. The assizes are held at Cavan, and quarter sessions are held at Cavan, Bailieborough, Cootehill and Ballyconnell. Before the Union the county re- turned six members to the Irish parliament, two for the county at large, and two for each of the boroughs of Cavan and Belturbet; but since that period it has been represented in the imperial par- liament by two members only, for the east and west divisions.

History and Antiquities. — At the period of the English settle- ment, and for some centuries afterwards, this district was known as the Brenny, being divided between the families of O'Rourke and O'Reilly; and its inhabitants, protected by the nature of the country, long maintained their independence. In 1579 Cavan was made shire ground as part of Connaught, and in 1584 it was formed into a county of Ulster by Sir John Perrott, and subdivided into seven baronies, two of which were assigned to Sir John O'Reilly and three to other members of the family; while the two remaining, possessed by the septs of Mackernon and

Magauran, and situated in the mountains bordering on O'Rourke's country, were left subject to their ancient tenures and the exactions of their Irish lord. The county subsequently came within the scheme for the plantation of Ulster under James I. The population is less mixed in race than in most parts of Ulster, being generally of Celtic extraction. Some few remains of antiquity remain in the shape of cairns, raths and the ruins of small castles, such as Cloughoughter Castle on an island (an ancient crannog) of Lough Oughter. Three miles from the town of Cavan is Kilmore, with its cathedral, a plain erection containing a Romanesque doorway brought from the abbey of Trinity Island, Lough Oughter. The bishopric dates

from about 1450. A portion of a round tower is seen in the churchyard of the parish of Drumlane at Belturbet.

CAVAN, a market-town and the county town of Co. Cavan, Ireland, near the centre of the county, in the west parliamentary division, 85I m. N.W. of Dublin by the Midland Great Western railway, and the terminus of a branch of the Great Northern railway from Clones. Pop. of urban district (1901), 2822. It is on one of the tributary streams of the Annalee river, in a broad valley surrounded on every side by elevated ground, with picturesque environs, notably the demesnes of Farnham and of Kilmore, which belongs to the bishops of that diocese. Cavan has no buildings of antiquarian interest, but the principal county institutions are here, and the most conspicuous building is the grammar school, founded by Charles I. It was rebuilt in 18 19 on an eminence overlooking one of the main entrances into the town, and is capable of accommodating 100 resident pupils. The college of St Patrick is near the town. Cavan has some linen trade, and a considerable retail business is transacted in the town. A monastery of Dominican friars, founded by O'Reilly, chieftain of the Brenny, formerly existed here, and became the burial-place of the celebrated Irish general, Owen O'Neill, who died as is supposed by poison, in 1649, at Clough- oughter. There was also the castle of the O'Reillys, but this and all other antiquities of the town were swept away during the violent and continuous feuds to which the country was subjected. In 1600 the chief portion of the town was burned by the Enniskilleners under General Wolseley, when they routed a body of James II. 's

troops under the duke of Berwick.

CAVANILLES, ANTONIO J0S6 (1745-1804), Spanish botanist, was born at Valencia on the 16th of January 1745. He was educated at the university of that town, and in 1777 went to Paris, where he resided twelve years, engaged in the study of botany. In 1801 he became director of the botanic gardens at Madrid, where he died on the 4th of May 1804. In 1 785-1 786 he published Monadelphiae Classis Dissertationes X., and in 1791 he began to issue Icones et descriptiones plantarum Hispaniae.

His nephew, Antonio Cavanilles (1805-1864), was a distinguished advocate, and the author of a history of Spain, published at Madrid in 1860-1864.

CAVATINA (Ital. diminutive of cavala, the producing of tone from an instrument, plural cavatine), originally a short song of simple character, without a second strain or any repetition of the air. It is now frequently applied to a simple melodious air, as distinguished from a brilliant aria, recitative, &c, and often forms part of a large movement or scena in oratorio or opera.

CAVE, EDWARD (1691-1754), English printer, was born at Newton, Warwickshire, on the 27th of February 1691. His father, Joseph Cave, was of good family, but the entail of the family estate being cut off, he was reduced to becoming a cobbler at Rugby. Edward Cave entered the grammar school of that town, but was expelled for robbing the master's hen-roost. After many vicissitudes he became apprentice to a London printer, and after two years was sent to Norwich to conduct a printing house and publish a weekly paper. While still a printer he obtained a place in the post office, and was promoted to be clerk of the franks. He was at this time engaged in supplying London news- letters to various country papers; and his enemies, who had twice summoned him before the House of Commons for breach of privilege, now accused him of opening letters to obtain his news, and he was dismissed the service. With the capital which he had saved, he set up a small printing office at St John's Gate, Clerkenwell, which he carried on under the name of R. Newton. He had long formed a scheme of a magazine " to contain the essays and intelligence which appeared in the two hundred half-sheets which the London press then threw off monthly," and had tried in vain to persuade some publisher to take it up. In 1731 he himself put it into execution, and began the Gentle- man's Magazine (see Periodicals), of which he was the editor, under the

pseudonym " Sylvanus Urban, Gent." The magazine had a large circulation and brought a fortune to the projector. In 1732 he began to issue reports of the debates in both Houses

of Parliament. He commissioned friends to note the speeches, which he published with the initial and final letters of personal names. In 1738 Cave was censured by parliament for printing the king's answer to an address before it had been announced by the speaker. From that time he called his reports the debates of a " parliament in the empire of Lilliput " (see Reporting). To piece together and write out the speeches for this publication was Samuel Johnson's first literary employment. In 1747 Cave was reprimanded for publishing an account of the trial of Lord Lovat, and the reports were discontinued till 1752. He died on the 10th of January 1 754. Cave published Dr Johnson's Rambler, and his Irene, London and Life of Savage, and was the subject of a short biography by him.

CAVE, WILLIAM (163 7-1 7 13), English divine, was born at Pickwell in Leicestershire. He was educated at St John's College, Cambridge, and successively held the livings of Islington (1662), of All-Hallows the Great, Thames Street, London (1679), and of Isleworth in. Middlesex (1690). Dr Cave was chaplain to Charles II., and in 1684 became a canon of Windsor. The two works on which his reputation principally rests are the Apostolici, or History of Apostles and Fathers in the first three centuries of the Church (1677), and Scriptorum Ecclesiasticorum Historia Liter aria (1688). The best edition of the latter is the Clarendon Press, 1740-1743, which contains additions by the author and others. In both works he was drawn into controversy with Jean le Clerc, who was then writing his Bibliotheque universelle, and who accused him of partiality. He wrote several other works of the same nature which exhibit scholarly research and lucid arrangement. He is said to have been a good talker and an eloquent preacher. His death occurred at Windsor on the 4th of July 1713.

CAVE (Lat. cavea, from cavus, hollow), a hollow extending beneath the surface of the earth. The word " cavern " (Lat. caverna) is practically a synonym, though a distinction is sometimes drawn between sea caves and inland caverns, but the term " cave " is used here as a general description. Caves have excited the awe and wonder of mankind in all ages, and have been the centres round which have clustered many legends and superstitions. They were the abode of the sibyls and the nymphs

in Roman mythology, and in Greece they were the temples of Zeus, Pan, Dionysus, Pluto and the Moon, as well as the places where the oracles were delivered at Delphi, Corinth and Mount Cithaeron. In Persia they were connected with the obscure worship of Mithras. Their names frequently are survivals of the superstitious ideas of antiquity, as, for example, the Fairy, Dragon's, or Devil's Caves of France and Germany. Long after the Fairies and Little Men had forsaken the forests and glens of Germany, they dwelt in their palaces deep in the Harz Mountains, in the Dwarfholes, &c, whence they came from time to time into the upper air.

The Seven Sleepers of Ephesus slept their long sleep in a cave. The hills of Granada are still believed by the Moorish children to contain the great Boabdil and his sleeping host, who will awake, when an adventurous mortal invades their repose, to restore the glory of the Moors in Spain.

Caves have been used in all ages by mankind for habitation, refuge and burial. In the Old Testament we read that when Lot went up out of Zoar he dwelt in a cave with his two daughters. The five kings of the Canaanites took refuge from Joshua, and David from Saul, in the caves of Palestine, just as the Aquitani fled from Caesar to those of Auvergne, and the Arabs of Algeria to those of Dahra, where they were suffocated by Marshal Pelissier in 1845. In Central Africa David Livingstone discovered vast caves in which whole tribes found security with their cattle and household stuff.

The cave of Machpelah may be quoted as an example of their use as sepulchres, and the rock-hewn tombs of Palestine and of Egypt and the Catacombs of Rome probably owe their existence to the ancient practice of burial in natural hollows in the rock. We might therefore expect to find in them most important evidence as to the ancient history of mankind, which would reach long beyond written record; and since they have always

been used by wild beasts as lairs we might reasonably believe also that their exploration would throw light upon the animals which have in many cases disappeared from the countries which they formerly inhabited. The labours of Buckland, Pengelly,

Falconer, Lartet and Christy, and Boyd Dawkins have added an entirely new chapter to the history of man in Europe, as well as established the changes that have taken place in the European fauna. The physical history of caves will be taken first, and we shall then pass on to the discoveries relating to man and the lower animals which have been made in them of late years.

Physical History. — The most obvious agent in hollowing out caves is the sea. The set of the currents, the force of the breakers, the grinding of the shingle inevitably discover the weak places in the cliff, and leave caves as one of the results of their work, modified in each case by the local conditions of the rock. Those formed in this manner are easily recognized from their floors being rarely much out of the horizontal; their entrances are all in the same plane, or in a succession of horizontal and parallel planes, if the land has been elevated at successive times. From their inaccessible position they have been rarely occupied by man. Among them Fingal's Cave, on the island of Staffa, off the south-west coast of Scotland, hollowed out of columnar basalt, is perhaps the most remarkable in Europe. In volcanic regions also there are caves formed by the passage of lava to the surface of the ground, or by the expansion of steam and gases in the lava while it was in a molten state. They have been observed in the regions round Vesuvius and Etna, in Iceland and Teneriffe. We may take as an example the Grotto del Cane (" cave of the dog "), near Pozzuoli, a few miles to the south-west of Naples, remarkable for the flow of carbonic acid from crevices in the floor, which fills the lower part of the cave and suffocates any small animal, such as a dog, immersed long enough in it.

The most important class of caves, however, and that which immediately demands our notice, is that composed of those which have been cut out of calcareous rocks by the action of carbonic acid in the rain-water, combined with the mechanical friction of the sand and stones set in motion by the streams which have, at one time or another, flowed through them. They occur at various levels, and are to be met with wherever the strata are sufficiently compact to support a roof. Those of Brixham and Torquay and of the Eifel are in the Devonian limestone; those of Wales, Somerset, the Pennine chain, Ireland, the central and northern counties of Belgium, Saxony, and Westphalia, of Maine and Anjou, of Virginia and Kentucky, are in that of the Carboniferous age. The cave of Kir kdale in Yorkshire, and most of those in Franconia and Bavaria, penetrate Jurassic limestones. The Neocomian and Cretaceous limestones

contain most of the caverns of France, rendered famous by the discovery of the remains of the cave-men along with the animals which they hunted; as well as those of the Pyrenees, the Alps, Sicily, Greece, Dalmatia, Carniola and Palestine. The cave of Lunelviel near Montpellier is the most important of those which have been hollowed in limestones of the Tertiary age. They are also met with in rocks composed of gypsum; in Thuringia, for example, they occur in the saliferous and gypseous strata of the Zechstein, and in the gypseous Tertiary rocks of the neighbourhood of Paris, as, for example, at Montmorency.

Caves formed by the action of carbonic acid and the action of water are distinguished from others by the following characters. They open on the abrupt sides of valleys and ravines at various levels, and are arranged round the main axes of erosion, just as the branches are arranged round the trunk of a tree. In a great many cases the relation of the valley to the ravine, and of the ravine to the cave, is so intimate that it is impossible to deny that all three have been produced by the same causes. The caves themselves ramify in the same irregular fashion as the valleys, and are to be viewed merely as the capillaries in the general valley system through which the rain passes to join the main channels. Some- times, as in the famous caves of Adelsberg, Kentucky, Wookey Hole in Somersetshire, the Peak in Derbyshire, and in many in the Jura, they are still the passages of subterranean streams; but very frequently the drainage has found an outlet at a lower

level, and the ancient watercourses have been deserted. These in every case present unmistakable proof that they have been traversed by water in the sand, gravel and clay which they contain, as well as in the worn surfaces of the sides and bottom. In all districts where there are caves there are funnel-shaped depressions of various sizes called pot-holes or swallow-holes, or betoires, ” chaldrons du diable,” ” marmites des geants,” or ” katavothra,” in which the rain is collected before it disappears into the subterranean passages. They are to be seen in all stages, some being mere hollows which only contain water after excessive rain, while others are profound vertical shafts into which the water is continually falling. Gaping Ghyl, 330 ft., and Helln Pot in Yorkshire, 300 ft. deep, are examples of the latter class. The cirques described by M. Desnoyers belong to the same class as the swallow-holes.

The history of swallow-holes, caves, ravines and valleys in

calcareous strata may be summed up as follows: — The calcareous rocks are invariably traversed by joints or lines of shrinkage, which are lines of weakness by which the direction of the drainage is determined; and they are composed to a large extent of carbonate of lime, which is readily exchanged into soluble bicarbonate by the addition of carbonic acid. The rain in its passage through the air takes up carbonic acid, and it is still further charged with it in percolating through the surface soil in which there is decomposing vegetable matter. As the raindrops converge towards some one point, determined by some local accident on the surface, and always in a line of joint, the carbonic acid attacks the carbonate of lime with which it comes into contact, and thus a funnel is gradually formed ending in the ver- tical joint below. Both funnel and vertical joint below are being continually enlarged by this process. This chemical action goes on until the free carbonic acid is used up. The subterranean passages are enlarged in this manner, and what was originally an insignificant network of fissures is developed into a series of halls, sometimes as much as from 80 to 100 ft. high. These results are considerably furthered by the mechanical friction of the pebbles and sand hurried along by the current, and by falls of rock from the roof produced by the removal of the underlying strata. In many cases the results of this action have produced a regular subterranean river system. The thick limestones of Kentucky, for example, are traversed by subterranean waters which collect in large rivers, and ultimately appear at the surface in full power. The river Axe, near Wells, the stream flowing out of the Peak Cavern at Castleton, Derbyshire, that at Adelsberg in Carniola, flow out of caverns in full volume. The river Styx and the waters of Acheron disappear in a series of caverns which were supposed to lead down to the infernal regions.

If the direction of the drainage in the rock has been altered, either by elevations such as those with which the geologist is familiar, or by the opening out of new passages at a lower level, these watercourses become dry, and present us with the caves which have afforded shelter to man and the wild animals from the remotest ages, sometimes high up on the side of a ravine, at other times close to the level of the stream at the bottom.

Caves, as a general rule, are as little effected by disturbances of the rock as the ravines and valleys, which have been formed, in the main, irrespective of the lines of fault or dislocation.

We must now examine what happens to the bicarbonate of lime

which has been formed by the action of the acid on the limestone. If a current of air play upon the surface of the water, the carbonic acid, which floats up the lime, so to speak, is given off and the insoluble carbonate is deposited, and as a result of this action we have the elaborate and fantastic stony incrustations termed stalactites and stalagmites. The water percolating through the rock covers the sides of the cavern with a stalactitic drapery, and if a line of drops persistently falls from the same point to the floor, the calcareous deposit gradually descends from the roof, forming in some cases stony tassels, and in others long columns which are ultimately united to the calcareous boss formed by the plash of the water on the floor. The surface also of the pools is sometimes covered over with an ice-like sheet of stalagmite, which shoots from the sides, and sometimes forms a

solid and firm floor when the water on which it was supported has disappeared. Sometimes the drops form a little calcareous basin, beautifully polished inside, which contains small pearl-like particles of carbonate of lime, polished by friction one against the other. The most beautiful stalactitic caves in Great Britain are those of Cheddar in Somerset, Caldy Island and Poole's Cavern at Buxton. A portion only of the carbonate of lime is thus deposited in the hollows of the rock from which it was taken; the rest is carried into the open air by the streams, in part deposited on the sides and bottom, forming tufa and the so-called petrifica- tions, and partly being conveyed down to the sea to be ultimately secreted in the tissues of the Mollusca, Echinodermata and Foraminif era. Through these it is again collected in a solid form , and in the long course of ages it is again lifted up above the level of the water as limestone rock, and again undergoes the same series of changes. Thus the cycle of carbonate of lime is a never- ending one from the land to the ocean, from the ocean to the land, and so it has been ever since the first stratum of limestone was formed out of the remains of the animals and plants of the sea. The rate of the accumulation of stalagmite in caverns is neces- sarily variable, since it is determined by the presence of varying currents of air. In the Ingleborough cavern a stalagmite, measured in 1830 and in 1873, is growing at the rate of 2946 in. per annum. It is obvious, therefore, that the vast antiquity of deposits containing remains of man underneath

layers of stalag mite cannot be inferred from a thickness of a few inches or even of a few feet.

The intimate relation which exists between caves and ravines renders it extremely probable that many of the latter have been originally subterranean watercourses, which have been unroofed by the degradation of the rock. In all limestone districts ravines are to be found continued in the same direction as the caves, and the process of atmospheric erosion may be seen in the fallen blocks of stone which generally are to be met with at the mouths of the caverns. In illustration of this the valley and caves of Weathercote, in Yorkshire, may be quoted, or the source of the Axe at Wookey; and the ravine formed in this way has very frequently been widened out into a valley by the action of subaerial waste, or by the, grinding of glaciers through it during the glacial stage of the Pleistocene period.

For further details as to the physical history of caverns we must refer the reader to the works quoted at the-end of this article, by E. A. Martel, the intrepid explorer of most of the large European caves, including those of Great Britain and Ireland. The history of the Glaciires or Ice-caves will be found in Browne's Ice Caves in France and Switzerland.

Classification. — The caves which have offered shelter to the mammalia are classified according to their contents, and are of various ages, ranging from the Pliocene to the present day.

(1) Those containing the Pliocene mammalia belong to that age.

(2) Those with the remains of the mammoth, woolly rhinoceros and other extinct species, or with paleolithic man (see Archaeology), are termed Pleistocene. These are sometimes called Quaternary, under the mistaken idea that "they belong to an age succeeding the Tertiary period. (3) Those which contain the remains of the domestic animals in association with the remains of man either in the Neolithic, Bronze or Iron stages of civilization are termed Prehistoric. (4) The fourth group consists of those which can be brought into relation with the historic period, and are therefore termed Historic.

The Pliocene Caves. — It is a singular fact, only to be explained by the vast denudation of the earth's surface since the Pliocene Age, that only one cave referable to that age has as yet been discovered, that at Doveholes near Buxton, Derbyshire, described

by Boyd Dawkins in 1903 {Quart. Joum. Geol, Soc). The cave consists of a large horizontal chamber and a small passage, connected with a, swallow-hole close by, and exposed in the working face of a quarry in 1901, at a depth of about 40 ft. from the surface. The locality is in the limestone plateau, 1158 ft. high, which forms the divide between the waters flowing into the Mersey on the west and the Humber on the east. Both swallow-bole and cave were comDletely blocked up with debris, and the

latter was filled with red and yellow clay, horizontally stratified and containing pebbles of sandstone from the neighbouring ridge of Axe Edge, and bones and teeth of fossil mammals, some waterworn and others without traces of transport by water. All the mammals belong to well-known species found in the Pliocene strata of East Anglia, and in Auvergne and Italy. Among them were the sabre-toothed lion (Machairodus crena- tidens), the hyena of Auvergne, the mastodon, and the southern elephant (E. meridionalis) , and rhinoceros (R. Etruscus), and Steno's horse. Most of the bones had evidently been gnawed by hyenas and accumulated in one of their dens, and had after- wards been carried by water into the chambers deep down in the rock, where they were found. Since that time the general level of the district has been lowered by denudation to an extent of more than 230 ft., and all the hyena dens destroyed with the Pliocene surface not only in this district but generally over the world... In this case a covering of limestone some 270 ft. thick, including the depth from the present surface, protected the remains from the denuding forces.

The Pleistocene Caves. — The search after ebur fossile or unicorns' horn, or in other words the fossil bones which ranked high in the materia medica of the 16th and 17th centuries, led to the discovery of the ossiferous caverns of the Harz Mountains, and of Hungary and Franconia. The famous cave of Gailenreuth in the last of these districts was explored by Goldfuss in 1810. The bones of . the hyena, lion, wolf, fox and stag, which it contained, were identified by Baron Cuvier, and some of the skulls have been proved by Busk to belong to the grizzly bear. They were as- sociated with the bones of the reindeer, horse and bison, as well as with those of the great cave bear. These discoveries were of very great interest, because they established the fact that the above animals had lived in Germany in ancient times. The first bone cave systematically explored in England was one at Oreston near Plymouth in 18 16, which proved that an extinct species of rhinoceros (R. leptorhinus) lived in that

district. Four years later the famous hyena den at Kirkdale in Yorkshire was explored by Buckland. He brought forward proof that it had been in- habited by hyenas, and that the broken and gnawed bones of the mammoth, rhinoceros, stag, bison and horse belonged to animals which had been dragged in for food. He pointed out that all these animals had lived in Yorkshire in ancient times, and that it was impossible for the carcases of the rhinoceros, hyena and mammoth to have been floated from tropical regions into the places where he found their bones. He subsequently investigated bone caves in Derbyshire, South Wales and Somerset, as well as in Germany, and published his Reliquiae Diluvianae in 1822, a work which laid the foundations of the new science of cave- hunting in this country. The well-known cave of Kent's Hole near Torquay furnished McEnery, between the years 1825 and 1 84 1, with the first flint implements discovered in intimate association with the bones of extinct animals. He recognized the fact that they proved the existence of man in Devonshire while those animals were alive, but the idea was too novel to be accepted by his contemporaries. His discoveries have since been verified by the subsequent investigations carried on by Godwin Austen, and ultimately by the committee of the British Associa- tion, which worked for several years under the guidance of Pengelly. There are four distinct strata in the cave. 1st, The surface is composed of dark earth, and contains medieval remains, Roman pottery and articles which prove that it was in use during the Iron, Bronze and Neolithic Ages. 2nd, Below this is a stalagmite floor, varying in thickness from 1 to 3 ft., and covering (3rd) the red earth, which contained bones of the hyena, lion, mammoth, rhinoceros and other animals, in associa- tion with flint implements and an engraved antler, which proved man to have been an inhabitant of the cavern during the time of its deposition. 4th, Filling the bottom of the cave is a hard breccia, with the remains of bears and flint implements, in the main ruder than those found above; in some places it was no less than 12 ft. thick. The most remarkable animal found in Kent's Hole is the sabre-toothed carnivore, Machairodus latidens of Owen. While the value of McEnery's discoveries was in dispute the

exploration of the cave of Brixham near Torquay in 1858 proved that man was coeval with the extinct mammalia, and in the

following year additional proof was offered by the implements that were found in Wookey Hole. Similar remains have been met with in the caves explored since that time in Wales, and in England as far north as Derbyshire (Creswell), proving that palaeolithic man hunted the mammoth and rhinoceros and other extinct animals over the whole of southern and middle England.

The discoveries in Kent's Hole and in the Creswell caves prove further that palaeolithic man was in two stages of civilization — the ruder or riverdrift man, with implements of the type found in the river gravels (see Archaeology; and Palaeolithic) being the older; and the more highly advanced, or the cave-man, mainly characterized by the better implements, and a singular facility in depicting animal life (as shown by the figure of a horse incised on the fragment of a bone found in the Creswell caves), being the newer. We may also conclude from the absence of palaeolithic implements from the glaciated regions in which most of these caves occur, that both riverdrift and cave-men dwelt in middle and northern Britain in the pre-glacial age, their remains being protected in the caverns from the denuding forces that removed all traces of their existence from the surface of the ground in glacial and post-glacial times. The riverdrift man is, however, proved to be post-glacial in southern and eastern England, by the occurrence of his implements in the river gravels of that age. Both these peoples inhabited southern England and the continent before and after the glacial period. The riverdrift man, whose implements occur in river deposits in middle and southern Europe, in Africa, Palestine and Hindustan, is everywhere in the same age of primitive barbarism, and has not as yet been identified with any living race. The cave-men are in a higher and more advanced stage, and led a life in Europe identical with that of the Eskimos in the Arctic regions.

The Pleistocene Caves of the European Continent. — The researches of Mortillet have proved that the same two groups of cave-dwellers occur in the caves of France, the older being represented by the Chelleen and Mousterien sections, and the newer by that of Solutre and La Madelaine. To the former belong the human remains found in the caverns of Spy and Neanderthal, which prove that the riverdrift man had " the most brutal of all known human skulls." To the latter we must assign all the caves and rock-shelters of Perigord, with the better implements, explored by Lartet and Christy in 1 863-1 864 in the valleys of the Vezere and Dordogne. These offer as vivid a picture of the life of the cave-men as that revealed of Italian manners in the 1st

century by the buried cities of Herculaneum and Pompeii. The old floors of human occupation consist of broken bones of animals killed in the chase, mingled with rude implements and weapons of bone and unpolished stone, and with charcoal and burnt stones, which indicate the position of the hearths. Flakes without number, awls, lance-heads, hammers and saws made of flint rest pUe-mUe with bone needles, sculptured reindeer antlers, arrowheads and harpoons, and bones of the reindeer, bison, horse, ibex, Saiga antelope and musk sheep. These singular accumulations of debris mark the places where the ancient hunters lived, and are merely the refuse cast aside. The reindeer formed by far the greater portion of the food, and must have lived in enormous herds at that time in the centre of France. From this, as well as from the presence of the most arctic of the herbivores, the musk sheep, we may infer the severe climate of that portion of France at that time. Besides these animals the cave bear and lion have been met with in one, and the mammoth in five localities, and their remains bear marks of cutting or scraping which showed they fell a prey to the hunters. The most remarkable remains left behind in these refuse heaps are the sculptured reindeer antlers and figures engraved on fragments of schist and on ivory. A well-defined outline of an ox stands out boldly from one piece of antler; a second represents a reindeer kneeling down in an easy attitude with his head thrown up in the air so that the antlers rest on the shoulders, and the back forms an even surface for a handle, which is too small to be grasped by an ordinary European nana;

in a third a man stands close to a horse's head, and on the other side of the same cylinder are two heads of bisons drawn with sufficient clearness to ensure recognition by any one who has seen that animal. On a fourth the natural curvature of one of the tines has been taken advantage of by the artist to engrave the head and the characteristic recurved horns of the ibex; and on a fifth horses are represented with large heads, up- right, dishevelled manes and shaggy ungroomed tails. The most striking figure is that of the mammoth engraved on a fragment of its own tusk; the peculiar spiral curvature of the tusk and the long mane, which are now not to be found in any living elephant, prove that the original was familiar to the eye of the artist, These drawings probably employed the idle hours of the hunter, and hand down to us the scenes which he witnessed in the chase. They are full of artistic feeling and are evidently drawn from life. The mammoth is engraved in its own ivory, and the reindeer and

the stag on their respective antlers. Further researchej have revealed the fact that in Auvergne and in the Pyrenees the cave-men ornamented some of their caves with incised figures and polychrome frescoes of the wild animals. Riviere has dis- covered on the walls of the grotto of La Mouthe (Dordogne) three large hunting scenes, one with bisons and horses, a second representing a primitive hut, a bison, reindeer, ibex and mammoth, and a third with a mammoth, hinds and horses. In the Pyrenees similar frescoes have been described by Cartailhac and Breuil. They are on the walls of the cavern and roof of Altamira, and on the walls of Marsoulas. The outlines have been engraved first, and afterwards filled in with colour in brown and red ochre and black oxide of manganese.

The cave-men ranged over middle Europe as far south as the Pyrenees and the Alps, and inhabited the caverns of Belgium and Germany, Hungary and Switzerland. Their remains have not as yet been met with in southern Europe. They lived by hunting and fishing, they were fire users, and fit up the darkness of their caves with stone lamps filled with fat (Altamira) . They were clad in skins sewn together with sinews of reindeer or strips of intestines. They used huts as well as caves for habitation. They had a marvellous facility for drawing animal figures. They possessed no domestic animals, nor were they acquainted with spinning or with the potter's art. We have no evidence that they buried their dead — the interments, such as those of Aurignac, Les Eyzies and Mentone, most probably belonging to a later age.

If these remains be compared with those of existing races, it will be found that the cave-men were in the same hunter stage of civilization as the Eskimos, and that they are unlike any other races of hunters. If they were not allied to the Eskimos by blood, there can be no doubt that they handed down to the latter their art and their manner of life. The bone needles, and many of the harpoons, as well as the flint spearheads, arrowheads and scrapers, are of precisely the same form as those now in use amongst the Eskimos. The artistic designs from the caves of France, Belgium and Switzerland, are identical in plan and workmanship with those of the Eskimos, with this difference only, that the hunting scenes familiar to the Palaeolithic cave-dwellers were not the same as those familiar to the inhabitants of the shores of the Arctic Ocean. Each represented the animals which he knew, and the whale, walrus and seal were unknown to the inland dwellers of Aquitaine, just as the mammoth, bison and wild horse are unknown to the Eskimos. The reindeer, which

they both knew, is represented in the same way by both. The practice of accumulating large quantities of the bones of animals round their dwelling-places, and the habit of splitting the bones for the sake of the marrow, are the same in both. The hides were prepared with the same sort of instruments, and the needles with which they were sewn together are of the same pattern. The stone lamps were used by both. In both there was the same disregard of sepulture. All these facts can hardly be mere coincidences caused by both peoples leading a savage life under similar conditions. The conclusion, therefore, seems inevitable that, so far as we have any evidence of the race to which the r' cave-dwellers belong, that evidence points only in the direction

of the Eskimos. It is to a considerable extent confirmed by a consideration of the animals found in the caves. The reindeer and musk sheep afford food to the Eskimos now in the Arctic Circle, just as they afforded it to the cave-men in Europe; and both these animals have been traced by their remains from the Pyrenees to the north-east through Europe and Asia as far as the very regions in which they now live. The mammoth and bison also have been tracked by their remains in the frozen river gravels and morasses through Siberia as far as the American side of Bering Strait. Palaeolithic man appeared in Europe with the arctic mammalia, lived in Europe with them, and in all human probability retreated to the north-east along with them.

There are refuse heaps in north-eastern Siberia containing the remains of the mammoth and woolly rhinoceros as well as the reindeer and musk sheep, which may be referred with equal justice to the cave-men or to the Eskimos.

Ancient Geography of Europe. — The remains of man and the animals described in the preceding paragraphs have been introduced into the caves either by man or the wild beasts, or by streams of water, which may or may not now occupy their ancient courses; and the fact that the same species are to be met with in the caves of France, Switzerland and Britain implies that our island formed part of the continent, and that there were no physical barriers to prevent their migration from the Alps, as far to the north-west as Ireland.

The same conclusion may be gathered from the exploration of caves in the south of Europe, which has resulted in the discovery of African species, in Gibraltar, Sicily and Malta. In the first of these the spotted hyena, the serval and Kaffre cat lie side by side with the horse, grizzly bear and slender rhinoceros (R. hptorhinus) — see Falconer's Palaeonto graphical Memoirs. To these African animals inhabiting the Iberian peninsula in the Pleistocene age, Lartet has added the African elephant and striped hyena, found in a stratum of gravel near Madrid, along with flint implements. The hippopotamus, spotted hyena and African elephant occur in the caves of Sicily, and imply that in ancient times there was a continuity of land between that spot and Africa, just as the presence of the Elephas antiquus proves the non-existence of the Straits of Messina during a portion, to say the least, of the Pleistocene age. A small species of hippo-potamus (H. Pentlandi) occurs in incredible abundance in the Sicilian caves. It has also been found in those of Malta along with an extinct pigmy elephant species (E. Melitensis). It has also been discovered in Candia and in the Peloponnese. For these animals to have found their way to these regions, a con- tinuity of land is necessary. The view advanced by Dr Falconer and Admiral Spratt, that Europe was formerly connected with Africa by a bridge of land extending southwards from Sicily, is fully borne out by these considerations. The present physical geography of the Mediterranean has been produced by a depres- sion of land to the amount of about 400 fathoms, by which the Sicilo-African and Ibero-African barriers have been submerged, and Crete and Malta separated from the South-European continent. It is extremely probable that this submergence took place at the same time that the adjoining sea-bottom was elevated to about the same amount so as to constitute that region now known as the Sahara.

Pleistocene Caves of the Americas and Australia. — The Pleisto-cene caverns of the Euro- Asiatic continent contain the pro-genitors of the animals now alive in some parts of the Old World, the extinct forms being closely allied to those now living in the same geographical provinces. Those of Brazil and of Penn-sylvania present us with animals whose nearest analogues are to be found in North and South America, such as sloths, arma- dillos and agoutis. Those, again, of Australia present us with marsupials (metatheria) only, allied to, or identical with, those of that most ancient continent. The extinct forms in each case are mainly those of the larger animals, which, from their large size, and low fecundity, would be specially liable to be beaten in the

battle for life by their smaller and more fertile contem- poraries, and less likely to survive those changes in their environ- ment which have undoubtedly taken place in the long lapse of v. 19

ages. It is, therefore, certain that the mammalian life in the Old, New and Australian worlds, was as well marked out into geographical provinces in the Pleistocene age as at the present time, and that it has been continuous in these areas from that remote time to the present day.

Prehistoric Caves of Neolithic Age in Europe. — The prehistoric caves are distinguished from Pleistocene by their containing the remains of domestic animals, and by the wild animals to which they have afforded shelter belonging to living species. They are divisible into three groups according to the traces of man which occur in them — into the Neolithic, Bronze and Iron Ages.

The Neolithic caves are widely spread throughout Europe, and have been used as the habitations and tombs of the early races who invaded Europe from the East with their flocks and herds. The first of these systematically explored was at Perthi Chwareu, near the village of Llandegla, Denbighshire, in 1869. In the following years five others were discovered close by, as well as a second group in the neighbourhood of Cefn on the banks of the Elwy. They contained polished celts, flint flakes, rude pottery and human skeletons, along with the broken bones of the pig, dog, horse, Celtic shorthorn and goat. The remains of the wild animals belong to the wolf, fox, badger, bear, wild boar, stag, roe, hare and rabbit. Most of the bones were broken or cut, and the whole group was obviously an accumulation which resulted from these caves having been used as dwellings. They had subsequently been used for burial. The human skeletons in them were of all ages, from infancy to old age; and the inter- ments had been successive until each became filled. The bodies were buried in the contracted posture which is so characteristic of Neolithic interments generally. The men to whom these skeletons belonged were a short race, the tallest being about 5 ft. 6 in., and the shortest 4 ft. 10 in.; their skulls are ortho- gnathic, or not presenting jaws advancing beyond a vertical line dropped from the forehead, in shape long or oval, and of fair average capacity. The face was oval, and the cheek bones were not prominent. Some of the individuals were characterized by a peculiar flattening of the shinbone (platycnemism), which probably stood in relation to the free action of the foot that was not hampered by the use of a rigid sole or sandal. This, however, cannot be

looked upon as a race character, or.as a tendency towards a simian type of leg. These Neolithic cave-dwellers have been proved to be identical in physique with the builders of the cairns and tumuli which lie scattered over the face of Great Britain and Ireland. (See Thurnam, Crania Britannica.) They have also been met with abundantly in France. In the Caverne de 1'Homme Mort, for example, in the department of Lozere, explored in 1871, the association of remains was of precisely the same nature as those mentioned above, and the human skeletons were of the same small type. The same class of remains has also been discovered in Gibraltar, in the caves of Windmill Hill, and some others. The human remains examined "by Busk are of precisely the same type as those of Denbighshire. In the work of Don Manuel Gongora J. Martinez (Anliguedades prehistoricas de Andalusia, 1868), several interments are described in the cave of Murcielagos, which penetrates the limestone out of which the grand scenery of the southern Sierra Nevada has been to a great extent carved. In one place a group of three skeletons was met with, one of which was adorned with a plain coronet of gold, and clad in a tunic made of esparto grass finely plaited, so as to form a pattern like that on some of the gold ornaments in Etruscan tombs. In a second spot farther within, twelve skeletons formed a semicircle round one covered with a tunic of skin, and wearing a necklace of esparto grass, ear-rings of black stone, and ornaments of shell and wild boar tusk. There were other articles of plaited esparto grass, such as baskets and sandals. There were also flint flakes, polished-stone axes, implements of bone and wood, together with pottery of the same type as that from Gibraltar. The same class of remains have been discovered in the Woman's Cave, near Alhama de Granada. From the physical identity of the human remains in all these cases it maybe inferred that in the Neolithic Age a long-headed,

small race inhabited the Iberian peninsula, extending through France, as far north as Britain, and to the north-west as far as Ireland — a race considered by Professor Busk " to be at the present day represented by at any rate a part of the population now inhabiting the Basque provinces." This identification of the ancient Neolithic cave-dwellers with the modern Basque-

speaking inhabitant of the western Pyrenees is corroborated by the elaborate researches of Broca, Virchow and Thurnam on modern Basque skulls. It may, therefore, be concluded that in the Neolithic Age an Iberian population occupied the whole of the area mentioned above, inhabiting caves and burying their dead in caves and chambered tombs, and possessed of the same habits of life. The remains of the same small, oval- featured, long-headed race have been found in Belgium in the cave of Chauvaux, and they have been described by Sergi in southern Europe under the name of the Mediterranean race.

There is no evidence that any other race except the Iberic buried their dead in the caves of Britain in the Neolithic Age. In Belgium, however, the exploration of the cave of Sclaigneaux by Soreil proves that broad-headed men of the type defined by Huxley and Thurnam as brachycephalic, and characterized by high cheek-bones, projecting muscles and large stature, the average height being 5 ft. 8-4 in. (Thurnam) , inhabited and buried their dead in the caves of that region. In France they occur in the sepulchral cave of Orrouy (Oise) in association with those of the Iberic type. They have also been met with in Gibraltar. This type is undistinguishable from the Celtic (Goidelic) or Gaulish, found so abundantly in the chambered tombs of the Neolithic Age in France. Both these ancient races are repre- sented at the present day by the Basques and Aquitanians of France and Spain, and by the Celts or Gauls of France, Britain and the Mediterranean border of Spain, their relative antiquity being proved by an appeal to their history and geographical distribution. For just as the earliest records show that the Iberic power ex- tended as far north as the Loire, and as far east as the Rhone, so we have proof of the gradual retrocession of the Iberic frontier southwards, under the attacks of the successive Celtic hordes, until ultimately we find the latter in possession of a considerable part of southern Spain, forming by their union with the con- quered the powerful nation of Celt-Iberi. The Iberians were in possession of the continent before they were dispossessed by the Goidels,and at a later time by the Brythons. They are recognized by Tacitus in Britain in the Silures of Wales; and they are still to be seen in the small, dark, lithe inhabitants of North Wales. The discovery of the characteristic skulls of both these races in the same family vault in the cave of Gop near Prestatyn, Flintshire, proves that the two races were mingled together in Britain as far back as the Bronze Age.

From the present distribution of this non-Aryan race it is obvious

that they were gradually pushed back westward by the advance of tribes coming from the East, and following those routes which were subsequently taken by the Low and High Germans.

The exploration of the Grotta dei Colombi, in the island of Palmaria, overlooking the Gulf of Spezzia, in 1873, proves that the stories scattered through the classical writers, that the caves on the Mediterranean shores were inhabited by cannibals, are not altogether without foundation. In it broken and cut bones of children and young adults were found along with those of the goat, hog, fox, wolf, wild-cat, flint flakes, bone implements and shells perforated for suspension.

Prehistoric Caves of Bronze and Iron Ages. — The extreme rarity of articles of bronze in the European caves implies that they were rarely used by the Bronze folk for habitation or burial. Bronze weapons mingled with gold ornaments have, however, been discovered in the Heatheryburn cave near Stanhope, Dur- ham, as well as in those of Kirkhead in Cartmell, in Thor's cave in Staffordshire, and the Cat Hole in Gower in Glamorganshire. In the Iberian peninsula the cave of Cesareda, explored by Signor Delgado, in the valley of the Tagus, contained bronze articles, associated with broken and cut human bones, as well as those of domestic animals, rendering it probable that cannibalism was practised in early times in that region. Busk believes, however,

that the facts are insufficient to support the charge of cannibalism against the ancient Portuguese.

Caves containing articles of iron, and therefore belonging to that division of the prehistoric age, are so unimportant that they do not deserve notice in this place. As man increased in civiliza- tion he* preferred to live in houses of his own building, and he no longer buried his dead in the natural sepulchres provided for him in the rock.

Prehistoric caves have been rarely explored in extra- European areas. Among those which abound in Palestine, one in Mount Lebanon, examined by Canon Tristram, contained flint imple- ments along with charcoal and broken bones and teeth, some of which may be referred to a small ox, undistinguishable from the small short-horn, Bos longifrons. In North America the remains found by F. W. Putnam in the caves of Kentucky, consisting of moccasins, rudely-plaited cloth, and other articles, may be referred to the same division.

Historic Caves in Britain. — The historic caves have only attracted notice in fairly recent years, and in Britain alone, principally through the labours of the Settle Cave Committee from the year 1869 to the present day. To them is due the exploration of the Victoria cave, which had been discovered and partially investigated as early as the year 1838. It consists of three large ill-defined chambers opening on the face of the cliff, 1450 ft. above the sea, and filled with debris very nearly up to the roof. It presented three distinct eras of occupation — one by hyenas, which dragged into it rhinoceroses, bisons, mammoths, horses, reindeer and bears. This was defined from the next occupation, which is probably of the Neolithic Age, by a layer of grey clay, on the surface of which rested a bone harpoon and a few flint flakes and bones. Then after an interval of debris at the entrance was a layer of charcoal, broken bones, fragments of old hearths, and numerous instruments of savage life associated with broken pottery, Roman coins, and the rude British imita- tions of them, various articles of iron, and elaborate personal ornaments, which implied a considerable development of the arts. The evidence of the coins stamps the date of the occu- pation of the cave to be between the first half of the 5th century and the English conquest. Some of the brooches present a peculiar flamboyant and spiral pattern in relief, of the same character as the art of some of the illuminated manuscripts, as for example one of the Anglo-Saxon gospels at Stockholm, and of the gospels of St Columban in Trinity College, Dublin. It is mostly allied to that work which is termed by Franks late Celtic. From its localization in Britain and Ireland, it seems to be probable that it is of Celtic derivation; and if this view be accepted, there is nothing at all extraordinary in its being recognized in the illuminated Irish gospels. Ireland, in the 6th and 7th centuries, was the great centre of art, civilization and literature; and it is only reasonable to suppose that there would be intercourse between the Irish Christians and those of the west of Britain, during the time that the Romano-Celts, or Brit-Welsh, were being slowly pushed westwards by the heathen English invader. Proof of such an intercourse we find in the brief notice of the Annates Cam briae, in which Gildas, the Brit- Welsh historian, is stated to have sailed over to Ireland in the year a.d. 565. It is by no means improbable that about this time there was a Brit- Welsh migration into Ireland, as well as into Brittany. Objects with these designs found in Germany are probably directly or indirectly due to the Irish missionaries, who spread Christianity through those regions. The early Christian art in Ireland grew out

of the late Celtic, and is to a great extent free from the in- fluence of Rome, which is stamped on the Brit- Welsh art of the same age in this country.

Several other ornaments with enamel deserve especial notice. The enamel, composed of red, blue and yellow, has been inserted into the hollows in the bronze, and then heated so as to form a close union with it. They are of the same design as those which have been met with in late Roman tumuli in this country, and in places which are mainly in the north. They all belong to a class named late Celtic by Franks, and are considered by him to be of British manufacture. This view is supported by the only

reference to the art of enamelling furnished by the classical writers. Philostratus, a Greek sophist in the court of Julia Domna, the wife of the emperor Severus, writes, ” It is said that the barbarians living in the ocean pour these colours (those of horse-trappings) on heated bronze, and . that these adhere, grow as hard as stone, and preserve the designs that are made in them.” It is worthy of remark that, since the emperor Severus built the wall which bears his name, marched in person against the Caledonians, and died at York, the account of the enamels may have reached Philostratus from the very district in which the Victoria Cave is situated.

Associated with these were bronze ornaments inlaid with silver, and miscellaneous iron articles, among which was a Roman key. Remains of this kind have been met with in the Albert and Kelko caves in the neighbourhood, in that of Dowker- bottom near Arncliffe, in that of Kirkhead on the northern shore of Morecambe Bay, in Poole’s Cavern near Buxton, and in Thor’s Cave near Ashbourne, and over a wide area ranging from York-shire and the Lake district southwards into Somerset and Devon.

List of Principal Animals and Objects found in Brit-Welsh Strata in Caves.

Animals.

Domestic—

Canis familiaris. Dog .

Sus scrofa. Pig

Equus caballus. Horse . Bos longifrons. Celtic short-horn Capra hircus. Goat Wild—

Canis vulpes. Fox .... Meles taxus. Badger Cervus elaphus. Stag . Cervus capreolus. Roe .

Roman coins, or imitations Enamelled ornaments, in bronze Bronze ornaments, inlaid with silver .....

Iron articles

Samian ware

Black ware

Bone spoon fibulae . . Bone combs . . . .

o o 0-°

ui£

2 >

&

X

It is obvious in all these cases that men accustomed to luxury and refinement were compelled, by the pressure of some great calamity, to flee for refuge to caves with whatever they could transport thither of their property. The number of spindle-whorls and personal ornaments imply that they were accompanied by their families. We may also infer that they were cut off from the civilization to which they had been accustomed, because in some cases they extemporized spindle-whorls out of fragments of Samian ware, instead of using those which were expressly manufactured for the purpose. Why the Caves were inhabited is satisfactorily explained by an appeal to contemporary history. In the pages of Gildas, in the Anglo-Saxon Chronicle, and in the Annates Cambriae, we have a graphic picture of that long war of invasion by which the inhabitants of the old Roman province of Britannia were driven back by the Jutes, Angles and Saxons, who crossed over with their families and household stuff: Slowly, and in the chances of a war which

extended through three centuries, they were gradually pushed back into Cumberland, Wales and West Somerset, Devon and Cornwall. While this war was going on the coinage became debased and Roman coins afforded the patterns for the small bronze minimi, which are to be met with equally in these caves and in the ruins of Roman cities. As the tide of war rolled to the west, the English tongue and, until towards the close of the struggle, the worship of Thor and Odin supplanted the British tongue and the Christian faith, and a rude barbarism replaced what was left of the Roman civilization in the island. It is to this period that relics of this kind in the caves must be assigned. They are traces of the anarchy of those times, and complete the

picture of the desolation of Britain, revealed by the ashes of the cities and villas that were burnt by the invader. They prove that the vivid account given by Gildas of the straits to which his countrymen were reduced was literally true.

The shrines of Zeus in the Idaean and Dictaean caves have been explored by Halbher and Orsi {Antichita dell' anlro de Zeus Ideo) and by Arthur Evans and Hogarth {Journal of Hellenic Studies). These discoveries prove that the cult of Zeus began among the Mycenaean peoples some 2000 years B.C. according to Evans, and was practised far down into the later Greek times. They show that the Greeks are indebted to the Mycenaean peoples not only for their art, but for the chief of their divinities.

Authorities. — 1. Britain: Boyd Dawkins, Cave-hunting (1874); Early Man (1880); Mattel, Irlande et cavernes anglaises (1897); Buckland, Reliquiae Diluvianae (1821); Brit. Assoc. Reports (1860- 1875); Journ. Anthrop. Inst. (1870-1876); Quart. Geol. Journ. (1860-ˆ1875); Pengelly, Trans. Devonshire Association. 2. The European Continent: Martel, Les AMmes (1894)* Cartailhac and Breuil, L' Anthropologic, xv., xvi.; Lartet and Christy, Reliquiae A'quitanicae; Internal. Congress of Prehistoric Archaeology; Marcel de Serres, Les Ossemens fossiles de Lunel Viel; Dupont, V Homme pendant les dges de la pierre dans les environs de Dinant-sur-Meuse; Schmerling, Recherches sur les ossemens fossiles decouverts dans les cavernes de Liege; Merk, Excavations at Kesserloch, transl. J. E. Lee (1876). For the chief American caves, see Luray Cavern, Mammoth Cave, Wyandotte Cave, Colossal Cavern, Jacob's Cavern. (W. B. D.)

CAVEA, the Latin name given to the subterranean cells in which the wild beasts were confined prior to the combats in the Roman

arena. The term is ; sometimes applied to the amphi- theatre (q.v.) itself.

CAVEAT (Latin for ” let him beware,” from cavere), in law, a notice given by the party interested (caveator) to the proper officer of a court of justice to prevent the taking of a certain step without warning. It is entered in connexion with dealings in land registered in the land registry, with the grant of marriage licences, to prevent the issuing of a lunacy commission, to stay the probate of a will, letters of administration, &c. Caveat is also a term used in United States patent law (see Patents).

Caveat emptor (” let the buyer beware “) is a maxim which implies that the responsibility for making a bad bargain over a purchase rests On the purchaser. In an ordinary contract for the sale of goods, there is no implied warranty or condition as to the quality or fitness for any particular purpose of the goods supplied, with certain exceptions, and, therefore, the buyer takes at his own risk. The maxim does not apply (a) where the buyer, expressly or by implication, makes known to the seller the particular purpose for which the goods are required, so as to show that the buyer relies on the seller’s skill or judgment, and that the goods are of a description which it is in the course of the seller’s business to supply; (b) where goods are bought by description from a seller who deals in goods of that description, for there is an implied condition that the goods are of merchantable quality, though if the buyer has actually examined the goods, there is no implied condition as regards defects which the examination ought to have revealed; (e) where the usage of trade annexes an implied warranty or condition to the goods as to their quality or fitness for a particular purpose. The maxim of caveat emptor is said to owe its origin to the fact that in early times sales of goods took place principally in market overt. (See further Sale of Goods.)

CAVEDONE, JACOPO (1577-1660), Italian painter, born at Sassuolo in the Modenese, was educated in the school of the Caracci, and under them painted in the churches of Bologna. His’ principal works are the ” Adoration of the Magi,” the ” Four Doctors,” and the ” Last Supper “; and more especially the “Virgin and Child in Glory,” with San Petronio and other saints, painted in 1614, and now in the Bolognese Academy. Cavedone became an assistant to Guido Reni in Rome; his art was generally of a subdued undemonstrative character, with rich Titianesque colouring. In his declining years his energies broke down after

his wife had been accused of witchcraft, and after the death of a cherished son. He died in extreme poverty, in a stable at Bologna.
:

CAVENDISH, GEORGE (1500-1562?), English writer, the biographer of Cardinal Wolsey, was the elder son of Thomas

Cavendish, clerk of the pipe in the exchequer, and his wife, Alice Smith of Padbrook Hall. He was probably born at his father's manor of Cavendish, in Suffolk. Later the family resided in London, in the parish of St Alban's, Wood Street, where Thomas Cavendish died in 1524. Shortly after this event George married Margery Kemp, of Spains Hall, an heiress, and the niece of Sir Thomas More. About 1527 he entered the service of Cardinal Wolsey as gentleman-usher, and for the next three years he was divided from his wife, children and estates, in the closest personal attendance on the great man. Cavendish was wholly devoted to Wolsey's interests, and also he saw in this appointment an opportunity to gratify his master-passion, a craving " to see and be acquainted with strangers, in especial with men in honour and authority." He was faithful to his master in disgrace, and showed the courage of the " loyal servitor." It is plain that he enjoyed Wolsey's closest confidence to the end, for after the cardinal's death George Cavendish was called before the privy council and closely examined as to Wolsey's latest acts and words. He gave his evidence so clearly and with so much natural dignity, that he won the applause of the hostile council, and the praise of being " a just and diligent servant." He was not allowed to suffer in pocket by his fidelity to his master, but retired, as it would seem, a wealthy man to his estate of Glemsford, in West Suffolk, in 1530. He was only thirty years of age, but his appetite for being acquainted with strange acts and persons was apparently sated, for we do not hear of his engaging in any more adventures. It is not to be doubted that Cavendish had taken down notes of Wolsey's conversation and movements, for many years passed before his biography was composed. At length, in 1557, he wrote it out in its final form. It was not, however, possible to publish it in the author's lifetime, but it was widely circulated in MS. Evidently one of these MSS. fell into Shakespeare's hands, for that poet made use of it in his King Henry VIII., although it is excessive to say, as Singer has done,

that Shakespeare " merely put Cavendish's language into verse." The book was first printed in 1641, in a garbled text, and under the title of The Negotiations of Thomas Wolsey. The genuine text, from contemporary MSS., was given to the world in 1810, and more fully in 1815. Until that time it was believed that the book was the composition of George Cavendish's younger brother William, the founder of Chatsworth, who also was attached to Wolsey. Joseph Hunter proved this to be impossible, and definitely asserted the claim of George. The latter is believed to have died at Glemsford in or about 1562. The intrinsic value of Cavendish's Life of Cardinal Wolsey has long been perceived, for it is the sole authentic record of a multi- tude of events highly important in a particularly interesting section of the history of England. Its importance as a product of biographical literature was first emphasized by Bishop Creighton, who insisted over and over again on the claim of Cavendish to be recognized as the earliest of the great English biographers and an individual writer of particular charm and originality. He writes with simplicity and with a certain vivid picturesqueness, rarely yielding to the rhetorical impulses which governed the ordinary prose of his age. (E. G.)

CAVENDISH, HENRY (1731-1810), English chemist and physicist, elder son of Lord Charles Cavendish, brother of the 3rd duke of Devonshire, and Lady Anne Grey, daughter of the duke of Kent, was born at Nice in October 1731. He was sent to school at Hackney in 1742, and in 1749 entered Peter- house, Cambridge, which he left in 1753, without taking a degree. Until he was about forty he seems to have enjoyed a very mode- rate allowance from his father, but in the latter part of his life he was left a fortune which made him one of the richest men of his time. He lived principally at Clapham Common, but he had also a town-house in Bloomsbury, while his library was in a house in Dean Street, Soho; and there he used to attend on appointed days to lend the books to men who were properly vouched for. So methodical was he that he never took down a volume for his own use without entering it in the loan-book. He was a regular attendant at the meetings of the Royal Society, of which he became a fellow in 1760, and he dined every Thursday with the

club composed of its members. Otherwise he had little inter- course with society; indeed, his chief object in life seems to have been to avoid the attention of his fellows. With his relatives he had little intercourse, and even Lord George Cavendish, whom he made his principal heir, he saw only for a few minutes once a

year. His dinner was ordered daily by a note placed on the hall-table, and his women servants were instructed to keep out of his sight on pain of dismissal. In person he was tall and rather thin; his dress was old-fashioned and singularly uniform, and was inclined to be shabby about the times when the precisely arranged visits of his tailor were due. He had a slight hesitation in his speech, and his air of timidity and reserve was almost ludicrous. He was never married. He died at Clapham on the 24th of February 1810, leaving funded property worth £700,000, and a landed estate of £8000 a year, together with canal and other property, and £50,000 at his bankers.

Cavendish's scientific work is distinguished for the wideness of its range and for its extraordinary exactness and accuracy. The papers he himself published form an incomplete record of his researches, for many of the results he obtained only became generally known years after his death; yet in spite of the absence of anything approaching self-advertisement he acquired a very high reputation within his own country and abroad, recognized by the Institute of France in 1803 when it chose him as one of its eight foreign associates. Arsenic formed the subject of his first recorded investigation, on which he was engaged at least as early as 1764, and in 1766 he began those communications to the Royal Society on the chemistry ol gases, which are among his chief titles to fame. The first {Phil. Trans., 1766) consists of "Three papers containing experiments on Factitious Airs," dealing mostly with " inflammable air " (hydrogen), which he was the first to recognize as a distinct substance, and " fixed air " (carbon dioxide). He determined the specific gravity of these gases with reference to common air, investigated the extent to which they are absorbed by various liquids, and noted that common air containing one part in nine by volume of fixed air is no longer able to support combustion, and that the air produced by fermentation and putrefaction has properties identical with those of fixed air obtained from marble. In the following year he published a paper on the analysis of one of the London pump-waters (from Rathbone Place, Oxford Street), which is closely connected with the memoirs just mentioned, since it shows that the calcareous matter in that water is held in solution by the " fixed air " present and can be precipitated by lime. Electrical studies seem next to have engaged his attention, and in 1771 and 1772 he read to the Royal Society his " Attempt to explain some of the principal phenomena of electricity by an elastic fluid," which was followed in 1775 by an " Attempt to imitate the effects

of the Torpedo (a fish allied to the ray)" {Phil. Trans., 1776). But these two memoirs contain only a part of the electrical researches he carried out between 1771 and 1781, and many more were found aftei his death in a number of sealed packets of papers. The contents of these for a long time remained unknown, but ultimately by permission of the duke of Devonshire, to whom they belonged, they were edited by James Clerk Maxwell and published in 1879 by the Cambridge University Press as the Electrical Researches of the Hon. Henry Cavendish. About 1777 or 1778 he resumed his pneumatic inquiries, though he published nothing on the subject till 1783. In that year he described a new eudiometer to the Royal Society and detailed observations he had made to determine whether or not the atmosphere is constant in composition; after testing the air on nearly 6d different days in 1781 he could find in the proportion of oxygen no difference of which he could be sure, nor could he detect any sensible variation at different places. Two papers on " Experi- ments with Airs," printed in the Phil. Trans, for 1784 and 1785, contain his great discoveries of the compound nature of water and the composition of nitric acid. Starting from an experiment, narrated by Priestley, in which John Warltire fired a mixture of common air and hydrogen by electricity, with the result that there was a diminution of volume and a deposition of moisture

Cavendish burnt about two parts of hydrogen with five of common air, and noticed that almost all the hydrogen and about one-fifth of the common air lost their elasticity and were con- densed into a dew which lined the inside of the vessel employed. This dew he judged to be pure water. In another experiment he fired, by the electric spark, a mixture of hydrogen and oxygen (dephlogisticated air), and found that the resulting water contained nitric acid, which he argued must be due to the nitrogen present as an impurity in the oxygen (" phlogisticated air with which it [the dephlogisticated air] is debased")- In the 1785 paper he proved the correctness of this supposition by showing that when electric sparks are passed through common air there is a shrinkage of volume owing to the nitrogen uniting with the oxygen to form nitric acid. Further, remarking that little was known of the phlogisticated part of our atmosphere, and thinking it might fairly be doubted " whether there are not in reality many

different substances confounded together by us under the name of phlogisticated air," he made an experiment to determine whether the whole of a given portion of nitrogen (phlogisticated air) of the atmosphere could be reduced to nitric acid. He found that a small fraction, not more than rˆth part, resisted the change, and in this residue he doubtless had a sample of the inert gas argon which was only recognized as a distinct entity more than a hundred years later. His last chemical paper, published in 1 788, on the " Conversion of a mixture of dephlogisti- cated and phlogisticated air into nitrous acid by the electric spark," describes measures he took to authenticate the truth of the experiment described in the 1785 paper, which had " since been tried by persons of distinguished ability in such pursuits without success." It may be noted here that, while Cavendish adhered to the phlogistic doctrine, he did not hold it with any- thing like the tenacity that characterized Priestley; thus, in his 1784 paper on " Experiments on Air," he remarks that not only the experiments he is describing, but also " most other pheno- mena of nature seem explicable as well, or nearly as well," upon the Lavoisierian view as upon the commonly believed principle of phlogiston, and he goes on to give an explanation in terms of the antiphlogistic hypothesis.

Early in his career Cavendish took up the study of heat, and had he promptly published his results he might have anticipated Joseph Black as the discoverer of latent heat and of specific heat. But he made no reference to his work till 1783, when he presented to the Royal Society some " Observations on Mr Hutchins's experiments for determining the degree of cold at which quicksilver freezes." This paper, with others published in 1786 and 1788, is concerned with the phenomena attending the freezing of various substances, and is noteworthy because in it he expresses doubt of the supposition that " the heat of bodies is owing to their containing more or less of a substance called the matter of heat," and inclines to Newton's opinion that it " consists in the internal motion of the particles of bodies." His " Account of the Meteorological Apparatus used at the Royal Society's House " (Phil. Trans., 1776) contains remarks on the precautions necessary in making and using thermometers, a subject which is continued in the following year in a report signed by him and six others.

Cavendish's last great achievement was his famous series of experiments to determine the density of the earth (Phil. Trans., 1798). The apparatus he employed was devised by the Rev. John

Michell, though he had the most important parts recon- structed to his own designs; it depended on measuring the attraction exercised on a horizontal bar, suspended by a vertical wire and bearing a small lead ball at each end, by two large masses of lead. (See Gravitation.) The figure he gives for the specific gravity of the earth is 5-48, water being 1, but in fact the mean of the 29 results he records works out at 5-448. Other publications of his later years dealt with the height of an aurora seen in 1784 (Phil. Trans., 1790), the civil year of the Hindus (Id. 1792), and an improved method of graduating astronomical instruments (Id. 1809). Cavendish also had a taste for geology, and made several tours in England for the purpose of gratifying it.

A life by George Wilson (1818-1859), printed for the Cavendish Soeiety in 1851, contains an account of his writings, both published and unpublished, together with a critical inquiry into the claims of all the alleged discoverers of the composition of water. Some of his instruments are preserved in the Royal Institution, London, and his name is commemorated in the Cavendish Physical Laboratory at Cambridge, which was built by his kinsman the 7th duke of Devon- shire.

CAVENDISH [CandishI, THOMAS (i555?-i592), the third circumnavigator of the globe, was born at Trimley St Martin, Suffolk. On quitting Corpus Christi College, Cambridge (without a degree), he almost ruined himself by his. extravagance as a courtier. To repair his fortune he turned to maritime and colonial enterprise, and in 1585 accompanied Sir Richard Grenville to America. Soon returning to England, he undertook an elaborate imitation of Drake's great voyage. On the 21st of July 1586, he sailed from Plymouth with 123 men in three vessels, only one of which (the " Desire," of 140 tons) came home. By way of Sierra Leone, the Cape Verde Islands and C. Frio in Brazil, he coasted down to Patagonia (where he discovered " Port Desire," his only important contribution to knowledge), and passing through Magellan's Straits, fell upon the Spanish settlements and shipping on the west coast of South and Central America and of Mexico. Among his prizes were nineteen vessels of worth, and especially the treasure-galleon, the " Great St Anne," which he captured off Cape St Lucas, the southern extremity of California (November 14, 1587). After this success he struck across the Pacific for home; touched at the Ladrones, Philippines, Moluccas and Java; rounded the Cape of Good Hope; and arrived again at Plymouth (September 9- 10, 1588), having circumnavigated the globe in two years and fifty days. It is said that his sailors were clothed in

silk, his sails were damask, and his top-mast covered with cloth of gold. Yet by 1591 he was again in difficulties, and planned a fresh American and Pacific venture. John Davis (q.v .) accompanied him, bu*t the voyage (undertaken with five vessels) was an utter failure, much of the fault lying with Cavendish himself, who falsely accused Davis, with his last breath, of deserting him (May 20, 1592). He died and was buried at sea, on the way home, in the summer of 1592.

See Hakluyt's Principal Navigations, (a) edition of 1589, p. 809 (N. H.'s narrative of the voyage of 1586-1588) ; (b) edition of 1599- 1600, vol. iii. pp. 803-825 (Francis Pratty's narrative of the same); (c) edition of 1599-1600, vol. iii. pp. 251-253 (on the venture of 1585); (d) edition of 1599-1600, vol. iii. pp. 845-852 (John Lane's narrative of the last voyage, of I 591-1592) ; also Stationers' Registers (Arber), vol. ii. pp. 505-509; the Molyneux Globe of 1592, in the library of the Middle Temple, London, and the Ballads in Biog. Brit., vol. i. p. 1 196.

CAVENDISH, SIR WILLIAM (c. is°5-i557), founder of the English noble house of Cavendish, was the younger brother of George Cavendish (q.v.). His father, Thomas, was a descendant of Sir John Cavendish, the judge, who in 1381 was murdered by Jack Straw's insurgent peasants at Bury St Edmunds. Of William's education nothing seems known, but in 1530 he was appointed one of the commissioners for visiting monasteries; he worked directly under Thomas Cromwell, whom he calls " master " and to whom many of his extant letters are addressed. In 1 54 1 he was auditor of the court of augmentations, in 1546 treasurer of the king's chamber, and was knighted and sworn of trie privy council. Under Edward VI. and Mary he continued in favour at court; during the latter's reign he partially conformed, but on the occasion of the war with France he with other Derbyshire gentlemen refused the loan of £100 demanded by the queen. He died in 1557. Cavendish acquired large properties from the spoils of the monasteries, but in accordance with the wish of his third wife Elizabeth he sold them to purchase land in Derbyshire. This wife was the celebrated " building Bess of Hardwick," daughter of John Hardwicke, of Hardwicke, Derby- shire ; she completed the original building of Chatsworth House — begun in 1553 by her husband, — of which nothing now remains. Her fourth husband was George Talbot, 6th earl of Shrewsbury. By her Cavendish had six children; an elder son who died without issue; William, who in 1618 was created earl of Devon- shire; Charles, whose son William became 1st duke of Newcastle;

Frances, who married Sir Henry Pierpont, and was the ancestress of the dukes of Kingston; Elizabeth, who married Charles Stuart, earl of Lennox, and was the mother of Arabella Stuart; and Mary, who married Gilbert Talbot, 7th earl of Shrewsbury.

CAVETTO (Ital. diminutive of cavo, hollow), in architec- ture, the term given to a hollow concave moulding sometimes employed in the place of the cymatium of a cornice, as in that of the Doric order of the theatre of Marcellus. It forms the crowning feature of the Egyptian temples, and took the place of the cymatium in many of the Etruscan temples.

CAVIARE, or Caviar, the roe of various species of Acipehser or sturgeon (q.v.), prepared, in several qualities, as an article of food. The word is common to most European languages and supposed to be of Turk or Tatar origin, but the Turk word khavyah is probably derived from the Ital. caviale; the word does not appear in Russian. The best caviare, which can only be made in winter and is difficult to preserve, is the loosely granu- lated, almost liquid, kind, known in Russia as ikra. It is prepared by beating the ovaries and straining through a sieve to clear the eggs of the membranes, fibres and fatty matter; it is then salted with from 4-6 % of salt. The difficulty of preparation and of transport has made it a table delicacy in western Europe, where it has been known since the 16th century, as is evidenced by Hamlet's " His play ... pleased not the million, 'twas caviare to the general." It is eaten either as an hors d'ceuvre, particularly in Russia and northern Europe with kummel or other liqueurs, or as a savoury, or as a flavouring to other dishes. The coarser quality, in Russia known as pdjusnaya (from pajus, the adherent skin of the ovaries), is more strongly salted in brine and is pressed into a more solid form than the ikra; it is then packed in small barrels or hermetically-sealed tins. This forms a staple article of food in Russia and eastern Europe. Though the best forms of caviare are still made in Russia, and the greater quantity of the coarser kinds are exported from Astrakhan, the centre of the trade, larger amounts are made each year for export in America and also in Germany, Norway and Sweden. The roe of tunny and mullet, pickled in brine and vinegar, is used, under the name of " Botargo," along the Mediterranean littoral and in the Levant.

CAVITE, a fortified seaport, the capital of the province of Cavite, Luzon, Philippine Islands, and the seat bf the principal Asiatic naval station of the United States, on a forked tongue of land in Manila Bay, 8 m. S. of the city of Manila. Pop. (1903) 4494; with the barrios of San Roque and Caridad (on the main peninsula) , which are under the municipal government of Cavite (15,630). Cavite is the terminus of a railway which follows the shore of the bay from Manila. The northern part of the town, Sangley Point (one of the two forks of the main peninsula), is the principal coaling station of the U.S. fleet in Asiatic waters^ The naval station proper and the old town of Cavite are on the south fork of the peninsula. Cavite's buildings are mostly of stone, with upper storeys of wood; its streets are narrow and crooked. It has five churches (one of these is an independent Filipino church), and is the seat of a provincial high school. Cavite has long been the principal naval base of the Philippine Islands, and one of the four Spanish penitentiaries in the Islands was here. During the 19th century Cavite was the centre of political disturb- ances in the Philippines; in 1896 on the parade ground thirteen political prisoners were executed, and to their memory a monu- ment was erected in 1906 at the head of the isthmus connecting with the main peninsula. The town was nearly destroyed by an earthquake in 1880. It was taken from the Spanish by an American squadron under Commodore GeorgeDeweyinMayi898.

CAVOUR, CAMILLO BENSO, Count (1810-1861), Italian statesman, was born at Turin on the 1st of August 1810. The Bensos, who belonged to the old Piedmontese feudal aristocracy, were a very ancient house, said, to be descended from a Saxon warrior who settled at Santena in the 12 th century and married a Piedmontese heiress; Camillo's father, the marquis Michele, married a noble Genevese lady, and both he and his wife held offices in the household of Prince Borghese, the governor of Piedmont under Napoleon, and husband of the lafter's sister, Pauline Bonaparte. Being a younger son (his brother Gustavo

was the eldest) Cavour was destined for the army, and when ten years old he entered the military academy at Turin. On leaving the college at the age of sixteen he was first of his class, and received a commission in the engineers. He spent the next five years in the army, residing at Ventimiglia, Genoa, and various Alpine fortresses to superintend defence works; but he spent his leisure hours in study, especially of the English language. He soon developed strongly marked Liber'al tendencies and an uncompromising dislike for absolutism and clericalism, which, as

he had not acquired the art of reticence, made him a suspect in the eyes of the police and of the reactionaries; at the same time he does not seem to have joined any secret society, for he was too loyal to conspire against the king whose uniform he wore, and he did not believe that the time was yet ripe for a revolution. But after the accession to the throne Of Charles Albert, whom he always distrusted, he felt that his position in the army was intolerable, and resigned his commission (1831). From that moment we find him in the ranks of the opponents of the government, although his was always a loyal and straight-forward opposition which held aloof from conspiracies. During the next few years he devoted himself to the study of political and social problems, to foreign travel, and to acquiring a thorough knowledge of practical agriculture. Cavour's political ideas were greatly influenced by the July revolution of 1830 in France, which proved that an historic monarchy was not incompatible with Liberal principles, and he became more than ever convinced of the benefits of a constitutional monarchy as opposed both to despotism and to republicanism. But he was not affected by the doctrinaire Liberalism of the time, and his views were strength- ened by his studies of the British constitution, of which he was a great admirer; he was even nicknamed " Milord Camillo." He frequently visited Paris and London, where he plunged into the political and social questions of the day, and contributed among other essays two admirable and prophetic articles, one on the Irish question, in which he strongly defended the Union, and another on the Corn Laws. He applied his knowledge of agriculture to the management of his father's estate at Leri, which he greatly improved, he founded the Piedmontese Agricul- tural Society, and took the lead in promoting the introduction of steam navigation, railways and factories into the country.

Thus his mind gradually evolved, and he began to dream dreams of a united Italy free of foreign influence, but owing to the reactionary policy of the Piedmontese government he was unable to take any active part in politics. In 1847, however, the psycho-logical moment seemed to have arrived, for the new pope, Pius IX., showed marked Liberal tendencies and seemed ready to lead all the forces of Italian patriotism against the Austrian domination. The hopes of the Italian Liberals rose high and the so-called neo-Guelph party, represented by such men as Vincenzo Gioberti and Cesare Balbo, believed that an Italian confederation might be formed under the presidency of the pope. CavOur,

although he realized that a really Liberal pope was an impossibility, saw the importance of the movement and the necessity of profiting by it. Together with Balbo, P. di Santa Rosa, and M. Castelli, he founded a newspaper at Turin called II Risorgimento, which advocated the ideas of constitutional reform in Piedmont, with a view to preparing that country for an important role in the upheaval which seemed imminent. In January 1848 the revolution first broke out in Sicily. Cavour, in a speech before a delegation of journalists, declared that the king must take a decided line and grant his people a constitution. Strong pressure was brought to bear on Charles Albert, and after much hesitation he was induced to grant a charter of liberties (February 8, 1848). Cesare Balbo was called upon to form the first constitutional ministry; but Cavour was not offered a seat in it, being suspected by Liberals and Conservatives alike. He continued his journalistic activity, and his articles in the Risorgimento came to exercise great influence both on the king and on public opinion. When the news of the revolt of the Milanese against the Austrians, known as the Five Days, reacted Turin on the 19th of March, Cavour felt that the time for Piedmont to act with energy had come; and advocated war against Austria. ” After deliberately weighing

each word,” he wrote, ” we are bound in conscience to declare that only one path is open to the nation, the government, and the king: war, immediate war!” Piedmont was the only part of Italy enjoying a government at once national and independent, and if it did not hasten to the assistance of the Milanese in their desperate struggle, if possible before the Austrians were expelled, the monarchy could not survive. The situation was most critical, and even the British government was not friendly to Piedmont; but Cavour was prepared to face any danger rather than see his country inactive. In an article in the Risorgimento he de- clared that, while he never believed that material help was to be expected from England, he was convinced that she would not actively help Austria to crush the revolution, but that if she did “she would have against her a coalition not of princes, but of peoples.” Cavour’s article made such an impression that it put an end to the king’s vacillations, and a few days after its appearance war was declared (March 25).

For a few months patriotic and revolutionary enthusiasm carried all before it. In Hungary, in Germany, in Paris, in Vienna itself the revolution was triumphant; constitutions were granted, dynasties tottered and fell, and provisional governments were set up. In all parts of Italy, too, revolts broke out against the established order. But the Piedmontese army, although the troops behaved with gallantry, was no match for Austria's veteran legions, and except in a few minor engagements, in one of which Cavour's nephew Gustavo was killed, it was generally unsuccessful, and an armistice was concluded in the summer. In the meanwhile the elections were being held in Piedmont. Cavour himself was not returned until the supplementary elections in June, and he took his seat in parliament on the right as a Con- servative. His parliamentary career was not at first very suc- cessful; he was not a ready speaker; his habit of talking French made Italian difficult for him, and, although French was at that time allowed in the chamber, he preferred to speak Italian. But he gradually developed a strong argumentative power, his speeches became models of concise reasoning, and he rose at times to the highest level of an eloquence which was never rhetorical. After the dissolution in January 1849, Cavour was not re-elected. The new parliament had to discuss, in the first instance, the all-important question of whether the campaign should be continued now that the armistice was about to expire. The king decided on a last desperate throw, and recommenced hostilities. On the 23rd of March the Piedmontese were totally defeated at Novara, a disaster which was followed immediately by the abdication of Charles Albert in favour of his son Victor Emmanuel II.

Although the new king was obliged to conclude peace with Austria and the Italian revolution was crushed, Cavour neverthe- less did not despair; he believed that so long as the constitution was maintained in Piedmont, the Italian cause was safe. There were fresh elections in July, and this time Cavour was returned. He was still in the difficult position of a moderate Liberal at a time when there seemed to be room for none but reactionaries and conspirators, but by his consummate ability he convinced men that his attitude was the right one, and he made it triumph. His speech on the 7th of March 1850, in which he said that, .": Piedmont, gathering to itself all the living forces of Italy, would be soon in a position to lead our mother-country to the high destinies to which she is called," made a deep impression, for it struck the first note of encouragement after the dark days of the

preceding year. He supported the ministry of which Massimo d' Azeglio was president in its work of reform and restoration, and in October of the same year, on the death of Santa Rosa, he himself was appointed minister of agriculture, industry and commerce. In 185 1 he also assumed the portfolio of finance, and devoted himself to the task of reorganizing the Piedmontese finances. By far the ablest man in the cabinet, he soon came to dominate it, and, in his anxiety to dominate the chamber as well, he negotiated the union of the Right Centre with the Left Centre (a manoeuvre known as the connubio), and promoted the election of Urbano Rattazzi to the presidency of the chamber. This, which he accomplished without d' Azeglio's knowledge,

led to a split between that statesman and Cavour, and to the latter's resignation. Cavour has been blamed for not informing his colleagues of the compact, but for public reasons it was not desirable that the connubio should be discussed before it was consummated. D' Azeglio indeed bore no malice, and remained Cavour's friend. Cavour made use of his freedom to visit England and France again, in order to sound public opinion on the Italian question. In London he found the leaders of both parties friendly, and Lord Palmerston told him that if the constitutional experiment in Piedmont succeeded the Italian despots were doomed. At this time Sir James Hudson was appointed British minister at Turin, where he became the intimate friend of Cavour and gave him valuable assistance. In Paris, Cavour had a long interview with Prince Louis Napoleon, then president of the republic, and he already foresaw the great part which that ruler was destined to play in Italian affairs. He also met several Italian exiles in France.

On Cavour's return he found the country in the throes of a new cabinet crisis, in consequence of which, on d' Azeglio's recommendation, he was invited to form a ministry. By the 4th of November he was prime minister, a position which he held with two short interruptions until his death. He devoted the first years of his premiership to developing the economic resources of the Country; but in preparing it for greater des- tinies, he had to meet the heavy expenditure by increased taxation, and some of his measures made him the object of hostile demonstrations, although he soon outlived his unpopularity. Cavour's first international difficulty was with Austria; after the abortive rising at Milan in February 1853, the Austrian government, in addition to other measures of repression, con- fiscated the estates of those Lombards who had become natural- ized Piedmontese, although

they had nothing to do with the outbreak. Cavour took a strong line on this question, and on Austria's refusal to withdraw the obnoxious decree, he recalled the Piedmontese minister from Vienna, thus by his very audacity winning the sympathy of the Western powers.

Then followed the Crimean War, in which Cavour first showed his extraoidinary political insight and diplomatic genius. The first suggestion of Piedmontese co-operation is usually believed to have come from England, who desired the Italian contingent, not only as material assistance, but also in order to reduce the overwhelming French preponderance. From the Piedmontese point of view there were several reasons why Cavour should desire his country to participate in the campaign. Firstly, it was advisable to use every opportunity of making the Italian question an international one; secondly, by joining the alliance Piedmont would place the Western powers under an obligation; thirdly, Cavour, like Balbo, believed that the Italian question was bound up with the Eastern problem, and as Austria was demanding the permission of the powers to occupy Alessandria, as a guarantee that Piedmont would not profit by the war in the East to create trouble in Italy, Piedmontese participation would in itself prove the best guarantee; and finally, as he always looked to Italy and not merely to Piedmont, he felt that, having proved to Europe that Italians could combine order with liberty, it remained to show that they were capable of fighting as well. But there were serious difficulties in the way. Had Austria joined the allies, as at one time seemed probable, Sardinia's position fighting by her side would have been an impossible one. On the other hand, Piedmont could not demand definite promises of future aid from the Western powers as some politicians desired, because these would never have been given, lest Austria should be offended and driven into the arms of Russia. Then, both the extreme Conservatives and the extreme Radicals were opposed to expenditure on foreign adventures for which they could see no use. In all these diffi- culties, however, Cavour was loyally supported by the king, who saw the advantages of Piedmontese participation, even if unattended by definite promises. General Dabormida, the minister of foreign affairs, disapproved of this policy and resigned. The vacant portfolio was offered to d' Azeglio, who refused it; whereupon Cavour assumed it himself. On the same

day (January 10, 1855) the treaty with France and England was signed, and shortly afterwards 15,000 Piedmontese troops under General La Marmora were despatched to the Crimea.

Events at first seemed to justify the fears of Cavour's oppo- nents. Cholera attacked the Piedmontese soldiers, who for a long time had no occasion to distinguish themselves in action; public opinion became despondent and began to blame Cavour, and even he himself lost heart. Then came the news of the battle of the Tchernaya, fought and won by the Italians, which turned sadness and doubt into jubilation. Joy was felt through- out Italy, especially at Milan, where the victory was the first sign of daylight amid the gloom caused by the return of the Austrians. Everyone realized that the Piedmontese contingent was fighting Italy's battles. But to Cavour the announcement that Russia had accepted Austrian mediation (January 16, 1856) was a great disappointment. He had always hoped that if the war continued Austria would be forced to side with Russia in return for the aid given by the emperor Nicholas in suppress- ing the Hungarian revolt in 1849, and the Western powers would then have an opportunity of helping the Italian cause. He sent a memorandum, at Napoleon's request, to Count Walewski, the French minister of foreign affairs, setting forth a kind of minimum programme of Piedmont's claims. On the summoning of the congress of Paris at the conclusion of the war, Cavour first proposed that d' Azeglio should represent Piedmont, and on the latter's refusal decided to go himself. After much discussion, and in spite of the opposition of Austria, who as mediator occupied a predominant position, behaving " as though she had taken Sevastopol," Cavour obtained that Piedmont should be treated as one of the great powers. Although he did not expect that the congress would liberate Italy, yet by his marvellous diplomatic skill, far superior to that of his colleagues, he first succeeded in isolating Austria, secondly in indirectly compromising Napoleon in the Italian question, and thirdly in getting the wretched conditions of Italy discussed by the representatives of the great powers, who declared that some remedy to that state of things was necessary, not in the interests of Italy alone, but of all Europe. A scheme of reform proposed by Count Walewski gave Cavour the opportunity to plead the Italian cause, and from that moment it was manifest to all that the liberation of Italy was personified in him, the statesman who came to hold all the strings of European politics in his hands.

Cavour's chief measure of internal reform during this period was a bill for suppressing all monastic orders unconnected with education, preaching or charity; this aroused strong opposition from the extremists of both parties and also from the king, and led to the minister's resignation. But he was soon recalled, for the country could not do without him, and the bill was passed (May 29, 1855).

Cavour now saw that war with Austria was merely a question of time, and he began to establish connexions with the revolutionists of all parts of Italy, largely by means of La Farina; but it was necessary that this policy should not be advertised to Europe, and he strongly discountenanced Mazzini's abortive revolutionary attempts. He continued to strengthen Piedmont's military resources, and the army soon grew too large for the country and was obviously destined for more than merely defensive purposes. But he well knew that although Piedmont must be made as efficient as possible from the military point of view, it could not defeat Austria single-handed. He would have preferred an alliance with Great Britain, who would never demand territorial compensation; but although British sympathies were wholly Italian, the government was desperately anxious to avoid war. From Napoleon more was to be hoped, for the emperor still preserved some of his revolutionary in- stincts, while the insecurity of his situation at home made him eager to gain popularity by winning military glory abroad; but he still hesitated, and Cavour devoted the whole of his ability to overcoming his doubts. In the midst of these negotia- tions came Orsini's attempt on Napoleon's life (January 14, 1858), which threatened to alienate his Italian sympathies

and cause serious embarrassments to Piedmont. But after some remonstrances to Piedmont for not acting with sufficient energy against the revolutionists, the incident was settled: and Napoleon was, in fact, afraid that if he did not help the Italian cause more such attempts would be made. A month after the Orsini outrage he laid before Cavour a proposal for a Franco-Piedmontese alliance and the marriage of Prince Jerome Bonaparte with Princess Clothilde, the daughter of Victor Emmanuel.

An " accidental " meeting between Napoleon and Cavour was arranged and took place at Plombieres in July, and although no one knew what passed, the news of it fell like a bombshell on the diplomatic world. No definite treaty was signed, but the basis of an agreement was laid, whereby France and Piedmont were to

declare war against Austria with the object of expelling her from Italy, and a north Italian state was to be formed; in exchange for this help France was to receive Savoy and possibly Nice. But the emperor still hesitated, and refused to decide on war unless Austria attacked Piedmont; the British govern- ment, too, in its anxiety to preserve peace, was not very friendly to the Italian cause. Cavour saw that the only way to overcome all these obstacles was to force Austria's hand. Then there was the danger lest an Italy freed by French arms should be over- whelmed under French predominance; for this reason Cavour was determined to secure the co-operation of volunteers from other parts of Italy, and that the war should be accompanied by a series of risings against Austria and the local despots. It was also necessary that the risings should break out in the various provinces before the Piedmontese and French troops arrived, so that the latter should not appear as invaders and conquerors, but merely as liberators.

The moment war was seen to be imminent, parties of Italians of all classes, especially Lombards, poured into Piedmont to enlist in the army. Cavour also had a secret interview with Garibaldi, with whom he arranged to organize volunteer corps so that the army should be not merely that of Piedmont, but of all Italy. Every day the situation grew more critical, and on the 10th of January 1859 the king in his speech from the throne pronounced the memorable words " that he could not remain deaf to the cry of pain (il grido di dolore) that reached him from all parts of Italy " — words which, although actually suggested by Napoleon, rang like a trumpet-call throughout the land. In the meanwhile the marriage negotiations were concluded, and during the emperor's visit to Turin a military convention was signed between the two states, and Savoy and Nice were promised to France as a reward for the expulsion of the Austrians from Italy. But the British government was still unfavourable, and Napoleon, ever hesitating, again sought an excuse for backing out of his engagements; he jumped at the Russian proposal to settle the Italian question by means of his own favourite expedient, a congress. To this Austria agreed on condition that Piedmont should disarm and should be excluded from the congress; England supported the scheme, but desired that all the Italian states should be represented. Cavour was in despair at the turn events were taking, and appealed to Napoleon, actually threaten- ing to emigrate to America and publish all his correspondence with the emperor if the latter did not keep his engagements. He

decided at last most reluctantly to accept the English proposal, lest Piedmont should be abandoned by all, but clung to the hope that Austria would reject it. On the 19th of April the Austrian emperor, on the advice of the military party, did reject it; and on the 23rd, to Cavour's inexpressible joy, Austria sent an ultimatum demanding the disarmament of Piedmont. Cavour replied that his government had agreed to the congress proposed by the powers and that it had nothing more to say. On quitting the chamber that day he said to a friend: " I am leaving the last sitting' of the last Piedmontese parliament " — the next would represent united Italy. France now allied herself definitely with Piedmont, and England, delighted at Cavour's acquiescence to her own proposal and enraged by Austria's ultimatum, became wholly friendly to the Italian cause. A few days later Austria declared war.

. As La Marmora now took the chief command of the army, Cavour added the ministry of war to the others he already held. His activity at this time was astounding, for he was virtually dictator and controlled single-handed nearly all the chief offices of the state. The French troops entered Piedmont, where they were received with enthusiasm, and the allies marched into Lombardy; the victory of Magenta, which opened the gates of Milan to them, was shortly followed by that of Solferino. The people rose in arms at Parma, Modena, Florence and Bologna, which had been occupied by Austria for the pope since 1849; the local princes were expelled and provisional governments set up. Cavour sent special commissioners to take charge of the various provinces in Victor Emmanuel's name. But these events, together with Prussia's menacing attitude, began to alarm Napoleon, who, although he wished to destroy Austrian influence in Italy, was afraid of a large and powerful Italian state. Conse- quently, after Solferino, he concluded an armistice with Austria at Villafranca on the 8th of July, without previously informing Cavour. When Cavour heard of it he was thunderstruck; he immediately interviewed the king at Monzambano, and in violent, almost disrespectful language implored him not to make peace until Venice was free. But Victor Emmanuel saw that nothing was to be gained by a refusal, and much against his own inclina- tion, signed the peace preliminaries at Villafranca, adding the phrase, " pour ce qui me concerne," which meant that he was not

responsible for what the people of other parts of Italy might do (July 12). Lombardy was to be ceded to Piedmont, Venetia to remain Austrian, the deposed princes to be reinstated, and the pope made president of an Italian confederation.

The cabinet resigned the next day, but remained in office provisionally, and Cavour privately advised the revolutionists of central Italy to resist the return of the princes, by force if necessary: " for we must now become conspirators ourselves," he said. His policy was thus continued after he left office, and Palmerston, who had meanwhile succeeded Malmesbury as foreign minister, informed France and Austria that Great Britain would never tolerate their armed intervention in favour of the central Italian despots. The new Piedmontese ministry, of which La Marmora was the president, but Rattazzi the leading spirit, hesitated between annexing central Italy and agreeing to the terms of peace, but on the 10th of November peace was signed at Zurich. Napoleon proposed a new congress, which never met, and on the fall of the Rattazzi-La Marmora cabinet the king, in spite of the quarrel at Monzambano, asked Cavour to take office again. By January he was once more premier, as well as minister for foreign affairs and of the interior. His first act was to invite the people of Italy to declare their own wishes with regard to annexation to Piedmont; but Napoleon still refused to consent to the union of Tuscany with Piedmont, for he contemplated placing one of his own relatives on the throne of the grand-duchy. Cavour now saw that Napoleon might be ready to deal, and, although the bargain of the preceding year had not been exactly fulfilled, as the Austrians were still in Venice, he again brought forward the question of Nice and Savoy. To Cavour no less than to the king the loss of these two provinces was a cruel wrench, but it was a choice between them and central Italy. The plebiscites in the latter region had unanimously declared in favour of union with Piedmont, and Napoleon became more pressing, going so far as to threaten that unless the cession were made, the French troops would leave Lombardy at the mercy of Austria and occupy Bologna and Florence. On the 24th of March the treaty was signed and the emperor's opposition to the annexa- tion of central Italy withdrawn. On the 2nd of April the parlia- ment representing Piedmont, the duchies of Parma and Modena, Tuscany and Romagna, met, and Cavour had the difficult and ungrateful task of explaining the cession of Nice and Savoy. In spite of some opposition, the agreement was ratified by a large majority.

The situation in the kingdom of Naples was now becoming critical, but there seemed as yet little chance of union with upper Italy, for the Bourbon government was a more or less regular one, and, although risings had broken out, there was no

general revolution. Cavour therefore had to follow a somewhat double-faced policy, on the one hand negotiating with the Bourbon king (Francis II.), suggesting a division of Italy between him and Victor Emmanuel, and on the other secretly backing up the revolutionary agitation. Having now learnt that Garibaldi was planning an expedition to Sicily with his volunteers, he decided, after some hesitation, not to oppose its departure; on the 5th of May it sailed from Quarto near Genoa, and Cavour was only deterred from declaring war on Naples by the fear of foreign complications. Garibaldi with his immortal Thousand landed at Marsala, and the whole rotten fabric of the Bourbon government collapsed. At Palermo they were welcomed by the Piedmontese admiral Persano, and soon the whole island was occupied and Garibaldi proclaimed dictator. The general now proposed to cross over to the mainland, and this placed Cavour in a serious dilemma; Russia and Austria protested against the expedition, France and Prussia were unfriendly, Great Britain alone remained warmly pro-Italian. He still hoped for a revolu- tion in Naples, so that King Victor's authority might be estab- lished before Garibaldi's arrival, but this proved impossible. When Garibaldi crossed the straits of Messina the Neapolitan government fell, and he entered Naples in triumph. But there was still danger that he might be subsequently defeated, for the Neapolitan army was still a force in being, and Cavour feared, moreover, that, although Garibaldi himself had always loyally acted in the king of Italy's name, the red republicans around him might lead him to commit some imprudence and plunge the country into anarchy. The cession of Nice, Garibaldi's birthplace, had made an impassable gulf between the two men, and neither quite trusted the other. Cavour also feared that Garibaldi might invade the papal states, which would have led to further international complications. In any case, Rome must not be touched for the present, since Napoleon was pledged to protect the pope; but as the latter had made large armaments, and his forces, consisting largely of brigands and foreigners under the French general Lamoriciere, were in a menacing attitude on the frontier, Cavour decided on the momentous step of annexing the papal states with the exception of the Roman province. The Italian army crossed the frontier from Romagna on the nth of

September, whereupon every power, except Great Britain and Sweden, withdrew its minister from Turin. But the troops advanced and were everywhere received with open arms by the people; Ancona was taken, Lamoriciere was defeated and captured at the battle of Castelfidardo, and on the 20th King Victor marched into the Neapolitan kingdom. On the 1st of October Garibaldi defeated the Neapolitan troops on the Volturno, and Gaeta alone, where King Francis of Naples had retired, still held out.

New difficulties with Garibaldi arose, for he would not resign his dictatorship of the southern provinces, and wished to march on Rome. Cavour had to use all his tact to restrain him and at the same time not to appear ungrateful. He refused to act despotically, but he summoned parliament to vote on the annexation, which it did on the nth. Two days later Garibaldi magnanimously gave in to the nation's will and handed his conquests over to King Victor as a free gift. Gaeta was invested, and after a siege prolonged through the action of Napoleon, who for some reason unknown kept his fleet before the town, preventing any attack by sea until England induced him to withdraw it, the garrison surrendered on the 13 th of February, and King Francis retired to Rome. Parliament was dissolved once more; the new chamber showed an overwhelming majority in favour of Cavour, and Victor Emmanuel was proclaimed king of Italy.

The last question with which Cavour had to deal was that of Rome. For some years past the pope had only been able to maintain his authority by the help of foreign troops, and Cavour saw that as long as this state of things lasted there could be no united Italy. In October he declared in parliament that Rome must be the capital of Italy, for no other city was recognized as such by the whole country, and in January 1861 a resolution to that effect was passed. But owing to Napoleon's attitude he had to proceed warily, and made no attempt for the present to

carry out the nation's Wishes. At the same time he was anxious that the church should preserve the fullest liberty, and he believed in the principle of " a free church in a free state." His great dream, save for Rome and Venice, was now realized, and Italy was free and united. But the wear and tear of these last

years had been almost unbearable, and at last began to tell; the negotiations with Garibaldi were particularly trying, for while the great statesman wished to treat the hero and his volunteers generously, far more so than seemed wise to the Conservatives and the strictly military party, he did not wish the Italian cause to be endangered by their imprudences, and could not permit all the Garibaldian officers to be received into the regular army with the same grades they held in the volunteer forces. This question, together with that of Nice, led to a painful scene in the chamber between the two men, although they were formally reconciled a few days later. For some time past Cavour had been unwell and irritable, and the scene with Garibaldi undoubtedly hastened his end. A fever set in. and after a short illness he passed away on the 6th of June 1861. He was buried at his ancestral castle of Santena.

The death of Cavour was a terrible loss to Italy; there re- mained many problems to be solved in which his genius and personality were urgently needed. But the great work had been carried to such a point that lesser men might now complete the structure. He is undoubtedly the greatest figure of the Risor- gimento, and although other men and other forces co-operated in the movement, it was Cavour who organized it and skilfully conducted the negotiations which overcame all, apparently insuperable, obstacles. " That which in Alfieri and Gioberti was lacking," wrote T. Artom, his private secretary, " a deep and lively sense of reality, Cavour possessed to a supreme degree. He was not a litterateur ; he was never a political dreamer. His views broadened progressively; at each stage he discovered a new horizon, and he followed his path without ever seeking anything save what was real and possible." He was gifted with pronounced political genius and with an astounding power of foresight. In his ideas he was always a moderate Liberal, and although he disapproved of republicanism, he was an ardent constitutionalist, ever refusing to resort to arbitrary methods, for he felt that, the Italian character being what it is, Italian unity could not last if unsupported by popular feeling. In meet- ing opposition he could not, like Bismarck, rely on a great military power, for the Piedmontese army was a small one; Austria must first be isolated and then an alliance had to be obtained with some other power. Some of his acts, especially his policy towards the Neapolitan kingdom, have been criticized as politically immor?l; but apart from the fact that few revolutions — and Cavour, after all, was a revolutionist — can be conducted without attacking vested

rights, it is hard to see that any policy which led to the destruction of a government, rightly described as the ” negation of God on earth,” could be deemed immoral. He has been accused of changing his views, but what statesman has not? Moreover, in the extremely complicated and difficult diplo- matic situations which he had to face, what was impossible or dangerous one day became possible and desirable the next. This was particularly the case with the Neapolitan question. Cavour’s one absorbing passion was the liberation and regenera- tion of Italy, and to this he devoted his whole life and talent.

Bibliography. — G. Buzziconi, Bibliografia Cavouriana (Turin, 1898); Countess Evelyn Martinengo Cesaresco, Cavour (London, 1898), an excellent and handy little monograph which brings out the chief points of Cavour’s life in the right light; G. Massari, // Conte di Cavour (Turin, 1873); W. de la Rive, Le Comte de Cavour (Paris, 1862), interesting and valuable as the work of a contemporary and intimate friend of Cavour; L. Chiala, Letters edite ed inedite del Conte di Cavour (7 vols., Turin, 1883-1887); D. Zanichelli, Gli Scritti del Conte di Cavour (Bologna, 1892), and Cavour (Florence, 1905) ; H. von Treitschke, “Cavour,” in his Historische und politische Aufsdtze (Leipzig, 1871); E. Dicey, A Memoir of Catour (London, 1861); Conte C. di Cavour, Discorsi parlamentari (8 vols., Turin, 1863-1872), Opere politico-economiche (Cuneo, 1855); F. X. Krauss, Cavour (Mainz, 1902) ; E. Artom, L’Opere politica del Senatore T. Artom nel Risorgimento Italiano (Bologna, 1906), a biography of Cavour’s devoted private secretary, containing new material.

(L. V.*)

CAVOUR (ahc. Caburrum or Forum Vibii), a town of Tiedraont, Italy, in the province of Turin, 32 m. S.W. by rail and steam tram (via Pinerolo from the town of Turin). Pop. (1901) town, 2091 ; commune, 6843. It lies on the north side of a huge isolated mass of granite (the Rocca di Cavour) which rises from the plain. On the summit was the Roman village, which, belonged to the province of the Alpes Cottiae. There are some ruins of medieval fortifications. The town gave its name to the Benso family of Chieri, who were raised to the marquisate in 1771, and of which the statesman Cavour was a member.

For the ancient name see Th. Mommsen in Corp. Inscrip. Lat. v. (Berlin, 1877), p. 825.

CAVY, a name commonly applied to several South American rodent animals included in the family Caviidae (see Rodentia), but perhaps properly applicable only to those belonging to the typical genus Cavia, of which the most familiar representative is the domesticated guinea-pig. Cavies in general, the more typical representatives of the Caviidae, are rodents with hoof- like nails, four front and three hind toes, imperfect collar-bones, and the cheek-teeth divided by folds of enamel into transverse plates. The tail is short or rudimentary, the incisors are short, and the outer surface of the lower jaw is marked by a distinct ridge.

True cavies, or couies (Cavia), are best known by the guinea- pig, a domesticated and parti-coloured race derived from one of the wild species, all of which are uniformly coloured. They are comparatively small and stoutly built animals, with' short, rounded ears and no tail. In habits they are partly diurnal; and live either in burrows among the crevices of rocks, beneath the leaves of aquatic plants in marshy districts, or underneath the floors of outbuildings. Their cries are faint, squeaks and grunts. They feed upon nearly all vegetable substances, but drink little. Generally they associate in small societies, and seldom wander far from home. Although the guinea-pig is a fertile breeder, the wild species only produce one or two young a-t a birth, and this but once in a year. The young come into the world in a highly developed condition, being able to feed them- selves the day following their birth. Cavies are widely distri- buted in South America, and are represented by several species. Among them may be mentioned the aperea or restless cavy (C. p&rcellus or C. aperea) of Brazil; the Bolivian C. boliviensis, found at great elevations in the Andes; the Brazilian rock-cavy (C. rupestris), characterized by its short blunt claws; and the Peruvian C. cutleri. The latter was tamed by the Incas, and is the ancestor of the guinea-pig. As to the origin of that name, some writers consider it a corruption of Guiana-pig, but it is more probable that the word " Guinea " merely signifies foreign. The guinea-pig is a singularly inoffensive and defenceless creature, of a restless disposition, and wanting in that intelligence which usually characterizes domestic pets, although said to show some discrimination. It is of no particular service to man, neither its flesh nor its fur being generally put to use, while the state- ment that its presence is sufficient to drive off rats and mice appears to be without foundation. It is exceedingly prolific, beginning to breed at the age of two months; the number of young varying, according to the age of the parent, from four to twelve. It has

been calculated that a single pair of guinea- pigs may prove the parent stock of a thousand individuals in a single year.

A very different animal is the Patagonian cavy, or mara (Dolichotis patachonica) , the typical representative of a genus characterized by long limbs, comparatively large ears, and a short tail. The animal is about the size of a hare, to which it approximates in form and habits. It is most abundant in the open districts of Patagonia, but also ranges on to the Argentina Pampas, where it is now scarce. Although occasionally seen in large flocks, the mara is more commonly found in small parties or in pairs, the parties commonly moving in single file. It has a peculiar kind of hopping gait; and is mainly diurnal, in accordance with which habit its eyes are protected by lashes. It lives in a burrow, generally excavated by itself; but when pursued, seeks safety in flight, rather than by a retreat to, its hole. From two to five young are produced twice a year. A

much : smaller species, D. salinicola, without the characteristic black band above the tail, inhabits the salt-plains of Argentina. Maras. have been introduced into several British parks. Fossil Species of Dolichotis occur in the caverns of Brazil, and also in the superficial deposits of Argentina. (R. L.*)

•• CAWDOB, a village and parish of Nairnshire, Scotland. Pop. of parish (1901) 925. The village is situated 5 m. S.S.W. of Nairn and 3 m. from Gollanfield Junction on the Highland railway. The castle was the scene, according to the tradition which Shakespeare has perpetuated, of the murder of King Duncan by Macbeth, thane of Cawdor (or Calder), in 1040. Sinqe the ‘oldest part of the structure dates from 1454, however, and Seemingly had no predecessor, the tradition has no founda- tion in fact. The building stands on the rocky bank of Cawdor Burn, a right-hand tributary of the Nairn. The massive keep with small turrets is the original portion of the castle, and to it were added, in the 17 th century, the modern buildings forming two sides of a square.

Kilravock (pronounced Kilrawk) Castle, i|m. W. of Cawdor, occupies a commanding site on the left bank of the Nairn. Its keep dates from 1460, and the later buildings belong to the 17 th century. It has been continuously tenanted by the Roses, one of

the most remarkable families in Scotland. They came over with William the Conqueror and settled at Kilravock in 1293, since which date son has succeeded father without the interposition of a collateral heir, an instance of direct descent unique in Scottish history. Moreover, nearly every Rose has borne the Christian name of Hugh, and only one attained to a higher social rank than that of laird. Queen Mary was received at the castle in 1562, and Prince Charles Edward was entertained four days before the battle of Culloden. The gardens are remark- able for their beauty.

CAWNPORE, or Kanpur, a city and district of British India in the Allahabad division of the United Provinces. The city is situated on the south bank of the Ganges, 40 m. south-west of Lucknow, and formed from early times a frontier outpost of the people of Oudh and Bengal against their northern neigh- bours. Clive selected it, on account of its commanding position, as the cantonment for the brigade of troops lent him by the nawab of Oudh. In 1801, when the Ceded Provinces were ac- quired by the East India Company, it became the chief British frontier station. But by the time of the Mutiny the frontier had left it behind, and it was denuded of troops. Now it is chiefly known as the junction of four railways, the East Indian, Oudh & Rohilkand, Rajputana and Indian Midland, and as a great emporium for harness, shoes and other leather-work. In 1901 the population was 197,170, showing an increase of 4 % in the decade. In 1903 the city was devastated by an epidemic of plague.

The name of Cawnpore is indelibly connected with the blackest episode in the history of the Indian Mutiny — the massacre here injury 1857 of hundreds of women and children by the Nana Sahib. The full details of the siege and massacre will be found under Indian Mutiny, and here it will suffice to refer to the local memorials of that evil time. The entrenchment, where General Sir H. M. Wheeler with his small band of soldiers and the European and Eurasian residents were exposed for 21 days to the fire of the mutineers, is merely a bare field, containing the well where many women and children were shot while getting water. This well is now surrounded by an enclosure with an inscription upon its cross. About three-quarters of a mile away, on the banks of the river Ganges, is the Massacre Ghat. A grassy road between banks 10 to 12 ft. high leads down to the river, and it was among the trees on these banks that the murderers concealed themselves who shot down the little garrison as soon as they were embarked in the boats which were to take them to safety. On the river bank is a temple to Siva, of hexagonal shape, old and going to ruin.

Steps lead from this temple to an enclosed flight of stairs, which in the cold season descend to the water, but in the rains are covered almost to the top. This is the ghat where some 600 helpless people were slain, in spite of a promise of safe-conduct from the Nana. The r remaining

200 victims, who had escaped the bullets of the siege and survived the butchery of the river bank, were massacred afterwards and cast down the famous well of Cawnpore, which is now marked by a memorial and surrounded by gardens. The memorial is crowned by the figure of an angel in white marble, and on the wall of the well itself is the following inscription: —

Sacred to the perpetual Memory of a great company of Christian people, chiefly Women and Children, who near this spot were cruelly murdered by the followers of the rebel Nana Dhundu Pant, of Bithur, and cast, the dying with the dead, into the well below, on the xvth day of July, MDCCCLVII.

The district or Cawnpore is situated between the Ganges and Jumna rivers, and is a portion of the well-watered and fertile tract known as the Doab, the total area being 2384 sq. m. The general inclination of the country is from north to south. Besides the two great rivers, the principal streams are the Arand or Rhind, the Kavan or Singar, the Isan and the Pandu. The district is watered by four branches of the Ganges canal, and traversed by two lines of railway. It used to be a great centre of the indigo industry, which has now declined. The population in 1901 was 1 ,258,868, showing an increase of 4 % during the decade.

CAXTON, WILLIAM (c. 1422-1491), the first English printer, was born somewhere in the Weald of Kent, perhaps at Tenterden. The name, which was apparently pronounced Cauxton, is identical with Causton, the name of a manor in the parish of Hadlow, and was a fairly common surname in the 15th century. The date of Caxton's birth was arbitrarily fixed in 1748 by Oldys as 141 2. Blades, however, inferred that in 1438, when he was apprenticed to Robert Large, he would not have been more than sixteen years of age. This would place his birth in 1422-1423. Robert Large was a rich silk mercer who became sheriff in 1430 and lord mayor of London in 1439, and the fact of Caxton's apprenticeship to him argues that Caxton's own parents were in a good position. Large died in 1441, leaving a small be- quest to Caxton, and his executors would be bound to place the young man where he could finish his term. He was probably sent direct to Bruges, then

the central foreign market of the Anglo- Flemish trade, for he presently entered business there on his own, account. In 1450 his name appears in the Bruges records as standing joint surety for the sum of £100; and in 1463 he was acting governor of the company of Merchant Adventurers in the Low Countries. This association, sometimes known as the " English Nation," was dominated by the Mercers' Company, to the livery of which Caxton had been formally admitted in London in 1453. The first governor, appointed in terms of a charter granted by Edward IV. in 1462, was W. Obray, but Caxton's position is definitely asserted in 1464. In that year he was appointed, together with Sir Richard Whitehill, to negotiate with Philip, duke of Burgundy, the renewal of a treaty concerning the wool trade, which was about to expire. These attempts failed, but he was again employed, with two other members of the Mercers' Company, in a similar but successful mission in October 1468 to the new duke, Charles the Bold, who earlier in the year had married Princess Margaret of York, sister of Edward IV. The last mention of Caxton in the capacity of governor of the " English Nation " is on the 13th of August 1469, and it was probably about that time that he entered the household of the duchess Margaret, possibly in the position of commercial adviser. In his diplomatic mission in 1468 he had been associated with Lord Scales, afterwards Earl Rivers and one of his chief patrons, and at the Burgundian court he must have come in touch with Edward IV. during his brief exile in 1470.

He had begun his translation of the popular medieval romance of Troy, The Recuyell of the Historyes of Troye, from the French of Raoul le Fevre, early in 1469; and, after laying it aside for some time, he resumed it at the wish of the duchess Margaret, to whom the MS. was presented in September 1471. During his thirty-three years' residence in Bruges Caxton would have access to the rich libraries of the duke of Burgundy and other nobles, and about this time he learned the art of printing. His disciple, Wynkyn de Worde, says that he was taught at Cologne, probably during a visit there in 1471, recorded in the preface to

the Recuydl; Blades suggests that he learnt from Colard Mansion, but there is no evidence that Mansion set up his press at Bruges before 1474. He ceased to be a member of the gild of St

John (a gild of illuminators) in 1473, and the first dated book he is known to have printed is dated 1476. Mansion and Caxton were partners or associates at Bruges, where Caxton printed his Recuydl in 1474 or 1475. His second book, The Game and Playe of Chesse, from the Liber de ludo scacchorum of Jacobus de Cessolis through the French of Jehan de Vignay, was finished in 1474, and printed soon after; the last book printed by Mansion and Caxton at Bruges was the Quatre derrenieres choses, an anonymous treatise usually known as De quattuor novissimis. Other books in the same type were printed by Mansion at Bruges after Caxton's departure.

By September 1476 Caxton had established himself in the almonry at Westminster at the sign of the Red Pale. Robert Copland the printer, who was afterwards one of Caxton's assistants, states that Caxton began by printing small pamphlets. The first dated book printed in England was Lord Rivers's translation (revised by Caxton) of The Dictes or sayengis of the philosophres (1477). From this time until his death in 1491 Caxton was busy writing and printing. His services to English literature, apart from his work as a printer (see Typography), are very considerable. His most important original work is an eighth book added to the Polychronicon (vol. viii. in the Rolls Series edition) of Ralph Higden. Caxton revised and printed John of Trevisa's work, and brought down the narrative himself from 1358 to 1460, using as his authorities Fasciculus lemporum, a popular work in the 15th century, and an unknown Aureus de universo. In the year before his death he complained in the preface to his Eneydos of the changing state of the English language, a condition of things which he did as much as any man to remedy. He printed Chaucer's Canterbury Tales (1478? and 1483), Troilus and Creseide (1483 ?), the House of Fame (1483 ?), and the translation of Boethius (1478?); Gower's Confessio Amantis (1483), and many poems of Lydgate. His press was, however, not worked for purely literary ends, but was a com- mercial speculation. For the many service-books which he printed there was no doubt a sure sale, and he met the taste of the upper classes by the tales of chivalry which issued regularly from his press. He printed Malory's Morte d' 'Arthur, and himself translated from the French the Boke of Histories of Jason (1477 ?), The Historye of Reynart the Foxe (from the Dutch, 1481 and 1489?), Godfrey of Boloyne or The Siege and Conqueste of Jherusalem (1481), The Lyf of Charles the Grete (1485), The Knyght Parys and the Fayr Vyenne (1485), Bldnchardyn and

Eglantine (1489?), The Foure Sonnes of Aytnon (1489?); also the Morale Proverbs (1478), and the Fayttes of Armes and of Chyualrye (1489) of Christine de Pisan. The most ambitious production of his press was perhaps his version of the Golden Legend, the translation of which he finished in November 1483. It is based on the lives of the saints as given in the 13th century Legenda aurea of Jacobus de Voragine, but Caxton chiefly used existing French and English versions for his compilation. The book is illustrated by seventy woodcuts, and Caxton says he was only encouraged to persevere in his laborious and expensive task by the liberality of William, earl of Arundel. The idleness which he so often deprecates in his prefaces was no vice of his, for in addition to his voluminous translations his output as a printer was over 18,000 pages, and he published ninety-six separate works or editions of works, with apparently little skilled assistance, though later printers, Wynkyn de Worde, Robert Copland and possibly Richard Pynson, were trained under him.

The different founts of type used by Caxton are illustrated by Blades and Duff, and there is an excellent selection of Caxtons in the British Museum, in the University library at Cambridge, besides those in private hands. A record price for a Caxton was reached in 1902 when Mr Bernard Quaritch paid £2225 for The Royal Book (1487?), a translation of the popular Somme des vices et des vertus. His books have no title-pages, and from 1487 onwards are usually adorned with a curious device, consisting of the letters W. C. separated by a trade mark, with an elaborate

$<$$>&<&<$><&<$>

•iˆmessamsˆmjis

border above and below. The flourishes on the trade mark have been fancifully interpreted as S.C. for Sancta Colonia, implying that Caxton learnt his art at Cologne, and the whole mark has been read as 74, for 1474, the date of his first printed book. This device was first used in an edition of the Sarum missal, printed for Caxton by George Maynial in Paris, and was subsequently adopted with small alterations by his successor at the Westminster press, Wynkyn de Worde. The first of his books containing woodcut illustrations was his Myrrour of the World (148 1), translated from Vincent de Beau- vais, which has diagrams and pictures for the assistance of young students. He had used a woodcut initial letter in his broadside Indulgence printed in 1480.

No record of Caxton's marriage or of the birth of his children has been found, but Gerard Croppe was separated from his wife Elizabeth, daughter of William Caxton, before 1496, when Croppe made certain claims in connexion with his father-in-law's will.

Authorities. — Earlier biographies of Caxton were superseded by the work of William Blades, whose Life and Typography of William Caxton (2 vols., 1861-1863) remains the standard authority. It contains a bibliography of each of the works issued from Caxton's press. For later discoveries see George Bullen's Catalogue of the Caxton celebration loan collection exhibited at South Kensington in 1877; articles by E. J. L. Scott in the Athenaeum (Feb. 10, 1900; May 21 and June 8, 1892); articles in Notes and Queries (April 21, 1900; Feb. 24, 1906), and the publications of the Caxton Club, Chicago, notably William Caxton, by E. Gordon Duff (1905). See also Census of Caxtons, by Seymour de Ricci, No. xv. of the illustrated monographs of the Bibliographical Society, 1909. Many of Caxton's translations are available in modern reprints; the Golden Legend, the Recuyell and Godeffroy of Boloyne, were printed by William Morris at the Kelmscott Press in 1892-1893; the Boke of Curtesye (1 868) , the Lyf of Charles the Grete (1 880) , Alain Chartier's Curial (1888), Foure Sonnes of Aymon (1884), Eneydos (1890), Blanchardyn and Eglantine (1890), and others, by the Early English Text Society. For modern editions of Reynart see Reynard the Fox. No authentic portrait of Caxton is known, but a MS. at Mag- dalene College, Cambridge, of the last six books of the Metamorphoses of Ovid, translated by Caxton, is probably in his handwriting.

CAYENNE, a seaport and the capital of French Guiana, on the N.W. extremity of the island of Cayenne, and near the mouth of the river of that name, in 4 56′ 28″ N., and 52° 20′ 36″ W. Pop. about 12,600. The town forms an almost perfect square, and has clean and well-macadamized streets. The houses, mostly of two storeys, are of wood, strengthened on the first and ground floors by brickwork. In the old town, which contains the government-house and Jesuits' College, the streets are not so regularly and. well built as in the new. The Place d'Armes, a fine quadrangular space, lies between them. To the right of the governor's house is Mount Ceperon, on which stand Fort St Michel, the marine barracks, the signal station and the lighthouse. Here, too, are the capacious reservoirs for the water-supply of the town, the source of which is a lake to the south of the island. The harbour is shallow at its entrance, and craft drawing more than 14 ft. are

obliged to anchor 6 m. from the town. There is no dock for the repair of vessels; but there are two quays at the town. The principal exports of Cayenne are gold, cocoa, phosphates, hides, woods and spices. The imports are French wines, spirits and liqueurs; silk and cotton stuffs, tobacco, hardware, glass, earthenware, clothing, preserved meat, fish, and vegetables, maize, flour, hay, bran, oils and cattle. There is a regular mail service between Cayenne and Martinique once a month. Cayenne is the seat of the government of French Guiana, and was formerly a penal settlement for political offenders. Food as well as clothing is exorbitantly dear, the only cheap articles of consumption being bread and French wines. The temperature of Cayenne is between 76 and 88° Fahr. throughout the year; but the heat is tempered by easterly winds. Between December and March a north wind blows, unfavourable to weak constitutions. Yellow and other fevers often attack the

inhabitants of the town, but the climate, though moist, is as a whole healthy. (See Guiana.)

CAYENNE PEPPER (Guinea Pepper, Spanish Pepper, Chilly), a preparation from the dried fruit of various species of Capsicum,a, genus of the natural order Solanaceae. The true peppers are members of a totally distinct order, Piperaceae. The fruits of plants of the genus Capsicum have all a strong, pungent flavour. The capsicums bear a greenish-white flower, with a star-shaped corolla and five anthers standing up in the centre of the flower like a tube, through which projects the slender style. The pod-like fruit consists of an envelope at first fleshy and afterwards leathery, within which are the spongy pulp and several seeds. The plants are herbaceous or shrubby; the leaves are entire, and alternate, or in pairs near one another; the flowers are solitary and do not arise in the leaf-axils. There are about thirty species, natives of Central and South America. They are now grown in various parts of the world, both for the sake of the fruit and for ornament. In England the annual sorts are sown from March to the middle of April under a frame. They can be planted out when 2 or 3 in. high, and in June may be transferred to a light rich soil in the open garden. They flower in July or August, and produce pods from August till the end of September. The perennial and shrubby kinds may be wintered in a conserva- tory. Several

species or varieties are used to make cayenne pepper. The annual or common capsicum (C. annuum), the Guinea pepper plant, was brought to Europe by the Spaniards, and was grown in England in 1548. It is indigenous to South America, but is now cultivated in India, Hungary, Italy, Spain and Turkey, with the other species of capsicum. It is a hardy herbaceous plant, which attains a height of 2 or 3 ft. There are numerous cultivated forms, differing in the shape and colour of the pod, which varies from more or less roundish to narrow- conical, with a smooth or wrinkled coat, and white, yellow, red or black in colour. The principal source of cayenne pepper is C. frutescens, the spur or goat pepper, a dwarf shrub, a native of South America, but commonly cultivated in the East Indies. It produces a small, narrow, bright red pod, having very pungent properties. C. telragonum, or bonnet pepper, is a species much esteemed in Jamaica; it bears very fleshy fruits. Other well- known kinds of capsicum are the cherry pepper (C. cerasiforme) , with small berries; bell pepper (C. grossum), which has thick and pulpy fruit, well adapted for pickling; and berry or bird pepper (C. baccatum). The last mentioned has been grown in England since 1731; its fruit is globular, and about the size of a cherry. The West Indian stomachic man-dram is prepared by mashing a few pods of bird pepper and mixing them with sliced cucumber and shallots, to which have been added a little lime-juice and Madeira wine. Chillies, the dried ripe or unripe fruit of capsicums, especially C. annuum and C. frutescens, are used to make chilly- vinegar, as well as for pickles. Cayenne pepper is manufactured from the ripe fruits, which are dried, ground, mixed with wheat flour, and made into cakes with yeast; the cakes are baked till hard like biscuit, and then ground and sifted. The pepper is sometimes prepared by simply drying the pods and pounding them fine in a mortar. Cayenne pepper is occasionally adulter- ated with red lead, vermilion, ochre, salt, ground-rice and turmeric. The taste of the pepper is impaired by exposure to damp and the heat of the sun. Chillies have been in use from time immemorial; they are eaten in great quantity by the people of Guiana and other warm countries, and in Europe are largely consumed both as a spice and as medicine.

The dried ripe fruit of Capsicum frutescens from Zanzibar, known as pod pepper and Guinea pepper, is official in the British Pharmacopoeia under the name Capsici Fructus. The fruit has a characteristic, pungent odour and an intensely bitter taste. The chief constituents are a crystallizable resin, capsaicin, a volatile

alkaloid, capsicine and a volatile oil. The dose is f-i grain. The British Pharmacopoeia contains two preparations of capsicum, a tincture (dose 5-15 minims) and an ointment. Externally the drug has the usual action of a volatile oil, being a very powerful counter-irritant. It does not, however, cause pustulation. Its internal action is also that of its class, but its

marked contact properties make it specially useful in gastri-atony and flatulence, and sometimes in hysteria.

CAYEY, an inland district and mountain town of the depart- ment of Guayama, Porto Rico, celebrated for its cool, invigorat- ing climate and the beauty of its scenery. Pop. (1899) of the town, 3763; of the district, 14,442. The town is surrounded by mountain summits, the highest of which, El Torito, rises to an elevation of 2362 ft. above sea-level. It was made a military post by the Spaniards and used as an acclimatizing station. The old Spanish barracks have been enlarged and improved by the American military authorities and, under the name of " Henry Barracks," are used for the same purpose. The town is a popular summer resort for residents of the coast cities. The surrounding country is wooded and very fertile, being especially noted for its coffee and tobacco. The town has large cigar factories. Cayey is connected with Guayama by an excellent military road.

CAYLEY, ARTHUR (1821-1895), English mathematician, was born at Richmond, in Surrey, on the 16th of August 1821, the second son of Henry Cayley, a Russian merchant, and Maria Antonia Doughty. His father, Henry Cayley, retired from business in 1829 and settled in Blackheath, where Arthur was sent to a private school kept by the Rev. G. B. F. Potticary; at the age of fourteen he was transferred to King's College school, London. He soon showed that he was a boy of great capacity, and in particular that he was possessed of remarkable mathe- matical ability. On the advice of the school authorities he was entered at Trinity College, Cambridge, as a pensioner. He was there coached by William Hopkins of Peterhouse, was admitted a scholar of the college in May 1840, and graduated as senior wrangler in 1842, and obtained the first Smith's Prize at the next examination. In 1842, also, he was elected a fellow of Trinity, and became a major fellow in 1845, the year in which he proceeded to the M.A. degree. He was assistant tutor of Trinity for three years. In 1846, having decided to adopt the law as a profession, he left Cambridge, entered at Lincoln's Inn, and became a pupil of the conveyancer Mr Christie. He was called to the bar in 1849, and

remained at the bar fourteen years, till 1863, when he was elected to the new Sadlerian chair of pure mathematics in the university of Cambridge. He settled at Cambridge in the same year, and married Susan, daughter of Robert Moline of Greenwich. He continued to reside in Cambridge and to hold the professorship till his death, which occurred on the 26th of January 1895. From the time he went first to Cambridge till his death he was constantly engaged in mathematical investiga- tion. The number of his papers and memoirs, some of them of considerable length, exceeds 800; they were published, at the time they were composed, in various scientific journals in Europe and America, and are now embodied, through the enter- prise of the syndics of the Cambridge University Press, in thirteen large quarto volumes. These form an enduring monument to his fame. He wrote upon nearly every subject of pure mathe- matics, and also upon theoretical dynamics and spherical and physical astronomy. He was quite as much a geometrician as he was an analyst. Among his most remarkable works may be mentioned his ten memoirs on quantics, commenced in 1854 and completed in 1878; his creation of the theory of matrices; his researches on the theory of groups; his memoir on abstract geometry, a subject which he created; his introduction into geometry of the ” absolute “; his researches on the higher singularities of curves and surfaces; the classification of cubic curves; additions to the theories of rational transformation and correspondence; the theory of the twenty-seven lines that lie on a cubic surface; the theory of elliptic functions; the attraction of ellipsoids; the British Association Reports, 1857 and 1862, on recent progress in general and special theoretical dynamics, and on the secular acceleration of the moon’s mean motion. He is justly regarded as one of the greatest of mathe- maticians. Competent judges have compared him to Leonhard Euler for his range, analytical power and introduction of new and fertile theories. He was the recipient of nearly every academic distinction that can be conferred upon an eminent man

of sdence. Amongst others may be noted honorary degrees by the universities of Oxford, Dublin, Edinburgh, Gottingen, Heidelberg, Leiden and Bologna. He was fellow .or foreign corresponding member of the French Institute, the academies of Berlin, Gottingen, St Petersburg, Milan, Rome, Leiden, Upsala and

Hungary; and he was nominated an officer of the Legion of Honour by President Carnot. At various times he was president of the Cambridge Philosophical Society, of the London Mathematical Society and of the Royal Astronomical Society. He was elected a fellow of the Royal Society in 1852, and received from that body a Royal medal in 1850 and the Copley medal in 1882. He also received the De Morgan medal from the London Mathematical Society, and the Huygens medal from Leiden. His nature was noble and generous, and the universal appreciation of this fact gave him great influence in his university. His portrait, by Lowes Dickinson, was placed in the hall of Trinity College in 1874, and his bust, by Henry Wiles, in the library of the same college in 1888. (P. A. M.)

CAYLUS, ANNE CLAUDE PHILIPPE DE TUBIERES DE GRIMOARD DE PESTELS DE LEVIS, Comte de, Marquis d'Esternay, . baror de Bransac (1692-1765), French archaeo- logist and man of letters, was born at Paris on the 31st of October 1692. He was the eldest son of Lieutenant-General Count de Caylus. His mother, Marthe Marguerite le Valois de Vilette de Murcay, comtesse de Caylus (1673-1729), was a cousin of Mme de Maintenon, who brought her up like her own daughter. She wrote valuable memoirs of the court of Louis XIV. entitled Souvenirs; these were edited by Voltaire (1770), and by many later editors, notably Renouard (1806), Ch. Asselineau (i860), M. de Lescure (1874), M. E. Raunie (1881), J. Soury (1883). While a young man Caylus distinguished himself in the campaigns of the French army, from 1 709 to 1 7 14. After the peace of Rastadt he spent some time in travelling in Italy, Greece, the East, England and Germany, and devoted much attention to the study and collection of antiquities. He became an active member of the Academy of Painting and Sculpture and of the Academy of Inscriptions. Among his antiquarian works are Recueil d'antiquites igyptiennes, Urusques, grecques, romaineS, et gauloises (6 vols., Paris, 1752-1755), Numismata Aurea Impera- torum Romanorum, and a Memoir e (1755) on the method of en- caustic painting with wax mentioned by Pliny, which he claimed to have rediscovered. Diderot, who was no friend to Caylus, maintained that the proper method had been found by J. J. Bachelier. Caylus was an admirable engraver, and copied many of the paintings of the great masters. He caused engravings to be made, at his own expense, of Bartoli's copies from ancient pictures and published Nouveaux sujets de peinture et de sculpture (1755) and Tableaux tire's de I'lliade, de I'Odysse, et de I'EnSide (1757). He encouraged artists whose reputations

were still in the making.but his patronage was somewhat capricious. Diderot expressed this fact in an epigram in his Salon of 1765 : “La mort nous a delivrds du plus cruel des amateurs.” Caylus had quite another side to his character. He had a thorough acquaintance with the gayest and most disreputable sides of Parisian life, and left a number of more or less witty stories dealing with it. These were collected (Amsterdam, i787)as his (Euvres iodines completes. The best of them is the Histoire de M. Guillaume, cocker (c. 1730).

The Souvenirs du comte de Caylus, published in 1805, is of very doubtful authenticity. See also A. and J. de Goncourt, Portraits intimes du X VI I I e siecle; Ch. Nisard’s edition of the Correspondance du comte de Caylus avec le pere Paciaudi (1877); and a notice by O. Uzanne prefixed to a volume of his Faceties (1879).

CAYMAN ISLANDS, a group of three low-lying islands in the West Indies. They consist of Grand Cayman, Little Cayman and Cayman Brae, and are situated between 79 44′ and 8o° 26′ W. and 19 44′ and 19° 46′ N., forming a dependency of Jamaica, which lies 178 m. E.S.E. Grand Cayman, a rock-bound island protected by coral reefs, is 17 m. long and varies from 4 m. to 7 m. in breadth. It has two towns, Georgetown and Boddentown. Little Cayman and Cayman Brae are both about 70 m. E.N.E. of Grand Cayman. Excepting near the rocky coast, the islands are fruitful, mahogany and other valuable timbers with some dye-

wood are grown, and large quantities of coco-nuts are produced by the two smaller islands. Phosphate deposits ofconsiderable value are worked, but the principal occupation of the inhabitants is catching turtles for export to Jamaica. The people are excellent shipwrights and do a considerable trade in schooners built of native wood. The islands are governed by a com- missioner, and the laws passed by the local legislative assembly are subject to the assent of the governor of Jamaica. The population of the group is about 5000. The islands were dis- covered by Columbus, who named them Tortugas from the turtles with which the surrounding sea abounds. They were never occupied by the Spaniards and were colonized from Jamaica by the British.

CAZALES, JACQUES ANTOINE MARIE DE ˆ758-1805), French orator and politician, was born at Grenade in Languedoc, of a family of the lower nobility. Before 1789 he was a cavalry officer, but in that year was returned as deputy to the states general. In the Constituent Assembly he belonged to the section of moderate

royalists who sought to set up a constitution on the English model, and his speeches in favour of retaining the right of war and peace in the king's hands and on the organization- of the judiciary gained the applause even of his opponents. Apart from his eloquence, which gave him a place among the finest orators of the Assembly, Cazales is mainly remembered for a duel fought with Barnave. After the insurrection of the 10th of August 1792, which led to the downfall of royalty, Cazales emigrated. He fought in the army of the emigre's against revolutionary France, lived in Switzerland and in England, arid did not return to France until 1803. He died on the 24th of November 1805. His son, Edmond de Cazales, wrote philo- sophical and religious studies.

See Discours de Cazales, edited by Chare (Paris, 1821), with an introduction; F. A. Aulard, Les Orateurs de la Constituante (2nd ad., Paris, 1905.)

CAZALIS, HENRI (1840-ˆ909), French poet and man of letters, was born at Cormeilles-en-Parisis (Seine-et-Oise) in 1840. He wrote under the pseudonyms of Jean Caselli and Jean Labor. His works include: Chants poptdaires de I'ltalie (1865); Vita tristis, Reveries fantastiques, Romances sans musique (1865);' Le Livre du neant (1872) ; Henry Regnault, sa vie et son ceuvre(i&j2); L' Illusion (1875-1893) ; Melancholia (1878); Cdntique des cantiques (1885); Les Quatrains d'Al-Gazali (1896); William Morris (1897). The author of the Livre du n&ant has a predilec- tion for gloomy subjects and especially for pictures of death. His oriental habits of thought earned for him the title of the " Hindou du Parnasse contemporain." He died in July 1909.

See a notice by P. Bourget in Anthologig des poltes fr. du XIX' siecle , (1887-1888); J. Lemaitre, Les Contemporains (1889); E. Faguet in the Revue bleue (October 1893).

CAZEMBE, the hereditary name of an African chief, whose territory was situated south of Lake Mweru and north of Bangweulu, between 9° and n° S. In the end of the 18th century the authority of the Cazembe was recognized over a very ex- tensive district. The kingdom, known also as the Cazembe, continued to exist, though with gradually diminishing power arid extent, until the last quarter of the 19th century, when the Cazembe sank to the rank of a petty chief. The country is now divided between Great Britain and Belgian Congo. The British half, lying east of the Luapula, forms part of Rhodesia, and the chief town in it is called Kazembe. The native state, ruled by a

negro race who overcame the aboriginals, had attained a certain degree of civilization. Agriculture was diligently followed, and cotton cloth, earthenware and iron goods manufactured. The country contains rich deposits of copper, and copper ore was one of the principal articles of export. The Cazembe had despotic power and used it in barbarous fashion. He had hundreds of wives, and his chiefs imitated his example according to their means. On his accession every new Cazembe chose a new site for his residence. In 1796 the Cazembe was visited by Manoel Caetano Pereira, a Portuguese merchant; and in r798 a more important journey to the same region was undertaken by Dr Francisco Jose Maria de Lacerda. He died in that country oh

the i8tb of October that year, but left behind him a valuable journal. In 1802 two native traders or pombeiros, Pedro Jo ao Baptista and Amaro Jose, were sent by the Portuguese on a visit to the Cazembe; and in 183 1 a more extensive mission was despatched by the Portuguese governor of Sena. It consisted of Major Jos6 Monteiro and Antonio Gamitto, with an escort of 20 soldiers and 120 negro slaves as porters; but its reception by the Cazembe was not altogether satisfactory. In 1868 David Livingstone visited the Cazembe, whose capital at that time numbered no more than 1000 souls. Since 1894, when the country was divided between Britain and the Congo State, it has been thoroughly explored. An important copper mining industry is carried on in the Congo division of the territory.

See The Lands of the Cazembe, published by the Royal Geographical Society in 1873, containing translations of Lacerda and Baptista s journals, and a resume of Gamitto's Muata Cazembe (Lisbon, 1854); also Livingstone's Last Journals (Lofidon, 1874).

CAZIN, JEAN CHARLES (1840-1901), French landscape- painter, son of a well-known doctor, F. J. Cazin (1 788-1 864), was bornat Samer, Pas-de-Calais. AfterstudyinginFrance,he wentto England, where he was strongly influenced by the pre-Raphaehte movement. His chief earlier pictures have a religious interest, shown in such examples as " The Flight into Egypt " (1877), or "Hagar and Ishmael" (1880, Luxembourg); and afterwards his combination of luminous landscape with figure-subjects ("

Souvenir de fSte," 1881; " Journee faite," 1888) gave him a wide repute, and made him the leader of a new school of idealistic subject-painting in France. He was made an officer of the Legion of Honour in 1 889. His charming and poetical treatmen t of landscape is the feature in his painting which in later years has given them an increasing value among connoisseurs. His wife, Marie Cazin, who was his pupil and exhibited her first picture at the Salon in 1876, the same year in which Cazin himself made his debut there, was also a well-known artist and sculptor.

CAZOTTE, JACQUES (1719-1792), French author, was born at Dijon, on the 17th of October 17 19. He was educated by the Jesuits, and at twenty-seven he obtained a public office at Martinique, but it was not till his return to Paris in 1760 with the rank of commissioner-general that he made a public appearance as an author. His first attempts, a mock romance, and a coarse song, gained so much popularity, both in the court and among the people, that he was encouraged to essay something more ambitious. He accordingly produced his romance, Les Prouesses inimitables d'Ollivier, marquis d'fidesse. He also wrote a number of fantastic oriental tales, such as his Mille et unefadaises, Conies a dormir debout (1742). His first success was with a " poenv" in twelve cantos, and in prose intermixed with verse, entitled Ollivier (2 vols., 1762), followed in 1771 by another romance, the Lord Impromptu. But the most popular of his works was the Diable amoureux (1772), a fantastic tale in which the hero raises the devil. The value of the story lies in the picturesque setting, and the skill with which its details are carried out. Cazotte possessed extreme facility and is said to have turned off a seventh canto of Voltaire's Guerre civile de Geneve in a single night. About 1775 Cazotte embraced the views of the Illuminati, declaring himself possessed of the power of prophecy. It was upon this fact that La Harpe based his famous jeu d' esprit, in which he represents Cazotte as prophesying the most minute events of the Revolution. On the discovery of some of his letters in August 1792, Cazotte was arrested; and though he escaped for a time through the love and courage of his daughter, he was executed on the 25 th of the following month.

The only complete edition is the CEuvres badines et morales, historigues et philosophiques de Jacques Cazotte (4 vols., 1816-1817), though more than one collection appeared during his lifetime. An edition de luxe of the Diable amoureux was edited (1878) by A. J. Pons, and a selection of Cazotte's Conies, edited (1880) by Octave Uzanne, is included in the series of Petits

Conteurs du XVIII" Steele. The best notice of Cazotte is in the Illumines (1852) of Gerard de Nerval.

CEANOTHUS, in botany, a genus of the natural order Rhamnaceae, containing about forty species of shrubs or small trees, natives of North America. They are very attractive from their dense panicles of white or blue flowers, and several species are

known as garden plants. The leaves of one of these, C. americanus, New Jersey tea, or red-root, are used instead of the true tea; the root, which contains a red colouring matter, has long been employed by the Indians as a febrifuge.

CEARA, a northern maritime state of Brazil, bounded N. by the Atlantic, E. by the Atlantic and the states of Rio Grande do Norte and Parahyba, S. by Pernambuco. and W. by Piauhy; and having an area of 4°.253 S Q- m – It lies partly upon the north-eˆst slope of the great Brazilian plateau, and partly upon the sandy coastal plain. Its surface is a succession of great ter- races, facing north and north-east, formed by the denudation of the ancient sandstone plateau which once covered this part of the continent; the terraces are seamed by watercourses, and their valleys are broken by hills and ranges of highlands. The latter are usually described as mountain ranges, but they are, in fact, only the remains of the ancient plateau, capped with horizontal strata of sandstone, and having a remarkably uniform altitude of 2000 to 2400 ft. The flat top of such a range is called a chapada or taboleira, and its width in places is from 32 to 56 m. The boundary line with Piauhy follows one of these ranges, the Serra de Ibiapaba, which unites with another range on the southern boundary of the state, known as the Serra do, Araripe. Another range, or escarpment, crosses the state from east to west, but is broken into two principal divisions, each having several local names. These ranges are not continuous, the breaking down of the ancient plateau having been irregular and uneven. The higher ranges intercept considerable moisture from the prevailing trade winds, and their flanks and valleys are covered with forest, but the plateaus are either thinly wooded or open campo. These upland forests are of a scrubby character and are called catingas.

The sandy, coastal plain, with a width of 12 to 18 m., is nearly bare of vegetation. The rivers of the state are small and, with one or two exceptions, become completely dry in the dry season. The largest is the Jaguaribe, which flows entirely across the state in a

north-east direction with an estimated length of 210 to 465 m. The year is divided into a rainy and dry season, the rains beginning in January to March and lasting until June. The dry season, July to December, is sometimes broken by slight showers in September and October, but these are of very slight importance. The soil is thin and porous and does not retain moisture, consequently the long, dry season turns the country into a barren desert, relieved only by vegetation along the river courses and mountain ranges, and by the hardy, widely-distributed carnahuba palm (Copernicia cerif era) , .which in places forms groves of considerable extent. Sometimes the rains fail altogether, and then a drought (sicca) ensues, causing famine and pestilence throughout the entire region. The most destructive droughts recorded are those of 1711, 1723, i777 -I 77 8 » I 79°. 1825, 1844-1845, and 1877-1878, the last-mentioned destroy- ing nearly all the live-stock in the state, and causing the death through starvation and pestilence of nearly half-a-million people, or over half the population. The climate, which is generally de- scribed as healthful, is hot and humid on the coast, tempered by the cool trade winds; but in the more elevated regions it is very hot and dry, although the nights are cool. The sandy zone along the coast is nearly barren, but behind this is a more elevated region with broken surfaces and sandy soil which is amenable to cultivation and produces fruit and most tropical products when conditions are favourable.

The higher plateau is devoted almost exclusively to cattle-raising, once the principal industry of the state, though recurring seccas have been an insuperable obstacle to its profitable develop- ment. There is still a considerable export of cattle, hides and skins, but no effort is made to develop the production of jerked beef on a large scale. Horses are raised to a limited extent; also goats, sheep and swine. The principal agricultural products are cotton, coffee, sugar, mandioca and tropical fruits. The pro- duction of cotton has increased largely since the development of cotton manufactures in Brazil. The natural vegetable pro- ductions are important, and include manicoba or Ceara rubber, carnahuba wax and fibre, caju wine and ipecacuanha.

There are two lines of railway running inland from the coast: the Baturite line from Fortaleza to Senador Pompeu, 179 m., and the

Sobral line from Camocim (a small port) to Ipu, 134 m. These railways were built by the national government after the drought of 1877-1878 to give work to the starving refugees, and are now operated under leases. Great dams were also begun for irrigation purposes.

The misfortunes and poverty of the people have hindered their material development to a large extent, but another obstacle is to be found in their racial and social composition. Only a very small percentage of the population which numbered 805,687 in 1890, and 849,127 in 1900, is of pure European origin, the great majority being of the coloured races and their mixtures with the whites. The number of landed proprietors, professional men, merchants, &c, is comparatively small (about one-sixth), and a part of these are of mixed blood; the remaining five-sixths own no property, pay no taxes, and derive no benefits from the social and political institutions about them beyond the protection of the proprietors upon whose estates they live, the nominal protection of the state, and an occasional day's wage. Education has made no impression upon such people, and is confined almost exclusively to the upper classes, from which some of the most prominent men in Brazilian politics and literature have come. The state of Ceara has formed a bishopric of the Roman Catholic Church since 1853, the bishop having his residence at Fortaleza. The state is represented in the national congress by three senators and ten deputies. Its local government is vested in a president and legislative assembly of one chamber elected for a period of four years. Three vice-presidents are elected at the same time who succeed to the presidency in case of a vacancy according to the number of votes received. The judicial organization con- sists of the tribunal da Relaca.6 at the state capital and sub- ordinate courts in the comarcas and termos. The judges of the higher courts are appointed for life. The capital of the state is Fortaleza, sometimes called Ceara, which is also the principal commercial centre and shipping port. The principal towns are Aracaty, Baturite, Acarahu, Crato, Maranguape and Sobral. The territory of Ceara. includes three of the capitanias originally granted by the Portuguese crown in 1534. The first attempts to settle the territory failed, and the earliest Portuguese settle- ment was made near the mouth of the Rio Camocim in 1604. The French were already established on the coast, with their headquarters at Saint Louis, now Mar'anh ao. Ceaf a was occupied by the Dutch from 1637 to 1654, and became a dependency of Pernambuco in 1680; this relationship lasted until

1799, when the capitania of Ceara was made independent. The capitania became a province in 1822 under Dom Pedro I. A revolution followed in 1824, the president of the province was deposed fifteen days after his arrival, and a republic was proclaimed. Internal dissensions immediately broke out, the new president was as- sassinated, and after a brief reign of terror the province resumed its allegiance to the empire. Ceara. was one of the first provinces of Brazil to abolish slavery.

See Rodolpho Theophilo, Historia da Secca do Ceara, 1877 a 1880 (Fortaleza, 1883) ; Professor and Mrs Louis Agassiz, A Journey in Brazil (Boston, 1869); George Gardiner, Travels in the Interior of Brazil (London, 1846) ; C. F. Hartt, Geology and Physical Geography of Brazil (Boston, 1870); and H. H. Smith, Brazil: the Amazon and the Coast (New York, 1879).

CEAWLIN (d. 593), king of the West Saxons, first mentioned in the Anglo-Saxon Chronicle under the date 556 as fighting with his father Cynric against the Britons at the battle of Beranbyrig or Barbury Hill. Becoming king in 560, he began a career of conquest. Silchester was taken, and moving eastwards Ceawlin and his brother Cutha defeated the forces of ˆEthelberht, king of Kent, at the battle of Wibbandun in 568. In 577 he led the West Saxons from Winchester towards the Severn valley; gained an important victory over some British kings at Deorham, and added the district round /Gloucester, Bath and Cirencester to his kingdom. A further advance was begun in 583. Uriconium, a town near the Wrekin, and Pengwyrn, the modern Shrewsbury, were destroyed; but soon Ceawlin was defeated by the Britons

at Fethanleag or Faddiley, near Nantwich, and his progress was effectually checked. Intestine strife among the West Saxons followed. In 591 Ceawlin lost the western part of his kingdom, and in 592 was defeated by his nephew, Ceolric, at Wanborough, and driven from Wessex. He was killed in 593, possibly in an attempt to regain his kingdom. Ceawlin is included in the Chronicle among the Bretwaldas.

See Two of the Saxon Chronicles, ed. by C. Plummer (Oxford, 1892); Dictionary of National Biography, vol. ix (London, 1887); E. Guest, Origines Celticae, vol. ii. (London, 1883),

CEBES, the name of two Greek philosophers. (1) Cebes of Cyzicus, mentioned in Athenaeus (iv. 156 d), seems to have been a Stoic, who lived during the reign of Marcus Aurelius. Some would

attribute to him the Tabula Cebetis (see below), but as that work was well known in the time of Lucian, it is probably to be placed earlier. (2) Cebes of Thebes, a disciple of Socrates and Philolaus. He is one of the speakers in the Phaedo of Plato, in which he is represented as an earnest seeker after virtue and truth, keen in argument and cautious in decision. Three dialogues, the 'Eˆdonn, the Qphvixos and the IIiVa£ or Tabula, are attributed to him by Suidas and Diogenes Laertius. The two former are lost, and most scholars deny the authenticity of the Tabula on the ground of material and verbal anachronisms. They attribute it either to Cebes of Cyzicus (above) or to an anonymous author, of the 1st century A.D., who assumed the characteV of Cebes of Thebes. The work professes to be an interpretation of an allegorical picture in the temple of Cronus at Athens or Thebes. The author develops the Platonic theory of pre-existence, and shows that true education consists not in mere erudition, but rather in the formation of character.

The Tabula has been widely translated both into European languages and into Arabic (the latter version published with the Greek text and Latin translation by Salmasius in 1640). It is usually printed together with Epictetus. Separate editions by C. S. Jerram (with introduction and notes, 1878), C. Prachter (1893), and many others. See Zeller's History of Greek Philosophy; F. Klopfer, De Cebetis Tabula (1818-1822); C. Prachter, Cebetis Tabula quanam aetate conscripta esse videatur (1885).

CEBtJ, a city and municipality, port of entry, and the capital of the province of Cebu, island of Cebu, Philippine Islands, on the E. coast, a little N. of the centre. Pop. (1903) of the city proper, 18,330;. of the municipality, 31,079; in the same year, after the census enumeration, the neighbouring municipalities of Mabolo (pop. 1903, 8454) and EI Pardo (pop. 6461) were added to the municipality of Cebu. The surrounding country, which is level and fertile, is traversed by several good carriage roads. The port, formed by the north-west shore of the island of Mactan, is well protected from violent winds, and in front of it stands a picturesque Spanish fort. The streets are wide and regularly laid out. The government buildings are fairly good, and the church buildings very fine. Cebu is an episcopal see, and the palace of the bishop, although small, is widely known for its interior decorations. The Augustinian church is famous for its so-called miraculous image of Santo Nino. The Recoleto monastery and the seminary of San Carlos are worthy of mention. The cathedral was finished toward the end of the eighteenth century. The San Jose

hospital here was founded by one of the religious orders. There was a leper hospital in the outskirts of the city until 1906, when a leper colony was established on the island of Culion. Commercially, Cebu is the second city of the Philippines. Hemp, tobacco, sugar and copra are the most important exports. In addition to the trade with foreign ports, an important domestic commerce is carried on with Manila, Bohol, Negros and northern Mindanao. Salt, pottery and fabrics of silk, sinamay, hemp and cotton are manufactured, and sugar sacks are woven in considerable quantity. The island of Cebu is known for its excellent mangoes and for the rare cornucopia-shaped sponges, called Venus's flower basket {Euplectella aspergillum), found here. Historically Cebu is famous as the scene of Magellan's landing in 1521. A cross, said to be the one first erected by him, is still preserved in the cathedral. The great explorer lost his life in the neighbouring island of Mactan; a monument marks the place where he was

killed. The first Spanish settlement in the Philippines was established at Cebu in 1565, and from that year to 1571 it was the capital of the colony. The city is unincorporated. The language is Cebu-Visayan.

CECCO D'ASCOLI (i257-i327),the popular name of Francesco degli Stabixi, a famous Italian encyclopaedist and poet — Cecco being the diminutive of Francesco, and Ascoli, in the marshes of Ancona, the place of the philosopher's birth. He devoted himself to the study of mathematics and astrology, and in 1322 was made professor of the latter science at the university of Bologna. It is alleged that he entered the service of Pope John XXII. at Avignon, and that he cultivated the acquaintance of Dante only to quarrel with the great poet afterwards; but of this there is no evidence. It is certain, however, that, having published a commentary on the sphere of John de Sacrobosco, in which he propounded audacious theories concerning the employment and agency of demons, he got into difficulties with the clerical party, and was condemned in 1324 to certain fasts and prayers, and to the payment of a fine of seventy crowns. To elude this sentence he betook himself to Florence, where he was attached to the household of Carlo di Calabria. But his free- thinking and plain speaking had got him many enemies; he had attacked the

Commedia of Dante, and the Canzone d' A more of Guido Cavalcanti; and his fate was sealed. Dino di Garbo, the physician, was indefatigable in pursuit of him; and the old accusation of impiety being renewed, Cecco was again tried and sentenced, this time to the stake. He was burned at Florence the day after sentence, in the seventieth year of his age.

Cecco d' Ascoli left many works in manuscript, most of which have never been given to the world. The book by which he achieved his renown and which led to his death was the Acerba (from acervus), an encyclopaedic poem, of which in 1546, the date of the last reprint, more than twenty editions had been issued. It is unfinished, and consists of four books in sesta rima. The first book treats of astronomy and meteorology; the second of stellar influences, of physiognomy, and of the vices and virtues; the third of minerals and of the love of animals; while the fourth propounds and solves a number of moral and physical problems. Of a fifth book, on theology, the initial chapter alone was com- pleted. A man of immense erudition and of great and varied abilities, Cecco, whose knowledge was based on experiment and observation (a fact that of itself is enough to distinguish him from the crowd of savants of that age),had outstripped his contempor- aries in many things. He knew of metallic aerolites and shooting stars; the mystery of the dew was plain to him; fossil plants were accounted for by him through terrene revolutions which had resulted in the formation of mountains; he is even said to have divined the circulation of the blood. Altogether a remark- able man, he may be described as one of the many Cassandras of the middle ages — one of the many prophets who spoke of coming light, and were listened to but to have their words cast back at them in accusations of impiety and sentences of death.

The least faulty of the many editions of the Acerba is that of Venice, dated 1510. The earliest known, which has become exces- sively rare, is that of Brescia, which has no date, but is ascribed to 1473 or thereabouts.

CECIL, the name of a famous English family. This house, whose two branches hold each a marquessate, had a great statesman and administrator to establish and enrich it. The first Lord Burghley's many inquiries concerning the origin of his family created for it more than one splendid and improbable genealogy, although his grandfather is the first ascertained ancestor. In the latter half of the 15th century a family of yeomen or small gentry

with the surname of Seyceld, whose descendants were accepted by Lord Burghley as his kinsmen, lived on their lands at Allt yr Ynys in Walterstone, a Hereford- shire parish on the Welsh marches. Of the will of Richard ap Philip Seyceld of Allt yr Ynys, made in 1508, one David ap Richard Seyceld, apparently his younger son, was overseer. This David seems identical with David Cyssell, Scisseld or Cecill, a yeoman admitted in 1494 to the freedom of Stamford in Lincoln- shire. He may well have been one of those men from the Welsh

border who fought at Bosworth, for at the funeral of Henry VII. he appears as a yeoman of the guard and is given a livery of black cloth. At Stamford he prospered, being three times mayor and three times member of parliament for the borough, and he served as sheriff of Northamptonshire in 1532-1533. Remaining in the service of Henry VIII. he was advanced to be yeoman of the chamber and sergeant-at-arms, being rewarded with several profitable leases and offices. His first wife was the daughter of a Stamford alderman, and his second the already twice widowed heir of a Lincolnshire squire. By the first marriage David CeGil left at his death in 1536 a son and heir, Richard Cecil, who enjoyed a place at court as yeoman of the king's wardrobe under Henry VIII. and Edward VI. A gentleman of the privy chamber and sometime sheriff of Rutland, Richard Cecil had his share at the distribution of abbey lands, St Michael's priory in Stamford being among the grants made to him. William Cecil, only son of Richard, was born, by his own account, in 1520, at Bourne in Lincolnshire. He advanced himself first in the service of the protector Somerset, after whose fall, his great abilities being necessary to the council, he was made a secretary of state and sworn of the privy council. In 1 571 he was created Lord Burghley, and from 1572, when he was given the Garter, he was lord high treasurer and principal minister to Queen Elizabeth. By his first wife, Mary Cheke, sister of the scholar Sir John Cheke, tutor to Edward VI., he was father to Thomas, first earl of Exeter. By a second wife, Mildred Cooke, the most learned lady of her time, he had an only surviving son, Robert Cecil, ancestor of the house of Salisbury.

Created earl of Exeter by James I., the second Lord Burghley was more soldier than statesman, and from his death to the present day the elder line of the Cecils has taken small part in public affairs. William Cecil, 2nd earl of Exeter, took as his first wife the Lady Roos, daughter and heir of the 3rd earl of Rutland of the Manners family. The son of this marriage in- herited the barony

of Roos as heir general, and died as a Roman Catholic at Naples in 1618 leaving no issue. A third son of the 1st earl was Edward Cecil, a somewhat incompetent military commander, created in 1625 Lord Cecil of Putney and Viscount Wimbledon, titles that died with him in 1638, although he was thrice married. In 1801 a marquessate was given to the 10th earl of Exeter, the story of whose marriage with Sarah Hoggins, daughter of a Shropshire husbandman, . has been refined by Tennyson into the romance of ” The Lord of Burleigh.” This elder line is still seated at Burghley, the great mansion built by their ancestor, the first lord.

The younger or Hatfield line was founded by Robert Cecil, the only surviving son of the great Burghley’s second marriage. As a secretary of state he followed in his father’s steps, and on the death of Elizabeth he may be said to have secured the accession of King James, who created him Lord Cecil of Essendine (1603), Viscount Cranborne (1604), and earl of Salisbury (1605). Forcedbytheking to exchange his house of Theobalds for Hatfield, he died in 161 2, worn out with incessant labour, before he could inhabit the house which he built upon his new Hertfordshire estate. Of Burghley and his son Salisbury, “great ministers of state in the eyes of Christendom,” Clarendon writes that ” their wisdom and virtues died with them.” The 2nd earl of Salisbury, ” a man of no words, except in hunting and hawking,” was at first remarked for his obsequiousness to the court party, but taking no part in the Civil War came at last to sit in the Protector’s parliament. After the Restoration, Pepys saw him, old and discredited, at Hatfield, and notes him as ” my simple Lord Salisbury.” The 7th earl was created marquess of Salisbury in 1789.

Hatfield House, a great Jacobean mansion which has suffered much from restoration and rebuilding, contains in its library the famous series of state papers which passed through the hands of Burghley and his son Salisbury, invaluable sources for the history of their period. (O. Ba.)

CECILIA, SAINT, in the Catholic Church the patron saint of music and of the blind. Her festival falls on the 22nd of Novem’- ber. It was long supposed that she was a noble lady of Rome

who, with her husband and other friends whom she had con- : verted, suffered martydom, c. 230, under the emperor Alexander Severus. The researches of de Rossi, however {Rom. sott. ii. 147), go to confirm the statement of Fortunatus, bishop of Poitiers (d. 600), that she perished in Sicily under Marcus Aurelius between 176 and 180. A church in her honour existed in Rome from about the 4th century, and was rebuilt with much splendour by Pope Paschal I. about the year 820, and again by Cardinal Sfondrati in 1 599. It is situated in the Trastevere near the Ripa Grande quay, where in earlier days the Ghetto was located, and gives a ” title ” to a cardinal priest. Cecilia, whose musical fame rests on a passing notice in her legend that she praised God by instrumental as well as vocal music, has inspired many a masterpiece in art, including the Raphael at Bologna, the Rubens in Berlin, the Domenichino in Paris, and in literature, where she is commemorated especially by Chaucer’s ” Seconde Nonnes Tale,” and by Dryden’s famous ode, set to music by Handel in 1736, and later by Sir Hubert Parry (1889).

Another St Cecilia, who suffered in Africa in the persecution of Diocletian (303-304), is commemorated on the nth of February.

See U. Chevalier, Repertoire des sources historigues (1905), i. 826 f.

CECROPIA, inbotany,agenusof trees (natural order MorSceae), native of tropical America. They are of very rapid growth, affording a light wood used for making floats. C. peltata is the trumpet tree, so-called from the use made of its hollow stems by the Uaupe Indians as a musical instrument. It is a tree reaching about 50 ft. in height with a large spreading head, and deeply lobed leaves 12 in. or more in diameter. The hollows of the stem and branches are inhabited by ants, which in return for the shelter thus afforded, and food in the form of succulent growths on the base of the leaf-stalks, repel the attacks of leaf- cutting ants which would otherwise strip the tree of its leaves. This is an instance of ” myrmecophily,” i.e. a living together for, mutual benefit of the ants and the plant.

CECROPS (KkpoiA), traditionally the first king of Attica, and the founder of its political life (Pausanias ix. 33). He was said to have divided the inhabitants into twelve communities, to have instituted the laws of marriage and property, and a new form of worship. The introduction of bloodless sacrifice, the burial of the dead, and the invention of writing were also attributed to him.

He is said to have acted as umpire during the dispute of Poseidon and Athena for the possession of Attica. He decided in favour of the goddess,who planted the firstolivetree, which he adjudged to be more useful than the horse (or water) which Poseidon caused to spring forth from the Acropolis rock with a blow of his trident (Herodotus viii. 55 ; Apollodorus iii. 14). As one of the autochthones of Attica, Cecrops is represented as human in the upper part of his body, while the lower part is shaped like a dragon (hence he is sometimes called Sufrvhs or geminus, Diod. Sic. i. 28; Ovid, Metam. ii. 555). Miss J. E. Harrison (in Classical Review, January 1895) endeavours to show that Cecrops is the husband of Athene, identical with the snake- like Zeus Soter or Sosipolis, and the father of Erechtheus- Erichthonius.

CEDAR (Lat. cedrus, Gr. KeSpot), a name applied to several members of the natural order Coniferae. The word has been derived from the Arabic Kedr, worth or value, or from Kedrat, strong, and has been supposed by some to have taken its origin from the brook Kedron, in Judaea.

Cedrus Libani, the far-famed Cedar of Lebanon, is a tree which, on account of its beauty, stateliness and strength, has always been a favourite with poets and painters, and which, in the ‘ figurative language of prophecy, is frequently employed in the Scriptures as a symbol of power, prosperity and longevity. It grows to a vertical height of , from 50 to 80 ft. — ” exalted above all trees of the field ” — and at an elevation of about 6000 ft. above sea-level. In the young, tree, the bole is straight and upright, and one or two leading branches rise above the rest. As the tree increases in size, however, the upper branches become mingled together, and the tree is then clumpˆheaded. Numerous lateral ramifying branches spread out from the main trunk in a I

horizontal direction, tier upon tier, coverings compass of ground the diameter of which is often greater than the height of the tree. William Gilpin, in his Forest Scenery, describes a cedar which, at an age of about 118 years, had attained to a height of 53 ft. and had a horizontal expanse of 96 ft. The branchlets of the cedar take the same direction as the branches, and the foliage is very dense. The tree, as with the rest of the fir-tribe, except the larch, is evergreen; new leaves are developed every spring, but their fall is gradual. In shape the leaves are straight, tapering, cylindrical and pointed; they are about 1 in. long and of a dark green colour, and grow in alternate tufts of about thirty in number. The male and female flowers grow on the same tree, but

are separate. The cones, which are on the upper side of the branches, are flattened at the ends and are 4 to 5 in. in length and 2 in. wide; they take two years to come to perfection and while growing exude much resin. The scales are close pressed to one another and are reddish in colour. The seeds are provided with a long membranous Wing. The root of the tree is very strong and ramifying. The cedar flourishes best on sandy, loamy soils. It still grows on Lebanon, though for several centuries it was believed to be restricted to a small grove in- the Kadisha valley at 6000 ft. elevation, about 15 m. from Beyrout. The number of trees in this grove has been gradually diminishing, and as no young trees or seedlings occur, the grove will probably become extinct in course of time. Cedars are now known to occur in great numbers on Mt. Lebanon, chiefly on the western slopes, not forming a continuous forest, but in groves, some of which contain several thousands of trees. There are also large forests on the higher slopes of the Taurus and Anti-Taurus mountains. Lamartine tells us that the Arabs regard the trees as endowed with the principles of continual existence, and with reasoning and prescient powers, which enable them to prepare for the changes of the seasons.

The wood of the cedar of Lebanon is fragrant, though not so strongly scented as that of the juniper or red-cedar of America. The wood is generally reddish-brown, light and of a coarse grain and spongy texture, easy to work, but liable to shrink and warp. Mountain-grown wood is harder, stronger, less liable to warp and more durable;

The cedar of Lebanon is cultivated in Europe for ornament only. It can be grown in parks and gardens, and thrives well; but the young plants are unable to bear great variations of temperature. The cedar is not mentioned in Evelyn's Silva (1664), but it must have been introduced shortly afterwards. The famous Enfield cedar was planted by Dr Robert Uvedale, (1642-17 2 2)., a noted schoolmaster and horticulturist, between 1662-1670, and an old cedar at Bretby Park in Derbyshire is known to have been planted in 1676. Some very old cedars exist also at Syon House, Woburn Abbey, Warwick Castle and elsewhere, which presumably date from the 17th century. The first cedars in Scotland were planted at Hopetoun House in 1740; and the first one said to have been introduced into France was brought from England by Bernard de Jussieu in 1734, and placed in the Jardin des Plantes. Cedar-wood is earliest noticed in Leviticus xiv. 4, 6, where it is prescribed among the materials to be used for the

cleansing of leprosy ; but the wood there spoken of was probably that of the juniper. The term Eres (cedar) of Scripture does not apply strictly to one kind of plant, but was used indefinitely in ancient times, as is the word cedar at present. The term arz is applied by the Arabs to the cedar of Lebanon, to the common pine-tree, and to the juniper; and certainly the ” cedars ” for masts, mentioned in Ezek. xxvii. 5, must have been pine-trees. It seems very probable that the fourscore thousand hewers employed by Solomon for cutting timber did not confine their operations simply to what would now be termed cedars and fir-trees. Dr John Lindley considered that some of the cedar- trees sent by Hiram, king of Tyre, to Jerusalem might have been procured from Mount Atlas, and have been identical with Callitris.quadrivalvis, or arar-tree, the wood of which is hard and durable, and was much in request in former times for the building of temples. The timber-work of the roof of Cordova cathedral, built eleven centuries ago, is composed of it. In the time> of

Vitruvius ” cedars ” were growing in Crete, Africa and Syria. Pliny says that their wood was everlasting, and therefore images of the gods were made of it; he makes mention also of the oil of cedar, or cedrium, distilled from the wood, and used by the ancients for preserving their books from moths and damp; papyri anointed or rubbed with cedrium were on this account called ced ati libri. Drawers of cedar or chips of the wood are now employed to protect furs and woollen stuffs from injury by moths. Cedar-wood, however, is said to be injurious to natural history objects, and to instruments placed in cabinets made of it, as the resinous matter of the wood becomes deposited upon them. Cedria, or cedar resin, is a substance similar to mastic, that flows from incisions in the tree; and cedar manna is a sweet exudation from its branches.

The genus Cedrus contains two other species closely allied to C. Libani— Cedrus Deodar a, the deodar, or ” god tree ” of the Himalayas, and Cedrus aUantica, of the Atlas range, North Africa. The deodar forms forests on the mountains of Afghan- istan, North Beluchistan and the north-west Himalayas, flourish- ing in all the higher mountains from Nepal up to Kashmir, at an elevation of from 5500 to 12,000 ft.; on the peaks to the northern

side of theBoorung Pass it grows to a height of 60 to 70 ft. before branching. The wood is close-grained, long-fibred, perfumed -and highly resinous, and resists the action of water. The foliage is of a paler green, the leaves are slender and longer, and the twigs are thinner than those of C. Libani. The tree is employed for a variety of useful purposes, especially in building. It is now much cultivated in England as an ornamental plant. C. aUantica, the Atlas cedar, has shorter and denser leaves than C. Libani; the leaves are glaucous, sometimes of a silvery whiteness, and the cones smaller than in the other two forms; its wood also is hard, and more rapid in growth than is that of the ordinary cedar. It is found at an altitude above the sea of from 4000 to 6000 ft.

The name cedar is applied to a variety of trees, including species of several genera of Conifers, Juniperus, Thuja, Libocedrus and Cupressus. Thuja gigantea of western North America is known in the United States as White (or Yellow) cedar, and the same name is applied to Cupressus Lawsoniana, the Port Orford or Oregon cedar, a native of the north-west States, and one of the most valuable juniper trees of North America. The Bermuda cedar {Juniperus bermudiana) and the red or American cedar (/. virginiana) are both much used in joinery and in the manufacture of pencils; though other woods are now superseding them for pencil-making. The Japanese cedar (Cryptomeria japonica) is a kind of cypress, the wood of which is very durable. Another species of cypress (Cupressus thyoides, also known as Chamaetyparis thyoides or sphaeroidea), found in swamps in the south of Ohio and Massachusetts, is known as the American white cedar. It has small leaves and fibrous bark, the wood is light, soft and easily-worked, and very durable in contact with the soil, and is much used for boat-building and for making fences and coopers' staves. The Spanish cedar is a name applied to Juniperus tkurifera, a native of the western Mediterranean region, and also to another speties, /. Oxy cedrus, a common plant in the Mediterranean region, forming a shrub or low tree with spreading branches and short, stiff, prickly leaves. The latter was much used by the Greeks for making images; and its empyreumatic oil, Huile de Cade, is used medicinally for skin-diseases. A species of cypress, Cupressus lusitanica, which has been naturalized in the neighbourhood of Cintra is known as the cedar of Goa. The genus Widdringtonia of tropical and South Africa is also known locally as cedar. W. juniperoides is the characteristic tree of the Cederberg range in Cape Colony, while W. Whytei, recently discovered in Nyasaland and Rhodesia (the Mlanje cedar) is a

fine tree reaching 150 ft. in height, and yielding an ornamental light yellow-brown wood, suitable for building. The order Cedrelaceae (which is entirely distinct from the Conifers) includes, along with the mahoganies and other valuable timber-trees, the Jamaica and the Australian red cedars, Cedrela odorata, and C. Toona respectively. The cedar-wood of Guiana, used for making canoes, is a species of the natural order Bur-

seraceae, Idea alHssima. It is a large tree, reaching 100 ft. in height, the wood is easily worked, fragrant and durable.

See Gordon's Pinetum; Loiseleur-Deslongchamps, Histoire du cedre du Liban (Paris, 1838) ; Loudon, Arboretum Britannicum, vol. iv. pp. 2404-2432 (London, 1839) ; Marquis de Chambray, Traite pratique des arbres resineux coniferes (Paris, 1845); J- D- Hooker, Nat. Hist. Review (January, 1862), pp. 11-18; Brandis, Forest Flora of North-west and Central India, pp. 516-525 (London, 1874) ; Veitch, Manual of Coniferae (2nd ed., London, 1900).

CEDAR CREEK, a small branch of the North Fork of the Shenandoah river, Virginia, U.S.A. It is known in American history as the scene of a memorable battle, which took place on the 19th of October 1864, between the Union army under Major-General P. H. Sheridan and the Confederates under Lieut.-General J. A. Early. (See Shenandoah Valley Campaigns.)

CEDAR FALLS, a city of Black Hawk county, Iowa, U.S.A., on the Cedar river, about 100 m. W. of Dubuque. Pop. (1890) 3459; (i9°°) 53*9; (190S, state census) 5329 (872 being foreign- born); (1910) 5012. It is served by the Chicago, Rock Island & Pacific, the Illinois Central, the Chicago Great Western, and the Waterloo, Cedar Falls & Northern railways. Its manufactures include flour, ground feed, other cereal preparations, hardware specialties, canned vegetables (especially Indian corn), and plan- ing-mill products. It is the seat of the state normal school (1876), and has a public library. The settlement of the place, the oldest in the county, was begun in 1847; it was laid out as a town in 185 1, incorporated as a village in 1857, chartered as a city in 1865, and for a short time in 1853 was the county-seat.

CEDAR RAPIDS, a city of Linn county, Iowa, U.S.A., on the Cedar river, in the east central part of the state. Pop. (1896) 18,020; (1900) 25,656, of whom 4478 were foreign-born, an unusually large and influential part being Bohemians; (1910 census)

32,811. It is served by the Chicago, Milwaukee & Saint Paul, the Chicago & North- Western, the Chicago, Rock Island & Pacific (which has repair shops here), and the Illinois Central railways, and by interurban electric lines. The city has an air of substantial prosperity; its principal streets are from 80 ft. to 1 20 ft. wide, paved with brick and asphalt, and well shaded. Prominent among its buildings are the federal building, the auditorium, the public library and the Masonic library, which contains one of the best collections of Masonic literature in the world. The city has two well-equipped hospitals, a home for aged women, a home for the friendless, and four parks. The grounds of the Cedar Rapids country club comprise 180 acres. Cedar Rapids is in a rich agricultural country. The name of the city was suggested from the rapids in the river, which afford abundant water power and have enabled the city to take first rank in Iowa (1905) as a manufacturing centre. From 1900 to 1905 there was an increase in the value of its manufactured products from $11,135,435 to $16,279,706, or 46-2%. More than one-fourth of the value of its manufactures is in Quaker Oats and other food preparations; among those of less importance are lumber and planing-mill products, foundry and machine- shop products, furniture, patent medicines, pumps, carriages and waggons, packed meats and agricultural implements. Cedar Rapids has also a large grain trade and a large jobbing business, especially in dry goods, millinery, groceries, paper and drugs. At Cedar Rapids are Coe College (co-educational; Presbyterian), which grew out of the Cedar Rapids Collegiate Institute (1851), was named in honour of Daniel Coe, a benefactor, and was chartered under its present name and opened in 1881; the Interstate Correspondence schools, and the Cedar Rapids business college. The first settlers came in 1838; but the city's early growth was slow, and it was not incorporated until 1856. It has been governed by commission since 1908.

CEFALU (anc. Cephaloedium) , a seaport and episcopal see of the province of Palermo, Sicily, 42 m. E. of Palermo by rail. Pop. (1901)13,273. The ancient town (of Sicel origin, probably, despite its Greek name) takes its name from the headland (Kta\ii, head) upon which it stood (1233 ft.); its fortifications extended to the shore, on the side where the modern town now is, in the form of two long walls protecting the port. There are remains of a wall of massive rectangular blocks of stone at the

modern Porta Garibaldi on the south. It does not appear in history before 396 B.C., and seems to have owed its importance mainly to its naturally strong position. The only ancient remains on the mountain are those of a small building in good polygonal work (a style of construction very rare in Sicily), consisting of a passage on each side of which a chamber opens. The doorways are of finely-cut stone, and of Greek type, and the date, though uncertain, cannot, from the careful jointing of the blocks, be very early. On the summit of the promontory are extensive remains of a Saracenic castle. The new town was founded at the foot of the mountain, by the shore, by Roger II. in 1131, and the cathedral was begun in the same year. The exterior is well preserved, and is largely decorated with interlacing pointed arches; the windows also are pointed. On each side of the facade is a massive tower of four storeys. The round-headed Norman portal is worthy of note. The interior was restored in 1559, though the pointed arches of the nave, borne by ancient granite columns, are still visible: and the only mosaics preserved are those of the apse and the last bay of the choir: they are remarkably fine specimens of the art of the period (1148) and, though restored in 1859-1862, have suffered much less than those at Palermo and Monreale from the process. The figure of the Saviourisespecially fine. The groined vaulting of the roof isvisible in the choir and the right transept, while, the rest of the church has a wooden roof. Fine cloisters, coeval with the cathedral, adjoin it. (See G. Hubbard in Journal of the R.I.B.A. xv. SS3 sqq., 1908.) The harbour is comparatively small. (T. As.)

CEHEGiN, a town of south-eastern Spain, in the province of Murcia, on the right bank of the river Caravaca, a small tributary Of the Segura. Pop. (1900) 11,601. Cehegin has a thriving trade in farm produce, especially wine, olive oil and hemp; and various kinds of marble are obtained from quarries near the town. Some of the older houses, however, as well as the parish church and the convent of San Francisco, which still has well-defined Roman inscriptions on its walls, are built of stone from the ruins of Begastri, a Roman colony which stood on a small adjacent hill known as the Cabecico de Roenas. The name Cehegin is sometimes connected by Spanish antiquaries with that of the Zenaga, Senhaja or Senajeh, a North African tribe, which invaded Spain in the nth century.

CEILING (from a verb ” to ceil,” i.e. to line or cover; of disputed

etymology, but apparently connected with Fr. del, Lat. caelum, sky), in architecture, the upper covering of a church, hall or room. Ceilings are now usually formed of plaster, but in former times they were commonly either boarded (of which St Albans cathedral is perhaps the earliest example), or showed the beams and joists, which in England were moulded and carved, and in France and Italy were richly painted and gilded. Sometimes the ceilings were horizontal, sometimes canted on two sides, and sometimes they take the form of a barrel-vault. Ribs are sometimes planted on the boarding to divide up the surface, and their intersections are enriched with bosses. About the middle of the 16th century the ceilings were formed in plaster with projecting ribs, interlaced ornament and pendants, and the characteristics of the Elizabethan style. At Bramall Hall, Broughton Castle, Hatfield, Knowle, Sizergh and Levens in Westmorland, and Dorfold in Cheshire, are numerous examples, some with pendants. In Italy, at the same period, the plaster ceilings were based on the forms taken by vaulting; they were of infinite variety and were richly decorated with sunk panels containing the Roman conventional foliage. Raphael, about 152°, reproduced in the Vatican some of the stucco-duro ornament which he had studied in the Golden House of Nero, excavated under his directions. Later, about the middle of the 1 6th century, great coves were formed round the room, which were decorated with cartouches and figures in relief, garlands and swags. The great halls of the Ducal Palace at Venice and the galleries of the Pitti Palace at Florence were ceiled in this way. These coved ceilings were introduced into England in the middle of the 17th century. In Holyrood Palace at Edinburgh there is a fine ceiling of 1671, with figures (probably executed by Italian craftsmen) and floral wreaths.

At Coleshill, Berkshire, a ceiling by Inigo Jones (1650) shows a type which became more or less universal for a century, viz. deeply sunk panels with modillions round, and bands enriched with foliage, fruit, &c, in bold relief. Wren, Nicholas Hawks-moor, James Gibbs, John Webb and other architects continued on the same lines, and in 1760 Robert Adam introduced his type of ceiling, sometimes horizontal, and sometimes segmental, in which panels are suggested only, with slight projecting lines and rings of leaves, swags and arabesque work, which, like Raphael's, was found on the ceilings of the Roman tombs and baths in Rome and Pompeii. George Richardson followed with similar work, and Sir W. Chambers, in the rooms originally

occupied by the Royal Academy and the learned societies in Somerset House, designed many admirable ceilings. The moulds of all the orna- mental devices of Robert Adam are preserved and are still utilized for many modern ceilings. (R. P. S.)

CEILLIER, REMY (1688-1761), Benedictine monk of the Lorraine congregation of St Vannes. He was the compiler of an immense Patrology, Histoire genirale des auteurs sacris et eccltsiastiques (23 vols., Paris, 17 29-1 763), being a history and analysis of the writings of all the ecclesiastical writers of the first thirteen centuries. He put infinite trouble and time into the work, and many portions of it are exceedingly well done. A later and improved edition was produced in Paris, 1858, in 14 vols. Ceillier's other work, Apologie de la morale des peres de Viglise (Paris, 1718), also won some celebrity.

CELAENAE, an ancient city of Phrygia, situated on the great trade route to the East. Its acropolis long held out against Alexander in 333 and surrendered to him at last by arrangement. His successor, Eumenes, made it for some time his headquarters, as did Antigonus until 301. From Lysi- machus it passed to Seleucus, whose son Antiochus, seeing its geographical importance, refounded it on a more open site as Apamea (q.v.). West of the acropolis were the palace of Xerxes and the Agora, in or near which is the cavern whence the Marsyas, one of the sources of the Maeander, issues. According to Xenophon, Cyrus had a palace and large park full of wild animals at Celaenae.

See G. Weber, Dineir-Celenes (1892).

CELANDINE, Chelidonium majus, a member of the poppy family, an erect branched herb from 1 to 2 ft. high with a yellow juice, much divided leaves, and yellow flowers nearly an inch across, succeeded by a narrow thin pod opening by a pair of thin valves, separating upwards. The plant grows in waste places and hedgerows, and is probably an escape from cultiva- tion. The lesser celandine is a species of Ranunculus (R. Ficaria) , a small low-growing herb with smooth heart-shaped leaves and bright yellow flowers about an inch across, borne each on a stout stalk springing from a leaf-axil. It flowers in early spring, in pastures and waste-places.

CELANO, a town of the.Abruzzi, Italy, in the province of Aquila, 73 m. E. of Rome by rail. Pop. (1901) 9725. It is finely situated on a hill above the Lago Fucino, and is dominated by a square

castle, with round towers at the angles, erected in its present form in 1450. It contains three churches with 13th century facades in the style of those of Aquila. The origin of the town goes back to Lombard times. A count of Celano is first mentioned in n 78. It was the birthplace of Thomas of Celano, the author of the Dies Irae.

CELEBES, 1 one of the four Great Sunda Islands in the Dutch East Indies. Its general outline is extremely irregular, and has been compared to that of a starfish with the rays torn off from one side, corresponding to the west side of the island. It consists of four great peninsulas, extending from a comparatively small nucleus towards the north-east, east, south-east and south, and separated by the three large gulfs of Tomini or Gorontalo, Tolo or Tomaiki, and Boni. Of these gulfs the first is by far the largest, the other two having much wider entrances and not extending so far inwards. Most important among the smaller inlets are the bays of Amurang, Kwandang and Tontoli on the 1 The second syllable is accented.

north coast, Palos and Pare-Pare on the west, and Kendari or Vosmaer on the east. Of the numerous considerable islands which lie north-east, east and south of Celebes (those off the west coast are few and small), the chief are prolongations of the four great peninsulas — the Sangir and Talaut islands off the north-east, the Banggai and Sula off the east, Wuna and Buton off the south-east, and Saleyer off the south. Including the adjacent islands, the area of Celebes is estimated at 77,855 sq. m., and the population at 2,000,000; without them the area is 69,255 sq. m. and the population 1,250,000.

The scenery in Celebes is most varied and picturesque. ” Nowhere in the archipelago,” wrote A. R. Wallace, ” have I seen such gorges, chasms and precipices as abound in the district of Maros ” (in the southern peninsula) ; ” in many parts there are vertical or even overhanging precipices five or six hundred feet high, yet completely clothed with a tapestry of vegetation.” Much of the country, especially round the Gulf of Tolo, is covered with primeval forests and thickets, traversed by scarcely perceptible paths, or broken with a few clearings and villages. A considerable part of the island has been little explored, but the

general character seems to be mountainous. Well-defined ranges prolong themselves through each of the peninsulas, rising in many places to a considerable elevation. Naturally there are no great river-basins or extensive plains, but one of the features of the island is the frequent occurrence, not only along the coasts, but at various heights inland, of beautiful stretches of level ground often covered with the richest pastures. Minahassa, the north-eastern extremity, consists of a plateau divided into sections by volcanoes (Klabat, 6620 ft., being the highest). Sulphur springs occur here. In the west of the northern peninsula the interior consists in part of plateaus of considerable extent enclosed by the coast ranges. Near Lake Posso, in the centre of the island, the mountains are higher; the Tampiko massif has a height of nearly 5000 ft., the chains south and west of the lake have a general altitude of about 5450 ft., with peaks still loftier. In the southern peninsula two chains stretch parallel with the west and east coasts; the former is the higher, with a general altitude of 3200 ft. In the south it joins the Peak of Bonthain, or Lompo-battang, a great volcanic mass 10,088 ft. high. In the east central part of the island the mountain Koruve exceeds 10,000 ft., and is supposed to be the highest in the island. An alluvial coast plain, 7 to 9 m. wide, stretches along the foot of the western chain, and between the two chains is the basin of the Walannae river, draining northward into Lake Tempe. Little is known of the orography of the eastern peninsula. At the base of the south-eastern there is another large lake, Tovieti. In this peninsula there are parallel ranges on the east and west flanks. The trench between them is partly occupied by the vast swamp of Lake Opa.

The rivers of the narrow mountainous peninsulas form many rapids and cataracts; as the Tondano, draining the lake of the same name to the north-west coast of' Minahassa at Menado; the Rano-i-Apo, flowing over the plateau of Mongondo to the Gulf of Amurang; the Poigar, issuing from a little-known lake of that plateau; the Lombagin, traversing narrow canons; and the river of Boni, which has its outfall in the plain of Goron- talo, near the mouth of the Bolango or Tapa, the latter connected by a canal with the Lake of Limbotto. All these rivers are navigable by praus or rafts for only a few miles above the mouth. In central Celebes, the Kodina flows into Lake Posso, and the Kalaena discharges to the Gulf of Boni; the Posso, navigable by blottos (canoes formed of hollowed tree-trunks), is the only river flowing from the lake to the Gulf of Tomini. The rivers of the southern peninsula,

owing to the relief of the surface, are navigable to a somewhat greater extent. The Walannae flows into Lake Tempe, and, continued by the Jenrana (Tienrana), which discharges into the Gulf of Boni, is navigable for small boats; the Sadang, with many affluents, flows to the west coast, and is navigable by sanpans. The Jenemaja is a broad river, navigable far from the mouth. The coasts of Celebes are often fertile and well populated; but, as shown by the marine charts, many sand, mud and stone banks lie near the shore, and con-

sequently there are few accessible or. natural ports or good roadsteads.

Geology. — The geological observations on Celebes are too scattered to reveal its structure. The greater part of the island seems to be formed of gneiss and other crystalline rocks. These are overlaid by conglomerates, limestones and clay slates of very doubtful age, the most interesting being a radiolarian clay which occurs on the south side of the Matinang Mountains, at the north end of Lake Posso, &c. ; it may correspond with the radiolarian cherts of Borneo. Tertiary beds are found, especially near the coast. The Eocene includes a series of sandstones and marls with lignite, and these are overlaid by nummulite limestones. The Miocene contains an Orbitoides limestone. Intrusive and volcanic rocks of great variety and of various ages occur. Peridotite and gabbro form much of the eastern peninsula (Banggai). Leucite and nepheline rocks have been found in various parts of the island, especially in the south-west. In Minahassa, at the northern extremity, there is a large area of tuffs and agglomerates consisting chiefly of augite andesite, and in this area there are many recent volcanic cones. Eruptions still take place at intervals, but the volcanoes for the most part seem to have reached the solfataric stage.

Climate. — The climate of the island, everywhere accessible to the influence of the sea, is maritime-tropical, the temperature ranging generally between 77 and 8o° F., the extremes being about 90 and 70 F., only on the higher mountains falling during the night to 54° or 55 F. The rainfall in the northern peninsula (north of the equator) differs from that of the southern; the former has rains (not caused by the monsoon), and of smaller amount, 102 in. annually; the latter has a greater rainfall, 157 in., brought by the north-western monsoon, and of which the west coast receives a much larger share than the east.

Fauna and Flora. — In spite of its situation in the centre of the archipelago, Celebes possesses a fauna of a very distinctive kind. The number of species is small, but in many cases they are peculiar to the island. Of land birds, for example, about 160 species are known, and of these not less than about 90 are peculiar, the majority of the remainder being Asiatic in distinction from Australian. Mammals are few in species, but remarkable, especially Macacus niger, an ape found nowhere else but in Bachian; Anoa depressicornis, a small ox-like quadruped which inhabits the mountainous districts; and the babirusa or pig-deer of the Malays. Some of the animals are probably descendants of specimens introduced by man; others are allied in species, but not identical, with mammals of Java and Borneo; others again, including the three just mentioned, are wholly or practically confined to Celebes. There are no large beasts of prey, and neither the elephant, the rhinoceros nor the tapir is represented. Wild-buffaloes, swine and goats are pretty common; and most of the usual domestic animals are kept. The horses are in high repute in the archipelago; formerly about 700 were yearly exported to Java, but the supply has considerably diminished.

The same peculiarity of species holds in regard to the insects of the Celebes (so far as they are known) as to the mammals and birds. Out of 118 species of butterflies, belonging to four important classes, no fewer than 86 are peculiar; while among the rose-chafers or Cetoniinae the same is the case in 19 out of 30. Equally remarkable with this presence of peculiar species is the absence of many kinds that are common in the rest of the archipelago; and these facts have been considered to indicate connexion with a larger land-mass at a very distant geological epoch, and the subsequent continuous isolation of Celebes. This view, however, has been controverted. It is held that in the Miocene and Pliocene periods there were land connexions with the Philippines, Java and the Moluccas, and through the last with Australasian lands to the east and south-east. Migration of species took place along these lines in both directions. Those immigrants which remained in what is now Celebes may have developed new species. Moreover, while Celebes has species which are peculiar to itself and one other of the islands just mentioned, it has none which it shares exclusively with Borneo, and thus the importance of the Macassar Strait as a biological division is indicated.

Vegetation is extremely rich; but there are fewer large trees than

in the other islands of the archipelago. Of plants that

furnish food for man the most important are rice, maize and millet, coffee, the coco-nut tree, sago-palm, the obi or native potato, the bread-fruit and the tamarind; with lemons, oranges, mangosteens, wild-plums, Spanish pepper, beans, melons and sugar-cane. The shaddock is to be found only in the lower plains. Indigo, cotton and tobacco are grown; the bamboo and the ratan-palm are common in the woods; and among the larger trees are sandal-wood, ebony, sapan and teak. The palm, Arenga saccharifera, furnishes gemuti fibres for ropes; its juice is manufactured into sugar and a beverage called sagueir; and intoxicating drinks are prepared from several other palms.

Products. — As in natural vegeta- tion and fauna, so in cultivated products, Celebes, apart from its peculiarities, presents the transi- tional link between the Asiatic and the Australian regions of the Malayan province. For example, rice is produced here in smaller quantity and of inferior quality to that in the western part of the archipelago, but superior to that in the eastern section, where sago and sorghum form the staple articles of food. The products of the forests supply about half the total exports. The fisheries include trepang, turtle and pearl oysters. Gold is worked under European direction in the district of Gorontalo, but with only partial success; the search for coal in the southern peninsula has yielded no satisfactory results; tin, iron and copper, found in the eastern peninsula and elsewhere, are utilized only for native industries.

Natives. — The native population of the island is all of Malayan stock. The three most important peoples are the Bugis (q.v.) the Macassars and the Mandars. The medley of other Malayan tribes, of a more or less savage type, living in the island, are known under the collective name of Alfuros (q.v.). The Macassars are well-built and muscular, and have in general a dark-brown complexion, a broad and expressive face, black and sparkling eyes, a high forehead, a flattish nose, a large mouth and long black soft hair. The women are sprightly, clever and amiable. The men are brave and not treacherous, but ambitious, jealous and extremely revengeful. Drunkenness is rare, but they are passionate, and running amuck is frequent among them. In all

sorts of bodily exercises, as swinging, wrestling, dancing, riding and hunting, they take great pleasure. Though they call themselves Mahommedans, their religion is largely mingled with pagan superstitions; they worship animals, and a certain divinity called Karaeng Love, who has power over their fortune and health. Except where Dutch influence has made itself felt, little attention has been paid by the native races to agriculture; and their manufacturing industries are few and limited. The weaving of cotton cloth is principally carried on by women; and the process, at least for the finer description, is tedious in the extreme. The houses are built of wood and bamboo; and as the use of diagonal struts is not practised, the walls soon lean over from the force of the winds. The Macassar language, which belongs to the Malayo- Javanese group, is spoken in many parts of the southern peninsula; but it has a much smaller area than the Buginese, which is the language of Boni. It is deficient in generalizations; thus, for example, it has words for the idea of carrying in the hand, carrying on the head, carrying on the shoulder, and so on, but has no word for carrying simply. It has adopted a certain number of vocables from Sanskrit, Malay, Javanese and Portuguese, but on the whole is remark- ably pure, and has undergone comparatively few recent changes. It is written in a peculiar character, which has displaced, and probably been corrupted from, an old form employed as late as the 1 7 th century. Neither bears any trace of derivation from the Sanskrit alphabet. % The priests affect the use of the Arabic letters. The literature is poor, and consists largely of romantic stories from the Malay, and religious treatises from the Arabic. Of the few original pieces the most important are the early histories of Goa, Tello and some other states of Celebes, and

the Rapang, or collection of the decrees and maxims of the old princes and sages. The more modern productions are letters, laws and poems, many of the last of considerable beauty.

Divisions, Towns, Population. — Celebes is divided by the Dutch, for administrative purposes, into the government of Celebes with dependencies (south-eastern and southern peninsulas and all west coast), and the residency of Menado (north-eastern peninsula and coast of Gulf of Tomini) . The eastern peninsula and coast of the Gulf of Tolo belong politically to the residency of Ternate (q.v.). The following table shows approximately the distribution and composition of the population: —

Europeans.

Chinese.

Arabs.

Other

Oriental

Foreigners.

Natives.

Total.

Government of Celebes ‘ and Dependencies . Residency of Menado— Minahassa Gorontalo

1414

836 115

,3738

3574 505

554

286 133

54 16

409.739

\ 430,941

415,499 436,406

The Government of Celebes and Dependencies is subdivided into the government territory, the vassal states (Boni, q.v., and Ternate), and the federal countries. The density of population for the whole government is estimated as 3-7 or 4 per sq. m., varying from 2-2 in the vassal and federated states to 14-7 to 18-4 for Macassar and the districts directly governed by the Dutch. The density of population in districts outside the influence of European govern- ment sinks to I and less per sq. m. As in the case of Minahassa, the difference must be explained by physical and moral conditions. Two- thirds of the natives live by

agriculture, and one-third by trade, navigation, shipbuilding and other industries. In agreement with these principal occupations, the centres of population are found in southern Celebes, on the Coast (not in the interior plains or on the lake, as in Menado). Palos (3000), with good port; Pare- Pare, connected by road with Lake Tempe; and Macassar (17,925), the seat of the governor and the centre of trade for the eastern part of the archipelago. On the south coast must also be named Bonthain (4000); on the east coast, Balong-Nipa; and Buton and Saleyer, seats of administration and ports of call on the island groups of the same names.

The Residency of Menado comprises three districts: Minahassa, the little states along the north coast west of Minahassa, and Goron- talo, including the other states of the northern peninsula lying along the Gulf of Tomini. The density of population being calculated at about 2-7 to 3 per sq. m. for Celebes, is 16-2 for Minahassa, but only 1-5 to 2 for the Residency of Menado. Centres of population in Menado are Amurang (3000), the seat of a Dutch controller, and a calling place for the steamers of the Indian Packet Company; Menado (10,000), the chief town of the residency, the principal station of the Dutch missionaries, with a fair amount of trade, but an unsafe roadstead; Tondano (12,000), near the lake and river of the same name, at an altitude of nearly 2000 ft., and one of the chief centres; Gorontalo, one of the most important towns of Celebes, carrying on direct trade with Singapore and Europe. All the other coast places have some importance as chief villages of the little states and as ports of call for the vessels of the steam packet com- pany, but have only from 500 to 1000 inhabitants.

History. — Celebes was first discovered by the Portuguese in the early part of the 16th century, the exact date assigned by some authorities being 1512. The name is not used by the natives, and is apparently of foreign origin, but has been variously derived, e.g. from the mountain of Klabat or Kalabat, or from Seli Besi, an iron kris carried by the natives, of whom those who were first asked for the name of the island were conceived, according to this theory, to have misunderstood their questioners. At the time of the Portuguese discovery, the Macassars were the most powerful people in the island, having successfully defended themselves against the king of the Moluccas and the sultan of Ternate. In 1609 the British attempted to gain a footing; At what time the Dutch first arrived is not certainly known, but it was probably in the end of the 16th or beginning of the 17th century,

since in 1607 they formed a connexion with Macassar. In 161 1 the Dutch East Indian Company obtained the monopoly of trade on the island of Buton; and in 1618 an insurrection in Macassar gave them an opportunity of obtaining a definite establishment there. In 1660 the kingdom was sub- jugated, but in 1666 the war broke out anew. It was brought to an end in the following year, and the treaty of Bonga or Banga was signed, by which the Dutch were recognized as protectors.

In 1683 the north-eastern part of the island was conquered by Robert Paddenburg and placed under the command of the governor of the Moluccas. In 1 703 a fort was erected at Menado. The kingdom of Boni was successfully attacked in 1824, and in August of that year the Bonga treaty was renewed in a greatly modified form. Since then the principal military event is the Boni insurrection which was quelled in 1850, but this was far from pacifying the country permanently. A series of revolts of various chiefs in 1905-6 was not arrested without considerable fighting, but after this the whole island was brought under Dutch authority, even where native rule survived.

Bibliography. — ■ In P.J. Veth's Woordenboek van Nederlandsch Indie there will be found an extensive bibliography of Celebes drawn up by H. C. Millies. For additional bibliography and data for the island and its population, see C. M. Kan, " Celebes," in the Encyclopaedic van Nederlandsch Indie, ed. by P. A. van der Lith and A. H. Spaan (The Hague, 1895), &c, vol. i. p. 314. See P. and F. Sarasin (who have carried out extensive explorations in the island), " Berichte aus Celebes," Zeitschr. der Ges. f. Erdk. xxix. 351 ; Enlwurf einer geographisch-geologischen Beschreibung der Insel Celebes (Wiesbaden, 1901); Reisen in Celebes, 1893-1896, 1902—1903 (Wiesbaden, 1905); Versuch einer Anthropologic der Insel Celebes (Wiesbaden, 1906) ; C. van der Hart, Reize rondonˆ het Eiland Celebes (The Hague, 1853); Capt. R. Mundy, Narrative of Events in Borneo and Celebes (London, 1848) ; P. J. Veth, Een Nederlandsch reiziger op Zuid Celebes (Amsterdam, 1875); J. G. F. Riedel, Het landschap Boeool, Noord Selebes (1872); and "Die Landschaften Holontalo, Limoeto," &c, in Zeitschr. fur Ethnologie (1871); H. Bucking, " Beitrage zur Geologie von Celebes," Samml. geol. Reichs- mus. Leiden, vol. vii. pp. 29-205 (1902), pp. 221-224 (I 9°4)j and various articles in Tijdschrift v. h.

Aardrijkskundig Genootschap and Tijdsch. v. h. Batavian. Gen.

CELERY (Apium graveolens), a biennial plant belonging to the natural order Umbelliferae, which, in its wild state, occurs in England by the sides of ditches and in marshy places, especially near the sea, producing a furrowed stalk and compound leaves with wedge-shaped leaflets, the whole plant having a coarse, rank taste and a peculiar smell. It is also widely distributed in the north temperate region of the Old World. By cultivation and blanching the stalks lose their acrid qualities and assume the mild sweetish aromatic taste peculiar to celery as a salad plant. The plants are raised from seed, sown either in a hot bed or in the open garden, according to the season of the year, and after one or two thinnings out and transplantings, they are; on attaining a height of 6 or 8 in., planted out in deep trenches for convenience of blanching, which is effected by earthing up and so excluding the stems from the influence of light. A large number of varieties are cultivated by gardeners, which are ranged under two classes, white and red, — the white varieties being generally the best flavoured and most crisp and tender. As a salad plant, celery, especially if at all " stringy, " is difficult of digestion. Both blanched and green it is stewed and used in soups, the seeds also being used as a flavouring ingredient. In the south of Europe celery is seldom blanched, but is much used in its natural condition.

Celeriac, or turnip-rooted celery (Apium graveolens var. rapaceum), is a variety cultivated more on account of its roots than for the stalks, although both are edible and are used for salads and in soups. It is chiefly grown in the north of Europe. As the tops are not required, trenching is unnecessary, otherwise the cultivation is the same as for celery.

CELESTE, MADAME (1815-1882), French dancer and actress, was born in Paris on the 16th of August 181 5. As a little girl she was a pupil in the ballet class at the Opera. When fifteen, she had an offer from the United States, and made her debut at the Bowery theatre, New York. Returning to England, she appeared at Liverpool as Fenella in Masaniello, and also in London (1831). In 1834 she aroused such enthusiasm in America that her admirers carried her on their shoulders and took the horses out of her carriage in order to pull it themselves. It is even said that President Jackson introduced her to his cabinet as an adopted citizen of the Union. Having made a large fortune, she returned to England in 1837. She now gave up dancing, and appeared as

an actress, first at Drury Lane and then at the Haymarket. In 1844 she joined Benjamin Webster in the manage- ment of the Adelphi, and afterwards took the sole management

of the Lyceum all 1861; She made a third visit to the United States from 1865 to 1868, and retired in 1870. Her favourite part was Miami in Buckstone's Green Bushes. She died in Paris on the 1 2th of February 1882.

CELESTINA, LA, the popular alternative title attached from 1 519 (or earlier) to the anonymous Comedia de Caliste y Melibea, a Spanish novel in dialogue which was celebrated throughout Europe during the 16th century. In the two earliest known editions (Burgos, 1499, and Seville, 1501) the Comedia consists of sixteen acts; the reprints issued after 1501 are entitled Tragicomedia de Calisto y Melibea, and contain twenty-one acts. Three of these reprints include a twenty-second act which is admittedly spurious, and the authenticity of Acts xvn.-xxi. is disputed. The authorship of the Celestina and the date of its composition are doubtful. An anonymous prefatory letter in the editions subsequent to 1501 attributes the book to Juan de Mena or RodrigoCota, but this ascription is universally rejected. The prevailing opinion is that the author of the twenty-one acts was Fernando de Rojas, apparently a Spanish Jew resident at the Puebla de Montalban in the province of Toledo; R. Foulche-Delbose, however, maintains that the original sixteen acts are by an unknown writer who had no part in the five supplementary acts. Some scholars give 1483 as the date of composition; others hold that the book was written in 1497. These questions are still unsettled. Though profoundly original in treatment, the Celestina has points of analogy with the work of earlier writers, such as Juan Ruiz (q.v.), the archpriest of Hita; his rapid sketches of Trota-conventas, Melon and Endrina no doubt suggested the finished portraits of Celestina, Calisto and Melibea, and the closing scene in the Celestina recalls the suicide in Diego Fernandez de San Pedro's Cdrcel de Amor. Allowing for these and other debts of the same kind, it cannot be denied that the Celestina excels all earlier Spanish works in tragic force, in im- pressive conception, and in the realistic rendering of characters drawn from all classes of society. It passed through innumerable editions in Spain, and was the first Spanish book to find accept* ance ' throughout western Europe. At least twenty works by well-known Spanish authors are derived from it; it was adapted for the English stage as early as 1 525-1 530, and was translated into Italian (1505), French (1527) and other European languages. A

Latin version by Caspar Barth was issued under the title of Pornoboscodidascalus latinus (1624) with all the critical apparatus of a recognized classic. James Mabbe's English rendering (1 63 1) is one of the best translations ever published. The original edition of 1499 has been reprinted by R. Foulche-Delbose in the Bibliotheca Hispanica (1902), vol. xii.

Bibliography. — R. Foulche-Delbose, " Observations sur la Celestine ",in the Revue hispanique (Paris, 1900), vol. yii. pp. 28-80 and (Paris, 1902) vol. ix. pp. 171-199; K. Haebler, " Bemerkungen zur Celestina " in the Revue hispanique (Paris, 1902), vol. ix. pp. 139-176; and M. Menendez y Pelayo's introduction to the Celestina (Vigo, 1899-1900). (J. F.-K.)

CELESTINE (Caelestinus), the name of five popes.

Celestine I., pope from 422 to 432. At his accession the dissensions caused by the faction of Eulalius (see Boniface I.) had not yet abated. He, however, triumphed over them, and his episcopate was peaceful. When the doctrines of Nestorius were denounced to him, he instructed Cyril, bishop of Alexandria, to follow up the matter. The emperor Theodosius II. convoked an ecumenical council at Ephesus, to which Celestine sent his legates. He had some difficulties with the bishops in Africa on the question of appeals to Rome, and with the bishops of Prov- ence with regard to the doctrines of St Augustine. To expedite the extirpation of Pelagianism, he sent to Britain a deacon called Palladius, at whose instigation St Germanus of Auxerre crossed the English Channel, as delegate of the pope and bishops of Gaul, to inculcate orthodox principles upon the clergy of Britain. He also commissioned Palladius to preach the gospel in Ireland which was beginning to rally to Christianity. Celestine was the first pope who is known to have taken a direct interest in the churches of Britain and Ireland. (L. D.*)

Celestine II., pope in 1143-1144. Guido of Citta di Castello (Tiferno), born of noble Tuscan family, able and learned, studied

under Abelard and became a cardinal priest. Elected the successor of Innocent II. on the 26th of September 1143, he died on the 8th of March following. He removed the interdict which

Innocent had employed against Louis VII. of France. At the time of his death he was on the verge of a controversy with Roger of Sicily.

See A. Certini, Vita (Foligno, 1716); M. Bouquet, Recueil des historiens des Gaules (Paris, 1738 ff.), tome 15, 408-411; Migne, Patrologiae cursus computus, 179, 765-820; P. Jaffe, Regesta Pontifi- cum Romanorum, 2nd ed. vol. ii. (Lipsiae, 1888), 1 ff. ; Wetzer und Welte, Kirchenlexihon, 2nd ed. vol. iii. (Freiburg, 1884), 578 ff.; Herzog-Hauck, Realencyklopadie, 3rd ed. vol. iv. (Leipzig, 1898),

201.

Celestine III. (Giacinto Bobo), pope from n 91 to 11 98, was cardinal deacon of Santa Maria in Cosmedin as early as 1144, and had reached the age of eighty-five when chosen on the 30th of March 1 191 to succeed Clement III. The first pope of the house of the Orsini, his policy was marked by mildness and indecision. Henry VI. of Germany at once forced the pontiff to crown him emperor, and three or four years later took possession of the Norman kingdom of Sicily; he refused tribute and the oath of allegiance, and even appointed bishops subject to his own juris- diction; moreover, he gave his brother in fief the estates which had belonged to the countess Matilda of Tuscany. Celestine did not dare so much as to threaten him with excommunication. It was Celes tine's purpose to lay England under the interdict; but Prince John and the barons still refused to recognize the papal legate, the bishop of Ely. Richard I. had been set free before the dilatory pope put Leopold of Austria under the ban. In his last sickness Celestine wished to resign his office, but the cardinals protested. Death released him from his perplexities on the 8th of January n 98.

See " Epistolae Coelestini III. Papae," in M. Bouquet, Receuil des historiens des Gaules et de la France, tome 19 (Paris, 1738 ff.); J. P. Migne, Patrologiae cursus computus, tome 206 (Paris, 1855), 867 ff. ; further sources in Neues Archiv fiir die altere Deutsche Geschichtskunde, 2. 218; 11. 398 f. ; 12. 411-414; P. Jaffe, Regesta Pontificum Romanorum, vol. ii. (2nd ed., Leipzig, 1S88), 577 ff- (W. W. R.*)

Celestine IV. (Godfrey Castiglione) , pope in 1241, son of a sister of Urban III. (1185-1187), was archpriest and chancellor at Milan. After Urban's death he entered the Cistercian monas- tery

at Hautecombe in Savoy. In 1227 Gregory IX. created him cardinal priest of St Mark's, and in 1 233 made him cardinal bishop of Sabina. Elected to succeed Gregory on the 25th of October 1241, he died on the iothof November, before consecration, and was buried in St Peter's.

See A. Potthast, Regesta Pontificum Romanorum, vol. i. (Berlin, 1874), 940 f.

Celestine V. (St Peter Celestine), pope in 1294, was born of poor parents at Isernia about 121 5, and early entered the Benedictine order. Living as a hermit on Monte Morrone near Sulmone in the Abruzzi, he attracted other ascetics about him and organized them into a congregation of the Benedictines which was later called the Celestines (q.v.). The assistance of a vicar enabled him to escape from the growing administrative cares and devote himself solely to asceticism, apparently the only field of human activity in which he excelled. His Opuscula, published by Telera at Naples in 1640, are probably not genuine; he was indoctus libris. A fight between the Colonna and the Orsini, as well as hopeless dissensions among the cardinals, prevented a papal election for two years and three months after the death of Nicholas IV. Charles II. of Naples, needing a pope in order that he might regain Sicily, brought about a conclave. As the election of any cardinal seemed impossible, on the 5th of July 1294 the Sacred College united on Pietro di Morrone; the cardinals expected to rule in the name of the celebrated but incapable ascetic. Apocalyptic notions then current doubtless aided his election, for Joachim of Floris and his school looked to monasticism to furnish deliverance to the church and to the world. Multitudes came to Celestine's coronation at Aquila, and he began his reign the idol of visionaries, of extremists and of the populace. But the pope was in the power of Charles II. of Naples, and became his tool against Aragon. The king's son

Louis, a layman of twenty-one, was made archbishop of Lyons. The cardinals, scarcely consulted at all, were discontented. The pope, who wanted more time for his devotions, offered to leave three cardinals in charge of affairs; but his proposition was rejected. He then wished to abdicate, and at length Bene- detto Gaetano, destined to succeed him as Boniface VIII. , removed all scruples against this unheard-of procedure by finding a precedent in the case of Clement I. Celestine abdicated on the 13th of December 1 294. There is no sufficient ground for finding an allusion to this act in the noted line of Dante, " Che fece per

viltate il gran rifiuto ” (” who made from cowardice the great refusal,” Inferno, 3, 60). Boniface at length put him in prison for safe keeping; he died in a monastic cell in the castle of Fumone near Anagni on the 1 9th of May 1 296. He was canonized by Clement V. in 13 13.

See Wetzer und Welte and Herzog-Hauck (with excellent bibliography) as above; Jean Aurelien, Superieur de la Congregation des Celestins, La Vie admirable de ■ . ■ Saint Pierre Celestin (Bar-lc Due, 1873) ; H. Finke, Aus den Tagen Bonifaz VIII. (Miinster, 1902), pp. 24-43. (W. W. R.*)

CELESTINE, or Celestite, a name applied to native strontium sulphate (SrS04), having been suggested by the celestial blue colour which it occasionally presents. This colour has been referred to a trace of iron phosphate, but in some cases such an explanation appears doubtful. The mineral is usually colourless, or has only a delicate shade of blue. Celestine crystallizes in the orthorhombic system, being isomorphous with barytes (q.v.). The angle between the prism faces is 76 17’. The cleavage is perfect parallel to the basal pinacoid, and less marked parallel to the prism. Although celestine much resembles barytes in its physical properties, having for example the same degree of hard- ness (3), it is less dense, its specific gravity being 3-9. Celestine is a less abundant mineral than barytes. It is, however, much more soluble, and occurs frequently in mineral waters. W. W. Stoddart showed that many plants growing on Keuper marls containing celestine near Bristol appropriated the strontium salt, and the metal could be detected spectroscopically in their ashes.

Celestine occurs in the Triassic rocks of Britain, especially in veins and geodes in the Keuper marl in the neighbourhood of Bristol. At Wickwar and Yate in Gloucestershire it is worked for industrial purposes. Colourless crystals, of great beauty, occurin association with calcite and native sulphur in the sulphur deposits of Sicily, as at Girgenti. Fine blue crystals are yielded by the copper mines of Herrengrund, in Hungary; a dark blue fibrous form is known from Jena; and small crystals occur in flint at Meudon near Paris. Very large tabular crystals are found in limestone on Strontian Island in Lake Erie; and a blue fibrous variety from near Frankstown, Blair Co., Penn., is notable as having been the original celestine on which the species was founded by A. G. Werner in 1798.

Celestine is much used for the preparation of strontium hydrate,

which is employed in refining beetroot sugar in Germany. The mineral is used also as a source of various salts of strontium such as the nitrate, which finds application in pyrotechny for the production of red fire. (F. W. R.*)

CELESTINES, a religious order founded about 1260 by Peter of Morrone, afterwards Pope Celestine V. (1294). It was an attempt to unite the eremitical and cenobitical modes of life. Peter's first disciples lived as hermits on Mount Majella in the Abruzzi. The Benedictine rule was taken as the basis of the life, but was supplemented by regulations notably increasing the austerities practised. The form of government was borrowed largely from those prevailing in the mendicant orders. Indeed, though the Celestines are reckoned as a branch of the Benedic- tines, there is little in common between them. For all that, St Celestine, during his brief tenure of the papacy, tried to spread his ideas among the Benedictines, and induced the monks of Monte Cassino to adopt his idea of the monastic life instead of St Benedict's; for this purpose fifty Celestine monks were intro- duced into Monte Cassino, but on Celestine's abdication of the papacy the project fortunately was at once abandoned. During the founder's lifetime the order spread rapidly, and eventually

there were about 150 monasteries in Italy, and others in France, Bohemia and the Netherlands. The French houses, twenty-one in number, formed a separate congregation, the head-house being in Paris. The French Revolution and those of the 19th century destroyed their houses, and the Celestine order seems no longer to exist.

Peter of Morrone was in close contact with the Franciscan Spirituals of the extreme type (see Franciscans), and he endeavoured to form an amalgamation between them and his hermits, under the title " Poor Hermits of Celestine." On his abdication the amalgamation was dissolved, and the Franciscan element fled to the East and was finally suppressed by Boniface VIII. and compelled to re-enter the Franciscan order. The habit of the Celestines was black.

See Helyot, Histoire des ordres religieux (1792), vi. c. 23; Max Heimbucher, Orden und Kongregationen (1896), i. § 22, p. 134;

the art. ” Colestiner ” in Wetzer und Welte, Kirchenlexicon (ed. 2), and Herzog-Hauck, Realencyklopddie (ed. 3). (E. C. B.)

CELIBACY (Lat. caelibatus, from caelebs, unmarried), the state of being unmarried, a term now commonly used in the sense of complete abstinence from marriage; it originally included the state of widowhood also, and any one was strictly a caelebs who had no existing spouse. Physicians and physiologists have frequently discussed celibacy from their professional point of view; but it will be sufficient to note here the results of statistical inquiries. It has been established by the calculations of actuaries that married persons — women in a considerable, but men in a much greater degree — have at all periods of life a greater prob ability of living than the single. From the point of view of public utility, the state has sometimes attempted to discourage celibacy. The best-known enactment of this kind is that of the emperor Augustus, best known as Lex Julia et Papia Poppaea. This disabled caelibes from receiving an inheritance unless the testator were related to them within the sixth degree; it limited the amount which a wife could take by a husband’s will, or the husband by the wife’s, unless they had children; and preference was given to candidates for office in proportion to the number of their children. 1 Ecclesiastical legislators, on the other hand, have frequently favoured the unmarried state; and celibacy, partial or complete, has been more or less stringently enforced upon the ministers of different religions; many instances are quoted by H. C. Lea. The best known, of course, are the Roman Vestals; though here even the great honours and privileges accorded to these maidens were often insufficient to keep the ranks filled. In the East, however, this and other forms of asceticism have always flourished more freely; and the Buddhist monastic system is not only far older than that of Christendom, but also proportionately more extensive. 2 In early Judaism, chastity was indeed enjoined upon the priests at certain solemn seasons; but there was no attempt to enforce celibacy” upon the sacerdotal caste. On the contrary, all priests were the sons of priests, and the case of Elizabeth shows that here, as throughout the Jewish people, barrenness was considered a disgrace. But Alexander’s conquests brought the Jews into contact with Hindu and Greek mysticism; and this probably explains the growth of the ascetic Essenes some two centuries before the Christian era. The adherents of this sect, unlike the Pharisees and Sadducees, were never denounced by Christ, who seems on the contrary to have had real sympathy with the voluntary celibacy of an

exceptional few (Matt. xix. 12). St Paul's utterances on this subject, though they go somewhat further, amount only to the assertion that a struggling missionary body will find more freedom in its work in the absence of wives and children. At the same time, St Paul claimed emphatically for himself and the other apostles the right of leading about a wife; and he names

1 W. Smith, Diet, of Greek and Roman Antiquities (3rd ed.), vol. ii. p. 44.

2 " In the 14th century, the city of Ilchi, in Chinese Tartary, possessed 14 monasteries, averaging 3000 devotees in each; while in Tibet, at the present time, there are in the vicinity of Lhassa 12

C;at monasteries, containing a population of 18,500 lamas. In dak the proportion of lamas to the laity is as I to 13, in Spiti I to 7, and in Burmah 1 to 30 " (Lea i. 103).

among the qualifications for a bishop, an elder and a deacon, that he should be " the husband of one wife." Indeed it was freely admitted by the most learned men of the middle ages and Renaissance that celibacy had been no rule of the apostolic church; and, though writers of ability have attempted to maintain the contrary even in modern times, their contentions are unhesitatingly rejected by the latest Roman Catholic authority. 3

The gradual growth of clerical celibacy, first as a custom and then as a rule of discipline, can be traced clearly enough even through the scanty records of the first few centuries. The most ascetic Christians began to question the legality of second marriages on the part of either sex, as even paganism had often reprobated second marriages of women. Though these extremists were presently branded as heretics for their eccentric ultra-ascetic tenets (Montanists, Cathari), yet as early as Tertullian's time (c. a.d. 220) the right of second marriages was theoretically denied to the priesthood. This was logically followed by a revival of the old Levitical rule which required that priests should marry none but virgins (Lev. xxi. 7, 13). Both these rules, how- ever, proved difficult of enforcement and seem to have rested only on a vague basis of public opinion; twice-married men (digami) were admitted to the priesthood by Pope Calixtus I. (219-222), and even as late as the beginning of the 5th century we find husbands of widows consecrated to the episcopate. The so- called Apostolical Constitutions and Canons, the latter of which were compiled in the 4th century, give us the first clear and fairly

general rules on the subject. Here we find " bishops and priests allowed to retain the wives whom they may have had before ordination, but not to marry in orders; the lower grades, deacons, subdeacons, &c, allowed to marry after entering the church; but all were to be husbands of but one wife, who must be neither a widow, a divorced woman nor a concubine " (Lea i. 28). Many causes, however, were already at work to carry public feeling beyond this stage. Quite apart from the few enthusiasts who would have given a literal interpretation to the text in Matt, xix. 12, vows of virginity became more and more frequent as the virtue itself was lauded by ecclesiastical writers in language of increasing fervour. These vows were at first purely voluntary and temporary; but public opinion naturally grew less and less tolerant of those who, having once formed and published so solemn a resolution, broke it afterwards. Again not only was the church doctrine itself more or less consciously influenced by the Manichaean tenet of the diabolical origin of all matter, including the human body, but churchmen were also naturally tempted to compete in asceticism with the many heretics who held this tenet, and whose abstinence brought them so much popular consideration. Moreover, in proportion as the clergy, no longer mere ringleaders of a despised and persecuted sect, became beneficiaries and administrators of rich endowments — and this at a time when the external safeguards against embezzlement were comparatively weak — a strong feeling grew up among the laity that church revenues should not go to support the priest's family.' 4 Lastly, such partial attempts as we have already described to enforce upon the clergy a special rule of continence, by their very failure, suggested more heroic measures. Therefore, side by side with the evidence for difficult enforcement of the old rules, we find an equally constant series of new and more stringent enactments.

The first church council which definitely forbade marriage to the higher clergy was the local Spanish synod of Elvira (a.d. 305). A similar interpretation has sometimes been claimed for the third canon of that general council of Nicaea to which we

s 1 Cor. vii. 25 sq., ix. 5; I Tim. iii. 2, n, 12; Titus i. 6; E. Vacandard in Diet, de Thiol. Cath., s.v. " Celibat."

4 This was a natural argument for the defenders of clerical celibacy even in far later times. St Bonaventura (d. 1274) P uts this very strongly: " For if archbishops and bishops now had children, they would rob and plunder all the goods of the Church

so that little or nothing would be left for the poor. For since they now heap up wealth and enrich nephews removed from them by almost incal- culable degrees of affinity, what would they do if they had legi- timate children? . . .Therefore the Holy Ghost in His providence hath removed this stumbling-block," &c. &c. (In Sent. lib. iv. dist. xxxvii art. i. quaest. 3).

owe the Nicene creed (325), but this is now abandoned by the best authorities on all sides. 'There can be no doubt, however, that the 4th century opened a wide breach in this respect between the Eastern and Western churches. The modern Greek custom is " (a) that most candidates for Holy Orders are dismissed from the episcopal seminaries shortly before being ordained deacons, in order that they may marry (their partners being in fact mostly daughters of clergymen), and after their marriage, return to the seminaries in order to take the higher orders; (b) that, as priests, they still continue the marriages thus contracted, but may not remarry on the death of their wife; and © that the Greek bishops, who may not continue their married life, are com- monly not chosen out of the ranks of the married secular clergy, but from among the monks." J The Eastern Church, therefore, still adheres fairly closely to the rules laid down by the Apostolical Canons in the 4th century. In the West, however, a decisive forward step was taken by Popes Damasus and Siricius during the last quarter of that century. The famous decretal of Siricius , (385) not only enjoined strict celibacy on bishops, priests and deacons, but insisted on the instant separation of those who had already married, and prescribed the punishment of expulsion for disobedience (Siric. Ep. i. c. 7; Migne, P.L. xiii. col. 1138). Although we find Siricius a year later writing to the African Church on this same subject in tones rather of persuasion than of command, yet the beginning of compulsory sacerdotal celibacy in the Western Church may be conveniently dated from his decretal of a.d. 385. Leo the Great (d. 461) and Gregory the Great (d. 604) further extended the rule of celibacy to subdeacons.

For the next three or four centuries there is little to note but the continual evidence of open or secret resistance to these decrees, and the parallel frequency and stringency of ecclesi- astical legislation, which by its very monotony bears witness to its own

want of success. At least seven episcopal constitutions of' the £th and 9th centuries forbade the priesf to have even his mother or his sister in the house. 2 Nor did the only difficulty lie in such secret breaches of the law; in many districts the priesthood tended to become a mere hereditary caste, to the dis- advantage of church and state alike. In northern and southern Italy public clerical marriages were extremely frequent, whether with or without regular forms. 3 The see of Rouen was held for more than a century (942-1054) by three successive bishops who were family men and two of whom were openly married. 4 In England St Swithun (d. 862) was married, though very likely by special papal dispensation; and the married clergy were appar- ently predominant in Alfred's time. In spite of Dunstan's reforms at the end of the 10th century, the Norman Lanfranc found so many wedded priests that he dared not decree their separation; and when his successor St Anselm attempted to go further, this seemed a perilous novelty even to so distinguished an ecclesiastic as Henry of Huntingdon, who wrote: " About Michaelmas of this same year (1102) Archbishop Ahselm held a council in London, wherein he forbade wives to the English priesthood, heretofore not forbidden; which seemed to some a matter of great purity, but to others a perilous thing, lest the clergy, in striving after a purity too great for human strength, should fall into horrible impurity, to the extreme dishonour of the Christian name" (lib. vii.; Migne, P.L. cxcv. col. 944). Yet this was at a time when the decisive and continued action of two great popes ought to have left no possible doubt as to the law of the church. '

The growing tendency of the clergy to look upon their endow?

1 Hefele, Beitrage zur Kirchengesch. u.s.w. i. 139.

2 See the quotations in Lea i. 156. These prohibitions were re- newed in the 13th and 14th centuries {ibid. i. 410).

3 Ratherius, Itinerarium, c. 5 (Migne, P.L. cxxxvi; cql. 585). Gulielmus Apulus writes of southern Italy in 1059: "In these parts priests, deacons and the .whole clergy were publicly married " (De Normann. lib. ii.). .

4 Dom Pommeraye, S. Rotomag. Eccl. Concilia, pp. 56, 65 ; cf . similar instances on p. 31 5 of Dr A. Dresdner's Kultur-und Siltey,- geschichte d. italienischen Geistlichkeit im 10. und 11. Jhdt. (Breslau,

1890).

ments as hereditary fiefs, their consequent worldliness and (it must be added) their vices, aroused the indignation of two very remarkable men in the latter half of the nth century. St Pietro Damiani (988-1072) was a scholar, hermit and re- former, who did more perhaps than any. one else to combat the open marriages of the clergy. He complained that exhortation was wasted even on the bishops, ” because they despair of attaining to the pinnacle of chastity, and have no fear of con- demnation in open synod for the vice of lechery. ... If this evil were secret [he adds] , it might perhaps be borne.” 6 His Liber Gomorrhianus, addressed to and approved by St Leo IX., is sufficient in itself to explain the vehemence of his crusade, though it emphasizes even more strongly the impolicy of pro- ceeding more severely against the open marriages of the clergy than against. concubinage and other less public vices. 6 Damiani found a powerful ally in the equally ascetic but far more im- perious and statesmanlike Hildebrand, afterwards Pope Gregory VII. Under the influence of these two men, five successive popes between 1045 and 1073 attempted a radical reform; and when, in this latter year, Hildebrand himself became pope, he took measures so stringent that he has sometimes been erroneously represented not merely as the most uncompromising champion, but actually as the author of the strict rule of celibacy for all clerics- in sacred orders. His mind, strongly imbued with the theocratic ideal, saw more clearly than any other the enormous increase of influence which would accrue to a strictly celibate body of clergy, separated by their very ordination from the strongest earthly ties; and no statesman has ever pursued with greater energy and resolution a plan once formulated. In order to break down the desperate, and in many places organized, resistance of the clergy, he did not shrink from the perilous course, so contrary to his general policy, of subjecting them to the judgment of the laity. Not only were concubinary priests — a term which was now made to include also those who had openly married — forbidden to serve at the altar and threatened with actual deposition in cases of contumacy, but the laity were warned against attending mass said by ” any priest certainly known to keep a concubine or subintroducta.” ?

But these heroic measures soon caused serious embarrassment. If the laity were to stand aloof from all incontinent priests, while (as the most orthodox churchmen constantly complained) many priests were still incontinent, then this could only result in

estranging large bodies of the laity from the sacraments of the church. It became necessary, therefore, to soften a policy which to the lay mind might imply that the virtue of a sacrament was weakened by the vices of its ministers; and, whereas Peter Lombard (d. ri6o) concludes that no excommunicated priest can effect transubstantiation, St Thomas Aquinas (d. 1274) agrees with all the later Schoolmen in granting him that power, though to the peril of his own soul. 8 For, by the last quarter of the 13th century, the struggle had entered upon a new phase. The severest rneasures had been tried, especially against the priests' unhappy partners. As early as the council of Augsburg (952) these were condemned to be scourged, while Leo II. and Urban II., at the councils of Rome and Amalfi (1051, 1089),

5 Opusc. xvii. praef. The saint's evidence is carefully weighed by Dresdner (I.e.), especially oh pp. 309 ff. and 321 ff.

6 Even Pope Innocent III: Was compelled to decide that priests who had kept two or more concubines, successively or simultaneously, did not thereby incur the disabilities which attended digamists; or, in other words, that a layman who had contracted two lawful marriages and then proceeded to ordination on the death of his second wife, could be absolved only by the pope; whereas the concubinary priest, " as a man branded with simple fornication," might, receive a valid dispensation from his own bishop (Letter to archbishop of Lund in 1212. Re gest. lib. xvi. ep. 118; Migne, P.L. CCxvi. col. 914). As the great canonist Gratian remarked on a similar decretal of Pope Pelagius, " Here is a case where lechery has more rights at law than has chastity " (Decret. p. i. dist. xxxiv. c. vii. note a).

7 The actual originator of this policy was Nicholas II., probably at Hildebrand's suggestion; but the decree remained practically a dead letter until Gregory's accession.

S Peter Lombard, Sentent. lib. iv. dist. 13; Aquinas, Stimma Theol. pars iii. Q. lxxxiii. art. 7, 9.

adjudged them to actual slavery. 1 Such enactments naturally-defeated their own purpose More was done by the gentkr missionary zeal of the Franciscans and Dominicans in the early

13th century; but St Thomas Aquinas had seen half a century of that reform and had recognized its limitations; he therefore attenuated as much as possible the decree of Nicholas II. His contemporary St Bonaventura complained publicly that he himself and his fellow-friars were often compelled to hold their tongues about the evil clergy; partly because, even if one were expelled, another equally worthless would probably take his place, but " perhaps principally lest, if the people altogether lost faith in the clergy, heretics should arise and draw the people to themselves as sheep that have no shepherd, and make heretics of them, boasting that, as it were by our own testimony, the clergy were so vile that none need obey them or care for their teaching." 2 In other passages of his works St Bonaventura tells us plainly how little : had as yet been gained by suppressing clerical marriages; and the evidence of orthodox and distinguished churchmen for the next three centuries is equally decisive. Alvarez Pelayo, a Spanish bishop and papal penitentiary, wrote in 1332, " The clergy sin commonly in these following ways ... fourthly, in that they live very incontinently, and would that they had never promised continence ! especially in Spain and southern Italy, in which provinces the sons of the laity are scarcely more numerous than those of the clergy." Cardinal Pierre d'Ailly pleaded before the council of Constance in 1415 for the reform of " that most scandalous custom, or rather abuse, whereby many [clergy] fear not to keep concubines in public." 3 Meanwhile, as has been said above, the custom of open marriage among clergy in holy orders (priests, deacons and subdeacons) was gradually stamped out. A series of synods, from the early 12th century onwards, declared such marriages to be not only unlawful, but null and void in themselves. Yet the custom lingered sporadically in Germany and England until the last few years of the 13 th century, though it seems to have died out earlier in France and Italy. There was also a short- lived attempt to declare that even a clerk in lower orders should lose his clerical privileges on his marriage; but Boniface VIII. in 1300 definitely permitted such marriages under the already- quoted conditions of the Apostolic Canons; in these cases, however, a bishop's licence was required to enable the cleric to officiate in church, and the episcopal registers show that the diocesans frequently insisted on the celibacy of parish-clerks. As the middle ages drew to a close, earnest churchmen were compelled to ask themselves whether it would not be better to let the priests marry than, to continue a system under which concubinage was even licensed in some districts. 4 Serious pro- posals were made

to reintroduce clerical marriage at the great

1 Labbe-Mansi, ConciUa, vol. xix. col. 796 and xx. col. 724. Dr Lea is probably right in suggesting that it was a confused recollection. of .these decrees which prompted one of Cranmer's judges to assure him that " his children were bondmen to the see of Canterbury." Strype, Memorials of Cranmer, bk iii. c. 28 (ed. 1812, vol. i. p. 601).

2 Bonaventura, Libell. Apologet. quaest. i.; cf. his parallel treatise Quare Fratres Minores praedicent. ■ The firsft visitation of his friend Odo Rigaldi, archbishop of Rouen, shows that about 15 % of the parish clergy in that.diocese were notoriously incontinent (Regestrum Visitationum, ed. Bonnin, Rouen, 1852, pp. 17 ff.). Vacandard (J.oc. cit. p. 2087) appeals rather misleadingly to this record as proving the progress made during the half-century before Odo's time. It is probable that there were many more offenders than these 15 % known to the archbishop.

3 Alvarus Pelagius, De Planctu Ecclesiae, ed. 1517, f. 131a, col. 2; cf. f. 102b, col. 2 ; Hermann von der Hardt, Constantiensis Concilii, &c. vol. i. pars. viii. col. 428.

4 This more or less regular sale of licences by bishops and arch-deacons flourished from the days of Gregory VII. to the 16th century ; see index to Lea, s.v. "Licences." Dr Lea has, however, omitted the most striking' authority of all. Gascoigne, the most distinguished Oxford chancellor of his day, writing about 1450 of John de la Bere, then bishop of St David's, says that he had refused to separate the clergy of his diocese from their concubines, giving publicly as his reason, " for then I your bishop should lose the 400 marks which I receive yearly in my diocese for the priests' lemans " (Gascoigne, Lib. Ver. ed. Rogers, p. 36). Even Sir Thomas More, in'jhis polemic against the Reformers, admitted that this concubinage was too often tolerated in Wales (English Works, ed. 1557, p. 231, cf. 619).

ref6rming councils of Constance (1415) and Basel (143 i); but the overwhelming majority of orthodox churchmen were un- willing to abandon a rule for which the saints had fought during so many centuries,, and to which many of them probably attri- buted an apostolic origin. 6 This conservative attitude was inevitably strengthened by the attacks first of Lollard and then, of Lutheran heretics; and Sir Thomas More was driven to declare, in answer to Tyndale, that the marriage of priests, being essentially null

and void, ” defile th the priest more than double or treble whoredom.” It is well known that this became one of the most violently disputed questions at the Reformation, and that for eight years it was felony in England to defend sacerdotal marriage as permissible by the law of God .(Statute of the Six Articles, 31 Hen. VIII. c. 14). The diversity of practice on this point drew one of the sharpest lines between reformers and orthodox, until the disorders introduced by these religious wars tempted the -latter to imitate in considerable numbers the licence of their rivals. 6 This moved the emperor Charles V. to obtain from Paul III. dispensations for married priests in his dominions; and his successor Ferdinand, with the equally Catholic sovereigns of France, Bavaria and Poland, pleaded strongly at the council of Trent (1545) for permissive marriage. The council, after some hesitation, took the contrary course, and in the 9th canon of its 24th session it erected sacerdotal celibacy practically, if not formally, into an article of faith. In spite of this, the emperor Joseph II. reopened the question in 1783. In France the revolutionary constitution of 1791 abolished all restrictions on marriage, and during the Terror celibacy often exposed a priest to suspicion as an enemy to the Republic; but the better part of the clergy steadily resisted this innovation, and it js estimated that only about 2 % were married. The Old Catholics adopted the principle of sacerdotal marriage in 1875.

The working of the system in modern times is perhaps too controversial a question to be discussed here; but one or two points may be noted on which all fairly well informed writers would probably agree. It can scarcely be denied that the Roman Catholic clergy have always owed much of their influence to their celibacy, and that in. many cases this influence has been most justly earned by the celibate’s devotion to an unworldly ideal. Again, the most adverse critics would admit that much was done by the counter-Reformation, and that modern ecclesiastical discipline on this point is considerably superior to that qf the middle ages; while, on the other hand, many authorities of undoubted orthodoxy are ready to confess that it is not free from serious risks even in these days of easy publicity and stringent civil discipline. 7 Lastly, statistical research has shown that the children of the married British clergy have been distinguished far beyond their mere numerical proportion. 8

Authorities.— Henry Charles Lea, History of Sacerdotal Celibacy (3rd ed., 1907, 2 vols), is by far the fullest and best work on this subject, though a good deal qf important matter omitted by Dr

Lea may be found in Die E'infiihrung der erzwungenen Ehelosigkeit by the brothers Johann Anton and Augustin Theiner, which was put on the Roman Index, though Augustin afterwards became archivist at the Vatican (Altenburg, 1828, 2 vols.). The history of monastic celibacy has not yet been fully treated anywhere; the most im- portant evidence of the episcopal registers is either still in MS. or has been published only in comparatively recent years. The most learned work on clerical celibacy from the strictly conservative point of view is that of Francesco Antonio Zaccaria, Storia Polemica del celibato sacro (Rome, 17.74); but many of his most important

s One of Dr Lea's few serious mistakes is his acceptance of the spurious pamphlet infavour of priestly marriage which was attributed in the nth century to St Ulrich of Augsburg (i. 171).

8 Janssen, Gesch. d. diutschen Volkes, 13th ed., vol. viii. pp. 423, 4, 9; 434; Lea ii. 195, 204 ft. _ . ■ '

' Lea (ii. 339.ff.) gives a long series of quotations to this effect from church synods "and orthodox disciplinary writers of modern times.

8 Havelock Ellis, A Study of British Genius (London, 1904, p. 80), " Even if we compare the church with the other professions with which it is most usually classed, we find that the eminent children of the clergy considerably outnumber those of lawyers, doctors and army officers put together." Mr Ellis points out, however, that " the clerical profession . . . also produces more idiots than any other class." '

conclusions are set aside by the abbe E. Vacandard in his contribu- tion to the Dictionnaire de theologie catholique (vol. ii. art. " Ceiibat ecclesiastique ")• (G.G.Co.)

CELL (from Lat. cella, probably from an Indo-European kal — seen in Lat. celare, to hide; another suggestion connects the word with Lat. cera, wax, taking the original meaning to refer to the honeycomb), in its earliest application a small detached room in a building, particularly a small monastic house (see Abbey), generally in the country, belonging to large conventual buildings, and intended for change of air for the monks, as well

as places to reside in to look after the lands, vassals, &c. Thus Tynemouth was a cell to St Albans; Ashwell, Herts, to Westminster Abbey. The term was also used of the small sleeping apartments of the monks, or a small apartment used by the anchorite or hermit. This use still survives in the application to the small separate chambers in a prison (q.v.) in which prisoners are confined. The word is applied to various small compartments which build up a compound structure such as a honeycomb, to the minute compartments in a tissue, &c. More particularly the word is used, in electrical science, of the single constituent compartments of a voltaic battery (q.v.), and in biology of the living units of protoplasm of which plants and animals are composed (see Cytology).

CELLA, in architecture, the Latin name for the sanctuary of a Roman temple, corresponding with the naos of the Greek temple. In the Etruscan temples, according to Vitruvius, there were three cellas, side by side; and in the temple of Venus built by Hadrian at Rome there were two cellas, both enclosed, however, in a single peristyle.

CELLARET (i.e. little cellar), strictly that portion of a sideboard which is used for holding bottles and decanters, so called from a cellar (which in general may be any underground unlighted apartment) being commonly used for keeping wine. Sometimes it is a drawer, divided into compartments lined with zinc, and sometimes a cupboard, but still an integral part of the sideboard. In the latter part of the 18th century, when the sideboard was in process of evolution from a side-table with drawers into the large and important piece of furniture which it eventually became, the cellaret was a detached receptacle. It was most commonly of mahogany or rosewood, many-sided or even octagonal, and occasionally oval, bound with broad bands of brass and lined with zinc partitions to hold the ice for cooling wine. Sometimes a tap was fixed in’the lower part for drawing off the water from the melted ice. Cellarets were usually placed under the sideboard, and were, as a rule, handsome and well- proportioned; but as the artistic impulse which created the great 18th-century English school of furniture died away, their form grew debased, and under the influence of the English Empire fashion, which drew its inspiration from a bastard classicism, they assumed the shape of sarcophagi incongruously mounted with lions’ heads and claw-feet. Hepplewhite called them ” gardes du vin “; they are now nearly always known as ” wine-coolers.”

CELLE, a town of Germany, in the Prussian province of Hanover, on the left bank of the navigable Aller, near its junction with the Fuse and the Lachte, 23 m. N.E. of Hanover, on the main Lehrte-Hamburg railway. Pop. (1905) 21,400. The town has a Roman Catholic and five Protestant churches, among the latter the town-church with the burial vault of the dukes of Luneburg-Celle. Here rest the remains of Sophia Dorothea, wife of the elector George of Hanover, afterwards George I. of England, and those of Caroline Matilda, the divorced wife of Christian VII. of Denmark and sister of George III. of England, who resided here from 1772 until her death in 1775. The most interesting building in Celle is the former ducal .palace, begun in 1485 in Late Gothic style, but with extensive Renaissance additions of the close of the 17th century. The building of the court of appeal (Oberlandesgericht) , with a valuable library of 60,000 volumes and many MSS., including a priceless copy of the Sachsenspiegel, the museum and the hall of the estates (Landschaftshaus) are also worthy of notice. There are manu- factures of woollen yarn, tobacco, biscuits, umbrellas and printers'

ink, and a lively trade is carried on in wax, honey, wool and timber. Celle is the seat of the court of appeal from the superior courts of Aurich, Detmold, Gottingen, Hanover, Hildesheim, Luneburg, Osnabruck, Stade and Verden. Founded in 1292, the town was the residence of the dukes of Luneburg-Celle, a cadet branch of the ducal house of Brunswick, from the 14th century until 1705.

See Dehning, Geschichte der Stadt Celle (Celle, 1891). CELLIER, ALFRED (1844-1891), English musical composer, was born at Hackney on the 1st of December 1844. From 1855 to i860 he was a chorister at the Chapel Royal, St James's, under the Rev. Thomas Helmore, where Arthur Sullivan was one of his youthful colleagues. His first appointment was that of organist at All Saints' church, Blackheath (1862). In 1866 he succeeded Dr Chipp as director of the Ulster Hall concerts, Belfast, at the same time acting as conductor of the Belfast Philharmonic Society. In 1868 he returned to London as organist of St Alban's, Holborn. From 1871 to 1875 he was conductor at the Prince's theatre, Manchester; and from 1877 to 1879 at various London theatres. During this period he com- posed many comic operas and operettas, of which the most successful was The Sultan of Mocha, which was produced at Manchester in 1874, in London at the St James's theatre in 1876, and revived at the Strand theatre in 1887. In 1880 Cellier visited America, producing a musical

version of Longfellow's Masque of Pandora at Boston (1881). In 1883 his setting of Gray's Elegy in the form of a cantata was produced at the Leeds Festival. In 1886 he won the great success of his life in Dorothy, a comic opera written to a libretto by B. C. Stephenson, which was produced at the Gaiety theatre on the 25 th of September 1886, and, transferred first to the Prince of Wales theatre and subsequently to the Lyric theatre, ran until April 1889. Doris (1889), and The Mountebanks, which was produced in January 1892, a few days after the composer's death, were less successful. Cellier owed much to the influence of Sir Arthur Sullivan. He had little of the latter's humour and vivacity, but he was a fertile melodist, and his writing is invariably distinguished by elegance and refinement. He died in London on the 28th of December

1891.

CELLINI, BENVENUTO (1500-1571), Italian artist, metal worker and sculptor, was born in Florence, where his family, originally landowners in the Val d'Ambra, had for three genera- tions been settled. His father, Giovanni Cellini, was a musician and artificer of musical instruments; he married Maria Lisabetta Granacci, and eighteen years elapsed before they had any progeny. Benvenuto (meaning " Welcome ") was the third child. The father destined him for the same profession as himself, and endeavoured to thwart his inclination for design and metal work. When he had reached the age of fifteen his youthful predilection had become too strong to be resisted, and his father reluctantly gave consent to his being apprenticed to a goldsmith, Antonio di Sandro, named Marcone. He had already attracted some notice in his native place, when, being implicated in a fray with some of his companions, he was banished for six months to Siena, where he worked for Francesco Castoro, a goldsmith; from thence he removed to Bologna, where he became a more accomplished flute-player and made progress in the goldsmith's art. After visiting Pisa, and after twice resettling for a while in Florence (where he was visited by the sculptor Torrigiano, who unsuccessfully suggested his accompanying him to England), he decamped to Rome, aged nineteen. His first attempt at his craft here was a silver casket, followed by some silver candlesticks, and later by a vase for the bishop oi Salamanca, which introduced him to the favourable notice oi Pope Clement VII. ; likewise at a later date one of his celebrated works, the gold medallion of " Leda and the Swan," — the head and torso of Leda cut in hard stone — executed for Gonfaloniere Gabbriello

Cesarino, which is now in the Vienna museum; he also reverted to music, practised flute-playing, and was appointed one of the pope's court-musicians. In the attack upon Rome by the constable de Bourbon, which occurred immediately after, in 1527, the bravery and address of Cellini proved of signal service

to the pontiff; if we may believe his own accounts, his was the very hand which shot the Bourbon dead, and he afterwards killed Philibert, prince of Orange. His exploits paved the way for a reconciliation with the Florentine magistrates, and his return shortly after to his native place. Here he assiduously devoted himself to the execution of medals, the most famous of which (executed a short while later) are " Hercules and the Nemean Lion," in gold repousse work, and " Atlas supporting the Sphere," in chased gold, the latter eventually falling into the possession of Francis I. From Florence he went to the court of the duke of Mantua, and thence again to Florence and to Rome, where he was employed not only in the working of jewelry, but also in the execution of dies for private medals and for the papal mint. Here in 1529 he avenged a brother's death by slaying the slayer; and shortly afterwards had to flee to Naples to shelter himself from the consequences of an affray with a notary, Ser Benedetto, whom he wounded. Through the influence of several of the cardinals he obtained a pardon; and on the elevation of Paul III. to the pontifical throne he was reinstated in his former position of favour, notwithstanding a fresh homicide of a gold- smith which he had committed more by accident than of malice prepense in the interregnum. Once more the plots of Pierluigi Farnese, a natural son of Paul III., led to his retreat from Rome to Florence and Venice, and once more he was restored with greater honour than before. On returning from a visit to the court of Francis I., being now aged thirty-seven, he was im- prisoned oh a charge (apparently false) of having embezzled during the war the gems of the pontifical tiara; he remained some while confined in the castle of Sant' Angelo, escaped, was recaptured, and treated with great severity, and was in daily expectation of death on the scaffold. At last, however, he was released at the intercession of Pierluigi's wife, and more especi- ally of the Cardinal d' Este of Ferrara, to whom he presented a splendid cup. For a while after this he worked at the court of Francis I. at Fontainebleau and in Paris; but he considered the duchesse d'Etampes to be set against

him, and the intrigues of the king's favourites, whom he would not stoop to conciliate and could not venture to silence by the sword, as he had silenced his enemies in Rome, led him, after about five years of laborious and sumptuous work, and of continually-recurring jealousies and violences, to retire in 1545 in disgust to Florence, where he employed his time in works of art, and exasperated his temper in rivalries with the uneasy-natured sculptor Baccio Bandinelli. The first collision between the two had occurred several years before when Pope Clement VII. commissioned Cellini to mint his coinage. Now, in an altercation before Duke Cosimo, Bandinelli insultingly stigmatized Beivenuto as guilty of gross immorality; in his autobiography Cellini rather repels than denies the charge, but he certainly repels it with demonstrative and grotesque vivacity. Two somewhat similar charges had been made ere this: one in Paris, which he braved out in court — the other, in Florence, was a mere private quarrel, and perhaps undeserving of attention. During the war with Siena Cellini was appointed to strengthen the defences of his native city, and, though rather shabbily treated by his ducal patrons, he continued to gain the admiration of his fellow-citizens by the magnificent works which he produced. He died in Florence in 1571, unmarried, and leaving no posterity, and was buried with great pomp in the church of the Annunziata. He had supported in Florence a widowed sister and her six daughters.

Besides the works in gold and silver which have been adverted to, Cellini executed several pieces of sculpture on a grander scale. The most distinguished of these is the bronze group of " Perseus holding the head of Medusa," a work (first suggested by Duke Cosimo de' Medici) now in the Loggia dei Lanzi at Florence, full of the fire of genius and the grandeur of a terrible beauty, one of the most typical and unforgettable monuments of the Italian Renaissance. The casting of this great work gave Cellini the utmost trouble and anxiety; and its completion was hailed with rapturous homage from all parts of Italy. The original relief from the foot of the pedestal — -Perseus and Andromeda — is in the Bargello, and replaced by a cast.

Not less characteristic of its splendidly gifted and barbarically untameable author are the autobiographical memoirs which he composed, beginning them in Florence in 1558, — a production of the utmost energy, directness and racy animation, setting forth one of the most singular careers in all the annals of fine art. His amours and hatreds, his passions and delights, his love of the

sumptuous and the exquisite in art, his self applause and self assertion, running now and again into extravagances which it is impossible to credit, and difficult to set down as strictly conscious falsehoods, make this one of the most singular and fascinating books in existence. Here we read, not only of the strange and varied adventures of which we have presented a hasty sketch, but of the devout complacency with which Cellini could con- template a satisfactorily achieved homicide; of the legion of devils which he and a conjuror evoked in the Colosseum, after one of his not innumerous mistresses had been spirited away from him by her mother; of the marvellous halo of light which he found surrounding his head at dawn and twilight after his Roman imprisonment, and his supernatural visions and angelic protection during that adversity; and of his being poisoned on two several occasions. If he is unmeasured in abusing some people, he is also unlimited in praising others. The autobiography has been translated into English by Thomas Roscoe, by J. A. Symonds, and by A. Macdonald. Cellini also wrote treatises on the gold- smith's art, on sculpture, and on design (translated by C. R. Ashbee, 1899).

Among his works of art not already mentioned, many of which have perished, were a colossal Mars for a fountain at Fontaine-bleau and the bronzes of the doorway, coins for the Papal and Florentine states, a Jupiter in silver of life size, and a bronze bust of Bindo Altoviti. The works of decorative art are, speaking broadly, rather florid than chastened in style.

In addition to the bronze statue of Perseus and the medallions already referred to, the works of art in existence to-day executed by him are the celebrated salt-cellar made for Francis I. at Vienna; a medallion of Clement VII. in commemoration of the peace between the Christian princes, 1530, with a bust of the pope on the reverse and a figure- of Peace setting fire to a heap of arms in front of the temple of Janus, signed with the artist's name; a medal of Francis I. with his portrait, also signed; and a medal of Cardinal Pietro Bembo. Cellini, while employed at the papal mint at Rome during the papacy of Clement VII. and later of Paul III., executed the dies of several coins and medals, some of which still survive at this now defunct mint. He was also in the service of Alessandro de' Medici, first duke of Florence, for whom he executed in 1535 a forty-soldi piece with a bust of the duke on one side and standing figures of the saints Cosmo and Damian on the other. Some connoisseurs attribute to his hand several plaques, " Jupiter crushing the Giants," " Fight between Perseus

and Phinaeus," a Dog, &c.

The important works which have perished include the uncompleted chalice intended for Clement VII.; a gold cover for a prayer-book as a gift from Pope Paul III. to Charles V., — both described at length in his autobiography; large silver statues of Jupiter, Vulcan and Mars, wrought for Francis I. during his sojourn in Paris; a bust of Julius Caesar; and a silver cup for the cardinal of Ferrara. The magnificent gold " button," or morse, made by Cellini for the cope of Clement VII., the com- petition for which is so graphically described in his autobiography, appears to have been sacrificed by Pius VI., with many other priceless specimens of the goldsmith's art, in furnishing the indemnity of 30,000,000 francs demanded by Napoleon at the conclusion of the campaign against the States of the Church in 1797. According to the terms of the treaty, the pope was per- mitted to pay a third of that sum in plate and jewels. Fortunately there are in the print room of the British Museum three water- colour drawings of this splendid morse by F. Bertoli, done at the instance of an Englishman named Talman in the first half of the 18th century. The obverse and reverse, as well as the rim, are drawn full size, and moreover the morse with the precious stones set therein, including a diamond then considered the second largest in the world, is fully described.

Bibliography. — The autobiography already . named is the foundation ef most of the works written concerning Cellini's life. See also Cellini, His Times and Contemporaries, by " the Author of the Life of Sir Kenelm Digby " (1899); L. Dimier, Cellini a la cour de France (1898) ; Eugene Plon, Cellini, orfevre, medailleur, &c. (1883); Bolzenthal, Skizzen zur KunStgeschichte der modernen Medaillen-Arbeit ,1429-1840 (Berlin, 1840); A. Armand, Les Medailleurs italiens des XV' el XVI e siecles (3 vols., Paris, 1883- 1887) ; Dr Francesco Tassi, Vitadi Benvenuto Cellini (Firenze, 1829), Vita di Benvemito Cellini scritta da lui medisimo (1832) ; E. Babelon, La Gravure en pierres fines (Paris, 1894) ; A. Heiss, Les Medailleurs florentins (Paris, 1887) ; J. Friedlander, Die italienischen Schau- munzen des funfzehnten Jahrhunderts (Berlin, 1880-1882) ; N. Rondot, Les Medailleurs lyonnais (Macon, 1897) ; Dr Julius Cann, Medaillen und Plaketten der Sammlung W. P. Metzler (Frankfort-on-Main, 1898); Molinier, Les

Plaquettes ; I. B. Supino, II Medagliere Mediceo nel R. Museo Nazionale di Firenze (Florence, 1899) ; L'Arte di Benvenuto Cellini (Florence, 1901); C. von Fabriczy, Medaillen der italienischen Renaissance (Leipzig) ; L. Forrer, Biographical Diction- ary of Medallists, &c. (London, 1904), &C. (W. M. R. ; E. A. J.)

1 CELLULOSE, the name given to both an individual— cellulose proper, in the restricted sense of a chemical individual — and to a group of substances, the celluloses or cellulose group, which constitute in infinitely varied forms the containing envelope of the plant cell. They are complex carbohydrates, or " saccharo-colloids " (Tollens), and are resolved by ultimate hydrolysis into monoses. The typical cellulose is represented by the empirical formula CeHioOs, identical with that of starch, with which it has many chemical analogies as well as physiological correlations. The representative " cellulose " is the main con- stituent of the ' cotton fibre substance, and is obtainable by treating the raw fibre with boiling dilute alkalis, followed by chlorine gas or bromine water, or simply by alkaline oxidants. The cellulose thus purified is further treated with dilute acids, and then exhaustively with alcohol and ether. Chemical filter-paper (Swedish) is practically pure cellulose, the final purification consisting in exhaustive treatment with hydro- fluoric acid to remove silicious inorganic residues. The " cellu- lose " group, however, comprises a series of substances which; while presenting the characters generally similar to those of cotton cellulose, also exhibit marked divergences. The re- semblances are maintained in their synthetical reactions; but reactions involving the decomposition of the complex show many variations. For example, cotton cellulose is difficultly hydrolysed; other celluloses are more or less readily split up by dilute acids, the extreme members readily yielding sugars: the hexoses— dextrose, mannose and galactose; and the pentoses— xylose and arabinose; these less resistant cell-wall constituents are termed hemi-celluloses.

The celluloses proper are essentially non-nitrogenous, though originating in the cell protoplasm. The cell-walls of the lower cryptogams, similarly purified, retain a notable proportion — 2-o-4-o% — of constitutional nitrogen. When hydrolysed these fungoid celluloses yield, in addition to monoses, glucosamine and acetic acid. The celluloses of the phanerogams are generally associated, in a degree ranging from physical mixture to chemical union, with other complicated substances, constituting the " compound celluloses." The nature of the associated groups

affords a convenient classification into pecto-celluloses, ligno-cellu- loses and cuto-celluloses. Pecto- celluloses are so named because the associated substances — carbo- hydrates, together with their oxi- dation products, i.e. containing either two carbonyls (CO) in the unit group or carboxyl (CO-OH) groups in a complex — are readily hydrolysed by weak acids to the gelatinous ” pectic acids ” or their salts. Ligno-celluloses are the substances of lignified tissue, the iaon-cellulose constituents of which are characterized by the presence ofrbenzenoid and furfuroid groups; and although essentially complex,

they may be regarded as homogeneous, and are conveniently grouped under the name lignone, The lignone complex reacts, by its unsaturated groups, with the halogens. It is a complex containing but little hydroxyl; and is of relatively high carbon percentage (55-0-5 7-0%). Cuto-celluloses predominate in the protective coatings of plant organs, and are character- ized by constituent groups, the decomposition products of which are compounds of the fatty series, and also wax alcohols, acids, cholesterols, &c.

The typical pecto-cellulose is the flax fibre, i.e. the bast fibre of the flax plant (Linum usitatissimum) , as it occurs in the plant, or as the commercial textile fibre in its raw state. Rhea, or ramie, is another leading textile fibre in which the cellulose occurs associated with alkali-soluble colloidal carbohydrates. Pecto-celluloses are found in the stems of the Gramineae (cereal straws, esparto), and in the fibro-vascular bundles of monocotyle- dons used as textile and rope-making fibres. They are the chief constituents of the fleshy parenchyma of fruits, tubers, rhizomes. Ligno-celluloses find their chemical representative in the jute fibre. They constitute the woods, ‘ and are therefore of the widest distribution and the highest industrial utility. It is important to note that a complex having all the chemical characteristics of a ligno-cellulose occurs in a soluble colloidal form in the juice of the white currant. The formation of ligno- cellulose is the chemical equivalent of the morphological change of the plant cell known as ” lignification.” The typical cuto- celluloses are the epidermal tissues of all growing plants or organsˆ which are easily detached from the underlying tissues which it is their function to protect. To subserve this function, they are extremely resistant to the attack of reagents. The associated groups are mostly of the normal saturated series, and of very high molecular weight.

CelluloseandBotanicalScience. — Theelaborationof cellulose, i.e. of the cell walls, and its morphological and physiological aspects are discussed in the articles Plants: Physiology, Anatomy: and Cytology; while in the article Coal the part played by cellulose in the formation of these deposits receives treatment: here we may deal with its general relation to agriculture. In the analysis of fodder plants and other vegetable produce, the residue obtained after successive acid and alkaline hydrolysis is the ” crude fibre ” of the agricultural chemist, and is generally taken as a measure of the actual cellulose contents of the raw material. We give in tabular form the average percentage of crude fibre in typical food-stuffs and agricultural produce: —

Seeds

Per cent of

Leguminous and

Per cent of

Seeds of Cereals.

Fibre.

Oil Seeds.

Fibre.

ˆ Wheat

2-8

Rape .

6-4

Barley

6-3

Cotton

7-5

Oats .

9-0

Beans .

10-0

Maize . . .

5-2

Peas

10-0

Rye . , :

8-o

Lentils

IO-O

Rice

2-5

Vetches

7-2

Fodder Crops

Stems and Foliage

Per cent of

Per cent of

Per cent of

of Root Crops.

Fibre.

Fodder Crops.

Fibre. 1

Cereal Straws.

Fibre.

White Turnip

3-9

Grasses

32-0

Oats . . .

60-68

Meadow)

Hay \ . .

25-8

Wheat . . .

7577

Barley

71-74

Swedish „

4-2

Clover and \ Trefoil J

Carrot

3-1

2 3-5

Mangel .

2-6

Vetches .

25-9

Parsnip .

2-6

Lucerne . Sainfoin .

267

287

Leguminous.

Oil Seeds.

Stems and

Foliage of

Root Crops

Fodder Crops.

Cereal Straws.

Average % of water

H

7

87

70-80

15

'This percentage is calculated on airdry-produce containing 15% of water.

The above figures have a purely empirical value, since they represent a complicated mixture of various residues derived from the celluloses and compound celluloses. This mixture may be further resolved, and by special quantitative methods the proportions of actual cellulose, ligno-cellulose and cuto-celluloses estimated (J. Konig, Ber., 1906, 39, p. 3564). The figures are taken as an inverse measure of digestibility; at the same time it has been established that this group of relatively indigestible food constituents are more or less digestible and assimilable as flesh and fat producers. The percentage or coefficient of digestibility of the celluloses of the more important food-stuffs — green fodder, hay, straw and grains — varies from 20 to 75 Vo- lt has also been established that their physiological efficiency is, under certain conditions, quite equal to that of starch.

It must also be borne in mind that the indigestible food resi-

dues, as finally voided by the animal, have played an important mechanical part as an aid to digestion of those constituents more readily attacked in the digestive tract of animals. They are further an important factor of the agricultural cycle. Re- turned ,to the soil as ” farm-yard manure,” mixed with other cellulosic matter which has served as litter, they add ” fibre ” to the soil and, as a mechanical diluent of the mineral soil components, maintain this in a more open condition, penetrable by the atmospheric gases, and promoting distribution of moisture, further by breaking down, with production of ” humus,” a complex of colloidal ” unsaturated ” bodies of acid function, they fulfil important chemical functions by interaction with the mineral soil constituents.

Chemistry of Cellulose. — Purified cotton cellulose, which is the definitive prototype of the cellulose group or series, is a complex of monoses or their ” residues.” It is resolved by solution in sulphuric acid and subsequent hydrolysis of the esters thus produced into dextrose. This fundamental fact with its ele- mentary composition, most simply expressed by the formula C 6 HioO s , has caused it to be regarded as a polyanhydride of dextrose. Forming, as it does, simple esters in the ratio of the reacting hydroxyls 30H: C 6 H 10 O5, and taking into account its direct converson into co-brom-methyl furfural (Fenton) a constitutional formula has been proposed by A. G. Green (Zeit. Farb. Textil Chetn. 3, pp. 97 and 309 (1904)), which is a useful generalization of its reactions, and its ultimate relations to the

CH(OH)-CH-CH(OH) simpler carbohydrates, viz., I >0 >0 Green con-

CH(OH)-CH-CH 2 siders, moreover, that a group thus formulated may consistently represent the actual dimensions of the reacting unit, but that unit of larger dimensions, if postulated, is easily derived from the above by oxygen linkings.

From another point of view the unit group has been formu- / CH(OH)-CH(OH) lated as CO > CH 2 , the main linking of such units in the

NTH (OH) -CH (OH)

complex taking place as between their respective CO and CH 2 groups in the alternative enolic form CH — C (OH) . This view gives expression to the genetic relations of the celluloses to the

ligno- celluloses, to the tendency to carbon condensation as in the formation of coals, and pseudo-carbons, to the relative resistance of cellulose to hydrolysis, and its other points of differentiation from starch, and more particularly to the ketonic character of its carbonyl (CO) groups, which is also more in harmony with the experimental facts established by Fenton as to the production of methyl furfural.

The probability, however, is that no simple molecular formula adequately represents the constitution of cellulose as it actually exists or indeed reacts. On the other hand, it has been suggested that cellulose is to be regarded as representing a condition of matter analogous to that of a saline electrolyte in solution, i.e. as a complex of molecular aggregates, and of residues (of monose groups) having distinct and opposite polarities; such a complex is essentially labile and its configuration will change progressively under reaction. The exposition of this view is the subject of a publication by Cross and Bevan {Researches on Cellulose, ii. 1906). The main purpose is to give full effect to the colloidal

characteristics of cellulose and its derivatives, with reference to the modern theory of the colloidal state as involving a particular internal equilibrium of amphoteric electrolytes.

The typical cellulose is a white fibrous substance familiar to us in the various forms of bleached cotton. Other fibrous cellu- loses are equally characteristic as to form and appearance, e.g. bleached flax, hemp, ramie. It is hygroscopic, absorbing 6 to 7% its weight of moisture from the air. When dry, it is an electrical insulator, and has a specific inductive capacity of about 7: when wetted it is a conductor, and manifests electro- lytic phenomena. 1 It is insoluble in water and in the ordinary solvents; it dissolves, however, in a 40-50% solution of zinc chloride, and in ammoniacal solutions of copper oxide (3% CuO, 15% NH 3): from these solutions it is obtained as a highly hydrated, gelatinous precipitate, from the former by dilution or addition of alcohol, from the latter by acidification; these solu- tions have important industrial application. Projected or drawn into a precipitating solution they may be solidified continuously to threads of various, but controlled dimensions: the regenerated cellulose, now amorphous, in its finer dimensions is known as artificial silk or lustra-cellulose. These forms of cellulose retain the general characters of the original fibrous and ” natural ” celluloses. In composition they differ somewhat by combination with water (of hydration), which they retain in the air-dry con-

dition. They also further combine with an increased proportion of atmospheric moisture, viz. up to 10-11% of their weight.

Derivatives. — Important derivatives are the esters or ethereal salts of both inorganic and organic acids, cellulose behaving as an alcohol, the highest esters indicating that it reacts as a trihydric alcohol of the formula «[C6H 7 2 (OH)3] . The nitrates result by the action of concentrated nitric acid, either alone or in the presence of sulphuric acid: the normal dinitrate represents a definite stage in the series of nitrates, and the ester at this point manifests the important property of solubility in various alcoholic solvents, notably ether-alcohol. Such nitrates are the basis of collodion, of artificial silk by the processes of Chardonnet and Lehner, and of celluloid or xylonite. Higher nitrates are also obtainable-up to the limit of the trinitrate, which is insoluble in ether or alcohol, but is soluble in nitroglycerin, nitrobenzene and other solvents. These higher nitrates are the basis of the most important modern explosives.

Cellulose reacts directly with acetic anhydride to form low esters; in the presence of sulphuric acid the reaction proceeds to higher limits; the triacetate is soluble in chloroform. The acid sulphuric ester, C6H8032, is obtained by the action of sulphuric acid, but its relation to the original cellulose is doubt- ful. The monobenzoate and dibenzoate are formed by benzoyl chloride reacting on alkali-cellulose (see below). Cellulose xanthates are obtained from carbon bisulphide and alkali- cellulose; these are water soluble derivatives and the basis of ” viscose,” and of important industries. Mixed esters- — aceto- sulphate, aceto-benzoate, nitrobenzoyl nitrates, aceto-nitro- sulphates — have also been investigated.

Cellulose (cotton), when treated with a 15-20% caustic soda solution, gives the compound C6H 10 O5-H 2 O-2NaOH, alkali-cellulose, the original riband-like form with reticulated walls of the .cellulose being transformed into a smooth- walled cylinder. The structural changes in the ultimate fibre deter- mine very considerable changes in the dimensions of fabrics so treated. The reactions and structural changes were investigated by J. Mercer, and are known generally as ” mercerization.” In recent years a very large industry in ” mercerized ” fabrics (cotton) has resulted from the observation that if the shrinkages of the yarns and fabrics be antagonized by mechanical means, a very high lustre is developed.

Similar, but less definite compounds, are formed with the oxides of lead, manganese, barium, iron, aluminium and chromium. These derivatives, which also find industrial applica- tions in the dyeing and printing of fabrics, differ but little in

1 C. F. Cross and E. J. Bevan, Jour. Chem. Soc, 1895, 67, p. 449; C. R. Darling, Jour. Faraday Soc. 1904; A. Campbell, Trans. Roy. Soc. 1906.

appearance from the original cellulose, and are without influence on its essential characteristics.

Decompositions. — Hydrolysis: — By solution in sulphuric acid followed by dilution and boiling the diluted solution cellulose hydrolyses to fermentable sugars; this reaction is utilized industrially in the manufacture of glucose from rags. Hydro-chloric acid produces a friable mass of " hydrocellulose," probably $C_{12}H_{22}O_{11}$, insoluble in water, but readily attacked by alkalis, with the production of soluble derivatives; some dextrose is formed in the original reaction. Hydrobromic acid in ethereal solution gives furfurane derivatives. Cold dilute acids have no perceptible action on cellulose. The actions of such acids are an important auxiliary to bleaching, dyeing and printing processes, but they require careful limitation in respect of concentration and temperature. Cellulose is extremely resistant to the action of dilute alkalis: a 1-2% solution of sodium hydrate having little action at temperatures up to 150 ; hence the use of caustic soda, soda ash and sodium silicate in bleaching processes, i.e. for the elimination of the non -cellulose components of the raw fibres. Oxidation in acid solutions gives compounds classed as " oxycelluloses," insoluble in water, but more or less soluble in alkalis; continued oxidation gives formic, acetic and carbonic acids. Oxidation in alkaline solution is more easily controlled and limited; solutions of bleaching powder, or more generally of alkaline hydrochlorites, receive industrial application in oxidizing the coloured impurities of the fibre, or residues left after more or less severe alkali treatments, leaving the cellulose practically unaffected. This, however, is obviously a question of conditions: this group of oxidants also oxidize to oxycellulose, and under more severe conditions to acid products, e.g. oxalic and carbonic acids. Certain bacteria also induce decompositions

which are resolutions into ultimate products of the lowest molecular dimensions, as hydrogen, carbon dioxide, methane, acetic acid and butyric acid (Omeliansky) (Handb. Techn. Mykologie [F. Lafar] pp. 245-268), but generally the cellulose complex is extremely resistant to the organic ferments. Cellulose burns with a luminous flame to carbon dioxide and water; dry distillation gives a complicated mixture of gaseous and liquid products and a residue of charcoal or pseudo-carbon. Chromic acid in sulphuric acid solutions effects a complete oxidation, i.e. combustion to water and carbonic acid.

Ligno-celluloses. — These compounds have many of the characteristics of the cellulose esters; they are in effect ethereal compounds of cellulose and the quinonoid lignone complex, and the combination resists hydrolysis by weak alkalis or acids. The cellulose varies in amount from 80 to 50%, and the lignone varies inversely as the degree of lignification, that is, from the lignified bast fibre of annuals, of which jute is a type, to the dense tissues of the perennial dicotyledonous woods, typified by the beech. The empirical formula of the lignone complex varies from C19H22O9 (jute) to CjeHsAo (pine wood). In certain reactions the non-cellulose or lignone constituents are selectively converted into soluble derivatives, and may be separated as such from the cellulose which is left; for example, chlorination gives products soluble in sodium sulphite solution, by the combination of unsaturated groups of the lignone with the halogen, while digestion with bisulphite solutions at elevated temperatures (i40°-i6o°) gives soluble sulphonated derivatives. This last reaction is employed industriaDy in the preparation of cellu- lose for paper-making from coniferous woods. These reactions are " quantitative " since they depend upon well-defined constitutional features of the lignone complex, and the resolution of the ligno-cellulose takes place with no further change in the lignone than the synthetical combination with the substituting groups. The constituent groups of the lignone specifically

HC

reacting are of benzenoid type of the probable form ˆ q\ |ˆq>

CO deduced from the similarity of the chlorinated derivatives to mairogallol, the product of the action of chlorine on pyrogallol in acetic acid solution (A. Hantzsch, Ber. 20, p. 2033).

The complex contains methoxy (OCH 3) groups. There is also

present a residue which is readily broken down by oxidizing agents, and indeed by simple hydrolysis, to acetic acid. Another important group of actual constituents are pentosanes — partially isolated as " wood gum " by solution in alkalis — and furfural derivatives (hydroxy furfurals) derived from these. The actual constitutional relationships of these main groups, as well as the localization of the methoxy groups, are still problematical.

Certain colour reactions are characteristic, though they are in some cases reactions of certain constituents invariably present in the natural forms of the ligno-cellulose; which may be re- moved without affecting the essential character of the lignone complex. Aniline salts generally give a yellow coloration, dimethyl-para-phenylenediamine gives a deep red coloration, phloroglucin in hydrochloric acid gives a crimson coloration. Reactions more definitely characteristic of the lignone are: — ferric ferrocyanide, which is taken up and transformed into Prussian blue throughout the fibre, without affecting its structure, although there may be as much as a 50% gain in weight; iodine in potassium iodide solution gives a deep brown colour due to absorption of the halogen, a reaction which admits of quantitative application, i.e. as a measure of the proportion of ligno-cellulose in a fibrous mixture; nitric acid gives a deep orange yellow coloration; digested with the dilute acid (5-10% HN0 3) at 50 the ligno-celluloses are entirely resolved, the lignone complex being attacked and dissolved in the form of nitroso-ketonic acids, which, on continued heating, are finally resolved to oxalic, acetic, formic and carbonic acids.

Derivatives of Ligno-cellulose. — By reaction with chlorine jute yields the derivative C19H18CL.O9, soluble in alcohol, and in acetic acid; this derivative has the reactions of a quinone chloride. By reaction with sodium sulphite it is converted into a hydroquinone sulphonate of deep purple colour. The reaction of the ligno-celluloses (pine wood) with the bisulphites yields the soluble derivatives of the general formula Casˆ CySOaH (containing two 0-CH 3 groups). Jute reacts with nitric acid in presence of sulphuric acid to form nitrates; and with acetic anhydride to form low acetates. It reacts with alkaline hydrates with structural changes similar to those obtained with cotton; and by the further action of benzoyl chloride and of carbon bisulphide upon the resulting compounds there result the cor-responding benzoates and xanthates respectively. But these synthetical derivatives are mixtures of cellulose and lignone derivatives, and so far of merely theoretical interest.

Decompositions of Ligno-cellulose. — In addition to the specific resolutions above described which depend upon the distinctive chemical characters of the cellulose and lignone respectively, the following may be noted: to simple hydrolytic agents the two groups are equally resistant, therefore by boiling with dilute acids or alkalis the groups are attacked pari passu. Weak oxidants may also be used as bleaching agents to remove coloured by-products without seriously attacking the ligno-cellulose, which is obtained in its bleached form. Nitric acid of all strengths effects complete resolution. Chromic acid in dilute solutions combines with the lignone complex, but in presence of hydro- lysing acids total oxidation of the lignone is determined. The principal products are oxalic, carbonic, formic and acetic acids. This reaction is an index of constitution. Generally, the lignone is attacked under many conditions and by many reagents which are without action upon cellulose, by virtue of its unsaturated constitution, and its acid and aldehydic residues.

Cuto-cellulose. — A typical cuto-cellulose is the cuticle (peel) of the apple which, when purified by repeated hydrolytic treatment and finally by alcohol and ether, gives a product of the composi- tion C = 75-66%,' H=n-37%, = 14-97%. Hydrolysis by strong alkalis gives stearo-cutic acid, C28H48O4, and oleo-cutic acid, C14H20O4 (Fremy). Cork is a complex mixture containing various compound celluloses: extraction with alcohol removes certain fatty alcohols and acids, and aromatic derivatives related to tannic acid; the residue is probably a mixture of cellulose, ligno-cellulose, cerin, C20H32O and suberin; the latter yields

stearic acid, CisHseOj, and the acid C22H42O3. The cuto-celluloses have been only superficially investigated, and, with the exception of cork, are of but little direct industrial importance.

Industrial Uses of Cellulose. — The applications of cellulose to the necessities of human life, infinitely varied in kind as they are colossal in magnitude, depend upon two groups of qualities or properties, (1) structural, (2) chemical. The manufactures of vegetable textiles and of paper are based upon the fibrous forms of the naturally occurring celluloses, together with such structural qualities as are expressed in the terms strength,

elasticity, specific gravity. As regards chemical properties, those which come into play are chiefly the negative quality of resistance to chemical change; this is obviously a primary factor of value in enabling fabrics to withstand wear and tear, contact with atmospheric oxygen and water, and such chemical treatments as laundrying; positive chemical properties are brought into play in the auxiliary processes of dyeing, printing, and the treatment and preparation in connexion with these. Staple textiles of this group are cotton, flax, hemp and jute; other fibres are used in rope-making and brush-making industries. These subjects are treated in special articles under their own headings and in the article Fibres. The course of industrial development in the 19th century has been one of enormous expansion in use and considerable refinement in methods of preparation and manu- facture. Efforts to introduce new forms of cellulose have had little result. Rhea or ramie has been a favourite subject of investigation; the industry has been introduced into England, and doubtless its development is only a question of time, as on the continent of Europe the production of rhea yarns is well established, though it is still only a relatively small trade — probably two or three tons a day total production. The paper trade has required to seek new sources of cellulose, in consequence of the enormous expansion of the uses of paper. Important phases of development were: (1) in the period of i860 to 1870, the introduction of esparto, which has risen to a consump- tion of 250,000 tons a year in the United Kingdom, at which figure it remains fairly steady; (2) the decade 1870 to 1880, which saw the development of the manufacture of cellulose from coniferous woods, and this industry n*w furnishes a staple of world-wide consumption, though the industry is necessarily localized in countries where the coniferous woods are available in large quantities. As a development of the paper industry we must mention the manufacture of paper textiles, based upon the production of pulp yarns. Paper pulps are worked into flat strips, which are then rolled into cylindrical form, and by a final twisting process a yarn is produced sufficiently strong to be employed in weaving.

What we may call the special cellulose industries depend upon specific chemical properties of cellulose, partly intrinsic, partly belonging to the derivatives such as the esters. Thus the cellu- lose nitrates are the bases of our modern high explosives, as well as those now used for military purposes. Their use has been steadily developed and perfected since the middle of the 19th

century. The industries in celluloid, xylonite, &c, also depend upon the nitric esters of cellulose, and the plastic state which they assume when treated with solvent liquids, such as alcohol, amyl acetate, camphor and other auxiliaries, in which state they can be readily moulded and fashioned at will. They have taken an important place as structural materials both in useful and artistic applications. The acetates of cellulose have recently been perfected, and are used in coating fine wires for electrical purposes, especially in instrument-making; this use depends upon their electrical properties of high insulation and low inductive capacity. Hydrated forms 01 Cellulose, which result from treatment with various reagents, ate the bases of the following industries: vegetable parchment results from the action of sulphuric acid upon cellulose (cotton) in the form of paper, followed by that of water, which precipitates the partially colloidalized cellulose. This industry is carried out- on " continuous " machinery, the cellulose, in the form of paper, being treated in rolls. Vulcanized fibre is produced by similar processes, as for instance by treating paper with zinc chloride v. 20

solvents and cementing together a number of sheets when in the colloidal hydrated state; the goods are exhaustively washed to remove) last traces of soluble electrolytes; this is necessary, as the product is used for electrical insulation. The solvent action of cupro-ammonium is used in treating cellulose goods, cotton and paper, the action being allowed to proceed sufficiently to attack the constituent fibres and convert them into colloidal cupro-ammonium compounds, which are then dried, producing a characteristic green-coloured finish of colloidal cellulose and rendering the goods impervious to water. The important industry of mercerization has been mentioned above; this is carried out on both yarns and cloth of cotton goods chiefly composed of Egyptian cottons. A high lustrous finish is produced, giving the goods very much the appearance of silk.

Of special importance are the more recent developments in the production of artificial fibres of all dimensions, by spinning or drawing the solutions of cellulose or derivatives. Three such processes are in course of evolution. (1) The first is based on the nitrates of cellulose which are dissolved in ether-alcohol, and spun through fine glass jets into air or water, the unit threads being afterwards twisted together to constitute the thread used for weaving (process of Chardonnet and Lehner). These processes were developed in the period~i883 to 1897, at which later date they had assumed serious industrial proportions. (2) The

cupro-ammonium solution of cellulose is similarly employed, the solution being spun or drawn into a strong acid bath which instantly regenerates cellulose hydrate in continuous length. (3) Still more recently the " viscose " solution of cellulose, i.e. of the cellulose xanthogenic acid, has been perfected for the production of artificial silk or lustra-cellulose; the alkaline solution of the cellulose derivative being drawn either into concentrated ammonium salt solutions or into acid baths. This product, known as artificial silk, prepared by the three competing processes, was in 1908 an established textile with a total production in Europe of about 5000 tons a year, a quantity which bids fair to be very largely increased by the advent of the viscose process, Which will effect a very considerable lowering in the cost of production. The viscose solution of cellulose is also used for a number of industrial effects in connexion with paper-sizing, paper-coating, textile finishes, and the production of book cloth and leather cloth, and, solidified in solid masses, is used in preparing structural solids which can be moulded, turned and fashioned.

For the special literature of cellulose treated from the general point of view of this article, the reader may consult the following works by C. F. Cross and E. J. Bevan: Cellulose (1895, 2nd ed. 1903), Researches on Cellulose, i. (1901), Researches on Cellulose, ii. (1906). (C. F. C.)

CELSIUS, ANDERS (1701-1744), Swedish astronomer, was born at Upsala on the 27th of November 1701. He occupied the chair of astronomy in the university of his native town from 1730 to 1744, but travelled during 1732 and some subse- quent years in Germany, Italy and France. At Nuremberg he published in 1733 a collection of 316 observations of the aurora borealis made by himself and others 1716-1732. In Paris he advocated the measurement of an arc of the meridian in Lapland, and took part, in 1736, in the expedition organized for the purpose by the French Academy. Six years later he described the centigrade thermometer in a paper read before the Swedish Academy of Sciences (see Thermometry). His death occurred at Upsala on the 25th of April 1744. He wrote: Nova Methodus dislantiam solis a terra determinandi (1730); De observationibus pro figura telluris determinanda (1738); besides many less important works.

See W. Ostwald's Klassiker der exacten Wissenschaften, No. 57 (Leipzig, 1904), where Celsius's memoir on the thermometric scale is given in German with critical and biographical notes (p. 132) ; Marie, Histoire des sciences, viii. 30; Poggendorff's Biog.-

literarisches Handwbrterbuch.

CELSUS (c. a.d. 178), a 2nd-century opponent of Christianity, known to us mainly through the reputation of his literary work, The True Word (or Account; aXijdris Xoyos), published by Origen in 248, seventy years after its composition. In that year, though the Church was under no direct threat of attack, owing

to the inertia of the emperor Philip the Arabian, the atmosphere was full of conflict. The empire was celebrating the ioooth anniversary of its birth, and imperial aspirations and ideas were naturally prominent. Over against the state and the worship of the Caesar stood as usual the Christian ideal of a rule and a citizenship not of this world, to which a thousand years were but as a day. A supernatural pride was blended with a natural anxiety, and it was at this juncture that Origen brought to light again a book written in the days of Marcus Aurelius, which but for the great Alexandrian might have been lost for ever. Sometimes quoting, sometimes paraphrasing, sometimes merely referring, he reproduces and replies to all Celsusi arguments. His work shows many signs of haste, but he more than compen- sates for this by the way in which he thus preserves a singularly interesting memorial of the 2nd century. When we remember that only about one-tenth of the True Word is really lost and that about three-quarters of what we have is verbatim text, it would be ungracious to carp at the method.

Celsus opens the way for his own attack by rehearsing the taunts levelled at the Christians by the Jews. Jesus was born in adultery y Ae and nurtured on the wisdom of Egypt. His assertion of

argument, divine dignity is disproved by his poverty and his miser- able end. Christians have no standing in the Old Testa- ment prophecies, and their talk of a resurrection that was only revealed to some of their own adherents is foolishness. Celsus indeed says that the Jews are almost as ridiculous as the foes they attack; the latter said the saviour from Heaven had come, the former still looked for his coming. However, the Jews have the advantage of being an ancient nation with an ancient faith.

The idea of an Incarnation of God is absurd; why should the human race think itself so superior to bees, ants and elephants as to be put in this unique relation to its maker? And why should God choose to come to men as a Jew ? The Christian idea of a special providence is nonsense, an insult to the deity. Christians are like a council of frogs in a marsh or a synod of worms on a dunghill, croaking and squeaking, " For our sakes was the world created." It is much more reasonable to believe that each part of the world has its own special deity; prophets and supernatural messengers had forsooth appeared in more places than one. Besides being bad philosophy based on fictitious history, Christianity is not respectable. Celsus does not indeed repeat the Thyestean charges so frequently brought against Christians by their calumniators, but he says the Christian teachers who are mainly weavers and cobblers have no power over men of education. The qualifications for conversion are ignorance and childish timidity. Like all quacks they gather a crowd of slaves, children, women and idlers. " I speak bitterly about this," says Celsus, " because I feel bitterly. When we are invited to the Mysteries the masters use another tone. They say, ' Come to us ye who are of clean hands and pure speech, ye who are unstained by crime, who have a good conscience towards God, who have done justly and lived uprightly.' The Jews say, ' Come to us ye who are sinners, ye who are fools or children, ye who are miserable, and ye shall enter into the kingdom of Heaven.' The rogue, the thief, the burglar, the poisoner, the spoiler of temples and tombs, these are their proselytes. Jesus, they say, was sent to save sinners; was he not sent to help those who have kept themselves free from sin? They pretend that God will save the unjust man if he repents and humbles himself. The just man who has held steady from the cradle in the ways of virtue He will not look upon." He pours scorn upon the exorcists — who were clearly in league with the demons them- selves — and upon the excesses of the itinerant and undisciplined " prophets " who roam through cities and camps and commit to everlasting fire cities and lands and their inhabitants. Above all Christians are disloyal, and every church is an illicit collegium, an insinuation deadly at any time, but especially so under Marcus Aurelius. Why cannot Christians attach themselves to the great philosophic and political authorities of the world? A properly understood worship of gods and demons is quite compatible with a purified monotheism, and they might as well give up the mad idea of winning the authorities over to their faith, or of hoping to attain anything like universal agreement on divine things.

Celsus and Porphyry (q.v.) are the two early literary opponents of Christianity who have most claim to consideration, and it is The worth noticing that, while they agree alike in high

phiio- aims, in skilful address and in devoted toil, their B °Phy of religious standpoints are widely dissimilar. Porphyry is above all a pure philosopher, but also a man of deep religious feeling, whose quest and goal are the knowledge of God; Celsus, the friend of Lucian, though sometimes called Epicurean and sometimes Platonist, is not a professed philosopher at all, but a man of the world, really at heart an agnostic, like Caecilius in Minucius Felix (q.v.), whose religion is nothing more

or less than the Empire. He is keen, positive, logical; combining with curious dashes of scepticism many genuine moral convicT tions and a good knowledge of the various national religions and mythologies whose relative value he is able to appreciate. " His manner of thought is under the overpowering influence of the eclectic Platonism of the time, and not of the doctrine of the Epicurean school. He is a man of the world, of philosophic culture, who accepts much of the influential Platonism of the time but has absorbed little of its positive religious sentiment. In his antipathy to Christianity, which appears to him barbaric, and superstitious, he gives himself up to the scepticism and satire of a man of the world through which he comes in contact with Epicurean tendencies." He quotes approvingly from the Timaeus of Plato: " It is a hard thing to find out the Maker and Father of this universe, and after having found him it is im- possible to make him known to all." Philosophy can at best impart to the fit some notion of him which the elect soul must itself develop. The Christian on the contrary maintained that God is known to us as far as need be in Christ, and He is accessible to all. Another sharp antithesis was the problem of evil. Celsus made evil constant in amount as being the correlative of matter. Hence his scorn of the doctrine of the resurrection of the body held then in a very crude form, and his ridicule of any attempt to raise the vulgar masses from their degradation. The real root of the difficulty to Platonist as to Gnostic was his sharp antithesis of form as good and matter as evil.

Opinion at one time inclined to the view that the True Word was written in Rome, but the evidence (wholly internal) points much more decisively to an Egyptian, and in particular an Alexandrian origin. Not only do the many intimate te.”” references to Egyptian history and customs support this position, but it is clear that the

Jews of Celsus are not Western or Roman Jews, but belong to the Orient, and especially to that circle of Judaism which had received and assimilated the idea of the Logos.

The date also is clearly defined. Besides the general indication that the Empire was passing through a military crisis, which points to the long struggle waged by Marcus Aurelius against the Marcomanni and other* Germanic tribes, there is a reference [Contra Celsum, viii. 69) to the rescript of that emperor impressing on governors and magistrates the duty of keeping a strict watch on extravagances in religion. This edict dates from 176-177, and inaugurated the persecution which lasted from that time till the death of Marcus Aurelius in 180. During these years Commodus was associated with Marcus in the imperium, and Celsus has a reference to this joint rule (viii. 71).

Celsus shows himself familiar with the story of Jewish origins. Any pagan who wished to understand and criticize Christianity intimately had to begin by learning from the Jews, value la and this accounts for the opening chapters of his argu- the history rae.nl. He has a good knowledge of Genesis and oichris- Exodus, refers to the stories of Jonah, Daniel (vii. 53) tlaa,t y- and Enoch (v. 52), but does not make much use of the Prophets or the Psalter. As regards the New Testament his position is closely in agreement with that reflected in the con- temporary A cts of the Martyrs of Scili. He speaks of a Christian collection of writings, and knew and used the gospels, but was influenced less by the fourth than by the Synoptics. There is more evidence of Pauline ideas than of Pauline letters.

The gnostic sects and their writings were well known to him (viii. 15 and vi. 25), and so was the work of Marcion. There are indications, too, of an acquaintance with Justin Martyr and the Sibylline literature (vii. 53, cp. v. 61). ” He is perfectly aware of the internal differences between Christians, and he is familiar with the various stages of development in the history of their religion. These are cleverly employed in order to heighten the impression of its instability. He plays off the sects against the Catholic Church, the primitive age against the present, Christ against the apostles, the various revisions of the Bible against the trustworthiness of the text and so forth, though he admits that everything was not really so bad at first as it is at present.” The True Word had very little influence either on the mutual

relations of Church and State, or on classical literature. Echoes of it are found in Tertullian and in Minucius Felix, and then it lay forgotten until Origen gave it new life. A good deal of the neo-Platonic polemic naturally went back to Celsus, and both the ideas and phrases of the True Word are found in Porphyry and Julian, though the closing of the New Testament canon in the meantime somewhat changed the method of attack for these writers.

Of more importance than these matters is the light which the book sheds on the strength of the Church about the year 180. It is of course easy to see that Celsus had no apprehension of the spiritual needs even of his own day which it was the Christian purpose to satisfy, that he could not grasp anything of the new life enjoyed by the poor in spirit, and that he underrated the signi- ficance of the Church, regarding it simply as one of a number of warring sections (mostly Gnostic), and so seeing only a mark Of weakness. And yet, there is all through an undercurrent which runs hard against his surface verdicts, and here and there comes to expression. He is bound to admit that Christianity has been stated reasonably; against the moral teaching of Jesus he can only bring the lame charge of plagiarism, and with the Christian assertion that the Logos is the Son of God he completely accords. Most suggestive, however, is his closing appeal to the Christians. ” Come,” he says, ” don’t hold aloof from the common regime. Take your place by the emperor’s side. Don’t claim for yourselves another empire, or any special position.” It is an overture for peace. ” If all were to follow your example and abstain from politics, the affairs of the world would fall into the hands of wild and lawless barbarians ” (viii. 68). Forced to admit that Christians are not infrucluosi in negotiis, he wants them to be good citizens, to retain their own belief but conform to the state religion. It is an earnest and striking appeal on behalf of the Empire, which was clearly in great danger, and it shows the terms offered to the Church, as well as the strength of the Church at the time. Numerically, Christians may have formed perhaps a tenth of the population, i.e. in Alexandria there would be fifty or sixty thousand, but their power in a community was out of all pro- portion to their mere numbers.

Literature. — Th. Keim, Celsus’ Wahres Wort (1873); Pelagaud, Atude sur Celse (1878); K. J. Neumann’s edition in Scriptores

Graeci qui Christianam impugnaverunt religionem, and article in Hauck-Herzog's Realencyk. fitr prot. Theol., where a very full biblio- graphy is given. See also W. Moeller, Hist, of the Chr. Church, i. 169 ff. ; A. Harnack, Expansion of Christianity, ii. 129 ff. ; J. A. Froude, Short Studies, iv.

CELT, or Kelt, the generic name of an ancient people, the bulk of whom inhabited the central and western parts of Europe. (For the sense of a primitive stone tool, see the separate article, later.) Much confusion has arisen from the inaccurate use of the terms " Celt " and " Celtic." It is the practice to speak of the dark-complexioned people of France, Great Britain and Ireland as " black Celts," although the ancient writers never applied the term " Celt " to any dark-complexioned person. To them great stature, fair hair, and blue or grey eyes were the characteristics of the Celt. The philologists have added to the confusion by classing as "Celtic" the speeches of the dark- complexioned races of the west of Scotland and the west of Ireland. But, though usage has made it convenient in this work to employ the term, " Celtic " cannot be properly applied to what is really " Gaelic."

. The ancient writers regarded as homogeneous all the fair-haired peoples dwelling north of the Alps, the Greeks terming them all Keltoi. Physically they fall into two loosely-divided groups, which shade off into each other. The first of these is restricted to north-western Europe, having its chief seat in Scandinavia. It is distinguished by a long head, a long face, a narrow aquiline nose, blue eyes, very light hair and great stature. Those are the peoples usually termed Teutonic by modern writers. The other group is marked by a round head, a broad face, a nose often rather broad and heavy, hazel-grey eyes, light chestnut hair; they are thick-set and of medium height. This race is often termed " Celtic " or " Alpine " from the fact of its occurrence all along the great mountain chain from south-west France, in

Savoy, in Switzerland, the Po valley and Tirol, as well as in Auvergne, Brittany, Normandy, Burgundy, the Ardennes and the Vosges. It thus stands midway not only geographically but also in physical features between the " Teutonic " type of Scandi- navian and the so-called " Mediterranean race " with its long head, long face, its rather broad nose, dark brown or black hair, dark eyes, and slender form of medium height. The " Alpine race " is commonly supposed to be Mongoloid in origin and to have come from Asia, the home of round-skulled races. But it is far more

probable that they are the same in origin as the dark race south of them and the tall fair race north of them, and that the broadness of their skulls is simply due to their having been long domiciled in mountainous regions. Thus the " Celtic " ox (Bos longifrons), from remote ages the common type in the Alpine regions, is characterized by the height of its forehead above the orbits, by its highly-developed occipital region, and its small horns. Not only do animals change their physical character- istics in new environment, but modern peoples when settled in new surroundings for even one or two centuries, e.g. the American of New England and the Boer of South Africa, prove that man is no less readily affected by his surroundings.

The northern race has ever kept pressing down on the broad-skulled, brown-complexioned men of the Alps, and intermixing with them, and at times has swept right over the great mountain chain into the tempting regions of the south, producing such races as the Celto-Ligyes, Celtiberians, Celtillyrians, Celto-Thracians and Celto-Scythians. In its turn the Alpine race has pressed down upon their darker and less warlike kindred of the south, either driven down before the tall sons of the north or swelling the hosts of the latter as they swept down south.

As the natives of the southern peninsula came into contact with these mixed people, who though differing in the shape of the skull nevertheless varied little from each other in speech and colour of their hair and eyes, the ancient writers termed them all " Keltoi." But as the most dreaded of these Celtic tribes came down from the shores of the Baltic and Northern Ocean, the ancients applied the name Celt to those peoples who are spoken of as Teutonic in modern parlance. The Teutons, whose name is generic for Germans, appear in history along with the Cimbri, universally held to be Celts, but coming from the same region as the Guttones (Goths) by the shores of the Baltic and North Sea. Again, the Germani themselves first appear in the Celtic host destroyed by Marcellus at Clastidium in 225 B.C. All the true Celtae or Galatae in France had come across the Rhine; the Belgic tribes in northern France were Cimbri, who also had crossed the Rhine- in Caesar's day the Germans were still constantly crossing that river, and so-called Gauls who lived near the Germans, e.g. the Treveri, closely resembled the latter in their habits, while in later times were to come Goths and Franks from beyond the great river. It is then not strange that the Gallic name for a henchman (ambactus) is the same as the Gothic iambahts).

The earliest invaders, under the name of Celtae, had occupied all central Gaul, doubtless mixing with the aboriginal Ligurians and Iberians, who, however, maintained themselves respectively in the later Provence and in Aquitania. The Celts had firmly established themselves by the 7th century B.C. and we know not how long before, the Bituriges . (whose name survives in Berri) being the dominant tribe. In the Alps and the Danube valley some of the Celts had dwelt from the Stone Age; there they had developed the working of copper, discovered bronze (an alloy of copper and tin), and the art of smelting iron (see Hallstatt). The Umbrians, who were part of the Alpine Celts, had been pressing down into Italy from the Bronze Age, though checked completely by the rise of the Etruscan power in the 10th century B.C. The invention of iron weapons made the Celts henceforth irresistible. One of the earliest movements after this discovery was probably that of the Achaeans of Homer, who about 1450 B.C. invaded Greece (see Achaeans), bringing with them the use of iron and brooches, the practice of cremating the dead, and the style of ornament known as Geometric. Later the Cimmerians (see Scythia and Cimmerii) passed down from the

Cimbric Chersonese, doubtless following the amber routes, and then turned east along the Danube, some of their tribes, e.g. the Treres, settling in Thrace, and crossing into Asia; others settled in southern Russia, leaving their name in the Crimea; then when hard pressed by the Scythians most of them passed round the east end of the Euxine into Asia Minor, probably being the people known as Gimirri on Assyrian monuments, and ravaged that region, the relics of the race finally settling at Sinope.

At the beginning of the 6th century B.C. the Celts of France had grown very powerful under the Biturigian king Ambigatus. They appear to have spread southwards into Spain, occupying most of that country as far south as Gades (Cadiz), some tribes, e.g. Turdentani and Turduli, forming permanent settlements and being still powerful there in Roman times; and in northern central Spain, from the mixture of Celts with the native Iberians, the population henceforward was called Celtiberian. About this time also took place a great invasion of Italy; Segovisus and

Bellovisus, the nephews of Ambigatus, led armies through Switzerland, and over the Brenner, and by the Maritime Alps, respectively (Livy v. 34). The tribes who sent some of their numbers to invade Italy and settle there were the Bituriges, Arverni, Senones, Aedui, Ambarri, Carnuti and Aulerci.

Certain material remains found in north Italy, e.g. at Sesto Calende, may belong to this invasion. The next great wave of Celts recorded was that which swept down on north Italy shortly before 400 B.C. These invaders broke up in a few years the Etruscan power, and even occupied Rome herself after the disaster on the Allia (390 B.C.). Bought off by gold they withdrew from Rome, but they continued to hold a great part of northern Italy, extending as far south as Sena Gallica (Sinigaglia), and henceforward they were a standing source of danger to Rome, especially in the Samnite Wars, until at last they were either subdued or expelled, e.g. the Boii from the plains of the Po. At the same time as the invasion of Italy they had made fresh descents into the Danube valley and the upper Balkan, and perhaps may have pushed into southern Russia, but at this time they never made their way into Greece, though the Athenian ladies copied the style of hair and dress of the Cimbrian women. About 280 B.C. the Celts gathered a great host at the head of the Adriatic, and accompanied by the Illyrian tribe of Autariatae, they overthrew the Macedonians, overran Thessaly, and invaded Phocis in order to sack Delphi, but they were finally repulsed, chiefly by the efforts of the Aetolians (279 B.C.). The remnant of those who returned from Greece joined that part of their army which had remained in Thrace, and marched for the Hellespont. Here some of their number settled near Byzantium, having conquered the native Thracians, and made Tyle their capital. The Byzantines had to pay them a yearly tribute of 80 talents, until on the death of the Gallic king Cavarus (some time after 220 B.C.) they were annihilated by the Thracians. The main body of the Gauls who had marched to the Hellespont crossed it under the leadership of Leonnorius and Lutarius. Straightway they overran the greater part of Asia Minor, and laid under tribute all west of Taurus, even the Seleucid kings. At last Attila, king of Pergamum, defeated them in a series of battles commemorated on the Pergamene sculptures, and henceforth they were confined to a strip of land in the interior of Asia Minor, the Galatia of history. Their three tribes — Trocmi, Tolisto- bogians and Tectosages — submitted to Rome (189 B.C.), but they remained autonomous till the death of their king Amyntas, when Augustus erected Galatia

into a province. Their descend- ants were probably the ” foolish Galatians ” to whom St Paul wrote (see Galatia).

Ancient writers spoke of all these Gauls as Cimbri, and identified them with the Cimmerians of earlier date, who in Homeric times dwelt on the ocean next to the Laestrygones, in a region of wintry gloom, but where the sun set not in summer. Nor was it only towards the south and the Hellespont that the Celtic tide ever set. They passed eastward to the Danube mouth and into southern Russia, as far as the Sea of Azov, mingling with the Scythians, as is proved by the name Celto-scyths. Mithra-

dates VI. of Pontus seems to have negotiated with them to gain their aid against Rome, and Bituitus, a Gallic mercenary, was with him at his death.

The Celts had continually moved westwards also. The B elgae, who were Cimbric in origin, had spread across the Rhine and given their name to all northern France and Belgium (Gallia Belgica). Many of these tribes sent colonies over into south-eastern Britain, where they had been masters for some two centuries when Caesar invaded the island (see Britain). But there is evidence that from the Bronze Age there had been settlers in northern Britain who were broad-skulled and cremated their dead, a practice which had arisen in south Germany in the early Bronze Age or still earlier. It is not unlikely that, as tradition states, there were incursions of Celts from central Gaul into Ireland during the general Celtic unrest in the 6th century B.C. It is certain that at a later period invaders from the continent, bringing with them the later Iron Age culture, commonly called La Tene, which had succeeded that of Hallstatt, had settled in Ireland. Not only are relics of La Tene culture found in Ireland, but the oldest Irish epics celebrate tall, fair-haired, grey-eyed heroes, armed and clad in Gallic fashion, who had come from the continent. The Celts in Italy, in the Balkan, in France and in Britain, overspread the Indo-European peoples, who differed from themselves but slightly in speech. The Celts represented Indo-European q by p, whilst the Greeks, Illyrians, Thracians, Ligurians, and aborigines of France, Britain and Ireland represented it by k, c or qu. The Umbrian-Sabellian tribes had the same phonetic peculiarity as the Celts. Thus Gallic petor (petor-ritum, ” four-wheeler “), Umbrian petur, Homeric iriovpes, Boeotian (Achaean) irerrapes, Welsh pedwar; but Gaelic cethir, Lat. quatuor. The Celts are thus clearly distinguished from the Gaelic-speaking dark race of Britain and Ireland, and in spite of

usage it must be understood that it is strictly misleading to apply the term Celtic to the latter language.

See also Ridgeway, Early Age of Greece, vol. i., and Oldest Irish Epic ; Ripley, The Races of Europe ; Sergi, The Mediterranean Race.

(W. Rl.)

Celtic Languages

Introduction. — The Celtic languages form one group of the Indo-European family of languages. As might be expected from their geographical distribution, they hold a position between the Italic and Teutonic groups. They are distinguished from these and other branches of the family by certain well-marked characteristics, the most notable of which are the loss of initial and inter- vocalic p, cf. Ir. athair with Lat. pater; Ir. Ian, ” full,” Welsh llawn, Breton leun, with Lat. plenus; Gaulish are-, ” beside,” Ir. ar. Welsh, Breton ar, with Gr. -repi, irapa; and the change of I. E. e to i, cf. Ir. fir, ” true,” Welsh gwir, Breton gwir, Lat. verus. We may further mention that the I. E. labialized velar gv is represented by b, e.g. Ir. bo, ” cow,” Welsh buwch, Gr. flovs, Sanskr. gaus; Ir. ben, ” woman,” Gr. ywfi, whilst the medial aspirates bh, dh, gh result in simple voiced stops. I. E. sonant r and / become ri, li. Other distinctive features of the modern dialects are not found in Gaulish, partly owing to the character of the monuments. Such are the ss preterite and the fusion of simple prepositions with pronominal elements, e.g. Ir. fri-umm, ” against me,” Welsh wrth-yf, Breton ouz-inn. The initial mutations which are so characteristic of the living languages did not arise until after the Romans had left Britain. The Celtic languages betray a surprising affinity with the Italic dialects. Indeed, these two groups seem to stand in a much closer relationship to one another than any other pair. As features common to both Celtic and Italic we may mention: (1) the gen. sing, ending -1 of masc. and neut. stems in o ; (2) verbal nouns in Hon; (3) the b future; (4) the passive forma- tion in -r.

The various Celtic dialects may be divided as follows: — (1) Gaulish; (2) Goidelic, including Irish, Scottish Gaelic, and Manx ; (3) Brythonic, including Welsh, Breton and Cornish. Gaulish and Brythonic, like Oscan and Umbrian among the Italic dialects, change the I. E. labialized velar guttural qv to p, whilst the Goidelic dialects retain the qv which later gives up the labial

element and becomes k, e.g. Gaulish petor-, ” four,” Ir. cethir, Welsh petguar, Breton pevar, Lat. quattuor; Ir. cia, ” who,” Welsh pwy, Lat. quis; Gaulish epo-, ” horse,” Welsh eb-ol, Breton eb-eul, Ir. ech, Lat. equus. Several attempts have been made to prove the existence of Celtic dialects with qv on the continent. Forms containing p occur in the Coligny calendar, discovered in 1897, by the side of others with qv, a state of affairs not yet satisfactorily accounted for. The Rom tablets, dis- covered in 1898, have not been interpreted as yet, but p forms are found on them exclusively. In an excursus we shall deal with the language of the Picts.

No comprehensive handbook of the Celtic languages on the lines of Grober’s Grundriss der romanischen Philologie or Paul’s Grundriss der germanischen Philologie was available in 1909. The reader may refer to Windisch’s article ” Keltische Sprachen ” in Ersch und Gruber’s Allgemeine Encyklopddie der Wissenschaj ten und Kiinste, and V. Tourneur, Esquisse d’une histoire des etudes celtiques (Liege, 1905; vol. ii. with full bibliography). Also H. Zimmer, ” Die kelt. Littera- turen ” in Die Kultur d. Gegenwart, T. i. Abh. xi. 1 , Berlin and Leipzig, 1909. The materials for the study of the older forms of the languages are to be found in Zeuss’s Grammatica Celtica as revised by Ebel. A comparative grammar of the Celtic dialects has been prepared by H. Pedersen (Gottingen, 1908). See also Whitley Stokes and A. Bezzenˆ berger, Wortschatz der keltischen Spracheinheit (Gottingen, 1894).

I. Gaulish. — Celtic place-names are found as far east as the Dniester and Dobrudja, and as far north as Westphalia. The language of the Galatians in Asia Minor must have stood in a very close relation to Gaulish. Indeed few traces of dialect- ical differences are to be observed in continental Celtic. Unfor- tunately no literary ˆmonuments written in the ancient speech of Gaul have come down to us, though Caesar makes mention of religious poems orally transmitted by the Druids, and we also hear of bardi and vales. But a large number of personal and place-names have been preserved. The classical writers have, moreover, recorded a certain number of Gaulish words which can generally be identified without difficulty by comparing them

with words still living in the modern dialects, e.g. pempedula, " cinque- foil," cf. Welsh pump, "five," and deilen, "leaf"; ambactus, Welsh amaeth; pelorritum, " four-wheeled chariot," cf. Welsh pedwar, " four," and Ir. roth, " wheel," or rith, " course." We have further between thirty and forty inscriptions (three in north Italy) which we may without hesitation ascribe to the Gauls. These inscriptions are written in either N. Etruscan or Greek or Latin characters. We are thus in a position to reconstruct much of the old system of declension, which resembles Latin very closely on the one hand, and on the other represents the forms which are postulated by the O. Ir. paradigms. Hence Gaulish is particularly valuable as preserving the final vowels which have disappeared in early Irish and Welsh. The few verb-forms which occur in the remains of Gaulish are quite obscure and have not hitherto admitted of a satisfactory explanation. The statements of ancient authors with regard to the Belgae are conflicting, but there cannot be much doubt that the language of the latter was substantially the same as Gaulish. Caesar observes that there was little difference between the speech of the Gauls and the Britons in his day, and we may regard Gaulish as closely akin to the ancestor of the Brythonic dialects. It is difficult to say when Gaulish finally became extinct. It dis- appeared very rapidly in the south of France, but lingered on, possibly till the 6th century, in the northern districts, and it seems unnecessary to discredit Jeronte's statement that the speech of the Galatians in Asia Minor bore a strong resemblance to the language he had heard spoken in the neighbourhood of Trier. There is no evidence that Breton has been influenced by continental Celtic. The number of Gaulish words which have come down in the Romance languages is remarkably small, and though at first sight the sound-changes of French and Welsh seem to bear a strong likeness to one another, any influence of Gaulish pronunciation on French is largely discounted when we find the same changes occurring in other dialects where there is little or no question of Celtic influence.

The proper names occurring in classical writers, on inscriptions and coins, have been collected by A. Holder in his monumental Altceltischer Sprachschatz (Leipzig, 1896-1908). The inscriptions have been most recently treated by J. Rhys in the Proceedings of

the British Academy, vol. ii.- See also a paper in this volume entitled " Celtae and Galli " by the same author for the text of the Coligny and Rom inscriptions. The value of Gaulish for grammatical pur- poses is set forth by Whitley Stokes in a paper

on ” Celtic Declen- sion ” in the Proceedings of the London Philological Society (1885- 1886). For the extent over which Gaulish was spoken, its relation to Latin and its influence on Romance, see E. Windisch’s article on ” Keltische Sprache ” in the section ” Die vorromanischen Volks- sprachen ” in Grober’s Grundriss der romanischen Philologie*, vol. i. PP- 373 A- Cf. further the introduction to J. Loth’s Chrestomathie bretonne (Paris, 1890); G. Dottin, Manuel pour servir A I’ etude des antiquites celtiques (Paris, 1906) ; R. Thurneysen, Keltoromanisches (Halle, 1884).

II. Goidelic and Brythonic. — When the monuments of the Celtic dialects of the British Islands begin to appear, we find a wide divergence between the two groups. We can only mention some of the more important cases’here. The Brythonic dialects have gone very much farther in giving up inflectional endings than Goidelic. In Irish all final syllables in general disappear except long vowels folio wed by s or r and u

Brythonic initial s becomes h in the 7th century, but this is unknown in Goidelic, e.g. Ir. salann, ” salt,” W. Men, Cornish haloin, Bret, holenn; Lat. se-men, Ir. sil, ” seed,” W.M. Initial v gives / in Goidelic in the course of the 7th century, whereas in Brythonic it appears as gu, gw, cf. Lat. verus, It. fir, W., Bret. gwir. We may also mention that in Goidelic initial j and medial v disappear, e.g. Gaulish Jovincillus, W. ieuanc, ” young,” Bret, iouank, Ir. 6ac, 6c; W. bywyd, ” food,” Ir. biad. Post consonantic j in Brythonic sometimes gives -id (Mod. W. -ydd, Mod. Bret, ez), e.g. Gaulish nevio, novio-, O. Bret, nowid, W. newydd, Bret, nevez, Ir. title. I. E. -kt and -pt both appear in Goidelic as -cht but in Brythonic as -ith, cf. Lat. septem, 0. Ir. secht, W. seith, Bret. seiz.

We unfortunately know very little about the position of the stress in ancient Gaulish. According to Meyer-Lubke in place- names the penult was accented if the vowel was long, otherwise the stress lay on the preceding syllable, e.g. Augustodunum, O. Fr. Ostedun, now Autun; Cataldunos (Chalons), Tricasses (Fr. Troyes), Bititriges (Fr. Bourges). In Goidelic the stress, which is strongly expiratory, is always placed on the first syllable except in certain cases in verbs compounded with prepositional prefixes.

In Old Welsh and Old Breton, on the other hand, the final syllable, i.e. the primitive penult, received the stress, but in both languages the stress was shifted in the middle period to the penultimate. The Goidelic dialects, like the Slavonic, distinguish between palatalized and nonpalatalizeii consonants, according as the consonant was originally followed by a front (e, i) or back vowel {a, 0, u), a phenomenon which is entirely unknown to Brythonic.

Finally, the two groups differ radically in the matter of initial mutation or, as it is often called, aspiration. These mutations are by no means confined to initial consonants, as precisely the same changes have taken place under similar conditions in the interior of words. The Goidelic changes included under this head probably took place for the most part between the 5th and 7th centuries, whilst in Brythonic the process seems to have begun and continued later. It is easier to fix the date of the changes in Brythonic than in Goidelic, as a number of British names are preserved in lives of saints, and it is possible to draw conclusions from the shape that British place-names assumed in the mouths of the Anglo-Saxons. In Goidelic, we find two mutations, the vocalic and the nasal. Initial mutation only takes place between words which belong together syntactically, and which form one single stress-group, thus between article, numeral, possessive pronoun or preposition, and a following substantive; between a verbal prefix and the verb itself.

1. When the word causing mutation ended in a vowel we get the vocalic mutation, called by Irish grammarians aspiration. The sounds affected are the tenues k ©, t, p; the mediae g, d, b; the liquids and nasals m, n, r, I; s, and Prim. Celt.u (Ir. /, W. gw). At the present dav the results of this mutation in Irish and Welsh may be tabulated as follows. Where the sound is at variance with the traditional orthography, the latter is given in brackets. In the case

Original) sound J

k

t

P

g

d

b

m

Irish

x(ch)

h(th)

f(ph)

3(gh)

3(dh)

v,w(bh)

v,w(mh)

Welsh .

g

d

b

nil

S(dd)

v(f)

. v(f)

of n, r, I in Goidelic we get a different variety of n, r, I sound. In Welsh in the case of r, I, the absolute initial is a voiceless r, I written rh, 11, which on mutation become voiced and are written r, I. In Irish 5 becomes h written sh and the mutation of / is written fh, which, however, is now silent. Examples: — Irish, cu, “hound,” do chu, ” thy hound “; Welsh ci, dy gi {do, dy represent a Prim. Celt. *tovo) ; Irish mdthair, ” mother,” an mhdthair, ” the mother,” Weish mam, y fam (the feminine of the article was originally *sentd, sendd) .

, 2. When the word causing mutation originally ended in a nasal, we get the nasal mutation called by Irish grammarians eclipse. The sounds affected are k ©, t, p; g, d, b; Prim. Celt, v (Ir. /, W. gw). In mod. Irish and mod. Welsh the results are tabulated below. Irish / becomes w written bh, whilst W. gw gives ngw. Examples :— Irish bliadhna, ” year,” seacht m-bliadhna, ” seven years,” cf. Latin septem, Welsh blynedd, saith’ mlynedd ; Irish tir, ” country,” i d-tir,

” in a country, Latin in.

3. In Welsh h

[CELTIC LANGUAGES Welsh tref, ” town,” yn nhref, ” in a town,” cf. (c), t, p undergo a further change When the word

Original Sound

k

t

P

g

d

b

Irish

g

d

b

ng

n

m

Welsh .

ngh

nh

mh

n g

n

m

causing mutation originally ended in 5. There is nothing correspond- ing to this consonantal mutation in Goidelic. In this case k ©, t, p become the spirants x (ch), th, f (ph), e.g. lad, ” father,” ei thad, ” her father,” ei represents a primitive *esids. In the interior of words in Brythonic, cc, pp, tt give the same result as initial k, t, p by this mutation.

The relation in which the other Celtic dialects stand to this system will be mentioned below in dealing with the various languages. It will be noted from what has been said above that, with the exception of the different treatment of the labialized velar qv, and the nasal sonant v, the features which differentiate the Brythonic from the Goidelic dialects first appear for the most part after the Romans had left Britain. At the beginning of the Christian era the difference between the two groups can only have been very slight. And Strachan has shown recently that Old Irish and Old Welsh agree in a very striking manner in the use of the verbal particle ro and in other syntactical peculiarities connected with the verb.

(i.) Goidelic. — The term Goidelic is used to embrace the Celtic dialects of Ireland, Scotland and the Isle of Man. In each case the national name for the speech is Gaelic (Ir. Gaedhlig, Scottish Gaidhlig, Manx Gailck), from Ir. Scottish Gaodhal, Gaedheal, Mid. Ir. Goedel, W. Gwyddel, ” a Gael, inhabitant of Ireland or Scotland.” Old Irish may be regarded as the ancestor of Scottish and Manx Gaelic, as the forms of these dialects can be traced back to Old Irish, and there are practically no monuments of Scottish and Manx in the oldest period. Scottish and Irish may be regarded as standing to one another in much the same relation as broad Scottish and southern English. The divergences of Scottish and Manx from Irish will be mentioned below. The language of the Ogam inscriptions is the oldest form of Goidelic with which we are acquainted. Some 300 inscriptions have up to the present been discovered in this alphabet, the majority of them hailing

from the south-west of Ireland (Kerry and Cork). In Scotland 22 are known, whilst in England and Wales about 30 have turned up. Most of the latter are in. South Wales, but odd ones have been found in North Wales, Devon and Cornwall, and one has occurred as far east as Hampshire. The Isle of Man also possesses two. The letters in the oldest inscriptions are formed by strokes or notches scored on either side of the edge of an upright stone. Thus we obtain the following alphabet: —

■ / ///// //// ///// m g ng z 1

This system, which was eked out with other signs, would seem to have been framed in the south-west of Ireland by a person or persons who were familiar with the Latin alphabet. Some of the inscriptions probably go back to the 5th century and may even be earlier. As illustrations of the simplest forms of Ogam inscriptions we may mention the following: Doveti maqqi Cattini, i.e. "(the stone) of Dovetos son of Cattinos "; Trenagusu Maqi Maqi-Treni is rendered in Latin Trenegussi Fill Macu- treni hie jacit; Sagramni Maqi Cunatami, " (the stone) of Sagramnos son of Cunotamos"; Ovanos avi Ivacattos, "(the stone) of Ovanus descendant of Ivacattus." It will be seen that in the oldest of these inscriptions q is still kept apart from k ©, and that the final syllables have not disappeared (cf. maqqi, O. Ir. maicc), but it appears certain that in Ogamic writing stereotyped forms were used long after they had disappeared in ordinary speech. Several stones contain bilingual inscriptions, but .the key to the Ogam alphabet is supplied by a treatise on Ogamic writing contained in the Book of Ballymote, a manuscript of the late 14th century. It should be mentioned that the Welsh

stones are early whilst the Scottish ones are almost without exception late, and several of the latter have so far defied interpretation. In addition to the Irish Ogams there are a number of Christian inscriptions in Latin character, but, with one exception, they are not older than the 8th century.

See R. R. Brash, The Ogam Inscribed Monuments of the Gaedhil (London, 1879); R. A. Stewart Macalister, Studies in Irish Epi-

graphy (London), vol. i. (1897), vol. ii. 1902, vol. iii. 1907. The Welsh inscriptions are contained in J. Rhys, Lectures on Welsh Philology ,2 (London, 1879). The Scottish stones have also been treated by Rhys in the Proceedings of the Scottish Society of A ntiquaries (Edinburgh, 1892). See also G. M. Atkinson for the tract in the Book of Bally- mote, Kilkenny Journal of Archaeology (1874). The Irish Christian inscriptions were published by Margaret Stokes as the annual volumes of the Roy. Hist, and Archaeol. Association of Ireland (1870- 1877), and have been republished by R. A. Stewart Macalister.

(a) Irish. — We are able to trace the history of the Irish language continuously for a period of 1200 years, and from the time that the literary documents begin we are better supplied with linguistic material for the study of the language than is the case with any other Celtic dialect. At the same time that form of Irish which is to be found in the oldest documents has preserved a number of features which have entirely, or almost entirely, disappeared from the Brythonic languages. For this reason scholars have largely occupied themselves with Irish, which for purposes of comparative philology may be regarded as the classic Celtic language.

The history of Irish is divided into three periods: — Old Irish (700-1100), the documents mainly representing the language of the 8th and 9th centuries; Middle Irish, extending roughly from 1100 to 1550; Modern Irish from 1550 to the present day. These periods merge into one another to such an extent that no firm division can be made. The language of some manuscripts of the 14th century contains forms which are really Old Irish, and Middle Irish ortho- graphy was partly employed by historians and antiquarians in the middle of the 17th century. Old Irish, as compared with Brythonic, preserves a wealth of inflectional forms in declension and conjugation, but many of these tend to disappear very early. In the modern dialects of Ireland and Scotland there is a rigid rule of orthography that a palatalized, or, as it is termed, slender consonant in medial or final position, must be preceded by a palatal vowel (i), and a non- palatalized consonant by a non-palatal or broad vowel (a, 0, u). This is the famous rule of the grammarians known as caol le cool agus leathan le leathan (” slender to slender and broad to broad “), but it is not so strictly adhered to in the spoken language as is commonly stated. In the older language the quality of medial and final con- sonants is only denoted very imperfectly, thus non-palatalized final consonants are regularly not denoted as such,

e.g. O. and Mid. Ir. fir, Mod. lr.fior. In Old and Mid. Irish the initial mutations are only regularly denoted in the case of the vocalic mutation of c, p, t, s, f, and the nasal mutation of b, d, g. The vocalic mutation of c, p, I, s,f was denoted by writing ch, ph, th, sh, fh, the first three symbols of which were derived from the Latin alphabet. Another method of denoting the mutation was to write a dot over the letter, originally the punctum delens, which was justified in the case of mutated /as the latter early became silent. But no such devices were ready at hand in the case of the medial b, d, g, and the mutated forms of these con- sonants were consequently not represented at all in the orthography. The same remark holds good in the case of the nasal mutation (eclipse) of the tenues. But it is easy to demonstrate that the same condition of affairs as we find in the modern language must have obtained in Old Irish. This insufficiency of symbols renders the orthography of the early stages of the language very complicated. We find that b, d, g were used initially to denote the voiced stops, but medially and finally they represent spirants, the voiced stops in this case being denoted by c, p, t. It is not until much later times that the h in the mutated forms of the tenues, or the use of the dot, was extended to the mediae. Thus in Mid. Irish we find do bochtaib in choimded(Mod.lr.dobhochtaibh) ,Mid.lr.ro-gab = Mod.lr.do ghabh. The nasalmutation oic,p,t was first denoted by writing these sounds double and finally in the 18th century by writing gc, bp, dl. The spirants arising out of Prim. Celt, g, d, b came in Old Irish to be confused with those which developed out of Prim. Celt, p, t, k, in other than initial positions. In final positions in polysyllables we commonly find d and b written but medially th and ph, e.g. didnad, ” consolation,” gen. sing, dithnatha. For the ending -ad cp. Lat. atu. On the other hand we find g written medially and ch finally. These rules, however, are not yet applied in the oldest documents.

When we turn to the inflections we find that most of the old ter- minations have disappeared, but that their influence on preceding consonants is still felt and serves to distinguish one form from another; thus in the declension of fer, “man, nom. sing, fer, gen. sing, fir, dat. sing, fiur, ace. sing, /er n-, nom. pi. fir, gen. pi. fer n-, corresponding to Prim. Celt. (Gaulish) viros, viri, viro, mron, viri, viron, the influence of the following sound still differentiates the cases from one another. In the later language the initial mutations

come more and more to be used for this purpose. In Middle Irish the declensions and conjugations are much, simplified and the

neuter gender is given up in substantives. In the verb the athematic conjuga- tion has disappeared and the distinction of primary and secondary endings is not observed. On the other hand Irish has developed a peculiar system of absolute and conjoint inflection with different sets of endings. The conjoint endings are always used in the case of compound verbs, and in simple verbs they are employed after certain proclitics, e.g. the negative particles. Thus berid, ” he bears,” is an absolute form; do-beir, ” he gives,” ni beir, ” he does not bear,” are conjoint forms. Further, the verb system is partly dominated by the various devices employed to express relatival function. There are three main types of conjugation in Old Irish corresponding to the Latin first, third and fourth conjugations, the Latin types moneo and audio being difficult to distinguish in Irish. In the modern language there is in reality but one conjugation. The old Irish verb system comprises present and imperfect indicative, imperative, pres. sub- junctive in a or j with corresponding past subjunctive, future in / or s or, e or with reduplication along with corresponding second- ary future, s preterite, t preterite, reduplicated preterite, a preterite containing a long stem- vowel, together with deponential and passive forms in -rd. This system is eked out with the verbal prefix ro, which among other functions changes a preterite into a perfect or a present into a perfect. Such a cumbrous system was bound to fall to pieces. A number of isolated forms have come down, but the only tenses which have survived into the modern period are the present and imperfect indicative, the imperative, the present subjunctive, the s preterite, the b and e future with corresponding secondary forms, and some of the passive forms in r. At the same, time in the modern language there is an increasing tendency to use analytical forms. Two noteworthy features of the Irish verb remain to be mentioned. The one is the use of pronouns as objects infixed between particle and verb, or in a verb compounded with a preposition be tween preposition and verb. There are two sets of forms according as to whether the verb occurs in a relative clause or not. Thus m is the ordinary infixed pronoun of the 1st pers, sing., whilst dom is the corresponding relative form. In the 3rd pers. sing, aspiration may be employed, e.g. ni ceil, ” he does not hide,” ni cheil, ” he does not hide it.” This has been given up in the modern language. Secondly in verbs compounded with prepositions the accent of the verb varies according as to whether the verb is used encliticatly or not — thus after the negative morin the infinitive and imperative. Hence we have do-b&ir, ” he gives,” by the side of ni tdbair, ” he

does not give," infin. tabairt; do-gniu, " I do," ni dinim, " I do not do," infin. dinum. The changes caused by this alternation in addition to others due to the working of the Irish accent and to the initial and internal mutations have played havoc with the verb system and render it exceedingly difficult to reconstruct the paradigms. In the later periods of the language analogy naturally plays a great part, and many of the complicated forms are done away with, but even in the modern dialects the alternation between enclitic and ortho- tonic forms still survives in the commonest verbs, e.g. Irish bheir sS " he gives," ni thabhair se, " he does not give, " infin. tabhairt; Scottish bheir e, cha toir, toirt; Manx ver eh, cha der, coyrt; Irish, ni sS, " he does," ni dheanann se, " he does not do," infin, deanamh; Scottish nle, " he does," cha dean e, " he will not do," infin. deanafnH; Manx nee eh, cha jean eh, jannoo.

In the early period Irish borrowed a number of words from Latin. These are mainly connected with the church or with articles of civilization which would be imported from Roman Britain. Some of these show traces of British pronunciation, e.g. O. Ir. trindoit, from Latin trinitatem with o for a. In others again Lat. p is represented in Ir. by c, which may be due to the substitution of q as being the nearest Irish sound to the foreign p. Thus we find Ir. corcur, ' ' purple, ' ' case, ' ' Easter " ; cenciges, ' Whitsuntide ' ' ; cruimther, " presbyter." In addition to these several loans were received from Norse. In the Mid. Irish period many French words' came in, and during the middle and modern periods the number of English words introduced is legion. Pedersen has tried to show in his Vergl. Grdmm. that a considerable number of words were borrowed from Brythonic (Welsh) at an early date.

[For the Latin loan-words, see J. Vendryes, De hibernicis vocabulis quae a latina lingua originem duxerunt (Paris, 1902) ; Kuno Meyer has collected a number of loan-words from Norse, Anglo-Saxon, Early English, Latin and Early French in Revue celtique, xii. 460 and xiii. 505. See also Whitley Stokes, Bezzenberger' s Beitrage, xviii. 56 ff. For Celtic names in Norse see W. Stokes, Revue celtique, iii. 186 ff., and W. A. Craigie, Zeitschr. f. celt. Phil. i. 439 ff.]

With regard to the dialects of Irish, there is a well-known rhyme which states the peculiarities of the speech of the four provinces, and dialectical differences must have existed at an early period, though they do not make their appearance in the literary language until the 18th century. At the present day the Irish of

Lemster has vanished entirely, and we have unfortunately no records of it. But in the other three provinces the vernacular still lives, and we find the Irish of Munster, Connaught and Ulster marked off from one another by well-defined peculiarities. In general it may be stated that the south of Ireland is more conservative than the north. In Munster there is a tendency to shift the word-stress from the initial syllable to a heavy derivative syllable, e.g. -an. This does

not take place in Connaught, whilst in Ulster the tendency is to shorten the vowel. Again in monosyllables ending in 11, nn, m, and under certain other conditions a short vowel becomes a diphthong in the south, in Connaught it is merely lengthened, but in Ulster the original length is retained, e.g. Ulster ball, ” member, limb,” Con- naught ball, Munster baull. Final dh, gh in Munster are sounded as g. In certain cases the north prefers the vocalic mutation where the west and south have the nasal, thus notably in the dative singular after preposition and article, e.g. Munster-Connaught do’n bhfear, ” to the man,” Ulster do’n fhear. In the south synthetic verb- forms are employed to a much larger extent than in the north.

In the early part of the 19th century Irish was still the speech of more than half the inhabitants of Ireland. A German traveller reckoned that out of a total population of seven millions in 1835 four millions spoke Irish as their mother-tongue. The famine of 1846-1847 was felt most in those districts that were purely Irish, and these were the parts that were and still are chiefly affected by the tide of emigration. Add to this the fact that the influence of O’Connell and his satellites, and above all that of the Roman Catholic clergy, was against the language. In spite of the efforts of the Gaelic League (founded 1893), which have met with considerable success, the language is rapidly dying of internal decay. The speakers of Irish are chiefly confined to the following counties, where over 20 % of the population speak Gaelic : — Waterford, Cork, Kerry, Clare, Galway, Mayo, Sligo, Donegal. The following figures will illustrate the decay of the language since the famine : —

Year. Monoglots. Bilinguists.

1851 .... 319,602 1,204,684

1861 .... 163,275 942,261

1871 .... 103,562 7!4.3i3

1881 .... 64,167 885,765

1891 .... 38,192 642,053

1901 .... 20,953 620,189

According to the 1901 census report the speakers of Irish were dis- tributed as follows: — Leinster, 26,436; Munster, 276,268; Con- naught, 245,580; Ulster, 92,858. The Gaelic movement, which has thriven largely on account of its anti-English character, would have a much better chance of galvanizing the ancient language of Ireland if it were not for the supreme difficulties of Irish spelling and phonetics. Of the hundreds of thousands of persons who attend the classes of the League not more than one or two per cent, at the outside arrive at any state of proficiency. Presbyterian Gaels in Scotland are taught to read the Bible but Irish Catholics are not encouraged to do so. The result of this is seen in the fact that, whilst many, if not all, of the local Nationalist newspapers under the pressure of the League publish badly-printed and little-read columns in Irish, there are only two regularly appearing periodicals which contain any large amount of Irish. Half the contents — and those the most important — of the weekly organ of the league, An Claid- heamh Soluis (" the flaming sword "), are in English. The latter was started in 1898 under the title of Fdinne an Lae (" the ring of day," i.e. the dawn). The other periodical is the monthly Gaelic Journal {Irisleabhar na Gaedhilge), a. would-be literary magazine of very inferior quality which has led a precarious existence since 1882. In 1898 it was decided to hold a festival called the Oireachtas (" hosting, gathering ") on the lines of the Welsh Eisteddfod. The venture was a great success and similar meetings have been held every year since, whilst each province and many of the counties have their annual local Gaelic feis (festival). The literary output of the movement has been prodigious, consisting in the main of a number of short stories and dramas (mostly propagandist), but nothing of any particular merit has as yet been forthcoming. The best-known writers are Dr

Douglas Hyde (collector of folk-stories — Beside the Fire, 1890, An Sgeulaidke Gaedhealach, 1895 (reprinted from vol. x. of the Annates de Bretagne), Love Songs of Connaught, 1893, Religious Songs of Connaught, 1 905) ; P. O'Leary (author of two lengthy stories, Seadna, 1904, Niamh, 1907) ; P. Dinneen (author of an historical tale, Cormac Ua Connaill, 1901) ; P. O'Shea, better known as "Conan Maol," author of acollection of short stories entitled An Buaiceas, 1903.

Authorities on Irish Language. — For the study of Old Irish — Zeuss, Grammatica Celtica 2 (Berlin, 1871); B. Guterbock and R. Thurneysen, Indices to the Irish words treated in Zeuss (Leipzig, 1881); E. Windisch published the first grammar of Old Irish in 1879 (trans, by N. Moore, Pitt Press, 1882), but Windisch's treatment of the verb was rendered obsolete by the discovery of the laws of the Irish accent by H. Zimmer, Keltische Studien (Berlin, 1884), and R. Thurneysen, Revue celtique, vi. 309, J. Vendryes, Grammaire du Vieil-Irlandais (Paris, 1 908) ; R. Thurneysen, Handbuch des Alt- Irischen (Heidelberg, 1909). Mention should also be made of J. Strachan, Selections from the Old Irish Glosses (Dublin, 1904) ; and the same writer's Old Irish Paradigms (Dublin, 1 905), Stories from the Tdin (Dublin, 1908). See also various papers on the Irish verb in the Transactions of the London Philological Society by Strachan (1895- 1902); H. Pedersen, Aspirationen i Irsk (Copenhagen, 1898); C. Sarauw, Irske Studier (Copenhagen, 1901); G. J. Ascoli, Archivio glottologico italiano, vols. v. and vi. For the study of Middle Irish — E. Windisch, Irische Texte mit Worterbuch (Leipzig, 1880). (Other volumes in conjunction with W. Stokes.)

. Editions of texts by W. Stokes, Kuno Meyer and others in the Revue celtique, Zeitschrift fiir celtische Philologie, Eriu. K. Meyer has issued an exhaustive Mid. Irish glossary (A-D) as a supplement to the Archiv fiir celtische Lexikographie. The remainder is being published under the auspices of the Royal Irish Academy. The first grammar of Modern Irish was published by Francis Molloy in 1677 at Rome under the title of Grammatica Latino-Hibernica. Molloy was followed by Jeremiah Curtin in 1728 with a book called Elements of the Irish Language. Numerous other grammars were published towards the end of the 1 8th and at the beginning of the 19th century, but few of them have any value. The more important of them are enumerated in the introduction to O'Donovan's Grammar and to Windisch's Kurzgefasste irische Grammatik, and in Pedersen's Aspirationen i Irsk, pp. 29-47. We may mention W. Neilson's

Grammar (1808) as it is important for the Irish of E. Ulster. But the

Greatest native grammarian was John O' Donovan, who traversed reland in connexion with the Ordnance Survey, and published in 1854 a comprehensive grammar noting the differences between the various dialects. A little grammar published by Molloy in 1867 is instructive on account of the author's peculiar point of view. The most useful books for the study of the living language are the series of booklets (five) published by Father O'Growney, one of the chief promoters of the present movement. Mention should also be made of J. P. Henry's Handbook of Modern Irish, pts. i.iv., and of the grammars by P. W Joyce (Dublin, 1896) and the Christian Brothers (Dublin, 1901). For the northern form of Irish J. P. Craig's Grammar of Modern Irish is useful (2 Dublin, 1904). The phonetics of a Munster dialect have been investigated by R. Henebry, A Contribution to the Phonology of Desi Irish (Greifswald, 1901). The dialect of the Aran Islands off the coast of Galway has been described by F. N. Finck, Die Araner Mundart, i. Lautlehre und Grammatik, ii. Worterbuch (Marburg, 1899). G. Dottin has given an account of a dialect of North Connaught (Mayo) in the Revue celtique, xiv. pp. 97-137. A study of the speech of the north was published by E. C. Quiggin under the title of A Dialect of Donegal, Phonology and Texts (Cambridge, 1906). For an account of the decay of Irish see H. Zimmer, " Die keltische Bewegung in Irland," Premssische Jahr- bucher for 1898, vol. 93, p. 59 ff., and the last chapter of Douglas Hyde's Literary History of Ireland (London, 1901).

The work of the earlier compilers of glosses will be mentioned in the literature section below. The first dictionary of the modern language of any importance was that published by J. O'Brien in 1768. Next came E. O'Reilly with his Irish-English Dictionary (Dublin, 1817). This book contains a vast store of words gathered on no principle whatever from all manner of sources, and has therefore to be used with caution, but even at the present day it renders con- siderable service. A second edition with a supplement by O' Donovan was published after the latter's death in 1864. The first trustworthy dictionary of the modern language was published under the auspices of the Irish Texts Society by P. J. Dinneen (London, 1904). English- Irish dictionaries have been compiled by D. Foley (Dublin, 1855) ; E. E. Fournier (Dublin, 1903) ; T. O'Neill Lane (Dublin, 1904).

(b) Scottish Gaelic. — Scottish Gaelic is the form of Goidelic

speech which was introduced into Scotland by the Dalriadic Scots who came over from Ireland in the early centuries of our era. We possess practically no early monuments of the language. We have one or two inscriptions in Latin characters, such as that at St Vigeans and the Ogams mentioned above, which have not yet been solved. In the Book of Deir there is a colophon of a few lines probably written by an Irish scribe in the 9th century, and as the language of these lines differs in no wise from the Irish of the period, we do not know if they accurately represent the Gaelic of Scotland or if they may not be pure Irish. In the same MS. there are further Gaelic scraps belonging to the nth and 1 2th centuries. The word-forme in these entries are identical with those current at the time in Ireland, but the historical orthography seems to show more signs of decay than is the case in Irish. The medieval Scottish MSS. in the Advocates' Library at Edinburgh are only just being published, but they seem either to hail from Ireland or to be written in pure Irish. The end of the 15th century brought a change. The Lordship of the Isles, the great bond between Ireland and Scotland, was broken up. The Gaels of Scotland, thrown on their" own resources, advanced their own dialect to the position of a literary language and tried to discard the Irish orthography. The Book of the Dean of Lismore, compiled about 1500, is written in a kind of phonetic orthography which has not as yet been sufficiently investigated. The language of those poems which are not directly ascribed to Irish poets, and which may therefore be regarded as representing the literary language of the Highlands at the time, seems to occupy a position midway between Irish and Scottish Gaelic. But until the beginning of the 18th century the Highlands were

under the literary dominion of Ireland, so much so that Bedell's Irish version of the Scriptures was circulated in Scotland with a glossary from 1690 to 1767, and Bishop Carsewell's version of Knox's Prayer-book (1567) is pure Irish. The language of the people is poorly represented in the 16th and 17 th centuries, and the orthography is not fixed until we reach the 18th century.

Irish and Scottish Gaelic differ considerably in point of vocabulary, but there are also important divergences in phonetics and

inflections. In the first place, Scottish Gaelic as written has entirely given up the nasal mutation (eclipse), e.g. Scottish ar bo, ” our cow,” Irish ar m-bo; Scottish nan tir, ” of the countries,” Irish na d-tir. It should, however, be observed that in Skye and the Outer Isles the nasal mutation has been partly restored and in some places there are even parallels to the Welsh nasal mutation of c, p, t to ngh, mh, nh. Secondly, post-vocalic c, p, t are commonly preceded by £ breathed sound not represented in writing, thus mac ” son,” is pronounced mahk; slat, ” rod,” as slaht. Again there is a tendency to insert a sibilant in the group rt, thus ceart, ” right,” is sounded kearst, and the distinction between palatalized and non-palatalized sounds is not so rigidly observed as in Irish. The group cht is in Scotland pronounced as if chk. We may also mention that Scottish Gaelic preserves an old e in a number of words where Irish now has a, thus, Old Ir.fer, Scottish G.fer, Irish far, but in both cases the spell- ing is fear fin this respect Scottish Gaelic goes hand in hand with Manx and the almost extinct Irish of Down). Similarly, we find that in Scottish Gaelic and Manx stressed vowels preceding a palatalized consonant have not undergone palatalization to the same extent as in Irish, e.g. in Ireland duine, ” man,” <*dunjo-, is pronounced din'a, but in Scotland dun'3 (in Manx written dooinney). A further peculiarity of Scottish Gaelic is that it substitutes lenes or voiceless mediae for the voiced stops, and even I, r, n sounds show a great tendency to give up the voice. Scottish Gaelic goes farther even than Irish in the confusion of vowel-sounds, e.g. Lat. coxa, Ir. cos, " foot," Sc. cas ; Ir. codal, Sc. cadal. When we turn to the inflections we find that analogy has here played a much greater part than in Irish. There is a tendency to make the plural of all substantives except masculine monosyllables end in an. In the conjugation the synthetic forms have with one or two exceptions entirely dis appeared and the present forms have become momentary in force. Hence in ordinary grammars it is stated that the present has become a future, thus ni mi means ” I shall do.” The past participle chiefly ends in -te as against Irish -the, -te, or -tha, ta, according to the quality of the preceding sound. The present (future) and past subjunctive (conditional, representing both the imperfect indie, and secondary future of Irish) supply the place of the Irish consue tudinal forms. In idiom also Scottish has diverged very consider- ably from Irish, e.g. in the use of tha (Ir. ta) for is.

It seems now to be agreed that the various dialects of Scottish Gaelic fall into two main divisions — northern and southern.

Mackinnon states that the boundary between the two passes roughly up the Firth of Lome to Loch Leven, then across country from Balla- chulish to the Grampians. The country covered by the northern dialect was of old the country of the Northern Picts, whilst the portion of Argyllshire south of the boundary line, together with Bute and Arran, made up the kingdom of Dalriada. The Gaelic district south of the Grampians belonged to the Southern Picts. The southern dialect is commonly regarded as the literary language. It approaches more nearly to Irish and preserves the inflections much better than the speech of the north.

The following characteristics of the northern dialects may be mentioned : — (1) The diphthongization of open e to ia is carried much farther in the north than in the south. (2) The vowel ao in the north is more regularly the high-back-narrow-unrounded vowel-sound, whereas the south in many cases has a low-front-wide-round sound. (3) The north has str in initial position where the south prefers sr. Further, the northern dialects go very far in dropping unaccented final vowels. It may be remarked that in the reduction of derivative endings containing long vowels Scotland goes hand-in-hand with Ulster Irish, thus Connaught aran, " bread," is in Ulster and Scot- land aran. Again, Scottish agrees with North Irish in the loss of synthetic verb-forms and in using as negative cha, Mid. Ir. nico, nocha. But, on the other hand, Scotland, with the exception of South Argyll and some of the Isles, diphthongizes accented a, 0, e, in monosyllables, before 11, nn, m, thus resembling the speech of Munster. In South Argyll the original short vowel ishalf lengthened.

As to the southern limits of Gaelic speech in Scotland, the boundary between Gaelic and English in medieval times was the so-called Highland line, and at the War of Independence it is probable that it extended to Stirling, Perth and the Ochil and Sidlaw Hills, the Inglis being limited to a very narrow strip along the coast. Dr J. A. H. Murray traced the linguistic frontier in 1869-1870 with the following results. The line started about 3 m. west of the town of Nairn on the Moray Firth and- ran in a south-east direction to the Dee, 4 m. above Ballater. On the other side of the Dee it began 4 m. above Balmoral and followed the boundary of Perth and Forfar as far as Glen Shee, where it went off to the south-west as far as Dunkeld. After passing Birnam Hill it turned due west until the upper part of Glen Almond was reached, where it bent to the south-

ward, passing through Comrie and along the braes of Doune to the Teith, 3 or 4 m. below Callander. Thence it ran along the north shore of Lake Monteith to Gartmore, and from there to Rowar- dennan on the east side of Loch Lomond. On the west side it passed through Glen Douglas down Loch Long and the Firth of Clyde, leaving Bute and Arran to the west. At the present day this boundary has probably receded to the extent of several miles, and even in 1870 there were districts such as Bute and the region round Dunoon where Gaelic was only spoken by the oldest natives and the immigrant population. The language is not found in the north- east of Caithness, the boundary running, according to Murray, roughly from a little north-east of Lybster to the mouth of the Forss. Celtic was driven out of Shetland and Orkney by Scandinavian some time during the middle ages. (See further J. A. H. Murray, The Dialect of the Southern Counties of Scotland, London, 1875; Revue celtique, vol. ii. pp. 180-187.)

Until the 1 8th century Gaelic was spoken in Galloway and on the uplands of Ayr and Lanark. The following figures from the census returns illustrate the decrease in the number of persons who speak Gaelic: —

Monolinguists. Bilinguists. 1881 . . .No return 231,594

(this includes ‘ Gaelic monolinguists)

1891 . . . . 43,738 210,677

1901 . . . 28,106 202,700

In the last-mentioned year it appears that nearly one-half of the speakers of Gaelic are reported from the counties of Inverness and Ross (23,893 monolinguists and 82,573 bilinguists). From about 1300 we find Scottish emigrants filtering into the glens of Antrim, where the Gaelic that is spoken is still unmistakably Scottish. There have long been local societies of Highlanders for the cultivation of their native tongue, the most important one being An Comunn G&idhealach (founded 1 891). This society holds an annual gathering called the Mod (= Eng. “moot “) on the lines of the Welsh Eisteddfod, and recently the Scottish Education Department has countenanced the teaching of Gaelic in Highland schools. But the political element plays little or no part in the language movement in Scot- land, and the latter is not likely to assume the proportions of the Gaelic League in Ireland. As a rule, however, Highlanders are better able to read their own

language than Irish Gaels, for, the majority being Protestants, they are encouraged to read their Bibles. There are only two periodicals which devote half their space to Gaelic. The one is A n Deo-Greine (" the sunbeam"), founded October 1905; and the other is the Catholic propagandist quarterly Guth na Bliadhna (" the voice of the year "), started in 1904. Up to 1905 a fortnightly newspaper printed wholly in Gaelic appeared in Prince Edward Island, under the title of An Mac-talla (" the echo "), and efforts have been made to revive it. A weekly newspaper wholly in Gaelic was started in 1908 by R. Stuart Erskine under the title of Alba.

Authorities on Scottish Gaelic. — The first grammar of Scottish Gaelic was compiled by W. Shaw {An Analysis of the Galic Language, 1778). The most useful one was that published by Alexander Stewart, Elements of Gaelic Grammar (Edinburgh, 1801). A revised edition of this work with many additions and corrections was pub- lished by H. C. Gillies, London, 1902. This book is rather spoilt by the author's attitude, and requires to be supplemented and cor- rected. G. Henderson and C. W. Robertson have published im- portant papers on the modern dialects in the Zeitschrift fur celtische Philologie, the Celtic Review and the Transactions of the Gaelic Society of Inverness. The most useful work on Gaelic philology is Alexander Macbain's Etymological Gaelic Dictionary (Inverness, 1896) (a later edition by W. J. Watson). The chief dictionaries are Dictionarium Scotoˆ Celticum, published by the Highland Society of Scotland (Edinburgh, 1828) ; R. A. Armstrong, Gaelic Dictionary in two parts (London, 1825); N. McAlpine, Pronouncing Gaelic Dictionary (Edinburgh, 1847) (this book gives the pronunciation of I slay) ; Macleod and Dewar, Gaelic and English Dictionary (latest edition, Edinburgh, 1901); Faclair Gdidhlig, published by E. Macdonald, Heme Bay, appearing in parts since 1902.

(c) Manx. — Our sources of information with regard to the language of the Isle of Man are even more scanty in the early period than they are in the case of Scotland. There are a number of references to the island in Irish literature, but the earliest monument of the vernacular we possess is the version of the Book of Common Prayer made by Bishop Phillips in 1610. In this translation the traditional Irish orthography is not followed. The spelling resembles the orthography which was employed in Scotland by the compiler of the Book of the Dean of Lismore. How far this system was used is a question which it is difficult to decide. In Scotland the Irish orthography has prevailed in a slightly modified form, but Manx writers adhered to a mode of spelling which was as phonetic as any system based on English, or, probably more correctly Anglo-Scottish, orthography could be. This fact, combined with the rapid phonetic decay of the

language, makes it extremely difficult to discover what “sound-values are to be attached to the various symbols. At the beginning of the 18th century English was not understood by two-thirds of the natives, and in 1764 the S.P.C.K. issued a paper containing this statement: ” The population of the Isle is 20,000, of whom the far greater number are ignorant of English.” But from this time English gradually crept in. The last edition of the Manx Bible was issued in 18 19, and of the New Testament in 1840. The present writer’s great-grandmother refused to speak English, his grandfather (b. 181 5) preached in Manx and English, and his father (b. r844) only spoke English. The following figures illustrate the rapid decline of the language: —

Monolinguists. Bilinguists.

1875 .... 190 12,340

(out of a population of 41,084 exclusive of Douglas) 1901 .... None 4,419

Manx stands in a much closer relation to Scottish Gaelic than Irish, and fishermen state that they could understand a good deal of what is said in South Argyll, though they are quite at a loss at

Kinsale. Manx exhibits the same tendency as Scottish to use analytical and periphrastic forms in the verb, thus jannoo, ” to do,” is used like Scottish deanamh with an infinitive to express the past and future. The present has acquired a momentary (future) signification, and the past participle ends in -it (Scottish -te). The negative is cha as in Scotland and Ulster. Manx goes as far as northern Scottish in dropping unstressed final vowels, e.g. chiarn, ” lord,” Irish, tighearna; yn is the favourite plural ending in substantives. The nasal muta tion has been partly given up. Old Irish stressed e is frequently retained, e.g. fir, ” man,” Irish far (spelt fear), and the vowels and & are confused as in Scottish, e.g. Manx cass, ” foot,” Scottish cas, Irish cos. Manx is divided in itself about the treatment of short accented vowels before //,, nn, m. According to Rhys the south side lengthens, whilst the north side diphthongizes; e.g. Irish crann, “tree,” clann, “offspring,” S. Manx, kron, klon, N. Manx, kroun, kloun (written croan, cloan). In the matter of stress Manx is quite original, going farther even than the dialects of the south of Ireland. Not only does it shift the stress in the case of heavy derivative suffixes like -an and reduce the preceding vowel, e.g. Ir. fuaran, Sc. fuaran, Manx fran, ” spring,’ but even in cases like caghlda, “variety,” Sc. Ir. caochladh, O. Ir. coimmchloud ; coraa, “voice,” Ir. comhradh. The Mid. English stress on the final is further retained in words from the French such as ashoon, ” nation,” livrey, ” deliver.”

As other features peculiar to Manx we may mention the following. An intervocalic s or sh shows a tendency to become lisped and voiced to d. In monosyllables post-vocalic final m, n, are often preceded by an intrusive i, d respectively, thus ben ” woman,” may be heard as bedn. Ir. a becomes more palatal and is often a. Ir. sc becomes st, sht, e.g. Ir. fescor, ” evening,” Manx fastyr; Ir. uisce, ” water,” Manx ushtey.

Authorities on Manx. — The place and personal names of the Isle of Man have been collected by A. W. Moore in Manx Names’ 2 (London, 1903) (33% of the proper names are Scandinavian). The chief source of information about the spoken language is J. Rhys, The Outlines of the Phonology of Manx Gaelic (London, 1895) (the book has unfortunately no index and no texts). The only serious attempt to represent spoken Manx graphically is the transcription of a song by J. Strachan in the Zeitschr.fiir celtische Philologie, vol. i. p. 54. The native grammarian is J. Kelly, who in 1803 published A Practical Grammar of the Ancient Gaelic or Language of the Isle of Man, usually called Manks. This book was republished by W. Gill for the Manx Society in 1859, and a

facsimile reprint of this latter was made for Quaritch, London, 1870. A useful little book entitled, First Lessons in Manx was published by Edwin Goodwin (Dublin, 1901). There are two dictionaries, one by A. Cregeen, Douglas '835, which is now being reprinted for An Cheshaght Gailckagh, a Douglas society which is endeavouring to encourage the use of Manx and to get it introduced into the schools. The other dictionary is by J. Kelly in two parts — (1) Manx and English, (2) English and Manx, published by the Manx Society in 1866. Kelly also prepared a Triglot of Manx, Irish and Gaelic, based upon English, which has never been published. A useful paper on the language appeared in the Transactions of the London Philological Society for 1875 by H. Jenner, " The Manx Language: Its Grammar, Literature and Present State." (E. C. Q.)

(ii). Brythonic. The term Brythonic is used to denote the Celtic dialects of Wales, Brittany and Cornwall. Unlike the Goidels the Brythonic peoples have no common name for their language. Forms of Brythonic speech were doubtless current throughout England and Wales and the Lowlands of Scotland at the time of the Saxon invasion. The S.E. of Britain may have been extensively Romanized, and it is not impossible that

remnants of Goidelic speech may have lingered on in out-of-the-way corners. No literary documents dating from this period have been preserved, but some idea of the character of Brythonic may be gathered from the numerous inscriptions which have come to light. In the middle of the 6th century Brythonic was confined to the western half of Britain south of the Clyde and Forth. The colonization of Britannia minor or Armorican Brittany during the 5th and 6th centuries will be described later. In the latter part of the 6th century the W. Saxons pushed their conquests as far as the estuary of the Severn, and from that time the Brythons of S.W. Britain were cut off from their kinsmen in Wales. Early in the 7th century the Brythons of Strathclyde were similarly isolated by the battle of Chester (613). The kingdom of Strathclyde maintained a separate existence until the 10th century, and it is generally stated that Brythonic speech did not die out there until the 1 2th century. The question as to how far Brythonic names and words have survived in these districts has never been properly investigated. Certain it is that Bry- thonic numerals survived amongst shepherds in Cumberland, Westmorland and N.W. Yorkshire down to the second half of the 19th century, just as herrings are still counted in Manx by Manx fishermen otherwise quite innocent of the language. Accordingly,

from the 7 th century onwards Brythonic became gradually limited in Great Britain to three districts — Strathclyde, Wales, and Cornwall and Devon. During the 7th century the Brythons of Wales and Strathclyde often fought side by side against the Angles, and it is from this period that the name by which the Welsh call themselves is supposed to date, Cymro < *Combrox, pi. Cymry < *Combroges, i.e. "fellow-countrymen" as opposed to W. allfro, Gaul. Allobroges, " foreigners." We have no means of determining when Celtic speech became extinct in the petty states of the north which retained their independence longest.

The chief features which distinguish the Brythonic from the Goidelic dialects have already been enumerated. In the course of the 6th and 7th centuries final short vowels disappeared. In compound names the final vowel remains in the first component until the 7 th century. Short vowels in other than initial syllables when immediately preceding the stress (on the historical penultimate) disappear, whilst long ones are shortened, e.g. Welsh cardawt from Lat. caritdtem. O.ther vowels in unstressed position are apt to be reduced, thus d, 6, give i in O. W. (Mid. W. y). A marked characteristic of Welsh as distinguished from Cornish and Breton is the treatment of 0, under the influence of a following i. In Welsh the result is ei, in Corn, and Bret, e, e.g. Welsh seint, ” saints,” Bret, sent, sing. sant. The mutations seem to have started in the second half of the 6th century in the case of the tenues.

See J. Loth, Les Mots latins dans les langues Brittoniques (Paris, 1892); J. Loth, Chrestomathie bretonne (Paris, 1890).

(a) Welsh (Cymraeg). — It is usual to divide the history of the Welsh language into three periods — Old, Middle and Modern. To the oldest period belong the collections of glosses, the earliest of which go back to about 800. The middle period extends from 1 100 to 1500.

As a rule the medial mutation of the tenues and mediae is not denoted in O. Welsh. Intervocalic g is sometimes retained but generally it has disappeared, whilst after r and / it is still written. In the course of the 9th century initial w (v) becomes gu (later gw). As the O. Welsh documents consist almost entirely of isolated words, we know scarcely anything about the morphology of the language during this period. To the middle period belong the ancient poems from the Black Book of Carmarthen, but the language of these com- positions is evidently

much older than the date of the manuscript (t2th century), as it preserves a number of very archaic features. Other important sources of information for this period are the O. Welsh Laws contained in a MS. of the 12th century. To a somewhat later date belong the Mabinogion (14th century MS.), and the prose versions of French romances published by R.Williams (15th century). In Middle Welsh the consonant mutations are in general denoted in writing, though not consistently, and from this period dates the introduction of w and y (O. W. u, i) to denote vowel sounds. The symbol 11 to denote a voiceless / was already employed in M5d. W. but rh (— voiceless r), dd (= £ng. th in ” thou “) and/ (=») either do not appear or only become regular during the modern period In Mod. W. the orthography is regularized and does not differ

and extent.

materially from that of the late medieval documents. In O.W. the old stress on the final syllable (the historical penult) appears to have been preserved, but during the middle period the accent was shifted to the penult. In consequence of this change aw (<&) in final syllables is reduced to in Mod. W., e.g. Mid. W. pechawt

The comparative wealth of inflection preserved by O. Ir. has almost entirely disappeared in Welsh. There are only the faintest traces of the case forms, the dual and the neuter gender. Compared with the Irish nominal declension according to 0 (jo), a, i, u, s, guttural, dental and nasal stems, Welsh only distinguishes the nom. sing, and plur., the latter sometimes retaining an old formation. Thus masc. 0 stems show palatal modification, e.g. corn, ” horn,” plur. cyrn < *korm ; the plural ending of u stems, O. Gaulish -oves. gives O.W. -ou, Mid. W. -eu. Mod. W. -au, e.g. penneu, ” heads.” The termination -ones of the n stems appears as -on. The infixation of pronominal objects between a verbal particle and the verb itself continues in use down to the present day as in Breton. In the third person sing, of the pres. ind. there are instances in the oldest Welsh of the peculiar alternation between orthotonic and absolute forms which characterize the Irish paradigms, e.g. pereid, ” it endures,”

but ny phara. The several types of conjugation represented in Irish have become obscured, traces remaining only in the endings of the third sing, of the pres. ind., the pret. ind. (Mid. W. -as, -es. -is) and the pret. passive (Mid. W. -at, -et, it). The verb system of Welsh comprises the following tenses: indie, present (also used as future), imperative, imperfect, preterite (in Mid. W. forms with .s have become prevalent as in Irish, but forms corresponding to the Irish preterites in / or with reduplication or unreduplicated with long vowel are not infrequent in the early poetry), pluperfect (a new formation), pres. and pret. passive. In the subj. early W. dis tinguishes pres. and past, but the latter comes to be replaced by the pluperfect indicative. The sign of the subj. is h

We have seen already that Wales began to exist as a separate entity roughly at the end of the 6th and beginning of the 7th cen-
„. turies. In the second half of the 8th century the Welsh

n story were confined in pretty much their present limits by Offa, king of Mercia, who constructed the Dyke going by his name, which has approximately remained the political boundary between England and Wales ever since. From this time ” onwards the bitter feeling against England which we find expressed in the fervid compositions of Iolo Goch and other political bards served to prevent any serious inroads of English on Welsh-speaking territory. With the advent of the Tudors, however, there came a great change. Henry VII. owed his throne in large measure to the support he had received from Wales and he prided himself on his Welsh ancestry. A consequence of this was that throughout the 16th century Wales received exceptionally favourable treatment at the hands of the English sovereign and parliament. In 1562 a decree was issued ordering a translation of the Bible to be made into Welsh. All this could naturally not be without effect on the attitude of the leaders of the people towards England. The change is already apparent in the poems of Lewis Glyn Cothi and others. And the striking difference in the manner in which the Reformation was regarded in Ireland and Wales is worthy of remark. During the Stuart wars the Welsh nobles fought invariably on the Royalist side, and there is plenty of other evidence that the aristocracy of Wales was becoming thoroughly anglicized both in sentiment and language. At the same time the practice of the Tudors was reversed in many particulars. Thus it became the custom to appoint Englishmen ignorant of the national language to the Welsh bishoprics. In this manner it is not a matter for surprise that a feeling of estrangement should grow up between the bulk of the population, who only knew

Welsh, and the clergy and nobles, their intellectual leaders. The neglect of the national language is evident from the large number of English words which have even crept into such classical works as Prichard's Canwyll y Cymry and Ellis Wynn's Gweledigaethau y Bardd Cwsg. It is stated that, of the 269 works published by Welsh- men between 1546 and 1644, 44 were in Latin, 184 in English and only 41 in Welsh, and of these 37 consist of works of piety. Thus at the beginning of the 18th century there seemed a fair chance that Welsh would soon become extinct like Cornish.

An extraordinary change was brought about by the Methodist movement in Wales. The preachers, in order to get hold of the masses, addressed them in the vernacular, and their efforts were crowned with enormous success. At the same time a minister of the Established Church, Griffith Jones, went about Wales establish- ing lay. schools to which young and old might come to learn to read the Welsh Bible. Between 1737 and 1 761 3395 such schools sprang up, at which no fewer than 158,238 persons of all ages learned to read their native language. After Griffith Jones's death this work was carried on by others, notably by Charles of Bala (1755-1814), who passed over to Calvinistic Methodism and whose schools were trans- formed after the model of the Sunday schools instituted in 1782 by Robert Raikes. Charles of Bala was largely instrumental in the founding of the British and Foreign Bible Society, and Wales was provided with 100,000 copies of the Bible and Testament at very

moderate prices. Bishop's Morgan's version of the Scriptures made in 1588 (final revision 1620) represents the speech of North Wales which had remained more or less free from English influence, so that the language of the Welsh Bible is rightly regarded as the literary model. Three-fourths of the inhabitants of Wales belong to the various Nonconformist sects, and therefore pass almost without exception through the Sunday school, where they are drilled in its sole object of study, the Welsh Bible.

With the increasing employment of Welsh owing to the Non-conformist movement there was also awakened a new interest in the past history of the principality. A society calling itself the Cym- deithas y Cymmrodorion was founded in London in 1751, and during the succeeding half-century two periodicals exclusively in Welsh were started, the one, Trysorfa y Gwybodaeth, in 1770, the other, Cylchgrawn Cymraeg, in 1793. The year 1792 witnessed the creation of an important society, the

Cymdeithas y Cymreigyddion, in London, in which the moving spirits were William Owen (Pughe), Owen Jones and Edward Williams. The results of their indefatigable search for ancient Welsh manuscripts were published in three volumes under the title Myvyrian Archaiology (London, 1801-1807). Owen further published an edition of the greatest medieval Welsh poet Dafydd ap Gwilym, and also the first copious dictionary. But this was not all. In Goronwy Owen (1722-1769) a poet had arisen whose works could stand comparison with the compositions of the medieval writers, and it was owing to the efforts of the three men above mentioned that the national Eisteddfod (= session, from eistedd, "to sit") was revived. The origin of these literary festivals is shrouded in obscurity. It is recorded that a S. . Welsh prince, Gruffydd ap Rhys, held a festival lasting forty days in 1 135 to commemorate a victorious campaign at which poets and minstrels competed for gifts and other rewards. Gruffydd's son Rhys ap Gruffydd is re- ported to have instituted a similar contest in 11 76, at which the successful competitors received a chair whilst the others were given presents. It would seem that after the loss of Welsh independence a carefully graded order and a system of jealously guarded rules came into existence. Similar national festivals were held under royal patronage under Henry VIII. in 1523 and again under Eliza- beth in 1568. From 1568 until 1819 no general eisteddfod for all Wales was held. Since 1819 the national festival has been held annually and every little town has its own local celebration. Hence the Nonconformist Sunday school, the pulpit and the eisteddfod may be regarded as the most potent factors in resisting the inroads of English. The whole question of the vitality of Welsh and what may be called the political and social history of the language is treated in great detail by H. Zimmer, " Der Pan-Keltismus in Gross- britannien und Irland," i., in Preussische Jahrbucher, vol. xcii. (1898). In elementary schools in Wales the use of Welsh has been permitted since 1893.

With regard to the extent over which Welsh is spoken a detailed map is given in J. E. Southall's Welsh Language Census of l8gi (Newport, 1895). A line drawn from the southern end of the estuary of the Dee about 2 m.W. of Connah's Quay to Aberthaw in Glamorgan would practically include all those districts where Welsh is spoken by 60 % of the population, and considerable deductions would have to be made for parts of Flint, Montgomery, most of Radnor and the N. part of Brecon. Little is spoken in the southern half of the Gower peninsula or in S.

Pembrokeshire. Over much of Anglesey 97 J% of the population spoke Welsh and in parts of Cardiganshire 98-3 %. Of a total population in 1901 of 2,012,876, 929,824 were returned as speakers of Welsh, of whom 280,905 were monoglots. That Welsh is a very living language may be gathered from the following statistics. Between 1 801 and 1898 no fewer than 8425 volumes were published in the vernacular, whilst in 1895 there were appearing regularly 2 quarterlies, 2 bi-monthlies, 28 religious and literary monthlies and 25 weekly papers. In 1909 the number was probably greater. The danger for Welsh lies rather in the direction of internal decay. The speech of the people is saturated with English words and idiom, and modern writers like Daniel Owen submit to the same influence instead of returning to the classical models of the ,17th century.

Much remains to be done as regards the classification of the modern Welsh dialects. It is usual to divide them into four groups — (1) Powys (N.E.); (2) Gwynedd (N.W.) ; (3) Dyfed (S.W.) ; (4) Gwent (S.E.). One of the chief points on which N. and S. diverge is the pronunciation of the vowels i, u, y, which in the S. all tend to become i. The difference between N. and S. was noticeable as early as the time of Giraldus Cambrensis. See M. Nettlau, Beitrage zur cymrischen Grammatik (Leipzig, 1887), also Rev. celt. ix. pp. 64 ff., 1 13 ff. ; T. Darlington, " Some Dialectal Boundaries in Mid-Wales," Trans, of the Hon. Soc. of Cymmrodorion, 1900-1901. The only scientific description of a living dialect is " Spoken N. Welsh," by H. Sweet, Trans, of the London Phil. Soc, 1882-1884.

Authorities on Welsh Language. — For the study of older Welsh: — J. C. Zeuss, Grammatica Celtica (Berlin 2 , 1871) — an index to the O. Welsh glosses cited in this work was compiled by V. Tourneur, Archiv f. celt. Lexikographie, iii. 109-137; J. Strachan, An Introduction to Early Welsh, with a Reader (Manchester, 1909); J. Rhys, Lectures on Welsh Philology (London 2 , 1879). Editions of texts- — The Black Book of Carmarthen, facsimile edition by J, Gwenogvryn Evans (Pwllheli, 1906) ; J. Rhys and J. Gwenogvryn Evans, The Text of the Mabinogion (Oxford, 1887); The Myvyrian

Archaiology of Wales (1801-1807; reprinted Denbigh, 1870); W. F. Skene, The Four Ancient Books of Wales (2 vols., Edinburgh, 1868) ; Aneurin Owen, Ancient Laws and Institutes of Wales (London, 1841) ; facsimile edition by A. W. Wade-Evans, Welsh Medieval Law (Oxford, 1909) ; K. Meyer, Peredur ap Efrawc with glossary (Leipzig, 1887); R. Williams, Selections from the Hengwrt Manuscripts (London, 1876-1892) ; J. E. Southall, Wales and Her Language (Newport, 1892). The earliest Welsh grammar was published as long ago as 1567 in Milan by Griffiths Roberts, reprinted in facsimile as supplement to the Revue celtique (Paris, 1883). An account of the language was prefixed to Owen Pughe's Dictionary (1803). During the 19th century many manuals of indifferent value saw the light of day. The most authoritative works are: — T. Rowland, A Grammar of the Welsh Language (Wrexham, 1853 1 , 1876 4), (still the most complete work), the same author also published a companion volume of Welsh Exercises (Wrexham, n.d.) ; W. Spurrell, A Grammar of the Welsh Language (Carmarthen 3 , 1870); E. Anwyl, A Welsh Grammar for Schools, (i.) Accidence,ˆ (ii.) Syntax (London 2 , 1898). Other useful manuals for the beginner:— T. Jones, A Guide to Welsh, pts. i. ii. new ed. (Wrexham, n.d.) ; S. J. Evans, The Elements of Welsh Grammar (Newport 3 , 1903). Dictionaries: — The first Welsh dictionary was compiled by William Salesbury (London, 1547; facsimile reprint, London, 1877); W. Owen Pughe, A Dictionary of the Welsh Language (2 vols., London, 1803; reprinted Denbigh, 1870); W. Spurrell, Welsh-English and English-Welsh Dictionary (Carmarthen 6 , 1904) ; a smaller one by W. Richards in 2 vols. (Wrexham, n.d.), and many others. A dictionary on a large scale was planned by D. Silvan Evans and subsidized by the govern- ment. Only A-Dd has, however, appeared (Carmarthen, 1893- 1906), cp. J. Loth in Archiv f. celt. Lex. vol. i. for additions and corrections. A survey of Welsh periodical literature is contained in T. M. Jones's Llenyddiaeth fy Ngwlad (Treffynnon, 1893). For Welsh folklore see J. Rhys, Celtic Folklore, Welsh and Manx (Ox- ford, 1901). H. H. Vaughan, Welsh Proverbs (London, 1889), also Rev. celt. iii. 419 ff. See also G. Dottin, Revue de synthese hislorique, vi. 317 ff. ; H. Zimmer and L. C. Stern in Kultur der Gegenwart, Teil 1, Abt. xi. 1. (E. C. Q.)

(b) Breton. — Breton (Brezonek) is the name given to the language spoken by those Britons who fled from the south-west of England to Armorica (see Brittany) in the 5th and 6th centuries of our era to avoid being harassed by the Saxons. The first migration probably took place about 450. The Dumnonii and

Cornovii founded small states in Brittany, or Britannia Minor, as it was termed, and were followed in the second half of the 6th and into the 7th century by a long stream of refugees (cf. J. Loth, L' Emigration bretonne, Paris, 1883; A. de la Borderie, Histoire de la Bretagne 2 , vol. i.,1905).

In the earliest stages it is difficult to distinguish Breton from Welsh. The history of the language may be divided into Old Breton from the 7th to the nth centuries, Middle Breton from the nth to the 17th centuries, and Modern Breton. In Old Breton the only- material we possess consists of glosses and names occurring in lives of saints, Frankish authors, and charters. However, we find a few characteristics which serve to show that the old glosses are really Breton and not Welsh. Thus, an original a never becomes a diphthong (au, aw) in Old Breton, but remains 0. In Bret, gn becomes gr. Further, in O. W. pretonic u is weakened to an indeterminate sound written * and later y, a phenomenon which does not occur in Breton, e.g. Lat. culcita appears in O. W. as cilcet, but in O. Br. as colcet. A marked characteristic of Breton is the confusion of I and e, e.g. Ir. lis, " court," W. llys, Br. les. In Old Breton as in Old Welsh neither the initial nor the medial mutations are expressed in writing, whilst in Middle Breton only the latter are regularly denoted. In this period the language diverges very rapidly from Welsh. As prominent features we may mention the following. Stressed (=Prim. Celt, and Ir. o) becomes eu, in unstressed syllables e; thus the suffix -aco becomes -euc and later -ec, but in Welsh -auc and later -oc, -og. Postvocalic -tr, -tl become -dr, -dl as in Welsh, but in Middle Breton they pass into -zr, -zl, which in the modern language appear as -er, -el; e.g. Mid. Br. lazr, Mod. Br. laer, " robber," W. lleidr, Lat. latro. Further, -It becomes -ot, ut, e.g. Br. aot, aout, " cliff," W. allt; Br. autrou, " lord," Ir. altram, W. alltraw, athraw, Corn, altrou; and, more important still, th, ot (W. dd) become s, z, e.g. Mid. Br. clezeff, " sword," Mod. Br. kleze, W. cleddyf. The orthography only followed the pronunciation very slowly, and it is not until 1659 that we find any attempt made to reform the spelling. In this year a Jesuit priest, Julien Maunoir (Br. Maner), published a manual in which a new spelling is employed, and it is usual to date Modern Breton from the appearance of this book, although in reality it marks no new epoch in the history of the language. It is only now that the initial mutations are consistently denoted in writing (medi ally they are already written in the;i ith century), and the differences between the dialects first come into view at this time. As in Welsh the accent

is withdrawn during the middle period from the final to the penultimate (except in the Vannes dialect), which causes the modern unstressed vowel to be reduced in many cases. Again, in OldWelsh andOldBreton a short stressed vowel inwordsofonesyllable

was lengthened, e.g.W. tad, “father,” pi. t&dau, but in Modern Breton the accent tends to lengthen all stressed vowels. Breton has gone its own way in the matter of initial mutation. The nasal mutation has been entirely given up in the initial position, whilst a new mutation, called medial provection, has arisen in the case of b, d, g, which become p, k, t after a few words which originally ended for the most part in z or ch. The vocalic mutation of initial g in Breton is c’h. We may also make mention of one or two other points on which Breton differs widely from Welsh. Breton has given up the combination ng, e.g. Mid. Br. moe, Mod. Br. moue, ” mane,” W.mwng, Ir. mong. The language betrays a fondness for nasalized vowels.and in this connexion it may be noted that v representing an original m (W. /, Ir. mh), though generally written ff in Middle Breton, now frequently appears as nv ; Mid. Br. claff, Mod. Br. klanv, ” sick, ill,” W. claf, M. Ir. clam. Final g after r and / and sometimes in monosyllables after a vowel is represented in Breton by c’h, whilst in Welsh in the one case we find a vowel and in the other nil, e.g. Br. erc’h, ” snow,” W. eiry, eira; Br. lee h, ” place,” W. lie. In Welsh mb, nd immediately preceding the stress appear in the modern language as mm, nn, but in Breton we find mp, nt, e.g. Br. kantol, “candle,” W.‘cannwyll, Lat. candela; Br. kemper, “confluence” (in place names), W. cymmer, Ir. combor.

With regard to the extent of country over which Breton is spoken we shall do well to note the seats of the old Breton bishoprics. These were Quimper, St Pol de Leon, Treguier, St Brieuc, St Malo, Dol and Vannes. Under Count Nominoe the Bretons succeeded in throwing off the Frankish yoke (841-845) and founded an independent state. At this time of greatest political expansion the language boundary was formed by a line which started roughly a little to the west of Mont St Michel at the mouth of the Couesnon, and stretched to the mouth of the Loire. During the next three centuries, however, in consequence of political events which cannot be enumerated here, * we find French encroaching rapidly on Breton, and the old dioceses of Dol, St Malo, St Brieuc, and in part Vannes became Romance- speaking (cp. J. Loth, Revue celtique, xxviii. 374-403). So that since the 13th and 14th centuries the boundary between French and Breton begins in the

north about Plouha (west of St Brieuc Bay), and stretches to the mouth of the Vilaine in the south. That is to say, the Breton speakers are confined to the department of Finistere and the west of the departments Cotes-du-Nord and Morbihan. Lower Brittany contains a population of 1,360,000, of whom roughly 1,250,000 speak Breton. The number of monoglot Bretons is stated to have been 768,000 in 1878, 679,000 in 1885, and over 500,000 in 1898. There is an infinity of dialects and subdialects in Brittany, but it is usual to divide them into four groups. These are the dialects of (1) Leon in Finistere; (2) Cornouailles in Finistere, the C6tes-du-Nord and a part of Morbihan; (3) Treguier in the C6tes-du-Nord and Finistere; (4) Vannes in Morbihan and a portion of the C6tes-du-Nord. The first three resemble one another fairly closely, but the speech of Vannes has gone its own way entirely. The dialect of Leon is regarded as the literary dialect, thanks to Legonidec.

The modern language is unfortunately saturated with words borrowed from French which form at least a quarter of the whole vocabulary. The living speech is further characterized by innumer- able cases of consonantal metathesis and by parasitic nasalization. Loth gives specimens of the most important varieties of Breton in his Chrestomathie bretonne, pp. 363-380, but here we must confine ourselves to pointing out the two most salient differences between the speech of Vannes and the rest of Brittany. In Vannes the stress has not been shifted from the final syllable. In Haute-Cornouailles and Goelo there is a tendency to withdraw the stress on to the antepenultimate, whilst in Treguier certain enclitics attract the accent to the final, s, z of the other dialects representing Welsh th become h in Vannes, e.g. W. caeth, Br. keaz, kez, ” poor, miserable,” Vannes keah, keh. This phenomenon occurs sporadically in other dialects. It may also be mentioned that Prim. Celt, non-initial d, W. dd, is retained as 2 in Leon but disappears when final or standing between vowels in the other dialects, e.g. O. Br. fid, W. ffydi, ” faith,” Leon feiz, in Cornouailles, Treguier and Vannes /£. It is doubtful if the most serious differences between the dialects are older than the 16th century.

In the middle ages the language of the Breton aristocracy was French. Upper Brittany was politically more important than the western portion. The consequence was that no patronage was ex- tended to the vernacular, and Breton sank to the level of a patois with no unity for literary purposes. But a new era dawned with the beginning of the 19th century. The national consciousness

was awakened at the time of the Revolution, when the Bretons became aware of the difference between themselves and their French neigh- bours. It may be mentioned by the way that the Breton language was regarded with suspicion by the leaders of the First Republic and attempts were made to suppress it. A Breton named Legonidec had to flee to England for fighting against the Republic. He came under the influence of the movement in Wales, and on his return sought to create a Breton literary language. He published an excellent grammar (Grammaire celto-bretonne, Paris, 1807) and a dictionary (Dictionnaire breton-frangais, Paris, 1821), from which he omitted the numerous French words which had crept into the language and for which native terms already existed. Legonidec's

example fired a number of writers with zeal for their native tongue and the clergy became interested. Under their auspices manuals of Breton were published and the language was utilized in a number of schools. A society called the Association Bretonne was founded in the year 1844. But under the Second Empire, for reasons which are not easy to discover, this Breton awakening was declared to be contrary to the interests of the state, and all the means at the disposal of a highly centralized government like that of France were employed to throttle the movement. Down to the present day the use of Breton is strictly forbidden in all the state schools, and the influence of the Roman Catholic clergy has for the most part been hostile to the language. However, the attitude of the government aroused considerable dissatisfaction in the early 'nineties, and in 1896 the Association Bretonne (disbanded in 1859 and re- constructed in 1873) appointed a permanent committee with the object of preserving and propagating the national language. At the same time some of the clergy headed by Abbe Bulton began to move, and Breton was introduced into many of the schools not under state control. In 1898 was founded the Union Regionaliste Bretonne, the most important section of which endeavours to foster the native speech in conjunction with the Comiti. de preservation du breton (founded 1896). In 1899 the annual meeting of the U.R.B. was modelled on the lines of the Irish Oireachtas, the Welsh Eisteddfod and the Scottish Mod, and festivals of this kind have

been held ever since. Many Breton newspapers publish columns in Breton, thus Ar Bobl (a weekly newspaper founded in 1904 and published at Carhaix) frequently devotes half its columns to the language. But there is also a weekly four-page newspaper which is wholly in Breton. This is Kroaz ar Vretoned, edited by F. Vallee and published at St Brieuc. In addition to this there are three monthly magazines wholly in Breton. The first is Ar Vro, edited by the poet Jaffrennou, and in 1908 in its fifth year. The second is Dihunamb, written in the dialect of Vannes and started in 1905. The third is Feiz ha Breiz, started 1899.

Authorities for Breton. — For the external history of Breton see H. Zimmer, " Die keltische Bewegung in der Bretagne," Preussische Jahrbucher for 1899, xcix. 454-497. For Old and Middle Breton, J. Loth, Chrestomathie bretonne (Paris, 1890), and the same writer's Vocabulaire vieux-breton (Paris, 1884). Loth and E. Ernault have been indefatigable in investigating the history of the language. Their numerous contributions are mainly to be found scattered through the Revue celtique, Zeitschrift fur celtische Philologie and the Annates de Bretagne. Ernault has also published Glossaire moyen-breton in 2 vols. (Paris, 1895-1896) ; Dictionnaire elymologique du moyen-breton (Paris, 1888). Another etymological dictionary was published by V. Henry (Paris, 1900). Grammars, &c. : — Dialect of Leon : Legonidec, Grammaire celto-bretonne (Paris, 1807, 1838 2 , also contained in H. de la Villemarque's edition of Legonidec's Dictionary) ; F. Vallee, Lecons elementaires de grammaire bretonne (St Brieuc, 1902) ; E. Ernault, Petite Grammaire bretonne (St Brieuc, 1897, the latter also takes account of the dialects of Treguier and Cornouailles). Dialect of Treguier: L. le Clerc, Grammaire bretonne (St Brieuc, 1908) ; J. Hingant, Aliments de la grammaire bretonne (Treguier, 1868); P. le Roux, "Muta- tions et assimilations de consonnes dans le dialecte armoricain de Pleubian," Annates de Bretagne, xii. 3-31. Dialect of Vannes: A. Guillevic and P. le Goff, Grammaire bretonne du dialecte de Vannes (Vannes, 1902) ; Exercises sur la grammaire bretonne (Vannes, 1903) ; H. d'Arbois de Jubainville, " Etude phonetique sur le dialecte breton de Vannes," Revue celtique, i. 85 ff. 211 ff . ; E. Ernault, " Le Dialecte vannetais de Sarzeau," Rev. celt. iii. 47 ff., 232 ff . ; J. Guillome, Grammaire francaise-bretonne (Vannes, 1836). As a curiosity we mention P. Treasure, An Introduction to Breton Grammar (Carmarthen, 1903). Dictionaries: Legonidec, Dictionnaire fran- cais-breton (St Brieuc, 1847), Breton- Francais (St Brieuc, 1850), both republished by de

la Villemarque and representing the Leon dialect ; A. Troude, Nouveau Dictionnaire pratique francais et breton du dialecte de Leon avec les acceptations diverses dans les dia- lectes de Vannes, de Treguier, et de Cornouailles (Brest, 1869), and Nouveau Dictionnaire pratique breton-francais (Brest, 1876); E. Ernault, ” Supplement aux dictionnaires bretons-francais,” Revue celtique, iv. 145-170. The Breton words in Gallo, the French patois of Upper Brittany, were collected by E. Ernault, Revue celtique, v. 218 ff.

(c) Cornish. — The ancient language of Cornwall (Kern&ak, Carnoack) stood in a much closer relation to Breton than to Welsh, 1 though in some respects it sides with the latter against the former.

It agrees with Breton on the following points: — It has given up the nasal mutation of initials but provects the mediae. Prim. Celt. a is not diphthongized, but becomes e, e.g. Corn, ler, ” floor,” Br. leur, W. llawr, Ir. lar. Ng is lost as in Breton, e.g. toy, ” to swear,” Br. toui, W. tyngu, Ir. tongu; nd becomes nt before the stress and not nn as in Welsh, e.g. Corn. Br. hanter, “half,” W. hanner. Cornish like Breton does not prefix a vowel to words beginning with s -(con sonant, e.g. Corn, spirit, later spyrys, Br. spered, W. yspryd.

1 J. Loth gives it as his opinion that as late as 1400-1600 a Cornish- man and a Breton might have been able to understand one another.

On the other hand, O. Cornish does not confuse i and $ to the same extent as Bret., e.g. W. helyg, ” willow,” O. Cornish heligen, Br. halek. Further, Cornish does not change th, $to s, z as in Breton, e.g. beth, ” grave,” Br. bez, W. bedd, and initial g disappears in the vocalic mutation as in Welsh. Peculiar to Cornish is the change of non- initial /, d to s, z. This occurs in the oldest Cornish after n, I, e.g. O. Corn, nans, ” valley,” W. nant; Corn. Ids, ” father,” W. tad. A feature of later Cornish is the introduction of a d before post- vocalic m, n, e.g. pedn, ” head,” W. pen. In later Cornish the accent seems to have fallen on the penultimate as in Modern Welsh and Breton.

In 936 the ” Welsh ” were driven out of Exeter by ˆEthelstan, and from that time the Tamar appears to have formed a general boundary between English and Cornish, though there seems to be evidence that even as late as the reign of Elizabeth Cornish was

spoken in a few places to the east of that river. The decay of Cornish has been largely attributed to the Reformation. Neither the Prayer- book nor the Scriptures were translated into the vernacular, and we find the same apathy on the part of the Church of England in Cornwall as in Wales and Ireland. Unfortunately the Methodist movement came at a time when it was too late to save the language. By 1600 Cornish had been driven into the western parts of the duchy and in 1662 we are informed by John Ray that few of the children could speak it. Lhuyd gives a list of the parishes in which Cornish was spoken, but goes on to state that every one speaks English. In 1735 there were only a few people along the coast between Penzance and Land's End who understood Cornish, and Dolly Pentreath of Mouse- hole, who died in 1777, is commonly stated to have been the last person who spoke it, though Jenner seems to show that there were others who lived until well into the 19th century who were able to converse in the dialect. However, the modern English speech of West Cornwall is full of Celtic words, and nine-tenths of the places and people from the Tamar to Land's End bear Cornish names. Celtic words still in use are to be found in Jago's Dialect of Cornwall (Truro, 1882) ; thus the name for the dog-fish is morgy, " sea-dog." Authorities for Cornish. — A mass of details about Cornish is collected in H. Jenner's Handbook of the Cornish Language (London, 1904). (Cf. J. Loth's review in the Revue celtique, xxvii. 93.) Lhuyd's Archaeologica Britannica (1707) contains a grammar of the language as spoken in his day, and a Sketch of Cornish Grammar is to be found as an appendix to Norris's Ancient Cornish Drama. A dictionary was published by R. Williams entitled Lexicon Cornu- Britannicum (Landovery, 1865), to which W. Stokes published a supplement of about 2000 words in the Transactions of the London Philological Society for 1 868-1 869. We may also mention the English-Cornish Dictionary, by F. W. P. Jago (Plymouth, 1887), and a Glossary of Cornish Names, by J. Bannister (Truro, 1871). W. Stokes published a Glossary to Beunans Meriasek in the Archiv filr celtische Lexikographie, i. 101, and important articles by J. Loth have appeared in the Revue celtique, vols, xviii. to xxiv. W. S. Lach-Szyrma, " Les Derniers Echos de la langue cornique," Revue celtique, iii. 239 ff. H. Jenner, " Some Rough Notes on the Present Pronunciation of Cornish Names," Rev. celt. xxiv. 300-305.

III. The Language or the Ancient Picts. — The evidence from which we can draw any conclusions as to the affinities of the

language of the Picts is so extremely scanty that the question has been the subject of great controversy. The Picts are first mentioned by Eumenius (a.d. 297), who regarded them as having inhabited Britain in the time of Caesar. In the year 368 they are described by Ammianus Marcellinus as invading the Roman province of Britain in conjunction with the Irish Scots. In Columba's time we find the whole of Scotland east of Drumalban and north of the Forth divided into two kingdoms- north and south Pictland — and it is reasonable to identify the Picts, at any rate in part, with the Caledonians of the classical authors. Galloway and Co. Down were also inhabited by Picts. Bede in enumerating the languages of Britain mentions those of the Britons, Picts, Scots and the English. The names by which the Picts are known in history have aroused considerable discussion. It seems natural to connect Lat. Picti with the Pictones and Pictavi of Gaul, but in Irish they are known as Cruithne, which appears in Welsh as Prydyn, "Pict"; cp. Prydein, " Britain," forms corresponding to the earliest Greek name for these islands, vtjcol YLperavixai.

Three conflicting theories have been held as to the character of the Pictish language. Rhys, relying on the strange character of the Scottish Ogam inscriptions, pronounces it to be non- Celtic and non-Indo-European. In this he has been followed by Zimmer, who bases his argument on the Pictish rule of suc- cession. Skene maintained that the Picts spoke a language nearly allied to Goidelic, whilst Stokes, Loth, Macbain, D'Arbois and Meyer are of opinion that Pictish was more closely related

to Brythonic. Of personal names mentioned by classical writers' we have Calgacus and Argentocoxus, both of which are certainly Celtic. The names occurring in Ptolemy's description of Scotland have a decidedly Celtic character, and they seem, moreover, to bear a greater resemblance to Brythonic than to Goidelic, witness such tribal designations as Epidii, Cornavii, Damnonii, Decantae, Novantae. In the case of all these names, however, it should be borne in mind that they probably reached the writers of antiquity through Brythonic channels. Bede mentions that the east end of the Antonine Wall terminated at a place called in Pictish Pean-

fahel, and in Saxon Penneltun. Pean re- sembles Old Welsh penn, ” head,” Old Irish cenn, and the second element may possibly be connected with Gaelic fdl, Welsh gwawl, ” rampart.” The names of the kings in the Pictish chronicles are not an absolutely trustworthy guide, as owing to the Pictish rule of succession the bearers of the names may in many cases have been Brythons. The names of some of them occur in one source in a Goidelic, in another in a Brythonic form. It is of course possible that the southern part of Pictish territory was divided between Goidels and Brythons, the population being very much mixed. On the other hand there are a number of elements in place-names on Pictish ground which do not occur in Wales or Ireland. Such are pet, pit, ” farm ” (?), for, f other, fetter, foder, ” lower ” (?). Aber, ” confluence,” on the contrary, is pure Brythonic (Gaelic inver) . Though the majority of scholars are of opinion that Pictish was nearly akin to the Brythonic dialects, we are entirely in the dark as to the manner in which that language was ousted by the Goidelic speech of the Dalriadic Scots. In view of the comparatively unimportant part played for a considerable period in Scottish affairs by the colony from Ireland, it is well-nigh incredible that Pictish should have been supplanted by Gaelic.

Authorities. — J. Rhys, Celtic Britain (London 2 , 1905), The Welsh People (London 3 , 1902), ” The Language and Inscriptions of the Northern Picts,” in Proceedings of the Society of Antiquaries of Scotland (1892); H. Zimmer, ” Das Mutterrecht der Pikten,” in Savignys Zeitschrift (1895); also trans, by G. Henderson in Leabhar nan Gleann (Inverness, 1898); W. F. Skene, Celtic Scotland (Edin- burgh, 1876) ; A. Macbain in appendix to reprint of Skene’s High- landers of Scotland (Stirling, 1902) ; A. Macbain, ” Ptolemy’s Geography of Scotland,” in Transactions of the Gaelic Society of Inverness, xviii. 267-288; W; Stokes, Bezzenbergers Beitrage, xviii. 267 ff. ; H. d’Arbois de Jubainville, Les Druides et les dieux celtiques a forme d’animaux (Paris, 1906). The various theories have been recently reviewed and criticized by T. Rice Holmes in an appendix to his Caesar’s Invasion of Britain (London, 1907).

IV. History of Celtic Philology. — For many centuries the affinities of the Celtic languages were the subject of great dispute. The languages were in turn regarded as descended from Hebrew, Teutonic and Scythian. The first attempt to treat the dialects comparatively was made by Edward Lhuyd in his Archaeologia Britannica (Oxford, 1707), but the work of this scholar seems to have remained unnoticed. A century later

Adelung in Germany divided the dialects into true Celtic (= Goidelic) and Celtic influenced by Teutonic (= Brythonic). But it took scholars a long time to recognize that these languages belonged to the Indo-European family. Thus they were excluded by Bopp in his comparative grammar, though he did not fail to notice certain resemblances between Celtic and Sanskrit. James Pritchard was the first to demonstrate the true relationship of the group in his Eastern Origin of the Celtic Nations (London, 1831), but his conclusions were not accepted. As late as 1836 Pott denied the Indo-European connexion. A year later Pictet resumed Pritchard's arguments, and Bopp himself in 1838 admitted the languages into the charmed circle, showing in an able paper entitled tfber die keltischen Sprachen that the initial mutations were due to the influence of terminations now lost. But it was reserved to a Bavarian historian, J. C. Zeuss (1806- 1856), to demonstrate conclusively the Indo-European origin of the Celtic dialects. Zeuss, who may worthily rank with Grimm and Diez among the greatest German philologists, rediscovered the Old Irish glosses on the continent, and on them he reared the magnificent structure which goes by his name. The Grammatica Celtica was first published in 1853. The material contained in

this monumental work was greatly extended by a series of important publications by Whitley Stokes and Hermann Ebel, so much so that the latter was commissioned to prepare a second edition, which appeared in 1 8 7 1 . Stokes has rendered the greatest service to the cause of Celtic studies by the publication of count- less texts in Irish, Cornish and Breton. In 1870 the Revue celtique (vol. xxviii. in 1908) was founded by Henri Gaidoz, whose mantle later fell upon H. d'Arbois de Jubainville. In 1879 E. Windisch facilitated the study of Irish by publishing a grammar of Old Irish, and a year later a volume of important Middle Irish texts with an exhaustive glossary, the first of its kind. Since then Windisch and Stokes have collaborated to bring out some of the greatest monuments of Irish literature in the series of Irische Texte. The text of the Wiirzburg glosses was published by Zimmer (1881) and by Stokes (1887), and that of the Milan glosses by Ascoli. An important step forward was the discovery of the laws of the Irish accent made simultaneously by Zimmer and Thurneysen. This discovery led to a thorough investigation of the difficult verb system of Old Irish — a task which has largely occupied the attention of Strachan in England, Thurneysen and Zimmer in Germany, and Pedersen and Sarauw in Denmark. In a sense the publication of the Thesaurus

Palacohibernicus (Cambridge, 1901-1903) may be regarded as marking the close of this epoch. The older stages of Irish have hitherto so monopolized the energies of scholars that other departments of Celtic philology save Breton have been left in large measure unworked. J. Strachan had begun to tap the mine of the Old Welsh poems when his career was cut short by death. J. Loth and E. Ernault have concentrated their attention on Breton, andean claim that the development of the speech of Brittany has been more thoroughly investigated than that of any other Celtic language. The number of periodicals devoted entirely to Celtic studies has increased considerably of recent years. In 1896 K. Meyer and L. C. Stern founded the Zeitschrift fiir celtische Philologie (now in its 7th volume), and in 1897 the Archiv fiir celtische Lexikographie began to appear under the direction of K. Meyer and W. Stokes. As a supplement to the latter Meyer has been publishing his invaluable contributions to Middle Irish lexicography. In Ireland a new periodical styled &riu was started by the Irish School of Learning in 1904. The Scottish Celtic Review, dealing more particularly with Scottish and Irish Gaelic, began to appear in 1903, and the Transactions of the Gaelic Society of Inverness are in the 26th volume. For Wales we have Y Cymmrodor since 1877, and the Transactions of the Hon. Society of Cymmrodorion since 1892, and for Brittany the Annates de Bretagne, published by the Faculty of Letters at Rennes (founded 1886).

See V. Toumeur, Esquisse d'une histoire des itudes celtiques (Liege, 1905). (E. C. Q.)

Celtic Literature

1. Irish Literature. — In the absence of a native coinage it is extremely difficult to say when the use of letters was introduced into Ireland. It is probable that the Latin alphabet first came in with Christianity. With the exception inscrip- of the one bilingual Ogam inscription as yet discovered tloas. in Ireland (that at Killeen Cormac) all the inscriptions in Roman letters are certainly later than 500. Indeed, apart from the stone reading " LIE LUGUAEDON MACCI MENUEH," they are all contemporary with or later than the Old Irish glosses. With regard to the Ogam inscriptions we cannot make any confident assertions. Owing to the lack of criteria for dating certain Irish sound-changes accurately it is impossible to assign chronological limits for the earlier stones. The latter cannot be later than the 5th century, but there is nothing to show whether they are Christian or not,

and if pagan they may be a century or two earlier. It is true that the heroes and druids of the older epics are represented in the stories as making constant use of Ogam letters on wood and stone, and as the state of civilization described in the oldest versions of the Ulster sagas seems largely to go back to the beginning of the Christian era, it is not impossible that this peculiar system of writing had been

Old Irish MSS.

Hymns.

framed by them. The Ogam system is certainly based on the Latin and not the Greek alphabet, and was probably invented by some person from the south of Ireland who received his knowledge of the Roman letters from traders from the mouth of the Loire. It may, however, be regarded as certain that the Ogam script was never employed in early times for literary purposes. We are told that the Gaulish druids disdained to commit their lore to writing, although they were familiar with the use of Greek letters, and their Irish confreres probably resembled them in this respect. Tradition connects the codifica- tion of the Brehon Laws with the name of Patrick, and there is reason for believing, as we shall see later, that the greatest Irish epic was first committed to writing in the 7th century.

The great bulk of Irish literature is contained in MSS. belonging to the Middle Irish period (1100-1550), and in order to be able to treat this literature as a whole it will be convenient for us to deal first with those documents which are termed Old Irish, especially as the contemporary remains of the literature of the earlier period are almost ex- clusively of a religious nature. Most of the Old Irish documents have been printed by Stokes and Strachan in the Thesaurus Palaeohibernicus, and where no reference is given the reader is referred to that monumental work. The extraordinary outburst of intellectual activity in Ireland from the 6th to the 9th centuries and the compositions of Irishmen in the Latin language, belong to the history of medieval European literature and fall outside the scope of this article. For the

Confession of St Patrick and his ” Letter to the Subjects of Coroticus ” see Patrick. The only Irish document ascribed to the saint is the strange so-called ” Hymn,” the fdeth fiada, more properly f6id fiada, ” the cry of the deer.” This is a rhythmical incantation which is said to have rendered the saint and his companions in- visible to King Loigaire and his druids. The Trinity and powers of nature are invoked to help him to resist spells of women and smiths and wizards. The hymn, which contains a number of strange grammatical forms, is undoubtedly referred to in the Book of Armagh, and may very well go back to the 5th century. The Latin hymns contained in two MSS. dating from the end of the 1 1 th or beginning of the 1 2th century, a Trinity College, Dublin, MS., and a MS. belonging to the Franciscan monastery in Dublin, are of interest to us as exhibiting the influence of the native metrical system. Quantity and elision are ignored, and rhymes, assonances, alliterations and harmonies abound in true Irish fashion. The line consists of two units which commonly contain either seven or eight syllables apiece. The earliest and best-known of these religious poems are the Hymn of Secundinus (Sechnall d. 447) on St Patrick, and the two hymns attributed to St Columba (d. 597) beginning ” Noli pater ” and “Altusprosator,” the latter of which exhibits some of the peculiarities of the so- called Hibernian Latin of the Hisperica Famina and the Lorica of Gildas. The date of the Irish hymns in the Liber Hymnorum ranges, according to Stokes and Strachan, from the 7th to the nth centuries. Ultan’s hymn on St Brigit beginning ” Brigit be bithmaith,” which is by far the most artistic of the collection, was perhaps composed in the 7th century. Definite metrical laws had evidently been elaborated when this poem was written. The beat is iambic, but the natural accent of the words is rigidly observed. The long line consists of two units of five syllables each. The rhymes are dissyllabic and perfect. Alliteration is always observed in the latter half of each line and assonances are found knitting up the half-lines. The short prayer ascribed to Ninine or to Fiacc is a highly alliterative piece without rhyme, the date of which cannot be fixed. The well-known hymn on St Patrick traditionally ascribed to Fiacc, bishop of Sletty, and the piece beginning ” Sen De,” traditionally ascribed to Colman, are assigned on linguistic grounds to the beginning of the 9th century. The lines going by the name of ” Sanctan’s Hymn ” probably belong to the same century, whilst the metrical catalogue of marvels performed by St Brigit contains such a medley of older and later forms, probably due to interpolation, that it is impossible to determine its age. The few

lines entitled " Mael-Isu's Hymn " are the most recent of all and probably belong to the nth century

Earliest prose.

(Mael-Isud. 1086). The Patrician documents by MuirchuMaccu Machtheni, who professed to write at the command of Bishop Aed of Sletty (d. 698), and by Tirechan, who is said to have received his information from Bishop Ultan (d. 656) , are contained in the Book of Armagh, a MS. compiled by Ferdomnach in 807. These documents, like the Life of St Columba by Adamnan, the MS. of which was written by Dorbbene, abbot of Hi (d. 713), contain a number of names and forms of great importance for the study of the language.'

The earliest pieces of connected prose in Irish are three :— (1) the Cambray Homily, contained in an 8th-century codex at Cambray copied by a continental hand from a MS. in the Irish character ; the language is very archaic and dates from the second half of the 7th or the beginning of the 8th century; (2) the additions to the notes of Tirechan on the life of St Patrick in the Book of Armagh; these seem to go back to the early 8th century; (3) the tract on the Mass in the Stowe Missal, which is in all probability nearly as old as the Cambray Homily, though contained in a 10th or 1 ith century MS. Of especial interest are the spells and poems found in the Stowe Missal and two continental MSS. The Stowe MS. (now deposited in the Royal Irish Academy) contains three rather badly preserved spells for a sore eye, a thorn and disease of the urine. A St Gall codex has preserved four Irish incantations of the 8th and 9th centuries. These are respectively against a thorn, urinary disease, headache and various ailments. Another charm, which is partly obscure, occurs in the 9th-century codex preserved at the monastery of St Paul in Carinthia. The same MS. also contains (1) a humorous poem treating of the doings of a bookish writer and his favourite cat Pangur Ban; (2) a riddling poem ascribed to Suibne Geilt, a king who is said to have lost his reason at the battle of Moira (a.d. 637) ; (3) verses extracted from a poem ascribed to St Moling (d. 697), who may very well have been the actual author; (4) a poem in praise of some Leinster princeling called Aed.

For our knowledge of the older language, however, we have to rely mainly on the numerous glosses scattered about in a large number of MSS., which it is impossible to enumerate here. Indeed, such an enumeration is now rendered superfluous owing

to the publication of the Thesaurus Palaeohibernicus, in which all the various glosses have been collected. For our purpose it will be sufficient to mention the three most important codices containing Old Irish glosses. These are as follows: — (1) The Codex Paulinus at Wiirzburg, which contains the thirteen epistles of St Paul, and the Epistle to the Hebrews, with a great mass of explanatory glosses, partly in Latin, partly in Irish, partly mixed. The chief source of the commentary is the commentary of Pelagius, who is often cited by name. The date of this highly important MS. is much dis- puted; part of the Irish glosses seem to date from about 700, whilst the rest may be placed a little before 800. (2) The Codex Ambrosianus, formerly at Bobbio, now at Milan, which contains a commentary on the psalter with a large number of Irish glosses. In their present state these glosses were copied in the first half of the 9th century. (3) Glosses on Priscian contained in four MSS., of which the most important is the Codex Sangal- lensis, dating from the middle of the 9th century. Apart from the biblical glosses and scholia the other chief texts or authors provided with Irish glosses are Augustine, Bede, the Canons, the Computus, Eutychius, Juvencus, Philargyrius, Prudentius and Servius.

The Milan and the St Gall codices just mentioned both contain several short poems in Irish. In two stanzas in the Swiss MS. we find expressed for the first time that keen sympathy with nature in all her moods which is so marked a feature of Irish and Welsh verse. ,

Two ponderous religious poems have now to be noticed. To Oengus the Culdee is attributed the lengthy Felire or Calendar of Church Festivals, consisting of 365 quatrains in rinnard metre, one for each day in the year. The language of this dry compila- tion, which is heavily glossed and annotated, points to 800 as the date of composition, and Oengus, who is stated to have

Old

glosses.

lived about that time, may well have been the author. This

calendar has been twice edited by W. Stokes with an English translation, the first time for the Royal Irish Academy (Dublin, 1880), and again for the Bradshaw Society (London, 1905).

It may perhaps be as well to enumerate here the later Irish rnartyrologies. (1) The Martyrology of Tallaght (Tamlacht), founded on an 8th-century calendar, but containing additions down to 900 (ed. D. H. Kelly, Dublin, 1857). (2) The metrical Martyrology of O'Gorman, c. 1166-1174, edited by Stokes for the Bradshaw Society (London, 1895). (3) The Martyrology of Donegal, an important compilation in prose made by Michael O'Clery in 1630, edited by J. H. Todd (Dublin, 1864). A composition which is wrongly assigned to Oengus the Culdee is the Saltair na Rann or Psalter in Quatrains, contained in an Oxford MS. (Rawlinson B 502) and published without a translation by Stokes (Oxford, 1883). The work proper consists of 1 50 poems corresponding to the number of Psalms in the psalter, but 12 poems have been added, and in all it contains 2098 quatrains, chiefly in deibide metre of seven syllables. The poems are mainly based on biblical (Old Testament) history, but they preserve a large measure of medieval sacred lore and cosmogony. The psalter received additions as late as 998, and the Oxford MS. belongs to the 12 th century. We should perhaps also mention here the famous Antra or Eulogy of St Columba, commonly attributed to Dalian Forgaill, a contemporary of the saint, but Stokes takes the view that it was written in the 9th century, and is intentionally obscure. The oldest but not the best copy of the Antra is preserved in the Trinity College, Dublin, MS. of the Liber Hymnorum, but it also occurs in LU. and elsewhere. It invariably appears heavily gloss-laden, and the glosses and commentary added thereto are out of all proportion to the text. This piece, which is not extant in its integrity, was probably intended as artificial alliterative prose, but, as we have it, it is a medley of isolated phrases and irrelevant comment.

During the 9th and 10th centuries Ireland was harassed by the Vikings, and a host of scholars seem to have fled to the continent,

carrying with them their precious books, many of collectors, which are preserved in Italy, Switzerland, Germany

and elsewhere. Hence very few early Irish MSS. are preserved in Ireland itself. When the fury of the storm was past, Irish scholars showed increased interest in the old literary documents, and

copied all that they could lay hands on into miscellaneous codices. The earliest of these collections, such as the Cin of Druim Snechta, the Yellow Book of Slane, the Book of Dubdaleithe, the Psalter of Cashel, exist no longer, though their names have come down and certain of them were known in the 17th century. However, copies of a goodly portion of the contents of these old books are preserved to us in one form or another, but mainly in a series of huge miscellaneous codices

ranging in date from the 12th to the 16th century. the Dun ˆ ne oldest is Lebor na h-uidre, or Book of the Dun Cow. Cow, preserved in the Royal Irish Academy and

published in facsimile (Dublin, 1870). This MS. was compiled in part in the monastery of Clonmacnoise by Moelmuire MacCelechair, who was slain in 1106. The Book of the Dun Cow (where necessary we shall abbreviate as LU.) derives its name from a legend that Ciaran of Clonmacnoise (d. 544) took down the story of the Tdin Bo Cualnge on a parchment made from the hide of his favourite cow. The name seems to have been wrongly applied to the 1 2th-century MS. in the 1 5th century. LU. is almost entirely devoted to romance, the stories which _ it contains belonging mainly to the Ulster cycle. The

Leinster. next ˆˆ. m P omt ˚f a S e is the Book of Leinster

(abbreviated LL.) now in Trinity College, Dublin. It was transcribed by Finn, son of Gorman, -bishop of Kildare (d. 1 160). LL. also contains a large numb«r of romances in addition to other important matter, mainly historical and

genealogical, bearing more particularly on the affairs of BooTot Leinster. The Yellow Book of Lecan (YBL.), also in Lecan. Trinity College, Dublin, was written at different times

by the MacFirbis family, but chiefly by Gilla Isa, son of Donnchad M6r MacFirbis about 1391. The MacFirbises were

hereditary scribes and genealogists to the O’Dowds, chiefs of the Hy Fiachrach (Co. Sligo). YBL. contains a vast amount of romance, and is indispensable as supplementing and checking the contents of LU. and LL. The most extensive collection of all is the Book of Ballymote (BB.), now

Book of Ballymote.

belonging to the Royal Irish Academy, which was compiled about the beginning of the 15th century by various scribes. The book was in the possession of the chiefs of Bally- mote for more than a century. In 1522 it was purchased by the O'Donnells for 140 milch cows. BB. only contains little romantic matter, but it has preserved much valuable historical and genealogical material. The contents of the Leabhar Breac (LB .) , or Speckled Book, now in the Royal Irish jˆ* /e< ' Academy, are chiefly ecclesiastical and religious. LB. seems to have been compiled in large measure before 1 544. All these five codices have been published in facsimile by the Royal Irish Academy with a description of their contents. Two im- portant Mid. Ir. MSS. in the Bodleian (Rawlinson B 512 and Laud 610), containing a good deal of romantic material, are also published in facsimile by Henry Frowde.

Other MSS. which require special mention are (1) The Great Book of Lecan, compiled in the year 141 7 by Gilla Isa M6r Mac- Firbis, in the Royal Irish Academy ;(2)The Book of Lis- more, the property of the duke of Devonshire atLismore ˆJS r Castle. This codex was compiled in the latter half of material. the 1 5th century from the lost book of Monasterboice and other MSS. Its contents are described in the introduction to Stokes's Lives of Saints from the Book of Lismore (Oxford, 1890). (3) The Book of Fermoy in the Royal Irish Academy. The con- tents are described in the introduction to O'Beirne Crowe's edition of the Tdin B6 Fraich (Dublin, 1870). (4) The Book of Hy Maine recently acquired by the Royal Irish Academy. The scribe who wrote it died in 1372. O'Curry, O'Longan and O'Beirne Crowe drew up a MS. catalogue of the Irish MSS. in the Royal Irish Academy, and O'Donovan performed the same service for the Trinity College, Dublin, collection. A briefer account of the Irish MSS. in TCD. will be found in Abbott's Catalogue of the MSS. in that library. O'Curry also drew up a list of the Irish MSS. in the British Museum, and S.H.O'Grady has printed part i. of a descriptive catalogue of this collection (London, 1901), part ii. by T. O'Maille. The twenty-six MSS. in the Franciscan monastery in Dublin are described by J. T. Gilbert in the Fourth Report of the Royal Commission on Historical MSS. W. F. Skene catalogued the collection of MSS. in the Advocates' Library, Edinburgh, a printed catalogue of which has been issued by D. Mackinnon (Edinburgh, 1909; see also Trans. Gaelic Soc. of Inverness, xvi. 285-309).

In order to give some idea of the enormous extent of Irish MS. material we may quote some calculations made by O'Curry, who

states that if the five oldest vellum MSS. were printed the result would be 9400 quarto pages. Other vellum MSS. ranging in date from 1300 to 1600 would fill 9000 pages of the same size, whilst the innumerable paper MSS. belonging chiefly to the early 1 8th century would cover no less than 30,000 pages. The well- known French scholar, D'Arbois de Jubainville, published in 1883 a tentative catalogue of Irish epic literature. His work is by no means complete, but his figures are instructive. He mentions 953 Irish MSS. containing epic matter preserved in Irish and English libraries. To these have to be added another 56 in continental libraries. Of this mass of material 133 Irish and British MSS. and 35 continental MSS. were written before 1600. It should, however, be stated that the same subject is treated over and over again, and much of the later material is absolutely valueless.

Before we pass on to the consideration of the literature itself, it will be well to make a few preliminary observations on the nature of the language in which the pieces are written and on the status of the poet in medieval Ireland. „*^^l r The language in which the huge miscellaneous codices Irish. enumerated above are contained is called by the general name of Middle Irish, which is a very wide term. Irish scribes often copied their original somewhat mechanically, without

The "fill.

being tempted to change the language to that of their own time. Thus in many parts of LU. we find a thin Middle Irish veneer on what is largely Old Irish of the 8th or 9th century. Hence such a MS. often preserves forms which had been current several centuries before, and it may even happen that a 14th or 15th century MS. such as YBL. contains much older forms than a corresponding passage in LL. Of recent years several scholars — notably Strachan — have devoted much attention to the Old Irish verb-forms, so that we have now safe criteria for establishing with some degree of certainty the age of recensions of stories and poems preserved in late MSS. In this way a number of compositions have been assigned to the 9th, 10th and nth centuries, though actual written documents belonging to this

period are comparatively rare.

It remains for us to say a few words about the fili, the professional literary man in Ireland. The fili (from the stem vel-, ” to see,” Welsh, Breton, gwelet, ” to see “) appears to have been originally a diviner and magician, and corre- sponds to the vates, ovartis, of the ancient Gauls men- tioned by classical writers. In Ireland he is represented as sole possessor of three methods of divination: the imbas forosnai, teinm Uida and dichetal di chennaib cndime. The first two of these were forbidden by Patrick, but they seem to have survived as late as the 10th century. Part of the tremendous influence exercised by the fili was due to the belief in his powers of satire. By reciting a satirical poem or incantation he was able to raise blotches on the face of and so disfigure any person who aroused his displeasure. Numerous cases of this occur in Irish literature. The origin of the science of the fili is sometimes traced back to the Dagda, one of the figures of the Irish pantheon, and they were held in such esteem that the annalists give the obituaries of the head-ollams as if they were so many princes. With the introduction of Christianity they seem to have gradually super- seded the druid, and their functions are therefore very wide. We are told that they acted in three capacities: (1) as story- tellers (fer comgne or scelaige); (2) as judges {brithem), including the professions of arbiters, legislators and lawyers; (3) as poets proper (fercerte). We are here only concerned with the fili in his capacity of story-teller and poet. In accordance with the minute classification of the various ranks of society in early Ireland, the social status of the literary man was very carefully defined. The degrees vary slightly in different documents, but the following list of ten from the Senchus M6r is very instructive : (1) The highest degree is the ollam (ollave), who knows 350 stories; (2) the dnruth, 175 stories; (3) the clii, 80 stories; (4) the carta, 60 stories; (5) the doss, 50 stories; (6) the macfuirmid, 40 stories; (7) the fochlocon, 30 stories; (8) the drisac, 20 stories; (9) the taman, 10 stories; (10) the oblaire, 7 stories. In LL. we are told that the stories {scil) are divided into primary and secondary, and that the latter are only obligatory on the first four of the grades enumerated. Again, certain styles of com- position seem to have been the monopoly of certain grades. Thus the poem which was most highly rewarded and demanded the highest technical skill was called the anomain, and was the exclusive right of the ollam. A notable instance of this kind of composition is the Antra of Columba, attributed to Dalian Forgaill. The higher grades were allowed a

number of attend- ants, whom the kings had to support along with the poet himself. Thus the fochlocon had two and the doss four attendants. In the 6th century Dalian Forgaill, the chief fili of Ireland, claimed the right to be attended by thirty filid, which was the number of the train allowed to the supreme king. The reigning monarch, Aed MacAinmirech, weary of the pretensions of the poets, attempted to banish them, which led to the famous assembly of Druim Ceta, where Columba intervened and reduced the number to twenty-four (the train of a provincial king). In the plan of the hall of Tara, preserved in LL. and YBL., the sui littre or doctor in theology has the seat of honour opposite the king. The ollam brithem or supreme judge or lawyer ranks with the highest rank of nobility, whilst the ollam fili is on a footing with the nobleman of the second degree. We have already stated that the stories which formed the

stock-in-trade of the poets were divided into primary and secondary stories. Of the latter there were 100, but little is known of them. However, several more or less complete lists of the primary stories have come down to us. The oldest catalogue (contained in LL.) gives the titles of 187 of these tales arranged under the following heads — destructions, cow-spoils, courtships, battles, caves, navigations, violent deaths, expedi- tions, elopements and conflagrations; together with the follow- ing, which also reckon as prime-stories — irruptions, visions, loves, hostings and migrations. Of these stories sixty-eight have been preserved in a more or less complete form. The tales enumerated in these catalogues, which in their substance doubt- less go back to the 8th or even to the 7 th century, fall into four main categories: (1) the mythological cycle, (2) the Cuchulinn cycle, (3) the Finn cycle, (4) pieces relating to events of the 5th, 6th and 7th centuries. Meyer has estimated that of the 550 titles of epic tales in D'Arbois's Catalogue about 400 are known to us, though many of them only occur in a very fragmentary state; and about 100 others have since been discovered which were not known in 1883.

The course of training undergone by the fili was a very lengthy one. It is commonly stated to have extended over twelve years, at the end of which time the student was thoroughly versed in all the legendary, legal, historical and topographical lore of his native country, in the use of the innumerable and excessively complicated Irish metres, in Ogam writing and Irish grammar. The instruction in the schools of poetry seems to have been entirely oral, and the course consisted largely in learning by

heart the verses in which the native lore was enshrined. These schools of learning existed in one form or another down to the 1 7 th century. In the early days the fili is represented as employing a mysterious archaic form of speech — doubtless full of obscure kennings — which was only intelligible to the initiated. An instance of this birla jiine, as it was termed, is the piece entitled Acallam an Dd Shuad (Colloquy of the Two Sages, Rev. celt. xxvi. 4 ff.). In this piece two filid of the 1st century a.d. are represented as contending in this dialect for the office of chief ollam of Ireland, much to the chagrin of King Conchobar, to whom their speeches were unintelligible. It was in consequence of this that Conchobar ruled that the office of fili should no longer carry with it of necessity the office of judge {brithem). It ought to be observed that the church never showed itself hostile to the filid, as it did to the druids. Dubthach, chief fili of Ireland in the time of St Patrick, is represented as the saint's constant companion, and the famous Flann Mainistrech (d. 1056), though a layman and fili, was head of the monastery school at Monasterboice.

Before leaving the subject of the literary classes, we must notice an inferior grade of poet — the bard. Like the official filid, the bards were divided into grades. There were both The bard patrician and plebeian bards, each subdivided into eight degrees, having their own peculiar metres. Like the fili the bard had to go through a long course of study, and he was generally attached to the house of some chieftain whose praises he had to sing. In course of time the office of fili became extinct, owing to a variety of causes, and from the 13th to the 16th century we find the hitherto despised family bard stepping into the place of the most influential literary man in Ireland. His importance was fully realized by the English government, which did its best to suppress the order.

The medieval romances form by far the most attractive part of Irish literature, and it is to them that we shall first turn our attention. Two main groups of stories have to be distinguished. The one is the Ulster cycle, with ro mances . Conchobar and Cuchulinn as central figures. The other is the Southern or Leinster-Munster cycle, revolving round Finn and Ossian. Further stories dealing with mythological and historical personages will be mentioned in their turn.

The Ulster cycle may be regarded as Ireland's most important contribution to the world's literature. The chief and at the same

time the lengthiest romance in which the heroes of this group figure is the great epic, the Tdin B6 Cualnge or the

Ulster cycle.

The “Tdin.”

Cattle-raid of Cooley (Co. Louth). Here we find ourselves in a world of barbaric splendour, and we are constantly reminded of the Iliad, though the Irish epic from a purely literary point of view cannot bear comparison with the work of Homer. The main actors in the drama are Conchobar, king of Ulster, the great warrior Cuchulinn (see Cuchulinn), Ailill and Medb, king and queen of Connaught, and Fergus, Conchobar’s predecessor as king of Ulster, now in exile in Connaught. These persons may or may not have actually lived, but the Irish annalists and synchronists agree in placing them about the beginning of the Christian era. And there cannot be any doubt as to the antiquity of the state of civilization disclosed in this great saga. It has been repeatedly pointed out that the Irish heroes are equipped and conduct themselves in the same manner as the Gauls described by the Greek traveller Posidonius, and Prof. W. Ridgeway has shown recently that several articles of dress andarmour correspond exactly to the La Tene types of the continent. To mention a few primitive traits among many — the Irish champions of the Tain still fight in chariots, war-dogs are employed, whilst the heads of the slain are carried off in triumph and slung round the necks of the horses. It may also be mentioned that Emain Macha, Conchobar’s residence, is reported by the annalists to have been destroyed in a.d. 323, and that portions of Meath, which is stated to have been made into a separate province in the 2nd century a.d., are in the Tdin regarded as forming part of Ulster. Noteworthy is the exalted position occupied by the druid in the Ulster sagas, showing how little the romances were influenced by Christianity. No Roman soldier ever set foot in Ireland, and this early epic literature is of supreme value as a monument of primitive Celtic civilization. Ireland has always been a pastoral country. In early times no native coins were in circulation: the land belonged to the tribe.

Consequently a man's property consisted mainly of cattle. Cattle-raids were an event of daily occurrence, and Sir Walter Scott has made us familiar with similar expeditions on the part of the Scottish Highlanders in the 18th century. Hence it is not a matter for surprise that the theme of the greatest Irish epic is a cattle-raid. At the time there were two wonderful bulls in Ireland, the Dond or Brown Bull of Cualnge, and the Findbennach or White-horn, belonging to Medb. These two animals are of no ordinary nature. Other stories represent them as having existed under many different forms before they were reborn as bulls. First they appear as swineherds belonging to the supernatural people of the sid of fairy mounds; then they are metamorphosed suc- cessively as ravens, warriors, sea-monsters and insects. It was Queen Medb's ambition to gain possession of the Brown Bull of Cualnge, and for this purpose she collected the united hosts of Ireland to raid the province of Ulster and carry him off. Medb chooses the season when she knows the Ulstermen are all in- capacitated as the result of a curse laid upon them by a fairy woman. Cuchulinn alone is exempt from this debility.

The story is divided into a number of sections, and has been summarized by Miss Hull as follows:— (1) the prologue, relating, in the form of a night dialogue between Ailill and Medb, the dispute between them which brought about the raid; (2) the collecting of Medb's hosts and the preliminary movements of the army, during which period she first became aware of the presence and powers of Cuchulinn. Her inquiry of Fergus as to who this formidable foe is leads to a long section called (3) Cuchulinn's boy-deeds, in which Fergus relates the remarkable prodigies of Cuchulinn's youth, and warns Medb that, though the hero is but a beardless youth of seventeen, he will be more than a match for all her forces. (4) A long series of single combats, of which the first part of the tale is made up; they are at first gay and bombastic in character, but become more grave as they proceed, and culminate in the combat of Cuchulinn with his old companion, Fer Diad. This section contains the account of Cuchulinn's "distortion" or frenzy, which always occurred before any great output of the hero's energy, and of the rout of the hosts of Medb which followed it. (5) The general awakening of the warriors of Ulster from their lethargy, and their gathering by

septs upon the Hill of Slane, clan by clan being described as it comes up in order. (6) The final Battle of Gairech and Ilgairech, followed (7) by the rout of Medb's army and (8) the tragic death of the bulls.

The text of the Tain has come down to us as a whole or in part in nearly a score of MSS., most of which, however, are modern. The most important MSS. containing the story are LU., LL. and YBL. Of these LU. and YBL. are substantially the same, whilst LL. contains a longer and fuller text later in both style and language. LL. attempts to give a complete and consistent narrative in more polished form. In ancient times there were doubtless other versions now lost, but from the middle of the 12th century the scribes seem to have taken few liberties with the text, whilst previously the filid were constantly transforming the material and adding fresh matter. The YBL. version preserves a number of forms as old as the O. Ir. glosses (i.e. 8th century or earlier), and a curious story contained in LL. seems to point to the fact that the Tdin was first committed to writing in the 7th century. Senchan Torpeist, who lived in the first half of the 7th century and succeeded Dalian Forgaill as chief ollam of Ireland, summoned the filid to inquire which of them knew the Tdin in its entirety. As they were only familiar with fragments he despatched them to discover it. One of them seated himself at the grave of Fergus MacRoig, who appeared to him in a mist and dictated the whole story to him in three days and three nights.

At this point it will be well to say a few words about the form of the Tdin. The old Irish epic is invariably in prose with poems of varying length interspersed. The narrative and descriptive portions are in prose and are frequently followed by a brief epitome in verse. Dialogues, eulogies and laments also appear in metrical form. The oldest poems, termed rhetoric, which are best represented in LU., seem to be declamatory passages in rhythmical prose, not unlike the poetical passages in the Old Testament, and the original Tdin may have consisted of such rhetorics bound together with short connecting pieces of prose. At a later date poems were inserted in the metres of the filid (particularly the quatrain of four heptasyllabic lines) which Thurneysen and Windisch consider to have been developed out of medieval Latin verse. When in course of time the old rhetorics became unintelligible they were often omitted altogether or new poems substituted. Thus the LL. version contains a larger number of poems than the LU.-YBL. copy, whilst LU. preserves a number of rhetorics which do not appear in the later MS. The prose portions in LU. are very poor from a literary point of view. These passages are abrupt, condensed and frequently obscure, with no striving after literary effect such as we find in LL. The form in which many episodes are cast is not unlike a mnemonic, leaving

the story-teller to fill in the details himself. In the nth century certain portions of the theme possessing great human interest were vastly extended, new poems were added, and in this manner such episodes come to form sagas complete in themselves. The most notable instance of this is the " Fight with Fer Diad," which is not contained in LU. The genesis of the Tdin may thus be briefly summarized as follows. The story was first committed to writing in the 7th or 8th century, after which it was worked up by the filid. Extended versions existing in the 10th or nth century form the basis of the copies we now possess.

Though the sagas of the Ulster cycle are eminently Irish and pagan in character and origin, it cannot be denied that traces of foreign influence are to be observed. A number of Latin and Norse loan-words occur in them, and there can be little doubt that the monkish scribes consciously thrust the supernatural element into the background. However, although figures of Vikings are unmistakable in a few cases, and in one story Cuchulinn is made to fight with Hercules, such foreign elements can easily be detected in the older tales. They only affect minor details, and do not influence the body of the romances.

From what we have already said it will be plain that the Irish epic is in a fluid state. The Tdin is of interest in che history of literature as representing the preliminary stage through which the great verse epics of other nations have had to pass, but its

value as a work of art is limited by its form. We must now say a few words about the character and style of these romances. As already stated, the atmosphere is frankly pagan and barbaric, with none of that courtly element which we find in the Arthurian epics. The two features which strike one most forcibly in the medieval Irish romances are dramatic force and humour. The unexpected and weird is always happening, the effect of which is considerably heightened by the grim nature of the actors. In particular the dialogues are remarkably brilliant and clever, and it is a matter for surprise that this gifted race never developed a drama of its own. This is doubtless partly due to the political conditions of the island. And, moreover, we are constantly struck

by the lack of sustained effort which prevented the filid from producing great epics in verse. Dramatic material is abundantly present in the old epics, but it has never been utilized. As one might expect from the vernacular literature of Ireland, these romances are pervaded by a keen sense of humour. We feel that the story-teller is continually expecting a laugh and he exaggerates in true Irish fashion, so that the stories are full of extravagantly grotesque passages. In the later LL. version we notice a tendency to linger over pathetic situations, but this is unknown in the earlier stage. Perhaps the most serious defect of all Irish literary products is the lack of any sense of proportion, which naturally goes hand in hand with the love of the grotesque. Far too much attention is paid to trivial incidents and minute descriptions, however valuable the latter may be to the anti- quarian, to the detriment of the artistic effect. Further, the story-teller does not know when to stop. He goes meandering on long after the main portion of the story is finished, with the result that Irish romances are apt to end in a most uninteresting anticlimax. Finally we are wearied with a constant repetition of the same epithets and similes, and with turgid descriptions; even the grotesque exaggerations pall when we find them to be stereotyped. But the early epics do not offend our sense of propriety in expression to the same extent as the later Finn cycle. The Tdin B6 Cualnge formed a kind of nucleus round which a number of other tales clustered. A number of these are called remscSla or introductory stories to the Tdin. Such are the ” Revealing of the Tain ” (already mentioned), the ” Debility of the Ultonians ” (giving the story of the curse), ” The Cattle- Driving of Regamon, Dartaid and Flidais,” ” Tdin bd Regamna,” “The Cattle-Driving of Fraech,” “The Dispute of the Swine- herds,” telling the previous history of the Bulls, ” The Capture of the Fairy Mound,” ” The Dream of Mac 6c,” the ” Adventures of Nera,” the ” Wooing of Ferb.” Other stories form a kind of continuation of the Tdin. Thus the ” Battle of Rosnaree ” (” Cath Ruis na Rig “) relates how Conchobar, as a result of the loss of the Bull, sends an army against the kings of Leinster and Tara, and would have been routed but for the prowess of Cuchu- linn. The ” Great Rout of the Plain of Murthemne ” and ” Cuchulinn’s Death ” tell how the hero’s downfall is compassed by a monstrous brood of ill-shapen beings whose father and brothers had been slain by him during the Tdin. He finally meets with his end at the hands of Lugaid, son of Cur6i mac Daire (the central hero of a Munster cycle which has not come down to us), and Ere, king of Tara. We are also told of the terrible vengeance taken

on the murderers by Conall Cernach. Other stories deal with the " Conception of Conchobar," the " Conception of Cuchulinn," " The Glories of Conchobar's Reign," with an account of how he acquired the Throne from Fergus, " The Wooing of Emer and the Hero's Education in Scotland under Scathach," " The Siege of Howth," " Bricriu's Feast and the Exile of the Sons of Doel Dermait," " The Battle of the Boyne " (Eriu, vol. ii.), " The Deaths of Mill, Medb and Conall Cernach," " Destruction of Bruden Da Choca," " The Tragical Death of Conlaech at the hands of Cuchulinn his father," " The Deaths of Goll and Garbh," " The Sickbed of Cuchulinn," in which the hero is lured away for a time into the invisible land by' a fairy, Fand, wife of Manandan, " The Intoxication of the Ultonians," telling of a wild raid by night across the entire extent of the island from Dun-da-Benn near Coleraine to the fort of Cur6i MacDaire at Temair-Luachra in Kerry, " The Death of

Conchobar," " The Phantom Chariot of Cuchulinn," in which the hero is brought up from the grave to witness before St Patrick and King Loigaire to the truth of the Christian doctrine.

Four other stories in connexion with the Ulster cycle remain to be mentioned. The first is " Seel mucci Mate Datho " (" The Story of MacDatho's Pig ") . Various writers of antiquity inform us that at the feasts of the Gauls the champion received the best portion of meat, which frequently led to brawls. In this savage but picturesque Irish story we find the Ulstermen vaunting their achievements against the Connaughtmen, until at last the contest lies between Conall Cernach and Cet MacMagach. Nowhere, perhaps, is the dramatic element better brought out.

Apart from the Tdin the greatest and at the same time the longest saga in which Cuchulinn figures is Fled Bricrend (Bricriu's Feast). Bricriu is the mischief-maker among the Ulstermen, and he conceives the idea of building a banqueting hall in order to invite Conchobar and his nobles to a feast. After much hesita- tion they consent. Bricriu in turn incites the three chief heroes, Cuchulinn, Conall Cernach and Loigaire Buadach, to claim the champion's portion. He does the same thing with the spouses of the three warriors, who declaim in obscure verse the achieve- ments and excellences of their several husbands in a passage entitled the " Women's War of Words." Loosely attached to this story follows a wild series of adventures in which the powers of the three champions are tested, Cuchulinn always proving his superiority. In order to decide the dispute, visits are paid to Medb at Rath

Cruachan and to Cur6i in Kerry, and the story ends with the " beheading incident," which occurs in the romance of " Sir Gawayne and the Green Knight." Fled Bricrend presents a number of textual difficulties. The text of the oldest MS. (LU.) shows signs of contamination, and several versions of the story seem to have been current.

But the story of the Ulster cycle which is better known than any other, is the story of the " Tragical Death of the Sons of Usnech, or the Life and Death of Deirdre," one of the " Three Sorrows of Story-telling." This is the only tale of the group which has survived in the minds of the common people down to the present day. It is foretold of Deirdre, a girl-child of great beauty, that she will be the cause of great misfortunes, but Conchobar, having lost his wife, determines to have her brought up in solitude and marry her himself. However, the maiden chances to see a noble youth'named Naisi, one of the three sons of Usnech, and persuades him to carry her off to Scotland, where they live for many years. At length they are induced to return after several of the most prominent Ulster warriors have gone bail for their safety. But Conchobar resorts to treachery, and the three sons of Usnech are slain, whilst the account of Deirdre's end varies. The oldest version of the story is found in LL., and the characters are as rugged and unsophisticated as those of the Tdin. But in the later versions the savage features are toned down.

Before passing on, we must mention several old stories which are independent of the Ulster cycle, but which deal with events which are represented as having taken place before the Christian era. Few of the old romances deal directly with what we may call Irish mythology. The " Battle of Moytura " tells of the tremendous struggle between the Tuatha De Danann and their enemies, the Fomorian pirates. Connected with the events of this saga is the story of the " Tragic Deaths of the Sons of Tuirenn," which, though mentioned in Cormac's glossary, is not found in any MS. older than the 18th century. The three sons of Tuirenn have slain Cian, father of Lug Lamfhada, who lays upon them a huge eric-fine. They go through terrific ordeals and accomplish their task, but return home to die. This is the second of the " Three Sorrows of Story- telling." An old story dealing with Tuatha De Danann personages, but having a certain bear- ing on the Cuchulinn cycle, is the " Courtship of Etain," who, though of supernatural (sid) birth, is wedded to Eochaid Airern, a mortal king. In her previous existence she was the wife cf the supernatural personage Midir of Bri-leith, who wins back Etain

from her mortal husband in a game of chess and carrie i her off to his fairy mound.

For sake of completeness we may add the titles of two other

well-known stories here. The one is the ” Story of Baile the Sweet-spoken,” which tells of the deaths of two lovers for grief at the false tidings of each other’s death. The other is the ” Fate of the Children of Lir,” the third of the ” Three Sorrows of Story-telling,” which is only known in a modern dress. It relates how the four daughters of Lir (father of the sea-god Manandan and the original of Shakespeare’s Lear) were changed into swans by a cruel stepmother, and how, after goo years of wandering on the ocean, they at length regain their human form through the instrumentality of St Mochaomhog.

A large number of sagas, which claim to be founded ©n historical events, present a great similarity to the tales of the Ulster cycle. Most of them are mentioned in the old catalogues. We can only name the more important here. The ” Destruction of Dind-Rig and Exile of Labraid Loingsech ” relates how the kingdom of Leinster was snatched by one brother from another in the 6th century B.C., and how the son of the murdered prince with the aid of a British force sacked Dind-Rig, the fortress of the usurper. The story of the visit of the pigmies to the court of Fergus MacLeite, king of Ulster in the 2nd century B.C., is only contained in a 15th-century MS. This tale is commonly stated to have given Swift the idea of his Gulliver’s Travels to Lilliput. ” Caithreim Chonghail Claringnigh,” which only occurs in a modernized 17th-century version, deals with a revolution in the province of Ulster, supposed to have taken place before the Christian era.

The most important Old Irish saga after the Tain is beyond doubt the Destruction of Dd Derga’s Hostel, contained in LU. It deals with events in the reign of the High-King Conaire Mor, who is said by the annalists to have been slain in 43 B.C. after a reign of seventy years. Conaire, who was a descendant of the Etain mentioned above, was a just ruler, and had banished among

other lawless persons his own five foster brothers. These latter devoted themselves to piracy and made common cause with one Ingcel, a son of the king of Britain, who had been out- lawed by his father. The high-king was returning from Co. Clare when he found the whole of Meath in flames. He turned aside into Leinster and made for Da, Derga's hostel. The pirates perceive this, and Ingcel is sent to spy out the hostel and discover the size of Conaire's force. This gives the story- teller a chance for one of those lengthy minute descriptions of persons in which his soul delighted. This catalogue occupies one-half of the whole story. The pirates make their attack, and the king and most of his followers are butchered.

We can do no more than enumerate the titles of other historical tales: The " Destruction of the Hostel of MacDareo," describing the insurrection of the Aithech-Tuatha (1st century a.d.), " The Expulsion of the Deisi " and the " Battle of Mag Lemna " (2nd century a.d.), "Battle of Mag Mucrime" (a.d. 195 or a.d. 218), " Siege of Drom Damgaire " (3rd century), " Adventures of the Sons of Eochaid Muigmedoin, father of Niall N6igiallach " (4th century), "Death of Crimthann" (reigned 366-378), "Death of Dathi " (d. 428), " Death of Murchertach, son of Ere," and " Death of Diarmait, son of Cerball " (6th century) " Wooing of Becfola, who became the wife of Diarmait, son of Aed Slane " (reigned 657-664), " Battle of Mag Rath " (637), " Battle of Cam Conaill" ic. 648), "Death of Maelfothartaig MacRonain " (7th century), who was a kind of Irish Hippolytus, " Battle of Allen " (722).

It will be well to deal here with another class of story in its various stages of development. We have seen that in the older romances there is a close connexion between mortals and super-natural beings. The latter are represented as either inhabiting the sid mounds or as dwelling in islands out in the ocean, which are pictured as abodes of bliss and variously called Mag Mell (Plain of Delight), Tir na n-Oc (Land of Youth) and Tir Tairngiri (Land of Promise). The visits of mortals to the Irish Elysium form the subject of three romances which we must now examine. The whole question has been exhaustively dealt with by Kuno Meyer and Alfred Nutt in the Voyage of Bran (London, 1895- 1897). Condla Caem, son of Conn Cetchathach, was one day seated by his father on the hill of Usnech, when he saw a lady in

strange attire approaching invisible to all but himself. She describes herself, as coming from the " land of the living," a place of eternal delight, and invites the prince to return with her.

Conn invokes the assistance of his druid to drive away the strange visitor, who in parting throws an apple to Condla. The young man partakes of no food save his apple, which does not diminish, and he is consumed with longing. At the end of a month the fairy-maiden again makes her appearance. Condla can hold out no longer. He jumps into the damsel's skiff of glass. They sail away and were seen no more. This is the Imram or Adventure of Condla Caem, the oldest text of which is found in LU. A similar story is entitled Imram Brain maic Febail, contained in YBL. and Rawlinson B 512 (the, end also occurs in LU.), only with this difference that Bran, with twenty-seven companions, puts to sea to discover tir na mban (the land of maidens). After spending some time there, one of his comrades is seized with home-sickness. They return, and the home-sick man, on being set ashore, immediately turns to dust. A later story preserved in BB., YBL. and the Book of Fermoy, tells of the visit of Cormac, grandson of Conn Cetchathach, to Tir Tairngiri. These themes are also worked into tales belonging to the Ossianic cycle, and Finn and Ossian in later times become the typical warriors who achieve the quest of the Land of Youth. The romances we have just mentioned are almost entirely pagan in character, but a kindred class of story shows us how the old ideas were transformed under the influence of Christianity. A typical instance is Imram curaig Maelduin, contained in YBL. and in part in LU. Maelduin constructs a boat and sets out on a voyage with a large company to discover the murderer of his father. This forms the framework of the story. Numerous islands in the ocean are visited, each containing some great marvel. Imram ua Corra (Book of Fermoy) and Imram Snedgusa ocus Mac Riagla (YBL.) contain the same plan, but in this case the voyage is undertaken as an expiation for crime. In the nth century an unknown monkish writer compiled the Navigatio S. Brendani, drawing the material for his episodes from Imram curaig Mael- duin. This famous work only appears in an Irish dress in a confused and disconnected " Life of St Brendan " in the Book of Lismore. The same MS. contains yet another voyage, the " Adventure of Tadg MacCein."

We must now turn our attention to the later heroic cycle, commonly called the Fenian or Ossianic. Unfortunately the origin of the stories and poems connected with Finn and his warriors is obscure, and scholars are by no ossianic* means agreed over the question (see Finn Mac Cool), cycle. In the earlier cycle the figures and the age in which they live are sharply drawn, and we

can have no hesitation in assuming that the Tdin represents in the main the state of Ireland at the beginning of the Christian era. Finn and his companions are nebulous personages, and, although it is difficult to discover the actual starting-point of the legend, from the 12th century onwards we are able to trace the development of the saga with some degree of certainty. A remarkably small amount of space is devoted to this cycle in the oldest MSS. Of the 134 pages contained inLU. only half-a-dozen deal with Finn as against 58 with Cuchulinn. In LL. the figures are, Ulster cycle 100 pp., Ossianic 25 pp., the latter being mainly made up of short ballads, whilst in 15th-century MSS., such as the Book of Lismore and Laud 610, the proportion is overwhelmingly in favour of the later group. Again in Urard MacCoisi's list of tales, which seems to go back to the 10th century, only two appear to deal with subjects taken from the Ossianic cycle. In the first instance Finn seems to have been a poet, and as such he appears in the 12th-century MSS., LU. and LL. Thus the subjects of the Ossianic cycle in the earliest MSS. appear in a new dress. The vehicle of the older epic is prose, but the later cycle is clothed in ballad form. Of these ballads about a dozen, apart from poems in the Dindsenchus are preserved in LU., LL. and YBL., and none of these poems are probably much older than the nth century. In the commentary to the Amra of Columbkille a beautiful poem on winter is attributed to Finn. At the same time we do find a few prose tales, e.g. " Fotha catka

Cnucha " in LU., describing the death of Cumall, Finn's father, and in LL. and Rawlinson B 502, part of which Zimmer assigns to the 7th century, we have the first story in which Finn actually occurs. But it is remarkable that in no case do tales belonging to the Finn cycle contain any of the old rhetorics which occur in the oldest of the Ulster romances. Already in LL., by the side of Finn, Ossian, Cailte and Fergus Finnbel are represented as poets, and the strain of lament over the glories of the past, so characteristic a feature of the later developments of the legend, is already sounded. Hence by the 1 2th century the stories of the Fiann and their destruction at the battle of Gabra must have been fully developed, and from this time onward they appear gradually to have supplanted the Cuchulinn cycle in popular favour. Several

reasons have been assigned for this. In the first place until the time of Brian Boroime the high-kings of Ireland had almost without exception been drawn from Ulster, and consequently the northern traditions were pre-eminent. This exclusiveness on the part of the north was largely broken down by the Viking invasions, and during the nth century the leading poets were attached to the court of Brian and his descend- ants. In this manner an opportunity was afforded to the Leinster-Munster Fenian cycle to develop into a national saga. John MacNeill has pointed out Finn's connexion with a Firbolg tribe, and maintains that the Fenian cycle was the property of the subject race. Zimmer has attempted to prove with great plausibility that Finn and his warriors were transformed on the model of the Ulster heroes. Thus one text deals with the boyish exploits of Finn in the manner of Cuchulinn's youthful feats recorded in the Tdin. And it is possible that the Siaburcharpat Conchulainn gave rise to the idea of connecting Ossian and Cailte with Patrick. As Cuchulinn was opposed to the whole of Ireland in the Tdin, so Finn, representing Ireland, is pitted against the whole world in the Battle of V entry.

We have already stated that the form assumed by the stories connected with Finn in the earliest MSS. is that of the ballad, and this continued down to the 18th century. But here again the Irish poets showed themselves incapable of rising from the ballad to the true epic in verse, and in the 14th century we find the prose narrative of the older cycle interspersed with verse again appearing. The oldest composition of any length which deals with the Ossianic legends is the Acallam na Sendrach or Colloquy of the Old Men, which is mainly preserved in three 15th-century MSS., the Book of Lismore, Laud 610 and Rawlin- son 487. In this text we have the framework common to so much of the later Ossianic literature. Ossian and Cailte are represented as surviving the battle of Gabra and as living on until the time of Patrick. The two warriors get on the best of terms with the saint, and Cailte is his constant companion on his journey through Ireland. Patrick inquires the significance of the names of the places they visit, and Cailte recounts his reminiscences. In this manner we are given nearly a hundred stories, the subjects of some of which occur in the short ballads in older MSS., whilst others appear later as independent tales. A careful comparison of the Acallam with the Cuchulinn stories, whether from the point of view of civilization or language or art, discloses that the first lengthy composition of the Ossianic cycle is but a feeble

imitation of the older group. All that had become unintelligible in the Ulster stories, owing to their primi- tive character, is omitted, and in return for that the reminiscences of the Viking age play a very prominent part.

With the 1 6th century we reach the later treatment of the legend in the Battle of V entry. In this tedious story Daire, the king of the whole world, comes to invade Ireland with all his forces, but is repulsed by Finn and his heroes. The Battle of Venlry, like all later stories, is a regular medley of incidents taken from the writers of antiquity and European medieval romance. The inflated style to which the Irishman is so prone is here seen at its worst, and we are treated to a nauseous heaping up of epithet upon epithet, e.g. we sometimes find as many as twenty-seven adjectives accompanying a substantive running in alliterating sets of three.

Of greater literary interest are the later ballads connected with

Finn and Ossian. The latter has become the typical mouthpiece of the departed glory of the Fenian warriors, and Nutt has pointed out that there is a striking difference in spirit between the Acallam na Sendrach and the isth-i6th century poems. In the latter Ossian is represented. as a ” pagan, defiant and reckless, full of contempt and scorn for the howling clerics and their churlish low-bred deity,” whilst Patrick is a sour and stupid fanatic, harping with wearisome monotony on the damnation of Finn and all his comrades. The earliest collection of these later Ossianic poems is that made in Scotland by James Mac- gregor, dean of Lismore, early in the 16th century. Another miscellany is the Duanaire Finn, a MS. in the Franciscan monastery in Dublin, compiled from earlier MSS. in 1627. This ” song-book,” which has been edited for the Irish Texts Society by John MacNeill (part i. 1908), contains no less than sixty-nine Ossianic ballads, amounting in all to some ten thousand lines. Other Ossianic poems of dates varying from the 15th to the 18th century have been published in the Transactions of the Ossianic Society (Dublin, 1854-1861), including amongst others “The Battle of Gabhra,” ” Lamentation of Oisin (Ossian) after the Fenians,” ” Dialogue between Oisin and Patrick,” ” The Battle of Cnoc an Air,” and ” The Chase of Sliabh Guilleann.” These ballads still survive amongst the peasants at the present day. We further possess a number of prose romances, which in their present form date from the 16th to the 18th century; e.g. The Pursuit of Diarmaid and Grdinne, Finn and Grdinne, Death of Finn, The

Clown in the Drab Coat, Pursuit of the Gilla Decair, The Enchanted Fort of the Quicken-tree, The Enchanted Cave of Ceis Corann, The Feast in the House of Conan.

At the present moment it is impossible to give a complete survey of the other branches of medieval Irish literature. The attention of scholars has been largely devoted to the publication of the sagas to the neglect of other portions of the wide field. An excellent survey of the subject is given by K. Meyer, Die Kultur der Gegen- wart, i. xi. I. pp. 78-95 (Berlin-Leipzig, 1909).

We have already pointed out that as early as the Old Irish; period nameless Irish poets were singing the praises of nature in a strain which sounds to our ears peculiarly modern. At the present time it is difficult to say how much of what is really poetic in Irish literature has come down to us. Our MSS. preserve whole reams of the learned productions of the filid which were so much prized in medieval Ireland, but it is, generally speaking, quite an accident if any of the delightful little lyrics entered in themargins or on blank spaces in the MSS. have remained. The prose romances sometimes contain beautiful snatches of verse, such as the descriptions of Mag Mell in Serglige Conculaind, Tochmarc Etdine, and the Voyage of Bran or the Lament of Cuchulinn over Fer Diad. Mention has also been made of the exquisite nature poems ascribed to Finn, which have been collected into a pamphlet with English renderings by Kuno Meyer (under the title of " Four Old Irish Songs of Summer and Winter," London, 1903). The same writer points out that the ancient treatise on Irish prosody published by Thurneysen contains no less than 340 quotations from poems, very few of which have been preserved in their entirety. To Meyer we also owe editions of two charming little texts which sufficiently illustrate the lyrical powers of the early poets. The one is a poem referred to the 10th century in the form of a colloquy between Guaire of Aidne and his brother Marban. Guaire inquires of his brother why he prefers to live in a hut in the forest, keeping the herds and swine of the king, to dwelling in the king's palace. The question calls forth so wonderful a description of the delights of nature as viewed from a shieling that Guaire exclaims, " I would give my glorious kingship to be in thy company, Marban " {King and Hermit, ed. with trans, by K. Meyer, London, 1901). Another text full of passionate emotion and tender regret ascribed to the 9th century tells of the parting of a young poet and poetess, who after plighting their troth are separated for ever (Liadain and Curithir, ed. with trans, by K. Meyer, London, 1902). In the Old Woman of

Beare (publ. K. Meyer in Otia Merseiana) an old hetaira laments her departed youth, comparing her life to the ebbing of the tide (10th century).

Nature poetry.

We must now step aside from pure literature and turn our attention to the various productions of the professional learned classes of Ireland during the middle ages. The range of subjects coming under this heading is a very wide one, comprising history, genealogies, hagiology, topography, grammar, lexicography and metre, law and medicine. It will perhaps be as well first of

all to deal with the learned filid whose works have p ” >,es ‘ been preserved. Irish tradition preserves the names literatures of a number of antiquarian poets of prehistoric or

early medieval times, such as Amergin, one of the Milesian band of invaders; Moran Roigne, son of Ugaine M6r, Adna and his successor Ferceirtne, Torna (c. 400), tutor to Niall Noigiallach, Dalian Forgaill, Senchan Torpeist, and Cennfaelad (d. 678), but the poems attributed to these writers are of much later date. We can only enumerate the chief of those whose works have been preserved. To Maelmura (d. 887) is attributed a poem on the Milesian migrations. About the same time lived Flanagan, son of Cellach, who wrote a long composition on the deaths of the kings of Ireland, preserved in YBL., and Flann MacLonain (d. 918), called by the Four Masters the Virgil of Ireland, eight of whose poems have survived, containing in all about 1000 lines. Cormacan, son of Maelbrigde (d. 946), com- posed a vigorous poem on the circuit of Ireland performed by Muirchertach, son of Niall Glundub. A poet whose poems are most valuable from an antiquarian point of view is Cinaed Ua h-Artacain (d. 975). Some 800 lines of his have been preserved in LL. and elsewhere. Contemporary with him is Eochaid O’Flainn (d. c. 1003), whose chief work is a long chronological poem giving a list of the kings of Ulster from Cimbaeth down to the destruction of Emain in 33 1 . A little later comes MacLiac (d. 1016), who celebrated in verse the glories of the reign of Brian Boroime. His best-known work is a lament over Kincora, the palace of Brian. Contemporary with

MacLiac is MacGilla Coim Urard MacCoisi (d. 1023). To CuanuaLothchain(d. 1024), chief poet in the reign of Maelsheachlainn II., are ascribed poems on the antiquities of Tara. Sixteen hundred lines of his have come down to us. A writer who enjoyed a tremendous reputation in medieval Ireland was Flann Mainstrech (d. 1056), who in spite of his being a layman was head of the monastery school at Monaster- boice. He is the author of no fewer than 2000 lines in LL., and many other poems of his are contained in other MSS. His best- known work is a Book of Synchronisms of the kings of Ireland and those of the ancient world. We have also poems from his pen on the monarchs descended from Niall N6igiallach and on the chronology of the high-kings and provincial kings from the time of Loigaire. Flann's successor, Gilla Coemgin (d. 1072), gives us a chronological poem dealing with the annals of the world down to a.d. 1014. He also is the author of the Irish version of Nennius which contains substantial additions dealing with early Ireland. Minor writers of the same nature whose works have come down to us are Colman O'Sesnain (d. 1050), Neide ua Maelchonaire (d. 1136), Gilla na noem ua Duinn (d. 1160), Gilla Moduda O'Cassidy (1143). In the 13th century these historical poems become very rare. In the next century we again find anti- quarian poets of whom the best-known is John O'Dugan (d. 1372). His most valuable "composition treats of the tribes of the northern half of Ireland at the time of the northern con- quest. This work, containing 1660 lines in all in debide metre, was completed by his younger contemporary Gilla na naem O'Huidhrin. From the beginning of the 13th century the official poets began to give way to the hereditary bards and families of scribes. Among the chief bardic families we may mention the O'Dalys, the MacWards, the O'Higinns, the MacBrodys and the MacDaires. We must here content ourselves with glancing at a few of the more prominent names. Muiredach Albanach (c. 1214-1240), whose real name was O'Daly, has left behind in addition to the religious verses a considerable number of poems in praise of various patrons in Ireland and Scotland. He is said by Skene to be the first of the Macvurrichs, bards to Macdonald of Clanranald. A number of his compositions are preserved in the Book of the Dean of Lismore. Gilla Brigde Mac- Conmidhe was a contemporary of the last-mentioned bard. He

wrote a number of poems in praise of the O'Neills and O'Donnells. We may next mention the name of an abbot of Boyle, Donn- chad Mor O'Dilaig (d. 1244), a writer whose extant poems

are usually of a religious character. Many of them are addressed to the Virgin. Most of them appear in late MSS., but some few are preserved in the Book of the Hy Maine. Donnchad Mor is said to be the greatest religious poet that Ireland has produced. Many other members of the O'Daly family belonging to the 14th and 15th centuries have left poems behind them, but we cannot mention them here. Angus O'Daly, who lived in the second half of the 16th century, was employed by the English to satirize the chief Gaelic families in Ireland. Two members of the O'Higinn family deserve mention, Tadg mor O'Higinn (d. 1315),. and Tadg Og O'Higinn (d. 1448), a voluminous writer who eulogized the O'Neills, O'Connors and O'Kellys. Tadg Og also composed a number of religious poems, which enjoyed enormous popularity in both Ireland and Scotland. A duanaire was inserted into YBL., which contains some forty poems by him.

Closely connected with the compositions of the official poets are the works of native topography. Most of the sagas contain a number of explanations of the origins of place-names. The Dindsenchus is a compilation of such etymologies. But its chief value consists in the amount of legendary matter it contains, adduced in support of the etymologies given. The Dindsenchus has come down to us in various forms both in prose and in verse. Irish tradition ascribes it to Amergin MacAmalgaid, who lived in the 6th century, but if the kernel of the work goes back as early as this it must have been altered considerably in the course of the centuries. Both prose and verse forms of it are contained in LL. A kindred compilation is the Cdir Anmann (Fitness of Names), which does for personal names what the Dindsenchus does for geographical names. We further possess a versified compendium of geography for educational purposes dealing with the three continents, from the pen of Airbertach MacCosse-dobrain (10th century).

No people on the face of the globe have ever been more keenly interested in the past of their native country than the Irish. This will already have been patent from the com- positions of the filid, and now we may describe briefly the historical works in prose which have come down to us. The latter may be divided into two classes, (1) works containing a connected narrative, (2) annals. Closely allied to these are the sagas dealing with the high-kings. Even in the serious historical compositions we often find the manner of the sagas imitated, e.g. the supernatural plays a prominent part, and we are treated to the same exaggerated descriptions. The earliest of these histories is the wars of the Gael

and Gall (Cogad Gaedel re Gallaib), which gives an account of the Viking invasions of Ireland, the career of Brian Boroime and the overthrow of the Norsemen at the battle of Clontarf. This composition, a portion of which is contained in LL., is often supposed to be in part the work of MacLiac, and it is plain from internal evidence that it must have been written by an eye-witness of the battle, or from materials supplied by a person actually present. Numerous shorter tracts dealing with the same period exist, but as yet few of them have been published. Caithreim Cellachdin Caisil treats of the conflicts between the Vikings and the Irish, and the Leabhar Oiris gives an account of Irish history from 979 to 1027. Compilations relating to local history are the Book of Fenagh and the Book of Munster. Another ancient work also partly preserved in LL. is the Book of Invasions (Leabhar Gabhdla). This deals with the five prehistoric invasions of Ireland (see Ireland: Early History) and the legendary history of the Milesians. The most complete copy of the Leabhar Gabhdla which has been preserved was compiled by Michael O'Clery about 1630. The Boroma or History of the Leinster Tribute contained in LL. belongs rather to romance. Another history is theTriumphs of Turlough 0′ Brian, written about the year 1459 by John MacCraith, a Munster historian (edited by S. H. O'Grady, Camb. Press). This inflated composition is an important source of information on Munster history from the landing of the Normans to the middle of the 14th century. We also possess

History.

several documents in Irish concerning the doings of the O'Neills and O'Donnells at the close of the 16th century. A life of Hugh Roe O'Donnell, by Lughaidh O'Clery, has been published, and a contemporary history of the Flight of the Earls, by Tadhg O'Cianan, was being prepared in 1908. But the most celebrated Irish historian is certainly Geoffrey Keating (c. 15 70- 1646), who is at the same time the greatest master of Irish prose. Keating was a Munster priest educated in France, who drew down upon himself the displeasure of the English authorities and had to go into hiding. He travelled up and down Ireland examining all the ancient records, and compiled a history of Ireland down to the

Norman Conquest. His work, entitled Forus Feasa ar Eirinn, was never published, but it circulated from end to end of Ireland in MS. Keating's history is anything but critical. Its value for the scholar lies in the fact that the author had access to many important sources of information now lost, and has preserved accounts of events independent of and differing from those contained in the Four Masters. In addition to the history and a number of poems, Keating is also the author of two theo- logical works in Irish, the Defence of the Mass (Eochairsgialh an Aifrinn) and a collection of sermons entitled the Three Shafts of Death (Trl biorghaoithe an Bhdis), which are models of Irish prose.

From the writers of historical narrative we turn to the annalists, the most important sources of information with regard to Irish history. We have already mentioned the Synchronisms of Flann Mainistrech. Apart from this work the earliest collection of annals which has come down to us is the compilation by Tigernach O'Braein (d. 1088), abbot of Clonmacnoise. Tigernach, whose work is partly in Latin, partly in Irish, states that all Irish history previous to 305 B.C. is uncertain. No perfect copy is known of this work, but several fragments are in existence. The Annals of Innisf alien (a monastery on an island in the Lower Lake of Killarney), which are also in Latin and Irish, were perhaps compiled about 1215, though they may have begun two centuries earlier. The invaluable A nnals of Ulster were compiled on Belle Isle on Upper Lough Erne by Cathal Maguire (d. 1498), and afterwards continued by two different writers down to 1604. This work, which deals with Irish affairs from a.d. 431, exists in several copies. The Annals of Loch CS (near Boyle in Ros- common) were copied in 1588 and deal with Irish events from 1014 to 1636. The Annals of Connaught run from 1224 to 1562. The Chronicon Scotorum, one copy of which was transcribed about 1650 by the famous antiquary Duald MacFirbis, deals with Irish affairs down to 1135. The Annals of Boyle extend down to 1253. The Annals of Clonmacnoise, which come down to 1408, only exist in an English translation made by Connell MacGeoghegan in 1627. The most important of all these col- lections is the Annals of the Four Masters (so christened by Colgan), compiled in the Franciscan monastery of Donegal by Michael, Conary and Cucogry O'Clery and Ferfesa O'Mulconry. The O'Clerys were for a long period the hereditary ollams to the O'Donnells. Michael O'Clery (1 575-1643), the greatest of the four, was a lay brother in the order of St Francis, and devoted his whole life to the history of Ireland. He collected all the historical

MSS. he could find, and was encouraged in his under- taking by Fergal O'Gara, prince of Coolavin, who paid all ex- penses. The great work, which was begun in 1632 and finished In 1636, begins with the arrival in Ireland of Ceasair, grand- daughter of Noah, and comes down to 16 16. Nearly all the materials from which O'Clery drew his statements are now lost. O'Clery is also the author of a catalogue of the kings of Ireland, the genealogies of the Irish saints, and the Martyrology of Donegal and the Book of Invasions.

Of less interest, but every whit as important, are the lists of genealogies which occupy a great deal of space in LL., YBL. and BB., and two Trinity College, Dublin, MSS. (H. 3. 18 and H. 2. 4). But by far the most important collection of all is that made by the last great shanachie Duald MacFirbis, compiled between 1650 and 1666 in the college of St Nicholas at Galway. The only portions of any considerable length which have as yet been published deal with two Connaught tribes, viz. the Hy Fiachrach from Duald mac Firbis and the Hy Maine (O'Kellys),

and a Munster tribe, the Corcalaidhe, both from YBL. Valuable information with regard to early Irish history is often contained in the prophecies or, as they are sometimes termed, Baile {raptures, visions), a notable example of which is Baile in Scdil (Vision of the Phantom).

When we turn from secular to religious themes we find that Ireland is also possessed of a very extensive Christian literature, which is extremely valuable for the comparative study of medieval literature. Apart from the martyrologies atenSire. already mentioned in connexion with Oengus the Culdee, a number of lives of saints and other ecclesiastical literature have come down to us. One of the most important documents is the Tripartite Life of St Patrick, which cannot very well have been composed before the 10th or nth century, as it is full of the extravagant miracles which occur in the later lives of saints. The work consists of three separate homilies, each complete in itself. A later version of the Tripartite Life was printed by Colgan in 1647. The Leabhar Breac contains a quantity of religious tracts, most of which have been published. R. Atkinson issued a number of them under the title of Passions and Homilies from Leabhar Breac (Dublin, 1887). These are not original Irish compilations, but translations from Latin lives of saints. Nor do they deal with the lives of any Irish saints. Stokes has published nine lives of Irish saints from the Book of Lismore, including Patrick, Brigit,

Columba, Brendan, Findian (Clonard), Ciaran, Senan, Findchua and Mochua. They are written in the form of homilies preceded by short explanations of a text of scripture. These lives also occur in the Leabhar Breac. Other lives of saints have been published by O'Grady in Silva Gadelica. The longest life of St Columba was compiled in 1536 at the command of Manus O'Donnell. This tedious work is a specimen of hagiology at its worst. The Leabhar Breac further contains a number of legends, such as those on the childhood of Christ, and scattered through many MSS. are short anecdotes of saints which are very instructive.

But the most interesting Irish religious text is the Vision of Adamnan (preserved in LU.), which Stokes assigns to the nth century. The soul of Adamnan is represented as leaving his body for a space to visit heaven and hell under the conduct of an angel. The whole treatment of the theme challenges com- parison with Dante's great poem, but the Irish composition contains many ideas peculiar to the land of its origin. Later specimens of this kind of literature tend to develop into grotesque buffoonery. We may mention the Vision of Fursae, the Vision of Tundale (Tnugdal), published by V. Friedel and K. Meyer (Paris, 1907), Laisren's Vision of Hell and the Vision of Merlino. A further vision attributed to Adamnan contains a stern de- nunciation of the Irish of the nth century. Another form of religious composition, which was very popular in medieval Ire- land, was the prophecy in verse, but scarcely any specimens have as yet been published. Kuno Meyer edited a tract on the Psalter in his Hibernica M inora from a 15th century Oxford MS., but he holds that the text goes back to 750. A number of collections of monastic rules both in prose and verse have been edited in Eriu, and the MSS. contain numerous prayers, litanies and religious poems.

In LU. are preserved two sermons, Scila na esergi (Tidings of Resurrection) and Scila Idi brdtha (Tidings of Doomsday) ; and a number of other homilies have been published, such as the "Two Sorrows of the Kingdom of Heaven," "The Penance of Adam," the "Ever-new Tongue," and one on "Mortals' Sins." All the homilies contained in LB. have been published by R. Atkinson in his Legends and Homilies from Leabhar Breac (Dublin, 1887), and E. Hogan, The Irish Nennius (Dublin, 1895). The popular " Debate of the Body and the Soul " appears in Ireland in the form of a homily. A collection of maxims and a short moral treatise have been published by K. Meyer.

For the religious literature in general the reader may refer to O'Curry, Lectures on the MS. Materials of Ancient Irish History (PP- 339-434). an d G. Dottin, "Notes bibliographiques sur l'ancienne litterature chretienne de l'lrlande," in Revue d'histoire et de littera- ture religieuses, v. 162-167. See also Revue celtique, xi. 391-404. ib. xv. 79-91.

Here we may perhaps mention an extraordinary production entitled Aisling Meic Conglinne, the Vision- of Mac Conglinne, found in LB. and ascribed to the twelfth century (ed. K. Meyer, London, 1&92). Cathal MacFinguine, king of Munster (d. 737), was possessed by a demon of gluttony and is cured by the recital of a strange vision by a vagrant scholar named MacCongMnne. The composition seems to be intended as a satire on the monks, and in particular as a travesty of medieval hagiology. Another famous satire, entitled the Proceedings of the Great Bardic Institution, holds up the professional bards and their extortionate methods to ridicule. This curious work contains the story of how the great epic, the Tdin bo Cualnge, was recovered (see Transactions of the Ossianic Society, vol. v.) .

Collections of pithy sayings in the form of proverbs and maxims must have been made at a very early period. Not the least

remarkable are the so-called Triads (publ. K. Meyer, literature. Dublin, 1906), which illustrate every statement with

3 examples. Over 200 such triads were brought together in the 9th century. There are also two documents attributed to ist-century personages, " The Testament of Morann MacMoin to his son Feradach, " which is quoted as early as the 8th century, and " The Instructions of Cuchulinn to his foster-son Lugaid." K. Meyer has published Tecosca Cormaic or the Precepts of Cormac MacAirt to his son Cairpre (Dublin, 1909). Other collections such as the Senbriathra Fithail still await publication.

With that enthusiasm for the classics which is characteristic of the Irish, it is not strange that we should find medieval versions

of some of the better-known authors of antiquity. stories. ^ * s

interesting to note that only those works are

translated that could be utilized by the professional story-teller. So much so, that in the ancient (10th century) catalogue of sagas enumerated by Urard MacCoisi we find mention of Togail Troi and Scela Alexandir maic Pilip. We get descriptions of battle weapons and clothing similar to those occurring in the native sagas. Togail Troi is taken from the medieval prose version, Historia de Excidio Troiae of Dares Phrygius. The oldest Irish copy is found in LL. This version is exceedingly valuable, as it enables us to determine the meaning of words and formulas in the sagas which are otherwise obscure. An Irish abstract of the Odyssey, following an unknown source, and part of the story of Theseus have been published by K. Meyer. Scela Alexandir is preserved in LB. and BB. Imthechta Aeniusa, taken from the Aeneid, is contained in BB. A number of MSS. contain the Cath Catharda, a version of books vi. and vii. (?) of Lucan's Pharsalia, which has been published by Wh. Stokes. There is further at least one MS. containing a version of Statius's Thebaid and of Heliodorus's Aethiopica. Somewhat later, the medieval literature of western Europe comes to be represented in translations. Thus we have Irish versions, amongst others of the Gesta Romanorum, the Historia Brittonum, the Wars of Charlemagne, the History of the Lombards, Sir John Maunde- ville's Travels (trans, by Fingin O'Mahony in 1475), the Book of Ser Marco Polo (abridged), Guy Earl of Warwick, Bevis of Southampton, the Quest of ' the Holy Grail, Octavian, the chronicle of Turpin, Barlaam and Josaphat, and the story of Fierabras. The Arthurian cycle is developed in independent fashion in the Adventures of the Eagle Boy and the Adventures of the Crop-eared Dog. For translation literature see M. Nettlau, Revue celtique, x. pp. 184, 460-461.

Hand in hand with the interest of the medieval Irish scholars in the history of their island goes the cultivation of the native Philoiosy tongue. Owing to the profound changes produced by

the working of the Irish laws of accent and initial mutation, it is doubtful if any other language lends itself so well to wild etymological speculation . By the beginning of the Middle Irish period a good part of the cumbrous Old Irish verb-system had become obsolete, and texts which were at all faithfully copied had to be plentifully supplied with glosses. Moreover, if, as is probable, all the historical and legal lore was in verse, a large part of it must have been unintelligible except to those who knew the berla fine. But even before this Cormac mac

Cuillenain, the bishop-king of Cashel (d. 903), had compiled a glossary of archaic words which are accompanied by explanations, etymologies, and illustrative passages containing an amount of invaluable information concerning folk-lore and legendary history. This glossary has come down to us in various recensions all considerably later in date than the original work (the oldest copy is in LB.). Later collections of archaic words are O'Mulconry's Glossary (13th century), the Lecan Glossary (15th century), which draws principally from the glosses in the Liber Hymnorum, O'Davoren's Glossary (16th century), drawn principally from the Brehon Laws, a 16th century list of Latin and Irish names of plants employed in medicine, and O'Clery's Glossary (published atLouvain, 1643). BB. contains a curious tract on Ogamic writing. An Irish treatise on grammar, called Uraicept na n-eces, the Poet's Primer, traditionally ascribed to Cennfaelad and others, is contained in BB . and YBL. It appears to be a kind of medley of Donatus and the notions of the medieval Irish concerning the origin of their language. The St Gall glosses on Priscian contain Irish terms for all the nomenclature of the Latin grammarians, and show how extensive was the use made of Irish even in this department of learning.

Thurneysen had edited from'BB., Laud 610 and a TCD. MS. three treatises on metric which give an account of the countless metres practised by the filid. It is impossible for us prosody here to enter into the question of Irish prosody in any great detail. We have seen that there is some reason for believing that the primitive form of Irish verse was a kind of rhythmical alliterative prose as contained in the oldest versions of the sagas. The filid early became acquainted with the metres of the Latin church hymns, whence rhyme was introduced into Ireland. (This is the view of Thurneysen and Windisch. Others like Zeuss have maintained that rhyme was an invention of the Irish.) In any case the filid evolved an intricate system of rhymes for which it is difficult to find a parallel. The medieval metres are called by the general name of Dan Direch, " Direct Metre." Some of the more general principles were as follows. The verses are grouped in stanzas of four lines, each stanza being complete in itself. Each line must contain a fixed number of syllables, whilst the different metres vary as to the employment of internal and end rhyme, assonance and alliteration. The Irish elaborated a peculiar system of consonantal correspondence which counted as rhyme. The consonants were divided with a considerable degree of phonetic accuracy into six groups, so that a voiceless stop © rhymes with

another voiceless stop (t, p), a voiced stop (6) with another voiced stop (d, g) , and so forth. The commonest form of verse is the four-line stanza of seven syllables. Such a verse with rhymes abab and monosyllabic or dissyllabic finals belongs to the class rannaigecht. A similar stanza with aabb rhymes is the basis of the so-called debide (cut in two) metres. A peculiarity of the latter is that the rhyming word ending the second line must contain at least one syllable more than the rhyming word which ends the first. Another frequently employed metre is the rindard, consisting of lines of six syllables with dissyllabic endings. In the metrical treatises examples are given of some 200 odd metres. The result of the complicated technique evolved in Ireland was an inclination to sacrifice sense to musical harmony. See K. Meyer,ˆ4 Primer of Irish Metrics (Dublin,i9og).

We can conclude this survey of medieval Irish literature by mentioning briefly two departments of learning to which much attention was paid in Ireland. These are law and LaWi

medicine. The so-called Brehon Laws (q.v.) are represented as having been codified and committed to writing in the time of St Patrick. There is doubtless some grain of truth in this statement, as a fillip may have been given to this codifica- tion by the publication of the Theodosian Code, which was speedily followed by the codes of the various Teutonic tribes. The Brehon Laws were no doubt originally transmitted from teacher to pupil in the form of verse, and traces of this are to be found in the texts which have been preserved. But the Laws as we have them do not go back to the 5 th century. In our texts isolated phrases or portions of phrases are given with a com- mentary, and this commentary is further explained by some

Medicine.

later commentators. Kuno Meyer has pointed out that in the commentary to one text, Crlth Gablach, there are linguistic forms which must go back to the 8th century, and Arbois de Jubain- ville, who apart from Sir Henry Maine is the only scholar who has dealt with the subject, has attempted to prove from internal

evidence that part of the oldest tract, the one on Athgabdil or Seizure, cannot, in its present form, be later than the close of the 6th century. Cormac's Glossary contains a number of quota- tions from the commentary to Senchus Mor, which would therefore seem to have been in existence about 900. The Irish Laws were transcribed by O'Donovan and O'Curry, and have been published with a faulty text and translation in five volumes by the government commissioners originally appointed in 1852. A number of other law tracts must have existed in early times, and several which have been preserved are still unedited. Kuno Meyer has published the Cain Adamndin or Adamnan's Law from an Oxford MS. Adamnan succeeded in getting a law passed which forbade women to go into battle. An interesting but little-investigated text in prose and verse called Leabhar na gCeart or Book of Rights was edited with an English translation by O'Donovan (1847). It deals with the rights to tribute of the high-king and the various provincial kings. The text of the Book of Rights is preserved in YBL. and BB. In its present form it shows distinct traces of the influence of the Viking invasions, and cannot go back much beyond the year 1000. At one time it was incorporated in a larger work now lost, the Psalter of Cashel. We also possess a gth-century treatise on Sunday observance (Cdin Domnaig).

The medical profession in Ireland was hereditary in a number of families, such as the O'Lees (from Irish liaig, "a leech"), the O'Hickeys (Irish icide, " the healer "), the O'Shiels, the O'Cassidys, and many others. These families each had their own special leech-books, some of which are still pre- served. In addition to these there are many others. The medical literature which has come down to us is contained in MSS. ranging from the 13th to the 18th centuries. The Irish MSS. are translations from the Latin with the invariable commentary, and they further contain additions derived from experience. YBL. contains four of these tracts, and amongst others we may mention the Book of the O'Hickeys, a translation of the Lilium Medicinae of Bernard Gordon (written 1303), the Book of the O'Lees (written in 1443), the Book of the O'Shiels, transcribed in 1657, and the Book of MacAnlega, transcribed in 1512. Of these texts only two have been published as yet from MSS. in Edin- burgh. O'Curry drew-up a MS. catalogue of the medical MSS. in the Royal Irish Academy, and many more are described in O'Grady's catalogue of Irish MSS. in the British Museum. Some few MSS. deal with the subject of astronomy, but up to the present no description of the

texts has been published.

With the steady advance of the English power after 1600 it was only natural that the school of bardic poets should decline. But at the beginning of the 17th century for the last time they gave a great display of their resources. literature. Tadhg MacDaire, the ollam of the earl of Thomond, composed a poem in elaborate verse exalting the line of Eber (represented by the reigning families of Munster) at the expense of the line of Eremon (represented by the reigning families of the other provinces) . In a body of verse attributed to Torna Eces (c. 400), but obviously of more recent origin, the Eremonian, Niall Noigiallach, is lavishly praised, and Tadhg's attack takes the form of a refutation of Torna's pretensions. The challenge was immediately taken up by Lughaidh O'Clery. The recriminations of the two bards extend to nearly 3000 lines of verse, and naturally drew down the attention of the whole Irish world of letters. Soon all the hereditary poets were engaged in the conflict, which raged for many years, and the verses of both parties were collected into a volume of about 7000 lines in debide metre, known as the Contention of the Poets. Amongst the prominent poets of the period may be mentioned Tadhg Dall O'Higinn (d. shortly before 1617) and Eochaidh O'Hussey, who between them have left behind nearly 7000 lines in the classical metres, Bonaventura O'Hussey and Ferfesa O'Cainti.

Later Irish

The intricate classical measures gradually broke down. Dr Douglas Hyde gives it as his opinion that the exceedingly numerous metres known in Middle Irish had become restricted to a couple of dozen, and these nearly all heptasyllabic. Nevertheless they continued to be employed till into the 18th century. However, during the 17th century we find a new school arising with new principles and new methods. These consisted in (1) the adoption of vowel rhyme in place of consonantal rhyme, (2) the adoption of a certain number of accents in each line in place of a certain number of syllables. Thus, according to what we have just said, the accented syllables in a line with four accents in one line will fall on, say, the following vowels e,u,u,e, and the line rhyming with it will have the same sounds in the same or a different sequence. (For English imitations see Hyde, A Literary History of Ireland, pp. 548 ff .)

The consequences of the changed political conditions were of the

greatest importance. The bards, having lost their patrons in the general upheaval, threw behind them the old classical metres and turned to the general public. At the same time they had to abandon the countless chevilles and other characteristics of the old bardic language, which were only understood by the privileged few. But to compensate for this much more freedom of expression and naturalness were possible for the first time in Irish verse. The new metres made their appearance in Ireland about 1600, and the learned Keating himself was one of the first to discard the ancient prosody. During the latter half of the 17th century and throughout the 18th century the body of verse produced in Ireland voices the sorrows and aspirations of the whole nation, and the literary activity in almost every county was correspondingly great. It is only during the last few years that the works of any of the poets of this period have been published. Pierce Ferriter was the last chieftain who held out against Cromwell's army, and he was hanged in 1653. His poems have been edited by P. S. Dinneen (Dublin, 1903). The bard of the Williamite wars was David O'Bruadar (d. 1697- 1698). From this period date three powerful satires on the state of affairs in Munster, and in particular on the Cromwellian settlers. They are of a coarse and savage nature, for which reason they have never been printed. Their titles are the Parliament of Clan Thomas, the Adventures of Clan Thomas, and the Adventures of Tadhg Dubh (by Egan O'Rahilly) . A description of the parliament of Clan Thomas is given by Stern in the Zeitschr.f. celt. Phil. v. pp. 54r ff.

A little later we come across a band of Jacobite poets. The gallant figure of Charles Edward was so popular with Irish bards that a conventional stereotyped form arose in which the poet represents himself as wandering in a wood and meeting a beautiful lady. We are treated to a full description of all her charms, and the poet compares her to all the fair heroines of antiquity. But she replies that she is none of these. She is Erin seeking refuge from the insults of foreign suitors and looking for her mate. The idea of such poems is a beautiful one, but they become tedious when one has read a dozen of them only to find that there are scores of others in exactly the same strain. Besides the Visions (Aisling), as they are termed, there are several noteworthy war-songs, whilst other poems are valuable as giving a picture of the state of the country at the time. We can do no more than mention the names of John O'Neaghtan (d. c. 1720; edition of his poems by A. O'Farrelly, Dublin, 1908), Egan O'Rahilly, who flourished between 1700 and 1726; Tadhg O'Naghten, Andrew MacCurtin

(d. 1479), Hugh MacCurtin, author of a grammar and part editor of O'Begley's Dictionary; John Clarach MacDonnell (1691-1754), John O'Tuomy (d. 1775), Andrew Magrath, Tadhg Gaolach O'Sullivan (d. c. 1795), author of a well-known volume of religious poems, a valuable source of information for the Munster dialect ; and Owen Roe O'Sullivan (d. 1784), the cleverest of the Jacobite poets (his verses and bons mots are still well known in Munster) . These poets hailed mostly from the south, and it is chiefly the works of the Munster poets that have been preserved. Ulster and Connaught also produced a number of writers, but very little beyond the mere names has been preserved except in the case of the Connaught poet Raftery

(1784-1835), whose compositions have been rescued by Hyde {Abhrdin an Reachtuire, Dublin, 1903). Torlough O'CaroIan (1670-1738), " the last of the bards," was really a musician. Having become blind he was educated as a harper and won great fame. His poems, which were composed to suit his music, are mostly addressed to patrons or fair ladies. His celebrated " Ode to Whisky " is one of the finest bacchanalian songs in any language. Michael Comyn (b. c. 1688) is well known as the author of a version based upon older matter of " Ossian in the Land of Youth." This appears to be the only bit of deliberate creation in the later Ossianic literature. Comyn also wrote a prose story called " The Adventures of Torlogh, son of Starn, and the Adventures of his Three Sons." Brian MacGiolla Meidhre or Merriman (d. 1808) is the author of perhaps the cleverest sustained poem in the Irish language. His work, which is entitled the Midnight Court, contains about 1000 lines with four rhymes in each line. It describes a vision in which Aoibhill, queen of the Munster fairies, is holding a court. A handsome girl defends herself against an old man, and complains to the queen that in spite of all her charms she is in danger of dying unwed. Merriman's poem, which was written in 1781, has recently been edited with a German translation by L. C. Stern (Zeilschrift fur celtische Philologie, v. 193-415). Donough MacConmara (Macnamara) (d. c. 1814)' is best known as the author of a famous lyric " The Fair Hills of Holy Ireland," but he also wrote a mock epic describing his voyage to America and how the ship

was chased by a French cruiser. He is carried off in a dream by the queen of the Munster fairies to Elysium, where, instead of Charon, he finds Conan, the Thersites among the Fenians, acting as ferryman (Eachlra Ghiolla an Amardin, or The Adventures of a Luckless Fellow, edited by T. Flannery, Dublin, 1901).

During the first half of the 19th century nothing new was produced of a high order, though the peasants retained their love for poetry and continued to copy the MSS. in their posses- sion. Then came the famine and the consequent drain of population which gave Irish the death-blow as a living literary force. The modern movement has been dealt with above in the section on Irish language.

It remains for us to glance briefly at the later religious literature and the collections of folk-tales. The translation of the New Testament made by William O'Donnell and published in 1603 was first undertaken in the reign of Queen Elizabeth, who sent over to Dublin the first fount of Irish type. Bishop Bedell, one of the very few Protestant clergymen who undertook to learn Irish, translated the remainder of the Scriptures with the help of a couple of natives, but the whole Bible was not translated and published until 1686. This version naturally never became popular, but it is a valuable source of information with regard to Modern Irish. It is perhaps of interest to note that the earliest specimen of printing in Irish is a ballad on Doomsday (Dublin, 1 571). A version of the English Prayer Book was published in

1716.

The scholars of the various Irish colleges on the continent were particularly active in the production of manuals of devotion mainly translated from Latin. We can mention only a few of the more important. Sgalhdn an chrdbhaidh (The Mirror of the Pious), published in 1626 by Florence Conry; Sgathdn sacra- mente na h-Aithrighe (Mirror of the Sacrament of Penance), by Hugh MacCathmhaoil, published at Louvain, 1618; The Book of Christian Doctrine, by Theobald Stapleton (Brussels, 1639); Pdrrthas an Anma, or The Paradise of the Soul, by Anthony Gernon (Louvain, 1645) ; a book on Miracles, by Richard Mac- Gilla Cody (1667) ; Lochrdn na gcreidmheach, or Lucerna Fidelium, by Francis O'Mulloy (Louvain, 1676); O'Donlevy's Catechism (1742). O'Gallagher, bishop of Raphoe, published a collection of sermons which went through twenty editions and are still known at the present day. He is one of the earliest

writers in whom the characteristics of the speech of the north are noticeable. The only Catholic version of any considerable portion of the Scriptures up till quite recently was the translation of the Pentateuch by Archbishop MacHale, who also turned six books

of the Iliad into Irish. It is only within recent years that attention has been paid to the collection of folk-songs and tales in Irish, although as long ago as 1825 Crofton Croker pub- lished three volumes of folk-lore in the south of Ireland which attracted the attention of Sir Walter Scott. Nor do the classic stories of Carleton fall within our province. We may mention among others Patrick O'Leary's Sgeuluidheacht Chuige Mumhan (Dublin, 1895); Hyde's Beside the Fire (London, 1890) and An Sgeuluidhe Gaedhealach, reprinted from vol. x. of the Annates de Bretagne (London, 1901); Daniel O'Fogharta's Siamsa an Gheimhridh (Dublin, 1892); J. Lloyd's Sgealaidhe Oirghiall (Dublin, 1905); and Larminie's West Irish Folk-Tales (London, 1893). The most important collections of folk-songs are Love- Songs of Connaught (Dublin, 1893) and Religious Songs of Connaught (Dublin, 1906), both published by Hyde. The most extensive collection of proverbs is the one entitled Seanfhocla Uladh by Henry Morris (Dublin, 1907) . See also T. O'Donoghue, Sean-fhocail na Mumhan (Dublin, 1902).

Authorities.— In the absence of a comprehensive history, the best manual is Eleanor Hull's Text Book of Irish Literature (2 parts, London, 1904-1908; vol. 2 contains a bibliographical appendix).

D. Hyde's larger History of Irish Literature (London, 1899) is only trustworthy as regards the more modern period. A full bibliography of all published material is contained in G. Dottin's article " La Iitterature gaelique de I'lrlande " {Revue de synthase historique, vol. iii. pp. 1 ff.).' Dottin's article has been translated into English and supplemented by Joseph Dunn under the title of The Gaelic Literature of Ireland (Washington, 1906, privately printed). The following are important works: — W. Stokes and J. Strachan, Thesaurus Palaeohibernicus (2 vols., Cambridge, 1901-1903) ; J. H. Bernard and R. Atkinson, Liber Hymnorum (London, 1895);

E. O'Curry, Lectures on the MS. Materials of Ancient Irish History (Dublin, 1873) and Lectures on the Manners and Cus'oms of the Ancient Irish (3 vols., Dublin, 1873) ; P. W. Joyce, A Social History oUAncienl Ireland (2 vols., London, 1903) ; E. O'Reilly, Irish Writers (Dublin, 1 820) ; S. H. O'Grady, Catalogue of Irish MSS. in the British Museum (London, 1901) ; H. d'Arbois de

Jubainville, Introduction d V etude de la Iitterature celtique (Paris, 1883), Essai d'un catalogue de la Iitterature epique de I'lrlande (Paris, 1 883) ,L' Epopee celtique en Irlande (Paris, 1892), La Civilisation des Celtes et celle del' epopee homerique (Paris, 1899); E. Windisch, Tain Bo Cualnge, ed. with an introd. and German trans. (Leipzig, 1905) ; L. Winifred Faraday, The Cattle- Raid of Cualnge (London, 1904) ; the Irish text according to LU. and YBL. has been published as a supplement to Uriu; Eleanor Hull. The Cuchulinn-saga (London, 1899); W. Ridgeway, "The Date of the First Shaping of the Cuchulinn Cycle, Proceedings of the British Academy, vol. ii. (London, 1907); A. Nutt, Cuchulin, the Irish Achilles (London, 1899); H. Zimmer, " Keltische Beitrage" in Zeitschrift f. deutsches Altertum, vols. 32, 33 and 35, and " Uber den compilatorischen Charakter der irischen Sagentexte in sogen- annten Lebor na hUidre," Kuhn's Zeitschr. xxviii. pp. 417-689. We cannot here enumerate the numerous heroic texts which have been edited. For texts published before 1883 see d'Arbois's Catalogue, and the same writer gives a complete list in Revue Celtique, vol. xxiv. pp. 237 ff. The series of Irische Texte, vols, i.iv. (Leipzig, 1880 1901), by E. Windisch (vols, ii.-iv. in conjunction with W. Stokes), contains a number of important texts. Others, more particularly those belonging to the Ossianic cycle, are to be found in S. H. O'Grady's Silva Gadelica (2 vols. London, 1892). See also R. Thurneysen, Sagen aus dem alten Irland (Berlin, 1901) ; P. W. Joyce, Old Celtic Romances (London 2 , 1901).

For the Ossianic cycle see H. Zimmer, " Keltische Beitrage III." in vol. 35 of the Zeitschr. f. deutsches Altertum, also Gottinger Gelehrte Anzeigen, 1887, pp. 153-199; A. Nutt, Ossian and the Ossianic Literature (London, 1899); L. C. Stern, "Die ossianischen Helden- lieder," in Zeitschr. f. vergleichende Litteraturgeschichte for 1895, trans, by J. L. Robertson in Transactions of the Inverness Gaelic Society, vol. xxii. ; J. MacNeill, Duanaire Finn (London, 1908); Book of the Dean of Lismore, ed. by T. Maclauchlan (Edinburgh, 1862), and in vol. i. of A. Cameron's Reliquiae Celticae (Edinburgh, 1892); Transactions of the Ossianic Society (6 vols., Dublin, 1854- 1861) ; Miss Brooke, Reliques of Ancient Irish Poetry (Dublin, 1789).

Keating's History was translated by John O'Mahony (New York, 1866). The first part was edited with Eng. trans, by W. Halliday (Dublin, 1 81 1) and the whole work in 3 vols.for the Irish Texts Society by D, Comyn and P. Dinneen (London, 1901-1908). Comparatively few specimens have been published of the older

bards. Several from a Copenhagen MS. were printed by Stern in the Zeitschr. f. celt. Phil. vol. ii. ; J. Hardiman, Irish Minstrelsy (2 vols., Dublin, 1831); J. C. Mangan, The Poets and Poetry of Munster (Dublin 4 , no date); G. Sigerson, The Bards of the Gael and Gall (Dublin, 1906). Editions of the poems of Ferriter, Geoffrey O'Donoghue, O'Rahilly, John O'Tuomy, Andrew Magrath, John Claragh MacDonnell, Tadhg Gaolach and Owen Roe O'Sullivan by Dinneen, Gaelic League, Dublin, and Irish Texts Society, London, 1900-1903. (E. C. Q.)

GAELIC LITERATURE]

CELT

635

II. Scottish Gaelic Literature. — It is not until after the Forty-five that we find any great manifestation of originality in the literature of the Scottish Highlands. The reasons for this are not far to seek. Just as the dialects of Low German in the middle ages were overshadowed by the more brilliant literary dialect of the south, so Scotch Gaelic was from the outset seriously handicapped by the great activity of the pro- fessional literary class in Ireland. We may say that down to the beginning of the 18th century the literary language of the Highlands was the Gaelic of Ireland. During the dark days of the penal laws and with the extinction of the men of letters and their patrons in Ireland, an opportunity was given to the native Scottish muse to develop her powers. Another potent factor also made itself felt. After Culloden the causes of the clan feuds and animosities of the past were removed. The Highlands, perhaps for the first time in history, formed a compact whole and settled down to peace and quietude. A remarkable outburst of literary activity ensued, and the latter half of the 18th century is the period which Scottish writers love to call the golden age of Gaelic poetry. But before we attempt to deal with this period in detail, we must examine the scanty literary products of Gaelic Scotland prior to the 18th century.

The earliest document containing Gaelic matter which Scotland can claim is the Book of Deer, now preserved in the Cambridge University Library. This MS. contains portions of "Booko tfle Q 0S p e j s ; n L a ti n written in an Irish hand with illuminations of the well-known Irish type. At the end there occurs a colophon in Irish which is certainly as old as the 9th century. Inserted in the

margins and blank spaces are later notes and memoranda partly in Latin, partly in Gaelic. The Gaelic entries were probably made between 1000 and 11 50. They relate to grants of land and other privileges made from time to time to the monastery of Deer (Aberdeenshire). The most interesting portion deals with the legend of Deer and its traditional foundation by St Columba. The language of these entries shows a striking departure from the traditional ortho- graphy employed in contemporary Irish documents. The Advocates' Library in Edinburgh contains a number of MSS. probably written in Scotland between 1400 and 1600, but with one exception the language is Irish.

The solitary exception just mentioned is the famous codex known as the Book of the Dean of Lismore. The pieces contained ••Book * n tn ' s vo ' ume are written in the crabbed current of the Roman hand of the period, and the orthography is Dean of phonetic, both of which facts render the deciphering Lismore." f tn i s va i uaD i e MS. a task of supreme difficulty. The contents of this quarto volume of 311 pages are almost entirely verse compositions collected and written down by Sir James Macgregor, dean of Lismore in Argyllshire, and his brother Duncan, between the years 151 2 and 1526. A disproportionate amount of space is allotted to the compositions of well-known Irish bards such as Donnchadh Mor O'Daly (d. 1244), Muiredhach Albanach (c. 1224), Tadhg Og O'Higgin (d. 1448), Diarmaid O'Hiffernan, Torna O'Mulconry (d. 1468). But native bards are also represented. We can mention Allan Mac Rorie, Gillie Calum Mac an Ollav, John of Knoydart, who celebrates the murder of the young lord of the isles by his Irish harper in 1490, Finlay MacNab, and Duncan Macgregor, the transcriber of the greater part of the volume. The poems of the last-mentioned writer are in praise of the Macgregors. A few other poems are by Scottish authors such as Campbell, Knight of Glenorchy (d. 1513), the earl of Argyll and Countess Isabella. A number consist of satires on women. These Scottish writers are still under the influence of Irish metric, and regularly employ the four-lined stanza. They do not appear to adhere to the stricter Irish measures, but delight rather in the freer forms going by the name of dglachas. The Irish rules for alliteration and rhyme are not rigidly observed.

The linguistic peculiarities of the Dean's Book await investiga- tion, but among the pieces which represent the Scottish ver- nacular of the day are the Ossianic Ballads. These, twenty -eight in number, extend to upwards of 2500 lines, and form by far

the most important part of the collection. Thus the Dean’s Book was compiled a full hundred years before the earliest similar collection of heroic ballads was made in Ireland. In Scotland the term Ossianic is used loosely of both the Ulster and the Fenian cycles, and it may be as well to state that three of the pieces in the volume deal with Fraoch, Conlaoch and the Bloody Rout of Conall Cearnach. It is interesting to note that nine of the poems are directly attributed to Ossian, two to Ferghus File, one to Caoilte Mac Ronan, and one to Conall Cearnach, whilst others are ascribed to Allan MacRorie, Gillie Calum Mac an Ollav and Caoch O’Cluain, who are otherwise unknown. The Dean’s Book was first transcribed by Ewen MacLachlan in 181 3. Thomas MacLauchlan published the text of the Ossianic ballads with modern Gaelic and English render- ings in 1862. In the same volume W. F. Skene gave a useful description of the MS. and its contents. Alexander Cameron revised the text of the portion printed by MacLauchlan, and his amended text is printed in his Reliquiae Celticae, vol. i. (See also L. C. Stern, Zeitschr.f. celt. Phil. i. 294-326.)

Between the Book of the Dean and the Forty-five we find another great gap, which is only bridged over by a collection which presents many points of resemblance to Macgregor’s compilation. The Book of Femaig, which is also written in a kind of phonetic script, was compiled by Duncan Macrae of Inveririate between 1688 and 1693. The MS. contains about 4200 lines of verse of different dates and by different authors. The contents of the collection are mainly political and religious, with a few poems which are termed didactic. As in the Dean’s Book love-songs and drink- ing-songs are conspicuously absent, whilst the religious poetry forms about one-half of the contents. In state politics the authors are Jacobite, and in church politics Episcopalian. The Ossianic literature is represented by 36 lines. There are a number of poems by 16th-century writers, among whom is Bishop Carsewell. Mackinnon has pointed out that the language of the Book of Femaig corresponds exactly to the dialect spoken in Kintail at the present day. The text of the Book of Femaig is printed in its entirety in vol. ii. of Cameron’s Reliquiae Celticae, and many of the poems are to be found in standard orthography in G. Henderson’s Leabhar nan Gleann. The metres employed in the poems show the influence of the English system of versification. (See Stern, Zeitschr. f. celt. Phil. ii. pp. 566 ff.)

Two other Highland MSS. remain to be noticed. These are the

Red and Black Books of Clanranald, which are largely taken up with the histories of the families of Macdonald „ Red aa(J and with the achievements of Montrose, written in the Black ordinary Irish of the period by the Macvurichs, Books of hereditary bards to the Clanranald chiefs. The Red. ” M „

Book was obtained by Macpherson in 1760 from Neil Macvurich, nephew of the last great bard, and it figured largely in the Ossianic controversy. In addition to poems in Irish by Neil Macvurich, who died at a great age some time after 1715, and other bardic matter, the MSS. now contain only three Ossianic poems, and these are in Irish. During the Ossianic controversy the Red Book of Clanranald was supposed to contain the originals of much of Macpherson ‘s famous work; but, on the book coming into the hands of the enthusiastic Gaels of the closing years of the 18th century, and on its contents being examined and found wanting, the MS. was tampered with.

Mackenzie’s Beauties of Gaelic Poetry contains poems written by a number of writers who flourished towards the end of the 17th century and at the beginning of the 18th. These are Mary Macleod, John Macdonald (Iain Lorn) , Archibald Macleod, Macdonald, Dorothy Brown, Cicely Macdonald, Iain Dubh Iain Tc. Ailein (b. c. 1665), the Aosdan Matheson (one of his poems was rendered in English by Sir Walter Scott under the title of ” Farewell to Mackenzie, High Chief of Kintail “), Hector Maclean (also known through a translation by Scott called ” War- song of Lachlan, High Chief of Maclean “), Lachlan Mackinnon, Roderick Morrison (an Clarsair Dall), and John Mackay of Gairloch, but we can here only notice the first two. The famous Mary Macleod, better known as Mairi Nighean Alastair Ruaidh

••lain Lorn.’

(c. 1 588-1 693), was family bard to Sir Norman Macleod of Bernera, and later to John ” Breac ” Macleod of Macleod, in honour of whom most of her poems were composed. Like very many of the Highland poets Mary had little or no education, and it would seem that none of the poems which have come down to

us were composed before 1660. Her pieces are composed in the modern Irish metres with the characteristic vowel rhymes of the accented syllables. As might perhaps be expected it was only the Macvurichs (the professional bards of the Clanranald) who went on practising the classical debide metre. This they still continued to do during the first quarter of the 18th century. Mary Macleod's best-known pieces comprise a dirge on the drowning of Iain Garbh (MacTlle Chalum) in the Minch, a song "An Talla 'm bu ghnath le MacLeoid," and an ode to Sir Norman Macleod of Bernera, produced during her exile in Mull, which begins " 'S mi'mshuidhe air an tulaich." For the details of her career, which are the subject of some dispute, the reader may be referred to a paper by Alexander Mackenzie in the Transactions of the Gaelic Society of Inverness, vol. xxii. pp. 43-66. Mary Macleod is accounted one of the most musical and original of the Highland bards.

John Macdonald, better known as Iain Lorn (d. c. 17 10), was a vigorous political poet whose verses exercised an extraordinary influence during his lifetime. He is said to have received a yearly pension from Charles II. for his services to the Stuart cause. His best-known poems are Mort na Ceapach, on the murder of the heir of Keppoch, who was eventually avenged through the poet's efforts, and a piece on the battle of Inverlochay (1645). However great the inspira- tion of Mary Macleod and Iain Lorn, they were after all but political or family bards. In succession to them there' arose a small band of men with loftier thoughts, a wider outlook and greater art. The literature of the Scottish Highlands culminates in the names of Alexander Macdonald, Duncan Ban Maclntyre and Dugald Buchanan.

Alexander Macdonald, commonly called Alasdair MacMaighstir Alasdair (b. c. 1700), was the son of an Episcopalian clergyman in Moidart. He was sent to Glasgow University to fit Alexander jjj mse if f or a professional career. But an imprudent doaald. marriage caused him to abandon his studies, and about 1729 he received an appointment as a Presbyterian teacher in his native district. He was moved from place to place, and from 1739 to 1745 he taught at Corryvullin on the Sound of Mull, the scene of some of his most beautiful lyrics. About 1 740 he was invited to compile a Gaelic vocabulary, which was published in 1 74 1. Macdonald has thus the double distinction of being the author of the first book printed in Scotch Gaelic and of being the father of Highland lexicography. The news of the landing of the Pretender brought visions of release to the poverty-stricken poet, who was

by this time heartily sick of teaching and farming. He turned Roman Catholic, and was present at the unfurling of the Stuart standard. He was given the rank of captain, but rendered greater services to the Jacobite cause with his stirring poems than with the sword. After Culloden he suffered great privations. But in 1 751 he visited Edinburgh and brought out a collection of his poetry, which has the honour of being the first original work printed in Scotch Gaelic. His volume was therefore entitled Ais-eiridh na Seann Chanain Albannaich (Resurrection of the Ancient Scottish Tongue) . Till the day of his death he led a more or less wandering life, as he was dependent on the generosity of Clanranald. Only a small part of Macdonald's compositions have been preserved (thirty-one in all) . These naturally fall into three groups — love-songs, descriptive poems and patriotic and Jacobite poems. In his love-songs and descriptive poems Macdonald struck an entirely new note in Gaelic literature. His Moladh Moraig undCuachag an Fhasaich (also called A' Bhanarach Dhonn) are his best-known compositions in the amatory style. But he is distinctly at his best in the descriptive poems. We have already seen that even as early as the 8th century the poets of Ireland gave expression to that intimate love of nature which is perhaps the most striking feature in Celtic verse. Macdonald had a wonderful command of his native Gaelic. His verse is always

musical, and his skilful use of epithet, often very lavishly strewn, enables him to express with marvellous effect the various aspects of nature in her gentler and sterner moods alike. His masterpiece, the Birlinn of Clanranald, which is at the same time, apart from Ossianic ballads, the longest poem in the language, describes a voyage from South Uist to Carrickfergus. Here Macdonald excels in describing the movement of the ship and the fury of the storm. In Allt an t-Siucair (The Sugar Brook) we are given an exquisite picture of a beautiful scene in the country on a summer morning. Other similar poems full of melody and colour are Faille na Mor-thir (Hail to the Mainland), Or an an t-Samhraidh (Ode to Summer), and Or an an Gheamhraidk (Ode to Winter). When this gifted son of the muses identified himself with the Stuart cause he poured forth a stream of inspiring songs which have earned for him the title of the Tyrtaeus of the Rebellion. Among these we may mention Oran nam Fineachan Gaelach (The Song of the Clans), Brosnachadh nam Fineachan gaidh- ealach (A Call to the Highland Clans), and various songs to the prince. But incomparably the finest of all is Oran Luaighe no

Fucaidh (Waulking Song). Here the prince is addressed as a young girl with flowing locks of yellow hair on her shoulders, and called Morag. She had gone away over the seas, and the poet invokes her to return with a party of maidens {i.e. soldiers) to dress the red cloth, in other words, to beat the English red-coats. The song contains forty-seven stanzas in all, with the characteristic refrain of the waulking-songs. Am Breacan Uallach is a spirited poem in praise of the kilt and plaid, which had been forbidden by the English government. Macdonald is also the author of a number of poems in MS. which have been called the quintessence of indecency. His works have gone through eight editions, the last of which is dated 1892.

In connexion with Macdonald's Jacobite songs it will be well to mention here the name of a kindred spirit, John Roy Stuart (Iain Ruadh Stiubhart). Stuart was a gallant soldier who was serving in Flanders with the French against the English when the rebellion broke out. He hurried home and distinguished himself on the field of battle. After Culloden he gave vent to his dejection in two pathetic songs, one on the battle itself, while the other deals with the sad lot of the Gael.

The only poet of nature who can claim to rival Macdonald is a man of a totally different stamp. Duncan Ban Maclntyre (Donnachadh Ban, 1724-1812) was born of poor parents in Glenorchy, and never learned to read and faa."" write or to speak English. He was present on the English side at the battle of Falkirk, on which he wrote a famous ode, and shortly afterwards he was appointed gamekeeper to the earl of Breadalbane in Coire Cheathaich and Ben Dorain, where he lived for many years until he accepted a similar appointment from the duke of Argyll in Buachaill-Eite. Stewart of Luss is credited with having taken down the 6000 lines of verse of his own composition which Maclntyre had carried about with him for many years, and his works were published in 1768. In his later years he was first a volunteer and afterwards a member of the city guard in Edinburgh. In addition to his poems de- scriptive of nature Maclntyre composed a number of Jacobite martial songs, songs of love and sentiment, and comic and satiric pieces. The poem Mairi bhan og addressed to his wife is, on account of its grace and delicate sentiment, generally held to be the finest love-song in the language. But it is above all as the poet of ben and corrie that Maclntyre is remembered. He has been called the Burns of the Highlands, but the bitterness and intellectual power of the Ayrshire poet are absent in Maclntyre. Duncan Ban describes

fondly and tenderly the glories of his native mountains as only one can who spends his life in daily communion with them. His two great compositions are styled Ben Dorain and Coire Cheathaich. The former is a long poem of 550 lines divided into eight parts, alternating with a sort of strophe and antistrophe, one slow called urlar in stately trochees, the other swift called siubhal in a kind of galloping anapaests; the whole ending with the crunluath or final quick motion. It is said to follow very accurately the lilt of a pipe-tune. The poem, which might be called the "Song of the Deer," has been well

done into English by J. S. Blackie. Coire Cheathaich (The Misty Corrie), a much shorter poem than Ben Dorain, gives a loving description of all the prominent features in the landscape — the flowers, the bushes, the stones, the hillocks with the birds and game, and the whirling eddies with the glistening salmon. Maclntyre's works went through three editions in his lifetime, and a twelfth was issued in 1901.

From Duncan Ban we pass on to consider the compositions of two men who hailed from the outlying parts of Gaeldom. Robert Rob Dona. Mackay, or, as he is generally called, Rob Donn (1714-1778), was a native of Strathmore, Sutherlandshire, who, like Duncan Ban, never learned to read or write. His life, which was uneventful, was spent almost entirely within the confines of the county of his birth. He left behind a large number of poems which may be roughly classified as elegiac, love and satiric poems. His elegies are of the typical Highland kind. The singer is overwhelmed with sadness and despairing in his loss. His best-known composition in this style is " The Death-Song of Hugh." Having just heard of the death of Pelham, the prime minister, Mackay finds a poor friend of his dying alone amid squalor in the heart of the mountains. In a poem composed on the spot the poet contrasts the positions of the two men and reflects on the vanity of human existence. Among his love-poems the " Shieling Song " is deservedly famous. But it was above all as a satirist that Mackay excelled during his lifetime. Indeed he seems to have had the sharpest tongue of all the Highland bards. We have already seen what powers were attributed to satirical poets in Ireland in

medieval times, and though bodily disfigurements were no longer feared in the 18th century, nothing was more dreaded, both in Ireland and Scotland, than the lash of the bard. Hence many of Rob Donn's compositions have lost their point, and opinions have been greatly divided as to his merits as a poet. His collected poems were first published in 1829, a second edition appeared in 1 8 7 1 , and in 1 899 two new editions were issued simultaneously, the one by Hew Morrison, the other by Adam Gunn and Malcolm Macfarlane. Another satirical poet who enjoyed a tremendous reputation in his own day was John MacCodrum, Codruta. ' a native of North Uist and a contemporary of the men just mentioned. It is related of MacCodrum that the tailors of the Long Island refused to make any clothes for him in consequence of a satire he had directed against them. He was encountered in a ragged state by the Macdonald, who on learning the cause of his sorry condition promoted him to the dignity of bard to his family. Con- sequently a number of his compositions are addressed to his patrons, but one delightful poem entitled Smedrach Chlann- Domhnuill (The Mavis of Clan Donald) describes in verses full of melody the beauties of his beloved island home.

In the lyrical outburst which followed the Forty-five it was only to be expected that religious poetry should be represented. We have seen that much of the space in the Dean's Book and in the Book of Fernaig is allotted to verse of a pious order, though apart from the works of such Irish singers as Donnchadh O'Daly the poems do not reach a very high pitch of excellence. The first religious poem to be printed in Scotch Gaelic was a long hymn by David Mackellar, published in 1752. But incom- parably the greatest writer of hymns and sacred poems is Dugald Buchanan (1716-1768). Buchanan was born in Strathyre in Perthshire and was the son of a miller. He received a desultory kind of education and tried his hand at various trades. In 1753 he was appointed schoolmaster at Drumcastle near Kinloch Rannoch. He was selected to assist Stewart of Killin in preparing the first Highland version of the New Testament for the Society for Propagating Christian Knowledge (published 1767), and at the same time he issued an edition of his own poems. Of all Gaelic books this has been far and away the most popular, having gone through no less than forty editions. Buchanan seems to have been very susceptible to religious influences, and the stern Puritan doctrines of retribution and eternal damnation preached around him so worked on his mind that from his ninth to his

twenty-sixth year he was a prey to that mental anguish so eloquently described by Bunyan. The awful visions which presented themselves to his vivid imagination find expression in his poems, the most notable of which are ” The Majesty of God,” ” The Dream,” ” The Sufferings of Christ,” ” The Day of Judgment,” “The Hero,” “The Skull,” “Winter” and ” Prayer.” In the ” Day of Judgment,” a poem of about 120 stanzas, we are given in sublime verses a vivid delineation of the crack of doom as the archangel sounds the last trumpet. The poet then goes on to depict the awful scenes consequent upon the wreck of the elements, and pictures the gathering together of the whole human race before the Throne. But Buchanan’s masterpiece is admittedly ” The Skull.” Traces of the influence of English writers have been observed in all the poet’s writings, and it seems certain that the subject of his greatest poem was suggested by Shakespeare. The poet seated by a grave espies a skull. He takes it up and muses on its history. This poem in 44 stanzas concludes with a picture of the torments of hell and the glories of heaven.

The writers whom we have been discussing are practically unknown save to those who are able to read them in the original. Now we have to turn our attention to a man whose works have never been popular in the Highlands, but M ™~ , who nevertheless plays a prominent part in the history i>ossian.” of European literature. Though the precise origin of the Fenian cycle may remain a moot-point to all time, the development of the literature centring in the names of Finn and Ossian is at any rate clear from the nth century onwards. The interest taken in Celtic studies since the middle of the 19th century in Ireland and Scotland and elsewhere has accumulated a body of evidence which has settled for all time the celebrated dispute as to the authenticity of Macpherson’s Ossian. James Macpherson (1 736-1 796), a native of Kingussie, showed a turn for versification whilst yet a student at college. Whilst acting as tutor at Moffat he was asked by John Home as to the existence of ancient Gaelic literature in the Highlands. After some pressing Macpherson undertook to translate some of the more striking poems, and submitted to Home a rendering of ” The Death of Oscar.” Blair, Ferguson and Robertson, the foremost men in the Edinburgh literary circles of the day, were enthusiastic about the unearthing of such unsuspected treasures, and at their instance Macpherson published anonymously in 1760 his Fragments of Ancient Poetry, collected in the Highlands of Scotland and translated from the

Gaelic or Erse Language. This publication contained in all fifteen translations, preceded by a preface from the pen of Blair. Published under such auspices, Macpherson's venture was bound to succeed. In the preface it was stated that among other ancient poems an epic of considerable length existed in Gaelic, and that if sufficient encouragement were forthcoming the author of the versions would undertake to recover and translate the same. A subscription was raised at once, and Macpherson set out on a journey of exploration in the Highlands and islands. As the result of this tour, on which he was accompanied by two or three competent Gaelic scholars, Macpherson published in London in 1762 a large quarto con- taining his epic styled Fingal with fifteen other smaller poems. In the following year a still larger epic appeared with the title of Temora. It was in eight books, and contained a number of notes in addition to Cath-Loda and other pieces, along with the seventh book of Temora in Gaelic as a specimen of the original. Ten years later a new edition of the whole was issued. The authenticity of Macpherson's translations was soon impugned by Dr Johnson, Hume and Malcolm Laing, and the author was urged by his friends to publish the originals. Macpherson prevaricated, even though the Highlanders of India sent him a cheque for £1000 to enable him to vindicate the antiquity of their native literature. Macpherson at different times, and particularly towards the end of his life, seems to have had some intention of publishing the Gaelic of his Ossian, but he was naturally deterred by the feeling that his knowledge of Gaelic was becoming shakier with his continued absence from the Highlands. At any rate he left behind a quantity of Gaelic matter in MS. which was ultimately

published by the Highland Society of London in 1807. This MS., however, was revised and transcribed by Ross and afterwards destroyed, so that we are ignorant of its nature. The Highland Society also instituted an inquiry into the whole question, but their conclusions were somewhat negative. They succeeded in establishing that the characters introduced by Macpherson were familiar in the Highlands and that Ossianic ballads really existed, which Macpherson had utilized. Macpherson's claims still found ardent advocates, such as Clark, in the 'seventies, but the

question was finally disposed of in papers by Alexander Macbain (1885) and L. C. Stern (1895). We can here only summarize briefly the main lines of argument. (1) Macpherson's Ossian is full of reminiscences of Homer, Milton and the Hebrew prophets. (2) He confuses the Ulster and the Fenian heroic cycles in unpardonable fashion. (3) The Gaelic text of 1807 only represents one-half of the English versions (n poems out of 22 poems). Some Gaelic fragments from different pens appeared prior to 1807, but these differ considerably from the " official " version. (4) In the Gaelic text of 1807 the version of the passage from Temora is quite different from that published in 1763. (5) Macpherson's Gaelic is full of offences against idiom and un- naturally strained language. (6) The names Morven and Selma are entirely of his own invention (see also Macpherson, James). As a result of the stir caused by Macpherson's work a number of men set about collecting the genuine popular literature of the Highlands. A few years before the appearance of Fingal, Jeremy Stone, a schoolmaster at Dunkeld, had collected ten Ossianic ballads and published one of them in an English versified translation. For this collection see a paper by D. Mackinnon in the Transactions of the Gaelic Society of Inverness, vol. xiv. pp. 314 ff. Unfortunately other persons were led to follow Mac- pherson's example. The chief of these imitators were (1) John Clark, who in 1778 published, along with several others, an English poem Mordubh, later translated into Gaelic by Gillies; (2) R. Macdonald, son of Alexander Macdonald, who is the author of The Wish of the Aged Bard; (3) John Smith of Campbeltown (d. 1807), author of fourteen Ossianic poems styled Seandana, published in English in 1780 and in Gaelic in 1787; (4) D. Mac- Callum of Arisaig, who in 1821 published Collath and a complete Mordubh " by an ancient bard Fonar."

We have now reviewed in turn the greatest writers of the Scottish Highlands. The men we have dealt with created a kind of tradition which others have attempted to carry on. Ewen Maclachlan (1775-1822), the first transcriber of the Dean's Book, was assistant librarian of King's College and rector of the grammar school of Aberdeen. Amongst other things he translated the greater part of seven books of Homer's Iliad into Gaelic heroic verse, and he also had a large share in the compilation of the Gaelic- English part of the High- land Society's Dictionary. A number of Gaelic poems were published by him in 1816. These consist of poems of nature, e.g. Dain nan Aimsirean, Dan mu chonaltradh, Smebrach Chloinn- Lachuinn, and of a well-known

love-song, the Ealaidh Ghaoil. William Ross (1762-1790), a schoolmaster at Gairloch, is the typical Highland poet of the tender passion, and he is commonly represented as having gone to an early grave in consequence of unrequited affection. His finest compositions are Feasgar Luain and Moladh na h-oighe Gaelich. Another exquisite song Cuachag nan Craobh, is usually attributed to this poet, but it seems to go back to the beginning of the 18th century. A fifth edition of Ross's poems appeared in 1902. The most popular writer of sacred poems after Buchanan is undoubtedly Peter Grant, a Baptist minister in Strathspey, whose Dain Spioradail (first published in 1809) reached a twentieth edition in 1904, Sweetness, grace and simplicity are the characteristics which have endeared him to the heart of the Gael. Two other well- known hymn-writers spent their lives in Nova Scotia — James Macgregor (1750-1830) and John Maclean, a native of Tiree. The compositions of the latter have been published under the title Clarsach na CoiUe (Glasgow, 1881). But John Morrison (1790-1852), the poet-blacksmith of Rodel, Harris, is the most worthy of the name of successor to Buchanan. His works have

Later poets.

been carefully edited in two volumes by George Henderson (2nd edition, 1896). His poems are remarkably musical and imaginative. Two of the most characteristic are An Iondruinn and Tha duin' dg agus seann duin' agam. William Livingston or MacDhunleibhe (1808-1870) was a native of Islay. He received scarcely any education, and was apprenticed as a tailor, but he early made his way to the mainland. He was ever a fierce Anglophobe, and did his best to make up for the deficiencies of his early training. He published in English a Vindication of the Celtic Character, and attempted to issue a History of Scotland in parts. His poems, which have been at least twice published (1858, 1882), are equally powerful in the expression of ruthless fierceness and tearful sorrow. In Fios thun a' Bhaird he sings pathetically of the passing of the older order in Islay, and another powerful poem entitled Duan Geall deals with the campaign of the Highlanders under Sir Colin Campbell in the Crimea. Livingston's contemporary, Evan Maccoll (1808-1898), the son of a small farmer on Lochfyneside, in his early years devoured eagerly all the English literature and Gaelic lore that came in his way. In 1836 he issued a volume of songs called the Mountain Minstrel, containing his productions in Gaelic and English. Two years later two volumes appeared, one entirely in Gaelic, styled

Clarsach nam Beann, the other in English under the old title. A third edition of the Gaelic collection was published in 1886. Maccoll acted for many years as clerk in the custom- house at Liverpool, and afterwards he filled a similar post at Kingston, Canada. He has been called the Moore of Highland song. His spirit is altogether modern, and his poems are much nearer the Lowland type than those of the older bards. Among his best-known pieces are Bas Mairi and Duanag Ghaoil. We can do no more than mention the names of John Maclachlan of Rahoy (1804-1874), James Munro (1 794-1870), well known as a grammarian, Dugald Macphail (b. 1818), Mrs Mary Macpherson, Angus Macdonald (1804-1874), Mrs Mary Mackellar (1834-1890) and Neil Macleod (b. 1843), author of a popular collection Clarsach an Doire (1st ed., 1883; 3rd ed., 1904). Neil Macleod is also the writer of the popular song An Gleann 's an robh mi dg. Others whom we cannot mention here are known as the authors of one or more songs which have become popular. It is natural to compare the state of affairs at the beginning of the 20th century with that obtaining in 1800. In the dawn of the 19th century every district in the Highlands had its native poet, whilst a century later not a single Gaelic bard of known reputation existed anywhere within its borders. It is only too evident that the new writers prefer English to Gaelic as a medium of literature, partly because they know it better, but also because in it they appeal to a far wider public.

It will have been observed that we have said nothing about prose works written in Gaelic. Original Gaelic prose is con- spicuous by its absence. The first printed work is the translation of Knox's Liturgy by Bishop Carsewell, ˆrite'rs. published in 1567 (reprinted in 1873). Calvin's Cate- chism is said to have been issued in 1631. The Psalms and Shorter Catechism appeared in 1659, while two other psalters saw the light before the end of the century, one by Kirke (1684), the other issued by the Synod of Argyll (1694). The fanguage of all these publications may, however, be termed Irish. Apart from reprints of the catechism and psalter, the only other Gaelic matter which appeared in print before 1750 were Kirke's Irish version of the Bible in Roman type with a vocabulary (1690), and the Vocabulary by Alexander Macdonald (1741). But from the middle of the 18th century translations of the works of English religious writers streamed from the various presses. Alleine, Baxter, Boston, Bunyan, Doddridge and Jonathan Edwards were all prime favourites, and their works have gone through many editions. Apart from a well-

meant but wholly inadequate version of Schiller's Tell, the only non-religious work which can be termed literature existing in a Gaelic translation is a portion of the Arabian Nights, though fragments of other classics such as Lamb's Tales from Shakespeare have appeared in maga- zines. The one-sided character of Gaelic literature, in addition to exercising a baneful influence on Highland character, has in the

long run of necessity proved adverse to the vitality of the lan- guage. The best standard of Gaelic is by common consent the language of the Scriptures. ■ James Stewart of Killin's version of ■the New Testament, published by the Society for Propagating Christian Knowledge, was followed by a translation of the Old Testament in four parts (i 783-1801), the work of John Stewart of Luss and John Smith of Campbeltown. The whole Gaelic Bible saw the light in 1807. But the revision of 1826 is regarded as standard. The translators and revisers had no norm to follow, and it is difficult to say how far they were influenced by Irish tra- dition. Much in the Gaelic version seems to savour of Irish idiom, and it is a pity that some competent scholar such as Henderson has not investigated the question. Of original prose works we can mention two. The one is a History of the Forty-five (Eachdraidh a' Phrionnsa, no Bliadhna Thearlaich), published, in 1845 by John Mackenzie, the compiler of the Beauties of Gaelic Poetry (1806-1848). A second edition of this book appeared in 1906. The other is the more famous Caraid nan Gaedheal, by Norman Macleod (new edition, 1899). This volume consists mainly of a number of dialogues dealing with various departments of High- land life, which were originally contributed to various magazines from 1829 to 1848. Macleod's style is racy and elegant, and his work is deservedly popular.

In conclusion we must take notice of the more important collections of folklore. Gaelic, like Irish, is extraordinarily rich in proverbs. The first collection of Gaelic proverbs was published in 1 785 by Donald Macintosh. This work was supple- mented and enlarged in 1881 by Alexander Nicolson, whose book contains no fewer than 3900 short sayings. A large collection of Gaelic folk-tales was gleaned and published by J. F. Campbell under the title of Popular Tales of the West Highlands (4 vols., Edinburgh, 1862). Alexander Carmichael published a version of the Tdin Bo Calnge, called Toirioc na Tdine, which he collected in South Uist (Transactions- of the Gaelic Society of Inverness, ii. 25-42), also the story of Deirdre and the sons of Uisneach in prose taken down in Barra (ib. xiii. 241-257). Five volumes of popular stories, collected by J. G. Campbell, D. Maclnnes, J. Macdougall and Lord Archibald Campbell, have been published (1889-1895) by Nutt under the title Waifs and Strays of Celtic Tradition. These collections contain a good deal of matter pertaining to the old heroic cycles. Seven ballads dealing with the Ulster cycle were collected and printed by Hector Maclean under the title Ultonian Hero-ballads (Glasgow, 1892). Macpherson gave a fillip to collectors of Ossianic lore, and a number of MSS. going back to his time are deposited in the Advocates' Library at Edinburgh. J. F. Campbell spent twelve years searching for variants, and his results were published in his Leabhar na Feinne (1872). This volume contains 54,000 lines of heroic verse. The Edinburgh MSS. were transcribed by Alexander Cameron, and published after his death by Alexander Macbain and John Kennedy in his Reliquiae Celticae. This work is therefore a complete corpus of Gaelic heroic verse. Finally the charms and incantations of the Highlands have been collected and published by Alexander Carmichael in two sumptuous volumes under the title Carmina Gadelica (1900).

Authorities. — The standard work is Magnus Maclean, The Litera- ture of the Highlands (London, 1904) ; see also various chapters in the same writer's Literature of the Celts (London, 1902) ; L. C. Stern, Die Kultur der Gegenwart, i. xi. 1, pp. 98-109 ; Nigel MacNeill, The Litera- ture of the Highlanders (Inverness, 1892) ; J. S. Blackie, The Language and Literature of the Scottish Highlands '(Edinburgh, 1876); P. T. Pattison, Gaelic Bards (1890); L. Macbean, Songs and Hymns of the Scottish Highlands (Edinburgh, 1888); John Mackenzie, Sir- obair nam Bard Gaelach, or The Beauties of Gaelic Poetry (new ed., Edinburgh, 1904); A. Sinclair, An t-Oranaiche (Glasgow, 1879); The Book of Deer,

edited for the Spalding Club by Dr Stuart (1869) ; Alexander Macbain, Transactions of the Gaelic Society of Inverness, vols. xi. and xii. ; The Book of the Dean of Lismore, edited by T. Maclauchlan (1862); Alexander Cameron, Reliquiae Celticae (Inver- ness, 1892-1894); John Reid, BibHotheca Scoto-Celtica (Glasgow, 1832); Catalogue of the books in the Celtic department, Aberdeen University Library (1897); George Henderson, Leabhar nan Gleann (Inverness, 1898); D. Mackinnon, " The Fernaig MS." in Transac- tions of the Gaelic Society of Inverness, xi. 311-339; J- S. Smart,

James Macpherson, An Episode in Literature (London, 1905); L. C. Stern, " Die Ossianischen Heldenlieder " in Zeitschrift fiir vergleichende Litteraturgeschichte (1895), translated by J. L. Robertson in Transactions of the Gaelic Society of Inverness, xxv. 257- 325; G. Dottin, Revue de synthese histor'ique, viii. 79-91; M. C. Macleod, Modern Gaelic Bards (Stirling, 1908). (£. C. Q.)

III. Manx Literature. — The literary remains written in the Manx language are much slighter than those of any other Celtic dialect. With one small exception nothing pertaining to the saga literature of Ireland has been preserved. The little we possess naturally falls under two heads — original compositions and translations. With regard to the first category we must give the place of honour to an Ossianic poem contained in a MS. in the British Museum (written in 1789), which relates how Orree, Finn's enemy, was tormented by the women of Finn's household when the latter was away hunting, how he in revenge set fire to the house, and how Finn had him torn in pieces by wild horses. Most of the existing literature of native origin, however, consists of ballads and carols, locally called carvels. These used to be sung on Christmas eve in the churches, the members of the congregation each bringing a candle. Any one who pleased could get up and sing one. These carvels deal largely with the end of the world, the judgment-day and the horrors of hell. About eighty of them were published under the title of Carvalyn Gailckagh (Douglas, 1891). An attempt is being made by Yn Cheshaght Gailckagh to revive the Oiel Voirrey (= Irish Oidhche Fheile Mhuire), " the feast of Mary," as the festival used to be called, and gatherings in the old style have been held in Peel for the last two or three years. Apart from the carvels there are other ballads in existence, the most important of which were printed in vol. xvi. of the Publications of the Manx Society. The earliest is an 18th-century song of Manannan Mac y Lheir, traditionally supposed to have been written in the 16th century, and which

tells of the conversion of the island by St Patrick. Then comes Baase Illiam Dhdne (The Death of Brown William), dealing with the death of William Christian, who was shot as a traitor in 1662. The best-known Manx song is Mylecharaine (= Irish Maolchiardn) . It is directed against a man of this name who was the first to give a dowry to his daughter, the custom having previously been for the bridegroom to pay money to the father of the bride. Others are Ny Kirree fo Sniaghtey (The Sheep under the Snow), a song about the loss of the Douglas herring fleet in 1787 (reprinted at Douglas, 1872), and O Vannin Veg Veen (Dear little Mona). A further ballad was taken down by J. Strachan and is published in the Zeitschrift fiir celtische Philologie, i. 79. In 1760 Joseph Bridson wrote a "Short Account of the Isle of Man " in Manx (Coontey Ghiare jeh Elian Vannin ayns Gailck) , which was reprinted in vol. xx. of the Publications of the Manx Society. The translated literature is almost entirely of a religious character. Jenner prints a list of twenty -three volumes in his article referred to below, but we can only here mention the most important. The first is the translation of the English Prayer-Book by Bishop Phillips, 1610 (published by A. W. Moore, Oxford, 1895). The Sermons of Bishop Wilson in 3 vols. (1783) are a very rare work, highly important for our knowledge of Manx prose, and it is to be hoped that Yn Cheshaght Gailckagh will see their way to reprint it. A translation of parts of Milton's Paradise Lost (Pargys Caillit) by Thomas Christian, 1796, is reprinted in vol. xx. of the Publications of the Manx Society. The later translation of the Church of England Prayer-Book was printed in 1765 and again in 1777 and 1840. But by far the most important of all is the translation of the Bible. The energetic Bishop Wilson managed to get parts of the Scriptures translated and the Gospel of St Matthew was printed in 1748. Wilson's successor, Bishop Hildesley, completed the work, and in 1775 the whole Bible appeared. The last reprint of the Bible appeared in 1819, that of the New Testament in 1810 (?). As a curiosity it may be mentioned that recently Aesop's Fables have been translated into the vernacular (Douglas, 1901).

Authorities. — H. Jenner, " The Manx Language: its Grammar, Literature and Present State," Transactions of the London Philological Society (1875), pp. 172 ff. ; Publications of the Manx Society, vols, xvi., xx., xxi. ; L. C. Stern, Die Kultur d. Gegenwart, i. xi. 1 , pp. 1 10-1 1.

Early MSS.

IV. Welsh Literature. — The oldest documents consist of glosses of the 9th and 10th centuries found in four MSS. — Oxoni- ensis prior and posterior, the Cambridge Juvencus and Martianus Capella. These glosses were published by J. Loth in his Vocabulaire vieux-breton (1884), but their value is entirely philological. In addition, we possess two short verses, written in Irish characters, preserved in the Juvencus Manuscript in the University Library at Cambridge (printed in Skene's Four Ancient Books of Wales). This manu- script is a versification of the Gospels dating from the 9th century. The value of these two verses is threefold: they give us, in the first place, a specimen of the Welsh language at a time when the modern laws of euphony were in a comparatively elementary stage; secondly, they are of the utmost importance to the historian tracing the development of Welsh versification, and, in future research, they must be taken into account by the historian of modern metres in other languages; and, thirdly, the similarity of their form and diction to other verses, attributed to Lly warch Hen, and preserved in a much later orthography, will be a serious consideration to the higher critic in Welsh literature. All the prose and verse of the succeeding centuries, that is to say from the 10th to the beginning of the 14th, is preserved in "«/ k four important manuscripts, written during the latter Bookot half of the period. The first of these manuscripts is Carmnr- the Black Book of Carmarthen, a small quarto vellum then. " manuscript of fifty leaves, written in Gothic letters by various hands during the reign of Henry II. (published in facsimile by Gwenogvryn Evans, Oxford, 1907). This book belonged originally to the priory of Black Canons at Carmarthen, from whom it passed to the church of St David; at the suppres- sion of the monasteries in the reign of Henry VIII. it was pre- sented by the treasurer of that church to Sir John Price, one of the king's commissioners, and from him it passed eventually into the hands of Sir Robert Vaughan, the owner of the famous Hengwrt collection. It is now among the Peniarth AaeMn"" Manuscripts, undoubtedly the most valuable collec- tion of Welsh manuscripts in the United Kingdom. The second manuscript is the Book of Aneirin, a small quarto manuscript of nineteen leaves of vellum, written about 1250. It was at one time in the possession of Sir Thomas Phillips of

Middlehill, and now belongs to the free -Bookot library of the city of Cardiff. The third is the Book of Taliessin, in the Hengwrt and subsequently in the Peniarth collection. It is a small quarto manuscript containing thirty-eight leaves, written in Gothic letters, about the early part of the 14th century. The fourth manuscript, and in some respects the most important, is the Red Book "Red j jj er g es t y so called from Hergest Court, one of the Hergest." seats of the Vaughans. It is a folio volume of 360 leaves written by different hands between the beginning of the 14th and the middle of the 1 5th century. This manuscript, which is the most extensive compilation of the medieval prose and verse of Wales, is now in the possession of Jesus College, Oxford, and is kept in the Bodleian Library of that university. The main body of the poems contained in these four MSS. was printed by W. F. Skene with a tentative English version in his Four Ancient Books of Wales.

The other Welsh manuscripts, ranging down from the 15th to the 18th century, are far too numerous to notice, and it is outside the scope of this article to deal minutely with the original sources of the text of Welsh writings.

We will now only endeavour to sketch the history of Welsh literature from these early centuries down to our own times, and to show how the Celtic people of Wales have developed a literature true to their own genius, and how that literature stands to this day both a minister to the culture of the Welsh people and a sure indication of it.

1. Early Latin Writers. — The works now known as those of Gildas {q.v.) and Nennius {q.v.) are written in Latin; they throw considerable light on the origin of Welsh romantic literature and on the history of the earlier poems. Gildas was born at Ailclyd, the modern Dumbarton, that part of Britain which is

Tallest sin.

called by Welsh writers Y Gogledd, or the North. Several dates have been assigned for his birth and death, but he probably flourished between 500 and 580, and his book, De Excidio Britanniae seems to have been written about 560. This work is a sketch of British history under the Romans and in the period after their withdrawal from the country, and includes the period of the wars of the Britons with the Picts, Scots and Saxons. Mr Skene suggests very reasonably that the well-known letter of the

Britons to Aetius, asking for Roman aid, is misplaced, and that if put in its own place some of the ana- chronisms of Gildas will disappear. This work, which contains some spirited attacks on the leaders of the Britons for their sins, is strangely full of contradictions. It seems to be the work of some person well versed in the facts of that part of British history, to which he had an easy access, but who supplemented them with traditional details and with dates which were mere guess-work. Mr Skene thinks that the work of Nennius was originally written in Welsh in the north and was afterwards translated into Latin. To this nucleus was added the genealogies of the Saxon kings down to 738. Afterwards some person, called Marc in the Vatican manuscript, appended probably about 823 the life of St Germanus and the legends of St Patrick, which were subsequently incor- porated with the history. Some South Welshman added to the oldest manuscript of the history in these countries, about 977, a chronicle of events from 444 to 954, in which there are genea- logies beginning with Owain, son of Hywel Dda, king of South Wales. This chronicle, which is not found in other manuscripts, has been made the basis of two later chronicles brought down to 1286 and 1288 respectively. It is consequently not the work of one author. A learned Irishman named Gilla Coemgin, who died in 1072, translated it into Irish and added many things concerning the Irish and the Picts. The Historia Britonum is more valuable for the legendary matter which it contains than for what may be accepted as history, for it gives us the British legends of the colonization of Great Britain and Ireland, the exploits of King Arthur and the prophecies of Merlin, which are not found elsewhere before the 12th century. The date of the book is of the greatest importance to the history of medieval romance, and there can be no doubt that it is earlier than the Norman Conquest and that the legends themselves are of British origin.

2. The Epic Period, 700-950. — The higher criticism of the early poetry of Wales contained in the four ancient manuscripts already mentioned has undergone a good many changes since their contents first excited the curiosity of English scholars. In turn Welshmen, with more zeal than discretion, have displayed an amazing charlatanism in the extraordinary theories which they put forth, and Englishmen have shown an utmost meanness in belittling what is undoubtedly a most valuable monument of the past. But now the labours of Zeuss and others who have made a study of Celtic philology furnish us with much safer canons of

criticism than existed in 1849, when even a learned Welshman, the late Thomas Stephens, who did more than any one else to establish the claims of his country to a real literature, doubted the authenticity of a large number of the poems said to have been written by Taliessin, Aneirin, Myrddin and Llywarch Hen, who are supposed to have lived in the 5th century. A great service was done to Welsh literature by the publication of the texts of those poems from the four ancient manuscripts by W. F. Skene. In addition to the text, translations of the poems were furnished by Dr Silvan Evans and the Rev. Robert Williams, but the translation, though on the whole a very creditable work, is full of mistakes which few men, writing at that time, could have avoided. The publication of the text of the Black Book, with notes by Dr Gwenogvryn Evans, will be of great service towards clearing up the mist which envelops this older literature.

Most of the poems in these four manuscripts are attributed to four poets, Aneirin, Llywarch Hen, Taliessin and Myrddin, who are said to have lived and written in Cumbria or Y Gogledd, where the actors in the events referred to also lived. The greater part of this region enjoyed substantial independence down to the end of the 9th century, with the exception of the.

interval from 655, when they were subjected to the kingdom of Northumbria by Oswy after the defeat of Cadwallawn and Penda, to the battle of Dunnichen in 686, when Ecfrid, king of Northumbria, was defeated. From the 7th to the 9th century Cumbria, including under that name all the British territory from the Ribble to the Clyde, was the principal theatre of British and Saxon conflict. The rise of the dynasty of Maelgwn Gwynedd, who, according to Welsh tradition, was a descendant of Cunedda Wledig, one of the Picts of the north, brought Wales into close connexion with the Cumbrian kingdom, and prepared both North and South Wales for the reception of the northern traditions and the rise of a true Welsh literature.

Whether the poets of the north really wrote any of the poems which in a modified form have come down to us or not, there can be no doubt that a number of lays attributed to them lived in

popular tradition, and that under the sudden burst of glory which the deeds of Cadwallawn called forth and which ended in the disastrous defeat of 655, a British literature began to spring up, and was nourished by the hopes of a future resurrection under his son Cadwaladr, whose death was disbelieved in for such a long time. These floating lays and traditions gradually gathered into North Wales, brought thither by the nobility and the bards who fled before advancing hosts of the victorious Saxon kings of the north. The heroes of the north became now the heroes of Wales, and the sites of the battles they fought were identified with places of similar name in Wales and England.

By far the longest and the most famous poem of this series is attributed to Aneurin. This spelling of his name is comparatively modern, and in the old manuscripts it is given as Aneirin. The later form seems to have been affected by'the form eurin, " golden," and to owe the continuation of the misspelling to a belief that the poet and Gildas, whose name is supposed to be the Latin form of the Old English gylden, were one and the same person. This poem, called the Gododin (with notes by T. Stephens and published by Prof. Powel for the Cymmrodorion Society, Londdh, 1888), is extremely obscure, both on account of its vocabulary and its topography and allusions. It deals mainly with " the men who went to Cat- traeth," which is supposed to have been fought between the Britons and the Scots under Aedan, king of Dalriada, and the pagan Saxons and their British subjects in Devyr (Deira) and Bryneich (Bernicia), and the half-pagan Picts of Guotodin, a district corresponding to the northern half of the Lothians along the Firth of Forth. Critics have attempted with partial success to cast some light on its obscurity by supposing that the poem as a whole is made up of two parts dealing with two distinct battles. This may or may not be, but there is no doubt that many of the stanzas of the poem as found in the manuscript are not in their proper places, and a critical readjustment of the different stanzas and lines would do much towards solving its problem. It seems probable, too, that the original nucleus of the poem was handed down orally, and recited or sung by the bards and minstrels at the courts of different noblemen. It thus became the common stock-in-trade of the Welsh rhapsodist, and in time the bards, using it as a kind of framework, added to it here and there pieces of their own composition formed on the original model, especially when the heroes named happened to be the traditional forefathers of their patrons, and occasionally introduced the names of new heroes

and new places as it suited their purpose; and all this seems to have been done in early times. Older fragments dealing too with the legendary heroes of the Welsh were afterwards incorporated with the poem, and some of these fragments undoubtedly preserve the orthographical and grammatical forms of the 9th century. So that, on the whole, it seems as fruitless to look for a definite record of historical events in this poem as it would be to do so in the Homeric poems, but like them, though it cannot any longer be regarded as a correct and definite account of a particular battle or war, it still stands to this day the epic of the warriors of its own nation. It matters not whether these heroes fought at far Cattraeth or on some other forgotten field of disaster; this song v. 21

Taliessln.

Merlin.

still reflects, as a true national epic, the sad defeats and the brave but desperate rallies of the early Welsh. Like the music of the Welsh, its dominant note is that of sadness, expressing the exultation of battle and the very joy of life in minor notes. To a great extent Welsh poets are to this day true and faithful disciples of this early master.

Many of the poems attributed to Taliessin are undoubtedly late. Indeed, both Taliessin and Myrddin, 1 the one as the mythological chief of all Welsh bards and the other as a great magician, seem pre-eminently suited to attract a great deal of later Welsh poetry under their aegis; but the older poems attributed to them are worthy of any literature. ■ Some- times, as in the verses attributed to Llywarch Hen beginning Stafell Cynddylan, an early specimen of poetic grief over departed glory, we find that gentle elegiac note which is so common in early English poetry. In the Taliessinic poems, the Battle of Argoed Llwyvain and others, we have that boldness of portraiture which is found in the Gododin, whilst in many a noble line we seem to hear again the ravens screaming shrilly over their sword-feasts, and the strong strokes of the advancing warriors.

It was but natural that all the pseudo-prophetic poems, written of course after the events which they foretold, should be attributed to the chief among seers, Myrddin, or, as his name is written in English, Merlin; so that all the poems accredited to him, with the exception perhaps of the Avallenau, were not written before the

12th century.

In most of the poems attributed to Llywarch Hen and in some of the Myrddin poems, the verses begin with the same line, which, though it has no direct reference to the subject of the poem itself, is used as a- refrain or catch-word, exactly like the refrains employed by Mr Swinburne and others in their ballads. These lines generally refer to some natural object or objects, as, for instance, ” the snow of the mountain ” or ” bright are the tops of the broom.”

The first period, then, of Welsh literature lies between 700 and 950. It is in most respects the epic period, the period in which poets wrote of great men and their deeds, the legendary and the historic heroes of the Cymry, men like Urien Rheged, and heroes like Hyveidd Hir. Even in the next period the epic note had not quite died out.

3. The Prose Romances and the Poet Princes, 1100-1290. — It will be seen that there is a considerable gap between the first and second period of Welsh literature. It must not be supposed, however, that nothing was composed or written during these years. Indeed, it may well be that some of the poetry attributed to the minor bards of the last period was composed between 900 and 1 100, and that some other poetry too was written and lost. But there are abundant reasons for believing that Welsh poetry was at a very low ebb during those years. The progress of Wales as a political unit had suffered a check after the battle of Chester in 613. The effects of this defeat were not immediate, as the Welsh had still enough of their characteristic hopefulness to expect ultimate victory; we therefore have reasons for believing that the Gododin series of poems were still used — or perhaps used then for the first time — to spur on ” the V* e hawks of war ” to greater efforts. Gradually, however, series. the Angles, hemming them in on all sides from the Clyde to the Severn, began to press nearer and nearer; the Welsh at last seem to have lost heart, and no one any longer ” had the desire of song.” Content with their old epics and their older myths, which owe perhaps to these years a darker and more sombre tinge, they allowed their song to be hushed. The great lords had hardly chosen their final abodes; the smaller lords had all been killed in war and their places taken now by one, now by another, so that the warrior prince himself had not the leisure, and hardly the inspiration necessary, for song, and the bards found but scanty patronage among such a diminished and poverty-stricken

nobility. The only order that seemed to prosper was that of the monks, and we owe them our gratitude for

1 It is indeed probable that Myrddin is a purely fictitious character, whose name has been made up from Caer Fyrddin (= Maridunum), which was certainly not a personal name.

preserving the ancient writings and the ancient traditions; but they were simply copyists, though they had undoubtedly some hand in giving the Gododin its final form and in setting in its convenient framework the names of the forefathers of their aristocratic abbots.

In the year 1044 Gruff ydd ab Llewelyn conquered Hywel ab Edwin and became king of Wales. By means of his diplomacy and his arms he succeeded in stemming the tide of Saxon in- vasion that was threatening to overflow even the little remnant of land that was left to the Welsh, and his strong rule gave the Welsh muse another opportunity. Gruffydd, however, died in 1063, and was eventually succeeded in 1073 by Trahaern in North Wales, and Rhys ab Owen in South Wales. The rule of these two princes was destined to be the last period of literary inertness in the long interval following the confinement of Wales to her inaccessible highlands.

During these years a man was hiding in Ireland, called Gruffydd ab Cynan, a scion of the old branch of Welsh kings. In Brittany, too, Rhys ab Tewdwr, a claimant to the throne of South Wales, had sought the protection of his Breton kinsmen. In 1073 Rhys ab Tewdwr obtained the throne of Rhys ab Owen, and, after many years of hard fighting, Gruffydd ab Cynan, with the help of Rhys ab Tewdwr, defeated Trahaern at the battle of Myrydd Cam in 1081. On the accession of these two powerful princes the whole country broke forth into songs of praise and jubilation, and the long night was at an end.

It is important to remember that both Gruffydd and Rhys had a direct personal influence on the literary revival of their times. Gruffydd ab Cynan while in exile had seen how the Irish Oenach was held, and had seen prizes given for poetry and song. We have

it on the authority of Welsh writers that he reorganized the bards and improved the music, and in many other ways gave a great and beneficial impulse to Welsh literature. He may have brought over some of the later Irish legends which have had such a powerful effect on the literature of Wales.

Rhys ab Tewdwr, too, brought with him from Brittany an enthusiasm for the old Celtic tales, and perhaps some of the tales themselves which had been by that time forgotten in Wales, tales of the Round Table, and Arthur " begirt with British and Armoric knights," of knightly deeds and magical metamorphoses, which were destined to influence profoundly all the literatures of the West. We find, therefore, in this period that poetry flourished mostly in the North under Gruffydd ab Cynan, and prose in the south under Rhys ab Tewdwr, where the new enthusiasm for the old Welsh legends resulted in the History of Britain of Geoffrey of Monmouth, which Geoffrey j g an exparls j on f me books attributed to Gildas and mouth. Nenmus. It was written in Latin sometime before 1 147, and is dedicated to Robert, earl of Gloucester, the grandson of Rhys ab Tewdwr. In the introductory epistle, Geoffrey states that Walter, archdeacon of Oxford, had given him a very ancient book in the British tongue, giving an account of the kings of Britain from Brutus to Cadwaladr, and that he had translated it into Latin at the archdeacon's request. The book, however, is a compilation and not a translation, but the materials were probably drawn from British sources. In this history Geoffrey asserts that the deeds of Arthur " were commonly related in a pleasing manner." He was perhaps originally but the hero of some popular ballad, or of a forgotten stanza of the Gododin, and the importance of his name in the literature of the world seems to be due to an accident. We cannot, however, in this article consider the Arthurian Legend (q.v.) as a whole; we must be content with dealing with the most important of the romantic tales which are contained in the Red Book of Hergest. They may be divided into four classes: —

(i.) The Mabinogi proper, containing (1) Pwyll, prince of Pyvet; (2) Branwen, daughter of Llyr; (3) Manawyddan, son of Llyr; (4) Math, son of Mathonwy.

(ii.) Old British tales referring to Roman times, viz. (1) Lludd and Llevelys; (2) The Dream of Macsen Wledic.

(iii.) British Arthurian tales, viz. (1) Ktthwch and Olwen; (2) The Dream of Rhonabwy.

(iv.) Later tales of chivalry, viz. (1) The Lady of the Fountain; (2) Peredur, son of Evrawc; (3) Geraint, son of Erbin.

The group of four romances in the first class forms a cycle of legends and is called in the manuscript Pedeir Keinc y Mabinogi — the Four Branches of the Mabinogi; so it is only these four tales that can, strictly speaking, be called nogiont Mabinogion. In these stories we have the relics of the ancient Irish mythology of the Tuatha De Danann, some- times mixed with later myths. The Caer Sidi, where neither disease nor old age affects any one, is the Sid of Irish mythology, the residence of the gods of the Aes Side. It is called in one of the old poems the prison of Gweir, who no doubt represents Gaiar, son of Manandan MacLir, the Atropos who cut the thread of life of Irish mythology. Llyr is the Irish sea-god Lir, and was called Llyr Llediaith, or the half-tongued, implying that he spoke a language only partially intelligible to the people of the country. Bran, the son of Llyr, is the Irish Bran MacAllait, Allait being one of the names of Lir. Manawyddan is clearly the Manandan or Manannan MacLir of Irish mythology. These tales contain other characters which may not have been borrowed from Irish mythology but which are common to both mytho- logies; for example, Rhiannon, the wife of Pwyll who possessed marvellous birds which held warriors spell-bound for eighty years by their singing, comes from Annwn, or the unseen world, and her son Pryderi gives her, on the death of Pwyll, as a wife to Manawyddan.

Of the second class the first story relates to Lludd, son of Beli the Great, son of Manogan, who became king after his father's death, while his brother Llevelys becomes king of France and shows his brother how to get rid of the three plagues which devastated Britain : — first, a strange race, the Coranians, whose knowledge was so great that they heard everything no matter how low soever it might be spoken; second, a shriek which came into every house on May eve, caused by the fighting of two dragons; and third, a great giant who carried off all the pro- visions of the king's palace every day. The second tale relates how Maxen, emperor of Rome* has a dream while hunting, in which he imagines that he visits Britain, and in Caer Seint or Carnarvon sees a beautiful damsel, Helen, whom he ultimately finds and marries. > Both tales are British in origin and are founded on traditions referring to Roman times.

The most important of these tales are undoubtedly those contained in the first class, and the story of Ktthwch and Olwen.

The form in which they are found in the Red Book of Hergest is, as we have already said, comparatively speaking, modern. But it is apparent to any one reading these tales that the writers or compilers, as Matthew Arnold has suggested, are ” pillaging an antiquity, the secret of which they do not fully possess.” The foundations of the tales are the old Celtic traditions of the gods and the older heroes, and they clearly show Goidelic influence both in the persons they introduce and in their incidents. The tales would at first exist only in oral tradition, and after the advent of Christianity the characters they contain lost their title of divinity and became simply heroes — warriors and magicians. In time the monks began to write these ancient traditions, embellishing them and suppressing no doubt what they considered to be most objectionable. These then are the tales which we now possess — the traditional doings of the old heroes as set in order by Christian writers.

The changes which these later copyists wrought in the substance of the tales fall into two main divisions. In the first place, they attempted to find some connexion between tales or cycles of tales which originally had no connexion whatever, and were therefore forced to invent new incidents or to introduce other incidents from the outside in order to establish this connexion; and secondly, as in the case of the Gododin, the tales were twisted and altered to support references to and explanations of names known to the writer. So we find in the tale of Math vab Mathonwy the incident of the pigs is expanded to explain some place- names which the writer knew. It is this also that gives a local interest to the tales; for instance, Dyvet, the land of Pwyll, has come to be regarded as the home of Hud a Lledrith, of magic and

enchantment. Some places in North Wales, especially in the vicinity of Carnarvon, seem to be well known to the writers, and, therefore, to’ have associated with them to all time the glamour of the Mabinogion.

besides the scholastic efforts of the monks, which in course of time so greatly changed these old legends, there was another

class of men who had no little influence on the form and matter of Welsh, 1 and consequently of European, romance. These were the Welsh jongleurs — the professional story-tellers, against whom the bards proper fitirsed a deadly hatred because, presumably, their tales drew larger audiences and won greater rewards than the wwdlau of the poets. There is little doubt that this order existed in Wales at a very early period, being quite a natural evolution of the older poet who sang in comparatively free metres of the deeds of the great dead. It is these men who invented the term Mabinogi, which is supposed to mean a ” tale for young people “; but whatever the word may mean, the fact that they were the stock-in-trade of the professional story-teller will explain a good many of their structural peculiarities.

Thus there existed two distinct classes of tales, though it is to be supposed that the subject matter of both was more or less common; there are, in the first place, the ” four branches ” and the tales of the secoftd class, and, secondly, tales like those of the third class. With the exception of the Irish influence, which we have already referred to, aiid some later additions from early continental romance in the third class, we may take it that these three classes are of purely British origin. The pedair cainc are the old tales which were first committed to writing at an early period before the influence of the Armoric Arthur began to be felt, that is to say, about the beginning of the reign of Rhys ab Tewdwr in 1073. The other tales, that is those we have put in the third class, remained for a much longer time unwritten and were not set in writing before the early Arthur of Armoric and British romance had been evolved. This will account for the fact that Arthur is not mentioned in the first class of tales, and that in the third class he is simply a British Arthur. The third class is, therefore, in a sense later than the first and second, but its materials are as old as the oldest of the Mabinogion proper, and they show the influence of Irish mythology to the same extent. In the first class Irish names like Penardim, which have not been assimilated, show conclusively that the tale is a written one, while the eloquence of the descriptions in Kilhwch ac Olwen seem to point to the fact that it was up to a late period a spoken tale. Other such tales there were once, but they have now been lost.

The romances of the fourth class do not claim much notice. They are mostly imitations or translations of Norman French originals, and they belong to the history of European chivalry rather than to the history of Welsh literature.

As literature the Mabinogion may rank among the world's classics. We cannot here point out their beauties, but it will be sufficient to notice that the unknown writer who gave them their final form was a true artist in every sense of the word. In Branwen verck Lyr, for instance, the whole setting of the story is that of a great tragedy, a tragedy neither Hellenic nor Shakespearean, but the strong and ruthless tragedy of the Celts, — the tragedy of nature among unnatural surroundings, the tragedy which in our times Mr Thomas Hardy has so successfully developed. In this tale, Branwen is introduced as the sister of Manawyddan, the king of all Britain, and as the " fairest maid in the world." But as the tragedy deepens we read how this woman, dowered with beauty and goodness and nobility of lineage, is simply used as a pawn in a political game, and the full force of the tragedy falls on her own undeserving head. She is subjected to all kinds of indignities in her husband's court in Ireland, but throughout all her severe trials she preserves the cold and detached haughtiness which characterizes the full- bosomed heroines of the northern sagas; and, in the end, when her brother has delivered her and punished the Irish, and when she has safely reached the shores of her own M6n, she raises her eyes and beholds the two islands,Britain and Ireland. " 'Ah God!' said she, 'is it well that two islands have been made desolate for my sake?' And she gave a deep groan and died." So was her

tragedy consummated, and the writer, with a superb tragic touch, mentions the very shape of the grave in which they left her on the bank of the Alaw in Mon.

One of the earliest poets of this period whose productions we can be certain of is Meilir, bard of Trahaern, whom Gruffydd ab Cynan defeated at the battle of Cam, and afterwards of the conqueror Gruffydd himself. His best piece is the Death-bed of the Bard, a semi-religious poem which is distinguished by the structure of the verse, poetic feeling and religious thought. Meilir was the head of a family of bards; his son was Gwalchmai, one of the best Welsh poets; the latter had two sons, Einion and Meilir, some of whose poetry has reached us. In Gorhofedd Gwalchmai, Gwalchmai's Delight, there is an appreciation of the charms of nature, medieval parallels to which are only to be found in Ireland. His Arwyrain i Owain is an ode of considerable beauty and full of vigour in praise of Owain Gwynedd, king of North Wales; on account of his victory of Tal y Moelvre, part of which has been translated by Gray under the name of " The Triumphs of Owen.' Kynddelw, who lived in the second half of the 1 2th

century, was a contemporary of Gwalchmai, and wrote on a great number of subjects including religious ones ; indeed some of his eulogies have a kind of religious prelude. He had a command of words and much skill in versification, but he is pleonastic and fond of complicated metres and of ending his lines with the same syllable.

Among the other poets of the second half of the 12 th century may be mentioned Owain Kyveiliog and Howel ab Owain Gwynedd. The first named was prince of Powys, and was distinguished also as a soldier. The Hirlas, or drinking-horn, is a long poem where the prince represents himself as carousing in his hall after a fight; bidding his cup-bearer fill his great drinking-horn, he orders him to present it in turn to each of the assembled warriors. As the horn passes from hand to band he eulogizes each in a verse beginning Diwallaw di venestr, ” Fill, cup-bearer.” Having thus praised the deeds of two warriors, Tudyr and Moreiddig, he turns round to challenge them, but suddenly recollecting that they had fallen in the fray, and listening, as it were, to their dying groans, he bursts into a broken lamentation for their loss. The second was also a prince; he was the eldest of the many sons of Owain Gwynedd, and ruled for two years after his father until he fell in a battle between himself and his step-brother Dafydd. He was a young man of conspicuous merit, and one of the most charming poets of Wales, his poems being especially free from the conceits, trivial commonplaces, and complicated metres of the professional bards, while full of a gay humour, a love of nature and a delicate appreciation of women. The Welsh poets went on circuit like their Irish brethren, staying in each place according as hospitality was extended to them. When departing, a bard was expected to leave a sample of his versification behind him. In this way many manuscripts came to be written, as we find them in different hands. Llywarch ab Llywelyn has left us one of those departing eulogies addressed to Rhys Gryg, prince of South Wales, which affords a favourable specimen of his style.

The following are a few of the poets of the 13 th century whose poems are still extant. Davydd Benvras was the author of a poem in praise of Llywelyn ab Iorwerth; his works, though not so verbose or trite as bardic poems ,3tb of this class usually are, do not rise much above the ˆ“etsT bardic level, and are full of alliteration. Elidir Sais was, as his name implies, able to speak the English language, and wrote chiefly religious poetry. Einiawn ab Gwgawn is the author of an extant address to Llywelyn ab

Iorwerth of con- siderable merit. Phylip Brydydd, or Philip the poet, was house- hold bard to Rhys Gryg (Rhys the hoarse), lord of South Wales. One of his pieces, an apology to Rhys Gryg, is a striking example of the fulsome epithets a household bard was expected to bestow upon his patron, and of the privileged domesticity in which the. bards lived, which, as in Ireland, must have been fatal to genius. Prydydd Bychan, the Little Poet, was a South Wales bard whose extant work consists of short poems all addressed to his own princes. The chief feature of his Englynion is the use of a

kind of assonance in which in some cases the final vowels agreed alternately in each quatrain, and in others each line ended in a different vowel, in both cases with alliteration and consonance of final consonants or full rhyme. Llygad Gwr is known by an ode in five parts to Llywelyn ab Gruffydd, written about the year 1270, which is a good type of the conventional flattery of a family bard. Howel Voel, who was of Irish extraction, possessed some poetical merit; his remonstrance to Llywelyn against the imprisonment of his brother Owain is a pleasing variety upon the conventional eulogy. It has many lines beginning with the same word, e.g. gibr, man. The poems of Bleddyn Vardd, or Bleddyn the Bard, which have come down to us are all short eulogies and elegies. One of the latter on Llywelyn ab Gruffydd is a good example of the elaborate and artificial nature of Welsh versification.

The most illustrious name among the poets of this century is Gruffydd ab yr Ynad Coch, " Gruffydd, son of the Red Justice," who wrote many religious poems of great merit. His greatest work, however, is the elegy to Llywelyn ab Gruffydd, the last prince of Wales. It is easily first among all the elegies written in the Welsh language. We do not find in it that artficial grief which is too evident in the Marwnadau of the Welsh poets; it re-echoes an intense personal grief, and throughout the whole piece the poet feels that he stands at the end of all things,— the end of his own ideals, the extinction of all Cymric hopes. So poignant is his grief, and in so universal a manner does the catastrophe of Llywelyn's death present itself to him, that he imagines that all the natural features of the Welsh fatherland know that the last

great Welshman is dead; the winds howl over the mountains, the rain-clouds gather thick, the waves rage with grief against the Welsh coasts, and far away on the hills the giant oak-trees beat against each other in the fury of their passion. Sadly, in this manner, closes the second period of Welsh literature.

4. The Golden Age of the Cywydd, 1340-1440. — Just as, after the loss of the North, the Welsh muse was hushed, so after the final subjugation of Wales in 1282, hardly a note was heard for many a long year. The ancient patrons of literature were dead, and the country had not yet settled down to the steady rule of England. Indeed, the conquest of Wales effectively put an end to the older Welsh poetry of that type which we noticed in the last period. These older bards were without exception subjects of the princes of North Wales, where the old heroic poetry was still popular, and when the power of these princes came to an end the old poetry too ceased. When the Welsh muse emerges again from the darkness of this interval she is no longer of the North; the new poets are drawn from the Welshmen of the South, a land which had practically ceased to be a part of an independent Wales shortly after the Norman conquest of England. We find, too, that the poetry which poured forth from the Welsh bards of the south is of an altogether different type, it is modern in all its essentials, in diction, in language, and, comparatively speaking, in sentiment. Indeed, there is an infinitely greater difference between Dafydd ab Gwilym and Gruffydd ab yr Ynad Coch than there is between him and any poet writing in the alliterative metres in the 19th century. So that we must suppose that at the time when the poets of North Wales still sang of war and mead-drinking in a style and diction that was an inheritance from the times of the Gododin, the poets of the South, unharassed by wars, were developing a new poetry of their own, a poetry that had relinquished for ever the Old Welsh models and was at last in line with the great poetical movements of Europe. And, judging from the fact that the earliest of these poets whose works are accessible to us are in the full zenith of their poetical development, we must believe that their work is the consummation of a period, that is to say, that they must have had a long line of predecessors whose works were lost during the period intervening between the loss of Welsh independence and the rise of Daf} f dd ab Gwilym. These men wrote, as we have already said, in South Wales, a country which was then under the rule of the Norman lords, who, with the lapse of years and the rise of new systems, were fast becoming Welsh.

It ds no wonder, then, that the poets who wrote under their patronage should show unmistakable traces of Norman influence, Most of the barons still spoke French, and it was only natural that they should be well versed in French poetry. The poets followed the lead of their patrons, and their work was modelled to a very great extent on French and Provencal poetry. Nor does this account altogether for the wonderful similarity between Welsh cywyddau and other poems of this period and the French lays; we must remember that the Welsh poets lived under conditions similar to those under which the troubadours and the trouveres lived, and it was natural that the same environments should produce the same kind of work. The Provencal alba and the French aube, the serenade and other forms, became well known in South Wales and were of course read by the Welsh poets. We find continual references in the poets to " books of love " under the name of llyfr Ofydd, or the " book of Ovid," and a reference in one of Dafydd ab Gwilym's poems shows conclusively that one particular llyfr Ofydd was a work of the French poet Chrestien de Troyes. Indeed, one of the commonest names among the poets of this period — the llatai, 1 or love-messenger — may be a Romance word borrowed through the Norman-French from the Italian Galeotto, originally the name of the book of the loves of Galahaad, but afterwards the ordinary word for a go- between. This book of Galeotto, by the way, was the book which taught Paolo and Francesca da Rimini, in Dante's Divina Commedia, the tragic secret of love.

Another movement also was favourable to the rise of the new Welsh poetry. The iron hand of the church, which had been the censor of poetry for so many centuries, was slowly relaxing its grasp, and the men who a few years before would have sung religious hymns to the Virgin, now laid their tributes at the feet of divine womanhood as they saw it in the Welsh maidens and matrons living among them. The pale queen of heaven no longer held hearts captive; they had transferred their allegiance to the " brow that was as the snow of yesternight," and " the cheeks that were like the passion-flower." The Iolo MSS. assert that some time between January 1327 and November 1330 there were held, under the patronage of Ivor Hael, Dafydd ab Gwilym's patron, and others, the three Eisteddfodau Dadeni, or the Eisteddfods of the Revival of the Muse, to reorganize the bards, and to set in order all matters pertaining to Welsh poetry. The most important bards who are reported as present at some or all of these meetings were Dafydd ab Gwilym, Sion Cent, Rhys Goch of Eryri,

and Iolo Goch. It is now, however, generally agreed that this account is a fabrication and that the date of all the poets is later.

Dafydd ab Gwilym is certainly the most distinguished of all the Welsh poets, and were it not for the absolute impossibility of adequately translating his cywyddau he would rank amongst the greatest poets of medieval times. By gˆ™,.** far the greater part of his poetry is written in the metre called cywydd, with heptasyllabic lines rhyming in couplets. It was he who imparted so much lustre to this metre that it became the vehicle of all the most important poetry from his time to the 19th century, and he is generally referred to by his contemporaries as the special poet of the cywydd — Dafydd gywydd gwin, ” Dafydd of the wine-sweet cywydd.” Most of his poems deal with love in the spirit of the medieval writers of France and of Provence, but with this very important difference, that the French writers must base their reputation on their treatment of love as a theme, whereas Dafydd’s claim to fame is based on his treatment of nature and of out-door life. In many cases, indeed, love is only a conventional peg whereon he may hang his observations on nature, and Welsh literature may claim the distinction of having had its Wordsworth in the 14th century. His treatment of nature is not merely realistic and objective, it has a certain quaint and elusive symbolism and a subjectiveness which come as a revelation to those who are acquainted with the medieval poetry of other nations. Many

1 Another derivation of this word is from Had, ” profit ” + kai, a suffix denoting the agent. Others derive it from or connect it with the Irish slad-.

of the poems attributed to him are undoubtedly the work of later hands, but even after making all possible deductions, there is still an infinite variety among what remains, ranging as his poems do from a sturdy denunciation of monkish fraudu- lenee to the most delicate and pathetic recollections of departed joys. He has, besides, considerable importance as a teacher, as when, for instance, he invites the nun ” to leave her watercress and paternosters of Romish monks,” and to come with him ” to the

cathedral of the birch to listen to the cuckoo's sermons," for, " were it not an equally worthy deed to save his (Dafydd's) soul in the birch-grove as to do so by following the ritual of Rome and St James of Compostella " ? Even in his old age, when he is beginning to repent of his rash and merry youth, nature has not deserted him, — the very tree under which in the old days he used to meet his sweetheart has become bent and withered in sympathy with him. Though Dafydd yields not the palm to any poet of his class throughout the world, and though his influence is still a potent factor in the literature of Wales, we are certain of hardly a single fact about his life. He flourished between 1340 and 1390. His works were published in London in 1789. This edition was reprinted by Ffoulkes of Liverpool in 1870. See L. C, Stern, Zeilschr. f. celt. Phil. vol. vii.

Sion Cent was chaplain to the Scudamores of Kentchurch in Herefordshire, and though, therefore, in orders, was a most bitter opponent of the pretentious and the evil life of the monks of his time. All his writings show signs of the influence of the moralists of the middle ages, and treat of religious or of moral subjects. His poetry is strong and austere, interfused here and there with the most biting satire. He died about 1400. Like many of his con terriporaries,Dunbar, Villon, Menot and Manrique, his dominant note is that of sadness and regret.

Rhys Goch Eryri had a sprightly muse which deals with fanciful subjects. His themes are often similar to those of Dafydd ab Gwilym, but whereas the subject of Dafydd's muse was nature and his treatment universal, Rhys Goch's are simply natural objects which he treats in a vigorous but narrow and cold manner.

Iolo Goch, that is, Iorwerth the Red, deserves a special mention as the poet who voiced the aspirations of a new Wales when Owen Glyndwr began to rise into power, and it is to one of his poems that we owe a most minute description of Sycharth, Owen Glyndwr's home. His poetry is slightly more archaic in diction than that of his contemporaries, as his subject — war and the glory of Welsh heroes — belonged more properly to the age before his own. In one very striking cywydd composed after Glyndwr's downfall, he calls upon this hero to come again and claim his own, and addresses himself fancifully to all the countries of the world where his hero may be in hiding. He died after 1405, and, if the dates generally given for his birth be even approximately correct, he must have lived to a prodigious age

(cf. Gweithiau Iolo Goch, by Charles Ashton, London, 1896).

Rhys Goch ap Rhiccert claims to be named with Dafydd ab Gwilym as a writer of lyrics in praise of beautiful women. He has one advantage, however, over his more famous contemporary in the variety of his metres. The musical lilt and the delicate workmanship of his poems, with their recurring refrain, give him a unique position among his medieval contemporaries as the first purely lyrical poet. His jloreat is probably a little later than that of Dafydd ab Gwilym, for we must not be misled by the late orthography of his poems.

Dafydd Nanmor is chiefly famous for two exquisite cywyddau, Cywydd Marwnad Merch, or Elegy of a Maiden, and Cywydd i walk Llio, or Cywydd to Llio's Hair. In both these poems he shows elegance rather than depth, and a fancy as bold as that of his great master Dafydd. In the first of these cywyddau his grief is so great that he wishes that he were but the shroud around his dead sweetheart, and, in the second, Llio Rhydderch's golden hair over her white brow is compared to the refulgence of lightning over the fine snow. He is supposed to be a younger contemporary of Rhys Goch Eryri, but there are many facts to warrant a supposition that he lived much later, even as late as 1490.

Llywelyn Goch ap Meurig Hen deserves to be mentioned as the author of the famous Marwnad Lleucu Llwyd, an elegy which is far more convincing in its sincerity than Dafydd Nanmor's cywydd. Few of his compositions are extant, but the one already mentioned is sufficient to place him in the first rank of the poets of the period. He lived approximately from 1330 to 1390.

The other poets of this period who deserve some mention are Dafydd Ddu o Hiraddug, who wrote poems on religious subjects, and who is supposed to have translated part of the Officium Beatae Mariae into Welsh; Gruff ydd Grug, between whom and Dafydd ab Gwilym a most fierce poetic quarrel raged, but who is the author of a beautiful elegy on his opponent; Gruffydd Llwyd ab Dafydd, who was the poet of-Owen Glyndwr ; and whose cywydd in praise of his patron is one of the best of that type; Hywel Swrdwal and Gwilym ab Ieuan Hen.

5. The Silver Age of the Cywydd. 1440-1550. — The insurrection of Owen Glyndwr, though originally the result of a private quarrel, was the general revolt of a nation against the con-

querors whom it hated, and the English king knew well enough that the discontent with his rule was fanned by the older and more national Welsh institutions, and by none more than by the system of wandering bards. The conditions which had given rise to this system were fast dying out, but the noblemen, who fortunately were still intensely Welsh, were loth to give up their family bards, and the bards themselves, never a too industrious class, were too glad of their freedom and easy life to turn to more profitable work. We find, therefore, that a law was passed in 1403, the fourth year of Henry IV.'s reign, prohibiting bards " and other vagrants " from exercising their profession in Gwynedd or North Wales. This law, however, like its pre- decessor in the reign of Edward I., failed utterly in its purpose. By prohibiting the Welsh noblemen from giving their patronage to the bards, and, therefore, from distinguishing between the real bards and the mendicant rhymesters, this law took away the only safeguard against the latter class, with the result that by about 1450 they had become a pest to the country. About that time there flourished a poet called Llawdden, who, noticing the very unsatisfactory state of poetry in Wales, induced his kinsman, Gruffydd ab Nicolas, a nobleman living in Y Dre- newydd (Newtown), to petition Henry VI. for permission to hold an eisteddfod similar in purpose to the three Eisteddfodau Dadeni of the last period. This famous eisteddfod was held at Caerfyrddin (Carmarthen) in 1451, and / W j/, shortly before the actual eisteddfod was held a " statute " was drawn up under the direction of Llawdden, regulating the different orders of bards and musicians and setting in order the cynghaneddion a mesurau, the different kinds of alliterative verse to be presented to the assembled bards at the meeting. Among those present at that eisteddfod the most distinguished was Dafydd ab Edmwnd, who then made famous the dictum that the purpose of an eisteddfod was " to bring to mind the past, to consider the present, and to deliberate about the future." He, therefore, proposed emendations in " the rules of Welsh verse," making them more strict, so as to keep the un- learned rhymesters from the privileged bardic class. This measure had a most important effect on Welsh literature. It effectively put an end to the charming spontaneity which distinguishes the poetry of Dafydd ab Gwilym and his con- temporaries, and by introducing an arbitrary set of rules gave an artificial tone to almost all the poetry of the next two hundred years. It had, indeed, exactly the same retarding effect on Welsh poetry as the Unities had on the French drama. So that, whereas the poems of Dafydd ab Gwilym,

though written in the difficult alliterative metres, are nearly all light and have a sweet lyrical re-echo, the poetry of Dafydd ab Edmwnd and his successors is often heavy and nearly always artificial. After making, however, all these deductions, it is a debatable point whether the hard and fast rules which now regulated Welsh poetry did not eventually justify their existence. They have helped, by inciting to carefulness, to keep the idiom and the language pure and undented, and to this day style in Welsh

poetry is not necessarily a striving after the uncommon as it too often is in English.

There are some poets included in this period who belong more properly to the last, but even these show signs of the attempt at correctness and distinction which was supplanting the old simplicity. Ieuan ap Rhydderch ab Ieuan Llwyd, who is supposed to be a brother of the Llio Rhydderch of Dafydd Nanmor's poem, is the author of some cywyddau and other poems addressed to the Virgin, the structure of which shows great skill accompanied by force and clearness. He flourished about 1425. Dafydd ab Meredydd ap Tudur, who flourished about 1420, is the author of a cywydd " to Our Saviour." About the same time lived Rhys Nanmor, Ieuan Gethin ab Ieuan, and Ieuan Llwyd ab Gwilym. Among the earliest of the poets who belong properly to this period is Meredydd ap Rhys, whose cywyddau are a fair specimen of the generality of poems written in these years. Among the most famous of his works is a cywydd "begging for a fishing-net," and another giving thanks for the same. We shall find that many of his con- temporaries were able to write long and interesting poems on such seemingly dry and uninteresting subjects, but it is vain to look for anything beyond good verse in such compositions. Of poetry, as generally understood, there is none.

The commanding figure in this period is, of course, Dafydd ab Edmwnd, who was a disciple of Meredydd ap Rhys. He bears somewhat the same relation to his contemporaries T E4mwni. as Dafydd ab Gwilym does to his, and to strain an analogy, we

might say that as Dryden was to Milton, so Dafydd ab Edmwnd was to Dafydd ab Gwilym. He was regarded by his contemporaries as the greatest poet that North Wales had ever produced, and some would set him up as a rival even to Dafydd ab Gwilym himself. He would probably have produced much greater poetry had he understood that the cywydd and the other metres were strait and shackled enough without the cymeriadau and other devices which he introduced, or at least sanctioned and made popular. He begins many of his cywyddau and odes with the same letter; he is the chief among Welsh formalists, but in spite of his self-imposed restric- tions he is a great poet also. His most famous poems are three Cywyddau Merck or " Poems to a Lady," and his Cywydd i Wallt Merck, " cywydd to a lady's hair." He is the author of the lines already quoted: " thy brow," he sings, " is as the snow of yesternight, and thy cheeks like a shower of roses." He died about 1480. Dafydd ab Edmwnd's disciples were Gutyn Owain and Tudur Aled, who was also his nephew. Gutyn Owain lived between 1420 and 1500, and was one of the men appointed by the king's commissioners to trace, or perhaps to manu- facture, the Welsh pedigree of Henry VII. He belonged entirely to the school inaugurated by Dafydd ab Edmwnd, and though he was by no means wanting in imagination, the highest distinc- tion of his verse is its intricacy of form and very often the felicity of his couplets.

Just as the rise of Owen Glyndwr in the beginning of the century had given a new impulse and a new interest to poetry, so in 1485, when Henry VII. — the " little bull " as he is called by the poets — ascended the throne of England, a particular kind of poetry called brud, half history and half prophecy, became popular, and we have in the manuscripts much writing of this description, a good deal of it worthless as poetry. Occasionally, however, some of these " bruts " may claim to be called poetry, especially the compositions of Robin Ddu o Fon, who wrote poems in praise of the Tudors and hailed them as the deliverers of the nation, even before Henry VII. had landed in England, and Dafydd Llwyd ab Llywelyn, whose works deserve to be much better known than they are at present. One of the best cywyddau among his works is the " Address to the Raven," to whom he promises a right royal feast when the hero whom all Wales is expecting has met his royal enemy. Tudur Aled, too, was a zealous partisan of Henry VII. and wrote many cywyddau in praise of Sir Rhys ap Thomas, the great champion of Henry's cause in South Wales. He is also famous as having supplemented

and made a new recension of Dafydd ab Edmwnd's rules of

poetry in the eisteddfod held at Caerwysin 1524. Tudur Aled has always been more widely known in Wales than almost any other of the earlier poets except Dafydd ab Gwilym. This is perhaps due to the quotability and sententiousness of his couplets. There is a certain refreshing dryness about his poetry which partly makes up for his want of imagination. One of the most interesting poets of this century is Lewis Glyn Cothi, who lived between 1410 and 1490. During the Wars of the Roses he was a zealous Lancastrian, and his bitterest enemies were the men of Chester, who had treated him scurvily while he was there in hiding, and his omidl, satirizing the men of that city, is one of the most vigorous compositions in the language. Indeed, among so many cywyddau of this period in conventional praise of different patrons, it is most refreshing to find such an outburst of sincere personal feeling, boldly and fiercely expressed. He wrote an awdl also rejoicing in the victory of Henry VII. Most of his work, however, consists of cywyddau mawl — praise of patrons — containing weary and unpoetical pedigrees. Gruffydd Hiraethog, who flourished about 1 540, was a disciple of Tudur Aled. A fierce poetical dispute raged between him and Sion Brwynog of Anglesey, who was a contemporary of his. About this time there were many poets in Wales who were imitators of Dafydd ab Gwilym, and who did not follow implicitly the lead of Dafydd ab Edmwnd, like those whom we have mentioned. Much of their poetry is feeble, but Bedo Brwynllysg especially stands out from among the rest, and his poetry, though highly imitative and often over fanciful, is of a much higher order than the genealogical poems of Lewis Glyn Cothi and others. In the same way the only poem of any merit of Ieuan Denlwyn printed in the Gorchestion is written in this imitative strain. Other poets of the middle of this period are Deio ap Ieuan Du, Iorwerth Fynglwyd, Lewys Morganwg, Ieuan Brydydd Hir, and Tudur Penllyn, who wrote a superb cywydd to Dafydd ab Siencyn, the outlaw.

Towards the end of the period we begin to breathe a literary atmosphere that is gradually but surely changing, — it is the change from the misty Wales of Roman Catholic times to the modern Wales after the Reformation. The poetical incoherencies of the old metres and the tricks of fancy of the old stylists occasionally form a somewhat incongruous dress for the thoughts of later poets. The old spirit and the glamour were gradually wearing away, only to be momentarily revived in the poetry of Goronwy Owen, nearly two centuries later. Two; or three figures,

indeed, stand out prominently during these years, among whom are some of the bards ordained penceirddiaid (master-poets) in the second Caerwys Eisteddfod held in 1568, viz. William Llyn,' William Cynwal, Sion Tudur, and Sion Phylip. William Llyn (1530?-! 580) was a pupil of Gruffydd Hiraethog. His complicated awdlau are marvels of ingenuity, but many of them are on that very account almost unintelligible. He was, however, a complete master of the cywydd, in which he sometimes displays a sense of style and a sweetness of imagery allied to a melodiousness of language unequalled by the other poets of the period. His best-known work is the famous marwnad to his master, Gruffydd Hiraethog. Sion Tudur (d. 1602), also a disciple of G. Hiraethog, was connected in some capacity or other with the cathedral at St Asaph. He is a realist, and delights in giving vivid word pictures in a less fanciful strain than his pre- decessors. Sion Phylip (1543-1620) wrote a famous marwnad to his father and a cywydd "to a sea-gull," which is a superb piece of nature-painting in the style of Dafydd ab Gwilym. While dealing with this second Eisteddfod at Caerwys, we may note that Simwnt Fychan's " Laws of Poetry " were accepted at this festival.

Two poets of this period, whom an English writer describes a " the two filthy Welshmen who first smoked publicly in the streets," were captains in Queen Elizabeth's navy, viz. Thomas Prys (d. 1634) of Plas Iolyn, and William Myddleton (1556-1621), called in Welsh Gwilym Canoldref. The former wrote, among other things, humorous cywyddau descriptive of life in London and in the English navy of those days, in a style which was afterwards attempted by Lewys Morys. The work of

Myddleton, by which he is best known, is his translation of the Psalms (1603) into Welsh cywydd metre, a difficult and profitless experiment.

With Edmwnd Prys (1541-1624), the famous archdeacon of Merioneth, we come to distinctly modern times. He is hardly a great poet, if we judge him by the canons which are now popular. His gift was a gift of terse and biting statement, and his cywyddau on the whole have more of literary than of poetical

merit. He was a man of vast learning, and his works are full of scholastic and often difficult allusions. His most famous cywyddau are those written in the literary quarrel between him and Wiliam Cynwal. ” Wiliam Cynwal,” says Goronwy Owen, ” though the greater poet, was like a man fighting with bare fists against complete armour,” and it may be freely granted that in this, the most famous quarrel in Welsh literature, the palm of victory rested with the contentious old ecclesiastic. We shall deal with the rest of Edmwnd Prys’s literary work in the section on the rise of popular poetry.

Here the age of the cywydd and the awdl, as the chief forms of verse, ends. They appear again in the succeeding centuries, but as aliens among a nation that no longer paid them homage. The distinctly Welsh fashion in song was dying out.

6. Prose, 1550-1750. — One of the most striking features of Welsh literature is the almost entire absence of prose between 1300 and 1550. The genius of the people has always befen an eminently poetical and imaginative one, and the history of Wales, politically and socially, has always been a fitter subject for poetry than for prose. During this period, Wales enjoyed a rest from propagandists and revolutionaries which has seldom been the happy lot of any other nation— they lay content with their own old traditions, acquiescing proudly in their separation from the other nations of Europe, and in their aloofness from all the movements which shook England and the continent during those years. Dynasties came and went, one religion ousted another religion, a new learning exposed the absurdities of the old, but the Welsh, among their hills, knew nothing of it; and when new ideas began to brood over the consciousness of the nation, they never got beyond the stage of providing new subjects for cywyddau. The Peasant Revolt, for instance, had but little effect on Welsh history, its most important contribution to the heritage of the nation being Iolo Goch’s superb ” Cywydd to the Labourer.” Even the Reformation, which helped to change the whole fabric of English literature, had little effect on that of Wales, and the age of the cywydd dragged out wearily its last years without experiencing the slightest quickening from the great movement which was remaking Europe. Hardly a prophet or reactionary raised his voice in defence or condemnation, and the Welsh went on serenely making and reading poetry. The two political movements in which Wales was really interested, the revolt of Glyndwr and the accession of Henry VII., paid their tribute to its poetry alone, and both enterprises had sufficient of

romance in them to repel the historian and to capture the poet. Naturally, therefore, we have no prose in this period, because there was no cause strong enough to produce it. What prose the nation required they found in the tales of romance, in the legends of Arthur and Charlemagne and the Grail, and, as for pedigrees and history, were they not written in the cywyddau of the poets?

The little prose that was produced during this period (1300- iSSo) was of an extraordinary kind. It was simply an exercise in long sentences and in curiously built compounds, and therefore more nearly allied to poetry. It generally took the form of dewis-bethau, a list of the " choice things " of such and such a person, or of the later triads (trioedd), which, starting from an ancient nucleus, gradually grew till, at the present day, Wales has a gnomic literature out of all proportion to the rest of its prose. Modern Welsh prose, however, is only very indirectly connected with these compositions. It is almost altogether a product of the Biblical literature which began to appear after the Reformation, and we shall proceed to give here the main facts and dates in its development. The first Welsh book was printed in 1546. It consisted of extracts in Welsh from the Bible and the Prayer

Book, and a calendar. The author was Sir John Prys (1502 1555). The most important name in the early part of this period is William Salesbury (i520?i6oo?). His chief books were, A Dictionary in Englyshe and Welshe (printed in 1547, and pub lished in facsimile reprint by the Cymmrodorion Society), Kynniver Llilh a Ban (1551), the Prayer Book in Welsh (1567), and the most important of all his works, the translation of the New Testament (1567). It is difficult to form any estimate, at this distance of time, of the impetus which William Salesbury gave to Welsh prose, but it must be regretfully admitted that his great work was marred by many defects. He had a theory that Welsh ought to be written as much like Latin as possible, and the result is that his language is very poor Welsh, both in spelling and idiom; it is an artificial dialect. It is a striking testimony, however, to his influence that many of the constructions and words which he manufactured are found to this day in correct literary Welsh.

In 1567 was published a Welsh Grammar by Dr Gruffydd Roberts, a Roman Catholic priest living at Milan (reprinted in facsimile, Paris, 1883), and in 1583, under the direction of Dr Rhosier Smyth, his Drych Cristionogawl was published at Rouen. Many

other important Welsh books were produced during these years, but the work which may be regarded as having the greatest influence on the subsequent literature of Wales was the translation of the Welsh Bible (1588) by Dr William Morgan (1547 ?-i6o4), bishop of Llandaff, and afterwards of St Asaph. The Authorized Version (1620) now in use is a revision of this work by Dr Richard Parry, bishop of St Asaph (1560-1623). In 1592 the Welsh Grammar of Sion Dafydd Rhys (1 534-1609) was published — a most valuable treatise on the language and on the rules of Welsh poetry. It was followed in 1621 by the Welsh Grammar, and in 163 2 by the Welsh Dictionary of Dr John Davies o Fallwyd (rS7o 7-1644).

There are two prose compositions which stand entirely by themselves in this period of Bibles and grammars — the History of Ellis Gruffydd, and Morris Kyffin's Defyniad y Ffydd. The former was a soldier in the English army during the reign of Queen Elizabeth, and wrote a long history of England from the earliest times to his own day. This document, which has never been published, and which lies hidden away among the Mostyn MSS., is a most important and valuable original contribution to the history of the author's contemporaries, and it sheds considerable light on the inner life of the court and the army. It is written in a delightfully easy style, contrasting favourably with the stiff diction of this period of translations. The work of Morris Kyffin (1555 ?i 598 ?) which we have mentioned is a translation of Bishop Jewel's Apologia Ecclesiae Anglicanae (1562) and was published in 1595 This work is the first piece of modern Welsh prose within reach of the ordinary reader, written in the rich idiom of the spoken Welsh. It is a precursor of many other books of its kind, a long series culminating in the immortal Bardd Cwsc. In this sense Morris Kyffin may with perfect justice be hailed as the father of modern Welsh prose.

Most of the works which were afterwards written in the strong idiomatic Welsh of Morris Kyffin were on religious subjects, and many of them were translated from the English. The first was Ymarfer Dduwioldeb (1630) by Rowland Vychan o Gaergai (a translation of Bailey's Practice of Piety), which was followed in 1632 by Dr John Davies's Llyfr y Resolution, and in 1666 by Hanes y Ffydd Ddijfuant (A History of the True Faith) by Charles Edwards. All these authors and many of their successors were strong adherents of the Established Church, which was then intensely Welsh in sentiment. But in the midst of these churchmen, a flame-bearer of dissent appeared — Morgan Llwyd o

Wynedd, who published in 1653 ” a mystery to be understood of some, and scorned of others ” — Llyfr y Tri Aderyn (The Book of the Three Birds). It is in the form of a discussion between the eagle (Cromwell), the dove (Dissent) and the raven (the Established Church) . This book is certainly the most important original composition published during the 17th century, and to this day remains one of the widely-read classics of the Welsh

tongue. Morgan Llwyd wrote many other books in- Welsh and English, all more or less in the vein of the first book.

During the remaining years of this period, the prose output of the Welsh press consisted mainly of devotional books, written or translated for or at the instigation of the Society for Promoting Christian Knowledge. The Established Church, with the help of this society, made a gallant attempt to lighten the darkness of Wales by publishing books of this description, and it is mainly due to its exertions that the lamp of Welsh prose was kept burning during these years. Among the clergy who produced books of this description were Edward Samuel (1674-1748), who published among other works Holl Ddyledswydd Dyn, a translation of The Whole Duty of Man (17 18); Moses Williams (1684-1742), a most diligent searcher into Welsh MSS. and translator; Griffith Jones of Llanddowror (1683-1761), the father of Welsh popular education; Iago ab Dewi (1644 P-I722) and Theophilus Evans (1694-1769), the famous author of Drych y Prif Oesoedd (1716 and 1740). This book, like Llyfr y Tri Aderyn and Y Bardd Cwsc, has an established position for all time in the annals of Welsh literature.

We come now to the greatest of all Welsh prose writers, Ellis Wyn o Lasynys (1671-1734). His first work was a translation of Jeremy Taylor’sˆ Holy Living, under the title of Rheol Buchedd Sanctaidd (1701). His next work was the immortal Gweledigaethau y Bardd Cwsc (1703). The founda- tion of this work was L’Estrange’s translation of the Suenos of the Spaniard Quevedo. Ellis Wyn has certainly followed his original closely, even as Shakespeare followed his, but by his inimitable magic he has transmuted the characters and the scenery of the Spaniard into Welsh characters

and scenery of the 17th century. No writer before or after him has used the Welsh language with such force and skill, and he will ever remain the stylist whom all Welsh writers will strive to imitate. The magic of his work has endowed the stately idiom of Gwynedd with such glamour that it has now become the standard idiom of Welsh prose. See Stern, Z. f. celt. Phil. iii. 165 ff.

7. The Rise of Popular Poetry, 1600-1750. — When Henry VII. ascended the throne, the old hostility of the Welsh towards the English disappeared. They had realized their wildest hope, that of seeing a Welshman wearing " the crown of London." Naturally enough, therefore, the descendants of the old Welsh gentry began to look towards England for recognition and preferment, and their interest in their own little country necessarily began to wane. The result was that the traditional patrons of the Welsh muse could no longer understand the language of the poets, and the poets were forced to seek some more profitable employment. Besides, the old conditions were changing; the medieval traditions were indeed dying hard, but it gradually and imperceptibly came about that the poets of the older school had no audience. The only poets who still followed the old traditions were the rich farmers who " sang on their own land," as the Welsh phrase goes. A new school, however, was rising. The nation at large had a vast store of folk-poetry, full of all the poetical characteristics of the Celt, and it was this very poetry, despised as it was, that became ultimately the groundwork of the new literature.

The first landmark in this new development was the publica- tion in 162 1 of Edmwnd Prys's metrical version of the Psalms (followed by later editions in 1628, 1630, 1638 and 1648), and of the first poem of the Welshmen's Candle (Cannwyll y Cymry) of Rhys Pritchard, vicar of Llandovery (1569-1644). This was published in 1646. These works were not written in the old metres peculiar to Wales, but in the free metres, like those of English poetry. The former work is of the utmost importance, as these Psalms were about the first metrical hymns in use. They are often rugged and uncouth, but many of the verses — such as the 23rd Psalm — have a haunting melody of their own, which grips the mind once and for ever. The second work, the first complete edition of which was published in 1672, consisted of moral verses in the metres of the old folk-songs (Penillion Telyn), and for nearly two centuries was the " guide, philosopher and friend " of the common people. Many other poets of the

early part of this period wrote in these metres, such as Edward Dafydd o Fargam (fl. 1640), Rowland Fychan, Morgan Llwyd o Wynedd and William Phylip (d. 1669). Poetry in the free metres, however, was generally very crude, until it was given a new dignity by the greatest poet of the period, Huw Morus o Bont y Meibion (1622-1709). Most of his earlier compositions, which are among his best, and which were influenced to a great extent by the cavalier poetry of England, are love poems, perfect marvels of felicitous ingenuity and sweetness. He fixed the poetic canons of the free metres, and made what was before homely and uncouth, courtly and dignified. He wrote a cywydd marwnad to his contemporary, Edward Morus o'r Perthi Llwydion (d. 1689), who was also a poet of considerable merit. Most of his work is composed of " moral pieces " and carols. Other poets of the period were Sion Dafydd Las (1650-1691), who was among the last of the family bards, and Dafydd Jones o Drefriw (fl. 1750). Towards the end of the period comes Lewys Morys (1700-1765). His poetry alone does not seem to warrant his fame, but he was the creator of a new period, the inspirer and the patron of Goronwy Owen. According to the lights of the 18th century, he was, like his brothers Richard and William; a scholar. His poetry, except a few well-known pieces, will never be popular, because it does not conform to modern canons of taste. His greatest merit is that he wrote the popular poetry then in vogue with a scholar's elegance.

8. The Revival, 1750-1830. — The two leading figures in this period are Goronwy Owen (172 2-1769) and William Williams, Pantycelyn (1717-1791). Goronwy Owen wrote all his poetry in the cynghanedd, and his work gave the old metres a new life; He raised them from the neglect into which they had fallen, and caused them to be/till this day, the vehicle of half the poetical thought of Wales. But he was in no way a representative of his age; he, like Milton, sang among a crowd of inferior poets themes quite detached from the life of his time, so that he also, like his English brother, lacks •" human interest." After Dafydd ab Gwilym, he is the greatest poet who sang in the old metres, and the influence of his correct and fastidious muse remains to this day. William Williams, however, wrote in the free metres in a way that was astoundingly fresh. It is not enough to say of him that he was a hymnologist; he is much more, he is the national poet of Wales. He had certainly the loftiest imagina- tion of all the poets of five centuries, and his influence on the Welsh people can be gauged by the fact that a good deal of his idiom and

dialect has fixed itself indelibly on modern literary Welsh. Besides the hymns, he wrote a religious epic, Theo- memphus, which is to this day the national epic of evangelical Wales. Even as Goronwy Owen is the father of modern Welsh poetry in the old metres, so William Williams is the great fountain- head of the free metres, because he set aflame the imagination of every poet that succeeded him. With two such pioneers, it is natural that the rest of this period should contain many great names. Thomas Edwards (Twm o'r Nant) (1739-1810) has been called by an unwarrantably bold hyperbole, " the Welsh Shakespeare." Most of his works are interludes and ballads, and he used to be very popular with the common people; he is, to this day, probably the oftenest quoted of all the Welsh poets. William Wynn, rector of Llangynhafal (1 704-1 760), is the author of a " Cywydd of the Great Judgment," which bears comparison with Goronwy Owen's masterpiece. Evan Evans (Ieuan Brydydd Hir) (1 731-1789) was famous both as a poet and as a scholar and antiquarian. Edward Rhisiart (171 4- 1777), the schoolmaster of Ystradmeurig, was a scholar and a writer of pastorals in the manner of Theocritus. Most of the other poets who flourished towards the end of this period — Dafydd Ddu Eryri (1760-1822), Gwallter Mechain (1761- 1849), Robert ab Gwilym Ddu (1767-1850), Dafydd Ionawr (1751-1827), Dewi Wyn o Eifion (1784-1841) — were brought into prominence by the Eisteddfod, which began to increase in influence during this period until it has become to-day the national festival. They all wrote for the most part in cynghanedd, and the work of nearly all of them is marked by correctness rather than by poetical inspiration.

9. Prose after 1830. — In the preceding periods, we have seen that Welsh prose, though abundant in quantity, had a very narrow range. Few writers rose above theological controversy or moral treatises, and the humaner side of literature was almost entirely neglected. In this period, however, we find a prose literature that, with the exception of scientific works, is as wide in its range as that of England, and all departments are well and competently represented, though by but few names. Dr Lewis Edwards (1800-1887) struck a new note when he began to contribute his literary and theological essays to the periodicals,

but, though many have equalled and even surpassed him as theological essayists, few, if any, of his followers have attempted the literary and critical essays on which his fame as writer must mainly rest. Together with Gwilym Hiraethog (1802-1883), the author of the inimitable Llythyrau Hen Ffarmwr, he may be regarded as the pioneer of the new literature. Samuel Roberts (1800-1885), generally known as S.R., wrote numerous tracts and books on politics and economics, and as a political thinker he was in many respects far in advance of his English contemporaries. It was in this period, too, that Wales had her national novelist, Daniel Owen (1836-1895). He was a novelist of the Dickens school, and delighted like his great master " in writing mythology rather than fiction." He has created a new literary atmosphere, in which the characters of Puritanical and plebeian Wales move freely and without restraint. He can never be eclipsed just as Sir Walter Scott cannot be eclipsed, because the Wales which he describes is slowly passing away. He has many worthy disciples, among whom Miss Winnie Parry is easily first. Indeed, in her finer taste and greater firmness of touch, she stands on a higher plane than even her great master. The inspiring genius of the latter part of this period is Owen M. Edwards (b. 1858), and, as a stylist, all writers of Welsh prose since Ellis Wynn have to concede him the laurel. His little books of travel and history and anecdote have created, or rather, are creating a new school of writers, scrupulously and almost pedantically careful and correct, an ideal which, on its philological side is the outcome of the scientific study of the language as inaugurated by Sir John Rhys and Professor Morris Jones. One of the earliest, if not the ablest writer of this " new Welsh " was the independent and original Emrys ap I wan (d. 1906), whose Homiliau was published in 1907.

10. Poetry after 1820. — The origins of this period are really placed in the last period. Its great characteristics are the development of the lyric, and the influence of English and continental ideas. Just as the cywydd was among the older writers the favourite form of poetry, so the lyric becomes now paramount, almost to the exclusion of other forms. The first great name, after those already mentioned in the development of this form of poetry, is that of Anne Griffiths (1776-1805). Her poetry is exclusively composed of hymns, but to the English mind, the word " hymn " is entirely inadequate to give any idea of the passion, the mysticism and the rich symbolistic grace of her poems. She gave to the Welsh lyric the depth and the rather

melancholy intensity which has always characterized it. Evan Evans (Ieuan Glan Geirionydd) (1795-1855) was also a hymnologist, but he wrote many secular lyrics and awdlau — among the former being the famous Morfa Rkuddlan. Ebenezer Thomas (Eben Fardd) (1802-1863) was a famous Eisteddfodwr; his best work is his awdlau, and no one will deny him the distinction of being the master poet of the awdl in the 19th century. Gwilym Cawrdaf (1795-1848), also a writer of awdlau, has the gift of simple and direct expression, well exemplified in Hiraeth Cymro am ei wlad. Daniel Ddu (1792-1846) was a scholar who wrote some touching lyrics and hymns. Gwilym Hiraethog (1802- 1883) attempted an epic, Emmanuel, with indifferent success. His shorter works and some of his awdlau are of a much higher order. Caledfryn (1801-1869) was a direct successor of Dewi Wyn and the earlier writers of awdlau, but his Drylliad y Rothsay Castle is superior to anything which his master wrote. Similar in genius, though not on quite as high a plane, were Nicander (1809-1874), Cynddelw (1812-1875), Gwalchmai (1803-1897) and Tudno (1844-1895).

John Blackwell (Alun) (1797-1840) was a lyricist of the first order. With Ieuan Glan Geirionydd, he is the pioneer of the secular lyric of the 19th century. Succeeding to this group of lyricists, we have another later group, Ceiriog (1832-1887), Talhaiam (1810-1869) and Mynyddog (1833-1877), who certainly had the advantage over their predecessors in freshness, in vigour and in human interest, but they lacked the scholastic training of the earlier group, and so their work is often uneven, and cannot therefore be fairly compared with that of the earlier poets. Ceiriog, of course, is the greater name of the three, and is to Wales what Robert Burns was to Scotland, sharing with him his poetical faults and merits. He is called the national poet of Wales, because he was the first to sing of the land and the nation he knew, and he cast the glamour of his genius over the life of the gwerin, the peasants of Wales.

Somewhat higher flights were essayed by Gwilym Maries (1834-1879) and Islwyn (1832-1878). Their poetry is Wordsworthian and mystical, and well exemplifies the love of metaphysics and speculation which is growing in Wales. Islwyn's Y storm, though uneven, is full of powerful passages, and he was a master of blank verse. Of the remaining poets of the period / living in 1908, the most distinguished was the Rev. Elvet Lewis in the older generation, and Eifion Wyn in the younger — both writers of lyrics. Other lyrical poets of the first class are Gwylfa

and Silyn Roberts. In the old metres, two poets stand out prominent above all others — J. Morris Jones and T. Gwynn Jones. The Awdl i F anion of the former, and the Ymadawiad Arthur of the latter, gave reason to believe that Welsh poetry was only entering on its golden period.

Authorities. — General. — T. Stephens, Literature of the Kymry (London 2 , 1876) ; L. C. Stern in Die Kultur d. Gegenwart, i. xi. 1 pp. 1 14-130; Gweirydd ap Rhys. Hanes Llenyddiaeth Gymreig, 1300- 1650 (London, 1885) ; C. Ashton, Hanes Llenyddiaeth Gymreig, 165 1- 1850 (Liverpool, 1893); J. Loth, Les Mabinogion (2 vols., Paris, 1889) ; E. Anwyl, Prolegomena to Welsh Poetry (London, 1905), also on the Mabinogi in Zeitschr.f. celt. Phil. i. 277 ff. ; LB. John, The Mabin- ogiore(London, 1901) ; T. Shankland, Diwygwyr Cymru, reprinted from Sereh Gomer (1899); W. J. Gruffydd, Foreign Influences on Welsh Literature in the XIV. and XV. Centuries, Guild of Welsh Graduates . (1908) ; Gwilym Lleyn, Llyfryddiaeth y Cymry (Llanidloes, 1867) ; Robert Williams, Enwogion Cymru (Llandovery, 1852) ; Owen Jones, Cymru (2 vols., London, 1875); D. W. Nash, History of the Battle of Cattraeth (Tenby, 1861); Encyclopaedia Cambrensis (10 vols., 2 1 889-1 896); C. Ashton, Bywyd ac amserau yr Esgob Morgan (Treherbert, 1891); J. Foulkes, /. Ceiriog Hughes, ei fywyd a'i waith (Liverpool, 1887); J. M. Jones, Llenyddiaeth fy ngwlad (Holy- well, 1893) ; H. Elvet Lewis, Sweet Singers of Wales (London, 1889) ; H. W. Lloyd, Welsh Books Printed Abroad in the XVI. and XVII. Centuries (London, 1881).

Anthologies, Selected Prose and Verse, &c. — W. F. Skene, The Four Ancient Books of Wales (2 vols., Edinburgh, 1868); W. Owen (Pughe), Iolo Morganwg and Owen Jones (Myfyr), Myvyrian Archai- ology of Wales (3 vols., London, 1801; 2 Denbigh, 1870, in 1 vol.); Dr John Davies (o Fallwyd), Flores Poetarum Britannicorum (Shrews- bury, 1710; Swansea, 1814; reprinted London, 1864); Iolo Morganwg, Iolo Manuscripts (Llandovery, 1848); E. Evans, Some Specimens of the Poetry of the Antient Welsh Bards translated into English, &c. (London, 1764); Hugh Jones, Dewisol Ganiadau yr Oes Hon (Shrewsbury, 1759; 6 Merthyr, 1827), Diddanwch Teuluaidd (London, 1763); David Jones, Blodeugerdd Cymry (Shrewsbury 2 , 1779); Owen Jones, Ceinion Llenyddiaeth Gymreig (2 vols., London, 1876); W. Lewis Jones, Caniadau Cymru (Bangor 2 , 1908); W. Jenkyn Thomas, Penillion Telyn (Carnarvon, 1894); Myrddin Fardd, Cynfeirdd Lleyn (1905) ; Cyfres Lien Cymru, vols, i.-vi. (Cardiff, 1900-1906) ; W. J. Gruffydd, Y Flodeugerdd Newydd (Cardiff, 1908) ; 0. M.

Edwards, Beirdd y Berwyn (Conway, 1903).

Versification, &c, — Dafydd Morganwg, Yr Ysgol Farddol (Cardiff 3 , 1887); Iolo Morganwg, Cyfrinach Beirdd Ynys Prydain (Merthyr, 1829 ; 2 Carnarvon, 1874) ; Simwnt Vychan and Dafydd Ddu Athraw, Dosparlh Edeyrn Davod Aur, ed. by J. Williams ab Ithel (Llandovery, 1856) ; J. Morris Jones, " Welsh Versification," Zeitschr.f. celt. Phil. iv. pp. 106-142.

Collected Works, Editions and Reprints, — J. Gwenogvryn Evans and John Rhys, Y Llyyyr Coch Hergest (2 vols. Oxford, 1887-1890), Pedeir Kainc y Mabinogi (Oxford, 1897); J. Gwenogvryn Evans, The Black Book of Carmarthen (Oxford, 1907; also in facsimile, Oxford, 1888), Llyvyr Job trans. byDr Morgan, 1558 (reprinted 1888)., Oil Synwyr pen [Salesbury] (Bangor, 1902) ; J. Morris Jones and John Rhys, Llyvyr Agkyr Llandewivrevi (Oxford, 1894); Aneurin Owen, Ancient Laws and Institutes of Wales (2 vols., London, 1841), Brut y Tywysogion (London, 1863); J. Williams ab Ithel, Gododin with Notes and Translation (Llandovery, 1852); T. Stephens,

Gododin with Notes and Translation, ed. by T. Powel (London, 1888) ; R. Williams, Selections from the Hengwrt MSS. (2 vols., London, 1876-1892); T. Powel, Ystorya de Carolo Magno (London, 1883), Psalmau Dafydd trans, by W. Morgan (facsimile, 1896) ; Owen Jones (Myfyr) and W. Owen (Pughe), Barddoniaeth Dafydd ab Gwilym (London, 1789) ; Walter Davies and J. Jones, Poetical Works of Lewis Glyn Cothi (1837); Prince Louis Bonaparte, Athrawaeth Gristnogavl by Morys Clynoc (facsimile London, 1880) ; Walter Davies, Caniadau Huw Morus (2 vols., 1823), Psalmau Dafydd gan W. Middleton (Llanfair, 1827) ; J. Morris Jones, Gweledugaethai y Bardd cwsc gan Elis Wynne (Bangor, 1 898) ; R. Jones, The Poetical Works of Goronwy Owen (2 vols., London, 1876); W. J. Gruffydd, Cywyddau Goronwy Owen (Newport, 1906) ; T. E. Ellis, Gweithiau Morgan Llwyd (Bangor, 1899); J. H. Davies, Yn y Llyvyr hwn (Bangor, 1902) ; S. J. Evans, Drych y Prif Oesoedd gan Th. Evans (Bangor, 1902) ; W. P. Williams, Deffyniad Ffydd Eglwys Loegr gan Morys Kyffin (Bangor, 1908) ; N. Cynhafal Jones, Gweithiau W. Williams Pantycelyn (2 vols., 1 887-1891); O. M. Edwards, Gweithiau Islwyn (1897). (W. J. G.)

V. Breton Literature. — Unlike the literature of Wales, the literature of Brittany is destitute of originality, and we find nothing to compare with the Mabinogion. Till the 19th century- all the monuments which have come down to us are copies of French models, though the retention down to the 17 th century of that intricate system of versification found in Welsh and Cornish may indicate that what was really Breton in spirit has riot been preserved (v. J. Loth, La Melrique galloise, ii. 177-203). It is usual to divide the literature into three periods in con- formity with the language in which the monuments are written — ■ Old, Middle, and Modern Breton. No connected monuments of the first period (8th to nth centuries) have come down to us: For our knowledge of the language of this period we must have recourse to the manuscripts containing glosses and the names occurring in ancient documents. The chief collections of glosses are (1) the Oxford glosses on Eutychius; (2) the Luxemburg glosses; (3) the Bern glosses on Virgil; (4) the glosses on Amalarius (Corpus Christi, Cambridge); (5) five Collationes Canonum, the chief manuscripts being at Paris and Orleans. All these glosses have been published in one volume by J. Loth (Vocabulaire Vieux-Breton, Paris, 1 884) . From a linguistic point of view the Breton names in the Latin lives of saints are very important, particularly those of St Samson, St Paul, Aurelian, St Winwaloe, St Ninnoc, St Gildas and St Brieuc. Of even greater value are the names in the Charter of Redon, which was written in the nth century, but dates largely from the 9th (published by A. de Courson, 1865); we ‘may also mention the Charter of Landevennec (nth century). In the Middle Breton period, which extends from the nth to the 17th centuries, we are obliged, down to the 15th century, to rely on official documents such as the Charter of Quimperle. French seems to have been the language of the aristocracy and the medium of culture. Hence the oldest connected texts are either translated or imitated from French, and are full of French words. We might mention a Book of Hours belonging to the 16th century, published by Whitley Stokes, and three religious poems bound up with the Grand Mystere de Jesus; further, the Life of St Catherine (1576) in prose (published by Ernault, Revue celtique, viii. 76), translated from the Golden Legend, the Mirror of Death, containing 3360 verses, which was composed in 1519 and printed in 1576, the Mirror of Confession, a translation from the French in prose (1621), the Christian Doctrine, a translation in verse (1622), a collection of carols {An Nouelou ancien, 1650, Rev. celt. vols, x.-xiii.) and the Christian Meditations of J. Cadec, 1651 (Rev. Celt, xx. 56). The earliest Breton printed work is the

Catholicon of Jean Lagadeuc, a Breton-Latin-French dictionary, dated 1464 but printed first in 1499 (reprinted by R. F. Le Men, Lorient, 1867). Modern Breton begins with the orthographical reforms of the Jesuit, Julien Maunoir, whose grammar (Le SacrS College de Jesus) and dictionary appeared in 1659. Throughout the modern period we find numerous collections of religious poems and manuals of devotion in prose and verse, which we cannot here attempt to enumerate. But the bulk of Breton literature before the 19th century consists of mysteries and miracle plays. This class of literature had a tremendous vogue in Brittany, and the native stage was only killed about 1850.

It is stated, for instance, that no less than 15,000 copies were sold of the Tragedy of the Four Sons of Aymon, first published in 1815. It is impossible to give the titles of all the dramas which have come down to us (about 120). The manuscript collection of the Bibliotheque Nationale in Paris is described in the Revue celtique, xi. 389-423 (many since published) and Le Braz gives a useful list of other manuscripts in the biblio- graphical appendix to his TMdtre celtique. A few of these plays belong to the Middle Breton period. The Life of St Nonn, the mother of St David, belongs to the end of the 15th century, and follows the Latin life (published by Ernault in the Revue celtique, viii. 230 ff., 405 ff.). Le Grand Mystere de J&sus (1513) follows the French play of Arnoul Gresban and Jean Michel (published by H. de la Villemarque, Paris, 1865). A French original is also followed in the Mystere de Sainte Barbe (1st ed., 1557, 2nd ed., 1647, reprinted by Ernault, Nantes, (1885). These mystery plays may be divided into four categories according to the subjects with which they deal: (1) Old Testa- ment subjects; (2) New Testament subjects; (3) lives of saints; (4) romances of chivalry. There is occasionally a dash of local colouring in these plays; but the subject matter is taken from French sources or, in the case of the third category, from Latin lives. Even when the life of a Breton saint, e.g. St Gwennolfi, is dramatized, the treatment is the traditional one accorded to all saints of whatever origin. Amongst the most favourite subjects in addition to those already mentioned we may note the following: Vie des quatre fils, Aymon, Ste Tryphine et le red Arthur, Huon de Bordeaux, Vie de Louis Eunius, Robert le Diable. These mysteries commonly contain from 5000 to 9000 lines of either 1 2 or 8 syllables apiece. For the sake of complete- ness we may add the names of three farces, described by Le Braz: Ar Farvel goapaer (Le bouffon moqueur), Ian Melargt (Mardi-gras), La Vie de Mardi-gras, de

triste Mine, safemme, et de ses enfants. The actors, who were always peasants, came to be regarded with an unfavourable eye by the clergy, who finally succeeded in killing the Breton stage.

We look in vain for any manifestation of originality in Breton literature until we reach the 19th century. The consciousness of nationality then awakened and found expression in verse.

The movement led by Le Gonidec (described above in the section on Breton language) caused ardent patriots to endeavour to create a national literature, more especially when the attention of the whole world of letters was directed to Brittany after the publication of the Barzas Breiz. The most prominent of these pioneers were Auguste Brizeux, F. M. Luzel and Prosper Proux. Brizeux (1803-1858), better known as a French poet, wrote a collection of lyrics entitled Telen Arvor, or the Armorican Harp (Lorient, 1844, reprinted Paris, 1903). Luzel's original compositions were published under the title of Bepred Breizad, Toujours Breton (Morlaix, 1865), and Prosper Proux is known as the author of Canaouenno grit gant eur C'hernewod (1838) and Ar Bombard Kerne, or The Hautboy of Cornouailles (Guingamp, 1866). Dottin also mentions Telenn Remengol, by J. Lescour (Brest, 1867) ; Telenn Gwengam, by the same writer (Brest, 1869), a volume of Chansoniou by Y. M. Thomas (Lannion, 1870), and another by C. Rannou. This was a very creditable beginning, but the themes of these writers are apt to be somewhat conventional and the constant recurrence of the same situation or the same idea grows monotonous. An anthology of poems connected with this movement appeared at Quimperle in 1862 under the title of Bleuniou Breiz, Poisies anciennes et modemes de la Basse-Bretagne (reprinted, Paris, 1905). Several of La Fontaine's fables were published in a Breton dress by P. D. de Goesbriand (Morlaix, 1836), and a collection of fables in verse which is thought very highly of by cultivated Bretons appeared under the title of Marvaillou Grac'h koz by G. Milin (Brest, 1867). A book of Georgics in the dialect of Vannes appeared under the title of Lew al labourer (The Farmer's Book) by 1′ Abbe Guillome (Vannes, 1849), and Le Gonidec prepared a translation of the Scriptures, which was revised by Troude and Milin, and published at St Brieuc in 1868. But the real literature of Brittany consists of legends, folk-tales and ballads. The first to tap this source was

Hersart de la Villemarque (1815-1895), who issued in 1839 his famous collection of ballads entitled Barzas Breiz, but which cannot be regarded as an anthology of Breton popular poetry. The publication of this work gave rise to a controversy which is almost as famous as that caused by Macpherson's forgeries. De la Villemarque was endowed with considerable poetic gifts, and, coming as he did at a time when folk-poetry was the fashion, he determined to collect the popular literature of hisown country. However, he was not content to publish the poems as he found them circulating in Brittany. With the aid of several collaborators he transformed his material, eliminating anything that was crude and gross. The poems included in his collection may be divided into three classes: (1) Poems rearranged by himself or others. These consist mainly of love-songs and ballads. (2) Modern poems transferred to medieval times. (3) Spurious poems dealing with such personages as Nominoe and Merlin. The compiler of the Barzas Breiz unfortunately laboured under the delusion that these Breton folk-songs were in the first instance the work of medieval bards corresponding to Taliessin and Llywarch Hen in Wales, and that it was possible to make them appear in their primitive dress. The very title of the collection indicates the artificial nature of the contents. For Barzas (in the 2nd edition of 1867 spelt Barzaz) is not a Breton word at all but is formed on Welsh barddas (bardic poems). For the whole controversy the reader may consult H. Gaidoz and P. Sebillot, " Bibliographie des traditions et de la litterature populaire de la Bretagne " {Revue celtique, v. 277 ff., and G. Dottin in the Revue de synthese historique, viii. 95 ff.). In Brittany it is usual to divide the popular poetry into gwerziou and soniou. The gwerziou (complaintes) deal with local history, folk-lore, religious legends and superstitions, and are in general much more original than the other class. The soniou consist of love-songs, satires, carols and marriage-lays, as well as others dealing with professional occupations, and seem in many cases to show traces of French influence. The first scholar who published the genuine ballad literature of Brittany was F. M. Luzel, who issued two volumes under the title of Gwerziou Breiz-Izel, chants populaires de la Basse-Bretagne (Lorient and Paris, 1868, 1874). This collection contains several of the originals of poems in the Barzas Breiz. Luzel is also the author of a collection of Breton tales in French translation, Conies bretons recueillis et Iraduits par F. M. Luzel (Quimperle, 1870). The same author published

Les L'egendes chreliennes de la Basse- Bretagne (Paris, 1881) and Veillees bretonnes, maeurs, chants, contes etrecits populaires des Bretons- Armoricains (Morlaix, 1879). Another indefatigable collector of Breton legends is Anatole le Braz, who was commissioned by the minister of public instruction to investigate the stories current with reference to An Ankou (death). Le Braz's results are to be found in his La LSgende de la mort (1902 2). A well-known collection of stories with a French translation was issued by the lexicographer Trbude under the title of Ar marvailler brezounek (Brest, 1870), and one of the most popular books at the present day is Pipi Gonto, by A. le Moal (St Brieuc, vol. i. 1902, vol. ii. 1908). A recent collection of stories with a religious tendency is C. M. le Prat's Marvailhou ar Vretoned (Brest, 1907). The modern movement, which started in the 'nineties of last century, has already produced numerous dramas and volumes of lyrics, and it may now be affirmed in all seriousness that Brittany is producing something really national. The scope of the writers of the earlier movement was very ■ limited and little originality was displayed in their productions. The literary output of the last ten years in Brittany may truly be termed prodigious, and much of it reaches quite a high level. The dramas which are being produced are mainly propagandist in the interests either of the Union RSgionaliste Bretonne or of temperance reform. These are for the most part very crude, but they have been received with great enthusiasm, and this has led to the revival of the old mysteries, though in a somewhat modified form. The foremost living writer is Fanch Jaffrennou, who writes under the name of " Taldir " (Brow of Steel) and is the author of two very striking volumes of lyrics — An Hirvoudou or Sighs (St Brieuc, 1899) and An Delen Dir or The Harp of

Steel (St Brieuc, 1900). The latter is the most interesting out-come of the modern movement. Among other poets we may mention N. Quellien (Annaik, Paris, 1880; Breiz, Poisies bretonnes, Paris, 1898), Erwan Berthou (Dre an Delen hag ar c'horn-boud, Par la harpe et par le cor de guerre, St Brieuc, 1904), C. M. le Prat, who writes under the name of Klaoda (Mouez Reier Plougastel, " The Voice of the Cliffs of Plougastel," St Brieuc, 1905), J. Cuillandre (Mouez an Aochcu, La Voix des greves, Rennes, 1903), abbe Lec'hvien, Gwerziou ha soniou (St Brieuc, 1900), and, further, two anonymous volumes of verse, An Tremener, Gwerziou ha soniou (Brest, 1900), and Kanaou- ennou Kerne (Brest, 1900). Two older collections are mentioned by Dottin — J. Cadiou, En Breiz-Izel (Morlaix, 1885) and Ivona

(Morlaix, 1886). An anthology of latter-day lyrics appeared at Rennes in 1902 under the title of Bleuniou Breiz-Izel, Dibab Barzoniezou. Of the numerous plays those most deserving of mention from a literary point of view are perhaps Ar Vezventi by T. le Garrec; the comedy Alanik al Louarn by J. M. Perrot (Brest, 1905) based on the farce of Pathelin; Tanguy Malmanche, Le Conte de I'dme qui a faim, in which Breton superstitions connected with the spirits of the dead are introduced with strange effect; J. le Bayon, En Eutru Keriolet (Vannes, 1902), which deals with the life and death of a blaspheming Breton nobleman of the early part of the 17th century; F. Jaffrennou, Pontkallek (Brest, 1903), which tells of the betrayal of a noble Breton who was put to death by the French in 1720; and the farce Eur Pesk-Ebrel by L. Rennadis (Morlaix, 1900).

Authorities. — A history of Breton literature does not exist, though we possess ample materials for such a work. The following works and articles may be consulted: G. Dottin. Revue de synthese historique, viii, 93-104, contains a full bibliography; J. Loth, Chrestomathie bretonne (Paris, 1890); L. C. Stern in Die Kultur d. Gegenwart, i. xi. 1, pp. 132-137; A. le Braz, Le Theatre celtique (Paris, 1904) ; H. Gaidoz and P. Sebillot, " Bibliographie des traditions et de la litterature populaire de la Bretagne " (Revue celtique, v. 277-338; supplement by P. Sebillot, Revue de Bretagne, de Vendee, et d'Anjou, 1894); F. M. Luzel, " Formules initiates et finales des conteurs en Basse-Bretagne " (Revve celtique, iii. 336 ff.) ; L. F. Sauve, " Formulettes et traditions diverses de la Basse- Bretagne " (Revue celtique, v. 157 ff.) ; Channes, " Oraisons et con- jurations magiques," ib vi. 66 ff. ; " Devinettes bretonnes," ib. iv 60 ff. ; " Proverbes et dictons de la Basse-Bretagne," ib. i.-iii. For Breton proverbs see also A. Brizeux, " Furnez Breiz," in CEuvres de A. Brizeux (Paris, 1903) ; J. Loth, " Chansons en bas-vannetais " (Revue celtique, vii. 171 ff.) ; N. Quellien, Chansons et danses des Bretons (Paris, 1889); E. Ernault, " Chansons populaires" (Revue celtique, xxiii. 121 ff.) ; P. le Roux, " Une Chanson bretonne du xviii siecle " (Revue celtique, xix. 1). Since 1901 a complete bibliography of modern works pertaining to Breton language and literature appears from time to time in the Annates de Bretagne. (E. C. Q.V

VI. Cornish Literature. — The literature of Cornwall is more destitute of originality and more limited in scope than that of Brittany, and it is remarkable that the medieval drama should occupy the most prominent place in both. The earliest Cornish we know consists of proper names and a vocabulary. About 200

Cornish names occur among the manumissions of serfs in the Bodmin Gospels (10th century). They were printed by Whitley Stokes in the Revue celtique, i. 232. Next comes the Cotton ian Vocabulary, which seems to follow a similar Anglo- Saxon collection and is contained in a 12th-century MS. at the British Museum. It consists of seven pages and the words are classified under various headings, such as heaven and earth, different parts of the human body, birds, beasts, fishes, trees, herbs,, ecclesiastical and liturgical terms. At the end we find a number of adjectives. This vocabulary was printed by Zeuss 2 , p. 1065, and again in alphabetical order by Norris in the Ordinalia. The language of this document is termed Old Cornish, although the forms it contains correspond to those of Mid. Welsh and Mid. Breton.

The first piece of connected Cornish which we know consists of a poem, or portion of a play (?), of forty-one lines discovered by Jenner in the British Museum. This fragment was probably written about 1400 and deals with the subject of marriage (edited by W. Stokes in the Revue celtique, iv. 258). A little later is the Poem of Mount Calvary or the Passion, of which five MSS. are in existence. The poem has been twice printed, *

first by Davies Gilbert with English translation by John Keigwin (1826), and again by W. Stokes for the London Philological Society in 1862. It consists of 259 stanzas of eight lines of seven syllables apiece, and contains a versified narrative of the events of the Passion made up from the Gospels and apocryphal sources, notably the Gospel of Nicodemus. But the bulk of Cornish literature is made up of plays, and in this connexion it may be noted that there still exist in the west of Cornwall the remains of a number of open-air amphitheatres, locally called plan an guari, where the plays seem to have been acted. The earliest representatives of this kind of literature in Cornwall form a trilogy going under the name of Ordinalia, of which three MSS. are known, one a 15th-century Oxford MS. from which the two others are copied. The Ordinalia were published by Edwin Norris under the title of The Ancient Cornish Drama (Oxford, 1859). The first play is called Origo Mundi and deals with events from the Old Testament down to the building of Solomon’s temple. The second play, the Passio Domini, goes on without interruption

into the third, the Resurrectio Domini, which embraces the Harrowing of Hell, the Resurrection and Ascension, the legend of St Veronica and Tiberius, and the death of Pilate. Here again the pseudo-Gospel of Nicodemus is drawn upon, and interwoven with the Scriptural narrative we find the Legend of the Cross. As the title Ordinalia indicates, these plays are of learned origin and are imitated from English sources. The popular name for these dramas, quari-mirkle, is a literal translation of the English term miracle play, and Norris shows that whole passages were translated word for word. Many of the events are represented as having taken place in well-known Cornish localities, but apart from this scarcely any traces of originality can be discovered. The same remark holds good in the case of another play, Beunans Meriasek or the Life of St Meriasek. This deals in an incoherent manner with the life and death of Meriasek (in Breton Meriadek), the son of a duke of Brittany, and interwoven with this theme is the legend of St Silvester and the emperor Constantine, quite regardless of the circumstance that St Silvester lived in the 4th and St Meriasek in the 7th century. The MS. of this play was written by " Dominus Hadton " in the year 1504, and is preserved in the Peniarth library. The language is more recent than that of the Ordinalia, and there is a certain admixture of English. The Life of St Meriasek falls into two parts, and at the end of each the spectators are invited to carouse. St Meriasek was in earlier times the patron saint of Camborne, where his fountain is still to be seen and pilgrims to it were known by the name of Merra-sickers. In this play, consequently, we might expect to find something really Cornish. But le Braz has shown that the author of this motley drama was content to draw his materials from Latin and English lives of saints. The story of Meriasek himself was taken from a Breton source and closely resembles the narrative of the 17th-century Breton hagiographer, Albert le Grand. The last play we have to mention is Gwreans an Bys (The Creation of the World), of which five complete copies are known. Two of these are in the Bodleian and one in the British Museum, which also possesses a further fragment. The oldest text was revised by William Jordan of Helston in 161 1, but there are indications that parts of it at any rate are older than the Reformation. This play bears a great resemblance to the first part of the Origo Mundi, and may have been imitated from it. It was printed first by Davies Gilbert in 1827 with a transla- tion by John Keigwin, and again by W. Stokes in the Transactions of the London Philological Society for 1864. The language shows considerable signs of decay, and Lucifer and his angels are often

made to speak English. The only other original compositions of any length written in Cornish are Nebbaz Gerriau dro tho Carnoack (A Few Words about Cornish) , by John Boson (printed in the Journal of the Royal Institution of Cornwall, 1879), and the Story of John of Chy-an-Hur (Ram's House) , a folk- tale which appears in Ireland and elsewhere. The latter was printed in Lhuyd's Grammar and in Pryce's Archaeologia. Andrew Borde's Booke of the Introduction of Knowledge (1542) contains some > Cornish conversations (see Archiv f. celt. Lexikographie, vol. i.),

and in Carew's Survey of Cornwall a number of words and phrases are to be found. Apart from the Cornish preface to Lhuyd's Grammar, the other remains of the language consist of a few songs, verses, proverbs, epigrams, epitaphs, maxims, letters, conversations, mottoes and translations of chapters and passages of Scripture, the Lord's Prayer, the Creed, the Commandments, King Charles's Letter, &c. These fragments are to be found (1) in the Gwavas MS. in the British Museum, a collection ranging in date from 1709 to 1736; (2) in the Borlase MS. (1750); (3) in Pryce's Archaeologia Cornu-Britannica (1790); (4) in D. Gilbert's editions of the Poem of the Passion (i826) : and the Creation of the World (1827). They are enumerated, classified and described by Jenner in his Handbook.

Authorities. — H. Jenner, Handbook of the Cornish Language (London, 1904) ; A. le Rraz, Le Thedtre celtigue (Paris, 1905) ; E. Norris, The Ancient Cornish Drama (2 vols., Oxford, 1859); T C. Peter, The Old Cornish Drama (London, 1906) ; L. C. Stern, Die Kultur d. Gegenwart, i. xi. 1, pp. 131-132. (E. C. Q.)

CELT, a word in common use among British and French archaeologists to describe the hatchets, adzes or chisels of chipped or shaped stone used by primitive man. The word is variously derived from the Welsh cellt, a flintstone (that being the material of which the weapons are chiefly made, though celts of basalt felstone and jade are found) ; from being supposed to be the implement peculiar to the Celtic peoples; or from a Low Latin word celtis, a chisel. The last derivation is more probably correct. The word has come to be somewhat loosely applied to metal as well as stone axe-heads. The general form of stone celts is that of blades approaching an oval in section, with sides more or less straight and one end broader and sharper than the other. In length they vary from about 2 to as much as 16 in. The largest and finest specimens are found in Denmark: one in an English collection being of beautiful white flint 13 in. long, i| in. thick

and 35 in. broad. Those found in Denmark are sometimes polished, but usually are left rough. Those found in north-western Europe are ground to a more or less smooth surface. That some were held in the hand and others fixed in wooden handles is clear from the presence of peculiar polished spaces produced by the friction of the wood. In the later stone adzes holes are sometimes found pierced to receive the handles.

The bronze celts vary in size from an inch to a foot in length. The earlier specimens are much like the stone ones in shape and design, but the later manufactures show a marked improvement, the metal being usually pierced to receive the handles. It is noteworthy that the celtmakers never cast their axes with a transverse hole through which the handle might pass. Bronze celts are usually plain, but some are ornamented with ridges, dots or lines. That they were made in the countries where they are found is proved by the presence of moulds.

A point worthy of mention is the position which stone celts hold in the folk-lore and superstitious beliefs of many lands. In the West of England the country folks believe the weapons fell originally from the sky as " thunderbolts," and that the water in which they are boiled is a specific for rheumatism. In the North and Scotland they are preservatives against cattle diseases. In Brittany a stone celt is thrown into a well to purify the water. In Sweden they are regarded as a protection against lightning. In Norway the belief is that, if they are genuine thunderbolts, a thread tied round them when placed on hot coals will not burn but will become moist. In Germany, Spain, Italy, the same beliefs prevail. In Japan the stones are accounted of medicinal , value, while in Burma and Assam they are infallible specifics for ophthalmia. In Africa they are the weapons of the Thunder- God. In India and among the Greeks the hatchet appears to have had a sacred importance, derived, doubtless, from the universal superstitious awe with which these weapons of pre- historic man were regarded.

See Sir J. Evans's Ancient Stone Implements of Great Britain; Lord Avebury's Prehistoric Times (1865-1900) and Origin of Civilization (1870); E. B. Tylor's Anthropology, and Primitive Culture, &c. For the history of polished stone axes up to the 17th century see Dr Marcel Bandouin and Lionel Bonnemere in the Bulletin de la Societe d' Anthropologic de Paris, April-May 1905.

CELTES, KONRAD (1459-1508), German humanist and Latin poet, the son of a vintner named Pickel (of which Celtes is the Greek translation), was born at Wipfeld near Schweinfurt. He early ran away from home to avoid being set to his father's trade, and at Heidelberg was lucky enough to find a generous patron in Johann von Dalberg and a teacher in Agricola. After the death of the latter (1485) Celtes led the wandering life of a scholar of the Renaissance, visiting most of the countries of the continent, teaching in various universities, and everywhere establishing learned societies on the model of the academy of Pom'ponius.Laetus at Rome. Among these was the Sodalitas litteraria Rhenana or Celtica at Mainz (1491). In i486 he published his first book, Ars versificandi et carminum, which created an immense sensation and gained him the honour of being crowned as the first poet laureate of Germany, the ceremony be'ing performed by the emperor Frederick III. at the diet of Nuremberg in 1487. In 1497 he was appointed by the emperor Maximilian I. professor of poetry and rhetoric at Vienna, and in 1 502 was made head of the new Collegium Poetarum et Mathematicorum, with the right of conferring the laureateship. He did much to introduce system into the methods of teaching, to purify the Latin of learned intercourse, and to further the study of the classics, especially the Greek. But he was more than a mere classicist of the Renaissance. He was keenly interested in history and topography, especially in that of his native country. It was he who first unearthed (in the convent of St Emmeran at Regensburg) the remarkable Latin poems of the nun Hrosvitha of Gandersheim, of which he published an edition (Nuremberg, 1 501), the historical poem Ligurinus sive de rebus gestis Frederici primi imperatoris libri x. (Augsburg, 1507), and the celebrated map of the Roman empire known as the Tabula Peutingeriana (after Konrad Peutinger, to whom he left it). He projected a great work on Germany; but of this only the Germania generalis and an historical work in prose, De origine, situ, moribus et institutis Nurimbergae libellus, saw the light. As a writer of Latin verse Celtes far surpassed any of his predecessors. He composed odes, elegies, epigrams, dramatic pieces and an un- finished epic, the Theodoriceis. His epigrams, edited by Hart- felder, were published at Berlin in 1881. His editions of the classics are now, of course, out of date. He died at Vienna on the 4th of February 1508.

For a full list of Celtes's works see Engelbert Klijpfel, De vita et

scriptis Conradi Celtis (2 vols., Freiburg, 1827); also Johann Asch- bach, Die friiheren Wanderjahre des Conrad Celtes (Vienna, 1869) ; Hartmann, Konrad Celtes in Niirnberg (Nuremberg, 1889).

CELTIBERIA, a term used by Greek and Roman writers to denote, sometimes the whole north-east of Spain, and sometimes the north-east part of the central plateau of the peninsula. The latter was probably the correct use. The Celtiberi, in this narrower sense, were not so much one tribe as a group of cantons — Arevaci, Pelendones, Berones and four or five others. They were the most warlike people in Spain, and for a long time offered a stubborn resistance to the Romans. Originally Carthaginian mercenaries, they were induced to serve the Romans in a similar capacity, and Livy (xxiv. 49) distinctly states that they were the first mercenaries in the Roman army. They did not, however, keep faith, and several campaigns were undertaken against them. In 179 B.C. the whole country was subdued by T. Sempronius Gracchus, who by his generous treatment of the vanquished gained their esteem and affection. In 153 they again revolted, and were not finally overcome until the capture of Numantia (133). The twenty years' war waged round this city, and its siege and destruction by Scipio the Younger (133 B.C.) form only the most famous episode in the long struggle, which has left its mark in entrenchments near Numantia excavated in 1906-1907 by German archaeologists. After the fall of Numantia, and still more after the death of Sertorius (72 B.C.), the Celtiberians became gradually romanized, and town life grew up among their valleys; Clunia, for instance, became a Roman municipality, and ruins of its walls, gates and theatre testify to its civilization; while Bilbilis (Bambola), another municipality, was the birth- place of the eminently Roman poet Martial. The Celtiberians

may have been so called because they were thought to be the descendants of Celtic immigrants from Gaul into Iberia (Spain), or because they were regarded (cf. Lucan iv. 9) as a mixed race of Celts and Spaniards (Iberians) ; in either case the name repre- sents a geographer's theory rather than an ascertained fact. That a strong Celtic element existed in Spain is proved both by numerous traditions and by the more trustworthy evidence of place-names. The Celtic place-names of Spain, however, are not confined to Celtiberia or even to the north and east; they occur even in the south and west.

A long description of the manners and customs of the Celtiberi is

given by Diodorus Siculus (v. 33, 34). Their country was rough and unfruitful as a whole (barley, however, was cultivated), being chiefly used for the pasture of sheep. Its inhabitants either led a nomadic life or occupied small villages; large towns were few. Their infantry and cavalry were both excellent. In battle, they adopted the wedge-shaped formation of the column. They carried double-edged swords and short daggers for use hand to hand, the steel of which was hardened by being buried underground; their defensive armour was a light Gallic shield or a round wicker buckler, and greaves of felt round their legs. They wore brazen helmets with purple crests, and rough-haired black cloaks, in which they slept on the bare ground. Like the Cantabri, they washed themselves with urine instead of water. They were said to offer sacrifice to a nameless god (Strabo iii. p. 164) at the time of the full moon when all the household danced together before the doors of the houses. Although cruel to their enemies, they were hospitable to strangers. They ate meat of all kinds, and drank a kind of mead. E. Hiibner's article in Pauly-Wissowa's Realencyclopddie, iii. (1886-1893), collects all the ancient references, which are almost all brief. Strabo's notice (bk. iii.), based perhaps on Poseidonius, is fullest. (F. J. H.)

CEMENT (from Lat. caementum, rough pieces of stone, a shortened form of caedimentum, from caedere, to cut), apparently first used of a mixture of broken stone, tiles, &c, with some binding material, and hence of any material capable of adhering to, and uniting into a coherent mass, fragments of a substance not in itself adhesive. The term is often applied to adhesive mixtures employed to unite objects or parts of objects (see below), but in engineering, when used without qualification, it means Portland cement, its modifications and congeners; these are all hydraulic cements, i.e. when set they resist the action of water, and can, under favourable conditions, be allowed to set under water.

Hydraulic Cements. — It was well known to builders in the earliest historic times that certain limes would, when set, resist the action of water, i.e. were hydraulic; it was also known that this property could be conferred on ordinary lime by admixture of silicious materials such as pozzuolana or tufa. We have here the two classes into which hydraulic cements are divided.

When pure chalk or limestone is " burned," i.e. heated in a kiln until its carbonic acid has been driven off, it yields pure lime. This slakes violently with water, giving slaked lime, which can

be made into a smooth paste with water 1ˆ”°’ and mixed with sand to form common mortar. The cement setting of the mortar is due to the drying of the lime (a purely physical phenomenon, no chemical action occurring between the lime and the sand). The function of the sand is simply that of a diluent to prevent undue shrinkage and cracking in drying. Subsequent hardening of the mortar is caused by the gradual absorption of carbonic acid from the air by the lime, a skin of carbonate of lime being formed; but the action is superficial. Mortar made from pure or ” fat ” lime cannot with- stand the action of water, and is only used for work done above water-level. If, however, such ” fat ” lime is mixed in the presence of water, not with sand but with silica in an active form, i.e. amorphous and (generally) hydrated, or with a silicate containing silica in an active condition, it will unite with the silica and form a silicate of lime capable of resisting the action of water. The mixture of the lime and active silica or silicate is a pozzuolanic cement. The simplest of all pozzuolanic cements would be a mixture of pure lime and hydrated silica, but though the latter is prepared artificially for various purposes, it is too expensive to be used as a cement material. A similar obstacle lies in the way of using a certain native form of active silica, viz. kieselguhr, for it is too valuable as an absorbent of nitro-glycerine, for the manufacture of dynamite, to be available for making pozzuolanic cement. There are, however, many silic’ous

substances occurring abundantly in nature which can thus be used. They are mostly of volcanic origin, and include pumice, tufa, santorin earth, trass and pozzuolana itself. The following analyses show their general composition : —

Neapolitan Pozzuo- lana (per cent).

Roman Pozzuo- lana (per cent).

Trass (per cent).

Soluble silica (Si0 2) . Insoluble silicious residue Alumina (AI2O3) . Ferric oxide (Fe 2 03) Lime (CaO) . Magnesia (MgO) . Sulphuric anhydride (SO3) Combined water (H 2 0) . Carbonic anhydride (C0 2) Moisture Alkalis and loss

27-80

35-38

j- 19-80

5-68

o-35 Trace

\ 4-27

6-72

32-64

25-94

22-74 \

4-06

1-37

Trace

8-92 |

4-33

19-32

50-40

13-86

3-10

0-13

7-57

5-04 0-58

IOO-OO

100-00

loo-oo

An artificial product which serves perfectly as a pozzuolana is granulated blast-furnace slag. The slag, which must contain a high percentage of lime, is granulated by being run while fused into abundance of water. This granulated slag differs from the same slag allowed to cool slowly, in that a portion of the energy which it possesses while fused is retained after it has solidified. It bears to ordinary slowly-cooled slag a similar relation to that borne by plastic sulphur to ordinary crystalline sulphur. This potential energy becomes kinetic when the slag is brought into contact with lime in the presence of water, and causes the formation of a true hydraulic silicate of lime. The following analysis shows the composition of a typical slag:-

Per cent

Insoluble residue 1-04

Silica (Si0 2)

31-50

Alumina (A1 2 3) .

18-56

Manganous oxide (MnO)

0-44

Lime (CaO)

42-22

Magnesia (MgO)

3 -i8

Soda (Na 2 0)

0-70

Sulphuric anhydride (SO3)

o-45

Sulphur (S).

2-21

I00-30

Deduct oxygen equivalent to

sulph

ur

I-IO

99-20

Granulated slag of this character is ground with slaked lime until both materials are in a state of fine division and intimately mixed. The usual proportions are three of slag to one of slaked lime by weight. The product termed slag cement sets slowly, but ultimately attains a strength scarcely inferior to that of Portland cement. Although it is cheap and suitable for many purposes, its use is not large and tends to decrease. Pozzuolanic cements are little used in England. Generally speaking, they are only of local importance, their cheapness depending largely on the nearness and abundance of some suitable volcanic deposit of the trass or tufa class. They are not usually manufactured by the careful grinding together of the pozzuolana and the lime, but are mixed roughly, a great excess of pozzuolana being

employed. This excess does no harm, for that part which fails to unite with the lime serves as a diluent, much as does sand in mortar. In fact, ordinary pozzuolanic cement made on the spot where it is to be used may be regarded as a better kind of common mortar having hydraulic qualities. Good hydraulic mortars may be made from lime mixed with furnace ashes or burnt clay as the pozzuolanic constituent.

Cements of the Portland type differ in kind from those of the pozzuolanic class; they are not mechanical mixtures of lime and active silica ready to unite under suitable conditions, but consist of definite chemical compounds of lime and Cement. silica and lime and alumina, which, when mixed with water, combine therewith, forming crystalline substances of great mechanical strength, and capable of adhering firmly to clean inert material, such as stone and sand. They are made by heating to a high temperature an intimate mixture of a calcareous substance and an argillaceous substance. The commonest of suchsubstances in

England are chalk and clay, but where local conditions demand it, limestone, marl, shale, slag or any similar material may be used, provided that the correct proportions of lime, silica and alumina are maintained. The earliest forms of cements of the Portland class were the hydraulic limes. These are still largely used, and are prepared by burning limestones containing clayey matter. Some of these naturally possess a composition differing but little from that of the mixture of raw materials artifici- ally prepared for the manufacture of Portland cement itself. Although hydraulic limes have been in use from the most ancient times, their true nature and the reason of their resistance to water have only become known since 1791. Next in antiquity to hydraulic lime is Roman cement, prepared by heating an indurated marl occurring naturally in nodules. Its name must not be taken to imply that it was used by the ancients; in point of fact the manufacture of this substance dates back only to 1796.

With the growth of engineering in the early part of the 19th Century arose a great demand for hydraulic cement. The supply of materials containing naturally suitable proportions of calcium carbonate and clay being limited, attempts were made to produce artificial mixtures which would serve a similar end. Among those who experimented in this direction was Joseph Aspdin, of Leeds, who added clay to finely ground limestone, calcined the mixture, and ground the product, which he called Portland cement. The only connexion between Portland cement and the place Portland is that the cement when set somewhat resembles Portland stone in colour. True, it is possible to manufacture Portland cement from Portland stone (after adding a suitable quantity of clay), but this is merely because Portland stone is substantially carbonate of lime; any other limestone would serve equally well. Although Portland cement is later in date than either Roman cement or hydraulic lime, yet on account of its greater industrial importance, and of the fact that, being an artificial product, it is of approximately uniform composition and properties, it may conveniently be treated of first. The greater part of the Portland cement made in England is manu- factured on the Thames and Medway. The materials are chalk and Medway mud; in a few works the latter is replaced by gault.

The composition of typical samples of chalk and clay is shown in

the following analyses :—

Chalk.

Clay.

Silica (SiOj) . . . . .

Alumina + ferric oxide (Al 2 03 +

Fe 2 3)

Lime (CaO) ....

Magnesia (MgO)

Carbonic anhydride (C0 2) .

Per cent.

092

0-24

55-0O

0-36 43-40

99-92

Insoluble silicious matter Silica (Si0 2) Alumina (A1 2 3) . Ferric oxide (Fe 2 0s) Lime (CaO) Magnesia (MgO) . Soda (Na 2 0) Potash (K 2 0) Sodium chloride (NaCl) Combined water, organic matter, and loss

Per cent.

26-67

31-24 16-60 8-66 0-25 1-91

i-oo

o-45

1-86

11-36

Consisting of Quartz (SiOs) Silica (SiOs) . . Alumina (Al 2 O s) . Magnesia (MgO) Soda (Na 2 0) . .

19-33 5-19 1-47 0-03 0-65

26-67

Felspar

7-34%

CEMENT

655

These materials are mixed in the proportion of about 3 :i by weight so that the dried mixture contains approximately 75 % of calcium

‘. carbonate, the balance being clay. The mixing may be

nixing. effected- in several ways. The method once exclusively used consists in mixing the raw materials with a large quantity of water in a wash mill, a machine having radial horizontal arms driven from a central vertical spindle and carrying harrows which stir up and intermix any soft material placed in the pit in which the apparatus revolves. The raw materials in the correct proportion are fed into this mill together with a large quantity of water. The thin watery “slip” or slurry flows into large settling tanks (“backs “) where the solids in suspension are deposited ; the water is drawn off, leaving behind an intimate mixture of chalk and clay in the form of a wet paste. This is dug out, and after being dried on floors heated by flues is ready for burning. This process is now almost obsolete. According to present practice the raw materials are mixed in a wash mill with so much water that the resulting slurry contains 40 to 50 % of water. The slurry, which is wet enough to flow, is ground between millstones so as to complete the process of comminution begun in the wash mill. Thorough grinding and mixing are of the utmost importance, as otherwise the cement ultimately produced will be unsound and of inferior quality. The drying of the slurry is generally effected by the waste heat of the kilns, so that while one charge is burning another is drying ready for the next loading of the kilns. The kilns commonly employed are ” chamber kilns,” circular structures not unlike an ordinary running lime kiln, but Jl t« having the top closed and connected at the side with a the join. ˆ j e ˆ ue j n wh j ch the slurry is exposed to the hot products of combustion from the kiln. The farther ends of the flues of several such kilns are connected with

a chimney shaft. The slurry, in drying on the floor of the flue, forms a fairly tough cake which cracks spontaneously in the process of drying into rough blocks suitable for loading into the kiln. At the bottom of the kiln is a grate of iron bars, and on this wood and coke are piled to start the fire. A layer of dried slurry is loaded on this, then a layer of coke, then a layer of slurry, and srfon until the kiln is filled with coke and slurry evenly distributed. Fresh slurry is run on to the drying floors, and the kiln is started. The construction of an ordinary chamber kiln may be gathered from the accompanying diagram (fig. 1). The

Chimney

Lˆi.|.“u’LˆV!ˆ?•ˆiˆ>ˆaˆ■ˆV’j ‘i ; T”ˆ ‘i tt i i Vij ffi

Plan

Kiln

Fig. I.

operation of burning, is a slow one. An ordinary kiln, which will contain about 50 tons of slurry and 12 tons of coke, will take two days to get fairly alight, and will be another two or three days in burning out. Therefore, allowing adequate time for loading and unloading, each kiln will require about one week for a complete run. The output will be about 30 tons of ” clinker ” ready to be ground into cement. The grinding of the hard rock-like masses of clinker is effected between millstones, or in modern plants in ball-mills, tube-mills and edge-runners. It is an important part of the manu- facture, because the finished cement should be as fine and ” floury ” as possible. The foregoing description represents the procedure in use in many English factories. There are various modifications in practice according to local conditions: a few of these may be described. In all cases, however, the main operations are the same, viz. intimately mixing the raw materials, drying the mixture, if necessary, and burning it at a clinkering temperature (about 1 500? C. = 2732° F.). Thus when hard limestone is the form of calcium carbonate locally available, it is ground dry and mixed with the correct proportion of clay also dried and ground. The mixture is slightly damped, moulded into rough bricks, dried and burned. A possible alternative is to burn the limestone first and mix the result- ing lime with clay, the mixture being burned as before. By this method grinding the hard limestone is avoided, but there is an extra expenditure of fuel in the double burning. ■ Many different forms of kiln are used for burning Portland’ cement. Besides the chamber kilns which have been described, there are the old-fashioned bottle kilns, which ire similar to the chamber kilns, but are bottle-shaped and open at the top; they do not dry the slurry for their next charge. Their use is becoming obsolete. There are also stage kilns

Other kilns.

Upper shaft

containing

raw material

of the Dietzsch type, which consist of two vertical shafts, one above the other, but not in the same vertical line, connected by a

horizontal channel. At this middle portion and in the upper part of the lower shaft the burning proper proceeds ; the upper shaft is full of unburnt raw material which is heated by the hot gases coming from the burning zone, and the lower shaft contains clinker already burned and hot enough to heat the incoming air which supplies that necessary for combustion at the clinkering zone. A pair of Dietzsch kilns, built back to back, are shown in fig. 2. There are other forms of shaft kiln, such as the Schneider, in which there is a burning zone, a heating and cooling zone as in the Dietzsch, but no horizontal stage, the whole shaft being in the same vertical plane. Another form is the Hoffmann or ring kiln, made up of a number of compart- ments arranged in a ring and connected with a central chimney; in these compartments rough brick-shaped masses of the raw materials are stacked, and between these bricks fuel is sprinkled. At a given moment one of these compartments is burning and at its full temperature ; the air for combustion is drawn in through one or more compartments behind it which have just finished burning, and is thereby strongly heated; the products of combustion pass away through one or more compartments in front of it and heat their contents before they are subjected to actual combustion. It will be seen that the principle of the ring kiln is similar to that of the stage kiln. In each case the clinker which has just been burned and is fully hot serves to heat the air-supply to the compart- ment where com- bustion is actu- ally proceeding ; in like manner the raw materials about to be burned are well heated by the waste gases from the compartment in full activity before they them- selves are burned. (It may be noted that here and generally in this article ” burn ” is used in the technical sense ; it is technically correct to speak of cement clinker Bumng zone being burned, *-

although it is not a fuel ; in accur- ate terms it is the fuel which is burned, and it is hot clinker the heat it gen- erates which raises the clinker to a high temper- ature, i.e. tech- nically ” burns ” it.) By this de- vice a great part of the heat is regenerated and a saving of fuel is effected.

The methods of burning cement described above are obsolescent. They are being replaced by the rotatory process, so called because the cement is burned in rotating cylinders instead of in R t a torv fixed kilns. These cylinders vary from 60 to 150 ft. in tiins length, an ordinary length in modern practice being 100 to 120 ft.; their diameter correspondingly varies from 6 ft. to 7 ft. 6 in. The cylinders are made of steel plate, lined with refractory

bricks, are carried on rollers at a slight angle with the horizontal, and are rotated by power. At the upper end the raw material is fed in either as a dry powder or as a slurry ; at the lower end is a power- ful burner. In the early days of rotatory kilns producer gas was used as a fuel, but with little success; about 1895 petroleum was used in the United States with complete success, but at a relatively heavy cost. At the present time, finely powdered coal injected by a blast of air is almost universally employed, petroleum being used only where it is actually cheaper than coal. In the working of this type of kiln the rotation and slight inclination of the cylinder cause the raw material to descend towards the lower end. At the upper end the raw material is dried and heated moderately. As it descends it reaches a part of the kiln where the temperature is higher; here the carbonic acid of the carbonate of lime, and the combined water of the clay are driven off, and the resulting lime begins to act chemi- cally on the dehydrated clay. The material is then in a partially burnt and slightly sintered state, but it is not fully clinkered and would not make Portland cement. The material continues to descend by the rotation of the kiln and reaches the lower end nearest

Lower shaft containing.

Fig. 2.

the burner where the temperature is highest, and is there heated so highly that the union of the lime, silica and alumina is complete, and fully burnt clinker falls out of the kiln. It is extremely hot, and is cooled usually by being passed down one or more rotating cylinders, similar to' the first, but smaller, and acting as coolers instead of kilns. On its way down the cylinders the clinker meets a current of cold air and is cooled, the air being correspondingly warmed and passing on to aid in the combustion of the fuel used in heating the kiln. This regenerative heating is similar in principle and effect to that obtained by means of the shaft and ring kilns described above. The output of these kilns varies from 200 to 400 tons per kiln per week according to their size and the nature of the raw materials burned, as against 30 tons per week for an ordinary chamber kiln. A large saving in labour is also secured. The rotatory system presents many

advantages and is rapidly replacing the older methods of cement making. Fig. 3 represents diagrammatically a

Fig. 3.

rotatory cement plant on the Hurry & Seaman system, which was one of the first to make cement by the rotatory process successfully on a large scale, using powdered coal as fuel. Rotatory kilns of various other makes are now in use, but the same principles are embodied, namely, the employment of a rotating inclined cylinder for burning the raw materials, a burner fed with powdered coal and a blast of air, and some device such as a cooling cylinder or cooling tower by which the clinker may be cooled and the air correspondingly heated on its way to the burner.

Another method of making Portland cement which has been proposed and tried with some success consists in fusing the raw materials together in an apparatus of the type of a blast furnace. The high temperature necessary to fuse cement clinker makes this process difficult to accomplish commercially, but it has many inherent merits and may be the process of the future, displacing the rotatory method.

Portland cement clinker, however produced, is a hard, rock-like substance of semi-vitrified appearance and very dark colour. The Cement product from a well-run rotatory kiln is all evenly burnt clinker. an d properly vitrified; that from an ordinary fixed kiln of whatever type is apt to contain a certain amount (5 to 15%) of underburnt material, which is yellowish and friable and is not properly clinkered. This material must be picked out, as such underburnt stuff contains free lime or unsaturated lime compounds. These may slake slowly in the finished cement and cause such ex- pansion as may destroy the work of which it forms part. Well-burnt, well-picked clinker when ground yields good Portland cement. Nothing is added during or after grinding save a small amount (1 to 2%) of calcium sulphate in the form either of gypsum or of plaster of Paris, which is sometimes needed to make the cement slower-setting. For the same purpose a small quantity of water (up to 2 %) may be added either by moistening the clinker or by blowing steam into the mills in which the clinker is ground. This small addition for this specified purpose is recognized as legitimate, but the employment of various cheap materials such as ragstone and blast-furnace slag, sometimes added as diluents or make-weights, is adulteration and therefore

fraudulent.

The composition of Portland cement varies within comparatively narrow limits, and for given raw materials the variations are tending Compost- t0 become smaller as regularity and skill in manufacture tioa. increase. The following analysis may be taken as typical

of cements made from chalk and clay on the Thames and Medway : —

Silica (Si0 2) _ Insoluble residue . Alumina _(A1 2 3) . Ferric oxide (Fe20 3) Lime (CaO) Magnesia (MgO) Sulphuric anhydride (SO3) Carbonic anhydride (CO2) Water (H,0) Alkalis ....

Per cent.

22-0

I'O

7-5 3-5

62-0

I-O

i-5 o-5 o-5 o-5

IOO-O

There may be variations from this composition according to the

nature of the raw materials employed. Thus the silica may range from 19 to 27 , the alumina and ferric oxide jointly from 7 to 14, the lime from 60 to 67 %. All such variations are per- missible provided that the quantity of silica and alumina is sufficient to saturate the whole of the lime and to leave none of it in a " free " condition, likely to cause the cement to expand after setting. Other things being equal, the higher the percentage of lime within the limits indicated above the stronger is the cement, but such highly limed cement is less easy to burn than cement containing about 62 % of lime ; and unless the burning is thorough and the raw materials are intimately mixed, the cement is apt to be unsound. Although the ultimate composition of cement, that is, the percentage of each base and acid present, can

be accurately determined by analysis, its proximate composition, i.e. the nature and amount of the compounds formed from these acids and bases, can only be ascertained indirectly and with difficulty. The foundations of our knowledge on this subject were laid by H. le Chatelier, whose work has since been supplemented by that of Spenser B. Newberry, W. B. Newberry and Clifford Richard- son. As the outcome of these inquiries it has been established that tricalcium silicate 3CaO-Si02 is the essential constituent of Portland cement. The cpn- stituent of next importance is an aluminate, but whether this is dicalcium aluminate, 2CaO-Al 2 Os, or Cru*. RoJ» tricalcium aluminate, 3CaO AI2O3,. is still in doubt.

■ ‘ “i ‘ In the following description it is assumed to be the

tricalcium aluminate. The remaining silicates and aluminates present, and ferric oxide and magnesia, if existing in the moderate quantities which are usual in Portland cement of good quality, are of minor importance and may be regarded as little more than impurities. The silicates and aluminates of which Portland cement is composed are believed to exist not as individual units but as solid solutions of each other, these solid solutions taking the form of minerals recognizable as individuals. The two principal minerals are termed alite and celite; according to the best opinion, alite consists of a solid solution of tricalcium aluminate in tricalcium silicate, and celite of a solid solution of dicalcium aluminate in dicalcium silicate. Celite is little affected by water, and has but small influence on the setting; alite is de- composed and hydrated, this action constituting the main part of the setting of Portland cement. Both the components of alite react, and for simplicity their reactions may be stated in separate equations, thus:~

(1) 2(3CaO-Si0 2) +9H 2 = 2(CaO-Si0 2)-5H 2 0+4Ca(OH) 2
Tricalcium silicate. Hydrated mono- Calcium

calcium silicate. hydroxide.

(2) 3CaO-Al 2 3 +12H 2 O = 3CaO-Al20 3 -12H 2 O Tricalcium aluminate. Hydrated tricalciurn aluminate.

Since alite is a solid solution and, although an individual mineral, is not a chemical unit, the proportion of tricalcium silicate to tri- calcium aluminate in a given specimen of alite will vary ; but, what- ever the proportions, each of these substances

will react in its char- acteristic manner according to the equations given above.

The precise mechanism of the process of setting of Portland cement is not known with certainty, but it is probably analogous to that of the setting of plaster of Paris, consisting in the dissolution of the compounds produced by hydration while they are in a more soluble form, their transition to a less soluble form, the consequent supersaturation of the solution, and the deposition of the surplus of the dissolved substance in crystals which interlock and form a coherent mass. This theory being accepted, it is evident that a small quantity of water, by successive dissolution and deposition of a substance capable of existing in a more soluble and in a less soluble form, is able to bring about the crystallization of an in- definitely large quantity of material. It is not necessary that there should be present sufficient water to dissolve the whole of the react- ing substance at any one time ; it is sufficient if there is enough for hydration and a small surplus for the crystallization by successive stages as above described. It is generally admitted that the alu- minate is the chief agent in the first setting of the cement, and that its ultimate hardening and attainment of strength are due to the tricalcium silicate.

As mentioned above, the constituents other than the tricalcium silicate and tricalcium aluminate of which alite is composed, are of minor importance. The function of the ferric oxide present in ordinary cement is little more than that of a flux to aid the union of silica, alumina and lime in the clinker; its r61e in the setting of the cement is altogether secondary. In fact, excellent Portland cement can be prepared from materials free from iron. Such cement, if free also from manganese, is white, and its manufacture has been proposed for exterior decorative use. Magnesia, if present in Portland cement in quantity not exceeding 5%, appears to be inert, but there is evidence that in larger proportion, e.g. 10-15%, it may hydrate and set after the general setting of the cement, and may give rise to disruptive strains causing the cement to ” blow ” ar.d fail. In so-called natural cement which is comparatively lightly burnt, the magnesia appears to be inert, and as much as 20 to 30% may be present. Another constituent of Portland cement which influences

its setting time is calcium sulphate, naturally formed from the sulphur in the raw materials or fuel, or intentionally added to the finished cement as gypsum or plaster of Paris. It has a remarkable retarding effect on the hydration of the calcium aluminate, and consequently on the setting of the cement; thus it is that a little gypsum is often added to convert a naturally quick-setting cement into one which sets slowly. It will be observed that in the hydration of tricalcium silicate, the main constituent of Portland cement, a large portion of the lime appears as calcium hydroxide, i.e. slaked lime. It is evident that this will form a pozzuolanic cement if a suitable silicious material such as trass is added to the cement. The ultimate product when set may be regarded as a mixed Portland and pozzuolanic cement. The use of trass in this manner as an adjunct to Portland cement has been advocated by W. Michaelis, and undoubtedly increases the strength of the material, but it has not become general.

The quality of Portland cement is ascertained by its analysis and by determining its specific gravity, fineness, mechanical strength _, . and soundness. A good sample will usually have a com-

Testlng. position within the limits cited above and approximating to the typical figures given above. It will be ground so finely that not more than 3% will be left on a sieve of 76X76 meshes per sq. in., the wires of the sieve being 0-005 m – m diameter. It will have, when freshly burned, a specific gravity not lower than 3-15, and briquettes made from it and kept in water will possess a tensile strength of 400-500 ft per sq. in. seven days after they are made, while briquettes made from a mixture of 3 parts by weight of sand and 1 of cement will give about 225 ft per sq. in. at twenty-eight days. Formerly the soundness of cement was determined by keep- ing thin pats of the cement in cold water for twenty-eight days, or in warm water (iio -I2o’ :> F.) for twenty-four hours, and examin- ing for cracks or other signs of expansion. Modern practice is to measure the expansion of a test piece of cement kept in water at a temperature of 212° F. The simplest and most generally used method is due to H. L. le Chatelier, and consists in measuring the increase in circumference of a cylinder of cement 30 mm. in diameter by means of a split ring encircling the cylinder, the motion of which is magnified by two light rods extending radially. Another quanti- tative test for soundness is that formulated by L. Deval, who has shown that briquettes of 3 of sand and I of cement kept

in water for two days at 80° C. = 176° F. attain approximately the same strength as similar briquettes attain at seven days in water at the ordinary temperature. In like manner briquettes kept at 176° F. for seven days are approximately equal in strength to those kept at the ordinary temperature for twenty-eight days. A cement not perfectly sound will give low results in the hot test, and a cement of indifferent soundness will crack and go to pieces. The test is ad- mittedly severe, but can be passed without difficulty by cement made with proper care and skill. There are many modifications and elaborations of all the tests which have been mentioned. Cement for all important work is submitted to a rigorous system of testing and analysis before it is accepted and used.

Hydraulic Lime is a cement of the Portland as distinct from the pozzuolanic class. The most typical hydraulic lime is that known as Chaux du Theil, made from a limestone found at Ardeche in France. This limestone consists of calcium carbonate most intimately intermixed with very finely divided silica. It contains but little alumina and oxide of iron, which are the constituents generally necessary to bring about the union of silica and lime to form a cement, but in spite of this the silica is so finely divided and so well distributed that it unites readily with the lime when the limestone is burned at a sufficiently high temperature. English hydraulic limes are of a different class; they contain a good deal of alumina and ferric oxide, and in composition resemble somewhat irregular Portland cement. Analyses of the two classes of hydraulic lime are as follows : —

Chaux de Theil. Blue Lias. Per cent. Per cent.

Insoluble silicious matter . . 0-3 2-39

Silica (Si0 2) 21-7 14-17

Alumina (A1 2 3) ... 1-8 6-79

Ferric oxide (Fe 2 0»), . . . o-6 2-34

. Lime (CaO) . . 74”° 63-43

Magnesia (MgO) ... 0-7 1-54

Sulphuric anhydride (SO3) • . 0-3 1-63

Carbonic anhydride (COj) \ , (3-64

Water (H 2 0) f °'° } 2-69

Alkalis and loss 1-38

ioo-o 100-00

Hydraulic lime contains a good deal of uncombined lime, and has to be slaked before it is used as a cement. In France this slaking is conducted systematically by the makers, the freshly burned lime being sprinkled with water and stored in large bins where slaking proceeds slowly and regularly until the whole of the surplus uncom-

bined lime is slaked and rendered harmless, while the cementitious compounds, notably tricalcium silicate, remain untouched. In English practice hydraulic lime is slaked by the user. Seeing that regular and perfect slaking is more easily attained when working systematically on a large scale and by storing the material for a long period, the French method is the better and more rational. The product may then be regarded as a cement of the Portland class mixed with slaked lime. When gauged with water and made into a mortar it sets slowly, but ultimately becomes almost as strong as Portland cement. Its slow setting is an advantage for some purposes, e.g. for foundations and abutments where settlements may occur. The structure is free to take its permanent position before the lime sets, and cracks are thus avoided. A case in point is the employ- ment of hydraulic lime in place of Portland cement as grouting out- side the cast-iron tubes used for lining tunnels made by the shield system.

Roman Cement is another cement of the Portland class which came into use shortly before the manufacture of artificial Port- land cement was attempted. It is still in use, though only for special purposes where a quick-setting material is required. It is made from septaria nodules which are dredged up on the Kent and Essex coasts and consist of about 60 % of calcium carbonate mixed with clay, the mass being sufficiently indurated to remain coherent under water. The nodules are not prepared in any way, but simply burned at a moderate red heat.

The resulting cement varies somewhat in composition, but ap- proximates to the following figures : —

Per cent. Insoluble silicious matter 5-86

Silica (SiOj)

-o”

19-62

Alumina (AI2O3).

. 10-30

Ferric oxide (Fe 2 0s) .

7-44

Manganese dioxide (Mn0 2) .

1-57

Lime (CaO)

• 44-54

Magnesia (MgO)

2-92

Sulphuric anhydride (SO3) .

2-6l

Carbonic anhydride (C0 2) .

3-43

Water (H 2 0) .

0-25

Alkalis and loss .

1-46

100-00

The most characteristic constituent is the oxide of iron, which gives the cement a reddish colour, and the presence of manganese also differentiates Roman from Portland cement, which rarely contains appreciable quantities of that element. The

high percentage of alumina causes the cement to be quick-setting, and it becomes hard in about five minutes. It resists the action of water, salt or fresh, very well, and is therefore useful in situations where the work is likely to be submerged immediately after it has been put in place.

The term Natural Cements is applied to cements made by burning mixtures of clay and carbonate of lime naturally occur- ring in approximately suitable proportions. They may be regarded as badly-mixed Portland cements, and need no special description. American “natural” cements are of a somewhat different class. They are usually made from a silicious limestone containing magnesia, and are comparatively lightly burned.

The following analysis is typical of a cement of this kind : —

Per cent. Silica (Si0 2) 24-30

Alumina (Al 2 0s)

Ferric oxide (Fe 2 0s)

Lime (CaO)

Magnesia (MgO)

Water, carbonic anhydride, and loss

7-22

5-o6

33-70

20-94

8-78

100-00

These irregular cements of the Portland class are good building materials for ordinary purposes, but are not so suitable as good artificial Portland cement for heavy and important undertakings.

Passow Cement is a recent product which is in a class by itself. It is made by granulating blast furnace slag of suitable com- position and finely grinding the product, either alone or with an

admixture of about 10 % of Portland cement clinker. It differs from ordinary slag cement (see above) in that it is not a pozzuolanic cement depending on the interaction of granulated slag and lime. The particular method of granulating slag for Passow cement produces a material which sets per se and attains a strength comparable with that of Portland cement. Passow cement has been successfully made from slag of different compositions in Germany, England and America.

The chief use of hydraulic cements, whether of the pozzuolanic or Portland class, is to act as an adhesive material in work which is to be exposed to water. No doubt in times of remote ft S rf S tie antiquity it was found that the jointing of masonry cements, which was to be immersed required the use of a cement indifferent to the action of water. Ordinary mortar failed in such positions; mortar made from lime prepared from limestones or chalks containing a little clay was found to stand; mortar made from lime mixed with trass or similar active silicious material was also found to stand. On this observation rests the whole of the present enormous employment of hydraulic cements. It was a natural transition to utilize these cements not merely for jointing masonry but also for making concrete, and the only reason why hydraulic cements, as distinct from cements which are not hydraulic (e.g. ordinary mortar), are used for the latter purpose is their great mechanical strength. Their use in above-water work is checked by the low price of common brick. Even in such work, where it would be thought that masses of burnt clay would be the cheapest conceivable material, concrete is at least on level terms with its rival. It must be remembered that one of the great advantages of concrete is that five-sixths of its total mass may be provided from local sand and gravel, on which no carriage has to be paid. The cement, on which alone freight is to be reckoned, converts these from loose incoherent material into a solid stone. Thus it comes about that the largest use of cement is for manufacturing concrete for dock and harbour work, and for the making of foundations. It is also employed for the building of light bridges, floors, and pipes constructed of cement mortar disposed round a skeleton of iron rods. Such composite structures take advantage at once of the high tensile strength of iron and of the high compressive strength of cement mortar. (See also Concrete.)

Good hydraulic cements are highly permanent materials provided certain conditions be observed. It might be supposed that hydraulic cements from their nature would be indifferent to the action of water, but this is only true if the structures of which they form part are sufficiently compact. In this case the action of the water is checked by the film of carbonate of lime which eventually forms oh the surface of calcareous cement. This, together with the compactness of the mortar, hinders the ingress and egress of water, and prevents the dissolution and ultimate destruction of the cement. But where the concrete or mortar is not well made and is porous, the continual passage of water through it will gradually break up and dissolve away the calcareous constituents of the cement until its strength is utterly destroyed. This destructive action is increased if the water contains sulphates or magnesium salts, both of which act chemically on the calcareous constituents of the cement. As sea-water contains both sulphates and magnesium salts, "it is especially necessary in concrete for harbour work to take every care to produce an impervious structure. There are various minor external causes for the failure and ultimate destruction of cement mortar and concrete, but their discussion is a matter for the specialist. Failure from inherent vice in the cement has been already touched on; it can always be traced to want of skill and care in manufacture.

Calcium Sulphate Cements. — Under this term are comprehended all cements whose setting properties primarily depend on the hydration of calcium sulphate. They include plaster of Paris, Keene's cement and many variants of these two types. The raw material is gypsum (q.v.). This may be almost chemically pure, when it is generally used for Keene's cement; or it may contain smaller or greater quantities of impurities, in which case it is suitable for the preparation of cements of the plaster of Paris class. The mode of preparation is to calcine the gypsum at temperatures which depend on the class of cement to be produced. If plaster of Paris is to be made, calcination is carried out at about 204° C. (= 400° F.); at this temperature, gypsum, CaS04-2H 2 0, loses three-quarters of its combined water and becomes 2CaS04-H 2 0. If a cement of the Keene's cement class is to be prepared the temperature used is higher, e.g. 500 C. (= 932° F.), and the whole of the combined water of

the gypsum is expelled, the anhydrous sulphate • CaS04 being obtained.

To produce plaster of Paris European practice consists in baking the mineral in ovens, and in America in heating it in kettles. Both processes are inferior in economy to calcination in rotatory piaster of kilns, a process which may be regarded as the method of p ar / s . the present and the immediate future. Keene's cement K eea ' e > s and its congeners are made in fixed kilns so constructed cement. that only the gaseous products of combustion come into contact with the gypsum to be burnt, in order to. avoid contamination with the ash of the fuel. ' ' .

The setting of plaster of Paris depends On the fact that when 2CaS04-H 2 is treated with water it dissolves, forming a super-saturated solution of CaS04-2H 2 0. The excess held temporarily in solution is then deposited in crystals of CaS04-2H 2 0. In the light of this knowledge the mode of setting of plaster of Paris becomes clear. The plaster is mixed with a quantity of water sufficient to make it into a smooth paste; this quantity of water is quite in- sufficient to dissolve the whole of it, but it dissolves a small part, and gives a supersaturated solution of CaS04-2H 2 0. In a few minutes the surplus hydrated calcium sulphate is deposited from the solution, and the water is capable again of dissolving 2CaS04-H 2 0, which in turn is fully hydrated and deposited as CaS(V2H 2 0. The process goes on until a relatively small quantity of water has by instal- ments dissolved and hydrated the 2CaSOVH 2 0, and has deposited CaS04-2H 2 in felted crystals forming a solid mass well cemented together. The setting is rapid, occupying only a few minutes, and is accompanied by a considerable expansion of the mass. There is reason to suppose that the change described takes place in two stages, the gypsum first forming orthorhombic crystals and then crystal- lizing in the monosymmetric system. Gypsum thus crystallized is in its normal monosymmetric form, more stable under ordinary conditions than the orthorhombic form. Correlatively in its process pf dehydration to form plaster of Paris, monosymmetric gypsum is, converted into the orthorhombic form before it begins to be dehydrated.

The principles which govern the preparation and setting of the other class of calcium sulphate cements, that is, cements of the Keene class, are not fully understood, but there is a fair amount of know- ledge on the subject, both empirical and scientific. The essential difference between the setting of Keene's cement and that of plaster of Paris is that the former takes place much more slowly, occupying hours instead of minutes, and the considerable heating and expansion which characterize the setting of plaster

of Paris are much less marked. ‘ . >

It is the practice in Great Britain to burn pure gypsum at a low temperature so as to convert it into the hydrate 2CaSCVH 2 0, to soak the lumps in a solution of alum or of aluminium sulphate, and to recalcine them at about 500° C. On grinding they give Keene’s cement. Instead of alum various other’ salts, e.g. borax, may be used. The quantity of these materials is so small that analyses of Keene’s cement show it to be almost pure anhydrous calcium sulphate, and make it difficult to explain what, if any, influence these minute amounts of alum and the like can exert on the setting of the cement. It seems probable that the effect of, the salts is inconsiderable, and that the governingcondition is the temperature at which the cement has been burnt. The setting of Keene’s cement takes place by the same sort of process which has been described for the setting of plaster of Paris, the chief differences being .that the substance dissolved is anhydrous calcium sulphate and that the operation takes a longer time.

All cements having calcium sulphate as their base are suitable only for indoor work because of the solubility of this substance. They form excellent decorative plasters on account of their clean white colour and the sharpness of castings made from them, this latter quantity being due to their expansion when setting.

See D. B. Butler, Portland Cement (London, 1905) ; E. C. Eckel, Cements, Limes and Piasters (New York, 1905) ; G. R. Redgrave and Charles Spackman, Calcareous Cements (London, 1905) ; F, H. Lewis, ” Manufacture of Hydraulic Cements in the United States,” The Mineral Industry (New York, 1898) ; W. H. Stanger and Bertram Blount, ” Cement ! Manufacture in Great Britain,” The Mineral Industry, New York, 1897 and 1905; Id. ” The Testing of Hydraulic Cements,” Journ. Soc. Chem. Ind., 1894, 13, p. 455; Id., Proc. Inst. Civ. Eng., 1901 ; B. Blount, ” Recent Progress in the Cement Industry,” Journ. Soc. Chem. Ind., 1906, 25, p. 1020; H. L. le Chatelier, Recherches experimenlales sur la constitution des mortiers hydrauliques ; Desch, Concrete, No. 2, pp. 101,-102; Davis, Journ. Soc. Chem. Ind., 1905, 26, p. 727. (B. Bl.)

Adhesive Cements. — Mixtures of animal, vegetable and mineral substances are employed in great variety in the arts for making joints, mending broken china and other objects, &c. A strong cement for alabaster and marble, which sets in a day, may be prepared by mixing 12 parts of Portland cement, 8 of fine sand

and I of in- fusorial earth, and making them into a thick' paste with silicate of soda; the object to be cemented need not be heated. For stone t marble, and. earthenware a strong cement, insoluble in water, can be made as follows :— slcimmed-milk cheese is boiled in water till of a gluey consistency, washed, kneaded well in cold water, and incorporated

with quicklime; the composition is warmed for use. A. similar cement is a mixture of dried fresh curd with ˆth of its weight of quicklime and a little camphor; it is made into a paste with water when employed. A cement for Derbyshire spar and china, &c, is composed of 7 parts of rosin and 1 of wax, with a little plaster of Paris; a small quantity only should be applied to the surfaces to be united, for, as a general rule, the thinner the stratum of a cement, the more powerful its action. Quicklime mixed with white of egg, hardened Canada balsam, and thick copal or mastic varnish are also useful for cementing broken china, which should be warmed before their application. For small articles, shellac dissolved in spirits of wine is a very convenient cement. Cements such as marine glue are solutions of shellac, india-rubber or asphaltum in benzene or naphtha. For use with wood which is exposed to moisture, as in the case of wooden cisterns, a mixture may be made of 4 parts of linseed oil boiled with litharge, and 8 parts ot melted glue; other strong cements for the same purpose are prepared by softening gelatine in cold water and dissolving it by heat in linseed oil, or by mixing glue with one-fourth of its weight of turpentine, or with a little bichromate of potash. Mahogany cement, for filling up cracks in wood, consists of 4 parts of beeswax, I of Indian red and yellow- ochre to give colour. Culler's cement, used for fixing knife-blades in their hafts, is made of equal parts of brick-dust and melted rosin, or of 4 parts of rosin with I each of beeswax and brick-dust. For covering bottle-corks a mixture of pitch, brick-dust and rosin is employed. A cheap cement, sometimes employed to fix iron rails in stone-work, is melted brimstone, or brimstone and brick-dust. For pipe-joints, a mixture of iron turnings, sulphur and sal ammoniac, moistened with water, is employed. Japanese cement, for uniting surfaces of paper, is made by mixing rice- flour with water and boiling it. Jewellers' or Armenian cement consists of isinglass with mastic and gum ammoniac dissolved in spirit. Gold and silver chasers keep their work firm by means of a cement of pitch

and rosin, a little tallow, and brick-dust to thicken. Temporary cement for lathg-work, such as the polishing and grinding of jewelry and optical glasses, is compounded thus : — rosin, 4 oz. ; whitening previously made red- hot, 4 oz. ; wax, \ oz. ‘

CEMETERY (Gr. KOL/xiiTripiov, from uoinav, to sleep), literally a sleeping-place, the name applied by the early Christians to the places set apart for the burial of their dead. These were generally extra-mural and unconnected with churches, the practice of interment in churches or churchyards being unknown in the first centuries of the Christian era. The term cemetery- has, therefore, been appropriately applied in modern times to the burial-grounds, generally extra-mural, which have been sub- stituted for the overcrowded churchyards (q.v.) of populous parishes both urban and rural.

From 1840 to 1855, attention was repeatedly called to the condition of the London churchyards by correspondence in the press and by the reports of parliamentary committees, the first of which, that of Mr Chad wick, appeared in 1843. The vaults, under the pavement of the churches, and the small spaces of open ground surrounding them, were crammed with coffins. In many of the buildings the air was so tainted with the products of corruption as to be a direct and palpable source of disease and death to those who frequented them. In the churchyards coffins were placed tier above tier in the graves until they were within a few feet (or sometimes even a few inches) of the surface, and the level of the ground was often raised to that of the lower windows of the church. To make room for fresh interments the sextons had recourse to the surreptitious removal of bones and partially-decayed remains, and in some cases the contents of the graves were systematically transferred to pits adjacent to the site, the grave-diggers appropriating the coffin-plates, handles and nails to be sold as waste metal. The neighbourhood of the churchyards was always unhealthy, the air being vitiated by the gaseous emanations from the graves, and the water, wherever it was obtained from wells, containing organic matter, the source of which could not be mistaken. In all the large towns the evil prevailed in a greater or less degree, but in London, on account of the immense population and the consequent mortality, it forced itself more readily upon public attention, and after more than one partial measure of relief had been passed the church-yards were, with a few exceptions, finally closed by the act of 1.855, an< i the cemeteries which now occupy a large extent of ground to the north, souths east and west became henceforth the

burial-places of the metropolis. Several of them had been already established by private enterprise before the passing of the Burial Act of 1855 (Kensal Green cemetery dates from 1&32),

but that enactment forms the epoch from which the general development of cemeteries in Great Britain and Ireland began. Burial within the limits of cities and towns is now almost everywhere abolished, and where it is still in use it is surrounded by such safeguards as make it practically innocuous. This tendency has been conspicuous both in the United Kingdom and the United States. The increasing practice of cremation (q.v.) has assisted in the movement for disposing of the dead in more sanitary conditions; and the proposals of Sir Seymour Haden and others for burying the dead in more open coffins, and abandoning the old system of family graves, have had consider- able effect. The tendency has therefore been, while improving the sanitary aspects of the disposal of the dead, to make the cemeteries themselves as fit as possible for this purpose, and beautiful in arrangement and decoration.

The chief cemeteries of London are Kensal Green cemetery on the Harrow Road; Highgate cemetery on the slope, of Highgate Hill; the cemetery at Abney Park (once the residence of Dr Watts) ; the Norwood and Nunhead cemeteries to the south of London; the West London cemetery at Brompton; the cemeteries at Ilford and Ley tons tone in Essex; the Victoria cemetery and the Tower Hamlets cemetery in East London; and at a greater distance, accessible by railway, the great cemetery at Brookwood near Woking in Surrey, and the cemetery at New Southgate. The general plan of all these cemeteries is the same, a park with broad paths either laid out in curved lines as at Kensal Green and Highgate, or crossing each other at right angles as in the case of the West London cemetery. The ground on each side of these paths is marked off into grave spaces, and trees and shrubs are planted in the intervals between them. The buildings consist of a curator's residence and one or more chapels, and usually there is also a range of family graves with imposing tombs, massive structures containing in their corridors recesses for the reception of coffins, generally closed only by an iron grating. The provincial cemeteries in the main features of their arrangements resemble those of the metropolis. One of the most remarkable is St James's cemetery at Liverpool, which occupies a deserted quarry. The face of the eastern side of the quarry is traversed by ascending gradients off which open catacombs formed in the living rock, — a soft sandstone; the ground below is planted with

trees, amongst which stand hundreds of gravestones. The main approach on the north side is through a tunnel, above which, on a projecting rock, stands the cemetery chapel, built in the form of a small Doric temple with tetrastyle porticos.

Many of the cities of America possess very fine cemeteries. One of the largest, and also the oldest, is that of Mount Auburn near Boston. Others of importance are the Laurel Hill cemetery (1836) at Philadelphia; the Greenwood cemetery (1838) at Brooklyn (New York); the Lake View cemetery at Cleveland, Ohio; while the cemeteries at New Orleans (q.v.) are famous for their beauty.

The chief cemetery of Paris is that of Pere la Chaise, the prototype of the garden cemeteries of western Europe. It takes its name from the celebrated confessor of Louis XIV., to whom as rector of the Jesuits of Paris it once belonged. It was laid out as a cemetery in 1804. It has an area of about 200 acres, and contains about 20,000 monuments, including those of all the great men of France of the 19th century — marshals, generals, ministers, poets, painters, men of science and letters, actors and musicians. Twice the cemetery and the adjacent heights have been the scene of a desperate struggle; in 1814 they were stormed by a Russian column during the attack on Paris by the allies, and in 1871 the Communists made their last stand among the tombs of Pere la Chaise; 900 of them fell in the defence of the cemetery or were shot there after its capture, and 200 of them were buried in quicklime in one huge grave and 700 in another. There are other cemeteries at Mont Parnasse and Montmartre, besides the minor burying-grounds at Auteuil, Batignolles, Passy, La Villette, &c. In consequence of all these cemeteries being more or less crowded, a great cemetery was laid out in 1874 on the plateau of M6ry sur Oise, 16 m. to the north of Paris, with which

it is connected by a railway line. It includes within its circuit fully 2 sq. m. of ground. The French cemetery system differs in many respects from the English. Every city and town is required by law to provide a burial-ground beyond its barriers, properly laid out and planted, and situated if possible on a rising ground. Each interment must take place in a separate grave. This, however, does not apply to Paris, where the dead are buried, forty or fifty at a time, in the fosses communes, the poor being

interred gratuitously, and a charge of 20 francs being made in all other cases. The fosse is filled and left undisturbed for five years, then all crosses and other memorials are removed, the level of the ground is raised 4 or 5 ft. by fresh earth, and interments begin again. For a fee of 50 francs a concession temporaire for ten years can be obtained, but where it is desired to erect a permanent monument the ground must be bought by the executors of the deceased. In Paris the undertakers' trade is the monopoly of a company, the SociStS des pompes funebres, which in return for its privileges is required to give a free burial to the poor.

The Leichenhauser, or dead-houses, of Frankfort and Munich form a remarkable feature of the cemeteries of these cities. The object of their founders was twofold — (1) to obviate even the remotest danger of premature interment, and (2) to offer a respectable place for the reception of the dead, in order to remove the corpse from the confined dwellings of the survivors. At Frankfort the dead-house occupies one of the wings of the propylaeum, which forms the main entrance to the cemetery. It consists of the warder's room, where an attendant is always on duty, on each side of which there are five rooms, well ventilated, kept at an even temperature, and each provided with a bier on which a corpse can be laid. On one of the fingers is placed a ring connected by a light cord with a bell which hangs outside in the warder's room. The use of the dead-house is voluntary. The bodies deposited there are inspected at regular intervals by a medical officer, and the warder is always on the watch for the ringing of the warning bell. One revival, that of a child, has been known to take place at Frankfort. The Leichenhaus of Munich is situated in the southern cemetery outside the Sendling Gate. At one end of the cemetery there is a semicircular building with an open colonnade in front and a projection behind, which contains three large rooms for the reception of the dead. At both Frankfort and Munich great care is taken that the attendants receive the dead confided to them with respect, and no interment is permitted until the first signs of decomposition appear; the relatives then assemble in one of the halls adjoining the Leichenhaus, and the funeral takes place. In any case there is, with ordinary care, little fear of premature interment, but in another way such places of deposit for the dead are Of great use in large towns, as they prevent the evil effects which result from the prolonged retention of the dead among the living. Mortuaries for this purpose have also been established in many places in

England.

In Italy the Campo Santo (Holy Field) is best illustrated by the famous one at Pisa, from which the name has been given to other Italian burying-grounds. Of the cemeteries still in use in southern Europe the catacombs (q.v.) of Sicily are the most curious. There is oiie of these under the old Capuchin monastery of Ziza near Palermo, where in four large airy subterranean corridors 2000 corpses are ranged in niches in the wall, many of them shrunk up into the most grotesque attitudes, or hanging with pendent limbs and head from their places. As a preparation for the niche, the body is desiccated in a kind of oven, and then dressed as in life and raised into its place in the wall. At the end of the principal corridor at Ziza there is an altar strangely ornamented with a kind of mosaic of human skulls and bones.

Cemeteries have been in use among many Eastern nations from time immemorial. In China, the high grounds near Canton and Macao are crowded with tombs, many of them being in the form of small tumuli, with a low encircling wall, forcibly recalling the ringed barrows of western Europe. But the most picturesque cemeteries in the world are those of the Turks. From them it was, perhaps, that the first idea of the modern cemetery, with

its ornamental plantations, was derived. Around Constantinople the cemeteries form vast tracts of cypress woods under whose branches stand thousands of tombstones. A grave is never reopened; a new resting-place is formed for every one, and so the dead now occupy a wider territory than that which is covered by the homes of the living. The Turks believe that till the body is buried the soul is in a state of discomfort, and the funeral, therefore, takes place as soon as possible after death. No coffin is used, the body is laid in the grave, a few boards are arranged round it, and then the earth is shovelled in, care being taken to leave a small opening extending from the head of the corpse to the surface of the ground, an opening not unfrequently enlarged by dogs and other beasts which plunder the grave. A tombstone of white marble is then erected, surmounted by a carved turban in the case of a man, and ornamented by a palm branch in low relief if the grave is that of a woman. The turban by its varying form indicates not only the rank of the sleeper below but also the period of his death, for the fashion of the Turkish head-dress is always changing. A cypress is usually planted beside the grave, its odour being supposed to neutralize any noxious exhalations from the ground, and thus every cemetery is a forest, where by

day hundreds of turtle doves are on the wing or perching on the trees, and where bats and owls swarm undisturbed at night. Especially for the Turkish women the cemeteries are a favourite resort, and some of them are always to be seen praying beside the narrow openings that lead down into a parent's, a husband's, or a brother's grave. Some of the other cemeteries of Constantinople contrast rather unfavourably ' with the simple dignity of those which belong to the Turks. That of the Armenians abounds with bas-reliefs which show the manner of the death of whoever is buried below, and on these singular tombstones there are frequent representations of men being decapitated or hanging on the gallows.

See also the articles Burial and Burial Acts; Cremation; Funeral Rites; Churchyard.

CENCI, BEATRICE (1577-1599), a Roman woman, famous for her tragic story; poetic fancy has woven a halo of romance about her, which modern historic research has to a large extent destroyed. Born at Rome, she was the daughter of Francesco Cenci (1549-1598), the bastard son of a priest, and a man of great wealth but dissolute habits and violent temper. He seems to have been guilty of various offences and to have got off with short terms of imprisonment by bribery; but the monstrous cruelty which popular tradition has attributed to him is purely legendary. His first wife, Ersilia Santa Croce, bore him twelve children, and nine years after her death he married Lucrezia Petroni, a widow with three daughters, by whom he had no offspring. He was very quarrelsome and lived on the worst possible terms with his children, who, however, were all of them more or less disreputable. He kept various mistresses and was even prosecuted for unnatural vice, but his sons were equally dissolute. His harsh treatment of his daughter Beatrice was probably due to his discovery that she had had an illegitimate child as the result of an intrigue with one of his stewards (A. Bertolotti, in his Francesco Cenci, publishes Beatrice's will in which she provides for this child), but there is no evidence that he tried to commit incest with her, as has been alleged. The eldest son Giacomo was a riotous, dishonest young scoundrel, who cheated his own father and even attempted to murder him (1595). Two other sons, Rocco and Cristoforo, both of them notorious rakes, were killed in brawls. Finally Francesco's wife Lucrezia and his children Giacomo, Bernardo and Beatrice, assisted by a certain Monsignor Guerra, plotted to murder him. Two bravos were hired (one of them named Olimpio, according

to Bertolotti, was probably Beatrice's lover), and Francesco was assassinated while asleep in his castle of Petrella in the kingdom of Naples (1598). Giacomo afterwards had one of the bravos murdered, but the other was arrested by the Neapolitan authorities and confessed everything. Information having been communicated to Rome, the whole of the Cenci family were arrested early in 1599; but the story of the hardships they underwent in prison is greatly exaggerated. Guerra escaped;

Lucrezia, Giacomo and Bernardo confessed the crime; and Beatrice, who at first denied everything, even under torture, also ended by confessing. Great efforts were made to obtain mercy for the accused, but the crime was considered too heinous, and the pope (Clement VIII.) refused to grant a pardon; on the nth of September 1599, Beatrice and Lucrezia were beheaded, and Giacomo, after having been tortured with red- hot pincers, was killed with a mace, drawn and quartered. Bernardo's penalty, on account of his youth, was commuted to perpetual imprisonment, and after a year's confinement he was pardoned. The property of the family was confiscated.

The romantic character of the history of this family has been the subject of poems, dramas and novels. Shelley's tragedy is well known as a magnificent piece of writing, although the author adopts a purely fictitious version of the story. Nor is F. D. Guerrazzi's novel, Beatrice Cenci (Milan, 1872), more trustworthy. The first attempt to deal with the subject on documentary evidence is A. Bertolotti's Francesco Cenci e la sua famiglia (2nd ed., Florence, 1879), containing a number of interesting documents which place the events in their true light; cf. Labruzzi's article in the Nuova Antohgia, 1879, vol. xiv., and another in the Edinburgh Review, January 1879.

CENOBITES (from Gr. koiws, common, and /3ios, life), monks who lived together in a convent or community under a rule and a superior, — in contrast to hermits or anchorets who live in isolation. The Basilians (q.v.) in the East and the Bene- dictines (q.v.) in the West are the chief cenobitical orders (see Monasticism).

CENOMANI, a branch of the Aulerci in Gallia Celtica, whose

territory corresponded generally to Maine in the modern department of Sarthe. Their chief town was Vindinum or Suindinum (corrupted into Subdinnum), afterwards Civitas Cenomanorum (whence Le Mans), the original name of the town, as usual in the case of Gallic cities, being replaced by that of the people. According to Caesar (Bell. Gall. vii. 75. 3), they assisted Vercingetorix in the great rising (52 B.C.) withaforceof 5000 men. Under Augustus they formed a civitas stipendiaria of Gallia Lugdunensis, and in the 4th century part of Gallia Lugdunensis iii. About 400 B.C., under the leadership of Elitovius (Livy v. 35), a large number of the Cenomani crossed into Italy, drove the Etruscans southwards, and occupied their territory. The statement of Cato (in Pliny, Nat. Hist. iii. 130), that some of them settled near Massilia in the territory of the Volcae, may indicate the route taken by them. The limits of their territory are not clearly defined, but were probably the Athesis (Adige or Etsch) on the east, the Ollius (Oglio, or perhaps the Addua) on the west, and the Padus on the south. Liyy gives their chief towns as Brixia (Brescia) and Verona; Pliny, Brixia and Cremona. The Ceno- mani nearly always appear in history as loyal friends and allies of the Romans, whom they assisted in the Gallic war (225 B.C.), when the Boii and Insubres took up arms against Rome, and during the war against Hannibal. They certainly joined in the revolt of the Gauls under Hamilcar (200), but after they had been defeated by the consul Gaius Cornelius (197) they finally submitted. In 49, with the rest ofGallia Transpadana, they acquired the rights of citizenship.

The orthography and the quantity of the penultimate vowel of Cenomani have given rise to discussion. According to Arbois de Jubainville, the Cenomani of Italy are not identical with the Cenomani (or Cenomanni) of Gaul. In the case of the latter, the survival of the syllable ” man ” in Le Mans is due to the stress laid on the vowel; had the vowel been short and unaccented, it would have disappeared. In Italy, Cenomani is the name of a people; in Gaul, merely a surname of the Aulerci.

See A. Voisin, Les Cenomans anciens et modernes (Le Mans, 1862) ; A. Desjardins, GSographie historique de la Gaule romaine, ii. (1876- 1893) ; Arbois de Jubainville, Les Premiers Habitants de VEurope (1889-1894); article and authorities in La Grande Encyclopedic; C. Hiilsen in Pauly-Wissowa’s Realencyclopadie, iii. pt. 2 (1899); full ancient authorities in A. Holder, Alt-celtischer Sprachschatz, i.

(1896).

CENOTAPH (Gr. /cecos, empty, t

The custom arose from the erection of monuments to those whose bodies could not be recovered, as in the case of drowning.

CENSOR (from Lat. censer e, assess, estimate; in Gr. n/xr/Tijs). I. In ancient Rome, the title of the two Roman officials who presided over the census, the registration of individual citizens for the purpose of determining the duties which they owed to the community. In the etymology of the word lurks the idea of the arbitrary assignment of burdens or duties. Varro defines census as arbitrium, and derives the name censores from the position of these magistrates as arbitri populi (Varro, de Ling. Lat. v. 81; ap. Non. p. 519). This original idea of "discre- tionary power" was never entirely lost; although ultimately it came to be more intimately associated with the appreciation of morals than with the assignment of burdens. From the point, of view of its moral significance the censorship was the Rorriart manifestation of that state control of conduct which was a not unusual feature of ancient societies. It is true that Rome possessed sumptuary laws, and laws dealing with moral offences, which it was the duty of other magistrates to enforce; but the, organization for the control of conduct was mainly exhibited in the censorship, and, as thus exhibited, was at once simple and comprehensive.

The censorship was believed to have been instituted in 443 B.C. to relieve the consuls of the duties of registration. Since the periods of registration were quinquennial, it was not a continuous office; but its tenure does not seem to have been fixed until 434 B.C., when a lex Aemilia provided that the censors should hold office for eighteen months. This magistracy was at first confined to patricians; a plebeian censor is first mentioned in 351 B.C. A lex Publilia of 339 B.C. is said to have enacted that one censor must be a plebeian. Two plebeian censors were for the first time elected in 131 B.C. The election always took place in the Comitia Centuriata (see Comitia). The censorship, although lacking the powers implied in the imperium and the right of summoning the senate and the people, was not only one of the higher magistracies, but was regarded as the crown of a political career. It was an irresponsible office; and the only limitations on its powers were created by the restriction of tenure to a year and a half, the fact that re-election was forbidden, and the restraint imposed on each censor by the fact that no act of his was valid

without the assent of his colleague.

The original functions of the censors were (1) the registration of citizens in the state-divisions, such as tribes and centuries; (2) the taxation of such citizens based on an estimate of their property; (3) the right of exclusion from public functions on moral grounds, known as the regimen morum; (4) the solemn act of purification (lustrum) which closed the census. Two other functions were subsequently added:— (5) the selection of the senate (lectio senatus, see Senate), and (6) certain financial duties such as the leasing of the contracts for tax-collecting and for the repair of public buildings. The first four of these functions were those of the census, which was a detailed examination of the citizen body as represented by heads of families (patres familiarum) in the Campus Martius. The equites were a select portion of this citizen body; but the review of these knights took place, not in the Campus, but in the Forum (see Equites). It was in connexion with this review of the ordinary citizens and the knights, as well as with the choice of senators, that the censors published their edicts stating the moral rules which they intended to enforce. The offences which they punished were sometimes concerned with family life and private relations, sometimes with breaches of political duty. Certain professions, such as that of an actor or gladiator, also invoked their stigma, and at times the disqualifications they pronounced were the? consequence of a previous judicial condemnation. Infamia was the general name given to the disabilities pronounced by the censor. These varied in degree from the deprivation of a senator of his seat, or a knight's loss of his horse, to exclusion from the tribes or centuries, an exclusion which entailed the loss of voting power. All the disabilities pronounced by one pair of censors might be removed by their successors.

The censorship, although its control over the senate came to

be weakened (see Senate), lasted as long as the republic; and it was only suspended, not abolished, during the principate. Although the princeps exercised censorial functions, he was seldom censor. Yet the office itself was held by Claudius I. and Vespasian. Domitian assumed the title of life censor (censor perpetuus), but the precedent was not followed. A fruitless

attempt to galvanize the republican office into new life was made in a.d. 251, during the reign of the emperor Decius.

Authorities. — Mommsen, Romisches Staatsrecht, ii. 331 foil. (3rd ed., Leipzig, 1887); Daremberg-Saglio, Dictionnaire des antiquites grecques et romaines, i. 990 foil. (1875, &c.) ; Lange, Romische Alterthiimer, i. 572 foil. (Berlin, 1856, &c.) ; de Boor, Fasti Censorii (Berlin, 1873); Gerlach, Die romische Censur in ihrem Verhalt- nisse zur Verfassung (Basel, 1842) ; Nitzsch, " Uber die Census " in Neues Jahrbuch f. Phil, lxxiii. 730 (Leipzig, 1856) ; Zumpt, "Die Lustra der Romer " in Rhein. Museum, xxv. 465, xxvi. 1.

(A.H.J.G.)

■ II. In modern times the word " censor " is used generally for one who exercises supervision over, or criticizes, the conduct of other persons. In the universities of Oxford and Cambridge it is the title of the official head or supervisor of the non-collegiate students (i.e: those who are not attached to a college, hall or hostel) . In Oxford the censor is nominated by the vice-chancellor and the proctors, and holds office for five years; in Cambridge he is similarly appointed, and holds office for life. The censors of the Royal College of Physicians are the officials who grant licences.

Council of Censors, in American constitutional history, is the name given to a council provided by the constitution of Pennsylvania from 1776 to 1790, and by the constitution of Vermont from 1777 to 1870. Under both constitutions the council of censors was elected once in seven years, for the purpose of inquiring into the working of the governmental departments, the conduct of the state officers, and the working of the laws, and as to whether the constitution had been violated in any particular. The Vermont council of censors, limited in number to thirteen, had power, if they thought the constitution required amending in any particular, to call a convention for the purpose. A convention summoned by the council in 1870 amended the constitution by abolishing the censors.

For the censorship of the press, see Press Laws ; for the censorship of plays, Theatre : Law, and Lord Chamberlain.

CENSORINUS, Roman grammarian and miscellaneous writer, flourished during the 3rd century a.d. He wag the author of a lost work De Accentibus, and of an extant treatise De Die Natali,

written in 238, and dedicated to his patron Quintus Caerellius as a birthday gift. The contents are of a varied character: the natural history of man, the influence of the stars and genii, music, religious rites, astronomy, the doctrines of the Greek philosophers. The second part deals with chronological and mathematical questions, and has been of great service in determining the principal epochs of ancient history. The whole is full of curious and interesting information. The style is clear and concise, although somewhat rhetorical, and the Latinity, for the period, good. The chief authorities used were Varro and Suetonius. Some scholars, indeed, hold that the entire work is practically an adaptation of the lost Pratum of Suetonius. The fragments of a' work De Natali Institutione, dealing with astronomy, geometry, music and versification, and usually printed with the De Die Natali of Censorinus, are not by him. Part of the original MS., containing the end of the genuine work, and the title and name of the author of the fragment are lost.

The only good edition with commentary is still that of H. Lindenbrog (1614) ; the most recent critical editions are bv O. Jahn (1845), F. Hultsch (1867), and J. Cholodniak (1889). There is an English translation of the De Die Natali (the first eleven chapters being omitted) with notes by W. Maude (New York, 1900).

CENSUS (from Lat. censere, to estimate or assess; connected by some with centum, i.e. a count by hundreds), a term used to denote a periodical enumeration restricted, in modern times, to population, and occasionally to industries and agricultural resources, but formerly extending to property of all kinds, for the purpose of assessment.

Operations of this character have been conducted with different objects from very ancient times. The fighting strength of the children of Israel at the Exodus was ascertained by a count of all males of twenty years old and upwards, made by enumerators appointed for each clan. The Levites, who were exempted from military duties, were separately enumerated from the age of thirty upwards, and a similar process was' ordained subsequently by Solomon, in order to distribute amongst them the functions assigned to the priestly body in connexion with the temple. The census unwillingly carried out by Joab at the behest of David related exclusively to the fighting men of the community, and the dire consequences ascribed to it were quoted in reprobation of such inquiries as late as the middle of the 18th century. It appears, too, that a register of the population of each clan was

kept during the Babylonian captivity and its totals were published on their return to Jerusalem. In the Persian empire there was apparently some method in force by which the resources of each province were ascertained for the purpose of fixing the tribute. In China, moreover, an enumera- tion of somewhat the same nature was an ancient institution in connexion with the provincial revenues and military liabilities. In Egypt, Amasis had the occupation of each individual annually registered, nominally to aid the official supervision of morals by discouraging disreputable means of subsistence; and this ordinance, according to Herodotus, was introduced by Solon into the Athenian scheme of administration, where it developed later into an electoral record.

It was in Rome, however, that the system from which the name of the inquiry is derived was first established upon a regular footing. The original census was ascribed to Servius Tullius, and in the constitution which goes by his name it was decreed that every fifth year the population should be enumer- ated along with the property of each family — land, live-stock, slaves and freedmen. The main object was to ensure the accurate division of the people into the six main classes and their respective centuries, which were based upon considerations of combined numbers and wealth. With the increase of the city the operation grew in importance, and was followed by an official lustrum, or purificatory sacrifice, offered on behalf of the people by the censors or functionaries in charge of the classifica- tion. Hence the name of lustrum came to denote the intercensal term, or a period of five years. The word census, too, came to mean the property qualification of the class, as well as the process of registering the resources of the individual. Later, it was used in the sense of the imposition itself, in which it has survived in the contracted form of cess. Unfortunately the statistics of population thus collected were subordinated to the fiscal interests of the inquiry, and no record has been handed down relating to the population of the city and its neighbourhood. In the time of Augustus the census was extended to the whole empire. In the words of the Gospel of St Luke, he ordered ” the whole world to be taxed,” or, according to the revised version, to be enrolled. The compilation of the results of this the most comprehensive enumeration till then attempted was engaging the attention of the emperor, it is said, just before his death, but was never completed. The various inquiries instituted during the middle ages, such as the Domesday Book and the Breviary of

Charlemagne, were so far on the Roman model that they took little or no account of the population, the feuda} system probably rendering information regarding it unnecessary for the purposes of taxation or military service.

The foundations of the census on the modern system were laid in Europe towards the middle or end of the 17th century. Sweden led the way, by making compulsory the parish record of births, deaths and marriages, kept by the clergy, and extending it to include the whole of the domiciled population of the parish. In France, Colbert, in 1670, ordered the extension to the rural communes of the system which had for many years been in force in Paris of registering and periodically publishing the domestic occurrences of the locality. Five years before this, however, a periodical enumeration by families and individuals had been established in the colony of New France, and was continued in

Quebec from 1665 till 1754. This, therefore, may be considered to be the earliest of modern censuses.

'Efforts have been almost unceasingly made since 1872 by statistical experts in periodical conference to bring about a general understanding, first, as to the subjects which may be considered most likely to be ascertained with approximate accuracy at a census, and secondly — a point of scarcely less importance — as to the form in which the results of the inquiry should be compiled in order to render comparison possible between the facts recorded in the different areas. In regard to the scope of the inquiry, it is recognized that much is practic- able in a country where the agency of trained officials is employed throughout the operation which cannot be expected to be adequately recorded where the responsibility for the correctness of the replies is thrown upon the householder. The standard set up by eminent statisticians, therefore, may be taken to repre- sent an ideal, not likely to be attained anywhere under present conditions, but towards which each successive census may be expected to advance. The subjects to which most importance is attached from the international standpoint are age, sex, civil condition, birthplace, illiteracy and certain infirmities. Occupation, too, should be included, but the record of so detailed a subject is usually considered to be better obtained by a special

inquiry, rather than by the rough and ready methods of a synchronous enumeration. This course has been adopted in Germany, Belgium and France, and an approach to it is made in the decennial census of Canada and the United States. Religious denomination, another of the general subjects suggested, is of considerably more importance in some countries than in others, and the same may be said of nationality,; which is often usefully supplemented by the return of mother-tongue. Nor should it be forgotten that the internal classification and the combinations of the above subjects are also matters to be treated upon some uniform plan, if the full value of the statistics is to be extracted from the raw material. On the whole, the progress towards a general understanding on many, if not most, of the questions here mentioned which has been made in the present generation, is a gratifying tribute to those who have long laboured in the cause of efficient enumeration.

The British Empire England and Wales. — Up to the beginning of the 19th century the number of the population was a matter of estimate and conjecture. In 1753 a bill was introduced by a orivate member of the House of Commons, backed by official support, to provide for the annual enumeration of the people and of the persons in receipt of parochial relief. It was violently opposed as ” sub- versive of the last remains of English liberty ” and as likely to result in ” some public misfortune or an epidemical distemper.” After passing that House, however, the bill was thrown out by the House of Lords. The fear of disclosing to the enemies of England the weakness of the country in fighting-material was one of the main objections offered to the proposal. By the end of the century, however, owing to a great extent to the publica- tion of the essays of Malthus, the pendulum had swung far in the opposite direction, it was thought desirable to possess the means of judging from time to time the relations between an increasing population and the means of subsistence. A census bill, accord- ingly, again brought in by a private member, became law without opposition at the end of 1800, and the first enumeration under it took place in March of the following year, the operations being confined to Great Britain. The inquiry was entrusted in England to the overseers, acting under the justices of the peace and the high constables, and in Scotland, to village schoolmasters, under the sheriffs. A supplementary statement of births, deaths and marriages for each parish was required from the clergy, who transmitted it to parliament through the bishops and primates successively. There

was no central office or control. The schedule required the number of houses, inhabited and otherwise, the population of each family, by sex, and the occupation, under one of the three heads, (a) agriculture, (b) trade, manufacture or industry, or © other than these two. The results, which were

not satisfactory, were published without comment. Ten years later, the chief alteration in the inquiry was the substitution of the main occupation of the family for that of the individual. The report on this census contained a very valuable exposition of the difficulties involved in such operations and the numerous sources of error latent in an apparently simple set of questions. In 182 1 an attempt to get a return of ages was made, but it was not repeated in 1831, when the attention of the enumerators was concentrated upon greater detail in the occupation record. Their efforts were successful in getting a better, but still far from complete result. The creation, in 1834, of poor law unions, and the establishment, in 1836, of civil registration districts, as a rule coterminous with them, provided a new basis for the taking of a census, and the operations in 1 841 were made over accord- ingly to the supervision of the registrar-general and his staff. The inquiry was extended to the sex, age and occupation Of every individual; those born in the district were distinguished from others, foreigners being also separately returned. The number of houses inhabited, uninhabited and under construction respectively, was noted in the return. The parish statement of births, deaths and marriages was sent up by the clergy for the last time. The most important innovation, however, was the transfer of the responsibility for filling up the schedule from the overseers to the householders, thereby rendering possible a synchronous record.

With some modification in detail, the system then inaugurated has been since maintained. In 1851 the relationship to the head of the family, civil condition, and the blind and deaf- mute were included in the inquiry. On this occasion, the act providing for the census was interpreted to authorize the collection of details regarding accommodation in places of public worship and the attendance thereat, as well as corresponding informa- tion about educational establishments. A separate report wa's published on the former subject which proved something of a storm centre. The census of 187 1 obtained for the first time a return of persons of unsound mind not confined in asylums. During the next ten years, the separate areas for which popula- tion returns had to be prepared were seriously multiplied by the creation of sanitary

districts, to the number of 966. The necessity, for administrative or other purposes, of tabulating separately the returns for so many cross-divisions of the country constitutes one of the main difficulties of the English census operations, more particularly as the boundaries of these areas are frequently altered. In anticipation of the census of 1891, a treasury committee was appointed to consider the various suggestions made in regard to the form and scope of the inquiry. Its pro- posals were adopted as to the subdivision of the occupation column into employer, employed and independent worker, and as to the record upon the schedule of the number of rooms occupied by the family, where not more than five. Separate entry was also made of the persons living upon property or resources, but not following any occupation. No action was taken, however, upon the more important recommendation that midway between two censuses a simple enumeration by sex and age should be effected. A return was also prepared in 1891, for Wales, of those who could speak only Welsh, only English, and both languages, but, owing to the inclusion of infants, the results were of little value. In 1901 the same information was called for, excluding all under three years of age. The term tenement, too, was substituted for that of storey, as the subdivision of a house, whilst in addition to inhabited and uninhabited houses, those occupied by day, but not by night, were separately recorded.' The nationality of those born abroad, which used to be returned only for British subjects, was called for from all not born within the kingdom.

Scotland. — In the acts relating to the census from 1801 to 1851, provision for the enumeration of Scotland was made with that for England and Wales, allowance being made for the differences in procedure, which mainly concerned the agency to be employed. In 1855, however, civil registration of births and deaths was established in Scotland, and the conduct of the census of 1861 was, by a separate act, entrusted to the registrar-

general of that country. The same course was followed at the three succeeding enumerations, but in 1901 the former practice was resumed. The complexity of administrative areas, though far less than in England, was simplified, and the census com- pilation proportionately facilitated, by the passing of the Local Government Act for Scotland, in 1889. In 1881, the definition of a

house in Scotland was made identical with that in England, since previously what was called a house in the northern portion of Great Britain was known as a tenement in the south, and vice versa. Since 1861 a return has been called for in Scotland of the number of rooms with one or more windows, and that of children of school-age under instruction is also included in the inquiry. The number of persons speaking Gaelic was recorded for the first time in 1881. The question was somewhat expanded at the next census, and in 1901 was brought into harmony with the similar inquiry as to Welsh and Manx.

Ireland. — An estimate of the population of Ireland was made as early as 1672, by Sir W. Petty, and another in 1712, in connexion with the hearth-money, but the first attempt to take a regular census was made in 181 1, through the Grand Juries. It was not successful, and in 1821 again, the inquiry was considered to be but little more satisfactory. The census of 183 1 was better, but the results were considered exaggerated, owing to the system of paying enumerators according to the numbers they returned. The census, therefore, was supplemented by a revisional inquiry three years afterwards, in order to get a good basis for the newly introduced system of public instruction. The completion of the ordnance survey and the establishment of an educated constabulary force brought the operations of 1 841 up to the level of those of the sister kingdom. The main difference in procedure between the two inquiries is that in Ireland the schedule is filled in by the enumerator, a member of the constabulary, or, in Dublin, of the metropolitan police, instead of being left to the householder. The tabulation of the returns, again, is carried out at the central office from the original schedule, and not, as in England, from the book into which the former has been copied by the enumerating agency. The inquiry in Ireland is more extensive than that in Great Britain. It includes, for instance, a considerable amount of information regarding holdings and stock. The details of house accommodation are fuller. A column is provided for the degree of education, and another for religious denomination, an addition which has always been successfully resisted in England. This last information was made voluntary in 1881 and the following enumerations without materially affecting the extent of the record. The inquiry as to infirmities, too, is made to extend to those temporarily incapacitated from work, whether at home or in a hospital. There is also a column for the entry of persons speaking the Irish language only or able to speak both that and

English. In the report of 1901 for England and Wales (p. 170) a table is given showing, for the three divisions of the United Kingdom, the relative number of persons speaking the ancient languages either exclusively or in addition to English.

British Colonies and Dependencies. — A simultaneous and uniform census of the British empire is an ideal which appeals to many, but its practical advantages are by no means commensurate with the difficulties to be surmounted. Scattered as are the colonies and dependencies over the world, the date found most suitable for the inquiry in the mother country and the temperate regions of the north is the opposite in the tropics and inconvenient at the antipodes. Then, again, as to the scope of the inquiry, the administrative purposes for which information is thus collected vary greatly in the different countries, and the inquiry, too, has to be limited to what the conditions of the locality allow, and the population dealt with is likely to be able and willing to answer. By prearrangement, no doubt, uniformity may be obtained in regard to most of the main statistical facts ascertainable at a census, at all events in the more advanced units of the empire, and proposals to this effect were made by the registrar-general of England and Wales in his report upon the figures for 1901. Previous to that date, the only step towards compilation of the census results of the empire had been a bare

statement of area and population, appended without analysis; comparison or comment, to the reports for England and Wales> from the year 1861 onwards. In 1905, however, the returns published in the colonial reports were combined with those of the United Kingdom, and the subjects of house-room, sex, age, civil condition, birthplace, occupation, and, where available, instruction, religion and infirmities, were reviewed as fully as the want of uniformity in the material permitted (Command paper, 2860, 1906). The measures taken by the principal states, colonies and dependencies for the periodical enumeration of their population are set forth below.

Canada. — The first enumeration of what was afterwards called Lower Canada, took place, as above stated, in 1665, and dealt with the legal, or domiciled, population, not with that actually present at the time of the census, a practice still main- tained, in contrast to that prevailing in the rest of the empire. The record was by families, and included the sex, age and civil condition of each individual, with a partial return of profession or trade. Later on, the last item was abandoned in favour of a fuller return of

agricultural resources, a feature which has remained a prominent part of the inquiry. After the British occupation, a census was taken in 1765 and 1784, and annually from 1824 to 1842, the information asked for differing from time to time. Enumerations were conducted independently by the different states until 1871, when the first federal census was taken of the older parts of the Dominion. Since then, the enumeration has been decennial, except in the case of the more recently colonized territories of Manitoba and the North-West, where an intermediate census was found necessary in 1885-1886. The census of Canada is organized on the plan adopted in the United States rather than in accordance with British practice, and includes much which is the subject of annual returns in the latter country, or is not officially collected at all. The details of deaths in the year preceding the census, for instance, are called for, there being no registration of such occurrences in the rural tracts. In consideration of the large immigrant population again, the birthplace of each parent is recorded, with details as to nationality, naturalization and date of immigration. Occupa- tion is dealt with minutely, in conjunction with temporary unemployment, average wage or salary earned, and other particulars. No less than eleven .schedules are employed, most of them relating to details of industries and production. The duty of filling up so comprehensive a return, involving an answer to 561 questions, is not left to the householder, but entrusted to enumerators specially engaged, working under the supervision of the Department of Agriculture. Owing to the sparse popula- tion and difficulties of communication in a great part of the dominion, the inquiry, though referred to a single date, is not completed on that day, a month being allowed to the enumerator for the collection of his returns and their revision and trans- mission to the central office. A special feature in the operations is the provision, necessitated by the record of the legal population, for the inclusion in the local return of the persons temporarily absent on the date of the census, and their adjustment in the general aggregates, a matter to which considerable attention is paid. The very large mass of detail collected at these inquiries entails an unusually long time spent in compilation; the statistics of population, accordingly, are available considerably in advance of those relating to production and industries.

Australasia— As the sphere of the census operations in Canada has been gradually spreading from the small beginnings on the east coast to the immense territories of the north-west, so, in the

island continent, colonization, first concentrated in the south-east, has extended along the coasts and thence into the interior, except in the northern region. The first act of effective occupation of the country having been the establishment of a penal settlement, the only population to be dealt with in. the earlier years of British administration was that under restraint, with its guardians and a few scattered immigrants in the immediate neighbourhood of Sydney Cove. This was enumerated from 1788 onwards by official " musters," at first weekly, and afterwards at lengthening intervals. The record was so inaccurate

that it had no statistical value until 1820, when the muster was taken after due preparation and with greater care, approximating to the system of a regular census. The first operation, however, called by the latter name, was the enumeration of 1828, when an act was passed providing for the enumeration of the whole population, the occupied area and the live-stock. The details of population included sex, children and adults respectively, religion and status, that is whether free (immigrants or liberated convicts), on ticket-of -leave, or under restraint. A similar inquiry was made in 1833 and again in 1836. In 1841 a separate census was taken of New Zealand and Tasmania respectively. The scope of the inquiry in New South Wales was somewhat extended and made to include occupations other than agriculture and stock-breeding. Five years later, the increase of the popula- tion justified the further addition of particulars regarding birthplace and education. The record of status, too, was made optional, and in 1856 was omitted from the schedule. In that year, moreover, Victoria, which had become a separate colony, took its – own census. South Australia, too, was enumerated in 1846, ten years after its foundation as a colony. From 1861 the census has been taken decennially by all the states except Queensland, where, as in New Zealand, it has been quinquennial since 1875 and 1881 respectively. Up to and including the census of 1 901 each state conducted separately its own inquiries. The scheme of enumeration is based on that of Great Britain, modified to suit the conditions of a thin and widely scattered population. The schedules are distributed by enumerators acting under district supervisors; but it is found impossible to collect the whole number in a single day, nor does the mobility of the popu- lation in the rural tracts make such expedition necessary. In more than

one state the police are employed as enumerators, but elsewhere, a staff has to be specially recruited for the purpose. The operations were improved and facilitated by means of an interstatal conference held before the census of 1891, at which a standard schedule was adopted and a series of general tables agreed upon, to be supplemented in greater detail according to the requirements of each state. The standard schedule, in addition to the leading facts of sex, age, civil condition, birth-place, occupation and house-room, includes education and sickness as well as infirmities, and leaves the return of religious denomination optional with the householder. Under the head of occupation, the bread-winner is distinguished from his dependants and is returned as employer, employed, or working on his own account, as is now the usual practice in census-taking. Each state issues its own report, in which the returns are worked up in the detail required for both local administrative purposes, and for comparison with the corresponding returns for the neighbouring territory. The reports for New South Wales and Victoria are especially valuable in their statistical aspect from the analysis they contain of the vital conditions of a comparatively young community under modern conditions of progress.

South Africa. — Almost from the date of their taking possession of the Cape of Good Hope and its vicinity, the Netherlands East Indian Company instituted annual returns of population, live-stock and agricultural produce. The results from 1687 for nearly a century were recorded, but do not appear to have been more accurate than those subsequently obtained on the same method by the British government, by whom they were dis- continued in 1856. The information was collected by district officials, unguided by any general instructions as to form or procedure. The first synchronous census of the colony, as it was then constituted, took place in 1865, on a fairly compre- hensive schedule. Ten years later the inquiry was extended to religion and civil condition, and for the census of 1891, again, a rather more elaborate schedule was used. The next census was deferred till 1904; in consequence of the disorganization produced by the Boer war. The inquiry was on the same lines as its predecessors, with a little more detail as to industries and religious denomination. Speaking generally, the administration of the operations is conducted upon the Australian plan, with special attention to allaying the distrust of the native and more ignorant classes, for which purpose the influence of the clergy

was enlisted. In some tracts it was found advisable to sub- stitute a less elaborate schedule for that generally prescribed. In Natal, indeed, where the first independent census was taken in 1891, the Kaffir population was not on that occasion enumerated at all. In 1904, however, they were counted on a very simple schedule, by sex and by large age-groups up to 40 years old, with a return of birthplace, in a form affording a fair indication of race. Natives of India, an element of considerable extent and importance in this colony, are enumerated apart from the white population, but in full detail, recognizing the remarkable difference between the European and the Oriental in the matter of age distribution and civil condition. The Transvaal and the Orange River colonies were enumerated in 1904. In the latter, a census had been taken in 1890, in considerable detail, but that of the Transvaal, in 1896, seems to have been far from complete or accurate even in regard to the white population. In Southern Rhodesia the white residents were enumerated in 1891, but it was not until 1904 that the whole population was included in the census. The difficulty in all these cases is that of procuring a sufficient quantity of efficient agency, especially where a large and illiterate native population has to be taken into account. For this reason, amongst others, no census had been taken up to 1906 of Northern Rhodesia, the British possessions and protectorates of eastern Africa, or, again, of Nigeria and the protectorates attached to the West African colonies of Gambia, Sierra Leone and Lagos.

The West Indies. — Each of the small administrative groups here included takes its census independently of the rest, though since 1871 all take it about the date fixed for that of the United Kingdom. The information required differs in each group, but the schedule is, as a rule, of a simple character, and the results of the inquiry are usually set forth with comparatively little comment or analysis. In some of the groups distinctions of colour are returned in general terms; in others, not at all. On the other hand, considerable detail is included regarding the indentured labourers recruited from India, and those of this class who are permanently settled on the land in Guiana and Trinidad. No census was taken in the former, or in Jamaica and Barbados, in 1901.

Ceylon. — Here the census is taken decennially, on the same date as in India, in consideration of the constant stream of migration between the two countries. The schedule is much the same as in India with the substitution of race for caste. Until 1 901,

however, it was not filled in by the enumerator, as in India, but was distributed before and collected after the appointed date as in Great Britain.

India'.— The population of India is the largest aggregate yet brought within the scope of a synchronous and uniform enumeration. It amounts to three-fourths of that of the British Empire, and but little less than a fifth of the estimated population of the world. Between 1853 and 1881 each province conducted its own census operations independently, with little or no attempt at uniformity in date, schedule or tabulation. In the latter year the operations were placed for the first time under central administra- tion, and thelike procedure wasadoptedin 1 89 1 and 1 901 , with such modification of detail as was suggested by the experience of the preceding census. On each occasion new areas had to be brought within the sphere of enumeration, whilst the necessity for the use in the wilder tracts of a schedule simpler in its demands than the standard, grew less as the country got more accustomed to the inquiry, and the efficiency of the administrative agency increased. Not more than 5 % of the householders in India can read and write, and the proportion capable of fully understanding the schedule and of making the entries in it correctly is still lower. From the literate minority, therefore, agency has to be drawn in sufficient strength to take down every particle of the information dictated by the heads of families. As it would be impossible for an enumerator to get through this task in the course of the census night for more than a comparatively small number of houses, the operation is divided into two processes. First a preliminary record is made a short time before the night in question, of the persons ordinarily residing in each house.

Then, on that night, the enumerator, reinforced if necessary by aid drafted from outside, revisits his beat, and brings the record up to date by striking out the absent and entering the new arrivals. The average extent of each beat is arranged to include about 300 persons. Thus, in 1901, not far from a million men were required for enumeration alone. To this army must be added the controlling agency, of at least a tenth of the above number, charged with the instruction of their subordinates, the inspection and correction of the preliminary record, and the

transmission of the schedule books to the local centre after the census has been taken. The supply of agency for these duties is, fortunately, not deficient. Irrespective of the large number of clerks, village scribes and state and municipal employes which can be drawn upon with but slight interruption of official routine, there is a fair supply of casual literary labour up to the moderate standard required. The services, too, of the educated public are often voluntarily placed at the disposal of the local authorities for the census night, with no desire for remuneration beyond out-of-pocket expenses, and the addition, perhaps, of a persona] letter of thanks from the chief official of the district. By means of a well-organized chain of tabulating centres, the preliminary totals, by sexes, of the 204 millions enumerated in 1901 were given to the public within a fortnight of the census, and differed from the final results by no more than 94,000, or •03%. The schedule adopted contains in addition to the standard subjects of sex, age, civil condition, birthplace, occupa- tion and infirmities, columns for mother-tongue, religion and sect, and caste and sub-caste. It is printed in about 20 lan- guages. The results for each province or large state are tabulated locally, by districts or linguistic divisions. The final compilation is done by a provincial superintendent, who prepares his own report upon the operations and results. This work has usually an interest not found in corresponding reports elsewhere, in the prominent place necessarily occupied in it by the ethnographical variety of the population.

Foreign Countries

Inquiries by local officials in connexion with measures of taxation, such as the hearth-tax in France, were instituted in continental Europe as early as the 14th century; but as the basis of an estimate of population they were intrinsically untrust- worthy. Going outside Europe, an extreme instance of the results of combining a census with more definite administrative objects may be found in the census of China in 171 1, when the population enumerated in connexion with a poll-tax and liability to military service, was returned as 28 millions; but forty years later, when the question was that of the measures for the relief of widespread distress, the corresponding total rose to 103 millions! The notion of obtaining a periodical record of popula- tion and its movement, dissociated from fiscal or other liabilities, originated, as stated above, in Sweden, where, in 1686, the birth and death registers, till then kept voluntarily by the parish clergy, were made compulsory and general, the results for each

year being communicated to a central office. A census, as a special undertaking, was not, however, carried out in that country until 1749. The example of Sweden was followed in the next year by Finland, and twenty years later, by Norway, where the parish register was an existing institution, as in the neighbouring state. Several other countries followed suit in the course of the 18th century, though the results were either partial or inaccurate. Amongst them was Spain, though here a trustworthy census was not obtained until 1857, or perhaps 1887. Some of the small states of Italy, too, recorded their population in the middle of the above century, but the first general census of that country took place in 1861, after its unification. In Austria, a census was taken in 1754 by the parish clergy, concurrently with the civil authorities and the military commandants. Hungary was in part enumerated thirty years later. The starting-point of the modern census, however, in either part of the dual monarchy, was not until 1857. Speaking generally, most of the principal countries began the current series of their censuses between 1825 and i860. The German empire has taken its census

quinquennially since its foundation, but long before 187 1 a census at short intervals used to be taken in all the states of the Zollverein, for the purpose of ascertaining the contribution to the federal revenue, the amount of which was revisable every three years. The last great country to enter the census field was Russia. From 1721, what are known as revisions of the population were periodically carried out, for military, fiscal and police purposes; but these were conducted by local officials without central direction or systematic organization. In 1897 a general census was taken as synchronously throughout the empire as was found possible. It embraced a population second to that of India alone, as China, probably the most populous country in the world, has not yet been subjected to this test. The inquiry was made in great detail, under central control, an3 on a plan sufficiently elastic to suit the requirements of so varied a country and population. As in India, the schedules had to be issued in an unusual number of languages, and were dealt with locally in the earlier stages of tabulation. The principal regions of which the population is still a matter of mere conjecture are the Turkish empire, Persia, Afghanistan, China and the Indo-Chinese peninsula, in Asia, nearly nine-tenths of Africa, and a considerable portion of South America. (J. A. B.)

United States

Modern census-taking seems to have originated in the United States. Professor von Mayr declares in a recent and authoritative work, " It was no European state, but the United States of America that made a beginning of census-taking in the large and true sense of that word," and Professor H. Wagner, writing of the censuses of Sweden, said to have been taken in the 18th century, uses these words, " Since 1749 careful parish registers have been kept by the clergy and have in general the value of censuses." The same authority, although mentioning a reported census of Norway in 1769, indicates his conviction that the first real census of that country was in 1815. Sweden, Norway and the United States are the only countries with any claim to have taken the first modern census, as distinguished from a register of tax-payers, &c, the lineal descendant of the old Roman census, and the innovation seems to be due to the United States. If so, the first modern census was the American census of 1790. At the present date more than three-fifths of the estimated popula- tion of the world has been enumerated in this way. It is of interest accordingly to note how and why the device originated.

The Federal census, which began in 1790 and has been taken every ten years since under a mandate contained in the Constitution of the United States, was the outgrowth of a controversy in the convention which prepared the document. Representatives of the smaller states as a rule claimed that the vote, and so the influence, of the states in the proposed government should be equal. Representatives of the larger states as a rule claimed that their greater population and wealth were entitled to recognition. The controversy ended in the creation of a bicameral legislature in the lower branch of which the claim of the larger states found recognition, while in the upper, the Senate, each state had two votes. In the House of Representatives seats were to be distributed in proportion to the population, and the convention, foreseeing rapid changes of population, ordained an enumeration of the inhabitants and a redistribution or reapportionment of seats in the House of Representatives every ten years.

The provision of the Constitution on the subject is as follows : —
■ " Representatives and direct taxes shall be apportioned among the several states which may be included within this Union according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years and excluding Indians not taxed, three-fifths of all other persons. The actual enumeration

shall be made within three years after the first meeting of the Congress of the United States, and within every subsequent term of ten years, in such manner as they shall bylaw direct."

In 1790 the population was reported classed as slaves and free, the free classed as white and others, the free whites as males and females, and the free white males as under or q.bove sixteen

years of age. In 1800 and 1810 the same classification was preserved, except that five age-groups instead of two were given for free white males and the same five were applied also to free white females. In connexion with the census of 18 10 an attempt, perhaps the earliest in any country, was made to gather certain industrial statistics showing " the number, nature, extent, situation and value of the arts and manufactures of the United States." In 1820 a sixth age class was introduced for free white' males, an age classification of four periods was applied to the free coloured and the slaves of each sex, and the number of aliens and of persons engaged in agriculture, in manufactures and in commerce was called for. The inquiry into industrial statistics begun in 1810 was also repeated and extended.

In 1830 thirteen age classes were employed for free whites of each sex, and six for the free coloured and the slaves of each sex. The number of aliens, of the deaf and dumb and the blind were also gathered.

The law under which the census of 1840 was taken contained a novel provision for the preparation in connexion with the census of statistical tables giving " such information in relation to mines, agriculture, commerce, manufactures and schools as will exhibit a full view of the pursuits, industry, education and resources of the country." This was about the first indication of a tendency, which grew in strength for half a century, to load the Federal census with inquiries having no essential or necessary connexion with its main purpose, which was to secure an accurate enumeration of the population as a basis for a reapportionment of seats in the House of Representatives. This tendency was largely due to a doubt whether the Federal government under the Constitution possessed the power to initiate general statistical inquiries, a doubt well expressed in the 9th edition of the Encyclo- paedia Britannica by Francis A. Walker, himself a prominent member of the party whose

contention he states: — ■

" The reservation by the states of all rights not granted to the general government makes it fairly a matter of question whether purely statistical inquiries, other than for the single purpose of apportioning representation, could be initiated by any other authority than that of the states themselves. That large party which advocates a strict and jealous construction of the constitution would certainly oppose any independent legislation by the national Congress for providing a registration of births, marriages and deaths, or for obtaining social and industrial statistics, whether for the satisfaction of the publicist or for the guidance of the legislature. Even though the supreme court should decide such legislation to be within the grant of powers to the general government, the distrust and opposition, on constitutional grounds, of so large a portion of the people, could not but go far to defeat the object sought."

The difficulty stated in the foregoing quotation, although now mainly of historic importance, exerted great influence upon the development of the American census prior to 1900.

The pioneer work of the census of 1840 in the fields of educational statistics, statistics of occupations, of defective classes and of causes of death, suffered from numerous errors and defects. Public discussion of them contributed to secure radical modifications of scope and method at the census of 1850. Before the census law was passed, a census board, consisting of three members of the president's cabinet, was appointed to draft plans for the inquiry, and the essential features of its report prepared after consultation with a number of leading statisticians were embodied in the law.

The census of 1850 was taken on six 'schedules, one for free inhabitants, one for slaves, one for deaths during the preceding year, one for agriculture, one for manufactures and one for social statistics. The last asked for returns regarding valuation, taxation, educational and religious statistics, pauperism, crime and the prevailing rates of wages in each municipal division. It was also the first American census to give a line of the schedule to each person, death or establishment enumerated, and thus to make the returns in the individual form indispensable for a detailed classification and compilation. The results of this census were tabulated with care and skill, and a preliminary analysis gave the salient results and in some cases compared them with

European figures.

The census of i860 followed the model of its predecessor with

slight changes. When the time for the next census approached it was felt that new legislation was needed, and a committee of the House of Representatives, with James A. Garfield, afterwards president of the United States, at its head, made a careful and thorough study of the situation and reported an excellent bill, which passed the House, but was defeated by untoward influences in the Senate. In consequence the census of 1870 was taken with the outgrown machinery established twenty years earlier, a law characterized by Francis A. Walker, the superintendent of the census, who administered it, as ” clumsy, antiquated and bar- barous.” It suffered also from the fact that large parts of the country had’ not recovered from the ruin wrought by four years of civil war. In consequence this census marks the lowest ebb of American census work. Tie accuracy of the results is generally denied by competent experts. The serious errors were errors of omission, were probably confined in the main to the Southern states, and were especially frequent among the negroes.

Since 1870 the development of census work in the United States has been steady and rapid. The law, which had been prepared for the census of 1870 by the House committee, furnished a basis for greatly improved legislation in 1879, underwhich the tenth census was taken. By this law the census office for the first time was allowed to call into existence and to control an adequate local staff of supervisors and enumerators. The scope of the work was so extended as to make the twenty-two quarto volumes of the tenth census almost an encyclopaedia, not only of thepopulation,but also of theproductsand resources of the United States. Probably no other census in the world has ever covered so wide a range of subjects, and perhaps none except that of India and the eleventh American census has extended through so many volumes. The topics usually contained in a census suffered from the great addition of other and less pertinent matter, and the reputation of the work was unfavourably affected by the length of time required to prepare and publish the volumes (the last ones not appearing until near the end of the decade), the original underestimate of the cost of the work, which made frequent supplementary appropriations necessary, the resignation of the superintendent, Francis A. Walker, in 1882, and the disability and death of his successor, Charles W. Seaton. The eleventh

census was taken under a law almost identical with that of the tenth, and extended through twenty-five large volumes, presenting a work almost as encyclopaedic, but much more distinctively statistical.

The popular opinion of a census, at least in the United States, depends largely upon the degree to which its figures for the population of the country, of states, and especially of cities, meet or fail to meet the expectations of the interested public. Judged by this standard, the census of 1890 was less favourably received than that of 1880. The enumerated population of the country in 1880 was larger than had been anticipated; and in the face of these figures it was difficult for local complaints, even where they were made, to find hearing and acceptance. But according to the eleventh census the decennial rate of growth of population fell suddenly from over 30%, which the figures had shown between 1870 and 1880, and in every preceding decade of the century, except that of the Civil War, to less than 25%, in spite of an immigration nearly double that of any preceding decade. For this change no adequate explanation was offered by the census office. Hence the protests of those who believed that the figures for population were too small swelled into a. general chorus of dissatisfaction. But the census was probably more correct than the critics. Most of the motives influencing popular estimates of population in the United States tend to exaggeration. The convention which drafted the Constitution of the United States attempted to secure a balance of interests by apportioning both representatives in Congress and direct taxes according to population. A passage in The Federalist suggests the motives of the convention as follows: —

" As the accuracy of the census to be obtained by Congress will necessarily depend in a considerable degree on the disposition if not co-operation of the states, it is of great importance that the states should feel as little bias as possible to swell or reduce the

amount of their numbers. Were their share of representation alone to be governed by this rule, they would have an interest in exaggerating their inhabitants. Were the rule to decide their share of taxation alone, a contrary temptation would prevail. By extending the rule to both objects the states will have opposite

interests, which will control and balance each other, and produce a requisite impartiality."

With the disappearance of direct taxation as a source of federal revenue, the motive mentioned for understating the population disappeared. – On the other hand, the desire for many representatives in Congress has been reinforced by the more influential feelings of local pride and of rivalry with other cities of somewhat similar size. Hence a complaint that the population is overstated is seldom heard, and hence, also, popular charges of an under- count afford little evidence that the population was really larger than stated by the census.

After the detailed tabulation had been completed, it was shown that the number of persons under ten years of age in 1890 was surprisingly small, and that this deficiency in children was a leading cause of the slow growth in population. Before the tabulation had been made Francis A. Walker wrote: — " If the birth-rate among the previously existing population did not suffer a sharp decline . . . the census of 1890 cannot be vindicated. To ascertain the facts we must await the tabulation of the population by periods of life, and ascertain how many of the inhabitants of the United States of 1890 were under ten years of age." These results thus confirmed the accuracy of the count of 1890. Efforts to invalidate the census returns by com- parison with the registration records of Massachusetts cannot be deemed conclusive, since in the United States, as in Great Britain, the census must be deemed more accurate and less subject to error than registration records. A strong argument in favour of the eleventh census, apart from its self-consistency, is that its results as a whole fit in with the subsequent state enumerations. In eleven cases such enumerations have been taken; and on computing from them and the results of the federal census of 1880 what the population at the date of the eleventh census should have been, if the annual rate of increase had been uniform, it appears that in no case, except New York City and Oregon, was the difference between the enumerations and these estimates over 4%. In Oregon about 30,000 more people were found in 1890 than the estimate would lead one to expect; in New York city, about 100,000 less. It seems not improbable that in the latter, where the difficulties incident to a count during the summer are almost insurmountable, serious omissions occurred. Still, such a comparison confirms the accuracy of the eleventh census as a whole. fe (

The results of the twelfth census {1900) further refute the argument that would maintain the eleventh census to be inaccurate because it showed a smaller rate of increase in popula- tion during the preceding decade than had been recorded by other censuses during earlier decades. The rate of increase dur- ing the decade ending in 1900 was even less than that for the preceding decade; and it is impossible that a falling off so marked could in two successive enumerations be the result of sheer inaccuracy. The rate of increase from 1890 to 1900, eliminating from the computation the population of Alaska, Hawaii, Indian Territory and Indian reservations, was 20-7; the rate of increase if these places are included — in which case the figures of the population of Hawaii in 1890 must be taken from the census of the Hawaiian government in that year — was 21 %.

The law regulating the twelfth census deserves to rank with those of 1790, 1850 and 1879 as one of the four important laws relative to census work. By this law the census office was far more independent than ever before. Appointments and removals were made by the director of the census rather than by the secretary of the interior, and in all plans for the execution of the law the head of the office was responsible for success. The law divided the subjects of census inquiry into two parts — first, those of primary importance, requiring the aid of the enumerator; and, secondly, those of subsidiary importance, capable of production without the aid of the enumerator. The former had to be finished and published by 1st July 1902; the latter were not to be undertaken until the former were well advanced towards completion. By this means the attention of the office could be concentrated on a small number

of subjects rather than distributed over the long list treated in the volumes of the tenth and eleventh censuses.

Under the federal form of government, with its delegation of all residuary powers to the several states, the United States have no system of recording deaths, births and marriages. Hence there is no such basis as exists in nearly every other civilized state for a national system of registration, and the country depends upon the crude method of enumerators' returns for its information on vital statistics, except in the states and cities which have estab- lished a trustworthy registration system of their own. These are the New England states and a few others in their vicinity or influ- enced by their example. Enumerators' returns in this field are so incomplete that hardly two-thirds of the deaths which have

occurred in any community during the preceding year are obtained by an enumerator visiting the families, no satisfactory basis for the com- putation of death-rates is afforded, and the returns have compara- tively little scientific value. In the regions where census tables and interpretations are derived from registration records kept by the several states or cities they are often made more complete than those in the state or municipal documents. The census of agricul- ture is also liable to a wide margin of error, owing to defects in farm accounts and the inability of many farmers to state the amount or the value even of the leading crops. The census figures relate to the- calendar year preceding 1st June 1900, and hurried and careless answers about the preceding year's crop are almost sure to have been given by many farmers in the midst of the summer's work.

The difficulties facing the manufacturing census were of a different character. A large proportion of the industries of the country keep satisfactory accounts, and can answer the questions with some correctness. But manufacturers are likely to suspect the objects of the census, and to fear that the information given will be open to the public or betrayed to competitors. Furthermore, the manu- facturing schedule presupposes some uniformity in the method of accounting among different companies or lines of business, and this is often lacking. Another source of error in the manufacturing census of the United States is that the words of the census law are construed as requiring an enumeration of the various trades and handicrafts, such as carpentering. The deficiencies in such returns are gross and notorious, but the census office feels obliged to seek for them and to report what it finds, however incomplete or in- correct the results may be. Even on the population returns certain answers, such as the number of the divorced or the number unable to read and write, may be open to question.

The wide range of the American census, and the publication of uncertain figures, find a justification in the fact that the develop- ment of accurate census work requires a long educational process in the office, and, above all, in the community. Rough approxi- mations must always precede accurate measurements; and these returns, while often inaccurate, are better than nothing, and probably improve with each decade.

Besides ,the breadth of its scope, in which the American census stands unrivalled, the most important American contribution to census work has been the application of electricity to the tabula-

tion of the results, as was first done in 1890. The main difficulties which this method reduced were two. The production of tables for so enormous a population as that of the United States through the method of tallying by hand requires a great number of clerks and a long period of time, and when complete cannot be verified except by a repetition of the process. The new method abbreviates the time, since an electric current can tally almost simultaneously the data, the tallying of which by hand would be separated by appreciable intervals. The method also renders comparatively easy the verification of the results of certain selected parts.

Judged by European standards the cost of the American census is very great. The following table gives the total and the per capita cost of each enumeration.

Date.

Cost.

Date.

Cost.

Total in

Per Capita

Total in

Per Capita

dollars.

in cents.

dollars.

in cents.

1790

44,377

I-I2

1850

1423,351

6-13

1800

66,109

1-24

i860

1,969,377

626

1810

178,445

2-46

1870

3,421,198

8-87

1820

208,526

216

1880

5,790,678

11-48

1830

378,545

2-94

1890

11,547,127

18-33

1840

833,371

4-88

1900

16,116,930

21-16

For the sake of comparison it may be stated that the per capita cost of the English census of 1901 was 2-24 cents, or little more than one-tenth that of the American census. This difference is due in part to the greater scope and complexity of the American census, and in part to the fact that in the United States the field work is done by well-paid enumerators, while in England it is done in most cases by the heads of families, who are not paid.

The course of events has clearly established the fact that the authority of the Federal government in this field is greater than the strict constructionists of a previous generation as represented

by Generat Walker in the passage already quoted believed it to be. Decision after decision of individual instances has made it a settled practice for the Federal government to co-operate with or to supple- ment the state governments in the gathering of

statistics that may fur- nish a basis for state or Federal legislation. The law has allowed the Federal census office in its discretion to compile and publish the birth statistics of divisions in which they are accurately kept ; one Federal report on the statistics of marriages and divorces through- out the country from 1867 to 1886 inclusive was published in 1889, and a second for the succeeding twenty-year period was published in 1908-1909; an annual volume gives the statistics of deaths for about half the population of the country, including all the states and cities which have approximately complete records of deaths; Federal agencies like the bureau of labour and the bureau of cor- porations have been created for the purpose of gathering certain social and industrial statistics, and the bureau of the census has been made a permanent statistical office.

The Federal census office has been engaged in the compilation and publication of statistics of many sorts. Among its important lines of work may be mentioned frequent reports during the cotton ginning season upon the amount of cotton ginned, supplemental census reports upon occupations, on employees and wages, and on further interpretation of various population tables, reports on street and electric railways, on mines and quarries, on electric light and power plants, on deaths in the registration area 1900-1904, on benevolent institutions, on the insane, on paupers in almshouses, on the social statistics of cities and on the census of manufactures in 1905. Congress has recently entrusted it with still further duties, and it has developed into the main statistical office of the Federal government, finding its nearest analogue probably in the Imperial Statistical Office in Berlin. (W. F. W.)

CENTAUREA, in botany, a genus of the natural order Com- positae, containing between four and five hundred species, and of wide distribution, but with its principal centre in the Medi- terranean region. The plants are herbs with entire or cut often spiny-toothed leaves, and ovoid or globose involucres surrounding a number of tubular, oblique or two-lipped florets, the outer of which are usually larger and neuter, the inner bisexual. Four species are native in Britain. C. nigra is knapweed, common in meadows and pastureland; C. Cyanus is the bluebottle or cornflower, a well-known cornfield weed; C. Calcitrapa is star- thistle, a rare plant, found in dry waste places in the south of England, and characterized by the rose-purple flower-heads enveloped by involucral bracts which end in a long, stiff spine. Besides cornflower, a few other species are worth

growing as garden plants; they are readily grown in ordinary soil: — C. Cineraria, a half-hardy perennial, native of Italy, is remarkable for its white downy foliage; C. babylonica (Levant) has large downy leaves and a tall spike of small yellow flowers; C. dealbata (Caucasus) is a low-growing plant with larger rose-coloured heads; C. macrocephala (Caucasus) has large yellow heads; C. Montana (Pyrenees) large handsome blue heads; and C. ragusina (S.E. Europe) beautiful silver-haired leaves and yellow flowers.

CENTAURS, in Greek mythology, a race of beings part horse part man, dwelling in the mountains of Thessaly and Arcadia. The name has been derived (1) from KtvTtiv (goad) and raupos (bull), implying a people who were primarily herdsmen, (2) from Kevrttv and the common termination -avpos or avpa ("air") i.e. " spearmen." The former is unsatisfactory partly from the philological standpoint, and the latter, though not certain, is preferable. The centaurs were the offspring of Ixion and Nephele (the rain-cloud), or of Kentauros (the son of these two) and some Magnesian mares or of Apollo and Hebe. They are best known for their fight with the Lapithae, caused by their attempt to carry off Deidameia on the day of her marriage to Peirithous, king of the Lapithae, himself the son of Ixion. Theseus, who happened to be present, assisted Peirithous, and the Centaurs were driven off (Plutarch, Theseus, 30; Ovid, Metam. xii. 210; Diod. Sic. iv. 69, 70). In later times they are often represented drawing the car of Dionysus, or bound and ridden by Eros, in allusion to their drunken and amorous habits. Their general character is that of wild, lawless and inhospitable beings, the slaves of their animal passions, with the exception of Pholus and Chiron. They are variously explained by a fancied resemblance to the shapes of clouds, or as spirits of the rushing mountain torrents or winds. As children of Apollo, they are taken to signify the rays of the sun. It is suggested as the origin of the legend, that the Greeks in early times, to whom riding was

unfamiliar, regarded the horsemen of the northern hordes as one and the same with their horses; hence the idea of the Centauf as half-man, half-animal. Like the defeat of the Titans by Zeus, the contests with the Centaurs typified the struggle between civilization and barbarism.

In early art they were represented as human beings in front, with the body and hind legs of a horse attached to the back: later, they were men only as far as the waist. The battle with the Lapithae,

and the adventure of Heracles with Pholus (Apollodorus, ii. 5; Diod. Sic. iv. 11) are favourite subjects of Greek art (see Sidney Colvin, Journal of Hellenic Studies, i. 1881, and the exhaustive article in Roscher's Lexikon der Mythologie). Fig. 34 in article Greek Art (the west pediment of the temple of Zeus at Olympia) represents the attempt of the Centaurs to carry off the bride of Peirithous.

CENTAURUS (" The Centaur "), in astronomy, a constella- tion of the southern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.), Ptolemy catalogued thirty-seven stars in it. a-Centauri is a splendid binary star. Its components are of the 1st magnitude, and revolve in a period of eighty-one years; and since its parallax is 0-75", it is the nearest star to the earth; ui-Centauri, the finest globular star- cluster in the heavens, consists of about 6000 stars in a space of about 20′ diameter, of which about 125 variables have been examined. Nova Ceniauri, a " new " star, was discovered in 1895 by Mrs Fleming in photographs taken at Harvard.

CENTAURY (Erythraea Centaurium, natural order Gentian-aceae), an annual herb with erect, smooth stem, usually branched above, and a terminal inflorescence with numerous small red or pink regular flowers with a funnel-shaped corolla. The plant occurs in dry pastures and on sandy coasts in Britain, and presents many varieties, differing in length of stem, degree of branching, width and shape of leaves, and laxity or closeness of the inflorescence. Several other species of the genus are grown as rock-plants.

CENTENARY (from Lat. centenarius, of or belonging to a hundred, from centeni, distributive of centum, hundred), a space of a hundred years, and particularly the celebration of an event on the lapse of a hundred years, a centennial anniversary. The word " centennial " (from Lat. centennis, from centum, and annus, a year), though usually an adjective as in " the Centennial State," the name given to Colorado on its admission to statehood in 1876, is also used as a synonym of centenary.

CENTERVILLE, a city and the county-seat of Appanoose county, Iowa, U.S.A., in the south part of the state, about 90 m. N.W. of Keokuk. Pop. (1890) 3668; (1900) 5256; (1905, state census) 5967 (487 being foreign-born); (1910) 6936. Center- ville is served by the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific and the Iowa Central railways. Among the

principal buildings are the county court-house and the Federal building, and the city has a public library and a hospital. It is in one of the most productive coal regions of the state ; it ships coal, limestone and livestock, has large bottling works, and manufactures iron, brick and tile, machine-shop products, woollen goods, shirts, cigars and flour. The place was platted in 1846, was called Chaldea until 1849, when the present name was adopted, was incorporated as a town in 1855, and in 1870 was chartered as a city of the second class. The city limits were extended in 1 906-1 907.

CENTIPEDE, the characteristic member of the group Chilopoda, a class of the Arthropoda, formerly associated with the Diplopoda (Millipedes), the Pauropoda and the Symphyla, to constitute the now abandoned group Myriapoda. The resemblance between the Chilopoda and the Diplopoda is principally superficial and due to the elongation and vermiform shape of the body, which in both is composed of a number of similar or subsimilar somites not differentiated as are those of Insecta, existing Arachnida and most Crustacea, into series or ” tagmata ” of varying function. Until 1893 no one doubted the correctness of the assumption that the Chilopoda and Diplopoda were orders of a class Myriapoda of the same systematic status as the Arachnida or Hexapoda. But in that year, R. I. Pocock and J. S. Kingsley independently pointed out that they differ as much from each other as either differs from the Hexapoda; and should, therefore,

rank as distinct classes of Arthropods. . Pocock, indeed, definitely associated the Chilopoda with the Hexapoda in a group, the Opisthogoneata (Opisthogonea), equivalent to a group, the Progoneata (Prosogonea), comprising the Diplopoda, Pauropoda and Symphyla. As the basis for this classification was taken the position of the generative orifices which open in the Opisthogonea at the posterior end and in the Prosogonea near the anterior end of the body. As a matter of fact, in the Chilopoda they are Situated on the penultimate or pretelsonic somite; in the Hexapoda upon the antepenultimate somite (male) or a little farther forward (female). Moreover, the recent researches of Heymons into the embryology of Scolopendra, one of the Chilopods, has shown a close correspondence in the number of cephalic metameres between the Chilopoda and Hexapoda, a

correspondence which has not yet been established in the case of the Diplopoda or Symphyla. This last discovery bears out the view of relationship between the centipedes and insects, to the exclusion of the Diplopoda, Symphyla and Pauropoda. But even if in the future it can be shown that all these groups can be brought into line with respect to the metamerism of the head, the position of the generative orifices will remain as a fundamental and constant character, distinguishing the Chilo poda from the other groups of so-called ” Myriapods ” and the Hexapoda from the Symphyla, which in many particulars they resemble.

Structure of the Chilopoda. — -The exoskeletal elements of a typical somite consist of a dorsal plate or tergum, a ventral plate or sternum, a lateral or pleural membrane, often strengthened with chitinous Sclerites, and a pair of appendages. At the anterior extremity there is a head-shield or cephalite, which bears eyes, when present, and a pair of antennae. In all centipedes, except the Scuhgeridae, the preantennal portion of the cephalite is sharply reflexed, ventrally forrning an area called the clypeus. The inferior edge of this bears the labrum, which is usually represented by a small median, and two large lateral plates- The appendages are modified as a single pair of antennae, four pairs, of jaws or gnathites, a variable number of walking legs and a single pair of generative limbs or gonopods. The antennae, articulated to the forepart of the head and preoral in position, are long and flexible and consist of fourteen or more seg- ments. The jaws of the first pair of mandibles are stout and bi-segmented, with a dentate cutting edge. Those of the second pair or maxillae vary considerably in structure in different groups. They are foliaceous and are usually regarded as biramous. In some genera (Scutigera, Lithobius) the inner branch consists of two distinct seg- ments meeting those of the opposite side in the middle line. The outer branch, which is always larger, consists of three or four seg- ments. Generally, however, the basal segments of the two branches are coalesced with each other and with the corresponding segments of the opposite side to form a single broad transverse plate. The above described condition seen in Scutigera suggests that two pairs of jaws may be involved in the formation of the maxillae in the Chilopoda. The jaws of the third pair, the palpognaths or second pair of maxillae, resemble dwarfed walking legs, and consist of five or six segments, of which the basal or coxa is united mesially to its fellow. The jaws of the fourth pair, the toxicognaths or poison- jaws, are long and powerful, and consist like the legs primarily of six segments,

whereof the basal is large and usually fused with its fellow to form a large coxal plate, the second is small and generally suppressed by fusion with the third, the fourth and fifth are also small, while the sixth is transformed into a great piercing fang, at the tip of which opens the duct of a poison gland lodged within the appendage.

The tergal elements of the somites bearing the antennae, mandibles and maxillae appear to be represented by the head-shield or cephalite. The tergal element of the somite bearing the palpognath is usually suppressed ; that of the toxicognath is sometimes of large size as in some Geophilomorpha (Himantarium) , sometimes small as irt Scutigera, Lithobius, Craterostigmus, sometimes suppressed probably by fusion with the tergum of the first leg-bearing somite as in the Scolopendromorpha. The sternal plates of all the jaw- bearing somites have disappeared, except in the case of the somite of the toxicognath, where it may be vestigial. In the case of the somites bearing the walking legs the tergal and sternal elements are preserved without fusion with the corresponding plates of the preceding or succeeding somites, so that great flexibility of the body is retained. The only exception to this is presented by Scutigera, where the terga corresponding to the sofaites bearing the fifteen pairs of legs -are reduced by fusion and suppression to seven. The walking legs are articulated to the inferior portion of the pleural or lateral area of the somites close to the external margins of the sterna, which widely separate those of the left from those of the right side, Generally speaking the legs resemble each other, although as a rule they progressively increase in length towards the posterior

end of the body. They consist typically of six segments, of which the basal is termed the coxa and the apical the tarsus. The tarsus is armed with a single terminal claw, and, except in the Geophilo- morpha and a few genera of other orders, is divided by a mesial transverse joint into two segments, as is the case in Scolopendra and Lithobius for example. But in some of the longer-legged, swift- footed centipedes of the order Lithobiomorpha (e.g. Henicops, Cermalobius) the tarsi are further subdivided. The multiplication of sub-segments reaches its maximum in Scutigera, where the tarsi are extremely long, slender, flexible and annulated. The legs of the last pair are directed backwards in a line parallel with the long axis of the body, so that their coxae, fused in some cases with the pleural sclerites (Scolopendra, Geophilus), or free and of large size (Scutigera, Lithobius), serve to protect the small genital and anal

somites. They are often greatly modified. In the males of some species of Lithobius one or more of the segments is inflated or fur- nished with tubercle-bearing, tactile bristles; in some Geophilo- morpha the whole limb is thickened in the male sex. In most Scolopendromorpha the basal segment is armed beneath with spines or spikes (Dacetum, Scolopocryptops) ; sometimes the whole appen- dage is thickened and terminated by a sharp and serrate claw (Theatops, Plutonium). In these cases the legs act as weapons of defence and offence. In other cases (Newportia) the tarsi lose the claw, become many-jointed and act as feelers, while in Alipes the terminal segments are flattened, leaf-like and furnished with a peculiar stridulating organ. The genital somite is always small and sometimes retractile within the somite bearing the last pair of legs. Its tergal plate is usually retained, but its sternal plate is generally suppressed. In females of the Lithobiomorpha and Scutigeromorpha the appendages of this somite— the gonopods — are jointed, forcipate and relatively well developed although small. In the females of the other orders they are greatly reduced or absent. In the males their development varies considerably. They are well developed in Scutigera, where they form two pairs of digitiform sclerites, whereas in the Geophilomorpha they are reduced to a pair of very short, two-jointed limbs. The anal somite is always small and limbless. In Craterostigmus the genital and anal somites are represented by a pair of elongate valves projecting between the legs of the last pair. The structure of the gonopods is unknown, and

the homology between the two valves and the skeletal elements

of the somites in question not clearly understood.

A study of the development of Scolopendra has shown that the

antennae of the adult are the appendages of the second postoral

metamere and the mandibles

those of the fourth, the first

postoral metamere, which has a

pair of transient preantennal

appendages, and the third, which

has no appendages, being ex-

calated at an early stage of

embryonic growth. Further- more, behind the legs of the last

pair two pairs of appendages are

present. The second of these

persists as the gonopods of the

adult, but the first is suppressed.

Possibly, however, it is repre- sented in the male of Scutigera

by the anterior branches of

the gonopods. The cerebral or

cephalic portion of the nervous

system consists of a quadrilobate

mass. From the two upper

lobes, which are set transversely,

arise the ocular nerves; from

the two lower lobes, which are

united by a transverse commis- sure, spring the antennal nerves

in front and the chords which

form the oesophageal collar be- hind. These chords unite below

the oesophagus to form the com- pound suboesophageal ganglion,

whence the nerves for the four

pairs of jaws arise. The ventral

system consists of a double

chord uniting in each of the leg- bearing segments in a ganglionic

swelling which gives off four

pairs of nerves to the limbs and

tissues of the somite. There is embryo of Scolopendra, ventral

a single ganglion in the genital view, showing the anal segment

segment. or telson (/) ; the legs of the last

Eyes are frequently absent. P air in the adult (Ig. 21) and the

When present they may be either tw ° rudimentary pairs of legs

simple or compound, i.e. consist- (‘£• 22 > ‘#• 2 3)-

ing externally of a single lens

(monomeniscous) of or an aggregation of lenses (polymeniscous).

Simple eyes vary in number on each side of the h<»ad from one, as in

Henicops, to as many as forty, as in some specie of Lithobius. In

Modified from Heymons, Bib. Zool., 1001, by permission of E. Nagele.

Fig. 1.

A, Diagram of anterior ex- tremity of an early embryo of Scolopendra, ventral view; cl, clypeus; lb, labrum; m, mouth; p.a, preantennal appendage; a, antenna ; int, premandibular rudi- ment; mdl, mandible; mx, max- illa; p.g, palpognath; t.g, toxico- gnath ; Ig. 1 , first pair of walking legs.

B, Posterior end of a later

Scolopendra, where there are four, the corneal lens is a biconvex thick- ening of the cuticle. The soft or retinal portion of the eye beneath the lens consists of an aggregation of large cells forming a single layer continuous with the epidermic cells of the circumocular area. Thus the eye is monostichous. The

arrangement of the cells, however, is peculiar. They are invaginated to form what may be described as a very deep cup with exceedingly thick walls and correspondingly narrow median space, the outer surface of the cup being formed by the inner or proximal ends of the cells and the inner surface by their outer or distal ends. It results from this arrangement that the cells forming all but the bottom of the invagination lie horizon- tally, i.e. at right angles to the vertical axis of the eye. From the distal ends of the cells are secreted chitinous rhabdomeres, forming a rhabdom which occupies and fills up the central portion of the cup beneath the middle of the corneal lens. The outer ends of the cells are nucleated and are continuous with the fibres of the optic nerve,

rv.ani

large accessory glands; and a pair of tubes, or vesiculae seminaSe. , open, one on each side, into the divided sperm ducts close to the* point of origin above the intestine.

The organs of the female are very similar. There is a large median ovary followed by a short oviduct forming a circum-intestinal collar and a common atrium. Into the latter open a pair of short re- ceptacula seminis and the slender duct of two pairs of large acces- sory glands. There is nothing in the female corresponding to the supra-intestinal vesiculae semin- ales of the male. In the male of Scolopendra,on the contrary, there

lerU

71- opt

P9

O.ii:

5%P*r— '.-'n/opl

A and B after Heymons, Bi&Z. Zool., 1901, by permission of E, Nagele.

A, Brain tif Scolopendra. n.ant, Antenna! nerves; n.opt, ocular nerves; n.pr.ant, preantennal nerves; oes.comm, oesophageal commissure.

Fig. 2. B, Section of Eye of Scolopendra. len, Corneal lens; ret,

retinal or visual cells; n.opt, optic nerve.

“\>

%

...s.gi

....iti.g

..m.l

which passes from the outer surface of the bottom of the cup to the brain. Compound eyes are found only in the Scutigeridae. Exter- nally the eye consists of one hundred or more little lenses or lenticles. The retinal portion is composed of a corresponding number of ocular units or ommatidia. Each ommatidium is an elongated cone with its broad extremity abutting against the corneal lenticle. It consists of a non-nucleated crystalline cone developed from embryonic cells, and is enveloped in three tiers of large nucleated cells. The cells of the outermost tier are heavily pigmented; those of the middle and innermost (proximal) tiers, the retinal cells, are at their inner extremities pro- duced into threads continuous with the fibres of the optic nerve. In the space between these cells and the crystalline cone which they surround, there is a layer of rhabdomeres deposited apparently by the cells.

The alimentary canal is a simple tube running without convolutions from the mouth to the anus. Its anterior portion or pharynx, which arises from the stomo- daeal invagination in the embryo, is short; a pair of large, so-called salivary glands open into it. The mesenteric part of the canal is relatively wide and receives at its junction with the hind-gut the excretory products of a pair of very a long and slender malpighian tubes of

Fig. 3. — Diagram of proctodaeal origin. The posterior end of Alimentary Canal of the canal, arising from the proctodaeum, ” : ” ” is relatively short and narrow.

The generative organs vary in struc- tural details in different centipedes. In the male of Lithobius the testes consist of a single coiled tube lying above the alimentary canal. The slender vas de- ferens which proceeds from its hinder end divides posteriorly into a right and left branch, embracing the gut and unit- ing beneath it to form a common chamber or atrium within the

genital orifice. The atrium receives the secretion of two pairs of

Ugli

Lithobius. a, Anus. mg, Mid-gut. hg, Hind-gut. mt, Malpighian tubule. ‘s.gl, Salivary gland. h-h. lg-i$, Legs of first and fifteenth pairs.

C after Adensamer, Verh. z. &. Verein, Vienna, 1893, pi. vii. C, Ocular unit or ommatidium of compound Eye of Scutigera. len, corneal lenticle; c.c, crystal- line cone; 1, pigmented cells of outermost tier; 2, 3, retinular cells of middle and innermost tiers; rbd, rhabdomeres; n.opt, optic nerve; pg, pigment cells.

are as many as twelve pairs of somewhat sausage-shaped testes, approximated two by two. From each pair proceed two slender ducts which open into a median duct coiled in the posterior third of the body and much expanded in the last three of the leg-bearing segments. The right and left portions of the intestinal ring of the genital duct are unequally de- veloped, and there are no vesiculae seminales, but two pairs of

gl. ace

After Heymons, Bibl. Zool., 1901, by permission of E. Nagele.

Fig. 4. — Posterior portion of generative organs of male of

Scolopendra (A), of female (B). t, Testes; v.d, vas deferens; oil,

ovary; r.s, receptaculum seminis; gl.acc, accessory glands; g.o, generative orifice.

accessory glands communicate with the genital atrium as in Lithobius. In the female Scolopendra the right and left portions of the intestinal collar are also unequally developed, and only a single pair of accessory glands besides the receptacula seminis open into the atrium.

The heart is tubular and lies in the middle dorsal line immediately

beneath the integument. It consists of a series of chambers corre-

sponding roughly to the leg-bearing segments, and lies in a blood- sinus formed by a pericardial membrane whence large alary muscles extend to the sides of the body. Each chamber gives off in Scolo- pendra a pair of fine lateral vessels, and is furnished at its posterior

B

a.m.

A after Newpoit, Phil. Trans., 1843. B after Haase, Zool. Beilrage, i. pt. 65, 1

C after Haase, he. cil.

Fig. 5. B, Two segments of Scolo- pendra, showing the branching and anastomosing tracheae and a spiracle (sp).

A, Anterior extremity of Scolopendra, showing two chambers of the heart (h), the aortic ring (a), the alae cordis (a.m.) and a cardiac orifice (0). . ,

extremity with a pair of orifices by which the blood re-enters the organ from the pericardial space. From the anterior chamber, which lies in the first or second leg-bearing segment, proceed three arteries, a median which runs forwards into the head to supply the brain and other organs, and a lateral which with its fellow of the opposite side forms an oesophageal aortic collar. From the sides of the latter arise vessels to the gnathites, and from its inferior portion an unpaired vessel passes forwards into the head and another back- wards above the nerve chord to the posterior end of the body, supplying each segment in its course with a delicate lateral branch. In Scolopendra the chambers of the heart, excepting the first and last, which are small, are subequal in size; but in forms like Scutigera where the terga are very unequal in size a corresponding inequality in the size of the chambers is manifested.

In all centipedes, except Scutigera, respiration is effected by chitinized tracheal tubes which extend with their ramifications throughout the body and open to the exterior by means of spiracles perforating the lateral or pleural membrane of more or fewer of the somites below the edge of the terga. Spiracles are never present upon the anal, genital and last leg-bearing somites, and only rarely, as in Henicops, upon the somite bearing the legs of the first pair. In the majority of cases the spiracles are circular,

sigmoid or slit-like orifices, with chitinized rim, leading into a pocket-like integumental infolding, from which emanate numerous small tracheal tubes which soon anastomose to form the main tracheal trunks. In Dacetum, one of the Scolopendridae, there is no pocket-like in- folding, the small tracheal tubes opening direct to the exterior on a large subcircular plate where their apertures fuse to form a com- plicated network. The apertures, as in the case of other genera, are protected by fine hairs; and the tracheae themselves are strengthened by a fine spiral filament. In the Lithobiidae the tracheae do not anastomose; but in Scolopendra and Geophilus the main trunks in each segment fuse transversely with those of the opposite side and also longitudinally with those of the preceding and succeeding segments.

In Scutigera the tracheae differ both in structure and position from those of all other Chilopoda. The spiracles, unpaired and seven in number, open in the median dorsal line. Each leads into a short sac from which five tracheal tubes depend into the peri- cardial blood-sinus.

Existing Chilopoda may be classified as follows, into five orders referable to two subclasses —

Subclass I. Pleurostigma.

Order 1 Geophilomorpha.

,, 2 Scolopendromorpha.

,, 3 Craterostigmomorpha.

,, 4 Lithobiomorpha.

Subclass II. Notostigma.

Order 5 Scutigeromorpha.

Subclass i, Pleurostigma.— Chilopods furnished with a rich system of branching tracheal tubes, the spiracles of which are

is’

by permission of J,

C, A pair of tufted tracheae of Scutigera. d, Dorsal plate ; t.s,

tracheal sac; tr, tracheal tubes.

paired and open upon the pleural area of more or fewer of the somites. Each leg-bearing somite contains a distinct tergum and sternum, the number of sterna never exceeding that of the terga. Eyes are either preserved or lost; when preserved they are represented either by a single one-lensed ocellus or by an aggregation of such ocelli on each side of the head. The anterior portion of the head, bearing the labrum, is bent sharply downwards and backwards beneath the larger posterior portion lying behind the antennae, so that these appendages, approximated in the middle line, project directly forwards from the margin of the head formed by this retroversion of the labral area. The maxillae are short and have no sensory organ; the palpognaths consist of four segments, and the toxicognaths have their basal segments fused to form a single

coxal plate.

Order 1. Geophilomorpha. — Chilopods with a large and indefinite number of somites, most of which are partially or completely divided into a smaller anterior segment, represented by a pretergal and two presternal sclerites, and a larger posterior segment bearingthe spiracles and legs. Spiracles are present upon all the leg-bearing somites except the first and last ; and the legs which are short and subequal in length consist of six segments, the basal of which remains small. There are no eyes, and the antennae consist invariably of four- teen segments. The tergal plate of the somite bearing the toxi- cognaths always remains distinct and separates the head-shield from the tergum of the first leg-bearing somite. The penultimate and antepenultimate segments of the toxicognaths are reduced on the preaxial side of the appendage to the condition of arthrodial integu- mental folds and suppressed on the postaxial side where the distal segment or fang is firmly jointed to the femoral segment. In the last leg-bearing somite the pleural sclerites coalesce with the coxa of the appendage; but the second segment (trochanter) of this appendage does not fuse with the third (femur). The genital and anal somites are not retractile within the last leg-bearing somite, and the gonopods typically persist in „

the male as small two-jointed appendages and in the female as jointed or Unjointed sclerites. The young are hatched with the full number of segments.

Remarks. — The Geophilomorpha are universally distributed in suit- able localities. The number of families into which the order should be divided is as yet unsettled, some authors admitting several groups of this rank, others referring all the genera tp a single family, Geo- philidae. In habits the Geophilidae are mostly subterranean, living in

Fig. 6.

A, Upper view of anterior ex- tremity in Geophilus. a, Basal segments of antennae, c, Cephalic plate. [palpognaths. t.palp, Tergal plate of somite, bearing t.tox, Tergal plate of somite, bearing

toxicognaths (tox). t.lg. I , Tergal plate of somite, bearing legs of first pair.

B, Toxicognaths of Scolopendra, showing the large coxal plate and the reduced penultimate and ante- penultimate segments.

C, Terminal segment or fang of the same, showing the orifice of the poison gland.

(After Latzel, Vie Myr. bst.-ung. Mori. vol. i. “Chilopoda,” Vienna, 1880.)

the earth and feeding principally upon earthworms. Occasionally they may be found eating fruit or fungi, probably for the sake of moisture. Although without eyes, they are extremely sensitive to light, and when exposed to it crawl away in serpentine fashion to the nearest sheltered spot, feeling the way with their antennae. They

t.pafy)

t.lq.l

..tox

can, however, progress with almost equal facility backwards, using the legs of the posterior pair as feelers. Differing from the majority of the family in habits are the two species Linotaenia

maritima and Schendyla submarina, which live under stones or seaweed between tide-marks on the coasts of western Europe. Most, if not all, the species are provided with glands, which open upon the sterna and secrete a fluid which in some forms (Himantarium) is blood-red, while in others it is phosphorescent. In the tropical form Orphnaeus phos- phoreus the fluid is known to possess this property ; and its lumin- osity has been repeatedly observed in England in the autumn in the case of Linotaenia acuminata and L. crassipes.

The number of pairs of legs within this family varies from between thirty and forty to over one hundred and seventy. Corresponding discrepancies are observable in size, the smallest specimens being less than I in. long and barely I mm. wide, while the largest example recorded, a specimen of Notiphilides from Venezuela, was u in. long and J of an inch wide.

When pairing takes place the female fertilizes herself by taking

up a spermatophore which a male has left upon a sheet of web for

that purpose. The female lays a cluster of eggs in some sheltered

spot, sometimes in a specially prepared nest, and encircling them

with her body, keeps guard until the young

disperse and shift for themselves.

Order 2. Scolopendromorpha. — Chilopods differing principally from the Geophilo- morpha in that the number of leg-bearing somites is definitely fixed at twenty-three or twenty-one. These are differentiated into larger and smaller, which alternate with nearly complete regularity. The anterior portion of each somite is only partially cut off as a subsegment. The tergal plate of the somite bearing the toxicognaths is suppressed, probably by fusion with the tergum of the first leg- bearing somite. The antennae consist of a number of segments varying from seventeen to about thirty, and usually differing in the individuals of a species. The second seg- ment (trochanter) of the legs of the last pair is coalesced with the third (femur). In only one genus, namely Plutonium, which occurs in Italy, is there a pair of spiracles for each leg-bearing segment, except the first and last, as in the Geophilomorpha. In most genera there are only nine pairs of spiracles situated upon the 3rd, 5th, 8th, 10th, 12th,

14th, 16th, 18th and 20th leg- bearing segments, as in Scolopendra, Cormo- cephalus, Cryptops, &c. In genera with twenty-three pairs of legs, like Scolopo- Fig. 7. — Scolopendra cryptops, there is an additional pair of morsitans (after Buffon). spiracles on the twenty-second pedigerous A, a, Cephalic plate. segment ; and a few genera such as Rhy- b, Tergum of segment, sida, Edentisloma, possess a pair upon the bearing first pair of 7th segment. Eyes, when present, _are

legs (d). Tip of palpognath. Antenna. Toxicognath. Last pair of append-

always four in number on each side. The newly hatched young has the full com- plement of appendages.

This order is divided into four families : — Scolopendridae {Scolopendra, Rhysida), age's, enfargeS and Cryptopidae (Cryptops, Theatops), Scolopo- directed back- cryptopidae (Scolopocryptops, Otocryplops) wards, and Newportiidae (Newportia). Apart from

the frigid zones it is cosmopolitan in distri- bution, though only one genus (Cryptops) extends into north temperate latitudes. In the tropics and warmer countries of the southern hemisphere the genera and species are particularly abundant, and individuals reach the greatest dimensions, some specimens of the tropical American species Scolopendra gigantea exceeding 12 in. in length. They are strictly carnivorous, their diet consisting of any animal, vertebrate or invertebrate, small enough to be overcome. They live in damp obscure places, under logs of wood or stones, and are nocturnal, shunning, like the Geophilidae, exposure to light ; and as in the Geophilidae, the females guard their eggs and young until the latter disperse to lead an independent life.

Order 3. Craterostigmomorpha. — Chilopods with twenty-one tergal plates as in the typical genera of Scolopendromorpha, but with only fifteen pairs of legs as in the Lithobiomorpha. As in some members of the latter order there is a single ocellus on each side of the head, the penultimate and antepenultimate segments of the toxicognaths are complete on the postaxial side of the appendage, and spiracles are present upon the 3rd, 5th, 8th, 10th, 12th and 14th leg-bearing somites. In the size and shape of the head, of the toxi- cognaths, of the tergal plate of this somite, and of the first leg-bearing somite, great similarity to some genera of Geophilomorpha (e.g. Mecistocephalus) is presented ;

but in the structure of the posterior end of the body this order differs f rom'all the other orders of Chilopoda. The skeletal elements of the last leg-bearing segment are welded together to form a subcylindrical tube, and the genital and anal

t.tox

1.1&2..&

■box

somites are represented by a pair of chitinous valves capable of opening below for the escape of the genital and intestinal products.

This order, containing the family Craterostigmidae, is based upon a remarkable genus and species Craterostigmus tasmanianus, of which only two specimens are known. These were collected under stones upon the summit of Mount Rumney in Tas- mania. They are about I J in. in length; but nothing has been recorded of their habits. The chief morphological in- terest attaching to Craterostigmus is that, apart from cer- tain structural pecu- liarities of its own, it presents features previously believed to be found exclu- sively either in the S c olopendromorpha , or the Geophilo- morpha, or the Litho- biomorpha; and it shows how the Litho- biomorpha may be derived from a Scolo- pendromorphous type most nearly re- sembling Plutonium by the excalation of the third, sixth, ninth, eleventh, four- teenth and seven- teenth leg – bearing somites.

Order 4. Lithobio- morpha. Chilopoda with fifteen pairs of leg-bearing somites differentiated into larger and smaller, the 1st, 3rd, 5th, 7th, 8th, 10th, 12th and . 14th being large, the others small. Spir- acles present upon all the larger with the exception sometimes of the 1st. The toxicognaths are relatively weaker than in the orders hitherto considered, and have their basal segments less firmly fused mesially. In correlation with their weaker muscularity the first leg-bearing segment is relatively small. The gonopods, present and usually jointed in both sexes, are especially well developed and forcipate in the female, and arise from a large ventral plate resulting from the fusion of their coxae with the sternum of the genital somite. The antennae are many-jointed, and there is a single ocellus or a cluster of ocelli on each side of the head. The coxae of the legs are large, and those of the last four or five pairs usually contain glands opening

by large orifices. The newly-hatched young has only seven pairs of legs, the remaining pairs being succes- sively added as growth proceeds.

The genera of this order are divisible into three families, the Lithobiidae (Lithobius, Bothropolys), Henicopidae (Henicops, Haasi- ella), the Cermatobiidae (Cermatobius). Cermatobius, based upon a single species, martensii, from the isl. of Adenara, is of peculiar interest, since in the absence of coxal pores, and the length and multi-articulation of the antennae and tarsal segments, it approaches more nearly to Scutigera than does any other pleurostigmousChilopod. It is also stated that the spiracles have assumed a more dorsal position, thus foreshadowing the completely dorsal situation they have taken up in the Notostigma. The Henicopidae, containing centipedes of small size, attains its maximum of development in the southern continents and islands, more particularly Australia. New Zealand, South Africa and South America. One genus (Lamyctes) however, occurs in Europe. The Lithobiidae, on the contrary, are almost exclusively northern in range, being particularly abundant and of large size individually in Europe, extra-tropical Asia, and North and Central America. In habits the Lithobiidae closely resemble the Scolopendridae. They are, however, comparatively far more agile with their shorter, more compact bodies and stronger legs. They are mostly of small size, the largest species, Lithobius fusciatus, of south Europe measuring only 2 in. in length of body. The females do not guard their eggs, but coat them with soil and leave them to their fate.

Subclass 2, Notostigma. — Chilopods with a series of median

it

After Pocock. Q.J.M.S. vol. 45, pi. 23, 1902.

Fig. 8.

A, Anteriorendof Craterostigmus fromabove. a. Basal segments of antennae.

c, Cephalic plate with eyes (0).

t.tox, Tergal plate of somite bearing toxi- cognaths (tox).

t.lg.l, Tergal plate of somite bearing legs of first pair.

B, Maxillae.

C, Palpognath.

D, Toxicognath.

E, Last segment with genital capsule(g.c) ,and

basal segments of legs of 14th and 15th pairs (Ig. 14, Ig. 15).

dorsal tracheal sacs furnished with tubes dipping into the pericardial blood space, and opening each by an unpaired spiracle upon the ist, 3rd, 5th, 8th, 10th, 12th and 14th leg-

Fig. 9. — A, Sculigera rubrolineata (after Buffon). B, Tergum and part of a second of the same enlarged to show the position of the stigmata 0, 0; p, hinder margin of tergum.

bearing somites. This characteristic is accompanied by the complete disappearance of the tergum of the 7th, either by fusion with that of the 8th or by excalation, and by the evanes- cence of the terga of the 2nd, 4th, 6th, gth, nth and 13th pedigerous somites. The preantennal area of the head is not strongly reflexed inferiorly, and the eyes are large and compound. The maxillae are long and have a sensory organ; the palpognaths are long, spiny and composed of five segments, like the primitive Chilopod leg, and the toxicognaths have their basal segments disunited and independently movable. Gonopods duplicated in the male.

This subclass contains the single order Scutigeromorpha and the family Scutigeridae. As in the Lithobiomorpha there are fifteen pairs of legs, the gonopods are well developed in both sexes and the young

is hatched with only seven pairs of legs. The legs and antennae in the adult are extremely long and many jointed. In habits as well as in structure the Scutigeridae, of which Scutigera is the best-known genus, differ greatly from other centipedes. Although they hide under stones and logs of wood like Lithobius, they are not luei- fugous but diurnal, and may be seen chasing their foes in the blazing sun. They run with astonishing speed and have the power of dropping their legs when seized. South of about the

40th parallel of north latitude they are uni- versally distributed in suit- able localities. In most species the body only reaches a length of about 1 in. ; but twice that size or more is reached by examples of the Indian species Scutigera longicornis.

After Latzel, Die Myr. dst.-ung. Mm. ” Cliilopoda,” Vienna, 1880.

Fig. 10.— Gnathites of Scutigera. I. Mandibles. II. Maxillae. III. Palpognaths. IV. Toxicognaths.

Some fossils of Carboniferous age have been described as Chilopoda by Scudder, who refers them to two families, Gerascutigeridae and Eoscolopendridae. But until the specimens have been examined by zoologists the genera they are alleged to represent cannot be taken seriously into consideration. Remains of centipedes closely related to existing forms have been recorded from Oligocene beds. (R. I. P.)

CENTLIVRE, SUSANNA (c. 1667-1723), English dramatic writer and actress, was born about 1667, probably in Ireland, whither her father, a Lincolnshire gentleman named Freeman, had been forced to flee at the Restoration on account of his political sympathies. When sixteen she married the nephew of Sir Stephen Fox, and on his death within a year she married an officer named Carroll, who was killed in a duel. Left in poverty, she began to support herself, writing for the stage, and some of her early plays are signed S. Carroll. In 1706 she

married Joseph Centlivre, chief cook to Queen Anne, who survived her. Her first play was a tragedy, The Perjured Husband (1700), and she herself appeared for the first time at Bath in her comedy Love at a Venture (1706). Among her most successful comedies are — The Gamester (1705); The Busy Body (1709).; A Bold Stroke for a Wife (1718); The Basset-table (1706); and The Wonder! a Woman keeps a Secret (1714), in which, as the jealous husband, Garrick found one of his best parts. Her plots, verging on the farcical, were always ingenious and amusing, though coarse after the fashion of the time, and the dialogue fluent. She never seems to have acted in London, but she was a friend of Rowe, Farquhar and Steele. Mrs Centlivre died on the ist of December 1723. Her dramatic works were published, with a biography, in 1761 (reprinted 1872).

CENTO, a town of Emilia, Italy, in the province of Ferrara, 18 m. S.E. direct from the town of Ferrara; 50 ft. above sea- level; it is

reached by road (6 m. to the W.) from the station of S. Pietro in Casale, 15 m. S.W. by W. of Ferrara, and also by a steam tramway (18 m. N.) from Bologna to Pieve di Cento, on the opposite bank of the Reno. Pop. (1901) 4307 (town), 19,078 (commune). It is connected by a navigable canal with Ferrara. It was the birthplace of the painter Giovanni Francesco Barbieri (Guercino). The communal picture-gallery aftd several churches contain works by him, but none of first-rate importance. A statue of him stands in front of the 16th century Palazzo Govern- ativo. The town was surrounded by walls, the gates of which are preserved. The origin of the name is uncertain.

CENTO (Gr. nhrpcov, Lat. cento, patchwork), a composition made up by collecting passages from various works. The Byzantine Greeks manufactured several out of the poems of Homer, among which may be mentioned the life of Christ by the famous empress Eudoxia, and a version of the Biblical history of Eden and the Fall. The Romans of the later empire and the monks of the middle ages were fond of constructing poems out of the verse of Virgil. Such were the Cento Nuptialis of Ausonius, the sketch of Biblical history which was compiled in the 4th century by Proba Falconia, wife of a Roman proconsul, and the hymns in honour of St Quirinus taken from Virgil' and Horace by Metellus, a monk of Tegernsee, in the latter half of the 1 2th century. Specimens may be found in the work of Aldus Manutius (Venice, 1504; Frankfort, 1541, 1544). In iS3sLaelius Capitulus produced from Virgil an attack upon the dissolute lives of the monks; in 1536 there appeared at Venice a Petrarca Spirituale; and in 1634 Alexander Ross (a Scotsman, and one of the chaplains of Charles I.) published a Virgilius Evangelizans , seu Historia Domini nostri Jesu Christi Virgilianis verbis et versibus descripta.

CENTRAL AMERICA, that portion of the American continent which lies between Mexico and Colombia, comprising the British crown colony of British Honduras, and the six independent republics of Guatemala, Salvador, Honduras, Nicaragua, Costa Rica and Panama. These seven divisions are described in Separate articles. Central America is bounded towards the N. by the Caribbean Sea, and towards the S. by the Pacific Ocean, and extends between 7 12′ and 18 3′ N. and between 77° 12′ and 92 17′ W. It has an area of about 208,500 sq. m., and stretches for some 1300 m. from N.W. to S.E., in a succession of three serpentine curves, reaching its greatest breadth, 450 m., between the Peninsula of Nicoya and the north coast of Honduras, and diminishing to 35 m. in the Isthmus of Panama. The eastern

boundary of Central America was usually regarded as identical with that of Costa Rica until 1903, when the republic of Panama was formed out of the northern territories of Colombia ; and the more modern definition given above does not command the universal assent of geographers, because it fails to include the whole region up to the natural frontier on the north-west, i.e. the Isthmus of Tehuantepec in Mexico. It has, however, the support of political and historical considerations, as well as of common usage; and it may therefore be regarded as adequate, although, in respect of climate and natural products, it would be more accurate to define Central America as lying between Tehuantepec and Darien.

CENTRAL AMERICA

675

Physical Features. — The Cordilleras, or mountain chains of Central America do not form a complete link between the western ranges in the north and south of the continent, for their continuity is interrupted by various depressions, of which the chief is the lacustrine basin of Nicaragua. With these exceptions, they traverse Central America from end to end, their main axis trending from north-west to south-east. They do not, as a rule, rise in sharply serrated ridges or series of volcanic crests, like the Andes, but the central Cordilleras are disposed in a succession of mountain masses, with many lesser chains radiating from them. The principal summits have an altitude of 12,000 and even, in a few cases, of 13,000 ft., and the general character of the ranges is volcanic, many craters being still active. Large tracts of land remained imperfectly surveyed at the beginning of the 20th century, owing to the unhealthiness of the tropical climate, and the dense underwoods which impede exploration. In the northern part of Guatemala, on the Pacific coast of the same country , in British Honduras, along the Segovia river,on the Mosquito Coast, and in the basin of Lake Nicaragua and the San Juan river, there are broad stretches of comparatively flat country. The main line of watershed is everywhere nearer to the Pacific than to the Atlantic, except in southern Costa Rica and Panama, where it is almost equidistant from the two oceans. In consequence, the rivers of the Pacific seaboard are mostly short and swift, — mere mountain torrents, in many instances, until they reach the sands and swamps which border the sea. The rivers of the Atlantic littoral descend more gradually, and by longer channels. The largest of them is the Segovia, in Nicaragua

and Honduras, which has a course of 450 m. Lake Nicaragua, the largest inland sheet of water, has an area ex- ceeding 3500 sq. m. There are also several mountain lakes of excep- tional interest and beauty, such as Atitlan and Amatitlan, in Guatemala, besides two great land-locked salt-water lakes — the Pearl Lagoon of the Mosquito Coast, and the Carataska Lagoon in Honduras.

Geology. — The neck of land which unites the continents of North and South America is not, geologically, the direct continuation of

Enwry Walker ic Archean d Metamorphlc

Younapr Volcanic Rocks

either, but constitutes a third element which is wedged, as it were, between the other two. The folds in the earth's crust which form the Andes and the Western ranges of North America, are not con- tinued along the connecting isthmus, where, on the contrary, the strata are folded from west to east, obliquely across the trend of the continent. It should, however, be noticed that the Andes, as they approach the Caribbean sea, bend round towards the east; and' it is probable that the folds of the North American Cordillera similarly bend eastward beneath the volcanic rocks of Mexico. The folds of Central America are tangential to the two arcs thus formed.

By far the greater part of Central America and Mexico is covered by Cretaceous and Tertiary deposits, both sedimentary and volcanic ; but the foundation on which they rest is exposed at intervals. From the Rio Grande to the southern declivity of the Mexican plateau the existence of ancient crystalline rocks at the surface is yet un- proved, but they probably occur in the Sierra Madre del Pacifico. South of the plateau, in the state of Oaxaca, low mountain ridges composed of granites and gneisses, supposed to be of Archaean age, begin to appear. They strike from west to east, and mark the front of the series of east and west folds which stand en echelon across the Central American region. Between the 15th and 17th parallels of latitude, in the state of Chiapas and in the republic of Guatemala, there is a second group of ridges composed of granites and schists with an eastward trend. In this case the evidence of age is clear, for the rocks are covered by a limestone which is proved to be Pre-Carboniferous. Similar rocks, supposed to be of Archaean or at

least of early Palaeozoic age, occupy considerable areas in British Honduras, Honduras and northern Nicaragua, and occur also in Costa Rica and perhaps in Panama; and wherever the strike has been observed, it is approximately from west to east. The presence of Palaeozoic rocks has been proved in Guatemala and the adjacent state of Chiapas, where limestones have been found containing many unmistakable Carboniferous fossils, and below these is a considerable thickness of beds supposed to be Silurian. Nowhere else in the Central American region is there any palaeontological evidence of Palaeozoic rocks.

The Mesozoic series begins with sands and red or yellow clays containing plant remains and possibly of Triassic age; but the occurrence of these deposits is limited to a few small isolated outcrops. Jurassic beds have been found in Mexico but not in Central America. The Cretaceous system, consisting of a lower series of clays, sandstones and conglomerates, followed conformably by an upper series of limestones, covers a considerable area in Chiapas – ., Guatemala and Honduras, and is found also in Costa Rica. The upper series contains hippurites. The greater part of the eastern half of the Mexican plateau is also formed of Cretaceous beds.

The Tertiary system may be conveniently divided into two divisions. The lower, of Eocene and Oligocene age, consists generally of sand and clays which were evidently laid down near a shore line. The upper division also, including the Pliocene and Pleistocene (which have not yet been clearly distinguished from each other), is usually of shallow water origin; but in the northern part of Yucatan it includes beds of chalky limestone, like those of the Antilles, which may have been deposited in a deeper sea.

It is probable that folding took place at more than one geological epoch, and the whole series of beds up to the Oligocene is involved in the folds. The Pliocene, on the other hand, is usually undis- turbed, and the final effort must, therefore, have occurred during the Miocene period, which appears- to have been a period of great earth movement throughout the Caribbean region. From the southern extremity of the Mexican plateau to the Colombian border, the strike of the folds — of the Mesozoic and early Tertiary deposits, as well as of the older rocks — is in general from east to west ; but there is one considerable exception. On both sides of the deep depression which crosses Honduras from Puerto Cortez to the Gulf of Fonseca, the strike is commonly from

north to south. The depression is probably a ” Graben ” or trough formed by faulting.

The great volcanoes of Mexico and Central America stand upon the Pacific side of the continent, and it is only where the land con- tracts to a narrow neck that their products spread over to the Caribbean shore. The extent of the volcanic deposits is very great, and over a wide area they entirely conceal the original structural features of the country. The eruptions began towards the close of the Cretaceous period and continue to the present day. The rocks are lavas and ashes, chiefly of andesitic or basaltic composition, but rhyolites and trachytes also occur, and phonolite has been met with in one or two places.

According to R. T. Hill, there is but little geological evidence of any Tertiary or later connexion between the Caribbean Sea and the Pacific, excepting, perhaps, a shallow opening during the Eocene period. It should, however, be stated that all authorities are not agreed upon this point, and K. Sapper found marls and sandstones which he believes to belong to the Upper Tertiary, lying horizontally at a height of about 7500 ft. in the Mexican state of Chiapas. Un- fortunately the fossils obtained from these beds were lost.

Climate. — The climate of Central America is subject to the most marked local differences of heat and cold, owing partly to the proximity of two oceans, partly to the variations of altitude which render such territories as the swamps of the coast, or the lowlands of British Honduras and northern Guatemala, totally unlike the alpine regions of Salvador and Costa Rica. The whole area may, however, be roughly divided into a tropical zone {tierra calienle), from sea-level to about 1500 ft.; a temperate zone (tierra templada), from 1500 to 5000 ft.; and a cold zone {tierra fria), above 5000 ft. These figures are, of course, only approximately correct; and it often happens that, at the same elevation, the heat is greater on the Pacific than on the Atlantic versant. The rainy season on the Pacific slope varies in duration from four to six months, between April and December. It lengthens as the altitude increases. On the coast, it corresponds with the prevalence of the south-west monsoon, the tempestuous Cordonazo de San Francisco, or ” Flagella- tion of St Francis,” as it is called in Mexico, and it is often interrupted by an interval of two or three weeks of fine weather, known as the Veranillo de San Juan, or ” Little summer of St John.” In the rainy season, the morning has usually a clear sky; about two or three o’clock in the

afternoon the clouds begin to gather in great cumulus masses; suddenly the lightning flashes out and the rain crashes down ; and by evening the sky is clear and starry. North winds are most usual during the dry season. On the Atlantic coast the trade-winds may bring rain in any month, and, owing to the moist atmosphere, the heat is more oppressive. The rainfall may vary in successive years from less than 50 in. to nearly 200 in., owing to the occurrence of cloud-bursts. Frosts are not rare above 7000 ft., but snow seldom falls.

Fauna. — The fauna of Central America is more closely connected with the fauna of South than with that of North America. As the

region is comparatively small, and its limits conventional, there are comparatively few species that it can claim as peculiarly its own. It is almost entirely free from the presence of animals dangerous to man. Of felines it possesses the jaguar {Felis onza), popularly called the tiger; the cuguar (Felis concolor), popularly called the lion; the tigrillo (Felis tigrina), which is sometimes kept tame; and other species. Several species of monkeys (Mycetes and A teles) are numerous in the warm coast region. The Mexican deer (Cervus mexicanus) has a wide range both in the lowlands and highlands. Besides the tapir there are several varieties of wild pig, such as the marrano de monte (Sus torquatus) and the jabali or javali (Sus labiatus javali). The Edentata are represented by a species of armadillo, the honey-bear (Myrmecophaga tomandua) , and the Myrmecophaga didactyla; and among the rodents may be mentioned, besides rats, hares and rabbits, the fruit-eating cotorra and tepes- cuinte (Dasyprocta aguti and Coelogenys paca), and the troublesome Geomys mexicana. The manatee is common in all the larger streams. Much annoyance is caused to the agriculturist by the little marsupial called the tacuacine, or the Dideiphys carcinora, its allied species. The bats are so numerous that villages have sometimes had to be left to their undisputed occupancy. In the south-east of Costa Rica the inhabitants are at times compelled to withdraw, with all their live-stock, before the swarms of large migratory vampires which in a single night can bleed the strongest animal to death. Most of the domestic animals — the horse, ox, goat, sheep, pig, dog, rabbit, common fowl, peacock and pigeon — are of European origin, and are popularly grouped

together as animales de Castillo-. For the bird collector there is a rich harvest. The catalogue of the National Museum at Washington shows that Costa Rica alone possesses more than twice as many species of birds as the whole of Europe. Among birds of prey it is sufficient to mention Corogyps atratus, the commonest of the vultures, which acts as a universal scavenger, the Cathartes aura, the beautiful Polyborus vulgaris, and the king of the vultures (Sarcorhamphus papa). Neither the condor of the southern continent nor the great eagles of the northern are known. The parrot, macaw and toucan are found in all parts; the crow, blackbird, Mexican jay, ricebird, swallow, rainbird, wood-pecker, humming-bird and trogon are also widely distributed. A bird of the last-named genus, the quetzal, quijal or quesal (Trogon resplendens) is of special note, not only from the fact that its yellow tail-feathers. 2 or 3 ft. long, were formerly worn as insignia by the Indian princes, but because it has been adopted as the emblematical figure on the national arms of Guatemala. The gallinaceous order is well represented, and comprises several peculiar species, as the pavo de cacho, and the Peten turkey (Meleagris ocellata), which has a bronze sheen on its plumage ; and aquatic birds, it is almost need- less to add, are unusually numerous in a region so richly furnished with lagoons, rivers and lakes.

Besides the alligator, which swarms in many rivers, the almost endless varieties of Central American reptiles include the harmless boba or chicken-snake, python and black snake; the venomous corali, tabcba, culebra de sangre and rattlesnake; iguanas of great size, scorpions, edible lizards and other lizards said to be poisonous. In the rivers aad lakes, as in both seas, fish of many kinds abound ; turtles and tortoises are exported ; and there are valuable pearl and oyster fisheries. Insect life is even richer and more varied. Of the Coleoptera, the Camelicorns, the Longicorns, the Curculionids, and the Chrysomelines are said to be best represented, and of the Lepido- ptera the prevalent genera are — Ageronia, Papilio, Heliconia, Sphinx and Bombyx. There are five species of bees, and the European honey-bee, known as aveja de Castilla or ” bee of Castile,” has been naturalized. Ants are common, and may sometimes be seen march- ing in a column 3 or 4 m. long. The mosquito, wood-tick, flea and locust are unfortunately no less plentiful in certain districts, but their distribution varies greatly, the mosquito being almost unknown in parts of Honduras. A curious species of butterfly is the Timeles Chiron, which migrates in countless

multitudes from the forests of Honduras to the Mosquito Coast, but is never known to return.

Flora. — The flora of Central America ranges from the alpine to the tropical, with the transition from one climatic zone to another. Although its forest growths are, on the whole, inferior in size to those of corresponding latitudes in the eastern hemisphere, it is unsurpassed for beauty, luxuriance and variety. In the volcanic districts, the soil is extremely fertile, yielding, where cultivated and irrigated, magnificent crops of sugar, cotton, rice, tobacco, coffee, cocoa and maize. Indigo is produced in small quantities; sugar yields two or three crops, and maize as many as four, this cereal supplying a chief staple of food. Plantains, bananas, beans, tomatoes, yams, arrowroot, pine-apples, guavas, citrons and many other tropical fruits are also cultivated, while the extensive primeval forests abound in mahogany, cedars, rosewood, ironwood, rubber, gum copal, vanilla, sarsaparilla, logwood and many other dye-woods, medicinal plants, and valuable timbers. Conspicuous amongst the forest trees are the giant ceiba, or pyramidal bombax, and the splendid Coyal palm (Cocos butyracea, L.), with feathery leaves 15 to 20 ft. long, golden flowers 3 ft. high, and a sap which when fer- mented produces the intoxicating chicha or vino de Coyol. In Guate- mala occurs the remarkable Herrania purpurea, a " Chocolate tree," whose seeds yield a finer flavoured chocolate than the cocoa itself. The same country is famous for its magnificent orchids, huge arbores-

cent thistles, and a remarkable plant called by the Spaniards Flor de la Calentura, " fever flower," from the heat which it is said to emit at the moment of fertilization. Salvador produces an abundance of medicinal plants, notably the so-called Peruvian balsam (Myro- spermum salvatorense) ; in Honduras there are immense forests of conifers, resembling those of the Landes in France ; in Nicaragua a characteristic tree is the cortes (Tecoma sideroxylon) yielding timber as hard as ebony, and noteworthy for the golden blossom with which it is entirely covered after the leaves have fallen.

Inhabitants — In 1905 the population of Central America numbered about 4,750,000, and this total tends to increase, despite the unhealthy climate of many districts, the terribly high average of infant mortality, and the slow progress of immigration. Some authorities estimate it at 5,500,000. The vast majority of the inhabitants are of mixed Indian and Spanish

blood, but the Indian element predominates everywhere except in Costa Rica, where the whites are exceptionally numerous. The Indian races have not shown the same power to adapt themselves to modern civilization as the Mexicans; in some regions there are tribes remaining in a state of complete savagery although before the Spanish conquest their ancestors attained a high level of culture (see below under Archaeology)'. The density of population throughout Central America is little more than 25 per sq. m.; and it is clear that several large areas now thinly peopled once maintained a far greater number of inhabitants. Such are parts of the Nicaraguan lake district, where the flora consists in great measure of plants that were formerly cultivated by the Indians. The depopulation of these areas was effected partly by tribal wars, partly by the harsh rule of the Spaniards. Apart from the German agricultural settlements in Guatemala and elsewhere, the foreign population is chiefly confined to the seaports and other centres of commerce, Great Britain, Germany and the United States being largely represented among the wealthier classes of residents; while the foreign labourers are mostly Italians or negroes, with a few Chinese on the Pacific coast.

History. — Central America was discovered by Columbus in August 1502; and part of the territory which is now Costa Rica was conquered by the Spaniards under Pedro Arias de Avila after 1513. Between 1522 and 1525, the authority of Avila was superseded, and his work of conquest completed by Hernando Cortes, who had already subjugated Mexico. Panama formed part of a distinct Spanish government, "New Granada"; British Honduras was colonized, though not formally annexed, in the 18th century; and over the Mosquito Coast the British government exercised a nominal protectorate after 1665. Otherwise the rest of Central America remained a Spanish dependency bearing the general name of " Guatemala," until 1821. It ranked as a captaincy-general under the rule of a military governor, and was organized in five departments, corresponding in area with the modern republics of Guatemala, Honduras, Salvador, Nicaragua and Costa Rica. For three centuries it was administered by Spanish officials, who almost invariably devoted their whole energy to enriching themselves and the home authorities. The old Indian civilization was swept away; the native races were enslaved, maltreated and, for a time, demoralized. But their history offers no parallel to that of the West Indian Caribs, who failed to survive, and were replaced by hordes of African slaves. In Central America the Indians not only

survived, thus leaving no room for any large negro popula- tion, but quickly acquired the language, religion and habits of their masters, with whom they intermarried. By the close of the 1 8th century, the majority had attained something like uniformity of life and thought. Racial distinctions had been obscured by intermarriage; even the term Ladino, or ” Latin,” came to mean an educated man, whether of Spanish or Indian blood. Nowhere, except in Mexico, has a mixed or coloured race more completely absorbed the civilization of its white rulers; but so gradual and silent was the process that it passed almost unnoticed. Its result, the successful revolt of the Spanish colonies — colonies mainly peopled by Indians or half-castes — was no more a conflict of rival races or civilizations than the rebellion of the British colonies in North America.

” New Granada ” attained its independence in 1810; and in 1821 ” Guatemala ” declared itself free. That the subsequent

history of the Central American republics has been largely a record of civil war, maladministration and financial dishonesty, is perhaps due in part to racial inferiority. In part, however, it may be explained by the absence of any tradition of good government; perhaps also by the brevity and artificiality of the evolution which converted a debased slave-population into the citizens of modern democratic states. The five divisions of ” Guatemala ” were temporarily incorporated in the Mexican empire during 1822, but regained their autonomy (as Guatemala, Honduras, Salvador, Nicaragua and Costa Rica) on the declaration of a Mexican republic, and in July 1823 combined to form the Republic of the United States of Central America. The Liberal or Federalist party, which was supreme in Honduras, found itself opposed by the Conservatives, including the clergy and former Spanish officials, who were very influential in Guatemala. A bitter and protracted struggle ensued. In 1837-1839 a Con- servative rising, under Rafael Carrera, president of Guatemala, resulted in the overthrow of the Liberals, under General Francisco Morazan of Honduras; and in 1842, after a vain attempt to restore the Federal republic, Morazan was captured and shot. A fresh union of the republics (except Costa Rica) was concluded in 1842, and dissolved in 1845. The year 1850 was signalized by the conclusion, on the 19th of April, of

the Clayton-Bulwer treaty (g.v.) between Great Britain and the United States, which was designed to facilitate the construction of an interoceanic canal. The history of this project is given in detail under Panama Canal. One important result of the treaty was the abandon- ment, in i860, of the British protectorate over the Mosquito Coast. This event had been preceded by a decade of political disturbances. In 1850 Honduras, Salvador and Nicaragua had combined to restore federal unity; but their allied armies were defeated by the Guatemalans under Carrera. In 1856 the American adventurer, William Walker, endeavoured to usurp the government of Nicaragua; in i860 he invaded Honduras and was captured and shot. His object was to assist the slave- holders of the United States by adding new slave-states to the Union. A further attempt to restore federal unity failed in 1885, and its promoter, Justo Rufino Barrios, president of Guatemala, lost his Hfe. In 1 805 the Greater Republic of Central America was formed by the union of Nicaragua, Salvador and Honduras; and a constitution was framed providing for the admission of Guatemala and Costa Rica; in December 1898 it was dissolved, as unsatisfactory to Salvador. On the 4th of November 1903 Panama, which had since 1863 formed part of Colombia, declared itself an autonomous republic. Its independence was immedi- ately recognized by the United States, and shortly afterwards by the European powers. The United States also forbade the landing of any Colombian force on the territories of Panama, and thus guaranteed the security of the new state.

Bibliography. — For a general description of Central America, and especially of-its physical features, the following monographs by K. Sapper are of prime importance : — In den Vulcangebieten Mittel- amerikas und Westindiens (Stuttgart, 1905) ; Mittelamerikanische Reisen und Studien aus den Jahren 1888 bis 1900 (Brunswick, 1902), and Das nbrdliche Mittelamerika nebst einem Ausflug nach dem Hochland von Anahuac (Brunswick, 1897); these all contain many useful illustrations and maps. See also Central America and the West Indies, by A. H. Keane, edited by Sir C. Markham (London, 1901, 2 vols., with maps and illustrations); Central and South America, by H. W. Bates (London, 1882); The Spanish American Republics, by T. Child (London, 1892) ; and Expedition nach Zentral und Sudatnerika, by P. Preuss (Berlin, 1901). For geology, see ” The Geological History of the Isthmus of Panama and Portions of Costa Rica,” by R. T. Hill, in Bull. Mus. Comp. Zool. Harvard, vol. xxviii., No. 5 (1898); and the following by K. Sapper: — ” Grundziige der

physikalischen Geographie von Guatemala," in Petermann' s Mitt. Erganzungsheft, No. 113 (1894), "Uber Gebirgsbau und Boden des nordlichen Mittelamerika," ibid., No. 127 (1899), and " Uber Gebirgsbau und Boden des siidlichen Mittelamerika," ibid., No. 151 (1905). The States of Central America, by E. G. Squier (New York, 1858), is still valuable, as are others of the numerous essays, pamphlets, &c., on Central American affairs left by this author; see the bibliography of his writings published in New York in 1876. The Bulletins of the Bureau of American Republics (Washington, from 1893) give ample information en commerce and industry. See also History of Central America, by H. Bancroft (San Francisco, 1881-1887. 3 vols.).

Archaeology of Central America

Discoveries and investigations carried on during the 19th century have thrown much light on the splendid past of Central America. The still extant ruins of great buildings, unlike any- thing which is known in the old world, testify to the high culture attained in pre-Columbian days by several native peoples differing greatly from one another in speech and racial affinities. As a science the archaeology of Central America has scarcely yet emerged from its infancy. Entire branches are still wholly uninvestigated. Amongst the numerous problems which await solution must still be reckoned the decipherment of the inscrip- tions, which hitherto has not progressed beyond the discovery of calendar systems and the relative darings involved in such systems.

For a complete survey of this ancient civilization, so far as it has been investigated, it is necessary to include with Central America, properly so called, a considerable portion of the Mexican territories south and east of the isthmus of Tehuantepec. The peoples inhabiting Yucatan, Campeche, Guatemala, Chiapas and Oaxaca present at the first view striking ethnical differences. On a linguistic basis, however, they may be united into several large groups. Thus, Yucatan and the greater part of Guatamala are inhabited by the Mayas, with whom may be included the still savage Lacantun or Lacandones. Related to these linguistically are the Tzendals in Chiapas and the Quiches and Cackchiquels in Guatemala, as well as the less important tribes of the Mam, Pokoman, Pokonchi, Tzotzil, Tzutuhil and Ixil. Between these there are patches of country in which dialects of the Mexican are spoken. In Oaxaca there is an extraordinary mixture of lan- guages, some of which, like that of the Huave of Tehuantepec, are of quite unknown affinities; the bulk of the population,

however, is composed of Mixtecs and Zapotecs with which the Mixe and Zoque on the east are connected. Mexican dialects also occur in isolated parts of Oaxaca.

Mayan Culture. — The civilization of the Mayas may well have been reared upon one more ancient, but the life of that culture of which the ruins are now visible certainly lasted no more than 500 years. The date of its extinction is unknown, but in certain places, notably Mayapan and Chichenitza, the highest development seems to be synchronous with the appearance of foreign, viz. Mexican or Nahua elements (see below). This quite distinctive local character suggests that the cities in question played a certain preponderating role, a hypothesis with which the scanty documentary evidence is in agreement. On the other hand the Mayan culture evinces an evident tendency to assimilate heterogeneous elements, obliterating racial distinctions and imposing its own dominant character over a wide area. Oaxaca, the country of the Mixtecs and Zapotecs, became, as was natural from its geographical position midway between Yucatan and Mexico, the meeting-ground where two archaeological traditions which are sharply contrasted in their original homes united.

Central American architecture is characterized by a fine feeling for construction, and the execution is at once bold and aesthetically effective. Amongst the various ruins, some of which represent the remains of entire cities, Jj'L ec ' while others are no more than groups of buildings or single buildings, certain types persistently recur. The commonest of such types are pyramids and galleries. The pyramids are occasionally built of brick, but most usually of hewn stone with a covering of finely-carved slabs. Staircases lead up to the top from one or more sides. Some pyramids are built in steps. Usually the platform on the top of a pyramid is occupied by buildings, the typical distribution of which is into two parts, viz. vestibule and sanctuary. In connexion with the pyramid there are various subsidiary structures, such as altars, pillars, and sacrificial stones, to meet the requirements of ritual and worship, besides habitations for officials and " tennis-courts " for the famous ball-game like that played by the Mexicans. The tennis-courts always run north and south, and all the buildings, almost without exception, have a definite orientation to particular points of the compass. Frequently the pyramids

constitute one of the four sides of a quadrangular enclosure, within which are contained other pyramids, altars or other buildings of various dimensions.

The normal type of gallery is an oblong building, of which the front facing inwards to the enclosure is pierced by doors. These divide it into a series of rooms, behind which again there may be a second series. Occasionally the rooms are distributed round a central apartment, but this is ordinarily done only when a second storey has to be placed above them. The gallery- buildings may rise to as much as three storeys, the height, size and shape of the rooms being determined by the exigencies of vaulting. The principle of the true arch is unknown, so that the vaults are often of the corbelled kind, the slabs of the side-walls being made to overlap in succession until there remains only so narrow a space as may be spanned by a single flat stone. At Mitla, where the material used in the construction of the buildings was timber instead of stone, the larger rooms were furnished with stone pillars on which the beams could rest. The same principle recurs in certain ruins at Chichenitza. The tops and sides of the doors are often decorated with carved reliefs and hieroglyphs, and the entrances are sometimes supported by plain or carved columns and pilasters, of which style the serpent columns of Chichenitza afford the most striking example. On its external front one of these galleries may have a cornice and half-pillars. Above this is a plain surface of wall, then a rich frieze which generally exhibits the most elaborate ornamentation in the whole building. The subjects are geometrical designs in mosaic, serpents' heads and human masks. The corners of the wall terminate in three-quarter pillars, above which the angles of the frieze frequently show grotesque heads with noses exaggerated into trunks. The roof of the gallery is flat and occasionally gabled.

Principal Sites. — Such are the general characteristics of Central American buildings, but it must be understood that almost every site exhibits peculiarities of its own, and the number of the ruined settlements even as at present known is very large. The most considerable are enumerated below.

Yucatan. — Of the very numerous ruins which are distributed over Yucatan and the islands of the east coast the majority still await exploration. A few words of special notice may be devoted to one or two sites in the centre of the peninsula which have

already become famous. At Uxmal the buildings consist'of five considerable groups, viz. — the Casa del Adivino, which is a step-pyramid 240 ft. long by 160 ft. wide and 80 ft. high, crowned by a temple 75 ft. long by 12 ft. wide; the Casa de Monjas, a striking erection of four oblong buildings on an extensive terrace ; the Casa de Tortugas, Casa del Gobernador, and Casa de Palomas, the last of which is a group of six galleries surrounding a court. At Izamal there is a very imposing group of ruins, as yet quite insufficiently explored. At Chichenitza, a city of first-rate importance, situated 22 m. west of Valladolid, the ruins consist of eight principal groups, the chief of which are as follows. The Casa de Monjas, a three-storeyed building, attributable to several distinct periods; the Caracol, a round structure with dome in imitation of a snail-shell, showing evident traces of Mexican influence; El Castillo, a large temple standing on a base 200 ft. long and 75 ft. high, approached by staircases on all four sides, and furnished with serpent-pillars of a kind unknown anywhere else except at Uxmal and Tula near Mexico; an unnamed temple-pyramid, which is remarkable for a group of caryatid figures; a tennis-court; and finally the Tiger Temple, which contains marvellous coloured reliefs representing figures of warriors and place-hieroglyphs, all executed in a distinctively Mexican style. Yet another evidence of Mexican influence at Chichenitza is to be noted in five figures of the so-called Chac-mol type, that is to say, horizontal figures in which the arms are extended to the navel which is indicated by a cup-like depression. This Chac-mol type is characteristic of such sites as Tlascala and Cempoallan.

Other important sites in Yucatan are Chacmaltun, with fine wall-paintings; Tantah, with remarkable pillared facades; the ruins of Labna, Chunhuhub, and the caves of Loltun; and

Xlabpak de Santa Rosa, where there is a three-storeyed temple palace. Two sculptured reliefs are of great interest; they represent a person holding a staff on which is a figure of the god Ah-bolon-tzacab.

Guatemala. — The Guatemalan ruins are distributed over a wide area. The most numerous and extensive are on the Usumacinta river. The most important sites in that district are Piedras Negras, and Yaxchilan or Menche Tinamit, where there are temples covered with sculptured reliefs and hieroglyphic inscrip- tions, and stelae and slabs carved with human figures placed in niches. In the Peten district, Tikal is famous for its splendid sculptures representing Kukulkan and other divinities. Near the modern city

of Guatemala are the vast ruins of Guatemala- Mixco. Chacujal, which Cortes visited on his expedition of 1524-1525 is very possibly to be identified' with the modern Pueblo Viejo on the river Tinaja. Chacula and Quen-Santo between the headwaters of the Rio de Chiapas and the Rio Lacantun are two sites of a strongly marked local character. Series of three pyramids are peculiar to these two settlements, as also are pyramids with human figures on their platforms. Stelae discovered at Quen Santo have a calendar character, which proves that Mayan science had penetrated into what was probably the home of an old Lacantun culture.

Santa Lucia Cozumalhuapa, on the Pacific slope of the Cordilleras, is a very peculiar site. The ruins are those of a settlement which had already been deserted before Alvarado's expedition of 1522. The sculptures of gods, goddesses and other figures, executed on enormous blocks of stone, show a distinctively Mexican character, with which, however, various Mayan features are blended. They may perhaps be attributed to some offshoot of the Nahua stock, probably the Pipil Indians, which developed on lines of its own in this remote corner.

Near the frontier of' Honduras are the remarkable ruins of Quirigua, which rival Copan in importance and have suffered less from the ravages of the climate. The ruins of temples and palaces contain gigantic stone stelae of very fine workmanship, on which are sculptured human and animal figures representing hieroglyphs of the calendar dates.

Honduras. — Copan, one of the most important seats of Mayan civilization, lies close to the borders of Guatemala. The ruins comprise great buildings, temples, pyramids, &c. and contain sculptures of the highest interest. Especially noteworthy are altars in the form of a turtle and stelae covered with hieroglyphs. The hieroglyphs are of the kind usually found in such ruins, the meaning of which is so far clear that it is known that the commencement of an inscription records certain dates in the complicated calendar system of the Mayas. A collation of these dates demonstrates that the most ancient on record are separated from the most recent by an interval of only a few centuries. From this it may be concluded that the Mayan civilization, whether or not it was preceded by anything older, flourished for only a comparatively short period, the beginning of which cannot be placed many centuries before a.d. iooo.

According to Squier (Honduras, London, 1870, p. 75) the other principal ruins of Honduras are to be found in plains of the department of Comayagua, near Yarumela, near Lajamini, and in the ruined town of Cururu. They are ” large, pyramidal, terraced structures, often faced with stones, conical mounds of earth and walls of stone.” Further ruins, such as those of Cala- mulla, Jamalteca, Maniana, Guasistagua, Chapuluca and Chapulistagua, are found in the department of Comayagua in the side valleys and adjoining tablelands. The most interesting and most extensive are the ruins of Tenampua (Pueblo Viejo), about 20 m. south-east of Comayagua. Here ramparts, defence works, terraced stone mounds and numerous large pyramids are to be found. Squier found further ruins in the west of Honduras, which have also been described in part by Stephens, and were probably first mentioned in 1576 by Diego Garcia de Palacio (Carta dirigida al Rei de Espana, published by Squier, New York, i860).

At Rio Ulloa are remains which testify to the existence of a large population in past days. Possibly they may be identified

with a site of the name of Naco mentioned by Las Casas and by Bernal Diaz (Histoire veridique de la conqulte de la Nouvelle Espagne, translated by D. Fourdanet, 2nd ed., Paris, 1877, ch. 178, p. 690).

Chiapas (Mexico). — The principal site is Palenque, the ruins of which were amongst the earliest of all to attract attention. The style of architecture, with the gigantic vaults and singular comb-shaped gables, distinguishes Palenque from Copan and Quirigua, which it surpasses also in the unequalled magnificence of its sculptures. Five out of the remarkably uniform series of buildings may be specially mentioned. They are the Great Palace, a complex structure of galleries and courts commanded by a three-storeyed tower, the Temples of the Cross, which are galleries

constructed on terraces and containing the well-known reliefs, the Temple of Inscriptions, the Sun. Temple and the Temple of the Relief. The sculptured figures of Palenque are familiar from many reproductions. The most characteristic groups represent a deity standing between worshippers who hold a staff surmounted by the water-god Ah-bolon-tzacab, the ” god of the nine medicines.” The inscriptions on the famous Cross and in the Sun Temple contain calendar-da tings which are remarkable as showing a particular combination of numbers and hieroglyphs, which does not occur elsewhere.

A whole series of sites is included within the geographical limits of Chiapas, which from the archaeologist’s standpoint must be considered as belonging properly to Guatemala. The country has been quite insufficiently explored.

Oaxaca (Mexico).— The bulk of the population of the province of Oaxaca is composed of a distinct racial group, best represented by the Zapotecs, who have been for an unknown length of time the intermediaries between the Nahua civilization of Mexico on the west and the Mayan on the east. The influence of the two separate currents may be detected in the bastard calendar system no less than in the still undeciphered inscriptions. The principal ruins are those of Mitla, the burial city of the priests and kings of the ancient Zapotecs, which bear a quite distinct character, though presenting certain analogies with the Mexican. One of the chief structures is a step-pyramid, rising in three steps to a height of 130 ft., another is a pyramid of brick. Besides these there are courts, surrounded by palaces which represented necropolises, the dwellings of the priests, of the chief priest, and of the king (with an audience-hall). The wall paintings of the ” palaces ” are especially admirable, and it is to be noted that the deities represented in them are those of the Mexican pantheon. Monte Alban is interesting for the definitely Zapotec character of its sculptures. Quiengola near Tehuantepec is a site with extensive ruins including a fine tennis court.

British Honduras.— The antiquities of British Honduras have been but little investigated. In the scanty literature relating to them a few accounts of ruined places are to be found. In style these buildings closely resemble those of the neighbouring Yucatan. The ruins in the colony New Boston, mentioned by Froebel {Central America, p. 167), are of this kind. F. de P. Castells (see American Antiquarian, Chicago, 1904, vol. xxvi. pp. 32-37) describes the ruins, in the north of the colony, of ” Ixim

chech," supposed to be the Indian form of the English name " Indian Church." They are on the road to the Lake of Yaxha (green water), where further ruins are to be found. Thomas Gann gives detailed accounts of numerous mounds also in the northern part of British Honduras (see igth Annual Report of the Bureau of American Ethnology, Washington, 1900, part i. pp. 661-692, with plates). The most interesting ruins are those which have been discovered in Santa Rita, at the mouth of the New River, near the town of Corosal. Here wonderful wall paintings in stucco came-to light, which unfortunately Gann could only save ; i part. The remainder were destroyed by Indians. It should be remarked that a number of the mounds in Santa Rita were erected over ruins of buildings which must therefore be of older date than the mounds.

Salvador. — Pedro de Alvarado in his expedition of 1524 calls this whole district Cuscatan (Mex. Cozcatlan), that is, " Land of precious stones, of treasures, of abundance." A further descrip-

tion of the land is given by Palacio (I.e.) in 1576. Although there are numerous relics of Mayan civilization buried in the earth," few ruins are to be seen on the surface. Karl Sapper has described three large ruins: Cuzcatlan near the capital, Tehuacan near S. Vicente, and Zacualpa on the Lake of Guija in the extreme north-west of the country. The ruins show a distinct affinity in style to those of the Mayan buildings in Guatemala, but they are less fine and artistically perfect. Probably the central and western districts of San Salvador were originally peopled by the same race of Mayas, and these tracts of country were later settled by the Mexican-speaking Pipiles.

A characteristic feature of the extensive ruins of Zacualpa is that the pyramids and ramparts have perpendicular steps which are higher than they are broad, and this peculiarity may be attributed to the influence of the Maya tribes, who are related to the Mams of Guatemala.

Decipherment of the Mayan Hieroglyphs. — The key to the decipherment, so far as this has progressed at present, was furnished by the Historia de las Cosas de Yucatan, a work written by Diego de Landa, the first bishop of the country. This pro-fessed to give, with much other more or less doubtful information, the full account of a calendar system analogous to that of the Mexicans, which was said to have been used by the Mayas (see Mexico). The signs for each of the 20 days and for the

18 weeks of 20 days are figured by Landa. The first step was to compare these with the hieroglyphic characters contained in the few Mayan picture manuscripts (Codex Troano, Cortesianus, Peresianus, Dresden Codex) which have survived the destructive fanaticism of the Spanish missionaries. Forstemann's acute analysis detected that the bars and dots which occur along the margin and in the body of the pictorial scenes represented numerals, dots standing for each integer up to five, while for five a bar was used. Next, it was found that the order in which these numeral-signs are placed is regular, and that there are never more than five in a group. It was established that the first sign in such a group is that for the numeral 1 {Kin), the next that for 2o(Uinal), the third for 18X20 (Tun), the fourth for 18X20 X2o(Kalun), and thefifthfor 18X20X20X20, that is to say, a cycle.

Had the available material for study been confined to the manuscripts, little more progress would have been made beyond establishing subsidiary details in the actual calendar. But when a similar analysis was applied to the numerous monuments discovered and figured by Maudslay and others, some important results of a general bearing were obtained. It was found that many of the hieroglyphs of various forms upon the stones were also of numeral value, and, what was of great importance, that they all referred back to a single starting-point. This starting-point or zero is no doubt the mythological date at which, according to Mayan cosmology, the world was created. It is placed at nine or ten cycles before the time when Copan and Quirigua were erected and the picture manuscripts made. And it is by reference to it in the inscriptions that such students as Seler, Goodman and others have been enabled, as already stated, to obtain a record of the relative chronology of the most famous monuments, to confine the period of their erection within the space of a few centuries, and approximately to fix even their absolute antiquity. Though much yet remains to be done, these are substantial results which have already been won from the study of the hieroglyphs.

Bibliography. — The AntiquitSs mexicaines of Dupaix (Paris, 1 834) ,the Voyage pittoresque el archeologique dans la province a" Yucatan of F. de Waldeck (Paris, 1838), and the Monuments anciens du Mexique of Brasseur de Bourbourg and Waldeck (Paris, 1866) are quite out of date and superseded. Stephen's Incidents of Travel in Central America, Chiapas and Yucatan (New York, 1841 and 1867), and B. M. Norman's Rambles in Yucatan (New York, 1843), are still of value, the first-mentioned

especially for the drawings by Catherwood. Among the earlier writers may also be mentioned Charnay, Les Anciennes Villes du Nouveau Monde (Paris, 1885) and Cites et mines americaines (Paris, 1863), the latter written in colla- boration with Viollet-le-Duc. Those, however, who are not primarily bibliophiles will be content to study the following :— Maudslay (in Godman and Salvin's Biologia Centrali-Americana, sect. Archaeology,

London, 1889, &c), a pioneer work containing the admirably pre- sented results of scientific exploration. Maler, in Memoirs of the Peabody Museum, vol. ii. 1, 2 (Cambridge, U.S.A., 1901 and .1903); Holmes, Archaeological Studies among the Ancient Mexicans (Field Columbian Museum, Chicago, 1895); E. Seler, Die alten Ansiede- lungen von Chacula (Berlin, 1901), Wandmalereien von Mitla (Berlin, 1895), Ges. Abhandlungen, vol. i. (Berlin, 1902) and vol. ii. (1904), Fuhrer von Mitla (Berlin, 1906). E. Forstemann has contributed many valuable essays to Globus and the Zeitschrift fur Ethnologie (Berlin) ; especially important are his commentaries to the Dresden Codex (Dresden, 1901), to the Codex Tro-Cortesianus Madrilensis (Danzig, 1902), and to the Codex Peresianus (Danzig, 1903). See also "The Archaic Maya Inscriptions," by F. T. Goodman (in Biologia Centrali- Americana, section Archaeology, viii., 1897), and Report of an Archaeological Tour in Mexico in 188 1, by A. F. Ban- delier (Boston, 1884). Valuable bibliographies have been made by Bandelier (Notes on the Bibliography of Yucatan and Central America, Worcester, U. S. A., 1881) and by K. Habler (" Die Maya Literatur und der Maya Apparat zu Dresden," in the Zentralblatt fur Biblio- thekwesen, xii., 1895). The Mayan picture MSS. have been published in facsimile as follows : — the Dresden Codex by Forstemann (Leipzig, 1880, and Dresden, 1892), and the Codex Tro by Brasseur de Bour- bourg — Manuscrit Troano, etude sur le systeme graphique et la langue des Mayas (Paris, 1 869-1 870), the Codex Cortesianus by Leon de Rosny (Paris, 1883) and by F. de Dios de la Rada y Delgado and F. L. de Ayala y del Hierro (Madrid, 1893), tne Codex Peresianus by Duruy and Brasseur de Bourbourg (Paris, 1864) and by L. de Rosny (Paris, 1887). The following relate especially to the ruins in Salvador: — La Universidad, by D. Gonzalez, vol. iii. ser. 3, No. 6, p. 283 (San Salvador, 1892-1893) ; Le Salvador pre-Colombien, etudes archeologiques, by F. de Montcasus de Ballore (Paris, 1891), 25

plates ; Karl Sapper in Arch, fur Ethnologie, 9, p. 3 ff. (1896). (W. L.*)

CENTRAL FALLS, a city of Providence county, Rhode Island, U.S.A., on the Blackstone river, about 5 m. N. of Providence. Pop. (1900) 18,167; (1905, state census) 19,446, of whom 8792 were foreign-born, 4164 being French-Canadian, 1587 being Eng- lish, and 1292 being Irish; (1910) 22,754. It is served by the New York, New Haven & Hartford railway. The Blackstone furnishes good water-power, and the chief industry of the city is the manu- facture of cotton goods; other important industries are the refining of copper and the manufacture of woollens, silks and hair-cloth. The total value of the factory, product in 1905 was $5,090,984, being 12-9% more than in 1900. A settlement was established here about 1763 and was first a part of Smithfield, and then, after 1871, of Lincoln. About 1780 a chocolate mill was erected, and from then until 1827 the settlement was known as Chocolateville. It was incorporated as the Central Falls Fire District of Smithfield in 1847, and in 1895 was chartered as a city.

CENTRALIA, a city of Marion county, Illinois, U.S.A., in the S. part of the state, about 62 m. E. of St Louis. Pop. (1890) 4763; (1900) 6721 (571 foreign-born); (1910) 9680. The city is served by the Chicago, Burlington & Quincy, the Illinois Central, the Illinois Southern, and the Southern railways; the first two have repair shops here. Centralia is situated in the central part of southern Illinois, popularly known as ” Egypt.” Among its manufactures are window glass, envelopes, cigars, concrete blocks and flour. In and near the city coal is mined, and apples, strawberries and other fruits are raised, and the city is a shipping point for coal and fruit. Centralia was first settled in 1853, and was first chartered as a city in 1859.

CENTRAL INDIA, a collection of native states in India forming a separate agency, which must not be confounded with the Centr.l Provinces. The Central India agency was formed in ; 1 854, when Sir R. Hamilton was appointed agent to the governor- general. It lies between 21° 24′ and 26° 52′ N. and between 74 o’ and 83° o’ E., and may be said to consist of two large detached tracts of country which, with Jhansi as a pivot, spread outwards east and west into the peninsula, reaching northward to within some 30 m. of Agra, and southward to the valley of the Nerbudda and the Vindhya and Satpura ranges. The total area is 78,772 sq. m. It is bounded on the N. and N.E. by the United Provinces, on the W.

and S. W. by Rajputana, some native states of the Bombay presidency, and Khandesh. The Central Pro- vinces and the Bengal district of Chota Nagpur enclose it on the S. and E., while the Jhansi district of the United Provinces separates the two tracts.

Central India may be divided into three great natural divisions: the highlands of the Malwa plateau, with a mean elevation of

some 1500 ft. above sea-level; the low-lying country some 600 ft. above sea-level, comprising the greater part of the eastern section of the agency; and the hilly tracts, which lie mostly to the south. The Malwa plateau consists of great undulating plains, separated by fiat-topped hills, whose sides are boldly terraced, with here and there a scarp rising above the general level; it is covered with long grass, stunted trees and scrub, which owing to the presence of deciduous plants is of a uniform straw colour, except in the rains. The foundation of this plateau is a bed of sandstone and shales belonging to the Vindhyan series. This bed, which stretches east and west from Sasseram to Neemuch, and north and south from Agra to Hoshangabad, comprises the whole of the agency except the northern part of Bundelkhand. On the plateau itself the sandstone is generally overlaid by the Deccan trap, a blackish-coloured basaltic rock of volcanic origin, the high level tableland having been formed by a succession of lava flows, the valleys of Central India being merely " denudation hollows" carved out by the action of rain and rivers. It is apparently the northern limit of what was once a vast basaltic plain stretch- ing from Goona to Belgaum, " one of the most gigantic outpour- ings of volcanic matter in the world." The sandstone bed on which it rests is visible at a point just north of Goona, and in a small area round Bhilsa and Bhopal, as it is in those places freed from the layer of trap. The low-lying land includes roughly that part of the agency which lies to the east of the plateau and comprises the greater part of the political divisions of Bundelkhand and Baghelkhand and the country round Gwalior. The formation save in north Bundelkhand is sandstone of the Vindhyan series, free as a rule from " trap." In the north of Bundelkhand the prevailing rock is gneiss and quartz. The quartz takes the shape of long serrated ridges, which are in many places a characteristic feature of the landscape. Trap appears here and there in intrusive dykes. The hilly tracts lie chiefly to the south of the agency, where the Vindhya, Satpura and Kaimur ranges are met with. The country is rough forest and jungle land little used for cultivation. The greater part of Central

India is covered with the well-known ” black cotton soil,” produced by the disintegration of the trap rock. It is a very rich loamy earth, possessing great fertility and an unusual power of retaining moisture, which makes artificial irrigation little needed. Opium and millet are the principal crops grown upon it. The ordinary ” red soil ” covers a large part of northern Bundelkhand, and as it requires much irrigation, tanks are a special feature in this country. Ethnologically as well as climatically the differences between the plateau and the eastern part of the agency are distinct and the languages markedly so. The plateau is inhabited by pure-blooded Rajput races, whose ancestry can be traced back for centuries, with all their numerous offshoots. The inhabitants of the low-lying country are also Rajputs, but their descent is mixed and as a rule the families of the plateau will have no marriage connexion with them. The races of the hilly tracts are semi-civilized tribes, who often flee at the mere sight of a white man, and have as yet been but little affected by the Hindu religion of their Rajput rulers. Of the climate of the plateau, Abul Fazl, the author of the Ain-i- Akbari, says: ” The climate is so temperate that in the winter there is no occasion for warm clothing, nor is it necessary in summer to cool the water with saltpetre. But in the four rainy months the night here is cold enough to render a quilt necessary.” The rains of the south-east monsoon reach Central India as a rule about the 12th of July, and last until the end of September. Administrative Divisions. — The Central India agency is divided for administrative purposes into eight units, two classed as residencies and six as agencies. These are the residencies of Gwalior and Indore, and the agencies of Baghelkhand, Bhopal, Bhopawar, Bundelkhand, Indore and Malwa. But these divisions are purely an artificial grouping for the purposes of the British government, the original native divisions consisting of 16 states and 98 minor states and estates. The 15 large states are Gwalior, Indore, Rewa, Bhopal, Dhar, Barwani, Datia, Orchha, Charkhari, Chhattarpur, Panna, Dewas (senior branch), I Dewas (junior branch), Jaora and Ratlam, At the close of the

Pindari War in 1818 the whole country, that is now under the Central India agency was in great confusion and disorder, having suffered heavily from the extortions of the Mahratta armies and from predatory bands. It had been the policy of the great

Mahratta chiefs, Holkar and Sindhia, to trample down into complete subjection all the petty Rajput princes, whose lands they seized and from whom they levied heavy contributions of money. Many of these minor chiefs had been expelled from their possessions, had taken refuge in the hills and forest, and retaliated upon the Mahratta usurpers by wasting the lands which they had lost, until the Mahrattas compounded for peace by payment of blackmail. In this state of affairs all parties agreed to accept the interposition of the British government for the restoration of order, and under Lord Hastings the work of pacification was effected. The policy pursued was to declare the permanency of the rights existing at the time of the British interposition, conditionally upon the maintenance of order; to adjust and guarantee the relations of subordinate and tributary chiefs to their superiors so as to prevent all further disputes or en- croachments; and to settle the claims of the ousted landholders, who had resorted to pillage or blackmail, by fixing grants of land to be made to them, or settling the money allowances to be paid to them. The general result was to place all the privileges, rights and possessions of these inferior chief s under the guarantee or protection of the British government, to whom all disputes between the superior and inferior states must be referred, and whose decision is final upon all questions of succession to hereditary rights or rulership. The states have no general ethnological affinity, such as exists in Rajputana. Their terri- tories are in many cases neither compact nor continuous, consist- ing of a number of villages here and there, with a nucleus of more or less importance round the chief town. Their relations to the government of India and to each other present many variations. Ten of them are under direct treaty with the government of India; others are held under sanads and deeds of fealty and obedience; while a third class, known as the mediatized states, are held under agreements mediated by the British government between them and their superior chiefs.

Population. — The total population of the Central India agency in 1901 was 8,628,781, showing a decrease during the decade of 16-4%. Considerable losses were caused by the famines of 1897-1898 and 1899-1900, which were severely felt, especially in Bhopal and Malwa. The greater part of the population of Central India is of the Hindu religion, but a few Mahommedan groups still exist, either traces of the days when the Mogul emperors extended their sway from the Punjab to the Deccan, or else the descendants of those northern adventurers who hired out their

services to the great Mahratta generals. Of the first Bhopal is the only example, while Jaora is the only notable instance of the other. Roughly there are four great sections of the population: the Mahratta section, who belong to the ruling circles; the Rajputs, who are also hereditary noblemen; the trading classes, consisting chiefly of Marwaris and Gujaratis; and lastly,. the jungle tribes of Dra vidian stock. The Mahrattas are foreigners, and, though rulers of the greater part of Central India, have no true connexion with the soil and are little met with outside cities, the vicinity of courts, and administrative centres. The Rajputs with all their endless ramifications form a large portion of the population. Originally invaders, they have sq long held a stake in the soil that they have become almost part of the indigenous population. The Marwaris hold practically all the trade of Central India, with the exception of the Bora class of Mahommedans. They are either Vaishnavite Hindus or else Jains. Their advent into Central India dates, except in the case of one or two families, from the time of the Mahratta invasion only. The Jain portion of this community is very wealthy. The last section, that of the jungle tribes, is mostly of Dravidian or mixed Aryo-Dravidian origin, these tribes being the modern representatives of the former rulers and inhabitants of this country.

The British agent to the governor-general resides at Indore, and .there are British cantonments at Mhow, Neemuch and

Nowgong. The whole country is fairly provided with railways, largely at the expense of Sindhia.

CENTRAL PROVINCES AND BERAR, a province of British India, which was formed in October 1903 by the amalgamation of the Central Provinces and the Hyderabad Assigned Districts. The total area of the provinces is 1 13,281 sq. m., and the population on that area in 1901 was 10,847,325. As is shown by its name the province is situated in the centre of the Indian peninsula, comprising a large proportion of the broad belt of hill and plateau country which separates the plains of Hindustan from the Deccan. It is bounded on the N. and N.E. by the Central India states, and along a small strip of the Saugor district by the United Provinces; on the W. by Bhopal, Indore and the Khandesh district of Bombay; on the S. by Hyderabad and the large zamindari estates of the Madras presidency; and on the E. by these latter estates and the tributary states of Bengal. In October 1905 most of Sambalpur and five Oriya-speaking hill-states were transferred from the Central Provinces to Bengal, while the Hindi speaking

statesof Chota Nagpur were transferred from Bengal to the Central Provinces. The province, therefore, now consists of the five British divisions of Jubbulpore, Ner budda, Nagpur, Chhattisgarh and Berar, which are divided into the twenty-two districts of Saugor, Damoh, Jubbulpore, Mandla, Seoni, Narsinghpur, Hoshangabad, Nimar, Betul, Chhindwara, Wardha, Nagpur, Chanda, Bhandara, Balaghat, Raipur, Bilaspur, Amraoti, Akola, Ellichpur, Buldana and Wun; and the fifteen tributary states of Makrai, Bastar, Ranker, Nandgaon, Kaira- garh, Chhuikhadan, Kawardha, Sakti, Raigarh, Sarangarh, Chang Bhakar, Korea, Sirguja, Udaipur and Jashpur.

The Central Provinces are divided into two parts by the Satpura range of hills {q.v.), which runs south of the Nerbudda river from east to west; so that, speaking generally, it consists of central districts north of the Satpuras, districts on the Satpura proyinces plateau, and districts south of the Satpuras. North of the Satpuras is the rich valley of the Nerbudda, which may be said to begin towards the north of the Jubbulpore district and to extend westward through the district of Narsinghpur as far as the western limit of Hoshangabad, a distance of nearly 300 m. The elevation of the valley above the sea varies from 1400 ft. at Jubbulpore to 1 1 20 at Hoshangabad. In breadth it is about 30 m., extending between the Satpuras and the southern scarp of the Vindhyas. This great plain, 10,613 sq. m. in extent, contains for the most part land of extreme fertility. The continuation of the valley west of Hoshangabad forms the northern portion of the district of Nimar, the farther limit of which touches the Khandesh district of the Bombay presidency. Towards the river, though rich in parts, this tract of country is generally wild and desolate, but nearer the base of the hill range there is a large natural basin of fertile land which is highly cultivated. South of the Satpuras lies the great plain of Chhattisgarh at a mean elevation above the sea of 1000 ft. ; it has an area of 23,000 sq. m., and forms the upper basin of the Mahanadi. Farther to the west and again divided off by hills is the great plain of Nagpur, extending over 24,000 sq. m. Its general surface inclines towards the south from 1000 ft. above the sea at Nagpur to 750 ft. at Chanda. To the south the province is shut in by the wide mountainous tract which stretches from the Bay of Bengal through Bastar to the Godavari, and west of that river is continued onward to the rocky ridges and plateaus of Khandesh by a succession of ranges that enclose the plain of Berar along its southern border.

Berar consists mainly of the valley lying between the Satpura

range of mountains in the north and the Ajanta range in the south. The Gawilgarh hills, a range belonging to the Satpura Berar.

mountains, form the northern border. On the east the frontier is marked by the Wardha river down to its confluence with the Penganga, and on the south by the Penganga for about two-thirds of the frontier's length. The tract is half surrounded on the east, north and north-west by the Central Provinces, with which it is amalgamated. In addition to the Melghat mountain tract which walls it in on the north, Berar is divided into two sections, the Payanghat or lowland country, bounded on the north by the Gdwilgarh hills, and on the south by the outer scarps of the Ajanta range, and the Balaghat or upland country above the Ajanta ridge, sloping down southwards beyond the ghats or passes which lead up to it. The Payanghat is a wide valley running up eastward between this ridge and the Gawilgarh hills, varying in breadth from 40 to 50 m., and broader towards the end than at its mouth. It contains all the best land in Berar; it is full of deep, rich, black alluvial soil, of almost inexhaustible fertility, and it undulates sufficiently to maintain a natural system of drainage, but there is nothing picturesque about this broad strip of champaign country. The upland tract, on the contrary, is diversified with low-lying

plains, high plateaus, fertile bottoms and rocky wastes, and is rendered picturesque by rivers and groves.

Natural Features.— The provinces may be divided into two tracts of upland and three of plain, consisting of the Vindhya and Satpura plateaus, and the Berar, Nagpur and Chhattisgarh plains. To the north the districts of Saugor and Damoh form the southern boundary of the Vindhyan escarpment. In this region the sandstone rocks are generally overlaid with heavy black soil formed from the decay- ing trap, which is principally devoted to the cultivation of the spring crops, wheat and grain, while rice and hill millets are sown in the lighter and more sandy soils. Next, the long and narrow valley of the Nerbudda from Jubbulpore to Hoshangabad is formed of deep alluvial deposits of extreme richness and excellently suited to the growth of wheat. To the south of the Nerbudda the Satpura range stretches across

the province, containing the greater part of five districts, its crystalline and sandstone rocks rising in places through the superficial stratum of trap, and with large areas of shallow stony land still covered to a great extent with forest interspersed by black-soil valleys of great fertility. In the latter are grown wheat and other spring crops, while the lighter kinds of rice and the hill millets are all that the poorer land can bear. To the south of the Satpuras and extending along its base from west to east lie success- ively the Berar, Nagpur and Chhattisgarh plains. The surface soil of Berar is to a great extent a rich black vegetable mould ; and where this surface soil does not exist, there are muram and trap with a shallow upper crust of inferior light soil. The Nagpur country, drained by the Wardha and Wainganga rivers, contains towards the west the shallow black soil in which autumn crops like cotton and the large millet, juar, which do not require excessive moisture, can be success- fully cultivated. The eastern part of the Nagpur country and the Chhattisgarh plain, comprising the Mahanadi basin, form the great rice tract of the province, its heavy rainfall and hard yellowish soil rendering it excellently adapted for the growth of this crop.

Climate. — As regards climate the districts of the Central Provinces are generally divided into hot and cool ones. In the latter division are comprised the two Vindhyan districts of Saugor and Damoh, Jubbulpore at the head of the Nerbudda valley, and the four Sat pura districts of Mandla, Seoni, Betul and Chhindwara, which enjoy, owing to their greater elevation, a distinctly lower average tem- perature than the rest of the province. The ordinary variation is from 3 to 4 degrees, the mean maximum reading in the shade in a cooler district being about 105 as against 108° in the hotter ones for the month of May, and 79 ° as against 83° for the month of December. In the cold weather the temperature in Nagpur and the other hot districts is about the same as in Calcutta and substantially higher than that of northern India. The climate of Berar differs very little from that of the Deccan generally, except that in the Payanghat valley the hot weather may be exceptionally severe. The rainfall of the province is considerably heavier than in northern India, and the result of this is a cooler and more pleasant atmosphere during the monsoon season. The average rainfall, before it was affected by the abnormal seasons which followed 1892, was 51 in., varying from 33 in. in Nimar to 65 in Balaghat. In the autumn months malarial fever is prevalent in all thickly forested tracts and also in the rice country ; but on the whole the province is

considered to be healthy, and as the rains break fairly regularly in June and produce an immediate fall in the temperature, severe heat is only experienced for a period of from two to three months.

Agriculture. — Broadly speaking, the northern districts of the pro- vince produce principally cold weather crops, such as wheat and grain, and the eastern ones principally rice. At the beginning of the decade 1891-1901 ivheat was the staple product of the Vindhyan and Nerbudda valley districts, and was also grown extensively in all the Satpura districts except Nimar and in Wardha and Nagpur. Cotton and juar were produced principally in Nimar, Nagpur, Wardha and the southern portion of Chhindwara, and the latter also in Chanda. In the Satpura districts the inferior soil was and is principally devoted to hill millets. Rice is an important crop in Damoh, Jubbulpore, Mandla, Seoni and Chanda, and is the chief staple of Bhandara, Balaghat, and the two eastern districts of Raipur and Bilaspur. The staple crops of Berar are cotton and juar. The succession of bad seasons which marked the end of the decade affected the distribution of the principal crops, but with the advent of more prosperous seasons things tend to return to their old level.

Industries. — The only important industries are connected with cotton and coal. In 1904 the total number of factories was 391, almost entirely cotton presses and ginning factories, which received an immense impetus from the rise in cotton prices. In 1896 a brewery was established at Jubbulpore. Two coal-mines are worked in the Central Provinces, at Warora and Mopani, to each of which there is a branch line of railway. Ih T903-1904 there was a total yield of 160,000 tons, valued at about £45,000. In connexion with the Warora colliery there is a fire-clay business. The Mopani colliery, which dates back to i860, is worked by a joint-stock company.

Trade.— The trade of the Central Provinces is conducted mainly by rail with Bombay and with Calcutta. The chief imports are cotton piece goods, cotton twist, salt, sugar, provisions, railway materials, raw cotton, metals, coal, tobacco, spices and kerosene oil. The chief exports are raw cotton, rice, wheat, oil-seeds, hides and

lac. The exports of wheat are liable to extreme fluctuations, especially during famine periods.

Railways. — Until recently, the only railway in the Central Provinces was the Great Indian Peninsula, with two branches, one terminating at Nagpur, the other at Jubbulpore, whence it was continued by the East Indian system to Allahabad. The Bengal-Nagpur line has now opened up the eastern portion of the country, bringing it into direct connexion with Calcutta; and a new branch of the Indian Midland, from Saugor through Damoh, has been partly constructed as a famine work. Large portions, however, in the hilly centre and in the south-east, are still remote from railways.

Administration. — The administration of the province is conducted by a chief commissioner on behalf of the governor-general of India in council, assisted by members of the Indian civil service, provincial civil service, subordinate civil service, district and assistant super- intendents of police, and officers specially recruited for various de- partments. The form of the administration of Berar was in 1903 entirely reorganized. Under the original settlement concluded by the treaties of 1853 and i860 the revenues of the province were assigned primarily for the maintenance of the Hyderabad contingent, such surplus as accrued from year to year being made over to the nizam, while the province itself was administered in trust by the government of India through the resident at Hyderabad. In November 1902 a fresh settlement was arranged and Berar was leased in perpetuity to the British government in return for an annual rental of 25 lakhs. It remained under the administration of the resident until the 1st of October 1903, from which date it was amalgamated with the Central Provinces for administrative purposes. As the immediate result of this change the offices of heads of departments in Berar, except the judicial commissionership and the conservatorship of forests, were amalgamated with the corresponding appointments in the Central Provinces, and Berar is now treated as one of the divisions of that province for purposes of revenue administration, with a divisional commissioner as its immediate hea<£

Population.- — The population of the Central Provinces and Berar as now defined according to the census of 1901 was 10,847,325, and is of very diverse ethical construction, having been recruited by immigration from the countries surrounding it on all sides. There are six main divisions of the people: the Dravidian tribes, who formerly held the country; Hindi-speaking immigrants from the north and north-west into Saugor, Damoh, the Nerbudda valley and the open country of Mandla and Seoni; Rajasthani-

speaking immigrants from Central India into Nimar, Betul and parts of Hoshangabad, Narsinghpur and Chhindwara; Marathi-speaking immigrants from Bombay into Berar, the Mahratta districts and the southern tahsil of Betul; the Telugu castes in the Sironcha and Chanda tahsil of Chanda and the south of Bastar; and the Hindu immigrants into Chhattisgarh, who are supposed to have arrived many centuries ago when the Haihaya dynasty of Ratanpur rose into power.

Language. — Owing to the diversity of race, the diversity of language is equally great. Thirty languages and a hundred and six dialects are found in the Central Provinces alone, and twenty-eight languages and sixty-eight dialects in Berar. The chief of these languages are Western Hindi, Eastern Hindi, Rajasthani, Marathi, Oriya, Telugu and Dravidian dialects. Of these last the chief dialects are Gondi, Oraon or Kurukh, Kandhi and Kanarese, of which Gondi is by far the most important. There are also the Munda languages, of which the chief are Korku, Kharia and Munda or Kol. The chief languages of Berar are Marathi, Urdu, Gondi, Banjari, Hindi, Marwari, Telugu, Korku and Gujarati.

History. — The authentic history of the greater part of the country embraced in the Central Provinces does not begin till the 1 6th century a.d. By the people of northern India the country was known as Gondwana, after the savage tribes of Gonds by whom it was inhabited. The Mussulman invaders of the Deccan passed it by, not caring to enter its mountain fastnesses and impenetrable forests; though occasional inscrip- tions show that parts of it had fallen from time to time under the dominion of one or other of the great kingdoms of the north, e.g. of Asoka, of the Guptas of Maghada, or of the ancient Hindu kingdom of Vidarbha (Berar) ; and inscriptions and numerous discoveries of coins prove that, during the middle ages, the open spaces were occupied by a series o Rajput dynasties. Of these the most important was that of the Haihayas of Ratanpur, a family which, settled from time immemorial in the Nerbudda valley, had towards the close of the 10th century succeeded the Pandava dynasty of Maha Kosala (Chhattisgarh) and ruled, though from the 16th century onwards over greatly diminished territories, until its overthrow by the Mahrattas in 1745. The second ruler of this dynasty, Ratnaraja, was the founder of Ratanpur.

The irscriptional records cease abruptly in the 12th century, and no more is known of the country until the rise of the Gond

dynasties from the 14th to the 16th centuries. The first of these is mentioned in 1398, when Narsingh Rai, raja of Kherla, is said by Ferishta to have ruled all the hills of Gondwana. He was finally overthrown and killed by Hoshang Shah, king of Malwa. The 1 6th century saw the establishment of a powerful Gond kingdom by Sangram Sah, who succeeded in 1480 as the 47th of the petty Gond rajas of Garha-Mandla, and extended his dominions so as to include Saugor and Damoh on the Vindhyan plateau, Jubbulpore and Narsinghpur in the Nerbudda valley, and Seoni on the Satpura highlands. Sangram Sah died in 1530; and the break up of his dominion began with the enforced cession to the Mogul emperor by Chandra Sah (1563-1575) of Saugor and Damoh and of that portion of his territories which after- wards formed the state of Bhopal.

About 200 years after Sangram Sah's time, Bakht Buland, the Gond chieftain of a principality seated at Deogarh in Chhind- wara, having visited Delhi, set about introducing the civilization he had there admired. He founded the city of Nagpur, which his successor made his capital. The Deogarh kingdom, at its widest extent, embraced the modern districts of Betul, Chhind- wara, Nagpur, with parts of Seoni, Bhandara and Balaghat. In the south of the province Chanda was the seat of another Gond dynasty, which first came into prominence in the 16th century. The three Gond principalities of Garha-Mandla, Deo- garh and Chanda were nominally subject to the Mogul em- perors. In addition to the acquisitions made in the north at the expense of Garha-Mandla, the Moguls, after the annexation of Berar, established governors at Paunar in Wardha and Kherla in Betul. Having thus hemmed in the Gond states, however, they made no efforts to assert any effective sovereignty over them; the Gond rajas for their part were content with practical independence within their own dominions. Under their peaceful rule their territories flourished, until the weakening of the Mogul empire and the rise of the predatory Bundela and Mahratta powers, with the organized forces of which their semi-barbarous feudal levies were unable to cope, brought misfortune upon- them.

In the 17th century Chhatarsal, the Bundela chieftain, deprived the Mandla principality of part of the Vindhyan plateau and the Nerbudda valley. In 1 733 the peshwa of Poona invaded Bundel-

khand; and in 1735 the Mahrattas had established their power in Saugor. In 1742 the peshwa advanced to Mandla and exacted the payment of chauth (tributary blackmail) , and from this time until 1 78 1, when the successors of Sangram Sah were finally overthrown, Garha-Mandla remained practically a Mahratta dependency. Meanwhile the other independent principalities of Gondwana had in turn succumbed. In 1 743 Raghoji Bhonsla of Berar established himself at Nagpur, and by 1751 had conquered the territories of Deogarh, Chanda and Chhattisgarh. In 1741 Ratanpur had surrendered to the Mahratta leader Bhaskar Pant without a blow, and the ancient Rajput dynasty came to an end. In Chanda and Deogarh the Gond rajas were suffered by Raghoji Bhonsla and his successor to carry on a shadowy existence for a while, in order to give them an excuse for avoiding the claims of the peshwa as their overlord; though actually decisions in important matters were sought at Poona. Raghoji died in 1755, and in 1769 his son and successor, Janoji, was forced to acknowledge the peshwa's effective supremacy. The Nagpur state, however, continued to grow. In 1 785 Mudhoji (d. 1788), Janoji's successor, bought from the Poona court the cession of Mandla and the upper Nerbudda valley, and between 1796 and 1798 this was followed by the acquisition of Hoshangabad and the larger part of Saugor and Damoh by Raghoji II. (d. 1816). Under this latter raja the Nagpur state covered practically the whole of the present Central Provinces and Berar, as well as Orissa and some of the Chota Nagpur states.

In 1803 Raghoji joined Sindhia against the British; the result was the defeat of the allies at Assaye and Argaon, and the treaty of Deogaon, by which Raghoji had to cede Cuttack, Sambalpur and part of Berar. Up to this time the rule of the Bhonsla rajas, rough warriors of peasant extraction, had been on the whole beneficent; but, soured by his defeat, Raghoji now set to work to recover some of his losses by a ruthless exploitation

of the peasantry, and until the effective intervention of the British in 1818 the country was subjected to every kind of oppression. After Raghoji II. 's death in 1816 his imbecile son Parsaji was deposed and murdered by Mudhoji, known as Appa Sahib. In spite of a treaty signed with the British in this year, Mudhoji in 181 7 joined the peshwa, but was defeated at Sitabaldi and forced to cede the rest of Berar to the nizam, and parts of Saugor and Damoh, with Mandla, Betul, Seoni and the Nerbudda valley, to the British. After a temporary restoration to the throne he was deposed, and Raghoji III., a grandchild of

Raghoji II., was placed on the throne. During his minority, which lasted till 1840, the country was well administered by a British resident. In 1853, on the death of Raghoji III. without heirs, Nagpur lapsed to the British paramount power. Until the formation of the Central Provinces in 1861, Nagpur province, which consists of the present Nagpur division, Chhindwara and Chhatisgarh, was administered by a commissioner under the central government.

The territories in the north ceded in 181 7 by the peshwa (parts of Saugor and Damoh) and in 1818 by Appa Sahib were in 1820 formed into the Saugor and Nerbudda Territories under an agent to the governor-general, and in 1835 were included in the newly formed North-West Provinces. In 1842, in consequence of a rising, they were again placed under the jurisdiction of an agent to the governor-general. Restored to the North-West Provinces in 1853, they were finally joined with the Nagpur province to constitute the new Central Provinces in 1861. On the 1st of October 1903 Berar also was placed under the administration of the commissioner of the Central Provinces (for history see Berar). In 1905 the greater part of Sambalpur district, with the feudatory states of Bamra, Rairakhol, Sonpur, Patna and Kalahandi, were transferred to Bengal, while the feudatory states of Chang Bhakar, Korea, Surguja, Udaipur and Jashpur were transferred from Bengal to the Central Provinces.

During the decade 1891-1901 the Central Provinces suffered from famine more severely than any other part of India. The complete failure of the rain in the autumn of 1896 caused scarcity to develop suddenly into famine, which lasted until the end of 1897. The total number of persons in receipt of relief reached its maximum of nearly 700,000 in May 1897. The expenditure on relief alone was about a million sterling; and the total cost of the famine, including loss of revenue, amounted to nearly twice that amount. During 1897 the death-rate for the whole province rose to sixty-nine per thousand, or double the average, while the birth-rate fell to twenty-seven per thousand. The Central Provinces were stricken by another famine, yet more severe and widespread, caused by the complete failure of the rains in 1899. The maximum of persons relieved for the whole province was 1,971,000 in June 1900. Ih addition, about 68,000 persons were in receipt of relief in the native states. During the three years 1899-1902 the total expenditure on famine relief amounted to about four millions sterling. Berar also suffered from the famines of 1897 and 1900.

See The Imperial Gazetteer of India (Oxford, 1908), x. 99, for list of authorities.

CENTUMVIRI (centum, hundred; vir, man), an ancient court of civil jurisdiction at Rome, probably instituted by Servius Tullius. 1 Its antiquity is attested by the symbol and formula used in its procedure, the lance (hasta) as the sign of true owner- ship, the oath or wager (sacramentum) , the ancient formula for recovery of property or assertion of liberty. It is probably alluded to in Livy's account of the Valerio-Horatian laws of 449 B.C. (Livy iii. 55, Consules . . . fecerunt sanciendo ut qui tribunis plebis, aedilibus, judicious, decemviris nocuisset, ejus caput Jovi sacrum esset). If the judices here mentioned are the centumviri, it is clear that they formed a tribunal which repre- sented the interests of the plebs. This is in accordance with Cicero's account {de Orat. i. 38. 173) of the sphere of their juris- diction. He says this was mainly concerned with the property of which account was taken at the census; it was therefore in

1 Mommsen (Staatsrecht, i 3 . 275, n. 4, ii 3 . 231, n. 1, 590 f.) believed that the Centumviri were instituted about 150 b. c.

their power to make or unmake a citizen. They also decided questions concerning debt. Hence the plebs had an interest in securing their decisions against undue influence. They were never regarded as magistrates, but merely as judices, and as such would be appointed for a fixed term of service by the magistrate, probably by the praetor urbanus. But in Cicero's time they were elected by the Comitia Tributa. They then numbered 105. Their original number is uncertain. It was probably increased by Augustus and in Pliny's time had reached 180. The office was probably open in quite early times to both patricians and plebeians. The term is also applied in the inscriptions of Veii to the municipal senates and Cures, which numbered 100 members.

Authorities. — Tigerstrom, De Judicibus apud Romanos (Berlin, 1826) ; Greenidge, Legal Procedure of Cicero's Time, pp. 40 ff., 58 ff., 182 ff., 264 (Oxford, 1901); Bethmann-Hollweg, Der romische Civilprozess, ii. 53 ff. (Bonn, 1864); Pauly-Wissowa, Realencyclo- pddie, iii. 1935 ff. (Wlassak). (A. M. Cl.)

CENTURION (Lat. centurio), in the ancient Roman army, an officer in command of a centuria, originally a body of a hundred infantry, later the sixtieth part of the normal legion. There were therefore in the legion sixty centurions, who, though theoretically subordinate to the six military tribunes, were the actual working officers of the legion. For the most part the centurions were promoted from the ranks: they were arranged in a complicated order of seniority; the senior centurion of the legion {primus pilus) was an officer of very high importance. Besides commanding the centuries of the legion, centurions were ” seconded ” for various kinds of special service, e.g. for staff employment, the command of auxiliaries. See further Roman Army.

CENTURIPE (formerly Centorbi, anc. KevTopura or Cen- turipae), a town of Sicily, in the province of Catania, situated 2380 ft. above sea-level in a commanding situation, 7 m. N. of the railway station of Catenanuova-Centuripe, which is 28 m. W. from Catania. Pop. (1901) 11,311. Thucydides mentions it as a city of the Sicels. It became an ally of the Athenians at the time of their expedition against Syracuse, and maintained its independence almost uninterruptedly (though it fell under the power of Agathocles) until the First Punic War. Cicero describes it, perhaps with some exaggeration, as being far the largest and richest city of Sicily, and as having a population of 10,000, engaged in the cultivation of an extensive territory. It was granted Latin rights before the rest of Sicily. It appears to have suffered much in the war against Sextus Pompeius, and not to have regained its former prosperity under the empire. Frederick II. entirely destroyed it in 1233, but it was soon rebuilt. Considerable remains of the ancient city walls and of buildings, mostly of the Roman period, still exist, and numerous antiquities, including some fine Hellenistic (erra-cottas, have been discovered in casual excavations.

See F. Ansaldi, / Monumenti dell’ antica Centuripi (Catania, 1 851) ; P. Orsi in Atti del Congresso Internationale di Scienze Storiche (Rome, 1904), v. 177. (T. As.)

CENTURY (from Lat. centuria, a division of a hundred men), the name for a unit in the Roman army, originally amounting to one hundred men, and for one of the divisions into which the Roman people was separated for voting purposes (see Comitia). The word is applied to any group of one hundred, and more particularly to a period of a hundred years, and to the successive periods of a hundred years, dating before or after the

birth of Christ. The ” Century-plant ” is a name given to the Agave (q.v.), or American aloe, from the supposition that it flowered once only in every hundred years.

CEOS (Gr. Kecos, mod. Zea or Tzia), an island in the Aegean Sea, belonging to the group of the Cyclades and the eparchy of Syra, 14 m. off the coast of Attica. Its greatest length is about 15 m. and its breadth about 8 m. It rises gradually towards the centre, where it culminates in Mount Elias, 1864 ft. high. Among its natural productions are lemons, citrons, olives, wine and honey; it also exports a considerable quantity of valonia. There were formerly four towns of some importance in the island: — Iulis, about 3 m. from the north-west shore; Coressia, the harbour of Iulis, with a temple of Apollo Smintheus in the neighbourhood; Carthaea, in the south-east, with a temple of

Apollo; and Poieessa, in the south-west. Of these Iulis is represented by the town of Zea, and Carthaea by the village of ‘S tais Polais; traces of the other two can still be made out. Iulis was the birthplace of the lyric poets Simonides and Bacchylides, the philosophers Prodicus and Ariston, and the phy- sician Erasistratus ; the excellence of its laws was so generally recognized that the title of Cean Laws passed into a proverb. One of them forbade a citizen to protract his fife beyond sixty years. The people of Ceos fought on the Greek side at Artemisium and Salamis; they joined the Delian League and also the later Athenian alliance in 377 B.C. They revolted in 363-362, but were reduced again, and the Athenians established a monopoly of the ruddle, or red earth, which was one of the most valuable products of the island. In a.D; 1207 it was divided between four Italian adventurers; after forming part of the duchy of Naxos in 1537, it passed under Turkish rule in 1566. Silver coins of Carthaea and Coressia have been found dating from the 6th century B.C. (see Numismatics: Greek, ” Cyclades and Sporades “). The present population of the island is about 4000, of which the capital has about 2000.

See Pridik, De Cei Insulae rebus (1892). (E. Gr.)

CEPHALIC INDEX, the term in use by anthropologists to express the percentage of breadth to length in any skull. The principle employed by Retzius is to take the longer diameter of a skull, the antero-posterior diameter, as 100; if the shorter or transverse diameter falls below 80 the skull may be classed as long (dolichocephalic), while if it exceeds 80 the skull is broad

(brachycephalic) (see Craniometry).

CEPHALONIA (Ital. Cefalonia, ancient and modern official Greek Cephallenia, Ke4 > a\~kqvia) , an island belonging to the kingdom of Greece, and the largest of those known as the Ionian Islands, situated on the west side of the mainland, almost directly opposite the Gulf of Corinth. The name was traditionally derived from Cephalus, the Attic hero who was regarded as having colonized the island. The tradition, which is repeated by Aristotle, is probably due solely to the similarity of the names (see J. G. Frazer, Pausanias, i. 37, 6 note). Pop. (1907) 71,235. Its extreme length is 31 m., and its breadth varies from about 20 m. in the southern portion to 3 m. or less in the projecting part, which runs parallel with the island of Ithaca, at a distance of about 4 m.' across the strait of Guiscardo or Viscaro. The whole island, with its area of 348 English sq. m., is covered with rocky hills of varying elevation, the main range running from north-west to south-east. The ancient Mount Aenos, now Elato, Monte Negro, or the Black Mountain (53 1 5 ft.), frequently retains the snow for several months. It is not only the loftiest part of the sierra, but also the highest land in the whole Ionian group. The name " Black" was given from the darkness of the pine woods which still constitute the most striking feature in Cepha- lonian scenery, although their extent has been greatly curtailed by fire. The summit is called Megalo Soros. The island is ill supplied with fresh water; there are few permanent streams except the Rakli, and springs are apt to fail in dry summers. In the western part of the island a gulf runs up from the south, a distance of about 7 m. ; on its east side stands the chief town Argostoli, with about 10,000 inhabitants, and on its west side the rival city of Lixouri, with 6000. About a mile west of the town are the curious sea mills; a stream of sea water running down a chasm in the shore is made to turn the wheels. About 5 m. from Argostoli is the castle of St George, a building of Venetian origin, and the strongest fortification in the island. On an eminence east-south-east of Argostoli are the ruins of the ancient Cranii, and Lixouri is close to or upon those of Pale; while on the other side of the island are the remains of Samos on the bay of the same name, of Proni or Pronni, farther south above the vale of Rakli and its blossoming oleanders, and of an unknown city near the village of Scala. The ruins of this city include Roman baths, a brick-built temple, rock-cut tombs, and tessellated pavements; and Cranii, Proni and Samos are remarkable for stretches of Cyclopean and Hellenic walls, partly of the most irregular construction, and partly

preserving almost unimpaired the results of the most perfect skill. The inhabitants

of Cephalonia have all along been extremely active; and no slight amount of toil has been expended in the construction of terraces on the steep sides of the hills. Owing to the thinness of the population, however, but a small proportion of the soil is under cultivation, and the quantity of grain grown in the island is comparatively-meagre. The staple is the currant, in the production of which the island surpasses Zante. The fruit is smaller than that of the Morea, and has a peculiar flavour; it finds a market mainly in Holland, Belgium and Germany. The grape vine also is grown, and the manufacture of wine is a rising industry. The olive crop is of considerable importance, and the culture of cotton in the low grounds has been successfully attempted. Manufactures are few and undeveloped, but lace from the aloe fibre, Turkey carpets and basket-work are pro- duced by the villagers, and boats are built at both the principal towns. Of all the seven Ionian islands Cephalonia and Zante are most purely Greek, and the inhabitants display great mental activity.

In the Homeric poems Cephalonia is generally supposed to be mentioned under the name of Same, and its inhabitants, among the subjects of Ulysses, to be designated Cephallenes (see, however, under Ithaca) . In the Persian War they took but little part; in the Peloponnesian they sided with the Athenians. The town of Pale was vainly besieged by Philip of Macedon in 218 B.C., because it had supported the Aetolian cause. In 189 B.C. all the cities surrendered to the Romans, but Same afterwards revolted, and was only reduced after a siege of four months. The island was presented by Hadrian to Athens, but it appears again at a later date as ” free and autonomous.” After the division of the Roman empire, it continued attached to Byzan- tium till 1082, when it was captured by Robert Guiscard, who died, however, before he could repress the revolt of 1085. In 1204 it was assigned to Gaius, prince of Tarentum, who accepted the protection of Venice in 121 5; and after 1225 it was held along with Santa Maura and Zante by a succession of five counts of the Tocco family at Naples. Formally made over to Venice in 1350 by the prince of Tarentum, it was afterwards captured by the Turks in 1479; but the Hispanico-Venetian fleet under Benedetto

Pessaro and Gonsalvo of Cordova effected their expulsion in 1 500, and the island continued in Venetian possession till the fall of the republic. For some time it was administered for the French government, but in 1809 it was taken by the British under Cuthbert, Lord Collingwood. Till 1813 it was in the hands of Major de Bosset, a Swiss in the British service, who displayed an industry and energy in the repression of injustice and development of civilization only outdone by the despotic vigour of Sir Charles Napier, who held the same office for the nine years from 18 18 to 1827. During the British protectorate the island made undoubted advances in material prosperity, but was several times the scene of political disturbances. It retained longer than the sister islands traces of feudal influence exerted by the landed proprietors, but has been gradually becoming more democratic. Under the Venetians it was divided into eight districts, and an elaborate system of police was jn force; since its annexation to Greece it has been broken up into twenty demarchies, each with its separate jurisdiction and revenues, and the police system has been abolished.

Authorities. — A special treatise on the antiquities of Cephalonia was written by Petrus Maurocenus. See Holland's Travels (1815); Ansted's Ionian Islands (1863); Viscount Kirkwall's Four Years in Ionian Islands (1864); Wiebel's Die Insel Kephalonia; parliamentary papers. Riemann, Recherches archeologiques sur les lies Ioniennes (Paris, 1879-1880); Partsch, Kephallenia und Ithaka (1890); see also Corfu; Ionian Islands. (E. Gr.)

CEPHALOPODA, the fifth of the classes into which the zoological phylum Mollusca is divided (see Mollusca). The Cephalopoda are mainly characterized by the concrescence of the foot and head. The foot grows forward on each side so as to surround the mouth, the two upgrowths meeting on the dorsal side of the head — whence the name Cephalopoda. The perioral portion of the foot is drawn out into paired arm-like processes; these may be beset with sheathed tentacles or with suckers or hooks, or both. The epipodia are expanded into a pair of

muscular lobes right and left, which are bent round towards one another so that their free margins meet and constitute a short tube — the siphon or funnel. The hind-foot is either very small or absent. A distinctive feature of the Cephalopoda is their bilateral symmetry and the absence of anything like the torsion of the visceral mass seen in the Anisopleurous Gastropoda.

The anus, although it may be a little displaced from the median line, is approximately median and posterior. The mantle-skirt is deeply produced posteriorly, forming a large sub-pallial chamber around the anus. By the side of the anus are placed the single or paired apertures of the nephridia, the genital apertures (paired only in Nautilus, in female Octopoda, female Ommatostrephes and male Eledone), and the paired ctenidia. The visceral hump or dome is elevated, and may be very much elongated in a direction almost at right angles to the primary horizontal axis of the foot.

A shell is frequently, but not invariably, secreted on the visceral hump and mantle-skirt. The shell is usually light in substance or lightened by air-chambers in correlation with the free-swimming habits of the Cephalopoda. It may be external or internal, that is, enclosed in folds of the mantle. Very numerous minute pigmented sacs, capable of expansion and contraction, and known as chromato- phores, are usually present in the integument. The sexes are separate.

The ctenidia are well developed as paired gill-plumes, serving as the efficient branchial organs (figs. 4, 24),

The vascular system is very highly developed ; the heart consists of a pair of auricles and a ventricle (figs. 12, 28). Branchial hearts are formed on the afferent vessels of the branchiae. It is not known to what extent the minute subdivision of the arteries extends, or whether there is a true capillary system.

The pericardium is extended so as to form a very large sac, passing among the viscera dorsalwards and sometimes containing the ovary or testis — the viscero-pericardial sac — which opens to the exterior either directly or through the renal organs. It has no connexion with the vascular system. The renal organs are always paired sacs, the walls of which invest the branchial afferent vessels (figs. 28, 29). They open each by a pore into the viscero-pericardial sac, except in Nautilus. The anal aperture is median and raised on a papilla. Jaws (fig. 6, e) and a radula (fig. 9) are well developed. The jaws have the form of powerful beaks, either horny or calcified (Nautilus), and are capable of inflicting severe wounds.

Cerebral, pleural and pedal ganglia are present, but the connectives are shortened and the ganglia concentrated and fused in the cephalic region. Large special ganglia (optic, stellate and supra-buccal) are developed. Sense-organs are highly

developed; the eye exhibits a very special elaboration of structure in the Dibranchiata, and a remarkable archaic form in the nautilus. Otocysts are present in all. The typical osphradium is not present, except in Nautilus, but other organs are present in the cephalic region, to which an olfactory function is ascribed both in Nautilus and in the other Cephalopoda.

Hermaphroditism is unknown in Cephalopoda, male and female individuals always being differentiated. The genital aperture and duct is sometimes single, when it is the left; sometimes the typical pair is developed right and left of the anus. The males of nearly all Cephalopoda have been shown to be characterized by a peculiar modification of the arm-like processes or lobes of the fore-foot, con- nected with the copulative function. The term hectocotylization is applied to this modification (see figs. 6, 24). Elaborate spermato- phores or sperm-ropes are formed by all Cephalopoda, and very usually the female possesses special capsule-forming and nida- mental glands for providing envelopes to the eggs (fig. 4, g.n). The egg is large, and the development is much modified by the presence of an excessive amount of food-material diffused in the protoplasm of the egg-cell. Trochosphere and veliger stages of development are consequently not recognizable.

The Cephalopoda are divisible into two orders, Tetrabranchiata and Dibranchiata, the names of which (due to Sir R. Owen) describe the number of gill-plumes present; but in. fact there are several characters, of as great importance as those derived from the gills, by which the members of these two orders are separated from one another.

Order i. Tetrabranchiata (= Schizosiphona, Tentaculifera) .

Characters. — The inrolled lateral margins of the epipodia are not fused, but form a siphon by apposition (fig. 4). The circum-oral lobes of the fore-foot carry numerous retractile tentacles, not suckers (fig. 6). There are two pairs of ctenidial gills (hence Tetrabranchiata), and two pairs of renal organs, consequently four renal apertures (fig. 4). The viscero-pericardial chamber opens by two independent apertures to the exterior, and not into the renal sacs. There are two oviducts (right and left) in the female, and two sperm-ducts in the male, the left duct in both sexes being rudimentary. A large external shell, either coiled or straight, is present, and is not enclosed by reflections of the

mantle-skirt. The shell consists of a series of chambers, the last-formed of which is occupied by the body of the animal, the hinder ones (successively deserted) containing gas (fig. i). The pair of cephalic eyes are hollow chambers (fig. 14, A), opening to the exterior by minute orifices (pinhole camera), and devoid of refractive structures. A pair of osphradia are present at the base of the gills (fig. 4, 0//). Salivary glands are wanting. An ink-sac is not present. Branchial hearts are not developed on the branchial afferent vessels.

Visceral Hump and Shell.— The visceral hump of Nautilus (if we exclude from consideration the fine siphuncular pedicle which it trails, as it were, behind it) is very little, if at all, affected by the coiled form of the shell which it carries, since the animal always slips forward in the shell as it grows, and inhabits a chamber

Fig. I. — Lateral vie* of the female Pearly Nautilus, contracted by spirit and lying in its shell, the right half of which is cut away (from Gegenbaur, after Owen).

a, Visceral hump.

b, Portion of the free edge of the

mantle-skirt reflected on to the 0, shell, — the edge of the mantle- t, skirt can be traced downwards and forwards around the base of the mid-foot or siphon i. 1,1, Superficial origin of the retractor muscle of the mid-foot(siphon), more or less firmly attached to v, the shell, of which a small piece (s) is seen between the letters

1,1.

s, (farther back) points to the siph- V, uncular pedicle, which is broken off short and not continued, as in the perfect state, through the

whole length of the siphuncle of the shell, also marked i and s'. points to the right eye. is placed near the extremities of the contracted tentacles of the outer or annular lobe of the fore-foot — the jointed tentacles are seen protruding a little from their long cylindrical sheaths.

The dorsal " hood " formed by an enlargement in this region of the annular lobe of the fore- foot {m in figs. 2,3).

A swelling of the mantle-skirt, indicating the position on its inner face of the nidamental gland (see fig. 4, g.n.).

which is practically cylindrical (fig. 1). Were the deserted chambers thrown off instead of being accumulated behind the inhabited chamber as a coiled series of air-chambers, we should have a more correct indication in the shell of the extent and form of the animal's body. Amongst Gastropods it is not very un- usual to find the animal slipping forward in its shell as growth advances and leaving an unoccupied chamber in the apex of the shell. This may indeed become shut off from the occupied cavity by a transverse septum, and a series of such septa may be formed, but in no Gastropod are these apical chambers known to contain a gas during the life of the animal in whose shell they occur. A further peculiarity of the nautilus shell and of that of the allied extinct Ammonites, Scaphites, Orthoceras, &c, and of the living Spirula, is that the series of deserted air-chambers is traversed by a cord-like pedicle extending from the centro-

dorsal area of the visceral hump to the smallest and first-formed chamber of the series. No structure comparable to this siphun- cular pedicle is known in any other Mollusca. The siphuncle does not communicate with the coelomic cavity; it is a simple vascular process of the mantle, whose cavity consists of a venous sinus, and whose wall contains a ramification of the pallial artery. There appears to be no doubt that the deserted chambers of the nautilus shell contain in the healthy living animal a gas which serves to lessen the specific gravity of the whole organism. This gas is said to be of the same composition -as the atmosphere, with a larger proportion of nitrogen. With regard to its origin we have only conjectures. Each septum shutting off an air-contain- ing chamber is formed during a period of quiescence, probably after the reproductive act, when the visceral mass of the nautilus may be slightly shrunk, and gas is secreted from the dorsal integument so as to fill up the space previously occupied by the animal. A certain stage is reached in the growth of the animal when no new chambers are formed. The whole process of the loosening of the animal in its chamber and of its slipping forward when a new septum is formed, as well as the mode in which the air-chambers may be used as a hydrostatic apparatus, and the relation to this use, if any, of the siphuncular pedicle, is involved in obscurity, and is the subject of much ingenious speculation. In

connexion with the secretion of gas by the animal, besides the parallel cases ranging from the protozoon Arcella to the physoclistic fishes, from the hydroid Siphonophora to the insect-larva Corethra, we have the identical phenomenon observed in the closely allied Sepia when recently hatched. Here, in the pores of the internal rudimentary shell, gas is observable, which has necessarily been liberated by the tissues which secrete the shell, and not derived from any external source (Huxley).

The coiled shell of Nautilus, and of the majority of extinct Tetrabranchiata, is peculiar in its relation to the body of the animal, inasmuch as the curvature of the coil proceeding from the centro-dorsal area is towards the head or forwards, instead of away from the head and backwards as in other discoid coiled shells such as Planorbis; the coil is in fact absolutely reversed in the two cases. Such a shell is said to be exogastric. But in some extinct forms, e.g. Phragmoceras, Cyrtoceras, Ptenoceras, the shell is coiled towards the ventral side, when it is termed endogastric. Amongst the extinct allies of the nautilus (Tetrabranchiata) we find shells of a variety of shapes, open coils such as Scaphites, leading on to perfectly cylindrical shells with chamber succeeding chamber in a straight line {Orthoceras), whence again we may pass to the corkscrew spires formed by the shell of Turrilites. In some extinct genera, e.g. Gomphoceras, among the Nautiloidea the aperture of the shell is con- tracted and the edge of the aperture is lobed. In these cases the animal was probably able only to protrude its appendages and not its whole head. The ventral part of the aperture corresponding to the funnel is separated from the dorsal part by a constriction. Hence it is possible to distinguish the ventral and dorsal sides of the shell and to decide whether it was exogastric or endogastric. The direction of the coil of the shell cannot be determined by the position of the siphuncle, which traverses the septa centrally, ventrally or dorsally. Contracted shell apertures occur also in Ammonitoidea, the condition reaching an extreme in Morphoceras, where the original aperture is sub- divided by the ingrowth of the sides, so that only five small separate apertures remain. Of these the central probably corre- sponded to the mouth, two lateral to the eyes, and the remaining two to the pedal appendages.

Head, Foot, Mantle-skirt and Sub-pallial Chamber. — In the pearly nautilus the ovoid visceral hump is completely encircled by the free flap of integument known as mantle-skirt (figs. 2, 3, d, e). In the antero-dorsal region this flap is enlarged so as to be

reflected a little over the coil of the shell which rests on it. In the postero-ventral region the flap is deepest, forming an extensive sub-pallial chamber, at the entrance of which e is placed in fig. 3. A view of the interior

of the sub-pallial chamber, as seen when the mantle-skirt is retro-verted and the observer faces in the direction indicated by the reference line passing from e in fig. 3, is given in fig. 4. With this should be compared the similar view of the sub-pallial chamber of the Dibranchiate Sepia. It should be noted as a difference between Nautilus and the Dibranchiates that in the former the nidamental gland (in the female) lies on that surface of the pallial chamber

Fig. 2. — Spirit specimen of female Pearly Nautilus, removed from its shell, and seen from the antero-dorsal aspect (drawn from nature by A. G. Bourne).

m.

The dorsal ” hood ” formed c, by the enlargement of the d, outer or annular lobe of the fore-foot, and corresponding to the sheaths of two tenta- cles (g, g in fig. 6).

Tentacular sheaths of lateral portion of the annular lobe.

The left eye.

The nuchal plate, continuous at its right and left posterior angles with the root of the g.a. mid-foot, and corresponding to the nuchal cartilage of Sepia.

Visceral hump.

The free margin of the mantle- skirt, the middle letter d points to that portion of the mantle-skirt which is re- flected over a part of the shell as seen in fig. 1,6; the cup-like fossa to which b and d point in the present figure is occupied by the coil of the shell.

points to the lateral con- tinuation of the nuchal plate b to join the root of the mid- foot or siphon.

formed by the dependent mantle-flap (fig. 4, g.ra. ; fig. I, V), whilst in the latter it lies on the surface formed by the body-wall ; in fact in the former the base of the fold forming the mantle-skirt comprises in its area a part of what is unreflected visceral hump in the latter.

The apertures of the two pairs of renal sacs, of the viscero-pericardial sac, of the genital ducts, and of the anus, are shown in position on the body-wall of the pallial chamber of Nautilus in figs. 4, 5- There are nine apertures in all, one median (the anus)

Fig. 3. — Lateral view of the same specimen as that drawn in fig. 2. Letters as in that figure with the following additions —

*,

points to the concave margin of the mantle-skirt leading into the sub-pallial chamber.

The mid-foot or siphon.

The superficial origin of its retractor muscles closely applied to the shell and

serving to hold the animal

in its place. /, The siphuncular pedicle of

the visceral hump broken

off short. v,v, The superior and inferior

ophthalmic tentacles.

and four paired. Besides these apertures we notice two pairs of gill-plumes which are undoubtedly typical ctenidia, and a short papilla (the osphradium) between each anterior and posterior gill- plume (see figs. 4, 5, and explanation). As compared with this in a Dibranchiate, we find (fig. 25) only four apertures, viz. the median anus with adjacent orifice of the ink-sac, the single pair of renal apertures, and one asymmetrical genital aperture (on the left side) except in female Octopoda and a few others, where the genital ducts and their apertures are paired. No viscero-pericardial pores are present on th<* surface of the pallial chamber, since in the Dibranchiata

the viscero-pericardial sac opens by a pore into each nephridium instead of directly to the surface. A single pair of ctenidia (gill-plumes) is present instead of the two pairsin Nautilus. The existence of two pairs of ctenidia and of two pairs of renal sacs in Nautilus, placed one behind the other, is highly remarkable. The interest of this arrangement is in relation to the general morphology of the Mollusca, for it is impossible to view this repetition of organs in a linear series as anything else than an instance of metameric seg- mentation, comparable to the segmentation of the ringed worms and Arthropods. The only other example which we have of this meta- merism in the Mollusca is presented by the Chitons. There we find not two pairs of ctenidia merely, but sixteen pairs (in some species more) accompanied by a similar metamerism of the dorsal integu- ment, which carries eight shells. In Chiton the renal organs are not affected by the metamerism as they are in Nautilus. It is im- possible on the present occasion to discuss in the way which their importance demands the significance of these two instances among Mollusca of incomplete or partial metamerism; but it would be

Fig. 4. — View of the postero-ventral surface of a female Pearly Nautilus, the mantle-skirt © being completely reflected so as to show the inner wall of the sub-pallial chamber (drawn from nature by A. G. Bourne).

Muscular band passing from the mid-foot to the integu- ment.

The valve on the surface of the funnel, partially con- cealed by the inrolled lat- eral margin of the latter.

The mantle-skirt retroverted.

The median anus.

Post-anal papilla of unknown significance. g.n., Nidamental gland.

Aperture of the right oviduct.

b,

an,

l.ov, Aperture of the rudimen- tary left oviduct (pyriform sac of Owen).

neph.a, Aperture of the left an- terior renal sac.

neph.p, Aperture of the left pos- terior renal sac.

viscper. Left aperture of the viscero-pericardial sac.

olf, The left osphradium placed near the base of the anterior gill-plume.

r.ov,

The four gill-plumes (ctenidia) are not lettered.

wrong to pass them by without insisting upon the great importance which the occurrence of these isolated instances of metameric seg- mentation in a group of otherwise unsegmented organisms possesses, and the light which they may be made to throw upon the nature of metameric segmentation in general.

The foot and head of Nautilus are in the adult inextricably grown together, the eye being the only part belonging primarily to the head which projects from the all-embracing foot. The fore-foot or front portion of the foot has the form of a number of lobes carrying tentacles and completely surrounding the mouth (figs. 2, 3). The epipodia incline towards each other posteriorly so as to form an incomplete siphon (fig. 4), a condition which is completed and rendered permanent in the tubular funnel of Dibranchiata. The epipodial nature of the funnel is well seen in young embryos, in which this organ is situated laterally and posteriorly between the mantle and the foot.

The lobes of the fore-foot of Nautilus and of the other Cephalopoda require further description. It has been doubted whether these lobes were rightly referred (by T. H. Huxley) to the fore-foot, and it has been maintained by some zoologists (H. Grenacher, H. von

•5P

Jhering) that they are truly processes of the head. It appears to be impossible to doubt that the lobes in question are the fore-portion of the foot, when their development is examined (see fig.

35), further, when the fact is considered that they are innervated by the pedal ganglion. The fore-foot of Nautilus completely surrounds the buccal cone (fig. 6, e), so as to present an appearance with its expanded tentacles similar to that of the disk of a sea-anemone (Actinia). A. G. Bourne, of University College, prepared from actual specimens

the drawings of this part in the male and female Nautilus reproduced in fig. 6, and restored the parts to their natural form when expanded. The drawings show ana verv strikingly the difference between male and female. In the females ilf. (lower figure), we observe in the centre of the disk the buccal cone e carrying the beak- like pair of jaws which project from the finely papillate buccal membrane. Three tentaculiferous lobes of the fore- foot are in im- mediate contact with this buccal cone ; they are the right and left (c, c) inner lobes, and the inferior inner

iriscjx

Fig. 5. — View of the postero-ventral surface of a male Pearly Nautilus, the mantle-skirt © being completely reflected so as to show the inner wall of the sub-pallial chamber, and the four ctenidia and the foot cut short (drawn from nature by A. G. Bourne), pe, Penis, being the enlarged termination of the right spermatic duct; l.sp, aperture of the rudimentary left spermatic duct (pyriform sac of Owen). Other letters as in fig. 4.

lobe (d) — called inferior because it really lies ventral wards of the mouth. This inner inferior lobe is clearly a double one, representing a right and left inner inferior lobe fused into one. A lamellated organ on its surface, known as Owen's organ, probably olfactory in function (n), marks the separation of the constituent halves of this double lobe. Each half carries a group of fourteen tentacles. The right and the left inner lobes (c, c) each carry twelve tentacles. External to these three lobes the muscular substance of the mouth-embracing foot is raised into a wide ring, which becomes especially thick and large in the dorsal region where it is notably modified in form, offering a concavity into which the coil of the shell is received, and furnishing a protective roof to the retracted mass of tentacles. This part of the external annular lobe of the fore-foot is called the " hood " (figs. 2, 3, m). The median antero-posterior line traversing this hood exactly corresponds to the line of concrescence of the two halves of the fore-foot, which primitively grew forward one on each side of the head, and finally fused together along this line in front of the

mouth. The tentacles carried by the great an- nular lobe are nineteen on each side, thirty-eight in all. They are called " digital," and are somewhat larger than the " labial " tentacles carried on the three inner lobes. The dorsalmost pair of tentacles (marked g in fig. 6) are the only ones which actually belong to that part of the disk which forms the great dorsal hood m. The hood is, in fact, to a large extent formed by the enlarged sheaths of these two tentacles. All the tentacles of the circumoral disk are set in remarkable tubular sheaths, into which they can be drawn. The sheaths of some of those belonging to the external or annular lobe are seen in fig. 3, marked n. The sheaths are muscular as well as the tentacles, and are simply tubes from the base of which the solid tentacle grows. The functional significance of this sheathing arrange- ment is as obscure as its morphological origin. With reference to the latter, it appears highly probable that the tubular sheath represents the cup of a sucker such as is found on the fore-foot of the Di- branchiata. In any case, it seems to the writer impossible to doubt that each tentacle, and its sheath on a lobe of the circumoral disk of Nautilus, corresponds to a sucker on such a lobe of a Dibranchiate. W. Keferstein follows Sir R. Owen in strongly opposing this identi- fication, and in regarding such tentacle as the equivalent of a whole lobe or arm of a Decapod or Octopod Dibranch. The details of these structures, especially in the facts concerning the hectocotylus and spadix, afford the most conclusive reasons for dissenting from Owen's view. On the ventral side an extensive part of the internal surface of the muscular ring is laminated, forming the so-called " organ of Valenciennes," peculiar to the female and serving for the attachment of the spermatophores. We have so far enumerated in the female nautilus ninety tentacles. Four more remain which have a very peculiar position, and almost lead to the suggestion that the eye itself is a modified tentacle. These remaining tentacles

FlG. 6. — Male (upper) and female (lower) specimens of Nautilus pompilius as seen in the expanded condition, the observer looking down on to the buccal cone e \ one-third the natural size linear. The drawings have been made from actual specimens by A. G. Bourne, B.Sc, University College, London.

The shell.

The outer ring-like expansion (annular lobe) of the circum- oral muscular mass of the fore-foot, carrying nineteen tentacles on each side — pos- teriorly this is enlarged to form the " hood "

(marked v in fig. 1 and m in figs. 2 and 3), giving off the pair of tentacles marked g in the present figure.

The right and left inner lobes of the fore-foot, each carry- ing twelve tentacles in the female, in the male sub- divided into p, the “spadix” or hectocotylus on the left side, and a, the ” anti-spadix,” a group of four tentacles on the right side — it is thus seen that the sub- divided right and left inner lobes of the male correspond to the undivided right and left inner lobes of the female.

The inner inferior lobe of the fore-foot, a bilateral structure in the female carrying two groups, each of fourteen ten- tacles, separated from one an- other by a lamellated organ n, supposed to be olfactory in function — in the male the inner inferior lobe of the fore-foot is very much re- duced, and has the form of a paired group of lamellae (d in the upper figure).

The buccal cone, rising from the centre of the three inner

/.

k,

n,

lobes, and fringing the pro- truded calcareous beaks or jaws with a series of minute papillae.

The tentacles of the outer circumoral lobe or annular lobe of the fore-foot pro- jecting from their sheaths.

The two most posterior ten- tacles of this series belonging to that part of the annular lobe which forms the hood (m in figs. 2 and 3).

Superior ophthalmic tentacle.

Inferior ophthalmic tentacle.

Eye.

Paired laminated organ on each side of the base of the inner inferior lobe (d) of the female.

Olfactory lamellae upon the inner inferior lobe (in the female).

The siphon (mid-foot).

The spadix (in the male), the hectocotylized portion of the left inner- lobe of the fore-foot representing four modified tentacles, eight being left unmodified.

The anti-spadix (in the male), being four of the twelve tentacles of the right inner lobe of the fore-foot isolated from the remaining eight, and representing on the right side the differentiated spadix of the left side. The four tentacles of the anti-spadix are set, three on one base and one on a separate base.

are placed one above (before) and one below (behind) each eye, and bring up the total to ninety-four (fig. 3 s, 1).

In the adult male nautilus we find the following important differences in the tentaculiferous disk as compared with the female (see upper drawing in fig. 6). The inner inferior lobe is rudimentary, and carries no tentacles. It is represented by three groups of lamellae (d), which are not fully exposed in the drawing. The right and left inner lobes are subdivided each into two portions. The right shows a larger portion carrying eight tentacles, and smaller detached groups (g) of four tentacles, of which three have their sheaths united whilst one stands alone. These four tentacles may be called the ” anti-spadix.” The left inner lobe shows a similar larger portion carrying eight tentacles, and a curious conical body behind it corre- sponding to the anti-spadix. This is the ” spadix.” It carries no tentacles, but is terminated by imbricated lamellae. These lamellae appear to represent the four tentacles of the anti-spadix of the right internal lobe, and are generally regarded as corresponding to that modification of the sucker-bearing arms of male Dibranchiate Siphonopods to which the name ” hectocotylus ” is applied. The spadix is in fact the hectocotylized portion of the fore-foot of the male nautilus. The hectocotylized a»-m or lobe of male Dibranchiata is connected with the process of copulation, and in the male nautilus the spadix has probably a similar significance, though it is not possible to suggest how it acts in this relation. It is important to observe that the modification of the fore-foot in the male as compared with the female nautilus is not confined to the existence of the spadix. The anti-spadix and

the reduction of the inner inferior lobe are also male peculiarities. The external annular lobe in the male does not differ from that of the female ; it carries nineteen tentacles on each side. The four ophthalmic tentacles are also present. Thus in the male nautilus we find altogether sixty-two tentacles, the thirty-two additional tentacles of the female being represented by lamelliform structures.

Musculature, Fins and Cartilaginous Skeleton. — Without entering into a detailed account of the musculature of Nautilus, we may point out that the great muscular masses of the fore-foot and of the mid- foot (siphon) are ultimately traceable to a large transverse mass of muscular tissue, the ends of which are visible through the integument on the right and left surfaces of the body dorsal of the free flap of the mantle-skirt (fig. 1, /, /, and fig. 3. *)• These muscular areae have a certain adhesion to the shell, and serve both to hold the animal in its shell and as the fixed supports for the various movements of the tentaculiferous lobes and the siphon. They are to be identified with the ring-like area of adhesion by which the foot-muscle of the limpet is attached to the shell of that animal. In the Dibranchs a similar origin of the muscular masses of the fore-foot and mid-foot from the sides of the shell— modified, as this is, in position and relations— can

In Nautilus there are no fin-like expansions of the integument,

whereas such occur in the ˆ,lvv\ v * i — e Decapod Dibranchs along

the sides of the visceral hump (figs. 15, 16). As an exception among Octopoda lateral fins occur in Pin- noctopus (fig. 38, A), and in Cirrhoteuthis (fig. 38, D). In Nautilus there is a curious plate-like expansion of integument in the mid- dorsal region just behind the hood, lying between that structure and the por- tion of mantle-skirt which is reflected over the shell. This is shown in fig. 2, b. If we trace out the margin of this plate we find that it becomes continuous on each side with the sides of the funnel. In Sepia and other Decapods (not in Octopods) a closely similar plate exists in an exactly corresponding position (see b in figs. 10, 26). In Sepia a cartilaginous development occurs here immediately be- low the integument forming the so-called ” nuchal plate,” drawn in fig. 8 > D. The morpho- logical significance of this nuchal lamella, as seen both in Nautilus and in Sepia, is not obvious. Cartilage having the structure shown in fig. 7 occurs in various regions of the body of Cephalopoda. In all

Glossophorous Mollusca the lingual apparatus is supported by internal skeletal pieces, having the character of cartilage; but in the Cephalopoda such cartilage has a wider range.

In Nautilus a large H-shaped piece of cartilage is found, forming the axis of the funnel (fig. 8, A, B). Its hinder part extends up into the head and supports the peri-oesophageal nerve-mass (a), whilst

Fig. 7. — Minute structure of the cartilage of Loligo (from Gegenbaur, after Furbringer).

o, Simple cells.

b, Dividing cells.

c, Canaliculi.

d, An empty cartilage capsule with its pores.

Canaliculi in section.

e,

its two anterior rami extend into the tongue-like siphon. In Sepia, and Dibranchs generally, the cartilage takes a different form, as shown in fig. 8, C. The processes of this cartilage cannot be identi- fied in any way with those of the capito-pedal cartilage of Nautilus. The lower larger portion of this cartilage in Sepia is called the cephalic cartilage, and forms a complete ring round the oesophagus ; it com- pletely invests also the ganglionic nerve-collar, so that all the nerves from the latter have to pass through foramina in the cartilage. The outer angles of this cartilage spread out on each side so as to form a cup-like receptacle for the eyes. The two processes springing right and left from this large cartilage in the median line (fig. 8, C) are the ” pre-orbital cartilages “; in front of these, again, there is seen a piece like an inverted T, which forms a support to the base of the ” arms ” of the fore-foot, and is the ” basi-brachial ” cartilage. The Decapod Dibranchs have, further, the ” nuchal cartilage ” already mentioned, and in Sepia, a thin plate-like ” sub-ostracal ” or (so-called) dorsal cartilage, the anterior end of which rests on and fits into the concave nuchal cartilage. In Octopoda there is no nuchal cartilage, but two band-like ” dorsal cartilages.” In Deca pods there are also two cartilaginous sockets on the sides of the funnel — ” siphon-hinge cartilages ” — into which fleshy knobs

of the mantle-

Fig. 8. — Cartilaginous skeleton of Cephalopoda (after Keferstein.)

A, Capito-pedal cartilage of

Nautilus pompilius. a points to the ridge which supports the pedal portion of the nerve-centre.

B, Lateral view of the same —

the large anterior processes

are sunk in the muscular substance of the siphon.

C, Cephalic cartilages of Sepia

officinalis.

D, Nuchal cartilage of Sepia

officinalis.

skirt are loosely fitted. In Sepia, along the whole base-line of each lateral fin of the mantle (fig. 15), is a " basi-pterygial cartilage." It is worthy of remark that we have, thus developed, in Dibranch Cephalopods a more complete internal cartilaginous skeleton than is to be found in some of the lower vertebrates. There are other instances of cartilaginous endo-skeleton in groups other than the Vertebrata. Thus in some capito-branchiate Chaetopods cartilage forms a skeletal support for the gill-plumes, whilst in the Arachnids (Mygale, Scorpio) and in Limulus a large internal cartilaginous plate — the ento-sternite — is developed as a support for a large series of muscles.

Alimentary Tract. — The buccal cone of Nautilus is terminated by a villous margin (buccal membrane), surrounding the pair of beak- like jaws, of which the ventral projects over the dorsal. These are very strong and dense in Nautilus, being calcified. Fossilized beaks of Tetrabranchiata are known under the name of rhyncholites. In Dibranchs the beaks are horny, but similar in shape to those of Nautilus. They resemble in general those of a parrot, the lower beak being the larger and overlapping the upper or dorsal beak. The lingual ribbon and odontophoral apparatus have the structure which is typical for Glossophorous

Mollusca. In fig. 9, A is repre- sented a single row of teeth from the lingual ribbon of Nautilus, and in fig. 9, B, C, of other Cephalopoda.

In Nautilus a long and wide crop or dilated oesophagus (fig. 10, cr) passes from the muscular buccal mass, and at the apex of the visceral hump passes into a highly muscular stomach, resembling the gizzard of a bird (fig 10, gizz). A nearly straight intestine passes from the muscular stomach to the anus, near which it develops a small caecum. In other Cephalopods the oesophagus is usually narrower and the muscular stomach more capacious, whilst a very important feature in the alimentary tract is formed by the caecum. In all but Nautilus the caecum lies near the stomach, and may be very capacious — much larger than the stomach in Loligo vulgaris — or elongated into a spiral coil. The simple U-shaped flexure of the alimentary tract, as seen in fig. 10, is the only important one which it exhibits in the Cephalopoda. The acini of the large liver of Nautilus are compacted into a solid reddish-brown mass by a firm

membrane, as also is the case in the Dibranchiata. The liver has four paired lobes in Nautilus, which open by two bile-ducts into the

Fig. 9. — Lingual dentition of Cephalopoda. A, A single row of lingual teeth of Nautilus pompilius (after Keferstein). B, Two rows of lingual teeth of Sepia officinalis (after Troschel). C, Lingual teeth of Eledone cirrhosa (after Loven).

alimentary canal at the commencement of the intestine. The bile-ducts unite before entering the intestine. In Dibranchiata the two large lobes of the liver are placed antero-dorsally (beneath the shell

Fig. 10. — Diagram representing a vertical approximately median antero-posterior section of Nautilus pompilius (from a drawing by A. G. Bourne). The parts which are quite black are the cut muscular surfaces of the foot and buccal mass. a, The shell.

e.

r, s,

t,

X,

Tentacles of the annular

lobe. Tentacles of the inner in- ferior lobe. Buccal membrane. Upper jaw or beak. Lower jaw or beak. Lingual ribbon. The viscero- pericardial sac. n.c, Nerve-collar. oe, Oesophagus. cr, Crop. gizz, Gizzard. int, Intestine. an, Anus. nept, Aperture of a nephridial

sac. r.e, Renal glandular masses on the walls of the afferent branchial veins (see fig. II). ■ a.b.v, Afferent branchial vessel. e.b.v, Efferent branchial vessel. vt, Ventricle of the heart.

in Decapoda), and the bile-ducts open into the caecum. Upon the bile-ducts in Dibranchiata are developed yellowish glandular diver- ticula, which are known as ” pancreas,” though neither physio- logically nor morphologically is there any ground for considering either the so-called liver or the so-called pancreas as strictly equivalent to the glands so denominated in the Vertebrata. In

The nuchal plate, identical with the nuchal cartilage of Sepia (see fig. 2, b).

The integument covering the visceral hump.

The mantle flap or skirt in the dorsal region where it rests against the coil of the shell.

The inferior margin of the mantle-skirt resting on the lip of the shell represented by the dotted line.

The pallial chamber with two of the four gills.

The vertically cut median por- tion of the mid-foot (siphon) .

The capito-pedal cartilage (see fig. 8).

The valve of the siphon.

The siphuncular pedicle (cut short).

m, The hood or dorsal enlarge- ment of the annular lobe of the fore-foot.

«,

Nautilus the equivalents of the pancreatic diverticula of the Dibranchs can be traced upon the relatively shorter bile-ducts.

Posterior salivary glands are not developed in Nautilus, but on each side in the wall of the buccal mass is a gland corresponding to the anterior salivary gland of the Dibranchiata. No ink-sac is present in Nautilus.

Coelom, Blood-vascular System and Excretory Organs. — Nautilus and the other Cephalopoda conform to the general Molluscan characters in regard to these organs. Whilst the general visceral cavity forms a lacunar blood-system or series of narrow spaces, connected with the trunks of a well-developed vascular system, that part of the original coelom surrounding the heart and known as the Molluscan pericardium is shut off from this general blood-lymph system, and communicates, directly in Nautilus, in the rest through the renal sacs, with the exterior. In the Cephalopoda this specialized peri- cardial cavity is particularly large, and has been recognized as distinct from the blood-carrying spaces, even by anatomists who have not considered the pericardial space of other Mollusca to be thus isolated. The enlarged pericardium, which may even take the form of a pair of sacs, has been variously named, but is best known as the viscero-pericardial sac or chamber. In Nautilus this sac

vent

Fig. 11. — Diagram to show the relations of the four nephridial sacs, the viscero-pericardial sac, and the heart and large vessels in Nautilus (drawn by A. G. Bourne). neph, neph, on the right side

point to the two nephridia of that side (the two of the opposite side are not lettered)— each is seen to have an independent aperture. x is the viscero-pericardial sac, the dotted line indicating its backward extension.

vise. per. apert, marks an arrow introduced into the right aperture of the viscero- pericardial sac.

r.e, r.e. point to the glandular en- larged walls of the afferent

v.c,

vent,

ao,

a.b.v, e.v.b.

branchial vessels — two small glandular bodies of the kind are seen to pro- ject into each nephridial sac, whilst a larger body of the same kind depends from each of the four branchial afferent vessels into the viscero-pericardial sac.

Vena-cava.

Ventricle of the heart.

Cephalic aorta (the small abdominal aorta not drawn).

Branchial vessel.

Efferent branchial vessel.

occupies the whole of the postero-dorsal surface and a part of the antero-dorsal (see fig. 10, x), investing the genital and other viscera' which lie below it, and having the ventricle of the heart suspended in it. Certain membranes forming incomplete septa, and a curious muscular band — the pallio-cardiac band — traverse the sac. The four branchial afferent veins, which in traversing the walls of the four renal sacs give off, as it were, glandular diverticula into those sacs, also give off at the same points four much larger glandular masses, which hang freely into the viscero-pericardial chamber (fig. 11, r.e). In Nautilus the viscero-pericardial sac opens to the exterior directly by a pair of apertures, one placed close to the right and one close to the left posterior renal aperture (fig. 5, vise. per). This direct opening of the pericardial sac to the exterior is an exception to what occurs in all other Mollusca. In all other Molluscs the pericardial sac opens into the renal organs, and through them or the one renal organ to the exterior. In Nautilus there is no opening from the viscero-pericardial sac into the renal sacs. Therefore the external pore of the viscero-pericardial sac may possibly be regarded as a shift- ing of the reno-pericardial orifice from the actual wall of the renal sac to a position alongside of its orifice. Parallel cases of such shifting are seen in the varying position of the orifice of the ink-bag in Dibranchiata, and in the orifice of the genital ducts of Mollusca, which in some few cases (e.g. Spondylus) open into the renal organs, whilst in other cases they open close by the

side of the renal organs on the surface of the body. The viscero-pericardial sac of the Dibranchs is very large also, and extends into the dorsal region. It varies in

shape — that is to say, in the extensions of it,s area right and left between the various viscera — in different genera, but in the Deca- pods is largest. In an extension of this chamber is placed the ovary of Sepia, whilst the ventricle of the heart and the branchial hearts and their appendages also lie in it. It is probable that water is drawn into this chamber through the renal sacs, since sand and other foreign matters are found in it. In all it opens into the pair of renal sacs by an orifice on the wall of each, not far from the external orifice (fig. 29, y, y'). There does not seem any room for doubting that each orifice corresponds to the reno-pericardial orifice which we have seen in the Gastropoda, and shall find again in the Lamellibranchia. The circulatory organs, blood-vessels and blood of Nautilus do not differ greatly from those of Gastropoda. The ventricle of the heart is a four-cornered body, receiving a dilated branchial efferent vessel (auricle) at each corner (fig. 11). It gives off a cephalic aorta anteriorly, and a smaller abdominal aorta posteriorly. The diagram, fig. 12, serves to show how this simple form of heart is related to the dorsal vessel of a worm or of an Arthropod, and how by a simple flexure of the ventricle (D) and a subsequent suppression of one auricle, following on the suppression of one branchia, one may obtain the form of heart characteristic of the anisopleurous Gastropoda (excepting the Aspidobranchia). The flexed condition of the heart is seen in Octopus, and is to some extent approached by Nautilus, the median vessels not presenting that perfect parallelism which is shown in the figure (B). The most remarkable feature presented by the heart of Nautilus is the possession of four instead of two auricles, a feature which is simply related to the metamerism of the branchiae. By the left side of the heart of Nautilus, attached

Fig. 12. — Diagram to show the relations of the heart in the Mollusca. (From Gegenbaur.)

A, Part of the dorsal vascular E, Of a Gastropod.

trunk and transverse trunks a, Auricle, of a worm. [Nautilus, v, Ventricle.

B, Ventricle and auricles of ac, Arteria = cephalica = (aorta).

C, Of a Lamellibranch, of Chiton, ai, Arteria abdominalis. The

or of Loligo, arrows show the direction

D, Of Octopus. of the blood-current.

to it by a membrane, and hanging loosely in the viscero-pericardial chamber, is the pyriform sac of Owen. This has been shown to be the rudimentary left oviduct or sperm-duct, as the case may be (E. R. Lankester and A. G. Bourne), the functional right ovi-sac and its duct being attached by a membrane to the opposite side of the heart.

The cephalic and abdominal aortae of Nautilus appear, after running to the anterior and posterior extremes of the animal respectively, to open into sinus-like spaces surrounding the viscera, muscular masses, &c. These spaces are not large, but confined and shallow. Capillaries are stated to occur in the integument. In the Dibranchs the arterial system is very much more complete; it appears in some cases to end in irregular lacunae or sinuses, in other cases in true capillaries which lead on into veins. An investigation of these capillaries in the light of modern histological knowledge is much needed. From the sinuses and capillaries the veins take origin, collecting into a large median trunk (the vena cava), which in the Dibranchs as well as in Nautilus has a ventral (postero-ventral) position, and runs parallel to the long axis of the animal. In Nautilus this vena cava gives off at the level of the gills four branchial afferent veins (fig. 11, v.c), which pass into the four gills without dilating. In the Dibranchs at a similar position the vena cava gives off a right and a left branchial afferent vein, each of which, traversing the wall of the corresponding renal sac and receiving additional factors, dilates at the base of the corresponding branchial plume, forming there a pulsating sac — the branchial heart. Attached to each branchial heart is a curious glandular body, which may possibly

be related to the larger masses (fig. II, r.e) which depend into the viscero-pericardial cavity from the branchial afferent veins of Nautilus. From the dilated branchial heart the branchial afferent vessel proceeds, running up the adpallial face of the gill-plume. From each gill-plume the blood passes by the branchial efferent vessels to the heart, the two auricles being formed by the dilatation of these vessels.

The blood contains the usual amoeboid corpuscles, and a diffused colouring matter — the haemocyanin of Fredericque — which has been found also in the blood of Helix, and in that of the Arthropods Homarus and Limulus. It is colourless in the oxidized, blue in the deoxidized state, and contains copper as a chemical constituent.

The renal sacs and renal glandular tissue are closely connected with the branchial advehent vessels in Nautilus and in the other Cephalopoda. The arrangement is such as to render the typical relations and form of a renal tube difficult to trace. In accordance with the metamerism of Nautilus already noticed, there are two pairs of renal organs. Each assumes the form of a sac opening by a pore to the exterior. As is usual in renal tubes a glandular and a non-glandular portion are distinguished in each sac ; these portions, however, are not successive parts of a tube, as happens in other cases, but they are localized areae of the wall of the sac. The glandular renal tissue is, in fact, confined to a tract extending along that part of the sac's wall which immediately invests the great branchial afferent vein. The vein in this region gives off directly from its wall a complete herbage of little venules, which branch and anastomose with one another, and are clothed by the glandular epithelium of the renal sac. The secretion is accumulated in the sac and passed by its aperture to the exterior. Probably the nitrogenous excretory pro- duct is very rapidly discharged ; in Nautilus a pink-coloured powder is found accumulated in the renal sacs, consisting of calcium phos- phate. The presence of this phosphatic calculus by no means proves that such was the sole excretion of the renal glandular tissue. In Nautilus a glandular growth like that rising from the wall of the branchial vessel into its corresponding renal sac, but larger in size, depends from each branchial afferent vessel into the viscero-peri- cardial sac and forms the pericardial gland — probably identical with the " appendage " of the branchial hearts of Dibranchs.

The chief difference, other than that of number, between the

renal organs of the Dibranchs and those of Nautilus, is the absence of the accessory growths depending into the viscero-pericardial space just mentioned, and, of more importance, the presence in the former of a pore leading from the renal sac into the viscero-pericardial sac (y, y' in fig. 29). The external orifices of the renal organs are also more prominent in Dibranchs than in Nautilus, being raised on papillae (np in fig. 29; r in fig. 25). In Sepia the two renal sacs give off each a diverticulum dorsalwards, which unites with its fellow and forms a great median renal chamber, lying between the ventral portions of the renal organs and the viscero-pericardial chamber. In Loligo the fusion of the two renal organs to form one sac is still more obvious, since the ventral portions are united. In Octopus the renal sacs are quite separate.

Gonads and Genital Ducts.ˆ-\n Nautilus it has been shown by E. Ray Lankester and A. G. Bourne that the genital ducts of both sexes are paired right and left, the left duct being rudimentary and forming the " pyriform appendage," described by Sir R. Owen as adhering by membranous attachment to the ventricle of the heart, and shown by W. Keferstein to communicate by a pore with the exterior. The ovary (female gonad) or the testis (male gonad) lies in Nautilus, as in the Dibranchs, in a distinct cavity walled off from the other viscera, near the centro-dorsal region. This chamber is formed by the coelomic or peritoneal wall; the space enclosed is originally part of the coelom, and in Sepia and Loligo is, in the adult, part of the viscero-pericardial chamber. In Octopus it is this genital chamber which communicates by a right and a left canal with the renal sac, and is the only representative of pericardium. The ovary or testis is itself a growth from the inner wall of this chamber, which it only partly fills. In Nautilus the right genital duct, which is functional, is a simple continuation to the pore on the postero-dorsal surface of the membranous walls of the capsule in which lies the ovary or the testis, as the- case may be. The gonad itself appears to repre- sent a single median or bilateral organ.

The ovary forms a large projection into the genital coelom, and the coelomic epithelium is deeply invaginated into the mass of the gonad, so as to constitute an ovarian cavity communicating with the coelom by a narrow aperture. The ova originate in the epithelium, migrate below it and then, as they enlarge, project into the ovarian cavity, pushing the epithelium before them. Each ovum is sur- rounded by a follicular epithelium which is nourished by numerous blood-vessels, and which penetrates into

the surface of the ovum in numerous folds. When mature, the ovum is contained in a mem- brane or chorion with a micropyle, and escapes by dehiscence of the follicle into the genital coelom and duct. In its passage to the ex- terior the ovum passes a glandular structure on the wall of the genital capsule, which probably secretes the gelatinous substance enclosing the eggs. In addition to this internal gland there are other accessory glands, which are not related to the genital duct or sac but are differentiations of the wall of the pallial cavity, and occur on the inner wall of the pallium in Nautilus, on the somatic wall in Dibranchiata. In Nautilus they form a continuous mass. These produce the external envelopes of the eggs.

In the male the testis is a specialized portion of the wall of the genital coelom, and has a structure comparable to that of the ovary. The spermatozoa pass through an orifice from the cavity of the testis to the genital capsule, and thence to the spermiduct. The spermi- duct is provided with a glandular pouch, and opens into a terminal reservoir known as Needham's sac or the spermatophore sac. The function of this pouch is to form the spermatophore, which is an elastic tube formed of structureless secretion and invaginated into itself. The deeper part contains the spermatozoa, the external part is called the connective, and is usually much contracted and spirally

coiled. When the spermatophore is expelled into the water the connective is extended and evaginated, and the sac containing the sperms bursts. In Nautilus the spermatophore when uncoiled is a little over 30 mm. in length. These spermatophores are somewhat similar to those formed in certain pulmonate Gastropods.

The eggs are laid shortly after copulation. In Nautilus they are laid separately, each being about 4 cm. long and contained in two thick shells, the outer of which is partly open.

Nervous System. — Nautilus, like the other Cephalopoda, exhibits a great concentration of the typical Molluscan ganglia, as shown in fig. 13. The ganglia take on a band-like form, and are

but little differentiated from their commissures and connectives — an archaic condition remind- ing us of Chiton. The special optic out- growth of the cerebral ganglion, the optical ganglion (fig. 13, 0), is characteristic. The cerebral ganglion-pair (a) lying above the oesophagus is connected with two sub- oesophageal ganglion-pairs, of band-like form. The anterior of these is the pedal b, b, and supplies the circumoral lobes and tentacles, and the funnel, a fact which proves the pedal origin of these organs. The hinder band is the visceral and pleural pair fused; from its pleural por- tion nerves pass to the mantle, from its visceral portion nerves to the branchiae and genital ganglion (fig. 13, d), and in immediate connexion with the latter is a nerve to the osphradium or olfactory papilla. A labial commissure arises by a double root from the cerebral ganglia and gives off a stomatogastric commissure, which passes under the pharynx immedi- ately behind the radula and bears a buccal ganglion on either side.

Special Sense-Organs. — Nautilus pos- sesses a pair of osphradial papillae (fig. 4, olf) corresponding in position and inner- vation to Spengel's organ placed at the base of the ctenidia (branchiae) in all classes of Mollusca. This organ has not been detected in other Cephalopoda. Nautilus possesses other olfactory organs largements on j n the region of the head. Just below the nerves passing from eve is a small triangular process (not seen the pedal ganglion j n our figures), having the structure of a to the inner series shortened and highly-modified tentacle of tentacles. and sheath. By A. Valenciennes, who is

Nerves to the ten- followed by W. Keferstein, this is regarded tacles of the outer as an olfactory organ. The large nerve or annular lobe. _ which runs to this organ originates from Pedal ganglion-pair, the point of juncture of the pedal with Cerebral ganglion- the optic ganglion. The lamelliform organ pair. _ upon the inner inferior tentacular lobe

Pleuro-visceralgang- f Nautilus is possibly also olfactory in lionic band (fused function. In Dibranchs behind the eye is pleural and visceral a pit or open canal supplied by a nerve ganglion-pairs). corresponding in origin to the olfactory

Genital ganglion nerve of Nautilus above mentioned. Pos- placed on the course s ibly the sense of taste resides in certain of the large visceral processes within the mouth of Nautilus nerve, just before an d other Cephalopoda, it gives off its bran- The otocysts

of Nautilus were discovered chialanditsosphra- by J. D. Macdonald. Each lies at the dial branches. side of the head, ventral to the eye, rest-

m, Nerves from the jng on the capito-pedal cartilage, and pleural ganglion to supported by the large auditory nerve the mantle-skirt. which apparently arises from the pedal ganglion but originates in the cerebral. It has the form of a small sac, I to 2 mm. in diameter, and contains whetstone-shaped crystals, such as are known to form the otoliths of other Mollusca.

The eye of Nautilus is among the most interesting structures of that remarkable animal. No other animal which has the same bulk and general elaboration of organization has so simple an eye as that of Nautilus. When looked at from the surface no metallic lustre, no transparent coverings, are presented by it. It is simply a slightly projecting hemispherical box like a kettle-drum, half an inch in diameter, its surface looking like that of the surrounding integument, whilst in the middle of the drum-membrane is a minute hole (fig. 3, u) . Sir R. Owen very naturally thought that some membrane had covered this hole in life, and had been ruptured in the specimen studied by him. It, however, appears from the researches of V. Hensen that the hole is a normal aperture leading into the globe of the eye, which is accordingly filled by sea- water during life. There is no dioptric apparatus in Nautilus, and in place of refracting lens and cornea we have actually here an arrangement for forming an image on the principle of " the pin-hole camera." There is no other eye known in the whole animal kingdom which is so constructed. The wall

Fig. 13. — Nervous system of Nautilus pom- pilius (from Gegenbaur, after Owen) . /,/, Ganglion-like en-

t',

d,

of the eye-globe is tough, and the cavity is lined solely by the naked retina, which is bathed by sea-water on one surface and receives the fibres of the optic nerve on the other (see fig. 14, A). As in other Cephalopods (e.g. fig. 33, Ri, Re, p), the retina consists of two layers of cells, separated by a layer of dark pigment. The most interesting consideration connected with this eye of Nautilus is found when the further facts are noted — (1)

that the elaborate lens-bearing eyes of Dibranchiata pass through a stage of development in which they have the same structure as the eye of Nautilus — namely, are open sacs (fig. 34) ; and (2) that amongst other Mollusca examples of cephalic eyes can be found which in the adult condition are, like the eye of Nautilus and the developing eye of Dibranchs, simple pits of the integument, the cells of which are surrounded by pigment and connected with the filaments of an optic nerve. Such is the structure of the eye of the limpet (Patella) , and in such a simple eye we obtain the clearest demonstration of the fact that the retina of the Molluscan cephalic eye, like that of the Arthropod cephalic eye and unlike that of the vertebrate myelohic eye, is essentially a modified area of the general epiderm, and that the sensitiveness of its cells to the action of light and their relation to nerve-filaments is only a specialization and intensifying of a property common to the whole epiderm of the surface of the body. What, however, strikes us as especially remark- able is that the simple form of a pit, which in Patella serves to accumulate a secretion which acts as a refractive body, should in Nautilus be glorified and raised to the dignity of an efficient optical apparatus. In all other Mollusca, starting as we may suppose from the follicular or pit-like condition, the eye has proceeded to acquire the form of a closed sac, the cavity of the closed vesicle being then

■WIP G.op Nop

Fig. 14. — Diagrams of Sections of the Eyes of Mollusca.

A, Nautilus (and Patella). I 1 , Outer portion of the lens.

B, Gastropod (Limax or Helix). Co.ep, Ciliary body.

C, Dibranchiate Cephalopod R, Retina. (Oigopsid). N.op, Optic nerve.

Pal, Eyelid (outermost fold). G.op, Optic ganglion.

Co, Cornea (second fold). x, Inner layer of the retina.

Ir, Iris (third fold). N.S., Nervous stratum of the

Int 1 , 2 , 3 , 1 , Different parts of the retina. (From Balfour, after

integument. Grenacher.) /, Deep portion of the lens.

filled partially or completely by a refractive body (lens) secreted by its walls (fig. 14, B). This is the condition attained in most Gastro- poda. It presents a striking contrast to the simple Arthropod eye, where, in consequence of the existence of a dense exterior cuticle, the eye does not form a vesicle, and the lens is always part of that cuticle. The development of Nautilus is still entirely unknown. Dr Arthur Willey, during his sojourn in the East Indies, made special efforts to obtain fertilized eggs, both by offering rewards to the native fishermen and collectors and by keeping the living adults in cap- tivity, but without success.

Phytogeny and Classification. — As Nautilus is the only living genus of the Tetrabranchiata, our knowledge of all the rest is based upon the study of their fossil shells. A vast number of species of shell similar in structure to that of Nautilus are known, chiefly from Primary and Secondary formations. These are divided into two sub-orders by differences in the form and structure of' the initial chamber. In the Nautiloidea this chamber has the form of an obtuse cone, on the apex of which is a slit-like mark or cicatrix, elongated dorso-ventrally and placed opposite to the blind end of the siphuncle, which indents the front wall of the initial chamber but does not enter its cavity. In the Ammonoidea, on the other hand, the initial chamber is inflated, and is spheroidal, oval or pyriform in shape, with no cicatrix, and separated from the first air-chamber by a constriction. The siphuncle also commences with a dilatation which deeply indents the front wall of the initial chamber, called the protoconch, but does not penetrate into its cavity. Munier- Chalmas has shown that the cavity of the protoconch is traversed by a tubular organ, the " prosiphon," which does not communicate with the true siphuncle, the place of which it is supposed to take in the early life of the animal. It is generally held, as suggested by

Alpheus Hyatt, that the initial chamber of the Nautiloidea corre- sponds not to the protoconch of the Ammonoids, but to the second chamber of the latter, and that there existed in the young Nautiloids a true initial chamber, a protoconch which was either uncalcified or deciduous. The shell of the living nautilus does not decide this question, as its early stages are unknown, and there is a little vacuity in the centre of the spirally coiled shell which may have been origin- ally occupied by the true protoconch.

The septa in the Nautiloidea are generally concave towards the aperture of the shell, their curvature therefore directed backwards (fig. 1); in the Ammonoidea, on the other hand, the convexity is usually towards the aperture, the curvature therefore directed forwards. The lines along which the edges of the septa are united to the shell are known as ” sutures,” and these in the Nautiloidea are simply curved or slightly lobed, whereas in the Ammonoidea they are folded in various degrees of complexity; the projections of the suture towards the mouth of the shell are called saddles, those in the opposite direction lobes. The siphuncle in the Nautilus pierces the centres of the septa, and in fossil Nautiloids it is usually central or sub-central. In a few cases it is marginal, and in that case may be external, i.e. ventral, or internal, i.e. dorsal. In Ammo- noids the siphuncle is always marginal, and usually external. Its walls in the living Nautilus are strengthened by the deposit of cal- careous granules, and in some fossil forms the wall is completely calcified. But this proper calcified wall is quite distinct from cal- careous tubes surrounding the siphuncle, which are developed from the septa. In the pearly nautilus each septum is prolonged back- wards at the point where it is pierced by the siphuncle, forming a shelly tube somewhat like the neck of a bottle. In many fossil forms these septal necks are continued from the septum from which they arise to the next, so that the siphuncle is enclosed in a complete secondary calcareous tube. In the majority of Nautiloids the septal necks are directed backwards, and they are said to be retrosiphonate. In the majority of the Ammonoids the septal necks are continued forwards from the septa to which they belong, and such forms are termed prosiphonate.

The Tetrabranchiata were most abundant in the Palaeozoic and Mesozoic periods. The Nautiloidea are the most ancient, appearing first in the Upper Cambrian, the genera being most numerous in the Palaeozoic period, and comparatively few surviving into the Second- ary. On the other hand, the Ammonoidea are scarce in Palaeozoic formations, being represented in deposits earlier than the Carboni- ferous only by comparatively simple types, such as Clymenia and Goniatites. I n the Secondary period Ammonoids were very abundant, both in genera and species and in individuals, and with few local exceptions none are known to have survived even to the commencement of the Tertiary. In the widest sense the genus Nautilus has existed since the Ordovician (Silurian) period, but the oldest types are not properly to be placed in the same genus

as the existing form. Even with this qualification the genus is very ancient, shells very similar to those of the living Nautilus being found in the Upper Cretaceous.

It has been maintained by some zoologists that the Ammonoidea were Dibranchiate, though it would not follow from this that the shell was, therefore, internal. They are, howeVer, generally classed with the Tetrabranchiata, and the absence of ail evidence of the possession of an ink-sac is in favour of this view. There can be little doubt that they gave rise to the Dibranchiata.

About 2500 fossil species are included in the Nautiloidea, but only a few species of the genus Nautilus survive. Some of the fossil forms are very large, the shell reaching a length of 2 metres, or 6 ft, 6 in. Of the Ammonoidea more than 5000 species have been described,' and some of the coiled forms are 70 cm., or nearly 2 ft. 6 in. in diameter.

Associated with various forms of Ammonoids there have been found peculiar horny or calcified plates, sometimes contained within the body-chamber of the shell, sometimes wholly detached. The most typical form of these structures has been named aptychus. It consists of two bilaterally symmetrical halves, of somewhat semi- circular shape, and attached to one another by their straight inner margins, like a pair of doors. In some cases the aptychus is thin and horny, but more often it is thick and calcified, in which case the principal layer has a peculiar cellular structure. The surface may be smooth or sculptured, and one side is usually marked by con- centric lines of growth. Another type is similar, except that the two halves are united in the middle line ; bodies of this character are called synaptychus ; they occur in the body-chamber of species of Scaphites. Another form called anaptychus consists of a thin horny undivided plate which is concentrically striated. This is associated with species of Ammonites and Goniatites.

Many theories have been proposed in explanation of these struc- tures. According to Sir Richard Owen, the aptychus is an oper- culum developed in a part of the body corresponding to the hood of Nautilus. E. Ray Lankester suggested that the double plate was borne on the surface of the nidamental gland, with the form and sculpturing of which in Nautilus it closely agrees. On this view the aptychus would occur only in females. The most recent view is that these structures could not have been opercula because of their constant position inside the body-chamber, and that they

were not external secretions at all, but a calcified internal cartilage situated at the base of the funnel.

Classification of Tetrabranchiata. — Cephalopoda in which the mantle is entirely enclosed by a multilocular siphunculated shell, which may or may not be coiled. Only the last compartment of the shell occupied by the body of the animal. Numerous pedal tentacles around the mouth, which are retractile within sheaths. Halves of the funnel not united. Two pairs of c*—nidia, and two pairs of renal tubes without reno-pericardial apertures. Pericardium opens directly to exterior. Cephalic cartilage wholly ventral. Optic vesicles with apertures, without crystalline lens.

Sub-order 1. Nautiloidea. — Initial chamber not inflated, with dorso-ventral cicatrix at extremity.

Fam. 1. Orthoceratidae. Shell straight or slightly curved, with a

simple aperture, large terminal chamber and cylindrical

siphuncle. Orthoceras, Silurian to Trias. Baltoceras, Silurian. Fam. 2. Actinoceratidae. Shell straight or slightly curved, with

wide siphuncle contracted at level of septa. Actinoceras,

Silurian to Carboniferous. Discosorus, Silurian. Huronia,

Silurian. Loxoceras, Silurian to Carboniferous. Fam. 3. Endoceratidae. Shell straight, with wide margina”

siphuncle, necks produced into tubes fitting into one another.

Endoceras, Silurian. Fam. 4. Gomphoceralidae. Shell globular, straight or arcuate,

aperture contracted. Gomphoceras, Silurian. Phragmoceras ,

Silurian. Fam. 5. Ascoceratidae. Shell straight, ampulliform, summit

truncate, terminal chamber extending nearly whole length ol

shell ventrally. Ascoceras, Silurian. Glossoceras, Silurian. Fam. 6. Poterioceratidae. Shell straight or curved, fusiform,

aperture simple, siphuncle contracted at septa. Poterioceras,

Silurian to Carboniferous. Streptoceras, Silurian. Fam. 7. Cyrtoceratidae. Shell slightly curved, aperture simple,

siphuncle wide, septa approximated. Cyrtoceras, Devonian. Fam. 8. Lituitidae. Shell coiled in one plane with the terminal

part uncoiled, aperture contracted. Lituites, Silurian. Ophidio-

ceras, Silurian. Fam. 9. Trochoceratidae. Shell helicoidally coiled, dextral or

sinistral, the last whorl generally uncoiled. Trochoceras,

Devonian. Adelphoceras, Devonian. Fam. 10. Nautilidae. Shell coiled in one plane, aperture wide

and simple, siphuncle central. Nautilus, recent. Trockolites,

Silurian. Gyroceras, Silurian to Carboniferous. Hercoceras,

Silurian. Ptenoceras, Devonian. Discites, Carboniferous. Fam. 11. Bactritidae. Shell straight, conical, siphuncle narrow

and marginal, necks long, infundibuliform, sutures undulating.

Bactrites, Silurian and Devonian.

Sub-order 2. A mmonitoidea.— Initial chamber spheroidal; siphuncle narrow and simple; septa convex towards aperture; sutures complex.

Tribe I. Retrosiphonata. — Siphuncular necks projecting behind the septa as in Nautiloidea. Sutures form simple undulations. Occur exclusively in Palaeozoic strata from Devonian upwards. Fam. 1. Goniatitidae. Shell nautiloid, with simple sutures and ventral siphuncle. Goniatites, Devonian and Carboniferous. Anarcestes, Devonian. Fam. 2. Clymeniidae. Shell nautiloid, with simple sutures, siphuncle dorsal, that is, internal. Clymenia, Upper Devonian. Tribe 2. Prosiphonata. — Siphuncular necks projecting in front of the septa. Sutures form deeply indented lobes and saddles. Fam. 1. Arcestidae. Globular and smooth or nearly smooth, with reduced umbilicus, terminal chamber very deep, an aptychus present. Popanoceras, Permian. Cyclolobus, Permian, Arcestes, Trias. Lobites, Trias. Fam. 2. Tropitidae. Shells globular, but having radiating and tuberculated costae. Thalassoceras, Permian. Tropites, Trias. Sibirites, Trias. Fam. 3.

Ceratitidae. Shells coiled, with a large umbilicus, ter- minal chamber short, sutures with simple saddles. Trachyceras, Upper Trias. Ceratites, Trias. Dinarites, Trias. Some genera with helicoidal shells are related to these coiled forms, viz. Cochloceras, Trias; also some straight forms, e.g. Rhab- doccras, Trias.

Fam. 4. Pinacoceratidae. Shell compressed, smooth, terminal chamber short, sutures very complicated, convex. Pinacoceras, Trias. Fam. 5. Phylloceratidae. Shell coiled, the whorls overlapping each other, sutures formed of numerous lobes and saddles. Phylloceras, Jurassic. Fam. 6. Lytoceratidae. Shell discoid, whorls loosely united or uncoiled, sutures deeply indented, but with only three saddles and lobes. Lytoceras, Jurassic and Cretaceous. Macroscaphites, Cretaceous. Hamites, Cretaceous. Ptychoceras, Cretaceous. Turrilites, Cretaceous. Baculites, Cretaceous. Fam. 7. Ammonitidae. Shell coiled, with narrow whorls which do not embrace one another, aperture simple, a horny anap- tychus present. Ammonites, Jurassic. Arietites, Jurassic. Aegoceras, Lias. Fam. 8. Harpoceratidae. Shell discord and flattened, with a carinated border, aperture provided with lateral projections,

a calcareous aptychus, formed of two pieces. Harpoceras, Jurassic. Oppelia, Jurassic. Lissoceras, Jurassic and Cre- taceous.

Fam. 9. Amaltheidae. Shell flattened, with a prominent carina continued anteriorly into a rostrum. Amaltheus, Lias. Cardio- ceras, Jurassic. Schloenbachia, Cretaceous.

Fam. 10. Stephanoceratidae. Shell not carinated, but with radiat- ing costae, which are often bifurcated, aperture often with lateral projections which contract it, aptychus formed of two pieces. Stephanoceras , Morphoceras, Perisphinctes, Peltoceras, Jurassic. Hoplites, Cretaceous. Acanthoceras , Cretaceous. Cosmoceras, Jurassic. Various more or less uncoiled forms are related to this family, viz. Scaphites, Crioceras, Cretaceous.

Order 2. Dibranchiata (= Holosiphona, Acetabulifera)

Characters. — Cephalopods in which the inflected margins of the epipodia are fused so as to form a complete tubular siphon (fig.

24, i). The circumoral lobes of the forefoot carry suckers

Fig. 15. — Sepia officinalis, L., about \ natural size, as seen when dead, the long prehensile arms being withdrawn from the pouches at the side of the head, in which they are carried during life when not actually in use. a. Neck; b, lateral fin of the mantle-sac; c, the eight shorter arms of the fore-foot ; d, the two long prehensile arms; e, the eyes.

disposed upon them in rows, not tentacles (see figs. 15, 24). There is a single pair of typical ctenidia (fig. 25) acting as gills (hence Dibranchiata), and a single pair of renal organs, opening by apertures right and left of the median anus (fig. 25, r) and by similar internal pores into the pericardial chamber, which consequently does not open directly to the surface as in Nautilus. The oviducts are sometimes paired right and left (Octopoda, Oigopsida), sometimes that of one side only is developed (Myopsida). The sperm-duct is always single except, according to W. Keferstein, in Eledone moschata.

A plate-like shell is developed in a closed sac formed by the mantle (figs. 20, 21), except in the Octopoda, which have none, and in Spirilla (fig. 17, D) and the extinct Belemnitidae, &c, which have a small chambered shell resembling that of Nautilus with or without the addition of plate-like and cylindrical accessory developments (fig. 17, A, C, fig. 19).

The pair of cephalic eyes are highly-developed vesicles with a

refractive lens (fig. 33), cornea and lid-folds, — the vesicle being in the embryo, an open sac like that of Nautilus (fig. 34). Osphradia are not present, but cephalic olfactory organs are recog-

Fig. 16. — Decapodous Cephalopods.

A, Cheiroteuthis Veranyi, d'Orb. (from the Mediterranean).

B, Thysanoteuthis rhombus, Troschel (from Messina).

C, Loligopsis cyclura, Fer. and d'Orb. (from the Atlantic Ocean).

nized. One or two pairs of large salivary glands with long ducts are present. An ink-sac formed as a diverticulum of the rectum and opening near the anus is present in all Dibranchiata (fig. 25, t), and has been detected even in the fossil Belem- nitidae. Branchial hearts are developed on the two branchial affer- ent

blood-vessels (fig. 28, vc' , m).

In the Dibranchiata the shell shows various stages of degeneration, culminating in its com- plete disappearance in Octopus. As in other Mollusca, there is a tend- ency in Cephalopods for the mantle to extend over the outside of the shell from its edges, and when these secondary mantle-folds entirely cover the shell and meet or fuse together the shell is surrounded by the mantle both externally and internally, and is said to be internal, though it remains always a cuticular structure ex- ternal to the epidermis, by a reduction of the

Fig. 17. — Internal Shells of Cephalopoda.

A, Conoteitthis dupiniana, d'Orb. (from

the Neocomian of France).

B, Shell Sepia orbigniana. Fer. (Medi-

terranean).

C, Shell of Spirulirostra Bellardii, d'Orb.

(from the Miocene of Turin). The specimen is cut so as to show in section the chambered shell and the laminated " guard " deposited upon its surface.

D, Shell of Spirula laevis, Gray (New

Zealand).

This process is generally accompanied size of the shell in comparison with that of the body, so that the relations of the two are gradu- ally reversed, the body outgrows its house and instead of the

After Chun, from Lankester's Treatise on Zoology.

Fig. 18. — Spirula.

A, Dorsal aspect.

B, Ventral aspect, a, Arms.

e, Eyes. fi. Fins. /«, Funnel.

pa, Mantle.

po, Posterior fossa.

sh, Shell.

te, Tentacular arms.

td,

mantle being enclosed by the shell, the shell is enclosed" by the mantle. The earliest stage of this process is shown in

the recent Spirula, though it is perhaps not impossible that in u some of the later fossil Ammonoids the shell was becoming more and more internal. The shell of Spirula (fig. 18) is coiled somewhat like that of Nautilus, but the coils are not in contact, the direction of the coil is endogastric or ventral instead of exogastric, and the shell is very much smaller than the body. Like that of Nautilus it is divided by septa and traversed by a siphuncle. The relation of the animal to the terminal chamber is as in Nau-, tilus, but the body Terminal * palTial extends far beyond disk. the aperture, and folds

of the mantle grow up over the shell and cover it everywhere except part of the dorsal and ventral surfaces.

The next modification in the en- closed shell is the addition to it of secondary deposits of calcareous matter, by the inner surface of the shell-sac. Successive layers are de- posited on the posterior part of the original shell, whether coiled or straight, and these layers form a conical mass, which may attain great thickness. A somewhat coiled shell with such a deposit is seen in Spirulirostra (fig. 17, C) of the Miocene. In the next stage of modification secondary secre- tion forms a long and broad projection of the dorsal lip of the aperture; this is well developed in the belemnites (fig. 19). Thus in these modi- fied shells three parts are to be distinguished: the original septate shell, which has been called the phragmacone; the posterior conical deposit, called the rostrum or guard; and the anterior somewhat flat projec- tion, called the proostracum. In the living Dibranchiata other than Spirula the phrag- macone and rostrum have be- come very

rudimentary. The Fig. 19. — Diagram of shell of Sepia (fig. 20) consists Belemnite (after Phillips). a i mos t entirely of the probs- itS-r “coˆd tracum, the little ventral cavity or ” alveolus,” in hollow posteriorly representing which the chambered the phragmacone, and the pos- ” phragmacone ” (p) is terior pom t e d projection, the guard, rostrum inthe Oigopsida the shell is represented by a pro- ostracum which is no longer calcified but forms a chitinous

(fig. 21) and Sepiolidae. Lastly, in the Octopoda the shell is represented only by small chitinous rudiments to which the retractor muscles of the head and funnel are attached; these are paired in Octopus, unpaired in other cases as in Cirrholeuthis.

Fig. 20.

Fig. 21.

Fig. 20. — The calcareous internal shell of Sepia officinalis, the so- called cuttle-bone, a, Lateral expansion; b, anterior cancellated region ; c, laminated region, the laminae enclosing air.

Fig. 21. — The horny internal shell or gladius or pen of Loligo.

The early appearance of the sac of the mantle in which the shell is enclosed has led to an erroneous identification of this sac with the primitive shell-sac or shell-gland of the Molluscan embryo. The first appearance of the shell- sac in Dibranchiata is shown in figs. 35, 36. Its forma- tion as an open upgrowth of the centro-dorsal area, and the fact that it appears and disappears without closing in Argonauta and Octopus, was demonstrated by E. Ray Lankester.

contained ; g, or ” rostrum.

Fig. 22. — The Argonaut in life. (After Lacaze-Duthiers.) Tr. Float; Br. a, anterior arms ; Br.p, posterior arms ; V, the expanded portion of them, once called the sails; B, the beak; C, the shell; En, the funnel.

In Argonauta (the paper nautilus) the female only possesses plume or gladius, and a similar rudiment occurs in Loliginidae | a shell, in which the body is contained; but this is not

/

homologous with the true shell in other cases; it is a structure sui generis secreted by the expanded arms of the dorsal pair which are closely applied to it on either side (fig. 22).

Head, Foot, Mantle and Mantle-cavity— If we now compare the fore-foot of the Dibranchiata with that of Nautilus, we find in the first place a more simple arrangement of its lobes, which are either four or five pairs of tapering processes (called ” arms “), arranged in a series around the buccal cone, and a sub- stitution of suckers for tentacles on the surface of these lobes (figs. 15 and 24). The most dorsally placed pair of arms, corresponding to the two sides of the hood of Nautilus, are in reality the most anterior, and are termed the first pair. In the Octopoda there are four pairs of these arms (fig. 38), in the Decapoda five pairs, of which the fourth is greatly elon- gated (figs. 15, 16). In Sepia, Sepiola and Rossia, each of these long arms is withdrawn into a pouch beside the head, and is only ejected for the purpose of prehension. In Loligo they are completely retractile, very slightly

dˆ

-J

Fig. 23. — Head and circum- oral processes of the fore-foot of Onychoteuthis (from Owen).

a, Neck. 6, Eye.

c, The eight short arms.

d, Long prehensile arms, the

clavate extremities _ of

which are provided with

suckers at e, and with a

double row of hooks be- yond at/. The temporary

conjunction of the arms

by means of the suckers

enables them to act in

combination.

so in the majority of the Oigopsida, and in Rhynchoteuthis they are united to form a beak-like appendage. A gradual reduction of the tentacular arms can be seen in the Decapoda, leading to their total absence in Octopoda ; thus in Leachia, Chaunoteutkis and others these arms are reduced to mere stumps. In some Cheiroteuthidae and Cranchiidae the ordinary or sessile arms, especially the dorsal pairs, are reduced. In the Octopoda they are not unfrequently connected by a web, and form an efficient swimming-bell, e.g. in Cirrhoteuthidae and Amphiiretidae. The suckers are placed on the adoral surface of the arms, and may be in one, two or four rows, and very numerous. In place of suckers in some genera, e.g. Veranya, we find on certain arms or parts of the

Fig. 24. — Male of Ocy- thoe catenulata, Steenstrup {Octopus carena, Ver.), showing the hectocotylized arm. (From Gegenbaur.) t l , P, t 3 , t*, The first, second, third and fourth arms or processes of the fore- foot. h, The third arm of the right side hectocoty- lized. x. The apical sac of the

hectocotylized arm. y, The filament which issues from the sac when development is complete. i, The siphon.

arms horny hooks; in other cases a hook rises from the centre of each sucker. The hooks on the long arms of Onychoteuthis are drawn in fig. 23. In various species of Cheiroteuthis the suckers on the tentacular arms are very feeble, but the bottom of the cup is covered by a number of anastomosed epithelial filaments which are used as a fishing-net. The fore-foot, with its apparatus of suckers and hooks, is in the Dibranchiata essentially a prehensile apparatus, though the whole series of arms in the Octopoda serve as swimming organs, and in many (e.g. the common octopus or poulp) the sucker- bearing surface is used as a crawling organ.

In the males of the Dibranchiata one of the arms is more or less

Fig. 25. — View of the postero-ventral surface of a male Sepia, obtained by cutting longitudinally the firm mantle-skirt and drawing the divided halves apart. This figure is strictly comparable with fig. 4. (From Gegenbaur.)

The head. J, The mid-foot or siphon, which has been cut open so as to display the valve i. R, The glandular tissue of the left nephridium or renal- sac, which has been cut open (see fig. 29). P, P, The lateral fins of the mantle-skirt. The single pair of branchiae

(ctenidia). The anus — immediately below it is the opening of the ink-bag. Cartilaginous socket in the siphon to receive c', the cartilaginous knob of the mantle-skirt — the two con-

Br

c,

apparatus " characteristic of Decapoda, not found in Octopoda.

g, The azygos genital papilla and aperture.

'i, Valve of the siphon (possibly the rudimentary hind-foot).

m. Muscular band connected with the fore-foot and mid-foot (siphon) and identical with the muscular mass k in fig. 3.

r, Renal papillae, carrying the apertures of the nephridia.

v.br, Branchial efferent blood- vessel.

v.br', Bulbous enlargements of the branchial blood-vessels (see figs. 28, 29).

t, Ink-bag.

stituting the " pallial hinge

modified in connexion with tHfe reproductive function, and is called the " hectocotylized arm." This name is derived from the condition assumed by the arm in those cases in which its modification is carried out to the greatest extent. These cases are those of the Octopods Argonauta argo and Ocythoe catenulata (fig. 24). In the males of these the third arm (on the left side in Argonauta, on the right side in Ocythoe) is found before the breeding season to be repre- sented by a globular sac of integument. This sac bursts, and from it issues an arm larger than its neighbours, having a small sac at its extremity in Ocythoe (fig. 24. x), from which subsequently a long filament issues. Before copulation the male charges this arm with the spermatophores or

packets of spermatozoa removed from its generative orifice beneath the mantle-skirt, and during coitus the arm becomes detached and is left adhering to the female by means of its suckers. A new arm is formed at the cicatrix before the next breeding season. The female, being much larger than the male, swims away with the detached arm lodged beneath her mantle-skirt. There, in a way which is not understood, the fertilization of the eggs

is effected. Specimens of the female Ocythoe with the detached arm adherent were examined by Cuvier, who mistook the arm for a para- sitic worm and gave to it the name Hectocotylus. Accordingly, the correspondingly modified arms of other Cephalopoda are said to be hectocotylized. J. J. S. Steenstrup has determined the hectocoty- lized condition of one or other of the arms in a number of male Dibranchs as follows: — in all, excepting Argonauta and Ocythoe and Tremoctopus, the modification of the arm is slight, consisting in a small enlargement of part or the whole of the arm, and the obliteration of some of its suckers ; in Octopus and Eledone the third right arm is hectocotylized ; in Rossia and Sepiola the fourth left arm is hectocotylized along its whole length, and the fourth right arm also in the middle only ; in Sepia the fourth left arm is modified at its base only ; in Sepioteulhis, the same at its apex ; in Loligo, the same also at its apex; in Loliolus, the same along its whole length; in Ommatostrephes , Onychoteuthis and Loligopsis no hectocotylized arm has hitherto been observed. Thus, speaking generally, it is one or both of the fourth pair of short arms which are modified in the Decapoda, of the third pair in the Octopoda. In the pallial cavity are situated one pair of gills in the Dibranchiata .(fig- 25), attached

apj > .

re mux visc.per. apert.

Fig. 26. — Diagram representing a vertical approximately median antero-posterior section of Sepia officinalis (from a drawing by A. G. Bourne). The lettering corresponds with that of fig. 10, with which this drawing is intended to be compared.

a, Shell (here enclosed by a 0, The fifth or lowermost lobe growth of the mantle). of the fore-foot. [foot.

b, The nuchal plate (here a p, ‘ The third lobe of the fore-

cartilage). 5, The buccal membrane.

c, (The reference line should be v, The upper beak or jaw.

continued through the black s, The lower beak or jaw.

area representing the shell /, The lingual ribbon.

to the outline below it), the x, The viscero-pericardialsac.

integument covering the vis- n.c, The nerve-collar.

ceral hump. cr, The crop.

d, The reflected portion of the gizz, The gizzard.

mantle-skirt forming the an, The anus, sac which encloses the c.t, The left ctenidium or gill- shell. _ plume.

e, The inferior margin of the vent, Ventricle of the heart.

mantle-skirt (mouth of the a.b.v, Afferent branchial vessel.

pallial chamber). e.b.v, Efferent branchial vessel.

/, The pallial chamber. re, Renal glandular mass.

g, The vertically cut median n.n.a, Left nephridial aperture.

portion of the siphon. visc.per. apert, Viscero-pericardial i, The valve of the siphon.* aperture (see fig. 29).

m, The two upper lobes of the br.b, Branchial heart.

fqre-foot. [the same, app, Appendage of the same.

n, The long prehensile arms of i.s, Ink-bag.

dorsally along the whole of their afferent borders. On each side of the branchia is a series of lamellae, least in number in the Octopoda. Each lamella is transversely folded, and the folds are in turn folded, so that the respiratory surface is increased. On the somatic wall of the pallial cavity, between and ventral to the

gills, are the follow- ing apertures : the anus and opening of the ink-sac, close together in the median line; a pair of apertures of the renal sacs, on either side of the median line; external to the renal orifice, on the left side, the genital aperture in Cirrhoteuthidae and Myopsida. In other Octopoda, and in nearly all the Oigopsida among the Decapoda, the genital ducts are paired in the female, but only the left is developed in the male. The funnel forms a complete tube in the Dibranchiata, and in the majority of the Decapoda, as in Nautilus, it is provided with an internal valve projecting from its somatic surface, which allows water to pass outwards but prevents it passing inwards. The mantle performs rhythmical respiratory movements of expansion and contraction, the water entering between funnel and mantle and passing out through the funnel. In Decapoda the edge of the mantle bears internally on each side a cartilaginous projection which fits into a corresponding depression on the external surface of the funnel; this is called the " resisting apparatus," and serves to make the union of mantle and funnel firmer during expiration. More powerful expiratory movements are used for sudden retrograde locomotion through the water

Luminous Organs. — In certain Oigopsida living in deep water, e.g. Histioteuthis, Calliteuthis, Histiopsis, Pterygioteuthis, the surface of the skin bears photogenous organs directed towards the oral extremity. Anatomically these consist of a deeper photogenous layer and a more superficial refracting layer. In some cases, e.g. Pterygioteuthis, they occur even within the mantle-cavity.

Fins. — In the majority of the Decapoda and in the Cirrhoteuthidae, the mantle is produced into lateral symmetrical expansions which have the function of fins. They originate at the aboral extremity where they remain in Spirula (fig. 18). In most other Oigopsida they are terminal, but more dorsal than ventral, e.g. Loligopsis (fig. 16), and there may be two on each side, as in Grimalditeuthis. In other cases they extend laterally along a greater length of the body, as in Sepia (fig. 15). In Ctenopteryx they have a superficial resemblance to the fins of fishes, consisting of a thin membrane supported by a series of muscular rods.

Chromatophores. — These are characteristic of the Dibranchiata, apparently absent in Nautilus. They are originally single cells of ectodermic origin which sink below the epidermis and become con- nected with radiating muscular fibres. The cells are single

but multinuclear. Different cells contain pigments of different colours, yellow, brown, red or blue. Each cell in life is in constant tremulous movement ; under the influence of nervous excitement the cells are suddenly expanded or contracted, producing blushes of colour and pallor. By reflex action of which the afferent stimulus acts upon the eyes as in fishes, the chromatophores assume a con- dition which approximates the colour of the animal to that of surrounding objects. In the Decapoda there are also reflecting elements which produce iridescent hues.

Aquiferous Cavities. — In addition to the pockets into which the tentacular arms of Decapoda are retracted, there are in several Dibranchiata cavities in the integument which open to the exterior by special pores but have no communication with the vas- cular system or other internal cavities of the body. In Ocythoe there are such pores on the back of the head and at the base of the funnel; buccal pouches on the ventral side of the mouth, internal to the arms, occur in some genera, one in Loligo, two in Sepia. In some species of Sepia there are pouches in the mantle.

Alimentary Tube. — The principal differ- ences from Nautilus are the following: —

the mandibles are similar in shape, but are – ■ , , r ,.

chitinous, not calcified. In the radula there ar y.„ c f n ˆ of J Loh ˆ ° are three teeth on each side of the median sagittate (from Gegen- tooth in each row, except in Gonatus, in ” 3aur); “} e buccal which there are only two lateral teeth, and mass is ■omitted, the Cirrhoteuthidae, in which the radula has oe, Oesophagus, entirely disappeared. In front of the radula v, The stomach is the so-called tongue, a fleshy projection opened longitudi-

corresponding to the sub-radular organ of nally.

other Mollusca. X, Probe passed

In most of the Dibranchiata there are two through the py-

pairs of salivary glands. In the Decapoda the ducts of the posterior pair unite into a c, median duct which opens on the surface of the sub-radular organ. The anterior pair e, Its spiral portion, is but slightly developed except in the i, Intestine.

Oigopsida. In the Octopoda there are also a, Ink-bag. two pairs, but the posterior pair, except b, Its opening into in Cirrhoteuthis where they are absent, the rectum,

are large and displaced backwards, being

situated near the oesophageal proventriculus. Connected with the intestine immediately beyond the pylorus is a thin-walled caecum, spherical in Rossia and Leachia, elongated in Loligo, but usually coiled into a spiral (fig. 17). The hepatic ducts open into the caecum. The liver is developed as a paired gland, more or less fused into one in the adult, but the ducts are always paired. The ducts are covered by a number of glandular follicles forming what is called the pancreas.

The ink-sac, absent in Nautilus, is a rectal caecum developed from its dorsal wall. It is present in all Dibranchiata except Octopus arcticus, 0, piscatorum and Cirrhoteuthis. It consists of a deeper part or gland proper and a reservoir. It extends to the posterior ex- tremity of the body in Sepia, but in Octopoda is usually embedded in the surface of the liver. The pigment of the secretion is melanin, and its function is to produce a dense opacity in the water, which conceals the animal.

Vascular System (fig. 28). — The ventricle lies in the pericardial cavity, except in Octopoda where this cavity is much reduced. The auricles, one pair, are contractile expansions of the efferent branchial vessels. The heart gives off an anterior or cephalic and a posterior or abdominal aorta. The vascular system is almost perfect, arteries and veins being united by capillaries. The principal vein is a vena

Fig. 27. — Aliment-

lorus. Commencement of the caecum.

cava passing backwards ventrally from the cephalic region and dividing into two afferent branchial veins, each of which receives a

Fig. 28.-

Circulatory and excretory organs of Sepia (from Gegen baur, after John Hunter).

br. Branchiae (ctenidia).

c, Ventricle of the heart.

a, Anterior artery (aorta).

a', Posterior artery.

v, The right and left auricles (enlargements of the efferent branchial veins).

v', Efferent branchial vein on the free face of the gill- plume.

v.c, Vena cava.

vi, vc', Afferent branchial vessels (branches of the vena cava, see fig. 20).

vc", Abdominal veins. [ages.

x, Branchial heartsandappend-

re, e, Glandular substance of the nephridia developed on the wail of the great veins on their way to the gills. The arrows indicate the direc- tion of the blood-current.

pallial and an abdominal vein. Each of these afferent branchial vessels is enclosed in the cavity of a renal organ and is covered ex- ternally by the glandular tissue which forms the excretory part of the " kidney " (fig. 29). Each afferent vessel is expanded into a

r.d.v.c

*' J

Fig. 29. — Diagram of the nephridial sacs, and the veins which run through them, in Sepia officinalis (after Vigelius). The nephridial sacs are supposed to have their upper walls removed. v.c, Vena cava, [of the same, np, r.d.v.c, r.s.v.c,

Vena cava, [of the same. Right descending branch Left descending branch of the same.

v.b.a, Vein from the ink-bag.

v.m, Mesenteric vein.

v.g, Genital vein.

v.a.d, Right abdominal vein.

v.a.s, Left abdominal vein.

v.p.d, Right pallial vein.

v.p.s, Left pallial vein.

c.b, Branchial heart.

*, Appendage of the same.

c.v, Capsule of the branchial heart.

a.r, w.k,

External aperture of the right nephridial sac.

Reno-pericardial orifice plac- ing the left renal sac or nephridium in ccmmuni- caton with the viscero- pericardial sac, the course of which below the nephri- dial sac is indicated by dotted lines.

The similar orifice of the right side.

Glandular renal outgrowths.

Viscero-pericardial sac (dotted outline).

contractile branchial heart, which is provided with a glandular appendage. The latter corresponds to the glandular masses which are attached to the afferent branchial veins in Nautilus, and to the pericardial glands of other Molluscs.

Coelom. — The coelom forms a large sac with a constriction between

Fig. 30. Fig. 31.

Figs. 30, 31. — Nerve-centres of Octopus. Figure 30 gives a view

from the dorsal aspect, figure 31 one from the ventral aspect. buc, The buccal mass. oes, Oesophagus.

/, Foramen in the nerve-mass formed by pedal, pleural and visceral ganglion-pairs, traversed by a blood-vessel.

ped, Pedal ganglion.

opt, Optic ganglion.

cer, Cerebral ganglion.

pl, Pleural ganglion.

vise, Visceral ganglion.

the anterior or pericardial division and the posterior or genital division, and it is produced into lateral diverticula which contain the branchial hearts; but in the Octopoda the pericardial division is suppressed and the genital division communicates by long ducts with sacs containing the appendages of the branchial hearts. The renal sacs com- municate with the pericardium by pores near the external renal apertures; in the Octo- poda the reno-pericardial open- ings are in the capsules of the branchial hearts. The genital ducts pass from the genital coelom to the exterior. They are paired in female Oigopsida and Octopqda except Ctrrho- teuthidae, but only the left persists in the males of all Dibranchiata, and in the female Myopsida.

In the oviduct is a glandular enlargement, and in addition to this the females are pro- vided with the so-called nida- mental glands which are de- veloped on the somatic wall of the pallial cavity, one on each side of the rectum, except in certain Oigopsida (Enoploleu- this, Cranchia, Leachia) and in the Octopoda, in which these organs are absent. The latter fact is related to the habit of the majority of the Octopoda of guarding or ” incubating ” their eggs, which have little protective covering. In the other cases the eggs are sur- Fig. 32. — Lateral view of the rounded by a tough gelatinous nervous centres and nerves of the elastic material secreted by the right side of Octopus vulgaris (from nidamental glands. a drawing by A. G. Bourne).

The vas deferens is at first bg, Buccal ganglion, narrow and convoluted, then cer, Cerebral ganglion, dilates into a vesicula semin- ped, Pedal ganglion, alis at the end of which is a pl, ~’ glandular diverticulum called

Pleural, and vise, visceral region of the pleuro-visceral ganglion, the prostate. By the vesicula gang, stell, The right stellate

ganglion

and the prostate the sperma-

tophores are formed. These

have a structure similar to n.visc,

those of Nautilus, and in the n.olf,

Octopoda may be as much as

50 mm. in length. Beyond the n.br,

prostate the duct opens into a

large terminal reservoir which has been called Needham's sac, and

in which the spermatophores are stored.

Nervous System and Sense-Organs. — The figures (30, 31, 32) repre- senting the nerve-centres of Octopus serve to exhibit the disposition

of the mantle connected by a

nerve to the pleural portion.

The right visceral nerve.

Its (probably) olfactory

branches.

Its branchial branches.

of these parts in the Dibranchiata. The ganglia are more distinctly swollen than in Nautilus. In Octopus an infra-buccal ganglion-pair are present, corresponding to the buccal ganglion-pair of Gastropoda. In Decapoda a supra-buccal ganglion-pair connected with these are also developed. Instead of the numerous radiating pallial nerves of Nautilus, we have in the

Dibranchiata on each side (right and left) a large pleural nerve passing from the pleural portion of the pleuro- visceral ganglion to the mantle, where it enlarges to form the stellate ganglion. From each stellate ganglion nerves radiate to supply the powerful muscles of the mantle-skirt. The two stellate ganglia are connected, except in Sepiola, by a transverse supra-oesophageal commissure, which represents the pallial cords united by a commissure above the intestine in Amphineura. The nerves from the visceral portion of the pleuro- visceral ganglion have the same course as in Nautilus, but no osphradial papilla is present. An enteric nervous system is richly developed in the Dibranchiata, connected with the somatic nervous centres through the buccal ganglia, as in the Arthro- poda through the stomato-gastric ganglia, and anastomozing with deep branches of the visceral nerves of the viscero-pleural ganglion- pair. It has been especially described by A. Hancock in Ommato- slrephes. Upon the stomach it forms a single large and readily detected gastric ganglion.

In the Dibranchiate division of the Cephalopoda the greatest elaboration of the dioptric apparatus of the eye is attained, so that ik x> ik

Fig. 33. — Horizontal section of the eye of Sepia (Myopsid). (From Gegenbaur, after Hensen.) KK, Cephalic cartilages (see fig. 8). 0, Optic nerve.

C, Cornea (closed). L, Lens. ci, Ciliary body.

Ri, Internal layer of the retina. Re, External layer of the retina. p, Pigment between these.

go, Optic ganglion.

k and k', Capsular cartilage.

ik, Cartilage of the iris.

w, White body.

ae, Argentine integument.

we have in this class the extremes of the two lines of development of the Molluscan eye, those two lines being the punctigerous and the lentigerous. The structure of the Dibranchiate's eye is shown in section in fig. 14, C, and in fig. 33, and its development in figs. 34 and 37. The open sac which forms

the retina of the young Dibranchiate closes up, and constitutes the posterior chamber of the eye, or primitive optic vesicle (fig. 37, A, poc) . The lens forms as a structure- less growth, secreted by both the internal and external surfaces of the front wall of the optic vesicle (fig. 37, B, I). The integument around the primitive optic vesicle which has sunk below the surface now rises up and forms firstly nearest the axis of the eye the iridian folds (if in B, fig. 37; ik in fig. 33; Ir in fig. 14), and then secondly an outer circular fold grows up like a wall and completely closes over the iridian folds and the axis of the primitive vesicle (fig. 33, C). This covering is transparent, and is the cornea. In the oceanic Decapoda the cornea does not completely close, but leaves a central aperture traversed by the optic axis. These forms are termed Oigopsidae by C. d'Orbigny, whilst the Decapoda with closed cornea are termed Myopsidae. In the Octopoda the cornea is closed, and there is yet another fold thrown over the eye. The skin surrounding the cornea presents a free circular margin, and can be drawn over the surface of the cornea by a sphincter muscle. It thus acts as an adjustable diaphragm, exactly similar in movement to the iris of Vertebrates. Sepia and allied Decapods have a horizontal lower eyelid, that is to say, only one-half of the sphincter-like fold of integument is movable. The statocysts are situated ventrally between the pedal and visceral ganglia, and are entirely enclosed

Fig. 34. — Diagrams of sections showing the early stage of development of the eye of Loligo when it is, like the permanent eye of Nautilus and of Patella, an open sac. (From Lankester.)

A, First appearance of the eye as a ring- like upgrowth.

B, Ingrowth of the ring-like wall so as to form a sac, the primitive optic vesicle of Loligo.

in the cranial cartilage. The cavity of each is continued into a small

blind process which is the remnant of the embryonic connexion of

the vesicle with the external surface. The sensory epithelium is at

the anterior end of

the vesicle forming a ˆb A

macula acustica, and in the cavity is a single otolith, partly calcareous and partly organic except in Eledone, in which it' is entirely organic. The nerve arises from the cerebral ganglion on each side and passes through the pedal ganglion.

There is no bran- chial osphradium in the Dibranchiata corresponding to that of Nautilus, but the olfactory organ or rhinophore near the eye is present. In Sepia and the majority of the Dibranchiata it is a simple pit, in some of the Oigopsida it is a projection which may be stalked.

Reproduction and Development. — The modification of one or a pair of the arms in the male for purposes of copulation has already been described. In many genera the sexes differ from one another in other characters also. As a rule the males are more slender or smaller than the females. The maximum degree of sexual dimor- phism occurs in Argonauta among the Octopods; in this genus the female may be fifteen times as large as the male, and the peculiar modification of the dorsal arms for the secretion of the shell occurs in the female only, no shell being formed in the male. In most cases the females are much more numerous than the males, but the opposite relation appears to exist in those Octopodia in which the hectocotylus is autotomous, for as many as four hectocotyli have been found in the pallial cavity of a single female. When the hecto- cotylus is not detached it is usually inserted into the pallial cavity of the female so as to

deposit the spermatophores in or near the aperture of the oviduct, but in Sepia and Loligo they are merely deposited on the ventral lobes of the buccal membrane.

The eggs are laid shortly after copulation. In the Octopoda and in Sepia, Sepiola and Rossia, each egg has a separate envelope continued into a long stalk by which it is attached with several others in a cluster. In Argonauta the eggs are carried by the female in the cavity of the shell. In Loligo the eggs are very numerous, and are enclosed in cylindrical transparent gelatinous strings united at one end into a cluster.

The Cephalopoda appear to be the only Invertebrates in which the egg is mesoblastic and telolecithal like that of Vertebrata. This is the result of the large quantity of the yolk, and the position the latter assumes in relation to the blastoderm. In all other Mollusca the segmentation is complete though in some cases very unequal. In the egg of Loligo, which has been chiefly studied (fig. 35), the protoplasmic pole is at the narrower end of the egg, and segmentation is restricted to this end, forming a layer of ectoderm cells. From one part of the periphery of the ectoderm proliferation of cells takes place and gives rise to a layer of scattered nuclei over the whole surface of the yolk. The region of proliferation marks the anal side of the ectoderm, and the layer of nuclei forms the perivitelline membrane' This process must be regarded as equivalent to the first stage of invagination, the yolk being surrounded by hypoblast cells or their nuclei. Later on the same anal edge of the ectoderm forms another cellular layer, the endoderm proper, which forms a continuous sheet below the ectoderm.

The mesoderm also originates at the anal side of the ectoderm and extends in two bands right and left between ectoderm and endoderm. After the mesoderm is thus established, a little vesicle lying upon and open to the yolk is formed from the endoderm, and this vesicle ultimately gives rise to the stomach, the two lobes of the liver and the intestine. The buccal mass and oesophagus arise from a stomo- daeal invagination, and the anus is formed later from a short procto- daeal invagination.

The external changes of form are as follows: — The mantle is the middle of the embryonic area, and in its centre is the shell-gland, which, however, behaves in a different way from that seen in other Molluscs. Its borders grow inwards and approach each other to form the shell-sac. E. Ray Lankester showed that in

Argonauta and other Octopods the shell-sac disappears before it is closed up, but in other forms except Spirula it closes completely and the shell develops within it. The lateral and posterior borders of the embryo form the foot, and these borders grow out into ten or eight lobes which become the arms, and which at first, as seen in fig. 35 (8), are entirely posterior to the mouth. Development actually shows the anterior arms gradually growing round the mouth and uniting in front of it.

3

Fig. 35. — Development of Loligo.

View of the cleavage of the egg during the first formation of embryonic cells. Lateral view of the egg at a little later stage, a, Limit to which the layer of cleav- age-cells has spread over the e gg'> b, portion of the egg (shaded) as yet uncovered by cleavage-cells; ap, the auto- plasts ; kp, cleavage-pole where first cells were formed. Later stage, the limit a now extended so as to leave but little of the egg-surface (6) unenclosed. The eyes (d), mouth (e) and mantle-sac (m) have appeared.

4. Later stage, anterior surface, the embryo is becoming nipped off from the yolk- sac (g).

5. View of an embryo similar to

(3) from the cleavage-pole or centro-dorsal area.

6. Later stage, posterior surface.

7. Section in a median dorso- ventral and antero-posterior plane of an embryo of the same age as (4) . View of the anterior face of an older embryo.

8

9. View of the posterior face of an embryo of the same age as (8).

Letters in (3) to (9) : — a, lateral fins of the mantle ; b, mantle-skirt; c, supra-ocular in- vagination to form the " white body "; d, the eye; e, the mouth; f 1 ,*, », 4 , 5 , the five paired processes of

the fore-foot ; g, rhythmically contractile area of the yolk- sac, which is itself a hernia- like protrusion of the median portion of the fore-foot; h, dotted line showing inter- nal area occupied by yolk (food-material of the egg); k, first rudiment of the epi- podia (paired ridges which unite to form the siphon or funnel) ; /, sac of the radula or lingual ribbon; m, stomach ; n, rudiments of the gills (paired ctenidia) ; 0, the otocysts — a pair of invaginations of the surface of the epipodia; p, the optic ganglion; q, the distal por- tion of the ridges which form the siphon, k being the basal portion of the same struct- ure; r, the vesicle-like

rudiment of the intestine formed independently of the parts connected with the mouth, s, k, m, and without invagination; s, rudiment of the salivary glands; t in (7), the shell-sac at an earlier stage open (see fig. 36), now closed up; u, the open shell-sac formed by an uprising ring-like growth of the centro-

dorsal area; w in (5), the mantle-skirt commencing to be raised up around the area of the shell-sac. In (7) mes points to the middle cell- layer of the embryo, ep to the outer layer, and h to the deep layer of fusiform cells which separates everywhere the embryo from the yolk or food-material lying within it.

Between the mantle and the foot are two ridges which form the funnel, and their position shows them to be the epipodia. The otocysts and eyes are formed as invaginations of ectoderm, the former behind the eyes, at the sides of the funnel. All the nerve-centres, cerebral, visceral, pedal and optic, are formed as prolifera- tions of the ectoderm. At the sides of the optic ganglia a pair of ectodermic invaginations are formed, which in the adult become the white bodies of the eyes, surrounding the optic ganglion. These are vestiges of lateral cerebral lobes which degenerate in the course of development.

The coelomic cavity appears as a symmetrical pair of spaces in the mesoderm, right and left of the intestine, and from it grow out the genital ducts and the renal organs. The gonad develops from the wall of the coelom.

Phytogeny and Classification. — The order is divided into two sub- orders, Decapoda and Octopoda, by the presence or absence of the tentacular arms. The Decapoda are more adapted for swimming than the Octopoda, the body being usually provided with fins. In the former also there is generally an internal shell of considerable size, often calcified, while in the Octopoda only the

merest vestiges of a shell remain. There can be no doubt that the Octopoda were derived from the Decapoda, although from the absence of skeletal structures fossil re- mains of Octopods gpin m' are almost entirely ' ■' " unknown. Palae octopus, however, occurs in the Cre- taceous, while shells of Argonauta do not appear before the Pliocene. The De- capoda are abund- antly represented in the Secondary for- mations by the Fig. 36. — Section through aboral end of Belemnitidae, whose embryo of Loligo showing shell-sac still open, shell (fig. 19) con- ep, ectoderm; m, mesoderm; m', endoderm; sists of a straight shs, shell-sac; y, yolk, conical phragma-

cone covered posteriorly by a very thick rostrum, and produced anteriorly into a thin long proostracum which is only occasionally preserved. In certain cases remains of the arms provided with hooks, and of the ink-sac, have been recognized. The Belemnitidae appear first in the Upper Trias, attain their maximum development in the Jurassic rocks, and are not continued into the Tertiary period, though represented in the Eocene by a few allied forms.

There is no difficulty in deriving the typical existing Decapoda from Belemnitidae, and many of the extinct forms may have been directly ancestral. Chitinous " pens " like that of Loligo, however, begin to appear in the Jurassic and Cretaceous rocks, so that in this case as in many others the parent form and the modified form existed contemporaneously, and the latter alone has survived. The oldest shells of the Sepia type are from the Eocene, and it is perhaps possible that the Sepiidae arose separately from the Belem- nites.

It is a curious fact that no fossil specimens of the genus Spirula have been found, but this may be due to the fact that it occurs only in deep water. At any rate there is no evidence that the shell of Spirula has lost a rostrum and a proostracum ; its characters must be regarded as primitive, not secondary. In the characters of the protoconch and of the commencement of the siphuncle, the shell of Spirula agrees with that of the Ammonoids, and in both its position is ventral, although in most Ammonoids the shell being exogastric the ventral side is the convex or external, while in Spirula the shell is endogastric and the siphuncle internal. The fact that the shell is not completely enclosed by the mantle is also a primitive character.

With regard to the general morphology of the Cephalopoda, it is

difficult to reconcile the existence of two pairs of renal tubes as well as a pair of genital ducts in Nautilus with the view that the original Mollusc was unsegmented and had only one pair of coelomoducts. Considering the great specialization, however, and high degree of organization of the Cephalopods, it is evident that the earliest Nautiloid whose remains are known to us must have had a long evolutionary history behind it, and such metamerism as exists may have been developed in the course of its own history. In the other direction the evidence seems to prove that the Dibranchiata with only two renal ducts have been derived from the Tetrabranchiata.

CEPHALOPODA

701

Suborder i. Decapoda. — Four pairs of ordinary non-retractile arms which are shorter than the body, and one pair of tentacular arms, situated between the third and fourth normal arms on each side and retractile within special pouches. Suckers pedunculated and provided with horny rings, on the tentacular arms confined usually to the distal extremities. Usually a well-developed internal shell, and lateral fins on the edges of the body. Heart in a coelomic cavity ; nidamentary glands usually present.

Tribe 1. Oigopsida. — A wide aperture in the cornea. Two oviducts in the female. In fossil genera and Spirula, shell has a multi- lobular phragmacone with a siphuncle; initial chamber globular and larger than the second chamber. The most ancient forms char- acterized by the small size of the rostrum and proostracum, and large

Fig. 37. — Right and left sections through embryos of Loligo. (After Lankester.)

A, B,

al,

is,

ep,

mes,

ym,

ng, ot, •wb,

Same stage as fig. 35 (4).

Same stage as fig. 35 (8) ;

only the left side of the mtf, sections is drawn, and the g, food-material which occu- ps, pies the space internal to the membrane ym is dg, omitted. poc.

Rectum.

Ink-sac. I,

Outer cell-layer. r,

Middle cell-layer. soc,

Deep cell-layer of fusiform cells (yolk- membrane). if,

Optic nerve-ganglion. C,

Otocyst.

The ” white body ” of the adult ocular capsule form-

ing as an invagination of

the outer cell-layer. Mantle-skirt. Gill. Pen-sac or shell-sac, now

closed. Dorsal groove. Primitive optic vesicle, now

closed (see fig. 34). Lens. Retina. Second or anterior optic

chamber still open. Iridean folds. The primitive invagination

to form one of the otocysts,

as seen in fig. 35 (5) and

(6).

6ize of the phragmacone. In the living genera, except Spirula, the shell is a chitinous gladius.

Fam. 1. Belemnoteuthidae. Extinct; shell with well-developed phragmacone, and rostrum merely a calcareous envelope; siphuncular necks directed backwards as in Nautiloidea; ten

equal arms provided with hooks. Phragmoteuthis, Trias. Belemnoteuthis, Jurassic and Cretaceous. Acanthoteuthis , Jurassic.

Fam. 2. Aulacoceratidae, Extinct; phragmacone with widely separated septa; rostrum well developed and clavifprm. Aulacoceras, Trias. Atractites, Trias and Jurassic. %ipho- teuthis, Lias.

Fam. 3. Belemnitidae. Extinct; phragmacone short with ventral siphuncle, prolonged dorsally into long proostracum; rostrum large and cylindrical. Belemnites, 350 species from Jurassic and Cretaceous. Diploconus, Upper Jurassic.

Fam. 4. Belopteridae. Extinct; rostrum and phragmacone well developed, phragmacone often curved; initial chamber small. Beloptera, Eocene. Bayanoteuthis, Eocene. Spirulirostra, Miocene.

Fam. 5. Spirulidae. Dorsal and ventral sides of posterior extremity of shell uncovered by mantle; no rostrum or proostracum; shell calcareous, coiled endogastrically and sipnunculated; fins posterior. Spirula, three living species known, abyssal.

Fam. 6. Ommatostrephidae. Shell internal and chitinous, ending aborally in a little narrow cone; tentacular arms short and thick; suckers with denticulate rings. Ommatostrephes, fins aboral, simple and rhomboidal, British. Ctenopteryx, fins pectinate, as long as the body; Bathyteuthis, fins terminal, rudimentary; tentacular arms, filiform; abyssal. Rhyncho- teuthis, tentacular arms united to form a beak-shaped appendage. Symplectoteuthis. Tracheloteuthis. Doridicus. Architeuthis ; this is the largest of Cephalopoda, reaching 60 ft. in length including arms.

Fam. 7. Thysanoteuthidae. Arms enlarged, bearing two rows of suckers and filaments; fins triangular, extending whble length of body. Thysanoteuthis, Mediterranean.

Fam. 8. Onychoteuthidae. Fins terminal; tentacular arms long; suckers with hooks. Onychoteuthis , hook-bearing suckers on tentacular arms only. Enoploteuthis, hook-bearing suckers on all the arms. Veranya, body very short, tentacular arms atrophied in the adult, Mediterranean. Chaunoteuthis, body elongated, tentacular arms atrophied. Pterygioteuthis. Ancis- troteuthis. Abralia. Teleoteuthis. Lepidoteuthis.

Fam. 9. Gonatidae. Body elongated; .fins terminal; radula with only two lateral teeth. Gonaius.

Fam. 10. Cheiroteuthidae. Tentacular arms long, not retractile; resisting apparatus well developed. Cheiroteuthis , suckers along the whole length of the tentacular arms. Doratopsis, body very long and slender with aboral spine, dorsal arms very short. Histioteuthis, six dorsal arms united by membrane, photogenous organs present. Histiopsis, membrane of dorsal

Fig. 38. — Octopodous Cephalopods.

A, Pinnoctopus cordiformis, Quoy and Gain (from New Zealand).

B, Tremoctopus violaceus, Ver. (from the Mediterranean).

C, Cranchia scabra, Owen (from the Atlantic Ocean; one of the Decapoda).

D, Cirrhoteuthis Mulleri, Esch. (from the Greenland coast), arms only half-way up the arms, photogenous organs present. Calliteuthis, no brachial membrane, photogenous organs present. Grimalditeuthis , two fins on each side, no tentacular arms.

Fam. 11. Cranchiidae. Eight normal arms, very short; eyes prominent; fins small and terminal. Cranchia, body short,

Eurse-shaped, normal arms short, fins entirely aboral. Loligopsis, ody elongated, conical, tentacular arms slender. Leachia, tentacular arms absent, funnel without a valve. Taonius, body elongated, normal arms, rather short, eyes pedunculated. Tribe 2. Myopsida. — No aperture in the cornea. Left oviduct only developed in female. Internal shell without a distinct phragmacone, calcified or simply chitinous. Fam. 1. Sepiidae. Body wide and flat; fins narrow, extending the whole length of the body; shell calcareous and laminated. Belosepia, a rudiment of rostrum and phragmacone present in shell, Eocene. Sepia, shell with a rostrum, British. Sepiella, shell without a rostrum.

Fam. 2. Sepiolidae. Body short, rounded at the aboral end ; fins rounded, inserted in middle of body-length; shell chitinous, small or absent. Sepiola, head united to mantle dorsally, British.

Rossia, head not united to mantle, British. Stoloteuthis and Inioteuihis, without shell. Heteroteuthis. Euprymna.

Fam. 3. Idiosepiidae. Body elongated, with rudimentary terminal fins; internal shell almost lost. Jdiosepius, 1-5 cm. long, Indian Ocean.

Fam. 4. Sepiadariidae. Body short; mantle united to head dorsally; no shell. Sepiadarium, Pacific Ocean. Sepioloidea, Australian.

Fam. 5. Loliginidae. Body elongated and conical ; fins extending forward beyond the middle of body-length; shell chitinous, well developed. Loligo, fins triangular, aboral, British. Sepio- teuthis, fins rounded, extending along whole of body-length. Loliolus. Loliguncula. The following fossil genera, known only by their gladius and ink-sac, have been placed near Loligo:— Teuthopsis, Beloteuthis and Geoteuthis, Lias; Phylloteuthis, Cretaceous; Plesioteuthis, Jurassic and Cretaceous.

Suborder 2. Octopoda. — Only four pairs of arms, all similar and longer than the body. Body short and rounded aborally.

1

mil i

1

B&%

n

“mm

1

Wmm

FlG. 39. — Palaeoctopus Newboldi, the oldest Octopod known. From the Cretaceous rocks of Lebanon. (After H. Woodward.)

Suckers sessile. Hearc not contained in coelom. No nidamentary glands.

Tribe I. Leioglossa. — No radula. Arms united by a complete membrane. Fins on sides of body.

Fam. Cirrhoteuthidae. Tentacular filaments on either side of the suckers. Cirrhoteuthis , pallial sac prominent, fins large, pelagic. Opisthoteuthis, body flattened, with small fins, deep- sea. Vampyroteuthis, four fins. Palaeoctopus, fossil, Cretaceous. Tribe 2. Trachyglossa. — Radula present. No fins. Fam. 1. Amphitretidae. Arms united by membrane; funnel attached to mantle, dividing the pallial aperture into two. Amphitretus, pelagic.

Fam. 2. Alloposidae. All arms united by membrane; mantle

joined to head by dorsal band and two lateral commissures.

Alloposus, pelagic. Fam. 3. Octopodidae. Arms long and equal, without membrane;

hectocotylus not autotomous. No cephalic aquiferous pores.

Octopus, two rows of suckers on each arm, British. Eledone,

single row of suckers on each arm. Scaeurgus. Pinnoctopus.

Cistopus. Japetetta. Fam. 4. Philonexidae. Hectocotylus autotomous; arms unequal

in size; aquiferous pores on head and funnel. Tremoctopus,

two dorsal pairs of arms united by membrane. Ocythoi, without

interbrachial membrane. Fam. 5. Argonautidae. Hectocotylus autotomous; no inter- * brachial membrane; extremities of dorsal arms in female

expanded and secreting a shell; males very small, without

shell. Argonauta. Literature. — Use has been freely made above of the article by E. Ray Lankester, on Mollusca, in the 9th edition of this Encyclo- pedia. For the chief modern works, see Bashford Dean, ” Notes on Living Nautilus,” Amer. Nat. xxxv., 1901 ; Arthur Willey, ” Contribution to the Natural History of the Pearly Nautilus,” A. Willey’s Zoological Results, pt. vi. (1902) ; Foord, Cat. Fossil Cephalopoda in British Museum; Alpheus Hyatt, ” Fossil Cephalo- pods of the Museum of Comp. Zoology,” Bull. Mus. Corrip. Zool. (Cambridge, U.S., 1868); Jalta, ” I Cefalopodi viventi nel golfo di Napoli,” Fauna und Flora des Golfes von Neapel, xxiii. (1896); Joubin, ” Cephalopodes de l’atlantique

nord," " Ceph. delaPrincesse Alice," Camp, sci, Albert I" de Monaco, ix. (1895), xxii. (1900); Paul Pelseneer, " Mollusca," in the Treatise on Zoology, edited by E. Ray Lankester. (J. T. C.)

CEPHEUS, in Greek mythology, the father of Andromeda (q.v.) ; in astronomy, a constellation of the northern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.). Ptolemy catalogued 13 stars in this constellation, Tycho 11, and Hevelius 51. The most interesting star in it is 5 Cephei, a remarkable double star, the brighter component of which is a short period variable (5-37 days), with a-, range in magnitude of 3-7 to 4-9; it is also a spectroscopic binary.

CEPHISODOTUS, the name of the father and of the son of Praxiteles, both sculptors like himself. The former must have flourished about 400 B.C. A noted work of his was Peace bearing the infant Wealth, of which a copy exists at Munich. Peace is a Madonna-like figure of a somewhat conservative type; the child Wealth is less successful. Cephisodotus also made, like his son, a figure of Hermes carrying the child Dionysus, unless indeed ancient critics have made two works of one. He made certain statues for the city of Megalopolis, founded in 370 B.C. Of the work of the younger Cephisodotus, his grandson, we have no remains; he was a prolific sculptor of the latter part of the 4th century B.C., especially noted for portraits, of Menander, of the orator Lycurgus, and others (see J. Overbeck, Antike Schrift-quellen, p. 255).

CERAM (Sirang), an island of the Dutch East Indies, in the Molucca group, lying about 3° S., and between 127 45′ and 131 E. Its length is a little over 200 m., its greatest breadth about 50 m., and its area, including neighbouring islets, 6621 sq. m. It consists of two parts, Great Ceram and Little Ceram or Huvamohel, united by the isthmus of Taruno; and, for ad- ministrative purposes, is assigned to the residency of Amboyna, being divided into Kairatu or West Ceram, Wahai and Amahai, the northern and the southern parts of Middle Ceram, and Waru or Eastern Ceram. No central chain of mountains stretches west and east through the island, but near the north coast hills, rising 2300 to 2600 ft., slope steeply to the shore. Near the south coast, west of the Bay of Elpaputeh, a complex mass of mountains forms, a colossal pyramid, with peaks rising to nearly 5000 ft. The isthmus connecting the two parts of the island is very narrow, and has a height of only 460 to 490 ft. The chief rivers flow north and south into bays, but are navigable only for a few miles during the rainy

season. The rainfall is very heavy, amounting to 121 in. (mean annual) on the south coast. On the north coast the bays of Savai and Waru are accessible for small vessels. The geological structure, consisting chiefly of eruptive rocks and crystalline limestone, is similar to that of northern Amboyna. In the eastern section the prevailing rock is crystal- line chalk, similar to that of Buru. Several hot springs occur, and earthquakes are not infrequent. About 4000 persons

perished in the earthquake of 1899. A large part of the interior is covered with dense forests, and except along the coast the population is scanty. For the naturalist Ceram is without much interest, lacking characteristic species or abundance of specimens. The Bandanese pay occasional visits to shoot bears and deer; there are numbers of wild goats and cattle; and among birds are mentioned cassowaries, cockatoos, birds of paradise, and the swallows that furnish edible nests. A large number of fish are to be found in the various rivers; and as early as i860 no fewer than 213 species were described. The most valuable timber tree is the iron-wood. Rice, maize, cocoa-nuts, sugar-cane and a variety of fruits are grown; and some tobacco is exported to Europe; but by far the most important production is the sago palm, which grows abundantly in the swampy districts, especially of Eastern Ceram, and furnishes a vast supply of food, not only to Ceram itself, but to other islands to the east. The Dutch have established cocoa and coffee plantations at various points. The coast-villages are inhabited by a mixed Malay population, Buginese, Macassars, Balinese and other races of the archipelago. The interior is occupied by the aborigines, a people of Papuan stock. They are savages and head-hunters. The introduction of Christianity was hampered by the baneful influence of a secret society called the Kakian Union, to which pagans, Mahommedans and Christians indiscriminately attached themselves; and it has several times cost the Dutch authori- ties considerable efforts to frustrate their machinations (see Tijdschrift van Ned. Ltd., fifth year). The total population is estimated at 100,000, including 12,000 Christians and 16,000 Mahommedans. The chief settlements are Savai at the north and Elpaputeh at the south end of the isthmus of Taruno. There was a Dutch fort at Kambello, on the west side of Little Ceram, as early as 1646.

CERAMICS, or KERAMics(Gr.KepOiUos, earthenware), a general term for the study of the art of pottery. It is adopted for this purpose both in French (ciramique) and in German (Keramik) , and thus has its convenience in English as representing an international form of description for a study which owes much to the art experts of all nations, though ” ceramic ” and ” ceramics ” do not appear in English as technical terms till the middle of the 19th century.

The word ” pottery ” (Fr. poterie) in its widest sense includes all objects fashioned from clay and then hardened by fire, though there is a growing tendency to restrict the word to the commoner articles of this great class and to apply the word “porcelain” to all the finer varieties. This tendency is to be deprecated, as it is founded on a misconception; the word ” porcelain ” should only be applied to certain well-marked varieties of pottery. The very existence of pottery is dependent on two important natural properties of that great and widespread group of rocky or earthy substances known as clays, viz. the property of plasticity (the power of being readily kneaded or moulded while moist), and the property of being converted when fired into one of the most indestructible of ordinary things.

The clays form such an important group of mineral substances that the reader must refer to the article Clay for an account of their occurrence, composition and properties. In this article we shall only deal with the various clays as they have affected the problems of the potter throughout the ages. The clays found on or close to the earth’s surface are so varied in composition and properties that we may see in them one of the vital factors that has determined the nature of the pottery of different countries and different peoples. They vary in plasticity, and in the hardness, colour and texture of the fired product, through an astonish- ingly wide range. To-day the fine, plastic, white-burning clays of the south of England are carried all over Europe and America for the fabrication of modern wares, but that is a state of affairs which has only been attained in recent times. Even down to the 18th century, the potters of every country could only use on an extensive scale the clays of their own immediate district, and the influence of this controlling factor on the pottery of bygone centuries has never yet received the attention it deserves. 1 1 The archaeologist is frequently puzzled as to the place of origin.

General Evolution of Pottery. — The primitive races of mankind,

whether of remote ages or of to-day, took perforce such clay as they found on the surface of the ground, or by some river-bed, and with the rudimentary preparation of spreading it out on a stone slab if necessary and picking out any rocky fragments of appreci- able size, then beating it with the hands, with stones or boards, or treading it with the feet to render it fairly uniform in consistency, proceeded to fashion it into such shapes as need or fancy dictated. Fired in an open fire, or in the most rudimentary form of potter's kiln, such pottery may be buff, drab, brown or red — and these from imperfect firing become smoked, grey or black. How many generations of men, of any race, handed on their painfully acquired bits of knowledge before this earliest stage was passed, we can never know; but here and there, where the circumstances were favourable or the race was quick of observation, we can trace in the work of prehistoric man in many countries a gradually advancing skill based on increased technical knowledge. For ages tools and methods remained of the simplest — the fingers for shaping or building up vessels, a piece of mat or basket- work for giving initial support to a more ambitious vase, — until some original genius of the tribe finds that by starting to build up his pot on the flattened side of a boulder he can turn his support so as to bring every part in succession under his hand, and lo! the potter's wheel is invented — not brought down from heaven by one of the gods to a favoured race, as the myths of all the older civilizations or barbarisms, Egyptian, Chaldean, Greek, Scythian, and Chinese have fabled, but born from the brain and hand of man struggling to fulfil his allotted task.

Formerly every writer on the history of pottery seemed to imagine that the very rudest pottery must have been the inven- tion of Egyptian, Chinese or some other distinct race from which the knowledge radiated to all the other races of the prehistoric world. No conception could be more erroneous. Since the middle of the 19th century research has established beyond doubt that wherever clay was found men became potters of a sort, just as they became hunters, carpenters, smiths, &c, by sheer force of need and slowly-gathered tradition. The not yet exploded view that Egypt or Assyria was the special cradle of this art, and that the pottery of the Greeks and Romans directly descended from such a parent stock, cannot survive in view of the incontestable evidence that pottery was made by the prehistoric peoples of what we now call Greece, Italy, Spain and other countries, long before they were aware that any other peoples lived on the earth

than themselves.

For centuries this simple hand-made pottery was hardened by drying in the sun, so that it would serve for the storage of dried grain, &c, but the increasing use of fire would soon bring out the amazing fact that a baked clay vessel became as hard as stone. Then, too, came the knowledge that even in one district all the clays did not fire to the same colour, and colour decoration arose, in a rude daubing or smearing of some clay or earth (a ruddle or bole perhaps) , which was found to give a bright red or buff colour on vessels shaped in a duller-coloured clay — most precious of all were little deposits of white clay which kept their purity unsullied through the fire, — and by these primitive means the races of the dawn made their wares. On this substructure all the pottery of the last four thousand years has been built, for behind all Egyptian, Greek or Chinese pottery we find the same primitive foundations.

We now reach the beginnings of recorded history, and as the great nations of the past emerge from the shadows they each develop the potter's art in an individual way. The Egyptians evolve schemes of glowing colour — brilliant glazes fired on objects, shaped in sand held together with a little clay, or actually carved from rocks or stones; the Greeks produce their marvels

of some example of ancient pottery — was it made in the district where it was found, or had it been imported from some other centre? When we possess a sufficient body of analytical data obtained by the use of one general chemical method, an analysis of a fragment will frequently enable such a question to be answered, where now all is doubt and speculation, feut the analytical results published hitherto are often not worth the paper they are printed on for such a purpose, the older methods of silicate analysis being only approximate.

of plastic form, and then, excited by their growing skill in metal work, turn the plastic clay into imitations of metal forms. These nations are overthrown, and the Romans spread some knowledge

— only a tincture, it must be confessed— over all the lands they hold in fee; and from the Euphrates to the Atlantic, from Egypt to the Wall of Hadrian, they set alight potters' fires that have never since been extinguished. The Roman empire falls, and over Europe its pottery is forgotten along with its greater achievements; yet still pottery-making goes on in a very simple way, to be slowly revived and modified once more by the communities of monks, who, in later centuries, replace the Roman legions as the great civilizing influence in Europe. Meantime Egypt and the nearer East continued, in a debased form, the splendours of their glorious past, and glazed and painted pottery was still made by traditional methods. What part the Byzantine civilization and the Persians played during this obscure time, we are only just beginning to realize; but we now know that many interesting kinds of decorated pottery were made at Old Cairo, at Alexandria, at Damascus, in Syria, Anatolia and elsewhere (on which the later Moslem potters founded their glorious works), at a time when all over Europe crocks of simple red or drab clay, covered only with green and yellow lead-glazes, were the sole evidence of the potter's skill. What the Arab conquests destroyed, and what their breath quickened into life, we can only guess; but the fact is indisputable that with the Mahommedan con- quests there came a time when the potter's art of the Occident reached its highest expression, and when methods and knowledge hitherto confined to Egypt, Syria and Persia were spread from Spain and the south of France to India — even, it may be, into China.

Meantime, in the farther East, the Chinese — the greatest race of potters the world has ever seen — were quietly gathering strength, until from their glazed, hard-fired pottery there emerged the marvellous, white translucent porcelain, one of the wonders of the medieval world.

With the dawn of the 15th century of our era, the state of affairs was practically this:— In European countries proper we find rudely fashioned and decorated wares in which we can trace the slow development of a native craft from the superposition of Roman methods on the primitive work of the peoples. The vessels were mostly intended for use and not for show; were clumsily fashioned of any local clay, and if glazed at all then only with coarse lead-glazes, coloured yellow or green; in no case above the level of workmanship of the travelling brick- or tile- maker. The finest expression of this native style is to be found in the Gothic tile pavements of France, Germany and England, where all

the colours are due to the clays and there is no approach to painting. In the Moslem countries — including the greater part of Spain and Sicily, Egypt and the nearer East, probably even to the very centre of Asia — pottery was being made either of whitish clay and sand, or of a light reddish clay coated with a white facing of fine clay or of tin-enamel, on which splendid decorative patterns in vivid pigments or brilliant iridescent lustres were painted.

As early as the 12 th century of our era this superior artistic pottery of the Moslem nations had already attracted the notice of Europeans as an article of luxury for the wealthy; and we may well believe the traditional accounts that Saracen potters were brought into Italy, France and Burgundy to introduce the practice of their art, while Italian potters certainly penetrated into the workshops of eastern Spain and elsewhere, and gathered new ideas. In Italy certainly, and in the south of France probably, efforts were continuously in progress to improve the native wares by coating the vessels with a white " slip " and drawing on them rude, painted patterns in green, yellow and purplish black. The increasing intercourse with Spain, in war and peace, also introduced the use of tin-enamel after the fashion of the famous Hispano-Moresque wares, and by the end of the 14th century a knowledge of tin-enamel was widespread in Italy and paved the way to the glorious painted majolica of the 15th and 16th centuries. From Italy and Spain, France and Holland, Germany, and finally, though much later, England learnt this art,

and the tin-enamelled pottery of middle and northern Europe, so largely made during the 17th and 18th centuries, was the direct offshoot of this movement of the Italian Renaissance. 1

During the 15th and 16th centuries Chinese porcelain also began to find its way into Europe, and by the whiteness of its substance and its marvellous translucence excited the attention of the Italian majolists and alchemists. The first European imitation of this famous oriental porcelain of which we have indubitable record was made at Florence (1575-1585) by alche- mists or potters working under the patronage, and, it is said, with the active collaboration of Francesco de' Medici. This Florentine porcelain was the first of those distinctively European wares, made in avowed imitation of the Chinese, which form a connect- ing link between pottery and glass, for they may be considered either as pottery rendered translucent or as glass rendered opaque by shaping and firing a mixture containing a large

percentage of glass with a very little clay. After the cessation of the Florentine experiments we know of no European porcelain for nearly a century, though the importation of Chinese porcelain had largely increased owing to the activity of the various " India" companies. The next European porcelain, made like the Florentine of glass and clay, was that of Rouen (1673) and St Cloud (1696); and during the 18th century artificial glassy porcelain was made in France and England largely, and in other countries experimentally. German experimenters worked in another direction, and the first porcelain made in Europe from materials similar to the Chinese was produced at Meissen by Bottger (1710-1712). During the 18th century not only was there a very large trade in imported Chinese and Japanese porcelain, but there was a great development of porcelain manufacture in Europe; and in every country factories were established, generally under royal or princely patronage, for the manufacture of artificial porcelain like the French, or genuine porcelain like the German. The English made a departure in the introduction of a porcelain distinct from either, through adding calcined ox-bones to the other ingredients; and this English bone-porcelain— a well-marked species — is now largely made in America, France, Germany and Sweden as well as in England.

By the end of the 18th century the risks and losses attendant on the manufacture of the French glassy porcelain had caused its abandonment, and a porcelain made from natural materials like the Chinese has since been generally made on the continent of Europe.

The older tin-enamelled wares— derived from the Hispano-Moresque and the Italian majolica — so largely made in France, Holland, Germany and elsewhere during the 17th and 18th centuries, met with a fate analogous to that of the French porcelain. Tin-enamelled earthenware is always a brittle substance, soon damaged in regular use; so that, when, in the middle of the 18th century, the English potter first appeared as a serious competitor with a fine white earthenware of superior durability and precision of manufacture, the old painted faience gradually disappeared between the upper millstone of European porcelain and the nether millstone of English earthenware.

The 19th century witnessed a great and steady growth in the output of porcelain and pottery of all kinds in Europe and the United States. Mechanical methods were largely called in to supplement or replace what had hitherto remained almost pure

handicraft. The English methods of preparing and mixing the materials of the body and glaze, and the English device of replacing painted decoration by machine printing, to a large extent carried the day, with a great gain to the mechanical aspects of the

1 It must always be borne in mind that, side by side with the production of artistic wares in all countries, the traditional craft of the village pot-maker continued, and has probably been less interfered with than is generally imagined, except in the British Isles. Any country market-place in Spain. Italy, Greece, France, Germany, or Holland is provided to-day with a simple peasant pottery little removed in its forms, its decorations, or its technical skill from the country work of the middle ages. In England the cheapness of machine-made pottery has largely destroyed such village industries.

work and in many cases with an entire extinction of its artistic spirit. Even the hand-work that still remained was largely affected by the growing dominance of machinery; and the painting, gilding and decoration of pottery and porcelain, in the first half of the 19th century, became everywhere mechanical and hackneyed. During the latter half of the 19th century another influence was fortunately at work. Side by side with the increasing mechanica' perfection of the great bulk of modern pottery there grew up a school of innovators and experimentalists, who revived many of the older decorative methods that had fallen into oblivion and produced fresh and original work, in certain directions even beyond the achievements of the past. The 20th century opened with a wider outlook among the potters of Europe and America. In every country men were striving once again to bring back to their world-old craft something of artistic taste and skill.

Technical Methods.— All primitive pottery, whether of ancient or of modern times, has been made by the simplest methods. 1 he clay, dug from the earth's surface, was or is prepared by beating and kneading with the hands, feet or simple mallets of stone or wood; stones and hard particles were picked out; and the mass, well tempered with water, was used without any addition. l

Fig. 1. — Potter mould- ing a vessel on the wheel (from a painting in a tomb at Thebesabout 1800B.C.). Compare the wheel on the left in fig. 5.

Fig. 2. — Potter's wheel of the time of the Ptolemies, moved by the foot (from a wall-relief at Philae). Com- pare fig. 5, the wheel on the right.

disk pivoted on a central point to be set going by the hand, as the workman squatted on the ground ; and it may be seen to-day in India, Ceylon, China or Japan, in all its primitive simplicity (see fig 1) This form of potter's wheel was the only one known until about the Christian era, and then, in Egypt apparently, the improve- ment was introduced of lengthening the spindle which carries the throwing-wheel and mounting on it near the base a much larger disk which the potter could rotate with his foot, and so have both hands free for the manipulation of the clay (fig. 2). No further advance seems to have been made before the 17th century, when the wheel was spun by means of a cord working over a pulley ; and though a steam-driven wheel was introduced in the middle of the 19th century, this form remains the best for the production of fine pottery.

A prevalent misconception with regard to the potter s wheel needs correction. For anything beyond very simple shapes it is impossible to carry the work to completion on the wheel at one operation as is generally imagined. Ail that the potter can do while the clay is soft enough to " throw " on the wheel is to get a rough shape of even thickness. This operation completed, the piece is removed from the wheel and set aside to dry. When it is about leather-hard, it may be re-centred carefully on the wheel (the old practice), or placed in a horizontal lathe (since 16th century) and turned down to the exact shape and polished to an even, smooth surface. The Greek vase-makers were already adepts in what is often reckoned a modern, detestable practice. Many Greek vases have obviously been " thrown " in separate sections, and when these had contracted and hardened sufficiently they were luted together with slip, and the final vase-shape was smoothed and turned down on the wheel, and even polished to as fine a degree of mechanical finish as the modern potter ever attains. So too with the Chinese ; many of their forms have been made in two or three portions, subse- quently joined together and finished on the outside as one piece. Indeed it is

remarkable how the Greeks and Chinese had discovered for themselves many devices of this kind which are generally held up to opprobrium as the debased methods of a mechanical age.

V. »3

Always it should be borne in mind that the shaping of pottery by ” pressing ” cakes of clay into moulds is much older than the potter’s wheel, and has always been the method of making shapes other than those in the round. The modern method of ” casting ” pottery by pouring slip, a fluid mixture of clay and water, into absorbent moulds seems to have originated in England about the middle of the 18th century; and this too is a genuine potter’s method which does not merit the disapproval with which it has been generally regarded by writers on the potter’s art.

In all ages the work of the ” thrower ” or ‘ presser has been largely supplemented by the modeller, who alters the shape, and applies to it handles, spouts or modelled accessories at will.

Firing. — The firing of pottery has become in modern times such a specialized branch of the manufacture that the student can only be referred here to the technological works mentioned in the biblio- graphy at the end of this

article. It is, however, /V/>

necessary that we should briefly describe the earlier forms of potters’ kilns used by the nations whose pottery counts among the treasures of the collector and the antiquary. Here again we now know that the primitive types of kiln used by the potters of ancient Egypt or Greece have not vanished from the earth; it is only in the civilized countries of the modern world that they have been replaced by improved and perfected devices. The potters of the North-West Provinces of India use to-day a kiln practically identical with that depicted in severest silhouette on the rock- tombs of Thebes; and the skilful Japanese remain content with a kiln very similar to the one shown

in fig. %. This Greek type _ _ , _, , , .,

of kiln was improved and Fig. 3 —Early Greek potteryˆln enlarged by the Romans, about 700-600 B.C. (from a painted and its use seems to have votive tablet found at Corinth, now in been introduced wherever the Louvre). The section shows the pottery

was made under probable construction of the kill), their sway, for remains of .,/•-, m-ˆx. ±u

Roman kilns have been found in many countries (see ng. 4). With the end of Roman dominance we have ample evidence that their technical methods fell into disuse, and the northern European potter of the period from the 6th to the 12th century had to build up his methods

Fig. 4.— Roman kiln found at Castor. The low arch is for' the insertion of the fuel ; the pots rested on the perforated floor, made of clay slabs; the top of the kiln is missing,— it was probably a dome.

afresh, and improved kilns were invented. The general type of medieval potter's kiln is illustrated for us in the manuscript of an Italian potter of the 1 6th century, now in the library of the Victoria and Albert Museum 1 (fig. 5)- Kilns of a different type horizontal reverberatory kilns, were used for ma king the hard-fired pottery ol

1 I Ire libri dell' Arte del Vasajo, by Cipriano Piccolpasso of Castel Durante, a.d. 1548.

Europe (Rhenish stoneware, &c), as well as for Chinese porcelain and the earliest German porcelains. With the organization of pottery as a factory industry in the 18th century, improved kilns were intro- duced, and the type of kiln now so largely used in civilized countries is practically a vertical reverberatory furnace of circular section, from 10 to 22 ft. in diameter and of similar height, capable, there- fore, of containing at one firing a quantity of pottery that would have formed the output of a medieval potter for a year. Every device that can be thought of for the better utilization of heat and

Fig. 5. — Two forms of Italian potter's wheels, about 1540.

its even distribution throughout the kiln or oven has been experi-

mented with; and, though the results have been most successful from the point of view of the potter, even the most recent coal-fired ovens remain very wasteful types of apparatus, the amount of available heat being relatively small to the fuel consumption. Gas- fired kilns and ovens are now being used or experimented with in every country, and their perfection, which cannot be far distant, will improve the most vital of the potter's processes both in certainty and economy.

Glazes. — We are never likely to known when glaze {i.e. a coating of fired glass) was first applied to pottery, though the present state of knowledge would incline us to the opinion that the earliest glazed objects we possess are those of ancient Egypt, 1 but the practice may have been originated independently wherever a knowledge of the elements of glass-making had spread, as all the early glazes were of the alkaline type, which must first be fused into a glass before they can be applied to pottery.

Many primitive races seem to have burnished their pottery after it was fired, in order to get a glossy surface ; and in other cases the surface was rendered shining and waterproof by coating it with waxy or resinous substances which were often coloured. It is possible that the black varnish of Greek vases was obtained by such a method, and though that point is not settled, we have many types of primitive pottery, both modern and ancient, which are coated in this way. Such a coating is only a substitute for glaze in the work of peoples who do not know or have not mastered the technical secrets of true glazes. We can only consider as glazes those definite super- ficial layers of molten material which have been fired on the clay substance. Glazes are as varied as the various kinds of pottery, and it must never be forgotten that each kind of pottery is at its best with its appropriate glaze. The earliest known glazes (Egyptian and Assyrian) were silicates of soda and lime containing very little alumina and no lead. Such glazes are very uncertain in use, and can only be applied to pottery unusually rich in silica {i.e. deficient in clay). Consequently these alkaline glazes cannot be used on ordinary clay wares, and when they have been used successfully, the clay has always been coated with a surface layer of highly siliceous substance (e.g. the so-called Persian, Rhodian, Syrian and Egyptian pottery of the early middle ages). The fact that glazes containing lead-oxide would adhere to ordinary pottery when alkaline glazes would not was discovered at a very early period; for lead glazes were extensively used in Egypt and

the nearer East in Ptolemaic times, and it is significant that, though the Romans made singularly little use of glazes of any kind, the pottery that succeeded theirs, either in western Europe or in the Byzantine empire, was generally covered with glazes rich in lead. Throughout Europe, and over the greater part of the world, leaded glazes have been continuously used and improved for all ordinary pottery, and it is only with certain special hard-fired types of ware that they have yet been successfully replaced. Chinese porcelain and all the European porcelains made by analogous methods are fired at so high a temperature that a glaze by felspar softened by lime and silica is found most suitable for them, and the hard-fired stonewares, rich in silica, are often glazed with a salt glaze, or a melted earth rich in oxide of iron.

Every kind of potter's clay (the mixture of clay, sand, flint, &c, from which the potter shapes his wares) has its own type of glaze, and from the earliest time down to our own what the potter could produce in form or glaze or colour has been largely decided for him by the clay material at his command. With any good plastic play

1 The earliest glazed objects found in Egyptian tombs (once dignified by the name of Egyptian porcelain) are hardly to be called pottery at all, though we have no other name for them. The material is largely sand held together by a little clay and glass.

which cannot be fired at the highest temperature, lead glazes have always proved the most practicable. A similar clay, to which large quantities of sand are added, may be glazed by the vapours of common salt ; and mixtures rich in felspar, like Chinese or European porcelain, can be glazed by melting felspathic materials upon them . Naturally those species of pottery which are the hardest fired are the most durable — the glazes of hard porcelain are more unchangeable than lead glazes, and these in their turn than alkaline glazes.

Themost important types of glaze are (1) alkaline glazes {e.g. Egyptian, Syrian, Persian, &c), the oldest and most uncertain; (2) lead glazes, the most widespread in use and the best for all ordinary purposes; (3) felspathic glazes, the glazes of hard-fired porcelains, generally unsuited to any other material ; (4) salt glaze, produced by vapours of common salt, the special glaze of stonewares. Many intermediate glazes have been devised to meet special needs, but these remain the only important groups. Fuller

details on this important subject must be sought in the technical works.

Colours. — The primitive potters of ancient and modern times have all striven to decorate their wares with colour. The simplest, and therefore the earliest, colour decoration was carried out in natural earths and clays. The clays are so varied in composition that they fire to every shade of colour from white to grey, cream, buff, red, brown, or even to a bronze which is almost black. One clay daubed or painted upon another formed the primitive palette of the potter, especially before the invention of glaze. When glaze was used these natural clays were changed in tint, and native earths, . other than clays, containing iron, manganese and cobalt, were gradually discovered and used. It is also surprising to note that some of the very earliest glazes were coloured glasses containing copper or iron (the green, turquoise and yellow glazes of the ancient Egyptians and Assyrians). Marvellous workwas wrought in these few materials, but the era of the finest pottery-colour dawns with the Persian, Syrian and Egyptian work that preceded the Crusades. By this time the art of glazing pottery with a clear soda-lime glaze had been thoroughly learnt. Vases, tiles, &c, shaped in good plastic clay, were covered with a white, highly siliceous coating fit to receive glazes of this type, and giving the best possible ground for the painted colours then known. With this rudimentary technique the potters of the countries south and east of the Mediterranean produced, between the 9th and 16th centuries of our era, a type of pottery that remains ideal from the point of view of colour : for, with nothing more than the greens given by oxide of copper and iron, the turquoise of pure copper, the deep yet vivid blue of cobalt, the beautiful un- certain purple of manganese, and in certain districts the rich red of Armenian bole, they achieved colour schemes that have never been surpassed in their brilliant yet harmonious richness.

When the coating of white siliceous clay was replaced by an opaque tin-enamel as in Spain, Italy, France, Holland, &c, a necessary change in the colour schemes resulted. At first only the copper-greens and cobalt-blues could be used on such a ground; the fine manganese purple turned to brown or black and the rich iron-reds to filthy shades of yellow. We cannot wonder that the Spanish-Arab potters paid more attention to their lustre decoration, for* that was the natural thing to do. How strong and fine a palette could be evolved for use on a tin-enamel ground was shown by the Italian majolists of the 15th and 16th

centuries; and when the later developments of tin-enamelled pottery took place in France, Holland, Germany, &c, their colour schemes are only echoes of Italian majolica crossed with Chinese porcelain. Delft, Nevers, Moustiers and Rouen may each charm us with its individuality; Nuremberg and other south German towns may show us that they too had mastered the use of tin-enamel; yet our minds always go back to the colour schemes of Italian majolica and of the Persian and Syrian pottery that lie behind and beyond them.

The colours already spoken of were either clay colours or what are known as "under glaze" colours, because they were painted on th« pottery before the glaze was fired.

The earliest glazes of the Egyptians appear not to have been white, but were coloured throughout their substance, and this use of coloured glazes as apart from painted colour was developed along with the painted decoration by the later Egyptian, Syrian and Persian potters. Green, yellow and brown glazes were almost the only artistic productions of the medieval European potters' kilns, and their use everywhere preceded the introduction of painted pottery. The most extensive application of coloured glazes was, however, that made by the Chinese, who developed this type of colour decoration before they used painted patterns in underglaze colour. The earliest Chinese porcelains, and the hard-fired stone- wares out of which their porcelain arose, were decorated in this way, and the beauty of many of the early Sung coloured glazes has never been surpassed.

With the exceedingly refractory felspathic glazes of Chinese porcelain very few underglaze colours could be used; and the prevalence of blue and white among the early specimens of Chinese porcelains is due to the fact that cobalt was almost the onlj' substance known to the potters of the Ming dynasty which would endure the high temperature needed to melt their glazes. Consequently the Chinese were driven to invent the method of painting in coloured fusible glasses on the already fired glaze. They adopted for this purpose the coloured enamels used on metal; hence the common

primitive;

term ” enamel decoration,” which is so generally applied to painting in those colours which are attached to the already fired glaze by retiring at a lower temperature. With the introduction of this many- coloured Chinese porcelain into Europe the same practice was eagerly followed by our European potters, and a new palette of colours and fresh styles of decoration soon arose amongst us. Painting in on- glaze colours, being executed on the fired glaze, resembles glass painting, and it generally offers a striking contrast both in technique and colour-quality to the painting executed in colours under the glaze. In the former the work can be highly finished and the most mechanical execution is possible, but the colours are neither so rich nor so brilliant as under-glaze colours, nor have they the same softness as is given by the slight spread of the under-glaze colour when the glaze is melted over it.

It must be pointed out that the colour possibilities in any method of pottery decoration are largely dependent on the temperature at which the colour needs to be fired. The clay colours are naturally more limited in range than the under-glaze colours, and these in their turn than the on-glaze colours.

When, about the middle of the 18th century, European pottery took on its modern form, of earthenware made after the English fashion, and porcelain like the French and German, the lead or felspathic glazes used brought about another revolution in the potter’s palette. The growing ideal of mechanical perfection dis- counted the freedom of the earlier brushwork, and printed patterns, or painting that might almost have been printed, removed the mind still farther from the richness of painted faience or majolica. It is useless to look for the glorious colour of Persian faience, Italian majolica, or Chinese porcelain, in modern wares produced by manu- facturing processes where mechanical perfection is demanded to a degree undreamt of before the 19th century. The finest modern pottery colour is only to be sought in the work of those enthusiasts and experimenters who are striving to produce work as rich and free as the best of past times.

Metals. — The noble metals, such as gold, platinum and silver, have, since the early years of the 18th century, been largely used as adjuncts to pottery decoration, especially on the fine white earthen- wares and porcelains of the last two centuries. At first the gold was applied with a kind of japanner’s size and was not fired to the glaze, but for the last 150 years or so the metals have generally been fired to the surface of the glaze like enamel

colours, by mixing the metal with a small proportion of flux or fusible ground glass. There can scarcely be a doubt that the ancient lustres of Persia, Syria and Spain were believed to be a form of gilding, though their decorative effect was much more beautiful than gilding has ever been. The early Chinese and Japanese gilding appears, like the European, to have been ” sized ” or water-gilt, not fired; and it seems probable that the use of.” fired ” gold was taught to the Oriental by the European in the 18th century. To-day ” liquid ” gold is exported to China and Japan from Europe for the use of the potter.

Primitive Pottery

We can group together that great and widely-spread class of vessels made by the primitive races of mankind, whether before the dawn of civilization or at the present day, for it is interesting to note that many modern races still make pottery by the same rude method as the Neolithic races of Europe and Asia, and with striking similarity of result. In fact, the knowledgeof themethods and practices of the primitive potters of our own time furnishes the best possible guide to the methods of fabrication and ornamentation of the ancient specimens that are dug up from barrows, grave mounds, and tumuli. It is only natural that the materials and methods of such pottery are always of the simplest. The clay is used with very little preparation, and it is no unusual thing to find bits of stone, gravel, &c, embedded in the paste of such wares, though at a later stage of development they would have been removed. It must be remarked, however, that no race of potters practised the art for long without discovering that their vessels were not so liable to crack in drying, or lose their shape in firing, if fine sand or pounded ” potsherds ” were mixed with the clay; and when we are dealing with the work of races that have passed beyond the Stone Age and have learned the use of metals we find this custom universal.

There are three methods of shaping which seem to be common to almost every primitive race: —

r. The scooping out of a vessel from a ball of clay.

2. The building up of a form, often on a piece of basket-work or

matting, gradually raising the walls higher by applying and smoothing down successive layers of clay.

3. Coiling; in which the clay is rolled out into thin ropes, and these are coiled round and round upon each other and smoothed down with the hands and with simple tools of bone, wood or metal.

The use of the potter's wheel is unknown, while it is remarkable how beautifully true and finely-fashioned much primitive pottery is. The primitive red and black vases discovered by Flinders Petrie in Egypt, and the somewhat similar vessels of prehistoric date from Spain, are remarkable instances of this. Some primitive races leave their pottery without decoration, especially when they have a fine red-burning clay to work in, but, generally speaking, primitive pottery of every race and time is elaborately decorated, but only with the simplest patterns. Such decorations consist of lines, dots or lunette-shaped depressions arranged in crosses, chevrons, zigzags or all-over repeated pattern. All this ornament is scratched or impressed into the clay before it is fired. Simplest of all is, perhaps, the pattern which has so obviously been produced by pressing a twisted thong round the neck or bowl of a vase; though the thong may have been used in the first instance merely to serve as a support while the vessel was dried. At a later stage the ornament is generally obtained by scratching with a tool, by pressing the end of a hollow stick into the clay to form rows of circles, by using a stick cut at the end into the shape of a half-moon, or other equally simple decorative device. In certain tropical countries this rudimentary pottery becomes hard enough for a certain amount of use when merely dried in the sun, but in all northern and temperate countries it must have been fired, probably in the most imperfect way, in an open fire or in such a kiln as could be formed by sinking a hole into the ground and erecting round it a screen of stones. How imper- fect the firing was is shown by the ashen-grey colour due to smoke. In those countries where the ware has been more perfectly fired the pieces naturally become buff, drab, brown or red.

The primitive vessels that have been found in the grave- mounds of England and the northern countries generally have received a number of fanciful names for which there is very little warrant except in the case of the cinerary urns. These are generally the largest vessels of this class, and as they were used to contain burnt bones there seems sufficient warrant for the sup- position that they were made for this and for no other purpose.

Our knowledge of primitive pottery has been greatly improved

during recent years by the labours of a number of American students connected with the United States Geological Survey, who have carefully recorded the present-day practices of those native tribes who make and use pottery in various parts of North America and Mexico; while, in the same way, Peruvian, Brazilian and other South American pottery has been as closely investigated by European observers. It should be noted that no primitive pottery reveals any trace of a knowledge of glaze, though much of it has been highly polished after firing, and in some cases a varnish has been applied which may perhaps be regarded as the earliest kind of " glazing " ever applied to pottery vessels.

Literature. — On primitive pottery the following works may be specially mentioned. W. Greenwell, British Barrows (1877); Boyd-Dawkins, Early Man in Britain (1880); Mortimer, Forty Years' Researches in British and Saxon Burial-mounds of East Yorkshire (1905); Abercromby, "The Oldest Bronze-age Ceramic Type in Britain," /. Anth. Inst. vol. xxxii. (1902), 373; Guide to Antiquities of the Bronze Age (British Museum, 1904) ; Koenen, Gefdsskunde der vorrbmischen, romischen und frankischen Zeit in den Rheinlandern (1895); Wosinsky, Der inkrustierte Keramik der Stein- und Bronze- zeit (1904); Walters, History of Ancient Pottery (Greek and Roman) (1905); Holmes, Aboriginal Pottery of the Eastern United States (Bureau of Ethnology, Washington, 1899); also Holmes and Cush- ing in Report of Bureau of Ethnology for 1882; Wiener, Perou et Bolivie (1880); Von der Steinen, Natur-Vblkerei Central Brasiliens (1894); Hartman, Archaeological Researches in Costa Rica (1905); Strebel, on " Mexican Pottery " in Publications of Museum fur Volkerkunde (Berlin, vol. 6, 1899); Werner, British Central Africa (1907) ; Fullborn, Deutsche Ost-Afrika, vol. ix. (1907) ; Macluer, " Kabyle Pottery," Journ. Anth. Inst. vol. xxxii. p. 245, and " Upper Egypt," ibid. xxxv. p. 20; Myres, " Early Pottery Fabrics of Asia Minor," Journ. Anth. Inst, xxxiii. p. 367; Turveren Museum, Notes analytiques surles collections ethnographiques du Congo, tome ii. (1907) ; Cupart, Debuts de I'art de I'ancienne Egypte (1903). (W. B.*)

Egypt and Western Asia Egyptian Pottery. — Egypt affords us the most striking instance of the development of the potter's art. As in other countries

pottery was made even in Neolithic times, for the Nile mud forms a fine plastic clay and sand is of course abundant. With these materials various kinds of pottery, often extremely well made and of good form, have been continuously produced for common domestic requirements, but such pottery was never glazed.

The wonderful glazes of the Egyptians were applied to a special preparation which can hardly be called pottery at all, it contained so little clay. Yet as early as the 1st Dynasty the Egyptians had learnt to shape little objects in this tender material and cover them with their wonderful turquoise glazes. We have therefore to study the development of two independent things: (i) the ordinary pottery of common clay left without glaze; (2) the brilliant glazed faience which appears to be special to Egypt, though it may have been the groundwork for the technique of the slip-faced painted and glazed pottery of the nearer East.

We probably do not possess any specimens of the most primitive Neolithic pottery; the oldest type known to us, the black and red ware of B alias and Nagada (1), dates from the later Neolithic age, when copper was just beginning to be used. This ware is very hard and compact and the face is highly burnished. The red colour was produced by a wash of fine red clay; the black is an oxide of iron obtained by limiting the access of air in the process of baking, which was done, Professor Petrie suggests, by placing the pot's mouth down in the kiln, and leaving the ashes over the part which was to be burnt black. Both red and black colour go right through in every case. All-red and all-black vases are occasionally found, the red with geo- metrical decorations in white colour, and the black with incised decoration. The forms are usually very simple, but at the same time graceful, and the grace of form is more remarkable when it is remembered that none of this early pottery was made on the wheel. Pottery of almost similar technique was found in Crete in 1905 during the American excavations at Vasiliki near Hiera- petra. The general appearance of the Cretan pottery is much the same as that of the Egyptian, and the duller red and black decoration (which here has a spotted or mottled appearance) was probably obtained in the same way, the black spots being due to the action of separate fragments of the baking material. This discovery is important in view of the probable early connexion of the Cretan and Egyptian culture-centres.

A very similar red and black ware, usually of thinner and harder

make, and often with a brighter surface, was introduced into Egypt at a later date (Xllth Dynasty), probably by Nubian tribes who were descended from relatives of the Neolithic Egyptians. From their characteristic graves these people are called the Pan-Grave people, and their pottery is known by the same name.

Perhaps rather later in date than the early red and black wares, but by no means certainly so, the second characteristic type of primeval Egyptian pottery is a ware of buff colour with surface decorations in red. These decorations are varied in character, including ships, birds and human figures; wavy lines and geometrical designs commonly occur. The whole fades of this ware seems very un-Egyptian, and it has been compared with the decorated " Kabyle pottery " of modern times. To call the people who made this ware " Libyans " on the strength of this resemblance of their pottery to that of the modern Kabyles, six thousand years later, seems, however, rash. The prehistoric Egyptians were not Kabyles or Libyans, but Nilotes, and the peculiar decoration of their pottery, which seems so strangely barbaric, is in reality merely the most ancient handiwork of the Egyptian painter, and marks the first stage in the development of pictorial art on the banks of the Nile (2). Other types of pottery (3), in colour chiefly buff or brown, were also in use at this period; the most noticeable form is a cylindrical vase with a wavy or rope band round it just below the lip, which developed out of a necked vase with a wavy handle on either side. This cylindrical type outlived the red and black and the red and buff decorated styles (which are purely Neolithic and predynastic) and continued in use in the early dynastic period, well into the Copper age. The other unglazed pottery of the first three

dynasties is not very remarkable for beauty of form or colour, and is indeed of the roughest description (4), but under the IVth Dynasty we find beautiful wheel-made bowls, vases and vase-stand? of a fine red polished ware (4) . This fine ware con- tinued in use at least as late as the XVIIIth Dynasty, though the forms of course differed from age to age. Under the Xllth Dynasty, and during the Middle Kingdom generally, either this or a coarser unpolished red ware was in use. The forms of this period are very characteristic (5) ; the vases are usually footless, and have a peculiar globular or drop-like shape — some small ones seem almost spherical. At this period the foreign " Pan- Grave " black and red pottery was also in use (see above).

The art of making a pottery consisting of a siliceous sandy body

coated with a vitreous copper glaze seems to have been known unexpectedly early, possibly even as early as the period immediately preceding the 1st Dynasty (4000 B.C.). Under the Xllth Dynasty pottery made of this characteristic Egyptian faience seems to have come into general use, and it continued in use down to the days of the Romans, and is the ancestor of the glazed wares of the Arabs and their modern successors (6). The oldest Egyptian glazed ware is found usually in the shape of beads, plaques, &c. — rarely in the form of pottery vessels. The colour is usually a light blue, which may turn either white or green; but beads of the grey-black manganese colour are found, and on the light blue vases of King Aha (who is probably one of the historical originals of the legendary " Mena " or Menes) in the British Museum (No. 38,010) we have the king's name traced in the manganese glaze on (or rather in) the blue- white glaze of the vase itself, for the second glaze is inlaid. This style of decoration in manganese black or purple on copper-blue continued till the end of the " New Empire " shortly before the XXVIth (Saite) Dynasty. It was not usual actually to inlay the decoration before the time of the XVIIIth Dynasty. The light blue glaze was used well into the time of the Xllth Dynasty (British Museum, No. 36,346), but was then displaced by a new tint, a brilliant turquoise blue, on which the black decoration shows up in sharper contrast than before. This blue, and a somewhat duller, greyer or greener tint was used at the time for small figures, beads and vases, as well as for the glaze of scarabs, which, however, were usually of stone-schist or steatite — not faience. The characteristically Egyptian technique of glazed stone begins about this period, and not only steatite 01 schist was employed (on account of its softness) , but a remarkably brilliant effect was obtained by glazing hard shining white quartzite with the wonderfully delicate Xllth Dynasty blue. A fragment of a statuette plinth of this beautiful material was obtained during the excavation of the Xlth Dynasty temple at Deir el-Bahri in 1904 (British Museum, No. 40,948). Vessels of diorite and other hard stones are also found coated with the blue glaze. A good specimen of the finest Xllth Dynasty blue- glazed faience is the small vase of King Senwosri I. (2400 B.C.) in the Cairo Museum (No. 3666) (6). The blue-glazed hippopo- tami of this period, with the reeds and water-plants in purplish black upon their bodies to indicate their habitat, are well known. Fine specimens of these are in the collection of the Rev. Wm. MacGregor at Tamworth (8).

The blue glaze of the Xllth Dynasty deepened in colour under the

XHIth, to which the fine blue bowls with designs (in the manganese black) of fish and lotus plants belong (8) (British Museum, Nos. 4790, &c). The finest specimens of XVIIIth Dynasty blue ware have come from Deir el-Bahri, in the neighbourhood of which place there may have been a factory for the manufacture of votive bowls, cups, beads, &c, of this fine faience, for dedication by pilgrims in the temple of Hathor (good collection in British Museum). Towards the end of this dynasty polychrome glazes came into fashion; white, light and dark blue, violet, purple, red, bright yellow, apple-green and other tints were used, not only for smaller objects of faience, such as rings, scarabs, kohl-pots, &c, but also for vases, e.g. No. 3965 of the Cairo Museum(Amenophis III. wine-bottle) , the ground colour of which is white with a decoration of flower wreaths in blue, yellow and red, with an inscription in delicate blue (6). This

polychrome faience was also now used for the ushaUi figures which were placed in the tombs; hitherto they had been made exclusively of stone or wood, never of glazed stone or pottery; henceforward they were made exclusively of faience, but the polychrome glazes {e.g. British Museum, Nos. 34,180, 34,185) were soon abandoned, and the plain blue and black of the ordinary vases was adopted. The ushabtis of King Seti I. (British Museum, No. 22,818, &c.) (9) are fine specimens of this type. Under the XXth Dynasty the blue paled and became weak in quality, but the priest-king family of the XXIst used for their ushabtis a most brilliant blue glaze, an extraordinary colour which at once distinguishes the faience of this period from that of all others (9). The* same brilliant glaze was used for vases of various kinds as well. The polychrome ware had developed into a style of inlaying with glazed faience, which we see at Tel el-Amarna under the XVIIIth Dynasty (1400 B.C.) (10), and at Tel el-Yahudiya under the XXth (1200 B.C.), used for wall decoration. After this time polychrome ceramic decoration seems to have died out in Egypt, but was retained in Asia (see below).

The technical skill of the New Empire potters is shown by such a remarkable object as the gigantic f/as-sceptre of blue glazed faience, now in the Victoria and Albert Museum (12, 8). This is

the largest known piece of Egyptian glazed faience; really large vases of faience are not found. Faience vases were very commonly built up or carved out of a ball of the dried material, perhaps held together by some mucilaginous substance — it seems impossible that such a substance could ever have been fashioned on the wheel. Sometimes even small vases were made of separately moulded pieces united by a glassy material (6). Under the XXIInd Dynasty small glazed vases with figures of deities or animals in relief became common; these were made in moulds (6). In the matter of form the faience pottery of the New Empire follows the lead of the new earthenware types. Forms had altered considerably from those of the Xllth Dynasty. In place of the simple flowing lines of that period, we now find egg-shaped bodies with cylindrical necks, with or without handles; great amphorae with almost pointed bases, sometimes with the handles perched upon the shoulders of the vase; flat- tipped, squat jugs; little handleless vases somewhat resembling the modern kulla, ” mil mehrfach eingezogenem Bauch” (V.B.), and the common flat flask -like type known as the ” pilgrim bottle” (6, 13, 14, 15).

Owing to the extended foreign relations of Egypt at this time, imported vases from Greece and Asia, including Mycenaean Bugelkannen and Cypriote black ” base ring ” jugs, have been found in the tombs and deposits of this age (14). Imitations of foreign forms, especially the Bugelkannen, are found 1 chiefly in faience (British Museum, 22,731, is an imitation of a Minoan jug from Crete). The faience forms of the XVIIIth and XXIInd Dynasties include also the kulla shape, the pilgrim bottle, miniature amphorae, &c. (see fig. 6), and miscellaneous forms not found in common pottery, imitating metal and stone vases, e.g. the blue-green ribbed pots of the XXIInd Dynasty, imitating bronze originals, and the alabastron of the XVIIIth; these last go back to the Xllth Dynasty. Very pretty cups in the shape of lotus flowers (see fig. 7) are to be seen in most museums; they are of the XlXth Dynasty, and mostly came from Tuna (6, 8).

The continuance of the old red polished ware of the IVth Dynasty during the Middle Kingdom to the time of the XVIIIth

1 Foreign pottery had been imported into Egypt at least as early as the Xllth Dynasty, e.g. the Cretan polychrome ware of the Middle Minoan period (Kamares style) found at Medinet Ghuraib (” Kahun “) and the Cypriote (?) ‘‘punctuated ” black ware from the same site, and from Khata’anah (17). The date between the

Xllth and Xlllth Dynasties is certain (14), but the Middle Kingdom Egyptians do not seem to have imitated these earlier foreign forms. British Museum, No. 17,046, is, however, probably an instance of an Egyptian idea imitated by the foreign potter (17).

Fig. 6. — -Egyptian pottei'y made of fine blue paste.

Fig. 7. — Egyptian blue-glazed pottery.

Dynasty has already been mentioned. Characteristic of the latter period of this ware are long jugs with attenuated body and single handle, which, because they have been found with Mycenaean objects in Cyprus, have been considered to be of foreign, probably of Syrian origin. They may, however, be Egyp- tian. Vases of the same ware in the shape of men and animals are not un- common (17). Another ware of this period has a highly polished yellow face, some- times becoming ruddy, and passing off into a pinkish red; in this ware the pilgrim bottles are common. An unpolished, brittle, and thin yellow ware was also used largely for wine- vases. The rougher, commoner red and brown ware at this period became decorated with designs, chiefly of lily wreaths, &c, in paint of various colours (13). This new development hid the ugly colour of the common pottery and was a cheaply obtained imitation of the expensive, polychrome glazed ware of the period (see fig. 8). This painted pottery continued in use until about the time of the XXIInd Dynasty. From this time onwards, till the Ptolemaic period, the commonest pottery was a red ware, usually covered with a white slip. Under the XXVIth Dynasty a finer homogeneous white ware occurs, usually for vases with a rude representation of the face of the god Bes on their bodies.

The XXVIth Dynasty marks a new period of development in the history of Egyptian faience. The old deep blue colour had gradually deteriorated into an ugly green (British Museum, No. 8962), which was replaced by the Saite pott ;rs with a new light blue of very delicate tint, imitated, in accordance with the archaistic spirit of the time, from the old light blue of the earliest Dynasties. The glaze itself is very thin and " sugary " in texture. The old decoration of the blue with designs and in- scriptions in manganese-black is abandoned; on the ushabtis the inscriptions are now incised. Side by side with this light blue glaze was used an unglazed faience, a sort of composition paste with the colour going right through. 2 It has more variety of colour than the

glazed faience, light green and a dark indigo blue being found as well as the Saite light blue. Some- times it is of a very soft, almost chalky consistency. It was used . _. .

for vases, but more generally for ˆPˆo™ˆ* and small figures and scarabs (6) . 1 he

commonest vase-form of this period is the pilgrim bottle, now made with the neck in the form of a lily flower, and with inscrip- tions on the sides wishing good luck in the New Year to the possessor. These flasks appear to have been common New Year's gifts.

Under the Sebennyte kings of the XXXth Dynasty a further new development of glaze began, of a more radical character than ever before. The colour deepened, and the glaze itself became much more glassy, and was thickly laid on. The new glaze was partly translucent, and differed very greatly from the old opaque glaze. It first appeared on ushabtis at the end of the Saite period. A curious effect was obtained by glazing the head-dress, the inscription &c, of the ushabtis in dark blue, and then covering the whole with translucent light blue glaze. This method was regularly used during the succeeding Ptolemaic and Roman periods, when the new style of glaze came into general use. A yellowish green effect was obtained by glazing parts of the body of the vases in yellow and covering this with the translucent blue glaze. This method was used to touch up the salient portions of

2 Some of these figures appear to have been made with a mixture of sand, clay and coloured glass which produced a real glassy porce- lain — the earliest porcelain of which we have any record.

Fig. 8.— Egyptian pottery

the designs in relief, imitated from foreign originals, a style which now became usual on vases. The usual decoration is mixed Egyptian and classical, the latter generally predominating. A large range of colours was employed; purple, dark blue, blue-green, grass-green, and yellow glazes all being found. The glaze is very thickly laid on, and is often " crazed " (6, 8). A remark-

able instance of this Romano-Egyptian faience is the head of the god Bes in the British Museum (No. 35,028). A hard, light blue, opaque glaze like that of the XXVIth Dynasty is occasionally, but rarely, met with in the case of vases (British Museum, Nos. 37,407, 37,4o8).

We know something of the common wares in use during this period from the study of the ostraka, fragments of pottery on which dated tax-receipts, notes, and so forth were written. From the ostraka we see that during the Ptolemaic period the commonest pottery was made of red ware covered with white slip, which has already been mentioned. At the beginning of the Roman period we find at Elephantine a peculiar light pink ware with a brownish pink face, and elsewhere a smooth dark brown ware. About the 3rd century a.d. horizontally ribbed or fluted pots, usually of a coarse brown ware, came into general use. These were often large-sized amphorae, with very attenuated necks and long handles (see fig. 9)- During the Byzantine (Coptic) period most of the pottery in use was ribbed, and usually

pitched inside to hold water, as A the ware was loose in texture and porous.

During the Coptic period, a lighter ware was alsO in use, decorated with designs of various kinds in white, brown or red paint on the dull red or buff body. In Nubia a peculiar development of this ware is characteristic of the later period (Brit. Mus. No. 30,712). A polished red ware of Roman origin (imitation Arretine or ” Samian “) was commonly used as well.

The heavily glazed blue faience continued in use until replaced in the early Arab period by the well- known yellow and brown lead- glazed pottery, of which fragments are found in the mounds of Fostat (Old Cairo).

Western Asia. — Palestine. The most ancient Palestinian pottery is the rough ” Amorite ” ware from Lachish (Tel el-Hesi) which sometimes has wavy handles like the prehistoric Egyptian (18). Later we find actual Mycenaean pottery in Philistia (19), an interesting testimony to the truth of the legend which brings the Philistines from Crete; the fourth and fifth cities of Lachish (1 200-1000 B.C.) show us the first ordinary Phoenician or Israelite pottery — buff or red lamps and bowls, the latter with the handles sometimes painted in bistre, and vases showing strong Egyptian influence; while pottery from Cyprus and elsewhere is

found as in Egypt.

The only remarkable later development of Palestinian pottery is the Phoenician imitation of Egyptian faience of the Saite period, of which the characteristics are well known. Some of this may actually have been made in Egypt.

The course of the potter's art in Mesopotamia and Persia appears to have run on lines of development parallel with the art in Egypt, for the country between the Tigris and the Euphrates is rich in good clays, and, wherever the invention of glass arose, its application to pottery decoration was certainly developed at an early period in Egypt and in Mesopotamia.

Two characteristic uses of clay wares must, however, be pointed out, though they have nothing to do with vase-making.

I. The Babylonian and Assyrian use of clay shaped into tablets, cylinders and prisms, to produce an imperishable record of the literature of the time. The cylinders and prisms were thrown on the potter's wheel and are consequently hollow; the circular form was then sliced down, and the surface was impressed with cuneiform

Fig. 9. — Egyptian pottery under the Ptolemies, show- ing Greek influence in the shapes.

inscriptions, the prism, tablet or cylinder being subsequently dried and fired.

2. The architectural use of glazed bricks and slabs. While the Egyptians remained content for the most part with the application of their brilliant alkaline glazes to small and delicately-finished objects, the Babylonians and Assyrians developed an architecture decorated with glazed and coloured brickwork. The bricks were of very open texture, and the ornamental pattern or figure subjects were obtained by a strong outline in dark-coloured clay which formed a kind of cloison or boundary, the shallow cells between being filled in with coloured clays — yellow, red or white — or with coloured glazes of turquoise, green or blue, yellow and purplish brown. These glazes are obviously like the Egyptian, but they are more coarsely prepared and are always full of bubbles and consequently more or less opaque. Yet the severe simplicity of the method, the splendid colour effect, strong yet sumpflious, entitles these

productions to a very high rank among all the world's work in clay and glaze. The " Frieze of the Archers " now in the Louvre may be mentioned as one of the finest productions of its kind, and the Louvre and British Museum possess the finest collections of this early architec- tural use of glazed and coloured clay. (Seealso Mural Decoration.)

Coming to ordinary pottery we find that in early times well-formed vases made of good clay, unglazed and unpainted, were made. Small figures of deities made of the same clay are often found. It is practically the same terra-cotta as that of the inscribed tablets. None of the forms are particularly distinctive (see fig. 10). The excavations of the French in Persia have

Fig. 10. — Assyrian biscuit pottery.

brought to light at Moussian in Susiana an extremely interesting painted ware, which belongs to a very early period. The decora- tion is usually geometrical. The technique seems to be analogous to the Mycenaean-Greek (Firnismalerei) , and the whole effect is very like that of the Greek, Late Mycenaean or Dipylon pottery. The ware is buff in colour and fine in texture, with a polished surface. The decoration is sometimes in polychrome, but usually in the grey-brown iron-glaze (?) alone. This pottery degenerates later and finally disappears (20).

During the Sargonide period in Assyria (7th century B.C.) we find a polychrome faience (colours usually white and brown) obviously of Egyptian origin. It was used, not for vases, but architectonically for friezes, ornamental bosses, &c. Its origin may be found in Egypt under the XVIIIth Dynasty, when Egyptian influence extended to the Tigris, and Babylonia had regular diplomatic relations with Egypt. In Asia this polychrome decoration in glazes continued to be used long after it had ceased

- Wˆ- — y

FlG. 11. — Assyrian glazed and enamelled pottery.

to be made in the country of its origin; the enamelled brick decoration of Persepolis is the descendant of the glazed inlay decorations of Tel el-Amarna, Tel el-Yahudiya and Kuyunjik. In the Sargonide period blue glazed vases occur (see fig. 11) which are probably of Egyptian origin or are Phoenician imita- tions of Egyptian faience.

Characteristic of the Parthian period is a coarse green glazed pottery of which the slipper-shaped coffins of the time were made

(British Museum, Nos. 1645-1647) (21). This glaze possibly contains a small amount of lead; in appearance it is not unlike the contemporary translucent blue glaze of Egypt. The Egyptian glaze certainly spread into western Asia, and we find the last specimens of it in the tiles from the destroyed city of Rhagae in Persia, which may be as late as the 13th century a.d. The lead glazes, unknown in Egypt till the late Roman period, may be of Asiatic origin, though this important point is by no means clear.

References. — (1) Petrie-Quibell, Ballas and Nagada (date erroneous); (2) Jacques de Morgan, L' Agede la pierre etdesmetaux; (3) Petrie, Diospolis Parva, frontispiece (also for " sequence-dates " of pottery) ; (4) Garstang, Mahdsna and Bet Khall&f, pis. xxix.- xxxii.; (5) Petrie, Illahun, pi. xii. (corr. by V. Bissing in (14)); (6) V. Bissing, Catalogue generate du musee de Caire, " Die Fayence- gefasse"; (7) Petrie, A bydos, ii., frontispiece; (8) Henry Wallis, Egyptian Ceramic Art (Macgregor Collection); (9) Guide to Third and Fourth Egyptian Rooms, British Museum, p. 252 ff. ; (10) Petrie, Tel-el- Amarna; (11) Guide to Third and Fourth Egyptian Rooms, p. 261; (12) Petrie, Nagada, pi. xxviii. ; (13) Petrie, Illahun, pis. xx., xxi.; (14) V. Bissing, Strena Helbigiana, p. 20 ff. ; (15) Garstang, El Ardbah, pis. xviii.-xxi., xxviii., xxix. ; (16) Hall, Oldest Civilization of Greece, p. 143 ff. ibid. figs. 29, 30, 69; (17) Guide to Third and Fourth Egyptian Rooms, pi. viii.; (18) Petrie, Tell-el-Hesy, pi. v. ; (19) Welch, Ann. Brit. Sch. Ath. vi. ; (20) de Morgan, Delegation en Perse, viii. (1905); (21) Brit. Mus.: Guide to Babylonian and Assyrian Room. (H. R. H.)

Greek, Etruscan and Roman

Greek. Study of Greek Vases. — It is not so many years since an account of Greek pottery would naturally have followed chronologically the history of Egyptian pottery with little overlapping; but recent discoveries have reversed all such ideas, and,

while up to the end of the 19th century the earliest remains to be traced on Greek soil could be assigned at the furthest to the period 2500-2000 B.C., it is now possible not only to show that at that period technical processes were highly developed, but even to trace a continuous development of Greek pottery from the Neolithic age. This result has been mainly brought about by Dr Arthur Evans's researches at Cnossus in Crete, but traces of similar phenomena are not wanting in other parts of Greece. Whether the race which produced this pottery can strictly be called Greek may be open to question, but at all events the ware is the independent product of a people inhabiting in prehistoric times the region afterwards known as Greece; its connexion with the pottery of the historic period can now be clearly traced, and in its advanced technical character and the genuinely artistic appearance of its decoration even this early ware proclaims itself as inspired by a similar genius.

The study of Greek vases has thus received an additional impetus from the light that it throws on the early civilization of the country, and its value for the student of ethnology. But it has always appealed strongly to the archaeologist and in some degree also to the artist or connoisseur, to the former from its importance as a contribution to the history of Greek art, mythology and antiquities, to the latter from its beauty of form and decoration. Attention was first redirected to the painted vases at the end of the 17th century, though for a long time they served as little more than an adjunct to the cabinet of the amateur or a pleasing souvenir for the traveller; but even during the 1 8th century it dawned on the minds of students that they were of more than merely artistic importance, and attention was devoted to the elucidation of their subjects, and attempts made to arrive at a chronological classification. Two facts must, however, be borne in mind: firstly, that down to the middle of the 19th century the great majority of painted vases had been found only in Italy; secondly, that these vases were mostly of the later and more florid styles, which, if artistically advanced, are now known to represent a decadent phase of Greek art.

From the former cause arose the notion that these vases were the product not of Greek but of Etruscan artists, and so the term " Etruscan vase " arose and passed into the languages of Europe, surviving even at this day in popular speech in spite of a century of refutation. Meanwhile, the study of the subjects depicted on the vases passed through the successive stages of

Fig. 12. — Jug from Cyprus of Oriental style, 10 in. high.

allegorical, historical and mystical interpretation, until a century and more of painstaking study led to the more rational principles of modern archaeologists.

Sites and Discoveries. — The sites on which Greek vases have been found cover the whole area of the Mediterranean and beyond, from the Crimea to Spain, and from Marseilles to Egypt. By far the great majority, at all events of the finer specimens, have been extracted from the tombs of Vulci and other sites in Etruria; those of the later period or decadence have been found in large numbers on various sites in southern Italy, such as Capua, Cumae and Nola in Campania, Anzi in Lucania, and Ruvo in Apulia. In the western Mediterranean, Sicily has also been a fruitful field for this pottery, early varieties being found at Syracuse, later ones at Gela, Girgenti and elsewhere. Painted vases have also come to light in Sardinia and in North Africa, especially in the Cyrenaica, where the finds mostly belong to the 4th century B.C. In Greece proper the most prolific site has been Athens, where the finds extend from the Dipylon vases of the 8th cen- tury B.C. down to the decadent productions of the 4th century ; one group, that of the white funeral lekythoi, is almost peculiar to Athens. Next to this city, Corinth has been most productive, especially in pottery of the archaic period and of local manufacture. Large quantities of pottery of all periods have been yielded by Thebes, Tanagra and other sites in Boeotia, and remains of the ” Mycenaean ” period at Mycenae, Argos and elsewhere. But on the whole painted pot- tery is rare in other parts of the mainland. Among the western islands of the archi- pelago, Aegina and Euboea have proved fruitful in vases of all periods; Thera, Melos and others of the Cyclades are remarkable for pottery of the prehistoric period with rudely painted designs; and above all Crete is now famous for the wondrous series of painted and orna- mented pottery of pre-Mycenaean date, which can be traced back even tothe Neolithic period, and the discovery of which has entirely revolutionized the preconceived theories on the appearance of painted pottery in Greece. This has been found in the recent ex- cavations at Cnossus, Palaeokastro and else- where. In Asia Minor there have been some important finds on the mainland, but only along the coast; some of the islands, more especially Samos and Rhodes, have been more fruitful in this respect. At Kertch and else- where in the Crimea, large numbers of fine but somewhat florid vases of the 5th and 4th centuries B.C. have come to light. Cyprus has long been known as a rich

field for pottery of all periods, from the Mycenaean onwards, the later varieties being marked by strong local quasi-oriental characteristics, with little development from the more primitive types (figs. 12 and 13). The principal sites are Salamis, Amathus, Marion (Poli) and Curium. Lastly, in the Egyptian delta two sites, Naucratis and Daphnae, have yielded results of considerable importance for the history of early Greek vase-painting.

The great majority of these vases have been found in tombs; but some important discoveries have been made on the sites of temples and sanctuaries, as on the Acropolis of Athens, or at Naucratis. In such cases the vases are seldom complete, having been broken up and cast away into rubbish-heaps, where the fragments have remained undisturbed. The tombs vary greatly in form, those of Greece being usually small rock-graves or shafts, those of Italy often fine and elaborate chambers with architectural details, and the manner in which the vases are found in these tombs varies greatly. Plain unornamented pottery is almost universal, and may be considered to have formed the " tomb-furniture " proper — the painted vases being as in daily life merely ornamental adjuncts.

Fig. 13. — Pottery from Cyprus with geometrical ornament.

Shapes and Uses of Greek Vases. — The enormous number of painted vases now collected in museums is in itself sufficient evidence of the important part they must have played in the daily life, of the Greeks, and the care which was bestowed on their decoration shows the high estimation in which they were held. It is, however, remark- able that, with the exception of general allusions to pottery and its use in daily life, there are singularly few passages in classical litera- ture which throw light on the purposes for which these vases were used. Where any are described at full length there is always evidence that metal vases are intended. Athenaeus and the lexicographers have indeed put on record a long list of names of shapes, but it is only in a few cases that v e can be certain what forms they describe, or whether any of the typical forms of existing vases can be identified with the literary descriptions.

We have then two questions to consider in this section: firstly, the uses to which painted vases were put by the Greeks; secondly, the classical names of the various forms of plain and painted pottery which have come down to us.

As we have seen, the majority of painted vases have been discovered in tombs, which at first sight seems to suggest that they were made principally for sepulchral purposes; but that they also had their uses in daily life as much as plain pottery or earthenware cannot be doubted. They stand, in fact, in the same relation to the commoner wares of their day as china or porcelain does with us, being largely ornamental only, but used by wealthy people or on special occasions for the purposes of daily life, as for instance at banquets or in religious ceremonies.

Vases were used as measures, as in the case of a small one-handled cup in the British Museum (see fig. 15), found at Cerigo (Cythera) and inscribed with the word i?Aii/coriiXtoy or " half-kotyle," equivalent to about one-fourth of a pint. Another vase found at Athens is supposed to represent the official xo'^'f or quart, having a capacity of 0-96 litre; it is inscribed brtiibaiov or " official measure," and bears the official stamp of the state. Conversely many names of vases, such as the amphora or the kotyle, were adopted to indicate measures of capacity for liquid or dry commodities. Earthenware vessels were used for storing both liquids and food, for the preparation of foods and liquids, and for the various uses of the table and the toilet. That the painted ware was used at banquets or on great occasions we learn from scenes depicted on the vases themselves, in which vases painted with subjects appear in use. In connexion with athletics, they were given as prizes, as in the case of the Panathenaic amphorae, a class of vases given for victories in the games held at Athens at the Panathenaic festivals, where, however, they do not represent prizes so much as marks of honour corresponding to modern racing cups. Vases were also used as toys for children, as is proved by the discovery of many diminutive specimens, chiefly jugs, in the tombs of children at Athens, on which are depicted children playing at various games. They also served a purely decorative use as domestic ornaments, being placed on columns or shelves; or, in the case of flat cups and plaques, suspended on the wall. Many of the later Greek and Italian painted vases are very carelessly decorated on the one side, which was obviously not intended to be seen.

We come now to the use of vases for religious purposes,

dedicatory, sacrificial or funerary. Of all these uses, especially the last, there is ample evidence. That vases were often placed in temples or shrines as votive offerings is clear from the frequent mention in literature of the dedication of metal vases, and it can hardly be doubted that painted pottery served the same purpose for those who could only afford the humbler material. Of late years much light has been thrown upon this subject by excavations, notably on the Acropolis of Athens, at Corinth, and at Naucratis in the Egyptian delta, where numerous fragments have been found bearing inscriptions which attest their use for such purposes. It was a well-known Greek custom to clear out the temples from time to time and form rubbish-heaps (javissae) of the disused vases and statuettes, which were broken in pieces as useless, but it is to this very fact that we owe their preservation. At Naucratis many of the fragments bear incised inscriptions, such as ‘ kirbWoivos elm, ” I am Apollo’s ” (possibly a memorandum of the priest’s, to mark consecrated property), or 6 Sel va. pe avWriKe rjj ‘ Aˆpo Sirn , “So-and-so dedicated me to Aphrodite.” Fig. 14 gives another example with a dedication to Apollo. At Penteskouphia, near Corinth, a large series of painted tablets (irLvaKes), dating from 600 to 550 B.C., with representations of Poseidon and dedicatory inscriptions to that deity, were found in 1879. Votive offerings in this latter form were common at all periods, and tablets painted with figures and hung on trees or walls are often depicted on the vases, usually in connexion with scenes representing sacrifices or offerings.

There is no doubt that vases (though not necessarily painted ones) must have played a considerable part in the religious ceremonies of the Greeks. We read of them in connexion with the Athenian festival of the Anthesteria, and that of the gardens of Adonis. They were also used in sacrifices, as shown on an early black-figured cup in the British Museum and on a vase at Naples with a sacrifice to Dionysus. In scenes of libation the use of the jug and bowl (phiale) is invariable.

But their most important use, and that to which their preservation is mainly due, was in connexion with funeral ceremonies. They were not only employed at the burial, but were placed both outside the

tombs to receive offerings, and inside them either to hold the ashes of the dead or as ” tomb-furniture,” in accordance with Greek religious beliefs in regard to the future life. Several classes of vases are marked out by their subjects as exclusively devoted

to this purpose, such as the large jars found in the Dipylon cemetery at Athens, which were placed outside the tombs, the white Athenian lekythoi of the 5th and 4th centuries B.C., and the large krateres and

Fig. 14. — Part of vase from Naucratis with dedication to Apollo.

other vases of the 4th century B.C. found in the tombs of Apulia and other parts of southern Italy. Their use as cinerary urns was perhaps more restricted, at all events as regards the painted vases, though the custom is well known and is referred to in literature from Homer downwards. In " Mycenaean " times coffers (Xapyaxes) of clay were used for this purpose, especially in Crete, where fine painted examples have been found; but of Greek pottery of the best periods there are but isolated instances.

The diagrams in fig. 15 show the principal shapes characteristic of Greek pottery in all but the earliest periods, when the variety of form was as yet too great to permit of more than the vaguest nomen- clature; each form has its conventional name appended. These shapes may be classified under the following heads: (l) Vases in which food or liquids were preserved; (2) vases in which liquids were mixed or food cooked; (3) those by means of which liquids were poured out or food distributed; (4) drinking-cups; (5) other vases for the use of the table or toilet. Thus we have the pithos and amphora for storing wine, the krater for mixing it, the psykter for cooling it, the kyathos for ladling it out, and the oinochoe or prochoos for pouring it out; the hydria was used for fetching water from the well. The names and forms of drinking-cups are innumer- able, the principal being the kylix, kotyle, kantharos, rhyton (drinking- horn) and phiale (libation bowl). The pyxis was used by women at their toilet, and the lekythos, alabastron and askos for oil and unguents.

Technical Processes. — Though the Greeks succeeded in making pottery of a very high order from the point of view of form and decoration, the technical processes remained throughout of the most elementary — for glaze was not used at all, the colour was of the simplest, and the temperature at which the ware was fired was not high enough to _ introduce any serious difficulties. As we should expect, it is possible to trace a gradual improvement in the technical processes in the direction of greater precision and refinement, for no vase-painter of the best period could have achieved his decorative triumphs on wares so coarse in substance and so rough in finish as those that satisfied his predecessors. As

in every other case technical and artistic refinement went hand in hand. In the earliest times the clay was used with very little preparation ; at all events before the introduction of the potter's wheel the finish is not to be compared with that of the early races in Egypt. As the practice developed no doubt, specially good clays were found in certain districts, and these became centres of manufacture or the clays were carried to other established centres. The primitive wares usually exhibit the natural buff, yellow, grey or brownish colours of other elementary pottery, and the surface is somewhat rough and possesses no gloss. Thenceforward it becomes appreciably warmer in tone as it becomes finer in texture, until it reaches its perfection in the glowing orange, inclining to red, of the best Attic vases of the 5th century B.C. In the vases of the later Italian centres the colour again reverts to a paler hue.

The clay for the potter was doubtless prepared by a system of sedimentation, so as to get rid of all coarse particles. It was mixed with water and decanted into a series of vats so that ultimately fine clay of two or three grades was obtained. Both red and whitish clays were used, and the best potters gradually discovered that mixtures of different clays gave the best results. The clay for the Athenian vases was obtained from Cape Kolias in Attica ; and as it did not burn to a very warm tone, ruddle or red ochre (rubrica) was added to it to produce the lovely deep orange glow that distinguishes the best vases. Corinth, Cnidus, Samos and other places were also famous for their clays, and at the first named tablets have

been found bearing representations of the digging of clay for pottery.

The improved manipulation of the clays, and the increasing knowledge that the colour of a clay could be modified by admixture of other substances such as ruddle and ochre, really paved the way

Bronze age tombs of 2500-1500 B.C. contain only hand-made pottery, but in the next period (1500-1000 B.C.) we find hand-

made and coarse vases side by side with a more developed kind of painted pottery — the ” Mycenaean “• — obviously made on the wheel. It seems prob- able, therefore, that the wheel was introduced into Greece about

Amphora

Calyx-krater

Stamnos

Kalpis

Fig. 15. — Shapes of Greek Vases.

for what is known as the glaze of the Greek painted vases. This delicate gloss, so thin as to defy analysis, has been commonly called glaze, but it cannot be a glaze in the sense of a separate coating of finely-ground glass superimposed upon the clay. In all probability, as the Greek potter used finer and finer clays and so was enabled to perfect his shapes, he found that after a vase had been ” thrown ” he could get a closer texture on it by dipping it in a slip of still finer clay material and then smoothing it down and polishing it on the wheel when sufficiently dry. But the mixtures he would use for such a purpose — of very siliceous clay and ochre — would, when they were burnt in the Greek kiln, not only fire to a beautifully bright colour, but also to a glossy surface, especially where the flames had freely played about them ; and it is more in accordance with our knowledge to believe that the exquisitely thin gloss of the finest Greek red vases was produced in this way, for it seems impossible that it can have been a coating of any special glaze.

In any case we may state broadly that the body of Greek vases is always fine in grain, fired hard enough to give forth a dull metallic sound when it is struck, but seldom fired above a temperature of about 900 C, which a modern potter would consider very lqw. When broken the inside is generally found to be duller in colour, and is often yellow or grey, even where the external surface is red. The material is exceedingly porous, and allows water to ooze through it ‘another proof that it was not glazed). Numerous analyses of the material of Greek vases have been published, but they tell us nothing of the secrets of the Greek potter. The results of a great number of these analyses may be summed up as follows: silica, 52-60 parts; alumina, 13-19

parts; lime, 5-10 parts; magnesia, 1-3 parts; oxide of iron, 12-19 parts. Analyses of a thousand ordinary simple red burning clays would give a similar result. It is to the glory of the Greek potter that with such ordinary materials, by the exercise of selection, patience and skill, he achieved the fine artistic results we see. He did as much as can be done with natural clay materials, but the glory of painted colour and glaze, like the later Persian or Chinese, was not for him.

Manufacture of Vases. — The earliest Greek pottery is, like all primitive pottery, hand-made. The introduction of the potter's wheel into Greece was the subject of various ancient traditions, but we now know that it can be easily traced by a study of the primitive pottery of Crete, Cyprus or Troy. In Cyprus, for instance, the

1500 B.C.; it was certainly known to Homer, as a familiar allusion shows (//. xviii. 600). It was still a low circular table turned with the hand, not the foot; representations of its use are seen on several vases of the archaic period (fig. 16), and they further prove that the vase was replaced on the wheel for the subsequent processes of painting, polishing and adding separately modelled parts, as well as for the original shaping or " throwing."

The method of shaping the vase on the wheel, which is the same as that still in use, need not be described in detail; the feet, necks, mouths and handles were modelled separately or shaped in moulds, and attached while the clay was moist, as is also indicated on a vase. Large and coarse vases, such as wine casks {■kLBoi), were always modelled by hand on a kind of hooped mould (navvafios).

Parts of vases were modelled by hand at all periods by way of decora- tion. Even in the . geometrical period we find horses modelled in the ., .. . , , , „ . ,

round on the tIG – l6 – — Votive tablet from Corinth; a covers of vases and P otter applying painted bands while the vessel later on handles revolves on the wheel.

enriched with moulded figures of serpents twining round them. Such embellishments are frequently, if not always, deliberate imitations of metal forms, but the plastic principle is one which obtained in Greek pottery from the very first, as for instance in

the primitive pottery of Troy, in which the vases are often modelled in human or animal forms ; and the same principle is involved in the common practice of speaking of the ” neck,” ” shoulder ” or ” foot ” of a vessel. In the best period the practice of adding moulded ornaments or of modelling vases in natural forms took a subsidiary place, but

examples occur from time to time, as in the beautiful rhyta or drinking-horns of the red- figure period (Plate II., fig. 58) , or in smaller details such as are seen in handles enriched with heads in relief, a favourite practice of the potter Nicosthenes. In the 4th-century vases of southern Italy the handles are often much ornamented in this fashion, as in the large krateres, where they are adorned with masks in rejief.

The system of moulding whole vases or ornamenting them with designs in relief taken from moulds really belongs to the decadence of the art, when imitations of metal were superseding the painted pottery. Even then it is rare to find whole vases produced from a mould, except in the case of those in the form of human figures or animals (Plate II., figs. 57 and 58), which almost come under the heading of terra-cotta figures, except for the fact that they are usually painted in the manner of the vases. But in southern Italy the tendency to imitate metal led to the popularity of ornaments made separately from moulds and attached or let in to vases other- wise plain. Vases of this period, with reeded bodies, must also have been made from moulds, as were a series of phialae or libation-bowls associated with Cales in Campania (Plate II., fig. 56), which are known to be direct imitations of metal.

All or nearly all of these vases are covered with a plain black glaze or varnish, and painted decoration is rare except in the case of those moulded in special forms or of a certain class made in Apulia with opaque colouring laid on the varnish. Some of these plain black vases of the 4th century are ornamented with stamped patterns made with a metal punch impressed in the moist clay. This decoration is confined to simple patterns.

After the vases had been made on the wheel they were dried in the sun and lightly baked, after which they were ready for varnish- ing and painting; it is also probable that the gloss was brought out by a process of polishing, the surface of the clay being smoothed with a piece of wood or hard leather. On a vase in Berlin a boy is seen applying a tool of some kind to an unfinished cup, probably for this purpose ; the cup, being shown in red on the vase, has evidently not been varnished. Many vases are varnished black all over the exterior (whether decorated with designs or not) with the exception of the foot and lip.

The process of baking was regarded as one of the most critical in the potter's art. It was not indeed universal, as we read of sun-dried vessels for utilitarian purposes, but all the vases that have come down to us have been baked. The amount of heat required was regulated by the character of the ware, but was not very high. Many examples exist of discoloured vases which have been subjected to too much or too little heat, the varnish having acquired a greenish or reddish hue. Or again the red gloss is sometimes turned to an

ashen-grey colour, the black remaining unimpaired. Other accidents were liable to occur in the baking, such as cracking under too great heat, or the damaging of the shape by vases knocking against one another and so being dented in or crushed. The form of the oven was of the simplest (fig. 17). No furnaces have been found in Greece, and only one or two in Italy, but we have a variety of evidence from vase-paintings. They were fed by fires from beneath, and the vases were inserted with a long shovel. They were heated with charcoal or wood fuel, and there are representations of men poking or raking the fires with long-handled implements. One vase-painting gives a bird's-eye view, in horizontal section, of the interior of an oven full of jugs of various forms. Others have more complete presentations of potteries, with men engaged in the different processes of vase manufacture, modelling, painting or supplying the kilns with newly-made wares.

The Painting of Vases. — We may distinguish three principal classes of painted pottery, of which two admit of subdivision.

1. Primitive Greek vases with simple painted ornaments, chiefly linear and geometrical, laid directly on the clay with the brush. The colour employed is usually a yellowish or brownish red passing into black. The execution varies, but is often extremely

coarse.

2. Greek vases painted with figures. These may be subdivided as follows : —

(a) Vases with figures in shining black on a red glossy ground.

(b) Vases with figures left in the glossy red on a ground of

shining black.

3. Vases with polychrome decoration.

(a) Vases of various dates with designs in outline or washes in

various colours on white ground (these range from the 6th to the 4th century B.C.).

(b) Vases of various dates with designs in opaque colour laid

over a ground of shining black (ranging from the primitive period to the 3rd century B.C.). Of these the second group is by far the largest and most im-

Fig. 17.

-Model of Kiln found in Essex.

portant, including the majority of the finest specimens of Greek vase-painting, and the following account will deal mainly with the technical processes by which the most successful results were ob- tained. In both the classes (a) and (b) the colouring is almost confined to a contrasting of the glossy red ground and shining black.

This black varnish (?) is particularly deep and lustrous, but varies under different circumstances according to differences of locality, of manufacture or accidents of production. It is seen in its greatest perfection in the ” Nolan ” amphorae of the earlier red-figure period, at its worst in the Etruscan and Italian imitations of Greek vases. The gradations of quality may be partly due to the action of heat, i.e. stoving at a higher or lower temperature. It also varies in thickness. At present no certainty has been attained as to its composition — Brongniart’s oft-quoted analysis cannot be accepted — nor has any acid been found to have an effect upon it, though the chemical action of the earth

sometimes causes it to disappear.

The method of its use forms the chief distinction between the black-figured and red-figured vases, but there is a class of the former which approaches near in treatment to the latter, the whole vase being covered with black except a framed panel which is left red to receive the figures. It is obvious that the transition to merely leaving the figures red is but a slight one. But in all black-figured vases the main principle is that the figures are painted in black silhouette on the red ground, the outlines being first roughly indicated by a pointed instrument making a faint line. The surface within these outlines being filled in with black, details of anatomy, dress, &c, were brought out by incising inner lines with a pointed tool. After a second baking or perhaps stoving had taken place, 'the designs were further enriched by the application of opaque purple and white pigments, which follow certain conventional principles in their respective use. After a third baking at a lower heat still to fix these colours the vase was complete.

In the red-figured vases the shining black is used as a background. But before it is applied the outlines of the figures are indicated not by incised lines, but by drawing a thick line of black round their contours. Recent researches have attempted to show that the instrument with which this was achieved may have been a feather brush or pen, by which the lines were drawn separately, not con- currently. The other tools used for painting would be an ordinary metal or reed pen and a camel's-hair brush, or at any rate something analogous. Thus the outlines of the figures were clearly marked, and the process is one of drawing rather than painting, but it was in draughtsmanship that the best vase-painters excelled. The next stage was to mark the inner details by very fine black lines or by masses of black for surfaces such as the hair; white and purple were also em- ployed, but more sparingly than on the earlier vases. The main processes always remain the same down to the termination of vase-painting, though the tendency to polychromy, which came in about the end of the 5th century B.C., effected some modifications. The blacking of the whole exterior surface — a purely mechanical process — took place after the figures had been completed and protected from accidents by the thick black border of which we have spoken.

A fragment of an unfinished vase pre- served in the Sevres Museum gives a very clear idea of the process just described, the

figures being completed, but the back- ground not yet applied (fig. 18). There is also another vase in existence which gives the interior of a vase-painter's studio, in which three artists are at work with their brushes, their paint-pots by their side.

In the class of vases (3 (a)), with polychrome figures on a white ground, the essential feature is the white slip or engobe with which the naturally pale clay is covered. In the archaic vases of the 7th and 6th centuries B.C., especially in the Ionian centres, as at Rhodes, Naucratis and Cyrene, this slip is frequently employed, but with this difference, that the figures are painted in the ordinary black-figure method, the only additional colour being purple laid on the black. We first find polychrome decoration, whether in wash or outline, in a small class of fragments from Naucratis, of the 6th century B.C., which technically are of a very advanced character. The colours used either for outline or wash include purple, brown, yellow, crimson and rose-colour, but some, if not all, of these colours were not fired.

In the 5th century this practice was revived at Athens, chiefly in the class of lekythoi or oil-flasks devoted exclusively to sepulchral uses. Here the vases, after leaving the wheel and being fitted with handles, &c, were covered with a coating of white clay. A second coating of black was applied to the parts not required for decoration, and the white was then finely polished, acquiring a dull gloss, and finally fired at a low temperature. The decoration was achieved as follows: a preliminary sketch was made with fine grey lines, ignoring draperies, &c, and not always followed when the colours were laid on. This was done when the first lines were dry, the colour

(From a photo supplied by the Director of the Sevres Museum).

Fig. 18. — Fragment of unfinished red -figured vase.

being applied with a fine brush in monochrome — black, yellow or red — following the lines of the sketch. For the drapery and other details polychrome washes were employed, laid on with a large brush. All varieties of red from rose to brown are found,

also violet, yellow, blue, black and green. Hair is treated either in outline or by means of washes.

Finally, we have to deal with the class of vases (3 (&)) in which opaque pigments are laid over the surface of the shining black with which the whole vase is coated. This method is met with at three distinct periods in the history of vase-painting, separated by long distances of time.

We first find it in the earlier Cretan or Kamares ware, where it seems to have been introduced not long after the close of the Neolithic period, about 2500 B.C., and where it holds its own for about a thousand years against the contrasted method of ” dark on light ” painting, till it was finally ousted by the latter at the height of ” Mycenaean ” civilization in Crete. The colouring is very varied, orange, brown, pink and white being the principal tints employed.

The process appears again at the end of the 5th century in a small class of Attic vases, which have been regarded as a sort of transition between the black-figured and red-figured. White and orange-red are here employed, sometimes with accessory details in purple and black and incised lines, so that the technique is virtually black-figured, though the appearance of the vases is often red- figured. Lastly, it appears in southern Italy as a final effort of vase-painting to flicker into life again about the end of the 3rd century. Some of these vases were made in Campania, where the method resembles that of the Attic class just described, others in Apulia, probably at Gnathia. The latter have feeble conventional decoration in purple and white with details in yellow, confined to one side of the vases, and are also distinguished by the use of ornaments in relief. They were also occasionally made in Greece proper.

Remarkably few colours were used by the Greek vase painters, especially in the best periods. The deep purple used for accessory details was produced from iron oxide, but the red used for lines on the white lekythoi is an ochre {iilhros, rubrica). The white also used for accessories is an earth or clay; in the slip coating of the white ground vases it assumes the consistency of pipe-clay. Yellow, where used for details on the later vases, is an ochre, and blue and green are produced from artificial compounds containing copper. A number of the colours, such as blue, rose and green, used by the polychrome painters, are obviously artificial pigments which have not been fired. When gilding was

employed it was laid on over a raised ground of clay finely modelled with a small tool or brush, and was attached by varnish, not by fire.

Potters and Inscriptions. — The potters who made these vases were mostly — at least at Athens in the 6th and 5th centuries, B.C. — itkroutoi, or resident aliens, as their names in many cases imply. We have an Amasis (an Egyptian name), a Brygus (a Scythian), a Lydus and a Scythes. The dialect of many of the inscriptions on Attic vases seems to show foreign influence, though in other cases peculiarities may be merely due to the use of a vernacular. They formed a gild or fraternity, and in each pottery there was probably more or less division of labour, the more simple processes being the work of slaves. This seems to be implied in the vase-paintings representing the interior of potteries. Others again "specialized ' in different shapes, and were known as x u rpoxXi0ot, XifKvdcmoiol, and so on.

Over a hundred names of artists are known, found on some five hundred vases. They go back to about 700 B.C., the earliest names being found on Corinthian and Boeotian vases; but the majority of the signatures are found on Attic black- and red-figured wares. Some, such as Andocides, made vases in which the two methods are combined. The best known is Nicosthenes, whose signature occurs eighty times. The ordinary forms of signature are four — (1) 6 btlva iirolT] (T(v\ (2) 6 5iiva typaˆ/tv ; (3) 6 del va iypa\//e nal iirolrjcev ; (4) A iyparpe- B hcol-qotv. Where broi-qaf. alone occurs (as in a signa- ture of Euxitheus), it probably refers to the master of the pottery who designed the vase and superintended its production; in other cases the share of the actual artist is clearly indicated. Some artists, such as Duris and Makron, sign iypai//t alone; in all cases, the form of signature affords us a useful guide to their style.

Space forbids the discussion of other inscriptions found on vases, which include those descriptive of subjects or persons, ejaculations uttered by the figures, convivial exclamations, or the KaXos names discussed below; all these are painted on the designs themselves. There is also another class of graffiti inscriptions, which includes those incised by the owners with their names and memoranda scratched under the foot, probably made by the potter or his workmen relating to the number of vases in a batch or " set " and their price.

Vitreous and Lead-glazed Wares. — In Greek tombs a class of

pottery is often found which approximates more in appearance to porcelain, but, though often spoken of by that name, it is not porce- lain at all, but is analogous to the Egyptian glazed faience, of which it is in point of fact an imitation. It is distinguished by the white gritty material of which it is made, largely composed of sand, and forming what is sometimes known as “frit ” from its semi-vitreous consistency. The surface is covered with a glaze, usually of a pale blue or cream colour, but other colours such as a manganese-purple or brown are sometimes found. Some of the earliest examples of this ware have been found in Mycenaean tombs at Enkomi in Cyprus,

Fig. 19. — Enamelled pottery from tombs in Rhodes, made under

in the form of vases moulded in the shape of human or animal heads. These exhibit a remarkably advanced skill in modelling, and are more like Greek work of the 6th century B.C. Apart from the technique they have nothing in common with the Egyptian importations so often found in Mycenaean tombs.

In a subsequent period (8th~7th century B.C.) Egyptian objects in faience became a common import into Greek cities, such as those of Rhodes, and to a less degree in Sardinia and southern Italy, through the commercial medium of the Phoenicians. Flasks of faience occur in the Polledrara tomb at Vulci (610-600 B.C.) and similar vases with a pale green glaze at Tharros in Sardinia in tombs of the same date. In Rhodes, small flasks and jars are found orna- mented with friezes of men and animals in relief, or imitating in colour and design the glass vessels of the Phoenicians. It also seems probable that the Greeks of Rhodes and other centres attempted the imitation of this ware (see fig. 19), for we find faience aryballi or globular oil-flasks modelled in the form of helmeted heads or animals, which are purely Greek in style.

In the Hellenistic period the fashion was revived at Alexandria,’ and under the Ptolemies large jugs of blue-enamelled faience with figures in relief and bearing the names of reigning sovereigns were made and exported to the Cyrenaica and to southern Italy. Two of these are in the British -Museum (Egyptian department).

The same collection includes a very beauti-

ful glazed vase in the form of Eros riding Egyptian influence, on a

duck, found in a tomb at Tanagra, but undoubtedly of Alexandrine make, and a head of a Ptolemaic queen, with a surface of bright blue glaze.

Subsequently in the 1st century B.C., this so-called porcelain ware was replaced by a variety of ware characterized by a brilliantly coloured glaze coating, in which the presence of lead is often indicated. This ware was principally made at three centres ; at Tarsus in Asia Minor, at Alexandria and at Lezoux in central Gaul. But it was probably also made in western Asia Minor and in Italy. It is not confined to vases, being also employed for lamps and small figures ; the vases are usually of small size, in shapes imitated from metal (Plate II., fig. 59). The colour of the glaze varies from a deep green to bright yellow, and the inside of a vessel is often of a different tint from the exterior. Many of these vases are decorated with figures or designs in relief, others are quite plain. The colours of these glazes are of course due to the addition of oxide of copper and oxide of iron to a lead glaze, and they are strictly analogous to the green and yellow glazes of medieval Europe. 1

Historical Account of Greek Vase-painting. — It has been indicated in the section dealing with technical processes that Greek vases may be classified under four headings according to the character of the decoration, and this classification may with a slight modification be adopted as a chronological one, the history of the art falling under four main heads, under which it will be convenient to describe its development from the earliest specimens of painted pottery down to the period when it was finally replaced by other methods of decoration.

These four classes and their main characteristics may be summarized as follows: —

‘ I. Vases of the Primitive Period from about 2500 or 2000 to 600 B.C., including both the Cretan-Mycenaean epoch and the early ages of historical Greece. In the former the pottery is either decorated in polychrome on a shining black ground or conversely in shining black on a buff ground; in the latter, the decoration is in brown or black (usually dull, not shiny) on an unglazed ground varying from white to pale red. In the former again the decoration is marked by its naturalistic treatment of plant and animal forms; in the latter the ornaments are chiefly linear, floral or figures of animals; human figures and mythological scenes being very rare.

II. Black-figured Vases from about 600-500 B.C.; figures painted in shining black on a glossy ground varying from cream colour to bright orange red, with engraved lines and white and purple for details; subjects mainly from mythology and legend.

III. Red-figured Vases, from 520 to 400 B.C.; figures drawn in outline on red clay and the background wholly filled in with shining black, inner details indicated by painted lines or dashes of purple and white, scenes from daily life or mythology. With these are included the vases with polychrome figures on white ground. In these, which are exclusively made at Athens, the perfection of vase-painting is reached .between 480 and 450 B.C.

IV. Vases of the Decadence, from 400 to 200 B.C. ; mostly from southern Italy, technique as in Class III., but the drawing is free

1 On this subject see in particular Mazard, De la connaissance par les anciens des glacures plombiferes, a scientific and valuable mono- graph (1879); also Rayet and Collignon, Hist, de la ceramique grccquc, p. 365 (or B.M. Cat. of Roman Pottery, Introduction).

and often careless, and the general effect gaudy ; subjects funereal, theatrical and fanciful. At the end of this period vases are largely replaced by plain shining black pottery modelled in various forms, or with decorations in relief, all these being imitations of the metal vases which began to take the place of painted wares in the estimation of the Hellenistic world.

I. Vases of the Primitive Period. — It has been noted in the introductory section that it is possible to trace the development

of pottery in Greece as far back as the Neolithic period, lowing chiefly to the light recently thrown on the sub- ject by the excavations in Crete. These have yielded large quantities of painted pottery of high technical merit, usually with decoration in polychrome or white on a dark ground, in what is known as the Kamares ware, cover- ing the period 2500-1500 B.C. (fig. 20). This was gradually superseded by painting in dark shining pigments on a light glossy ground during the later Minoan period

(1500-1000 B.C.), forming what is known as the ” Mycenaean ” style. ... .._ ,, The subjects, though chiefly

;« n ° a „l°k£ amares confined to floral ornaments or aquatic plants and creatures,

From Annual of the British School at Athens.

Fig. 20.-

ware, from Crete.

are marvellously naturalistic yet decorative in their treatment, often rivalling in this respect the pottery of the Far East. In the latter part of this period this class of pottery was spread all over the Mediterranean, and large quantities have been found in Greece, especially at Mycenae, in Rhodes and other Greek islands, and in Cyprus, where a series of vases with animals, monsters, and even human figures shows what is prob- ably the latest development of the pure Minoan or Mycenaean style.

Outside Crete the earliest Greek pottery has been found in Cyprus and at Troy, with simple incised or painted patterns on a black polished ground, the vases being all hand- made, and often treated in a plastic fashion with rude modelling of human or animal forms (figs. 21, 22); these cover the period 2500-2000 B.C. Early painted pottery, parallel with the Kamares ware, has been found in Thera and in the important cemeteries of Phylakopi in Melos. But until the general spread

Fig. 21. — Primitive black pottery from the Troad.

Fig. 22. — Primitive red pottery from the Troad.

of Mycenaean civilization and art in the latter half of the second millennium there is no site except Crete where a continuous and successful development can be studied.

About the time which is represented in Greek tradition by the Dorian invasion (1100 B.C.) the then decadent Mycenaean civilization was replaced by a new one much more backward in development, making pottery of a far simpler and more con-

ventional type, the decoration being largely confined to geo- metrical patterns to the exclusion of motives derived from plant forms. This is usually known as the geometrical style, and the

pottery covers the period from about 1000 to 700 B.C. It is found all over the mainland and islands of Greece, and exhibits a certain development towards a more advanced stage. The patterns include the chevron, the triangle, the key or maeander, and the circle, in various combinations, painted in dull black on a brown ground. In most places the art advanced no further, but in Boeotia, and still more at Athens, we can trace the gradual growth of decorative skill, first in the introduction of animals, and then in the appearance of the human figure. In the Athenian cemetery outside the Dipylon gate a series of colossal vases has come to light, on which are painted such subjects as sea-fights and funeral processions. The human figures are exceedingly rude and conven- tional, painted almost entirely in silhouette, but there is a distinct striving after artistic effect in the composition and arrangement. In Boeotia the vases do not advance beyond the animal stage, and many exhibit a tendency to de- cadence in their carelessness, as Fig. 23.— Vase with bands contrasted with the painstaking of animals, Oriental in style, helplessness of the Athenian (British Museum.) artists.

1 In Ionia and the islands of the Aegean such as Rhodes, the art of vase-painting from the first carried on the Mycenaean tradition, and was distinguished by its naturalism and originality, and by the bold and diverse effects produced by variety of colour

•

Fig. 24. — Ionic amphora, with contest between Heracles and Hera, and bands of birds and animals ; black, with incised lines.

or novelty of subject. The ornamentation is at first elementary, consisting of friezes of animals, especially lions, deer and goats (figs. 23 and 24). These figures stand out sharply in black against the creamy buff ground which is characteristic of nearly all Ionic pottery, and details are brought out by means of en- graved lines, patches of purplish iron pigment, or by drawing parts of the figures, especially the heads, in outline on the clay ground. Another feature is the general use of small ornaments such as rosettes and crosses in great variety of form to cover

the background and avoid the vacant spaces which the Greek artist abhorred. The system of decoration has been thought to owe much to Assyrian textile fabrics.

One of the best though most advanced examples of early Ionic pottery is a pinax or plate from Rhodes in the British Museum, on which is represented the combat of Menelaus and Hector over the body of Euphorbus (fig. 25); their names are inscribed over the figures, and this is almost the earliest known instance of a mythological subject, the date of the painting being not later than 600 B.C. To a slightly later date belongs another remarkable group of cups with figures on a white ground, probably made at Cyrene in North Africa. Of these the most famous has a painting in the interior, of Arcesilaus II., king of Cyrene from 580 to 550 B.C., weighing goods for export in a ship. Others have mythological subjects, such as Zeus, Atlas and Prometheus, Cadmus and Pelops.

But these vases, though still retaining the older technique, really belong to the second class, that of black-figured vases, and they belong to a time when in all Ionian centres this method was being superseded by the new technique which Corinth had

Fig. 25. — Early inscribed pinax from Rhodes, with contest of Menelaus and Hector over the body of Euphorbus.

introduced and Athens perfected, to the consideration of which we must return.

For some 1 50 years Corinth almost monopolized the industry of pottery on the west of the Aegean. Large numbers of examples have been found in or near the city itself, many bearing inscriptions in the peculiar local alphabet. They show a continuous progress from the simplest ornamentation to fully-developed black-figured wares. In the earliest (Plate I. fig. 52) oriental influence is very marked, the surface being so covered with the figures and patterns that the background disappears and the designs are at times almost unintelligible. The general effect is thus that of a rich oriental tapestry, and the subjects are largely chosen from the fantastic and monstrous creations of Assyrian art, such as the sphinx and gryphon. The vases are mostly small, the ground varies from cream to yellow, and the figures are painted in black and purple.

Both in Ionia and at Corinth during the early part of the 6th century the same tendencies are seen to be at work, tending to a unification of styles under the growing influence of Athens. In Ionia (see above) figure subjects become more common, and the technique approaches gradually nearer to the black-figure method. Similarly at Corinth the ground ornaments diminish and disappear, the friezes of animals are restricted to the borders of the designs, and human figures are introduced, first singly, then in friezes or groups, and finally engaged in some definite

action such as combats or hunting scenes. In the last stages Greek myths and legends are freely employed. A new develop- ment, traditionally associated with the painter Eumarus of Athens, was the distinguishing of female figures by the use of white for flesh tints. A somewhat similar development was in progress at Athens, though represented by comparatively few vases. Here the adoption of Corinthian and Ionian technical improvements evolved by the middle of the 6th century the fully developed black-figure style which by degrees supplanted or assimilated all other schools.

II. Black-figured Vases. — At the head of this new development stands the famous Francois vase at Florence, found at Chiusi in 1844 (Plate I. fig. 53). Its shape is that of a krater or mixing-bowl, and it bears the signatures of its maker and decorator in the form ” Ergotimos made me, Klitias painted me.” It might be described as a Greek mythology in miniature, with its numerous subjects and groups of figures all from legendary sources such as the stories of Peleus, Theseus and Meleager, or the return of Hephaestus to heaven. All the figures have their names inscribed.

The general technique of the black-figured vases has already been described. It may be noted as a chronological guide that the use of purple for details is much commoner in the earlier vases, white in the later, but towards the end of the century when the new fashion of red figures was gaining ground, both colours were almost entirely dropped. The drawing of the figures is, as might be expected, somewhat stiff and conventional, though it advanced considerably in freedom before the style went out of fashion. Many vases, otherwise carefully and delicately executed, are marred by an excess of mannerism and affectation, as in the works of the artists Amasis and Exekias (Plate I. fig. 54). The treatment of drapery is a good indication of date, ranging from flat masses of colour to oblique flowing lines of angular falling folds.

The shapes most commonly employed by the Athenian potters of this period are the amphora, hyalria, hylix, oinochoe and lekythos, the first-named being the most popular. A special class of amphorae is formed by the Panathenaic vases, which were given as prizes in the Athenian games, and were adorned with a figure of the patron goddess Athena on one side and a representation of the contest in which they were won on the other (fig. 26) . They usually bear the inscription ruv 'hBT\vrfitv aO'Siov djxi, " I am (a prize) from the games at Athens." Some of these can be dated by the names of Athenian archons which they bear, as late as the 4th century, the old method of painting in black figures with a stiff conventional pose for the goddess being re- tained for religious reasons.

The chief interest of the black- figured vases is really derived from their subjects, which range over every conceivable field, the proportion of myth and legend to scenes from daily life being much greater than in the suc- ceeding period. They include groups of Olympian and other deities, and the various scenes in which they take part, such as the battle of the gods and giants, or the birth of Athena (treated in a very conventional manner, as on a fine amphora in the British Museum) ; Dionysus and his attendant satyrs and maenads, the labours and exploits of Heracles and other heroes, subjects taken from the tale of Troy and other less familiar legends; and scenes from daily life, battle scenes, athletics, the chase and so on. The same classifica- tion of course holds good for the later periods of vase-painting, f with some exceptions. The proportion of genre-scenes subse- I quently becomes greater, and some myths disappear, others rise

Fig. 26. — Panathenaic amphora;

into prominence, new deities such as Eros (Love), and Nike (Victory) appear for the first time, and, generally speaking, the later subjects are characterized by a sentimentality or tendency to emotion which is entirely foreign to the conventional stereo- typed compositions of the 6th century artist.

A remarkable feature of the subjects on black-figured vases is

that a stereotyped form of composition is invariably adopted at least for the principal figures, but minor variations are generally to be found, as, for instance, in the number of bystanders; and it is almost an impossibility to find any two vase-paintings which are exact duplicates. The form of the composition was partly determined by the field available for the design ; when this took the form of a long frieze the space was filled up with a series of spectators or the repetition of typical groups, but when the design is on a framed panel or confined by ornamental borders the method of treatment is adapted from that of a sculptured metope, and the figures limited to two or three. In many cases it is difficult to decide, in the absence of inscriptions, whether or no a scene has mythological signification; the mythological types are over and over again adopted for scenes of ordinary life, even to the divine attributes or poses of certain figures.

Among the artists of the period who have left their names on the vases, besides those already mentioned, the most conspicuous is Nicosthenes, a potter of some originality, from whose hand

the artist Andocides, who not only produced vases in each method, but also several in which the two are combined (fig. 27). In two or three cases the subject is actually the same on each side, almost every detail being repeated, except that the colouring is reversed.

The date at which the change took place was formerly placed well on in the 5 th century, on account of the great advance in drawing which most of the red-figured vases show, as compared with the black. They were thus regarded as contemporary with the painter Polygnotus, if not with Pheidias. But the excavations on the Acropolis of Athens yielded so many frag- ments in the advanced red-figured style which must be earlier than 480 B.C., that it has become necessary to find an earlier date for its appearance. This is now usually placed at about 520 B.C., overlapping with the preceding period.

The red-figure period is usually subdivided into four, marking the chief stages of development, and known respectively as the “severe,” “strong,” “fine,” and “late fine” periods. Their principal characteristics and representative painters may be briefly enumerated.

In the severe period there is no marked advance on the black-

figured vases as regards style. The figures are still more or less stiff and conventional, and some vases even show signs of an analogous decadence. The real development is partly technical,

Vase by Andocides. Black figures on obverse.

Fig. 27.

Vase by Andocides. Red figures on reverse.

we have over seventy examples, a few being in the red-figure method. He is supposed to have introduced at Athens a revival of the Ionic fashion of painting on a cream-coloured ground instead of on red, of which some very effective examples have been preserved. He was always a potter rather than a painter, and most of his vases are remarkable for their forms — intro- ducing plastic imitations of metal vases — rather than for their painted decoration. Most of the artists of this period, as in the succeeding one, have left their signatures on cups (kylikes), but this form did not receive so much attention from the painter as at a later period, and many of these examples bear only inscriptions and no painted decoration.

III. Red-figured Vases. — The sudden reversal of technical method involved in the change from black figures on a red ground to red figures on black is not at first sight easy of explanation. Some artists, like Nicosthenes and Andocides, used both methods, sometimes on the same vase, and there is no doubt that the two went on for some years concurrently. As, however, no inter- mediate stage is possible, there is no question of development or transition. The new style was in fact a bold and ingenious innovation. It may possibly have been suggested by a small class of vases in which the figures are painted in the black-figure method, but have the converse appearance, that is to say they are painted in a thick red pigment on a ground of shining black. It may therefore have occurred to the artist that he could obtain the same effect merely by leaving the figures unpainted on the red clay and surrounding them with the black. The change, must, however, be closely associated with the career of

partly in the introduction of new subjects. Although the change of style probably had its actual origin in the amphora, as treated by Andocides, the new developments are best seen in the kylix, a form of vase which now sprang into popularity and called forth

the chief efforts of the principal artists. Its curved surface gave ample scope for skilful effects of drawing and decorative arrangement, and the earlier painters devoted all their attention to perfecting it as a work of decorative art. For other shapes, such as the hydria and lekythos, the old method was for a time preferred.

The most typical artist of the period was Epictetus, and other famous cup-painters were Pamphaeus, Cachrylion and Phintias. The earliest cups are decorated in a quite simple fashion like those of the black-figure period, often with a single figure each side between two large ” symbolical ” eyes, and a single figure in a circle in the interior. To the latter the artist at first devoted his chief efforts, though even here his scope was at first limited. But although he had not yet attained to skill in composition, he did discover that the circular space was well adapted for exhibiting his newly-acquired abilities as a draughtsman and for disposing figures in ingeniously conceived attitudes. In all cases the object was to fill the space as far as possible, a char- acteristic of all the best Greek art. By degrees more attention was paid to the designs on the exterior, and the single figures were replaced by groups, but regular compositions in the form of friezes telling some story were not introduced until quite the end of this period. Epictetus was throughout his career a thoroughly ” archaic ” artist, but a considerable advance was

made by Cachrylion, who stands on the verge of the succeeding stage.

The strong period centres round the name of Euphronius, the author of a really great artistic movement. His capacity for inventing new subjects or new poses — or otherwise overcoming technical and artistic difficulties — marks a great advance on all previous achievements, and he seems to represent the stage of development traditionally associ- ated with the painter Cimon of Cleonae, the in-_ ventor of foreshort- ening and other novelties. Thus figures were no longer represented exclusively in pro- file, as in the black- figured vases which had made no ad- vance beyond the conventions of Egyptian art. Ten vases signed by him

are in existence (though it is not certain that all were actually painted by him), most of them having mythological sub- jects (fig. 28).

Of his contemporaries, Duris, Hieron and Brygus take foremost rank, all three being, like Euphro- nius, essentially cup-painters, though they use other forms at times. For decorative effect and beauty of composition their vases have never been surpassed. As an example we may quote a kotyle or beaker in the British Museum signed by Hieron, with a group of Eleusinian deities. The larger vases of this period are more rarely signed, but many of them rival the, cups in execu- tion, though the subjects are characterized by greater sim- plicity and largeness of style.

In the fine style (460-440 B.C.) breadth of effect and dignity are aimed at, and although cup- painting had passed its zenith, and signed specimens become rarer, yet, considering the red- figured vases as a whole, this period exhibits the perfection of technique and drawing. In many of the larger vases the scenes are of a pictorial char- acter, landscape being intro- duced, with figures ranged at different levels, and herein we may see a reflection of the style of the painter Polygnotus.. One of the finest cups in this style is in the Berlin Museum, it is signed by the artists Erginus and Aris- tophanes, and the subject is the battle of the gods and giants. To the end of the period belongs a beautiful hydria in the British Museum by the painter Meidias with subjects from Greek legend in twe friezes (fig. 29). Generally speaking, there is a reaction in favour of mythological subjects

Fig. 28. — Cup by Euphronius.

Fig. 29. — Mydria by Meidias in the style of Polygnotus.

In the late fine style, which begins about 440 B.C., the pictorial effect is preserved, but with perfected skill in drawing the com- positions deteriorate greatly in merit, and become at once over- refined and careless. The figures are crowded together without

meaningorinterest. The fashion also arose of enhancing the de- signs by means of accessory colours — almost unknown in the previous stages — such as white laid on in masses, blue and green, and even with gilding. Athletic and mythological subjects yield place to scenes from the life of women and children or meaningless groups of figures (fig. 30).

A good example of this style is an amphora from Rhodes with the subject of Peleus wooing Thetis, in which polychrome colouring and gilding are intro- duced. There are also many imposing and elaborate speci- mens found (and perhaps made) in the colonies of the Crimea and the Cyrenaica; in particular one signed by Xenophantus with the Persian king hunting, and an- other representing the contest of Athena and Poseidon for the soil of Attica, both from the Crimea. Contemporary with the red-figure method is one in which the figures are painted on a white slip or engobe resembling pipe- clay, with which the whole surface was covered; the figures are

drawn in outline in red or black, and partly filled in with washes of colour, chiefly red, purplish red, or brown, but sometimes also with blue or green. This style seems to have been popular about the middle of the 5th century B.C. and was employed for the funeral lekythoi which came into fashion at Athens about that time. These vases, which form a class by them- selves, were made specially for funeral ceremonies and were painted with subjects relating to the tomb, such as the laying-out of the corpse on the bier, the ferrying of the dead over the Styx by Charon, or (most fre- quently) mourners bringing offer- ings to the tomb (fig. 31). They continued to be made well on into the 4th century, but the later examples are very de- generate and careless.

Of other forms, especially the kylix and the pyxis (toilet-box), some exceedingly beautiful speci- mens have come down to us, which show a delicacy of draw- ing and firmness of touch never surpassed, although the lines were probably only drawn with a brush. The technique of these vases may reflect the methods of the painter Polygnotus and his contemporaries, who used a

limited number of colours on a white ground. Among them no finer specimen exists than the cup in the British Museum with Aphrodite riding on a goose; the design is entirely in brown outlines, and the drawing, if slightly archaic, full of grace and refinement. In the subjects on red-figured vases we do not find the same

Fig. 30. — Painting from a small toilet-box or pyxis, showing painted vases used to decorate a lady's room. On the left is a gilt pyxis with a tall lid, and an oenochoe on a low table; on the right two tall vases (lebes) on a plinth. All except the pyxis are decorated with painted figures, and contain flowers.

variety of choice as on the black-figured, but on the other hand there is infinitely greater freedom of treatment. The stereotyped form of composition is almost entirely discarded, and each painter forms his own conception of his subject. The class of slim amphorae, known as " Nolan " from the place where they were mostly found, are distinguished by having the design limited to one or at most two figures on each side, often on a large scale; these vases are also famous for the marvellous brilliance of their shining black (fig. 32).

Towards the middle of the 5th century the patriotism of the Athenian artist finds expression in the growing importance which he attaches to local legends, especi- ally those of Theseus, the typical Attic hero. He seems to have been regarded as the typical Athenian athlete or ephebus, and his contests as analogous to episodes of the gymnasium. Hence the grouping on some vases of scenes from his labours are like so many groups of athletes (fig. 33), and hence, too, a general tendency of the red-figured vases, especi- ally the cups, to become a sort of glorification of the Attic ephebus, the representations of whom in all sorts of occupations are out of all proportion to other subjects. .

We find evidence of this, too, in another Fig. 31. — Funeral form. Many vases, especially the cups of 1 e k y t h o s showing the « seyere ., and « strong » periods, bear

vases placed inside , . ., 5 4. v. j„„- .„

tomb. names of persons inscribed on the designs

with the word koX&s, "fair" or " noble," attached; sometimes merely, " the boy is fair." The exact meaning of this practice has been much discussed, but evi- dence seems to show that the persons celebrated must have been quite young at the time, and were probably youths famous for their beauty or athletic prowess. Some of the names are those of historical characters, such as Hipparchus, Miltiades or Alcibiades, and, though they cannot always be identified with these celebrated personages, enough evidence has been obtained te i-v of great value for the

chronology of the vases.

Further, the practice of the vase-painter of adopting his own particular favourite name or set of names has enabled us to increase our knowledge of the characteristics of individual artists by identifying unsigned vases with the work of particular schools.

IV. Vases of the Decadence. — For all practical purposes the red-figure style at Athens came to an end with the fall of the city in 404 B.C. Painted vases did not then altogether cease to be made, as the Panathenaic prize vases and the funeral lekythoi testify, but at the same time a rapid decadence set in. The whole tendency of the 4th century B.C. in Greece was one of decentralization, and the art of vase-painting was no exception, for we find that there must have been a general migration of craftsmen from Athens, not only to the Crimea and to North Africa, but also to southern Italy, which now becomes the chief centre of vase production. Here there were many rich and flourishing Greek colonies or Grecianized towns, such as Tarentum, Paestum and Capua, ready to welcome the new art as an addition to their many luxuries. In the character of the vases of this period we see their tend- encies reflected, especially in their splendid or showy aspect; the only aim being size and gaudy colouring.

The general method of paint- ing remains that of the Athenian red-figure vases, but with entire loss of simplicity or refinement, either in the orna- mentation, the choice of colours, or the drawing of the figures. Large masses of white are invariably employed, especially for the flesh of women or of Eros, the universally present god of Love, and for architectural details. Yellow is introduced for details of hair or features, and in attempts at shading, nor is a dull iron- purple uncommon. The reverses of the vases, when they have subjects, are devoid of all accessory colouring, and the figures are drawn with the greatest carelessness, as if not intended to be seen. There is throughout a lavish use of ornamental patterns such as palmettes, wreaths of leaves, or ornaments strewn over the field (a reversion to an old practice).

The drawing, having now become entirely free, errs in the opposite extreme; the forms are soft and the male figures often effeminate. The fanciful and richly-embroidered draperies of the figures and the frequent architectural settings seem to indicate

that theatrical representations exercised much influence on the vase-painters. The great painters of the 4th century may also have contributed their share of inspiration, but rather perhaps in the subjects chosen than in regard to style; though the effect of many scenes on the larger vases is decidedly pictorial, they are chiefly remarkable for their emotional and dramatic themes.

The influence of the stage is twofold, for tragedy as well as comedy plays its part. Many subjects are taken directly, others indirectly, from the plays of Euripides, such as the Medea, Hecuba (Plate II. fig. 60), or Hercules Furens, and the arrangement, of the scenes is essentially theatrical. The influence of

Fig. 32. — ■" Nolan " amphora by Euxitheus (c. 450 B.C.), figure of Briseis; the other side has Achilles.

comedy is seen in subjects derived from the phlyakes, a kind of farce or burlesque popular in southern Italy, and here again the setting is adapted from the stage, some vases having parodies of myths, others comic scenes of daily life.

Many vases of this period, especially those of large size, were expressly designed for funeral purposes. Some of these bear representations of the underworld, with groups of figures undergoing punishment. On others shrines or tombs are depicted — sometimes containing effigies of the deceased, at which the relatives make offerings — as on the Athenian lekythoi. But by far the greater portion of the subjects are taken from daily life, many of these being of a purely fanciful and meaningless character like the designs on Sevres or Meissen china; the commonest type is that of a young man and a woman exchanging presents, the presence of Eros implying that they are scenes of courtship.

The vases of this period are usually grouped in three or four different types, corresponding to the ancient districts of Lucania, Campania and Apulia, each with its special features of technique, drawing and sub- jects. In Lucanian vases the drawing is bold and restrained, more akin to that of the Attic vases; in Campania a fondness for polychromy is combined with careless exe- cution.

In Apulia a tendency to mag- nificence exempli- fied in the great funeral and the- atrical vases is fol- lowed by a period of decadence char- acterized by small vases of fantastic form with purely decorative sub- jects. Besides these we have the school of Paestum, repre- sented by two artists who have left their names on their vases, Assteas and Python. A well-known example of the work of the former is a krater in Madrid with Heracles destroy- ing his children, a theatrical and quasi-grotesque composi- tion, and there is a fine example of Python's work in a krater in the British Museum, with Alkmena, the mother of Heracles, placed on the funeral pyre by her husband Amphitryon, and rain-nymphs quenching the flames (Plate I. fig. 55).

About the end of the 3rd century B.C. the manufacture of painted vases would seem to have been rapidly dying out in Italy, as had long been the case elsewhere, and their place is taken by unpainted vases modelled in the form of animals and human figures, or ornamented with stamped and moulded reliefs. These in their turn gave way to the Arretine and so-called " Samian " red wares of the Roman period. In all these wares we see a tendency to the imitation of metal vases, which, with the growth of luxury in the Hellenistic age, had entirely replaced painted pottery both for use and ornament; the pottery of the period is reduced to a subordinate and utilitarian position, merely supplying the demands of those in the humbler spheres of life.

Collections. — The majority of the painted vases now in existence are to be found in the various public museums and collections of Europe, of which the largest and most important are the British Museum, the Louvre and the Berlin Museum. Next to these come the collections at Athens, Naples, Munich, Vienna, Rome and St Petersburg; isolated specimens of importance are to be found in other museums, as at Florence, Madrid or the Bibliotheque Ncitionale at Paris. Most of the great private collections of the two preceding centuries have now been dispersed. In recent years the

Fig. 33. — Cup with exploits of Theseus.

Boston Museum has raised America to a level with Europe in this respect; and the Metropolitan Museum at New York contains a vast collection of Cypriote pottery.

Literature. — Important original articles are to be found in various archaeological journals such as American Journal of

Archae- ology (1885, &c) ; Annual of the British School at Athens (1894, &~0 ‘< Athenische Mitteilungen (1876, &c); Bulletin de correspondence hellenique (1877, &c); Comptes rendus de la commission imperiale archeologigue (St Petersburg, 1859-1888) ; Gazette archeologigue (Paris, 1 875-1 889); Jahrbuch des kaiserlichen deutschen archao- logischen Instituts, Berlin (1886, &c); Journal of Hellenic Studies (1880, &c.)> Monumenti antichi (Milan, 1890, &c); Monuments grecs (Paris, 1872-1898); Monuments Piot (Paris, 1894, &c); Revue archeologigue (Paris, 1844, &c). The older works have been recently superseded by important publications embodying the latest views such as Hartwig, Die griechischen Meisterschalen des strengen rolfigurigen. Stils (1893); Louvre, Catalogue des vases antiques de terre cuite, by E.Pottier (1896, &c.) ; S. Reinach, Repertoire des vases peints (Paris, 1899-1900); H. B. Walters, History of Ancient Pottery (Greek, Etruscan and Roman), 1905, with an excellent bibliographical list; also art. ” Hischylos” in J.H.S. xxix. (1909) p. 103.

Etruscan Pottery.— Parallel with the development of the art of pottery in Greece runs the course of the art in Etruria, though with far inferior results; in its later stages it is actually no more than a feeble imitation of the Greek. The period of time which wemust consider extends from the Bronze age (1000 B.C. or earlier) down to the 3rd century B.C., when Etrus- can civilization was merged into Roman.

The earliest civil- ization traced in Italy is not, strictly speaking, Etruscan, but may perhaps be more accurately styled “Umbrian.” It is usually referred to as the ” Terramare ” period from the remains discovered in that dis- trict in the basin of the Po. These people were lake- dwellers, barely removed from the Neolithic stage of culture, and their pottery was of the rudest kind, hand-made and roughly baked. Cups and pots have been found sometimes with simple decoration in the form of knobs or bosses, and many have a crescent-shaped handle serving as a support for the thumb.

The next period, the earliest which” can be spoken of as ” Etruscan,” is known as the ” Villanova ” period, from a site of that name near Bologna, or as the period of pit-tombs (a pozzo), from the form of the graves in which the pottery has been found (see Villanova). It begins with the 9th century B.C. and lasts for about two hundred years. The pit-tombs usually contain large cinerary urns or ossuaria (containing the ashes of the dead),

fashioned by hand from a badly-levigated volcanic clay known as impasto Italico. These vessels were irregularly baked in an open fire, and the colour of the surface varies from red-brown to greyish black. They appear to have been covered with a polished slip, intended to give the vases a metallic appear- ance. The shape of the urns is peculiar, but uniform; they have a small handle at the widest part and a cover in the form of an inverted bowl with handle (Plate III. fig. 63) . Their ornamenta- tion consists of incised or stamped geometrical ornaments formed in the moist clay in bands round the neck and body; more rarely patterns painted in white are found. Common pottery is also found showing little advance on that of the Terramare

period except in variety of decoration. The technique and ornament are the same as in the case of the urns. They corre- spond in development, though not in date, to the early pottery of Troy and Cyprus, as well as to the primitive pottery of other races, but one marked difference »is the general fondness of the Italian potter for vases with handles.

Sometimes the cinerary urns take the form of huts (tuguria), though these are more often found in the neighbourhood of Rome. One of the best examples is in the British Museum; it still contains ashes which were inserted through a little door secured by a cord passing through rings. The ornamentation suggests the rude carpentry of a primitive hut, the cover or roof being vaulted with raised ridges to represent the beams. The surface is polished, and other specimens are occasionally painted with patterns in white.

In the next stage a change is seen in the form of the tombs, the pit being replaced by a trench; this is accordingly known as the ” trench-tomb ” or a fossa period, and extends from the 8th century B.C. to the beginning of the 6th. Importations of Greek pottery now first make their appearance. The character of the local pottery actually remains for some time the same as that of the preceding period, but it improves in technique. By degrees an improvement in the forms is also noted, and new varieties of ornamentation are introduced; there is, however, no evidence

that the wheel was used.

Two entirely new classes of pottery are found at Cervetri (Caere) belonging to the 7th century. One consists of large jars (viffoi) of red ware, the lower part being moulded in ribs, while the upper has bands of design stamped round it in groups or friezes. These designs were either produced from single stamps or rolled out from cylinders like those used in Babylonia, The subjects are usually quasi-oriental in character, and it is not certain that this ware was made in Etruria, especially as similar vases have been found in Rhodes and Sicily; either it was imported, or it was a local imitation of Greek models.

The other class is similar as regards the shapes and the nature of the clay, but is distinguished by having painted subjects in white outlines on a red glossy ground. The clay, a kind of impasto Italico, was first hardened by baking, and then a mixture of wax, resin and iron oxide was applied and polished; on this the pigments, a mixture of chalk and earth, were laid. The subjects are from Greek mythology or are at least Greek in character, but the technique is purely Etruscan, and the drawing is crude and un-Greek in the extreme.

The fourth period shows a close continuity with the third; but the difference is defined firstly by the appearance of a new type of tomb in the form of a chamber {a camera) , secondly, by the all-pervading influence of oriental art, and to a less extent of that of the Greeks The period extends from about 650 to 550 B.C., and is further marked by the general introduction of the wheel into Etruria arid by the appearance of inscriptions in an alphabet derived from western Greece. In the earlier tombs the typical local pottery is of hand-made impasto Italico resem- bling that of the previous periods; in the later we find what is known'as bucchero ware — the national pottery of Etruria — which is made on the wheel and baked in a furnace, and shows a marked tendency to imitate metal.

To this period also belongs the famous Polledrara tomb or Grotto d'lside at Vulci, the contents of which are now in the British Museum and include some remarkable specimens of pottery. It dates from about 620-610 B.C. The most remarkable of the vases is a hydria, of reddish-brown clay covered with a lustrous black slip on which have been painted designs in red, blue and a yellowish white. The colours have unfortunately now almost disappeared, and it is doubtful if they had been fired. The

principal subject is from the story of Theseus and Ariadne. This tomb also contained a large wheel-made pithos of red impasto ware with designs painted in polychrome. In the Regulini-Galassi tomb at Cervetri (about 650 B.C.) large cauldrons of red glossy ware were found, with gryphons' heads projecting all round, to which chains were attached. A similar cauldron from Falerii on a high open-work stand is now in the British Museum.

We now come to the bucchero ware, which is characteristic of the later portion of this period, though the earliest examples go back to the end of the 7th century. Its main feature is the black paste of which it is composed, covered with a more or less shining black slip. Modern experiments seem to indicate that the clay was smoked or fumigated in a closed chamber after baking, becoming thereby blackened throughout, and the surface was then polished with wax and resin. Analyses of the ware have proved that it contains carbon and that it had been lightly fired. The oldest bucchero vases are small and hand-made, sometimes with incised geometrical patterns engraved with a sharp tool like metal-work. Oriental influence then appears in a series of chalice-shaped cups found at Cervetri with friezes of animals. From about 560 B.C. onwards the vases are all wheel-made, with ornaments in relief either stamped from a cylinder or composed of separate medallions attached to the vase. The subjects range from animals or monsters to winged deities or suppliants making offerings (fig. 34) ; in other cases we find meaningless groups of figures or plant forms. These types are found chiefly in southern Etruria, but at Chiusi (Clicsium) a more elaborate variety found favour from about 500 to 300 B.C. The shapes are very varied and the ornament covers the vase from top to bottom, the covers of the vases being also frequently modelled in various forms. The figures are stamped from moulds, incised designs being added to fill up the spaces. The range of subjects is much widened, including scenes from Greek mythology and oriental types combining Egyptian and Assyrian motives, which must have been introduced by the Phoenicians.

Thus the technique of the

bucchero wares is purely native,

but the decoration is entirely

dependent on foreign types

whether Greek or oriental, and

throughout the whole series the

tendency to imitate metal-work ■ , r 1 ?’ u 34 “~i5′ vl r

. , , J , ,. , . ., black bucchero ware, with figures

in relief. (British Museum.)

is to be observed in every detail,

both in the forms and in the

methods of decoration. Some are mere counterparts of existing

work in bronze.

The last variety of peculiarly Etruscan pottery which call? for notice is the Canopic jar, so called from its resemblance to the KavuTOt. in which the Egyptians placed the bowels of their mummies. They are rude representations of the human figure, the head forming the cover, and in the tombs were placed on round chairs of wood, bronze or terra-cotta. An example of such a jar on a bronze-plated chair may be seen in the Etruscan Room of the British Museum (Plate III. fig. 65). Their origin has been traced to the funeral masks found in the earliest Etruscan tombs. From these a gradual transition may be observed from the mask (1) placed on the corpse, (2) on the cinerary urn, (3) the head modelled in the round and combined with the vase, and (4) at last the complete human figure. The earliest of these jars are found in. the ” pit-tombs ” of the 8th century B.C., and the latest and most developed types belong to the 5th century B.C.

The skill shown by the Etruscans in metal-work and gem-engraving never extended to their pottery, which is always purely imitative, especially when they attempted painted vases after the Greek fashion. The kinds already described are all more or less plastic in character and imitative of metal, except in the case of the Cervetri and Polledrara finds, which have little in common with anything Greek, and exhibit a quite undeveloped art. But towards the end of the 6th century B.C., when Greek vases were coming into the country in large numbers, attempts were made to

imitate the black-figure style, especially of a particular class of Ionian vases. Imitations of these are to be found in most museums and may be readily recognized as Etruscan from peculiarities of style, drawing and subject, as well as their inferior technique (fig. 35).

Fig. 35. — Etruscan Amphora imitating Greek style; parting scene of Alcestis and Admetus, with Etruscan inscriptions.

At a later date (4th-3rd century B.C.) they began to copy red-figured vases with similarly unsuccessful results. With the exception of a small class of a somewhat ambitious character made at Falerii (Civita Castellana), of which there is a good example in the British Museum with the subject of the infant Heracles strangling the serpents, they are all marked by their inferior material and finish and their bizarre decoration. The style is often repulsive and disagreeable, as well as ineffective, and the grim Etruscan deities, such as Charun, are generally introduced. Some of these vases have painted inscriptions in the Etruscan alphabet. The latest specimens positively degenerate into barbarism.

Painted vases of native manufacture are also found in the extreme south of Italy and have been attributed to the indigenous races of the Peucetians and Messapians; their decoration is partly geometrical, partly in conventional plant forms, and is the result of natural development rather than of imitation of Greek types. Some of the shapes are characteristic, especially a large four-handled kraler. They cover the period 600-450 b.c, after which they were ousted by the Graeco-Italian pro- ductions we have already described.

Roman Pottery. — Roman vases are far inferior to Greek; the shapes are less artistic, and the decoration, though sometimes not without merits of its own, owes most of its success to the imitation or adaptation of motives learnt from earlier Grecian, Egyptian or Syrian potters. They required only the skill of the potter for their completion, and, being made by processes largely mechanical, they are altogether on a lower scale of artistic production.

It has been noted that during a certain period — namely, the 3rd and 2nd centuries B.C. — ceramic art had reached the same stage of evolution all round the Mediterranean, painted pottery had been ousted by metal-work, and such vases as continued to be made were practically imitations of metal both in Greece and Italy. These latter we must regard as representing ordinary household pottery, or as supplying to those who could not afford to adorn their houses and temples with costly works in metal, a humble but fairly efficient substitute. There is a terra-cotta bowl of the 2nd century B.C. in the British Museum which is an exact replica of a chased silver bowl with reliefs in the same collection, and may serve as an illustration of this condition of things (Plate II. fig. 56).

These imitations of metal were largely made in southern Italy, a district which enjoyed close artistic relations with Etruria, and we have already seen that the same principle had long been in vogue among the Etruscans. Hence it is not surprising that an important centre of pottery manufacture should have sprung up in Etruria, in the 2nd century B.C., which for many years set the fashion to the whole Roman world. But before discussing such products it may be as well to say something on the technical character, shapes and uses of Roman pottery in general.

Technical Processes. — Roman pottery regarded in its purely tech- nical aspect is in some ways better known to us than the Greek, chiefly owing to extensive discoveries of kilns and potters' apparatus in western Europe. It may be classified under two heads, of which only the second will concern us for the most part as yielding by far the greater amount of material and interest: (1) the plain, dul' earthenware used for domestic purposes, and (2) the fine, red shining wares, usually known to archaeologists as terra sigittata, clay suited to receive stamps {sigilla) or impressions.

For both classes all kinds of clay were used, varying somewhat in different regions, and ranging in colour when fired from black to grey, drab, yellow, brown and red. The clays varied greatly in quality; most of the pottery made in southern Gaul was fashioned from the ferruginous red clay of the Allicr district, but at St-Rcmy-en-Rollat and in that neighbourhood a white clay was used. In Italy we find a carefully levigated red clay in use, great care being devoted to its preparation and admixture. But apart from decoration and style there is a great similarity in the general appearance of the Italian and provincial pottery made

under Roman influence, and it is often very. difficult to decide whether the vases were manufactured where they had been found or were imported from some famous centre of manufacture. The secret of the glossy red surface seems to have been common property and found its way from Italy to Gaul, Spain and Germany, and perhaps even to Britain.

The manner in which this glossy red surface was produced has been a much-disputed question, some, as for instance Artis, the excavator of the Castor potteries in Northamptonshire, claiming that it was a natural result obtained in the baking, after polishing of the surface, by means of specially contrived kilns. But it is now generally agreed that it was artificial. It is true that the Roman lamps and many of the commoner wares have a gloss produced by polishing only, varying in colour and brightness with the proportion of iron oxide in the clay and the degree of heat at which the pieces were fired. But the surface finish of the finer or terra sigillata wares is something quite distinct, and reaches a high and wonderfully uniform perfection.

It is possible that the technical secret of the potters of the Roman world was only a development from the practice of the Greeks, but it does seem as if the finer Roman wares were coated with a brilliant glossy coating so thin as to defy analysis, yet so persistent as to leave no doubt of its existence as a definite glossy coat. Repeated at- tempts have been made to determine its nature by analysis, but chemists ought to have known better, for the coating is so thin that it is impossible to remove it without detaching much more body than glaze. Examination shows it to be much more than a surface polish or than the gloss of the finest Greek vases, and we shall have to wait for a final determination of its nature until some one who is at once a chemist and a potter can reconstruct it synthetically. What- ever its nature and method of production, it is certain that the glaze itself was a transparent film which heightened the natural red colour of the clay, until in the finest specimens it has something of the quality of red coral.

In the manufacture of vases the Romans used the same processes as the Greeks. They were all made on the wheel, except those of abnormal size, such as the large casks (dolia), which were built up on a frame. Specimens of potters' wheels have been found at Arezzo and Nancy, made of terra-cotta, with a pierced centre for the pivot, and bearing small cylinders of lead round the circum- ference to give a purchase for the hand and to aid the momentum

of the wheel. For the ornamental vases with reliefs an additional process was necessary, and the decoration was in nearly all cases produced from moulds. The process in this case was a threefold one: first the stamps had to be made bearing the designs; these were then pressed upon the inside of a clay mould which had been previously made on the wheel to the size and shape required ; finally, the clay was impressed in the mould and the vase was thus produced, decoration and all. Handles being of rare occurrence in Roman pottery, the vases were thus practically complete, requiring only the addition of rim and foot. The stamps were made in various materials, and had a handle at the back (Plate III. fig. 64). The moulds were of lighter clay than the vases, and were lightly fired when completed, so as to absorb the moisture from the pressed-in clay. Large numbers of these moulds are in existence (Plate III. fig. 61), and the British Museum possesses a fine series from Arezzo. Those discovered in various parts of Gaul have afforded valuable evidence as to the sites of the various pottery centres, as their presence obviously denoted a place of manufacture, and the value of this evidence is increased when they bear potters' names.

Remains of kilns for baking Roman pottery ' are very numerous in western Europe, especially in Gaul, where the best examples are at Lezoux near Clermont, at Chatelet in Haute-Marne, and near Agen in Lot-et-Garonne. In Germany good remains have come to light at Heiligenberg in Baden, at Heddernheim near Frankfort, Rhcinzabern near Carlsruhe, and Westerndorf in Bavaria. In England the best kilns are those discovered by Artis in 1821-1827 at Castor in Northamptonshire (see fig. 4).

Shapes. — As is the case with Greek vases, a long list of names of

J For a full description and lists of such kilns see Walters, Ancunt Pottery, ii. 443-454.

shapes may be collected from Latin literature, and the same difficulties as to identification arise in the majority of cases. They may, however, be classified in the same manner; as vases for storing liquids, for mixing or pouring wine, for use at the table,

and so on. In addition Varro and other writers have preserved a number of archaic and obscure names chiefly applied to the vases used in sacrifices.

The principal vases for storing liquid or solid food were: — The dolium, el large cask or barrel of earthenware ; the amphora, a jar holding about six gallons; and the cadus, a jar about half as large as the amphora. The dolium had no foot, and was usually buried in the earth ; it was also used for purposes of burial. The amphora corresponds to the Greek wine-jar of that name, and had, like its prototype, a pointed base. Many examples were found at Pompeii stamped with the names of consuls (cf. Hor. Od. iii. 21. i), or with painted inscriptions relating to their contents. The cadus is men- tioned by Horace and Martial.

Of smaller vases for holding liquids, such as jugs, bottles and flasks, the principal were the urceus, answering to the Greek oivoxori, the ampulla, a kind of flask with globular body, and the lagena, a narrow-necked flask or bottle. Of drinking-cups the Romans had almost as large a variety as the Greeks, and the great majority of the ornamented vases preserved to the present day were devoted to this purpose. The generic name for a cup was poculum, but the Romans borrowed many of the Greek names, such as cantharus and scyphus. The calix appears to have answered in popularity, though not in form, to the Greek kylix, and is probably the name by which the ornamented bowls were usually known. The names for a dish are lanx, patina and catinum. Another common form is the olla (Greek xirpaj, which served many purposes, being used for a cooking-pot, for a jar in which money was kept, or for a cinerary urn. The form of vase identified with this name has a spherical or elliptical body with short neck and wide mouth. Of sacrificial vases the principal was the patera or libation-bowl, corresponding to the Greek 0taXij.

Arretine Ware. — The Latin writers, and in particular Pliny, mention numerous places in Italy, Asia Minor and elsewhere, which were famous for the production of pottery in Roman times. Pliny mentions with special commendation the ” Samian Ware,” the reputation of which, he says, was maintained by Arretium (Arezzo). Samian pottery is also alluded to by other writers, and hence the term was adopted in modern times as descriptive of the typical Roman red wares with reliefs, whether found in Italy, Germany, Gaul or Britain. But it was only accepted with diffidence as a convenient name, and as early as 1840 discoveries at Arezzo made it possible to distinguish the vases found there as

a local product, now known as “Arretine” ware. The name ” Samian ” has, however, adhered to the provincial wares and at the present day is often used even by archaeologists. But recent researches have shown that nearly all the provincial wares can be traced to Gaulish or German potteries, and, since it is implied by Pliny that ” Samian ” pottery is older than ” Arretine,” the name may now be fairly rejected altogether, as we have rejected the name ” Etruscan ” for Greek pottery. The Romans probably used it as a generic term, just as we speak of ” china,” and the real Samian ware is to be seen in the later Greek pottery, with reliefs, of the 3rd century B.C.

There were, as Pliny and other writers imply, many pottery centres in Italy, at Rhegium, Cumae, Mutina and elsewhere, as well as at Saguntum in Spain, but all were surpassed in excellence by Arretium. In more modern times its pottery came under notice even in the middle ages, and discoveries were made in the time of Leo X. (about 1500) and again in the 18th century. The Arretine ware may be regarded as the Roman pottery par excellence, and its popularity extended from about 150 B.C. down to the end of the 1st century of the Empire, reaching its height in the 1st century B.C., after which it rapidly degenerated, and its place was taken by the wares of the provinces. Its general characteristics may be summed up as follows: — (1) The fine local red clay, carefully levigated and baked very hard to a rich coral red or a colour like sealing-wax; (2) the fine red glaze, which has already been discussed; (3) the great variety of forms employed, showing the marked influence of metal-work; (4) the almost invariable presence of stamps with potters’ names. The majority of the specimens have been found at Arezzo itself, but there was a branch of the industry at Puteoli, producing pottery almost equal in merit, and it was also exported to central and eastern Europe and Spain.

The earliest examples are of black glossy ware, but the red appears to have been introduced by 100 B.C., when the first potters’ stamps appear. These are usually quadrangular in form, though other shapes are found, and are impressed in the midst of the design on the ornamented vases, or on plain wares on the bottom of the interior. The number of potters’ names is very large, though some appear to have been more prolific than others, and to have employed a large number of slaves, whose names appear with their masters’ on the stamps. The best known is Marcus Perennius, whose wares take highest rank for their artistic merit, the designs being copied from good Greek models.

He employed seventeen slaves, of whom the best known is Tigranes, the stamps usually appearing as M-PEREN and TIGRAN. The slave-name of Bargates is found on one of his finest vases, in the Boston Museum, the subject being the fall of Phaethon. We may suppose that the stamps for the figures were designed by the masters, but that the vases were actually moulded by the slaves. Other important artists are Calidius Strigo, who had twenty slaves; P. Cornelius, who had no less than forty; Aulus Titius, who signs himself A-TITI-FIGVL- ARRET; the Annii and the Tetii; and L. Rasinius Pisanus, a degenerate potter of the Flavian period, who imitated Gaulish wares.

The forms of the vases are all, without exception, borrowed from metal shapes and are of marked simplicity (see fig. 37, Nos. 1, 8, 9, 11). They are mostly of small size and devoid of handles, but a notable exception is a bell-shaped krater or mixing- bowl, of which there is a very fine example in the British Museum, found at Capua and decorated with the four seasons (Plate III. fig. 62). For the decoration and subjects the potters undoubtedly drew their inspiration from the ” new-Attic ” re- liefs of the Hellenistic period, of which the krater just cited is an example. So, too, are such subjects as the dancing maenads or priestesses with wicker head-dresses, or the Dionysiac scenes which are found, for instance, on the vases of Perennius. Others again are distinguished by a free use of conventional ornament, figures when they occur being merely decorative. There is throughout a remarkable variety both in the ornamentation and in the methods of composition.

Provincial Wares. — The Arretine ware, as has been noted, steadily degenerated during the 1st century of the Empire, and the manufacture of ornamental pottery appears to have entirely died out in Italy by the time of Trajan. Its place was taken by the pottery of the provinces, especially by that of Gaul, where the transference of artistic traditions led to the rise of new industrial centres in the country bordering on the Rhone and the Rhine.

As to the general characteristics of the provincial wares, that is, of the ornamented wares or terra sigillata, the clay is fine and close-grained, harder than the Arretine, and when broken shows a light red fracture; the surface is smooth and lustrous, of a brighter yet darker red colour (i.e. less like coral) than that of Arretine ware, but the tone varies with the degree of heat used. The most important feature is the fine glaze with which it is coated, similar in composition to that of the Arretine; it is

exceedingly thin and transparent, and laid equally over the whole surface, only slightly brightening the color of the clay. The ornament is invariably coarser than that of Arretine ware, by which, however, it is indirectly inspired.

The vases are usually of small dimensions, consisting of various types of bowls, cups and dishes, of which two or three forms are preferred almost to the exclusion of the rest, and they frequently bear the stamp of the potter impressed on the inside or outside. Although this ware is found all over the Roman world, by far the greater portion comes from Gaul, Germany or Britain, and evidence points to two — and only two — districts as the principal centres of manufacture: the valleys of the Loire and the Rhine and their immediate neighbourhood. In the 1st century a.d. Gaulish pottery was largely exported into Italy, and isolated finds of it occur in Spain and other parts.

The recent researches of Dr Dragendorff and M. Dechelette have shown that a chronological sequence of the pottery may be clearly traced, both in the shapes employed and in the method of

decoration; and, further, that it is possible — at least as regards Gaul — to associate certain potters' names and certain types of figures, though found in many places, with two centres in particular, Graufesenque near Rodez (department of Aveyron) in the district occupied by the Ruteni, and Lezoux near Clermont (department of Puy-de-D6me) in the country of the Arverni.

The periods during

< ■ ■ ?tf_... » which these potteries

flourished are con- secutive, or rather overlapping, but not contemporaneous, the former being practically coinci- dent with the 1 st century a.d., the latter with the 2nd and 3rd down to about a.d. 260, when the manufacture of terra sigillata practically came to an end in Gaul.

There were also certain smaller potteries, some of which mark a transition between the Italian and provincial wares, in the north

of Italy and on the Rhine and upper Loire, e.g. St Remy-en-Rollat, and others of later date, as at Banassac and Montans in the latter district, but none of these produced pottery of special

Fig. 36. — Bowl of Gaulish ware, with moulded patterns in slight •relief .

\D

is usually spoken of as No. 29. This is characterized by its moulded rim engraved with finely incised hatchings, and by the division of the body by a moulding into two separate friezes for the designs (fig. 36). Its ornament is at first purely decorative, consisting of scrolls and wreaths, then small animals and birds are introduced, and finally figure subjects arranged in rectangular panels or circular medallions. About the middle of the century a second variety of bowl (known as No. 30; see fig. 37) was intro- duced; this is cylindrical in form, and, being found both at Graufesenque and Lezoux, may be regarded as transitional in character. In the latter half of this century a new form arises (No. 37; fig. 37), a more or less hemispherical bowl which holds the field exclusively on all sites down to the termination of the potteries. In this form and in No. 30 a new system of decoration is introduced, the upper edge being left quite plain. The panels and medallions at first prevail, but are then succeeded by arcad- ing or inverted semicircles enclosing figures, and finally after the end of the 1st century (and on form 37 only) we find the whole surface covered with a single composition of figures unconfined by borders or frames of any kind, but in a continuous frieze; this is known as the ” free ” style (Plate IV. fig. 69).

As regards the figure subjects, it may be generally laid down that the conceptions are good, but the execution poor. Many are obvious imitations of well-known types or works of art, and the absence of Gaulish subjects is remarkable. They include repre- sentations of gods and heroes, warriors and gladiators, hunters

Fig. 37.— Shapes used in Roman Pottery. 1-11, Arretine; 18-65, Gaulish and German.

merit or importance. The early Rhenish wares are, strictly speaking, of a semi-Celtic or Teutonic character, while the later

German terra sigillata, for which the principal centres were Rheinzabern near Carlsruhe and Westerndorf in Bavaria, are of similar character but inferior to the 2nd-century pottery of Lezoux. A mould from Rheinzabern is illustrated, Plate IV. fig. 66.

The ornamented vases produced in these potteries are, as we have said, almost confined to two or three varieties, which follow one another chronologically. A shape favoured at first is the krater, which has been mentioned as one of the characteristic Arretine forms; but this enjoyed but a short term of popularity. Early in the 1st century we find a typical form of bowl in use, which, following the numeration of Dr Dragendorff's treatise,

and animals, the two latter classes being pre-eminently popular. ;

The potters' names at Graufesenque are nearly all of a common Roman type, such as Bassus, Primus, Vitalis; those at Lezoux are Gaulish in form, such as Advocisus, Butrio, Illixo or Lax- trucisa. This seems to imply that Roman influence was still strong in the earlier centre which drew its inspiration more directly from Arretium. But even the purely Roman names are sometimes converted into Gaulish forms, as Masclus for Masculus, or Tornos for Turnus. The stamps are quadrangular in form, depressed in the surface of the vase with the letters in relief; on the plain wares they are usually in the centre of the interior, but on the ornamented vases are impressed on the exterior among the figures. The usual formula is OF (for officina) or M (for manu)

with the name in the genitive, or F, FE or FEC for fecit with the nominative.

Besides the ordinary terra sigillata with figures produced in moulds we find other methods of decoration employed. In the south of France, about Aries and Orange, vases were made with medallions separately moulded and attached round the body; these have a great variety of subjects, both mythological and gladiatorial or theatrical, or even portraits of emperors. There is a remarkable specimen in the British Museum with a scene from the tragedy of the Cycntts, on which Heracles and Ares are

represented, with seated deities in the background (Plate IV. fig. 67). The date of these reliefs is the 3rd century after Christ. Of the same date is a somewhat similar ware made at Lezoux. Here each figure is attached separately to the vase, and the background is filled in with foliage produced by the method known as en barbotine (slip-painting), of which we shall speak presently. The effect of these vases, which are mostly large jars or ollae (Plate IV. fig. 70), is often very decorative, and there is a fine specimen in the British Museum from Felixstowe, on which the modelling is really admirable. Other good examples have been found in various parts of Britain.

The " slip-decoration " process is practically unknown in Italy, but it is found early in the 1st century of our era in Germany, and appears to have originated in the Rhine district. It is not confined to the red ware, but in the early German examples is applied on a dull grey or black back- ground. On the continent its use is almost limited to simple decorative patterns of scrolls or foliage, but in Britain it was largely adopted, as in the well-known Castor ware made on the site of that name (Durobrivae) in Northamptonshire. Many of the vases found or made here have gladiatorial combats, hunting-scenes, or chariots executed by this method (fig. 38) . The decoration was applied in the form of a thick viscous slip, usually of the same colour as the clay, but reduced to this consistency with water, and was laid on by means of a narrow tube or run from the edge of a spatula. The Castor ware appears to date from the 3rd and 4th centuries a.d. Painted wares are at all times rare, but were occasionally produced in Gaul, Germany and Britain. A notable class of such ware seems to have been produced in the Rhine district, repre- sented by small jars covered with a glossy black coating, on which are painted in thick white slip inscriptions of a convivial character, such as BIBE, REPLE, DA VINUM, or VIVAS (Plate IV. fig. 68) . A very effective ware, obviously imitating cut glass, by means of sharply incised patterns, was made at Lezoux in both the red and black varieties.

Literature. — Dragendorff in Bonner Jahrbiicher, xcvi. 37 ff. ; Dechelette, Vases ceramiques de la Gaule romaine (1904) ; Walters, Ancient Pottery, ii. chaps, xxi.-xxiii. ; British Museum Catalogue of Roman Pottery (1908). (H. B. Wa.)

Persian, Syrian, Egyptian and Turkish Pottery 1 Formerly, in all general accounts of the potter's art, it was the custom to pass over the period between the fall of the Roman empire and the

appearance of the beautiful Persian and Syrian pottery of the early middle ages, as if the intervening centuries had produced nothing worthy of note. Even yet the successive steps by which this beautiful art arose are largely matters of inference and deduction, but it must be borne in mind that while the Greeks and Romans made singularly little use of glaze and painted colour, the Egyptians and the inhabitants of Syria and Mesopotamia had long been noted for their skill in this direction. In discussing the pottery of these peoples we have already Jlpinted out at what a very early period they had developed the production of rich and beautiful coloured glazes — the Egyptians

1 See examples in colour on Plate V.

Fig. 38. — Jar of Castor ware, with reliefs of a stag pursued by a hound, exe- cuted in semi-fluid slip. 6 in. high.

as a jewel-like decoration of small pieces made in a very sandy paste, or actually carved from stone, and the Assyrians, on a bolder scale, in their glazed and coloured brickwork. Though the Egyptian and Syrian empires were overthrown, the peoples of these countries remained; and, as we are now aware, carried on their traditional craft, though in a less splendid way. There is abundant evidence that pottery was made in the Egypt of Roman times and later with rich turquoise blue and yellow glazes, though the potters had learned to produce this glaze on a material containing more clay and less sand than that used in earlier days. We know also that they had learned that the addition of lead oxide to a glaze enabled such glaze to be applied on vessels formed from clay which was sufficiently plastic to be shaped on the wheel. This knowledge was not confined to Egypt, but appears to have been spread over Syria and parts of Asia Minor; and throughout the Byzantine empire many forms of pottery were made which were clearly the starting-points of much of the fine pottery produced in Europe in later times. We find, for instance, side by side, a manufacture of bowls, dishes and vases of very simple shape, yet made of two distinct materials: (1) a whitish sandy body on which turquoise blue, green or even white glaze, consisting mainly of silicates of soda and lime, was used either without ornament or with simple painted patterns in black or cobalt blue under the glaze; (2) similar vessels made of a lightish red clay, also rather sandy and porous, coated with a white slip (pipeclay or impure kaolin) covered with a yellowish lead glaze. These vessels were decorated in a variety of ways: (1) Graffiati; patterns cut or scratched through the coating of white slip while it was still soft,

down to the red ground, so that when the vessel was glazed it displayed a pattern in dark upon a light ground. (2) Yellow and red ochre and copper scales were rudely ” dabbed ” over the white slip surface, so that when the vessel was glazed it presented a marbled or mottled appearance with touches of red, yellow, brown or green, on a yellowish- white ground. (See the section on Egyptian pottery above.) (3) Oxides of copper or iron were added to the lead glaze, and the resulting green or yellow glazes were applied to plain vases or to vessels decorated with moulded reliefs. In all these methods we see the continuation of old tradition in simpler forms, but we shall also see that these, in their turn, became the startingrpoint of much of the medieval pottery of Europe, particularly of Italy and the other southern countries.

In the same way, a little farther east, the Persians of Sassanian times seem to have preserved some of the traditions of the potters of Assyria, just as they inherited their skill; and the Assyrian device of raising strong brown outlines round a design to control the flow of coloured glazes, which is exemplified in the Frieze of Archers in the Louvre, was carried on by them, for it appears unchanged in the tiles of the Mosque of Mahommed I. built at Brusa in the 15th century. The intercourse between the Persian and Byzantine empires at this time must have led to a general diffusion of technical knowledge among the pottery centres of the various countries round the eastern end of the Mediterranean, though our knowledge is too fragmentary to furnish sufficient data for any definite placing of the progress made. Our informa- tion is mainly derived from the examination of the rubbish mounds at Fostat, or Old Cairo, in Egypt, by Dr Fouquet, and by eager inquirers like Henry Wallis. Fostat was built in a.d. 640 by Amr and destroyed in the 12th century; partially rebuilt, it was given over to pillage in 1252 by a Mameluke sultan, and all that remains is the Old Cairo of to-day, the rest of the site being covered with accumulated rubbish heaps. In the same way Rhagae or Rai, one of the ancient capitals of Persia, the site of which lies a,few miles east of Teheran, was destroyed about 1 220 by Jenghiz Khan. Like Fostat it was partially rebuilt, but was destroyed again in the following century, so that its existence practically ceased in the 14th century. Rhagae was once an important centre of the ceramic industry, but this was transferred to the neighbouring town of Veramin, in the 13th century. Excavations have also been made on the site of Rakka, near Aleppo, in Syria, and from all these

sources, and a few ethers p*

minor importance, much interesting light has been thrown on the development of the potter's art in these countries during the period between the 4th and 1 2th centuries. Yet, until systematic excavations have been made in Persia, Anatolia, Syria and the Delta, on the same scale as those which have proved so valuable in Greece, Crete, Cyprus and the valley of the Nile, we cannot hope to possess sound chronological data of the developments of the arts in these countries. Meantime the exact share which should be allotted to each district for its discoveries will remain ground of contention for scholars of conflicting schools, though there can be little doubt that Egypt and the southern part of Syria played a more important part than has generally been supposed in the development of the potter's art at this period.

Persian Pottery. — The most important pottery of the nearer East, whether considered on its own merits or from the influence it has exercised on the pottery of later times, is that so highly valued by collectors under the distinctive name of Persian; though much that passes under that name may not have been made in Persia. From the 10th to the 16th centuries the crafts- men of Persia were perfect masters of decorative design and colour; and, as potters, they possessed a sense of the forms proper to clay, such as none of the great races of antiquity ever exhibited. The shapes of Greek pottery speak more strongly of metal than of clay, but the best Persian work exhibits a feeling for the material that has rarely been equalled. The shapes are not only true clay-shapes but they are designed so as best to exhibit the qualities of the glaze and colour with which they were to be decorated. Certainly from the 12 th to the 16th centuries the pottery of the Persians must rank among the greatest achievements of the potter's art. The ware was shaped from various mixtures such as we have already spoken of — but whether its body was a mixture of white clay with a large pro- portion of sand, or some inferior clay that burnt to a yellowish or red tint, and was surfaced with a fine white coating of siliceous slip, or with a mixture of soda-glass, clay and oxide of tin, which made it whiter still — the one aim was to produce a white pottery. On this white ground — with a

coarsish absorbent surface — beautiful patterns, in conventional floral or animal forms, wert deftly painted in cobalt-blues, manganese-purples, copper-greens and turquoise, with mixtures for intermediate tints; while a strong brownish-black outline colour was com- pounded by mixing the oxides of iron and manganese, to be turned into a fine, still black by the addition of a trace of cobalt and later of oxide of chromium. Over this freely painted colour, often used in broad flat masses, a singularly limpid alkaline glaze, generally of considerable thickness, was fired until it just fused; and the resultant effect is of the most rich and brilliant colour relieved on a ground of slightly toned white. Judging from fragments which have been found at Rai, and which can scarcely therefore be later than the 13th century, we find the characteristic Persian style of ornament already developed; dumpy little figures kneeling, standing or riding on grass between cypress trees, or animals and birds similarly disposed, with conventional borders and bands of Cufic inscriptions. Another well-known type of pattern consists of highly conventionalized floral orna- ment which often runs to a beautiful tracery of ” arabesque ” lines. The drawing is generally finely outlined with brown , or black (a survival of the ancient Assyrian practice), and in the earliest pieces the flat washes of colour are laid in only in cobalt- blue, turquoise or green from copper, and shades of purple and brown from manganese. From the 16th century onwards Chinese influence is strongly felt both in the designs and in the colour schemes, particularly in the wares painted with patterns in blue only (fig. 39), which sometimes carry the imitation of Chinese porcelain so far as to bear forged Chinese marks. Finally, Shah Abbas I. (1 587-1629) is said to have brought a number of Chinese artificers, among them many potters, to Ispahan, and we find that Chinese porcelain was largely painted at King- tfi-Chen, with blue decorations in the Persian taste, so that we cannot be surprised at the growth of a hybrid Perso-Chinese style of decoration. From this period, however, Persian pottery deteriorated both in its technical and artistic aspects. Crudely

moulded figures in fairly high relief, coloured with an opaque yellow and green as well as with transparent blue and turquoise, began to make their appearance, especially on the famous Persian tiles; and in the 18th century the brown and black outlines of the drawing (a most valuable decorative resource) vanish, and we get brighter and more glittering, yet poorer colours, including a rose-red enamel fired over the glaze,

evidently imitated from the Chinese famille-rose porcelains of the 18th century.

The finest work appears to have been produced from the nth to the 14th centuries; yet so imperfect is our knowledge of what is truly Persian, Syrian or Egyptian, that we are forced to accept many conventional names that have perhaps little but custom to recommend them. There is, for instance, animportant class of pottery known, until recently, only from a few remark- ably handsome vases, and once called ” Siculo-Arab ” because these few examples had been mostly found in Sicily. This ware is characterized by its fine quality and its distinguished ornament — leaf-shaped panels with arabesques; interlacing patterns; striped and dotted bands ; friezes of animals or birds amidst

Fig. 39-

-Persian Plate painted in blues only. Albert Museum.)

(Victoria and

flowers and foliage, inscriptions, &c; all strongly and firmly drawn in black or brown outlines and washed in with a very pure cobalt-blue or with turquoise. In spite of the resemblance of these pieces to the oldest Persian wares, we know that bowls, dishes, vases and spoilt pieces of the same kind have been dug up on the site of Rakka near Aleppo; similar ware has been found at Fostat, together with evidences of local manufacture, and occasional pieces have been brought from Persia; so that probably this distinguished ware was made at Rakka in Syria between the 9th and the 13th centuries, and was afterwards made by Syrian potters both in Persia and Egypt.

Other Persian Wares. — We have already spoken of the pre- valent use of coloured glazes in all the countries of the nearer East — from Egypt to Persia — from remote times, either as the sole colour decoration or in conjunction with modelled or painted ornament. The fragments from Rai and Fostat include rich turquoise glazes (derived from the ancient Egyptian), deep and light-green glazes containing lead and copper, imitations of ancient Chinese celadon-green, a brownish-purple glaze, a coffee-brown glaze and a deep cobalt-blue glaze. 1 All these may be

1 A peculiarity of the Persian and allied blue glazes, of many shades, is that they appear to have been produced not by

dissolving the colouring matter in the glaze, but by coating the white ground of the ware with a thin wash of some cobaltiferous substance — probably an earth containing varying proportions of cobalt, man- ganese and iron — and then melting a thick alkaline glaze over it.

found either on plain vases, or on vessels with modelled orna- ment; or covering delicate floral or arabesque patterns painted in white slip or incised in the paste. Sometimes, even at this early period, there are traces of applied gold-leaf attached, but not fired, to the glaze.

At a Very early period, too, we find those beautiful bowls, dishes and vases decorated with geometrical or arabesque patterns in a singularly still underglaze black, and covered with the blue turquoise or green copper glazes. This characteristic and beautiful ware is common to Persia, Syria and Egypt in Saracen times, and it was soon prized in Europe, as is shown by the famous fragment found by the late Mr Drury Fortnum built into the outer walls of S. Cecilia in Pisa, where it was apparently placed in the 12th century. 1

At a later date a shining black glaze made its appearance, and in the 13th century pale and lapis-lazuli blues, while there is a comparatively modern sage-green glaze found only on pieces bearing patterns modelled in low relief.

Persian Porcelain. — This beautiful and somewhat mysterious ware — often called ” Gombroon ” ware — apparently made its appearance in the 13th century, though the bulk of the known examples are not earlier than the 17th or 18th century. The ware is quite translucent and is of soft and delicate texture. Unlike Chinese porcelain, it was made from a mixture of pipe-clay and glass, and was glazed with a soft lead glaze; so that a fragment of it would melt to an opaque glass in an ordinary porcelain oven. It is principally met with in the form of dishes, bowls (often mounted on feet) and saucers. The ‘pieces are generally very thin and are either perfectly plain or bear flutings or simple wavy patterns incised in the paste. Most characteristic and beautiful is

the decoration by means of delicate perforations either straight or lozenge-shaped. In the finest pieces the perforations are filled with glaze, and then they form a decoration analogous to the well-known ” rice-grain ” decoration of the Chinese. Occasional pieces are found decorated with colour, either a delicate green, producing an effect like pale bright celadon, or the well-known Persian blue ground; and this is sometimes decorated with lustre patterns. Nowhere can this rare and delicately beautiful ware be so well studied as in the Victoria and Albert Museum.

Lustred Ware. — The decoration of pottery with iridescent metallic films is one of the most astonishing and beautiful inventions ever made by the potter. Hitherto we have seen only coloured clays, coloured glazes, or colours fired under the glaze, but we are now brought face to face with a colour effect produced by retiring the finished glazed pieces, at a lower temperature, with pigments painted upon the glaze (fig. 40; see also Plate V. 13th-century Persian lustre). How such a practice originated is probably an idle speculation, but it may have come through repeated attempts to decorate pottery with gold. If gold was painted under the glazes of these ancient vases, it would probably vanish and leave no trace; but gold, alloyed with much silver, applied over the finished glaze and retired, in the attempt to make it adhere, may have given the first films of iridescent colour. We know certainly that before the 13 th century the elements, of the process had been mastered, and that the potters of the nearer East had learnt that by mixing some compound of silver (doubt- less the sulphide) with clay, and painting the mixture on the finished vase, which was retired in such a way that the pieces were only raised to a dull red heat and were then exposed to the vapours of the wood-fuel, glowing lustrous patterns were left on the ware that looked like metal — but metal shot over with all the hues of the rainbow, golden, rosy, purple and green. Numerous fragments of this lustred pottery had been disinterred from the site at Rhagae, and it was therefore assumed that the beautiful process was of Persian origin, particularly as most of the examples then known bore designs of distinctly Persian style. We are now inclined to think that the process really arose in Egypt or in Syria, and was carried eastward to Persia, just as it was afterwards carried westward to Spain. In support of this view there is the written record of the Persian traveller Nasiri 1 See Drury Fortnum, Archaeologia, vol. xlii.

Khosrau, who visited Old Cairo in the nth century (103 5-1042). He was apparently familiar with the pottery of his own country,

and notes all the novel forms that he found in the bazaars of Old Cairo, which was both a great trading emporium for the traffic of East and West, and a pottery centre of note. He mentions, specially, certain translucent bowls of earthenware decorated with colours resembling a stuff called ” bougalemoun,” ” the tints changing according to the position which one gives to the vase.” Such a description could only apply to ” lustred ” pottery, and it would seem as if this process must have been known in Egypt or Syria before it was practised in Persia (see Plate V., 13th-century Syro-Persian). In any case the secret was soon carried to Persia, for we have ample evidence that it was practised at Rhagae in the next century.

The earliest dated example of Persian lustred ware is a star-shaped tile of the year a.d. 1217 (a.h. 614), decorated with spotted hares, heraldically confronted, in a ground of lustre relieved by dots and curls, and surrounded by an inscribed border. A vase in the Godman collection bears the date a.d. i 23 i (a.h. 629), and some of the well-known ” star and cross ” tiles from Veramin belong to the year a.d. 1262. The early Persian

Fig. 40. — Persian Ewer, white ground, with pattern in brown copper lustre; the upper part has a blue ground. The mounting is gilt bronze, Italian 16th-century work. (British Museum.)

lustre is chiefly known to us through the tiles with which the walls of mosques and public buildings were decorated ; the more ephemeral vases, bowls and dishes have survived in smaller numbers and very rarely in perfect condition. Common motives of decoration were animals and birds (sometimes showing Chinese influence), the hare and the deer being favourites; roughly drawn sack-like figures of men and women, mounted or on foot (probably heroes of Persian legend), conventional foliage and arabesques. The designs are usually reserved in a lustred ground, which is relieved by small scrolls, curls and dots etched in the lustre (as though the glazed piece had been covered all over with the lustre mixture and the ornament scratched out < of this when it was dry), and showing beneath the ivory-white tin-enamel with which the early wares are generally coated. The lustre itself when viewed directly may look like some golden or deep chocolate-brown colour, but as the piece is turned to catch a side-light this deep colour is seen to bear a thin iridescent film, which glows with golden, green, purple or ruby-red metallic reflels. On the earliest examples the decoration is often entirely in lustre, but later, lustre is often used to eke out a pattern

painted with masses of pale cobalt-blue or turquoise under the glaze. Similar tiles with rather more elaborate ornament bear 14th-century dates, and another variety has parts of the decoration, more particularly the large letters of the inscriptions, raised in low relief and heightened with blue. Yet another class, belonging to the 14th century, has a fine dark-blue alkaline glaze,

with designs in low relief, picked out with scrolls and arabesques in white enamel or bold floral sprays in leaf-gold. Lustre is frequently found applied to the rich cobalt-blue ground, and there are still existing a few magnificent vases which show the artistic possibilities of this scheme of decoration. It should be noted that when the pieces are in the round, the pattern is usually painted in lustre and not reserved in a lustre ground as on the flat tiles. In the later examples the tin-enamel was replaced entirely by white slip, and the lustre decoration continued in use until the end of the reign of Shah Abbas I. (1587-1629). To the last period belong many charming bowls, narghilis, cups and dishes in a brown lustre, with ruby reflets, on a white or a deep blue ground; this ware is pure white in substance and generally translucent, and the pieces are occasionally signed (see Persian porcelain above).

Damascus Ware. — This time-honoured name (for ” Damas Ware ” was often mentioned in medieval inventories, and appears to have included many varieties of oriental pottery which were highly prized in Italy, France and England in the middle ages) 1 forms rather a puzzle nowadays for the archaeo- logist, for many diverse wares have been included under this

title, some of which were not made at Damascus. Yet Damascus is one of the oldest cities in the world, and has seen unnumbered dynasties come and go around its desert-fringed oasis. An important centre of cara- van traffic, a nexus of palpitating life from east and west, north and south, we cannot wonder if it developed a special pottery of its own, tinged with something of a cos- mopolitan spirit. For- merly the Damascus wares were treated as a variety of the Persian pottery we have just de-

scribed, but the best ex- amples of the class now known under this name exhibit a mingling of various influences such as we might expect, and have well-marked affinities both with the Persian wares and those brilliant productions now commonly recognized as Syrian and Turkish, while even far-off echoes of Chinese decorative mannerisms are not wanting. The characteristic Damascus ware of the collector is marked by its quality; the ground is of very clear white, the colours are pure and brilliant, and the vessels, whether dishes or vases, are soundly made. The decoration, which is purely floral or conventional, recalls the more formal Persian style, but the colours recall those of the Turkish pottery with one remarkable substitution. The piled-up red-clay pigment of the latter is absent, but where it would inevitably occur in the design of a Turkish piece its place is taken by a purple made from manganese, which is often thin and rather washy in quality. Fine examples of this famous ware are to be seen in the British Museum and in the Louvre; its characteristic style of pattern is well shown in the 16th-century Damascus piece reproduced in Plate V. Another splendid example is the lamp from the Mosque of Omar at Jerusalem, also in the British Museum (fig. 41); and this has generally been classed with the Damascus wares, though its colouring and its technique belong rather to Lower Syria or to Egypt. This magnificent piece bears a dated inscription, ” In the year 956 in the month Jemazi-l-oola.

1 Specimens of Turkish and other Eastern wares exist with elabor- ate English silver mounts of the time of Elizabeth, and these were doubtless included under the name of ” Damas Wares.”

Fig. 41.

-Lamp from the Mosque of Omar.

The painter is the poor and humble Mustafa.” This is reckoned as June a.d. 1549. It may be remarked that our difficulties of identification are increased by the fact that, under Arab rule, Syrian and Persian potters were at work in Damascus, in Old Cairo and elsewhere. Among the Fostat fragments classified by Dr Fouquet are many bearing the signatures of Syrian work- men. In the 15th and 16th centuries, too, imitations of Chinese blue-and-white porcelain became common throughout the nearer East, and quantities of fragments have been found at Fostat, Ephesus and elsewhere.

Turkish Pottery. — This beautiful and striking ware, formerly called Persian, and till lately Rhodian because Rhodes was a known centre of manufacture, seems to have been fabricated in all the countries overrun by the Ottoman Turks in the 13th century, so that the name " Turkish," in spite of some opposition, is now generally applied to it. (See fig. 42 ; and the 16th-century Rhodian or Turkish pieces, Plate V.) It has a fine white body of the usual sandy texture, covered, as a rule, with a wash of pure white slip; it is painted in strong brilliant colours, chiefly blue, turquoise, green, and a peculiar red pigment which is heaped up in palpable relief — the whole of the ornament being outlined with black or dark green. The ware was glazed with an alkaline glaze of great depth, so that the colours soften and some- times run, producing one of the most brilliant and attractive of all the oriental wares. In cer- tain districts the white ground was not used, but over it a slip of the red colour (Armenian bole) , varying in strength from bright red to pale salmon, was laid over the piece, reserving the pattern only in the white slip, which consequently lies lower than the red ground. Other examples are known where the ground has been covered with lavender, blue, sage, apple and turquoise greens, chocolate or coffee-brown, and the sumptuous effect of the whole was often increased by the application of gold- leaf over the fired glaze. The decorative motives are dis- tinguished from those of the Persian wares by a breadth and boldness which are in keeping with the brilliant, and not always harmonious, colouring. They include, it is true, the Persian arabesque, the floral scroll with feathery leaf, the thistle- bloom and the cypress tree, but the naturalistic treatment which permits immediate recognition of the favourite Turkish flowers such as the tulip, hyacinth, carnation, fritillary, corn-flower and lily (some of which were imported into Europe by the Turks), is as original and distinctive as the arrangement of the different elements of the design is artistic and charming. Other styles of design include formal patterns and diapers, rarely human and animal figures, and occasionally armorial devices and ships. Tiles of this ware were extensively used for lining the walls of public buildings, replacing the carpets and textile hangings which their designs so freely imitated. Of domestic articles, dishes are the most numerous, though vases, ewers, sprinklers, jugs, tankard-shaped flower-holders, covered bowls and mosque lamps are also plentiful. The tiles are found in all parts of the Turkish empire, though they were probably made at certain centres, such as Nicaea (which gave its name to the ware in the 16th century and no doubt supplied many of the mosques

in Constantinople), Kutaia, Demitoka, Lindus and other centres in Rhodes and Damascus. Individual wares cannot be

Fig. 42. — Rhodian Jug.

distinguished, except in some measure those of Damascus and Kutaia'. A small jug in the Godman Collection has an Armenian inscription stating that it was made by " Abraham of Kutaia " in the 16th century. A few fine bowls and vases, painted in a beautiful blue with Persian arabesques and rosette scrolls, recalling Chinese porcelains of the Ming dynasty, but of very characteristic appearance, are also attributed to this place; and later, in the 18th and up to the end of the 19th century, an inferior ware was largely manufactured here. This late ware usually takes the form of small objects — plates, cups, jugs, egg-shaped ornaments, &c. — with a thin, well-potted, white body and slight patterns of radiating leaves, scale diapers, &c, in blue, black and yellow. Turkish pottery was at its best in the 16th and the early part of the 17th century, and though good tile work of later date exists, the general pottery deteriorated before the 18th century. An inferior ware of poor colour is still produced in Turkey, Persia and Syria, and some attempt has been made of late to revive the old lustre decoration, but the results are not likely to be mistaken for those of old times.

Collections. — The Victoria and Albert Museum contains the finest collection of the medieval pottery of the nearer East — the British Museum collection, though much smaller, has some magnificent examples. The Cluny Museum in Paris has a never-to-be-forgotten collection of Turkish pottery, especially plates and dishes. The museums of the Louvre and of Sevres have also many beautiful examples. Berlin, Frankfort and other German towns have collec- tions, but much smaller in extent. Private collectors in England and France own many fine specimens, and mention may be made parti- cularly of those owned by Mr Ducane Godman and Mr George Salting.

Literature. — Fortnum, Majolica (1896) (also in South Kensing-ton Museum Handbook); Falke, Majolica (Berlin, 1896); Fouquet,

Contributions a V etude de la ceramique orientate (Cairo, 1900) ; Kara- bacek, " Zur muslimischen Keramik," in Monatsschrift fiir den Orient (1884); Lane-P.oole, Art of the Saracens in Egypt (1886); Migeon, Manuel de Part musulman, vol. ii. (1907) ; Sarre, Persische Keramik; and Jahrbuch der kbniglichen preussichen Kunstsammlung (1905), part ii. ; H. Wallis, The Godman Collection (1) Lustred Vases (London, 1 891); (2) The Tenth Century Lustred Wall-tiles (1894); Notes on some Early Persian Lustre Vases (1885); Egyptian Ceramic Art (1898). (R. L. H.; W. B.*)

HlSPANO-MORESQUE POTTERY

With the doings of the Moslem potters of the countries round the eastern Mediterranean fresh in our minds, it is interesting to follow the westward trend of the Moslem conquests, and see how in their wake there also sprung up in Spain a ware of high distinction and beauty. The Iberian peninsula had been the scene of pottery-making from prehistoric times —a red unglazed ware was made before the dawn of civilization as finely finished as that found in the Nile valley by Flinders Petrie (see Egypt: Art and Archaeology), and the Romans had one of their great provincial pottery centres at Saguntum; but it was only when a great part of Spain lay under Mussulman rule that artistic and distinctive pottery was produced. What is by no means clear is how it came to pass that when the traditional methods, learnt by the Arabs in Egypt and Syria, were carried westward they should have undergone such a radical change. Oxide of tin, the opacifying and whitening material in glazes par excellence, was certainly known and used in the East from at least the 6th century B.C.; the ancient wares are coated with a covering of white tin-enamel to hide the buff or reddish-coloured clay, and it was similarly used elsewhere; but its use was sporadic and not general in those countries, where we find instead a consistent development of the pottery made with a white slip-coating and a clear alkaline glaze. Perhaps it was that at this period tin was almost as costly as gold, and it was only when potters with an oriental training brought their skill to Spain, where tin abounded, that the relative cheapness of the material led them to employ it, so far as is known, exclusively. (There is a wide distinction between the tin-enamelled and the slip-faced wares, glazed with an alkaline glaze. In the latter, the more oriental type, the slip-coating is of fine white clay and sand, and this is finished with a transparent alkaline glaze containing little or no lead : in the former there is no need of a coating of slip, for

the addition of oxide of tin to a glaze rich in lead gives a dense coating of white enamel, opaque enough to disguise the color of the clay beneath.) Such colours as were used for painted patterns were painted over this enamel coating before it was fired, so that they became perfectly incorporated with it, and then this ground furnished a splendid medium for the development of those thin iridescent metallic films that we call " lustres." The knowledge of this lustre process had been brought from the East also, where it was used on another ground, and with the growing use of lustre pigments containing copper as well as silver — until the red, strongly metallic copper lustre almost ousted the quieter silver lustres — we get the simple technique of one of the most distinctive kinds of pottery known.

Briefly, the wares were " thrown " upon the wheel or " pressed " on modelled forms — handles, ribs and dots of clay, or strongly incised patterns were often added by hand — and they were then fired a first time. A coating of the tin-enamel (rich in lead as well as tin) was applied, and on this coating designs were painted in cobalt and manganese; sometimes these colours were only used as masses to break up the background. Then the second firing took place and the piece came from the firing all shining and white, except where the blue or brownish purple

Fig. 43. — Hispano-Moorish Plate, painted in blue and copper lustre.

had been painted (see fig. 43). The lustre pigments, a mixture of sulphide of copper or sulphide of silver, or both with red ochre or other earth, was then painted over the glazed surface with vinegar as a medium. The repainted piece was fired a third time to a dull red heat, and smoked with the smoke from the wood used in firing, and when cold the loosely adherent ochre and metallic ash left were washed off, leaving the iridescent films in all their beauty.

The technical practices of the Spanish potters and the composition of the lustre pigments are given in Cocks's account of the processes followed at Muel (Aragon) in 1585- The Manises receipt of 1785 gives: — copper 3 oz., red ochre 12 oz., silver 1 peseta piece, sulphur 3 oz., vinegar 1 qt. and the ashes scraped off the pots after lustring 36 oz. 1 Interesting documents have recently been published concerning the works executed by the " Saracen," John of Valencia, at Poitiers in 1384, and it is certain, from the list of materials supplied to him, that he made there tiles that

were enamelled and lustred.

The earliest record of lustred pottery in Spain is the geographer Edrisi's mention of the manufacture of " golden ware " then carried on at Calatayud in Aragon in 1154. Ibn Sa'id (1214-1286.)

'See Riaiio, Spanish Arts, Victoria and Albert Museum Handbook, pp. 149-15 1; and Sobre la tnanera de fabricar la antigua loza dorada de Manises (1878).

speaks of the glass and the golden pottery made at Murcia (city), Almeria and Malaga. From the 14th century the notices which have come down to us divide themselves into two main groups relating to the industry (a) at Malaga; (b) at various localities, but especially Manises in Valencia.

Malaga. — Malaga was situated within the Moorish kingdom of Granada, which formed, from 1235 until the late 15th century, the last remnant of Moorish dominion in Spain. Here under the art-loving Nasride dynasty, Mussulman arts and learning flourished to an unprecedented degree. In 1337 Ahmed ben-Yahya al-Omari enumerates, among the craft productions of Malaga, its golden pottery, the like of which he declares is not to be met with elsewhere. The Moroccan traveller Ibn Batuta mentions (1350) the Malagan golden pottery, as does Ibn al-Hatib (1313-1374) of Granada, in his description of Malaga. The principal monument of the period is the royal palace of Granada, begun in 1273, and finished during the 14th century, from which period most of its ornamentation dates. Two vases were discovered there, of which the existing one, known as the " Alhambra vase," is admittedly the most imposing product of Hispano-Moresque ceramic art extant. Its amphora-shaped body (4 ft. 5 in. high) is encircled by a band of Arabic inscription, above which are depicted gazelles reserved in cream and golden lustre upon a blue field; the rest of the body and the prominent handles are covered with compartments of arabesques and inscriptions in the same colours; and panels on the neck, divided by mouldings and decorated with strap-work and arabesques. Vases similar in shape and technique, with ornament of Cufic

characters and arabesques in horizontal rows, are to be found in the museums at St Petersburg, Palermo and Stockholm. As to the exact date of these, experts are not agreed. Though pre- senting all the characteristics of the 14th-century Hispano- Moresque ornament, it seems probable that they were produced at the same period as the large lustred wall-tile formerly in the Fortuny (now in the Osma) collection, an inscription upon which is by some held to refer to Yusuf III. of Granada (1409-1418), not to Yusuf I. (1333-1354)- Another remarkable example is a dish (Sarre collection, Berlin) , which, it is claimed, bears upon its back, in Arabic, the word Malaga; it is ornamented with eight segmental compartments filled alternately with strap-work designs and arabesques in lustre. Malaga was reconquered by Ferdinand and Isabella in 1487, and after this its industry probably decayed, as it is not mentioned by Lucio Marineo in 1539 among the localities where ceramics then flourished.

Valencia. — The emirate of Valencia was reconquered by Aragon in 1238. The history of its lustred ware is known from 1383, when Eximenes (whose evidence has been erroneously held to date from 1499) mentions the golden ware {Obra dorado) of Manises. Valencian pottery of this kind was an offshoot of the Malagan industry, as in documents lately published (ranging from 1405 to 1517) it is repeatedly designated Malaga ware (Gbra de Malaga). Its decorative qualities became famous throughout the whole of Europe and North Africa. The ware was chiefly manufactured at Manises by the Moorish retainers of the Buyl or Boil family, lords of Manises, who levied dues upon the output of the kilns, and occasionally arranged for its sale. It is dis- tinguished as regards its ornamentation from the pottery of Malaga by the adoption of a more natural rendering of plant form motives and by the use of armory. The ware consists of drug pots, deep dishes, large and small plates, aquamaniles, vases, &c. Some dozen varieties of ornament were employed during the 15th and early 16th centuries, including mock arabic inscriptions, various flower or foliage patterns taken from the vine, bryony, &c, and gadroons. The centres of dishes frequently bear the arms of a king or queen of Aragon, of the Buyls of Manises, or other Valencian or Italian families for whom they were made. Great dexterity is shown in the execution of minute and complicated schemes of ornament and in the richness of the colour schemes; golden lustre of various hues, with blue and manganese, form the simple combinations, but the ruby, violet or opalescent lustre combine to produce with the colours a

wonderful decorative effect. From 1500 the use of blue and

manganese was gradually discontinued and the ornament quickly became nondescript, but the brilliancy of the lustre pigment nevertheless obtained a wide popularity for the ware, as is attested by Marineo (1539), Viciana (1564) and Escolano (1610). After the expulsion of the Moriscoes (1609) the industry was carried on by those who had escaped deportation or by Spaniards who had learnt the craft; generally speaking their productions can be summed up in the word " decadence." In the course of the 15th century the manufacture of lustred pottery was carried on at various other small towns near Valencia; in 1484 it was produced at Mislata, Paterna and Gesarte. It is known to have flourished at Calatayud in 1507, and at Muel, also in Aragon, in 1 589. In the Valencia district much pottery for ordinary use, ornamented with blue on white, was also produced.

Majorca.— Scaliger, in 1557, states that Chinese porcelain was imitated in the Balearic Isles, and that the Italians called these imitations " majolica," changing the letter in the name of the islands (then called Majorica) where they originated. The truth would appear to be that Valencian wares, being exported in Balearic vessels that called at Majorca on the voyage to Italy, acquired a reputed Mallorcan origin. There is extant a potter's petition praying for permission to establish himself in Majorca (1560), in which he states that " Manises ware," &c, had to be imported, as it was not made there.

Collections. — In England, the Victoria and Albert and the British Museums have fine collections of this ware. At Paris the Cluny Museum collection, and the Louvre; the museum at Sevres contains many fine typical pieces. Another good collection is that of the archaeological museum at Madrid. The Berlin and the Hamburg museums, the Metropolitan Art Museum at New York and the Boston Museum of Fine Arts also contain good specimens. The private collections of England, France and Italy are rich in these wares, among the finest being those of Mr F. D. Godman (Horsham), and of Don G. J. de Osma (Madrid).

Literature. — A. Van de Put, Hispano-Moresque Ware of the 15th Century (1904) ; F. Sarre, " Die spanisch-maurischen Luster-fayencen des Mittelalters," &c. (in Jahrbuch der kgl. preuss. Kunstsammlungen, xxiv. (1903) ; G. J. de Osma, " Apuntes sobre ceramica morisca : textos y documentos valencianos," No. 1,1906, and " Los Letreros ornamentales en la ceramica morisca

del siglo xv." (in the review CulturaEspanola, No. ii, 1906 ; J. Font y Guma, Rajolas valencianas y catalanas (1905); J. Tramoyeres Blasco, " Ceramica valenciana del siglo xvii." (in the Almanaque, para iqo8, del periodica Las Provincias de Valencia; J. Gestoso y Perez, Historia de los barros vidriados sevillanos (1904); also J. C. Davillier, Histoire des faiences hispano-moresques a reflets metalliques (1861). (A. v. de P.)

Medieval and Later Italian Pottery 1 Little is known of the potter's art in Italy afterthe fall of the Roman empire till the 13th century. The traditions of the Roman potters appear to have been gradually lost, leaving behind only sufficient skill to make rude crocks for domestic use and to coat them, if required, with a crude yellowish lead glaze sometimes stained to a vivid green with copper oxide. Applied ornament of roughly modelled clay and scratched designs were the chief embellishments of such wares, which were of the same class as the medieval pottery of Great Britain and the north of Europe. In the 12th and 13th centuries, however, contact with Asia Minor, Syria, Egypt- and Spain, where ceramic skill had been highly developed in fresh directions, as we have seen, introduced into Italy as well as the rest of Europe those superior wares characterized by a white surface decorated with bright colours under a brilliant transparent glaze, and glorified by metallic lustres. The Italian potters did not long remain unaffected by these influences, but though Persian, Syrian and Egyptian pottery must have been fairly plentiful in the house- holds of the wealthy, it was the distinctively Hispano-Moresque wares from which the potters of Italy drew the inspiration for a new ware of their own. The technique of a siliceous slip- coating with colour painted on that and covered with a trans- parent alkaline glaze, was only sparingly used, and then not very successfully; it is only the introduction of the tin-enamel that was turned to fruitful account and led to the production of the magnificent Italian majolica of the 15th and 16th centuries. 1 See examples in colour, Plate VI.

In the same way the practice of lustre decoration might have been learnt from the Orient, but its late appearance on Italian wares (16th century) and its evident relationship to the lustres of

Spain, rather than to the earlier lustres of Egypt, Syria and Persia, are further evidence that though oriental decorative motives gave the Italians certain early types of design, it is the Hispano- Moresque potters from whom the Italians learnt the art they were afterwards to develop so splendidly in a new direction. 1

All the Italian pottery above the level of common crocks may be conveniently grouped into four classes.

i. The native wares, made of coarse and often dark-red clay, coated with a white clay slip (a kind of pipe-clay) and covered with a crude lead glaze, either yellow or green. The idea of rendering this ware ornamental, and fitting it for more than vulgar use, led to a great development of the graffiato process; where, while the vessel, with its white clay coating was firm yet soft enough, patterns were scratched or engraved through the white slip to the red body beneath. This decorative method has been already mentioned several times, for it was practised during the early middle ages in all the countries from India to Italy, and the Byzantine potters were adepts in its use. Nor has its practice ever ceased in Italy, for through all the times

Fig. 44.-

-Italian Graffiato Plate, 16th century. Kensington Museum.)

(South

when painted majolica was the ware of the wealthy, this earlier and humbler pottery was used by those who could not afford the former; and the gaily-coloured later wares of this kind have a fine decorative quality of their own. From the depth beneath the present soil at which fragments of this ware have been disinterred, it is obvious that the method was widely practised in early times, and no simpler glazed wares are known except those covered all over with green, yellow or brown glazes. Early examples have been found all over northern Italy — in Faenza, Florence, Pisa, &c, and particularly in Padua, where it seems to have been extensively made. Pavia was another centre of its manufacture, even to the end of the 17th century, and Citta di Castello must have been noted for it in the 16th century, for Piccolpasso describes this ware as ” alia Castellana ” (see fig. 44). Apparently in the latter half of the 15th century a sudden advance takes place in the colouring of this graffiato ware.

Instead of the simple glazes, of uniform colour, of the earlier productions, underglaze colours — green, purple, blue and a brown of the tint of burnt sienna which passes into a glossy black where it is thick — were applied in bold splashes under the straw- coloured glaze, producing a rich and decorative effect by very

1 There is ample documentary evidence to prove how largely the lustred pottery of Spain was imported into Italy from the 12th century onwards ; and it is important to- note in this connexion that almost all the fine examples of Hispano-Moresque in our modern collections have been obtained from the palaces of ancient Italian families.

simple means. As fine examples of this kind we may mention the dish with the mandoline players, and one with cupids disporting themselves in a tree, in the Victoria and Albert Museum; the tazza, supported by three modelled lions, in the Louvre; and the dish, with figures of the Virgin and two saints, in the museum at Padua. The ware has often been called, quite erroneously, mezza-majolica. It had nothing to do with majolica, being the natural development of a much older process; and its manu- facture was carried on all through the period of majolica manu- facture and has never ceased.

2. Mezsa-Majolica. — This name is accurately applied to certain Italian wares that made their appearance in the 12 th century or even earlier, when rude patterns — a clumsy star, a rude crossing of strokes or some equally elementary work — are found painted on a thin white ground covering a drab body. The pieces, generally pitchers of ungainly forms, are uncouth in the extreme; the body has been shaped in local clay and then thinly coated by dipping it into a white slip, which seems at first to have been of white clay only, though oxide of tin and lead were added to it even in the 1 2th century. The colours used for the rude painting were oxide of copper and oxide of manganese, and the final glaze, which is generally thin and often imperfectly fused, seems to have been based on the alkaline glazes of the nearer East. The specimens so assiduously recovered by Professor Aragnani, some of which, or similar wares, are to be found in the Louvre, the British and the Victoria and Albert museums, are typical of the rude work out of which, by a fuller knowledge of Spanish methods, the painted majolica grew.

3. Majolica. — For the last three centuries the word majolica has

been used to signify an Italian ware with a fine but comparatively soft buff body, coated with an opaque tin-enamel of varying degrees of whiteness and purity, on which a painted decoration was laid and fired. In the later pictorial wares, a fine coating of transparent alkaline glaze was fired over the painting to soften the colours — really to varnish them. The word itself appears to have been derived from the name of the island Majorca, and was originally applied by the Italians to the lustred wares of Spain which were largely imported into Italy, probably arriving in ships that called at or hailed from Majorca, as we do not believe that the ware was actually made in that island. That the secret of the tin-glaze, which is the essential feature of Italian majolica, was known in Italy in the 13th century is practically proved; and there is both literary and archaeological proof of its use there in the 14th. Mention of it is made in the Margarita Preciosa published at Pola by Pierre Le Bon in 1336, and the well-known jug, bearing the arms of Astorgio I., discovered under the Manfredi palace at Faenza, must have been made shortly after 1393. Its development marched side by side with that of the mezza-majolica, until it practically superseded the latter for painted wares in the 15th century; but the earliest examples have little more than an archaeological interest, and it was only after the last decade of the quattrocento or the first of the cinquecento that it blossomed into an artistic creation. In its prime the production of majolica was confined to a very small part of Italy. Bologna on the north, Perugia to the south, Siena on the west, and the Adriatic to the east, roughly enclose the district in which lie Faenza, Forli, Rimini, Pesaro, Cafaggiolo, Urbino, Castel Durante, Gubbio, Perugia and Siena. Towards the middle of the 16th century Venice on the one hand, and in the 17th and 18th centuries the Ligurian factories at Genoa, Albissola and Savona, made majolica of the later decadent styles, while, at the end of the 17th and in the early part of the 1 8th centuries, the southern town of Castelli, near Naples, produced a ware which closes the period of artistic majolica.

4. Lustred Majolica. — This brilliant species of Italian pottery (to which alone Piccolpasso applied the name majolica) seems to have been mainly produced at Deruta and Gubbio, though experiments were made at Cafaggiolo and probably at Faenza and Siena. Considering how much the Italian majolist owed to the Spanish-Moorish potter, it is remarkable that this beautiful method of decoration should have made so tardy an appearance, for the earliest specimens do not appear to be much earlier than

CERAMICS

Plate L

. J iuˆu. . A- - A jrf3gasBv-«-T > —Jˆ—.'- > .ˆjj»;

I H

Fk,. 52.— CORINTHIAN JAR.

Fig. 53.— FRANCOIS VASE.

(From Furtwangler and Reichhold, Griechische Vasenmalerei,

by permission of F. Bruckmann.)

Fig. 54.ˆBLACK-FICURF.D AMPHORA BY EXEKIAS. V. 732.

Fig. 55.— VASE FROM SOUTHERN ITALY. Signed by Python.

Plate II,

CERAMICS

Fig. 56.— BOWL MADE AT CALES IN IMITATION OF METAL.

(2nd cent, b.c.)

Fig. 58.- VASE OF (5th CENT. B.C., IX FORM OF HELMETED HEAD.

Fig. 57.— VASE OF 5th CENT. B.C., MODELLED IN FORM OF HEAD.

Fig. 60— AMPHORA OF APULIAN STYLE, WITH SCENE FROM EURIPIDES' "HECUBA."

Fig. 59.-

-FLASK OF VITREOUS GLAZED WARE. (ROMAN PERIOD.)

Plate III.

Fig. 6i.— MOULD FOR ARRET1NE BOWL.

Fig. 62.— JAR OF ARRETINE WARE FROM CAPUA.

Fig. 63— EARLY ETRUSCAN JAR. (VILLANOVA PERIOD.)

Fig. 64.— STAMP FOR ORNA- Fig. 65.— ETRUSCAN “CANOPIC” MENTING ARRETINE VASE. JAR PLACED IN BRONZE CHAIR.

Plate IV.

CERAMICS

mmm

4m

Fig. 67. — MEDALLION FROM VASE MADE IN S. FRANCE, WITH SCENE FROM TRAGEDY. (3rd CENT. AFTER CHRIST.)

Fig. 66.— MOULD FOR BOWL OF GERMAN WARE. (2nd CENT. AFTER CHRIST.)

Fig. 68. — JAR OF RHENISH WARE WITH INSCRIPTION. (3rd CENT. AFTER CHRIST.)

Fig. 69.— BOWL OF GAULISH (LEZOUX) WARE WITH FIGURES IN “FREE” STYLE. (2nd CENT. AFTER CHRIST.)

Fig. 70-ˆJAR OF LATER LEZOUX WARE. (3rd CENT. AFTER CHRIST.)

ITALIAN]

CERAMICS

733

the end of the 15th century, and the process was apparently abandoned by the middle of the 16th. The lustre wares of Deruta, probably the earliest made in Italy, have strongly- marked affinities with their Spanish prototypes; the earlier examples are hardly to be distinguished from Spanish wares, and to the last the ware remained technically like the earlier ware, though with perfectly Italian decorative treatment. Yet the best examples of Deruta silver lustre have a quality of tone that has never been surpassed; a colour resembling a wash of very transparent umber bearing a delicate nacreous film of the most tender iridescence. The Gubbio lustre is best known to us through the works of Maestro Giorgio, whose distinctive lustre is a magnificent ruby-red unlike any other. In all probability the lustre process was so quickly abandoned on the fine painted majolica, because the

increasing efforts to make a ” picture ” were discounted by so uncertain a process. When one of the later majolica painters had spent weeks on the decoration of some vase or dish, with an elaborate composition of carefully drawn figures, it was not likely that he would care to expose it to any risks that could be avoided. The risks of the lustre process were inordinately great — Piccolpasso says, ” Frequently only six pieces were good out of a hundred ” — so that its use was rele- gated only to inferior wares, and then the process was relinquished and forgotten until its rediscovery in the second half of the 19th century.

The history of the development of these noble wares is by no means clear, nor is it always certain what part was played by each town in the successive inventions of technical methods, decoration and colouring, so that it is better, in such a general sketch as this, to treat the subject in its broadest features only. In the earlier painted wares the only colours used were manganese-purple and a transparent copper-green as on the mezza-majolica* but early in the 1 5th century cobalt-blue was added to the palette, and, later on, the strong yellow antimoniate of lead, mixed with iron. The decorations at this period were largely influenced by the wares imported from Persia, Syria, Egypt and Spain, specimens of which were so prized as to be used for the decoration of church fronts and the facades of public buildings. The lustre of the Saracenic wares was not yet under- stood, but its place was taken first by manganese and afterwards by yellow. The designs were chiefly conventional flower-patterns in the Persian or Moorish style, arabesques, and floral scrolls, the ground being filled at times with those tiny spirals, scrolls and dots to which the Eastern potters were so partial. Figures, human and animal, were introduced either among the formal ornament or only sundered from it by panels, of which the outlines often followed the contours of the central design (see the early 15th-century Faenza piece, Plate VI.). The figures were, in fact, drawn to conform to the outline of the vessel, and not the vessel made to display the figure-subject as in the majolica of the succeeding century. The earliest dated example of this period is the pavement laid down in the Caracciolo chapel in the church of San Giovanni a Carbonara, in Naples, about 1440. Specimens of these tiles may be seen in the British Museum, and from their style it has been suggested that they were made by some Spanish potters brought over to Naples by Queen Joanna, who was of the royal house of Aragon. To this period also have been referred the large ovoid jars made to contain drugs or confections, and

decorated with bold scrolls of formal oak leaves enclosing spirited figures of men or animals, or heraldic devices. These are characterized by a rich blue colour generally piled up in palpable relief and sometimes verging on black; the outlines are usually in manganese, and transparent green is used for details and occasionally even as a ground colour. This ware has been definitely assigned to Florence on what seem very inadequate grounds, and it is better to speak of it simply as Tuscan. Then, essentially Italian ornament began to assert itself, and it redounds to the credit of the Italian majolist that he soon freed himself from repeating the styles of the wares from which he obtained his methods, and produced a distinctive type of ornament of his own. He revelled in patterns with bold floral scrolls, or those based on peacocks' feathers (see fig. 45), and

Fig. 45. — Early Faenza plate, with peacock-feather design, in blues, yellow and orange-red. (Victoria and Albert Museum

LOJXSIOK&IO 32L

Early Faenza Potter's mark.

Late Faenza Potter's mark.

then he advanced to concentric bands of painted ornament, borrowed from classic art yet breathing the true spirit of the Renaissance; while cable borders, chequer and scale patterns, bands of stiff radiating leaves, festoons of fruit and flowers, zigzags and pyramidal scrolls occu- pied nearly the whole I surface or framed an 1 armorial or emblematic ' central subject. Figure- subjects occur with in- creasing frequency as the century advanced; Madonnas and other sacred subjects, portraits, and, occasionally, groups of figures after the early Italian masters, or scenes borrowed from the first illustrated editions of the classics, gradually encroach on the conventional borders and occupy more and more of the surface of the piece. The provenance of these 1 5th-century pieces still remains uncertain— Faenza, Forli, Florence, Siena and other places offering rival claims, — but there is no doubt that from the earliest times Faenza was the most fertile centre of their manufac- ture, and almost all the motives of the quattrocento wares are found on fragments discovered there or on examples that can be traced to Faventine factories.

It is customary to treat the enamelled terra-cottas of Luca della

Robbia, the great Florentine sculptor (1399-1482), and his followers, Andrea and Giovanni della Robbia and other members of the family, as belonging rather to the domain of sculpture than of pottery, and this is right, for there is nothing certainly known of the work of this great sculptor which connects it with painted majolica. The old theory that Luca invented the tin-glaze is long since exploded; what he did was to use coloured glazes made with a basis of tin-enamel on his boldly modelled terra- cottas — a very different thing, — and it is by no means certain that he was the first to do even that. The Victoria and Albert Museum is extraordinarily rich in della Robbia ware of every kind; and one may see there these beautifully modelled figures in high relief covered with pure white tin-enamel, set in a back- ground of slatey blue or rich manganese purple and framed in wreaths of flowers and fruit which are coloured with blue, green, purple and sometimes yellow. There are altar vases too, of classic shape with low relief ornament, covered with the same peculiar blue glaze; these are sometimes furnished with modelled fruit and flowers; and finally there is the rare set of roundels painted on the flat with figure-subjects typifying the months; but the attribution of these remains doubtful, and their method is not that of painted majolica.

A remarkable development took place at the beginning of the 1 6th century, and in the forty succeeding years the highest perfection of manipulative skill, both in potting and painting, was attained. Artistically regarded, the elaborate and detailed methods of painting then adopted are too much allied to fresco-painting to be considered as fit treatment for enamelled clay; but this view was certainly not accepted at the time, nor is it subscribed to by many modern collectors; yet, regarded as decorated pottery, the 1 5th-century majolica, simpler and more conventional in design and treatment, is eminently preferable. The ruling families of northern Italy, who now took the industry under their personal patronage, clearly inclined to the opposite view and spared no expense to provide subjects for their

pot-painters. During the first two decades the influence of Faenza was paramount, and though the encroachments of purely

pictorial motives are clearly indicated on the wares, room was still found for ornamental patterns. The broad rims of the dishes were covered with beautiful arabesque designs, frequently including grotesque figures, masks, dolphins and cherubs (see the Faenza Casa Pirota piece, 1525, Plate VI.). Sometimes reserved in the white on a dark blue ground and shaded with light blue and yellow, sometimes traced in dark blue on a paler grey-blue glaze (called berettino) or painted in darker tints on a ground of orange or full yellow, the Faventine arabesques form a conspicuous feature of the early wares of this century. Honeysuckle patterns and interlaced lines drawn in pure white on a toned tin-enamel (white on white or sopra-bianco decoration) commonly appear on the sides of the deep wells of the dishes, while in the centre is a single figure, a coat of arms, or a small figure-subject. A similar treatment, without the sopra-bianco, was accorded to the fruit-dishes, shallow bowls on low feet, &c, with moulded gadroons or scalloped sides, which are generally attributed to Faenza or Castel Durante. The workshops of Siena were .also noted for delicately painted grotesques and arabesques, with a rich brownish-yellow or deep black ground. At Gubbio, too, the ” grotesque ” decoration was practised with marked success. Other developments of this style are the ‘■’ a candelieri ” designs, in which grotesques were symmetrically arranged round some central subject, such as a candelabrum or vase, and ” a trofei ” in which trophies of arms, musical instruments, and other objects were symmetrically disposed, or arranged in studied disarray throughout the design; these patterns are generally associated with the wares of Castel Durante and Deruta. Lovers’ gifts, dishes in which the whole space is occupied by a portrait bust of a girl or man, with the name and a complimentary adjective inscribed on a ribbon in the background, were common to Faenza, Castel Durante and many other factories. Elaborate figure-subjects also were attempted early in the century at Faenza and with no little success, as may be seen from a dish in the British Museum, which is entirely occupied by the scene of the death of the Virgin, after a print by Martin Schongauer, delicately painted in shades of blue, and dated about 1 500.

In the early Faventine school the outlines of the figures are almost always traced in blue, even when they are laid on the grey-blue berettino ground, and blue was the prevailing colour of the shading and details. In the third decade of the century the style affected at Urbino superseded that of Faenza. The majolica

painter's palette was now complete; in addition to the primitive blue, manganese-purple, transparent green and yellow, we find black, white, orange, greens of varying shades, brown, and a great number of intermediate tints obtained by mixing the standard colours. All the colours of the majolica of the best perioas were painted on the tin-enamel before the final glazing, and were capable of standing the full heat of the fire. Such a thing as painting in enamels on the finished ware and retiring them at a lower heat was unknown before the end of the 17 th or beginning of the 18th century. A true red colour seems to have been beyond the power of most of the Italian majolists, and was only attained at Faenza, and with less complete success at Cafaggiolo; the famous red of the Turkish pottery behaves very indifferently on tin-enamel.

In the Urbino style, which now be- came general, the ware was given over entirely to pictorial subjects, scenes from history or romance, scriptural and mythological, copied from the compositions of the Italian painters and usually set in a background of Italian landscape. Guidobaldo II., duke of Urbino, spared no pains to develop this phase of the art; the cartoons of Raphael, engraved by Marc Antonio and others, were placed at the disposal of the pot-painters, as well as the paintings of Michelangelo, Giulio Romano, Battista Franco, Rosso Rossi, Pcrugino, Parmeggiano and many more, and these, together

Urbino Potter's mark.

with engravings by Agostino Venetiano, Marco Dente, Enea Vico and others, were copied, with more or less fidelity, on the majolica. Some of the painters, as, for instance, Xanto Avelli, were eclectic in their tastes and made up their subjects by taking a figure here or there from various pictures. Thus of three figures on a plate in the British Museum, painted with the Dream of Astyages, one is borrowed from Raphael and another from Mantegna. These " istoriati " wares reached their zenith at Urbino between the years 1530 and 1560, when the workshops of the Fontana family were in full activity; but their popularity was very general, and skilful painters at many other towns produced specimens that it is hard to distinguish from those of Urbino. Baldasara Manara was a prolific p£?inter in this style at Faenza; Pesaro and Castel Durante were little behind Urbino in the skill of their artists, the Lanfranchi family in the former town having a weli-deserved reputation, while the founders of the Fontana factories learnt their art in the latter; and a few pieces of

considerable merit bear the name of Rimini as their place of origin.

There will always remain a large number of specimens of majolica which cannot be assigned with certainty to any particular factory, partly because the same style of painting was in vogue at many places at the same time, and partly because of the itinerant propensities of many of the painters, whose signed works prove that they moved from place to place to practise their art. There are, however, a few prominent artists whose touch is sufficiently well known from the examples that bear their signatures to enable us to classify a considerable proportion of the finest pieces. First of these is Niccola Pellipario, the founder of the Fontana family, who moved from Castel Durante to Urbino in 1510, and worked at the latter place in the factory of his son, Guido Fontana. There is little doubt that he was the painter of the famous service in the Correr Museum at Venice, which marks the transition from the style of Faenza to that of Urbino, and his free figure-drawing, the oval faces with strongly marked classical features, the peculiarly drawn knees, the careful landscapes and the characteristic balls of cloud are easily recog- nized in quite a number of pieces in the British Museum (see the Gonzago Este piece, Plate VI.) . His pupil, who frequently signed his name in full, Xanto Avelli da Rovigo, was one of the foremost Urbino painters, and his work is characterized by bold colouring and fine figure-drawing, with a' marked fondness for yellowish flesh tints. But Niccola's grandson, Orazio Fontana (see example, Plate VI.), was perhaps the most celebrated exponent of the pure Urbino style, and his free drawing and soft har- monious colouring, in which a brilliant blue is usually conspicuous, are unequalled by any other majolica painter of the period.

Certain characteristic wares of Faenza have already been noted. Those with the grey-blue (berettino) glaze were principally made at the factory called Casa Pirota, though inferior imitations were also produced at Padua, and a blue glaze of paler tint was largely used at Venice. Dolphins are a frequent motive in the arabesque ornaments of the same Faventine workshop, and many of the wares are marked with a circle divided by a cross and containing a dot in one of the quarters. A ' capital P crossed with a line or paraph is another Faventine mark, and a somewhat similar monogram, with an S added to the upper part, is found in the wares of Cafaggiolo. It has already been stated that a red colour is peculiar to Faenza and in an inferior and browner tint to Cafaggiolo; it was used, according to Piccolpasso, at the factory

of Vergiliotto in the former place. At Cafaggiolo, the factory of the Medici family, many fine pieces were painted, mostly in the Faven- tine style; a deep blue, heavily applied and showing ib” marks of the brush, was freely used in backgrounds, ancS delicate running leaf scrolls in paler blue and reminiscent of

Venetian Majolica Potter’s mark.

Later

Cafaggiolo

Potter’s

mark.

Persian style often appear on the Cafaggiolo wares (see example, Plate VI.)- Not a little can be learnt from the ornament on the reverse sides of the dishes and plates; those of Faenza and Siena are richly decorated with scale patterns and concentric bands; those of Cafaggiolo and Venice are either left blank or have one or two rings of yellow. A few pre- eminently beautiful dishes, with central figure sub- jects of miniature-like finish in delicate landscapes with poplar trees in a peculiar mannered style, are probably the work of M. Benedetto of Siena. Borders of arabesques with black or deep orange ground belong to the same factory and were perhaps decorated by the same hand. The dishes covered, except for a few small medallions, with interlaced oak branches (” a cerquate ” decoration), are no doubt the productions of Castel Durante; and a certain class of large dishes with figure subjects in blue on a toned blue glaze, and sometimes with formal ornaments in relief, are of undisputed Venetian origin.

Another phase of majolica decoration began about the middle of the 16th century and synchronized with the decline of the pictorial style. The figureˆ subjects were relegated to central panels or entirely replaced by small medallions, and the rest of the surface covered with fantastic figures among floral scrolls, inspired by Raphael’s grotesques painted on the walls of the

Loggie in the Vatican. The prevailing tone of this ornament was yellow or orange, and the tin-enamel ground, which is always more or less impure in colour on Italian pottery, was washed over with a pure milk-white, known as bianco di Ferrara or bianco allatato, said to have been invented by Alphonso I., duke of Ferrara, who took an active interest in his private factory founded at Ferrara, and managed by potters from Faenza and Urbino.

The new style flourished at Urbino, Pesaro and Ferrara; at the first-named particularly in the workshops of the Patanazzi family, and lasted far into the 17th century. But the majolica was now in full decline, partly through the falling off of princely patronage, and partly, perhaps, owing to a reaction in favour of Chinese porcelain, which was becoming more plentiful and better known in Europe. The manufacture, however, never entirely ceased, and revivals of the old style were attempted at the end of the 17 th century by Ferdinando Maria Campori of Siena, who copied Raphael's and Michelangelo's compositions, and by the families of Gentile and Grue at Naples and Castelli. The majolica of Castelli is distinguished by the lightness of the ware, good technique, and harmonious but pale and rather weak colouring; it continued into the 18th century. A coarse and inferior ware was made at Padua and Monte Lupo; and the factories of Faenza were still active, producing, among other kinds, a pure white ware with moulded scallops and gadroons. The industry continued to flourish in Venice and the north. Black ware with gilt decoration was a Venetian product of the

17 th century, and at Savona and Genoa blue painted ware in imitation of Chinese blue and white porcelain made its appearance. In the 18th century a new departure was made in the introduction of enamel painting over the glaze, a method borrowed from porcelain; but this process was common to all the faience factories of Europe at the time, and though it was widely practised in Italy no special distinction was attained in any particular factory. In our own days imitations of the 16th century wares continue to be made in the factories of Ginori, Cantigalli and others, not excepting the lustred majolica of Gubbio and Deruta; but, compared with the old pieces, the modern copies are heavy to handle, stiff in drawing, suspiciously wanting in the quality of the colours and the purity of the final glaze which distinguish the work of the best period. Lustred Wares.— The lustred wares of Deruta have marked

Black ware witn gut decoration vi

Turin

Potter's

mark.

Savona Potter's marks.

characteristics, and, though differing in actual treatment from the Hispano-Moresque, their appearance is eloquent in favour of such a derivation. The most characteristic examples are large dishes and plateaux, thickly made and with the enamel on the upper face only, the back having a lead glaze. They are often decorated (see fig. 46) with a single figure or bust in the centre (with or without an inscribed ribbon), which is usually set against a dark blue background which covers only half the field, while in the other half is a formal flower, and in the borders are radiating panels with palmettes alternating with scale pattern, or some other formal design. The whole style is archaic, the designs being heavily outlined in blue and washed over with a greenish yellow lustre, with beautiful opalescent reflets recalling mother of pearl. The lustre varies from this madreperla tint to a brassy metallic yellow, and parts of the ornament are sometimes modelled in low relief. In spite of its archaic appearance, the Deruta lustred wares are scarcely older than the 16th century, and the style was continued as late as the second half of that century. Deruta pottery was not always lustred, and some of the pieces signed by the painter El Frate, who flourished between

Fig. 46. — Early majolica plate, in blue and yellow lustre only, made at Pesaro or Deruta, c. 1500. The motto on the scroll may be Englished as follows: " He who steers well his ship will enter the harbour." (Louvre.)

1541 and 1554, are without the lustre pigment, though showing the heavy blue outlines of the lustred wares. The lustred majolica of Gubbio owes its celebrity almost entirely to the work of one man, Maestro Giorgio Andreoli, who came thither from Pavia, with his brothers Salimbene and Giovanni, and obtained citizenship in 1498. His earliest efforts were in the direction of sculpture, and some of his reliefs in the style of della Robbia are still in existence; indeed the earliest dated piece of lustred majolica attributed to him is a plaque of 1501, with the figure of

St Sebastian in relief, in the Victoria and Albert Museum. It is not known whence he learnt the secret of the beautiful transparent ruby lustre peculiar to Gubbio. A red or rosy lustre is found in both Persian and Hispano-Moresque wares, and no doubt the process was learnt from some Moslem potter and developed by Giorgio to unusual perfection. Golden, yellow, brown and opalescent lustres were also freely used at Gubbio, the ruby being only sparingly applied. Finished painted pieces were sent from other factories to receive the addition of lustre at Gubbio, but these can almost always be distinguished from the true Gubbio wares, in which the lustre is an integral part of the decoration. Apart from the lustred enrichment, the majolica of Gubbio has few distinctive qualities, for its styles were various and almost all borrowed (see fig. 47). The archaic taste of Deruta, the arabesques and grotesques of

Faenza and Castel Durante, and in a lesser degree the ” istoriato ” style of Urbino, reigned in turn. Perhaps the most characteristic paintings of Maestro Giorgio are the central medallions of cups and deep dishes enclosing a single figure of a child or a cupid in grisaille. Giorgio’s larger figure compositions) if indeed his

Fig. 47. — Gubbio plate, with portrait in ruby lustre and blue outline. (Victoria and Albert Museum.)

signature in lustre may be taken to imply that he painted the designs as well as lustred them, show great inequality, some rising to a very high standard — as the dish with ” the Three Graces ” in the Victoria and Albert Museum, and the ” Bath of Nymphs ” in the Wallace collection — ‘while in others the figure drawing is quite inferior. The arabesques and grotesques on the Gubbio wares are usually of great merit. There are a few known pieces of unlustred Gubbio wares with figure subjects, painted chiefly in blue and in the style of the early Faventine artists. After 1 5 1 7 , when we may assume that the lustre process was thoroughly mastered, the Gubbio wares were usually signed with the initials or full name of Maestro Giorgio, and a few rapidly executed

ˆHˆi-d?

Gubbio Potters' marks.

scrolls in lustre completed the decorations of the reverse of the plates and dishes. The master's latest signed work is dated 1541, and he died in 1552. It is probable that his brother Salimbene assisted him, and Piccolpasso names his son Vincentio as possessor of the lustre secret. Possibly the latter was the painter who signed his wares with the initial N, but this conjecture rests solely on the ingenious, but unsupported notion that N is a monogram of the first three letters of the name Vincentio. Other initials, M, D, R, also occur on Gubbio plates, and the latest dated example of the ware is signed by one " Mastro Prestino " in 1557, but it has little to recommend it save that it is enriched with the Gubbio lustres, which after this time entirely disappear.

The old majolica shapes are briefly as follows : — among the earliest are small bowls (scodelle), often with flattened sides; jugs (boccali) with large lip-spouts, and mouths pinched into trefoil form ; large dishes with gradually shelving sides (bacili), or with flat broad rims and deep centres; akin to these are the plateaux with a raised flat disk in the centre; small dishes with broad flat rims and deep though narrow central walls (tondini) , suitable for handing a wine- glass or sweetmeats ; flat trencher-shaped plates (piatti or taglieri) ; saucer-shaped dishes on low feet and sometimes with moulded sides (tazze or fruttieri) suitable for holding fruit. Among the vase forms ovoid shapes with short necks and a pair of flat handles are common in the Tuscan wares of the 15th century; the jars for confectionery, drugs, or syrups were often of the cylindrical form with graceful eon- cave sides known as the " albarello," in shape of Eastern origin, and in

name perhaps derived from the Persian el barani (a vase for drugs, &c.) ; other vase forms with spouts and handles were used for the same purpose; ornamental vases after classical designs (vast a bronzi antichi) ; and in the best Urbino period a great variety of fanciful forms — ewers, vases, cisterns, shells, salt-cellars, ink-pots, &c, with applied masks and serpentine handles, were made in the exuberant taste of the time. A complex piece of furniture for the bedside of ladies in childbirth (vaso puerperale) consisted of a bowl with a foot surmounted by a flat trencher on which fitted an inverted drinking-bowl (ongaresca) ; and above this again a salt-cellar with cover. Many of these shapes were

suited to daily use, but the richly decorated majolica was designed to adorn the walls, the credenze, table-centres and cabinets of the rich. This alone could have been the destination of the large dishes (piatti di pompa) with rim pieces for suspension, and the smaller dishes (coppe amatorii) with portraits of young men and girls and lovers' symbols ; and it is inconceivable that the costly lustred wares of Gubbio or the fine madreperla dishes of Deruta were designed for anything but decorative use. The ware was in fact an article produced for the wealthy in the century of Italy's glory, and under no other conditions could such magnificent and expensive pieces have been made.

Technical Methods. — This is a convenient place to give an account of the methods used by the early medieval potters — (1) because they represent what had been learnt from Roman times'to the 16th cen- tury, and indeed to the introduction of modern methods, (2) because, besides all that a potter could derive from an examination of the wares, we have ample written accounts of the methods and processes followed by the Italian majolist. Mr Colon has recently published an epitome of the account given in Biringuccio's La Pyrotechnica (Venice, 1540), and there is the memorable MS. of Piccolpasso, a potter of Castel Durante, now in the library of the Victoria and Albert Museum, which, besides giving an account of the processes, contains illustrations of kilns, mills, decorative motives, &C. 1

1. The potter's clay was prepared from mixtures of various kinds prepared by (a) beating and picking out coarse particles, (b) mixing with water, (c) passing through a sieve, (d) drying again into plastic clay ready for the working potter. The essential point about the potter's clay of the best tin-enamelled wares, whether Spanish, Italian, French or Dutch, is that the clays are those known geo- logically as " marls," which contain a large percentage of carbonate of lime. Such clays always fire to a pinky red or buff colour, and give a ware that is strong and yet light in substance, and on no other kind of clay does the tin-enamel display its full perfection (see Deck's La Faience). The analyses of certain tin-enamelled wares are useful as showing the essential constitution of the best pottery bodies for such purposes.

Delia Robbia.

Majolica.

Delft.

French Faience.

Silica ....

49-65

48-00

49-07

48-65

Alumina .

15-50

17-59

16-19

17-05

Lime ....

22-40

2012

18-01

19-43

Magnesia.

0-17

1-17

0-82

0-27

Oxide of iron

370

3-75

2-82

4-33

Carbonic Acid,

water, &c. .

8-58

9-46

13-09

2. Shaping. — The vessels were either ” thrown ” on the potter’s wheel (which had remained practically unaltered from Egyptian times), or they were formed by ” pressing ” thin cakes of clay into moulds, made of a composition of plaster (gesso), bone-ash and marble dust. In the latter way all shapes that were not circular were made, as well as those with heavy bosses or gadroons imitated from embossed metal forms. It is interesting, though not surprising, to note that for the fine later wares, the roughly thrown vases, when sufficiently dry, were recentred on the wheel or were placed in a joiner’s lathe and smoothed to a clean and accurate surface. The Greek potters did the same, and this practice must always be followed where fine painting or gilding is afterwards to be applied. In the later florid vases of the Urbino style the piece was built up of thrown parts and moulded parts (handles, masks, spouts, &c), luted together with slip when they were dry enough to be safely handled, and then retouched by the modeller or vase-maker, a method followed to this day for elaborate pieces of pottery or porcelain.

3. The Glaze. — The white enamel which formed at first both the glaze and the ground for painting upon — bianco, as it was called — was prepared in a complicated way. A clear potash glass (marzacotto) was made by melting together clean siliceous sand (rena) and the potash salt left as the lees of wine (feccia). This corresponds to the alkaline glaze of the Egyptians with the substitution of potash for soda. Such a glaze alone would have been useless to the Italian potter, and accordingly the bianco was made by melting together

1 Piccolpasso, / tre libri dell’ arte del Vasajo, dated 1548. It has been several times translated both into modern Italian and French. The English reader will find an excellent abstract of this interesting MS. in the volumes on Majolica by Drury E. Fortnum.

CERAMICS

Rbodha cm- Turkish; li’th century.

Plate V.

Syro- Persian; 13th century.

ihodian or Turkish, 16th century.

Khodian or Turkish; llith century.

Damascus: ltilh century.

Persian, lustre and undrrglaze colour: 13th century.

J mJj Ax is* 1**4 \w**^3

*lt,ifi or Turkish; l»“th a-nuirv.

Plate V.

Syro- Persian; l.‘lih ccuturv

n or Turkish, lfirh renturv.

Itjfh century.

Djiiukus: 16th century.

IVrsi.ii

>i.ir: 13th ccnturv.

FRENCH]

CERAMICS

737

thirty parts of marzacotto and twelve parts of lead and tin ashes. The white enamel as used was therefore a mixed silicate of lead and potash rendered opaque with oxide of tin. .

4. Pigments (colori) were compounded from metallic oxides or earths; the yeilow, from antimoniate of lead, which was mixed with oxide of iron to give orange; the green, from oxide of copper (the turquoise tint given to the Egyptian and Syrian glazes by oxide of copper is impossible with a glaze of lead and tin) ; and the greens were made by mixing oxide of copper with oxide of antimony or oxide of iron; blue, from oxide of cobalt, used in the form of a blue glass (smalto, or zaffara) ; brownish-purple, from manganese; black, from mixtures of the other colours; and the rare red, or reddish brown, of Faenza and Cafaggiolo was probably the same Armenian bole that was used so magnificently by the makers of the Turkish pottery, but on the white enamel ground this colour was most treacherous and uncertain. It must

be remembered that many of these colours owe their tint to the lead used in their composition, or to the grounds containing oxides of lead and tin on which they were painted. Piccolpasso describes the preparation and composition of the various colours used in his day.

5. Coperta, or transparent glaze. In the later majolica a thin coating of soft rich glaze was applied over the fired painting to give a smooth bright surface. This coperta was a soft lead glass consisting of silica (sand), 20 parts; oxide of lead, 17 parts; potash, 12 parts; and common salt, 8 parts; fused together and then finely ground in water.

6. Methods of Glazing and Decorating. — In the mezza-majolica and the early majolica it is probable that the clay vessel was dipped in the white bath to give it an envelope {invetriatura) before it was fired at all; but it must soon have become apparent that it was much better to fire first the shaped vessel until it was about as hard and brittle as a clay tobacco-pipe, and then coat it with the white enamel, by dipping it into a bath or pouring the fluid material upon it. This was the practice described by Piccolpasso. Acoatingofwhiteenamel, the thickness of glove leather, having been obtained, the piece was carefully taken by the painter, who first etched in the outline on the absorbent powdery ground, and then shaded the figures, landscapes, &c, in blue or in a mixture of blue and yellow, adding the other colours as gradated washes. The vase was then fired a second time to a heat greater than the first, so that the enamel was melted on the vessel and the colours sunk into the enamel at one and the same operation. This method of painting on the unbaked enamel demanded a bold direct treatment — for alteration or retouching was impossible — and much of the vigour of the earlier designs is due to this fact. As the ware became more refined in its treatment it was felt that this method did not yield a sufficiently brilliant surface, and so the painted and fired piece was coated with a film of coperta and fired again at a slightly lower temperature to make it smoother and more glossy. Still pursued by the idea of rivalling the triumphs of pictorial art, the majolist carried his methods a step farther. The white enamel coating was fired before painting, giving a glossy surface on which the painter could draw or wipe out, and so could execute outlining, tinting, or shading of the -utmost delicacy. A film of coperta was then washed over the painting, and the piece was fired a third time in the cooler parts of the kiln. In some instances it is not easy even for an experienced potter to decide which method has been

pursued, owing to the softening of the colours. Generally we should expect that the later and more pictorial pieces had been painted on a ground of fired white enamel, and we may be absolutely certain when delicate white patterns have been " picked out " in a coloured ground.

Where lustre decoration has been added to a piece of majolica it indicates, as elsewhere, the use of a special process, and a final firing at a lower heat. The lustre pigments were the same as those used on the earlier lustred wares, and these were painted over an otherwise finished piece. To obtain the lustre effect these were placed in a special kiln, so contrived that when the pots were just visibly red the smoke of the burning fuel (rosemary or gorse) was allowed to play upon them long enough to drive the metallic films (silver or copper) into the already-fired glaze. 1

Collections. — The Victoria and Albert Museum contains perhaps the most widely representative collection in the world, especially as at the present time the pieces of the Salting and Pierpont Morgan collections are on exhibition there. The British Museum collection is valuable, being rich in " signed " pieces of the first quality. The Wallace collection and the Ashmolean Museum at Oxford (Fortnum collection, &c.) are also valuable and contain some remarkable examples. The Cluny Museum, the Louvre and the museum at Sevres have fine collections; while noteworthy pieces are to be found in the Ceramic Museum at Limoges. In Germany the museum at Brunswick contains one of the largest collections known, but many inferior and doubtful examples. Berlin, Munich, Vienna and St Petersburg have noteworthy collections. In Italy, the Bargello at Florence and the museums of Venice, Milan, Turin, Faenza, Pesaro, Urbino, Rome and Naples all have collections, whilst interesting examples of local manufactures are to be found in many of the

1 For a full account of the lustre process see Franchet, Comptes rendus for December 1905, and W. Burton, Society of Arts Journal, 2846, vol. lv., 1907. V. 24

smaller Italian towns. The American museums, especially those in New York, Boston and Philadelphia, have some fine examples.

Literature. — F. Argnani, La Ceramiche et maioliche faentine (Faenza, 1880 and 1903); D. Bonghi, Intorno alle Majoliche di Castelh (Naples, 1856); Professor Douglas, " Siena," in the Nineteenth Century, September 1900; Hensel, Essai sur la majolique

(Paris, 1836) ; G. I. Montanari, Majoliche dipinte nella collezione del N.S.C. Domenico Mazza (Pesaro, 1836); L. Frati, Di un insigna raccolta di majoliche (Bologna, 1844); also Di un pavimenlo in majolica (Bologna, 1853); J. C. Robinson, Italian Sculpture of the Middle Ages (London, 1862); E. Darcel, Musee du Louvre: Notice des faiences peintes; Drury E. Fortnum, Contribution to the History of Pottery (London, 1868) ; Delange, Recueil de faiences italiennes du XV e au XVII s silcle (Paris, 1869); M.. Meurer, Italienische Majolika Fliesen (Berlin) ; E. Molinier, Les Majoliques italiennes en Italie (Paris, 1883), also La Ceramique italienne auXV" silcle (Paris, 1888) ; C. Piccolpasso, I tre libri dell' arte del Vasajo, Castel Durante 1548 (original MS.) and translations by C. Popelyn, Paris, 1841 and i860, also Italian editions of Rome and Milan; V. Lazari, Notizia della raccolta Correr (Venice, 1859); Drury E. Fortnum, A Descrip- tive Catalogue of the Majolica in the South Kensington Museum (London, 1873) ; Beckwith, Majolica and Faience (New York, 1877) ; G. Corona, La Ceramica (Milan, 1878); G. Vanzolini, Istoria delle fabbriche di majoliche metaurensi (Pesaro, 1879); A. Genolini, Majoliche italiane (Milan, 1881) ; Mely, La Ceramique italienne (Paris, 1884); J. E. Jaccbsthal, Siid-italienische Fliesen (Berlin, 1886); Bertolotti, Figulini, fonditori, e scultori (Milan, 1890); H. Wallis, Italian Ceramic Art (1897), The Oriental Influence on the Ceramic Art of the Italian Renaissance (1900), The Art of the Precursors (1901), The Majolica Pavements of the Fifteenth Century (1902), Oak-leaf Jars: A Fifteenth Century Italian Ware (1903), The Albarello (1904), also Seventeen Plates by Nicola Fontana (1905), and Italian Ceramic Art: Figure Designs (1905); Tesorone, L'Antico Pavimento delle Logge di Raffaello in Vaticano (Naples, 1891) ; Columba, // " Quos Ego" di Raffaello (Palermo, 1895); Drury E. Fortnum, Majolica (London, 1896) ; also Fortnum Collection in the Oxford Museum (London, 1896); O. von Falke, Majolika (Berlin, 1896); also Sammlung R. Zschille: Katalog der italienischen Majoliken (Leipzig, 1899); Antaldi Santinelli, Museo di Pesaro (Pesaro, 1897); De Mauri, L'Amatore di Majolica (Milan, 1898); E. Hannover, De Spanske-Mauriske, og de forste Italienske Fayence (Copenhagen 1906). (R. L. H.; W. B.*) '

French Pottery trom the 15TH to the 19TH Century The pottery of medieval France needs little attention here, for it was, in the main, similar to that which was made generally in Europe—rudely shaped vessels of ordinary clay often decorated with modelled ornament and glazed with yellow or brown lead glaze,

or, if coated with white slip, decorated with bright green glazes, and towards the end of the 15th century with greyish blue. The later specimens of this simple ware — pronouncedly Gothic in feeling — were often extremely decorative. Avignon, Beauvais and Savigny are the best-known centres of this truly national manufacture, and, as we might expect in French work the reliefs are often sharp and well designed. Evidence accumu- lates that from time to time the princes and great nobles imported Spanish or Italian workmen to make special tiles for the decora- tion of their palaces or chapels. The duke of Burgundy brought Jehan de Moustiers and Jehan-le-Voleur, ” ouvriers en quar- rieaux paints et jolis,” in 1391, to paint tiles for his palaces at Hesdin and Arras in the north, and we have already referred to the tile-work in the Spanish fashion made at Poitiers by John of Valencia, the ” Saracen,” in 1384 for Duke Jean de Berry. 2 Other instances might be multiplied but that this foreign work left little or no traces on contemporary French pottery. Even at a later date, when Francis I. brought Girolamo della Robbia from Italy to decorate his ” Petit Chateau de Madrid ” in 1529, or when Masseot Abaquesne, about 1542, manufactured at Rouen the painted tile pavements for the chateau of Ecouen, the cathedral of Langres, and other places, nothing came of the imported methods; the works were executed and left no traces on the general pottery of the country. During the 16th century, however, two remarkable kinds of pottery were made in France of distinctive quality, and both eminently French — the Henri-Deux ware and the pottery of Bernard Palissy and his imitators. Henri-Deux, Oiron or St Porchaire ware, for all these names have in turn been applied to the enigmatic and wonderful pottery, specimens of which are now valued at more than their weight in

2 See Magne, Le Palais de Justice de Poitiers (Paris, 1904) ; also Solon in Burlington Magazine (November 1907).

gold, was once believed to have been made by the librarian

Bernard, and his assistant Charpentier, for their patroness Hclene de Hangest about 1529 at her chateau at Oiron, near Thouars. 1 A few years ago this theory was discarded in favour of one which assigned them to some unknown potter of St Porchaire in the same region; 2 but even of this theory there is insufficient proof, and we are left in doubt both as to the maker and the place of origin. All we know is that the ware

dates from the reign of Henry II.

Fig. 48. — Tazza of Oiron pottery. (Louvre.)

and that it was probably made somewherenearOiron, as most of the speci- mens have been found in that district. The work is sui generis, for it had no direct ancestry, neither did it leave any mark on contemporary French pottery. Sixty-five pieces of the ware (see fig. 48) are known to be in museums and private collections; the Louvre and the Victoria and Albert Museum have the best collections of their kinds, but the Roth- schilds still hold the greater number of ex- amples. The ware is fashioned in a simple whitish pipeclay, and

Oiron Potter's mark.

ornamented with interlacing strap-work patterns, typical of the period, inlaid in yellow, buff or dark-brown clay. The forms are generally graceful, but some examples are over- elaborate and overloaded with modelled ornament. The pieces were designed to serve as candlesticks, salt-cellars, tazzas, ewers, holy-water pots and dishes. After the vessels had been " thrown " and " turned " to a perfect shape, metal tools, such as were used by the bookbinders and casemakers of that day, were pressed into the clay, so as to form sunk cells of ornamental tooling. These cells were carefully filled with finely-prepared slips of other clays, that would burn yellow, buff or dark-brown; and when the whole was dry the piece was carefully smoothed again, and moulded reliefs were attached, or touches of colour were applied. After being fired the ware was glazed, apparently with the ordinary lead glaze of the time care- fully prepared and fired again. At a later period the ornament was not inlaid in this elaborate manner, but was simply painted, as indeed it might all have been so far as decorative effect is concerned.

Palissy Ware. — Bernard Palissy was a genius of original talent, but, at the hands of his literary admirers, he has gained a

legendary rank as one of the great potters of the world which his pottery does not warrant. He is supposed to have spent sixteen years in the search for the white enamel which was being used all the time in Italy and Spain — probably he was searching for the mystery of Chinese porcelain — and when he settled down to make the ” Palissy ware,” he did nothing more than carry to perfection the methods of the village pot-makers of his own district. On a hard-fired red clay he disposed groups of moulded plants, shells, fish and reptiles, painted them with crude green, brown and yellow colours, and glazed the whole with a well-prepared lead glaze. His style soon had numerous imitators, like A. Clericy and B. de Blemont, who executed works quite as good as those of their master; but their works also vanished and

1 See B. Fillon, Les Faiences d’Oiron (1862). – See E. Bonaffe, Les Faiences de Saint-F ‘or -chair x (1

left no permanent impression on the general trend of French pottery.

Meantime Italian, and, it may be, Spanish potters strayed over the French border and attempted to introduce the manu- facture of their tin-enamelled wares; for we know of the works of Gambin and Tardessir of Faenza, established at Lyons about 1556; of Sigalon at Nimes in 1548; of Jehan Ferro at Nantes about 1580, and other sporadic efforts. The needed impetus came, however, when the Mantuan duke, Louis de Gonzague, became duke of Nevers in 1565; and we find Italian majolists, working under princely patronage, planting their decadent art in the centre of France. The first efforts met with little success until, with the appearance of the Conrades from Savona, who were domiciled in Nevers in 1602, we get the genuine ware of Nevers. Naturally the first productions, whether of the Con- rades or their predecessors, were in the style of the debased majolica of Savona, but the body and glaze of the ware is harder, the colours are not so rich, and the execution is less spirited. The first departure from Italian traditions is seen in the ware of the so-called “Persian style” of Nevers — probably adopted from contemporary work in Limoges enamels on metal — where conventional and fanciful designs of flowers and foliage, birds, animals or figures were thickly raised in white enamel on a ground of bright, intense cobalt-blue glaze. After the middle of the 17th century the Italian style of design appears to have been entirely replaced by pseudo-oriental patterns painted in blue or in polychrome, but really imitated from the “Delft” copies of

Chinese and Japanese porcelain. When Rouen and Moustiers became famous for their distinctive wares Nevers copied their designs also, and on a gradually descending scale the manufacture continued to the end of the 18th century, when

Fig. 49. — Dish of Rouen enamelled pottery, painted in blues and deep red.

France was flooded with the rude Faiences patriotiques from this centre.

The genuine French tin-enamelled ware, freed from the traces of Italian influence, first developed itself at Rouen under the famous Poterats in the later part of the 17th century. A new scheme of ornamentation was gradually evolved in the daintily-designed scalloped and radiating patterns adapted from oriental fabrics, lace and needlework, and from the ornamental devices of contemporary printers. These designs, having been skilfully drawn on the pieces, were filled in with bright blue, strong yellow, light green, or a bright bricky-red in palpable relief, applied as flat washes or in fine lines; and the result was a gay and sparkling ware much superior in decorative value to the later Italian majolicas (see fig. 49). So successful was this Rouen ware that rival factories were quickly started at Saint Cloud, Sinceny,

Quimper, Lille, and other places in the north. Saint Cloud and

Lille made fine pottery of this class at the end of the 17th and

in the early 18th century. It was imitated at Nevers, the

potters' marks shown being those of J. Bourdu and H. Borne.

„ ^^^ In the south of France, Pierre

C'~B*% J 1 9 Clerissy established the industry

| V-^ I I * I j| at Moustiers in 1686, and, though

1 ^^ » # *i^ t -' le ear ly Moustiers ware bears a

^^ CˆP 1 qX ˆv* strong resemblance to the debased

•ˆ Italian majolica of the time, the

Nevers Potters' marks. Moustiers painters soon left that behind, and on a glaze of inimitable whiteness and softness they deftly pencilled blue patterns based on the engravings of designs after Berain, Marot and Toro. At a later date Olerys, who had been to Alcora to introduce the French faience into Spain, returned to Moustiers and introduced a pale polychrome style very inferior to that of Rouen. These pieces are covered with patterns outlined in blue and filled in with yellow, pale green and light purple. Olerys is also said to have introduced the grotesque style of Moustiers, founded on the caricatures of Callot. Other factories were started from Moustiers, such as those at Apt, Ardus and Montauban, and even at Narbonne, Bordeaux and Clermont-Ferrand; just as the northern factories had sprung from Rouen.

We have already seen at Nevers the introduction of patterns in the Chinese style, and the same course was increasingly followed at all the French factories during the 18th century. At Strassburg a fresh impetus was given in this direction when, about 1 721, Charles Hannong introduced the practice of painting his white tin-enamelled ware with the on-glaze colours used by the porcelain painters. This process enabled the French potter to produce many colours unobtainable by his older process, and moreover helped him to make his wares look more like the coveted porcelain, then becoming the rage all over Europe. This new departure marks the end of the best period of French faience, but so successfully did it meet the demands of the time that it gradually displaced the old method of decoration where the colours were painted on the raw glaze and fired along with it. Factories sprang up for the manufacture of this new ware in the

first half of the 18th century at Niederviller, Luneville and Sceaux, and it was quickly adopted by the older factories at Rouen, Sinceny, Marseilles, &c. With its general adoption the old French faience, developed from the Italian stock, departed, to make way for a tin-enamelled imitation of famille-rose porcelain. But this last style was not of long life. The wealthy classes were no longer patrons of pottery but of porcelain, and when, after 1786, the newly perfected English earthenware was thrown upon the French market, the French faience-makers had to give up their works, or adopt the manufacture of this neater and, for domestic purposes, more suitable form of- pottery. This change, together with the disturbances of revolutionary times, brought artistic pottery in France to a standstill, and we shall treat of its revival during the last fortv or fifty years in a subsequent section.

Collections. — -The Victoria and Albert Museum and the British Museum contain typical examples; but not such collections as are to be seen in the Cluny Museum, the Louvre, the museum at Sevres, or the French provincial museums at Rouen, Limoges, Marseilles, Lille, St Omer, &c.

Literature. — Deck, La Faience (Paris, 1887); Gasnault and Gamier, French Pottery (Victoria and Albert Museum Handbooks, 1884); Le Breton, Le Musee ceramique de Rouen (Rouen, 1883); Milet, (?) Historique de la faience et de la porcelaine de Rouen (Rouen, 1898); Pottier, Histoire de la faience de Rouen (Amiens, 1870); L'Abbe H. Requin, Histoire de la faience artistique de Moustiers, tome 1″ (Paris, 1903) ; M. L. Solon, The Old French Faience (London, 1903) — the best survey of the whole subject, with a very full bibliography. The various volumes of the Gazette des beaux- arts contain many valuable original articles. (W. B.*)

German, Dutch and Scandinavian Pottery In northern Europe until the time of the Renaissance the making of tiles is the only branch of the potter's craft of artistic rank. The pavement tiles of Germany of the Gothic period,

examples of which have been found in the valley of the Rhine from Constance to Cologne, often bear designs of foliage or grotesque animals full of character and spirit. Their decoration is effected either by impression with a stamp of wood or clay, or by " pressing " the tile in a mould to produce a design in relief. The surface is sometimes protected by a lead glaze — green, brown or yellow — but is generally left unglazed.

Glazed tiles with relief ornament were also made as early as the 14th century for the construction of stoves, such as have continued in use in Germany to the present day. About 1 500 a development took place in the combination of glazes of different colours on a single tile. In the middle of the 16th century Renaissance ornament appears in place of Gothic canopies and tracery, and blue and white enamels begin to be used in combination with lead glaze's of other colours. Figures in the costume of the period, or shields of arms, in round-arched niches are a favourite motive alike in the stove tiles and in the wares of similar technique known as Hafnergefasse, which have been wrongly attributed to Hirsvogel of Nuremberg. These were made not only in that city but also in Silesia and at Salzburg, Steyr, and elsewhere in Upper Austria; their manufacture continued into the 18th century.

Imitations of Italian majolica with polychrome painting on a white enamelled ground were first made in southern Germany about 1525, and it is with these wares that the name of Hirsvogel should really be associated. The same style survived for more than a century and a half in the stoves and pottery made by the Pfau family at Winterthur in Switzerland, from the end of the 1 6th century onwards. An interesting development is exhibited by certain rare productions, of Silesian origin, dating from about 1550, with decorations in coloured enamels which are prevented from flowing together by a strong outline incised in the clay.

Stoneware. — The most important feature of the history of German pottery is the development of stoneware along the valley of the Rhine. This ware is of a highly refractory white or grey body of intense hardness, glazed by the introduction of salt into the kiln when the highest temperature was reached. It was exported in large quantities through the markets of Cologne and Aachen (Aix-la-Chapelle) to England, France and other parts of northern Europe. The frequent occurrence in its decoration of the arms of foreign cities and princes shows that the German potters were alive to the requirements of foreign customers.

The oldest centre of this manufacture seems to have been at Siegburg near Coblenz, where the white stoneware peculiar to the neighbourhood, made from local clay, must have been made and exported in considerable quantities at least as early as the 15th century; plain beer-jugs of that date with cylindrical neck and slightly swelling body have been unearthed in London and the eastern counties of England. In the 16th century an artistic

development took place, and the potters were formed into an exclusive gild under stringent regulations. The manufacture lasted till the sack of the town by the Swedes in 1632, subsequent attempts to re-establish it being unsuccessful. This ware, of a creamy white colour, generally thinly glazed and only rarely coloured by staining with cobalt blue, is decorated by impression with small stamps or by the application of reliefs pressed from separate moulds. The motives include sacred and classical figure subjects, portraits of contemporary sovereigns, and armorial bearings, with accessory foliage in which a survival of Gothic feeling is often perceptible. Characteristic forms are the high tankard (Schnelle) and the ewer with long spout (Schnabelkrug), but the fancy of the potter also found expression in various quaint or extravagant forms.

At Raeren in the duchy of Limburg this industry attained importance about 1550, and was continued for over seventy years; 1539 is the earliest date known to occur on this ware. The pieces were of two kinds, brown-glazed and grey; the latter usually decorated with blue. The favourite form is a baluster-shaped jug with heraldic designs or a frieze of figures round the middle. The subjects are from Scripture history or contemporary peasant life as interpreted by Hans Sebald Beham and the German and French " Little Masters." Examples are known

beaming dates and names or initials of mould-cutters, among them Ian Emens and Baldem Mennicken; but it must not always be inferred that a piece is as old as the date introduced in its decoration, for the same set of moulds might be used for many years.

Another important centre in the 16th century was at Frechen near Cologne. Round-bellied jugs known as Bartmanner, from the bearded mask applied in front of the neck, covered with a brown glaze, which in later examples is often coagulated into thick spots, were first made here towards the end of the 15th century, and continued to be the staple product well into the 17th. The jugs of this type, known as Greybeards or Bellarmines, which were exported in profusion to England, Scandinavia and the Low

Countries, were mostly made here. At Cologne itself there were also factories, probably before the 16th century, the later productions of which resemble those of Frechen.

During the 17th and 18th centuries the busiest stoneware centre was the district surrounding Hohr-Grenzhausen in Nassau known as the Kannebackerlandchen, where artistic ware was being made before 1600. Soon after that date manganese purple was first used in the decoration in addition to cobalt blue, and henceforward colour in combination with impressed and incised ornament tended more and more to supersede decoration in relief. Figure subjects gave place to rosettes, foliage on wavy stems, and geometrical patterns. Vessels of large size and fantastic shape appear beside the standard forms of the earlier factories. In the 18th century the forms of beer-vessels became stereotyped in the globular jug with cylindrical neck and the cylindrical tankard, while tea and coffee pots, inkstands and other vessels, hitherto unknown, began to be made. A stoneware manufacture dating back to the middle ages existed at Creussen in Bavaria. The productions of this district during the 17th and 18th centuries consist of tankards of squat shape, jugs and jars, of a dark red body, covered with a lustrous dark brown glaze, frequently painted after the first firing in brilliant enamel colours with figures of the Apostles, the electors of the Empire, or other oft-repeated motives. Imitations of the wares of Raeren and Grenzhausen were made at Bouffioulx near Charleroi; other minor centres of the manufacture were at Meckenheim near Cologne and Bunzlau in Silesia.

As in England, so in Holland (by Ary de Milde and certain Delft potters) and in Germany, attempts were made with some success, early in the 18th century, to imitate the Chinese red stoneware, known as boccaros. The early efforts of Bottger, the discoverer of the secret of true porcelain, at Meissen, belong to this category. His red ware is of such hardness that it was cut and polished on the lapidary's wheel. For some time after the manufacture of red ware at Meissen had ceased, a glazed brown ware of less hard body with gilt or silver decoration was made at Bayreuth. The products of other minor factories of this class cannot now be identified.

Mention may be made of the lead-glazed peasant pottery, such as the bowls produced at Marburg with quaint symbolical devices modelled in relief and applied. Slip-covered wares with graffiato decoration, apparently of indigenous growth and not inspired by

foreign examples, were made well on into the 19th century near Crefeld and elsewhere in Germany, at Langnau in Switzerland, and by German emigrants in Penn- sylvania. In Holland a peculiar green-glazed ware was made in the 18th century with pierced geometrical decoration recalling the Dutch carved woodwork of the period.

Delft. — One of the most remarkable phenomena in the history of pottery is the appearance about 1600, in a highly developed state, of the manufacture of a tin-enamelled earthenware at Delft. It was introduced in that town by Herman Pietersz of Haarlem, but whence he learned his art is unknown. The faience-makers (plateelbackers) were one of the eight crafts of Delft which formed the Gild of St Luke founded in 161 1. About 1650 a great development took place, and till the latter years of the 18th century, when its faience was ousted by the more

serviceable wares of the English potteries, Delft remained the most important centre of ceramic industry in northern Europe. The ware is of fine buff-coloured clay, dipped after the first firing in a white tin-enamel, which formed the ground for painted decoration; after painting, this was covered with a transparent lead glaze and fired a second time, so that in its technique it belongs to the same class as the painted Italian majolica and the old French faience. At its best it is rightly ranked among the greatest achievements of the potter's art.

Characteristic of the first period are dishes and plaques in blue monochrome with somewhat overcrowded scenes of popular life in the style of the engravings of Goltzius. Imitations of the oriental porcelain imported by the Dutch East India Company were introduced about 1650 by Aelbregt de Keizer and con- tinued for some time among the finest productions. At the same time the earlier tradition was developed in the finely painted landscapes and portraits of Abraham de Kooge and Frederick van Frytom. Other potters of the best period were Lambartus van Eenhorn and Louwys Fictoor, makers of the large reeded vases with Chinese floral designs in polychrome, Augestyn Reygens, Adriaen Pynacker, and Lucas van Dale; to the last are attributed the pieces with yellow decoration on an olive-green enamel ground. The rare examples with poly- chrome decoration on a black ground in imitation of Chinese lacquer are the work of Fictoor and Pynacker. With the 18th century came a largely increased demand and a consequent deterioration in artistic quality. The rise of the German porce- lain factories had its effect

in the introduction of overglaze painting fired in a muffle kiln, typified by the work of the Dextras, father and son. This innovation, by which the Delft potters attempted to compete with European porcelain, contributed to the ruin of their art by eliminating the skilled touch required for painting on the unfired enamel. The ware frequently, but not invariably, bears a mark derived from the sign of the factory (the rose, the peacock, the three bells, &c), or the name or initials of its proprietor.

A small faience factory was started by Jan van Kerkhoff about 1755 at Arnhem; its productions were of good quality, chiefly in the rococo style, marked with a cock.

The exportation of the Delft ware to Germany occasioned the rise of numerous factories in that country for making faience in imitation of the Dutch. Among these may be named Hanau (founded about 1670), Frankfort and Cassel. Others, such as Kiel and Stralsund, drew their inspiration from the productions of Marseilles and Strassburg (q.v.). At Nuremberg a factory was founded in 171 2, which was but little affected by extraneous influences; among its characteristic productions are dishes with sunk decoration in the form of a star, and jugs with long necks and pear-shaped bodies, often spirally fluted. Similar w&res were made at Bayreuth. The Dutch and French styles were carried by German potters into Scandinavia; fac- tories were established at Copenhagen in 1722, at Rorstrand and Marieberg near Stockholm in 1728 and 1758, and at Herrebe in Norway about 1759.

At the close of the 18th century the influence of imported English earthenware was strongly felt. In Holland workshops were established for painting the English cream-coloured ware with subjects suited to the Dutch taste; and in Germany cream-coloured wares and sleingut in imitation of Wedgwood's productions were manufactured at Cassel, Proskau and else-where. The " Delft " ware of Holland during the 17th century was a beautiful decorative ware, in which the Dutch painters caught successfully the spirit, and often the very colour value, of Chinese blue and white porcelain. Its fame spread over the whole of Europe, and its styles were readily imitated by the potters of all other countries who made a similar ware. Even the polychrome Delft, though not nearly so beautiful as the " blue and white," is strongly decorative, and one sees in the polychrome faience of northern France and of Germany more than a trace of its influence. When this ware was supplanted by English earthenware it was a clear instance of a ware that was

technically superior displacing a more artistic product.

CERAMICS

h MP VI.

I'rbino. 1526 (?). A pbtr of the famous Consiga-Eatr service.

Facnxa: early 15th century.

CERAMICS

Pi \ir VI.

t'il>iiiM, 1525 (?V A pl.it f of the- l.imou- (rf>ntii;.i-r>tt' Mf \ ire.

F,tet«.<; c.trlv 15«h century.

SPANISH]

CERAMICS

741

Collections. — For German wares the German museums are natur- ally best, The museums at Munich and Nuremberg contain splendid collections of the tin-enamelled and peasant wares of South Germany. Cologne has a wonderful collection of the Rhenish stoneware, and Berlin and Hamburg have good general collections. Copenhagen and Stockholm are especially good for Scandinavian wares, and Zurich for Swiss. There are also good collections of German stone- ware in the Victoria and Albert and the British museums, and in the Cluny Museum, the Louvre, and the museum at Sevres; but there are no notable collections of the German tin-enamelled wares out of Germany. The wares of Delft may be best studied in the museums at the Hague and Amsterdam. There is an interesting collection at the factory of Thooft and Labouchere in Delft. The principal museums in England, France and Germany all have fair to good collections of this renowned ware.

Literature. — For tiles and peasant pottery, see Forrer, Ge- schichte der europdischen Fliesen-Keramik (Strassburg, 1900; chapters on the Netherlands and Germany) ; Walcher von Molthein, Bunte Hafnerkeramik der Renaissance in Osterreich ob

der Enns und Salzburg (Vienna, 1906) ; Hafner, Das Hafnerhandwerk und die alien Ofen in Winterthur (Winterthur, 1876-1877); Barber, Tulip-ware of the Pennsylvania German Potters (Philadelphia, 1903). For stoneware, see Solon, The Ancient Art Stoneware of the Low Countries and Ger- many (London, 1892); Van Bastelaer, Les Gres wallons (Mons, 1885). For Bottger's red ware, see Berling, Das Meissner Porzellan (Leipzig, 1900), chap. iii. For Dutch faience, see Havard, Histoire de la faience de Delft (Paris, 1878), and article by same author on " La Faience d'Arnhem " in Gazette des beaux-arts, 2nd series, vol. xx. (1879). For German faience, see von Falke, Majolika (Berlin, 1896), and articles by Stieda, " Deutsche Fayencefabriken des 18. Jahrhunderts," in Keramische Monatshefte, vols. ii. and iii. For Scandinavian pottery, see Nyrop, Danske Fajence og Porcellains- maerker (Copenhagen, 1881); Strale, Rorstrand et Marieberg (Stock- holm, 1872); Grosch, Herrebfie-Fayencer (Christiania, 1901). Ex- cellent accounts of most branches of the subjects are given by Brinckmann, Das kamburgische Museum fur Kunst und Gewerbe (Hamburg, 1894). (B. Ra.)

Later Wares of Spain and Portugal We shall only deal at length here with those important kinds of pottery that have exerted real influence on the historical development of the art. Offshoots from the main stem that have developed little or no individuality can only be briefly mentioned. When the characteristic Spanish-Moorish lustre wares ceased to be desired by the wealthy they rapidly sank into insignificance, though as a decorative peasant pottery their manufacture never really ceased and has been revived again in our day. The course of pottery importation was changed and the now fashion- able Italian majolica was brought into Spain in the 16th and 17 th centuries, as Hispano-Moresque wares had followed the opposite course two centuries earlier. Besides the influence which these imported wares had on the Spanish potters, a number of wandering Italian majolists found their way into Spain, so that we find the use of painted colour, particularly blue, yellow, orange, green and purple, making its appearance at various centres, around Valencia, at Triana near Seville, &c, but the most important manufacture was at Talavera in the centre of the peninsula. The best of this ware recalls the late Italian majolica of Savona, and the influence of Chinese porcelain de- signs, probably filtered through to the Spanish potters by the then popular enamelled Delft wares, is very apparent. The potteries of Talavera are mentioned as early as 1560, and they continued at work, with varying fortunes, down

to the end of the 1 8th century. Many and varied wares were produced, in- cluding tiles as well as pottery; the most common pottery pieces are dishes, bowls, vases, tinajas, holy-water vessels, drug- pots, and hanging flower vases.together with moulded and painted snails, owls, dogs, oranges, almonds, walnuts, and every kind of fruit. Apart from the poorer colour the baroque style of ornament also rendered the ware much inferior to that of Italy or of France. The popular Talavera wares were imitated else- where in Spain, and a number of factories existed at Toledo in the 17th century, but their wares are very inferior. In the 18th century, besides debased imitations of this ware, some coarse but striking pottery was made at Puente del Arzobispo near Toledo.

An interesting offshoot from the Talavera potteries is to be found in the tin-enamelled wares made at Puebla, Mexico, from the early 17th century. It is said that Spanish potters were

settled at this place by the Dominicans soon after 1600; and the making of a debased form of Spanish majolica continued there for nearly two centuries. See Barber's "Tin-Enamelled Pottery," Bulletin of the Philadelphia Museum, 1907. During the 18th century determined efforts were made by King Charles III. and by the famous Count Aranda to improve the Spanish pottery wares, as well as to introduce the manufacture of porcelain. The efforts of the king led to the foundation of the porcelain works at Buen Retiro near Madrid, which will be mentioned later, and considerable success also attended the revival of strong copper lustre, like that of the late Hispano-Moresque wares; but the finest tin-enamelled wares were those made at Alcora in the important factory founded by Count Aranda in 1726, which continued in operation down to the French wars. For his purposes the count brought from Moustiers, then one of the famous French pottery centres (see above), Joseph Olerys, a well-known pot-painter. He went to Alcora as chief draughts- man and designer, having charge of a number of Spanish potters and painters. Olerys introduced the Moustiers style of decora- tion, and the glaze and body of the Alcora wares of the best period recall the fine quality of Moustiers faience. It is only fair to add that Olerys in his turn learnt the use of various delicate yellow and green colours from the Spaniards, and when he returned to France in 1737, having acquitted himself most honourably, he introduced this new style of delicate polychrome decoration at Moustiers. The mixture of motives and ideas that animated the duke and his potters may be seen by the following list of wares

produced about 1750. Vases of different shapes; small teapots; teapots and covers, Chinese fashion; teapots and covers, Dutch fashion; cruets, Chinese style; entree dishes; salt-cellars, Chinese style; escudillas (bowls) of Constantinople; barquillos (sauce-bowls), Chinese style; cups, plates, and saucers of different kinds with good painted borders in imitation of lace-work, and finally fruit-stands, salad-bowls and dishes, trays and refrigerators. Later in the century the manufacture of porcelain was introduced here, as well as white earthenware made in imitation of the productions of Wedgwood, and the tin-enamelled wares flickered out in Spain as they did elsewhere.

The manufacture of a kind of debased majolica was also practised in Portugal from the 16th century down to our own times; but the ware never attained to any distinction and is little known outside that country. The best-known specimens were made at Rato, near Lisbon, where a factory was founded in 1767 under the patronage of the court.

Mention must be made of the unglazed native pottery of Spain and Portugal, for wine-jars, water-jars and bottles, cooking pots, and other domestic utensils are still made in these countries for ordinary domestic use, in traditional forms and by methods of the most primitive kind. Many of these vessels, especially the tinajas (wine-jars) and water-coolers, are based on ancient, classical or Arab forms, and in every country market-place it is still common to see groups of vessels, in unglazed pottery of fine shape and finish, exposed for sale- — a very different state of things from what obtains in France, Germany, and particularly in England, where the primitive methods of the peasant are being imitated by those who ought to know better. From the 16th to the 1 8th century a special kind of unglazed pottery vessels known as buccaros was extensively made both in Spain and Portugal. The body of the ware is unglazed, whitish, black or red, accord- ing to the special kind of clay. The curious point about this ware is that, if we may believe contemporary documents, the vessels were delicately scented, like a ware imported from Mexico ; and the soft vessels are said to have been eaten — a custom common enough in certain parts of Central and Southern America. (See M. L. Solon, The Noble Buccaros, 1896.) (W. B.*)

English Pottery from the i6th to the 19TH Century 1 The course of pottery manufacture in England followed, generally rather in the rear, that of France, Germany and other northern countries. Before the coming of the Romans much pottery of the late Stone

age and the Bronze age was made in 1 See examples in colour, Plate X.

Britain. The Romans introduced their more advanced technique, and, besides importing Italian and Gaulish pottery, they founded numerous centres of pottery manufacture, as at Upchurch, Castor, Uriconium, &c. With the departure of the Roman legions their simple, yet comparatively advanced, pottery vanished, and Saxon and early Norman times have left us little but wares resembling those of the Germanic and Frankish pro- ductions (fig. 50). The early middle ages passed without much improvement, and, though rare specimens — like the ewer in

V T«HW— •— – V

Fig. 50. — Saxon cinerary urns; the stamped patterns are shown.

the. form of a mounted knight in Salisbury Museum — proved that glazed wares were made in this country, the general run of our medieval pottery vessels never soared above the skill of the travelling brick or tile maker. 1 The monastic tile-makers, with their strong, Gothic tile pavements, produced artistic work of a very high order; but the patrons of the common potter remained content with his rudely made and simply glazed pitchers, flagons, dishes and mugs (see fig. 51). Even in the 16th century the excellence of English pewter probably acted as a barrier to the introduction of finer pottery, and it was only the importation of foreign wares — Italian, German, Dutch and French — that stirred up our native clay-wsrkers to the possibilities of their art. In early Tudor times there was some importation of Italian majolica as well as of the Hispano-Moresque pieces, and the religious wars as well as the constant intercourse with the Low Countries brought over to

the eastern counties not only the stonewares of the Rhineland and the ” Delft ” wares of Hol- ‘ land, but also emigrant potters from those countries who tried to practise their native crafts amongst us. The Civil War appears to i/mjqpBa, have been unable to

Fig. 51— Common forms of medieval check this new spirit, for pottery; the upper part of the slender we have the evidence of jug is covered with a green vitreous lead dated examples to show glaze; the other is unglazed with stripes that various immigrants

of red ochre. . . ,, . .

went on quietly practis- ing their trade along the Thames side, in what were then the out- skirts of London, and probably in the eastern counties and Kent as well. It seems probable that the earliest influence was an Italian one, but before this was firmly domiciled it was sup- planted by that of the Dutch and Germans. The first wares of an improved kind that were made in England are so closely re- lated to the German stonewares and the " Delft " wares that it is often difficult to determine whether actual specimens are of English or foreign origin. The first, and in some senses the greatest, of English potters was John Dwight, an educated man,

1 An excellent summary of the remains of English medieval pottery will be found in Hobson's " Medieval Pottery found in England," Archaeological Journal, vol. lix.

who had held the office of secretary to three successive bishops of Chester, and who obtained a patent in 1671 for the manu- facture of certain improved kinds of pottery. We have no knowledge where Dwight acquired his skill in the potter's art, for when he obtained his patent he was residing at Wigan (Lancashire), far removed from the districts where foreign potters had settled. About 167 2-1673 Dwight set up a factory at Fulham, where he resided till his death in 1703. He was always an eager experimenter, and from his diaries it seems certain that he was searching after the, then, mysterious Chinese porcelain. We have no grounds for believing that he ever at- tained success in this search, for his known productions may be grouped into two main classes: (1) Hard-fired red stone- ware — mostly small vessels, teapots, mugs, &c, in imitation of the Chinese buccaros. 2 (2) Whitish, grey, or drab salt-glazed stoneware made in imitation of, and often not to be distinguished from, the wares of the Rhineland. But Dwight produced a considerable number of modelled portrait-busts, statuettes, &c, all in stoneware of various tints, which entitle him to a place in the very first rank of potters. The portrait-bust of Prince Rupert (British Museum), the statuettes of Meleager (British Museum), of Jupiter (Liverpool), &c, are worthy of a sculptor of the Italian Renaissance, while the

recumbent effigy of Lydia Dwight (Victoria and Albert Museum) is one of the most beautiful works ever executed by an English potter.

Meantime the manufacture of tin-enamelled pottery, in the style of " Delft," was prosecuted with increasing industry in London on the south side of the river, and particularly at Lambeth. By the end of the 17th century the same imitation " Delft " wares were made at Bristol and Liverpool, continuing until, in the closing years of the 18th century, tin-enamelled earthenware was abandoned in favour of the perfected English cream-colour. There is a strong family likeness in all this English " Delft," whether made at Lambeth, Bristol or Liverpool. The body of the ware is harder and denser than in the tin-enamelled wares of the continent, and is not so suitable for its special purpose, as it is generally deficient in lime. The decoration is usually painted in cobalt blue of good tone, though inferior in softness and richness of tint to that of the best Delft pieces; polychrome painting was not so common, and it differs from that of the Dutchmen in the greater prevalence of a pale yellow colour and the general absence of any good red like that found on the poly- chrome wares of Delft, Rouen, &c.

German stoneware also received a well-merited share of attention long before the time of Dwight, and it is often impossible to distinguish the grey and brown ale-jugs, greybeards, &c, presumably of English manufacture in the 17th and early 18th centuries, from their German prototypes. Fulham remained an important centre of this manufacture, and a fine brown stoneware was largely made at Nottingham as early as 1700; in each case the manufacture continues in neighbouring districts to this day.

The development of a native English pottery took place in North Staffordshire. A growing community of peasant potters, who manufactured some strongly decorative English wares by very simple means, was established here from the middle of the 17th century. Rudely fashioned dishes, jugs, bottles, &c, were shaped in the local red-burning brick clays, and, while the pieces were still soft, simple but effective decorative patterns were drawn upon them in diluted white clay (slip), trailed on through a quill or from a narrow-spouted vessel. This ancient and world-wide process (for it was used by the Ptolemaic Egyptian, the Roman and the Byzantine potters) has furnished the peasant potters of every European country with character- istic wares, but nowhere

was it used with greater skill than in England. The English slip-decorated wares are often spoken of as " Toft ware," because Thomas Toft, living in what is now Hanley (Staffordshire) boldly signed and dated many of his pieces (1670, &c); but similar wares were made at Wrotham in Kent, in Derbyshire, Wales and elsewhere. The repute of

2 Bottger at Meissen made a similar ware as his prelude to the discovery of white porcelain, but this was after Dwight's death.

the Staffordshire district must have spread by the time of the Revolution, for soon after 1690 John Philip Elers, a Dutchman of good family, settled there and began to make a superior pottery to any previously made in the district. Elers is generally described as a great inventor who brought all kinds of knowledge into the district, but the only wares he is known to have made were singularly like those of Dwight, and, quite recently, records of a lawsuit in which Dwight charged Elers and some other Staffordshire potters with suborning his work- men and infringing his patents have been brought to light. It is certain that, from the time of Elers, the Staffordshire potters made great advances in the fabrication of their wares, and during the 18th century they evolved two distinctively English kinds of pottery , (i)the white and drab salt-glaze, (2)English earthenware.

Staffordshire Salt-glaze. — It is uncertain when and how the Staffordshire potters learnt that a highly siliceous pottery could be glazed by throwing common salt into the kiln at the height of the firing, for the practice had originated in the Rhineland more than a century before. Many writers have maintained that the practice was introduced by Elers, but this is uncertain. Early in the 18th century a fine, white, thin, salt-glazed ware was made in Staffordshire, in many quaint and fanciful forms largely influenced by Chinese porcelain — still an object of wonder and mystery. Teapots, coffee-pots, tea-caddies, plates, dishes, bowls, candlesticks, mugs and bottles were made in great variety, and at its best the ware is a dainty and elegant one, so that a brisk trade was developed in the district, and, for the first time, a distinctively English pottery was exported to the continent and to

the American colonies.

English Earthenware. — The manufacture of tin-enamelled pottery scarcely obtained a foothold in Staffordshire, but the invention of the white salt-glazed ware paved the way for one of the greatest revolutions in the potter's art that the world has ever seen. This was nothing less than the' abandonment of the ordinary red or buff clays with a coating of white slip or of tin-enamel, and the substitution of a ware white throughout its substance, prepared by mixing selected white-burning clays and finely-ground flint (silica). 1 The change has generally been associated with Wedgwood, most famous of English potters, but he really only perfected, along with his contemporaries, the Warburtons, Turners and others, the work of half a century's experiment and discovery. The ware compared most favour- ably, from the point of view of serviceableness, neatness and mechanical finish, with all that had gone before it, and as the tin-enamelled wares had almost everywhere in Europe sunk to the position of domestic crockery — for the Chinese, German, French and English porcelains had displaced it with the wealthy — 'this better-fashioned and more durable English ware gave it its final death-blow. English earthenware in its various forms was to be met with all over Europe, from London to Moscow, and from Cadiz to Stockholm; and, aided by emigrant English potters, the continental nations soon began a similar manufacture for them-selves. Everywhere this great change was encouraged by the growing fondness for mechanical perfection, and it is not with-out a sigh that a lover of pottery can witness the gradual dis-appearance of the painted tin-enamelled wares — degenerate survivals though they were of Italian majolica, French faience and Dutch " Delft " — before the unconquerable advance of another form of pottery which in its inception was based on technical rather than artistic qualities, especially as nearly a century passed before the new material was turned to artistic account.

By general consent the name of Josiah Wedgwood has been pre-eminently associated with this great change, and with good reason, for though he had many contemporaries who equalled or even excelled him in certain kinds of pottery, no other potter ever approached him in the range of his products and the varied applications to which he turned the exercise of his remarkable

1 For a discussion of the stages through which this was achieved the reader is referred to special works, such as Prof. A. H.

Church's English Earthenware, and W. Burton's English Earthenware and Stoneware.

talents. 2 True, he soon abandoned the simple Staffordshire wares, coloured with mottled glazes or clay-slips, to which the names of Astbury or Whieldon are commonly attached, but the varied productions of his factory united the best work of a district fruitful in new kinds of pottery, with something especial to Wedgwood himself. Thus he adopted and improved the green and yellow glazes which had come down from medieval times (see the cauliflower ware piece, Plate X.), and gave a new direction to their use in his green-glazed dessert services, candlesticks, &c. He carried on the manufacture of hard- fired red-clay teapots, mugs, coffee-pots, cream-jugs, &c, introduced by Elers; and, along with his fellow-potters, he invented drab, grey, brown and other colours in similarly hard- fired unglazed bodies. He neither invented nor alone perfected the Staffordshire cream-coloured earthenware, but he made it so well that his " Queen's ware " was the best of its class. He undoubtedly invented the Jasper ware, in which on grounds of unglazed blue, green, black, &c, white figures and ornamental motives, adapted from the antique by Flaxman, Webber and other sculptors, were applied; and he even attempted to re- produce the painted vases of the Greek decadence in dry colours painted over a hard black body.

Wedgwood's " Jasper ware," his most original production (see Plate X.), differed both in nature and composition from all the species of pottery that had preceded it. In an attempt to obtain the qualities of the finest porcelain biscuit, Wedgwood discovered, after years of experiment, that by mixing together a plastic white clay and " cawk " or barytes he could obtain a " body " which might be " thrown " on the wheel or " pressed " in moulds, and which, while it fired to a white and sub-trans- lucent pottery, was capable of being coloured, by the usual metallic oxides, to various shades of blue, green, yellow, lilac and black. The ware resembled " biscuit " porcelain in that.it needed no glaze to render it impervious to water, and it thus marked the culmination of those " dry " or unglazed wares that had been so largely made in China, Japan and Europe, where the quality resides in the fired clay material without any adventitious aid from a glaze. The general practice was to make the body of the vessel of a coloured material and to ornament this with applied figures or ornamental reliefs, in " white " of the same kind, " pressed " from intaglio moulds and then applied by wet- ting the

surface and squeezing — leaving the fire to unite the vessel and its applied ornament into one piece. Sometimes the ornament was in a coloured clay applied on a white body, and We get in the same way black on red, buff on red or black, and red or black on buff and drab bodies. The variety of bodies produced by Wedgwood and his followers in this way is ex- ceedingly great, and is only to be equalled by the diversity of their application, for the pieces made include plaques, vases, plates, dishes, jardinieres, bulb-pots, teapots, cups and saucers, inkstands, scent-bottles, buttons, buckles, and, in a word, every kind of thing that could be made in clay. Many of the applied designs, whether of figures or ornament, were very beautiful in a way, being copied or adapted from Greek and Roman gems, vases, &c. At their best they are marvellous for the precision and delicacy of their execution, and it is impossible to imagine that anything better could have been done in this style. So per- fectly did they represent the taste of their period that attempts were made at Sevres, Meissen, Berlin and Buen Retiro to produce something of the same kind in porcelain; but none of these can be compared with the works of Wedgwood, or his great con- temporary Turner (see Plate X.) , in beauty of colour or perfection of workmanship.

It is obvious nowadays that much of this work was inspireu by mistaken motives; that it was founded on an imperfect view of ancient art; and that it was marred by its mechanical ideals ; but it must be remembered that it was in perfect harmony

2 It is amusing or annoying to find in European museums the wares of Wedgwood, Turner, Adams and one of the Leeds potteries, all lumped together as ” Wedgwood,” and yet one can hardly wonder at it, remembering how much has been written of Wedgwood and how little of the other English potters of the 18th century.

with the spirit of the times, and that while it emphasizes for us the pseudo-classic taste of the late 18th century, it marks an advance in the technical skill of the potter, which is simply astounding. The co-ordination of labour, which had gone further with the Greek and the Italian potter than is generally supposed,

was now brought to a climax. Mechanical appliances were introduced for the performance of many portions of the potter's work that had hitherto been indifferently performed by rude and exhausting manual toil; and while the application of mechanism was pushed too far — so that in the first half of the 19th century we find the most inartistic pottery the world has ever seen — we must regard this even more as a cyclic movement of human feeling than as the work of any individual, or group of men. The late 18th century marks the period when pottery was no longer produced, as Italian majolica, the Henri-Deux ware, the Palissy wares, the best faience of Nevers, Rouen, Moustiers, Delft or Nuremberg had been, for the noble or the wealthy, but when it was largely in demand by the poorer classes, anxious in their turn to have a useful ware which should imitate the more costly porcelain used by the great. France, Germany, 5weden, Russia, and later the United States, all followed in the wake of the English potters, and the printing-press was applied in all countries to produce elaborate engraved patterns in blue, brown, green, &c, in order to get an effective-looking ware in harmony with the spirit of the times, and at the same time cheaper in price than the simple painted patterns of the vanquished tin-enamel.

Collections. — The British and the Victoria and Albert Museums naturally contain the most representative collections of English pottery. The museums at Liverpool, Bristol, Burslem, Hanley and Nottingham, also have good collections, while Birmingham, Manchester and Stoke-upon-Trent may be mentioned. The Guildhall Museum, London, is rich in early wares found or made in London and its vicinity. Continental collections of English pottery are meagre in the extreme and badly described, even in the ceramic museums at Sevres and Limoges. The collection at Dresden is interesting, as it was purchased from the collection made by Enoch Wood, a Staffordshire potter. In America, the Boston Museum of Fine Arts, the Metropolitan Museum of New York, and the Penn- sylvania Academy of Fine Arts at Philadelphia, contain interesting examples of wares exported to America in the late 18th and early 19th centuries.

Literature. — The earliest compilations, such as Jewitt's Ceramic Art in Great Britain (1878), and Life of Josiah Wedgwood (1865); Chaffers, Marks and Monograms (1863; 9th edition revised, 1900); Meteyard's Life of Wedgwood (1865-1866), and Shaw's History of the Staffordshire Potteries (1829; reissued London, 1900), must always be of interest as original sources of information; but the later works, such as Church, English

Earthenware (1884; new edition, 1906); Josiah Wedgwood (1894, reissue 1903 and 1907) ; Solon, Art of the Old English Potter (1883; 2nd ed., 1885); Hobson, Catalogue of English Pottery in the British Museum (1903) ; Burton, English Earthenware and Stoneware (1904), are the best authorities. (W. B.*)

Chinese Pottery and Porcelain 1

In China, as in every other country where pottery-making has been practised for centuries, we find a natural progression from primitive pottery akin in shape, decoration and manu- facture to the pottery of other primitive races the world over. We find too the early use of bricks, tiles, &c, as in Egypt and Assyria; and then the usual succession of domestic utensils, funeral vases, and vessels for religious ceremonials. There is nothing to show that the potter's wheel made its appearance in China earlier than elsewhere, and the Chinese potters have used the simple methods of carving and " pressing " from moulds which preceded the use of the potter's wheel, even more than other nations 1 . In books of the Chow dynasty (1122-249 B.C.) the difference between the processes of " throwing " and of " pressing " from moulds is clearly described, 2 and it is instructive to note that many early as well as late forms of Chinese pottery are remarkably like their works in bronze. In the same way there is no definite date to which we can refer the introduction of glazed pottery. The earliest specimens of glazed ware known are referred by the Chinese to the times of the Han dynasty

1 See examples in colour, Plates VII. and VIII.

2 S. W. Bushell, Chinese Art (Victoria and Albert Museum Hand-books, ii. 5-6).

(206 b.c.a.d. 22b), a date much later than that of the earliest glazed wares of Egypt and Assyria. Remembering the inter course between China and the West, at times historically remote, it is not impossible that the idea of coating a vessel of clay with a glaze was carried into China from Chaldaea or Assyria. In any case the Chinese developed the potter's art on their own lines, for we have ample evidence that from very early times they fired their pottery to a much higher temperature than was common in the west of Asia, and so discovered types of glaze and of pottery that remained for centuries a mystery elsewhere. The glazed wares of the Han dynasty already mentioned are quite unlike any contemporary pottery produced in Syria, Egypt or Europe, for the

body of the ware is so hard that it can scarcely be scratched by a knife, and the dark-greenish glaze has become iridescent by age as though it contained oxide of lead. The easily-fired friable wares of Assyria, Egypt and Greece seem to have had no attraction for the Chinese, and the glazes on their hard-fired wares were naturally different from those already described. The Chinese appear to have been the first potters in the world to discover that at a sufficiently high tempera- ture pottery can be glazed with powdered felspathic rock mixed with lime. At first these glazes were used on any ordinary refractory clay which might burn red, drab or buff; but in this technique lay the germ of Chinese porcelain, the most advanced form of pottery the world has yet seen. It is necessary to con- sider the pottery that preceded porcelain, for not only was it the matrix out of which porcelain grew, but in certain districts of China, where the necessary materials for porcelain are not found, similar wares have been manufactured without inter- mission to the present time. Naturally, in progress of time, the technique of this pottery has been greatly improved, both by developments in the preparation and mixture of the clays, the shaping and modelling of the wares, the introduction of coloured enamels or glazes, and the like. Dr Bushell, who is our great authority on the Chinese arts and handicrafts, rightly seizes on two outstanding types of Chinese pottery other than porcelain which have exercised considerable influence on the doings of European potters.

1. Yi-IIsing-Yao. 3 — -This is the pottery, generally of unglazed fawn, red or brown stoneware, made at Yi-hsing-hsien in the province of Kiang-su. Articles of every kind are made in these fine-coloured clays, but the general forms are dainty and skilfully finished pieces, such as small teapots, cups, saucers, dishes, trays, water- bottles and wine cups. This ware was largely manufactured under the Ming dynasty (a.d. 1368-1643) and later. 4 It was imported into Europe by the Portuguese, who applied to it the name boccaro, formerly given only to a scented terra-cotta brought from Mexico and Peru. 6 This pottery and Chinese porcelain were wide asunder as the poles in nature as well as origin, but the potters of northern Europe regarded every kind of pottery coming from the Far East as a species of porcelain, and the manufacture of red teapots, mugs, bowls, cups, &c, in imitation of the Yi-Hsing-Yao was widespread during the late 17th and early 1 8th centuries under the name of red porcelain. Dwight, Elers and Bottger are notable names in this connexion.

2. Kuang- Yao, — The name given by the Chinese to the pottery

made in the province of Kwang-tung. There are several centres of manufacture in this extensive province, but for the purposes of this article it is sufficient to state that the best-known of these wares are dense, hard-fired and glazed stonewares, which are always dark- coloured grey, red, brown or blackish. They are usually glazed with thick, variegated or opalescent glazes, grey, blue, green, yellow or red, but flecked, veined and streaked with other tints. The wares are so like the productions of the Sung dynasty (a.d. 960-1279) that modern pieces are often confounded with the more precious productions of that epoch. One of the first lessons to be learnt by the student of Chinese pottery is that, with great reverence for their own antiquities, the Chinese of every period have endeavoured to reproduce the famous wares of their ancestors, and often with euch skill as to deceive the most expert. Even when the manufacture of porcelain was at its highest in King-tl-chln, the potters in other parts of China carried on the production of glazed or unglazed pottery in coloured clays, and, further, the directors of the imperial factory from time to time strove to reproduce the most archaic wares that could be found in the Empire.

3 Yao is the Chinese term equivalent of the English ” pottery ‘ or ” ware.”

4 See Brinkley, Japan and China, ix. 353-365.

6 Solon, The Noble Buccaros (Stoke-upon-Trent, 1896).

CERAMICS

Pl,\tf. VII

Chinese. Sang dc ficcuf.

Chinese. Turquoise glaze “crackled.”

Purple Souffle. Coral red.

Peach blow. Pigeon’s blo

Lemon yellow. Apple green.

CERAMICS

Plate VII

Chinese, Sang dc Bocuf.

Chinc&c. Flambi.

Chinese. Turquoise glaze “crackled.’

Purple Souffle.

Coral red.

Peach blow. Pigeon’s blood.

Lemon yellow.

Apple green.

Porcelain. — By this word we distinguish broadly all those pieces of pottery in which the body of the ware is vitrified and translucent, and also, broadly speaking, in which the material is white throughout, unless minute quantities of metallic oxides have been definitely added to colour it. It is impossible to draw any hard and fast line between porcelain and stoneware, for both may be thoroughly vitrified and translucent in thin pieces — but generally the stonewares are drab, red or brown in the colour of the fired clay, and they seldom exhibit the precious quality of translucence. If the body of a piece of pottery is not even vitrified, however hard it may be, it is terra-cotta or earthen-ware. The Chinese, accustomed from a very early period to fire their pottery to a high temperature, produced vitrified stonewares before any other nation. Moreover, they glazed these stonewares with fusible mineral substances, and from that stage the natural refinements of methods must necessarily have produced porcelain. In regions where beds of primary clay were found, the body of the ware would burn whiter than elsewhere, and a mixture of limestone or marble with the fels- pathic rock would give a glaze of greater purity and brilliance and one that was more readily fusible and Would spread better over the whole piece. How many centuries were needed before a ware white enough and translucent enough to be now classed as porcelain was produced we cannot know; but the process was certainly one

of gradual evolution. Some Chinese writers in their zeal for ancient things have ascribed to remote periods the production of wares of this class. Where authentic speci- mens are not to be found it is necessary to proceed with caution, and literary evidence alone cannot be deemed sufficient to settle such a difficult point. The balance of opinion at the present time is that something worthy of the name of porcelain was made during the Tang dynasty (a.d. 618-907), but we have no pieces earlier than the Sung dynasty (a.d. 960-1259), and the majority of these are perhaps more fitly described as stoneware than as porcelain.

Under the Sung dynasty China enjoyed great material pro- sperity, and all the arts were cultivated assiduously. Pottery of distinguished merit was made in many districts, and much of it has been classified as porcelain because the body is whitish and vitrified, though it is much inferior in finish and in trans- lucence to the perfect white porcelain of later times. It is necessary to realize, too, that we have no record of any pottery with painted decoration until perhaps the very end of the 13th century; such ornament as was used consists entirely of designs incised or modelled in the clay. But the principal decoration is to be found in the varied coloured glazes with which the wares, whether stoneware or porcelain, were covered. The glaze is never clear and white as at later times; it is generally uneven, imperfectly fused and presents all the marks of an imperfect technique. The nearest approach to white is found in an opal- escent grey which shades off to greenish and bluish tints. The glazes of this period which are most highly valued arethe cUadons, a family of cool bluish or yellowish greens of indescribable depth and softness. Besides the cMadons which are the most uniform in tints of the Sung glazes, we get many shades of palish lavender, brownish yellow and brownish black, but these are aH subtly of boldly mottled, splashed, clouded or veined with strange tones of red, blue, purple, opalescent grey and black. The most famous of these now very rare Sung wares were the stonewares of Chun-chow, remarkable for their rich and varied glazes, the black variegated glazed wares of Fu-kien province, ” hare’s fur cups ” and ” partridge cups ” of collectors, and the four principal wares that may be called porcelain, viz. — the Ju-Yao, made at Ju-chow in Honan; the Kuan-Yao {Kuan — ” official ” or ” im- perial “), made first at Pien-chow and afterwards at Hang-chow; the Ko-Yao, made at Liu-t’ien; and the Ting-Yao, made at Tung-chow in Chih-li.

This was the period when Chinese porcelain became known

beyond its native country, for the first mention of porcelain outside China appears in the writings of a Mahommedan traveller, Sulaiman, who visited China in the 9th century and wrote: ” They have in China a very fine clay with which they make

vases which are as transparent as glass; water is seen through them “-, 1 and its first appearance in the west is always given as a.d. 1 171 (or 1 188), when Saladin sent a present of forty pieces to the sultan of Damascus. From this time onwards an export trade was developed, particularly in the cMadon wares oi Lung-chiian, a city in the south-west of the province of Cheh- kiang. This famous ware, the ” green porcelain ” of the Chinese, probably made as an imitation of jade, exists mostly in the form of thick heavy dishes, bowls and jars, bearing incised or fluted patterns, and coated with a remarkable thick green glaze of indescribable softness of tone. Though the body of the ware is white when it is broken through, any parts not covered by the glaze have a reddish-brown colour due to the unrefined paste, and when the ware was reproduced in later times this reddish-brown tint had to be imitated artificially. The ware was highly prized both in China and Japan, in the islands of the East Indies, and in all Mahommedan countries. In Persia it was largely used, and specimens of it have been recovered during the last century from the east coast of Africa and as far west as Morocco. ” Archbishop Warham’s cup ” at New College, Oxford, which is the first specimen of Chinese porcelain to reach England that we can now produce, is a celadon bowl with a silver-gilt mount of the time of Henry VIII. 2

The Sung dynasty was overthrown by the Tatars under Kublai Khan (grandson of Jenghiz Khan), and the power remained in Tatar hands until 1368, when the great native dynasty of the Mings was established. During this period (Yuan dynasty), roughly a century, one can say little of ceramic progress, for the Wares of the period are singularly like those of Sung times. But two important changes took place which had a marked influence on the subsequent development of Chinese porcelain — (1) the concentration of the industry at King-te-chen, which was con-summated in the early years of the Ming dynasty; (2) the introduction of painted decoration under a white transparent glaze, the idea of which (and perhaps the necessary cobalt mineral) was brought from Persia.

King-te-chen was already a pottery centre when its factories were

rebuilt in 1369 by Hung-Wu, the founder of the Ming dynasty, who made it the imperial factory, so that the best porcelain workers were attracted thither, and in the other old centres the industry was abandoned or some earlier manufacture was continued, as in the southern province of Kiang-su. In the province of Fu-kien a distinct kind of porcelain manufacture has also continued. We have already mentioned the black glazed cups, " hare's fur," &c, made in this province in Sung times, and, while King-te-chen was to be the scene of the develop- ments of the coloured and painted porcelains, Te-hwa in Fu-kien perfected the manufacture of the famous and beautiful white porcelain in bowls, dishes, cups and statuettes, best known under its French title of blanc de Chine.

The earliest painted Chinese porcelains, which are referred to the beginning of the Ming period, though some of them may be older, speak strongly of ideas imported from the west of Asia. The pieces are massive both in form and substance, and the orna- ment, consisting of figures mounted or on foot, animals, bands of diaper or foliage, or pendant necklaces, is strongly silhouetted by a raised outline recalling the decorative methods of the Assyrian brickwork. The technical methods also recall the methods of western Asia, for the ware was fired before it was glazed, and then yellow, turquoise, green or purple glazes, similar in nature to the glazes of Egypt, Syria and Persia, and quite unlike the Chinese Sung glazes, were filled into the outlined spaces and melted at a lower temperature. The Grandidier

1 M. Reinand, Relation des voyages fails par Us Arabes et les Persons dans I'Inde et d, la Chine dans le IX" siicle (Paris, 1845).

2 The suggestion has been made that the celadon wares found in Western countries were made by Moslem potters and not by the Chinese, but this theory is not generally accepted. On this point consult Karabacek, " Zur muslimischen Keramik " in Osterreichische Monatsschrift fur den Orient, vol. x., 1884; A. B. Meyer, " fiber die Herkunft gewisser Seladon-Porzellane " under " fiber die Marta banis," ibid. vol. xi., 1885; Hirth, Ancient Porcelain (1888), and Bushell, Oriental Ceramic Art (1899).

collection in the Louvre, the Franks collection at the British Museum, the Victoria and Albert Museum, as well as all the great private collections of Chinese porcelain, contain samples of this primitive and archaic-looking ware.

The great stream of porcelain decoration was, however, to take an entirely different direction. The Persian pottery with its brilliant painted decorations in blue, green and purple on a pure white ground, exercised its natural fascination over men as keen in colour-sense as the Chinese potters. With the con- centration of the industry at King-te-chen, and the rapid im- provement in technical skill and knowledge that followed, the production of a fine porcelain with a transparent white glaze was perfected. Of all the colours used by the Persian pot-painter the only one that would endure the fierce fire of the Chinese porcelain was the blue obtained by using the ores of cobalt, and with this colour, and a wonderful blood-red obtained from copper, the foundation of Chinese painted porcelain was laid. It would be idle to try and fix any specific date for this important development, which took more than a generation to perfect, but it is reasonably accurate to say that the blue and white painted porcelains were unknown in the 13th, century and were fully developed at the beginning of the 15th century. Chinese collectors prize most highly the blue and white of the reign of Suen-te (a.d. 1426-1435), of Cheng-hwa (1465-1487), and next of Yung-lo (1403-1424). It is interesting to note that the colour used during these reigns is spoken of as " Mahommedan " blue, so that it was evidently brought from some country to the west. This 15th-century blue and white porcelain is admittedly the finest of its class, and though the Chinese never abandon an old method and have continued to make blue and white porcelain, often of very good quality, the later wares, fine as they may be, rarely equal these.

The under-glaze red, an invention of the Chinese, has already been mentioned, and this most difficult of all ceramic colours was largely used during the same period. At first it appears as a general ground colour for the outside of bowls and cups, then vessels were made in special forms (persimmon fruit, &c.) to display its qualities, finally it was used either alone or in con- junction with blue in painted designs under a white glaze of exceptional quality. A Chinese connoisseur of the 15th century describes one of his pieces as being decorated with " three red fishes on a white ground, pure as driven snow; the fish boldly outlined and red as fresh blood, all with colour so brilliant as to dazzle the eye."

Other characteristic wares which made their appearance in Ming times are the marvellous ” eggshell ” porcelains, called by the Chinese ” bodyless ” from their extreme thinness. As early as the reign of Yung-lo (1403-1424) these delicate wares were in high repute, and their manufacture has been continued ever since with varying skill and success. In spite of their extreme thinness the specimens have designs of dragons in the midst of clouds and waves, inscriptions, &c, engraved in the paste before firing. In the fine white specimens the design is so delicate that it is barely visible until the vessel is filled with liquid or held to the light. Others were covered with a coloured glaze which serves to accentuate the design, and the most prized of these are the yellow pieces made during the reign of Hung-Chi (1488-1505) and Cheng-te (1506-1521).

Another wonderful variety of Chinese porcelains which made its appearance at this period is the well-known perforated ware, commonly spoken of, from the shape of the perforations, as ” grain of rice ” porcelain, though the Chinese have exhibited consummate skill in the manufacture of perforated pieces of all kinds. Sometimes the perforations are left clear, but in the rice-grain pattern the incisions are generally filled up with the melted glaze so that they become like so many windows in the walls of the piece. We have already seen that the Persian potters used a similar method of decoration in the 16th century, but we are unable to say at present whether the device originated in China orin Persia. Its usein both countries is only an additional proof of the intercourse between eastern and western Asia.

It is only toward the end of the 16th century that we find

the first examples of porcelain decorated with colours fired over the glaze. It seems probable that the practice grew out of the use of enamels on metal, which had spread from Byzantium to China, and which the Chinese developed with remarkable skill. It is important to remember that the very nature of the glaze of Chinese porcelain, necessitating such a high temperature to melt it, severely restricted the under-glaze palette to cobalt- blue and the glorious but uncertain copper-red. To obtain the rich polychromatic schemes of the potters of the West some other means must be found, and so the device was adopted of taking a finished piece of blue and white and decorating it further by very fusible colours painted over the fired glaze and then attached to it by retiring at a lower temperature equal only to that used by the enameller on metals. At first the on-glaze or enamel colours

were applied as thin washes, as in the Ming (San ts' ai) three-colour decoration of green, purple, and yellow. Then we get the Ming (Wan-li Wu ts' ai) five-colour scheme, in which the same three colours are combined with an over-glaze red and all are painted over a skeleton pattern in under-glaze blue. This development, as its name implies, only took place in the reign of Wan-li (1573-1620).

At this time King-te-chen must have produced a very large quantity of porcelain. The requirements of the court were enormous, for in 1583 one of the supervising censors, remonstrating with the emperor, declared that one year's demands comprised over 96,000 pieces; and Dr Bushell writes: "The colossal production of the reign of Wan-li is shown by the abundance of porcelain of this time to be found in Pekin at the present day, where a garden of any pretensions must have a large collection of bowls or cisterns for goldfish, and street-hawkers may be seen with sweetmeats upheld by dishes a yard in diameter, or ladling syrup out of large bowls, and there is hardly a butcher's shop without a cracked Wan-li jar standing on the counter to hold scraps of meat."

Such profuse orders may be accountable for the fact that the wares of this reign are inferior both in material and workmanship to the wares of the preceding and also of later periods, but the influence of the growing export trade doubtless told in the same direction. For several centuries the native Chinese porcelain had been exported to all the neighbouring countries, and through Persia and Cairo to the West. No long time elapsed before the Chinese adopted forms, colours and decorations for these export wares, not in accordance with Chinese usage, but pre- sumably more suited to the tastes of the foreigner. Hence the Persian and Syrian style of the painted blue decoration of the 15th and 16th century wares found in other Asiatic countries. Now, for the first time, there came a direct European demand, and cargoes of ware were brought to Europe by the Portuguese and afterwards by the Dutch, which were increasingly decorated in fashions foreign to Chinese taste. The production of these export wares slowly modified the taste of the Chinese themselves and paved the way for the new styles of the late 17 th and early 1 8th centuries.

The political troubles which marked the downfall of the Ming dynasty definitely separated the first great period of Chinese porcelain from its second and culminating period. The works at

King-te-chen were destroyed more than once in the 17th century, but in spite of these difficulties the potters must have remained, for the reigns of K'ang-hi (1662-1722), Yung-cheng (1722-1735), and K'ien-lung (1736-1795) covered a century and a half, within which the high- water mark of artistic pro- duction was reached and passed. It is only possible here to sketch in broadest outline the course of this Renaissance, which has formed the subject of many learned works.

It is characteristic of the Chinese mind that during this period, when a spirit of eager experiment was abroad, the productions of their ancient kilns should receive no less attention than the new methods of decoration in on-glaze colours, while at the same time many of the discoveries of the later Ming days were carried on to perfection. The first remarkable productions of the reign of K'ang-hi, the famous green and blood-red Lang-yao glazes, were made in the attempt to produce glazes like those

of old times. With the more carefully prepared body and glaze the results are strikingly different and, as we think, superior, for it is difficult to believe that any example of the " sacrificial " red of the reign of Suen-te can have been as glorious as the red Lang-Yao, the crown of all that group of glazes known from their general colour as sang de bceuf (see example, Plate VII.). In the same way the traditional blue and white of the Ming period was continued with the greatest skill, and, if the blue pigment be not so pure as that of the 15th century, the decorative effect of the blue and white of the reign of K'ang-hi (see example, Plate VIII.) has never been equalled in Europe. The subjects of the blue and white pieces of this period are very varied, including religious, ceremonial, battle and hunting subjects, homely scenes such as ladies and children amusing themselves in gardens, or animals, birds, dragons and other fabulous monsters dis- porting themselves in clouds or waves. The so-called " hawthorn ginger jars " form a class by themselves in the opinion of modern collectors (see the plum-blossom jar, Plate VIII.), a specimen being sold at the Louis Huth sale (1906) for £5000. The fertility of the painters was remarkable, and a collection of the blue and white of this reign offers a fine feast of ceramic colour from the

harmonious relation between the tones of the white and the blue, especially when it is seen en masse, as in the famous Dresden collection. 1

The practice of painting the ground of a piece in blue so that the pattern was reserved in white (even artfully heightened by the use of slip) dates from Ming times, but the grounds of powder-blue aooear to have originated at this time. The cobalt- pigmer>t was not applied by a brush, but was blown on through 8 tube, one end of which was covered with fine muslin, in a rain of minute drops. This ground was either carried over the whole piece so as to give the effect of a vibrating blue glaze — in which case it was generally covered with conventional designs pencilled in ground-up gold-leaf over the glaze — or panels were reserved in white on which floral designs were afterwards painted in on-glaze colours.

In the same way the decoration in underglaze red was revived or re-introduced, and probably the finest pieces of this ware, as of so many others in our great European collections, date only from the beginning of the 18th century. Eggshell wares and pierced or reticulated pieces were made to great perfection, and the coloured glazes in light green, turquoise, purple and black (see Plate VII.) reached their height. The early glazes of this type appeared in Sung times (see above) , but on the finely prepared K'ang-hi wares much more striking and brilliant colour effects were obtained. As in old times, for the production of some of these glazes a departure was made from the general Chinese methods. The vessels were first fired to the " biscuit " state, and then soft alkaline glazes coloured with copper or manganese were fired over them at a much lower temperature so as to give the " peacock-blue," " kingfisher-green " and " aubergine- purple " glazes. Many varieties of single-coloured glazes were made by covering a white glazed piece with on-glaze colour, and in this way new shades of coloured glaze, such as the coral-reds (Plate VII.) ,wereobtained. The various brown or bronze-coloured grounds, so well known in the so-called " Batavian " porcelain, were obtained by coating the piece with a slip of some ochreous clay under the usual white glaze. Even these methods do not exhaust the fertile resources of the potters of this period, for they carried on concurrently the style of decoration in overglaze colours, first in the schemes characterized by the predominance of a vivid green enamel (jamitte verte; see Plate VIII.), and finally, in the 18th century, in the schemes in which rose, pink and purple colours predominate (Jamille rose; see Plate VIII.). It

is probable that these latter colours, which owe their tint to gold, were introduced into China from Europe, but the Chinese employed them whole-heartedly, until in fact they largely ousted all the earlier types of colour decoration.

During the reign of Yung-Cheng (1723-1735) the diverse

1 It is of interest to note that the " Delft " of Holland, also a product of the 17th and early 1 8th centuries, makes the nearest approach in quality to the blue and white porcelain of the Chinese.

styles seem to have been finally struggling for mastery. Yung-Cheng was an ardent collector of ancient Chinese porcelains, and he sent to King-te-chen specimens of the most ancient wares, whether of pottery or porcelain, to be reproduced, while at the same time he and his court patronized the wares in foreign styles and colours (Japanese and European.)

The struggle continued practically to the end of the 18th century, but in spite of certain brilliant inventions, such as the " iron-rust " and " tea-dust " glazes of the reign of K'ien-lung in harmony with old Chinese effects, what we must regard as the inferior decorative style triumphed, and we see the gradual disappearance of the ancient methods in favour of (1) wares of a beautiful white body decorated only with on-glaze colours, principally those of the jamille rose, and (2) a very large production of inferior wares, made in European shapes and decorated with on-glaze painting and gilding to suit the European taste of the 1 8th century.

This " armorial " china, so much of which was once foolishly ascribed to Lowestoft, has little to commend it. The material is seldom of the best quality, and the Chinese rendering of European arms and crests, or stiff copies of European engravings surrounded by quasi-oriental borders of diaper, &c, does nothing to recommend it. A great deal of this ware, though manufactured at King-te-chen, was decorated at Canton, and the school of pottery decorators founded there by reason of this export trade also produced a certain number of pieces in pure Chinese taste, especially some of the ruby-backed plates and dishes and the small cups and saucers decorated with deftly-painted designs of cocks, peonies, &c.

It must be pointed out that the great change implied in the

replacement of patterns painted in blue under the glaze by those painted in colours over the glaze profoundly influenced the style of painting. In the earlier wares the treatment is bold and vigorous as becomes true pottery colour, and the softening of the colour by the melting glaze adds to the artistic charm of the result. Painting on a fired glaze is like painting on glass — fine lines, delicate drawing, and skilful stippling or cross-hatching are just as natural in this method as they are impossible or uncertain in the other. Naturalism of rendering takes the place of conventional decorative treatment, and elabo- rate minuteness of finish supplants the broad freedom of direct brushwork. During the 18th century the same leaven was at work on the porcelains of China and of Europe, the East in- fluenced the West, and the West in its turn bore down the East. If Chinese porcelain remained superior to its European counter- feits, it was because the Chinaman was still the better potter and had a longer tradition of decorative art behind him.

There is little to be said of Chinese porcelain during the 19th century. The European demand was practically killed by the growth of porcelain works at home, and the imperial patronage, so great a factor in the production of artistic wares, was fitful and uncertain. Tao-Kwang (1821-1850) gave some attention to porcelain, and the pieces made for him and marked ” Shen- te-t’ang ” are valued by collectors. The so-called Peking bowls of his reign (made of course at King-te-chen) are also of repute. But the political difficulties of China left little leisure for the cultivation of the arts; the successive wars with France and England served only to scatter the splendid wares of the past (see the Musee Chinoise at Fontainebleau) , and during the reign of the next emperor Hien-feng (1851-1861) the T’aipings over- ran the province of Kiang-si and destroyed King-te-chen and its factories. Since then the town has been rebuilt and is once again producing Chinese porcelain. Tempted doubtless by the high prices now paid in Europe and America for examples of the Chinese porcelains of the 18th century, modern copies of the single-coloured, sang de bceuf, flamM and other glazes are being made, while the highly prized ” hawthorn ” jars and black-ground vases are receiving the same undesirable attention.

Materials and Manufacture of Chinese Porcelain. — For many centuries after its first appearance Chinese porcelain differed from every other known species of pottery both in its material and its manufacture. While the pottery of all other countries was generally

made of coloured clays mixed only with sand or broken ” shards ” and fired at a comparatively low temperature, Chinese porcelain was compounded from the purest white clays, sand and fusible rock ; it was glazed with fusible rock, and it was so hard fired that the entire mass became vitrified and translucent. The germ of the manufacture lay in the discovery of large masses of primary clay (kaolin) mixed with finely-ground felspathic rock (petuntse), both of which were carefully washed, levigated and purified. The body of Chinese porcelain varied from time to time within wide limits, but, broadly speaking, it always consists of purified kaolin, petuntse and quartz (sand), mixed in various proportions, sometimes with addi- tional ingredients, according to the quality of ware desired. For the glaze the purest and cleanest portionsof the felspathic rock (petuntse) were selected and mixed with lime — all being ground to fine powder. The lime causes the glaze to melt at a lower temperature than would be necessary for petuntse alone. The lime also gives the Chinese glazes their luscious softness of aspect and the faint greenish or bluish tone, while it enabled them to receive the later decorations in piled-up enamels, impossible on the harder European porcelain glazes of the 18th century. The finely-prepared glaze was applied to the clay vessels, before they had been fired, either by dipping, by painting, or by insufflation; and then glaze and body were fired together at a very high temperature. For certain glazes — turquoise, purple, &c. — which were not of the felspathic type, the vessels were first fired to the ” biscuit ” state, and the glazes were then applied and fired at a much lower temperature — the usual practice of the potters of other countries. When painted wares in blue and red were first introduced, the necessary pigments were painted on the pieces before firing, the glaze was applied over them, and then all was finished at one and the same firing. With the later enamel colours the piece was first fired as above described, and the fusible colours were then painted on the glaze, which was of course like glass. A second firing at a lower temperature fused these on- glaze colours to the ware. For information on Chinese materials and methods the reader is referred to the letters of Pere d’Entrecolles in the collection of Jesuit letters known a.sLettres6difiantes etcurieuses . The English reader will find

reliable translations of the essential parts in Bushell's Oriental Ceramic Art, Dillon's Porcelain, and Burton's History of Porcelain. Later information will be found in Brongniart's Traiti des arts ciramiques, especially in the 3rd edition, 1877; and in an article by G. Vogt, Bulletin de la Societe d' encouragement pour Vindustrie nationale, April 1900, pp_. 530-6I2.

Collections. — The Franks collection in the British Museum; the Victoria and Albert Museum, where the famous collection of Mr George Salting has for years been displayed, together with the collec- tions belonging to the museum. Paris, the Grandidier collection at the Louvre; the collection at the Musee Guimet; the Sevres Museum. Fontainebleau, the Musee Chinoise. Dresden, the Porce- lain Collection — the oldest in Europe. Boston, the Museum of Fine Arts. New York, the Metropolitan Museum containing the Garland and other collections. Washington, the Hippisley collec- tion; as well as magnificent private collections, at the head of which is that of the late W. T. Walters of Baltimore.

Literature. — The older European works on Chinese porcelain have been superseded by the later books. The following list contains the best recent books: — S. W. Bushell, Oriental Ceramic Art (New York, 1897; text separately 1899); Chinese Porcelain before the present Dynasty (Pekin, 1886) ; Chinese Art, vol. ii. ; Victoria and Albert Museum Handbooks (1906) ; Brongniart, Traite des arts ceramiques (3rd edition, with valuable supplements by Salvetat, 1877); Dillon, Porcelain (1900); Sir A. W. Franks, Catalogue of Oriental Pottery and Porcelain (1878); Grandidier, La Ctramique chinoise (1894); Griggs, Examples of Armorial China (1887); Hippisley, Ceramic Arts in China (Smithsonian Institute, Washing- ton, 1890); Hirth, Ancient Chinese Porcelain (Leipzig, 1888); Julien, Histoire et fabrication de la porcelaine chinoise (Pans, 1856); Meyer, Lung-chiian Yao, oder alter Seladon Porzellan (Berlin, 1889) ; Monkhouse, History of Chinese Porcelain (1901); O. du Sartel, La Porcelaine de Chine (Paris, 1881) ; Burton, Porcelain (1906) ; Bushell and Laffan, The Garland Collection in the Metropolitan Museum of New York (1907). (W. B.*)

European Porcelain to the end of the i8th Century Europe can claim no share in the discovery of porcelain, the white and translucent pottery par excellence, for when the first specimens of Chinese porcelain were brought to Europe, perhaps as early as the nth or 12th century, they excited the greatest wonder and

admiration. Cairo was at this time the great mart for the exchange of the products of East and West, and from this centre porcelains were sent into Europe. Nasir i Khosrau, the Persian traveller, who visited Old Cairo in a.d. 1035-1042, was evidently acquainted with Chinese porcelain, and he also speaks of a translucent ware made at Fostat (Old Cairo) which may well have been the progenitor of the glassy porcelains of Persia, as well as of those made in Italy during the 15th and 16th centuries. In a.d. 1171 the famous Saladin sent from Cairo a

present of forty pieces of Chinese porcelain to the sultan of Babylon; and from that time onwards we have frequent records of pieces of this exotic pottery finding their way into the treasuries of European princes. With the renewed attention paid to the potter's art in Europe after the 14th century, it was but natural that efforts should be made to imitate a material so mysterious and beautiful. But knowledge of Chinese materials and methods was nil, and for a further two centuries all that Europe manu- factured in the shape of translucent pottery was the artificial porcelain made with glass, which can only be looked upon as a substitute for true porcelain. In Italy during the 16th century, and in France during the century from 1670 to 1770 roughly, this artificial porcelain was made and developed. At Meissen in Saxony the famous Bottger made a true porcelain from materials analogous to the Chinese about 1710-1712, and this manufacture was pursued in Germany, Austria and elsewhere in Europe (even in France; the home of the artificial glassy porcelain, after 1770), so that by the end of the 18th century, when Chinese porcelain had reached and passed its zenith, the manufacture of a similar material was well established in Europe, and the glassy porcelains had been generally abandoned. The only country which offered any departure from this general rule was England. The earliest English porcelains were derived from the French, and, like them, owed their translucence to the use of glass. Efforts were made at Plymouth and at Bristol (1758-1781) to introduce the manufacture of porcelain, like the Chinese and its German counterparts, but these failed and the English potters finally invented a third kind of porcelain, in which calcined ox-bones were added to the clay and ground rock to give a white trans- lucent porcelain capable of receiving any form of decoration. This distinctively English porcelain, perfected about 1800, is not only the principal kind made in England in our own times, but its manufacture has been adopted, to some extent in France,

Germany and Sweden, as well as in the United States.

It is impossible to describe these various efforts of European potters without a certain amount of overlapping, for during the 1 8th century all the three kinds of European porcelain weie struggling for supremacy. It is advisable, therefore, to keep clearly in mind which kind of porcelain is in question, for many problems of manufacture and decoration are absolutely determined by the nature of the materials.

If we could trust to documentary evidence alone, the earliest European porcelains were made at Venice in 1470, and again in 1519; while we also read of its manufacture at Ferrara in 1561. 1 Unfortunately, documentary evidence alone is not conclusive,. and the first European porcelain, known from actual specimens as well as by documentary evidence, was that made at Florence in the laboratory of Francesco de' Medici, between 1575 and 1585. Specimens of this rare porcelain are to be found only in great museums and private collections, where they rank among our chief ceramic treasures. They show clearly that the Florentine potters never fully mastered their difficult material, for the ware is always imperfect and compares indifferently in whiteness and translucence with fine porcelain, while the glaze is neither smoothly melted nor free from defects. Obviously the effect of Chinese blue and white porcelain was aimed at, the decorations, reminiscent of the style of the Persian pot-painters, being executed in cobalt blue alone. These rare and interesting pieces bear distinctive marks; for at their period the use of painters' marks or monograms had become fairly general on artistic pottery in Europe. One of the best known marks is the " palle " or balls of the arms of the Medici family, bearing the letters "FMMED II." for " Franciscus Medici Magnus Etruriae Dux II."; while other pieces have a Florentine rude representation of the Great Dome of Florence Potter'smark. and the letter " F."

Fortunately, too, besides the few specimens of Florentine porcelain that have survived to our day a manuscript has been

1 See Drake, Sir W., Venetian Ceramics; and Davillier, Baron Ch., Les Origines de la porcelaine en Europe.

Chinese. K’ang-hsi period.

Chinese. Black ground. K’ang-hsi period.

Chinese {Famiilc Verte). K’ang-hsi period.

Chinese {Famiilc Rose). Ch’ien-lung period.

Chinese. Plum-blossom jar. K’ang-hsi period.

CERAMICS

Plate VI IL

Chinese. K’ang-hsi period.

Chinese. Black ground. K’ang-hsi period.

Chinese (Famiile Verte). K’ang-hsi period.

tffgsMw

Chinese (Famillc Host). Ch’ien-lung period.

Chinese. Plum-blossom jar. K’ang-hsi period.

GERMAN PORCELAIN]

CERAMICS

749

found in the Magliabechian Library at Florence which states that the paste was composed of 24 parts of sand, 16 of a glass (powdered rock crystal 10 and soda 8), and 12 parts white earth of Faenza. To 12 parts of this mixture 3 parts of the kaolinic clay of Vicenza were to be added, and the pieces glazed with a lead glaze, or sometimes with the tin-enamel of the Italian faience maker. We are in the presence, therefore, of a material unlike Chinese porcelain in every respect, the Florentine porce- lain being the first of a long line of European porcelains the artistic qualities of which were obtained by mixing a large quantity of glass with a small quantity of clay, so that they may almost be regarded as a species of glazed and painted glass. The technical methods used in their manufacture and decoration, however, were those of the potter and not of the glass maker.

With the death of Francesco de' Medici in 1587 it seems probable that this wonderful innovation came to an untimely end, and we hear no more of porcelain in Italy for more than a century. During this century (1587-1687) there can be no doubt that efforts were made all over Europe to discover the secret of porcelain manufacture; but the first reliable date we can point to is 1673, when Louis Poterat, a faience maker of Rouen, obtained a privilege from the French king for the manufacture of porcelain in that town. The Rouen porcelain in turn ceased with the death of Poterat in 1696. Authentic specimens are extant in the shape of salt-cellars, mustard pots and some few vases, the latter of considerable size. The pieces are usually decorated in blue with patterns in the Rouen style and were evidently painted by an expert faience painter. In composi- tion, the porcelain of Rouen, like that of Florence, was of the artificial or glassy type, and shortly afterwards a similar ware . made its appearance at the faience

"7x* works of St Cloud near Paris, and at , */\ « /ˆ various works in the city of Paris.

/I J fS*\ -J f"ˆ Well-known pieces, bearing the marks' JtXˆte V here shown, formerly supposed to be

Paris Potters' marks. the earliest specimens of French porcelain and the work of Poterat at Rouen, are probably experimental pieces made in Paris after the date of Poterat's discovery, as they differ in important particulars from his ware.

Once firmly established in France, this manufacture, under the patronage of the French court or of some great French noble, rapidly assumed a position of importance. The works at St Cloud received letters-patent from Louis XIV. in 1696, and the manufacture was continued there down to 1773. The appearance of the St Cloud porcelain is very characteristic, for though the paste has a yellowish tinge it is of fine quality with a clear and brilliant glaze. The first efforts appear to have consisted in frank imitations of the much-prized Oriental wares, and white pieces decorated only with branches of flowering plum c ˆ! j m relief, or pieces modelled with imbricated or Potters sca l e pattern or with delicate flutings, were made, mark. The earliest colour decoration was naturally in under-glaze blue, and while quasi-oriental designs were largely used, the commonest feature is the prevalence of painted borders like those used on the faience of Rouen and St Cloud. At a later date decoration in over-glaze

colours and gilding was also employed, and though the ware never reached to such a pitch of excellence as that of the Royal Manu- factory at Sevres, the St Cloud porcelain is one of the most distinctive French porcelains of the 18th century.

German Porcelains. — While the glassy porcelains of France were being developed at St Cloud, success of a more permanent order was reached in Germany. Augustus the Strong, elector of Saxony (1670-1733), had formed an extensive collection of Chinese and Japanese porcelains, still to be seen in the Dresden Museum, and he had established experimental pottery works, bringing skilled potters from Holland and elsewhere. His chief investigators appear to have been Tschirnhaus and, Bbttger, both alchemists, and it was the glory of the latter to be the first European to produce a porcelain like the Chinese, both in the

$*c

nature of its materials, and in the appearance of its paste and glaze. It may be surmised that Bbttger was guided toward this momentous discovery by information brought from China, though such an idea is always stoutly denied by German authorities, who, with pardonable pride, claim that Bbttger at the age of twenty-four succeeded where all other European experimenters had failed. He was certainly working at the problems offered by the exotic wares of China, for his first pro- duction was an extremely hard redstone-ware — often erroneously called “Bbttger’s red porcelain” — resembling the Chinese ” boccaros ” or red teapots of the Yi-hsing potteries. He had been anticipated in this direction by Dwight of Fulham, but the red pottery of Bbttger was so intensely fired that it became dense enough to be cut and polished by the lapidary as if it were a piece of jasper or carnelian. It was first offered for sale at the Leipzig fair of 17 10, and for many years it enjoyed great popu- larity, as well as the undesirable honour of wide imitation. At the same time (1710) Bbttger exhibited a few crude specimens of greyish-white porcelain. Imperfect pieces were on sale in 1713, and by 1716 its manufacture was definitely established, though the pieces were still far from perfect. Bbttger died in 1719, having had the rare fortune, in his short and eventful life, to establish in Europe the manufacture of true porcelain.

The life of Bbttger reads like a page of romance, and the story of the subsequent development of porcelain manufacture throughout the German empire is hardly less romantic. When the

importance of Bbttger's discovery was recognized, he and his workmen were removed from Dresden to the Albrechtsburg, a fortress situated at Meissen some 16 m. away, so that the manufacture could be conducted with the greatest secrecy. All concerned were practically state prisoners, and this extreme rigour doubtless defeated the end in view, for workmen escaped from time to time, and professing, more or less truthfully, a knowledge of the manufacture, found patrons among the German princes all eager to gain reputation as experimenters in the new art of porcelain. Some of these wandering " Arcanists," like Ringler and Hunger, and the men who learnt from them, travelled all over the empire, and the following list of dates will show how porcelain factories sprang up from the parent factory at Meissen : —

Meissen Vienna Ansbach . Bayreuth .

Meissen. — Although the factory which was founded at Meissen as a result of Bbttger's discovery remained on its old site until 1863, the porcelain made there has been commonly known as Dresden porcelain; probably because Dresden was the seat of the Saxon court, and the enterprise was conducted at the ex- pense of the electors of Saxony. So jealously were the secrets of this factory guarded that when Napoleon, the master of Europe, sent Brongniart to investigate the methods in use at Meissen in 181 2, the elector of Saxony had to release Steinauer, the director, from his oath of secrecy before he would explain the processes. Meissen porcelain, therefore, affords us the best example by which we may follow the changes of fashion and taste that governed the styles of porcelain decoration in Europe during the 18th century. The early Meissen porcelain was made from the kaolin found at Aue, near Schneeberg, and while there is no mention of any other material, we may be sure that clay and felspathic rock, analogous to the Chinese kao-lin and pe- tun-tse, were obtained from the same quarries, and were used together. Until after the death of Bbttger in 17 19 it cannot be said that the venture was more than a succes d'eslime. The specimens preserved in the Dresden Museum show that the pieces were generally thick in substance and clumsy in shape, being often made from the moulds that had been designed foi Bbttger's red-stoneware. Naturally enough these early examples were inspired by Chinese models, both in shape and decoration. As at St Cloud, white pieces with modelled decoration were common. Unlike the contemporary French glassy porcelains, the decorations in under-glaze blue were very imperfect, the

1710

St Petersburg

• 1744

1718

Berlin

■ 1750

1718

Nymphenburg

• 1758

1720

Ludwigsburg

• 1758

blue colour being much run and blistered; and when attempts were made at decoration in enamel colours (i.e. colours fired on the finished glaze) the result was unsatisfactory, as, owing to the refractory nature of the hard felspathic material, these colours frequently scaled off. The later success of the Meissen factory must be attributed to Herold or Horoldt (who joined the staff in 1 7 20 as a colour maker and painter) , and to Kandler, a sculptor, who came to the works in 173 1. In the hands of these two men the forms and decorations, still largely based on Chinese and Japanese models, assumed a definitely European style, while the composition of the body and the glaze, and the application of colours and gold, were brought to perfection. Herold was appointed director of the works a few years after 1720, and retained that post until 1765, while Kandler was chief modeller from 1731 to 1775. The years from 1730 (when the work definitely emerged from its experimental stage) to 1775 (when Kandler died) mark the most distinctive period of the Meissen

porcelain. In the estimation of collectors also the Meissen porcelain of this period is the most valuable, and genuine examples of Alt-Meissen command high prices in the sale rooms, especially in Germany. This appreciation was quite as apparent in the 18th century, for by 1740 Meissen porcelain had won the greatest renown in Europe, and was actually exported by way of Constantinople over the Mahommedan countries of the Nearer East. It is frequently described by contemporary writers as being far superior to the porcelain of China, and so great was its vogue between 1740 and 1750 that as many as 700 workmen — a large number for those days — were employed, and the industry brought large profits as well as great reputation to the Saxon court. Each year saw some fresh departure from the original inspiration of the work, some fresh innovation of European style in design. After 1730 the rude reproductions of Chinese forms and decorations in white or blue and white were replaced by imitations of the Imari porcelains, especially those decorated in the style of Kakiemon. Here Meissen was running a race with Chantilly in setting the fashion for the dainty decorations in red and green and gold which" spread in time to all the porcelain factories of Europe. Gradually European motifs became predominant. The simple oriental forms were replaced by distinctively European shapes with architectural mouldings, handles and feet. Instead of the dainty Japanese patterns, we perceive the gradual introduction of " Rococo " scroll-work (as interpreted by the Germans) to form a framework or border for miniature-like paintings of landscapes, ruins, figure-subjects, hunting scenes, &c, executed in the limited palette of on-glaze colours then available. Further evidence of the departure from oriental influence is to be found in the numerous " armorial " services produced between 1730 and 1740; and at the same period we find the first appearance of a style of decoration that has persisted to our own times, as a means of passing off pieces with small flaws in body or glaze, by hiding them among sprays of naturalistic flowers, with an occasional fly or some other winged creature thrown with seeming artlessness over the surface of the piece. This idea, though it seems to have been first used at Meissen, was so useful to the potter that it became general, and a device originally adopted to cover faults of manufacture was elevated into a distinct style of decoration by later European factories (e.g. Strassburg, Niederviller, &c).

The talents of Kandler were applied in ambitious but unsatisfactory attempts to produce life-sized figures of the twelve

apostles, an equestrian statue of Augustus the Strong of heroic proportions, and many models of animals intended for the decoration of the Japanese palace at Dresden. Many of these latter are to be seen in the Dresden Museum, and create an unfavourable impression of the taste of their period. The fame of Kandler is better perpetuated (see example, Folate IX.) by the little statuettes and groups of figures and anirflals that flowed in a steady stream from his facile hand; for though these figures have prettiness rather than grace, and flair rather than style, they are instinct with the spirit of the middle 18th century, and were eagerly imitated or boldly copied at every factory in Europe. Only in the biscuit porcelain figures of Sevres, and in some few

of the portrait figures of Derby, do we find anything artistically superior. These Meissen statuettes look their best when they are simply in white; many are grotesque and ugly, and the colour decorations are usually in very poor taste, the harsh, shining colours contrasting unpleasantly with the pronounced white of the porcelain.

Mention must be made of the use of modelled flowers at Meissen. Originating in the simple application of modelled branches of prunus, &c. in imitation of the white porcelains of Fu-kien, the method developed until we get not only the characteristic ” May-flower ” decoration (see example, Plate IX.), but also independent sprays and bouquets modelled in porcelain and coloured with the utmost mechanical precision. It is not quite clear whether this production of porcelain flowers was first perfected at Meissen or at Vincennes, 1 but it was largely practised at both places.

Toward the end of this period, vases, candelabra, mirror- frames and clock cases were modelled in the most outri rococo forms with applied scrolls, shells and flowers. These pieces had their modelled details picked out in gold and colours, while the success of the French styles of decoration is still further shown by the copies of Watteau figures and groups on the more important vases, dishes and plates. Frederick the Great made sad havoc with the prosperity of Meissen during the Seven Yeans’ War. He looted the factory both in 1759 and 1761, and is said on the latter occasion to have carried away to Berlin both models, working moulds and many workmen. This misfortune marks the end of the most distinctive Meissen porcelain, for after this time Sevres became the most important porcelain factory in Europe,

and the later productions of Meissen were, for the most part, German versions of the styles initiated at the French royal factory. From 1764 to 1774 Dietrich, a painter, was at the head of affairs, while a Frenchman named Acier succeeded Kandler. They introduced the neo-classical style, which was spreading like a blight all over Europe, and this departure was perfected under the directorship of Count Marcolini (1774-1814), when Meissen, fallen from its high estate, was content to follow the lead of Sevres.

After the Marcolini period there is nothing to be said of Meissen. The old productions of the factory had become valuable, and the custom of reproducing them, marks included, was adopted. Such a practice was not likely to lead to further progress, and, though the factory was removed from its old site in the Albrechtsburg in 1863, it cannot be said to have added anything to the progress of European porcelain during the 19th century.

&7&K

_ During the initiatory period the ” Dresden ” pieces bore the monogram ” A. R.” interlaced (Augustus Rex), and between 1712 and 1716

pieces intended for sale and not for the use « Dresden – p ot ter*s ot the court were marked with the sign of mark

Aesculapius (a snake twining round a staff).

From about 1720 two crossed swords, painted in blue under the glaze, with or without accompanying stars, crosses, &c, formed the general mark, but the mark has been so often used on other porcelains that, in itself, it is of slight value as a means of identification.

Vienna. — The first mention of the manufacture of porcelain in Vienna occurs in 17 18, when a Dutchman, Claude du Paquier, was granted a patent. He had secured two runaways from Meissen, Stolzel and Hunger, yet little progress was made until after 1744, when the factory was bought by the empress Maria Theresa. At first the traditional styles of Meissen were continued, but the characteristic Viennese porcelain was produced after 1785. In this ware figure-painting, rich ground colours and elaborate gilding are associated in an unmistakeable manner. Leithner, who was chemist and colour maker at this period,

succeeded in producing a more extensive and brilliant palette of colours than was in use at any other European porcelain factory in the last quarter of the 18th century; and the gilding

1 A perfect tour de force in this inartistic style of work, preserved in the Dresden Museum and formerly attributed to Meissen, has been shown to be the work of Vincennes. See Gaz. des beaux-arts, September 1904.

was rich and elaborate. Apart from its technical merits the ware has nothing to recommend it, for the styles of decoration showed pronounced neo-classical influence, and lacked the saving merits of the French work in the same style. The works was closed in 1864, on account of the heavy expenses, and collectors should be reminded that many spurious imitations, the product of small Viennese factories, are to be found on the market.

Berlin. — The first Berlin porcelain was made by W. Casper Wegeli, aided by workmen from other German factories, as

W early as 1750. This business was unsuccessful and came to an end in 1757, but its productions are . highly prized on account of their rarity. Success Weeeli's onl y came when Frederick the Great brought mark. workmen, moulds and materials from Meissen in 1 761, and, becoming proprietor of the works in 1763, founded the Royal Berlin Porcelain Manufactory. Though Meissen workmen and methods had been imported, and the Meissen style governed the earliest productions, Frederick's well-known penchant for French art was doubtless respon- sible for the fact that the rococo style of decoration was more determinedly followed here than elsewhere in Germany. The colour schemes of this ware are unusually simple, pieces being seldom decorated in more than three colours, while a rose- coloured enamel, a favourite colour with the great Frederick, is quite characteristic. The Royal Berlin Factory passed under a cloud in the troubled condition of the Prussian monarchy during the early years of the 19th century, and down to 1870 it was content to follow in the wake of Sevres like most of the other European factories. Since about the year 1880, however, it has developed into the most

scientific of European porcelain works, and it was here that Seger manufactured his special porcelain, made to reproduce the qualities of .the finest Japanese wares. In spite of this scientific success it must be remarked that the late Berlin porcelain is artistically disappoint- ing, being too exuberant for our taste and recalling anything rather than porcelain in its treatment.

Minor German Factories. — It is unnecessary to describe the productions of all the German porcelain works of the 18th century, for not only is there a strong family likeness, but all the works aimed at producing pieces comparable with those of Meissen, Vienna or Berlin. In every case the industry was established under the patronage or at the direct charge of princes or great nobles, anxious to emulate the success of the elector of Saxony or the king of Prussia, and generally the enterprise came to an end with the death of a patron or from his unwillingness to sustain the continued drains upon his purse.

The factory at Hochst was started about 1720 by wanderers from Meissen, but it was only carried to a successful issue through the patronage of the archbishop-elector of Mainz after 1746. The general style of Hochst is a palpable imitation of the contemporary wares of Meissen, but this factory was noted for its excellent figures and groups, especially those modelled by Melchior (1770-1780). He modelled, at Hochst, more than three hundred figures, as well as many portrait medallions. The works came to an untimely end during the French invasion of 1794.

Frankenthal had a porcelain factory (founded by the Hannongs of Strassburg) in 1756, and patronized by Karl Theodor, elector palatine from 1762 to 1795, when the French invasion put an end to its activities. Melchior, the sculptor, came here from Hochst after 1780, and elaborate pieces in the current styles of Sevres and Dresden were made.

Nymphenburg.jnear Munich, had a factory which was made a royal factory in 1758 by Max Joseph III. of ‘Bavaria. The ware was of fine quality, but without special distinction. Melchior came on here about 1800, remaining till his death in 1825; his Nymphenburg figures are as highly esteemed as those he modelled at Hochst and Frankenthal. In the early years of the 19th century elaborate painting became the rule here, as at the other royal factories, and copies were made on porcelain of some of the famous paintings in the Munich galleries. The works is still in existence, in the hands of a private company, who

unfortunately sell many reproductions of the 18th-century wares. • Ludwigsburg, some 9 m. from Stuttgart, had a porcelain factory from 1758 to 1824, liberally subsidized by the dukes of Wurttemberg. Highly-finished painting was the rule at this factory, and because the ware bore a crown as one of its marks, it has rather foolishly been called ” Kronenberg ” porcelain.

Fiirstenbergwas the factory patronized by the dukes of Brunswick. Experiments were made as early as 1746, but little ware was pro- duced before 1770. Fiirstenberg set itself to imitate all the best-

known styles of the day, and its only distinctive productions are its ” biscuit ” statuettes and medallions. The factory remained in operation until 1888, but as the moulds were then sold by auction, imitations of the old pieces are now common.

Other 18th-century German factories were those of Fulda, Bay reuth, Cassel, Ansbach, Kloster-Veilsdorf, Wallendorf and Limbach.

Mention must also be made of the work of certain famous decorators, like Bottengruber and Preussler, who decorated both German and oriental pieces; while Busch, the canon of Hildesheim, produced effects like fine engraving by etching the glaze with a diamond and rubbing black colour into the lines.

While France and Germany were each developing their own particular type of porcelain, it was only natural that the kings and princes of other countries should strive to emulate them in the manufacture of this still rare and highly esteemed form of pottery. Naturally, perhaps, the countries to the north and east seem to have been influenced most by German methods, whilst those to the south and west followed the French example.

Holland. — The earliest Dutch factories were started as early as 1704, first at Weesp near Amsterdam, and afterwards at Oude Loosdrecht. The mark of this factory occurs as M : O.L., or M. o. L. After 1782 the works was removed to Nieuwe Amstel, but the ” Amstel ” porcelain came to an end with the French invasion. The ware resembled the German both in material and decoration. The best porcelain made in Holland was produced at a factory at the Hague, founded some time after 1775. There is a choice collection of this ware in the Gemeente Museum at the Hague. No porcelain appears to have been made in Holland after about 1810

until 1890 or later.

Denmark. — It has been stated that porcelain of the German type was made in Copenhagen as early as 1731, but there is no definite record of the production of true porcelain until about 1772, when potters, modellers and painters from some of the German works founded the enterprise which was taken over by King Christian VII. in 1779 and converted into a royal factory. Fostered by the king's patronage, fine porcelain of pronouncedly German style was largely made down to the end of the 18th century. The collection in the castle of Rosenburg contains many examples of the work of this period. In the early years of the 19th century the Empire style of decoration was adopted, and the artistic influence of Sevres became paramount. Large sums of money were continually required from the crown to maintain the establishment until, in 1867, it was sold into private hands to get rid of an encumbrance. The subsequent new-birth of the existing royal Copenhagen porcelain works must be noted in the next section.

Sweden. — The history of Swedish porcelain in the 18th century is connected with the factories at Rorstrand and Marieberg, both in the environs of Stockholm. Tentative experiments were made at both these places before 1760, but these came to an end by the close of the 1 8th century, though the Rorstrand works was reopened some fifty years ago and will be subsequently referred to. The Swedish porce- lains were of two kinds, one a true felspathic porcelain like the German, and the other a glassy porcelain resembling that made at Mennecy in France. It is interesting to note that the decorative styles in both cases are distinctly French in character.

Russia. — Peter the Great is said to have projected a porcelain factory at the suggestion of his ally Augustus the Third of Saxony, but the scheme was not carried into execution until the days of the empress Elizabeth. Catherine II. subsidized the work in prodigal fashion, but although she brought over French artists, the Russian porcelain more closely resembles its German than its French proto- type. In the early years of the 19th century the imperial Russian factory followed the example of Sevres in producing costly dinner services and extravagant vases of large dimensions.

Small independent factories were started in the neighbourhood of Moscow: one by an Englishman named Gardner about 1780,

and another by A. Popoff. Besides producing ordinary table ware these Moscow factories sent forth a considerable number of statuettes, the most interesting being those representing Russian peasant types.

Hungary. — The one Hungarian porcelain factory of note is that at Herend, which was founded about 1830 by Moritz Fischer. At this factory copies of oriental porcelain were made that have deceived many collectors, though the pieces are usually impressed with the word ” Herend ” in the paste.

Switzerland. — Little porcelain has been produced in Switzerland, and considering the geographical position of the country it seems natural that porcelain of the German type should have been made at Zurich and of the French type at Nyon on the lake of Geneva, but these productions are of no particular importance.

French Porcelains. — The beginnings of French porcelain at Rouen and St Cloud have already been mentioned, as they preceded Bottger’s discovery of true porcelain; but as nothing was known in France of the methods and materials used by the German porcelain makers, the artificial or glassy porcelain held sway in France through the greater part of the 18th century.

il tne Japanese xm;

The next important factory after St Cloud was that founded at Chantilly about 1725 under the patronage of the Prince de Conde, an enthusiastic collector of Chinese and Japanese porcelains. One distinctive feature of the Chantilly porcelain is its imitation of the Japanese Imari wares of the 17th century,

, especially those bearing deli- cate patterns in the Kakiemon I style. This imitation was not confined to the decoration — alone, but great efforts were Lille and Chantilly Potters’ marks. made t0 rep roduce the de- licious tender whiteness of the original ware, by covering the body of the soft porcelain with a coating of the tin-enamel used by the French faience makers. Similar imitation of the Kakiemon style of decoration became the rage all over

Europe, and was largely followed at Meissen and in England as well as in France; but no European imitations equalled those of the famous Chantilly ware.

Other porcelain factories were started at Mennecy-Villeroy and at Lille, but the most important French factory was that founded at Vincennes about 1740, not only because of the many beautiful pieces produced there, but also because the works was taken under the direct patronage of the king in 1753 and was transferred to Sevres in 1756, becoming ultimately the most important porcelain factory in Europe.

Fortunately we have documentary information of the exact composition of the artificial porcelain (p&te tendre) of Sevres, and a brief account of its manufacture will serve to explain how all the glassy porcelains of Europe were made. The potter commenced by preparing a glass or frit, melting together pure sand, alum, sea-salt, gypsum, soda and nitre. The clear portions of this frit were powdered and washed with boiling water, and the working clay was compounded by adding to such powdered frit a small quantity of chalky clay or marl and sometimes pure chalk as well. This mixture was ground in water until the fluid was as fine as cream, and it was then boiled to a thick paste which was so little plastic in itself that black soap or parchment size was added to it to give it enough plasticity for the workman to be able to shape it. Vases and other pieces were made from this paste by pressing cakes of it in plaster moulds of considerable thickness. After pressing, the pieces were dried and were then either turned on a lathe or rubbed down with sand-paper to reduce them to sufficient thinness ; while handles, spouts or other ornaments in relief were applied with a lute of slip, as is customary with every other species of pottery. The fragile objects were then fired into what is known as the ” biscuit ” condition; the most difficult part of the whole process. During this firing the pieces frequently went out of shape because of the excessive shrinkage of the material and its tendency to soften as it approachedthe melting point of the frit. Consequently an elaborate system of ” propping ” the pieces had to be resorted to, and even then a very large proportion became deformed. When the porcelain was drawn from the oven after the first firing, the supports were removed and the pieces were rubbed with sand to clean the surface, and were then coated with glaze by sprinkling with a brush ; the glaze being a fusible glass very rich in lead. The glaze coat was melted by retiring the piece at a lower temperature ; and it was frequently necessary to repeat this

process several times in order to get a perfectly even and brilliant result. The difficulties of such a process were enormous, and it was only by the financial support of wealthy patrons, or of the state, that such a method of manufacture was ever carried on for any length of time. At its best the material is an exceedingly beautiful one, lending itself especially to decoration in on-glaze colours, and the pieces produced at Vincennes and at Sevres, between 1745 and 1770 or thereabouts, form a distinct class by themselves. Skilful chemists like Hellot and Macquer were employed to direct the operations, and many beautiful ground colours, such as the famous gros-bleu, bleu de roi, rose Pompadour, pea-green and apple-green were invented.

Sevres Porcelains. — The forms of the Sevres porcelain are exceedingly varied. Many of the older shapes were designed by Duplessis, the king's silversmith, and, as is perhaps natural, are more proper to metal than to pottery; but the French glassy porcelain is such an artificial material in every respect that such a point should not be strained too far. Owing to the want of plasticity in the paste the pieces were always made in moulds of plaster of Paris, while in many cases they were moulded in separate parts and these united together with metal screws or mounted in bands of chased ormolu. Table services made for actual use were usually painted on a plain white ground with the full palette of on-glaze colours (or enamels) and much rich

Fig. 52. — Sevres vase, pate tendre; green body and gilt

fig^e-subjects, are extraordinarily Sfc^£* ■ ^^

gilding. The decorative pieces such as vases, candelabra, jardinieres, &c, were decorated in a much more sumptuous fashion by covering the greater part of the piece with a ground of one of the rich enamel colours previously mentioned, reserving only panels in white on which delicate miniature-like decorations of the most varied kind were subsequently painted and fired (see fig. 52; and examples of Sevres, Plate IX.). Such collections as the Wallace at Hertford House, or the Jones Bequest in the Victoria and Albert Museum, show at once the variety and perfection to which the work attained.

This Sevres porcelain is entirely devoid of the broad decorative treatment and rich full colour of any of the great kinds of fine pottery or porcelain. Artistically considered, it has no place beside the triumphs of the Chinese or Persian potters, or of the

Italian majolists. Its shapes are too formal, and are not sufficiently imbued with a sense of the quali- ties of the material. The ground colours defy every natural ten- dency of pottery colour for they are even, flawless and mechanical, with none of the palpitating rich- ness that comes so naturally from the potter's processes. The paint- ings, whether of flowers, birds or

ˆ-subjects are extraordinarily and Albert Museum) skilful regarded as miniatures, but as examples of pottery decoration they cannot be compared to the swift, apparently careless, brushwork of the great masters of earlier times. So pronounced was the demand of the period for smooth even finish that such ground colours as gros-bleu and bleu de roi, where the colour naturally came varied and uneven, were subsequently decorated with small diapers or lines of gold in the form of o£l de perdrix or vermicelle, so as to produce a more regular and even effect. The most elaborate and costly of all the varieties of old Sevres is what is known as " jewelled Sevres," which is richly sown with imitation jewels, such as turquoises, pearls and rubies, closely resembling the real stones. These imitation jewels were in every case set in beautifully chased mountings of gold, and in the museum at Sevres are to be found examples of the punches and other tools used in making these mounts. On account of the enormous expense involved in the production of such costly triumphs of skill, examples of jewelled Sevres are rare even in the best collections, but the English student is fortunate in the fact that the Wallace collection contains a considerable number of them.

Many reasons — the prestige attaching to a Royal Manufactory, the knowledge that the porcelain was produced regardless of cost, the mechanical perfection of its colours, gilding and decora- tion, as well as the fact that the glassy porcelain was abandoned as too costly and risky after about 1780 — have all conspired to raise the prices which modern collectors are prepared to pay for fine examples of vieux Sevres. It is doubtful whether even the prices paid for paint- ings by old masters have advanced so rapidly as those paid for Sevres porcelain of the best period. In the 'seventies of the 19th century it was deemed worthy of remark that a sum of £10,000 should have been paid at public auction for three old Sevres vases; thirty years later one such piece would probably fetch the same price. It should be added that the extravagant prices now paid for Sevres porcelain, which is much more a triumph of technical than of artistic skill, have led

Sevres Potters' marks, 1753 and 1772.

to an extensive system of " faking " and even forging specimens which are purchased at high prices by amateurs.

Beautiful as the old Sevres porcelain was, those who were responsible for its manufacture could not fail to recognize that the porcelain made at Meissen and other German factories was both harder and whiter in substance, more truly resembling the oriental porcelain in every respect. It was also known that these German porcelains were not so difficult, and therefore so costly to manufacture as the French, and all these causes com- bined to make the directorate of Sevres unremitting in their efforts to discover in France natural materials analogous to those used by the German and Chinese potters. Pere d'Entre- colles, the famous Jesuit missionary, had forwarded to France long before an account of the methods used by the Chinese, as well as samples of the materials they employed; and after many years' research Millot and Macquer discovered the precious materials at St Yrieix near Limoges (see Auscher, History of French Porcelain, pp. 77-81). The first experimental pieces of this French porcelain, similar in material to the German and Chinese, appear to have been made about 1769; but it was some years after this before the manufacture of the new product was firmly established, and then to the end of the 18th century more and more of the hard porcelain and less of the glassy porce.- lain was made at Sevres. Speaking broadly, we might say that after 1789. comparatively little of the original French porcelain was made in France; and from that time to this practically all French porcelain has been of the same type as the German porce- lain, viz. made with china clay and felspathic rock. This technical change in the nature of the materials had a profound influence on the artistic qualities of French porcelain, and the change was doubtless accentuated by the neo-classical rage which followed on the discovery of Herculaneum and Pompeii. The influence of antique vase shapes and of modern renderings of Greek motives in design spread over Europe like a plague, and whether in France, Germany or England the last quarter of the 18th and the first quarter of the 19th century mark a definite period in pottery design and

decoration. The intro- duction of hard-paste porcelain rendered the manufacture of large vases and other pieces possible; and after 1780 we find the manufactory at Sevres engaged in the production of enormous vases 5 or 6 ft. in height, a manufacture which has been continued there to this day. About the same time, too, we find the first production of large plaques or slabs of porcelain on which copies of well-known pictures were painted in enamel colours. The earliest of these slabs were in soft-paste porcelain, but in this material it was only possible to make them of quite modest dimensions; with the introduction of hard-paste porcelain very large slabs were manufactured, and a series of these are to be seen in the museum at Sevres.

The most artistic of all the productions of Sevres are un- doubtedly the " biscuit " figures and groups. These were modelled with great skill by many of the best French sculptors of the day, such as Pajou, Pigalle, Clodion, La Rue, Caffieri, Falconet, Boizot, Julien, Le Riche, &c. The best of these Sevres " biscuits " have a real artistic value which places them in a class quite apart from the German porcelain figures made at Meissen, Frankenthal and Hochst.

Paris. — Although during the reign of Louis XV. many privileges and prerogatives had been given to the Sevres manufactory, such as the exclusive right to gild or paint in colours on porcelain, the breakdown of the monarchical reVune, which was rapidly accelerated after the accession of Louis XVI. , led to the establishment in Paris and its environs of a number, of factories for the production of hard-paste porcelains' more or less in open rivalry with the royal manufactory of Sevres. In order that the royal edicts might be more easily evaded, most of these factories were placed under the patronage of one of the French princes of the blood or even of Queen Marie Antoinette. There is little need to dwell on the doings of these Parisian factories, but the productions of the best of them, such as those of Clignancourt (patronized by Monsieur, the king's eldest brother) ; Rue Thiroux (patronized by Queen Marie Antoin- ette) ; Rue de Bondy (patronized by the due d'AngoulSme), compare not unfavourably with those of Sevres itself.

It is impossible to do more than mention the other important French factories at ˆMennecy, Sceaux, Bourg-la-Reine, Strassburg,

Niederviller, Marseilles, Limoges and Caen. In the disastrous years of the French revolution (between 1789 and 1800), such of

these factories as had survived came to an untimely end, even the royal factory at Sevres passing through a kind of lingering death between 1792 and 1801, and it was not until Napoleon decided to revive the glories of Sevres that modern French porcelain really came into being.

Just as the manufacture of German porcelain spread into Holland, Denmark, Sweden, Russia, &c, we find the manufacture of a glassy porcelain analogous to the early French arising in Belgium, Italy, Spain and England. The materials and methods were so like those used in France that it would be ridiculous to claim for them an independent origin, even were we unable to prove by documentary evidence that workmen trained in the French factories had migrated into those countries.

Italy. — In Italy we have the factories at Le Nove near Bassano (1 762-1 825) ; Doccia near Florence (founded in 1735 by the marcliese Carlo Ginori, and still carried on by the same family) ; and Capo-di- Monte near Naples (1736-1820); with

minor factories like those at Vinovo, \ˆ±A.Ast yt

Treviso, and the Volpato factory at _ I \prYYJ QK

Br

Capo-di-Monte Potters' marks; 1736, 1759, 1780.

ˆ3d

Rome. The most important of these were the factories at Doccia and Capo- di-Monte. The porcelain made at Doccia was famous for its soft trans- lucent texture, so that it lent itself beautifully to the production of white glazed porcelain figures resembling in quality the white pieces of Fu-kien.

The factory at Capo-di-Monte was under the direct patronage of Charles III., king of Naples. The earliest and best of its productions are in pure white, probably made in imitation of Chinese white pieces, though modelled in the form of natural shells supported by corals and seaweed. Figure-modelling was also largely practised, and besides groups of statuettes and figures in conjunction with vases, we have the typical Capo-di-Monte examples in which vases, cups, saucers, plates, &c, are covered with groups of figures modelled in high relief on a minute scale. This trivial style of work is greatly admired because

of the minuteness of its execution. At a later period the works was removed to Portici and ultimately to Naples, but after about 1770 the classic style was adopted for the shapes and decorations. The factory came to an end as late as 1820.

Spain. — Charles III. of Naples ascended the throne of Spain in 1759 and took with him to Madrid many of the workmen from the Capo-di-Monte factory, as well as the best moulds and models. He established a new china factory in the gardens of Buen Retiro, a palace outside Madrid. As long as Charles III. lived immense sums were lavished on this factory, and the ware was not allowed to be sold, but was either used for the decoration of the royal palaces or for presentation to other European sovereigns. Enormous vases were

made, following the example of SeVres,

and these were often filled with jˆj bouquets of flowers modelled in porce- /© lain. The most famous productions _

of this factory, however, were the r> D 4 . „ t , , ™”ˆ plaques and slabs of porcelain used Buen Retiro Potters marks – for lining the walls of certain rooms in the royal palaces. Two of these rooms still remain, and are frightful examples of the Spanish rococo style. The factory was entirely destroyed in 18 12 during the French war, and since that date no porcelain of any importance has been made in Spain. ,

English Porcelains of the i8lh century.- — There can be no doubt that whatever experimental work may have been conducted by our early English potters, such as the famous John Dwight of Fulham, nothing like an established manufacture of porcelain existed in this country prior to about 1 740-1 745. There are records of many tentative experiments before this date, but no real history. Between 1745 and 1755 important porcelain works were established at Chelsea, Bow, Worcester and Derby, and when we examine the productions of these factories it is impossible to avoid the conclusion that the processes had been imported from France. The early English porcelains, like all the French porcelains of that date, were composed of artificial or glassy mixtures.

We may take the early productions of Bow and Chelsea as typical of the earliest English porcelain of which there is any definite record. The material was a mixture of pipe-clay, sand from Alum

Bay in the Isle of Wight, and glass, while the glaze was a fusible English flint-glass rich in lead. It is obvious, therefore, that we are dealing with substances very similar to those used in the glassy French porcelain (see above), and such mixtures were very difficult of fabrication, being subject to great loss in the process of firing. In the other European countries

the manufacture oi porcelain was almost invariably carried on at the expense of some royal or princely patron; in England, however, the manufacture was not subsidized in this way, and it is probably for this reason that at a very early date we find the English porcelain-makers experimenting with other materials than glass and clay in order to make their processes more certain. In a patent taken out in 1749 by Thomas Frye of the Bow works we find mention of the use of bone-ash — the material that was to make English porcelain a distinct species by itself. From 1750 onwards there can be little doubt that, though a large proportion of glass was still used in the composition of the English porcelains, bone-ash was more and more introduced into the paste in order to obtain a more refractory material; yet it was not until about 1800 that Josiah Spode of Stoke-upon- Trent abandoned entirely the use of glass and composed his porcelain of china clay, bone-ash and felspathic rock for the body, glazing it with a rich lead glaze, and so laid the foundation of distinctively English porcelain. The material has many merits both from the useful and artistic points of view; it is much more easily fabricated than the old glassy porcelains, it endures better for ordinary table use than any other kind of porcelain, and it permits the fullest range of decoration.

Before entering upon a detailed notice of the important English factories of the 18th century, something should be said of the various influences that were at work in determining what the porcelain-maker should do, both in the way of shape and decoration. The eyes of all men were, of course, turned first to the porcelain brought from the far East; and in the early efforts of the English factories, as of those of France and Germany, we notice a predominance of white pieces or of pieces decorated with paintings in under-glaze blue alone, obviously inspired by the

current importations from China. Bow and Chelsea pro- duced large quantities of ware of this class, and in the early days of the Worcester factory little else was made there than white, or blue and white pieces closely simulating the Chinese. Another oriental influence was to be found in the Imari patterns of Japan, particularly those in the style of Kakiemon. It has been noted that Meissen, Chantilly and other continental factories had already created a vogue for these reproductions of Japanese decorations, and in our own country Bow, Chelsea and Worcester followed suit. The later Imari patterns, heavily decorated with blue and red and gold for the use of " the foreigner," furnished another popular style for Worcester and Derby, and the vogue of these English " Japan " patterns, in the last quarter of the 1 8th century and the first half of the 19th century, was so great that they represent a large proportion of the output of our English porcelain works during that period. The productions of the German and French factories also exerted a profound influence on English potters; so that throughout the 18th century English porcelains largely consisted of imitations of the foreign wares brought into the country by the wealthy.

We can only point to one method of porcelain decoration which undoubtedly arose in England. This is the method of transfer-printing, whereby patterns printed on paper from engraved copper plates are transferred to porcelain or pottery and subsequently fired, either under or on the glaze. At the best these printed patterns are in no way superior to the stencilled work of modern oriental porcelain, while, at the worst, European and American printed patterns have been perhaps the most in-appropriate decoration ever applied to porcelain in the world. It has been generally urged on behalf of transfer-printing that it enables elaborate effects to be produced at" a small cost and so brings decorated pottery within the reach of the humblest. The truer view is, that the simplest brushwork patterns, or even no pattern at all, would be preferable to the tawdry results that the cheapest forms of transfer-printing have rendered possible.

Chelsea. — Between 1750 and 1770 the Chelsea factory was the most important of all the English porcelain works, and fine specimens of this period command high prices in the saleroom to-day. We know little of the origin of this important factory, though it is believed to have been in existence from some time after 1740 to 1784, when it was finally demolished and some of

the workmen and part of the plant were removed to the then

important works at Derby. The first manager was one Charles Gouyn, who was followed by a Mr Sprimont before 1750. Sprimont retained possession of the works until 1769, and died in 1 77 1. It was during his management, from 1750 to 1770, that the finest and most characteristic pieces of Chelsea porcelain were made.

Although the styles in vogue at Chelsea are extremely varied, little was produced there that was really English in character. The earliest pieces appear to have been either in pure white or in white decorated with paintings in under-glaze blue. The goat-and-bee cream jugs, crawfish salt cellars, the shell and rockwork salt cellars, jugs, sauce boats, small cups and saucers of this type are fairly plentiful. Then came the decora- tions, mainly in red and gold, of the Kakiemon style, followed by reproductions of the brocade patterns of Imari porcelain. Afterwards we find the appearance of table wares modelled in imitation of leaves, animals, fruits, birds and fishes, apparently adopted from current French and German practice.

In another direction the influence of Meissen was also shown by the production of statuettes (see in Chelsea figure, Plate X.),' and of the small" modelled trinkets, scent-bottles and toys of which there is such a fine collection in the British Museum. In the latter days of the factory (say after 1758) we find Chelsea following in the wake of Sevres in the production of large and elaborate rococo vases, with pierced necks and covers, scroll- work bases and interlacing handles such as are to be seen in the Jones Bequest in the Victoria and Albert Museum. Pieces of this elaborate kind are overlaid with rich grounds of Mazarine blue, turquoise, pea-green, or the famous Chelsea claret-colour, while white panels are reserved framed with gilt scrolls and painted in enamel colours with flowers, birds or figure-subjects in absolute rivalry with the pieces manufactured at Sevres.

The Chelsea works appears to have come to an end through the ill-health of Sprimont, and it was sold in 1769-1770 to Duesbury, the proprietor of the Derby works. He carried on the establish- ment from 1770 to 1784, but in this period a great change is noticeable in the product of the factory. The " rococo " forms and decorations of the true Chelsea porcelain were replaced by works in the neo-classical style already rendered popular by the success of Josiah Wedgwood, and the Derby-Chelsea porcelain is quite a distinct production from the early works of Chelsea. The most distinctive mark of the Chelsea porcelain is an anchor — either

em- bossed in the paste or painted in gold or colour. Often the anchors occur in pairs, and it is frequently associated with other marks such as a dagger or a cross. Some of the Derby- Chelsea pieces are marked with a conjoined D and an anchor.

Bow. — The date of the establishment of the factory at Stratford-le-Bow, in what is now the East End of London, is quite uncertain, but in 1744 Edward Heylyn and Thomas Frye, who were con- nected with this factory, took out a patent for the manufacture of porcelain. The materials mentioned in this patent are not such as would produce porcelain at all, and it appears likely that the specification was made purposely defective. In 1748 a further patent was applied for in which we get the first mention of bone-ash, so that from the technical point of view the wares made at the Bow factory are of the utmost importance as in- dicating the' experimental beginnings of our English porcelain in which bone-ash plays such an important part. In 1750 the works at Bow belonged to Messrs Weatherby & Crowther, and was then known as " New Canton," and as 300 workpeople were employed, the operations must have been conducted on a large scale; but ultimately, from causes that can only be surmised, the partnership was dissolved and the business failed, so that in 1775 the works was bought for a very small sum by the William Duesbury already mentioned, who transferred part of the plant and moulds to his more prosperous works at Derby. It would appear from what we know of the factory and its

Chelsea Potters' marks.

productions that the business was conducted on simpler lines than at the Chelsea works. We have, for instance, no elaborate vases in imitation of Sevres, and no important groups of figures which might challenge rivalry with Meissen. We find, as is common with all the early porcelain factories of Europe, first the pro- duction of white pieces with modelled reliefs, or of pieces painted with under-glaze blue in imitation of Chinese porcelain. Then followed the well-known " Quail," or "Partridge," and " Wheat- sheaf " patterns in red and green and gold in imitation of the Japanese patterns; and the manufacture of table ware

decorated with these simple yet bright and pleasant devices seems to have formed the greater part of the work at the factory. Many figures and statuettes were also produced at Bow, but they are fewer in number and less cleverly made and decorated than the con- temporary productions of the Chelsea factory. We may surmise that there was considerable rivalry between these two works

. situated on the outskirts of

JL i J^ j. the metropolis, for we find the

I ^ \jL. •§■" " ancnor " mar k, which is the

I X^l^ ' I * I best recognized mark of Chelsea

f\ . J I V Jb_L^ porcelain, often occurring on

^^ * specimens that from internal

Bow Potters marks. ev i de nce or from the piece

itself we should rather attribute to Bow. The Bow marks are

not very certain, but some of the likeliest are here given.

Worcester. — The third of the early English factories, and ultimately the most important of all, was that founded at Worcester in 1751 by Dr Wall, a man of unusual attainments, and a number of his friends. How Dr Wall came to learn the secret of porcelain making is absolutely unknown, but even assuming that he acquired some information from wandering workmen it is certain that the Worcester porcelain was soon developed on original lines. The nature of the paste and the glaze of the early Worcester productions, as well as the sobriety of their decorations, stamp this factory as the first where English- men really developed a native porcelain. Between 1751 and 1770, the first period of Worcester porcelain, the prevalent influence was that of Chinese blue-and-white, and the pieces of that period are rightly esteemed by collectors for their artistic quality. Probably nowhere in Europe, certainly nowhere in England, was oriental blue-and-white more carefully studied, and a collection of this blue-and-white Worcester is most satis- factory from the aesthetic point of view. The productions at this time were tea and coffee services, bowls, dishes, mugs and plates. The cups were usually made without handles in imitation of the oriental practice, but

large, two-handled covered cups for caudle, broth and chocolate were also made during the early period. Many of these larger cups bore an embossed pattern resembling a pine-cone, possibly imitated from a shape produced at St Cloud; while openwork dishes, plates and fruit baskets were also made in imitation of a popular Meissen fashion.

The method of decorating porcelain with transfer prints was introduced at Worcester as early as 1756, when Robert Hancock, an engraver, came from York House, Battersea, where the process was first employed for the decoration of the Battersea enamels. The early Worcester prints comprised portraits of celebrities of the time (the Frederick the Great mug), or adaptations of the works of great artists such as Gainsborough and Watteau, or copies of current engravings or sporting prints. The first printing was done in black or purple, and transferred on to the fired glaze, and it was not until about 1770 that the process of printing in blue under the glaze was perfected. It is interesting to note that for many years this process of transfer printing was developed side by side with the older method of porcelain painting, and until the end of the 18th century the processes appear to have been used at Worcester quite independently. The closing of the Chelsea factory in 1770 led to the migration of some of the Chelsea painters to Worcester, and from about that date a considerable amount of Worcester porcelain was decorated on the glaze with enamel colours and gilding after the styles that had been rendered popular at Chelsea and Bow. It is only fair to remark, however, that the Worcester patterns are always

CIX

MA

Early Worcester Potters' marks.

distinguished by a certain English character both in the style and the workmanship (see example, Plate X.). The first and most artistic period of Worcester porcelain came to an end before

1783, when, after the death of Dr Wall, the works passed under the control of Thomas Flight and his two sons, who had been jewellers. The Flight influence was soon noticeable from the fact that the new shapes were more and more based on those of Sevres and Meissen, while the decoration became more

mechanical and precise as befitted the work of jewellers rather than potters. King George III. and Queen Charlotte visited the works in 1788 and bestowed upon the firm the privilege of styling themselves ” China Manu- facturers to Their Majesties,” since when the works has always been known as the Worcester Royal Porcelain Works. In 1793 Martin Barr was taken into partnership; the ” Flight & Barr ” period, so well known to collectors, lasted until 1807.

Another Worcester porcelain works was in existence after

1784, viz. the Chamberlain factory, which was working in rivalry with the original establishment; but its productions are of no particular artistic merit, and in 1840 the two firms became amalgamated, and so gave rise to the present Worcester Royal Porcelain Co. The most noteworthy feature of the pro- ductions of both the Worcester works at the end of the 18th century were the ” Armorial ” services made for various royal and noble families, and those adaptations of Imari patterns known as ” Old Japan.”

Derby. — Experiments in the manufacture of porcelain appear to have been made at Derby as early as 1750 by a French refugee, Andrew Planch6; but the business, which was afterwards to attain such a great development, was only founded in 1756 with William Duesbury as its manager. Duesbury was originally a decorator of china figures in London, and his career proves that he was a man of great industry and energy, for within twenty five years he not only built up a large business at Derby, but he absorbed the decadent works at Bow and Chelsea, so that in the last quarter of the 18th century Derby was the most import- ant china manufactory in England. As is so often the case, a commercial success like this implied the absence of any distinct artistic impulse. The porcelain produced at Derby is for the most part only an echo of the successes of Meissen, Sevres, or the earlier English factories. It is only fair to remark that a very deep and rich under-glaze blue was attained at the Derby works,

CDˆ 4,

Derby Potters’ marks.

and that this was associated with very mechanical painting of birds and flowers and with gilding of exceptional quality. At this factory, too, the old Japan patterns were imitated with exceptional vigour, until ” Crown-Derby Japan ” became a

standard trade name for this clobbered oriental style.

Mention has already been made of the ” biscuit ” porcelain figures made at Derby, which are superior in style to anything else made in- Europe in the 18th century except the ” biscuit ” porcelains of Sevres. The Derby ” biscuits ” of the best type range from 1 790 to 1810, and the finest specimens have a ” waxy ” surface, though there is little or no sheen and every detail remains as crisp as when the figure left the hand of its maker. The most famous of these figures are the portrait medallions and statuettes of British generals and admirals which were modelled by an artist named Stephan. Spengler, a Swiss, modelled numerous groups adapted from the drawings of Angelica Kaufmann, while a workman named Coffee seems to have modelled only rustic figures and animals.

Plymouth and Bristol. — The porcelain factories at Plymouth

and Bristol are mainly noteworthy because they were the only English factories in which a true porcelain strictly analogous to the Chinese was ever manufactured. William Cookworthy, a Quaker druggist of Plymouth, was greatly interested in attempting to discover in Cornwall and Devonshire minerals similar to those which were described in the letters of Pere d’Entrecolles as forming the basis of Chinese porcelain. After many years of travel and research he ascertained the nature of the Cornish stone and Cornish clay, and in 1768 he founded a works at Plymouth for the production of a porcelain similar to the Chinese from these native materials. Readers interested in this abortive enterprise, from which such great results were afterwards to come, can only be referred to the general histories of English porcelain, for the factory was removed to Bristol in 1770 and was shortly afterwards transferred to Richard Champion, a Bristol merchant, who had already been dabbling in the fashionable pursuit of porcelain making. Champion’s Bristol factory lasted from 1773 to 1781, when the business had to be sold to a number of Stafford- shire potters owing to the serious losses it had entailed. The Bristol porcelain, like that of Plymouth, was always a true fels- pathic porcelain resembling the Chinese, but made from the china clay

and china stone of Cornwall. It is, therefore, harder and whiter than the other English porcelains, and its cold, harsh, glittering glaze marks it off at once from the wares of Bow, Chelsea, Worcester or Derby.

The Bristol porcelain resembled that of Meissen quite as much in its style of decoration as in the nature of its materials. One can point to nothing distinctly English about it, and if specimens now command very high prices in the salerooms it is on account of their rarity rather than of any intrinsic quality or beauty that they possess.

Table ware of various kinds formed the greater part of the production of the Bristol works, but a considerable number of figures are known, in many cases obviously copied from those of Meissen, and a few large hexagonal vases similar in style to specimens produced at Chelsea and at Worcester. The most distinctive pieces made at the Bristol factory are certain small plaques or slabs in ” biscuit ” porcelain, usually bearing in the centre a portrait medallion or armorial bearings surrounded by a wreath of skilfully modelled flowers. Good examples of these choice productions are to be seen in the British Museum.

The Plymouth factory is supposed to have adopted as its general mark the alchemical symbol for tin. This mark was also used to a limited extent at the Bristol factory, though the

general Bristol mark was a cross or a copy of the crossed swords of Meissen. The Staffordshire potters who bought the rights of — L ˆjf the Bristol porcelain factory

I ^^* from Champion established

Plymouth, Bristol, Champion and a works at Shelton, near Swansea marks. Stoke-upon-Trent, in Staf-

fordshire, under the name of New Hall Porcelain Co., but they never manufactured anything of artistic account.

Minor English Factories. — A number of other porcelain factories were founded in England in the latter half of the 1 8th century, but none of these produced ware of any particular merit. The porcelain made at Longton Hall by William Littler (1752-1758), always clumsy and ugly in form, is interesting for a splendid blue colour character- istic of the factory. This small venture was ultimately absorbed by William Duesbury.

The colony of potters established in Liverpool also made a certain amount of porcelain, as well as ” Delft ” and other earthenwares, and the Liverpool Museum contains some good examples of their productions.

A little factory at work at Lowestoft in the last quarter of the 1 8th century has attracted much more attention than it deserves, because certain writers foolishly attributed to it large quantities of ” Ar- morial ” porcelain which had, undoubtedly, been made in China. Recent excavations have established the fact that this factory was only of minor importance, and was mainly occupied in producing cheap wares in rivalry with, and even in imitation of, those of the more important English factories.

Towards the end of the 18th century the manufacture of English porcelain spread into the Staffordshire potteries, and the firms of

¥^».r

Spode, Davenport and Minton became the most important English factories of the early 19th century. For notices of the minor English factories of the late 18th century and early 19th century, such as Caughley, Coalport, Swansea and Nantgarw, the student is referred to the special works dealing with the history of English porcelain.

Collections. — The British Museum and the Victoria and Albert Museum contain the best general collections of English porcelain. The museums at Bristol and Liverpool contain examples of the local wares; while the museum at the Worcester Royal Porcelain works has an admirable collection of the wares of that factory. Many noteworthy private collections are in existence, of which we may mention those of Mr Dyson Perrins, Mr Cockshutt and Mr Trapnell.

Literature. — Alex. Brongniart, Traite des arts ceramiques (1844); Jacquemart, Histoire de la ceramique (Eng. ed. 1873); Janmcke, Grundriss der Keramik (1879); Dr Brinkmann, Handbook of European Porcelains in the Hamburg Museum ; Marry at, History of Pottery and Porcelain (1857) ; Jewitt, Ceramic Art of Great Britain (1878); Auscher, A History and Description of French Porcelain U905); Burton, A History and Description of English Porcelain (1902); Dillon, Porcelain (1904); Solon, Old English Porcelain (1903); Burton, Porcelain (1906); R. Almstrom, Lervarorna och deras Tilherkning (1903). (W. B.*)

Pottery and Porcelain during the 19TH Century The development of the manufacture of pottery and porcelain in Europe and America throughout the 19th century need not be treated in such detail as the history of its growth up to that period, for modern means of communication and the general diffusion of knowledge have tended to destroy the individual character which was so marked a feature of the pottery of different countries in previous centuries. The 19th century was distinctly the century of machinery, and, for the most part, it witnessed the displacement by mechanical processes of those methods of handicraft which made the older pottery individual and interesting even in its simplest forms. Collectors are pre- pared to pay very large sums for choice examples of the potter's art of bygone centuries, but it is doubtful if much of the pottery of the 19th century will ever be collected for its intrinsic merits, though it may be preserved as an illustration of the spirit of the age.

In preceding sections of this article the development of the brightly painted tin-enamelled wares and the gaily decorated porcelains of various European countries have been traced down to the end of the 18th century, because that date marks, quite distinctly, the period when the old handicraft of the potter was for various reasons displaced by organized manufacture. The disturbed economic condition of Europe in the last quarter of the 18th century and the Napoleonic Wars of the early 19th century proved disastrous to most of the pottery and porcelain works where artistic wares were made, and the disturbance of traditional methods was completed by the superior mechanical perfection and cheapness of the English earthenware introduced by Wedgwood and his contemporaries. The English pottery was neater, more perfectly finished and more durable than the painted tin-enamelled pottery of the continent. It vied in finish with the expensive continental porcelains, and for nearly half a century it carried all before it, not only in England, but throughout the world. An intelligent observer, M. Faujas de Saint Fond, writing in the beginning of the 19th century, remarks of English pottery that " Its excellent workmanship, its solidity, the advantage which it possesses of sustaining the action of fire, its fine glaze im- penetrable to acids, the beauty and convenience of its form, and the cheapness of its price, have given rise to a commerce so active and so universal, that in travelling from Paris to Petersburg, from Amsterdam to the farthest parts of Sweden, and from Dunkirk to the extremity of the south of France one is served at every inn upon English ware. Spain, Portugal and Italy

are supplied with it; and vessels are loaded with it for the East Indies, the West Indies, and the continent of America." 1 It was calculated that at this time three-fourths of the pottery manufactured in England was sent abroad. Such a state of things was not likely to continue, and in most of the European countries, after the settlement of 1815, such of the older factories as had survived, or new factories specially created for the purpose, adopted English methods of manufacture. In many cases

1 Travels in England and Scotland (Eng. trans.), vol. i. p. 97.

CERAMICS

Plate IX.

Meissen. Mayflower vase mounted in ormolu. Pate-dure.

Sevres Pite-tcndre, c. 1757, painted by Falot and Morin.

AH

&:

P I

('/*-

1

(-*

ˆf

\

Meissen. Crinoline figure (Kandlcr), PAtc-dure,

Sevres. PAtc-tcndrc, e. 1750.

CERAMICS

Plate IX.

Meissen. May-flower vase mounted in ormolu. Pate.dure,

Sevres Pite-tcndre, C. 1757, painted by Falot and Morin.

Meissen. Crinoline figure (Kandlcr), Pute-dure,

Sevres. Pite-tendre, e. 1756.

experienced Staffordshire potters were procured to direct these works, and so far as ordinary domestic pottery was concerned, the first half of the 19th century witnessed the establishment in every country of Europe and in the United States of America of pottery works managed by Englishmen, where earthenwares were made after the English fashion. We shall refer presently to the survival or revival of the older styles of pottery and porcelain, but the English influence was undoubtedly paramount, with one or two notable exceptions, down to 1 8 50, or even later. England itself witnessed a notable development of its pottery manufacture, which became more and more aggregated in that district of North Staffordshire designated emphatically ” The Potteries,” where, in spite of later developments, from two-thirds to three-quarters of all the pottery and porcelain made in the British Isles is still produced. This concentration of the industry in England has resulted in a race of pottery workers not to be matched elsewhere in the world, and while it was the supply of cheap coal and coarse clay which first gave Staffordshire its pre-eminence, that pre- eminence is now retained as much by the traditional skill of the workmen of the district as by the enterprise of its manufacturers.

While we must admire, from the economic point of view, the methods of manufacture which have placed England in the first rank as a pottery-producing country, inasmuch as they have brought within the reach of the humblest domestic utensils of high finish and great durability, it is impossible to say much for the taste or art associated with them. Neatness, serviceableness and durability, English domestic wares undoubtedly possess in a degree unknown to any earlier type of pottery, but the general use of transfer-printing as the principal method of decoration, and the absence of any distinctive style of ornament, must cause them to take a low rank in comparison with the wares of past centuries, when mechanical perfection was impossible and rich colour and truly decorative painting were the chief distinctions of the pottery of every country. The London International Exhibition of 1851 is generally supposed to indicate the low-

water mark of art as applied to industry; it should rather be regarded as marking the period when many of the old handicrafts had been extinguished by the use of mechanical appliances and the growth of the factory system, and when the delight of men in these current developments was so great that they were regarded as triumphs in themselves, when they were only " means to an end."

Since that period the development of pottery and porcelain has followed two main directions: (1) an attempt on the part of manufacturers to produce the most artistic results possible with modern processes and methods, and (2) the interesting and valuable efforts of those individual potters in every country with whom art was the first consideration and commercial production was disregarded.

Though the English pottery factories were of such paramount importance in the first half of the 10th century, it must be remembered that some of the oldest factories in Europe were still alive and active. The royal factories in Sevres, Meissen, Berlin, Vienna, St Petersburg and elsewhere, surviving the wreck of the Napoleonic Wars, continued at the expense of their respective states, to produce porcelains which were the legitimate development of their work during the 18th century.

Meissen and Berlin. — At Meissen, efforts were made to improve the technical process in use, but, unfortunately, the old Meissen wares had already become valuable, and they were reproduced, marks included, until all initiative was destroyed, and the factory continued to live, mainly, on its old reputation.

At Berlin, the financial troubles of the Prussian monarchy throughout the early years of the 19th century were severely felt, so that a cheaper class of porcelain was manufactured. The only innovations that can be ascribed to the factory during this period, though highly esteemed at the time, form striking examples of the artistic decadence of the period. Such was the lace-work decoration made by dipping lace in porcelain slip so that on firing the thread burned away, leaving a porcelain facsimile; another was the production of slabs of porcelain modelled in such a way that on viewing the piece by transmitted light it appeared like a picture painted en grisaille.

From the artistic point of view there is little to be said for the majority of productions of the Berlin factory, but nowhere in the

world has greater attention been paid to the technical and scientific problems of porcelain manufacture, and this establishment has rendered the greatest service in the development of the important chemical and electrical industries of Germany by the splendid appliances it has invented for scientific use.

Since 1870 the works, removed to Charlottenburg, have been conducted with very great enterprise. It was here that Seger perfected his soft porcelain based on the glazes and bodies of the best Japanese porcelains, and here also he developed the manufacture of copper-red glazes in imitation of the old sang-de-bmuj and flambe glazes of the Chinese, at the same time establishing some of the scientific principles underlying their production. At Berlin, too, all the modern methods of decoration, whether in coloured glazes, raised enamels, pdte sur pdte, trie elaborate paintings of flowers, birds or figures, or the use of crystalline glazes, have been followed with great success; but the factory has never yet given any special impetus or new direction to the decorative side of porcelain.

Vienna.— Few European factories were so little affected by the general trend of affairs as the royal factory at Vienna. We have already referred to the elaborate paintings and rich gilding which became the distinguishing feature of its wares towards the end of the 18th century, and this style, once perfected, seems to have been continued with little change. It has been stated by a renowned German authority, that the Viennese porcelain was at its best between 1785 and 1815. During this period the plan of painting copies of pictures on porcelain was developed to its utmost, and this, in combination with the richest gilding, marks the apotheosis of Viennese porcelain. The factory came to an end in 1864, but collectors should be warned that a flood of cheap porcelains, decorated in modern Viennese workshops, and therefore styled ” Viennese porcelain,” has during the last twenty years overwhelmed the English and American markets.

Sevres. — The important part played by the Royal French manufactory at Sevres has already been sketched. During the troublous years of the French Revolution the works practically came to a standstill, and under the Directory it was a question whether this manufactory, along with certain other state establishments in France, should be closed. Napoleon, however, decided that for the glory of France and as a means of encouraging its porcelain industry, seriously threatened by the English potters, the establishment at Sevres should be conducted as a

national factory. By a splendid coincidence Alexander Brongniart, a man of great natural ability, and a noted scientist, was appointed director, and retained that post under the successive governments of France until his death in 1847. In the hands of Brongniart the establishment at Sevres became at once a school of research and a centre of practical accomplishment— the influence of which was felt throughout Europe. Its products were obviously inspired by the demands of successive French monarchs and their courts. It ministered to the grandiose ideas of Napoleon, who demanded pieces that were to speak of his victories, and after every campaign a fresh table service or new suite of vases was produced to commemorate the emperor's successes. The most striking piece of this kind was the vase made to commemorate the marriage of Napoleon and Marie Louisein 1810. It was designed by Isabey and was modelled with figures in bas-relief. The principal group contains not less than 115 such figures, while the subsidiary group, representing the acclaiming populace, contains between 2000 and 3000 figures. This vase was three years in making, and is said to have cost something like £1250. Unfortunately this was not a solitary example of the productions of Sevres, for under every successive government of the 19th century the factory has been called to produce enormous vases which are to be found in the rooms or corridors of every palace and museum in France, and while these pieces represent wonderful technical skill, both in their manufacture and the decorations with which they are covered, very few of them possess either spontaneity or charm. They are correct frigid, cold, and compare most unfavourably from

the artistic point of view with the masterpieces of oriental pottery.

Everything was carried out on the grand scale, and once again the influence of Sevres became paramount in Europe, and its styles of painting and decoration were eagerly followed from 1830 to 1870 by all those European potters who were attempting to make anything beyond useful domestic wares. As an instance of its aims in the period between 1830 and 1850, large sums were spent in the production of great slabs of porcelain many feet in

area; on which were painted copies of some of the famous portraits and other pictorial masterpieces in the galleries of the Louvre. A number of these are preserved in the museum at Sevres, and must always excite admiration and even wonder at their technical accomplishment.

The most noticeable invention of Sevres in the middle part of the 19th century was the pdte sur pdte decoration in which porcelain clays of various colours are used as the artist's medium. The idea appears to have been adopted from an old Chinese vase by Robert, the chief painter, and at the London International Exhibition of 1862 some small cups decorated in this method, by Gely, were first shown. The most successful work in this style was, however, that produced by M. Solon, who worked at Sevres until 1870. In that year he came to England and was employed at Minton's, where for about thirty-five years he continued this method of work, one of the few artistic and beautiful styles of pottery decoration of the 19th century. As practised by M. Solon the pdte sur pdte decoration took the form of paintings of figure subjects or dainty ornamental designs in white slip on a coloured porcelain ground of green, blue, dark-grey or black. On such grounds a thin wash of the slip gives a translucent film, so that by washing on or building up successive layers of slip, sharpening the drawing with modelling tools, or softening or rounding the figure with a wet brush, the most delicate gradations of tint can be obtained, from the brilliant white of the slip to the full depth of the ground. This method was rapidly adopted by all the principal European factories, though nowhere was it carried to such perfection as at Sevres and at Minton's. M. Taxile Doat has executed many extraordinary pieces in this style of decoration at Sevres, and in the British Museum there is a large vase of his, presented by the French government at the beginning of the present century. One great feature of French porcelain manufacture during the 19th century was the develop- ment of the industry at Limoges and the neighbouring district of central France. Limoges was a small centre of porcelain production in the period between 1780 and 1850, but after the latter date it rapidly developed into a pottery centre second only in importance to that of the Potteries district in England. We can do no more than mention this fact, because, for the most partj the activities of Limoges have been devoted to the pro- duction of pottery commercially, rather than pottery as an art. , The Franco-German War proved a disaster for Sevres, and all work came to a standstill for a time. The existing manufactory, which was almost

completed before the outbreak of the war, was opened by Marshal MacMahon in 1876, but for many years the work was continued under great discouragement. Between 1879 and 1889 attention was paid to the study and imitation of old Chinese methods, and this resulted in the reproduction of many of those Chinese glazes which had hitherto been the despair of European potters.

At the Paris Exhibition of 1900 the display made by Sevres was perhaps the most notable feature of the magnificent collec- tion of ceramics gathered there. The collection included many varieties of porcelain, both hard and soft paste, decorated in all the current styles of the period; under-glaze painting, on-glaze painting, flambe glazes and crystalline glazes, but most beautiful of all were the magnificent groups of ” biscuit ” figures designed as table garnitures by sonie of the best French sculptors of the time.

English Progress. — The demand for elaborate specimens of painted porcelain was at its height throughout Europe between 1851 and 1880, and this demand was undoubtedly fostered by the series of international exhibitions held during that period,

when every European pottery works of note produced large and costly specimens of porcelain or earthenware, smothered with painting and gilding. Every famous manufactory produced something beyond the ordinary, but undoubtedly the first of European factories during this period was that of Messrs Minton at Stoke-upon-Trent. M. Leon Arnoux, a descendant of the Arnoux’s of Apt, an old family of French potters, was at this time the technical and artistic director of Messrs Minton’s works, and he was the only pottery director during the 19th century who could in any sense be compared with M. Brongniart of Sevres. M. Arnoux combined in a remarkable degree artistic with technical skill, and under his management the works of Messrs Minton became the greatest centre of ceramic art in Europe. Skilful modellers, like Jeannest, Carriere-Belleuse, and Protat, and pottery painters such as A. Boullemier, Moussill, E. Lessore and L. Solon were engaged at this factory and pro- duced many of the most characteristic European decorations of the middle of the 19th century.

To this period, too, we must refer another English invention, that of a special porcelain known as ” Parian.” This in its finest expression was a “biscuit” porcelain used for the production of

statuettes and groups rivalling the finest 18th century " biscuit " figures of Sevres and Derby. It seems probable that this Parian was first made at the works of Copeland and Garratt, at Stoke-upon-Trent; but it was immediately adopted at Minton's, Wedgwood's, and at Worcester; and each of these firms used it in a distinctive way. Glazed Parian was also manufactured at the Belleek Porcelain Works in Ireland (the only Irish porcelain works of any note), and later its manufacture was developed by the Worcester Royal Porcelain Company, Moore Brothers of Longton, and other English manufacturers until it became an important branch of the English porcelain made in the period under review.

Japanese Influence. — At the Paris Exhibition of 1867 the great collection of the applied arts of Japan took Europe by storm, and there was an immediate outbreak of adaptations of Japanese art in Europe once more; not as in the 18th century, when the old Japanese patterns were copied or frankly imitated, but a European- Japanese style arose, based on the methods and ideas of the great Japanese painters and draughtsmen, the workers in metal, in iron, in lacquer and in silk. In England the Worcester Royal Porcelain Company produced a series of elaborate and skilful pieces inspired from this source, which for perfect and minute execution must be ranked before all other European works of their kind.

The most admirable result of this revived interest in Japanese art was, however, developed at the Royal Copenhagen works, the productions of which are not only famous all over the world, but have set a new style in porcelain decoration which is being followed at most of the continental factories. By the use of the pure Swedish felspar and quartz and the finest china clays from Germany or Cornwall a material of excellent quality is prepared, and on this naturalistic paintings of birds, fishes, animals and water or northern landscapes and figure subjects are painted in delicate under-glaze blues, greys and greens. The Royal Copenhagen works has also produced a profusion of skilfully modelled animals, birds and fishes, either in pure white, or delicately tinted after nature, with the same under-glaze colours.

Not only have Berlin, Sevres and other European factories adopted the modern Copenhagen style of decoration, but the Japanese are now imitating these skilful productions which were originally inspired by their own early work.

Stonewares. — Mention must be made of the revival of the manufacture of artistic stonewares by Doultons of Lambeth, and Villeroy and Boch, the great German potters. Doultons, besides reviving the older forms of English stoneware, made some entirely new departures, and their pieces with designs etched in the clay are admirable examples of the right use of a refractory material. Villeroy and Boch reproduced the old Rhenish stonewares, and many interesting new departures in addition, but mostly in German forms that have not commended the wares to other nations.

CERAMICS

Plate X.

fee v

%

A.tiM

i» .’■• v;

h

ST

Chelsea porcelain; 1715-1770. Figure after Wattcan.

Whicldon and Wedgwood, cauliflower ware; c. 1750-17GO.

Worcester porcelain; e. 17C0-1770.

Turner’s jasper; C. 178D.

Wedgwood’s jasper; c. 178(1.

CERAMICS

Plate X.

Chelsea porcelain; 1715-1770. Figure after Watteau.

Whicldon and Wedgwood, cauliflower ware; c. 1750-17CO,

Worcester porcelain; c. 17G0-1770.

\Ml

Turner's jasper; C. 1780.

Wedgwood's jasper; c. 17811.

MODERN]

CERAMICS

Artistic Results. — While the great potteries of Europe have been employed in improving their methods of manufacture and in consolidating their knowledge on the technical and scientific side, so that they are able to produce pottery more perfect in shape, with a higher degree of finish and greater certainty of result than was ever known before, it cannot be said that the artistic results have been commensurate with the labour expended. Fortunately, however, the success of these important industrial concerns in stereotyping modern production has incited a considerable number of clever men, either potters or artists, to become artist-potters and producers of individual wares, often recalling the works of the great schools of bygone centuries. This movement, which to-day has its exponents in every European country as well as in the United States of America, originated in France between 1840 and 1850, when the formation of the earliest ceramic museums and the new-born interest in the old French faience led to various attempts at pottery-making by the old methods of handwork and rule of thumb. Avisseau of Tours (1845), Pull of Paris (1855), and Barbizet (1859) began to make pieces in the style of Palissy, and Ulysse of Blois (1863) revived painted faience in imitation of that of Nevers. Slowly a demand for painted pottery was created among collectors and amateurs, and in France and other countries artists began to dabble in the painting of pottery. In some cases the artist retained his free- dom, painting pieces obtained from some pottery manufacturer, which he sold on his own account after they had been decorated and fired; or he became attached to a particular factory and his productions were sold by the potter; or the artist became an amateur potter, and either worked alone or encouraged other artists to co-operate with him.

It is impossible to do more than mention a few of the prominent men in each class, whose works were not only esteemed in their own day, but are also likely to be regarded always as among the distinguished productions of the 19th century. Emile Lessore and Chapelet were both painters who were attracted by the technique of the potter. For some time they bought speci- mens of pottery from a small manufacturer named Laurin at Bourg-la-Reine, and after a time they definitely forsook pictorial art for that of the potter. Lessore painted in underglaze colours in a delicate sketchy style figure-subjects, mostly adapted from old

engravings. He worked for a short time at Sevres, and then, like so many other French pottery artists of this period, he came to Minton's in England, and finally entered into an en- gagement with the old firm of Josiah Wedgwood & Sons which continued almost to his death (1860-1876). On their fine cream- coloured earthenware he sketched many thousands of fanciful designs which had a great vogue in the 'seventies and 'eighties of the last century. Chapelet pursued a very different course. His first innovation was a method known as " Barbotine " or slip-painting, in which coloured clays were used " impasto," often in considerable thickness, so that after the work had been fired and glazed it bore some resemblance to an oil painting. For a few years this style of decoration became the rage all over Europe, but it fell into contempt almost as rapidly as it had found favour, and is now only used for the decoration of common wares. Ultimately, Chapelet gave up painting and applied himself to the discovery of technical novelties. He was apparentiy the first European potter to produce flambe glazes after the manner of the Chinese, and a fine collection of these productions of his is preserved in the museum at Sevres.

The greatest of all the French innovators was, however, Theodore Deck, who had been trained as a working potter and was led to forsake the management of an ordinary tile and pottery business in Paris to experiment on his own account. He started a little workshop in the Boulevard Montparnasse in Paris and rapidly gathered round him a number of young painters all eager to experiment in the magnificent colours which Deck with his passionate love of Persian and other oriental pottery could place at their disposal. Within a few years this venture was so success- ful that Deck was known all over the civilized world as a great potter, and his original creations, painted by men like Ranvier, Collin, Ehrmann, Anker and other artists, were readily purchased

by the lovers of ceramic art in every country. The crown of his career came in 1887, when he was appointed director of the National Manufactory at Sevres, for he was the only practical potter who had ever occupied that position; but he died in 1890 before he had been able to impress his personality on the work of Sevres.

The same movement that was active in France found its ex- ponents in other countries as well. In Italy and the south of France the last quarter of the 19th century witnessed a revival of Italian majolica and of lustre decoration. Prominent in this

direction were the productions of Cantegalli of Florence and of the Massiers of Golf e- Juan near Cannes; while in England William de Morgan created an artistic sensation by his tiles and vases decorated with lustres, or with painted colours recalling those of the Persian and Syrian potters of the middle ages. This departure in England was, however, followed up by many manufacturers who were keenly alive to the possibilities of pottery colour, and Mr Bernard Moore, of Longton, Maw & Company of Jackfield, and Minton's of Stoke-upon-Trent, produced much excellent work, in tiles and vases inspired from the same oriental sources.

Meantime, in America there had been growing up a manufacture of pottery after the approved methods, in Trenton, New Jersey; East Liverpool, Zanesville and Cincinnati (Ohio). To all these centres English workmen had been attracted, and earthenware after the current English styles was manufactured; but, as was the case in Europe, individual efforts were made to produce artistic pottery. The first and best known of these artistic departures was that of the Rookwood Pottery at Cincinnati, and again it was an amateur, Mrs Bellamy Storer, who founded an enterprise which has since produced some very original work. From 1880 to r889 the work was mainly carried on at the expense of this lady, but since that date the enterprise has been self-supporting, and the Rookwood pottery has become known throughout the world.

The latter half of the 19th century also witnessed the development of new branches of pottery manufacture for sanitary purposes — and it is not too much to say that much of the improved sanitation of modern dwellings and towns has been rendered possible by the special appliances invented by potters for these purposes. In this direction the English potters undoubtedly led the way, and not only have their methods been imitated abroad, but English manufacturers have also established large works in Germany, France and the United States of America. Varieties, too, of hard-fired pottery, comprising earthenwares, stonewares and porcelains, have been invented for use in the chemical and electrical industries. But these belong to the great modern branch of pottery manufacture, not to pottery art. In the same way, the revived attention paid to the various forms of pottery for the interior and exterior of buildings belongs rather to the question of mural decoration than of pottery.

At the beginning of the 20th century we find England and

Germany the leading pottery manufacturing countries; Germany excelling in the amount of its output, and England in the fineness and finish of its productions. France, in addition to the National Manufactory at Sevres, as much as ever divorced from commerce, has its porcelain industry at Limoges and large manufactories of tiles and earthenware in many departments; while there are also a number of artist potters like Lachenal, Dalpayrat, Dela- herche and Taxile Doat who make purely artistic pottery in hard-fired stonewares (gres) and porcelain, while the production of decorative stonewares for building purposes has been developed by such firms as Bigot, Boulanger and E. Miiller. A great development has also taken place in the production of decorative pottery and tiles in Holland. The famous Delft works, besides producing quantities of painted blue and white earthenware (made in the English and not in the old Dutch fashion), has been experimenting largely in the development of crystalline and opalescent glazes and in lustres, while the Rozenburg factory at the Hague and a factory at Puramerende, near Amsterdam, havemadesome distinctive but rather bizarre painted pottery and porcelain. The success of the Royal Copenhagen factory has

already been mentioned, and this success led to the foundation of Bing & Grondhal of Copenhagen, who largely follow the styles of decoration initiated at the Royal works. In Sweden there are two important factories at Rorstrand and Gustafsberg. Under the accomplished director of the Rtfrstrand factory, Mr Robert Almstrom, a great variety of products have been success- fully manufactured, including hard-paste porcelain, English bone china, earthenware, majolica and stoves. Italy, Spain and Belgium have also important modern pottery works.

In the United States of America there are large establishments for the manufacture of earthenware, bone china and tiles, all after the English fashion, while in addition there are a number of experimental kilns at work producing artistic pottery. The Rookwood factory has already been mentioned, but the wares produced at the Grueby factory and by Mrs Robineau and T. Brouwer are also worthy of note. (See ” Report on American Art Pottery,” pp. 922-935 of Special Reports of the U.S. Census Office, Manufactures, pt. iii., 1905.)

Technical Pottery Works.— It is only possible to give a selection of the best of the modern standard works dealing with the technical side of pottery production. Brongniart, TraitS des arts ceramiques (3rd ed., Paris, 1877), with notes and additions by Salvetat; E. Bourry, TraitS des industries ceramiques (Paris, 1897); Theodore Deck, La Faience (Paris, 1 887) ; A. Granger, La Ceramique industrielle (Paris, 1905) ; E. S. Auscher, La Ceramique cuisant d haute temperaˆ lure (Paris, 1899); Technologie de la ceramique (Paris, 1901); Les Industries ceramiques (Paris, 1901); Seger, Gesammelte Schriften (Berlin, 1896; Eng. trans., Easton, Pa., U.S.A., 1902); Langenbeck, The Chemistry of Pottery (Easton, Pa., U.S.A., 1895); William Burton, Porcelain (London, 1906). (W. B.*)

CERARGYRITE, a mineral species consisting of silver chloride; an important ore of silver. The name cerargyrite is a Greek form (from /teptts, horn, and apyvpos, silver) of the older name hornsilver, which was used by K. Gesner as far back as 1565. The chloro-bromide and bromide of silver were also included under this term until they were distinguished chemically in 1 84 1 and 1842, and described under the names emboli te and bromargyrite (or bromyrite) respectively; the! chloride then came to be distinguished as chlorargyrite, though the name cerargyrite is often now applied to this alone. Chloro-bromo- iodide of silver has also been recognized as a mineral and called iodembolite. All these are strikingly alike in appearance and general characters, differing essentially only in chemical composi- tion, and it would seem better to reserve the name cerargyrite for the whole group, using the names chlorargyrite (AgCl), embolite (Ag(Cl, Bl)), bromargyrite (AgBr) and iodembolite (Ag(Cl, Br, I)) for the different isomorphous members of the group. They are cubic in crystallization, with the cube and the octahedron as prominent forms, but crystals are small and usually indistinct; there is no cleavage. They are soft (H = 2ˆ) and sectile to a high degree, being readily cut with a knife like horn. With their resinous to adamantine lustre and their translucency they also present somewhat the appearance of horn; hence the name hornsilver. The colour varies somewhat with the chemical composition, being grey or colourless in chlorargyrite, greenish-grey in embolite and bromargyrite, and greenish-yellow to orange-yellow in iodembolite. On exposure to light the colour quickly darkens. The specific gravity also varies with the composition: for the pure chloride it is 5-55, and the highest recorded for an iodembolite is 6-3.

The hornsilvers all occur under similar conditions and are often associated together; they are found in metalliferous veins with native silver and ores of silver, and are usually confined to the upper oxidized parts of the lodes. They are important ores of silver (the pure chloride contains 75-3 % of silver), and have been extensively mined at several places in Chile, also in Mexico, and at Broken Hill in New South Wales. The chloride and chloro-bromide have been found in several Cornish mines, but never in very large amounts. (L. J. S.)

CERBERUS, in Greek mythology, the dog who guarded the entrance to the lower world. He allowed all to enter, but seized those who attempted to escape. According to Hesiod (Theog. 311), he was a fifty-headed monster with a fearful bark, the offspring of Typhon and Echidna. He was variously

represented with one, two or (usually) three heads, often with the tail of a snake or with snakes growing from his head or twiaed round his body. One of the tasks imposed upon Heracles was to fetch Cerberus from below to the upper world, a favourite subject of ancient vase-paintings. ,

CERDIC (d. 534), founder of the West Saxon kingdom, is described as an ealdorman who in 495 landed with his son Cynric in Hampshire, where he was attacked at once by the Britons. Nothing more is heard of him until 508, when he defeated the Britons with great slaughter. Strengthened by fresh arrivals of Saxons, he gained another victory in 519 at Certicesford, a spot which has been identified with the modern Charford, and in this year took the title of king. Turning westward, Cerdic appears to have been defeated by the Britons in 520 at Badbury or Mount Badon, in Dorset, and in 527 yet another fight with the Britons is recorded. His last work was the conquest of the Isle of Wight, probably in the interest of some Jutish allies. All the sovereigns of England, except Canute, Hardicanute, the two Harolds and William the Conqueror, are said to be descended from Cerdic.

See Anglo-Saxon Chronicle, edited by C. Plummer (Oxford, 1892-1899); Gildas, De exctdio Britanniae, edited by Th. Mommsen (Berlin, 1898) ; Nennius, Historia Brittonum, edited by Th. Mommsen (Berlin, 1898) ; Bede, Historiae ecclesiasticae gentis Anglorum Ubri v., ed. C. Plummer (Oxford, 1896) ; E. Guest, Origines Celticae (London, 1883); J. R. Green, The Making of England (London, 1897).

CERDONIANS, a Gnostic sect, founded by Cerdo, a Syrian, who came to Rome about 137, but concerning whose history little is known. They held that there are two first causes — the perfectly good and the perfectly evil. The latter is also the creator of the world, the god of the Jews, and the author of the Old Testament. Jesus Christ is the son of the good deity; he was sent into the world to oppose the evil; but his incarnation, and therefore his sufferings, were a mere appearance. Regarding the body as the work of the evil deity, the Cerdonians formed a moral system of great severity, prohibiting marriage, wine and the eating of flesh, and advocating fasting and other austerities. Most of what the Fathers narrate of Cerdo's tenets has probably been transferred to him from his famous pupil Marcion, like whom he is said to have rejected the Old Testament and the New, except part of Luke's Gospel and of Paul's Epistles. (See Marcion, and Gnosticism.)

CEREALIS (Cerialis), PETILLIUS (1st century a.d.), Roman general, a near relative of the emperor Vespasian. He is first heard of during the reign of Nero in Britain, where he was completely defeated (a.d. 61) by Boadicea. Eight years later he played an important part in the capture of Rome by the supporters of Vespasian. In 70 he put down the revolt of Civilis (q.v.). In 71, as governor of Britain, where he had as a subordinate the famous Agricola, he inflicted severe defeats upon the Brigantes, the most powerful of the' tribes of Britain. Tacitus says that he was a bold soldier rather than a careful general, and preferred to stake everything on the issue of a single engagement. He possessed natural eloquence of a kind that readily appealed to his soldiers. His loyalty towards his superiors was unshakable.

Tacitus, Annals, xiv. 32; Histories, iii. 59, 78, iv. 71, 75, 86, v. 21 ; Agricola, 8, 17.

CERES, an old Italian goddess of agriculture. The name probably means the "creator" or "created," connected with crescere and creare. But when Greek deities were introduced into Rome on the advice of the Sibylline books (in 495 B.C., on the occasion of a severe drought), Demeter, the Greek goddess of seed and harvest, whose worship was already common in Sicily and Lower Italy, usurped the place of Ceres in Rome, or rather, to Ceres were added the religious rites which the Greeks paid to Demeter, and the mythological incidents which originated with her. At the same time the cult of Dionysus and Persephone (see Liber and Libera) was introduced. The rites of Ceres were Greek in language and form. Her priestesses were Italian Greeks and her

temple was Greek in its architecture and built by Greek artists. She was worshipped almost exclusively by plebeians, and her temple near the Circus Maximus was under the care of the plebeian aediles, one of whose duties was the superintendence

of the corn-market. Her chief festivals were the ludi Ceteris or Cerealia (more correctly, Cerialia), games held annually from April 12-19 (Ovid, Fasti, iv. 392 ff.); a second festival, in August, to celebrate the reunion of Ceres and Proserpine, in which women, dressed in white, after a fast of nine days offered the goddess the first-fruits of the harvest (Livy xxii. 56) ; and the Jejunium Ceteris, a fast also introduced (191 B.C.) by command of the Sibylline books (Livy xxvi. 37), at first held only every four years, then annually on the 4th of October. In later times Ceres was confused with Tellus. (See also Demeter.)

CERIGNOLA, a town of Apulia, Italy, in the province of Foggia, 26 m. S.E. by rail from the town of Foggia. Pop. (1901) 34,195. It was rebuilt after a great earthquake in 1731, and has a considerable agricultural trade. In 1503 the Spaniards under Gonzalo de Cordoba defeated the French under the due de Nemours below the town — a victory which made the kingdom of Naples into a Spanish province in Italy. Cerignola occupies the site of Furfane, a station on the Via Traiana between Canusium and Herdoniae.

CERIGOTˆTO, called locally Lius (anc. Aegilia or Ogylos; mod. Gr. officially Antikythera) , an island of Greece, belonging to the Ionian group, and situated between Cythera (Cerigo) and Crete, about 20 m. from each. Some raised beaches testify to an upheaval in comparatively recent times. With an area of about 10 sq. m. it supports a population of about 30×3, who are mainly Cretan refugees, and in favourable seasons exports a quantity of good wheat. It was long a favourite resort of Greek pirates. It is famous for the discovery in 1900, close to its coast, of the wreck of an ancient ship with a cargo of bronze and marble statues.

CERINTHUS (c. a.d. 100), an early Christian heretic, contemporary with the closing years of the apostle John, who, according to the well-known story of Polycarp, reported by Irenaeus (iii. 3) and twice recorded in Eusebius {Hist. Eccl. hi.

28, iv. 14), made a hasty exit from a bath in Ephesus on learning that Cerinthus was within. Other early accounts agree in making the province of Asia the scene of his activity, and Hippolytus (Haer. vii. 33) credits him with an Egyptian training. There can be no truth in the notice given by Epiphanius (Haer. xxviii. 4) that Cerinthus had in earlier days at Jerusalem led the judaizing opposition against Paul.

The difficulty of defining Cerinthus's theological position is due not only to the paucity of our sources but to the fact that the witness of the two principal authorities, Irenaeus (1. 26, iii. n) and Hippolytus (Syntagma), does not agree. Further, Irenaeus himself in one passage fails to distinguish between Cerinthian and Valentinian doctrines. It would appear, however, that Cerinthus laid stress on the rite of circumcision and on the observance of the Sabbath. He taught that the world had been made by angels, from one of whom, the god of the Jews, the people of Israel had received their Law, which was not perfect. The only New Testament writing which he accepted was a mutilated Gospel of Matthew. Jesus was the offspring of Joseph and Mary, and on him at the baptism descended the Christ, 1 revealing the hitherto unknown Father, and endowing him with miraculous power. This Christ left Jesus again before the Passion, and the resurrection of Jesus was still in the future. Together with these somewhat gnostic ideas, Cerinthus, if we may trust the notices of Gaius the Roman presbyter (c. 290) and Dionysius of Alexandria (c. 340), held a violent and crude form of chiliasm. But the chief significance of the man is his " combination of zeal for legal observances with bold criticism of the Law itself as a whole and of its origin," which reminds us of the Clementine Recognitions. Cerinthus is a blend of judaizing christian and gnostic.

CERIUM (symbol Ce, atomic weight 140-25), a metallic chemical element which occurs with the rare earths in the minerals cerite, samarskite, euxenite, monazite, parisite and many yttrium minerals. The particular earth containing cerium was discovered by M. H. Klaproth in 1803, whilst J. Berzelius at about the same time also examined it and came to the conclusion

1 So Irenaeus. According to Hippolytus and Epiphanius it was the Holy Ghost that thus descended.

that it was the oxide of a new metal, which he termed cerium. The crude oxide of the metal is obtained from cerite, by evaporat-

ing the mineral with strong sulphuric acid, removing excess of acid and dissolving the residue in ice-cold water; sulphuretted hydrogen is passed through the solution, which is then filtered, acidified with hydrochloric acid, and precipitated as oxalate by oxalic acid; the oxalate is then converted into oxide by ignition. From the crude oxide so obtained (which contains lanthanum and didymium oxides) the cerium may be separated by conversion into its double sulphate on the addition of potassium sulphate, the sulphates of the cerium group being insoluble in a saturated solution of potassium sulphate. The sulphate is subsequently boiled with water, when a basic sulphate is precipitated. For the preparation of pure cerium compounds see Auer v. Welsbach, Monatshefte, 1884, v. 508.

The metal was first obtained, in an impure state, by C. G. Mosander, by fusing its chloride with sodium. W. F. Hillebrand and T. Norton have prepared it by the electrolysis of the melted chloride (Pogg. Ann., 1875, 156, p. 466) ; and C. Winkler (Berichte, 1 89 1, xxiv. 884) obtained it by heating the dioxide with mag- nesium powder. The metal has somewhat the appearance of iron, and has a specific gravity of 6-628, which, after melting, is increased to 6-728. Its specific heat is 0-04479 (W. F. Hille- brand). It is permanent in dry air, but tarnishes in moist air; it can be hammered and rolled; it melts at 623 C. It burns readily on heating, with a brilliant flame; and it also combines with chlorine,bromine, iodine, sulphur, phosphorus and cyanogen. In the case of the two former elements the combination is accompanied by combustion of the metal. With water it is slowly converted into the dioxide. Cold concentrated nitric and sulphuric acids are without action on the metal, but it reacts rapidly with dilute nitric and hydrochloric acids. The dioxide is used in incandescent gas mantles (see Lighting).

Three oxides of cerium are known. The sesquioxide, Ce_2O_3 , is obtained by heating the carbonate in a current of hydrogen. It is a bluish-green powder, which on exposure rapidly combines with the oxygen of the air. By the addition of caustic soda to cerous salts, a white precipitate of cerous hydroxide is formed. Cerium dioxide, CeO_2 , is produced when cerium carbonate, nitrate, sulphate or oxalate is heated in air. It is a white or pale yellow compound, which becomes reddish on heating. Its specific gravity is 6-739, and its specific heat 0-0877. It is not reduced to the metallic condi- tion on heating with carbon. Concentrated sulphuric acid dissolves this oxide, forming a yellowish solution and ozone. By suspending the precipitated cerous hydroxide in

water and passing chlorine through the solution, a hydrated form of the dioxide, 2Ce0 2 -3H 2 0, is obtained, which is readily soluble in nitric and sulphuric acids, forming eerie salts, and in hydrochloric acid, where it forms cerous chloride, with liberation of chlorine. A higher hydrated oxide, Ce0 3 -xH 2 0, is formed by the interaction of cerous sulphate with sodium acetate and hydrogen peroxide (Lecoq de Boisbaudran, Comptes rendus, 1885, 100, p. 605).

Cerous chloride, CeCls, is obtained when the metal is burned in chlorine; when a mixture of cerous oxide and carbon is heated in chlorine; or by rapid heating of the dioxide in a stream of carbon monoxide and chlorine. It is a colourless substance, which is easily fusible. A hydrated chloride of composition 2CeCl 3 15H 2 is also known, and is obtained when a solution of cerous oxide in hydro chloric acid is evaporated over sulphuric acid. Double salts of cerous chloride with stannic chloride, mercuric chloride, and platinic chloride are also known. Cerous bromide, 2CeBr 3 -3H 2 0, and iodide, CeI 3 -9H 2 0, are known. Cerous sulphide, Ce 2 S 3 , results on heating cerium with sulphur or cerium oxide in carbon bisulphide vapour. It is a red infusible mass of specific gravity 5-1, and is slowly decomposed by warm water. The sulphate, Ce 2 (S0 4)s, is formed on dissolving the carbonate in sulphuric acid, or on dissolving the basic sulphate in sulphuric acid, in the presence of sulphur dioxide, evaporating the solution, and drying the product obtained, at high temperature (B. Brauner, Monatshefte, 1885, vi. 793). It is a white powder of specific gravity 3-912, easily soluble in cold water. Many hydrated forms of the sulphate are known, as are also double salts of the sulphate with potassium, sodium, ammonium, thallium and cadmium sulphates. Ceric fluoride, CeF < -H 2 0, is obtained when the hydrated dioxide is dissolved in hydrofluoric acid and the solu- tion evaporated on the water bath (B. Brauner). The sulphate, Ce(S0 4) 2 4H 2 0, is formed when the basic sulphate is dissolved in sulphuric acid ; or when the dioxide is dissolved in dilute sul phuric acid, and evaporated in vacuo over sulphuric acid. It forms yellow crystals soluble in water; the aqueous solution on standing gradually depositing a basic salt. Double sulphates of comp6sition2Ce(S0 4) 2 -2K 2 S0 4 -2H 2 0,Ce(S0 4) 2 -3(NH 1) 2 S04-4H 2 Oare

known. Nitrates of cerium have been described, as have alsp phos- phates, carbonates and a carbide.

Cerium compounds may be recognized by the red precipitate of eerie hydroxide, which is formed when sodium hypochlorite is added to a colourless cerous salt. For the quantitative determination of the metal, the salts are precipitated by caustic potash, the precipitate washed, dried and heated, and finally weighed as the dioxide.

The atomic weight of cerium has been determined by B. Brauner (Chem. News, 1895, lxxi. 283) from the analysis of the oxalate; the values obtained varying from 140-07 to 140-35.

CERNUSCHI, HENRI (1821-1896), Italian politician and economist, was born of wealthy parents at Milan in 182 1, and was destined for the legal profession. During his studies he became involved in the revolutionary movement. He played a conspicuous part in the insurrection at Milan in 1848, and also at Rome in 1849, where he had a seat in the National Assembly. On the collapse of the revolutionary government he was arrested (1850), but managed to escape to France, where he engaged in commerce and banking, became naturalized, and acquired a large fortune. He took a prominent part in opposing the Socialist movement, and in April 1870, having subscribed a large sum to the funds of a committee formed to combat the Napoleonic plebiscite, had to leave the country. In September the formation of the Third Republic enabled him to return, but he soon left Paris to travel in the East, whence he returned with a fine art collection, particularly of Japanese objects. Cernuschi is best known for his publications on financial questions, more especially bimetallism. Of the latter he was an ardent champion, and the word itself is commonly supposed to have originated with him — at least in its English form it is first found in his Silver Vindicated (1876). Among his other works may be mentioned: Mecanique de Vichange (1861); Illusion des societes cooperatives (1886); Le B.imetallisme en Angleterre (1879); Le Grand Proces de VUnion latine (1884). He died at Mentone on the 1 2th of May 1896.

CEROGRAPHY (from the" Gr. Kijpos, wax, and ypafaiv, to write), the art of painting in wax. (See Encaustic Painting.)

CERRO DE PASCO, or Pasco, a mining town of Peru, capital of the department of Junin, 107 m. (221 m. by rail, via Oroya) N.E. of

Lima. Pop. (1907 est.) 10,000. It is situated on the plateau of Bombon, 14,280 ft. above sea-level, and in the midst of one of the oldest and richest silver-mining districts of Peru. There were 342 silver mines in this district in 1890, and at the end of the 19th century the average annual output since the discovery of the mines in 1630 was estimated at 1,600,000 oz. A decline in the silver production having set in, the American company which had become owners of three-fourths of the mining properties in the district turned its attention to the extensive copper deposits there, built a railway to Oroya 83 m. distant, another, 25 m. long, to the coal-fields of Gollarisquisga, north of Pasco, and then erected large smelting works (in which 2500 men were regularly employed in 1907) 8 m. out of town and 4 m. from limestone beds. The railway to Oroya was completed in 1903, the coal mine branch and smelter later on, and in 1907 the copper output was 20,152,000 lb. The town of Pasco is badly built and unattractive, and is inhabited chiefly by mining labourers and their families. Its population is increased 50% in times of great mining activity. The name Cerro de Pasco is that of a ” knot ” of mountains uniting the two great ranges of the Andes at this point.

CERTALDO, a town of Tuscany, Italy, in the province of Florence, 35 m. S.S.W. by rail and 18 m. direct from the town of Florence. Pop. (1901) town, 4552; commune, 9120. It was the home of the family of Giovanni Boccaccio, who died and was buried here in 1375. His house (of red brick, like the other old houses of the town) was restored in 1823 and fitted up with old furniture. A statue of him was erected in the principal square in 1875. The Palazzo Pretorio, or Vicariale, the residence of the Florentine governors, recently restored to its original condition, has a picturesque facade and court adorned with coats of arms, and in the interior are various frescoes dating from the 13th to the 16th century. The town as a whole is picturesque, and lies on a hill 426 ft. above sea-level.

See R. Pantini, 5. Cimignano e Certaido (Bergamo, 1904), p. 101 seq.

Fig. 1.

conchoidal containing

CERUSSITE, a mineral consisting of lead carbonate (PbC0 3), and an important ore of lead. The name (sometimes erroneously spelt cerusite) is from the Lat. cerussa, ” white lead.” ” Cerussa nativa

” was mentioned by K. Gesner in 1565, and in 1832 F. S. Beudant applied the name ceruse to the mineral, whilst the present form, cerussite, is due to W. Haidinger (1845). Popular names in early use were lead-spar and white-lead-ore.

Cerussite crystallizes in the orthorhombic system and is isomorphous with aragonite. Like aragonite it is very fre- quently twinned, the compound crystals being pseudo-hexagonal in form. Three crystals are usually twinned together on two faces of the prism m { 1 10} , producing six-rayed stellate groups (figs. 1 and 2) with the individual crystals intercrossing at angles of nearly 60°. Twinning on the faces of the prism r{i$o},the angles of which are also nearly 6o°, produces a similar kind of grouping, but is much less common. Crystals are of frequent occurrence, and they usually have very bright and smooth faces. The mineral also occurs in compact granular masses, and sometimes in fibrous forms. It is usually colourless or white, sometimes grey or greenish in tint; it varies from transparent to translucent, and has an adamantine lustre. It is very brittle, and has a fracture. Hardness 3-35; sp. gr. 6-5. A variety 7 % of zinc carbonate, replacing lead carbonate, is known as iglesiasite, from Iglesias in Sardinia, where it is found.

The mineral may be readily recognized by its characteristic twinning, in conjunction with the adamantine lustre and high specific gravity. It dissolves with effervescence in dilute nitric acid. Before the blow-

pipe it fuses very readily,

and gives reactions for

lead. Cerussite occurs

in metalliferous veins in

association with galena,

and has been formed by

the action of carbonated

waters on the galena: it

is therefore found in the

upper parts of the lodes Fig. 2.

together with other secondary minerals, such as limonite. Finely crystallized specimens have been obtained from the Friedrichs-segen mine near Ems in Nassau, Johanngeorgenstadt in Saxony, Mies in Bohemia, Phenixville in Pennsylvania, Broken Hill in New South Wales, and several other localities. Delicate acicular crystals of considerable length were found long ago in the Pentire Glaze mine near St Minver in Cornwall. It is often found in considerable quantities, and contains as much as 775% of lead. (L. J. S.)

CERUTTI, GIUSEPPE ANTONIO GIACHIMO (1 738-1 792), French author and politician, was born at Turin on the 13th of June 1 738. He joined the Society of Jesus and became professor at the Jesuit college at Lyons. In 1762, in reply to the attacks on his order, he published an Apologie generate de I'institut et de la doctrine des Jtsuites, which won him much fame and some exalted patronage; notably that of the ex-king Stanislaus of Poland and of his grandson" the dauphin. During the agitations that preceded the Revolution Cerutti took the popular side, and in 1788 published a pamphlet, Memoire pour le peuple franQais, in which in a clear and trenchant style he advocated the claims of the tiers etat. In May 1789 he presided over the electors of Paris, by whom in January 1791 he was chosen member of the administration of the department and afterwards deputy to the Legislative Assembly. He was a friend of Mirabeau, whose policy he supported and whose funeral oration he pronounced. He himself died on the 3rd of February 1792. Of Cerutti's literary enterprises the most interesting, and probably the most influential, was the popular newspaper founded by him, on the 30th of September 1790, in collaboration with Rabaut Saint-Etienne and Philippe Antoine Grouvelle. Its character and

objects are explained by its title: La Feuille villageoise, adressSe chaque semaine a tons les villages de France pour les instruire des lots, des evSnements, des decouvertes qui interessent tout bon citoyen, &c. It was continued by Grouvelle after Cerutti's death, the last number appearing on the 2nd of August 1795.

Cerutti's works were published in 1793 in 3 volumes. On the Memoire pour le peuple francais, see F. A. Aulard in La Revolution francaise, torn. xv. (1888).

CERVANTES SAAVEDRA, MIGUEL DE (1547-1616), Spanish novelist, playwright and poet, was born at Alcala de Henares in 1547. The attempts of biographers to provide him with an illustrious genealogy are unsuccessful. The family history begins with the author's grandfather, Juan de Cervantes (b. 1490), a lawyer who at one time (1545-6) administered the estates of the duke de Osuna, and resided later at Cordova, where he died about 1555. Cervantes' father was Rodrigo de Cervantes, an apothecary-surgeon, who married Leonor de Cortinas in 1540 or 1541. The children of this marriage were Andres (b. 1543), Andrea (b. 1544), Luisa (b. 1546), Miguel, Rodrigo (b. 1550), Magdalena (b. 1554) and Juan (of whom nothing is known beyond the mention of him in his father's will).

The exact date of Cervantes' birth is not recorded: he was baptized on the 9th of October 1547, in the church of Santa Maria la Mayor at Alcala. There are indications that Rodrigo de Cervantes resided at Valladolid in 1554, at Madrid in 1 561, at Seville in 1 564-1 565, and at Madrid from 1566 onwards. It may be assumed that his family accompanied him, and it seems likely that either at Valladolid or at Madrid Cervantes saw the famous actor-manager and dramatist, Lope de Rueda, of whose performances he speaks enthusiastically in the preface to his plays. In 1569 a Madrid schoolmaster, Juan Lopez de Hoyos, issued a work commemorative of Philip II. 's third wife, Isabel de Valois, who had died on the 3rd of October 1568. This volume, entitled Historia y relacidn verdadera de la enfermedad, felicisimo trdnsito y sumptuosas exequias funebres de la Serenisima Reyna de Espana Dona Isabel de Valoys, contains six contribu- tions by Cervantes: a sonnet, four redondillas, and an elegy. Lopez de Hoyos introduces Cervantes as "our dear and beloved pupil," and the elegy is dedicated to Cardinal Espinosa " in the name of the whole school." It has been inferred that Cervantes was educated by Lopez de Hoyos, but this conclusion is untenable, for Lopez de Hoyos' school was not opened till 1567.

On the 13th of October 1568, Giulio Acquaviva reached Madrid chargecj with a special mission to Philip II. ; he left for Rome on the 2nd of December, and Cervantes is supposed to have accompanied him. This conjecture is based solely on a passage in the dedica- tion of the Galatea, where the writer speaks of having been " camarero to Cardinal Acquaviva at Rome." There is, however, no reason to think that Cervantes met Acquaviva in Madrid; the probability is that he enlisted as a supernumerary towards the end of 1568, that he served in Italy, and there entered the household of Acquaviva, who had been raised to the cardinalate on the 17th of May 1570. There exists a warrant (dated September 15, 1569) for the arrest of one Miguel de Cervantes, who had wounded Antonio de Sigura, and had been condemned in absence to have his right hand cut off and to be exiled from the capital for ten years; and it has been sought to identify the offender with the future author of Don Quixote. No evidence is available. All that is known with certainty is that Cervantes was in Rome at the end of 1569, for on the 22nd of December of that year the fact was recorded in an official information lodged by Rodrigo de Cervantes with a view to proving his son's legitimacy and untainted Christian descent.

If it is difficult to say precisely when Cervantes was in Acquaviva's service, it is no less difficult to say when he left it to join the regular army. There is evidence, more or less satis- factory, that his enlistment took place in 1570; in 1571 he was serving as a private in the company commanded by Captain Diego de Urbina which formed part of Miguel de Moncada's famous regiment, and on the 16th of September he sailed from Messina on board the " Marquesa," which formed part of the armada under Don John of Austria. At the battle of Lepanto

(October 7, 1571) the " Marquesa " was in the thickest of the conflict. As the fleet came into action Cervantes lay below, ill with fever; but, despite the remonstrances of his comrades, be vehemently insisted on rising to take his share in the fighting, and was posted with twelve men under him in a boat by the galley's side. He received three gunshot wounds, two in the chest, and one which permanently maimed his right hand — " for the greater glory of the right," in his own phrase. On the 30th of October the fleet returned to Messina, where Cervantes went into hospital, and during his convalescence received grants-in- aid amounting to eighty-two ducats. On the 29th of April 1572 he was transferred to Captain Manuel Ponce de Le6n's company in Lope de Figueroa's regiment; he shared in the indecisive naval

engagement off Navarino on the 7th of October 1572, in the capture of Tunis on the 10th of October 1573, and in the unsuccessful expedition to relieve the Goletta in the autumn of 1574. The rest of his military service was spent in garrison at Palermo and Naples, and shortly after the arrival of Don John at Naples on the 18th of June 1575, Cervantes was granted leave to return to Spain; he received a recommendatory letter from Don John to Philip II., and a similar testimonial from the duke de Sessa, viceroy of Sicily. Armed with these credentials, Cervantes embarked on the " Sol " to push his claim for pro- motion in Spain.

On the 26th of September 1575, near Les Trois Maries off the coast of Marseilles, the " Sol " and its companion ships the "Mendoza" and the "Higuera" encountered a squadron of Barbary corsairs under Arnaut Mami; Cervantes, his brother Rodrigo and other Spaniards were captured, and were taken as prisoners to Algiers. Cervantes became the slave of a Greek renegade named Dali Mami, and, as the letters found on him were taken to prove that he was a man of importance in a position to pay a high ransom, he was put under special sur- veillance. With undaunted courage and persistence he organized plans of escape. In 1576 he induced a Moor to guide him and other Christian captives to Oran; the Moor deserted them on the road, the baffled fugitives returned to Algiers, and Cervantes was treated with additional severity. In the spring of 1577 two priests of the Order of Mercy arrived in Algiers with a sum of three hundred crowns entrusted to them by Cervantes' parents; the amount was insufficient to free him, and was spent in ransoming his brother Rodrigo. Cervantes made another attempt to escape in September 1577, but was betrayed by the renegade whose services he had enlisted. On being brought before Hassan Pasha, the viceroy of Algiers, he took the blame on himself, and was threatened with death; struck, however, by the heroic bearing of the prisoner, Hassan remitted the sentence, and bought Cervantes from Dali Mami for five hundred crowns. In 1577 the captive addressed to the Spanish secretary of state, Mateo Vazquez, a versified letter suggesting that an expedition should be fitted out to seize Algiers; the project, though practicable, was not entertained. In 1578 Cervantes was sentenced to two thousand strokes for sending a letter begging help from Martin de Cordoba, governor of Oran; the punishment was not, however, inflicted on him. Meanwhile his family were not idle. In March 1578 his father presented a petition to the king setting forth Cervantes' services;

the duke de Sessa repeated his testimony to the captive's merits; in the spring of 1579 Cervantes' mother applied for leave to export two thousand ducats' worth of goods from Valencia to Algiers, and on the 31st of July 1579 she gave the Trinitarian monks, Juan Gil and Ant6n de la Bella, a sum of two hundred and fifty ducats to be applied to her son's ransom. On his side Cervantes was indefatigable, and towards the end of 1579 he arranged to secure a frigate; but the plot was revealed to Hassan by Juan Blanco de Paz, a Dominican monk, who appears to have con- ceived an unaccountable hatred of Cervantes. Once more the conspirator's life was spared by Hassan who, it is recorded, declared that " so long as he had the maimed Spaniard in safe keeping, his Christians, ships and city were secure." On the 29th of May 1 580 the two Trinitarians arrived in Algiers : they were barely in time, for Hassan's term of office was drawing

to a close, and the arrangement of any ransom was a slow process, involving much patient bargaining. Hassan refused to accept less than five hundred gold ducats for his slave; the available funds fell short of this amount, and the balance was collected from the Christian traders of Algiers. Cervantes was already embarked for Constantinople when the money was paid on the 19th of September 1580. The first use that he made of his liberty was to cause affidavits of his proceedings at Algiers to be drawn up; he sailed for Spain towards the end of October, landed at Denia in November, and made his way to Madrid. He signed an information before a notary in that city on the 1 8th of December 1580.

These dates prove that he cannot, as is often alleged, have served under Alva in the Portuguese campaign of 1580: that campaign ended with the battle of Alcantara on the 25th of August 1 580. It seems certain, however, that he visited Portugal soon after his return from Algiers, and in May 1581 he was sent from Thomar on a mission to Oran. Construed literally, a formal statement of his services, signed by Cervantes on the 2 1 st of May 1590, makes it appear that he served in the Azores campaigns of 1582-83; but the wording of the document is involved, the claims of Cervantes are confused with those of his brother Rodrigo (who was promoted ensign at the Azores), and on the whole it is doubtful if he took part in either of the expeditions under Santa

Cruz. In any case, the stories of his residence in Portugal, and of his love affairs with a noble Portu- guese lady who bore him a daughter, are simple inventions. From 1582-3 to 1587 Cervantes seems to have written copiously for the stage, and in the Adjunta al Parnaso he mentions several of his plays as “worthy of praise”; these were Los Tratos de Argel, La Numancia, La Gran Turquesa, La Batalla naval, La Jerusalem, La Amaranta 6 la de Mayo, El Bosque amoroso, La Unica y Bizarra Arsinda — ” and many others which I do not remember, but that which I most prize and pique myself on was, and is, one called La Confusa which, with all respect to as many sword-and-cloak plays as have been staged up to the present, may take a prominent place as being good among the best.” Of these only Los Tratos de Argel (or El Trato de Argel) and La Numancia have survived, and, though La Numancia contains many fine rhetorical passages, both plays go to prove that the author’s genius was not essentially dramatic. In February 1584 he obtained a licence to print a pastoral novel entitled Primera parte de la Galatea, the copyright of which he sold on the 14th of June to Bias de Robles, a bookseller at Alcala de Henares, for 1336 reales. On the 12th of December he married Catalina de Palacios Salazar y Vozmediano of Esquivias,eighteen years his junior. The Galatea was published in the spring of 1585, and is frequently said to relate the story of Cervantes’ courtship, and to introduce various distinguished writers under pastoral names. These assertions must be received with great reserve. The birth of an illegitimate daughter, borne to Cervantes by a certain Ana Francisca de Rojas, is referred to 1584, and earlier in that same year the Galatea had passed the censor; with few exceptions, the identifications of the characters in the book with personages in real life are purely conjectural. These circumstances, together with the internal evidence of the work, point to the conclusion that the Galatea was begun and completed before 1583. It was only twice reprinted — once at Lisbon (1590), and once at Paris (1611) — during the author’s lifetime; but it won him a measure of repute, it was his favourite among his books, and during the thirty years that remained to him he repeatedly announced the second part which is promised con ditionally in the text. However, it is not greatly to be regretted that the continuation was never published; though the Galatea is interesting as the first deliberate bid for fame on the part of a great genius, it is an exercise in the pseudo-classic literature introduced into Italy by Sannazaro, and transplanted to Spain by the Portuguese Montemor; and, ingenious or eloquent as the Renaissance prose-pastoral may be, its innate artificiality

stifles Cervantes' rich and glowing realism. He himself recognized its defects; with all his weakness for the Galatea, he ruefully allows that " it proposes something and concludes

nothing." Its comparative failure was a serious matter for Cervantes who had no other resource but his pen; his plays were probably less successful than his account of them would imply, and at any rate play-writing was not at this time a lucrative occupation in Spain. No doubt the death of his father on the 13th of June 1585 increased the burden of Cervantes' responsibilities; and the dowry of his wife, as appears from a document dated the 9th of August 1586, consisted of nothing more valuable than five vines, an orchard, some household furniture, four beehives, forty-five hens and chickens, one cock and a crucible.

It had become evident that Cervantes could not gain his bread by literature, and in 1587 he went to Seville to seek employment in connexion with the provisioning of the Invincible Armada. He was placed under the orders of Antonio de Guevara, and before the 24th of February was excommunicated for excessive zeal in collecting wheat at Ecija. During the next few months he was engaged in gathering stores at Seville and the adjacent district, and after the defeat of the Armada he was retained as commissary to the galleys. Tired of the drudgery, and without any prospect of advancement, on the 21st of May 1590 Cervantes drew up a petition to the king, recording his services arid applying for one of four posts then vacant in the American colonies: a place in the department of public accounts in New Granada, the governorship of Soconusco in Guatemala, the position of auditor to the galleys at Cartagena, or that of corregidor in the city of La Paz. The petition was referred to the Council of the Indies, and was annotated with the words: — " Let him look for something nearer home." Cervantes perforce remained at his post; the work was hard, uncongenial and ill-paid, and the salary was in constant arrears. In November 1590 he was in such straits that he borrowed money to buy himself a suit of clothes, and in August 1592 his sureties were called upon to make good a deficiency of 795 reales in his accounts. His thoughts turned to literature once more, and on the 5 th of September 1592, he signed a contract with Rodrigo Osorio undertaking to write six plays at fifty ducats each, no payment to be made unless Osorio considered that each of these pieces was " one of the best ever produced in Spain." Nothing came of this agreement, and it appears that, between the date of signing it and the 19th of September, Cervantes was imprisoned (for

reasons unknown to us) at Castro del Rio. He was speedily Released, and continued to perquisition as before in Andalusia; but his literary ambitions were not dead, and in May 1595 he won the first prize — three silver spoons — at a poetical tourney held in honour of St Hyacinth at Saragossa. Shortly afterwards Cervantes found himself in difficulties with the exchequer officials. He entrusted a sum of 7400 reales to a merchant named Simon Freire de Lima with instructions to pay the amount into the treasury at Madrid; the agent became bankrupt and absconded, leaving Cervantes responsible for the deficit. By some means the money was raised, and the debt was liqui- dated on the 21st of January 1 597. But Cervantes' position was shaken, and his unbusinesslike habits lent themselves to mis-interpretation. On the 6th of September 1597 he was ordered to find sureties that he would present himself at Madrid within twenty days, and there submit to thet exchequer vouchers for all official moneys collected by him in Grahada and elsewhere. No such sureties being available, he was committed to Seville jail, but was released on the 1st of December on condition that tie complied with the original order of the court within thirty days. He was apparently unable to find bail, was dismissed from the public service, and sank into extreme poverty. During a momentary absence from Seville in February 1599, he was again summoned to Madrid by the treasury, but does not appear to have obeyed: it is only too likely that he had not the money to pay for the journey. There is some reason to think that he was imprisoned at Seville in 1602, but nothing positive is known of his existence between 1600 and the 8th of February 1603: at the latter date he seems to have been at Valladolid, to which city Philip III. had removed the court in 1601.

Since the publication of the Galatea in 1585 Cervantes'

contributions to literature had been limited to occasional poems. In 1591 he published a ballad in Andres de Villalta's Flor de varios y nuevos romances; in 1595 he composed a paem, already mentioned, to celebrate the canonization of St Hyacinth; in 1596 he wrote a sonnet ridiculing Medina Sidonia's tardy entry into Cadiz after the English invaders had retired, and in the same year his sonnet lauding Santa Cruz was printed in Cristobal. Mosquera de Figueroa's Comentario en breve compendio de disciplina

militar; to 1597 is assigned a sonnet (the authenticity of which is disputed) commemorative of the poet Herrera; in 1598 he wrote two sonnets and a copy of quintUlas on the death of Philip II.; and in 1602 a complimentary sonnet from his pen appeared in the second edition of Lope de Vega's Dragontea. Curiously enough, it is by Lope de Vega that Don Quixote is first mentioned. Writing to an unknown correspondent (appar- ently a physician) on the 14th of August 1604, Lope de Vega says that " no poet is as bad as Cervantes, nor so foolish as to praise Don Quixote," and he goes on to speak of his own plays as being odious to Cervantes, It is obvious that the two men had quarrelled since 1602, and that Lope de Vega smarted under the satire of himself and his works in Cervantes' forthcoming book; Don Quixote may have been circulated in manuscript, or may even have been printed before the official licence was granted on the 26th of September 1604. It was published early in 1605, and was dedicated to the seventh duke de B6jar in phrases largely borrowed from the dedication in Herrera's edition (1580) of Garcilaso de la Vega, and from Francisco de Medina's preface to that work.

The mention of Bernardo de la Vega's Pastor de Iberia shows that the sixth chapter of Don Quixote cannot have been written before 1591. In the prologue Cervantes describes his master- piece as being " just what might be begotten in a jail "; on the strength of this passage, it has been thought that he conceived the story, and perhaps began writing it, during one of his terms of imprisonment at Seville between 1597 and 1602. Within a few weeks of its publication at Madrid, three pirated editions of Don Quixote were issued at Lisbon; a second authorized edition, imperfectly revised, was hurried out at Madrid; and another reprint appeared at Valencia with an aprobacidn dated 18th July 1605. With the exception of Aleman's Guzmdn de Alfarache, no Spanish book of the period was more successful. Modern criticism is prone to regard Don Quixote as a symbolic, didactic or controversial work intended to bring about radical reforms in church and state. Such interpretations did not occur to Cervantes' contemporaries, nor to Cervantes himself. There is no reason for rejecting his plain statement that his main object was to ridicule the romances of chivalry, which in their latest developments had become a tissue of tiresome absurdities. It seems clear that his first intention was merely to parody these extravagances in a short story; but as he proceeded the immense possibilities of the subject became more evident to him, and he

ended by expanding his work into a brilliant panorama of Spanish society as it existed during the 16th century. Nobles, knights, poets, courtly gentlemen, priests, traders, farmers, barbers, muleteers, scullions and convicts; accomplished ladies, impassioned damsels, Moorish beauties, simple-hearted country-girls and kindly kitchen-wenches of questionable morals — all these are presented with the genial fidelity which comes of sympathetic insight. The immediate vogue of Don Quixote was due chiefly to its variety of incident, to its wealth of comedy bordering on farce, and perhaps also to its keen thrusts at eminent contemporaries; its reticent pathos, its large humanity, and its penetrating criticism of life were less speedily appreciated.

Meanwhile, on the 12th of April 1605, Cervantes authorized his publisher to proceed against the Lisbon booksellers who threatened to introduce their piratical reprints into Castile. By June the citizens of Valladolid already regarded Don Quixote and Sancho Panza as proverbial types. Less gratifying ex- periences awaited the popular author. On the 27 th of June 1605 Gaspar de Ezpeleta, a Navarrese gentleman of dissolute life, was wounded outside the lodging-house in which Cervantes and his family lived; he was taken indoors, was nursed by

Cervantes' sister Magdalena, and died on the 39th of June. That same day Cervantes, his natural daughter (Isabel de Saavedra), his sister Andrea and her daughter were lodged in jail on suspicion of being indirectly concerned in Ezpeleta's death; one of the witnesses made damaging charges against Cervantes' daughter, but no substantial evidence was produced, and the prisoners were released. Little is known of Cervantes' life between 1605 and 1608. A Relacidn of the festivities held to celebrate the birth of Philip IV., and a certain Carta d don Diego Astudillo Carrillo have been erroneously ascribed to him; during these three years he apparently wrote nothing beyond three sonnets, and one of these is of doubtful authenticity. The depositions of the Valladolid enquiry show that he was living in poverty five months after the appearance of Don Quixote, and the fact that he borrowed 450 reales from his publisher before "November 1607 would convey the idea that his position improved slowly, if at all. But it is difficult to reconcile this view of his circumstances with the details concerning his illegitimate daughter revealed in documents recently discovered. Isabel de Saavedra was stated to be a spinster when arrested at Valladolid in June 1605; the settlement of her marriage with Luis de Molina

in 1608 describes her as the widow of Diego Sanz, as the mother of a daughter eight months old, and as owning house-property of some value. These particulars are perplexing, and the situation is further complicated by the publication of a deed in which Cervantes declares that he himself is the real owner of this house-property, and that his daughter has merely a life-interest in it. This claim may be regarded as a legal fiction; it cannot easily be reconciled with Cervantes' statement towards the end of his life, that he was dependent on the bounty of the count de Lemos and of Bernardo de -Sandoval, cardinal-archbishop of Toledo. In 1609 he joined the newly founded confraternity of the Slaves of the Most Blessed Sacrament; in 1610 Lemos was appointed viceroy of Naples, and Cervantes was keenly disappointed at not being chosen to accompany his patron. In 161 1 he lost his sister Magdalena, who was buried by the charity of the Tertiaries of Saint Francis; in 161 2 he joined the Academia Selvaje, and there appears to have renewed his former friendly relations with Lope de Vega; in 16 13 he dedicated his Novelas exemplares to the count de Lemos, and disposed of his rights for 1600 reales and twenty-four copies of the book. The twelve tales in this volume, some of them written very much later than others, are of unequal merit, but they contain some of the writer's best work, and the two picaresque stories — Rinconete y Cortaditto and the Coloquio de los perros — are superb examples of their kind, and would alone entitle Cervantes to take rank with the greatest roasters of Spanish prose. In 1614 he published the Viage del Parnaso, a burlesque poem suggested by the Viaggio in Parnaso (1582) of the Perugian poet Cesare Caporali. It contains some interesting autobiographical passages, much flattery of contemporary poetasters, and a few happy satirical touches; but, though it is Cervantes' most serious bid for fame as a poet, it has seldom been reprinted, and would probably have been forgotten but for an admirably humorous postscript in prose which is worthy of the author at his best. In the preface to his Ocho comedias y ocho entremeses nuevos (161 5) he good-humoUredly admits that his dramatic works found no favour with managers, and, when this collection was first reprinted (1749), the editor advanced the fantastic theory that the comedias were deliberate exercises in absurdity, intended to parody the popular dramas of the day. This view cannot be maintained, but a sharp distinction must be drawn between the eight set plays and the eight interludes; with one or two exceptions, the comedias or set plays are unsuccessful experiments in Lope de Vega's manner, while the entremeses or interludes, particularly those in prose, are

models of spontaneous gaiety and ingenious wit.

In the preface to the Novelas exemplares Cervantes had announced the speedy appearance of the sequel to Don Quixote which he had vaguely promised at the end of the first part. He was at work on the fifty-ninth chapter of his continuation when he learned that he had been anticipated by Alonso Fernandez de Avellaneda of Tordesillas (whose Segunde tomo del ingenioso

hidalgo don Quixote de la Mancha was published at Tarragona in 1614. On the assumption that Fernandez de Avellaneda is a pseudonym, this spurious sequel has been ascribed to the king's confessor, Luis de Aliaga, to Cervantes' old enemy, Blanco de Paz, to his old friend, Bartolome Leonardo de Argen- sola, to the three great dramatists, Lope de Vega, Tirso de Molina and Ruiz de Alarc6n, to Alonso Fernandez, to Juan Jose Marti, to Alfonso Lamberto, to Luis de Granada, and probably to others. Some of these attributions are manifestly absurd — for example, Luis de Granada died seventeen years before the first part of Don Quixote was published — and all of them are improbable conjectures; if Avellaneda be not the real name of the author, his identity is still undiscovered. His book is not devoid of literary talent and robust humour, and possibly he began it under the impression that Cervantes was no more likely to finish Don Quixote than to finish the Galatea. He should, however, have abandoned his project on reading the announcement in the preface to the Novelas exemplares; what he actually did was to disgrace himself by writing an insolent preface taunting Cervantes with his physical defects, his moral infirmities, his age, loneliness and experiences in jail. He was too intelligent to imagine that his continuation could hold its own against the authentic sequel, and malignantly avowed his intention of being first in the field and so spoiling Cervantes' market. It is quite possible that Don Quixote might have been left incomplete but for this insulting intrusion; Cervantes was a leisurely writer and was, as he states, engaged on El Engano & los ojos, Las Semanas del Jardin and' El Famoso Bernardo, none of which have been preserved. Avellaneda forced him to concentrate his attention on his masterpiece, and the authentic second part of Don Quixote appeared towards the end of 161 5. No book more signally contradicts the maxim, quoted by the Bachelor Carrasco, that " no second part was ever good."

It is true that the last fourteen chapters are damaged by undignified denunciations of Avellaneda; but, apart from this, the second part of Don Quixote is an improvement on the first. The humour is more subtle and mature; the style is of more even excellence; and the characters of the bachelor and of the physician, Pedro Recio de AgUero, are presented with a more vivid effect than any of the secondary characters in the first part. Cervantes had clearly profited by the criticism of those who objected to " the countless cudgellings inflicted on Sefior Don Quixote," and to the irrelevant interpolation of extraneous stories in the text. Don Quixote moves through the second part with unruffled dignity; Sancho Panza loses something of his rustic cunning, but he gains in wit, sense and manners. The original conception is unchanged in essentials, but it is more logically developed, and there is a notable progress in construction. Cervantes had grown to love his knight and squire, and he understood his own creations better than at the outset; more completely master of his craft, he wrote his sequel with the unfaltering confidence of a renowned artist bent on sustaining his reputation. The first part of Don Quixote had been reprinted at Madrid in 1608; it had been produced at Brussels in 1607 and 1611, and at Milan in 1610; it had been translated into English in 161 2 and into French in 1614, Cervantes was celebrated in and out of Spain, but his celebrity had not brought him wealth. The members of the French special embassy, sent to Madrid in February 1615, under the Commandeur de Sillery, heard with amazement that the author of the Galatea, the Novelas exemplares and Don Quixote was " old, a soldier, a gentleman and poor." But his trials were almost at an end. Though failing in health, he worked assiduously at Los Trabajos de Persiles y Sigismunda, which, as he had jocosely prophesied in the preface to the second part of Don Quixote, would be " either the worst or the best book ever written in our tongue." It is the most carefully written of his prose works, and the least animated or attractive of them; signs of fatigue and of waning powers are unmistakably visible. Cervantes was not destined to see it in print. He was attacked by dropsy, and, on the 18th of April 1616, received the sacrament of extreme unction; next day he wrote the dedication of Persiles y Sigismunda to the count de Lemos — the most

moving and gallant of farewells. He died at Madrid in the Calk del Le6n on the 23rd of April; he was borne from his house " with his face uncovered," according to the rule of the Tertiaries of St Francis, and on the 24th of April was buried in the church

attached to the convent of the Trinitarian nuns in the Calle de Cantarranas. There he rests — the story of his remains being removed in 1633 to the Calle del Humilladero has no foundation in fact — but the exact position of his grave is unknown. Early in 1 61 7 Persiles y Sigismunda was published, and passed through eight editions within two years; but the interest in it soon died away, and it was not reprinted between 1625 and 1719. Cervantes' wife died without issue on the 31st of October 1626; his natural daughter, who survived both the child of her first marriage and her second husband, died on the 20th of September 1652. Cervantes is represented solely by his works. The Novelas exemplares alone would give him the foremost place among Spanish novelists; Don Quixote entitles him to rank with the greatest writers of all time: " children turn its leaves, young people read it, grown men understand it, old folk praise it." It has outlived all changes of literary taste, and is even more popular to-day than it was three centuries ago.

Bibliography. — Leopold Rius, Bibliografia critica de las obras de Miguel de Cervantes Saavedra (Madrid, 1 895-1905, 3 vols.); Obras completas (Madrid, 1863-1864, 12 vols.), edited by Juan Eugenio Hartzenbusch ; Complete Works (Glasgow, '1901-1906, 8 vols, in progress), edited by James Fitzmaurice- Kelly ; Don Quijote (Madrid, 1833-1839, 6 vols.), edited by Diego Clemenciu; Don Quixote (London, 1899-1900, 2 vols.), edited by James Fitzmaurice-Kelly and John Ormsby; Don Quijote (Madrid, I 905-1906, 2 vols, in progress), edited by Clemente Cortejon; Rinconete y Cortadillo (Sevilla, 1905), edited by Francisco Rodriguez Marin; Epistolad Mateo Vazquez (Madrid, ' 1905), edited by E[milio] Qotarelo] ; Julian Apraiz, Estudio historico-critico sobre las Novelas ejemplares de Cervantes (Madrid, 1901); Francisco A. de Icaza, Las Novelas ejemplares de Cervantes (Madrid, 1901) ; Francisco Rodriguez Marin, El Loaysa de " El Celoso Extremeno" (Sevilla, 1901); Narciso Diaz de Escovar, Apuntes escenicos cervantinos (Madrid, 1905) ; Manuel Jose Garcia, Estudio critico acerca del entremes " El Vizcaino fingido " (Madrid, 1905) ; Alfred Morel-Fatio, L'Espagne de Don Quichotte in Etudes sur I'Espagne (Paris, 1895, 2 me serie) ; Julio Puyol y Alonso, Estado social que refleja "El Quijote" (Madrid, 1905); James Fitzmaurice-Kelly,ˆ Cervantes in England (London, 1905); Raymond Foulche-Delbose, Etude sur "La tiafingida," in the Revue hispanique (Paris, 1899), vol. vi. pp. 256-306 ; Benedetto Croce, Due illustrazioni al " Yiage del Parnaso," in the Homenaje a Menendez y Pelayo (Madrid, 1899), vo '- i\ PP- 161-193; Paul

Groussac, Vne ILnigme littiraire: le Don Quichotte d 'Avellaneda (Paris, 1903); Alonso Fernandez de Avellaneda, El ingenioso hidalgo Don Quixote de la Mancha (Barcelona, [1905]), edited by Marcelino Menendez y Pelayo; Julio Cejador y Franca, La Lengua de Cervantes (Madrid, 1905, &c.) ; Martin Fernandez de Navarrete, Vida de Miguel de Cervantes Saavedra (Madrid, 1819); Cristobal Perez Pastor, Docu- ments Cervantinos hasta ahora ineditos (Madrid, 1 897-1902, 2 vols.) ; Emilio Cotardo y Mori, Efemerides Cervantinos (Madrid, 1905) Francisco Rodriguez Marin, Cervantes estudio en Sevilla, 1564-1565 (Seville, 1905). (J. F.-K.)

CERVERA, PASCUAL CERVERA Y TOPETE (1839-1909), Spanish admiral, was born at Medina Sidonia on the 18th of February 1839. He showed an early inclination for the sea, and his family sent him to the naval cadet school at the age of twelve. As a sub-lieutenant he took part in the naval operations on the coast of Morocco during the campaign of 1859-60. Then he was for some time engaged in operations in the Sulu Islands and the Philippines. Afterwards he was on the West Indian station during the early part of the first Cuban War (1868-78), returning to Spain in 1873 to serve on the Basque coast against the Carlists. He distinguished himself in defending the Carraca arsenal near Cadiz against the Federals in 1873. He won each step in his promotion up to flag-rank through his steadiness and brilliant conduct in action, and was awarded the crosses of the Orders of Military and Naval Merit, Isabella the Catholic, and St Hermen-gilde, besides several medals. Cervera had a great reputation for decision, unbending temper and honesty, before he was placed at the head of the Bilbao building-yards. This post he resigned after a few months in order to become minister of marine in 1892, in a cabinet presided over by Sagasta. He with- drew from the cabinet when he found that his colleagues, from political motives, declined to support him in making reforms and,

on the other hand, unwisely cut down the naval estimates. When in 1898 the Spanish- American War (q.v.) broke out, he was chosen to command a squadron composed of four first-class cruisers, the "Maria Theresa," his flagship, " Oquendo," " Vizcaya," and "Columbus," and several destroyers. This ill-fated squadron only started upon its reckless cruise across the ocean

after its gallant commander had repeatedly warned both the minister of marine and the prime minister, Sagasta, in despatches from Cadiz and from the Canary and Cape Verde Islands, that the ships were insufficiently provided with coal and ammunition. Some of them, indeed, even lacked proper guns. In compliance with the instructions of the government, Admiral Cervera made for the landlocked harbour of Santiago de Cuba, where he co-operated in the defence, landing some guns and a naval brigade. In spite of his energetic representations, Cervera received an order from Madrid, dictated by political considerations, to sally forth. It meant certain destruction. The gallant squadron met forces trebly superior to it, and was totally destroyed. The admiral, three of his captains, and 1800 sailors and marines were taken by the victors to Portsmouth, New Hampshire, U.S.A. After the war, Cervera and his captains were tried before the supreme naval and military court of the realm, which honourably acquitted them all. In 1901 he became vice-admiral, in 1902 was appointed chief of staff of the Spanish navy, and in 1903 was made life senator. He died at Puerto Real on the 3rd of April 1909.

CESAREVICH, or more properly Tsesarevich, the title of the heir-apparent to the Russian throne. The full official title is Nasliednik Tsesarevich, i.e. ” heir of Caesar,” and in Russia the heir to the throne is commonly called simply Nasliednik, the word Tsesarevich never being used alone. Tsarevich, a form now much used in England, means simply any ” king’s son “; it is an antiquated term now out of use in Russia, and was last borne as heir to the throne by the unfortunate Alexius, son of Peter the Great. The style of the wife of the tsesarevich is Tsesarevna. The Cesarewitch handicap race at Newmarket, founded in 1839, was named after the prince who was afterwards Alexander II. of Russia, who paid a state visit to England that year.

CESARI, GIUSEPPE, called II Cavaliere d’ Arpino (born in or about 1568 and created a ” Cavaliere di Cristo ” by Pope Clement VIII.), also named II Giuseppino, an Italian painter, much encouraged at Rome and munificently rewarded. His father had been a native of Arpino, but Giuseppe himself was born in Rome. Cesari is stigmatized by Lanzi as not less the corrupter of taste in painting than Marino was in poetry; indeed, another of the nicknames of Cesari is ” II Marino de’ Pittori ” (the pictorial Marino). There was spirit in Cesari’s heads of men and horses, and his frescoes in the Capitol (story of Romulus and Remus, &c), which occupied him at intervals during forty years, are well coloured; but he

drew the human form ill. His perspective is faulty, his extremities monotonous, and his chiaroscuro defective. He died in 1640, at the age of seventy- two, or perhaps of eighty, at Rome. Cesari ranks as the head of the " Idealists " of his period, as opposed to the " Naturalists," of whom Michelangelo da Caravaggio was the leading champion, — the so-called " idealism " consisting more in reckless facility, and disregard of the common facts and common-sense of nature, than in anything to which so lofty a name could be properly accorded. He was a man of touchy and irascible character, and rose from penury to the height of opulence. His brother Bernardino assisted in many of his works.

' CESAROTTI, MELCHIORE (1 730-1 808), Italian poet, was born at Padua in 1730, of a noble but impoverished family. At the university of his native place his literary progress procured for him at a very early age the chair of rhetoric, and in 1768 the professorship of Greek and Hebrew. On the invasion of Italy by the French, he gave his pen to their cause, received a pension, and was made knight of the iron crown by Napoleon I., to whom, in consequence, he addressed a bombastic and extravagantly nattering poem called Pronea. Cesarotti is best known as the translator of Homer and Ossian. Much praise cannot be given to his version of the Iliad, for he has not scrupled to add, omit

and modernize. Ossian, which he held to be the finest of poems, he has, on the other hand, considerably improved in translation; and the appearance of his version attracted much attention in Italy and France, and raised up many imitators of the Ossianic style. Cesarotti also produced a number of works in prose, including a Course of Greek Literature, and essays On the Origin and Progress of the Poetic Art, On the Sources of the Pleasure derived from Tragedy, On the Philosophy of Language and On the Philosophy of Taste, the last being a defence of his own great eccentricities in criticism. His weakness was a straining after novelty. His style is forcible, but full of Gallicisms.

A complete edition of his works, in 42 vols. 8vo, began to appear at Pisa in 1800, and was completed in 1813, after his death. See Memoirs, by Barbieri (Padua, 1810), and Un Filosofo delle lettere, by Alemanni (Turin, 1894).

CESENA (anc. Caesena), a town and episcopal see of Emilia, Italy, in the province of Forli, 12 m. S.E. by rail from the town of Forli, on the line between Bologna and Rimini, 144 ft. above sea-level. Pop. (1905) 12,245 (town); 43,468 (commune). The town is

picturesquely situated at the foot of the slopes of the Apennines, and is crowned by a medieval fortress (Rocca), begun by the emperor Frederick I. (Barbarossa) probably, but altered and added to later. The cathedral has two fine marble altars by the Lombardi of Venice (or their school) . The library, built for Domenico Malatesta in 1452 by Matteo Nuzio, is a fine early Renaissance building, and its internal arrangements, with the original desks to which the books are still chained, are especially well preserved (see J. W. Clark, The Care of Books, Cambridge, 1901, p. 199). In it are valuable MSS., many of which were used by Aldus Manutius. It also contains a picture gallery with a good " Presentation in the Temple " by Francesco Francia. There are some fine palaces in the town. Three- quarters of a mile south-east on the hill, stands the handsome church of S. Maria del Monte, after the style of Bramante, with carved stalls of the 16th century. Wine, hemp and silk are the main articles of trade. About the ancient Caesena little is said in classical authors: it is mentioned as a station on the Via Aemilia and as a fortress in the wars of Theodoric and Narses. During the middle ages it was at first independent. In 1357 it was unsuccessfully defended by the wife of Francesco Ordelaffi, lord of Forli, against the papal troops under Albornoz. In 1377 it was sacked by Cardinal Robert of Geneva (afterwards Clement VII., antipope). It was then held by the Malatesta of Rimini until 1465, when it came under the dominion of the church. Both Pius VI. (17 1 7) and Pius VII. (1742) were born at Cesena. (T. As.)

CESNOLA, LUIGI PALMA DI (1832-1904), Italian-American soldier and archaeologist, was born near Turin on the 29th of July 1832. Having served in the Austrian and Crimean Wars, in i860 he went to New York, where he taught Italian and French and founded a military school for officers. He took part in the American Civil War as colonel of a cavalry regiment, and at Aldie (June 1863) was wounded and taken prisoner. He was released from Libby prison early in 1864, served in the Wilderness and Petersburg campaigns (1864-65) as a brigadier of cavalry, and at the close of the war was breveted brigadier- general. He was then appointed United States consul at Larnaca in Cyprus (1865-1877). During his stay in the island he carried on excavations, which resulted in the discovery of a large number of antiquities. The collection was purchased by the Metropolitan Museum of New York, and Cesnola became director in 1879. Doubt having been thrown by Gaston L. Feuerdant, in an article in the New York Herald (August 1880), upon the genuineness of his restorations, the

matter was referred to a special committee, which pronounced in his favour. 1 He is the author of Cyprus, its ancient Cities, Tombs and Temples (1877), an interesting book of travel and of considerable service to the practical antiquary; and of a Descriptive Atlas of the Cesnola Collection of Cypriote Antiquities (3 vols., 1884-6). He died in New York on the 21st of November 1904. He was a

'For the Cesnola controversy see C. D. Cobham's Attempt at a Bibliography of Cyprus (4th ed., 1900). See also article Cyprus.

member of several learned societies in Europe and America, and in 1897 he received a Congressional medal of honour for conspicuous military services.

His brother, Alessandro Palma di Cesnola, born in 1839, conducted excavations at Paphos (where he was U.S. vice-consul) and Salamis on behalf of the British government. The results of these are described in Salaminia (1882).

CESPEDES (in Ital. Cedaspe), PABLO DE (1538-1608), Spanish poet, painter, sculptor and architect, was born at Cordova, and was educated at Alcala de Henares, where he studied theology and Oriental languages. On leaving the university, he went to Rome, where he became the pupil and friend of Federigo Zuccaro, under whose direction he studied particularly the works of Raphael and of Michelangelo. In 1 560, while yet in Rome, proceedings were taken against him by the Inquisition at Valladolid on account of a letter which, found among the papers of the archbishop of Toledo, had been written by Cespedes during the preceding year, and in which he had spoken with great freedom against the holy office and the in- quisitor-general, Fernando de Valdes. Cespedes remained in Rome at this critical moment, and he appears rightly to have treated the prosecution with derision. It is not known how he contrived to bring the proceedings to an end; he returned, however, to Spain a little before 1577, and in that year was installed in a prebend of the cathedral at Cordova, where he resided till his death. Pablo de Cespedes has been called the most savant of Spanish artists. According to his friend Francisco Pacheco, to whom posterity is indebted for the preservation of all of Cespedes's verse that is

extant, the school of Seville owes to him its introduction to the practice of chiaroscuro. He was a bold and correct draughtsman, a skilful anatomist, a master of colour and composition; and the influence he exerted to the advantage of early Spanish art was considerable. Cristobal de Vera, Juan de Penalosa and Zambrano were among his pupils. His best picture is a Last Supper at Cordova, but there are good examples of his work at Seville and at Madrid. Cespedes was author of several opuscules in prose on subjects connected with his profession. Of his poem on The Art of Painting enough was preserved by Pacheco to enable us to form an opinion of the whole. It is esteemed the best didactic verse in Spanish; and it has been compared, not disadvantageously, with the Georgia. It is written in strong and sonorous octaves, in the majestic declamatory vein of Fernando Herrera, and is not altogether so dull and lifeless as is most didactic verse. It contains a glow- ing eulogy of Michelangelo, and some excellent advice to young painters, insisting particularly on hard work and on the study of nature. The few fragments yet remaining, amounting in all to some six hundred lines, were first printed by Pacheco in his treatise Del arte de la pintura, in 1649.

CESPEDES Y MENESES, GONZALO DE (1585 ?-i638), Spanish novelist, was born at Madrid about 1585. Nothing positive is known of him before the publication of his celebrated romance, the Poema trdgico del Espanol Gerardo, y desengano id amor lascivo (1615-1617); there is evidence that he had been sentenced to eight years at the galleys previous to the 1st of January 1620, and that the penalty had been remitted; but the nature of his offence is not stated. His treatment of political questions in the Historia apologilica en los sucesos del reyno de Arag&n, y su ciudad de Zaragoza, anos de gi y Q2 (1622), having led to the confiscation of the book, Cespedes took up his residence at Saragossa and Lisbon. While in exile he issued a collection of short stories entitled Historias peregrinas y exemplar es (1623), the unfinished romance Varia fortuna del soldado Pindaro (1626), and the first part of his Historia de Felipe IV. (163 1), a fulsome eulogy which was rewarded by the author's appointment as official historiographer to the Spanish king. Cespedes died on the 27th of January 1638. His novels, though written in a ponderous, affected style, display considerable imagination and insight into character. The Poema trdgico has been utilized by Fletcher in The Spanish Curate and in The Maid of the Mill.

The Historias peregrinas has been reprinted (1906) with a

valuable introduction by Sr. Cotarelo y Mori.

, CESS (a shortened form of ” assess “; the spelling is due to a mistaken connexion with ” census “), a tax; a term formerly more particularly applied to local taxation, in which sense it still is used in Ireland; otherwise it has been superseded by ” rate.” In India it is applied, with the qualifying word prefixed, to any taxation, such as ” irrigation-cess ” and the like, and in Scotland to the land-tax.

CESSIO BONORUM (Latin for a ” surrender of goods “), in Roman law, a voluntary surrender of goods by a debtor to his creditors. It did not amount to a discharge unless the property ceded was sufficient for the purpose, but it secured the debtor from personal arrest. The creditors sold the goods in satisfaction, pro tanto, of their claims. The procedure of cessio bonorum avoided infamy, and the debtor, though his after-acquired property might be proceeded against, could not be deprived of the bare necessaries of life. The main features of the Roman law of cessio bonorum were adopted in Scots law, and also in the French legal system. (See further Bankruptcy.)

CESTI, MARC ANTONIO (1620 ?-i66 9 ?), Italian musical composer, was born at Florence about 1620. He was a pupil of Carissimi, and after holding a post somewhere in Florence as maestro di cappella entered the papal chapel in 1660. In 1666 he became Vice-Kapellmeister at Vienna, and died at Venice in 1669. Cesti is known principally as a composer of operas, the most celebrated of which were La Dori (Venice, 1663) and // Porno d’ oro (Vienna, 1668). He was also a composer of chamber-cantatas, and his operas are notable for the pure and delicate style of their airs, more suited to the chamber than to the stage.

CESTIUS, LUCIUS, surnamed Pius, Latin rhetorician, flourished during the reign of Augustus. He was a native of Smyrna, a Greek by birth. According to Jerome, he was teaching Latin at Rome in the year 13 b. c. He must have been living after a.d. 9, since we are told that he taunted the son of Quintilius Varus with his father’s defeat in the Teutoburgian forest (Seneca, Controv. i. 3, 10). Cestius was a man of great ability, but vain, quarrelsome and sarcastic. Before he left Asia, he was invited to dinner by Cicero’s son, then governor of the province. His host, being uncertain as to his identity, asked a slave who Cestius was; and on receiving the answer, ” he is the man who said your father was illiterate,” ordered him to be flogged (Seneca, Suasoriae, vii.

13). As an orator in the schools Cestius enjoyed a great reputation, and was worshipped by his youthful pupils, one of whom imitated him so slavishly that he was nicknamed ” my monkey ” by his teacher (Seneca, Controv. ix. 3, 12). As a public orator, on the other hand, he was a failure. Although a Greek, he always used Latin in his declamations, and, although he was sometimes at a loss for Latin words, he never suffered from lack of ideas. Numerous specimens of his declamations will be found in the works of Seneca the rhetorician.

See the monograph De Lucio Cestio Pio, by F. G. Lindner (1858) ; J. Brzoska in Pauly-Wissowa’s Realencydopddie, iii. 2 (1899) ; Teuffel-Schwabe, Hist, of Roman Lit. (Eng. tr.), § 268, 6; M. Schanz, Geschichte der romischen Litteratur, ii.

CESTUI, CESTUY, an Anglo-French word, meaning ” that person,” which appears in the legal phrases cestui que trust, use, or vie. It is usually pronounced as ” cetty.” Cestui que trust means literally “the person for whose benefit the trust ” is created. The cestui que trust is the person entitled to the equit- able, as opposed to the legal, estate. Thus, if land be granted unto, and to the use of A. in trust for B., B. is cestui que trust, and A. trustee. The term, principally owing to its cumbersome- ness, is being gradually superseded in modern law by that of ” beneficiary.” Cestui que use (sometimes cestui d que use) means ” the person for whose benefit a use ” is created (see Trust). Cestui que vie is ” the person for whose life” lands are held by another (see Remainder).

CETACEA (from the Gr. k*tos, a whale), the name of the mammalian order represented by whales, dolphins, porpoises, &c. From their fish-like form, which is manifestly merely an adapta- tion to their purely aquatic life, these creatures are often regarded

as fishes, although they are true mammals, with warm blood, and suckle their young.

The general form is essentially fish-like, the spindle-shaped body passing anteriorly into the head without any distinct neck, and posteriorly tapering gradually towards the extremity of the tail,

which is provided with a pair of lateral, pointed expansions of skin supported by fibrous tissue, called ” flukes,” forming a horizontal triangular propelling organ, notched behind in the middle line. The head is generally large, in some cases attaining more than one-third the entire length; and the mouth is wide, and bounded by stiff, immobile lips. The fore-limbs are reduced to flattened paddles, encased in a continuous skin, showing no external sign of division, and without trace of nails. There are no signs of hind-limbs visible externally. The surface of the skin is smooth and glistening, and devoid of hair, although in many species there are a few bristles in the neighbourhood of the mouth which may persist through life or be present only in the young state. Immediately beneath the skin is a thick layer of fat, held together by a mesh of tissue, constituting the “blubber,” which retains the heat of the body. In nearly all species a compressed dorsal fin is present. The eye is small, and not provided with a true lacrymal apparatus. The external ear is a minute aperture in the skin situated at a short distance behind the eye. The nostrils open separately or by a single crescentic aperture, near the vertex of the head.

The bones generally are spongy in texture, the cavities being filled with oil. In the vertebral column, the cervical region is short and immobile, and the vertebrae, always seven in number, are in many species more or less fused together into a solid mass. The odontoid process of the second cervical vertebra, when that bone is free, is usually very obtuse, or even obsolete. In a paper on the form and function of the cervical vertebrae published in the Jenaische Zeilschrift for 1905, Dr O. Reche points out that the shortening and soldering is most pronounced in species which, like the right-whales, live entirely on minute organisms, to capture which there is no necessity to turn the head at all. Accordingly we find that in these whales the whole seven cervical vertebrae are fused into an immovable solid mass, of which the compound elements, with the exception of the first and second, are but little thicker than plates. On the other hand, in the finner-whales, several of which live exclusively on fish, and thus require a certain amount of mobility in the head and neck, we find all the cervical vertebrae much thicker and entirely separate from one another. Among the dolphin group the narwhal and the white whale, or beluga, are distinguished from all other cetaceans by the great com- parative length of their cervical vertebrae, all of which are com- pletely free. In the case of the narwhal such an abnormal structure is easily accounted

for, seeing that to use effectively the long tusk with which the male is armed a considerable amount of mobility in the neck is absolutely essential. The beluga, too, which is believed to feed on large and active fishes, would likewise seem to require mobility in the same region in order to effect their capture. On the other hand, the porpoise preys on herrings, pilchards and mackerel, which in their densely packed shoals must apparently fall an easy prey with but little exertion on the part of their captor, and we accordingly find all the neck-vertebrae very short, and at least six out of the seven coalesced into a solid immov- able mass. None of the vertebrae are united to form a sacrum. The lumbar and caudal vertebrae are numerous and large, and, as their arches are not connected by articular processes (zygapo- physes), they are capable of free motion in all directions. The caps, or epiphyses, at the end of the vertebral bodies are flattened disks, not uniting until after the animal has attained its full dimen- sions. There are largely developed chevron-bones on the under side of the tail, the presence of which indicates the distinction between caudal and lumbar vertebrae.

In the skull, the brain-case is short, broad and high, almost spherical, in fact (fig. 1). The supra-occipital bone rises upwards and forwards from the foramen magnum, to meet the frontals at the vertex, completely excluding the parietals from the upper region; and the frontals are expanded laterally to form the roof of the orbits. The nasal aperture opens upwards, and has in front of it a more or less horizontally prolonged beak, formed of the maxillae, premaxillae, vomer, and mesethmoid cartilage, extending forwards to form the upper jaw or roof of the mouth.

There are no clavicles. The humerus is freely movable on the scapula at the shoulder-joint, but beyond this the articulations of the limb are imperfect; the flattened ends of the bones coming in contact, with fibrous tissue interposed, allowing of scarcely any motion. The radius and ulna are distinct, and about equally de- veloped, and much flattened, as are all the bones of the flippers. There are four, or more commonly five, digits, and the number of the phalanges of the second and third always exceeds the normal

number in mammals, sometimes considerably; they present the exceptional character of having epiphyses at both ends. The pelvis is represented by a pair of small rod-like bones placed longitudinally, suspended below and at some distance from the

vertebral column at the commencement of the tail. In some species, to the outer surface of these are fixed other small bones or cartilages, the rudiments of the hind-limb.

Teeth are generally present, but exceedingly variable in number. In existing species, they are of simple, uniform character, with conical or compressed crowns and single roots, and are never pre- ceded by milk-teeth. In the whalebone whaies teeth are absent (except in the foetal condition), and the palate is provided with numerous transversely placed horny plates, forming the ” whale- bone.” Salivary glands are rudimentary or absent. The stomach is complex, and the intestine simple, and only in some species provided with a small caecum. The liver is little fissured, and there is no gall-bladder. The blood-vascular system is complicated by net-like expansions of both arteries and veins, or retia mirabilia. The larynx is of peculiar shape, the arytenoid cartilages and the epiglottis being elongated, and forming a tubular prolongation,

IP

£r0

jBO

Fig. i.— A Section of the Skull of a Black-Fish (Globicephalus melas).

PMx, Premaxilla. AS,

Mx, Maxilla. PS, ME, Ossified portion of the mes- Ft,

ethmoid. pn,

an, Nostrils. PI,

Na, Nasal. Vo,

IP, Inter-parietal. s,

Fr, Frontal. id,

Pa, Parietal. cp,

SO, Supra-occipital. cd,

ExO, Ex-occipital. a,

BO, Basi-occipital. sh,

Sq, Squamosal. bh,

Per, Periotic. th,

Alisphenoid.

Presphenoid.

Pterygoid.

Posterior nares.

Palatine.

Vomer.

Symphysis of lower jaw.

Inferior dental canal.

Coronoid process of lower jaw.

Condyle.

Angle.

Stylo-hyal.

Basi-hyal.

Thyro-hyal.

which projects into the posterior nares, and when embraced by the soft palate forms a continuous passage between the nostrils and the trachea, or wind-pipe, in a more perfect manner. The brain is relatively large, round in form, with its surface divided into numerous and complex convolutions. The kidneys are deeply lobulated ; the testes are abdominal; and there are no vesiculae seminales nor an os penis. The uterus is bicorriuate ; the placenta non-deciduate and diffuse. The two teats are placed in depressions on each side of the genital aperture. The ducts of the milk-glands are dilated during suckling into large reservoirs, into which the milk collects, and from which it is injected by the action of a muscle into the mouth of the young animal, so that sucking under water is greatly facilitated.

Whales and porpoises are found in all seas, and some dolphins and porpoises are inhabitants of the larger rivers of South America and Asia. Their organization necessitates their passing their life entirely in the water, as on land they are absolutely helpless. They have, however, to rise very frequently to the surface for the purpose of respiration; and, in relation to the upward and downward movement in the water thus necessitated, the principal instrument of motion, the tail, is expanded horizontally. The position of the nostril on the highest part of the head is important for this mode of life, as it is the only part of the body the exposure

of which above the surface is absolutely necessary. Of numerous erroneous ideas connected with natural history, few are so widespread as that whales spout through their blow-holes water taken in at the mouth. But the ” spouting,” or ” blowing,” of whales is nothing more than the ordinary act of expiration, which, taking place at longer intervals than land-animals, is performed with a greater emphasis. The moment the animal rises to the surface it forcibly expels from its lungs the air taken in at the last inspiration, which is charged with vapour in consequence of the respiratory changes. This rapidly condensing in the cold atmosphere in which the phenomenon is often observed, forms a column of steam or spray, which has been taken for water. It happens, however, especially when the surface of the ocean is agitated into waves, that the animal commences its expiratory puff before the orifice has cleared the top of the water, some of which may thus be driven upwards with the blast, tending to complete the illusion. From photographs of spouting rorquals, it appears that the height and volume of the ” spout ” of all the species is much less than was supposed to be the case by the older observers; even that of the huge ” sulphur-bottom ” (Balaeno- plera sibbaldi) averaging only about 14 ft. in height, although it may occasionally reach 20 ft.

As regards their powers of hearing, the capacity of cetaceans for receiving (and acting upon) sound-waves is demonstrated by the practice of shouting on the part of the fishermen when engaged in driving a shoal of porpoises or black-fish into shallow water, for the purpose of frightening their intended victims. As regards the possession of a voice by cetaceans, it is stated that one

species, the ” buckelwal ” of the Germans, utters during the breeding- season a prolonged scream, comparable to the scream of a steam- siren, and embracing the whole musical scale, from base to treble. In respect of anatomical considerations, it is true that the external ear is much reduced, the ” pinna ” being absent, and the tube or ” meatus ” of very small calibre. On the other hand, the internal auditory organs are developed on the plan of those of ordinary mammals, but display certain peculiar modifications (notably the remarkable shell-like form of the tympanic bone) for intensifying and strengthening the sound-waves as they are received from the water. It seems, therefore, perfectly evident that whales must hear when in the water. This inference is confirmed by the comparatively small development of the other sense-organs. The eye, for instance, is very small, and can be of little use even at the comparatively small depths to which whales are now believed to descend. Again, the sense of smell, judging from the rudimentary condition of the olfactory organs, must be in abeyance; and whales have no sense-organs com- parable to the lateral-line-system of fishes. Consequently, it would seem that when below the surface of the water they must depend chiefly upon the sense of hearing. Probably this sense is so highly developed as to enable the animals, in the midst of the vibrations made by the screw-like movements of the tail, or flukes, to distinguish the sound (or the vibrations) made by the impact of water against rocks, even in a dead calm, and, in the case of piscivorous species, to recognize by the pulse in the water the presence of a shoal of fish. Failing this explanation, it is difficult to imagine how whales can find their way about in the semi-darkness, and avoid collisions with rocks and rock-bound coasts.

In the Christiania Nyt Magazin for Nalurvidenskaberne, vol. xxxviii., Dr G. Guldberg has published some observations on the body-temperature of the Cetacea, in which he shows how extremely imperfect is our knowledge of this subject. As he remarks, it is a matter of extreme difficulty to obtain the temperature of living cetaceans, although this has been taken in the case of a white-whale and a dolphin, which some years ago were kept in confinement in a pond in the United States. With the larger whales such a mode of procedure is, however, obviously quite impracticable, and we have, accordingly, to rely on post-mortem observations. The layer of blubber by which all cetaceans are protected from cold renders the post-mortem refrigeration of the blood a much slower process than in most

mammals, so that such observations have a much higher value than might at first be supposed to be the case. Indeed, the blood-temperature of a specimen of Sibbald's rorqual three days after death still stood at 34° C. The various observations that have been taken have afforded the following results in individual

cases: Sperm-whale, 40° C. ; Greenland right-whale, 38-8° C.; porpoise, 35-6° C. ; liver of a second individual, 37-8 C.; common rorqual, 35-4° C. ; dolphin, 35-6° C. The average blood-temperature of man is 37 C, and that of other mammals 39 C. ; while that of birds is 42 s C. The record of 40 C. in the case of the sperm-whale seems to indicate that at least some cetaceans have a relatively high temperature.

With the possible exception of one West African dolphin, all the Cetacea are predaceous, subsisting on living animal food of some kind. One kind alone (Orca) eats other warm-blooded animals, as seals, and even members of its own order, both large and small. Many feed on fish, others on small floating crusta- ceans, pteropods and jelly-fishes, while the principal staple of the food of many is constituted by cuttle-fishes and squids. In size cetaceans vary much, some of the smaller dolphins scarcely exceeding 4 ft. in length, while whales are the most colossal of all animals. It is true that many statements of their bulk are exaggerated, but the actual dimensions of the larger species exceed those of all other animals, not even excluding the extinct dinosaurian reptiles. With some exceptions, cetaceans are generally timid, inoffensive animals, active in their movements and affectionate in their disposition towards one another, especially the mother towards the young, of which there is usually but one, or at most two at a time. They are generally gregarious, swimming in herds or " schools," sometimes amount-ing to many thousands in number; though some species are met with either singly or in pairs.

Commercially these animals are of importance on account of the oil yielded by the blubber of all of them; while whalebone, spermaceti and ambergris are still more valuable products yielded by certain species. Within the last few years whalebone has been sold in America for £2900 per ton, while it is also asserted that £3000 per ton has been paid for two and a quarter tons at Aberdeen, although there teems to be some degree of doubt attaching to the statement. Soon after the middle of the last century, the price of this commodity was as low as £150 per ton, but, according to Mr Frank Buckland, it suddenly leapt up to

£620 with the introduction of " crinoline " into ladies' costume, and it has apparently been on the rise ever since. Ambergris, which is very largely used in perfumery, is solely a product of the sperm-whale, and appears to be a kind of biliary calculus. It generally contains a number of the horny beaks of the cuttle-fishes and squids upon which these whales chiefly feed. Its market-price is subject to considerable variation, but from £3 to £4 per oz. is the usual average for samples of good quality. In 1898 a merchant in Mincing Lane was the owner of a lump of ambergris weighing 270 lb, which was sold in Paris for about 85s. per oz., or £18,360.

Whalebone Whales. — Existing Cetacea are divisible into two sections, or suborders, the relationships of which are by no means clearly apparent. The first section is that of the whalebone whales, or Mystacoceti, in which no functional teeth are developed, although there are tooth-germs during foetal life. The palate is furnished with plates of baleen or whalebone; the skull is symmetrical; and the nasal bones form a roof to the nasal passages, which are directed upwards and forwards. The maxilla is produced in front of, but not over, the orbital process of the frontal. The lacrymal is small and distinct from the jugal. The tympanic is welded with the periotic, which is attached to the base of the skull by two strong diverging processes. The olfactory organ is distinctly developed. The two halves of the lower jaw are arched outwards, their anterior ends meeting at an angle, and connected by fibrous tissue without any symphysis. All the ribs at their upper extremity articulate only with the transverse processes of the vertebrae; their capitular processes when present not articulating directly with the bodies of the vertebrae. The sternum is composed of a single piece, and articulates only with a single pair of ribs ; and there are no ossified sternal ribs. External openings of nostrils distinct from each other, longitudinal. A short conical caecum.

When in the foetal state these whales have numerous minute teeth lying in the dental groove of both upper and lower jaws. They are best developed about the middle of foetal life, after which they are absorbed, and no trace of them remains at the time of birth. The whalebone does not make its appearance until after birth; and consists of a series of flattened horny plates, between three and four hundred in number, on each side of the palate, with a bare interval along the middle line. The plates are placed transversely to the long axis of the palate, with short intervals between them. Each plate or blade is somewhat

triangular in form, with the base

attached to the palate and the apex hanging downwards. The outer edge of the blade is hard and smooth, but the inner edge and apex fray out into long bristly fibres, so that the roof of the whale s mouth looks as if covered with hair, as described by Aristotle. At the inner edge of each principal blade are two or three much smaller or sub- sidiary blades. The principal blades are longest near the middle of the series and gradually diminish towards the front and back ot the mouth. The horny plates grow from a fibrous and vascular matrix, which covers the palatal surface of the maxillae, and sends out plate- like processes, one of which penetrates the base of each blade. Moreover, the free edges of these processes are covered with long vascular thread-like papillae, one of which forms the central axis ot each of the hair-like fibres mainly composing the blade. A transverse section of fresh whalebone shows that it is made up of numbers 01 these soft vascular papillae, circular in outline, and surrounded by concentrically arranged epidermic cells, the whole bound together by other epidermic cells, that constitute the smooth (so-called “enamel “) surface of the blade, which, disintegrating at the tree edge, allows the individual fibres to become loose and assume a hair-like appearance.

Whalebone really consists of modified papillae of the mucous membrane of the mouth, with an excessive and horny epithelial development. The blades are supported and bound together for a certain distance from their base, by a mass of less hardened epi-thelium, secreted by the surface of the palatal membrane or matrix of the whalebone in the intervals of the plate-like processes, this is the ” gum ” of the whalers. Whalebone varies much in colour in different species; in some it is almost jet black, in others slate colour, horn colour, yellow, or even creamy-white. In some descriptions the blades are variegated with longitudinal stripes of different hues. It differs also greatly in other respects, being short, thick, coarse, and stiff in some cases, and greatly elongated and highly elastic in those species in which it has attained its fullest development. Its function is to strain the water from the small marine molluscs, crustaceans, or fish upon which the whales subsist. In feeding, whales fill the immense mouth with water containing shoals of these small creatures, and

then, on closing the jaws and raising the tongue, so as to diminish the cavity of the mouth, the water streams out through the narrow intervals between the hairy fringe of the whalebone blades, and escapes through the lips, leaving the living prey to be

Although sometimes divided into two families, Balaenidae and Balaenopteridae, whalebone-whales are best included in a single family group under the former name. The typical members of this family are the so-called right-whales, forming the genus Balaena, in which there are no folds on the throat and chest, and no back-nn; while the cervical vertebrae are fused into a single mass. The flippers are short and broad, with five digits; the head is very large and the whalebone very long and narrow, highly elastic and black; while the scapula is high, with a distinct coracoid and coronoid process. This genus contains the well-known Greenland right-whale (3. mysticetus) of the Arctic seas, the whalebone and oil of which are so much valued in commerce, and also other whales, distinguished bv having the head somewhat smaller in proportion to the body, with shorter whalebone and a larger number of vertebrae. These inhabit the temperate seas of both northern and southern hemispheres, and have been divided into species in accordance with their geographical distribution, such as B. biscayensis of the North Atlantic, B.japonica of the North Pacific, B. australis of the South Atlantic, and B. antipodarum and novae-zelandiae of the South Pacific; but the differences between them are so small that they may probably be regarded as races of a single species, the black whale (B australis). On the head these whales carry a peculiar structure which is known to whalers as the " bonnet." This is a large horny excrescence, worn into hollows like a much-denuded piece of limestone rock, growing probably in the neighbourhood of the blow-hole. More than one theory has been suggested to account for its presence. One suggestion is that it indicates the descent of whales from rhino- ceros-like mammals; another that this species of whale is in the habit of rubbing against rocks in order to free itself from barnacles, and thus produces a kind of corn— although why on the nose alone is not stated Dr W. G. Ridewood, however, considers that the structure is due to the fact that the horny layers which are produced all over the skin are not shed on this particular spot.

The pigmy whale (NVbbalaena marginata) represents a genus agreeing with the right-whales in the absence of throat-nutings and with the rorquals in the presence of a dorsal fin. I he cervical vertebrae are united, and there are only 43 vertebrae altogether.

The flippers are small, narrow, and with only four digits. 1 he ribs remarkably expanded and flattened; the scapula low and broad, with completely developed acromion and coracoid processes. 1 he whalebone is long, slender, elastic and white. The species which inhabits the South American, Australian and New Zealand seas is the smallest of the whalebone-whales, being not more than 20 ft. in lcnsfth

In contrast to the preceding is the great grey whale {RacHanectes glaucus) of the North Pacific, which combines the relatively small head, elongated shape, and narrow flippers of the fin-whales, with the smooth throat and absence of a back-fin distinctiveof the right- whales. The whalebone is shorter and coarser than in any other

species. In the skeleton the cervical vertebrae are free, and the first two ribs on each side expanded and united to form a large bony shield. In the humpback-whale (Megaptera longimana or loops) the head is of moderate size, the whalebone-plates are short and wide, and the cervical vertebrae free. The skin of the throat is fluted so as to form an expansible pouch ; there is a low back-fin ; and the flippers, which have four digits each, are extremely long, equalling about one-fourth the total length of the animal. The acromion and coracoid processes of the scapula are rudimentary. See Humpback-Whale. .

The right-whales are built for cruising slowly about m search ot the shoals of small floating invertebrates which form their food, and are consequently broad in beam, with a float-shaped body and im- movable neck. The humpback is of somewhat similar build, but with a smaller head, and probably attains considerable speed owing to the length of its flippers. The finners, or rorquals (Balaenoptera) , which prey largely on fish, are built entirely for speed, and are the ocean greyhounds of the group. Their bodies are consequently long and attenuated, and their necks are partially mobile; while they are furnished with capacious pouches for storing their food. They chiefly differ from the humpback by the smaller head, long and slender build, small, narrow, and pointed flippers, each containing four digits, and the large acromion and coracoid processes to the low and broad scapula. Rorquals are found in almost every sea. Among them are the most gigantic of all animals, B. sibbaldi, which attains the length of 80 ft., and the small B. rostrata, which does not exceed 30. There are certainly four distinct modifications of this genus, represented by the two just mentioned, and by B. musculus and

B. borealis, all inhabitants of British seas, but the question whether almost identical forms found in the Indian, Southern and Pacific Oceans are to be regarded as specifically identical or as distinct awaits future researches, although some of these have already received distinct names. See Rorqual.

In the report on the zoology of the Discovery expedition, published in 1907 by the British Museum, E. A. Wilson describes a whale frequenting the fringe of the Antarctic ice which indicates a new generic type. Mainly black in colour, these whales measure about 20 or 30 ft. in length, and have a tall dorsal fin like that of a killer. . ,

Toothed Whales.— -The second suborder is represented by the toothed whales, or Odontoceti, in which there is no whalebone, and teeth, generally numerous, though sometimes reduced to a single pair, and occasionally wanting, are normally developed. Unlike that of the whalebone-whales, the upper surface of the skull is more or less unsymmetrical. The nasal bones are in the form of nodules or flattened plates, applied closely to the frontals, and not forming any part of the roof to the nasal passage, which is directed upwards and backwards. The olfactory organ is rudimentary or absent. Hinder end of the maxilla expanded and covering the greater part of the orbital plate of the frontal bone. Lacrymal bone either in- separable from the jugal, or, if distinct, large, and forming part of the roof of the orbit. Tympanic bone not welded with the penotic, which is usually only attached to the rest of the skull by ligament. Two halves of the lower jaw nearly straight, expanded in height posteriorly, with a wide funnel-shaped aperture to the dental canal, and coming in contact in front by a flat surface of variable length but constituting a symphysis. Several of the anterior ribs with well-developed capitular processes, which articulate with the bodies of the vertebrae. Sternum almost always composed of several pieces, placed one behind the other, with which several pairs of ribs are connected by well-developed cartilaginous or ossified sternal ribs. External respiratory aperture single, the two nostrils uniting before they reach the surface, usually in the form of a transverse sub- crescentic valvular aperture, situated on the top of the head. Flippers with five digits, though the first and fifth are usually little developed. No caecum, except in Platanista.

The first family, Physeteridae, is typified by the sperm-whale, and characterized by the absence of functional teeth in the upper jaw; the lower teeth being various, and often much reduced in

number. Bones of the skull raised so as to form an elevated promin- ence or crest behind the nostrils. Pterygoid bones thick, produced backwards, meeting in the middle line, and not involuted to form the outer wall of the post-palatine air-sinuses, but simply hollowed on their outer side. Transverse processes of the arches of the dorsal vertebrae, to which the tubercles of the ribs are attached, ceasing abruptly near the end of the series, and replaced by processes on the body at a lower level, and serially homologous anteriorly with the heads of the ribs, and posteriorly with the transverse processes of the lumbar vertebrae. Costal cartilages not ossified. ... .,

The first group, or Physeterinae, includes the sperm-whale ltseli, and is characterized by the presence of a full series of lower teeth, which are set in a groove in place of sockets, the groove being im- perfectly divided by partial septa, and the teeth held in place by the strong fibrous gum. No distinct lacrymal bone. Skull strikingly asymmetrical in the region of the nasal apertures, in consequence of the left opening greatly exceeding the right in size.

In the sperm-whale ((Physeter macrocephalus) the upper teeth are apparently of uncertain number, rudimentary and functicnless, being embedded in the gum. Lower jaw with from 20 to 25 teeth on each side, stout, conical, recurved and pointed at the apejc

until they are worn, without enamel. Upper surface of the skull concave ; its posterior and lateral edges raised into a very high and greatly compressed semicircular crest or wall (fig. 2). Zygomatic processes of jugal bones thick and massive. Muzzle greatly elon- gated, broad at the base, and gradually tapering to the apex. Lower

Fig. 2. — Skull of Sperm-Whale {Physeter macrocephalus).

jaw exceedingly long and narrow, the symphysis being more than half the length. Vertebrae: C 7, D 11, L 8, Ca 24; total 50. Atlas, or first vertebra, free; all the other cervical vertebrae united by their bodies and spines into a single mass. Eleventh pair of ribs rudimentary. Head about one-third the length of the body; very

massive, high and truncated, and rather compressed in front; owing its huge size and form mainly to the accumulation of a mass of fatty tissue filling the large hollow on the upper surface of the skull and overlying the long muzzle. The single blow-hole is longi- tudinal, slightly S-shaped, and placed at the upper and anterior extremity of the head to the left side of the middle line. The opening of the mouth is on the under side of the head, considerably behind the end of the snout. Flippers short, broad and truncated. Dorsal fin represented by a low protuberance. See Sperm-Whale.

In the lesser or pigmy sperm-whale (Cogia breviceps) there may be a pair of rudimentary teeth in the upper jaw, while on each side of the lower jaw there are from 9 to 12 rather long, slender, pointed and curved teeth, with a coat- ing of enamel. Upper surface of the skull concave, with thick, raised, posterior and lateral margins, massive and rounded at their anterior terminations above the orbits. Muzzle not longer than the cranial position of the skull, broad at the base, and rapidly tapering to the apex. Zygomatic process of the jugal rod-like. Lower jaw with symphysis less than half its length. Vertebrae: C 7, D 13 or 14, L and Ca 30; total 50 or 51. All the cervical ver- tebrae united by their bodies and arches. The head is about one- sixth of the length of the body, and obtusely pointed in front; the mouth small and placed far below the apex of the snout ; the blow-hole

in the middle line and in front; their outer edges, especially that of the right, expanded over the front of the inner border of the maxilla. Very high longitudinal crests on the maxillae at the base of the beak, extending backwards almost to the nostrils, approaching each other in the middle line above; sometimes compressed and sometimes so massive that their inner edges come almost in contact. Preorbital notch distinct, and mesethmoid cartilage slightly ossified. Verte- brae: C 7, D 9, L 10, Ca 19; total 45. All the cervical vertebrae united. Upper surface of the head in front of the blowhole very prominent and rounded, rising abruptly from above the small, distinct snout. Two species are known. See Bottle-nose Whale.

The typical representative of the beaked whales is Ziphius cuvieri, in which there is a single conical tooth of moderate size on each side close to the anterior extremity of the lower jaw, directed forwards and upwards. Skull with the premaxillae immediately in front and at the sides of the nostrils expanded, hollowed, with elevated lateral margins, the posterior ends rising

to the vertex and curving forwards, the right being considerably more developed than the left. The conjoint nasals form a pronounced symmetrical eminence at the top of the skull, projecting forwards over the nostrils, fiat above, prominent and rounded in the middle line in front, and separated by a notch on each side from the premaxillae. Preorbital notch not distinct. Rostrum (seen from above) triangular, tapering from the base to the apex; upper and outer edges of maxillae at base of rostrum raised into low roughened tuberosities. Mesethmoid cartilage densely ossified in adult age, and coalescing with the surrounding bones of the rostrum. Vertebrae: C 7, D 10, L 10, Ca 22; total 49. The three anterior cervical vertebrae united, the rest free.

In the numerous species of the allied genus Mesoplodon there is a much-compressed and pointed tooth in each half of the lower jaw,

Fig. 4. — Sowerby's Beaked Whale {Mesoplodon bidens).

Fig. 3. — Bottle-nose (Hyperobdon rostratus)

the coast of Scotland, 1882.

crescentic, and placed obliquely on the crown of the head in advance of the eyes and to the left of the middle line ; while the flippers are bluntly sickle-shaped, and the back-fin triangular. This species attains a length of from 9 to 13 ft.

A second subfamily is represented by the bottle-noses and beaked whales, and known as the Ziphiinae. In this group the lower teeth are rudimentary and concealed in the gum, except one, or rarely two, pairs which may be largely developed, especially in the male. There is a distinct lacrymal bone. Externally the mouth is produced into a slender rostrum or beak, from above which the rounded eminence formed by a cushion of fat resting on the cranium in front of the blow-hole rises somewhat abruptly. The blow-hole is single, crescentic and median, as in the Delphinidae. Flippers small, ovate, with five digits moderately well developed. A small obtuse dorsal fin situated considerably behind the middle of the back. Longi- tudinal grooves on each side of the skin of the throat, diverging posteriorly, and nearly meeting in front. In external characters and habits the whales of this group closely resemble each other. They appear to be almost exclusively feeders on cuttle-fishes, and occur either singly, in pairs, or in

small herds. By their dental and osteological characters they are easily separated into four genera.

In the first of these, Hyperobdon, or bottle-nose, there is a small conical pointed tooth at the apex of each half of the lower jaw, concealed by the gum during life. Skull with the upper ends of the premaxillae rising suddenly behind the nostrils to the vertex and expanded laterally, their outer edges curving backwards and their anterior surfaces arching forwards and overhanging the nostrils; the right larger than the left. Nasal bones lying in the hollow between the upper extremities of the premaxillae, strongly concave

variously situated, but generally at some distance behind the apex; its point directed upwards, and often somewhat backwards, occasion- ally developed to a great size. In the skull the region round the nostrils is as in Hyperobdon, except that the nasals are narrow and more sunk between the upper ends of the premaxillae ; like those of Hyperobdon, they are concave in the middle line in front and above. No maxillary tuberosities. Preorbital notch not very distinct. Rostrum long and narrow. Mesethmoid in the adult ossified in its entire length, and coalescing with the surrounding bones. Verte- brae : C 7, D 10, L 10 or 1 1, Ca 19 or 20 ; total 46 to 48. Two or three anterior cervicals united, the rest usually free.

Though varying in form, the lower teeth of the different members of this genus agree in their essential structure, having a small and pointed enamel-covered crown, com- posed of dentine, which, instead of surmounting a root of the ordinary character, is raised upon a solid mass of osteo- dentine, the continuous growth of which greatly alters the From a specimen taken off form and general appearance of the tooth as age advances,

as in the case of M. layardi, where the long, narrow, flat, strap-like teeth, curving inwards at their extremities, meet over the rostrum, and interfere with the movements of the jaw. In one species (M.grayi) a row of minute, conical, pointed teeth, like those of ordinary Dolphins, 17 to 19 in number, is present even in the adults, on each side of the middle part of the upper jaw, but embedded by their roots only in the gum, and not in bony sockets. This, with the frequent presence of rudimentary teeth in other species of this genus, indicates that the beaked whales are derived

Fig. 5. — Skull of a Beaked Whale (Mesoplodon densirostris).

from ancestral forms with teeth of normal character in both jaws. The species are distributed in both northern and southern hemispheres, but most'frequent in the latter. Among them are M . bidens, M. europaeus, M. densirostris, M. layardi, M. grayi and M. hectori; but there is still much to be learned with regard to their characters

and distribution. This group was abundant in the Pliocene age, as attested by the frequency with which the imperishable long, cylin- drical rostrum of the skull, of more than ivory denseness, is found among the rolled and waterworn animal remains which compose the " bone-bed " at the base of the Red Crag of Suffolk.

Finally, in Arnoux's beaked whale (Berardtus arnouxi), of New Zealand, which grows to a length of 30 ft., there are two moderate- sized, compressed, pointed teeth, on each side of the symphysis of the lower jaw, with their summits directed forwards, the anterior being the larger of the two and close to the front of the jaw. Upper ends of the premaxillae nearly symmetrical, moderately elevated, slightly expanded, and not curved forward over the nostrils. Nasals broad, massive and rounded, of nearly equal size, forming the vertex of the skull, flattened in front, most prominent in the middle line. Preorbital notch distinct. Rostrum long and narrow. Mesethmoid partially ossified. Small rough eminences on the outer edge of the upper surface of the maxillae at base of rostrum. Vertebrae:

Fig. 6. — The Susu, or Ganges Dolphin {Platanista gangetica).

C 7, D 10, L 12, Ca 19; total 48. The three anterior cervicals welded, the rest free and well developed. Apparently this whale has the power of thrusting its teeth up and down, exposing them to view when attacked.

In a family by themselves— the Platinishdae — are placed three cetaceans which differ from the members of the preceding and the following groups in the mode of articulation of the ribs with the vertebrae, as the tubercular and capitular articulations, distinct at the commencement of the series, gradually blend together, as in most mammals. The cervical vertebrae are all free.

The lacrymal bone is not distinct from the jugal. The jaws are long and narrow, with numerous teeth in both; the symphysis of the lower one exceeding half its length. Externally the head is divided from the body by a slightly constricted neck. Pectoral limbs broad and truncated. Dorsal fin small or obsolete. In habits these dolphins are fluviatile or estuarine. In the Indian susu, or Ganges dolphin (Platanisla gangetica), the teeth number about f? on each side, are set near together, are rather large, cylindrical, and sharp-pointed in the young, but in old animals acquire a large laterally com- pressed base, which in the posterior part of the series becomes irregularly divided into roots. As the conical enamel-covered crown wears away, the teeth of the young and old animals have a totally different appearance. The beak and tooth-bearing portion of the lower jaw are so narrow that the teeth of the two sides are almost in contact. Maxillae supporting large, incurved, compressed bony crests, which overarch the nostrils and base of the rostrum, and almost meet in the middle line above. Orbits very small and eyes rudimentary, without crystalline lens. Blow-hole longitudinal, linear. Vertebrae: C 7, D 1 1, L 8, Ca 25; total 51. A small caecum. No pelvic bones. Dorsal fin represented by a low ridge. .

The second genus is represented by Inia geoffroyi, of the Amazon, in which the teeth vary from 26 to 33 pairs in each

Fig. 7. — River Plate Dolphin (Slenodelphis blainvilki).

jaw; those at the posterior part with a distinct tubercle at the inner side of the base of the crown. Vertebrae: C 7, D 13, L 3, Ca 18; total 41. Transverse processes of lumbar vertebrae very broad. Sternum short and broad, and consisting of a single segment only. Dorsal fin a mere ridge. The long cylindrical rostrum externally furnished with scattered, stout and crisp hairs. The third type is Stenodelphis blainvilki, the River Plate dolphin, a small brown species (fig. 7), with from 50 to 60 pairs of teeth in each jaw, furnished with a cingulum at the base of the crown. Jaws very long and slender. Vertebrae: C 7, D 10, L 5, Ca 19; total 41. Trans- verse processes of the lumbar vertebrae extremely broad. Sternum elongated, composed of two segments, with four sternal ribs attached. Dorsal fin rather small, triangular, pointed. Blow-hole transverse. In several respects this species connects the two preceding ones with the Delphinidae (see Dolphin).

The last family of existing cetaceans is the above-mentioned

Delphinidae, which includes the true dolphins, porpoises, grampuses and their relatives. As a rule there are numerous teeth in both jaws ; and the pterygoid bones of the skull are short, thin and involuted to form with a process of the palate bone the outer wall of the post-

palatine air-sinus. Symphysis of lower jaw short, or moderate, never exceeding one-third the length of the jaw. Lacrymal bone not distinct from the jugal. Transverse processes of the dorsal verte- brae gradually transferred from the arches to the bodies of the vertebrae without any sudden break, and becoming posteriorly continuous serially with the transverse processes of the lumbar vertebrae. Anterior ribs attached to the *

transverse process by the tubercle, and to the body of the vertebra by the head; the latter attachment lost in the posterior ribs. Sternal ribs ossified. The blow-hole is trans- verse, crescentic, with the horns of the crescent pointing forwards.

First on the long list is the narwhal, Monodon monoceros, in which, apart from some irregular rudimentary teeth, the dentition is reduced to a single pair of teeth which lie horizontally in the maxilla, and in the female remain permanently concealed within the socket, so that this sex is practically toothless, while in the male (fig. 8), the right tooth usually remains similarly concealed while the left is immensely developed, attaining a length equal to more than half that of the entire animal, projecting horizontally from the head in the form of a cylindrical, or slightly tapering, pointed tusk, without enamel, and with the surface marked by spiral grooves and ridges, running in a sinistral direction. Vertebrae: C 7, D II, L 6, Ca 26; total 50. Cervical region comparatively long, and all the vertebrae distinct, or with irregular unions towards the middle of the series, the atlas and axis being usually free. Flipper small, short and broad, with the second and third digits nearly equal, the fourth slightly shorter. No dorsal fin. See Narwhal.

Closely allied is the beluga or white-whale (Delphinapterus leucas), of the Arctic seas, in which, however, there are from eight to ten pairs of teeth in each jaw, occupying the anterior three-fourths of the rostrum and corresponding portion of the lower jaw, rather small, conical, and pointed when unworn, but usually become obliquely trun- cated, separated by intervals considerably wider than the diameter of the tooth, and implanted obliquely, the crowns inclining forwards especially in the upper

jaw. Skull rather narrow and elongated, depressed. Pre- maxillae convex in front of the nostrils. Rostrum about equal in length to the cranial portion of the skull, triangular, broad at the base, and gradually contracting towards the apex, where it is somewhat curved down- wards. Vertebrae: C 7, D II, L 9, Ca 23; total 50. Cervical vertebrae free. Flippers broad, short and rounded, all the digits being tolerably well developed, except the first. Anterior part of head rounded ; no distinct snout. No dorsal fin, but a low ridge in its place. See Beluga.

In all the remaining genera of Delphinidae the cervical region of the vertebral column is very short, and the first two, and usually more, of the vertebrae are firmly united. The common porpoise (Phocaena communis, or P. phocaena) is the typical representa- tive of the first genus, in which the teeth vary from jf to ff, are small, and occupy nearly the whole length of the rostrum, with

compressed, spade-shaped crowns, separated male Narwhal (Mono- from the root by a constricted neck, don monoceros), with Rostrum rather shorter than the cranium the whole of both proper, broad at the base and tapering to- teeth exposed by re- wards the apex. Premaxillae raised into moval of the upper tuberosities in front of the nostrils. The wall of their alveolar frontalbonesformasomewhatsquareelevated cavities, protuberance in the middle line of the * skull behind the nostrils, rising above the flattened nasals. Sym- physis of lower jaw very short. Vertebrae: C 7, D 13, L 14, Ca 30; total 64. First to sixth cervical vertebrae and sometimes the seventh also, coalesced. Flippers of moderate size, oval, slightly sickle- shaped, with the second and third digits nearly equal in length, and the fourth and fifth well developed, but shorter. Head short, moderately rounded in front of the blow-hole. Dorsal fin near the middle of the back, triangular; its height considerably less than the length of the base; its anterior edge frequently furnished With one or more rows of conical horny tubercles.

[A-

m

Fig, 8. — Upper sur- face of the Skull of

The porpoise, which is so common in British waters and the Atlantic, seldom enters the Mediterranean, and apparently never resides there. There is, however, a porpoise in the Black Sea, which, according to Dr O. Abel, is entitled to rank as a distinct species, with the name of Phocaena relicla. This Black Sea porpoise is readily distinguished from the Atlantic species by the contour of the profile of the head, which, in place of forming a continuous curve from the muzzle to what represents the neck, has a marked prominence above the angle of the mouth, followed by an equally marked depression. The teeth are also different in form and number. The absence of porpoises from the Mediterranean is explained by Dr Abel on account of the greater saltness of that sea as compared with the ocean in general ; his idea being that these cetaceans are near akin to fresh- water members of the group, and therefore unsuited to withstand an excessively saline medium. From the Taman Peninsula, on the

Fig. 9. — Beluga or White-Whale [Delphinapterus leucas). ‘ From a specimen taken in the river St Lawrence and exhibited in London, 1877.

north shore of the Black Sea, the same writer has described an extinct type of ancestral porpoise, under the name of Palaeophocaena andrus- sowi. Another species is the wholly black P. spinipennis, typically from South America. Black is also the hue of the Indian porpoise (Neophocaena phocaenoides) , which wants a dorsal fin, and has eighteen pairs of teeth rather larger than those of the ordinary porpoise. (See Porpoise.)

Next comes the Indo-Malay genus Orcella, in which the \l to \%, small, conical teeth are pointed, rather closely set, and occupy nearly the whole length of the rostrum. Skull sub-globular, high. Rostrum nearly equal in length to the cranial portion of the skull, tapering. Flippers of moderate size, not elongated, but somewhat pointed, with all the bones of the digits broader than long, except the first phalanges of the index and third fingers. Head globular in front. Dorsal fin rather small, placed behind the middle of the body. Two species, both of small size — 0. breviroslris, from the Bay of Bengal, and O. fluminalis, from the Irrawaddy river, from 300 to 900 m. from the sea.

In the grampus, or killer, Orca gladiator (or 0. orca) the teeth form about twenty pairs, above and below, occupying nearly the whole length of the rostrum, very large and stout, with conical recurved crowns and large roots, expanded laterally and

flattened, or rather hollowed, on the anterior and posterior surfaces. Rostrum about equal in length to the cranial part of the skull, broad and flattened above, rounded in front; premaxillae broad and rather concave in front of the nostrils, contracted at the middle of the rostrum, and expanding again towards the apex. Vertebrae: C 7, D 11-12, L 10, Ca 23; total 51 or 52; bodies of the first and second and sometimes the third cervical vertebrae united; the rest free.

Fig. 10. — The Grampus or Killer (Orca gladiator]

Flippers very large, ovate, nearly as broad as long, with all the

Ehalanges and metacarpals broader than long. General form of ody robust. Face short and rounded. Dorsal fin near the middle of the back, very high and pointed. See Grampus.

The lesser killer or black killer, Pseudorca crassidens, has its gˆj-j

teeth confined to the anterior half of the rostrum and corresponding part of the lower jaw; they are small, conical, curved and sharp- pointed when unworn, but sometimes deciduous in old age. Skull broad and depressed ; with the rostrum and cranial portions about equal in length. Upper surface of rostrum broad and flat. Pre- maxillae concave in front of the nostrils, as wide at the middle of the rostrum as at the base, and nearly or completely concealing the maxillae in the anterior half of tjiis region. Vertebrae: C 7, D II, L 12-14, Ca 28-29; total 58 or 59. Bodies of the anterior five or six cervical vertebrae united. Length of the bodies of the lumbar and anterior caudal vertebrae about equal to their width. Flippers very long and narrow, with the second digit the longest, and having as many as 12 or 13 phalanges, the third shorter (with 9 phalanges), the first, fourth and fifth very short. Fore part of the head round, in consequence of the great development of a

cushion of fat, placed on the rostrum of the skull in front of the blow-hole. Dorsal fin low and triangular, the length of its base considerably exceeding its vertical height.

Next comes the ca’ing whale, or black-fish (Globicephalus melas), with about ten pairs of upper and lower teeth. Cranial and dental characters generally like those of Orca, except that the roots of the teeth are cylindrical. Vertebrae: C 7, D 10, L 9, Ca 24; total 50; first to sixth or seventh cervical vertebrae united; bodies of

the lumbar vertebrae distinguished from those of the preceding genera by being more elongated, the length being to the width as 3 to 2. Flippers of moderate size, narrow and pointed. Dorsal fin situated near the middle of the back, of moderate size, and sickle-shaped. Head in front of the blow-hole high, and compressed anteriorly, the snout truncated. See Ca'ing Whale.

Risso's dolphin, Grampus griseus, represents another genus, characterized by the absence of teeth in the upper and the small number of these in the lower jaw (3 to 7 on each side, and confined to the region of the symphysis). Vertebrae: C 7, D 12, L 19, Ca 30; total 68. General external characters much as in Globicephalus, but the fore part of the head less rounded, and the flippers less elongated. G. griseus is about 13 ft. long, and remarkable for its great variability of colour. It has been found, though rarely, in the North Atlantic and Mediterranean. The common dolphin (Delphinus delphis) is the typical representative of a large group of relatively small species, some of which are wholly marine, while others are more or less completely fluviatile. They are divided into a number of genera, such as Prodel- phinus, Steno, Lagenorhynchus, Cephalorhynchus, Tursiops, &c, best distinguished from one another by the number and size of the teeth, the form and relations of the bones on the hinder part of the palate, the length of the beak and of the union of the two halves of the lower jaw, and the number of vertebrae. For the distinctive characters of these genera the reader may refer to one of the works mentioned below; and it must suffice to state that, collectively, all these dolphins are characterized by the following features. The teeth are numerous in both jaws, and more than -§§ in number, occupying nearly the whole length of the rostrum, and small, close-set, conical, pointed and slightly curved. Rostrum more or less elongated, and pointed in front, usually considerably longer than the cranial portion of the skull. Vertebrae: C 7, D 12-14, L and Ca variable; total 51 to 90. Flippers of moderate size, narrow, pointed, somewhat sickle-shaped, with the first digit rudimentary, the second longest, third nearly equal, and the fourth and fifth extremely short. Ex- ternally the head shows a distinct beak or pointed snout, marked off from the antenasal fatty elevation by a V-shaped groove. Dorsal fin rather large, triangular or sickle-shaped, rarely wanting. A curiously marked brown and white species, perhaps referable to Lagenorhynchus is found on the fringe of the Antarctic ice (see report on the zoology of the " Discovery," published in 1907 by the British Museum).

See Dolphin.

Extinct Cetacea. At present we are totally in the dark as to the origin of the whale- bone-whales, not being even assured that they are derived from the same stock as the toothed whales. It is noteworthy, however, that some of the fossil representatives of the latter have nasal bones of a type recalling those of the former. Such fossil whalebone-whales as are known occur in Pliocene, and Miocene formations are either referable to existing genera, or to more or less nearly related extinct ones, such as Plesiocetus, Herpetocetus and Cetotherium.

The toothed whales, on the other hand, are very largely represented in a fossil state, reaching as low in the geological series as the upper Cretaceous. Many of these present much more generalized characters than their modern represen- tatives, while others indicate apparently a transition towards the still more primitive zeuglodonts, which, as will be shown later, are themselves derived from the creodont Carnivora. In the Pliocene deposits of Belgium and Eng- land are preserved the teeth and other remains of a number of cetaceans, such as Physodon, Encetus, Dinoziphius, Hoplocetus, Balaenodon and Scaldicetus, more or less nearly related to the sperm- whale, but presenting several primitive characters. A complete skull of a member of this group from the Tertiary deposits of Pata- gonia, at first referred to Physodon, but subsequently to Scaldicetus, has a full series of enamelled teeth in the upper jaw; and it is prob- able that the same was the case in other forms. This entails either a modification of the definition of the Physeteridae as given above, or the creation of a separate family for these primitive sperm-whales. In other cases, however, as in the Miocene Prophyseter and Placozi- phius, the anterior portion or the whole of the upper jaw had already become toothless; and these forms are regarded as indicat- ing the descent of the sperm-whales from the under-mentioned Squalodon. The beaked whales, again, are believed to be inde- pendently descended from the latter type, Berardius being traced into the Miocene Mioziphius, Anoplonassa and Palaeoziphius, the last of which shows signs in its dentition of approximating to the complicated tooth-structure of the squalodonts.

Another line of descent from the latter, apparently culmin- ating in the modern Platanistidae, is represented by the family

Eurhinodelphidae, typified by the European Miocene Eurhtnodelphts, but also including the contemporary Patagonian Argyrocetus and the nearly allied European Cyrtodelphis. All these were very long-beaked dolphins; and in Argyrocetus, at all events, the occipital condyles, instead of being closely pressed to the skull, are as prominent as in ordinary mammals, while the nasal bones, instead of forming mere rudimentary nodules, were squared and roofed over the hind part of the nasal chamber.

In the Miocene Squalodon, representing the family Squalodon-tidae, the dentition is differentiated into incisors, canines and cheek- teeth, the hinder ones of the latter series having double roots and compressed crowns carrying serrations on the hinder edge ; generally the dental formula has been given as i. jj, c. {, p. %, m.i, the single- rooted cheek-teeth being regarded as premolars and those with double roots as molars. Dr Abel is, however, of opinion that the

formula is better represented as i. \, c. i, p. ˆ 9 , «• 1”. the teeth

reckoned as molars corresponding to those of the creodont Carnivora. The single-rooted cheek-teeth are regarded as due, not to the division of double-rooted ones, but to the fusion of the two roots of teeth of the latter type. In Squalodon the nasal bones were of the modern nodular type, but in the Miocene Patagonian Prosqualodon they partially covered the nasal chamber.

At present there is a gap between the most primitive squalodonts and the Eocene zeuglodonts (Zeuglodontidae), which are regarded by Messrs Max Weber, O. Abel and C. W. Andrews as the direct forerunners of the modern-toothed whales, forming the sub- order Archaeoceti. It is, however, right to mention that some authorities refuse to admit the relation of the Archaeoceti to the whales.

In the typical zeuglodonts the long and flat skull has large temporal fossae, a strong sagittal crest, a long beak formed mainly by the premaxillae (in place of the maxillae, as in modern whales), and long nasal bones covering over the nasal chamber, so that the nostrils opened about half-way down the beak. All the cervical vertebrae were free. Normally the dentition in the typical genus Zeuglodon (which is common to the Eocene of North America and Egypt) is i. |, c. |, p. i, m. | ; the cheek-teeth being two-rooted, with com- pressed pointed crowns, of which the fore-and-aft edges are coarsely serrated. In the Egyptian Zeuglodon osiris the number of the molars is, however, reduced to f , while some of the earlier cheek-teeth have become single-rooted, as in the squalodonts. The probable tran- sitional form between the latter and the zeuglodonts is the small Microzeuglodon caucasicus described by the present writer, from the Caucasus. As regards the origin of the zeuglodonts themselves, remains discovered in the Eocene formations of Egypt indicate a practically complete transition, so far at least as dental characters are concerned, from these whale-like creatures to the creodont Carnivora. In the earliest type, Protocetus, the skull is practically that of a zeuglodont, the snout being in fact more elongated than in some of the earliest representatives of the latter, although the nostrils are placed nearer the tip. The incisors are unknown, but the cheek-teeth are essentially those of a creodont, none of them having acquired the serrated edges distinctive of the typical zeuglo- donts; and the hinder premolars and molars retaining the three roots of the creodonts. In the somewhat later Prozeuglodon the skull is likewise essentially of the zeuglodont type, although the nostrils have shifted a little more backwards; as regards the cheek- teeth, which have acquired serrated crowns, the premolars at any rate retain the inner buttress supported by a distinct third root, so that they are precisely intermediate between Protocetus and Zeuglo- don. Yet another connecting form is Eocetus, a very large animal from nearly the same horizon as Prozeuglodon ; its skull approaching that of Zeuglodon as regards the backward position of the

nostrils, although the cheek-teeth are of the creodont type, having inner, or third, roots. It is noteworthy that Zeuglodon apparently occurs in the same beds as these intermediate types.

It follows from the foregoing that if zeuglodonts are the ancestors of the true Cetacea — and the probability that they are so is very great — the latter are derived from primitive Carnivora, and not, as has been suggested, from herbivorous Ungulata. The idea that the zeuglodonts were provided with a bony armour does not appear to be supported by recent discoveries.

Authorities. — The above article is based on that by Sir W. H. Flower in the 9th edition of this work. See also W. H. Flower, ” On the Characters and Divisions of the Family Delphinidae,” Proc. Zool. Soc. (London, 1883) ; F. VV. True, ” Review of the Family Delphinidae,” Proc. U. S. Museum, No. 36 (1889) ; R. Ly-dekker, ” Cetacean Skulls from Patagonia,” Palaeontol. Argentina, vol. ii : An. Mus. La Plata (1893); W. Dames, ” fiber Zeuglodonten aus Agypten,” Paldontol. Abhandlungen, vol. i. (1894); F. E. Beddard, A Book of Whales (London, 1900) ; O. Abel, ” Unter- suchungen iiber die fossilen Platanistiden des Wiener Beckens,” Denks. k. Akad. Wiss. Wien., vol. lxviii. (1899); ” Les Dauphins longirostres du Bolerien,” Mem. musee d’hist. nat. belgique (1901 and 1902) ; ” Die phylogenetische Entwickelung des Cetaceengebisses und die systematische Stellung der Physeteriden,” Verhandl. deutsch. zool. Gesellschaft (1905) ; E. Fraas, ” Neue Zeuglodonten aus dem unteren Mittelocean vom Mokattam bei Cairo,” Geol.

und paldontol. Abhandl. ser. 2, vol. vi. (1904); C. W. Andrews, ” Descriptive Catalogue of the Tertiary Vertebrata of the Fayum (British Museum, 1906). (R. L.*)

CETHEGUS, the name of a Roman patrician family of the Cornelian gens. Like the younger Cato its members kept up the old Roman fashion of dispensing with the tunic and leaving the arms bare (Horace, Ars Poetica, 50; Lucan, Pharsalia, ii. 543). Two individuals are of some importance: —

(1) Marcus Cornelius Cethegus, pontifex maximus and curule aedile, 213 B.C. In 211, as praetor, he had charge of Apulia; later, he was sent to Sicily, where he proved a successful administrator. ‘ In 209 he was censor, and in 204 consul. In 203 he was proconsul in Upper Italy, where, in conjunction with the praetor P. Quintilius Varus, he gained a hard-won victory over Mago,

Hannibal's brother, in Insubrian territory, and obliged him to leave Italy. He died in 196. He had a great reputation as an orator, and is characterized by Ennius as " the quintessence of persuasiveness " (suadae medulla). Horace (Ars Poet. 50; Epistles, ii. 2. 117) calls him an authority on the use of Latin words.

Livy xxv. 2, 41, xxvii. 11, xxix. 11, xxx. 18.

(2) Gaius Cornelius Cethegus, the boldest and most dangerous of Catiline's associates. Like many other youthful profligates, he joined the conspiracy in the hope of getting his debts cancelled. When Catiline left Rome in 63 B.C., after Cicero's first speech, Cethegus remained behind as leader of the conspirators with P. Lentulus Sura. He himself undertook to murder Cicero and other prominent men, but was hampered by the dilatoriness of Sura, whose age and rank entitled him to the chief consideration. The discovery of arms in Cethegus's house, and of the letter which he had given to the ambassadors of the Allobroges, who had been invited to co- operate, led to his arrest. He was condemned to death, and executed, with Sura and others, on the night of the 5th of December.

Sallust, Catilina, 46-55; Cicero, In Cat. iii. 5-7; Appian, Bell. Civ. ii. 2-5 ; see Catiline.

CFTINA, GUTIERRE DE (i5i8?-i572?), Spanish poet and soldier, was born at Seville shortly before 1520. He served under Charles V. in Italy and Germany, but retired from the army in 1545 to settle in Seville. Soon afterwards, however, he sailed for Mexico, where he resided for some ten years; he appears to have visited Seville in 1557, and to have returned to Mexico, where he died at some date previous to 1575. A follower of Boscan and Garcilaso de la Vega, a friend of Jeronimo de Urrea and Baltavar del Alcazar, Cetina adopted the doctrines of the Italian school and, under the name of Vandalio, wrote an extensive series of poems in the newly introduced metres; his sonnets are remarkable for elegance of form and sincerity of sentiment, his other productions being in great part adaptations from Petrarch, Ariosto and Ludovico Dolce. His patrons were Antonio de Leyva, prince of Ascoli, Hurtado de Mendoza, and Alva's grandson, the duke de Sessa, but he seems to have profited little by their protection. His works have been well edited by Joaquin Hazanas y la Rua in two volumes published at Seville

(1895)-

CETTE, a seaport of southern France in the department of Herault, 18 m. S.W. of Montpellier by the Southern railway. Pop. (1906) 32,659. After Marseilles it is the principal com- mercial port on the south coast of France. The older part of Cette occupies the foot and slope of the Mont St Clair (the ancient Mons Setius), a hill 590 ft. in height, situated on a tongue of land that lies between the Mediterranean and the lagoon of Thau. This quarter with its wide streets and lofty stone buildings is bounded on the east by the Canal de Cette, which leads from the lagoon of Thau to the Old Basin and the outer harbour. Across the canal lie the newer quarters, which chiefly occupy two islands separated from each other by a wet dock and limited on the east by the Canal Maritime, parallel to the Canal de Cette. A lateral canal unites the northern ends of the two main canals. A breakwater running W.S.W. and

E.N.E. protects the entrance to the harbour, which is one of the safest in France. The outer port and the Old Basin are enclosed by a mole to the south and by a jetty to the east. Behind the outer port lies an inner and more recent basin which communicates with the Canal Maritime. The entire area of the harbour, including the canals, is in acres with a quayage length of over 8000 yds. The public institutions of Cette include tribunals of commerce and of maritime commerce, councils of arbitration in commercial and fishing affairs, an exchange and chamber of commerce, a branch of the Bank of France and a large hospital. There are also a communal college, a naval school, and schools of music, commerce and industry, and navigation. Cette is much resorted to for sea-bathing. The town is connected with Lyons by the canal from the Rhone to Cette, and with Bordeaux by the Canal du Midi, and is a junction of the Southern and Paris-Lyon railways. The shipping trade is carried on with South America, the chief ports of the Mediterranean, and especially with Spain. The chief exports are wines and brandy, chemical products, skins and soap; the chief imports are wine, cereals, coal, timber, petroleum, sulphur, tar and chemical substances. In the five years 1901-1905 the average annual value of imports was £3,720,000 (£4,980,000 in years 1896-1900), of exports £1,427,000 (£1,237,000 in 1896-1900). More than 400 small craft are employed in the sardine, tunny, cod and other fisheries. Large quantities of shell-fish are obtained from the lagoon of

Thau. There are factories for the pickling of sardines, for the manufacture of liqueurs and casks, and for the treatment of sulphur, phosphates, and nitrate of soda. The Schneider Company of Creusot also have metallur- gical works at Cette, and the establishments for making wine give employment to thousands. The port of Cette was created in 1666 by the agency of Colbert, minister of Louis XIV., and according to the plans of Vauban; toward the end of the 17th century its development was aided by the opening of the Canal du Midi.

CETTIGNE (Servian, Tsetinye; also written Cettinje, Tzetinje, and Tsettinye), the capital of Montenegro; in a narrow plain deeply sunk in the heart of the limestone mountains, at a height of 2093 ft. above the sea. Pop. (1900) about 3200. The sur- rounding country is bare and stony, with carefully cultivated patches of rich red soil among the crevices of the rock. In winter it is often so deeply covered with snow as to be well-nigh inaccessible, while in spring and autumn it is frequently flooded by the waters of a small brook which becomes a torrent after rain or a thaw. Cettigne itself is little more than a walled village, consisting of a cluster of whitewashed cottages and some unadorned public buildings. These include a church; a fortified monastery* which was founded in 1478, but so often burned and rebuilt as to seem quite modern, and which is visited by pilgrims to the tomb of Peter I. (1782-1830); resi- dences for the archimandrite and the vladika or metropolitan of Cettigne; a palace built in 1863, which accommodates the ministries; the court of appeal, and a school modelled on the gymnasia of Germany and Austria; the newer palaces of the prince and his heir; foreign legations; barracks; a seminary for priests and teachers, established by the tsar Alexander II. (1855-1881), with a very successful girls' school founded and endowed by the tsaritsa Marie; a library and reading-room; a theatre, a museum and a hospital. In an open space near the old palace stood the celebrated plane tree, beneath which Prince Nicholas gave audience to his subjects, and administered justice until the closing years of the 19th century. A zigzag highway, regarded as a triumph of engineering, winds through the mountain passes between Cettigne and the Austrian seaport of Cattaro; and other good roads give access to the richest parts of the interior. There is, however, little trade, though mineral waters are manufactured.

Cettigne owes its origin to Ivan the Black, who was forced, towards the end of the 15th century, to withdraw from Zhabliak, his former capital. It has often been taken and sacked by the

Turks, but has seldom been occupied by them for long.

CETUS (" The Whale "), in astronomy, a constellation of the southern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.), and fabled by the Greeks to be the monster sent by Neptune to devour Andromeda, but which was slain by Perseus. Ptolemy catalogued 22 stars in this constellation; Tycho Brahe, 21; and Hevelius, 45. The most remarkable star of this constellation is o-(Mira) Ceti, a long-period variable, discovered by the German astronomer Fabricius; its magnitude varies between about 3 to 9, and its period is ˆi 1 days. r-Celi is an irregular variable, its extreme magnitudes being 5 and 7; y-Ctti is a beautiful double star, consisting of a yellow star of magnitude 3 and a blue of magnitude 6-8; v-Ceti is also a double star.

CETYWAYO (?-i88 4), king of the Zulus, was the eldest son of King Umpande or Panda, and a nephew of the two previous kings, Dingaan and Chaka. Cetywayo was a young man when in 1840 his father was placed on the throne by the aid of the Natal Boers; and three years later Natal became a British colony. Cetywayo had inherited much of the military talent of his uncle Chaka, the organizer of the Zulu military system, and chafed under his father's peaceful policy towards his British and Boer neighbours. Suspecting Panda of favouring a younger son, Umbulazi, as his successor, Cetywayo made war on his brother, whom he defeated and slew at a great battle on the banks of the Tugela in December 1856. In the following year, at an assembly of the Zulus, it was resolved that Panda should retire from the mangement of the affairs of the nation, which were entrusted to Cetywayo, though the old chief kept the title of king. Cetywayo was, however, suspicious of the Natal government, which afforded protection to two of his brothers. The feeling of distrust was removed in 1861 by a visit from Mr (afterwards Sir) Theophilus Shepstone, secretary for native affairs in Natal, who induced Panda to proclaim Cetywayo publicly as the future king. Friendly relations were then maintained between the Zulus and Natal for many years. In 1872 Panda died, and Cetywayo was declared king, August 1873, in the presence of Shepstone, to whom he made solemn promises to live at peace with his neighbours and to govern his people more humanely. These promises were not kept. Not only were numbers of his own people wantonly slain (Cetywayo returning defiant messages to the governor of Natal when remonstrated with), and the military system of Chaka and Dingaan strengthened, but he had a feud

with the Transvaal Boers as to the possession of the territory between the Buffalo and Pongola rivers, and encouraged the chief Sikukuni (Secocoeni) in his struggle against the Boers. This feud with the Boers was inherited by the British government on the annexation of the Transvaal in 1877. Cetywayo's attitude became menacing; he allowed a minor chief to make raids into the Transvaal, and seized natives within the Natal border.

Sir Bartle Frere, who became high commissioner of South Africa in March 1877, found evidence which convinced him that the Kaffir revolt of that year on the eastern border of Cape Colony was part of a design or desire " for a general and simul- taneous rising of Kaffirdom against white civilization"; and the Kaffirs undoubtedly looked to Cetywayo and the Zulus as the most redoubtable of their champions. In December 1878 Frere sent the Zulu king an ultimatum, which, while awarding him the territory he claimed from the Boers, required him to make reparation for the outrages committed within the British borders, to receive a British resident, to disband his regiments, and to allow his young men to marry without the necessity of having first " washed their spears." Cetywayo, who had found a defender in Bishop Colenso, vouchsafed no reply, and Lord Chelmsford entered Zululand, at the head of 13,000 troops, on the nth of January 1879 to enforce the British demands. The disaster of Isandhlwana and the defence of Rorke's Drift signalized the commencement of the campaign, but on the 4th of July the Zulus were utterly routed at Ulundi. Cetywayo became a fugitive, but was captured on the 28th of August. His kingdom was divided among thirteen chiefs and he himself taken to Cape Town, whence he was brought to London in

August 1882. He remained in England less than a month, during which time the government (the second Gladstone administration) announced that they had decided upon his restoration. To his great disappointment, however, restoration proved to refer only to a portion of his old kingdom. Even there one of his kinsmen and chief enemies, Usibepu, was allowed to retain the territory allotted to him in 1879. Cetywayo was reinstalled on the 29th of January 1883 by Shepstone, but his enemies, headed by Usibepu, attacked him within a week, and after a struggle of nearly a year's duration he was defeated and

his kraal destroyed. He then took refuge in the Native Reserve, where he died on the 8th of February 1884. For a quarter of a century he had been the most conspicuous native figure in South Africa, and had been the cause of long and bitter political controversy in Great Britain.

His son Dinizulu afterwards attempted to become king, was exiled (1889) to St Helena, permitted to return (1898), and granted the position of a chief. In December 1907 Dinizulu was imprisoned at Maritzburg, being suspected of complicity in the revolt which had occurred in Zululand the previous year. He was kept many months waiting trial, there being considerable friction between the colonial government and the British government over the incident. He was eventually brought to trial in November 1908 before a special court, his defence (to the cost of which the British government contributed £2006} being undertaken by Mr W. P. Schreiner. The trial was not concluded until March 1909. The charge of high treason was not proved, but Dinizulu was convicted of harbouring rebels and was sentenced to four years' imprisonment.

The Life of Sir Bartle Frere, by John Martineau, vol. ii. chaps. 18 to 2 1 , contains much information concerning Cetywayo.

CEUTA (Arabic Sebta), a Spanish military and convict station and seaport on the north coast of Morocco, in 35° 54′ N., 5° 18′ W. Pop. about 13,000. It is situated on a promontory con- nected with the mainland by a narrow isthmus. This pro- montory marks the south-eastern end of the straits of Gibraltar, which between Ceuta and Gibraltar have a width of 14 m. The promontory terminates in a bold headland, the Montagne des Singes, with seven distinct peaks. Of these the highest is the Monte del Hacko, the ancient Abyla, one of the " Pillars of Hercules," which faces Gibraltar and rises 636 ft. above the sea. On the westernmost point — Almina, 476 ft. high—is a lighthouse with a light visible for 23 m. Ceuta consists of two quarters, the old town, covering the low ground of the isthmus, and the modern town, built on the hills forming the north and west faces of the peninsula. Between the old and new quarters and on the north side of the isthmus lies the port. The public buildings in the town, thoroughly Spanish in its character, are not striking: they include the cathedral (formerly a mosque), the governor's palace, the town hall, barracks, and the convict prison in the old convent of San Francisco. Ceuta has been fortified seaward, the works being furnished with modern ar- tillery intended to command the

entrance to the Mediterranean. Landward are three lines of defence, the inner line stretching completely across the isthmus. These fortifications, which date from the time of the Portuguese occupation, have been partly modernized. The citadel, El Hacho, built on the neck of the isthmus, dates from the 15th century. The garrison consists of between 3000 and 4000 men, inclusive of a disciplinary corps of military convicts. Of the rest of the population about 2000 are civilian convicts; and there are colonies of Jews, negroes and Moors, the last including descendants of Moors transferred to Ceuta from Oran when Spain abandoned that city in 1796.

Ceuta occupies in part the site of a Carthaginian colony, which was succeeded by a Roman colony said to have been called Ad Septem Fratres and also Exilissa or Lissa Civitas. From the Romans the town passed to the Vandals and afterwards to Byzantium, the emperor Justinian restoring its fortifications in 535. In 618 the town, then known as Septon, fell into the hands of the Visigoths. It was the last stronghold in North Africa which held out against the Arabs. At that date (a.d. 711) the governor of the town was the Count Julian who, in

revenge for the betrayal of his daughter by King Roderick of Toledo, invited the Arabs to cross the straits under Tarik and conquer Spain for Islam. By the Arabs the town was called Cibta or Sebta, hence the Spanish form Ceuta. From the date of its occupation by the Arabs the town had a stormy history, being repeatedly captured by rival Berber and Spanish-Moorish dynasties. It became nevertheless an important commercial and industrial city, being noted for its brass ware, its trade in ivory, gold and slaves. It is said to have been the first place in the West where a paper manufactory was established. In 1415 the town was captured by the Portuguese under John I.,' among those taking part in the attack being Prince Henry " the Navigator " and two of his brothers, who were knighted on the day following in the mosque (hastily dedicated as a Christian church). Ceuta passed to Spain in 1580 on the sub- jugation of Portugal by Philip II., and was definitely assigned to the Spanish crown by the treaty of Lisbon in 1688. The town has been several times unsuccessfully besieged by the Moors — one siege, under Mulai Ismail, lasting twenty-six years (1694- 1720). In 1810, with the consent of Spain, it was occupied by British troops under General Sir J. F. Fraser. The town was restored to Spain by the British at the close of the Napoleonic Wars. As the result of the war between Spain and Morocco in i860 the area of Spanish territory

around the town was increased. The military governor of the town also commands the troops in the other Spanish stations on the coast of Morocco. For civil purposes Ceuta is attached to the province of Cadiz. It is a free port, but does little trade.

See de Prado, Recuerdos de Africa; historic de la plaza de Ceuta (Madrid, 1850-1860) ; Budgett Meakin, The Land of the Moors (London, 1901), chap, xix., where many works dealing with Spanish Morocco are cited.

CEVA, a town of Piedmont, Italy, in the province of Cuneo, 33 m. E. by rail from the town of Cuneo, 1270 ft. above sea-level. Pop. (1901) 2703. In the middle ages it was a strong fortress defending the confines of Piedmont towards Liguria, but the fortifications on the rock above the town were demolished in 1800 by the French, to whom it had been ceded in 1796. Its cheese (caseus cebanus) was famous in Roman times, but it does not seem ever to have been a Roman town. It lay on the road between Augusta Taurinorum and Vada Sabatia. A branch railway runs from Ceva through Garessio, with its marble quarries, to Ormea (2398 ft.), 22 m. to the south through the upper valley of the Tanaro, which in Roman times was under Albingaunum (Th. Mommsen in Corp. Inscr. Lat. v. (Berlin, 1877), p. 898). From Ormea a road runs south to (31 m.) Oneglia on the Ligurian coast.

CEVENNES (Lat. Cebenna or Gebenna), a mountain range of southern France, forming the southern and eastern fringe of the central plateau and part of the watershed between the Atlantic and Mediterranean basins. It consists of a narrow ridge some 320 m. long, with numerous lofty plateaus and secondary ranges branching from it. The northern division of the range, which nowhere exceeds 3320 ft. in height, extends, under the name of the mountains of Charolais, Beaujolais and Lyonnais, from the Col de Longpendu (west of Chalon-sur-Sa6ne) in a southerly direction to the Col de Gier. The central Cevennes, comprising the volcanic chain of Vivarais, incline south-east and extend as far as the Lozere group. The northern portion of this chain forms the Boutieres range. Farther south it includes the Gerbier des Jones (5089 ft.), the Mont de Mezenc (5755 ft.), the culminating point of the entire range, and the Tanargue group. South of the Mont Lozere, where the Pic Finiels reaches 5584 ft., lies that portion of the range.to which the name Cevennes is most strictly applied. This region, now embraced in the departments of Lozere and Gard, stretches south to include the Aigoual and Esp6rou groups. Under various local names (the Garrigues, the mountains

of Espinouse and Lacaune) and with numerous offshoots the range extends south-east and then east to the Montagne Noire, which runs parallel to the Canal du Midi and comes to an end some 25 m. east of Toulouse. In the south the Cevennes separate the cold and barren tablelands

known as the Causses from the sunny region of Languedoc, where the olive, vine and mulberry flourish. Northwards the contrast between the two slopes is less striking.

The Cevennes proper are formed by a folded belt of Palaeozoic rocks which lies along the south-east border of the central plateau of France. Concealed in part by later deposits, this ancient mountain chain extends from Castelnaudary to the neighbourhood of Valence, where it sinks suddenly beneath the Tertiary and recent deposits of the valley of the Rhone. It is in the Montagne Noire rather than in the Cevennes proper that the structure of the chain has been most fully investigated. All the geological systems from the Cambrian to the Carboniferous are included in the folded belt, and J. Bergeron has shown that the gneiss and schist which form so much of the chain consist, in part at least, of metamorphosed Cambrian beds. The direction of the folds is about N. 6o° E., and the structure is complicated by overthrusting on an extensive scale. The overthrust came from the south-east, and the Palaeozoic beds were crushed and crumpled against the ancient massif of the central plateau. The principal folding took place at the close of the Carboniferous period, and was contemporaneous with that of the old Hercynian chain of Belgium, &c. The Permian and later beds lie unconformably upon the denuded folds, and in the space between the Montagne Noire and the Cevennes proper the folded belt is buried beneath the horizontal Jurassic strata of the Causses. Although the chain was completed in Palaeozoic times, a second folding took place along its south-east margin at the close of the Eocene period. The Secondary and Tertiary beds of the Languedoc were crushed against the central plateau and were frequently overfolded. But by this time the ancient Palaeozoic chain had become a part of the unyielding massif, and the folding did not extend beyond its foot.

As the division between the basins of the Loire and the Garonne

to the west and those of the Sa6ne and Rhone to the east, the Cevennes send many affluents to those rivers. In the south the Orb, the Herault and the Vidourle are independent rivers flowing to the Golfe du Lion; farther north, the Gard — formed by the union of several streams named Gardon — the Ceze and the Ardeche flow to the Rhone. The Vivarais mountains and the northern Cevennes approach the right banks of the Rhone and Sa6ne clpsely, and on that side send their waters by way of short torrents to those rivers; on the west side the streams are tributaries of the Loire, which rises at the foot of Mont M6zenc. A short distance to the south on the same side are the sources of the Allier and Lot. The waters of the north- western slope of the southern Cevennes drain into the Tarn either directly or by way of the Aveyron, which rises in the outlying chain of the Levezou, and, in the extreme south, the Agout. The Tarn itself rises on the southern slope of the Mont Lozere.

In the Lozere group and the southern Cevennes generally, good pasturage is found, and huge flocks spend the summer there. Silkworm-rearing and the cultivation of peaches, chest- nuts and other fruits are also carried on. In the Vivarais cattle are reared, while on the slopes of the Beaujolais excellent wines are grown.

The chief historical event in the history of the Cevennes is the revolt of the Camisards in the early years of the 18th century (see Camisards).

CEYLON, a large island and British colony in the Indian Ocean, separated on the N.W. from India by the Gulf of Manaar and Palk Strait. It lies between 5°s5'andg° 51'N. and between 79 41′ and 8i° 54′ E. Its extreme length from north to south is 2715 m.; its greatest width is 1375 m.; and its area amounts to 25,481 sq. m., or about five-sixths of that of Ireland. In its general outline the island resembles a pear, the apex of which points towards the north.

The coast is beset on the N.W. with numberless sandbanks,

rocks and shoals, and may be said to be almost connected with

Coa St India by the island of Rameswaram and Adam's

Bridge, a succession of bold rocks reaching almost

across the gulf at its narrowest point. Between the island and

the opposite coast there exist two open channels of varying depth and width, beset by rocks and shoals. One of these, the Manaar Passage, is only navigable by very small craft. The other, called the Paumben Passage, lying between Rameswaram and the mainland, has been deepened at considerable outlay, and is used by large vessels in passing from the Malabar to the Coromandel coast, which were formerly compelled in doing so to make the circuit of the island. The west and south coasts, which are uniformly low, are fringed their entire length by coco nut trees, which grow to the water's edge in great luxuriance, and give the island a most picturesque appearance. Along these shores there are numerous inlets and backwaters of the sea, some of which are available as harbours for small native craft. The east coast from Point de Galle to Trincomalee is of an entirely opposite character, wanting the ample vegetation of the other, and being at the same time of a bold precipitous character. The largest ships may freely approach this side of the island, provided they take care to avoid a few dangerous rocks, whose localities, however, are well known to navigators.

Seen from a distance at sea this " utmost Indian isle " of the old geographers wears a truly beautiful appearance. The remarkable elevation known as " Adam's Peak," the most prominent, though not the loftiest, of the hilly ranges of the interior, towers like a mountain monarch amongst an assemblage of picturesque hills, and is a sure landmark for the navigator when as yet the Colombo lighthouse is hidden from sight amid the green groves of palms that seem to be springing from the waters of the ocean. The low coast-line encircles the mountain zone of the interior on the east, south and west, forming a belt which extends inland to a varying distance of from 30 to 80 m.; but on the north the whole breadth of the island from Kalpitiya to Batticaloa is an almost unbroken plain, containing magnificent forests of great extent.

The mountain zone is towards the south of the island, and covers an area of about 4212 sq. m. The uplifting force seems to have been exerted from south-west to north-east, and although there is much confusion in many of the inter- talas' secting ridges, and spurs of great size and extent are sent off in many directions, the lower ranges manifest a remarkable tendency to run in parallel ridges in a direction from south-east to north-west. Towards the north the offsets of the mountain system radiate to short distances and speedily sink to the level of the plain. Detached hills are rare; the most celebrated of these are Mihintale (anc.

Missiaka), which overlooks the sacred city of Anuradhapura, and Sigiri. The latter is the only example in Ceylon of those solitary acclivities which form so remarkable a feature in the tableland of the Deccan — which, starting abruptly from the plain, with scarped and perpendicular sides, are frequently converted into strongholds accessible only by precipitous path- ways or by steps hewn in the solid rock.

For a long period Adam's Peak was supposed to be the highest mountain in Ceylon, but actual survey makes it only 7353 ft. above sea-level. This elevation is chiefly remarkable as the resort of pilgrims from all parts of the East. The hollow in the lofty rock that crowns the summit is said by the Brahmans to be the footstep of Siva, by the Buddhists of Buddha, by the Mahommedans of Adam, whilst the Portuguese Christians were divided between the conflicting claims of St Thomas and the eunuch of Candace, queen of Ethiopia. The footstep is covered by a handsome roof, and is guarded by the priests of a rich monastery half-way up the mountain, who maintain a shrine on the summit of the peak. The highest mountains in Ceylon are Pidurutalagala, 8296 ft. in altitude; Kirigalpota, 7836 ft.; and Totapelakanda, 7746 ft.

The summits of the highest ridges are clothed with verdure, and along their base, in the beautiful valleys which intersect them in every direction, the slopes were formerly covered with forests of gigantic and valuable trees, which, however, have disappeared under the axe of the planter, who felled and burnt the timber on all the finest slopes at an elevation of 2000 to 4500 ft., and Converted the hillsides into highly cultivated coffee and afterwards tea estates.

The plain of Nuwara Eliya, the sanatorium of the island, is at an elevation of 6200 ft., and possesses many of the attributes of an alpine country. The climate of the Horton plains, at an elevation of 7000 ft., is still finer than that of Nuwara Eliya, but they are difficult of access, and are but little known to Europeans. The town of Kandy, in the Central Province, formerly the capital of the native sovereigns of the interior, is situated 1727 ft. above sea-level.

The island, though completely within the influence of oceanic evaporation, and possessing an elevated tableland of considerable Rivers extent, does not boast of any rivers of great volume. The rains which usher in each monsoon or change of season are indeed heavy, and during their fall swell the streams to torrents and impetuous rivers. But when these cease the water-courses fall back to their original state, and there are few of the rivers which cannot generally be passed on horseback. The largest river, the Mahaweliganga, has a course of 206 m., draining about one-sixth of the area of the island before it reaches the sea at Trincomalee on the east coast. There are twelve other considerable rivers, running to the west, east and south, but none of these exceeds 90 m. in length. The rivers are not favourable for navigation, except near the sea, where they expand into backwaters, which were used by the Dutch for the construction of their system of canals all round the western and southern coasts. Steamers ply between Colombo and Negombo along this narrow canal and lake. A similar service on the Kaluganga did not prove a success. There are no inland lakes except the remains of magnificent artificial lakes in the north and east of the island, and the backwaters on the coast. The lakes which add to the beauty of Colombo, Kandy, Lake Gregory, Nuwara Eliya and Kurunegala are artificial or partly so. Giant's Tank is said to have an area of 6380 acres, and Minneri and Kalawewa each exceed 4000 acres.

The magnificent basin of Trincomalee, situated on the east coast of Ceylon, is perhaps unsurpassed in extent, security and beauty by any haven in the world. The admiralty had a dock- yard here which was closed in 1905.

Geology. — Ceylon may be said to have been for ages slowly rising from the sea, as appears from the terraces abounding in marine shells, which occur in situations far above high-water mark, and at some miles distance from the sea. A great portion of the north of the island may be regarded as the joint production of the coral polyps and the currents, which for the greater part of the year set impetuously towards the south; coming laden with alluvial matter collected along the coast of Coromandel, and meeting with obstacles south of Point Calimere, they have deposited their burdens on the coral reefs round Point Pedro; and these, raised above the sea-level and covered deeply by sand drifts, have formed the peninsula of Jaffna, and the plains that trend westward till they unite with the narrow causeway of Adam's Bridge. Tertiary rocks are almost unknown. The great

geological feature of the island is the profusion of gneiss, overlaid in many places in the interior by extensive beds of dolomitic limestone. This formation appears to be of great thickness; and when, as is not often the case, the under-surface of the gneiss series is exposed, it is invariably found resting on granite. Veins of pure quartz and felspar of considerable extent have been frequently met with in the gneiss; while in the elevated lands of the interior in the Galle districts may be seen copious deposits of disintegrated felspar, or kaolin, commonly known as porcelain clay. At various elevations the gneiss may be found intersected by veins of trap rock, upheaved whilst in a state of fusion subsequent to the consolidation of the former. In some localities on the seashore these veins assume the character of pitch-stone porphyry highly impregnated with iron. Hornblende and primitive greenstone are found in the vicinity of Adam's Peak and in the Pussellava district. Laterite, known in Ceylon as kabuk, a product of disintegrated gneiss, exists in vast quantities in many parts, and is quarried for building purposes.

Climate. — The seasons in Ceylon differ very slightly from those prevailing along the coasts of the Indian peninsula. The

two distinctive monsoons of the year are called, from the winds Which accompany them, the south-west and the north-east. The former is very regular in its approach, and may be looked for along the south-west coast between the 10th and 20th of May; the latter reaches the north-east coast between the end of October and the middle of November. There is a striking contrast in the influence which the south-west monsoon exerts on the one side of the island and on the other. The clouds are driven against the lofty mountains that overhang the western and southern coasts, and their condensed vapours descend there in copious showers. But the rains do not reach the opposite side of the island: while the south-west is deluged, the east and north are sometimes exhausted with dryness; and it not un- frequently happens that different sides of the same mountain present at the same moment the opposite extreme of droughts and moisture. The influence of the north-east monsoon is more general. The mountains which face the north-east are lower and more remote from the sea than those on the south-west; the clouds are carried farther inland, and it rains simultaneously on both sides of the island.

The length of the day, owing to the proximity of the island to the equator, does not vary more than an hour at any season. The

mean time of the rising of the sun's centre at Colombo on February 1st is 6 h 23 m a.m., and of its setting 6 h s m p.m. On August 1 5th its rising is at 5 h 45 m a.m., and its setting at 6 h 7 m p.m. It is mid-day in Colombo when it is morning in England. Colombo is situated in 79 50′ 45″ E., and the day is further advanced there than at Greenwich by 5 h i9 m 23 s .

Flora. — The characteristics of the low-growing plants of Ceylon approach nearly to those of the coasts of southern India. The Rhizophoreae are numerous along the low muddy shores of salt lakes and stagnant pools; and the acacias are equally abundant. The list comprises Aegiceras fragrans, Epithinia malayana, Thespesia populnea, Feronia elephantum, Salvadora persica (the true mustard tree of Scripture), Eugenia bracteata, Elaeodendron Roxburghii, Cassia Fistula, Cassia Roxburghii, &c. The herbaceous plants of the low country belong mostly to the natural orders Compositae,Leguminosae, Rubiaceae, Scrophulariaceae and Euphorbiaceae.

Leaving the plains of the maritime country and ascending a height of 4000 ft. in the central districts, we find both herbage and trees assume an altered character. The foliage of the latter is larger and deeper coloured, and they attain a height unknown in the hot low country. The herbaceous vegetation is there made up of ferns, Cyrtandreae, Compositae, Scitamineae and Urticaceae. The dense masses of lofty forest at that altitude are interspersed with large open tracts of coarse wiry grass, called by the natives patanas, and of value to them as affording pasturage for their cattle.

Between the altitudes of 4000 and 8000 ft., many plants are to be met with partaking of European forms, yet blended with tropical characteristics. The guelder rose, St John's wort, the Nepenthes distillatoria or pitcher plant, violets, geraniums, buttercups, sun-dews, ladies' mantles and campanulas thrive by the side of Magno- liaceae, Ranunculaceae, Elaeocarpeae, &c. The most beautiful flowering shrub of this truly alpine region is the rhododendron, which in many instances grows to the height of 70 ft. It is met with in great abundance in the moist plains of the elevated land above Nuwara Eliya, flowering abundantly in June and July. There are two distinct varieties, one similar to the Nilgiri plant, having its leaves broad and cordate, and of a rusty colour on the under side; the other, peculiar to Ceylon, is found only in forests at the loftiest elevations; it has narrow rounded leaves, silvery on the under side, and grows to enormous heights,

frequently measuring 3 ft. round the stem. At these altitudes English flowers, herbs and vegetables have been cultivated with perfect success, as also wheat, oats and barley. English fruit-trees grow, but rarely bear. Grapes are grown success- fully in the north of the island. The vines were introduced by the Dutch, who overcame the difficulty of perpetual summer by exposing the roots, and thus giving the plants an artificial winter.

The timber trees indigenous to Ceylon are met with at every altitude from the sea-beach to the loftiest mountain peak. They vary much in their hardiness and durability, from the common cashew-nut tree, which when felled decays in a month, to the ebony and satinwood, which for many years resist the attacks of insects and climate. Many of the woods are valuable for furniture, and house and shipbuilding, and are capable of standing long exposure to weather. The most beautiful woods adapted to furniture work are the calamander, ebony, flowered satinwood, tamarind, nedun, dell, kadomberiya, kitul, coco-nut, &c. ; the sack-yielding tree (Antiaris saccidora), for a long time confounded with the far-famed upas tree of Java {Antiaris toxicaria), grows in the Kurunegala district of the island. The Cocos nucifera, or coco-nut palm, is a native of the island, and may justly be considered the most valuable

of its trees. It grows in vast abundance along the entire sea-coast of the west and south sides of the island, and furnishes almost all that a Sinhalese villager requires. Its fruit, when green, supplies food and drink; when ripe, it yields oil. The juice of the unopened flower gives him toddy and arrack. The fibrous casing of the fruit when woven makes him ropes, nets, matting. The nut-shells form drinking-vessels, spoons, &c. The plaited leaves serve as plates and dishes, and as thatch for his cottage. The dried leaves are used as torches, the large leaf -stalks as garden fences. The trunk of the tree sawn up is employed for every possible purpose, from knife-handles to door-posts; hollowed out it forms a canoe or a coffin. There are four kinds of this palm — the common, the king, the dwarf and the Maldive. The Palmyra and Areca palms grow luxuriantly and abundantly, the former in the northern, the latter in the western and central districts. The one is valuable chiefly for its timber, of which large quantities are exported to the Indian coasts; the other supplies the betel-nut in

common use amongst natives of the eastern tropics as a masticatory. The export trade in the latter to India and eastern ports is very considerable. Next in importance to the coco- nut palm among the indigenous products of Ceylon is the cinnamon plant, yielding the well-known spice of that name.

Fauna. — Foremost among the animals of Ceylon is the elephant, which, though far inferior to those of Africa and the Indian continent, is nevertheless of considerable value when tamed, on account of its strength, sagacity and docility. They are to be met with in greater or less numbers throughout most unfrequented parts of the interior. Occasionally they make inroads in herds upon the cultivated grounds and plantations, committing great damage. In order to protect these lands, and at the same time keep up the government stud of draught elephants, ” kraals ” or traps on a large scale are erected in the forests, into which the wild herds are driven; and once secured they are soon tamed and fit for service. The oxen are of small size, but hardy, and capable of drawing heavy loads. Buffaloes exist in great numbers throughout the interior, where they are employed in a half-tame state for ploughing rice-fields and treading out the corn. They feed upon any coarse grass, and can therefore be main- tained on the village pasture-lands where oxen would not find support. Of deer, Ceylon possesses the spotted kind {Axis maculata), the muntjac (Stylocerus muntjac), a red deer (the Sambur of India), popularly called the Ceylon elk (Musa Aristotelis) , and the small musk (Moschus minima). There are five species of monkeys, one the small rilawa (Macacus pileatus), and four known in Ceylon by the name of ” wandaru ” (Presbytes ur sinus, P. Ther sites, P. cephalo- pterus, P. Priamus), and the small quadrumanous animal, the loris (Loris gracilis), known as the ” Ceylon sloth.” Of the Cheiroptera sixteen species have been identified; amongst them is the rousette or flying fox (Pteropus Edwardsii). Of the Carnivora the only one dangerous to man is the small black bear (Prochilus labiatus). The tiger is not known in Ceylon, but the true panther (Felis pardus) is common, as is the jackal (Canis aureus) and the mongoose or ich- neumon (Herpestes vitticollis). Rats are numerous, as are the squirrel and the porcupine, and the pig-rat or bandicoot (Mus bandi- cota), while the scaly ant-eater (Mams pentedactyla) , locally known by the Malay name of pangolin, is occasionally found. The dugong (Halicore dugong) is frequently seen on various points of the coast. A game preservation society and the judicious action of government have done much to prevent the wanton destruction of Ceylon deer,

elephants, &c, by establishing a close season. It is estimated that there must be 5000 wild elephants in the Ceylon forests. A licence to shoot or capture and an export royalty are now levied by govern- ment.

Captain V. Legge includes' 371 species of birds in Ceylon, and many of them have splendid plumage, but in this respect they are surpassed by the birds of South America and Northern India. The eagles are small and rare, but hawks and owls are numerous; among the latter is a remarkable brown species, the cry of which has earned for it the name of the " devil-bird." The esculent swift, which furnishes in its edible nest the celebrated Chinese dainty, builds in caves in Ceylon. Crows of various species are numerous, and in the wilder parts pea-fowl are abundant. There are also to be mentioned king- fishers, sun-birds, several beautiful fly-catchers and snatchers, the golden oriole, parroquets and numerous pigeons, of which there are at least a dozen species. The Ceylon jungle-fowl (Gallus Lafayetti) is distinct from the Indian species. Ceylon is singularly rich in wading and water birds— ibises, storks, egrets, spoonbills and herons being frequently seen on the wet sands, while flamingoes line the beach in long files, and on the deeper waters inland are found teal and a countless variety of ducks and smaller fowl. Of the birds familiar to European sportsmen there are partridge, quail and snipe in abundance, and the woodcock has been seen.

The poisonous snakes of Ceylon are not numerous. Four species have been enumerated — the ticpolonga (Daboia elegans), the cobra di capello (Naja tripudians), the carawilla (Trigonocephaly hypnale), and the Trigonocephaly nigromarginatus, which is so rare that it ha9 no popular name. The largest snake in Ceylon is the " boa," or "anaconda" of Eastern story (Python reticulatus) ; it is from 20_to 30 ft. in length, and -preys on hog-deer and other smaller animals. Crocodiles infest the rivers and estuaries, and the large fresh-water reservoirs which supply the rice-fields; there are two species (C. biporcatns and C. palustris). Of lizards the most note-

worthy are the iguana, several bloodsuckers, the diameleon and the familiar geckoes, which are furnished with pads to each toe, by which they are enabled to ascend perpendicular walls and adhere to glass and ceilings.

Insects exist m great numbers. The leaf and stick insects are of great variety and beauty. Ceylon has four species of the ant-lion,

renowned for the predaceous ingenuity of its larvae; and the white ants or termites, the ravages of which are most destructive, aTe at once ubiquitous and innumerable in every place where the climate is not too chilly or the soil too sandy for them to construct their domed dwellings. They make their way through walls and floors, and in a few hours destroy every vegetable substance within their reach. Of all the insect pests that beset an unseasoned European the most annoying are the mosquitoes. Ticks are also an intolerable nuisance; they are exceedingly minute, and burrow under the skin. In the lower ranges of the hill country land leeches are found in tormenting profusion. But insects and reptiles do not trouble Euro- pean residents so much as in early years — at any rate in the towns, while in the higher planting districts there is almost complete exemption from their unwelcome attentions. Bungalows are more carefully built to resist white ants, drainage and cleanliness prevent mosquitoes and ticks from multiplying, while snakes and leeches avoid cultivated, occupied ground.

Of the fish in ordinary use for the table the finest is the seir, a species of scomber (Cybium guttatum). Mackerel, dories, carp, whitings, mullet (red and striped), soles and sardines are abundant. Sharks appear on all parts of the coast, and the huge saw fish (Pristis antiquorum) infests the eastern coast of the island, where it attains a length of 12 to 15 ft. There are also several fishes remarkable for the brilliancy of their colouring ; e.g. the Red Sea perch (Holocentrunt rubrum), of the deepest scarlet, and the great fire fish (Scorpaena miles), of a brilliant red. Some are)purple, others yellow, and numbers with scales of a lustrous green are called ” parrots ” by the natives; of these one (Sparus Hardwichii) is called the ” flower parrot,” from its exquisite colouring — irregular bands of blue, crimson and purple, green, yellow and grey, crossed by perpendicular stripes of black. The pearl fishery, as indicated below, is of great importance.

Population. — The total population of Ceylon in 1901, inclusive of military, shipping and 4914 prisoners of war, was 3,578,333, showing an increase of i8-8% in the decade. The population of Colombo was 158,228.

The population and area of the nine provinces was as follows : —

District.

Western Province Central Province . Northern Province . Southern Province Eastern Province North- Western Province North Central Province . Province of Uva ... Province of Sabaragamuwa

Population.

925-342 623,011 341.985 566,925

174,288

353.845

79,110

192,072

32L755

3.578,333

Area in sq. m.

1.432

2.299!

3.363i

2,1461

4.036!

2.996J

4,oo2t

3-i54i

1,9015

25,332

The table of nationality gives the principal groups as follows : —

Europeans 9,509

Burghers and Eurasians 23,539

Low-country Sinhalese 1,458,320

Kandyan Sinhalese 872,487

Tamils 953,535

Moors (Mahommedan) 228,706

Malays 11,963

Veddahs (Aborigines) . 3,97i

Altogether there are representatives of some seventy races in Ceylon. The /veddahs, who run wild in the woods, are the aborigines of the island.

Language. — The language of nearly 70% of the population is Sinhalese, which is nearly allied to Pali (q.v.) ; of the remaining 30%, with the exception of Europeans, the language is Tamil. A corrupt form of Portuguese is spoken by some natives of European descent. The Veddahs, a small forest tribe, speak a distinct language, and the Rodiyas, an outcast tribe, possess a large vocabulary of their own. The Sinhalese possess several original poems of some merit, and an extensive and most interesting series of native chronicles, but their most valuable literature is written in Pali, though the greater portion of it has been translated into Sinhalese, and is best known to the people through these Sinhalese translations.

Religion. — The principal religions may be distributed as follows: — Christians, 349,239; Buddhists, 2,141,404; Hindus, 826,826; Mahommedans, 246,118. Of the Christians, 287,419 are Roman Catholics, and 61,820 are Protestants of various denominations; and of these Christians 319,001 are natives, and 30,238 Europeans. The Mahommedans are the descendants of Arabs (locally termed Moormen) and the Malays. The Tamils, both the inhabitants of the island and the immigrants from India, are Hindus, with the exception of 93,000 Christians. The Sinhalese, numbering 70% of the whole

population, are, with the exception of 180,000 Christians, Buddhists. Ceylon may properly be called a Buddhist country,

and it is here that Buddhism is found almost in its pristine purity. Ceylon was con- verted to Buddhism in the 3rd century B.C. by the great Augustine of Buddhism, Mahinda, son of the Indian king Asoka ; and the ex- tensive ruins throughout Ceylon, especially in the ancient cities of Anuradhapura and Polonnaruwa, bear witness to the sacrifices which kings and people joined in making to create lasting monu- ments of their faith. The Buddhist temples in the Kandyan country possess valuable lands, the greater portion of which is held by hereditary tenants on the tenure of service. These lands were given out with much care to provide for all that was necessary to maintain the temple and its connected monastery. Some tenants had to do the blacksmiths' work, others the carpenters', while another set of tenants had to cultivate the land reserved for supplying the monas- tery; others again had to attend at the festivals, and prepare decorations, and carry lamps and banners. In course of time difficulties arose ; the English courts were averse to a system under which the rent of lands was paid by hereditary service, and a com- mission was issued by Sir Hercules Robinson (afterwards Lord Rosmead) when governor, to deal with the whole question, to define the services and to enable the tenants to commute these for a money payment. The result of the inquiry was to show that the services, except in a few instances, were not onerous, and that almost without an exception the tenants were willing to continue the system. The anomaly of an ecclesiastical establishment of Anglican and Presby- terian chaplains with a bishop of Colombo paid out of the general revenues has now been abolished in Ceylon, and only the bishop and two or three incumbents remain on the list for life, or till they retire on pension.

Education. — There has been a great advance in public instruction since 1875, through the multiplication of vernacular, Anglo-ver- nacular and English schools by government, by the different Christian missions and by the Buddhists and Hindus who have come forward to claim the government grant. The government has also started a technical college, and an agricultural school has been reorganized. An agricultural department, recommended by a commission, should profit by the services of the entomologist, mycologist and chemical analyst added by the governor to the staff of the royal botanic gardens at Peradeniya. There are industrial and reformatory schools, which are partially supported by govern- ment. In spite of the great advance that has been made, however, at the census of 1901 no

fewer than 2,790,235 of the total population were entered as unable to read or write their own tongue. Of this number 1,553,078 were females, showing a very unsatisfactory state of things.

A griculture. — The natural soils of Ceylon are composed of quartzose gravel, felspathic clay and sand often of a pure white, blended with _ ., or overlaid by brown and red loams, resulting from the

‘ decay of vegetable matter, or the disintegration of the

gneiss and hornblende formations. The whole of the great northern extremity of the island consists of a sandy and calcareous admixture, made to yield productive crops of grain, tobacco, cotton and vege- tables by the careful industry of the Tamil population, who spare no pains in irrigating and manuring their lands. Between the northern districts and the elevated mountain ranges which overlook the Bintenne and Uva countries are extensive plains of alluvial soil washed down from the table-lands above, where once a teeming popu- lation produced large quantities of grain. The remains of ancient works of irrigation bear testimony to the bygone agriculture of these extensive regions now covered by swamps or dense jungle.

The general character of the soil in the maritime provinces to the east, south and west is sandy. Large tracts of quartzose sand spread along the whole line of sea-coast, some of which, of a pure white, and very deficient in vegetable matter, is admirably adapted to the growth of the cinnamon plant. In the light sandy districts where the soil is perfectly free, and contains a portion of vegetable and mineral loam, the coco-nut palm flourishes in great luxuriance. This is the case along the entire coast line from Kalpitiya to Point de Galle, and farther eastward and northward to Matara, stretching to a distance inland varying from 100 yds. to 3 m. From this light sandy belt as far as the mountain-zone of the Kandyan country the land is mainly composed of low hilly undulations of sandstone and ferruginous clay, incapable of almost any cultivation, but intersected in every direction with extensive valleys and wide plains of a more generous soil, not highly fertile, but still capable, with a little industry, of yielding ample crops of rice..

The soil of the central province, although frequently containing great quantities of quartzose sand and ferruginous clay, is in

many of the more elevated districts of a fine loamy character. Sand sufficiently vegetable and light for rice culture may be seen at all elevations in the hill districts; but the fine chocolate and brown loams overlying gneiss or limestone formations, so admirably adapted for coffee cultivation, are only to be found on the steep sides or along the base of mountain ranges at an elevation varying from 2000 to 4000 ft. Such land, well-timbered, contains in its elements the decom- posed particles of the rocks above, blended with the decayed vegetable matter of forests that have for centuries scattered beneath them the germs of fertility. The quantity of really rich coffee land in these districts is but small as compared with the extent of country — vast

tracts of open valleys consisting of an indifferent yellow tenacious soil interspersed with many low ranges of quartz rock, but tea is a much hardier plant than coffee, and grows on poorer soil.

Irrigation. — The native rulers covered the whole face of the country with a network of irrigation reservoirs, by which Ceylon was enabled in ancient times to be the great granary of southern Asia. Wars, and the want of a strong hand to guide the agriculture of the country, led to the decay of these ancient works, and large tracts of land, which were formerly highly productive, became swampy wastes or dense forests. The remains of some of the larger irrigation works are amongst the most interesting of the memorials of Ceylon's former greatness. Some of the artificial lakes were of great size. Minneri, formed by damming across the valleys between the low hills which surround it with an embankment 60 ft. wide at the top, is at this day 20 m. in circumference. It has recently been restored by government, and is capable of irrigating 15,000 acres; while the Giant's Tank, which has also been restored, irrigates 20,000 acres. Another lake, with an embankment several miles in length, the Kalawewa, was formed by damming back the waters of the Kalaoya, but they have forced their way through the embank- ment, and in the ancient bed of the lake, or tank, are now many small villages. In connexion with these large tanks were numerous canals and channels for supplying smaller tanks, or for irrigating large tracts of fields. Throughout the district of Nuwarakalawiya every village has its tank. The embankments have been formed with great skill, and advantage has been taken to the utmost of the slightest fall in the land ; but they in common with the larger works had been allowed to fall into decay, and were being brought to destruction by the evil practice

of cutting them every year to irrigate the fields. The work of restoring these embankments was undertaken by the government, and 100 village tanks were repaired every year, besides eighteen larger works. In 1900 a sum of five million rupees was set apart for these larger undertakings.

Cultivation and Products. — The area of uncultivated land is little over 3§ million acres, whereas fully four times that amount is capable of cultivation. A great deal is waste, besides lagoons, tanks, backr waters, &c. Thick forest land does not cover more than 5000 sq. m. Scrub, or chena, and patana grass cover a very great area. Tea, cacao, cardamoms, cinchona, coffee and indiarubber are the products cultivated by European and an increasing number of native planters in the hill country and part of the low country of Ceylon. A great change has been effected in the appearance of the country by the introduction of the tea plant in place of the coffee plant, after the total failure of the latter owing to disease. For some time coffee had been the most important crop. In the old days it grew wild like cinnamon, and was exported so far back as the time of the Portu- guese, but was lightly esteemed as an article of European commerce, as the berry was gathered unripe, was imperfectly cured and had little flavour. In 1824 the governor, Sir E. Barnes, introduced coffee cultivation on the West Indian plan; in 1834 the falling off of other sources of supply drew general attention to Ceylon, and by 1841 the Ceylon output had become considerable, and grew steadily (with an interval in 1847 due to a commercial crisis) till 1877 when 272,000 acres were under coffee cultivation, the total export amounting to 103,000,000 lb. Then owing to disease came a crisis, and a rapid decline, and now only a few thousand acres are left. On the failure of the coffee crops planters began extensively to grow the tea plant, which had already been known in the island for several years. By 1882 over 20,000 acres had been planted with tea, but the export that year was under 700,000 lb. Five years later the area planted was 170,000 acres, while the export had risen to nearly 14,000,000 lb. By 1892 there were 262,000 acres covered with tea, and 71,000,000 lb were that year exported. In 1897, 350,000 acres were planted, and the export was 1 1 6,000,000 lb. By the beginning of the 20th century, the total area cultivated with tea was not under 390,000 acres, while the estimate of shipments was put at 146,000,000 lb annually. Nearly every plantation has its factory, with the machinery necessary to prepare the leaf as brought in from the bushes until it becomes the tea of commerce. The total amount of

capital now invested in the tea industry in Ceylon cannot be less than £10,000,000. The tea-planting industry more than anything else has raised Ceylon from the depressed state to which it fell in 1882.

Before tea was proved a success, however, cinchona cultivation was found a useful bridge from coffee to the Ceylon planter, who, however, grew it so freely that in one year 15,000,000 lb bark was shipped, bringing the price of quinine down from 16s. to is. 6d. an ounce.

In a few places, where the rainfall is abundant, rice cultivation is allowed to depend on the natural supply of water, but in most parts the cultivation is not attempted unless there is secured before- hand a certain and sufficient supply, by means of canals or reservoirs. In the hill country every valley and open plain capable of tillage is made to yield its crops of grain, and the steep sides of the hills are cut into terraces, on which are seen waving patches of green rice watered by mountain streams, which are conducted by means of channels ingeniously carried round the spurs of the hills and along the face of acclivities, by earthen water-courses and bamboo aque- ducts, so as to fertilize the fields below. These works bear witness to the patience, industry and skill of the Kandyan villagers. In the low country, to the north and east and north-west of the hills,

irrigation works of a more expensive kind are necessary. In January 1892, the immemorial rent or tax on fields of paddy (rice in the husk) was removed, but not the customs duty on imported rice. But even with the advantage of protection to the extent of 10% in the local markets, there has been no extension of paddy cultivation; on the contrary, the import of grain from India has grown larger year by year. Through the multiplication of irrigation works and the northern railway, rice culture may be sufficiently extended to save some of the large imports (8,000,000 to 9,000,000 bushels annually) now required from India.

Tobacco is extensively cultivated in various parts of the island, and the growth of particular places, such as Dumbara and Uva, is much prized for local consumption. The tobacco of export is

grown in the peninsula of Jaffna. The exports of this article in 1850 were 22,176 cwts., valued at £20,698. The cultivation of the plant has not greatly increased of recent years, and is almost entirely in the hands of natives in the northern and parts of the central Province.

Ceylon has been celebrated since the middle of the 14th century for its cinnamon, and during the period of the Dutch occupation this spice was the principal article of commerce; under their rule and up to 1832 its cultivation was a government monopoly. With the abolition of the monopoly the quantity exported increased, but the value declined.

Unlike the coffee plant, the hardy tea plant grows from sea-level to 7000 ft. altitude; but crown forest-lands above 5000 ft. are no longer sold, so that a very large area on the highest mountain ranges and plateaus is still under forest. Moreover, on the tea plantations arboriculture is attended to in a way unknown in 1875; the Aus- tralian eucalypts, acacias and grevilleas, Indian and Japanese conifers, and other trees of different lands, are now freely planted for ornament, for protection from wind, for firewood or for timber. A great advance has been made at Hakgalla and Nuwara Eliya, in Upper Uva, and other high districts, in naturalizing English fruits' and vegetables. The calamander tree is nearly extinct, and ebony and other fine cabinet woods are getting scarce; but the conser- vation of forests after the Indian system has been taken in hand under a director and trained officers, and much good has been done. The cinnamon tree (wild in the jungles, cultivated as a shrub in plantations) is almost the only one yielding a trade product which is indigenous to the island. The coco-nut and nearly all other palms have been introduced.

Among other agricultural products mention must be made of cacao, the growth and export of which have steadily extended since coffee failed. Important also is the spice or aromatic product of cardamoms.

The culture of indiarubber was begun on low-country plantations, and Ceylon rubber is of the best quality in the market. The area of cultivation of the coco-nut palm has been greatly extended since 1875 by natives as well as by Europeans. The products of this palm that are exported, apart from those so extensively used in the island itself, exceed in a good year £1,000,000 sterling in value. Viticulture and cotton cultivation,

as well as tobacco growing, are being developed along the course of the new northern railway.

Taking the trade in the products mentioned as a whole, no country can compete with the United Kingdom as a customer of Ceylon. But there is a considerable trade in nearly all products with Germany and America; in cardamoms with India; in cinnamon with Spain, Italy, Belgium, Australia, Austria and France ; and in one or other of the products of the coco-nut palm (coco-nuts, coco-nut oil; copra, desiccated coco-nut, poonac, coir) with Belgium, Russia, France, Austria, Australia and Holland.

Pearl Fishery.— Pearl oysters are found in the Tambalagam bay, near Trincomalee, but the great banks on which these oysters are usually found lie near Arippu, off the northern part of the west coast of Ceylon, at a distance of from 16 to 20 m. from the shore. They extend for many miles north and south, varying considerably in their size and productiveness. It is generally believed that the oyster arrives at maturity in its seventh year, that the pearl is then of full size and perfect lustre, and that if the oyster be not then secured it will shortly die, and the pearl be lost. It is certain that from some unexplained cause the oysters disappear from their known beds for years together. The Dutch had no fishery from 1732 to 1746, and it failed them again for twenty-seven years from 1768 to 1796. The fishery was again interrupted between 1820 and 1828, also from 1833 to 1854, from 1864 to 1873, and again from 1892 to 1900. The fishery of 1903 was the first since 1891, and produced a revenue of Rs.829,348, being the third largest on record. In 1797 and 1798 the government sold the privilege of fishing the oyster-beds for £123,982 and £142,780 respectively. From that time the fishery was conducted by the government itself until 1906, when it was leased to the Ceylon Pearl Fisheries Company for twenty years at a rent of £20,000 a year. Professor Herdman, F.R.S., was appointed to inquire and report on the conservation and cultivation of the Ceylon pearl-oyster, and visited Ceylon in January 1902. In consequence of his report, a marine laboratory for the culture of the pearl oysters was established in Galle harbour under the care of Mr Hornell.

Mineral Industries. — Commercially there are two established mineral industries: — (1) that of digging for precious stones; and (2) the much more important industry of digging for plumbago or

graphite, the one mineral of commercial importance found.

Further developments may result in the shipment of the exceptionally pure iron ore found in different parts of Ceylon, though still no coal has been found to be utilized with it. Several places, too — Ruanwella, Rangalla, Rangbodde, &c. — indicate where gold was found in the time of the Kandyan kings; and geologists might possibly indicate a paying quartz reef, as in Mysore. Owing to the greatly increased demand in Europe and America, plumbago in 1 899 more than doubled in price, rising from £40 to £80, and even £100 a ton for the finest. Latterly there has been a considerable fall, but the permanent demand is likely to continue keen in consequence mainly of the Ceylon kind being the best for making crucibles. The trade with Great Britain and the United States has slightly decreased, but there has been a rapid expansion in the exports to Belgium and Holland, Russia, Japan and Victoria; and the industry seems to be estab- lished on a sound basis. One consequence of its development has been to bring European and Americaa capitalists and Cornish and Italian miners into a field hitherto almost entirely worked by Sinhalese. Though some of the mines were carried to a depth of 1000 ft., the work was generally very primitive in character, and Western methods of working are sure to lead to greater safety and economy. Besides a royalty or customs duty of 5 rupees (about 6s. 8d.) per ton on all plumbago exported, the government issue licenses at moderate rates for the digging of plumbago on crown lands, a certain share of the resulting mineral also going to government. The plum- bago industry, in all its departments of mining, carting, preparing, packing and shipping, gives employment to fully 100,000 men and women, still almost entirely Sinhalese. The wealthiest mine-owners, too, are Sinhalese land-owners or merchants.

As regards gems, there are perhaps 500 gem pits or quarries worked in the island during the dry season from November to June in the Ratnapura, Rakwane and Matara districts. Some of these are on a small scale; but altogether several thousands of Sinhalese find a precarious existence in digging for gems. Rich finds of a valuable ruby, sapphire, cat's-eye, amethyst, alexandrite or star stone, are comparatively rare; it is only of the commoner gems, such as moonstone, garnet, spinels, that a steady supply is obtained. The cat's-eye in its finer qualities is peculiar to Ceylon, and is occasion- ally in great demand, according to the fashion. The obstacle to the investment of European capital in " gemming " has always been the difficulty of preventing the native labourers in the pits- — even if practically

naked— from concealing and stealing gems. A Chamber of Mines, with a suitable library, was established in Colombo duringl899.

Manufactures.- — Little is done save in the preparation in factories and stores, in Colombo or on the plantations, of the several products exported. The manufacture of jewellery and preparation of precious stones, and, among native women and children, of pillow lace, give employment to several thousands. Iron and engineering works are numerous in Colombo and in the planting districts. The Sinhalese are skilful cabinetmakers and carpenters. The Moormen and Tamils furnish good masons and builders.

Commerce. — There has been rapid development since 1882, and the returns for 1903 showed a total value of 22 J millions sterling. The principal imports were articles of food and drink (chiefly rice from India) manufactured metals (with specie), coal, cotton yarns and piece goods from Manchester, machinery and millwork and apparel. The Ceylon customs tariff for imports is one of 65% ad valorem, save in the case of intoxicating drinks, arms, ammunition, opium, &c. The chief export is tea.

Roads. — The policy of the Sinhalese rulers of the interior was to exclude strangers from the hill country. Prior to the British occupation of the Kandyan territory in 18 15, the only means of access from one district to another was by footpaths through the forests. The Portuguese do not appear to have attempted to open up the country below the hills, and the Dutch confined themselves to the improvement of the inland water-communications. The British government saw from the first the necessity of making roads into the interior for military purposes, and, more recently, for developing the resources of the country. The credit of opening up the country is due mainly to the governor, Sir Edward Barnes, by whose direction the great military road from Colombo to Kandy was made. Gradually all the military stations were connected by broad tracks, which by degrees were bridged and converted into good carriage roads. The governors Sir Henry Ward and Sir Hercules Robinson recognized the importance of giving the coffee planters every assistance in opening up the country, and the result of their policy is that the whole of the hill country is now intersected by a vast number of splendid roads, made at a cost of upwards of £2000 per mile. In 1848 an ordinance was passed to levy from every adult male in the colony (except Buddhist priests and British soldiers) six days' labour on the roads, or an equivalent in money. The labour and money

obtained by this wise measure have enabled the local authorities to connect the government highways by minor roads, which bring every village of importance into communication with the principal towns.

Railways. — After repeated vain attempts by successive governors to connect Colombo with the interior by railways, Sir Charles MacCarthy successfully set on foot a railway of 75 m. in length from Colombo to Kandy. The railway mileage had developed to 563 m. in 1908, including one of thejr finest mountain lines in the world —

over 160 m. long, rising to 6200 ft. above sea-level, and falling at the terminus to 4000 ft. The towns of Kandy, Matale, Gampola, Nawa- lapitiya, Hatton and Haputale (and practically Nuwara Eliya) in the hills, are thus connected by rail, and in the low country the towns of Kurunegala, Galle, Matara, Kalutara, &c. Most of the debt on the railways (all government lines) is paid off, and the traffic receipts now make up nearly one-third of the general revenue. An Indo- Ceylon railway to connect the Indian and Ceylon systems has been the subject of separate reports and estimates by engineers serving the Ceylon and Indian governments, who have pronounced the work across the coral reef between Manaar and Rameswaram quite feasible. A commission sat in 1903 to consider the gauge of an Indo-Ceylon railway. Such a line promised to serve strategic as well as commercial purposes, and to make Colombo more than ever the port for southern India. The headquarters of the mail steamers have been removed from Galle to Colombo, where the colonial government have constructed a magnificent breakwater, and under- taken other harbour works which have greatly augmented both the external trade and the coasting trade of the island.

Government. — Ceylon is a crown colony, that is, a possession of the British crown acquired by conquest or cession, the affairs of which are administered by a governor, who receives his appointment from the crown, generally for a term of six years. He is assisted by an executive and a legislative council. The executive council acts as the cabinet of the governor, and consists of the attorney-general, the three principal officers of the colony (namely, the colonial secre- tary, the treasurer and the

auditor-general), and the general in command of the forces. The legislative council includes, besides the governor as president and nine official members, eight unofficial members — one for the Kandyan Sinhalese (or Highlanders) and one for the " Moormen " having been added in 1890. The term of office for the unofficial members is limited to five years, though the governor may reappoint if he choose. The king's advocate, the deputy-advocate, and the surveyor-general are now respectively styled attorney-general, solicitor-general, and director of public works. The civil service has been reconstituted into five classes, not including the colonial secretary as a staff appointment, nor ten cadets; these five classes number seventy officers. The district judges can punish up to two years' imprisonment, and impose fines up to Rs.iooo. The police magistrates can pass sentences up to six months' imprisonment, and impose fines of Rs.150. The criminal law has since 1890 been codified on the model of the Indian penal code; criminal and civil procedure have also been the subject of codification. There are twenty-three prisons in the island, mostly small; but convict establishments in and near the capital take all long-sentence prisoners.

Banks and Currency. — Ceylon has agencies of the National Bank of India, Bank of Madras, Mercantile Bank of India, Chartered Bank of India, Australia and China, and of the Hong-kong and Shanghai Bank, besides mercantile agencies of other banks, also a govern- ment savings bank at Colombo, and post-office savings banks all over the island. In 1884, on the failure of the Oriental Bank, the notes in currency were guaranteed by government, and a government note currency was started in supersession of bank notes. The coin currency of Ceylon is in rupees and decimals of a rupee, the value of the standard following that fixed for the Indian rupee, about is. 4d. per rupee.

Finance. — With the disease of the coffee plant the general revenue fell from Rs. 1,70,00,000 in 1877 to Rs. 1,20,00,000 in 1882, when trade vvas in a very depressed state, and the general prosperity of the island was seriously affected. Since then, however, the revenue has steadily risen with the growing export of tea, cocoa-nut produce, plumbago, &c, and in 1902 it reached a total of 28 millions of rupees. (J. F. D.; C. L.)

History. — The island of Ceylon was known to the Greeks and Romans under the name of Taprobane, and in later times Serendib, Sirinduil and Zeylan have been employed to designate it by writers of the Western and Eastern worlds. Serendib is a

corruption of the Sanskrit Sinhaladvipa. Like most oriental countries, Ceylon possesses a great mass of ancient records, in which fact is so confused with fable that they are difficult to distinguish. The labours of George Tumour (1 799-1843), however, helped to dissipate much of this obscurity, and his admirable edition (1836) of the Mahavamsa first made it possible to trace the main lines of Sinhalese history.

The Sinhalese inscriptional records, to which George Tumour first called attention, and which, through the activity of Sir William Gregory in 1874, began to be accurately transcribed and translated, extend from the 2nd century B.C. onwards. Among the oldest inscriptions discovered are those on the rock cells of the Vessagiri Vihara of Anuradhapura, cut in the old Brahma-lipi character. The inscriptions show how powerful was the Buddhist hierarchy which dominated the government and national life. The royal decrees of successive rulers are

mainly concerned with the safeguarding of the rights of the hierarchy, but a few contain references to executive acts of the kings, as in a slab- inscription of Kassapa V. (c. a.d. 929-939). In an edict ascribed to Mahinda IV. (c. a.d. 975-991) reference is made to the Sinhalese palladium, the famous tooth-relic of Buddha, now enshrined at Kandy, and the decree confirms tradition as to the identity of the fine stone temple, east of the Thuparama at Anuradhapura, with the shrine in which the tooth was first deposited when brought from Kalinga in the reign of Kirti Sri Meghavarna (a.d. 304-324).

The earliest inhabitants of Ceylon were probably the ancestors of the modern Veddahs, a small tribe of primitive hunters who inhabit the eastern jungles; and the discovery of palaeolithic stone implements buried in some of their caves points to the fact that they represent a race which has been in the island for untold ages. As to subsequent immigrations, the great Hindu epic, the Ramayana, tells the story of the conquest of part of the island by the hero Rama and his followers, who took the capital of its king Rawana. Whatever element of truth there may be in this fable, it certainly represents no permanent occupation. The authentic history of Ceylon, so far as it can be traced, begins with the landing in 543 B.C. of Vijaya, the founder of the Sinhalese dynasty, with a small band of Aryan-speaking followers from the mainland of India. Vijaya married the daughter of a native chief, with whose aid he proceeded to master the whole island, which he parcelled out among his followers, some of whom formed

petty kingdoms. The Sinhalese introduced from the mainland a comparatively high type of civilization, notably agriculture. The earliest of the great irrigation tanks, near Anuradhapura, was opened about 504 B.C. by the successor of Vijaya; and about this time was established that system of village communities which still obtains over a large part of Ceylon.

The island was converted to Buddhism at the beginning of the 3rd century B.C. by the preaching of Mahinda, a son of the great Buddhist emperor Asoka; a conversion that was followed by an immense multiplication of daghobas, curious bell-shaped reliquaries of solid stone, and of Buddhist monasteries. For the rest, the history of ancient Ceylon is largely a monotonous record of Malabar or Tamil invasions, conquests and usurpations. Of these latter the first was in 237 B.C. when two officers in the cavalry and fleet revolted, overthrew the Sinhalese ruler with the aid of his own Tamil mercenaries, and reigned jointly, as Sena I. and Guptika, until 215. The Sinhalese Asela then ruled till 205, when he was overthrown by a Tamil from Tanjore, Elala, who held the reins of power for 44 years. In 161 B.C. Elala was defeated and slain by Dutegemunu, still remembered as one of the great Sinhalese heroes of Ceylon. The ruins of the great monastery, known as the Brazen Palace, at Anuradhapura, remain a memorial of King Dutegemunu's splendour and religious zeal. He died in 137 B.C., and thenceforth the history of Ceylon is mainly that of further Tamil invasions, of the construction of irrigation tanks, and of the immense development of the Buddhist monastic system. A tragic episode in the royal family in the 5th century a.d. is, however, worthy of notice as connected with one of Ceylon's most interesting remains, the Sigiri rock and tank (see Sigiri). In a.d. 477 King Datu Sen was murdered by his son, who mounted the throne as Kasyapa I., and when he was driven from the capital by the inhabitants, infuriated by his crime, built himself a stronghold on the inaccessible Sigiri rock, whence he ruled the country until in 495 he was overthrown and slain by his brother Mugallana (495-513), who at the time of his father's murder had escaped to India.

Towards the close of the 10th century Ceylon was invaded by Rajaraja the Great, the Chola king, and after a series of protracted campaigns was annexed to his empire in 1005. Tha island, did not, however, remain long under Tamil domination. In 1071 Vijaya Bahu succeeded in re-establishing the Sinhalese dynasty, and for a while Ceylon was freed from foreign intervention. The most notable of the successors of Vijaya Bahu, and

indeed of all the long line of Sinhalese rulers, was Parakrama Bahu I. (1155-1180), whose colossal statue still stands near Polonnaruwa. He not only took advantage of the unaccustomed

tranquillity of the country to restore the irrigation tanks and the mojaasteries, tot he availed himself of a disputed succession to the Pandya throne of Madura to turn the tables on his Tamil enemies by invading India. According to the Mahavamsa his generals met with immediate and unbroken success; according to the more probable account preserved in a long Chola in- scription at Arpakkam near Kanchi, they were, though at first successful, ultimately driven out by a coalition of the southern princes (V. A, Smith, Early History of India, ed. 1908, p. 411). In any case, within thirty years of Parakrama Bahu's death his work was undone; the Malabar invaders were once more able to effect a settlement in the island, and the Sinhalese capital was moved farther and farther south, till in 1410 it had become established at Kotta, now a suburb of Colombo. In 1408 a new misfortune had befallen the Sinhalese dynasty; in revenge for an insult offered to a Chinese envoy, a Chinese army invaded the island and carried away King Vijaya Bahu IV. into captivity. For thirty years from this date the Sinhalese kings of Ceylon were tributary to China.

When, in 1505, the Portuguese Francisco de Almeida landed in Ceylon, he found the island divided into seven kingdoms. Twelve years later the viceroy of Goa ordered the erection of a fort at Colombo, for which permission was obtained from the king of Kotta; and from this time until the advent of the Dutch in the 17 th century the Portuguese endeavoured, amid perpetual wars with the native kings, who were assisted by Arab and other traders jealous of European rivalry, to establish their control over the island. They ultimately succeeded so far as the coast was concerned, though their dominion scarcely penetrated inland. Materially their gain was but small, for the trade of Ceylon was quite insignificant; but they had the spiritual satisfaction of prosecuting a vigorous propaganda of Catholicism, St Ffancis Xavier being the most notable of the missionaries who at this time laboured in the island.

The fanatical zeal and the masterful attitude of the Portuguese were a constant source of dissension with the native rulers, and when the Dutch, under Admiral Spilberg, landed on the east

coast in 1602 and sought the alliance of the king of Kandy in the interior of the island, every inducement was held out to them to aid in expelling the Portuguese. Nothing seems to have come of this until 1638-1639, when a Dutch expedition attacked and razed the Portuguese forts on the east coast. In the following year they landed at Negombo, without however establishing themselves in any strong post. In 1644 Negombo was captured and fortified by the Dutch, while in 1656 they took Colombo, and in 1658 they drove the Portuguese from Jaffna, their last stronghold in Ceylon.

Pursuing a wiser policy than their predecessors, the Dutch lost no opportunity of improving that portion of the country which owned their supremacy, and of opening a trade with the interior. More tolerant and less disposed to stand upon their dignity than the Portuguese, they subordinated political to com- mercial ends, flattered the native rulers by a show of deference, and so far succeeded in their object as to render their trade between the island and Holland a source of great profit. Many new branches of industry were developed. Public works were undertaken on a large scale, and education, if not universally placed within the reach of the inhabitants of the maritime provinces, was at least well cared for on a broad plan of govern- ment supervision. That which they had so much improved by policy, they were, however, unable to defend by force when the British turned their arms against them. A century and a half had wrought great changes in the physical and mental status of the Dutch colonists. The territory which in 1658 they had slowly gained by undaunted and obstinate bravery, they as rapidly lost in 1796 by imbecility and cowardice.

The first intercourse of the English with Ceylon was as far back as 1763, when an embassy was despatched from Madras to the king of Kandy, without, however, leading to any result. On the rupture between Great Britain and Holland in 1795, a force was sent against the Dutch possessions in Ceylon, where the opposition offered was so slight that by the following year

the whole of their forts were in the hands of the English commander.

The abiding results of the occupation of Ceylon by the Portuguese and Dutch is described by Sir Emerson Tennent (Ceylon) as

follows:

" The dominion of the Netherlands in Ceylon was nearly equal in duration with that of Portugal, about 140 years; but the policies of the two countries have left a very different impress on the char- acter and institutions of the people amongst whom they lived. The most important bequest left by the utilitarian genius of Holland is the code of Roman Dutch law, which still prevails in the supreme courts of justice, whilst the fanatical propagandism of the Portu- guese has reared for itself a monument in the abiding and expanding influence of the Roman Catholic faith. This flourishes in every hamlet and province where it was implanted by the Franciscans, whilst the doctrines of the reformed church of Holland, never preached beyond the walls of the fortresses, are already almost forgotten throughout the island, with the exception of an expiring community at Colombo. Already the language of the Dutch, which they sought to extend by penal enactments, has ceased to be spoken even by their direct descendants, whilst a corrupted Portuguese is to the present day the vernacular of the lower classes in every town of importance. As the practical and sordid government of the Netherlands only recognized the interest of the native population in so far as they were essential to uphold their trading monopolies, their memory was recalled by no agreeable associations : whilst the Portuguese, who, in spite of their cruelties, were identified with the

Ceople by the bond of a common faith, excited a feeling of admiration y the boldness of their conflicts with the Kandyans, and the chivalrous though ineffectual defence of their beleaguered fortresses. The Dutch and their proceedings have almost ceased to be remem- bered by the lowland Sinhalese; but the chiefs of the south and west perpetuate with pride the honorific title Don, accorded to them by their first European conquerors, and still prefix to their ancient patronymics the sonorous Christian names of the Portuguese."

The British forces by which the island had been conquered were those of the East India Company, and Ceylon was therefore at first placed under its jurisdiction and administered from Madras. The introduction of the Madras revenue system, how- ever, together with a host of Malabar collectors, led to much discontent, which culminated in rebellion; and in 1798 the colony was placed directly under the crown. By the treaty of Amiens, in 1803, this situation was regularized, from the inter-

national point of view, by the formal cession to Great Britain of the former Dutch possessions in the island. For a while the British dominion was confined to the coast. The central tract of hilly country, hedged in by impenetrable forests and pre- cipitous mountain ranges, remained in possession of Sri Vikrama Raja Sinha, the last of the Sinhalese dynasty, who showed no signs of encouraging communication with his European neighbours.

Minor differences led in 1803 to an invasion of the Kandyan territory; but sickness, desertion and fatigue proved more formidable adversaries to the British forces than the troops of the Sinhalese monarch, and peace was eventually concluded upon terms by no means favourable to the English. The cruelty and oppression of the king now became so intolerable to his subjects that disaffection spread rapidly amongst them. Punishments of the most horrible kinds were inflicted, but failed to repress the popular indignation; and in 1815 the British, at the urgent request of many of the Adigars and other native chiefs, proceeded against the tyrant, who was captured near Kandy, and subse- quently ended his days in exile. With him ended a long line of sovereigns, whose pedigree may be traced through upwards of two thousand years.

By a convention entered into with the Kandyan chiefs on the 2nd of March 1815, the entire sovereignty of the island passed into the hands of the British, who in return guaranteed to the inhabitants civil and religious liberty. The religion of Buddha was declared inviolable, and its rights, ministers and places of worship were to be maintained and protected; the laws of the country were to be preserved and administered according to established forms; and the royal dues and revenues were to be levied as before for the support of government.

With the exception of a serious outbreak in some parts of the interior in 1817, which lasted for upwards of a year, and of two minor attempts at rebellion easily put down, in 1843 and 1848,

the political atmosphere of Ceylon has remained undisturbed since the deportation of the last king of Kandy.

Authorities. — Major Thomas Skinner, Fifty Years in Ceylon,

edited by his son, A. Skinner (London, 1891) ; Constance F. Gordon Gumming, Two “Happy Years in Ceylon (2 vols., Edinburgh, 1892) ; H. W. Cave, The Ruined Cities of Ceylon (London, 1897), and The Book of Ceylon (London, 1908) ; Sir Emerson Tennent, Ceylon (2 vols. 4th ed., i860); J. Ferguson, Ceylon in 1903 (Colombo); J. C. Willis, Ceylon (Colombo, 1907). See also E. Muller, Ancient Inscriptions in Ceylon, published for the government (1883-1884), and the important archaeological survey in Epigraphia Zeylonica, part i., 1904, ii., 1907, iii., 1907, by Don Martino de Silva Wickre- masinghe, who in 1899 was appointed epigraphist to the Ceylon government. Among other works on special subjects may be mentioned H. Trimen, F.R.S., director of Ceylon Botanic Gardens, Ceylon Flora, in 5 vols., completed by Sir Joseph Hooker; Captain V. Legge, F.Z.S., History of the Birds of Ceylon (London, 1870) ; Dr Copleston, bishop of Colombo, Buddhism, Primitive and Present, in Magadha and in Ceylon (London, 1892); review by Sir West Ridgeway, Administration of Ceylon, 1896-1903; Professor W. A. Herdman, Report on the Pearl Oyster Fisheries, 1903-1904.

CHABAZITE, a mineral species belonging to the group of zeolites. It occurs as white to flesh-red crystals which vary from transparent to translucent and have a vitreous lustre. The crystals are rhombohedral, and the predominating form is often a rhombohedron ® with interfacial angles of 85 14’; they therefore closely resemble cubes in appearance, and the mineral was in fact early (in 1772) described as a cubic zeolite. A characteristic feature is the twinning, the crystals being fre quently interpenetration twins with the principal axis as twin-axis

Fig. 1. Fig. 2.

Twinned Crystals of Chabazite.

(figs. 1, 2). The appearance shown in fig. 1, with the corners of small crystals in twinned position projecting from the faces r of the main crystal, is especially characteristic of chabazite. Such groups resemble the interpenetrating twinned cubes of fluorspar, but the two minerals are readily distinguished by their cleavage, fluorspar having a perfect octahedral cleavage truncating the corners of the cube, whilst in chabazite there are less distinct cleavages parallel to the rhombohedral (cube-like) faces. Another type of twinned crystal is represented in fig. 2, in which the predominating form is an obtuse hexagonal pyramid (/) ; the faces of these flatter crystals are often rounded, giving rise to

lenticular shapes, hence the name phacolite (from (frauds, a lentil) for this variety of chabazite.

The hardness of chabazite is 45, and the specific gravity 2-o8-2-i6. As first noticed by Sir David Brewster in 1830, the crystals often exhibit anomalous optical characters: instead of being uniaxial, a basal section may be divided into sharply- defined biaxial sectors. Heating of the crystals is attended by a loss of water and a change in their optical characters; it is probable therefore that the anomalous optical characters are dependent on the amount of water present.

Besides phacolite, mentioned above, other varieties of chabazite are distinguished. Herschelite and seebachite are essentially the same as phacolite. Haydenite is the name given to small yellowish crystals, twinned on a rhombohedron plane r, from Jones's Falls near Baltimore in Maryland. Acadialite is a reddish chabazite from Nova Scotia (the old French name of which is Acadie) .

Chemically, chabazite' is a complex hydrated calcium and sodium silicate, with a small proportion of the sodium replaced by potassium, and sometimes a small amount of the calcium replaced by barium and strontium. The composition is however variable,

and is best expressed as an isomorphous mixture of the molecules (Ca, Na 2) Al 2 (Si0 4) 2 +4H 2 and (Ca,Na 2) Al 2 (Si 3 8) 2 +8H 2 0, which are analogous to the felspars. Most analyses correspond with a formula midway -between these extremes, namely, (Ca,Na 2)Al 2 (Si0 3) 4 +6H 2 0.

Chabazite occurs with other zeolites in the amygdaloidal cavities of basaltic rocks; occasionally it has been found in gneisses and schists. Well-formed crystals are known from many localities; for example, Kilmalcolm in Renfrewshire, the Giant's Causeway in Co. Antrim, and Oberstein in Germany. Beautiful, clear glassy crystals of the phacolite (" seebachite ") variety occur with phillipsite and radiating bundles of brown calcite in cavities in compact basalt near Richmond, Melbourne, Victoria. Small crystals have been observed lining the cavities of fossil shells from Iceland, and in the recent deposits of the hot springs of Plombieres and Bourbonne-les-Bains in France.

Gmelinite and levynite are other species of zeolites which may be

mentioned here, since they are closely related to chabazite, and like it are rhombohedral and frequently twinned. Gmelinite forms lirge flesh-red crystals usually of hexagonal habit, and was early known as soda-chabazite, it having the composi- tion of chabazite but with sodium predominating over calcium (Na_2 ,Ca)Al_2 (Si_0 $_3$)i6H_2 0. The formula of levynite is $CaAl_2Si_3O_{10} + 5H_2O$. (L. J. S.)

CHABLIS, a town of north-central France, in the department of Yonne, on the left bank of the Serein, 14 m. E. by N. of Auxerre by road. Pop. (1906) 2227. Its church of St Martin belongs to the end of the 12th century. The town gives its name to a well-known white wine produced in the neighbouring vineyards, of which the most esteemed are Clos, Bouguerots, Moutonne, Grenouille, Montmaires, Lys and Vaux-Desirs. There are manufactures of biscuits.

CHABOT, FRANCOIS (1757-1794), French revolutionist, had been a Franciscan friar before the Revolution, and after the civil constitution of the clergy continued to act as ” constitu- tional ” priest, becoming grand vicar of Henri Gregoire, bishop of Blois. Then he was elected to the Legislative Assembly, sitting at the extreme left, and forming with C. Bazire and Merlin de Thionville the ” Cordelier trio.” Re-elected to the Convention he voted for the death of Louis XVI., and opposed the proposal to prosecute the authors of the massacre of September, ” because among them there are heroes of Jemmapes.” Some of his sayings are well known, such as that Christ was the first ” sans- culotte.” Compromised in the falsification of a decree suppressing the India Company and in a plot to bribe certain members of the Convention, especially Fabre d’Eglantine and C. Bazire, he was arrested, brought before the Revolutionary Tribunal, and was condemned and executed at the same time as the Dantonists, who protested against being associated with such a ” fripon.”

CHABOT, GEORGES ANTOINE, known as Chabot de l’Aixier (1758-1819), French jurist and statesman, was pre- sident of the tribunal of Montlucon when he was elected as a deputy suppliant to the National Convention. A member of the council of the Ancients, then of the Tribunate, he was president of the latter when the peace of Amiens was signed. He had a resolution adopted, tending to give Napoleon Bonaparte the consulship for life; and in 1804 supported the proposal to establish a hereditary monarchy. Napoleon named him inspector-general of the law schools, then judge of the court of cassation. He published

various legal works, e.g. Tableau de la legislation ancienne sur les successions et de la Ugislation nouvelle etablie par le code civil (Paris, 1804), and Questions transitoires sur le code Napolion (Paris, 1809).

CHABOT, PHILIPPE DE, Seigneur de Brion, Count of Charny and Buzancais (c. 1492-1543), admiral of France. The Chabot family was one of the oldest and most powerful in Poitou. Philippe was a cadet of the Jarnac branch. He was a companion of Francis I. as a child, and on that king's accession was loaded with honours and estates. After the battle of Pavia he was made admiral of France and governor of Burgundy (1526), and shared with Anne de Montmorency the direction of affairs. He was at the height of his power in 1535, and

commanded the army for the invasion of the states of the duke of Savoy; but in the campaigns of 1536 and 1537 he was eclipsed by Montmorency, and from that moment his influence began to wane. He was accused by his enemies of peculation, and condemned on the 10th of February 1541 to a fine of 1,500,000 livres, to banishment, and to the confiscation of his estates. Through the good offices of Madam d'Etampes, however, he obtained the king's pardon almost immediately (March 1541), was reinstated in his posts, and regained his estates and even his influence, while Montmorency in his turn was disgraced. But his health was affected by these troubles, and he died soon afterwards on the 1st of June 1543. His tomb in the Louvre, by an unknown sculptor, is a fine example of French Renaissance work. It was his nephew, Guy Chabot, seigneur de Jarnac, who fought the famous duel with Francois de Vivonne, seigneur de la Chataigneraie, in 1547, at the beginning of the reign of Henry II.

The main authorities for Chabot's life are his MS. correspondence in the Bibliotheque Nationale, Paris, and contemporary memoirs. See also E. de Barthelemy, " Chabot de Brion," in the Revue des questions historiques (vol. xx. 1876) ; Martineau, " L'Amiral Chabot," in the Positions des theses de I'Ecole des Chartes (1883).

CHABRIAS (4th century B.C.), a celebrated Athenian general. In 388 B.C. he defeated the Spartans at Aegina and commanded the fleet sent to assist Evagoras, king of Cyprus, against the Persians.

In 378, when Athens entered into an alliance with. Thebes against Sparta, he defeated Agesilaus near Thebes. On this occasion he invented a manoeuvre, which consisted in receiving a charge on the left knee, with shields resting on the ground and spears pointed against the enemy. In 376 he gained a decisive victory over the Spartan fleet off Naxos, but, when he might have destroyed the Spartan fleet, remembering the fate of the generals at Arginusae, he delayed to pick up the bodies of his dead. Later, when the Athenians changed sides and joined the Spartans, he repulsed Epaminondas before the walls of Corinth. In 366, together with Callistratus, he was accused of treachery in advising the surrender of Oropus to the Thebans. He was acquitted, and soon after he accepted a command under Tachos, king of Egypt, who had revolted against Persia. But on the outbreak of the Social War (357) he joined Chares in the command of the Athenian fleet. He lost his life in an attack on the island of Chios.

See Cornelius Nepos, Ckabrias; Xenophon, Hellenica, v. 1-4; Diod. Sic. xv. 29-34; an d C. Rehdantz, Vitae Iphicratis, Chabriae, et Timothei (1845) ; art. Delian League, section B, and authorities there quoted.

CHABRIER, ALEXIS EMMANUEL (1841-1894), French composer, was born at Ambert, Puy de D6me, on the 18th of January 1841. At first he only cultivated music as an amateur, and it was not until 1879 that he threw up an administration appointment in order to devote himself entirely to the art. He had two years previously written an opera bouffe entitled L'Etoile, which was performed at the Bouffes Farisiens. In 1881 he was appointed chorus-master of the concerts then recently established by Lamoureux. In 1883 he composed the brilliant orchestral rhapsody entitled Espana, the themes of which he had jotted down when travelling in Spain. His opera Gwendoline was brought out with considerable success at Brussels on the 10th of April 1886, and was given later at the Paris Grand Opera. The following year 1887, Le Roi malgre lui, an opera of a lighter description, was produced in Paris at the Opera Comique, its run being interrupted by the terrible fire by which this theatre was destroyed. His last opera, Briseis, was left unfinished, and performed in a fragmentary condition at the Paris Opera, after the composer's death in Paris on the 13th of September 1894. Chabrier was also the author of a set of piano pieces entitled Pieces pittoresques, Valses romantiques, for two pianos, a fantasia for horn and piano, &c. His great admiration for Wagner

asserted itself in Gwendoline, a work which, in spite of inequalities due to want of experience, is animated by a high artistic ideal, is poetically conceived, and shows considerable harmonic originality, besides a thorough mastery over the treatment of the orchestra. The characteristics of Le Roi

malgre' lui have been well summed up by M. Joncieres when he alludes to " cette verve inepuisable, ces rythmes endiables, cette exuberance de gaiete et de vigueur, a laquelle vcnait se joindre la note melancolique et emue." Chabrier's premature death prevented him from giving the full measure of his worth.

CHACMA, the Hottentot name of the Cape baboon, Papio porcarius, a species inhabiting the mountains of South Africa as far north as the Zambezi. Of the approximate size of an English mastiff, this powerful baboon is blackish grey in colour with a tinge of green due to the yellow rings on most of the hairs. Unlike most of its tribe, it is a good climber; and where wooded cliffs are not available, will take up its quarters in tall trees. Chacmas frequently strip orchards and fruit-gardens, break and devour ostrich eggs, and kill lambs and kids for the sake of the milk in their stomachs.

CHACO, a territory of northern Argentina, part of a large district known as the Gran Chaco, bounded N. by the territory of Formosa, E. by Paraguay and Corrientes, S. by Santa Fe, and W. by Santiago del Estero and Salta. The Bermejo river forms its northern boundary, and the Paraguay and Parana rivers' its eastern; these rivers are its only means of communica- tion. Pop. (1895) 10,422; (1904, est.) 13,937; area, 52,741 sq. m. The northern part consists of a vast plain filled with number- less lagoons; the southern part is slightly higher and is covered with dense forests, occasionally broken by open grassy spaces. Its forests contain many species of trees of great economic value; among them is the quebracho, which is exported for the tannin which it contains. The capital, Resistencia, with an estimated population of 3500 in 1904, is situated on the Parana river opposite the city of Corrientes. There is railway communi- cation between Santa Fe and La Sabana, an insignificant timber- cutting village on the southern frontier. In the territory there are still several tribes of uncivilized Indians, who occasionally raid the neighbouring settlements of Santa Fe.

CHACONNE (Span, chacona), a slow dance, introduced into Spain by the Moors, now obsolete. It resembles the Passa- caglia. The

word is used also of the music composed for this dance — a slow stately movement in j time. Such a movement was often introduced into a sonata, and formed the conventional finale to an opera or ballet until the time of Gluck.

CHAD [Ceadda], SAINT (d. 672), brother of Cedd, whom he succeeded as abbot at Lastingham, was consecrated bishop of the Northumbrians by Wine, the West Saxon bishop, at the request of Oswio in 664. On the return of Wilfrid from France, where he had been sent to be consecrated to the same see, a dispute of course arose, which was settled by Theodore in favour of Wilfrid after three years had passed. Chad thereupon retired to Lastingham, whence with the permission of Oswio he was summoned by Wulfhere of Mercia to succeed his bishop Jaruman, who died 667. Chad built a monastery at Barrow in Lincoln- shire and fixed his see at Lichfield. He died after he had held his bishopric in Mercia two and a half years, and was succeeded by Wynfrith. Bede gives a beautiful character of Chad.

See Bede's Hist. Eccl. edited by C. Plummer, iii. 23, 24, 28; iv. 2, 3 (Oxford, 1896); Eddius, Vita Wilfridi, xiv., xv. edited by J. Raine, Rolls Series (London, 1879).

CHAD, a lake of northern Central Africa lying between 12 50′ and 14 10′ N. and 13 and 15 E. The lake is situated about 850 ft. above the sea in the borderland between the fertile and wooded regions of the Sudan on the south and the arid steppes which merge into the Sahara on the north. The area of the lake is shrinking owing to the progressive desiccation of the country, Saharan climate and conditions replacing those of the Sudan. The drying-up process has been comparatively rapid since the middle of the 19th century, a town which in 1850 was on the southern margin of the lake being in 1905 over 20 m. from it. On the west the shore is perfectly flat, so that a slight rise in the water causes the inundation of a considerable area — a fact not without its influence on the estimates made at varying periods as to the size of the lake. Around the north-west and north shores is a continuous chain of gently sloping sand-hills covered with bush. This region abounds in big game and birds

are plentiful. In the east, the country of Kanem, the desiccation

has been most marked. Along this coast is a continuous chain of islands running from north-west to south-east. But what were islands when viewed by Overweg in 1851, formed in 1903 part of the mainland and new islands had arisen in the lake. They are generally low, being composed of sand and clay, and lie from 5 to 20 m. from the shore, which throughout its eastern side nowhere faces open water. The channels between the islands do not exceed 2 m. in width. Two principal groups are distinguished, the Kuri archipelago in the south, and the Buduma in the north. The inhabitants of the last-named islands were noted pirates until reduced to order by the French. The coast- line is, in general, undefined and marshy, and broken into numer- ous bays and peninsulas. It is also, especially on the east, lined by lagoons which communicate with the lake by intricate channels. The lake is nowhere of great depth, and about midway numerous mud-banks, marshes, islands and dense growths of aqueous plants stretch across its surface. Another stretch of marsh usually cuts off the northernmost part of the lake from

Emery VMlka wc

the central sections. The open water varies in depth from 3 ft. in the north-west to over 20 in the south, where desiccation is less apparent. Fed by the Shari (q.v.) and other rivers, the lake has no outlet and its area varies according to the season. The flood water brought down by the Shari in December and January causes the lake to rise to a maximum of 24 ft., the water spreading over low-lying ground, left dry again in May or June. But after several seasons of heavy rainfall the waters have remained for years beyond their low-water level. Never- theless the secular shrinking goes on, the loss by evaporation and percolation exceeding the amount of water received; whilst, on the average, the rainfall is diminishing. In 1870 the lake rose to an exceptional height, but since then, save in 1897, there has been only the normal seasonal rise. The prevalent north- east wind causes at times a heavy swell on the lake. Fish abound in its waters, which are sweet, save at low-level, when they become brackish. The lagoons are believed to act as purifying pans in which the greater part of the salt in the water is precipitated. In the south-west end of the lake the water is yellow, caused by banks of clay; elsewhere it is clear.

The southern basin of Chad is described under the Shari, which empties its waters into the lake about the middle of the southern shore, forming a delta of considerable extent. Beyond the south-

east corner of the lake is a depression known as the Bahr-el-Ghazal (not to be confounded with the Nile affluent of

the same name) . This depression is the termination of what is in all probability the bed of one of the dried-up Saharan rivers. Coming from the Tibesti highlands the Bahr-el-Ghazal has a south-westerly trend to Lake Chad. Near the lake the valley was formerly swampy, and at high-water the lake overflowed into it. There was also at one time communication between the Shari and the Bahr-el-Ghazal, so that the water of the first- named stream reached Chad by way of the Bahr-el-Ghazal. There is now neither inlet nor outlet to the lake in this direction, the mouth of the Ghazal having become a fertile millet field. There is still, however, a distinct current from the Shari delta to the east end of the lake — known to the natives, like the de- pression beyond, as the Bahr-el-Ghazal — indicative of the former overflow outlet.

Besides the Shari, the only important stream entering Lake Chad is the Waube or Yo (otherwise the Komadugu Yobe), which rises near Kano, and flowing eastward enters the lake on its western side 40 m. north of Kuka. > In the rains the Waube carries down a considerable body of water to the lake.

Lake Chad is supposed to have been known by report to Ptolemy, and is identified by some writers with the Kura lake of the middle ages. It was first seen by white men in 1823 when it. was reached by way of Tripoli by the British expedition under Dr Walter Oudney, R.N., the other members being Captain Hugh Clapperton and Major (afterwards Lieut. -Colonel) Dixon Denham. By them the lake was named Waterloo. In 1850 James Richardson, accompanied by Heinrich Barth and Adolf Overweg, reached the lake, also via Tripoli, and Overweg was the first European to navigate its waters (1851). The lake was visited by Eduard Vogel (1855) and by Gustav Nachtigal (1870), the last-named investigating its hydrography in some detail. In 1890-1893 its shores were divided by treaty between Great Britain, France and Germany. The first of these nations to make good its footing in the region was France. A small steamer, brought from the Congo by Emile Gen til, was in 1897 launched on the Shari, and reaching the Chad, navigated the southern part of the lake. Communication between Algeria and Lake Chad by way of the Sahara was opened, after repeated failures, by the French explorer F. Foureau in 1899-1900, At the same time a French officer, Lieut. Joalland, reached the lake from the middle Niger, continuing his journey round the north end to Kanem. A

British force under Colonel T. L. N. Morland visited the lake at the beginning of 1902, and in May of the same year the Germans first reached it from Cameroon. In 1902-1903 French officers under Colonel Destenave made detailed surveys of the south-eastern and eastern shores and the adjacent islands. In 1903 Captain E. Lenfant, also a French officer, succeeded in reaching the lake (which he circumnavigated) via the Benue, proving the existence of water communication between the Shari and the Niger. In 1905 Lieut. Boyd Alexander, a British officer, further explored the lake, which then contained few stretches of open water. The lake is bordered W. and S.W. by Bornu, which is partly in the British protectorate of Nigeria and partly in the German protectorate of Cameroon. Bagirmi to the S.E. of the lake and Kanem to the N.E. are both French possessions. The north and north-west shores also belong to France. One of the ancient trade routes across the Sahara — that from Tripoli to Kuka in Bornu — strikes the lake at its north- west corner, but this has lost much of its former importance.

See the works of Denham, Clapperton, Barth and Nachtigal cited in the biographical notices; Geog. Journal, vol. xxiv. (1904) ; Capt. Tilho in La Geographie (March 1906) ; Boyd Alexander, From the Niger to the Nile, vol. i. (London, 1907) ; A. Chevalier, Mission Chari-Lac Tchad 1902-1904 (Paris. 1908) ; E. Lenfant, La Grande Route du Tchad (Paris, 1905) ; H. Freydenberg, Etude sur le Tchad et le bassin du Chari (Paris, 1908).

CHADDERTON, an urban district of Lancashire, England, within the parliamentary borough of Oldham (q.v.). Pop. (1901) 24,892. Cotton and chemical works, and the coal-mines of the neighbourhood, employ the large industrial population.

CHADERTON, LAURENCE (?i 536-1640), Puritan divine, was born at Lees Hall, in the parish of Oldham, Lancashire, probably in September 1536, being the second son of Edmund Chaderton,

a gentleman of an ancient and wealthy family, and a zealous Catholic. Under the tuition of Laurence Vaux, a priest, he became an able scholar. In 1564 he entered Christ's College, Cambridge, where, after a short time, he formally adopted the reformed doctrines and was in consequence disinherited by his father. In

1567 he was elected a fellow of his college, and subsequently was chosen lecturer of St Clement's church, Cambridge, where he preached to admiring audiences for many years. He was a man of moderate views, though numbering among his friends extremists like Cartwright and Perkins. So great was his reputation that when Sir Walter Mildmay founded Emmanuel College in 1584 he chose Chaderton for the first master, and on his expressing some reluctance, declared that if he would not accept the office the foundation should not go on. In 1604 Chaderton was appointed one of the four divines for managing the cause of the Puritans at the Hampton Court conference; and he was also one of the translators of the Bible. In 1578 he had taken the degree of B.D., and in 1613 he was created D.D. At this period he made provision for twelve fellows and above forty scholars in Emmanuel College. Fearing that he might have a successor who held Arminian doctrines, he resigned the mastership in favour of John Preston, but survived him, and lived also to see the college presided over successively by William Sancroft (or Sandcroft) and Richard Holdsworth. He died on the 13 th of November 1640 at the age of about 103, preserving his bodily and mental faculties to the end.

Chaderton published a sermon preached at St Paul's Cross about 1580, and a treatise of his On Justification was printed by Anthony Thysius, professor of divinity at Leiden. Some other works by him on theological subjects remain in manuscript.

CHADWICK, SIR EDWIN (1800-1800), English sanitary reformer, was born at Longsight, near Manchester, on the 24th of January 1800. Called to the bar without any independent means, he sought to support himself by literary work, and his essays in the Westminster Review (mainly on different methods of applying scientific knowledge to the business of government) introduced him to the notice of Jeremy Bentham, who engaged him as a literary assistant and left him a handsome legacy. In 1832 he was employed by the royal commission appointed to inquire into the operation of the poor laws, and in 1833 he was made a full member of that body. In conjunction with Nassau W. Senior he drafted the celebrated report of 1834 which procured the reform of the old poor law. His special contribution was the institution of the union as the area of administration. He favoured, however, a much more centralized system of admini- stration than was adopted, and he never ceased to complain that the reform of 1834 was fatally marred by the rejection of his views, which contemplated the management of poor-law relief by salaried officers controlled from a central board, the boards of guardians

acting merely as inspectors. In 1834 he was appointed secretary to the poor law commissioners. Finding himself unable to administer in accordance with his own views an act of which he was largely the author, his relations with his official chiefs became much strained, and the disagree- ment led, among other causes, to the dissolution of the poor law commission in 1846. Chadwick's chief contribution to political controversy was his constant advocacy of entrusting certain departments of local affairs to trained and selected experts, instead of to representatives elected on the principle of local self-government. While still officially connected with the poor law he had taken up the question of sanitation in conjunction with Dr Southwood Smith, and their joint labours produced a most salutary improvement in the public health. His report on " The Sanitary Condition of the Labouring Population " (1842) is a valuable historical document. He was a commissioner ai the Board of Health from its establishment in 1848 to its abolition in 1854, when he retired upon a pension, and occupied the remainder of his life in voluntary contributions to sanitary and economical questions. He died at East Sheen, Surrey, on the 6th of July 1890. He had been made K.C.B. in 1889.

See a volume on The Evils of Disunity in Central and Local Administration . . . and the New Centralization for the People, by

Edwin Chadwick (1885) ; also The Health of Nations, a Review of the Works of Edwin Chadwick, with a Biographical Introduction, by Sir B. W. Richardson (1887).

CHAEREMON, Athenian dramatist of the first half of the 4th century B.C. He is generally considered a tragic poet. Aristotle {Rhetoric, iii. 12) says his works were intended for reading, not for representation. According to Suidas, he was also a comic poet, and the title of at least one of his plays {Achilles Slayer of Tkersites) seems to indicate that it was a satyric drama. His Centaurus is described by Aristotle {Poet. i. 12) as a rhapsody in all kinds of metres. The fragments of Chaeremon are distinguished by correctness of form and facility of rhythm, but marred by a florid and affected style reminiscent of Agathon. He especially excelled in descriptions (irrelevantly introduced) dealing with such subjects as flowers and female beauty. It is not agreed whether he is the author of three epigrams in the Greek Anthology (Palatine vii. 469, 720, 721) which bear his name.

See H. Bartsch, De Chaeremone Poeta tragico (1843); fragments

in A. Nauck, Fragmenta Tragicorum Graecorum.

CHAEREMON, of Alexandria (1st century a.d..), Stoic philosopher and grammarian. He was superintendent of the portion of the Alexandrian library that was kept in the temple of Serapis, and as custodian and expounder of the sacred books (Upoypannarevs, sacred scribe) belonged to the higher ranks of the priesthood. In a.d. 49 he was summoned to Rome, with Alexander of Aegae, to become tutor to the youthful Nero. He was the author of a History of Egypt; of works on Comets, Egyptian Astrology, and Hieroglyphics; and of a grammatical treatise on Expletive Conjunctions (crw5e

Fragments in C. Miiller, Fragmenta Historicorum Graecorum, iii.

495-499-

CHAERONEIA, or Chaeronea, an ancient town of Boeotia, said by some to be the Homeric Arne, situated about 7 m. W. of Orchomenus. Until the 4th century B.C. it was a dependency of Orchomenus, and at all times it played but a subordinate part in Boeotian politics. Its importance lay in its strategic position near the head of the defile which presents the last serious obstacle to an invader in central Greece. Two great battles were fought on this site in antiquity. In 338 B.C. Philip II. and Alexander of Macedon were confronted by a confederate host from central Greece and Peloponnese under the leadership of Thebes and Athens, which here made the last stand on behalf of Greek liberty. A hard-fought conflict, in which the Greek infantry displayed admirable firmness, was decided in favour of Philip through the superior organization of his army. In 86 B.C. the Roman general L. Cornelius Sulla defeated the army of Mithradates VI., king of Pontus, near Chaeroneia. The latter's enormous numerical superiority was neutralized by Sulla's judicious choice of ground and the steadiness of his legionaries; the Asiatics after the failure of their attack were worn down and almost annihilated. Chaeroneia is also notable as the birth- place of Plutarch, who returned to his native town in old age, and was held in honour by its citizens for many successive generations. Pausanias (ix. 40) mentions the divine honours accorded at Chaeroneia to the sceptre of Agamemnon, the work of Hephaestus (cf. Iliad, ii. 101). The site of the town is partly occupied by the village of Kapraena; the ancient citadel was known as the Petrachus, and there is a theatre cut in the rock. A colossal seated lion a little to the S.E. of the site marks the grave

of the Boeotians who fell fighting against Philip; this lion was found broken to pieces ; the tradition that it was blown up by Odysseus Androutsos is incorrect (see Murray, Handbook for Greece, ed. 5, 1884, p. 409). It has now been restored and re-erected (1905).

-9′

.nr it

..cl

sa-/

Authorities. — Thucydides iv. 76; Diodorus xvi. 85-86; Plu- tarch, Alexander, ch. 9; Sulla, chs. 16-19; Appian, Mithradatica, chs, 42-45 ; W. M. Leake, Travels in Northern Greece (London, 1835), ii. 112-117, 192-201 ; B. V. Head, Historia Numorum (Oxford, 1887), p. 292; J. Kromayer, Antike Schlachtj elder in Griechenland (Berlin, I9°3) > PP- I2 7′ I 95 ; G. Sotiriades in Athen. Mitteil. 1903, pp. 301 ff . ; 1905, p. 120; 1906, p. 396; ‘Ew. ‘ApxatoX., 1908, p. 65.

CHAETOGNATHA, the name given by R. Leuckhart to a small group of transparent and for the most part pelagic organisms, whose position in the animal kingdom is a very isolated one. Only three genera, Sagilla, Spadetta and Krohnia, are recognised, and the number of species is small. Nevertheless these animals exist in ex- traordinary quantities, so that at certain seasons and under certain conditions the surface of the sea seems almost stiff with the incredible multitude of organisms which pervade it. Rough seas, &c, cause them to seek safety in dropping into deeper water. Deep-sea forms also occur, but in spite of this the group is essentially pelagic.

As a rule the body is some I to 2 or 3 cm.

in length, though some species are larger, by

4 or 5 mm. in breadth, and it is shaped

.,.it something like a torpedo with side flanges

—*• and a slightly swollen, rounded head. It can be divided into three regions — (i.) head, (ii.) trunk, and (iii.) tail, separated from one another by two transverse septa. The almost spherical head is covered by a hood which can be retracted; it bears upon its 3 side a number of sickle-shaped, chitinous -<" hooks and one or more short rows of low ‘*9 spines— both of these features are used in characterizing the various species. A pair of eyes lie dorsally and behind them is a closed circlet, often pulled out into various ‘ shapes, of modified epidermis, to Which an olfactory function has been attributed. The interior of the head is filled up with masses of muscle fibres which are mainly occupied with moving the sickle-shaped hooks. The f j trunk contains a spacious body-cavity filled y during the breeding season by the swollen ovaries, and the same is true of the tail if we substitute testes for ovaries.

The skin consists of a transparent cuticle excreted by the underlying ectoderm-, the cells of which though usually one-layered Spadella cephaloptera may be heaped up into several layers in (Busch). tˆe head; beneath this is a basement

5/, Septa dividing membrane, and then a layer of longitudinal

body-cavity trans- musc l e fibres which are limited inside by a layer of peritoneal cells. The muscles are striated and arranged in four quadrants, two dorso-lateral and two ventro-lateral , an arrangement which recalls that of the Nematoda, whilst in their histology they somewhat resemble the muscles of the Oligochaeta. Along each side of the body stretches a horizontal fin and a similar flange surrounds the tail. Into these fins, which are largely cuticular and strengthened by radiating bars, a single layer of ectoderm cells projects.

The mouth, a longitudinal slit, opens on . to the ventral surface of the head. It leads Tactile hairs spring- ; n t a straight alimentary canal whose walls “f^v. a” 1 sur consist of a layer of ciliated cells ensheathed

of body. m a tn in layer of peritoneal cells. There is

e ‘i rwJP’ no arma ture, and no glands, and the whole

el, Oviduct. tract can only be divided into an oesophagus

no, Testes. anc j an intestine. The latter runs with no

«■’.« . S ,eren f’ [hns. twists or coils straight to the anus, which is /^.Lateral and caudal s i tU ated at the junction of the trunk with jo, Seminal pouch. the tail. Amedian mesentery running dorso-

rhe eyes are indi- ventrally supports the alimentary canal and is continued behind it into the tail, thus dividing the body cavity into two lateral halves.

There are no specialized circulatory, respiratory or excretory organs.

The nervous system consists of a cerebral ganglion in the head,

versely.

g J , Cerebral ganglia.

»’, Commissure unit- ing this with ven- tral ganglion (not shown in fig.).

n ! , Nerve uniting cere- bral ganglia with small ganglia on head.

nr, Olfactory nerve.

d, Alimentary canal.

r, Olfactory organ.

te, Tentacle.

cated as black dots behind the cerebral ganglia.

a conspicuous ventral ganglion in the trunk, and of lateral conv

missures uniting these ganglia on each side. The whole of this system has retained its primitive connexion with the ectoderm. The cerebral ganglion also gives off a nerve on each side to a pair of small- ganglia, united by a median commissure, which have sunk into and control the muscles of the head. As in other animals there is a minute but extensive nervous plexus, which permeates the whole body and takes its origin from the chief ganglia. In addition to the eyes and the olfactory circle on the head scattered tactile papillae are found on the ectoderm.

Chaetognatha are hermaphrodite. The ovaries are attached to the side walls of the trunk region ; between them and the body wall lie the two oviducts whose inner and anterior end is described as closed, their outer ends opening one on each side of the anus, where the trunk joins the tail. According to Miss N. M. Stevens the so- called oviduct acts only as a ” sperm-duct ” or receptaculum seminis. The spermatozoa enter it and pass through its walls and traverse a minute duct formed of two accessory cells, and finally enter the ripe ovum. Temporary oviducts are formed between the ” sperm- duct ” and the germinal epithelium at each oviposition. A number of ova ripen simultaneously. The two testes lie in the tail and are formed by lateral proliferations of the living peritoneal cells. These break off and, lying in the coelomic fluid, break up into spermatozoa. They pass out through short vasa deferentia with internal ciliated funnels, sometimes an enlargement on their course — the seminal vesicles — and a minute external pore situated on the side of the tail.

With hardly an exception the transparent eggs are laid into the sea and float on its surface. The development is direct and there is no larval stage. The segmentation is complete; one side of the hollow blastosphere invaginates and forms a gastrula. The blasto-pore closes, a new mouth and a new anus subsequently arising. The archenteron gives off two lateral pounchs and thus becomes trilobed. The middle lobe forms the alimentary canal; it closes behind and opens to the exterior anteriorly and so makes the mouth. The two lateral lobes contain the coelom ; each separates off in front a segment which forms the head and presumably then divides again to form anteriorly the trunk, and posteriorly the tail regions. An interesting feature of the development of Chaetognaths is that, as in some insects, the cells destined to form the reproductive organs are differentiated at a very early period, being apparent even in the gastrula stage.

The great bulk of the group is pelagic, as the transparent nature

of all their tissues indicates. They move by flexing their bodies. Spadella cephaloptera is, however, littoral and oviposits on seaweed, and the " Valdivia " brought home a deep-sea species.

The three genera are differentiated as follows : —

Sagitta M. Slabber, with two pairs of lateral fins. This genus was named as long ago as 1775.

Krohnia P. Langerhans, with one lateral fin on each side, extending on to the tail.

Spadella P. Langerhans, with a pair of lateral fins on the tail and a thickened ectodermic ridge running back on each side from the head to the anterior end of the fin.

The group is an isolated one and should probably be regarded as a separate phylum. It has certain histological resemblances with the Nematoda and certain primitive Annelids, but little stress must be laid on these. The most that can be said is that the Chaetognaths begin life with three segments, a feature they share with such widely- differing groups as the Brachiopoda, the Echinoderma and the Enteropneusta, and probably Vertebrata generally.

See O. Hertwig, Die Chaetognathen, eine Monographie (Jena, 1880); B. J. Grassi, Chelognathi: Flora u. Fauna d. Golfes von Neapel (1883); S. Strodtman, Arch. Naturg. lviii., 1892; N. M. Stevens, Zool. Jahrb. Anal, xviii., 1903, and xxi., 1905. (A. E. S.)

CHAETOPODA (Gr. x°*rq, hair, irovs, foot), a zoological class, including the majority of the Annelida (q.v.), and indeed, save for the Echiuroidea (q.v.), co-extensive with that group as usually accepted. They are divisible into the Haplodrili (q.v.) or Archiannelida, the Polychaeta containing the marine worms, the Oligochaeta or terrestrial and fresh- water annelids (see Earthworm), the Hirudinea or leeches (see Leech), and a small group of parasitic worms, the Myzostomida (q.v.).

The distinctive 'characters of the class Chaetopoda as a whole are partly embodied in the name. They possess (save for certain Archiannelida, most Hirudinea, and other very rare exceptions) setae or chaetae implanted in epidermal pits. The setae are implanted metamerically in accordance with the metamerism of the body, which consists of a prostomium followed by a number of segments. The number of segments in an individual is fre-

quently more or less definite. The anterior end of body always shows some ” cephalization.” The internal organs are largely repeated metamerically, in correspondence with the external metamerism. Thus the body cavity is divided into a sequence of chambers by transverse septa; and even among the Hirudinea,

where this condition is usually not to be observed, there is embryological evidence that the existing state of affairs is derived from this. Commonly the nephridia are strictly paired a single pair to each segment, while the branches of the blood vascular system are similarly metameric. The alimentary canal is nearly always a straight tube running from the mouth, which is sur- rounded by the first segment of the body and overhung by the prostomium, to the anus, which is then either surrounded by the last segment of the body or opens dorsally a little way in front of this.

The Class as a Whole. — The Chaetopoda are with but few exceptions (Myzostomida in part, Sternaspis) elongated worms, flattened or, more usually, cylindrical, and bilaterally sym- metrical. The body consists of a number of exactly similar or closely similar segments, which are never fused and meta- morphosed, as in the Arthropoda, to form specialized regions of the body. It is, however, always possible to recognize a head, which consists at least of the peristomial segment with a forward projection of the same, the prostomium. A thorax also is sometimes to be distinguished from an abdomen. Where locomotive appendages (the parapodia of the Polychaeta) exist, they are never jointed, as always in the Arthropoda; nor are they modified anteriorly to form jaws, as in that group.

The prostomium overhangs the mouth, and is often of considerable size and, as a rule, quite distinct from the segment following, being

E, M, d.c, per,

■ *” A ‘■ ˆ ˆ / ~~B ■

Fig. i . — A, side view of the head region of Nereis cultrifera ; B, dorsal view of the same.

pi, Prostomial palp.

PP.

Pr,

pr.t,

t.s,

v.c,

Parapodium. Prostomium. Prostomial tentacle. Trunk segment. Ventral cirrus.

Eye. Mouth. Dorsal cirrus.

Peristomium, probably equal to two segments, per.c, Peristomial cirri.

separated by an external groove, and containing, at least temporarily, the brain, which always arises there. Its cavity also is at first independent of the coelom though later invaded by the latter. In any case the cavity of the prostomium is single, and not formed, as is the cavity of the segments of the body, by paired coelomic chambers. It has, however, been alleged that this cavity is formed by a pair of mesoblastic somites (N. Kleinenberg), in which case there is more reason for favouring the view that would assign an equality between the prostomium and the (in that case) other segments of the body. The peculiar prostomium of Tomopteris is described below. The body wall of the Chaetopoda consists of a ” dermo-muscular ” tube which is separated from the gut by the coelom and its peritoneal walls, except in most leeches. A single layer of epidermic cells, some of which are glandular, forms the outer layer. Rarely are these ciliated, and then only in limited tracts. They secrete a cuticle which never approaches in thickness the often calcified cuticle of Arthropods. Below this is a circular, and below that again a longi- tudinal, layer of muscle fibres. These muscles are not striated, as they are in the Arthropoda.

Setae. — These chitinous, rod-like, rarely squat and then hook-like structures are found in the majority of the Chaetopoda, being absent only in certain Archiannelida, most leeches, and a very few Oligo- chaeta. They exist in the Brachiopoda (which are probably not unrelated to the Chaetopoda) , but otherwise are

absolutely distinctive of the Chaetopods. The setae are invariably formed each within an epidermic cell, and they are sheathed in involutions of the epider- mis. Their shape and size varies greatly and is often of use in classification. The setae are organs of locomotion, though their large size and occasionally jagged edges in some of the Polychaeta suggest an aggressive function. They are disposed in two groups on either side, corresponding in the Polychaeta to the parapodia; the two bundles are commonly reduced among the earthworms to two pairs of setae or even to a single seta. On the other hand, in

certain Polychaeta the bundles of setae are so extensive that they nearly form a complete circle surrounding the body; and in the Oligochaet genus Perichaeta (= Pheretima) , and some allies, there is actually a complete circle of setae in each segment broken only by minute gaps, one dorsal, the other ventral.

Coelom. — The Chaetopoda are characterized by a spacious coelom, which is divided into a series of chambers in accordance with the general metamerism of the body. This is the typical arrangement, which is exhibited in the majority of the Polychaeta and Oligo- chaeta ; in these the successive chambers of the coelom are separated by the intersegmental septa, sheets of muscle fibres extending from the body wall to the gut and thus forming partitions across the body. The successive cavities are not, however, completely closed from each other; there is some communication between adjoining seg- ments, and the septa are sometimes deficient here and there. Thus in the Chaetopoda the perivisceral cavity is coelomic; in this respect the group contrasts with the Arthropoda and Molluscs, where the perivisceral cavity is, mainly at least, part of the vascular or haemal system, and agrees with the Vertebrata. The coelom is lined throughout by cells, which upon the intestine become large and loaded with excretory granules, and are known as chloragogen cells. Several forms of cells float freely in the fluid of the coelom. In another sense also the coelom is not a closed cavity, for it com- municates in several ways with the external medium. Thus, among the Oligochaeta there are often a series of dorsal pores, or a single head pore, present also among the Polychaeta (in Ammochares) . In these and other Chaetopods the coelom is also put into indirect relations with the outside world by the nephridia and by the gonad ducts. In these features, and in the fact that the gonads are local proliferations of the coelomic epithelium, which have undergone no further changes in the simpler forms, the coelom of this group shows in a particularly clear fashion the general

characters of the coelom in the higher Metazoa, It has been indeed largely upon the con- ditions characterizing the Chaetopoda that the conception of the coelom in the Coelomocoela has been based.

Among the simpler Chaetopoda the coelom retains the character of a series of paired chambers, showing the above relations to the exterior and to the gonads. There are, however, further complications in some forms. Especially are these to be seen in the more modified Oligochaeta and in the much more modified Hirudinea. In the Polychaeta, which are to be regarded as structurally simpler forms than the two groups just referred to, there is but little sub- division of the cpelom of the segments, indeed a tendency in the reverse direction, owing to the suppression of septa. Among the Oligochaeta the dorsal vessel in Dinodrilus and Megascolides is enclosed in a separate coelomic chamber which may or may not communicate with the main coelomic cavity. To this pericardial coelom is frequently added a gonocoel enclosing the gonads and the funnels of their ducts. This condition is more fully dealt with below in the description of the Oligochaeta. The division and, indeed, partial suppression of the coelom culminates in the leeches, which in this, as in some other respects, are the most modified of Annelids.

Nervous System. — In all Chaetopods this system consists of cerebral ganglia connected by a circumoesophageal commissure with a ventral ganglionated cord. The plan of the central nervous system is therefore that of the Arthropoda. Among the Archiannelida, in Aeolosoma and some Polychaetes, the whole central nervous system remains imbedded in the epidermis. In others, it lies in the coelom, often surrounded by a special and occasionally rather thick sheath. The cerebral ganglia constitute an archicerebrum for the most part, there being no evidence that, as in the Arthropoda, a movement forward of post-oral ganglia has taken place. In the leeches, however, there seems to be the commencement of the formation of a syn- cerebrum. In the latter, the segmentally arranged ganglia are more sharply marked off from the connectives than in other Chaetopods, where nerve cells exist along the whole ventral chain, though more numerous in segmentally disposed swellings.

Vascular System. — In addition to the coelom, another system of fluid-holding spaces lies between the body wall and the gut in the Chaetopoda. This is the vascular or haemal system (formerly and unnecessarily termed pseudhaemal). With a few exceptions

among the Polychaeta the vascular system is always present among the Chaetopoda, and always consists of a system of vessels with definite walls, which rarely communicate with the coelom. It is in fact typically a closed system. The larger trunks open into each other either directly by cross branches, or a capillary system is formed. There are no lacunar blood spaces with ill-defined or absent walls except for a sinus surrounding the intestine, which is at least fre- quently present. The principal trunks consist of a dorsal vessel lying above the gut, and a ventral vessel below the gut but above the nervous cord. These two vessels in the Oligochaeta are united in the anterior region of the body by a smaller or greater number of branches which surround the oesophagus and are, some of them at least, contractile and in that case wider than the rest. The dorsal vessel also communicates with the ventral vessel indirectly by the intestinal sinus, which gives off branches to both the longitudinal trunks, and by tegementary vessels and capillaries which supply the skin and the nephridia. In the smaller and simpler forms the capillary networks are much reduced, but the dorsal and ventral vessels are usually present. The former, however, is frequently

developed only in the anterior region of the body where it emerges from the peri-intestinal blood sinus. On the other hand, additional longitudinal trunks are sometimes developed, the chief one of which is a supra-intestinal vessel lying below the dorsal vessel and closely adherent to the walls of the oesophagus in which region it appears. The capillaries sometimes (in many leeches and Oligochaeta) extend into the epidermis itself. Usually they do not extend outwards of the muscular layers of the body wall. The main trunks of the vascular system often possess valves at the origin of branches which regulate the direction of the blood flow. Among many Oligochaeta the dorsal blood-vessel is partly or entirely a double tube, which is a retention of a character shown by F. Vezhdovsky to exist in the embryo of certain forms. The blood in the Chaetopoda consists of a plasma in which float a few corpuscles. The plasma is coloured red by haemoglobin: it is sometimes (in Sabella and a few other Polychaeta) green, which tint is due to another respiratory pigment. The plasma may be pink (Magelona) or yellow {Aphrodite) in which cases the colour is owing to another pigment. In Aeolosoma it is usually colourless. The vascular

system is in the majority of Chaetopods a closed system. It has been asserted (and denied) that the cellular rod which is known as the " Heart-body " (Herzkorper), and is to be found in the dorsal vessel of many Oligochaeta and Polychaeta, is formed of cells which are continuous with the chlora- gogen cells, thus implying the existence of apertures of communica- tion with the coelom. The statement has been often made and denied, but it now seems to have been placed on a firm basis (E. S. Goodrich), that among the Hirudinea the coelom, which is largely broken up into narrow tubes, may be confluent with the tubes of the vascular system. This state of affairs has no antecedent im- probability about it, since in the Vertebrata the coelom is unquestion- ably confluent with the haemal system through the lymphatic vessels. Finally, there are certain Polychaeta, e.g. the Capitellidae, in which the vascular system has vanishod altogether, leaving a coelom containing haemoglobin-impregnated corpuscles. It has been suggested (E. Ray Lankester) that this condition has been arrived at through some such intermediate stage as that offered by Polychaet Magelona. In this worm the ventral blood-vessel is so swollen as to occupy nearly the whole of the available coelom. Carry the process but a little farther and the coelom disappears and its place is taken by a blood space or haemocoel. It has been held that the condition shown in certain leeches tend to prove that the coelom and haemocoel are primitively one series of spaces which have been gradually differentiated. The facts of development, however, prove their distinctness, though those same facts do not speak clearly as to the true nature of the blood system. One view of the origin of the latter (largely based upon observations upon the development of Polygordius) sees in the blood system a persistent blastocoel. F. Vezhdovsky has lately seen reasons for regarding the blood system as originating entirely from the hypoblast by the secretion of fluid, the blood, from particular intestinal cells and the consequent formation of spaces through pressure, which become lined with these cells.

Nephridia and Coelomoducts. — The name " Nephridium " was originally given by Sir E. Ray Lankester to the members of a series of tubes, proved in some cases to be excretory in nature, which exist typically to the number of a single pair in most of the segments of the Chaetopod body, and open each by a ciliated orifice into the coelom on the one hand, and by a pore on to the exterior of the body on the other. In its earlier conception, this view embraced as homologous organs (so far as the present

group is concerned) not only the nephridia of Oligochaeta and Hirudinea, which are obviously closely similar, but the wide tubes with an intercellular lumen and large funnels of certain Polychaeta, and (though with less assurance) the gonad ducts in Oligochaeta and Hirudinea. The function of nitrogenous excretion was not therefore a necessary part of the view — though it may be pointed out that there are grounds for believing that the gonad ducts are to some extent also organs of excretion (see below). Later, the investigations of E. Meyer and E. S. Goodrich, endorsed by Lankester, led to the opinion that under the general morphological conception of " nephridium " were included two distinct sets of organs, viz. nephridia and coelomoducts. The former (represented by, e.g. the " segmental organs " of Lutnbricus) have been asserted to be " ultimately, though not always, actually traceable to the ectoderm"; the latter (represented by, e.g. the oviduct of Lumbricus) are parts of the coelomic wall itself, which have grown out to the exterior. The nephridia, in fact, on this view, are ectodermic ingrowths, the coelomoducts coelomic outgrowths. The cavity of the former has nothing to do with coelom. The cavity of the latter is coelom.

The embryological facts upon which this view has been based, however, have been differently interpreted. According to C. O. Whitman the entire nephridial system (in the leech Clepsine) is formed by the differentiation of a continuous epiblastic band on each side. The exact opposite is maintained by R. S. Bergh (for Lumbricus and Criodrilus), whose figures show a derivation of the entire nephridium from mesoblast, and an absence of any connexion between successive nephridia by any continuous band, epiblastic or mesoblastic. A midway position is taken up by Wilson, who asserts the mesoblastic formation of the funnel, but also asserts the presence of a continuous band of epiblast from which certainly

the terminal vesicle of the nephridium, and doubtfully the glandular part of the tube is derived. Vezhdovsky's figures of Rhynchelmis agree with those of Bergh in showing the backward growth of the nephridium from the funnel cell. There are thus substantial reasons for believing that the nephridium grows backwards from a funnel as does the coelomoduct. It is therefore by no means certain that so profound a difference embryologically can be asserted to exist between the excretory nephridia and the ducts leading from the coelom to the exterior, which are usually associated with the ex- trusion of the genital products among the Chaetopoda.

There are, however, anatomical and histological differences to be seen at any rate at the extremes between the undoubted nephridia of Goodrich, Meyer and Lankester, and the coelomoducts of the same authors.

1. Nephridia. — Excretory organs which are undisputed nephridia are practically universal among the Oligochaeta, Hirudinea and Archiannelida, and occur in many Polychaeta. Their total absence has been asserted definitely only in Paranais littoralis. Usually these

Fig. 2 (from

A, Diagram of the nephridium of Nereis diversicolor.

B, Diagram of the nephridium of Alciope, into which opens the large genital funnel (coelo- mostome).

C, Small portion of the nephri- dium of Glycera siphono- stoma, showing the canal cut through, and the solenocytes on the outer surface.

D, Optical section of a branch of

Goodrich).

the nephridium of Nephthys

scolopendroides. c.s, Cut surface. est, Coelomostome. /, Flagellum. g.f. Genital funnel. n, Neck of solenocyte. n.c, Nephridial canal. n.p, Nephridiopore. nst, Nephridiostome. nu, Nucleus of solenocyte. s, Solenocytes. /, Tube.

organs are present to the number of a single pair per somite, and are commonly present in the majority of the segments of the body, failing often among the Oligochaeta in a varying number of the anterior segments. They are considerably reduced in number in certain Polychaeta. Essentially, a nephridium is a tube, generally very long and much folded upon itself, composed of a string of cells placed end to end in which the continuous lumen is excavated. Such cells are termed ” drain pipe ” cells. Frequently the lumen is branched and may form a complicated anastomosing network in these cells. Externally, the nephridium opens by a straight part of the tube, which is often very wide, and here the intracellular lumen becomes intercellular. Rarely the nephridium does not communicate with the coelom ; in such

cases the nephridium ends in a single cell, like the “flame cell ” of a Platyhelminth worm, in which there is a lumen blocked at the coelomic end by a tuft of fine cilia projecting into the lumen. This is so with Aeolosoma (Vezhdovsky). The condition is interesting as a persistence of the conditions obtaining in the provisional nephridia of e.g. Rhynchelmis, which afterwards become by an enlargement and opening up of the funnel the permanent nephridia of the adult worm. In some Polychaets (e.g. Glycera, see fig. 2) there are many of these flame cells to a single nephridium which are specialized in form, and have been termed ” solenocytes ” (Goodrich). They are repeated in Polygordius, and are exactly

to be compared with similarly-placed cells in the nephridia of Amphioxus.

More usually, and indeed in nearly every other case among the Oligochaeta and Hirudinea, thecoelomic aperture of the nephridium consists of several cells, ciliated like the nephridium itself for a greater or less extent, forming a funnel. The funnel varies greatly in size and number of its component cells. There are so many differences of detail that no line can be drawn between the one-celled funnel of Aeolosoma and the extraordinarily large and folded funnel of the posterior nephridia in the Oligochaete Thamnodrilus. In the last- mentioned worm the funnels of the anterior nephridia are small and but few celled; it is only the nephridia in and behind the 17th segment of the body which are particularly large and with a sinuous margin, which recall the funnels of the gonad ducts (i.e. coelomo- ducts).

Among the Polychaeta the nephridium of Nereis (see fig. 2) is like that of the Oligochaeta and Hirudinea in that the coiled glandular tube has an intracellular duct which is ciliated in the same way in parts. The Polychaeta, however, present us with another form of nephridium seen, for example, in Arenicola, where a large funnel leads into a short and wide excretory tube whose lumen is inter- cellular. In the young stages of this worm which have been in- vestigated by W. B. Benham, the tube, though smaller, and with a but little pronounced funnel, has still ah intercellular duct. That these organs in Polychaeta serve for the removal of the generative products to the exterior is proved

not only by the correspondence in number to them of the gonads, but by actual observation of the generative products in transit. This form of nephridia leads to the shorter but essentially similar organs in the Polychaete Sternaspis, and to those of the Echiuroidea (q.v.) and of the Gephyrea (q.v.).

Though the paired arrangement of the nephridia is the prevalent one in the Chaetopoda, there are many examples, among the Oligo- chaeta, of species and genera in which there are several, even many, nephridia in each segment of the body, which may or may not be connected among themselves, but have in any case separate orifices on to the exterior.

2. Coelomoduas. — In this category are included (by Goodrich and Lankester) the gonad ducts of the Oligochaeta, certain funnels without any aperture to the exterior that have been detected in Nereis, &c, funnels with wide and short ducts attached to nephridia in other Polychaeta, gonad ducts in the Capitellidae, the gonad ducts of the leeches. In all these cases we have a duct which has a usually wide, always intercellular, lumen, generally, if not always, ciliated, which opens directly into the coelom on the one hand and on to the exterior of the body on f. he other. These char- acters are plain in all the cases cited, excepting only the leeches which will be considered separately.

There is not a great deal of difference between most of these structures and true nephridia. It is not clear, for example, to which category it is necessary to refer the excretory organs of Arenicola, or Polynoe. Both series of organs consist essentially of a ciliated tube leading from the coelom to the exterior. Both series of organs grow back centrifugally from the funnel. In both the cavity origin- ally or immediately continuous with the coelom appears first in the funnel and grows backwards. In some cases, e.g. oviducts of Oligo- chaeta, sperm ducts of Phreoryctes, the coelomoducts occupy, like the nephridia, two segments, the funnel opening into that in front of the segment which carries the external pore. It is by no means certain that a hard and fast line can be drawn between intra- and intercellular lumina. Finally, in function there are some points of like- ness. The gonad ducts of Lumbricus, &c, must perform one function of nephridia ; they must convey to the exterior some of the coelomic fluid with its disintegrated products of waste. There is no possi- bility that sperm and ova can escape by these tubes not in company with coelomic fluid. In the case of many Oligochaeta where there is no

vascular network surrounding the nephridium, this function must be the chief one of those glands, the more elaborate process of excretion taking place in the case of nephridia surrounded by a rich plexus of blood capillaries. A consideration of the mode of development and appearance 6 > f the coelomoducts that have thus far been enumerated (with the possible exception of those of the leeches) seems to show that there is a distinct though varying relation between them and the nephridia. It has been shown that in Tubifex, and some other aquatic Oligochaeta, the genital segments are at first provided with nephridia, and that these disappear on the appearance of the generative ducts, which are coelomoducts. In Lumbricus the connexion is a little closer ; the funnel of the nephridium, in the segments in which the funnels of the gonad ducts are to be developed, persists and is continuous with the gonad duct funnels on their first appearance. In the development of the Acanthodrilid earthworm Octochaetus (F. E. Beddard) the funnels of thepronephridia disappear except in the genital segments, where they seem to be actually converted into the genital funnels. At the least there is no doubt that the genital funnels are developed precisely where the nephridial funnels formerly existed. If the genital funnels are not wholly or

Fartly formed out of the nephridial funnels they have replaced them. n the genital segments of Eudrilus the nephridia are present, but the funnels have not been found though they are obvious in other segments. Here also the genital funnels have either replaced or been formed out of nephridial funnels. In Haplotaxis neterogync

(W. B. Benham) the sperm ducts are hardly to be distinguished from nephridia; they are sinuous tubes with an intra-cellular duct. But the funnel is large and thus differs from the funnels of the nephridia in adjoining segments. Here again the nephridial funnel seems to have been converted into or certainly replaced by a secondarily developed funnel. This example is similar to cases among the Po'v- chaeta where a true nephridium is provided with a large funnel, a coelomostome, according to the nomenclature of Lankester. The whole organ, having, as is thought but not known, this double origin, is termed a nephromixium. The various facts, however, seem to be susceptible of another interpretation. It may be pointed out that the several examples described recall a phenomenon which is not uncommon and is well known to anatomists. That is the replace-ment of an organ by, sometimes coupled with its partial

conversion into, a similar or slightly different organ performing the same or an analogous function. Thus the postcaval vein of the higher verte- brata is partly a new structure altogether, and is partly formed out of the pre-existing posterior cardinals. The more complete replace- ments, such as the nephridia of the genital segment of Tubifex by a subsequently formed genital duct, may be compared with the succession of the nesonephros to the pronephros in vertebrates, and of the metanephros to the mesonephros in the higher vertebrates. It might be well to term these structures, mostly serving as gonad ducts, which have an undoubted resemblance to nephridia, and for the most part an undoubted connexion with nephridia, " Nephro- dinia," to distinguish them from another category of " ducts " which are communications between the coelom and the exterior, and which have no relation whatever to nephridia or to the organs just discussed. For these latter, the term coelomoducts might well be reserved. To this category belong certain sacs and pouches in many, perhaps most, genera of the Oligochaeta family, Eudrilidae, and possibly the gonad ducts in the Hirudinea. As an example of the former it has been shown (Beddard) that a large median sac in Lybiodrilus is at first freely open to the coelom, that it later becomes shut off from the same, that it then acquires an external orifice, and, finally, that it encloses the ovary or ovaries, between which and the exterior a passage is thus effected. To this category will belong the oviducts in Teleostean fishes and probably the gonad ducts in several groups of invertebrates.

Polychaeta. — This group may be thus defined and the definition contrasted and compared with those of the other divisions of the Chaetopoda. Setae always present and often very large, much varied in form and very numerous, borne by the dorsal and ventral parapodia (when present). The pros- tomium and the segments generally often bear processes sensory and branchial. Eyes often present and comparatively com- plicated in structure. Clitellum not present as a definite organ, as in Oligochaeta. The anus is mostly terminal, and there are no anterior and posterior suckers. Nervousˆ system often imbedded in the epidermis. Vascular system generally present forming a closed system of tubes. Alimentary canal rarely coiled, occasionally with glands which are simple caeca and sometimes serve as air reservoirs; jaws often present and an evefsible pharynx. Nephridia sometimes of the type of those of the Oligochaeta; in other cases short, wide tubes with a large funnel serving also entirely or in

part as gonad ducts. Fre- quently reduced in number of pairs; rarely (Capitellidae) more than one pair per segment. Gonads not so restricted in position as in Oligochaets, and often more abundant; the individuals usually unisexual. No specialized system of spermathecae, sperm reservoirs, and copulatory apparatus, as in Oligochaeta; development generally through a larval form; reproduction by budding also occurs. Marine (rarely fresh-water) in habit.

The Polychaeta contrast with the Oligochaeta by the great variety of outward form and by the frequency of specialization of different regions of the body. The head is always recognizable and much more conspicuous than in other Chaetopoda. As in the Oligochaeta the peristomial segment is often without setae; but this character is not by any means so constant as in the Oligochaeta. The prostomium bears often processes, both dorsal and ventral, which in the Sabellids are split into the circle of branchial plumes, which surround or nearly surround the mouth in those tube-dwelling Annelids. Tomopteris is remark- able for the fact that the hammer-shaped prostomium has paired ventral processes each with a single seta. It is held, however, that these are a pair of parapodia which have shifted forwards. The presence of parapodia distinguish this from other groups of Chaetopoda. Typically, the parapodium consists of two processes of the body on each side, each of which bears a bundle of setae; these two divisions of the ” limb ” are termed

Fig. 3. — a, Bristle of Pionosyttis Malmgreni; b, Hook of Terebella.

respectively notopodium and neuropodium. The notopodium may be rudimentary or absent and the entire parapodium reduced to the merest ridge or even completely unrepresented. Naturally, it is among the free living forms that the parapodium is best developed, and least developed among the tubicolous Polychaeta. To each division of the parapodium belongs typically a long tentacle, the cirrus, which may be defective upon one or other .of the noto- podium or neuropodium, and may be developed into an arborescent gill or into a flat scale-like process, the elytron (in Polynoe, &c). There are other gills developed in addition to those which represent the rri.

Setae. — The setae of the Polychaeta are disposed in two bundles in many genera, but in only one bundle in such forms as have no notopodium {e.g. Syttis). In some genera the setae are in vertical rows, and in certain Capitellidae these rows so nearly meet that an arrange- ment occurs reminiscent of the continuous circle of setae in the perichaetous Oligo- chaeta. The setae vary much in form and are often longer and stronger than in the Oligo- chaetes. Jointed setae and very short hooks or ” uncini ” (see fig. 3) are among the most remarkable forms. Simple bifid setae, such as those of Oligochaetes, are also present in certain forms.

Among the burrowing and tubicolous forms it is not uncommon for the body to be distinguish- able into two or more regions; a ” thorax,” for example, is sharply marked off from an ” abdomen ” in the Sabellids. In these forms the bundles of setae are either capilliform or uncinate, and the dorsal setae of the thorax are like the ventral setae of the abdomen. It is a remarkable and newly-ascertained fact that in regeneration (in Potamilla) the thorax is not replaced by the growth of uninjured thoracic segments ; but that the anterior segments of the abdomen take on the same characters, the setae dropping out and being replaced in accordance with the plan of the setae in the thorax of uninjured worms. Among the Oligochaeta the sexually mature worm is distinguished from the immature worm by the clitellum and by the development of genital setae. Among the Polychaeta the sexual worm is often more marked from the asexual form, so much so that these latter have been placed in different species or even genera. The alteration in form does not only affect structures used in generation; but the form of the parapodia, &c, alter. There are even dimorphic forms among the Syllids where the sexes are, as in many Polychaets, separate.

Nephridia. — The nephridia of the Polychaeta have been generally dealt with above in considering the nephridial system of the Chaeto- poda as a whole. They contrast with those of the Oligochaeta and Hirudinea by reason of their frequently close association with the gonads, the same organ sometimes serving the two functions of excretion and conveyance of the ova and spermatozoa out of the body. On the hypothesis that such a form as Dinophilus (see Haplodrili) has preserved the characters of the primitive Chaetopod more nearly than any existing Polychaet or Oligochaet, it is clear that the nephridia in the Oligochaeta have preserved the original features of those organs more nearly than most Polychaeta. Thus Nereis among the latter worms, from the resemblance which its excretory system bears to that of the

Oligochaeta, may be made the starting-point of a series. In this worm the paired nephridia exist in most of the segments of the body, and their form (see fig. 2) is much like that of the nephridia in the Enchytraeidae. The funnel, which is not large, appears to open, as a rule at least, into the segment in front of that which bears the external orifice. Quite independent of these are certain large dorsally situate funnel-like folds of the coelomic epithelium, ciliated, but of which no duct has been dis- covered leading to the exterior. It is possible that we have here gonad ducts distinct from nephridia which at the time of sexual maturity do open on to the exterior.

In Polynoe the nephridia are short tubes with a slightly folded funnel whose lumen is intercellular, and this intercellular lumen is characteristic of the Polychaetes as contrasted with leeches and Oligochaetes. Among the Terebelloidea there is a remarkable differentiation of the nephridia into two series. One set lies in front of the diaphragm, which is the most anterior and complete septum, the rest having disappeared or being much less developed. The anterior nephridia, of which there are one to three pairs, contrast with the posterior series by their small funnels and large size, the

fosterior nephridia having a large funnel followed by a short tube, n Chaetozone setosa the anterior nephridia occupy five segments. There is usually a gap between the two scries, several segments being

without nephridia. It seems that the posterior nephridia are mainly gonad ducts, and the gonads are developed in close association with the funnels. The same arrangement is found in some other Poly- chaetes; for instance, in Sabellaria there is a single pair of large anterior nephridia, which open by a common pore, followed after an interval by large-funnelled and short nephridia. This differentiation is not, however, peculiar to the Polychaetes; for in several Oligo- chaetes the anterior nephridia are of large size, and opening as they do into the buccal cavity clearly play a different function to those which follow. In Thantnodrilus, as has been pointed out, there are two series of nephridia which resemble those of the Ter„ebelloidea in the different sizes of their funnels. In Lanice conchilega the posterior series of nephridia are connected by a thick longitudinal duct, which seems to be seen in its most reduced form in Owenia, where a duct on each side runs in the epidermis, being in parts a groove, and receives one short tubular nephridium only and

occupies only one segment. This connexion of successive nephridia (in Lanice) has its counterpart in Allolobophora, Lybiodrilus, and apparently in the Lumbriculids Teleuscolex and Styloscolex, among the Oligochaeta. Among the Capitellidae, which in several respects resemble the Oligochaeta, wide and short gonad ducts coexist in the same segments with nephridia, the latter being narrower and longer. It is noteworthy that in this family only among the Poly- chaeta, the nephridia are not restricted to a single pair in each seg- ment; so that the older view that the gonad ducts are meta- morphosed nephridia is not at variance with the anatomical facts which have been just stated.

Alimentary Canal. — The alimentary canal ot Polychaetes is usually a straight tube running from the anterior mouth to the posterior anus. But in some forms, e.g. Sternaspis, the gut is coiled. In others, again, e.g. Cobangia, the anus is anterior and ventral. A gizzard is present in a few forms. The buccal cavity is sometimes armed with jaws. The oesophagus is provided often with caeca which in Syllids and Hesibnidae have been found to contain air, and possibly therefore perform the function of the fish's air-bladder. In other Polychaetes one or more pairs of similar outgrowths are glandular. The intestine is provided with numerous branched caeca in Aphrodite.

Reproduction.— As is the case with the Oligochaeta, the Poly- chaeta furnish examples of species which multiply asexually by

budding. There is a further resem- blance between the two orders of Chae- topoda in that this budding is not a general pheno- menon, but con- fined to a few forms only. Budding, in fact, among the Polychaetes is limited to the family Syllidae. In the Oligochaetes it is only the families Aeoloso- matidae and Nai- didae that show the same phenomenon. It has been men. tioned that in the Nereids a sexual form occurs which differs structurally from the asexual worms, and was originally placed in a separate genus, Heteronereis ; hence the name " Heteronereid " for the sexual worm. In Syttis there is also a " Heterosyllid " form in which the gonads are limited to a posterior region of the body which is further marked off from the anterior non-sexual segments by the oak-like setae. In some Syllids this posterior region separates off from the rest,

Eroducing a new head ; thus a process of ssion occurs which has been termed schizo- gamy. A similar life history distinguishes

certain Sabellid worms, e.g. Filigrana. Among the Syllids this simple state of affairs is further complicated. In Autolytus there is, to begin with, a conversion of the ppsterior half of the body to form a sexual zooid. But before this separates off a number of other _ , zooids are formed from a zone of budding • ^ IG ; ^~~ Uas y c ™ ne which appears between the two first-formed tnJracta, Kr. (Alter ind i v i dua i s . Ultimately, a chain of sexual Malmgren.) zooids is thus formed. A given stock only

produces zooids of one sex. In Myrianida there is a further development of this process. The conversion of the posterior end of the simple individual into a sexual region is dispensed with; but from a preanal budding segment a series of sexual buds are produced. The well-known Syllid, discovered during the voyage of the " Challenger," shows a modification of this form of budding. Here, however, the buds are lateral, though produced from a budding

zone, and they themselves produce other buds, so that a ramifying colony is created.

Quite recently, another mode of budding has been described in Trypanosyllis gemmipara, where a crowd of some fifty buds arising symmetrically are produced at the tail end of the worm. In some Syllids, such as Pionosyllis gestans, the ova are attached to the body

$£££&

A

Fig. 5. — A, Autolytus (after Mensch) with numerous buds. B, Portion of a colony of Syllis ramosa (from M'Intosh). b.z, Budding zone; p, anterior region of the parent worm; 1-5, buds.

of the parent in a regular line, and develop in situ ; this process, which has been attributed to budding, is an " external gestation," and occurs in a number of species.

As is very frequently the case with marine forms, as compared with their fresh-water and terrestrial allies, the Polychaeta differ from the Oligochaeta and Hirudinea in possessing a free living

Fig. 6. — A, Side view of the larva of Lopadorhynchus (from Kleinen- berg), showing the developing trunk region. B, Side view of the trochophore larva of Eupomatus uncinatus (from Hatschek).

A, Anus.

me,

Mesoblast.

E, Eye.

ms,

Larval muscle.

M, Mouth.

0,

Otocyst.

ap. Apical organ.

PP,

Parapodium.

h, ” Head kidney.”

Pr,

Praeoral ciliated ring, or

i, Intestine.

prototroch.

larval form which is hatched at an early stage in development. This larva is termed the Trochosphere larva, and typically (as it is held) is an egg-shaped larva with two bands of cilia, one preoral and one postoral, with an apical nervous plate surmounted by a tuft of longer cilia, and with a simple bent alimentary canal, with lateral mouth and posterior anus, between which and the ectoderm is a spacious cavity (blastocoel) traversed by muscular strands and often containing a larval kidney. The segmentation is

of the mesoblast

to begin with, and appears later behind the mouth, the part anterior to this becoming the prostomium of the adult. The chief modi- fications of this form are seen in the Mitraria larva of Ammochares with only the preoral band, which is much folded and which has provisional and long setae; the atrochous larva, where the covering of cilia is uniform and not split into bands; and the polytrochous larva where there are several bands surrounding the body. There are also other modifications.

Classification. — The older arrangement of the Polychaeta into Errantia or free living and Tubicola or tube-dwelling forms will hardly fit the much increased knowledge of the group. W. B. Benham's division into Phanerocephala in which the prostomium is plain, and Cryto- cephala in which the prostomium is hidden by the peristomium adopted by Sedgwick, can only be justified by the character used; for the Tere- bellids, though phanerocephalous, have many of the features of the Sabellids. It is perhaps safer to subdivide the Order into 6 Suborders (in the number of these following Benham, except in combining the Sabelliformia and Hermelli- formia). Of these 6, the two first to be con- sidered are very plainly separable and represent the extremes of Polychaete organization. (1) Nereidiformia. — " Errant " Polychaetes with well-marked prostomium possessing tentacles and palps with evident and locomotor para- podia, supported (with few exceptions) by strong spines, the aciculi; muscular pharynx usually armed with jaws; septa and nephridia regu- larly metameric and similar throughout body; free living and predaceous. (2) Cryptocephala. — Tube-dwelling with body divided into thorax and abdomen marked by the setae, which are reversed in position in the neuropodium and notopodium respectively in the two regions. Parapodia hardly projecting; palps of pro- somium forming branched gills; no pharynx or eversible buccal region; no septa in thorax, septa in abdomen regularly disposed. Nephridia in two series; large, anterior nephridia followed

by small, short tubes in abdomen. The remain- Fig. 7. Nereis

ing groups are harder to define, with the exception pelagi'ca. L. (After of the (3) Capitelliformia, which are mud-living Oersted) worms of an " oligochaetous " appearance, and with some affinities to that order. The peristomium has no setae, and the setae generally are hair-like or uncinate, often forming almost

com- plete rings. The genital ducts are limited to one segment (the 8th in Capitella capitata), and there are genital setae on this and the next

Fig. 8. — Sabella vesiculosa, Mont. (After Montagu.)

Fig. 9. Arenicola marina, L.

segment. In other forms genital ducts and nephridia coexist in the same segment. The nephridia are sometimes numerous in each seg- ment. There is no blood system, and the coelomic corpuscles contain

haemoglobin. (4) Terebelliformia. These worms are in some respects like the Sabellids (Cryptocephala). The parapodia, as in the Capitellidae, are hardly developed. The buccal region is un- armed and not eversible. The prostomium has many long filaments which recall the gills of the Sabellids, &c. The nephridia are special- ized into two series, as in the last-mentioned worms. (5) Spioni- formia (including Chaetopterus, Spio, &c.) and (6) Scoleciformia (Arenicola, Chloraema, Sternaspis) are the remaining groups. In both, the nephridia are all alike; there are no jaws; the pro- stomium rarely has processes. The body is often divisible into regions.

Literature. — W. B. Benham, ” Polychaeta ” in Cambridge Natural History; E. Claparede, Annelides cketopodes du golfe de Naples (1868 and 1870); E. Ehlers, Die Borstenwurmer (1868); H. Eisig, Die Capitelliden (Naples Monographs), and development of do. in Mitth. d. zool. Stat. Neapel (1898); W. C. M’Intosh, ” Chal- lenger” Reports (1885); E. R. Lankester, Introductory Chapter in A Treatise on Zoology; E. S. Goodrich, Quart. Journ. Mic. Sci. (1897-1900); E. Meyer, Mitth. d. zool. Stat. Neapel (1887, 1888), as well as numerous other memoirs by the above and by J. T. Cunning- ham, de St Joseph, A. Malaquin, A. Agassiz, A. T. Watson, Malm- gren, Bobretsky and A. F. Marion, E. A. Andrews, L. C. Cosmovici, R. Horst, W. Michaelsen, G, Gilson, F. Buchanan, H. Levinsen, Joyeux-Laffuie, F. W. Gamble, &c.

Oligochaeta. — As contrasted with the other subdivisions of the Chaetopoda, the Oligochaeta may be thus defined. Setae

very rarely absent (genus Achaeta) and as a rule not so large or so numerous in each segment as in the Polychaeta, and different |gT|g* in shape. Eyes rarely 'Tilsipl' present and then rudimentary. Prostomium gener- ally small, sometimes pro- longed, but never bearing tentacles or processes. Appendages of body reduced to branchiae, present only in four species, and to the ventral copulatory appendages of Alma and Criodrilus. Clitellum always present, extending over two (many limicolous forms) to forty-five seg- ments {Alma). Segments of body numerous and not distinctive of species, being irregular and not fixed in numbers. In terrestrial forms dorsal pores are usu- ally present; in aquatic forms a head pore only. Anus nearly always ter- minal, rarely dorsal, at a little distance from end of body. Suckers absent. Nervous system rarely {Aeolosoma) in continuity with epidermis. Vascular system always present, forming a closed system, more complicated in the larger forms than in the aquatic genera. Several specially large contractile trunks in the anterior segments uniting the dorsal and ventral vessels. Nephridia generally paired, often very numerousin each segment, in the form of long, much-coiled tubes with intracellular lumen. Gonads limited in number of pairs, testes and ovaries always present in the same individual. Special sacs developed from the intersegmental septa lodge the developing ova and sperm. Special gonad ducts always present. Male ducts often open on to exterior through a terminal chamber which is variously specialized, and sometimes with a penis.

Fig. I o. — Diagrams of various Earth- worms, to illustrate external characters. A, B, C, anterior segments from the ventral surface ; D, hinder end of body of Urochaeta.

A, Lumbricus : 9, 10, segments contain-

ing spermathecae, the orifices of which are indicated ; 14, segment bearing oviducal pores; 15, seg- ment bearing male pores; 32, 37, first and last segments of clitellum.

B, Acanthodrilus: cp, orifices of sper-

mathecae ; 9 , oviducal pores ; rj\ male pores; on 17th and 19th segments are the apertures of the atria.

C, Perichaeta: the spermathecal pores

are between segments 6 and 7, 7 and 8, 8 and 9, the oviducal

pores upon the 14th and the male pores upon the 18th segment. In all the figures the nephridial pores

are indicated by dots and the setae by

strokes.

Generative pores usually paired, sometimes single and median. Spermathecae nearly always present. Alimentary canal straight, often with appended glands of complicated or simpler structure; no jaws. Eggs deposited in a cocoon after copulation. Development direct. Reproduction by budding also occurs. Fresh- water (rarely marine) and terrestrial.

The Oligochaeta show a greater variety of size than any other group of the Chaetopoda. They range from a millimetre or so (smaller species of Aeolosoma) to 6 ft. or even rather more {Microchaeta rappi, &c.) in length.

Setae. — The setae, which are always absent from the peristomial segment, are also sometimes absent from a greater number of the

9′ Hf

Fig. 11. — Setae of Oligochaeta.

a, Penial seta of Perichaeta cey- d, Seta of Lumbricus.

lonica.

b, Extremity of penial seta of

Acanthodrilus (after Horst).

c, Seta of Urochaeta (Perier).

e, Seta of Criodrilus.

f, g, Setae of Bohemilla comata. h, i, j, Setae of Psammoryctes bar-

batus (/tojafterVezhdovsky).

anterior segments of the body, and have completely disappeared in Achaeta cameranoi. When present they are either arranged in four bundles of from one to ten or even more setae, or are disposed in con- tinuous lines completely encircling each

segment of the body. This latter arrangement characterizes many genera of the family Mega- scolicidae and one genus (Periscolex) of the Glossoscolicidae. It has been shown (Bourne) that the " perichaetous " condition is prob- ably secondary, inasmuch as in worms which are, when adult, " perichaetous " the setae develop in pairs so that the embryo passes through a stage in which it has four bundles of setae, two to each bundle, the prevalent condition in the group. Rarely there is an irregular disposition of the setae which are not paired, though the total number is eight to a segment (fig. 10), e.g. Pontoscolex. The varying forms of the setae are illustrated in fig. 11.

Structure.— The body wall consists of an epidermis which secretes a delicate cuticle and is only ciliated in Aeolosoma, and in that genus only on the under surface of the prostomium. The epidermis con- tains numerous groups of sense cells; beneath the epidermis there is rarely (Kynotus) an extensive connective tissue dermis. Usually the epidermis is immediately followed by the circular layer of muscles, and this by the longitudinal coat. Beneath this again is a distinct peritoneum lining the coelom, which appears to be wanting as a special layer in some Polychaetes (Benham, Gilson). The muscular layers are thinner in the aquatic forms, which possess only a single row of longitudinal fibres, or (Enchytraeidae) two layers. In the earthworms, on the other hand, this coat is thick and composed of many layers.

The clitellum consists of a thickening of the epidermis, and is of two forms among the Oligochaeta. In the aquatic genera the epidermis comes to consist entirely of glandular cells, which are, however, arranged in a single layer. In the earthworms, on the other hand, the epidermis becomes specialized into several layers of cells, all of which are glandular. It is therefore obviously much thicker than the clitellum in the limicolous forms. The position of the clitellum, which is universal in occurrence, varies much as does the number of component segments. As a rule — to which, however, there are exceptions — the clitellum consists of two cr three segments only in the small aquatic Oligochaeta, while in the terrestrial forms it is as a general rule, to which again there are exceptions, a more extensive, sometimes much more extensive, region.

In the Oligochaeta there is a closer correspondence between ex- ternal metamerism and the divisions of the coelom than is apparent in some Chaetopods. The external segments are usually

definable by the setae ; and if the setae are absent, as in the anterior segments

of several Geoscolicidae, the nephridiopores indicate the segments ; to each segment corresponds internally a chamber of the coelom which is separated from adjacent segments by transverse septa.which are only unrecognizable in the genus Aeolosoma and in the head region of other Oligochaeta. In the latter case, the numerous bands of muscle attaching the pharynx to the parietes have obliterated the regular partition by means of septa.

Nephridia. — The nephridia in this group are invariably coiled tubes with an intracellular lumen and nearly invariably open into the coelom by a funnel. There are no renal organs with a wide inter- cellular lumen, such as occur in the Polychaeta, nor is there ever any permanent association between nephridia and ducts connected with the evacuation of the generative products, such as occur in Alciope, Saccocirrus, &c. In these points the Oligochaeta agree with the Hirudinea. They also agree in the general structure of the nephridia. It has been ascertained that the nephridia of Oligochaeta are preceded in the embryo by a pair of delicate and sinuous tubes, also found in the Hirudinea and Polychaeta, which are larval excretory organs. It is not quite certain whether these are to be regarded as the remnant of an earlier excretory system, replaced among the Oligochaeta by the subsequently developed paired structures, or whether these ” head kidneys ‘ are the first pair of nephridia precociously de- veloped. The former view has been extensively held, and it is supported by the fact that in Octochaetus the first segment of the body has a pair of nephridia which is exactly like those which follow, and, like them/persists. On the other hand, in most Oligochaeta the first segment has in the adult no nephridium, and in the case of Octochaetus the existence of a ” head kidney ” antedating the subse- quently developed nephridia of the first and other segments has neither been seen nor proved to be absent. In any case the nephridia which occupy the segments of the body generally are first of all represented by paired structures, the ” pronephridia,” in which the funnel is composed of but one cell, which is flagellate. This stage has at any rate been observed in Rhynchelmis and Lumbricus (in its widest

sense) by Vezhdovsky. It is further noticeable that in Rhynchelmis the covering of vesicular cells which clothes the drain- pipe cells of the adult nephridium is cut off from the nephridial cells themselves and is not a peritoneal layer surrounding the nephridium. Thus the nephridia, in this case at least, are a part of the coelom and are not shut off from it by a layer of peritoneum, as are other organs which lie in it, e.g. the gut. A growth both of the funnel, which becomes multicellular, and of the rest of the nephri- dium produces the adult nephridia of the genera mentioned. The paired disposition of these organs is the prevalent one among the Oligochaeta, and occurs in all of twelve out of the thirteen families into which the group is divided.

Among the Megascolicidae, however, which in number of genera and species nearly equals the remaining families taken together, another form of the excretory system occurs. In the genera Phere- tima, Megascolex, Dichogaster, &c, each segment contains a large number of nephridia, which, on account of the fact that they are necessarily smaller than the paired nephridia of e.g. Lumbricus , have been termed micronephridia, as opposed to meganephridia ; there is, however, no essential difference in structure, though micronephridia are not uncommonly (e.g. Megascolides, Octochaetus) unprovided with funnels. It is disputed whether these micronephridia are or are not connected together in each segment and from segment to segment. In any case they have been shown in three genera to de- velop by the growth and splitting into a series of original paired pronephridia. A complex network, however, does occur in Lybio- drilus and certain other Eudrilidae, where the paired nephridia possess ducts leading to the exterior which ramify and anastomose on the thickness of the body wall. The network is, however, of the duct of the nephridium, possibly ectodermic in origin, and does not affect the glandular tubes which remain undivided and with one coelomic funnel each.

The Oligochaeta are the only Chaetopods in which undoubted nephridia may possess a relationship with the alimentary canal. Thus, in Octochaetus multiporus a large nephridium opens anteriorly into the buccal cavity, and numerous nephridia in the same worm evacuate their contents into the rectum. The anteriorly-opening and usually very large nephridia are not uncommon, and have been termed ” peptonephridia.”

Gonads and Gonad Ducts. — The Oligochaeta agree with the

leeches and differ from most Polychaeta in that they are hermaphrodite. There is no exception to this generalization. The gonads are, more- over, limited and fixed in numbers, and are practically invariably attached to the intersegmental septa, usually to the front septum of a segment, more rarely to the posterior septum. The prevalent number of testes is one pair in the aquatic genera and two pairs in earthworms. But there are exceptions; thus a species of Lampro- drilus has four pairs of testes. The ovaries are more usually one pair, but two are sometimes present. The segments occupied by the gonads are fixed, and are for earthworms invariably X, XI, or one of them for the testes, and XIII for the ovaries. The position varies in the aquatic Oligochaeta. The Oligochaeta contrast with the Polychaeta in the general presence of outgrowths of the septa in the genital segments, which are either close to, or actually involve, the gonads, and into which may also open the funnels of the gonad ducts. These sacs contain the developing sperm cells or eggs, and

are with very few exceptions universal in the group. The testee are more commonly thus involved than are the ovaries. It is indeed only among the Eudrilidae that the enclosure of the ovaries in septal sacs is at all general. Recently the same thing has been recorded in a few species of Pheretima (— Perichaeta), but details are as yet wanting. We can thus speak in these worms of gonocoels, i.e. coelomic cavities connected only with the generative system. These cavities communicate with the exterior through the gonad ducts, which have nothing to do with them, but whose coelomic funnels are taken up by them in the course of their growth. There are, however, in the Eudrilidae, as already mentioned, sacs envolving the ovaries which bore their own way to the exterior, and thus may be termed coelomoducts. These sacs are dealt with later under the description of the spermathecae, which function they appear to perform. The gonad ducts are male and female, and open opposite to or, rarely, alongside of the gonads, whose products they convey to the exterior. The oviducts are always short trumpet-shaped tubes and are some- times reduced (Enchytraeidae) to merely the external orifices. It is possible, however, that those oviducts belong to a separate morpho- logical category, more comparable to the dorsal pores and to abdominal pores in some fishes. The sperm ducts are usually longer than the oviducts; but in Limicolae both series of tubes opening by the funnel into one segment and on to the exterior in the following segment. While the oviducts always

open directly on to the ex- terior, it is the rule for the sperm ducts to open on to the exterior near to or through certain terminal chambers, which have been variously termed atrium and pro- state, or spermiducal gland. The distal ex- tremity of this apparatus is sometimes eversible as a penis. Associated with these glandsare frequently to be found bundles or pairs of long and variously modified setae which are termed penial setae.to dis- tinguish them from other setae sometimes but not always associated with rather similar glands which are found anteriorly to these, and often in the immediate neighbourhood of the spermathecae; the latter are spoken of as genital setae.

Spermathecae. — These structures appear to be absolutely distinctive of the Oligochaeta, unless the sacs which contain sperm and open in common with the nephridia of Sac- cocirrus (see Haplodrili) are similar. Spermathecae are generally present in the Oligochaeta and are absent only in comparatively few genera and species. Their position varies, but is constant for the species, and they are rarely found behind the gonads. They are essentially spherical, pear-shaped or oval sacs opening on to the exterior but closed at the coelomic end. In a few Enchytraeidae and Lumbri- culidae the spermathecae open at the distal extremity into the oesophagus, which is a fact difficult of explanation. Among the aquatic Oligochaeta and many earthworms (the families Lumbri- cidae, Geoscolicidae and a few other genera) the spermathecae are simple structures, as has been described. In the majority of the Megascolicidae each sac is provided with one or more diverticula, tubular or oval in form, of a slightly different histological character in the lining epithelium, and in them is invariably lodged the sperm. The spermathecae are usually paired structures, one pair to each of the segments where they occur. In many Geoscolicidae, however, and certain Lumbricidae and Perichaetidae, there are several, even a large number, of pairs of very small spermathecae to each of the segments which contain them.

In the Eudrilidae there are spermathecae of different morpho- logical value. In figs. 12 and 13 are shown the spermathecae of the genera Hyperiodrilus and Heliodrilus, which are simple sacs ending blindly as in other earthworms, but of which there is only one median opening in the thirteenth segment or in trie eleventh. In Heliodrilus the blind extremity of the spermatheca is enclosed in a coelonvjc sac which is in connexion with the sacs envolving the ovaries and ovi- ducts. In Hyperiodrilus the whole spermatheca is thus included in a corresponding sac, which is of

great extent. In such other genera of the family as have been examined, the true spermatheca has entirely disappeared, and the sac which contains it in Hyperio- drilus alone remains. This sac has been already referred to as a coelomoduct. Its orifice on to the exterior is formed by an involution

Fig. 12. — Female reproductive system oiHeliodrilus. — XI-XIV,eleventh to four- teenth segments, sperm, spermatheca; sp. o,its external orifice ; sp. sac, sperma- thecal sac; ov, sac containing ovary; r.o, egg sac ; od, oviduct.

(as it appears) of the epidermis, and that it performs the function of a spermatheca is shown by its containing spermatozoa, or, in Sluhlmannia, a spermatophore. In Polytoreutus, also, spermato- phores have been found in these spermathecal sacs. We have thus the replacement of a spermatheca, corresponding to those of the remaining families of Oligochaeta, and derived, as is believed, from the epidermis, by a structure performing the same function, but derived from the mesoblastic tissues, and with a cavity which is coelom.

Alimentary Canal. — The alimentary canal is always a straight tube, and the anus, save in the genera Criodrilus and Dero, is completely terminal. A buccal cavity, a pharynx, an oesophagus and an intestine are always distinguishable. Commonly among the terres- trial forms there is a gizzard, or two gizzards, or a larger number, in the oesophageal region. There is no armed protrusible pharynx, such as exists in some other Chaetopods. This may be associated with mud-eating habits; but it is not wholly certain that this is the case; for in Chaetogaster and Agriodrilus, which are predaceous worms, there is no protrusible pharynx, though in the latter the oesophagus is thickened through its extent with muscular fibres. The oesophagus is often furnished with glandular diverticula, the ” glands of Morren,” which are often of complex structure through the folding of their walls. Among the purely aquatic families such structures ar.e very rare, and are represented by two caeca in the genus Limnodriloides. It is a remarkable fact, not yet understood, that in certain Enchytraeidae and Lumbriculidae the spermathecae open into the oesophagus as well as on to the exterior. The only comparable fact among other worms is the Laurer’s canal or

genito- intestinal canal in the Trematoda. The intestine is usually in

the higher forms provided with a typhlosole, in which, in Pontoscolex, runs a ciliated canal or canals communicating with the intestine. It is possible that this represents the syphon or supplementary intestine of Capitellidae, which has been shown to develop as a groving of the intestine ultimately cut off from it. The in- testine has a pair of caeca or two or three pairs (but all lie in one segment) in the genus Pheretima and in one species of Rhino- drilus. In Typhoeus and Megascolex there are com- Fig. 13. — Female reproductive system plex glands appended to of Hyperiodrilus. — XIII, XIV, thirteenth the intestine.

In Benhamia caecifera and at least one other earthworm there are

and fourteenth segments.

sp, Spermatheca. ov, Ovary.

sp' } Spermathecal sac r.o, Egg sac.

involving the last. od, Oviduct, numerous caeca, one pair

to each segment. Classification.— The classifications of Adolf Eduard, Grube and Claparede separated into two subdivisions the aquatic and the terres- trial forms. This scheme, opposed by many, has been reinstated by Sedgwick. The chief difficulty in this scheme is offered by the Moniligastridae, which in some degree combine the characters of both the suborders, into neither of which will they fit accurately. The following arrangement is a compromise: —

Group I. Aphaneura.— This group is referred by A. Sedgwick to the Archiannelida. It is, however, though doubtless near to the base of the Oligochaetous series, most nearly allied in the reproductive system to the Oligochaeta. It contains but one family, Aeolo- somatidae- There are three pairs of spermathecae situated in seg- ments III-V, a testis in V and an ovary in VI. There are a clitellum and sperm ducts which though like nephridia have a larger funnel and a less complexly wound duct. This family consists of only one well-known genus, Aeolosoma, which contains several species. They are minute worms with coloured oil drops (green, olive green or orange) contained in the epidermis. The nervous system is em- bedded in the epidermis,

and the pairs of ganglia are separated as in Serpula, &c. ; each pair has a longish commissure between its two ganglia. The intersegmental septa are absent save for the division of the first segment. The large prostomium is ciliated ventrally. The setae are either entirely capillary or there are in addition some sigmoid setae even with bifid free extremities. This genus also propagates asexually, like Ctenodrilus, which may possibly belong to the same family. Asexual reproduction universal.

Group II. Limicolae. — With a few exceptions the Limicolae are, as the name denotes, aquatic in habit. They are small to moderate- sized Oligochaeta, with a smaller number of segments than in the Terricolae. The alimentary canal is simple and a gizzard or oeso- phageal diverticula rarely developed. The vascular system is simple with as a rule direct communication between dorsal and ventral vessels in each segment. Nerve cord lies in coelom ; brain in first segment or prostomium in many forms. Clitellum generally only

two or three segments and more anterior in position than in Terri- colae. Nephridia always paired and without plexus of blood capil- laries. Spermatheca rarely with diverticula ; sperm ducts as a rule occupying two segments only, usually opening by means of an atrium. Srjerm sacs generally occupying a good many segments and with simple interior undivided by a network of trabeculae. Ova large and with much yolk. Asexual reproduction only in Naids. Egg sacs as large or nearly so as sperm sacs. Testes and ovaries always free. The following families constitute the group, viz. Naididae, Enchytraeidae, Tubificidae, Lumbriculidae, Phreoryctidae, Phreodrilidae, Alluroididae, the latter possibly not referable to this group.

Group III. Moniligastres.— Moderate-sized to very large Oligo- chaeta, terrestrial in habit, with the appearance of Terricolae. Generative organs anterior in position as in Limicolae. Sperm ducts and atria as in Limicolae; egg sacs large; body wall thick; vascular system and nephridia as in Terricolae. Only one family, Moniligastridae.

Group IV. Terricolae. — Earthworms, rarely aquatic in habit. Of small to very large size. Clitellum commonly extensive and more posterior in position than in other groups. Vascular system complicated without regular connexion between dorsal and ventral vessels, except in anterior segments. Nephridia as a rule with abundant vascular supply. Testes, and occasionally ovaries,

en- closed in sacs. Sperm sacs generally limited to one or two segments with interior subdivided by trabeculae. Sperm ducts traverse several segments on their way to exterior. They open in common with, or near to, or, more rarely, into, glands which are not certainly comparable to the atria of the Limicolae. Egg sacs minute and functionless (?). Eggs minute with little yolk. Nephridia some- times very numerous in each segment. Spermathecae often with diverticula.

Earthworms are divided into the following families, viz. Mega- scolicidae, Geoscolicidae, Eudrilidae, Lumbricidae.

As an appendix to the Oligochaeta, and possibly referable to that group, though their systematic position cannot at present be deter- mined with certainty, are to be placed the Bdellodrilidae (Disco- drilidae auct.), which are small parasites upon crayfish. These worms lay cocoons like the Oligochaeta and leeches, and where they depart from the structure of the Oligochaeta agree with that of leeches. The body is composed of a small and limited number of segments (not more than fourteen), and there is a sucker at each end of the body. There are no setae and apparently only two pairs of nephridia, of which the anterior pair open commonly by a common pore on the third segment after the head, whose segments have not been accu- rately enumerated. The intervening segments contain the genitalia, which are on the Oligochaeta plan in that the gonads are independent of their ducts and that there are special spermathecae, one pair. The male ducts are either one pair or two pairs, which open by a common and complicated efferent terminal apparatus furnished with a protrusible penis. The ganglia are crowded at the posterior end of the body as in leeches, and there is much tendency to the obliteration of the coelom as in that group. Pterodrilus and Cirro- drilus bear a few, or circles of, external processes which may be branchiae; Bdellodrilus and Astacobdella have none. The vascular system is as in the lower Oligochaeta. There are two chitinous jaws in the buccal cavity, a dorsal and a ventral, which are of specially complicated structure in Cirrodrilus.

Literature.— F. E. Beddard, A Monograph of the Oligochaeta (Oxford, 1895), also Quart. Journ. Micr. Set., 1886-1895, and Proc. Zool. Soc, 1885-1906; W. B. Benham, Quart. Journ. Micr. Sci., 1886-1905 ; W. Michaelsen, ” Oligochaeta ” in Das Tierreich, 1900, and Miiih, Mus. (Hamburg, 1 890-1906) ; A. G. Bourne, Quart. Journ. Micr. Sci., 1894; H. J. Moore, Journ. Morph., 1895;

F. Vezhdovsky, System d. Oligochaeten (Prague, 1884), and Entwick- lungsgeschichtliche Untersuchungen; and numerous papers by the above and by G. Eisen, E. Perrier, D. Rosa, R. Horst, L. Cognetti, U. Pierantoni, W. Baldwin Spencer, H. Ude, &c, and embryological memoirs by R. S. Bergh, E. B. Wilson, N. Kleinenberg, &c.

Hirudinea. — The leeches are more particularly to be compared with the Oligochaeta, and the following definition embraces the main features in which they agree and disagree with that group. Setae are only present in the genus Acanthobdella. Eyes are present, but hardly so complex as in certain genera of Polychaetes. The appendages of the body are reduced to branchiae, present in certain forms. A clitellum is present. The segments of body are few (not more than thirty-four) and fixed in number. The anus is dorsal. One or two (anterior and posterior) suckers always present. Nervous system always in coelom. Coelom generally reduced to a system of tubes, sometimes communicating with vascular system; in Acanthobdella and Ozobranchus a series of metamerically arranged chambers as in Oligochaeta. Ne- phridia always paired, rarely (Pontobdella) forming a network communicating from segment to segment; lumen of nephridia always intracellular, funnels pervious or impervious. Alimentary

canal sometimes with protrusible proboscis; never with gizzard or oesophageal glands; intestine with caeca as a rule. Jaws often present. Testes several pairs, rarely one pair, continuous with sperm ducts; ovaries, one pair, continuous with oviducts; generative pores single and median. No separate spermathecae or septal chambers for the development of the ova and sperm. Eggs deposited in a cocoon. Development direct. No asexual generation. Fresh-water, marine and terrestrial. Parasitic or carnivorous.

In external characters the Hirudinea are unmistakable and not to be confused with other Annelids, except perhaps with the Bdello- drtiidae, which resemble them in certain particulars. The absence of setae — save in Acanthobdella, where five of the anterior segments possess each four pairs of setae with reserve setae placed close behind them (fig. 14), and the presence of an

anterior and posterior sucker, produce a looping mode of progression similar to that of a Geometrid larva. The absence of setae and the great secondary annulation render the mapping of the segments a subject of some difficulty. The most reliable test appears to be the nerve ganglia, which are more distinct from the intervening connectives than in other Annelids.

In the middle of the body, where the limits of the somites can be checked by a comparison with the arrangement of the nephridia and the gonads, and where the ganglia are quite distinct and separ- ated by long connectives, each ganglion is seen to consist of six masses of cells enclosed by capsules and to give off three nerves on

each side. This corre- sponds to the usual pre- sence (in the Rhyncho- bdellidae) of three annuli to each segment. An- teriorly and posteriorly separate ganglia have fused. The brain con- sists not only of a group of six capsules corre- sponding to the archi- cerebrum of the Oligo- chaeta, but of a further mass of cells surrounding and existing below the alimentary canal, which can be analysed into five or six more separate gan- Fig. 14.— Acanthobdella, from the ven- S lia – The wh ° le mass lies tral surface, showing the five sets of setae ln the seventh or eighth (5, to 5 5) and the replacing setae (Sr) segment. At the pos- tehind them. The three pairs of pig- tenor end of the body mented spots show the position of the there are likewise seven eyes on the dorsal surface. (After separate ganglia partially Kovalevsky.) fuse(* to form a single

3/ ganglionic mass, which

innervates the segments lying behind the anus and corre- sponding to the posterior sucker. So that a leech in which only twenty-seven segments are apparent by the enumeration of the annuli, separate ganglia, nephridia, lines of sensillae upon the body, really possesses an additional seven lying behind that which is apparently the last of the series and crowded together into a minute space. The annuli into which segments are externally divided are so deeply incised as to render it impossible to distinguish, as can be readily done in the Oligochaeta as a rule, the limits of an annulus from that of a true segment. As remarked, the prevalent number of annuli to a segment is three in the Rhynchobdellidae. But in that group {Cystobranchus) there may be as many as eight annuli. In the Gnathobdellidae the prevailing number of annuli to a segment is five; but here again

the number is often increased, and Trocheta has no less than eleven. The reason for this excessive annulation has been seen in the limited number of segments (thirty-four) of which the body is composed, which are laid down early and do not increase. In the Oligochaeta, on the other hand, there is growth of new segments. It is important to notice that the metameric plan of growth of Chaetopods is still preserved.

The nephridia are like those of the Oligochaeta in general structure ; that is to say, they consist of drain-pipe cells which are placed end to end and are perforated by their duct. The internal funnel varies in the same way as in the Oligochaeta in the number of cells which form it. In Clepsine (Glossiphonia) there are only three cells, and in Nephelis five to eight cells. In Hirudo the funnel is not pervious and is composed of a large number of cells. Externally, the nephridium opens by a vesicle, as in many Oligochaetes whose lumen is intercellular. In Pontobdella and Branchellion the nephridia form a network extending from segment to segment, but there is only one pair of funnels in each segment. Slight differences in form have been noted between nephridia of different segments; but the Hirudinea do not show the marked differentiation that is to be seen in some other Chaetopods; nor do the nephridia ever acquire any relations to the alimentary canal.

Coelom. — The coelom of the Hirudinea differs in most genera from that of the Oligochaeta and Polychaeta. The difference is that it is broken up into a complex sinus system. The least modified type is shown by Acanthobdella, a leech, parasitic upon fishes, in which transverse sections (see figs. 15 and 16) show the gut, the nervous system, &c, lying in a spacious chamber which is the coelom. This coelom is lined by peritoneal cells and is divided into 1 series of metameres by septa which correspond to the segmentation of the

.rnd.v

el

cl

Fig. 15.- c, Coelom.

-Section of Acanthobdella (after Kovalevsky). Nerve cord.

Intestine. Circular muscle. Longitudinal muscle. Dorsal vessel.

Ventral vessel.

c.ch, Coelomic epithelium (yellow- m,

cells). • mc,

eg, Glandular cells. ml,

cl, Muscle cells of lateral line. vd,

cp, Pigment cells. vv, ep, Ectoderm.

body, the arrangement being thus precisely like that of typical Chaetopoda. Moreover, upon the intestine the coelomic cells are modified into chloragogen cells. In Acanthobdella the testes are, however, not contained in the general coelom, and the nephridia lie in the septa. It is remarkable, in view of the spaciousness of the coelom, that the funnels of the latter have not been seen. Ozo- branchus possesses a coelom which is less typically chaetopodous than that of Acanthobdella, but more so than in other leeches. There is a spacious cavity surrounding the gut and containing also blood- vessels, and to some extent the generative organs, and the nervous cord. Furthermore, in the mid region of the body this coelom is broken up by metamerically arranged septa, as in Acanthobdella. These septa are, however, rather incomplete and are not fastened to the gut; and, as in Acanthobdella, the nephridia are embedded

true

cch

Fig. 16. — Section of Acanthobdella (after Kovalevsky). Identical letters as in fig. 2; in addition, en, nerve cord; in, intestine; nf, parts of nephridium; on, external opening of nephridium ; ov, ova; /, testis.

in them. In addition to the median lacuna there are two lateral lacunae, one upon each side. These regions of the coelom end at the ends of the body and communicate with each other by means of a branched system of coelomic sinuses, which are in places very fine tubes. Neither in this genus nor in the last is there any communi- cation between coelom and vascular system. In Clepsine (Glossi- phonia) there is a further breaking up of the coelom. The median lacuna no longer exists, but is represented by a dorsal and ventral sinus. The former lodges the dorsal, the

latter the ventral, blood- vessel. The gut has no coelomic space surrounding it. A complex

network places these sinuses and the lateral sinuses in communication. Here also the blood system has no communication with the sinus system of the coelom. In Hirudo and the Gnalhobdellidae there is only one system of cavities which consist of four principal longitudinal trunks, of which the two lateral are contractile, which communicate with a network ramifying everywhere, even among the cells of the epidermis. The network is partly formed out of pigmented cells which are excavated and join to form tubes, the so- called botryoidal tissue, not found among the Rhynchobdellidae at all. It seems clear from the recent investigations of A. G. Bourne and E. S. Goodrich that the vascular system and the coelom are in communication (as in vertebrates by means of the lymph system). On the other hand, it has been held that in these leeches there is no vascular system at all and that the entire system of spaces is coelom. In favour of regarding the vascular system as totally absent, is the fact that the median coelomic channels contain no dorsal and ventral vessel. In favour of seeing in the lateral trunks and their branches a vascular system, is the contractility of the former, and the fact of the intrusion of the latter into the epidermis, matched among the Oligochaeta, where undoubted blood capillaries perforate the epidermis. A further fact must be considered in deciding this question, which is the discovery of ramifying coelomic tubes, ap- proaching close to, but not entering, the epidermis in the Polychaete Arenicola. These tubes are lined by flattened epithelium and often contain blood capillaries; they communicate with the coelom and are to be regarded as prolongation of it into the thickness of the body wall.

Gonads and Gonad Ducts. — The gonads and their ducts in the Hirudinea invariably form a closed system of cavities entirely shut off from the coelom in which they lie. There is thus a broad resem- blance to the Eudrilidae, to which group of Oligochaeta the Hiru- dinea are further akin by reason of the invariably unpaired condition of the generative apertures, and the existence of a copulatory apparatus (both of which characters, however, are present occasion- ally in other Oligochaeta).

The testes are more numerous than the ovaries, of which latter there are never more than one pair. The testes vary in numbers of pairs. Four (Ozobranchus) to six (Glossiphonia) or ten (Philaemon) are common numbers. In Acanthobdetta, however, the testes of each side of the body have grown together to form a continuous band, which extends in front of external pore. Each testis communicates by means of an efferent duct with a common collecting duct of its side of the body, which opens on to the exterior by means of a pro- trusible penis, and to which is sometimes appended a seminal vesicle. The efferent ducts are ciliated, and there is a patch of cilia at the point where they communicate with the cavity of each testis. The ovaries are more extensive in some forms (e.g. Ozobranchus) than in others, where they are small rounded bodies. The two ducts continuous with the gonads open by a common vagina on to the exterior behind the male pores. This " vagina " is sometimes of exaggerated size. Thus, in Philaemon pungens (Lambert) it has the form of a large sac, into which open by a single orifice the con- joined oviducts. From this vagina arises a narrow duct leading to the exterior. In Ozobranchus the structures in question are still more complicated. The two long ovarian sacs communicate with each other by a transverse bridge before uniting to form the terminal canal. Into each ovarian sac behind the transverse junction opens a slender tube, which is greatly coiled, and, in its turn, opens into a spherical "spermathecal sac." From this an equally slender tube proceeds, which joins its fellow of the opposite side, and the two form a thick, walled tube, which opens on to the exterior within the bursa copulatrix through which the penis protrudes. These two last- mentioned types show features which can be, as it seems, matched in the Eudrilidae.

The gonads develop (O. Burger) in coelomic spaces close to nephridial funnels, which have, however, no relation to the gonad ducts. The ovaries are solid bodies, of which the outer layer becomes separated from the plug of cells lying within ; thus a cavity is formed which is clearly coelom. This cavity and its walls becomes pro- longed to form the oviducts. A stage exactly comparable to the stage in the leeches, where the ovary is surrounded by a closed sac, has been observed in Eudrilus. In this Annelid later the sac in question joins its fellow, passing beneath the nerve cord exactly as in the leech, and also grows out to reach the exterior. The sole difference is therefore that in Eudrilus the ovarian sac gives rise to a tube which bifurcates, one branch meeting a corresponding branch of the other ovary of the

pair, while the second branch reaches the exterior. In the leech the two branches are fused into one. We have here clearly a case of a true coelomoduct performing the function of an oviduct in both leeches and Eudrilidae. The facts just referred to suggest further comparisons between the Hirudinea and Eudrilidae. The large sacs which have been termed vagina are suggestive of the large coelomic spermathecae in Eudrilids, a comparison which needs, however, embryological data, not at present forthcoming, for its justification. It is at least clear that in Ozobranchus this comparison is justifiable; but only probable, or

Jierhaps possible, in the case of Philaemon. In the former, the duct, eading from the ovarian sac, and swelling along its course into the spherical sac, the " spermatheca," is highly suggestive of the oviduct and receptaculum of the Eudrilidae.

The testes during development become hollowed out and are prolonged into the vasa efferentia. These ducts therefore have not their exact counterparts in the Oligochaeta, unless we are to assume that they collectively are represented by the seminal vesicles of earthworms and the vasa deferentia. It is to be noted that the Hirudinea differ from the Oligochaeta in that the male pore is in advance of the gonads (except in Acanthobdetta, which here, as in so many points, approximates to the Oligochaeta), whereas in Oligochaeta that pore is behind the gonads (again with an exception, Allurus).

Classification. — The Hirudinea may bedivided into three families: —

(i.) Rhynchobdellidae. — A protrusible proboscis exists, but there are no jaws. The blood is colourless. Pontobdella, Glossiphonia, &c.

(ii.) Gnalhobdellidae. — A proboscis absent, but jaws usually present. Blood coloured red with haemoglobin. Hirudo, Nephelis, &c.

(iii.) Acanthobdellidae. — Proboscis present, but short. Paired setae of Oligochaetous pattern present in anterior segments. Blood red. Acanthobdetta.

Literature. — A. O. Kovalevsky, Bull. Imp. Sci. (St Petersburg, November 1896) (Acanthobdetta); A. G. Bourne, Quart. Journ. Micr. Sci., 1884; A. Oka, Zeitschr. wiss. Zool., 1894; E. S. Good-

rich, Quart. Journ. Micr. Sci., 1899; W. E. Castle, Bull. Mus. Contp. Zool., 1900; A. M. Lambert, Proc. Roy. Soc. (Victoria, 1897) ; C. O. Whitman, Journ. Morph., 1889 and 1891 ; O. Burger, Zeitschr. wiss. Zool., 1902, and other memoirs by the above, and by St V. Apathy, R. Blanchard, H. Bolsius, A. Dendy, R. S. Bergh, &c. (F. E. B.)

CHAETOSOMATIDA, a small group of minute, free-living, aquatic organisms which are usually placed as an annex to the Nematoda. Indeed Mechnikov, to whom we owe much of our knowledge of these forms, calls them ” creeping Nematoda.” They are usually found amongst seaweed in temperate seas, but they are probably widely distributed; some are fresh-water. The genus Chaeto- soma, with the two species Ch. claparedii and Ch. ophicephalum and the genus Tristicochaeta, have swollen heads. The third genus Rhabdogaster has no such distinct head, though the body may be swollen anteriorly. The mouth is ter- minal and anterior and surrounded by a ring of spicules or a half-ring of hooks. Scattered hairs cover the body. Just in front of the anus there is in Chaetosoma a double, and in Tristicochaeta a triple row of about fifteen stout cylindrical projections upon which the animals creep. The females are a little larger ? rom Cambridgeˆ Natnrai than the males; in Ch. claparedii the b /permission of Macm5ian& former attain a length of 1-5 mm., the Co – Ltd – latter of 1-12 mm. The mouth opens Mature female of into an oesophagus which passes into an Chaetosoma claparedii. intestine; this opens by a ventral anus gZˆˆTllt- situated a little in front of the posterior tine ; c, anus ; d, ovary ; end. The testis is single, and its duct e, generative pore; /, opens with the anus, and is provided ventral bristles, with a couple of spicules. The ovary is

double, and the oviducts open by a median ventral pore about the middle of the body; in this region there is a second swelling both in Chaetosoma and in Rhabdogaster. The last-named form is in the female 0-36 mm. in length. In it the hairs are confined to the dorsal middle line and the creeping setae are hooked, of a finer structure than in Chaetosoma, and situated so far forward that the vagina opens amongst them. Ch. ophicephalum has been taken in the English Channel.

See E. Mechnikov, Zeitschr. wiss.’ Zool. xvii., 1867, p. 537; Panceri, Atti Ace. Napoli, vii., 1878, p. 7. (A. E. S.)

CHAFER, a word used in modern speech to distinguish the beetles

of the family Scarabaeidae, and more especially those species which feed on leaves in the adult state. The word is derived from the O. Eng. ceafor, and it is interesting to note that the cognate Ger. Kdfer is applied to beetles of all kinds. For the characters of the Scarabaeidae see Coleoptera. This family includes a large number of beetles, some of which feed on

dung and others on vegetable tissues. The cockchafers and their near allies belong to the subfamily Melolonthinae, and the rose-chafers to the Cetoniinae; in both the beetles eat leaves, and their grubs spend a long life underground devouring roots. In Britain the Melolonthines that are usually noted as injurious are the two species of cockchafer (Melolontha vulgaris and M . hippocastani), large heavy beetles with black pubescent pro- thorax, brown elytra and an elongated pointed tail-process; the summer-chafer (Rhizotrogus solstitialis) , a smaller pale brown chafer; and the still smaller garden-chafer or ” cocker- bundy ” (Phyllopertha korticola), which has a dark green pro- thorax and brown elytra. Of the Cetoniines, the beautiful metallic green rose-chafer, Cetonia aurala, sometimes causes damage, especially in gardens. The larvae of the chafers are heavy, soft-skinned grubs, with hard brown heads provided with powerful mandibles, three pairs of well-developed legs, and a swollen abdomen. As they grow, the larvae become strongly flexed towards the ventral surface, and lie curled up in their earthen cells, feeding on roots. The larval life lasts several years, and in hard frosts the grubs go deep down away from the surface. Pupation takes place in the autumn, and though the perfect insect emerges from the cuticle very soon afterwards, it remains in its underground cell for several months, not making its way to the upper air until the ensuing summer. After pairing, the female crawls down into the soil to lay her eggs. The grubs of chafers, when turned up by the plough, are greedily devoured by poultry, pigs and various wild birds. When the beetles become so numerous as to call for destruction, they are usually shaken off the trees where they rest on to sheets or tarred boards. On the continent of Europe chafers are far more numerous than in the United Kingdom, and the rural governments in France give rewards for their destruction. D. Sharp states that in the department of Seine-inferieure 867,173,000 cockchafers and 647,000,000 larvae were killed in the four years preceding 1870. The anatomy of Melolontha is

very fully described in a classical memoir by H. E. StrausB-Diirckheim (Paris, 1828). (G. H. C.)

CHAFF (from the A.S. ceaf, allied to the O. High Ger. cheva, a husk or pod), the husks left after threshing grain, and also hay and straw chopped fine as food for cattle; hence, figuratively, the refuse or worthless part of anything. The colloquial use of the word, to chaff, in the sense of to banter or to make fun of a person, may be derived from this figurative sense, or from " to chafe," meaning to vex or irritate.

CHAFFARINAS, or Zaitarines, a group of islands belonging to Spain off the north coast of Morocco, near the Algerian frontier, 2§ m. to the north of Cape del Agna. The largest of these isles, Del Congreso, is rocky and hilly. It has a watch- house on the coast nearest to Morocco. Isabella II., the central island, contains several batteries, barracks and a penal convict settlement. The Spanish government has undertaken the con- struction of breakwaters to unite this island with the neighbouring islet of El Rey , with a view to enclose a deep and already sheltered anchorage. This roadstead affords a safe refuge for many large vessels. The Chaffarinas, which are the Tres Insulae of the Romans and the Zafran of the Arabs, were occupied by Spain in 1848. The Spanish occupation anticipated by a few days a French expedition sent from Oran to annex the islands to Algeria. The population of the islands is under 1000.

CHAFFEE, ADNA ROM ANZA (1842-), American general, was born at Orwell, Ohio, on the 14th of April 1842. At the outbreak of the Civil War he entered the United States cavalry as a private, and he rose to commissioned rank in 1863, becoming brevet captain in 1865. He remained in the army after the war and took part with distinction in many Indian campaigns. His promotion was, however, slow, and he was at the age of fifty-six still a lieutenant-colonel of cavalry. But in 1898, at the outbreak of the Spanish- American War, he was made brigadier-general and soon afterwardsmajor-generalofvolunteers. In the Cuban campaign he won particular distinction, and the victory of the Americans in the action of El Caney was in large measure due to his careful personal reconnaissances of the ground to be attacked and to the endurance of his own brigade. After

reverting for a time to the rank of brigadier-general, he was made a major-general U.S.V. again in 1900 and was appointed to command the United States contingent in China. He took a

brilliant and successful part in the advance on Peking and the relief of the Legations. In 1901 he became a major-general in the regular army, and in 1901-1902 commanded the Division of the Philippines. In 1902-1903 he commanded the Department of the East, and from 1904 to 1906 was chief of the general staff of the army. In 1904 he received the rank of lieutenant-general in the United States army, being the first enlisted man of the regular army to attain this, the highest rank in the service. He was retired at his own request on the 1st of February 1906, after more than forty years' service.

CHAFFINCH {Fringilla coelebs), the common English name of a bird belonging to the family Fringillidae (see Finch), and distinguished, in the male sex, by the deep greyish blue of its crown feathers, the yellowish green of its rump, the white of the wing coverts, so disposed as to form two conspicuous bars, and the reddish brown passing into vinous red of the throat and breast. The female is drab, but shows the same white markings as the male, and the young males resemble the females until after the first autumn moult, when they gradually assume the plumage of their sex. The chaffinch breeds early in the season, and its song may often be heard in February. Its nest, which is a model of neatness and symmetry, it builds on trees and bushes, preferring such as are overgrown with moss and lichens. It is chiefly composed of moss and wool, lined internally with grass, wool, feathers, and whatever soft material the locality affords. The outside consists of moss and lichens, and according to Selby, " is always accordant with the particular colour of its situation." When built in the neighbourhood of towns the nest is somewhat slovenly and untidy, being often composed of bits of dirty straw, pieces of paper and blackened moss; in one instance, near Glasgow, the author of the Birds of the West of Scotland found several postage-stamps thus employed. It lays four or five eggs of a pale purplish buff, streaked and spotted with purplish red. In spring the chaffinch is destructive to early flowers, and to young radishes and turnips just as they appear above the surface; in summer,, however, it feeds principally on insects and their larvae, while in autumn and winter its food consists of grain and other seeds. On the continent of Europe the chaffinch is a favourite s6ng-bird, especially in Germany, where great attention is paid to its training.

CHAFING-DISH (from the O. Fr. chaufer, to make warm), a kind of portable grate heated with charcoal, and used for cooking or keeping food warm. In a light form, and heated over a spirit

lamp, it is also used for cooking various dainty dishes at table. The employment of the chafing-dish for the latter purpose has been largely restored in modern cookery.

CHAGOS, a group of atolls in the Indian Ocean, belonging to Britain, disposed in circular form round the Chagos bank, in 4° 44′ to 7° 39′ S., and 70* 55′ to 72 52′ E. The atolls on the south and east side of the bank, which has a circumference of about 270 m., have disappeared through subsidence; a few — Egmont, Danger, Eagle, and Three Brothers — still remain on the east side, but most of the population (about 700) is centred on Diego Garcia, which lies on the south-east side, and is nearly 13 m. long by 6 m. wide. The lagoon, which is enclosed by two coral barriers and accessible to the largest vessels on the north side, forms one of the finest natural harbours in the world. The group, which has a total land area of 76 sq. m., is dependent for administrative purposes on Mauritius, and is regularly visited by vessels from that colony. The only product is cocoa-nut oil, of which about 106,000 gallons are annually exported. The French occupied the islands in 1791 from Mauritius, and the oil industry(from which the group is sometimes called the Oil Islands) came into the hands of French Creoles.

CHAGRES, a village of the Republic of Panama, on the Atlantic coast of the Isthmus, at the mouth of the Chagres river, and about 8 m. W. of Colon. It has a harbour from 10 to 12 ft. deep, which is difficult to enter, however, on account of bars at its mouth. The port was discovered by Columbus in

1502, and was opened for traffic with Panama, on the Pacific coast, by way of the Chagres river, in the 16th century. With the decline of Porto Bello in the 18th century Chagres became the chief Atlantic port of the Isthmus, and was at the height of its importance during the great rush of gold- hunters across the Isthmus to California in 1849 and the years immediately following. With the completion of the Panama railway in 1855, however, travel was diverted to Colon, and Chagres soon became a village of miserable huts, with no evidence of its former importance. On a high rock at the mouth of the river stands the castle of Lorenzo, which was destroyed by Sir Henry Morgan when he captured the town in 167 1, but was rebuilt soon

afterwards by the Spaniards. Chagres was again captured in 1740 by British forces under Admiral Edward Vernon.

CHAIN (through the O. Fr. chains, chmne, &c, from Lat. catena), a series of links of metal or other material so connected together that the whole forms a flexible band or cord. Chains are used for a variety of purposes, such as fastening, securing, or connecting together two or more objects, supporting or lifting weights, transmitting mechanical power, &c. ; or as an ornament to serve as a collar, as a symbol of office or state, or as part of the insignia of an order of knighthood; or as a device from which to hang a jewelled or other pendant, a watch, &c. (see Collar). Ornamental chains are made with a great variety of links, but those intended for utilitarian purposes are mostly of two types. In stud chains a stud or brace is inserted across each link to prevent its sides from collapsing inwards under strain, whereas in open link chains the links have no studs. The addition of studs is reckoned to increase the load which the chain can safely bear by 50%. Small chains of the open-link type are to a great extent made by machinery. For larger sizes the smith cuts off a length of iron rod of suitable diameter, forms it while hot to the shape of the link by repeated blows of his hammer, and welds together the two ends of the link, previously slipped inside its fellow, by the aid of the same tool; in some cases the bending is done in a mechanical press and the welding under a power hammer (see also Cable) . Weldless chains are also made ; in A. G. Strathern's process, for instance, cruciform steel bars are pressed, while hot, into links, each without join and engaging with its neighbours. Chains used for transmitting power are known as pitch-chains; the chain of a bicycle (q.v.) is an example.

From the use of the chain as employed to bind or fetter a prisoner or slave, comes the figurative application to anything which serves as a constraining or restraining force; and from its series of connected links, to any series of objects, events, arguments, &c, connected by succession, logical sequence or reasoning. Specific uses are for a measuring line in land-survey- ing, consisting of 100 links, i.e. iron rods, 7-02 in. in length, making 22 yds. in all, hence a lineal measure of that length; and, as a nautical term, for the contrivance by which the lower shrouds of a mast are extended and secured to the ship's sides, consisting of dead-eyes, chain-plates, and chain-wale or " channel."

CHAIR (in. Mid. Eng. chare, through O. Fr. chaere or chaiere, from Lat. cathedra, later caledra, Gr. KadkSpa, seat, cf .

“cathedral ” ; the modern Fr. form chaise, a chair, has been adopted in English with a particular meaning as a form of carriage; chaire in French is still used of a professorial or ecclesiastical ” chair,” or cathedra), a movable seat, usually with four legs, for a single person, the most varied and familiar article of domestic furniture. The chair is of extreme antiquity, although for many centuries and indeed for thousands of years it was an appanage of state and dignity rather than an article of ordinary use. ” The chair ” is still extensively used as the emblem of authority in the House of Commons and in public meetings. It was not, in fact, until the 1 6th century that it became common anywhere. The chest, the bench and the stool were until then the ordinary seats of everyday life, and the number of chairs which have survived from an earlier date is exceedingly limited; most of such ex- amples are of ecclesiastical or seigneurial origin. Our knowledge of the chairs of remote antiquity is derived almost entirely from v. 26

monuments, sculpture and paintings. A few actual examples exist in the British Museum, in the Egyptian museum at Cairo, and elsewhere. In ancient Egypt they appear to have been of great richness and splendour. Fashioned of ebony and ivory, or of carved and gilded wood, they were covered with costly stuffs and supported upon representations of the legs of beasts of the chase or the figures of captives. An arm-chair in fine preservation found in a tomb in the Valley of the Kings is astonishingly similar, even in small details, to that ” Empire ” style which followed Napoleon’s campaign in Egypt. The earliest monuments of Nineveh represent a chair without a back but with tastefully carved legs ending in lions’ claws or bulls’ hoofs; others are supported by figures in the nature of carya- tides or by animals. The earliest known form of Greek chair, going back to five or six centuries before Christ, had a back but stood straight up, front and back. On the frieze of the Parthenon Zeus occupies a square seat with a bar-back and thick turned legs; it is ornamented with winged sphinxes and the feet of beasts. The characteristic Roman chairs were of marble, also adorned with sphinxes; the curule chair was originally very similar in form to the modern folding chair, but eventually received a good deal of ornament.

The most famous of the very few chairs which have come down from a remote antiquity is the reputed chair of St Peter in St Peter’s at Rome. The wooden portions are much decayed, but it would appear to be Byzantine work of the 6th century, and to be really an ancient sedia gestatoria. It has ivory carvings

representing the labours of Hercules. A few pieces of an earlier oaken chair have been let in; the existing one, Gregorovius says, is of acacia wood. The legend that this was the curule chair of the senator Pudens is necessarily apocryphal. It is not, as is popularly supposed, enclosed in Bernini's bronze chair, but is kept under triple lock and exhibited only once in a century. Byzantium, like Greece and Rome, affected the curule form of chair, and in addition to lions' heads and winged figures of Victory and dolphin-shaped arms used also the lyre-back which has been made familiar by the pseudo-classical revival of the end of the 18th century. The chair of Maximian in the cathedral of Ravenna is believed to date from the middle of the 6th century. It is of marble, round, with a high back, and is carved in high relief with figures of saints and scenes from the Gospels — the Annunciation, the Adoration of the Magi, the flight into Egypt and the baptism of Christ. The smaller spaces are filled with carvings of animals, birds, flowers and foliated ornament. Another very ancient seat is the so-called "Chair of Dagobert" in the Louvre. It is of cast bronze, sharpened with the chisel and partially gilt; it is of the curule or faldstool type and supported upon legs terminating in the heads and feet of animals. The seat, which was probably of leather, has disappeared. Its attri- bution depends entirely upon the statement of Suger, abbot of St Denis in the 1 2th century, who added a back and arms. Its age has been much discussed, but Viollet-le-Duc dated it to early Merovingian times, and it may in any case be taken as the oldest faldstool in existence. To the same generic type belongs the famous abbots' chair of Glastonbury; such chairs might readily be taken to pieces when their owners travelled. The faldisterium in time acquired arms and a back, while retaining its folding shape. The most famous, as well as the most, ancient, English chair is that made at the end of the 13th century for Edward I., in which most subsequent monarchs have been crowned. It is of an architectural type and of oak, and was covered with gilded gesso which long since disappeared.

Passing from these historic examples we find the chair monopolized by the ruler, lay or ecclesiastical, to a comparatively late date. As the seat of authority it stood at the head of the lord's table, on his dais, by the side of his bed. The seigneurial chair, commoner in France and the Netherlands than in England, is a very interesting type, approximating in many respects to the episcopal or abbatial throne or stall. It early acquired a very high back and sometimes had a canopy. Arms were in- variable, and the lower part was closed in with panelled or carved front and sides — the seat, indeed, was often hinged and

sometimes closed with a key. That we are still said to sit " in " an arm-chair and " on " other kinds of chairs is a reminiscence of the time when the lord or seigneur sat " in his chair." These throne-like seats were always architectural in character, and as Gothic feeling waned took the distinctive characteristics of Renaissance work. It was owing in great measure to the Renaissance that the chair ceased to be an appanage of state, and became the customary companion of whomsoever could afford to buy it. Once the idea of privilege faded the chair speedily came into general use, and almost at once began to reflect the fashions of the hour. No piece of furniture has ever been so close an index to sumptuary changes. It has varied in size, shape and sturdiness with the fashion not only of women's dress but of men's also. Thus the chair which was not, even with its arms purposely suppressed, too ample during the several reigns of some form or other of hoops and farthingale, became monstrous when these protuberances disappeared. Again, the costly laced coats of the dandy of the 18th and early 19th centuries were so threatened by the ordinary form of seat that a " conversation chair" was devised, which enabled the buck and the ruffler to sit with his face to the back, his valuable tails hanging unimpeded over the front. The early chair almost invariably had arms, and it was not until towards the close of the 16th century that the smaller form grew common.

The majority of the chairs of all countries until the middle of the 17 th century were of oak without upholstery, and when it be-

came customary to cushion them, leatherwas sometimesemployed; subsequently velvet and silk were extensively used, and at a later period cheaper and often more durable materials. Leather was not infrequently used even for the costly and elaborate chairs of the faldstool form — occasionally sheathed in thin plates of silver — which Venice sent all over Europe. To this day, indeed, leather is one of the most frequently employed materials for chair covering. The outstanding characteristic of most chairs until the middle of the 17 th century was massiveness and solidity. Being usually made of oak, they were of considerable weight, and it was not until the introduction of the handsome Louis XIII. chairs with cane backs and seats that either weight or solidity was reduced. Although English furniture derives so extensively from foreign and especially French and Italian models, the earlier forms of English chairs owed but little to exotic influences. This was especially the case down to the end of the Tudor period, after which France began to set her mark upon the British chair. The squat variety, with heavy and sombre back, carved like a piece of panelling, gave place to a taller, more slender, and more elegant form, in which the frame- work only was carved, and attempts were made at ornament in new directions. The stretcher especially offered opportunities which were not lost upon the cabinet-makers of the Restoration. From a mere uncompromising cross-bar intended to strengthen the construction it blossomed, almost suddenly, into an elaborate scroll-work or an exceedingly graceful semicircular ornament connecting all four legs, with a vase-shaped knob in the centre. The arms and legs of chairs of this period were scrolled, the splats of the back often showing a rich arrangement of spirals and scrolls. This most decorative of all types appears to have been popularized in England by the cavaliers who had been in exile with Charles II. and had become familiar with it in the north-western parts of the European continent. During he reign of William and Mary these charming forms degenerated into something much stiffer and more rectangular, with a solid, more or less fiddle-shaped splat and a cabriole leg with pad feet. The more ornamental examples had cane seats and ill-pro- portioned cane backs. From these forms was gradually developed the Chippendale chair, with its elaborately interlaced back, its graceful arms and square or cabriole legs, the latter terminating in the claw and ball or the pad foot. Hepplewhite, Sheraton and Adam all aimed at lightening the chair, which, even in the master hands of Chippendale, remained comparatively heavy. The endeavour succeeded, and the modern chair is everywhere

comparatively slight. Chippendale and Hepplewhite between them determined what appears to be the final form of the chair,

for since their time practically no new type has lasted, and in its main characteristics the chair of the 20th century is the direct derivative of that of the later 18th.

The 18th century was, indeed, the golden age of the chair, especially in France and England, between which there was considerable give and take of ideas. Even Diderot could not refrain from writing of them in his Encyclopedic The typical Louis Seize chair, oval-backed and ample of seat, with descending arms and round-reeded legs, covered in Beauvais or some such gay tapestry woven with Boucher or Watteau-like scenes, is a very gracious object, in which the period reached its high-water mark. The Empire brought in squat and squabby shapes, comfortable enough no doubt, but entirely destitute of inspira- tion. English Empire chairs were often heavier and more sombre than those of French design. Thenceforward the chair in all countries ceased to attract the artist. The art nouveau school has occasionally produced something of not unpleasing simplicity; but more often its efforts have been frankly ugly or even grotesque. There have been practically no novelties, with the exception perhaps of the basket-chair and such like, which have been made possible by modern command over material. So much, indeed, is the present indebted to the past in this matter that even the revolving chair, now so familiar in offices, has a pedigree of something like four centuries (see also Sedan-chair). (J. P.-B.)

CHAISE (the French for ” chair,” through a transference from a ” sedan-chair ” to a wheeled vehicle), a light two- or four-wheeled carriage with a movable hood or ” calash “; the ” post-chaise ” was the fast- travelling carriage of the 18th and early 19th centuries. It was closed and four-wheeled for two or four horses and with the driver riding postillion.

CHAKRATA, a mountain cantonment in the Dehra Dun district of the United Provinces of India, on the range of hills overlooking the valleys of the Jumna and the Tons, at an elevation of 7000 ft. It was founded in 1866 and first occupied in April 1869.

CHALCEDON, more correctly Calchedon (mod. Kadikeui), an ancient maritime town of Bithynia, in Asia Minor, almost directly opposite Byzantium, south of Scutari. It was a Megarian colony

founded on a site so obviously inferior to that which was within view on the opposite shore, that it received from the oracle the name of " the City of the Blind." In its early history it shared the fortunes of Byzantium, was taken by the satrap Otanes, vacillated long between the Lacedaemonian and the Athenian interests, and was at last bequeathed to the Romans by Attalus III. of Pergamum (133 B.C.). It was partly destroyed by Mithradates, but recovered during the Empire, and in a.d. 451 was the seat of the Fourth General Council. It fell under the repeated attacks of the barbarian hordes who crossed over after having ravaged Byzantium, and furnished an encampment to the Persians under Chosroes, c. 616-626. The Turks used it as a quarry for building materials for Constantinople. The site is now occupied by the village of Kadikeui (" Village of the Judge "), which forms the tenth " cercle " of the municipality of Constantinople. Pop. about 33,000, of whom 8000 are Moslems. There is a large British colony with a church, and also Greek and Armenian churches and schools, and a training college for Roman Catholic Armenians. To the S. are the ruins of Panteichion (mod. Pendik), where Belisarius is said to have lived in retirement.

See J. von Hammer, Constantinopolis (Pesth, 1822) ; Murray's Handbook for Constantinople (London, 1900).

CHALCEDON, COUNCIL OF, the fourth ecumenical council of the Catholic Church, was held in 451, its occasion being the Eutychian heresy and the notorious " Robber Synod " (see Eutyches and Ephesus, Council of), which called forth vigorous protests both in the East and in the West, and a loud demand for a new general council, a demand that was ignored by the Eutychian Theodosius II., but speedily granted by his successor, Marcian, a " Flavianist." In response to the imperial summons, five to six hundred bishops, all Eastern, except the Roman legates and two Africans, assembled in Chalcedon on the

8th of October 451. The bishop of Rome claimed for his legates the right to preside, and insisted that any act that failed to receive their approval would be invalid. The first session was tumultu- ous; party feeling ran high, and scurrilous and vulgar epithets were bandied to and fro. The acts of the Robber Synod were examined; fraud, violence and coercion were charged

against it; its entire proceedings were annulled, and, at the third session, its leader, Dioscurus, was deposed and degraded. The emperor requested a declaration of the true faith; but the sentiment of the council was opposed to a new symbol. It contented itself with reaffirming the Nicene and Constantino-politan creeds and the Ephesine formula of 431, and accepting, only after examination, the Christological statement contained in the Epistola Dogmatica of Leo I. {q.v.) to Flavianus. Thus the council rejected both Nestorianism and Eutychianism, and stood upon the doctrine that Christ had two natures, each perfect in itself and each distinct from the other, yet perfectly united in one person, who was at once both God and man. With this statement, which was formally subscribed in the presence of the emperor, the development of the Christological doctrine was completed, but not in a manner to obviate further con- troversy (see Monophysites and Monothelites).

The remaining sessions, vii.xvi., were occupied with matters of discipline, complaints, claims, controversies and the like. Canons were adopted, thirty according to the generally received tradition, although the most ancient texts contain but twenty eight, and, as Hefele points out, the so-called twenty-ninth and thirtieth are properly not canons, but repetitions of proposals made in a previous session. »

The most important enactments of the council of Chalcedon were the following: (1) the approval of the canons of the first three ecumenical councils and of the synods of Ancyra, Neo- Caesarea, Changra, Antioch and Laodicea; (2) forbidding trade, secular pursuits and war to the clergy, bishops not even being allowed to administer the property of their dioceses; (3) for- bidding monks and nuns to marry or to return to the world; likewise forbidding the establishment of a monastery in any diocese without the consent of the bishop, or the disestablish- ment of a monastery once consecrated; (4) punishing with deposition an ordination or clerical appointment made for money; forbidding ” absolute ordination ” (i.e. without assign- ment to a particular charge), the translation of clerics except for good cause, the enrolment of a cleric in two churches at once, and the performance of sacerdotal functions outside of one’s diocese without letters of commendation from one’s bishop; (5) confirming the jurisdiction of bishops over all clerics, regular and secular alike, and punishing with deposition any conspiracy against episcopal authority; (6) establishing a gradation of ecclesiastical tribunals, viz. bishop, provincial synod, exarch of the diocese, patriarch of

Constantinople (obviously the council could not here have been legislating for the entire church); forbidding clerics to be running to Constantinople with com- plaints, without the consent of their respective bishops; (7) confirming the possession of rural parishes to those who had actually administered them for thirty years, providing for the adjudication of conflicting claims, and guaranteeing the integrity of metropolitan provinces; (8) confirming the third canon of the second ecumenical council, which accorded to Constanti- nople equal privileges (Jaa irpeaffeia) with Rome, and the second rank among the patriarchates, and, in addition, granting to Constantinople patriarchal jurisdiction over Pontus, Asia and Thrace.

The Roman legates, who were absent (designedly ?) when this famous twenty-eighth canon was adopted, protested against it, but in vain, the imperial commissioners deciding in favour of its regularity and validity. Leo I., although he recognized the council as ecumenical and confirmed its doctrinal decrees, rejected canon xxviii. on the ground that it contravened the sixth canon of Nicaea and infringed the rights of Alexandria and Antioch. In what proportion zeal for the ancient canons and the rights of others, and jealous fear of encroachment upon his own juris- diction, were mixed in the motives of Leo, it would be interesting

to know. The canon was universally received in the East, and was expressly confirmed by the Quinisext Council, 692 (see Constantinople, Councils of).

The emperor Marcian approved the doctrinal decrees of the council and enjoined silence in regard to theological questions. Eutyches and Dioscurus and their followers were deposed and banished. But harmony was not thus to be restored; hardly had the council dissolved when the church was plunged into the Monophysite controversy.

See Mansi vi. pp. 529-1102, vii. pp. 1-868; Hardouin ii. pp. 1-772; Hefele (2nd ed.) ii. pp. 394-578 (English translation, iii. pp. 268-464); also extended bibliographies in Herzog-Hauck, Realencyklo- padie, 3rd ed., s.v. ” Eutyches ” (by Loofs) and s.v. ” Nestorianer ” (by Kessler). (T. F. C.)

CHALCEDONY, or Calcedony (sometimes called by old writers cassidoine), a variety of native silica, often used as an ornamental stone. The present application of the term is com- paratively modern. The ” chalcedonius ” of Pliny was quite a

different mineral, being a green stone from the copper-mines of Chalcedon, in Asia Minor, whence the name. There has been some confusion between chalcedony andthe ancient "carcedonia," a stone which seems to have been a carbuncle from Africa, brought by way of Carthage (KapxtSiiv). Our chalcedony was probably included by the ancients among the various kinds of jasper and agate, especially the varieties termed " leucachates " and " cerachates."

By modern mineralogists the name chalcedony is restricted to those kinds of silica which occur not in distinct crystals like ordinary quartz, but in concretionary, mammillated or stalactitic forms, which break with a fine splintery fracture, and display a delicate fibrous structure. Chalcedony may be regarded as a micro-crystalline form of quartz. It is rather softer and less dense than crystallized quartz, its hardness being about 6-5 and its specific gravity 2-6, the difference being probably due to the presence of a small amount of opaline silica between the fibres. Chalcedony is a translucent substance of rather waxy lustre, presenting great variety of colours, though usually white, grey, yellow or brown. A rare blue chalcedony is some- times polished under the name of " sapphirine " — a term applied also to a distinct mineral (an aluminium-magnesium silicate) from Greenland.

Chalcedony occurs as a secondary mineral in volcanic rocks, representing usually the silica set free by the decomposition of various silicates, and deposited in cracks, forming veins, or in vesicular hollows, forming amygdales. Its occurrence gives the name to Chalcedony Park, Arizona. It is found in the basalts of N. Ireland, the Faroe Isles and Iceland: it is common in the traps of the Deccan in India, and in volcanic rocks in Uruguay and Brazil. Certain flat oval nodules from a decomposed lava (augite-andesite) in Uruguay present a cavity lined with quartz crystals and enclosing liquid (a weak saline solution), with a movable air-bubble, whence they are called " enhydros " or water-stones. Very fine examples of stalactitic chalcedony, in whimsical forms, have been yielded by some of the Cornish copper-mines. The surface of chalcedony is occasionally coated with a delicate bluish bloom. A chalcedonic deposit in the form of concentric rings, on fossils and fragments of limestone in S. Devon, is known as " orbicular silica " or " beekite," having been named after Dr Henry Beeke, dean of Bristol, who first directed attention to such deposits. Certain pseudomorphs of chalcedony after datolite, from Haytor in Devonshire, have received the name of "

haytorite." Optical examination of many chalcedonic minerals by French mineralogists has shown that they are aggregates of various fibrous crystalline bodies differing from each other in certain optical characters, whence they are distinguished as separate minerals under such names as calcedonite,pseudocalcedonite,quartzine, lutecite and lussatite. Many coloured and variegated chalcedonies are cut and polished as ornamental stones, and are described under special headings. Chalcedony has been in all ages the commonest of the stones used by the gem-engraver.

See Agate, Bloodstone, Carnelian, Chrysoprase, Helio- trope, Mocha Stone, Onyx. Sard and Sardonyx. (F. W. K,*)

CHALCIDICUM, in Roman architecture, the vestibule or portico of a public building opening on to the forum; as in the basilica of Eumactria at Pompeii, and the basilica of Constantine at Rome, where it was placed at one end.

CHALCIS, the chief town of the island of Euboea in Greece, situated on the strait of the Euripus at its narrowest point. The name is preserved from antiquity and is derived from the Greek xˆXkos (copper, bronze), though there is no trace of any mines in the neighbourhood. Chalcis was peopled by an Ionic stock which early developed great industrial and colonizing activity. In the 8th and 7th centuries it founded thirty town- ships on the peninsula of Chalcidice, and several important cities in Sicily (q.v.). Its mineral produce, metal- work, purple and pottery not only found markets among these settlements, but' were distributed over the Mediterranean in the ships of Corinth and Samos. With the help of these allies Chalcis engaged the rival league of its neighbour Eretria (q.v.) in the so-called Lelantine War, by which it acquired the best agricultural district of Euboea and became the chief city of the island. Early in the 6th century its prosperity was broken by a disastrous war with the Athenians, who expelled the ruling aristocracy and settled a cleruchy on the site. Chalcis subsequently became a mem- ber of both the Delian Leagues. In the Hellenistic period it gained inportance as a fortress by which the Macedonian rulers controlled central Greece. It was used by kings Antiochus III. of Syria (192) and Mithradates VI. of Pontus (88) as a base for invading Greece.

Under Roman rule Chalcis retained a measure of commercial prosperity; since the 6th century a.d. it again served as a fortress for the protection of central Greece against northern invaders. From 1209 it stood under Venetian control; in 1470 it passed to the Ottomans, who made it the seat of a pasha. In 1688 it was successfully held against a strong Venetian attack. The modem town has about 10,000 inhabitants, and maintains a considerable export trade which received an impetus from the establishment of railway connexion with Athens and Peiraeus (1904). It is composed of two parts — the old walled town towards, the Euripus, called the Castro, where the Jewish and Turkish families who have remained there mostly dwell; and the more modern suburb that lies outside it, which is chiefly occupied by the Greeks. A part of the walls of the Castro and many of the houses within it were shaken down by the earthquake of 1894; part has been demolished in the widening of the Euripus. The most interesting object is the church of St Paraskeve, which was once the chief church of the Venetians; it dates from the Byzantine period, though many of its architectural features are Western. There is also a Turkish mosque, which is now used as a guard-house.

Authorities. — Strabo vii. fr. 11, x. p. 447; Herodotus v. 77; Thucydides i. 15; Corpus Inscr. Atticarum, iv. (1) 27a, iv. (2) 10, iv. (2) p. 22; W. M. Leake, Travels in Northern Greece (London, 1835), ii. 254-270; E. Curtius in Hermes, x. (1876), p. 220 sqq.; A. Holm, Lange Fehde (Berlin, 1884); H. Dondorff, De Rebus Chalcidensium (Gottingen, 1869); for coinage, B. V. Head, Historia Numorum (Oxford, 1887), pp. 303-5; and art. Numismatics: Greek § Euboea. CHALCONDYLES 1 (or Chalcocondylas), LAONICUS, the only Athenian Byzantine writer. Hardly anything is known of his life. He wrote a history, in ten books, of the period from 1 298-1463, describing the fall of the Greek empire and the rise of the Ottoman Turks, which forms the centre of the narrative, down to the conquest of the Venetians and Mathias, king of Hungary, by Mahommed II. The capture of Constantinople he rightly regarded as an historical event of far-reaching im- portance, although the comparison of it to the fall of Troy is hardly appropriate. The work incidentally gives a quaint and interesting sketch of the manners and civilization of England, France and Germany, whose assistance the Greeks sought to obtain against the Turks. Like that of other Byzantine writers, Chalcondyles' chronology is defective, and his adherence to the old Greek geographical nomenclature is a source of

confusion. For his account of earlier events he was able to obtain infor- mation from his father, who was one of the most prominent

1 A shortened form of Chalcocondyles, from xatek, copper, and K&v&vXos, knuckle.

men in Athens during the struggles between the Greek and Frankish nobles. His model is Thucydides (according to Bekker, Herodotus); his language is tolerably pure and correct, his style simple and clear. The text, however, is in a very corrupt state.

Editio princeps, ed. J. B. Baumbach (1615); in Bonn Corpui Scriptorum Hist. Byz. ed. I. Bekker (1843) ; Migne, Patrologia Graeca, clix. There is a French translation by Blaise de Vigenere (1577, later ed. by Artus Thomas with valuable illustrations on Turkish matters); see also F. Gregorovius, Geschichte der Stadt A then im Mittelalter, ii. (1889); Gibbon, Decline and Fall, ch. 66; C. Krum- bacher, Geschichte der byzantinischen Litteratur (1897). There is a biographical sketch of Laonicus and his brother in Greek by An- tomus Calosynas, a physician of Toledo, who lived in the latter part of the 16th century (see C. Hopf, Chroniques greco-romanes, 1873). His brother, Demetrius Chalcondyles (1424-1511), was born in Athens. In 1447 he migrated to Italy, where Cardinal Bessarion gave him his patronage. He became famous as a teacher of Greek letters and the Platonic philosophy; in 1463 he was made professor at Padua, and in 1479 he was summoned by Lorenzo de' Medici to Florence to fill the professorship vacated by John Argyropoulos. In 1492 he removed to Milan, where he died in 1511. He was associated with Marsilius Ficinus, Angelus Politianus, and Theodorus Gaza, in the revival of letters in the western world. One of his pupils at Florence was the famous John Reuchlin. Demetrius Chalcondyles published the editio princeps of Homer, Isocrates, and Suidas, and a Greek grammar (Erotemata) in the form of question and answer.

See H. Hody, De Graecis illustribus (1742); C. Hopf, Chroniques greco-romanes (1873); E. Legrand, Bibliographie hellSnique, i.

(1885).

CHALDAEA. The expressions "Chaldaea" and "Chaldaeans" are frequently used in the Old Testament as equivalents for " Babylonia " and " Babylonians." Chaldaea was really the name of

a country, used in two senses. It was first applied to the extreme southern district, whose ancient capital was the city of Bit Yakin, the chief seat of the renowned Chaldaean rebel Merodach-baladan, who harassed the Assyrian kings Sargon and Sennacherib. It is not as yet possible to fix the exact boundaries of the original home of the Chaldaeans, but it may be regarded as having been the long stretch of alluvial land situated at the then separate mouths of the Tigris and Euphrates, which rivers now combine to flow into the Persian Gulf in the waters of the majestic Shatt el 'Arab.

The name " Chaldaea," however, soon came to have a more extensive application. In the days of the Assyrian king Ramman-nirari III. (812-783 B.C.), the term matKaldu covered practically all Babylonia. Furthermore, Merodach-baladan was called by Sargon II. (722-705 B.C.) " king of the land of the Chaldaeans " and " king of the land of Bit Yakin " after the old capital city, but there is no satisfactory evidence that Merodach-baladan had the right to the title " Babylonian." The racial distinction between the Chaldaeans and the Babylonians proper seems to have existed until a much later date, although it is almost certain that the former were originally a Semitic people. That they differed from the Arabs and Aramaeans is also seen from the distinction made by Sennacherib (705-681 B.C.) between the Chaldaeans and these races. Later, during the period covering the fall of Assyria and the rise of the Neo-Babylonian empire, the term mat Kaldu was not only applied to all Babylonia, but also embraced the territory of certain foreign nations who were later included by Ezekiel (xxiii. 23) under the expression "Chaldaeans."

As already indicated, the Chaldaeans were most probably a Semitic people. It is likely that they first came from Arabia, the supposed original home of the Semitic races, at a very early date along the coast of the Persian Gulf and settled in the neighbourhood of Ur (" Ur of the Chaldees," Gen. xi. 28), whence they began a series of encroachments, partly by warfare and partly by immigration, against the other Semitic Babylonians. These aggressions after many centuries ended in the Chaldaean supremacy of Nabopolassar and his successors {c. 626 ff.), although there is no positive proof that Nabopolassar was

purely Chaldaean in blood. The sudden rise of the later Babylonian empire under Nebuchadrezzar, the son of Nabopolassar, must have tended to produce so thorough an amalgamation of the Chaldaeans and Babylonians, who' had theretofore been considered as two kindred branches of the same original Semite stock, that in the course of time no perceptible differences existed between them. A similar amalgamation, although in this case of two peoples originally racially distinct, has taken place in modern times between the Manchu Tatars and the Chinese. It is quite evident, for example, from the Semitic character of the Chaldaean king-names, that the language of these Chaldaeans differed in no way from the ordinary Semitic Babylonian idiom which was practically identical with that of Assyria. Consequently, the term " Chaldaean " came quite naturally to be used in later days as synonymous with " Baby- lonian." When subsequently the Babylonian language went out of use and Aramaic took its place, the latter tongue was wrongly termed " Chaldee " by Jerome, because it was the only language known to him used in Babylonia. This error was followed until a very recent date by many scholars.

The derivation of the name " Chaldaean " is extremely uncertain. Peter Jensen has conjectured with slight probability that the Chaldaeans were Semitized Sumerians, i.e. a non- Semitic tribe which by contact with Semitic influences had lost its original character. There seems to be little or no evidence to support such a view. Friedrich Delitzsch derived the name "Chaldaean" = Kasdim from the non-Semitic Kassites who held the supremacy over practically all Babylonia during an extended period (c. 1 783-1 200 B.C.). This theory seems also to be extremely improbable. It is much more likely that the name " Chaldaean " is connected with the Semitic stem kasadu (conquer), in which case Kaidi-Kaidi, with the well-known interchange of / and s, would mean " conquerors." It is also possible that KaSdu-Kaldu is connected with the proper name Chesed, who is represented as having been the nephew of Abraham (Gen. xxii. 22). There is no connexion whatever between the Black Sea peoples called " Chaldaeans " by Xeno- phon (Anab. vii. 25) and the Chaldaeans of Babylonia.

In Daniel, the term " Chaldaeans" is very commonly employed with the meaning " astrologers, astronomers," which sense also appears in the classical authors, notably in Herodotus, Strabo and Diodorus. In Daniel i. 4, by the expression " tongue of the Chaldaeans," the writer evidently meant the language in which

the celebrated Babylonian works on astrology and divina- tion were composed. It is now known that the literary idiom of the Babylonian wise men was the non-Semitic Sumerian; but it is not probable that the late author of Daniel (c. 168 B.C.) was aware of this fact.

The word ” Chaldaean ” is used in Daniel in two senses. It is applied as elsewhere in the Old Testament as a race-name to the Babylonians (Dan. iii. 8, v. 30, ix. 1); but the expression is used oftener, either as a name for some special class of magicians, or as a term for magicians in general (ix. 1). The transfer of the name of the people to a special class is perhaps to be explained in the following manner. As just shown, ” Chaldaean ” and ” Babylonian” had become in later times practically synonymous, but the term ” Chaldaean ” had lived on in the seoondaty re- stricted sense of ” wise men.” The early Kaldi had seized and held from very ancient times the region of old Sumer, which was the centre of the primitive non-Semitic culture. It seems extremely probable that these Chaldaean Semites were so strongly influenced by the foreign civilization as to adopt it eventually as their own. Then, as the Chaldaeans soon became the dominant people, the priestly caste of that region developed into a Chal- daean institution. It is reasonable to conjecture that southern Babylonia, the home of the old culture, supplied Babylon and other important cities with priests, who from their descent were correctly called ” Chaldaeans.” This name in later times, owing to the racial amalgamation of the Chaldaeans and Babylonians, lost its former national force, and became, as it occurs in Daniel, a distinctive appellation of the Babylonian priestly class. It is possible, though not certain, that the occurrence of the word kalu

(priest) in Babylonian, which has no etymological connexion with Kaldii, may have contributed paronomastically towards the popular use of the term ” Chaldaeans ” for the Babylonian Magi. (See also Astrology.)

Literature.— Delattre, Les Chaldeens jusqu’a la fond, de Vemp. de Nebuch. (1889) ; Winckler, Untersuchungen zur altor. Gesch. (1889), pp. 49 ff. ; Gesch. Bab. u. Assyr. (1892), pp. in ff. ; Prince, Commentary on Daniel (1899), pp. 59-61; see also Babylonia and Assyria and Sumer and Sumerian. (J. D. Pr.)

CHALDEE, a term sometimes applied to the Aramaic portions of the biblical books of Ezra and Daniel or to the vernacular

paraphrases of the Old Testament (see Targum). The explanation formerly adopted and embodied in the name Chaldee is that the change took place in Babylon. That the so-called Biblical Chaldee, in which considerable portions of the books of Ezra and Daniel are Written, was really the language of Babylon was supposed to be clear from Dan. ii. 4, where the Chaldaeans are said to have spoken to the king in Aramaic. But the cunei- form inscriptions show that the language of the Chaldaeans was Assyrian; and an examination of the very large part of the Hebrew Old Testament written later than the exile proves conclusively that the substitution of Aramaic for Hebrew as the vernacular of Palestine took place very gradually. Hence scholars are now agreed that the term " Chaldee " is a misnomer, and that the dialect so called is really the language of the South- Western Arameans, who were the immediate neighbours of the Jews (W. Wright, Comparative Grammar of the Semitic Languages, p. 16). (See Semitic Languages.)

CHALICE (through a central O. Fr. form of the Lat. calix, caiicis, cup), a drinking-vessel of the cup or goblet form, now only used of the cup used in the celebration of the Eucharist (q.v,). For the various forms which the " chalice " so used has taken, see Drinking-Vessels and Plate. When, in the eucharistic service, water is mixed with the wine, the " chalice " is known as the " mixed chalice." This has been customary both in the Eastern and Western Churches from early times. The Armenian Church does not use the " mixed chalice." It was used in the English Church before the Reformation. According to the present law of the English Church, the mixing of the water with wine is lawful, if this is not done as part of or during the services, i.e. if it is not done ceremonially (Martin v. Mackonochie, 1868, L.R. 2 P.C. 365; Read v. Bp. of Lincoln, 1892, A.C. 664).-

CHALIER, JOSEPH (1747-1793), French Revolutionist. He was destined by his family for the church, but entered business, and became a partner in a firm at Lyons for which he travelled in the Levant, in Italy, Spain and Portugal. He was in Paris in 1789, and entered into relations with Marat, Camille Desmoulins and Robespierre. On his return to Lyons, Chalier was the first to be named member of the municipal bureau. He organized the national guard, applied the civil constitution of the clergy, and regulated the finances of the city so as to tax the rich heavily and spare the poor. Denounced to the Legislative Assembly by the directory of the department of Rhone-et-Loire for having made a nocturnal domiciliary perquisition, he was sent to the bar of the

Assembly, which approved of his conduct. In the election for mayor of Lyons, in November 1792, he was defeated by a Royalist. Then Chalier became the orator and leader of the Jacobins of Lyons, and induced the other revolutionary clubs and the commune of his city to arrest a great number of Royalists in the night of the 5th and 6th of February 1793. The mayor, supported by the national guard, opposed this project. Chalier demanded of the Convention the establishment of a revolutionary tribunal and the levy of a revolutionary army at Lyons. The Convention refused, and the anti-revolutionary party, encouraged by this refusal, took action. On the 29th and 30th of May 1793 the sections rose; the Jacobins were dispossessed of the muni- cipality and Chalier arrested. On the 15th of July, in spite of the order of the Convention, he was brought before the criminal tribunal of the Rhone-et-Loire, condemned to death, and guillotined the next day. The Terrorists paid a veritable worship to his memory, as to a martyr of Liberty.

See N. Wahl, “fitude sur Chalier,” in Revue historique, t. xxxiv. ; and Les Premieres Annies de la Revolution & Lyon (Paris, 1894).

CHALK, the name given to any soft, pulverulent, pure white limestone. The word is an old one, having its origin in the Saxon cealc, and the hard form ” kalk ” is still in use amongst the country folk of Lincolnshire. The German Kalk comprehends all forms of limestone; therefore a special term, Kreide, is em- ployed for chalk — French craie. From being used as a common name, denoting a particular material, the word was subsequently utilized by geologists as an appellation for the Chalk formation; and so prominent was this formation in the eyes of the earlier workers that it imposed its name upon a whole system of rocks, the Cretaceous (Lat. creta, chalk), although this rock itself is by no means generally characteristic of the system as a whole.

The Chalk formation, in addition to the typical chalk material — creta scriptoria — comprises several variations; argillaceous kinds — creta marga of Linnaeus — known locally as malm, marl, clunch, &c. ; and harder, more stony kinds, called rag, freestone, rock, hurlock or harrock in different districts. In certain parts of the formation layers of nodular flints (q.v.) abound ; in parts, it is inclined to be sandy, or to contain grains

of glauconite which was originally confounded with another green mineral, chlorite, hence the name ” chloritic marl ” applied to one of the subdivisions of the chalk. In its purest form chalk consists of from 95 to 99% of calcium carbonate (carbonate of lime); in this condition it is composed of a mass of fine granular particles held together by a somewhat feeble calcareous cement. The particles are mostly the broken tests of foraminifera, along with the debris of echinoderm and molluscan shells, and many minute bodies, like coccoliths, of somewhat obscure nature.

The earliest attempts at subdivision of the Chalk formation initiated by Wm. Phillips were based upon lithological characters, and such a classification as ” Upper Chalk with Flints,” ” Lower Chalk without Flints,” ” Chalk marl or Grey chalk,” was generally in use in England until W. Whitaker established the following order in 1865: —

Upper Chalk, with flints

(chalk rock Lower Chalk j chalk with few flints (chalk without flints 1 Totternhoe stone

Chalk Marl

marl

In France, a similar system of classification was in vogue, the subdivisions being craie blanche, craie Man, craie Moritee, until 1843 when d’Orbigny proposed the term Senonien for the Upper Chalk and Turonien for the Lower; later he divided the Turonien, giving the name Cenomanien to the lower portion. The subdivisions of d’Orbigny were based upon the fossil contents and not upon the lithological characters of the rocks. In 1876 Prof. Ch. Barrois showed how d’Orbigny’s classification might be applied to the British chalk rocks; and this scheme has been generally adopted by geologists, although there is some divergence of opinion as to the exact position of the base line of the Cenomanian.

The accompanying table shows the classification now adopted in England, with the zonal fossils and the continental names of the substages : —

N. France

Zonal fossils used in Britain.

Stages.

and

S.E. and

Belgium.

S. France.

■Ostrea lunata (Norfolk)

Danian?

“ >;

(Trimingham)

.M

2

m

Belemnitella mucronata

*3

J3

a

“3

J3

A.-

Actinocamax quadratus

Upper Chalk

O

>

= Inoceramus lingua in Yorkshire

Senonian

bo

-t-»

Marsupitestestudinarium j ˆintacnnus

Craie blanche

a

to

O

c

CO

CMicraster cor-anguinum

.a

a

a .

B.s „ cor-testudinarium

_c

<

-W S3

\Holaster planus, Chalk rock

E

w

« U

»* < ■

•8*

Terebratulina gracilis

Middle Chalk

Turonian

JD

Sˆ

Rhynchonella Cuvieri, Melbourne rock

Craie marneuse

ˆ

‘S

co G

CO HI’S

O p

Lower Chalk,

Chalk Marl and

“3

0 >

Cambridge Green-

u

3

c

sand

S*

CO

Si :

Actinocamax plenus

Cenomanian

CO

£

uT .

Holaster subglobosus, Totternhoe stone.

Craie glauconieuse

£

OS

Schloenbachia varians.

§

Since Prof. Barrois introduced the zonal system of subdivision (C. Evans had used a similar scheme six years earlier), our knowledge of the English chalk has been greatly increased by the work of Jukes-Browne and William Hill, and particularly by the laborious studies of Dr A. W. Rowe. Instead of employing the mixed assemblage of animals indicated as zone fossils in the table, A. de Grossouvre proposed a scheme for the north of France based upon ammonite faunas alone, which he c'ontended would be of more general applicability (Recherches sur la Craie Supirieure, Paris, 1901).

The Upper Chalk has a maximum thickness in England of about 1000 ft., but post-cretaceous erosion has removed much of it in many districts. It is more constant in character, and more typically chalky than the lower stages; flints are abundant, and harder nodular beds are limited to the lower portions, where some of the compact limestones are known as " chalk rock." The thickness of the Middle Chalk varies from about 100 to 240 ft. ; flints become scarcer in descending from the upper to the lower portions. The whole is more compact than the upper stage, and nodular layers are more frequent — the " chalk rock " of Dorset and the Isle of Wight belong to this stage. At the base is the hard " Melbourne rock." The thickness of the Lower Chalk in England varies from 60 to 240 ft. This stage includes part of the " white

chalk without flints," the " chalk marl," and the "grey chalk." The Totternhoe stone is a hard freestone found locally in this stage. The basement bed in Norfolk is a pure limestone, but very frequently it is marly with grains of sand and glauconite, and often contains phosphatic nodules; this facies is equivalent to the " Cambridge Greensand " of some districts and the "chloritic marl " of others. In Devonshire the Lower Chalk has become thin sandy calcareous series.

The chalk can be traced in England from Flamborough Head in Yorkshire, in a south-westerly direction, to the coast of Dorset; and it not only underlies the whole of the S.E. corner, where it is often obscured by Tertiary deposits, but it can be followed across the Channel into northern France. Rocks of the same age as the chalk are widespread (see Cretaceous System); but the variety of limestone properly called by this name is almost confined to the Anglo-Parisian basin. Some chalk occurs in the great Cretaceous deposits of Russia, and in Kansas, Iowa, Nebraska and S. Dakota in the United States. Hard white chalk occurs in Ireland in Antrim, and on the opposite shore of Scotland in Mull and Morven.

Economic Products of the Chalk.— Common chalk has been frequently used for rough building purposes, but the more important building stones are " Beer stone," from Beer Head in Devonshire, " Sutton stone " from a little north of Beer, and the " Totternhoe stone." It is burned for lime, and when mixed with some form of clay is used for the manufacture of cement; chalk marl has been used alone for this purpose. As a manure, it has been much used as a dressing for clayey land. Flints from the chalk are used for road metal and concrete, and have been employed in building as a facing for walls. Phosphatic nodules for manure have been worked from the chloritic marl and Cambridge Greensand, and to some extent from the Middle Chalk. The same material is worked at Ciply in Belgium and Picardy in France. Chalk is employed in the manu- facture of carbonate of soda, in the prepara- tion of carbon dioxide, and in many other chemical processes; also for making paints, crayons and tooth-powder. Whiting or Spanish white, used to polish glass and metal, is purified chalk prepared by triturat- ing common chalk with a large quantity of water, which is then decanted and allowed to deposit the finely-divided particles it holds in suspension.

Chalk Scenery. — Where exposed at the surface, chalk produces

rounded, smooth,

grass-covered hills as in the Downs of southern England and the Wolds of Yorkshire and Lincolnshire. The hills are often intersected by clean-cut dry valleys. It forms fine cliffs on the coast of Kent, Yorkshire and Devonshire.

Chalk is employed medicinally as a very mild astringent either alone or more usually with other astringents. It is more often used, however, for a purely mechanical action, as in the preparation hydrargyrum cum creta. As an antacid its use has been replaced by other drugs.

Black chalk or drawing slate is a soft carbonaceous schist, which gives a black streak, so that it can be used for drawing or writing. Brown chalk is a kind of umber. Red chalk or reddle is an impure earthy variety of haematite. French chalk is a soft variety of steatite, a hydrated magnesium silicate.

The most comprehensive account of the British chalk is contained in the Memoirs of the Geological Survey of the United Kingdom, ” The Cretaceous Rocks of Britain,” vol. ii. 1903, vol. iii. 1904 (with bibliography), by Jukes-Browne and Hill. See also ” The White Chalk of the English Coast,” several papers in the Proceedings of the Geologists’ Association, London, (1) Kent and Sussex, xvi. 1900, (2) Dorset, xvii., 1901, (3) Devon, xviii., 1903, (4) Yorkshire, xviii., 1904. (J. A. H.)

CHALKHILL, JOHN (fl. 1600?), English poet. Two songs by him are included in Izaak Walton’s Compleat Angler, and in 1683 appeared ” Thealma and Clearchus. A Pastoral History in smooth and easie Verse. Written long since by John Chalkhill, Esq., an Acquaintant and Friend of Edmund Spencer ” (1683), with a preface written five years earlier by Walton. Another poem, ” Alcilia, Philoparthens Loving Follie ” (1595, reprinted in vol. x. of the Jahrbuch des deutschen Shakespeare- Vereins) , was at one time attributed to him. Nothing further is known of the poet, but a person of his name occurs as one of the coroners for Middlesex in the later years of Queen Elizabeth’s reign. Pro- fessor Saintsbury, who included Thealma and Clearchus in vol. ii. of his Minor Poets of the Caroline Period (Oxford, 1906), points out a

marked resemblance between his work and that of William Chamberlayne.

CHALKING THE DOOR, a Scottish custom of landlord and tenant law. In former days the law was that " a burgh officer, in presence of witnesses, chalks the most patent door forty days before Whit Sunday, having made out an execution of 'chalking,' in which his name must be inserted, and which must be subscribed by himself and two witnesses." This ceremony now proceeds simply on the verbal order of the proprietor. The execution of chalking is a warrant under which decree of removal will be pronounced by the burgh court, in virtue of which the tenant may be ejected on the expiration of a charge of six days.

CHALLAMEL, JEAN BAPTISTE MARIUS AUGUSTIN (1818- 1894), French historian, was born in Paris on the 18th of March 1818. His writings consist chiefly of popular works, which enjoyed great success. The value of some of his books is en- hanced by numerous illustrations, e.g. Histoire-musee de la Revolution francaise, which appeared in 50 numbers in 1 841-1842 (3rd ed., in 72 numbers, 1857-1858); Histoire de la mode en France; la toilette des femmes depuis I'gpoque gallo-romaine jusqu'a nos jours (1874, with 12 plates; new ed., 1880, with 21 coloured plates). His Memoires du peuple francaise (1865- 1873) and La France et les Franqais A travers les siecles (1882) at least have the merit of being among the first books written on the social history of France. In this sense Challamel was a pioneer, of no great originality, it is true, but at any rate of fairly wide information. He died on the 20th of October 1894.

CHALLEMEL-LACOUR, PAUL AMAND (1827-1896), French statesman, was born at Avranches on the 19th of May 1827. After passing through the Ecole Normale Superieure he became professor of philosophy successively at Pau and at Limoges. The coup d'itat of 1851 caused his expulsion from France for his republican opinions. He travelled on the continent, and in 1856 settled down as professor of French literature at the Polytechnic of Zurich. The amnesty of 1 8 59 enabled him to return to France , but a projected course of lectures on history and art was immediately suppressed. He now supported himself by his pen, and became a regular contributor to the reviews. On the fall of the

Second Empire in September 1870 the government of national defence appointed him prefect of the department of the Rhone, in

which capacity he had to suppress the Communist rising at Lyons. Resigning his post on the 5th of February 1871, he was in January 1872 elected to the National Assembly, and in 1876 to the Senate. He sat at first on the Extreme Left; but his philosophic and critical temperament was not in harmony with the recklessness of French radicalism, and his attitude towards political questions underwent a steady modification, till the close of his life saw him the foremost representative of moderate republicanism. During Gambetta's lifetime, however, Challemel-Lacour was one of his warmest supporters, and he was for a time editor of Gambetta's organ, the Ripublique francaise. In 1879 he was appointed French ambassador at Bern, and in 1880 was transferred to London; but he lacked the suppleness and command of temper necessary to a successful diplomatist. He resigned in 1882, and in February 1883 became minister of foreign affairs in the Jules Ferry cabinet, but retired in November of the same year. In 1890 he was elected vice-president of the Senate, and in 1893 succeeded Jules Ferry as its president. His influence over that body was largely due to his clear and reasoned eloquence, which placed him at the head of contemporary French orators. In 1893 he also became a member of the French Academy. He distinguished himself by the vigour with which he upheld the Senate against the encroachments of the chamber, but in 1895 failing health forced him to resign, and he died in Paris on the 26th of October 1896. He published a translation of A. Heinrich Ritter's Geschichte der Philosophie (1861); La Philo- sophic individualiste: Mude sur Guillaume de Humboldt (1864); and an edition of the works of Madame d'Epinay (1869).

In 1897 appeared Joseph Reinach's edition of the CEuvres oratoires de Challemel-Lacour.

CHALLENGE (O. Fr. chalonge, calenge, &c, from Lat. calumnia, originally meaning trickery, from caliii, to deceive, hence a false accusation, a " calumny "), originally a charge against a person or a claim to anything, a defiance. The term is now particularly used of an invitation to a trial of skill in any contest, or to a trial by combat as a vindication of personal honour (see Duel), and, in law, of the objection to the members of a jury allowed in a civil action or in a criminal trial (see Jury).

"CHALLENGER" EXPEDITION. The scientific results of several short expeditions between i860 and 1870 encouraged the council of the Royal Society to approach the British govern- ment, oil the

suggestion of Sir George Richards, hydrographer to the admiralty, with a view to commissioning a vessel for a prolonged cruise for oceanic exploration. The government detailed H.M.S. ” Challenger,” a wooden corvette of 2306 tons, for the purpose. Captain (afterwards Sir) George Nares was placed in command, with a naval crew; and a scientific staff was selected by the society with Professor (afterwards Sir) C. Wyville Thomson as director. The staff included Mr (afterwards Sir) John Murray and Mr H. N. Moseley, biologists; Dr von Willemoes-Suhm, Commander Tizard, and Mr J. Y. Buchanan, chemist and geologist. A complete scheme of instructions was drawn up by the society. The ” Challenger ” sailed from Ports- mouth in December 1872. For nearly a year the work of the expedition lay in the Atlantic, which was crossed several times. Teneriffe, the Bermudas, the Azores, Madeira, the Cape Verd Islands, Bahia and Tristan da Cunha were successively visited, and in October 1873 the ship reached Cape Town. Steering then south-east and east she visited the various islands between 45 and 50° S., and reached Kerguelen Island in January 1874. She next proceeded southward about the meridian of 8o c E. She was the first steamship to cross the Antarctic circle, but the attainment of a high southerly latitude was not an object of the voyage, and early in March the ship left the south polar regions and made for Melbourne. Extensive researches were now made in the Pacific. The route led by New Zealand, the Fiji Islands, Torres Strait, the Banda Sea, and the China Sea to Hong Kong. The western Pacific was then explored northward to Yokohama, after which the ” Challenger ” struck across the ocean by Honolulu and Tahiti to Valparaiso. She then coasted

southward, penetrated the Straits of Magellan, touched at Montevideo, recrossed the Atlantic by Ascension and the Azores, and reached Sheerness in May 1876. This voyage is without parallel in the history of scientific research. The ” Challenger ” Report was issued in fifty volumes (London, 1880-1895), mainly under the direction of Sir John Murray, who succeeded Wyville Thomson in this work in 1882. Specialists in every branch of science assisted in its production. The zoological collections alone formed the basis for the majority of the volumes; the deep-sea soundings and samples of the deposits, the chemical analysis of water samples, the meteorological, water-temperature,

magnetic, geological, and botanical observations were fully worked out, and a summary of the scientific results, narrative of the cruise and indices were also provided.

See also Lord G. Campbell, Log Letters from the " Challenger," (1876) ; W. J. J. Spry, Cruise of H.M.S. " Challenger " (1876) ; Sir C. Wyville Thomson, Voyage of the " Challenger," The Atlantic, Preliminary Account of General Results (1877); J. J. Wild, At Anchor; Narrative of Experiences afloat and ashore during the Voyage of H.M.S. " Challenger " (1878); H. N. Moseley, Notes by a Naturalist on the " Challenger " (1879).

CHALLONER, RICHARD (1691-1781), English Roman Catholic prelate, was born at Lewes, Sussex, on the 29th of September 1691. After the death of his father, who was a rigid Dissenter, his mother, left in poverty, lived with some Roman Catholic families. Thus it came about that he was brought up as a Roman Catholic, chiefly at the seat of Mr Holman at Warkworth, Northamptonshire, where the Rev. John Gother, a celebrated controversialist, officiated as chaplain. In 1704. he was sent to the English College at Douai, where he was ordained a priest in 17 16, took his degrees in divinity, and was appointed professor in that faculty. In 1730 he was sent on the English mission and stationed in London. The controversial treatises which he published in rapid succession attracted much attention, particularly his Catholic Christian Instructed (1737), which was prefaced by a witty reply to Dr Conyers Middleton's Letters from Rome, showing an Exact Conformity between Popery and Paganism. Middleton is said to have been so irritated that he endeavoured to put the penal laws in force against his antagonist, who prudently withdrew from London. In 1741 Challoner was raised to the episcopal dignity at Hammersmith, and nominated co- adjutor with right of succession to Bishop Benjamin Petre, vicar-apostolic of the London district, whom he succeeded in 1758. He resided principally in London, but was obliged to retire into the country during the " No Popery " riots' of 1780. He died on the 12th of January 1781, and was buried at Milton, Berkshire. Bishop Challoner was the author of numerous con- troversial and devotional works, which have been frequently reprinted and translated into various languages. He compiled the Garden of the Soul (1740 ?), which continues to be the most popular manual of devotion among English-speaking Roman Catholics, and he revised an edition of the Douai version of the Scriptures (1749-17 50), correcting the language and orthography, which in many places had become obsolete. Of his

historical works the most valuable is one which was intended to be a Roman Catholic antidote to Foxe's well-known martyrology. It is entitled Memoirs of Missionary Priests and other Catholicks of both Sexes who suffered Death or Imprisonment in England on account of their Religion, from the year 1577 till the end of the reign of Charles II. (2 vols. 1741, frequently reprinted). He also published anonymously, in 1745, the lives of English, Scotch and Irish saints, under the title of Britannia Sancta, an interesting work which has, however, been superseded by that of Alban Butler.

For a complete list of his writings see J. Gillow's Bibl. Diet, of Eng. Cath. i. 452-458; Barnard, Life of R. Challoner (1784); Flanagan, History of the Catholic Church in England (1857); there is also a critical history of Challoner by Rev. E. Burton. ,

CHALMERS, ALEXANDER (1750-1834), Scottish writer, was born in Aberdeen on the 29th of March 1759. He was educated as a doctor, but gave up this profession for journalism, and he was for some time editor of the Morning Herald. Besides editions of the works of Shakespeare, Beattie, Fielding, Johnson,

Warton, Pope, Gibbon, Bolingbroke, he • published A General Biographical Dictionary in 32 vols.(i8i2-i8i7); a Glossary to Shakspeare (1797); an edition of Steevens's Shakespeare (1809); and the British Essayists, beginning with the Taller and ending with the Observer, with biographical and historical prefaces and a general index. He died in London on the 1 9th of December

1834.

CHALMERS, GEORGE (1742-1825), Scottish antiquarian and political writer, was born at Fochabers, a village in the county of Moray, in 1742. His father, James Chalmers, was a grandson of George Chalmers of Pittensear, a small estate in the parish of Lhanbryde, now St Andrews-Lhanbryde, in the same county, possessed by the main line of the family from about the beginning of the 17 th to the middle of the 18th century. After completing the usual course at King's College, Aberdeen, young Chalmers studied law in Edinburgh for several years. Two uncles on the father's side having settled in America, he visited Maryland in 1763, with the view, it is said, of assisting to recover a tract of land of some extent about which a dispute had arisen, and was in this way induced to commence practice as a lawyer at Baltimore, where for a time he met with much success. Having,

however, espoused the cause of the Royalist party on the breaking out of the American War of Independence, he found it expedient to abandon his professional prospects in the New World, and return to his native country. For the losses he had sustained as a colonist he received no compensation, and several years elapsed before he obtained an appointment that placed him in a state of comfort and independence.

In the meantime Chalmers applied himself with great diligence and assiduity to the investigation of the history and establishment of the English colonies in North America; and enjoying free access to the state papers and other documents preserved among what were then termed the plantation records, he became possessed of much important information. His work entitled Political Annals of the present United Colonies from their Settlement to the Peace of 1763, 4to, London, 1780, was to have formed two volumes; but the second, which should have contained the period between 1688 and 1763, never appeared. The first volume, however, is complete in itself, and traces the original settlement of the different American colonies, and the progressive changes in their constitutions and forms of government as affected by the state of public affairs in the parent kingdom. Independently of its value as being compiled from original documents, it bears evidence of great research, and has been of essential benefit to later writers. Continuing his researches, he next gave to the world An Estimate of the Comparative Strength of Britain during the Present and Four Preceding Reigns, London, 1782, which passed through several editions. At length, in August 1786, Chalmers, whose sufferings as a Royalist must have strongly recommended him to the government of the day, was appointed chief clerk to the committee of privy council on matters relating to trade, a situation which he retained till his death in 1825, a period of nearly forty years. As his official duties made no great demands on his time, he had abundant leisure to devote to his favourite studies, — the antiquities and topography of Scotland having thenceforth special attractions for his busy pen.

Besides biographical sketches of Defoe, Sir John Davies, Allan Ramsay, Sir David Lyndsay, Churchyard and others, prefixed to editions of their respective works, Chalmers wrote a life of Thomas Paine, the author of the Rights of Man, which he published under the assumed name of Francis Oldys, A.M., of the University of Pennsylvania; and a life of Ruddiman, in which considerable light is thrown on the state of litera ture in Scotland

during the earlier part of the last century. His life of Mary, Queen of Scots, in two 4to vols., was first published in 1818. It is founded on a MS. left by John Whitaker, the historian of Manchester; but Chalmers informs us that he found it necessary to rewrite the whole. The history of that ill-fated queen occupied much of his attention, and his last work, A Detection of the Love-Letters lately attributed in Hugh Campbell's work to Mary Queen of Scots, is an exposure of an attempt to represent as genuine some fictitious letters said to have passed between Mary and BothwelL

which had fallen into deserved oblivion. In 1797 appeared his Apology for the Believers in the Shakespeare Papers which were exhibited in Norfolk Street, followed by other tracts on the same subject. These contributions to the literature of Shakespeare are full of curious matter, but on the whole display a great waste of erudition, in seeking to show that papers which had been proved forgeries might nevertheless have been genuine. Chalmers also took part in the Junius controversy, and in The Author of Junius Ascertained, from a Concatenation of Circumstances amounting to Moral Demonstration, Lond. 181 7, 8vo, sought to fix the author- ship of the celebrated letters on Hugh Boyd. In 1824 he published The Poetical Remains of some of the Scottish Kings, now first collected; and in the same year he edited and presented as a con- tribution to the Bannatyne Club Robene and Makyne and the Testament of Cresseid, by Robert Henryson. His political writings are equally numerous. Among them may be mentioned Collec- tion of Treaties between Great Britain and other Powers, Lond. 1790, 2 vols. 8vo; Vindication of the Privileges of the People in respect to the Constitutional Right of Free Discussion, &c, Lond. 1796, 8vo, published anonymously; A Chronological Account of Commerce and Coinage in Great Britain from the Restoration till 1810, Lond. 1810, 8vo; Opinions of Eminent Lawyers on various points of English Jurisprudence, chiefly concerning the Colonies, Fisheries, and Commerce of Great Britain, Lond. 1814, 2 vols. 8vo; Comparative Views of the State of Great Britain before and since the War, Lond. 1817, 8vo.

But Chalmers's greatest work is his Caledonia, which, however, he did not live to complete. The first volume appeared in 1807, and is introductory to the others. It is divided into four books,

treating successively of the Roman, the Pictish, the Scottish and the Scoto-Saxon periods, from 80 to 1306 a.d. In these we are presented, in a condensed form, with an account of the people, the language and the civil and ecclesiastical history, as well as the agricultural and commercial state of Scotland during the first thirteen centuries of our era. Unfortunately the chapters on the Roman period are entirely marred by the author's having accepted as genuine Bertram's forgery De Situ Britanniae; but otherwise his opinions on controverted topics are worthy of much respect, being founded on a laborious investigation of all the original authorities that were accessible to him. The second volume, published in 18 10, gives an account of the seven south-eastern counties of Scotland — Roxburgh, Berwick, Haddington, Edinburgh, Linlithgow, Peebles and Selkirk — each of them being treated of as regards name, situation and extent, natural objects, antiquities, establishment as shires, civil history, agriculture, manufactures and trade, and ecclesiastical history. In 1824, after an interval of fourteen years, the third volume appeared, giving, under the same headings, a description of the seven south-western counties — Dumfries, Kirkcudbright, Wigtown, Ayr, Lanark, Renfrew and Dumbarton. In the preface to this volume the author states that the materials for the history of the central and northern counties were collected, and that he expected the work would be completed in two years, but this expectation was not destined to be realized. He had also been engaged on a history of Scottish poetry and a history of printing in Scotland. Each of them he thought likely to extend to two large quarto volumes, and on both he expended an unusual amount of enthusiasm and energy. He had also prepared for the press an elaborate history of the life and reign of David I. In his later researches he was assisted by his nephew James, son of Alexander Chalmers, writer in Elgin.

George Chalmers died in London on the 31st of May 1825. His valuable and extensive library he bequeathed to his nephew, at whose death in 1841 it was sold and dispersed. Chalmers was a member of the Royal and Antiquarian Societies of London, an honorary member of the Antiquarian Society of Scotland, and a member of other learned societies. In private life he was undoubtedly an amiable man, although the dogmatic tone that disfigures portions of his writings procured him many opponents. Among his avowed antagonists in literary warfare the most distinguished were Malone and Steevens, the Shakespeare editors; Mathias, the author of the Pursuits of Literature; Dr

Jamieson,

the Scottish lexicographer; Pinkerton, the historian; Dr Irving, the biographer of the Scottish poets; and Dr Currie of Liverpool. But with all his failings in judgment Chalmers was a valuable writer. He uniformly had recourse to original sources of information; and he is entitled to great praise for his patriotic and self-sacrificing endeavours to illustrate the history, literature and antiquities of his native country. (J. M'D.;

CHALMERS, GEORGE PAUL (1836-1878), Scottish painter, was born at Montrose, and studied at Edinburgh. His land- scapes are now more valued than the portraits which formed his earlier work. The best of these are " The End of the Harvest " (1873), " Running Water " (1875), and " The Legend " (in the National Gallery, Edinburgh). He became an associate (1867) and a full member (1 871) of the Scottish Academy.

CHALMERS, JAMES (1841-1901), Scottish missionary to New Guinea, was born at Ardrishaig in Argyll. After serving in the Glasgow City Mission he passed through Cheshunt College, and, being accepted by the London Missionary Society, was appointed to Rarotonga in the South Pacific in 1866. Here the natives gave him the well-known name " Tamate." After ten years' service, especially in training native evangelists, he was transferred to New Guinea. In addition to his enthusiastic but sane missionary work, Chalmers did much to open up the island, and, with his colleague W. G. Lawes, gave valuable aid in the British annexation of the south-east coast of the island. On the 8th of April 1901, in company with a brother missionary, Oliver Tomkins, he was killed by cannibals at Goaribari Island. R. L. Stevenson has left on record his high appreciation of Chalmers's character and work.

Chalmers's Autobiography and Letters were edited by Richard Lovett in 1902, who also wrote a popular life called Tamate.

CHALMERS, THOMAS (1780-1847), Scottish divine, was born at Anstruther in Fifeshire, on the 17 th of March 1780. At the age of eleven he was entered as a student at St Andrews, where he devoted himself almost exclusively to mathematics. In January 1799 he was licensed as a preacher of the Gospel by the St Andrews presbytery. In May 1803, after attending further courses of lectures in Edinburgh, and acting as assistant to the professor of mathematics at St Andrews, he was ordained as minister of

Kilmany in Fifeshire, about 9 m. from the university town, where he continued to lecture. His mathematical lectures roused so much enthusiasm that they were discontinued by order of the authorities, who disliked the disturbance of the university routine which they involved. Chalmers then opened mathematical classes on his own account which attracted many students; at the same time he delivered a course of lectures on chemistry, and ministered to his parish at Kilmany. In 1805 he became a candidate for the vacant professorship of mathematics at Edinburgh, but was unsuccessful. In 1808 he published an Inquiry into the Extent and Stability of National Resources, a contribution to the discussion created by Bonaparte's commercial policy. Domestic bereavements and a severe illness then turned his thoughts in another direction. At his own request the article on Christianity was assigned to him in Dr Brewster's Edinburgh Encyclopaedia, and in studying the credentials of Christianity he received a new impression of its contents. His journal and letters show how he was led from a sustained effort to attain the morality of the Gospel to a profound spiritual revolution. After this his ministry was marked by a zeal which made it famous. The separate publication of his article in the Edinburgh Encyclopaedia, and contributions to the Edinburgh Christian Instructor and the Eclectic Review, enhanced his reputation as an author. In 181 5 he became minister of the Tron Church, Glasgow, in spite of determined opposition to him in the town council on the ground of his evangelical teaching. From Glasgow his repute as a preacher spread throughout the United Kingdom. A series of sermons on the relation between the discoveries of astronomy and the Christian revelation was published in January 181 7, and within a year nine editions and 20,000 copies were in circulation. When he visited London Wilberforce wrote, " all the world is wild about Dr Chalmers."

In Glasgow Chalmers made one of his greatest contributions

to the life of his own time by his experiments in parochial organization. His parish contained about n,ooo persons, and of these about one-third were unconnected with any church. He diagnosed this evil as being due to the absence of personal influence, spiritual oversight, and the want of parochial organizations which had not kept pace in the city, as they had done in rural

parishes, with the growing population. He declared that twenty new churches, with parishes, should be erected in Glasgow, and he set to work to revivify, remodel and extend the old parochial economy of Scotland. The town council consented to build one new church, attaching to it a parish of 10,000 persons, mostly weavers, labourers and factory workers, and this church was offered to Dr Chalmers that he might have a fair opportunity of testing his system.

In September 1819 he became minister of the church and parish of St John, where of ,‘2000 families more than 800 had no connexion with any Christian church. He first addressed him- self to providing schools for the children. Two school-houses with four endowed teachers were established, where 700 children were taught at the moderate fees of 2s. and 3s. per quarter. Between 40 and 50 local Sabbath schools were opened, where more than 1000 children were taught the elements of secular and religious education. The parish was divided into 25 districts embracing from 60 to 100 families, over each of which an elder and a deacon were placed, the former taking oversight of their spiritual, the latter of their physical needs. Chalmers was the mainspring of the whole system, not merely superintending the visitation, but personally visiting all the families, and holding evening meetings, when he addressed those whom he had visited. This parochial machinery enabled him Jo make a singularly successful experiment in dealing with the problem of poverty. At this time there were not more than 20 parishes north of the Forth and Clyde where there was a compulsory assessment for the poor, but the English method of assessment was rapidly spreading. Chalmers believed that compulsory assessment ended by swelling the evil it was intended to mitigate, and that relief should be raised and administered by voluntary means. His critics replied that this was impossible in large cities. When he undertook the management of the parish of St John’s, the poor of the parish cost the city £1400 per annum, and in four years, by the adoption of his method, the pauper expenditure was reduced to £280 per annum. The investigation of all new applications for relief was committed to the deacon of the district, and every effort was made to enable the poor to help themselves. When once the system was in operation it was found that a deacon, by spending an hour a week among the families com- mitted to his charge, could keep himself acquainted with their character and condition.

In 1823, after eight years of work at high pressure, he was glad to

accept the chair of moral philosophy at St Andrews, the seventh academic offer made to him during his eight years in Glasgow. In his lectures he excluded mental philosophy and included the whole sphere of moral obligation, dealing with man's duty to God and to his fellow-men in the light of Christian teaching. Many of his lectures are printed in the first and second volumes of his published works. In ethics he made con- tributions to the science in regard to the place and functions of volition and attention, the separate and underived character of the moral sentiments, and the distinction between the virtues of perfect and imperfect obligation. His lectures kindled the religious spirit among his students, and led some of them to devote themselves to missionary effort. In November 1828 he was transferred to the chair of theology in Edinburgh. He then introduced the practice of following the lecture with a viva voce examination on what had been delivered. He also introduced text-books, and came into stimulating contact with his people; perhaps no one has ever succeeded as he did by the use of these methods in communicating intellectual, moral and religious im- pulse to so many students.

These academic years were prolific also in a literature of various kinds. In 1826 he published a third volume of the Christian and Civic Economy of Large Towns, a continuation of work begun

at St John's, Glasgow. In 1 83 2 he published a Political Economy, the chief purpose of which was to enforce the truth that the right economic condition of the masses is dependent on their right moral condition, that character is the parent of comfort, not vice versa. In 1833 appeared a treatise on The Adaptation of External Nature to the Moral and Intellectual Constitution of Man. In 1834 Dr Chalmers was elected fellow of the Royal Society of Edinburgh, and in the same year he became corresponding member of the Institute of France; in- 1835 Oxford conferred on him the degree of D.C.L. In 1834 he became leader of the evangelical section of the Scottish Church in the General Assembly. He was appointed chairman of a committee for church extension, and in that capacity made a tour through a large part of Scotland, addressing presbyteries and holding public meetings. He also issued numerous appeals, with the result that in 1841, when he resigned his office as convener of the church extension committee, he was able to announce that in seven years upwards of £300,000 had been contributed, and 220 new churches had been built. His efforts to induce the Whig government to assist in this effort were unsuccessful.

In 1 84 1 the movement which ended in the Disruption was rapidly culminating, and Dr Chalmers found himself at the head of the party which stood for the principle that ” no minister shall be intruded into any parish contrary to the will of the congregation ” (see Free Church of Scotland). Cases of con- flict between the church and the civil power arose in Auchter- arder, Dunkeld and Marnoch; and when the courts made it clear that the church, in their opinion, held its temporalities on condition of rendering such obedience as the courts required, the church appealed to the government for relief. In January 1843 the government put a final and peremptory negative on the church’s claims for spiritual independence. On the 18th of May 1843 470 clergymen withdrew from the general assembly and constituted themselves the Free Church of Scotland, with Dr Chalmers as moderator. He had prepared a sustentation fund scheme for the support of the seceding ministers, and this was at once put into successful operation. On the 30th of May 1847, immediately after his return from the House of Commons, where he had given evidence as to the refusal of sites for Free Churches by Scottish landowners, he was found dead in bed.

Dr Chalmers’ action throughout the Free Church controversy was so consistent in its application of Christian principle and so free from personal or party animus, that his writings are a valuable source for argument and illustration on the question of Establishment. ” I have no veneration,” he said to the royal commissioners in St Andrews, before either the voluntary or the non-intrusive controversies had arisen, ” for the Church of Scotland qua an establishment, but I have the utmost veneration for it qua an instrument of Christian good. ” He was transparent in character, chivalrous, kindly, firm, eloquent and sagacious; his purity of motive and unselfishness commanded absolute con- fidence; he had originality and initiative in dealing with new and difficult circumstances, and great aptitude for business details.

During a life of incessant activity Chalmers scarcely ever allowed a day to pass without its modicum of composition; at the most unseasonable times, and in the most unlikely places, he would occupy himself with literary work. His writings occupy more than 30 volumes. He would have stood higher as an author had he written less, or had he indulged less in that practice of reiteration into which he was constantly betrayed by his anxiety to impress his ideas upon others. As a political economist he was the first to unfold the connexion that subsists between the degree of the fertility of the soil and the social condition of a

community, the rapid manner in which capital is reproduced (see Mill's Political Economy, i. 94), and the general doctrine of a limit to all the modes by which national wealth may accumulate. He was the first also to advance that argument in favour of religious establishments which meets upon its own ground the doctrine of Adam Smith, that religion like other things should be left to the operation of the natural law of supply and demand. In the department of natural theology and the Christian evidences he ably advocated that

method of reconciling the Mosaic narrative with the indefinite antiquity of the globe which William Buckland (1784-1856) advanced in his Bridgewater Treatise, and which Dr Chalmers had previously communicated to him. His refutation of Hume's objection to the truth of miracles is perhaps his intellectual chef-d'oeuvre. The distinction between the laws and dispositions of matter, as between the ethics and objects of theology, he was the first to indicate and enforce, and he laid great emphasis on the superior authority as witnesses for the truth of Revelation of the Scriptural as compared with the Extra-Scriptural writers, and of the Christian as compared with the non-Christian testimonies. In his Institutes of Theology, no material modification is attempted on the doctrines of Calvinism,which he received with all simplicity of faith as revealed in the Divine word, and defended as in harmony with the most profound philosophy of human nature and of the Divine providence.

For biographical details see Dr W. Hanna's Memoirs (Edinburgh, 4 vols., 1849-1852); there is a good short Life by Mrs Oliphant (1893). (W. Ha.; D. Mn.)

CHALONER, SIR THOMAS (1521-1565), English statesman and poet, was the son of Roger Chaloner, mercer of London, a descendant of the Denbighshire Chaloners. No details are known of his youth except that he was educated at both Oxford and Cambridge. In 1540 he went, as secretary to Sir Henry Knyvett, to the court of Charles V., whom he accompanied in his expedition against Algiers in 1541, and was wrecked on the Barbary coast. In 1547 he joined in the expedition to Scotland, and was knighted, after the battle of Musselburgh, by the protector Somerset, whose patronage he enjoyed. In 1549 he was a witness

against Dr Bonner, bishop of London; in 1551 against Stephen Gardiner, bishop of Winchester; in the spring of the latter year he was sent as a commissioner to Scotland, and again in March 1552. In 1553 he went with Sir Nicholas Wotton and Sir William Pickering on an embassy to France, but was recalled by Queen Mary on her accession. In spite of his Pro- testant views, Chaloner was still employed by the government, going to Scotland in 1 555-1 556, and providing carriages for troops in the war with France, 1557-1558. In 1558 he went as Elizabeth's ambassador to the emperor Ferdinand at Cambrai, from July 1559 to February 1559/60 he was ambassador to King Philip at Brussels, and in 1561 he went in the same capacity to Spain. His letters are full of complaints of his treatment there, but it was not till 1564, when in failing health, that he was allowed to return home. He died at his house in Clerkenwell on the 14th of October 1565. He acquired during his years of service three estates, Guisborough in Yorkshire, Steeple Claydon in Buckinghamshire, and St Bees in Cumberland. He married (1) Joan, widow of Sir Thomas Leigh; and(2) Etheldreda,daughter of Edward Frodsham, of Elton, Cheshire, by whom he had one son, Sir Thomas Chaloner (1561-1615), the naturalist. Chaloner was the intimate of most of the learned men of his day, and with Lord Burghley he had a life-long friendship. Throughout his busy official life he occupied himself with literature, his Latin verses and his pastoral poems being much admired by his con- temporaries. Chaloner's " Howe the Lorde Mowbray . . . was . . . banyshed the Realme, "printed in the 1559 edition of William Baldwin's Mirror for Magistrates (repr. in vol. ii. pt. 1 of Joseph Haslewood's edition of 181 5), has sometimes been attributed to Thomas Churchyard. His most important work, De Rep. Anglorum instauranda libri decern, written while he was in Spain, was first published by William Malim (1579, 3 pts.), with compli- mentary Latin verses in praise of the author by Burghley and others. Chaloner's epigrams and epitaphs were also added to the volume, as well as In landem Henrici octavi . . . carmen Panegericum, first printed in 1 560. Amongst his other works are The praise of folie, Moriae encomium ... by Erasmus . . . Englished by Sir Thomas Chaloner, Knight (1549, ed. Janet E. Ashbee, 1901); A book of the Office of Servantes (1543), translated from Gilbert Cognatus; and An homilie of Saint John Chrysostome . . . Englished by T. C. (1544).

See " The Chaloners, Lords of the Manor of St Bees," by William Jackson, in Transactions of the Cumberland Assoc, for the Advance- ment of Literature and Science, pt. vi. pp. 47-74,

1880-1881.

CHALONS-SUR-MARNE, a town of north-eastern France, capital of the department of Marne, 107 m. E. of Paris on the main line of the Eastern railway to Nancy, and 25 m. S.S.E. of Reims. Pop. (1906) 22,424. Chalons is situated in a wide level plain principally on the right bank of the Marne, its suburb of Marne,which contains the railwaystations of the Eastern and Est-Etat railways, lying on the left bank. The town proper is bordered on the west by the lateral canal of the Marne, across which lies a strip of ground separating it from the river itself. Chalons is traversed by branches of the canal and by small streams, and its streets are for the most part narrow and irregular, but it is surrounded by ample avenues and promenades, the park known as the Jard, in the south-western quarter, being especially attractive. Huge barracks lie to the north and east. There are several interesting churches in the town. The cathedral of St Etienne dates chiefly from the 13th century, but its west facade is in the classical style and belongs to the 17 th century. There are stained-glass windows of the 13 th century in the north transept. Notre-Dame, of the 12th and 13th centuries, is con- spicuous for its four Romanesque towers, two flanking the apse; the other two, surmounted by tall lead spires, flanking the principal facade. The churches of St. Alpin, St Jean and St Loup date from various periods between the nth and the 17th centuries. The hotel-de-ville (17 71), facing which stands a monument to President Carnot; the prefecture (1759-1764), once the residence of the intendants of Champagne; the college, once a Jesuit establishment; and a training college which occupies the Augustinian abbey of Toussaints (16th and 17th centuries), are noteworthy civil buildings. The houses of Chalons are generally ill-built of timber and plaster, or rough-cast, but some old mansions, dating from the 15 th to the 16th centuries, remain. The church of Ste Pudentienne, on the left bank of the river, is a well-known place of pilgrimage. The town is the seat of a bishop and a prefect, and headquarters of the VI. army corps; it has tribunals of first instance and of commerce, a chamber of commerce, a board of trade-arbitrators, a museum, a library, training colleges, a higher ecclesiastical seminary, a communal college and an important technical school. The principal industry is brewing, which is carried on in the suburb of Marne. Galleries of immense length, hewn in a limestone hill and served by lines of railway, are used as store-houses for beer. The preparation of champagne, the manufacture of boots and shoes, brushes, wire-

goods and wall-paper also occupy many hands. There is trade in cereals.

Chalons-sur-Marne occupies the site of the chief town of the Catalauni, and some portion of the plains which lie between it and Troyes was the scene of the defeat of Attila in the conflict of 451. In the 10th and following centuries it attained great prosperity as a kind of independent state under the supremacy of its bishops, who were ecclesiastical peers of France. In 12 14 the militia of Chalons served at the battle of Bouvines; and in the 15th century the citizens maintained their honour by twice (1430 and 1434) repulsing the English from their walls. In the 16th century the town sided with Henry IV., king of France, who in 1589 transferred thither the parlement of Paris, which shortly afterwards burnt the bulls of Gregory XIV. and Clement VIII. In 1856 Napoleon III. established a large camp, known as the Camp of Chalons, about 16 m. north of the town by the railway to Reims. It was situated in the immediate neighbour- hood of Grand Mourmelon and Petit Mourmelon, and occupied an area of nearly 30,000 acres. The " Army of CMlons," formed by Marshal MacMahon in the camp after the first reverses of the French in 1870, marched thence to the Meuse, was surrounded by the Germans at Sedan, and forced to capitulate. The camp is still a training-centre for troops.

About 5 m. E. of Chalons is L'Epine, where there is a beautiful pilgrimage church (15th and 16th centuries, with modern restora- tion) with a richly-sculptured portal. In the interior there is a fine choir-screen, an organ of the 16th century, and an ancient and much-venerated statue of the Virgin.

CHALON-SUR-SAONE, a town of east-central France, capital of an arrondissement in the department of Saone-et-Loire,

81 m. N. of Lyons by the Paris-Lyon railway. Pop. (1906) 26,538. It is a well-built town, with fine quays, situated in an extensive plain on the right bank of the Sa6ne at its junction with the Canal du Centre. A handsome stone bridge of the 15th century, decorated in the 18th century with obelisks, connects it with the suburb of St Laurent on an island in the river. The principal building is the church of St Vincent, once the cathedral. It dates

mainly from the 12th to the 15th centuries, but the facade is modern and unpleasing. The old bishop's palace is a building of the 15th century. The church of St Pierre, with two lofty steeples, dates from the late 17th century. Chalon pre- serves remains of its ancient ramparts and a number of old houses. The administrative buildings are modern. An obelisk was erected in 1730 to commemorate the opening of the canal. There is a statue of J. N. Niepce, a native of the town. Chalon is the seat of a sub-prefect and a court of assizes, and there are tribunals of first instance and commerce, a branch of the Bank of France, a chamber of commerce, communal colleges for boys and girls, a school of drawing, a public library and a museum. Chalon ranks next to Le Creusot among the manufacturing towns of Burgundy; its position at the junction of the Canal du Centre and the Saone, and as a railway centre for Lyons, Paris, D61e, Lons-le-Saunier and Roanne, brings it a large transit trade. The founding and working of copper and iron is its main industry; the large engineering works of Petit-Creusot, a branch of those of Le Creusot, construct bridges, tug-boats and torpedo-boats; distilleries, glass-works, chemical works, straw-hat manufactories, oil-works, tile-works and sugar refineries also occupy many hands. Wine, grain, iron, leather and timber are among the many products for which the town is an entrepot. About 2 m. east of Chalon is St Marcel (named after the saint who in the 2nd century preached Christianity at Chalon) , which has a church of the 1 2 th century, once belonging to a famous abbey.

Chalon-sur-Saone is identified with the ancient CabUlonum, originally an important town of the Aedui. It was chosen in the 6th century by Gontram, king of Burgundy, as his capital; and it continued till the 10th to pay for its importance by being frequently sacked. The bishopric, founded in the 4th century, was suppressed at the Revolution. In feudal times Chalon Was the capital of a countship. In 1 23 7 it was given in exchange for other fiefs in the Jura by Jean le Sage, whose descendants neverthe- less retained the title. Hugh IV., duke of Burgundy, the other party to the exchange, gave the citizens a communal charter in 1256. In its modern history the most important event was the resistance offered to a division of the Austrian army in

1814.

CHALUKYA, the name of an Indian dynasty which ruled in the Deccan from a.d. 550 to 750, and again from 973 to 1190. The Chalukyas themselves claimed to be Rajputs from the north who

imposed their rule on the Dravidian inhabitants of the Deccan tableland, and there is some evidence for connecting them with the Chapas, a branch of the foreign Gurjaras. The dynasty was founded by a chief named Pulakesin I., who mastered the town of Vatapi (now Badami, in the Bijapur district) about 550. His sons extended their principality east and west; but the founder of the Chalukya greatness was his grandson Pulakesin II., who succeeded in 608 and proceeded to extend his rule at the expense of his neighbours. In 609 he established as his viceroy in Vengi his brother Kubja Vishnu- vardhana, who in 615 declared his independence and established the dynasty of Eastern Chalukyas, which lasted till 1070. In 620 Pulakesin defeated Harsha (q.v.), the powerful overlord of northern India, and established the Nerbudda as the boundary between the South and North. He also defeated in turn the Chola, Pandya and Kerala kings, and by 630 was beyond dispute the most powerful sovereign in the Deccan. In 642, however, his capital was taken and he himself killed by the Pallava king Narasimhavarman. In 6 5 5 the Chalukya power was restored by Pulakesin's son Vikramaditya I.; but the struggle with the Pallavas continued until, in 740, Vikramaditya II. destroyed the Pallava capital. In 750 Vikramaditya's son, Kirtivarman Chalukya, was overthrown by the Rashtrakutas.

In 973, Taila or Tailapa II. (d. 995), a scion of the royal Chalukya race, succeeded in overthrowing the Rashtrakuta king Kakka II., and in recovering all the ancient territory of the Chalukyas with the exception of Gujarat. He was the founder of the dynasty known as the Chalukyas of Kalyani. About a.d. 1000 a formidable invasion by the Chola king Rajaraja the Great was defeated, and in 1052 Somesvara I., or Ahama valla (d. 1068), the founder of Kalyani, defeated and slew the Chola Rajadhiraja. The reign of Vikramaditya VI., or Vikramanka, which lasted from 1076 to 1126, formed another period of Chalukya greatness. Vikramanka's exploits against the Hoysala kings and others, celebrated by the poet Bilhana, were held to justify him in establishing a new era dating from his accession. With his death, however, the Chalukya power began to decline. In 1 1 56 the commander-in-chief Bijjala (or Vijjana) Kalachurya revolted, and he and his sons held the kingdom till n 83. In this year Somesvara IV. Chalukya recovered part of his patri- mony, only to succumb, about 11 90, to the Yadavas of Devagiri and the Hoysalas of Dorasamudra. Henceforth the Chalukya rajas ranked only as petty chiefs.

See J. F. Fleet, Dynasties of the Kanarese Districts; Prof. R. G.

Bhandarker, " Early History of the Deccan," in the Bombay Gazetteer (1896), vol. i. part ii.; Vincent A. Smith, Early Hist, of India (Oxford, 1908), pp. 382 ff.

CHALYBAUS, HEINRICH MORltZ (1 796-1862), German philosopher, was born at Pfaffroda in Saxony. For some years he taught at Dresden, and won a high reputation by his lectures on the history of philosophy in Germany. In 1839 he became professor in Kiel University, where, with the exception of one brief interval, when he was expelled with several colleagues because of his German sympathies, he remained till his death. His first published work, Historische Entwickelung der spekulativen Philosophic von Kant bis Hegel (1837, 5th ed. i860), which still ranks among the best expositions of modern German thought, has been twice translated into English, by A. Tulk (London, 1854), and by A. Edersheim (Edinburgh, 1854). His chief works are Entwurf eines Systems der Wissenschaftslehre (Kiel, 1846) and System der spekulativen Ethik (2 vols., 1850). He opposed both the extreme realism of Herbart and what he regarded as the one-sided idealism of Hegel, and endeavoured to find a mean between them, to discover the ideal or formal principle which unfolds itself in the real or material world presented to it. His Wissenschaftslehre, accordingly, divides itself into (1) Principlehre, or theory of the one principle; (2) Vermittelungs- lehre, or theory of the means by which this principle realizes itself ; and (3) Teleologie. The most noticeable point is the position assigned by Chalybaus to the " World Ether," which is defined as the infinite in time and space, and which, he thinks, must be posited as necessarily coexisting with the Infinite Spirit or God. The fundamental principle of the System der Ethik is carried out with great strength of thought, and with an unusually complete command of ethical material.

See J. E. Erdmann, Grundriss der Gesch. d. Philos. ii. 781-786; K. Prantl, in Allgem. deutsch. Biog.

CHALYBITE, a mineral species consisting of iron carbonate ($FeC0_3$) and forming an important ore of iron. It was early known as spathose iron, spathic iron or steel ore. F. S. Beudant in 1832 gave the name siderose (from alh)pos, iron), which was modified by W. Haidinger in 1845 to siderite. Chalybite (from XaXiˆ, x

Crystal of Chalybite.

masses with a coarse or fine granular texture; also in botryoidal or globular (sphaerosiderite) and oolitic forms. When compact and mixed with much clay and sand it constitutes the well-known clay ironstone. Chalybite is usually yellowish-grey or brown in colour; it is translucent and has a vitreous lustre. Hardness 3!; sp. gr. 3-8. The double refraction (w-« = o-24i) is stronger than that of calcite. When pure it contains 48-2%

of iron, but this is often partly replaced isomorphously by manganese, magnesium or calcium: the varieties known as oligonspar or oligonite, sideroplesite and sidero- dote contain these elements respec- tively in large amount. These varieties form a passage to ankerite (q.v.) and mesitite, and all are referred to loosely as brown-spar. Chalybite is a common gangue mineral in metalliferous veins, and well-crystallized specimens are found with ores of copper, lead, tin, &c, in Cornwall, the Harz, Saxony and niany other places. It also occurs alone as large masses in veins and beds in rocks of various kinds. The clay ironstone so extensively worked as an ore of iron occurs as nodules and beds in the Coal Measures of England and the United States, and the oolitic iron ore of the Cleveland district in Yorkshire forms beds in the Lias. The mineral is occasionally found as concretionary masses (sphaerosiderite) in cavities in basic igneous rocks such as dolerite. (L. J. S.)

CHAMBA, a native state of India, within the Punjab, amid the Himalayas, and lying on the southern border of Kashmir. It has an area of 3216 sq. m. Pop. (1001) 127,834. The sana- torium of Dalhousie, though within the state, is attached to the district of Gurdaspur. Chamba is entirely mountainous; in the east and north, and in the centre, are snowy ranges. The valleys in the west and south are fertile. The chief rivers are the Chandra and Ravi. The country is much in favour with sports- men. The principal crops are rice, maize and millet. Mineral ores of various kinds are known, but unworked. Trade is chiefly in forest produce. The capital of the state is Chamba (pop. 6000), situated above the gorge of the Ravi. External communications are entirely by road. The state was founded in the 6th century, and, though sometimes nominally subject to Kashmir and afterwards tributary to the Mogul empire, always practically maintained its independence. Its chronicles are preserved in a series of inscriptions, mostly engraved on copper. It first came under British influence in 1846, when it was declared independent of

Kashmir. The line of the rajas of Chamba was founded in the 6th century a.d. by Marut, of an ancient family of Rajputs. In 1904 Bhuri Singh, K.C.S.I., CLE., an enlightened and capable ruler, succeeded.

CHAMBAL, a river of India, one of the principal tributaries of the Jumna. Rising amid the summits of the Vindhya mountains in Malwa, it flows north, and after being joined by 1 he Chambla and Sipra, passes through the gorges of the Mokan- darra hills. After receiving the waters of the Kali-Sind, Parbati and Banas, its principal confluents, the Chambal becomes a great river, enters the British district of Etawah, and joins the Jumna 40 m. below Etawah town, its total length being 650 m.

CHAMBERLAIN, JOSEPH (1836-), British statesman, third son of Joseph Chamberlain, master of the Cordwainers' Company, was born at Camberwell Grove, London, on the 8th of July 1836. His father was a well-to-do man of business, a Unitarian in religion and a Liberal in politics. Young Chamber- lain was educated at Canonbury from 1845 to 1850, and at University College school, London, from 1850 to 1852. After two years in his father's office in London, he was sent to Birming- ham to join his cousin Joseph Nettlefold in a screw business in which his father had an interest; and ljy degrees, largely owing to his own intelligent management, this business became very successful. Nettlefold & Chamberlain employed new methods of attracting customers, and judiciously amalgamated rival

firms with their own so as to reduce competition, with the result that in 1874, after twenty-two years of commercial life, Mr Chamberlain was able to retire with an ample fortune. Mean- while he had in 1861 married his first wife, Miss Harriet Kenrick (she died in 1863), and had gradually come to take an increasingly important part in the municipal and political life of Birmingham. He was a constant speaker at the Birmingham and Edgbaston Debating Society; and when in 1868 the Birmingham Liberal Association was reorganized, he became one of its leading members. In 1869 he was elected chairman of the executive council of the new National Education League, the outcome of Mr George Dixon's movement for promoting the education of the children of the lower classes by paying their school fees, and agitating for more accommodation and a better national system. In the same year he was elected a member of the town council, and married his second wife — a cousin of his first- Miss Florence Kenrick (d. 1875).

In 1870 he was elected a member of the first school board for Birmingham; and for the next six years, and especially after 1873, when he became leader of a majority and chairman, he actively championed the Nonconformist opposition to denominationalism. He was then regarded as a Republican — the term signifying rather that he held advanced Radical opinions, which were construed by average men in the light of the current political developments in France, than that he really favoured Republican institutions. His programme was ” free Church, free land, free schools, free labour.” At the general election of 1874 he stood as a parliamentary candidate for Sheffield, but without success. Between 1869 and 1873 he was a prominent advocate in the Birmingham town council of the gospel of municipal reform preached by Mr Dawson, Dr Dale and Mr Bunce (of the Birmingham Post); and in 1873 his party obtained a majority, and he was elected mayor, an office he retained until June 1876. As mayor he had to receive the prince and princess of Wales on their visit in June 1874, an occasion which excited some curiosity because of his reputation as a Republican; but those who looked for an exhibition of bad taste were disappointed, and the behaviour of the Radical mayor satisfied the require- ments alike of The Times and of Punch.

The period of his mayoralty was one of historic importance in the growth of modern Birmingham. New municipal buildings were erected, Highgate Park was opened as a place of recreation, the free library and art gallery were developed. But the great work carried through by Mr Chamberlain for Birmingham Was the municipalization of the supply of gas and Water, and the improvement scheme by which slums were cleared away and forty acres laid out in new streets and open spaces. The prosperity of modern Birmingham dates from 1875 and 1876, when these admirably administered reforms were initiated, and by his share in them Mr Chamberlain became not only one of its most popular citizens but also a man of mark outside. An orator of a business-like, straightforward type, cool and hard-hitting, his spare figure, incisive features and single eye-glass soon made him a favourite subject for the caricaturist; and in later life his aggressive personality, and the peculiarly irritating effect it had on his opponents, made his actions and speeches the object of more controversy than was the lot of any other politician of his time. His hobby for orchid-growing at his house ” Highbury ” near Birmingham also became famous. In private life his loyalty to his friends, and his “genius for friendship ” (as John Morley

said) made a curious contrast to his capacity for arousing the bitterest political hostility. It may be added here that tjie interest taken by him in Birmingham remained undiminished during his life, and he was largely instrumental in starting the Birmingham University (1900), of which he became chancellor. His connexion with Birmingham University was indeed peculiarly appropriate to his character as a man of business; but in spite of his representing a departure among men of the front rank in politics from the " Eton and Oxford " type, his general culture sometimes surprised those who did not know him. In later life Oxford- and Cambridge gave him their doctors' degrees; and in 1897 he was made lord rector of Glasgow

University (delivering an address on " Patriotism " at his installation).

In 1876 Mr Dixon resigned his seat in parliament, and Mr Chamberlain was returned for Birmingham in his place unopposed, as John Bright's colleague. He made his maiden speech in the House of Commons on the 4th of August 1876, on Lord Sandon's Education Bill. At this period, too, he paid much attention to the question of licensing reform, and in 1876 he examined the Gothenburg system in Sweden, and advocated a solution of the problem in England on similar lines. During 1877 the new federation of Liberal Associations which became known as the " Caucus " was started under Mr Chamberlain's influence in Birmingham — its secretary, Mr Schnadhorst, quickly making himself felt as a wire-puller of exceptional ability; and the new organization had a remarkable effect in putting life into the Liberal party, which since Mr Gladstone's retirement in 1874 had been much in need of a stimulus. When the general election came in 1880, Mr Schnadhorst's powers were demonstrated in the successes won under his auspices. The Liberal party numbered 349, against 243 Conservatives and 60 Irish Nationalists; and the Radical section of the Liberal party, led by Mr Chamberlain and Sir Charles Dilke, was recognized by Mr Gladstone by his inclusion of the former in his cabinet as president of the Board of Trade, and the appointment of the latter as under secretary for foreign affairs. In his new capacity Mr Chamberlain was responsible for carrying such important measures as the Bankruptcy Act 1883, and the Patents Act. Another bill which he had

much at heart, on merchant shipping, had to be abandoned, and a royal commission substituted, but the subsequent legis- lation in 1888-1894 owed much to his efforts. The Franchise Act of 1884 was also one in which he took a leading part as a champion of the opinions of the labouring class. At this time he took the current advanced Radical views of both Irish and foreign policy, hating ” coercion,” disliking the occupation of Egypt, and prominently defending the Transvaal settlement after Majuba. Both before and after the defeat of Mr Gladstone’s government on the Budget in June 1885, he associated himself with what was known as the ” Unauthorized Programme,” i.e. free education, small holdings, graduated taxation and local government. In June 1885 he made a speech at Birmingham, treating the reforms just mentioned as the ” ransom ” that property must pay to society for the security it enjoys — for which Lord Iddesleigh called him ” Jack Cade “; and he continually urged the Liberal party to take up these Radical measures. At the general election of November 1885 Mr Chamberlain was returned for West Birmingham. The Liberal strength generally was, however, reduced to 335 members, though the Radical section held their own; and the Irish vote became necessary to Mr Gladstone if he was to command a majority. In December it was stated that Mr Gladstone in- tended to propose Home Rule for Ireland, and in January Lord Salisbury’s ministry was defeated on the Address, on an amend- ment moved by Mr Chamberlain’s Birmingham henchman, Mr Jesse Collings (b. 1831), embodying the ” three acres and a cow ” of the Radical programme. Unlike Lord Hartington (after- wards duke of Devonshire) and other Liberals, who declined to join Mr Gladstone in view of the altered attitude he was adopting towards Ireland, Mr Chamberlain entered the cabinet as presi- dent of the Local Government Board (with Mr Jesse Collings as parliamentary secretary), but on the 15th of March 1886 he resigned, explaining in the House of Commons (8th April) that, while he had always been in favour of the largest possible ex- tension of local government to Ireland consistently with the integrity of the empire and the supremacy of parliament, and had therefore joined Mr Gladstone when he believed that this was what was intended, he was unable to consider that the scheme communicated by Mr Gladstone to his colleagues main- tained those limitations. At the same time he was not irreconcil- able, and he invited Mr Gladstone even then to modify his bill so as to remove the objections made to it. This indecisive attitude did not last long, and the split in the party rapidly widened. At Birmingham Mr Chamberlain was supported

by

the ” Two Thousand,” but deserted by the ” Caucus ” and Mr Schnadhorst. In May the Radicals who followed Mr Bright and Mr Chamberlain, and the Whigs who took their cue from Lord Hartington, decided to vote against the second reading of the Home Rule Bill, instead of allowing it to be taken and then pressing for modifications in committee, and on 7 th June the bill was defeated by 343 to 313, 94 Liberal Unionists— as they were generally called — voting against the government. Mr Chamberlain was the object of the bitterest attacks from the Gladstonians for his share in this result; he was stigmatized as ” Judas,” and open war was proclaimed by the Home Rulers against the ” dissentient Liberals “—the description used by Mr Gladstone. The general election, however, returned to parliament 316 Conservatives, 78 Liberal Unionists, and only 276 Gladstonians and Nationalists, Birmingham returning seven Unionist members. When the House met in August, it was decided by the Liberal Unionists, under Lord Hartington’s leadership, that their policy henceforth was essentially to combine with the Tories to keep Mr Gladstone out. The old Liberal feeling still prevailing among them was too strong, however, for their leaders to take office in a coalition ministry. It was enough for them to be able to tie down the Conservative government to such measures as were not offensive to Liberal Unionist principles. It still seemed possible, moreover, that the Gladstonians might be brought to modify their Home Rule proposals, and in January 1887 a Round Table conference (suggested by Mr Chamberlain) was held between Mr Chamberlain, Sir G. Trevelyan, Sir William Harcourt, Mr Morley and Lord Herschell. But no rapproche- ment was effected, and reconciliation became daily more and more difficult. The influence of Liberal Unionist views upon the domestic legislation of the government was steadily bring- ing about a more complete union in the Unionist party, and destroying the old fines of political cleavage. Before 1892 Mr Chamberlain had the satisfaction of seeing Lord Salisbury’s ministry pass such important acts, from a progressive point of view, as those dealing with Coal Mines Regulation, Allotments, County Councils, Housing, of the Working Classes, Free Educa- tion and Agricultural Holdings, besides Irish legislation like the Ashbourne Act, the Land Act of 1891, and the Light Railways and Congested Districts Acts. In October 1887 Mr Chamberlain, Sir L. Sackville West and Sir Charles Tupper were selected by the

government as British plenipotentiaries to discuss with the United States the Canadian fisheries dispute, and a treaty was arranged by them at Washington on the 15th of February 1888. The Senate refused to ratify it; but a protocol provided for a modus vivendi pending ratification, giving American fishing vessels similar advantages to those contemplated in the treaty; and on the whole Mr Chamberlain's mission to America was accepted as a successful one in maintaining satisfactory relations with the United States. He returned to England in March 1888, and was presented with the freedom of the borough of Birmingham. The visit also resulted, in November 1888, in his marriage with his third wife, Miss Endicott, daughter of the United States secretary of war in President Cleveland's first administration.

At the general election of 1892 Mr Chamberlain was again returned, with an increased majority, for West Birmingham; but the Unionist party as a whole came back with only 315 members against 355 Home Rulers. In August Lord Salisbury's ministry was defeated; and on the 13th of February r893 Mr Gladstone introduced his second Home Rule Bill, which was eventually read a third time on the 1st of September. During the eighty-two days' discussion in the House of Commons Mr Chamberlain was the life and soul of the opposition, and his criticisms had a vital influence upon the attitude of the country when the House of Lords summarily threw out the bill. His chief contribution to the discussions during the later stages of the Gladstone and Rosebery ministries was in connexion with Mr Asquith's abortive Employers' Liability Bill, when he fore- shadowed the method of dealing with this question afterwards carried out in the Compensation Act of 1897. Outside parliament he was busy formulating proposals for old age pensions, which had a prominent place in the Unionist programme of 1895. In

that year, on the defeat of Lord Rosebery, the union of the Unionists was sealed by the inclusion of the Liberal Unionist leaders in Lord Salisbury's ministry; and Mr Chamberlain became secretary of state for the colonies. There had been much speculation as to what his post would be, and his nomination to the colonial office, then considered one of secondary rank, excited some surprise; but Mr Chamberlain himself realized how

important that department had become. He carried with him into the ministry his close Birmingham municipal associates, Mr Jesse Collings (as under secretary of the home office), and Mr J. Powell- Williams (1 840-1 904) as financial secretary to the war office. Mr Chamberlain's influence in the Unionist cabinet was soon visible in the Workmen's Compensation Act and other measures. This act, though in Sir Matthew White Ridley's charge as home secretary, was universally and rightly associated with Mr Chamberlain; and its passage, in the face of much interested opposition from highly-placed, old-fashioned conservatives and capitalists on both sides, was principally due to his determined advocacy. Another " social " measure of less importance, which formed part of the Chamberlain programme, was the Small Houses Acquisition Act of 1899; but the problem of old age pensions was less easily solved. This subject had been handed over in 1893 to a royal commission, and further discussed by a select committee in 1899 and a departmental committee in 1900, but both of these threw cold water on the schemes laid before them — a result which, galling enough to one who had made so much play with the question in the country, offered welcome material to his opponents for electioneering recrimination, as year by year went by between 1895 and 1900 and nothing resulted from all the confident talk on the subject in which Mr Chamberlain had indulged when out of office. Eventually it was the Liberal and not the Unionist party that carried an Old Age Pensions scheme through parliament, during the 1908 session, when Mr Chamberlain was hors de combat.

From January 1896 (the date of the Jameson Raid) onwards South Africa demanded the chief attention of the colonial secretary (see South Africa, and for details Transvaal). In his negotiations with President Kruger one masterful tempera- ment was pitted against another. Mr Chamberlain had a very difficult part to play, in a situation dominated by suspicion on both sides, and while he firmly insisted on the rights of Great Britain and of British subjects in the Transvaal, he was the continual object of Radical criticism at home. Never has a statesman's personality been more bitterly associated by his political opponents with the developments they deplored. Attempts were even made to ascribe financial motives to Mr Chamberlain's actions, and the political atmosphere was thick with suspicion and scandal. The report of the Commons com mittee (July 1897) definitely acquitted both Mr Chamberlain and the colonial office of any privity in the Jameson Raid, but Mr Chamberlain's detractors continued to

assert the contrary. Opposition hostility reached such a pitch that in 1899 there was hardly an act of the cabinet during the negotiations with Presi- dent Kruger which was not attributed to the personal malignity and unscrupulousness of the colonial secretary. The elections of 1900 (when he was again returned, unopposed, for West Birming- ham) turned upon the individuality of a single minister more than any since the days of Mr Gladstone's ascendancy, and Mr Chamberlain, never conspicuous for inclination to turn his other cheek to the smiter,was not slow to return the blows with interest.

Apart from South Africa, his most important work at this time was the successful passing of the Australian Commonwealth Act (1900), in which both tact and firmness were needed to settle certain differences between the imperial government and the colonial delegates.

Mr Chamberlain's tenure of the office of colonial secretary between 1895 and 1900 must always be regarded as a turning-point in the history of the relations between the British colonies and the mother country. His accession to office was marked by speeches breathing a new spirit of imperial consolidation, em- bodied either in suggestions for commercial union or in more immediately practicable proposals for improving the " imperial

estate "; and at the Diamond Jubilee of 1897 the visits of the colonial premiers to London emphasized and confirmed the new policy, the fruits of which were afterwards seen in the cordial support given by the colonies in the Boer War. Even in what Mr Chamberlain called his " Radical days " he had never supported the " Manchester " view of the value of a colonial empire; and during the Gladstone ministry of 1882-1885 Mr Bright had remarked that the junior member for Birmingham was the only Jingo in the cabinet — meaning, no doubt, that he objected to the policy of laissez-faire and the timidity of what was afterwards known as " Little Englandism." While he was still under Mr Gladstone's influence these opinions were kept in subordination; but Mr Chamberlain was always an imperial federationist, and from 1887 onwards he constantly gave ex- pression to his views on the desirability of drawing the different parts of the empire closer together for purposes of defence and commerce. In 1895 the time for the realization of these views had come; and Mr Chamberlain's speeches, previously remark- able chiefly for debating power and directness of argument, were nowdominated by a newnote of constructive statesmanship, basing itself on the

economic necessities of a world-wide empire. Not the least of the anxieties of the colonial office during this period was the situation in the West Indies, where the cane- sugar industry was being steadily undermined by the European bounties given to exports of continental beet; and though the government restricted themselves to attempts at removing the bounties by negotiation and to measures for palliating the worst effects in the West Indies, Mr Chamberlain made no secret of his repudiation of the Cobden Club view that retaliation would be contrary to the doctrines of free trade, and he did his utmost to educate public opinion at home into understanding that the responsibilities of the mother country are not merely to be con- strued according to the selfish interests of a nation of consumers. As regards foreign affairs, Mr Chamberlain more than once (and particularly at Leicester on 30th November 1899) indicated his leanings towards a closer understanding between the British empire, the United States and Germany, — a suggestion which did not save him from an extravagant outburst of German hostility during the Boer War. The unusually outspoken and pointed expression, however, of his disinclination to submit to Muscovite duplicity or to ” pin-pricks ” or ” unmannerliness ” from France was criticized on the score of discretion by a wider circle than that of his political adversaries.

During the progress of the Boer War from 1899 to 1902, Mr Chamberlain, as the statesman who had represented the cabinet in the negotiations which led to it, remained the object of constant attacks from his Radical opponents — the ” little Englanders ” and ” Pro-Boers,” as he called them — and he was supported by the Imperialist and Unionist party with at least equal ardour. But as colonial secretary, except in so far as his consistent support of Lord Milner and his enthusiastic encouragement of colonial assistance were concerned, he naturally played only a subordinate part during the carrying out of the military opera- tions. Among domestic statesmen he was felt, however, to be the backbone of the party in power. He was the hero of the one side, just as he was the bugbear of the other. On the 13th of February 1902 he was presented with an address in a gold casket by the city corporation, and entertained at luncheon at the Mansion House, an honour not unconnected with the strong feeling recently aroused by his firm reply (at Birmingham, January n) to some remarks made by Count von Biilow, the German chancellor, in the Reichstag (January 8), reflecting the offensive allegations current in Germany against

the conduct of the army in South Africa. Mr Chamberlain's speech, in answer to what had been intended as a contemptuous rebuke, was uni- versally applauded. His own imperialism was intensified by the way in which England's difficulties resulted in calling forth colonial assistance and so cementing the bonds of empire. The domestic crisis, and the sharp cleavage between parties at home, had driven the bent of his mind and policy further and further away from the purely municipal and national ideals which he had followed so keenly before he became colonial minister. The

problems of empire engrossed him, and a new enthusiasm for imperial projects arose in the Unionist party under his inspiration. No English statesman probably has ever been, at different times in his career, so able an advocate of absolutely contradictory policies, and his opponents were not slow to taunt him with quotations from his earlier speeches. As the war drew to its end, new plans for imperial consolidation were maturing in his brain. Subsidiary points of utility, such as the formation of the London and Liverpool schools of tropical medicine from 1899 onwards, were taken up by him with characteristic vigour. But the next step was to prove a critical one indeed for the loyalty of the party which had so far been unanimous in his favour.

The settlement after the war was full of difficulties, financial and others, in South Africa. When Mr Arthur Balfour succeeded Lord Salisbury as prime minister in July 1902, Mr Chamberlain agreed to serve loyally under him, and the friendship between the two leaders was indeed one of the most marked features of the political situation. In November 1902 it was arranged that Mr Chamberlain should go out to South Africa, and it was hoped, not without reason, that his personality would effect more good than any ordinary official negotiations. At the time the best results appeared to be secured. He went from place to place in South Africa (December 26-February 25); arranged with the leading Transvaal financiers that in return for support from the British government in raising a Transvaal loan they would guarantee a large proportion of a Transvaal debt of £30,000,000, which should repay the British treasury so much of the cost of the war; and when he returned in March 1903, satisfaction was general in the country over the success of his mission. But meantime two

things had happened. He had looked at the empire from the colonial point of view, in a way only possible in a colonial atmosphere; and at home some of his colleagues had gone a long way, behind the scenes, to destroy one of the very factors on which the question of a practical scheme for imperial commercial federation seemed to hinge. In the budget of 1902 a duty of a shilling a quarter on imported corn had been reintroduced. This small tax was regarded as only a “registration duty. Even by free-trade ministers like Gladstone it had been left up to 1869 untouched, and its removal by Robert Lowe (Lord Sherbrooke) had since then been widely regarded as a piece of economic pedantry. Its reimposition, officially sup- ported for the sake of necessary revenue in war-time, and cordially welcomed by the Unionist party, had justified itself, as they contended, in spite of the criticisms of the Opposition (who raised the cry of the ” dear loaf”), by proving during the year to have had no general or direct effect on the price of bread. And the more advanced Imperialists, as well as the more old- fashioned protectionists (like Mr Chaplin) who formed an integral body of the Conservative party, had looked forward to this tax being converted into a differential one between foreign and colonial corn, so as to introduce a scheme of colonial preference and commercial consolidation between the colonies and the mother country. In South Africa — as in any other British colony, since all of them were accustomed to tariffs of a protec- tionist nature, and the idea of a preference (already started by Canada) was fairly popular — Mr Chamberlain had found this view well established. The agitation in England against the tax had now blown over. The Unionist rank and file were committed to its support, — many even advocating its increase to two shillings at least. But Mr Ritchie, the chancellor of the exchequer, having a surplus in prospect and taxation to take off, carried the cabinet in favour of again remitting this tax on corn. Mr Chamberlain himself had proposed only to take it off as regards colonial, and not foreign corn, — thus inaugurating a preferential system. But a majority of the cabinet supported Mr Ritchie. The remission of this tax, after all the conviction with which its restoration had been supported a year before, was very difficult for the party itself to stomach, and on any ground it was a distasteful act, loyally as the party followed their leaders. But to those who had looked to it as providing a lever for a gradual change in the established fiscal system,

the volte-face was a bitter blow, and at once there began, though

not at first openly, a split between the more rigid free-traders — advocates of cheap food and free imports — and those who desired to use the opportunities of a tariff, of however moderate a kind, for attaining national and imperial and not merely revenue advantages. This idea, which had for some time been floating in Mr Chamberlain's mind (see especially his speech at Birmingham of May 16, 1902), now took full possession of it. For the moment he remained in the cabinet, but the seed of dissension was sown. The first public intimation of his views was given in a speech to his constituents at Birmingham (May 15, 1903), when he outlined a plan for raising more money by a rearranged tariff, partly to obtain a preferential system for the empire and partly to produce funds for social reform at home. On May 28th in the House of Commons he spoke on the same subject, and declared " if you are to give a preference to the colonies, you must put a tax on food." Considered in the light of after events, this putting the necessity of food-taxes in the forefront was decidedly injudicious; but imperialist conviction and enthusiasm were more conspicuous than electioneering tact in the launching of Mr Chamberlain's new scheme.

The movement grew quickly, its supporters including a number of the cleverest younger politicians and journalists in the Unionist party. The idea of tariff reform — to broaden the basis of taxation, to introduce a preference, and to stimulate home industries and increase employment — took firm root; and the political economists of the party — Prof. W. Cunningham, Profv W. Ashley and Prof. W. A. S. Hewins, in particular- brought effective criticism to bear on the one-sided " free trade " in vogue. The first demand was for inquiry. The country was still bearing an income-tax of elevenpence in the pound; it appeared that the old sources of revenue were inadequate; and meanwhile the statistics of trade, it was argued, showed that the English free-import system hampered English trade while providing the foreigner with a free market. Mr Chamberlain and his supporters argued that since 1870 certain other countries (Germany and the United States), with protective tariffs, had increased their trade in much larger proportion, while English trade had only been maintained by the increased business done with British colonies. A scientific inquiry into the facts was needed. By the Opposition, who now found themselves the defenders of conservatism in the established fiscal policy of the country, this whole argument was scouted; but for a time the demand merely for inquiry, and the production of figures, gave no sufficient occasion for dissension

among Unionists, even when, like Sir M. Hicks Beach, they were convinced free-importers on purely economic grounds; and Mr Balfour (?.».), as premier, managed to hold his colleagues and party together by taking the line that particular opinions on economic subjects should not be made a test of party loyalty. The Board of Trade was set to work to produce fiscal Blue-books, and hum-drum politicians who had never shown any genius for figures suddenly blossomed out into arithmeticians of the deepest dye. The Tariff Reform League was founded in order to further Mr Chamberlain's policy, holding its inaugural meeting on July 21st; and it began to take an active part in issuing leaflets and in work at by-elections. Discussion proceeded hotly on the merits of a preferential tariff, arid on August 15th a manifesto appeared against it signed by 'fourteen professors or lecturers on political economy, including Mr Leonard Courtney, Professor Edgeworth, Professor Marshall, Professor Bastable, Professor Smart, Professor J. S. Nicholson, Professor Gonner, Mr Bowley, Mr E. Cannan and Mr L. R. Phelps,— men of admitted competence, yet, after all, of no higher authority than the economists support- ing Mr Chamberlain, such as Dr Cunningham and Professor Ashley.

Meanwhile, the death of Lord Salisbury (August 22) removed a weighty figure from the councils of the Unionist party. The cabinet met several times at the beginning of September, and the question of their attitude towards the fiscal problem became acute. The public had its first intimation of impending events in the appearance on September 16th of Mr Balfour's Economic

Notes on Insular Free Trade, which had been previously cir- culated as a cabinet memorandum. The next day appeared the Board of Trade Fiscal Blue-book. And on the 18th the resignations were announced, not only of the more rigid free-traders in the cabinet, Mr Ritchie and Lord George Hamilton, but also of Mr Chamberlain. Letters in cordial terms were published, which had passed between Mr Chamberlain(September 9) and Mr Balfour (September 16). Mr Chamberlain pointed out that he was committed to a preferential scheme involving new duties on food, and could not remain in the government without prejudice while it was excluded from the party pro- gramme; remaining loyal to Mr Balfour and his general objects, he could best

promote this course from outside, and he suggested that the government might confine its policy to the " assertion of our freedom in the case of all commercial relations with foreign countries." Mr Balfour, while reluctantly admitting the necessity of Mr Chamberlain's taking a freer hand, expressed his agreement in the desirability of a closer fiscal union with the colonies, but questioned the immediate practicability of any scheme; he was willing to adopt fiscal reform so far as it covered retaliatory duties, but thought that the exclusion of taxation of food from the party programme was in existing circumstances necessary, so long as public opinion was not ripe. At the same time he welcomed the fact that Mr Chamberlain's son, Mr Austen Chamberlain, was ready to remain a member of the government. Mr Austen Chamberlain (b. 1863) accordingly became the new chancellor of the exchequer; he was already in the cabinet as postmaster-general, having previously made his mark as civil lord of the admiralty (1895-1900), and financial secretary to the treasury (1900-1902).

From the turning-point of Mr Chamberlain's resignation, it is not necessary here to follow in detail the discussions and dissensions in the party as a whole in its relations with the prime minister (see Balfour, A. J.). It is sufficient to say that while Mr Balfour's sympathetic " send off " appeared to indicate his inclination towards Mr Chamberlain's programme, if only further support could be gained for it, his endeavour to keep the party together, and the violent opposition which gathered against Mr Chamberlain's scheme, combined to make his real attitude during the next two years decidedly obscure, both sections of the party — free-traders and tariff reformers — being induced from time to time to regard him as on their side. The tariff reform movement itself was now, however, outside the purely official programme, and Mr Chamberlain (backed by a majority of the Unionist members) threw himself with impetuous ardour, into a crusade on its behalf, while at the same time supporting Mr Balfour in parliament, and leaving it to him to decide as to the policy of going to the country when the time should be ripe. In his own words, he went in front of the Unionist army as a pioneer, and if his army was attacked he would go back to it; in no conceivable circumstances would he allow himself to be put in any sort of competition, direct or indirect, with Mr Balfour, his friend and leader, whom he meant to follow (October 6).

On October 6th he opened his campaign with a speech at Glasgow. Analysing the trade statistics as between 1872 and

1902, he insisted that British progress involved a relative decline compared with that of protectionist foreign countries like Germany and the United States; Great Britain exported less and less of manufactured goods, and imported more and more; the exports to foreign countries had decreased, and it was only the increased exports to the colonies that maintained the British position. This was the outcome of the working of a one-sided free-trade system. Now was the time, and it might soon be lost, for consolidating British trade relations with the colonies. If the mother country and her daughter states did not draw closer, they would inevitably drift apart. A further increase of £26,000,000 a year in the trade with the colonies might be obtained by a preferential tariff, and this meant additional employment at home for 166,000 workmen, or subsistence for a population of a far larger number. His positive proposals were: (1) no tax on raw materials; (2) a small tax on food other than colonial, e.g. two shillings a quarter on foreign corn but excepting

maize, and 5% on meat and dairy produce excluding bacon; (3) a io % general tariff on imported manufactured goods. To meet any increased cost of living, he proposed to reduce the duties on tea, sugar and other articles of general consumption, and he estimated that his scheme would in no case increase a working-man's expenditure, and in most cases would reduce it. " The colonies," he said, " are prepared to meet us; in return for a very moderate preference, they will give us a substantial advantage in their markets." This speech, delivered with characteristic vigour and Imperialistic enthusiasm, was the type of others which followed in quick succession during the year. At Gree- nock next day he emphasized the necessity of retaliating against foreign tariffs— " I never like being hit without striking back." The practice of " dumping " must be fairly met; if foreign goods were brought into England to undersell British manufacturers, either the Fair Wages Clause and the Factory Acts and the Com-pensation Act would have to be repealed, or the workmen would have to take lower wages, or lose their work. " Agriculture has been practically destroyed, sugar has gone, silk has gone, iron is threatened, wool is threatened, cotton will go! How long are you going to stand it?" On October 20th he spoke at New- castle, on the 21st at Tynemouth, on the 27th at Liverpool, insisting that free-trade had never been a working-class measure and that it could not be reconciled with trade-unionism; on November 4th at Birmingham, on the 20th at Cardiff, on the 2 1st at Newport, and on December 16th at Leeds. In all these speeches he managed to point his argument by application to local industries. In the Leeds speech he announced that, with a view to drawing up a scientific model tariff, a non-political commission of representative experts would be appointed under the auspices of the Tariff Reform League to take evidence from every trade; it included many heads of businesses, and Mr Charles Booth, the eminent student of social and industrial London, with Sir Robert Herbert as chairman, and Professor W. A. S. Hewins as secretary. The name of " Tariff Commission," given to this voluntary and unofficial body, was a good deal criticized, but though flouted by the political free-traders it set to work in earnest, and accumulated a mass of evidence as to the real facts of trade, which promised to be invaluable to economic inquirers. On January 18th, 1904, Mr Chamberlain ended his series of speeches by a great meeting at the Guildhall, in the city of London, the key-note being his exhortation to his audience to " think imperially."

All this activity on Mr Chamberlain's part represented a great physical and intellectual feat on the part of a man now sixty-seven years of age; but his bodily vigour and comparatively youthful appearance were essential features of his personality. Nothing like this campaign had been known in the political world since Mr Gladstone's Midlothian days; and it produced a great public impression, stirring up both supporters and opponents. Free-trade unionists like Lord Goschen and Lord Hugh Cecil, and the Liberal leaders — for whom Mr Asquith became the principal spokesman, though Lord Rosebery's criticisms also had consider- able weight— found new matter in. Mr Chamberlain's speeches for their contention that any radical change in the traditional English fiscal policy, established now for sixty years, would only result in evil. The broad fact remained that while Mr Chamber- lain's activity gathered round him the bulk of the Unionist members and an enthusiastic band of economic sympathizers, the country as a whole remained apathetic and unconvinced. One reason was the intellectual difficulty of the subject and the double-faced character of all arguments from statistics, which were either incomprehensible or disputable; another was the fact that substantially this was a political movement, and that tariff reform was, after all, only one in a complexity of political issues, most of which during this period were being interpreted by the electorate in a sense hostile to the Unionist party. Mr Chamberlain had relied on his personal influence, which from 1895 to 1902 had been supreme; but his own resignation, and the course of events, had since 1903 made his personality less authori- tative, and new interests— such as the opposition to the Educa- tion Act, to the heavy taxation, and to Chinese labour in the

Transvaal, and indignation over the revelations concerned with the war — were monopolizing attention, to the weakening of his hold on the public. The revival in trade, and the production of new statistics which appeared to stultify Mr Chamberlain's prophecies of progressive decline, enabled the free-trade champions to reassure their audiences as to the very foundation of his case, and to represent the whole tariff reform movement as no less unnecessary than risky. Moreover, the split in the Unionist party brought the united Liberal party in full force into the field, and at last the country began to think that the danger

of Irish Home Rule was practically over, and that a Liberal majority might be returned to power in safety, with the prospect of providing an alternative government which would assure commercial repose (Lord Rosebery's phrase) , relief from extravagant expenditure, and — as the working-classes were led to believe — a certain amount of labour legislation which the Tory leaders would never propose. On the other hand the colonies took a great interest in the new movement, though without putting any such pressure on the home public as Mr Chamberlain might have expected. At the opening of 1904 he was officially invited by Mr Deakin, the prime minister of the Commonwealth, to pay a visit to Australia, in order to expound his scheme, being promised an enthusiastic welcome " as the harbinger of commercial reciprocity between the mother country and her colonies." Mr Chamberlain, however, declined; his work at home was too pressing.

From the end of Mr Chamberlain's series of expository speeches on his scheme of tariff reform, onwards during the various fiscal debates and discussions of 1904, it is unnecessary to follow events in detail. The scheme was now before the country, and Mr Chamberlain was anxious to take its verdict. Time was not on his side at his age, and if he had to be beaten at one election he was anxious to get rid of the other issues which would encumber the popular vote, and to press on to a second when he would be on the attacking side. But he would make no move which would embarrass Mr Balfour in parliament, and adhered to his promise of loyalty. The result was a long drawn out interval, while the government held on and its supporters became more embittered over their differences. Mr Chamberlain needed a rest, and was away in Italy and Egypt from March to May, and again in November. He made three important speeches at Welbeck (August 4), at Luton (October 5), and at Limehouse (December 15), but he had nothing substantial to add to his case, and the party situation continued in all its embarrassments. Mr Balfour's introduction of his promise (at Edinburgh on October 3) to convene an imperial conference after the general election if the Unionists came back to power, in order to discuss a scheme for fiscal union, represented an academic rather than a practical advance, since the by-elections showed that the Unionists were certain to be defeated. The one important new development concerned the Liberal-Unionist organization. In January some correspondence was published between' Mr Chamberlain and the duke of Devonshire, dating from the previous October, as to

difficulties arising from the central Liberal-Unionist organization subsidizing local associations which had adopted the programme of tariff reform. The duke objected to this departure from neutrality, and suggested that it was becoming " impossible with any advantage to maintain under existing circumstances the existence of the Liberal- Unionist organization." Mr Chamberlain retorted that this was a matter for a general meeting of delegates to decide; if the duke was outvoted he might resign his presidency; for his own part he was prepared to allow the local associations to be subsidized impartially, so long as they supported the government, but he was not prepared for the violent disruption, which the duke apparently contemplated, of an association so necessary to the success of the Unionist cause. The duke was in a difficult position as president of the organization, since most of the local associations supported Mr Chamberlain, and he replied that the differences between them were vital, and he would not be responsible for dividing the association into sections, but would rather resign. Mr Chamberlain then called a general meeting on his own responsi-

bility in February, when a new constitution was proposed; and in May, at the annual meeting of the Liberal-Unionist council, the free-food Unionists, being in a minority, retired, and the association was reorganized under Mr Chamberlain's auspices, Lord Lansdowne and Lord Selborne (both of them cabinet ministers) becoming vice-presidents. On July 14th the reconstituted Liberal-Unionist organization held a great demonstration in the Albert Hall, and Mr Chamberlain's success in ousting the duke of Devonshire and the other free-trade members of the old Liberal-Unionist party, and imposing his own fiscal policy upon the Liberal-Unionist caucus, was now complete.

During the spring and summer of 1905 Mr Chamberlain's more active supporters were in favour of forcing a dissolution by leaving the government in a minority, but he himself preferred to leave matters to take their course, so long as the prime minister was content to be publicly identified with the policy of eventually fighting on tariff reform lines. Speaking at the Albert Hall in July Mr Chamberlain pushed somewhat further than before his " embrace " of Mr Balfour; and in the autumn, when foreign affairs no longer dominated the attention of the government, the crisis rapidly came to a head. In reply to Mr Balfour's appeal for the sinking of differences (Newcastle, November 14), Mr Chamberlain insisted at Bristol (November 21) on the adop- tion of his fiscal policy; and Mr Balfour resigned on

December 4. on the ground that he no longer retained the confidence of the party. At the crushing Unionist defeat in the general election which followed in January 1906, Mr Chamberlain was triumph- antly returned for West Birmingham, and all the divisions of Birmingham returned Chamberlainite members. Amid the wreck of the party — Mr Balfour and several of his colleagues themselves losing their seats — he had the consolation of knowing that the tariff reformers won the only conspicuous successes of the election. But he had no desire to set himself up as leader in Mr Balfour's place, and after private negotiations with the ex-prime minister, a common platform was arranged between them, on which Mr Balfour, for whom a seat was found in the City of London, should continue to lead the remnant of the party. The formula was given in a letter from Mr Balfour of February 14th (see Balfour, A. J.) which admitted the necessity of making fiscal reform the first plank in the Unionist platform, and accepted a general tariff on manufactured goods and a small duty on foreign corn as " not in principle objectionable."

It may be left to future historians to attempt a considered judgment on the English tariff reform movement, and on Mr Chamberlain's responsibility for the Unionist debdcle of 1906. But while his enemies taunted him with having twice wrecked his party — first the Radical party under Mr Gladstone, and secondly the Unionist party under Mr Balfour — no well-informed critic doubted his sincerity, or failed to recognize that in leaving the cabinet and embarking on his fiscal campaign he showed real devotion to an idea. In championing the cause of imperial fiscal union, by means involving the abandonment of a system of taxation which had become part of British orthodoxy, he followed the guidance of a profound conviction that the stability of the empire and the very existence of the hegemony of the United Kingdom depended upon the conversion of public opinion to a revision of the current economic doctrine. There were doubtless miscalculations at the outset as to the resistance to be encountered. But from the purely party point of view he was entitled to say that he followed the path of loyalty to Mr Balfour which he had marked out from the moment of his resignation, and that he persistently, refused to be put in com-petition with him as leader. Even in the absence of the new issue, defeat was foredoomed for Mr Balfour's administration by the ordinary course of political events; and it might fairly be claimed that " Chinese slavery," " passive resistance," and labour

irritation at the Taff Vale judgment (see Trade Unions) were mainly responsible for the Unionist collapse. Time alone would show whether the system of free imports could be permanently reconciled with British imperial policy or commercial prosperity. It remained the fact that Mr Chamberlain staked an already established position on his refusal to compromise with his

convictions on a question which appeared to him of vital and immediate importance.

Mr Chamberlain's own activity in the political field was cut short in the middle of the session of 1906 by a serious attack of gout, which was at first minimized by his friends, but which, it was gradually discovered, had completely crippled him. Though encouragement was given to the idea that he might return to the House of Commons, where he continued to retain his seat for Birmingham, he was quite incapacitated for any public work; and this invalid condition was protracted through- out 1907, 1908 and 1909. But he remained in the background as the inspirer and adviser of the Tariff Reformers. The cause made continuous headway at by-elections, and though the general election of January 1910 gave the Unionists no majority it saw them returned in much increased strength, which was chiefly due to the support obtained for tariff reform principles. Mr Chamberlain himself was returned unopposed for West Birming- ham again. (H. Ch.)

CHAMBERLAIN, JOSHUA LAWRENCE (1828-), Ameri- can soldier and educationalist, was born at Brewer, Maine, on the 8th of September 1828. He graduated at Bowdoin College in 1852, and at the Bangor Theological Seminary in 1855, and was successively tutor in logic and natural theology (1855-1856), professor of rhetoric and oratory (1856-1861), and professor of modern languages (1861-1865), at Bowdoin. In 1862 he entered the Federal army as lieutenant-colonel of the 20th Maine Infantry. His military career was marked by great personal bravery and energy and intrepidity as a leader. He was six times wounded, and participated in all the important battles in the East from Antietam onwards, including Fredericks- burg, Chancellorsville, Gettysburg, the Wilderness, Cold Harbor, Petersburg and Five Forks. For his conduct at Petersburg, where

he was severely wounded, he was promoted to be brigadier-general of volunteers. He was breveted major-general of volunteers on the 29th of March 1865, and led the Federal advance in the final operations against General R. E. Lee. In 1893 he received a Congressional medal of honour " for daring heroism and great tenacity in holding his position on the Little Round Top and carrying the advance position on the Great Round Top at the Battle of Gettysburg." After the war he was again professor of rhetoric and oratory at Bowdoin in 1865-1866, and in 1867-1870 was governor of Maine, having been elected as a Republican. From 187 1 to 1883 he was president of Bowdoin College, and during 1874-1879 was professor of mental and moral philosophy also. Appointed in 1880 by Alonzo Garcelon, the retiring governor, to protect the property and institutions of the state until a new governor should be duly qualified, and acting as major-general of the state militia, Chamberlain did much to avert possible civil war, at a time of great political excitement and bitter partisan feeling. (See Maine: History.) In 1883- 1885 he was a lecturer on political science and public law at Bowdoin, and in 1900 became surveyor of customs for the district of Portland, Maine. He published Maine, Her Place in History (1877), and edited Universities and Their Sons (6 vols., 1898).

CHAMBERLAIN, SIR NEVILLE BOWLES (1820-1902), British field marshal, was the third son of Sir Henry Chamberlain, first baronet, consul-general and charge d'affaires in Brazil, and was born at Rio on the 10th of January 1820. He entered the Indian army in 1837, served as a subaltern in the first Afghan War (1839-42), and was wounded on six occasions. He was attached to the Governor-General's Bodyguard at the battle of Maharajpur, in the Gwalior campaign of 1843, was appointed military secretary to the governor of Bombay in 1846, and honorary aide-de-camp to the governor-general of India in 1847. He served on the staff throughout the Punjab campaign of 1848- 49, and was given a brevet majority. In 1850 he was appointed commandant of the Punjab military police, and in 1852 military ' secretary to the Punjab government. Promoted lieut.-colonel in 1854, he was given the command of the Punjab Frontier Force with rank of brigadier-general, and commanded in several expeditions against the frontier tribes. In the Indian Mutiny he succeeded Colonel Chester as adjutant-general of the Indian

army, and distinguished himself at the siege of Delhi, where he was severely wounded. He was rewarded with a brevet-

colonelcy, the appointment of A.D.C. to the queen, and the C.B. He was reappointed to the command of the Punjab Frontier Force in 1858, and commanded in the Umbeyla campaign (1863), in which he was severely wounded. He was now made major-general for distinguished service and a K.C.B. He was made K.C.S.I. in 1866, lieut.general in 1872, G.C.S.I. in 1873, G.C.B in 1875, and general in 1877. From 1876 to 1881 he was commander-in-chief of the Madras army, and in 1878 was sent on a mission to the amir cf Afghanistan, whose refusal to allow him to enter the country precipitated the second Afghan War. He was for some time acting military member of the council of the governor-general of India. He retired in 1886, was made a field marshal in 1900, and died on the 18th of February 1902.

An excellent biography by G. W. Forrest appeared in 1909.

CHAMBERLAIN (0. Fr. chamberlain, chamberlenc, Mod. Fr. chambellan, from 0. H. Ger. Chamarling, Chamarlinc, whence also the Med. Lat. cambellanus, camerlingus, camerlengus; Ital. camerlingo; Span, camerlengo, compounded of 0. H. Ger. Chamara, Kamara [Lat. camera, ” chamber “] , and the Ger. suffix ling), etymologically, and also to a large extent historically, an officer charged with the superintendence of domestic affairs. Such were the chamberlains of monasteries or cathedrals, who had charge of the finances, gave notice of chapter meetings, and provided the materials necessary for the various services. In these cases, as in that of the apostolic chamberlain of the Roman see, the title was borrowed from the usage of the courts of the western secular princes. A royal chamberlain is now a court official whose function is in general to attend on the person of the sovereign and to regulate the etiquette of the palace. He is the representative of the medieval camberlanus, cambellanus, or cubicularius, whose office was modelled on that of the prae fectus sacri cubiculi or cubicularius of the Roman emperors. But at the outset there was another class of chamberlains, the camerarii, i.e. high officials charged with the administration of the royal treasury {camera). The camerarius of the Carolingian emperors was the equivalent of the hordere or thesaurarius (treasurer) of the Anglo-Saxon kings; he develops into the Erzkdmmerer {archicamerarius) of the Holy Roman Empire, an office held by the margraves of Brandenburg, and the grand chambrier of France, who held his chamberie as a fief. Similarly in England after the Norman conquest the hordere becomes the chamberlain. This office was of great importance. Before the Conquest he had been, with the marshal, the principal officer of

the king's court; and under the Norman sovereigns his functions were manifold. As he had charge of the administration of the royal household, his office was of financial importance, for a portion of the royal revenue was paid, not into the exchequer, but in camera regis. In course of time the office became hereditary and titular, but the complexities of the duties necessitated a division of the work, and the office was split up into three: the hereditary and sinecure office of magister camerarius or lord great chamberlain (see Lord Great Chamberlain), the more important domestic office of camerarius regis, king's chamberlain or lord chamberlain (see Lord Chamberlain), and the chamber- lains {camerarii) of the exchequer, two in number, who were originally representatives of the chamberlain at the exchequer, and afterwards in conjunction with the treasurer presided over that department. In 1826 the last of these officials died, when by an act passed forty-four years earlier they disappeared.

In France the office of grand chambrier was early overshadowed by the chamberlains {cubicularii, cambellani, but sometimes also camerarii), officials in close personal attendance on the king, men at first of low rank, but of great and ever-increasing in-fluence. As the office of grand chambrier, held by great feudal nobles seldom at court, became more and more honorary, the chamberlains grew in power, in numbers and in rank, until, in the 13 th century, one of them emerges as a great officer of state, the chambellan de France or grand chambellan (also magister cambellanorum, mestre chamberlenc) , who at times shares with the grand chambrier the revenues derived from certain

trades in the city of Paris (see Regestum Memoralium Cameras computorum, quoted in du Cange, s. Camerarius). The honorary office of grand chambrier survived till the time of Henry II., who was himself the last to hold it before his accession; that of grand chambellan, which in its turn soon became purely honorary, survived till the Revolution. Among the prerogatives of the grand chambellan which survived to the last not the least valued was the right to hand the king his shirt at the ceremonial levee. The offices of grand chambellan, premier chambellan, and chambellan were revived by Napoleon, continued under the Restoration, abolished by Louis Philippe, and again restored by

Napoleon III.

In the papal Curia the apostolic chamberlain (Lat. camerarius, Ital. camerlingo) occupies a very important position. He is at the head of the treasury {camera thesauraria) and, in the days of the temporal power, not only administered the papal finances but possessed an extensive civil and criminal jurisdiction. During a vacancy of the Holy See he is at the head of the ad- ministration of the Roman Church. The office dates from the nth century, when it superseded that of archdeacon of the Roman Church, and the close personal relations of the camerarius with the pope, together with the fact that he is the official guardian of the ceremonial vestments and treasures, point to the fact that he is also the representative of the former vestararius and vice-dominus , whose functions were merged in the new office, of which the idea and title were probably borrowed from the usage of the secular courts of the West (Hinschius, Kirchenrecht, i. 405, &c). There are also attached to the papal household (jamiglia poniificia) a large number of chamberlains whose functions are more or less ornamental. These are divided into several categories: privy chamberlains (camerieri segreti), chamberlains, assistant and honorary chamberlains. These are gentlemen of rank and belong to the highest class of the household {jamiglia mobile).

In England the modern representatives of the cubicularii are the gentlemen and grooms of the bed-chamber, in Germany the Kammerherr {K ammerer, from ca»reeram«,inBavariaand Austria) and Kammerjunker. The insignia of their office is a gold key attached to their coats behind.

Many corporations appoint a chamberlain. The most important in England is the chamberlain of the corporation of the city of London, who is treasurer of the corporation, admits persons entitled to the freedom of the city, arid, in the chamberlain's court, of which he and the vice-chamberlain are judges, exercises concurrent jurisdiction with the police court in determining disputes between masters and apprentices. Formerly nominated by the crown, since 1688 he has been elected annually by the liverymen. He has a salary of £2000 a year. Similarly in Germany the administration of the finances of a city is called the Kdmmerei and the official in charge of it the Kiimmerer.

See also State, Great Officers of; Household, Royal; Du Cange, Clossarium, s. "Camerarius" and " Cambellanus " ; Pere Anselme

(Pierre de Guibours), Hist, genealogique et chronologique de la maison royale de France, &fc. (9 vols., 3rd ed., 1726-1733); A. Luchaire, Manuel des institutions francaises (Paris, 1892) ; W. R. Anson, Law and Custom of the Constitution (Oxford, 1896) ; Hinschius, Kirchenrecht, i. 405 (Berlin, 1869).

CHAMBERLAYNE, WILLIAM (1619-1679), English poet, was born in 1619. Nothing is known of his history except that he practised as a physician at Shaftesbury in Dorsetshire, and fought on the Royalist side at the second battle of Newbury. He died on the nth of July 1679. His works are: Pharonnida (1659), a verse romance in five books; Love's Victory (1658), a tragi-comedy, acted under another title in 1678 at the Theatre Royal; England's Jubilee (1660), a poem in honour of the Restoration. A prose version of Pharonnida, entitled Eromena, or the Noble Stranger, appeared in 1683. Southey speaks of him as " a poet to whom I am indebted for many hours of delight." Pharonnida was reprinted by S. W. Singer in 1820, and again in 1905 by Prof. G. Saintsbury in Minor Poets of the Caroline Period (vol. i.). The poem is loose in construction, but contains some passages of great beauty.

CHAMBERS, EPHRAIM (d. 1740), English encyclopaedist, was born at Kendal, Westmorland, in the latter part of the 17th century. He was apprenticed to a globe-maker in London, but having conceived the plan of his Cyclopaedia, or Universal Dictionary of Arts and Sciences, he devoted himself entirely to it. The first edition appeared by subscription in 1728, in two vols. fol., and dedicated to the king (see Encyclopaedia). The Encycloptdie of Diderot and d'Alembert owed its inception to a French translation of Chambers's work. In addition to the Cyclopaedia, Chambers wrote for the Literary Magazine (1735-1736), and translated the History and Memoirs of the Royal Academy of Sciences at Paris (1742), and the Practice of Perspective from the French of Jean Dubreuil. He died on the 1 5th of May 1 740.

CHAMBERS, GEORGE (1803-1840), English marine painter, born at Whitby, Yorkshire, was the son of a seaman, and for several years he pursued his father's calling. While at sea he was in the habit of sketching the different classes of vessels. His master, observing this, gratified him by cancelling his indentures, and thus set him free to follow his natural bent. Chambers then apprenticed himself to an old woman who kept a painter's shop in Whitby, and began by house-painting. He also took lessons of a drawing-master, and found a ready sale for small and cheap pictures of shipping. Coming afterwards to London, he was

employed by Thomas Horner to assist in painting the great panorama of London for the Colosseum (the exhibition building in Regent's Park, demolished towards i860), and he next became scene-painter at the Pavilion theatre. In 1834 he was elected an associate, and in 1836 a full member, of the Water-colour Society. His best works represent naval battles. Two of these — the " Bombardment of Algiers in 181 6," and the " Capture of Porto Bello "—are in Greenwich hospital. Not long before his death he was introduced to William IV., and his professional prospects brightened; but his constitution, always frail, gave way, and he died on the 28th of October 1840.

A Life, by John Watkins, was published in 1841.

CHAMBERS, ROBERT (1802-1871), Scottish author and publisher, was born at Peebles on the 10th of July 1802. He was sent to the local schools, and gave evidence of unusual literary taste and ability. A small circulating library in the town, and a copy of the Encyclopaedia Britannica which his father had purchased, furnished him with stores of reading of which he eagerly availed himself. Long afterwards he wrote of his early years — " Books, not playthings, filled my hands in childhood. At twelve I was deep, not only in poetry and fiction, but in encyclopaedias." Robert had been destined for the church, but this design had to be abandoned for lack of means. The family removed to Edinburgh in 1813, and in 18 18 Robert began business as a bookstall-keeper in Leith Walk. He was then only sixteen, and his whole stock consisted of a few old books belonging to his father. In 1819 his elder brother William had begun a similar business, and the two eventually united as partners in the publishing firm of W. & R. Chambers. Robert Chambers showed an enthusiastic interest in the history and antiquities of Edinburgh, and found a most congenial task in his Traditions of Edinburgh (2 vols., 1824), which secured for him the approval and the personal friendship of Sir Walter Scott. A History of the Rebellions in Scotland from i6j8 to 1745 (5 vols., 1828) and numerous other works followed.

In the beginning of 1832 William Chambers started a weekly publication under the title of Chambers's Edinburgh Journal (known since 1854 as Chambers's Journal of Literature, Science and Arts), which speedily attained a large circulation. Robert was at first only a contributor. After fourteen numbers had appeared, however, he was associated with his brother as joint- editor, and his collaboration contributed more perhaps than anything else to

the success of the Journal.

Among the other numerous works of which Robert was in whole or in part the author, the Biographical Dictionary of • Eminent Scotsmen (4 vols., Glasgow, 1832-1835), the Cyclopaedia of English Literature (1844), the Life and Works of Robert Burns (4 vols., 1851), Ancient Sea Margins (1848), the Domestic Annals of Scotland (3 vols., 1859-1861) and the Book of Days (2 vols.,

1862-1864) were the most important. Chambers's Encyclopaedia (1859-1868), with Dr Andrew Findlater as editor, was carried out under the superintendence of the brothers (see Encyclo- paedia). The Cyclopaedia of English Literature 1 contains a series of admirably selected extracts from the best authors of every period, " set in a biographical and critical history of the literature itself." For the Life of Burns he made diligent and laborious original investigations, gathering many hitherto unrecorded facts from the poet's sister, Mrs Begg, to whose benefit the whole profits of the work were generously devoted. Robert Chambers was a scientific geologist, and availed himself of tours in Scandinavia and Canada for the purpose of geological exploration. The results of his travels were embodied in Tracings of the North of Europe (1851) and Tracings in Iceland and the Faroe Islands (1856). His knowledge of geology was one of the principal grounds on which the authorship of the Vestiges of the Natural History of Creation (2 vols., 1843-1846) was eventually assigned to him. The book was published anonymously. Robert Chambers was aware of the storm that would probably be raised at the time by a rational treatment of the subject, and did not wish to involve his firm in the discredit that a charge of heterodoxy would bring with it. The arrange- ments for publication were made through Alexander Ireland of Manchester, and the secret was so well kept that such different names as those of Prince Albert and Sir Charles Lyell were coupled with the book. Ireland in 1884 issued a 12th edition, with a preface giving an account of its authorship, which there was no longer any reason for concealing. The Book of Days was Chambers's last publication, and perhaps his most elaborate. It was a miscellany of popular antiquities in connexion with the calendar, and it is supposed that his excessive labour in connexion with this book hastened his death, which took place at St Andrews on the 17th

of March 1871. Two years before, the university of St Andrews had conferred upon him the degree of doctor of laws, and he was elected a member of the Athenaeum club in London. It is his highest claim to distinction that he did so much to give a healthy tone to the cheap popular literature which has become so important a factor in modern civilization.

His brother, William Chambers (1800-1883) was born at Peebles, on the 16th of April 1800. He was the financial genius of the publishing firm. He laid the city of Edinburgh tinder the greatest obligations by his public spirit and munificence. As lord provost he procured the passing in 1867 of the Improvement Act, which led to the reconstruction of a great part of the Old Town, and at a later date he proposed and carried out, largely at his own expense, the restoration of the noble and then neglected church of St Giles, making it in a sense " the West- minster Abbey of Scotland." This service was fitly acknow- ledged by the offer of a baronetcy, which he did not live to receive, dying on the 20th of May 1883, three days before the reopening of the church. He was the author of a history of St Giles's, of a memoir of himself and his brother (1872), and of many other useful publications. On his death in 1883 Robert Chambers (1832-1888), son of Robert Chambers, succeeded as head of the firm, and edited the Journal until his death. His eldest son, Charles Edward Stuart Chambers (b. 1859), became editor of the Journal and chairman of W. & R. Chambers, Limited.

See also Memoir of Robert Chambers, with A utobiographic Reminis- cences of William Chambers (1872), the 13th ed. of which (1884) has a supplementary chapter; Alexander Ireland's preface to the 12th ed. (1884) of the Vestiges of Creation; the Story of a Long and Busy Life (1884), by William Chambers; and some discriminating appreciation in James Payn's Some Literary Recollections (1884), chapter v. The Select Writings of Robert Chambers were published in 7 vols, in 1847, and a complete list of the works of the brothers is added to A Catalogue of Some of the Rarer Books . . . in the Collec- tion of C. E. S. Chambers (Edinburgh, 189 1).

CHAMBERS, SIR WILLIAM (17 26-1 796), British architect, was the grandson of a rich merchant who had financed the armies of Charles XII., but was paid in base money, and whose son remained in Sweden many years endeavouring to obtain

l A new and enlarged edition of this work, edited by David

Patrick, LL. D., appeared in 1903.

redress. In 1728 the latter returned to England and settled at Ripon, where William, who was born in Stockholm, was educated. At the age of sixteen he became supercargo to the Swedish East IndiaCompany, and voyaging to Canton made drawingsof Chinese architecture, furniture and costume which served as basis for his Designs for Chinese Buildings, &c. (1757). Two years later he quitted the sea to study architecture seriously, and spent a long time in Italy, devoting special attention to the buildings of classical and Renaissance architects. He also studied under Clerisseau in Paris, with whom and with the sculptor Wilton he lived at Rome. In 1755 he returned to England with Cipriani and Wilton, and married the beautiful daughter of the latter. His first important commission was a villa for Lord Bessborough at Roehampton, but he made his reputation by the grounds he laid out and the buildings he erected at Kew between 1757 and 1762 for Augusta, princess dowager of Wales. Some of them have since been demolished, but the most important, the pagoda, still survives. The publication in a handsome volume of the designs for these buildings assured his position in the profession. He was employed to teach architectural drawing to the prince of Wales (George III.), and gained further pro- fessional distinction in 1759 by the publication of his Treatise of Civil Architecture. He began to exhibit with the Society of Artists in 1761 at Spring Gardens, and was one of the original members and treasurer of the Royal Academy when it was established in 1768. In 1772 he published his Dissertation on Oriental Gardening, which attempted to prove the inferiority of European to Chinese landscape gardening. As a furniture designer and internal decorator he is credited with the creation of that ” Chinese Style ” which was for a time furiously popular, although Thomas Chippendale (q.v.) had published designs in that manner at a somewhat earlier date. It is not unreasonable to count the honours as divided, since Chippendale unques- tionably adapted and altered the Chinese shapes in a manner better to fit them for European use. To the rage for every possible form of chinoiserie, for which he is chiefly responsible, Sir William Chambers owed much of his success in life. He became architect to the king and queen, comptroller of his majesty’s works, and afterwards surveyor-general. In 1775 he was appointed architect of Somerset House, his greatest monu- ment, at a salary of £2000 a year. He also designed town mansions for Earl Gower at Whitehall and Lord Melbourne in Piccadilly, built Charlemont House, Dublin,

and Duddingston House near Edinburgh. He designed the market house at Worcester, was employed by the earl of Pembroke at Wilton, by the duke of Marlborough at Blenheim, and by the duke of Bedford in Bloomsbury. The state coach of George III., his constant patron, was his work; it is now in the Victoria and Albert Museum. Although his practice was mainly Classic, he made Gothic additions to Milton Abbey inDorset. Sir William Chambers achieved considerable distinction as a designer of furniture. In addition to his work in the Chinese style and in the contemporary fashions, he was the author, of what is probably the most ambitious and monumental piece of furniture ever produced in England. This was a combined bureau, dressing-case, jewel- cabinet and organ, made for Charles IV., king of Spain, in 1793. These combination pieces were in the taste of the time, and the effort displays astonishing ingenuity and resource. The panels were painted by W. Hamilton, R.A., with representations of the four seasons, night and morning, fire and water, Juno and Ceres, together with representations of the Golden Fleece and the Immaculate Conception. The organ, in the domed top, is in a case decorated with ormolu and Wedgwood. This remarkable achievement, which possesses much sober elegance, formed part of the loan collection of English furniture at the Franco- British Exhibition in London in 1908. Sir William Chambers numbered among his friends Dr Johnson, Goldsmith, Sir Joshua Reynolds, David Garrick and Dr Burney.

CHAMBERS (the Fr. chambre, from Lat. camera, a room), a term used generally of rooms or apartments, but especially in law of the offices of a lawyer or the semi-private rooms in which judges or judicial officers deal with questions of practice and

other matters not of sufficient importance to be dealt with in court. It is a matter of doubt at what period the practice of exercising jurisdiction ” in chambers ” commenced in England; there is no statutory sanction before 1821, though the custom can be traced back to the 17th century. An act of 1821 provided for sittings in chambers between terms, and an act of 1822 empowered the sovereign to call upon the judges by warrant to sit in chambers on as many days in vacation as should seem fit, while the Law Terms Act 1830 defined the jurisdiction to be exercised at chambers. The Judges’ Chambers Act 1867 was the

first act, however, to lay down proper regulations for chamber work, and the Judicature Act 1873 preserved that jurisdiction and gave power to increase it as might be directed or authorized by rules of court to be thereafter made. (See Chancery; King's Bench, Court of.)

CHAMBERSBURG, a borough and the county-seat of Franklin county, Pennsylvania, U.S.A., at the confluence of Conococheague Creek and Falling Spring, 52 m. S.W. of Harrisburg. Pop. (1890) 7863; (1900) 8864, of whom 769 were negroes; (1910) 11,800. It is served by the Cumberland Valley and the Western Maryland railways, and is connected by electric lines with Greencastle, Waynesboro, Caledonia, a beautiful park in the Pennsylvania timber reservation, on South Mountain, 12 m. east of Chambersburg, and Pen Mar, a summer resort, on South Mountain, near the boundary line between Pennsyl- vania and Maryland. Chambersburg is built on an elevated site in the broad and fertile Cumberland Valley, and commands a fine view of the distant hills and dales. The borough is the seat of Chambersburg Academy, a preparatory school; Penn Hall, a school for girls; and Wilson College, a Presbyterian institution for women, opened in 1870. The Wilson College campus, the former estate of Col. A. K. McClure (1828-1909), a well-known journalist, was laid out by Donald G. Mitchell (" Ik Marvel "), who was an enthusiastic landscape gardener. The shops of the Cumberland Valley railway are at Chambersburg, and among the borough's manufactures are milling machinery, boilers, engines, hydraulic presses, steam-hammers, engineering and bridge supplies, hosiery, shoes, gloves, furniture, flour, paper, leather, carriages and agricultural implements; the total value of its factory product in 1905 was $1,085,185. The waterworks and the electric-lighting plant are owned and operated by the municipality. A settlement was founded here in 1730 by Benjamin Chambers, in whose honour the borough was named, and who, immediately after General Edward Braddock's defeat in 1755, built a stone fort and surrounded it with a stockade for the protection of the community from the Indians. Chambersburg was laid out in 1764 and was incor- porated as a borough in 1803. On the 30th of July 1864 Cham- bersburg was occupied by a Confederate cavalry force under General McCausland (acting under General Jubal A. Early's orders), who, upon the refusal of the citizens to pay $ 100,000 for immunity, burned a large part of the borough.

CHAMBERY, a city of France, capital of the department of Savoie, pleasantly situated in a fertile district, between two hills, on the

rivers Leysse and Albane, 79 m. by rail S.S.W. of Geneva. Pop. (1906) town, 16,852; commune, 23,027. The town is irregularly built, and has only two good streets — the Place Saint-Leger and the Rue de Boigne, the latter being named after General Benoit Boigne (1741-1830), who left a fortune of 3,400,000 francs (accumulated in India) to the town. The principal buildings are the cathedral, dating from the 14th and 15th centuries; the H6tel-Dieu, founded in 1647; the castle, a modern building serving as the prefecture, and preserving only a great square tower belonging to the original structure; the palace of justice, the theatre, the barracks, and the covered market, which dates from 1863. Several of the squares are adorned with fountains; the old ramparts of the city, destroyed during the French Revolution, have been converted into public walks; and various promenades and gardens have been con- structed. Chambery is the seat of an archbishop (raised to that dignity from a bishopric in 1817) and of a superior tribunal. It has also a Jesuit college, a royal academical society, a society

of agriculture and commerce, a public library with 60,000 volumes, a museum (antiquities and paintings), a botanic garden, and many charitable institutions. It manufactures silk-gauze, lace, leather and hats, and has a considerable trade in liqueurs, wine, lead, copper and other articles. Overlooking the town on the north is the Rocher de Lemenc, which derives its name from the Lemincum of the Romans; and in the vicinity is Les Charmettes, for some time (1 736-1 740) the residence of Rousseau.

The origin of Chambery is unknown, but its lords are mentioned for the first time in 1029. In 1232 it was sold to the count of Savoy, Thomas I., who bestowed several important privileges on the inhabitants. As capital of the duchy of Savoy, it has passed through numerous political vicissitudes. Between 1 536 and 1 7 13 it was several times occupied by the French; in 1742 it was captured by a Franco-Spanish army; and in 1792 it was occupied by the Republican forces, and became the capital of the depart- ment of Mont Blanc. Restored to the house of Savoy by the treaties of Vienna and Paris, it was again surrendered to France in i860. Among the famous men whom it has given to France, the most important are Vaugelas (1585-1650), Saint-Real (1639-1692), and the brothers Joseph (1754-1821) and Xavier (1763-1852) de Maistre.

CHAMBORD, HENRI CHARLES FERDINAND MARIE DIEUDONN&

Comtede (1820-1883), the “King Henry V.” of the French legitimists, was born in Paris on the 29th of September 1820. His father was the due de Berry, the elder son of the comte d’Artois (afterwards Charles X.); his mother was the princess Caroline Ferdinande Louise of Naples. Born seven months after the assassination of his father, he was hailed as the ” enfant du miracle,” and was made the subject of one of Lamartine’s most famous poems. He was created due de Bordeaux, and in 1821, as the result of a subscription organized by the government, received the chateau of Chambord. He was educated by tutors inspired by detestation of the French Revolution and its principles, and from the due de Damas in particular imbibed those ideas of divine right and of devotion to the Church to which he always remained true. After the revolution of July, Charles X. vainly endeavoured to save the Bourbon cause by abdicating in his favour and proclaiming him king under the title of Henry V. (August 2, 1830). The comte de Chambord accompanied his grandfather into exile, and resided successively at Holyrood, Prague, and Gorz. In 1841, during an extensive tour through Europe, he broke his leg — an accident that resulted in permanent lameness. The death of his grandfather, Charles X., in 1836, and of his uncle, the due d’Angouleme, in 1844, left him the last male representative of the elder branch of the Bourbon family; and his marriage with the archduchess Maria Theresa, eldest daughter of the duke of Modena (November 7, 1846), remained without issue. The title to the throne thus passed to the comte de Paris, as representative of the Orleans branch of the house of Bourbon, and the history of the comte de Chambord’s life is largely an account of the efforts made to unite the Royalist party by effecting a reconciliation between the two princes. Though he continued to hold an informal court, both on his travels and at his castle of Frohsdorf , near Vienna, yet he allowed the revolution of 1848 and the coup d’itat of 1851 to pass without any decisive assertion of his claims. It was the Italian war of 1859, with its menace to the pope’s independence, that roused him at last to activity. He declared himself ready ” to pay with his blood for the triumph of a cause which was that of France, the Church, and God himself.” Making common cause with the Church, the Royalists now began an active campaign against the Empire. On the 9th of December 1866 he addressed a manifesto to General Saint-Priest, in which he declared the cause of the pope to be that of society and liberty, and held out promises of retrenchment, civil and religious liberty, ” and above all honesty.” Again, on the 4th of September 1870, after the fall

of the Empire, he invited Frenchmen to accept a government " whose basis was right and whose principle was honesty," and promised to drive the enemy from French soil. These vague phrases, offered as a panacea to a nation fighting for its life, showed conclusively his want of all political genius; they had as little effect on the French as his

protest against the bombardment of Paris had on the Germans. Yet fortune favoured him. The elections placed the Republican party in a minority in the National Assembly; the abrogation of the law of exile against the royal family permitted him to return to his castle of Chambord; and it was thence that on the 5th of July 1871 he issued a proclamation, in which for the first time he publicly posed as king, and declared that he would never abandon the white standard of the Bourbons, "the flag of Henry IV., Francis I., and Joan of Arc," for the tricolour of the Revolution. He again quitted France, and answered the attempts to make him renounce his claims in favour of the comte de Paris by the declaration (January 25, 1872) that he would never abdicate. In the following month he held a great gathering of his adherents at Antwerp, which was the cause of serious disturbances. A constitutional programme, signed by some 280 members of the National Assembly, was presented for his acceptance, but without result. The fall of Thiers in May 1873, however, offered an oppor- tunity to the Royalists by which they hastened to profit. The comte de Paris and the prince de Joinville journeyed to Frohsdorf , and were formally reconciled with the head of the family (August 5). The Royalists were united, the premier (the due de Broglie) an open adherent, the president (MacMahon)a benevolent neutral. MM. Lucien Brun and Chesnelong were sent to interview the comte de Chambord at Salzburg, and obtain the definite assur- ances that alone were wanting. They returned with the news that he accepted the principles of the French Revolution and the tricolour flag. But a letter to Chesnelong, dated Salzburg, 27th of October, declared that he had been misunderstood: he would give no guarantees ; he would not inaugurate his reign by an act of weakness, nor become " le roi legitime de la Revolution." " Je suis le pilote necessaire," he added, " le seul capable de conduire le navire au port, parce que j'ai mission et autorite pour cela." This outspoken adherence to the principle of divine right did credit to his

honesty, but it cost him the crown. The due de Broglie carried the septennate, and the Republic steadily estab- lished itself in popular favour. A last effort was made in the National Assembly in June 1874 by the due de la Rochefoucauld- Bisaccia, who formally moved the restoration of the. monarchy. The comte de Chambord on the 2nd of July issued a fresh mani- festo, which added nothing to his former declarations. The motion was rejected by 272 to 79, and on the 25th of February 1875 the Assembly definitely adopted the Republic as the national form of government. From this time the comte de Chambord, though continuing to publish letters on political affairs, made no further effort to regain the throne. He died at Frohsdorf on the 24th of August 1883.

See Manifestes et programmes politiques de M. le comte de Cham- bord, 1848-1873 (1873), and Correspondance de la famille royale et principalement de Mgr. le comte de Chambord avec le comte de Bouille (1884). Of the enormous literature relating to him, mention may be made of Henri V et la monarchie traditionnelle (1871), Le Comte de Chambord etudie dans ses voyages et sa correspondance (1880), and Henri de France, by H. de Pene (1885). (H. Sy.)

CHAMBORD, a village of central France, in the department of Loir-et-Cher, on the left bank of the Cosson, 10 m. E. by N. of Blois by road. The village stands in the park of Chambord, which is enclosed by a wall 21 m. in circumference. The cele- brated chateau (see Architecture: Renaissance Architecture in France) forms a parallelogram flanked at the angles by round towers and enclosing a square block of buildings, the facade of which forms the centre of the main front. The profusion of turrets, pinnacles, and dormer windows which decorates the roof of this, the chief portion of the chateau, constitutes the main feature of the exterior, while in the interior are a well-preserved chapel of the 16th century and a famous double staircase, the construction of which permits two people to ascend and descend respectively without seeing one another. There are 440 apart- ments, containing pictures of the 17th century and souvenirs of the comte de Chambord. The chateau was originally a hunting- box of the counts of Blois, the rebuilding of which was begun by Francis I. in 1526, and completed under Henry II. It was the residence of several succeeding monarchs, and under Louis XIV. considerable alterations were made. In the same reign

Moliere performed Monsieur de Pourceaugnac and Le Bourgeois

gentilhomme for the first time in the theatre. Stanislaus, king of Poland, lived at Chambord, which was bestowed by his son-in-law, Louis XV., upon Marshal Saxe. It was given by Napoleon to Marshal Berthier, from whose widow it was purchased by subscription in 182 1, and presented to the due de Bordeaux, the representative of the older branch of the Bourbons, who assumed from it the title of comte de Chambord. On his death in 1883 it came by bequest into the possession of the family of Parma.

CHAMBRE ARDENTE (Fr. ” burning’ chamber “) , the term for an extraordinary court of justice in France, mainly held for the trials of heretics. The name is perhaps an allusion to the fact that the proceedings took place in a room from which all daylight was excluded, the only illumination being from torches, or there may be a reference to the severity of the sentences in ardente, suggesting the burning of the prisoners at the stake. These courts were originated by the Cardinal of Lorraine, the first of them meeting in 1535 under Francis I. The Chambre Ardente co-operated with an inquisitorial tribunal also established by Francis I., the duty of which was to discover cases of heresy and hand them over for final judgment to the Chambre Ardente. The reign of Henry II. of France was particularly infamous for the cruelties perpetrated by this court on the Huguenots. The marquise de Brinvilliers (q.v.) and her associates were tried in the Chambre Ardente in 1680. The court was abolished in

1682.

See N. Weiss, La Chambre Ardente (Paris, 1889), and F. Ravaisson, Archives de la Bastille (Paris, 1866-1884, 16 vols.). –

CHAMELEON, the common name of one of the three suborders of Lacertilia or lizards. The chief genus is Chamaeleon, containing most of the fifty to sixty species of the whole group, and with the most extensive range, all through Africa and Madagascar into Arabia, southern India and Ceylon. The Indian species is Ch. calcaratus; the dwarf chameleon of South Africa is Ch. pumilus; the giant of the whole tribe, reaching a total length of 2 ft., is Ch. parsoni of Madagascar. The commonest species in the trade is Ch. vulgaris of North Africa, introduced into southern Andalusia. A few queer genera, with much stunted tail, e.g. Rhampholeon, in tropical Africa and Brookesia in Madagascar are the most aberrant. The common chameleon is the most typical. The head is raised into a pyramidal crest far beyond the occiput, there is no outer ear, nor a drum-cavity. The limbs are very long and

slender, and the digits form stout grasping bundles; on the hand the first three form an inner bundle, opposed to the remaining two; on the foot the inner bundle is formed by the first and second toe, the outer by the other three toes. The tail is prehensile, by being rolled down- wards; it is not brittle and cannot be renewed. The eyeballs are large, but the lids are united into one concentric fold, leaving only the small pupil visible. The right and left eyes are incessantly moved separately from each other and literally in every direction, up and down, forwards and straight backwards, producing the most terrible squinting. Chameleons alone of all reptiles can focus their eyes upon one spot, and conformably they alone possess a retinal macula centralis, or spot of acutest, binocular vision. The tongue has attained an extraordinary development. It is club-shaped, covered with a sticky secretion, and based upon a very narrow root, which is composed of extremely elastic fibres and telescoped over the much elongated, style-shaped, copular piece of the hyoid. The whole apparatus is kept in a contracted state like a spring in a tube. When the spring is released, so to speak, by filling the apparatus with blood and by the play of the hyoid muscles, the heavy thick end shoots out upon the insect prey and is withdrawn by its own elasticity.

Left Forefoot of Chamaeleon o'shaughenesii, outer view. ,

The whole act is like a flash. An ordinary chameleon can shoot a fly at the distance of fully 6 in., and it can manage even a big sphinx moth.

Another remarkable feature is their changing of colour. This proverbial power is greatly exaggerated. They cannot assume in succession all the colours of the rainbow, nor are the changes quick. The common chameleon may be said to be greenish grey, changing to grass-green or to dull black, with or without maroon red, or brown, lateral series of patches. At night the same specimen assumes as a rule a more or less uniform pale straw-colour. After it has been watched for several months, when all its possibilities seem exhausted, it will probably surprise us by a totally new combination, for instance, a black garb with many small yellow specks, or green with many black specks. Pure red and blue are not in the register of this species, but they are

rather the rule upon the dark green ground colour of the South African dwarf chameleon. The changes are partly under control of the will, partly complicated reflex actions, intentionally adaptive to the physical and psychical surroundings. The mechanism is as follows. The cutis contains several kinds of specialized cells in many layers, each filled with minute granules of guanine. The upper cells are the smallest, most densely filled with crystals, and cause the white colour by diffusion of direct light; near the Malpighian layer the cells are charged with yellow oil drops; the deeper cells are the largest, tinged light brown, and acting as a turbid medium they cause a blue colour, which, owing to the superimposed yellow drops, reaches our eye as green; provided always that there is an effective screen at the back, and this is formed by large chromatophores which lie at the bottom and send their black pigment half-way up, or on to the top of the layers of guanine and oil containing cells. When all the pigment is shifted towards the surface, as near the epidermis as possible, the creature looks black; when the black pigment is withdrawn into the basal portions of the chromatophores the skin appears yellow.

The lungs are very capacious, and end in several narrow blind sacs which extend far down into the body cavity, so that not only the chest but the whole body can be blown up. This happens when the animals hiss and fight, as they often do. But when they know themselves discovered, they make themselves as thin as possible by compressing the chest and belly vertically by means of their peculiarly elongated ribs. The whole body is then put into such a position that it presents only its narrow edge to the enemy, and with the branch of the tree or shrub interposed. They are absolutely arboreal, but they hibernate in the ground.

The usual mode of propagation is by eggs, which are oval, numerous, provided with a calcareous shell, and buried in humus, whence they are hatched about four months later. But a few species, e.g. the dwarf chameleon, are viviparous.

Chameleons are insectivorous. They prefer locusts, grass- hoppers and lepidoptera, but are also fond of flies and mealworms. They are notoriously difficult to keep in good health. They want not only warmth, but sunshine, and they must have water, which they lick up in drops from the edges of wet leaves whenever they have a chance. The silliness of the fable that they live on air is shown by the fact that they usually die in an absolutely emaciated and parched condition after three or four months'

starvation. (H. F. G.)

In astronomy, ” Chamaeleon ” is a constellation situated near the south pole and surrounded by the constellations of Octans, Mensa, Piscis volans, Carina (Nauta), Musca and Apus. In chemistry, ” chameleon mineral ” is a name applied to the green mass which is obtained when pyrolusite (manganese dioxide) is fused with nitre, since a solution in water assumes a purple tint on exposure to the air; this change is due to the oxidation of the manganate, which is first formed, to a permanganate.

CHAMFER, Champfer or Chaumfer (Fr. chanfrein; possibly from Lat. cantus, corner, and Jrangere, to break), an architectural term; when the edge or arris of any work is cut off at an angle of 45° in a small degree, it is said to be ” chamfered,” while it would be ” canted ” if on a large scale. The chamfer is much used in medieval work, and is sometimes plain, sometimes

hollowed out and sometimes moulded. Chamfers are sometimes ” stopped ” by a bead or some moulding, but when cut short by a slope they are generally known as ” stop chamfer.”

CHAMFORT, SEBASTIEN ROCH NICOLAS (1741-1794), French man of letters, was born at a little village near Clermont in Auvergne in 1 741 . He was, according to a baptismal certificate found among his papers, the son of a grocer named Nicolas. A journey to Paris resulted in the boy’s obtaining a bursary at the College des Grassins. He worked hard, although he wrote later in one of his most contemptuous epigrams — ” Ce quej’ai appris je ne le sais plus; le peu que je sais je I’ at divine”.” His college career ended, Chamfort assumed the dress of a petit abbe. ” C’est un costume, et non point un Stat,” he said; and to the principal of his college who promised him a benefice, he replied that he would never be a priest, inasmuch as he preferred honour to honours — ” j’aime Vhonneur et non les konneurs.” About this time he assumed the name of Chamfort.

For some time he contrived to exist by teaching and as a booksellers’ hack. His good looks and ready wit, however, soon brought him into notice; but though endowed with immense strength—” Hercule sous la figure d’Adonis,” Madame de Craon called him— he lived so hard that he was glad of the chance of doing a ” cure ” at Spa when the Belgian minister in Paris, M. van Eyck, took him with him to Germany in 1761. On his return to Paris he produced a comedy, La Jeune Indienne (1764), which

was performed with some success, and this was followed by a series of " epistles " in verse, essays and odes. It was not, however, until 1769, when he won the prize of the French Academy for his £loge on Moliere, that his literary reputation was established.

Meanwhile he had lived from hand to mouth, mainly on the hospitality of people who were only too glad to give him board and lodging in exchange for the pleasure of the conversation for which he was famous. Thus Madame Helvetius entertained him at Sevres for some years. In 1770 another comedy, Le Marchand de Smyrne, brought him still further into notice, and he seemed on the road to fortune, when he was suddenly smitten with a horrible disease. His distress was relieved by the generosity of a friend, who made over to him a pension of 1 200 livres charged on the Mercure de France. With this assistance he was able to go to the baths of Contrexeville and to spend some time in the country, where he wrote an Eloge on La Fontaine which won the prize of the Academy of Marseilles (1774). In 1775, while taking the waters at Bareges, he met the duchesse de Grammont, sister of Choiseul, through whose influence he was introduced at court. In 1776 his poor tragedy, Mustapha et Zeangir, was played at Fontainebleau before Louis XVI. and Marie Antoinette; the king gave him a further pension of 1 200 livres. and the prince de Conde made him his secretary. But he was a Bohemian naturally and by habit, the restraints of the court irked him, and with increasing years he was growing misanthropical. After a year he resigned his post in the prince's household and retired into solitude at Auteuil. There, comparing the authors of old with the men of his own time, he uttered the famous mot that proclaims the superiority of the dead over the living as companions; and there too he presently fell in love. The lady, attached to the household of the duchesse du Maine, was forty-eight years old, but clever, amusing, a. woman of the world; and Chamfort married her. They left Auteuil, and went to Vaucouleurs, where in six months Madame Chamfort died. Chamfort lived in Holland for a time with M. de Narbonne, and returning to Paris received in 1781 the place at the Academy left vacant by the death of La Curne de Sainte-Palaye, the author of the Diction- naire des antiquiUs francaises. In 1784, through the influence of Calonne, he became secretary to the king's sister, Madame Elizabeth, and in 1 786 he received a pension of 2000 livres from the royal treasury. He was thus once more attached to the court, and made himself friends in spite of the reach and tendency of his

unalterable irony; but he quitted it for ever after an un- fortunate and mysterious love affair, and was received into the house of M. de Vaudreuil. Here in 1 783 he had met Mirabeau, with whom he remained to the last on terms of intimate friendship.

whom he assisted with money and influence, and one at least of whose speeches — that on the Academies — he wrote.

The outbreak of the .Revolution made a profound change in the relations of Chamfort's life. Theoretically he had long been a republican, and he now threw himself into the new movement with almost fanatical ardour, devoting all his small fortune to the revolutionary propaganda. His old friends of the court he forgot. " Those who pass the river of revolutions," he said, " have passed the river of oblivion." Until the 31st of August 1 791 he was secretary of the Jacobin club; he became a street orator and entered the Bastille among the first of the storming party. He worked for the Mercure de France, collaborated with Ginguene in the Feuille villageoise, and drew up for Talleyrand his Adresse au peuple franqais.

With the reign of Marat and Robespierre, however, his un- compromising Jacobinism grew critical, and with the fall of the Girondins his political life came to an end. But he could not restrain the tongue that had made him famous; he no more spared the Convention than he had spared the court. His notorious republicanism failed to excuse the sarcasms he lavished on the new order of things, and denounced by an assistant in the Bibliotheque Nationale, to a share in the direction of which he had been appointed by Roland, he was taken to the Made- lonnettes. Released for a moment, he was threatened again with arrest; but he had determined to prefer death to a repetition of the moral and physical restraint to which he had been sub- jected. He attempted suicide with pistol and with poniard; and, horribly hacked and shattered, dictated to those who came to arrest him the well-known declaration — ■" Moi, Sebastien- Rock- Nicolas Chamfort, declare avoir voulu mourir en homme libre pluldt que d'etre reconduit en esclave dans une maison d'arrit " — which he signed in a firm hand and in his own blood. He did not die at once, but lingered on until the 13th of April 1794 in charge of a gendarme, for whose

wardship he paid a crown a day. To the Abbe Sieyes Chamfort had given fortune in the title of a pamphlet (" Qu'est-ce que le Tiers-Elat? Tout. Qu'a-t-il? Rien "), and to Sieyes did Chamfort retail his supreme sarcasm, the famous " Je m'en vais enfin de ce monde ou ilfaut que le coeur se brise ou se bronze." The maker of constitutions followed the dead wit to the grave.

The writings of Chamfort, which include comedies, political articles, literary criticisms, portraits, letters, and verses, are colourless and uninteresting in the extreme. As a talker, however, he was of extraordinary force. His Maximes et Pensees, highly praised by John Stuart Mill, are, after those of La Rochefoucauld, the most brilliant and suggestive sayings that have been given to the modern world. The aphorisms of Chamfort, less systematic and psychologically less important than those of La Rochefoucauld, are as significant in their violence and iconoclastic spirit of the period of storm and preparation that gave them birth as the Reflexions in their exquisite restraint and elaborate subtlety are characteristic of the tranquil elegance of their epoch; and they have the advantage in richness of colour, in picturesqueness of phrase, in passion, in audacity. Sainte- Beuve compares them to " well-minted coins that retain their value," and to keen arrows that " arrivent brusquement et sifflent encore."

An edition of his works — CEuvres completes de Nicolas Chamfort — Was published at Paris in five volumes in 1824-1825. Selections — CEuvres de Chamfort — in one volume, appeared in 1852, with a bio- graphical and critical preface by Arsene Houssaye, reprinted from the Revue des deux mondes; and CEuvres choisies (2 vols.), with a preface and notes by M. de Lescure (1879). See also Sainte-Beuve, Causeries du Lundi.

CHAMIER, FREDERICK (1796-1870), English novelist, was the son of an Anglo-Indian official. In 1809 he entered the navy, and was in active service until 1827. He retired in 1833, and was promoted to be captain in 1856. On his retirement he settled near Waltham Abbey, and wrote several nautical novels on the lines popularized by Marryat, that had considerable success. Thesewere TheLifeof a Sailor (1832), Ben Brace (1836), The Arethusa (1837), Jack Adams (1838), Tom Bowling (1841) and Jack Malcolm's Log (1846). He wrote a number of other

books, and edited and brought down to 1827 James's Naval History (1837).

CHAMILLART MICHEL (1652-1721), French statesman, minister of Louis XIV., was born at Paris of a family of the noblesse of recent elevation. Following the usual career of a statesman of his time he became in turn councillor of the parle- ment of Paris (1676), master of requests (1686), and intendant of the generality of Rouen (January 1689). Affable, of polished manners, modest and honest, Chamillart won the confidence of Madame de Maintenon and pleased the king. In 1690 he was made intendant of finances, and on the 5th of September 1699 the king appointed him controller-general of finances, to which he added on the following 7 th of January the ministry of war. From the first Chamillart's position was a difficult one. The deficit amounted to more than 53 million livres, and the credit of the state was almost exhausted. He lacked the great in- telligence and energy necessary for the situation, and was unable to moderate the king's warlike tastes, or to inaugurate economic reforms. He could only employ the usual expedients of the time — the immoderate sale of offices, the debasement of the coinage (five times in six years), reduction of the rate of interest on state debts, and increased taxation. He attempted to force into circulation a kind of paper money, billets de monnaie, but with disastrous results owing to the state of credit. He studied Vauban's project for the royal tithe and Boisguillebert's pro- position for the taille, but did not adopt them. In October 1706 he showed the king that the debts immediately due amounted to 288 millions, and that the deficit already foreseen for 1707 was 160 millions. In October 1707 he saw with consternation that the revenue for 1708 was already entirely eaten up by anticipation, so that neither money nor credit remained for 1708. In these conditions Chamillart, who had often complained of the overwhelming burden he was carrying, and who had already wished to retire in 1706, resigned his office of controller-general. Public opinion attributed to him the ruin of the country, though Jie had tried in 1700 to improve the condition of commerce by the creation of a council of commerce. As secretary of state for war he had to place in the field the army for the War of the Spanish Succession, and to reorganize it three times, after the great defeats of 1704, 1706 and 1708. With an empty treasury he succeeded only in part, and he frankly warned the king that the enemy would soon be able to dictate the terms of peace. He was reproached with having secured the command of the army which besieged Turin (1 706) for his son-in-law, the incapable due de la Feuillade. Madame de Maintenon even became hostile to him, and he abandoned his position on the 10th of June 1709, retiring

to his estates. He died on the 14th of April 1721.

Chamillart's papers have been published by G. Esnault, Michel Chamillart, controleur general et secretaire d'etat de la guerre, corre- spondance et papiers inedits (2 vols., Paris, 1885) ; and by A. de Bois- lisle in vol. 2 of his Correspondance des controleurs generaux (1883). See D'Auvigny, Vies des hommes illustres (1739), tome vi. pp. 288-402 ; E. Moret, Quinze annees du regne de Louis XIV (Paris, 1 851) ; and the new edition of the Memoires de St-Simon, by A. de Boislisle.

CHAMINADE, CECILE (1861-), French musical composer, was born at Paris on the 8th of August 1861. She studied in Paris, her musical talent being shown at the age of eight by the writing of some church music which attracted Bizet's attention; and at eighteen she came out in public as a pianist. Her own compositions, both songs (in large numbers) and instrumental pieces, were soon produced in profusion: melodious and interest- ing, and often charming, they became very popular, without being entitled to rank with the greater style of music. Both in Paris and in England Mile Chaminade and her works became well known at the principal concerts. In 1908 she visited America and was warmly welcomed.

CHAMISSO, ADELBERT VON [Louis Charles Adelaide de] (1 781-1838), German poet and botanist, was born at the chateau of Boncourt in Champagne, France, the ancestral seat of his family, on the 30th of January 1781. Driven from France by the Revolution, his parents settled in Berlin, where in 1796 youjig Chamisso obtained the post of page-in- waiting to the queen, and in 1 798 entered a Prussian infantry regiment as ensign.

His family were shortly afterwards permitted to return to France ; he, however, remained behind and continued his career in the army. He had but little education, but now sought dis- traction from the soulless routine of the Prussian military service in assiduous study. In collaboration with Varnhagen von Ense, he founded in 1803 the Berliner Musenalmanach, in which his first verses appeared. The enterprise was a failure, and, in- terrupted by the war, it came to an end in 1806. It brought him, however, to the notice of many of the literary celebrities of the day and

established his reputation as a rising poet. He had become lieutenant in 1801, and in 1805 accompanied his regiment to Hameln, where he shared in the humiliations follow- ing the treasonable capitulation of that fortress in the ensuing year. Placed on parole he went to France, where he found that both his parents were dead; and, returning to Berlin in the autumn of 1807, he obtained his release from the service early in the following year. Homeless and without a profession, disillusioned and despondent, he lived in Berlin until 1810, when, through the services of an old friend of the family, he was offered a professorship at the lycie at Napoleonville in La Vendee. He set out to take up the post, but drawn into the charmed circle of Madame de Stael, followed her in her exile to Coppet in Switzerland, where, devoting himself to botanical research, he remained nearly two years. In 1812 he returned to Berlin, where he continued his scientific studies. In the summer of the eventful year, 1813, he wrote the prose narrative Peter Schlemihl, the man who sold his shadow. This, the most famous of all his works, has been translated into most European languages (English by W. Howitt). It was written partly to divert his own thoughts and partly to amuse the children of his friend Hitzig. In 1 8 1 s Chamisso was appointed botanist to the Russian ship " Rurik," which Otto von Kotzebue (son of August von Kotzebue) commanded on a scientific voyage round the world. His diary of the expedition (Tagebuch, 1821) affords some interest- ing glimpses of England and English life. On his return in 1818 he was made custodian of the botanical gardens in Berlin, and. was elected a member of the Academy of Sciences, and in 1820 he married. Chamisso's travels and scientific researches re- strained for a while the full development of his poetical talent, and it was not until his forty-eighth year that he turned again to literature. In 1829, in collaboration with Gustav Schwab, and from 1832 in conjunction with Franz von Gaudy, he brought out the Deutsche Musenalmanach, in which his later poems were mainly published. He died on the 21st of August 1838.

As a scientist Chamisso has not left much mark, although his Bemerkungen und Ansichten, published in an incomplete form in O. von Kotzebue's Entdeckungsreise (Weimar, 1821) and more completely in Chamisso's Gesammelte Werke (1836), and the botanical work, Ubersicht der nutzbarsten und schadlichsten Gewachse in Norddeutschland (1829) are esteemed for their careful treatment of the subjects with which they deal. As a poet Chamisso's reputation stands high, Frauen Liebe und Leben

(1830), a cycle of lyrical poems, which was set to music by Schumann, being particularly famous. Noteworthy are also Schloss Boncourt and Salas y Gomez. In estimating his success as a writer, it should not be forgotten that he was cut off from his native speech and from his natural current of thought and feeling. He often deals with gloomy and some- times with ghastly and repulsive subjects; and even in his lighter and gayer proudctions there is an undertone of sadness or of satire. In the lyrical expression of the domestic emotions he displays a fine felicity, and he knew how to treat with true feeling a tale of love or vengeance. Die Lowenbraut may be taken as a sample of his weird and powerful simplicity; and Vergeltung is remarkable for a pitiless precision of treatment.

The first collected edition of Chamisso's works" was edited by J. E. Hitzig, 6 vols. (1836); 6th edition (1874); there are also excellent editions by M. Koch (1883) and O. F. Walzel (1892). On Chamisso's life see J. E. Hitzig, " Leben und Briefe von Adelbert yon Chamisso " (inthe Gesammelte Werke); K. Fulda, Chamissound seine Zeit (1881); G. Hofmeister, Adelbert von Chamisso (1884); and, for the scientific side of Chamisso's life, E. du Bois- Raymond, Adelbert von Chamisso als Naturforscher (1889).

CHAMKANNI, a small Pathan tribe on the Kohat border of the North-West Province of India. They inhabit the western part of the Kurmana Valley in the Orakzai portion of Tirah, but are supposed to be a distinct race. They took part in the frontier risings of 1897, and during the Tirah expedition of that year a brigade under General Gaselee was sent to punish them.

CHAMOIS, the Franco-Swiss name of an Alpine ruminant known in the German cantons as Gemse, and to naturalists as Rupicapra tragus or R. rupicapra tragus. It is the only species of its genus, and typifies a subfamily, Rupicaprinae, of hollow- horned ruminants in some degree intermediate between antelopes and goats (see Antelope). About equal in height to a roebuck, and with a short black tail, the chamois is readily distinguishable from all other ruminants by its vertical, backwardly-hooked, black horns, which are common to males and females, although smaller in the latter. Apart from black and white face-markings, and the black tail and dorsal stripe, the prevailing colour of the Alpine chamois is chestnut brown in summer, but lighter and greyer in winter. In the Pyrenees the species is represented by a small race locally known as the izard; a very brightly-coloured

form, if. t. picla, inhabits the Apennines; the Carpathian chamois is very dark-coloured, and the one from the Caucasus is the representative of yet another race. A thick under-fur is developed in the winter-coat, as in all other ruminants dwelling at high altitudes. Chamois are gregarious, living in herds of 15 or 20, and feeding generally in the morning or evening. The old males, however, live alone except in the rutting season, which occurs in October, when they join the herds, driving off the younger bucks, and engaging in fierce contests with each other, that often end fatally for one at least of the combatants. The period of gestation is twenty weeks, when the female, beneath the shelter generally of a projecting rock, produces one and sometimes two young. In summer they ascend to the limits of perpetual snow, being only exceeded in the loftiness of their haunts by the ibex; and during that season they show their intolerance of heat by choosing such browsing-grounds as have a northern exposure. In winter they descend to the wooded districts that immediately succeed the region of glaciers, and it is there only they can be successfully hunted. Chamois are exceedingly shy; and their senses, especially those of sight and smell, very acute. The herd never feeds without having a sentinel posted on some prominence to give notice of the approach of danger; which is done by stamping on the ground with the forefeet, and uttering a shrill whistling note, thus putting the entire herd on the alert. No sooner is the object of alarm scented or seen than each one seeks safety in the most inaccessible situations, which are often reached by a series of astounding leaps over crevasses, up the faces of seemingly perpendicular rocks, or down the sides of equally precipitous chasms. The. chamois will not hesitate, it is said, thus to leap down 20 or even 30 ft., and this it effects with apparent ease by throwing itself forward diagonally and striking its feet several times in its descent against the face of the rock. Chamois-shooting is most successfully pursued when a number of hunters form a circle round a favourite feeding ground, which they gradually narrow; the animals, scenting the hunters to windward, fly in the oppo- site direction, only to encounter those coming from leeward. Chamois-hunting, in spite of, or perhaps owing to the great danger attending it, has always been a favourite pursuit among the hardy mountaineers of Switzerland and Tirol, as well as of the amateur sportsmen of all countries, with the result that the animal is now comparatively rare in many districts where it was formerly common. Chamois feed in summer on mountain-herbs and flowers, and in winter chiefly on the young shoots and buds of fir and pine trees. They are

particularly fond of salt, and in the Alps sandstone rocks containing a saline impregnation are often met with hollowed by the constant licking of these creatures. The skin of the chamois is very soft; made into leather it was the original shammy, which is now made, however, from the skins of many other animals. The flesh is prized as venison. (R. L.*)

CHAMOMILE, or Camomile Flowers, the flores anthemidis of the British Pharmacopoeia, the flower-heads of Anthemis nobilis (Nat. Ord. Compositae) , a herb indigenous to England and western Europe. It is cultivated for medicinal purposes in Surrey, at several places in Saxony, and in France and Belgium, — that grown in England being much more valuable than any of the foreign chamomiles brought into the market. In the wild plant the florets of the ray are ligulate and white, and contain pistils only, those of the disk being tubular and yellow; but under cultivation the whole of the florets tend to become ligulate and white, in which state the flower-heads are said to be double. The flower -heads have a warm aromatic odour, which is characteristic of the entire plant, and a very bitter taste. In addition to a bitter extractive principle, they yield about 2 % of a volatile liquid, which on its first extraction is of a pale blue colour, but becomes a yellowish brown on exposure to light. It has the characteristic odour of the flowers, and consists of a mixture of butyl and amyl angelates and valerates. Angelate of potassium has been obtained by treatment of the oil with caustic potash, and angelic acid may be isolated from this by treatment with dilute sulphuric acid. Chamomile is used in medicine in the form of its volatile oil, of which the dose is 5-3 minims. There is an official extract which is never used. Like all volatile oils the drug is a stomachic and carmi- native. In large doses the infusion is a simple emetic.

Wild chamomile is Matricaria Chamomilla, a weed common in waste and cultivated ground especially in the southern counties of England. It has somewhat the appearance of true chamomile, but a fainter scent.

CHAMONIX, a mountain valley in south-east France, its chief village, of the same name, being the capital of a canton of the arrondissement of Bonneville in the department of Haute- Savoie.

The valley runs from N.E. to S.W., and is watered by the Arve, which rises in the Mer de Glace. On the S.E. towers the snowclad chain of Mont Blanc, and on the N.W.the less lofty, but rugged chain of the Brevent and of the Aiguilles Rouges. Near the head of the valley is the village of Argentiere Uior ft.), which is connected with Switzerland by " char " (light carriage) roads over the Tete Noire and past Salvan, and by a mule path over the Col de Balme, which joins the Tete Noire route near Trient and then crosses by a " char " road the Col de la Forclaz to Martigny in the Rhone valley. The principal village, Chamonix (3416 ft.), is 6 m. below Argentiere by electric railway (which continues via Finhaut to Martigny) and is visited annually by a host of tourists, as it is the best starting-point for the exploration of the glaciers of the Mont Blanc chain, as well as for the ascent of Mont Blanc itself. It is connected with Geneva by a railway (55 m.). In 1906 the population of the village was 806, of the commune 3482.

The valley is first heard of about 1001, when it was granted by the count of the Genevois to the great Benedictine house of St Michel de la Cluse, near Turin, which by the early 13th century established a priory therein. But in 1 786 the inhabitants bought their freedom from the canons of Sallanches, to whom the prioiy had been transferred in 1 519. In 1530 the inhabitants obtained from the count of the Genevois the privilege of holding two fairs a year, while the valley was often visited by the civil officials and by the bishops of Geneva (first recorded visit in 141 1, while St Francis de Sales came thither in 1606). But travellers for pleasure were long rare. The first party to publish (1744) an account of their visit was that of Dr R. Pococke, Mr W. Windham and other Englishmen who visited the Mer de Glace in 1741. In 1742 came P. Martel and several other Genevese, in 1760 H. B. de Saussure, and rather later Bourrit.

See J. A. Bonnefoy and A. Perrin, Le Prieurc de Chamonix (2 vols., Chambery, 1879 and 1883); A. Perrin, Histoire de la vallee et du prieure de Chamonix (Chambery, 1887); L. Kurz and X. Imfeld, Carte de la chatne du Mont Blanc (1896; new ed., 1905); L. Kurz, Climbers' Guide to the Chain of Mont Blanc (London, 1892); also works referred to under Blanc, Mont. (W. A. B. C.)

CHAMPAGNE, an ancient province of the kingdom of France, bounded N. by Liege and Luxemburg; E. by Lorraine; S. by Burgundy; and W. by Picardy and Isle de France. I* now

forms the departments of Ardennes, Marne, Aube and Haute

Marne, with part of Aisne, Seine-et-Marne, Yonne and Meuse. Its name — in Latin Campania, ” country of plains ” — is derived from the immense plains near Reims, Chalons and Troyes. It was constituted towards the end of the middle ages by joining to the countship of Champagne the ecclesiastical duchies of Reims and Langres, together with the ecclesiastical countship of Chalons. Documents of the 12th and 13th centuries make it possible to determine the territorial configuration of the countship of Champagne with greater accuracy than in the case of any other fief of the crown of France. Formed at random by the acquisitions of the counts of the houses of Vermandois and Blois, Champagne reckoned among its dependencies, from 1 1 52 to 1 234, the countship of Blois and Chartres, of which Touraine was a fief, the countship of Sancerre, and various scattered fiefs in the Bourbonnais and in Burgundy. Officially called the ” countship of Champagne and Brie ” since 12 17, this state was formed by the union of the countships of Troyes and Meaux, to which the greater part of the districts embraced in the country known, since the beginning of the middle ages, by the name of Champagne and Brie came in course of time to be attached. Placed under the authority of a single count in 960, the countships of Troyes and Meaux were not again separated after 1125. For the counts of Troyes before the nth century see Troyes. We confine ourselves here to the counts of Champagne of the house of Blois.

About 1020 Eudes or Odo L (Odo II., count of Blois) became count of Champagne. He disputed the kingdom of Burgundy with the emperor Conrad, and died in 1037, in a battle near Bar- le-Duc. In 1037 he was succeeded by his younger son, Stephen II. About 1050 Odo II., son of Stephen II., became count. This prince, guilty of murder, found refuge in Normandy, where he received the castle of Aumale. He took part in 1066 in the conquest of England, and became earl of Holderness. About 1063 Theobald (Thibaud) I., count of Blois and Meaux, eldest son of Odo I., became count of Champagne. In 1077 he seized the countships of Vitry and Bar-sur-Aube, left vacant by Simon of Valois, who had retired to a monastery. In 1089 Odo III. , second son of Theobald II., became count, and was succeeded about 1093 by his younger brother, Hugh, who became a templar in 1125, and gave up the countship to his suzerain, the count of Blois. In 1 1 25 the countship of Champagne passed to Theobald II. the Great, already count of Blois and Meaux, and one of the most powerful French barons of his time. He was related to the royal house of

England, and incurred the displeasure of the king of France, who in 1142 invaded Champagne and burnt the town of Vitry. After Theobald the Great the countship of Blois ceased to be the dominant fief of his house and became the appanage of a younger branch. In n 52 Henry the Liberal, eldest son of Theobald II., became count of Champagne; he married Mary, daughter of Louis VII. of France, and went to the crusade in 1 1 78. He was taken prisoner by the Turks, recovered his liberty through the good offices of the emperor of the East, and died a few days after his return to Champagne. In 1 181 his eldest son, Henry II., succeeded him under the tutelage of Mary of France. In 1190 he went to the Holy Land, and became king of Jerusalem in 1 192 by his marriage with Isabelle, widow of the marquis of Mont- ferrat. He died in 1 197 in his town of Acre from the results of an accident. In 1197 Theobald III., younger son of Henry I., be- came count, and was succeeded in 1201 by Theobald IV., " le Chansonnier " (the singer), who was the son of Theobald III. and Blanche of Navarre, and was born some days after the death of his father. From 1201 to 1222 he remained under the tutelage of his mother, who governed Champagne with great sagacity. The reign of this prince was singularly eventful. The two daughters of count Henry II. successively claimed the countship, so that Theobald had to combat the claims of Philippa, wife of Erard of Brienne, seigneur of Rameru, from 12 16 to 1222, and those of Alix, queen dowager of Cyprus, in 1233 and 1234. In 1 2 26 he followed king Louis VII. to the siege of Avignon, and after the death of that monarch played a prominent part during the reign of St Louis. At first leagued with the malcontent barons, he allowed himself to be gained over by the queen-mother, and

thus eame into collision with his old allies. He became king of Navarre in 1234 by the death of his maternal uncle, Sancho VII. but by the onerous treaty which he concluded in that year with the queen of Cyprus he was compelled to cede to the king, in return for a large sum of money, the overlordship of the countships of Blois, Chartres and Sancerre, and the viscounty of Chateaudun. In 1239 and 1 240 he took part in an expedition to the Holy Land, probably accompanied St Louis in 1242 in the campaign of Saintonge against the English, and died on the 14th of July 1254 at Pampeluna. If the author of the Grandes chroniques de France can be believed, Theobald IV. conceived a

passion for Queen Blanche, the mother of St Louis, — a passion which she returned, and which explains the changes in his policy; but this opinion apparently must be relegated to the category of historical fables. The witty and courtly songs he composed place him in the front rank of the poets of that class, in which he showed somewhat more originality than his rivals. In 1 254 Theobald V. the Young, eldest son of Theobald IV. and, like his father, king of Navarre, became count of Champagne. He married Isabelle of France, daughter of St Louis, and followed his father-in-law to Tunis to the crusade, dying on his return. In 1270 he was succeeded by Henry III. the Fat, king of Navarre. Henry was succeeded in 1274 by his only daughter, Joan of Navarre, under the tutelage of her mother, Blanche of Artois, and afterwards of Edmund, earl of Lancaster, her mother's second husband. In 1 284 she married the heir-presumptive to the throne of France, Philip the Fair, to whom she brought the countship of Champagne as well as the kingdom of Navarre. She became queen of France in 1285, and died on the 4th of April 1305, when her eldest son by King Philip, Louis Hutin, became count of Champagne. He was the last independent count of the province, which became attached to the French crown on his accession to the throne of France in 1314.

The celebrated fairs of Champagne, which flourished in the 1 2 th and 13 th centuries, were attended by merchants from all parts of civilized Europe. They were six in number: two at Troyes, two at Provins, one at Lagny-sur-Marne, and one at Bar-sur- Aube. They formed a kind of continuous market, divided into six periods, and passed in turn from Lagny to Bar, from Bar to Provins, from Provins to Troyes, from Troyes to Provins and from Provins to Troyes, to complete the year. It was, in fact, a perpetual fair, which had at once unity and variety, offering to the different parts of the countship the means of selling succes- sively the special productions of their soil or their industry, and of procuring in exchange riches and comforts. These fairs had special legislation; and special magistrates, called " masters of the fairs," had control of the police.

For the wine " champagne " see Wine.

Authorities.— H. d Arbois de Jubainville, Histoire des dues et des comtes de Champagne (1859-1866); A. Longnon, Documents relatifs au comte de Champagne et de Brie (1901 seq. ; vol. i. with map) ; F. Bourquelot, Mtudes sur les foires de Champagne (1865). (A. Lo.)

CHAMPAGNY, JEAN BAPTISTE NOMPERE DE (1756-1834), French politician, was born at Roanne, and entered the navy in 1774. He fought through the war in America and resigned in 1787. Elected deputy by the noblesse of Forex to the states- general in 1789, he went over to the third estate on the 21st of June and collaborated in the work of the Constituent Assembly, especially occupying himself with the reorganization of the navy. A political career seems to have attracted him little; he remained in private life from 1791 to 1799, when Napoleon named him member of the council of state. From July 1801 to August 1804 he was ambassador of France at Vienna, and directed with great intelligence the incessant negotiations between the two courts. In August 1804 Napoleon made him minister of the interior, and in this position, which he held for three years, he proved an administrator of the first order. In addition to the ordinary charges of his office, he had to direct the recruitment of the army, organize the industrial exhibition of 1808, and to complete the public works undertaken in Paris and throughout France. He was devoted to Napoleon, on whom he lavished adulation in his speeches. In August 1807 the emperor chose him to succeed

Talleyrand as minister for foreign affairs. He directed the annexation of the Papal States in April 1808, worked to secure the abdication of Charles IV. of Spain in May 1808, negotiated the peace of Vienna (1809) and the marriage of Napoleon. In April 181 1 a quarrel with the emperor led to his retirement, and he obtained the sinecure office of intendant general of the crown. In 1 8 14, after the abdication, the empress sent him on a fruitless mission to the emperor of Austria. Then he went over to the Bourbons. During the Hundred Days he again joined Napoleon. This led to his exclusion by Louis XVIII. , but in 1819 he re- covered his dignity of peer. He died in Paris in 1834. He had three sons who became men of distinction. Francois (1804-1882) was a well-known author, who was made a member of the French Academy in 1869. His great work was a history of the Roman empire, in three parts, (1) Les CSsars (1841-1843, 4 vols.), (2) Les Antonins (1863, 3 vols.), (3) Les Cesars du III' siecle (1870, 3 vols.). Napoleon (1806-1872) published a Traill de la police municipale in 4 volumes (1844-1861), and was a deputy in the Corps Legislatif from 1852 to 1870. Jerome Paul (1809- 1886) was also deputy in the Corps Legislatif from 1853 to 1870, and was made honorary chamberlain in 1859. He worked at the official publication of the correspondence of Napoleon I.

CHAMPAIGN, a city of Champaign county, Illinois, U.S.A., about

125 m. S. by W. of Chicago, on the head-w r aters of the Vermilion river. Pop. (1890) 5839; (1900) 9098, of whom 973 were foreign-born; (1910 census) 12,421. It is served by the Cleveland, Cincinnati, Chicago & St Louis, the Wabash, and the Illinois Central railways (the last having repair shops here), and by the Illinois (electric) Traction System from Danville, Illinois, to St Louis, Missouri. In 1 906 the city covered 3 • 5 sq. m. ; it is situated in a rich agricultural region, and has small manufacturing interests. Immediately east of Champaign is the city of Urbana, the county-seat of Champaign county, served by the Wabash and the Cleveland, Cincinnati, Chicago & St Louis railways, with repair shops of the latter. In 1890 the population of Urbana was 3511; in 1900, 5728 (300 foreign-born); in 1910, 8245. Partly in Urbana and partly in Champaign is the University of Illinois (see Illinois) ; immediately south of its campus is the 400-acre farm of the university. Each city has a public library, and in Champaign are the Burnham Athenaeum, the Burnham hospital, the Garwood home for old ladies, and several parks, all gifts of former citizens. Champaign was founded in 1855, incorporated as a city in i860, and re-chartered in 1883. Urbana secured a city charter in 1855.

CHAMPAIGNE, PHILIPPE DE (1602-1674), Belgian painter of the French school, was born at Brussels of a poor family. He was a pupil of J. Fouquieres; and, going to Paris in 1621, was employed by N. Du Chesne to paint along with Nicholas Poussin in the palace of the Luxembourg. His best works are to be found at Vincennes, and in the church of the Carmelites at Paris, where is his celebrated Crucifix, a signal perspective success, on one of the vaultings. After the death of Du Chesne, Philippe became first painter to the queen of France, and ultimately rector of the Academy of Paris. As his age advanced and his health failed, he retired to Port Royal, where he had a daughter cloistered as a nun, of whom (along with Catherine Agnes Arnauld) he painted a celebrated picture, now in the Louvre, highly remark- able for its solid unaffected truth. This, indeed, is the general character of his work, — grave reality, without special elevation or depth of character, or charm of warm or stately colour. He pro- duced an immense number of paintings, religious and other subjects as well as portraits, dispersed over various parts of France, and now over the galleries of Europe. Philippe was a good man, indefatigable, earnest and scrupulously religious. He died on the 12th of August 1674.

CHAMPARAN, or Chumparun, a district of British India, in the

Patna division of Bengal, occupying the north-west corner of Behar, between the two rivers Gandak and Baghmati and the Nepal hills. It has an area of 3531 sq. m. In 1901 the population was 1,790,463, showing a decrease of 4% in the decade. A broad grass-covered road or embankment defines the Nepal frontier, except where rivers or streams form a natural

boundary. The district is a vast level except in the N. and N.W., where it undulates, and gradually assumes a rugged appearance as it approaches the mountains and forests of Nepal. Wide uncultivated tracts cover its north-western corner; the southern and western parts are carefully cultivated, and teem with an active agricultural population. The principal rivers are the Gandak, navigable all the year round, the Buri Gandak, Panch Nadi, Lalbagia, Koja and Teur. Old beds of rivers intersect Champaran in every direction, and one of these forms a chain of lakes which occupy an area of 139 sq. m. in the centre of the district. Champaran, with the rest of Bengal and Behar, was acquired by the British in 1765. Up to 1866 it remained a subdivision of Saran. In that year it was separated and formed into a separate district. The administrative headquarters are at Motihari (population, 13,730); Bettia is the centre of a very large estate; Segauli, still a small military station, was the scene of a massacre during the Mutiny. Champaran was the chief seat of indigo planting in Behar before the decline of that industry. There are about 40 saltpetre refineries. The district suffered severely from drought in 1866 and 1874, and again in 1897. In the last year a small government canal was opened, and a canal from the Gandak has also been constructed. The district is traversed almost throughout its length to Bettia by the Tirhoot state railway. A considerable trade is conducted with Nepal.

CHAMPEAUX, WILLIAM OF [Gulielmus Campellensis] (c. 1070-1121), French philosopher and theologian was born at Champeaux near Melun. After studying under Anselm of Laon and Roscellinus, he taught in the school of the cathedral of Notre Dame, of which he was made canon in 1103. Among his pupils was Abelard. In 1108 he retired into the abbey of St Victor, where he resumed his lectures. He afterwards became bishop of Chalons-sur-Marne, and took part in the dispute concerning investitures as a supporter of Calixtus II., whom he represented

at the conference of Mousson. His only printed works are a fragment on the Eucharist (inserted by Jean Mabillon in his edition of the works of St Bernard), and the M or alia Abbreviata and De Origine Animae (in\E. Martene's Thesaurus novus Anecdotorum, 1717, vol. 5). In the last of these he maintains that children who die unbaptized must be lost, the pure soul being defiled by the grossness of the body, and declares that God's will is not to be questioned. He upholds the theory of Creatianism (that a soul is specially created for each human being). Ravaisson-Mollien has discovered a number of fragments by him, among which the most important is the De Essentia Dei et de Substantia Dei; a Liber Sententiarum, consisting of discussions on ethics and Scriptural interpretation, is also ascribed to Champeaux. He is reputed the founder of Realism. For his views and his controversy with Abelard, see Scholasticism and Abelard.

See Victor Cousin, introduction to his Outrages inedits d' 'Abelard (1836), and Fragments pour servir a Vhistoire de la philosophie (1865) ; G. A. Patru, Wilhelmi Campellensis de natura et de origine rerum placita (1847) ; E. Michaud, Guillaume de Champeaux et les ecoles de Paris au XII' siecle (2nd ed., 1868); " William of Champeaux and his Times" in Christian Observer, lxxii. 843; B. Haureau, De la philosophie scolastique (Paris, 1850) ; Opuscula in J. P. Migne's Patrologia, clxiii.

CHAMPERTY, or Champaety (Lat. campi partitio, 0. Fr. champ parti), in English law, a bargain between a plaintiff or defendant in a cause and another person, to divide the land {campum partiri) or other matter sued for, if they prevail, in consideration of that person carrying on or defending the suit at his own expense. It is a misdemeanour punishable by fine or imprisonment. It differs only from maintenance (q.v.), in that the recompense for the service which has been given ' is always part of the matter in suit, or some profit growing out of it. So an agreement by a solicitor not to charge costs on condition of retaining for himself a share of the sums recovered would be illegal and void. It is not, however, champerty to charge the subject-matter of a suit in order to obtain the means of prosecuting it.

See Fifth Report of the Criminal Law Commissioners, pp. 34-9.

CHAMPION (Fr. champion, Late Lat. campio from campus, a field or open space, i.e. one " who takes the field " or fights; cf. Ger. Kampf, battle, and Kampfer, fighter), in the judicial combats of

the middle ages the substitute for a party to the suit disabled from bearing arms or specially exempt from the duty to do so (see Wager). Hence the word has come to be applied to any one who " champions," or contends on behalf of, any person or cause. In the laws of the Lombards (lib. ii. tit. 56 §§ 38, 39), those who by reason of youth, age or infirmity could not bear arms were allowed to nominate champions, and the same provision was made in the case of women (lib. i. tit. 3 § 6, tit. 16, §2). This was practically the rule laid down in all subsequent legislation on the subject. Thus the Assize oj Jerusalem (cap. 39) says: " These are the people who may defend themselves through champions; a woman, a sick man, a man who has passed the age of sixty, &c." The clergy, too, whether as individuals or corporations, were represented by champions; in the case of bishops and abbots this function was part of the duties of the advocatus (see Advocate). Du Cange gives instances of mercenary champions (campiones conductitii) , who were regarded as " infamous persons " and sometimes, in case of defeat, were condemned to lose hand or foot. Sometimes championships were " serjeanties," i.e. rendered service to lords, churches or cities in consideration of the grant of certain fiefs, or for annual money payments, the champion doing homage to the person or corporation represented by him {campiones homagii).

The office of " king's champion " {campio regis) is peculiar to England. The function of the king's champion, when the ceremonial of the coronation was carried out in its completeness, was to ride, clad in complete armour, on his right the high constable, on his left the earl marshal, into Westminster Hall during the coronation banquet, and challenge to single combat any who should dispute the king's right to reign. The challenge was thrice repeated by the herald, at the entrance to the hall, in the centre, and at the foot of the dais. On picking up his gauntlet for the third time the champion was pledged by the king in a gilt-covered cup, which was then presented to him as his fee by the king. If he had had occasion to fight, and was victorious, his fee would have been the armour he wore and the horse he rode, the second best in the royal stables; but no such occasion has ever arisen. This picturesque ceremonial was last performed at the coronation of George IV. The office of king's champion is of great antiquity, and its origins are involved in great obscurity. It is said to have been held under William the Conqueror by Robert or Roger Marmion, whose ancestors had been hereditary champions in Normandy. The first authentic record, however is a charter of

Henry I., signed by Robert Marmion {Robertus de Bajucis campio regis). Of the actual exercise of the office the earliest record dates from the coronation of Richard II. On this occasion the champion, Sir John Dymoke, appeared at the door of the Abbey immediately after the corona- tion mass, but was peremptorily told to go away and return later; moreover, in his bill presented to the court of claims, he stated that the champion was to ride in the procession before the service, and make his challenge to all the world. This seems to show that the ceremony, as might be expected, was originally performed before the king's coronation, when it would have had some significance. The office of king's champion is hereditary, and is now held by the family of Dymoke {q.v.).

See Du Cange, Glossarium, s.v. " Campio " ; L. G. Wickham Legg, English Coronation Records (Westminster, 1901) ; J. H. T. Perkins, The Coronation Book (London, 1902).

CHAMPIONNET, JEAN ETIENNE (1762-1800), French general, enlisted in the army at an early age and served in the great siege of Gibraltar. When the Revolution broke out he took a prominent part in the movement, and was elected by the men of a battalion to command them. In May 1793 he was charged with the suppression of the disturbances in the Jura, which he quelled without bloodshed. Under Pichegru he took part in the Rhine campaign of that year as a brigade commander, and at Weissenburg and in the Palatinate won the warm com- mendation of Lazare Hoche. At Fleurus his stubborn fighting

in the centre of the field contributed greatly to Jourdan's victory. In the subsequent campaigns he commanded the left wing of the French armies on the Rhine between Neuwied and Dusseldorf, and took a great part in all the successful and unsuccessful expeditions to the Lahn and the Main. In 1798 Championnet was named commander-in-chief of the " army of Rome " which was protecting the infant Roman republic against the Neapolitan court and the British fleet. Nominally 32,000 strong, the army scarcely numbered 8000 effectives, with a bare fifteen cartridges per man. The Austrian general Mack had a tenfold superiority in numbers, but Championnet so well held his own that he ended by capturing Naples itself and there setting up the Parthenopean

Republic. But his intense earnestness and intolerance of opposition soon embroiled him with the civilians, and the general was recalled in disgrace. The following year, however, saw him again in the field as commander-in-chief of the " army of the Alps." This, too, was at first a mere paper force, but after three months' hard work it was able to take the field. The campaign which followed was uniformly unsuccessful, and, worn out by the unequal struggle, Championnet died at Antibes on the 9th of January 1800. In 1848 a statue was erected in his honour at Valence.

See A. R. C. de St Albin, Championnet, ou les Campagnes de Hollande, de Rome et de Naples (Paris, i860).

CHAMPLAIN, SAMUEL DE (1567-1635), French explorer, colonial pioneer and first governor of French Canada, was born at Brouage, a small French port on the Bay of Biscay, in 1567. His father was a sea captain, and the boy was early skilled in seamanship and navigation. He entered the army of Henry IV., and served in Brittany under Jean d'Aumont, Frangois de St Luc and Charles de Brissac. When the army of the League was disbanded he accompanied his uncle, who had charge of the ships in which the Spanish allies were conveyed home, and on reaching Cadiz secured (1599) the command of one of the vessels about to make an expedition to the West Indies. He was gone over two years, visiting all the principal ports and pushing inland from Vera Cruz to the city of Mexico. The MS. account of his adventures, Bref Discours des Choses plus remarquables que Samuel Champlain de Brouage a recognues aux Indes Occidentals, is in the library at Dieppe. It was not published in French until 1870, although an English translation was printed by the Hakluyt Society in 1859. It contains a suggestion of a Panama Canal, " by which the voyage to the South Sea would be shortened by more than 1500 leagues." In 1603 Champlain made his first voyage to Canada, being sent out by Aymar de Clermont, seigneur de Chastes, on whom the king had bestowed a patent. Champlain at once established friendly relations with the Indians and explored the St Lawrence to the rapids above Montreal. On his return he published an interesting and historically valuable little book, Des sauvages, ou voyage de Samuel Champlain de Brouage fait en la France Nouvelle. During his absence de Chastes had died, and his privileges and fur trade monopolies were conferred upon Pierre de Guast, sieur de Monts (1560-1611). With him, in 1604, Champlain was engaged in exploring the coast as far south as Cape Cod, in seeking a site for

a new settlement, and in making surveys and charts. They first settled on an island near the mouth of the St Croix river, and then at Port Royal — now Annapolis, N.S.

Meanwhile the Basques and Bretons, asserting that they were being ruined by de Monts' privileges, got his patent revoked, and Champlain returned with the discouraged colonists to Europe. When, however, in modified form, the patent was re-granted to his patron Champlain induced him to abandon Acadia and establish a settlement on the St Lawrence, of the commercial advantages of which, perhaps even as a western route to China and Japan, he soon convinced him. Champlain was placed in command of one of the two vessels sent out. He was to explore and colonize, while the other vessel traded, to pay for the expedition. Champlain fixed on the site of Quebec and founded the first white settlement there in July 1608, giving it its present name. In the spring he joined a war party of Algonquins and Hurons, discovered the great lake that bears his name, and, near

the present Ticonderoga, took with his arquebus an important part in the victory which his savage friends obtained over the Iroquois. The Iroquois naturally turned first to the Dutch and then to the English for allies. " Thus did new France rush into collision with the redoubted warriors of the Five Nations. Here was the beginning, and in some measure doubtless the cause, of a long suite of murderous conflicts, bearing havoc and flame to generations yet unborn " (Parkman). Champlain returned to France and again related to Henry IV. — who had previously learned his worth and had pensioned him — his exciting adventures. De Monts failed to secure a renewal of his patent, but resolved to proceed without it. Champlain was again (161 1) in Canada, fighting for and against the Indians and establishing a trading post at Mont Royal (see Montreal). He was the third white man to descend, and the second to descend successfully, the Lachine Rapids. De Monts, now governor of Paris, was too busy to occupy himself in the waning fortunes of the colony, and left them entirely to his associate. An influential protector was needed; and Champlain prevailed upon Charles de Bourbon, comte de Soissons, to interest himself to obtain from the king the appointment of lieutenant-general in New France. The comte de Soissons died almost immediately, and was succeeded in the office by Henri de Bourbon, prince de Conde, and he, like his predecessors and successors, retained Champlain as lieutenant-governor. " In Champlain alone was the life of New France. By instinct and temperament he was more impelled to the

adventurous toils of exploration than to the duller task of building colonies. The profits of trade had value in his eyes only as means to these ends, and settlements were important chiefly as a base of discovery. Two great objects eclipsed all others, — to find a route to the Indies, and to bring the heathen tribes into the embraces of the Church, since, while he cared little for their bodies, his solicitude for their souls knew no bounds" (Parkman).

In 1 6 1 3 Champlain again crossed the Atlantic and endeavoured to confirm Nicolas de Vignau's alleged discovery of a short route to the ocean by the Ottawa river, a great lake at its source, and another river flowing north therefrom. That year he got as far as Allumette Island in the Ottawa, but two years later, with a " Great War Party " of Indians, he crossed Lake Nipissing and the eastern ends of Lakes Huron and Ontario, and made a fierce but unsuccessful attack on an Onondaga fortified town a few miles south of Lake Oneida. This was the end of his wanderings. He now devoted himself to the growth and strengthening of Quebec. Every year he went to France with this end in view. He was one of the hundred associates of the Company of New France, created by Richelieu to reform abuses and take over all his country's interests in the new world. These ill-defended possessions England now prepared to seize. Three ships were sent out under letters of marque commanded by David, Lewis and Thomas Kirke, and Quebec, already on the verge of starvation, was compelled to surrender (1629). Champ- lain was taken to England a prisoner, but when Canada was restored to the French he returned (1633) to his post, where he died on the 25th of December 1635. He had married in 1610, Helene Boulle, then but twelve years old. She did not leave France for Canada, however, until ten years later. After his death she became a nun.

Champlain's complete works in 6 vols, were published under the patronage of the university of Laval in 1870. There is a careful translation of Champlain's Voyages, by Professor and Mrs E. G. Bourne in the " Trailmaker " series edited by Prof. J. B. McMaster. See F. Parkman, Pioneers of France in the New World (1865); J- Winsor, Cartier to Frontenac (1894); N. E. Dionne, Champlain (i9°5)- (N. E. D.)

CHAMPLAIN, a lake lying between the states of New York and Vermont, U.S.A., and penetrating for a few miles into Canada. It extends about 130 m. from N. to S., varies from 1 m. to 1 m. in width for 40 m. from its S. terminus, and then widens until it reaches a maximum width of about 1 1 m. near Ausable Point. Its

area is about 500 sq. m. Its surface is 96 ft. above the sea. In the north part it is generally from 200 to 300 ft. deep; opposite Essex, N.Y., near its middle, the depth

increases to 400 ft.; but farther south it is much less; throughout the greater part of the lake there is a depth of water of more than 100 ft. Since the lake is caused by the ponding of water in a broad irregular valley, the shore line is nearly everywhere much broken, and in the northern portion are several islands, both large and small, most of which belong to Vermont. These islands divide the lake's northern end into two large arms which extend into Canada. From the western arm the Richelieu river flows out, carrying the water of Champlain to the St Lawrence. The waters abound in salmon, salmon- trout, sturgeon and other fish, and are navigated from end to end by large steamboats and vessels of considerable tonnage. The lake was formerly the seat of extensive traffic, especially in lumber, but navigation has greatly decreased; the tonnage entering and clearing at the lake was twice as great in the early '7o's as it was thirty years later. The principal ports are Burlington, Vt., and Plattsburg, N.Y. Lake Champlain lies in a valley from 1 to 30 m. wide, between the Green Mountains on the east and the Adirondack Mountains on the west, and the scenery is most picturesque. On the east side is a rather gradual ascent for 20 m. or more from shore to summit, while on the west side the ascent is by a succession of hills, in some places from the water's edge. North of Crown Point low mountains rise 1000 to 1600 ft. above the lake, and behind these are the higher peaks of the Adirondacks, reaching an elevation of more than 5000 ft. Lake George is a tributary on the south, several small streams flow in from each side; the Champlain Canal, 63 m. in length, connects the lake with the Hudson river; and through the Richelieu it has a natural outlet to the north into the St Lawrence.

Lake Champlain was named from Samuel de Champlain, who discovered it in July 1609. The valley is a natural pathway between the United States and Canada, and during the various wars which the English have waged in America it had great strategic importance. In 1731 the French built a fort at Crown Point; in 1756, another at Ticonderoga; and both were important strategic points in the French and Indian War as well as in

the American War of Independence. On the nth of October 1776, the first battle between an American and a British fleet, the battle of Valcour Island, was fought on the lake. Benedict Arnold, the American commander, with a decidedly inferior force, withstood the British under Thomas Pringle for about seven hours, and then during the night escaped through the enemy's line. Although overtaken the next day he again, after a fight of a few hours, made a successful retreat.

At the beginning of the War of 181 2 the American naval force on the lake, though very small, was superior to that of the British, but on the 3rd of June 1813 the British captured two American sloops in the narrow channel at the northern end and gained supremacy. Both sides now began to build and equip vessels for a decisive contest; by May 1814 the Americans had regained supremacy, and four months later a British land force of 11,000 men under Sir George Prevost (1767-1816) and a naval force of 16 vessels of about 2402 tons with 937 men and 92 guns under Captain George Downie (d. 1814) confronted an American land force of 1500 men under Brigadier-General Alexander Macomb (1782-1841), strongly entrenched at Platts- burg, and an American naval force (anchored in Plattsburg Bay) of 14 vessels of about 2244 tons with 882 men and 86 guns under Commodore Thomas Macdonough (1783-1825). In the open lake the British naval force should have been the superior, but at anchor in the bay the Americans had a decided advantage. Expecting the British land force to drive the American fleet from its anchorage, Captain Downie, on the nth of September 1814, began the battle of Lake Champlain. It had continued only fifteen minutes when he was killed; the land force failed to co-operate, and after a severe fight at close range for 2§ hours, during which the British lost about 300 men, the Americans 200 and the vessels of both sides were greatly shattered, the British retreated both by land and by water, abandoning their plan of invading New York.

See C. E. Peet, " Glacial and Post-Glacial History of the Hudson and Champlain Valleys," in vol. xii. of the Journal of Geology

(Chicago, 1904); P. S. Palmer, History of Lake Champlain (Albany. 1866) ; and Capt. A. T. Mahan, Sea Power in its Relations to the War of 1812 (2 vols., Boston, 1905).

CHAMPMESlJ, MARIE (1642-1698), French actress, was born in Rouen of a good family. Her father's name was Desmares. She made her first appearance on the stage at Rouen with Charles

Chevillet (1645-1701), who called himself sieur de Champmesle, and they were married in 1666. By 1669 they were playing in Paris at the Theatre du Marais, her first appear- ance there being as Venus in Boyer's File de Venus. The next year, as Hermione in Racine's Andromaque, she had a great success at the Hotel de Bourgogne. Her intimacy with Racine dates from then. Some of his finest tragedies were written for her, but her repertoire was not confined to them, and many an indifferent play — like Thomas Corneille's Ariane and Comte d' Essex — owed its success to " her natural manner of acting, and her pathetic rendering of the hapless heroine." Phedre was the climax of her triumphs, and when she and her husband deserted the Hotel de Bourgogne (see Bf.jart ad fin.), it was selected to open the Comedie Francaise on the 26 th of August 1680. Here, with Mme Guerin as the leading comedy actress, she played the great tragic love parts for more than thirty years, dying on the 15th of May 1698. La Fontaine dedicated to her his novel Belphegor, and Boileau immortalized her in verse. Her husband distinguished himself both as actor and playwright, and his Parisien (1682) gave Mme Guerin one of her greatest successes.

Her brother, the actor Nicolas Desmares (c. 1650-1714), began as a member of a subsidized company at Copenhagen, but by her influence he came to Paris and was received in 1685 sans debut — the first time such an honour had been accorded — ■ at the Comedie Franchise, where he became famous for peasant parts. His daughter, to whom Christian V. and his queen stood sponsors, Christine Antoinette Charlotte Desmares (1682- 1 753), was a fine actress in both tragedy and soubrette parts. She made her debut at the Comedie Francaise in 1699, in La Grange Chancel's Oreste et Pylade, and was at once received as societaire. She retired in 1721.

CHAMPOLLION, JEAN FRANCOIS (1790-1832), French Egyptologist, called le Jeune to distinguish him from Cham- pollion-Figeac (q.v.), his elder brother, was born at Figeac, in the department of Lot, on the 23rd of December 1790. He was educated by his brother, and was then appointed government pupil at the Lyceum, which had recently been founded. His first work (1804) was an attempt to show by means of their names that the giants of the Bible and of Greek mythology were personifications of natural phenomena. At the age of sixteen (1807) he read before the academy of Grenoble a paper in which he maintained that the Coptic was the ancient language of Egypt. He soon after removed to Paris, where he enjoyed the friendship

of Langles, De Sacy and Millin. In 1809 he was made professor of history in the Lyceum of Grenoble, and there published his earlier works. Champollion's first decipherment of hieroglyphics dates from 1821. In 1824 he was sent by Charles X. to visit the collections of Egyptian antiquities in the museums of Turin, Leghorn, Rome and Naples; and on his return he was appointed director of the Egyptian museum at the Louvre. In 1828 he was commissioned to undertake the conduct of a scientific expedition to Egypt in company with Rosellini, who had received a similar appointment from Leopold II., grand duke of Tuscany. He remained there about a year. In March 1 83 1 he received the chair of Egyptian antiquities, which had been created specially for him, in the College de France. He was engaged with Rosellini in publishing the results of Egyptian researches at the expense of the Tuscan and French governments, when he was seized with a paralytic disorder, and died at Paris in 1832. Champollion, whose claims were hotly disputed for many years after his death, is now universally acknowledged to have been the founder of Egyptology.

He wrote UHgypte sous les Pharaons (2 vols. 8vo, 1814); Sur I'ecriture hieratique (1821); Sur I' ecriture demotique ; Precis du sys- teme hieroglyphique, &c. (1824); Pantheon egyptien, ou collection des personnages mythologiques de I'ancienne Egypte (incomplete) ;

Monumens de I'fcgyple el de la Nubie consideres par rapport d, Vhistoire, la religion, &c; Grammaire egyptienne (1836), and Dictionnaire egyptienne (1841), edited by his brother; Analyse methodique du texte demotique de Rosette; Apercu des resultats historiques de la decouverte de I 'alphabet hieroglyphique (1827) ; Memoires sur les signes employes par les Hgyptiens dans leurs trois systemes graphiques a la notation des principales divisions du temps; Lettres ecrites d'Egypte et de Nubie (1833); and also several letters on Egyptian subjects, addressed at different periods to the due de Blacas and others.

See H. Hartleben, Champollion, sein Leben und sein Werk (2 vols., 1906) ; also Egypt: Language and Writing (ad init.).

CHAMPOLLION-FIGEAC, JACQUES JOSEPH (1 778-1867), French

archaeologist, elder brother of Jean Francois Cham- pollion, was born at Figeac in the department of Lot, on the 5th of October 1778. He became professor of Greek and librarian at Grenoble, but was compelled to retire in 1816 on account of the part he had taken during the Hundred Days. He afterwards became keeper of manuscripts at the Bibliotheque Nationale in Paris, and professor of palaeography at the Ecole des Chartes. In 1849 he became librarian of the palace of Fontainebleau. He edited several of his brother's works, and was also author of original works on philological and historical subjects, among which may be mentioned Nouvelles recherches sur les patois ou idiomes vulgaires de la France (1809), Annales de Lagides (18 19) and Chartes latines sur papyrus du VI' siecle de I'ere chrttienne. His son Aime (181 2-1894) became his father's assistant at the Bibliotheque Nationale, and besides a number of works on historical subjects wrote a biographical and bibliographical study of his family in Les Deux Champollion (Grenoble, 1887).

CHANCE (through the 0. Fr. cMance, from the Late Lat. cadentia, things happening, from coder e, to fall out, happen; cf. " case "), an accident or event, a phenomenon which has no apparent or discoverable cause; hence an event which has not been expected, a piece of good or bad fortune. From the popular idea that anything of which no assignable cause is known has therefore no cause, chance (Gr. tvxv) was regarded as having a substantial objective existence, being itself the source of such uncaused phenomena. For the philosophic theories relating to this subject see Accidentalism.

" Chance," in the theory of probability, is used in two ways. In the stricter, or mathematical usage, it is synonymous with probability; i.e. if a particular event may occur in n ways in an aggregate of p events, then the " chance " of the particular event occurring is given by the fraction n/p. In the second usage, the "chance" is regarded as the ratio of the number of ways which a particular event may occur to the number of ways in which it may not occur; mathematically expressed, this chance is nl(p-n) (see Probability) . In the English law relating to gaming and wagering a distinction is drawn between games of chance and games of skill (see Gaming and Wagering).

CHANCEL (through 0. Fr. from Lat. plur. cancelli, dim. of cancer, grating, lattice, probably connected with an Indo- European root Kar-, to bend; cf. circus, curve, &c), in the earliest and strictest sense that part of a church near the altar occupied by the

deacons and sub-deacons assisting the officiating priest, this space having originally been separated from the rest of the church by cancelli or lattice work. The word cancelli is used in classical Latin of a screen, bar or the like, set to mark off an enclosed space in a building or in an open place. It is thus used of the bar in a court of justice (Cicero, Verres, ii. 3 seq.). It is particularly used of the lattice or screen in the ancient basilica, which separated the bema, or raised tribunal, from the rest of the building. The use of the name m ecclesiastical buildings is thus natural, for the altar stood in the place occupied by the bema in the apse of the basilica. From the screen the term was early transferred to the space inter cancellos, i.e. the locus altaris cancellis septus. This railed-off space is now gener- ally known among Roman Catholics as the " sanctuary," the word chancel being little used. In the Church of England, however, the word chancel survived the Reformation, and is applied, both in the ecclesiastical and the architectural sense, to that part of the church occupied by the principal altar or communion table and by the clergy and singers officiating at the chief services; it thus includes presbytery, chancel proper and

choir (q.v.), and in this sense, in the case of cathedrals and other large churches, is often used synonymously with choir. In this more inclusive sense the early basilican churches had no chancels, which were a comparatively late development; the cancelli, e.g. of such a church as San Clemente at Rome are equivalent not to the " chancel screen " of a medieval church but to the " altar rails " that divide off the sanctuary. In churches of the type that grew to its perfection in the middle ages the chancels are clearly differentiated from the nave by structural features: by the raising of the floor level, by the presence of a " chancel arch," and by a chancel or rood screen (see Rood). The chancel screen might be no more than a low barrier, some 4 ft. high, or a light structure of wood or wrought iron; sometimes, however, they were massive stone screens, which in certain cases were continued on either side between the piers of the choir and (on the European continent) round the east end of the sanctuary, as in the cathedrals of Paris, Bourges, Limoges, Amiens and Chartres. These screens served the purpose, in collegiate and conventual churches, of cutting off the space reserved for the services conducted for and by the members of the chapter or community. For popular services a second high altar was usually set up to the west of the screen, as formerly at Westminster Abbey. In parish churches the screen was set, partly to

differentiate the space occupied by the clergy from that reserved for the laity, partly to support the representation of the crucifixion known as the Rood. In these churches, too, the chancel is very usually structurally differenti- ated by being narrower and, sometimes, less high than the nave.

In the Church of England, the duty of repairing the chancel falls upon the parson by custom, while the repair of the body of the church falls on the parishioners. In particular cases, as in certain London churches, the parishioners also have to repair the chancel. Where there aˆe both a rector and a vicar the repairs are shared between them, and this is also the case where the rector is a lay impropriator. By the rubric of the English Prayer Book ” the chancels shall remain as they have done in times past,” i.e. distinguished from the body of the church by some partition sufficient to separate the two without interfering with the view of the congregation. At the Reforma- tion, and for some time after, this distinction was regarded by the dominant Puritan party as a mark of sacerdotalism, and services were commonly said in other parts of the church, the chancels being closed and disused. The rubric, however, directs that ” ‘ Morning and Evening Prayer ‘ shall be used in the accustomed place in the church, chapel or chancel, except it shall be otherwise determined by the Ordinary.” Chancel screens, with or without gates, are lawful, but chancellors of dioceses have refused to grant a faculty to erect gates, as unnecessary or inexpedient.

CHANCELLOR (M. Eng. and Anglo-Fr. canceler, chanceler, Fr. chancelier, Lat. cancellarius) , an official title used by most of the peoples whose civilization has arisen directly or indirectly out of the Roman empire. At different times and in different countries it has stood and stands for very various duties, and has been, and is, borne by officers of various degrees of dignity. The original chancellors were the cancellarii of Roman courts of justice, ushers who sat at the cancelli or lattice work screens of a ” basilica ” or law court, which separated the judge and counsel from the audience (see Chancel). In the later Eastern empire the cancellarii were promoted at first to notarial duties. The barbarian kingdoms which arose on the ruin of the empire in the West copied more or less intelligently the Roman model in all their judicial and financial administration. Under the Frankish kings of the Merovingian dynasty the cancellarii were sub- ordinates of the great officer of state called the referendarius, who was the predecessor of the more modern chancellor. The office became established under the form archi-cancellarius, or

chief of the cancellarii. Stubbs says that the Carolingian chancellor was the royal notary and the arch-chancellor keeper of the royal seal. His functions would naturally be discharged by a cleric in times when book learning was mainly confined to the clergy. From the reign of Louis the Pious the post was held

by a bishop. By an equally natural process he became the chief secretary of the king and of the queen, who also had her chancellor. Such an office possessed an obvious capacity for developing on the judicial as well as the administrative side. Appeals and petitions of aggrieved persons would pass through the chancellor's hands, as well as the political correspondence of the king. Nor was the king the only man who had need of a chancellor. Great officers and corporations also had occasion to employ an agent to do secretarial, notarial and judicial work for them, and called him by the convenient name of chancellor. The history of the office in its many adaptations to public and private service is the history of its development on judicial, administrative, political, secretarial and notarial lines.

The model of the Carolingian court was followed by the medieval states of Western Europe. In England the office of

chancellor dates back to the reign of Edward the Con- ceUor in"' Iessor > tne nrst English king to use the Norman practice England, of sealing instead of signing documents; and from the

Norman Conquest onwards the succession of chancellors is continuous. The chancellor was originally, and long continued to be, an ecclesiastic, who combined the functions of the most dignified of the royal chaplains, the king's secretary in secular matters, and keeper of the royal seal. From the first, then, though at the outset overshadowed by that of the justiciar, the office of chancellor was one of great influence and importance. As chaplain the chancellor was keeper of the king's conscience; as secretary he enjoyed the royal confidence in secular affairs; as keeper of the seal he was necessary to all formal expressions of the royal will. By him and his staff of chaplains the whole secretarial work of the royal household was conducted, the accounts were kept under the justiciar and treasurer, writs were drawn up and sealed, and the royal correspondence was carried

on. He was, in fact, as Stubbs puts it, a sort of secretary of state for all departments. ” This is he,” wrote John of Salisbury (d. 1 1 80), ” who cancels (cancellat) the evil laws of the realm, and makes equitable (aequo) the commands of a pious prince,” a curious anticipation of the chancellor’s later equitable jurisdiction. Under Henry II., indeed, the chancellor was already largely employed in judicial work, either in attendance on the king or in provincial visitations; though the peculiar jurisdic- tion of the chancery was of later growth. By this time, however, the chancellor was ” great alike in Curia and Exchequer “; he was secundus a rege, i.e. took precedence immediately after the justiciar, and nothing was done either in the Curia or the exchequer without his consent. So great was his office that William FitzStephen, the biographer of Becket, tells us that it was not purchasable (emenda non est), a statement which requires modification, since it was in fact more than once sold under Henry I., Stephen, Richard and John (Stubbs, Const. Hist. i. pp. 384-497 ; Gneist, Const. Hist, of England, p. 219), an evil precedent which was, however, not long followed.

The judicial duties of the chancellor grew out of the fact that all petitions addressed to the king passed through his hands. The number and variety of these became so great that in 1280, under Edward I., an ordinance was issued directing the chancellor and the justices to deal with the greater number of them; those which involved the use of the great seal being specially referred to the chancellor. The chancellor and justices were to determine which of them were “so great, and of grace, that the chancellor and others would not despatch them without the king,” and these the chancellor and other chief ministers were to carry in person to the king (Stubbs ii. 263, note, and p. 268). At this period the chancellor, though employed in equity, had ministerial functions only; but when, in the reign of Edward III., the chancellor ceased to follow the court, his tribunal acquired a more definite character, and petitions for grace and favour began to be addressed primarily to him, instead of being merely examined and passed on by him to the king; and in the twenty-second year of this reign matters which were of grace were definitely committed to the chancellor for decision. This is the starting-point of the equitable jurisdiction of the chancellor, whence developed that immense body of rules, supplementing the deficiencies or v.. 27

modifying the harshness of the common law, which is known as Equity (q.v.).

The position of the chancellor as speaker or prolocutor of the House of Lords dates from the time when the ministers of the royal Curia formed ex officio a part of the commune the concilium and parliament. The chancellor originally chancellor attended with the other officials, and he continued to top * f ” a ‘ attend ex officio after they had ceased to do so. If he chanced to be a bishop, he was summoned regularly qua bishop; otherwise he attended without summons. When not a peer the chancellor had no place in parliament except as chancellor, and the act of 31 Henry VIII. cap. 10 (1539) laid down that, if not a peer, he had ” no interest to give any assent or dissent in the House.” Yet Sir Robert Bourchier (d. 1349), the first lay chancellor, had protested in 1341 against the first statute of 15 Edward III. (on ‘trial by peers, &c), on the ground that it had not received his assent and was contrary to the laws of the realm. From the time, however, of William, Lord Cowper (first lord high chancellor of Great Britain in 1705, created Baron Cowper in 1706), all chancellors have been made peers on their elevation to the woolsack. Sometimes the custody of the great seal has been transferred from the chancellor to a special official, the lord keeper of the great seal (see Lord Keeper) ; this was notably the case under Queen Elizabeth (cf. the French garde des sceaux, below). Sometimes it is put into commission, being affixed by lords commissioners of the great seal. By the Catholic Emancipation Act of 1829 it was enacted that none of these offices could be held by a Roman Catholic (see further under Lord High Chancellor). The’office of lord chancellor of Ireland, and that of chancellor of Scotland (who ceased to be appointed after the Act of Union of 1707) followed the same lines of development.

The title of chancellor, without the predicates ” high ” or ” lord,” is also applied in the United Kingdom to a number of other officials and functionaries of varying rank and importance. Of these the most important is the f”fjg e ot chancellor of the exchequer, an office which originated exchequer. in the separation of the chancery from the exchequer in the reign of Henry III. (1 216-127 2). His duties consisted originally in the custody and employment of the seal of the exchequer, in the keeping of a counter-roll to check the roll kept by the treasurer, and in the discharge of certain judicial functions in the exchequer of account. So long as the treasury board was in active working, the chancellorship of the exchequer was an office of small importance, and even during a great part of the 19th century was not necessarily a cabinet office, unless held in

conjunction with that of first lord of the treasury. At the present time the chancellor of the exchequer is minister of finance, and therefore always of cabinet rank (see Exchequer).

The chancellor of the duchy of Lancaster is the representative of the crown in the management of its lands and the control of its courts in the duchy of Lancaster, the property of which is scattered over several counties. These

lands and privileges, though their inheritance has duchy. always been vested in the king and his heirs, have always been kept distinct from the hereditary revenues of the sovereign, whose palatine rights as duke of Lancaster were distinct from his rights as king. The Judicature Act of 1873 left only the chancery court of the duchy, but the chancellor can appoint and dismiss the county court judges within the limits of the duchy; he is responsible also for the* land revenues of the duchy, which are the private property of the sovereign, and keeps the seal of the duchy. His appointment is by letters patent, and his salary is derived from the revenue of the duchy. As the judicial and estate work is done by subordinate officials, the office is practically a sinecure and is usually given to a minister whose assistance is necessary to a government, but who for one reason or another cannot undertake the duties of an important department. John Bright described him as the maid-of-all-work of the cabinet.

The chancellor of a diocese is the official who presides over the bishop's court and exercises jurisdiction in his name. This use of the word is comparatively modern, and, though

employed in acts of parliament, is not mentioned in the commission, having apparently been adopted on the analogy of the Eceiesi- like title in the state. The chancellor was originally astical the keeper of the archbishop or bishop's seals; but chao- jjjg fg ce) as now understood, includes two other

offices distinguished in the commission by the titles of vicar-general and official principal (see Ecclesiastical Jurisdiction). The chancellor of a diocese must be distin- guished from the chancellor of a cathedral, whose office is the same as that of the

ancient scholasticus (see Cathedral) .

The chancellor of an order of knighthood discharges notarial duties and keeps the seal. The chancellor of a university is

an official of medieval origin. The appointment was &c _ ‘ originally made by the popes, and the office from the

first was one of great dignity and originally of great power. The chancellor was, as he remains, the head of the university; he had the general superintendence of its studies and of its discipline, could make and unmake laws, try and punish offences, appoint to prof essoriaL chairs and admit students to the various degrees (see Du Cange, 5. ” Cancellarii Aca- demiarum “). In England the chancellorship of the universities is now a more or less ornamental office and is conferred on noble- men or statesmen of distinction, whose principal function is to look after the general interests of the university, especially in Its relations with the government. The chancellor is repre- sented in the university by a vice-chancellor, who performs the administrative and judicial functions of the office. In the United States the heads of certain educational establishments have the title of chancellor. In Scotland the foreman of a jury is called its chancellor. In the United States the chancellors are judges of ftie chancery courts of the states, e.g. Delaware and New Jersey, where these courts are still maintained as distinct from the courts of common law. In other states, e. g. New York since 1847, the title has been abolished, and there is no federal chancellor.

In diplomacy generally the chancellor of an embassy or legation is an official attached to the suite of an ambassador or minister. He performs the functions of a secretary, archivist, notary and the like, and is at the head of the chancery, or chancellery (Fr. chancellerie) , of the mission. The functions of this office are the transcribing and registering of official despatches and other documents, and generally the transaction of all the minor business, e.g. marriages, passports and the like, .connected with the duties of a diplomatic agent towards his nationals in a foreign country. The dignified connotation of the title chancellor has given to this office a prestige which in itself it does not deserve; and ” chancery ” or ” chancellery ” is commonly used as though it were synonymous with embassy, while diplomatic style is sometimes called style de chancellerie, though as a matter of fact the chanceries have nothing to do with it.

France. — The country in which the office of chancellor followed most closely the same lines as in England is France. He had become a great officer under the Carolingians, and he grew still greater under the Capetian sovereigns. The great chancellor, summus cancellarius or archi-cancellarius, was a dignitary who had indeed little real power. The post was commonly filled by the archbishop of Reims, or the bishop of Paris. The cancellarius, who formed part of the royal court and administration, was officially known as' the sub-cancellarius in relation to the summus cancellarius, but as proto-cancellarius in regard to his subordinate cancellarii. He was a very great officer, an ecclesiastic who was the chief of the king's chaplains or king's clerks, who administered all ecclesiastical affairs; he had judicial powers, and from the 1 2 th century had the general control of foreign affairs. The chancellor in fact became so great that the Capetian kings, who did not forget the mayor of the palace, grew afraid of him. Few of the early ecclesiastical chancellors failed to come into collision with the king, or parted with him on good terms. Philip Augustus suspended the chancellorship throughout the whole of his reign, and appointed a keeper of the seals {garde ies sceaux). The office was revived under Louis VIII., but the

ecclesiastical chancellorship was finally suppressed in 1227. The king of the 13th century employed only keepers of the seal. Under the reign of Philip IV. le Bel lay chancellors were first appointed. From the reign of Charles V. to that of Louis XL the French chancelier was elected by the royal council. In the 16th century he became irremovable, a distinction more honourable than effective, for though the king could not dismiss him from office he could, and on some occasions did, deprive him of the right to exercise his functions, and entrusted them to a keeper of the seal. The chancelier from the 13th century downwards was the head of the law, and performed the duties which are now entrusted to the minister of justice. His office was abolished when in 1790 the whole judicial system of France was swept away by the Revolution. The smaller chancelier s of the provincial parlements and royal courts disappeared at the same time. But when Napoleon was organizing the empire he created an arch- chancellor, an office which was imitated rather from the Erz- Kanzler of the Holy Roman Empire than from the old French chancelier. At the Restoration the office of chancellor of France was restored, the chancellor being president of the House of Peers, but it was finally abolished at the revolution of 1848. The administration of the Legion of Honour is presided over by a

grand chancelier, who is a grand cross of the order, and who advises the head of the state in matters concerning the affairs of the order. The title of chancelier continues also to be used in France for the large class of officials who discharge notarial duties in some public offices, in embassies and consulates. They draw up diplomas and prepare all formal documents, and have charge of the registration and preservation of the archives.

Spain. — In Spain the office of chancellor, canciller, was introduced by Alphonso VII. (1126-1157), who adopted it from the court of his cousins of the Capetian dynasty of France. The canciller did not in Spain go beyond being the king's notary. The chancellor of the privy seal, canciller del sello de la puridad (literally the secret seal), was the king's secretary, and sealed all papers other than diplomas and charters. The office was abolished in 1496, and its functions were transferred to the royal secretaries. The cancelario was the chancellor of a university. The canciller succeeded the maesescuela or scholasticus of a church or monastery. Canciller mayor de Castilla is an honorary title of the archbishops of Toledo. The gran canciller de las Indias, high chancellor of the Indies, held the seal used for the American dominions of Spain, and presided at the council in the absence of the president. The office disappeared with the loss of Spain's empirp in America.

Italy, Germany, b°c. — In central and northern Europe, and in Italy, the office had different fortunes. In southern Italy, where Naples and Sicily were feudally organized, the chancellors of the Norman kings, who followed Anglo-Norman precedents very closely, and, at least in Sicily, employed Englishmen, were such officers as were known in the West. The similarity is somewhat concealed by the fact that these sovereigns also adopted names and offices from the imperial court at Constantinople. Their chancellor was officially known as Protonotary and Logothete, and their example was followed by the German princes of the Hohenstaufen family, who acquired the kingdoms of Naples and Sicily. The papal or apostolic chancery is dealt with in the article on the Curia Romana (q.v.). It may be pointed out here, however, that the close connexion of the papacy with the Holy Roman Empire is illustrated by the fact that the archbishop of Cologne, who by right of his see was the emperor's arch- chancellor (Erz-Kanzler) for Italy, was confirmed as papal arch- chancellor by a bull of Leo IX. in 1052. The origin and duration of this connexion are, however, obscure; it appears to have ceased before 1187. The last record of a papal chancellor in the middle ages dates

from 121 2, from which time onward, for reasons much disputed, the head of the papal chancery bore the title vice-chancellor (Hinschius i. 439), until the office of chancellor was restored by the constitution Sapientius of Pius X. in 1908.

The title of arch-chancellor (Erz-Kanzler) was borne by three great ecclesiastical dignitaries of the Holy Roman Empire.

The archbishop of Mainz was arch-chancellor for Germany. The archbishop of Cologne held the dignity for Italy, and the archbishop of Trier for Gaul and the kingdom of Aries. The second and third of these dignities became purely formal with the decline of the Empire in the 13th century. But the arch-chancellorship of Germany remained to some extent a reality till the Empire was finally dissolved in 1806. The office continued to be attached to the archbishopric of Mainz, which was an electorate. Karl von Dalberg, the last holder of the office, and the first prince primate of the Confederation of the Rhine, continued to act in show at least as chancellor of that body, and was after a fashion the predecessor of the Bundes Kanzler, or chancellor of the North German Confederation. The duties imposed on the imperial chancery by the very complicated constitution of the Empire were, however, discharged by a vice- chancellor who was attached to the court of the emperor. The abbot of Fulda was chancellor to the empress.

The house of Austria in their hereditary dominions, and in those of their possessions which they treated as hereditary, even where the sovereignty was in theory elective, made a large and peculiar use of the title chancellor. The, officers so called were of course distinct from the . arch-chancellor and vice- chancellor of the Empire, although the imperial crown became in practice hereditary in the house of Habsburg. In the family states their administration was, to use a phrase familiar to the French, ” polysynodic.” As it was when fully developed, and as it remained until the March revolution of 1848, it was conducted through boards presided over by a chancellor. There were three aulic chancellorships for the internal affairs of their dominions, ” a united aulic chancellorship for all parts of the empire {i.e. of Austria, not the Holy Roman) not belonging to Hungary or Transylvania, and a separate chancellorship for each of those

last-mentioned provinces ” (Hartig, Genesis of the Revolution in Austria). There were also a house, a court, and a state chancellor for the business of the imperial household and foreign affairs, who were not, however, the presidents of a board. These ” aulic ” {i.e. court) officers were in fact secretaries of the sovereign, and administrative or political rather than judicial in character, though the boards over which they presided controlled judicial as well as administrative affairs. In the case of such statesmen as Kaunitz and Metternich, who were house, court, and state chancellors as well as ” united aulic ” chancellors, the combination of offices made them in practice prime ministers, or rather lieutenants-general, of the sovereign. The system was subject to modifications, and in the end it broke down under its own complications. We are not dealing here with the confusing history of the Austrian administration, and these details are only quoted to show how it happened that in Austria the title chancellor came to mean a political officer and minister. There is obviously a vast difference between such an official as Kaunitz, who as house, court, and state chancellor was minister of foreign affairs, and as ” united aulic “chancellor had a general superiority over the whole machinery of government, and the lord high chancellor in England, the chancelier in France, or the canciller mayor in Castile, though the title was the same. The development of the office in Austria must be understood in order to explain the position and functions of the imperial chancellor {Reichs Kanzler) of the modern German empire. Although the present empire is sometimes rhetorically and absurdly spoken of as a revival of the medieval Empire, it is in reality an adaptation of the Austrian empire, which was a continuation under a new name of the hereditary Habsburg monarchy. The Reichs Kanzler is the immediate successor of the Bnndes Kanzler, or chancellor of the North German Confederation {Bund). But the Bundes Kanzler, who bore no sort of resemblance except in mere name to the Erz-Kanzler of the old Empire, was in a position not perhaps actually like that of Prince Kaunitz, but capable of becoming much the same thing. When the German empire was established in 187 1 Prince Bismarck, who was Bundes Kanzler and became Reichs Kanzler, took care that his position should be as like as possible to that of Prince Kaunitz or Prince Metter- nich. The constitution of the German empire is separately

dealt with, but it may be pointed out here that the Reichs Kanzler is the federal minister of the empire, the chief of the federal officials, and a great political officer, who directs the

foreign affairs, and superintends the internal affairs, of the empire.

In these German states the title of chancellor is also given as in France to government and diplomatic officials who do notarial duties and have charge of archives. The title of chancellor has naturally been widely used in the German and Scandinavian states, and in Russia since the reign of Peter the Great. It has there as elsewhere wavered between being a political and a judicial office. Frederick the Great of Prussia created a Gross Kanzler for judicial duties in 1746. But there was in Prussia a state chancellorship on the Austrian model. It was allowed to lapse on the death of Hardenberg in 1822. The Prussian chancellor after his time was one of the four court ministries {Hofamter) of the Prussian monarchy.

Authorities. — Du Cange, Glossarium, s.v. ” Cancellarius ” ; W. Stubbs, Const. Hist, of England (1874-1878); Rudolph Gneist, Hist, of the English Constitution (Eng. trans., London, 1891); L. O. Pike, Const. Hist, of the House of Lords (London, 1894); Sir William R. Anson, The Law and Custom of the Constitution, vol. ii. part i. (Oxford, 1907) ; A. Luchaire, Manuel des institutions francaises (Paris, 1892); K. F. Stumpf, Die Reichs Kanzler (3 vols., Innsbruck, 1865-1873); G. Seeliger, Erzkanzler und Reichskanzleien {ib. 1889); P. Hinschius, Kirchenrecht (Berlin, 1869); Sir R. J. Phillimore, Eccles. Law (London, 1895) ; P. Pradier-Fodere, Cours de droit diplomatique, ii. 542 (Paris, 1899).

CHANCELLORSVILLE, a village of Spottsylvania county, Virginia, U.S.A., situated almost midway between Washington and Richmond. It was the central point of one of the greatest battles of the Civil War, fought on the 2nd and 3rd of May 1863, between the Union Army of the Potomac under Major-General Hooker, and the Confederate Army of Northern Virginia under General Lee. (See American Civil War, and Wilderness.) General ” Stonewall ” Jackson was mortally wounded in this battle.

CHANCE-MEDLEY (from the A.-Fr. chance-medlee, a mixed chance, and not from chaude-medlee, a hot affray), an accident of a mixed character, an old term in English law for a form of homicide arising out of a sudden affray or quarrel. The homicide has not the characteristic of ” malice prepense ” which would raise the death to murder, nor the completely accidental nature which would reduce it to homicide by misadventure. It was practically identical, therefore, with manslaughter.

CHANCERY, in English law, the court of the lord chancellor of England, consolidated in 1873 along with the other superior courts in the Supreme Court of Judicature. Its origin is noticed under the head of Chancellor.

It has been customary to say that the court of chancery consists of two distinct tribunals — one a court of common law, the other a court of equity. From the former have issued all the original writs passing under the great seal, all commissions of sewers, lunacy, and the like — some of these writs being origin- ally kept in a hanaper or hamper (whence the ” hanaper office “), and others in a little sack or bag (whence the ” petty-bag office “) . The court had likewise power to hold pleas upon scire facias {q.v.) for repeal of letters patent, &c. ” So little,” says Blacks tone, ” is commonly done on the common law side of the court that I have met with no traces of any writ of error being actually brought since the fourteenth year of Queen Elizabeth.”

The equitable jurisdiction of the court of chancery was founded on the supposed superiority of conscience and equity over the strict law. The appearance of equity in England is in harmony with the general course of legal history in progressive societies. What is remarkable is that, instead of being Incor- porated with or superseding the common law, it gave rise to a wholly independent set of tribunals. The English dislike of the civil law, and the tendency to follow precedent which has never ceased to characterize English lawyers, account for this un- fortunate separation. The claims of equity in its earlier stages are well expressed in the little treatise called Doctor and Student, published in the reign of Henry VIII.: — ” Conscience never resisteth the law nor addeth to it, but only when the law ia

directly in itself against the law of God, or law of reason.” So also King James, speaking in the Star Chamber, says: ” Where the rigour of the law in many cases will undo a subject, then the chancery tempers the law with equity, and so mixes mercy with justice, as it preserves a man from destruction.” This theory of the essential opposition between law and equity, and of the natural superiority of the latter, remained long after equity had ceased to found itself on natural justice, and had become as fixed and rigid as the common law itself. The jealousy of the common

lawyers came to a head in the time of Lord Ellesmere, when Coke disputed the right of the chancery to give relief against a judgment of the court of queen's bench obtained by gross fraud and imposition. James I., after consultation, decided in favour of the court of equity. The substitution of lay for clerical chancellors is regarded by G. Spence (Equitable Jurisdiction of the Court of Chancery, 2 vols.,1846-1849) as having at first been unfortunate, inasmuch as the laymen were ignorant of the principles on which their predecessors had acted. Lord Nottingham(i62i-i682) is usually credited with the first attempt to reduce the decisions of the court to order, and his work was continued by Lord Hardwicke (1690- 17 64). By the time of Lord Eldon equity had become fixed, and the judges, like their brethren in the common law courts, strictly followed the precedents. Henceforward chancery and common law courts have exhibited the anomaly of two co-ordinate sets of tribunals, empowered to deal with the same matters, and compelled to proceed in many cases on wholly different principles. The court of chancery could in most cases prevent a person from taking advantage of a common law right, not approved of by its own system. But if a suitor chose to go to a court of common law, he might claim such unJHSt rights, and it required the special intervention of the court of equity to prevent his enforcing them. In many cases also a special application had to be made to chancery for facilities which were absolutely necessary to the successful conduct of a case at common law. Another source of difficulty and annoyance was the uncertainty in many cases whether the chancery or common law courts were the proper tribunal, so that a suitor often found at the close of an expensive and protracted suit that he had mistaken his court and must go elsewhere for relief. Attempts more or less successful were made to lessen those evils by giving the powers to both sets of courts; but down to the consolidation effected by the Judicature Act, the English judicial system justified the sarcasm of Lord Westbury, that one tribunal was set up to do injustice and another to stop it.

The equitable jurisdiction of chancery was commonly divided into exclusive, concurrent and auxiliary. Chancery had exclusive jurisdiction when there were no forms of action by which relief could be obtained at law, in respect of rights which ought to be enforced. Trusts were the most conspicuous example of this class. It also included the rights of married women, infants and lunatics. Chancery had concurrent jurisdiction when the common

law did riot give adequate relief, e.g. in cases of fraud, accident, mistake, specific performance of contracts, &c. It had auxiliary jurisdiction when the administrative machinery of the law courts was unable to procure the necessary evidence.

The Judicature Act 1873 enacted (§ 24) that in every civil cause or matter commenced in the High Court of Justice, law and equity should be administered by the High Court of Justice and the court of appeal respectively, according to the rules therein contained, which provide for giving effect in all cases to "equitable rights and other matters of equity." The 25th section declared the law hereafter to be administered in England on certain points, and ordained that " generally in all matters not hereinbefore particularly mentioned in which there is any conflict or variance between the rules of equity and the rules of the common law with reference to the same matter, the rules of equity shall prevail." The 34th section specifically assigned to the chancery division the following causes and matters: — The administration of the estates of deceased persons; the dissolution of partnerships, or the taking of partnership, or other accounts; the redemption or foreclosure of mortgages; the raising of portions, or other charges on land; the sale

and distribution of the proceeds of property subject to any lien or charge; the execution of trusts, charitable or private; the rectification, or setting aside, or cancellation of deeds or other written instruments; the specific performance of contracts between vendors and purchasers of real estates, including contracts for leases; the partition or sale of real estates; the wardship of infants and the care of infants' estates.

The chancery. division originally consisted of the lord chancellor as president and the master of the rolls, and the three vice-chancellors. The master of the rolls was also a member of the court of appeal, but Sir George Jessel, who held that office when the new system came into force, regularly sat as a judge of first instance until 1881, when, by the act of that year (sec. 2), the master of the rolls became a member of the court of appeal only, and provision was made for the appointment of a judge to supply the vacancy thus occasioned (sec. 3). Sir James Bacon (1 798-1895) was the last survivor of the vice-chancellors. He retained his seat on the bench until the year 1886, when he retired after more than seventeen years' judicial service. For some reason the solicitors, when they had the choice, preferred to bring their actions in the chancery division. The practice

introduced by the Judicature Act of trying actions with oral evidence instead of affidavits, and the comparative inexperience of the chancery judges and counsel in that mode of trial, tended to lengthen the time required for the disposal of the business. Demand was consequently made for more judges in the chancery division. By an act of 1877 the appointment of an additional judge in that division was authorized, and Sir Edward Fry (afterwards better known as a lord justice) was appointed. In August 1899 the crown consented to the appointment of a new judge of the High Court in the chancery division on an address from both Houses of Parliament, pursuant to the 87 th section of the Appellate Jurisdiction Act 1876. The chancery division, therefore, consists of the lord chancellor and six puisne judges. The latter are styled and addressed in the same manner as was customary in the old common law courts. 1 Formerly there were only four judges of this division (being the successors of the master of the rolls and the three vice-chancellors) to whom chambers were attached. The fifth judge heard only causes with witnesses transferred to him from the overflowing of the lists of his four brethren. In each set of chambers there were three chief clerks, with a staff of assistant clerks under them. The chief clerks had no original jurisdiction, but heard applica- tions only on behalf of the judge to whose chambers they belonged, and theoretically every suitor had the right to have his applica- tion heard by the judge himself in chambers. But the appoint- ment of a sixth judge enabled the lord chancellor to carry out a reform recommended by a departmental committee which reported in 1885. The great difficulty in the chancery division always was to secure the continuous hearing of actions with witnesses, as nearly one-half of the judge's time was taken up with cases adjourned to him from chambers and other adminis- trative business and non-witness actions and motions. The in- terruption of a witness action for two or three days, particularly in a country case, occasioned great expense, and had other inconveniences. It was a simple remedy to link the judges in pairs with one list of causes and one set of chambers assigned to each pair. This reform was effected by the alteration of a few words in certain rules of court. There are, therefore, only three sets of chambers, each containing four chief clerks, or, as they are now styled, masters of the Supreme Court, and one of the linked judges, by arrangement between themselves, continuously tries the witness actions in their common list, while the other attends in chambers, and also hears the motions, petitions, adjourned summonses and non-witness cases.

Although styled masters it does not appear that the chief

1 The comte de Franqueville comments on the misuse of the title ” Lord ” in addressing judges as another anomaly which only adds to the confusion, but perhaps unnecessarily. According to Foss (vol. viii. p. 200) it was only in the 1 8th century that the judges began to be addressed by the title of “Your Lordship.” In the Year Books (he adds) they are constantly addressed by the title of ” Sir.” “Sir, vous voyez bien,” &c.

clerks have any larger or different jurisdiction than they had before. They are still the representatives of and responsible to the judges to whom the chambers are attached. The judge may either hear an application in chambers, or may direct any matter which he thinks of sufficient importance to be argued before him in court, or a party may move in court to discharge an order made in chambers with a view to an appeal, but this is not required if the judge certifies that the matter was sufficiently discussed before him in chambers.

Under the existing rules of court many orders can now be made on summons in chambers which used formerly to require a suit or petition in court (see Order LV. as to foreclosure, administration, payment out of money in court and generally). The judge is also enabled to decide any particular question arising in the administration of the estate of a deceased person or execu- tion of the trusts of a settlement without directing administration of the whole estate or execution of the trusts generally by the court (Order LV. rule 10), and where an application for accounts is made by a dissatisfied beneficiary or creditor to order the accounts to be delivered out of court, and the application to stand over till it can be seen what questions (if any) arise upon the accounts requiring the intervention of the court (Order LV. 2, 100). Delay and consequent worry and expense are thus saved to the parties, and, at the same time, a great deal of routine administration is got rid of and a larger portion of the judicial term can be devoted to hearing actions and deciding any question of importance in court. The work of the chambers staff of the judges has probably been increased; but, on the other hand, it has been lightened by the removal of the winding-up business. The chancery division has also

inherited from the court of chancery a staff of registrars and taxing masters.

In the United States ” chancery ” is generally used as the synonym of ” equity.” Chancery practice is practice in cases of equity. Chancery courts are equity courts (see Equity). For the diplomatic sense of chancery (chancellery) see Chan- cellor.

CHANDA, a town and district of British India, in the Nagpur division of the Central Provinces. In 1901 the town had a population of 17,803. It is situated at the junction of the Virai and Jharpat rivers. It was the capital of the Gond kingdom of Chanda, which was established on the ruins of a Hindu state in the nth or 12th century, and survived until 1751 (see Gond- wana). The town is still surrounded by a stone wall 55 m. in circuit. It has several old temples and tombs, and the district at large is rich in remains of antiquity. There are manufactures . of cotton, silk, brass-ware and leather slippers, and a considerable local trade.

The District of Chanda has an area of 10, 1 56 sq. m. Except- ing in the extreme west, hills are thickly dotted over the country, sometimes in detached ranges, occasionally in isolated peaks rising sheer out from the plain. Towards the east they increase in height, and form a broad tableland, at places 2000 ft. above sea- level. The Wainganga river flows through the district from north to south, meeting the Wardha river at Seoni, where their streams unite to form the Pranhita. Chanda is thickly studded with fine tanks, or rather artificial lakes, formed by closing the outlets of small valleys, or by throwing a dam across tracts intersected by streams. The broad clear sheets of water thus created are often very picturesque in their surroundings of wood and rock. The chief architectural objects of interest are the cave temples at Bhandak, Winjbasani, Dewala and Ghugus; a rock temple in the bed of the Wardha river below Ballalpur; the ancient temples at Markandi, Ambgaon and elsewhere; the forts of Wairagarh and Ballalpur; and the old walls of the city of Chanda, its system of waterworks, and the tombs of the Gond kings. In 1901 the population was 601,533, showing a decrease of 15% in the decade. The principal crops are rice, millet, pulse, wheat, oil- seeds and cotton. The district contains the coalfield of Warora, which was worked by government till 1906, when it was closed. Other fields are known, and iron ores also occur. The district suffered severely from famine in 1900, when in April the number of persons relieved rose to 90,000.

CHANDAUSI, a town of British India, in the Moradabad district of the United Provinces, 28 m. south of Moradabad. Pop. (1901) 25,711. It is an important station on the Oudh & Rohilkhand railway, with a junction for Aligarh. Its chief exports are of cotton, hemp, sugar and stone. There is a factory for pressing cotton.

CHAND BARDAI (fl. c. 1200), Hindu poet, was a native of Lahore, but lived at the court of Prithwi Raja (Prithiraj), the last Hindu sovereign of Delhi. His Prithiraj Rasau, a poem of some 100,000 stanzas, chronicling his master's deeds and the contemporary history pf his part of India, is valuable not only as historical material but as the earliest monument of the Western Hindi language, and the first of the long series of bardic chronicles for which Rajputana is celebrated. It is written in ballad form, and portions of it are still sung by itinerant bards throughout north-western India and Rajputana.

See Lieut.-Col. James Tod, Annals and Antiquities of Rajast'han (2 vols., London, 1829-1832; repub. by Lalit Mohan Auddy, 2 vols. ib., 1894-1895), where good translations are given.

CHANDELIER, a frame of metal, wood, crystal, glass or china, pendent from roof or ceiling for the purpose of holding lights. The word is French, but the appliance has lost its original significance of a candle-holder, the chandelier being now chiefly used for gas and electric lighting. Clusters of hanging lights were in use as early as the 14th century, and appear originally to have been almost invariably of wood. They were, however, so speedily ruined by grease that metal was gradually sub- situted, and fine and comparatively early examples in beaten iron, brass, copper and even silver are still extant. Throughout the 17th century the hanging candle-holder of brass or bronze was common throughout northern Europe, as innumerable pictures and engravings testify. In the great periods of the art of decoration in France many magnificent chandeliers were made by Boulle, and at a later date by Gouthiere and Thomire and others among the extraordinarily clever fondeurs-ciseleurs of the second half of the 18th century. The chandelier in rock crystal and its imitations had come in at least a hundred years before their day, and continued in favour to the middle of the 19th century, or even somewhat later. It reached at last the most extreme elaboration of banality, with ropes of pendants and hanging faceted drops often called lustres. When many lights were burning in one of these chandeliers an effect of splendour was produced that was

not out of place in a ballroom, but the ˆordinary household varieties were extremely ugly and inartistic. The more purely domestic chandelier usually carries from two to six lights. The rapidly growing use of electricity as an illuminating medium and the preference for smaller clusters of lights have, however, pushed into the background an appli- ance which had grown extremely commonplace in design, and had become out of character with modern ideas of household decoration.

CHANDERNAGORE, or Chandarnagar, a French settlement in India, with a small adjoining territory, situated on the right bank of the river Hugh, 20 m. above Calcutta, in 22 51′ 40″ N, and 88° 24′ 50″ E. Area 3 sq. m.; pop. (1901) 25,000. Chander- nagore has played an important part in the European history of Bengal. It became a permanent French settlement, in 1688, but did not rise to any importance till the time of Dupleix, during whose administration more than two thousand brick houses were erected in the town and a considerable maritime trade was carried on. In 1757 Chandernagore was bombarded by an English fleet under Admiral Watson and captured; the fortifications and houses were afterwards demolished. On peace being established the town was restored to the French in 1763. When hostilities afterwards broke out in 1794, it was again taken possession of by the English, and was held by them till 18 1 6, when it was a second time given up to the French; it has ever since remained in their possession. All the former commercial grandeur of Chander- nagore has now passed away, and at present it is little more than a quiet suburb of Calcutta, without any external trade. The European town is situated at the bottom of a beautiful reach of the Hugli, with clean wide thoroughfares, and many elegant

residences along the river-bank. The authorities of Chanderna- gore are subject to the jurisdiction of the governor-general of Pondicherry, to whom is confided the general government of all the French possessions in India.

CHANDLER, HENRY WILLIAM (1828-1889), English scholar, was born in London on the 31st of January 1828. In 1848 he entered Pembroke College, Oxford, where he was elected fellow in 1853. In 1867 he succeeded H. L. Mansel as Waynflete pro- fessor of moral and metaphysical philosophy, and in 1884 was appointed curator of the Bodleian library. He died by his own hand in Oxford on the 16th of May 1889. . He was chiefly known as an

Aristotelian scholar, and his knowledge of the Greek commentators on Aristotle was profound. He collected a vast amount of material for an edition of the fragments of his favourite author, but on the appearance of Valentine Rose's work in 1886 he abandoned the idea. Two works on the bibliography of Aristotle, A Catalogue, of Editions of Aristotle's Nicomachean Ethics and of Works illustrative of them printed in the ijth century (1868), and A Chronological Index to Editions of Aristotle's Nicomachean Ethics, and of Works illustrative of 'them from the Origin of Printing to ijqq (1878), are of great value. Chandler's collection of works on Aristotelian literature is now in the library of Pembroke College. His Practical Introduction to Greek Accentuation (1862, ed. min. 1877) is the standard work in English.

CHANDLER, RICHARD (1738-1810), British antiquary, was born in 1738 at Elson in Hampshire, and educated at Winchester and at Queen's and Magdalen Colleges, Oxford. His first work consisted of fragments from the minor Greek poets, with notes (Elegiaca Graeca, 1759); and in 1763 he published a fine edition of the Arundelian marbles, Marmora Oxoniensia, with a Latin translation, and a number of suggestions for supplying thelacunae. He was sent by the Dilettanti Society with Nicholas Revett, an architect, and Pars, a painter, to explore the antiquities of Ionia and Greece (1763-1766); and the result of their work was the two magnificent folios of Ionian antiquities published in 1 769. He subsequently held several church preferments, including the rectory of Tylehurst, in Berkshire, where he died on the 9th of February 18 10. Other works by Chandler were Inscriptiones Antiquae pleraeque nondum editae (Oxford, 1774); Travels in Asia Minor (1775); Travels in Greece (1776); History of Ilium (1803), in which he asserted the accuracy of Homer's geography. His Life of Bishop Waynflete, lord high chancellor to Henry VI., appeared in 181 1.

A complete edition (with notes by Revett) of the Travels in Asia Minor and Greece was published by R. Churton (Oxford, 1825), with an " Account of the Author."

CHANDLER, SAMUEL (1 693-1 766), English Nonconformist divine, was born in 1693 at Hungerford, in Berkshire, where his father was a minister. He was sent to school at Gloucester, where he began a lifelong friendship with Bishop Butler and Archbishop Seeker; and he afterwards studied at Leiden. His talents and learning were such that he was elected fellow of the Royal and

Antiquarian Societies, and was made D.D. of Edin- burgh and Glasgow. He also received offers of high preferment in the Church of England. These he refused, remaining to the end of his life in the position of a Presbyterian minister. He was moderately Calvinistic in his views and leaned towards Arianism. He took a leading part in the deist controversies of the time, and discussed with some of the bishops the possibility of an act of comprehension. From 1716 to 1726 he preached at Peckham, and for forty years he was pastor of a meeting-house in Old Jewry. During two or three years, having fallen into pecuniary distress through the failure of the South Sea scheme, he kept a book-shop in the Poultry. On the death of George II. in 1760 Chandler published a sermon in which he compared that king to King David. This view was attacked in a pamphlet entitled The History of the Man after God's own Heart, in which the author complained of the parallel as an insult to the late king, and, following Pierre Bayle, exhibited King David as an example of perfidy, lust and cruelty. Chandler condescended to reply first in a review of the tract (1762) and then in A Critical History of the Life of David, which is perhaps the best of his productions. This work was just com-

pleted when he died, on the 8th of May 1766. He left 4 vols, of sermons (1768), and a paraphrase of the Epistles to the Galatians and Ephesians (1777), several works on the evidences of Christi- anity, and various pamphlets against Roman Catholicism.

CHANDLER, ZACHARIAH (1813-1879), American politician, was born at Bedford, New Hampshire, on the 10th of December 1813. In 1833 he removed to Detroit, Michigan, where he became a prosperous dry-goods merchant. He took a prominent part as a Whig in politics (serving as mayor in 1851), and, impelled by his strong anti-slavery views, actively furthered the work of the " Underground Railroad," of which Detroit was one of the principal " transfer " points. He was one of the organizers in Michigan of the Republican party, and in 1857 succeeded Lewis Cass in the United States Senate, serving until 1875, and at once taking his stand with the most radical opponents of slavery extension. When the Civil War became inevitable he endeavoured to impress upon the North the necessity of taking extraordinary measures for the preservation of the Union. After the fall of Fort Sumter he advocated the enlistment of 500,000 instead of 75,000 men for a long instead of a short term, and the vigorous enforcement of confiscation measures. In July 1862 he made a bitter attack in the Senate on General George B. McClellan,

charging him with incompetency and lack of ” nerve.” Throughout the war he allied himself with the most radical of the Republican faction in opposition to President Lincoln’s policy, and subsequently became one of the bitterest opponents of President Johnson’s plan of reconstruction. From October 1875 to March 1877 he was secretary of the interior in the cabinet of President Grant, succeeding Columbus Delano (1809-1896). In 1876, as chairman of the national republican committee, he managed the campaign of Hayes against Tilden. In February 1879 he was re-elected to the Senate to succeed Isaac P. Christiancy (181 2-1890), and soon afterwards, in a speech concerning Mexican War pensions, bitterly denounced Jefferson Davis. He died at Chicago, Illinois, on the 1st of November 1879. By his extra- ordinary force of character he exercised a wide personal influence during his lifetime, but failed to stamp his personality upon any measure or policy of lasting importance.

CHANDOS, BARONS AND DUKES OF. The English title of Chandos began as a barony in 1554, and was continued in the family of Brydges (becoming a dukedom in 1719) till 1789. In 1822 the dukedom was revived in connexion with that of Buckingham.

John Brydges, 1st Baron Chandos (c. 1490-1557), a son of Sir Giles Brydges, or Bruges (d. 151 1), was a prominent figure at the English court during the reigns of Henry VIII., Edward VI. and Mary. He took part in suppressing the rebellion of Sir Thomas Wyat in 1554, and as lieutenant of the Tower of London during the earlier part of Mary’s reign, had the custody, not only of Lady Jane Grey and of Wyat, but for a short time of the princess Elizabeth. He was created Baron Chandos of Sudeley in 1554, one of his ancestors, Alice, being a grand-daughter of Sir Thomas Chandos (d. 1375), and he died in March 1557. The three succeeding barons, direct descendants of the 1st baron, were all members of parliament and persons of some importance. Grey, 5th Baron Chandos (c. 1580-1621), lord-lieutenant of Gloucestershire, was called the ” king of the Cotswolds,” owing to his generosity and his magnificent style of living at his residence, Sudeley Castle. He has been regarded by Horace Walpole and others as the author of some essays, Horae Subsecivae. His elder son George, 6th Baron Chandos (1620-1655), was a supporter of Charles I. during his struggle with Parliament, and distinguished himself at the first battle of Newbury in 1643. He had six daughters but no sons, and after the death of his brother William in 1676 the barony came to a kinsman, Sir James Brydges, Bart. (1642-1714), who was English ambassador to

Constantinople from 1680 to 1685.

James Brydges, 1st duke of Chandos (1673-1744), son and heir of the last-named, had been member of parliament for Hereford from 1698 to 1714, and, three days after his father's death, was created Viscount Wilton and earl of Carnarvon. For eight years, from 170510 17 13, during the War of the Spanish

Succession, he was paymaster-general of the forces abroad, and in this capacity he amassed great wealth. In 17 19 he was created marquess of Carnarvon and duke of Chandos. The duke is chiefly remembered on account of his connexion with Handel and with Pope. He built a magnificent house at Canons near Edgware in Middlesex, and is said to have contemplated the construction of a private road between this place and his un- finished house in Cavendish Square, London. For over two years Handel, employed by Chandos, lived at Canons, where he composed his oratorio Esther. Pope, who in his Moral Essays (Epistle to the Earl of Burlington) doubtless described Canons under the guise of "Timon's Villa," referred to the duke in the line, "Thus gracious Chandos is belov'd at sight"; but Swift, less complimentary, called him " a great complier with every court." The poet was caricatured by Hogarth for his supposed servility to the duke. Chandos, who was lord-lieutenant of the counties of Hereford and Radnor, and chancellor of the university of St Andrews, became involved in financial difficulties, and after his death on the 9th of August 1744 Canons was pulled down. He was succeeded by his son Henry, 2nd duke (1708-1771), and grandson James, 3rd duke (1731-1789). On the death of the latter without sons in September 1789 all his titles, except that of Baron Kinloss, became extinct, although a claimant arose for the barony of Chandos of Sudeley. The 3rd duke's only daughter, Anna Elizabeth, who became Baroness Kinloss on her father's death, was married in 1796 to Richard Grenville, afterwards marquess of Buckingham; and in 1822 this nobleman was created duke of Buckingham and Chandos (see Buckingham, Dukes or).

See G. E. C(okayne), Complete Peerage (1887-1898) ; and J. R. Robinson, The Princely Chandos, i.e. the 1st duke (1893).

CHANDOS, SIR JOHN (?-i37o), one of the most celebrated English

commanders of the 14th century. *He is found at the siege of Cambrai in 1337, and at the battle of Crecy in 1346. At the battle of Poitiers, in 1356, it was he who decided the day and saved the life of the Black Prince. For these services Edward III. made him a knight of the Garter, gave him the lands of the viscount of Saint Sauveur in Cotentin, and appointed him his lieutenant in France and vice-chamberlain of the royal household. In 1362 he was made constable of Aquitaine, and won the victories of Auray (1364) and Navaret in Spain (1367) over Duguesclin. He was seneschal of Poitou in 1369, and was mortally wounded at the bridge of Lussac near Poitiers on the 31st of December. He died on the following day, the 1st of January 1370.

See Benjamin Fillon, " John Chandos, Connetable d'Aquitaine et Senechal de Poitou," in the Revue des provinces de Vouest (1855).

CHANDRAGUPTA MAURYA (reigned 321-296 B.C.), known to the Greeks as Sandracottus, founder of the Maurya empire and first paramount ruler of India, was the son of a king of Magadha by a woman of humble origin, whose caste he took, and whose name, Mura, is said to have been the origin of that of Maurya assumed by his dynasty. As a youth he was driven into exile by his kinsman, the reigning king of Magadha. In the course of his wanderings he met Alexander the Great, and, according to Plutarch (Alexander, cap. 62), encouraged him to invade the Ganges kingdom by enlarging on the extreme un- popularity of the reigning monarch. During his exile he collected a large force of the warlike clans of the north-west frontier, and on the death of Alexander attacked the Macedonian garrisons and conquered the Punjab. He next attacked Magadha, de- throned and slew the king, his enemy, with every member of his family, and established himself on the throne (321). The great army acquired from his predecessor he increased until it reached the total of 30,000 cavalry, 9000 elephants, and 600,000 infantry; and with this huge force he overran all northern India, establishing his empire from the Arabian Sea to the Bay of Bengal. In 305 Seleucus Nicator crossed the Indus, but was defeated by Chandragupta and forced to a humiliating peace (303), by which the empire of the latter was still farther extended in the north. About six years later Chandragupta died, leaving his empire to his son Bindusura.

An excellent account of the court and administrative system of Chandragupta has been preserved in the fragments of Megas-

thenes, who came to Pataliputra as the envoy of Seleucus shortly after 303. The government was, of course, autocratic and even tyrannous, but it was organized on an elaborate system, army and civil service being adminimered by a series of boards, while the cities were governed by municipal commissioners responsible for public order and the upkeep of public works. Chandra- gupta himself is described as living in barbaric splendour, appearing in public only to hear causes, offer sacrifice, or to go on military and hunting expeditions, and withal so fearful of assassination that he never slept two nights running in the same room.

See J. W. MacCrindle, Ancient India as described by Megasthenes and Arrian (Calcutta, 1877); V. A. Smith, Early Hist, of India (Oxford, 1908) ; also the articles India: History, and Inscriptions: Indian.

CHANGARNIER, NICOLAS ANNE THEODULE (1793-1877), French general, was born at Autun on the 26th of April 1793. Educated at St Cyr, he served for a short time in the bodyguard of Louis XVIII., and entered the line as a lieutenant in January 1815. He achieved distinction in the Spanish campaign of 1823, and became captain in 1825. In 1830 he entered the Royal Guard and was sent to Africa, where he took part in the Mascara expedition. Promoted commandant in 1835, he distinguished himself under Marshal Clausel in the campaign against Ahmed Pasha, bey of Constantine, and became lieutenant-colonel in 1837. The part he took in the, expedition of Portes-de-Fer gained him a colonelcy, and his success against the Hajutas and Kabyles, the cross of the Legion of Honour. Three more years of brilliant service in Africa won for him the rank of marSchal de camp in 1840, and of lieutenant-general in 1843. In 1847 he held the Algiers divisional command. He visited France early in 1848, assisted the provisional government to establish order, and returned to Africa in May to succeed General Cavaignac in the government of Algeria. He was speedily recalled on his election to the general assembly for the department of the Seine, and received the command of the National Guard of Paris, to which was added soon afterwards that of the troops in Paris, altogether nearly 100,000 men. He held a high place and exercised great influence in the complicated politics of the next two years. In 1849 he received the grand cross of the Legion of Honour. An avowed enemy of republican institutions, he held a unique position in upholding the power of the president; but in January 1851 he opposed Louis Napoleon’s policy, was in consequence deprived of his double command, and at the coup d’etat in December was

arrested and sent to Mazas, until his banishment from France by the decree of the 9th of January 1852. He returned to France after the general amnesty, and resided in his estate in the department of Saone-et-Loire. In 1870 he held no command, but was present with the headquarters, and afterwards with Bazaine in Metz. He was employed on an unsuccessful mission to Prince Frederick Charles, commanding the German army which besieged Metz, and on the capitulation became a prisoner of war. At the armistice he returned to Paris, and in 1871 was elected to the National Assembly by four depart- ments, and sat for the Somme. He took an active part in politics, defended the conduct of Marshal Bazaine, and served on the committee which elaborated the monarchical constitution. When the comte de Chambord refused the compromise, he moved the resolution to extend the executive power for ten years to Marshal MacMahon. He was elected a life senator in 1875. He died in Paris on the 14th of February 1877.

CHANG-CHOW, a town of China, in the province of Fu-kien, on a branch of the Lung Kiang, 35 m. W. of Amoy. It is surrounded by a wall 45 m. in circumference, which, however, includes a good deal of open ground. The streets are pave d with granite, but are very dirty. The river is crossed by a curious bridge, 800 ft. long, constructed of wooden planks supported on twenty-five piles of stones about 30 ft. apart. The city is a centre of the silk-trade, and carries on an extensive commerce in different directions. Brick-works and sugar-factories are among its chief

industrial establishments. Its population is estimated at about

1,000,000.

CHANG CHUN, KIU (1148-1227), Chinese Taoist sage and traveller, was born in 1148. In 1219 he was invited by Jenghiz Khan, founder of the Mongol empire and greatest of Asiatic conquerors, to visit him. Jenghi# letter of invitation, dated the 15th of May 1219 (by present reckoning), has been preserved, and is among the curiosities of history; here the terrible warrior appears as a meek disciple of wisdom, modest and simple, almost Socratic in his self-examination, alive to many of the deepest truths of life and government. Chang Chun obeyed this summons;

and leaving his home in Shantung (February 1220) journeyed first to Peking. Learning that Jenghiz had gone far west upon fresh conquests, the sage stayed the winter in Peking. In February 1221 he started again and crossed eastern Mongolia to the camp of Jenghiz' brother Ujughen, near Lake Bor or Buyur in the upper basin of the Kerulun-Amur. Thence he travelled south-westward up the Kerulun, crossed the Karakorum region in north-central Mongolia, and so came to the Chinese Altai, probably passing near the present Uliassutai. After traversing the Altai he visited Bishbalig, answering to the modern Urumtsi, and moved along the north side of the Tian Shan range to lake Sairam, Almalig (or Kulja), and the rich valley of the Hi. We then trace him to the Chu, over this river to Talas and the Tashkent region, and over the Jaxartes (or Syr Daria) to Samar- kand, where he halted for some months. Finally, through the " Iron Gates " of Termit, over the Oxus, and by way of Balkh and northern Afghanistan, Qiang Chun reached Jenghiz' camp near the Hindu Kush. Returning home he followed much the same course as on his outward route : certain deviations, however, occur, such as a visit to Kuku-khoto. He was back in Peking by the end of January 1224. From the narrative of his ex- pedition (the Si yu ki, written by his pupil and companion Li Chi Chang) we derive some of the most faithful and vivid pictures ever drawn of nature and man between the Great Wall of China and Kabul, between the Aral and the Yellow Sea: we may particularly notice the sketches of the Mongols, and of the people of Samarkand and its neighbourhood; the account of the fertility and products of the latter region, as of the Hi valley, at or near Almalig-Kulja; and the description of various great mountain ranges, peaks and defiles, such as the Chinese Altai, the Tian Shan, Mt Bogdo-ola (?), and the Iron Gates of Termit. There is, moreover, a noteworthy reference to a land apparently identical with the uppermost valley of the Yenisei. After his return Chang Chun lived at Peking till his death on the 23rd of July 1227. By order of Jenghiz some of the former imperial garden grounds were made over to him, for the foundation of a Taoist monastery.

See E. Bretschneider, Mediaeval Researches from Eastern Asiatic Sources, vol. i. pp. 35-108, where a complete translation of the narrative is given, with a valuable commentary; C. R. Beazley Dawn of Modern Geography, iii. 539. (C. R. B.)

CHANGE (derived through the Fr. from the Late Lat. cambium, cambiare, to barter; the ultimate derivation is probably from the root which appears in the Gr. KafXTrrav, to bend), properly the

substitution of one thing for another, hence any alteration or variation, so applied to the moon's passing from one phase to another. The use of the word for a place of commercial business has usually been taken to be a shortened form of Exchange {q.v.) and so is often written 'Change. The New English Dictionary points out that " change " appears earlier than " exchange " in this sense. " Change " is particularly used of coins of lower denomination given in substitution for those of larger denomination or for a note, cheque, &c, and also for the balance of a sum paid larger than that which is due. A further application is that in bell-ringing, of the variations in order in which a peal of bells may be rung. The term usually excludes the ringing of the bells according to the diatonic scale in which they are hung (see Bell) . It is from a combination of these two meanings that the thieves' slang phrase " ringing the changes " arises; it denotes the various methods by which wrong change may be given or extracted, or counterfeit coin passed.

CHANGELING, the term used of a child substituted or changed for another, especially in the case of substitutions popularly supposed to be through fairy agency. There was formerly a widespread superstition that infants were sometimes stolen from their cradles by the fairies. Any specially peevish or weakly baby was regarded as a changeling, the word coming at last to be almost synonymous with imbecility. It was thought that the elves could only effect the exchange before christening, and in the highlands of Scotland babies were strictly watched till then. Strype states that in his time midwives had to take an oath binding themselves to be no party to the theft or exchange of babies. The belief is referred to by Shakespeare, Spenser and other authors. Pennant, writing in 1796, says: "In this very century a poor cottager, who lived near the spot, had a child who grew uncommonly peevish; the parents attributed this to the fairies and imagined it was a changeling. They took the child, put it in a cradle, and left it all night beneath the " Fairy Oak " in hopes that the tylwydd tig or fairy family would restore their own before morning. When morning came they found the child perfectly quiet, so went away with it, quite confirmed in their belief " (Tour in Scotland, 1796, p. 257).

See W. Wirt Sikes, British Goblins (1880).

CHANGOS, a tribe of South American Indians who appear to have originally inhabited the Peruvian coast. A few of them still live on the coast of Atacama, northern Chile. They are a dwarfish

race, never exceeding 5 ft. in height. Their sole occupa- tion is fishing, and in former times they used boats of inflated sealskins, lived in sealskin huts, and slept on heaps of dried seaweed. They are a hospitable and friendly people, and never resisted the whites.

CHANGRA, or Kanghari (anc. Gangra; called also till the time of Caracalla, Germanicopolis, after the emperor Claudius), the chief town of a sanjak of the same name in the Kastamuni vilayet, Asia Minor, situated in a rich, well- watered valley; altitude 2500 ft. The ground is impregnated with salt, and the town is, unhealthy. Pop. (1894) 15,632, of whom 1086 are Christians (Cuinet). Gangra, the capital of the Paphlagonian kingdom of Deiotarus Philadelphus, son of Castor, was taken into the Roman province of Galatia on his death in 6-5 B.C. The earlier town, the name of which signified " she-goat," was built on the hill behind the modern city, on which are the ruins of a late fortress; while the Roman city occupied the site of the modern. In Christian times Gangra was the metropolitan see of Paphlagonia. In the 4th century the town was the scene of an important ecclesiastical synod.

Synod of Gangra. — Conjectures as to the date of this synod vary from 341 to 376. All that can, be affirmed with certainty is that it was held about the middle of the 4th century. The synodal letter states that twenty-one bishops assembled to take action concerning Eustathius (of Sebaste?) and his followers, who contemned marriage, disparaged the offices of the church, held conventicles of their own, wore a peculiar dress, denounced riches, and affected especial sanctity. The synod condemned the Eustathian practices, declaring however, with remarkable moderation, that it was not virginity that was condemned, but the dishonouring of marriage; not poverty, but the disparage- ment of honest and benevolent wealth; not asceticism, but spiritual pride; not individual piety, but dishonouring the house of God. The twenty canons of Gangra were declared ecumenical by the council of Chalcedon, 451.

See Mansi ii. pp. 1095-1122; Hardouin i. pp. 530-540; Hefele 2nd ed., i. pp. 777 sqq. (English trans, ii. pp. 325 sqq.).

CHANNEL ISLANDS (French lies Normandes), a group of islands in the English Channel, belonging (except the lies' Chausey) to Great Britain. (For map, see England, Section VI.) They lie between 48° 50′ and 49° 45′ N., and i° 50′ and 2° 45′ W., along the

French coast of Co ten tin (department of Manche), at a distance of 4 to 40 m. from it, within the great rectangular bay of which the northward horn is Cape La Hague. The greater part of this bay is shallow, and the currents among the numerous groups of islands and rocks are often dangerous to navigation. The nearest point of the English coast to the Channel Islands

is Portland Bill, a little over 50 m. north of the northernmost outlier of the islands. The total land area of the islands is about 75 sq. m. (48,083 acres), and the population in 1901 was 95,618. The principal individual islands are four: — Jersey (area 45 jq. m., pop. 52,576), Guernsey (area 24-5 sq. m., pop. 40,446), Alderney (area 3-06 sq. m., pop. 2062), and Sark (area nearly 2 sq. m., pop. 504). Each of these islands is treated in a separate article. The chief town and port of Jersey is St Helier, and of Guernsey St Peter Port; a small town on Alderney is called St Anne. Regular communication by steamer with Guernsey and Jersey is provided on alternate days from Southampton and Weymouth, by steamers of the London & South-Western and Great Western railway companies of England. Railway communications within the islands are confined to Jersey. Regular steamship communications are kept up from certain French ports, and locally between the larger islands. In summer the islands, especially Jersey, Guernsey and Sark, are visited by numerous tourists, both from England and from France.

The islands fall physically into four divisions. The northernmost, lying due west of Cape La Hague, and separated therefrom by the narrow Race of Alderney, includes that island, Burhou and Ortach, and numerous other islets west of it, and west again the notorious Casquets, and angry group of jagged rocks, on the largest of which is a powerful lighthouse. Doubtful tradition places here the wreck of the "White Ship," in which William, son of Henry I., perished in 1120; in 1744 the "Victory," a British man-of-war, struck on one of the rocks, and among calamities of modern times the wreck of the" Stella," a passenger vessel, in 1899, may be recalled. The second division of islands is also the most westerly; it includes Guernsey with a few islets to the west, and to the east, Sark, Herm, Jethou (inhabited islands) and others. The strait between Guernsey and Herm is called Little Russel, and that between Herm and Sark Great Russel. Sark is famous ior its splendid cliffs and caves, while Herm possesses the remarkable phenomenon of a shell-beach, or shore, half-a-mile in length, formed wholly of small shells, which accumulate in a tidal eddy formed at the north of the island. To the south-east of these, across the channel called La Deroute, lies Jersey, forming, with a few attendant islets, of which the Ecrehou to the north-east are the chief, the third division. The fourth and southernmost division falls into two main subdivisions. The Minquiers, the more western, are a collection of abrupt rocks, the largest of which, Maitresse He, affords a landing and shelter for fishermen. Then eastern sub- division, the lies Chausey, lies about 9 m. west by north of Granville (to which commune they belong) on the French coast, and belongs to France. These rocks are close set, low and curiously regular in form. On Grande He, the only permanently inhabited island (pop. 100), some farming is carried on, and several of the islets are temporarily inhabited by fishermen. There is also a little granite-quarrying, and seaweed-burning employs many.

None of the islands is mountainous, and the fine scenery for which they are famous is almost wholly coastal. In this respect each main island has certain distinctive characteristics. Bold cliffs are found on the south of Alderney; in Guernsey they alternate with lovely bays; Sark is specially noted for its magnificent sea-caves, while the coast scenery of Jersey is on the whole more gentle than the rest.

Geology. — Geologically, the Channel Islands are closely related to the neighbouring mainland of Normandy. With a few

exceptions, to be noted later, all the rocks are of pre-Cambrian, perhaps in part of Archean age. They consist of massive granites, gneisses, diorites, porphyrites, schists and phyllites, all of which are traversed by dykes and veins. In Jersey we find in the north-west corner a granitic tract extending from Grosnez to St Mary and St John, beyond which it passes into a small granulitic patch. South of the granites is a schistose area, by St Ouen and St Lawrence, and reach- ing to St Aubin's Bay. Granitic masses again appear round St Bre- lade's Bay. The eastern half of the island is largely occupied by porphyrites and similar rocks (hornstone porphyry) with rhyolites and devitrified obsidians; some of the latter contain large spheru- lites with a diameter of as much as 24 in. ; these are well exposed in Bouley Bay; a complex igneous and intrusive series of rocks lies around St Helier. In the north-east corner of the island a con-

glomerate, possibly of Cambrian age, occurs between Bouley Bay and St Catherine's Bay. Tracts of blown-sand cover the ground for some distance north of St Clement's Bay and again east of St Ouen's Bay. In the sea off the latter bay a submerged forest occurs. The northern half of Guernsey is mainly dioritic, the southern half, below St Peter, is occupied by gneisses. Several patches of granite and granulite fringe the western coast, the largest of these is a hornblende granite round Rocquaine Bay. Horn- blende gneiss from St Sampson and quartz diorite from Capelles, Corvee and elsewhere are transported to England for road metal. Sark is composed almost wholly of hornblende-schists and gneisses with hornblendic granite at the north end of the island, in Little Sark and in the middle of Brechou. Dykes of diabase and diorite are abundant. Alderney consists mainly of hornblende granite and granulite, which are covered on the east by two areas of sandstone which may be of Cambrian age. An enstatite-augite-diorite is sent from Alderney for road-making. Besides the submerged forest on the coast of Jersey already mentioned, there are similar occurrences near St Peter Port and St Sampson's harbour, and in Vazon Bay in Guernsey. Raised beaches are to be seen at several points in the islands.

Climate. — The climate is mild and very pleasant. In Jersey the mean temperature for twenty years is found to be — in January (the coldest month) 42-1° F., in August (the hottest) 63 , mean annual 51-7°. In Guernsey the figures are, for January 42-5°, for August 59-7°, mean annual 49-5°. The mean annual rainfall for twenty-five years in Jersey is 34-21 in., and in Guernsey 38-64 in. The average amount of sunshine in Jersey is considerably greater

than in the most favoured spots on the south coast of England; and in Guernsey it is only a little less than in Jersey. Snow and frost are rare, and the seasons of spring and autumn are protracted. Thick sea-fogs are not uncommon, especially in May and June.

Flora and Fauna.— The flora of the islands is remarkably rich, considering their extent, nearly 2000 different species of plants having been counted throughout the group. Of timber properly speaking there is little, but the evergreen oak, the elm and the beech are abundant. Wheat is the principal grain in cultivation; but far more ground is taken up with turnips and potatoes, mangold, parsnip and carrot. The tomato ripens as in France, and the Chinese yam has been successfully grown. There is a curious cabbage, chiefly cultivated in Jersey, which shoots up into a long woody stalk from 10 to 15 ft. in height, fit for walking- sticks or palisades. Grapes and peaches come to perfection in greenhouses without artificial heat; and not only apples and pears but oranges and figs can be reared in the open air. The arbutus ripens its fruit, and the camellia clothes itself with blossom, as in more southern climates; the fuchsia reaches a height, of 15 or 20 ft., and the magnolia attains the dimensions of a tree. Of the flowers, both indigenous and exotic, that abound throughout the islands, it is sufficient to mention the Guernsey lily with its rich red petals, which is supposed to have been brought from Japan;

The number of the species of the mammalia is little over twenty, and several of these have been introduced by man. There is a special breed of horned cattle, and each island has its own variety, which is carefully kept from all intermixture. The animals are small and delicate, and marked by a peculiar yellow colour round the eyes and within the ears. The red deer was once indigenous, and the black rat is still common in Alderney, Sark and Herm. The list of birds includes nearly 200 species, nearly 100 of which are permanent inhabitants of the islands. There are few localities in the northern seas which are visited by a greater variety of fish, and the coasts abound in crustacea, shell-fish and zoophytes.

Government. — For the purposes of government the Channel Islands (excluding the French Chauseys) are divided into two divisions: — (1) Jersey, and (2) the bailiwick of Guernsey, which includes Alderney, Sark, Herm and Jethou with the island of Guernsey. The constitutions of each division are peculiar and broadly similar, but differing in certain important details; they

may therefore be considered together for the sake of comparison. Until 1854 governors were appointed by the crown; now a separate military lieutenant-governor is appointed for each division on the recommendation of the war office after consultation with the home office. The other crown officials are the

bailiff (bailli) or chief magistrate, the procureur du roi, represent- ing the attorney-general, and the avocat du roi, or in Guernsey the contrdle, representing the solicitor-general. In Jersey the vicomte is also appointed by the crown, in the position of a high sheriff (and coroner); but his counterpart in Guernsey, the prSvdt, is not so appointed. The bailiff in each island is president of the royal court, which is composed of twelve jurats, elected for life, in Jersey by the ratepayers of each parish, in Guernsey by the Elective States, a body which also elects the prevdl, who, with the jurats, serves upon it. The rest of the body is made up of the rectors of the parishes, the douzaines, or elected parish councils (" dozens," from the original number of their members) of the town parish of St Peter Port, the four cantons, and the county parishes, and certain other officials. The royal court administers justice (but in Jersey there is a trial by jury for criminal cases), and in Guernsey can pass temporary ordinances subject to no higher body. It also puts forward projets de lot for the approval of the Deliberative States. Alderney and Sark have a separate legal existence with courts dependent on the royal court of Guernsey. In both Jersey and Guernsey the chief administrative bodyis the Deliberative States. The Jersey States is composed of the lieutenant-governor (who has a veto on the deliberation of any question, but no vote), the bailiff, jurats, parish rectors, parish constables and deputies, the procureur and avocat, with right to speak but no vote, and the vicomte, with right of attendance only. Besides the veto of the lieutenant-governor, the bailiff has the power to dissent from any measure, in which case it is referred to the privy council. In Guernsey the States consists of the bailiff, jurats, eight out of ten rectors, the procureur and deputies; while the lieutenant-governor is always invited and may speak if he attends. By both States local administration is carried on (largely through committees) ; and relations with the British parliament are maintained through the privy council. Acts of parliament are transmitted to the islands by an order in council to be registered in the rolls of the royal

court, and are not considered to be binding until this is done; moreover, registration may be held over pending discussion by the States if any act is considered to menace the privileges of the islands. The right of the crown to legislate by order in council is held to be similarly limited. In cases of encroachment on property, a remarkable form of appeal of very ancient origin called Clameur de Haro survives (see Haro, Clameur de). The islands are in the diocese of Winchester, and there is a dean in both Jersey and Guernsey, who is also rector of a parish.

These peculiar constitutions are of local development, the history of which is obscure. The bailiff was originally assisted in his judicial work by itinerant justices; their place was later taken by the elected jurats; later still the practice of summoning the States to assist in the passing of Ordinances was established by the bailiff and jurats, and at last the States claimed the absolute right of being consulted. This was confirmed to them in 1771.

It is characteristic of these islands that there should be compulsory service in the militia. In Jersey and Alderney every man between the ages of sixteen and forty-five is liable, but in Jersey after ten years' service militiamen are transferred to the reserve. In Guernsey the age limit is from sixteen to thirty- three, and the obligation is extended to all who are British subjects, and draw income from a profession practised in the island. Garrisons of regular troops are maintained in all three islands. Taxation is light in the islands, and pauperism is practically unknown.

In 1904 the revenue of Jersey was £70,191, and its expenditure £69,658; the revenue of Guernsey was £79,334, and the expenditure £43>3ˆ5- The public debt in the respective islands was £322,070 and £195,794. In Jersey the annual revenues from crown rights (principally seigneurial dues, houses and lands and tithes) amount to about £2700, and about £360 is remitted to the paymaster-general. In Guernsey these revenues, in which the principal item is fines on transference of property (treiziemes or fees), amount to about £4500, and about £1000 is remitted. In Alderney the revenues (chiefly from harbour dues) amount to about £1400.

In Jersey the English gold and silver coinage are current, but there is a local copper coinage and local one-pound notes are issued.

Guernsey has also such notes, and its copper coinage consists of

pence, halfpence, two-double and one-double (one-eighth of a penny) pieces. A Guernsey pound is taken as equal to 24 francs, and English and French currency pass equally throughout the islands.

Industry. — The old Norman system of land-tenure has survived, and the land is parcelled out among a great number of small proprietors; holdings ranging from 5 to 25 acres as a rule. The results of this arrangement seem to be favourable in the extreme. Every corner of the ground is carefully and intelligently cultivated, and a considerable proportion is allotted to market-gardening. The cottages are neat and comfortable, the hedges well-trimmed, and the roads kept in excellent repair. There is a considerable export trade in agricultural produce and stock, including vegetables and fruit, in fish (the fisheries forming an important industry) and in stone. There is no manufacture of importance. The inhabitants share in common the right of collecting and burning seaweed (called vraic) for manure. The cutting of the weed (vraicking) became a ceremonial occasion, taking place at times fixed by the government, and connected with popular festivities.

Language.— The language spoken in ordinary life by the inhabitants of the islands is in great measure the same as the old Norman French. The use of the patois has decreased naturally in modern times. Modern French is the official language, used in the courts and states, and English is taught in the parochial schools, and is familiar practically to all. The several islands have each its own dialect, differing from that of the others in vocabulary and idiom; differences are also observable in different localities within the same island, as between the north and the south of Guernsey. None of the dialects has received much literary cultivation, though Jersey is proud of being the birthplace of one of the principal Norman poets, Wace, who flourished in the 12 th century.

History. — The original ethnology and pre-Christian history of the Channel Islands are largely matters of conjecture and debate. Of early inhabitants abundant proof is afforded by the numerous megalithic monuments — cromlechs, kistvaens and maenhirs — still extant. But little trace has been left of Roman occupation, and such remains as have been discovered are mainly of the portable description that affords little proof of actual settlement, though there may have been an unimportant garrison here. The constant recurrence of the names of saints in the place-names of

the islands, and the fact that pre-Christian names do not occur, leads to the inference that before Christianity was introduced the population was very scanty. It may be con- sidered to have consisted originally of Bretons (Celts), and to have received successively a slight admixture of Romans and Legionaries, Saxons and perhaps Jutes and Vandals. Chris- tianity may have been introduced in the 5th century. Guernsey is said to have been visited in the 6th century by St Sampson of Dol (whose name is given to a small town and harbour in the island), St Marcou or Marculfus and St Magloire, a. friend and fellow-evangelist of St Sampson, who founded monasteries at Sark and at Jersey, and died in Jersey in 5 7 5 . Another evangelist of this period was St Helerius, whose name is borne by the chief town of Jersey, St Helier. In his life it is stated that the popula- tion of the island when he reached it was only 30. In 933 the islands were made over to William, duke of Normandy (d. 943), and after the Norman conquest of England their allegiance shifted between the English crown and the Norman coronet according to the vicissitudes of war and policy. During the purely Norman period they had been enriched with numerous ecclesiastical buildings, some of which are still extant, as the chapel of Rozel in Jersey.

In the reign of John of England the future of the islands was decided by their attachment to the English crown, in spite of the separation of the duchy of Normandy. To John it has been usual to ascribe a document, at one time regarded by the islanders as their Magna Carta; but modern criticism leaves little doubt that it is not genuine. An unauthenticated ” copy ” of uncertain origin alone has been discovered, and there is little proof of there ever having been an original. The reign of Edward I. was

full of disturbance; and in 1279 Jersey and Guernsey received from the king, by letters patent, a public seal as a remedy for the dangers and losses which they had incurred by lack of such a certificate. Edward II. found it necessary to instruct his collectors not to treat the islanders as foreigners: his successor, Edward III., fully confirmed their privileges, immunities and customs in 1341 ; and his charter was recognized by Richard II. in 1378. In 1343 there was a descent of the French on Guernsey; the governor was defeated, and Castle Cornet besieged. In 1372 there was another attack on Guernsey, and in 1374 and 1404 the French descended

on Jersey. None of these attempts, however, resulted in permanent settlement. Henry V. confiscated the alien priories which had kept up the same connexion with Nor- mandy as before the conquest, and conferred them along with the regalities of the islands on his brother, the duke of Bedford. During the Wars of the Roses, Queen Margaret, the consort of Henry VI., made an agreement with Pierre de Breze, comte de Maulevrier, the seneschal of Normandy, that if he afforded assistance to the king he should hold the islands independently of the crown. A force was accordingly sent to take possession of Mont Orgueil. It was captured and a small part of the island subjugated, and here Maulevrier remained as governor from 1460 to 1465; but the rest held out under Sir Philip de Carteret, seigneur of St Ouen, and in 1467 the vice-admiral of England, Sir Richard Harliston, recaptured the castle and brought the foreign occupation to an end. In 1482-1483 Pope Sixtus IV., at the instance of King Edward IV., issued a bull of anathema against all who molested the islands; it was formally registered in Brittany in 1484, and in France in i486; and in this way the islands acquired the right of neutrality, which they retained till 1689. In the same reign (Edward IV.) Sark was taken by the French, and only recovered in the reign of Mary, by the strategy (according to tradition) of landing from a vessel a coffin nomin- ally containing a body for burial, but in reality filled with arms. By a charter of 1494, the duties of the governors of Jersey were defined and their power restricted; and the educational interests of the island were furthered at the same time by the foundation of two grammar schools. The religious establishments in the islands were dissolved, as in England, in the reign of Henry VIII. The Reformation was heartily welcomed in the islands. The English liturgy was translated into French for their use. In the reign of Mary there was much religious persecution ; and in that of Elizabeth Roman Catholics were maltreated in their turn. In 1568 the islands were attached to the see of Winchester, being finally separated from that of Coutances, with which they had long been connected, with short intervals in the reign of John, when they had belonged to the see of Exeter, and that of Henry VI., when they had belonged to Salisbury.

The Presbyterian form of church government was adopted under the influence of refugees from the persecution of Protestant- ism on the continent. It was formally sanctioned in St Helier and St Peter Port by Queen Elizabeth; and in 1603 King James enacted that the whole of the islands ” should quietly enjoy their said

liberty." During his reign, however, disputes arose. An Episcopal party had been formed in Jersey, and in 161 9 David Bandinel was declared dean of the island. A body of canons which he drew up agreeable to the discipline of the Church of England was accepted after considerable modification by the people of his charge; but the inhabitants of Guernsey maintained their Presbyterian practices. Of the hold which this form of Protestantism had got on the minds of the people even in Jersey abundant proof is afforded by the general character of the worship at the present day.

In the great struggle between king and parliament, Presbyterian Guernsey supported the parliament; in Jersey, however, there were at first parliamentarian and royalist factions. Sir Philip de Carteret, lieutenant-governor, declared for the king, but Dean Bandinel and Michael Lempriere, a leader of the people, headed the parliamentary party. They received a commission for the apprehension of Carteret, who established himself in Elizabeth Castle; but after some fighting had taken place he died in the castle in August 1643. Meanwhile in Guernsey Sir Peter Osborne,

the governor, was defying the whole island and maintaining himself in Castle Cornet. A parliamentarian governor, Leonard Lydcott, arrived in Jersey immediately after Sir Philip de Carteret's death. But the dowager Lady Carteret was holding Mont Orgueil; George Carteret, Sir Philip's nephew, arrived from St Malo to support the royalist cause, and Lydcott and Lempriere presently fled to England. George Carteret estab- lished himself as lieutenant-governor and bailiff. Bandinel was imprisoned in Mont Orgueil, and killed himself in trying to escape. Jersey was now completely royalist. In 1646 the prince of Wales, afterwards Charles II., arrived secretly at Jersey, and remained over two months at Elizabeth Castle. He went on to France, but returned in 1649, having been proclaimed king by George Carteret, and at Elizabeth Castle he signed the declara- tion of his claims to the throne on the 29th of October. In 1651, when Charles had fled to France again after the battle of Worcester, parliamentarian vessels of war appeared at Jersey. The islanders, weary of the tyrannical methods of their governor, now Sir George Carteret, offered little resistance. On the 15th of December the royalist remnant yielded up Elizabeth Castle; and at the same time Castle Cornet, Guernsey, which had been steadily held by Osborne, capitulated. In each case honourable terms of surrender were granted. Both islands had suffered severely from the struggle, and the people of Guernsey, appealing to Cromwell on the

ground of their support of his cause, com- plained that two-thirds of the land was out of cultivation, and that they had lost " their ships, their traffic and their trading." After the Restoration there was considerable improvement, and in the reign of James II. the islanders got a grant of wool for the manufacture of stockings — 4000 tods 1 of wool being annually allowed to Jersey, 2000 to Guernsey, 400 to Alderney and 200 to Sark. Alderney, which had been parliamentarian, was granted after the Restoration to the Carteret family; and it continued to be governed independently till 1825.

By William of Orange the neutrality of the islands was abolished in 1689, and during the war between England and France (1778-1783) there were two unsuccessful attacks on Jersey, in 1779 and 1781, the second, under Baron de Rullecourt, being famous for the victory over the invaders due to the bravery of the young Major Peirson, who fell when the French were on the point of surrender. During the revolutionary period in France the islands were the home of many refugees. In the 1 8th century various attempts were made to introduce the English custom-house system; but proved practically a failure, and the islands throve on smuggling and privateering down to 1800.

Authorities. — Heylin, Relation of two Journeys (1656); P.Falle, Account of the Island of Jersey (1694; notes, &c, by E. Durell, Jersey, 1837); J. Duncan, History of Guernsey (London, 1841); P. le Geyt, Sur les constitutions, les lois et les usages de celle He [Jersey] , ed. R. P. Marett (Jersey, 1846-1847); F. B. Tupper, Chronicles of Castle Cornet, Guernsey (2nd ed. London, 1851), and History of Guernsey and its Bailiwick (Guernsey, 1854); S. E. Hoskins, Charles II. in the Channel Islands (London, 1854), and other works; Delacroix, Jersey, ses anliquites, &c. (Jersey, 1859); T. Ie Cerf, L'archipel des lies Normandes (Paris, 1863) ; G. Dupont, Le Cotentin et ses ties (Caen, 1870-1885); J. P. E. Havet, Les Cours royales des lies Normandes (Paris, 1878); E. Pegot-Ogier, Histoire des lies de la Manche (Paris, 1881); C. Noury, Geologie de Jersey (Paris and Jersey, 1886) ; D. T. Ansted and R. G. Latham, Channel Islands (1865; 3rd ed., rev. by E. T. Nicolle, London, 1893), the principal general work of reference; Sir E. MacCulloch, Guernsey Folklore, ed. Edith F. Carey (London, 1903); E. F. Carey, Channel Islands (London, 1904).

CHANNING, WILLIAM ELLERY (1780-1842), American divine and philanthropist, was born in Newport, Rhode Island, on the 7th of April 1780. His maternal grandfather was William Ellery, a signer

of the Declaration of Independence; his mother, Lucy Ellery, was a remarkable woman; and his father, William Channing, was a prominent lawyer in Newport. Channing had as a child a refined delicacy of feature and temperament, and seemed to have inherited from his father simple and elegant tastes, sweetness of temper, and warmth cf affection, and from his mother that strong moral discernment and straightforward rectitude of purpose and action which formed so striking a feature 1 A tod generally equalled 28 lb.

of his character. From his earliest years he delighted in the beauty of the scenery of Newport, and always highly estimated its influence upon his spiritual character. His father was a strict Calvinist, and Dr Samuel Hopkins, one of the leaders of the old school Calvinists, was a frequent guest in his father's house. He was, even as a child, he himself says, " quite a theologian, and would chop logic with his elders according to the fashion of that controversial time." He prepared for college in New London under the care of his uncle, the Rev. Henry Channing, and in 1794, about a year after the death of his father, entered Harvard College. Before leaving New London he came under religious influences to which he traced the beginning of his spiritual life. In his college vacations he taught at Lancaster, Massachusetts, and in term time he stinted himself in food that he might need less exercise and so save time for study,— an experiment which undermined his health, producing acute dyspepsia. From his college course he thought that he got little good, and said " when I was in college, only three books that I read were of any moment to me: . . . Ferguson on Civil Society, . . . Hutcheson's Moral Philosophy, and Price's Dissertations. Price saved me from Locke's philosophy."

After graduating in 1798, he lived at Richmond, Virginia, as tutor in the family of David Meade Randolph, United States marshal for Virginia. Here he renewed his ascetic habits and spent much time in theological study, his mind being greatly disturbed in regard to Trinitarian teachings in general and especially prayer to Jesus. He returned to Newport in 1800 " a thin and pallid invalid," spent a year and a half there, and in 1802 went to Cambridge as regent (or general proctor) in Harvard; in the autumn of 1802 he began to preach, having been approved by the

Cambridge Association. On the 1st of June 1803, having refused the more advantageous pastorate of Brattle Street church, he was ordained pastor of the Federal Street Congregational church in Boston. At this time it seems certain that his theological views were not fixed, and in 1808, when he preached a sermon at the ordination of the Rev. John Codman (1782-1847), he still applied the title " Divine Master " to Jesus Christ, and used such expressions as " shed for souls " of the blood of Jesus, and " the Son of God himself left the abodes of glory and expired a victim of the cross." But his sermon preached in 181 9 at Baltimore at the ordination of the Rev. Jared Sparks was in effect a powerful attack on Trinitarianism, and was followed in 18 19 by an article in The Christian Disciple, " Objections to Unitarian Christianity Considered," and in 1820 by another, " The Moral Argument against Calvinism " — an excellent evidence of the moral (rather than the intellectual) character of Unitarian protest. In 1814 he had married a rich cousin, Ruth Gibbs, but refused to make use of the income from her property on the ground that clergymen were so commonly accused of marrying for money.

He was now entering on his public career. Even in 1810, in a Fast Day sermon, he warned his congregation of Bonaparte's ambition; two years later he deplored " this country taking part with the oppressor against that nation which has alone arrested his proud career of victory"; in 1814 he preached a thanks-giving sermon for the overthrow of Napoleon; and in 1816 he preached a sermon on war which led to the organization of the Massachusetts Peace Society. His sermon on " Religion, a Social Principle," helped to procure the omission from the state constitution of the third article of Part I., which made compulsory a tax for the support of religious worship. In 182 1 he delivered the Dudleian lecture on the " Evidences of Revealed Religion " at Harvard, of whose corporation he had been a member since 1813; he had received its degree of S.T.D. in 1820. In August 1821 he undertook a journey to Europe, in the course of which he met in England many distinguished men of letters, especially Wordsworth and Coleridge. Both of these poets greatly in- fluenced him personally and by their writings, and he prophesied that the Lake poets would be one of the greatest forces in a coming spiritual reform. Coleridge wrote of him, " He has the fove of wisdom and the wisdom of love."

On his return to America in August 1823; Dr Channing resumed

his duties as pastor, but with a more decided attention than

before to literature and public affairs, especially after receiving as colleague, in 1824, the Rev. Ezra Stiles Gannett. In 1830, because of his wife's bad health, Channing went to the West Indies. Negro slavery, as he saw it there, and as he had seen it in Richmond, more than thirty years before, so strongly im- pressed him that he began to write his book Slavery (1835). In this he insists that " not what is profitable, but what is right " is " the first question to be proposed by a rational being "; that slavery ought to be discussed " with a deep feeling of responsi- bility, and so done as not to put in jeopardy the peace of the slave-holding states "; that " man cannot be justly held and used as property "; that the tendency of slavery is morally, intellectu- ally, and domestically, bad; that emancipation, however, should not be forced on slave-holders by governmental inter- ference, but by an enlightened public conscience in the South (and in the North), if for no other reason, because " slavery should be succeeded by a friendly relation between master and slave; and to produce this the latter must see in the former his benefactor and deliverer." He declined to identify himself with the Abolitionists, whose motto was " Immediate Emancipa- tion " and whose passionate agitation he thought unsuited to the work they were attempting. The moderation and temperance of his presentation of the anti-slavery cause naturally resulted in some misunderstanding and misstatement of his position, such as is to be found in Mrs Chapman's Appendix to the Autobiography of Harriet Martineau, where Channing is represented as actually using his influence on behalf of slavery. In 1837 he published Thoughts on the Evils of a Spirit of Conquest, and on Slavery: A Letter on the Annexation of Texas to the United States, addressed to Henry Clay, and arguing tnat the Texan revolt from Mexican rule was largely the work of land-speculators, and of those who resolved " to throw Texas open to slave-holders and slaves "; that the results of annexation must be war with Mexico, embroil- ing the United States with England and other European powers, and at home the extension and perpetuation of slavery, not alone in Texas but in other territories which the United States, once started at conquest, would force into the Union. But he still objected to political agitation by the Abolitionists, preferring " unremitting appeals to the reason and conscience," and, even after the prominent part he took in the meeting in Faneuil Hall, called to protest against the murder of Elijah P. Lovejoy, he wrote to The Liberator, counselling the Abolitionists to " disavow this resort to force by Mr Lovejoy." Channing's pamphlet Emancipation (1840) dealt with the success of emancipation in

the West Indies, as related in Joseph John Gurney's Familiar Letters to Henry Clay of Kentucky, describing a Winter in the West Indies (1840), and added his own advice " that we should each of us bear our conscientious testimony against slavery," and that the Free States " abstain as rigidly from the use of political power against Slavery in the States where it is estab- lished, as from exercising it against Slavery in foreign com- munities," and should free themselves " from any obligation to use the powers of the national or state governments in any manner whatever for the support of slavery." In 1842 he pub- lished The Duty of the Free States, or Remarks Suggested by the Case of the Creole, a careful analysis of the letter of complaint from the American to the British government, and a defence of the position taken by the British government. On the 1st of August 1842 he delivered at Lenox, Massachusetts, an address celebrat- ing the anniversary of emancipation in the British West Indies. Two months later, on the 2nd of October 1842, he died at Bennington, Vermont.

Physically Channing was short and slight; his eyes were un- naturally large; his voice wonderfully clear, and like his face, filled with devotional spirit. He was not a great pastor, and lacked social tact, so that there were not many people who became his near friends; but by the few who knew him well, he was almost worshipped. As a preacher Channing was often criticised for his failure to deal with the practical everyday duties of life. But his sermons are remarkable for their rare simplicity and gracefulness of style as well as for the thought

that they express. The first open defence of Unitarians was not based on doctrinal differences but on the peculiar nature of the attack on them made in June 181 5 by the conservatives in the columns of The Panoplist, where it was stated that Uni- tarians were " operating only in secret, . . . guilty of hypocritical concealment of their sentiments." His chief objection to the doctrine of the Trinity (as stated in his sermon at the ordination of the Rev. Jared Sparks) was that it was no longer used philo- sophically, as showing God's relation to the triple nature of man, but that it had lapsed into mere Tritheism. To the name " Unitarian " Channing objected strongly, thinking " unity " as abstract a word as " trinity " and as little expressing the close fatherly relation of God to man. It is to be noted that he strongly

objected to the growth of ” Unitarian orthodoxy ” and its increasing narrowness. His views as to the divinity of Jesus were based on phrases in the Gospels which to his mind established Christ’s admission of inferiority to God the Father, — for example, ” Knoweth no man, neither the Son, but the Father “; at the same time he regarded Christ as ” the sinless and spotless son of God, distinguished from all men by that infinite peculiarity — freedom from moral evil.” He believed in the pre-existence of Jesus, and that it differed from the pre- existence of other souls in that Jesus was actually conscious of such pre-existence, and he reckoned him one with God the Father in the sense of spiritual union (and not metaphysical mystery) in the same way that Jesus bade his disciples ” Be ye one, even as I am one.” Bunsen called him ” the prophet in the United States for the presence of God in mankind.” Channing believed in historic Christianity and in the story of the resurrec- tion, ” a fact which comes to me with a certainty I find in few ancient histories.” He also believed in the miracles of the Gospels, but held that the Scriptures were not inspired, but merely records of inspiration, and so saw the possibility of error in the construction put upon miracles by the ignorant disciples. But in only a few instances did he refuse full credence of the plain gospel narrative of miracles. He held, however, that the miracles were facts and not ” evidences ” of Christianity, and he considered that belief in them followed and did not lead up to belief in Christianity. His character was absolutely averse from controversy of any sort, and in controversies into which he was forced he was free from any theological odium and continually displayed the greatest breadth and catholicity of view. The differences in New England churches he considered were largely verbal, and he said that ” would Trinitarians tell us what they mean, their system would generally be found little else than a mystical form of the Unitarian doctrine.”

His opposition to Calvinism was so great that even in 181 2 he declared ” existence a curse ” if Calvinism be true. Possibly his boldest and most elaborate defence of Unitarianism was his sermon on Unitarianism most favourable to Piety, preached in 1826, criticizing as it did the doctrine of atonement by the sacrifice of an ” infinite substitute “; and the Election Sermon of 1830 was his greatest plea for spiritual and intellectual freedom.

Channing’s reputation as ‘ an author was probably based largely on his publication in The Christian Examiner of Remarks on the Character and Writings of John Milton (1826), Remarks on the

Life and Character of Napoleon Bonaparte (1827-1828), and an Essay on the Character and Writings of Fenelon (1829). An Essay on Self Culture (1838) was an address introducing the Franklin Lectures delivered in Boston September 1838. Chan ning was an intimate friend of Horace Mann, and his views on the education of children are stated, by no less an authority than Elizabeth Palmer Peabody, to have anticipated those of Froebel. His Complete Works have appeared in various editions (5 vols., Boston, 1841; 2 vols., London, 1865; 1 vol., New York, 1875).

Among members of his family may be mentioned his two nephews William Henry (1810-1884), son of his brother Francis Dana, and William Ellery, commonly known as Ellery (1818-1901), son of his brother Walter, a Boston physician (1 786-1876). The former, whose daughter married Sir Edwin Arnold, the

English poet, became a Unitarian pastor (for some time in America, and also in England, where he died; he was deeply interested in Christian Socialism, and was a constant writer, translating Jouffroy's Ethics (1840), and assisting in editing the Memoirs of Margaret Fuller (1852) ; and he wrote the biography of his uncle (see 0. B. Frothingham's Memoir, 1886). Ellery Channing married Margaret Fuller's sister (1842), and besides critical essays and poems published an intimate sketch of Thoreau in 1873.

See the Memoir by William Henry Channing (3 vols., London, 1848; republished in one volume, New York, 1880); Elizabeth Palmer Peabody, Reminiscences of the Rev. William Ellery Channing, D.D. (Boston, 1880), intimate but inexact; John White Chadwick, William Ellery Channing, Minister of Religion (Boston, 1903); and William M. Salter, " Channing as a Social Reformer" {Unitarian Review, March 1888). (R. We.)

CHANSONS DE GESTE, the name given to the epic chronicles which take so prominent a place in the literature of France from the nth to the 15th century. Gaston Paris defined a chanson de geste as a song the subject of which is a series of historical facts or gesta. These facts form the centre around which are grouped sets of poems, called cycles, and hence the two terms have in modern criticism become synonymous for the epic family to which the hero of the particular group or cycle belongs. The earliest chansons de geste were founded on the fusion of the Teutonic spirit, under a Roman form, into the new Christian and

French civilization. It seems probable that as early as the 9th century epic poems began to be chanted by the itinerant minstrels who are known as jongleurs. It is conjectured that in a base Latin fragment of the 10th century we possess a transla- tion of a poem on the siege of Girona. Gaston Paris dates from this lost epic the open expression of what he calls " the epic fermentation" of France. But the earliest existing chanson de geste is also by far the noblest and most famous, the Chanson de Roland; the conjectural date of the composition of this poem has been placed between the years 1066 and 1095. That the author, as has been supposed, was one of the conquerors of England, it is perhaps rash to assert, but undoubtedly the poem was composed before the First Crusade, and the writer lived at or near the sanctuary of Mont Saint-Michel. The Chanson de Roland stands at the head of modern French literature, and its solidity and grandeur give a dignity to the whole class of poetry of which it is the earliest and by far the noblest example. But it is in the crowd of looser and later poems, less fully character- ized, less steeped in the individuality of their authors, that we can best study the form of the typical chanson de geste. These epics sprang from the soil of France; they were national and historical; their anonymous writers composed them spon- taneously, to a common model, with little regard to the artificial niceties of style. The earlier examples, which succeed the Roland, are unlike that great work in having no plan, no system of composition. They are improvisations which wander on at their own pace, whither accident may carry them. This mass of medieval literature is monotonous, primitive and superficial. As Leon Gautier has said, in the rudimentary psychology of the chansons de geste, man is either entirely good or entirely bad. There are no fine shades, no observation of character. The language in which these poems are composed is extremely simple, without elaboration, without ornament. Everything is sacrificed to the telling of a story by a narrator of little skill, who helps himself along by means of a picturesque, but almost childish fancy, and a primitive sentiment of rhythm. Two great merits, however, all the best of these poems possess, force and lucidity; and they celebrate, what they did much to create, that unselfish elevation of temper which we call the spirit of chivalry.

Perhaps the most important cycle of chansons de geste was that which was collected around the name of Charlemagne, and was known as the Geste du roi. A group of this cycle dealt with the history of the mother of the emperor, and with Charlemagne

himself down to the coming of Roland. To this group belong Bertha Greatfoot and Aspremont, both of the 12th century, and a variety of chansons dealing with the childhood of Charlemagne and of Ogier the Dane. A second group deals with the struggle

of Charlemagne with his rebellious vassals. This is what has been denned as the Feudal Epic; it includes Girars de Viane and Ogier the Dane, both of the 13th century, or the end of the 12 th. A third group follows Charlemagne and his peers to the East. It is in the principal of these poems, The Pilgrimage to Jerusalem, that Alexandrine verse first makes its appearance in French literature. This must belong to the beginning of the 1 2th century. A fourth group, antecedent to the Spanish war, is of the end of the 12th century and the beginning of the 13th; it includes Aiquin, Fierabras and Otinel. The fifth class discusses the war in Spain, and it is to this that Roland belongs; there are different minor epics dealing with the events of Roncevaux, and independent chansons of Gui de Bourgogne, Gaidon and Anse'is de Carthage. The Gesle du Roi comprises a sixth and last group, proceeding with events up to the death of Charlemagne; this contains Huon de Bordeaux and a vast number of poems of minor originality and importance.

Another cycle is that of Duke William Shortnose, La Geste de Guillaume. This includes the very early and interesting Departure of the Aimeri Children, Aliscans and Rainoart. It is thought that this cycle, which used to be called the Geste de Garin de Monglane, is less artificial than the others; it deals with the heroes of the South who remained faithful in their vassalage to the throne. The poems belonging to this cycle are extremely numerous, and some of them are among the earliest which survive. These chansons find their direct opposites in those which form the great cycle of La Geste de Doon de Mayence, sometimes called " la faulse geste," because it deals with the feats of the traitors, of the rebellious family of Ganelon. This is the geste of the Northmen, always hostile to the Carlovingian dynasty. It comprises some of the most famous of the chansons, in particular Parise la duchesse and The Four Sons of Aymon. Several of its sections are the production of a known poet, Raimbert of Paris. From this triple division of the main body of the chansons de geste into La Geste du Roi, La Geste de Guil-

laume and La Geste de Doon, are excluded certain poems of minor importance, — some provincial, such as Amis and Amiles and Garin, some dealing with the Crusades, such as Antioche, and some which are not connected with any existing cycle, such as Ciperis de Vignevaux; most of this last category, however, are works of the decadence.

The analysis which is here sketched is founded on the latest theories of Leon Gautier, who has given the labour of a lifetime to the investigation of this subject. The wealth of material is baffling to the ordinary student; of the medieval chansons de geste many hundreds of thousands of lines have been preserved. The habit of composing became in the 14th century, as has been said, no longer an art but a monomania. Needless to add that a very large proportion of the surviving poems have never yet been published. All the best of the early chansons de geste are written in ten-syllable verse, divided into stanzas or laisses of different length, united by a single assonance. Rhyme came in with the 13th century, and had the effect in languid bards of weakening the narrative; the sing-song of it led at last to the abandonment of verse in favour of plain historical prose. The general character of the chansons de geste, especially of those of the 1 2th century, is hard, coarse, inflexible, like the march of rough men stiffened by coats of mail. There is no art and little grace, but a magnificent display of force. These poems enshrine the self sufficiency of a young and powerful people; they are full of Gallic pride, they breathe the spirit of an in domitable warlike energy. All their figures belong to the same social order of things, and all illustrate the same fighting aristocracy. The moving principle is that of chivalry, and what is presented is, invariably, the spectacle of the processional life of a medieval soldier. The age described is a disturbed one; the feudal anarchy of Europe is united, for a moment,- in defend- ing western civilization against the inroads of Asia, against ” the yellow peril.” But it is a time of transition in Europe also, and Charlemagne, the immortal but enfeebled emperor, whose beard is whiter than lilies, represents an old order of things against which the rude barons of the North are perpetually in successful

revolt. The loud cry of the dying Ronald, as E. Quinet said, rings through the whole poetical literature of medieval France; it is the voice of the individuality of the great vassal, who, in the decay of the empire, stands alone with himself and with his sword.

Authorities. — Leon Gautier, Les Epopees francaises (4 vols.,

1878-1894); Gaston Paris, La Litterature francaise au moyen age (1890) ; Paul Meyer, Recherches sur V epopee francaise (1867) ; G. Paris, Histoire poetique de Charlemagne (1865); A. Longnon, Les Quatre Fits Aimon, Sec. (1879). (E. G.)

CHANT (derived through the Fr. from the Lat. cantare, to sing; an old form is " chaunt "), a song or melody, particularly one sung according to the rules of church service-books. For an account of the chant or cantus firmus of the Roman Church see Plain-song. In the English church " chants " are the tunes set to the unmetrical verses of the psalms and canticles. The chant consisted of an " intonation " followed by a reciting note of indefinite length; a " mediation " closed the first part of the verse, leading to a second reciting note; a " termination " closed the second part of the verse. In the English chant the " intonation " disappeared. Chants are " single," if written for one verse only, " double," if for two. " Quadruple " chants for four verses have also been written.

CHANTABUN, or Chantabdri, the principal town of the Siamese province of the same name, on the E. side of the Gulf of Siam, in 102 6′ E., 12° 38′ N. Pop. about 5000. The town lies about 12 m. from the sea on a river which is navigable for boats and inside the bar of which there is good anchorage for light-draft vessels. The trade is chiefly in rubies and sapphires from the mines of the Krat and Pailin districts, and in pepper, of which about 500 tons are exported annually. Cardamoms and rosewood are also exported. In 1905 Chantabun was made the headquarters of a high commissioner with jurisdiction ex- tending over the coast districts from the Nam Wen on the East to Cape Liant on the West, which were thus united to form a provincial division (Monton). In 1893 Chantabun was occupied by a French force of four hundred men, a step taken by France as a guarantee for the execution by Siam of undertakings entered into by the treaty of that year. The occupation, which was merely military and did not affect the civil government, lasted until January 1905, when, in accordance with the provisions of the Franco-Siamese treaty of 1904, the garrison of occupation was withdrawn. Chantabun has been since the 17th century, and still is, a stronghold of the Roman Catholic missionaries, and the Christian element amongst the population is greater here than anywhere else in Siam.

CHANTADA, a town of north-western Spain, in the province of Lugo, on the left bank of the Rio de Chantada, a small right- hand tributary of the river Mino, and on the main road from Orerse, 18

m. S. by W., to Lugo, 28 m. N. by E. Pop. (1900) 1 5,003. Chantada is the chief town of the fertile region between the Mino and the heights of El Faro, which mark the western border of the province. Despite the lack of railway communica- tion, it has a thriving .trade in grain, flax, hemp, and dairy produce.

CHANTAGE (a Fr. word from chanter, to sing, slang for a criminal making an avowal under examination), a demand for money backed by the threat of scandalous revelations, the French equivalent of ” blackmail.”

CHANTARELLE, an edible fungus, known botanically as Cantharellus cibarius, found in woods in summer. It is golden yellow, somewhat inversely conical in shape and about 2 in. broad and high. The cap is flattened above with a central depression and a thick lobed irregular margin. Running down into the stem from the cap are a number of shallow thick gills. The substance of the fungus is dry and opaque with a peculiar smell suggesting ripe apricots or plums. The flesh is whitish tinged with yellow. The chantarelle is sold in the markets on the continent of Europe, where it forms a regular article of food, but seems little known in Britain though often plentiful in the New Forest and elsewhere. Before being cooked they should be allowed to dry, and then thrown into boiling water. They mav

then be stewed in butter or oil, or cut up jmall and stewed with meat. No fungus requires more careful preparation.

See M. C. Cooke, British Edible Fungi, (1891), pp. 104-105.

CHANTAVOINE, HENRI (1850-), French man of letters, was born at Montpellier on the 6th of August 1850, and was educated at the Ecole Normale Superieure. After teaching in the provinces he moved, in 1876, to the Lycee Charlemagne in Paris, and subsequently became professor of rhetoric at the Lycee Henri IV. and maitre de conferences at the Ecole Normale at Sevres. He was associated with the Nouvclle Revue from its foundation in 1879, and he joined the Journal des debats in 1884. His poems include Poemes sinceres (1877), Satires contemporaines (1881), Ad memoriam (1884), Au fil des jours (1889).

CHANTILLY, a town of northern France, in the department of

Oise, 25 m. N. of Paris on the Northern railway to St Quentin. Pop. (1906) 4632. It is finely situated to the north of the forest of Chantilly and on the left bank of the river Nonette, and is one of the favourite Parisian resorts. Its name was long associated with the manufacture, which has now to a great extent decayed, of lace and blonde; it is still more celebrated for its chateau and its park (laid out originally by A. Le Notre in the second half of the 17th century), and as the scene of the great annual races of the French Jockey Club. The chateau consists of the palace built from 1876 to 1885 and of an older portion adjoining it known as the chatelet. The old castle must have been in existence in the 13th century, and in the reign of Charles VI. the lordship belonged to Pierre d'Orgemont, chancellor of France. In 1484 it passed to the house of Montmorency, and in 1632 from that family to the house of Conde. Louis II., prince de Conde, surnamed the Great, was specially attached to the place, and did a great deal to enhance its beauty and splendour. Here he enjoyed the society of La Bruyere, Racine, Moliere, La Fontaine, Boileau, and other great men of his time; and here his steward Vatel killed himself in despair, because of a hitch in the prepara- tions for the reception of Louis XIV. The stables close to the racecourse were built from 17 19 to 1735 by Louis-Henri, duke of Bourbon. Of the two splendid mansions existing at that period known as the grand chateau and the chatelet, the former was destroyed about the time of the Revolution, but the latter, built for Anne de Montmorency by Jean Bullant, still remains as one of the finest specimens of Renaissance architecture in France. The chateau d'Enghien, facing the entrance to the grand chateau, was built in 1770 as a guest-house. On the death in 1830 of che duke of Bourbon, the last representative of the house of Conde, the estate passed into the hands of Henri, due d'Aumale, fourth son of Louis Philippe. In 1852 the house of Orleans was declared incapable of possessing property in France, and Chantilly was accordingly sold by auction. Purchased by the English bankers, Coutts & Co., it passed back into the hands of the due d'Aumale, in 1872. By him a magnificent palace, including a fine chapel in the Renaissance style, was erected on the foundations of the ancient grand chateau and in the style of the chatelet. It is quadrilateral in shape, consisting of four unequal sides flanked by towers and built round a courtyard. The whole group of buildings as well as the pleasure-ground behind them, known as the Parterre de la Voliere, is surrounded by fosses supplied with water from the Nonette. On the terrace in front of the chateau there is a bronze statue of the constable Anne de Montmorency. The due d'Aumale

installed in the chatelet a valuable library, specially rich in incunabula and 16th century editions of classic authors, and a collection of the paint- ings of the great masters, besides many other objects of art. By a public act in 1886 he gave the park and chateau with its superb collections to the Institute of France in trust for the nation, reserving to himself only a life interest; and when he died in 1897 the Institute acquired full possession.

CHANTREY, SIR FRANCIS LEGATT (1782-1841), English sculptor, was born on the 7th of April 1782 at Norton near Sheffield, where his father, a carpenter, cultivated a small farm. His father died when he was eight years of age; and his mother having married again, his profession was left to be chosen by his friends. In his sixteenth year he was on the point of being

apprenticed to a, grocer in Sheffield, when, having seen some wood-carving in a shop-window, he requested to be made a carver instead, and was accordingly placed with a Mr Ramsey, wood- carver in Sheffield. In this situation he became acquainted with Raphael Smith, a distinguished draftsman in crayon, who gave him lessons in painting; and Chan trey, eager to commence his course as an artist, procured the cancelling of his indentures, and went to try his fortune in Dublin and Edinburgh, and finally (1802) in London. Here he first obtained employment as an assistant wood-carver, but at the same time devoted himself to portrait-painting, bust-sculpture, and modelling in clay. He exhibited pictures at the Academy for some years from 1804, but from 1807 onwards devoted himself mainly to sculpture. The sculptor Nollekens showed particular zeal in recognizing his merits. In 1807 he married his cousin, Miss Wale, who had some property of her own. His first imaginative work in sculp ture was the model of the head of Satan, which was exhibited at the Royal Academy in 1808. He afterwards executed for Greenwich hospital four colossal busts of the admirals Duncan, Howe, Vincent and Nelson; and so rapidly did his reputation spread that the next bust which he executed, that of Home Tooke, procured him commissions to the extent of £12,000. From this period he was almost uninterruptedly engaged in professional labour. In 1819 he visited Italy, and became acquainted with the most distinguished sculptors of Florence and Rome. He was chosen an associate (181 5) and afterwards a member (1818) of the Royal Academyˆ received the degree of M.A. from Cambridge, and that of D.C.L. from Oxford, and in 1835 was knighted. He died after an illness of only two hours' duration on the 25th of November 1841, having for some years suffered from disease of the heart,

and was buried in a tomb constructed by himself in the church of his native village.

The works of Chantrey are extremely numerous. The principal are the statues of Washington in the State-house at Boston, U.S.A.; of George III. in the Guildhall, London; of George IV. at Brighton; of Pitt in Hanover Square, London; of James Watt in Westminster Abbey and in Glasgow; of Roscoe and Canning in Liverpool; of Dalton in Manchester; of Lord President Blair and Lord Melville in Edinburgh, &c. Of his eques- trian statues the most famous are those of Sir Thomas Munro in Calcutta, and the duke of Wellington in front of the London Exchange. But the finest of Chantrey's works are his busts, and his delineations of children. The figures of two children asleep in each other's arms, which form a monumental design in Lichfield cathedral, have always been lauded for beauty, sim- plicity and grace. So is also the statue of the girlish Lady Louisa Russell, represented as standing on tiptoe and fondling a dove in her bosom. Both these works appear, in design, to have owed something to Stothard; for Chantrey knew his own scantiness of ideal invention or composition, and on system sought aid from others for such attempts. In busts, his leading excellence is facility — a ready unconstrained air of life, a prompt vivacity of ordinary expression. Allan Cunningham and Weekes were his chief assistants, and were indeed the active executants of many works that pass under Chantrey's name. Chantrey was a man of warm and. genial temperament, and is said to have borne ? noticeable though commonplace resemblance to the usual portraits of Shakespeare.

Chantrey Bequest. — By the will dated the 31st of December 1840, Chantrey (who had no children) left his whole residuary personal estate after the decease or on the second marriage of his widow (less certain specified annuities and bequests) in trust for the president and trustees of the Royal Academy (or in the event of the dissolution of the Royal Academy, to such society as might take its place), the income to be devoted to the encouragement of British fine art in painting and sculpture only, by " the purchase of works of fine art of the highest merit . . . that can be obtained." The funds might be allowed to accumulate for not more than five years; works by British or foreign artists, dead or living, might be acquired, so long as such works were entirely executed within the shores of Great Britain, the artists having been in residence there during such execution and completion. The prices to be paid

were to be " liberal," and no sympathy for an artist or his family was to influence the selection or the purchase of works, which were to be acquired solely on the ground of intrinsic merit. No commission or orders might be given: the works must be finished before purchase. Conditions were made as to the exhibition of the works, in the confident expectation that as the intention of the testator was to form and establish a " public collection of British Fine Art in Painting and Sculpture," the government or the country would provide a suitable gallery for their display; and an annual sum of £300 and £50 was to be paid to the president of the Royal Academy and the secretary respectively, for the discharge of their duties in carrying out the provisions of the will.

Lady Chantrey died in 1875, and two years later the fund became available for the purchase of paintings and sculptures. The capital sum available amounted to £105,000 in 3 % Consols, which (since reduced to 25%) produces an available annual income varying from £2500 to £2100. Galleries in the Victoria and Albert Museum at South Kensington were at first adopted as the depository of the works acquired, until in 1898 the Royal Academy arranged with the treasury, on behalf of the government, for the transference of the collection to the National Gallery of British Art, which had been erected by Sir Henry Tate at Millbank. It was agreed that the " Tate Gallery " should be its future home, and that " no power of selection or elimination is claimed on behalf of the trustees and director of the National Gallery " (Treasury Letter, 18054-98, 7th December 1898) in respect of the pictures and sculptures which were then to be handed over and which should, from time to time, be sent to augment the collection. Inasmuch as it was felt that the provision that all works must be complete to be eligible for purchase militated against the most advantageous disposition of the fund in respect of sculpture, in the case of wax models or plaster casts before being converted into marble or bronze, it was sought in the action of Sir F. Leighton v. Hughes (tried by Mr Justice North, judgment May 7th, 1888, and in the court of appeal, before the master of the rolls, Lord Justice Cotton, and Lord Justice Fry, judgment June 4th, 1889 — the master of the rolls dissenting) to allow of sculptors being commissioned to complete in bronze or marble a work executed in wax or plaster, such " completion "

being more or less a mechanical process. The attempt, however, was abortive.

A growing discontent with the interpretation put by the Royal Academy upon the terms of the will as shown in the works acquired began to find expression more than usually forcible and lively in the press during the year 1903, and a debate raised in the House of Lords by the earl of Lytton led to the appointment of a select committee of the House of Lords, which sat from June to August 1904. The committee consisted of the earls of Carlisle, Lytton, and Crewe, and Lords Windsor, Ribblesdale, Newton, and Killanin, and the witnesses represented the Royal Academy and representative art institutions and art critics. The report (ordered to be printed on the 8th of August 1904) made certain recommendations with a view to the prevention of certain former errors of administration held to have been sustained, but dismissed other charges against the Academy. In reply thereto a memorandum was issued by the Royal Academy (February 1905, ordered to be printed on the 7th of August 1905 — Paper 166) disagreeing with certain recommendations, but allowing others, either intact or in a modified form.

Up to 1905 inclusive 203 works had been bought — all except two from living painters — at a cost of nearly £68,000. Of these, 175 were in oil-colours, 12 in water-colours, and 16 sculptures (10 in bronze and 6 marble).

See The Administration of the Chantrey Bequest, by D. S. MacColl (l6mo, London, 1904), a highly controversial publication by the leading assailant of the Royal Academy ; Chantrey and His Bequest, by Arthur Fish, a complete illustrated record of the purchases, &c. (London, 1904) ; The Royal Academy, its Uses and Abuses, by H. J. Laidlay (London, 1898), controversial; Report from the Select Com- mittee of the House of Lords on the Chantrey Trust; together with the Proceedings of the Committee, Minutes of Evidence and Appendix (Wyman & Sons, 1904), and Index (separate publication, 1904).

CHANT ROYAL, one of the fixed forms of verse invented by the ingenuity of the poets of medieval France. It is composed of five strophes, identical in arrangement, of eleven verses each, and of an envoi of five verses. All the strophes are written on the five rhymes exhibited in the first strophe, the entire poem, therefore, consisting of sixty lines in the course of which five rhymes are repeated. It has been conjectured that the chant royal is an

extended ballade, or rather a ballade conceived upon a larger scale; but which form preceded the other appears to be uncertain. On this point Henri de Croi, who wrote about these forms of verse in his Art el science de rhetorique (1493), throws no light. He dwells, however, on the great dignity of what he calls the " Champt Royal," and says that those who defy with success the ardour of its rules deserve crowns and garlands for their pains. Etienne Pasquier (1529-1615) points out the fact that the Chant Royal, by its length and the rigidity of its structure, is better fitted than the ballade for solemn and pompous themes. In Old French, the most admired chants royal are thoseof Clement Marot; his Chant royal chrestien, with its refrain " Sante au corps, et Paradis a l'ame,"

was celebrated. Theodore de Banville defines the chant royal as essentially belonging to ages of faith, when its subjects could be either the exploits of a hero of royal race or the processional splendours of religion. La Fontaine was the latest of the French poets to attempt the chant royal, until it was resuscitated in modern times.

This species of poem was unknown in English medieval literature and was only introduced into Great Britain in the last quarter of the 19th century. The earliest chant royal in English was that published by Edmund Gosse in 1877; it is here given to exemplify the structure and rhyme-arrangement of tht form : —

The Praise of Dionysus

" Behold, above the mountains there is light, A streak of gold, a line of gathering fire, And the dim East hath suddenly grown bright With pale aerial flame, that drives up higher The lurid mists which all the night long were Breasting the dark ravines and coverts bare; Behold, behold! the granite gates unclose, And down the vales a lyric people flows, Who dance to music, and in dancing fling Their frantic robes to every wind that blows, And deathless praises to the Vine-God sing.

Nearer they press, and nearer still in sight, Still dancing blithely in a seemly choir; Tossing on high the symbol of their rite, The cone-tipp'd thyrsus of a god's desire; Nearer they come, tall damsels flushed and fair, With ivy circling their abundant hair, Onward, with even pace, in stately rows, With eye that flashes, and with cheek that glows, And all the while their tribute-songs they bring, And newer glories of the past disclose And deathless

praises to the Vine-God sing.

The pure luxuriance of their limbs is white, And flashes clearer as they draw the nigher, Bathed in an air of infinite delight, Smooth without wound of thorn, or fleck of mire, Borne up by song as by a trumpet's blare, Leading the van to conquest, on they fare, Fearless and bold, whoever comes or goes, These shining cohorts of Bacchantes close, Shouting and shouting till the mountains ring, And forests grim forget their ancient woes, And deathless praises to the Vine-God sing.

And youths there are for whom full many a night

Brought dreams of bliss, vague dreams that haunt and tire

Who rose in their own ecstasy bedight,

And wandered forth through many a scourging briar,

And waited shivering in the icy air,

And wrapped the leopard-skin about them there,

Knowing for all the bitter air that froze,

The time must come, that every poet knows,

When he shall rise and feel himself a king,

And follow, follow where the ivy grows,

And deathless praises to the Vine-God sing.

But oh! within the heart of this great flight, Whose ivory arms hold up the golden lyre? What form is this of more than mortal height? What matchless beauty, what inspired ire? The brindled panthers know the prize they bear, And harmonize their steps with tender care ; Bent to the morning, like a living rose, The immortal splendour of his face he shows; And, where he glances, leaf and flower and wing Tremble with rapture, stirred in their repose, And deathless praises to the Vine-God sing.

Envoi. Prince of the flute and ivy, all thy foes Record the bounty

that thy grace bestows, But we, thy servants, to thy glory cling, And with no frigid lips our songs compose, And deathless praises to the Vine-God sing."

In the middle ages the chant royal was largely used for the praise of the Virgin Mary. Eustache Deschamps (1340-1410) distinguishes these Marian chants royaux, which were called " serventois," by the absence of an envoi. These poems are first mentioned by Rutebeuf, a Irouvere of the 13th century. The chant royal is practically unknown outside French and English literature. (E. G.)

CHANTRY (Fr. chanterie, from chanter, to sing; Med. Lat. cantuaria), a small chapel built out from a church, endowed in pre-Ref ormation times for the express purpose of maintaining priests for the chan ting of masses for the soul of the founder or of some one named by him. It generally contained the tomb of the founder, and, as the officiator or mass-priest was often unconnected with the parochial clergy, had an entrance from the outside. The word passed through graduations of meaning. Its first sense was singing or chanting. Then it meant the endowment funds, next the priests, and then the church or chapel itself.

CHANUTE, a city of Neosho county, Kansas, U.S.A., 1 m. from the Neosho river, and about 120 m. S.S.W. of Kansas city. Pop. (1890) 2826; (1900) 4208, of whcm 210 were foreign-born and 171 were negroes; (1910 census) 9272. Chanute is served by the Atchison, Topeka & Santa Fe and the Missouri, Kansas & Texas railways, the former having large repair shops. The city is in the Kansas-Oklahoma oil and gas field, and is surrounded by a fine farming and dairying region, in which special attention is given to the raising of small fruit; oil, gas, cement rock and brick shale are found in the vicinity. Among the city's manufactures are refined oil, Portland cement, vitrified brick and tile, glass, asphalt, ice, cigars, drilling machinery, and flour. The municipality owns and operates the waterworks, a natural gas plant, and an electric lighting plant. Four towns • — New Chicago, Tioga, Chicago Junction and Alliance — were started here about the same time (1870). In 1872 they were consolidated, and the present name was adopted in honour of Octave Chanute (b. 1832), the civil engineer and aeronautist (see Flight and Flying), then the engineer of the Lawrence, Leavenworth & Galveston railway (now part of the Atchison system). Chanute was incorporated as a city of the third class in 1873, and its charter was revised in

1888. Natural gas and oil were found here in 1899, and Chanute became one of the leaders of the Kansas independent refineries in their contest with the Standard 0:1 Company.

CHANZY, ANTOINE EUGENE ALFRED (1823-1883), French general, was born at Nouart (Ardennes) on the 18th of March 1823. The son of a cavalry officer, he was educated at the naval school at Brest, but enlisted in the artillery, and, subsequently passing through St Cyr, was commissioned in the Zouaves in 1843. He saw a good deal of fighting in Algeria, and was promoted lieutenant in 1848, and captain in 1851. He became chef de bataillon'm 1856, and served in the Lombardy campaign of 1859, being present at Magenta and Solferino. He took part in the Syrian campaign of 1860-61 as a lieutenant-colonel; and as colonel commanded the 48th regiment at Rome in 1864. He returned to Algeria as general of brigade, assisted to quell the Arab insurrection, and commanded the subdivisions of Bel Abbes and Tlemcen in 1868. Although he had acquired a good professional reputation, he was in bad odour at the war office

on account of suspected contributions to the press, and at the outbreak of the Franco- German War he was curtly refused a brigade command. After the revolution, however, the government of national defence called him from Algeria, made him a general of division, and gave him command of the XVI. corps of the army of the Loire. (For the operations of the Orleans campaign which followed, see Franco-German War.) The Loire army won the greatest success of the French during the whole war at Coulmiers, and followed this up with another victorious action at Patay; in both engagements ■ General Chanzy's corps took the most brilliant part. After the second battle of Orleans and the separation of the two wings of the French army, Chanzy was appointed to command that in the west, designated the second army of the Loire. His enemies, the grand duke of Mecklenburg, Prince Frederick Charles, and General von der Tann, all regarded Chanzy as their most for- midable opponent. He displayed conspicuous moral courage and constancy, not less than technical skill, in the fighting from Beaugency to the Loire, in his retreat to Le Mans, and in retiring to Laval behind the Mayenne. As Gambetta was the soul, Chanzy was the strong right arm of French resistance to the invader. He was made a grand officer of the Legion of Honour, and was elected to the National Assembly. At the outbreak of the Commune, Chanzy, then at Paris, fell into the hands of the insurgents, by whom he was forced to give his parole not to serve against them. It was said

that he would otherwise have been appointed instead of MacMahon to command the army of Versailles. A ransom of £40,000 was also paid by the government for him. In 1872 he became a member of the committee of defence and commander of the VII. army corps, and in 1873 was appointed governor of Algeria, where he re- mained for six years. In 1875 he was elected a life senator, in 1878 received the grand cross of the Legion of Honour, and in 1879, without his consent, was nominated for the presidency of the republic, receiving a third of the total votes. For two years he was ambassador at St Petersburg, during which time he received many tokens of respect, not only from the Russians, but also from the German emperor, William I., and Prince Bismarck. He died suddenly, while commanding the VI. army corps (stationed nearest to the German frontier) , at Chalons-sur- Marne, on the 4th of January 1883, only a few days after Gam- betta, and his remains received a state funeral. He was the author of La Deuxieme Armie de la Loire (1872). Statues of General Chanzy have been erected at Nouart and Le Mans.

CHAOS, in the Hesiodic theogony, the infinite empty space, which existed before all things (Tkeog. 116, 123). It is not, however, a mere abstraction, being filled with clouds and dark- ness; from it proceed Erebus and Nyx (Night), whose children are Aether (upper air) and Hemera (Day). In the Orphic cosmogony the origin of all goes back to Chronos, the personi- fication of time, who produces Aether and Chaos. In the Aristo- phanic parody (Birds, 691) the winged Eros in conjunction with gloomy Chaos brings forth the race of birds. The later Roman conception (Ovid, Metam. i. 7) makes Chaos the original undigested, amorphous mass, into which the architect of the world introduces order and harmony, and from which individual forms are created. In the created world (cosmos, order of the universe) the word has various meanings: — the universe; the space between heaven and earth; the under- world and its ruler. Metaphorically it is used for the immeasurable darkness, eternity, and the infinite generally. In modern usage ” chaos ” denotes a state of disorder and confusion.

CHAPBOOK (from the O. Eng. chap, to buy and sell), the comparatively modern name applied by booksellers and biblio- philes to the little stitched tracts written for the common people and formerly circulated in England, Scotland and the American colonies by itinerant dealers or chapmen, consisting chiefly of vulgarized versions of popular stories, such as Tom Thumb, Jack

the Giant Killer, Mother Shiplon, and Reynard the Fox — travels, biographies and religious treatises. Few of the older chapbooks exist. Samuel Pepys collected some of the best and had them bound into small quarto volumes, which he called

Vulgaria ; also four volume of a smaller size, which he lettered Penny Witticisms, Penny Merriments, Penny Compliments and Penny Godlinesses. The early chapbooks were the direct descendants of the black-letter tracts of Wynkyn de Worde. It was in France that the printing-press first began to supply reading for the common people. At the end of the 15th century there was a large popular literature of farces, tales in verse and prose, satires, almanacs, &c, stitched together so as to contain a few leaves, and circulated by itinerant booksellers, known as colporteurs. Most early English chapbooks are adaptations or translations of these French originals, and were introduced into England early in the 16th century. The chapbooks of the 17th century present us with valuable illustrations of the manners of the time; one of the best known is that containing the story of Dick Whittington. Others which had a great vogue are Jack the Giant Killer, Little Red Riding Hood, and Mother Shipton. Those of the 18th century are far inferior in every way, both as regards the literature and the printing; and unfortunately it is these which form the bulk of what is now known to us in collections as chapbooks. They have never exercised any great influence in England nor received much attention, owing no doubt to their poor literary character. In France, on the other hand, their French equivalents have been the object of close and systematic study, and L'Histoire des livres popidaires ou de la literature du colportage by Charles Nisard (1854) goes deeply into the subject. Amongst English books may be mentioned Notices of Fugitive Tracts and Chapbooks, by J. O. Halliwell-Phillipps (1849); Chapbooks of the 18th Century, by John Ashton (1882), and some reprints by the Villon Society in 1885. The word " chap- book " has not been noticed earlier than 1824, when Dibdin, the celebrated bibliographer, described a work as being "a chapbook, printed in rather a neat black-letter."

CHAPE (from the Fr. chape, a hood, cope or sheath), a cover or metal plate, such as the cap upon the needle in the compass, also the transverse guard of a sword which protects the hand. From the original meaning comes the use of the word as a support or

catch to attach one thing to another, as the hook on a belt to which the sword is fastened. The word is also used for the tip of a fox's brush.

CHAPEL, a place of religious worship, 1 a name properly applied to that of a Christian religious body, but sometimes to any small temple of pagan worship (Lat. sacellum). The word is derived through the O. Fr. chapele, modern chapelle, from the Late Lat. capelle or cappella, diminutive of cappa, a cape, particularly that of a monk. This word was transferred to any sanctuary containing relics, in the early history of the Frankish Church, because the cloak of St Martin, cappa brevior Sancti Martini, one of the most sacred relics of the Frankish kings, was carried in a sanctuary or shrine wherever the king went; and oaths were taken on it (see Ducange, Glossarium, s.v. Capella). Such a sanctuary was served by a priest, who was hence called capellanus, from which is derived the English " chaplain " (q.v.). The strict application of the word to a sanctuary containing relics was extended to embrace any place of worship other than a church, and it was synonymous, therefore, with " oratory " (oralorium), especially one attached to a palace or to a private dwelling-house. The celebrated Sainte Chapelle in Paris, attached to what is now the Palais de Justice, well illustrates the early and proper mean- ing of the word. It was built (consecration, 1248) by St Louis of France to contain the relic of the Crown of Thorns, ransomed by the king from the Venetians, who held it in pawn from the Latin emperor of the East, John of Brienne, lately dead. The chapel served as the sanctuary of the relic lodged in the upper chapel, and the whole building was attached as the place of worship to the king's palace. This, the primary meaning, survives in the chapels usually placed in the aisles of cathedrals and large churches. They were originally built either to contain relics of a particular saint to whom they were dedicated, or the tomb of a particular family.

1 The only other English sense is that of a printer's workshop, or the body of compositors in it, who are presided over by a " father of the chapel."

In the Church of England the word is applied to a private place of worship, attached either to the palaces of the sovereign, " chapels royal," or to the residence of a private person, to a college, school, prison, workhouse, &c. Further, the word has particular legal applications, though in each case the building might be and often is styled a church. These are places of

worship supplementary to a parish church, and may be either " chapels of ease," to ease or relieve the mother-church and serve those parishioners who may live far away, " parochial chapels," the " churches " of ancient divisions of a very large and widely scattered parish, or " district chapels," those of a district of a parish divided under the various church building acts. A " free chapel " is one founded by the king and by his authority, and visited by him and not by the bishop. A "proprietary chapel" is one that belongs to a private person. They are anomalies to the English ecclesiastical law, have no parish rights, and can be converted to other than religious purposes, but a clergyman may be licensed to perform duty in such a place of worship. In the early and middle part of the 19th century such proprietary-chapels were common, but they have practically ceased to exist. " Chapel" was early and still is in England the general name of places of worship other than those of the established Church, but the application of "church" to all places of worship without distinction of sect is becoming more and more common. The word " chapel " was in this restricted sense first applied to places of worship belonging to the Roman Church in England, and was thus restricted to those attached to foreign embassies, or to those of the consorts of Charles I. and II. and James II., who were members of that church. The word is still frequently the general term for Roman Catholic churches in Great Britain and always so in Ireland. The use of " chapel " as a common term for all Nonconformist places of worship was general through most of the 19th century, so that " church and chapel " was the usual phrase to mark the distinction between members of the established Church and those of Nonconformist bodies. Here the widened use of " church " noticed above has been especially marked. Most of the recent buildings for worship erected by Noncon- formist bodies will be found to be styled Wesleyan, Congrega- tional, &c, churches. It would appear that while the word " chapel " was not infrequent in the early history of Noncon- formity, " meeting-house " was the more usual term.

From the* architectural point of view the addition of chapels to a cathedral or large church assumes some historical importance in consequence of the changes it involved in the plan. It was the introduction of the apsidal chapels in the churches of France which eventually led to the chevet or cluster of eastern'chapels in many of the great cathedrals, and also sometimes to the extension of the transept so as to include additional apsidal chapels on the east side. In France, and to a certain extent in

Italy, the multiplication of chapels led to their being placed on tha north and south side of the aisles, and in some cases, as at Albi in France, to the suppression of the aisles and the instalment of the chapels in their place. The chapels of the colleges at Oxford and Cambridge are sometimes of large dimensions and architecturally of great importance, that of Christ Church being actually the cathedral of Oxford; among others may be mentioned the chapel of Merton College, and the new chapel of Exeter College, both in Oxford, and the chapel of King's College, Cambridge, which is roofed over with perhaps the finest fan-vault in England. (See Vault, Plate II., fig. 19.)

CHAPELAIN, JEAN (1595-1674), French poet and man of letters, the son of a notary, was born in Paris on the 4th of December 1595. His father destined him for his own profession; but his mother, who had known Ronsard, had determined otherwise. At an early age Chapelain began to qualify himself for literature, learning, under Nicolas Bourbon, Greek and Latin, and teaching himself Italian and Spanish. Having finished his studies, he was engaged for a while in teaching Spanish to a young nobleman. He was then appointed tutor to the two sons of a M. de la Trousse, grand provost of France. Attached for the next seventeen years to the family of this gentleman, the administration of whose fortune was wholly in his hands, he

seems to have published nothing during this period, yet to have acquired a great reputation as a probability. His first work given to the public was a preface for the Adone of Marini, who printed and published that notorious poem at Paris. This was followed by an excellent translation of Mateo Aleman's novel, Guzman de Aljarache, and by four extremely indifferent odes, one of them addressed to Richelieu. The credit of introducing the law of the dramatic unities into French literature has been claimed for many writers, and especially for the Abbe d'Aubignac, whose Pratique du theatre appeared in 1657. The theory had of course been enunciated in the Art poetique of J. C. Scaliger in 1561, and subsequently lay other writers, but there is no doubt that it was the action of Chapelain that transferred it from the region of theory to that of actual practice. In a conversation with Richelieu in about 1632, reported by the abbe d'Olivet, Chapelain maintained that it was indispensable to maintain the unities of

time, place and action, and it is explicitly stated that the doctrine was new to the cardinal and to the poets who were in his pay. French classical drama thus owes the riveting of its fetters to Chapelain. Rewarded with a pension of a thousand crowns, and from the first an active member of the newly- constituted Academy, Chapelain drew up the plan of the grammar and dictionary the compilation of which was to be a principal function of the young institution, and at Richelieu's command drew up the Sentiments de VAcademie sur le Cid. In 1656 he published, in a magnificent form, the first twelve cantos of his celebrated epic La Pucelle, 1 on which he had been engaged during twenty years. Six editions of the poem were disposed of in eighteen months. But this was the end of the poetic reputation of Chapelain, " the legist of Parnassus." Later the slashing satire of Boileau (in this case fairly master of his subject) did its work, and Chapelain (" Le plus grand poete Francais qu' ait jamais itt et du plus solide jugement," as he is called in Colbert's list) took his place among the failures of modern art.

Chapelain's reputation as a critic survived this catastrophe, and in 1663 he was employed by Colbert to draw up an account of contemporary men of letters, destined to guide the king in his distribution of pensions. In this pamphlet, as in his letters, he shows to far greater advantage than in his unfortunate epic. His prose is incomparably better than his verse; his criticisms are remarkable for their justice and generosity; his erudition and kindliness of heart are everywhere apparent; the royal attention is directed alike towards the author's firmest friends and bitterest enemies. To him young Racine was indebted not only for kindly and seasonable counsel, but also for that pension of six hundred livres which was so useful to him. The catholicity of his taste is shown by his De la lecture des vieux Tomans (pr. 1870), in which he praises the chansons de geste, forgotten by his generation. Chapelain refused many honours, and his disinterestedness in this and other cases makes it necessary to receive with caution the stories of Menage and Tallemant des Reaux," who assert that he was in his old age a miser, and that a considerable fortune was found hoarded in his apartments when he died on the 22nd of February 1674.

there is a very favourable estimate of Chapelain's merits as a critic in George Saintsbury's History of Criticism, ii. 256-261. An analysis of La Pucelle is given in pp. 23-79 of Robert Southey's Joan of Arc. See also Les Lettres de Jean Chapelain (ed. P. Tanuzey de Larroque, 1880-1882); Lettres inedites . . . a, P. D.

Huet (1658- 1673, ed. by L. G. Pellissier, 1894); Julien Duchesne, Les Poemes epiques du XVII" sie.de (1870) ; the abbe A. Fabre, Les Ennemis de Chapelain (1888), Chapelain et nos deux premieres Academies (1890) ; and A. Muehlan, Jean Chapelain (1893).

CHAPEL-EN-LE-FRITH, a market town in the High Peak parliamentary division of Derbyshire, England, 20 m. S.E. of Manchester, on the London & North-Western and Midland railways. Pop. (1901) 4626. It lies in an upland valley of the Peak district, the hills of which rise above 1200 ft. in its im- mediate vicinity. There are paper- works and ironworks, and

1 The last twelve cantos of La Pucelle were edited (1882) from the MS. with corrections and a preface in the author's autograph, in the Bibliotheque Nationale, by H. Herluison. Another edition, by E. de Molenes (2 volis.), «-as published in 1892.

brewing is carried on. The foundation of the church of St Thomas of Canterbury is attributed to the foresters of the royal forest or frith of the Peak early in the 13th century; and from this the town took name. After the defeat of the Scottish forces at Preston by Cromwell in 1648, it is said that 1500 prisoners were confined in the church at Chapel-en-le-Frith.

CHAPEL HILL, a town of Orange county, North Carolina, U.S.A., about 28 m. N.W. of Raleigh. Pop. (1900) 1099; (1910) 1 149. It is served by a branch of the Southern railway, connect- ing at University, 10 m. distant, with the Greensboro & Goldsboro division. The town is best known as the seat of the University of North Carolina (see North Carolina), whose campus contains 48 acres. There are cotton and knitting mills and lumber interests of some importance. Chapel Hill was settled late in the 18th century, and was first incorporated in 1851.

CHAPELLE ARDENTE (Fr. "burning chapel"), the chapel or room in which the corpse of a sovereign or other exalted personage lies in state pending the funeral service. The name is in allusion to the many candles which are lighted round the catafalque. This custom is first chronicled as occurring at the obsequies of Dagobert I. (602-638).

CHAPERON, originally a cap or hood (Fr. chape) worn by nobles and knights of the Garter in full dress, and after the i6tb century by middle-aged ladies. The modern use of the word is of a

married or elderly lady (cf. ” duenna “) escorting or protect- ing a young and unmarried girl in public places and in society.

CHAPLAIN, strictly one who conducts service in a chapel (q.v.), i.e. a priest or minister without parochial charge who is attached for special duties to a sovereign or his representatives (ambassadors, judges, &c), to bishops, to the establishments of nobles, &c, to institutions (e.g. parliament, congress, colleges, schools, workhouses, cemeteries), or to the army and the navy. In some cases a parish priest is also appointed to a chaplaincy, but in so far as he is a chaplain he has no parochial duties. Thus a bishop of the English Church appoints examining chaplains who conduct the examination of candidates for holy orders; such officials generally hold ordinary benefices also. The British sovereign has 36 ” Chaplains in Ordinary,” who perform service at St James’s in rotation, as well as ” Honorary Chaplains ” and ” Chaplains of the Household.” There are also royal chap- lains in Scotland and Ireland. The Scottish chaplains in ordinary are on the same basis as those in England, but the Irish chaplains are attached to the household of the lord-lieutenant. The Indian civil service appoints a number of clergymen of the Church of England and the Church of Scotland. These clergymen are known as Chaplains, and are subject to the same conditions as other civil servants, being eligible for a retiring pension after 23 years of service. Chaplains are also appointed under the foreign office to embassies, legations, consulates, &c.

Workhouse chaplains are appointed by overseers and guardians on the direction of the Local Government Board, to which alone such chaplains are responsible. Prison chaplains are appointed by the home secretary.

In the British army there are two kinds of chaplains, permanent and occasional! The former, described as Chaplains to the Forces, hold commissions, serving throughout the empire except in India: they include a Chaplain-General who ranks as a major-general, and four classes of subordinate chaplains who rank respectively as colonels, lieutenant-colonels, majors and captains. There are about 100 in all. Special chaplains (Acting Chaplains for Temporary Service) may be appointed by a secretary of state under the Army Chaplains Act of 1868 to perform religious service for the army in particular districts. The permanent chaplains may be Church of England, Roman Catholic, or Presbyterian; Wesleyans (if they prefer not to accept com- missions) may be appointed Acting Chaplains. The Church

of England chaplains report to the chaplain-general, while other chaplains report to the War Office direct. In the navy, chaplains are likewise appointed but do not hold official rank. They must have a special ecclesiastical licence from the archbishop of Canterbury. In 1909 a Chaplains' Department of the Territorial Force was formed; there is no denominational restriction.

In the armies and navies of all Christian countries chaplains are officially appointed, with the single exception of France, where the office was abolished on the separation of Church and State. In the army of the United States of America chaplains are originally appointed by the president, and subsequently are under the authority of the secretary of war, who receives recommendations as regards transfer from department commanders. By act of Congress, approved in April 1904, the establishment of chaplains was fixed at 57 (15 with the rank of major), 12 for the artillery corps and 1 each for the cavalry and infantry regiments. There is no distinction of sect. In the U.S. navy the chaplains are 24 in number, of whom 13 rank as lieutenants, 7 as commanders, 4 as captains.

In the armies of Roman Catholic countries there are elaborate regulations. Where the chaplains are numerous a chaplain- major is generally appointed, but in the absence of special sanction from the pope such officer has no spiritual jurisdiction. Moreover, chaplains must be approved by the ordinary of the locality. In Austria there are Roman Catholic, Greek Church, Jewish and Mahommedan chaplains. The Roman Catholic chaplains are classed as parish priests, curates and assistants, and are subject to an army Vicar Apostolic. In war, at an army headquarters there are a " field-rabbi," a " military imam," an evangelical minister, as well as the Roman Catholic hierarchy. By a decree of the Sacred Congregation of Propaganda (May 15, 1906), the archbishop of Westminster is the ecclesiastical superior of all commissioned Roman Catholic chaplains in the British army and navy, and he is empowered to negotiate with the civil authorities concerning appointments.

In Germany, owing to the fact that there are different religions in the different states, there is no uniform system. In Prussia there are two Feldprobsle (who are directly under the war minister),

one Lutheran, one Roman Catholic. The latter is a titular bishop, and has sole spiritual authority over soldiers. There are also army corps and divisional chaplains of both faiths. Bavaria and Saxony, both Roman Catholic states, have no special spiritual hierarchy; in Bavaria, the archbishop of Munich and Freysing is ex officio bishop of the army.

The origin of the office of capellanus or cappellanus in the medieval church is generally traced (see Du Cange, Gloss, med. et infim. Latin.) to the appointment of persons to watch over the sacred cloak (cappa or capella) of St Martin of Tours, which was preserved as a relic by the French monarchs. In time of war this cloak was carried with the army in the field, and was kept in a tent which itself came to be known as a cappella or capella. It is also suggested that the capella was simply the tent or canopy which the French kings erected over the altar in the field for the worship of the soldiers. However this may be, the name capellanus was generally applied to those who were in charge of sacred relics: such officials were also known as custodes, martyrarii, cubicularii. Thus we hear of a custos palatinae capellae who was in charge of the palace chapel relics, and guarded them in the field; the chief of these custodes was sometimes called the archi- capellanus. From the care of sacred relics preserved in royal chapels, &c. (sacella or capellae), the office of capellanus naturally extended its scope until it covered practically that of the modern court chaplain, and was officially recognized by the Church. These clerics became the confessors in royal and noble houses, and were generally chosen from among bishops and other high dignitaries. The arch-chaplain not only received jurisdiction within the royal household, but represented the authority of the monarch in religious matters, and also acquired more general powers. In France the arch-chaplain was grand-almoner, and both in France and in the Holy Roman Empire was also high chancellor of the realm. The office was abolished in France at the Revolution in 1789, revived by Pius IX. in 1857, and again abolished on the fall of the Second Empire.

The Roman Catholic Church also recognizes a class of beneficed chaplains, supported out of ” pious foundations ” for the specific duty of saying, or arranging for, certain masses, or taking part in certain services. These chaplains are classified as follows: — Ecclesiastical, if the foundation has been recognized officially

as a benefice; Lay, if this recognition has not been obtained; Mercenary, if the person who has been entrusted with the duty of

performing or procuring the desired celebration is a layman (such persons also are sometimes called ” Lay Chaplains “) ; Collative, if it is provided that a bishop shall collate or confer the right to act upon the accepted candidate, who otherwise could not be recognized as an ecclesiastical chaplain. There are elaborate regulations governing the appointment and conduct of these chaplains.

Other classes of chaplains are: — (1) Parochial or Auxiliary Chaplains, appointed either by a parish priest (under a provision authorized by the Council of Trent) or by a bishop to take over certain specified duties which he is unable to perform; (2) Chaplains of Convents, appointed by a bishop: these must be men of mature age, should not be regulars unless secular priests cannot be obtained, and are not generally to be appointed for life; (3) Pontifical Chaplains, some of whom (known as Private Chaplains) assist the pontiff in the celebration of Mass; others attached directly to the pope are honorary private chaplains who occasionally assist the private chaplains, private clerics of the chapel, common chaplains and supernumerary chaplains. The common chaplains were instituted by Alexander VII., and in 1907 were definitely allowed the title ” Monsignore ” by Pius X.

CHAPLIN, HENRY (1841-), English statesman, second son of the Rev. Henry Chaplin, of Blankney, Lincolnshire, was educated at Harrow and Christ Church, Oxford, and first entered parliament in 1868 as Conservative member for Mid-Lincolnshire. He represented this constituency (which under the Redistribution Act of 1885 became the Sleaford division) till 1906, when he was defeated, but in 1907 returned to the House of Commons as member for Wimbledon at a by-election. In 1876 he married a daughter of the 3rd duke of Sutherland, but lost his wife in 1 88 1. Outside the House of Commons he was a familiar figure on the Turf, winning the Derby with Hermit in 1867; and in politics from the first the ” Squire of Blankney ” took an active interest in agricultural questions, as a popular and typical representative of the English “country gentleman” class. Having filled the office of chancellor of the duchy of Lancaster in Lord Salisbury’s short ministry of 1885-1886, he became president of the new Board of Agriculture in 1889, with a seat in the cabinet, and retained this post till 1892. In the Conserva- tive cabinet of 1895-1900 he was president of the Local Govern- ment Board, and was responsible for the Agricultural Rates Act of 1896; but he was not included in the ministry after its reconstruction in 1 900. Mr Chaplin had always been an advocate of protectionism, being in this respect

the most prominent inheritor of the views of Lord George Bentinck; and when in 1903 the Tariff Reform movement began under Mr Chamber- lain's leadership, he gave it his enthusiastic support, becoming a member of the Tariff Commission and one of the most strenuous advocates in the country of the new doctrines in opposition to free trade.

CHAPMAN, GEORGE (? 1559-1634), English poet and dramatist, was born near Hitchin. The inscription on the portrait which forms the frontispiece of The Whole Works of Homer states that he was then (1616) fifty-seven years of age. Anthony a Wood (Athen. Oxon. ii. 575) says that about 1574 he was sent to the university, " but whether first to this of Oxon, or that of Cambridge, is to me unknown; sure I am that he spent some time in Oxon, where he was observed to be most excellent in the Latin and Greek tongues, but not in logic or philosophy." Chapman's first extant play, The Blind Beggar of Alexandria, was produced in 1596, and two years later Francis Meres mentions him in Palladis Tamia among the " best for tragedie " and the " best for comedie." Of his life between leaving the university and settling in London there is no account. It has been suggested, from the detailed knowledge displayed in The Shadow of Night of an incident in Sir Francis Vere's campaign, that he saw service in the Netherlands. There are frequent entries with regard to Chapman in Henslowe's diary for the years 1 598-1 599, but his dramatic activity slackened during

the following years, when his attention was chiefly occupied by his Homer. In 1604 he was imprisoned with John Marston for his share in Eastward Ho, in which offence was given to the Scottish party at court. Ben Jonson voluntarily joined the two, who were soon released. Chapman seems to have enjoyed favour at court, where he had a patron in Prince Henry, but in 1605 Jonson and he were for a short time in prison again for " a play." Beaumont, the French ambassador in London, in a despatch of the 5th of April 1608, writes that he had obtained the prohibition of a performance of Biron in which the queen of France was represented as giving Mademoiselle de Verneuil a box on the ears. He adds that three of the actors were imprisoned, but that the chief culprit, the author, had escaped (Raumer, Briefe aus Paris, 1831, ii. 276). Among Chapman's patrons was Robert Carr,

earl of Somerset, to whom he remained faithful after his disgrace. Chapman enjoyed the friendship and admiration of his great contemporaries. John Webster in the preface to The White Devil praised " his full and heightened style," and Ben Jonson told Drummond of Hawthornden that Fletcher and Chap- man " were loved of him." These friendly relations appear to have been interrupted later, for there is extant in the Ashmole MSS. an " Invective written by Mr George Chapman against Mr Ben Jonson." Chapman died in the parish of St Giles in the Fields, and was buried on the 12th of May 1634 in the churchyard. A monument to his memory was erected by Inigo Jones. (M. Br.)

Chapman, his first biographer is careful to let us know, " was a person of most reverend aspect, religious and temperate, qualities rarely meeting in a poet "; he had also certain other merits at least as necessary to the exercise of that profession. He had a singular force and solidity of thought, an admirable ardour of ambitious devotion to the service of poetry, a deep and burning sense at once of the duty implied and of the dignity inherent in his office; a vigour, opulence, and loftiness of phrase, remarkable even in that age of spiritual strength, wealth and exaltation of thought and style; a robust eloquence, touched not unfrequently with flashes of fancy, and kindled at times into heat of imagination. The main fault of his style is one more commonly found in the prose than in the verse of his time, — a quaint and florid obscurity, rigid with elaborate rhetoric and tortuous with labyrinthine illustration; not dark only to the rapid reader through closeness and subtlety of thought, like Donne, whose miscalled obscurity is so often " all glorious within," but thick and slab as a witch's gruel with forced and barbarous eccentricities of articulation. As his language in the higher forms of comedy is always pure and clear, and sometimes exquisite in the simplicity of its earnest and natural grace, the stiffness and density of his more ambitious style may perhaps be attributed to some pernicious theory or conceit of the dignity proper to a moral and philosophic poet. Nevertheless, many of the gnomic passages in his tragedies and allegoric poems are of singular weight and beauty; the best of these, indeed, would not discredit the fame of the very greatest poets for sublimity of equal thought and expression: witness the lines chosen by Shelley as the motto for a poem, and fit to have been chosen as the motto for his life.

The romantic and sometimes barbaric grandeur of Chapman's Homer remains attested by the praise of Keats, of Coleridge and of Lamb ; it is written at a pitch of strenuous and laborious

exaltation, which never flags or breaks down, but never flies with the ease and smoothness of an eagle native to Homeric air. From his occasional poems an expert and careful hand might easily gather a noble anthology of excerpts, chiefly gnomic or meditative, allegoric or descriptive. The most notable examples of his tragic work are comprised in the series of plays taken, and adapted sometimes with singular licence, from the records of such part of French history as lies between the reign of Francis I. and the reign of Henry IV., ranging in date of subject from the trial and death of Admiral Chabot to the treason and execution of Marshal Biron. The two plays bearing as epigraph the name of that famous soldier and conspirator are a storehouse of lofty thought and splendid verse, with scarcely

a flash or sparkle of dramatic action. The one play of Chapman's whose popularity on the stage survived the Restoration is Bussy d'Ambois (d'Amboise), — a tragedy not lacking in violence of action or emotion, and abounding even more in sweet and sublime interludes than in crabbed and bombastic passages. His rarest jewels of thought and verse detachable from the context lie embedded in the tragedy of Caesar and Pompey, whence the finest of them were first extracted by the unerring and unequalled critical genius of Charles Lamb. In most of his tragedies the lofty and labouring spirit of Chapman may be said rather to shine fitfully through parts than steadily to pervade the whole; they show nobly altogether as they stand, but even better by help of excerpts and selections. But the excellence of his best comedies can only be appreciated by a student who reads them fairly and fearlessly through, and, having made some small deductions on the score of occasional pedantry and occasional indecency, finds in All Fools, Monsieur d'Olive, The Gentleman Usher, and The Widow's Tears a wealth and vigour of humorous invention, a tender and earnest grace of romantic poetry, which may atone alike for these passing blemishes and for the lack of such clear-cut perfection of character and such dramatic progression of interest as we find only in the yet higher poets of the English heroic age.

So much it may suffice to say of Chapman as an original poet, one who held of no man and acknowledged no master, but from the birth of Marlowe well-nigh to the death of Jonson held on his own hard and haughty way of austere and sublime ambi- tion, not without kindly and graceful inclination of his high grey head to salute such younger and still nobler compeers as Jonson and Fletcher. With Shakespeare we should never have guessed that he

had come at all in contact, had not the keen intelligence of William Minto divined or rather discerned him to be the rival poet referred to in Shakespeare's sonnets with a grave note of passionate satire, hitherto as enigmatic as almost all questions connected with those divine and dangerous poems. This conjecture Professor Minto fortified by such apt collocation and confrontation of passages that we may now reasonably accept it as an ascertained and memorable fact.

The objections which a just and adequate judgment may bring against Chapman's master-work, his translation of Homer, may be summed up in three epithets: it is romantic, laborious, Elizabethan. The qualities implied by these epithets are the reverse of those which should distinguish a translator of Homer; but setting this apart, and considering the poems as in the main original works, the superstructure of a romantic poet on the submerged foundations of Greek verse, no praise can be too warm or high for the power, the freshness, the indefatigable strength and inextinguishable fire which animate this exalted work, and secure for all time that shall take cognizance of English poetry an honoured place in its highest annals for the memory of Chapman. (A. C. S.)

Chapman's works include: — 2iad vvktos: The Shadow of Night: Containing two Poeticall Hymnes . . . (1594), the second of which deals with Sir Francis Vere's campaign in the Netherlands; Ovid's Banquet of Sence. A Coronet for his Mistresse Philosophie; and His Amorous Zodiacke with a translation of a Latine coppie, written by a Fryer, Anno Dom. 1400 (1595, 2nd ed. 1639), a collection of poems frequently quoted from in England's Parnassus (1600) ; " De Guiana, carmen epicum," a poem prefixed to Lawrence Keymis's A Relation of the second voyage to Guiana (1596) ; Hero and Leander. Begun by Christopher Marloe; and finished by George Chapman (1598); The Blinde begger of Alexandria, most pleasantly discoursing his variable humours . . . (acted 1596, printed 1598), a popular comedy; A Pleasant Comedy entituled An Humerous dayes Myrth (identified by Mr Fleay with the " Comodey of Umero " noted by Henslowe on the nth of May 1597; printed 1599); Al Fooles, A Comedy (paid for by Henslowe on the 2nd of July 1599, its original name being " The World runs on wheels " ; printed 1605) ; The Gentle- man Usher (c. 1601, pr. 1606), a comedy; Monsieur d'Olive (1604, pr. 1606), one of his most amusing and successful comedies; East- ward Hoe (1605), written in conjunction with Ben Jonson and John Marston, an excellent comedy of city life; Bussy d'Ambois, 1 A

1 Chapman's source in this piece remains undetermined. It cannot be the Historia sui temporis of Jacques de Thom, for the 4th volume of his work, which relates the story, was not published until 1609 (see Koeppel, p. 14).

Tragedie (1604, pr. 1607, 1608, 1616, 1641, &c), the scene of which is laid in the court of Henry III.; The Revenge of Bussy d'Ambois. A Tragedie (pr. 1613, but probably written much earlier) ; The Conspiracie, And Tragedie of Charles Duke of Byron, Marshall of France. . .in two plays (1607 and 1608; pr. 1608 and 1625); May-Day, A witty Comedie (pr. 161 1; but probably acted as early as 1601); The widdowes Teares. A Comedie (pr. 1612; produced perhaps as early as 1605) ; Caesar and Pompey: A Roman Tragedy, declaring their warres. Out of whose events is evicted this Proposition. Only a just man is a freeman (pr. 1631), written, says Chapman in the dedication, " long since," but never staged.

The Tragedy of Alphonsus Emperour of Germany (see the edition by Dr Karl Elye; Leipzig, 1867) and Revenge for Honour (1654) l both bear Chapman's name on the title-page, but his authorship has been disputed. In The Ball (lie. 1632; pr. 1639), a comedy, and The Tragedie of Chabot Admirall of France (lie. 1635; pr. 1639) he collaborated with James Shirley. The memorable Masque of the two Honourable Houses or Inns of Court; the Middle Temple and Lyn- coln's Inne, was performed at court in 1613 in honour of the marriage of the Princess Elizabeth.

The Whole Works of Homer: Prince of Poets. In his Iliads and Odysseys . . . appeared in 1616, and about 1624 he added The Crowne of all Homers works Batrachomyomachia or the Battaile of Frogs and Mise. His Hymns and Epigrams. But the whole works had been already published by instalments. Seaven Bookes of the Iliades of Homer had appeared in 1598, Achilles Shield in the same year, books i.-xii. about 1609; in i6u The Iliads of Homer, Prince of Poets . . . ; and in 1614 Twenty-four Bookes of Homer's Odisses were entered at Stationers' Hall. In 1609 he addressed to Prince Henry Enthymiae Raptus; or the Teares of Peace, and on the death of his patron he contributed An Epicede, or Funerall Song (1612). A paraphrase of Petrarchs Seven Penitentiall Psalms (1612), a poem in honour of the marriage of Robert Carr, earl of

Somerset, and Frances, the divorced countess of Essex, indiscreetly entitled Andromeda Liberata . . . (1614), a translation of The Georgicks of Hesiod (1618), Pro Vere Auturnni Lachrymae (1622), in honour of Sir Horatio Vere, A justification of a Strange Action of Nero . . . also . . . the fifth Salyre of Jtivenall (1629), and Eugenia . . . (1614), an elegy on Sir William Russell, complete the list of his separately published works.

Chapman's Homer was edited in 1857 by the Rev. Richard Hooper ; and a reprint of his dramatic works appeared in 1873. The standard edition of Chapman is the Works, edited by R. H. Shepherd (1874- 1875), the third volume of which contains an " Essay on the Poetical and Dramatic works of George Chapman, ' ' by Mr Swinburne, printed separately in 1875. The selection of his plays (1895) for the Mermaid Series is edited by Mr W. L. Phelps. For the sources of the plays see Emil Koeppel, " Anellen Studien zu den Dramen George Chap- man's, Philip Massinger's und John Ford's " in Quellen und For- schungen zur Sprach und Kulturgeschichte (vol. 82, Strassburg, 1897). The suggestion of W. Minto (see Characteristics of the English Poets, 1885) that Chapman was the " rival poet " of Shakespeare's sonnets is amplified in Mr A. Acheson's Shakespeare and the Rival Poet 1903). Much satire in Chapman's introduction is there applied to Shake- speare. For other criticisms of his translation of Homer see Matthew Arnold, Lectures on translating Homer (1861), and Dr A. Lohff, George Chapman' s Ilias-Uber setzung (Berlin, 1903). (M. Br.)

CHAPMAN (from O. Eng. ceap, and Mid. Eng. cheap, to barter, cf . " Cheapside " in London, and Ger. Kaufmann) , one who buys or sells, a trader or dealer, especially an itinerant pedlar. The word " chap," now a slang term, meant originally a customer.

CHAPONE, HESTER (1727-1801), English essayist, daughter of Thomas Mulso, a country gentleman, was born at Twywell, Northamptonshire, on the 27th of October 1727. She was a precocious child, and at the age of nine wrote a romance entitled The Loves of Amoret and Melissa. Hecky Mulso, as she was familiarly called, developed a beautiful voice, which earned her the name of " the linnet." While on a visit to Canterbury she made the acquaintance of the learned Mrs Elizabeth Carter, and soon became one of the admirers of the novelist Samuel Richardson. She was one of the little court of women who gathered at North End, Fulham; and in Miss Susannah Highmore's sketch of the novelist reading Sir Charles Grandison

to his friends Miss Mulso is the central figure. She corresponded with Richardson on ” filial obedience ” in letters as long as his own, signing herself his ” ever obliged and affec- tionate child.” She admired, however, with discrimination, and in the words of her biographer (Posthumous Works, 1807, p. 9) ” her letters show with what dignity, tempered with proper humility, she could maintain her own well-grounded opinion.” In 1 760 Miss Mulso, with her father’s reluctant consent, married

1 This play appears to have been issued in 1653 with the title TheParracide, or Revenge for Honour as the work of Henry Glathorne.

the attorney, John Chapone, who had been befriended by Richardson. Her husband died within a year of her marriage. Mrs Chapone remained in London visiting various friends. She had already made small contributions to various periodicals when she published, in 1772, her best known work, Letters on the Improvement of the Mind. This book brought her numerous requests from distinguished persons to undertake the education of theirchildren. She died on the 25th of December 1801.

See The Posthumous Works of Mrs Chapone, containing her corre- spondence with Mr Richardson; a series of letters to Mrs Elizabeth Carter . . . together with an account of her life and character drawn up by her own family (1807).

CHAPPE, CLAUDE (1763-1805), French engineer, was born at Brulon (Sarthe) in 1763. He was the inventor of an optical telegraph which was widely used in France until it was super- seded by the electric telegraph. His device consisted of an upright post, on the top of which was fastened a transverse bar, while at the ends of the latter two smaller arms moved on pivots. The position of these bars represented words or letters; and by means of machines placed at intervals such that each was distinctly visible from the next, messages could be conveyed through. 50 leagues in a quarter of an hour. The machine was adopted by the Legislative Assembly in 1792, and in the follow- ing year Chappe was appointed ingenieur-teUgraphe; but the originality of his invention was so much questioned that he was seized with melancholia and (it is said) committed suicide at Paris in 1805.

His elder brother, Ignace Urbain Jean Chappe (1760-1829), took part in the invention of the telegraph, and with a younger brother, Pierre Francois, from 1805 to 1823 was administrator of

the telegraphs, a post which was also held by two other brothers, Rene and Abraham, from 1823 to 1830. Ignace was the author of a Histoire de la telegraphie (1824). An uncle, Jean Chappe d'Auteroche (17 28-1 769), was an astronomer who observed two transits of Venus, one in Siberia in 1761, and the other in 1769 in California, where he died.

CHAPPELL, WILLIAM (1809-1888), English writer on music, a member of the London musical firm of Chappell & Co. , was born on the 20th of November 1809, eldest son of Samuel Chappell (d. 1834), who founded the business. William Chappell is particu- larly noteworthy for his starting the Musical Antiquarian Society in 1840, and his publication of the standard work Popular Music of the Olden Time (1855-1859) — an expansion of a collec- tion of " national English airs " made by him in 1838-1840. The modern revival of interest in English folk-songs owes much to this work, which has since been re-edited by Professor H. E. Wooldridge (1893). W. Chappell died on the 20th of August 1888. His brother, Thomas Patey Chappell (d. 1902), meanwhile had largely extended the publishing business, and had started (1859) the Monday and Saturday Popular Concerts at St James's Hall, which were successfully managed by a younger brother, S. Arthur Chappell, till they came to an end towards the close of the century.

CHAPRA, or Chupra, a town of British India, the adminis- trative headquarters of Saran district in Bengal, near the left bank of the river Gogra, just above its confluence witji the Ganges; with a railway station on the Bengal & North- Western line towards Oudh. Pop. (1901) 45,901, showing a decrease of 21% in the decade. There are a government high school, a German Lutheran mission, and a public library endowed by a former maharaja of Hatwa. Chapra is the centre of trade in indigo and saltpetre, and conducts a large business by water as well as by rail.

CHAPTAL, JEAN ANTOINE CLAUDE, Comte de Chante- loup (1 756-1832), French chemist and statesman, was born at Nogaret, Lozere, on the 4th of June 1756. The son of an apothecary, he studied chemistry at Montpellier, obtaining his doctor's diploma in 1777, when he repaired to Paris. In 1781 the States of Languedoc founded a chair of chemistry for him at the school of medicine in Montpellier, where he taught the doctrines of Lavoisier. The capital he acquired by the death of a wealthy uncle he employed in the establishment of chemical

works for the manufacture of the mineral acids, alum, white-lead, soda and other substances. His labours in the cause of applied science were at length recognized by the French government, which presented him with letters of nobility, and the cordon of the order of Saint Michel. During the Revolution a publication by Chaptal, entitled Dialogue entre un Montagnard et un Girondin, caused him to be arrested; but being speedily set at liberty through the intermission of his friends, he undertook, in 1793, the management of the saltpetre works at Grenelle. In the following year he went to Montpellier, where he remained till 1797, when he returned to Paris. After the coup d'etat of the 18th of Brumaire (November 9, r 799) he was made a councillor of state by the First Consul, and succeeded Lucien Bonaparte as minister of the interior, in which capacity he established a chemical manufactory near Paris, a school of arts, and a society of indus- tries; he also reorganized the hospitals, introduced the metrical system of weights and measures, and otherwise greatly encouraged the arts and sciences. A misunderstanding between him and Napoleon (who conferred upon him the title of comte de Chanteloup) occasioned Chaptal's retirement from office in 1804; but before the end of that year he was again received into favour by the emperor, who bestowed on him the grand cross of the Legion of Honour, and made him treasurer to the conservative senate. On Napoleon's return from Elba, Chaptal was made director-general of commerce and manufactures and a minister of state. He was obliged after the downfall of the emperor to withdraw into private life; and his name was removed from the list of the peers of France until 1819. In 1816, however, he was nominated a member of the Academy of Sciences by Louis XVIII. Chaptal was especially a popularizer of science, attempting to apply to industry and agriculture the discoveries of chemistry. In this way he contributed largely to the development of modern industry. He died at Paris on the 30th of July 1832.

His literary works exhibit both vigour and perspicuity of style; he wrote, in addition to various articles, especially in the Annates de chimie, Elemens de chimie (3 vols., 1790; new ed., 1796-1803); Traite du salpitre et des goudrons (1796); Tableau des principaux sets terreux (1798); Essai sur le perfectionnement des arts chimiques en France (1800); Art de faire, de gouverner, et de perfectionner les vins (1 vol., 1801; new ed., 1819); Traite

theorique et pratique sur la culture de la vigiie, &c. (2 vols., 1801 ; new ed., 181 1); Essai sur le blanchiment (1801); La Chimie appliquee aux arts (4 vols., 1806); Art de la teinture du colon en rouge (1807); Art du teinturier et du degraisseur (1800); De V Industrie francaise (2 vols., 1819); Chimie appliquee a V agriculture (2 vols., 1823; new ed., 1829).

CHAPTER (a shortened form of chapiter, a word still used in architecture for a capital; derived from O. Fr. chapitre, Lat. capitellum, diminutive of caput, head), a principal division or section of a book, and so applied to acts of parliament, as forming " chapters " or divisions of the legislation of a session of parlia- ment. The name " chapter " is given to the permanent body of the canons of a cathedral or collegiate church, presided over, in the English Church, by the dean, and in the Roman communion by the provost or the dean, and also to the body of the members of a religious order. This may be a " conventual " chapter of the monks of a particular monastery, " provincial " of the members of the order in a province, or " general " of the whole order. This ecclesiastical use of the word arose from the custom of reading a chapter of Scripture, or a head (capitulum) of the regula, to the assembled canons or monks. The transference from the reading to the assembly itself, and to the members constituting it, was easy, through such phrases as convenire ad capitulum. The title " chapter " is similarly used of the assembled body of knights of a military or other order. (See also Canon; Cathedral; Dean).

CHAPTER-HOUSE (Lat. capitolium, Ital. capitolo, Fr. chapitre, Ger. Kapitelhaus) , the chamber in which the chapter or heads of the monastic bodies (see Abbey and Cathedral) assembled to transact business. They are of various forms; some are oblong apartments, as Canterbury, Exeter, Chester, Gloucester, &c. ; some octagonal, as Salisbury, Westminster, Wells, Lincoln, York, &c. That at Lincoln has ten sides, and that at Worcester is circular; most are vaulted internally and polygonal externally, and some, as Salisbury, Wells, Lincoln, Worcester, &c, depend

on a single slight vaulting shaft for the support of the massive vaulting. They are often provided with a vestibule, as at West- minster, Lincoln, Salisbury and are almost exclusively English.

CHAPU, formerly an important maritime town of China, in the province of Cheh-kiang, 50 m. N.W. of Chen-hai, situated in one of the richest and best cultivated districts in the country. It is the

port of Hang-chow, with which it has good canal communication, and it was formerly the only Chinese port trading with Japan. The town has a circuit of about 5 m. exclusive of the suburbs that lie along the beach; and the Tatar quarter is separated from the rest by a wall. It was captured and much injured by the British force in 1842, but was abandoned immediately after the engagement. The sea around it has now silted up, though in the middle of the 19th century it was accessible to the light-draught ships of the British fleet.

CHAR (Salvelinus),a. fish of the family Salmonidae, represented in Europe, Asia and North America. The best known and most widely distributed species, the one represented in British and Irish lakes, is S. alpinus, a graceful and delicious fish, covered with very minute scales and usually dark olive, bluish or purplish black above, with or without round orange or red spots, pinkish white or yellowish pink to scarlet or claret red below. When the char go to sea, they assume a more silvery coloration, similar to that of the salmon and sea trout; the red spots become very indistinct and the lower parts are almost white. The very young are also silvery on the sides and white below, and bear n to 15 bars, or parr-marks, on the side. This fish varies much according to localities; and the difference in colour, together with a few points of doubtful constancy, have given rise to the establishment of a great number of untenable so-called species, as many as seven having been ascribed to the British and Irish fauna, viz. S. alpinus, nivalis, killinensis, willoughbyi, perisii, colii and grayi, the last from Lough Melvin, Ireland, being the most distinct. S. alpinus varies much in size according to the waters it inhabits, remaining dwarfed in some English lakes, and growing to 2 ft. or more in other localities. In other parts of Europe, also, various local forms have been distinguished, such as the ” omble chevalier ” of the lakes of Switzerland and Savoy (S. umbla), the ” Sabling ” of the lakes of South Germany and Austria (S. sal- velinus), the ” kullmund ” of Norway (S. carbonarius) , &c, while the North American S. parkei, alipes, slagnalis, arcturus, areolus, oquassa and marstoni may also be regarded as varieties. Taken in this wide sense, 5. alpinus has a very extensive distribu- tion. In central Europe, in the British islands and in the greater part of Scandinavia it is confined to mountain lakes, but farther to the north,in both the Old World and the New,it lives in the sea and ascends rivers to spawn. In Lapland, Iceland, Greenland and other parts of the arctic regions, it ranks among the com- monest fishes. The extreme northern

point at which char have been obtained is 82 34′ N. (Victoria lake and Floeberg Beach, Arctic America). It reaches an altitude of 2600 ft. in the Alps and 6000 ft. in the Carpathians.

The American brook char, S. fontinalis, is a close ally of S. alpinus, differing from it in having fewer and shorter gill-rakers, a rather stouter body, the back more or less barred or marbled with dark olive or black, and the dorsal and caudal fins mottled or barred with black. Many local varieties of colour have been distinguished. Sea-run individuals are often nearly plain bright silvery. It is a small species, growing to about 18 in. abundant in all clear, cold streams of North America, east of the Mississippi, northward to Labrador. The fish has been introduced into other parts of the United States, and also into Europe.

Another member of the same section of Salmonidae is the Great Lake char of North America, S. namaycush, one of the largest salmonids, said to attain a weight of 100 lb. The body is very elongate and covered with extremely small scales. The colour varies from grey to black, with numerous round pale spots, which may be tinged with reddish; the dorsal and caudal fins reticulate with darker. This fish inhabits the Great Lakes regions and neighbouring parts of North America.

CHAR-A-BANC (Fr. for ” benched carriage “), a largeformof wagonette-like vehicle for passengers, but with benched seats

arranged in rows, looking forward, commonly used for large parties, whether as public conveyances or for excursions.

CHARACTER (Gr. xapa/crV, from xo-PO-tt&v, to scratch), a distinctive mark (spelt ” caracter ” up to the 16th century, with other variants); so applied to symbols of notation or letters of the alphabet; more figuratively, the distinguishing traits of anything, and particularly the moral and mental qualities of an individual human being, the sum of those qualities which dis- tinguish him as a personality. From the latter usage “a character” becomes almost identical with ” reputation “; and in the sense of ” giving a servant a character,” the word involves a written testimonial. For the law relating to servants’ char- acters see Master and Servant. A further development is the use of ” character ” to

mean an ” odd or eccentric person “; or of a ” character actor,” to mean an actor who plays a highly- coloured strange part. The word is also used as the name of a form of literature, consisting of short descriptions of types of character. Well-known examples of such ” characters ” are those of Theophrastus and La Bruyere, and in English, of Joseph Hall (1574-1656) and Sir Thomas Overbury.

CHARADE, a kind of riddle, probably invented in France during the 18th century, in which a word of two or more syllables is divined by guessing and combining into one word (the answer) the different syllables, each of which is described, as an independent word, by the giver of the charade. Charades may be either in prose or verse. Of poetic charades those by W. Mackworth Praed are well known and excellent examples, while the following specimens in prose may suffice as illustrations. ” My first, with the most rooted antipathy to a Frenchman, prides himself, whenever they meet, upon sticking close to his jacket; my second has many virtues, nor is its least that it gives its name to my first; my whole may I never catch!” “My first is company; my second shuns company; my third collects com- pany; and my whole amuses company.” The solutions are Tar-tar and Co-nundrum. The most popular form of this amusement is the acted charade, in which the meaning of the different syllables is acted out on the stage, the audience being left to guess each syllable and thus, combining the meaning of all the syllables, the whole word. A brilliant example of the acted charade is described in Thackeray’s Vanity Fair.

CHARCOAL, the blackish residue consisting of impure carbon obtained by removing the volatile constituents of animal and vegetable substances; wood gives origin to wood-charcoal; sugar to sugar-charcoal; bone to bone-charcoal (which, however, mainly consists of calcium phosphate) ; while coal gives ” coke ” and ” gas-carbon.” The first part of the word charcoal is of obscure origin. The independent use of ” char,” meaning to scorch, to reduce to carbon, is comparatively recent, and must have been taken from ” charcoal,” which is quite early. The New English Dictionary gives as the earliest instance of ” char ” a quotation dated 1679. Similarly the word ” chark ” or ” chak,” meaning the same as ” char,” is also late, and is probably due to a wrong division of the word ” charcoal,” or, as it was often spelled in the 16th and 17th centuries, ” charkole ” and ” charkecoal.” No suggestions for an origin of ” char ” are satisfactory. It may be a use of the word ” chare,” which appears in ” char-

woman," the American " chore "; in all these words it means " turn," a turn of work, a job, and " charcoal " would have to mean " turned coal," i.e. wood changed or turned to coal, a somewhat forced derivation, for which there is no authority. Another suggestion is that it is connected with " chirk " or "chark," an old word meaning " to make a grating noise."

Wood-charcoal. — In districts where there is an abundance of wood, as in the forests of France, Austria and Sweden, the operation of charcoal-burning is of the crudest description. The method, which dates back to a very remote period, generally consists in piling billets of wood on their ends so as to form a conical pile, openings being left at the bottom to admit air, with a central shaft to serve as a flue. The whole is covered with turf of moistened soil. The firing is begun at the bottom of the flue, and gradually spreads outwards and upwards. The success of the operation— both as to the intrinsic value of the product and

its amount — depends upon the rate of the combustion. Under average conditions, 100 parts of wood yield about 60 parts by volume, or 25 parts by weight, of charcoal. The modern process of carbonizing wood — either in small pieces or as sawdust — in cast iron retorts is extensively practised where wood is scarce, and also by reason of the recovery of valuable by-products (wood spirit, pyroligneous acid, wood- tar), which the process permits. The question of the temperature of the carbonization is important; according to J. Percy, wood becomes brown at 220 C., a deep brown-black after some time at 280°, and an easily powdered mass at 310 . Charcoal made at 300 is brown, soft and friable, and readily inflames at 380 ; made at higher temperatures it is hard and brittle, and does not fire until heated to about 700 . One of the most important applications of wood-charcoal is as a constituent of gunpowder (q.v.). It is also used in metallurgical operations as a reducing agent, but its application has been diminished by the introduction of coke, anthracite smalls, &c. A limited quantity is made up into the form of drawing crayons; but the greatest amount is used as a fuel.

The porosity of wood-charcoal explains why it floats on the surface of water, although it is actually denser, its specific gravity being about 1-5. The porosity also explains the property of absorbing gases and vapours; at Ordinary temperatures ammonia and cyanogen are most readily taken up; and Sir James Dewar has utilized this property for the preparation of high vacua at low temperatures. This character is commercially

applied in the use cf wood-charcoal as a disinfectant. The fetid gases produced by the putrefaction and waste of organic matter enter into the pores of the charcoal, and there meet with the oxygen previously absorbed from the atmosphere; oxidation ensues, and the noxious effluvia are decomposed. Generally, however, the action is a purely mechanical one, the gases being only absorbed. Its pharmacological action depends on the same property; it absorbs the gases of the stomach and intestines (hence its use in cases of flatulence), and also liquids and solids. Wood-charcoal has also the power of removing colouring matters from solutions, but this property is possessed in a much higher degree by animal-charcoal.

Animal-charcoal or bone black is the carbonaceous residue obtained by the dry distillation of bones; it contains only about 10% of carbon, the remainder being calcium and magnesium phosphates (80%) and other inorganic material originally present in the bones. It is generally manufactured from the residues obtained in the glue (q.v.) and gelatin (q.v.) industries. Its decolorizing power was applied in 181 2 by Derosne to the clarification of the syrups obtained in sugar- refining; but its use in this direction has now greatly diminished, owing to the introduction of more active and easily managed reagents. It is still used to some extent in laboratory practice. The decolorizing power is not permanent, becoming lost after using for some time; it may be revived, however, by washing and reheating.

Lampblack or soot is the familiar product of the incomplete combustion of oils, pitch, resins, tallow, &c. It is generally prepared by burning pitch residues (see Coal-tar) and condensing the product. Thus obtained it is always oily, and, before using as a pigment, it must be purified by ignition in closed crucibles (see Carbon).

CHARCOT, JEAN MARTIN (1825-1803), French physician, was born in Paris on the 29th of November 1825. In 1853 he graduated as M.D. of Paris University, and three years later was appointed physician of the Central Hospital Bureau. In i860 he became professor of pathological anatomy in the medical faculty of Paris, and in 1862 began that famous connexion with the Salp6triere which lasted to the end of his life. He was elected to the Academy of Medicine in 1873, and ten years afterwards became a member of the Institute. His death occurred suddenly on the 1 6th of August 1893 at Morvan, where he had gone for a holiday. Charcot, who was a good linguist and well acquainted

with the literature of his own as well as of other countries, excelled as a clinical observer and a pathologist. His work at the SalpStriere exerted a great influence on the development of the science of neurology, and his classical Legons sur les maladies du

systcme nerveux, the first series of which was published in 1873, represents an enormous advance in the knowledge and discrimination of nervous diseases. He also devoted much attention to the study of obscure morbid conditions like hysteria, especially in relation to hypnotism (q.v.) ; indeed, it is in connexion with his investigation into the phenomena and results of the latter that his name is popularly known. In addition to his labours on neurological and even physiological problems he made many contributions to other branches of medicine, his published works dealing, among other topics, with liver and kidney diseases, gout and pulmonary phthisis. As a teacher he was remarkably successful, and always commanded an enthusiastic band of followers.

CHARD, JOHN ROUSE MERRIOTT (1847-1897), British soldier, was born at Boxhill, near Plymouth, on the 21st of December 1847, and in 1868 entered the Royal Engineers. In 1878 Lieutenant Chard was ordered to South Africa to take part in the Zulu War, and was stationed at the small post of Rorke's Drift to protect the bridges across the Buffalo river, and some sick men and stores. Here, with Lieutenant Gonville Bromhead (1856-1891) and eighty men of the 2nd 24th Foot, he heard, on the 22nd of January 1879, of the disaster of Isandhl- wana from some fugitives who had escaped the slaughter. Believing that the victorious Zulus would attempt to cross into Natal, they prepared, hastily, to hold the Drift until help should come. They barricaded and loopholed the old church and hospital, and improvised defences from wagons, mealie sacks and bags of Indian corn. Early in the afternoon they were attacked by more than 3000 Zulus, who, after hours of desperate hand-to-hand fighting, carried the outer defences, an inner low wall of biscuit boxes, and the hospital, room by room. The garrison then retired to the stone kraal, and repulsed attack after attack through the night. The next morning relieving forces appeared, and the enemy retired. The spirited defence of Rorke's Drift saved Natal from a Zulu invasion, and Chard's and Bromhead's gallantry was

rewarded with the V.C. and immediate promotion to the rank of captain and brevet-major. On Chard's return to England he became a popular hero. From 1893-1896 he commanded the Royal Engineers at Singapore, and was made a colonel in 1897. He died the same year at Hatch-Beauchamp, near Taunton, on the 1st of November.

CHARD, a market town and municipal borough in the Southern parliamentary division of Somersetshire, England, 1425 m. W. by S. of London by the London & South Western railway. Pop. (1901) 4437. It stands on high ground within 1 m. of the Devonshire border. Its cruciform parish church of St Mary the Virgin is Perpendicular of the 15th century. A fine east window is preserved. The manufactures include linen, lace, woollens, brassware and ironware. Chard is governed by a mayor, 4 aldermen and 12 councillors. Area, 444 acres.

Chard (Cerdre, Cherdre, Cherde) was commercial in origin, being a trade centre near the Roman road to the west. There are two Roman villas in the parish. There was a British camp at Neroche in the neighbourhood. The bishop of Bath held Chard in 1086, and his successor granted in 1234 the first charter which made Chard a free borough, each burgage paying a rent of 1 2d. Trade in hides was forbidden to non-burgesses. This charter was confirmed in 1253, 1280 and 1285. Chard is said to have been incorporated by Elizabeth, as the corporation seal dates from 1570, but no Elizabethan charter can be found. It was incorporated by grant of Charles I. in 1642, and Charles II. gave a charter in 1683. Chard was a mesne borough, the first overlord being Bishop Joceline, whose successors held it (with a brief interval from 1545 to 1552) until 1801, when it was sold to Earl Poulett. Parliamentary representation began in 1312, and was lost in 1328. A market on Monday and fair on the 25th of July were granted in 1253, and confirmed in 1642 and 1683, when two more fair days were added (November 2 and May 3), the market being changed to Tuesday. The market day is now Monday, fairs being held on the first Wednesday in May, August and November, for corn and cattle only, their medieval importance as centres of the cloth trade having departed.

CHARD IN, JEAN SIMEON (1699-1779), French genre painter, was born in Paris, and studied under Pierre Jacques Cazes (1676-1754), the historical painter, and Noel Nicolas Coypel. He became famous for his still-life pictures and domestic interiors, which are well represented at the Louvre, and for figure-painting,

as in his Le BinidicM (1740).

CHARDIN, SIR JOHN (1643-1713), French traveller, was born at Paris in 1643. His father, a wealthy jeweller, gave him an excellent education, and trained him in his own art; but instead of settling down in the ordinary routine of the craft, he set out in company with a Lyons merchant named Raisin in 1665 for Persia and India, partly on business and partly to gratify his own inclination. After a highly successful journey, during which he had received the patronage of Shah Abbas II. of Persia, he returned to France in 1670, and there published in the following year Ricit du Couronnement du roi de Perse Soliman III. Finding, however, that his Protestant profession cut him off from all hope of honours or advancement in his native country, he set out again for Persia in August 1671. This second journey was much more adventurous than the first, as instead of going directly to his destination, he passed by Smyrna, Constantinople, the Crimea, Caucasia, Mingrelia and Georgia, and did not reach Ispahan till June 1673. After four years spent in researches throughout Persia, he again visited India, and returned to Europe by the Cape of Good Hope in 1677. The persecution of Protestants in France led him, in 1681, to settle in London, where he was appointed jeweller to the court, and received from Charles II. the honour of knighthood. In 1683 he was sent to Holland as representative of the English East India Company; and in 1686 he published the first part of his great narrative — The Travels of Sir John Chardin into Persia and the East Indies, &c. (London). Sir John died in London in 1713, and was buried in Westminster Abbey, where his monument bears the inscription Nomen sibi fecit eundo.

It was not till 171 1 that the complete account of Chardin's travels appeared, under the title of Journal du voyage du chevalier Chardin, at Amsterdam. The Persian portion is to be found in vol. ii. of Harris's Collection, and extracts are reprinted by Pinkerton in vol. ix. The best complete reprint is by Langles (Paris, 1811). Sir John Chardin's narrative has received the highest praise from the most competent authorities for its fulness, comprehensiveness and fidelity; and it furnished Montesquieu, Rousseau, Gibbon and Helvetius with most important material.

CHARENTE, an inland department of south-western France, comprehending the ancient province of Angoumois, and inconsiderable portions of Saintonge, Poitou, Marche, Limousin and

Perigord. It is bounded N. by the departments of Deux-Sevres and Vienne, E. by those of Vienne and Dordogne, S. by Dordogne and W. by Charente-Inferieure. Area 2305 sq. m. Pop. (1906) 3S J >733- The department, though it contains no high altitudes, is for the most part of a hilly nature. The highest points, many of which exceed 1000 ft., are found in the Confolentais, the granite region of the extreme north-east, known also as the Terres Froides. In the Terres Chaudes, under which name the remainder of the department is included, the levels vary in general between 300 and 650 ft., except in the western plains — the Pays-Bas and Champagne — where they range from 40 to 300 ft. A large part of Charente is thickly wooded, the principal forests lying in its northern districts. The department, as its name indicates, belongs mainly to the basin of the river Charente (area of basin 3860 sq. m.; length of river 225 m.), the chief affluents of which, within its borders, are the Tardoire, the Touvre and the Ne. The Confolentais is watered by the Vienne, a tributary of the Loire, while the arrondissement of Barbezieux in the south-west belongs almost wholly to the basin of the Gironde.

The climate is temperate but moist, the rainfall being highest in the north-east. Agriculturally, Charente is prosperous. More than half its surface is arable land, on the greater part of which cereals are grown. The potato is an important crop. The vine is predominant in the region of Champagne, the wine produced being chiefly distilled into the famous brandy to which the town of Cognac gives its name. The best pasture is found

in the Confolentais, where horned cattle are largely reared. The chief fruits are chestnuts, walnuts and cider-apples. The poultry raised in the neighbourhood of Barbezieux is highly esteemed. Charente has numerous stone quarries, and there are peat workings and beds of clay which supply brick and tile-works and earthenware manufactories. Among the other industries, paper-making, which has its chief centre at Angouleme, is foremost. The most important metallurgical establishment is the large foundry of naval guns at Ruelle. Flour-mills and leather-works are numerous. There are also many minor industries subsidiary to paper-making and brandy-distilling, and Angouleme manufactures gunpowder and confectionery. Coal, salt and timber are prominent imports. Exports include paper, brandy,

stone and agricultural products. The depart- ment is served chiefly by the Orleans and Ouest-Etat railways, and the Charente is navigable below Angouleme. Charente is divided into the five arrondissements of Angouleme, Cognac, Ruffec, Barbezieux and Confolens (29 cantons, 426 communes). It belongs to the region of the XII. army corps, to the province of the archbishop of Bordeaux, and to the academic (educational division) of Poitiers. Its court of appeal is at Bordeaux.

Angouleme (the capital), Cognac, Confolens, Jarnac and La Rochefoucauld (q.v.) are the more noteworthy places in the department. Barbezieux and Ruffec, capitals of arrondissements and agricultural centres, are otherwise of little importance. The department abounds in churches of Romanesque architecture, of which those of Bassac, St Amant-de-Boixe (portions of which are Gothic in style), Plassac and Gensac-la-Pallue may be mentioned. There are remains of a Gothic abbey church at La Couronne, and Roman remains at St Cybardeaux, Brossac and Chassenon (where there are ruins of the Gallo-Roman town of Cassinomagus).

CHARENTE-INFERIEURE, a maritime department of south western France, comprehending the old provinces of Saintonge and Aunis, and a small portion of Poitou, and including the islands of Re, Oleron, Aix and Madame. Area, 2791 sq. m. Pop. (1906) 453,793. It is bounded N. by Vendee, N.E. by Deux-Sevres, E. by Charente, S.E. by Dordogne, S.W. by Gironde and the estuary of the Gironde, and W. by the Bay of Biscay. Plains and low hills occupy the interior; the coast is flat and marshy, as are the islands (R6, Aix, Oleron) which lie opposite to it. The department takes its name from the river Charente, which traverses it during the last 61 m. of its course and drains the central region. Its chief tributaries are on the right the Boutonne, on the left the Seugne. The climate is temperate and, except along the coast, healthy. There are several sheltered bays on the coast, and several good harbours, the chief of which are La Rochelle, Rochefort and Tonnay- Charente, the two latter some distance up the Charente. Royan on the north shore of the Gironde is an important watering-place much frequented for its bathing.

The majority of the inhabitants of Charente-Inferieure live by agriculture. The chief products of the arable land are wheat, oats, maize, barley and the potato. Horse and cattle-raising is carried on and dairying is prosperous. A considerable quantity of wine, most of which is distilled into brandy, is produced. The

department has a few peat-workings, and produces freestone, lime and cement; the salt-marshes of the coast are important sources of mineral wealth. Glass, pottery, bricks and earthenware are prominent industrial products. Ship-building, brandy-distilling, iron-founding and machine construction are also carried on. Oysters and mussels are bred in the neighbourhood of La Rochelle and Marennes, and there are numerous fishing ports along the coast.

The railways traversing the department belong to the Ouest-Etat system, except one section of the Paris-Bordeaux line belonging to the Orleans Company. The facilities of the department for internal communication are greatly increased by the number of navigable streams which water it. The Charente, the Sevre Niortaise, the. Boutonne, the Seudre and the Gironde furnish 142 m. of navigable waterway, to which must be added the 56 m. covered by the canals of the coast.

There are 6 arrondissements (40 cantons, 481 communes), cognominal with the towns of La Rochelle, Rochefort, Marennes, Saintes, Jonzac and St Jean d'Angely — La Rochelle being the chief town of the department. The department forms the diocese of La Rochelle, and is attached to the 18th military region, and in educational matters to the academie of Poitiers. Its court of appeal is at Poitiers.

La Rochelle, St Jean d'Angely, Rochefort and Saintes (q.v.) are the principal towns. Surgeres and Aulnay possess fine specimens of the numerous Romanesque churches. Pons has a graceful chateau of the 15th and 16th centuries, beside which there rises a fine keep of the 12th century.

CHARENTON-LE-PONT, a town of northern France in the department of Seine, situated on the right bank of the Marne, at its confluence with the Seine, 1 m. S.E. of the fortifications of Paris, of which it is a suburb. Pop. (1906) 18,034. It derives the distinctive part of its name from the stone bridge of ten arches which crosses the Marne and unites the town with Alfort- ville, well known for its veterinary school founded in 1766. It has always been regarded as a point of great importance for the defence of the capital, and has frequently been the scene of sanguinary conflicts. The fort of Charenton on the left bank of the Marne is one of the older forts of the Paris defence. In the 1 6th and 17 th centuries Charenton was the scene of the ecclesiastical councils of the Protestant party, which had its principal

church in the town. At St Maurice adjoining Charenton is the famous Hospice de Charenton, a lunatic asylum, the foundation of which dates from 1641. Till the time of the Revolution it was used as a general hospital, and even as a prison, but from 1802 onwards it was specially appropriated to the treatment of lunacy. St Maurice has two other national establishments, one for the victims of accidents in Paris (asile national Vacassy), the other for convalescent working-men (asile national de Vincennes). Charenton has a port on the- Canal de St Maurice, beside the Marne, and carries on boat-building and the manufacture of tiles and porcelain.

CHARES, Athenian general, is first heard of in 366 B.C. as assisting the Phliasians, who had been attacked by Argos and Sicyon. In 361 he visited Corcyra, where he helped the oligarchs to expel the democrats, a policy which led to the subsequent defection of the island from Athens. In 357, Chares was appointed to the command in the Social War, together with Chabrias, after whose death before Chios he was associated with Iphicrates and Timotheus (for the naval battle in the Hellespont, see Timotheus). Chares, having successfully thrown the blame for the defeat on his colleagues, was left sole commander, but receiving no supplies from Athens, took upon himself to join the revolted satrap Artabazus. A complaint from the Persian king, who threatened to send three hundred ships to the assistance of the confederates, led to the conclusion of peace (355) between Athens and her revolted allies, and the recall of Chares. In 349, he was sent to the assistance of Olynthus (q.v.) against Philip II. of Macedon, but returned without having effected anything; in the following year, when he reached Olynthus, he found it already in the hands of Philip. In 340 he was appointed to the command of a force sent to aid Byzantium against Philip, but the inhabit- ants, remembering his former plunderings and extortions, refused to receive him. In 338 he was defeated by Philip at Amphissa, and was one of the commanders at the disastrous battle of Chaeroneia. Lysicles, one of his colleagues, was condemned to death, while Chares does not seem to have been even accused. After the conquest of Thebes by Alexander (335), Chares is said to have been one of the Athenian orators and generals whose surrender was demanded. Two years later he was living at. Sigeum, for Arrian (Anabasis i. 12) states that he went from there to pay his respects to Alexander. In 332 he entered the service of Darius and took over the command of a Persian force in Mytilene, but capitulated on the approach of a

Macedonian fleet on condition of being allowed to retire unmolested. He is last heard of at Taenarum, and is supposed to have died at Sigeum. Although boastful and vain-glorious, Chares was not lacking in personal courage, and was among the best Athenian general?

of his time. At the best, however, he was ” hardly more than an ordinary leader of mercenaries ” (A. Holm). He openly boasted of his profligacy, was exceedingly avaricious, and his bad faith became proverbial.

Diod. Sic. xv. 75, 95, xvi. 7, 21, 22, 85-88; Plutarch, Phocion, 14; Theopompus, ap. Athenaeum, xii. p. 532; A. Schafer, Demosthenes und seine Zeit (1885); A. Holm, History of Greece (Eng. trans., 1896), voi. iii.

CHARES, of Lindus in Rhodes, a noted sculptor, who fashioned for the Rhodians a colossal bronze statue of the sun-god, the cost of which was defrayed by selling the warlike engines left behind by Demetrius Poliorcetes, when he abandoned the siege of the city in 303 B.C. (Pliny, Nat. Hist, xrxiv. 41). The colossus was seventy cubits (105 ft.) in height; and its fingers were larger than many statues. The notion that the legs were planted apart, so that ships could sail between them, is absurd. The statue was thrown down by an earthquake after 56 years; but the remains lay for ages on the spot.

CHARES, of Mytilene, a Greek belonging to the suite of Alexander the Great. He was appointed court-marshal or introducer of strangers to the king, an office borrowed from the Persian court. He wrote a history of Alexander in ten books, dealing mainly with the private life of the king. The fragments are chiefly preserved in Athenaeus.

See Scriptores Rerum Alexandra (pp. 1 14-120) in the Didot edition of Arrian,

CHARGE (through the Fr. from the Late Lat. carricare, to load in a carrus or wagon; cf. ” cargo “), a load; from this, its primary meaning, also seen in the word ” charger,” a large dish, come the uses of the word for the powder and shot to load a fire- arm, the accumulation of electricity in a battery, the necessary quantity of

dynamite or other explosive in blasting, and a device borne on an escutcheon in heraldry. ” Charge ” can thus mean a burden, and so a care or duty laid upon one, as in ” to be in charge ” of another. With a transference to that which lays such a duty on another, ” charge ” is used of the instructions given by a judge to a jury, or by a bishop to the clergy of his diocese. In the special sense of a pecuniary burden the word is used of the price of goods, of an encumbrance on property, and of the expenses of running a business. Further uses of the word are of the violent, rushing attack of cavalry, or of a bull or elephant, or football player; hence ” charger ” is a horse ridden in a charge, or more loosely a horse ridden by an officer, whether of infantry or cavalry.

CHARGE D’AFFAIRES (Fr. for ” in charge of business “), the title of two classes of diplomatic agents. (1) Charges d’affaires (ministres charges d’affaires), who were placed by the reglement of the congress of Vienna in the 4th class of diplomatic agents, are heads of permanent missions accredited to countries to which, for some reason, it is not possible or not desirable to send agents of a higher rank. They are distinguished from these latter by the fact that their credentials are addressed by the minister for foreign affairs of the state which they are to represent to the minister for foreign affairs of the receiving state. Though still occasionally accredited, ministers of this class are now rare. They have precedence over the other class of charges d’affaires. (2) Charges d’affaires per interim, or charge’s des affaires, are those who are presented as such, either verbally or in writing, by heads of missions of the first, second or third rank to the minister for foreign affairs of the state to which they are accredited, when they leave their post temporarily, or pending the arrival of their successor. It is usual to appoint a counsellor or secretary of legation charge d’affaires. Some governments are accustomed to give the title of minister to such charges d’affaires, which ranks them with the other heads of legation. Essentially charges d’affaires do not differ from ambassadors, envoys or ministers resident. They represent their nation, and enjoy the same privileges and immunities as other diplomatic agents (see Diplomacy).

CHARGING ORDER, in English law, an order obtained from a court or judge by a judgment creditor under the Judgment Acts 1838 and 1840, by which the property of the judgment

debtor in any stocks or funds stands charged with the payment of

the amount for which judgment shall have been recovered, with interest. A charging order can only be obtained in respect of an ascertained sum, but this would include a sum ordered to be paid at a future date. An order can be made on stock standing in the name of a trustee in trust for the judgment debtor, or* on cash in court to the credit of the judgment debtor, but not on stock held by a debtor as a trustee. The application for a charg- ing order is usually made by motion to a divisional court, though it may be made to a judge. The effect of the order is not that of a contract to pay the debt, but merely of an instrument of charge on the shares, signed by the debtor. An interval of six months must elapse before any proceedings are taken to enforce the charge, but, if necessary, a stop order on the fund and the divi- dends payable by the debtor can be obtained by the creditor to protect his interest A solicitor employed to prosecute any suit, matter or proceeding in any court, is entitled, on declaration of the court, to a charge for his costs upon the property recovered or preserved in such suit or proceeding. (See Rules of the Supreme Court, o. xlix.)

CHARIBERT (d. 567), king of the Franks, was the son of Clotaire I. On Clotaire's death in 561 his estates were divided between his sons, Charibert receiving Paris as his capital, together with Rouen, Tours, Poitiers, Limoges, Bordeaux and Toulouse. Besides his wife, Ingoberga, he had unions with Merofleda, a wool-carder's daughter, and Theodogilda, the daughter of a neatherd. He was one of the most dissolute of the Merovingian kings, his early death in 567 being brought on by his excesses. (C. Pf.)

CHARIDEMUS, of Oreus in Euboea, Greek mercenary leader. About 367 B.C. he fought under the Athenian general Iphicrates against Amphipolis. Being ordered by Iphicrates to take the Amphi- politan hostages to Athens, he allowed them to return to their own people, and joined Cotys, king of Thrace, against Athens. Soon afterwards he fell into the hands of the Athenians and accepted the offer of Timotheus to re-enter their service. Having been dismissed by Timotheus (362) he joined the revolted satraps Memnon and Mentor in Asia, but soon lost their confidence, and was obliged to seek the protection of the Athenians. Finding, however, that he had nothing to fear from the Persians, he again joined Cotys, on whose murder he was appointed guardian to his youthful son Cersobleptes. In 357, on the arrival of Chares with considerable forces, the Chersonese was restored to Athens. The supporters of Charidemus represented this as due to his efforts, and, in spite of the

opposition of Demosthenes, he was honoured with a golden crown and the franchise of the city. It was further resolved that his person should be inviolable. In 351 he com- manded the Athenian forces in the Chersonese against Philip II. of Macedon, and in 349 he superseded Chares as commander in the Olynthian War. He achieved little success, but made him- self detested by his insolence and profligacy, and was in turn replaced by Chares. After Chaeroneia the war party would have entrusted Charidemus ‘ with the command against Philip, but the peace party secured the appointment of Phocion. He was one of those whose surrender was demanded by Alexander after the destruction of Thebes, but escaped with banishment. He fled to Darius III., who received him with distinction. But, having expressed his dissatisfaction with the preparations made by the king just before the battle of Issus im), he was put to death.

See Diod. Sic. xvii. 30; Plutarch, Phocion, 16, 17; Arrian, Anabasis, i. 10; Quintus Curtius iii. 2; Demosthenes, Contra Aristocratem; A. Schafer, Demosthenes und seine Zeit (1885).

CHARING CROSS, the locality about the west end of the Strand and the north end of Whitehall, on the south-east side of Trafalgar Square, London, England. It falls within the bounds of the city of Westminster. Here Edward I. erected the last of the series of crosses to the memory of his queen, Eleanor (d. 1290). It stood near the present entrance to Charing

1 According to some authorities, this is a second Charidemus, the first disappearing from history after being superseded by Chares in the Olynthian war.

Cross station of the South-Eastern & Chatham railway, in the courtyard of which a fine modern cross has been erected within a few feet of the exact site. A popular derivation of the name connected it with Edward’s ” dear queen ” (chere reine), and a village of Cherringe or Charing grew up here later, but the true origin of the name is not known. There is a village of Charing in Kent, and the name is connected by some with that of a Saxon family, Cerring.

CHARIOT (derived from an O. Fr. word, formed from char, a car),

in antiquity, a conveyance (Gr. apixa, Lat. currus) used in battle, for the chase, in public processions and in games. The Greek chariot had two wheels, and was made to be drawn by two horses; if a third or, more commonly, two reserve horses were added, they were attached on each side of the main pair by a single trace fastened to the front of the chariot, as may be seen on two prize vases in the British Museum from the Panathenaic games at Athens. On the monuments there is no other sign of traces, from the want of which wheeling round must have been difficult. Immediately on the axle {afav, axis), without springs of any kind, rested the basket or body (5ld>pos) of the chariot, which consisted of a floor to stand on, and a semicircular guard round the front about half the height of the driver. It was entirely open at the back, so that the combatant might readily leap to the ground and up again as was necessary. There was no seat, and generally only room for the combatant and his charioteer to stand in. The pole (pvfi6s,iemo) was probably attached to the middle of the axle, though it appears to spring from the front of the basket; at the end of the pole was the yoke (f vyov, jugum), which consisted of two small saddles fitting the necks of the horses, and fastened by broad bands round the chest. Besides this the harness of each horse consisted of a bridle and a pair of reins, mostly the same as in use now, made of leather and ornamented with studs of ivory or metal. The reins were passed through rings attached to the collar bands or yoke, and were long enough to be tied round the waist of the charioteer in case of his having to defend himself. The wheels and body of the chariot were usually of wood, strengthened in places with bronze or iron; the wheels had from four to eight spokes and tires of bronze or iron. This description applies generally to the chariots of all the nations of antiquity; the differences consisted chiefly in the mountings. The chariots of the Egyptians and Assyrians, with whom the bow was the principal arm of attack, were richly mounted with quivers full of arrows, while those of the Greeks, whose character- istic weapon was the spear, were plain except as regards mere decoration. Among the Persians, again, and more remarkably among the ancient Britons, there was a class of chariot having the wheels mounted with sharp, sickle-shaped blades, which cut to pieces whatever came in their way. This was probably an invention of the Persians; Cyrus the younger employed these chariots in large numbers. Among the Greeks and Romans, on the other hand, the chariot had passed out of use in war before historical times, and was retained only for races in the public games, or for processions, without undergoing any alteration

apparently, its form continuing to correspond with the description of Homer, though it was lighter in build, having to carry only the charioteer. On two Panathenaic prize vases in the British Museum are figures of racing bigae, in which, contrary to the description given above, the driver is seated with his feet resting on a board hanging down in front close to the legs of his horses. The biga itself consists of a seat resting on the axle, with a rail at each side to protect the driver from the wheels. The chariot was unsuited to the uneven soil of Greece and Italy, and it is not improbable that these nations had brought it with them as part of their original habits from their former seats in the East. In the remains of Egyptian and Assyrian art there are numerous representations of chariots, from which it may be seen with what richness they were sometimes ornamented. The " iron " chariots in use among the Jews appear to have been chariots strengthened or plated with metal, and no doubt were of the form above described, which prevailed generally among the other ancient nations. (See also Cajriuage.)

The chief authorities are J. C. Ginzrot, Die Wagen und Fahrwerke

der Griechen und R'&mer (1817); C. F. Grashof, tiber das Fuhrwerk bei Homer und Hesiod (1846) ; W. Leaf in Journal of Hellenic Studies, v.; E. Buchholz, Die homerischen Realien (1871-1885); W. Helbig, Das homerische Epos aus den Denkmdlern erldutert (1884), and the article " Currus " in Daremberg and Saglio, Dictionnaire des Antiquitis.

CHARISIUS, FLAVIUS SOSIPATER, Latin grammarian, flourished about the middle of the 4th century a.d. He was probably an African by birth, summoned to Constantinople to take the place of Euanthius, a learned commentator on Terence. The Ars Grammatica of Charisius, in five books, addressed to his son (not a Roman, as the preface shows), has come down to us in a mutilated condition, the beginning of the first, part of the fourth, and the greater part of the fifth book having been lost. The work, which is merely a compilation, is valuable as contain- ing excerpts from the earlier writers on grammar, who are in many cases mentioned by name — Q. Remmius Palaemon, C. Julius Romanus, Cominianus.

The best edition is by H. Keil, Grammatici Latini, i. (1857); see also article by G. Gotz in Pauly-Wissowa's Realencyclopadie, iii. 2 (1899) ; Teuffel-Schwabe, Hist, of Roman Literature (Eng. trans.), § 419, 1. 2; Frohde, in Jahr.f. Philol., 18 Suppl. (1892), 567-672.

CHARITON, of Aphrodisias in Caria, the author of a Greek romance entitled The Loves of Chaereas and Callirrhoe, probably flourished in the 4th century a.d. The action of the story, which is to a certain extent historical, takes place during the time of the Peloponnesian War. Opinions differ as to the merits of the romance, which is an imitation of Xenophon of Ephesus and Heliodorus.

Editions by J. P. D'Orville (1783), G. A. Hirschig (1856) and R. Hercher (1859); there is an (anonymous) English translation (1764) ; see also E. Rohde, Der griechische Roman (1900).

CHARITY AND CHARITIES. The word " charity," or love, represents the principle of the good life. It stands for a mood or habit of mind and an endeavour. From it, as a habit of mind, springs the social and personal endeavour which in the widest sense we may call charity. The two correspond. Where the habit of mind has not been gained, the endeavour fluctuates and is relatively purposeless. In so far as it has been gained, the endeavour is founded on an intelligent scrutiny of social conditions and guided by a definite purpose. In the one case it is realized that some social theory must be found by us, if our action is to be right and consistent; in the other case no need of such a theory is felt. This article is based on the assump- tion that there are principles in charity or charitable work, and that these can be ascertained by a study of the development of social conditions, and their relation to prevalent social aims and religious or philosophic conceptions. It is assumed also that the charity of the religious life, if rightly understood, cannot be inconsistent with that of the social life.

Perhaps some closer definition of charity is necessary. The words that signify goodwill towards the community and its members are primarily words expressive of the affections of family life in the relations existing between parents, and between parent and child. As will beseen, the analogies underlying such phrases as " God the Father," " children of God," " brethren," have played a great part in the development of charitable thought in pre-Christian as well as in Christian days. The germ, if we may say so, of the words <£iXia, ayain] , amor, love; amicitia, friendship, is the sexual or the parental relation. With the realization of the larger life in man the meaning of the word expands. Caritas, or charity, strikes another note — high price, and thus dearness. It is charity, indeed, expressed in mercantile metaphor; and it would seem that it was associated in thought with the word xˆP's.

which has also a commercial mean- ing, but signifies as well favour, gratitude, grace, kindness. Partly thus, perhaps, it assumed and suggested a nobler conception; and sometimes, as, for instance, in English ecclesiastical documents, it was spelt charitas. 'Kyhirri, which in the Authorized Version of the Bible is translated charity, was used by St Paul as a translation of the Hebrew word hesed, which in the Old Testament is in the same version translated " mercy " — as in Hosea vi. 6, " I desired mercy, and not sacrifice." This word represents the charity of kind- ness and goodness, as distinguished from almsgiving. Almsgiving, sedaqah, is translated by the word 'ihermoavvT) in the Septuagint, and in the Authorized Version by the word " righteousness." It repre- sents the deed or the gift which is due — done or made, not spon- taneously, but under a sense of religious obligation. In the earlier Christian period the word almsgiving has this meaning, and was in that sense applied to a wide range of actions and contracts, from

a gift to a beggar at a church door to a grant and a tenure of land. It also, in the word almoner, represented the fulfilment of the religious obligation with the aid of an agent or delegate. The words charity or love (caritas or ayawri), on the other hand, without losing the tone with which the thought of parental or family love inspires them, assume a higher meaning. In religious thought they imply an ideal life, as represented by such expressions as ” love (agape) of God.” This on the ore side; and on the other an ideal social relation, in such words as ” love of man.” Thus in the word ” charity ” religious and social associations meet; and thus regarded the word means a disciplined and habitual mood in which the mind is considerate of the welfare of others individually and generally, and devises what is for their real good, and in which the intelligence and the will strive to fulfil the mind’s purpose. Charity thus has no necessary relation to relief or alms. To give a lecture, or to nurse a sick man who is not in want or ” poor, ‘ may be equally a deed of charity; though in fact charity concerns itself largely with the classes usually called ” the poor,” and with problems of distress and relief. Relief, however, is not an essential part of charity or charit- able work. It is one of many means at its disposal. If the world were so poor that no one could make a gift, or so wealthy that no one needed it, charity — the charity of life and of deeds

— would remain.

The history of charity is a history of many social and religious theories, influences and endeavours, that have left their mark alike upon the popular and the cultivated thought of the present day. The inconsistencies of charitable effort and argument may thus in part be accounted for. To understand the problem of charity we have therefore (i) to consider the stages of charit- able thought— the primitive, pagan, Greek and Roman, Jewish and Christian elements, that make up the modern consciousness in regard to charity, and also the growth of the habit of ” charity ” as representing a gradually educated social instinct. (2) We have also to consider in their relation to charity the results of recent investigations of the conditions of social life. (3) At each stage we have to note the corresponding stage of practical administration in public relief and private effort — for the division between public or ” poor-law ” relief and charity which prevails in England is, comparatively speaking, a novelty, and, generally speaking, the work of charity can hardly be appreciated or understood if it be considered without reference to public relief. (4) As to the present day, we have to consider practical suggestions in regard to such subjects as charity and economic thought, charity organization, friendly visiting and almonership, co-operation with the poor-law, charity and thrift, parochial management, hospitals and medical relief, exceptional distress and the ” unemployed,” the utilization of endowments and their supervision, and their adaptation to new needs and emergencies. (5) We have also throughout to consider charitable help in relation to classes of dependants, wl o appear early in the history of the question — widows and orphans, the sick and the aged, vagrants and wayfarers.

First in the series come the charities of the family and of hospitality; then the wider charities of religion, the charities of the community, and of individual donors and of mutual help. These gradually assumed importance in communities which consisted originally of self-supporting classes, within which widows and orphans, for instance, would be rather provided for, in accordance with recognized class obligations, than relieved. Then come habitual almsgiving, the charitable endowment, and the modern charitable institution and association. But throughout the test of progress or decadence appears to be the condition of the family. The family is the source, the home and the hearthstone of charity. It has been created but slowly, and there is naturally a constant tendency to break away from its

obligations and to ignore and depreciate its utility. Yet the family, as we now have it, is itself the outcome of infinite thought working through social instinct, and has at each stage of its development indicated a general advance. To it, therefore, constant reference must be made.

Part I. — Primitive Charity

The study of early communities has brought to light the history of the development of the family. ” Marriage in its lowest phases is by no means a matter of affection or companionship ” ; and only very slowly has the position of both parents been recognized as implying different but correlative responsibilities

towards their child. Only very slowly, also, has the morality necessary to the making of the family been won. Charity at earlier stages is hardly recognized as a virtue, nor infanticide as an evil. Hospitality — the beginning of a larger social life — is non-existent. The self-support of the community is secured by marriage, and when relations fail marriage becomes a pro- vision against poverty. Then by the tribal system is created another safeguard against want. But apart also from these methods of maintenance, at a very early stage there is charitable relief. The festivals of the solstices and equinoxes, and of the seasons, are the occasions for sacrifice and relief; and, as Christmas customs prove, the instinct to give help or alms at such festival periods still remains. Charity is concerned prim- arily with certain elemental forces of social life: the relation between these primitive instincts and impulses that still influence charity should not, therefore, be overlooked. The basis of social life is also the basis of charitable thought and action.

The savage is the civilized man in the rough. ” The lowest races have,” Lord Avebury writes, ” no institution of marriage.” Many have no word for ” dear ” or ” beloved.” The child belongs to the tribe rather than to the parent. In these circumstances a problem of charity such as the following may arise: — ” Am I to starve, while my sister has children whom she can sell?” a question asked of Burton by a negro. From the point of view of the tribe, an able- bodied man would be more valuable than dependent children, and the relationship of the larger family of brothers and sisters would be a truer claim to help than that of mother and child. Subsequently the child is recognized as related, not to the father, but to the mother, and there is ” a kind of bond which lasts for life between mother and child, although the father is a

stranger to it." Slowly only is the relative position of both parents, with different but cor- relative responsibilities, recognized. The first two steps of charity have then been made: the social value of the bond between the mother, and then between the father, and the child has been recog- nized. Until this point is reached the morality necessary to the making of the family is wanting, and for a long time afterwards it is hardly won. The virtue of chastity — the condition precedent to the higher family life — is unrecognized. Indeed, the set of such religious thought as there may be is against it. Abstract conceptions, even in the nobler races, are lacking. The religion of life is vaguely struggling with its animality, and that which it at last learns to rule it at first worships. In these circumstances there is little charity for the child and little for the stranger. " There is," Dr Schwein- furth wrote in his Heart of Africa, " an utter want of wholesome intercourse between race and race. For any member of a tribe that speaks one dialect to cross the borders of a tribe that speaks another is to make a venture at the hazard of his life." The religious obliga- tions that fostered and sanctified family life among the Greeks and Romans and Jews are unknown. Much later in development comes charity for the child, with the abhorrence of infanticide — against which the Jewish-Christian charity of 2000 years ago uttered its most vigorous protests. If the child belonged primarily to the tribe or state, its maintenance or destruction was a common concern. This motive influenced the Greeks, who are historically nearer the earlier forms of social life than ourselves. For the common good they exposed the deformed child; but also " where there were too many, for in our state population has a limit," as Aristotle says, " the babe or unborn child was destroyed." And so, to lighten their own responsibilities, parents were wont to do in the slow years of the degradation of the Roman empire, though the interest of the state then required a contrary policy. The transition to our present feeling of responsibility for child-life has been very gradual and uncertain, through the middle ages and even till the 18th century. Strictly it may be said that all penitentiaries and other similar institutions are concrete protests on behalf of a better family life. The movement for the care of children in the 1 8th century naturally and instinctively allied itself with the penitentiary movement. The want of regard for child-life, when the rearing of children becomes a source of economic pressure, suggests why in earlier stages of civilization all that charitable apparatus which we now think neces- sary for the assistance of children is wanting, even if the need, so far as it does arise, is not

adequately met by the recognized obligations of the clan-family or brotherhood.

In the case of barbarous races charity and self-support may be considered from some other points of view. Self-support is secured in two ways — by marriage and by slavery. ” For a man or woman to be unmarried after the age of thirty is unheard of ” (T. H. Lewin, Wild Races of South-East India). On the other hand, if any one is without a father, mother or other relative, and destitute of the necessaries of life, he may sell himself and become a slave. Thus slavery becomes a provision for poverty when relations fail. The clan-family may serve the same purpose. David Livingstone de- scribes the formation of the clan-family among the Bakuena. ‘ ‘ Each man, by virtue of paternity, is chief of his own children. They build huts round his. . . . Near the centre of each circle of huts is a spot

called a ‘ kotla,’ with a fireplace; here they work, eat, &c. A poor man attaches himself to the ‘ kotla ‘ of a rich one, and is considered a child of the latter.” Thus the clan-family is also a poor-relief association.

Studies in folklore bring to light many relations between the charity of the old world and that of our own day.

In regard to the charity of the early community, we may take the 8th century B.C. as the point of departure. The Odyssey (about 800 B.C.) and Hesiod (about 700 B.C.) are Theeariy r0U g n iy p ara ll e l with Amos (816-775), an d represent munUy. two streams of thought that meet in the early Christian period. The period covered by the Odyssey seems to merge into that of Hesiod. We take the former first, dealing with the clan-family and the phratry, which are together the self-maintaining unit of society, with the general relief of the poor, with hospitality, and with vagrancy. In Hesiod we find the customary law of charity in the earlier community definitely stated, and also indications of the normal methods of neighbourly help which were in force in country districts. First of the family and brotherhood, or phratry. The family (Od. viii. 582) included alike the wife’s father and the daughter’s husband. It was thus a clanlike family. Out of this was developed the phratry or brotherhood, in which were included

alike noble families, peasants and craftsmen, united by a common worship and responsibilities and a common customary law {themis). Zeus, the god of social life, was worshipped by the phratry. He was the father of the law {themis). He was god of host and guest. Society was thus based on law, the brotherhood and the family. The irresponsible man, the man worthy of no respect or consideration, was one who belonged to no brotherhood, was subject to no customary law, and had no hearth or family. The phratry was, and became afterwards still more, " a natural gild." Outside the self- sustaining phratry was the stranger, including the wayfarer and the vagrant; and partly merged in these classes was the beggar, the recognized recipient of the alms of the community. To change one's abode and to travel was assumed to be a cause of reproach (II. ix. 648). The " land-louper " was naturally sus- pected. On the other hand, a stranger's first thought in a new country was whether the inhabitants were wild or social (Skcuoi), hospitable and God-fearing (Od. xiii. 201). Hospitality thus became the first public charity; Zeus sent all strangers and beggars, and it was against all law (de/jus) to slight them. Out of this feeling — a kind of glorified almsgiving — grew up the system of hospitality in Greek states and also in the Roman world. The host greeted the stranger (or the suppliant). An oath of friendship was taken by the stranger, who was then received with the greeting, Welcome (xatpe), and water was provided for ablution, and food and shelter. In the larger house there was a guests' table. In the hut he shared the peasant's meal. The custom bound alike the rich and the poor. On parting presents were given, usually food for the onward journey, sometimes costly gifts. The obligation was mutual, that the host should give hospitality, and that the guest should not abuse it. From early times tallies were exchanged between them as evidence of this formal relationship, which each could claim again of the other by the production of the token. And further, the relationship on either side became hereditary. Thus indi- viduals and families and tribes remained linked in friendship and in the interchange of hospitalities.

Under the same patronage of Zeus and the same laws of hospitality were vagrants and beggars. The vagrant and loafer are sketched in the Odyssey — the vagrant who lies glibly that he may get entertainment, and the loafer who prefers begging to work on a farm. These and the winter idlers, whom Hesiod pictures — a group known to modern life — prefer at that season to spend their time in the warmth of the village smithy, or at a

house of common resort (Keaxv) — a common lodging-house, we might say — where they would pass the night. Apparently, as in modern times, the vagrants had organized their own system of entertainment, and, supported by the public, were a class for whom it was worth while to cater. The local or public beggars formed a still more definite class. Their begging was a recognized means of maintenance; it was a part of the method of poor

relief. Thus of Penelope it was said that, if Odysseus' tale were true, she would give him better clothes, and then he might beg his bread throughout the country-side. Feasts, too, and alms-giving were nearly allied, and feasts have always been one resource for the relief of the poor. Thus naturally the beggars frequented feasts, and were apparently a recognized and yet inevitable nuisance. They wore, as part of their dress, scrips or wallets in which they carried away the food they received, as later Roman clients carried away portions of food in baskets (sportula) from their patron's dinner. Odysseus, when he dresses up as a beggar, puts on a wallet as part of his costume. Thus we find a system of voluntary relief in force based on a recognition of the duty of almsgiving as complete and peremptory as that which we shall notice later among the Jews and the early Christians. We are concerned with country districts, and not with towns, and, as social conditions that are similar produce similar methods of administration, so we find here a general plan of relief similar to that which was in vogue in Scotland till the Scottish Poor Law Act of 1845.

In Hesiod the fundamental conceptions of charity are more clearly expressed. He has, if not his ten, at least his four commandments, for disobedience to which Zeus will punish the offender. They are: Thou shalt do no evil to suppliant or guest; thou shalt not dishonour any woman of the family; thou shalt not sin against the orphan; thou shalt not be unkind to aged parents.

The laws of social life are thus duty to one's guest and duty to one's family; and chastity has its true place in that relation, as the later Greeks, who so often quote Hesiod (cf. the so-called Economics of Aristotle), fully realized. Also the family charities due to the orphan, whose lot is deplored in the Iliad (xxii. 490), and to the aged are now clearly enunciated. But there is also in Hesiod the duty to one's neighbour, not according to the " perfection " of " Cristes lore," but according to a law of honourable reciprocity in act and intent. " Love him who loves thee, and cleave to him who cleaveth to thee : to him who would have given, give ; to him who would not have given, give not." The groundwork of Hesiod's charity outside the family is neighbourly help (such as formed no small part of old Scottish charity in the country districts) ; and he put his argument thus : Competition, which is a kind of strife, " lies in the roots of the world and in men." It is good, and rouses the idle " handless " man to work. On one side are social duty (Sluri) and work, done briskly at the right season of the year, which brings a full barn. On the other side are unthrift and hunger, and relief with the disgrace of begging; and the relief, when the family can do no more, must come from neighbours, to whose house the beggar has to go with his wife and children to ask for victual. Once they may be helped, or twice, and then they will be refused. It is better, Hesiod tells his brother, to work and so pay off his debts and avoid hunger (see Erga, 391, &c, and elsewhere). Here indeed is a problem of to-day as it appeared to an early Greek. The alternatives before the idler — so far as his own community is concerned- — are labour with neighbourly help to a limited extent, or hunger.

Hesiod was a farmer in Boeotia. Some 530 years afterwards a pupil of Aristotle thus describes the district and its community of farmers. " They are," he says, " well to do, but simple in their way of life. They practise justice, good faith, and hospitality. To needy townsmen and vagabonds they give freely of their substance; for meanness and covetousness are unknown to them." The charitable method of Homeric and Hesiodic days still continued.

Part II.— Charity among the Greeks

Society in a Greek state was divided into two parts, citizens and slaves. The citizens required leisure for education, war and government. The slaves were their ministers and servants to

enable them to secure this leisure. ~^ eareek We have therefore to consider, on the one hand, the position of the family and the clan-family, and the maintenance of the citizen from public funds and by public and private charities; and on the other hand the condition of the slaves, and the relation between slavery and charity.

The slaves formed the larger part of the population. The census of Attica, made between 317 and 307 B.C., gives their numbers at 400,000 out of a population of about 500,000; and even if this be considered excessive, the proportion of slaves to citizens would certainly be very large. The citizens with their wives and children formed some 1 2 % of the community. Thus, apart from the resident aliens, returned in the census at 10.000,

and their wives and children., we have two divisions of society: the citizens, with their own organization of relief and charities; and the slaves, permanently maintained by reason of their dependence on individual members of the civic class. Thus, there is no poverty but that of the poor citizens. Poverty is limited to them. The slaves — that is to say, the bulk of the labouring population — are provided for.

From times relatively near to Hesiod's we may trace the growth and influence of the clan-family as the centre of customary charity within the community, the gradual increase of a class of poor either outside the clan-family or eventually independent of it, and the development of a new organization of relief introduced by the state to meet newer demands. We picture the early state as a group of families, each of which tends to form in time a separate group or clan. At each expansion from the family to the clan the members of the clan retain rights and have to fulfil duties which are the same as, or similar to, those which prevailed in the family. Thus, in Attica the clan-families (genos) and the brotherhoods (phr atria) were " the only basis of legal rights and obligations over and above the natural family." The clan-family was " a natural guild," consisting of rich and poor members — the well-born or noble and the craftsman alike. Originally it would seem that the land was divided among the families of the clan by lot and was inalienable. Thus with the family was combined the means of supporting the family. On the

other hand, every youth was registered in his phratry, and the phratry remained till the reforms of Cleisthenes (509 B.C.) a political, and even after that time a social, organization of importance.

First, as to the family — the mother and wife, and the father.- Already before the age of Plato and Xenophon (450-350 B.C.) we find that the family has suffered a slow decline. The wife, according to later Greek usage, was married as a child, hardly educated, and confined to the house, except at some festival or funeral. But with the decline came criticism and a nobler conception of family life. " First, then, come laws regarding the wife," writes the author of the so-called Economics of Aris- totle, and the law, " thou shalt do no wrong; for, if we do no wrong, we shall not be wronged." This is the " common law," as the Pythagoreans say, " and it implies that we must not wrong the wife in the least, but treat her with the reverence due to a suppliant, or one taken from the altar." The sanctity of marriage is thus placed among the " commandments " of Hesiod, beside the duty towards the stranger and the orphan. These and other references to the Pythagoreans suggest that they, possibly in common with other mystics, preached the higher religion of marriage and social life, and thus inspired a deeper social feeling, which eventually allied itself with the Christian movement.

Next, as to parents and children: the son was under an obliga- tion to support his father, subject, after Solon's time, to the condition that he had taught him a trade; and after Solon's time the father had no claim for support from an illegitimate son. " The possession of children," it was said (Arist. Econ.), " is not by nature for the public good only, but also for private advantage. For what the strong may gain by their toii for the weak, the weak in their old age receive from the strong . . . Thus is the nature of each, the man and the woman, prearranged by the Divine Being for a life in common." Honour to parents is " the first and greatest and oldest of all debts " (Plato, Laws, 717). The child has to care for the parent in his old age. " Nemesis, the minister of justice (5ki)), is appointed to watch over all these things." And "if a man fail to adorn the sepulchre of his dead parents, the magistrates take note of it and inquire " (Xen. Mem. ii. 14). The heightened conception of marriage implies a fuller interpretation of the mutual relations of parent and child as well; both become sacred.

Then as to orphans. Before Solon's time (594 b.c.) the property of any member of the clan-family who died without children went to the clan; and after his time, when citizens were permitted to leave their property by will, the property of an intestate fell to the clan. This arrangement carried with it corresponding duties. Through the clan-family provision was made for orphans.

Any member of the clan had the legal right to claim an orphan member in marriage; and, if the nearest agnate did not marry her, he had to give her a dowry proportionate to the amount of his own property. Later, there is evidence of a growing sense of responsibility in regard to orphans. Hippodamus (about 443 B.C.), in his scheme of the perfected state (Arist. Pol. 1268), suggested that there should be public magistrates to deal with the affairs of orphans (and strangers) ; and Plato, his contemporary, writes of the duty of the state and of the guardian towards them very fully. Orphans, he proposes (Laws, 927), should be placed under the care of public guardians. "Men should have a fear of the loneliness of orphans . . . and of the souls of the departed, who by nature take a special care of their own children. ... A man should love the unfortunate orphan (boy or girl) of whom he is guardian as if he were his own child; he should be as careful and diligent in the management of the orphan's property as of his own — or even more careful still."

To relieve the poverty of citizens and to preserve the citizenhood were objects of public policy and of charity. In Crete and Sparta the citizens were wholly supported out of the public resources. In Attica the system was different. The citizens were aided in various ways, in which, as often happens, legal or official and voluntary or private methods worked on parallel lines. The means were (1) legal enactment for release of debts; (2) emigration; (3) the supply of corn; (4) poor relief for the infirm, and relief for the children of those fallen in war; (5) emoluments; (6) voluntary public service, separate gifts and liberality; (7) loan societies.

(1) In 594 B.C. the labouring class in Attica were overwhelmed with debts and mortgages, and their persons pledged as security. Only by a sharp reform was it possible to preserve them from slavery. This Solon effected. He annulled their obligations, abolished the pledge of the person, and gave the labourers the franchise (but see under Solon). Besides the laws above mentioned, he gave power to the Areopagus to inquire from what sources each man obtained the necessaries of life, and to punish

those who did not work. His action and that of his successor, Peisistratus (560 B.C.), suggest that the class of poor (axopoi) was increasing, and that by the efforts of these two men the social decline of the people was avoided or at least postponed. Peisistratus lent the poor money that they might maintain themselves in husbandry. He wished, it is said (Arist. Ath. Pol. xvi.), to enable them to earn a moderate living, that they might be occupied with their own affairs, instead of spending their time in the city or neglecting their work in order to visit it. As rent for their land they paid a tenth of the produce.

(2) Akin to this policy was that of emigration. Athenians, .selected in some instances from the two lowest political classes, emigrated, though still retaining their rights of citizenship. In 570-565 B.c Salamis was annexed and divided into lots and settled, and latei Pericles settled more than 2750 citizens in the Chersonese and else- where — practically a considerable section of the whole body cf citizens. " By this means," says Plutarch, " he relieved the state of numerous idle agitators and assisted the necessitous." In other states this expedient w r as frequently adopted.

(3) A third method was the supply of corn at reduced rates— a method similar to that adopted, as we shall see, at Rome, Constan- tinople and elsewhere. The maintenance of the mass of the people depended on the corn fleets. There were public granaries, where large stores were laid up at the public expense. A portion of all cargoes of corn was retained at Athens and in other ways importa- tion was promoted. Exportation was forbidden. Public donations and distributions of corn were frequent, and in times of scarcity rich citizens made large contributions with that object. The distributions were made to adult citizens of eighteen years of age and upwards whose names were on the registers.

(4) In addition to this there was a system of public relief for those who were unable to earn a livelihood on account of bodily defects and infirmities. The qualification was a property test. The pro- perty of the applicant had to be shown to be of a value of not more than three minae (say £12). Socrates, it may be noted, adopts the same method of estimating his comparative poverty (Xen. Econ. 2. 6), saying that his goods would realize about five minae (or about twenty guineas). The senate examined the case, and the ecclesia awarded the bounty, which amounted to 1 or 2 obols a day, rather more than i«d. or 3d. — out-door relief, as we

might say, amounting at most to about is. 9d. a week. There was also a fund for the maintenance of the children of those who had fallen in war, up to the age of eighteen.

(5) But the main source of support was the receipt of emoluments for various public services. This was not relief, though it produced in the course of time the effect of relief. It was rather the Athenian method of supporting a governing class of citizens.

The inner political history of Athens is the history of the extension of the franchise to the lower classes of citizens, with the privileges of holding office and receiving emoluments. In early times, either by Solon (q.v.) or previously, the citizens were classified on the basis of property. The rich retained the franchise and the right of holding office; the middle classes obtained the franchise; the fourth or lowest class gained neither. By the reforms of Cleis- thenes (509 B.C.) the clan-family and the phratry were set aside for the deme or parish, a geographical division superseding the social. Finally, about 478 B.C., when all had acquired the franchise, the right to hold office also was obtained by the third class. These changes coincided with a period of economic progress. The rate of interest was high, usually 12%; and in trading and bottomry the returns were much higher. A small capital at this interest soon produced comparative wealth ; and simultaneously prices were falling. Then came the reaction. ” After the Peloponnesian war ” (432-404 B.C.), writes Professor Jebb, ” the wealth of the country ceased to grow, as population had ceased to grow about 50 years sooner. The rich went on accumulating: the poor, having no means of enriching themselves by enterprise, were for the most part occu- pied in watching for some chance of snatching a larger share of the stationary total.” Thus the poorer classes in a time of prosperity had won the power which they were able to turn to their own account afterwards. A period of economic pressure followed, coupled with a decline in the population ; no return to the land was feasible, nor was emigration; the people had become town-folk inadaptable to new uses ; decreasing vitality and energy were marked by a new temper, the ” pauper ” temper, unsettled, idle and grasping, and political power was utilized to obtain relief. The relief was forth- coming, but it was of no avail to stop the general decline. The state, it might almost

be said, in giving scope to the assertion of the spirit of dependence, had ruined the self-regarding energy on which both family and state alike depended. The emoluments were diverse. The number of citizens was not large ; the functions in which citizens could take part were numerous; and when payment was forth- coming the poorer citizens pressed in to exercise their rights (cf. Arist. Pol. 1293 a). All Athenian citizens could attend the public assembly or ecclesia. Probably the attendance at it varied from a few hundred to 5000 persons. In 395 B.C. the payment for attend- ance was fixed at 3 obols, or little more than 4|d. a day — for the system of payment had probably been introduced a few years before (but see Ecclesia and refs.). A juror or dicast would receive the same sum for attendance, and the courts or juries often consisted of 500 persons. If the estimate (Bockh, Public Economy of Athens, Eng. trans, pp. 109, 117) holds good that in the age of Demosthenes (384-323 B.C.) the member of a poor family of four free persons could live (including rent) on about 3-3d. or between 2 and 3 obols a day, the pay of the citizen attending the assembly or the court would at least cover the expenses of subsistence. On the other hand, it would be less than the pay of a day labourer, which was probably about 4. obols or 6d. a day. In any case many citizens — they numbered in all about 20,000 — in return for their participation in political duties would receive considerable pecuniary assistance. Attending a great public festival also, the citizen would receive 2 obols or 3d. a day during the festival days ; and there were besides frequent public sacrifices, with the meal or feast which accompanied them. But besides this there were confiscations of private property, which produced a surplus revenue divisible among the poorer citizens. (Some hold that there were confiscations in other Greek states, but not in Athens.) In these circumstances it is not to be wondered that men like Isocrates should regret that the influence of the Areopagus, the old court of morals and justice in Athens, had dis- appeared, for it " maintained a sort of censorial police over the lives and habits of the citizens; and it professed to enforce a tutelary and paternal discipline, beyond that which the strict letter of the law could mark out, over the indolent, the prodigal, the undutiful, and the deserters of old rite and custom."

(6) In addition to public emoluments and relief there was much private liberality and charity. Many expensive public services were undertaken honorarily by the citizens under a kind of civic compulsion. Thus in a trial about 425 B.C. (Lysias, Or. 19. 57) a

citizen submitted evidence that his father expended more than £2000 during his life in paying the expenses of choruses at festivals, fitting out seven triremes for the navy, and meeting levies of income tax to meet emergencies. Besides this he had helped poor citizens by portioning their daughters and sisters, had ransomed some, and paid the funeral expenses of others (cf. for other instances Plutarch's Cimon, Theophrastus, Eth., and Xen. Econ.).

(7) There were also mutual help societies (?pacoi). Those for relief would appear to have been loan societies (cf. Theoph. Eth.), one of whose members would beat up contributions to help a friend, who would afterwards repay the advance.

The criticisms of Aristotle (384-321 B.C.) suggest the direction to which he looked for reform. He (Pol. 1320 a) passes a very un-favourable judgment on the distribution of public money to the poorer citizens. The demagogues (he does not speak of Athens particularly) distributed the surplus revenues to the poor, who received them all at the same time; and then they were in want again. It was only, he argued, like pouring water through a sieve. It were better to see to it that the greater number were not so entirely

destitute, for the depravity of a democratic government was due to this. The problem was to contrive how plenty (anropia, not poverty, diropia) should become permanent. His proposals are adequate aid and voluntary charity. Public relief should, he urges, be given in large amounts so as to help people to acquire small farms or start in business, and the well-to-do (tviropot) should in the meantime subscribe to pay the poor for their attendance at the public assem- blies. (This proves, indeed, how the payments had become poor relief.) He mentions also how the Carthaginian notables divided the destitute amongst them and gave them the means of setting to work, and the Tarentines (kolvo. iroio&'i-es) shared their property with the poor. (The Rhodians also may be mentioned (Strabo xiv. c. 652), amongst whom the well-to-do undertook the relief of the poor voluntarily.) The later word for charitable distribution was a sharing (kouhovIo., Ep. Rom. xv. 26), which would seem to indicate that after Aristotle's time popular thought had turned in that direction. But the chief service rendered by Aristotle — a service which covered indeed the whole ground of social progress — was to show that unless the purpose of civil and social life was carefully considered and clearly realized by those

who desired to improve its conditions, no change for the better could result from individual or associated action.

Two forms of charity have still to be mentioned: charity to the stranger and to the sick. It will be convenient to consider both in relation to the whole classical period.

With the growth of towns the administration of hospitality was elaborated.

(1) There was hospitality between members of families bound by the rites of host and guest. The guest received as a right only shelter and fire. Usually he dined with the host the first -the day, and if afterwards he was fed provisions were supplied stranger. to him. There were large guest-chambers (ttviiv) or small guest-houses, completely isolated on the right or left of the principal house; and here the guest was lodged. (2) There were also, e.g. at Hierapolis (Sir W. M. Ramsay's Phrygia, ii. 97), brotherhoods 'of hospitality (£ewH Tcnirripeloi, bearers of the sign), which made hospitality a duty, and had a common chest and Apollo as their tutelary god. (3) There were inns or resting-places (Karayiiyia) for strangers at temples (Thuc. iii. 68; Plato, Laws, 953 a) and places of resort (\koxv) at or near the temples for the entertainment of strangers — for instance, at a temple of Asclepius at Epidaurus (Pausanias ii. 174); and Pausanias argues that they were common throughout the country. Probably also at the temples hospitable provision was made for strangers. The evidence at present is not perhaps sufficiently complete, but, so far as it goes, it tends to the conclusion that in pre-Christian times hospitality was provided to passers-by and strangers in the temple buildings, as later it was furnished in the monasteries and churches. (4) There were also in towns houses for strangers (iecwv) provided at the public cost. This was so at Megara; and in Crete strangers had a place at the public meals and a dormitory. Xenophon suggested that it would be profitable for the Athenian state to establish inns for traders (Karaywyia i-q/ibaia} at Athens. Thus, apart from the official hospitality of the proxenus or " consul," who had charge of the affairs of foreigners, and the hospitality which was shown to persons of distinction by states or private individuals, there was in Greece a large provision for strangers, wayfarers and vagrants based on the charitable sentiment of hospitality. Among the Romans similar customs of private and public hospitality prevailed; and throughout the empire the older system was altered, probably very slowly. In Christian times (cf. Ramsay above) Pagan temples were (about a.d. 408) utilized for

other purposes, including that of hos- pitality to strangers.

Round the temples, at first probably village temples, the organization of medical relief grew up. Primitive medicine is connected with dreams, worship, and liturgical The sick. ” pollution,” punishment and penitence, and an experimental practice. Finally, systematic observation and science (with no knowledge of chemistry and little of physiologyˆ assert themselves, and a secular administration is created by the side of the older religious organization. ‘ Sickness among primitive races is conceived to be a material substance to be extracted, or an evil spirit to be driven away by incantation. Religion and medicine are thus at the beginning almost one and the same thing. In Anatolia, in the groups of villages (cf. Ramsay as above, i. 101) under the theocratic govern- ment of a central Upbv or temple, the god Men Karou was the physician and saviour (o-wnjp and aoiˆaiv) of his people. Priests, prophets and physicians were his ministers. He punished wrong- doing by diseases which he taught the penitent to cure. So else- where pollution, physical or moral, was chastened by disease and loss of property or children, and further ills were avoided by sacrifice and expiation and public warning. In the temple and out of this phase of thought grew up schools of medicine, in whose practice dreams and religious ritual retained a place. The newer gods, Asclepius and Apollo, succeeded the older local divinities; and

the ” sons. ” of Asclepius became a profession, and the temple with its adjacent buildings a kind of hospital. There were many temples of Asclepius in Greece and elsewhere, placed generally in high and salubrious positions. After ablution the patient offered sacrifices, repeating himself the words of the hymn that was chanted. Then, when night came on, he slept in the temple. In the early dawn he was to dream ” the heavenly dream ” which would suggest his cure; but if he did not dream; relations and others — officials at the temple — might dream for him. At dawn the priests or sons of Asclepius came into the temple and visited the sick, so that, in a kind of drama, where reality and appearance seemed to meet, the patients believed that they saw the god himself. The next morning the prescription and treatment were settled. At hand in the inn or guest-chambers of the temple the patient could remain, sleeping again in the

temple, if necessary, and carrying out the required regimen. In the temple were votive tablets of cases, popular and awe-inspiring, and records and prescriptions, which later found their way into the medical works of Galen and others. At the temple of Asclepius at Epidaurus was an inn (naTaytiyiov) with four courts and colonnades, and in all 160 rooms. (Cf. Pausanias ii. 171; and Report, Archaeol. in Greece, R. C. Bosanquet, 1899,

1900.)

At three centres more particularly, Rhodes, Cnidos and Cos, were the medical schools of the Asclepiads. If one may judge from an inscription at Athens, priests of Asclepius attended the poor gratuitously. And years afterwards, in the nth century, when there was a revival of medicine, we find (Daremberg, La Mtdecine: histoire et doctrines) at Salerno the Christian priest as doctor, a simple and less palatable pharmacy for the poor than for the rich, and gratuitous medical relief.

Besides the temple schools and hospitals there was a secular organization of medical aid and relief. States appointed trained medical men as physicians, and provided for them medical establishments (larpeta, ” large houses with large doors full of light “) for the reception of the sick, and for operations there were provided beds, instruments, medicines, &c. At these places also pupils were taught. A lower degree of medical establishment was to be found at the barbers’ shops. Out-patients were seen at the iatreia. They were also visited at home. There were doctors’ assistants and slave doctors. The latter, apparently, attended only slaves (Plato, Laws, 720); they do “a great service to the master of the house, who in this manner is relieved of the care of his slaves.” It was a precept of Hippocrates that if a physician came to a town where there were sick poor, he should make it his first duty to attend to them; and the state physician attended gratuitously any one who applied to him. There were also travelling physicians going rounds to heal children and the poor. These methods continued, probably all of them, to Christian times.

It has been argued that medical practice was introduced into Italy by the Greeks. But the evidence seems to show that there was a quite independent Latin tradition and school of medicine (Rene Brian, ” Medecine dans le Latium et a. Rome,” Rev. Archiol., 1885). In Rome there were consulting-rooms and dispensaries, and houses in which the sick were received.

Hospitals are mentioned by Roman writers in the 1st century a.d. There were infirmaries — detached buildings — for sick slaves; and in Rome, as at Athens, there were slaves skilled in medicine. In Rome also for each regio there was a chief physician who attended to the poorer people.

Slavery was so large a factor in pre-Christian and early Christian society that a word should be said on its relation „. v to charity. Indirectly it was a cause of poverty

and social degradation. Thus in the case of Athens, with the achievement of maritime supremacy the number of slaves increased greatly. Manual arts were despised as un- becoming to a citizen, and the slaves carried on the larger part of the agricultural and industrial work of the community; and for a time — until after the Peloponnesian War (404 B.C.) — slavery was an economic success. But by degrees the slave, it would seem, dispossessed the citizen and rendered him unfit for competition. The position of the free artisan thus became akin to that of the slave (Arist. Pol. 1260 a, &c), and slavery became the industrial method of the country. Though Greeks, Romans, Jews and Christians spent money in ransoming individual slaves and also enfranchised many, no general abolition v. 28

of slavery was possible. At last through economic changes the new status of coloni, who paid as rent part of the produce of the land they tilled, superseded the status of slavery (cf. above; the system turned to account by Peisistratus). But this result was only achieved much later, when a new society was being created, when the slaves from the slave prisons (ergastula) of Italy joined its invaders, and the slave-owner or master, as ˆne may suppose, unable any longer to work the gangs, let them become coloni.

In Greece the feeling towards the slave became constantly more humane. Real slavery, Aristotle said, was a cast of mind, not a condition of life. The slave was not to be ordered about, but to be commanded and persuaded like a child. The master was under the strongest obligation to promote his welfare. In Rome, on the other hand, slavery continued to the end a massive, brutal, industrial force — a standing danger to the state. But alike in Greece and Rome the influence of slavery on the family was pernicious. The pompous array of domestic slaves, the transfer of motherly duties to slave nurses, the loss of that homely education which for most people comes only from the practical details of life — all this in later Greece and Italy, and far into

Christian times, prevented that permanent invigoratioa and reform of family life which Jewish and Christian influence* might otherwise have produced.

Part III. — Charity in Roman Times

The words that suggest most clearly the Roman attitude towards what we call charity are liberalitas, beneficentia anil pietas. The two former are almost synonymous (Cicero, De Offic. i. 7, 14). Liberality lays stress on the mood — that of the liber, the freeborn, and so in a sense the independent and superior; beneficence on the deed and its purpose (Seneca, De Bene}, vi. 10). The conditions laid down by Cicero, following Panaetius the Stoic (185-112 B.C.) are three: not to do harm to him whom one would benefit, not to exceed one's means, and to have regard to merit. The character of the person whom we would benefit should bo considered, his feelings towards us, the interest of the community, our social relations in life, and services rendered in the past. The utility of the deed or gift graded according to social relation- ship and estimated largely from the point of view of ultimate advantage to the doer or donor seems to predominate in the general thought of the book, though (cf. Aristotle, Eth. viii. 3) the idea culminates in the completeness of friendship where " all things are in common." Pietas has the religious note which the other words lack, loving dutifulness to gods and home and country. Not " piety " only but " pity " derive from it: thus it comes near to our " charity." Both books, the De Officii* and the De Beneficiis, represent a Roman and Stoical revision of the problem of charity and, as in Stoicism generally, there seems to be a half-conscious attempt to feel the way to a new social standpoint from this side.

As from the point of view of charity the well-being of the community depends upon the vigour of the deep-laid elemental life within it, so in passing to Roman times we consider the family first. The Roman family was unique in its tjˆt!' completeness, and by some of its conditions the world has long been bound. The father alone had independent authority (sui juris), and so long as he lived all who were under his power — his wife, his sons, and their wives and children, and his unmarried daughters — could not acquire any property of their own. Failing father or husband, the unmarried daughters were placed under the guardianship of the nearest male members of the family. Thus the family, in the narrower sense in which we commonly use the word, as meaning descendants of a common

father 01 grandfather, was, as it were, a single point of growth in a larger organism, the gens, which consisted of all those who shared a common ancestry.

The wife, though in law the property of her husband, held a position of honour and influence higher than that of the Greek wife, at least in historic times. She seems to come nearer to the ideal of Xenophon : ” the good wife should be the mistress of every- thing within the house.” ‘ A house of his own and the blessing of children appeared to the Roman citizen as the end and essence

of life ” (Mommsen, Hist. Rome). The obligation of the father to the sons was strongly felt. The family, past, present and future, was conceived as one and indivisible. Each succeeding generation had a right to the care of its predecessor in mind, body and estate. The training of the sons was distinctly a home and not a school training. Brought up by the father and constantly at his side, they learnt spontaneously the habits and traditions of the family. The home was their school. By their father they were introduced into public life, and though still remaining under his power during his lifetime, they became citizens, and their relation to the state was direct. The nation was a nation of yeomen. Only agriculture and warfare were considered honourable employments. The father and sons worked outdoors on the farm, employing little or no slave labour; the wife and daughters indoors at spinning and weaving. The drudgery of the household was done by domestic slaves. The father was the working head of a toiling household. Their chief gods were the same as those of early Greece — Zeus-Diovis and Hestia- Vesta, the goddess of the hearth and home. Out of this solid, compact family Roman society was built, and so long as the family was strong attachment to the service of the state was intense. The res publica, the common weal, the phrase and the thought, meet one at every turn; and never were citizens more patient and tenacious combatants on their country’s behalf. The men were soldiers in an unpaid militia and were constantly engaged in wars with the rivals of Rome, leaving home and family for their cam- paigns and returning to them in the winter. With a hardness and closeness inconsistent with — indeed, opposed to — the charitable spirit, they combined the strength of

character and sense of justice without which charity becomes sentimental and unsocial. In the development of the family, and thus, indirectly, in the development of charity, they stand for settled obligation and unrelenting duty.

Under the protection of the head of the family ” in dependent freedom ” lived the clients. They were in a middle position between the freemen and the slaves. The relation between patron and client lasted for several generations; and there were many clients. Their number increased as state after state was conquered, and they formed the plebs, in Rome the plebs urbana, the lower orders of the city.

In relation to our subject the important factors are the family, the plebs and slavery.

Two processes were at work from an early date, before the first agrarian law (486 B.C.): the impoverishment of the plebs and the increase of slavery. The former led to the annona civica, or the free supply of corn to the citizens, and to the sp’ortula or the organized food-supply for poor clients, and ultimately to the alimentarii pueri, the maintenance of children of citizens by voluntary and imperial bounty. The latter (slavery) was the standing witness that, as self-support was undermined, the task of relief became hopeless, and the impoverished citizen, as the generations passed, became in turn dependant, beggar, pauper and slave.

The great patrician families — ” an oligarchy of warriors and slaveholders ” — did not themselves engage in trade, but, entering on large speculations, employed as their agents their clients, liberlini or freedmen, and, later, their slaves. The constant wars, for which the soldiers of a local militia were eventually retained in permanent service, broke up the yeomanry and very greatly reduced their number. Whole families of citizens be- came impoverished, and their lands were in consequence sold to the large patrician families, members of which had acquired lucrative posts, or prospered in their speculations, and assumed possession of the larger part of the land, the ager publicus, acquired by the state through conquest. The city had always been the centre of the patrician families, the patron of the trading liberlini and other dependants. To it now flocked as well the metoeci, the resident aliens from the conquered states, and the poorer citizens, landless and unable for social reasons to turn to trade. There was thus in Rome a growing multitude of aliens,

dispossessed yeomen and dependent clients. Simultaneously slavery increased very largely after the second Punic War (202 B.C.). Every conquest brought slaves into the market, for whom ready purchasers were found. The slaves took the place of the freemen upon the old family estates, and the free country people became extinct. Husbandry gave place to shepherding. The estates were thrown into large domains (latifundia) , managed by bailiffs and worked by slaves, often fettered or bound by chains, lodged in cells in houses of labour (ergastula), and some- times cared for when ill in infirmaries {valetudinaria). In Crete

and Sparta the slaves toiled that the mass of citizens might have means and leisure. In Rome the slave class was organized for private and not for common ends. In Athens the citizens were paid for their services; at Rome no offices were paid. Thus the citizen at Rome was, one might almost say, forced into a dependence on the public corn, for as the large properties swallowed up the smaller, and the slave dispossessed the citizen, a population grew up unfit for rural toil, disinclined to live by methods that pride considered sordid, unstable and pleasure-loving, and yet a serious political factor, as dependent on the rich for their enjoyments as they were on their patrons or the prefect of the corn in the city for their food.

It is estimated, from extremely difficult and uncertain data, that the population of Rome in the time of Augustus was about 1,200,000 or 1,500,000. At that time the plebs urbana numbered 320,000. If this be multiplied by three, to give a low average of dependants, wives and children, this section of the population would number 960,000. The remainder of the 1,500,000, 540,000, would consist of (a) slaves, and (b) those, the comparatively few, who would be members of the great clan-families (gentes). Proportionately to Attica this seems to allow too small a- population of slaves. But however this be, we may picture the population of Rome as consist- ing chiefly of a few patrician families ministered to by a very large number of slaves, and a populace of needy citizens, in whose ranks it was profitable for an outsider to find a place in order that he might participate in the advantages of state maintenance.

In Rome the clan-family became the dominant political factor. As in England and elsewhere in the middle ages, and even in later times, the family, in these circumstances, assumes an influence which is out of harmony with the common The good. The social advantage of the family lies in its C Mca. self-maintenance, its

home charities, and its moral and educational force, but if its separate interests are made supreme, it becomes uncharitable and unsocial. In Rome this was the line of development. The stronger clan-families crushed the weaker, and became the ” oligarchy of warriors and slave-, holders.” In the same spirit they possessed themselves of the ager publicus. The land obtained by the Romans by right of conquest was public. It belonged to the state, and to a yeo- man state it was the most valuable acquisition. At first part of it was sold and part was distributed to citizens without property and destitute (cf . Plutarch, Tib. Gracchus) . At a very early date, however, the patrician families acquired possession of much of it and held it at a low rental, and thus the natural outlet for a conquering farmer race was monopolized by one class, the richer clan-families. This injustice was in part remedied by the establishment of colonies, in which the emigrant citizens received sufficient portions of land. But these colonies were comparatively few, and after each conquest the rich families made large pur- chases, while the smaller proprietors, whose services as soldiers were constantly required, were unable to attend to their lands or to retain possession of them. To prevent this (367 B.C.) the Licinian law was passed, by which ownership in land was limited to 500 jugera, about 312 acres. This law was ignored, however, and more than two centuries later the evil, the double evil of the dispossession of the citizen farmer and of slavery, reached a crisis. The slave war broke out (134 B.C.) and (133 B.C.) Tiberius Gracchus made his attempt to re-endow the Roman citizens with the lands which they had acquired by conquest. He undertook what was essentially a charitable or philanthropic movement, which was set on foot too late. He had passed through Tuscany, and seen with resentment and pity the deserted country where the foreign slaves and barbarians were now the only shepherds and cultivators. He had been brought up under the influence of Greek Stoical thought, with which, almost in spite of itself, there was always associated an element of pity. The problem which he desired to solve, though larger in scale, was essentially the same as that with which Solon and Peisis- tratus had dealt successfully. At bottom the issue lay between private property, considered as the basis of family life for the great bulk of the community, with personal independence, and pauperism, with the annona or slavery. In 133 B.C. Tiberius Gracchus became tribune. To expand society on the lines of private property, he proposed the enforcement of ” the Licinian

Rogations "; the rich were to give up all beyond their rightful 312 acres, and the remainder was to be distributed amongst the poor. The measure was carried by the use of arbitrary powers, and followed by the death of Tiberius at the hands of the patricians, the dominant clan-families. In 132 B.C. Caius Gracchus took up his brother's quarrel, and adopting, it would seem, a large scheme of political and social reform, proposed measures for emigration and for relief. The former failed; the latter apparently were acceptable to all parties, and continued in force long after C. Gracchus had been slain (121 B.C.). Already, at times, there had been sales of corn at cheap prices. Now, by the lex jrumentaria he gave the citizens — those who had the Roman franchise — the right to purchase corn every month from the public stores at rather more than half-price, 65 asses or about 3.3d. the peck. This, the fatal alternative, was accepted, and henceforth there was no possibility of a reversion to better social conditions.

The provisioning of Rome was, like that of Athens, a public service. There were public granaries (267 B.C.), and there was a quaestor to supervise the transit of the corn from Sicily and, later, from Spain and Africa, and an elaborate administration for collecting and conveying it. The lex Jrumentaria of Caius was followed by the lex Octavira, restricting the monthly sale to citizens settled in Rome, and to 5 modii (ij bushels). According to Polybius, the amount required for the maintenance of a slave was 5 modii a month, and of a soldier 4. Hence the allowance, if continued at this rate, was practically a maintenance. The lex Clodia (58 B.C.) made the corn gratuitous to the plebs urbana.

Julius Caesar (5 B.C.) found the number of recipients to be 320,000, and reduced them to 150,000. In Augustus's time they rose to 200,000. There seems, however, to be some confusion as to the numbers. From the Ancyranum Monumentum it appears that the plebs urbana who received Augustus's dole of 60 denarii (37s. 6d.) in his eighth consulship numbered 320,000. And (Suet. Caes. 41) it seems likely that in Caesar's time the lists of the recipients were settled by lot; further, probably only those whose property was worth less than 400,000 sesterces (£3541) were placed on the lists. It is probable, therefore, that 320,000 represents a maximum, reduced for purposes of administration to

a smaller number (a) by a property test, and {b) by some kind of scrutiny. The names of those certified to receive the corn were exposed on bronze tablets. They were then called aerarii. They had tickets {tesserae) for pur- poses of identification, and they received the corn or bread in the time of the republic at the temple of Ceres, and afterwards at steps in the several (14) regions or wards of Rome. Hence the bread was called panis gradilis. In the middle of the 2nd century there were state bakeries, and wheaten loaves were baked for the people perhaps two or three times a week. In Aurelian's time (a.d. 270) the flour was of the best, and the weight of the loaf (one undo) was doubled. To the gifts of bread were added pork, oil and possibly wine; clothes also — white tunics with long sleeves — were distributed. In the period after Constantine (cf. Theod. Code, xiv. ig) three classes received the bread — the palace people {palatini), soldiers {militares), and the populace {populares). No distribution was per- mitted except at the steps. Each class had its own steps in the several wards. The bread at one step could not be transferred to another step. Each class had its own supply. There were arrange- ments for the exchange of stale loaves. Against misappropriation there were (law of Valentinian and Valens) severe penalties. If a public prosecutor {actor), a collector of the revenue {procurator), or the slave of a senator obtained bread with the cognizance of the clerk, or by bribery, the slave, if his master was not a party to the offence, had to serve in the state bakehouse in chains. If the master were involved, his house was confiscated. If others who had not the right obtained the bread, they and their property were placed at the service of the bakery {pistrini exercitio subjugari). If they were poor {pauperes) they were enslaved, and the delinquent client was to be put to death.

The right to relief was dependent on the right of citizenship. Hence it became hereditary and passed from father to son. It was thus in the nature of a continuous endowed charity, like the well-known family charity of Smith, for instance, in which a large property was left to the testator's descendants, of whom it was said that as a result no Smith of that family could fail to be poor. But the annona civica was an endowed charity, affecting not a single family, but the whole population. Later, when Constantinople was founded, the right to relief was attached to new houses as a premium on building operations. Thus it

belonged not to persons only, but also to houses, and became a species of " immovable " property, passing to the purchaser of

the house or property, as would the adscript slaves. The bread followed the house {aedes sequantur annonae). If, on the transfer of a house, bread claims were lost owing to the absence of claimants, they were transferred to the treasury (fisci viribus vindicentur) . But the savage law of Valentinian, referred to above, shows to what lengths such a system was pushed. Early in its history the annona civica attracted many to Rome in the hope of living there without working. For the 400 years since the lex Clodia was enacted constant injury had been done by it, and now (a.d. 364) people had to be kept off the civic bounty as if they were birds of prey, and the very poor man (pauperrimus), who had no civic title to the food, if he obtained it by fraud, was enslaved. Thus, in spite of the abundant state relief, there had grown up a class of the very poor, the Gentiles of the state, who were outside the sphere of its ministrations. The annona civica was introduced not only into Constantinople, but also into Alexandria, with baleful results, and into Antioch. When Constantinople was founded the corn-ships of Africa sailed there instead of to Rome. On charitable relief, as we shall see, the annona has had a long-continued and fatal influence.

1. If the government considers itself responsible for provisioning the people it must fix the price of necessaries, and to meet distress or popular clamour it will lower the price. It becomes thus a large relief society for the supply of corn. In a time of distress, when the corn laws were a matter of moment in England, a similar system was adopted in the well-known Speenhamland scale (1795), by which a larger or lesser allowance was given to a family according to its size and the prevailing price of corn. A maintenance was thus provided for the able-bodied and their families, at least in part, without any equivalent in labour; though in England labour was demanded of the applicant, and work was done more or less perfunctorily. In amount the Roman dole seems to have been equivalent to the allowance provided for a slave, but the citizen received it without having to do any labour task. He received it as a statutory right. There could hardly be a more effective method for degrading his manhood and denaturalizing his family. He was also a voter, and the alms appealed to his weakness and indolence; and the fear of displeasing him and losing his vote kept him, socially, master of the situation, to his own ruin. If in England now relief were given to able-bodied persons who retained their votes, this evil would also attach to it.

2. The system obliged the hard-working to maintain the idlers,

while it continually increased their number. The needy teacher in Juvenal, instead of a fee, is put off with a tessera, to which, not being a citizen, he has no right. ” The foreign reapers,” it was said, ” filled Rome’s belly and left Rome free for the stage and the circus.” The freeman had become a slave — ” stupid and drowsy, to whom days of ease had become habitual, the games, the circus, the theatre, dice, eating-houses and brothels.” Here are all the marks of a degraded pauperism.

3. The system led the way to an ever more extensive slavery. The man who could not live on his dole and other scrapings had the alternative of becoming a slave. ” Better have a good master than live so distressfully “; and ” If I were free I should live at my own risk; now I live at yours,” are the expressions suggestive of the natural temptations of slavery in these conditions. The escaped slaves returned to ” their manger.” The annona did not prevent destitution. It was a half-way house to slavery.

4. The effect on agriculture, and proportionally on commerce generally, was ruinous. The largest corn-market, Rome, was with- drawn from the trade — the market to which all the necessaries of life would naturally have gravitated; and the supply of corn was placed in the hands of producers at a few centres where it could be grown most cheaply — Sicily, Spain and Africa. The Italian farmer had to turn his attention to other produce — the cultivation of the olive and the vine, and cattle and pig rearing. The greater the ex- tension of the system the more impossible was the regeneration of Rome. The Roman citizen might well say that he was out of work, for, so far as the land was concerned, the means of obtaining a living were placed out of his reach. While not yet unfitted for the country by life in the town, he at least could not ” return to the land.”

5. The method was the outcome of distress and political hopeless- ness. Yet the rich also adopted it in distributing their private largess. Cicero {De Off. ii. 16) writes as though he recognized its evil; but though he expresses his disapprobation of the popular shows upon which the aediles spent large sums, he argues that some- thing must be done _” if the people demand it, and if good men, though they do not wish it, assent to it.” Thus in a guarded manner he approves a distribution of food— a free breakfast in the streets of Rome. One bad result of the annona was that it encouraged a special and ruinous form of charitable munificence.

.

CHARITY AND CHARITIES

The sportuld was a form of charity corresponding to the annona civica. Charity and poor relief run on parallel lines, and when the one is administered without discrimination, little sportula. discrimination will usually be exercised in the other. It was the charity of the patron of the chiefs of the clan-iamilies to their clients. Between them it was natural that a relation, partly hospitable, partly charitable, should grow up. The clients who attended the patron at his house were invited to dine at his table. The patron, as Juvenal describes him, dined luxuriously and in solitary grandeur, while the guests put up with what they could get; or, as was usual under the empire, instead of the dinner (coena recta) a present of food was given at the outer vestibule of the house to clients who brought with them baskets (sportula) to carry off their food, or even charcoal stoves to keep it warm. There was endless trickery. The patron (or almoner who acted for him) tried to identify the applicant, fearing lest he might get the dole under a false name; and at each mansion was kept a list of persons, male and female, entitled to receive the allowance. " The pilferer grabs the dole " (sportulam furunculus capiat) was a proverb. The sportula was a charity sufficiently important for state regulation. Nero (a.d. 54) reduced it to a payment in money (100 quadrantes, about is.). Domitian (a.d. 81) restored the custom of giving food. Subse- quently both practices — gifts in money and in food — appear to have been continued.

In these conditions the Roman family steadily decayed. Its "old discipline" was neglected; and Tacitus (a.d. 75), in his dialogue on Oratory, wrote (c. xxviii.) what might be called its epitaph. Of the general decline the laws of Caesar and Augustus to encourage marriage and to reward the parents of large families are sufficient evidence.

The destruction of the working-class family must have been finally achieved by the imperial control of the collegia.

In old Rome there were corporations of craftsmen for common worship, and for the maintenance of the traditions of the craft. The These corporations were ruined by slave labour, and

collegia. becoming secret societies, in the time of Augustus were suppressed. Subsequently they were reorganized, and gave scope

for much friendliness. They often existed in connexion with some great house, whose chief was their patron and whose household gods they worshipped. The gilds of the poor, or rather of the lower orders {collegia tenuiorum), consisted of artisans and others, and slaves also, who paid monthly contributions to a common fund to meet the expenses of worship, common meals, and funerals. They were not in Italy, it would seem (J. P. Waltzing, £tudes histor. sur les corporations professionnelles chez les Romains, i. 145, 300), though they may have been in Asia Minor and elsewhere, societies for mutual help generally. They were chiefly funeral benefit societies. Under Severus (a.d. 192) the collegia were extended and more closely organized as industrial bodies. They were protected and controlled, as in England in the 15th century the municipalities affected the cause of the craft gilds and ended by controlling them. Industrial disorder was thus prevented; the government were able to provide the supplies required in Rome and the large cities with less risk and uncertainty; and the workmen employed in trade, especially the carrying trade, became almost slaves. In the 2nd century, and until the invasions, there were three groups of collegia: (1) those engaged in various state manufactures; (2) those engaged in the provision trade; and (3) the free trades, which gradually lapsed into a kind of slavery. If the members of these gilds fled they were brought back by force. Parents had to keep to the trade to which they belonged; their children had to succeed them in it. A slave caste indeed had been formed of the once free workmen.

As a charitable protest against the destruction of children,

in the midst of a broken family life, and increasing dependence

and poverty, a special institution was founded (to use

meatartt. *-ˆ e Scottish word) for the ” alimentation ” of the

children of citizens, at first by voluntary charity and

afterwards by imperial bounty.

Nerva and Trajan adopted the plan. Pliny (Ep. vii. 18) refers to it. There was a desire to give more lasting and certain help than an allotment of food to parents. A list of children, whose names were on the relief tables at Rome, was accordingly drawn up, and a special service for their maintenance established. Two

instances are recorded in inscriptions — one at Veleia, one at Bene- ventum. The emperor lent money for the purpose at a low per- centage — 2 J or 5 % as against the usual 10 or 12. At Veleia his loan amounted to 1,044,000 sesterces — about £8156, and 51 of the local landed proprietors mortgaged land, valued at 13 or 14 million

sesterces, as security for the debt. The interest on the emperor's money at 5 % was paid into the municipal treasury, and out of it the children were relieved. The figures seem small; at Veleia 300 children were assisted, of whom 36 were girls. The annual interest at 5 % amounted to nearly £408, which divided among 300 gives about 27s. a head. The figures suggest that the money served as a charitable supplementation of the citizens' relief in direct aid of the children. Apparently the scheme was widely adopted. Curators of high position were the patrons; procurators acted as inspectors over large areas; and quaestores alimentarii undertook the local management. Antoninus Pius (a.d. 138), and Marcus Aurelius (a.d. 160), and subsequently Severus (a.d. 192) established these bursaries for children in the names of their wives. In the 3rd century the system fell into disorder. There were large arrears of payments, and in the military anarchy that ensued it came to an end. It is of special interest, as indicating a new feeling of responsibility towards children akin to the humane Stoicism of the Antonines, and an attempt to found, apart from temples or collegia, what was in the nature of a public endowed charity.

Part IV. — Jewish and Christian Charity With Christianity two elements came into fusion, the Jewish and the Greco-Roman. To trace this fusion and its results it is necessary to describe the Jewish system of charity, and to com- pare it with that of the early Christian church, to note the theory of love or friendship in Aristotle as representing Greek thought, and of charity in St Paul as representing Christian thought, and to mark the Roman influences which moulded the administration of Ambrose and Gregory and Western Christianity generally.

In the early history of the Hebrews we find the family, clan- family and tribe. With the Exodus (probably about 1390 B.C.) comes the law of Moses (cf . Kittel, Hist, of the Hebrews, Eng. trans, i. 244), the central and permanent element charity. of Jewish thought. We may compare it to the " commandments " of Hesiod. There is the recognition of the family and its obligations: " Honour thy father and mother "; and honour included help and

support. There is also the law essential to family unity: ” Thou shalt not commit adultery “; and as to property there is imposed the regulation of desire: ” Thou shalt not covet thy neighbour’s house.” Maimonides (A.D.1135), true to the old conception of the family (x. 16), calls the support of adult children, ” after one is exempt from support- ing them,” and the support of a father or mother by a child, ” great acts of charity; since kindred are entitled to the first consideration. ” To relief of the stranger the Decalogue makes no reference, but in the Hebraic laws it is constantly pressed; and the Levitical law (xix. 18) goes further. It first applies a new standard to social life: ” Thou shalt love thy neighbour as thy- self.” This thought is the outcome of a deep ethical fervour — the element which the Jews brought into the work of charity. In Judges and Joshua, the ” Homeric ” books of the Old Testa- ment, the Hebrews appear as a passionately fierce and cruel people. Subsequently against their oppression of the poor the prophets protested with a vehemence as great as the evil was intense; and their denunciations remained part of the national literature, a standing argument that life without charity is nothing worth. Thus schooled and afterwards tutored into discipline by the tribulation of the exile (587 B.C.), they turned their fierceness into a zeal, which, as their literature shows, was as fervent in ethics as it was in religion and ceremonial. In the services at the synagogues, which supplemented and afterwards took the place of the Temple, the Commandments were constantly repeated and the Law and the Prophets read; and as the Jews of the Dispersion increased in number, and especially after the destruction of Jerusalem, the synagogues became centres of social and charitable co-operation. Thus rightly would a Jewish rabbi say, ” On three things the world is stayed: on the Thorah (or the law), and on worship, and on the bestowal of kindness.” Also there was on the charitable side an indefinite power of expansion. Rigid in its ceremonial, there it was free. Within the nation, as the Prophets, and after the exile, as the Psalms show, there was the hope of a universal religion, and with it of a universally recognized charity. St Paul accentuated the pro- hibitive side of the law and protested against it; but, even while he ‘was so doing, stimulated by the Jewish discipline, he was moving unfettered towards new conceptions of charity and life —

charity as the central word of the Christian life, and life as a participation in a higher existence — the ” body of Christ.”

To mark the line of development, we could compare — 1. The family among the Jews and in the early Christian church; 2. The sources of relief and the tithe, the treatment of the poor and their aid, and the assistance of special classes of poor; 3. The care of strangers; and, lastly, we would consider the theory of almsgiving, friendship or love, and charity.

1. As elsewhere, property is the basis of the family. Wife and children are the property of the father. But the wife is held in high respect. In the post-exilian period the virtuous wife is represented as laborious as a Roman matron, a ” lady bounti- ful” to the poor, and to her husband wife and friend alike. Monogamy without concubinage is now the rule — is taken for granted as right. There is no ” exposure of children.” The slaves are kindly treated, as servants rather than slaves — though in Roman times and afterwards the Jews were great slave- traders. The household is not allowed to eat the bread of idleness. ” Six days,” it was said, ” must [not mayest] thou work.” ” Labour, if poor; but find work, if rich.” ” Whoever does not teach his son business or work, teaches him robbery.” In Job xxxi., a chapter which has been called ” an inventory of late Old Testament morality,” we find the family life developed side by side with the life of charity. In turn are mentioned the relief of the widow, the fatherless and the stranger — the classifi- cation of dependents in the Christian church ; and the whole chapter is a justification of the homely charities of a good family. ” The Jewish religion, more especially in the old and orthodox form, is essentially a family religion ” (C. G. Montefiore, Religion of Ancient Hebrews).

In the early documents of the Church the fifth commandment is made the basis of family life (cf. Eph. vi. 1; A post. Const. ii. 32, iv. n — if we take the first six books of the Apost. Const. as a composite production before a.d. 300, representing Judaeo-Christian or Eastern church thought). But two points are prominent. Duties are insisted on as reciprocal (cf. especially St Paul’s Epistles), as, e.g. between husband and wife, parent and child, master and servant. Charity is mutual; the family is a circle of reciprocal duties and charities. This implies a principle of the greatest importance in relation to the social utility of charity. Further reference will be made to it later. Next the ” thou shalt love thy neighbour ’” is translated from its position as one among many sayings to the chief place as a rule of life. In the Didache or

Teaching of the Twelve Apostles (Jewish-Christian, c. 90-120 a.d.) the first commandment in ” the way of life ” is adapted from St Matthew’s Gospel thus: ” First, thou shalt love God who made thee; secondly, thy neighbour as thyself; and all things whatsoever thou wouldst not have done to thee, neither do thou to another.” A principle is thus applied which touches all social relations in which the ” self ” can be made the standard of judgment. Of this also later. To touch on other points of comparison: the earlier documents seem to ring with a reiterated cry for a purer family life (cf. the second, the negative, group of commandments in the Didache, and the judgment of the apocalyptic writings, such as the Revelations of Peter, &c); and, sharing the Jewish feeling, the riper conscience of the Christian community formulates and accepts the injunction to preserve infant life at every stage. It advocates, indeed, the Jewish purity of family life with a missionary fervour, and it makes of it a condition of church membership. The Jewish rule of labour is enforced (A p. Const. ii. 63). If a stranger settle (Didache, xii. 3) among the brother- hood, ” let him work and eat.” And the father (Constit. iv. n) is to teach the children ” such trades as are agreeable and suitable to their need.” And the charities to the widow, the fatherless, are organized on Jewish lines.

2. The sources of relief among the Jews were the three gifts of corn: (1) the corners of the field (cf. Lev. xix. &c), amounting to a sixtieth part of it; (2) the gleanings, a definite minimum dropped in the process of reaping (Maimonides, Laws of the Hebrews relating to the Poor, iv. 1); (3) corn overlooked and left behind. So it was with the grapes and with all crops that

were harvested, as opposed, e.g. to figs, that were gathered from time to time. These gifts were divisible three times in the day, so as to suit the convenience of the poor (Maim. ii. 17), and the poor had a right to them. They are indeed a poor-rate paid in kind such as in early times would naturally spring up among an agricultural people. Another gift ” out of the seed of the earth,” is the tithe. In the post-exilian period the septenniad was in force. Each year a fiftieth part of the produce (Maim. vi. 2, and Deut. xviii. 4) was given to the priest (the class which in the Jewish state was supported by the community). Of the remainder one-tenth went to the Levite, and one-tenth in three years of the septennium was retained for pilgrimage to Jerusalem, in two given to the poor. In the seventh year ” all things were in common.” Supplementing these gifts were alms to all who asked; ” and he who gave less than a tenth of his means was a man of

evil eye ” (Maim. vii. 5). All were to give alms, even the poor themselves who were in receipt of relief. Refusal might be punished with stripes at the hand of the Sanhedrim. At the Temple alms for distribution to the worthy poor were placed by worshippers in the cell of silence; and it is said that in Palestine at meal times the table was open to all comers. As the synagogues extended, and possibly after the fall of Jerusalem (a.d. 70) , the collections of alms was further systematized. There were two collections. In each city alms of the box or chest (kupha) were collected for the poor of the city on each Sabbath eve (later, monthly or thrice a year), and distributed in money or food for seven days. Two collected, three distributed. Three others gathered and distributed daily alms of the basket (tamchui). These were for strangers and wayfarers — casual relief ” for the poor of the whole world.” In the Jewish synagogue community from early times the president (parnass) and treasurer were elected annually with seven heads of the congregation (see Abraham’s Jewish Life in the Middle Ages, p. 54), and sometimes special officers for the care of the poor. A staff of almoners was thus forthcoming. In addition to these collec- tions were the pruta given to the poor before prayers (Maim. x. 15), and moneys gathered to help particular cases (cf. Jewish Life, p. 3 2 2) by circular letter. There were also gifts at marriages and funerals; and fines imposed for breach of the communal ordinances were reserved for the poor. The distinctive feature of the Jewish charity was the belief that ” the poor would not cease out of the land,” and that therefore on charitable grounds a permanent provision should be made for them — a poor-rate, in fact, subject to stripes and distraint, if necessary (Maim. vii. 10; and generally cf. articles on ” Alms ” and ” Charity ” in the Jewish Encyclopaedia).

If we compare this with the early church we find the following sources of relief: (1) The Eucharistic offerings, some consumed at the time, some carried home, some reserved for the absent (see Hatch, Early Church, p. 40). The ministration, like the Eucharist, was connected with the love feast, and was at first daily (Acts ii. 42, vi. 1, and the Didache). (2) Freewill offerings and first-fruits and voluntary tithes {Ap. Con. ii. 25) brought to the bishop and used for the poor — orphans, widows, the afflicted and strangers in distress, and for the clergy, deaconesses, &c. (3) Collections in churches on Sundays and week-days, alms-boxes and gifts to the poor by worshippers as they entered church; also collections for special purposes (cf. for Christians at Jerusalem). Apart from ”

the corners," &c, the sources of relief in the Christian and Jewish churches are the same. The separate Jewish tithe for the poor, which (Maim. vi. 11, 13) might be used in part by the donor as personal charity, disappears. A voluntary tithe remains, in part used for the poor. We do not hear of stripes and distraint, but in both bodies there is a penitential system and excommunication (cf. Jewish Life, p. 52), and in both a settlement of disputes within the body (Clem. Horn. iii. 67). In both, too, there is the abundant alms provided in the belief of the permanence of poverty and the duty of giving to all who ask. As to administration in the early church (Acts vi. 3), we find seven deacons, the number of the local Jewish council; and later there were in Rome seven ecclesiastical relief districts, each in charge of a deacon. The deacon acted as the minister of the bishop (Ep. Clem, to Jam. xii.), reporting to him and giving as he dictated (Ap. Con. ii. 30, 31). He at first combined disciplinary powers with charitable. The presbyters also (Polycarp, Ad Phil. 6, a.d. 69-155), forming (Hatch, p. 69) a kind of bishop's council, visited the sick, &c. The bishop was president and treasurer. The bishop was thus the trustee of the poor. By reason of the churches' care of orphans, responsibilities of trusteeship also

devolved on him. The temples were in pagan times depositories of money. Probably the churches were also.

3. Great stress is laid by the Jews on the duty of gentleness to the poor (Maim. x. 5). The woman was to have first attention (Maim. vi. 13). If the applicant was hungry he was to be fed, and then examined to learn whether he was a deceiver (Maim, vii. 6). Assistance was to be given according to the want — ■ clothes, household things, a wife or a husband — and according to the poor man's station in life. For widows and orphans the " gleanings " were left. Both are the recognized objects of charity (Maim. x. 16, 17). " The poor and the orphan were to be employed in domestic affairs in preference to servants." The dower was a constant form of help. The ransoming of slaves took precedence of relief to the poor. The highest degree of alms-deed (Maim. x. 7) was " to yield support to him who is cast down, either by means of gifts, or by loan, or by commerce, or by procuring for him traffic with others. Thus his hand becometh strengthened, exempt from the necessity of soliciting succour

from any created being."

If we compare the Christian methods we find but slight difference. The absoluteness of " Give to him that asketh " is in the Didache checked by the " Woe to him that receives: for if any receives having need, he shall be guiltless, but he that has no need shall give account, . . . and coming into distress ... he shall not come out thence till he hath paid the last farthing." It is the duty of the bishop to know who is most worthy of assistance (Ap. Con. ii. 3, 4); and " if any one is in want by gluttony, drunkenness, or idleness, he does not deserve assistance, or to be esteemed a member of the church." The widow assumes the position not only of a recipient of alms, but a church worker. Some were a private charge, some were maintained by the church. The recognized " widow " was maintained: she was to be sixty years of age (cf. 1 Tim. v. 9 and A p. Con. iii. 1), and was sometimes tempted to become a bedes- woman and gossipy pauper, if one may judge from the texts. Remarriage was not approved. Orphans were provided for by members of the churches. The virgins formed another class, as, contrary to the earlier feeling, marriage came to be held a state of lesser sanctity. They too seem to have been also, in part at least, church workers. Thus round the churches grew up new groups of recognized dependents; but the older theory of charity was broad and practical — akin to that of Maimonides. " Love all your brethren, performing to orphans the part of parents, to widows that of husbands, affording them sustenance with all kindliness, arranging marriages for those who are in their prime, and for those who are without a profession the means of necessary support through employment: giving work to the artificer and alms to the incapable " (Ep. Clem, to James viii.).

4. The Jews in pre-Christian and Talmudic times supported the stranger or wayfarer by the distribution of food (tamchui) ; the strangers were lodged in private houses, and there were inns provided at which no money was taken (cf. Jewish Life, p. 314). Subsequently, besides these methods, special societies were formed " for the entertainment of the resident poor and of strangers." There were commendatory letters also. These conditions prevailed in the Christian church also. The Xenodocheion, coming by direct succession alike from Jewish and Greek precedents, was the first form of Christian hospital both for strangers and for members of the Christian churches. In the Christian community the endowment charity comes into existence in the 4th century, among the Jews not till the 13th.

The charities of the synagogue without separate societies sufficed.

We may now compare the conceptions of Jews and Christians on charity with those of the Greeks. There are two chief ex- areek ponents of the diverse views — Aristotle and St Paul; Jewish for to simplify the issues we refer to them only. and Thoughts such as Aristotle's, recast by the Stoic

Christian p anae tius (185-112 B.C.), and used by Cicero in his De thong . officiis, became in the hands of St Ambrose arguments for the direction of the clergy in the founding of the medieval church; and in the 13th century Aristotle reasserts his influence through such leaders of medieval thought as St Thomas Aquinas.

St Paul's chapters on charity, not fully appreciated and understood, one is inclined to think, have perhaps more than any other words prevented an absolute lapse into the materialism of almsgiving. After him we think of St Francis, the greatest of a group of men who, seeking reality in life, revived charity; but to the theory of charity it might almost be said that since Aristotle and St Paul nothing has been added until we come to the economic and moral issues which Dr Chalmers explained and illustrated.

The problem turns on the conception (1) of purpose, (2) of the self, and (3) of charity, love or friendship as an active force in social life. To the Greek, or at least to Greek philosophic thought, purpose was the measure of goodness. To have no purpose was, so far as the particular act was concerned, to be simply irrational: and the less definite the purpose the more irrational the act. This conception of purpose was the touch- stone of family and social life, and of the civic life also. In no sphere could goodness be irrational. To say that it was without purpose was to say that it was without reality. So far as the actor was concerned, the main purpose of right action was the good of the soul (i/'ux 1 ?) 5 and by the soul was. meant the better self, " the ruling part " acting in harmony with every faculty and function of the man. With faculties constantly trained and developed, a higher life was gradually developed in the soul. We are thus, it might be said, what we become. The gates of the higher life are within us. The issue is whether we will open them and pass in.

Consistent with this is the social purpose. Love or friendship is not conceived by Aristotle except in relation to social life. Society is based on an interchange of services. This interchange in one

series of acts we call justice; in another friendship or love. A man cannot be just unless he has acquired a certain character or habit of mind;1 and hence no just man will act without knowledge, previous deliberation and definite purpose. So also will a friend fulfil these conditions in his acts of love or friendship. In the love existing between good men there is continuance and equality of service; but in the case of bene- factor and benefited, in deeds of charity, in fact, there is no such equality. The satisfaction is on one side but often not on the other. (The dilemma is one that is pressed, though not satisfac- torily, in Cicero and Seneca.) The reason for this will be found, Aristotle suggests, in the feeling of satisfaction which men experience in action. We realize ourselves in our deeds — throw ourselves into them, as people say; and this is happiness. What we make we like: it is part of us. On the other hand, in the person benefited there may be no corresponding action, and in so far as there is not, there is no exchange of service or the contentment that arises from it. The " self " of the recipient is not drawn out. On the contrary, he may be made worse, and feel the uneasiness and discontent that result from this. In truth, to complete Aristotle's argument, the good deed on one side, as it represents the best self of the benefactor, should on the other side draw out the best self of the person benefited. And where there is not ultimately this result, there is not effective friendship or charity, and consequently there is no personal or social satisfaction. The point may be pushed somewhat further. In recent developments of charitable work the term " friendly visitor " is applied to persons who endeavour to help families in distress on the lines of associated charity. It represents the work of charity in one definite light. So far as the relation is mutual, it cannot at the outset be said to exist. The charitable friend wishes to befriend another; -but at first there may be no reciprocal feeling of friendship on the other's part — indeed, such a feeling may never be created. The effort to reciprocate kindness by becoming what the friend desires may be too painful to make. Or the two may be on different planes, one not really befriending, but giving without intelligence, the other not really endeavouring to change his nature, but receiving help solely with a view to immediate advantage. The would-be befriender may begin " despairing of no man," expecting nothing in return; but if, in fact, there is never any kind of return, the friendship actually fails of its purpose, and the " friend's " satisfaction is lost, except in that he may " have loved much." In any case,

according to this theory friendship, love and charity represent the mood from which spring social acts, the value of which will depend on the knowledge, deliberation and purpose with which they are done, and accordingly as they acquire value on this account will they give lasting satisfaction to both parties.

St Paul's position is different. He seems at first sight to ignore the state and social life. He lays stress on motive force rather than on purpose. He speaks as an outsider to the state, though technically a citizen. His mind assumes towards it the external Judaic position, as though he belonged to a society of settlers (irdpoocot) . Also, as he expects the millennium, social life and its needs are not uppermost in his thoughts. He considers charity in relation to a community of fellow-believers — drawn together in congregations. His theory springs from this social base, though it over-arches life itself. He is intent on creating a spiritual association. He conceives of the spirit (irvevixa) as " an immaterial personality." It transcends the soul (\pvxh), and is the Christ life, the ideal and spiritual life. Christians participate in it, and they thus become part of " the body of Christ," which exists by virtue of love — love akin to the ideal life, £71×70}. The word represents the love that is instinct with reverence, and not love (4>i\la) which may have in it some quality of passion. This love is the life of " the body of Christ." Therefore no act done without it is a living act — but, on the contrary, must be dead — an act in which no part of the ideal life is blended. On the individual act or the purpose no stress is laid. It is assumed that love, because it is of this intense and exalted type, will find the true purpose in the particular act. And, when the expectation of the millennium passed away, the theory of this ideal charity remained as a motive force available for whatever new conditions, spiritual or social, might arise. Nevertheless, no sooner does this charity touch social conditions, than the necessity asserts itself of submitting to the limitations which knowledge, deliberation and purpose impose. This view had been depreciated or ignored by Christians, who have been content to rely upon the strength of their motives, or perhaps have not realized what the Greeks understood, that society was a natural organism (Arist. Pol. 1253A), which develops, fails or prospers in accordance with definite laws. Hence endless failure in spite of some success. For love, whether we idealize it as kyairr] or

consider it a social instinct as 4 > CKla, cannot be love at all unless it quickens the intelligence as much as it animates the will. It cannot, except by some confusion of thought, be held to justify the indulgence of emotion irrespective of moral and social results. Yet, though this fatal error may have dominated thought for a long time, it is hardly possible to attribute it to St Paul's theory of charity when the very practical nature of Judaism and early Christianity is considered. In his view the misunderstanding could not arise. And to create a world or " body " of men and women linked to- gether by love, even though it be outside the normal life of the community, was to create a new form of religious organization, and to achieve for it (so far as it was achieved) what, mutatis mutandis, Aristotle held to be the indispensable condition of social life, friendship (< £iXta), " the greatest good of states," for " Socrates and all the world declare," he wrote, that " the unity of the state " is " created by friendship " (Arist. Pol. ii. 1262 b).

It should, however, be considered to what extent charity in the Christian church was devoid of social purpose. (1) The Jewish con- ceptions of charity passed, one might almost say, in their complete- ness into the Christian church. Prayer, the petition and the purging of the mind, fasting, the humiliation of the body, and alms, as part of the same discipline, the submissive renunciation of possessions— all these formed part of the discipline that was to create the religious mood. Alms henceforth become a definite part of the religious discipline and service. Humility and poverty hereafter appear as yoked virtues, and many problems of charity are raised in regard to them. The non-Christian no less than the Christian world appreciated more and more the need of self-discipline (4o-k7)ctis) ; and it seems as though in the first two centuries A.D. those who may have thought of reinvigorating society searched for the remedy rather in the preaching and practice of temperance than in the application of ideas that were the outcome of the observation of social or economic conditions. Having no object of this kind as its mark, almsgiving took the place of charity, and, as Christianity triumphed, the family

life, instead of reviving, continued to decay, while the virtues of the discipline of the body, considered apart from social life, became an end in themselves, and it was desired rather to annihilate instinct than to control it. Possibly this was a necessary phase in a move- ment of progress, but however that be, charity, as St Paul understood it, had in it no part. (2) But the evil went farther. Jewish religious philosophy is not elaborated

as a consistent whole by any one writer. It is rather a miscellany of maxims; and again and again, as in much religious thought, side issues assume the principal place. The direct effect of the charitable act, or almsgiving, is ignored. Many thoughts and motives are blended. The Jews spoke of the poor as the means of the rich man's salvation. St Chrysostom empha- sizes this: " If there were no poor, the greater part of your sins would not be removed: they are the healers of your wounds" (Horn, xiv,, Timothy, &c, St Cyprian on works and alms). Alms are the medicine of sin. And the same thought is worked into the penitential system. Augustine speaks of " penance such as fasting, almsgiving and prayer for breaches of the Decalogue " (Reichel, Manual of Canon Law, p. 23) ; and many other references might be cited. " Pecuniary penances (lb. 154), in so far as they were re- laxations of, or substitutes for, bodily penances, were permitted because of the greater good thereby accruing to others " (and in this case they were — a.d. 1284 — legally enforceable under English statute law). The penitential system takes for granted that the almsgiving is good for others and puts a premium on it, even though in fact it were done, not with any definite object, but really for the good of the penitent. Thus almsgiving becomes detached from charity on the one side and from social good on the other. Still further is it vulgarized by another confusion of thought. It is considered that the alms are paid to the credit of the giver, and are realized as such by him in the after- world; or even that by alms present prosperity may be obtained, or at least evil accident avoided. Thus motives were blended, as indeed they now are, with the result that the gift assumed a greater importance than the charity, by which alone the gift should have been sanctified, and its actual effect was habitually overlooked or treated as only partially relevant.

(3) The Christian maxim of "loving(dYd?nj) one's neighbour as one's self " sets a standard of charity. Its relations are idealized accord- ing as the " self " is understood; and thus the good self becomes the measure of charity. In this sense, the nobler the self the com- pleter the charity; and the charity of the best men, men who love and understand their neighbours best, having regard to their chief good, is the best, the most effectual charity. Further, if in what we consider " best " we give but a lesser place to social purpose or even allow it no place at all, our "self" will have no sufficient social aim and our charity little or no social result. For this " self," however, religion has substituted not St Paul's conception of the spirit (irvevtia), but a soul, conceived as

endowed with a substantial nature, able to enjoy and suffer quasi-material rewards and punish- ments in the after-life; and in so far as the safeguard of this soul by good deeds or almsgiving has become a paramount object, the purpose of charitable action has been translated from the actual world to another sphere. Thus, as we have seen, the aid of the poor has been considered not an object in itself, but as a means by which the almsgiver effects his own ulterior purpose and " makes God his debtor." The problem thus handled raises the question of reward and also of punishment. Properly, from the point of view of charity, both are excluded. We may indeed act from a complexity of motives and expect a complexity of rewards, and undoubtedly a good act does refresh the " self," and may as a result, though not as a reward, win approval. But in reality reward, if the word be used at all, is according to purpose; and the only reward of a deed lies in the fulfilment of its purpose. In the theory of almsgiving which we are discussing, however, act and reward are on different planes. The reward is on that of a future life ; the act related to a distressed person here and now. The interest in the act on the doer's part lies in its post-mortal consequences to himself, and not either wholly or chiefly in the act itself. Nor, as the interest ends with the act — the giving — can the intelligence be quickened by it. The questions " How? by whom? with what object? on what plan? with what result?" receive no detailed consideration at all. Two general results follow. In so far as it is thus practised, almsgiving is out of sympathy with social progress. It is indeed alien to it. Next also the self-contained, self-sustained poverty that will have no relief and does without it, is outside the range of its thought and understanding. On the other hand, this almsgiving is equally in- capable of influencing the weak and the vicious ; and those who are suffering from illness or trouble it has not the width of vision to understand nor the moral energy to support so that they shall not fall out of the ranks of the self-supporting. It believes that " the poor " will not cease out of the land. And indeed, however great might be the economic progress of the people, it is not likely that the poor will cease, if the alms given in this spirit be large enough in amount to affect social conditions seriously one way or the other. When we measure the effects of charity, this inheritance of divided thought and inconsistent counsels must be given its full weight.

The sub-apostolic church was a congregation, like a synagogue, the centre of a system of voluntary and personal relief, connected

with the congregational meals (or ay&cKtu) and the Eucharist, and under the supervision of no single officer or bishop. Out

of this was developed a system of relief controlled by Uationof' a bishop, who was assisted chiefly by deacons or the parish presbyters, while the aycurcu, consisting of offerings aad laid before the altar, still remained. Subsequently

cJharhJes. tne mea l was separated from the sacrament, and

became a dole of food, or poor people's meal — e.g. in St Augustine's time in western Africa — and it was not allowed to be served in churches (a.d. 391). As religious asceticism became dominant, the sacrament was taken fasting; it appeared unseemly that men and women should meet together for such purposes, and the a'ydircu fell out of repute. Simultaneously it would seem that the parish (irapouda) became from a congregational settlement a geographical area.

The organization of relief at Rome illustrates both a type of administration and a transition. St Gregory's reforms (a.d. 590) largely developed it. The first factor in the transition was the church fund of the second period of Christianity, about a.d. 150 to after 208 (Tertullian, Apol. 39). It served as a friendly fund, was supported by voluntary gifts, and was used to succour and to bury the poor, to help destitute and orphaned children, old household slaves and those who suffered for the faith. This fund is quite different from the collegia tenuiorum or funeratica of the Romans, which were societies to which the members paid stipulated sums at stated periods, for funeral benefits or for common meals (J. P. Waltzing, Corporations professionnelles chez les Romains, i. 313). It represents the charitable centre round which the parochial system developed. That system was adopted probably about the middle of the 3rd century, but in Rome the diaconate probably remained centralized. At the end of the 4th century Pope Anastasius had founded deaconries in Rome, and endowed them largely " to meet the frequent demands of the diaconate." Gregory two hundred years later reorganized the system. He divided the fourteen old " regions " into seven ecclesiastical districts and thirty " titles " (or parishes). The parishes were under the charge of sixty-six priests; the districts were eleemosynary divisions. Each was placed under the charge of a deacon, not (Greg. Ep. xi. and xxviii.) under the priests

(presbyteri titularii). Over the deacons was an archdeacon. It was the duty of the deacons to care for the poor, widows, orphans, wards, and old people of their several districts. They inquired in regard to those who were relieved, and drew up under the guidance of the bishop the register of poor (matricula). Only these received regular relief. In each district was an hospital or office for alms, of which the deacon had charge, assisted by a steward (or oeconomus). Here food was given and meals were taken, the sick and poor were maintained, and orphan or foundling children lodged. The churches of Rome and of other large towns possessed considerable estates, " the patrimony of the patron saints," and to Rome belonged estates in Sicily which had not been ravaged by the invaders, and they continued to pay to it their tenth of corn, as they had done since Sicily was conquered. Four times a year (Milman, Lat. Christ, ii. 117) the shares of the (1) clergy and papal officers, (2) churches and monasteries, and (3) " hospitals, deaconries and ecclesiastical wards for the poor," were calculated in money and distributed; and the first day in every month St Gregory distributed to the poor in kind corn, wine, cheese, vegetables, bacon, meal, fish and oil. The sick and infirm were superintended by persons appointed to inspect every street. Before the pope sat down to his own meal a portion was separated and sent out to the hungry at his door. The Roman plebs had thus become the poor of Christ (pauperes Christi), and under that title were being fed by civica annona and sportula as their ancestors had been; and the deaconries had superseded the " regions " and the " steps " from which the corn had been distributed. The hospitium was now part of a common organization of relief, and the sick were visited according to Jewish and early Christian precedent. How far kindly Romans visited the sick of their day we do not know. Alms and the annona were now, it would seem, administered concurrently; and there was a system of poor relief independent of the churches

and their alms (unless these, organized, as in Scottish towns, on the ancient ecclesiastical lines, were paid wholly or in part to a central diaconate fund) . Much had changed, but in much Roman thought still prevailed.

On lines similar to these the organization of poor relief in the middle ages was developed. In the provinces in the later empire the senate or ordo decurionum were responsible for the public provisioning of the towns (Fustel de Coulanges, La Gaule romaine, p. 251), and no doubt the care of the poor would thus

in some measure devolve on them in times of scarcity or distress. On the religious side, on the other hand, the churches would probably be constant centres of almsgiving and relief; and then, further, when the Roman municipal system had decayed, each citizen (as in Charlemagne's time, 742-814) was required to support his own dependants — a step suggestive of much after-history.

The change in sentiment and method could hardly be more strongly marked than by a comparison of " the Teaching " with St Ambrose's (334-397)ˆ " Duties of the Clergy " (De Officiis Ministrorum). For the old instinctive obedience to a command there is now an endeavour to find a reasoned basis for charitable action. Pauperism is recognized. " Never was the greed of beggars greater than it is now. . . . They want to empty the purses of the poor, to deprive them of the means of support. Not content with a little, they ask for more. . . . With lies about their lives they ask for further sums of money." " A method in giving is necessary." But in the suggestions made there is little consistency. Liberality is urged as a means of gaining the love of the people; a new and a false issue is thus raised. The relief is neither to be " too freely given to those who are unsuitable, nor too sparingly bestowed upon the needy." Everywhere there is a doctrine of the mean reflected through Cicero's De Officiis, the doctrine insufficiently stated, as though it were a mean of quantity, and not that rightly tempered mean which is the harmony of opposing moods. The poor are not to be sent away empty. Those rejected by the church are not to be left to the " outer darkness " of an earlier Christianity. They must be supplied if they are in want. The methodic giver is " hard towards none, but is free towards all." Consequently none are refused, and no account is taken of the regeneration that may spring up in a man from the effort towards self-help which refusal may originate. Thus after all it appears that method means no more than this — to give sometimes more, sometimes less, to all needy people. In the small congregational church of early Christianity, each member of which was admitted on the conditions of strictest discipline, the common alms of the faithful could hardly have done much harm within the body, even though outside they created and kept alive a horde of vagrant alms-seekers and pretenders. Now in this department at least the church had become the state, and discipline and a close knowledge of one's fellow-Christians no longer safeguarded the alms. From Cicero is borrowed the thought of " active help," which " is often grander and more noble," but the thought is not

worked out. . From the social side the problem is not understood or even stated, and hence no principle of charity or of charitable administration is brought to light in the investigation. Still there are rudiments of the economics of charity in the praise of Joseph, who made the people buy the corn, for otherwise " they would have given up cultivating the soil; for he who has the use of what is another's often neglects his own." Perhaps, as St Augus- tine inspired the theology of the middle ages, we may say that St Ambrose, in the mingled motives, indefiniteness, and kindliness of this book, stands for the charity of the middle ages, except in so far as the movement which culminated in the brotherhood of St Francis awakened the intelligence of the world to wider issues.

In Constantinople the pauperism seems to have been extreme. The corn supplies of Africa were diverted there in great part when it became the capital of the empire. This must have left to Rome a larger scope for the development of the civic- religious administration of relief. St Chrysostom's sermons give no impression of the rise of any new administrative force, alike sagacious and dominant. The appeal to give alms is constant, but the positive counsel on charitable work is nil. The people had the annona civica, and imperial gifts, corn, allowances (solaria) from the treasury granted for the poor and needy, and an annual gift of 50 gold pounds (rather more than £1400) for funerals. Besides these there were many institutions, and the begging and the almsgiving at the church doors. " The land could not support the lazy and valiant beggars." There were public works provided for them; if they refused to work on them they were to be driven away. The sick might visit the capital, but must be registered and sent back (a.d. 382); the sturdy beggar was condemned to slavery. So little did alms

effect. And in the East monasticism seems to have produced no firmness of purpose such as led to the organization of the church and of charitable relief under St Gregory.

Another movement of the Byzantine period was the establish- men t of the endowed charity. The Jewish synagogue long served as a place for the reception of strangers — a religious £evo8oxtiov. Probably the strangers referred to in " the Teaching " were so entertained. The table of the bishop and a room in his

house served as the guest-chamber, for which afterwards a separate building was instituted. In the East the Jewish charitable inn first appears, and there took place the earliest extension of institutions. There was probably a demand for an elaboration of institutions as social changes made themselves felt in the churches. We have seen this in the case of the ayairrj. Similar changes would affect other branches of charitable work. The hospital (hospitalium, fcvoboxeiov) is denned as a " house of God in which strangers who lack hospitality are received " (Suicerus, Thesaur.), a home separated from the church; and round the church, out of the primitive £tvo8oxtiov of early Christian times and the entertainment of strangers at the houses of members of the community, would grow up other similar charities. In a.d. 321 licence was given by Constantine to leave property to the Church. The churches were thus placed in the same position as pagan temples, and though subsequently Valentinian (a.d. 379) withdrew the permission on account of the shameless legacy-hunting of the clergy, in that period much must have been done to endow church and charitable institutions. In the same period grew to its height the passion for monasticism. This affected the parish and the endowed charity alike. Under its influence the deacon as an almoner tends to disappear, except where, as in Rome, there is an elabor- ate system of relief. Nor does it seem that deaconesses, widows, and virgins continued to occupy their old position as church workers and alms-receivers. Naturally when marriage was considered " in itself an evil, perhaps to be tolerated, but still degrading to human nature," and (a.d. 385) the marriage of the clergy was prohibited, men, except those in charge of parishes, and women would join regular monastic bodies; the deacon, as almoner, would disappear, and the " widows " and virgins would become nuns. Thus there would grow up a large body of men and women living segregated in institutions, and forming a leisured class able to superintend institutional charities. And now two new officers appear, the eleemosynarius or almoner and the oeconomus or steward (already an assistant treasurer to the bishop), who superintend and distribute the alms and manage the property of the institution. (In the first six books of the A post. Constit., a.d. 300, these officers are not mentioned.) In these circumstances the hospitium or hospital (i;tvwv, Karayiji- yvov) assumes a new character. It becomes in St Basil's hands (a.d. 330-379) a resort not only for those who " visit it from time to time as they pass by, but also for those who need some treatment in illness." And round St Basil at Caesarea there springs up a colony of

institutions. Four kinds principally are mentioned in the Theodosian code : (1) the guest-houses (few- SoxcTa); (2) the poor-houses (tttuxˆ) , where the poor (mendici) were housed and maintained (the irrooxfiov was a general term also applied to all houses for the poor, the aged, orphans and sick) ; (3) there were orphanages (6pavoTpo4 > t£a.) for orphans and wards; and (4) there were houses for infant children (/3pe < £o- Tpo(j > ua). Thus a large number of endowed charities had grown up. This new movement it is necessary to consider in connexion with the law relating to religious property and bequests, in its bearing on the rule of the monasteries, and in its effect on the family.

The sacred property (res sacra) of Roman law consisted of things dedicated to the gods by the pontiff with the approval of the civil authority, in turn, the people, the senate and the emperor. Things so consecrated were inalienable. Apart from this in the empire, the municipalities as they grew up were considered "juristic persons " who were entitled to receive and hold property. In a similar position were authorized collegia, amongst which were the mutual aid societies referred to above. Christians associated in these societies would leave legacies to them. Thus (VV. M. Ramsay, Cities and Bishoprics

of Phrygia, I. i. 119) an inscription mentions a bequest (possibly by a Christian) to the council (trvviSpiov) of the presidents of the dyers in purple for a ceremonial, on the condition that, if the ceremony be neglected, the legacy shall become the property of the gild for the care of nurslings; and in the same way a bequest is left in Rome (Orelli 4420) for a memorial sacrifice, on the condition that, if it be not performed, double the cost be paid to the treasury of the corn- supply (fisco stationis annonae). No unauthorized collegia could receive a legacy. " The law recognized no freedom of association." Nor could any private individual create a foundation with separate property of its own. Property could only be left to an authorized juristic person, being a municipality or a collegium. But as the problem of poverty was considered from a broader standpoint, there was a desire to deal with it in a more permanent manner than by the annona civica. The pueri alimenlarii (see above) were considered to hold their property as part of the fiscus or property of the state. Pliny (Ep. vii. 18), seeking a method of endowment, transferred property in land to the steward of public property, and then took it back again subject to a permanent charge for the aid of children of freemen. By the law of Constantine and subsequent laws no such devices were necessary. Widows or deaconesses, or virgins

dedicated to God, or nuns (a.d. 455), could leave bequests to a church or memorial church (martyrum), or to a priest or a monk, or to the poor in any shape or form, in writing or without it. Later (A.D. 475) donations of every kind, ” to the person of any martyr, or apostle, or prophet, or the holy angels,” for building an oratory were made valid, even if the building were promised only and not begun; and the same rule applied to infirmaries (vooonontio) and poor-houses (7TTux«a) — the bishop or steward being competent to appear as plaintiff in such cases. Later, again (a.d. 528), contri- butions of 50 solidi (say about £19, 10s.) to a church, hostel (£tvo- Soxeiov), &c, were made legal, though not registered; while larger sums, if registered, were also legalized. So (a.d. 529) property might be given for ” churches, hostels, poor-houses, infant and orphan homes, and homes for the aged, or any such community ” (consortium), even though not registered, and such property was free from taxation. The next year (530) it was enacted that pre- scription even for 100 years did not alienate church and charitable property. The broadest interpretation was allowed. If by will a share of an estate was left ” to Christ our Lord,” the church of the. city or other locality might receive it as heir; ” let these, the law says, belong to the holy churches, so that they may become the alimony of the poor.” It was sufficient to leave property to the poor (Corpus Juris Civilis, ed. Krueger, 1877, ii. 25). The bequest was legal. It went to the legal representative of the poor — the church. Charitable property was thus church property. The word ” alms ” covered both. It was given to pious uses, and as a kind of public institution ” shared that corporate capacity which belonged to all ecclesiastical institutions by virtue of a general rule of law.” On a pia causa it was not necessary to confer a juristic personality. Other laws preserved or regulated alienation (a.d. 477, a.d. 530), and checked negligence or fraud in management. The clergy had thus become the owners of large properties, with the coloni and slaves upon the estates and the allowances of civic corn (annona civica) ; and (a.d. 357) it was stipulated that whatever they acquired by thrift or trading should be used for the service of the poor and needy, though what they acquired from the labour of their slaves in the labour houses (ergastula) or inns (tabernae) might be considered a profit of religion (religionis lucrum).

Thus grew up the system of endowed charities, which with certain modifications continued throughout the middle ages, and, though it assumed different forms in connexion with gilds and municipalities, in England it still retains, partially at least, its relation to the church. It remained the system of institutional relief parallel to the more personal almsgiving of the parish.

Monasticism, in acting on men of strong character, endowed them with a double strength of will, and to men like St Gregory it seemed to give back with administrative power the relentless firmness of the Roman. In the East it produced the turbulent soldiery of the church, in the West its missionaries; and each mission-monastery was a centre of relief. But whatever the services monasticism rendered, it can hardly be said to have furthered true charity from the social standpoint, though out of regard to some of its institutional work we may to a certain degree qualify this judgment. The movement was almost of necessity in large measure anti-parochial, and thus out of sympathy with the charities of the parish, where personal relations with the poor at their homes count for most.

The good and evil of it may be weighed. Monasticism working through St Augustine helped the world to realize the mood of love as the real or eternal life. Of the natural life of the world and its responsibilities, through which that mood would have borne its completest fruit, it took but little heed, except in so far as, by creating a class possessed of leisure, it created able scholars, lawyers

and. administrators, and disciplined the will of strong men. It had no power to stay the social evils of the day. Unlike the friars, at their best the monks were a class apart, not a class mixed up with the people. So were their charities. The belief in poverty as a fixed condition — irretrievable and ever to be alleviated without any regard to science or observation, subjected charity to a per- petual stagnation. Charity requires belief in growth, in the sharing of life, in the utility and nobility of what is done here and now for the hereafter of this present world. Monasticism had no thought of this. It was based on a belief in the evil of matter; and from that root could spring no social charity. Economic

difficulties also fostered monasticism. Gold was appreciated in value, and neces- saries were expensive, and the cost of maintaining a family was great. It was an economy to force a son or a brother into the church. The population was decreasing; and in spite of church feeling Marjorian (a.d. 461) had to forbid women from taking the veil before forty, and to require the remarriage of widows, subject to a large forfeit of property (Hodgkin, Italy and her Invaders, ii. 420). Monasticism was inconsistent with the social good. As to the family — like the moderns who depreciate thrift and are careless of the life of the family, the monks, believing that marriage was a lower form of morality, if not indeed, as would at times appear, hardly moral at all, could feel but little enthusiasm for what is socially a chief source of health to the community and a well-spring of spontaneous charit- able feeling. By the sacerdotal-monastic movement the moralizing force of Christianity was denaturalized. Among the secular clergy the falsity of the position as between men and women revealed itself in relations which being unhallowed and unrecognized became also degrading. But worse than all, it pushed charity from its pivot. For this no monasteries or institutions, no domination of religious belief, could atone. The church that with so fine an in- tensity of purpose had fostered chastity and marriage was betraying its trust. It was out of touch with the primal unit of social life, the child-school of dawning habits and the loving economy of the home. It produced no treatise on economy in the older Greek sense of the word. The home and its associations no longer retained their pre- eminence. In the extreme advocacy of the celibate state, the honourable development of the married life and its duties were depreciated and sometimes, one would think, quite forgotten. • We may ask, then, What were the results of charity at the close of the period which ends with St Gregory and the founding of the medieval church? — for if the charity is reflected in the social good the results should be manifest. Economic and social conditions were adverse. With lessened trade the middle class was decaying (Dill, Roman Society in the Last Century of the Western Empire, p. 204) and a selfish aristocracy rising up. Muni- cipal responsibility had been taxed to extinction. The public service was corrupt. The rich evaded taxation, the poor were oppressed by it. There were laws upon laws, endeavours to underpin the framework of a decaying society. Society was bankrupt of skill — and the skill of a generation has a close bearing on its charitable administration. While hospitals increased, medicine was unprogressive. There were miserable years of famine and pestilence, and constant

wars. The care of the poorer classes, and ultimately of the people, was the charge of the church. The church strengthened the feeling of kindness for those in want, widows, orphans and the sick. It lessened the degradation of the " actresses," and, co-operating with Stoic opinion, abolished the slaughter of the gladiatorial shows. It created a popular " dogmatic system and moral discipline," which paganism failed to do; but it produced no prophet of charity, such as enlarged the moral imagination of the Jews. It ransomed slaves, as did paganism also, but it did not abolish slavery. Large economic causes produced that great reform. The serf attached to the soil took the place of the slave. The almsgiving of the church by degrees took the place of annona and sportula, and it may have created pauperism. But dependence on almsgiving was at least an advance on dependence founded on a civic and hereditary right to relief. As the colonus stood higher than the slave, so did the pauper, socially at any rate, free to support himself, exceed the colonus. Bad economic conditions and traditions, and a bad system of almsgiving, might enthral him. But the way, at least, was open; and thus it became possible that charity, working in alliance with good economic traditions, should in the end accomplish the self-support of society, the independence of the whole people.

Part V. — Medieval Charity and its Development It remains to trace the history of thought and administration in relation to (1) the development of charitable responsibility in

the parish, and the use of tithe and church property for poor relief; and (2) the revision of the theory of charity, with which are associated the names of St Augustine (354-430), St Benedict (480-542), St Bernard (1001-1153), St Francis (1182-1226), and St Thomas Aquinas (1225-1274). (3) There follows, in reference chiefly to England, a sketch of the dependence of the poor under feudalism, the charities of the parish, the monastery and the hospital — the medieval system of endowed charity; the rise of gild and municipal charities; the decadence at the close of the 1 5th century, and the statutory endeavours to cope with economic difficulties which, in the 16th century, led to the establishment of statutory serfdom and the poor-laws. New elements affect the problem of charity in the 17th and 18th centuries; but it is not too much to say that almost all these headings represent phases of thought or institutions which in later forms are interwoven with the charitable thought and endeavours of the present day. Naturally, two methods of relief have usually been prominent : relief administered locally, chiefly to residents in their own

homes, and relief administered in an institution. At The parish the time of Charlemagne (742-814) the system of and relief was parochial, consisting principally of assistance cj> arltab, <> at the home. After that time, except probably in re ” ef ‘ England, the institutional method appears to have predominated, and the monastery or hospital in one form or another gradually encroached on the parish.

The system of parochial charity was the outcome, apparently, of three conditions : the position and influence of the bishop, the eleemosynary nature of the church funds, and the need of some responsible organization of relief. It resulted in what might almost be called an ecclesiastical poor-law. The affairs of a local church or congregation were superintended by a bishop. To deal with the outlying districts he detached priests for religious work and, as in Rome and (774) Strassburg, deacons also for the administration of relief. Originally all the income of the church or congregation was paid into one fund only, of which the bishop had charge, and this fund was available primarily for charitable purposes. Church property was the patrimony of the poor. In the 4th centurv (IV. Council of Carthage, 398) the names of the clergy were entered on a list {matricula or canon), as were also the names of the poor, and both received from the church their daily portion (cf. Ratzinger, Geschichte der kirchlichen Armenpflege, p. 117). There were no expenses for building. Before the reign of Constantine (306) very few churches were built (Ratzinger, p. 120). Thus the early church as has been said, was chiefly a charitable society. By degrees the property of the church was very largely increased by gifts and bequests, and in the West before St Gregory’s time the division of it for four separate purposes — the support of the bishop, of the clergy, and of the poor, and for church buildings— still further promoted decentralization. Apart from any special gifts, there was thus created a separate fund for almsgiving, supervised by the bishop, consisting of a fourth of the church property, the oblations (mostly used for the poor), and the tithe, which at first was used for the poor solely. The organization of the church was gradually extended. The church once established in the chief city of a district would become in turn the mother church of other neighbourhoods, and the bishop or priest of the mother church would come to exercise super- vision over them and their parishes.

In France, which may serve as a good illustration, in the 4th cen- tury (Ratzinger, p. 181) the civic organization was utilized for a

further change. The Roman provinces were divided into large areas, civitates, and these were adopted by the church as bishop's parishes or, as we should call them, dioceses; and the chief city became the cathedral city. The bishop thus became responsible in Charlemagne's time both for his own parish — that of the mother church — and for the supervision of the parishes in the civitas, and so for the sick and needy of the diocese generally. He had to take charge of the poor in his own parish personally, keep the list of the poor, and houses for the homeless. The other parishes were at first, or in some measure, supported from his funds, but they acquired by degrees tithe and property of their own and were endowed by Charlemagne, who gave one or more manses or lots of land (cf. Fustel de Coulanges, Hist, des institutions politiques de Vancienne France, p. 360) for the support of each parish priest. The priests were required to relieve their own poor so that they should not stray into other cities (II. Counc. Tours, 567), and to provide food and lodging for strangers. The method was indeed elaborated and became, like the Jewish, that contradiction in terms — a compulsory system of charitable relief. The payment of tithe was enforced by Charlemagne, and it became a legal due (Counc. Frankfort, 794; Arelat. 794). At the same time two other conditions were enforced. Each person (unusquisque fidelium nostrorum or omnes cives) was to keep his own family, i.e. all dependent on him — all, that is, upon his freehold estate {allodium), and no one was to presume to give

relief to able-bodied beggars unless they were set to work (Charlem. Co-pit. v. 10). Thus we find here the germ of a poor-law system. As in the times of the annona civica, slavery, feudalism, or statutory serfdom, the burthen of the maintenance of the poor fell only in part on charity. Only those who could not be maintained as members of some "family" were properly entitled to relief, and in these circumstances the officially recognized clients of the church consisted of the gradually decreasing number of free poor and those who were tenants of church lands.

Since 817 there has been no universally binding decision of the church respecting the care of the poor (Ratzinger, p. 236). So long ago did laicization begin in charity. In the wars and

confusion of the 9th and 10th centuries the poorer freemen lapsed still further into slavery, or became coloni or bond servants; and later they passed under the feudal rule. Thus the church's duty to relieve them became the masters' obligation to maintain them. Simultaneously the activity of the clergy, regular and secular alike, dwindled. They were exhorted to increase their alms. The revenues and property of " the poor " were largely turned to private or partly ecclesiastical purposes, or secularized. Legacies went wholly to the clergy, but only the tithe of the produce of their own lands was used for relief ; and of the general tithe, only a third or fourth part was so applied. Eventually to a large extent, but more elsewhere than in England (Ratzinger, pp. 246, 269), the tithe itself was appropriated by nobles or even by the monasteries; and thus during and after the 10th century a new organization of charity was created on non-parochial methods of relief. Alms, with prayer and fasting, had always been connected with penance. But the character of the penitential system had altered. By the 7th century private penance had super- seded the public and congregational penance of the earlier church [Diet. Christian Antiquities, art. " Penitence "). To the penalties of exclusion from the sacraments or from the services of the church or from its communion was coupled, with other penitential discipline, an elaborate penitential system, in which about the 7th century the redemption of sin by the " sacrifice " of property, payments of money fines, &c, was introduced. (Cf. for instance Cone. Elberti: — Labbeus i. 969 (a.d. 305), with Cone. Berghamstedense, Wilkins, Cone. p. 60 (a.d. 696), and the Penitential (p. 115) and Canons (a.d. 960), p. 236.) The same sin committed by an overseer (prae- positus paganus) was compensated by a fine of 100 solidi; in the case of a colonus by a fine of 50. So amongst the ways of penitence were entered in the above-mentioned Canons, to erect a church, and if means allowed, add to it land ... to repair the public roads . . . " to distribute," to help poor widows, orphans and strangers, redeem slaves, fast, &c. — a combination of " good deeds "which suggests a line of thought such as ultimately found expression in the definition of charities in the Charitable Uses Act of Queen Elizabeth. The con- fessor, too, was " spiritualis medicus," and much that from the point of view of counsel would now be the work of charity would in his hands be dealt with in that capacity. For lesser sins (cf. Bede (673- 735), Horn. 34, quoted by Ratzinger) the penalty was prayer, fasting and alms; for the greater sins — murder, adultery and idolatry — to give up all. Thus while half-converted barbarians were kept in moral

subjection by material penances, the church was enriched by their gifts; and these tended to support the monastic and institutional methods which were in favour, and to which, on the revival of religious earnestness in the nth century, the world looked for the reform of social life.

To understand medieval charity it is necessary to return to St Augustine. According to him, the motive of man in his Medieval legitimate effort to assert himself in life was love or revision of desire (amor or cupido). “All impulses were only tl,e theory evo hitions of this typical characteristic ” (Harnack, History of Dogma (trans.), v. iii.); and this was so alike in the spiritual and the sensuous life. Happiness thus depended on desire; and desire in turn depended on the regulation of the will; but the will was regulated only by grace. God was the spiritualis substantia; and freedom was the identity of the will with the omnipotent unchanging nature. This highest Being was ” holiness working on tKe will in the form of omnipotent love.” This love was grace—” grace imparting itself in love.” Love (caritas — charity) is identified with justice; and the will, the goodwill, is love. The identity of the will with the will of God was attained by communion with Him. The after- life consummated by sight this communion, which was here reached only by faith. Such a method of thought was entirely introspective, and it turned the mind ” wholly to hope, asceticism and the contemplation of God in worship.” “Where St Augus- tine indulges in the exposition of practical piety he has no theory at all of Christ’s work.” To charity on that side he added nothing. In the nth century there was a revival of piety, which had amongst its objects the restoration of discipline in the monasteries and a monastic training for the secular clergy.

To this Augustinian thought led the way. ” Christianity was asceticism and the city of God ” (Harnack vi. 6). A new religious feeling took possession of the general mind, a regard and adora- tion of the actual, the historic Christ. Of this St Bernard was the expositor. ” Beside the sacramental Christ the image of the historical took its place, — majesty in humility, innocence in penal suffering, life in death.” The spiritual and the sensuous were intermingled. Dogmatic formulae fell into the background. The picture of the historic Christ led to the realization of the Christ according to the spirit (Kara iryeD/xa). Thus St Bernard carried forward Augustinian thought; and the historic Christ became the ” sinless man, approved by suffering, to whom the divine grace, by which He lives, has lent such power that His

image takes shape in other men and incites them to corresponding humility and love."

Humility and poverty represented the conditions under which alone this spirit could be realized; and the poverty must be spiritual, and therefore self-imposed (" wilful," as it was afterwards called). This led to practical results. Poverty was not a social state, but a spiritual; and consequently the poor generally were not the pauperes Christi, but those who, like the monks, had taken vows of poverty. From these premisses followed later the doctrine that gifts to the church were not gifts to the poor, as once they had been, but to the religious bodies. The church was not the church of the poor, but of the poor in spirit. But the immediate effect was the belief for a time, apparently almost universal, that the salvation of society would come from the monastic orders. By their aid, backed by the general opinion, the secular clergy were brought back to celibacy and the monasteries newly disciplined. But charity could not thus regain its touch of life and become the means of raising the standard of social duty.

Next, one amongst many who were stirred by a kindred inspiration, St Francis turned back to actual life and gave a new reality to religious idealism. For him the poor were once again the pauperes Christi. To follow Christ was to' adopt the life of " evangelical poverty," and this was to live among the poor the life of a poor man. The follower was to work with his hands (as the poor clergy of the early church had done and the clergy of the early English church were exhorted to do) ; he was to receive no money; he was to earn the actual necessaries of life, though what he could jnot earn he might beg. To ask for this was a right, so long as he was bringing a better life into the world. All in excess of this he gave to the poor. He would possess no property, buildings or endowments, nor was his order to do so. The fulness of his life was in the complete realization of it now, without the cares of property and without any fear of the future. Having a definite aim and mission, he was ready to accept the want that might come upon him, and his life was a discipline to enable him to suffer it if it came. To him humility was the soul making itself fit to love; and poverty was humility expanded from a mood to a life, a life not guarded by seclusion, but spent amongst those who were actually poor. The object of life was to console the poor— those outside all monasteries and institutions — the poor as they lived and worked. The movement was practically a lay movement, and its force consisted in its simplicity and directness. Book learning was disparaged: life was to be the

teacher. The brothers thus became observant and practical, and afterwards indeed learned, and their learning had the same characteristics. Their power lay in their practical sagacity, in their treatment of life, outside the cloister and the hospital, at first hand. They knew the people because they settled amongst them, living just as they did. This was their method of charity.

The inspiration that drew St Francis to this method was the contemplation of the life of Christ. But it was more than this. The Christ was to him, as to St Bernard, an ideal, whose nature passed into that of the contemplating and adoring beholder, so that, as he said, " having lost its individuality, of itself the creature could no longer act." He had no impulse but the Christ impulse. He was changed. His identity was merged in that of Christ. And with this came the conception of a

gracious and finely ordered charity, moving like the natural world in a constant harmonious development towards a definite end. The mysticism was intense, but it was practical because it was intense. In that lay the strength of the movement of the true Franciscans, and in those orders that, whether called heretical or not, followed them — Lollards and others. Religion thus became a personal and original possession. It became individual. It was inspired by a social endeavour, and for the world at large it made of charity a new thing.

St Thomas Aquinas took up St Bernard's position. Re- nunciation of property, voluntary poverty, was in his view also a necessary means of reaching the perfect life; and the feeling that was akin to this renunciation and prompted it was charity. " All perfection of the Christian life was to be attained according to charity," and charity united us to God.

In the system elaborated by St Thomas Aquinas two lines of thought are wrought into a kind of harmony. The one stands for Aristotle and nature, the other for Christian tradition and theology. We have thus a duplicate theory of thought and action throughout, both rational and theologic virtues, and a duplicate beatitude or state of happiness correspondent to each. On the one hand it is argued that the good act is an act which, in relation to its object, wholly serves its purpose; and thus the measure of good- ness (Prima Secundae Summae Theolog. Q. xviii. 2) is the proportion between action and effect. On the other hand, the act

has to satisfy the twofold law, human reason and eternal reason. From the point of view of the former the cardinal factor is desire, which, made pro- portionate to an end, is love {amor) ; and, seeking the good of others, it loses its quality of concupiscence and becomes friendly love {amor amicitiae). But this rational love (amor) and charity (caritas), the theologic virtue, may meet. All virtue or goodness is a degree of love (amor), if by virtue we mean the cardinafvirtues and refer to the rule of reason only. But there are also theologic virtues, which are on one side " essential," on the other side participative. As wood ignited participates in the natural fire, so does the individual in these virtues (II. II." lxii. 1). Charity is a kind of friendship towards God. It is received per infusionem spiritus sancti, and is the chief and root of the theologic virtues of faith and hope, and on it the rational virtues depend. They are not degrees of charity as they are of (amor) love, but charity gives purpose, order and quality to them all. In this sense the word is applied to the rational virtues —as, for instance, beneficence. The counterpart of charity in social life is pity (misericordia), the compassion that moves us to supply another's want (summa religionis Christianae in misericordia consistit quantum ad exteriora opera). It is, however, an emotion, not a virtue, and must be regulated like any other emotion (. . . passio est et non virtus. Hie autem molus potest esse secundum rationem regulatus, II. II." xxx. 3). Thus we pass to alms, which are the instrument of pity— an act of charity done through the intervention of pity. The act is not done in order to purchase spiritual good by a corporal means, but to merit a spiritual good (per effectum caritatis) through being in a state of charity; and from that point of view its effect is tested by the recipient being moved to pray for his benefactor. The claim of others on our beneficence is relative, according to consanguinity and other bonds (II. II." xxxi. 3), subject to the condition that the common good of many is a holier obligation (divinius) than that of one. Obedience and obligation to parents may be crossed by other obligations, as, for instance, duty to the church. To give alms is a command. Alms should consist of the superfluous — that is, of all that the individual possesses after ha has reserved what is necessary. What is necessary the donor should fix in due relation to the claims of his family and dependants, his position in life (dignitas), and the sustenance of his body. On the other hand, his gift should meet the actual necessities of the recipient and no more. More than this will lead to excess on the recipient's part (ut inde luxurietur) or to want of spirit and apathy (ut aliis remissio'et refrigerium sit), though allowance must be made for

different requirements in different conditions of life, It were better to distribute alms to many persons than to give more than is neces- sary to one. In individual cases there remains the further question of correction — the removing of some evil or sin from another; and this, too, is an act of charity.

It will be seen that though St Thomas bases his argument on a duplicate theory of thought, action and happiness, part natural, part theologic, and states fully the conditions of good action, he does not bring the two into unison. Logically the argument should follow that alms that fail in social benefit (produce remissionem et refrigerium, for instance) fail also in spiritual good, for the two cannot be inconsistent. But in regard to the former he does not press the importance of purpose, and, in spite of his Aristotle, he misses the point on which Aristotle, as a close observer of social conditions, insists, that gifts without purpose and reciprocity foster the depend- ence they are designed to meet. The proverb of the ” pierced cask ” is as applicable to ecclesiastical as to political almsgiving, as has often been proved by the event. The distribution of all ” super- fluous ” income in the form of alms would have the effect of a huge

endowment, and would stereotype ” the poor ” as a permanent and unprogressive class. The proposal suggests that St Thomas con- templated the adoption of a method of relief which would be like a voluntary poor-law; and it is noteworthy that his phrase ” neces- sary relief ” forms the defining words of the Elizabethan poor-law, while he also lays stress on the importance of ” correction,” which, on the decline and disappearance of the penitential system, assumed at the Reformation a prominent position in administration in relation not only to ” sin,” but also to offences against society, such as idleness, &c.

On this foundation was built up the classification of acts of charity, which in one shape or another has a long social tradition, and which St Thomas quotes in an elaborated form — the seven spiritual acts (consule, carpe, doce, solar e, remitte, fer, or a), counsel, sustain, teach, console, save, pardon, pray; and the seven corporal (vestio, poto, cibo, redimo, tego, colligo, condo) I clothe, I give drink to, I feed, I free from prison, I shelter, I assist in sickness, I bury (II. II. ae xxxii. 2). These in subse- quent thought became ” good works,” and availed for the after-life, bringing with them definite boons. Thus charity was linked to the system of indulgences. The bias of the act of charity is made to favour the actor. Primarily the benefit reverts to him.

He becomes conscious of an ultimate reward accruing to himself. The simplicity of the deed, the spontaneity from which, as in a well-practised art, its freshness springs and its good effects result, is falsified at the outset. The thought that should be wholly concerned in the fulfilment of a definite purpose is diverted from it. The deed itself, apart from the outcome of the deed, is highly considered. An extreme induce- ment is placed on giving, counselling, and the like, but none on the personal or social utility of the gift or counsel. Yet the value of these lies in their end. No policy or science of charity can grow out of such a system. It can produce innumerable isolated acts, which may or may not be beneficent, but it cannot enkindle the " ordered charity." This charity is, strictly speak- ing, by its very nature alike intellectual and emotional. Other- wise it would inevitably fail of its purpose, for though emotion might stimulate it, intelligence would not guide it.

There are, then, these three lines of thought. That of St Bernard, who invigorated the monastic movement, and helped to make the monastery or hospital the centre of charitable relief. That of St Francis, who, passing by regular and secular clergy alike, revived and reinvigorated the conception of charity and gave it once more the reality of a social force, knowing that it would find a freer scope and larger usefulness in the life of the people than in the religious aristocracy of monasteries. And that of St Thomas Aquinas, who, analysing the problem of charity and almsgiving, and associating it with definite groups of works, led to its taking, in the common thought, certain stereotyped forms, so that its social aim and purpose were ignored and its power for good was neutralized.

We have now to turn to the conditions of social life in which these thoughts fermented and took practical shape. The population of England from the Conquest to the ch 14th century is estimated at between i| and 2-| ant social millions. London, it is believed, had a population conditions of about 40,000. Other towns were small. Two or '" three of the larger had 4000 or 5000 inhabitants. The Eng,and ' only substantial building in a village, apart perhaps from the manor-house, was the church, used for many secular as well as religious purposes. In the towns the mud or wood-paved huts sheltered a people who, accepting a common poverty, traded in little more than the necessaries of life (Green, Town Life in the 15th Century, i. 13) . The population was stationary. Famine and pestilence were of frequent occurrence (Creighton, Epidemics in Britain, p. 19), and for the careless

there was waste at harvest- time and want in winter. Hunger was the drill-sergeant of society. Owing to the hardship and penury of life infant mor- tality was probably very great (Blashill, Sutton in Holdernesse, p. 123). The 15th century was, however, ” the golden age of the labourer.” Our problem is to ascertain what was the service of charity to this people till the end of that century. In order to estimate this we have to apply tests similar to those we

applied before to Greece and Rome and the pre-medieval church.

The Family. — Largely Germanic in its origin, we may perhaps set down as elemental in the English race what Tacitus said of the Germans. They had the home virtues. They had a high regard for chastity, and respected and enforced the family tie. The wife was honoured. The men were poor, but when the actual pressure of their work — fighting — was removed, idle. They were born gamblers. Much toil fell upon the wife; but slavery was rather a form of tenure than a Roman bondage. As elsewhere, there was in England ” the joint family or household ” (Pollock and Maitland, English Law before Edward I. i. 31). Each member of the com- munity was, or should be, under some lord ; for the lordless man was, like the wanderer in Homer, who belonged to no phratry, suspected and dangerous, and his kinsfolk might be required to find a lord for him. There was personal servitude, but it was not of one complexion ; there were grades amongst the unfree, and the general advance to freedom was continuous. By the 9th century the larger amount of the slavery was bondage by tenure. In the reign of Edward I., though ” the larger half of the rural population was unfree,” yet the serf, notwithstanding the fact that he was his lord’s chattel, was free against all save his lord. A century later (1381) villenage — that is payment for tenancy by service, instead of by quit-rent — was practically extinguished. So steady was the progress towards the freedom and self-maintenance of the individual and his family.

The Manor. — In social importance, next to the family, comes the manor, the organization of which affected charity greatly on one side. It was ” an economic unit,” the estate of a lord on which there were associated the lord wich his demesne, tenants free of service, and villeins and others, tenants by service. All had the

use of land, even the serf. The estate was regulated by a manor court, consisting of the lord of the manor or his representative, and the free tenants, and entrusted with wide quasi-domestic jurisdiction. The value of the estate depended on the labour available for its cultivation, and the cultivators were the unfree tenants. Hence the lord, through the manor-court, required an indemnity or fine if a child, for instance, left the manor; and similarly, if a villein died, his widow might have to remarry or pay a fine. Thus the lord reacquired a servant and the widow and her family were maintained. The courts, too, fixed prices, and thus in local and limited conditions of supply and demand were able to equalize them in a measure and neutralize some of the effects of scarcity. In this way, till the reign of Edward I., and, where the manor courts remained active, till much later, a self-supporting social organization made any systematic public or charitable relief unnecessary.

The Parish and the Tithe. — The conversion of England in the 7th century was effected by bishops, accompanied by itinerant priests, who made use of conventual houses as the centres of their work. The parochial system was not firmly established till the 10th century (970). Then, by a law of Edgar, a man who had a church on his own land was allowed to pay a third of his tithe to his own church, instead of giving the whole of it to the minister or con- ventual church. Theodore, archbishop of Canterbury (667), had introduced the Carolingian system into England ; and, accordingly, the parish priest was required to provide for strangers and to keep a room in his house for them. Of the tithe, a third and not a fourth was to go to the poor with any surplus ; and in order to have larger means of helping them, the priests were urged to work themselves, according to the ancient canons of the church (cf. Labbeus, IV. Cone. Carthag. a.d. 398). The importance of the tithe to the poor is shown by acts of Richard II. and Henry IV., by which it was enacted that, if parochial tithes were appropriated to a monastery, a portion of them should be assigned to the poor of the parish. At a very early date (1287) quasi-compulsory charges in the nature of a rate were imposed on parishioners for various church purposes (Pollock and Maitland, i. 604), though in the 14th and 15th centuries a compulsory church rate was seldom made. Collections were made by paid collectors, especially for Hock-tide (q.v .) money — gathered for church purposes (Brand's Antiquities, p. 112). But there must have been many varieties in practice. In Somersetshire the church- wardens' accounts (1349

to 1560) show that the parish contributed nothing to the relief of the poor, and it seems probable that the personal charities of the parishioners, and the charities of the gild fellowships and of the parsonage house sufficed (Bishop Hobhouse, Churchwardens' Accounts, 1349-1560, Somerset Record Society). Many parishes possessed land, houses and cattle, and received gifts and legacies of all kinds. The proceeds of this property, if given for the use of the parish generally, might, if necessary, be available for the relief of the poor, but, if given definitely for their use, would provide doles, or stock cattle or " poor's " lands, &c. (Cf. Augustus Jessopp, Before the Great Pillage, p. 40; and many instances in the reports of the Charity Commissioners, 1818-1835.) Of the endow- ments for parish doles very many may have disappeared in the break- up of the 16th century. There were also " Parish Ales," the proceeds of which would be used for parish purposes or for relief. Further, all the greater festivals were days of feasting and the distribution of food; at funerals also there were often large distributions, and also at marriages. The faithful generally, subject to penance, were

required to relieve the poor and the stranger. In the larger part of England the parish and the vill were usually coterminous. In the north a parish contained several vills. There were thus side by side the charitable relief system of the parish, which at an early date became a rating area, and the self-supporting system of the manor. The Monasteries. — As Christianity spread monasteries spread, and each monastery was a centre of relief. Sometimes they were established, like St Albans (796), for a hundred Benedictine monks and for the entertainment of strangers; or sometimes without any such special purpose, like the abbey of Croyland (reorganized 946), which, becoming exceeding rich from its diver sorium pauperum, or almonry, " relieved the whole country round so that prodigious numbers resorted to it." At Glastonbury, for instance (1537), £140 16s. 8d. was given away in doles. But documents seem to prove (Denton, England in Fifteenth Century, p. 245) that the relief generally given by monasteries was much less than is usually supposed.

The general system may be described (cf. Rule, St Dunst. Cant. Archp. p. 42, Dugdale; J. B. Clark, The Observances, Augustinian Priory, Barnwell; Abbot Gasquet, English Monastic Life). The almonry was usually near the church of the monastery. An almoner was in charge. He was to be prudent and discreet in the distribution of his doles (portiones) and to relieve travellers, palmers, chaplains and mendicants (mendicantes, apparently the

beggars recognized as living by begging, such as we have noted under other social con- ditions), and the leprous more liberally than others. The old and infirm, lame and blind who were confined to their beds he was to visit and relieve suitably (in competenti annona). The importunity of the poor he was to put up with, and to meet their need as far as he could. In the almonry there were usually rooms for the sick. The sick outside the precincts were relieved at the almoner's dis- cretion. Continuous relief might be given after consultation with the superior. All the remnants of meals and the old clothes of the monks were given to the almoner for distribution, and at Christmas he had a store of stockings and other articles to give away as presents to widows, orphans and poor clerks. He also provided the Maundy gifts and selected the poor for the washing of feet. He was thus a local visitor and alms distributor, not merely at the gate of the monastery but in the neighbourhood, and had also at his disposal " indoor " relief for the sick. Separate from the rest of the house there was also a dormitory and rooms and the kitchen for strangers. A hospitularius attended to their needs and novices waited on them. Guests who were laymen might stay on, work- ing in return for board and lodging (Smith's Diet. Christian Antiq., "Benedictine").

The monasteries often established hospitals; they served also as schools for the gentry and for the poor; and they were pioneers of agriculture. In the 12th century, in which many monastic orders were constituted, there were many lavish endowments. In the 14th century their usefulness had begun to wane. At the end of that century the larger estates were generally held in entail, with the result that younger sons were put into religious houses. This worldliness had its natural consequences. In the 15th century, owing to mismanagement, waste, and subsequently to the decline of rural prosperity, their resources were greatly crippled. In their relation to charity one or two points may be noted: (1) Of the small population of England the professed monks and nuns with the parish priests (Rogers, Hist. Agric. and Prices, i. 58) numbered at least 30,000 or 40,000. This number of celibates was a standing protest against the moral sufficiency of the family life. On the other hand, amongst them were the brothers and sisters who visited the poor and nursed the sick in hospitals; and many who now succumb physically or mentally to the pressure of life, and are cared for in institutions, may then have found maintenance and a retreat in the monasteries. (2) Bound together by no common controlling organization, the monasteries were

but so many miscellaneous centres of relief, chiefly casual relief. They were mostly ” magni- ficent hostelries.” (3) They stood outside the parish, and they weakened its organization and hampered its development.

The Hospitals. — The revival of piety in the nth century led to a large increase in the number of hospitals and hospital orders.’ To show how far they covered the field in England two instances may be quoted. At Canterbury (Creighton, Epidemics, p. 87) there were four for different purposes, two endowed by Lanfranc (1084), one for poor, infirm, lame and blind men and women, and one out- side the town for lepers. These hospitals were put under the charge of a priory, and endowed out of tithes payable to the secular clergy. Later (Henry II.), a hospital for leprous sisters was established, and afterwards a hospital for leprous monks and poor relations of ‘ the monks of St Augustine’s. In a less populous parish, Luton (Cobbe, Luton Church), there were a hospital for the poor, an alms- house, and two hospitals, one for the sick and one for the leprous. The word ” leper,” it is evident, was used very loosely, and was applied to many diseases other than leprosy. There were hospitals for the infirm and the leprous; the disease was not considered contagious. The hospital in its modern sense was but slowly created. Thus St Bartholomew’s in London was founded (1123) for a master, brethren and sisters, and for the entertainment of poor diseased persons till they got well; of distressed women big with child till they were able to go abroad ; and for the maintenance, until the age

of seven, of all such children whose mothers died in the house. St Thomas’s (rebuilt 1228) had a master and brethren and three lay sisters, and 40 beds for poor, infirm and impotent people, who had also victual and firing. There were hospitals for many special purposes — as for the blind, for instance. There were also many hospital orders in England and on the continent. They sprang up beside the monastic orders, and for a time were very popular: brothers and sisters of the Holy Ghost (1 198), sisters of St Elizabeth (1207-1231), Beguines and Beghards (see Beguines), knights of St John and others.

The Mendicant Orders. — The Franciscans tended the sick and poor in the slums of the towns with great devotion — indeed, the

whole movement tells of a splendid self-abandonment and an intensity of effort in the early spring of its enthusiasm, and with the aid of reform councils and reformations it lengthened out its usefulness for two centuries.

As in the pre-medieval church, the system of relief is that Medieval of charitable endowments — a marked contrast to endowed the modern method of voluntary associations or charities. ra te-supported institutions.

(1) The Church as Legatee. — The church building among the Teutonic races was not held by the bishop as part of what was originally the charitable property of the church. It was assigned to the patron saint of the church by the donor, who retained the right of administration, of which his own patronage or right of presentation is a relic. Subsequently, with the study of Roman law, the conception of the church as a persona ficta prevailed ; and till the larger growth of the gilds and corporations it was the only general legatee for charitable gifts. As these arise a large number of charitable trusts are created and held by lay corporations; and ” alms ” include gifts for social as well as religious or eleemosynary purposes. (2) Freedom from Taxation and Service. — Gifts to the church for charitable or other purposes were made in free, pure and perpetual alms (” ad tenendum in puram et perpetuam eleemosynam sine omni temporali servicio et consuetudine “). Land held under this frankalmoign was given ” in perpetual alms,” therefore the donor could not retract it; in free alms, therefore he could exact no services in regard to it; and in pure alms as being free from secular jurisdiction (cf. Pollock and Maitland). (3) Alienation and Mortmain. — To prevent alienation of property to religious houses, with the consequent loss of service to the superior or chief lords, a licence from the chief lord was required to legalize the alienation (Magna Carta, and Edw. I., De viris religiosis). Other statutes (Edw. I. and Rich. II.) enacted that this licence should be issued out ‘of chancery after investigation; and the principle was applied to civil corporations. The necessity of this licence was one lay check on injurious alienation. (4) Irresponsible Administration. — Until after the 13th century, when the lay courts had asserted their right to settle disputes as to lands held in alms, the administration of charity was from the lay point of view entirely irresponsible. It was outside the secular jurisdiction; and civilly the professed clergy, who were the administrators, were ” dead.” They could not sue or be sued except through their sovereign — their chief, the abbot. They

formed a large body of non-civic inhabitants free from the pressure and the responsibilities of civil life. (5) Control. — • Apart from the control of the abbot, prior, master or other head, the bishop was visitor, or, as we should say, inspector; and abuses might be remedied by the visit of the bishop or his ordinary. The bishop's ordinary (2 Henry V. i. 1) was the recognized visitor of all hospitals apart from the founder. The 'ounder and his family retained a right of intervention. Sometimes thus an institution was reorganized, or even dissolved, the property reverting to the founder (Dugdale, Monasticon Anglicanum, vi. 2. 715). (6) Cy-pres. — Charities were, especially after Henry V.'s reign, appropriated to other uses, either because their original purpose failed or because some new object had become important. Thus, for instance, a. college or hospital for lepers (1363) is re-established by the founder's family with a master and priest, quod nulli leprosi reperiebantur ; and a similar hospital founded in Henry I.'s time near Oxford has decayed, and is given by Edward III. to Oriel College, Oxford, to maintain a chaplain and poor brethren. Thus, apart from alienation pure and simple, the principle of adaptation to new uses was put in force at an early date, and supplied many precedents to Wolsey, Edward VI. and the post-Reformation bishops. The system of endowments was indeed far more adaptable than it would at first sight seem to have been. (7) The Sources of Income.— The hospitals were chiefly supported by rents or the produce of land; or, if attached to monasteries, out of the tithe of their monastic lands or other sources of revenue, or out of the appropriated tithes of the secular clergy; or they might be in part maintained by collections made, for instance, by a commissioner duly authorized by a formal attested document, in which were recounted the indulgences by popes, archbishops and bishops to those who became its benefactors (Cobbe, p. 75) ; or, in the case of leper hospitals, by a leper with a " clapdish," who begged in the markets; or by a proctor, in the case of more important institutions in towns, who " came with his box one day in every month to the churches and other religious houses, at times of service, and there received the voluntary gifts

of the congregation " ; or they might receive inmates on payment, and thus apparently a frequent abuse, decayed servants of the court and others, were " farmed out." (8) Mode of Admission. — The admission was usually, no doubt, regulated by the prior or master. At York, at the hospital of St Nicholas for the leprous, the conditions of admission were: promise or vow of

continence, participation in prayer, the abandonment of all business, the inmate's property at death to go to the house. This may serve as an example. The master was usually one of the regular clergy. (9) Decline of the Hospitals. — It is said that, in addition to 645 monasteries and 90 "colleges" and many chantries, Henry VIII. suppressed no hospitals (Speed's Chronicle, p. 778). The numbers seem small. In the economic decline at the end of the 15th and beginning of the 1 6th centuries many hospitals may have lapsed.

In the 15th century the towns grew in importance. First the wool trade and then the cloth trade flourished, and the English developed a large shipping trade. The towns grew up like " little principalities "; and for the advancement mun a ˆ lpat of trade, gilds, consisting alike of masters and workmen, charities. were formed, which endeavoured to regulate and then to monopolize the market. By degrees the corporations of the towns were worked in their interests, and the whole commercial system became restrictive and inadaptable. Meanwhile the towns attracted newcomers; freedom from feudal obligations was gained with comparative ease; and a new plebs was congregating, a population of inhabitants not qualified as burghers or gild members, women, sons living with their fathers, menial servants and apprentices. There was thus an increasing restriction imposed on trade, coupled with a growing plebs. Naturally, then, lay charities sprang up for members of gilds, and for burghers and for the commonalty. Men left estates to their gilds to maintain decayed members in hospitals, almshouses or otherwise, to educate their children, portion their daughters, and to assist their widows. The middle-class trader was thus in great measure insured against the risks of life. The gilds were one sign of the new temper and wants of burghers freed from feudal- ism. Another sign was a new standard of manners. Rules and saws, Hesiodic in their tone, became popular — in regard, for instance, to such a question as " how to enable a man to live on his means, and to keep himself and those belonging to him." The boroughs established other charities also, hospitals and alms- houses for the people, a movement which, like that of the gilds, began very early — in Italy as early as the 9th century. They sometimes gave outdoor relief also to registered poor (Green i. 41), and they had in large towns courts of orphans presided over by the mayor and aldermen, thus taking over a duty that previously had been one of conspicuous importance in the church. As early as 1 257 in Westphalian towns there was a rough-and-ready system of Easter

relief of the poor; and in Frankfort in 1437 there was a town council of almoners with a systematic pro- gramme of relief (Ratzinger, p. 352). Thus at the close of the middle ages the towns were gradually assuming what had been charitable functions of the church.

While a new freedom was being attained by the labourer in the country and the burgher in the town, the difficulty of obtain- ing a sufficient supply of labour for agriculture must statutor have been constant, especially at every visitation of w * g ” or} plague and famine. In accordance with a general control. policy of state regulation which was to control and supervise industry, agriculture and poor relief and to repress vagrancy by gaols and houses of correction, the state stepped in as arbiter and organizer. By Statutes of Labourers beginning in 1351 (25 Edw. III. 135), it aimed at enforcing a settled wage and restraining migration. From 1351ft endeavoured to suppress mendicity, and in part to systematize it in the interest of infirm and aged mendicants. Each series of enactments is the natural complement of the other. In the main their signification, from the point of view of charity, lies in the fact that they represent a persistent endeavour to prevent social unsettlement and in part the distress which unsettlement causes, and which vagrancy in some measure indicates, by keeping the people within the ranks of recognized dependence, the settled industry of the crafts and of agriculture, or forcing them back into it by fear of the gaol or the stocks. The extreme point of this policy was

reached when by the laws of Edward VI. and Elizabeth the “rogue, vagabond or sturdy beggar” was branded with an R on the shoulder and handed over as a bondman for a period to any one who would take him. On the other hand, it was desired that relief should be a means of preventing migration. In any time of general pressure there is a desire to organize mendicity, to prevent the wandering of beggars, to create a kind of settled poor, distinguished from the rest as infirm and not able-bodied, and to keep these at least at home sufficiently supported by local and parochial relief; and this, in its simpler form all the world over, has in the past been by response to public begging. The argument may be summed up thus: We cannot have begging, which implies that the beggar is cared for by no one, belongs to

no one, and therefore throws himself on the world at large. Therefore, if he is able-bodied he must be punished as unsocial, for it is his fault that he belongs to no one; or we must make him some one's dependant, and so keep him; or if he is infirm, and therefore of no service to any one — if no one will keep him — we must organize his mendicity, for such mendicity is justified. If he cannot dig for the man to whom he does or should belong, he must beg. Then out of the failure to organize mendicity — for relief of itself is no remedy, least of all casual relief — a poor-law springs up, which, afterwards associated with the provision of employment, will, it is hoped, make relief in some measure remedial by increasing its quantity by means of com- pulsory levies. This argument, which combined statutory wage control and statutory poor relief, seems to have been firmly bedded in the English legislative mind for more than two centuries , from 1351 till after 1600; and until 1834 these two series of laws effectually reduced the English labourer to a new industrial dependence. To people imbued with ideas of feudalism the way of escape from villenage seemed to be not independence, but a new reversion to it.

Many elements produced the social and economic catastrophe of the 16th century, for the condition into which the country fell can hardly be considered less than a catastrophe. With the growing independence of the people there was created after the 13th century an unsettled " master- less " class, a residue of failure resulting from social changes, which was large and important enough to call for legislation. In the 15th century, " the golden age of the English labourer," the towns increased and flourished. Both town and country did well. At the end of the century came the decadence. The measure of the strain, when perhaps it had reached its lowest level, is indicated by the following comparison: ".The cost of a peasant's family of four in the early part of the 14th century was £3:4:9; after 1540 it was £8 " (Rogers, Hist, of Agric. and Prices, iv. 756).

The cause of this has now been fairly investigated. The value of land in the 13th century generally depended chiefly on " the head of labour " retained upon it. Its fertility depended on main-oeuvre (manure). To keep labour upon it was therefore the aim of the lord or owner. The enclosing of lands for sheep began early, and in the time of Edward III., in the great days of the woolstaple, must have been extensive. So long as the demand for the exporta- tion of wool, and then for its consumption at home in the cloth trade, continued, the towns prospered, and the

enclosures did not become a grievance. Even before the reign of Henry VII., with the decay of trade, the towns decayed, and their population in some cases diminished extraordinarily. This reacted on the country, where the great families had already become impoverished, and were hardly able to support their retainers. In Henry VIII. ‘s time the lands of the religious houses were confiscated. Worked on old lines, the custom of tillage remained in force on them. Accordingly, when these estates fell into private hands they were transferred subject to the condition that they should be tilled as heretofore. The con- dition was evaded by the new owners, and the disbandment of farm labourers went on apace. In England and Wales these changes, it is said, affected a third of the country, more than 12,000,000 acres, if the estimates be correct, or rather a third of the best land in the kingdom. With towns decaying, the effect of this must have been terrible. What were really ” latifundia ” were created, ” great landes,” ” enclosures of a mile or two or thereabouts . . . destroy- ing thereby not only the farms and cottages within the same circuits, but also the towns and villages adjoining.” A herdsman and his wite took the place of eighteen to twenty-four farm hands. The people thus set wandering could only join the wanderers from the

The de- cadence.

decaying towns. At the same time the economic difficulty was aggravated by a new patrician or commercial greed ; and once more the land question — the absorption of property into a few hands instead of its free exchange — led to lasting social demoralization. A few years after the alienation of the monasteries the coinage (!543) was debased. By this means prices were arbitrarily raised, and wages were increased nominally; but nevertheless the price of necessaries was ” so enhanced ” that neither ” the poor labourers can live with their wages that is limited by your grace’s laws, nor the artificers can make, much less sell, their wares at any reasonable price ” (Lamond, The Commonweal of this Realm of England, p. xlvii). No social reformation, such as the charitable instincts of W’ycliffe, More, Hales, Latimer and other men suggested, was attempted, or at least persistently carried out. In towns the organization of labour had become restrictive, exclusive and inadaptable, or, judged from the moral standpoint, uncharitable. There had been a time of plenty and extravagance, of which in high quarters the famous ” field of the cloth of gold ” was typical; and probably, in accordance with the frequently observed law of social economics,

as the advance in wages and their purchasing power in the earlier part of the 15th century had not been accompanied by a simultaneous advance in self-discipline and intelligent expenditure, it resulted in part in lessened competence and industrial ability on the part of the work- men, and thus in the end produced pauperism.

The poverty of the country was very great in the reigns of Edward VI. and Elizabeth. Adversity then taught the people new manners, and households became more simple and thrifty. In the reign of James I., with enforced economy and thrift, a " slow but substantial improvement in agriculture " took place, and a new growth of commercial enterprise. The vigour of the municipalities had abated, so that in Henry VIII. 's time they had become the very humble servants of the government; and the government, on the other hand, had become strongly centralized — in itself a sign of the general withdrawal of self- sustaining activity in all administration, in the administration of charitable relief no less than in other departments. A system of endowed charities had been built up, supported chiefly by rents from landed property. These now had disappeared, and thus the means of relief, which Edward VI. and Queen Elizabeth might have utilized at a time of general distress, had been dis- sipated by the acts of their predecessors. The civil independence of the monasteries and religious houses might have been justified, possibly, when they were engaged in missionary work and were instilling into the people the precepts of a higher moral law than that which was in force around them. But afterwards, as the ability and intelligence of the community increased, their privi- leges became more and more antagonistic to charity, and tended to create a non-social and even anti-social ecclesiastical democracy actuated by aims and interests in which the general good of the people had little or no place. There was a growing alienation between religious tradition and secular opinion, as Lollardism slowly permeated the thought of the people and led the way to the Reformation. While this alienation existed no national system of charity, civic and yet religious, could be created. But worse than all, the ideal of charity had been degraded. A self- regarding system of relief had superseded charity, and it was productive of nothing but alms, large or small, isolated and un- methodic, given with a wrong bias, and thus almost inevitably with evil results. Out of this could spring no vigorous co-opera- tive charity. Charity — not relief — indeed seemed to have left the world. The larger issues were overlooked.

Then the property of the hospitals and the gilds was wantonly confiscated, though the poor had already lost that share in the revenues of the church to which at one time they were admitted to have a just claim. A new beginning had to be made. The obligations of charity had to be revived. A new organization of charitable relief had to . be created, and that with an empty exchequer and after a vast waste of charitable resources. There were signs of a new con- gregational and parochial energy, yet the task could not be entrusted to the religious bodies, divided and disunited as they were. In their stead it could be imposed only on some authority which represented the general community, such as municipalities; and in spite of the centralization of the government there seemed some hope of creating a system of relief in connexion with them. They were tried, and, very naturally, failed. In the poverty of the time it seemed that the poor could be relieved only by a

compulsory rate, and the administration of statutory relief naturally devolved on the central government — the only vigorous administrative body left in the country. The government might indeed have adopted the alternative of letting the industrial difficulties of the country work themselves out, but they had inherited a policy of minute legislative control, and they continued it. Revising previous statutes, they enacted the Poor Law, which still remains on the statute book. It could be no remedy for social offences against charity and the community. But in part at least it was successful. It helped to conceal the failure to find a remedy.

Part VI. — After the Reformation During the Reformation, which extended, it should be under- stood, from the middle of the 14th century to the reign of James I., The t ˆ le groundwork of the theory of charity was being

Reform*- recast. The old system and the narrow theory on which Hon theory £t had come to depend were discredited. The recoil of charity. j g startling. To a very large extent charitable ad- ministration had been in the hands of men and women who, as an indispensable condition to their participation in it, took the vows of obedience, chastity and ” wilful ” poverty. Now this was all entirely set aside. It was felt (see Homilies on Faith and Good

Works, &°c, a.d. 1547) that socially and morally the method had been a failure. The vow of obedience, it was argued, led to a general disregard of the duties of civic and family life. Those who bound themselves by it were outside the state and did not serve it. In regard to chastity the Homily states the common opinion: " How the profession of chastity was kept, it is more honesty to pass over in silence and let the world judge of what is well known." As to wilful poverty, the regulars, it is urged, were not poor, but rich, for they were in possession of much wealth. Their property, it is true, was held in communi, and not personally, but nevertheless it was practically theirs, and they used it for their personal enjoyment; and " for all their riches they might never help father nor mother, nor others that were indeed very needy and poor, without the license of their father abbot" or other head. This was the negative position. The positive was found in the doctrine of justification — the central point in the discussions of the time, a plant from the garden of St Augustine. Justification was the personal conviction of a lively (or living) faith, and was defined as "a true trust and confidence of the mercy of God through our Lord Jesus Christ, and a stedfast hope of all good things to be received at His hands." Without this justification there could be no good works. They were the signs of a lively faith and grew out of it. Apart from it, what seemed to be " good works " were of the nature of sin, phantom acts productive of nothing, " birds that were lost, unreal." So were the works of pagans and heretics. The relation of almsgiving to religion was thus entirely altered. The personal reward here or hereafter to the actor was eliminated. The deed was good only in the same sense in which the doer was good; it had in itself no merit. This was a great gain, quite apart from any question as to the sufficiency or insufficiency of the Protestant scheme of salvation. The deed, it was realized, was only the outcome of the doer, the expression of himself, what he was as a whole, neither better nor worse. Logically this led to the discipline of the intelligence and the emotions, and undoubtedly " justification "' to very many was only con- sistent with such discipline and implied it. Thus under a new guise the old position of charity reasserted itself. But there were other differences.

The relation of charity to prayer, fasting, almsgiving and penance was altsred. The prayerful contemplation of the Christ was pre- served in the mysticism of Protestantism ; but it was dissociated from the " historic Christ," from the fervent idealization of whom St Francis drew his inspiration and his active charitable impulse.

The tradition did not die out, however. It remained with many, notably with George Herbert, of whom it made, not unlike St Francis, a poet as well as a practical parish priest; but the absence of it indicated in much post-Reformation endeavour a want, if not of devotion, yet of intensity of feeling which may in part account for the fact that sectarianism in relief has since proved itself stronger than charity, instead of yielding to charity as its superior and its

organizer. Fasting was parted from prayer and almsgiving. It was ” a thing not of its own proper nature good as the love of father or mother or neighbour, but according to its end.” Almsgiving also as a ” work ” disappeared and with it a whole series of inducements that from the standpoint of the pecuniary and material supply of relief had long been active. It was no wonder that the preachers advocated it in vain, and reproached their hearers with their dimin- ished bounty to the poor ; the old personal incentive had gone, and could only gradually be superseded by the spontaneous activity of personal religion very slowly wedding itself to true views of social duty and purpose. Penance, once so closely related to almsgiving, passed out of sight. Charity, the love of God and our neighbour, had two offices, it was said, ” to cherish good and harmless men ” and ” to correct and punish vice without regard to persons.” Correction as a means of discipline takes the place of penance, and it becomes judicial, regulating and controlling church membership by the authority of the church, a congregation, minister or elder ; or deal- ing with laziness or ill-doing through the municipality or state, in connexion with what now first appear, not prisons, but houses of correction.

The religious life was to be democratic — not in religious bodies, but in the whole people; and in a new sense — in relation to family and social life — it was to be moral. That was the significance of the Reformation for charity.

Consistently with this movement of religious activity towards a complete fulfilment of the duties of civic life, the older classical social theory, fostered by the Renaissance, assumed a _ new influence — the great conception of the state as a organiza- community bound together by charity and friendship. Hon of ” We be not born to ourselves,” it was said, ” but m ˆ c ‘/” / partly to the use of our country, of our parents, of our kinsfolk, and partly of our friends and neighbours; and therefore all good virtues are grafted on us naturally, whose effects be to do good to

others, when it showeth forth the image of God in man, whose property is ever to do good to others ” (Lamond, p. 14). Economic theoryalso changed. Instead of the medieval opinion of the ” theologian or social preacher,” that ” trade could only be defended on the ground that honestly conducted it made no profit ” (Green, ii. 71), we have a recognition of the advantages resulting from exchange, and individual interests, it is argued, are not necessarily inconsistent with those of the state, but are, on the contrary, a source of solid good to the whole community.

Municipal laws for the suppression of the mendicity of the able-bodied and the organization of relief on behalf of the infirm were common in England and on the continent (Colmar, 1362; Nuremberg, 1478 ; Strassburg, 1523 ; London, 1514). Vives (Ehrle, Beitrdge zur Geschichte und Reform der Armenpflege, p. 26), a Spaniard, who had been at the court of Henry VIII., in a book translated into several languages and widely read, seems to have summed up the thought of the time in regard to the management of the poor. He divided them into three classes: those in hospitals and poor- houses, the public homeless beggars and the poor at home. He would have a census taken of the number of each class in the town, and information obtained as to the causes of their distress. Then he would establish a central organization of relief under the magis- trates. Work was to be supplied for all, while begging was strictly forbidden. Non-settled poor who were able-bodied were to be sent to their homes. Able-bodied settled poor who knew no craft were to be put on some public work — the undeserving being set to hard labour. For others work was to be found, or they were to be assisted to become self-supporting. The hospitals provided with medical advice and necessaries were to be classified to meet the needs of the sick, the blind and lunatics. The poor living at home were to work with a view to their self-support. What they earned, if insufficient, might be supplemented. If a citizen found a case of distress he was not to help it, but to send it for inquiry to the magistrate. Children were to be taught. Private relief was to be obtained from the rich. The funds of endowed charities were to be the chief source of income ; if more was wanted, bequests and church collections would suffice. The scheme was put in force in Ypres in 1524. The Sorbonne approved it, and similar plans were adopted in Paris and elsewhere. It is in outline the scheme of London municipal charity promoted by Edward VI., by which the poor were classified, St Bartholomew’s and St Thomas’s hospitals appropriated for the sick, Christ’s hospital for the children of the

poor, and Bridewell for the correction of the able-bodied. Less the institutional arrangements and plus the compulsory rate, the methods are those of the Poor Relief Act of Queen Elizabeth of 1601. At first the attempt had been made to introduce state relief in reliance on voluntary alms (1 Mary 13, 5 Eliz. 3, 1562-1563), subject to the right of assessment if alms were refused. But the position was anomalous. Charity is voluntary, and spontaneously meets the demands of distress. Such demands have always a tendency to increase with the supply. Hence the very

limitations of charitable finance are in the nature of a safeguard. At most economic trouble can only be assuaged by relief, and it can only be met or prevented by economic and social reforms. If a compulsory rate be not enforced, as in Scotland and formerly in some parishes in England, a voluntary rate may be made in supple- mentation of the local charities. In Scotland, where the compulsory clauses of the Poor Relief Act of James I. were not put in force, the country weathered the storm without them, and the compulsory rate, which was extended throughout the country by the Poor Act of 1844, came in very slowly in the 18th and 19th centuries. In France (1566) a similar act was passed and set aside. If a compul- sory rate be enforced, it is inevitable that the resources of charity, unless kept apart from the poor-law and administered on different lines from it, will diminish, and at the same time, as has happened often in the case of endowed charities, the interest in charitable administration will lapse, while the charges for poor-law relief, drawn without much scruple from the taxation of the community, will mount to millions either to meet increasing demands or to pro- vide more elaborate institutional accommodation. The principle once adopted, it was enacted (1572-1573) that the aged and infirm should be cared for by the overseers of the poor, a new authority; and in 1601 the duplicate acts were passed, that for the relief of the poor (43 Eliz. 2), and that for the furtherance and protection of endowed charities. Thus the poor were brought into the depend- ence of a legally recognized class, endowed with a claim for relief, on the fulfilment of which, after a time, they could without difficulty insist if they were so minded. The civic authority had indeed taken over the alms of the parish, and an eleemosyna civica had taken the place of the annona civica. It was a similar system under a different name.

A phrase of Robert Cecil's (1st earl of Salisbury) indicates the minute domestic character of the Elizabethan legislation (D'Ewes, Poor Relief 674). The question (1601) was the repeal of a statute Acts and of tillage. Cecil says: "If in Edward I.'s time a statutory j aw was m ade for the maintenance of the fry of fish, ora. an(j j n jj enrv VII. 's for the preservation of the eggs of wild fowl, shall we now throw away a law of more consequence and import? If we debar tillage, we give scope to the depopulating. And then, if the poor being thrust out of their houses go to dwell with others, straight we catch them with the statute of inmates; if they wander abroad, they are within the danger of the statute of the poor to be whipt. So by this undo this "Statute, and you endanger many thousands." A strong central government, a local authority appointed directly by the government, and a network of legislation controlled the whole movement of economic life. On this reliance was placed to meet economic difficulties. The local authorities were the justices of the peace; and they had to carry out the statutes for this purpose, to assess the wages of artisans and labourers, and to enforce the payment of the wages they had fixed; to ensure that suitable provision was made for the relief of the poor at the expense of rates which they also fixed; and to suppress vagabondage. Since 23 Edw. III. there had been labour statutes, and in 1563 a new statute was passed, an " Act containing divers orders for Artificers, Labourers, Servants of Husbandry and Apprentices " (5 Eliz. c. 4). It recognized and upheld a social classification. On the one hand there was the gentleman or owner of property to which the act was not to apply; and on the other the artisan and labouring class. This class in turn was subdivided, and the justices were to assess their wages annually according to " the plenty and scarcity of the time and other circumstances." Persons between the ages of twelve and sixty, who were not apprentices or engaged in certain specified employ- ments, were compelled to serve in husbandry by the year " with any person that keepeth husbandry." The length of the day's work and the conditions of apprenticeship were fixed. The assessed rate of wages was enforceable by fine and imprisonment, and refusal to be apprenticed by imprisonment. Thus there was created a life control over labour with an industrial settle- ment and a wage fixed by the justices annually. There are differences of opinion in regard to the extent to which this act was enforced; and the evidence on the point is comparatively scanty. It was enforced thrqughout the century in which it was passed, and it probably continued in force generally until the Restoration, while subsequently it was put in operation

to meet special emergencies, such as times of distress when some settlement of wages seemed desirable (cf. Rogers, v. 611; Hewins, English Trade and Finance, p. 82; Cunningham, Growth

of English Industry and Commerce: Modem Times, i. 168). It was not repealed till 1814.

From 1585 to 1622 there was, it is said, a slight increase in labourers' wages, which fluctuated from 5s. |d. to 5s. 8jd. a week, with a declining standard of comfort and at times great distress. Then there was a marked increase of wage till 1662 and " a very marked improvement; the rate of increase being very nearly double that of the earlier periods," and reaching gs., " as the highest weekly rate for the whole period." Then from 1662 to 1702 there was "a slight improvement" (Hewins, p. 89). It would seem indeed that the stir of the times between 1622 and 1662 may have caused a great demand for labour. But with the Restoration, when the assessment system was falling into desuetude, came the Poor Relief Act of 1662 (13 & 14 Car. II. cap. 62), which brought in the law of settlement, and a settlement for relief of a very strict nature was added to the industrial settlement of the Artificers and Labourers Act. Thus, if the influence of that act, which had so long controlled labour, was waning, its place was now taken by an act which, though it had nothing to do with the assessment of wage, yet so settled the labourer within the bounds of his parish that he had practically to rely, if not upon a wage fixed by the justices, yet upon a customary wage limited and restricted as a result of the law of settlement. And the assessment by the justices, in so far as it may have continued, would therefore be of little or no con- sequence. Settlement also, like the Artificers and Lahourers Act, would prevent the country labourer from passing to the towns, or the townsmen passing to other towns. At least they would do so at the risk of forfeiting their right to relief if they lost their settlement without acquiring a new one. Hence the industrial control, though under another name and other conditions, remained in force to a large extent in practice.

By the Artificers and Labourers Act then, in conjunction with other measures, the labouring classes were finally committed to a new bondage, when they had freed themselves from the serfdom of feudalism, and when the control exercised over them by the gild and municipality was relaxed. The statute was so enforced that to earn a year's livelihood would have taken a labourer not 52 weeks, but sometimes two years, or 58 weeks, or 80 weeks, or

72 weeks; sometimes, however, less — 48 or 35. It followed that on such a system the country could only with the utmost good fortune free itself from the economic difficulties of the century, and that the need of a poor-law was felt the more as these difficulties persisted. A voluntary or a municipal system could not suffice, even as a palliative, while such statutes as these were in force to render labour immobile and unprogressive. Also, while wages were fixed by statute or order, whether chiefly in the interest of the employers or not, obviously any shortage on the wages had to be made good by the community. The community, by fixing the wages to be earned in a livelihood, made itself responsible for their sufficiency. And it is suggestive to find that in the year in which the Artificers and Labourers Act (1563) was passed, the act for the enforcement of assessments of poor-rate (5 Eliz. cap. 3) was also enacted. The Law of Settlement, to which we have referred, passed in the reign of Charles II., was due, it is said, to a migration of labourers southward from counties where less favourable statutory wages prevailed; but it was, in fact, only a corollary of the Artificers and Labourers Act of 1563 and the Poor Relief Act of 1601. These laws, it may be said, were the means of making the English labourer, until the poor-law reform of 1834, a settled but landless serf, supported by a fixed wage and a state bounty. By the poor-law it was possible to continue this state of things till, in consequence of an absolute economic breakdown, there was no alternative but reform.

The philanthropic nature of the poor-law is indicated by its antecedents: once enacted, its bounties became a right; its philanthropy disappeared in a quasi-legal claim. Its object was to relieve the poor by home industries, apprentice children, and provide necessary relief to the poor unable to work. The act was commonly interpreted so as to include the whole of that indefinite class, the ” poor “; by a better and more rigid interpretation it

was, at least in the 19th century,held to apply only to the ” destitute,” that is, to those who required ” necessary relief ” — accord- ing to the actual wording of the statute. The economic fallacy of home industries founded on rate-supplied capital early declared itself, and the method could only have continued as

long as it did because it formed part of a general system of industrial control. When in the 18th century workhouses were established, the same industrial fallacy, as records show, repeated itself under new conditions. Within the parish it resulted in the farmer paying the labourer as small a wage as possible, and leaving the parish to provide whatever he might require in addition during his working life and in his old age. Thus, indeed, a gigantic experi- ment in civic employment was made for at least two centuries on a vast scale throughout the country — and failed. As was natural, the lack of economic independence reacted on the morals of the people. With pauperism came want of energy, idleness and a disregard for chastity and the obligations of marriage. The law, it is true, recognized the mutual obligations of parents and grand- parents, children and grandchildren; but in the general poverty which it was itself a means of perpetuating such obligations became practically obsolete, while at all times they are difficult to enforce. Still, the fact that they were recognized implies a great advance in charitable thought. The act, passed at first from year to year, was very slowly put in force. Even before it was passed the poor-rate first assessed under the act of 1563 was felt to be " a greater tax than some subsidies," and in the time of Charles II. it amounted to a third of the revenue of England and Wales (Rogers, v. 81).

The service of villein and cottar was, as we have now seen, in part superseded by what we have called a statutory wage-control, founded on a basis of wage supplemented by relief, provided by a rate-supported poor-law. But it follows .that with the decay of this system the poor-law itself should have disappeared, or should have taken some new and very limited form. Unfortunately, as in Roman times, state relief proved to be a popular and vigorous parasite that outlived the tree on which it was rooted : assessments of wage under the Statute of Labourers fell into disuse after the Restoration, it is said, and the statute was finally repealed in 1814, and sixty years later the act against illegal combinations of working men; but the serfdom of the poor-law, the eleemosyna civica, remained, to work the gravest evil to the labouring classes, and even after the reform of 1834 greatly impeded the recovery of their independence. Neverthe- less, by a new law of state alms for the aged, or by statutory outdoor relief with, as some would wish, a regulated wage, it is now proposed to bring them once again under a thraldom similar to that from which they have so slowly emancipated themselves.

The policy adopted by Queen Elizabeth for the relief of the poor (1601) included a scheme for the reorganization of voluntary charity as well as plans for the extension of rate-aided endowed re ˆ e f • During the century, as we have seen, endeavours charities, had been made to create a system of voluntary charity. This it was proposed to safeguard and promote con- currently with the extension of the poor-rate. Accordingly, in the poor-law it was arranged that the overseers, the new civic authority, and the churchwardens, the old parochial and charit- able authority, should act in conjunction, and, subject to magis- terial approval, together ” raise weekly or otherwise ” the necessary means ” by taxation of every inhabitant.” The old charitable organization was based on endowment, and the church- warden was responsible for the administration of many such endowments. What was not available from these and other sources was to be raised ” by taxation.” The object of the new act was to encourage charitable gifts.

Towards the end of the 18th century, when the administration of poor relief fell into confusion, many charities were lost, or were in danger of being lost, and many were mismanaged. In 1786 and 1788 a committee of the House of Commons reported on the subject. In 1818, chiefly through the instrumentality of Lord Brougham, a commission of inquiry on educational charities was appointed, and in 1819 another commission to investigate (with some exceptions) all the charities for the poor in England and

Wales. These and subsequent commissions continued their inquiries till 1835, when a select committee of the House of Commons made a strong report, advocating the establishment of a permanent and independent board, to inquire, to compel the production of accounts, to secure the safe custody of charity property, to adapt it to new uses on cy-pres lines, &c. A com- mission followed in 1849, and eventually in 1853 the first Charitable Trusts Act was passed, under which ” The Charity Commissioners of England and Wales ” were appointed.

The following are details of importance: — (1) Definition. — The definition of the act of 1601 (Charitable Uses, 43 Eliz. 4) still holds good. It enumerates as charitable objects all that was once called ” alms “: (a) ” The relief of aged, impotent and poor people ” — the normal poor; “the maintenance of sick and maimed soldiers and mariners ” — the poor chiefly by reason of war, sometime a class of privileged mendicants; (V) education, ” schools of learning, free schools and scholars in universities ” ;

and then © a group of objects which include general civic and religious purposes, and the charities of gilds and corporations; ” the repair of bridges, ports, havens, causeways, churches, sea-banks and highways; the educa- tion and preferment of orphans ; the relief, stock, or maintenance for houses of correction; marriages of poor maids, supportation, aid, and help of young tradesmen, handicraftsmen, and persons de- cayed ” ; and there follows (d) ” the relief or redemption of prisoners or captives ” ; and, lastly, (e) ” the aid and ease of any poor inhabit- ants concerning payment of fifteens ” (the property-tax of Tudor times), setting out of soldiers, and other taxes. The definition might be illustratedby the charitable bequests of the next 60, or indeed 225, years. It is a fair summary of them. (2) Charitable Gifts. — A public trust and a charitable trust are, as this definition shows, synonymous. It is a trust which relates to public charities, and is not held for the benefit of private persons, e.g. relations, but for the common good, and, subject to the instructions of the founder, by trustees responsible to the community. Gifts for charitable purposes, other than those affected by the law of mortmain, have always been viewed with favour, ” Where a charitable bequest is capable of two constructions, one of which would make it void and the other would make it effectual, the latter will be adopted by the court ” (Tudor’s Charitable Trusts, ed. 1906, by Bristowe, Hunt and Burdett, p. 167). Gifts to the poor, or widows, or orphans, in- definitely, or in a particular parish, were valid under the act, or for any purpose or institution for the aid of the ” poor.” Thus practi- cally the act covered the same field as the poor-law, though after- wards it was decided that, ” as a rule, persons receiving parochial relief were not entitled to the benefit of a charity intended for the poor ” (Tudor, p. 167). (3) Religious Differences. — In the adminis- tration of charities which are for the poor the broadest view is taken of religious differences. (4) Superstitious Uses. — The superstitious use is one that has for its object the propagation of the rights of a religion not tolerated by the law (Tudor, p. 4). Consequently, so far as charities were held or left subject to such rights, they were illegal, or became legal only as toleration was extended. Thus by degrees, since the Toleration Act of 1688, all charities to dis- senters have become legal — that is, trusts for schools, places for reli- gious instruction, education and charitable purposes generally. But bequests for masses for the soul of the donor, or for monastic orders, are still void. (5) Administration. — The duty of administering charitable trusts falls upon trustees or

corporations, and under the term ” eleemosynary corporations ” are included endowed hospitals and colleges. Under schemes of the Charity Commissioners, where charities have been remodelled, besides trustees elected by corpora- tions, there are now usually appointed ex-officio trustees who repre- sent some office or institution of importance in connexion with the charity. (6) Jurisdiction by Chancery and Charity Commission. — The Court of Chancery has jurisdiction over charities, under the old principle that ” charities are trusts of a public nature, in regard to which no one is entitled by an immediate and peculiar interest to prefer a complaint for compelling the performance by the trustees of their obligations.” The court, accordingly, represents the crown as parens patriae. Now, by the Charitable Trusts Act 1853, and subsequent acts, a charity commission has been formed wh ; ch is entrusted with large powers, formerly enforced only by the Court of Chancery. (7) Jurisdiction by Visitor. — A further jurisdiction is by the ” visitor,” a right inherent in the founder of any eleemosy- nary corporation, and his heirs, or those whom he appoints, or in their default, the king. The object of the visitor is ” to prevent all perverting of the charity, or to compose differences among members of the corporation.” Formerly the bishop’s ordinary was the recog- nized visitor (2 Henry V. 1, 1414) of hospitals, apart from the founder. Subsequently his power was limited (14 Eliz. c. 5, 1572) to hospitals for which the founders had appointed no visitors. Then (1601) by the Charitable Uses Act commissions were issued for inquiry by county juries. Now, apart from the duty of visitors, inquiry is conducted by the charity commissioners and the assistant commissioners. By subsequent acts (see below) ecclesiastical and elee- mosynary charities have been still further separaced and defined. (8) Advice. — ” Trustees, or other persons concerned in the management

of a charity, may apply to the charity commissioners for their opinion, advice or direction; and any person acting under such advice is indemnified, unless he has been guilty of misrepresentation in obtainingit.” (9) Limitation of Charity Commissioners’ Powers. — The commissioners cannot, however, make any order with respect to any charity of which the gross annual income amounts to £50 or upwards, except on the application (in writing) of the trustees or a majority of them.

Their powers are thus very limited, except when put in motion by the trustees. If a parish is divided they can apportion the charities if the gross income does not exceed £20. (10) General Poviers of the Charity Commission. — Subject to the limitation of £50, &c, the charity commissioners have power (Charit- able Trusts Act i860) to make orders for the appointment or removal of trustees, or of any officer, and for the transfer, payment and' vesting of any real or personal estate, or " for the establishment of any scheme for the administration " of the charity. (11) Schemes and Remodelling of Charities. — Under this power charities are re- modelled, and small and miscellaneous charities put into one fund and applied to new purposes. The cy-pres doctrine is applied, by which if a testator leaves directions that are only indefiniteˆ or if the objects for which a charity was founded are obsolete, the charity is applied to some purpose, as far as possible, in accordance with the charitable intention of the founder. This doctrine probably received its widest application in the City of London Parochial Charities Act of 1 883. Under other acts doles have been applied to education and to allotments. About 380 schemes are issued in the course of a year. (12) Objects adopted in remodelling Charities. — In the remodelling of charities for the general benefit of the poor some one or more of thirteen objects are usually included in the scheme. These are subscriptions to a medical charity, to a provident club or coal or clothing society, to a friendly society; for nurses, for annuities, for outfit for service, &c. ; for emigration ; for recreation grounds, clubs, reading-rooms, museums, lectures; for temporary relief to a limited amount in each year; for clothes ; fuel, tools, medical aid, food, &c, or in money " in cases of unexpected loss or sudden destitution"; for' pensions. (13) Parochial Charities. — By the Local Government Act of 1892, local ecclesiastical charities, i.e. endowments for " any spiritual purpose that is a legal purpose " (for spiritual persons, church and other buildings, for spiritual uses, &c), are separated from parochial charities, " the benefits of v/hich are, or the separate distribution of the benefits of which is, confined to inhabitants of a single parish, or of a single ancient ecclesiastical parish, or not more than five neighbouring parishes." These charities, since the Local Government Act 1894, are under the supervision of the parish councils, who appoint trustees for their management in lieu of the former overseer or vestry trustees, or, under certain conditions, " additional trustees." The accounts have to be submitted to the parish meeting, and the names of the beneficiaries of dole charities published. (14) Sfficial Trustees. —

There is also ” an official trustee of charity lands,” who as “bare trustee ” may hold the land or stock of the charity managed by the trustees or administrators. In 1905 the stock transferred to the official trustees amounted to £24,820,945. (15) Audit. — The charity commissioners have no power of audit, but the trustees of every charity have to prepare a statement of accounts annually, and transmit it to the commission. The accounts have to be ” certi- fied under the hand of one or more of the trustees and by the auditor of the charity.” (16) Taxation. — In the case of rents and profits of lands, &c, belonging to hospitals or almshouses, or vested in trustees for charitable purposes, allowances are made in diminution of income- tax (56 Vict. 35 § 61). From the inhabited house duty any hos- pital charity school, or house provided for the reception or relief of poor persons, is exempted (House Tax Act 1808). Also there is an extmption from the land-tax in regard to land rents, &c, in pos- session of hospitals before 1693. (17) The Digest. — A digest of endowed charities in England and Wales was compiled in the years 1861 to 1876. A new digest of reports and financial particulars has since been completed.

The income of endowed charities in 1876 was returned at £2,198,463. It is now, no doubt, considerably larger than it was in 1876. Partial returns show that at least a million a year is now available in England and Wales for the assistance of the aged poor and for doles. Between the poor-law, which, as it is at present administered, is a permanent endowment provided from the rates for the support of a class of permanent ” poor,” and endowed charities, which are funds avail- able for the poor of successive generations, there is no great difference. But in their resources and administration the difference is marked. Local endowed charities were constantly founded after Queen Elizabeth’s time till about 1830, and the poor-rate was at first supple- mentary of the local charities. When corn and fuel were dear and clothes very expensive, what now seem trivial endowments for food, fuel, coal and clothes were important assets in the thrifty manage- ment of a parish. But when the poor were recognized as a class of dependants entitled by law to relief from the community, the rate increased out of all proportion to the charities. A distinction then made itself felt between the ” parish ” poor and the ” second ” poor, or the poor who were not relieved from the rates, and relief from the rates altogether overshadowed the charitable aid. Charit- able endowments were ignored, ill-administered, and often were lost. After 1834 the

poor-law was brought under the control of the

central government. Poor relief was placed in the hands of boards of guardians in unions of parishes. The method of co-operation between poor-law and charity suggested by the acts of Queen Elizabeth was set aside, and, as a responsible partner in the public work of relief, charity was disestablished. In the parishes the endowed charities remained in general a disorganized medley of separate trusts, jealously guarded by incompetent administrators. To give unity to this mass of units, so long as the principles of charity are misunderstood or ignored, has proved an almost impossible and certainly an unpopular task. So far as it has been achieved, it has been accomplished by the piecemeal legislation of schemes cautiously elaborated to meet local prejudices. Active reform has been resented, and politicians have often accentuated this resentment. In 1894 a select committee was appointed to inquire whether it was desirable to take measures to bring the action of the Charity Commission mere directly under the control of parliament, but no serious griev- ances were substantiated. The committees' reports are of interest, however, as an indication of the initial difficulties of all charitable work, the general ignorance that prevails in regard to the elementary conditions that govern it, the common disregard of these principles, and the absence of any accepted theory or constructive policy that should regulate its development and its administration.

After the Poor-Law Act of 1601 the history of the voluntary parochial charities in a town parish is marked by their decreasing amount and utility, as poor-law relief and pauperism increased. The act, it would seem, was not adopted Cbarli y la with much alacrity by the local authorities. From a tieˆi60t. 1625 to 1646 there were many years of plague and sickness, but in St Giles's, London, as late as 1649, the amount raised by the " collectors " (or overseers) was only £176. They disbursed this to " the visited poor " as " pensions." In 1665 an extra levy of £600 is mentioned. In the accounts of St Martin's-in-the-Fields, where, as in St Giles's, gifts were received, the change wrought by another half-century (1714) is apparent. The sources of charitable relief are similar to those in all the Protestant churches — English, Scottish or continental: church collections and offertories; correctional fines, such as composi- tion for bastards and conviction money for swearers; and besides these, income from annuities and legacies, the parish estate, the royal bounty, and " petitions to persons of quality." In all £2041 was collected, but,

so far as relief was concerned, the parish relied not on it, but on the poor-rate, which produced £3765. All this was collected and disbursed on their own authority by collectors, to orphans, ” pensioners ” or the ” known or standing ” poor, or to casual poor (£1818), including nurse children and bastards. The begging poor were numerous and the infant death-rate enormous, and each year three-fourths of those christened were ” inhumanly suffered to die by the barbarity of nurses.” The whole administration was uncharit- able, injurious to the community and the family, and inhuman to the child. If one may judge from later accounts of other parishes even up to 1834, usually it “remained the same, purpose- less and unintelligent; and it can hardly be denied that, generally speaking, only since the middle of the 19th century has any serious attention been paid to the charitable side of parochial work. Parallel to the parochial movement of the poor-law in Englandˆ in France (about 161 7) were established the bureaux de bienfaisance, at first entirely voluntary institutions, then recognized by the state, and during the Revolution made the central administration for relief in the communes.

In the 17th century in England, as in France, opinion favoured the establishment of large hospitals or maisons Dieu for the reception of the poor of different classes. In France charitable throughout the century there was a continuous struggle move- with mendicancy, and the hospitals were used as meats places into which offenders were summarily driven. ” er A new humanity was, however) beginning its protest. The pitiful condition of abandoned children attracted sympathy in both countries. St Vincent de Paul established homes for the enfants trouvSs, followed in England by the establishment of the Found- ling hospital (1739). In both countries the method was applied inconsiderately and pushed to excess, and it affected family life most injuriously. Grants from parliament supported the foundling movement in England, and homes were opened in many parts of the country. The demand soon became over- whelming; the mortality was enormous, and the cost so large

that it outstripped all financial expedients. The lesson of the experiment is the same as that of the poor-law catastrophe before 1834; only, instead of the able-bodied poor of another age, infants were made the object of a compassionate but

undiscerning philanthropy. With widespread relief there came widespread abandonment of duty and economic bankruptcy. Had the poor-rates instead of charitable relief been used in the same way, the moral injury would have been as great, but the annual draft from the rates would have concealed the moral and postponed the economic disaster. To amend the evil, changes were made by which the relation between child and mother was kept alive, and a personal application on her part was required; the character of the mother and her circumstances were investigated, and assistance was only given when it would be " the means of replacing the mother in the course of virtue and the way of an honest livelihood." General reforms were also made, especially through the instrumentality of Jonas Hanway, to check infant mortality, and metropolitan parishes were required to provide for their children outside London. A kindred move- ment led to the establishment of penitentiaries (1758), of lock hospitals and lying-in hospitals (1749-1752).

In Queen Anne's reign there was a new educational movement, " the charity school " — " to teach poor children the alphabet and the principles of religion," followed by the Sunday-school movement (1780), and about the same time (1788) by "the school of industry " — to employ children and teach them to be industrious. In 1844 the Ragged School Union was estab- lished, and until the Education Act of 1870 continued its volun- tary educational work. As an outcome of these movements, through the efforts of Miss Mary Carpenter and many others, in 1854-1855 industrial and reformatory schools were established, to prevent crime and reform child criminals. The orphanage movement, beginning in 1758, when the Orphan Working Home was established, has been continued to the present day on a vastly extended'scale. In 1772 a society for the discharge of persons imprisoned for small debts was established, and in 1773 Howard began his prison reforms. This raised the standard of work in institutional charities generally. After the civil wars the old hospital foundations of St Bartholomew and St Thomas, munici- palized by Edward VI., became endowed charities partly sup- ported by voluntary contributions. The same fate befell Christ's Hospital, in connexion with which the voting system, the admis- sion of candidates by the vote of the whole body of subscribers — that peculiarly English invention — first makes its appearance.

A new interest in hospitals sprang up at the end of the 17th century. St Thomas's was rebuilt (1693) and St Bartholomew's

(1739); Guy's was founded in 1724, and on the system of free " letters " obtainable in exchange for donations, voluntary hospitals and infirmaries were established in London (1733 and later) and in most of the large towns. Towards the end of the 18th century the dispensary movement was developed — a system of local dispensaries with fairly definite districts and home visiting, a substitute for attendance at a hospital, where " hos- pital fever " was dreaded, and an alternative to what was then a very ill-administered system of poor-law medical relief. After 1840 the provident dispensary was introduced, in order that the patients by small contributions in the time of health might provide for illness without having to meet large doctors' bills, and the doctor might receive some sufficient remuneration for his attendance on poor patients. This movement was largely extended after i860. Three hospital funds for collecting contributions for hospitals and making them grants, a movement thai originated in Birmingham in 1859, were established in London in 1873 and 1897.

Since 1868 the poor-law medical system of Great Britain has been immensely improved and extended, while at the same time the number of persons in receipt of free medical relief in most of the large towns has greatly increased. The following figures refer to London : at hospitals, 97 in number, in-patients (1904) during the year, 118,536; out-patients and casualty cases, 1,858,800; patients at free, part-pay, or provident dispensaries, about 280,000; orders issued for attendance at poor-law dispensaries and at home, 114,158. The number of beds in poor-law infirmaries (1904) was 16,076. There are in London 12 general hospitals with, 18 without, medical

schools, and 67 special hospitals. Thus the population in receipt of public and voluntary medical relief is very large, indeed altogether excessive.

Each religious movement has brought with it its several charities. The Society of Friends, the Wesleyans, the Baptists have large charities. With the extension of the High Church movement there have been established many sisterhoods which support penitentiaries, convalescent homes and hospitals, schools, missions, &c.

The magnitude of this accumulating provision of charitable relief is evident, though it cannot be summed up in any single total.

At the beginning of the 19th century anti-mendicity societies were established; and later, about 1869, in England and Scotland a movement began for the organization of charitable relief, in connexion with which there are now societies and committees in most of the larger towns in Great Britain, in the colonies, and in the United States of America. More recently the movement for the establishment of settlements in poor districts, initiated by Canon Barnett at Toynbee Hall — " to educate citizens in the knowledge of one another, and to provide them with teaching and recreation "—has spread to many towns in England and America.

These notes of charitable movements suggest an altogether new development of thought. On behalf of the charity school of Queen Anne's time were preached very formal iw—ˆg sermons, which showed but little sympathy with child of thought life. After the first half of the century a new humanism laisth with which we connect the name of Rousseau, slowly ff//lr superseded this formal beneficence. Rousseau made the world open its eyes and see nature in the child, the family and the community. He analysed social life, intent on explaining it and discovering on what its well-being depended; and he stimulated that desire to meet definite social needs which is apparent in the charities of the century. Little as it may appear to be so at first sight, it was a period of charitable reformation. Law revised the religious conception of charity, though he was himself so strangely devoid of social instinct that, like some of his successors, he linked the utmost earnestness in belief to that form of almsgiving which most effectually fosters beggardom. Howard introduced the era of inspection, the ardent apostle of a new social sagacity; and Bentham, no less sagacious, propounded opinions, plans and suggestions which, perhaps it may be said, in due course moulded the principles and methods of the poor-law of 1834. In the broader sense the turn of thought is religious, for while usually stress is laid on the religious scepticism of the century, the deeper, fervent, conscientious and evangelical charity in which Nonconformists, and especially " the Friends," took so large a part, is often forgotten. Sometimes, indeed, as often happens now, the feeling of charity passed into the merest sentimentality. This is evident, for instance, from so ill-considered a measure as Pitt's Bill for the relief of the poor. On the other hand, during the 1 8th century the poor-law was the object of constant criticism, though so long as the labour statutes and the old law of settle- ment were in force, and the relief of the labouring population as state " poor " prevailed, it was

impossible to reform it. Indeed, the criticism itself was generally vitiated by a tacit acceptance of ” the poor ” as a class, a permanent and irrevocable charge on the funds of the community; and at the end of the 1 8th century, when the labour statutes were abrogated, but the conditions under which poor relief was administered remained the same, serfdom in its later stage, the serfdom of the poor-law, asserted itself in its extremest form in times of dearth and difficulty during the Napoleonic War. In 1802-1803 it was calculated (Marshall’s Digest) that 28% of the population were in receipt of permanent or occasional relief. Those in receipt of the former numbered 734,817, including children — so real had this serfdom of the poor become.

In 1832 the expenditure on pauperism in England and Wales was £7,036,968. In the early years of the 19th century the mendicity societies, established in some of the larger towns, were a sign of the general discontent with existing methods of ad- ministration. The Society for Bettering the Condition of the

Poor — representing a group of men such as Patrick Colquhoun, Sir I. Bernard, Dr Lettsom, Dr Haygarth, James Neald, Count Rumford and others — took a more positive line and issued many useful publications (1796). After 1833 the very atmosphere of thought seems changed. There was a general desire to be quit of the serfdom of pauperism. The Poor-law Amendment Act was passed in 1834, and since then male able-bodied pauperism has dwindled to a minimum. The bad years of 1860-1870 revived the problem in England and Scotland, and the old spirit of reform for a time prevailed. Improved administration work- ing with economic progress effected still further reductions of pauperism, till on the 1st of January 1905 (exclusive of lunatics in .county asylums and casual paupers) the mean number of paupers stood at 764,589, or 22-6 per thousand of the population, instead of 41 -8 per thousand as in 1859 (see Poor-La w).

Charity organization societies were formed after 1869, with the object of ” improving the condition of the poor,” or, in other words, to promote independence by an ordered and co-operative charity; and the Association for Befriending Young Servants, and workhouse aid committees, in order to prevent relapse into pauperism on the part of those who as children or young women

received relief from the poor-law. The Local Government Board adopted a restricted out-door relief policy, and a new interest was felt in all the chief problems of local administration. The movement was general. The results of the Elberfeld system of municipal relief administered by unpaid almoners, each dealing with but one or two cases, influenced thought both in England and America. The experience gained by Mr Joseph Tuckerman of Boston of the utility of registering applications for relief, and the teaching of Miss Octavia Hill, led to the founda- tion of the system of friendly visiting and associated charity at Boston (1880) and elsewhere. Since that time the influence of Arnold Toynbee and the investigations of Charles Booth have led to a better appreciation of the conditions of labour; and to some extent, in London and elsewhere, the spirit of charity has assumed the form of a new devotion to the duties of citizenship. But perhaps, in regard to charity in Great Britain, the most important change has been the revival of the teaching of Dr Chalmers (1 780- 1847), who (1819) introduced a system of parochial charity at St John's, Glasgow, on independent lines, consistent with the best traditions of the Scottish church. In the development of the theory of charitable relief on the economic side this has been a main factor. His view, which he tested by experience, may be summed up as follows: Society is a growing, self-supporting organism. It has within it, as between family and family, neighbour and neighbour, master and employee, endless links of sympathy and self-support. Poverty is not an absolute, but a relative term. Naturally the members of one class help one another; the poor help the poor. There is thus a large invisible fund available and constantly used by those who, by their proximity to one another, know best how to help. The philan- thropist is an alien to this life around him. Moved by a sense of contrast between his own lot, as he understands it, and the lot of those about him, whom he but little understands, he concludes that he should relieve them. But his gift, unless it be given in such a way as to promote this self-support, instead of weakening it, is really injurious. In the first place, by his interference he puts a check on the charitable resources of another class and lessens their social energy. What he gives they do not give, though they might do so. But next, he does more harm than this. He stimulates expectation, so that by a false arithmetic his gift of a few shillings seems to those who receive it and to those who hear of it a possible source of help in any difficulty. To them it represents a large command of means; and where one has received what, though it be little, is yet, relative to wage, a large

sum to be acquired without labour, many will seek more, and with that object will waste their time and be put off their work, or even be tempted to lie and cheat. So social energy is diverted from its proper use. Alms thus given weakens social ties, diminishes the natural relief funds of mutual help, and beggars a neighbour instead of benefiting him. By this argument a clear and well-defined purpose is placed before charity. Charity

becomes a science based on social principles and observation. Not to give alms, but to keep alive the saving health of the family, becomes its problem: relief becomes altogether subordinate to this, and institutions or societies are serviceable or the reverse according as they serve or fail to serve this purpose. Not poverty, but distress is the plea for help; not almsgiving, but charity the means. To charity is given a definite social aim, and a desire to use consistently with this aim every method that increasing knowledge and trained ability can devise.

Under such influences as these, joined with better economic conditions, a great reform has been made. The poor-law, however, remains — the modern eleemosyna civica. It now, indeed, absorbs a proportionately lesser amount of the largely increased national income, but, excluding the maintenance of lunatics, it costs Great Britain more than twelve millions a year; and among the lower classes of the poor, directly or indirectly, it serves as a bounty on dependence and is a permanent obstacle to thrift and self-reliance. The number of those who are within the circle of its more immediate attraction is now perhaps, in different parts of the country or different districts in a town, not more than, say, 20% of the population. Upon that population the statistics of a day census would show a pauperism not of 2-63, the percentage of the mean day pauperism on the population in 1908, but of 13-15%; and the percentage would be much greater — twice as large, perhaps — if the total number of those who in some way received poor relief in the course of a year were taken into account. The English poor-law is thus among the lower classes,, those most tempted to dependence — say some six or seven millions of the people — a very potent influence definitely antagonistic to the good development of family life, unless it be limited to very narrow proportions; as, for instance, to restricted indoor or institutional relief for the sick, for the aged and infirm, who in extreme old age require special care and nursing, and for the afflicted, for whom no sufficient charitable provision is procurable. As ample experience shows, only on these conditions can poor- law relief be justified from the point of view of charity

and the common good. In marked contrast to this opinion is the English movement for Old Age pensions, which came to its first fruition in 1908 — a huge charity started on the credit of the state, the extension of which might ultimately involve a cost comparable with that of the army or the navy. Schemes of the kind have been adopted in the Australasian colonies with limitations and safeguards; and they seem likely to develop into a new type of poor-relief organization for the aged and infirm (Report: Royal Commission on Old Age Pensions, Commonwealth of Australia, 1906). In England, partly to meet the demand for better state provision for the aged, the Local Government Board in 1900 urged the boards t>f guardians to give more adequate outdoor relief to aged deserving people, and laid no stress on the test of desti- tution, or, in other words, the limitation of relief to what was actually " necessary," the neglect of which has led to new diffi- culties. History has proved that demoralization results from the wholesale relief whether of the mass of the citizens, or of the able-bodied, or of the children, and the proposal to limit the endowment to the aged makes no substantial difference. The social results must be similar; but social forces work slowly, and usually only the unanswerable argument of financial bank- ruptcy suffices to convert a people habituated to dependence, though the inward decay of vitality and character may long before be manifest. Ultimately the distribution of pensions by way of out-door relief, corrupting a far more independent people, is calculated to work a far greater injury than the annona civica. Such an endowment of old age might indeed be justified as part of a system of regulated labour, which, as in earlier times, could not be enforced without some such extraneous help, but it could not be justified otherwise. It is naturally associated, therefore, with socialistic proposals for the regulation of wage.

In the light of the principles of charity, which we have con- sidered historically, we have now to turn to two questions: charity and economics, and charity and socialism.

The object of charity is to render to our neighbour the services and duties of goodwill, friendship and love. To prevent distress

charity has for its further object to preserve and develop the manhood and womanhood of individuals and their self-main-

tenance in and through the family; and any form of Thc m/cs state intervention is approved or disapproved by the o/cfauty? s* 11116 standard. By self-maintenance is meant self- support throughout life in its ordinary contingencies — sickness, widowhood, old age, &c. Political economy we would define as the science of exchange and exchange value. Here it has to be considered in relation to the purposes of charity. By way of illustration we take, accordingly, three points: distribution and use, supplementation of wage, and the standard of well-being or comfort in relation to wage.

(i) Distribution and Use. — Economy in the Greek sense begins at this point — the administration and the use of means and resources. Political economy generally ignores this part of the problem. Yet from the point of view of charity it is cardinal to the whole issue. The distribution of wage may or may not be largely influenced by trades unions; but the variation of wage, as is generally the case, by the increase or decrease of a few pence is of less importance than its use. Comparing a careful and an unthrifty family, the difference in use may amount to as much as a third on the total wage. Mere abstention from alcohol may make, in a normal family, a difference of 6s. in a wage of 25s. On the other hand, membership of a friendly society is at a time of sickness equivalent to the command of a large sum of money, for the common stock of capital is by that means placed at the disposal of each individual who has a share in it. Further, even a small amount saved may place the holder in a position to get a better market for his labour; he can wait when another man cannot. Rent may be high, but by co-operation that too may be reduced. Other points are obvious and need not _ be mentioned. It is evident that while the amount of wage is im- portant, still more important is its use. In use it has a large expansive value.
(2) Supplementation of Wage. — The exchange between skill and wage must be free if it is to be valid. The less the skill the greater is the temptation to philanthropists to supplement the lesser wage; and the more important is non-supplementation, for the skilled can usually look after their own interests in the market, while the less skilled, because their labour is less marketable, have to make the greater effort to avoid dependence. But the dole of endowed charities, outdoor relief, and any constant giving, tend to reduce wage, and thus to deprive the recipients of some part of the means of independence. The employer is pressed by competition himself, and in return he presses for profit through a reduced wage, if circumstances make it possible for the workman

to take it. And thus a few individuals may lower the wages of a large class of poorly skilled or unskilled hands. In these conditions unionism, even if it were likely to be advantageous, is not feasible. Unionism can only create a coherent unit of workers where there is a limited market and a definite saleable skill. Except for the time, insufficient wage will not be remedied in the individual case by supplementation in any form — doles, clothes, or other kinds of relief ; and in that case, too, the relief will probably produce lessened energy after a short time, or in other words lessened ability to live. An insufficient wage may be prevented by increasing the skill of the worker, who will then have the advantage of a better series of economic exchanges, but hardly otherwise. If the supplementation be not immediate, but postponed, as in the case of old-age pensions, its etfect will be similar. To the extent of the prospective adventitious gain the attraction to the friendly society and to mutual help and saving will grow less. Necessity has been the inventor of these; and where wage is small, a little that would otherwise be saved is quickly spent if the necessity for saving it is removed. Only necessity schools most men, especially the weak, to whom it makes most difference ultimately, whether they are thrifty or whether or not they save for the future in any way. (3) The Standard of Well-being or Comfort in Relation to Wage. — With an increase of income there has to be an increase in the power to use income intelligently. Whatever is not so used reacts on the family to its undoing. Constantly when the wife can earn a few shillings a week, the husband will every week idle for two or three days; so also if the husband finds that in a few days he can earn enough to meet what he considers to be his require- ments for the week. In these circumstances the standard of well- being falls below the standard of wage ; the wage is in excess of the energy and intelligence necessary to its economic use, and in these cases ultimately pauperism often ensues. The family is demoralized. Thus, with a view to the prevention of distress in good times, when there is the less poverty there is the more need of charity, rightly understood; for charity would strive to promote the right use of wage, as the best means of preventing distress and preserving the economic well-being of the family.

The theory of charity separates it entirely from socialism, as that word is commonly used. Strictly socialism means, in questions affecting the community, a dominant regard for the common or social good in so far as it is contrary to private or individual advantage. But even so the antithesis is misleading,

for the two need not be inconsistent. On the contrary, the Common good is really and ultimately only individual good (not advantage) harmonized to a common end. The issue, indeed, is that of old Greek days, and the conditions C J^J ity of a settlement of it are not, substantially different, socialism. Using modern terms one may say that charity is " interventionist." It has sought to transform the world by the transformation of the will and the inward life in the individual and in society. It would intensify the spirit and feeling of membership in society and would aim at improving social con- ditions, as science makes clear what the lines of reform should be. So it has constantly intervened in all kinds of ways, and, in the 19th century for instance, it has initiated many move- ments afterwards taken up by public authorities— such as prison reform, industrial schools, child protection, housing, food reform, &c, and it has been a friendly ally in many reforms that affect industry very closely, as, for instance, in the introduction of the factory acts. But it has never aimed at recasting society itself on a new economic plan, as does socialism. Socialism indeed offers the people a new state of social security. It recognizes that the annona civica and the old poor-law may have been bad, but it would meet the objection made against them by insisting on the gradual creation of a new industrial society in which wage would be regulated and all would be supported, some by wage in adult life, some by allowance in old age, and others by maintenance in childhood. Accordingly for it all schemes for the state maintenance of school children, old age pensions, or state provision for the unemployed are, like municipal trading, steps towards a final stage, in which none shall want because all shall be supported by society or be dependent on it industrially. To charity this position seems to exclude the ethical element in life and to treat the people primarily or chiefly as human animals. It seems also to exclude the motives for energy and endeavour that come from self-maintenance. Against it, on the other hand, socialism would urge, that only by close regulation and penalty will the lowest classes be improved, and that only the society that maintains them can control them. Charity from its experience doubts the possibility of such control without a fatal loss of initiative on the part of those controlled, and it believes both that there is constant improvement on the present conditions of society and that there will be constantly more as science grows and its conclusions are put in force. Thus charity and socialism, in the usual meaning of the word, imply ultimately two quite different theories of social life. The one would re-found society

industrially, the other would develop it and allow it to develop.

The springs of charity lie in sympathy and religion, and, one would now add, in science. To organize it is to give to it the ” ordered nature ” of an organic whole, to give it a definite social purpose, and to associate the members i zg e tl „ˆ”’ of the community for the fulfilment of that purpose, charity. This in turn depends on the recognition of common principles, the adoption of a common method, self-discipline and training, and co-operation. In a mass of people there may be a large variation in motives coincident with much unity in action. Thus there may be acceptance of a common social purpose in charity, while in one the impulse is similar to that which moved St Francis or George Herbert, in another to that which moved Howard or Dr Chalmers, or a modern poor-law reformer like Sir G. Nicholls or E. Denison. Accepting, then, the principles of charity, we pass to the method in relation to assistance and relief. Details may vary, but on the following points there is general agreement among students and workers:— (1) The Committee or Conference. — There are usually two kinds of local relief: the public or poor-law relief, and relief connected with religious agencies. Besides, there is the relief of endowments, societies and charitable persons. Therefore, as a condition precedent to all organization, there must be some local centre of association for information and common help. A town should be divided for this purpose into manageable areas coincident with parishes or poor-law divisions, or other districts. Subject to an acceptance of general principles, those engaged in charity should be members of a local conference or committee, or allied to it. The committee would thus be the rallying-point of a large and somewhat loosely knit

association of friends and workers. (2) Inquiry, A id and Registration. — The object of inquiry is to ascertain the actual causes of distress or dependence, and to carry on the work there must usually be a staff of several honorary and one or two paid workers. Two methods may be adopted : to inquire in regard to applications for help with a view to forming some plan of material help or friendly aid, or both, which will lead to the ultimate self-support of the family and its members, and, under certain conditions, in the case of the aged or sick, to their continuous or their sufficient help; or to ascertain the facts partly

at once, partly by degrees, and then to form and carry out some plan of help, or continue to befriend the family in need of help, in the hope of bringing them to conditions of self- support, leaving the work of relief entirely to other agencies. The committee in neither case should be a relief committee — itself a direct source of relief. On the former method it has usually no relief fund, but it raises from relations, employers, charities and charit- able persons the relief required, according to the plan of help agreed upon, unless, indeed, it is better not to relieve the case, or to leave it to the poor-law. The committee thus makes itself responsible for endeavouring to the best of its ability to raise the necessary relief, and acts as trustee for those who co-operate without it, in such a way as to keep intact and to give play to all the natural obligations that lie within the inner circles of a self-supporting community. On the latter method the work of relief is left to general charity, or to private persons, or to the poor-law; and the effort is made to help the family to self-support by a friendly visitor. This procedure is that adopted by the associated charities in Boston, Mass., and other similar societies in America and elsewhere. It is akin also to that adopted in the municipal system of relief in Elber- feld — which has become with many variations in detail the standard method of poor relief in Germany. The method of associated help, combined with personal work, represents the usual practice of charity organization societies. Mutatis mutandis, the plan can be adopted on the simplest scale in parochial or other relief committees, subject to the safeguards of sufficient training and settled method. The inquiry should cover the following points: names and address, and ages of family, previous addresses, past employment and wages, present income, rent and liabilities, membership of friendly or other society, and savings, relations, relief (if any) from any source. These points should be verified, and reference should be made to the clergy, the poor-law authorities, and others, to ascertain if they know the applicant. The result should be to show how the applicant has been living, and what are the sources of possible help, and also what is his character. The problem, however, is not whether the person is " deserving " or " undeserving," but whether, granted the facts, the distress can be stayed and self-support attained. If the help can be given privately from within the circle of the family, so much the better. Often it may be best to advise, but not to inter- fere. In some cases but little help may be necessary; in others again the friendly relation between applicant and friend may last for months and even years. Usually in charitable work the question

of the kind of relief available — money, tickets, clothes, &c. — governs the decision how the case should be assisted. But this is quite wrong : the opposite is the true rule. The wants of the case, rightly understood, should govern the decision as to what charity should do and what it should provide. Cases are overwhelming in number, as at the out-patient and casualty departments of a hospital, where the admissions are made without inquiry, and subject practically to no restrictions; but when there is inquiry, and each case is seriously considered and aided with a view to self-support, the numbers will seldom be overwhelming. On this plan appeal is made to the strength of the applicant, and requires an effort on his part. Indiscriminate relief, on the other hand, attracts the applicant by an appeal to his weakness, and it requires of him no effort. Hence, apart even from the differentiating effect of inquiry, one method makes applicants, the other limits their number, although on the latter plan much more strenuous endeavours be made to assist the lesser number of claimants. For the routine work of the office an extremely simple system of records with card index, &c, has been devised. In some cities, particularly in the United States of America, there is a central registration of cases, notified by individual charities, poor-relief authorities and private persons. The system of charity organization or associated charity, it will be seen, allows of the utmost variety of treatment, according to the difficulties in each instance and the remedies available, and the utmost scope for per- sonal work. (3) Training. — If charitable work is an art, those who undertake it must needs be trained both in practice and method and in judgment. It requires, too, that self-discipline which blends intelligence with emotion, and so endows emotion with strength and purpose. In times of distress a reserve of trained workers is of the utmost service. At all times they do more and produce, socially, better results; but when there is general distress of any kind they do not lose their heads like new recruits, but prevent at least some of the mischief that comes of the panic which often takes possession of a community, when distress is apprehended, and leads to the wildest distribution of relief. Also trained workers make the most useful poor-law guardians, trustees of charities, secretaries of charitable societies and district visitors. All clergy and ministers and all medical men who have to be engaged in the administration of medical relief should learn the art of charity.

Poor-law guardians are usually elected on political or general grounds, and have no special knowledge of good methods of

charity; and trustees are seldom appointed on the score of their qualifications on this head. To provide the necessary education in charity there should be competent helpers and teachers at charity organization committees and elsewhere, and an alliance for this purpose should be formed between them and professors and teachers of moral science and economics and the "settlements." Those who study social problems in connexion with what a doctor would call " cases " or " practice " see the limits and the falsity of schemes that on paper seem logical enough. This puts a check on the influence of scheme- building and that literary sensationalism which makes capital out of social conditions. (4) Co-operation. — Organization in charity depends on extensive co-operation, and ultimately on the acceptance 'of common views. This comes but slowly. But with much tribula- tion the goal may be reached, if in case after case the effort is made to provide friendly help through charities and private persons, — unless, as may well be, it should seem best not to interfere, but to leave the applicant to apply to the administrators of public relief. Experience of what is right and wrong in charity is thus gained on both sides. Many sources may have to be utilized for aid of different kinds even in a single case, and for the prevention of distress co- operation with members cf friendly societies and with co-operative and thrift agencies is indispensable.

Where there is accord between charity and the poor-law pauper- ism may be largely reduced. The poor-law in most countries has at its disposal certain institutional relief and out-door allowances, but it has no means of devising plans of law. 1 """"^ help which may prevent application to the rates or " take " people " off the rates." Thus a widow in the first days of widowhood applies and receives an allowance according to the number of her children. Helped at the outset by charity on some definite plan, she may become self-supporting; and if her family be large one or two of her children may be placed in schools by the guardians, while she maintains the remaining children and herself. As far as possible there should be a division of labour between the poor-law and charity. Except where some plan such as that just mentioned is adopted, one or the other should take whole charge of the case relieved. There should be no supplementation of poor-law relief by charity. This will weaken the strength and dissipate the resources of charity with- out adding to the efficiency of the poor-law. Unless the guardians adopt a restrictive out-door relief policy, there is no scope for

any useful division of labour between them and charity; for the many cases which, taken in time, charity might save from pauperism, they will draw into chronic dependence by their allowances a very much larger number. But if there is a restrictive out-door policy, so far as relief is necessary, charity may undertake to meet on its own lines distress which the poor-law would otherwise have met by allowances, and, subject to the assistance of urgent cases, poor-law relief may thus by degrees become institutional only. Then, in the main, natural social forces would come into play, and dependence on any form of annona civica would cease.

Open-handed hospitality always creates mendicants. This is what the hospitals offer in the out-patient and casualty depart- ments, and they have created a class of hospital ff osoltals mendicants. The cases are quickly dealt with, without inquiry and without regard to home conditions. The medical man in the hospital does not co-operate with any fellow-workers outside the hospital. Where his physic or advice ceases to operate his usefulness ceases. He regards no conditions of morality. In a large number of cases drink or vice is the cause of application, and the cure of the patient is dependent on moral conditions; but he returns home, drinks and may beat his wife, and then on another visit to the hospital he will again be physicked and so on. The man is not even referred to the poor- law infirmary for relief. Nor are conditions of home sanitation regarded. One cause of constant sickness is thus entirely over- looked, while drugs, otherwise unnecessary, are constantly given at the hospital. The hospitals are thus large isolated relief stations which are creating a new kind of pauperism. So far as the patients can pay — and many can do so — the general practitioners, to whom they would otherwise go, are deprived of their gains. Still worse is it when the hospital itself charges a fee in its out-patient department. The relief is then claimed even more absolutely as a right, and the general

practitioners are still further injured. The doctors, as a medical staff, are not only medical men, but whether they recognize the fact or not, they are also almsgivers or almoners; what they give is relief. Yet few or none of them have ever been trained for that work, and consequently they do not realize how very

advantageous, even for the cure of their own patients, would be a thorough treatment of each case both at the hospital and outside it. Nor can they understand how their methods at present protract sickness and promote habitual dependence. Where this side of their work studied by them in any way they would be the first, probably, to press upon the governors of their hospitals the necessity for a change. Unfortunately, at present the governors are themselves untrained, and to finance the hospital and to make it a good institution is their sole object. Hospitals, however, are, after all, only a part of the general administration of charity, though as they are now managed they have seldom any systematic connexion with that administration. Nor is there any co-ordination between the several hospitals and dispensaries. If one rightly refuses further treatment to certain applicants, they have only to wander to some other hospital, there to be admitted with little or no scrutiny. For usually outpatients and casualty patients are not even registered, nor can they be identified if they apply again. Practically they come and go at will. The definite limitation of cases, according to some standard of effectual work, association with general charity, trained almonership and inquiry, and a just regard for the interests of general practitioners, are stepping-stones to reform. In towns where medical charities are numerous a representative board would promote mutual help and organization.

Like the poor-law, endowed charities may be permanent institutions established to meet what should be passing and decreasing needs (cf . the arguments in The State and charities. Charity, by T. Mackay) . Administered as they usually are in isolation — apart from the living voluntary charities of the generation, and consisting often of small trusts difficult to utilize satisfactorily, they tend to create a permanent demand which they meet by fixed quantities of relief. Also, as a rule, they make no systematic inquiries with a view to the verification of the statements of the applicants, for they have no staff for these purposes; nor have they the assistance of almoners or friendly visitors. Nor does the relief which they give form part of any plan of help in conjunction with other aid from with- out; nor is the administration subject to frequent inspection, as in the case of the poor-law. All these conditions have led to a want of progress in the actual administration of endowed charities, in regard to which it is often very difficult to prevent the exercise of an undue patronage. But there is no reason why these charities should not become a responsible part of the country's administration, aiding

it to reduce outdoor pauperism. It was never intended that the poor-law should extinguish the endowed charities, still less, as statistics now prove, that where endowments abound the rate of pauperism should be considerably above the average of the rest of the country. This shows that these charities often foster pauperism instead of preventing it. As a step to reform, the publication of an annual register of endowed charities in England and Wales is greatly needed. The consolidating schemes of the charity commissioners have done much good; still more may be done in some counties by extending to the county the benefits of the charities of well-endowed towns, as has been accomplished by the extension of the eleemosynary endowments of the city of London to the metropolitan police area. Nor, again, until quite lately, and that as yet only in a few schemes, has the principle been adopted that pensions or other relief should be given only in supplementation of the relief of relations, former employers and friends, and not in substitution of it. This, coupled with good methods of inquiry and super- vision, has proved very beneficial. Hitherto, however, to a large extent, endowed charities, it must be admitted, have tended to weaken the family and to pauperize.

In many places funds are raised for the relief of school children by the supply of meals during the winter and spring; and an act has now been passed in England (1906) enabling the cost to be

put upon the rates. Usually a very large number of children are said to be underfed, but inquiry shows that such state- ments may be taken as altogether excessive. They are sometimes based on information drawn from the Heiietto children at school; or sometimes on general deduc- at school. tions; they are seldom founded on any systematic and competent inquiry at the homes. When this has been made, the numbers dwindle to very small proportions. Teachers of experience have noted the effect of the meals in weakening the independence of the family. While they are forthcoming women sometimes give up cooking meals at home, use their money for other things, and tell the child he can get his meal at school. Great temptations are put before a parent to neglect her family, and very much distress is due to this. The meals — just at a time when, owing to the age of her children, the mother's care is most needed, and just in those families where the temptation is greatest, and where the family instinct should be strengthened — stimulate this neglect. Considered from the point of view of meeting by eleemosynary provision a normal economic demand for food, intervention can only have one result. The demand must continue to outstrip the supply, so

long as there are resources available on the one side, and until on the other side the desire of the social class that is chiefly exposed to the tempta- tions of dependence in relation to such relief has been satisfied. If the provision be made from the resources of local or general taxation the largeness of the fund available will allow practically of an unlimited expansion of the supply of food. If the provision be made from voluntary sources, in some measure limited there- fore and less certain, this very fact will tend to circumscribe demand and limit the offer of relief. It is indeed the problem of poor-law relief in 1832 over again. The relief provided by local taxation practically unlimited will create a mass of constant claimants, with a kind of assumed right to aid based on the payment of rates; while voluntary relief, whatever its short- comings, will be less injurious because it is less amply endowed. In Paris the municipal subvention for meals rose from 545,900 francs in 1892 to 1,000,000 in 1904. Between 1894 and 1904 there was an increase of 9 % in the school population ; and an increase of 28% in the municipal grant. In that period the contribu- tions from the local school funds (caisses des ecoles) decreased 36%; while the voluntary contributions otherwise received were insignificant ; and the payments for meals increased 2%.

The subject has been lately considered from a somewhat different standpoint (cf. the reports of the Scottish Royal Com- mission on Physical Education, 1903; of the Inter-departmental committees on Physical Deterioration, 1905, and on Medical Inspection and the Feeding of School Children, 1905; also the report of the special committee of the Charity Organization Society on “the assistance of school children,” 1893). After careful investigations medical officers especially have drawn attention to the low physical condition of children in schools in the poorer parts of large English towns, their low stature, their physical defects, the improper food supplied to them at home, their uncleanliness, and their want of decent bringing-up, and sometimes their want of food. Other inquiries have shown that, as women more usually become breadwinners their children receive less attention, and the home and its duties are neglected, while in the lowest sections of the poorer classes social irresponsi- bility reaches its maximum. Cheap but often quite improper food is provided, and infant mortality, which is largely prevent- • able, remains as high as ever, though adult fife is longer. This. with a marked decrease in the birth-rate in recent years, has, it may be said, opened out a new field for charitable effort and social work. Science is at each

revision of the problem making its task more definite. Actually the mere demand for meals stands for less; the reform of home conditions for more. So it was hoped that instead of making school meals a charge on taxation, as parliament has done, it would be content to leave it a voluntary charge, while the medical inspection of elementary Schools will be made universal; representative relief committees formed for schools or groups of schools; the cases of want or distress among the school children dealt with individually in

connexion with their families, and, where necessary, day schools established on the lines of day industrial schools.

At a time of exceptional distress the following suggestions founded on much English experience may be of service (cf. Report of special committee of the Charity Organization f? cep ‘ Society on the best means of dealing with exceptional distress, distress, 1886). Usually at such a time proposals are 1 made to establish special funds, and to provide employ- ment to men and women out of work. But it is best, if possible and as long as possible, to rely on existing agencies, and to strengthen them. Round them there are usually workers more or less trained. A new fund usually draws to it new people, many of whom may not have had any special experience at all. If a new fund is inevitable, it is best that it should make its grants to existing agencies after consultation with them. In any case, a clear policy should be adopted, and people should keep their heads. The exaggeration of feeling at a time of apprehended or actual distress is sometimes extraordinary, and the unwise action which it prompts is often a cause of continuing pauperism after- wards. Where there is public or poor-law relief the following plan may be adopted: — In any large town there are usually different recognized poor-law, charitable or other areas. The local people already at work in these areas should be formed into local committees. In each case a quick inquiry should be made, and the relieving officer communicated with, some central facts verified, and the home visited. Roughly, cases may be divided into three classes: the irresponsible casual labouring class, a middle class of men with decent homes, who have made no provision for the future, and are not members of either friendly society or trades union; and a third class, who have made some provision. These usually are affected last of all; at all hazards they should be kept from receiving public relief, and should be helped, as far as possible, privately and personally. If there are public works, the second class might be referred to them ; if there are not, probably some should be left to the poor-law, some assisted in the same way as members of class three. Much would turn upon the family and the home. The first class should be left to the poor-law. If there is no poor-law system at work they should be put on public works. Working men of independent position, not the creatures of any political club, but such as are respected members of a friendly society, or are otherwise well

qualified for the task, should be called into consultation. The relief should be settled according to the requirements of each case, but if the pressure is great, at first at least it may be necessary to make grants according to some generally sufficient scale. There should be as constant a revision of cases as time permits. Great care should be taken to stop the relief as soon as possible, and to do nothing to make it the stepping-stone to permanent dependence. If employment be provided it should be work within the skill of all; it should be fairly remunerated, so that at least the scantiness of the pay may not be an excuse for neglect; and it should be paid for according to measured or piece work. The discipline should be strict, though due regard should be paid at first to those unaccustomed to digging or earthwork. In England and Wales the guardians have power to open labour yards. These, like charities which provide work, tend to attract and keep in employment a low class of labourer or workman, who finds it pays him to use the institution as a convenience. It is best, therefore, to avoid the opening of a labour yard if possible. If it is opened, the discipline should be very strict, and when there is laziness or insubordination, relief in the work- house should at once be offered. The relief furnished to men employed in a labour yard, of which in England at least half has to be given in kind, should, it has been said, be dealt out from day to day. This leads to the men giving up the work sooner than they otherwise would. They have less to spend.

In Great Britain a great change has taken place in regard to the provision of employment in connexion with the state. Vaem- Since about 1890 there has been a feeling that men in pioymeat. distress from want of employment should not be dealt with by the poor-law. A circular letter issued by the Local Government Board in 1886, and subsequently in 1895,

coincided with this feeling. It was addressed to town councils and other local authorities, asking them to provide work (1) which will not involve the stigma of pauperism, (2) which all can perform whatever may have been their previous avocations, and (3) which does not compete with that of other labourers at present in employment. This circular led to the vestries and subsequently the borough councils in many districts becoming partially recognized relief authorities for the unemployed, concurrently with the poor-law. Much confusion resulted. The local authorities had seldom any suitable organization for the investigation of applications. It was difficult to supply work on the terms required; and the work was often ill-done and costly.

Also it was found that the same set of people would apply year after year, unskilled labourers usually out of work part of the winter, or men habitually " unemployed." As on other occasions when public work was provided, very few of the applicants were found to be artisans, or members of trades unions or of friendly societies. In 1904 Mr Long, then president of the Local Government Board, proposed that local voluntary distress committees should be established in London consisting of poor-law guardians and town councillors and others, more or less supervised by a central committee and ultimately by the Local Government Board. This organization was set on foot and large sums were subscribed for its work. The report on the results of the movement was somewhat doubtful (Report, London Unemployed Fund, 1904-1905, p. 101, &c), but in 1905 the Unemployed Workmen's Act was passed, and in London and elsewhere distress committees like the voluntary committees of the previous year were established by statute. It was enacted that for establishment expenses, emigration and removal, labour exchanges, and the acquisition of land a halfpenny rate might be levied, but that the rate would not be available for the re-muneration of men employed. For this purpose (1905-1906) a large charitable fund was raised. A training farm at Hollesley Bay was acquired, and it was hoped to train Londoners there to become fit for agricultural work. It is impossible to judge this experiment properly, on the evidence available up to 1908. But one or two points are important: (1) something very like the "right to labour" has been granted by the legislature; (2) this has been done apart from the conditions required by the poor-laws and orders of the Local Government Board on poor relief and without imposing disfranchisement on the men employed; (3) a labour rate has not been levied, but a rate has been levied in aid of the provision of employment; (4) if the line of development that the act suggests were to be followed (as the renewed Labour agitation in 1908- 1909 made probable) it must tend to create a class of " unemployed," unskilled labourers of varying grades of industry who may become the dependent and state-supported proletariat of modern urban life. Thus, unless the administration be extremely rigorous, once more will a kind of serfdom be established, to be, as some would say, taken over hereafter by the socialist state.

In some of the English colonies Homeric hospitality still prevails, but by degrees the station-house or some refuge is established in the towns as they grow more populous. Va Finally, some system

of labour in exchange for relief agrancy – is evolved. At first this is voluntary, afterwards it is officially recognized, and finally it may become part of the system of public relief. As bad years come, these changes are made step by step. In England thfi vagrant or wayfarer is tolerated and discouraged, but not kept employed. He should be under greater pressure to maintain himself, it is thought. The provision made for him in different parts of the country is far from uniform, and now, usually, at least in the larger towns, after he has had a bath and food, he is admitted to a separate room or cell in a casual ward. Before he leaves he has to do a task of work, and, subject to the discretion of the master, he is detained two nights. This plan has reduced vagrancy, and if it were universally adopted clean accommodation would everywhere be provided for the vagrant without the attractions of a common or " associated " ward; and probably vagrancy would diminish still further. It seems almost needless to say that, in these circumstances at any

rate, casual alms should not be given to vagrants. They know much better how to provide for themselves than the almsgiver imagines, for vagrancy is in the main a mode of life not the result of any casual difficulty. Vagrancy and criminality are also nearly allied. The magistrate, therefore, rather than the almsgiver, should usually interfere; and, as a rule, where the magistrates are strict, vagrancy in a county diminishes. An inter-depart- mental committee (1906) taking generally this line, reported in favour of vagrants being placed entirely under police control, and it recommended a system of wayfarers' tickets for men on the roads who are not habitual vagrants, and the committal of men likely to become habitual vagrants to Certified labour colonies for not less than six months. Still undoubtedly vagrancy has its economic side. In a bad year the number of tramps is increased by the addition of unskilled and irresponsible labourers, who are soonest discharged when work is slack. As a part- voluntary system under official recognition the German Arbeiter- colonien are of interest. This in a measure has led to the introduc- tion of labour homes in England, the justification of which should be that they recruit the energy of the men who find their way to them, and enable them to earn a living which they could not do otherwise. In a small percentage of cases their result may be achieved. Charitable refuges or philanthropic common

Jodging- houses, usually established in districts where this class already congregate, only aggravate the difficulty. They give additional attractions to a vagrant and casual life, and make it more endurable. They also make a comfortable avoidance of the responsibilities of family life comparatively easy, and in so far as they do this they are clearly injurious to the community.

The English colonists of the New England states and Pennsylvania introduced the disciplinary religious and relief system of American Protestantism and the Elizabethan poor-law. To conditions the former reference has already been made. With an and . . appreciation of the fact that the cause of distress is not usually poverty, but weakness of character and want of judgment, and that relief is in itself no remedy, those who have inherited the old Puritan traditions have, in the light of toleration and a larger social experience, organized the method of friendly visiting, the object of which is illustrated by the motto, " Not alms, but a friend." To the friendship of charity is thus given a disciplinary force, capable of immense expansion and usefulness, if the friendship on the side of those who would help is sincere and guided by practical knowledge and sagacity, and if on the side of those in distress there is awakened a reciprocal regard and a willingness to change their way of life by degrees. Visiting by " districts " is set aside, for " friendliness " is not a quality easily diffused over a wide area. To be real it must be limited as time and ability allow. Conse- quently, a friendly visitor usually befriends but one or two, or in any case only a few, families. The friendly visitor is the outcome of the movement for " associated charities," but in America charity organization societies have also adopted the term, and to a certain extent the method. Between the two movements there is the closest affinity. The registration of applicants for relief is much more complete in American cities than in England, where the plan meets with comparatively little support. At the office of the associated charities in Boston there is a central and practically a complete register of all the applica- tions made to the public authority for poor relief, to the associated charities, and to many other voluntary bodies.

The Elizabethan poor-law system, with the machinery of overseers, poor-houses and out-door relief, is still maintained in New England, New York state and Pennsylvania, but with many modifications, especially in New York." A chief factor in these changes has been immigration. While the County or town remained the administrative area for local poor relief, the large

number of immigrant and ” unsettled ” poor, and the business connected with their removal from the state, entailed the establishment of a secondary or state system of administration and aid, with special classes of institutions to which the counties or towns could send their poor, as, for instance,, state reform schools, farms, almshouses, &c. For the oversight of these

institutions, and often of prisons also and lunatic asylums, in many states there have been established state boards of ” charity or corrections and charity.” The members of these boards are selected by the state for a term of years, and give their services honorarily. There are state boards in Massachusetts, New York, Pennsylvania, Ohio, Illinois, Minnesota, Michigan, Wisconsin, Iowa, Colorado, North Carolina and elsewhere. There is also a district board of charities in the district of Columbia. These boards publish most useful and detailed reports. Besides the state board there is sometimes also, as in New York, a State Charities Aid Association, whose members, in the counties in which they reside, have a legal right of entry to visit and inspect any public or charitable institution owned by the state, and any county and other poor-house. A large association of visitors accustomed to inspect and report on institutions has thus been created. Further, the counties and towns in New York state, for instance, and Massachusetts, and the almshouse districts in Pennsylvania, are under boards of supervision. Usually the overseers give out- door relief, and the pauperism of some areas is as high as that in some English unions, 3, 4 and 5%. On the whole population of the United States, however, and of individual states, consisting to a great extent of comparatively young and energetic immi- grants, the pauperism is insignificant. In Massachusetts ” it has been the general policy of the state to order the removal to the state almshouse of unsettled residents of the several cities and towns in need of temporary aid, thus avoiding some of the abuses incident to out-door relief.” In New York state, in the city of New York, including Brooklyn, the distribution of out- door relief by the department of charities is forbidden, except for purposes of transportation and for the adult blind. Most counties in the state have an almshouse, and the county super- intendents and overseers of the poor ” furnish necessary relief to such of the county poor as may require only temporary assistance, or are so disabled that they cannot be safely removed to the almshouse.” Public attention is in many cases being drawn to the inutility and injury of out-door relief.

In some states and cities the system of subsidizing voluntary

institutions is in full force, and it is in force also in many English colonies. At first sight it has the advantage of providing relief for public purposes without the creation of a new staff or establishment. There is thus an apparent economy. But the evils are many. Political partisanship and favour may influence the amount and disposition of the grants. The grants act as a bounty on the establishment and continuance of charitable institutions, homes for children, hospitals, &c, but not on the expansion of the voluntary charitable funds and efforts that should maintain them; and thus charitable homes exist in which charity in its truer sense may have little part, but in which the chief motive of the administration may be to support sectarian interests by public subsidies. Claimants for relief have little scruple in turning such institutions to their own account; and the institutions, being financially irresponsible, are not in these circumstances scrupulous on their side to prevent a misdirection of their bounties. " Parents unload their children upon the community more recklessly when they know that such children will be provided for in private orphan asylums and protectories, where the religious training that the parents prefer will be given them " (Amos G. Warner, in International Congress: Charities and Correction, 1893). Past history in New York city illustrates the same evil. The admission was entirely in the hands of the managers. They admitted; the city paid. In New York city the population between 1870 and 1890 increased about 80%; the subsidies for prisoners and public paupers increased by 43 %, but those for paupers in private institutions increased frcm $334,828 to $1,845,872, or about 461 %. The total was at that time $3,794,972; in 1898 it was rather less, $3,132,786. The alternative to this system is either the establishment of state or municipal institutions, and possibly in special cases payments to voluntary homes for the maintenance of inmates admitted at the request of a state authority, as at certified and other homes in England, with grants made conditional on the work being conducted on specified lines, and subject to a certain increasing

amount of voluntary financial support; or a close general and financial inspection o'f charitable institutions — the method of reform adopted in New York; or payment for only those inmates who are sent by public authorities and admitted on their request. The enormous extent to which children's aid societies have been

increased in the United States, sometimes with the help of considerable public grants, suggests the greatest need for caution from the point of the preservation of the family as the central element of social strength in the community. The problem of charity in relation to medical relief in the large towns of the United States is similar to that of England; its difficulties are alike.

Literature. — As good translations of the classics become accessible it is easy for the general reader or student to combine a study of the principles of charity in relation to the community with a study of history. Thus, and in connexion with special investi- gations and the conditions of practical charity, social economics may best be studied. In N. Masterman, Chalmers on Charity (1900) ; T. Mackay, Methods of Social Reform (1896); B. Bosanquet and others, Some Aspects of the Social Problem (1894) ; and C. S. Loch, Methods of Social Advance (1904), this point of view is generally assumed. Special investigations of importance may be found in the reports of medical officers of health. See Report of Committee on Physical Deterioration referred to above, and", for instance, Dr News- holme's Vital Statistics and Charles Booth's Labour and Life in London. For the history of charity there is no good single work. On details there are many good articles in Daremberg's Dictionary of Classical Antiquities, and similar works. Modern Methods of Charity, by C. H. Henderson and others (1904), supplies much general information in regard to poor relief and charity in different countries. Apart from books and official documents mentioned in the text as' indicating the present state of charitable and public relief, or as aids to practical work, the following may be of service. England : — A nnual Charities' Register and Digest, with Introduction on "How to help Cases of Distress"; the Charity Organization Review; Occasional Papers (3 vols.), published by the London Charity Organization Society (1896-1906); Reports of Proceedings of Conferences of Poor-Law Guardians; The Strength of the People, by Helen Bosanquet; Homes of the London Poor and Our Common Land, by Miss Octavia Hill ; The Queen's Poor, by M. Loane. United States of America : — The Proceedings of the International Conference on Charities and Correction (1894), and the proceedings of the annual conferences; Friendly Visiting among the Poor, by Mary E. Rich- mond (1899); American Charities, by Amos G. Warner (1908); The Practice of Charity, by E. T. Devine; Handworterbuch der Staatswissenschaften, by Dr J. Conrad, &c, vol. ii. ; Das Armenwesen in den Vereinigten Staaten

von America, by Dr Francis G. Peabody (1897) ; the Charities Review, published monthly by the New York Charity Organization Society ; the Papers and Reports of the Boston and Baltimore societies. France : — La Bibliographic charitable, by Camille Granier (1891); La Charite avant et depuis iy8g, by P. Hubert Valleroux; Fascicules of the Conseil supSrieur de V assistance publique, Revue d 'assistance, published by the SociStS internationale pour l' etude des questions d' assistance. Germany : — Reports and Pro- ceedings of the Deutsche Vereine fur Armenpflege und Wohltatigkeit; Die Armenpflege, a practical handbook.by Dr E.Miinsterberg (1897). Austria: — Osterreichs Wohlfahrtseinrichtungen, 1848-1898, by Dr Ernest Mischler (1899). (C. S. L.)

CHARIVARI, a French term of uncertain origin, but probably onomatopoeic, for a mock serenade " rough music," made by beating on kettles, fire-irons, tea-trays or what not. The charivari was anciently in France a regular wedding custom, all bridal couples being thus serenaded. Later it was reserved for ill-assorted and unpopular marriages, for widows or widowers who remarried too soon, and generally as a mockery for all who were unpopular. At the beginning of the 17th century, wedding charivaris were forbidden by the Council of Tours under pain of excommunication, but the custom still lingers in rural districts. The French of Louisiana and Canada introduced the charivari into America, where it became known under the corrupted name of " shivaree."

CHARKHARI, a native state in the Bundelkhand agency of Central India. Area, 745 sq. m.; pop. (1901) 123,594; estimated revenue £33,000. It is surrounded on all sides by other states of Central India, except near Charkhari town, where it meets the United Provinces. It was founded by Bijai Bahadur (vikrama- ditya), a sanad being granted him in 1804 and another in 181 1. The chief, whose title is maharaja, is a Rajput of the Bundela clan, descended from Chhatar Sal, the champion of the inde- pendence of Bundelkhand in the 18th century. In 1857 Raja

Ratan Singh received a hereditary salute of 11 guns, a khilal and a perpetual jagir of £1300 a year in recognition of his services during the Mutiny. The town of Charkhari (locally Maharaj-nagar) is 40 m. W. of Banda; pop. (1901) 11,718.

CHARLATAN (Ital. ciarlatano, from ciarlare, to chatter), originally one who " patters " to a crowd to sell his wares, like a

” cheap-jack ” or ” quack ” doctor — ” quack ” being similarly derived from the noise made by a duck; so an impostor who pretends to have some special skill or knowledge.

CHARLEMAGNE [Charles the Great] (c. 742-814), Roman emperor, and king of the Franks, was the elder son of Pippin the Short, king of the Franks, and Bertha, or Bertrada, daughter of Charibert, count of Laon. The place of his birth is unknown and its date uncertain, although some authorities give it as the 2nd of April 742 ; doubts have been cast upon his legitimacy, and it is just possible that the marriage of Pippin and Bertha took place subsequent to the birth of their elder son. When Pippin was crowned king of the Franks at St Denis on the 28th of July 754 by Pope Stephen II., Charles, and his brother Carloman were anointed by the- pope as a sign of their kingly rank. The rough surroundings of the Frankish court were unfavourable to the acquisition of learning, and Charles grew up almost ignorant of letters, but hardy in body and skilled in the use of weapons.

In 76r he accompanied his father on a campaign in Aquitaine, and in 763 undertook the government of several counties. In 768 Pippin divided his dominions between his two sons, and on his death soon afterwards Charles became the ruler of the northern portion of the Frankish kingdom, and was crowned at Noyon on the 9th of October 768. Bad feeling had existed for some time between Charles and Carloman, and when Charles early in 769 was called upon to suppress a rising in Aquitaine, his brother refused to afford him any assistance. This rebellion, however, was easily crushed, its leader, the Aquitainian duke Hunold, was made prisoner, and his territory more closely attached to the Frankish kingdom. About this time Bertha, having effected a temporary reconciliation between her sons, overcame the re-pugnance with which Pope Stephen III. regarded an alliance between Frank and Lombard, and brought about a marriage between Charles and a daughter of Desiderius, king of the Lombards. Charles had previously contracted a union , probably of an irregular nature, with a Frankish lady named Himiltrude, who had borne him a son Pippin, the ” Hunchback.” The peace with the Lombards, in which the Bavarians as allies of Desiderius joined, was, however, soon broken. Charles thereupon repudi-ated his Lombard wife (Bertha or Desiderata) and married in 771 a princess of the Alamanni named Hildegarde. Carloman died in December 77r, and Charles was at once recognized at Corbeny as sole king of the Franks. Carloman’s widow Gerberga had fled to the protection of the Lombard king, who espoused her cause and

requested the new pope, Adrian I., to recognize her two sons as the lawful Frankish kings. Adrian, between whom and the Lombards other causes of quarrel existed, refused to assent to this demand, and when Desiderius invaded the papal terri- tories he appealed to the Frankish king for help. Charles, who was at the moment engaged in his first Saxon campaign, ex- postulated with Desiderius; but when such mild measures proved useless he led his forces across the Alps in 773. Gerberga and her children were delivered up and disappear from history; the siege of Pavia was undertaken; and at Easter 774 the king left the seat of war and visited Rome, where he was received with great respect.

During his stay in the city Charles renewed the donation which his father Pippin had made to the papacy in 754 or 756. This transaction has given rise to much discussion as to its trust- worthiness and the extent of its operation. Our only authority, a passage in the Liber Pontificalis, describes the gift as including the whole of Italy and Corsica, except the lands north of the Po, Calabria and the city of Naples. The vast extent of this donation, which, – moreover, included territories not owning Charles's authority, and the fact that the king did not execute, or apparently attempt to execute, its provisions, has caused many scholars to look upon the passape as a forgery; but the better

opinion would appear to be that it is genuine, or at least has a genuine basis. Various explanations have been suggested. The area of the grant may have been enlarged by later interpola- tions; or it may have dealt with property rather than with sovereignty, and have only referred to estates claimed by the pope in the territories named ; or it is possible that Charles may have actually intended to establish an extensive papal kingdom in Italy, but was released from his promise by Adrian when the pope saw no chance of its fulfilment. Another supposition is that the author of the Liber Pontificalis gives the papal interpretation of a grant that had been expressed by Pippin in ambiguous terms; and this view is supported by the history of the subse- quent controversy between king and pope.

Returning to the scene of hostilities, Charles witnessed the capitulation of Pavia in June 774, and the capture of Desiderius, who was sent into a monastery. He now took the title " king of

the Lombards," to which he added the dignity of " Patrician of the Romans," which had been granted to his father. Adalgis, the son of Desiderius, who was residing at Constantinople, hoped the emperor Leo IV. would assist him in recovering his father's kingdom; but a coalition formed for this purpose was ineffectual, and a rising led by his ally Rothgaud, duke of Friuli, was easily crushed by Charles in 776. In 777 the king was visited at Paderborn by three Saracen chiefs who implored his aid against Abd-ar-Rahman, the caliph of Cordova, and promised some Spanish cities in return for help. Seizing this opportunity to extend his influence Charles marched into Spain in 778 and took Pampeluna, but meeting with some checks decided to return. As the Frankish forces were defiling through the passes of the Pyrenees they were attacked by the Wascones (probably Basques), and the rear- guard of the army was almost annihilated. It was useless to attempt to avenge this disaster, which occurred on the 15th of August 778, for the enemy disappeared as quickly as he came; the incident has passed from the domain of history into that of legend and romance, being associated by tradition with the pass of Roncesvalles. Among the slain wasone Hruodland, or Roland, margrave of the Breton march, whose death gave rise to the Chanson de Roland (see Roland, Legend of).

Charles now sought to increase his authority in Italy, where Frankish counts were set over various districts, and where Hildebrand, duke of Spoleto, appears to have recognized his overlordship. In 780 he was again in the peninsula, and at Mantua issued an important capitulary which increased the authority of the Lombard bishops', relieved freemen who under stress of famine had sold themselves into servitude, and condemned abuses of the system of vassalage. At the same time commerce was encouraged by the abolition of unauthorized tolls and by an improvement of the coinage; while the sale of arms to hostile peoples, and the trade in Christian slaves were forbidden. Proceeding to Rome, the king appears to have come to some arrangement with Adrian about the donation of 774. At Easter 781, Carloman, his second son by Hildegarde, was renamed Pippin and crowned king of Italy by Pope Adrian, and his youngest son Louis was crowned king of Aquitaine; but no mention was made at the time of his eldest son. Charles, who was doubtless intended to be king of the Franks. In 783 the king, having lost his wife Hildegarde, married Fastrada, the daughter of a Frankish count named Radolf; and in the same year his

mother Bertha died . The emperor Constantine VI . was at this time exhibiting some interest in Italian affairs, and Adalgis the Lombard was still residing at his court; so Charles sought to avert danger from this quarter by consenting in 781 to a marriage between Constantine and his own daughter Rothrude. In 786 the entreaties of the pope and the hostile attitude of Arichis II., duke of Benevento, a son-in-law of Desiderius, called the king again into Italy. Arichis submitted without a struggle, though the basis of Frankish authority in his duchy was far from secure; but in conjunction with. Adalgis he sought aid from Constantinople. His plans were ended by his death in 787, and although the empress Irene, the real ruler of the eastern empire, broke off the projected marriage between her son and Rothrude, she appears to have given very little assistance to Adalgis,

whose attack on Italy was easily repulsed. During this visit Charles had presented certain towns to Adrian, but an estrangement soon arose between king and pope over the claim of Charles to confirm the election to the archbishopric of Ravenna, and it was accentuated by Adrian's objection to the establishment by Charles of Grimoald III. as duke of Benevento, in succession to his father Arichis.

These journeys and campaigns, however, were but interludes in the long and stubborn struggle between Charles and the Saxons, which began in 772 and ended in 804 with the incorporation of Saxony in the Carolingian empire (see Saxony). This contest, in which the king himself took a very active part, brought the Franks into collision with the Wiltzi, a tribe dwelling east of the Elbe, who in 789 was reduced to dependence. A similar sequence of events took place in southern Germany. Tassilo III., duke of the Bavarians, who had on several occasions adopted a line of conduct inconsistent with his allegiance to Charles, was deposed in 788 and his duchy placed under the rule of Ceroid, a brother-in-law of Charles, to be governed on the Frankish system (see Bavaria). Having thus taken upon himself the control of Bavaria, Charles felt himself responsible for protecting its eastern frontier, which had long been menaced by the Avars, a people inhabiting the region now known as Hungary. He accordingly ravaged their country in 791 at the head of an army containing Saxon, Frisian, Bavarian and Alamannian warriors, which penetrated as far as the Raab ; and he spent the following year in Bavaria preparing for a second campaign against them, the conduct of which, however, he was compelled by further trouble in Saxony to entrust to his son king Pippin, and to Eric, margrave of Friuli.

These deputies succeeded in 795 and 796 in taking possession of the vast treasures of the Avars, which were distributed by the king with lavish generosity to churches, courtiers and friends. A conspiracy against Charles, which his friend and biographer Einhard alleges was provoked by the cruelties of Queen Fastrada, was suppressed without difficulty in 792, and its leader, the king's illegitimate son Pippin, was confined in a monastery till his death in 811. Fastrada died in August 794, when Charles took for his fourth wife an Alamannian lady named Liutgarde.

The continuous interest taken by the king in ecclesiastical affairs was shown at the synod of Frankfort, over which he presided in 794. It was on his initiative that this synod con- demned the heresy of adoptianism and the worship of images, which had been restored in 787 by the second council of Nicaea; and at the same time that council was declared to have been superfluous. This policy caused a further breach with Pope Adrian; but when Adrian died in December 795, his successor, Leo III., in notifying his elevation to the king, sent him the keys of St Peter's grave and the banner of the city, and asked Charles to send an envoy to receive his oath of fidelity. There is no doubt that Leo recognized Charles as sovereign of Rome. He was the first pope to date his acts according to the years of the Frankish monarchy, and a mosaic of the time in the Lateran palace represents St Peter bestowing the banners upon Charles as a token of temporal supremacy, while the coinage issued by the pope bears witness to the same idea. Leo soon had occasion to invoke the aid of his protector. In 799, after he had been attacked and maltreated in the streets of Rome during a proces- sion, he escaped to the king at Paderborn, and Charles sent him back to Italy escorted by some of his most trusted servants. Taking the same journey himself shortly afterwards, the king reached Rome in 800 for the purpose (as he declared) of restoring discipline in the church. His authority was undisputed; and after Leo had cleared himself by an oath of certain charges made against him, Charles restored the pope and banished his leading opponents.

The great event of this visit took place on the succeeding Christmas Day, when Charles on rising from prayer in St Peter's was crowned by Leo and proclaimed emperor and augustus amid the acclamations of the crowd. This act can hardly have been unpremeditated, and some doubt has been cast upon the statement which Einhard attributes to Charles, that he would not

have entered the building had he known of the intention of Leo. He accepted the dignity at any rate without demur, and there seems little doubt that the question of assuming, or obtaining, this title had previously been discussed. His policy had been steadily leading up to this position, which was rather the emblem of the power he already held than an extension of the area of his authority. It is probable therefore that Charles either considered the coronation premature, as he was hoping to obtain the assent of the eastern empire to this step, or that, from fear of evils which he foresaw from the claim of the pope to crown the emperor, he wished to crown himself. All the evidence tends to show that it was the time or manner of the act rather than the act itself which aroused his temporary displeasure. Contemporary accounts lay stress upon the fact that as there was then no emperor, Constantinople being under the rule of Irene, it seemed good to Leo and his counsellors and the " rest of the Christian people " to choose Charles, already ruler of Rome, to fill the vacant office. However doubtful such conjectures concerning his intentions may be, it is certain that immediately after his coronation Charles sought to establish friendly relations with Constantinople, and even suggested a marriage between himself and Irene, as he had again become a widower in 800. The deposition and death of the empress foiled this plan; and after a desultory warfare in Italy between the two empires, negotiations were recommenced which in 810 led to an arrangement between Charles and the eastern emperor, Nicephorus I. The death of Nicephorus and the accession of Michael I. did not interfere with the relations, and in 812 an embassy from Constantinople arrived at Aix-la-Chapelle, when Charles was acknowledged as emperor, and in return agreed to cede Venice and Dalmatia to Michael.

Increasing years and accumulating responsibilities now caused the emperor to alter somewhat his manner of life. No longer leading his armies in person he entrusted the direction of campaigns in various parts of his empire to his sons and other lieutenants, and from his favourite residence at Aix watched their progress with a keen and sustained interest. In 802 he ordered that a new oath of fidelity to him as emperor should be taken by all his subjects over twelve years of age. In 804 he was visited by Pope Leo, who returned to Rome laden with gifts. Before his coronation as emperor, Charles had entered into communications with the caliph of Bagdad, Harun-al-Rashid, probably in order to protect the eastern Christians, and in 801 he had

received an embassy and presents from Harun. In the same year the patriarch of Jerusalem sent him the keys of the Holy Sepulchre; and in 807 Harun not only sent further gifts, but appears to have confirmed the emperor's rights in Jerusalem, which, how- ever, probably amounted to no more than an undefined protector- ate over the Christians in that part of the world. While thus extending his influence even into Asia, there was scarcely any part of Europe where the power of Charles did not make itself felt. He had not visited Spain since the disaster of Roncesvalles, but he continued to take a lively interest in the affairs of that country. In 798 he had concluded an alliance with Alphonso II., king of the Asturias, and a series of campaigns mainly under the leadership of King Louis resulted in the establishment of the " Spanish march," a district between the Pyrenees and the Ebro stretching from Pampeluna to Barcelona, as a defence against the Saracens. In 799 the Balearic Islands had been handed over to Charles, and a long warfare was carried on both by sea and land between Frank and Saracen until 810, when peace was made between the emperor and El-Hakem, the emir of Cordova. Italy was equally the scene of continuous fighting. Grimoald of Bene- vento rebelled against his overlord; the possession of Venice and Dalmatia was disputed by the two empires; and Istria was brought into subjection.

With England the emperor had already entered into relations, and at one time a marriage was proposed between his son Charles and a daughter of Offa, king of the Mercians. English exiles were welcomed at his court; he was mainly instrumental in restoring Eardwulf to the throne of Northumbria in 809; and Einhard includes the Scots within the sphere of his influence.

In eastern Europe the Avars had owned themselves completely under his power in 805; campaigns against the Czechs in 805 and 806 had met with some success, and about the same time the land of the Sorbs was ravaged; while at the western ex- tremity of the continent the Breton nobles had done homage to Charles at Tours in 800. Thus the emperor's dominions now stretched from the Eider to the Ebro, and from the Atlantic to the Elbe, the Saale and the Raab, and they also included the greater part of Italy; while even beyond these bounds he exer- cised an acknowledged but shadowy authority. In 806 Charles arranged a division of 'his territories among his three legitimate sons, but this arrangement came to nothing owing to the death of Pippin in 810, and of the younger Charles in the following year. Charles then named his remaining son Louis as his suc- cessor; and at his father's

command Louis took the crown from the altar and placed it upon his own head. This ceremony took place at Aix on the nth of September 813. In 808 the Frankish authority over the Obotrites was interfered with by Gudrod (Godfrey), king of the Danes, who ravaged the Frisian coasts and spoke boastfully of leading his troops to Aix. To ward off these attacks Charles took a warm interest in the building of a fleet, which he reviewed in 811; but by this time Gudrod had been killed, and his successor Hemming made peace with the emperor.

In 81 1 Charles made his will, which shows that he contemplated the possibility of abdication. The bulk of his possessions were left to the twenty-one metropolitan churches of his dominions, and the remainder to his children, his servants and the poor. In his last years he passed most of his days at Aix, though he had sufficient energy to take the field for a short time during the Danish War. Early in 814 he was attacked by a fever which he sought to subdue by fasting; but pleurisy supervened, and after partaking of the communion, he died on the 28th of January 814, and on the same day his body was buried in the church of St Mary at Aix. In the year 1000 his tomb was opened by the emperor Otto III., but the account that Otto found the body upright upon a throne with a golden crown on the head and hold- ing a golden sceptre in the hands, is generally regarded as legend- ary. The tomb was again opened by the emperor Frederick I. in 1 165, when the remains were removed from a marble sarco- phagus and placed in a wooden coffin. Fifty years later they were transferred by order of the emperor Frederick II. to a splendid shrine, in which the relics are still exhibited once in every six years. The sarcophagus in which the body originally lay may still be seen at Aix, and other relics of the great emperor are in the imperial treasury at Vienna. In 1 165 Charles was canonized by the antipope Paschal III. at the instance of the emperor Frederick I., and Louis XL of France gave strict orders that the feast of the saint should be observed.

The personal appearance of Charles is thus described by Einhard:-—" Big and robust in frame, he was tall, but not excessively so, measuring about seven of his own feet in height. His eyes were large and lustrous, his nose rather long and his countenance bright and cheerful." He had a commanding presence, a clear but somewhat feeble voice, and in later life became rather corpulent. His health was uniformly good, owing perhaps to his moderation in eating and drinking, and to his love for hunting and swimming. He was an affectionate father, and

loved to pass his time in the company of his children, to whose education he paid the closest attention. His sons were trained for war and the chase, and his daughters instructed in the spinning of wool and other feminine arts. His ideas of sexual morality were primitive. Many concubines are spoken of, he had several illegitimate children, and the morals of his daughters were very loose. He was a regular observer of religious rites, took great pains to secure decorum in the services of the church, and was generous in almsgiving both within his empire and without. He reformed the Frankish liturgy, and brought singers from Rome to improve the services of the church. He had considerable knowledge of theology, took a prominent part in the theological controversies of the time, and was responsible for the addition of the clause filioqtie to the Nicene Creed. The most

attractive feature of his character, however, was his love of learning. In addition to his native tongue he could readLatin and understood Greek, but he was unable to write, and Einhard gives an account of his futile efforts to learn this art in later life. He loved the reading of histories and astronomy, and by questioning travellers gained some knowledge of distant parts of the earth. He attended lectures on grammar, and his favourite work was St Augustine's De civitate Dei. He caused Frankish sagas to be collected, began a grammar of his native tongue, and spent some of his last hours in correcting a text of the Vulgate. He delighted in the society of scholars — Alcuin, Angilbert, Paul the Lombard, Peter of Pisa and others, and in this company the trappings of rank were laid aside and the emperor was known simply as David. Under his patronage Alcuin organized the school of the palace, where the royal children were taught in the company of others, and founded a school at Tours which became the model for many other establishments. Charles was unwearying in his efforts to improve the education of clergy and laity, and in 789 ordered that schools should be established in every diocese. The atmosphere of these schools was strictly ecclesiastical and the questions discussed by the scholars were often puerile, but the greatness of the educational work of Charles will not be doubted when one considers the rude condition of Frankish society half a century before. The main work of the Carolingian renaissance was to restore Latin to its position as a literary language, and to reintroduce a correct

system of spelling and an improved handwriting. The manuscripts of the time are accurate and artistic, copies of valuable books were made and by careful collation the texts were purified.

Charles was not a great warrior. His victories were won rather by the power of organization, which he possessed in a marked degree, and he was eager to seize ideas and prompt in their execution. He erected a stone bridge with wooden piers across the Rhine at Mainz, and began a canal between the Altmuhl and the Rednitz to connect the Rhine and the Danube, but this work was not finished. He built palaces at Aix (his favourite residence) , Nijmwegen and Ingelheim, and erected the church of St Mary at Aix, modelled on that of St Vitalis at Ravenna and adorned with columns and mosaics brought from the same city. He loved the simple dress and manners of the Franks, and on two occasions only did he assume the more stately attire of a Roman noble. The administrative system of Charles in church and state was largely personal, and he brought to the work an untir- ing industry, and a marvellous grasp of detail. He admonished the pope, appointed the bishops, watched over the morals and work of the clergy, and took an active part in the deliberations of church synods; he founded bishoprics and monasteries, was lavish in his gifts to ecclesiastical foundations, and chose bishops and abbots for administrative work. As the real founder of the ecclesiastical state, he must be held mainly responsible for the evils which resulted from the policy of the church in exalting the ecclesiastical over the secular authority.

In secular affairs Charles abolished the office of duke, placed counts over districts smaller than the former duchies, and supervised their government by means of missi dominici, officials responsible to himself alone. Marches were formed on all the borders of the empire, and the exigencies of military service led to the growth of a system of land-tenure which contained the germ of feudalism. The assemblies of the people gradually changed their character under his rule. No longer did the nation come together to direct and govern, but the emperor summoned his people to assent to his acts. Taking a lively interest in commerce and agriculture, Charles issued various regulations for the organization of the one and the improvement of the other. He introduced a new system of weights and measures, which he ordered should be used throughout his kingdom, and took steps to reform the coinage. He was a voluminous lawgiver. Without abolishing the customary law of the German tribes, which is said

to have been committed to writing by his orders, he added "to it by means of capitularies, and thus introduced

certain Christian principles and customs, and some degree of uniformity.

The extent and glamour of his empire exercised a potent spell on western Europe. The aim of the greatest of his successors was to restore it to its pristine position and influence, while many of the French rulers made its re-establishment the goal of their policy. Otto the Great to a considerable extent succeeded; Louis XIV. referred frequently to the empire of Charlemagne; and Napoleon regarded him as his prototype and predecessor. The empire of Charles, however, was not lasting. In spite of his own wonderful genius the seeds of weakness were sown in his lifetime. The church was too powerful, an incipient feudalism was present, and there was no real bond of union between the different races that acknowledged his authority. All the vigi- lance of the emperor could not restrain the dishonesty and the cupidity of his servants, and no sooner was the strong hand of their ruler removed than they began to acquire territorial power for themselves.

• Authorities. — The chief authorities for the life and times of Charlemagne are Einhard's Vita Karoli Magni, the Annates Laurissenses majores, the Annates Fuldenses, and other annals, which are published in the Monumenta Germaniae historica. Scriptores, Band 1. and ii., edited by G. H. Pertz (Hanover and Berlin, 1826-1892). For the capitularies see Capitularia regum Francorum, edited by A. Boretius in the Monumenta. Leges. Many of the songs of the period appear in the Poetae Latini aevi Carolini, edited by E. Diimmler (Berlin, 1 881-1884). The Bibliotheca rerum Germani- carum, tome iv., edited by Ph. Jaffe ˆBerlin, 1864-1873), contains some of the emperor's correspondence, and Hincmar's De ordine palatii, edited by M. Prou (Paris, 1884), is also valuable.

The best modern authorities are S. Abel and B. Simson, Jahrbiicher des frdnkischen Reiches unter Karl dem Grossen (Leipzig, 1883-1888); G. Richter and H. Kohl, Annalen des frdnkischen Reichs im Zeitalter der Karolinger (Halle, 1885-1887) ; E. Miihlbacher, Deutsche Geschichte unter den Karolingern (Stuttgart, 1886); H. Brosien, Karl der Grosse (Leipzig and Prague, 1885) ; J. I. Mombert, History of Charles the Great (London, 1888) ; M. Lipp, Dasfrankische Grenzsystem unter Karl

dem Grossen (Breslau, 1892) ; J. von Doll- inger, Das Kaiserthum Karls des Grossen und seiner Nachfolger (Munich, 1864) ; F. von Wyss, Karl der Grosse als Gesetzgeber (Zurich, 1869); Th. Sickel, Lehre von den Vrkunden der ersten Karolinger (Vienna, 1867); E. Diimmler in the Allgemeine deutsche Biographie, Band xv. ; Th. Lindner, Die Fabel von der Bestattung Karls des Grossen (Aix-la-Chapelle, 1893); J. A. Ketterer, Karl der Grosse und die Kirche (Munich and Leipzig, 1898) ; and J. B. Mullinger, The Schools of Charles the Great and the Restoration of Education in the gth century (London, 1877).

The work of the monk of St Gall is found in the Monumenta, Band ii. ; an edition of the Historia de vita Caroli Magni et Rolandi, edited by F. Castets, has been published (Paris, 1880), and an edition of the Kaiserchronik, edited by E. Schroder (Hanover, 1892). See also P. Clemen, Die Portratdarstellung Karls des Grossen (Aix-la- Chapelle, 1896). (A. W. H.*)

The Charlemagne Legends

Innumerable legends soon gathered round the memory of the great emperor. He was represented as- a warrior performing superhuman feats, as a ruler dispensing perfect justice, and even as a martyr suffering for the faith. It was confidently believed towards the close of the 10th century that he had made a pil- grimage to Jerusalem; and, like many other great rulers, it was reported that he was only sleeping to awake in the hour of his country's need. We know from Einhard (Vita Karoli, cap. xxix.) that the Frankish heroic ballads were drawn up in writing by Charlemagne's order, and it may be accepted as certain that he was himself the subject of many such during his lifetime. The legendary element crept even into the Latin panegyrics produced by the court poets. Before the end of the 9th century a monk of St Gall drew up a chronicle De gestis Karoli Magni, which was based partly on oral tradition, received from an old soldier named Adalbert, who had' served in Charlemagne's army. This recital contains various fabulous incidents. The author relates a conversation between Otkar the Frank (Ogier the Dane) and the Lombard king Desiderius (Didier) on the walls of Pavia in view of Charlemagne's advancing army. To Didier's repeated question "Is this the emperor?" Otkar continues to answer " Not yet," adding at last " When thou shalt see the fields bristling with an iron harvest, and the Po and the Ticino swollen with sea-floods, inundating the walls of the city

with iron billows, then shall Karl be nigh at hand." This episode, which bears the marks of popular heroic poetry, may well be the substance of a lost Carolingian cantilena. 1

The legendary Charlemagne and his warriors were endowed with the great deeds of earlier kings and heroes of the Frankish kingdom, for the romancers were not troubled by considerations of chronology. National traditions extending over centuries were grouped round Charlemagne, his father Pippin, and his son Louis. The history of Charles Martel especially was absorbed in the Charlemagne legend. But if Charles's name was associated with the heroism of hjs predecessors he was credited with equal readiness with the weaknesses of his successors. In the earlier chansons de geste he is invariably a majestic figure and represents within limitations the grandeur of the historic Charles. But in the histories of the wars with his vassals he is often little more than a tyrannical dotard, who is made to submit to gross insult. This picture of affairs is drawn from later times, and the sym- pathies of the poet are generally with the rebels against the monarchy. Historical tradition was already dim when the hypothetical and much discussed cantilenae, which may be taken to have formed the repository of the national legends from the 8th to the 10th century, were succeeded in the nth and the early 12th centuries by the chansons de geste. The early poems of the cycle sometimes contain curious information on the Frankish methods in war, in council and in judicial procedure, which had no parallels in contemporary institutions. The account in the Chanson de Roland of the trial of Ganelon after the battle of Roncesvalles must have been adopted almost intact from earlier poets, and provides a striking example of the value of the chansons de geste to the historian of manners and customs. In general, however, the trouvere depicted the feeling and manners of his own time.

Charlemagne's wars in Italy, Spain and Saxony formed part of the common epic material, and there are references to his wars against the Slavs; but especially he remained in the popular mind as the great champion of Christianity against the creed of Mahomet, and even his Norman and Saxon enemies became Saracens in current legend. He is the Christian emperor directly inspired by angels; his sword Joyeuse contained the point of the

lance used in the Passion; his standard was Romaine, the banner of St Peter, which, as the orifiamme of Saint Denis, was later to be borne in battle before the kings of France; and in 1 1 64 Charles was canonized at the desire of the emperor Frederick I. Barbarossa by the anti-pope Pascal III. This gave him no real claim to saintship, but his festival was observed in some places until comparatively recent times. Charlemagne was endowed with the good and bad qualities of the epic king, and as in the case of Agamemnon and Arthur, his exploits paled beside those of his chief warriors. These were not originally known as the twelve peers 2 famous in later Carolingian romance. The twelve peers were in the first instance the companions in arms of Roland in the Teutonic sense. 3 The idea of the paladins forming an association corresponding to the Arthurian Round Table first appears in the romance of Fierabras. The lists of them are very various, but all include the names of Roland and

1 A remnant of the popular poetry contemporary with Charlemagne and written in the vernacular has been thought to be discernible under its Latin translation in the description of a siege during Charlemagne's war against the Saracens, known as the " Fragment from the Hague " (Pertz, Script, iii. pp. 708-710).

2 The words douze pairs were anglicized in a variety of forms ranging from douzepers to dosepers. The word even occurred as a singular in the metrical romance of Octavian: — " Ferst they sent out a doseper." At the beginning of the 13th century there existed a cour des pairs which exercised judicial functions and dated possibly from the nth century, but their prerogatives at the beginning of the 14th century appear to have been mainly ceremonial and decorative. In 1257 the twelve peers were the chiefs of the great feudal provinces, the dukes of Normandy, Burgundy and Aquitaine, the counts of Toulouse, Champagne and Flanders, and six spiritual peers, the archbishop of Reims, the bishops of Laon, Ch&lons-sur-Marne, Beauvais, Langres and Noyon. (See Du Cange, Clossarium, s.v. ".Par.").

3 See J. Flach, Le Compagnonnage dans les chansons de geste (Paris,

1891).

Oliver. The chief heroes who fought Charlemagne's battles were Roland; Ganelon, afterwards the traitor; Turpin, the fighting archbishop of Reims; Duke Naimes of Bavaria, the wise

counsellor who is always on the side of justice; Ogier the Dane, the hero of a whole series of romances; and Guillaume of Toulouse, the defender of Narbonne. Gradually most of the chansons de geste were attached to the name of Charlemagne, whose poetical history falls into three cycles: — the geste du roi, relating his wars and the personal history of himself and his family; the" southern cycle, of which Guillaume de Toulouse is the central figure; and the feudal epic, dealing with the revolts of the barons against the emperor, the rebels being invariably connected by the trouveres with the family of Doon de Mayence

(?■»■)■

The earliest poems of the cycle are naturally the closest to historical truth. The central point of the geste du roi is the 1 ith-century Chanson de Roland (see Roland, Legend of), one of the greatest of medieval poems. Strangely enough the defeat of Roncesvalles, which so deeply impressed the popular mind, has not a corresponding importance in real history. But it chanced to find as its exponent a poet whose genius established a model for his successors, and definitely fixed the type of later heroic poems. The other early chansons to which reference is made in Roland — Aspremont, Enfances Ogier, Guiteclin, Balan, relating to Charlemagne's wars in Italy and Saxony — are not preserved in their original form, and only the first in an early recension. Basin or Carl el Elegast (preserved' in Dutch and Icelandic), the Voyage de Charlemagne & Jerusalem and Le Couronnement Looys also belong to the heroic period. The purely fictitious and romantic tales added to the personal history of Charlemagne and his warriors in the 13th century are inferior in manner, and belong to the decadence of romance. The old tales, very much distorted in the 15th-century prose versions, were to undergo still further degradation in 18th-century compilations.

According to Berte aus grans pie's, in the 13th-century remanie-menl of the Brabantine trouvere Adenes li Rois, Charlemagne was the son of Pippin and of Berte, the daughter of Flore and Blanchefleur, king and queen of Hungary. The tale bears marks of high antiquity, and presents one of the few incidents in the French cycle which may be referred to a mythic origin. On the night of Berte's marriage a slave, Margiste, is substituted for her, and reigns in her place for nine years, at the expiration of which Blanchefleur exposes the deception; whereupon Berte is restored from her refuge in the forest to her rightful place as queen. Mainet (12th century) and the kindred poems in German and

Italian are perhaps based on the adventures of Charles Martel, who after his father's death had to flee to the Ardennes. They relate that, after the death of his parents, Charles was driven by the machinations of the two sons of Margiste to take refuge in Spain, where he accomplished his enfances (youthful exploits) with the Mussulman king Galafre under the feigned name of Mainet. He delivered Rome from the besieging Sara- cens, and returned to France in triumph. But his wife Galienne, daughter of Galafre, whom he had converted to the Christian faith, died on her way to rejoin him. Charlemagne then made an expedition to Italy {Enfances Ogier in the Venetian Charle- magne, and the first part of the Chevalerie Ogier de Dannemarche by Raimbert of Paris, 12th century) to raise the siege of Rome, which was besieged by the Saracen emir Corsuble. He crossed the Alps under the guidance of a white hart, miraculously sent to assist the passage of the army. Aspremont (12th century) describes a fictitious campaign against the Saracen King Agolant in Calabria, and is chiefly devoted to the enfances of Roland. The wars of Charlemagne with his vassals are described in Girart de Roussillon, Renaus de Montauban, recounting, the deeds of the four sons of Aymon, Huon de Bordeaux, and in the latter part of the Chevalerie Ogier, which belong properly to the cycle connected with Doon of Mayence.

The account of the pilgrimage of Charlemagne and his twelve paladins to the Holy Sepulchre must in its first form have been earlier than the Crusades, as the patriarch asks the emperor to

free Spain, not the Holy Land, from the Saracens. The legend probably originated in a desire to authenticate the relics in the abbey of Saint Denis, supposed to have been brought to Aix by Charlemagne, and is preserved in a 12th-century romance, Le Voyage de Charlemagne a Jerusalem et a Constantinople. 1 This journey forms the subject of a window in the cathedral of Chartres, and there was originally a similar one at Saint-Denis. On the way home Charles and his paladins visited the emperor Hugon at Constantinople, where they indulged in a series of gabs which they were made to carry out. Galien, a favourite 15th-century romance, was attached to this episode, for Galien was the son of the amours of Oliver with Jacqueline, Hugon's daughter. The traditions of Charlemagne's fights with the

Norsemen (Norois, Noreins) are preserved in Aiquin (12th century), which describes the emperor's reconquest of Armorica from the " Saracen " king Aiquin, and a disaster at Cezembre as terrible in its way as those of Roncesvalles and Aliscans. La destruction de Rome is a 13th-century version of the older chanson of the emir Balan, who collected an army in Spain and sailed to Rome. The defenders were overpowered and the city destroyed before the advent of Charlemagne, who, however, avenged the disaster by a great battle in Spain. The romance of Fierabras (13th century) was one of the most popular in the 15th century, and by later additions came to have pretensions to be a complete history of Charlemagne. The first part represents an episode in Spain three years before Roncesvalles, in which Oliver defeats the Saracen giant Fierabras in single combat, and converts him. The hero of the second part is Gui de Bourgogne, who recovers the relics of the Passion, lost in the siege of Rome. Otinel (13 th century) is also pure fiction. L' Entree en Espagne, preserved in a 14th-century Italian compilation, relates the beginning of the Spanish War, the siege of Pampeluna, and the legendary combat of Roland with Ferragus. Charlemagne's march on Saragossa, and the capture of Huesca, Barcelona and Girone, gave rise to La Prise de Pampelune (14th century, based on a lost chanson); and Gui de Bourgogne (12th century) tells how the children of the barons, after appointing Guy as king of France, set out to find and rescue their fathers, who are represented as having been fighting in Spain for twenty-seven years. The Chanson de Roland relates the historic defeat of Roncesvalles on the 15th of August 778, and forms the very crown of the whole Carolingian legend. The two 13th-century romances, Gaidon, by Herbert Leduc de Dammartin, and Anstis de Carthage, contain a purely fictitious account of the end of the war in Spain, and of the establishment of a Frankish kingdom under the rule of Anseis. Charlemagne was recalled from Spain by the news of the outbreak of the Saxons. The contest between Charlemagne and Widukind (Guiteclin) offered abundant epic material. Unfortunately the original Guiteclin is lost, but the legend is preserved in Les Saisnes (c. 1300) of Jehan Bodel, which is largely occupied by the loves of Baudouin and Sibille, the wife of Guiteclin. The adventures of Blanchefleur, wife of Charlemagne, form a variation of the common tale of the innocent wife falsely accused, and are told in Macaire and in the extant fragments of La Reine Sibille (14th century). After the conquest of the Saracens and the Saxons, the defeat of the Northmen, and the suppression of the feudal revolts, the emperor abdicated in

favour of his son Louis {Le Couronnement Looys, 1 2 th century) . Charles's harangue to his son is in the best tradition of epic romance. The memory of Roncesvalles haunts him on his death-bed, and at the moment of death he has a vision of Roland.

The mythic element is practically lacking in the French legends, but in Germany some part of the Odin myth was associated with Charles's name. The constellation of the Great Bear, generally associated with Odin, is Karlswagen in German, and Charles's Wain in English. According to tradition in Hesse, he awaits resurrection, probably symbolic of the triumph of the sun over winter, within the Gudensberg (Hill of Odin) . Bavarian

1 For clerical accounts of Charles's voyage to the Holy Land see the Chronicon (c. 968) of Benedict, a monk of St Andre, and Descriptio qualiter Karolus Magnus clavum et coronam Domini . . . demerit, by an 11th-century writer.

tradition asserts that he is seated in the Untersberg in a chair, as in his tomb at Aix-la-Chapelle. His white beard goes on grow- ing, and when it has thrice encircled the stone table before him the end of the world will come; or, according to another version. Charles will arise and after fighting a great battle on the plain of Wals will reign over a new Germany. There were medieval chroniclers who did not fear to assert that Charles rose from the dead to take part in the Crusades.' In the MS. Annates S. Stephani Frisingenses (15th century), which formerly belonged to the abbey of Weihenstephan, and is now at Munich, the childhood of Charlemagne is practically the same as that of many mythic heroes. This work, generally known as the chronicle of Weihenstephan, gives among other legends a curious history of the emperor's passion for a dead woman, caused by a charm given to Charles by a serpent to whom he had rendered justice. The charm was finally dtopped into a well at Aix, which thence-forward became Charles's favourite residence. The story of Roland's birth from the union of Charles with his sister Gilles, also found in German and Scandinavian versions, has abundant parallels in mythology, and was probably transferred from mythology to Charlemagne.

The Latin chronicle, wrongly ascribed to Turpin (Tilpinus), bishop of Reims from 753 to 800, was. in reality later than the earlier poems of the French cycle, and the first properly authenticated mention of it is in 1165. Its primary object was to authenticate the relics of St James at Compostella. Alberic Trium

Fontium, a monk of the Cistercian monastery of Trois Fontanes in the diocese of Chalons, embodied much poetical fiction in his chronicle (c. 1249). A large section of the Chronique rimee (c. 1243) of Philippe Mousket is devoted to Charlemagne's exploits. At the beginning of the 14th century Girard of Amiens made a dull compilation known as Charlemagne from the chansons de gests, authentic history and the pseudo- Turpin. La Conqueste que fit le grand roi Charlemaigne es Espaignes (pr. i486) is the same work as the prose compilation of Fierabras (pr. 1478), and Caxton's Lyf of Charles the Crete (148S).

The Charlemagne legend was fully developed in Italy, where ii. was to have later a great poetic development at the hands of Boiardo, Ariosto and Tasso. There are two important Italian compilations, MS. XIII. of the library of St Mark, Venice (c. 1200), a.nd the Reali di Francia (c. 1400) of a Florentine writer, Andrea da Barberino (b. 1370), edited by G. Vandelli (Bologna, 1892). The six books of this work are rivalled in importance by the ten branches of the Norse Karlamagnus saga, written under the reign of Haakon V. This forms a consecutive legendary history of Charles, and is apparently based on earlier versions of the French Charlemagne poems than those which we possess. It thus furnishes a guide to the older forms of stories, and moreover preserves the substance of others which have not survived in their French form. A popular abridgment, the Keiser Karl Magnus Kronike (pr. Malmo, 1534), drawn up in Danish, serves in some cases to complete the earlier work. The 2000 lines of the German Kaiserchronik on the history of Charlemagne belong to the first half of the 12th century, and were perhaps the work of Conrad, the poet of the Ruolantes Liet. The German poet known as the Strieker used the same sources as the author of the chronicle of Weihen- stephan for his Karl (c. 1230). The earliest important Spanish version was the Chronica Hispaniae (c. 1284) of Rodrigo de Toledo.

The French and Norman- French chansons circulated as freely in England as in France, and it was therefore not until the period of decadence that English versions were made. The English metrical romances of Charlemagne are: — Rowlandes Song (15th century); The Taill of Rauf Coilyear (c. 1475, pr. by R. Lek- preuik, St Andrews, 1472), apparently original; Sir Ferumbras (c. 1380) and the Sowdone of Babylone (c. 1400) from an early version of Fierabras; a fragmentary Roland and Vernagu (Ferragus); two versions of Otuel (Otinel); and a Sege of Meldyne (c. 1390), forming a prologue to Otinel unknown in French.

Bibliography. — The most important works on the Charlemagne cycle of romance are : — G. Paris, Hist, poetique de Charlemagne (Paris, 1865; reprint, with additional notes by Paris and P. Meyer, 1905); L. Gautier, Les Epopees franqaises (Paris, 4 vols, new ed., 1878, 1892, 1880, 1882) and the supplementary Bibliographie des chansons de geste (1897). The third volume of the Mpopees francaises contains an analysis and full particulars of the chansons de geste immediately connected with the history of Charlemagne. See also G. Rauschen, Die Legende Karls des Grossen im llten und I2ten Jahrhundert (Leipzig, 1890); Kristoffer Nyrop, Den oldfranske Heldedigtning (Copenhagen, 1883; Ital. trans. Turin, 1886); Pio Rajna, Le Origini dell' epopea francese (Florence, 1884); G. T. Graesse, " Die grossen Sagenkreise des Mittelalters," in his Litterar- geschichte (Dresden, 1842) ; Histoire litteraire de la France (vol. xxii., 1-852); H. L. Ward, Catalogue of Romances in the Dept. of MSS. in the British Museum (1883), vol. i. pp. 546-689; E. Muntz, La L&gende de Charlemagne dans Vart du moyen age (Paris, 1885); and for the German legend, vol. iii. of H. F. Massmann's edition of the Kaiserchronik (Quedlinburg, 1 849-1 854). The English Charlemagne Romances were edited (extra series) for the Early Eng. Text Soc. by Sidney J. Herrtage, Emil Hausknecht, Octavia Richardson and Sidney Lee (1879-1881), the romance of Duke Huon of Bordeaux containing a general account of the cycle by Sidney Lee; the Karlamagnussaga, by C. R. Unger (Christiania, i860), see also G. Paris in Bibl. de I'Ecole des Charles (1864-1865). For individual chansons see Anseis de Carthage, ed. J. Alton (Tubingen, 1892); Aiquin, ed. F. Jouon des Longrais (Nantes, 1880) ; Aspremont, ed. F. Guessard and L. Gautier (Paris, 1885); Basin, or Charles et Elegast or Le Couronnement de Charles, preserved only in foreign versions (see Paris, Hist. Poet. pp. 315, seq.) ; Berta de li gran pie, ed. A. Mussafia, in Romania (vols. iii. and iv., 1874-1875); Berte aus grans pies, ed. A. Scheler (Brussels, 1874) ; Charlemagne, by Girard d'Amiens, detailed analysis in Paris, Hist. Poet. (Appendix iv.) ; Couronnement Looys, ed. E. Langlois (Le Puy, 1888) ; Desier (Desiderius or Didier), lost songs of the wars of Lombardy, some fragments of which are preserved in Ogier le Danois ; Destruction de Rome, ed. G. Grober in Romania (1873) ; A. Thomas, Nouvelles recherches sur " I'entree de Spagne," in Bibl. des ecoles francaises de Rome (Paris, 1882); Fierabras, ed. A. Krober and G.

Servois (Paris, i860) in Anciens poetes de la France, and Provencal text, ed. I. Bekker (Berlin, 1829) ; Galien, ed. E. Stengel and K. Pfeil (Marburg, 1890) ; Gaydon, ed. F. Guessard and S. Luce (Anciens poetes .... 1862); Gui de Bourgogne, ed. F. Guessard and H. Michelant (same series, 1859); Mainet (fragments only extant), ed. G. Paris, in Romania (t875); Otinel, ed .Guessard and Michelant (Anciens poetes, 1859), and Sir Otuel, ed. S. J. Herrtage (E.E.T.S., 1880); Prise de Pam- pelune (ed. A. Mussafia, Vienna, 1864) ; for the Carolingian romances relating to Roland, see Roland; Les Saisnes, ed. F. Michel (1839); The Sege of Melaine, introductory to Otinel, preserved in English only (ed. E.E.T.S., 1880); Simon de Pouille, analysis in lipop. fr. (iii. pp. 346 sq.) ; Voyage de C. d, Jerusalem, ed. E. Koschwitz (Heilbronn, 1879). For the chronicle of the Pseudo-Turpin, see an edition by Castets (Paris, 1881) for the " Societe des langues romanes," and the dissertation by G. Paris, De Pseudo-Turpino (Paris, 1865). The Spanish versions of Carolingian legends are studied by Mila y Fontanals in Dela poesia heroico-popular castellana (Barcelona, 1874). (M. Br.)

CHARLEMAGNE, JEAN ARMAND (1753-1838), French dramatic author, was born at Bourget (Seine) on the 30th of November 1753. Originally intended for the church, he turned first to being a lawyer's clerk and then a soldier. He served in the American War of Independence, and on returning to France (1783) began to employ his pen on economic subjects, and later in writing for the stage. He became the author of a large number of plays, poems and romances, among which may be mentioned the comedies M. de Crac a Paris (1793), Le Souper des Jacobins (i795)and L'Agioteur(i 796) , and Observations de quelques patriotes sur la necessite de conserver les monuments de la littSrature et des arts (1794), an essay written in collaboration with M.M. Chardin and Renouard, which induced the Convention to protect books adorned with the coats of arms of their former owners and other treasures from destruction at the hands of the revolutionists. He died in Paris on the 6th of March 1838.

CHARLEMONT, JAMES CAULFEILD, ist Earl of (1728- 1799), Irish statesman, son of the 3rd viscount Charlemont, was born in Dublin on the 18th of August 1728, and succeeded his father as 4th viscount in 1 734. The title of Charlemont descended from Sir Toby Caulfeild (1565-1627) of Oxfordshire, England, who was given lands in Ireland, and created Baron Charlemont (the name of a fort on the Blackwater), for his services to King James I. in 1620, and the ist viscount was the'sth baron (d. 1671), who was

advanced by Charles II. Lord Charlemont is historically interesting for his political connexion with P'lood and Grattan; V29— 1

he was a cultivated man with literary and artistic tastes, and both in Dublin and in London his amiable character gave him con- siderable social influence. For various early services in Ireland he was made an earl in 1 763, but he disregarded court favours and cordially joined Grattan in 1780 in the assertion of Irish inde- pendence. He was president of the volunteer convention in Dublin in November 1783, having taken from the first a leading part in the embodiment of the volunteers; and he was a strong opponent of the proposals for the Union.. He died on the 4th of August 1799; his eldest son, who succeeded him, being subse- quently (1837) created an English baron. His Life, by F. Hardy, appeared in 1810.

CHARLEROI (Carolus Rex), a town in the province of Hainaut, Belgium. Pop. (1904) 26,528. It was founded in 1666 on the site of a village called Charnoy by the Spanish governor Roderigo and named after his sovereign Charles II. of Spain. Charleroi is the centre of the iron industry of Belgium. It is connected by a canal with Brussels, and from its position on the Sambre enjoys facilities of communication by water with France as well as Belgium. It was ceded soon after its foundation to France by the treaty of Aix-la-Chapelle, and Vauban fortified it. During the French occupation the town was considerably extended, and the fortifications were made so strong that Charleroi twice successfully resisted the strenuous attacks of William of Orange. In 1794 Charleroi again fell into the hand's of the French, and on this occasion instead of fortifying they dismantled it. In 1816 Charleroi was refortified under Wellington's direction, and it was finally dismantled in 1859. Some portions of the old ramparts are left near the railway station. There is an archaeological museum with a miscellaneous collection of Roman and Frank antiquities.

CHARLEROI, a borough of Washington county, Pennsylvania, U.S.A., on the Monongahela river, near the S.W. corner of the state, about 20 m. S. of Pittsburgh. Pop. (1900) 5930, (1749 foreign-born); (1910) 9615 It is served by the Pennsylvania railway. The surrounding country has good farming land and large coal mines. In 1905 the borough ranked fifth among the cities of the United States in the manufacture of glass (plate-glass, lamp chimneys and bottles), its product (valued at $1,841,308) being 2-3 % of that of the whole country. Charleroi

was settled in 1890 and was incorporated in 1891.

CHARLES (Fr. Charles; Span. Carlos; Ital. Carlo; Ger. Karl; derived from O.H.G. CAara/,latinized as Carolus, meaning originally " man ": cf. Mod. Ger., Kerl," fellow," A.S. ceorl, Mod. Eng. " churl "), a masculine proper name. It has been borne by many European princes, notices of the more important of whom are given below in the following order: (1) Roman emperors, (2) kings of England, (3) other kings in the alphabetical order of their states, (4) other reigning princes in the same order, (5) non-reigning princes. Those princes who are known by a name in addition to Charles (Charles Albert, &c.) will be found after the private individuals bearing Charles as a surname.

CHARLES II. 1 called The Bald (823-877), Roman emperor and king of the West Franks, was the son of the emperor Louis the Pious and of his second wife Judith and was born in 823. The attempts made by his father to assign him a kingdom, first Alamannia (829), then the country between the Meuse and the Pyrenees(839),a1,theexpenseofhishalf-brothersLothairandLouis led to a rising on the part of these two (see Louis I., the Pious). The death of the emperor in 840 was the signal for the outbreak of war between his sons. Charles allied himself with his brother Louis the German to resist the pretensions of the emperorLothair, and the two allies conqueredhim in thebloody victoryofFontenoy-en-Puisaye (25 June 841). In the following year, the two brothers confirmed their alliance by the celebrated oaths of Strassburg, made by Charles in the Teutonic language spoken by the subjects of Louis, and by Louis in the Romance tongue of Charles's subjects. The war was brought to an end by the treaty of Verdun (August 843), which gave to'Charles the Bald the kingdom of the western Franks, Which practically corresponded with what

1 For Charles I., Roman emperor, see Charlemagne ; cf. under Charles I. of France below.

is now France, as far as the Meuse, the Saone and the Rhone, with the addition of the Spanish March as far as the Ebro. The

first years of his reign up to the death of Lothair I. (855) were comparatively peaceful, and during them was continued the system of " confraternal government " of the sons of Louis the Pious, who had various meetings with one another, at Coblenz (848) , at Meersen (851), and at Attigny (854). In 8 58 Louis the German, summoned by the disaffected nobles, invaded the kingdom of Charles, who fled to Burgundy, and was only saved by the help of the bishops, and by the fidelity of the family of the Welfs, who were related to Judith. In 860 he in his turn tried to seize the kingdom of his nephew, Charles of Provence, but met with a repulse. On the death of Lothair II. in 869 he tried to seize his dominions, but by the treaty of Mersen (870) was com- pelled to share them with Louis the German. Besides this, Charles had to struggle against the incessant rebellions in Aqui- taine, against the Bretons, whose revolt was led by their chief Nomenoe and Erispoe, and who inflicted on the king the defeats of Ballon (845) and Juvardeil (851), and especially against the Normans, who devastated the country in the north of Gaul, the va'-'.eys of the Seine and Loire, and even up to the borders of Aˆuitaine. Charles was several times compelled to purchase tHeir retreat at a heavy price. He has been accused of being incapable of resisting them, but we must take into account the unwillingness of the nobles, who continually refused to join the royal army; moreover, the Frankish army does not seem to have been sufficiently accustomed to war to make any headway'against the pirates. At any rate, Charles led various expeditions against the invaders, and tried to put a barrier in their way by having fortified bridges built over all the rivers. In 875, after the death of the emperor Louis II., Charles the Bald, supported by Pope John VIII., descended into Italy, receiving the royal crown at Pavia and the imperial crown at Rome (29th December). But Louis the German, who was also a candidate for the succession of Louis II., revenged himself for Charles's success by invading and devastating his dominions. Charles was recalled to Gaul, and after the death of Louis the German (28th August 876), in his turn made an attempt to seize his kingdom, but at Andernach met with a shameful defeat (8th October 876). In the meantime, John VIII., who was menaced by the Saracens, was continually urging him to come to Italy, and Charles, after having taken at Quierzy the necessary measures for safeguarding the government of his dominions in his absence, again crossed the Alps, but this expedition had been received w,ith small enthusiasm by the nobles, and even by Boso, Charles's brother-in-law, who had been entrusted by him with the government of Lombardy, and they refused to come with

their men to join the imperial army. At the same time Carlo man, son of Louis the German, entered northern Italy. Charles, ill and in great distress, started on his way back to Gaul, and died while crossing the pass of the Mont Cenis on the 5th or 6th of October 877. He was succeeded by his son Louis the Stammerer, the child of Ermentrude, daughter of a count of Orleans, whom he had married in 842, and who had died in 86q. In 870 he had married Richilde, who was descended from a noble family of Lorraine, but none of the children whom he had by her played a part of any importance. Charles seems to have been a prince of education and letters, a friend of the church, and conscious of the support he could find in the episcopate against his unruly nobles, for he chose his councillors for preference from among the higher clergy, as in the case of Guenelon of Sens, who betrayed him, or of Hincmar of Reims. But his character and his reign have been judged very variously. The general tendency seems to have been to accept too easily the accounts of the chroniclers of the east Frankish kingdom, which are favourable to Louis the German, and to accuse Charles of cowardice and bad faith. He seems on the contrary not to have lacked activity or decision.

Authorities. — The most important authority for the history of Charles's reign is represented by the Annates Bertiniani, which were the work of Prudentius, bishop of Troyes, up to 861, then up to 882 of the celebrated Hincmar, archbishop of Reims. This prince's charters are to be found published in the collections of the Academic des Inscriptions, by M. M. Prou. The most complete

history of the reign is found in E. Dummler, Geschichte des ost-frdnkiscken Reiches (3 vols., Leipzig, 1 887-1 888). See also J. Cal- mette, La Diplomatic carolingienne du traitS de Verdun ti la mort de Charles le Chauve (Paris, 1901), andˆF. Lot, " Une Annee du regne de Charles le Chauve," in Le Moyen-Age, (1902) pp. 393-438.

CHARLES III., the Fat ! (832-888), Roman emperor and king of the West Franks, was the youngest of the three sons of Louis the German, and received from his father the kingdom of Swabia (Alamannia). After the death of his two brothers in succession, Carloman (881) and Louis the Young (882) , he inherited the whole of his father's dominions. In 880 he had helped his two cousins in the west Frankish realm, Louis III. and Carloman, in their struggle with the usurper Boso of Provence, but abandoned them during the campaign in order to be crowned emperor at

Rome by Pope John VIII. (February 881). On his return he led an expedition against the Norsemen of Friesland, who were entrenched in their camp at Elsloo, but instead of engaging with them he preferred to make terms and paid them tribute. In 884 the death of Carloman brought into his possession the west Frankish realm, and in 885 he got rid of his rival Hugh of Alsace, an illegitimate son of Lothair II., taking him prisoner by treachery and putting out his eyes. However, in spite of his six expeditions into Italy, he did not succeed in pacifying the country, nor in delivering it from the Saracens. He was equally unfortunate in Gaul and in Germany against the Norsemen, who in 886-887 besieged Paris. The emperor appeared before the city with a large army (October 886), but contented himself by treating with them, buying the retreat of the invaders at the price of a heavy ransom, and his permission for them to ravage Burgundy without his interfering. On his return to Alamannia, however, the general discontent showed itself openly and a conspiracy was formed against him. He was first forced to dismiss his favourite, the chancellor Liutward, bishop of Vercelli. The dissolution of his marriage with the pious empress Richarde, in spite of her inno- cence as proved by the judicial examination, alienated his nobles still more from him. He was deposed by an assembly which met at Frankfort or at.Tribur (November 887), and died in poverty at Neidingen on the Danube (iSth January 888).

See E. Dummler, Geschichte des ostfrdnkischen Reiches vol. iii. (Leipzig 1888).

CHARLES IV. (1316-1378), Roman emperor and king of Bohemia, was the eldest son of John of Luxemburg, king of Bohemia, and Elizabeth, sister of Wenceslas III., the last Bohemian king of the Premyslides dynasty. He was born at Prague on the 14th of May 1316, and in 1323 went to the court of his uncle, Charles IV., king of France, and exchanged his baptismal name of Wenceslas for that of Charles. He remained for seven years in France, where he was well educated and learnt five languages; and there he married Blanche, sister of King Philip VI., the successor of Charles IV. In 1331 he gained some experience of warfare in Italy with his father; and on his return to Bohemia in 1333 he was made margrave of Moravia. Three years later he undertook the government of Tirol on behalf of his brother John Henry, and was soon actively concerned in a struggle for the possession of this county. In consequence of an alliance between his father and Pope Clement VI., the relentless enemy of the emperor Louis IV.,

Charles was chosen German king in opposition to Louis by some of the princes at Rense on the nth of July 1346. As he had previously promised to be sub- servient to Clement he made extensive concessions to the pope in 1347. Confirming the papacy in the- possession of wide territories, he promised to annul the acts of Louis against Clement, to take no part in Italian affairs, and to defend and protect the church. Meanwhile he had accompanied his father into France and had taken part in the battle of Crecy in August 1346, when John was killed and Charles escaped wounded from the field. As king of Bohemia he returned to Germany, and after being crowned German king at Bonn on the 26th of November 1346, prepared to attack Louis. Hostilities were interrupted by the death of the emperor in October 1347, and Gunther, count of Schwarzburg, who was chosen king by the

‘ This surname has only been applied to Charles since the 13th century.

partisans of Louis, soon abandoned the struggle. Charles, having made good use of the difficulties of his opponents, was recrowned at Aix-la-Chapelle on the 25th of July 1549, and was soon the undisputed ruler of Germany. Gifts or promises had won the support of the Rhenish and Swabian towns; a marriage alliance secured the friendship of the Habsburgs; and that of Rudolph II., count palatine of the Rhine, was obtained when Charles, who had become a widower in 1348, married his daughter Anna.

In 1350 the king was visited at Prague by Cola di Rienzi, who urged him to go to Italy, where the poet Petrarch and the citizens of Florence also implored his presence. Turning a deaf ear to these entreaties, Charles kept Rienzi in prison for a year, and then handed him as a prisoner to Clement at Avignon. Four years later, however, he crossed the Alps without an army, received the Lombard crown at Milan on the 6th of January 1355, and was crowned emperor at Rome by a cardinal on the 5th of April in the same year. His sole object appears to have been to obtain the imperial crown in peace, and in accordance with a promise previously made to Pope Clementheonly remained in the city for

a few hours, in spite of the expressed wishes of the Romans. Having virtually abandoned all the imperial rights in Italy, the emperor recrossed the Alps, pursued by the scornful words of Petrarch but laden with considerable wealth. On his return Charles was occupied with the administration of Germany, then just recovering from the Black Death, and in 1356 he promulgated the Golden Bull (q.v.) to regulate the election of the king. Having given Moravia to one brother, John Henry, and erected the county of Luxemburg into a duchy for another, Wenceslas, he was unremitting in his efforts to secure other territories as compensation and to strengthen the Bohemian monarchy. To this end he purchased part of the upper Palatinate of the Rhine in 1353, and in 1367 annexed Lower Lusatia to Bohemia and bought numerous estates in various parts of Germany. On the death in 1363 of Meinhard, duke of Upper Bavaria and count of Tirol, Upper Bavaria was claimed by the sons of the emperor Louis IV., and Tirol by Rudolph IV., duke of Austria. Both claims were admitted by Charles on the understanding that if these families died out both territories should pass to the house of Luxemburg. About the same time he was promised the succession to the margraviate of Brandenburg, whichghe actually obtained for his son Wenceslas in 1373. He also gawked a considerable portion of Silesian territory, partly by inheritance through his third wife, Anna, daughter of Henry II., duke of Schweidnitz. In 1365 Charles visited Pope Urban V. at Avignon and undertook to escort hkn to Rome; and on the same occasion was crowned king of Burgundy, or Aries, at Aries on the 4th of June 1365.

His second journey to Italy took place in 1368, when he had a meeting with Urban at Viterbo, was besieged in his palace at Siena, and left the country before the end of the year 1369. During his later years the emperor took little part in German affairs beyond securing the election of his son Wenceslas as king of the Romans in 1376, and negotiating a peace between the Swabian league and some nobles in 1378. After dividing his lands between his three sons, he died on the 29th of November 1378 at Prague, where he was buried, and where a statue was erected to his memory in 1848.

Charles, who according to the emperor Maximilian I. was the step-father of the Empire, but the father of Bohemia, brought the latter country to a high state of prosperity. He reformed the finances, caused roads to be made, provided for greater security to life and property, and introduced or encouraged various forms

of industry. In 1348 he founded the university of Prague, and afterwards made this city the seat of an arch- bishop, and beautified it by the erection of several fine buildings. He was an accomplished diplomatist, possessed a penetrating intellect, and was capable of much trickery in order to gain his ends. By refusing to become entangled in Italian troubles and confining himself to Bohemia, he proved that he preferred the substance of power to its shadow. Apparently the most pliant of men, he had in reality great persistence of character, and if

foiled in one set of plans readily turned round and reached his goal by a totally different path. He was superstitious and peace-loving, had few personal wants, and is described as a round-shouldered man of medium height, with black hair and beard, and sallow cheeks.

His autobiography the ” Vita Caroli IV.,” which deals with events down to the year 1346, and various other documents relating to hit life and times, are published in the Fontes rerum Germanicarum, Band I., edited by J. F. Bohmer (Leipzig, 1885). For other docu- ments relating to the time see Die Regesten des Kaiserreichs unter Kaiser Karl IV., edited by J. F. Bohmer and A. Huber (Innsbruck, 1889); Acta Karoli IV. imperatoris inedita (Innsbruck, 1891); E. Werunsky, Excerpta ex registris Clementis VI. et Innocentii VI. (Innsbruck, 1885). See also E. Werunsky, Geschichte Kaiser Karls IV. und seiner Zeit (Innsbruck, 1880-1892); H. Friedjung, Kaiser Karl IV. und sein Antheil am geistigen Leben seiner Zeit (Vienna, 1876) ; A. Gottlob, Karls IV. private und politische Bezie- hungen zu Frankreich (Innsbruck, 1883) ; O. Winckelmann, Die Beziehungen Kaiser Karls IV. zum Kdnigreich Arelat (Strassburg, 1882); K. Palm, ” Zu Karls IV. Politik gegen Baiern,” in the Forschungen zur deutschen Geschichte, Band xv. (Gottingen, 1862- 1866); Th. Lindner, “Karl IV. und die Wittelsbacher,” and S. Stienherz, ” Die Beziehungen Ludwigs I. von Ungarn zu Karl IV.,” and ” Karl IV. und die osterreichischen Freiheitsbriefa,” in the Mittheilungen des Instituts fiir osterreichische Geschichtsforschung (Innsbruck, 1880).

CHARLES V. (1500-1358), Roman emperor and (as Charles I.) king of Spain, was born at Ghent on the 24th of February 1500. His parents were Philip of Burgundy and Joanna, third child of Ferdinand and Isabella. Philip died in 1506, and Charles succeeded to his Nethcrland possessions and the county of Burgundy (Franche Comte). His grandfather, the emperor

Maximilian, as regent, appointed his daughter Margaret vice-regent, and under her strenuous guardianship Charles lived in the Netherlands until the estates declared him of age in 151 5. In Castile, Ferdinand, king of Aragon, acted as regent for his daughter Joanna, whose intellect was already clouded. On the 23rd of January 1516 Ferdinand died. Charles's visit to Spain was delayed until the autumn of 151 7, and only in 1518 was he formally recognized as king conjointly with his mother, firstly by the cortes of Castile, and then by those of Aragon. Joanna lived to the very eve of her son's abdication, so that he was only for some months technically sole king of Spain. During this Spanish visit Maximilian died, and Charles succeeded to the inheritance of the Habsburgs, to which was shortly added the duchy of Wurttemberg. Maximilian had also intended that he should succeed as emperor. In spite of the formidable rivalry of Francis I. and the opposition of Pope Leo X., pecuniary corrup- tion and national feeling combined to secure his election in 15 19. Charles hurriedly left Spain, and after a visit to Henry VIII. and his aunt Catherine, was crowned at Aix on the 23rd of October 1520.

The difficulty of Charles's reign consists in the complexity of interests caused by the unnatural aggregate of distinct territories and races. The crown of Castile brought with it the two recently conquered kingdoms of Navarre and Granada, together with the new colonies in America and scattered possessions in northern Africa. That of Aragon comprised the three distinct states of Aragon, Valencia and Catalonia, and in addition the kingdoms of Naples, Sicily and Sardinia, each with a separate character and constitution of its own. No less than eight independent cortes or parliaments existed in this Spanish-Italian group, adding greatly to the intricacy of government. In the Nether- land provinces again the tie was almost purely personal; there existed only the rudiments of a central administration and a common representative system, while the county of Burgundy had a history apart. Much the same was true of the Habsburg group of states, but Charles soon freed himself from direct responsibility for their government by making them over, together with Wurttemberg, to his brother Ferdinand. The Empire entailed serious liabilities on its ruler without furnishing any reliable assets: only through the cumbrous machinery of the diet could Charles tap the military and financial resources of Germany. His problem here was complicated by the growth of Lutheranism, which he had to face at his very first diet in 15 21. In addition to such administrative difficulties Charles had

inherited a quarrel with France, to which the rivalry of Francis I. for the Empire gave a personal character. Almost equally formidable was the advance of Sultan Suliman up the Danube, and the union of the Turkish naval power with that of the Barbary States of northern Africa. Against Lutheran Germany the Catholic emperor might hope to rely upon the pope, and against France on England. But the attitude of the popes was almost uniformly disagreeable, while from Henry VIII. and Edward VI. Charles met with more unpleasantness than favour.

The difficulty of Charles himself is also that of the historian and reader of his reign. It is probably more instructive to treat it according to the emperor's several problems than in strict chronological order. Yet an attempt to distinguish the several periods of his career may serve as a useful introduction. The two best dividing lines are, perhaps, the coronation as emperor at Bologna in 1530, and the peace of Crepy in 1544. Until his visit to Italy (1529) Charles remained in the background of the European stage, except for his momentous meeting with Luther at the diet of Worms (1521). This meeting in itself forms a subdivision. Previously to this, during his nominal rule in the Netherlands, his visit to Spain, and his candidature for the Empire, he seemed, as it was said, spell-bound under the ferule of his minister Chievres. Almost every report represented him as colourless, reserved and weak. His dependence on his Flemish counsellors provoked the rising in Castile, the feebleness of his government the social war in Aragon. The religious question first gave him a living interest, and at this, moment Chievres died. Aleander, the papal nuncio at Worms, now recognized that public opinion had been wrong in its estimate of Charles. Never again was he under tutelage. The necessity, however, of residence in Spain prevented his taking a personal part in the great fight with Francis I. for Italy. , He could claim no credit for the capture of his rival at Pavia. When his army sacked Rome and held Pope Clement VII. prisoner, he could not have known where this army was. And when later the French overran Naples, and all but deprived him of his hold on Italy, he had to instruct his generals that they must shift for themselves. The world had become afraid of him, but knew little of his character. In the second main

division of his career Charles changed all this, No monarch until Napoleon was so widely seen in Europe and in Africa. Complexity of prbblems is: the characteristic of. this period. At the head of his arrny Charles forced the Turks back- wards down the Danube (153?ˆ. He personally conquered.Tunis (1535), and was only prevented by ” act of God” from winning Algiers (1541). The invasion of Provence in 1536 was headed by the emperor. In person he crushed the rebellion of Ghent (1540). In his last war with Francis (1 542-44) he journeyed from Spain to the Netherlands, brought the rebellious duke of Cleves to his knees, and was within easy reach of Paris when he made the peace of Crepy (1 544) . In Germany, meanwhile, from the diet of Augs-burg (1530) onwards, he had presided at the diets or conferences, which, as he hoped, would effect the reunion of the church.

Peace with France and the Turk and a short spell of friendliness with Pope Paul III. enabled Charles at last to devote his whole energies to the healing of religious schism. Conciliation proving impossible, he led the army which received the submission of the Lutheran states, and then captured the elector of Saxony at Mtihlberg, after which the other leader, Philip of Hesse, capitu-lated. The Armed Diet of 1548 was the high-water mark of Charles’s power. Here, in defiance of the pope, he published the Interim which was meant to reconcile the Lutherans with the church, and the so-called Reform which was to amend its abuses. During the next four years, owing to ill-health and loss of insight, his power was ebbing. In 1552 he was flying over the Brenner from Maurice of Saxony, a princeling whose fortunes he had made. Once again the old complications had arisenˆ His old enemy’s son, Henry II., had attacked him indirectly in Piedmont and Parma, and then directly in Germany in alliance with Maurice. Once more the Turk was moving in the Danube and in the western Mediterranean. The humiliation of his flight gave Charles new spirit, and he once more led an army through Germany against the French, only to be checked by the duke of

Guise’s defence of Metz. Henceforth the waves of his fortune plashed to and fro until his abdication without much ostensible loss or gain.

Charles had abundance of good sense, but little creative genius, and he was by nature conservative. Consequently he never sought to impose any new or common principles of administra-tion on his several states. He took them as he found them, arid at most, as in the Netherlands, improved upon what he found. So

also in dealing with rival powers his policy may be called opportunist. He was indeed accused by his enemies of emulating Charlemagne, of aiming at universal empire. Historians have frequently repeated this charge. Charles himself in later life laughingly denied the imputation, and facts are in favour of his denial. When Francis I. was in his power he made no attempt to dismember France, in spite of his pledges to his allies Henry VIII. and the duke of Bourbon. He did, indeed, demand the duchy of Burgundy, because he believed this to have been unrighteously stolen by Louis XI. from his grandmother when a helpless girl. The claim was not pressed, and at the height of his fortunes in 1548 he advised his son never to surrender it, but also never to make it a cause of war. When Clement VII. was his prisoner, he was vehemently urged to overthrow the temporal power, to restore imperial dominion in Italy, at least to make the papacy harmless for the future. In reply he restored his enemy to the whole of his dominions, even reimposing him by force on the Florentine republic. To the end of his life his conscience was sensitive as to Ferdinand's expulsion of the house of Albret from Spanish Navarre, though this was essential to the safety of Spain. Though always at war he was essentially a lover of peace, and all his wars were virtually defensive. " Not greedy of territory," wrote Marcantonio Contarini in 1536, " but most greedy of peace and quiet;" For peace he made sacrifices which angered his hot-headed brother Ferdinand. He would not aid in expelling the sultan's puppet Zapolya from Ferdinand's kingdom of Hungary, and he suffered the restoration of the ruffianly duke of Wurttemberg, to the grave prejudice of German Catholicism. In spite of his protests, Henry VIII. with impunity ill-treated his aunt Catherine, and the feeble government of Edward VI. bullied his cousin Mary, who had been his fiancee. No serious efforts were made to restore his brother-in-law, Christian II., to the throne of Denmark, and he advised his son Philip to make friends with the usurper. After the defeat of the Lutheran powers in 1 547 he did not gain a palm's breadth of territory for himself. . He resisted Ferdinand's claim for Wurttemberg, which the duke had deserved to forfeit; he disliked his acceptance of the voluntary surrender of the city of Constance; he would not have it said that he had gone to war for the benefit of the house of Habsburg.

On the other hand, Charles V.'s policy was not merely negative. He enlarged upon the old Habsburg practice of marriage as a means of alliance of influence. Previously to his election as emperor, his sister Isabella was married to Christian II. of

Denmark, and the marriages of Mary and Ferdinand with the king of Hungary and his sister had been arranged. Before he was twenty Charles himself had been engaged some ten times with a view to political combinations. Naturally, therefore, he regarded his near relations as diplomatic assets. The federative system Was equally familiar; Germany, the Netherlands, and even Spain, were in a measure federations. Combining these two principles, he would within his more immediate spheres of influence strengthen existing federations by intermarriage, while he hoped that the same means would convert the jarring powers of Europe into a happy family. He made it a condition of the treaty of Madrid (1526) that Francis I. should marry his sister Eleanor, Manuel of Portugal's widow, in the hope, not that she would be an ally or a spy within the enemy's camp, but an instrument of peace. His son's marriage with Mary Tudor would not only salve the rubs with England, but give such absolute security to the Netherlands that France would shrink from war. The personal union of all the Iberian kingdoms under a single ruler had long been an aim of Spanish statecraft. So Charles had married his sister Eleanor, much against her will, to the old king Manuel, and then his sister Catherine to his successor. The empress was a Portuguese

infanta, and Philip's first wife wa9 another. It is thus small wonder that, within a quarter of a century of Charles's death, Philip became king of Portugal.

In the wars with Francis I. Italy was the stake. In spite of his success Charles for long made no direct conquests. He would convert the peninsula into a federation mainly matrimonial. Savoy, the important buffer state, was detached from France by the marriage of the somewhat feeble duke to Charles's capable and devoted sister-in-law, Beatrice of Portugal. Milan, conquered from France, was granted to Francesco Sforza, heir of the old dynasty, and even after his treason was restored to him. In the vain hope of offspring Charles sacrificed his niece, Christina of Denmark, to the valetudinarian duke. In the long negotiations for a Habsburg-Valois dynasty which followed Francesco's death, Charles was probably sincere. He insisted that his daughter or

niece should marry the third rather than the second son of Francis I., in order, apart from other reasons, to run less risk of the duchy falling under French dominion. The final investiture of Philip was forced upon him, and does not represent his saner policy. The Medici of Florence, the Gonzaga of Mantua, the papal house of Farnese, were all attached by Habsburg marriages. The republics of Genoa and Siena were drawn into the circle through the agency of their chief noble families, the Doria and Piccolomini; while Charles behaved with scrupulous moderation towards Venice in spite of her active hostility before and after the League of Cognac. Occasional acts of violence there were, such as the participation in the murder of Pierluigi Farnese, and the measures which provoked the rebellion of Siena. These were due to the difficulty of controlling the imperial agents from a distance, and in part to the faults of the victim prince and republic. On the whole, the loose federation of viceroyalties and principalities harmonized with Italian interests and traditions. The alternative was not Italian independence, but French domination. At any rate, Charles's structure was so durable that the French met with no real success in Italy until the 18th century. • Germany offered a fine field for a creative intellect, since the evils of her disintegration stood confessed. On the other hand, princes and towns were so jealous of an increase of central authority that Charles, at least until his victory over the League of Schmalkalden, had little effective power. Owing to his wars with French and Turks he was rarely in Germany, and his visits were very short. His problem was infinitely complicated by the union of Lutheranism and princely independence. He fell back on the old policy of Maximilian, and strove to create a party by personal alliances and intermarriage. In this he met with some success. The friendship of the electors of Brandenburg, whether Catholic or Protestant, was unbroken. In the war of Schmalkalden half the Protestant princes were on Charles's side or friendly neutrals. At the critical moment which preceded this, the lately rebellious duke of Cleves and the heir of Bavaria were secured through the agency of two of Ferdinand's invaluable daughters. The relations, indeed, between the two old enemies, Austria and Bavaria, were permanently improved. The elector palatine, whose love affairs with his sister Eleanor Charles as a boy had roughly broken, received in compensation a Danish niece. Her sister, widow of Francesco Sforza, was utilized to gain a hold upon the French dynasty which ruled Lorraine. More than once there were proposals for winning the hostile house of Saxony by matrimonial means. After his victory over the League

of Schmalkalden, Charles perhaps had really a chance of making the imperial power a reality. But he lacked either courage or imagination, contenting himself with proposals for voluntary association on the lines of the defunct Swabian League, and dropping even these when public opinion was against them. Now, too, he made his great mistake in attempting to foist Philip upon the Empire as Ferdinand's successor. Gossip reported that Ferdinand himself was to be set aside, and careless historians have given currency to this. Such an idea was im- possible. Charles wished Philip to succeed Ferdinand, while he ultimately conceded that Ferdinand's son Maximilian should follow Philip, and even in his lifetime exercise the practical

power in Germany. This scheme irritated Ferdinand and his popular and ambitious son at the critical moment when it was essential that the Habsburgs should hold together against princely malcontents. Philip was imprudently introduced to Germany, which had also just received a foretaste of the un- pleasant characteristics of Spanish troops. Yet the person rather than the policy was, perhaps, at fault. It was natural that the quasi-hereditary succession should revert to the elder line. France proved her recuperative power by the occupation of Savoy and of Metz, Toul and Verdun, the military keys of Lorraine. The separation of the Empire and Spain left two weakened powers not always at accord, and neither of them permanently able to cope on equal terms with France. Never- theless, this scheme did contribute in no small measure to the failure of Charles in Germany. The main cause was, of course, the religious schism, but his treatment of this requires separate consideration.

The characteristics of Charles's government, its mingled conservatism and adaptability, are best seen in Spain and the Netherlands, with which he was in closer personal contact than with Italy and Germany. In Spain, when once he knew the country, he never repeated the mistakes which on his first visit caused the rising of the communes. The cortes of Castile were regularly summoned, and though he would allow no encroach- ment on the crown's prerogatives, he was equally scrupulous in respecting their constitutional rights. They became, perhaps, during the reign slightly more dependent on the crown. This has been ascribed to the system of gratuities which in later reigns became a scandal, but was not introduced by Charles, and as yet amounted ;to little more than the payment of members' expenses. Indirectly, crown influence increased owing to the greater control which had gradually been exercised over the composition

of the municipal councils, which often returned the deputies for the cortes. Charles was throughout nervous as to the power and wealth of the greater nobles. They rather than the crown had conquered the communes, and in the past they rather than the towns had been the enemies of monarchy. He earnestly warned his son against giving them administrative power, especially the duke of Alva, who in spite of his sancti- monious and humble bearing cherished the highest ambitions: in foreign affairs and war he might be freely used, for he was Spain's best soldier. In the cortes of 1538 Charles came into collision with the nobles as a class. They usually attended only on ceremonial occasions, since they were exempted from direct taxation, which was the main function of the cortes. Now, however, they were summoned, because Charles was bent upon a scheme of indirect taxation which would have affected all classes. They offered an uncompromising opposition, and Charles somewhat angrily dismissed them, nor did he ever summon them again. The peculiar Spanish system of departmental councils was further developed, so that it may be said that the bureaucratic element was slightly increasing just as the parlia- mentary element was on the wane. The evils of this tendency were as yet scarcely apparent owing to Charles's personal inter- vention in all departments. The councils presented their reports through the minister chiefly concerned; Charles heard their advice, and formed his own conclusions. He impressed upon Philip that he should never become the servant of his ministers : let him hear them all but decide himself. Naturally enough, he was well served by his ministers, whom he very rarely changed. After the death of the Piedmontese Gattinara he relied mainly on Nicolas Perrenot de Granvella for Netherland and German affairs, and on Francisco de los Cobos for Spanish, while the younger Granvella was being trained. From 1520 to 1555 these were the only ministers of high importance. Above all, Charles never had a court favourite, and the only women who exercised any influence were his natural advisers, his wife, his aunt Margaret and his sister Mary. In all these ladies he was peculiarly fortu- nate. Charles was never quite popular in Spain, but the empress whom he married at his people's request was much beloved. Complaints were made of his absenteeism, but until rs43 he spent the greater portion of his reign in Spain, or on expeditions

such as those against Tunis and Algiers which were distinctively in Spanish interests. Spaniards disliked his Netherland and German connexions, but without the vigorous blows which these enabled him to strike at France, it is improbable that Spain could have retained her hold on -Italy, or her monopoly of commerce with the Indies. The wars with Francis I. were, in spite of the rival candidature for the Empire, Spanish wars entailed by Ferdinand's retention of Roussillon, his annexation of Navarre, his summary eviction of the French from Naples. The Netherlands had become convinced on commercial grounds of the wisdom of peace with France, and the German interest in Milan was not sufficiently active to be a standing cause of war. Charles and Francis had inherited the hostility of Ferdinand and Louis XII.

The reign of Charles was in America the age of conquest and organization. Upon his accession the settlements upon the mainland were insignificant; by 1556 conquest was practically complete, and civil and ecclesiastical government firmly established. Actual expansion was the work of great adventurers starting on their own impulse from the older colonies. To Charles fell the task of encouraging such ventures, of controlling the conquerors, of settling the relations between colonists and natives, which involved those between the colonists and the missionary colonial church. He must arrest depopulation, provide for the labour market, regulate oceanic trade, and check military preponderance by civil and ecclesiastical organization. In America Charles took an unceasing interest; he had a boundless belief in its possibilities, and a determination to safeguard the interests of the crown. Cortes, Alvarado and the brothers Pizarro were brought into close personal communication with the emperor. If he bestowed on Cortes the confidence which the loyal conqueror deserved, he showed the sternest determination in crushing the rebellious and autonomous instincts of Almagro and the Pizarros. But for this, Peru and Chile must have become independent almost as soon as they were conquered. Throughout he strove to protect the natives, to prevent actual slavery, and the consequent raids upon the natives. Legislation was not, indeed, always consistent, because the claims of the colonists could not always be resisted, but on the whole he gave earnest support to the missionaries, who upheld the cause of the natives against the military, and sometimes the civil and ecclesiastical elements. His humane care for his native subjects may well be studied in the instructions sent to Philip from Germany in 1548, when Charles was at the summit of his power. If Charles had had his will, he would have opened the colonial trade to the whole of his wide possessions. The Castilians, however, jealously confined it to the city of Seville, artificially fostering the indolence of the colonists to maintain the agricultural and manufacturing monopoly of Castile, and by extreme protective measures forcing them to live on smuggled goods from other countries. Charles did actually attempt to cure the exclusive interest of the colonists in mineral wealth by the establishment of peasant and artisan colonies. If in many respects he failed, yet the organization of Spanish America and the survival of the native races were perhaps the most permanent results of his reign. It is a proof of the complexity of his interests that the march of the Turk upon Vienna and of the French on Naples delayed until the following

reign the foundation of Spain's eastern empire. Charles carefully organized the expedition of Magellan, which sailed for the Moluccas and discovered the Philippines. Un- fortunately, his straits for money in 1529 compelled him to mortgage to Portugal his disputed claim to the Moluccas, and the Philippines consequently dropped out of sight.

If in the administration of Spain Charles did little more than mark time, in the Netherlands advance was rapid. Of the seven northern provinces he added five, containing more than half the area of the later United Provinces. In the south he freed Flanders and Artois from French suzerainty, annexed Tournai and Cambrai, and closed the natural line of French advance through the great bishopric of Liege by a line of fortresses across its western frontier. Much was done to convert the aggregate of jarring provinces into a harmonious unity by means of common

principles of law and finance, and by the creation of a national army. While every province had its own assembly, there were at Charles's accession only the rudiments of estates general for the Netherlands at large. At the close of the reign the common parliamentary system was in full swing, and was fast converting the loosely knit provinces into a state. By these means the ruler had wished to facilitate the process of supply, but supply soon entailed redress, and the provinces could recognize their common interests and grievances. Under Philip II. all patriotic spirits passionately turned to this creation of his father as the palladium of Netherland liberty. This process of consolidation was infinitely difficult, and conflicts between local and central authorities were frequent. That they were safely tided over was due to Charles's moderation and his legal mind, which prompted him to draw back when his case was bad. The harshest act of his life was the punishment of the rebellion of Ghent. Yet the city met with little or no sympathy in other quarters, because she had refused to act in concert with the other members of Flanders and the other provinces. It was no mere local quarrel, but a breach of the growing national unity.

In the Netherlands Charles showed none of the jealousy with which he regarded the Spanish nobles. He encouraged the growth of large estates through primogeniture; he gave the nobles the provincial governorships, the great court offices, the command of the professional cavalry. In the Order of the Golden Fleece and the long established presence of the court at Brussels, he possessed advantages which he lacked in Spain. The nobility

were utilized as a link between the court and the provinces. Very different was it with the church. By far the greater part of the Netherlands fell under foreign sees, which were peculiarly liable to papal exactions and to the intrigues of rival powers. Thus the usual conflict between civil and ecclesiastical juris- diction was peculiarly acute. To remedy this dualism of authority and the consequent moral and religious abuses, Charles early designed the creation of a national diocesan system, and this was a darling project throughout his life. He was doing what every German territorial prince, Catholic or- Lutheran, attempted, making bishoprics and abbeys dependent on the crown, with nomination and institution in his hands, and with reasonable control over taxation and jurisdiction. The papacy unfortunately thwarted him, and the scheme, which under Charles would have been carried with national assent, and created a national church, took the appearance under Philip of alien domination.

If in Germany Charles was emperor, he was in the Netherlands territorial prince, and thus his interests might easily be at disaccord with those of the Empire. Consequently, just as he had shaken off French suzerainty from Flanders and Artois, so he loosened the tie of the other provinces to Germany.' In 1548 they were declared free and sovereign principalities not subject to imperial laws, and all the territories were incorporated in the Burgundian circle. It was, indeed, agreed that they should contribute to imperial taxation, and in return receive imperial protection. But this soon became a dead letter, and the Nether- lands were really severed from the Empire, save for the nominal feudal tie in the case of some provinces. Thus some writers have dated their independence from Charles's convention of 1548 rather than from the peace of 'Westphalia, a century later. Having converted his heterogeneous territories into a self-sufficient state, Charles often contemplated the formation of a middle kingdom between France and Germany. At the last moment he spoiled his own work by granting the Netherlands to Philip. It was indeed hard to set aside the order of inheritance, and the commercial interests of the provinces were closely bound with Spain, and with England, whose queen Philip had married. Under any other ruler than Philip the breach might not have come so early. Yet it must be regretted that Charles had not the courage of his convictions, and that he lost the opportunity of completing the new nation which he had faithfully laboured to create.

Charles V. is in the eyes of many the very picture of a Catholic

zealot. Popular opinion is probably mainly based upon the

letters written from Yuste in 1558, when two hot-beds of heresy had been discovered in Spain herself, and on the contemporary-codicil to his will. These were, perhaps, really in part responsible for the later persecution. Yet the circumstances were far from being typical of the emperor's career. Death was very near him; devotional exercises were his main occupation. The letters, moreover, were cries of warning, and not edicts. Charles was not then the responsible authority. There is a long step between a violent letter and a violent act. Few men would care to have their lives judged by letters written in the last extremities of gout. Less pardonable was the earlier persecution of the Valencian Moriscoes in 1525-1526. They had fought for their landlords in the cause of order, had been forcibly converted by the revolutionaries, and on the suppression of revolution had naturally relapsed. But for this momentary conversion the Inquisition would have had no hold upon them. The edict of persecution was cruel and unnecessary, and all expert opinion in Valencia was against it. It was not, however, actually enforced until after the victory of Pavia. It seems likely that Charles in a fit of religious exaltation regarded the persecution as a sacrificial thank-offering for his miraculous preservation. It is characteristic that, when in the following year he was brought into personal contact with the Moors of Granada, he allowed them to buy themselves off from the more obnoxious measures of the Inquisition. Henceforth the reign was marked by extreme leniency. Spain enjoyed a long lull in the activity of her Inquisition. At Naples in 1547 a rumour that the Spanish Inquisition was to be introduced to check the growth of heresy in influential quarters produced a dangerous revolt. The briefs were, however, issued by Paul III., no friend of Charles, and when a Neapolitan deputation visited the emperor he disclaimed any intention of making innovations. Of a different type to all the above was the persecution in the Netherlands. Here it was deliberate, chronic, and on an ascending scale. It is not a sufficient explanation that heresy also was persistent, ubiquitous and increasing, for this was also the case in Germany where Charles's methods were neither uniform nor drastic. But in the

Netherlands the heretics were his immediate subjects, and as in every other state, Catholic or Lutheran, they must conform to their prince's religion. But there was more than this. After the suppression of the German peasant revolt in 1525 many of the refugees found shelter in the teeming Netherland cities, and heresy took the form, not of Lutheranism, but of Anabaptism, which was believed to be perilous to society and the state. The government put down Anabaptism, as a modern government might stamp out Anarchism. The edicts were, indeed, directed against heresy in general, and were as harsh as they could be — at least on paper. Yet when Charles was assured that they were embarrassing foreign trade he let it be understood that they should not affect the foreign mercantile communities. Prudential considerations proved frequently a drag upon religious zeal.'

The relations of Charles to heresy must be judged in the main by his treatment of German Lutheranism. Here he had to deal, not with drawing-room imprudences nor hole-and-corner conventicles, not with oriental survivals nor millenary aspirations, but with organized churches protected by their princes, supported by revenues filched from his own church and stiffened by formulae as rigid as those of Catholicism. The length and stubbornness of the conflict will serve to show that Charles's religious conserva- tism had a measure of elasticity, that he was not a bigot and nothing more. It should be remembered that all his principal ministers were inclined to be Erasmian or indifferent, that one of his favourite confessors, Loaysa, advised compromise, and that several intimate members of his court and chapel were, after his death, victims of the Inquisition. The two more obvious courses towards the restoration of Catholic unity were force and re- conciliation, in other words, a religious war or a general council. Neither of these was a simple remedy. The latter was impossible without papal concurrence, inoperative without the assistance of the European powers, and merely irritant without the adhesion of the Lutherans. It was most improbable that the papacy, the

powers and the Lutherans would combine in a measure so palpably advantageous to the emperor. Force was hopeless save in the absence of war with France and the Turk, and of papal hostility in Italian territorial politics. Charles must obtain subsidies from ecclesiastical sources, and the support of all German Catholics, especially of the traditional rival, Bavaria. Even so the Protestants would probably be the stronger, and therefore they must be divided by utilizing any religious split,

any class distinction, any personal or traditional dislikes, or else by bribery. Force and reconciliation seeming equally difficult, could an alternative be found in toleration? The experiment might take the form either of individual toleration, or of toleration for the Lutheran states. The former would be equally objectionable to Lutheran and Catholic princes as loosening their grip upon their subjects. Territorial toleration might seem equally obnoxious to the emperor, for its recognition would strengthen the anti-imperial particularism so closely associated with Lutheranism. If Charles could find no permanent specific, he must apply a provisional palliative. It was absolutely necessary to patch, if not to cure, because Germany must be pulled together to resist French and Turks. Such palliatives were two — suspension and comprehension. Suspension deferred the execution of penalties incurred by heresy, either for a term of years, or until a council should decide. Thus it recognized the divorce of the two religions, but limited it by time. Comprehension instead of recognizing the divorce would strive to conceal the breach. It was a domestic remedy, German and national, not European and papal. To become permanent it must receive the sanction of pope and council, for the Roman emperor could not set up a church of Germany. Yet the formula adopted might conceivably be found to fall within the four corners of the faith, and so obviate the necessity alike of force or council. Such were the conditions of the emperor's task, and such the methods which he actually pursued. He would advance now on one line, now on another, now on two or three concurrently, but he never de- finitely abandoned any. This fusion of obstinacy and versatility was a marked feature of his character.

Suspension was of course often accidental and involuntary. The two chief stages of Lutheran growth naturally corresponded with the periods, each of nine years, when Charles was absent. Deliberate suspension was usually a consequence of the failure of comprehension. Thus at Augsburg in 1530 the wide gulf between the Lutheran confession and the Catholic confutation led to the definite suspensive treaty granted to the Lutherans at Nuremberg (1532). Charles dared not employ the alternative of force, because he needed their aid for the Turkish war. In 1 541 , after a series of religious conferences,he personally presented a compromise in the so-called Book of Regensburg, which .was rejected by both parties. He then proposed that the articles agreed upon should be compulsory, while on others toleration should be exercised until a national council should decide. Never

before nor after did he go so far upon the path of toleration, or so nearly accept a national settlement. He was then burning to set sail for Algiers. His last formal suspensive measure was that of Spires (Speyer) in 1544, when he was marching against Francis. He promised a free and general council to be held in Germany, and, as a preparation, a national religious congress. The Lutherans were privately assured that a measure of comprehension should be concluded with or without papal approval. Meanwhile all edicts against heresy were suspended. No wonder that Charles afterwards confessed that he could scarcely reconcile these concessions with his conscience, but he won Lutheran aid for his campaign. The peace of Crepy gave all the conditions required for the employment of force. He had peace with French and Turk, he won the active support of the pope, he had deeply divided the Lutherans and reconciled Bavaria. Finding that the Lutherans would not accept the council summoned by the pope to Trent, he resorted to force, and force succeeded. At the Armed Diet of 1 548 reunion seemed within reach. But Paul III. in direct opposition to Charles's wish had withdrawn the council from Trent to Bologna. Charles could not force Lutherans to submit to a council which he did not himself recognize, and he could not

bring himself to national schism. Thus, falling back upon his old palliatives, he issued the Interim and the accompanying Reform of the Clergy, pending a final settlement by a satisfactory general council. These measures pleased neither party, and Charles at the very height of his power had failed. He was conscious of failure, and made few attempts even to enforce the Interim. Henceforward political complications gathered round him anew. The only remedy was toleration in some form, independent of the papacy and limitless in time. To this Charles could never assent. His ideal was shattered, but it was a great ideal, and the patience, the moderation, even at times the adroit-' ness with which he had striven towards it, proved him to be no bigot.

The idea of abdication had long been present with Charles. After his failure to eject the French from Metz he had not shrunk from a wearisome campaign against Henry II., and he was now tired

out. His mother's death removed an obstacle, for there could now be no question as to his son's succession to the Spanish kingdoms. Religious settlement in Germany could no longer be postponed, and he shrank from the responsibility; the hand that should rend the seamless raiment of God's church must not be his. To Ferdinand he gave his full authority as emperor, although at his brother's earnest request formal abdication was delayed until 1558. In the Hall of the Golden Fleece at Brussels on the 25th of October 1555 he formally resigned to Philip the sovereignty of his beloved Netherlands. Turning from his son to the representatives of the estates he said, " Gentlemen, you must not be astonished if, old and feeble as I am in all my members^ and also from the love I bear you, I shed some tears." In the Netherlands at least the love was reciprocal, and tears were infectious among the thousand deputies who listened to their sovereign's last speech. On the 1 6th of January 1556, Charles resigned his Spanish kingdoms and that of Sicily, and shortly afterwards his county of Burgundy. On the 17th of September he sailed from Flushing on the last of his many voyages, an English fleet from Portland bearing him company down the Channel. In February 1 5 5 7 he was installed in the home which he had chosen at Yuste in Estremadura.

The excellent books which have been written upon the emperor's retirement have inspired an interest out of all pro- portion to its real significance. His little house was attached to the monastery, but was not within it. He was neither an ascetic nor a recluse. Gastronomic indiscretions still entailed their inevitable penalties. Society was not confined to interchange of civilities with the brethren. His relations, his chief friends, his official historians, all found their way to Yus,te. Couriers brought news of Philip's war and peace with Pope Paul IV., of the victories of Saint Quentin and Gravelines, of the French capture of Calais, of the danger of Oran. As head of the family he intervened in the delicate relations with the closely allied house of Portugal: he even negotiated with the house of Navarre for reparation forthe wrong done by his grandfather Ferdinand, which appeared to weigh upon his conscience. Above all he was shocked by the discovery that Spain, his own court, and his very chapel were infected with heresy. His violent letters to his son and daughter recommending immediate persecution, his profession of regret at having kept his word when Luther was in his power, have weighed too heavily on his reputation. The feverish phrases of religious exaltation due to broken health and unnatural

retirement cannot balance the deliberate humanity and honour of wholesome manhood. Apart from such occasional moments of excitement, the emperor's last years passed tranquilly enough. At first he would shoot pigeons in the monastery woods, and till his last illness tended his garden and his animal pets, or watched the operations of Torriani, maker of clocks and mechanical toys. After an illness of three weeks the call came in the early hours of the feast of St Matthew, who, as his chaplain said, had for Christ's sake forsaken wealth even as Charles had forsaken empire. The dying man clasped his wife's crucifix to his breast till his fingers lost their hold. The archbishop held it before his eyes, and with the cry of "Ay Jesus!" died, in the words of his faithful squire D, Luis de Quijada, " the chief of men that had ever been or

would ever be." Posterity need not agree, but no great man can boast a more honest panegyric.

In character Charles stands high among contemporary princes. It consists of pairs of contrasts, but the better side is usually stronger than the worse. Steadfast honesty of purpose was occasionally warped by self-interest, or rather he was apt to think that his own course must needs he that of righteousness. Self-control would give way, but very rarely, to squalls of passion. Obstinacy and irresolution were fairly balanced, the former generally bearing upon ends, the latter upon means. His own ideals were constant, but he could gradually assimilate the views of others, and could bend to argument and circumstance; yet even here he had a habit of harking back to earlier schemes which he had seemed to have definitely abandoned. Intercourse with different nationalities taught him a certain versa tility; he was dignified with Spaniards, familiar with Flemings, while the material Italians were pleased with his good sense. His sympathies were neither wide nor quick, but he was a most faithful friend, and the most considerate of masters. For all who sought him his courtesy and patience were unfailing. At his abdication he dwelt with reasonable pride upon his labours and his journeyings. Few monarchs have lived a more strenuous life. Yet his industry was broken by fits of indolence, which were probably due to health. In his prime his confessor warned him against this defect, and it caused, indeed, the last great disaster of his life. Fortunately he was conscious of his obstinacy, his irresolution and his indolence. He would accept admonition from the chapter of the Golden Fleece, would comment on his failings as a warning to his son. When Cardinal Contarini politely assured him that to

hold fast to good opinions is not obstinacy but firmness, the emperor replied, ” Ah! but I sometimes stick to bad ones.” Charles was not cruel, indeed the character of his reign was peculiarly merciful. But he was somewhat unforgiving. He especially resented any slight upon his honour, and his unwise severity to Philip of Hesse was probably due to the unfounded accusation that he had imprisoned him in violation of his pledge. The excesses of his troops in Italy, in Guelders and on the Austrian frontiers caused him acute pain, although he called himself ” hard to weep.” No great nobleman, statesman or financier was executed at Charles’s order. He was proud of his generalship, classing himself with Alva and Montmorenci as the best of his day. Yet his failures nearly balanced his successes. It is true that in his most important campaign, that against the League of Schmalkalden, the main credit must be ascribed to his well-judged audacity at the opening, and his dogged persistency at the close. As a soldier he must rank very high. It was said that his being emperor lost to Spain the best light horseman of her army. At every crisis he was admirably cool, setting a truly royal example to his men. His mettle was displayed when he was attacked on the burning sands of Tunis, when his troops were driven in panic from Algiers, when in spite of physical suffering he forded the Elbe at Muhlberg, and when he was bombarded by the vastly superior Lutheran artillery under the walls of Ingolstadt. When blamed for exposing himself on this last occasion, ” I could not help it,” he apologized; “we were short of hands, I could not set a bad example.” Nevertheless he was by nature timid. Just before this very action he had a fit of trembling, and he was afraid of mice and spiders. The force of his example was not confined to the field. Melanchthon wrote from Augsburg in 1530 that he was a model of continence, temperance and moderation, that the old domestic discipline was now only preserved in the imperial household. He tenderly loved his wife, whom he had married for pecuniary and diplomatic reasons. Of his two well-known illegitimate children, Margaret was born before he married, and Don John long after his wife’s death, but he felt this latter to be a child of shame. His sobriety was frequently contrasted with the universal drunkenness of the German and Flemish nobles, which he earnestly condemned; But on his appetite he could place no control, in spite of the ruinous effects of his gluttony upon his health. In dress, in his household, and in his stable he was simple and economical. He loved children, flowers, animals and birds. Professional

jesters amused him, and hs was not above a joke himself. Maps and mechanical inventions greatly interested him, and in later life he became fond of reading. He takes his place indeed among authors, for he dictated the commentaries on his own career. Of music he possessed a really fine knowledge, and his high appreciation of Titian proves the purity of his feeling for art. The little collection of books and pictures which he carried to Yuste is an index of his tastes. ■ Charles was undeniably plain. He confessed that he was by nature ugly, but that as artists usually painted him uglier than he was, strangers on seeing him were agreeably disappointed. The protruding lower jaw and the thin pale face were redeemed by the fine open brow and the bright speaking eyes. He was, moreover, well made, and in youth had an incomparable leg. Above all no man could doubt his dignity; Charles was every inch an emperor.

Bibliography. — Commentaries de Charles-quint, ed. by Baron Kervyn de Lettenhove (Brussels, 1862) ; Memoirs written by Charles in 1550, and treating somewhat fully of the years 1543-1548; W. Robertson, History of the Emperor Charles V. (latest ed., London, 1887), an English classic, which needs supplementing by later authorities; F. A. Mignet, Rivalite de Francois I et de Charles-quint (2 vols., Paris, 1875) ; E. Armstrong, The Emperor Charles V. (2 vols., London, 1902), to which reference may be made for monographs and collections of documents bearing on the reign; H. Baumgarten, Ceschichte Karls V. (3 vols., Stuttgart, 1885-1893), very full but extending only to 1539; G. de Leva, Storia documentata di Carlo V. in forreldzione all' Italia (5 vols., Venice, 1 862-1 894), a general history •of the reign, though with special reference to its Italian aspects, and extending to 1552 ; article by L. P. Gachard in Biographie nationale, vol. iii., 1872, an excellent compressed account. The life of Charles V. at Yuste may be studied in L. P. Gachard's Retraite et mort de Charles-quint au monastire de Yuste (Brussels, 1 854-1 855), and in Sir W. Stirling-Maxwell's The Cloister Life of the Emperor Charles V. (London, 4 editions from 1852) ; also in W. H. Prescott's edition of Robertson's History (1857). (E. Ar.)

CHARLES VI. (1685-1740), Roman emperor, was born on the 1st of October 1685 at Vienna. He was the second son of the emperor Leopold I. by his third marriage with Eleanore, daughter of Philip William of Neuburg, elector palatine of the Rhine. When the Spanish branch of the house of Habsburg became extinct in 1 700ˆ he was put forward as the lawful heir in opposi- tion to Philip V., the Bourbon to whom the Spanish dominions had been left by the will of Charles II. of Spain. He was pro- claimed at Vienna on the 19th of September 1703, and made his way to Spain by the Low Countries, England and Lisbon, remaining in Spain till 1 7 1 1 , mostly in Catalonia, where the Habs- burg party was strong. Although he had a certain tenacity of purpose, which he showed in later life, he displayed none of the qualities required in a prince who had to gain his throne by the sword (see Spanish Succession, War of). He was so afraid of appearing to be ruled by a favourite that he would not take good advice, but was easily earwigged by flatterers who played on his weakness for appearing independent. In 1708 he was married at Barcelona to Elizabeth Christina of Brunswick- Wolfenbiittel (1691-1750), a Lutheran princess who was per- suaded to accept Roman Catholicism by the assurances of Protestant divines and of the philosopher Leibnitz, that she could always give an Evangelical meaning to Catholic ceremonies. On the death of his elder brother Joseph I. on the 1 7th of April 171 1, Charles inherited the hereditary possessions of the house of Habsburg, and their claims on the Empire. The death of Joseph without male issue had been foreseen, and Charles had at one time been prepared to give up Spain and the Indies on condition that he was allowed to retain Naples, Sicily and the Milanese. But when the case arose, his natural obstinacy led him to declare that he would not think of surrendering any of the rights of his family. It was with great difficulty that he was persuaded to leave Spain, months after the death of his brother (on the 27th of September 1711). Only the emphatic refusal of the European powers to tolerate the reconstruction of the empire of Charles V. forced him to give a sullen submission to necessity. He abandoned Spain and was crowned emperor in December 171 1, but for a long time he would not recognize Philip V. It is to his honour that he was very reluctant to desert the Catalans who had fought for his cause. Some of their

chiefs followed him to Vienna, and their advice had an un- fortunate influence on his mind. They almost succeeded in arousing his suspicions of the loyalty of Prince Eugene at the very

moment when the prince's splendid victories over the Turks had led to the peace of Passarowitz on the 28th of July 17 18, and a great extension of the Austrian dominions eastward. Charles showed an enlightened, though not always successful, interest in the commercial prosperity of his subjects, but from the date of his return to Germany till his death his ruling passion was to secure his inheritance against dismemberment. As early as 1 7 13 he had begun to prepare the " Pragmatic Sanction " which was to regulate the succession. An only son, born on the 13th of April 1716, died in infancy, and it became the object of his policy to obtain the recognition of his daughter Maria Theresa as his heiress. He made great concessions to obtain his aim, and embarked on complicated diplomatic negotiations. His last days were embittered by a disastrous war with Turkey, in which he lost almost all he had gained by the peace of Passaro- witz. He died at Vienna on the 20th of October 1740, and with him expired the male line of his house. Charles VI. was an admirable representative of the tenacious ambition of the Habsburgs, and of their belief in their own " august greatness " and boundless rights.

For the personal character of Charles VI. see A. von Arneth, Ceschichte Maria Theresias (Vienna, 1863-1879). Dr Franz Krones, R. v. Marchland, Grundriss der osterreichischen Ceschichte (Vienna, 1882), gives a very copious bibliography.

CHARLES VII. (1697-1745), Roman emperor, known also as Charles Albert, elector of Bavaria, was the son of the elector Maximilian Emanuel and his second wife, Theresa Cunigunda, daughter of John Sobieski, king of Poland. He was born on the 6th of August 1697. His father having taken the side of Louis XIV. of France in the War of the Spanish Succession (q.v), Bavaria was occupied by the allies. Charles and his brother Clement, afterwards archbishop of Cologne, were carried prisoners to Vienna, and were educated by the Jesuits under the name of the counts of Wittelsbach. When his father was restored to his electorate, Charles was released, and rn 17 17 he led the Bavarian contingent of the imperial army which served under Prince Eugene against the Turks, and is said to have distinguished himself at Belgrade. On the 25th of September 1722 he was betrothed to Maria Amelia, the younger of the two orphan daughters of the emperor Joseph I. Her uncle Charles VI. insisted that the Bavarian house should recognize the Pragmatic Sanction which established his daughter Maria Theresa as heiress of the Habsburg dominions. They did so, but with secret protests and

mental reservations of their rights, which were designed to render the recognition valueless. The electors of Bavaria had claims on the possessions of the Habsburgs under the will of the emperor Ferdinand I., who died in 1564.

Charles succeeded his father on the 26th of February 1726. As a ruler of Bavaria, he showed a vague disposition to improve the condition of his subjects, but his profuse habits and his efforts to rival the splendour of the French court crippled his finances. His policy was one of much duplicity, for he was constantly endeavouring to keep on good terms with the emperor while slipping out of his obligation to accept the Pragmatic Sanction and intriguing to secure French support for his claims whenever Charles VI. should die. On hearing of the emperor's last illness, he ordered his agent at Vienna to renew his claim to the Austrian inheritance. The claim was advanced immediately after the death of Charles VI. on the 20th of October 1 740. Charles Albert now entered into the league against Maria Theresa, to the great misfortune of himself and his subjects. By the help of her enemies he was elected emperor in opposition to her husband Francis, grand duke of Tuscany, on the 24th of January 1742, under the title of Charles VII., and was crowned at Frankfort-on-Main on the 12th of February. But as his army had been neglected, he was utterly unable to resist the Austrian troops. While he was being crowned his hereditary dominions in Bavaria were being overrun. He described himself as attacked by stone and gout, ill, without money or land, and in distress comparable to the

sorrows of Job. During the War of the Austrian Succession (q.v.) he was a mere puppet in the hands of the anti-Austrian coalition, and was often in want of mere necessaries. In the changes of the war he was able to re-enter his capital, Munich, in 1743, but had immediately afterwards to take flight again. He was restored by Frederick the Great in October 1744, but died worn out at Munich on the 20th of January 1745.

See A. von Arneth, Geschichte Maria Theresias (Vienna, 1863-1879) ; and P. T. Heigel, Der osterreichische Erbfolgestreit und

die Kaiserwahl Karls VII. (Munich, 1877).

CHARLES I. (1600-1649), king of Great Britain and Ireland, second son of James I. and Anne of Denmark, was born at Dunfermline on the 19th of November 1600. At his baptism he was created duke of Albany, and on the 16th of January 1605 duke of York. In 161 2, by the death of his elder brother Henry, he became heir-apparent, and was created prince of Wales on the 3rd of November 1616. In 1620 he took up warmly the cause of his sister the queen of Bohemia, and in 162 1 he defended Bacon, using his influence to prevent the chancellor's degradation from the peerage. The prince's marriage with the infanta Maria, daughter of Philip III. of Spain, had been for some time the subject of negotiation, James desiring to obtain through Spanish support the restitution of his son-in-law, Frederick, to the Palatinate; and in 1623 Charles was persuaded by Buckingham, who now obtained a complete ascendancy over him in opposition to wiser advisers and the king's own wishes, to make a secret expedition himself to Spain, put an end to all formalities, and bring home his mistress himself: " a gallant and brave thing for his Highness." " Steenie " and " Baby Charles," as James called them, started on the 17th of February, arriving at Paris on the 21st and at Madrid on the 7th of March, where they assumed the unromantic names of Mr Smith, and Mr Brown. They found the Spanish court by no means enthusiastic for the marriage 1 and the princess herself averse. The prince's im- mediate conversion was expected, and a complete religious tolerance for the Roman Catholics in England demanded. James engaged to allow the infanta the right of public worship and to use his influence to modify the law, but Charles himself went much further. He promised the alteration of the penal laws within three years, conceded the education of the children to the mother till the age of twelve, and undertook to listen to the infanta's priests in matters of religion, signing the marriage contract on the 25th of July 1623. The Spanish, however, did not trust to words, and Charles was informed that his wife could only follow him to England when these promises were executed. Moreover, they had no intention whatever of aiding the Protestant Frederick. Meanwhile Buckingham, incensed at the failure of the expedition, had quarrelled with the grandees, and Charles left Madrid, landing at Portsmouth on the 5th of October, to the joy of the people, to whom the proposed alliance was odious. He now with Buckingham urged James to make war on Spain, and in December 1624 signed a marriage treaty with Henrietta Maria,

daughter of Henry IV. of France. In April Charles had declared solemnly to the parliament that in case of his marriage to a Roman Catholic princess no concessions should be granted to recusants, but these were in September 1624 deliberately promised by James and Charles in a secret article, the first instance of the duplicity and deception practised by Charles in dealing with the parliament and the nation. The French on their side promised to assist in Mansfeld's expedition for the recovery of the Palatinate, but Louis in October refused to allow the men to pass through France; and the army, without pay or provisions, dwindled away in Holland to nothing.

On the 27th of March 1625 Charles I. succeeded to the throne by the death of his father, and on the 1st of May he was married by proxy to Henrietta Maria. He received her at Canterbury on the 13th of June, and on the 18th his first parliament assembled. On the day of his marriage Charles had given direc- tions that the prosecutions of the Roman Catholics should cease, but he now declared his intention of enforcing the laws against them, and demanded subsidies for carrying on the war against 1 Hist. MSS. Comm. n Rep. app. Pt. iv. 21.

Spain. The Commons, however, responded coldly. Charles had lent ships to Louis XIII. to be used against the Protestants at LaRochelle, and the Commons were not aware of the subterfuges and fictitious delays intended to prevent their employment. The Protestant feelings of the Commons were also aroused by the king's support of the royal chaplain, Richard Montagu, who had repudiated Calvinistic doctrine. They only voted small sums, and sent up a petition on the state of religion and reflecting upon Buckingham, whom they deemed responsible for the failure of Mansfeld's expedition, at the same time demanding counsellors in whom they could trust. Parliament was accordingly dissolved by Charles on the 1 2th of August. He hoped that greater success abroad would persuade the Commons to be more generous. On the 8th of September 1625 he made the treaty of Southampton with the Dutch against Spain, and sent an expedition to Cadiz under Sir Edward Cecil, which, however, was a failure. In order to make himself independent of parliament he attempted to raise money on the crown jewels in Holland, and to diminish the opposition in the Commons he excluded the chief leaders by appointing them sheriffs. When the second parliament met, however, on the 6th of February 1626, the opposition, led by Sir John Eliot, was more determined than before, and their attack was concentrated upon Buckingham. On the 29th of March,

Charles, calling the Commons into his presence, accused them of leading him into the war and of taking advantage of his difficulties to “make their own game.” “I pray you not to be deceived,”’ he said, ” it is not a parliamentary way, nor ‘tis not a way to deal with a king. Remember that parliaments are altogether in my power for their calling, sitting, and dissolution; therefore as I find the fruits of them good or evil, they are to continue or not to be.” Charles, however, was worsted in several collisions with the two houses, with a consequent loss of influence. He was obliged by the peers to set at liberty Thomas Howard, earl of Arundel, whom he had put into the Tower, and to send a summons to the earl of Bristol, whom he had attempted to exclude from parlia- ment, while the Commons compelled him, with a threat of doing nobusiness, to liberate Eliot and Digges, the managersof Bucking- ham’s impeachment, whom he had imprisoned. ˆFinally in June the Commons answered Charles’s demand for money by a re- monstrance asking for Buckingham’s dismissal, which they decided must precede the grant of supply. They claimed respon- sible ministers, while Charles considered himself the executive and the sole and unfettered judge of the necessities of the state. Accordingly on the 1 5th Charles dissolved the parliament.

The king was now in great need of money. He was at war with Spain and had promised to pay £30,000 a month to Christian IV. of Denmark in support of the Protestant campaign in Germany. To these necessities was now added a war with France. Charles had never kept his promise concerning the recusants; disputes arose in consequence with his wife, and on the 31st of July 1626 he ordered all her French attendants to be expelled from Whitehall and sent back to France. At the same time several French ships carrying contraband goods to the Spanish Netherlands were seized by English warships. On the 27th of June 1627 Buckingham with a large expedition sailed to the Isle of Re to relieve La Rochelle, then besieged by the forces of Louis XIII. Though the success of the French Protestants was an object much desired in England, Buckingham’s unpopularity prevented support being given to the expedition, and the duke returned to Plymouth on the nth of November completely defeated. Meanwhile Charles had endeavoured to get the money refused to him by parliament by means of a forced loan, dis- missing Chief Justice Crewe for declining to support its legality, and imprisoning several of the leaders of the opposition for re- fusing to subscribe to it. These summary measures, however, only

brought a small sum into the treasury. On the 2nd of January 1628 Charles ordered the release of all the persons imprisoned, and on the 17th of March summoned his third parliament.

Instead of relieving the king's necessities the Commons immediately proceeded to discuss the constitutional position and to formulate the Petition of Right, forbidding taxation without

consent of parliament, arbitrary and illegal imprisonment, compulsory billeting in private houses, and martial law. Charles, on the 1st of May, first demanded that they should " rest on his royal word and promise." He obtained an opinion from the judges that the acceptance of the petition would not absolutely preclude in certain cases imprisonments without showing cause, and after a futile endeavour to avoid an acceptance by returning an ambiguous answer which only exasperated the Commons, he gave his consent on the 7 th of June in the full and usual form. Charles now obtained his subsidies, but no real settlement was reached, and his relations with the parliament remained as unfriendly as before. They proceeded to remonstrate against his government and against his support of Buckingham, and denied his right to tonnage and poundage. Accordingly, on the 26th of June they were prorogued. New disasters befell Charles, in the assassination of Buckingham and in the failure of the fresh expedition sent to Re. In January 1629 the parliament reassembled, irritated by the exaction of the duties and seizure of goods during the interval, and suspicious of " innovations in religion," the king having forbidden the clergy to continue the controversy concerning Calvinistic and Arminian doctrines, the latter of which the parliament desired to suppress. While they were discussing these matters, on the 2nd of March 1629, the king ordered them to adjourn, but amidst a scene of great excitement the speaker, Sir John Finch, was held down in his chair and the doors were locked, whilst resolutions against innova- tions in religion and declaring those who levied or paid tonnage and poundage enemies to their country were passed. Parliament was immediately dissolved, and Charles imprisoned nine members, leaders of the opposition, Eliot, Holies, Strode, Selden, Valentine, Coryton, Heyman, Hobart and Long, his

vengeance being especi- ally shown in the case of Eliot, the most formidable of his opponents, who died in the Tower of consumption after long years of close and unhealthy confinement, and whose corpse even Charles refused to give up to his family.

For eleven years Charles ruled without parliaments and with some success. There seemed no reason to think that "that noise," to use Laud's expression concerning parliaments, would ever be heard again by those then living. A revenue of about £618,000 was obtained by enforcing the payment of tonnage and poundage, and while avoiding the taxes, loans, and benevolences forbidden by the petition of right, by monopolies, fines for knighthood, and for pretended encroachments on the royal domains and forests, which enabled the king to meet expenditure at home. In Ireland, Charles, in order to get money, had granted the Graces in 1628, conceding security of titles of more than sixty years' standing, and a more moderate oath of allegiance for the Roman Catholics, together with the renunciation of the shilling fine for non-attendance at church. He continued, however, to make various attempts to get estates into his possession on the pretext of invalid title, and on the 12th of May 1635 the city of London estates were sequestered. Charles here destroyed one of the most valuable settlements in Ireland founded by James I. in the interests of national defence, and at the same time ex- tinguished the historic loyalty of the city of London, which henceforth steadily favoured the parliamentary cause. In 1633 Wentworth had been sent to Ireland to establish a medieval monarchy and get money, and his success in organization seemed great enough to justify the attempt to extend the system to England. Charles at the same time restricted his foreign policy to scarcely more than a wish for the recovery of the Palatinate, to further which he engaged in a series of numerous and mutually destructive negotiations with Gustavus Adolphus and with Spain, finally making peace with Spain on the 5th of November 1630, an agreement which was' followed on the 2nd of January 1631 by a further secret treaty, the two kings binding themselves to make war on the Dutch and partition their territories. A notable feature of this agreement was that while in Charles's portion Roman Catholicism was to be tolerated, there was no guarantee for the security of Protestantism in the territory to be ceded to Spain.

In 1634 Charles levied ship-money from the seaport towns for

the increase of the navy, and in 1635 the tax was extended to the

inland counties, which aroused considerable opposition. In February 1637 Charles obtained an opinion in favour of his claims from the judges, and in 1638 the great Hampden case was decided in his favour. The apparent success, however, of Charles was imperilled by the general and growing resentment aroused by his exactions and whole policy, and this again was small compared with the fears excited by the king's attitude towards religion and Protestantism. He supported zealously Laud's rigid Anglican orthodoxy, his compulsory introduction of unwelcome ritual, and his narrow, intolerant and despotic policy, which was marked by several savage prosecutions and sentences in the Star Chamber, drove numbers of moderate Protestants out of the Church into Presbyterianism, and created an intense feeling of hostility to the government throughout the country. Charles further increased the popular fears on the subject of religion by his welcome given to Panzani, the pope's agent, in 1634, who endeavoured unsuccess- fully to reconcile the two churches, and afterwards to George Conn, papal agent at the court of Henrietta Maria, while the favour shown by the king to these was contrasted with the severe sentences passed upon the Puritans.

The same imprudent neglect of the national sentiment was pursued in Scotland. Charles had already made powerful enemies there by a declaration announcing the arbitrary revoca- tion of former church estates to the crown. On the 18th of June 1633 he was crowned at Edinburgh with full Anglican ceremonial, which lost him the hearts of numbers of his Scottish subjects and aroused hostility to his government in parliament. After his return to England he gave further offence by ordering the use of the surplice, by his appointment of Archbishop Spotiswood as chancellor of Scotland, and by introducing other bishops into the privy council. In 1636 the new Book of Canons was issued by the king's authority, ordering the communion table to be placed at the east end, enjoining confession, and declaring excommunicate any who should presume to attack the new prayer-book. The latter was orderedto be used on the 18th of October 1636, but it did not arrive in Scotland till May 1637. It was intensely disliked both as. "popish" and as English. A riot followed its first use in St Giles' cathedral on the 23rd of July, and Charles's order to enforce it on the 10th of September was met by fresh disturbances and by the establishment of ' the " Tables," national committees which now became the real though informal government of Scotland. In 1638 the national covenant was drawn up, binding those that signed it to defend their religion to

the death, and was taken by large numbers with enthusiasm all over the country. Charles now drew back, promised to enforce the canons and prayer-book only in a " fair and legal way," and sent the marquis of Hamilton as a mediator. The latter, however, a weak and incapable man, desirous of popularity with all parties, and unfaithful to the king's interests, yielded everything, without obtaining the return of Charles's subjects to their allegiance. The assembly met at Glasgow on the 2 1 st of November, and in spite of Hamilton's opposition immediately proceeded to judge the bishops. On the 28th Hamilton dissolved it, but it continued to sit, deposed the bishops and re-established Presbyterianism. The rebellion had now begun, and an appeal to arms alone could decide the quarrel between Charles and his subjects. On the 28th of May 1639 he arrived at Berwick with a small and ill-trained force, thus beginning what is known as the first Bishops' War; but being confronted by the Scottish army at Duns Law, he was compelled to sign the treaty of Berwick on the 18th of June, which provided for the disbandment of both armies and the restitution to the king of the royal castles, referring all questions to a general assembly and a parliament. When the assembly met it abolished episcopacy, but Charles, who on the 3rd of August had returned to Whitehall, refused his consent to this and to other measures proposed by the Scottish parliament. His extreme financial necessities, and the prospect of renewed hostilities with the Scots, now moved Charles, at the instigation of Strafford, who in September had left Ireland to become the king's chief adviser, to turn again to parliament for assistance as the last resource,

and on the 13th of April 1640 the Short Parliament assembled. But on its discussing grievances before granting supplies and finally refusing subsidies till peace was made with the Scots; it was dissolved on the 5 th of May. Charles returned once more to measures of repression, and on the 10th imprisoned some of the London aldermen who refused to lend money. He prepared for war, scraping together what money be could and obtaining a grant through Strafford from Ireland. His position, however, was hopeless; his forces were totally undisciplined, and the Scots were supported by the parliamentary opposition in England. On

the 20th of August the Scots crossed the Tweed, beginning the so-called second Bishops' War, defeated the king's army at Newburn on the 28th, and subsequently occupied Newcastle and Durham. Charles at this juncture, on the 24th of September, summoned a great council of the peers; and on the 21st of October a cessation of arms was agreed to by the treaty of Ripon, the Scots receiving £850 a day for the maintenance of the army, and further negotiations being transferred to London. On the 3rd of November the king summoned the Long Parliament.

Such was the final issue of Charles's attempt to govern without parliaments — Scotland in triumphant rebellion, Ireland only waiting for a signal to rise, and in England the parliament revived with almost irresistible strength, in spite of the king, by the force of circumstances alone. At this great crisis, which would indeed have taxed the resolution and resource of the most cool-headed and sagacious statesman, Charles failed signally. Two alternative courses were open to him, either of which still offered good chances of success. He might have taken his stand on the ancient and undoubted prerogative of the crown, resisted all encroach- ments on the executive by the parliament by legal and con- stitutional means, which were probably ample, and in case of necessity have appealed to the loyalty of the nation to support him in arms; or he might have waived his rights, and, acknow- ledging the mistakes of his past administration, have united with the parliament and created once more that union of interests and sentiment of the monarchy with the nation which had made England so powerful. Charles, however, pretended to do both simultaneously or by turns, and therefore accomplished neither. The illegally imprisoned members of the last parliament, now smarting with the sense of their wrongs, were set free to stimulate the violence of the opposition to the king in the new assembly. Of Charles's double statecraft, however, the series of incidents which terminated the career of the great Strafford form the most terrible example. Strafford had come to London in November, having been assured by Charles that he " should not suffer in his person, honour or fortune," but was impeached and thrown into the Tower almost immediately. Charles took no steps to hinder the progress of the proceedings against him, but entered into schemes for saving him by bringing up an army to London, and this step exasperated Strafford's enemies and added new zeal to the prosecution. On the 23rd of April, after the passing of the attainder by the Commons, he repeated to Strafford his former assurances of protection. On the 1st of May

he appealed to the Lords to spare his life and be satisfied with rendering him incapable of holding office. On the 2nd he made an attempt to seize the Tower by force. On the 10th, yielding to the queen's fears and to the mob surging round his palace, he signed his death-warrant. " If my own person only were in danger," he declared to the council, " I would gladly venture it to save my Lord Strafford's life; but seeing my wife, children, all my kingdom are concerned in it, I am forced to give way unto it." On the nth he sent to the peers a petition for Strafford's life, the force of which was completely annulled by the strange post-script: " If he must die, it were a charity to reprieve'him until Saturday." This tragic surrender of his great and devoted servant left an indelible stain upon the king's character, and he lived to repent it bitterly. One of his last admonitions to the prince of Wales was " never to give way to the punishment of any for their faithful service to the crown." It was regarded by Charles as the cause of his own subsequent misfortunes, and on tha scaffold the remembrance of it disturbed his own last moments. The surrender of Strafford was followed by another

stupendous concession by Charles, the surrender of his right to dissolve the parliament without its own consent, and the parliament immediately proceeded, with Charles's consent, to sweep away the star-chamber, high commission and other extra-legal courts, and all extra-parliamentary taxation. Charles, however, did not remain long or consistently in the yielding mood. In June 1641 he engaged in a second army plot for bringing up the forces to London, and on the 10th of August he set out for Scotland in order to obtain the Scottish army against the parliament in England; this plan was obviously doomed to failure and was interrupted by another appeal to force, the so- called Incident, at which Charles was suspected (in all prob- ability unjustly) of having connived, consisting in an attempt to kidnap and murder Argyll, Hamilton and Lanark, with whom he was negotiating. Charles had also apparently been intriguing with Irish Roman Catholic lords for military help in return for concessions, and he was suspected of complicity in the Irish rebellion which now broke out. He left Scotland more dis- credited than ever, having by his concessions made, to Use Hyde's words, " a perfect deed of gift of that kingdom," and without gaining any advantage.

Charles returned to London on the 2 5 th of November 1641 and was immediately confronted by the Grand Remonstrance (passed on the 2 2nd), in which, after reciting the chief pointsof the king's misgovernment, the parliament demanded the appoint-

ment of acceptable ministers and the constitution of an assembly of divines to settle the religious question. On the 2nd of January 1642 Charles gave office to the opposition members Colepeper and Falkland, and at the same time Hyde left the opposition party to serve the king. Charles promised to take no serious step without their advice. Nevertheless, entirely without their knowledge, through the influence of the queen whose impeachment was intended, Charles on the 4th made the rash and fataj attempt to seize with an armed force the five members of the Commons, Pym, Hampden, Holies, Hesilrige and Strode, whom, together with Mandeville (afterwards earl of Manchester) in the Lords, he had impeached of high treason. No English sovereign ever had (or has since that time) penetrated into the House of Commons. So complete and flagrant a violation of parliamentary liberties, and an appeal so crude and glaring to brute force, could only be justified by complete success; but the court plans had been betrayed, and were known to the offending members, who, by order of the House, had taken refuge in the city before the king's arrival with the soldiers. Charles, on entering the House, found " the birds flown," and returned baffled, having thrown away the last chance of a peaceful settlement (see Lenthall, William). The next day Charles was equally unsuccessful in obtaining their surrender in the city. " The king had the worst day in London yesterday," wrote a spectator of the scene, " that ever he had, the people crying ' privilege of parliament ' by thousands and prayed God to turn the heart of the king, shutting up their shops and standing at their doors with swords and halberds." x On the 10th, amidst general manifestations of hostility, Charles left Whitehall to prepare for war, destined never to return till he was brought back by his victorious enemies to die.

Several months followed spent in manceuvres to obtain the control of the forces and in a paper war of controversy. On the 23rd of April Charles was refused entry into Hull, and on the 2nd of June the parliament sent to him the " Nineteen Propo- sitions," claiming the whole sovereignty and government for the parliament, including the choice of the ministers, the judges, and the control of the army, and the execution of the laws against the Roman Catholics. The military events of the war are described in the article Great Rebellion. On the 22nd of August the king set up his standard at Nottingham, and on the 23rd of October he fought the indecisive battle of Edgehill, occupying Oxford and advancing as far as Brentford. It seemed possible that the war might immediately be ended by Charles penetrating to the heart

of the enemy's position and occupying London, but he drew back on the 13th of November before the parliamentary force at Turnham Green, and avoided a decisive contest. 1 Hist. MSS. Comm.: MSS. of Lord Montagu of Beaulieu, 141.

Next year (1643) another campaign, for surrounding instead of penetrating into London, was projected. Newcastle and Hopton were to advance from the north and west, seize the north and south banks of the river below the city, destroy its commerce, and combine with Charles at Oxford. The royalist force, however, in spite of victories at Adwalton Moor (June 30th) and Roundway Down (July 13th), did not succeed in combining with Charles, Newcastle in the north being kept back by the Eastern Association and the presence of the enemy at Hull, and Hopton in the west being detained by their successful holding out at Plymouth. Being too weak to attempt anything alone against London, Charles marched to besiege Gloucester, Essex following him and relieving the place. Subsequently the rival forces fought the indecisive first battle of Newbury, and Charles failed in preventing the return of Essex to London. Meanwhile on the 1st of February the parliament had submitted proposals to Charles at Oxford, but the negotiations came to nothing, and Charles's unwise attempt at the same time to stir up a rising in his favour in the city, known as Waller's Plot, injured his cause considerably. He once more turned for help to Ireland, where the cessation of the campaign against the rebels was agreed upon on the 1 5th of September 1643, and several English regiments became thereby available for employment by the king in England. Charles also accepted the proposal for bringing over 2000 Irish. On the 22nd of January 1644 the king opened the rival parliament at Oxford.

The campaign of 1644 began far less favourably for Charles than the two last, principally owing to the alliance now made between the Scots and the parliament, the parliament taking the Solemn League and Covenant on the 25 th of September 1643, and the Scottish army crossing the border on the 19th of January 1644. No attempt was this year made against London, and Rupert was sent to Newcastle's succour in the north, where the great disaster

of Marston Moor on the 2nd of July ruined Charles's last chances in that quarter. Meanwhile Charles himself had defeated Waller at Cropredy Bridge on the 20th of June, and he subsequently followed Essex to the west, compelling the surrender of Essex's infantry at Lostwithiel on the 2nd of September. With an ill-timed leniency he allowed the men to go free after giving up their stores and arms, and on his return towards Oxford he was confronted again by Essex's army at Newbury, combined now with that of Waller and of Manchester. Charles owed his escape here from complete annihilation only to Manchester's unwillingness to inflict a total defeat, and he was allowed to get away with his artillery to Oxford and to revictual Donnington Castle and Basing House.

The negotiations carried on at Uxbridge during January and February 1645 failed to secure a settlement, and On the 14th of June the crushing defeat of the king's forces by the new model army at Naseby practically ended the civil war. Charles, however, refused to make peace on Rupert's advice, and considered it a point of honour " neither to abandon God's cause, injure my successors, nor forsake my friends." His chief hope was to join Montrose in Scotland, but his march north was prevented by the parliamentary forces, and on the 24th of September he witnessed from the walls of Chester the rout of his followers at Rowton Heath. He now entered into a series of intrigues, mutually destructive, which, becoming known to the different parties, exasperated all and diminished still further the king's credit. One proposal was the levy of a foreign force to reduce the kingdom ; another, the supply through the marquis of Ormonde of 10,000 Irish. Correspondence relating to these schemes, fatally compromising as they were if Charles hoped ever to rule England again, was discovered by his enemies, including the Glamorgan treaty, which went much further than the instructions to Ormonde, but of which the full responsibility has never been really traced to Charles, who on the 29th of January 1646 disavowed his agent's proceedings. He simultaneously treated with the parliament, and promised toleration to the Roman Catholics if they and the pope would aid in the restoration of the monarchy and the church. Nor was this all. ' The parliamentary forces had been closing round Oxford. On the 27 th of April the king left the city, and on the 5th of May gave himself up to the Scottish

army at Newark, arriving on the 13th with them at Newcastle. On the 13th of July the parliament sent to Charles the " Newcastle Propositions," which included the extreme demands of

Charles'sacceptanceoftheCovenants,theabolitionof episcopacy and establishment of Presbyterianism, severer laws against the Roman Catholics and parliamentary control of the forces, with the withdrawal of the Irish Cessation, and a long list of royalists to be exempted from pardon. Charles returned no definite answer for several months. He imagined that he might now find support in Scottish royalism, encouraged by Montrose's series of brilliant victories, but these hopes were destroyed by the latter's defeat at Philiphaugh on the 3rd of September. The Scots insisted on the Covenant and on the permanent establishment of Presbyterianism, while Charles would only consent to a temporary maintenance for three years. Accordingly the Scots, in return for the payment of part of their army arrears by the parliament, marched home on the 30th of January 1647, leaving Charles behind, who under the care of the parliamentary commissioners was conducted to Holmby House. Thence on the 12 th of May he sent his answer to the Newcastle Propositions, offering the militia to the parlia- ment for ten years and the establishment of Presbyterianism for three, while a final settlement on religion was to be reached through an assembly of twenty divines at Westminster. But in the midst of the negotiation with the parliament Charles's person was seized, on the 3rd of June 1647, by Cornet Joyce under instruct- ions of the army, which soon afterwards occupied London and overpowered the parliament, placing Charles at Hampton Court. If Charles could have remained firm to either one or the other faction, and have made concessions either to Presbyterianism or on the subject of the militia, he might even now have pre- vailed. But he had learned nothing by experience, and continued at this juncture his characteristic policy of intrigue and double- dealing, " playing his game," to use his own words, negotiating with both parties at once, not with the object or wish to arrive at a settlement with either, but to augment their disputes, gain time and profit ultimately by their divisions. The " Heads of the Proposals," submitted to Charles by the army on the 28th of July 1647, were terms conceived on a basis far broader and more statesmanlike than the Newcastle Propositions, and such as Charles might well have accepted. The proposals on religion anticipated the Toleration Act of 1689. There was no mention of episcopacy, and its existence was thereby indirectly admitted, but complete religious freedom for all Protestant denominations was provided, and the power of the church to inflict civil penalties abolished, while it was also suggested that dangers from Roman Catholics and Jesuits might be avoided by means

other than enforcing attendance at church. The parliament was to dissolve itself and be succeeded by biennial assemblies elected on a re- formed franchise, not to be dissolved without their own consent before 120 days, and not to sit more than 240 days in the two years. A council of state was to conduct the foreign policy of the state and conclude peace and war subject to the approval of parliament, and to control the militia for ten years, the commanders being appointed by parliament, as also the officers of state for ten years. No peer created since May the 21st, 1642, was to sit in parliament without consent of both Houses, and the judicial decisions of the House of Lords were to be ratified by the Commons. Only five persons were excepted from am nesty, but royalists were not to hold office for five years and not to sit in the Commons till the end of the second biennial parliament. Proposals for a series of reforms were also added. Charles, however, was at the same time negotiating with Lauder- dale for an invasion of England by the Scots, and imagined he could win over Cromwell and Fairfax by " proffers of advantage to themselves." The precious opportunity was therefore allowed to slip by. On the 9th of September he rejected the proposals of the parliament for the establishment of Presbyterianism. His hopes of gaining advantages by playing upon the differences of his opponents proved a complete failure. Fresh terms were drawn up by the army and parliament together on the 10th of November, but before these could be presented, Charles, on the nth, had escaped to Carisbrooke Castle in the Isle of Wight

Thence on the 16th he sent a message offering Presbytarianism for three years and the militia for his lifetime to the parliament, but insisting on the maintenance of episcopacy. On the 28th of December he refused his assent to the Four Bills, which demanded the militia for parliament for twenty years and practically for ever, annulled the honours recently granted by the king and his declarations against the Houses, and gave to parliament the right to adjourn to any place it wished. On the 3rd of January 1648 the Commons agreed to a resolution to address the king no further, in which they were joined by the Lords on the 15th.

Charles had meanwhile taken a further fatal step which brought about his total destruction. On the 26th of December 1647 he had signed at Carisbrooke with the Scottish commis- sioners the secret treaty called the " Engagement," whereby the Scots undertook to invade England on his behalf and restore him to the throne on condition of the establishment of Presby- terianism for three years and the suppression of the sectarians. In consequence the second civil war broke out and the Scots invaded England under Hamilton. The royalist risings in England were soon suppressed, and Cromwell gained an easy and decisive victory over the Scots at Preston. Charles was now left alone to face his enemies, with the whole tale of his intrigues and deceptions unmasked and exposed. The last intrigue with the Scots was the most unpardonable in the eyes of his contemporaries, no less wicked and monstrous than his design to conquer England by the Irish soldiers; " a more prodigious treason," said Cromwell, " than any that had been perfected before; because the former quarrel was that English- men might rule over one another; this to vassalize us to a foreign nation." Cromwell, who up to this point had shown himself foremost in supporting the negotiations with the king, now spoke of the treaty of Newport, which he found the parlia- ment in the act of negotiating on his return from Scotland, as " this ruining hypocritical agreement." Charles had engaged in these negotiations only to gain time and find opportunity to escape. " The great concession I made this day," he wrote on the 7th of October, " was made merely in order to my escape." At the beginning he had stipulated that no concession from, him should be valid unless an agreement were reached upon every point. He had now consented to most of the demands of the parliament, including the repudiation of the Irish Cessation, the surrender of the delinquents and the cession of the militia for twenty years, and of the offices of state to parliament, but re- mained firm in his refusal to abolish episcopacy, consenting only to Presbyterianism for three years. Charles's devotion to the church is undoubted. In April 1646, before his flight from Oxford, inspired perhaps by superstitious fears as to the origin of his misfortunes, he had delivered to Sheldon, afterwards arch- bishop of Canterbury, a written vow (now in the library of St Paul's cathedral) to restore all church lands held by the crown on his restoration to the throne; and almost his last injunction to the prince of Wales was that of fidelity to the national church. His present firmness, however, in its support was caused probably less by his devotion to it than by his desire to secure the failure of the whole treaty, and his attempts to

escape naturally weakened the chances of success. Cromwell now supported the petitions of the army against the treaty. On the 16th of November the council of officers demanded the trial of the king, ” the capital and grand author of our troubles,” and on the 27 th of November the parliamentary commissioners returned from Newport without having secured Charles’s consent. Charles was removed to Hurst Castle on the 1st of December, where he remained till the 19th, thence being taken to Windsor, where he arrived on the 23rd. On the 6th ” Pride’s Purge ” had removed from the Commons all those who might show any favour to the king. On the 25th a last attempt by the council of officers to come to terms with him was repulsed. On the 1st of January the remnant of the Commons resolved that Charles was guilty of treason by ” levying war against the parlia- ment and kingdom of England”; on the 4th they declared their own power to make laws without the lords or the sovereign,

and on the 6th established a ” high court of justice ” to try the king. On the 19th Charles was brought to St James’s Palace, and on the next day his trial began in Westminster Hall, without the assistance of any of the judges, who all refused to take part in the proceedings. He laughed aloud at hearing himself called a traitor, and immediately demanded by what authority he was tried. He had been in treaty with the parliament in the Isle of Wight and taken thence by force; he saw no lords present. He was told by Bradshaw, the president of the court, that he was tried by the authority of the people of England, who had elected him king; Charles making the obvious reply that he was king by inheritance and not by election, that England had been for more than 1000 years an hereditary kingdom, and Bradshaw cutting short the discussion by adjourning the court. On the 22nd Charles repeated his reasoning, adding, ” It is not my case alone; it is the freedom and liberty of the people of England, and do you pretend what you will, I stand more for their liberties, for if power without law may make laws … I do not know what subject he is in England that can be sure of his life or any- thing that he calls his own.” On the 23rd he again refused to plead. The court was adjourned, and there were several signs that the army in their prosecution of the king had not the nation at their back. While the soldiers had shouted “Justice” justice!” as the king passed through their ranks, the civilian spectators from the end of the hall had cried ” God save the king!” There was considerable opposition and reluctance to proceed among the members of the court. On the 26th, however, the court decided unanimously upon his

execution, and on the 27th Charles was brought into court for the last time to hear his sentence. His request to be heard before the Lords and Commons was rejected, and his attempts to answer the charges of the president were silenced. Sentence was pronounced, and the king was removed by the soldiers, uttering his last broken protest: ” I am not suffered to speak. Expect what justice other people will have.”

In these last hours Charles, who was probably weary of life, showed a remarkable dignity and self-possession, and a firm resignation supported by religious faith and by the absolute conviction of his own innocence, which, says Burnet, ” amazed all people and that so much the more because it was not natural to him. It was imputed to a very extraordinary measure of supernatural assistance . . . ; it was owing to something within himself that he went through so many indignities with so much true greatness without disorder or any sort of affecta- tion.” Nothing in his life became Charles like the leaving it. ” He nothing common did or mean Upon that-memorable scene.” On the morning of the 29th of January he said his last sad farewell to his younger children, Elizabeth and Henry, duke of Gloucester. On the 30th at ten o’clock he walked across from St James’s to Whitehall, calling on his guard ” in a pleasant manner ” to walk apace, and at two he stepped upon the scaffold from a window, probably the middle one, of the Banqueting House (see Architecture, Plate VI., fig. 75). He was separated from the people by large ranks of soldiers, and his last speech only reached Juxon and those with him on the scaffold. He declared that he had desired the liberty and freedom of the people as much as any; ” but I must tell you that their liberty and freedom consists in having govern- ment. ... It is not their having a share in the government; that is nothing appertaining unto them. A subject and a sovereign are clean different things.” These, together with his declaration that he died a member of the Church of England, and the mysterious ” Remember,” spoken to Juxon, were Charles’s last words. ” It much discontents the citizens,” wrote a spectator; ” ye manner of his deportment was very resolutely with some smiling countenances, intimating his willingness to be out of his troubles.” x ” The blow I saw given,” wrote another, Philip Henry, ” and can truly say with a sad heart, at the instant whereof, I remember well, there was such a grone by the Thousands then present as I never heard before and desire I may never hear again. There was according to 1 Notes and Queries, 7th ser., viii. 326.

order one Troop immediately marching fromwards Charing-Cross to Westminster and another fromwards Westminster to Charing-Cross, purposely to masker ” (i.e. to overpower) ” the people and to disperse and scatter them, so that I had much adoe amongst the rest to escape home without hurt.” 1

Amidst such scenes of violence was at last effected the destruction of Charles. ” It is lawful,” wrote Milton, ” and hath been held so through all ages for any one who have the power to call to account a Tyrant or wicked King and after due conviction to depose and put him to death.” 2 But here (it might well be contended) there had been no ” due conviction.” The execution had been the act of the king’s personal enemies, of ” only some fifty or sixty governing Englishmen with Oliver Cromwell in the midst of them” an act technically illegal, morally unjustifiable because the supposed crimes of Charles had been condoned by the later negotiations with him, and indefensible on the ground of public expediency, for the king’s death proved a far greater obstacle to the re-establishment of settled government than his life could have been. The result was an extraordinary revulsion of feeling in favour of Charles and the monarchy, in which the incidents of his misgovernment were completely forgotten. He soon became in the popular veneration a martyr and a saint. His fate was compared with the Crucifixion, and his trials and sufferings to those of the Saviour. Handkerchiefs dipped in his blood wrought ” miracles,” and the Eikon Basilike, published on the day of his funeral, presented to the public a touching if not a genuine portrait of the unfortunate sovereign. At the Restoration the anniversary of his death was ordered to be kept as a day of fasting and humiliation, and the service appointed for use on the occasion was only removed from the prayer-book in 1859. The same conception of Charles as a martyr for religion appeals still to many, and has been stimulated by modern writers. ” Had Charles been willing to abandon the church and give up episcopacy,” says Bishop Creighton, ” he might have saved his throne and his life. But on this point Charles stood firm, for this he died and by dying saved it for the future.” 3 Gladstone, Keble, Newman write in the same strain. ” It was for the Church,” says Gladstone, ” that Charles shed his blood upon the scaffold.” 4 “I

rest," says Newman, "on the scenes of past years, from the Upper Room in Acts to the Court of Carisbrooke and Uxbridge." The injustice and violence of the king's death, however, the pathetic dignity of his last days, and the many noble traits in his character, cannot blind us to the real causes of his downfall and destruction, and a sober judgment cannot allow that Charles was really a martyr either for the church or for the popular liberties.

The constitutional struggle between the crown and parliament had not been initiated by Charles I. It was in full existence in the reign of James I., and distinct traces appear towards the latter part of that of Elizabeth. Charles, therefore, in some degree inherited a situation for which he was not responsible, nor can he be justly blamed, according to the ideas of kingship which then prevailed, for defending the prerogatives of the crown as precious and sacred personal possessions which it was his duty to hand down intact to his successors. Neither will his persistence in refusing to yield up the control of the executive to the parliament or the army, or his zeal in defending the national church, be altogether censured. In the event the parlia- ment proved quite incapable of governing, an army uncontrolled by the sovereign was shown to constitute a more grievous tyranny than Charles's most arbitrary rule, and the downfall of the church seen to make room only for a sectarian despotism as intolerable as the Laudian. The natural inference might be that both conceptions of government had much to support them, that they were bound sooner or later to come into collision, and that the actual individuals in the drama, including the king himself, were rather the victims of the greatness of events than real actors in the scene, still less the controllers of their own

1 Letters and Diaries of P. Henry (1882), 12.

- Tenure of Kings and Magistrates. 3 Lectures on Archbishop Laud (1895), p. 25. * Remarks on the Royal Supremacy (1850), p. 57.

and the national destiny. A closer insight, however, shows that biographical more than abstract historical elements determined the actual course and issue of the Rebellion. The great con- stitutional and religious points of dispute between the king and parliament, though doubtless involving principles vital to the national interests, would not alone have sufficed to destroy Charles. Monarchy was too much venerated, was too deeply rooted in the national life, to be hastily and easily extirpated; the perils of removing the foundation of all government, law and

order were too obvious not to be shunned at almost all costs. Still less can the crowning tragedy of the king's death find its real explanation or justification in these disputes and antagon- isms. The real cause was the complete discredit into which Charles had brought himself and the monarchy. The ordinary routine of daily life and of business cannot continue without some degree of mutual confidence between the individuals brought into contact, far less could relations be maintained by subjects with a king endowed with the enormous powers then attached to the kingship, and with whom agreements, promises, negotiations were merely subterfuges and prevarications. We have seen the series of unhappy falsehoods and deceptions which constituted Charles's statecraft, beginning with the fraud concerning the concessions to the Roman Catholics at his marriage, the evasions with which he met the Petition of Right, the abandonment of Strafford, the simultaneous negotiation with, and betrayal of, all parties. Strafford's reported words on hearing of his desertion by Charles, " Put not your trust in princes," re-echo through the whole of Charles's reign. It was the degradation and dishonour of the kingship, and the personal loss of credit which Charles suffered through these transactions — ■ which never appear to have caused him a moment's regret or uneasiness, but the fatal consequences of which were seen only too clearly by men like Hyde and Falkland — that were the real causes of the rebellion and of the king's execution. The con- stitutional and religious grievances were the outward and visible sign of the corroding suspicions which slowly consumed the national loyalty. In themselves there was nothing incapable of settlement either through the spirit of union which existed between Elizabeth and her subjects, or by the principle of compromise which formed the basis of the constitutional settle- ment in 1688. The bond of union between his people and himself Charles had, however, early broken, and compromise is only possible between parties both of whom can acknowledge to some extent the force of the other's position, which can trust one another, and which are sincere in their endeavour to reach agreement. Thus on Charles himself chiefly falls the responsi- bility for the catastrophe.

His character and motives fill a large place in English history, but they have never been fully understood and possibly were largely due to physical causes. His weakness as a child was so extreme that his life was despaired of. He outgrew physical defects, and as a young man excelled in horsemanship and in the sports of the times, but always retained an impediment of speech. At the time

of his accession his reserve and reticence were especially noticed. Buckingham was the only person who ever enjoyed his friendship, and after his death Charles placed entire confidence in no man. This isolation was the cause of an ignorance of men and of the world, and of an incapacity to appreciate the ideas, principles and motives of others, while it prepared at the same time a fertile soil for receiving those exalted conceptions of kingship, of divine right and prerogative, which came into vogue at this period, together with those exaggerated ideas of his own personal supremacy and importance to which minds not quite normal are always especially inclined. His character was marked by a weakness which shirked and postponed the settlement of difficulties, by a meanness and ingratitude even when dealing with his most devoted followers, by an obstinacy which only feigned compliance and by an untruth- fulness which differed widely from his son's unblushing deceit, which found always some reservation or excuse, but which while more scrupulous was also more dangerous and insidious because employed continually as a principle of conduct. Yet Charles, in

spite of his failings, had many fine qualities. Clarendon, who was fully conscious of them, who does not venture to call him a good king, and allows that " his kingly virtues had some mixture and alloy that hindered them from shining in full lustre," declares that " he was if ever any, the most worthy of the. title of an Honest Man, so great a lover of justice that no temptation could dispose him to a wrongful action except that it was; disguised to him that he believed it just," " the worthiest of gentlemen, the best master, the best friend, the best husband, the best father and the best Christian that the age in which he lived produced." With all its deplorable mistakes and failings Charles I. 's reign belongs to a sphere infinitely superior to that of his unscrupulous, corrupt, selfish but more successful son. His private life was with- out a blemish. Immediately on his accession he had suppressed the disorder which had existed in the household of James I., and let it be known that whoever had business with him " must never approach him by backstairs or private doors." 1 He maintained a strict sobriety in food and dress. He had a fine artistic sense, and Milton reprehends him for having made

Shakespeare ” the closest companion.of his solitudes.” ” Monsieur le Prince de Galles,” wrote Rubens in 1625, ” est le prince le plus amateur de la peinture qui soit au monde.” He succeeded in bringing together during twenty years an unrivalled collection, of which a great part was dispersed at his death. He showed a noble insensibility to flattery. He was deeply and sincerely religious. He wished to do right, and was conscious of the purity of his motives. Those who came into contact with him, even the most bitter of his opponents, were impressed with his good- ness. The great tragedy of his life, to be read in his well-known, dignified, but weak and unhappy features, and to be followed in his inexplicable and mysterious choice of baneful instruments, such as Rupert, Laud, Hamilton, Glamorgan, Henrietta Maria — all in their several ways working out his destruction— seems to have been inspired by a fateful insanity or infirmity of mind or will, recalling the great Greek dramas in which the poets depicted frenzied mortals rushing into their own destruction, impelled by the unseen and superior powers.

The king’s body, after being embalmed, was buried by the few followers who remained with him to the last, hastily and withoutanyfuneralservice.whichwasforbiddenbytheauthorities, in the tomb of Henry VIII. , in St George’s Chapel, Windsor, where his coffin was identified and opened in 1813. An ” account of what appeared ” was published by Sir Henry Halford, and a bone abstracted on the occasion was replaced in the vault by the prince of Wales (afterwards Edward VH.) in 1888. Charles I. left, besides three children who died in infancy, Charles (after- wards Charles II.) ; James (afterwards James II.) ; Henry, duke of Gloucester (1630-1660); Mary (1631-1660), who married William of Orange; Elizabeth (1635-1650); and Henrietta, duchess of Orleans (1644-1670).

Bibliography. — The leading authority for the life and reign of Charles I. is the History of England (1883) and History of the Great Civil War (1893), by S. R. Gardiner, with the references there given. Among recent works may be mentioned Memoirs of the Martyr King, by A. Fea (1905) ; Life of Charles I, 1600-162$, by E. B. Chancellor (1886); The Visits of Charles I. to Newcastle, by C. S. Terry (1898); Charles I., by Sir J. Skelton, valuable for its illus- trations (1898) ; The Manner of the Coronation of King Charles I., ed. by C. Wordsworth (Henry Bradshaw Soc, 1892); The Picture Gallery of Charles I., by C. Phillips (1896). See also Calendars of State Papers, Irish and Domestic Series; Hist. MSS. Comm. Series, esp. MSS. of J. Eliot Hodghin, F. J, Savile

Foljambe, Lord Montagu of Beaulieu, Duke of Rutland at Belvoir Castle, Marquis of Ormonde, Earl Cowper (Coke MSS.), Earl of Lonsdale (note-books of parlia- ments of 1626 and 1628), Duke of Buccleuch at Montagu House, Duke of Portland, nth Rep. app. pt. vi., Duke of Hamilton, pt. i., Salvetti Correspondence, 10th Rep. pt. vi., Lord Braye; Add. MSS. Brit. Mus., 33,596 fols. 21-32 (keys to ciphers), 34,171, 35, 2 97; Notes and Queries, ser. vi., vii., viii., ix. indexes; Eng. Hist. Rev. ii. 687 (" Charles and Glamorgan" by S. R. Gardiner), vii. 176; Cornhill Mag. vol. 75, January 1897, " Execution of Charles," by C. H. Firth. (P. C. Y.)

CHARLES II. (1630-1685), king of Great Britain and Ireland, second son of Charles I. and Queen Henrietta Maria, was born on the 29th of May 1630 at St James's Palace, and was brought

l Salvetti's Corresp. in Hist. MSS.Comm.nth Rep. app. pt. i. p. 6.

up under the care successively of the countess of Dorset, William Cavendish, duke of Newcastle, and the marquess of Hertford. He accompanied the king during the campaigns of the Civil War, and sat in the parliament at Oxford, but on the 4th of March 1645 he was sent by Charles I. to the west, accompanied by Hyde and others who formed his council. Owing, however, to the mutual jealousies and misconduct of Goring and Grenville, and the prince's own disregard and contempt of the council, his presence was in no way advantageous, and could not prevent the final overthrow of the king's forces in 1646. He retired (17th of February) to Pendennis Castle at Falmouth, and on the approach of Fairfax (2nd of March) to Scilly, where he remained with Hyde till the 16th of April. Thence he fled to Jersey, and finally refusing all the overtures from the parliament, and in opposition to the counsels of Hyde, who desired the prince to remain on English territory, he repaired to the queen at Paris, where he remained for two years. He is described at this time by Mme de Motteville as "well-made, with a sv/arthy complexion agreeing well with his fine black eyes, a large ugly mouth, a graceful and dignified carriage and a fine figure "; and according to the description circulated later for his capture after the battle of Worcester, he was over six feet tall. He received instruction in mathematics from Hobbes, and was early initiated into all the vices of the age by Buckingham and Percy. In July 1648 the prince joined the royalist fleet and blockaded the Thames with a fleet of eleven ships, returning to Holland, where he received the news of the final royalist defeats and afterwards of the execution of his father. On the 14th of January 1649 he had forwarded to

the council a signed carte blanche, granting any conditions provided his father's life were spared. He immedi- ately assumed the title of kiAg, and was proclaimed in Scotland (5th of February) and in some parts of Ireland. On the 17th of September, after a visit to his mother at St Germain, Charles went to Jersey and issued a declaration proclaiming his rights; but, owing to the arrival of the fleet at Portsmouth, he was obliged, on the 13th of February 1650, to return again to Breda. The projected invasion of Ireland was delayed through want of funds till it was too late; Hyde's mission to Spain, in the midst of Cromwell's' successes, brought no assistance, and Charles now turned to Scotland for aid. Employing the same unscrupulous and treacherous methods which had proved so fatal to his father, he simultaneously supported and encouraged the expedition of Montrose and the royalists, and negotiated with the covenanters. On the 1st of May he signed the first draft of a treaty at Breda with the latter, in which he accepted the Solemn League and Covenant, conceded the control of public and church affairs to the parliament and the kirk, and undertook to establish Presbyterianism in the three kingdoms. He also signed privately a paper repudiating Ormonde and the loyal Irish, and recalling the commissions granted to them. In acting thus he did not scruple to desert his own royalist followers, and to repudiate and abandon the great and noble Montrose, whose heroic efforts he was apparently merely using in order to extort better terms from the covenanters, and who, having been captured on the 4th of May, was executed on the 21st in spite of some attempts by Charles to procure for him an indemnity.

Thus perjured and disgraced the young king embarked for Scotland on the 2nd of June; on the nth when off Heligoland he signed the treaty, and on the 23rd, on his arrival at Speymouth, before landing, he swore to both the covenants. He proceeded to Falkland near Perth and passed through Aberdeen, where he saw the mutilated arm of Montrose suspended over the city gate. He was compelled to dismiss all his followers except Buckingham, and to submit to interminable sermons, which generally contained violent invectives against his parents and himself. To Argyll he promised the payment of £40,000 at his restoration, doubtless the sum owing as arrears of the Scottish army unpaid when Charles I. was surrendered to the English at Newcastle, and entered into negotiations for marrying his daughter. In August he was forced to sign a further declaration, confessing his own wickedness in dealing with the Irish, his father's blood-guiltiness,

his mother's idolatry, and his abhorrence

o'i prelacy, besides ratifying his allegiance to the covenants and to Presbyterianism. At the same time he declared himself secretly to King, dean of Tuam, " a true child of the Church of England," " a true Cavalier," and avowed that " what concerns Ireland is in no ways binding "; while to the Roman Catholics in England he promised concessions and expressed his goodwill towards their church to Pope Innocent X. His attempt, called " The Start," on the 4th of October 1650, to escape from the faction at Perth and to join Huntly and the royalists in the north failed, and he was overtaken and compelled to return. On the 1st of January 1651 he was crowned at Scone, when he was forced to repeat his oaths to both the covenants.

Meanwhile Cromwell had advanced and had defeated the Presbyterians at Dunbar on the 3rd of September 1650, subsequently occupying Edinburgh. This defeat was not wholly unwelcome to Charles in the circumstances; in the following summer, during Cromwell's advance to the north, he shook off the Presbyterian influence, and on the 31st of July 1651 marched south into England with an army of about 10,000 commanded by David Leslie. He was proclaimed king at Carlisle, joined by the earl of Derby in Lancashire, evaded the troops of Lambert and Harrison in Cheshire, marched through Shropshire, meeting with a rebuff at Shrewsbury, and entered Worcester with a small, tired and dispirited force of only 16,000 men (22nd of August). Here the decisive battle, which ruined his hopes, and in which Charles distinguished himself by conspicuous courage and fortitude, was fought on the 3rd of September. After leading an unsuccessful cavalry charge against the enemy he fled, about 6 p.m., accompanied by Buckingham, Derby, Wilmot, Lauder- dale and others, towards Kidderminster, taking refuge at White- ladies, about 25 m. from Worcester, where he separated himself from all his followers except Wilmot, concealing himself in the famous oak during the 6th of September, moving subsequently to Boscobel, to Moseley and Bentley Hall, and thence, disguised as Miss Lane's attendant, to Abbots Leigh near Bristol, to Trent in Somersetshire, and finally to the George Inn at Brighton, having

been recognized during the forty-one days of his wander- ings by about fifty persons, none of whom, in spite of the reward of £1000 offered for his capture, or of the death penalty threatened for aiding his concealment, had betrayed him. . He set sail from Shoreham on the 15th of October 1651, and landed at Fecamp in Normandy the next day. He resided at Paris at St Germain till June 1654, in inactivity, unable to make any further effort, and living with difficulty on a grant from Louis XIV. of 600 livres a month. Various missions to foreign powers met with failure; he was excluded from Holland by the treaty made with England in April 1654, and he antici- pated his expulsion from France, owing to the new relations of friendship established with Cromwell, by quitting the country in July. He visited his sister, the princess of Orange, at Spa, and went to Aix-la-Chapelle, thence finally proceeding in November to Cologne, where he was hospitably received. The conclusion of Cromwell's treaty with France in October 1655, and the war between England and Spain, gave hope of aid from the latter power. In April 1656 Charles went to Bruges, and on the 7th of February 1658 to Brussels, where he signed a treaty with Don John of Austria, governor of the Spanish Netherlands, by which he received an allowance in place of his French pension and undertook to assemble all his subjects in France in aid of the Spanish against the French. This plan, however, came to nothing; projected risings in England were betrayed, and by the capture of Dunkirk in June 1658, after the battle of the Dunes, by the French and Cromwell's Ironsides, the Spanish cause in Flanders was ruined.

As long as Cromwell lived there appeared little hope of the restoration of the monarchy, and Charles and Hyde had been aware of the plots for his assassination, which had aroused no disapproval. By the protector's death on the 3rd of September 1658 the scene was wholly changed, and amidst the consequent confusion of factions the cry for the restoration of the monarchy grew daily in strength. The premature royalist rising, however. in August 1659 was defeated, and Charles, who hacl awaited

the result on the coast of Brittany, proceeded to Fuenterrabia on the Spanish frontier, where Mazarin and Luis dc Haro were negotiating the treaty of the Pyrenees, to induce both powers to support his cause; but the failure of the attempt in England ensured the rejection of his request, and he returned to Brussels in December, visiting his mother at Paris on the way. Events had meanwhile developed fast in favour of a restoration. Charles, by Hyde's advice, had not interfered in the movement, and had

avoided inconvenient concessions to the various factions by referring all to a ” free parliament.” He left Brussels for Breda, and issued in April 1660, together with the letters to the council, the officers of the army and the houses of parliament and the city, the declaration of an amnesty for all except those specially excluded afterwards by parliament, which referred to parliament the settlement of estates and promised a liberty to tender consciences in matters of religion not contrary to the peace of the kingdom.

On the 8th of May Charles II. was proclaimed king in .West-minster Hall and elsewhere in London. On the 24th he sailed from the Hague, landing on the 26th at Dover, where he was met by Monk, whom he saluted as father, and by the mayor, from whom he accepted a ” very rich bible,” ” the thing that he loved above all things in the world.” He reached London on the 29th, his thirtieth birthday, arriving with the procession, amidst general rejoicings and ” through a lane of happy faces,” at seven in the evening at Whitehall, where the houses of parliament awaited his coming, to offer in the name of the nation their congratulations and allegiance.

No event in the history of England had been attended with more lively and general rejoicing than Charles’s restoration, and none was destined to cause greater subsequent disappointment and disillusion. Indolent, sensual and dissipated by nature, Charles’s vices had greatly increased during his exile abroad, and were now, with the great turn of fortune which gave him full opportunity to indulge them, to surpass all the bounds of decency and control. A long residence till the age of thirty abroad, together with his French blood, had made him politically more of a foreigner than an Englishman, and he returned to England ignorant of the English constitution, a Roman Catholic and a secret adversary of the national religion, and untouched by the sentiment of England’s greatness or of patriotism. Pure selfishness was the basis of his policy both in domestic and foreign affairs. Abroad the great national interests were eagerly sacrificed for the sake of a pension, and at home his personal ease and pleasure alone decided every measure, and the fate of every minister and subject. During his exile he had surrounded himself with young men of the same spirit as himself, such as Buckingham and Bennet, who, without having any claim to statesmanship, inattentive to business, neglectful of the national interests and national prejudices, became Charles’s chief advisers. With them, as with their master, public office was only

desirable as a means of procuring enjoyment, for which an absolute monarchy provided the most favourable conditions. Such persons were now, accordingly, destined to supplant the older and responsible ministers of the type of Clarendon and Ormonde, men of high character and patriotism, who followed definite lines of policy, while at the same time the younger men of ability and standing were shut out from office.

The first period of Charles II. 's reign (1660-1667) was that of the administration of Lord Clarendon, the principal author of the Restoration settlement. The king was granted the large revenue of £1 ,300,000. The naval and military forces were disbanded, but Charles managed to retain under the name of guards three regiments, which remained the nucleus of a standing army. The settlement of estates on a legal basis provided ill for a large number of the king's adherents who had impoverished themselves in his cause. The king's honour was directly involved in their compensation and, except for the gratification of a few individuals, was tarnished by his neglect to afford them relief. Charles used his influence to carry through parliament the act of indemnity, and the execution of some of the regicides was a measure not more severe than was to be expected in the times and circumstances;

but that of Sir Henry Vane, who was not a regicide and whose life Charles had promised the parliament to spare in case of his condemnation, was brought about by Charles's personal insistence in revenge for the victim's high bearing during his trial, and was an act of gross Cruelty and perfidy. Charles was in favour of religious toleration, and a declaration issued by him in October 1660 aroused great hopes; but he made little effort to conciliate the Presbyterians or to effect a settlement through the Savoy conference, and his real object was to gain power over all the factions and to free his co-religionists, the Roman Catholics, in favour of whom he issued his first declaration of indulgence (26th of December 1662), the bill to give effect to it being opposed by Clarendon and defeated in the Lords, and being replied to by the passing of further acts against religious liberty. Meanwhile the plotof Vennerand of the Fifth Monarchy men had

been suppressed in January 1661, and the king was crowned on the 23rd of April. The convention parliament had been dissolved on the 29th of December 1660, and Charles's first parliament, the Long Parlia- ment of the Restoration, which met on the 8th of May 1661 and continued till January 1679, declared the command of the forces inherent in the crown, repudiated the taking up of arms against the king, and repealed in 1664 the Triennial Act, adding only a provision that there should not be intermission of parliaments for more than three years. In Ireland the church was re-established, and a new settlement of land introduced by the Act of Settle- ment 1661 and the Act of Explanation 1665. The island was excluded from the benefit of the Navigation Laws, and in 1666 the importation of cattle and horses into England was forbidden. In Scotland episcopacy was set up, the covenant to which Charles had taken so many solemn oaths burnt by the common hangman, and Argyll brought to the scaffold, while the kingdom was given over to the savage and corrupt administration of Lauderdale. On the 2istof May 1662, in pursuance of the pro- French and anti- Spanish policy, Charles married Catherine of Braganza, daughter of John IV. of Portugal, by which alliance England obtained Tangier and Bombay. She brought him no children, and her attractions for Charles were inferior to those of his mistress, Lady Castlemaine, whom she was compelled to receive as a lady of her bedchamber. In February 1665 the ill-omened war with Holland was declared, during the progerss of which it became apparent how greatly the condition of the national services and the state of administration had deteriorated since the Commonwealth, and to what extent England was isolated and abandoned abroad, Michael de Ruyter, on the 13th of June 1667, carrying out his celebrated attack on Chatham and burning several warships. The disgrace was unprecedented. Charles did not show himself and it was reported thathe had abdicated, but to allay the popular panic it was given out " that he was very cheerful that night at supper with his mistresses." The treaty of Breda with Holland (21st of July 1667) removed the danger, but not the ignominy, and Charles showed the real baseness of his character when he joined in the popular outcry against Clarendon, the upright and devoted adherent of his father and himself during twenty-five years of misfortune, and drove him into poverty and exile in his old age, recalling ominously Charles I.'s betrayal of Strafford.

To Clarendon now succeeded the ministry of Buckingham and Arlington, who with Lauderdale, Ashley (afterwards Lord

Shaftesbury) and Cliff ord,constituted the so-called Cabal ministry in 1672. With these advisers Charles entered into those schemes so antagonistic to the national interests which have disgraced his reign. His plan was to render himself independent of parlia- ment and of the nation by binding himself to France and the French policy of aggrandizement, and receiving a French pen- sion with the secret intention as well of introducing the Roman Catholic religion again into England. In 1661 under Clarendon's rule, the evil precedent had been admitted of receiving money from France, in 1662 Dunkirk had been sold to Louis, and in February 1667 during the Dutch war a secret alliance had been made with Louis, Charles promising him a free hand in the Netherlands and Louis undertaking to support Charles's designs " in or out of the kingdom." In January 1668 Sir W. Temple had made with Sweden and Holland the Triple Alliance against

the encroachments and aggrandizement of France, but this national policy was soon upset by the king's own secret plans. In 1668 the conversion of his brother James to Romanism became known to* Charles. Already in 1662 the kinˆ had sent Sir Richard Bellings to Rome to arrange the terms of England's conversion, and now in 1668 he was in correspondence with Oliva, the general of the Jesuits in Rome, through James de la Cloche, the eldest of his natural sons, of whom he had become the father when scarcely sixteen during his residence at Jersey. On the 25 th of January 1669, at a secret meeting between the two royal brothers, with Arlington, Clifford and Arundell of Wardour, it was deter- mined to announce to Louis XIV. the projected conversion of Charles and the realm, and subsequent negotiations terminated in the two secret treaties of Dover. The first, signed only, among the ministers, by Arlington and Clifford, the rest not being initiated, on the 20th of May 1670, provided for the return of England to Rome and the joint attack of France and England upon Holland, England's ally, together with Charles's support of the Bourbon claims to the throne of Spain, while Charles received a pension of £200,000 a year. In the second, signed by Arlington, Buckingham, Lauderdale and Ashley on the 31st of December i67o,nothing was said about the conversion, and the pension provided for that purpose was added to the military subsidy, neither of these treaties being communicated to parlia- ment or to the nation. An immediate gain to Charles was the acquisition of another mistress in the person of Louise de Keroualle,the so-called "Madam

Carwell,“who had accompanied the duchess of Orleans, the king’s sister, to Dover, at the time of the negotiations, and who joined Charles’s seraglio, being created duchess of Portsmouth, and acting as the agent of the French alliance throughout the reign.

On the 24th of October 1670, at the very time that these treaties were in progress, Charles opened parliament and obtained a vote of £800,000 on the plea of supporting the Triple Alliance. Parliament was prorogued in April 167 1, not assembling again till February 1673, and on the 2nd of January 1672 was announced the ” stop of the exchequer,” or national bankruptcy, one of the most blameworthy and unscrupulous acts of the reign, by which the payments from the exchequer ceased, and large numbers of persons who had lent to the government were thus ruined. On the reassembling of parliament on the 4th of February 1673 a strong opposition was shown to the Cabal ministry which had been constituted at the end of 1672. The Dutch War, declared on the 17th of March 1672, though the com- mercial and naval jealousies of Holland had certainly not dis- appeared in England, was unpopular because of the alliance with France and the attack upon Protestantism, While the king’s second declaration of indulgence (15th of March 1672) aroused still further antagonism, was declared illegal by the parliament, and was followed up by the Test Act, which obliged James and Clifford to resign their offices. In February 1674 the war with Holland was closed by the treaty of London or of Westminster, though Charles still gave Louis a free hand in his aggressive policy towards the Netherlands, and the Cabal was driven from office. Danby (afterwards duke of Leeds) now became chief minister; but, though in reality a strong supporter of the national policy, he could not hope to keep his place without acquiescence in the king’s schemes. In November 1675 Charles again prorogued parliament, and did not summon it again till February 1677, when it was almost immediately prorogued. On the 17th of February 1676 ,with Danby ‘s knowledge, Charles concluded a further treaty with Louis by which he undertook to subordinate entirely his foreign policy to that of France, and received an annual pension of £100,000. On the other hand, Danby succeeded in. effecting the marriage (4th of November 1677) between William of’Orange and the princess Mary, which proved the most important political event in the whole reign. Louis revenged himself by intriguing with the Opposition and by turning his streams of gold in that direction, and a further treaty

with France for the annual payment to Charles of £300,000 and the dismissal of his parliament, concluded on the 17th of May 1678, was not executed. Louis made peace with Holland

at Nijmwegen on the 10th of August, and punished Danby by disclosing his secret negotiations, thus causing the minister's fall and impeachment. To save Danby Charles now prorogued the parliament on the 30th of December, dissolving it on the.24th of January 1679.

Meanwhile the " Popish Plot," the creation of a band of impostors encouraged by Shaftesbury and the most violent and unscrupulous of the extreme Protestant party in order to exclude James from the throne, had thrown the whole country into a panic. Charles's conduct in this conjuncture was highly characteristic and was marked by his usual cynical selfishness. He carefully refrained, from incurring suspicion and unpopularity by opposing the general outcry, and though he saw through the imposture from the beginning he made no attempt to moderate the popular frenzy or to save the life of any of the victims, his co-religionists, not even intervening in the case of Lord Stafford, and allowing Titus Oates to be lodged at Whitehall with a pension. His policy was to take advantage of the violence of the faction, to " give them line enough," to use his own words, to encourage it rather than repress it, with the expectation of procuring finally a strong royalist re- action. In his resistance to the great movement for the exclusion of James from the succession, Charles was aided by moderate men such as Halifax, who desired only a restriction of James's powers, and still more by the violence of the extreme exclusionists themselves, who headed by Shaftesbury brought about their own downfall and that of their cause by their support of the legitimacy and claims of Charles's natural son, the duke of Monmouth. In 1679 Charles denied, in council, his supposed marriage with Lucy Walter, Monmouth's mother, his declarations being published in 1680 to refute the legend of the black box which was supposed to contain the contract of marriage, and (old Burnet he would rather see him hanged than legitimize him. He deprived him of his general's commission in consequence of his quasi-royal progresses about

the country, and in December on Monmouth's return to England he was forbidden to appear at court. In February 1679 the king had consented to order James to go abroad, and even approved of the attempt of the primate and the bishop of Winchester to convert him to Protestantism. To weaken the opposition to his government Charles accepted Sir W Temple's new scheme of governing by a council which in- cluded the leaders of the Opposition, and which might have be- come a rival to the parliament, but this was an immediate failure. In May 1679 he prorogued the new parliament which had attainted Danby, and in July dissolved it, while in October he prorogued another parliament of the same mind till January and finally till October 1680, having resolved " to wait till this violence should wear off." He even made overtures to Shaftesbury in November 1679, but the latter insisted on the departure of both the queen and James. All attempts at compromise failed, and on the assembling of the parliament in October 1680 the Exclusion Bill passed the Commons, being, however, thrown out in the Lords through the influence of Halifax. Charles dissolved the parlia- ment in January 1681, declaring that he would never give his consent to the Exclusion Bill, and summoned another at Oxford, which met there on the 21st of March 1681, Shaftesbury's faction arriving accompanied by armed bands. Charles expressed his willingness to consent to the handing over of the administration to the control of a Protestant, in the case of a Roman Catholic sovereign, but the Opposition insisted on Charles's nomination of Monmouth as his successor, and the parliament was accordingly once more (28th of March) dissolved by Charles, while a royal proclamation ordered to be read in all the churches proclaimed the ill-deeds of the parliament and the king's affection for the Protestant religion.

Charles's tenacity and clever tact were now rewarded. A great popular reaction ensued in favour of the monarchy, and a large number of loyal addresses were sent in, most of them condemning the Exclusion Bill. Shaftesbury was imprisoned, and though the Middlesex jury threw out his indictment and he was liberated, he never recovered his power, and in October ˆ682 left England for ever. The Exclusion Bill and the limitation

of James's powers were no more heard of, and full liberty was granted to the king to pursue the retrograde and arbitrary policy to which his disposition naturally inclined. In Scotland James set up a tyrannical administration of the worst type. The royal enmity towards William of Orange was increased by a visit of the

latter to England in July. No more parliaments were called, and Charles subsisted on his permanent revenue and his French pensions. He continued the policy of double-dealing and treachery, deceiving his ministers as at the treaty of Dover, by pretending to support Holland and Spain while he was secretly engaged to Louis to betray them. On the 22nd of March 1 68 1 he entered into a compact with Louis whereby he undertook to desert his allies and offer no resistance to French aggressions. In August he joined with Spain and Holland in a manifesto against France, while secretly for a million livres he engaged himself to Louis, and in 1682 he proposed himself as arbitrator with the intention of treacherously handing over Luxemburg to France, an offer which was rejected owing to Spanish suspicions of collusion. In the event, Charles's duplicity enabled Louis to seize Strassburg in 1681 and Luxemburg in 1684. The govern- ment at home was carried on principally by Rochester, Sunder- land and Godolphin, while Guilford was lord chancellor and Jeffreys lord chief justice. The laws against the Nonconformists were strictly enforced. In order to obtain servile parliaments and also obsequious juries, who with the co-operation of judges of the stamp of Jeffreys could be depended upon to carry out the wishes of the court, the borough charters were confiscated, the charter of the city of London being forfeited on the 12th of June 1683.

The popularity of Charles, now greatly increased, was raised to national enthusiasm by the discovery of the Rye House plot in 1683, said to be a scheme to assassinate Charles and James at an isolated house on the high road near Hoddesdon in Hert- fordshire as they returned from Newmarket to London, among those implicated being Algernon Sidney, Lord Russell and Monmouth, the two former paying the death penalty and Monmouth being finally banished to the Hague. The administra- tion became more and more despotic, and Tangier was abandoned in order to reduce expenses and to increase the forces at home for overawing opposition. The first preliminary steps were now taken for the , reintroduction of the Roman Catholic religion. Danby and those confined on account of participation in the popish plot were liberated, and Titus Oates thrown into prison. A scheme was announced for withdrawing the control of the army in Ireland from Rochester, the lord-lieutenant, and placing it in the king's own hands, and the commission to which the king had delegated ecclesiastical patronage was revoked. In May 1684 the office of lord high admiral, in spite of the Test Act, was again given to James, who had now returned from Scotland.

To all appearances the same policy afterwards pursued so recklessly and disastrously by James was now cautiously initiated by Charles, who, however, not being inspired by the same religious zeal as his brother, and not desiring ” to go on his travels again,” would probably have drawn back prudently before his throne was endangered. The developments of this movement were, however, now interrupted by the death of Charles after a short illness on the 6th of February 1685. He was buried on the 17th in Henry VII. ‘s chapel in Westminster Abbey with funeral ceremonies criticized by contemporaries as mean and wanting in respect, but the scantiness of which was probably owing to the fact that he had died a Roman Catholic.

On his death-bed Charles had at length declared himself an adherent of that religion and had received the last rites according to the Romanist usage. There appears to be no trustworthy record of his formal conversion, assigned to various times and various agencies. As a youth, says Clarendon, ” the ill-bred familiarity of the Scotch divines had given him a distaste ” for Presbyterianism, which he indeed declared ” no religion for gentlemen,” and the mean figure which the fallen national church made in exile repelled him at the same time that he was attracted by the ” genteel part of the Catholic religion.” With Charles religion was not the serious matter it was with James, and was largely regarded from the political aspect and from that

of ease and personal convenience. Presbyterianism constituted a dangerous encroachment on the royal prerogative; the national church and the cavalier party were indeed the natural supporters of the authority of the crown, but on the other hand they refused to countenance the dependence upon France; Roman Catholicism at that moment was the obvious medium of governing without parliaments, of French pensions and of reigning without trouble, and was naturally the faith of Charles’s choice. Of the two papers in defence of the Roman Catholic religion in Charles’s own hand, published by James, Halifax says ” though neither his temper nor education made him very fit to be an author, yet in this case … he might write it all himself and yet not one word of it his own. . . .”

Of his amours and mistresses the same shrewd observer of human character, who was also well acquainted with the king, declares " that his inclinations to love were the effects of health and a good constitution with as little mixture of the seraphic part as ever man had. ... I am apt to think his stayed as much as any man's ever did in the lower region." His health was the one subject to which he gave unremitting attention, and his fine constitution and devotion to all kinds of sport and physical exercise kept off the effects of uncontrolled debauchery for thirty years. In later years the society of his mistresses seems to have been chiefly acceptable as a means to avoid business and petitioners, and in the case of the duchess of Portsmouth was the price paid for ease and the continuance of the French pensions. His ministers he never scrupled to sacrifice to his ease. The love of ease exercised an entire sovereignty in his thoughts. " The motive of his giving bounties was rather to make men less uneasy to him than more easy to themselves." He "Would rob his own treasury and take bribes to press a measure through the council. He had a natural affability, but too general to be much valued, and he was fickle and deceitful. Neither gratitude nor revenge moved him, and good or ill services left little im- pression on his mind. Halifax, however, concludes by desiring to moderate the roughness of his picture by emphasizing the excellence of his intellect and memory and his mechanical talent, by deprecating a too censorious judgment and by dwelling upon the disadvantages of his bringing up, the difficulties and tempta- tions of his position, and on the fact that his viees were those common to human frailty. His capacity for king-craft, know- ledge of the world, and easy address enabled him to surmount difficulties and dangers which would have proved fatal to his father or to his brother. " It was a common saying that he could send away a person better pleased at receiving nothing than those in the good king his father's time that had requests granted them," 1 and his good-humoured tact and familiarity compensated for and concealed his ingratitude and perfidy and preserved his popularity. He had good taste in art and literature, was fond of chemistry and science, and the Royal Society was founded in his reign. According to Evelyn he was " debonnaire and easy of access, naturally kind-hearted and possessed an excellent temper," virtues which covered a multitude of sins.

These small traits of amiability, however, which pleased his contemporaries, cannot disguise forus the broad lines of Charles's career and character. How far the extraordinary corruption of

private morals which has gained for the restoration period so unenviable a notoriety was owing to the king's own example of flagrant debauchery, how far to the natural reaction from an artificial Puritanism, is uncertain, but it is incontestable that Charles's cynical selfishness was the chief cause of the degradation of public life which marks his reign, and of the disgraceful and- unscrupulous betrayal of the national interests which raised France to a threatening predominance and imperilled the very existence of Britain for generations. The reign of his predecessor Charles I., and even of that of his successor James II., with their mistaken principles and ideals, have a saving dignity wholly wanting in that of Charles II., and the administration of Cromwell, in spite of the popularity of the restoration, was soon regretted. " A lazy Prince," writes Pepys, "no Council, no money, no reputation at home or abroad. It is strange 1 Mem. of Thomas, earl of Ailesbury, p. 95.

how . . . everybody do nowadays reflect upon Oliver and commend him, what brave things he did and made all the neighbour princes fear him; while here a prince, come in with all the love and prayers and good liking of his people . . . hath lost all so soon. . . ."

Charles II. had no children by his queen. By his numerous mistresses he had a large illegitimate progeny. By Barbara Villiers, Mrs Palmer, afterwards countess of Castlemaine and duchess of Cleveland, mistress en litre till she was superseded by the duchess of Portsmouth, he had Charles Fitzroy, duke of Southampton and Cleveland, Henry Fitzroy, duke of Grafton, George Fitzroy, duke of Northumberland, Anne, countess of Sussex, Charlotte, countess of Lichfield, and Barbara, a nun; by Louise de Keroualle, duchess of Portsmouth, Charles Lennox, duke of Richmond; by Lucy Walter, James, duke of Monmouth and Buccleuch, and a daughter; by Nell Gwyn, Charles Beau-clerk, duke of St Albans, and James Beauclerk; by Catherine Peg, Charles Fitz Charles, earl of Plymouth; by Lady Shannon, Charlotte, countess of Yarmouth; by Mary Davis, Mary Tudor, countess of Derwentwater.

Bibliography. — See the article in the Diet, of Nat. Biog. by A. W. Ward (1887), with authorities there given; Charles II., by O. Airy (1904); Life of Sir G. Savile, by H. C. Foxcroft, and esp. Halifax's Character of Charles II. printed in the appendix (1898) ; The Essex Papers (Camden Soc., 1890) ; Despatches of W. Perwich (Royal Hist. Soc. Pubtns., 1903) ; History of England, of the Civil

War and of the Commonwealth, by S. R. Gardiner; Hist, of Scotland, by A. Lang, vol. iii. (1904); Macaulay's Hist, of England, vol. i. ; Notes which passed at Meetings of the privy Council between Charles II. and the Earl of Clarendon (Roxburghe Club, 1896) ; A French Ambassador at the Court of Charles II., by J. J. Jusserand (1902); The Story of Nell Gwyn and the Sayings of Charles II., by P. Cunningham, ed. by H. B. Wheatley (1892) ; for his adventures and period of exile see Memoiren der Herzogin Sophie, ed. by A. Kocher (1879) ; " Briefe der Elisabeth Stuart," by A. Wendland (Litter arischer Verein in Stuttgart, No. 228) ; Memoirs of Cardinal de Retz, Mile de Montpensier and Mme de Motteville; The King in Exile, by E. Scott (1905) ; Scottish History Pubtns. vols. 17 (Charles II. in Scot- land, by S. R. Gardiner, 1894) and 18 (Scotland and the Common- wealth, 1651-1653, ed. by C. H. Firth, 1895); Charles II. in the Channel Islands, by S. E. Hoskins (1854) i Boscobel, by T. Blount, &c, ed. by C. G. Thomas (1894); The Flight of the King (1897) and After Worcester Fight (1904), by A. Fea; Edinburgh i?eOTez

CHARLES I. and II., kings of France. By the French, Charles the Great, Roman emperor and king of the Franks, is reckoned the first of the series of French kings named Charles (see Charle- magne). Similarly the emperor Charles II. the Bald (q.v.) is reckoned as Charles II. of France. In some enumerations the emperor Charles III. the Fat (q.v.) is reckoned as Charles II. of France, Charlemagne not being included in the list, and Charles the Bald being styled Charles I.

CHARLES III., the Simple (879-929), king of France, was a posthumous son of Louis the Stammerer and of his second wife Adelaide. On the deposition of Charles the Fat in 887 he was excluded from the throne by his youth; but during the reign of Odo, who had succeeded Charles, he succeeded in gaining the recognition of a certain number of notables and in securing his coronation at Reims on the 28th of January 893. He now obtained the alliance of the emperor, and forced Odo to cede part of Neustria. In 898, by the death of his rival (Jan. 1), he obtained possession of the whole kingdom. His most important act was the treaty of Saint-Clair-sur-Epte with the Normans in 911. Some of them were baptized; the territory which was afterwards known as the duchy of Normandy was ceded to them; but the story of the marriage of their chief Rollo with a sister of the king, related by the chronicler Dudo of Saint Quentin, is very doubtful. The same year Charles, on the invitation of the barons, took possession of the kingdom of Lotharingia. In 920 the barons,

jealous of the growth of the royal authority and discontented with the favour shown by the king to his counsellor Hagano, rebelled, and in 922 elected Robert, brother of King Odo, in place of Charles. Robert was killed in the battle of

Soissons, but the victory remained with his party, who elected Rudolph, duke of Burgundy, king. In his extremity Charles trusted himself to Herbert, count of Vermandois, who deceived him, and threw him into confinement at Chateau-Thierry and afterwards at Peronne. In the latter town he died on the 7 th of October 929. In 907 he had married Frederona, sister of Bovo, bishop of Chalons. After her death he married Eadgyfu (Odgiva), daughter of Edward the Elder, king of the English, who was the mother of Louis IV. See A. Eckel, Charles le Simple (Paris, 1899).

CHARLES IV. (1294-1328), king of France, called The Fair, was the third and youngest son of Philip IV. and Jeanne of Navarre. In 1316 he was created count of La Marche, and succeeded his brother Philip V. as king of France and Navarre early in 1322. He followed the policy of his predecessors in enforcing the royal authority over the nobles, but the machinery of a centralized government strong enough to hold nobility in check increased the royal expenditure, to meet which Charles had recourse to doubtful financial expedients. At the beginning of his reign he ordered a recast of the coinage, with serious results to commerce; civil officials were deprived of offices, which had been conferred free, but were no%v put up to auction; duties were imposed on exported merchandise and on goods brought into Paris; the practice of exacting heavy fines was encouraged by making the salaries of the magistrates dependent on them ; and on the pretext of a crusade to free Armenia from the Turks, Charles obtained from the pope a tithe levied on the clergy, the proceeds of which he kept for his own use; he also confiscated the property of the Lombard bankers who had been invited to France by his father at a time of financial crisis. The history of the assemblies summoned by Charles IV. is obscure, but in 1326, on the outbreak of war with England, an assembly of prelates and barons met at Meaux. Commissioners were afterwards despatched to the provinces to state the position of affairs and to receive complaints. The king justified his failure to summon the estates on the ground of the expense incurred by provincial deputies. The external politics of his reign were not marked by any striking events. He maintained excellent relations with Pope

John XXII., who made overtures to him, indirectly, offering his support in case of his candidature for the imperial crown. Charles tried to form a party in Italy in support of the pope against the emperor Louis IV. of Bavaria, but failed. A treaty with the English which secured the district of Agenais for France was followed by a feudal war in Guienne. Isabella, Charles's sister and the wife of Edward II., was sent to France to negotiate, and with her brother's help arranged the final conspiracy against her husband. Charles's first wife was Blanche, daughter of Otto IV., count of Burgundy, and of Matilda (Mahaut), countess of Artois, to whom he was married in 1307. In May 13 14, by order of King Philip IV., she was arrested and imprisoned in the Chateau-Gaillard with her sister- in-law Marguerite, daughter of Robert II., duke of Burgundy, and wife of Louis Hutin, on the charge of adultery with two gentlemen of the royal household, Philippe and Gautier d'Aunai. Jeanne, sister of Marguerite and wife of Philip the Tall, was also arrested for not having denounced the culprits, and imprisoned at Dourdan. The two knights were put to the torture and executed, and their goods confiscated. It is impossible to say how far the charges were true. Tradition has involved and obscured the story, which is the origin of the legend of the tour de Nesle made famous by the drama of A. Dumas the elder. Marguerite died shortly in prison ; Jeanne was declared innocent by the parlement and returned to her husband. Blanche was still in prison when Charles became king. He induced Pope John XXII. to declare the marriage null, on the ground that Blanche's mother had been his godmother. Blanche died in 1326, still in confinement, though at the last in the abbey of Maubuisson.

In 1322, freed from his first marriage, Charles married his cousin Mary of Luxemburg, daughter of the emperor Henry VII., and upon her death, two years later, Jeanne, daughter of Louis, count of Evreux. Charles IV. died at Vincennes on the 1st of

February 1328. He left no issue by his first two wives to succeed him, and daughters only by Jeanne of Evreux. He was the last of the direct line of Capetians.

See A. d'Herbomey, " Notes et documents pour servir a l'histoire des rois fils de Philippe le Bel," in Bibl. de I'&ole des Charles (lix. pp. 479 seq. and 689 seq.) ; de Brequigny, " Memoire sur les differends entre la France et l'Angleterre sous le regne de Charles le Bel," in Mem. de I' Acad, des Inscriptions (xli. pp. 641-692); H. Lot, "Projets de crusade sous Charles le Bel et sous Philippe de Valois " (Bibl. de I'Sxole des Chartes, xx. pp. 503-509) ; "

Chronique parisienne anonyme de 1316 a 1339 . . .” ed. Hellot in Mem. de la soc. de I’hist. de Paris (xi., 1884, pp. 1-207).

CHARLES V. (1337-1380), king of France, called The Wise, was born at the chateau of Vincennes on the 21st of January 1337, the son of John II. and Bonne of Luxemburg. In 1349 he became dauphin of the Viennois by purchase from Humbert II., and in 1355 he was created duke of Normandy. At the battle of Poitiers (1356) his father ordered him to leave the field when the battle turned against the French, and he was thus saved from the imprisonment that overtook his father. After arranging for the government of Normandy he proceeded to Paris, where he took the title of lieutenant of the kingdom. During the years of John II. ‘s imprisonment in England Charles was virtually king of France. He summoned the states-general of northern France (Langue d’oil) to Paris in October 1356 to obtain men and money to carry on the war. But under the leadership of fitienne Marcel, provost of the Parisian merchants and president of the third estate, and Robert le Coq, bishop of Laon, president of the clergy, a partisan of Charles of Navarre, the states refused any ” aid ” except on conditions which Charles declined to accept. They demanded the dismissal of a number of the royal ministers; the establishment of a commission elected from the three estates to regulate the dauphin’s administration, and of another board to act as council of war; also the release of Charles the Bad, king of Navarre, who had been imprisoned by King John. The estates of Languedoc, summoned to Toulouse, also made protests against misgovernment, but they agreed to raise a war-levy on terms to which the dauphin acceded. Charles sought the alliance of his uncle, the emperor Charles IV., to whom he did homage at Metz as dauphin of the Viennois, and he was also made imperial vicar of Dauphine, thus acknowledging the imperial jurisdiction. But he gained small material advantage from these proceedings. The states-general were again convoked in February 1357. Their demands were more moderate than in the preceding year, but they nominated members to replace certain obnoxious persons on the royal council, demanded the right to assemble without the royal summons, and certain administrative reforms. In return they promised to raise and finance an army of 30,000 men, but the money — a tithe levied on the annual revenues of the clergy and nobility — voted for this object was not to pass through the dauphin’s hands. Charles appeared to consent, but the agreement was annulled by letters from King John, announcing at the same time the conclusion of a two years’ truce, and the reformers

failed to secure their ends. Charles had escaped from their power by leaving Paris, but he returned for a new meeting of the estates in the autumn of 1357-

Meanwhile Charles of Navarre had been released by his partisans, and allying himself with Marcel had become a popular hero in Paris. The dauphin was obliged to receive him and to undergo an apparent reconciliation. In Paris Etienne Marcel was supreme. He forced his way into the dauphin's palace (February 1358), and Charles's servant, Jean de Conflans, marshal of Champagne, and Robert de Clermont, marshal of Normandy, were murdered before his eyes. Charles was power- less openly to resent these outrages, but he obtained from the provincial assemblies the money refused him by the states- general, and deferred his vengeance until the dissensions of his enemies should offer him an opportunity. Charles of Navarre, now in league with the English and master of lower Normandy and of the approaches to Paris, returned to the immediate neighbourhood of the city, and Marcel found himself driven to avowed co-operation with the dauphin's enemies, the English

and the Navarrese. Charles had been compelled in March to take the title of regent to prevent the possibility of further intervention from King John. In defiance of a recent ordinance prohibiting provincial assemblies, he presided over the estates of Picardy and Artois, and then over those of Champagne. The states-general of 1358 were summoned to Compiegne instead of Paris, and granted a large aid. The condition of northern France was rendered more desperate by the outbreak (May- June 1358) of the peasant revolt known as the Jacquerie, which was repressed with a barbarity far exceeding the excesses of the rebels. Within the walls of Paris Jean Maillart had formed a royalist party; Marcel was assassinated (31st July 1358), and the dauphin entered Paris in the following month. A reaction in Charles's favour had set in, and from the estates of 1359 he regained the authority he had lost. It was with their full concurrence that he restored their honours to the officials who had been dismissed by the estates of 1356 and 1337. They supported him in repudiating the treaty of London (1359), which King John

had signed in anxiety for his personal freedom, and voted money unconditionally for the continuation of the war. From this time the estates were only once convoked by Charles, who contented himself thenceforward by appeals to the assembly of notables or to the provincial bodies. Charles of Navarre was now at open war with the regent; Edward III. landed at Calais in October; and a great part of the country was exposed to double depreda- tions from the English and the Navarrese troops. In the scarcity of money Charles had recourse to the debasement of the coinage, which suffered no less than twenty-two variations in the two years before the treaty of Bretigny. This disastrous financial expedient was made good later, the coinage being established on a firm basis during the last sixteen years of Charles's reign in accordance with the principles of Nicolas Oresme. On the conclusion of peace King John was restored to France, but, being unable to raise his ransom, he returned in 1364 to England, where he died in April, leaving the crown to Charles, who was crowned at Reims on the 19th of May.

The new king found an able servant in Bertrand du Guesclin, who won a victory over the Navarrese troops at Cocherel and took prisoner their best general, Jean de Grailli, captal of Buch. The establishment of Charles's brother, Philip the Bold, in the duchy of Burgundy, though it constituted in the event a serious menace to the monarchy, put an end to the king of Navarre's ambitions in that direction. A treaty of peace between the two kings was signed in 1365, by which Charles of Navarre gave up Mantes, Meulan and the county of Longueville in exchange for Montpellier. Negotiations were renewed in 1370 when Charles of Navarre did homage for his French possessions, though he was then considering an offensive and defensive alliance with Edward III. Du Guesclin undertook to free France from the depredations of the " free companies," mercenary soldiers put out of employment by the cessation of the war. An attempt to send them on a crusade against the Turks failed, and Du Guesclin led them to Spain to put Henry of Trastamara on the throne of Castile. By the marriage of his brother Philip the Bold with Margaret of Flanders, Charles detached the Flemings from the English alliance, and as soon as he had restored something like order in the internal affairs of the kingdom he provoked a quarrel with the English. The text of the treaty of Bretigny presented technical difficulties of which Charles was not slow to avail himself. The English power in Guienne was weakened by the disastrous Spanish expedition of the Black Prince, whom

Charles summoned before the parlement of Paris in January 1369 to answer the charges preferred against him by his subjects, thus expressly repudiating the English supre- macy in Guienne. War was renewed in May after a meeting of the states-general. Between 1371 and 1373 Poitou and Sain- tonge were reconquered by Du Guesclin, and soon the English had to abandon all their territory north of the Garonne. John IV. of Brittany (Jean de Montfort) had won his duchy with English help by the defeat of Charles of Blois, the French nominee, at Auray in 1364. His sympathies remained English, but he was now (1373) obliged to take refuge in England, and

later in Flanders, while the English only retained a footing in two or three coast towns. Charles's generals avoided pitched battles, and contented themselves with defensive and guerrilla tactics, with the result that in 1380 only Bayonne, Bordeaux, Brest and Calais were still in English hands.

Charles had in 1378 obtained proof of Charles of Navarre's treasonable designs. He seized the Norman towns held by the Navarrese, while Henry of Trastamara invaded Navarre, and imposed conditions of peace which rendered his lifelong enemy at last powerless. A premature attempt to amalgamate the duchy of Brittany with the French crown failed. Charles sum- moned the duke to Paris in 1378, and on his non-appearance committed one of his rare errors of policy by confiscating his duchy. But the Bretons rose to defend their independence, and recalled their duke. The matter was still unsettled when Charles died at Vincennes on the 16th of September 1380. His health, always delicate, had been further weakened, according to popular report, by a slow poison prepared for him by the king of Navarre. His wife, Jeanne of Bourbon, died in 1378, and the succession devolved on their elder son Charles, a boy of twelve. Their younger son was Louis, duke of Orleans.

Personally Charles was no soldier. He owed the signal suc- cesses of his reign partly to his skilful choice of advisers and administrators, to his chancellors Jean and Guillaume de Dor- mans and-Pierre d'Orgemont, to Hugues Aubriot, provost of Paris, Bureau de la Riviere and others; partly to a singular coolness and subtlety in the exercise of a not over-scrupulous diplomacy, which made him a dangerous enemy. He had learnt prudence and self-restraint in the troubled times of the regency, and did not lose his moderation in success. He modelled his private life on that of his predecessor Saint Louis, but was no

fanatic in religion, for he refused his support to the violent methods of the Inquisition in southern France, and allowed the Jews to return to the country, at the same time confirming their privileges. His support of the schismatic pope Clement VII. at Avignon was doubtless due to political considerations, as favouring the independence of the Gallican church. Charles V. was a student of astrology, medicine, law and philosophy, and collected a large and valuable library at the Louvre. He gathered round him a group of distinguished writers and thinkers, among whom were Raoul de Presles, Philippe de Mezieres, Nicolas Oresme and others. The ideas of these men were applied by him to the practical work of administration, though he con- fined himself chiefly to the consolidation and improvement of existing institutions. The power of the nobility was lessened by restrictions which, without prohibiting private wars, made them practically impossible. The feudal fortresses were regu- larly inspected by the central authority, and the nobles them- selves became in many cases paid officers of the king. Charles established a merchant marine and a formidable navy, which under Jean de Vienne threatened the English coast between 1377 and 1380.- The states-general were silenced and the royal prerogative increased; the royal domains were extended, and the wealth of the crown was augmented; additions were made to the revenue by the sale of municipal charters and patents; and taxation became heavier, since Charles set no limits to the gratification of his tastes either in the collection of jewels and precious objects, of books, or of his love of building, examples of which are the renovation of the Louvre and the erection of the palace of Saint Paul in Paris.

See the chronicles of Froissart, and of Pierre d'Orgemont (Grandes Chroniques de Saint Denis, Paris, vol. vi., 1838) ; Christine de Pisan, Le Livre des fais et bonnes rruzurs du sage toy Charles V, written in 1404, ed. Michaud and Poujoulat, vol. ii. (1836) ; L. Delisle, Mande- ments et actes divers de Charles V (1886); letters of Charles V. from the English archives in Champollion-Figeac, Lettres de rois et de reines, ii. pp. 167 seq. ; the anonymous Songe du vergier or Somnium viridarii, written in 1376 and giving the political ideas of Charles V. and his advisers; " Relation de la mort de Charles V " in Haureau, Notices et extraits, xxxi. pp. 278-284 ; Ch. Benoist, La Politique du roi Charles V (1874) ; S. Luce, La France pendant la guerre de cent ans; G. Clement Simon, La Rupture du traite de Bretigny (1898) ; A. Vuitry, Htudes sur le regime financier de la France, vols. i. and

ii. (1883) ; and R. Delachenal, Histoire de Charles V (Paris. 1908).
,

CHARLES VI. (1368-1422), king of France, son of Charles V. and Jeanne of Bourbon, was born in Paris on the 3rd of December 1368. He received the appanage of Dauphin6 at his birth, and was thus the first of the princes of France to bear the title of dauphin from infancy. Charles V. had entrusted his education to Philippe de Mezieres, and had fixed his majority at fourteen. He succeeded to the throne in 1380, at the age of twelve, and the royal authority was divided between his paternal uncles, Louis, duke of Anjou, John, duke of Berry, Philip the Bold, duke of Burgundy , and his mother's brother,Louis II. ,duke of Bourbon. In accordance with an ordinance of the late king the duke of Anjou became regent, while the guardianship of the young king, together with the control of Paris and Normandy, passed to the dukes of Burgundy and Bourbon, who were to be assisted by certain of the councillors of Charles V. The duke of Berry, excluded by this arrangement, was compensated by the government of Languedoc and Guienne. Anjou held the regency for a few months only,until the king's coronation in November 1380. He enriched himself from the estate of Charles V. and by excessive exactions, before he set out in 1382 for Italy to effect the conquest of Naples. Considerable discontent existed in the south of France at the time of the death of Charles V., and when the duke of Anjou re-imposed certain taxes which the late king had remitted at the end of his reign, there were revolts at Puy and Montpellier. Paris, Rouen, the cities of Flanders, with Amiens, Orleans, Reims and other French towns, also rose (1382) in revolt against their masters. The Maillotins, as the Parisian insur- gents were named from the weapon they used, gained the upper hand in Paris, and were able temporarily to make terms, but the commune of Rouen was abolished, and the Tuchins, as the marauders in Languedoc were called, were pitilessly hunted down. Charles VI. marched to the help of the count of Flanders against the insurgents headed by Philip van Artevelde, and gained a complete victory at Roosebeke (November 27th, 1382). Strengthened by this success the king, on his return to Paris in the following January, exacted vengeance on the citizens by

fines, executions and the suppression of the privileges of the city. The help sent by the English to the Flemish cities resulted in a second Flemish campaign. In 1385 Jean de Vienne made an unsuccessful descent on the Scottish coast, and Charles equipped a fleet at Sluys for the invasion of England,, but a series of delays ended in the destruction of the ships by the English.

In 1385 Charles VI. married Elizabeth, daughter of Stephen II., duke of Bavaria, her name being gallicized as Isabeau. Three years later, with the help of his brother, Louis of Orleans, duke of Touraine, he threw off the tutelage of his uncles, whom he replaced by Bureau de la Riviere and others among his father's counsellors, nicknamed by the royal princes the marmousets because of their humble origin. Two years later he deprived the duke of Berry of the government of Languedoc. The opening years of Charles VI. 's effective rule promised well, but excess in gaiety of all kinds undermined his constitution, and in 1302 he had an attack of madness at Le Mans, when on his way to Brittany to force from John V. the surrender of his cousin Pierre de Craon, who had tried to assassinate the constable Olivier de Clisson in the streets of Paris. Other attacks followed, and it became evident that Charles was unable permanently to sustain the royal authority. Clisson, Bureau de la Riviere, Jean de Merrier, and the other marmousets were driven from office, and the royal dukes regained their power. The rivalries between the most powerful of these — the duke of Burgundy, who during the king's attacks of madness practically ruled the country, and the duke of Orleans — were a constant menace to peace. In 1396 peace with England seemed assured by the marriage of Richard II. with Charles VI. 's daughter Isabella, but the Lancastrian revolution of 1399 destroyed the diplomatic advantages gained by this union. In France the country was disturbed by the papal schism. At an assembly of the clergy held in Paris in 1398 it was resolved to refuse to recognize the authority of Benedict XIII., who succeeded Clement VII. as schismatic pope at Avignon. The question became a party

one; Benedict was supported by

The king's intelligence became yearly feebler, and in 1404 the death of Philip the Bold aggravated the position of affairs. The new duke, John the Fearless, did not immediately replace his father in general affairs, and the influence of the duke of Orleans increased. Queen Isabeau, who had generally supported the Burgundian party, was now practically separated from her

husband, whose madness had become pronounced. She was replaced by a young Burgundian lady, Odette de Champdivers, called by her contemporaries la petite reine, who rescued the king from the state of neglect into which he had fallen. Isabeau of Bavaria was freely accused of intrigue with the duke of Orleans. She was from time to time regent of France, and as her policy was directed by personal considerations and by her love of splendour she further added to the general distress. The relations between John the Fearless and the duke of Orleans became more embittered, and on the 23rd of November 1407 Orleans was murdered in the streets of Paris at the instigation of his rival. The young duke Charles of Orleans married the daughter of the Gascon count Bernard VII. of Armagnac, and presently formed alliances with the dukes of Berry, Bourbon and Brittany, and others who formed the party known as the Armagnacs (see Armagnac), against the Burgundians who had gained the upper hand in the royal council. In 141 1 John the Fearless contracted an alliance with Henry IV. of England, and civil war began in the autumn, but in 141 2 the Armagnacs in their turn sought English aid, and, by promising the sovereignty of Aquitaine to the English king, gave John the opportunity of posing as defender of France. In Paris the Burgundians were hand in hand with the corporation of the butchers, who were the leaders of the Parisian populace. The malcontents, who took their name from one of their number, Caboche, penetrated into the palace of the dauphin Louis, and demanded the surrender of the unpopular members of his household. A royal ordinance, promising reforms in administration, was promulgated on the 27th of May 1413, and some of the royal advisers were executed. The king and the dauphin, powerless in the hands of Duke John and the Parisians, appealed secretly to the Armagnac princes for deliverance. They entered Paris in September; the ordinance extracted by the Cabochiens was rescinded; and numbers of the insurgents were banished the city.

In the next year Henry V. of England, after concluding an alliance with Burgundy, resumed the pretensions of Edward III. to the crown of France, and in 141 5 followed the disastrous battle of Agincourt. The two elder sons of Charles VI., Louis, duke of Guienne, and John, duke of Touraine, died in 1415 and 1417, and Charles, count of Ponthieu, became heir apparent. Paris was governed by Bernard of Armagnac, constable of France, who expelled all suspected of Burgundian sympathies and treated Paris like a conquered city. Queen Isabeau was imprisoned at

Tours, but escaped to Burgundy. The capture of Paris by the Burgundians on the 29th of May 1418 was followed by a series of horrible massacres of the Armagnacs; and in July Duke John and Isabeau, who assumed the title of regent, entered Paris. Meanwhile Henry V. had completed the conquest of Normandy. The murder of John the Fearless in 1419 under the eyes of the dauphin Charles threw the Bur- gundians definitely into the arms of the English, and his suc- cessor Philip the Good, in concert with Queen Isabeau, concluded (1420) the treaty of Troyes with Henry V., who became master of France. Charles VI. had long been of no account in the government, and the state of neglect in which he existed at Senlis induced Henry V. to undertake the re-organization of his household. He came to Paris in September 1422, and died on the 21st of October.

The chief authorities for the reign of Charles VI. are: — Chronica Caroli VI., written by a monk of Saint Denis, commissioned officially to write the history of his time, edited by C. Bellaguet with a French translation (6 vols., 1 839-1 852) ; Jean Juvenal des Ursins, Chronique, printed by D. Godefroy in Histoire de Charles VI (1653), chiefly an abridgment of the monk of St Denis's narrative; a fragment of the Grandes Chroniques de Saint Denis covering the years 1381 to 1383 (ed. J. Pichon 1864) ; correspondence of Charles VI. printed by Champollion-Figeac in Lettres de rois, vol. ii. ; Choix de pieces inSdites rel. au regne de Charles VI (2 vols., 1863-1864), edited by L. Douet d'Arcq for the Societe de l'Histoire de France; J. Froissart, Chroniques; Enguerrand de Monstrelet, Chroniques, covering the first half of the 15th century (Eng. trans., 4 vols., 1 809) ; Chronique des quatre premiers Valois, by an unknown author, ed. S. Luce (1862). See also E. Lavisse, Hist, de France, iv. 267 seq.; E. Petit, " Sejours de Charles VI," Bull, du com. des travaux hist. (1893); Vallet de Viriville, " Isabeau de Baviere," Revue jrancaise (1858-1859) ; M. Tbibaut, Isabeau de Baviere (1903).

CHARLES VII. (1403-1461), king of France, fifth son of Charles VI. and Isabeau of Bavaria, was bora in Paris on the 22nd of February 1403. The count of Ponthieu, as he was called in his boyhood, was betrothed in 1413 to Mary of Anjou, daughter of

Louis II., duke of Anjou and king of Sicily, and spent the next two years at the Angevin court. He received the duchy of Touraine in 1416, and in the next year the death of his brother John made him dauphin of France. He became lieutenant-general of the kingdom in 141 7, and made active efforts to combat the complaisance of his mother. He assumed the title of regent in December 1418, but his authority in northern France was paralysed in 1419 by the murder of John the Fearless, duke of Burgundy, in his presence at Montereau. Although the deed was not apparently premeditated, as the English and Burgundians declared, it ruined Charles's cause for the time. He was disinherited by the treaty of Troyes in 1420, and at the time of his father's death in 1422 had retired to Mehun-sur-Yevre, near Bourges, which had been the nominal seat of government since 141 8. He was recognized as king in Touraine, Berry and Poitou, in Languedoc and other provinces of southern France; but the English power in the north was presently increased by the provinces of Champagne and Maine, as the result of the victories of Crevant (1423) and Verneuil (1424). . The Armagnac administrators who had been driven out of Paris by the duke of Bedford gathered round the young king, nicknamed the " king of Bourges," but he was weak in body and mind, and was under the domination of Jean Louvet and Tanguy du Chastel, the instigators of the murder of John the Fearless, and other discredited partisans. The power of these favourites was shaken by the influence of the queen's mother, Yolande of Aragon, duchess of Anjou. She sought the alliance of John, V., duke of Brittany, who, however, vacillated throughout his life between the English and French alliance, concerned chiefly to maintain the independence of his duchy. His brother, Arthur of Brittany, earl of Richmond (comte de Richemont) , was reconciled with the king, and became constable in 1425, with the avowed intention of making peace between Charles VII. and the duke of Burgundy. Richemont caused the assassination of Charles's favourites Pierre de Giac and Le Camus de Beaulieu, and imposed one of his own choosing, Georges de la Tremoille, an adventurer who rapidly usurped the constable's power. For five years (1427- 1432) a private war between these two exhausted the Armagnac forces, and central France returned to anarchy.

Meanwhile Bedford had established settled government throughout the north of France, and in 1428 he advanced to the siege of Orleans. For the movement which was to lead to the deliverance of France from the English invaders, see Joan oy Arc.

The siege of Orleans was raised by her efforts on the 8th of May 1429, and two months later Charles VII. was crowned at Reims. Charles's intimate counsellors, La Tremoille and Regnault de Chartres, archbishop of Reims, saw their profits menaced by the triumphs of Joan of Arc, and accordingly the court put every difficulty in the way of her military career, and received the news of her capture before Compiegne (1430) with indifference. No measures were taken for her deliverance or her ransom, and Normandy and the Isle of France remained in English hands. Fifteen years of anarchy and civil war intervened

before peace was restored. Bands of armed men fighting for their own hand traversed the country, and in the ten years between 1434 and 1444 the provinces were terrorized by these icorchews, who, with the decline of discipline in the English army, were also recruited from the ranks of the invaders. The duke of Bedford died in i43S> and in the same year Philip the Good of Burgundy concluded a treaty with Charles VII. at Arras, after fruitless negotiations for an English treaty. From this time Charles's policy was strengthened. La Tremoille had been assassinated in 1433 by the constable's orders, with the con- nivance of Yolande of Aragon. For his former favourites were substituted energetic advisers, his brother-in-law Charles of Anjou, Dunois (the famous bastard of Orleans), Pierre de Breze, Richemont and others. Richemont entered Paris on the 13th of April 1436) an d in the next five years the finance of the country was re-established on a settled basis. .Charles himself commanded the troops who captured Pontoise in 1441, and in the next year he made a successful expedition in the south.

Meanwhile the princes of the blood and the great nobles resented the ascendancy of councillors and soldiers drawn from the smaller nobility and the bourgeoisie. They made a formidable league against the crown in 1440 which included Charles I., duke of Bourbon, John II., duke of Alencon, John IV. of Armagnac, and the dauphin, afterwards Louis XI. The revolt broke out in Poitou in 1440 and was known as the Praguerie. Charles VII. repressed the rising, and showed great skill with the rebel nobles, finally buying them over individually by con- siderable concessions. In 1444 a truce was concluded with England at Tours, and Charles proceeded to organize a regular army. The central authority was gradually made effective, and a definite system of payment, by removing the original cause of brigandage, and the establishment of a strict discipline learnt perhaps from the English troops, gradually stamped out the most serious of the many evils under

which the country had suffered. Pierre Bessonneau, and the brothers Gaspard and Jean Bureau created a considerable force of artillery. Domestic troubles in their own country weakened the English in France. The con- quest of Normandy was completed by the battle of Formigny (1 5th of April 1450). Guienne was conquered in 1451 by Duncis, but not subdued, and another expedition was necessary in 1453, when Talbot was defeated and slain at Castillon. Meanwhile in 1450 Charles VII. had resolved on the rehabilitation of Joan of Arc, thus rendering a tardy recognition of her services. This was granted in 1456 by the Holy See. The only foothold retained by the English on French ground was Calais. In its earlier stages the deliverance of France from the English had been the work of the people themselves. The change which made Charles take an active part in public affairs is said to have been largely due to the influence of Agnes Sorel, who became his mistress in 1444 and died in 1450. She was the first to play a public and political r61e as mistress of a king of France, and may be said to have established a tradition. Pierre de Brez6, who had had a large share in the repression of the Praguerie, obtained through her a dominating influence over the king, and he inspired the monarch himself and the whole administration with new vigour. Charles and Rene of Anjou retired from court, and the greater part of the members of the king's council were drawn from the bourgeois classes. The most famous of all these was Jacques Cceur (q.v.). It was by the zeal of these councillors that Charles obtained the surname of " The Well-Served."

Charles VII. continued his father's general policy in church matters. He desired to lessen the power of the Holy See in France and to preserve as far as possible the liberties of the Gallican church. With the council of Constance (1414-1418) the great schism was practically healed. Charles, while careful to protest against its renewal, supported the anti-papal con- tentions of the French members of the council of Basel (1431- 1449), and in 1438 he promulgated the Pragmatic Sanction at Bourges, by which the patronage of ecclesiastical benefices was removed from the Holy See, while certain interventions of the royal power were admitted. Bishops and abbots were to be elected, in accordance with ancient custom, by their clergy.

After the English had evacuated French territory Charles still had to cope with feudal revolt, and with the hostility of the dauphin, who was in open revolt in 1446, and for the next ten years ruled like an independent sovereign in Dauphine. He took refuge in 1457 with Charles's most formidable enemy, Philip of Burgundy. Charles VII. nevertheless found means to prevent Philip from attaining his ambitions in Lorraine and in Germany. But the dauphin succeeded in embarrassing his father's policy at home and abroad, and had his own party in the court itself. Charles VII. died at Mehun-sur-Yevre on the 22nd of July 146 1. He believed that he was poisoned by his son, who cannot, how- ever, be accused of anything more than an eager expectation of his death.

Authorities. — The history of the reign of Charles VII. has been written by two modern historians, — Vallet de Viriville, Histoire de Charles VII . . . et de son ipoque (Paris, 3 vols., 1862-1865), and G. du Fresne de Beaucourt, Hist, de Charles VII (Paris, 6 vols., 1881-1891). There is abundant contemporary material. The herald, Jacques le Bouvier or Berry (b. 1386), whose Chronicques du feu roi Charles VII was first printed in 1528 as the work of Alain Chartier, was an eye-witness of many of the events he described. His Recouvrement de Normandie, with other material on the same subject, was edited for the " Rolls " series {Chronicles and Memorials) by Joseph Stevenson in 1863. The Histoire de Charles VII by Jean Chartier, historiographer-royal from 1437, was included in the Grandes Chroniques de Saint-Denis, and was first printed under Chartier'snameby Denis Godefroy, together with other contemporary narratives, in 1661. It was re-edited by Vallet de Viriville (Paris, 3 vols., 1858-1859). With these must be considered the Burgundian chroniclers Enguerrand de Monstrelet, whose chronicle (ed. L. Douet dArcq; Paris, 6 vols., 1857-1862) covers the years 1400-1444, and Georges Chastellain, the existing fragments of whose chronicle are published in his CEuwes (ed. Kervyn de Lettenhove; Brussels, 8 vols., 1 863-1 866). For a detailed bibliography and an account of printed and MS. documents see du Fresne de Beaucourt, already cited, also A. Molinier, Manuel de bibliographie historique, iv.

240-306. *

CHARLES VIII. (1470-1498), king of France, was the only son of Louis XL During the whole of his childhood Charles lived far from his father at the chateau of Amboise, which was throughout his

life his favourite residence. On the death of Louis XL in 1483 Charles, a lad of thirteen, was of age, but was absolutely incapable of governing. Until 1492 he abandoned the government to his sister Anne of Beaujeu. In 1491 he married Anne, duchess of Brittany, who was already betrothed to Maximilian of Austria. Urged by his favourite, Etienne de Vesc, he then, at the age of twenty-two, threw off the yoke of the Beaujeus, and at the same time discarded their wise and able policy. But he was a thoroughly worthless man with a weak and ill-balanced intellect. He had a romantic imagination and conceived vast projects. He proposed at first to claim the rights of the house of Anjou, to which Louis XL had succeeded, on the kingdom of Naples, and to use this as a stepping-stone to the capture of Constantinople from the Turks and his own coronation as emperor of the East. He sacrificed everything to this adventurous policy, signed disastrous treaties to keep his hands free, and set out for Italy in 1494. The cere- monial side of the expedition being in his eyes the most important, he allowed himself to be intoxicated by his easy triumph and duped by the Italians. On the 12th of May 1495 he entered Naples in great pomp, clothed in the imperial insignia. A general coalition was, however, formed against him, and he was forced to return precipitately to France. It cannot be denied that he showed bravery at the battle of Fornovo (the 5th of July 1495). He was preparing a fresh expedition to Italy, when he died on the 8th of April 1498, from the results of an accident, at the chateau of Amboise.

See Histoire de Charles VIII, ray de France, by G. de Jaligny, Andre de la Vigne, &c, edited by Godefroy (Paris, 1684); De Cherrier, Histoire de Charles VIII (Paris, 1868); H. Fr. Delaborde, Expedition de Charles VIII en Italic (Paris, 1888). For a complete bibliography see H. Hauser, Les Sources de Vhistoire de France, 1494-1610, vol. i. (Paris, 1906) ; and E. Lavisse, Histoire de France, vol. v. part i., by H. Lemonnier (Paris, 1903).

CHARLES IX. (1 550-1 574), king of France, was the third son of Henry II. and Catherine de ‘Medici. At first he bore the title of duke of Orleans. He became king in 1560 by the death of his brother Francis II., but as he was only ten years old the power

was in the hands of the queen-mother, Catherine. Charles seems to have been a youth of good parts, lively and agreeable, but he had a weak, passionate and fantastic nature. His education had spoiled him. He was left to his whims— even the strangest — and

to his taste for violent exercises; and the excesses to which he gave himself up ruined his health. Proclaimed of age on the 17 th of August 1563, he continued to be absorbed in his fantasies and his hunting, and submitted docilely to the authority of his mother. In 1570 he was married to Elizabeth of Austria, daughter of Maximilian II. It was about this time that he dreamed of making a figure in the world. The successes of his brother, the duke of Anjou, at Jarnac and Moncontour had already caused him some jealousy. When Coligny came to court, he received him very warmly, and seemed at first to accept the idea of an intervention in the Netherlands against the Spaniards. For the upshot of this adventure see the article St Bartholomew, Massacre or. Charles was in these circumstances no hypocrite, but weak, hesitating and ill-balanced. Moreover, the terrible events in which he had played a part transformed his character. He became melancholy, severe and taciturn. ” It is feared,” said the Venetian ambassador, ” that he may become cruel.” Undermined by fever, at the age of twenty he had the appearance of an old man, and night and day he was haunted with nightmares. He died on the 30th of May 1574. By his mistress, Marie Touchet, he had one son, Charles, duke of Angouleme. Charles IX. had a sincere love of letters, himself practised poetry, was the patron of Ronsard and the poets of the Pleiad, and granted privileges to the first academy founded by Antoine de Ba’if (afterwards the Academie du Palais). He left a work on hunting, Traiti de la chasse royale, which was published in 1625, and reprinted in 1859.

Authorities. — The principal sources are the contemporary memoirs and chronicles of T. A. d’Aubigne, Brantdme, Castelnau, Haton, la Place, Montluc, la Noue, l’Estoile, Ste Foy, de Thou, Tavannes, &c. ; the published correspondence of Catherine de’ Medici, Marguerite de Valois, and the Venetian ambassadors; and Calendars of State Papers, &c. See also Abel Desjardins, Charles IX, deux annees de rigne (Paris, 1873) i de la Ferriere, Le XVI’ siecle et les Valois (Paris, 1879) ; H. Mariejol, La Rijorme et la Ligue (Paris, 1904), in vol. v. of the Histoire de France, by E. Lavisse, which contains a bibliography for the reign.

CHARLES X. (1757-1836), king of France from 1824 to 1830, was the fourth child of the dauphin, son of Louis XV. and of Marie Josephe of Saxony, and consequently brother of Louis XVI. He was known before his accession as Charles Philippe, count of Artois. At the age of sixteen he married Marie Therese of Savoy, sister-in-law of his brother, the count of Provence (Louis XVIII.) .

His youth was passed in scandalous dissipation, which drew upon himself and his coterie the detestation of the people of Paris. Although lacking military tastes, he joined the French army at the siege of Gibraltar in 1772, merely for distraction. In a few years he had incurred a debt of 56 million francs, a burden assumed by the impoverished state. Prior to the Revolution he took only a minor part in politics, but when it broke out he soon became, with the queen, the chief of the reactionary party at court. In July 1 789 he left France, became leader of the emigre's, and visited several of the courts of Europe in the interest of the royalist cause. After the execution of Louis XVI: he received from his brother, the count of Provence, the title of lieutenant- general of the realm, and, on the death of Louis XVII. , that of " Monsieur." In 1795 he attempted to aid the royalist rising of La Vendee, landing at the island of Yeu. But he refused to advance farther and to put himself resolutely at the head of his party, although warmly acclaimed by it, and courage failing him, he returned to England, settling first in London, then in Holyrood Palace at Edinburgh and afterwards at Hartwell. There he remained until 1813, returning to France in February 1814, and entering Paris in April, in the track of the Allies.

During the reign of his brother, Louis XVIIL, he was the leader of the ultra-royalists, the party of extreme reaction. On succeeding to the throne in September 1824 the dignity of his address and his affable condescension won him a passing popu- larity. But his coronation at Reims, with all the gorgeous

ceremonial of the old regime, proclaimed his intention of ruling, as the Most Christian King, by divine right. His first acts, indeed, allayed the worst alarms of the Liberals; but it was soon apparent that the weight of the crown would be consistently thrown into the scale of the reactionary forces. The imigr&s were awarded a milliard as compensation for their confiscated lands; and Gallicans and Liberals alike were offended by measures which threw increased power into the hands of the Jesuits and Ultramontanes. In a few months there were disquieting signs of the growing unpopularity of the king. The royal princesses were insulted in the streets; and on the 29th of April 1825 Charles,

when reviewing the National Guard, was met with cries from the ranks of ” Down with the ministers ! ” His reply was, next day, a decree disbanding the citizen army.

It was not till 1829, when the result of the elections had proved the futility of Villele’s policy of repression, that Charles consented unwillingly to try a policy of compromise. It was, however, too late. Villele’s successor was the vicomte de Martignac, who took Decazes for his model; and in the speech from the throne Charles declared that the happiness of France depended on ” the sincere union of the royal authority with the liberties consecrated by the charter.” But Charles had none of the patience and common- sense which had enabled Louis XVIII. to play with decency the part of a constitutional king. ” I would rather hew wood,” he exclaimed, ” than be a king under the conditions of the king of England “; and when the Liberal opposition obstructed all the measures proposed by a ministry not selected from the parliamentary majority, he lost patience. ” I told you,” he said, ” that there was no coming to terms with these men.” Martignac was dismissed; and Prince Jules de Polignac, the very incarnation of clericalism and reaction, was called to the helm of state.

The inevitable result was obvious to all the world. ” There is no such thing as political experience,” wrote Wellington, certainly no friend of Liberalism; ” with the warning of James II. before him, Charles X. was setting up a government by priests, through priests, for priests.” A formidable agitation sprang up in France, which only served to make the king more obstinate. In opening the session of 1830 he declared that he would ” find the power ” to overcome the obstacles placed in his path by ” culpable manoeuvres.” The reply of the chambers was a protest against ” the unjust distrust of the sentiment and reason of France “; whereupon they were first prorogued, and on the 1 6th of May dissolved. The result of the new elections was what might have been foreseen: a large increase in the Oppo- sition; and Charles, on the advice of his ministers, determined on a virtual suspension of the constitution. On the 25th of July were issued the famous ” four ordinances ” which were the immediate cause of the revolution that followed.

With singular fatuity Charles had taken no precautions in view of a violent outbreak. Marshal Marmont, who commanded the scattered troops in Paris, had received no orders, beyond a jesting command from the duke of Angouleme to place them

under arms ” as some windows might be broken.” At the beginning of the revolution Charles was at St Cloud, whence on the news of the fighting he withdrew first to Versailles and then to Rambouillet. So little did he understand the seriousness of the situation that, when the laconic message ” All is over!” was brought to him, he believed that the insurrection had been suppressed. On realizing the truth he hastily abdicated in favour of his grand- son, the duke of Bordeaux (comte de Chambord), and appointed Louis Philippe, duke of Orleans, lieutenant-general of the king- dom (July 30th). But, on the news of Louis Philippe’s accept- ance of the crown, he gave up the contest and began a dignified retreat to the sea-coast, followed by his suite, and surrounded by the infantry, cavalry and artillery of the guard. Beyond sending a corps of observation to follow his movements, the new government did nothing to arrest his escape. At Maintenon Charles took leave of the bulk of his troops, and proceeding with an escort of some 1200 men to Cherbourg, took ship there for England on the 16th of August. For a time he returned to Holy- rood Palace at Edinburgh, which was again placed at his dis-

posal. He died at Goritz, whither he had gone for his health, on the 6th of November 1836.

The best that can be said of Charles X. is that, if he did not know how to rule, he knew how to cease to rule. The dignity of his exit was more worthy of the ancient splendour of the royal house of France than the theatrical humility of Louis Philippe’s entrance. But Charles was an impossible monarch for the 19th century, or perhaps for any other century. He was a typical Bourbon, unable either to learn or to forget; and the closing years of his life he spent in religious austerities, intended to expiate, not his failure to grasp a great opportunity, but the comparatively venial excesses of his youth. 1

See Achille de Vaulabelle, Chute de I ‘empire: histoire des deux restaurations (Paris, 1847-1857); Louis de Vielcaste!, Hist, de la restauration (Paris, 1860-1878); Alphonse de Lamartine, Hist, de la restauration (Paris, 1851-1852); Louis Blanc, Hist, de dix ans, 1830-1840 (5 vols., 1842-1844); G. I. de Montbel, Derniere Upoqtie de I’hist. de Charles X (5th ed., Paris, 1840); Theodore Anne, Memoires, souvenirs, et anecdotes sur I’interieur du palais de Charles X et les evenements de 1815 d, 1830 (2 vols., Paris, 1831); ib., Journal de Saint-Cloud & Cherbourg; Vedrenne, Vie de Charles X (3 vols., Paris, 1879); Petit, Charles X (Paris, 1886);

Villeneuve, Charles X et Louis XIX en exil. Memoires inedits (Paris, 1889); Imbert de Saint- Amand, La Cow de Charles X (Paris, 1892).

CHARLES I. (1 288-1342), king of Hungary, the son of Charles Martell of Naples, and Clemencia, daughter of the emperor Rudolph, was known as Charles Robert previously to being enthroned king of Hungary in 1309. He claimed the Hungarian crown, as the grandson of Stephen V., under the banner of the pope, and in August 1300 proceeded from Naples to Dalmatia to make good his claim. He was crowned at Esztergom after the death of the last Arpad, Andrew III. (1301), but was forced the same year to surrender the crown to Wenceslaus II. of Bohemia (1 289-1306). His failure only made Pope Boniface VIII. still more zealous on his behalf, and at the diet of Pressburg

(1304) his Magyar adherents induced him to attempt to recover the crown of St Stephen from the Czechs. But in the meantime

(1305) Wenceslaus transferred his rights to Duke Otto of Bavaria, who in his turn was taken prisoner by the Hungarian rebels. Charles's prospects now improved, and he was enthroned at Buda on the 15th of June 1309, though his installation was not regarded as valid till he was crowned with the sacred crown (which was at last recovered from the robber-barons) at Szekesfehervar on the 27 th of August 13 10. For the next three years Charles had to contend with rebellion after rebellion, and it was only after his great victory over all the elements of rapine and dis- order at Rozgony (June 15,1312) that he was really master in his own land. His foreign policy aimed at the aggrandizement of his family, but his plans were prudent as well as ambitious, and Hungary benefited by them greatly. His most successful achievement was the union with Poland for mutual defence against the Habsburgs and the Czechs. This was accomplished by the convention of Trencsen (1335), confirmed the same year at the brilliant congress of Visegrad, where all the princes of central Europe met to compose their differences and were splendidly entertained during the months of October and November. The immediate result of the congress was a combined attack by the Magyars and Poles upon the emperor Louis and his ally Albert of Austria, which resulted in favour of Charles in 1337. Charles's desire to unite the kingdoms of Hungary and Naples under the eldest son Louis was frustrated by Venice and the pope, from fear lest Hungary might become the dominant

1 This, at any rate, represents the general verdict of history. It is interesting, however, to note that so liberal-minded and shrewd a critic of men as King Leopold I. of the Belgians formed a different estimate. In a letter of the 18th of November 1836 addressed to Princess (afterwards Queen) Victoria he writes: — ” History will state that Louis XVIII. was a most liberal monarch, reigning with great mildness and justice to his end, but that his brother, from his despotic and harsh disposition, upset all the other had done, and lost the throne. Louis XVIII. was a clever, hard-hearted man, shackled by no principle, very proud and false. Charles X. an honest man, a kind friend, an honourable master, sincere in his opinions, and inclined to do everything that is right. That teaches us what we ought to believe in history as it is compiled according to ostensible events and results known to the generality of people.”

Adriatic power. He was, however, more than compensated for this disappointment by his compact (1339) with his ally and brother-in-law, Casimir of Poland, whereby it was agreed that Louis should succeed to the Polish throne on the death of the childless Casimir. For an account of the numerous important reforms effected by Charles see Hungary: History. A states- man of the first rank, he not only raised Hungary once more to the rank of a great power, but enriched and civilized her. In character he was pious, courtly and valiant, popular alike with the nobility and the middle classes, whose increasing welfare he did so much to promote, and much beloved by the clergy. His court was famous throughout Europe as a school of chivalry. Charles was married thrice. His first wife was Maria, daughter of Duke Casimir of Teschen, whom he wedded in 1306. On her death in 13 18 he married Beatrice, daughter of the emperor Henry VII. On her decease two years later he gave his hand to Elizabeth, daughter of Wladislaus Lokietek, king of Poland. Five sons were the fruit of these marriages, of whom three, Louis, Andrew and Stephen, survived him. He died on the 16th of July 1342, and was laid beside the high altar at Szekesfeh6rvar, the ancient burial-place of the Arpads.

See Bela Kerekgyarto, The Hungarian Royal Court under the

House of Anjou (Hung.) (Budapest, 1881); Rationes Collectorum Pontif. in Hungaria (Budapest, 1887); Diplomas of the Angevin Period, edited by Imre Nagy (Hung, and Lat.), vols, i.-iii. (Budapest, 1878, &c.).. (R. N. B.)

CHARLES I. (1226-1285), king of Naples and Sicily and count of Anjou, was the seventh child of Louis VIII. of France and Blanche of Castile. Louis died a few months after Charles's birth and was succeeded by his son Louis IX. (St Louis), and on the death in 1232 of the third son John, count of Anjou and Maine, those fiefs were conferred on Charles. In 1 246 he married Beatrice, daughter and heiress of Raymond Berenger V., the last count of Provence, and after defeating James I. of Aragon and other rivals with the help of his brother the French king, he took possession of his new county. In 1 248 he accompanied Louis in the crusade to Egypt, but on the defeat of the Crusaders he was taken prisoner with his brother. Shortly afterwards he was ransomed, and returned to Provence in 1230. During his absence several towns had asserted their independence; but he succeeded in subduing them without much difficulty and gradually suppressed their communal liberties. Charles's ambition aimed at wider fields, and when Margaret, countess of Flanders, asked help of the French court against the German king William of Holland, by whom she had been defeated, he gladly accepted her offer of the county of Hainaut in exchange for his assistance (1253); this arrangement was, however, rescinded by Louis of France, who returned from captivity in 1254, and Charles gave up Hainaut for an immense sum of money. He extended his influence by the subjugation of Mar- seilles in 1257, then one of the most important maritime cities of the world, and two years later several communes of Pied- mont recognized Charles's suzerainty In 1262 Pope Urban IV. determined to destroy the power of the Hohenstaufen in Italy, and offered the kingdoms of Naples and Sicily, in consideration of a yearly tribute, to Charles of Anjou, in opposition to Manfred, the bastard son of the late emperor Frederick II. The next year Charles succeeded in getting himself elected senator of Rome, which gave him an advantage in dealing with the pope. After long negotiations he accepted the Sicilian and Neapolitan crowns, and in 1264 he sent a first expedition of Provencals to Italy, he also collected a large army and navy in Provence and France with the help of King Louis, and by an alliance with the cities of Lombardy was able to send part of his force overland. Pope Clement IV. confirmed the Sicilian agreement on conditions even more favourable to Charles, who

sailed in 1265, and con- ferred on the expedition all the privileges of a crusade. After narrowly escaping capture by Manfred's fleet he reached Rome safely, where he was crowned king of the Two Sicilies. The land army arrived soon afterwards, and on the 26th of February 1 266 Charles encountered Manfred at Benevento, where after a hard- fought battle Manfred was defeated and killed, and the whole

kingdom was soon in Charles's possession. Then Conradin, Frederick's grandson and last legitimate descendant of the Hohenstaufen, came into Italy, where he found many partisans among the Ghibellines of Lombardy and Tuscany, and among Manfred's former adherents in the south. He gathered a large army consisting partly of Germans and Saracens, but was totally defeated by Charles at Tagliacozzo (23rd of August 1268); taken prisoner, he was tried as a rebel and executed at Naples. Charles, in a spirit of the most vindictive cruelty, had large numbers of Conradin's barons put to death and their estates confiscated, and the whole population of several towns massacred.

He was now one of the most powerful sovereigns of Europe, for besides ruling over Provence and Anjou and the kingdom of the Two Sicilies, he was imperial vicar of Tuscany, lord of many cities of Lombardy and Piedmont, and as the pope's favourite practically arbiter of the papal states, especially during the interregnum between the death of Clement IV. (1268) and the election of Gregory X. (1272). But his ambition was by no means satisfied, and he even aspired to the crown of the East Roman empire. In 1272 he took part with Louis IX. in a crusade to north Africa, where the French king died of fever, and Charles, after defeating the soldan of Tunis, returned to Sicily. The election of Rudolph of Habsburg as German king after a long interregnum, and that of Nicholas III. to the Holy See (1277), diminished Charles's power, for the new pope set himself to compose the difference between Guelphs and Ghibel- lines in the Italian cities, but at his death Charles secured the election of his henchman Martin IV. (1281), who recommenced persecuting the Ghibellines, excommunicated the Greek emperor, Michael Palaeologus, proclaimed a crusade against the Greeks, filled every appointment in the papal states with Charles's vassals, and reappointed the Angevin king senator of Rome. But the cruelty of the French rulers of Sicily drove the people of the island to despair, and a Neapolitan nobleman, Giovanni da Procida, organized the rebellion known as the Sicilian Vespers (see Vespers, Sicilian), in which the French in Sicily were all

massacred or expelled (1282). Charles determined to subjugate the island and sailed with his fleet for Messina. The city held out until Peter III. of Aragon, whose wife Constance was a daughter of Manfred, arrived in Sicily, and a Sicilian-Catalan fleet under the Calabrese admiral,' Ruggiero di Lauria, completely destroyed that of Charles. " If thou art determined, O God, to destroy me," the unhappy Angevin exclaimed, " let my fall be gradual !" He was forced to abandon all attempts at reconquest, but proposed to decide the question by single combat between himself and Peter, to take place at Bordeaux under English protection. The Aragonese accepted, but fearing treachery, as the French army was in the neighbourhood, he failed to appear on the appointed day. In the meanwhile Ruggiero di Lauria appeared before Naples and destroyed another Angevin fleet commanded by Charles's son, who was taken prisoner (May 1 284). Charles came to Naples with a new fleet from Provence, and was preparing to invade Sicily again, when he contracted a fever and died at Foggia on the 7th of January 1285. He was undoubtedly an extremely able soldier and a skilful statesman, and much of his legislation shows a real political sense; but his inordinate ambition, his oppressive methods of government and taxation, and his cruelty created enemies on all sides, and led to the collapse of the edifice of dominion which he had raised.

CHARLES II. (1250-1309), king of Naples and Sicily, son of Charles I., had been captured by Ruggiero di Lauria in the naval battle at Naples in 1284, and when his father died he was still a prisoner in the hands of Peter of Aragon. In 1 288 King Edward I. of England had mediated to make peace, and Charles was liberated on the understanding that he was to retain Naples alone, Sicily being left to the Aragonese; Charles was also to induce his cousin Charles of Valois to renounce for twenty thousand pounds of silver the kingdom of Aragon which had been given to him by Pope Martin IV. to punish Peter for having invaded Sicily, but which the Valois had never effectively occupied. The Angevin king was thereupon set free, leaving

three of his sons and sixty Provencal nobles as hostages, promising to pay 30,000 marks and to return a prisoner if the conditions

were not fulfilled within three years. He went to Rieti, where the new pope Nicholas IV. immediately absolved him from all the conditions he had sworn to observe, crowned him king of the Two Sicilies (1289), and excommunicated Alphonso, while Charles of Valois, in alliance with Castile, prepared to take possession of Aragon. Alphonso III , the Aragonese king, being hard pressed, had to promise to withdraw the troops he had sent to help his brother James in Sicily, to renounce all rights over the island, and pay a tribute to the Holy See. But Alphonso died childless in 1291 before the treaty could be carried out, and James took possession of Aragon, leaving the government of Sicily to the third brother Frederick. The new pope Boniface VIII., elected in 1294 at Naples under the auspices of King Charles, mediated between the latter and James, and a most dishonourable treaty was sighed : James was to marry Charles's daughter Bianca and was promised the investiture by the pope of Sardinia and Corsica, while he was to leave the Angevin a free hand in Sicily and even to assist him if the Sicilians resisted. An attempt was made to bribe Frederick into consenting to this arrangement, but being backed up by his people he refused, and was afterwards crowned king of Sicily. The war was fought with great fury on land and sea, but Charles, although aided by the pope, by Charles of Valois, and by James II. of Aragon, was unable to conquer the island, and his son the prince of Taranto was taken prisoner at the battle of La Falconara in 1 299. Peace was at last made in 1302 at Caltabellotta, Charles II. giving up all rights to Sicily and agreeing to the marriage of his daughter Leonora to King Frederick; the treaty was ratified by the pope in 1303. Charles spent his last years quietly in Naples, which city he improved and embellished. He died in August 1309, and was succeeded by his son Robert.

Bibliography. — A. de Saint-Priest, Histoire de la conque'te de Naples par Charles d'Anjou (4 vols., Paris, 1847-1849), is still of use for the documents from the archives of Barcelona, but it needs to be collated with more recent works; S. de Sismondi, in vol. ii. of his Histoire des republiques italiennes (Brussels, 1838), gives a good general sketch of the reigns of Charles I. and II., but is occasionally inaccurate as to details; the best authority on the early life of Charles I. is R. Sternfeld, Karl von Anjou als Graf von Provence (Berlin, 1888) ; Charles's connexion with north Italy is dealt with in Merkel's La Dominazione di Carlo d'Angib in Piemonie e in Lornbardia (Turin, 1891), while the R. Deputazione di Storia Patria Toscana has recently published a Codice

diplomatico delle relazioni di Carlo d'Angib con la Toscana; the contents of the Angevin archives at Naples have been published by Durrien, Archives angevines de Naples (Toulouse, 1866-1867). M. Amari's La Guerra del Vespro Sicihano (8th ed., Florence, 1876) is a valuable history, but the author is too bitterly prejudiced against the French to be quite impartial; his work should be compared with L. Cadier's Essai sur l' administration du royaume de Sicile sous Charles I et Charles II d'Anjou (Paris, 1 89 1, Bibl. des ecoles francaises d'Athenes et de Rome, fasc. 59), which contains many documents, and tends somewhat to rehabilitate the Angevin rule.

CHARLES II. (1332-1387), called The Bad, king of Navarre and count of Evreux, was a son of Jeanne II., queen of Navarre, by her marriage with Philip, count of Evreux (d. 1343). Having become king of Navarre on Jeanne's death in 1349, he suppressed a rising at Pampeluna with much cruelty, and by this and similar actions thoroughly earned his surname of " The Bad." In 1352 he married Jeanne (d. 1393), a daughter of John II., king of France, a union which made his relationship to the French crown still more complicated. Through his mother he was a grandson of Louis X. and through his father a great-grandson of Philip III., having thus a better claim to the throne of France than Edward III. of England; and, moreover, he held lands under the suzerainty of the French king, whose son-in-law he now became. Charles was a man of great ability, possessing popular manners and con- siderable eloquence, but he was singularly unscrupulous, a quality which was revealed during the years in which he played an im- portant part in the internal affairs of France. Trouble soon arose between King John and his son-in-law. The promised dowry had not been paid, and the county of Angouleme, which had formerly belonged to Jeanne of Navarre, was now in the possession of the French king's favourite, the constable Charles la Cerda. In

January 1354 the constable was assassinated by order of Charles, and preparations for war were begun. The king of Navarre , who defended this deed, had, however, many friends in France and was in communication with Edward III. ; and consequently John was forced to make a treaty at Mantes and to compensate him for the loss of Angouleme by a large grant of lands, chiefly in Normandy. This peace did not last long, and in 1355 John was compelled to confirm the treaty of Mantes. Returning to Normandy, Charles was partly responsible for some unrest in the duchy, and in April 1356 he was treacherously seized by the

French king at Rouen, remaining in captivity until November 1357, when John, after his defeat at Poitiers, was a prisoner in England. Charles was regarded with much favour in France, and the states-general demanded his release, which, however, was effected by a surprise. Owing to his popularity he was considered by Etienne Marcel and his party as a suitable rival to the dauphin, afterwards King Charles V., and on entering Paris he was well received and delivered an eloquent harangue to the Parisians. Subsequently peace was made with the dauphin, who promised to restore to Charles his confiscated estates. This peace was not enduring, and as his lands were not given back Charles had some ground for complaint. War again broke out, quickly followed by a new treaty, after which the king of Navarre took part in suppressing the peasant rising known as the Jacquerie. Answering the en- treaties of Marcel he returned to Paris on June 1358, and became captain-general of the city, which was soon besieged by the dauphin. This position, however, did not prevent him from negotiating both with the dauphin and with the English; terms were soon arranged with the former, and Charles, having lost much of his popularity, left Paris just before the murder of Marcel in July 1358. He continued his alternate policy of war and peace, meanwhile adding if possible by his depredations to the misery of France, until the conclusion of the treaty of Br6tignyin May 1360 deprived him of the alliance of the English, and compelled him to make peace with King John in the following October. A new cause of trouble arose when the duchy of Burgundy was left without a ruler in November 1361, and was claimed by Charles; but, lacking both allies and money, he was unable to prevent the French king from seizing Burgundy, while he himself returned to Navarre.

In his own kingdom Charles took some steps to reform the financial and judicial administration and so to increase his revenue; but he was soon occupied once more with foreign entanglements, and in July 1362, in alliance with Peter the Cruel, king of Castile, he invaded Aragon, deserting his new ally soon afterwards for Peter IV., king of Aragon. Meanwhile the war with the dauphin had been renewed. Still hankering after Burgundy, Charles saw his French estates again seized; but after some desultory warfare, chiefly in Normandy, peace was made in March 1365, and he returned to his work of interference in the politics of the Spanish kingdoms. In turn he made treaties with the kings of Castile and Aragon, who were at war with each other; promising to assist Peter the Cruel to regain his throne,

from which he had been driven in 1366 by his half-brother Henry of Trastamara, and then assuring Henry and his ally Peter of Aragon that he would aid them to retain Castile. He continued this treacherous policy when Edward the Black Prince advanced to succour Peter the Cruel; then signed a treaty with Edward of England, and then in 1371 allied himself with Charles V. of France. His next important move was to offer his assistance to Richard II. of England for an attack upon France. About this time serious charges were brought against him. Accused of attempting to poison the king of France and other prominent persons, and of other crimes, his French estates were seized by order of Charles V. , and soon afterwards Navarre was invaded by the Castilians. Won over by the surrender of Cherbourg in July 1378, the English under John of Gaunt, duke of Lancaster, came to his aid; but a heavy price had to be paid for the neutrality of the king of Castile. After the death of Charles V. in 1380, the king of Navarre did not interfere in the internal affairs of France, although he endeavoured vainly again to obtain aid from Richard II., and to regain Cherbourg. His lands in France were handed

over to his eldest son Charles, who governed them with the consent of the new king Charles VI. Charles died on the 1st of January 1387, and many stories are current regarding the manner of his death. Froissart relates that he was burned to death through his bedclothes catching iire; Secousse says that he died in peace with many signs of contrition; another story says he died of leprosy; and a popular legend tells how he expired by a divine judgment through the burning of the clothes steeped in sulphur and spirits in which he had been wrapped as a cure for a loath- some disease caused by his debauchery. He had three sons and four daughters, and was succeeded by his eldest son Charles; one of his daughters, Jeanne, became the wife of Henry IV. of England.

See Jean Froissart, Chroniques, edited by S. Luce and G. Raynaud (Paris, 1869-1897); D. F. Secousse, Memoires pour servir d, I'histoire de Charles II, rot de Navarre (Paris, 1755-1768); E. Meyer, Charles II, rot de Navarre et la Normandie au XIV' slide (Paris, 1898); F. T. Perrens, Ulienne Marcel (Paris, 1874) ; R.

Delachenal, Premieres negotiations de Charles le Mauvais avec les Anglais (Paris, 1900) ; and E. Lavisse, Histoire de France, tome iv. (Paris, 1902).

CHARLES III. (1361-1425), called The Noble, king of Navarre and count of Evreux, was the eldest son of Charles II. the Bad, king of Navarre, by his marriage with Jeanne, daughter of John II., king of France, and was married in 1375 to Leonora (d. 141 5), daughter of Henry II., king of Castile. Having passed much of his early life in France, he became king of Navarre on the death of Charles II. in January 1387, and his reign was a period of peace and order, thus contrasting sharply with the long and calamitous reign of his father. In 1393 he regained Cherbourg, which had been handed over by Charles II. to Richard II. of England, and in 1403 he came to an arrangement with the representatives of Charles VI. of France concerning the extensive lands which he claimed in .that country. Cherbourg was given to the French king; certain exchanges of land were made; and in the following year Charles III. surrendered the county of Evreux, and was created duke of Nemours and made a peer of France. After this his only interference in the internal affairs of France was when he sought to make peace between the rival factions in that country. Charles sought to improve the condition of Navarre by making canals and rendering the rivers navigable, and in other ways. He died at Olite on the 8th of September 1425 and was buried at Pampeluna. After the death of his two sons in 1402 the king decreed that his kingdom should pass to his daughter Blanche (d. 1441), who took for her second husband John, afterwards John II., king of Aragon; and the cortes of Navarre swore to recognize Charles (q.v.), prince of Viana, her son by this marriage, as king after his mother's death.

CHARLES (Karl Eitel Zephyrin Ludwig; in Rum. Carol), king of Rumania (1839-)> second son of Prince Karl Anton of Hohenzollern-Sigmaringen, was born on the 20th of April 1839. He was educated at Dresden (1850-1856), and passed through his university course at Bonn. Entering the Prussian army in 1857, he won considerable distinction in the Danish war of 1864, and received instruction in strategy from General von Moltke. He afterwards travelled in France, Italy, Spain and Algeria. He was a captain in the 2nd regiment of Prussian Dragoon Guards when he was elected hospodar or prince of Rumania on the 20th of April 1866, after the compulsory abdication of Prince Alexander John Cuza. Regarded at first with distrust by Turkey, Russia and Austria, he succeeded in gaining general recognition in six

months; but he had to con- tend for ten years with fierce party struggles between the Conservatives and the Liberals.

During this period, however, Charles displayed great tact in his dealings with both parties, and kept his country in the path of administrative and economic reform, organizing the army, developing the railways, and establishing commercial relations with foreign powers. The sympathy of Rumania with France in the Franco-Prussian War of 1870, and the consequent interruption of certain commercial undertakings, led to a hostile movement against Prince Charles, which, being fostered by Russia, made him resolve to abdicate; and it was with difficulty that he was persuaded to remain. In the Russo-Turkish War

of 1877—78 he joined the Russians before Plevna (q.v.), and being placed in command of H the combined Russian and Rumanian forces, forced Osman Pasha to surrender. As a consequence of the prince's vigorous action the independence of Rumania, which had been proclaimed in May 1877, was confirmed by various treaties in 1878, and recognized by Great Britain, France and Germany in 1880. On the 26th of March 1881 he was proclaimed king of Rumania, and, with his consort, was crowned on the 22nd of May following. From that time he pursued a successful career in home and foreign policy, and greatly improved the financial amd military position of his country; while his appreciation of the fine arts was shown by his formation of an important collection of paintings of all schools in his palaces at Sinaiia and Bucharest. For a detailed account of his reign, see Rumania. On the 1st of November 1869 he married Princess Elizabeth (q.v.), a daughter of Prince Hermann of Wied, widely known under her literary name of " Carmen Sylva." As the only child of the marriage, a daughter, dded in 1874, the succession was finally settled upon the king's nephew, Prince Ferdinand of Hohenzollern-Sigmaringen, who was created prince of Rumania on the 18th of March 1889, and married, on the 10th of January 1893, Princess Marie, daughter of Alfred, duke of Saxe-Coburg, their children being Prince Carol (b. 1893) and Princess Elizabeth (b. 1894).

The official life of King Charles, mainly his own composition, Aus dem Leben Kbnig Karls von Rumanien (Stuttgart, 1894-1900, 4 vols.), deals mainly with political history. See for an account of his domestic life, M. Kremnitz, K6nig Karl von Rumanien. Ein Lebensbild (Breslau, 1903).

CHARLES II. (1661-1700), king of Spain, known among Spanish kings as "The Desired "and "The Bewitched," was the son of Philip IV. by his second marriage with Maria, daughter of the emperor Ferdinand III., his niece. He was born on the nth of November 1661, and was the only surviving son of his father's two marriages — a child of old age and disease, in whom the constant intermarriages of the Habsburgs had de- veloped the family type to deformity. His birth was greeted with joy by the Spaniards, who feared the dispute as to the succession which must have ensued if Philip IV. left no male issue. The boy was so feeble that till the age of five or six he was fed only from the breast of a nurse. For years afterwards it was not thought safe to allow him to walk. That he might not be overtaxed he was left entirely uneducated, and his indolence was indulged to such an extent that he was not even expected to be clean. When his brother, the younger Don John of Austria, a natural son of Philip IV., obtained power by exiling the queen mother from court he insisted that at least the king's hair should be combed. Charles made the malicious remark that nothing was safe from Don John — not even vermin. The king was then fifteen, and, according to Spanish law, of age. But he never became a man in body or mind. The personages who ruled in his name arranged a marriage for him with Maria Louisa of Orleans. The French princess, a lively young woman of no sense, died in the stifling atmosphere of the Spanish court, and from the attendance of Spanish doctors. Again his advisers arranged a marriage with Maria Ana of Neuburg. The Bavarian wife stood the strain and survived him. Both marriages were merely political — the first a victory for the French, and the second for the Austrian party. France and Austria were alike preparing for the day when the Spanish succession would have to be fought for. The king was a mere puppet in the hands of each alternately. By natural instinct he hated the French, but there was no room in his nearly imbecile mind for more thari childish superstition, insane pride of birth, and an interest in court etiquette. The only touch of manhood was a taste for shooting which he occasionally indulged in the preserves of the Escorial. In his later days he suffered much pain, and was driven wild by the conflict between his wish to transmit his inheritance to " the illustrious house of Austria," his own kin, and the belief instilled into him by the partisans of the French claimant that only the power of Louis XIV. could avert the dismemberment of the empire. A silly fanatic made the discovery that the king was bewitched, and his confessor Froilan Diaz supported the

belief. The king was exorcised, and the exorcists of the king- dom were called upon to put stringent questions to the devils they cast out. The Inquisition interfered, and the dying king was driven mad among them. Very near his end he had the lugubrious curiosity to cause the coffins of his embalmed ancestors to be opened at the Escorial. The sight of the body of his first wife, at whom he also insisted on looking, provoked a passion of tears and despair. Under severe pressure from the cardinal archbishop of Toledo, Portocarrero, he finally made a will in favour of Philip, duke of Anjou, grandson of Louis XIV., and died on the 1st of November 1700, after a lifetime of senile decay.

The best picture of Charles II. is to be found in Les Memoires de la cour d'Espagne of the Marquis de Villars (London, 1861), and the Letters of the Marquise de Villars (Paris, 1868).

CHARLES III. (1716-ˆ788), king of Spain, born on the 20th January 17 16, was the first son of the second marriage of Philip V. with Elizabeth Farnese of Parma. It was his good fortune to be sent to rule as duke of Parma by right of his mother at the age of sixteen, and thus came under more intelligent influence than he could have found in Spain. In 1734 he made himself master of Naples and Sicily by arms. Charles had, however, no military tastes, seldom wore uniform, and could with difficulty be persuaded to witness a review. The peremptory action of the British admiral commanding in the Mediterranean at the approach of the War of the Austrian Succession, who forced him to promise to observe neutrality under a threat to bombard Naples, made a deep impression on his mind. It gave him a feeling of hostility to England which in after-times influenced his policy.

As king of the Two Sicilies Charles began there the work of internal reform which he afterwards continued in Spain. Foreign ministers who dealt with him agreed that he had no great natural ability, but he was honestly desirous to do his duty as king, and he showed good judgment in his choice of ministers. The chief minister in Naples, Tanucci, had a considerable in- fluence over

him. On the death of his half-brother Ferdinand VI. he became king of Spain, and resigned the Two Sicilies to his third son Ferdinand. As king of Spain his foreign policy was disastrous. His strong family feeling and his detestation of England, which was unchecked after the death of his wife, Maria Amelia, daughter of Frederick Augustus II. of Saxony, led him into the Family Compact with France. Spain was entangled in the close of the Seven Years' War, to her great loss. In 1770 he almost ran into another war over the barren Falkland Islands. In 1779 he was, somewhat reluctantly, led to join France and the American insurgents against England, though he well knew that the independence of the English colonies must have a ruinous influence on his own American dominions. For his army he did practically nothing, and for his fleet very little except build fine ships without taking measures to train officers and men.

But his internal government was on the whole beneficial to the country. He began by compelling the people of Madrid to give up emptying their slops out of the windows, and when they objected he said they were like children who cried when their faces were washed. In 1766 his attempt to force the Madrilenos to adopt the French dress led to a riot during which he did not display much personal courage. For a long time after it he remained at Aranjuez, leaving the government in the hands of his minister Aranda. All his reforms were not of this formal kind. Charles was a thorough despot of the benevolent order, and had been deeply offended by the real or suspected share of the Jesuits in the riot of 1766. He therefore consented to the expulsion of the order, and was then the main advocate for its suppression. His quarrel with the Jesuits, and the recollection of some disputes with the pope he had had when king of Naples, turned him towards a general policy of restriction of the over- grown power of the church. The number of the idle clergy, and more particularly of the monastic orders, was reduced, and the Inquisition, though not abolished, was rendered torpid. In the meantime much antiquated legislation which tended to restrict

trade and industry was abolished; roads, canals and drainage works were carried out. Many of his paternal ventures led to little more than waste of money, or the creation of hotbeds of jobbery. Yet on the whole the country prospered. The result was largely due to the king, who even when he was i'1-advised did at least work steadily at his task of government. His example was not without effect on some at least of the nobles. In his domestic life King Charles was regular, and was a con- siderate master,

though he had a somewhat caustic tongue and took a rather cynical view of mankind. He was passionately fond of hunting. During his later years he had some trouble with his eldest son and his daughter-in-law. If Charles had lived to see the beginning of the French Revolution he would probably have been frightened into reaction. As he died on the 14th of December 1788 he left the reputation of a philanthropic and " philosophic " king. In spite of his hostility to the Jesuits, his dislike of friars in general, and his jealousy of the Inquisition, he was a very sincere Roman Catholic, and showed much zeal in endeavouring to persuade the pope to proclaim the Immaculate Conception as a dogma necessary to salvation.

See the Reign of Charles III., by M. Danvila y Collado (6 vols.), in the Historia General de Espana de la Real Academia de la Historia (Madrid, 1892, &c); and F. Rousseau, Regne de Charles III d'Espagne (Paris, 1907).

- CHARLES IV. (i748-i8io),kingof Spain, second son of Charles III. and his wife Maria Amelia of Saxony, was born at Portici on the nth of November 1748, while his father was king of the Two Sicilies. The elder brother was set aside as imbecile and epileptic. Charles had inherited a great frame and immense physical strength from the Saxon line of his mother. When young he was fond of wrestling with the strongest countrymen he could find. In character he was not malignant, but he was intellectually torpid, and of a credulity which almost passes belief. His wife, Maria Luisa of Parma, his first cousin, a thoroughly coarse and vicious woman, ruled him completely, though he was capable of obstinacy at times. During his father's lifetime he was led by her into court intrigues which aimed at driving the king's favourite minister, Floridablanca, from office, and replacing him by Aranda, the chief of the "Aragonese" party. After he succeeded to the throne in 1788 his one serious occupation was hunting. Affairs were left to be directed by his wife and her lover Godoy (q.v.). For Godoy the king had an unaffected liking, and the lifelong favour he showed him is almost pathetic. When terrified by the French Revolution he turned to the Inquisition to help him against the party which would have carried the reforming policy of Charles III. much further. But he was too slothful to have more than a passive part in the direction of his own government. He simply obeyed the impulse given him by the queen and Godoy. If he ever knew his wife's real character he thought it more consistent with his dignity to shut his eyes. For he had a profound belief in his divine right and the sanctity of his person.

If he understood that his king- dom was treated as a mere dependence by France, he also thought it due to his ” face ” to make believe that he was a powerful monarch. Royalty never wore a more silly aspect than in the person of Charles IV., and it is highly credible that he never knew what his wife was, or what was the position of his kingdom. When he was told that his son Ferdinand was appealing to the emperor Napoleon against Godoy, he took the side of the favourite. When the populace rose at Aranjuez in 1808 he abdicated to save the minister. He took refuge in France, and when he and Ferdinand were both prisoners of Napoleon’s, he was with difficulty restrained from assaulting his son. Then he abdicated in favour of Napoleon, handing over his people like a herd of cattle. He accepted a pension from the French emperor and spent the rest of his life between his wife and Godoy. He died at Rome on the 20th of January 1819, probably without having once suspected that he had done anything unbecoming a king by divine right and a gentleman.

See Historia del Reinado de Carlos IV., by General Gomez de Arteche (3 vols.), in the Historia General de Espana de la Real Academia de la Historia (Madrid, 1892, &c).

SWEDEN]

CHARLES IX.— X.

927

CHARLES IX. (1550-1611), king of Sweden, was the youngest son of Gustavus Vasa and Margareto Lejonhufrud. By his father’s will he got, by way of appanage, the duchy of Soderman- land, which included the provinces of Nerike and Vermland; but he did not come into actual possession of them till after the fall of Eric XIV. (1569). In 1568 he was the real leader of the rebellion against Eric, but took no part in the designs of his brother John against the unhappy king after his deposition. Indeed, Charles’s relations with John III. were always more or less strained. He had no sympathy with John’s high-church tendencies on the one hand, and he sturdily resisted all the king’s endeavours to restrict his authority as duke of Sodermanland (Sudermania) on the other. The nobility and the majority of the Riksdag supported John, however, in his endeavours to unify the realm, and Charles had consequently (1587) to resign his pretensions to autonomy within his duchy; but, fanatical Calvinist as he was, on the

religious question he was immovable. The matter came to a crisis on the death of John III. (1592). The heir to the throne was John's eldest son, Sigismund, already king of Poland and a devoted Catholic. The fear lest Sigismund might re-catholicize the land alarmed the Protestant majority in Sweden, and Charles came forward as their champion, and also as the defender of the Vasa dynasty against foreign interference. It was due entirely to him that Sigismund was forced to confirm the resolutions of the council of Upsala, thereby recognizing the fact that Sweden was essentially a Protestant state (see Sweden: History). In the ensuing years Charles's task was extraordinarily difficult. He had steadily to oppose Sigismund 's reactionary tendencies; he had also to curb the nobility, which he did with cruel rigour. Necessity compelled him to work rather with the people than the gentry; hence it was that the Riksdag assumed under his government a power and an im- portance which it had never possessed before. In 1595 the Riksdag of Soderkoping elected Charles regent, and his attempt to force Klas Flemming, governor of Finland, to submit to his authority, rather than to that of the king, provoked a civil war. Technically Charles was, without doubt, guilty of high treason, and the considerable minority of all classes which adhered to Sigismund on his landing in Sweden in 1598 indisputably behaved like loyal subjects. But Sigismund was both an alien and a heretic to the majority of the Swedish nation, and his formal deposition by the Riksdag in 1599 was, in effect, a natural vindica- tion and legitimation of Charles's position. Finally, the diet of Linkoping (Feb. 24, 1600) declared that Sigismund and his posterity had forfeited the Swedish throne, and, passing over duke John, the second son of John III., a youth of ten, recognized duke Charles as their sovereign under the title of Charles IX.

Charles's short reign was an uninterrupted warfare. The hos- tility of Poland and the break up of Russia involved him in two overseas contests for the possession of Livonia and Ingria, while his pretensions to Lapland brought uponjiim a war with Denmark in the last year of his reign. In all these struggles he was more or less unsuccessful, owing partly to the fact that he had to do with superior generals (e.g. Chodkiewicz and Christian IV.) and partly to sheer ill-luck. Compared with his foreign policy, the domestic policy of Charles IX. was com- paratively unimportant. It aimed at confirming and supple- menting what had already been done during his regency. Not till the 6th of March 1604, after Duke John had formally renounced his rights to the throne, did Charles

IX. begin to style himself king. The first deed in which the title appears is dated the 20th of March 1604; but he was not crowned till the 15th of March 1607. Four and a half years later Charles IX. died at Nykbping (Oct. 30, 161 1). As a ruler he is the link between his great father and his still greater son. He consolidated the work of Gustavus Vasa, the creation of a great Protestant state: he prepared the way for the erection of the Protestant empire of Gustavus Adolphus. Swedish historians have been excusably indulgent to the father of their greatest ruler. Indisputably Charles was cruel, ungenerous and vindictive; yet he seems, at all hazards, strenuously to have endeavoured to do his duty during a period of political and religious transition, and, despite

his violence and brutality, possessed many of the qualities of a wise and courageous statesman. By his first wife Marie, daughter of the elector palatine Louis VI., he had six children, of whom only one daughter, Catherine, survived; by his second wife, Christina, daughter of Adolphus, duke of Holstein-Gottorp, he had five children, including Gustavus Adolphus and Charles Philip, duke of Finland.

See Sveriges Historia, vol. iii. (Stockholm, 1878) ; Robert Nisbet Bain, Scandinavia (Cambridge, 1905), caps. 5-7. (R. N. B.)

CHARLES X. [Charles Gustavus] (1622-1660), king of Sweden, son of John Casimir, count palatine of Zweibriicken, and Catherine, sister of Gustavus Adolphus, was born at Nykop- ing Castle on the 8th of November 1622. He learnt the art of war under the great Lennart Torstensson, being present at the second battle of Breitenfeld and at Jankowitz. From 1646 to 1648 he frequented the Swedish court. It was supposed that he would marry the queen regnant, Christina, but her unsur- mountable objection to wedlock put an end to these anticipations, and to compensate her cousin for a broken half-promise she declared him (1649) her successor, despite the opposition of the senate headed by the venerable Axel Oxenstjerna. In 1648 he was appointed generalissimo of the Swedish forces in Germany. The conclusion of the treaties of Westphalia prevented him from winning the military laurels he so ardently desired, but as the Swedish plenipotentiary at the executive congress of Nuremberg, he had unrivalled opportunities of learning diplomacy, in which science he speedily became a past-master. As the recognized heir to the throne, his position on his return to Sweden was not without danger, for the growing discontent with the queen

turned the eyes of thousands to him as a possible deliverer. He therefore withdrew to the isle of Oland till the abdication of Christina (June 5, 1654) called him to the throne.

The beginning of his reign was devoted to the healing of domestic discords, and the rallying of all the forces of the nation round his standard for a new policy of conquest. He contracted a political marriage (Oct. 24, 1654) with Hedwig Leonora, the daughter of Frederick III., duke of Holstein-Gottorp, by way of securing a future ally against Denmark. The two great pressing national questions, war and the restitution of the alienated crown lands, were duly considered at the Riksdag which assembled at Stockholm in March 1655. The war question was decided in three days by a secret committee presided over by the king, who easily persuaded the delegates that a war with Poland was necessary and might prove very advantageous; but the consideration of the question of the subsidies due to the crown for military purposes was postponed to the following Riksdag (see Sweden: History). On the 10th of July Charles quitted Sweden to engage in his Polish adventure. By the time war was declared he had at his disposal 50,000 men and 50 warships. Hostilities had already begun with the occupation of Dunaburg (Dvinsk) in Polish Livonia by the Swedes (July 1, 1655), and the Polish army encamped among the marshes of the Netze concluded a convention (July 25) whereby the palatinates of Posen and Kalisz placed themselves under the protection of the Swedish king. Thereupon the Swedes entered Warsaw without opposition and occupied the whole of Great Poland. The Polish king, John Casimir, fled to Silesia. Meanwhile Charles pressed on towards Cracow, which was captured after a two months' siege. The fall of Cracow extinguished the last hope of the boldest Pole; but before the end of the year an extraordinary reaction began in Poland itself. On the 18th of October the Swedes invested the fortress-monastery of Czenstochowa, but the place was heroically defended; and after a seventy days' siege the besiegers were compelled to retire with great loss.

This astounding success elicited an outburst of popular enthusiasm which gave the war a national and religious character. The tactlessness of Charles, the rapacity of his generals, the barbarity of his mercenaries, his refusal to legalize his position by summoning the Polish diet, his negotiations for the partition of the very state he affected to befriend, awoke the long slumber- ing public spirit of the country. In the beginning of 1656 John Casimir returned from exile and the Polish army was

reorganized

and increased. By this time Charles had discovered that it was easier to defeat the Poles than to conquer Poland. His chief object, the conquest of Prussia, was still unaccomplished, and a new foe arose in the elector of Brandenburg, alarmed by the ambition of the Swedish king. Charles forced the elector, indeed, at the point of the sword to become his ally and vassal (treaty of Konigsberg, Jan. 17, 1656); but the Polish national rising now imperatively demanded his presence in the south. For weeks he scoured the interminable snow-covered plains of Poland in pursuit of the Polish guerillas, penetrating as far south as Jaroslau in Galicia, by which time he had lost two-thirds of his 15,000 men with no apparent result. His retreat from Jaroslau to Warsaw, with the fragments of his host, amidst three converging armies, in a marshy forest region, intersected in every direction by well-guarded rivers, was one of his most brilliant achievements. But his necessities were overwhelming. On the 21st of June Warsaw was retaken by the Poles, and four days later Charles was obliged to purchase the assistance of Frederick William by the treaty of Marienburg. On July 18-20 the combined Swedes and Brandenburgers, 18,000 strong, after a three days' battle, defeated John Casimir's army of 100,000 at Warsaw and reoccupied the Polish capital; but this brilliant feat of arms was altogether useless, and when the suspicious attitude of Frederick William compelled the Swedish king at last to open negotiations with the Poles, they refused the terms offered, the war was resumed, and Charles concluded an offensive and defensive alliance with the elector of Brandenburg (treaty of Labiau, Nov. 20) whereby it was agreed that Frederick William and his heirs should henceforth possess the full sovereignty of East Prussia.

This was an essential modification of Charles's Baltic policy; but the alliance of the elector had now become indispensable on almost any terms. So serious, indeed, were the difficulties of Charles X. in Poland that it was with extreme satisfaction that he received the tidings of the Danish declaration of war (June 1, 1657). The hostile action of Denmark enabled him honourably to emerge from the inglorious Polish imbroglio, and he was certain

of the zealous support of his own people. He had learnt from Torstensson that Denmark was most vulnerable if attacked from the south, and, imitating the strategy of his master, he fell upon her with a velocity which paralysed resist- ance. At the end of June 1657, at the head of 8000 seasoned veterans, he broke up from Bromberg in Prussia and reached the borders of Holstein on the 18th of July. The Danish army at once dispersed and the duchy of Bremen was recovered by the Swedes, who in the early autumn swarmed over Jutland and firmly established themselves in the duchies. But the fortress of Fredriksodde (Fredericia) held Charles's little army at bay from mid-August to mid-October, while the fleet of Denmark, after a stubborn two days' battle, compelled the Swedish fleet to abandon its projected attack on the Danish islands. The position of the Swedish king had now become critical. In July an offensive and defensive alliance was concluded between Den- mark and Poland. Still more ominously, the elector of Branden- burg, perceiving Sweden to be in difficulties, joined the league against her and compelled Charles to accept the proffered mediation of Cromwell and Mazarin. The negotiations foundered, however, upon the refusal of Sweden to refer the points in dispute to a general peace-congress, and Charles was still further encouraged by the capture of Fredriksodde (Oct. 23-24), whereupon he began to make preparations for conveying his troops over to Funen in transport vessels. But soon another and cheaper expedient presented itself. In the middle of December 1657 began the great frost which was to be so fatal to Denmark. In a few weeks the cold had grown so intense that eˆen the freezing of an arm of the sea with so rapid a current as the Little Belt became a conceivable possibility; and hence- forth meteorological observations formed an essential part of the strategy of the Swedes. On the 28th of January 1658, Charles X. arrived at Haderslev (Hadersleben) in South Jutland, when it was estimated that in a couple of days the ice of the Little Belt would be firm enough to bear even the passage of a

mail-clad host. The cold during the night of the 20th of January was most severe; and early in the morning of the 30th the Swedish king gave the order to start, the horsemen dismounting where the ice was weakest, and cautiously leading their horses as far apart as possible, when they swung into their saddles again, closed their ranks and made a dash for the shore. The Danish troops lining the opposite coast were quickly over- powered, and the whole of Funen was won with the loss of only two companies of cavalry, which disappeared under the ice while fighting with

the Danish left wing. Pursuing his irresistible march, Charles X., with his eyes fixed steadily on Copenhagen, resolved to cross the frozen Great Belt also. After some hesita- tion, he accepted the advice of his chief engineer officer Eric Dahlberg, who acted as pioneer throughout and chose the more circuitous route from Svendborg, by the islands of Langeland, Laaland and Falster, in preference to the direct route from Nyborg to Korsor, which would have been across a broad, almost uninterrupted expanse of ice. Yet this second adventure was not embarked upon without much anxious consideration. A council of war, which met at two o'clock in the morning to consider the practicability of Dahlberg's proposal, at once dismissed it as criminally hazardous. Even the king wavered for an instant; but, Dahlberg persisting in his opinion, Charles overruled the objections of the commanders. On the night of the 5 th of February the transit began, the cavalry leading the way through the snow-covered ice, which quickly thawed beneath the horses' hoofs so that the infantry which followed after had to wade through half an ell of sludge, fearing every moment lest the rotting ice should break beneath their feet. At three o'clock in the afternoon, Dahlberg leading the way, the army reached Grimsted in Laaland without losing a man On the 8th of February Charles reached Falster. On the nth he stood safely on the s6il of Sjaelland (Zealand). Not without reason did the medal struck to commemorate " the glorious transit of the Baltic Sea " bear the haughty inscription: Natura hoc debuit uni. An exploit unique in history had been achieved. The crushing effect of this unheard-of achievement on the Danish government found expression in the treaties of Taastrup (Feb. 18) and Roskilde (Feb. 26, 1658), whereby Denmark sacrificed nearly half her territory to save the rest (see Denmark: History). But even this was not enough for the conqueror. Military ambition and greed of conquest moved Charles X. to what, divested of all its pomp and circumstance, was an outrageous act of political brigandage. At a council held at Gottorp (July 7), Charles X. resolved to wipe from the map of Europe an inconvenient rival, and without any warning, in defiance of all international equity, let loose his veterans upon Denmark a second time. For the details of this second struggle, with the concomitant diplomatic intervention of the western powers, see Denmark: History, and Sweden: History. Only after great hesitation would Charles X. consent to reopen negotiations with Denmark direct, at the same time proposing to exercise pressure upon the enemy by a simultaneous winter campaign in Norway. Such an enterprise necessitated fresh subsidies from his

already impoverished people, and obliged him in December 1659 to cross over to Sweden to meet the estates, whom he had summoned to Gothenburg. The lower estates murmured at the imposition of fresh burdens; and Charles had need of all his adroitness to persuade them that his demands were reasonable and necessary. At the very beginning of the Riksdag, in January 1660, it was noticed that the king was ill; but he spared himself as little in the council-chamber as in the battle-field, till death suddenly overtook him on the night of the 13 th of February 1660, in his thirty-eighth year. The abrupt cessation of such an inexhaustible fount of enterprise and energy was a distinct loss to Sweden; and signs are not wanting that, in his latter years, Charles had begun to feel the need and value of repose. Had he lived long enough to overcome his martial ardour, and develop and organize the empire he helped to create, Sweden might perhaps have remained a great power to this day. Even so she owes her natural frontiers in the Scandinavian peninsula to Charles X.

SWEDEN]

See Martin Veibull, Sveriges Storhedstid (Stockholm, 1881); Frederick Ferdinand Carlson, Sveriges Historia under Konungarne af Pfalziska Huset (Stockholm, 1 883-1 885) ; E. Haumant, La Guerre du nord et la paix d'Oliva (Paris, 1893); Robert Nisbet Bam, Scandi- navia (Cambridge, 1905) ; G. Jones, The Diplomatic Relations between Cromwell and Charles X (Lincoln, Nebraska, 1897). (R.N.B.)

CHARLES XI. (1655-1697), king of Sweden, the only son of Charles X., and Hedwig Leonora of Holstein-Gottorp, was born in the palace at Stockholm, on the 24th of November 1655. His father, who died when the child was in his fourth year, left the care of his education to the regents whom he had ap- pointed. So shamefully did they neglect their duty that when, at the age of seventeen, Charles XL attained his majority, he was ignorant of the very rudiments of state-craft and almost illiterate. Yet those nearest to him had great hopes of him. He was known to be truthful, upright and God-fearing; if he had neglected his studies it was to devote himself to manly sports and exercises; and in the pursuit of his favourite pastime, bear-hunting, he had already given proofs of the most splendid courage. It was the general disaster produced by the speculative policy of his former guardians which first called forth his sterling qualities and hardened him into a premature manhood. With indefatigable

energy he at once attempted to grapple with the difficulties of the situation, waging an almost desperate struggle with sloth, corruption and incompetence. Amidst universal anarchy, the young king, barely twenty years of age, inex- perienced, ill-served, snatching at every expedient, worked day and night in his newly-formed camp in Scania (Skane) to arm the nation for its mortal struggle. The victory of Fyllebro (Aug. 17, 1676), when Charles and his commander-in-chief S. G. Helmfeld routed a Danish division, was the first gleam of good luck, and on the 4th of December, on the tableland of Helgonaback, near Lund, the young Swedish monarch defeated Christian V. of Denmark, who also commanded his army in person. After a ferocious contest, the Danes were practically annihilated. The battle of Lund was, relatively to the number engaged, one of the bloodiest engagements of modern times. More than half the combatants (8357, of whom 3000 were Swedes) actually perished on the battle-field. All the Swedish commanders showed remarkable ability, but the chief glory of the day indisputably belongs to Charles XL This great victory restored to the Swedes their self-confidence and prestige. In the following year, Charles with 9000 men routed 12,000 Danes near Malmo (July 15, 1678). This proved to be the last pitched battle of the war, the Danes never again venturing to attack their once more invincible enemy in the open field. In 1679 Louis XIV. dictated the terms of a general pacification, and Charles XL, who bitterly resented ” the insufferable tutelage ” of the French king, was forced at last to acquiesce in a peace which at least left his empire practically intact. Charles devoted the rest of his life to the gigantic task of rehabilitating Sweden by means of a reduktion, or recovery of alienated crown lands, a process which involved the examination of every title deed in the kingdom, and resulted in the complete readjustment of the finances. But vast as it was, the reduktion represents only a tithe of Charles XL ‘s immense activity. The constructive part of his administra- tion was equally thorough-going, and entirely beneficial. Here, too, everything was due to his personal initiative. Finance, commerce, the national armaments by sea and land, judicial procedure, church government, education, even art and science — everything, in short — emerged recast from his shaping hand. Charles XL died on the 5th of April 1697, in his forty-first year. By his beloved consort Ulrica Leonora of Denmark, from the shock of whose death in July 1693 he never recovered, he had seven children, of whom only three survived him, a son Charles, and two daughters, Hedwig Sophia, duchess of Holstein, and Ulrica

Leonora, who ultimately succeeded her brother on the Swedish throne. After Gustavus Vasa and Gustavus Adolphus Charles XL was, perhaps, the greatest of all the kings of Sweden. His modest, homespun figure has indeed been unduly eclipsed by the brilliant and colossal shapes of his heroic father and his meteoric son; yet in reality Charles XL is far worthier of admiration than either Charles X. or Charles XII. He was in

an eminent degree a great master-builder. He found Sweden in ruins, and devoted his whole life to laying the solid founda- tions of a new order of things which, in its essential features, has endured to the present day.

See Martin Veibull, Sveriges Storhedstid (Stockholm, 1881); Frederick Ferdinand Carlson, Sveriges Historia under Konungarne af Pfalziska Huset (Stockholm, 1883-1885); Robert Nisbet Bain, Scandinavia (Cambridge, 1905); O. Sjogren, Karl den Elfte och Svenska Folket (Stockholm, 1897); S. Jacobsen, Den nordiske Kriegs Kronicke, 1675-1679 (Copenhagen, 1897); J. A. de Mesmes d'Avaux, Neeociations du comte d'Avaux, 1603, 1697, 1698 (Utrecht, 1882, &c). (R- N. B.)

CHARLES XII. (1682-1 7 1 8) , king of Sweden, the only surviving son of Charles XL and Ulrica Leonora, daughter of Frederick III. of Denmark, was born on the 17th of June 1682. He was care- fully educated by excellent tutors under the watchful eyes of his parents. His natural parts were excellent; and a strong bias in the direction of abstract thought, and mathematics in particular, was noticeable at an early date. His memory was astonishing. He could translate Latin into Swedish or German, or Swedish or German into Latin at sight. Charles XL personally supervised his son's physical training. He was taught to ride before he was four, at eight was quite at home in his saddle, and when only eleven, brought down his first bear at a single shot. As he grew older his father took him on all his rounds, reviewing troops, inspecting studs, foundries, dockyards and granaries. Thus the lad was gradually initiated into all the minutiae of administration. The influence of Charles XL over his son was, indeed, far greater than is commonly supposed, and it accounts for much in Charles XII. 's character which is otherwise inexplicable, for instance his precocious reserve and taciturnity, his dislike of everything

French, and his inordinate contempt for purely diplomatic methods. On the whole, his early training was admirable; but the young prince was not allowed the opportunity of gradually gaining experience under his guardians. At the Riksdag assembled at Stockholm in 1697, the estates, jealous of the influence of the regents, offered full sovereignty to the young monarch, the senate acquiesced, and, after some hesitation, Charles at last declared that he could not resist the urgent appeal of- his subjects and would take over the government of the realm " in God's name." The subsequent coronation was marked by portentous novelties, the most significant of which was the king's omission to take the usual coronation oath, which omission was interpreted to mean that he considered himself under no obligation to his subjects. The general opinion of the young king was, however, still favourable. His conduct was evidently regulated by strict principle and not by mere caprice. His refusal to counte- nance torture as an instrument of judicial investigation, on the ground that " confessions so extorted give no sure criteria for forming a judgment," showed him to be more humane as well as more enlightened than the majority of his council, which had defended the contrary opinion. His intense application to affairs is noted by the English minister, John Robinson (1650-1723), who informed his court that there was every prospect of a happy reign in Sweden, provided his majesty were well served and did not injure his health by too much work.

The coalition formed against Sweden by Johann Reinhold Patkul, which resulted in the outbreak of the Great Northern War (1699) , abruptly put an end to Charles XII.'s political apprentice- ship, and forced into his hand the sword he was never again to relinquish. The young king resolved to attack the nearest of ■ his three enemies — Denmark — first. The timidity of the Danish admiral Ulrik C. Gyldenlove, and the daring of Charles, who forced his nervous and protesting admiral to attempt the passage of the eastern channel of the Sound, the dangerous flinterend, hitherto reputed to be unnavigable, enabled the Swedish king to effect a landing at Humleback in Sjaelland (Zealand), a few miles north of Copenhagen (Aug. 4, 1700). He now hoped to accomplish what his grandfather, fifty years before, had vainly attempted — the destruction of the Danish-Norwegian monarchy by capturing its capital. But for once prudential considerations prevailed, and the short and bloodless war was terminated by the peace of Travendal (Aug. 18), whereby

Frederick IV. conceded full sovereignty to Charles's ally and kinsman the duke of Gottorp, besides paying him an indemnity of 200,000 rix-dollars and solemnly engaging to commit no hostilities against Sweden in future. From Sjaelland Charles now hastened to Livonia with 8000 men. On the 6th of October he had reached Pernau, with the intention of first relieving Riga, but, hearing that Narva was in great straits, he decided to turn northwards against the tsar. He set out for Narva on the 13th of November, against the advice of all his generals, who feared the effect on untried troops of a week's march through a wasted land, along boggy roads guarded by no fewer than three formidable passes which a little engineering skill could easily have made impregnable. Fortunately, the two first passes were unoccupied; and the third, Pyhajoggi, was captured by Charles, who with 400 horsemen put 6000 Russian cavalry to flight. On the 19th of November the little army reached Lagena, a village about 9 m. from Narva, whence it signalled its approach to the beleaguered fortress, and early on the following morning it advanced in battle array. The attack on the Russian fortified camp began at two o'clock in the afternoon, in the midst of a violent snowstorm; and by nightfall the whole position was in the hands of the Swedes: the Russian army was annihilated. The triumph was as cheap as it was crushing; it cost Charles less than 2000 men.

After Narva, Charles XII. stood at the parting of ways. His best advisers urged him to turn all his forces against the panic-stricken Muscovites; to go into winter-quarters amongst them and live at their expense; to fan into a flame the smouldering discontent caused by the reforms of Peter the Great, and so disable Russia for some time to come. But Charles's determination promptly to punish the treachery of Augustus prevailed over every other consideration. It is easy from the vantage- point of two centuries to criticize Charles XII. for neglecting the Russians to pursue the Saxons; but at the beginning of the 18th century his decision was natural enough. The real question was, which of the two foes was the more dangerous, and Charles had many reasons to think the civilized and martial Saxons far more formidable than the imbecile Muscovites. Charles also rightly felt that he could never trust the treacherous Augustus to remain quiet, even if he made peace with him. To leave such a foe in his rear, while

he plunged into the heart of Russia would have been hazardous indeed. From this point of view Charles's whole Polish policy, which has been blamed so long and so loudly— the policy of placing a nominee of his own on the Polish throne — takes quite another complexion: it was a policy not of overvaulting ambition, but of prudential self-defence.

First, however, Charles cleared Livonia of the invader (July 1 701), subsequently occupying the duchy of Courland and converting it into a Swedish governor-generalship. In January 1702 Charles established himself at Bielowice in Lithuania, and, after issuing a proclamation declaring that " the elector of Saxony " had forfeited the Polish crown, set out for Warsaw, which he reached on the 14th of May. The cardinal-primate was then sent for and commanded to summon a diet, for the purpose of deposing Augustus. A fortnight later Charles quitted Warsaw, to seek the elector; on the 2nd of July routed the combined Poles and Saxons at Klissow; and three weeks later, captured the fortress of Cracow by an act of almost fabulous audacity. Thus, within four months of the opening of the campaign, the Polish capital and the coronation city were both in the possession of the Swedes. After Klissow, Augustus made every effort to put an end to the war, but Charles would not even consider his offers. By this time, too, he had conceived a passion for the perils and adventures of warfare. His character was hardening, and he deliberately adopted the most barbarous expedients for converting the Augustan Poles to his views. Such commands as " ravage, singe, and burn all about, and reduce the whole district to a wilderness! " " sweat contribu- tions well out of them!" "rather let the innocent suffer than the guilty escape!" became painfully frequent in the mouth of the young commander, not yet 21, who was far from being naturally cruel.

The campaign of 1703 was remarkable for Charles's victory at Pultusk (April 21) and the long siege of Thorn, which occupied him eight months but cost him only 50 men. On the 2nd of July 1704, with the assistance of a bribing fund, Charles's ambassador at Warsaw, Count Arvid Bernard Horn, succeeded in forcing through the election of Charles's candidate to the Polish throne, Stanislaus Leszczynski, who could not be crowned however till the 24th of September 1705, by which time the Saxons had again been defeated at Punitz. From the autumn of 1705 to the spring of 1706, Charles was occupied in pursuing the Russian auxiliary army under Ogilvie through the forests of Lithuania. On the 5 th of August, he recrossed the Vistula and established himself in

Saxony, where his presence in the heart of Europe, at the very crisis of the war of the Spanish Succession, fluttered all the western diplomats. The allies, in particular, at once suspected that Louis XIV. had bought the Swedes. Marlborough was forthwith sent from the Hague to the castle of Altranstadt near Leipzig, where Charles had fixed his headquarters, " to endeavour to penetrate the designs " of the king of Sweden. He soon convinced himself that western Europe had nothing to fear from Charles, and that no bribes were necessary to turn the Swedish arms from Germany to Russia. Five months later (Sept. 1707) Augustus was forced to sign the peace of Altranstadt, whereby he resigned the Polish throne and renounced every anti-Swedish alliance. Charles's departure from Saxony was delayed for twelve months by a quarrel with the emperor. The court of Vienna had treated the Silesian Protestants with tyrannical severity, in direct contravention of the treaty of Osnabriick, of which Sweden was one of the guarantors; and Charles demanded summary and complete restitution so dictatorially that the emperor prepared for war. But the allies interfered in Charles's favour, lest he might be tempted to aid France, and induced the emperor to satisfy all the Swedish king's demands, the maritime Powers at the same time agreeing to guarantee the provisions of the peace of Altranstadt.

Nothing now prevented Charles from turning his victorious arms against the tsar; and on the 13th of August 1707, he evacuated Saxony at the head of the largest host he ever com- manded, consisting of 24,000 horse and 20,000 foot. Delayed during the autumn months in Poland by the tardy arrival of reinforcements from Pomerania, it was not till November 1707 that Charles was able to take the field. On New Year's Day 1708 he crossed the Vistula, though the ice was in a dangerous condition. On the 4th of July 1 708 he cut in two the line of the Russian army, 6 m. long, which barred his progress on the Wabis, near Holowczyn, and compelled it to retreat. The victory of Holowczyn, memorable besides as the last pitched battle won by Charles XII., opened up the way to the Dnieper. The Swedish army now began to suffer severely, bread and fodder running short, and the soldiers subsisting entirely on captured bullocks. The Russians slowly retired before the invader, burning and destroying everything in his path. On the 20th of December it was plain to Charles himself that Moscow was inaccessible. But the idea of a retreat was intolerable to him, so he determined to march southwards instead of northwards as suggested by his generals,

and join his forces with those of the hetman of the Dnieperian Cossacks, Ivan Mazepa, who had 100,000 horsemen and a fresh and fruitful land at his disposal. Short of falling back upon Livonia, it was the best plan adoptable in the circumstances, but it was rendered abortive by Peter's destruction of Mazepa's capital Baturin, so that when Mazepa joined Charles at Horki, on the 8th of November 1708, it was as a ruined man with little more than 1300 personal attendants (see Mazepa-Koledinsky). A still more serious blow was the destruction of the relief army which Levenhaupt was bringing to Charles from Livonia, and which, hampered by hundreds of loaded wagons, was overtaken and almost destroyed by Peter at Lyesna after a two days' battle against fourfold odds (October), The very elements now began to fight against the perishing but still unconquered host. The winter of 1708 was the severest that Europe had known for a century. By the 1st of November

firewood would not ignite in the open air, and the soldiers warmed themselves over big bonfires of straw. By the time the army reached the little Ukrainian fortress of Hadjacz in January 1709, wine and spirits froze into solid masses of ice; birds on the wing fell dead; saliva congealed on its passage from the mouth to the ground. " Nevertheless," says an eye-witness, " though earth, sea and sky were against us, the king's orders had to be obeyed and the daily march made."

Never had Charles XII. seemed so superhuman as during these awful days. It is not too much to say that his imperturb- able equanimity, his serene bonhomie kept the host together. The frost broke at the end of February 1 709, and then the spring floods put an end to all active operations till May, when Charles began the siege of the fortress of Poltava, which he wished to make a base for subsequent operations while awaiting reinforce- ments from Sweden and Poland. On the 7 th of June a bullet wound put Charles hors de combat, whereupon Peter threw the greater part of his forces over the river Vorskla, which separated the two armies (June 19-25). On the 26th of June Charles held a council of war, at which it was resolved to attack the Russians in their entrenchments on the following day. The Swedes joyfully

accepted the chances of battle and, advancing with irresistible elan, were, at first, successful on both wings. Then one or two tactical blunders were committed; and the tsar, taking courage, enveloped the little band in a vast semicircle bristling with the most modern guns, which fired five times to the Swedes' once, and swept away the guards before they could draw their swords. The Swedish infantry was well nigh annihilated, while the 14,000 cavalry, exhausted and demoralized, surrendered two days later at Perevolochna on Dnieper. Char! es himself with 1 500 horsemen took refuge in Turkish territory.

For the first time in his life Charles was now obliged to have recourse to diplomacy; and his pen proved almost as formid- able as his sword. He procured the dismissal of four Russo-phil grand-viziers in succession, and between 17 10 and 1712 induced the Porte to declare war against the tsar three times. But after November 171 2 the Porte had no more money to spare; and, the tsar making a show of submission, the sultan began to regard Charles as a troublesome guest. On the 1st of February 17 13 he was attacked by the Turks in his camp at Bender, and made prisoner after a contest which reads more like an extravagant episode from some heroic folk-tale than an incident of sober 18th-century history. Charles lingered on in Turkey fifteen months longer, in the hope of obtaining a cavalry escort suffi-ciently strong to enable him to restore his credit in Poland. Disappointed of this last hope, and moved by the despairing appeals of his sister Ulrica and the senate to return to Sweden while there was still a Sweden to return to, he quitted Demotika on the 20th of September 17 14, and attended by a single squire arrived unexpectedly at midnight, on the 1 ith of November, at Stralsund, which, excepting Wismar, was now all that remained to him on German soil.

For the diplomatic events of these critical years see Sweden: History. Here it need only be said that Sweden, during the course of the Great Northern War, had innumerable opportunities of obtaining an honourable and even advantageous peace, but they all foundered oh the dogged refusal of Charles to consent to the smallest concession to his despoilers. Even now he would listen to no offers of compromise, and after defending Stralsund with desperate courage till it was a mere rubbish heap, returned to Sweden after an absence of 14 years. Here he collected another army of 20,000 men, with which he so strongly entrenched himself on the Scanian coast in 17 16 that his combined enemies shrank from attacking him, whereupon he assumed the offensive

by attacking Norway in 17 17, and again in 17 18, in order to conquer sufficient territory to enable him to extort better terms from his enemies. It was during this second adventure that he met his death. On the nth of December, when the Swedish approaches had come within 280 paces of the fortress of Fredriksten, which the Swedes were closely besieging, Charles looked over the parapet of the foremost trench, and was shot through the head by a bullet from the fortress.

See Charles XII., Die eigenhandigen Briefe Kbnig Karls XII. (Berlin, 1894) ; Friedrich Ferdinand Carlson, Sveriges Historia under Konungarne af Pfalziska Huset (Stockholm, 1883-1885); Robert Nisbet Bain, Charles XII. and the Collapse of the Swedish Empire (London and Oxford, 1895) ; Bidrag til den Store Nordiske Krigs Historic (Copenhagen, 1899-1900); G. Syveton, Louis XIV et Charles XII (Paris, 1900) ; Daniel Krmann, Historia ablegationis D. Krmann ad regent Sueciae Carolum XII. (Budapest, 1894); Oscar II., N&gra bidrag till Sveriges Krigshistoria Aren 1711-1713 (Stockholm, 1892); Martin Weibull, Sveriges Storhedstid (Stockholm, 1881). (R. N. B.)

CHARLES XIIL (1748-1818), king of Sweden and Norway, the second son of Adolphus Frederick, king of Sweden, and Louisa Ulrica, sister of Frederick the Great, was born at Stock- holm on the 7th of October 1748. In 1772 he co-operated in the revolutionary plans of his brother Gustavus III. (q.v.). On the outbreak of the Russo-Swedish War of 1788 he served with distinction as admiral of the fleet, especially at the battles of Hogland (June 17, 1788) and Oland (July 26, 1789). On the latter occasion he would have won a signal victory but for the unaccountable remissness of his second-in-command, Admiral Liljehorn. On the death of Gustavus III., Charles, now duke of Sudermania, acted as regent of Sweden till 1796; but the real ruler of the country was the narrow-minded and vindictive Gustaf Adolf Reuterholm (q.v.), whose mischievous influence over him was supreme. These four years were perhaps the most miserable and degrading in Swedish history (an age of lead succeeding an age of gold, as it has well been called) and may be briefly described as alternations of fantastic jacobinism and ruthless despotism. On the accession of Gustavus IV. (November 1796), the duke became a mere cipher in politics till the 13th of March 1809, when those who had dethroned Gustavus IV. appointed him regent, and finally elected him king. But by this time he was prematurely decrepit, and Bernadotte (see Charles XIV.) took over the government as soon as he landed in Sweden

(1810). By the union of 1814 Charles became the first king of Sweden and Norway. He married his cousin Hedwig Elizabeth Charlotte of Holstein-Gottorp (1759-1818), but their only child, Carl Adolf, duke of Vermland, died in infancy (1798). Charles XIIL, who for eight years had been king only in title, died on the 5th of February 18 18.

See Sveriges Historia vol. v. (Stockholm, 1884) ; Drottning Hedwig Charlottes Dagbokshandteckningar (Stockholm, 1898); Robert Nisbet Bain, Gustavus III. and his Contemporaries (London, 1895); ib. Scandinavia (Cambridge, 1905). (R. N. B.)

CHARLES XIV. (1763-1844), king of Sweden and Norway, born at Pau on the 26th of January 1763, was the son of Henri Bernadotte (1711-1780), procurator at Pau, and Jeanne St Jean (1725-1809). The family name was originally Deu Pouey, but was changed into Bernadotte in the beginning of the 17th century. Bernadotte's christian names were Jean Baptiste; he added the name Jules subsequently. He entered the French army on the 3rd of September 1780, and first saw service in Corsica. On the outbreak of the Revolution his eminent military qualities brought him speedy promotion. In 1794 we find him as brigadier attached to the army of the Sambre et Meuse, and after Jourdan's victory at Fleurus he was appointed a general of division. At the battle of Theiningen, 1796, he contributed, more than any one else, to the successful retreat of the French army over the Rhine after its defeat by the archduke Charles. In 1797 he brought reinforcements from the Rhine to Bonaparte's army in Italy, distinguishing himself greatly at the passage of the Tagliamento, and in 1798 was sent as ambassador to Vienna, but was compelled to quit his post owing to the disturbances caused by his hoisting the tricolor over the embassy. On the 16th of August 1798 he married Desiree Clary (1777-1860), the daughter of a Marseilles banker, and sister of Joseph Bona- parte's wife. From the 2nd of July to the 14th of September he was war minister, in which capacity he displayed great ability. About this time he held aloof from Bonaparte, but though he declined to help Napoleon in the preparations for the coup d'etat of November 1 799, he accepted employment from the Consulate, and from April 1800 till the 18th of August 1801 commanded the army in La Vendee. On the introduction of the empire he

was made one of the eighteen marshals of France, and, from June 1804 to September 1805, acted as governor of the recently-occupied Hanover. During the campaign of 1805, Bernadotte with an army corps from Hanover co-operated in the great movement which resulted in the shutting up of Mack in Ulm. He was rewarded for his services at Austerlitz (December 2, 1805) by the principality of Ponte Corvo (June 5, 1806), but during the campaign against Prussia, the same year, was severely reproached by Napoleon for not participating with his army corps in the battles of Jena and Auerstadt, though close at hand. In 1808, as governor of the Hanse towns, he was to have directed the expedition against Sweden, via the Danish islands, but the plan came to nought because of the want of transports and the defection of the Spanish contingent. In the war against Austria, Bernadotte led the Saxon contingent at the battle of Wagram, on which occasion, on his own initiative he issued an order of the day, attributing the victory principally to the valour of his Saxons, which Napoleon at once disavowed.

Bernadotte, considerably piqued, thereupon returned to Paris, where the council of ministers entrusted him with the defence of the Netherlands against the English. In 1810 he was about to enter upon his new post of governor of Rome when he was, unexpectedly, elected successor to the Swedish throne, partly because a large part of the Swedish army, in view of future complications with Russia, were in favour of electing a soldier, and partly because Bernadotte was very popular in Sweden, owing to the kindness he had shown to the Swedish prisoners during the late war with Denmark. The matter was decided by one of the Swedish couriers, Baron Karl Otto Morner, who, entirely on his own initiative, offered the succession to the Swedish crown to Bernadotte. Bernadotte communicated Morner's offer to Napoleon, who treated the whole affair as an absurdity. Bernadotte thereupon informed Morner that he would not refuse the honour if he were duly elected. Although the Swedish government, amazed at Morner's effrontery, at once placed him under arrest on his return to Sweden, the candidature of Bernadotte gradually gained favour there, and, on the 21st of August 1810, he was elected crown-prince.

On the 2nd of November Bernadotte made his solemn entry into Stockholm, and on the 5th he received the homage of the estates and was adopted by Charles XIII. under the name of Charles John. The new crown-prince was very soon the most popular and the most powerful man in Sweden. The infirmity of the old king

and the dissensions in the council of state placed the government, and especially the control of foreign affairs, entirely in his hands. The keynote of his whole policy was the acquisition of Norway, a policy which led him into many tortuous ways (see Sweden: History), and made him a very tricky ally during the struggle with Napoleon in 18 13. Great Britain and Prussia very properly insisted that Charles John's first duty was to them, the former power rigorously protesting against the ˆexpenditure of her subsidies on the nefarious Norwegian adventure before the common enemy had been crushed. After the defeats of Ltitzen and Bautzen, it was the Swedish crown- prince who put fresh heart into the allies; and at the conference of Trachenberg he drew up the general plan for the campaign which began after the expiration of the truce of Plaswitz. Though undoubtedly sparing his Swedes unduly, to the just displeasure of the allies, Charles John, as commander-in-chief of the northern army, successfully defended the approaches to Berlin against Oudinot in August and against Ney in September; but after Leipzig he went his own way, determined at all hazards to cripple Denmark and secure Norway. For the events which led to the union of Norway and Sweden, see Sweden: History and Norway: History. As unional king, Charles XIV. (who succeeded to that title in 1 8 1 8 on the death of Charles XIII .) was popular in both countries. Though his ultra-conservative views were detested, and as far as possible opposed (especially after 1823), his dynasty was never in serious danger, and Swedes and Norsemen alike were proud of a monarch with a European reputation. It is true that the Riksdag of 1840 meditated com- pelling him to abdicate, but the storm blew over and his jubilee

was celebrated with great enthusiasm in 1843. He died at Stockholm on the 8th of March 1844. His reign was one of un-interrupted peace, and the great material development of the two kingdoms during the first half of the 19th century was largely due to his energy and foresight.

See J. E. Sars, Norges politiske Mstoria (Christiania, 1899) ; Yngvar Nielsen, Carl Johan som han virkelig var (Christiania, 1897) ; Johan Almen, Alien Bernadotte (Stockholm, 1893); C. Schefer, Bernadotte roi (Paris, 1899); G. R. Lagerhjelm, Napoleon och Carl Johan under Kriget i Tyskland, 1813 (Stockholm, 1891).
(R. N. B.)

CHARLES XV. (1826-1872), king of Sweden and Norway, eldest son of Oscar I., king of Sweden and Norway, and Josephine

Beauharnais of Leuchtenberg, was born on the 3rd of May 1826. On the 19th of June 1850 he married Louisa, daughter of Prince Frederick of the Netherlands. He became regent on the 25th of September 1857, and king on the death of his father (8th of July 1859). As crown-prince, Charles's brusque and downright manners had led many to regard his future accession with some apprehension, yet he proved to be one of the most popular of Scandinavian kings and a constitutional ruler in the best sense of the word. His reign was remarkable for its manifold and far-reaching reforms. Sweden's existing communal law (1862), ecclesiastical law (1863) and criminal law (1864) were enacted appropriately enough under the direction of a king whose motto was: "Build up the land upon the laws!" Charles XV. also materially assisted De Geer (q.v.) to carry through his memorable reform of the constitution in 1863. Charles was a warm advocate of " Scandinavianism " and the political solidarity of the three northern kingdoms, and his warm friendship for Frederick VII., it is said, led him to give half promises of help to Denmark on the eve of the war of 1864, which, in the circumstances, were perhaps misleading and unjustifiable. In view, however, of the unpreparedness of the Swedish army and the difficulties of the situation, Charles was forced to observe a strict neutrality. He died at Malmo on the 18th of September 1872. Charles XV. was highly gifted in many directions. Pie attained to some eminence as a painter, and his Digte show him to have been a true poet. He left but one child, a daughter, Louisa Josephina Eugenia, who in 1869 married the crown-prince Frederick of Denmark.

See Cecilia Baath-Holmberg, Carl XV., som enskild man, konung och konstndr (Stockholm, 1891); Yngvar Nielsen, Det nor she og svenske Kongehus fra 1S18 (Christiania, 1883). (R. N. B.)

CHARLES (c. 1310-1364), duke of Brittany, known as Charles or Blois and Charles of Chatillon, was the son of Guy of Ch&tillon, count of Blois (d. 1342), and of Marguerite of Valois, sister of Philip VI. of France. In 1337 he married Jeanne of Penthievre (d. 1384), daughter of Guy of Brittany, count of Penthievre (d. 133 1), and thus acquired a right to the succession of the duchy of Brittany. On the death of John III., duke of Brittany, in April 1341, his brother John, count of Montfort- l'Amaury, and his niece Jeanne, wife of Charles of Blois, disputed the succession. Charles of Blois, sustained by Philip VI., cap- tured John of Montfort, who was supported by King Edward III. at Nantes, besieged his wife Jeanne of Flanders at Hennebont, and took Quimper and Guerande (1344). But next year his partisans were

defeated at Cadoret, and in June 1347 he was himself wounded and taken prisoner at Roche-Derrien. He was not liberated until 1356, when he continued the war against the young John of Montfort, and perished in the battle of Auray, on the 29th of September 1364. Charles bore a high reputation for piety, and was believed to have performed miracles. The Roman Church has canonized him.

See Simeon Luce, Histoire de Bertrand du Guesclin et de son epoque (Paris, 1876).

CHARLES, called The Bold (1433-147 7), duke of Burgundy, son of Philip the Good of Burgundy and Isabella of Portugal, was born at Dijon on the 10th of November 1433. In his father's lifetime he bore the title of count of Charolais. He was brought up under the direction of the seigneur d'Auxy, and early showed great application to studyand also to warlike exercises. Although he was on familiar terms with the dauphin (afterwards Louis XL), when the latter was a refugee at the court of Burgundy, he could

not but view with chagrin the repurchase by the king of France of the towns on the Somme, which had been temporarily ceded to Philip the Good by the treaty of Arras; and when his father's failing health enabled him to take into his hands the reins of government (which Philip abandoned to him completely by an act of the 12th of April 1465), he entered upon his lifelong struggle against Louis XI., and became one of the principal leaders of the League of the Public Weal. His brilliant bravery at the battle of Montlhery (16th of July 1465), where he was wounded and was left master of the field, neither prevented the king frem re-entering Paris nor assured Charles a decisive victory. He succeeded, however, in forcing upon Louis the treaty of Conflans (1466), by which the king restored to him the towns on the Somme, and promised him the hand of his infant daughter Catherine, with Champagne as dowry. In the mean- while the count of Charolais obtained the surrender of Ponthieu. The revolt of Liege and Dinant intervened to divert his attention from the affairs of France. On the 25th of August 1466 Charles took possession of Dinant, which he pillaged and sacked, and succeeded in treating at the same time with the Liegeois. After the death of Philip the Good (15th June 1467), the Liegeois

renewed hostilities, but Charles defeated them at St Trond, and made a victorious entry into Liege, which he dismantled and deprived of some of its privileges.

Alarmed by these early successes of the duke of Burgundy, and anxious to settle various questions relating to the execution of the treaty of Conflans, Louis requested a meeting with Charles and placed himself in his hands at Peronne. In the course of the negotiations the duke was informed of a fresh revolt of the Liegeois secretly fomented by Louis. After deliberating for four days how to deal with his adversary, who had thus mala- droitly placed himself at his mercy, Charles decided to respect the parole he had given and to treat with Louis (October 1468), at the same time forcing him to assist in quelling the revolt. The town was carried by assault and the inhabitants were massacred, Louis not having the courage to intervene on behalf of his ancient allies. At the expiry of the one year's truce which followed the treaty of Peronne, the king accused Charles of treason, cited him to appear before the parlement, and seized some of the towns on the Somme (1471). The duke retaliated by invading France with a large army, taking possession of Nesle and massacring its inhabitants. He failed, however, in an attack on Beauvais, and had to content himself with ravaging the country as far as Rouen, eventually retiring without having attained any useful result.

Other matters, moreover, engaged his attention. Relin- quishing, if not the stately magnificence, at least the gay and wasteful profusion which had characterized the court of Bur- gundy under the preceding duke, he had bent all his efforts towards the development of his military and political power. Since the beginning of his reign he had employed himself in reorganizing his army and the administration of his territories. While retaining the principles of feudal recruiting, he had en- deavoured to establish a system of rigid discipline among his troops, which he had strengthened by taking into his pay foreign mercenaries, particularly Englishmen and Italians, and by developing his artillery. Furthermore, he had lost no oppor- tunity of extending his power. In 1469 the archduke of Austria, Sigismund, had sold him the county of Ferrette, and the land- graviate of Alsace and some other towns, reserving to himself the right to repurchase. In 147 2-1473 Charles bought the reversion of the duchy of Gelderland from its old duke, Arnold, whom he had supported against the rebellion of his son. Not content with being " the grand duke of the West," he conceived the project of forming a kingdom of Burgundy or Aries with him- self as

independent sovereign, and even persuaded the emperor Frederick to assent to crown him king at Trier. The ceremony, however, did not take place owing to the emperor's precipitate flight by night (September 1473), occasioned by his displeasure at the duke's attitude. In the following year Charles involved himself in a series of difficulties and struggles which ultimately brought about his downfall. He embroiled himself successively v. 30

with Sigismund of Austria, to whom he refused to restore his possessions in Alsace for the stipulated sum; with the Swiss, who supported the free towns of Alsace in their revolt against the tyranny of the ducal governor, Peter von Hagenbach (who was condemned and executed by the rebels in May 1474) ; and finally, with Rene of Lorraine, with whom he disputed the succession of Lorraine, the possession of which had united the two principal portions of Charles's territories — Flanders and the duchy and county of Burgundy. All these enemies, incited and supported as they were by Louis, were not long in joining forces against their common adversary. ' Charles suffered a first rebuff in endeavouring to protect his kinsman, the archbishop of Cologne, against his rebel subjects. He spent ten months (July 1474- June 1475) in besieging the little town of Neuss on the Rhine, but was compelled by the approach of a powerful imperial army to raise the siege. Moreover, the expedition he had persuaded his brother-in-law, Edward IV. of England, to undertake against Louis was stopped by the treaty of Picquigny (29th of August 147s)- He was more successful in Lorraine, where he seized Nancy (30th of November 1475). From Nancy he marched against the Swiss, hanging and drowning the garrison of Granson in spite of the capitulation. Some days later, however, he was attacked before Granson by the confederate army and suffered a shamful defeat, being compelled to fly with a handful of attendants, and leaving his artillery and an immense booty in the hands of the allies (February 1476). He succeeded in raising a fresh army of 30,000 men, with which he attacked Morat, but he was again defeated by the Swiss army, assisted by the cavalry of Rene of Lorraine (22nd of June 1476). On the 6th of October Charles lost Nancy, which was re-entered by Rene. Making a last effort, Charles formed a new army and arrived in the depth of winter before the walls of Nancy. Having lost many of his troops through the severe cold, it was with only a few thousand men that he met the joint forces of the Lorrainers and the Swiss, who had come to the relief of the town (6th of January 1477). He

himself perished in the fight, his mutilated body being discovered some days afterwards.

Charles the Bold has often been regarded as the last representative of the feudal spirit— -a man who possessed no other quality than a blind bravery — and accordingly has often been contrasted with his rival Louis XL as representing modern politics. In reality, he was a prince of wide knowledge and culture, knowing several languages and austere in morals; and although he cannot be acquitted of occasional harshness, he had the secret of winning the hearts of his subjects, who never refused him their support in times of difficulty. He was thrice married — to Catherine (d, 1446), daughter of Charles VII. of France, by whom he had one daughter, Mary, afterwards the wife of the Emperor Maximilian I.; to Isabella (d. 1465), daughter of Charles I., duke of Bourbon; and to Margaret of York, sister of Edward IV. of England, whom he married in 1468.

The original authorities for the life and times of Charles the Bold are the numerous French, Burgundian and Flemish chroniclers of the latter part of the 15th century. Special mention may be made of the Memoires of Philippe de Comines, and of the Memoires and other writings of Olivier de la Marche. See also A. Molinier, Les Sources de Vhistoire de France, tome iv. (1904), and the compendious biblio- graphy in U. Chevalier's Repertoire des sources historiques, part iii. (1904). Charles the Bold, by J. F. Kirk (1863-1868), is a good English biography for its date; a more recent life is R. Putnam's Charles the Bold (1908). For a general sketch of the relations between France and Burgundy at this time see E. Lavisse, Histoire de France, tome iv. (i9°2)- . (R. Po.)

CHARLES, called The Good (le Bon), or The Dane (c. 1084- 1127), count of Flanders, only son of St Canute or Knut IV., king of Denmark, by Adela, daughter of Robert the Frisian, count of Flanders, was born about 1084. After the assassination of Canute in 1086, his widow took refuge in Flanders, taking with her her son. Charles was brought up by his mother and grandfather, Robert the Frisian, on whose death he did great services to his uncle, Robert II., and his cousin, Baldwin VII., counts of Flanders. Baldwin died of a wound received in battle in 11 19, and, having no issue, left by will the succession to his countship to Charles the Dane. Charles did not secure his

heritage without a civil war, but he was speedily victorious and made his position secure by treating his opponents with great clemency. He now devoted himself to promoting the welfare of his subjects, and did his utmost to support the cause of Christianity, both by his bounty and by his example. He well deserved the surname of Le Bon, by which he is known to posterity. He refused the offer of the crown of Jerusalem on the death of Baldwin, and declined to be nominated as a candidate for the imperial crown in succession to the emperor Henry V. He was murdered in the church of St Donat at Bruges on the 2nd of March 1127.

See J. Perneel, Histoire du regne de Charles le Bon, precede d'un resume de I' histoire de Flandres (Brussels, 1830).

CHARLES I. (c. 050-c. 992), duke of Lower Lorraine, was a younger son of the Frankish king Louis IV., and consequently a member of the Carolingian family. Unable to obtain the duchy of Burgundy owing to the opposition of his brother, King Lothair, he went to the court of his maternal uncle, the emperor Otto the Great, about 965, and in 977 received from the emperor Otto II. the duchy of Lower Lorraine. His authority in Lorraine was nominal; but he aided Otto in his struggle with Lothair, and on the death of his nephew, Louis V., made an effort to secure the Frankish crown. Hugh Capet, however, was the successful candidate and war broke out. Charles had gained some successes and had captured Reims, when in 991 he was treacherously seized by Adalberon, bishop of Laon, and handed over to Hugh. Imprisoned with his wife and children at Orleans, Charles did not long survive his humiliation. His eldest son Otto, duke of Lower Lorraine, died in 1005.

CHARLES II. (d. 143 1), duke of Lorraine, called The Bold, is sometimes referred to as Charles I. A son of Duke John I., he succeeded his father in 1390; but he neglected his duchy and passed his life in warfare. He died on the 25th of January 143 1, leaving two daughters, one of whom, Isabella (d. 1453), married Rene I. of Anjou (1409-14ˆ0), king of Naples, who succeeded his father-in-law as duke of Lorraine.

CHARLES III. or II. (1 543-1608), called The Great, duke of Lorraine, was a son of Duke Francis I. (d. 1545), and a descendant of Rene of Anjou. He was only an infant when he

became duke, and was brought up at the court of Henry II. of France, marrying Henry's daughter Claude in 1559- He took part in the wars of religion in France, and was a member of the League; but he was overshadowed by his kinsmen the Guises, although he was a possible candidate for the French crown in 1589. The duke, who was an excellent ruler of Lorraine, died at Nancy on the 14th of May 1608. He had three sons: Henry (d. 1624) and Francis (d. 1632), who became in turn dukes of Lorraine, and Charles (d. 1607), bishop of Metz and Strassburg.

CHARLES IV. or III. (1604-1675), duke of Lorraine, was a son of Duke Francis II., and was born on the 5th of April 1604. He became duke on the abdication of his father in 1624, and obtained the duchy of Bar through his marriage with his cousin Nicole(d. i657),daughterof DukeHenry. Mixing in the tortuous politics of his time, he was in continual conflict with the crown of France, and spent much of his time in assisting her enemies and in losing and regaining his duchies (see Lorraine) . He lived an adventurous life, and in the intervals between his several struggles with France fought for the emperor Ferdinand II. at Nordlingen and elsewhere; talked of succouring Charles I. in England; and after the conclusion of the treaty of Westphalia in 1648 entered the service of Spain. He died on the 18th of ; September 1675, leaving by his second wife, Beatrix de Cusance (d. 1663), a son, Charles Henry, count of Vaudemont (1642-

1723)-

CHARLES V. or IV. (1643-1690), duke of Lorraine, nephew of Duke Charles IV., was born on the 3rd of April 1643, and in 1664 received a colonelcy in the emperor's army. In the same year he fought with distinction at the battle of St Gotthard, in which he captured a standard from the Turks. He was a can- didate for the elective crown of Poland in 1668. In 1670 the emperor made him general of horse, and during the following years he was constantly on active service, first against the Turks

and subsequently against the French. At Seneff (1674) he was wounded. In the same year he was again a candidate for the Polish crown, but was unsuccessful, John Sobieski, who was to be associated with him in his greatest feat of arms, being elected. In 167 s, on the death of Charles IV., he rode with a cavalry corps into the duchy of Lorraine, then occupied by the French, and secured the adhesion of the Lorraine troops to himself; a little after this he succeeded Montecucculi as general of the imperial

army on the Rhine, and was made a field marshal. The chief success of his campaign of 1676 was the capture of Philipsburg, after a long and arduous siege. The war continued without decisive result for some time, and the fate of the duchy, which was still occupied by the French, was the subject of endless diplomacy. At the general peace Charles had to accept the hard conditions imposed by Louis XIV., and he never entered into effective possession of his sovereignty In 1678 he married the widowed queen of Poland, Eleonora Maria of Austria, and for nearly five years they lived quietly at Innsbruck. The Turkish invasion of 1683, the last great effort of the Turks to impose their will on Europe, called Charles into the field again. At the •head of a weak imperial army the duke offered the best resistance he could to the advance of the Turks on Vienna. But he had to fall back, contesting every position, and the Turks finally invested Vienna (July 13th, 1683). At this critical moment other powers came to the assistance of Austria, reinforcements poured into Charles's camp, and John Sobieski, king of Poland, brought 27,000 Poles. Sobieski and Charles had now over 80,000 men, Poles, Austrians and Germans, and on the morning of the 1 2th of September they moved forward to the attack. By nightfall the Turks were in complete disorder, Vienna was relieved, and the danger was at an end. Soon the victors took the offensive and reconquered part of the kingdom of Hungary. The Germans and Poles went home in the winter, but Charles continued his offensive with the imperialists alone. Ofen (Buda) resisted his efforts in 1684, but in the campaign of 1685 Neuhausel was taken by storm, and in 1686 Charles, now reinforced by German auxiliaries, resumed the siege of Ofen. All attempts to relieve the place were repulsed, and Ofen was stormed on the 2nd of September. In the following campaign the Austrians won a decisive victory on the famous battle-ground of Mohacs (August 18th, 1687). In 1689 Charles took the field on the Rhine against the forces of Louis XIV., the enemy of his house. Mainz and Bonn were taken in the first campaign, but Charles in travelling from Vienna to the front died suddenly at Wels on the 18th of April 1690.

His eldest son, Leopold Joseph (1679-1729), at the peace of Ryswick in 1697 obtained the duchy, of which his father had been dispossessed by France, and was the father of Francis Stephen, duke of Lorraine, who became the husband of Maria Theresa {q.v.), and of Charles (Karl Alexander), a distinguished Austrian commander in the wars with Frederick the Great. The

duchy was ceded by Francis Stephen to Stanislaus Leczynski, the dethroned king of Poland, in 1736, Francis receiving in- stead the grand-duchy of Tuscany.

CHARLES II. [Charles Louis de Bourbon] (1799-1883), duke of Parma, succeeded his mother, Maria Louisa, duchess of Lucca, as duke of Lucca in 1824. He introduced economy into the administration, increased the schools, and in 1832 as a reaction against the bigotry of the priests and monks with which his mother had surrounded him, he became a Protestant. He at first evinced Liberal tendencies, gave asylum to the Modenese political refugees of 1831, and was indeed suspected of being a Carbonaro. But his profligacy and eccentricities soon made him the laughing-stock of Italy. In 1842 he returned to the Catholic Church and made Thomas Ward, an English groom, his prime minister, a man not without ability and tact. Charles gradually abandoned all his Liberal ideas, and in 1847 declared himself hostile to the reforms introduced by Pius IX. The Lucchesi demanded the constitution of 1805, promised them by the treaty of Vienna, and a national guard, but the duke, in spite of the warnings of Ward, refused all concessions. A few weeks later he retired to Modena, selling his life-interest

in the duchy to Tuscany. On the 17 th of October Maria Louisa of Austria, duchess of Parma, died, and Charles Louis succeeded to her throne by the terms of the Florence treaty, assuming the style of Charles II. His administration of Parma was character- ized by ruinous finance, debts, disorder and increased taxation, and he concluded an offensive and defensive alliance with Austria. But on the outbreak of the revolution of 1848 there were riots in his capital (19th of March), and he declared his readiness to throw in his lot with Charles Albert, the pope, and Leopold of Tuscany, repudiated the Austrian treaty and promised a constitution. Then he again changed his mind, abdicated in April, and left Parma in the hands of a provisional government, whereupon the people voted for union with Piedmont. After the armistice between Charles Albert and Austria (August 1848) the Austrian general Thurn occupied the duchy, and Charles II. issued an edict from Weistropp annulling the acts of the pro- visional government. When Piedmont attacked Austria again in 1849, Parma was evacuated, but reoccupied by General d'Aspre in April.

In May 1849 Charles confirmed his abdication, and was succeeded by his son Charles III. (1823-1854), who, protected by Austrian troops, placed Parma under martial law, inflicted heavy penalties on the members of the late provisional govern- ment, closed the university, and instituted a regular policy of persecution. A violent ruler, a drunkard and a libertine, he was assassinated on the 26th of March 1854. At his death his widow Maria Louisa, sister of the comte de Chambord, became regent, during the minority of his son Robert. The duchess introduced some sort of order into the administration, seemed inclined to rule more mildly and dismissed some of her husband's more obnoxious ministers, but the riots of the Mazzinians in July 1854 were repressed with ruthless severity, and the rest of her reign was characterized by political trials, executions and imprisonments, to which the revolutionists replied with assassinations.

Bibliography. — Massei, Storia civile di Lucca, vol. ii. (Lucca, 1878); Anon., Y Borboni di Parma . . . del 1847 al 1859 (Parma, i860) ; N. Bianchi, Storia delta diplomazia europea in Italia (Turin, 1865, &c), ; C. Tivaroni, V Italia sotto il dominio austriaco, ii. 96-101, i. 590-605 (Turin, 1892), and U Italia degli Italiani, i. 126-143 (Turin, 1895) by the same; S. Lottici and G. Sitti, Bibliografia generate per la storia parmense (Parma, 1904).

CHARLES [Karl Ludwig] (1771-1847), archduke of Austria and duke of Teschen, third son of the emperor Leopold II., was born at Florence (his father being then grand-duke of Tuscany) on the 5th of September 1 771. His youth was spent in Tuscany, at Vienna and in the Austrian Netherlands, where he began his career of military service in the war of the French Revolution. He commanded a brigade at Jemappes, and in the campaign of 1793 distinguished himself at the action of Aldenhoven and the battle of Neerwinden. In this year he became Statthalter in Belgium and received the army rank of lieutenant field marshal, which promotion was soon followed by that to Feldzeugmeister. In the remainder of the war in the Low Countries he held high commands, and he was present at Fleurus. In 1795 he served on the Rhine, and in the following year was entrusted with the chief control of all the Austrian forces on that river. His conduct of the operations against Jourdan and Moreau in 1796 marked him out at once as one of the greatest generals in Europe. At first falling back carefully and avoiding a decision, he finally marched away, leaving a mere screen in front of Moreau; falling upon Jourdan he beat him in the battles of Amberg and Wiirz- burg, and drove

him over the Rhine with great loss. He then turned upon Moreau's army, which he defeated and forced out of Germany. For this campaign, one of the most brilliant in •modern history, see French Revolutionary Wars. In 1797 he was sent to arrest the victorious march of General Bonaparte in Italy, and he conducted the retreat of the over-matched Austrians with the highest skill. In the campaign of 1799 he was once more opposed to Jourdan, whom he defeated in the battles of Osterach and Stokach, following up his success by invading Switzerland and defeating Massena in the (first) battle of Zurich, after which he re-entered Germany and drove

the French once more over the Rhine. Ill-health, however, forced him to retire to Bohemia, whence he was soon recalled to Undertake the task of checking Moreau's advance on Vienna. The result of the battle of Hohenlinden had, however, fore- doomed the attempt, and the archduke had to make the armistice of Steyer. His popularity was now such that the diet of Regensburg, which met in 1802, resolved to erect a statue in his honour and to give him the title of saviour of his country; but Charles refused both distinctions.

In the short and disastrous war of 1805 the archduke Charles commanded what was intended to be the main army, in Italy, but events made Germany the decisive theatre of operations, and the defeats sustained on the Danube neutralized the success obtained by the archduke over Massena in the desperately fought battle of Caldiero. With the conclusion of peace began his active work of army reorganization, which was first tested on the field in 1809. As generalissimo of the army he had been made field marshal some years before. As president of the Council of War, and supported by the prestige of being the only general who had proved capable of defeating the French, he promptly initiated a far-reaching scheme of reform, which replaced the obsolete methods' of the 18th century, the chief characteristics of the new order being the adoption of the " nation in arms " principle and of the French war organization and tactics. The new army was surprised in the process of transition by the war of 1809, in which Charles commanded in chief; yet even so it proved a far more formidable opponent than the old, and, against the now heterogeneous army of which Napoleon disposed (see Napole- onic Campaigns) it succumbed only after a desperate struggle. Its initial successes were neutralized by the reverses of Abens- berg, Landshut and Eckmiihl; but, after the evacuation of Vienna, the archduke won the great battle of Aspern-Essling (q.v.) and soon

afterwards fought the still more desperate battle of Wagram (q.v.), at the close of which the Austrians were de- feated but not routed; they had inflicted upon Napoleon a loss of over 50,000 men in the two battles. At the end of the cam- paign the archduke gave up all his military offices, and spent the rest of his life in retirement, except a short time in 1815. when he was governor of Mainz. In 1822 he succeeded to the duchy of Saxe-Teschen. The archduke Charles married, in 1815, Princess Henrietta of Nassau-Weilburg (d. 1829). He had four sons, the eldest of whom, the archduke Albert (q.v.) became one of the most celebrated generals in Europe, and two daughters, the elder of whom became queen of Naples. He died at Vienna on the 30th of April 1847. An equestrian statue was erected to his memory in Vienna, i860.

The caution which the archduke preached so earnestly in his strategical works, he displayed in practice only when the situation seemed to demand it, though his education certainly prejudiced him in favour of. the defensive at all costs. He was at the same time capable of forming and executing the most daring offensive strategy, and his tactical skill in the handling of troops, whether in wide turning movements, as at Wiirzburg and Zurich, or in masses, as at Aspern and Wagram, was certainly equal to that of any leader of his time, Napoleon only excepted. The campaign of 1796 is considered almost faultless. That he sus- tained defeat in 1809 was due in part to the great numerical superiority of the French and their allies, and in part to the condition of his newly reorganized troops. His six weeks' inaction after the victory of Aspern is, however, open to un- favourable criticism. As a military writer, his position in the evolution of the art of war is very important, and his doctrines had naturally the greatest weight. Nevertheless they cannot but be considered as antiquated even in 1806. Caution and the importance of " strategic points " are the chief features of his system. The rigidity of his geographical strategy may be gathered from the prescription that " this principle is never to be departed from." Again and again he repeats the advice that nothing should be hazarded unless one's army is completely secure, a rule which he himself neglected with such brilliant results in 1 796. " Strategic points," he says (not the defeat of the enemy's army), " decide the fate of one's own country, and must

constantly remain the general's main solicitude " — a maxim which was never more remarkably disproved than in the war of 1809. The editor of the archduke's work is able to make but a feeble defence against Clausewitz's reproach that Charles attached more value to ground than to the annihilation of the foe. In his tactical writings the same spirit is conspicuous. His reserve in battle is designed to " cover a retreat." The baneful influence of these antiquated principles was clearly shown in the main- tenance of Koniggratz-Josefstadt in 1866 as a " strategic point," which was preferred to the defeat of the separated Prussian armies; in the strange plans produced in Vienna for the cam- paign of 1859, and in the " almost unintelligible " battle of Montebello in the same year. The theory and the practice of the archduke Charles form one of the most curious contrasts in military history. In the one he is unreal, in the other he dis- played, along with the greatest skill, a vivid activity which made him for long the most formidable opponent of Napoleon.

His writings were edited by the archduke Albert and his brother the archduke William in the Ausgewdhlte Schriften weiland Sr. K. Hoheit Erzh. Carl v. Osterreich (1862; reprinted 1893, Vienna and Leipzig), which includes the Grundsatze der Kriegskunst fur die Generate (1 806) , Grundsatze der Strategie erldutert durch die Darstellung des Feldzugs 1796 (1814), Gesch. des Feldzugs von 1799 (1819) — the two latter invaluable contributions to the history of the war, and papers " on the higher art of war," " on practical training in the field," &c. See, besides the histories of the period, C. von B(inder)- K(rieglstein), Geist und Stoff im Kriege (Vienna, 1895) ; Caemmerer, Development of Strategical Science (English transl.), ch. iv. ; M. Edler v. Angeli, Erzherzog Carl v. Osterr. (Vienna and Leipzig, 1896) ; Duller, Erzh._ Karl v. Osterr. (Vienna, 1845) ; Schneidawind, Karl, Erzherzog v. Osterr. und die osterr. Armee (Vienna, 1840) ; Das Buck vom Erzh. Carl (1848); Thielen, Erzh. Karl v. Osterr. (1858); Wolf, Erzh. Carl (i860); H. von Zeissberg, Erzh. Karl v. Osterr. (Vienna, 1895) ; M. von Angeli, Erzh. Karl als Feldherr und Organi- sator (Vienna, 1896).

CHARLES (iS 2 5 _ iS74), cardinal of Lorraine, French states- man, was the second son of Claude of Lorraine, duke of Guise, and brother of Francis, duke of Guise. He was archbishop of Reims in 1538, and cardinal in 1547. At first he was called the cardinal of Guise, but in 1550, on the death of his uncle John, cardinal of Lorraine, he in his turn took the style of cardinal of Lorraine. Brilliant, cunning and a master of intrigue, he was, like all the

Guises, devoured with ambition and devoid of scruples. He had, said Brant6me, ” a soul exceeding smirched,” and, he adds, ” by nature he was exceeding craven.” Together with his brother, Duke Francis, the cardinal of Lorraine was all- powerful during the reigns of Henry II. and Francis II.; in 1558 and 1559 he was one of the negotiators of the treaty of Cateau-Cambresis; he fought and pitilessly persecuted the reformers, and by his intolerant policy helped to provoke the crisis of the wars of religion. The death of Francis II. deprived him of power, but he remained one of the principal leaders of the Catholic party. In 1561, at the Colloquy of Poissy, he was commissioned to reply to Theodore Beza. In 1 562 he went to the council of Trent, where he at first defended the rights of the Gallican Church against the pretensions of the pope; but after the assassination of his brother, he approached the court of Rome, and on his return to France he endeavoured, but without success, to obtain the promulgation of the decrees of the council (1564). In 1567, when the Protestants took up arms, he held for some time the first place in the king’s council, but Catherine de’ Medici soon grew weary of his arrogance, and in 1570 he had to leave the court. He endeavoured to regain favour by negotiating at Rome the dispensation for the marriage of Henry of Navarre with Margaret of Valois (1572). He died on the 26th of December 1574, at the beginning of the reign of Henry III. An orator of talent, he left several harangues or sermons, among them being Oraison prononcie au Colloque de Poissy (Paris, 1562) and Oratio habita in Concil. Trident. (Concil. Trident. Orationes, Louvain, 1567).

A large amount of correspondence is preserved in the Biblioth £que Nationale, Paris. See also Rene de Bouillfe, Histoire des dues de Guise (Paris, 1849); H. Forneron, Les Guises et leur epoque (Paris, 1877); Guillemin, Le Cardinal de Lorraine (1847).

CHARLES [Karl Alexander] (1712-1780), prince of Lor- raine, was the youngest son of Leopold, duke of Lorraine, and

grandson of Charles V., duke of Lorraine (see above), the famous general. He was born at Luneville on the 12 th of December 1712, and educated for a military career; After his elder brother Francis, the duke, had exchanged Lorraine for Tuscany and married Maria Theresa, Charles became an Austrian officer, and he served in the campaigns of 1737 and 1738 against the Turks. At the outbreak of the Silesian wars in 1740 (see Austrian Succession, War. or. the), the queen made her brother-in-law a field marshal, though he was not yet thirty years old, and in 1742

Charles encountered Frederick the Great for the first time at the battle of Chotusitz (May 17th). The victory of the Prussians on that field was far from decisive, and Charles drew off his forces in good order. His conduct of the successful campaign of 1743 against the French and Bavarians heightened his reputation. He married, in January 1744, Marianne of Austria, sister of Maria Theresa, who made them jointly governors-general of the Austrian Netherlands. Very soon the war broke out afresh, and Charles, at the head of the Austrian army on the Rhine, won great renown by his brilliant crossing of the Rhine. Once more a Lorraine prince at the head of Austrian troops invaded the duchy and drove the French before him, but at this moment Frederick resumed the Silesian war, all available troops were called back to oppose him, and the French maintained their hold on Lorraine. Charles hurried to Bohemia, whence, aided by the advice of the veteran field marshal Traun, he quickly expelled the Prussians. At the close of his victorious campaign he received the news that his wife, to whom he was deeply attached, had died in childbirth on the 16th of December 1744 at Brussels. He took the field again in 1745 in Silesia, but this time without the advice of Traun, and he was twice severely defeated by Frederick, at Hohenf riedberg and at Soor. Subsequently, as commander-in-chief in the Low Countries he received, at Roucoux, a heavy defeat at the hands of Marshal Saxe. His government of the Austrian Netherlands during the peace of 1749-17 56 was marked by many reforms, and the prince won the regard of the people by his ceaseless activity on their behalf. After the first reverses of the Seven Years' War (q.v.), Maria Theresa called Charles again to the supreme command in the field. The campaign of 1757 opened with Frederick's great victory of Prague, and Prince Charles was shut up with his army in that fortress. In the victory of the relieving army under Daun at Kolin Charles had no part. Never- theless the battle of Breslau, in which the Prussians suffered a defeat even more serious than that of Kolin, was won by him, and great enthusiasm was displayed in Austria over the victory, which seemed to be the final blow to Frederick. But soon after- wards the king of Prussia routed the French at Rossbach, and, swiftly returning to Silesia, he inflicted on Charles the complete and crushing defeat of Leuthen (December 5, 1757). A mere remnant of the Austrian army reassembled after the pursuit, and Charles was relieved of his command. He received, however, from the hands of the empress the grand cross, of the newly founded order of Maria Theresa. For a year thereafter Prince Charles acted as a military adviser at Vienna, he then returned to Brussels, where,

during the remainder of his life, he continued to govern in the same liberal spirit as before. The affection of the people for the prince was displayed during his dangerous illness in 1765, and in 1775 the estates of Brabant erected a statue in his honour at Brussels. He died on the 4th of July 1780 at the castle of Tervoeren, and was buried with his Lorraine ancestors at Nancy.

CHARLES (1270-13 25), count of Valois, of Maine, and of Anjou, third son of Philip III., king of France, surnamed the Bold, and of Isabella of Aragon, was born on the 12th of March 1270. By his father's will he inherited the four lordships of Crepy, La Ferte-Milon, Pierrefonds and Bethisy, which together formed the countship of Valois. In 1284 Martin IV., having excommunicated Pedro III., king of Aragon, offered that kingdom to Charles. King Philip failed in an attempt to place his son on this throne, and died on the return of the expedition. In 1290 Charles married Margaret, daughter of Charles II., king of Naples, and renounced his pretensions to Aragon. In

1294, at the beginning of the hostilities against England, he invaded Guienne and took La Reole and Saint-Sever. During the war Flanders (1300), he took Douai, B6thune and Dam, received the submission of Guy of Dampierre, and aided King Philip IV., the Fair, to gain the battle of Mons-en-P6vele, on the 18th of August 1304. Asked by Boniface VIII. for his aid against the Ghibellines, he crossed the Alps in June 1301, entered Florence, and helped Charles II., the Lame, king of Sicily, to reconquer Calabria and Apulia from the house of Aragon, but was defeated in Sicily. As after the death of his first wife Charles had married Catherine de Courtenay, a granddaughter of Baldwin II., the last Latin emperor of Constantinople, he tried to assert his rights to that throne. Philip the Fair also wished to get him elected emperor; but Clement V. quashed his can- didature in favour of Henry of Luxemburg, afterwards the emperor Henry VII. Under Louis X. Charles headed the party of feudal reaction, and was among those who compassed the ruin of Enguerrand de Marigny. In the reign of Charles IV., the Fair, he fought yet again in Guienne (1324), and died at Perray (Seine-et-Oise) on the 16th of December 1325. His second wife had died in 1307, and in July 1308 he had married a third wife, Mahaut de Chatillon, countess of Saint-Pol. Philip, his eldest son, ascended the French throne in

1328, and from him sprang the royal house of Valois.

See Joseph Petit, Charles de Valois (Paris, 1900).

CHARLES (1421-1461), prince of Viana, sometimes called Charles IV. king of Navarre, was the son of John, afterwards John II., king of Aragon, by his marriage with Blanche, daughter and heiress of Charles III., king of Navasre. Both his grand- father Charles and his mother, who ruled over Navarre from 1425 to 1441, had bequeathed this kingdom to Charles, whose right had also been recognized by the Cortes; but when Blanche died in 1441 her husband John seized the government to the exclusion of his son. The ill-feeling between father and son was increased when in 1447 John took for his second wife Joanna Henriquez, a Castilian princess, who soon bore him a son, afterwards Ferdinand I. king of Spain, and who regarded her stepson as an interloper. When Joanna began to interfere in the internal affairs of Navarre civil war broke out; and in 1452 Charles, although aided by John II., king of Castile, was defeated and taken prisoner. Released upon promising not to take the kingly title until after his father's death, the prince, again unsuccessful in an appeal to arms, took refuge in Italy with Alphonso V., king of Aragon, Naples and Sicily. In 1458 Alphonso died and John became king of Aragon, while Charles was offered the crowns of Naples and Sicily. He declined these proposals, and having been reconciled with his father returned to Navarre in 1459. Aspiring to marry a Castilian princess, he was then thrown into prison by his father, and the Catalans rose in his favour. This insurrection soon became general and John was obliged to yield. He released his son, and recognized him as perpetual governor of Catalonia, and heir to the kingdom. Soon afterwards, however, on the 23rd of September 1461, the prince died at Barcelona, not without a suspicion that he had been poisoned by his stepmother. Charles was a cultured and amiable prince, fond of music and literature. He translated the Ethics of Aristotle into Spanish, a work first published at Saragossa in 1509, and wrote a chronicle of the kings of Navarre, Crdnica de los reyes de Navarra, an edition which, edited by J. Yangues y Miranda, was published at Pampeluna in 1843.

See J. de Moret and F. de Aleson, Anales del reyno de Navarra, tome iv. (Pampeluna, 1866); M. J. Quintana, Vidas de espanoles celebres (Paris, 1827) ; and G. Desdevises du Dezert, Carlos d' Aragon (Paris, 1889).

CHARLES, ELIZABETH (1828-1896), English author, was born at Tavistock on the 2nd of January 1828, the daughter of John Rundle, M.P. Some of her youthful poems won the praise of Tennyson, who read them in manuscript. In 1 8 5 1 she married Andrew Paton Charles. Her best known book, written to order for an editor who wished for a story about Martin Luther, The Chronicles of the Schonberg-Cotta Family, was published in 1862, and was translated into most of the European languages, into

Arabic, and into many Indian dialects. Mrs Charles wrote in all some fifty books, the majority of a semi-religious character. She took an active part in the work of various charitable institutions, and among her friends and correspondents were Dean Stanley, Archbishop Tait, Charles Kingsley, Jowett and Pusey. She died at Hampstead on the 28th of March 1896.

CHARLES, JACQUES ALEXANDRE CESAR (1746-1823), French mathematician and physicist, was born at Beaugency, Loiret, on the 12th of November 1746. After spending some years as a clerk in the ministry of finance, he turned to scientific pursuits, and attracted considerable attention by his skilful and elaborate demonstrations of physical experiments. He was the first, in 1783, to employ hydrogen for the inflation of balloons (see Aeronautics), and about 1787 he anticipated Gay Lussac's law of the dilatation of gases with heat, which on that account is sometimes known by his name. In 1785 he was elected to the Academy of Sciences, and subsequently he became professor of physics at the Conservatoire des Arts et Metiers. He died in Paris on the 7th of April 1823. His published papers are chiefly concerned with mathematical topics.

CHARLES, THOMAS (1755-1814), Welsh Nonconformist divine, was born of humble parentage at Longmoor, in the parish of Llanfihangel Abercywyn, near St Clears, Carmarthenshire, on the 14th of October 1755. He was educated for the Anglican ministry at Llanddowror and Carmarthen, and at Jesus College, Oxford (1775-1778). In 1777 he studied theology under the evangelical John Newton at Olney. He was ordained deacon in 1778 on the title of the curacies of Shepton Beauchamp and Sparkford, Somerset; and took priest's orders in 1780. He afterwards added to his charge at Sparkford, Lovington, South Barrow and North Barrow, and in September 1782 was presented to the perpetual curacy of South Barrow by the Rev. John Hughes, Coin St Denys. But he never left Sparkford, though the contrary has been maintained, until he resigned all his curacies in June 1783, and

returned to Wales, marrying (on August 20th) Sarah Jones of Bala, the orphan of a flourishing shopkeeper. He had early fallen under the influence of the great revival movement in Wales, and at the age of seventeen had been " converted " by a sermon of Daniel Rowland's. This was enough to make him unpopular with many of the Welsh clergy, and being denied the privilege of preaching for nothing at two churches, he helped his old Oxford friend John Mayor, now vicar of Shawbury, Shropshire, from October until January nth, 1784. On the 25th of January he took charge of Llan yn Mowddwy (14 m. from Bala), but was not allowed to continue there more than three months. Three influential people, among them the rector of Bala, agitated some of the parishioners against him, and persuaded his rector to dismiss him. His preaching, his catechizing of the children after evensong, and his connexion with the Bala Methodists — his wife's stepfather being a Methodist preacher — gave great offence. After a fort- night more at Shawbury, he wrote to John Newton and another clergyman friend in London for advice. The Church of England denied him employment, and the Methodists desired his services. His friends advised him to return to England, but it was too late. By September he had crossed the Rubicon, Henry Newman (his rector at Shepton Beauchamp and Sparkford) accompanying him on a tour in Carnarvonshire. InDecember,he was preaching at the BontUchel Association; so that he joined the Methodists (see Calvinistic Methodists) in 1784.

Before taking this step, he had been wont in his enforced leisure to gather the poor children of Bala into his house for in- struction, and so thickly did they come that he had to adjourn with them to the chapel. This was the origin of the Welsh Circulating Schools, which he developed on the lines adopted by Griffith Jones (d. 1761), formerly vicar of Llanddowror. First one man was trained for the work by himself, then he was sent to a district for six months, where, (for £8 a year) he taught gratis the children and young people (in fact, all comers) reading and Christian principles. Writing was added later. The expenses were met by collections made in the Calvinistic Methodist Societies, and as the funds increased masters were multiplied,

until in 1786 Charles had seven masters to whom he paid £10 per annum; in 1787, twelve; in 1789, fifteen; in 1794, twenty. By this

time the salary had been increased to £12; in 1801 it was £14. He had learnt of Raikes's Sunday Schools before he left the Establishment, but he rightly considered the system set on foot by himself far superior; the work and object being the same, he gave six days' tuition for every one given by them, and many people not only objected to working as teachers on Sunday, but thought the children forgot in the six days what they learnt on the one. But Sunday Schools were first adopted by Charles to meet the case of young people in service who could not attend during the week, and even in that form much opposition was shown to them because teaching was thought to be a form of Sabbath breaking. His first Sunday School was in 1787. Wilberforce, Charles Grant, John Thornton and his son Henry, were among the philanthropists who contributed to his funds; in 1798 the Sunday School Society (established 1785) extended its operations to Wales, making him its agent, and Sunday Schools grew rapidly in number and favour. A powerful revival broke out at Bala in the autumn of 1791, and his account of it in letters to correspondents, sent without his knowledge to magazines, kindled a similar fire at Huntly. The scarcity of Welsh bibles was Charles's greatest difficulty in his work. John Thornton and Thomas Scott helped him to secure supplies from the Society for the Promotion of Christian Knowledge from 1787 to 1789, when the stock became all but exhausted. In 1799 a new edition was brought out by the Society, and he managed to secure 700 copies of the 10,000 issued; the Sunday School Society got 3000 testaments printed, and most of them passed into his hands in 1801.

In 1800, when a frost-bitten thumb gave him great pain and much fear for his life, his friend, Rev. Philip Oliver of Chester, died, leaving him director and one of three trustees over his chapel at Boughton; and this added much to his anxiety. The Welsh causes at Manchester and London, too, gave him much uneasiness, and burdened him with great responsibilities at this juncture. In November 1802 he went to London, and on the 7th of December he sat at a committee meeting of the Religious Tract Society, as a country member, when his friend, Joseph Tarn — a member of the Spa Fields and Religious Tract Society committees — introduced the subject of a regular supply of bibles for Wales. Charles was asked to state his case to the committee, and so forcibly did he impress them, that it was there and then decided to move in the matter of a general dispersion of the bible. When he visited London a year later, his friends were ready to discuss the name of a new Society, and the sole object of which should

be to supply bibles. Charles returned to Wales on the 30th of January 1804, and the British and Foreign Bible Society was formally and publicly inaugurated on March the 7th. The first Welsh testament issued by that Society appeared on the 6th of May 1806, the bible on the 7th of May 1807 — both being edited by Charles.

Between 1805 and 1811 he issued his Biblical Dictionary in four volumes, which still remains the standard work of its kind in Welsh. Three editions of his Welsh catechism were published for the use of his schools (1789, 1791 and 1794); an English catechism for the use of schools in Lady Huntingdon's Connexion was drawn up by him in 1797; his shorter catechism in Welsh appeared in 1799, and passed through several editions, in Welsh and English, before 1807, when his Instructor (still the Connexional catechism) appeared. From April 1799 to December 1801 six numbers of a Welsh magazine called Trysorfa Ysprydol (Spiritual Treasury) were edited by Thomas Jones of Mold and himself; in March 1809 the first number of the second volume appeared, and the twelfth and last in November 1813.

The London Hibernian Society asked him to accompany Dr David Bogue, the Rev. Joseph Hughes, and Samuel Mills to Ireland in August 1807, to report on the state of Protestant religion in the country. Their report is still extant, and among the movements initiated as a result of their visit was the Circu- lating School system. In 1810, owing to the growthof Methodism and the lack of ordained ministers, he led the Connexion in the Movement for connexionally ordained ministers, and his influence

was the chief factor in the success of that important step. From 181 1 to 18 14 his energy was mainly devoted to establishing auxiliary Bible Societies. By correspondence he stimulated some friends in Edinburgh to establish charity schools in the High- lands, and the Gaelic School Society (1811) washisidea. Hislast work was a corrected edition of the Welsh Bible issued in small pica by the Bible Society. As a preacher he was in great request, though possessing but few of the qualities of the popular preacher. All his work received very small remuneration; the family was maintained by the profits of a business managed by Mrs Charles — a keen, active and good woman. He died on the 5th of October 1814. His influence is still felt, and he is rightly claimed as one of the makers of modern Wales. (D. E. J.)

CHARLES ALBERT [Carlo Alberto] (1 798-1849), king of Sardinia

(Piedmont), son of Prince Charles of Savoy- Carignano and Princess Albertine of Saxe-Courland, was born on the 2nd of October 1798, a few days before the French occupied Piedmont and forced his cousin King Charles Emmanuel to take refuge in Sardinia. Although Prince and Princess Carignano adhered to the French Republican regime, they soon fell under suspicion and were summoned to Paris. Prince Charles died in 1800, and his widow married a Count de Montleart and for some years led a wandering existence, chiefly in Switzerland, neglecting her son and giving him mere scraps of education, now under a devotee of J. J. Rousseau, now under a Genevan Calvinist. In 1802 King Charles Emmanuel abdicated in favour of his brother Victor Emmanuel L; the latter's only son being dead, his brother Charles Felix was heir to the throne, and after him Charles Albert. On the fall of Napolepn in 1814 the Piedmontese court returned to Turin and the king was anxious to secure the succession for Charles Albert, knowing that Austria meditated excluding him from it in favour of an Austrian archduke, but at the same time he regarded him as an objectionable person on account of his revolu- tionary upbringing. Charles Albert was summoned to Turin, given tutors to instruct him in legitimist principles, and on the 1st of October 181 7 married the archduchess Maria Theresa of Tuscany, who, on the 14th of March 1820, gave birth to Victor Emmanuel, afterwards king of Italy.

The Piedmontese government at this time was most re- actionary, and had made a clean sweep of all French institutions. But there were strong Italian nationalists and anti-Austrian tendencies among the younger nobles and army officers, and the Carbonari and other revolutionary societies had made much progress.

Their hopes centred in the young Carignano, whose agreeable manners had endeared him to all, and who had many friends among the Liberals and Carbonari. Early in 18 20 a revolutionary movement was set on foot, and vague plans of combined risings all over Italy and a war with Austria were talked of. Charles Albert no doubt was aware of this, but he never actually became a Carbonaro, and was surprised and startled when after the outbreak of the Neapolitan revolution of 1820 some of the leading conspirators in the Piedmontese army, including Count Santorre di Santarosa and Count San Marzano, informed him that a military rising was ready and that they counted on his help (2nd March 1821). He induced them to delay the outbreak and informed the king, requesting him, however, not to punish anyone. On the 10th the garrison of Alessandria mutinied, and

two days later Turin was in the hands of the insurgents, the people demanding the Spanish constitution. The king at once abdicated and appointed Charles Albert regent. The latter, pressed by the revolutionists and abandoned by his ministers, granted the constitution and sent to inform Charles Felix, who was now king, of the occurrence. Charles Felix, who was then at Modena, repudiated the regent's acts, accepted Austrian military assistance, with which the rising was easily quelled, and exiled Charles Albert to Florence. The young prince found himself the most unpopular man in Italy, for while the Liberals looked on him as a traitor, to the king and the Conservatives he was a dangerous revolutionist. At the Congress of Verona (1822) the Austrian chancellor, Prince Metternich, tried to induce Charles Felix to set aside Charles Albert's rights of succession.

But the king was piqued by Austria's interference, and as both the grand-duke of Tuscany and the duke of Wellington supported him, Charles Albert's claims were respected. France having decided to intervene in the Spanish revolution on the side of autocracy, Charles Albert asked permission to join the due d'Angouleme's expedition. The king granted it and the young prince set out for Spain, where he fought with such gallantry at the storming of the Trocadero (ist of September 1823) that the French soldiers proclaimed him the " first Grenadier of France." But it was not until he had signed a secret under- taking binding himself, as soon as he ascended the throne, to place himself under the tutelage of a council composed of the higher clergy and the knights of the Annunziata, and to maintain the existing forms of the monarchy (D. Berti, Cesare Alfieri, xi. 77, Rome, 1871), that he was allowed to return to Turin and forgiven. On the death of Charles Felix (27th of April 1831) Charles Albert succeeded; he inherited a kingdom without an army, with an empty treasury, a chaotic administration and medieval laws. His first task was to set his house in order; he reorganized the finances, created the army,ˆnd started Piedmont on a path which if not liberalism was at least progress. " He was," wrote his reactionary minister, Count della Margherita, " hostile to Austria from the depths of his soul and full of illusions as to the possibility of freeing Italy from dependence on her. ... As for the revolutionaries, he detested them but feared them, and was convinced that sooner or later he would be their victim." In 1833 a conspiracy of the

Giovane Italia Society, organized by Mazzini, was discovered, and a number of its members punished with ruthless severity. On the election in 1846 of Pius IX., who appeared to be a Liberal and an Italian patriot, the eyes of all Italy were turned on him as the heaven-born leader who was to rescue the country from the foreigner. This to some extent reconciled the king to the Liberal movement, for it accorded with his religious views. " I confess," he wrote to the marquis of Villamarina, in 1847, " that a war of national independence which should have for its object the defence of the pope would be the greatest happiness that could befall me." On the 30th of October he issued a decree granting wide reforms, and when risings broke out in other parts of Italy early in 1848 and further liberties were demanded, he was at last induced to grant the constitution (8th February).

When the news of the Milanese revolt against the Austrians reached Turin (19th of March) public opinion demanded that the Piedmontese should succour their struggling brothers; and after some hesitation the king declared war. But much time had been wasted and many precious opportunities lost. With an army of 60,000 Piedmontese troops and 30,000 men from other parts of Italy the king took the field, and after defeating the Austrians at Pastrengo on the 30th of April, and at Goito on the 30th of May, where he was himself slightly wounded, more time was wasted in useless operations. Radetzky, the Austrian general, having received reinforcements, drove the centre of the extended Italian line back across the Mincio (23rd of July), and in the two days' fighting at Custozza(24th and 25th of July) the Piedmontese were beaten, forced to retreat, and to ask for an armistice. On re-entering Milan Charles Albert was badly received and reviled as a traitor by the Republicans, and although he declared himself ready to die defending the city the municipality treated with Radetzky for a capitulation ; the mob, urged on by the demagogues, made a savage demonstra- tion against him at the Palazzo Greppi, whence he escaped in the night with difficulty and returned to Piedmont with his defeated armp. The French Republic offered to intervene in the spring of 1848, but Charles Albert did not desire foreign aid, the more so as in this case it would have had to be paid for by the cession of Nice and Savoy. The revolutionary movement throughout Italy was breaking down, but Charles Albert felt that while he possessed an army he could not abandon the Lombards and Venetians, and determined to stake all on a last chance. On the 12th of March 1849 he denounced the armistice and took the field again with an army of

80,000 men, but gave the chief command to the Polish general Chrzanowski. General

Ramorino commanding the Lombard division proved unable to prevent the Austrians from crossing the Ticino (20th of April), and Chrzanowski was completely out-generalled and defeated at La Bicocca near Novara on the 23rd . The Piedmontese fought with great bravery, and the unhappy king sought death in vain. After the battle he asked terms of Radetzky, who demanded the occupation by Austria of a large part of Piedmont and the heir to the throne as a hostage. Thereupon, feeling himself to be the obstacle to better conditions, Charles Albert abdicated in favour of his son Victor Emmanuel. That same night he departed alone and made his way to Oporto, where he retired into a monastery and died on the 28th of July 1849.

Charles Albert was not a man of first-rate ability; he was of a hopelessly vacillating character. Devout and mystical to an almost morbid degree, hating revolution and distrusting Liberalism, he was a confirmed pessimist, yet he had many noble qualities: he was brave to the verge of foolhardiness, devoted to his country, and ready to risk his crown to free Italy from the foreigner. To him the people of Italy owe a great debt, for if he failed in his object he at least materialized the idea of the Risorgimento in a practical shape, and the charges which the Republicans and demagogues brought against him were monstrously unjust.

Bibliography. — Besides the general works on modern Italy, see the Marquis Costa de Beauregard's interesting volumes La Jeunesse du roi Charles Albert (Paris, 1899) and Novare et Oporto (1890), based on the king's letters and the journal of Sylvain Costa, his faithful equerry, though the author's views are those of an old-fashioned Savoyard who dislikes the idea of Italian unity; Ernesto Masi's // Segreto del Re Carlo Alberto (Bologna, 1891) is a very illuminating essay; Domenico Perrero, Gli Ultimi Reali di Savoia (Turin, 1889); L. Cappelletti, Storia di Carlo Alberto (Rome, 1891); Nicomede Bianchi, Storia della diplomazia europea in Italia (8 vols., Turin, 1865, &c), a most important work of a general character, and the same author's Scritti e lettere di Carlo Alberto (Rome, 1879) and his Storia della monarchia piemontese (Turin, 1877); Count S. della Margherita, Memorandum storico-politico (Turin, 1851). ”

CHARLES AUGUSTUS [Karl August] (1757-1828), grand- duke of

Saxe- Weimar, son of Constantine, duke of Saxe- Weimar-Eisenach, and Anna Amalia of Brunswick, was born on the 3rd of September 1757. His father died when he was only nine months old, and the boy was brought up under the regency and supervision of his mother, a woman of enlightened but masterful temperament. His governor was Count Eustach von Gorz, a German nobleman of the old strait-laced school; but a more humane element was introduced into his training when, in 1771, Wieland was appointed his tutor. In 1 7 74 the poet Karl Lud wig von Knebel came to Weimar as tutor to the young Prince Constantine; and in the same year the two princes set out, with Count Gorz and Knebel, for Paris. At Frankfort, Knebel introduced Karl August to the young Goethe: the beginning of a momentous friendship. In 1775 Karl August returned to Weimar, and the same year came of age and married Princess Louise of Hesse-Darmstadt.

One of the first acts of the young grand-duke was to summon Goethe to Weimar, and in 1776 he was made a member of the privy council. " People of discernment," he said, " congratulate me on possessing this man. His intellect, his genius is known. It makes no difference if the world is offended because I have made Dr Goethe a member of my most important collegium without his having passed through the stages of minor official professor and councillor of state." To the undiscerning, the beneficial effect of this appointment was not at once apparent. With Goethe the " storm and stress " spirit descended upon Weimar, and the stiff traditions of the little court dissolved in a riot of youthful exuberance. The duke was a deep drinker, but also a good sportsman; and the revels of the court were alternated with break-neck rides across country, ending in nights spent round the camp fire under the stars. Karl August, however, had more serious tastes. He was interested in literature, in art, in science; critics, unsuspected of flattery, praised his judgment in painting; biologists found in him an expert in anatomy. Nor did he neglect the government of his little state. His reforms were the outcome of something more than the spirit of the

" enlightened despots " of the 18th century; for from the first he had realized that the powers of the prince to play " earthly providence " were strictly limited. His aim, then, was to educate

his people to work out their own political and social salvation, the object of education being in his view, as he ex- plained later to the dismay of Metternich and his school, to help men to " independence of judgment." To this end Herder was summoned to Weimar to reform the educational system; and it is little wonder that, under a patron so enlightened, the university of Jena attained the zenith of its fame, and Weimar became the intellectual centre of Germany.

Meanwhile, in the affairs of Germany and of Europe the character of Karl August gave him an influence out of all propor- tion to his position as a sovereign prince. He had early faced the problem presented by the decay of the Empire, and began to work for the unity of Germany. The plans of the emperor Joseph II., which threatened to absorb a great part of Germany into the heterogeneous Habsburg monarchy, threw him into the arms of Prussia, and he was the prime mover in the establish- ment of the league of princes (Fiirstenbund) in 1785, by which, under the leadership of Frederick the Great, Joseph's intrigues were frustrated. He was, however, under no illusion as to the power of Austria, and he wisely refused the offer of the Hun- garian crown, made to him in 1787 by Prussia at the instance of the Magyar malcontents, with the dry remark that he had no desire to be another " Winter King." In 1788 Karl August took service in the Prussian army as major-general in active command of a regiment. As such he was present, with Goethe, at the cannonade of Valmy in 1792, and in 1704 at the siege of Mainz and the battles of Pirmasenz (September 14) and Kaiserslautern (October 28-30). After this, dissatisfied with the attitude of the powers, he resigned; but rejoined on the accession of his friend King Frederick William III. to the Prussian throne. The disastrous campaign of Jena (1806) followed; on the 14th of October, the day after the battle, Weimar was sacked; and Karl August, to prevent the confiscation of his territories, was forced to join the Confederation of the Rhine. From this time till after the Moscow campaign of 1812 his contingent fought under the French flag in all Napoleon's wars. In 1813, however, he joined the Grand Alliance, and at the beginning of 1814 took the command of a corps of 30,000 men operating in the Nether- lands.

At the congress of Vienna Karl August was present in person, and protested vainly against the narrow policy of the powers in confining their debates to the " rights of the princes " to the exclusion of the " rights of the people." His services in the war of liberation were rewarded with an extension of territory and the

title of grand-duke; but his liberal attitude had already made him suspect, and his subsequent action brought him still further into antagonism to the reactionary powers. He was the first of the German princes to grant a liberal constitution to his state under Article XIII. of the Act of Confederation (May 5, 1816); and his concession of full liberty to the press made Weimar for a while the focus of journalistic agitation against the existing order. Metternich dubbed him contemptuously ” der grosse Bursche ” for his patronage of the ” revolutionary ” Burschenschaften; and the celebrated ” festival ” held at the Wartburg by his permission in 1818, though in effect the mildest of political demonstrations, brought down upon him the wrath of the great powers. Karl August, against his better judgment, was compelled to yield to the remonstrances of Prussia, Austria and Russia; the liberty of the press was again restricted in the grand-duchy, but, thanks to the good understanding between the grand-duke and his people, the regime of the Carlsbad Decrees pressed less heavily upon Weimar than upon other German states.

Karl August died on the 14th of June 1828. Upon his contemporaries of the most various types his personality made a great impression. Karl von Dalberg, the prince-primate, who owed the coadjutorship of Mainz to the duke’s friendship, said that he had never met a prince ” with so much understanding, character, frankness and true-heartedness “; the Milanese, when

he visited their city, called him the ” uomo principe”; and Goethe himself said of him ” he had the gift of discriminating intellects and characters and setting each one in his place. He was inspired by the noblest good-will, the purest humanity, and with his whole soul desired only what was best. There was in him something of the divine. He would gladly have wrought the happiness of all mankind. And finally, he was greater than his surroundings, . . . Everywhere he himself saw and judged, and in all circumstances his surest foundation was in himself.” He left two sons: Charles Frederick (d. 1853), by whom he w?s succeeded, and Bernhard, duke of Saxe-Weimar (1792-1862), a distinguished soldier, who, after the congress of Vienna, became colonel of a regiment in the service of the king of the Netherlands, distinguished himself as commander of the Dutch troops in the Belgian campaign of 1830, and from 1847 to 1850 held the com- mand of the forces in the Dutch East Indies. Bernhard’s son, William Augustus Edward, known as Prince Edward of Saxe- Weimar (1823-1902), entered the British army, served with much distinction in the Crimean War, and became

colonel of the 1st Life Guards and a field marshal; in 1851 he contracted a morganatic marriage with Lady Augusta Gordon-Lennox (d. 1904), daughter of the 5th duke of Richmond and Gordon, who in Germany received the title of countess of Dornburg, but was granted the rank of princess in Great Britain by royal decree in 1866. Karl August's only daughter, Caroline, married Frederick Louis, hereditary grand-duke of Mecklenburg-Schwerin, and was the mother of Helene (1814-1858), wife of Ferdinand, duke of Orleans, eldest son of King Louis Philippe.

Karl August's correspondence with Goethe was published in 2 vols, at Weimar in 1863. See the biography by von Wegele in the Allgem. deutsche Biographic

CHARLES EDWARD [Charles Edward Louis Philip Casimir StuartI (1720-1788), English prince, called the " Young Pretender " and also the " Young Chevalier," was born at Rome on December 31st, 1720. He was the grandson of King James II. of England and elder son of James, the " Old Pretender," by whom (as James III.) he was created at his birth prince of Wales, the title he bore among the English Jacobites during his father's lifetime. The young prince was educated at his father'? miniature court in Rome, with James Murray, Jacobite earl of Dunbar, for his governor, and under various tutors, amongst whom were the learned Chevalier Ramsay, Sir Thomas Sheridan and the abbe Legoux. He quickly became conversant with the English, French and Italian languages, but all his extant letters written in English appear singularly ill-spelt and illiterate. In 1734 his cousin, the duke of Liria, afterwards duke of Berwick, who was proceeding to join Don Carlos in his struggle for the crown of Naples, passed through Rome. He offered to take Charles on his expedition, and the boy of thirteen, having been appointed general of artillery by Don Carlos, shared with credit the dangers of the successful siege of Gaeta.

The handsome and accomplished youth, whose doings were eagerly reported by the English ambassador at Florence and by the spy, John Walton, at Rome, was now introduced by his father and the pope to the highest Italian society, which he fascinated by the frankness of his manner and the grace and dignity of 'his bearing. In 1737 James despatched his son on a tour through the chief Italian cities, that his education as a prince and man of the world might be completed. The dis- tinction with which he was received on his journey, the royal honours paid to him in Venice, and the jealous interference of the English ambassador in regard

to his reception by the grand- duke of Tuscany, show how great was the respect in which the exiled house was held at this period by foreign Catholic powers, as well as the watchful policy of England in regard to its fortunes. The Old Pretender himself calculated upon foreign aid in his attempts to restore the monarchy of the Stuarts; and the idea of rebellion unassisted by invasion or by support of any kind from abroad was one which it was left for Charles Edward to endeavour to realize. Of all the European nations France was the one on which Jacobite hopes mainly rested, and the warm

sympathy which Cardinal Tencin, who had succeeded Fleury as French minister, felt for the Old Pretender resulted in a definite scheme for an invasion of England to be timed simul- taneously with a prearranged Scottish rebellion. Charles was secretly despatched to Paris in January 1744. A squadron under Admiral Roquefeuil sailed from the coast of France. Transports containing 7000 troops, to be led by Marshal Saxe, accompanied by the young prince, were in readiness to set sail for England. A severe storm effected, however, a complete disaster without any actual engagement taking place.

The loss in ships of the line, in transports, and in lives was a crushing blow to the hopes of Charles, who remained in France for over a year in a retirement which he keenly felt. He had at Rome already made the acquaintance of Lord Elcho and of John Murray of Broughton; at Paris he, had seen many sup- porters of the Stuart cause; he was aware that in every European court the Jacobites were represented in earnest intrigue; and he had now taken a considerable share in correspondence and other actual work connected with the promotion of his own and his father's interests. Although dissuaded by all his friends, on the 13th of July 1745 he sailed from Nantes for Scotland on board the small brig "La Doutelle," which was accompanied by a French man-of-war, the " Elisabeth," laden with arms and ammunition. The latter fell in with an English man-of-war, the " Lion," and had to return to France; Charles escaped during the engagement, and at length arrived on the 2nd of August off Erisca, a little island of the Hebrides. Receiving, however, but a cool reception from Macdonald of Boisdale, he set sail again and arrived at the bay of Lochnanuagh on the west coast of Inverness-shire.

The Macdonalds of Clanranald and Kinloch Moidart, along with other chieftains, again attempted to dissuade him from the rashness of an unaided rising, but they yielded at last to the enthusiasm and charm of his manner, and Charles landed on Scottish soil in the company of the ” Seven Men of Moidart ” who had come with him from France. Everywhere, however, he met with discouragement among the chiefs, whose adherence he wished to secure; but ‘at last, by enlisting the support of Cameron of Lochiel, he gained a footing for a serious rebellion. With secrecy and speed communications were entered into with the known leaders of the Highland clans, and on the 19th of August, in the valley of Glenfinnan, the standard of James III. and VIII. was raised in the midst of a motley but increasing crowd. On the same day Sir John Cope at the head of 1500 men left Edinburgh in search of Charles; but, fearing an attack in the Pass of Corryarrick, he changed his proposed route to Inverness, and Charles thus had the undefended south country before him. In the beginning of September he entered Perth, having gained numerous accessions to his forces on his march. Crossing the Forth unopposed at the Fords of Frew and passing through Stirling and Linlithgow, he arrived within a few miles of the astonished metropolis, and on the 16th of September a body of his skirmishers defeated the dragoons of Colonel Gardiner in what was known as the ” Canter of Coltbrig.” His success was still further augmented by his being enabled to enter the city, a few of Cameron’s Highlanders having on the following morning, by a happy ruse, forced their way through the Canon- gate. On the 18th he publicly proclaimed James VIII. of Scot- land at the Market Cross and occupied Holyrood.

Cope had by this time brought his disappointed forces by sea to Dunbar. On the 20th Charles met and defeated him at Prestonpans, and returned to prosecute the siege of Edinburgh Castle, which, however, he raised on General Guest’s threatening to lay the city in ruins. In the beginning of November Charles left Edinburgh, never to return. He was at the head of at least 6000 men; but the ranks were being gradually thinned by the desertion of Highlanders, whose traditions had led them to consider war merely as a raid and an immediate return with plunder. Having passed through Kelso, on the 9th of November he laid siege to Carlisle, which capitulated in a week. Manchester received the prince with a warm welcome and with 150 recruits under Francis Towneley. On the 4th of December he had reached

Derby and was within ten days’ march of London, where the

inhabitants were terror-struck and a commercial panic immediately ensued. Two armies under English leadership were now in the field against him, one under Marshal Wade, whom he had evaded by entering England by the west, and the other under William, duke of Cumberland, who had returned from the continent. London was not to be supposed helpless in such an emergency; Manchester, Glasgow and Dumfries, rid of his presence, had risen against him, and Charles paused. There was division among his advisers and desertion among his men, and on the 6th of December he reluctantly was forced to begin his retreat northward. Closely pursued by Cumberland, he marched by way of Carlisle across the border, and at last stopped to invest Stirling Castle. At Falkirk, on the 17th of January 1746, he defeated General Hawley, who had marched from Edinburgh to intercept his retreat. A fortnight later, however, Charles raised the siege of Stirling, and after a weary though successful march rested his troops at Inverness. Having taken Forts George and Augustus, and after varying success against the supporters of the government in the north, he at last prepared to face the duke of Cumberland, who had passed the early spring at Aberdeen. On the 8th of April the duke marched thence to meet Charles, whose little army, exhausted with a futile night march, half-starving, and broken by desertion, was completely worsted at Culloden on the i6thof April 1746.

This decisive and cruel defeat sealed the fate of Charles Edward and the house of Stuart. Accompanied by the faithful Ned Burke and a few other followers, Charles at last gained the wild western coast. Hunted hither and thither, he wandered on foot or cruised restlessly in open boats among the many barren isles of the Scottish shore,enduring the greatest hardships with marvellous courage and cheerfulness. Charles, upon whose head a reward of £3°;°°° had a year before been set, was thus for over five months relentlessly pursued by the troops and spies of the government. Disguised in female attire and aided by a passport obtained by the devoted Flora Macdonald, he passed through Skye and parted from his gallant conductress at Portree. To- wards the end of July he took refuge in the cave of Coiraghoth in the Braes of Glenmoriston, and in August he joined Lochiel and Cluny Macpherson, with whom he remained in hiding until the news was brought that two French ships were in waiting for him at the place of his first arrival in Scotland — Lochnanuagh. He embarked with speed and sailed for France, reaching the little port of Roscoff, near Morlaix, on the 29th of September 1746. He

was warmly welcomed by Louis XV., and ere long he was again vigorously intriguing in Paris, and even in Madrid. So far as political assistance was concerned, his efforts proved fruitless, but he became at once the popular hero and idol of the people of Paris. So enraged was he with his brother Henry's acceptance of a cardinal's hat in July 1747, that he deliberately broke off communication with his father in Rome (who had approved the step), nor did he ever see him again. The enmity of the British government to Charles Edward made peace with France an impossibility so long as she continued to harbour the young prince. A condition of the treaty of Aix-la- Chapelle, concluded in October 1748, was that every member of the house of Stuart should be expelled the French dominions. Charles had forestalled the proclamation of the treaty by an indignant protest against its injustice, and a declaration that he would not be bound by its provisions. But his indignation and persistent refusal to comply with the request that he should voluntarily leave France had to be met at last with force: he was apprehended, imprisoned for a week at Vincennes, and on the 17th of December conducted to the French border. He lingered at Avignon; but the French, compelled to hard measures by the English, refused to be satisfied; and Pope Benedict XIV., alarmed by the threat of a bombardment of Civita Vecchia, advised the prince to withdraw. Charles quietly disappeared; for years Europe watched for him in vain. It is now established, almost with certainty, that he returned to the neighbourhood of Paris; and it is supposed that his resi- dence was known to the French ministers, who, however, firmly

proclaimed their ignorance. In 1750, and again, it is thought, in 1754, he was in London, hatching futile plots and risking his safety for his hopeless cause, and even abjuring the Roman Catholic faith in order to further his political interests.

During the next ten years of his life Charles Edward's illicit connexion with Miss Clementina Walkinshaw (d. 1802), whom he had first met at Bannockburn House while conducting the siege of Stirling, his imperious fretful temper, his drunken habits and debauched life, could no longer be concealed. He wandered over Europe in disguise, alienating the friends and crushing the hopes of his party; and in 1766, on returning to Rome at the death of

his father, he was treated by Pope Clement XIII. with coldness, and his title as heir to the British throne was openly repudiated by all the great Catholic powers. It was probably through the influence of the French court, still intriguing against England, that the marriage between Charles (now self-styled count of Albany) and Princess Louise of Stolberg was arranged in 1772. The union proved childless and unhappy, and in 1780 the countess fled for refuge from her husband's drunken violence to a convent in Florence, where Charles had been residing since 1774. Later, the countess of Albany (q.v.) threw herself on the protection of her brother-in-law Henry, Cardinal York, at Rome, and the formal separation between the ill-matched pair was finally brought about in 1784, chiefly through the kind offices of King Gustavus III. of Sweden. Charles, lonely, ill, and evidently near death, now summoned to Florence his natural daughter, Charlotte Stuart, the child of Clementina Walkinshaw, born at Liege in October 1753 and hitherto neglected by the prince. Charlotte Stuart, who was declared legitimate and created duchess of Albany, tended her father for the remaining years of his life, during which she contrived to reconcile the two Stuart brothers, so that in 1785 Charles returned to Rome, where he died in the old Palazzo Muti on the 30th of January 1788. He was buried in his brother's cathedral church at Frascati, but in 1807 his remains were removed to the Grotte Vaticanc of St Peter's. His daughter Charlotte survived her father less than two years, dying unmarried at Bologna in November 1789, at the early age of thirty-six.

See A. C. Ewald, Life and Times of Charles Stuart, the Young Pretender (2 vols., 1875) ; C. S. Terry, Life of the Young Pretender, and The Rising of 1745; with Bibliography of Jacobite History 1689- 1788 (Scott. Hist. fr. Contemp. Writers, iii.)"(i90o) ; Earl Stanhope, History of England (1836) and Decline of the Last Stuarts (1854); Bishop R. Forbes, The Lyon in Mourning (1895-1896); Andrew Lang, Pickle, the Spy (1897), and Prince Charles Edward (1900); R. Chambers, History of the Rebellion in Scotland, &c. &c.

(H. M. V.)

CHARLES EMMANUEL I. [Carlo Emanuele] (1562-1630), duke of Savoy, succeeded his father, Emmanuel Philibert, in 1580. He continued the latter's policy of profiting by the rivalry of France and Spain in order to round off and extend his dominions. His three chief objects were the conquest of Geneva, of Saluzzo and

of Monferrato. Saluzzo he succeeded in wresting from France in 1588. He intervened in the French religious wars, and also fought with Bern and other Swiss cantons, and on the murder of Henry III. of France in 1589 he aspired to the French throne on the strength of the claims, of his wife Catherine, sister of Henry of Navarre, afterwards King Henry IV. In 1590 he sent an expedition to Provence in the interests of the Catholic League, and followed it himself later, but the peace of 1593, by which Henry of Navarre was recognized as king of France, put an end to his ambitions. In the war between France and Spain Charles sided with the latter, with varying success. Finally, by the peace of Lyons (1601), he gave up all territories beyond the Rhone, but his possession of Saluzzo was confirmed. He now meditated a further enterprise against Geneva; but his attempt to capture the city by treachery and with the help of Spain (the famous escalade) in 1602 failed com- pletely. The next few years were filled with negotiations and intrigues with Spain and France which did not lead to any particular result, but on the death in 161 2 of Duke Francesco Gonzaga of Mantua, who was lord of Monferrato, Charles Em- manuel made a successful coup de main on that district. This

arrayed the Venetians, Tuscany, the Empire and Spain against him, and he was obliged to relinquish his conquest. The Spaniards invaded the duchy from Lombardy, and although the duke was defeated several times he fought bravely, gained some successes, and the terms of the peace of 16 18 left him more or less in the status quo ante. We next find Charles Emmanuel aspiring to the imperial crown in 1619, but without success. In 1628 he was in alliance with Spain in the war against France; the French invaded the duchy, which, being abandoned by Spain, was overrun by their armies. The duke fought desper- ately, but was taken ill at Savigliano and died in 1630. He was succeeded by his son Victor Amedeo I., while his third son Tommaso founded the line of Savoy-Carignano from which the present royal house of Italy is descended. Charles Emmanuel achieved a great reputation as a statesman and warrior, and increased the prestige of Savoy, but he was ‘too shifty and in- genious, and his schemes ended in disaster.

See E. Ricotti, Storia delta monarchia piemontese, vols. iii. and iv. (Florence, 1865); T. Raulich, Storia di Carlo Emanuele I. (Milan, 1 896-1902); G. Curti, Carlo Emanuele I. secondo; piu recenti studii (Milan, 1894).

CHARLES MARTEL 1 (c. 688-741), Prankish ruler, was a natural son of Pippin II., mayor of the palace, and Chalpa'ida. Charles was baptized by St Rigobert, bishop of Reims. At the death of his father in 714, Pippin's widow Plectrude claimed the government in Austrasia and Neustria in the name of her grand- children, and had Charles thrown into prison. But the Neustrians threw off the Austrasian yoke and entered into an offensive alliance with the Frisians and Saxons. In the general anarchy Charles succeeded in escaping, defeated the Neustrians at Ambleve, south of Liege, in 716, and at Vincy, near Cambrai, in 717, and forced them to come to terms. In Austrasia he wrested the power from Plectrude, and took the title of mayor of the palace, thus prejudicing the interests of his nephews. According to the Frankish custom he proclaimed a king in Austrasia in the person of the young Clotaire IV., but in reality Charles was the sole master — the entry in the annals for the year 717 being " Carolus regnare coepit." Once in possession of Austrasia, Charles sought to extend his dominion over Neustria also. In 719 he defeated Ragenfrid, the Neustrian mayor of the palace, at Soissons, and forced him to retreat to Angers. Ragenfrid died in 731, and from that time Charles had no competitor in the western kingdom. He obliged the inhabitants of Burgundy to submit, and disposed of the Burgundian bishoprics and count- ships to his leudes. In Aquitaine Duke Odo (Eudes) exercised independent authority, but in 719 Charles forced him to recognize the suzerainty of northern France, at least nominally. After the alliance between Charles and Odo on the field of Poitiers, the mayor of the palace left Aquitaine to Odo's son Hunald, who paid homage to him. Besides establishing a certain unity in Gaul, Charles saved it from a very great peril. In 711 the Arabs had conquered Spain. In 720 they crossed the Pyrenees, seized Narbonensis, a dependency of the kingdom of the Visi- goths, and advanced on Gaul. By his able policy Odo succeeded in arresting their progress for some years; but a new vali, Abdur Rahman, a member of an extremely fanatical sect, resumed the attack, reached Poitiers, and advanced on Tours, the holy town of Gaul. In October 732 — just 100 years after the death of Mahomet — Charles gained a brilliant victory over Abdur Rahman, who was called back to Africa by the revolts of the Berbers and had to give up the struggle. This was the last of the great Arab invasions of Europe. After his victory Charles took the offensive, and endeavoured to wrest Narbonensis from the Mussulmans. Although he was not successful in his attempt to recover Narbonne (737), he destroyed the fortresses of Agde, Beziers and Maguelonne, and set fire to

the amphitheatre at Nimes. He subdued also the Germanic tribes; annexed Frisia, where Christianity was beginning to make progress; put an end to the duchy of Alemannia; intervened in the internal affairs of the dukes of Bavaria; made expeditions into Saxony; and in 738 compelled some of the Saxon tribes to pay him tribute. 1 Or " The Hammer."

He also gave St Boniface a safe conduct for his missions in Thuringia, Alemannia and Bavaria.

During the government of Charles Martel important changes appear to have been made in the internal administration. Under him began the great assemblies of nobles known as the champs de Mars. To attach his leud.es Charles had to give them church lands as precarium, and this had a very great influence in the development of the feudal system. It was from the precarium, or ecclesiastical benefice, that the feudal fief originated. Vassalage, too, acquired a greater consistency at this period, and its rules began to crystallize. Under Charles occurred the first attempt at reconciliation between the papacy and the Franks. Pope Gregory III., menaced by the Lombatrds, invoked the aid of Charles (739), sent him a deputation with the keys of the Holy Sepulchre and the chains of St Peter, and offered to break with the emperor and Constantinople, and to give Charles the Roman consulate (ut a partibus imperatoris recederet et Romanum consulatum Carolo sanciret) . This proposal, though unsuccessful, was the starting-point of a new papal policy. Since the death of Theuderich IV. in 737 there had been no king of the Franks. In 741 Charles divided the kingdom between his two sons, as though he were himself master of the realm. To the elder, Carloman, he gave Austrasia, Alemannia and Thuringia, with suzerainty over Bavaria; the younger, Pippin, received' Neustria, Burgundy and Provence. Shortly after this division of the kingdom Charles died at Quierzy on the 22nd of October 741, and was buried at St Denis. The characters of Charles Martel and his grandson Charlemagne offer many striking points of resemblance. Both were men of courage and activity, and the two men are often confused in the chansons de geste.

See T. Breysig, Jahrbiicher d. frank. Reichs, 714-741; die Zeit Karl Martells (Leipzig, 1869) ; A. A. Beugnot, " Sur la spoliation des biens du clerge attribute a Charles Martel," in the Mem. de VAcad. ties Inscr. et Belles-Lettres, vol. xix. (Paris, 1853); Ulysse Chevalier, Bio-bibliographie (2nd ed., Paris, 1904). (C. Pf.)

CHARLESTON, a city and the county-seat of Coles county, Illinois, U.S.A., in the E. part of the state, about 45 m. W. of Terre Haute,

Indiana. Pop. (1900) 5488; (1910) 5884. It is served by the Cleveland, Cincinnati, Chicago & St Louis, and the Toledo, St Louis & Western railways, and by interurban electric lines. It is the seat of the Eastern Illinois state normal school (opened in 1899). The city is situated in an important broom-corn raising district, and has broom factories, a tile factory and planing mills. The water-works are owned and operated by the municipality. Charleston was settled about 1835, was incorporated in 1839, and was reincorporated in 1865. One of the Lincoln-Douglas debates was held here in 1858.

CHARLESTON, the largest city of South Carolina, U.S.A., the county-seat of Charleston county, a port of entry, and an important South Atlantic seaport, on a narrow peninsula formed by the Cooper river on the E. and the Ashley on the W. and S.W., and within sight of the ocean about 7 m. distant. Pop. (1890) 54,955; (1900) 55,807, of whom 31,522 were of negro descent and 2592 were foreign-born; (1910 census) 58,833. It is served by the Atlantic Coast Line and the Southern railways, the Clyde Steamship Line to New York, Boston and Jackson- ville, the Baltimore & Carolina Steamship Co. to Baltimore and Georgetown, and a branch of the North German Lloyfl Steamship Co., which brings immigrants from Europe direct to the Southern states; there are freight boat lines to ports in the West Indies, Central America and other foreign countries.

The city extends over 3.76 sq. m. of surface, nowhere rising more than 8 or 10 ft. above the rivers, and has about 9 m. of water front. In the middle of the harbour, on a small island near its entrance, is the famous Fort Sumter; a little to the north-east, on Sullivan's Island, is the scarcely less historic Fort Moultrie, as well as extensive modern fortifications; on James Island, opposite, is Fort Johnson, now the United States Quarantine Station, and farther up, on the other islands, are Fort Ripley and Castle Pinckney (now the United States buoy station). Viewed from any of these forts, Charleston's spires and public buildings seem to rise out of the sea. The streets

are shaded with the live oak and the linden, and are ornamented with the palmetto; and the quaint specimens of colonial architecture, numerous pillared porticoes, spacious verandas — both upper and lower — and flower gardens made beautiful with magnolias, palmettoes, azaleas, jessamines, camelias and roses, give the city a peculiarly picturesque character.

King Street, running north and south through the middle of the peninsula, and Market Street, crossing it about 1 m.from its lower end, are lined with stores, shops or stalls; on Broad Street are many of the office buildings and banks; the wholesale houses are for the most part on Meeting Street, the first thorough- fare east of King; nearly all of the wharves are on the east side; the finest residences are at the lower end of the peninsula on East Battery and South Battery, on Meeting Street below Broad, on Legare Street, on Broad Street and on Rutledge Avenue to the west of King. At the south-east corner of Broad and Meeting streets is Saint Michael's (built in 1752-1761), the oldest church edifice in the city, and a fine specimen of colonial ecclesiastical architecture; in its tower is an excellent chime of eight bells. Beneath the vestry room lie the remains of Charles Cotesworth Pinckney, and in the churchyard are the graves of John Rutledge, James Louis Petigru (1789-1863), and Robert Young Hayne. At the intersection of the same streets are also the massive United States post office building (Italian Renaissance in style), with walls of granite; the county court house, the city hall and Washington Square — in which stand a statue of William Pitt (one arm of which was broken off by a cannon shot during the British bombardment in 1780), and a monument to the memory of Henry Timrod (1829-1867), the poet. At the foot of Broad Street is the Colonial Exchange in which the South Carolina convention organized a new govern- ment during the War of Independence; and at the foot of Market Street is the large modern custom house of white marble, built in the Roman-Corinthian style. Saint Philip's church, with admirable architectural proportions, has a steeple nearly 200 ft. in height, from which a beacon light shines for the guidance of mariners far out at sea. In the west cemetery of this church are the tombs of John C. Calhoun, and of Robert James Turnbull (1775-1833), who was prominent locally as a milliner and under the name of " Brutus " wrote ably on behalf of nullification, free trade and state's rights. The French Protestant Church, though small, is an attractive specimen of Gothic architecture; and the Unitarian, which is in the Perpendicular style and is modelled after the chapel of Edward VI. in Westminster, has a beautiful fan-tracery ceiling.

Of the few small city squares, gardens or parks, the White Point Garden at the lower end of the peninsula is most frequented ; it is shaded with beautiful live oaks, is adorned with palmettoes and commands a fine view of the harbour. About i\ m. north of this

on Meeting Street is Marion Square, with a tall graceful monument to the memory of John C. Calhoun on the south side, and the South Carolina Military Academy along the north border. The largest park in Charleston is Hampton Park, named in honour of General Wade Hampton. It is situated in the north-west part of the city and is beautifully laid out. The Isle of Palms, to the north of Sullivan's Island, has a large pavilion and a wide sandy beach with a fine surf for bathing, and is the most popular resort for visitors. The Magnolia Gardens are about 8 m. up the Ashley. Twenty-two miles beyond is the town of Summerville (pop. in 1900, 2420), a health resort in the pine lands, with one of the largest tea farms in the country. Magnolia Cemetery, the principal burial-place, is a short distance north of the city limits; in it are the graves of William Washington (1 732-1810) and Hugh Swinton Legare. Charleston was the home of the Pinckneys, the Rutledges, the Gadsdens, the Laurenses, and, in a later generation, of W. G. Simms. A trace of the early social organization of the brilliant colonial town remains in the St Cecilia Society, first formed in 1737 as an amateur concert society.

Charleston has an excellent system of public schools. Fore- most among the educational institutions is the college of Charles- ton, chartered in 1785 and again in 1791, and opened in 1790;

it is supported by the city and by funds of its own, ranks high within the state, and has a large and well-equipped museum of natural history, probably founded as early as 1777 and transferred to the college in 1850. Here, too, are the Medical College of the state of South Carolina, which includes a department of pharmacy; the South Carolina Military Academy (opened in 1843), which is a branch of the University of South Carolina; the Porter Military Academy (Protestant Episcopal), the Confederate home school for young women, the Charleston University School, and the Avery Normal Institute (Congrega- tionalist) for coloured students. In the Charleston library (about 25,000 volumes), founded in 1748, are important collec- tions of rare books and manuscripts; the rooms of the South Carolina Historical Society are in the same building. The Charleston News and Courier, published first as the Courier in 1803 and combined with the Daily News (1865) in 1873, is one of the most influential

newspapers in the South. The charitable institutions of the city include the Roper hospital, the Charles- ton Orphan Asylum (founded in 1792), the William Euston home for the aged, and a home for the widows of Confederate soldiers.

In 1878 the United States government began the construction of jetties to remove the bar at the entrance to Charleston harbour, which was otherwise deep and spacious and well protected, and by means of these jetties the bar has been so far removed as to admit vessels drawing about 30 ft. of water. The result has been not only the promotion of the city's commerce, but the removal of the United States naval station and navy yard from Port Royal to what was formerly Chicora Park on the left bank of the Cooper river, a short distance above the city limits. The city's commerce consists largely in the export of cotton, 1 rice, fertil- izers, fruits, lumber and naval stores; the value of its exports, $10,794,000 in 1897, decreased to $2,196,596 in 1907 ($3,164,089 in 1008), while that of the import trade ($1,255,483 in 1897) increased to $3,840,585 in 1907 ($3,323,844 in 1908). The principal industries are the preparation of fertilizers — largely from the extensive beds of phosphate rock along the banks of the Ashley river and from cotton-seed meal — cotton compressing, rice cleaning, canning oysters, fruits and vegetables, and the manufacture of cotton bagging, of lumber, of cooperage goods, clothing and carriages and wagons. Between 1880 and 1890 the industrial development of the city was very rapid, the manufactures in 1890 showing an increase of 229-6% over those of 1880; the increase between 1890 and 1900 was only 6-2%. In 1900 the total value of the city's manufactures, 16-3% (in value) of the product of the entire state, was $9,562,387, the value of the fertilizer product alone, much the most important, being $3,697,ogo. 2

History. — The first English settlement in South Carolina, established at Albemarle Point on the west bank of the Ashley river in 1670, was named Charles Town in honour of Charles II. The location proving undesirable, a new Charles Town on the site of the present city was begun about 1672, and the seat-of government was removed to it in 1 680. The name Charles Town became Charles town about 17 19 and Charleston in 1783. Among the early settlers were English Churchmen, New England Congregationalists, Scotch and Irish Presbyterians, Dutch and German Lutherans, Huguenots (especially in 1680-1688) from France and Switzerland, and a few Quakers; later the French element of the population was augmented by settlers from Acadia

(1755) and from San Domingo (1793). Although it soon became the largest and the wealthiest settlement south of Philadelphia, Charleston did not receive a charter until 1783,

1 At an early date cotton became an important article in Charleston's commerce; some was shipped so early as 1747. At the outbreak of the Civil War Charleston was one of the three most important cotton-shipping ports in the United States, being exceeded in importance only by New Orleans and New York.

2 The special census of 1905 dealt only with the factory product, that of 1905 ($6,007,094) showing an increase of 5-1 % over that of 1900 ($5.7I3.3I5)- In 1905 the (factory) fertilizer product of Charleston was $1,291,859, which represented more than 35% of the (factory) fertilizer product of the whole state.

and did not have even a township government. Local ordinances were passed by the provincial legislature and enforced partly by provincial officials and partly by the church wardens. It was, however, the political and social centre of the province, being not only the headquarters of the governor, council and colonial officials, but also the only place at which courts of justice were held until the complaints of the Up Country people led to the establishment of circuit courts in 1772. After the American War of Independence it continued to be the capital of South Carolina until 1790. The charter of 1783, though frequently amended and altered, is still in force. By an act of the state legislature passed in 1837 the terms " mayor " and " alderman " superseded the older terms " intendant " and " wardens." The city was the heart of the nullification move- ment of 1832-1833; and in St Andrew's Hall, in Broad Street, on the 20th of December i860, a convention called by the state legislature passed an ordinance of secession from the Union.

Charleston has several times been attacked by naval forces and has suffered from many storms. Hurricane and epidemic together devastated the town both in 1699 and in 1854; the older and more thickly settled part of the town was burnt in 1740, and a hurricane did great damage in 1752. In 1706, during the War of the Spanish Succession, a combined fleet of Spanish and French under Captain Le Feboure was repulsed by the forces of Governor Nathaniel Johnson (d, 17 13) and Colonel William Rhett (1666-1721). During the War of Inde- pendence Charleston withstood the attack of Sir Peter Parker and Sir Henry Clinton in 1776, and that of General Augustus Prevost in 1779, but shortly

afterwards became the objective of a more formidable attack by Sir Henry Clinton, the commander-in-chief of the British forces in America. In the later years of the contest the British turned their attention to the reduction of the colonies in the south, and the prominent point and best base of operations in that section was the city of Charleston, which was occupied in the latter part of 1779 by an American force under General Benjamin Lincoln. In December of that year Sir Henry Clinton embarked from New York with 8000 British troops and proceeded to invest Charleston by land. He entrenched himself west of the city between the Cooper and Ashley rivers, which bound it north and south, and thus hemmed Lincoln in a cul-de-sac. The latter made the mistake of attempting to defend the city with an inferior force. Delays had occurred in the British operations and Clinton was not prepared to summon the Americans to surrender until the 10th of April 1780. Lincoln refused, and Clinton advanced his trenches to the third parallel, rendering his enemy's works untenable. On the 12th of May Lincoln capitulated. About 2000 American Continentals were made prisoners, and an equal number of militia and armed citizens. This success was regarded by the British as an offset against the loss of Burgoyne's army in 1777, and Charleston at once became the base of active operations in the Carolinas, which Clinton left Cornwallis to conduct. Thenceforward Charleston was under military rule until evacuated by the British on the 14th of December 1782.

The bombardment and capture of Fort ,Sumter (garrisoned by Federal troops) by the South Carolinians, on the 12th and 13 th of April 1 86 1, marked the actual beginning of the American Civil War. * From 1862 onwards Charleston was more or less under siege by the Federal naval and military forces until 1865. The Confederates repulsed a naval attack made by the Federals under Admiral S. F. Du Pont in April 1863, and a land attack under General Q. A. Gillmore in June of the same year. They were compelled to evacuate the city on the 17 th of February 1865, after having burned a considerable amount of cotton and other supplies to prevent them from falling into the hands of the enemy. After the Civil War the wealth and the population steadily increased, in spite of the destruction wrought by the earthquake of 31st August 1886 (see Earthquake). In that catastrophe 27 persons were killed, many more were injured and died subsequently, 90% of the buildings were injured, and property to the value of more than $5,000,000 was destroyed. The South Carolina Interstate and West Indian Exposition, held

here from the ist of December 1901 to the 1st of June 1902, called the attention of investors to the resources of the city and state, but was not successful financially, and Congress appropriated $160,000 to make good the deficit.

Much information concerning Charleston may be obtained in A. S. Salley's A Guide and Historical Sketch of Charleston (Charleston, 1903) , and in Mrs St Julien Ravenel's Charleston; The Place and the People (New York, 1906). The best history of Charleston is William A. Courtenay's Charleston, S.C.: The Centennial of Incorporation (Charleston, 1884). There is also a good sketch by Yates Snowden in L. P. PoweH's Historic Towns of the Southern States (New York, 1900). For the earthquake see the account by Carl McKinley in the Charleston Year-Book for 1886. See also South Carolina.

CHARLESTON, the capital of West Virginia, U.S.A., and the county-seat of Kanawha county, situated near the centre of the state, on the N. bank of the Kanawha river, at the mouth of the Elk river, about 200 m. E. of Cincinnati, Ohio, and about 130 m. S.W. of Wheeling. Pop. (1890) 6742; (1900) 11,099, of whom 1787 were negroes, and 353 were foreign-born; (1910 census) 22,996′ It is served by the Chesapeake & Ohio, the Toledo & Ohio Central, the Coal & Coke, and the Kanawha & West Virginia (39 m. to Blakeley) railways, and by several river transportation lines on the Kanawha river (navigable throughout the year by means of movable locks) connecting with Ohio and Mississippi river ports. The city is attractively built on high level land, above the river; in addition to a fine customs house, court house and high school, it contains the West Virginia state capitol, erected in 1880. The libraries include the state law library, with 14,000 volumes in 1908, and the library of the state Department of Archives and History, with about 11,000 volumes. Charleston is in the midst of a region rich in bitu- minous coal, the shipment of which by river and rail constitutes one of its principal industries. Oil wells in the vicinity also furnish an important product for export, and there are iron and salt mines near. An ample supply of natural gas is utilized by its manufacturing establishments; and among its manufactures are axes, lumber, foundry and machine shop products, furniture, boilers, woollen goods, glass and chemical fire-engines. The value of the city's factory

products increased from $1,261,815 m 1900 to $2,728,074 in 1905, or 116.2%, a greater rate of increase than that of any other city (with 8000 or more inhabitants) in the state during this period. The first permanent white settlement at Charleston was made soon after the close of the War of Independence; it was one of the places through which the streams of immigrants entered the Ohio Valley, and it became of considerable importance as a centre of transfer and shipment, but it was not until the development of the coal- mining region that it became industrially important. Charleston was incorporated in 1794, and was chartered as a city in 1870. Since the latter year it has been the seat of government of West Virginia, with the exception of the decade 1875-1885, when Wheeling was the capital.

CHARLESTOWN, formerly a separate city of Middlesex county, Massachusetts, U.S.A., but since 1874 a part of the city of Boston, with which it had long before been in many respects practically one. It is situated on a small peninsula on Boston harbour, between the mouths of the Mystic and Charles rivers; the first bridge across the Charles, built in 1786, connected Charlestown and Boston. A United States navy yard (1800), occupying about 87 acres, and the Massachusetts state prison (1805) are here; the old burying-ground contains the grave of John Harvard and that of Thomas Beecher, the first American member of the famous Beecher family; and there is a soldiers' and sailors' monument (1872), designed by Martin Milmore. Charlestown was founded in 1628 or 1629, being the oldest part of Boston, and soon rose into importance; it was organized as a township in 1630, and was chartered as a city in 1847. Within its limits was fought, on the 17th of June 1775, the battle of Bunker Hill (q.v.), when Charlestown was almost completely destroyed by the British. The Bunker Hill Monument com- memorates the battle; and the navy yard at Moulton's Point was the landing-place of the attacking British troops. Little was done toward the rebuilding of Charlestown until 1783.

The original territory of the township was very large, and from parts of it were formed Woburn (1642), Maiden (1649), Stoneham (1725), and Somerville (1842); other parts were annexed to Cambridge, to Medford and to Arlington. S. F. B. Morse, the inventor of the electric telegraph, was born here ; and Charles- town was the birthplace and home of Nathaniel Gorham (1738-1796), a member of the Continental Congress in 1782-1783 and 1 785-1 787, and its president in 1786; and was the home of Loammi Baldwin (1780-1838), a well-known civil engineer; of

Samuel Dexter (1761-1816), an eminent lawyer, secretary of war and for a short time secretary of the treasury in the cabinet of President John Adams; and of Oliver Holden (1765-1831), a composer of hymn-tunes, including ” Coronation.”

See R. Frothingham, History of Charlestown (Boston, 1845), covering 1629-1775; J. F. Hunnewell, A Century of Town Life . . . !775~i887 (Boston, 1888) ; and Timothy T. Sawyer, Old Charlestown

(1902).

CHARLET, NICOLAS TOUSSAINT (1792-1845), French de- signer and painter, more especially of military subjects, was born in Paris on the 20th of December 1792. He was the son of a dragoon in the Republican army, whose death in the ranks left the widow and orphan in very poor circumstances. Madame Charlet, however, a woman of determined spirit and an extreme Napoleonist, managed to give her boy a moderate education at the Lycee Napoleon, and was repaid by his lifelong affection. His first employment was in a Parisian mairie, where he had to register recruits: he served in the National Guard in 1814, fought bravely at the Barriere de Clichy, and, being thus un- acceptable to the Bourbon party, was dismissed from the mairie in 1 8 1 6. He then, having from a very early age had a propensity for drawing, entered the atelier of the distinguished painter Baron Gros, and soon began issuing the first of those lithographed designs which eventually brought him renown. His ” Grenadier de Waterloo,” 1817, with the motto ” La Garde meurt et ne se rend pas ” (a famous phrase frequently attributed to Cambronne, but which he never uttered, and which cannot, perhaps, be traced farther than to this lithograph by Charlet), was particularly popular. It was only towards 1822, however, that he began to be successful in a professional sense. Lithographs (about 2000 altogether), water-colours, sepia-drawings, numerous oil sketches, and a few etchings followed one another rapidly; there were also three exhibited oil pictures, the first of which was especially admired — “Episode in the Campaign of Russia” (1836), the ” Passage of the Rhine by Moreau ” (1837), ” Wounded Soldiers Halting in a Ravine ” (1843). Besides the military subjects in which he peculiarly delighted, and which found an energetic response in the popular heart, and kept alive a feeling of regret for the recent past of the French nation and discontent with the present, — a feeling which increased upon the artist himself towards the close of his career,- — Charlet

designed many subjects of town life and peasant life, the ways of children, &c, with much wit and whim in the descriptive mottoes. One of the most famous sets is the ” Vie civile, politique, et militaire du Caporal Valentin,” 50 lithographs, dating from 1838 to 1842. In 1838 his health began to fail owing to an affection of the chest. He died in Paris on the 30th of October 1845. Charlet was an un- commonly tall man, with an expressive face, bantering and good natured; his character corresponded, full of boyish fun and high spirits, with manly independence, and a vein of religious feeling, and he was a hearty favourite among his intimates, one of whom was the painter Gericault. Charlet married in 1824, and two sons survived him.

A life of Charlet was published in 1856 by a military friend, De la Combe. (W. M. R.)

CHARLEVILLE, a town of north-eastern France, in the department of Ardennes, 151 m. N.E. of Paris on the Eastern railway. Pop. (1906) 19,693. Charleville is situated within a bend of the Meuse on its left bank, opposite Mezieres, with which it is united by a suspension bridge. The town was founded in 1606 by Charles III. (Gonzaga), duke of Nevers, afterwards duke of Mantua, and is laid out on a uniform plan. ‘ Its central and most interesting portion is the Place Ducale, a large square

surrounded by old houses with high-pitched roofs, the porches being arranged so as to form a continuous arcade; in the centre there is a fountain surmounted by a statue of the duke Charles. A handsome church in the Romanesque style and the other public buildings date from the 19th century. An old mill, standing on the bank of the river, dates from the early years of the town’s existence. On the right bank of the Meuse is Mont Olympe, with the ruins of a fortress dismantled under Louis XIV. Charleville, which shares with Mezieres the administrative institutions of the department of Ardennes, has tribunals of first instance and of commerce, a chamber of commerce, a board of trade-arbitrators and lycees and training colleges for both sexes. Its chief industries are metal-founding and the manufacture of nails, anvils, tools and other iron goods, and brush-making; leather-working and sugar-refining, and the making of bricks and clay

pipes are also carried on.

CHARLEVOIX, PIERRE FRANCOIS XAVIER DE (1682-1761), French Jesuit traveller and historian, was born at St Quentin on the 29th of October 1682. At the age of sixteen he entered the Society of Jesus; and at the age of twenty-three was sent to Canada, where he remained for four years as professor at Quebec. He then returned and became professor of belles lettres at home, and travelled on the errands of his society in various countries. In 1720-1722, under orders from the regent, he visited America lor the second time, and went along the Great Lakes and dpwn the Mississippi. In later years (1733-1755) he was one of the directors of the Journal de Trivoux. He died at La Fleche on the 1st of February 1761. His works, enumerated in the Bibliographic des Prers de la Compagnie de Jesus (by Carlos Sommervogel), fall into two groups. The first contains his Histoire de I'etablissemenl, du progres et de la decadence du Christianisme dans V empire du Japon (Rouen, 1715; English trans. History of the Church of Japan, 17 15), and his Histoire et description generate du Japon (1736), a compilation chiefly from Kampfer. The second group includes his historical work on America: Histoire de I'lsle Espagnole ou de Saint Domingue (1730), based on manuscript memoirs of P. Jean-Baptiste Le Pers and original sources; Histoire de Paraguay (1756); Vie de la Mere Marie de I' Incarnation, inslitulrice et premiere supirieure des Urselines de la Nouvelle-France (1724); Histoire et description ginerale de la Nouvelle-France (1744; in English 1769; tr. J. G. Shea, 1866-1872), a work of capital importance for Canadian history.

CHARLEVOIX, a village and the county-seat of Charlevoix county, Michigan, U.S.A., 16 m. E.S.E. of Petoskey, on Lake Michigan and Pine Lake, which are connected by Pine river and Round Lake. Pop. (1890) 1496; (1900) 2079; (1904) 2395; (1910) 2420. It is on the main line of the Pere Marquette railway, and during the summer season is served by lake steamers. The village is best known as a summer resort; it is built on bluffs and on a series of terraces rising from Round and Pine lakes and affording extensive views; and there are a number of attractive summer residences. Charlevoix is an important hardwood lumber port, and the principal industries are the manufacture of lumber and of cement; fishing (especially for lake trout and white fish) ; the raising of sugar beets; and the manufacture of rustic and fancy wood-work. Charlevoix was settled about 1866, and was incorporated as a village in 1879.

CHARLOTTE, a city and the county-seat of Mecklenburg county, North Carolina, U.S.A., situated on Sugar Creek, in the south-west part of the state, about 175 m. south-west of Raleigh. Pop. (1890) 11,557; (I 9o°) 18,091, of whom 7151 were negroes; (1910 census) 34,014. It is served by the Seaboard Air Line and the Southern railways. Among the public buildings are a fine city hall, court-house, Federal and Young Men's Christian Association buildings, and a Carnegie library; several hospitals: St Peter's (Episcopal) for whites, Good Samaritan (Episcopal) for negroes, Mercy General (Roman Catholic) and a Presbyterian. The city is the seat of Elizabeth College and Conservatory of Music (1897), a non-sectarian institution for women, of the Presbyterian College for women, and of Biddle University (Presbyterian) for negroes, established

in 1867. There is a United States assay office, established as a branch mint in 1837, during the days of North Carolina's great importance as a gold producing state, and closed from 1861 to 1869. The city has large cotton, clothing, and knitting mills, and manufactories of cotton-seed oil, tools, machinery, fertilizers and furniture. The total value of its factory products was $4,849,630 in 1905. There are large electric power plants in and near the city. Printing and publishing are of some im- portance: Charlotte is the publication headquarters of the African Methodist Episcopal Zion Church; and several textile trade journals and two medical periodicals are published here. The water-works are owned by the municipality. Charlotte was settled about 1750 and was incorporated in 1768. Here in May 1775 was adopted the " Mecklenburg Declaration of Independence " (see North Carolina), and in honour of its signers there is a monument in front of the court-house. Charlotte was occupied in September 1780 by Cornwallis, who left it after learning of the battle of King's Mountain, and subsequently it became the principal base and rendezvous of General Greene.

CHARLOTTENBURG, a town of Germany, in the kingdom of Prussia, on the Spree, lying immediately west of Berlin, of which it forms practically the entire western suburb. The earlier name of the town was Lietzenburg. Pop. (1890) 76,859; (1900) 189,290; (1905) 237,231. It is governed by a council of 94 members. The central part of the town is connected with Berlin by a magnificent avenue, the Charlottenburger Chaussee, which runs from the Brandenburger Tor through the whole length of the Tiergarten. Although retaining its own municipal government, Charlottenburg,together with the adjacent suburban towns of

Schoneberg and Rixdorf, was included in 1900 in the police district of the capital. The Schloss, built in 1696 for the electress Sophie Charlotte, queen of the elector Frederick, afterwards King Frederick I., after whom the town was named, contains a collection of antiquities and paintings. In the grounds stands a granite mausoleum, the work of Karl Friedrich Schinkel, with beautiful white marble recumbent statues of Frederick William III. and his queen Louise by Christian Daniel Rauch, and also those of the emperor William I. and the empress Augusta by Erdmann Encke. It was in the Schloss that the emperor Frederick III. took over the reins of govern- ment in 1888, and here he resided for nearly the whole of his three months' reign. The town contains an equestrian statue of Frederick. Of public buildings, the famous technical academy and the Kaiser Wilhelm memorial church are referred to in the article Berlin. In Charlottenburg is the Physikalisch-technische Reichsanstalt, a state institution for the carrying out of scientific experiments and measurements, and for testing instruments of precision, materials, &c. It was established in 1886 with money provided by Ernst Werner Siemens. In addition to the famous royal porcelain manufactory, Charlottenburg has many flourish- ing industries, notably iron-works grouped along the banks of the Spree. Its main thoroughfares are laid out on a spacious plan, while there are many quiet streets containing pretty villas.

See F. Schultz, Chronik von Charlottenburg (Charlottenburg, 1888).

CHARLOTTESVILLE, a city and the county-seat of Albemarle county, Virginia, U.S.A., picturesquely situated on ihe Rivanna river, 96 m. (by rail) N. W. of Richmond in the beautiful Piedmont region. Pop. (1890) 5591; (1900) 6449 (2613 being negroes); (r9io) 6765. Thecity is served by the Chesapeake & Ohio, and the Southern railways, and is best known as the seat of the University of Virginia (q.v.), which was founded by Thomas Jefferson. Here are also the Rawlings Institute for girls, founded as the Albemarle Female Institute in 1857, and a University school. Monticello, Jefferson's home, is still standing about 2 m. south-east of the city on a fine hill, called Little Mountain until Jefferson Italian- ised the name. The south pavilion of the present house is the original brick building, one and a half storeys high, first occupied by Jefferson in 1770. He was buried near the house, which was sold by his daughter some years after his death. George Rogers Clark was born near Monticello. Charlottesville is a trade centre for the surrounding country;

among its manufactures are woollen goods, overalls, agricultural implements and

cigars and tobacco. The city owns its water-supply system and owns and operates ite gas plant; an electric plant, privately owned, lights the streets and many houses. The site of the city was a part of the Castle Hill estate of Thomas Walker (1715-1794), an intimate friend of George Washington. The act establishing the town of Charlottesville was passed by the Assembly of Virginia inNovember 1762, when the name Charlottes- ville (in honour of Queen Charlotte, wife of George III.) first appeared. In 17 79-1 780 about 4000 of Burgoyne's troops, surrendered under the " Convention " of Saratoga, were quartered here; in October 1780 part of them were sent to Lancaster, Pa., and later the rest were sent north. In June 1781 Tarleton raided Charlottesville and the vicinity, nearly captured Thomas Jefferson, and destroyed the public records and some arms and ammunition. In 1888 Charlottesville was chartered as a city administratively independent of the county.

CHARLOTTETOWN, a city of Canada, the capital of Prince Edward Island, situated in Queen's county, on Hillsborough river. Pop. (1901) 12,080. It has a good harbour, and the river is navigable by large vessels for several miles. The export trade of the island centres here, and the city has regular communi- cation by steamer with the chief American and Canadian ports. Besides the government buildings and the court-house, it contains numerous churches, the Prince of Wales College, supported by the province, the Roman Catholic college of St Dunstan's and a normal school; among its manufactures are woollen goods, lumber, canned goods, and foundry products. The head office and. workshops of the Prince Edward Island railway are situated here. The town was founded in 1 750 by the French under the name of Port la Joie, but under British rule changed its name in honour of the queen of George III.

CHARM (through the Fr. from the Lat. carmen, a song), an incantation, verses sung with supposed magical results, hence anything possessing powers of bringing good luck or averting evil, particularly articles worn with that purpose, such as an amulet. It is thus used of small trinkets attached to bracelets or

chains. The word is also used, figuratively, of fascinating qualities of feature, voice or character.

CHARNAY, (CLAUDE JOSEPH) DESIRE (1828-), French traveller and archaeologist, was born in Fleurie (Rhone), on the 2nd of May 1828. He studied at the Lycee Charlemagne, in 1850 became a teacher in New Orleans, Louisiana, and there became acquainted with John Lloyd Stephens's books of travel in Yucatan. He travelled in Mexico, under a commission from the French ministry of education, in 1857-1861; in Madagascar in 1863; m South America, particularly Chile and Argentina, in 1875; and in Java and Australia in 1878. In 1880-1883 he again visited the ruined cities of Mexico. Pierre Lorillard of New York contributed to defray the expense of this expedition, and Charnay named a great ruined city near the Guatemalan boundary line Ville Lorillard in his honour. Charnay went to Yucatan in 1886. The more important of his publications are Le Mexique, souvenirs et impressions de voyage (1863), being his personal report on the expedition of 1857-61, of which the official report is to be found in Viollet-le-Duc's Cites et mines amiricaines: Mitla, Palenque, Izamal, Chichen-Itza, Uxmal (1863), vol. 19 of Recueil des voyages et des documents; Les Anciennes Villes du Nouveau Monde (1885; English translation, The Ancient Cities of the New World, 1887, by Mmes. Gonino and Conant); a romance, Une Princesse indienne avant la conquete (1888); A travers les forets merges (1890); and Manu- scrit Ramirez: Histoire de I'origine des Indiens qui habitent la Nouvelle Espagne selon leurs traditions (1903). He translated Cortez's letters into French, under the title Lettres de Fernand Cortes a Charles-quint sur la dexouverte et la conquete du Mexique (1896). He elaborated a theory of Toltec migrations and con- sidered the prehistoric Mexican to be of Asiatic origin, because of observed similarities to Japanese architecture, Chinese decora- tion, Malaysian language and Cambodian dress, &c.

CHARNEL HOUSE (Med. Lat. carnarium), a place for deposit- ing the bones which might be thrown up in digging graves. Sometimes, as at Gloucester, Hythe and Ripon, it was a portion

of the crypt; sometimes, as at Old St Paul's and Worcester (both now destroyed), it was a separate building in the church- yard; sometimes chantry chapels were attached to these build- ings. Viollet-le-Duc has given two very curious examples of such ossuaires (as the French call them) — one from Fleurance (Gers), the other from Faouet (Finistere).

CHARNOCK, JOB (d. 1693), English founder of Calcutta, went out to India in 1655 or 1656, apparently not in the East India Company's service, but soon joined it. He was stationed at Cossimbazar, and subsequently at Patna. In 1685 he became chief agent at Hugli. Being besieged there by the Mogul viceroy of Bengal, he put the company's goods and servants on board his light vessels and dropped down the river 27 m. to the village of Sutanati, a place well chosen for the purpose of defence, which occupied the site of what is now Calcutta. It was only, however, at the third attempt that Charnock finally settled down at this spot, and the selection of the future capital of India was entirely due to his stubborn resolution. He was a silent morose man, not popular among his contemporaries, but " always a faithfull Man to the Company." He is said to have married a Hindu widow.

CHARNOCK (or Chernock), ROBERT (c.i 663-1 696), English conspirator, belonged to a Warwickshire family, and was educated at Magdalen College, Oxford, becoming a fellow of his college and a Roman Catholic priest. When in 1687 the dispute arose between James II. and the fellows of Magdalen over the election of a president Charnock favoured the first royal nominee, Anthony Farmer, and also the succeeding one, Samuel Parker, bishop of Oxford. Almost alone among the fellows he was not driven out in November 1687, and he became dean and then vice-president of the college under the new regime, but was expelled in October 1688. Residing at the court of the Stuarts in France, or conspiring in England, Charnock and Sir George Barclay appear to have arranged the details of the unsuccessful attempt to kill William III. near Turnham Green in February 1696. Barclay escaped, but Charnock was arrested, was tried and found guilty, and was hanged on the 18th of March 1696.

CHARNOCKITE, a series of foliated igneous rocks of wide distribution and great importance in India, Ceylon, Madagascar and Africa. The name was given by Dr T. H. Holland from the fact that the tombstone of Job Charnock, the founder of Calcutta, is made of a block of this rock. The charnockite series includes rocks of many different types, some being acid and rich in quartz and microcline, others basic and full of pyroxene and olivine, while there are also intermediate varieties corresponding mineralogically to norites, quartz-norites and diorites. A special feature, recurring in many members of the group, is the presence of strongly pleochroic, reddish or green hypersthene. Many of the minerals of these rocks are " schillerized," as they contain minute platy or rod-shaped enclosures, disposed parallel to

certain crystallographic planes or axes. The reflection of light from the surfaces of these enclosures gives the minerals often a peculiar appearance, e.g. the quartz is blue and opalescent, the felspar has a milky shimmer like moonshine, the hypersthene has a bronzy metalloidal gleam. Very often the different rock types occur in close association as one set forms bands alternating with another set,or veins traversing it, and where one facies appears the others also usually are found. The term charnockite consequently is not the name of a rock, but of an assemblage of rock types, connected in their origin because arising by differentiation of the same parent magma. The banded structure which these rocks commonly present in the field is only in a small measure due to crushing, but is to a large extent original,and has been produced by fluxion in a viscous crystallizing intrusive magma, together with differentiation or segregation of the mass into bands of differ- ent chemical and mineralogical composition. There have also been, of course, earth movements acting on the solid rock at a later time and injection of dikes both parallel to and across the primary foliation. In fact, the history of the structures of the charnockite series is the history of the most primitive gneisses in all parts of the world, for which we cannot pretend to have as yet any thoroughly satisfactory explanations to offer. A striking fact is the very wide distribution of rocks of this group

in the southern hemisphere; but they also, or rocks very similar to them, occur in Norway, Fiance, Germany, Scotland and North America, though in these countries they have been mostly described as pyroxene granulites, pyroxene gneisses, anorthosites, &c. They are usually regarded as being of Archean age (pre- Cambrian), and in most cases this can be definitely proved, though not in all. It is astonishing to find that in spite of their great age their minerals are often in excellent preservation. In India they form the Nilgiri Hills, the Shevaroys and part of the Western Ghats, extending southward to Cape Comorin and re-appearing in Ceylon. Although they are certainly for the most part igneous gneisses (or orthogneisses), rocks occur along with them, such as marbles, scapolite limestones, and corundum rocks, which were probably of sedimentary origin. (J. S. F.)

CHARNWOOD FOREST, an upland tract in the N.W. of

Leicestershire, England. It is undulating, rocky, picturesque, and in great part barren, though there are some extensive tracts of woodland; its elevation is generally 600 ft. and upwards, the area exceeding this height being about 6100 acres. The loftiest point, Bardon Hill, is 9 1 2 ft. On its western flank lies a coalfield, with Coalville and other mining towns, and granite and hone stones are worked.

CHAROLLES, a town of east-central France, capital of an arrondissement in the department of Saone-et-Loire, situated at the confluence of the Semence and the Arconce, 39 m. W.N.W. of Macon on the Paris-Lyon railway. Pop. (1906) 3228. It has a sub-prefecture, tribunals of primary instance and commerce, and a communal college. There are stone quarries in the vicinity ; the town manufactures pottery, and is the centre for trade in the famous breed of Charolais cattle and in agricultural products. The ruins of the castle of the counts of Charolais occupy the summit of a hill in the immediate vicinity of the town. Charolles was the capital of Charolais, an old division of France, which from the early 14th century gave the title of count to its possessors. In 1327 the countship passed by marriage to the house of Armagnac, and in 1390 it was sold to Philip of Burgundy. After the death of Charles the Bold, who in his youth had borne the title of count of Charolais, it was seized by Louis XL of France, but in 1493 it was ceded by Charles VIII. to Maximilian of Austria, the representative of the Burgundian family. Ulti- mately passing to the Spanish kings, it became for a considerable period an object of dispute between France and Spain, until at length in 1684 it was assigned to the great Conde, a creditor of the king of Spain. It was united to the French crown in 1771.

CHARON, in Greek mythology, the son of Erebus and Nyx (Night). It was his duty to ferry over the Styx (or Acheron) those souls of the deceased who had duly received the rites of burial, in payment for which service he received an obol, which was placed in the mouth of the corpse. It was only exceptionally that he carried living passengers (Aeneid, vi. 295 ff.). As ferryman of the dead he is not mentioned in Homer or Hesiod, and in this character is probably of Egyptian origin. He is represented as a morose and grisly old man in a black sailor's cape. By the Etruscans he was also supposed to be a kind of executioner of the powers- of the nether world, who, armed with an enormous hammer, was associated with Mars in the slaughter of battle. Finally he came to be regarded as the image of death and the

world below. As such he survives in the Charos or Charontas of the modern Greeks — a black bird which darts down upon its prey, or a winged horseman who fastens his victims to the saddle and bears them away to the realms of the dead.

See J. A. Ambrosch, De Charonte Etrusco (1837), a learned and exhaustive monograph; B. Schmidt, Volksleben der Neugriechen (1871), i. 222-251; O. Waser, Charon, Charun, Charos, mythologisch- archaologische Monographie (1898); S. Rocco, "Sufi" origine del Mito di Caronte," in Rivista di storia antica, ii. (1897), wn o considers Charon to be an old name for the sun-god Helios embarking during the night for the East.

CHARONDAS, a celebrated lawgiver of Catina in Sicily. His date is uncertain. Some make him a pupil of Pythagoras (c. 580-504 B.C.) ; but all that can be said is that he was earlier than Anaxilaus of Rhegium (494-476), since his laws were in u«e amongst the Rhegians until they were abolished by that

tyrant. His laws, originally written in verse, were adopted by the other Chalcidic colonies in Sicily and Italy. According to Aristotle there was nothing special about these laws, except that Charondas introduced actions for perjury; but he speaks highly of the precision with which they were drawn up (Politics, ii. 12). The story that Charondas killed himself because he entered the public assembly wearing a sword, which was a violation of his own law, is also told of Diodes and Zaleucus (Diod. Sic. xii. n-19). The fragments of laws attributed to him by Stobaeus and Diodorus are of late (neo-Pythagorean) origin.

See Bentley, On Phalaris, which (according to B. Niese s.v. in Pauly, Realencyclopadie) contains what is even now the best account of Charondas; A. Holm, Geschichte Siciliens, i. ; F. D. Gerlach, Zaleukos, Charondas, und Pythagoras (1858) ; also art. Greek Law.

CHARPENTIER, FRANCOIS (1620-1702), French archaeo- logist and man of letters, was born in Paris on the 15th of February 1620. He was intended for the bar, but was employed by Colbert, who had determined on the foundation of a French East India Company, to draw up an explanatory account of the project for Louis XIV. Charpentier regarded as absurd the use of Latin in monumental inscriptions, and to him was entrusted the task of supplying the paintings of Lebrun in the Versailles Gallery with appropriate legends. His verses were so indifferent that they had

to be replaced by others, the work of Racine and Boileau, both enemies of his. Charpentier in his Excellence de la langae jrancaise (1683) had anticipated Perrault in the famous academical dispute concerning the relative merit of the ancients and moderns. He is credited with a share in the production of the magnificent series of medals that commemorate the prin- cipal events of the age of Louis XIV. Charpentier, who was long in receipt of a pension of 1200 livres from Colbert, was erudite and ingenious, but he was always heavy and common- place. His other works include a Vie de Soar ate (1650), a trans- lation of the Cyropaedia of Xenophon (1658), and the TrailS de la peinture parlante (1684).

CHARRIERE, AGNES ISABELLE EMILIE DE (1 740-1805), Swiss author, was Dutch by birth, her maiden name being van Tuyll van Seeroskerken van Zuylen. She married in 1771 her brother's tutor, M. de Charriere, and settled with him at Colombier, near Lausanne. She made her name by the publica- tion of her Letlres neuchdteloises (Amsterdam, 1784), offering a simple and attractive picture of French manners. This, with Caliste, ou lettres icrites de Lausanne (2 vols. Geneva, 1785-1788), was analysed and highly praised by Sainte-Beuve in his Portraits de femmes and in vol. iii of his Portraits litteraires. She wrote a number of other novels, and some political tracts; but is perhaps best remembered by her liaison with Benjamin Constant between 1787 and 1796.

Her letters to Constant were printed in the Revue Suisse (April 1844), her Lettres-Memoires by E. H. Gaullieur in the same review in 1857, and all the available material is utilized in a monograph on her and her work by P. Godet, Madame de Charriere et ses amis (2 vols., Geneva, 1906). ,. ^.,

CHARRON, PIERRE (1541-1603), French philosopher, born in Paris, was one of the twenty-five children of a bookseller. After studying law he practised at Paris as an advocate, but, having met with no great success, entered the church, and soon gained the highest popularity as a preacher, rising to the dignity of canon, and being appointed preacher in ordinary to Marguerite, wife of Henry IV. of Navarre. About 1588, he determined to fulfil a vow which he had once made to enter a cloister; but being rejected by the Carthusians and the Celestines, he held himself absolved, and continued to follow his old profession. He delivered a course of sermons at Angers, and in the next year passed to Bordeaux, where he formed a famous friendship with

Montaigne. At the death of Montaigne, in 1592, Charron was requested in his will to bear the Montaigne arms.

In 1594 Charron published (at first anonymously, afterwards under the name of " Benoit Vaillant, Advocate of the Holy Faith," and also, in 1594, in his own name) Les Trois Verites, in which by methodical and orthodox arguments, he seeks to prove that there is a God and a true religion, that the true religion is the Christian, and that the true church is the Roman Catholic.

The last book (which is three-fourths of the whole work) is chiefly an answer to the famous Protestant work entitled Le TraiiS de V Aglise by Du Plessis Mornay; and in the second edition (1595) there is an elaborate reply to an attack made on the third Vdrite by a Protestant writer. Les Trots V&rites ran through several editions, and obtained for its author the favour of the bishop of Cahors, who appointed him grand vicar and theological canon. It also led to his being chosen deputy to the general assembly of the clergy, of which body he became chief secretary. It was followed in 1600 by Discours chrestiens, a book of sermons, similar in tone, half of which treat of the Eucharist. In 1601 Charron published at Bordeaux his third and most remarkable work — the famous De la sagesse, a complete popular system of moral philosophy. Usually, and so far correctly, it is coupled with the Essays of Montaigne, to which the author is under very extensive obligations. There is, however, distinct individuality in the book. It is specially interesting from the time when it appeared, and the man by whom it was written. Conspicuous as a champion of orthodoxy against atheists, Jews and Protestants — without resigning this position, and still upholding practical orthodoxy — Charron suddenly stood forth as the representative of the most complete intellectual scepticism. The De la sagesse, which represented a considerable advance on the standpoint of the Trois VSrites, brought upon its author the most violent attacks, the chief being by the Jesuit Francois Garasse (1585-1631), who described him as a "brutal atheist." It received, however, the warm support of Henry IV. and of the president Pierre Jeannin (1540-1622). A second edition was soon called for. In 1603, notwithstanding much opposition, it began to appear; but only a few pages had been printed when Charron died suddenly in the street of apoplexy. His death was

regarded as a judgment for his impiety.

Charron's psychology is sensationalist. With sense all our knowledge commences, and into sense all may be resolved. The soul, located in the ventricles of the brain, is affected by the temperament of the individual; the dry temperament produces acute intelligence; the moist, memory; the hot, imagination. Dividing the intelligent soul into these three faculties, he shows — after the manner which Francis Bacon subsequently adopted — what branches of science correspond with each. With regard to the nature of the soul he merely quotes opinions. The belief in its immortality, he says, is the most universal of beliefs, but the most feebly supported by reason. As to man's power of attaining truth his scepticism is decided; and he plainly declares that none of our faculties enable us to distinguish truth from error. In comparing man with the lower animals, Charron insists that there are no breaks in nature. The latter have reason; nay, they have virtue; and, though inferior in some respects, in others they are superior. The estimate formed of man is not, indeed, flattering. His most essential qualities are vanity, weakness, inconstancy, presumption. Upon this view of human nature and the human lot Charron founds his moral system. Equally sceptical with Montaigne, and decidedly more cynical, he is distinguished by a deeper and sterner tone. Man comes into the world to endure; let him endure then, and that in silence. Our compassion should be like that of God, who succours the suffering without sharing in their pain. Avoid vulgar errors ; cherish universal sympathy. Let no passion or attachment become too powerful for restraint. Follow the customs and laws which surround you. Morality has no connexion with religion. Reason is the ultimate criterion.

Special interest attaches to Charron's treatment of religion. He insists on the diversities in religions; he dwells also on what would indicate a common origin. All grow from small beginnings and increase by a sort of popular contagion; all teach that God is to be appeased by prayers, presents, vows, but especially, and most irrationally, by human suffering. Each is said by its devotees to have been given by inspiration. In fact, however, a man is a Christian, Jew, or Mahommedan, before he knows he is a man. One religion is built upon another. But while he openly declares religion to be " strange to common sense," the practical result at which Charron arrives is that one is not

to sit in judgment on his faith, but to be " simple and obedient,"

and to allow himself to be led by public authority. This is one rule of wisdom with regard to religion; and another equally important is to avoid superstition, which he boldly defines as the belief that God is like a hard judge who, eager to find fault, narrowly examines our slightest act, that He is revengeful and hard to appease, and that therefore He must be flattered and importuned, and won over by pain and sacrifice. True piety, which is the first of duties, is, on the other hand, the knowledge of God and of one's self, the latter knowledge being necessary to the former. It is the abasing of man, the exalting of God, — the belief that what He sends is all good, and that all the bad is from ourselves. It leads to spiritual worship; for external ceremony is merely for our advantage, not for His glory. Charron is thus the founder of modern secularism. His political views are neither original nor independent. He pours much hackneyed scorn on the common herd, declares the sovereign to be the source of law, and asserts that popular freedom is dangerous.

A summary and defence of the Sagesse, written shortly before his death, appeared in 1606. In 1604 his friend Michel de la Roche-maillet prefixed to an edition of the Sagesse a Life, which depicts Charron as a most amiable man of purest character. His complete works, with this Life, were published in 1635. An excellent abridgment of the Sagesse is given in Tennemann's Philosophie, vol. ix. ; an edition with notes by A. Duval appeared in 1820.

See Liebscher, Charron u. sein Werk, De la sagesse (Leipzig, 1890); H. T. Buckle, Introd. to History of Civilization in England, vol. ii. 19; Abbe Lezat, De la predication sous Henri IV. c. vi. ; J. M. Robertson, Short History of Free Thought (London, 1906), vol. ii. p. 19; J. Owen, Skeptics of the French Renaissance (1893); Lecky, Rationalism in Europe (1865).

CHARRUA, a tribe of South American Indians, wild and warlike, formerly ranging over Uruguay and part of S. Brazil. They were dark and heavily built, fought on horses and used the bolas or weighted lasso. They were always at war with the Spaniards, and Juan Diaz de Solis was killed by them in 1 516. As a tribe they are now almost extinct, but the modern Gauchos of Uruguay have much Charrua blood in them.

CHART (from Lat. carta, charta, a map). A chart is a marine map intended specially for the use of seamen (for history, see Map), though the word is also used loosely for other varieties of graphical representation. The marine or nautical chart is

constructed for the purpose of ascertaining the position of a ship with reference to the land, of finding the direction in which she has to steer, the distance to sail or steam, and the hidden dangers to avoid. The surface of the sea on charts is studded with numerous small figures. These are known as the soundings, indicating in fathoms or in feet (as shown upon the title of the chart), at low water of ordinary spring tides, the least depth of water through which the ship may be sailing. Charts show the nature of the unseen bottom of the sea — with the irregularities in its character in the shape of hidden rocks or sand-banks, and give information of the greatest importance to the mariner. No matter how well the land maybe surveyed or finely delineated, unless the soundings are shown a chart is of little use.

The British admiralty charts are compiled, drawn and issued by the hydrographic office. This department of the admiralty was established under Earl Spencer by an order in council in 1795, consisting of the hydrographer, one assistant and a draughtsman. The first hydrographer was Alexander Dalrymple, a gentleman in the East India Company's civil service. From this small beginning arose the important department which is now the main source of the supply of hydrographical information to the whole of the maritime world. The charts prepared by the officers and draughtsmen of the hydrographic office, and pub- lished by order of the lords commissioners of the admiralty, are compiled chiefly from the labours of British naval officers em- ployed in the surveying service; and also from valuable con- tributions received from time to time from officers of the royal navy and mercantile marine. In addition to the work of British sailors, the labours of other nations have been collected and utilized. Charts of the coasts of Europe have naturally been taken from the surveys made by the various nations, and in ' charts of other quarters of the world considerable assistance has

been received from the labours of French, Spanish, Dutch and American surveyors. Important work is done by the Hydro- graphic Office of the American navy, and the U.S. Coast and Geodetic Survey. The admiralty charts are published with the view of meeting the wants of the sailor in all parts of the world. They may be classed under five heads, viz. ocean, general, and coast charts, harbour plans and physical charts; for instance, the

Indian Ocean, the Mediterranean, approaches to Plymouth, Plymouth Sound and wind and current charts. The harbour plans and coast sheets are constructed on the simple principles of plane trigonometry by the surveying officers. (See Surveying: Nautical.) That important feature, the depth of the sea, is obtained by the ordinary sounding line or wire; all soundings are reduced to low water of ordinary spring tides. The times and heights of the tides, with the direction and velocity of the tidal streams, are also ascertained. These MS. charts are forwarded to the admiralty, and form the foundation of the hydrography of the world. The ocean and general charts are compiled and drawn at the hydrographic office, and as originals, existing charts, latest surveys and maps, have to be consulted, their compilation requires considerable experience and is a pains- taking work, for the compiler has to decide what to omit, what to insert, and to arrange the necessary names in such a manner that while full information is given, the features of the coast are not interfered with. As a very slight error in the position of a light or buoy, dot, cross or figure, might lead to grave disaster, every symbolon the admiralty chart has been delineated with great care and consideration, and no pains are spared in the effort to lay before the public the labours of the nautical surveyors and explorers not only of England, but of the maritime world; reducing their varions styles into a comprehensive system furnishing the intelligent seaman with an intelligible guide, which common industry will soon enable him to appreciate and take full advantage of.

As certain abbreviations are used in the charts, attention is called to the " signs and abbreviations adopted in the charts published by the admiralty." Certain parts of the world are still unsurveyed, or not surveyed in sufficient detail for the require- ments that steamships now demand. Charts of these localities are therefore drawn in a light hair-line and unfinished manner, so that the experienced seaman sees at a glance that less trust is to be reposed upon charts drawn in this manner. The charts given to the public are only correct up to the time of their actual publication. They have to be kept up to date. Recent publi- cations by foreign governments, newly reported dangers, changes in character or position of lights and buoys, are as soon as practicable inserted on the charts and due notice given of such insertions in the admiralty " Notices to Mariners."

The charts are supplemented by the Admiralty Pilots, or books of sailing directions, with tide tables, and lists of lighthouses, light

vessels, &c, for the coasts to which a ship may be bound. The physical charts are the continuation of the work so ably begun by Maury of the United States and FitzRoy of the British navy, and give the sailor a good general idea of the world's ocean winds and currents at the different periods of the year; the probable tracks and seasons of the tropical revolving or cyclonic storms ; the coastal winds; the extent or months of the rainy seasons; localities and times where ice may be fallen in with ; and, lastly, the direction and force of the stream and drift currents of the oceans. (T. A. H.)

CHARTER (Lat. charta, carta, from Gr. xˆP Tr l s , originally for papyrus, material for writing, thence transferred to paper and from this material to the document, in O. Eng. hoc, book), a written instrument, contract or convention by which cessions of srJes of property or of rights and privileges are confirmed and held, and which may be produced by the grantees in proof of lawful possession. The use of the word for any written document is obsolete in England, but is preserved in France, e.g. the Ecole des Chartes at Paris. In feudal times charters of privileges were granted, not only by the crown, but by mesne lords both lay and ecclesiastical, as well to communities, such as boroughs, gilds and religious foundations, as to individuals. In modern usage grants by charter have become all but obsolete, though in England this form is still used in the incorporation by the crown of such societies as the British Academy.

The grant of the Great Charter by King John in 121 5 (see Magna Carta), which guaranteed the preservation of English liberties, led to a special association of the word with consti- tutional privileges, and so in modern times it has been applied to constitutions granted by sovereigns to their subjects, in contradistinction to those based on " the will of the people." Such was the Charter (Charte) granted by Louis XVIII. to France in 1814. In Portugal the constitution granted by Dom Pedro in 1826 was called by the French party the " Charter," while that devised by the Cortes in 18 21 was known as the " Constitution." Magna Carta also suggested to the English radicals in 1838 the name " People's Charter," which they gave to their published programme of reforms (see Chartism). This association of the idea of liberty with the word charter led to its figurative use in the sense of freedom or licence. This is, however, rare; the most common use being in the phrase " chartered libertine " (Shakespeare, Henry V. Act i. Sc. 1) from the deri- vative verb " to charter," e.g, to grant a charter. The common colloquialism "

to charter," in the sense of to take, or hire, is derived from the special use of " to charter " as to hire (a ship) by charter-party.

CHARTERED COMPANIES. A chartered company is a trading corporation enjoying certain rights and privileges, and bound by certain obligations under a special charter granted to it by the sovereign authority of the state, such charter defining and limiting those rights, privileges and obligations, and the localities in which they are to be exercised. Such companies existed in early times, but have undergone changes and modifications in accordance with the developments which have taken place in the economic history of the states where they have existed. In Great Britain the first trading charters were granted, not to English companies, which were then non-existent, but to branches of the Hanseatic League (q.v.), and it was not till 1597 that England was finally relieved from the presence of a foreign chartered company. In that year Queen Elizabeth closed the steelyard where Teutons had been established for 700 years.

The origin of all English trading companies is to be sought in the Merchants of the Staple. They lingered on into the 18th century, but only as a name, for their business was solely to export English products which, as English manufactures grew, were wanted at home. Of all early English chartered companies, the " Merchant Adventurers " conducted its operations the most widely. Itself a development of very early trading gilds, at the height of its prosperity it employed as many as 5°,°°° persons in the Netherlands, and the enormous influence it was able to exercise undoubtedly saved Antwerp from the institution of the Inquisition within its walls in the time of Charles V. In the reign of Elizabeth British trade with the Netherlands reached in one year 12,000,000 ducats, and in that of James I. the company's yearly commerce with Germany and the Netherlands was as much as £1,000,000. Hamburg afterwards was its principal depot, and it became known as the " Hamburg Company." In the " Mer- chant Adventurers' " enterprises is to be seen the germ of the trading companies which had so remarkable a development in the 16th and 17th centuries. These old regulated trade gilds passed gradually into joint-stock associations, which were capable of far greater extension, both as to the number of members and amount of stock, each member being only accountable for the amount of his own stock, and being able to transfer it at will to any other person.

It was in the age of Elizabeth and the early Stuarts that the

chartered company, in the modern sense of the term, had its rise. The discovery of the New World, and the opening out of fresh trading routes to the Indies, gave an extraordinary impulse to shipping, commerce and industrial enterprise through- out western Europe. The English, French and Dutch govern- ments were ready to assist trade by the granting of charters to trading associations. It is to the " Russia Company," which received its first charter in 1554, that Great Britain owed its first intercourse with an empire then almost unknown. The first recorded instance of a purely chartered company annexing territory is to be found in the action of this company in setting

up a cross at Spitzbergen in 1613 with King James's arms upon it. Among other associations trading to the continent of Europe, receiving charters at this time, were the Turkey Company (Levant Co.) and the Eastland Company. Both the Russia and Turkey Companies had an important effect upon British relations with those empires. They maintained British influence in those countries, and even paid the expenses of the embassies which were sent out by the English government to their courts. The Russia Company carried on a large trade with Persia through Russian territory; but from various causes their business gradually declined, though the Turkey Company existed in name until 1825.

The chartered companies which were formed during this period for trade with the Indies and the New World have had a more wide-reaching influence in history. The extraordinary career of the East India Company (q.v.) is dealt with elsewhere.

Charters were given to companies trading to Guinea, Morocco, Guiana and the Canaries, but none of these enjoyed a very long or prosperous existence, principally owing to the difficulties, caused by foreign competition. It is when we turn to North America that the importance of the chartered company, as a colonizing rather than a trading agency, is seen in its full develop- ment. The " Hudson's Bay Company," which still exists as a commercial concern, is dealt with under its own heading, but most of the thirteen British North American colonies were in their inception chartered companies very much in the modern acceptation of the term. The history of these companies will be

found under the heading of the different colonies of which they were the origin. It is necessary, however, to bear in mind that two classes of charters are to be found in force among the early American colonies: (1) Those granted to trading associa- tions, which were often useful when the colony was first founded, but which formed a serious obstacle to its progress when the country had become settled and was looking forward to com- mercial expansion; the existence of these charters then often led to serious conflicts between the grantees of the charter and the colonies; ultimately elective assemblies everywhere super- seded control of trading companies. (2) The second class of charters were those granted to the settlers themselves, to protect them against the oppressions of the crown and the provincial governors. These were highly prized by the colonists.

In France and Holland, no less than in England, the institution of chartered companies became a settled principle of the govern- ments of those countries during the whole of the period in question. In France from 1599 to 1789, more than 70 of such companies came into existence, but after 1770, when the great Compagnie des Indes orientates went into liquidation, they were almost abandoned, and finally perished in the general sweeping away of privileges which followed on the outbreak of the Revolution.

If we inquire into the economic ideas which induced the granting of charters to these earlier companies and animated their promoters, we shall find that they were entirely consistent with the general principles of government at the time and what were then held to be sound commercial views. Under the old regime everything was a matter of monopoly and privilege, and to this state of things the constitution of the old companies corresponded, the sovereign rights accorded to them being also quite in accordance with the views of the time. It would have been thought impossible then that private individuals could have found the funds or maintained the magnitude of such enterprises. It was only this necessity which induced statesmen like Colbert to countenance them, and Montesquieu took the same view {Esprit des lois, t. xx. c. 10). John de Witt's view was that such companies were not useful for colonization properly so called, because they want quick returns to pay their dividends. So, even in France and Holland, opinion was by no means settled as to their utility. In England historic protests were made against such monopolies, but the chartered companies were less exclusive in England than in either France or Holland, the governors of

provinces almost always allowing strangers to trade on receiving some pecuniary inducement. French com-

mercial companies were more privileged, exclusive and artificial than those in Holland and England. Those of Holland may be said to have been national enterprises. French companies rested more than did their rivals on false principles; they were more fettered by the royal power, and had less initiative of their own, and therefore had less chance of surviving. As an example of the kind of rules which prevented the growth of the French companies, it may be pointed out that no Protestants were allowed to take part in them. State subventions, rather than commerce or colonization, were often their object; but that has been a characteristic of French colonial enterprise at all times.

Such companies, however, under the old commercial system could hardly have come into existence without exclusive privileges. Their existence might have been prolonged had the whole people in time been allowed the chance of participating in them.

To sum up the causes of failure of the old chartered companies, they are to be attributed to (1) bad administration; (2) want of capital and credit; (3) bad economic organization; (4) distribution of dividends made prematurely or fictitiously. But those survived the longest which extended the most widely their privileges to outsiders. According to contemporary pro- tests, they had a most injurious effect on the commerce of the countries where they had their rise. They were monopolies, and therefore, of course, obnoxious; and it is undoubted that the colonies they founded only became prosperous when they had escaped from their yoke.

On the other hand, it must not be forgotten that they contributed in no small degree to the commercial progress of their own states. They gave colonies to the mother country, and an impulse to the development of its fleet. In the case of England and Holland, the enterprise of the companies saved them from suffering from the monopolies of Spain and Portugal, and the wars of the English, and those of the Dutch in the Indies with Spain and Portugal, were paid for by the companiesˆ They furnished the mother country with luxuries which, by the 18th century, had become necessaries. They offered a career for the younger sons of good families, and sometimes greatly assisted large and useful enterprises.

During the last twenty years of the 19th century there was a great revival of the system of chartered companies in Great Britain. It is a feature of the general growth of interest in colonial expansion and commercial development which has made itself felt almost universally among European nations. Great Britain, however, alone has succeeded in establishing such companies as have materially contributed to the growth of her empire. These companies succeed or fail for reasons different from those which affected the chartered companies of former days, though there are points in common. Apart from causes inherent in the particular case of each company, which necessitates their being examined separately, recent experience leads us to lay down certain general principles regarding them. The modern companies are not like those of the 16th and 17th centuries. They are not privileged in the sense that those companies were. They are not monopolists; they have only a limited sovereignty, always being subject to the control of the home government. It is true that they have certain advantages given them, for without these advantages no capital would risk itself in the lands where they carry on their operations. They often have very heavy corresponding obliga- tions, as will be seen in the case of one (the East Africa) where the obligations were too onerous for the company to discharge, though they were inseparable from its position. The charters of modern companies differ in two points strongly from those of the old: they contain clauses prohibiting any monopoly of trade, and they generally confer some special political rights directly under the control of the secretary of state. The political freedom of the old companies was much greater. In these charters state control has been made a distinguishing feature. It is to be exercised in almost all directions in which the companies may come into contact with matters political. Of course, it is inevitable in all disputes of the companies with foreign powers,

and is extended over all decrees of the company regarding the administration of its territories, the taxation of natives, and mining regulations. In all cases of dispute between the com- panies and the natives the secretary of state is ex officio the judge, and to the secretary of state (in the case of the South Africa Company) the accounts of administration have to be submitted for his approbation. It is deserving of notice that the

British character of the company is insisted upon in each case in the charter which calls it into life. The crown always retains complete control over the company by reserving to itself the power of revoking the charter in case of the neglect of its stipulations. Special clauses were inserted in the charters of the British East Africa and South Africa Companies enabling the government to forfeit their charters if they did not promote the objects alleged as reasons for demanding a charter. This bound them still more strongly; and in the case of the South Africa Company the duration of the charter was fixed at twenty-five years.

The chartered company of these days is therefore very strongly fixed within limits imposed by law on its political action. As a whole, however, very remarkable results have been achieved. This may be attributed in no small degree to the personality of the men who have had the supreme direction at home and abroad, and who have, by their social position and personal qualities, acquired the confidence of the public. With the exception of the Royal Niger Company, it would be incorrect to say that they have been financially successful, but in the domain of government generally it may be said that they have added vast territories to the British empire (in Africa about 1,700,000 sq.m.), and in these territories they have acted as a civilizing force. They have made roads, opened facilities for trade, enforced peace, and laid at all events the foundation of settled administration. It is not too much to say that they have often acted unselfishly for the benefit of the mother country and even humanity. We may instance the antirslavery and anti-alcohol campaigns which have been carried on, the latter certainly being against the immediate pecuniary interests of the companies themselves. It must, of course, be recognized that to a certain extent this has been done under the influence of the home government. The occupation of Uganda certainly, and of the Nigerian territory and Rhodesia prob- ably, will prove to have been rather for the benefit of posterity than of the companies which effected it. In the two cases where the companies have been bought out by the state, they have had no compensation for much that they have expended. In fact, it would have been impossible to take into account actual expenditure day by day, and the cost of wars. To use the expression of Sir William Mackinnon, the shareholders have been compelled in some cases to " take out their dividends in philanthropy."

The existence of such companies to-day is justified in certain political and economic conditions only. It may be highly desir-

able for the government to occupy certain territories, but political exigencies at home will not permit it to incur the expenditure, or international relations may make such an undertaking inex- pedient at the time. In such a case the formation of a chartered company may be the best way out of the difficulty. But it has been demonstrated again and again that, directly, the company's interests begin to clash with those of foreign powers, the home government must assume a protectorate over its territories in order to simplify the situation and save perhaps disastrous collisions. So long as the political relations of such a company are with savages or semi-savages, it may be left free to act, but directly it becomes involved with a civilized power the state has (if it wishes to retain the territory) to acquire by purchase the political rights of the company, and it is obviously much easier to induce a popular assembly to grant money for the purpose of maintaining rights already existing than to acquire new ones. With the strict system of government supervision enforced by modern charters it is not easy for the state to be involved against its will in foreign complications. Economically such companies are also justifiable up to a certain point. When there is no other means of entering into commercial relations with remote and savage races save by enterprise of such magnitude that private I

individuals could not incur the risk involved, then a company may be well entrusted with special privileges for the purpose, as an inventor is accorded a certain protection by law by means of a patent which enables him to bring out his invention at a profit if there is anything in it. But such privileges should not be con- tinued longer than is necessary for the purpose of reasonably recompensing the adventurers. A successful company, even when it has lost monopoly or privileges, has, by its command of ; capital and general resources, established so strong a position that private individuals or new companies can rarely compete with it successfully. That this is so is clearly shown in the case of the Hudson's Bay Company as at present constituted. In colonizing new lands these companies often act successfully. They have proved more potent than the direct action of governments. This may be seen in Africa, where France and England have of late acquired vast areas, but have developed them with very different results, acting from the opposite principles of private and state promotion of colonization. Apart from national characteristics, the individual has far more to gain under the British system of private enterprise. A strong point in

favour of some of the British companies has been that their undertakings have been practically extensions of existing British colonies rather than entirely isolated ventures. But a chartered company can never be anything but a transition stage of colonization; sooner or later the state must take the lead. A company may act beneficially so long as a country-is undeveloped, but as soon as it becomes even semi-civilized its conflicts with private interests become so frequent and serious that its authority has to make way for that of the central government.

The companies which have been formed in France during recent years do not yet afford material for profitable study, for they have been subject to so much vexatious interference from home owing to lack of a fixed system of control sanctioned by government, that they have not been able, like the British, to develop along their own lines.

, 'See also Borneo; Nigeria; Brit. East Africa; Rhodesia; &c. The following works deal with the subject of chartered companies generally : Bonnassieux, Les Grandes Compagnies de commerce (Paris, 1892); Chailly-Bert, Les Compagnies de colonisation sous Vancien regime (Paris, 1898); Cawston and Keane, The Early Chartered Companies (London, 1896); W. Cunningham, A History of British Industry and, Commerce (Cambridge, 1890, 1892); Egerton, A Short History of British Colonial Policy (London, 1897); J- Scott Keltie, The Partition of Africa (London, 1895) ; Leroy-Beaulieu, De la colonisation chez les peuples modernes (Paris, 1898); Les Nouvelles Societes anglo-saxonnes (Paris, 1897); MacDonald, Select Charters illustrative of American History, 1606-1775 (New York, 1899); B. P. Poore>, Federal and State Constitutions, &c (Washington, 1877; a more complete collection of American colonial charters); H. L. Osgood, American Colonies in the 17th Cent. (1904-7); Carton de Wiart, Les Grandes Compagnies coloniales anglaises au ig m " siicle (Paris, 1899). Also see articles " Compagnies de Charte," " Colonies," " Privilege," in Nouveau Diclionnaire d' economie politique (Paris, 1892); and article "Companies, Chartered," in Encyclo- paedia of the Laws of England, edited by A. Wood Renton (London, 1907-1909). (W. B. Du.)

CHARTERHOUSE. This name is an English corruption of the French maison chartreuse, a religious house of the Carthusian order. As such it occurs not uncommonly in England, in various places (e.g. Charterhouse-on-Mendip, Charterhouse Hinton)

where the Carthusians were established. It is most familiar, however, in its application to the Charterhouse, London. On a site near the old city wall, west of the modern thoroughfare of Aldersgate, a Carthusian monastery was founded in 137 1 by Sir Walter de Manny, a knight of French birth. After its dissolution in 1535 the property passed through various hands.. In 1558, while in the possession of Lord North, it was occupied by Queen Elizabeth during the preparations for her coronation, and James I. held court here on his first entrance into London. The Charterhouse was then in the hands of Thomas Howard, earl of Suffolk, but in May 161 1 it came into those of Thomas Sutton (1532-1611) of Snaith, Lincolnshire. He acquired a fortune by the discovery of coal on two estates which he had leased near Newcastle-on-Tyne, and afterwards, removing to London, he carried on a commercial career. In the year of his death, which took place on the 12th of December 1611, he

endowed a hospital on the site of the Charterhouse, calling it the hospital of King James; and in his will he bequeathed moneys to maintain a chapel, hospital (almshouse) and school. The will was hotly contested but upheld in court, and the foundation was finally constituted to afford a home for eighty male pensioners (" gentlemen by descent and in poverty, soldiers that have borne arms by sea or land, merchants decayed by piracy or shipwreck, or servants in household to the King or Queen's Majesty "), and to educate forty boys. The school developed beyond the original intentions of its founder, and now ranks among the most eminent public schools in England. In 1872 it was removed, during the headmastership (1863-1897) of the Rev. William Haig-Brown (d. 1907), to new buildings near Godalming in Surrey, which were opened on the 1 8th of June in that year. The number of foundation scholarships is increased to sixty. The scholars are not now distinguished by wearing a special dress or by forming a separate house, though one house is known as Gownboys, preserving the former title of the scholars. The land on which the old school buildings stood in London was sold for new buildings to accommodate the Merchant Taylors' school, but the pensioners still occupy their picturesque home, themselves picturesque figures in the black gowns designed for them under the foundation. The buildings, of mellowed red brick, include a panelled chapel, in which is the founder's tomb, a fine dining-hall,

governors' room with ornate ceiling and tapestried walls, the old library, and the beautiful great staircase.

CHARTER-PARTY (Lat. charta partita, a legal paper or instrument, " divided," i.e. written in duplicate so that each party retains half), a written, or partly written and partly printed, contract between merchant and shipowner, by which a ship is let or hired for the conveyance of goods on a specified voyage, or for a definite period. (See Affreightment.)

CHARTERS TOWERS, a mining town of Devonport county, Queensland, Australia, 82 m. by rail S.W. of Townsville and 820 m. direct N.N.W. of Brisbane. It is the centre of an im- portant gold-field, the reefs of which improve at the lower depths, the deepest shaft on the field being 2558 ft. below the surface-level. The gold is of a very fine quality. An abundant water-supply is obtained from the Burdekin river, some 8 m. distant. The population of the town in 1901 was 5523; but within a 5 m. radius it was 20,976. Charters Towers became a municipality in 1877.

CHARTIER, ALAIN (c. 1392-C1430), French poet and political writer, was born at Bayeux about 1392. Chartier belonged to a family marked by considerable ability. His eldest brother Guillaume became bishop of Paris; and Thomas became notary to the king. Jean Chartier, a monk of St Denis, whose history of Charles VII. is printed in vol. iii. of Les Grands Chroniques de Saint-Denis (1477), was not, as is sometimes stated, also a brother of the poet Alain studied, as his elder brother had done, at the university of Paris. His earliest poem is the Livre des quatre dames, written after the battle of Agincourt. This was followed by the Debat du reveille-matin, La Belle Dame sans merci, and others. None of these poems show any very patriotic feeling, though Chartier's prose is evidence that he was not indifferent to the misfortunes of his country. He followed the fortunes of the dauphin, afterwards Charles VlL, acting in the triple capacity of clerk, notaryand financial secretary. In 1422 he wrote the famous Quadrilogue-invectif. The interlocutors in this dialogue are France herself and the three orders of the state. Chartier lays bare the abuses of the feudal army and the sufferings of the peasants. He rendered an immense service to his country by maintaining that the cause of France, though desperate to all appearance, was not yet lost if the contending factions could lay aside their differences in the face of the common enemy. In 1424 Chartier was sent on an embassy to

Germany, and three years later he accompanied to Scotland the mission sent to negotiate the marriage of Margaret of Scotland, then not four years old, with the dauphin, afterwards Louis XI. In 1429 he wrote the Livre d'esperance, which contains a fierce attack on the nobility and clergy. He was the author of a diatribe on the courtiers of Charles VII. entitled Le Curial,

translated into English {Here foloweth the copy of a lettre whyche maistre A . Charetier wrote to his brother) "by Caxton about 1484. The date of his death is to be placed about 1430. A Latin epitaph, discovered in the 18th century, says, however, that he was archdeacon of Paris, and declares that he died in the city of Avignon in 1449. This is obviously not authentic, for Alain described himself as a simple clerc and certainly died long before 1449. The story of the famous kiss bestowed by Margaret of Scotland on la precieuse bouche de laquelle sont issus et'sortis tanl de bans mots et vertueuses paroles is mythical, for Margaret did not come to France till 1436, after the poet's death; but the story, first told by Guillaume Bouchet in his Annates d' Aquitaine (1524), is interesting, if only as a proof of the high degree of estimation in which the ugliest man of his day was held. Jean de Masles, who annotated a portion of his verse, has recorded how the pages and young gentlemen of that epoch were required daily to learn by heart passages of his Breviaire des nobles. John Lydgate studied him affectionately. His Belle Dame sans merci was translated into English by Sir Richard Ros about 1640, with an introduction of his own; and Clement Marot and Octavien de Saint- Gelais, writing fifty years after his death, find many fair words for the old poet, their master and pre- decessor. • L ■ '

See Mancel, Alain Chartier, etude bibliographique et littSraire-, 8vo (Paris, 1849) ; D. Delaunay's Etude sur Alain Chartier (1876), with considerable extracts from his writings. His works were edited by A. Duchesne (Paris, 1617). On Jean Chartier see Vallet de Viriville, " Essais critiques sur les historiens originaux du regne de Charles VIII," in the Bibl. de l'£cole des Charles (July-August 1857).

CHARTISM, the name given to a movement for political reform in England, from the so-called " People's Charter " or " National Charter," the document in which in 1838 the scheme of reforms was embodied. The movement itself may be traced to the latter years of the 18th century. Checked for a while by the reaction due to the excesses of the French Revolution, it received a fresh impetus from the awful misery that followed the Napoleonic wars

and the economic changes due to the intro- duction of machinery. The Six Acts of 1819 were directed, not only against agrarian and industrial rioting, but against the political movement of which Sir Francis Burdett was the spokesman in the House of Commons, which demanded man- hood suffrage, the ballot, annual parliaments, the abolition of the property qualification for members of parliament and their payment. The movement was checked for a while by the Reform Bill of 1832; but it was soon discovered that, though the middle classes had been enfranchised, the economic and political grievances of the labouring population remained un- redressed. Two separate movements now developed: one socialistic, associated with the name of Robert Owen; the other radical, aiming at the enfranchisement of the "masses " as the first step to the amelioration of their condition. The latter was represented in the Working Men's Association, by which in 1838 the " People's Charter " was drawn up. It embodied exactly the same programme as that of the radical reformers mentioned above, with the addition of a demand for equal electoral districts.

In support of this programme a vigorous agitation began, the principal leader of which was Feargus O'Connor, whose irrespon- sible and erratic oratory produced a vast effect. Monster meetings were held, at which seditious language was occasionally used, and slight collisions with the military took place. Petitions of enormous size, signed in great part with fictitious names, were presented to parliament; and a great many newspapers were started, of which the Northern Star, conducted by Feargus O'Connor, had a circulation of 50,000. In November 1839 a Chartist mob consisting of miners and others made an attack on Newport, Mon. The rising was a total failure; the leaders, John Frost and two others, were seized, were found guilty of high treason, and were condemned to death. The sentence, however, was changed to one of transportation, and Frost spent over fourteen years in Van Diemen's Land. In 1854 he was pardoned, and from 1856 until his death on the 29th of July 1877 he lived in England. In 1840 the Chartist movement was still further organized by the inauguration at Manchester of the National

Charter Association, which rapidly became powerful, being the

head of about 400 sister societies, which are said to have numbered 40,000 members. Some time after, efforts were made towards a coalition with the more moderate radicals, but these failed; and a land scheme was started by O'Connor, which prospered for a few years. In 1844 the uncompromising spirit of some of the leaders was well illustrated by their hostile attitude towards the Anti – Corn – Law League. O'Connor, especially, entered into a public controversy with Cobden and Bright, in which he was worsted. But it was not till 1848, during a season of great suffering among the, working classes, and under the influence of the revolution at Paris, that the real strength of the Chartist movement was discovered and the prevalent discon- tent became known. Early in March disturbances occurred in Glasgow which required the intervention of the military, while in the manufacturing districts all over the west of Scotland the operatives were ready to rise in the event of the main movement succeeding. Some agitation, too, took place in Edinburgh and in Manchester, but of a milder nature; in fact, while there was a real and widespread discontent, men were indisposed to resort to decided measures.

The principal scene of intended Chartist demonstration was London. An enormous gathering of half a million was announced for the 10th of April on Kennington Common, from which they were to march to the Houses of Parliament to present a petition signed by nearly six million names, in order by this imposing display of numbers to secure the enactment of the six points. Probably some of the more violent members of the party thought to imitate the Parisian mob by taking power entirelyinto their own han'As. The announcement of the procession excited great alarm, and the most decided measures were taken by the authorities to prevent a rising. The procession was forbidden. The military were called out under the command of the duke of Wellington, and by him concealed near the bridges and other points where the procession might attempt to force its way. Even the Bank of England and other public buildings were put in a state of defence, and special constables, to the number, it is said, of 1 70,000, were enrolled, one of whom was destined shortly after to be the emperor of the French. After all these gigantic preparations on both sides the Chartist demonstration proved to be a very insignificant affair. Instead of half a million, only about 50,000 assembled on Ken- nington Common, and their leaders, Feargus O'Connor and Ernest Charles Jones, shrank from the responsibility of braving the authorities by conducting the

procession to the Houses of Parliament. The monster petition was duly presented, and scrutinized, with the result that the number of signatures was found to have been grossly exaggerated, and that the most unheard-of falsification of names had been resorted to. There- after the movement specially called Chartism soon died out. It became merged, so far as its political programme is concerned, with the advancing radicalism of the general democratic movement.

CHARTRES, a city of north-western France, capital of the department of Eure-et-Loir, 55 m. S.W. of Paris on the rail- way to Le Mans. Pop. (1906) 19,433. Chartres is built on the left bank of the Eure, on a hill crowned by its famous cathedral, the spires of which are a landmark in the surrounding country. To the south-east stretches the fruitful plain of Beauce, ” the granary of France,” of which the town is the commercial centre. The Eure, which at this point divides into three branches, is crossed by several bridges, some of them ancient, and is fringed in places by remains of the old fortifications, of which the Porte Guillaume (14th century) , a gateway flanked by towers, is the most complete specimen. The steep, narrow streets of the old town contrast with the wide, shady boulevards which encircle it and divide it from the suburbs. The Clos St Jean, a pleasant park, lies to the north-west, and squares and open spaces are numerous. The cathedral of Notre-Dame (see Architecture: Romanesque and Gothic Architecture in France; and Cathedral), one of the finest Gothic churches in France, was founded in the nth century by Bishop Fuibert on the site of an earlier church destroyed by fire. In n 94 another conflagration laid waste

the new building then hardly completed; but clergy and people set zealously to work, and the main part of the present structure was finished by 1240. Though there have been numerous minor additions and alterations since that time, the general character of the cathedral is unimpaired. The upper woodwork was consumed by fire in 1836, but the rest of the building was saved. The statuary of the lateral portals, the stained glass of the 13th century, and the choir-screen of the Renaissance are all unique from the artistic standpoint. The cathedral is also renowned for the beauty and perfect proportions of its western towers. That to the south, the Clocher Vieux (351 ft. high), dates from the 12th century; its upper portion is lower and less rich in design than that of the Clocher Neuf (377 ft.), which was not completed till the 1 6th century. In length the cathedral measures 440 ft., its choir measures 150 ft. across, and the height of the vaulting is

121 ft. The abbey church of St Pierre, dating chiefly from the 13th century, contains, besides some fine stained glass, twelve repre- sentations of the apostles in enamel, executed about 1547 by Leonard Limosin. Of the other churches of Chartres the chief are St Aignan (13th, 16th and 17th centuries) and St Martin-au-Val (12th century). The hotel de ville, a building of the 17th century, containing a museum and library, an older hotel de ville of the 13th century, and several medieval and Renaissance houses, are of interest. There is a statue of General F. S. Marceau-Desgraviers (b. 1769), a native of the town.

The town is the seat of a bishop, a prefecture, a court of assizes, and has tribunals of first instance and of commerce, a chamber of commerce, training colleges, a lycee for boys, a communal college for girls, and a branch of the Bank of France. Its trade is carried on chiefly on market-days, when the peasants of the Beauce bring their crops and live-stock to be sold and make their purchases. The game-pies and other delicacies of Chartres are well known, and the industries also include flour-milling, brewing, distilling, iron-founding, leather manufacture, dyeing, and the manufacture of stained glass, billiard requisites, hosiery, &c.

Chartres was one of the principal towns of the Carnutes, and by the Romans was called Autricum, from the river Autura (Eure), and afterwards civitas Carnutum. It was burnt by the Normans in 858, and unsuccessfully besieged by them in 911. In 141 7 it fell into the hands of the English, from whom it was recovered in 1432. It was attacked unsuccessfully by the Protestants in 1568, and was taken in 1591 by Henry IV., who was crowned there three years afterwards. In the Franco-German War it was seized by the Germans on the 21st of October 1870, and continued during the rest of the campaign an important centre of operations. During the middle ages it was the chief town of the district of Beauce, and gave its name to a countship which was held by the counts of Blois and Champagne and after- wards by the house of Chatillon, a member of which in 1286 sold it to the crown. It was raised to the rank of a duchy in 1528 by Francis I. After the time of Louis XIV. the title of duke of Chartres was hereditary in the family of Orleans.

See M. T. Bulteau, Monographie de la cathidrale de Chartres (1887) ; A. Plerval, Chartres, sa cathedrale, ses monuments (1896); H. J. L. J. Masse, Chartres: its Cathedral and Churches (1900).

CHARTREUSE, a liqueur, so called from having been made at the famous Carthusian monastery, La Grande Chartreuse, at Grenoble (see below). In consequence of the Associations Law, the Chartreux monks left France in 1904, and now continue the m anuf acture of this liqueur in Spain. There are two m ain varieties of Chartreuse, the green and the yellow. The green contains about 57, the yellow about 43% of alcohol. There are other differences due to the varying nature and quantity of the flavouring matters employed, but the secrets of manufacture are jealously guarded. The genuine liqueur is undoubtedly produced by means of a distillation process.

CHARTREUSE, LA GRANDE, the mother house of the very severe order of Carthusian monks (see Carthusians). It is situated in the French department of the Is£re, about 12 J m. N. of Grenoble, at a height of 3205 ft. above the sea, in the heart of a group of limestone mountains, and not far from the source

of the Guiers Mort. The original settlement here was founded by St Bruno about 1084, and derived its name from the small village to the S.E., formerly known as Cartusia, and now as St Pierre de Chartreuse. The first convent on the present site was built between 113 2 and 113 7, but the actual buildings date only from about 1676, the older ones having been often burnt. The convent stands in a very picturesque position in a large meadow, sloping to the S.W., and watered by a tiny tributary of the Guiers Mort. On the north, fine forests extend to the Col de la Ruchere, and on the west rise well-wooded heights, while on the east tower white limestone ridges, culminating in the Grand Som (6670 ft.). One of the most famous of the early Carthusian monks was St Hugh of Lincoln, who lived here from 1160 to 1 18 1, when he went to England to found the first Carthusian house at Witham in Somerset; in 1186 he became bishop of Lincoln, and before his death in 1 200 had built the angel choir and other portions of the wonderful cathedral there.

The principal approach to the convent is from St Laurent du Pont, a village situated on the Guiers Mort, and largely built by the monks — it is connected by steam tramways with Voiron (for Grenoble) and St Beron (for Chambery). Among the other routes may be mentioned those from Grenoble by Le Sappey, or by the

Col de la Charmette, or from Chambery by the Col de Couz and the village of Les Echelles. St Laurent is about 5 J m. from the convent. The road mounts along the Guiers Mort and soon reaches the hamlet of Fourvoirie, so called from forata via, as about 1510 the road was first pierced hence towards the convent. Here are iron forges, and here was formerly the chief centre of the manufacture of the famed Chartreuse liqueur. Beyond, the road enters the ” Desert ” and passes through most delightful scenery. Some way farther the Guiers Mort is crossed by the modern bridge of St Bruno, the older bridge of Parant being still visible higher up the stream. Here begins the splendid carriage road, constructed by M. E. Viaud between 1854 and 1856. It soon passes beneath the bold pinnacle of the Oeillette or Aiguillette, beyond which formerly women were not allowed to penetrate. After passing through four tunnels the road bends north (leaving the Guiers Mort which flows past St Pierre de Chartreuse) , and the valley soon opens to form the upland hollow in which are the buildings of the convent. These are not very striking, the high roofs of dark slate, the cross-surmounted turrets and the lofty clock-tower being the chief features. But the situation is one of ideal peace and repose. Women were formerly lodged in the old infirmary, close to the main gate, which is now a hotel. Within the conventual buildings are four halls formerly used for the reception of the priors of the various branch houses in France, Italy, Burgundy and Germany. The very plain and unadorned chapel dates from the 15th century, but the cloisters, around which cluster the thirty-six small houses for the fully professed monks, are of later date. The library con- tained before the Revolution a very fine collection of books and MSS., now mostly in the town library at Grenoble.

The monks were expelled in 1793, but allowed to return in 1816, but then they had to pay rent for the use of the buildings and the forests around, though both one and the other were due to the industry of their predecessors. They were again expelled in 1904, and are dispersed in various houses in England, at Pinerolo (Italy) and at Tarragona (Spain). It is at the last- named spot that the” various pharmaceutical preparations are now manufactured for which they are famous (though sold only since about 1840) — the Elixir, the Boule d’acier (a mineral paste or salve) , and the celebrated liqueur. The magnificent revenues derived from the profits of this manufacture were devoted by the monks to various purposes of benevolence, especially in the neighbouring villages, which owe to this source their churches, schools, hospitals, &c,

fee, built and maintained at the expense of the monks.

See La Grande Chartreuse par un Charlreux (Grenoble, 1898) ; H. Ferrand, Guide a la Grande Chartreuse (1889) ; and Les Montagnes de la Chartreuse (1899) (W. A. B. C.)

CHARWOMAN, one who is hired to do occasional household work. ” Char ” or ” chare,” which forms the first part of the

word, is common, in many forms, to Teutonic languages, meaning a ” turn,” and, in this original sense, is seen in ” ajar,” properly ” on char,” of a door ” on the turn ” in the act of closing. It is thus applied to a ” turn of work,” an odd job, and is so used, in the form ” chore,” in America, and in dialects of the south-west of England.

CHASE, SALMON PORTLAND (1808-1873), American states- man and jurist, was born in Cornish township, New Hampshire, on the 13th of January 1808. His father died in 1817, and the son passed several years (1820-1824) in Ohio with his uncle, Bishop Philander Chase (1775-1852), the foremost pioneer of the Protestant Episcopal Church in the West, the first bishop of Ohio (i8i9-i83i),andafter 1835 bishop of Illinois. He graduated at Dartmouth College in 1826, and after studying law under William Wirt, attorney-general of the United States, in Washington, D.C., was admitted to the bar in 1829, and removed to Cincinnati, Ohio, in 1830. Here he soon gained a position of prominence at the bar, and published an annotated edition, which long remained standard, of the laws of Ohio. At a time when public opinion in Cincinnati was largely dominated by Southern business connexions, Chase, influenced probably by James G. Birney, associated himself after about 1836 with the anti-slavery movement, and became recognized as the leader of the political reformers as opposed to the Garrisonian abolitionists. To the cause he freely gave his services as a lawyer, and was particularly conspicuous as counsel for fugitive slaves seized in Ohio for rendition to slavery under the Fugitive Slave Law of 1793 — indeed, he came to be known as the “attorney-general of fugitive slaves.” His argument (184,7) in the famous Van Zandt case before the United States Supreme Court attracted particular attention, though in this as in other cases of the kind the judgment was against him. In brief he contended that slavery was ” local, not national,” that it could exist only by virtue of positive State Law, that the Federal government was not empowered by the Constitution to create slavery anywhere, and

that " when a slave leaves the jurisdiction of a state he ceases to be a slave, because he continues to be a man and leaves behind him the law which made him a slave." In 1841 he abandoned the Whig party, with which he had previously been affiliated, and for seven years was the undisputed leader of the Liberty party in Ohio; he was remarkably skilful in drafting platforms and addresses, and it was he who prepared the national Liberty platform of 1843 and the Liberty address of 1845. Realizing in time that a third party movement could not succeed, he took the lead during the campaign of 1848 in combining the Liberty party with the Barnburners or Van Buren Democrats of New York to form the Free-Soilers. He drafted the famous Free-Soil platform, and it was largely through his influence that Van Buren was nominated for the presidency. His object, how- ever, was not to establish a permanent new party organization, but to bring pressure to bear upon Northern Democrats to force them to adopt a policy opposed to the further extension of slavery.

In 1849 he was elected to the United States Senate as the result of a coalition between the Democrats and a small group of Free-Soilers in the state legislature; and for some years thereafter, except in 1852, when he rejoined the Free-Soilers, he classed himself as an Independent Democrat, though he was out of harmony with the leaders of the Democratic party. During his service in the Senate (1849-1855) he was pre-eminently the champion of anti-slavery in that body, and no one spoke more ably than he did against the Compromise Measures of 1850 and the Kansas-Nebraska Bill of 1854. The Kansas-Nebraska legislation, and the subsequent troubles in Kansas, having convinced him of the futility of trying to influence the Democrats, he assumed the leadership in the North-west of the movement to form a new party to oppose the extension of slavery. The " Appeal of the Independent Democrats in Congress to the People of the United States," written by Chase and Giddings, and published in the New York Times of the 24th of January 1854, may be regarded as the earliest draft of the Republican party creed. He was the first Republican governor of Ohio,

serving from 1855 to 1859. Although, with the exception of Seward, he was the most prominent Republican in the country,

and had done more against slavery than any other Republican, he failed to secure the nomination for the presidency in i860, partly because his views on the question of protection were not orthodox from a Republican point of view, and partly because the old line Whig element could not forgive his coalition with the Democrats in the senatorial campaign of 1849; his uncompromising and conspicuous anti-slavery record, too, was against him from the point of view of " availability." As secretary of the treasury in President Lincoln's cabinet in 1861-1864, during the first three years of the Civil War, he rendered services of the greatest value. That period of crisis witnessed two great changes in American financial policy, the establishment of a national banking system and the issue of a legal tender paper currency. The former was Chase's own particular measure. He suggested the idea, worked out all of the important principles and many of the details, and induced Congress to accept them. The success of that system alone warrants his being placed in the first rank of American financiers. It not only secured an immediate market for government bonds, but it also provided a permanent uniform national currency, which, though inelastic, is absolutely stable. The issue of legal tenders, the greatest financial blunder of the war, was made contrary to his wishes, although he did not, as he perhaps ought to have done, push his opposition to the point of resigning.

Perhaps Chase's chief defect as a statesman was an insatiable desire for supreme office. It was partly this ambition, and also temperamental differences from the president, which led him to retire from the cabinet in June 1864. A few months later (December 6, 1864) he was appointed chief justice of the United States Supreme Court to succeed Judge Taney, a position which he held until his death in 1873. Among his most im- portant decisions were Texas v. White (7 Wallace, 700), 1869, in which he asserted that the Constitution provided for an " indestructible union composed of indestructible states," Veazie Bank v. Fenno (8 Wallace, 533), 1869, in defence of that part of the banking legislation of the Civil War which imposed a tax of 10% on state bank-notes, and Hepburn v. Griswold (8 Wallace, 603), 1869, which declared certain parts of the legal tender acts to be unconstitutional. When the legal tender decision was reversed after the appointment of new judges, 1871-1872 (Legal Tender Cases, 12 Wallace, 457), Chase prepared a very able dissenting opinion. Toward the end of his life he gradually drifted back toward his old Democratic position, and made an

unsuccessful effort to secure the nomination of the Democratic party for the presidency in 1872. He died in New York city on the 7th of May 1873. Chase was one of the ablest political leaders of the Civil War period, and deserves to be placed in the front rank of American statesmen.

The- standard biography is A. B. Hart's Salmon Portland Chase in the " American Statesmen Series " (1899). Less philosophical, but containing a greater wealth of detail, is J. W. Shuckers' Life and Public Services of Salmon Portland Chase (New York, 1874). R. B. Warden's Account of the Private Life and Public Services of Salmon Portland Chase (Cincinnati, 1874) deals more fully with Chase's private life.

CHASE, SAMUEL (1741-1811), American jurist, was bom in Somerset county, Maryland, on the 17th of April 1741. He was admitted to the bar at Annapolis in 1761, and for more than twenty years was a member of the Maryland legislature. He took an active part in the resistance to the Stamp Act, and from 1774 to 1778 and 1784ˆ0 1785 was a member of the Continental Congress. With Benjamin Franklin and Charles Carroll he was sent by Congress in 1776 to win over the Canadians to the side of the revolting colonies, and after his return did much to persuade Maryland to advocate a formal separation of the thirteen colonies from Great Britain, he himself being one of those who signed the Declaration of Independence on the 2nd of August 1776. In this year he was also a member of the convention which framed the first constitution for the state of Maryland. After serving in the Maryland convention which ratified for that state the Federal Constitution, and there

vigorously opposing ratification, though afterwards he was an ardent Federalist, he became in 1791 chief judge of the Maryland general court, which position he resigned in 1796 for that of an associate justice of the Supreme Court of the United States. His radical Federalism, however, led him to continue active in politics, and he took advantage of every opportunity, on the bench and off, to promote the cause of his party. His over-bearing conduct while presiding at the trials of John Fries for treason, and of James Thompson Callender (d. 1813) for seditious libel in 1800, drove the lawyers for the defence from the court, and evoked the wrath of the Republicans, who were stirred to action by a political harangue on the evil tendencies of democracy which he delivered as a charge to a grand jury at Baltimore in 1803. The House of Representatives adopted a

resolution of impeachment in March 1804, and on the 7th of December 1804 the House managers, chief among whom were John Randolph, Joseph H. Nicholson (1770-1817), and Caesar A. Rodney (1772- 1824), laid their articles of impeachment before the Senate. The trial, with frequent interruptions and delays, lasted from the 2nd of January to the 1st of March 1805. Judge Chase was defended by the ablest lawyers in the country, including Luther Martin, Robert Goodloe Harper (1765-1825), Philip Barton Key (1757-1815), Charles Lee (1758-1815), and Joseph Hopkinson (1770-1842). The indictment, in eight articles, dealt with his conduct in the Fries and Callender trials, with his treatment of a Delaware grand jury, and (in article viii.) with his making " highly indecent, extra-judicial " reflections upon the national administration, probably the greatest offence in Republican eyes. On only three articles was there a majority against Judge Chase, the largest, on article viii., being four short of the necessary two-thirds to convict. " The case," says Henry Adams, "proved impeachment to be an impracticable thing for partisan purposes, and it decided the permanence of those lines of constitutional development which were a reflection of the common law." Judge Chase resumed his seat on the bench, and occupied it until his death on the 19th of June 181 1.

See The Trial of Samuel Chase (2 vols., Washington, 1805), reported by Samuel H. Smith and Thomas Lloyd ; an article in The American Law Review, vol. xxxiii. (St Louis, Mo., 1899) ; and Henry Adams's History of the United Slates, vol. ii. (New York, 18

CHASE, WILLIAM MERRITT (1849-), American painter, was born at Franklin, Indiana, on the 1st of November 1849. He was a pupil of B. F. Hays at Indianapolis, of J. O. Eaton in New York, and subsequently of A. Wagner and Piloty in Munich. In New York he established a school of his own, after teaching with success for some years at the Art Students' League. A worker in all mediums — oils, water-colour, pastel and etching — • painting with distinction the figure, landscape and still-life, he is perhaps best known by his portraits, his sitters numbering some of the most important men and women of his time. Mr Chase won many honours at home and abroad, became a member of the National Academy of Design, New York, and for ten years was president of the Society of American Artists. Among his important canvases are " Ready for the Ride " (Union League Club, N.Y.), " The Apprentice," " Court Jester," and portraits of the painters Whistler and Duvenecls; of General Webb and of Peter Cooper.

CHASE. (1) (Fr. ckasse, from Lat. captare, frequentative of caper e, to take), the pursuit of wild animals for food or sport (see Hunting). The word is used of the pursuit of any- thing, and also o.f the thing pursued, as, in naval warfare, of a ship. A transferred meaning is that of park land reserved for the breeding and hunting of wild animals, in which sense it appears in various place-names in England, as Cannock Chase. It is also a term for a stroke in tennis (g.v.). (2) (Fr. chdsse, Lat. capsa, a box, cf. caisse, and ” chest “), an enclosure, such as the muzzle-end of a gun in front of the trunnions, a groove cut to hold a pipe, and, in typography, the frame enclosing the ” forme.”

CHASING, or Enchasing, the art of producing figures and ornamental patterns, either raised or indented, on metallic surfaces by means of steel tools or punches. It is practised

extensively for the ornamentation of goldsmith and silversmith work, electro-plate and similar objects, being employed to produce bold flutings and bosses, and in another manner utilized for imitating engraved surfaces. Minute work can be produced by this method, perfect examples of which may be seen in the watch-cases chased by G. M. Moser, R.A. (i 704-1 783). The chaser first outlines the pattern on the surface he is to ornament, after which, if the work involves bold or high embossments, these are blocked out by a process termed ” snarling.” The snarling iron is a long iron tool turned up at the end, and made so that when securely fastened in a vise the upturned end can reach and press against any portion of the interior of the vase or other object to be chased. The part to be raised being held firmly against the upturned point of the snarling iron, the workman gives the shoulder or opposite end of the iron a sharp blow, which causes the point applied to the work to give it a percussive stroke, and thus throw up the surface of the metal held against the tool. When the blocking out from the interior is finished, or when no such embossing is required, the object to be chased is filled with molten pitch, which is allowed to harden. It is then fastened to a sandbag, and with hammer and a multitude of small punches of different outline the whole details of the pattern, lined, smooth or ” matt,” are worked out. Embossing and stamping from steel dies and rolled ornaments have long since taken the place of chased ornamentations in the cheaper kinds of

plated works. (See Embossing.)

CHASLES, VICTOR EUPHEMIEN PHILARETE (1 798-1873), French critic and man of letters, was born at Mainvilliers (Eure et Loir) on the 8th of October 1798. His father, Pierre Jacques Michel Chasles (1754-1826), was a member of the Convention, and was one of those who voted the death of Louis XVI. He brought up his son according to the principles of Rousseau's Emile, and the boy, after a regime of outdoor life, followed by some years' classical study, was apprenticed to a printer, so that he might make acquaintance with manual labour. His master was involved in one of the plots of 181 5, and Philarete suffered two months' imprisonment. On his release he was sent to London, where he worked for the printer Valpy on editions of classical authors. He wrote articles for the English reviews, and on his return to France did much to popularize the study of English authors. He was also one of the earliest to draw attention in France to Scandinavian and Russian literature. He contributed to the Revue des deux mondes, until he had a violent quarrel, terminating in a lawsuit, with Francois Buloz, who won his case. He became librarian of the Bibliotheque Mazarine, and from 1841 was professor of comparative literature at the College de France. During his active life he produced some fifty volumes of literary history and criticism, and of social history, much of which is extremely valuable. He died at Venice on the 18th of July 1873. His son, Emile Chasles (b. 1827), was a philologist of some reputation.

Among his best critical works is Dix-huitieme Siecle en Angleterre . . . (1846), one of a series of 20 vols, of Etudes de litterature comparee (1846-1875), which he called later Trente ans de critique. An account of his strenuous boyhood is given in his Maison de mon pere. His Memoires (1876-1877) did not fulfil the expectations based on his brilliant talk.

CHASSE (from the Fr., in full chasse-cafS, or " coffee-chaser "), a draught of spirit or liqueur, taken with or after coffee, &c.

CHASSIS (Fr. for " chased "), a gliding step in dancing, so called since one foot is brought up behind or chases the other. The chasse croise is a double variety of the step.

CHASSELOUP-LAUBAT, FRANCOIS, Marquis de (1754- 1833), French general and military engineer, was born at St Sernin (Lower Charente) on the 18th of August 1754, of a noble family,

and entered the French engineers in 1774. He was still a subaltern at the outbreak of the Revolution, becoming captain in 1 79 1. His ability as a military engineer was recognized in the campaigns of 1792 and 1793. In the following year he won distinction in various actions and was promoted successively chef de bataillon and colonel. He was chief of engineers at the siege of Mainz in 1796, after which he was sent to Italy. He there conducted the first siege of Mantua, and reconnoitred the

positions and lines of advance of the army of Bonaparte. He was promoted general of brigade before the close of the campaign, and was subsequently employed in fortifying the new Rhine frontier of France. His work as chief of engineers in the army of Italy (1799) was conspicuously successful, and after the battle of Novi he was made general of division. When Napoleon took the field in 1800 to retrieve the disasters of 1-799, he again selected Chasseloup as his engineer general. During the peace of 1801-1805 he was chiefly employed in reconstructing the defences of northern Italy, and in particular the afterwards famous Quadrilateral. His chef-d'oeuvre was the great fortress 'of Aless- andria on the Tanaro. In 1805 he remained in Italy with Massena, but at the end of 1806 Napoleon, then engaged in the Polish campaign, called him to the Grande Armee, with which he served in the campaign of 1806-07, directing the sieges of Colberg, Danzig and Stralsund. During the Napoleonic domina L tion in Germany, Chasseloup reconstructed many fortresses, in particular Magdeburg. In the campaign of 1809 he again served in Italy. In 1810 Napoleon made him a councillor of state. His last campaign was that of 1812 in Russia. He retired from active service soon afterwards, though in 18 14 he was occasionally engaged in the inspection and construction of fortifications. Louis XVIII. made him a peer of France and a,knight of St Louis. He refusedto join Napoleon in the Hundred Days, but after the second Restoration he voted in the chamber of peers against the condemnation of Marshal Ney. In politics he belonged to the constitutional party. The king created him a marquis. Chasseloup's later years were employed chiefly in putting in order his manuscripts, a task which he had to abandon owing to the failure of his sight. His only published work was Correspondance d'un giniral franˆais, &c. sur divers sujets (Paris, 1801, republished Milan, 1805 and i8ir, under the title Corre- spondance de deux ginSrals, &c, essais sur quelques parties d'ariil- lerie et de fortification) . The most important of his papers are in manuscript in the Dep6t of Fortifications, Paris.

As an engineer Chasseloup was an adherent, though of advanced views, of the old bastioned system. He followed in many respects the engineer Bousmard, whose work was published in 1797 and who fell, as a Prussian officer, in the defence of Danzig in 1807 against Chasseloup's own attack. His front was applied to Alessandria, as has been stated, and contains many elabora- tions of the bastion trace, with, in particular, masked flanks in the tenaille, which served as extra flanks of the bastions. The bastion itself was carefully and minutely retrenched. The ordinary ravelin he replaced by a heavy casemated caponier after the example of Montalembert, and, like Bousmard's, his own ravelin was a large and powerful work pushed out beyond the glacis.

CHASSEPOT, officially " fusil modele 1866," a military breech-loading rifle, famous as the arm of the French forces in the Franco- German War of 1870-71. It was so called after its inventor, Antoine Alphonse Chassepot (1833-1905), who, from 1857 on- wards, had constructed various experimental forms of breech- loader, and it became the French service weapon in 1866. In the following year it made its first appearance on the battlefield at Mentana (November 3rd, 1867), where it inflicted severe losses upon Garibaldi's troops. In the war of 1870 it proved very greatly superior to the German needle-gun. The breech was closed by a bolt very similar to those of more modern rifles, and amongst the technical features of interest were the method of obturation, which was similar in principle to the de Bange obturator for heavy guns (see Ordnance), and the retention of the paper cartridge. The principal details of the chassepot are: — weight of rifle, 9ft 5 oz.; length with bayonet, 6 ft. 2 in.; calibre, -433 in.; weight of bullet (lead), 386 grains; weight of charge (black powder), 86-4 grains; muzzle velocity, 1328 f.s.; sighted to 1312 yds. (1200 m.). The chassepot was replaced in 1874 by the Gras rifle, which had a metal cartridge, and all rifles of the older model remaining in store were converted to take the same ammunition (fusil modele 1866/74) .

CHASSERIAU, THEODORE (1819-1856), French painter, was born in the Antilles, and studied under Ingres at Paris and

at Rome, subsequently falling under the influence of Paul Delaroche. He was a well-known painter of portraits and his-

torical pieces, his ” Tepidarium at Pompeii ” (1853) being now in the Louvre.

CHASSIS (Fr. chdssis, a frame, from the Late. Lat. capsum, an enclosed space) , properly a window-frame, from which is derived the word ” sash “; also the movable traversing frame of a gun, and more particularly that part of a motor vehicle consisting of the wheels, frame and machinery, on which the body or carriage part rests.

CHASTELARD, PIERRE DE BOCSOZEL DE (1540-1563), French poet, was born in Dauphin6, a scion of the house of Bayard. His name is inseparably connected with Mary, queen of Scots. From the service of the Constable Montmorency, Chastelard, then a page, passed to the household of Marshal Damville, whom he accompanied in his journey to Scotland in escort of Mary (1 561). He returned to Parisin themarshal’s train, but left for Scotland again shortly afterward, bearing letters of recommendation to Mary from his old protector, Montmorency, and the Regrets addressed to the ex-queen of France by Pierre Ronsard, his master in the art of song. He undertook to trans- mit to the poet the service of plate with which Mary rewarded him. But he had fallen in love with the queen, who is said to have encouraged his passion. Copies of verse passed between them; she lost no occasion of showing herself partial to his person and conversation. The young man hid himself under her bed, where he was discovered by her maids of honour. Mary pardoned the offence, and the old familiar terms between them were resumed. Chastelard was so rash as again to violate her privacy. He was discovered a second time, seized, sentenced and hanged the next morning. He met his fate valiantly and consistently, reading, on his way to the scaffold, his master’s noble Hymne de la mort, and turning at the instant of doom towards the palace of Holyrood, to address to his unseen mistress the famous farewell — ” Adieu, toi si belle et si cruelle, qui me tues et que je ne puis cesser d’aimer.” This at least is the version of the Mfmoires of Brant6me, who is, however, notoriously untrustworthy. But for his madness of love, it is possible that Chastelard would have left no shadow or shred of himself behind. As it is, his life and death are of interest as illustrating the wild days in which his lot was cast.

CHASTELLAIN, GEORGES (d. 1475), Burgundian chronicler, was a native of Alost in Flanders. He derived his surname from the fact that his ancestors were burgraves or chatelains of the town; his parents, who belonged to illustrious Flemish families, wfire

probably the Jean Chastellain and his wife Marie de Mas- mines mentioned in the town records in 1425 and 1432. A copy of an epitaph originally at Valenciennes states that he died on the 20th of March 1474-5 aged seventy. But since he states that he was so young a child in 1430 that he could not recollect the details of events in that year, and since he was " tcolier " at Louvain in 1430, his birth may probably be placed nearer 141 5 than 1405. He saw active service in the Anglo-French wars and probably elsewhere, winning the surname of L'adventureux. In 1434 he received a gift from Philip the Good, duke of Burgundy, for his military services, but on the conclusion of the peace of Arras in the next year he abandoned soldiering for diplomacy. The next ten years were spent in France, where he was connected with Georges de la Tremoille, and afterwards entered the house- hold of Pierre de Br6ze, at that time seneschal of Poitou, by whom he was employed on missions to the duke of Burgundy, in an attempt to establish better relations between Charles VII. and the duke. During these years Chastellain had ample oppor- tunity of obtaining an intimate knowledge of French affairs, but on the further breach between the two princes, Chastellain left the French service to enter Philip's household. He was at first pantler, then carver, titles which are misleading as to the nature of his services, which were those of a diplomatist; and in 1457 he became a member of the ducal council. He was continually employed on diplomatic errands until 1455, when, owing appar- ently to ill-health, he received apartments in the palace of the counts of Hainaut at Salle-le-Comte, Valenciennes, with a con-

siderable pension, on condition that the recipient should put in writing " choses nouvelles et morales," and a chronicle of notable events. That is to say, he was appointed Burgundian historio- grapher with a recommendation to write also on other subjects not strictly within the scope of a chronicler. From this time he worked hard at his Chronique, with occasional interruptions in his retreat to fulfil missions in France, or to visit the Bur- gundian court. He was assisted, from about 1463 onwards, by his disciple and continuator, Jean Molinet, whose rhetorical and redundant style may be fairly traced in some passages of the Chronique. Charles the Bold maintained the traditions of his house as a patron of literature, and showed special favour to Chastellain, who, after being constituted indiciaire or chronicler of the order of the Golden Fleece, was himself made a knight of the order on the 2nd of May 1473. He died at Valenciennes on the 13th of February (according to the

treasury accounts), or on the 20th of March (according to his epitaph) 1475. He left an illegitimate son, to whom was paid in 1524 one hundred and twenty livres for a copy of the Chronique intended for Charles V.'s sister Mary, queen of Hungary. Only about one- third of the whole work, which extended from 1419 to 1474, is known to be in existence, but MSS. carried by the Habsburgs to Vienna or Madrid may possibly yet be discovered.

Among his contemporaries Chastellain acquired a great reputation by his poems and occasional pieces now little considered. The unfinished state of his Chronique at the time of his death, coupled with political considerations, may possibly account for the fact that it remained unprinted during the century that followed his death, and his historical work was only disinterred from the libraries of Arras, Paris and Brussels by the painstaking researches of M. Buchon in 1825. Chastellain was constantly engaged during the earlier part of his career in negotiations between the French and Burgundian courts, and thus had personal knowledge of the persons and events dealt with in his history. A partisan element in writing of French affairs was inevitable in a Burgundian chronicle. This defect appears most strongly in his treatment of Joan of Arc; and the attack on Agnes Sorel seems to have been dictated by the dauphin (afterwards Louis XL), then a refugee in Burgundy, of whom he was afterwards to become a severe critic. He was not, however, misled, as his more picturesque predecessor Froissart had been, by feudal and chivalric tradition into misconception of the radical injustice of the English cause in France; and except in isolated instances where Burgundian interests were at stake, he did full justice to the patriotism of Frenchmen. Among his most sympathetic portraits are those of his friend Pierre de Breze and of Jacques Cceur. His French style, based partly on his Latin reading, has, together with its undeniable vigour and picturesqueness, the characteristic redundance and rhetorical quality of the Burgundian school. Chastellain was no mere annalist, but proposed to fuse and shape his vast material to his own conclusions, in accordance with his political experience. The most interesting feature of his work is the skill with which he pictures the leading figures of his time. His " characters " are the fruit of acute and experienced observation, and abound in satirical traits, although the 42nd chapter of his second book, devoted expressly to portraiture, is headed " Comment Georges escrit et mentionne les louanges vertueuses des princes de son temps."

The known extant fragments of Chastellain's Chroniques with his other works were edited by Kervyn de Lettenhove for the Brussels Academy in 1863-1866 (8 vols., Brussels) as CEuvres de Georges Chastellain. This edition includes all that had been already published by Buchon in his Collection de chroniques and Choix de chroniques (material subsequently incorporated in the Panthion litteraire), and portions printed by Renard in his Trteor national, vol. i. and by Quicherat in the Proces de la Pucelle vol. iv. Kervyn de Lettenhove's text includes the portions of the chronicle covering the periods September 1419, October 1422, January 1430 to December I431, 1451-1452, July 1454 to October 1458, July 1461 to July 1463, and, with omissions, June 1467 to September 1470 ; and three volumes of minor pieces of considerable interest, especially Le Temple de Boccace, dedicated to Margaret of Anjou, and the Deprecation for Pierre Breze, imprisoned by Louis XI. In the case of these minor works the attribution to Chastellain is in some cases erroneous, notably in the case of the Livre des fails de Jacques de Lalain, which

is the work of Lefebvre de Saint- Remi, herald of the Golden Fleece. In the allegorical Oultre d 'amour it has been thought a real romance between Brez6 and a lady of the royal house is concealed.

See A. Molinier, Les Sources de Vhistoire de France; as well as notices by Kervyn de Lettenhove prefixed to the CEuvres and in the Biographie nationale de Belgique; and an article (three parts) by Vallet de Viriville in the Journal des savants (1867).

CHASUBLE (Fr. chasuble, Ger. Kasel, Span, casulla; Late Lat. casula, a little house, hut, from casa), a liturgical vestment of the Catholic Church. It is the outermost garment worn by bishops and priests at the celebration of the Mass, forming with the alb (q.v.) the most essential part of the eucharistic vestments. Since it is only used at the Mass, or rarely for functions intimately connected with the sacrament of the altar, it may be regarded as the Mass vestment par excellence. The chasuble is thus in a special sense the sacerdotal vestment, and at the ordination of priests, according to the Roman rite, the bishop places on the candidate a chasuble rolled up at the back {planeta plicata), with the words, " Take the sacerdotal robe, the symbol of love," &o; at

the end of the ordination Mass the

vestment is unrolled. The chasuble or planeta (as it is called in the Roman missal) , according to the pre- vailing model in the Roman Catholic Church, is a scapular- like cloak, with a hole in the middle for the head, falling down over breast and back, and leaving the arms uncovered at the sides. Its shape and size, however, differ con- siderably in various countries (see fig. 1), while some churches — e.g. those of certain monastic orders- have retained or re- verted to the earlier ” Gothic ” forms to be described later.

From Braun’s Liiurgische Gewandung, by permission According to the de- of the publisher, B. Herder. cisions of the Con-

ˆ FlG vV _Comp ” ative – shaRe and S1 ? e – oi gregation of Rites Chasubles as now in use in various countries. 6 , °, .

, ~ t, j c • u chasubles must not

a.o.German. c, Roman, d, Spanish. , , ,.

be of linen, cotton or

woollen stuffs, but of silk; though a mixture of wool (or linen and cotton) and silk is allowed if the silk completely cover the other material on the outer side; spun glass thread, as a sub- stitute for gold or silver thread, is also forbidden, owing to the possible danger to the priest’s health through broken fragments falling into the chalice.

The chasuble, like the kindred vestments (the 4 > tk6viov, &c.) in the Eastern Churches, is derived from the Roman paenula or planeta, a cloak worn by all classes and both sexes in the Graeco-Roman world (see Vestments). Though early used in the celebration of the liturgy it had for several centuries no specifically liturgical character, the first clear instances of its ritual use being in a letter of St Germanus of Paris (d. 576), and the next in the twenty-eighth canon of the Council of Toledo (633). Much later than this, however, it was still an article of everyday clerical dress, and as such was prescribed by the German council convened by Carloman and presided over by St Boniface in 742. Amalarius of Metz, in his De ecclesiasticis qfficiis (ii. 19), tells us in 816 that the casula is the generate indumentum sacrorum ducum and ” is proper generally to all the clergy.” It was not until the nth century, when the cope (q.v.) had become estab-

lished as a liturgical vestment, that the chasuble began to be reserved as special to the sacrifice of the Mass. As illustrating

this process Father Braun (p. 170) cites an interesting correspondence between Archbishop Lanf ranc of Canterbury and John of Avranches, archbishop of Rouen, as to the propriety of a bishop wearing a chasuble at the consecration of a church, Lanfranc maintaining as an established principle that the vestment should be reserved for the Mass. By the 13th century, with the final development of the ritual of the Mass, the chasuble became definitely fixed as the vestment of the celebrating priest; though to this day in the Roman Church relics of the earlier general use of the chasuble survive in the planeta plicata worn by deacons and subdeacons in Lent and Advent, and other penitential seasons.

At the Reformation the chasuble was rejected with the other vestments by the more extreme Protestants. Its use, however, survived in the Lutheran churches; and though in those of Germany it is no longer worn, it still forms part of the liturgical costume of the Scandinavian Evangelical churches. In the Church of England, though it was prescribed alternatively with the cope in the First Prayer-Book of Edward VI., it was ulti- mately discarded, with the other '.' Mass vestments," the cope being substituted for it at the celebration of the Holy Communion ia cathedral and collegiate churches; its use has, however, during the last fifty years been widely revived in connexion with the reactionary movement in the direction of the pre-Reformation doctrine of the eucharist. The difficult question of its legality is discussed in the article Vestments.

Form. — The chasuble was originally a tent-like robe which fell in loose folds below the knee (see Plate I. fig. 4). Its obvious inconvenience for celebrating the holy mysteries, however, caused its gradual modification. The object of the change was primarily to leave the hands of the celebrant freer for the careful performance of the manual acts, and to this end a process of cutting away at the sides of the vestment began, which continued until the tent-shaped chasuble of the 12 th century had developed in the 16th into the scapular-like vestment at present in use. This process was, moreover, hastened by the substitution of costly and elaborately embroidered materials for the simple stuffs of which the vestment had originally been composed; for, as it became heavier and stiffer, it necessarily had to be made smaller. For the extremely exiguous proportions of some

chasubles actually in use, which have been robbed of all the beauty of form they ever possessed, less respectable motives have sometimes been responsible, viz. the desire of their makers to save on the materials. The most beautiful form of the chasuble is undoubtedly the " Gothic " (see the figure of Bishop Johannes of Liibeck in the article Vestments), which is the form most affected by the Anglican clergy, as being that worn in the English Church before the Reformation.

Decoration. — Though planetae decorated with narrow orphreys are occasionally met with in the monuments of the early centuries, these vestments were until the 10th century generally quite plain, and even at the close of this century, when the custom of decorating the chasuble with orphreys had become common, there was no definite rule as to their disposition; sometimes they were merely embroidered borders to the neck-opening or hem, sometimes a vertical strip down the back, less often a forked cross, the arms of which turned upwards over the shoulders. From this time onward, however, the embroidery became ever more and more elaborate, and with this tendency the orphreys were broadened to allow of their being decorated with figures. About the middle of the 13 th century, the cross with horizontal arms begins to appear on the back of the vestment, and by the 15th this had become the most usual form, though the forked. cross also survived — e.g. in England, where it is now considered distinctive of the chasuble as worn in the Anglican Church.- Where the forked cross is used it is placed both on the back and front of the vestment; the horizontal- armed cross, on the other hand, is placed only on the back, the front being decorated with a vertical strip extending to the lower hem (fig. 1, b,d). Sometimes the back of the chasuble has no cross, but only a vertical orphrey, and in this case the front, besides the vertical stripe, has a horizontal orphrey just below

the neck opening (see Plate I. fig. 2). This latter is the type used in the local Roman Church, which has been adopted in certain dioceses in South Germany and Switzerland, and of late years in the Roman Catholic churches in England, e.g. Westminster cathedral (see Plate I. figs. 3 and 5).

It has been widely held that the forked cross was a conscious

imitation of the archiepiscopal pallium (F. Bock, Gesch. der liturg. Gewdnder, ii. 107), and that the chasuble so decorated is proper to archbishops. Father Braun, however, makes it quite clear that this was not the case, and gives proof that this decoration was not even originally conceived as a cross at all, citing early instances of its having been worn by laymen and even by non-Christians (p. 210). Itwas not until the 13th century that the symbolical meaning of the cross began to be elaborated, and this was still further accentuated from the 14th century onward by the increasingly widespread custom of adding to it the figure of the crucified Christ and other symbols of the Passion. This, however, did not represent any definite rule; and the orphreys of chasubles were decorated with a great variety of pictorial subjects, scriptural or drawn from the stories of the saints, while the rest of the vestment was either left plain or, if embroidered, most usually decorated with arabesque patterns of foliage or animals. The local Roman Church, true to its ancient traditions, adhered to the simpler forms. The modern Roman chasuble pictured in Plate I. fig. 5, besides the conven- tional arabesque pattern, is decorated, according to rule, with the arms of the archbishop and his see.

The Eastern Church. — The original equivalent of the chasuble is the phelonion (4>e\6viov, 4>t\6vT)S, a.ivohu>v, from paenula). It is a full vestment of the type of the Western bell chasuble; but, instead of being cut away at the sides, it is for convenience' sake either gathered up or cut short in front. In the Armenian, Syrian, Chaldaean and Coptic rites it is cope- shaped. There is some difference of opinion as to the derivation of the vestment in the latter case; the Five Bishops (Report to Convocation, 1908) deriving it, like the cope, from the birrus, while Father Braun considers it, as well as the cope, to be a modification of the paenula. 1 The phelonion (Arm. shurtshar, Syr. phaina, Chald. maaphra or phaina, Copt, burnos, felonion, kuklion) is confined to the priests in the Armenian, Syrian, Chaldaean and Coptic rites; in the Greek rite it is worn also by the lectors. It is not in the East so specifically a eucharistic vestment as in the West, but is worn at other solemn functions besides the liturgy, e.g. marriages, processions, &c.

Until the nth century the phelonion is always pictured as a perfectly plain dark robe, but at this period the custom arose of decorating the patriarchal phelonion with a number of crosses, whence its name of iro\v<7Tavpu)v. By the 14th century the use of these polystauria had been extended to metropolitans and

later still to all bishops. The purple or black phelonion, however, remained plain in all cases. The Greeks and Greek Melchite metropolitans now wear the sakkos instead of the phelonion; and in the Russian, Ruthenian, Bulgarian and Italo-Greek churches this vestment has superseded the phelonion in the case of all bishops (see Dalmatic and Vestments).

See J. Braun, S.J., Die liturgische Gewandung (Freiburg im Breisgau, 1907), pp. 149-247, and the bibliography to the article

Vestments. (W. A. P.)

1 The writer is indebted to the courtesy of Father Braun for the following note: — "That the Syrian phaina was formerly a closed mantle of the type of the bell chasuble is clearly proved by the evidence of the miniatures of a Syrian pontifical (dated 1239) in the Bibliotheque Nationale at Paris (cf. Bild 16, 112, 284, in Die litur- gische Gewandung) . The liturgical vestments of the Armenians are derived, like their rite, from the Greek rite ; so that in this case also there can be no doubt that the shurtshar was originally closed. The Coptic rite is in the same relation to the Syrian. Moreover, it would be further necessary to prove that the birrus, in contradistinction to the paenula, was always open in front ; whereas, per contra, the paenula, both as worn by soldiers and in ordinary life, was, like the modern Arab burnus, often slit up the front to the neck. For the rest, it is obvious that if the Syrian phaina was still quite closed in the 13th century, and was only provided with a slit since that time, the same is very probable in the case of the Armenian chasuble. The absence of the hood might also be taken as additional proof of

CHATEAU (from Lat. castellum, fortress, through 0. Fr. chastel, chasteau), the French word for castle (q.v.). The develop- ment of the medieval castle, in the 15th and 16th centuries, into houses arranged rather for residence than defence led to a corresponding widening of the meaning of the term chdteau, which came to be applied to any seigniorial residence and so generally to all houses, especially country houses, of any pre- tensions (cf. the Ger. Schloss). The French distinguish the fortified castle from the residential mansion by describing the former as the chdteau fort, the latter as the chdteau de plaisance. The development of the one into the other is admirably illustrated by surviving buildings in France, especially in the chateaux scattered along the Loire. Of these Langeais, still in perfect preservation, is a fine type of the chdteau fort, with its

10th- century keep and 13th-century walls. Amboise (1490), Blois (1 500-1 540) , Chambord (begun 1526), Chenonceaux (151 5-1 560) , Azay-le-Rideau (1521), may be taken as typical examples of the chdteau de plaisance of the transition period, all retaining in greater or less degree some of the architectural characteristics of the medieval castle. Some description of these is given under their several headings. In English the word chdteau is often used to translate foreign words (e.g. Schloss) meaning country house or mansion.

For the Loire chateaux see Theodore Andrea Cook, Old Touraine

(1892).

CHATEAUBRIAND, FRANCOIS REN& Vicomte de (1768- 1848), French author, youngest son of Rene Auguste de Chateau- briand, comte de Combourg, 2 was born at St Malo on the 4th of September 1768. He was a brilliant representative of the reaction against the ideas of the French Revolution, and the most con- spicuous figure in French literature during the First Empire. His naturally poetical temperament was fostered in childhood by picturesque influences, the mysterious reserve of his morose father, the ardent piety of his mother, the traditions of his ancient family, the legends and antiquated customs of the sequestered Breton district, above all, the vagueness and solemnity of the neighbour- ing ocean. His closest friend was his sister Lucile, 3 a passionate- hearted girl, divided between her devotion to him and to religion. Francois received his education at Dol and Rennes, where Jean Victor Moreau was among his fellow-students. From Rennes he proceeded to the College of Dinan, and passed some years in desultory study in preparation for the priesthood. He finally decided, after a year's holiday at the family chateau of Combourg, that he had no vocation for the Church, and was on the point of proceeding to try his fortune in India when he received (1786) a commission in the army. After a short visit to Paris he joined his regiment at Cambrai, and early in the following year was presented at court. In 1788 he received the tonsure in order to enter the order of the Knights of Malta. In Paris (1787-1789) he made acquaintance with the Parisian men of letters. He met la Harpe, Evariste Parny, " Pindare " Lebrun, Nicolas Chamfort, Pierre Louis Ginguene, and others, of whom he has left portraits in his memoirs.

Chateaubriand was not unfavourable to the Revolution in its first stages, but he was disturbed by its early excesses; moreover, his

regiment was disbanded, and his family belonged to the party of reaction. His political impartiality, he says, pleased no one. These causes and the restlessness of his spirit induced him to take part in a romantic scheme for the discovery of the North-West Passage, in pursuance of which he departed for America in the spring of 1791. The passage was not found or even attempted, but the adventurer returned enriched with the — to him — more important discovery of his own powers and vocation, conscious of his marvellous faculty for the delineation of nature, and stored with the new ideas and new imagery,

the derivation of the phaina from the paenula, but I should not lay particular stress upon it. The question is settled by the above-mentioned miniatures."

2 For full details of the Chateaubriand family see R. Kerviler, Essai d'une bio-biblio graphic de Chateaubriand el de safamille (Vannes,

1895)-

3 Her CEuvres were edited in 1879, with a memoir, by Anatoli France.

CHASUBLE

Plate I.

Modern Roman Chasuble of Archbishop Bourne of Westminster.

Fiu. 0.— Modern English Chasuble, used at St Paul's Church, Knightsbridgc, London.

Plate II.

CHASUBLE

Fig. 7.— Back of a Chasuble of Italian Brocaded Damask (Red) with Embroidered Orphreys. The Vestment is of the early 16th century, the Orphreys of the late 14th century. (English. In the Victoria and Albert Museum.)

derived from the virgin forests and magnificent scenery of the

western continent. That he actually lived among the Indians, however, is shown by Bedier to be doubtful, and the same critic has exposed the untrustworthiness of the autobiographical details of his American trip. His knowledge of America was mainly derived from the books of Charlevoix and others.

The news of the arrest of Louis XVI. at Varennes in June 1791 recalled him to France. In 1792 he married Mile Celeste Buisson de Lavigne, a girl of seventeen, who brought him a small fortune. This enabled him to join the ranks of the emi- grants, a course practically imposed on him by his birth and his profession as a soldier. After the failure of the duke of Brunswick's invasion he contrived to reach Brussels, where he was left wounded and apparently dying in the street. His brother succeeded in obtaining some shelter for him, and sent him to Jersey. The captain of the boat in which he travelled left him on the beach in Guernsey. He was once more rescued from death, this time by some fishermen. After spending some time in the Channel Islands under the care of an emigrant uncle, the comte de Bedee, he made his way to London. In England he lived obscurely for several years, gaining an intimate acquaint- ance with English literature and a practical acquaintance with poverty. His own account of this period has been exposed by A. le Braz, Au pays d'exil de Chateaubriand (1909), and by E. Dick, Revue d'histoire lilUraire de la France (1908), i. From his English exile dates the Natchez (first printed in his CEuvres completes, 1826-1831), a prose epic designed to portray the life of the Red Indians. Two brilliant episodes originally designed for this work, Atala and Rene, are among his most famous productions. Chateaubriand's first publication, however, was the Essai historique, politique et moral sur les revolutions . . . (London, 1797), which the author subsequently retracted, but took care not to suppress. In this volume he appears as a mediator between royalist and revolutionary ideas, a free- thinker in religion, and a philosopher imbued with the spirit of Rousseau. A great change in his views was, however, at hand, induced, according to his own statement, by a letter from his sister Julie (Mme de Farcy), telling him of the grief his views had caused his mother, who had died soon after her release from the Conciergerie in the same year. His brother had perished on the scaffold in April 1794, and both his sisters, Lucile and Julie, and his wife had been imprisoned at Rennes. Mme de Farcy did not long survive her imprisonment.

Chateaubriand's thoughts turned to religion, and on his return to France in 1800 the Genie du christianisme was already in an

advanced state. Louis de Fontanes had been a fellow-exile with Chateaubriand in London, and he now introduced him to the society of Mme de Stael, Mme Recamier, Benjamin Constant, Lucien Bonaparte and others. But Chateaubriand's favourite resort was the salon of Pauline de Beaumont, who was destined to fill a great place in his life, and gave him some help in the preparation of his w r ork on Christianity, part of the book being written at her house at Savigny. Atala, ou les amours de deux sauvages dans le desert, used as an episode in the GSnie du christianisme, appeared separately in 1801 and immediately made his reputation. Exquisite style, impassioned eloquence and glowing descriptions of nature gained indulgence for the incongruity between the rudeness of the personages and the refinement of the sentiments, and for the distasteful blending of prudery with sensuousness. Alike in its merits and defects the piece is a more emphatic and highly coloured Paul et Virginie; it has been justly said that Bernardin Saint-Pierre models in marble and Chateaubriand in bronze. Encouraged by his success the author resumed his GSnie du christianisme, ou beautes de la religion chretienne, which appeared in 1802, just upon the eve of Napoleon's re-establishment of the Catholic religion in France, for which it thus seemed almost to have prepared the way. No coincidence could have been more opportune, and Chateaubriand came to esteem himself the counterpart of Napoleon in the intellectual order. In composing his work he had borne in mind the admonition of his friend Joseph Joubert, that the public would care very little for his erudition and very much

for his eloquence. It is consequently an inefficient pro- duction from the point of view of serious argument. The con- siderations derived from natural theology are but commonplaces rendered dazzling by the magic of style; and the parallels between Christianity and antiquity, especially in arts and letters, are at best ingenious sophistries. The less polemical passages, however, where the author depicts the glories of the Catholic liturgy and its accessories, or expounds its symbolical significance, are splendid instances of the effect produced by the accumulation and judicious distribution of particulars gorgeous in the mass, and treated with the utmost refinement of detail. The work is a masterpiece of literary art, and its influence in French literature was immense. The Eloa of Alfred de Vigny, the Harmonies of Lamartine and even the Legende des siecles of Victor Hugo may be said to have been inspired by the Genie du christianisme. Its immediate effect was very considerable. It admirably sub- served

the statecraft of Napoleon, and Talleyrand in 1803 appointed the writer attacks to the French legation at Rome, whither he was followed by Mme de Beaumont, who died there.

When his insubordinate and intriguing spirit compelled his recall he was transferred as envoy to the canton of the Valais, The murder of the duke of Enghien (21st of March 1804) took place before he took up this appointment. Chateaubriand, who was in Paris at the time, showed his courage and independence by immediately resigning his post. In 1807 he gave great offence to Napoleon by an article in the Mercure de France (4th of July), containing allusions to Nero which were rightly taken to refer to the emperor. The Mercure, of which he had become proprietor, was temporarily suppressed, and was in the next year amalgamated with the Decade. Chateaubriand states in his MSmoires that his life was threatened, but it is more than possible that he exaggerated the danger. Before this, in 1806, he made a pilgrimage to Jerusalem, undertaken, as he subsequently acknowledged, less in a devotional spirit than in quest of new imagery. He returned by way of Tunis, Carthage, Cadiz and Granada. At Granada he met Mme de Mouchy, and the place and the meeting apparently suggested the romantic tale of Le Dernier AbencSrage, which, for political reasons, remained unprinted until the publication of the CEuvres completes (1826- 1831). The journey also produced L'ltinSraire de Paris a Jeru- salem . . . (3 vols., 1811), a record of travel distinguished by the writer's habitual picturesqueness; and inspired his prose epic,. Les Martyrs, ou le triomphe de la religion chretienne (2 vols., 1809). This work may be regarded as the argument of the Genie du christianisme thrown into an objective form. As in the Epicurean of Thomas Moore, the professed design is the contrast between Paganism and Christianity, which fails of its purpose partly from the absence of real insight into the genius of antiquity, and partly because the heathen are the most interesting char- acters after all. RenS had appeared in 1802 as an episode of the Genie du christianisme, and was published separately at Leipzig without its author's consent in the same year. It was perhaps Chateaubriand's most characteristic production. The connect- ing link in European literature between Werther and Childe Harold, it paints the misery of a morbid and dissatisfied soul. The representation is mainly from the life. Chateaubriand be- trayed amazing egotism in describing his sister Lucile in the Amelie of the story, and much is obviously descriptive of his own early surroundings. With Les Natchez his

career as an im- aginative writer is closed. In 1831 he published his Etudes ou discours historiques ... (4 vols.) dealing with the fall of the Roman Empire.

As a politician Chateaubriand was equally formidable to his antagonists when in opposition and to his friends when in office. His poetical receptivity and impressionableness rendered him no doubt honestly inconsistent with himself; his vanity and ambition, too morbidly acute to be restrained by the ties of party allegiance, made him dangerous and untrustworthy as a political associate. He was forbidden to deliver the address he had prepared (181 1) for his reception to the Academy on M. J. Chenier on account of the bitter allusions to Napoleon contained in it. From this date until 18 14 Chateaubriand lived in seclusion at

the Vallee-aux-loups, an estate he had bought in 1807 at Aulnay. His pamphlet De Bonaparte, des Bourbons, et de la nScessite de se rattier a nos princes legitimes, published on the 31st of March 1814, the day of the entrance of the allies into Paris, was as opportune in the moment of its appearance as the Ginie du christianisme, and produced a hardly less signal effect. Louis XVIII. declared that it had been worth a hundred thousand men to him. Chateaubriand, as minister of the interior, accom- panied him to Ghent during the Hundred Days, and for a time associated himself with the excesses of the royalist reaction. Political bigotry, however, was not among his faults ; he rapidly drifted into liberalism and opposition, and was disgraced in September 1816 for his pamphlet De la monarckie selon la charte. He had to sell his library and his house of the Vallee-aux-loups.

After the fall of his opponent, the due Decazes, Chateaubriand obtained the Berlin embassy (1821), from which he was transferred to London (1822), and he also acted as French plenipotentiary at the Congress of Verona (1822). He here made himself mainly responsible for the iniquitous invasion of Spain — an expedition undertaken, as he himself admits, with the idea of restoring French prestige by a military parade. He next re- ceived the portfolio of foreign affairs, which he soon lost by his desertion of his colleagues on the question of a reduction of the interest on the national debt. After another interlude of effective pamphleteering in opposition, he accepted the embassy to Rome

in 1827, under the Martignac administration, but resigned it at Prince Polignac's accession to office. On the downfall of the elder branch of the Bourbons, he made a brilliant but inevitably fruitless protest from the tribune in defence of the principle of legitimacy. During the first half of Louis Philippe's reign he was still politically active with his pen, and published a Mimoire sur la captivite de madame la duchesse de Berry (1833) and other pamphlets in which he made himself the champion of the exiled dynasty; but as years increased upon him, and the prospect of his again performing a conspicuous part diminished, he re- lapsed into an attitude of complete discouragement. His Congres de Verone (1838), Vie de Ranct (1844), and his translation of Milton, Le Paradis perdu de Milton (1836), belong to the writings of these later days. He died on the 4th of July 1848, wholly exhausted and thoroughly discontented with himself and the world, but affectionately tended by his old friend Madame Recamier, herself deprived of sight. For the last fifteen years of his life he had been engaged on his MSmoires, and his chief distraction had been his daily visit to Madame Recamier, at whose house he met the European celebrities. He was buried in the Grand Be, an islet in the bay of St Malo. Shortly after his death his memory was revived, and at the same time exposed to much adverse criticism, by the publication, with sundry mutilations as has been suspected, of his celebrated Memoires d'outre-tombe (12 vols., 1849-1850). These memoirs undoubtedly reveal his vanity, his egotism, the frequent hollowness of his professed convictions, and his incapacity for sincere attachment, except, perhaps, in the case of Madame Recamier. Though the book must be read with the greatest caution, especially in regard to persons with whom Chateaubriand came into collision, it is perhaps now the most read of all his works.

Chateaubriand ranks rather as a great rhetorician than as a great poet. Something of affectation or unreality commonly interferes with the enjoyment of his finest works. The Genie du christianisme is a brilliant piece of special pleading; Atala is marred by its unfaithfulness to the truth of uncivilized human nature, Rene by the perversion of sentiment which solicits sympathy for a contemptible character. Chateaubriand is chiefly significant as marking the transition from the old classical to the modern romantic school. The fertility of ideas, vehemence of expression and luxury of natural description, which he shares with the romanticists, are controlled by a discipline learnt in the school of their predecessors. His palette, always brilliant, is

never gaudy; he is not merely a painter but an artist. He is also a master of epigrammatic and incisive sayings. Perhaps, however, the most truly characteristic feature of his genius is the peculiar magical touch which Matthew Arnold indicated as a

note of Celtic extraction, which reveals some occult quality in a familiar object, or tinges it, one knows not how, with " the light that never was on sea or land." This incommunicable gift supplies an element of sincerity to Chateaubriand's writings which goes far to redeem the artificial effect of his calculated sophistry and set declamation. It is also fortunate for his fame that so large a part of his writings should directly or indirectly refer to himself, for on this theme he always writes well. Egotism was his master-passion, and beyond his intrepidity and the loftiness of his intellectual carriage his character presents little to admire. He is a signal instance of the compatibility of genuine poetic emotion, of sympathy with the grander aspects both of man and nature, and of munificence in pecuniary matters, with absorption in self and general sterility of heart.

Bibliography. — The CEuvres completes of Chateaubriand were printed in 28 vols., 1826-1831; in 20 vols., 1829-1831 ; and in many later editions, notably in 1858-1861, in 20 volumes, with an introductory study by Sainte-Beuve. The principal authority for Chateaubriand's biography is the Memoires d'outre-tombe (1849- 1850), of which there is an English translation, The Memoirs of . . . Chateaubriand (6 vols., 1902), by A. Teixeira de Mattos, based on the admirable edition (4 vols., 1899-1901) of Edmond Bire. This work should be supplemented by the Souvenirs et correspondances tires des papiers de M m " Recamier (2 vols., 1859, ed. Mme Ch. Lenormant). See also Comte de Marcellus, Chateaubriand et son temps (1859); the same editor's Souvenirs diplomatiques; correspondance intime de Chateaubriand (1858) ; C. A. Sainte-Beuve, Chateaubriand et son groupe litteraire sous I'empire (2 vols., 1861, new and revised ed., 3 vols., 1872) ; other articles by Sainte-Beuve, who was in this case a somewhat prejudiced critic, in the Portraits contemporains, vols, i. andii..; Causeries du lundi, vols, i., ii. and x. ; Nouveaux Lundis, vol. iii.; Premiers Lundis, vol. iii. ; A. Vinet, Etudes sur la lilt, francaise au XIX" siecle (1849); M. de Lescure, Chateaubriand (1892), in the Grands ecrivains frangais; £mile Faguet, Eludes litteraires sur le XIX" siecle (1887) ; and Essai d'une bio-bibliographie de Chateaubriand et de sa famille (Vannes, 1896), by Rene Kerviler. Joseph Bedier, in Etudes critiques (1903), deals with the American writings. Some

correspondence with Sainte-Beuve was edited by Louis Thomas in 1904, and some letters to Mme de Stael appeared in the Revue des deux mondes (Oct. 1903).

CHATEAUBRIANT, a town of western France, capital of an arrondissement in the department of Loire-Inferieure, on the left bank of the Chere, 40 m. N.N.E. of Nantes by rail. Pop. (1906) 5969. Chateaubriant takes its name from a castle founded in the nth century by Brient, count of Penthievre, remains of which, consisting of a square donjon and four towers, still exist. Adjoining it is another castle, built in the first half of the 1 6th century by Jean de Laval, and famous in history as the residence of Francoise de Foix, mistress of Francis I. Of this the most beautiful feature is the colonnade running at right angles to the main building, and connecting it with a graceful pavilion. It is occupied by a small museum and some of the public offices. There is also an interesting Romanesque church dedicated to St Jean de Bere. Chateaubriant is the seat of a subprefect and has a tribunal of first instance. It is an important centre on the Ouest-Etat railway, and has trade in agricultural products. The manufacture of leather, agricultural implements and preserved angelica are carried on. In 1551 Henry II. signed an edict against the reformed religion at Chateaubriant.

CHATEAUDUN, a town of north central France, capital of an arrondissement in the department of Eure-et-Loir, 28 m. S.S.W. of Chartres by rail. Pop. (1906) 5805. It stands on an eminence near the left bank of the Loire. The streets, which are straight and regular, radiate from a central square, a uniformity due to the reconstruction of the town after fires in 1723 and 1870. The chateau, the most remarkable building in the town, was built in great part by Jean, count of Dunois, and his descendants. Founded in the 10th century, and rebuilt in the 12th and 15th centuries, it consists of a principal wing with a fine staircase of the 16th century, and, at right angles, a smaller wing adjoined by a chapel. To the left of the courtyard thus formed rises a lofty keep of the 12th century. The fine apartments and huge kitchens of the chateau are in keeping with its imposing exterior. The church of La Madeleine dates from the 1 2th century; the buildings of the abbey to which it be- longed are occupied by the subprefecture, the law court and the hospital. The medieval churches of St Valerien and St Jean

and the ruined chapel of Notre-Dame du Champde, of which the facade in the Renaissance style now forms the entrance to the cemetery, are other notable buildings. The public institutions include a tribunal of first instance and a communal college. Flour-milling, tanning and leather-dressing, and the manufacture of blankets, silver jewelry, nails and machinery are the prominent industries. Trade is in cattle, grain, wool and hemp. Chateaudun (Castrodunum) , which dates from the Gallo-Roman period, was in the middle ages the capital of the countship of Dunois.

CHATEAU-GONTIER, a town of western France, capital of an arrondissement in the department of Mayenne, on the Mayenne, 18 m. S. by E. of Laval by road. Pop. (1906) 6871. Of its churches, that of St Jean, a relic of the castle, dates from the nth century. Chateau- Gontier is the seat of a sub- prefect and has a tribunal of first instance, a communal college for boys and a small museum. It carries on wool- and cotton- spinning, the manufacture of serge, flannel and oil, and is an agricultural market. There are chalybeate springs close to the town. Chateau- Gontier owes its origin and its name to a castle erected in the first half of the nth century by Gunther, the steward of Fulk Nerra of Anjou, on the site of a farm belonging to the monks of St Aubin d' Angers. On the extinction of the family, the lordship was assigned by Louis XI. to Philippe de Comines. The town suffered severely during the wars of the League. In 1793 it was occupied by the Vendeans.

CHATEAUNEUF, LA BELLE, the name popularly given to Renee de Rieux, daughter of Jean de Rieux, seigneur de Chateauneuf, who was descended from one of the greatest families of Brittany. The dates both of her birth and death are not known. She was maid of honour to the queen-mother Catherine de' Medici, and inspired an ardent passion in the duke of Anjou, brother of Charles IX. This intrigue deterred the duke from the marriage which it was desired to arrange for him with Elizabeth of England; but he soon abandoned La Belle Chateau- neuf for Marie of Cleves (1571). The court then wished to find a husband for Renee de Rieux, whose singular beauty gave her an influence which the queen-mother feared, and matches were in turn suggested with the voivode of Transylvania, the earl of Leicester, with Du Prat, provost of Paris, and with the count of Brienne, all of which came to nothing. Ultimately, on the ground that she had been lacking in respect towards the queen, Louise of Lorraine-Vaudemont, Renee was

banished from the court. She married a Florentine named Antinotti, whom she stabbed in a fit of jealousy (1577); then she remarried, her husband being Philip Altoviti, who in 1586 was killed in a duel by the Grand Prior Henry of Angouleme, who was himself mortally wounded.

CHATEAU-RENAULT, FRANCOIS LOUIS DE ROUSSELET, Marquis de (1637-1716), French admiral, was the fourth son of the third marquis of Chateau-Renault. The family was of Breton origin, but had been long settled near Blois. He entered the army in 1658, but in 1661 was transferred to the navy, which Louis XIV. was eager to raise to a high level of strength. After a short apprenticeship he was made captain in 1666. His early services were mostly performed in cruises against the Barbary pirates (1672). In 1673 he was named chef d'escadre, and he was promoted lieutenant gineral des armees navales in 1687. During the wars up to this date he had few chances of distinction, but he had been wounded in action with the pirates, and had been on a cruise to the West Indies. When war broke out between England and France after the revolution of 1688, he was in command at Brest, and was chosen to carry the troops and stores sent by the French king to the aid of James II. in Ireland. Although he was watched by Admiral Herbert (Lord Torrington, q.v.), with whom he fought an indecisive action in Bantry Bay, he executed his mission with success. Chateau-Renault com- manded a squadron under Tourville at the battle of Beachy Head in 1600. He was with Tourville in the attack of the Smyrna convoy in 1693, and was named grand cross of the order of Saint Louis in the same year. Though in constant service, the reduced state of the French navy (owing to the

financial embarrassments of the treasury) gave him few openings for fighting at sea during the rest of the war.

On the death of Tourville in 1701 he was named to the vacant post of vice-admiral of France. On the outbreak of the War of the Spanish Succession he was named for the difficult task of protecting the Spanish ships which were to bring the treasure from America. It was a duty of extreme delicacy, for the Spaniards were unwilling- to obey a foreigner, and the French king was anxious that the bullion should be brought to one of his own ports, a scheme which the Spanish officials were sure to resent if they were allowed to discover what was meant. With the utmost difficulty Chateau-Renault was able to bring the galleons as far as Vigo, to which port he steered when he learnt that a

powerful English and Dutch armament was on the Spanish coast, and had to recognize that the Spanish officers would not consent to make for a French harbour or for Passages, which they thought too near France. His fleet of fifteen French and three Spanish war-ships, having under their care twelve galleons, had anchored on the 22nd of September in Vigo Bay. Obstacles, some of an official character, and others due to the poverty of the Spanish government in resources, arose to delay the landing of the treasure. There was no adequate garrison in the town, and the local militia was untrustworthy. Knowing that he would probably be attacked, Chateau-Renault strove to protect his fleet by means of a boom. The order to land the treasure was delayed, and until it came from Madrid nothing could be done, since according to law it should have been landed at Cadiz, which had a monopoly of the trade with America. At last the order came, and the bullion was landed under the care of the Gallician militia which was ordered to escort it to Lugo. A very large part, if not the whole, was plundered by the militiamen and the farmers whose carts had been commandeered for the service. But the bulk of the merchandise was on board of the galleons when the allied fleet appeared outside of the bay on the 22nd of October 1702. Sir George Rooke and his colleagues resolved to attack. The fleet was carrying a body of troops which had been sent out to make a landing at Cadiz, and had been beaten off. The fortifications of Vigo were weak on the sea side, and on the land side there were none. There was therefore nothing to offer a serious resistance to the allies when they landed soldiers. The fleet of twenty-four sail was steered at the boom and broke through it, while the troops turned the forts and had no difficulty in scattering the Gallician militia. In the bay the action was utterly disastrous to the French and Spaniards. Their ships were all taken or destroyed. The booty gained was far less than the allies hoped, but the damage done to the French and Spanish governments was great.

Chateau-Renault suffered no loss of his master's favour by his failure to save the treasure. The king considered him free from blame, and must indeed have known that the admiral had been trusted with too many secrets to make it safe to inflict a public rebuke. The Spanish government declined to give him the rank of grandee which was to have been the reward for bringing home the bullion safe. But in 1703 he was made a marshal of France, and shortly afterwards lieutenant-general of Brittany. The fight in Vigo Bay was the last piece of active service performed by

Chateau-Renault. In 1708 on the death of his nephew he inherited the marquisate, and on the 15th of November 1716 he died in Paris. He married in 1684 Marie-Anne-Renee de la Porte, daughter and heiress of the count of Crozon. His eldest son was killed at the battle of Malaga 1704, and another, also a naval officer, was killed by accident in 1708. A third son, who too was a naval officer, succeeded him in the title.

A life of Chateau-Renault was published in 1903 by M. Calmon-Maison. There is a French as well as an English account of the part played by him at Bantry Bay and Beachy Head, and the controversy still continues. For the French history of the navy under Louis XIV. see Leon Guerin, Histoire maritime de la France (1863), vols, iii., iv. ; and his Les Marins illustres (1861). Also the naval history by Charles Bouzel de la Ronciere. (D. H.)

CHATEAUROUX, MARIE ANNE DE MAILLY-NESLE,

Duchesse de (1717-T744), mistress of Louis XV. of France, was the fourth daughter of Louis, marquis de Nesle, a descendant

of a niece of Mazarin. In 1740, upon the death of her husband, the marquis de la Tournelle, she attracted the attention of Louis XV.; and by the aid of the due de Richelieu, who, dominated by Madame de Tencin, hoped to rule both the king and the state, she supplanted her sister, Madame de Mailly, as titular mistress in 1742. Directed by Richelieu, she tried to arouse the king, dragging him off to the armies, and negotiated the alliance with Frederick II, of Prussia, in 1 744. Her political role, however, has been exaggerated. Her triumph after the passing disgrace provoked by the king's illness at Metz did not last long, for she died on the 8th of December 1744.

See Ed. and J. de Goncourt, La Duchesse de Chdteauroux et ses sceurs (Paris, 1879).

CHATEAUROUX, a town of central France, capital of the department of Indre, situated in a plain on the left bank of the Indre, 88 m.S. of Orleans on the main line of the Orleans railway. Pop. (1906) 21,048. The old town, close to the river, forms a nucleus round which a newer and more extensive quarter, bordered by boulevards, has grown up; the suburbs of St

Christophe and Deols (q.v.) lie on the right bank of the Indre. The principal buildings of Chateauroux are the handsome modern church of St Andre, in the Gothic style, and the Chateau Raoul, of the 14th and 15th centuries; the latter now forms part of the prefecture. The hotel de ville contains a library and a museum which possesses a collection of paintings of the Flemish school and some interesting souvenirs of Napoleon I. A statue of General Henri Bertrand (1773-1844) stands in one of the principal squares. Chateauroux is the seat of a prefect and of a court of assizes. It has tribunals of first instance and of commerce, a board of trade-arbitrators, a branch of the Bank of France, a chamber of commerce, a lycee, a college for girls and training colleges. The manufacture of coarse woollens for military clothing and other purposes, and a state tobacco-factory, occupy large numbers of the inhabitants. Wool-spinning, iron-founding, brewing, tanning, and the manufacture of agri- cultural implements are also carried on. Trade is in wool, iron, grain, sheep, lithographic stone and leather. The castle from which Chateauroux takes its name was founded about the middle of the 10th century by Raoul, prince of Deols, and during the middle ages was the seat of a seigniory, which was raised to the rank of countship in 1497, and in 1616, when it was held by Henry II., prince of Conde, to that of duchy. In 1736 it returned to the crown, and was given by Louis XV. in 1744 to his mistress, Marie Anne de Mailly-Nesle, duchess of Chateauroux.

CHATEAU-THIERRY, a town of northern France, capital of an arrondissement in the department of Aisne, 59 m. E.N.E. of Paris on the Eastern railway to Nancy. Pop. (1906) 6872. Chateau-Thierry is built on rising ground on the right bank of the Marne, over which a fine stone bridge leads to the suburb of Marne. On the quay stands a marble statue erected to the memory of La Fontaine, who was born in the town in 162 1; his house is still preserved in the street that bears his name. On the top of a hill are the ruins of a castle, which is said to have been built by Charles Martel for the Frankish king, Thierry IV.,

and is plainly the origin of the name of the town. The chief relic is a gateway flanked by massive round towers, known as the Porte Saint-Pierre. A belfry of the 15th century and the church of St Crepin of the same period are of some interest. The town is the seat of a sub-prefect and has a tribunal of first instance and a communal college. The distinctive industry is the manufacture of mathematical and musical instruments. There is trade in the white wine of the neighbourhood, and in sheep, cattle and

agricul- tural products. Gypsum, millstone and paving-stone are quarried in the vicinity. Chateau-Thierry was formerly the capital of the district of Brie Pouilleuse, and received the title of duchy from Charles IX. in 1566. It was captured by the English in 1421, by Charles V. in 1544, and sacked by the Spanish in 159 1. During the wars of the Fronde it was pillaged in 1652; and in the cam- paign of 1814 it suffered severely. On the 12th of February of the latter year the Russo-Prussian forces were beaten by Napoleon in the neighbourhood.

CHATELAIN (Med. Lat. castellanus, from castellum, a castle), in France originally merely the equivalent of the English castellan, i.e. the commander of a castle. With the growth of the feudal system, however, the title gained in France a special significance which it never acquired in England, as implying the jurisdic- tion of which the castle became the centre. The chdtelain was originally, in Carolingian times, an official of the count; with the development of feudalism the office became a fief, and so ultimately hereditary. In this as in other respects the chatelain was the equivalent of the viscount {q.v-.) ; sometimes the two titles were combined, but more usually in those provinces where there were chatelains there were no viscounts, and vice versa. The title chatelain continued also to be applied to the inferior officer, or concierge chdtelain, who was merely a castellan in the English sense. The power and status of chatelains necessarily varied greatly at different periods and places. Usually their rank in the feudal hierarchy was equivalent to that of the simple sire {dominus), between the baron and the chevalier; but occasionally they were great nobles with an extensive jurisdiction, as in the Low Countries (see Burgrave). This variation was most marked in the cities, where in the struggle for power that of the chatelain depended on the success with which he could assert himself against his feudal superior, lay or ecclesiastical, or, from the 12th century onwards, against the rising power of the communes. The chdtellenie (castellania) , or jurisdiction of the chatelain, as a territorial division for certaih judicial and administrative purposes, survived the disappearance of the title and office of the chatelain in France, and continued till the Revolution.

See Achille Luchaire, Manuel des institutions francaises (Paris, 1892); Du Cange, Glossarium, s. “Castellanus.”

CHATELAINE (Fr. chdlelaine, the feminine form of chdtelain, a keeper of a castle), the mistress of a castle. From the custom of a

chatelaine to carry the keys of the castle suspended from her girdle, the word is now applied to the collection of short chains, often worn by ladies, to which are attached various small articles of domestic and toilet use, as keys, penknife, needlecase, scissors, &c.

MINTED IN U.S.A.

VOL06_CHATEL ET-CONSTANTINE

Britannica

THE

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

FIRST edit

ion, published in three volumes,

1768— 1771

SECOND ,

, ,, ten

»

1777— 1784.

THIRD ,

, „ eighteen

»

1788— 1797

FOURTH ,

, „ twenty

»

l80I l8lO.

FIFTH ,

, „ twenty

»

l8lS l8l7

SIXTH ,

, „ twenty

»

l823 l824

SEVENTH ,

, „ twenty-one

Jl

183O 1842.

EIGHTH ,

, „ twenty-two

»

l8S3 — l860

NINTH ,

, „ twenty-five

»

l87S-l88 9 .

TENTH ,

, ninth edition and eleven

supplementary volumes,

1902 I9O3.

ELEVENTH ,

, published in twenty-nine volumes,

I9IO igil.

COPYRIGHT

in all countries subscribing to the Bern Convention

by THE CHANCELLOR, MASTERS AND SCHOLARS

of the

UNIVERSITY OF CAMBRIDGE

All rights reserved

THE ENCYCLOPEDIA BRITANNICA

A

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME VI CHˆTELET to CONSTANTINE

New York

Encyclopaedia Britannica, Inc. 342 Madison Avenue

Copyright, in the United States of America, 191 1,

by

The Encyclopaedia Britannica Company.

INITIALS USED IN VOLUME VI. TO IDENTIFY INDIVIDUAL

CONTRIBUTORS, 1 WITH THE HEADINGS OF THE

ARTICLES IN THIS VOLUME SO SIGNED.

A. Bo.*

A. B. G.*

A. B. R.

A. C. Be. A. C. C.

A. C. McG.

A. C. S. A. D. A. E. B.

A. F. L.

A. G.

A. Go.* A. H.*

A. He.* A. H. J. G.

A. J. G.

f Conclave; Editor of the Canoniste -j Concordat; 1 Consistory.

Auguste Boudinhon, D.D., D.C.L.

Professor of Canon Law in the Catholic University of Paris. contemporain. Author of Biens d'eglise et peines canoniques; &c.

Alice B. Gomme.

Hon. Member of the Folk-lore Society. Author of Dictionary of Traditional Games -j Children's Games. of Great Britain and Ireland; Children's Singing Games. L

Alfred Barton Rendle, M.A., D.Sc, F.R.S., F.L.S. f r „. n „. R

Keeper, Department of Botany, British Museum. Author of Text Book on Classifi- i ljOCOa – botany, cation of Flowering Plants ; &c. I Coffee: Botany.

Arthur Christopher Benson, C.V.O., M.A., F.R.Hist.S. See the biographical article: Benson, Edward White.

Church, Dean.

Albert Curtis Clark, M.A.

Fellow and Tutor of Queen's College, Oxford, and University Reader in Latin. -\ Cicero. Editor of Cicero's Speeches (Clarendon Press).

Arthur Cushman McGiffert, D.D., Ph.D., M.A. (”

Professor of Church History in Union Theological Seminary, New Vork. Author of < Church History (in part).

A History of Christianity in the Apostolic Age; &c. (_

Algernon Charles Swinburne. J” Congreve, William.

See the biographical article: Swinburne, A. C. \

1 Chesterfield, 4th Earl of.

Church.

Austin Dobson.

See the biographical article: Dobson, Henry Austin.

Rev. Andrew Ewbank Burn, M.A., D.D.

Vicar of Halifax and Prebendary of Lichfield. Author of An Introduction to the- Creeds and the Te Deum ; Niceta of Remesiana ; &c.

Arthur Francis Leach, M.A.

Barrister-at-Law, Middle Temple. Charity Commissioner for England and Wales. . Formerly Assistant Secretary of the Board of Education. Fellow of All Souls’ College, Oxford, 1874-1881. Stanhope Prizeman, 1872. I

Major Arthur George Frederick Griffiths (d. 1908). f

H.M. Inspector of Prisons, 1878-1896. Author of The Chronicles of Newgate-A Children’s Courts. Secrets of the Prison House ; &c. L

Chicheley.

J” Chemnitz; \ Cochlaeus.

Church History Un part).

Rev. Alexander Gordon, M.A.

Lecturer on Church History in the University of Manchester.

Albert Hauck, D.Th., Ph.D., D. Juris.

Professor of Church History in the University of Leipzig. Director of the Collection of Ecclesiastical Archaeology. Member of the Royal Saxon Society of Arts and Sciences. Formerly Professor in the

University of Erlangen. Editor of the 3rd edition of Herzog-Hauck's Realencyklopddie fur protestantische Theologie und Kirche. Author of Kirchengeschichte Deutschlands ; Tertullians Leben und Schriften; &c.

Augustine Henry, M.A., F.L.S. r

Reader in Forestry, Cambridge University. Formerly Official in Chinese Imperial J pj,: na . pi Maritime Customs. Explorer of the Flora of the interior of China, Formosa and 1 *”’”’”• ^’■ ora – Hainan. [

Abel Hendy Jones Greenidge, M.A., D.Litt. (Oxon.) (d. 1905).

Formerly Fellow and Lecturer of Hertford College, Oxford, and of St John's College, Oxford. Author of Infamia in Roman Law ; Handbook” of Greek Constitutional \ Comitia. History; Roman Public Life; History of Rome. Joint-author of Sources of Roman History, 133-70 B.C.

Rev. Alexander James Grieve, M.A., B.D. (Lond.).

Professor of New Testament and Church History, Yorkshire United Independent College, Bradford. Sometime Registrar of Madras University and Member of Mysore Educational Service.

Clement I. (in part).

1 A complete list, showing all individual contributors, appears in the final volume.

V

V?

A. J. L.

,&. Lo.

A. W. 0, A. W. Po.

A. W. R.

INITIALS AND HEADINGS OF ARTICLES

c.

A. MacM

c.

B.*

c.

Bi.

c.

E.*

c.

E. A.

C. H. Ha. C. J. H.

C. M. K.

C. Pf. C. R. B.

as.

C. W. R. C.

C. W. W.

D. P. T.

Andrew Jackson Lamoureux.

Librarian, College of Agriculture, Cornell University. (Rio de Janeiro), 1879-1901

Editor of the Rio News

‘ Chile: Geography and

Statistics; Colombia: Geography and Statistics.

AUGUSTE LONGNON.

Professor at the College de France. Chevalier of the Legion of Honour. Member de la Gaule au VI e siecle.

Director of the ficole des Hautes Etudes. J rhSfillnn >mber of the Institute. Author of Gtoeraphie 1 vaduuan ‘

Arthur William Clayden, M.A.

Christ's College, Cambridge. Principal of the Royal Albert Memorial College, Exeter. Author of Cloud Studies; The Clouds of Venus; &c.

Alfred William Pollard, M.A.

Assistant Keeper of Printed . Books, British Museum. Fellow of King's College, London. Hon. Secretary, Bibliographical Society. Editor of Books about Books and Bibliographica. Joint-editor of the Library. Chief Editor of the " Globe " Chaucer.

Alexander Wood Renton, M.A., LL.B.

Puisne Judge of the Supreme Court of Ceylon. Editor of Encyclopaedia of the Laws of England.

Earl of Crewe.

See the biographical article: Crewe, Earl of.

Charles Alexander Macmunn, M.A., M.D., F.CS.

Formerly Physician and Pathologist to Wolverhampton General Hospital. Author of Outlines of Clinical Chemistry ; The Spectroscope in Medicine ; &c.

{

Cloud.

Chaucer; Colophon.

Compensation.

Cherbuliez.

Colours of Animals:

Chemistry.

J* Chronicle; \ Commines.

Charles Bemont, D.Litt. (Oxon.).

See the biographical article: Bemont, C.

Rev. Charles Bigg, M.A., D.D. (1840-1908). r

Regius Professor of Ecclesiastical History, Oxford, 1901-1908.

Examining J Clement Of Alexandria Chaplain to Bishop of London. Author of Neoplatonism; The Christian Platonists] r- . ,\ of Alexandria; &c. Editor of St Augustine's Confessions; De Imitatione; &c. L pan).

Charles Everitt, M.A., F.C.S., F.G.S., F.R.A.S. Sometime Scholar of Magdalen College, Oxford.

f Chemistry;

V Circle (in part).

E. Akers. Formerly Times Correspondent in Buenos Aires. America, 1854-1904.

Author of A History of South < Chile: History (in part)

Carlton Huntley Hayes, D.D. r

Assistant Professor of History in Columbia University, New York City. Member J Clement VI.;

of the American Historical Association. Author of An Introduction to the Sources 1 Clement VIII " antitoobe

relating to the Barbarian Invasions. _ " V V •

Charles John Holmes, M.A. r

Director, Keeper and Secretary of the National Portrait Gallery. Slade Professor J China: Chinese Art (Sculptttre); of Fine Art, Oxford, 1904-1910. Author of Constable; Constable and his Influence 1 Constable, John. on Landscape Painting ; Notes on the Science of Picture Making ; &c. I

Sir Charles Malcolm Kennedy, K.C.M.G., C.B. (1831-1908).

Head of Commercial Department, Foreign Office, 1872-1893. Lecturer on Inter- national Law, University College, Bristol. Commissioner in the Levant, 1870-1871 ; «j Commercial Treaties. at Paris, 1872-1886. Plenipotentiary, Treaty of the Hague, 1882. Author of Diplomacy and International Law.

Christian Pfister, D. es L. [Childebert; Chilperic;

Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour. Author of -! Clotaire; Clotilda, Saint; Etudes sue le regne de Robert le Pieux ; &c. [rjj ov ; s

Charles Raymond Beazley, M.A., D.Litt., F.R.G.S., F.R.Hist.S.

Professor of Modern History in the University of Birmingham. Formerly Fellow

of Merton College, Oxford, and University Lecturer in the History of Geography. -{ Columbus, Christopher.

Lothian Prizeman, Oxford, 1889. Lowell Lecturer, Boston, 1908. Author of

Henry the Navigator ; The Dawn of Modern Geography ; &c.

Hon. Carl Schurz, LL.D.

See the biographical article : Schurz, Carl.

Charles Wallwyn Radcliffe Cooke.

President, National Association of English Cider-makers. M.P. for Walworth, – 1885-1892, and for Hereford, 1893-1900. Author of A Book about Cider and Perry.

Sir Charles William Wilson, K.C.B., K.C.M.G., F.R.S. (1836-1907).

Major-General, Royal Engineers. • Secretary to the North American Boundary Commission, 1858-1862. British Commissioner on the Servian Boundary Com- mission. Director-General of the Ordnance Survey, 1886-1894. Director-General of Military Education, 1895-1898. Author of From Korti to Khartoum; Life of Lord Clive; &c.

Clay, Henry.

Cider.

Cilicia (in part).

Donald Francis Tovey. nienihini-

Balliol College, Oxford. Author of Essays in Musical Analysis, comprising the J v,nwu ” ,,I1 » Classical Concerto; The Goldberg Variations; and analyses of many other classical 1 Chorale; works. 1 Concerto.

INITIALS AND HEADINGS OF ARTICLES

B.6.H.

D.H.

D. Mn.

E. B. P,

E. C» Bi

E.C.Q

E.E.H

E. G.

E. G. J. M

E. Gr.

E. H. M.

E. K. C.

E. Ma. Rd.M.

E. 0.*

E.V.

E. W. C.

F. CO.

P. E. W.-S. F. G. M. B. F. G. P.

F.H.*

F. H. B. F. J. J.-S.

David George Hogarth, M.A.

Keeper of the Ashmolean Museum, Oxford. Fellow of Magdalen College, Oxford Fellow of the British Academy. Excavated at Paphos, 1888; Naukratis, 1899 ‘ and 1903; Ephesus, 1904-1905; Assiut, 1906-1907. Director, British School at Athens, 1897-1900; Director, Cretan Exploration Fund, 1899.

Cilicia (in part) ;

Colophon;

Comana.

David Hannay.

F'ormerly British Vice-Consul at Barcelona. 1 21 7-1688; Life of Emilio Castslar; &c.

Author of Short History of Royal Navy,

r Chioggia;

J Church, Sir Richard; 1 Coastguard; [Codrington, Sir Edward.

Rev. Dugald Macfadyen, M.A.

Minister of South Grove Congregational Church, Highgate. Director of the London -

Edward Bagnall Poulton, M.A., D.Sc, LL.D., F.R.S. f

Hope Professor of Zoology in the University of Oxford. Fellow of Jesus College, J Colours of Animals. Oxford. Author of The Colours of Animals; Essays on Evolution; Darwin and the\ Bionomics.

Original Species; &c.

Right Rev. Edward Cuthbert Butler, O.S.B., D.Litt. (DubUrs). Abbot of Downside Abbey, Bath.

Edmund Crosby Quiggin, M.A.

Fellow and Lecturer in Modern Languages and Monro Lecturer in Celtic, Gonville and Caius College, Cambridge.

Edward Everett Hale

See the biographical article : Hale, E. E.

Edmund Gosse, LL.D.

See the biographical article : Gosse, E.

E. G. J. Moyna, F.R.G.S. New College, Oxford.

Ernest Arthur Gardner, M.A.

See the biographical article: Gardner, Percy.

Ellis Hovell Minns, M.A.

Lecturer in Palaeography in the University of Cambridge. Lecturer and Assistant – Librarian, and formerly Fellow of Pembroke College, Cambridge.

Edmund Kerchever Chambers.

Assistant Secretary, Board of Education. Sometime Scholar of Corpus Christi College, Oxford. Chancellor's English Essayist, 1891. Author of The Medieval Stage. '

Editor of the " Red Letter " Shakespeare; Donne's Poems; Vaughan's Poems; &c.

»

Edward Manson.

Barrister-at-Law, Middle Temple. Joint-editor of Journal of Comparative Legislation ; ■ Law of Trading Companies ; Practical Guide to Company Law ; &c.

Eduard Meyer, D.Litt. (Oxon.), Ph.D., LL.D.

Professor of Ancient History in the University of Berlin. Prussian Academy. Author of Geschichte des Alterthums; Ceschichte; &c.

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc.

Consulting Surgeon to St Mary's Hospital, London, and to the Children's Hospital, Great Ormond Street. Author of A Manual of Analogy for Senior Students.

Rev. Edmund Venables, M.A., D.D. (1819-1895). Canon and Precentor of Lincoln. Author of Episcoi-

j Cistercians; Clara, Saint; I Clares, Poor; Cluny.

Columba, Saint.

Clarke, James Freeman.

f Choriambic Verse; Clanvowe; , Collins, William; 1 Conscience, Hendrik; I Constable, Henry.

Chile: History (in part).

J Chios (in part);

I Cithaeron; Clazomenae.

Chersonese; Cimmerii.

Clough, A. H.

Company.

Member of the Royal Forschuneen zur alien

‘■ Palaces of England.

Chosroes.

Cleft Palate and Hare Lip.

Cloister.

Ettrick William Creak, C.B., F.R.S., F.R.G.S. f

Captain, R.N. Formerly Superintendent of Compasses, Hydrographic Department, -J Compass (in part). Admiralty. Author of many papers on magnetic subjects. [

Frederick Cornwallis Conybeare, M.A., D.Th. (Giessen).

Fellow of the British Academy. Formerly Fellow of University College, Oxford. Author of The Ancient Armenian Texts of Aristotle; Myth, Magic and Morals; &c.

Francis Edward Wentworth-Sheilds, M.Inst.CE. Docks Engineer, London & South-Western Railway.

Frederick George Meeson Beck, M.A.

Fellow and Lecturer in Classics, Clare College, Cambridge.

Frederick Gymer Parsons, F.R.C.S., F.Z.S., F.R.Anthrop.Inst.

Vice-President, Anatomical Society of Great Britain and Ireland. Lecturer on Anatomy at St Thomas’s Hospital and the London School

of Medicine for Women. Formerly Hunterian Professor at the Royal College of Surgeons.

Frederick Hirth, Ph.D.

Professor of Chinese in Columbia University, New York. Author of China and the Roman Orient ; The A ncient History of China to the End of the Ghon Dynasty ; &c.

Francis H. Butler, M.A.

Associate of the Royal School of Mines.

Rev. Frederick John Jervis-Smith, M.A., F.R.S., F.R.A.S.

Millard Lecturer in Experimental Mechanics and Engineering, Trinity College, Oxford. Formerly University Lecturer in Mechanics.

Christmas; Consecration.

Concrete

f Cimbri; I Ccenwulf.

r

Coelom and Serous Membranes

China: History (in part). Compass (in part).

Chronograph.

Vlll F. K.

F. LI. G.

F. N. M

INITIALS AND HEADINGS OF ARTICLES

F.

R.

C.

F.

W

R.*

G.

G.

A.

B.

G. C. W.

G. E.

G. Fa. G. G. Co.

G. H. C.

G. H. Fo.

G.J.

G. J. T.

G. L. G. S. C.

G. W. Kn.

H. A. Gi.

H. B. H. C. H.

H. E. W. H.H.C.

Dommune: Medieval.

Feiedeich Wilhelm Eduard Keutgen, Ph.D.

Professor of History in the University of Hamburg. Formerly Professor of Medieval and Modern History in the University of Jena. Author of Die Hanse und England itn 14. Jahrhundert; Untersuchungen uber den Ur sprung der deutschen Stadtverfassung; Urkunden zur stddtischen Verfassungsgeschichte; Amter und Ziinfte; &c.

Francis Llewellyn Griffith, M.A., Ph.D. (Leipzig), F.S.A. (”

Reader in Egyptology, Oxford University. Formerly Scholar of Queen's College, J Oxford. Editor of the Archaeological Survey and Archaeological Reports of the 1 Cheops. Egypt Exploration Fund. Fellow of Imperial German Archaeological Institute. I

Col. Frederic Nattjsch Maude, C.B. f

Lecturer in Military History, Manchester University. Author of War and the 1 Conscription. World's Policy; The Leipzig Campaign; The Jena Campaign. {_

J Congo;

\ Congo Free State (in pari).

\ Chrysoberyl; Chrysoprase; 1 Cinnabar.

Clock (in part).

Frank R. Cana.

Author of South Africa from the Great Trek to the Union.

Frederick William Ritdler, I.S.O., F.G.S.

Curator and Librarian of the Museum of Practical Geology, London, 1879-1902 President of the Geologists' Association, 1887-1889.

Lord Grimthorpe.

See the biographical article: Grimthorpe, ist Baron.

George A. Boulenger, F.R.S. f c; e i,iM.

In charge of the Collections of Reptiles and Fishes, Department of Zoology, British -j '

Museum. Vice-President of the Zoological Society of London. [Cod.

George Charles Williamson, Litt.D. f

Chevalier of the Legion of Honour. Author of Portrait Miniatures; Life of Richard J Clouet, Francois; Cosway, R.A . ; George Engleheart ; Portrait Drawings ; &c. Editor of new edition | Clouet, Jean. of Bryan's Dictionary of Painters and Engravers. I

Rev. George Edmundson, M.A., F.R.Hist.S.

Formerly Fellow and Tutor of Brasenose College, Oxford. Ford's Lecturer, 1909. Employed by British Government in preparation of the British case in the British " Guiana- Venezuelan and British Guiana-Brazilian boundary arbitrations.

G. Faur.

George Gordon Coulton, M.A.

Birkbeck Lecturer in Ecclesiastical History, Trinity College, Cambridge. Author – of Medieval Studies; Chaucer and his England; &c.

George Herbert Carpenter, M.R.I.A.

Professor of Zoology in the Royal College of Science, Dublin. Author of Insects: their Structure and Life.

George Herbert Fowler, Ph.D., F.Z.S., F.L.S.

Formerly Berkeley Fellow of Owens College, Manchester, and Assistant Professor of Zoology at University College, London. Member of Council of Linnean Society.

George Jamieson, C.M.G., M.A.

Formerly Consul-General at Shanghai, and Consul and Judge of the Supreme Court, Shanghai.

George James Turner.

Barrister-at-Law, Lincoln's Inn. Society; &c.

Chile: History (in part) ; Colombia: History.

Conjuring (in part).

Concubinage.

\ Coleoptera. J Coelentera. J China (in part).

Editor of Select Pleas of the Forests for the Selden J Clarendon, Constitutions of,

Georg Lunge, Ph.D., F.C.S.

See the biographical article : Lunge, Georg.

Sir George Sydenham Clarke, G.C.M.G., G.C.I.E., F.R.S.

Governor of Bombay. Author of Imperial Defence; Russia's Great Sea Power; The . Last Great Naval War; &c.

Rev. George William Knox, D.D., LL.D.

Professor of Philosophy and History of Religion, Union Theological Seminary, New York. Author of The Religion of Jesus ; The Direct and Fundamental Proofs of the ' Christian Religion; &c.

Herbert Allen Giles, M.A., LL.D.

Professor of Chinese in the University of Cambridge. Member of the China Consular Service, 1 867-1 893. Author of a Chinese-English Dictionary; A Chinese Biographical ' Dictionary; History of Chinese Literature.

Hilary Bauermann, F.G.S. (d. 1909).

Formerly Lecturer on Metallurgy at the Ordnance College, Woolwich. Author of _ A Treatise on the Metallurgy of Iron.

Rev. Horace Carter Hovey, A.M., D.D.

Fellow of the American Association for the Advancement of Science, Geological Society of America, National GeographicSociety and Societe de Speleologie (France). ' Author of Celebrated American Caverns; Handbook of Mammoth Cave of Kentucky; &c.

Henry Edward Watts.

Editor of the Melbourne Argus. Quixote.

Sir Henry Hardtnge Cunynghame, E.C.B., M.A. f

Assistant Under-Secretary, Home Office ; Vice-President, Institute of Electrical A Clock. Engineers. Author of various works on Enamelling, Electric Lighting, &c. 1_

S Coal-Tar. Coaling-stations.

Christianity.

China: Language, Literature,

Religion.

Coal (in part) ; Coke.

Colossal Cavern.

Author of Life of Cervantes. Translator of Don \ Cid, The,

INITIALS AND HEADINGS OF ARTICLES

IX

H. L. C. H. M. R. H. M. W.

H. M. Wo.

H. S. J.

H.St. H. S. WL

H. Wh.

H. W. S. H. Y. LA.

J. A. CI. J. A. F.

J. A. H. J. A. R.

J. C. Sc.

J. D.

J. D. v. d. W.

J. E. F. J. E. S.*

J. H. R. J. J. T.

Hugh Longbourne Callendar, LL.D., F.R.S.

Professor of Physics, Royal College of Science, London. Formerly Professor of Physics in McGill College, Montreal, and in University College, London.

Hugh Munro Ross.

Formerly [.Exhibitioner of Lincoln College, Oxford. Engineering Supplement. Author of British. Railways.

Conduction of Heˆt.

Editor of ” The Times” -I Coal (in part).

i

Coccidia.

Constantine I. Condillac.

Chronology (in part) ; Civilization.

Harry Marshall Ward, F.R.S. , D.Sc. (d. 1905).

Formerly Professor of Botany, Cambridge University. President of the British ,

Mycological Society. Author of Timber and some of its Diseases ; The Oak ; Diseases 1 Conn, Ferdinand Julius.

in Plants; &c. [

Harold Mellor Woodcock, D.Sc. r

Assistant to the Professor of Proto-Zoology, London University. Fellow of Uni- J versity College, London. Author of ” Haemoflagellates ” in Professor Ray Lan- 1 kester’s Treatise of Zoology, and of various scientific papers. I

Henry Stuart Jones, M.A. (

Formerly Fellow of Trinity College, Oxford. Director of the British School at – Rome, 1903-1905. Author of The Roman Empire; &c.

Henry Sturt, M.A.

Author of Idola Theatri; The Idea of a Free Church; Personal Idealism; &c.

Henry Smith Williams, M.D., B.Sc.

Formerly Lecturer in the Hartford School of Sociology, U.S.A. Editor of The . Historians’ History of the World. Author of The Story of Nineteenth Century Science ; The History of the Art of Writing; The Lesson of Heredity; &c. I

Horace White, LL.D. f

Formerly Editor of the New York Evening Post. Sometime Editor of

Chicago J Cleveland, Grover. Tribune. Author of Money and Banking Illustrated by American History; The\ Tariff Question ; The Gold Question ; The Stiver Question ; &c. I

H. Wickham Steed.

Correspondent of The Times at Rome, 1897-1902, and at Vienna.

Sir Henry Yule, K.C.S.I., C.B.

See the biographical article: Yule, Sir Henry.

Israel Abrahams, M.A.

Reader in Talmudic and Rabbinic Literature in the University of Cambridge. Formerly President of the Jewish Historical Society of England. Author of A Short History of Jewish Literature; Jewish Life in the Middle Ages; Judaism; &c. Edited Jewish Quarterly Review, 1 888-1 908.

John Algernon Clarke.

Author of Fen Sketches ; &c.

John Ambrose Fleming, M.A., D.Sc, F.R.S., M.I.E.E.

Pender Professor of Electrical Engineering in the University of London. Fellow of University College, London. Formerly Fellow of St John's College, Cambridge, – and Lecturer on Applied Mechanics in the University. Author of Magnets and Electric Currents.

John Allen Howe, B.Sc.

Curator and Librarian of the Museum of Practical Geology, London.

Very Rev. Joseph Armitage Robinson, D.D.

Dean of Westminster. Fellow of the British Academy. Hon. Fellow of Christ's

College, Cambridge. Formerly Fellow of Christ's College, Cambridge, and Norrisian -i Clement I. (in part)

Professor of Divinity in the University. Author of Some Thoughts on the Incarnation ;

&c. John Christopher Schwab, A.M., Ph.D. r

Librarian, Yale University. Editor of Yale Review. Author of The Confederate -i Confederate States Of America.

States of America; History of New York Property Tax; &c. [

Sir James Donaldson.

See the biographical article : Donaldson, Sir J.

Johannes Diderik van der Waals, Ph.D. f

Professor of Physics at the University of Amsterdam. Author of The Continuity of A Condensation of Gases.

the Liquid and Gaseous States. L

Rev. James Everett Frame, A.M. (Harvard). f

Edward Robinson Professor of Biblical Theology in Union Theological Seminary, X Colossians, Epistle to the. New York. Author of Purpose of New Testament Theology. [

John Edwin Sandys, M.A., Litt.D., LL.D. f

Public Orator in the University of Cambridge. Fellow of St John's College, J Classics. Cambridge. Fellow of the British Academy. Author of History of Classical | Scholarship; &c. L

John Horace Round, LL.D. (Edin.). f

Author of Feudal England; Studies in Peerage and Family History; Peerage andi Clare: Family. Pedigree; &c. I

Sir Joseph John Thomson, M.A., D.Sc, F.R.S., LL.D., Ph.D.

Cavendish Professor of Experimental Physics, Cambridge. Professor of Physics, Conduction, Electric: Through Royal Institution, London. Fellow of Trinity College, Cambridge. President -(Gases of the British Association, 1909-1910. Awarded Nobel Prize for Physics, 1906. Author of Conduction of Electricity through Gases; Recent Researches in Electricity and Magnetism; Application of Dynamics to Physics and Chemistry; &c.

Cialdini.

China: History (in pari).

Circumcision.

Conjuring (in part).

Conduction, Electric.

Clay-with-FIints.

-j Clement of Alexandria (in part).

INITIALS AND HEADINGS OF ARTICLES

J. Le. J.L.M.

J. Mo. J. M. M.

J. M. Ro.

Rev. James Legge.

See the biographical article : Legge, James.

■< Confucius.

J.

N.

M.

J.

P.

-B.

J.

P.

E.

J.

R.

C.

J.

S.

F.

J. S. K.

J. T. C.

J. T. S.* J. V. B.

K. S.

L. B. L. D.* L. Gi.

L. J. S. L. V.*

M. E. S.

John Linton Myres, M.A., F.S.A. (

Wykeham Professor of Ancient History in the University of Oxford. Formerly J citium Gladstone Professor of Greek and Lecturer in Ancient Geography, University of 1 Liverpool. Lecturer in Classical Archaeology in University of Oxford. I

Viscount Morley of Blackburn.

See the biographical article : Morley, Viscount.

\ Comte.

John Malcolm Mitchell.. friˆh’

Formerly Scholar of Queen’s College, Oxford. Lecturer on Classics at East London “(Cleisthenes; College (University of London). Joint-editor of Grote’s History of Greece. I Colchis,

John Mackinnon Robertson, M.P. [

Author of Montaigne and Shakespeare; Modern Humanists; Buckle and Ms Critics;’) Coleridge, Samuel Taylor. &c. M.P., Tyneside Division of Northumberland. I

John Nevtl Maskelyne.

Author of Modern Spiritualism ;

Sharps and Flats ; &c.

-i Conjuring (in part).

J* Chippendale; 1 Clock (in part).

James George Joseph Penderel-Brodhurst. Editor of the Guardian, London.

Jean Paul Hippolyte Emmanuel Adhemar Esmein. C

Professor of Law in the University of Paris. Officer of the Legion of Honour. J Chatelet; Member of the Institute of France. Author of Cours elementaire d'histoire du droit 1 Code Napoleon. francais; &c. I

Joseph Rogerson Cotter, M.A.

Assistant to the Professor of Physics, Trinity College, Dublin, edition of Preston's Theory of Heat.

Editor of 2nd 3 Colour.

John Smith Flett, D.Sc, F.G.S. f Clay;

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in J Concretion* Edinburgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby | „ , '.

Medallist of the Geological Society of London. I Conglomerate.

John Scott Keltie, LL.D., F.S.S., F.S.A. (Scot.).

Secretary, Royal Geographical Society. Knight of Swedish Order of North Star. Commander of the Norwegian Order of St Olaf. Hon. Member, Geographical " Societies of Paris, Berlin, Rome, &c. Editor of Statesman's Year Book. Editor of the Geographical Journal.

Joseph Thomas Cunningham, M.A., F.Z.S. r

Lecturer on Zoology at South- Western Polytechnic, London. Formerly Fellow of J Chiton; University College, Oxford, and Assistant Professor of Natural History in the Uni- 1 Cockle. versity of Edinburgh. Naturalist to the Marine Biological Association. I

Congo Free State (in part).

James Thomson Shotwell, Ph.D.

Professor of History in Columbia University, New York City.

Author of The Apostolic

■j Colbert, Jean Baptiste.

Clementine Literature; Congregationalism.

Chelys; Cheng; Chorus; Cithara; Cittern; Clarina; Clarinet; Clavichord; Clavicytherium; Concertina.

■< China: Chinese Art.

/clement II.

Lionel Giles, M.A. (

Assistant, Oriental Department, British Museum. Author of Sun Tzu on the Art \ China: Language (in pari).

of War. l

James Vernon Bartlet, M.A., D.D. (St Andrews).

Professor of Church History, Mansfield College, Oxford. Age; &c.

Kathleen Schlesinger.

Author of The Instruments of the Orchestra.

Laurence Binyon.

See the biographical article: Binyon, L.

Louis Duchesne.

See the biographical article: Duchesne, L. M. O.

Leonard James Spencer, M.A.

Assistant, Department of Mineralogy, British Museum. Formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar. Editor of the Mineralogical

Magazine.

Luigi Villari.

Italian Foreign Office (Emigration Department). Formerly Newspaper Corre- spondent in East of Europe. Italian Vice-Consul in New Orleans, 1906; Phil- adelphia, 1907; and Boston, U.S.A., 1907-1910. Author of Italian Life in Town and Country; &c.

Michael Ernest Sadler, M.A., LL.D.

Professor of the History and Administration of Education in the University of Manchester. Formerly Director of Special Enquiries and Reports to the Board of Education. Student and Steward of Christ Church, Oxford. Editor of Continua- tion Schools in England and elsewhere; Moral Instruction and Training in Schools; &c.

Childrenite; Chlorite; Chromite; Chrysocolla; Clintonite; Cobaltite; Colemanite; Columbite.

Cibrario; Colleoni; Colletta; Colonna: Family; Colonna, Vittoria; Confalonieri.

Co-education.

INITIALS AND HEADINGS OF ARTICLES

x:

M. G. D.

M. V. T. M. 0. B. C. N.V.

N.W.T.

0. Ba. 0. J. R. H.

O.M.* P. A. M.

P. C. Y.

P. La.

R. de C. W.

R. H.*

R. J. M. R. K. D.

R. L.*

R. N. B. R. P. S.

Lecturer in Greek at Birming- i Chios (in part)

Rt. Hon. Sir Mountstuart Elphinstone Grant-Duff, G.C.S.I., F.R.S. (1829-

1906).

M.P. for the Elgin Burghs. 1857-1881. Under-Secretary of State for India, 1868- 1874. Under-Secretary of State for the Colonies, 1880-1881. Governor of Madras, 1881-1886. President of the Royal Geographical Society, 1889-1893. President of the Royal Historical Society, 1892-1899. Author of Studies in European Politics; Notes from a Diary ; &c.

Marcus Niebuhr Tod, M.A. J

Fellow and Tutor of Oriel College, Oxford. University Lecturer in Epigraphy. 1 Cleomenes, Joint-author of Catalogue of the Sparta Museum. *~

Max Otto Bismarck Caspari, M.A.

Reader in Ancient History at London University, ham University, 1905-1908.

Joseph Marie Noel Valois. ‘

Member of Academie des Inscriptions et Belles-Lettres, Paris. Honorary Archivist at the Archives Nationales. ˆFormerly President of the Societe de l’Histoire de ” France and the Societe de l’Ecole de Chartes. Author of La France et le grand schisme d’ Occident; &c.

Northcote Whitbridge Thomas, M.A.

Government Anthropologist to Southern Nigeria. Corresponding Member of the Societe d’Anthropologie de Paris. Author of Thought Transference ; Kinship and ‘ Marriage in Australia; &c. {

Oswald Barron, F.S.A. |”

Editor of the Ancestor, 1902-1905. Hon. Genealogist to Standing Council of the”i Collar. Honourable Society of the Baronetage. I

Osbert John Radcliffe Howarth, M.A. f

Christ Church, Oxford. Geographical Scholar, 1901. Assistant Secretary of the -j Coal {in part). British Association. I

Coleridge, J. D. C, 1st Baron

Clement VII.: antipope. Constance, Council of,

Clairvoyance.

Octave Maus, LL.D. (Brussels).

Advocate of the Court of Appeal at Brussels. Director of V Art Moderns and of La Libre Esthetique. President of the Association of Belgian writers. Officer of – the Legion of Honour. Author of Le Thedtre de Bayreuth; Aux Ambassadeurs; Malta, Constantinople et la Crimee ; &c.

Percy Alexander Macmahon, D.Sc, F.R.S.

Late Major, R.A. Deputy Warden of the Standards, Board of Trade. Joint General Secretary of the British Association. Formerly Professor of Physics, Ordnance College. President of London Mathematical Society, 1894-1896.

Philip Chesney Yorke, M.A. Magdalen College, Oxford.

Philip Lake, M.A., F.G.S.

Lecturer on Physical and Regional Geography in Cambridge University. Formerly of the Geological Survey of India. Author of Monograph of British Cambrian ” Trilobites. Translator and Editor of Kayser’s Comparative Geology.

Robert de Courcy Ward, A.M. (Harvard).

Assistant Professor of Climatology in the University of Harvard. Fellow of Royal Meteorological Society, London. Sometime Editor of American Meteorological’ Journal. Author of Climate considered especially in Relation to Man; &c.

Sir Robert Hunter, C.B., M.A.

Solicitor to the Post Office. Author of The Preservation of Open Spaces and of* Footpaths and other Rights of Way; &c.

Clays, Paul Jean.

Combinatorial Analysis.

Clanricarde, 1st Earl of; Clanricarde, Marquess of; Clarendon, 1st Earl of; Clifford of Chudleigh; Colepeper.

China: Geology.

Climate and Climatology.

Commons.

r- ~ 1 c-j* c *u o, t < I Chichester of Belfast; Formerly Editor of the St James s< _. . . _ , .

1 Clare, 1st Earl of.

r

Ronald John McNeill, M.A.

Christ Church, Oxford. Barrister-at-Law. Gazette, London.

Sir Robert Kennaway Douglas.

Formerly Professor of Chinese, King's College, London. Keeper of Oriental I

Printed Books and MSS. at British Museum, 1892-1907. Member of the Chinese -I China: History

Consular Service, 1 858-1 865. Author of The Language and Literature of China;

China ; Europe and the Far East ; &c. I

Richard Lydekker, F.R.S., F.G.S., F.Z.S. rˆ? vrota j n ; Chimpanzee;

Member of the Staff of the Geological Survey of India, 1874-1882. Author of J China: tauna;

Catalogues of Fossil Mammals, Reptiles and Birds in British Museum; The Deer of] Chiroptera; Chiru;

all Lands; &c. [Clouded Leopard.

part).

Robert Nisbet Bain (d. 1909).

Formerly Assistant Librarian, British Museum. Author of Scandinavia:

the Political History of Denmark, Norway and Sweden, 15 13-1900 ; The First Romanovs, 1613 to 1725 ; Slavonic Europe: the Political History of Poland and Russia from 1469 to 1796; &c.

R. Phene Spiers, F.S.A., F.R.I.B.A.

Formerly Master of Architectural School and Surveyor, Royal Academy, London. Past President of Architectural Association. Associate and Fellow of King's College, London. Corresponding Member of the Institute of France. Editor of Fergusson's History of Architecture. Author of Architecture: East and West; &c.

Chmielnicki; Chodkiewicz; Christian II., III., IV.; Christina of Sweden.

Chimney (in part); Chimney piece; Choir; Column.

Xll S. A. C.

S. J. L.

S.N. S. P. T.

T. A. I.

T. As.

T. Ba.

T. F. C. T. G. Br.

T. H. H.*

T. K. C.

T. Mu.

T. Se.

V. C.

W. A. B. C.

W. A. P.

W. B. B. W. C. D. W.

W. F. C. W. G. F.

INITIALS AND HEADINGS OF ARTICLES

Chronicles, Books of

(in pari) .

Stanley Arthur Cook, M.A.

Editor for Palestine Exploration Fund. Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904-1908. Author of Glossary of Aramaic Inscriptions; The Laws of Moses and Code of Hammurabi; Critical Notes on Old Testament History; Religion of Ancient Palestine; &c.

Sidney James Low, M.A. f

Fellow of King's College, London. Barrister-at-Law, Inner Temple. Formerly …… T – „„„„„„„„„„

Editor of the St James's Gazette. Joint-editor of the Dictionary of English History, i Uiurcnill, L.ora Kanaoipn. Author of The Governance of England. Joint-author of vol. xii. of Longman's Political History of England, 1837-1901.

Simon Newcomb, D.Sc, D.C.L.

See the biographical article : Newcomb,

Simon.

{

Comet.

Member of the Supreme Council J Conquest . of Honour. Author of Problems ˆ

Clement VIII.-XIV.

Silvanus Phillips Thompson, M.D., D.Sc, F.R.S. f

Principal and Professor of Physics in the City and Guilds Technical College, Fins- J Compass (in ■part) bury. Formerly President of Physical Society, of Institution of Electrical Engineers, v \ r /■

and of Rontgen Society. Author of Lectures on Light; Michael Faraday; &c. I

f Child, Sir Josiah; Children,

Thomas Allan Ingram, M.A., LL.D. J Law Relating to (in part) ;

Trinity College, Dublin.] Chiltern Hundreds; Clearing

I House; Confession: Law.

Thomas Ashby, M.A., Dim. (Oxon.), F.S.A. f Chioggia (in part) ■

Formerly Scholar of Christ Church, Oxford. Director of British School of Archaeo- J CirceiUS Mons; ClOdia, Via; logy at Rome. Member of the German Imperial Archaeological Institute. Craven j Clusium; Collatia; Como; Fellow, Oxford, 1897. I Concordia.

Sir Thomas Barclay, M.P.

Member of the Institute of International Law.

of the Congo Free State. Officer of the Legion

of International Practice and Diplomacy; &c. M.P. for Blackburn, 1910.

Dr Theodore Frelinghuysen Collier, Ph.D.

Assistant Professor of History, Williams College, Williamstown, Mass., U.S.A.

Thomas Gregor Brodie, M.D., F.R.S. f

Professor of Physiology in the University of Toronto. Author of Essentials of A Connective Tissues.

Experimental Physiology. t

Col. Sir Thomas Hungerford Holdich, K.C.M.G., K.C.I.E., D.Sc. f

Superintendent Frontier Surveys, India, 1892-1898. Gold Medallist, R.G.S.,

London, 1887. Author of The Indian Borderland; The Countries of the King's

Award; India; Tibet; &c. Rev. Thomas Kelly Cheyne, D.D., D.Litt.

See the biographical article: Cheyne, T. K.

Thomas Muir, C.M.G., M.A., LL.D., F.R.S., F.R.S. (Edin.). f

Superintendent-General of Education in Cape Colony. Formerly Assistant Pro- fessor of Mathematics in the University of Glasgow. Vice-Chancellor of the J Circle (in part). University of the Cape of Good Hope till 1901. Author of Theory of Determinants in the Historical Order of Development; History of Determinants; Text-Book of De- [terminanls; &c.

Thomas Seccombe, M.A. f

Balliol College, Oxford. Lecturer in History, East London and Birkbeck Colleges, . University of London. Assistant Editor, Dictionary of National Biography, 1891- 1900. Author of The Age of Johnson; &c.

Valentine Chirol.

Director of the Foreign Department of The Times. Author of The Middle Eastern – Question ; The Far Eastern Question ; &c.

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., D.Ph. (Bern). Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880-188 1. Author of Guide du Haut Dauphine; The Range of" the Todi; Guide to Grindelwald; Guide to Switzerland; The Alps in Nature and in History; &c. Editor of the Alpine Journal, 1880-1889, &c.

Chitral.

\ Cherubim.

Chenier, Andr6 de.

Walter Alison Phillips, M.A.

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, Oxford. Author of Modern Europe; Tlie War of Greek Independence; &c.

W. Baker Brown.

Lieut.-Col., Commanding Royal Engineers at Malta.

William Cecil Dampier Whetham, M.A., F.R.S.

Recent Development of Physical Science ;.&c.

William Feilden Craies, M.A.

New College, Oxford. Barrister-at-Law, Inner Temple. Lecturer on Criminal Law, King's College, London. Author of Craies on Statute Law. Editor of Archbold's Criminal Pleading (23rd edition).

William George Freeman, B.Sc. (London), A.R.C.S.

Joint-author of Nature Teaching; The World's Commercial Products. Joint-editor-ˆ (j g ee of Science Progress in the Twentieth Century.

China: History (in part).

Chaux de Fonds, La; Coire; Como, Lake of; Constance; Constance, Lake of. Chimere; Choir; Church History (in part) ; Clement VII.; Confessional; Congress; Constable.

\ Coast Defence.

J Conduction, Electric:

1 in Liquids.

Children, Law relating to

(in part).

Cocoa;

1

INITIALS AND HEADINGS OF ARTICLES

xi u

w.

K.

S.

w.

L.

R. C

w.

H.

R.

w.

N.

w.

0.

B.

w.

R.

S.*

w.

R.

s.

w.

W

F.*

w.

W

R.*

William Kirby Sullivan, Ph.D., D.Sc.

President of Queen’s College, Cork, 1S73-1890.

Author of Celtic Studies: &c.

i Clan.

William Liest Readwin Cates (1821-1895).

Editor of Dictionary of General Biography. Author of A History of England from the Death of Edward the Confessor to the Death of King John; &c. Part author of Encyclopaedia of Chronology.

William Michael Rossetti.

See the biographical article: Rossetti, D. G.

Walter Nernst, Ph.D.

Professor of Physical Chemistry in the University of Berlin. Director of the Physico-Chemical Institute in the University. Member of the Royal Prussian Academy of Science. Author of Theoretische Chemie ; &c.

Ven. Winerid Oldfield Burrows, M.A.

Archdeacon of Birmingham. Tutor of Christ Church, Oxford, 1884-1891, and Principal of Leeds Clergy School, 1891-1900.

William Roy Smith, M.A., Ph.D.

Associate Professor of History, Bryn Mawr College, Pennsylvania. Sectionalism in Pennsylvania during the Revolution ; &c.

J Chronology {in part).

J Cimabue;

1 Claude of Lorraine.

i Chemical Action.

Confession: Religion; Confirmation.

William Robertson Smith, LL.D.

See the biographical article : Smith, W. R.

Author ofi Compromise Measures of 1850, I Chronicles, Books of (in part).

William Warde Fowler, M.A.

Fellow of Lincoln College, Oxford. Sub-Rector, 1881-1904. Gifford Lecturer, Edinburgh University, 1908. Author of The City-State of the Greeks and Romans; The Roman Festivals of the Republican Period ; &c.

William Walker Rockwell, Lic.Theol.

Assistant Professor of Church History, Union Theological Seminary, New York. Author of Die Doppelehe des Landgrafen Philipp von Hessen.

Club: Greek and Roman.

j Clement III., IV., V.

PRINCIPAL UNSIGNED ARTICLES

Chatham, Earl of.

Chatterji.

Chatterton.

Cheering.

Chess.

Chicago.

Child.

Chilean Civil War.

Chile-Peruvian War.

Chillingworth.

Chino-Japanese War.

Chlorine.

Cholera.

Chopin.

Christian Science.

Chrysanthemum.

Chrysostom.

Churchill, Charles.

Cibber.

Cinque Ports.

Civil List.

Civil Service.

Clausewitz.

Clayton-Bulwer Treaty.

Clemeneeau.

Clive, Lord.

Club-foot.

Cnossus.

Cobbett.

Cobden.

Cock-fighting.

Coco-nut Palm.

Code.

Coke, Sir Edward.

Collier, Jeremy.

Colony. ,

Colorado.

Colours, Military.

Commerce.

Common Order, Book of.

Communism.

Compositae.

Condorcet.

Condottiere.

Confirmation of Bishops.

Congreve, Sir William.

Conic Section.

Connecticut.

Conservative Party.

CHATELET (from Med. Lat. castella), the word, sometimes also written castillet, used in France for a building designed for the defence of an outwork or gate, sometimes of great strength or size, but distinguished from the chdteau, or castle proper, in being purely defensive and not residential. In Paris, before the Revolution, this word was applied both to a particular building and to the jurisdiction of which it was the seat. This building, the original Chatelet, had been first a castle defending the ap- proach to the Cite. Tradition traced its existence back to Roman times, and in the 18th century one of the rooms in the great tower was still called the chambre de Cesar. The jurisdiction was that of the provostship {prevdte) and viscountship of Paris, which was certainly of feudal origin, probably going back to the counts of Paris.

It was not till the time of Saint Louis that, with the appoint- ment of Etienne Boileau, the provostship of Paris became a private en garde, i.e. a public office no longer put up to sale. When the baillis (see Bailiff and Bailie) were created, the provost of Paris naturally discharged the duties and functions of a bailli, in which capacity he heard appeals from the seigniorial and inferior judges of the city and its neighbourhood, keeping, however, his title of provost. When under Henry II. certain bailliages became presidial)ViXmd.\ct \or&{presidiaux) , i.e. received to a certain extent the right of judging without appeal, the Chatelet, the court of the provost of Paris, was made a presidial court, but without losing its former name. Finally, various tribunals peculiar to the city of Paris, i.e. courts exercising jurisdictions outside the common law or corresponding to certain cours d ‘exception which existed in the provinces, were united with the Chatelet, of which they became divisions (chambres). Thus the lieutenant-general of police made it the seat of his juris- diction, and the provost of the lie de France, who had the same criminal jurisdiction as the provosts of the marshals of France in other provinces, sat there also. As to the personnel of the Chatelet, it was originally the same as in the bailliages, except that after the 14th century it had some special officials, the auditors and the examiners of inquests. Like the baillis, the provost had lieutenants who were deputies for him, and in addition gradually acquired a considerable body of ex officio councillors. This last staff, however, was not yet in existence at the end of the 14th century, for it is not mentioned in the Registre criminel du CMtelet (1389-1392), published by the Societe des Bibliophiles Francah. In 1674 the whole personnel was doubled, at

the time when the new Chatelet was established side by side with the old, the two being soon after amalgamated. On the eve of the Revolution it comprised, beside the provost whose office had become practically honorary, the lieutenant civil, who presided over the chambre de pr&volt au pare civil or court of first instance; the lieutenant criminel, who presided over the criminal

court; two lieutenants parliculiers, who presided in turn over the chambre du prisidial or court of appeal from the inferior jurisdictions; a juge auditeur; sixty-four councillors (con- seillers); the procureur du roi, four avocats du roi, and eight substituts, i.e. deputies of the procureur (see Procurator) , beside a. host of minor officials. The history of the Chatelet under the Revolution may be briefly told: the Constituent Assembly em- powered it to try cases of lese-nation, and it was also before this court that was opened the inquiry following on the events of the 5th and 6th of August 1780. It was suppressed by the law of the 16th of August 1790, together with the other tribunals of the ancien regime. (J. P. E.)

CHATEIjLERAULT, a town of western France, capital of an arrondissement in the department of Vienne, 19 m. N.N.E. of Poitiers on the Orleans railway between that town and Tours. Pop. (1906) 15,214. Chatellerault is situated on the right and eastern bank of the Vienne; it is connected with the suburb of Chateauneuf on the opposite side of the river by a stone bridge of the 16th and 17th centuries, guarded at the western extremity by massive towers. The manufacture of cutlery is carried on on a large scale in villages on the banks of the Clain, south of the town. Of the other industrial establish- ments the most important is the national small-arms factory, which was established in 1815 in Chateauneuf, and employs from 1500 to 5500 men. Chatellerault (or Chatelherault: Castellum Airaldi) derives its name from a fortress built in the 10th century by Airaud, viscount of its territory. In 1515 it was made a duchy in favour of Francois de Bourbon, but it was not long after this date that it became reunited to the crown. In 1 548 it was bestowed on James Hamilton, 2nd earl of Arran (see Hamilton).

CHATHAM, WILLIAM PITT, 1st Earl of (1708-17 78), English statesman, was born at Westminster on the 15 th of November 1708. He was the younger son of Robert Pitt of Boconnoc, Cornwall, and grandson of Thomas Pitt (1653-1726), governor of Madras, who was known as ” Diamond ” Pitt, from the fact of his having sold a diamond of extraordinary size to the regent Orleans for something like

£135,000. It was mainly by this fortunate transaction that the governor was enabled to raise his family, which was one of old standing, to a position of wealth and political influence. The latter he acquired by purchasing the burgage tenures of Old Sarum.

William Pitt was educated at Eton, and in January 1727 was entered as a gentleman commoner at Trinity College, Oxford. There is evidence that he was an extensively read, if not a minutely accurate classical scholar; and it is interesting to know that Demosthenes was his favourite author, and that he diligently cultivated the faculty of expression by the practice of translation and re-translation. An hereditary gout, from which

he had suffered even during his school-days, compelled him to leave the university without taking his degree, in order to travel abroad. He spent some time in France and Italy; but the disease proved intractable, and he continued subject to attacks of growing intensity at frequent intervals till the close of his life. In 1727 his father had died, and on his return home it was necessary for him, as the younger son, to choose a profession. Having chosen the army, he obtained through the interest of his friends a cornet's commission in the dragoons. But his military career was destined to be short. His elder brother Thomas having been returned at the general election of – 1734 both for Oakhampton and for Old Sarum, and having preferred to sit for the former, the family borough fell to the younger brother by the sort of natural right usually recognized in such cases. Accord- ingly, in February 1735, William Pitt entered parliament as member for Old Sarum. Attaching himself at once to the formid- able band of discontented Whigs known as the Patriots, whom Walpole's love of exclusive power had forced into opposition' under Pulteney, he became in a very short time one of its most prominent members. His maiden speech was delivered in April 1736, in the debate on the congratulatory address to the king on the marriage of the prince of Wales. The occasion was one of compliment, and there is nothing striking in the speech as re- ported; but it served to gain for him the attention of the house when he presented himself, as he soon afterwards did, in debates of a party character. So obnoxious did he become as a critic of the government, that Walpole thought fit to punish him by procuring his dismissal from the army. Some years later he had occasion vigorously to denounce the system of cashiering officers for political differences, but with characteristic loftiness of spirit he disdained to make any reference to his own case. The loss of his commission was soon made up to him. The heir to the throne, as

was usually the case in the house of Hanover, if not in reigning families generally, was the patron of the opposition, and the ex-cornet became groom of the bed-chamber to the prince of Wales. In this new position his hostility to the govern- ment did not, as may be supposed, in any degree relax. He had all the natural gifts an orator could desire — a commanding pres- ence, a graceful though somewhat theatrical bearing, an eye of piercing brightness, and a voice of the utmost flexibility. His style, if occasionally somewhat turgid, was elevated and passion- ate, and it always bore the impress of that intensity of conviction which is the most powerful instrument a speaker can have to sway the convictions of an audience. It was natural, therefore, that in the series of stormy debates, protracted through several years, that ended in the downfall of Walpole, his eloquence should have been one of the strongest of the forces that combined to bring about the final result. Specially effective, according to contem- porary testimony, were his speeches against the Hanoverian subsidies, against the Spanish convention in 1739, and in favour of the motion in 1742 for an investigation into the last ten years of Walpole's administration. It must be borne in mind that the reports of these speeches which have come down to us were made from hearsay, or at best from recollection, and are necessarily therefore most imperfect. The best-known specimen of Pitt's eloquence, his reply to the sneers of Horatio Walpole at his youth anddeclamatory manner, which has found a place in somanyhand- books of elocution, is evidently, in form at least, the work, not of Pitt, but of Dr Johnson, who furnished the report to the Gentle- man's Magazine. Probably Pitt did say something of the kind attributed to him, though even this is by no means certain in view of Johnson's repentant admission that he had often invented not merely the form, but the substance of entire debates.

In 1742 Walpole was at last forced to succumb to the long- continued attacks of opposition, and was succeeded as prime minister by the earl of Wilmington, though the real power in the new government was divided between Carteret and the Pelhams. Pitt's conduct on the change of administration was open to grave censure. The relentless vindictiveness with which he insisted on the prosecution of Walpole, and supported the bill of indemnity to witnesses against the fallen minister, was in itself not magnanimous; but it appears positively un-

worthy when it is known that a short time before Pitt had offered, on certain conditions, to use all his influence in the other direction. Possibly he was embittered at the time by the fact that, owing to the strong personal dislike of the king, caused chiefly by the contemptuous tone in which he had spoken of Hanover, he did not by obtaining a place in the new ministry reap the fruits of the victory to

which he had so largely contributed. The so-called ” broad-bottom ” administration formed by the Pelhams in 1744, after the dismissal of Carteret, though it included several of those with whom he had been accustomed to act, did not at first include Pitt himself even in a subordinate office. Before the obstacle to his admission was overcome, he had received a remarkable accession to his private fortune. The eccentric duchess of Marlborough, dying in 1744, at the age of ninety, left him a legacy of £10,000 as an ” acknowledgment of the noble defence he had made for the support of the laws of England and to prevent the ruin of his country.” As her hatred was known to be at least as strong as her love, the legacy was probably as much a mark of her detestation of Walpole as of her admiration of Pitt. It may be mentioned here, though it does not come in chronological order, that Pitt was a second time the object of a form of acknowledgment of public virtue which few statesmen have had the fortune to receive even once. About twenty years after the Marlborough legacy, Sir William Pynsent, a Somerset- shire baronet to whom he was personally quite unknown, left him his entire estate, worth about three thousand a year, in testimony of approval of his political career.

It was with no very good grace that the king at length consented to give Pitt a place in the government, although the latter did all he could to ingratiate himself at court, by changing his tone on the questions on which he had made himself offensive. To force the matter, the Pelhams had to resign expressly on the question whether he should be admitted or not, and it was only after all other arrangements had proved impracticable, that they were reinstated with the obnoxious politician as vice-treasurer of Ireland. This was in February 1746. In May of the same year he was promoted to the more important and lucrative office of paymaster-general, which gave him a place in the privy council, though not in the cabinet. Here he had an opportunity of display- ing his public spirit and integrity in a way that deeply impressed both the king and the country. It had been the usual practice of previous paymasters to appropriate to themselves the interest of all money lying in their hands by way of advance, and also to accept a commission of J % on all foreign subsidies. Although there was no strong public sentiment against the practice, Pitt altogether refused to profit by it. All advances were lodged by him in the Bank of England until required, and all subsidies were paid over without deduction, even though it was pressed upon him, so that he did not draw a shilling from his office beyond the salary legally attaching to it. Conduct like this, though obviously disinterested, did not go without immediate and ample reward, in the public confidence which it created, and which formed the mainspring of Pitt’s power as a

statesman .

The administration formed in 1746 lasted without material change till 1754. It would appear from his published corre- spondence that Pitt had a greater influence in shaping its policy than his comparatively subordinate position would in itself have entitled him to. His conduct in supporting measures, such as the Spanish treaty and the continental subsidies, which he had violently denounced when in opposition, had been much criticized; but within certain limits, not indeed very well defined, inconsistency has never been counted a vice in an English statesman. The times change, and he is not blamed for changing with the times. Pitt in office, looking back on the commencement of his public life, might have used the plea ” A good deal has happened since then,” at least as justly as some others have done. Allowance must always be made for the restraints and responsibilities of office. In Pitt’s case, too, it is to be borne in mind that the opposition with which he had acted gradually dwindled away, and that it ceased to have any organized existence after the death of the prince of Wales in 17 51. Then in regard to the important question with Spain as to the right of search,

Pitt has disarmed criticism by acknowledging that the course he followed during Wapole’s administration was indefensible. All due weight being given to these various considerations, it must be admitted, nevertheless, that Pitt did overstep the limits within which inconsistency is usually regarded as venial. His one great object was first to gain office, and then to make his tenure of office secure by conciliating the favour of the king. The entire revolution which much of his policy underwent in order to effect this object bears too close a resemblance to the sudden and inexplicable changes of front habitual to placemen of the Tadpole stamp to be altogether pleasant to contemplate in a politician of pure aims and lofty ambition. Humiliating is not too strong a term to apply to a letter in which he expresses his desire to ” efface the past by every action of his life,” in order that he may stand well with the king.

In 1754 Henry Pelham died, and was succeeded at the head of affairs by his brother, the duke of Newcastle. To Pitt the change brought no advancement, and he had thus an opportunity of testing the truth of the description of his chief given by Sir Robert Walpole, ” His name is treason.” But there was for a time no open breach. Pitt continued at his post; and at the general election which took place during the year he even accepted a nomination for the duke’s pocket borough of Aid-

borough. He had sat for Seaford since 1747. When parliament met, however, he was not long in showing the state of his feelings. Ignoring Sir Thomas Robinson, the political nobody to whom Newcastle had entrusted the management of the Commons, he made frequent and vehement attacks on Newcastle himself, though still continuing to serve under him. In this strange state matters continued for about a year. At length, just after the meeting of parliament in November 17 51, Pitt was dismissed from office, having on the debate on the address spoken at great length against a new system of continental subsidies, proposed by the government of which he was a member. Fox, who had just before been appointed secretary of state, retained his place, and though the two men continued to be of the same party, and afterwards served again in the same government, there was henceforward a rivalry between them, which makes the celebrated opposition of their illustrious sons seem like an inherited quarrel.

Another year had scarcely passed when Pitt was again in power. The inherent weakness of the government, the vigour and eloquence of his opposition, and a series of military disasters abroad combined to rouse a public feeling of indignation which could not be withstood, and in December 1756 Pitt, who now sat for Okehampton, became secretary of state, and leader of the Commons under the premiership of the duke of Devonshire. He had made it a condition of his joining any administration that Newcastle should be excluded from it, thus showing a resentment which, though natural enough, proved fatal to the lengthened existence of his government. With the king un-friendly, and Newcastle, whose corrupt influence was still dominant in the Commons, estranged, it was impossible to carry on a government by the aid of public opinion alone, how- ever emphatically that might have declared itself on his side. In April 1757, accordingly, he found himself again dismissed from office on account of his opposition to the king's favourite continental policy. But the power that was insufficient to keep him in office was strong enough to make any arrangement that excluded him impracticable. The public voice spoke in a way that was not to be mistaken. Probably no English minister ever received in so short a time so many proofs of the confidence and admiration of the public, the capital and all the chief towns voting him addresses and the freedom of their corporations. From the political deadlock that ensued relief could only be had by an arrangement between Newcastle and Pitt. After some weeks' negotiation, in the course of which the firmness and moderation of " the Great Commoner," as he had come to be called, contrasted favourably with the characteristic tortuosities of the crafty peer, matters were settled on such a basis that, while Newcastle was the nominal, Pitt was the virtual head of

the government. On his acceptance of office he was chosen member for Bath.

This celebrated administration was formed in June 1757, and continued in power till 1761. During the four years of its existence it has been usual to say that the biography of Pitt is the history of England, so thoroughly was he identified with the great events which make this period, in so far as the external relations of the country are concerned, one of the most glorious in her annals. A detailed account of these events belongs to history; all that is needed in a biography is to point out the extent to which Pitt's personal influence may really be traced in them. It is scarcely too much to say that, in the general opinion of his contemporaries, the whole glory of these years was due to his single genius; his alone was the mind that planned, and his the spirit that animated the brilliant achievements of the British arms in all the four quarters of the globe. Posterity, indeed, has been able to recognize more fully the independent genius of those who carried out his purposes. The heroism of Wolfe would have been irrepressible, Clive would have proved himself ' a heaven-born general," and Frederick the Great would have written his name in history as one of the most skilful strategists the world has known, whoever had held the seals of office in England. But Pitt's relation to all three was such as to entitle him to a large share in the credit of their deeds. It was his discernment that selected Wolfe to lead the attack on Quebec, and gave him the opportunity of dying a victor on the heights of Abraham. He had personally less to do with the successes in India than with the other great enterprises that shed an undying lustre on his administration; but his generous praise in parlia- ment stimulated the genius of Clive, and the forces that acted at the close of the struggle were animated by his indomitable spirit. Pitt, the first real Imperialist in modern English history, was the directing mind in the expansion of his country, and with him the beginning of empire is rightly associated. The Seven Years' War might well, moreover, have been another Thirty Years' War if Pitt had not furnished Frederick with an annual subsidy of £700,000, and in addition relieved him of the task of defending western Germany against France.

Contemporary opinion was, of course, incompetent to estimate the permanent results gained for the country by the brilliant foreign policy of Pitt. It has long been generally agreed that by several of his most costly expeditions nothing was really won but glory. It has even been said that the only permanent acquisition that England owed directly to him was her Canadian dominion; and, strictly speaking, this is true, it being admitted that the campaign by which the Indian empire was virtually won was not planned by him, though brought to

a successful issue during his ministry. But material aggrandizement, though the only tangible, is not the only real or lasting effect of a war policy. More may be gained by crushing a formidable rival than by conquering a province. The loss of her Canadian possessions was only one of a series of disasters suffered by France, which radically affected the future of Europe and the world. Deprived of her most valuable colonies both in the East and in the West, and thoroughly defeated on the continent, her humiliation was the beginning of a new epoch in history. The victorious policy of Pitt destroyed the military prestige which repeated experience has shown to be in France as in no other country the very life of monarchy, and thus was not the least considerable of the many influences that slowly brought about the French Revolution. It effectually deprived her of the lead in the councils of Europe which she had hitherto arrogated to herself, and so affected the whole course of continental politics. It is such far-reaching results as these, and not the mere acquisition of a single colony, however valuable, that constitute Pitt's claim to be considered as on the whole the most powerful minister that ever guided the foreign policy of England.

The first and most important of a series of changes which ultimately led to the dissolution of the ministry was the death of George II. on the 25th of October 1760, and the accession of his grandson, George III. The new king had, as was natural, new counsellors of his own, the chief of whom, Lord Bute, was at once admitted to the cabinet as a secretary of state. Between Bute and Pitt there speedily arose an occasion of serious difference.

CHATHAM, EARL OF

The existence of the so-called family compact by which the Bourbons of France and Spain bound themselves in an offensive alliance against England having been brought to light, Pitt urged that it should be met by an immediate declaration of war with Spain. To this course Bute would not consent, and as his refusal was endorsed by all his colleagues save Temple, Pitt had no choice but to leave a cabinet in which his advice on a vital question had been rejected. On his resignation, which took place in October 1761, the king urged him to accept some signal mark of royal favour in the form most agreeable to himself. Accordingly he obtained a pension of £3000 a year for three lives, and his wife, Lady Hester Grenville, whom he had married in 1754, was created Baroness Chatham in her own right. In con- nexion with the latter gracefully bestowed honour it may be mentioned that Pitt's domestic life was a singularly happy one.

Pitt's spirit was too lofty to admit of his entering on any merely factious opposition to the government he had quitted. On the contrary, his conduct after his retirement was dis- tinguished by a moderation and disinterestedness which, as Burke has remarked, " set a seal upon his character." The war with Spain, in which he had urged the cabinet to take the initia- tive, proved inevitable; but he scorned to use the occasion for "altercation and recrimination," and spoke in support of the government measures for carrying on the war. To the preliminaries of the peace concluded in February 1763 he offered an indignant resistance, considering the terms quite inadequate to the successes that had been gained by the country. When the treaty was discussed in parliament in December of the preceding year, though suffering from a severe attack of gout, he was carried down to the House, and in a speech of three hours' duration, interrupted more than once by paroxysms of pain, he strongly protested against its various conditions. The physical cause which rendered this effort so painful probably accounts for the infrequency of his appearances in parliament, as well as for much that is otherwise inexplicable in his subsequent conduct. In 1763 he spoke against the obnoxious tax on cider, imposed by his brother-in-law, George Grenville, and his opposition, though unsuccessful in the House, helped to keep alive his popularity with the country, which cordially hated the excise and all con- nected with it. When next year the question of general warrants was raised in connexion with the case of Wilkes, Pitt vigorously maintained their illegality, thus defending at once the privileges of Parliament and the freedom of the press. During 1765 he seems to have been totally incapacitated for public business. In the following year he supported with great power the pro- posal of the Rockingham administration for the repeal of the American Stamp Act, arguing that it was unconstitutional to impose taxes upon the colonies. He thus endorsed the contention of the colonists on the ground of principle, while the majority of those who acted with him contented themselves with resisting the disastrous taxation scheme on the ground of expediency. The Repeal Act, indeed, was only passed pari passu with another censuring the American assemblies, and declaring the authority of the British parliament over the colonies " in all cases what- soever "; so that the House of Commons repudiated in the most formal manner the principle Pitt laid down. His language in approval of the resistance of the colonists was unusually bold, and perhaps no one but himself could have employed it with impunity at a time when the freedom of debate was only im- perfectly conceded.

Pitt had not been long out of office when he was solicited to return to it, and the solicitations were more than once renewed. Unsuccessful

overtures were made to him in 1763, and twice in 1765, in May and June — the negotiator in May being the king's uncle, the duke of Cumberland, who went down in person to Hayes, Pitt's seat in Kent. It is known that he had the opportunity of joining the marquis of Rockingham's short-lived administration at any time on his own terms, and his conduct in declining an arrangement with that minister has been more generally condemned than any other step in his public life. In July 1766 Rockingham was dismissed, and Pitt was entrusted by the king with the task of forming a government entirely on his

own conditions. The result was a cabinet, strong much beyond the average in its individual members, but weak to powerlessness in the diversity of its composition. Burke, in a memorable passage of a memorable speech, has described this " chequered and speckled" administration with great humour, speaking of it as " indeed a very curious show, but utterly unsafe to touch and unsure to stand on." Pitt chose for himself the office of lord privy seal, which necessitated his removal to the House of Lords; and in August he became earl of Chatham and Viscount Pitt. ■

By the acceptance of a peerage the great commoner lost at least as much and as suddenly in popularity as he gained in dignity. One significant indication of this may be mentioned. In view of his probable accession to power, preparations were made in the city of London for a banquet and a general illumina- tion to celebrate the event. But the celebration was at once countermanded when it was known that he had become earl of Chatham. The instantaneous revulsion of public feeling was somewhat unreasonable, for Pitt's health seems now to have been beyond doubt so shattered by his hereditary malady, that he was already in old age though only fifty-eight. It was natural, therefore, that he should choose a sinecure office, and the ease of the Lords. But a popular idol nearly always suffers by removal from immediate contact with the popular sympathy, be the motives for removal what they may.

One of the earliest acts of the new ministry was to lay an embargo upon corn, which was thought necessary in order to prevent a dearth resulting from the unprecedentedly bad harvest of 1766. The measure was strongly opposed, and Lord Chatham delivered his first speech in the House of Lords in support of it. It proved to be almost the only measure intro- duced by his government in which he personally interested himself . His attention had been directed to the growing importance of the affairs of India, and there is evidence in his correspondence that he was meditating a comprehensive scheme for transferring much of the power of the company to the crown, when he

was withdrawn from public business in a manner that has always been regarded as somewhat mysterious. It may be questioned, indeed, whether even had his powers been unimpaired he could have carried out any decided policy on any question with a cabinet representing interests so various and conflicting; but, as it happened, he was incapacitated physically and mentally during nearly the Whole period of his tenure of office. He scarcely ever saw any of his colleagues though they repeatedly and urgently pressed for interviews with him, and even an offer from the king to visit him in person was declined, though in the language of profound and almost abject respect which always marked his communications with the court. It has been insinuated both by contemporary and by later critics that being disappointed at his loss of popularity, and convinced of the impossibility of co-operating with his colleagues, he exaggerated his malady as a pretext for the inaction that was forced upon him by circumstances. But there is no sufficient reason to doubt that he was really, as his friends represented, in a state that utterly unfitted him for business. He seems to have been freed' for a time from the pangs of gout only to be afflicted with a species of mental alienation bordering on insanity. This is the most satisfactory, as it is the most obvious, explanation of his utter indifference in presence of one of the most momentous problems that ever pressed for solution on an English statesman. Those who are able to read the history in the light of what occurred later may perhaps be convinced that no policy whatever initiated, after 1766 could have prevented or even materially delayed the declaration of American independence; but to the politicians of that time the coming event had not yet cast so dark a shadow before as to paralyse all action, and if any man could have allayed the growing discontent of the colonists and prevented the ultimate dismemberment of the empire, it would have been Lord Chatham. The fact that he not only did nothing to remove existing difficulties, but remained passive while his colleagues took the fatal step which led directly to separation, is in itself clear proof of his entire incapacity. The imposition

of the import duty on tea and other commodities was the project of Charles Townshend, and was carried into effect in 1767 without consultation with Lord Chatham, if not in opposition to his wishes. It is probably the most singular thing in connexion with this singular administration, that its most pregnant measure should thus have been one directly opposed to the well-known principles of its head.

For many months things remained in the curious position that he who

was understood to be the head of the cabinet had as little share in the government of the country as an unenfranchised peasant. As the chief could not or would not lead, the sub- ordinates naturally chose their own paths and not his. The lines of Chatham's policy were abandoned in other cases besides the imposition of the import duty; his opponents were taken into confidence; and friends, such as Amherst and Shelburne, were dismissed from their posts. When at length in October 1768 he tendered his resignation on the ground of shattered health, he did not fail to mention the dismissal of Amherst and Shelburne as a personal grievance.

Soon after his resignation a renewed attack of gout freed Chatham from the mental disease under which he had so long suffered. He had been nearly two years and a half in seclusion when, in July 1769, he again appeared in public at a royal levee. It was not, however, until 1770 that he resumed his seat in the House of Lords. He had now almost no personal following, mainly owing to the grave mistake he had made in not forming an alliance with the Rockingham party. But his eloquence was as powerful as ever, and all its power was directed against the government policy in the contest with America, which had become the question of all-absorbing interest. His last appear- ance in the House of Lords was on the 7th of April 1778, on the occasion of the duke of Richmond's motion for an address praying the king to conclude peace with America on any terms. In view of the hostile demonstrations of France the various parties had come generally to see the necessity of such a measure. But Chatham could not brook the thought of a step which implied submission to the " natural enemy " whom it had been the main object of his life to humble, and he declaimed for a considerable time, though with sadly diminished vigour, against the motion. After the duke of Richmond had replied, he rose again excitedly as if to speak, pressed his hand upon his breast, and fell down in a fit. He was removed to his seat at Hayes, where he died on the nth of May. With graceful unanimity all parties combined to show their sense of the national loss. The Commons presented an address to the king praying that the deceased statesman might be buried with the honours of a public funeral, and voted a sum for a public monument which was erected over his grave in Westminster Abbey. Soon after the funeral a bill was passed bestowing a pension of £4000 a year on his successors in the earldom, He had a family of three sons and two daughters, of whom the second son, William, was destined to add fresh lustre to a name which is one of the greatest in the history of England.

Dr Johnson is reported to have said that " Walpole was a minister given by the king to the people, but Pitt was a minister given by the

people to the king," and the remark correctly indicates Chatham's distinctive place among English statesmen. He was the first minister whose main strength lay in the support of the nation at large as distinct from its representatives in the Commons, where his personal following was always small. He was the first to discern that public opinion, though generally slow to form and slow to act, is in the end the paramount power in the state; and he was the first to use it not in an emergency merely, but throughout a whole political career. He marks the commencement of that vast change in the movement of English politics by which it has come about that the sentiment of the great mass of the people now tells effectively on the action of the government from day to day, — almost from hour to hour. He was well fitted to secure the sympathy and admiration of his countrymen, for his virtues and his failings were alike English. He was often inconsistent, he was generally intractable and overbearing, and he was always pompous and affected to a

degree which, Macaulay has remarked, seems scarcely compatible with true greatness. Of the last quality evidence is furnished in the stilted style of his letters, and in the fact recorded by Seward that he never permitted his tinder-secretaries to sit in his presence. Burke speaks of " some significant, pompous, creeping, explanatory, ambiguous matter, in the true Chathamic style." But these defects were known only to the inner circle of his associates. To the outside public he was endeared as a statesman who could do or suffer " nothing base," and who had the rare power of transfusing his own indomitable energy and courage into all who served under him. "A spirited foreign policy " has always been popular in England, and Pitt was the most popular of English ministers, because he was the most successful exponent of such a policy. In domestic affairs his influence was small and almost entirely indirect. He himself confessed his unfitness for dealing with questions of finance. The commercial prosperity that was produced by his war policy was in a great part delusive, as prosperity so produced must always be, though it had permanent effects of the highest moment in the rise of such centres of industry as Glasgow. This, however, was a remote result which he could have neither intended nor foreseen. The correspondence of Lord Chatham, in four volumes, was published in 1838-1840; and a volume of his letters to Lord Camel- ford in 1804. The Rev. Francis Thackeray's History of the Rt. Hon. William Pitt, Earl of Chatham (2 vols., 1827), is a ponderous and shapeless work. Frederic Harrison's Chatham, in the " Twelve English Statesmen " series (1905), though skilfully executed, takes a rather academic and modern Liberal view. A German work, William Pitt, Graf von Chatham, by Albert von

Ruville (3 vols., 1905; English trans. 1907), is the best and most thorough account of Chatham, his period, and his policy, which has appeared. See also the separate article on William Pitt, and the authorities referred tc, especially the Rev. William Hunt's appendix i. to his vol. x. of The Political History of England (1905).

CHATHAM, also called Miramichi, an incorporated town and portof entryin Northumberland county, New Brunswick, Canada, on the Miramichi river, 24 m. from its mouth and 10 m. by rail from Chatham junction on the Intercolonial railway. Pop. (1901) 5000. The town contains the Roman Catholic pro-cathedral, many large saw-mills, pulp-mills, and several establishments for curing and exporting fish. The lumber trade, the fisheries, and the manufacture of pulp are the chief industries.

CHATHAM, a city and port of entry of Ontario, Canada, and the capital of Kent county, situated 64 m. S.W. of London, and 1 1 m. N. of Lake Erie, on the Thames river and the Grand Trunk, Canadian Pacific and Lake Erie & Detroit River railways. Pop. (1901) 9068. It has steamboat connexion with Detroit and the cities on Lakes Huron and Erie. It is situated in a rich agri- cultural and fruit-growing district, and carries on a large export trade. It contains a large wagon factory, planing and flour mills, manufactories of fanning mills, binder-twine, woven wire goods, engines, windmills, &c.

CHATHAM, a port and municipal and parliamentary borough of Kent, England, on the right bank of the Medway, 34 m. E.S.E. of London by the South-Eastern & Chatham railway. Pop. (1891) 31,657; (1901)37,057. Though a distinct borough it is united on the west with Rochester and on the east with Gillingham, so that the three boroughs form, in appearance, a single town with a population which in 1901 exceeded 110,000. With the exception of the dockyards and fortifications there are*' few objects of interest. St Mary's church was opened in 1903, but occupies a site which bore a church in Saxon times, though the previous building dated only from 1786. A brass commemorates Stephen Borough (d. 1584), discoverer of the northern passage to Archangel in Russia (1553). St Bartholomew's chapel, originally attached to the hospital for lepers (one of the first in England), founded by Gundulph, bishop of Rochester, in 1070, is in part Norman. The funds for the maintenance of the hospital were appropriated by decision of the court of chancery to the hospital of St Bartholomew erected in 1863 within the boundaries of Rochester. The almshouse established in 1592 by Sir John Hawkins for decayed seamen and shipwrights is still extant, the building having been re-erected in the 19th century; but the fund called the Chatham Chest,

originated by Hawkins and Drake in

1588, was incorporated with Greenwich Hospital in 1802. In front of the Royal Engineers' Institute is a statue (1890) of General Gordon, and near the railway station another (1888) to Thomas Waghorn, promoter of the overland route to India. In 1905 King Edward VII. unveiled a fine memorial arch com- memorating Royal Engineers who fell in the South African War. It stands in the parade ground of the Brompton barracks, facing the Crimean arch. There are numerous brickyards, lime-kilns and flour-mills in the district neighbouring to Chatham; and the town carries on a large retail trade, in great measure owing to the presence of the garrison. The fortifications are among the most elaborate in the kingdom. The so-called Chatham Lines enclose New Brompton, a part of the borough of Gillingham. They were begun in 1758 and completed in 1807, but have been completely modernized. They are strengthened by several detached forts and redoubts. Fort Pitt, which rises above the town to the west, was built in 1779, and is used as a general military hospital. It was regarded as the principal establishment of the kind in the country till the foundation of Netley in Hamp- shire. The lines include the Chatham, the Royal Marine, the Brompton, the Hut, St Mary's and naval barracks; the garrison hospital, Melville hospital for sailors and marines, the arsenal, gymnasium, various military schools, convict prison, and finally the extensive dockyard system for which the town is famous. This dockyard covers an area of 516 acres, and has a river frontage of over 3 m. It was brought into its present state by the extensive works begun about 1867. Before that time there was no basin or wet-dock, though the river Medway to some extent answered the same purpose, but a portion of the adjoin- ing salt-marshes was then taken in, and three basins have been constructed, communicating with each other by means of large locks, so that ships can pass from the bend of the Medway at Gillingham to that at Upnor. Four graving docks were also formed, opening out of the first (Upnor) basin. Subsequent improvements included dredging operations in the Medway to improve the approach, and the provision of extra dry-dock accommodation under the Naval Works Acts.

The parliamentary borough returns one member. The town was incorporated in 1890, and is governed by a mayor, six alder- men and eighteen councillors. Area, 435s acres. The borough includes the suburb (an ecclesiastical parish) of Luton, in which are the waterworks of Chatham and the adjoining towns.

Chatham (Ceteham, Chetham) belonged at the time of the Domesday Survey to Odo, bishop of Bayeux. During the middle ages it formed a suburb of Rochester, but Henry VIII. in founding a regular navy began to establish dockyards, and the harbour formed by the deep channel of the Medway was utilized by Elizabeth, who built a dockyard and established an arsenal here. The dockyard was altered and improved by Charles I. and Charles II., and became the chief naval station of England. In 1708 an act was passed for extending the fortifications of Chatham. During the excavations on Chatham Hill after 1758a number of tumuli containing human remains, pottery, coins, &c, suggestive of an ancient settlement, were found. Chatham was constituted a parliamentary borough by the Reform Bill of 1832. In the time of Edward III. the lord of the manor had two fairs, one on the 24th of August and the other on the 8th of September. A market to be held on Tuesday, and a fair on the 4th, 5th and 6th of May, were granted by Charles II. in 1679, and another provision market on Saturday by James II. in 1688. In 1738 fairs were held on the 4th of May and the 8th of September, and a market every Saturday.

CHATHAM ISLANDS, a small group in the Pacific Ocean, forming part of New Zealand, 536 m. due E. of Lyttelton in the South Island, about 44 S., 177° W. It consists of three islands, a large one called Whairikauri, or Chatham Island, a smaller one, Rangihaute, or Pitt Island, and a third, Rangatira, or South-east Island. There are also several small rocky islets. Whairikauri, whose highest point reaches about 1000 ft., is remarkable for the number of lakes and tarns it contains, and for the extensive bogs which cover the surface of nearly the whole of the uplands. It is of very irregular form, about 38 m. in

length and 25 m. in extreme breadth, with an area of 321 sq. m. — a little larger than Middlesex. The geological formation is principally of volcanic rocks, with schists and tertiary limestone; and an early physical connexion of the islands with New Zealand is indicated by their geology and biology. The climate is colder than that of New Zealand. In the centre of Whairikauri is a large brackish lake called Tewanga, which at the southern end is separated from the sea by a sandbank only 1 50 yds. wide, which it occasionally bursts through. The southern part of the island has an undulating surface, and is covered either with an open forest or with high ferns. In general the soil is extremely fertile, and where it is naturally drained a rich vegetation of fern and flax occurs. On the north-west are several conical hills of basalt, which are surrounded by oases of fertile soil. On the south- western side is Petre Bay, on which, at the mouth of the river Mantagu, is Waitangi, the principal settlement.

The islands were discovered in 1791 by Lieutenant W. R. Broughton (1762-1821), who gave them the name of Chatham from the brig which he commanded. He described the natives as a bright, pleasure-loving people, dressed in sealskins or mats, and calling' themselves Morioris or Maiorioris. In 1831 they were conquered by 800 Maoris who were landed from a European vessel. They were almost exterminated, and an epidemic of influenza in 1839 killed half of those left; ten years later there were only 90 survivors out of a total population of 1200. They subsequently decreased still further. Their language was allied to that of the Maoris of New Zealand, but they differed somewhat from them in physique, and they were probably a cross between an immigrating Polynesian group and a lower indigenous Melan- esian stock. The population of the islands includes about 200 whites of various races and the same number of natives (chiefly Maoris). Cattle and sheep are bred, and a trade is carried on in them with the whalers which visit these seas. The chief export from the group is wool, grown upon runs farmed both by Euro- peans and Morioris. There is also a small export by the natives of the flesh of young albatrosses and other sea-birds, boiled down and cured, for the Maoris of New Zealand, by whom it is reckoned a delicacy. The imports consist of the usual commodities required by a population where little of the land is actually cultivated.

There are no indigenous mammals; the reptiles belong to New Zealand species. The birds — the largest factor in the fauna — have become vˆry greatly reduced through the introduction of cats, dogs and pigs, as well as by the constant persecution of every sort of animal by the natives. The larger bell-bird (Anlh- ornis melanocephala) has become quite scarce ; the magnificent fruit-pigeon (Carpophaga chathamensis) , and the two endemic rails (Nesolimnas dieffenbachii and Cabalus modestus) , the one of which was confined to Whairikauri and the other to Mangare Island, are extinct. Several fossil or subfossil avian forms, very interesting from the point of view of geographical distribution, have been discovered by Dr H. O. Forbes, namely, a true species of raven (Palaeocorax moriorum), a remarkable rail (Diaphora-pteryx), closely related to the extinct Aphanapteryx of Mauritius, and a large coot (Palaeolimnas chathamensis). There have also been discovered the remains of a species of swan belonging to the South American genus Chenopis, and of the tuatara (Hatteria) lizard, the unique species of an ancient family now surviving only in New Zealand. The swan is identical with an extinct species found in caves and kitchen-middens in New Zealand, which was contemporaneous with the prehistoric Maoris and was largely used by them for food. One of the finest of the endemic flower- ing plants of the group is the

boraginaceous ” Chatham Island lily ” (Myositidium nobile), a gigantic forget-me-not, which grows on the shingly shore in a few places only, and always just on the high-water mark, where it is daily deluged by the waves; while dracophyllums, leucopogons and arborescent ragworts are characteristic forms in the vegetation.

See Bruno Weiss, Fiinfzig Jahre auf Chatham Island (Berlin, 1900); H. O. Forbes, “The Chatham Islands and their Story,” Fortnightly Review (1893), vol. liii. p. 669, “The Chatham Islands, their relation to a former Southern Continent,” Supplementary.

Papers, R.G.S., vol. iii. (1893); J. H. Scott, “The Osteology of the Maori and the Moriori,” Trans. New Zealand Institute, vol. xxvi. (1893) ; C. W. Andrews, ” The Extinct Birds of the Chatham Islands,” Novitates Zoologicae, vol. ii. p. 73 (1896).

CHATILLON, the name of a French family whose history has furnished material for a large volume in folio by A. du Chesne, a learned Frenchman, published in 1621. But in spite of its merits this book presents a certain number of inaccurate state- ments, some of which it is important to notice. If, for instance, it be true that the Chatillons came from Chatillon-sur-Marne (Marne, arrondissement of Reims), it is now certain that, since the nth century, this castle belonged to the count of Cham- pagne, and that the head of the house of ChS-tillon was merely tenant in that place. One of them, howeVer, Gaucher of Chatillon, lord of Crecy and afterwards constable of France, became in 1290 lord of Chatillon-sur-Marne by exchange, but since 1303 a new agreement allotted to him the countship of Porcien, while Chatillon reverted to the domain of the counts of Champagne. It may be well to mention also that, in consequence of a resem- blance of their armorial bearings, du Chesne considered wrongly that the lords of Bazoches and those of Chateau-Porcien of the 12th and 13th centuries drew their descent from the house of Chatillon.

The most important branches of the house of Chatillon were those of (1) St Pol, beginning with Gaucher III. of Chatillon, who became count of St Pol in right of his wife Isabelle in 1205, the last male of the line being Guy V. (d. 1360); (2) Blois, founded by the marriage of Hugh of Chatillon-St Pol (d. 1248) with Mary, daughter of Margaret of Blois (d. 1230), — this branch became extinct with the death of Guy II. in 1397; (3) Porcien, from 1303 to 1400, when Count John sold the countship to Louis, duke of Orleans; (4) Penthievre, by the marriage of Charles of Blois (d. 1364) with Jeanne (d. 1384), heiress of Guy, count

of Penthievre (d. 133 1), the male line becoming extinct in 1457.

See A. du Chesne, Histoire genealogique de la maison de Chastillon-sur-Marne (162 1); Anselme, Histoire genealogique de la maison royale de France, vi. 91-124 (1730). (A. Lo.)

CHATILLON-SUR-SEINE, a town of eastern France, capital of an arrondissement in the department of Cote-d'Or, on the Eastern and Paris-Lyon railways, 67 m. N.N.W. of Dijon, between that city and Troyes. Pop. (1906) 4430. It is situated on both banks of the upper Seine, which is swelled at its entrance to the town by the Douix, one of the most abundant springs in France. Chatillon is constructed on ample lines and rendered attractive by beautiful promenades. Some ruins on an eminence above it mark the Ate of a chateau of the dukes of Burgundy. Near by stands the church of St Vorle of the 10th century, but with many additions of later date; it contains a sculptured Holy Sepulchre of the 16th century and a number of frescoes. In a fine park stands a modern chateau built by Marshal Marmont, duke of Ragusa, born at Chatillon in 1774. It was burnt in 1871, and subsequently rebuilt. The town preserves several interesting old houses. Chatillon has a sub- prefecture, tribunals of first instance and of commerce, a school of agriculture and a communal college. Among its industries are brewing, iron-founding and the manufacture of mineral and other blacks. It has trade in v/pod, charcoal, lithographic and other stone. Chatillon anciently consisted of two parts, Chau-mont, belonging to the duchy of Burgundy, and Bourg, ruled by the bishop of Langres; it did not coalesce into one town till the end of the 16th century. It was taken by the English in 1360 and by Louis XI. in 1475, during his struggle with Charles the Bold. Chatillon was one of the first cities to adhere to the League, but suffered severely from the oppression of its garrisons and gover- nors, and in 1595 made voluntary submission to Henry IV. In modern times it is associated with the abortive conference of 18 14 between the representatives of Napoleon and the Allies.

CHATSWORTH, a village of Derbyshire, England, containing a seat belonging to the duke of Devonshire, one of the most splendid private residences in England. Chatsworth House is situated close to the left bank of the river Derwent, 2J m. from Bakewell. It is Ionic in style, built foursquare, and enclosing a large open courtyard, with a fountain in the centre. In front,

a beautiful stretch of lawn slopes gradually down to the riverside, and a bridge, from which may best be seen the grand facade of the building, as it stands out in relief against the wooded ridge of Bunker's

Hill. The celebrated gardens are adorned with sculptures by Gabriel Cibber; Sir Joseph Paxton designed the great conservatory, unrivalled in Europe, which covers an acre; and the fountains, which include one with a jet 260 ft. high, are said to be surpassed only by those at Versailles. Within the house there is ‘a very fine collection of pictures, including the well-known portraits by Reynolds of Georgiana, duchess of Devonshire. Other paintings are asccribed to Holbein, Diirer, Murillo, Jan van Eyck, Dolci, Veronese and Titian. Hung in the gallery of sketches there are some priceless drawings attributed to Michelangelo, Leonardo da Vinci, Raffaelle, Correggio, Titian and other old masters. Statues by Canova, Thorwaldsen, Chantrey and R. J. Wyatt are included among the sculptures. In the state apartments the walls and window-panes are in some cases inlaid with marble or porphyry; the woodcarving, mar- vellous for its intricacy, grace and lightness of effect, is largely the work of Samuel Watson of Heanor (d. 1715). Chatsworth Park is upwards of n m. in circuit, and contains many noble forest-trees, the whole being watered by the Derwent, and surrounded by high moors and uplands. Beyond the river, and immediately opposite the house, stands the model village of Edensor, where most of the cottages were built in villa style, with gardens, by order of the 6th duke. The parish church, restored by the same benefactor, contains an old brass in memory of John Beaton, confidential servant to Mary, queen of Scots, who died in 1570; and in the churchyard are the graves of Lord Frederick Cavendish, murdered in 1882 in Phoenix Park, Dublin, and of Sir Joseph Paxton.

Chatsworth (Chetsvorde, Chetelsvorde, ” the court of Chetel “) took its name from Chetel, one of its Saxon owners, who held it of Edward the Confessor. It belonged to the crown and was entrusted by the Conqueror to the custody of William Peverell. Chatsworth afterwards belonged for many generations to the family of Leech, and was purchased in the reign of Elizabeth by Sir William Cavendish, husband of the famous Bess of Hardwick. In 1557 he began to build Chatsworth House, and it was completed after his death by his widow, then countess of Shrewsbury. Here Mary, queen of Scots, spent several years of her imprisonment under the care of the earl of Shrewsbury. During the Civil War, Chatsworth was occasionally occupied as a fortress by both parties. It was pulled down, and the present house begun by William, 1st duke of Devonshire in 1688. The little village consists almost exclusively of families employed upon the estate.

CHATTANOOGA, a city and the county-seat of Hamilton county, Tennessee, U.S.A., in the S.E. part of the state, about 300 m. S. of Cincinnati, Ohio, and 150 m. S.E. of Nashville, Tennessee, on the Tennessee river, and near the boundary line between Tennessee and

Georgia. Pop. (i860) 2545; (1870) 16093; (1880) 12,892; (1890) 29,100; (1900)30,154,0! whom 994 were foreign-born and 13,122 were negroes; (TJ. S. census, 1910) 44,604. The city is served by the Alabama Great Southern (Queen and Crescent), the Cincinnati Southern (leased by the Cincinnati, New Orleans & Texas Pacific railway company), the Nashville, Chattanooga & St Louis (controlled by the Louisville & Nash- ville), and its leased line, the Western & Atlantic (connecting with Atlanta, Ga.), the Central of Georgia, and the Chattanooga Southern railways, and by freight and passenger steamboat lines on the Tennessee river, which is navigable to and beyond this point during eight months of the year. That branch of the Southern railway extending from Chattanooga to Memphis was formerly the Memphis & Charleston, under which name it became famous in the American Civil War. Chattanooga occupies a picturesque site at a sharp bend of the river. To the south lies Lookout Mountain, whose summit (2126 ft. above the sea; 1495 ft. above the river) commands a magnificent view. To the east rises Missionary Ridge. Fine driveways and electric lines connect with both Lookout Mountain (the summit of which is reached by an inclined plane on which cars are operated by

cable) and Missionary Ridge, where there are Federal reserva- tions, as well as with the National Military Park (15 sq. m.; dedicated 1895) on the battlefield of Chickamauga (q.v.); this park was one of the principal mobilization camps of the United States army during the Spanish-American Wax of i8g8. Among the principal buildings are the city hall, the Federal building, the county court house, the public library, the high school and the St Vincent's and the Baroness Erlanger hospitals. Among Chattanooga's educational institutions are two commercial colleges, the Chattanooga College for Young Ladies (non-sectarian), the Chattanooga Normal University, and the Uni- versity of Chattanooga, until June 1907, United States Grant University (whose preparatory department, " The Athens School," is at Athens, Tenn.), a co-educational institution under Methodist Episcopal control, established in 1867; it has a school of law (1899), a medical school (1889), and a school of theology (1888). East of the city is a large national cemetery containing more than 13,000 graves of Federal soldiers. Chattanooga is an important produce, lumber, coal and iron market, and is the principal trade and jobbing centre for a large district in Eastern Tennessee and Northern Georgia and Alabama. The proximity of coalfields and iron mines has made Chattanooga an iron

manufacturing place of importance, its plants including car shops, blast furnaces, foundries, agricultural implement and machinery works, and stove factories; the city has had an important part in the development of the iron and steel industries in this part of the South. There are also flour mills, tanneries (United States Leather Co.), patent medicine, furniture, coffin, woodenware and wagon factories, knitting and spinning mills, planing mills, and sash, door and blind factories — the lumber being obtained from logs floated down the river and by rail. The value of the city's factory products increased from $10,517,886 in 1900 to $15,193,909 in 1905 0ˆ44-5%.

Chattanooga was first settled about 1835, and was long known as Ross's Landing. It was incorporated in 185 1 as Chattanooga, and received a city charter in 1866. Its growth for the three decades after the Civil War was very rapid. During the American Civil War it was one of the most important strategic points in the Confederacy, and in its immediate vicinity were fought two great battles. During June 1862 it was threatened by a Federal force under General O. M. Mitchel, but the Confederate army of General Braxton Bragg was transferred thither by rail from Corinth, Miss., before Mitchel was able to advance. In September 1863, however, General W. S. Rosecrans, with the Union Army of the Cumberland out-manceuvred Bragg, concentrated his numerous columns in the Chickamauga Valley, and occupied the town, to which, after the defeat of Chickamauga (.q.v.) , he retired.

From the end of September to the 24th of November the Army of the Cumberland was then invested in Chattanooga by the Confederates, whose position lay along Missionary Ridge from its north end near the river towards Rossville, whence their entrenchments extended westwards to Lookout Mountain, which dominates the whole ground, the Tennessee running directly beneath it. Thus Rosecrans was confined to a semicircle of low ground around Chattanooga itself, and his supplies had to make a long and difficult detour from Bridgeport, the main road being under fire from the Confederate position on Lookout and in the Wauhatchie valley adjacent. Bragg indeed expected that Rosecrans would be starved into retreat. But the Federals once more, and this time on a far larger scale, concentrated in the face of the enemy. The XL and XII. corps from Virginia under Hooker were transferred by rail to reinforce Rosecrans; other troops were called up from the Mississippi, and on the 16th of October the Federal government reconstituted the western armies under the supreme command of General Grant, The XV. corps of the Army of the Tennessee, under Sherman, was on the march from the Mississippi. Hooker's troops had already arrived when Grant reached Chattanooga

on the 23rd of October. The Army of the Cumberland was now under Thomas, Rosecrans having been recalled. The first action was fought at Brown's Ferry in the Wauhatchie valley, where Hooker executed with

complete precision a plan for the revictualling of Chattanooga, established himself near Wauhatchie on the 28th, and repulsed a determined attack on the same night. But Sherman was still far distant, and the Federal forces at Knoxville, against which a large detachment of Bragg's army under Longstreet was now sent, were in grave danger. Grant waited for Sherman's four divisions, but prepared everything for battle in the meantime. His plan was that Thomas in the Chattanooga lines should contain the Confederate centre on Missionary Ridge, while Hooker on the right at Wauhatchie was to attack Lookout Mountain, and Sherman farther up the river was to carry out the decisive attack against Bragg's extreme right wing at the end of Missionary Ridgg. The last marches of the XV. corps were delayed, by stormy weather, Bragg reinforced Longstreet, and telegraphic communication between Grant and the Federals at Knoxville had already ceased. But Grant would not move forward without Sherman, and the battle of Chattanooga was fought more than two months after Chickamauga. On the 23rd of November a forward move of Thomas's army, intended as a

Confederate line of defence- XX XX Union troops. ..MB

demonstration, developed into a serious and successful action, whereby the first line of the Confederate centre was driven in for some distance. Bragg was now much weakened by successive detachments having been sent to Knoxville, and on the 24th the real battle began. Sherman's corps was graudally brought over the river near the mouth of Chickamauga Creek, and formed up on the east side.

The attack began at 1 p.m. and was locally a complete success. The heights attacked were in Sherman's hands, and fortified against counter-attack, before nightfall. Hooker in the mean- while had fought the " Battle above the Clouds " on the steep face of Lookout Mountain, and though opposed by an equal force of Confederates, had completely driven the enemy from the mountain. The 24th then had been a day of success for the Federals, and the decisive attack of the three armies in concert was to take place on the 25th. But the maps deceived Grant and Sherman as they had previously deceived Rosecrans. Sherman had captured, not the north point of Missionary Ridge, but a detached hill, and a new and more serious action had to be fought for the possession of Tunnel Hill, where Bragg's right now

lay strongly entrenched. The Confederates used every effort to hold the position and all Sherman's efforts were made in vain. Hooker, who was moving on Rossville, had not progressed far, and Bragg was still free to reinforce his right. Grant therefore directed Thomas to move forward on the centre to relieve the

pressure on Sherman. The Army of the Cumberland was, after all, to strike the decisive blow. About 3.30 p.m. the centre advanced on the Confederate's trenches at the foot of Missionary Ridge. These were carried at the first rush, and the troops were ordered to lie down and await orders. Then occurred one of the most dramatic episodes of the war. Suddenly, and without orders either from Grant or the officers at the front, the whole line of the Army of the Cumberland rose and rushed up the ridge. Two successive lines of entrenchments were carried at once. In a short time the crest was stormed, and after a last attempt at resistance the enemy's centre fled in the wildest confusion. The pursuit was pressed home by the divisional generals, notably by Sheridan. Hooker now advanced in earnest on Rossville, and by nightfall the whole Confederate army, except the troops on Tunnel Hill, was retreating in disorder. These too were withdrawn in the night, and the victory of the Federals was complete. Bragg lost 8684 men killed, wounded and prisoners out of perhaps 34,000 men engaged; Grant, with 60,000 men, lost about 6000.

CHATTEL (for derivation see Cattle), a term used in English law as equivalent to " personal property," that is, property which, on the death of the owner, devolves on his executor or administrator to be distributed (unless disposed of by will) among the next of kin according to the Statutes of Distributions. Chattels are divided into chattels real and chattels personal. Chattels real are those interests in land for which no " real action " (see Action) lies; estates which are less than freehold (estates for years, at will, or by sufferance) are chattels real. Chattels personal are such things as belong immediately to the person of the owner, and for which, if they are injuriously withheld from him, he has no remedy other than by a personal action. Chattels personal are divided into choses in possession and choses in action (see Chose).

A chattel mortgage, in United States law, is a transfer of personal property as security for a debt or obligation in such form that the title to the property will pass to the mortgagee upon the failure of the mortgagor to comply with the terms of the contract. At common law a chattel mortgage might be made without writing, and was valid as

between the parties, and even as against third parties if accompanied by possession in the mortgagee, but in most states of the Union legislation now requires a chattel mortgage to be in writing and duly recorded in order to be valid against third parties. At common law a mortgage can be given only of chattels actually in existence and belonging to the mortgagor, though if he acquired title afterwards the mortgage would be good as between the parties, but not as against subsequent purchasers or creditors. In equity, on the other hand, a chattel mortgage, though not good as a conveyance, is valid as an executory agreement.

Goods and chattels is a phrase which, in its widest signification, includes any property other than freehold. The two words, however, have come to be synonymous, and the expression, now practically confined to wills, means merely things movable in possession.

CHATTERIS, a market town in the Wisbech parliamentary division of Cambridgeshire, England, 255 m. N. by W. of Cam- bridge by the Great Eastern railway. Pop. of urban district (1001) 4711. It lies in the midst of the flat Fen country. The church of St Peter is principally Decorated; and there are fragments of a Benedictine convent founded in the 10th century and rebuilt after fire in the first half of the 14th. The town has breweries, and engineering and rope-making works. To the north runs the great Forty-foot Drain, also called Vermuyden's. after the Dutch engineer whose name is associated with the fen drainage works of the middle of the 17th century.

CHATTERJI, BANKIM CHANDRA [Bankimachandra Chattaradh-yaya] (1838-1894), Indian novelist, was born in the district of the Twenty-four Parganas in Bengal on the 27th of June 1838, and was by caste a Brahman. He was educated at the Hugh College, at the Presidency College in Calcutta, and at Calcutta University, where he was the first to take the degree of B.A. (1858). He entered the Indian civil service, and served

as deputy magistrate in various districts of Bengal, his official services being recognized, on his retirement in 1891, by the title of rai bahadur and the CLE. He died on the 8th of April 1894. • •

Bankim Chandra was beyond question the greatest novelist of India during the 19th century, whether judged by the amount and quality of his writings, or by the influence which they have continued to exercise. His education had brought him into touch with the works of the great European romance writers, notably Sir Walter Scott, and he created in India a school of fiction on the European model. His first

historical novel, the Durges-N andini or Chiefs Daughter, modelled on Scott, made a great sensation in Bengal; and the Kapala-Kundala and Mrinalini, which followed it, established his fame as a writer whose creative imagination and power of delineation had social been surpassed in India. In 1872 he brought out his first never novel, the Bisha-Brikkha or Poison Tree, which was followed by others in rapid succession. It is impossible to exaggerate the effect they produced; for over twenty years Bankim Chandra's novels were eagerly read by the educated public of Bengal, including the Hindu ladies in the zenanas ; and though numerous works of fiction are now produced year by year in every province of India, his influence has increased rather than diminished. Of all his works, however, by far the most important from its astonishing political consequences was the Ananda Math, which was published in 1882, about the time of the agitation arising out of the Ilbert Bill. The story deals with the Sannyasi (i.e.' fakir or hermit) rebellion of 1772 near Purmea, Tirtiut and Dinapur, and its culminating episode is a crushing victory won by the rebels over the united British and Mussulman forces, a success which was not, however, followed up, owing to the advice of a mysterious " physician " who, speaking as a divinely- inspired prophet, advises Satyananda, the leader of " the children of the Mother," to abandon further resistance, since a temporary submission to British rule is a necessity; for Hinduism has become too speculative and unpractical, and the mission of the English in India is to teach Hindus how to reconcile theory and speculation with the facts of science. The general moral of the Ananda Math, then, is that British rule and British education are to be accepted as the only alternative to Mussulman oppression, a moral which Bankim Chandra developed also in his Dharmataltwa, an elaborate religious treatise in which he explained his views as to the changes necessary in the moral and religious condition of his fellow-countrymen before they could hope to compete on equal terms with the British and Mahom- medans. But though the Ananda Math is in form an apology for the loyal acceptance of British rule, it is none the less inspired by the ideal of the restoration, sooner or later, of a Hindu kingdom in India. This is especially evident in the occasional verses in the book, of which the Bande Matdram is the most famous.

As to the exact significance of this poem a considerable controversy has raged. Bande Mataram is the Sanskrit for "Hail to thee, Mother!" or more literally "I reverence thee, Mother!", and according to Dr G. A. Grierson (The Times, Sept. 12, 1906) it can have no other possible meaning than an invocation of one of the " mother " goddesses of Hinduism, in his opinion Kali "the goddess of death and destruction." Sir' Henry Cotton, on the other hand (ib. Sept. 13, 1906), sees in it

merely an invocation of the ” mother-land ” Bengal, and quotes in support of this view the free translation of the poem by the late W. H. Lee, a proof which, it may be at once said, is far from convincing. But though, as Dr Grierson points out, the idea of a ” mother-land ” is wholly alien to Hindu ideas, it is quite possible that Bankim Chandra may have assimilated it with his European culture, and the true explanation is probably that given by Mr J. D. Anderson in The Times of September 24, 1906. He points out that in the nth chapter of the 1st book of the Ananda Math the Sannyasi rebels are represented as having erected, in addition to the image of Kali, ” the Mother who Has Been,” a white marble statue of ” the Mother that Shall Be,” which ” is apparently a representation of the mother-land.

vi. xa

IO

CHATTERTON

The Bande Mataram hymn is apparently addressed to both idols.”

The poem, then, is the work of a Hindu idealist who personified Bengal under the form of a purified and spiritualized Kali. Of its thirty-six lines, partly written in Sanskrit, partly in Bengali, the greater number are harmless enough. But if the poet sings the praise of the ” Mother ”

” As Lachmi, bowered in the flower That in the water grows,”

he also praises her as ” Durga, bearing ten weapons,” and lines 10, ii and 12 are capable of very dangerous meanings in the mouths of unscrupulous agitators. Literally translated these run, ” She has seventy millions of throats to sing her praise, twice seventy millions of hands to fight for her, how then is Bengal powerless?” As S. M. Mitra points out {Indian Problems, London, 1908), this language is the more significant as the Bande Mataram in the novel was the hymn by singing which the Sannyasis gained strength when attacking the British forces.

During Bankim Chandra Chatterji’s lifetime the Bande Mataram, though its dangerous tendency was recognized, was not used as a party war-cry; it was not raised, for instance, during the Ilbert Bill agitation, nor by the students who flocked round the court during the trial of Surendra Nath Banerji in 1883. It has, however, obtained an evil notoriety in the agita- tions that followed the partition of Bengal. That Bankim Chandra himself foresaw or desired any such use of it is

impossible to believe. According to S. M. Mitra, he composed it " in a fit of patriotic excitement after a good hearty dinner, which he always enjoyed. It was set to Hindu music, known as the Mallar-Kawali-Tal. The extraordinarily stirring character of the air, and its ingenious assimilation of Bengali passages with Sanskrit, served to make it popular."

Circumstances have made the Bande Mataram the most famous and the most widespread in its effects of Bankim Chandra's literary works. More permanent, it may be hoped, was the wholesome influence he exercised on the number of literary men he gathered round him, who have left their im- press on the literature of Bengal. In his earlier years he served his apprenticeship in literature under Iswar Chandra Vidyasagar, the chief poet and satirist of Bengal during the earlier half of the 19th century. Bankim Chandra's friend and colleague, Dina Bandhu Mitra, was virtually the founder of the modern Bengali drama. Another friend of his, Hem Chandra Banerji, was a poet of recognized merit and talent. And among the younger men who venerated Bankim Chandra, and benefited by his example and advice, may be mentioned two distinguished poets, Nalein Chandra Sen and Rabindra Nath Tagore.

Of Bankim Chandra's novels some have been translated into English by H. A. D. Phillips and by Mrs M. S. Knight.

CHATTERTON, THOMAS (1752-1770), English poet, was born at Bristol on the 20th of November 1752. His pedigree has a curious significance. The office of sexton of St Mary Redcliffe, at Bristol, one of the most beautiful parish churches in England, had been transmitted for nearly two centuries in the Chatter- ton family; and throughout the brief life of the poet it was held by his uncle, Richard Phillips. The poet's father, Thomas Chatterton, was a musical genius, somewhat of a poet, a numis- matist, and a dabbler in occult arts. He was one of the sub- chanters of Bristol cathedral, and master of the Pyle Street free school, near Redcliffe church. But whatever hereditary ten- dencies may have been transmitted from the father, the sole training of the boy necessarily devolved on his mother, who was in the fourth month of her widowhood at the time of his birth. She established a girls' school, took in sewing and ornamental needlework, and so brought up her two children, a girl and a boy, till the latter attained his eighth year, when he was admitted to Colston's Charity. But the Bristol blue-coat school, in which the curriculum was limited to reading, writing, arithmetic and the Church Catechism, had little share in the education of its marvellous pupil. The hereditary race of sextons had come to regard the church of St Mary Redcliffe as their

own peculiar

domain; and, under the guidance of his uncle, the child found there his favourite haunt. The knights, ecclesiastics and civic dignitaries, recumbent on its altar tombs, became his familiar associates ; and by and by, when he was able to spell his way through the inscriptions graven on their monuments, he found a fresh interest in certain quaint oaken chests in the muniment room over the porch on the north side of the nave, where parch- ment deeds, old as the Wars of the Roses, long lay unheeded and forgotten. They formed the child's playthings almost from his cradle. He learned his first letters from the illuminated capitals of an old musical folio, and learned to read out of a black-letter Bible. He did not like, his sister said, reading out of small books. Wayward, as it seems, almost from his earliest years, and manifesting no sympathy with the ordinary pastimes of children, he was regarded for a time as deficient in intellect. But he was even then ambitious of distinction. His sister relates that on being asked what device he would like painted on a bowl that was to be his, he replied, " Paint me an angel, with wings, and a trumpet, to trumpet my name over the world."

From his earliest years he was liable to fits of abstraction, sitting for hours in seeming stupor, or yielding after a time to tears, for which he would assign no reason. He had no one near him to sympathize in the strange world of fancy which his imagination had already called into being; and circumstances helped to foster his natural reserve, and to beget that love of mystery which exercised so great an influence on the develop- ment of his genius. When the strange child had attained his sixth year his mother began to recognize his capacity; at eight he was so eager for books that he would read and write all day long if undisturbed; and in his eleventh year he had become a contributor to Felix Farley's Bristol Journal. The occasion of his confirmation inspired some religious poems published in this paper. In 1763 a beautiful cross of curious workmanship, which had adorned the churchyard of St Mary Redcliffe for upwards of three centuries, was destroyed by a churchwarden. The spirit of veneration was strong in the boy, and he sent to the local journal on the 7th of January 1764 a clever satire on the parish Vandal. But his delight was to lock himself in a little attic which he had appropriated as his study; and there, with books, cherished parchments, saved from the loot of the muniment room of St Mary Redcliffe, and drawing materials, the child lived in thought with his 15th-century heroes and heroines. The first of his literary mystifications, the duologue of " Elinoure and Juga," was written before he was twelve years old, and he showed his poem to the usher at Colston's hospital, Thomas Phillips, as the work of a 15th-

century poet.

Chatterton remained an inmate of Colston's hospital for upwards of six years, and the slight advantages gained from this scanty education are traceable to the friendly sympathy of Phillips, himself a writer of verse, who encouraged his pupils to write. Three of Chatterton's companions are named as youths whom Phillips's taste for poetry stimulated to rivalry; but Chatterton held aloof from these contests, and made at that time no confidant of his own more daring literary adventures. His little pocket-money was spent in borrowing books from a circulating library; and he early ingratiated himself with book collectors, by whose aid he found access to Weever, Dugdale and Collins, as well as to Speght's edition of Chaucer, Spenser and other books.

His "Rowleian" jargon appears to have been chiefly the result of the study of John Kersey's Dictionarium Anglo- Bri- tannicum, and Prof. W..W. Skeat seems to think his knowledge of even Chaucer was very slight. His holidays were mostly spent at his mother's house; and much of them in the favourite retreat of his attic study there. He had already conceived the romance of Thomas Rowley, an imaginary monk of the 15 th century, and lived for the most part in an ideal world of his own, in that elder time when Edward IV. was England's king, and Master William Canynge — familiar to him among the recum- bent effigies in Redcliffe church — still ruled in Bristol's civic chair. Canynge is represented as an enlightened patron of literature, and Rowley's dramatic interludes were written for

performance at his house. In order to escape a marriage urged by the king, Canynge retired to the college of Westbury in Gloucestershire, where he enjoyed the society of Rowley, and eventually became dean of the institution. In " The Storie of William Canynge," one of the shorter pieces of his ingenious romance, his early history is recorded.

" Straight was I carried back to times of yore, Whilst Canynge swathed yet in fleshly bed, And saw all actions which had been before,

And ail the scroll of Fate unravelled; And when the fate-marked babe acome to sight, I saw him eager gasping after light. In all his sheepen gambols and child's, play,

In every merrymaking, fair, or wake, I kenn'd a perpled light of

wisdom's ray ;

He ate down learning with the wastel-cake; As wise as any of the aldermen, He'd wit enow to make a mayor at ten."

This beautiful picture of the childhood of the ideal patron of Rowley is in reality that of the poet himself — " the fate-marked babe," with his wondrous child-genius, and all his romantic dreams realized. The literary masquerade which thus consti- tuted the life-dream of the boy was wrought out by him in fragments of prose and verse into a coherent romance, until the credulous scholars and antiquaries of his day were persuaded into the belief that there had lain in the parish chest of Redcliffe church for upwards of three centuries, a collection of MSS. of rare merit, the work of Thomas Rowley, an unknown priest of Bristol in the days of Henry VI. and his poet laureate, John Lydgate.

Among the Bristol patrons of Chatterton were two pewterers, George Catcott and his partner Henry Burgum. Catcott was one of the most zealous believers in Rowley, and continued to collect his reputed writings long after the death of their real author. On Burgum, who had risen in life by his own exertions, the blue- coat boy palmed off the de Bergham pedigree, and other equally apocryphal evidences of the pewterer's descent from an ancestry old as the Norman Conquest. The de Bergham quartering, blazoned on a piece of parchment doubtless recovered from the Redcliffe muniment chest, was itself supposed to have lain for centuries in that ancient depository. The pedigree was pro- fessedly collected by Chatterton from original records, including " The Rowley MSS." The pedigree still exists in Chatterton's own handwriting, copied into a book in which he had previously transcribed portions of antique verse, under the title of " Poems by Thomas Rowley, priest of St. John's, in the city of Bristol "; and in one of these, " The Tournament," Syrr Johan de Berg- hamme plays a conspicuous part. The ennobled pewterer rewarded Chatterton with five shillings, and was satirized for this valuation of a noble pedigree in some of Chatterton's latest verse.

On the ist of July 1767, Chatterton was transferred to the office of John Lambert, attorney, to whom he was bound apprentice as a clerk. There he was left much alone; and after fulfilling the routine duties devolving on him, he found leisure for his own favourite pursuits. An ancient stone bridge on the Avon, built in the reign of Henry II., and altered by many later additions into a singularly picturesque but inconvenient thoroughfare, had been displaced by a structure better adapted to modern requirements. In September 1768, when Chatterton was in the second year of his apprenticeship, the new

bridge was partially opened for traffic. Shortly afterwards the editor of Felix Farley's Journal received from a correspondent, signing himself Dunelmus Bristoliensis , a " description of the mayor's first passing over the old bridge," professedly derived from an ancient MS. William Barrett, F.S.A., surgeon and antiquary, who was then accumu- lating materials for a history of Bristol, secured the original manuscript, which is now preserved in the British Museum, along with other Chatterton MSS., most of which were ultimately incorporated by the credulous antiquary into a learned quarto volume, entitled the History and Antiquities of the City of Bristol, published nearly twenty years after the poet's death. It was at this time that the definite story made its appearance — over

which critics and antiquaries wrangled for nearly a century — of numerous ancient poems and other MSS. taken by the elder Chatterton from a coffer in the muniment room of Redcliffe church, and transcribed, and so rescued from oblivion, by his son. The pieces include the " Bristowe Tragedie, or the Dethe of Syr Charles Bawdin," a ballad celebrating the death of the Lancastrian knight, Charles Baldwin; " ˆElla," a "Tragycal Enterlude," as Chatterton styles it, but in reality a dramatic poem of sustained power and curious originality of structure; " Goddwyn," a dramatic fragment; " Tournament," " Battle of Hastings," " The Parliament of Sprites," " Balade of Charitie," with numerous shorter pieces, forming altogether a volume of poetry, the rare merit of which is indisputable, wholly apart from the fact that it was the production of a mere boy. Unfortunately for him, his ingenious romance had either to be acknowledged as his own creation, and so in all probability be treated with con- tempt, or it had to be sustained by the manufacture of spurious antiques. To this accordingly Chatterton resorted, and found no difficulty in gulling the most learned of his credulous dupes with his parchments.

The literary labours of the boy, though diligently pursued at his desk, were not allowed to interfere with the duties of Mr Lambert's office. Nevertheless the Bristol attorney used to search his apprentice's drawer, and tear up any poems or other manuscripts that he could lay his hands upon; so that it was only during the absences of Mr Lambert from Bristol that he was able to expend his unemployed time in his favourite pursuits. But repeated allusions, both by Chatterton and others, seem to indicate that such intervals of freedom were of frequent occur- rence. Some of his modern poems, such as the piece entitled " Resignation," are of great beauty; and these, with the satires, in which he took his revenge on all the local celebrities whose vanity or meanness had excited his ire, are alone sufficient to fill a volume. The Catcotts, Burgum, Barrett and others of his patrons,

figure in these satires, in imprudent yet discriminating caricature, along with mayor, aldermen, bishop, dean and other notabilities of Bristol. Towards Lambert his feelings were of too keen a nature to find reliei in such sarcasm.

In December 1768′ in his seventeenth year, he wrote to Dodsley, the London publisher, offering to procure for him ” copies of several ancient poems, and an interlude, perhaps the oldest dramatic piece extant, wrote by one Rowley, a priest in Bristol, who lived in the reigns of Henry VI. and Edward IV.” To this letter he appended the initials of his favourite pseudonym, Dunelmus Bristoliensis, but directed the answer to be sent to the care of Thomas Chatterton, Redcliffe Hill, Bristol. To this, as well as to another letter enclosing an extract from the tragedy of ” ./Ella,” no answer appears to have been returned. Chatter- ton, conceiving the idea of finding sympathy and aid at the hand of some modern Canynge, bethought him of Horace Walpole, who not only indulged in a medieval renaissance of his own,’ but was the reputed author of a spurious antique in the Castle of Otranto. He wrote to him offering him a document entitled ” The Ryse of Peyncteyne yn Englande, wroten by T. Rowleie, 1469, for Mastre Canynge,” accompanied by notes which included specimens of Rowley’s poetry. To this Walpole replied with courteous acknowledgments. He characterized the verses as ” wonderful for their harmony and spirit,” and added, ” Give me leave to ask you where Rowley’s poems are to be had? I should not be sorry to print them; or at least a specimen of them, if they have never been printed.” Chatterton replied, enclosing additional specimens of antique verse, and telling Walpole that he was the son of a poor widow, and clerk to an attorney, but had a taste for more refined studies; and he hinted a wish that he might help him to some more congenial occupation. Walpole’s manner underwent an abrupt change. The specimens of verse had been submitted to his friends Gray and Mason, the poets, and pronounced modern. They did not thereby forfeit the wonderful harmony and spirit which Walpole had already professed to recognize in them. But he now coldly advised the boy to stick to the attorney’s office; and ” when he should have made a fortune,” he might betake himself to more favourite

studies, Chatterton had to write three times before he recovered his MSS. Walpoie has been loaded with more than his just share of responsibility for the fate of the unhappy poet, of whom he admitted

when too late, ” I do not believe there ever existed so masterly a genius.”

Chatterton now turned his attention to periodical literature and politics, and exchanged Felix Farley’s Bristol Journal for the Town and County Magazine and other London periodicals. Assuming the vein of Junius — then in the full blaze of his triumph — he turned, his pen against the duke of Grafton, the earl of Bute, and the princess of Wales. He had just despatched one of his political diatribes to the Middlesex Journal, when he sat down on Easter Eve, 17th April 1770, and penned his ” Last Will and Testament,” a strange satirical compound of jest and earnest, in which he intimated his intention of putting an end to his life the following evening. Among his satirical bequests, such as his ” humility ” to the Rev. Mr Camplin, his ” religion ” to Dean Barton, and his “modesty” along with his “prosody and grammar ” to Mr Burgum, he leaves “to Bristol all his spirit and disinterestedness, parcels of goods unknown on its quay since the days of Canynge and Rowley.” In more genuine earnestness he recalls the name of Michael Clayfield, a friend to whom he owed intelligent sympathy. The will was probably purposely prepared in order to frighten his master into letting him go. If so, it had the desired effect. Lambert cancelled his indentures; his friends and acquaintance made him up a purse; and on the 25th or 26th of the month he arrived in London.

Chatterton was already known to the readers of the Middlesex Journal as a rival of Junius, under the nom de plume of Decimus. He had also been a contributor to Hamilton’s Town and County Magazine, and speedily found access to the Freeholder’s Magazine, another political miscellany strong for Wilkes and liberty. His contributions were freely accepted; but the editors paid little or nothing for them. He wrote in the most hopeful terms to his mother and sister, and spent his first earnings in buying gifts for them. His pride and ambition were amply gratified by the promises and interested flattery of editors and political adven- turers; Wilkes himself had noted Jiis trenchant style, ” and expressed a desire to know the author*”; and Lord Mayor Beckford graciously acknowledged a political address of his, and greeted him ” as politely as a citizen could.” But of actual money he received but little. He was extremely abstemious, his diligence was great, and his versatility wonderful. He could assume the style of Junius or Smollett, reproduce the satiric bitterness of Churchill, parody Macpherson’s Ossian, or write in the manner of Pope, or with the polished grace of Gray and Collins. He wrote political letters, eclogues, lyrics, operas and satires, both in prose and verse. In June 1 7 70 — after Chatterton had been some nine weeks in London — he

removed from Shore- ditch, where he had hitherto lodged with a relative, to an attic in Brook Street, Holborn. But for most of his productions the payment was delayed; and now state prosecutions of the press rendered letters in the Junius vein no longer admissible, and threw him back on the, lighter resources of his pen. In Shoreditch, as in his lodging at the Bristol attorney's, he had only shared a room; but now, for the first time, he enjoyed uninterrupted solitude. His bed-fellow at Mr Walmsley's, Shoreditch, noted that much of the night was spent by him in writing; and now he could write all night. The romance of his earlier years revived, and he transcribed from an imaginary parchment of the old priest Rowley his " Excelente Balade of Charitie." This fine poem, perversely disguised in archaic language, he sent to the editor of the Town and County Magazine, and had it rejected. The high hopes of the sanguine boy had begun to fade. He had not yet completed his second month in London, and already failure and starvation stared him in the face. Mr Cross, a neigh-bouring apothecary, repeatedly invited him to join him at dinner or supper; but he refused. His landlady also, suspecting his necessity, pressed him to share her dinner, but in vain. " She knew," as she afterwards said, " that he had not eaten anything for two or three days." But he was offended at her urgency, and assured her that he was not hungry. The note of his actual

receipts, found in his pocket-book after his death, shows that Hamilton, Fell and other editors who had been so liberal in flattery, had paid him at the rate of a shilling for an article, and somewhat less than eightpence each for his songs; while much which had been accepted was held in reserve, and still unpaid for. The beginning of a new month revealed to him the indefinite postponement of the publication and payment of his work. He had wished, according to his foster-mother, to study medicine with Barrett; in his desperation he now reverted to this, and wrote to Barrett for a letter to help him to an opening as a surgeon's assistant on board an African trader. He appealed also to Mr Catcott to forward his plan, but in vain. On the 24th of August 1770, he retired for the last time to his attic in Brook Street, carrying with him the arsenic which he there drank, after tearing into fragments whatever literary remains were at hand.

He was only seventeen years and nine months old; but the best of his numerous productions, both in prose and verse, require no allowance to be made for the immature years of their author, when comparing him with the ablest of his contem- poraries. He pictures Lydgate, the monk of Bury St Edmunds, challenging Rowley to a trial at versemaking, and under cover of this fiction, produces his " Songe of .5511a," a piece of rare lyrical beauty, worthy of comparison with any

antique or modern production of its class. Again, in his ” Tragedy of Goddwyn,” of which only a fragment has been preserved, the ” Ode to Liberty,” with which it abruptly closes, may claim a place among the finest martial lyrics in the language. The collection of poems in which such specimens occur furnishes by far the most remark- able example of intellectual precocity in the whole history of letters. Collins, Burns, Keats, Shelley and Byron all awaken sorrow over the premature arrestment of their genius; but the youngest of them survived to his twenty-fifth year, while Chatterton was not eighteen when he perished in his miserable garret. The death of Chatterton attracted little notice at the time; for the few who then entertained any appreciative estimate of the Rowley poems regarded him as their mere transcriber. He was interred in a burying-ground attached to Shoe Lane Workhouse, in the parish of St Andrew’s, Holborn, which has since been converted into a site for Farringdon Market. There is a discredited story that the body of the poet was re- covered, and secretly buried by his uncle, Richard Phillips, in Redcliffe Churchyard. There a monument has since been erected to his memory, with the appropriate inscription, borrowed from his ” Will,” and so supplied by the poet’s own pen — ” To the memory of Thomas Chatterton. Reader! judge not. If thou art a Christian, believe that he shall be judged by a Superior Power. To that Power only is he now answerable.”

Bibliography. — Poems supposed to have been written at Bristol by Thomas Rowley and others, in the Fifteenth Century (1 777) was edited by Thomas Tyrwhitt; Thomas Warton, in his History of English Poetry (1778), vol. ii. section viii., gives Rowley a place among the 15th century poets; but neither of these critics believed in the antiquity of the poems. In 1782 a new edition of Rowley’s poems appeared, with a ” Commentary, in which the antiquity of them is considered and defended,” by Jeremiah Milles, dean of Exeter. The controversy which raged round the Rowley poems is discussed in A. Kippis, Biographia Britannica (vol. iv., 1789), where there is a detailed account by G. Gregory of Chatterton’s life (pp. 573-619). This was reprinted in the edition (1803) of Chatterton’s Works by R. Southey and J. Cottle, published for the benefit of the poet s sister. The neglected condition of the study of earlier English in the 1 8th century alone accounts for the temporary success of Chatterton’s mystification. It has long been agreed that Chatterton was solely responsible for the Rowley Poems, but the language and style are analysed in confirmation of this view by Prof. W. W. Skeat in an introductory essay prefaced to vol. ii. of The Poetical Works of Thomas Chatterton (1871) in the ” Aldine Edition of the British Poets.” This, which is the most convenient edition, also contains a

memoir of the poet by Edward Bell. The spelling of the Rowley poems is there modernized, and many of the archaic words are replaced by modern equivalents provided in many cases from Chatterton's own notes, the theory being that Chatterton usually composed in modern English, and inserted his peculiar words and his complicated orthography afterwards. For some criticism of Prof. Skeat's success in the very difficult task of reconstituting the text, see H. B. Forman, Thomas Chatterton and his latest Editor (1874).

The Chatterton MSS., originally in the possession of William Barrett of Bristol, were left. by his heir to the British Museum in 1800. Others are preserved in the Bristol library.

Chatterton's genius and his tragic death are commemorated by Shelley in Adonais, by Wordsworth in " Resolution and Independ- ence," by Coleridge in " A Monody on the Death of Chatterton," by D. G. Rossetti in " Five English Poets," and John Keats inscribed Endymion " to the memory of Thomas Chatterton." Alfred de Vigny's drama of Chatterton gives an altogether fictitious account of the poet. Herbert Croft (q.v .), in his Love and Madness, interpolated a long and valuable account of Chatterton, giving many of the poet's letters, and much information obtained from his family and friends (pp. 125-244, letter li.). There is a valuable collection of " Chattertoniana " in the British Museum, consisting of separate works by Chatterton, newspaper cuttings, articles, dealing with the Rowley controversy and other subjects, with MS. notes by Joseph Haslewood, and several autograph letters.

Among biographies of Chatterton may be mentioned Chatterton: A Biographical Study (1869), by Daniel Wilson; Chatterton: A Biography (1899; first printed 1856 in a volume of essays), by D. Masson; " Thomas Chatterton " (1900), by Helene Richter, in Wiener Beitrage zur engl. Philologie; Chatterton, by C. E. Russell

(1909).

CHATTI, an ancient German tribe inhabiting the upper reaches of the rivers Weser, Eder, Fulda and Werra, a district approximately corresponding to Hesse-Cassel, though probably somewhat more extensive. They frequently came into conflict with the Romans during the early years of the 1st century. Eventually they formed a portion of

the Franks and were incorporated in the kingdom of Clovis probably with the Ripuarii, at the beginning of the 6th century. • .

Tacitus, Annals, i. 2, 11, 12, 13; Germania, 30-31; Strabo p. 291 f.

CHAUCER, GEOFFREY (? 1340-1400), English poet. The name Chaucer, a French form of the Latin calcearius, a shoe- maker, is found in London and the eastern counties as early as the second half of the 13th century. Some of the London Chaucers lived in Cordwainer Street, in the shoemakers' quarter; several of them, however, were vintners, and among others the poet's father John, and probably also his grandfather Robert. Legal pleadings inform us that in December 1324 John Chaucer was not much over twelve years old, and that he was still un- married in 1328, the year which used to be considered that of Geoffrey's birth. The poet was probably born from eight to twelve years later, since in 1386, when giving evidence in Sir Richard le Scrope's suit against Sir Robert Grosvenor as to the right to bear certain arms, he was set down as " del age de xl ans et plus, armeez par xxvij ans." At a later date, and probably at the time of the poet's birth, his father lived in Thames Street, and had to wife a certain Agnes, niece of Hamo de Compton, whom we may regard as Geoffrey Chaucer's mother. In 1357 Geoffrey is found, apparently as a lad, in the service of Elizabeth, countess of Ulster, wife of Lionel, duke of Clarence, entries in two leaves of her household accounts, accidentally preserved, showing that she paid in April, May and December various small sums for his clothing and expenses. In 1359, as we learn from his deposition in the Scrope suit, Chaucer went to the war in France. At some period of the campaign he was at " Retters," i.e. Rethel, near Reims, and subsequently had the ill luck to be taken prisoner. On the 1st of March 1360 the king contributed £16 to his ransom, and by a year or two later Chaucer must have entered the royal service, since on the 20th of June 1367 Edward granted him a pension of twenty marks for his past and future services. A pension of ten marks had been granted by the king the previous September to a Philippa Chaucer for services to the queen as one of her " domi- cellae '.' or " damoiselles," and it seems probable that at this date Chaucer was already married and this Philippa his wife, a con- clusion which used to be resisted on the ground of allusions in his early poems to a hopeless love-affair, now reckoned part of his poetical outfit. Philippa is usually said to have been one of two daughters of a Sir Payne Roet, the other being Katherine, who after the death of her first husband, Sir Hugh de Swynford, in 1372, became governess to John of Gaunt's children, and subsequently his mistress and (in 1396) his wife. It is possible that Philippa was sister to Sir Hugh and sister-in-law to

Lite.

Katherine. In either case the marriage helps to account for the favour subsequently shown to Chaucer by John of Gaunt.

In the grant of his pension Chaucer is called " dilectus vallectus noster," our beloved yeoman; before the end of 1368 he had risen to be one of the king's esquires. In September of the following year John of Gaunt's wife, the duchess Blanche, died at the age of twenty-nine, and Chaucer wrote in her honour The Book of the Duchesse, a poem of 1334 lines in octosyllabic couplets, the first of his undoubtedly genuine works which can be connected with a definite date. In June 1370 he went abroad on the king's service, though on what errand, or whither it took him, is not known. He was back probably some time before Michaelmas, and seems to have remained in England till the 1st of December 1372, when he started, with an advance of 100 marks in his pocket, for Italy, as one of the three commissioners to treat with the Genoese as to an English port where they might have special facilities for trade. The accounts which he delivered on his return on the 23rd of May 1373 show that he had also visited Florence on the king's business, and he probably went also to Padua and there made the acquaintance of Petrarch.

In the second quarter of 1374 Chaucer lived in a whirl of prosperity. On the 23rd of April the king granted him a pitcher of wine daily, subsequently commuted for an annuity of 20 marks. From John of Gaunt, who in August 1372 had granted Philippa Chaucer £10 a year, he himself now received (June 13) a like annuity in reward for his own and his wife's services. On the 8th of June he was appointed Comptroller of the Custom and Subsidy of Wools, Hides and Woodfells and also of the Petty Customs of Wine in the Port of London. A month before this appointment, and probably in anticipation of it, he took (May 10, 1374) a lease for life from the city of London of the dwelling-house above the gate of Aldgate, and here he lived for the next twelve years. His own and his wife's income now amounted to over £60, the equivalent of upwards of £1000 in modern money. In the next two years large windfalls came to him in the form of two wardships of Kentish heirs, one of whom paid him £104, and a grant of £71: 4: 6; the value of some confiscated wool. In December 1376 he was sent abroad on the king's service in the retinue of Sir John Burley; in February 1377 he was sent to Paris and Montreuil in connexion probably with the peace negotiations between England and France, and at the end of April (after a reward of £20 for his good services) he was again despatched to France.

On the accession of Richard II. Chaucer was confirmed in his offices and pensions. In January 1378 he seems to have been in France in connexion with a proposed marriage between Richard and the daughter of the French king; and on the 28th of May of the same year he was sent with Sir Edward de Berkeley to the lord of Milan and Sir John Hawkwood to treat for help in the king's wars, returning on the 19th of September. This was his last diplomatic journey, and the close of a period of his life generally considered to have been so unprolific of poetry that little beyond the Clerk's " Tale of Grisilde," one or two other of the stories afterwards included in the Canterbury Tales, and a few short poems, are attributed to it, though the poet's actual absences from England during the eight years amount to little more than eighteen months. During the next twelve or fifteen years there is no question that Chaucer was constantly engaged in literary work, though for the first half of them he had no lack of official employment. Abundant favour was shown him by the new king. He was paid £22 as a reward for his later missions in Edward III.'s reign, and was allowed an annual gratuity of 10 marks in addition to his pay of £10 as comptroller of the customs of wool. In April 1382 a new comptrollership, that of the petty customs in the Port of London, was given him, and shortly after he was allowed to exercise it by deputy, a similar licence being given him in February 1385, at the instance of the earl of Oxford, as regards the comptrollership of wool. In October 1385 Chaucer was made a justice of the peace for Kent. In February 1386 we catch a glimpse of his wife Philippa being admitted to the fraternity of Lincoln cathedral in the company of Henry, earl of

Derby (afterwards Henry IV.), Sir Thomas de Swynford and other distinguished persons. In August 1386 he was elected one of the two knights of the shire for Kent, and with this dignity, though it was one not much appreciated in those days, his good fortune reached its climax. In December of the same year he was superseded in both his comptrollerships, almost certainly as a result of the absence of his patron, John of Gaunt, in Spain, and the supremacy of the duke of Gloucester. In the following year the cessation of Philippa's pension suggests that she died between Midsummer and Michaelmas. In May 1388 Chaucer surrendered to the king his two pensions of 20 marks each, and they were re-granted at his request to one John Scalby. The transaction was unusual and probably points to a pressing need for ready money, nor for the next fourteen months do we know of any source of income possessed by Chaucer beyond his annuity of £10

from John of Gaunt.

In July 1389, after John of Gaunt had returned to England, and the king had taken the government into his own hands, Chaucer was appointed clerk of the works at various royal palaces at a salary of two shillings a day, or over £31 a year, worth upwards of £500 present value. To this post was sub- sequently added the charge of some repairs at St George's Chapel, Windsor. He was also made a commissioner to maintain the banks of the Thames between Woolwich and Greenwich, and was given by the earl of March (grandson of Lionel, duke of Clarence, his old patron) a sub-forestership at North Petherton, Devon, obviously a sinecure. While on the king's business, in September 1390, Chaucer was twice robbed by highwaymen, losing £20 of the king's money. In June 1391 he was superseded in his office of clerk of the works, and seems to have suffered another spell of misfortune, of which the first alleviation came in January 1393 when the king made him a present of £10. In February 1394 he was granted a new pension of £20. It is possible, also, that about this time, or a little later, he was in the service of the earl of Derby. In 1397 he received from King Richard a grant of a butt of wine yearly. For this he appears to have asked in terms that suggest poverty, and in May 1398 he obtained letters of pro- tection against his creditors, a step perhaps rendered necessary by an action for debt taken against him earlier in the year. On the accession of Henry IV. a new pension of 40 marks was conferred on Chaucer (13th of October 1399) and Richard II. 's grants were formally confirmed. Henry himself, however, was probably straitened for ready money, and no instalment of the new pension was paid during the few months of his reign that the poet lived. Nevertheless, on the strength of his expectations, on the 24th of December 1399 ne leased a tenement in the garden of St Mary's Chapel, Westminster, and it was probably here that he died, on the 25th of the following October. He was buried in Westminster Abbey, and his tomb became the nucleus of what is now known as Poets' Corner.

The portrait of Chaucer, which the affection of his disciple, Thomas Hoccleve, caused to be painted in a copy of the latter's Regement of Princes (now Harleian MS. 4866 in the British Museum), shows him an old man with white hair; he has a fresh complexion, grey eyes, a straight nose, a grey moustache and a small double-pointed beard. His dress and hood are black, and he carries in his hands a string of beads. We may imagine that it was thus that during the last months of his life he used to walk about the precincts of the Abbey.

Henry IV. 's promise of an additional pension was doubtless elicited

by the Compleynt to his Purs, in the envoy to which w . Chaucer addresses him as the ” conquerour of Brutes

Albioun.” Thus within the last year of his life the poet was still writing. Nevertheless, as early as 1393-1394, in lines to his friend Scogan, he had written as if his day for poetry were past, and it seems probable that his longer poems were all composed before this date. In the preceding fifteen — or, if another view be taken, twenty — years, his literary activity was very great, and with the aid of the lists of his works which he gives in the Legende of Good Women (lines 414-431), and the talk on the road which precedes the ” Man of Law’s Tale ” {Canterbury Tales, B. 46-76), the order in which his main works were written

can be traced with approximate certainty, 1 while a few both of these and of the minor poems can be connected with definite dates.

The development of his genius has been attractively summed up as comprised in three stages, French, Italian and English, and there is a rough approximation to the truth in this formula, since his earliest poems are translated from the French or based on French models, and the two great works of his middle period are borrowed from the Italian, while his latest stories have no such obvious and direct originals and in their humour and free- dom anticipate the typically English temper of Henry Fielding. But Chaucer’s indebtedness to French poetry was no passing phase. For various reasons — a not very remote French origin of his own family may be one of them — he was in no way inter- ested in older English literature or in the work of his English contemporaries, save possibly that of ” the moral Gower.” On the other hand he knew the Roman de la rose as modern English poets know Shakespeare, and the full extent of his debt to his French contemporaries, not merely in 1369, but in 1385 and in 1393 (the dates are approximate), is only gradually being dis- covered. To be in touch throughout his life with the best French poets of the day was much for Chaucer. Even with their stimulus alone he might have developed no small part of his genius. But it was his great good fortune to add to this continuing French influence, lessons in plot and construction derived from Boc- caccio’s Filostrato and Teseide, as well as some glimpses of the higher art of the Divina Commedia. He shows acquaintance also with one of Petrarch’s sonnets, and though, when all is said, the Italian books with which he can be proved to have been intimate are but few, they sufficed. His study of them was but an episode in his literary life, but it was an episode of unique im- portance. Before it began he had already been making his own artistic experiments, and it is noteworthy that while he learnt so much from

Boccaccio he improved on his originals as he translated them. Doubtless his busy life in the service of the crown had taught him self-confidence, and he uses his Italian models in his own way and with the most triumphant and assured success. When he had no more Italian poems to adapt he had learnt his lesson. The art of weaving a plot out of his own imagination was never his, but he could take what might be little more than an anecdote and lend it body and life and colour with a skill which has never been surpassed.

The most direct example of Chaucer's French studies is his translation of Le Roman de la rose, a poem written in some 4000 lines by Guillaume Lorris about 1237 and extended to over 22,000 by Jean Clopinel, better known as Jean de Meun, forty years later. We know from Chaucer himself that he translated this poem, and the extant English fragment of 7698 lines was generally assigned to him from 1532, when it was first printed, till its authorship was challenged in the early years of the Chaucer Society. The ground of this challenge was its wide divergence from Chaucer's practice in his undoubtedly genuine works as to certain niceties of rhyme, notable as to not rhyming words ending in -y with others ending -ye. It was subsequently discovered, however, that the whole fragment was divisible linguistically into three portions, of which the first and second end respectively at lines 1705 and 5810, and that in the first of these three sections the variations from Chaucer's accepted practice are insignificant. Lines 1-1705 have therefore been provisionally accepted as Chaucer's, and the other two fragments as the work of unknown translators (James I. of Scotland has been suggested as one of them), which somehow came to be pieced together. If, however, the difficulties in the way of this theory are less than those which confront any other, they are still considerable, and the question can hardly be treated as closed.

While our knowledge of Chaucer's Romaunt of the Rose is in this unsatisfactory state, another translation of his from the French, the Book of the Lyon (alluded to in the " Retrac- tion " found, in some manuscripts, at the end of the Canterbury Tales), which must certainly have been taken from Guillaume

1 The positions of the House of Fame and Palamon and Arcyte are still matters of controversy.

Machault's Le Dit du lion, has perished altogether. The strength of French influence on Chaucer's early work may, however, be amply illustrated from the first of his poems with which we are on sure ground, the Book of the Duchesse, or, as it is alternatively called, the Deth of Blaunche. Here not only are individual passages closely imitated from Machault and Froissart, but the dream, the May morning, and the whole machinery of the poem are taken over from contemporary French conventions. But even at this stage Chaucer could prove his right to borrow by the skill with which he makes his materials serve his own purpose, and some of the lines in the Deth of Blaunche are among the most tender and charming he ever wrote.

Chaucer's A. B.C., a poem in honour of the Blessed Virgin, of which the stanzas begin with the successive letters of the alpha- bet, is another early example of French influence. It is taken from the Pelerinage de la vie humaine, written by Guillaume de Deguilleville about 1330. The occurrence of some magnificent lines in Chaucer's version, combined with evidence that he did not yet possess the skill to translate at all literally as soon as rhymes had to be considered, accounts for this poem having been dated sometimes earlier than the Book of the Duchesse, and sometimes several years later. With it is usually moved up and down, though it should surely be placed in the 'seventies, the Compleyntto Pity, a fine poem which yet, from its slight obscurity and absence of Chaucer's usual ease, may very well some day prove to be a translation from the French.

While Chaucer thus sought to reproduce both the matter and the style of French poetry in England, he found other materials in popular Latin books. Among his lost works are renderings of " Origenes upon the Maudeleyne," and of Pope Innocent III. on " The Wreced Engendring of Mankinde " {De miseria conditionis humanae). He must have begun his attempts at straightforward narrative with the Lyf of Seynt Cecyle (the weakest of all his works, the second Nun's Tale in the Canterbury series) from the Legenda Aurea of Jacobus de Voragine, and the story of the patience of Grisilde, taken from Petrarch's Latin version of a tale by Boccaccio. In both of these he condenses a little, but ventures on very few changes, though he lets his readers see his impatience with his originals. In his story of Constance (afterwards ascribed to the Man of Law), taken from the Anglo-Norman chronicle of Nicholas Trivet, written about 1334, we find him struggling to put some substance into another weak tale, but still without the courage to remedy its radical faults, though here, as with Grisilde, he does as much for his heroine as the conventional exaltation of one virtue at a time permitted. It is possible that other tales which now stand in the Canterbury series were written originally at this period. What is

certain is that at some time in the ‘seventies three or four Italian poems passed into Chaucer’s possession, and that he set to work busily to make use of them. One of the most interesting of the poems reclaimed for him by Professor Skeat is a fragment- ary ” Compleynt,” part of which is written in terza rima. While he thus experimented with the metre of the Divina Commedia, he made his first attempt to use the material provided by Boccaccio’s Teseide in another fragment of great interest, that of Queue Anelida and Fals Arcyte. More than a third of this is taken up with another, and quite successful, metrical experiment in Anelida’s ” compleynt,” but in the introduction of Anelida herself Chaucer made the first of his three unsuccessful efforts to construct a plot for an important poem out of his own head, and the fragment which begins so well breaks off abruptly at line 357.

For a time the Teseide seems to have been laid aside, and it was perhaps at this moment, in despondency at his failure, that Chaucer wrote his most important prose work, the translation of the De Consolatione Philosophiae of Boethius. Reminiscences of this helped to enrich many of his subsequent poems, and inspired five of his shorter pieces {The Former Age, Fortune, Truth, Gentilesse and Lak of Stedfastnesse) , but the translation itself was only a partial success. To borrow his own phrase, his ” Englysh was insufficient ” to reproduce such difficult Latin. The translation is often barely intelligible without the original,

and it is only here and there that it flows with any ease or rhythm.

If Chaucer felt this himself he must have been speedily con- sold by achieving in Troilus and Criseyde his greatest artistic triumph. Warned by his failure in Anelida and Arcyte, he was content this time to take his plot unaltered from the Filostrato, and to follow Boccaccio step by step through the poem. But he did not follow him as a mere translator. He had done his duty manfully for the saints ” of other holinesse ” in Cecyle* Grisilde and Constance, whom he was forbidden by the rules of the game to clothe with complete flesh and blood. In this great love-story there were no such restrictions, and the characters which Boccaccio’s treatment left thin and conventional became in Chaucer’s hands convincingly human. No other English poem is so instinct with the glory and tragedy of youth, and in the details of the story Chaucer’s gifts of vivid colouring, of humour and pity, are all at their highest.

An unfortunate theory that the reference in the Legends of Good Women to ” al the love of Palamon and Arcyte ” is to a hypothetical poem in seven-line stanzas en this theme, which Chaucer is imagined,

when he came to plan the Canterbury Tales, to have suppressed in favour of a new version in heroic couplets, has obscured the close connexion in temper and power between what we know as the " Knight's Tale " and the Troilus. The poem may have been more or less extensively revised before, with admirable fitness, it was assigned to the Knight, but that its main composition can be separated by several years from that of Troilus is aesthetically incredible. Chaucer's art here again is at its highest. He takes the plot of Boccaccio's Teseide, but only as much of it as he wants, and what he takes he heightens and humanizes with the same skill which he had shown in trans-: forming the Filostrato. Of the individual characters Theseus himself, the arbiter of the plot, is most notably developed; Emilie and her two lovers receive just as much individuality as- they will bear without disturbing the atmosphere of romance. The whole story is pulled together and made more rapid and effective. A comparison of almost any scene as told by the two poets suffices to show Chaucer's immense superiority. At some subsequent period the " Squire's Tale " of Cambuscan, the fair Canacee and the Horse of Brass, was gallantly begun in some- thing of the same key, but Chaucer took for it more materials than he could use, and for lack of the help of a leader like Boc- caccio he was obliged to leave the story, in Milton's phrase, " half-told," though the fragment written certainly takes us very much less than half-way.

Meanwhile, in connexion (as is reasonably believed) with the betrothal or marriage of Anne of Bohemia to Richard II. (i.e. about 1381-1382), Chaucer had brought to a successful com- pletion the Parlement of Foules, a charming sketch of 699 lines, in which the other birds, on Saint Valentine's day, counsel the " Formel Egle " on her choice of a mate. His success here, as in the case of the Deth of Blaunche the Duchesse, was due to the absence of any need for a climax; and though the materials which he borrowed were mainly Latin (with some help from passages of the Teseide not fully needed for Palamon and Arcyte) his method of handling them would have been quite approved by his friends among the French poets. A more ambitious venture, the Hous of Fame, in which Chaucer imagines himself borne aloft by an eagle to Fame's temple, describes what he sees and hears there, and then breaks off in apparent inability to get home, shows a curious mixture of the poetic ideals of the Roman de la rose and reminiscences of the Divina Commedia.

As the Hous of Fame is most often remembered and quoted for the personal touches and humour of Chaucer's conversation with the eagle, so the most-quoted passages in the Prologue to the Legende of Good Women are those in which Chaucer professes his affection for

the daisy, and the attack on his loyalty by Cupid and its defence by Alceste. Recent discoveries have shown, however, that (besides obligations to Machault) some of the touches about the daisy and the controversy between the partisans of the Flower and of the Leaf are snatches from poems by his friends Froissart and Deschamps, which Chaucer takes up

and returns to them with pretty compliments, and that he was indebted to Froissart for some of the framework of his poem. 1 Both of the two versions of the Prologue to the Legende are charming, and some of the tales, notably that of Cleopatra, rank with Chaucer's best work. When, however, he had written eight and part of the ninth he tired of his scheme, which was planned to celebrate nineteen of Cupids faithful " saints," with Alcestis as their queen. With his usual hopefulness he had overlooked the risk of monotony, which obviously weighed heavily on him ere he broke off, and the loss of the other ten stories is less to be regretted than that of the celebration of Alceste, and a possible epilogue which might have exceeded in charm the Prologue itself.

Chaucer's failure to complete the scheme of the Legende of Good Women may have been partly due to the attractions of the Canterbury Tales, which were probably taken up in Canter- immediate succession to it. His guardianship of two Tales. Kentish wards, his justiceship of the peace, his repre- senting the county in the parliament of 1386, his commissionership of the river-bank between Greenwich and Woolwich, all make it easy to understand his dramatic use of the merry crowds he saw on the Canterbury road, without supposing him to have had recourse to Boccaccio's Decamerone, a book which there is no proof of his having seen. The pilgrims whom he imagines to have assembled at the Tabard Inn in Southwark, where Harry Bailey was host, are said to have numbered " wel nyne and twenty in a company," and the Prologue gives full- length sketches of a Knight, a Squire (his son), and their Yeoman; of a Prioress, Monk, Friar, Oxford Clerk, and Parson, with two disreputable hangers-on of the church, a Summoner and Pardoner; of a Serjeant-at-Law and a Doctor of Physic, and of a Franklin, or country gentleman, Merchant, Shipman, Miller, Cook, Manciple, Reeve, Ploughman (the Parson's brother) and the ever-famous Wife of Bath. Five London burgesses are described in a group, and a Nun and Priest 2 are mentioned as in attendance on the Prioress. Each of these, with Chaucer himself making the twenty-

ninth, was pledged to tell two tales, but including one second attempt and a tale told by the Yeoman of a Canon, who overtakes the pilgrims on the road, we have only twenty finished stories, two unfinished and two interrupted ones. As in the case of the Legende of Good Women, our loss is not so much that of the additional stories as of the completed framework. The wonderful character sketches of the Prologue are carried yet farther by the Talks on the Road which link the different tales, and two of these Talks, in which the Wife of Bath and the Pardoner respectively edify the company, have the importance of separate Tales, but between the Tales that have come down to us there are seven links missing, 3 and it was left to a later and weaker hand to narrate, in the " Tale of Beryn," the adventures of the pilgrims at Canterbury.

The reference to the Lyf of Seynt Cecyle in the Prologue to the Legende of Good Women gives external proof that Chaucer included earlier work in the scheme of the Canterbury Tales, and mention has been made of other stories which are indisput- ably early. In the absence of any such metrical tests as have

1 The French influences on this Prologue, its connexion with the Flower and the Leaf controversy, and the priority of what had pre- viously been reckoned as the second or " B " form of the Prologue over the " A," were demonstrated in papers by Prof. Kittredge on " Chaucer and some of his Friends " in Modern Philology, vol. i. (Chicago, 1903), and by Mr J. L. Lowes on " The Prologue to the Legend of Good Women " in Publications of the Modern Language Association of America, vol. xix., December 1904.

2 The Talks on the Road show clearly that only one Priest in attendance on the Prioress, and two tales to each narrator, were originally contemplated, but the " Prestes thre " in line 164 of the Prologue, and the bald couplet (line 793 sq.) explaining that each pilgrim was to tell two tales each way, were probably both alterations made by Chaucer in moments of amazing hopefulness. The journey was reckoned a 3! days' ride, and eight or nine tales a day would surely have been a sufficient allowance.

3 The absence of these links necessitates the division cf the Canterbury Tales into nine groups, to which, for purposes of quota- tion, the letters A to I have been assigned, the line numeration of the Tales in each group being continuous.

proved useful in the case of Shakespeare, the dates at which several of the Tales were composed remain doubtful, while in the case of at least

two, the Clerk's tale of Grisilde and the Monk's tragedies, there is evidence of early work being revised and supplemented. It is fortunately impossible to separate the prologue to the charmingly told story of " yonge Hugh of Lincoln " from the tale itself, and with the "quod sche" in the second line as proof that Chaucer was here writing specially for his Prioress we are forbidden to limit the new stories to any one metre or tone. There can be no doubt, however, that what may be called the Tales of the Churls (Miller, Reeve, Summoner, Friar, &c), and the conversational outpourings of the Pardoner and Wife of Bath, form, with the immortal Prologue, the most important and distinctive additions to the older work. In these, and in the Pardoner's story of Death and the Three Revellers, and the Nun's Priest's masterly handling of the fable of the Cock and Fox, both of them free from the grossness which marks the others, Chaucer takes stories which could have been told in a short page of prose and elaborates them with all the skill in narration which he had sedulously cultivated. The conjugal reminiscences of the Wife of Bath and the Reeve's Tale with its abominable climax (lightened a little by Aleyn's farewell, lines 316-319) are among the great things in Chaucer, as surely as Troilus, and Palamon and Arcyte and the Prologue. They help notably to give him the width of range which may certainly be claimed for him.

In or soon after 1391 Chaucer wrote in prose for an eleven- year-old reader, whom he addresses as ” Litel Lowis my son,” a treatise on the use of the Astrolabe, its short prologue being the prettiest specimen of his prose. The wearisome tale of ” Melibee and his wyf Prudence,” which was perhaps as much admired in English as it had been in Latin and French, may have been translated at any time. The sermon on Penitence, used as the Parson’s Tale, was probably the work of his old age. ” En- voys ” to his friends Scogan and Bukton, a translation of some balades by Sir Otes de Granson, and the Compleynt to his Purs complete the record of his minor poetry. We have his own statement that in his youth he had written many Balades, Roundels and Virelayes in honour of Love, and the two songs embedded respectively in the Parlement of Foules and the Pro- logue to the Legende of Good Women are charming and musical. His extant shorter poems, however, whether early or late, offer no excuse for claiming high rank for him as a lyrist. He had very little sheer singing power, and though there are fine lines in his short poems, witness the famous ” Flee fro the prees and dwell with soothfastnesse,” they lack the sustained concen- tration of great work. From the drama, again, Chaucer was cut off, and it is idle to argue from the innumerable dramatic touches in his poems and his gift of characterization as to what he might have done had he lived two centuries later. His own age delighted in stories, and he gave it the stories it demanded invested with a humanity, a grace and strength which place him among the world’s greatest narrative poets, and which bring the England of his own day, with all the colour and warmth of life, wonderfully near to all his readers.

The part played by Chaucer in the development of the English language has often been overrated. He neither corrupted it, as used to be said, by introducing French words which it would otherwise have avoided, nor bore any such /nfluenc * part in fixing it as was afterwards played by the translators of the Bible. When he was growing up educated society in England was still bilingual, and the changes in vocabulary and pronunciation which took place during his life were the natural results of a society, which had been bilingual with a bias towards French, giving an exclusive preference to English. The practical identity of Chaucer’s language with that of Gower shows that both merely used the best English of their day with the care and slightly conservative tendency which befitted poets. Chaucer’s service to the English language lies in his decisive success having made it impossible for any later English poet to attain fame, as Gower had done, by writing alternatively in Latin and French. The claim which should be made for him is

that, at least as regards poetry, he proved that English was ” sufficient.”

Chaucer borrowed both his stanza forms and his ” deca- syllabic ” couplets (mostly with an extra syllable at the end of the line) from G.uillaume Machault, and his music, like that of his French master and his successors, depends very largely on assigning to every syllable its full value, and more especially on the due pronunciation of the final -e. The slower movement of change in Scotland allowed time for Chaucer to exercise a potent influence on Scottish poetry, but in England this final e, to which most of the earlier grammatical forms by Chaucer’s time had been reduced, itself fell rapidly into disuse during the 15th century, and a serious barrier was thus raised to the apprecia tion of the artistic value of his verse. His disciples, Hoccleve and Lydgate, who at first had caught some echoes of his rhythms, gradually yielded to the change in pronunciation, so that there was no living tradition to hand down his secret, while successive copyists reduced his text to a state in which it was only by accident that lines could be scanned correctly. For fully three centuries his reputation was sustained solely by his narrative power, his warmest panegyrists betraying no consciousness that they were praising one of the greatest technical masters of poetry. Even when thus maimed, however, his works found readers and lovers in every generation, and every improvement in his text has set his fame on a surer basis.

Bibliography. — The Canterbury Tales have always been Chaucer’s most popular work, and, including fragments, upwards of sixty 15th-century manuscripts of it still survive. Two thin volumes of his minor poems were among the little quartos which Caxton printed by way of advertisement immediately on his return to England ; the Canterbury Tales and Boethius followed in 1478, Troilus and a second edition of the Tales in 1483, the TIous of Fame in 1484. The Canterbury Tales were subsequently printed in 1492 (Pynson), 1498 (de Worde) and 1526 (Pynson); Troilus in 1517 (de Worde) and 1526 (Pynson); the Hous of Fame in 1526 (Pynson); the Parlement of Foules in 1526 (Pynson) and 1530 (de Worde), and the Mars, ” Venus ” and Envoy to Bukton by Julyan Notary about 1500. Pynson’s three issues in 1526 almost amounted to a collected edition, but the first to which the title The Workes of Geffray Chaucer was given was that edited by William Thynne in 1532 for Thomas Godfray. Of this there was a new edition in 1542 for John Reynes and William Bonham, and an undated reprint

a few years later for Bonham, Kele, Petit and Toye, each of whom put his name on part of the edition. In 1561 a reprint, with numerous additions, edited by John Stowe, was printed by J. Kyngston for J. Wight, and this was re-edited, with fresh additions by Thomas Speght, in 1598 for G. Bishop and again in 1602 for Adam Islip. In 1687 there was an anonymous reprint, and in 1721 John Urry produced the last and worst of the folios. By this time the paraphrasers were already at work, Dryden rewriting the tales of the Knight, the Nun's Priest and the Wife of Bath, and Pope the Merchant's. In 1737 (reprinted in 1740) the Prologue and Knight's Tale were edited (anonymously) by Thomas Morell " from the most authentic manuscripts," and here, though by dint of much violence and with many mistakes, Chaucer's lines were for the first time in print given in a form in which they could be scanned. This promise of better things (Morell still thought it necessary to accompany his text with the paraphrases by Betterton and Dryden) was fulfilled by a fine edition of the Canterbury Tales (1775-1778), in which Thomas Tyrwhitt's scholarly instincts produced a comparatively good text from second-rate manuscripts and accompanied it with valuable illustrative notes. The next edition of any importance was that edited by Thomas Wright for the Percy Society in 1848-1851, based on the erratic but valuable British Museum manuscript Harley 7334, containing readings which must be either Chaucer's second thoughts of the emendations of a brilliantly clever scribe. In 1866 Richard Morris re-edited this text in a more scholarly manner for the Aldine edition of the British Poets, and in the following year produced for the Clarendon Press Series a school edition of the Prologue and Tales of the Knight and Nun's Priest, edited with the fulness and care previously bestowed only on Greek and Latin classics.

In 1868 the foundation of the Chaucer Society, with Dr Furnivall as its director and chief worker, and Henry Bradshaw as a leading spirit, led to the publication of a six-text edition of the Canterbury Tales, and the consequent discovery that a manuscript belonging to the Earl of F.llesmere, though undoubtedly " edited," contained the best available text. The Chaucer Society also printed the best manuscripts of Troilus and Criseyde and of all the minor poems, and thus cleared the way for the " Oxford " Chaucer, edited by Professor Skeat, with a wealth of annotation, for the Clarendon Press in 1894, the text of which was used for the splendid folio printed two years later by William Morris at the Kelmscott Press, with illustrations by Sir Edward Burne-Jones. A supplementary volume

of the Oxford edition, entitled Chaucerian and other Pieces, issued by Professor Skeat in 1897, contains the prose and verse which his early

publishers and editors, from Pynson and Thynne onwards, included among his Works by way of illustration, but which had gradually come to be regarded as forming part of his text. The reasons for their rejection are fully stated by Professor Skeat in the work named and also in The Chaucer Canon (1900). Many of these pieces have now been traced to other authors, and their exclusion has helped to clear not only Chaucer's text but also his biography, which used (as in the " Life " published by William Godwin in two quarto volumes in 1803) to be encumbered with inferences from works now known not to be Chaucer's, notably the Testament of Love written by Thomas Usk. All information about Chaucer's life available in 1900 will be found summarized by Mr R. E. G. Kirk in Life-Records of Chaucer, part iv., published by the Chaucer Society in that year. See also Chaucer; a Bibliographical Manual, by Eleanor P. Hammond (1909). (A. W. Po.)

CHAUDESAIGUES, a village of central France, in the depart- ment of Cantal, at the foot of the mountains of Aubrac, 19 m. S.S.W. of St Flour by road. Pop. (1906) town, 937; commune, 1558. It is celebrated for its hot mineral springs, which vary in temperature from 135° to 177° Fahr., and at their maximum rank as the hottest in France. The water, which contains bicarbonate of soda, is employed not only medicinally (for rheumatism, &c), but also for the washing of fleeces, the incuba- tion of eggs, and various other economic purposes; and it furnishes a ready means of heating the houses of the town during winter. In the immediate neighbourhood is the cold chalybeate spring of Condamine. The warm springs were known to the Romans, and are mentioned by Sidonius Apollinaris.

CHAUFFEUR (from Fr. chauffer, to heat, a term primarily used in French of a man in charge of a forge or furnace, and so of a stoker on a locomotive or in a steamship, but in its anglicized sense more particularly confined to a professional driver of a motor vehicle. (See also Brigandage.)

CHAULIEU, GUILLAUME AMFRYE DE (1639-1720), French poet and wit, was born at Fontenay, Normandy, in 1639. His father, maitre des comptes of Rouen, sent him to study at the College de Navarre. Guillaume early showed the wit that was to distinguish him, and gained the favour of the duke of Vendome, who procured for him the abbey of Aumale and other benefices. Louis Joseph, duke of Vendome, and his brother Philippe, grand prior of the Knights of Malta in France, at that time had a joint establishment at the Temple, where they gathered round them a very gay and reckless circle. Chaulieu became the constant companion and adviser of the two princes. He made an expedi- tion to Poland in the suite of the marquis de Bethune,

hoping to make a career for himself in the court of John Sobieski; he saw one of the Polish king's campaigns in Ukraine, but returned to Paris without securing any advancement. Saint-Simon says that the abbe helped his patron the grand prior to rob the duke of Vendome, and that the king sent orders that the princes should take the management of their affairs from him. This account has been questioned by Sainte-Beuve, who regards Saint-Simon as a prejudiced witness. In his later years Chaulieu spent much time at the little court of the duchesse du Maine at Sceaux. There he became the trusted and devoted friend of Mdlle Delaunay, with whom he carried on an interesting correspond- ence. Among his poems the best known are " Fontenay " and " La Retraite." Chaulieu died on the 27th of June 1720.

His works were edited with those of his friend the marquis de la Fare in 1714, 1750 and 1774. See also C. A. Sainte-Beuve, Causeries du lundi, vol. i. ; and Lettres inedites (1850), with a notice by Raymond, marquis de Berenger.

CHAUMETTE, PIERRE GASPARD (1 763-1 794), French revolutionist, was born at Nevers. Until the Revolution he lived a somewhat wandering life, interesting himself particularly in botany. He was a student of medicine at Paris in 1790, became one of the orators of the club of the Cordeliers, and contributed anonymously to the Revolutions de Paris. As member of the insurrectionary Commune of the 10th of August 1792, he was delegated to visit the prisons, with full power to arrest suspects. He was accused later of having taken part in the massacres of September, but was able to prove that at that time he had been sent by the provisional executive council to Normandy to oversee a requisition of 60,000 men. Returning

from this mission, he pronounced an eloquent discourse in favour of the republic. His simple manners, easy speech, ardent temperament and irreproachable private life gave him great influence in Paris, and he was elected president of the Commune, defending the municipality in that capacity at the bar of the Convention on the 31st of October 1792. Re-elected in the municipal elections of the 2nd of December 1702, he was soon charged with the functions of procurator of the Commune, and contributed with success to the enrolments of volunteers by his appeals to the populace. Chaumette was one of the ringleaders in the attacks of the 31st of May and of the 2nd of June

1793 on the Girondists, toward whom he showed himself relentless. He demanded the formation of a revolutionary army, and preached the extermination of all traitors. He was one of the promoters of the worship of Reason, and on the 10th of November 1793 he presented the goddess to the Convention in the guise of an actress. On the 23rd of the same month he obtained a decree closing all the churches of Paris, and placing the priests under strict surveillance; but on the 25th he retraced his steps and obtained from the Commune the free exercise of worship. He wished to save the Hebertists by a new insurrection and struggled against Robespierre; but a revolutionary decree promulgated by the Commune on his demand was overthrown by the Con- vention. Robespierre had him accused with the Jiebertists ; he was arrested, imprisoned in the Luxembourg, condemned by the Revolutionary tribunal and executed on the 13th of April 1794. Chaumette's career had its brighter side. He was an ardent social reformer; he secured the abolition of corporal punishment in the schools, the suppression of lotteries, of houses of ill-fame and of obscene literature; he instituted reforms in the hospitals, and insisted on the honours of public burial for the poor.

Chaumette left some printed speeches and fragments, and memoirs published in the Amateur d'autographes. His memoirs on the 10th of August were published by F. A Aulard, preceded by a biographical study.

CHAUMONT-EN-BASSIGNY, a town of eastern France, capital of the department of Haute-Marne, a railway junction 163 m. E.S.E. of Paris on the main line of the Eastern railway to Belfort. Pop. (1906) 12,089. Chaumont is picturesquely situated on an eminence between the rivers Marne and Suize in the angle formed by their confluence. To the west a lofty viaduct over the Suize carries the railway. The church of St-Jean-Baptiste dates from the 13th century, the choir and lateral chapels belonging to the 15th and 16th. In the interior the sculptured triforium (15th century), the spiral staircase in the transept and a Holy Sepulchre are of interest. The lycee and the hospital have chapels of the 17th and 16th centuries respectively. The Tour Hautefeuille (a keep of the 1 1 th century) is the principal relic of a chateau of the counts of Champagne; the rest of the site is occupied by the law courts. In the Place de l'Escargot stands a statue of the chemist Philippe Lebon (1767-1804), born in Haute-Mame. Chaumont is the seat of a prefect and of a court of assizes, and has tribunals of first instance and of commerce, a lycee, training colleges, and a branch of the Bank of France. The main industries are glove- making and leather-dressing. The town has trade in grain, iron, mined in the vicinity, and leather. In 1 190 it received a charter from the counts of

Champagne. It was here that in 18 14 Great Britain, Austria, Russia and Prussia concluded the treaty (dated March 1, signed March 9) by which they severally bound them- selves not to conclude a separate peace with Napoleon, and to continue the war until France should have been reduced within the boundaries of 1792.

CHAUNCEY, ISAAC (1772-1840), American naval com- mander, was born at Black Rock, Connecticut, on the 20th of February 1772. He was brought up in the merchant service, and entered the United States navy as a lieutenant in 1 798. His first services were rendered against the Barbary pirates. During these operations, more especially at Tripoli, he greatly distinguished himself, and was voted by Congress a sword of honour, which, however, does not appear to have been given him. The most active period of his life is that of his command on the Lakes during

the War of r8r2. He took the command at Sackett's Harbor on Lake Ontario in October 181 2. There was at that time only one American vessel, the brig " Oneida " (16), and one armed prize, a schooner, on the lake. But Commodore Chauncey brought from 400 to 500 officers and men with him, and local resources for building being abundant, he had by November formed a squadron of ten vessels, with which he attacked the Canadian port, York, taking it in April 1813, capturing one vessel and causing the destruction of another then building. He returned to Sackett's Harbor. In May Sir James .Lucas Yeo (1732-1818) came out from England with some 500 officers and men, to organize a squadron for service on the Lakes. By the end of the month he was ready for service with a squadron of eight ships and brigs, and some small craft. The governor, Sir G. Prevost, gave him no serious support. On the 29th of May, dur- ing Chauncey's absence at Niagara, the Americans were attacked at Sackett's Harbor and would have been defeated if Prevost had not insisted on a retreat at the very moment when the American shipbuilding yard was in danger of being burnt, with a shipof more than eight hundred tons on the stocks. The retreat of the British force gave Chauncey time to complete this vessel, the " General Pike," which was so far superior to anything under Yeo's com- mand that she was said to be equal in effective strength to the whole of the British flotilla. The American commodore was considered by many of his subordinates to have displayed excessive caution. In August he skirmished with Sir James Yeo's small squadron of six vessels, but made little effective use of his own fourteen. Two of his schooners were upset in a squall, with the loss of all hands, and he allowed two to be cut off by Yeo. Commodore Chauncey showed a preference for relying on his long guns, and a disinclination to come to close quarters. He was described as chasing the British squadron all

round the lake, but his encounters did not go beyond artillery duels at long range, and he allowed his enemy to continue in existence long after he might have been destroyed. The winter suspended operations, and both sides made exertions to increase their forces. The Americans had the advantage of commanding greater resources for shipbuilding. Sir James Yeo began by blockading Sackett's Harbor in the early part of 1814, but when the American squadron was ready he was compelled to retire by the disparity of the forces. The American commodore was now able to blockade the British flotilla at Kingston. When the cruising season of the lake was nearly over he in his turn retired to Sackett's Harbor, and did not leave it for the rest of the war. During his later years he served as commissioner of the navy, and was president of the board of naval commissioners from 1833 till his death at Washington on the 27th of February 1840. See Roosevelt's War of 1812 (1882) ; and A. T. Mahan, Sea-Power in its Relations to the War of 18 12 (1905).

CHAUNCY, CHARLES (1592-1672), president of Harvard College, was born at Yardley-Bury, Hertfordshire, England, in November 1592, and was educated at Trinity College, Cambridge, of which he became a fellow. He was in turn vicar at Ware, Hertfordshire (1627-1633), and at Marston St Lawrence, North- amptonshire (1633-1637). Refusing to observe the ecclesiastical regulations of Archbishop Laud, he was brought before the court of high commission in 1629, and again in 1634, when, for opposing the placing of a rail around the communion table, he was sus- pended and imprisoned. His formal recantation in February 1637 caused him lasting self-reproach and humiliation. In 1637 he emigrated to America, and from 1638 until 1641 was an associate pastor at Plymouth, where, however, his advocacy of the baptism of infants by immersion caused dissatisfaction. He was the pastor at Scituate, Massachusetts, from 1641 until 1654, and from 1654 until his death was president of Harvard College, as the successor of the first president Henry Dunster (c. 1612-1659). He died on the 19th of February 1672. By his sermons and his writings he exerted a great influence in colonial Massachusetts, and according to Mather was " a most incomparable scholar." His writings include: The Plain Doctrine of the Justification of a Sinner in the Sight of God (1659) and Antisynodalia Scripta Americana (1662). His son, Isaac

Chauncy (1632-1712), who removed to England, was a volu- minous writer on theological subjects.

There are biographical sketches of President Chauncy in Cotton Mather's Magnalia Christi Americana (London, 1702), and in W. C. Fowler's Memorials of the Chauncys, including President Chauncy (Boston, 1858).

President Chauncy's great-grandson, Charles Chauncy (1705-1787), a prominent American theologian, was born in Boston, Massachusetts, on the 1st of January 1705, and gradu- ated at Harvard in 1 7 2 1 . In 1 7 2 7 he was chosen as the colleague of Thomas Foxcroft (1697-1769) in the pastorate of the First Church of Boston, continuing as pastor of this church until his death. At the time of the " Great Awakening " of 1740-1743 and afterwards, Chauncy was the leader of the so-called " Old Light " party in New England, which strongly condemned the White- fieldian revival as an outbreak of emotional extravagance. His views were ably presented in his sermon Enthusiasm and in his Seasonable Thoughts on the State of Religion in New England (1743), written in answer to Jonathan Edwards's Some Thoughts Concerning the Present Revival of Religion in New England (1742). He also took a leading part in opposition to the projected estab- lishment of an Anglican Episcopate in America, and before and during the American War of Independence he ardently sup- ported the whig or patriot party. Theologically he has been classed as a precursor of the New England Unitarians. He died in Boston on the 10th of February 1787. His publications in- clude : Compleal View of Episcopacy, as Exhibited in the Fathers of the Christian Church, until the close of the Second Century (1 7 7 1) ; Salvation of All Men, Illustrated and Vindicated as a Scripture Doctrine (1782); The Mystery Hid from Ages and Generations made manifest by the Gospel-Revelation (1783); and Five Dis- sertations on the Fall and its Consequences (1785).

See P. L. Ford's privately printed Bibliotheca Chaunciana (Brook- lyn, N. Y., 1884) ; and Williston Walker's Ten "New England Leaders (New York, 1901).

CHAUNY, a town of northern France in the department of Aisne, 19 m. S. by W. of St Quentin by rail. Pop. (1906) 10,127. The town is situated on the Oise (which here becomes navigable) and at the junction of the canal of St Quentin with the lateral canal of the Oise, and carries on an active trade. It contains mirror-polishing works, subsidiary to the mirror-works of St Gobain, chemical works, sugar manufactories, metal foundries and breweries. Chauny was the scene of much fighting in the Hundred Years' War.

CHAUTAUQUA, a village on the west shore of Chautauqua Lake in the

town of Chautauqua, Chautauqua county, New York, U.S.A. Pop. of the town (1900), 3590; (1905) 35°5; (191°) 3515; of the village (1908) about 750. The lake is a beautiful body of water over 1300 ft. above sea-level, 20 m. long, and from a few hundred yards to 3 m. in width. The town of Chau- tauqua is situated near the north end and is within easy reach by steamboat and electric car connexions with the main railways between the east and the west. The town is known almost solely as being the permanent home of the Chautauqua Institution, a system of popular education founded in 1874 by Lewis Miller (1829-1899) of Akron, Ohio, and Bishop John H. Vincent (b. 1832). The village, covering about three hundred acres of land, is carefully laid out to provide for the work of the Institution.

The Chautauqua Institution began as a Sunday-School Normal Institute, and for nearly a quarter of a century the administration was in the hands of Mr Miller, who was responsible for the business management, and Bishop Vincent, who was head of the instruction department. Though founded by Methodists, in its earliest years it became non-sectarian and has furnished a meeting-ground for members of all sects and de- nominations. At the very outset the activities of the assembly were twofold: (1) the conducting of a summer school for Sunday-school teachers, and (2) the presentation of a series of correlated lectures and entertainments. Although the move- ment was and still is primarily religious, it has always been assumed that the best religious education must necessarily take

advantage of the best that the educational world can afford in the literatures, arts and sciences. The scope of the plan rapidly broadened, and in 1879 a regular group of schools with graded courses of study was established. At about the same time, also, the Chautauqua Literary and Scientific Circle, providing a continuous home-reading system, was founded. The season lasts during June, July and August. In 1907 some 325 lectures, concerts, readings and entertainments were presented by a group of over 190 lecturers, readers and musicians, while at the same time 200 courses in the summer schools were offered by a faculty of instructors drawn from the leading colleges and normal schools of the country.

The Chautauqua movement has had an immense influence on education in the United States, an influence which is especially marked in three directions: (1) in the establishment of about 300 local assemblies or ” Chautauquas ” in the United States patterned after the mother Chautauqua; (2) in the promotion of the idea of summer education, which has been followed by the founding of summer schools or sessions at a large number of American universities, and of

various special summer schools, such as the Catholic Summer School of America, with head- quarters at Cliff Haven, Clinton county, New York, and the Jewish Chautauqua Society, with headquarters at Buffalo, N.Y.; and (3) in the establishment of numerous correspondence schools patterned in a general way after the system provided by the Chautauqua Literary and Scientific Circle.

See John Heyl Vincent, The Chautauqua Movement (Boston, 1886), and Frank C. Bray, A Reading Journey through Chautauqua (Chicago, I905)-

CHAUVELIN, BERNARD FRANQOIS, Marquis de (1766- 1832), French diplomatist and administrator. Though master of the king's wardrobe in 1789, he joined in the Revolution. He served in the army of Flanders, and then was sent to London in February 1792, to induce England to remain neutral in the war which was about to break out between France and "the king of Bohemia and Hungary." He was well received at first, but after the 10th of August 1792 he was no longer officially recognized at court, and on the execution of Louis XVI. (21st of January 1793) he was given eight days to leave England. After an unsuccessful embassy in Tuscany, he was imprisoned as a suspect during the Terror, but freed after the 9th Thermidor. Under Napoleon he became a member of the council of state, and from 181 2 to 1814 he governed Catalonia under the title of interidant-general, being charged to win over the Catalonians to King Joseph Bonaparte. He remained in private life during the Restoration and the Hundred Days. In 1816 he was elected deputy, and spoke in favour of liberty of the press and extension of the franchise. Though he was again deputy in 1827 he played no part in public affairs, and resigned in 1829.

See G. Pallain, La Mission de Talleyrand & Londres en 1792 (Paris, 1889).

CHAUVIGNY, a town of western France, in the department of Vienne, 20 m. E. of Poitiers by rail. Pop. (1906) 2326. The town is finely situated overlooking the Vienne and a small torrent, and has two interesting Romanesque churches, both restored in modern times. There are also ruins of a chateau of the bishops of Poitiers, and of other strongholds. Near Chau- vigny is the curious bone-cavern of Jioux, the entrance to which is fortified by large blocks of stone. The town carries on lime- burning and plaster-manufacture, and there are stone quarries in the vicinity. Trade is in wool and feathers.

CHAUVIN, ETIENNE (1640-1725), French Protestant divine, was born at Nimes on the 18th of April 1640. At the revocation of the Edict of

Nantes he retired to Rotterdam, where he was for some years preacher at the Walloon church; in 1695 the elector of Brandenburg appointed him pastor and professor of philo- sophy, and later inspector of the French college at Berlin, where he enjoyed considerable reputation as a representative of Cartesianism and as a student of physics. His principal work is a laborious Lexicon Rationale, sive Thesaurus Philosophicus (Rotterdam, 1692; new and enlarged edition, Leuwarden, 1713).

He also wrote Theses de Cognitione Dei (1662), and started the Nouveau Journal des Savans (1694-1698). See E. and E. Haag, La France Protestante, vol. iv. (1884).

CHAUVINISM, a term for unreasonable and exaggerated patriotism, the French equivalent of ” Jingoism.” The word originally signified idolatry of Napoleon, being taken from a much-wounded veteran, Nicholas Chauvin, who, by his adoration of the emperor, became the type of blind enthusiasm for national military glory.

CHAUX DE FONDS, LA, a large industrial town in the Swiss canton of Neuchatel. It is about 19 m. by rail N. W. of Neuchatel, and stands at a height of about 3255 ft. in a valley (5 m. long) of the same name in the Jura. Pop. (1900) 35,968 (only 13,659 in 1850); (1905) 38,700, mainly French-speaking and Pro- testants; of the 6114 ” Catholics ” the majority are ” Old Catholics.” It is a centre of the watch-making industry, especi- ally of gold watch cases; about 70% of those manufactured in Switzerland are turned out here. In 1900 it exported watches to the value of nearly £3,000,000 sterling. There is a school of industrial art (engraving and enamelling watch cases) and a school of watch-making (including instruction in the manufacture of chronometers and other scientific instruments of precision). It boasts of being le plus gros village de I’ Europe, and certainly has preserved some of the features of a big village. L6opold Robert (1794-183 5), the painter, was born here. (W. A. B. C).

CHAVES, a town of northern Portugal, in the district of Villa Real, formerly included in the province of Traz os Montes; 8 m. S. of the Spanish frontier, on the right bank of the river Tamega. Pop. (1900) 6388. Chaves is the ancient Aquae Flaviae, famous for its hot saline springs, which are still in use. A fine Roman bridge of 18 arches spans the Tamega. In the 16th century Chaves contained 20,000 inhabitants;

it was long one of the principal frontier fortresses, and in fact derives its present name from the position which makes it the ” keys,” or chaves, of the north. One of its churches contains the tomb of Alphonso I. of Portugal (1139-1185). In 1830 the town gave the title of marquess to Pinto da Fonseca, a leader of the Miguelite party. .

CHAZELLES, JEAN MATHIEU DE (1657-1710), French hydrographer, was born at Lyons on the 24th of July 1657. He was nominated professor of hydrography at Marseilles in 1685, and in that capacity carried out various coast surveys. In 1693 he was engaged to publish a second volume of the Neptune jrancflis, which was to include the hydrography of the Mediter- ranean. For this purpose he visited the Levant and Egypt. When in Egypt he measured the pyramids, and, finding that the angles formed by the sides of the largest were in the direction of the four cardinal points, he concluded that this position must have been intended, and also that the poles of the earth and meridians had not deviated since the erection of those structures. He was made a member of the Academy in 1695, and died in Paris on the 16th of January 17 10.

CHEADLE, a town in the Altrincham parliamentary division of Cheshire, England, 6 m. S. of Manchester, included in the urban district of Cheadle and Gatley. Pop. (1901) 7916. This is one of the numerous townships of modern growth which fringe the southern boundaries of Manchester, and practically form suburbs of that city. Stockport lies immediately to the east. The name occurs in the formerly separate villages of Cheadle Hulme, Cheadle Bulkeley and Cheadle Moseley. There are cotton printing and bleaching works in the locality. The parish church of St Giles, Cheadle, is Perpendicular, containing an altar- tomb of the 15th century for two knights.

CHEADLE, a market town in the Leek parliamentary divi- sion of Staffordshire, England, 13 m. N.E. of Stafford, and the terminus of a branch line from Cresswell on the North Staffordshire railway. Pop. (1901) 5186. The Roman Catholic church of St Giles, with a lofty spire, was designed by Pugin and erected in 1846. The interior is lavishly decorated. There are considerable collieries in the neighbourhood, and silk and tape works in the town. In the neighbouring Froghall district limestone is quarried, and there are manufactures of copper. In Cheadle two fairs of ancient origin are held annually.

CHEATING, ” the fraudulently obtaining the property of another by any deceitful practice not amounting to felony, which practice is of such a nature that it directly affects, or may directly affect, the public

at large” (Stephen, Digest of Criminal Law, chap. xl. § 367). Cheating is either a common law or statutory offence, and is punishable as a misdemeanour. An indictment for cheating at common law is of comparatively rare occurrence, and the statutory crime usually presents itself in the form of obtaining money by false pretences (q.v.). The word ” cheat ” is a variant of ” escheat,” i.e. the reversion of land to a lord of the fee through the failure of blood of the tenant. The shortened form ” cheater ” for ” escheator ” is found early in the legal sense, and chetynge appears in the Promptorium Parvulorum, c. 1440, as the equivalent of confiscaiio. In the 16th century ” cheat ” occurs in vocabularies of thieves and other slang, and in such works as the Use of Dice-Play (1532). It is frequent in Thomas Harman’s Caveat or Wareningfor . . . Vaga- bones (1567), in the sense of ” thing,” with a descriptive word attached, e.g. smeling chete = nose. In the tract Mihil Mumchance, his Discoverie of the Art of Cheating, doubtfully attributed to Robert Greene (1560-1592), we find that gamesters call them- selves cheaters, ” borrowing the term from the lawyers.” The sense development is obscure, but it would seem to be due to the extortionate or fraudulent demands made by legal ” escheators.”
CHEBICHEV, PAFNUTIY LVOVICH (1821-1894), Russian mathematician, was born at Borovsk on the 26th of May 1821. He was educated at the university of Moscow, and in 1859 became professor of mathematics in the university of St Peters- burg, a position from which he retired in 1880. He was chosen a correspondent of the Institute of France in i860, and succeeded to the high honour of associi Mr anger in 1874. He was also a foreign member of the Royal Society of London. After N. I. Lobachevskiy he probably ranks as the most distinguished mathematician Russia has produced. In 1841 he published a valuable paper, ” Sur la convergence de la serie de Taylor,” in Crelle’s Journal. His best-known papers, however, deal with prime numbers; in one of these (“Sur les nombres premiers,” 1850) he established the existence of limits within which must be comprised the sum of the logarithms of the primes inferior to a given number. Another question to which he devoted much attention was that of obtaining rectilinear motion by linkage. The parallel motion known by his name is a three-bar linkage, which gives a very close approximation to exact rectilinear motion, but in spite of all his efforts he failed to devise one that produced absolutely true rectilinear motion. At last, indeed, he came to the conclusion that to do so was impossible, and in that conviction set to work to find a rigorous proof of the impossibility. While he was engaged on this task the desired linkage, which moved the highest admiration of J. J. Sylvester, was discovered and exhibited to him by one of his pupils, named Lipkin, who, however, it was afterwards found, had been anticipated by A.

Peaucellier. Chebiche'v further constructed an instrument for drawing large circles, and an arithmetical machine with continuous motion. His mathematical writings, which account for some forty entries in the Royal Society's catalogue of scien- tific papers, cover a wide range of subjects, such as the theory of probabilities, quadratic forms, theory of integrals, gearings, the construction of geographical maps, &c. He also published a Traite de la theorie des nombres. He died at St Petersburg on the 8th of December 1894.

CHEBOYGAN, a city and the county-seat of Cheboygan county, Michigan, U.S.A., on South Channel (between Lakes Michigan and Huron), at the mouth of Cheboygan river, in the N. part of the lower peninsula. Pop. (1890) 6235; (1900) 6489, of whom 2101 were foreign-born; (1004) 6730; (1910) 6859. It is served by the Michigan Central and the Detroit & Mackinac railways, and by steamboat lines to Chicago, Mil- waukee, Detroit, Sault Ste Marie, Green Bay and other lake ports; and is connected by ferry with Mackinac and Pointe aux Pins. During a great part of the year small boats ply between Cheboygan and the head of Crooked Lake, over the " Inland Route." Cheboygan is situated in a fertile farming region, for

which it is a trade centre, and it has lumber mills, tanneries, paper mills, boiler works, and other manufacturing establish- ments. The water-works are owned and operated by the munici- pality. The city, at first called Duncan, then Inverness, and finally Cheboygan, was settled in 1846, incorporated as a village in 1 87 1, reincorporated in 1877, and chartered as a city in

1889.

CHECHENZES, Tchetchen, or Khists (Kisti), the last being the name by which they are known to the Georgians, a people of the eastern Caucasus occupying the whole of west Paghestan. They call themselves Nakhtche, " people." A wild, fierce people, they fought desperately against Russian aggression in the 18th century under Daud Beg and Oman Khan and Shamyl, and in the 19th under Khazi-Mollah, and even now some are inde- pendent in the mountain districts. On the surrender of the chieftain Shamyl to Russia in 1859 numbers of them migrated into Armenia. In physique the Chechenzes resemble the Cir- cassians, and have the same haughtiness of carriage. They are of a generous temperament, very hospitable, but quick to re-

venge. They are fond of fine clothes, the women wearing rich robes with wide, pink silk trousers, silver bracelets and yellow sandals. Their houses, however, are mere hovels, some dug out of the ground, others formed of boughs and stones. Before their subjection to Russia they were remarkable for their inde- pendence of spirit and love of freedom. Everybody was equal, and they had no slaves except prisoners of war. Government in each commune was by popular assembly, and the adminis- tration of justice was in the hands of the wronged. Murder and robbery with violence could be expiated only by death, unless the criminal allowed his hair to grow and the injured man consented to shave it himself and take an oath of brotherhood on the Koran. Otherwise the law of vendetta was fully carried out with curious details. The wronged man, wrapped in a white woollen shroud, and carrying a coin to serve as payment to a priest for saying the prayers for the dead, started out in search of his enemy. When the offender was found he must fight to a finish. A remarkable custom among one tribe is that if a betrothed man or woman dies on the eve of her wedding, the marriage ceremony is still performed, the dead being formally united to the living before witnesses, the father, in case it is the girl who dies, never failing to pay her dowry. The religion of the Chechenzes is Mahommedanism, mixed, however, with Christian doctrines and observances. Three churches near Kistin in honour of St George and the Virgin are visited as places of pilgrimage, and rams are there offered as sacrifices. The Chechenzes number upwards of 200,000. They speak a distinct language, of which there are said to be twenty separate dialects.

See Ernest Chanter, Recherches anthropologiques dans le Caucase (Lyon, 1885-1887) ; D. G. Brinton, Races of Man (1890) ; Hutchinson, Living Races of Mankind (London, 1901).

CHECKERS, the name by which the game of draughts (q.v.) is known in America. The origin of the name is the same as that of ” chess ” {q.v.).

CHEDDAR, a small town in the Wells parliamentary division of Somersetshire, England, 22 m. S.W. of Bristol by a branch of the Great Western railway. Pop. (1901) 1975. The town, with its Perpendicular church and its picturesque market-cross, lies below the south-western face of the Mendip Hills, which rise sharply from 600 to 800 ft. To the west stretches the valley of the river Axe, broad, low and flat. A fine gorge opening from the hills immediately upon the site of the town is known as Cheddar cliffs from the sheer walls which flank it; the contrast of its rocks and rich vegetation, and the falls of a small stream traversing it, make up a beautiful scene admired by many

visitors. Several stalactitical caverns are also seen, and pre- historic British and Roman relics discovered in and near them are preserved in a small museum. The two caverns most fre- quently visited are called respectively Cox's and Gough's; in each, but especially in the first, there is a remarkable collection of fantastic and beautiful stalactitical forms. There are other caverns of greater extent but less beauty, but their extent is not completely explored. The remains discovered in the caves give

evidence of British and Roman settlements at Cheddar (Cedre, Chedare), which was a convenient trade centre. The manor of Cheddar was a royal demesne in Saxon times, and the witenage- mot was held there in 966 and 968. It was granted by John in 1 204 to Hugh, archdeacon of Wells, who sold it to the bishop of Bath and Wells in 1229, whose successors were overlords until I SS3> when the bishop granted it to the king. It is now owned by the marquis of Bath. By a charter of 1 23 1 extensive liberties in the manor of Cheddar were granted to Bishop Joceline, who by a charter of 1235 obtained the right to hold a weekly market and fair. By a charter of Edward III. (1337) Cheddar was removed from the > king's forest of Mendip. The market wag discontinued about 1690. Fairs are now held on the 4th of May and the 29th of October under the original grants. The name of Cheddar is given to a well-known species of cheese (see Dairy), the manufacture of which began in the 17th century in the town and neighbourhood.

CHEDUBA, or Man-aung, an island in the Bay of Bengal, situated 10 m. from the coast of Arakan, between 18° 40′ and 18 56′ N. lat., and between 93 31′ and 93 50′ E. long. It forms part of the Kyaukpyu district of Arakan. It extends about 20 m. in length from N. to S., and 17 m. from E. to W., and its area of 220 sq. m. supports a population of 26,899 (in 1901). The channel between the island and the mainland is navigable for boats, but not for large vessels. The surface of the interior is richly diversified by hill and dale, and in the southern portion some of the heights exceed a thousand feet in elevation. There are various indications of former volcanic activity, and along the coast are earthy cones covered with green-sward, from which issue springs of muddy water emitting bubbles of gas. Copper, iron and silver ore have been discovered; but the island is chiefly noted for its petroleum wells, the. oil derived from which is of excellent quality, and is extensively used in the composition of paint, as it preserves wood from the ravages of insects. Timber is not abundant, but the gamboge tree and the wood-oil tree are found of a good size. Tobacco, cotton, sugar-cane, hemp and indigo are grown, and the staple article is rice, which is of superior quality, and the chief article of export. The

inhabitants of the island are mainly Maghs. Cheduba fell to the Burmese in the latter part of the 18th century. From them it was captured in 1824 by the British, whose possession of it was confirmed in 1826 by the treaty concluded with the Burmese at Yandaboo.

CHEERING, the uttering or making of sounds encouraging, stimulating or exciting to action, indicating approval of acclaim- ing or welcoming persons, announcements of events and the like. The word ” cheer ” meant originally face, countenance, expression, and came through the O. Fr. into Mid. Eng. in the 13th century from the Low Lat. cara, head; this is generally referred to the Gr. /capa. Cara is used by the 6th-century poet Flavius Cresconius Corippus, ” Postquam venere verendam Caesaris ante caram ” (In Laudem Justini Minoris). ” Cheer ” was at first qualified with epithets, both of joy and gladness and of sorrow; compare ” She thanked Dyomede for alle … his gode chere ” (Chaucer, Troylus) with ” If they sing . . . ‘tis with so dull a cheere ” (Shakespeare, Sonnets, xcvii.). An early transference in meaning was to hospitality or entertainment, and hence to food and drink, ” good cheer.” The sense of a shout of encouragement or applause is a late use. Defoe {Captain Singleton) speaks of it as a sailor’s word, and the meaning does not appear in Johnson. Of the different words or rather sounds that are used in cheering, ” hurrah,” though now generally looked on as the typical British form of cheer, is found in various forms in German, Scandinavian, Russian (urd), French (houra). It is probably onomatopoeic in origin; some connect it with such words as ” hurry,” ” whirl “; the meaning would then be ” haste,” to encourage speed or onset in battle. The English ” hurrah ” was preceded by ” huzza,” stated to be a sailor’s word, and generally connected with ” heeze,” to hoist, probably being one of the cries that sailors use when hauling or hoisting. The German hoch, seen in full in hoch lebe der Kaiser, &c, the French vive, Italian and Spanish viva, ewiva, are cries rather

of acclamation than encouragement. The Japanese shout banzai became familiar during the Russo-Japanese War. In reports of parliamentary and other debates the insertion of ” cheers ” at any point in a speech indicates that approval was shown by members of the House by emphatic utterances of ” hear hear.” Cheering may be tumultuous, or it may be conducted rhythmically by prearrangement, as in the case of the ” Hip-hip-hip ” by way of introduction to a simultaneous ” hurrah.”

Rhythmical cheering has been developed to its greatest extent in America in the college yells, which may be regarded as a development of the primitive war-cry; this custom has no real analogue at English schools and universities, but the New Zealand football team in 1907 familiarized English crowds at their matches with a similar sort of war-cry adopted from the Maoris. In American schools and colleges there is usually one cheer for the institution as a whole and others for the different classes. The oldest and simplest are those of the New England colleges. The original yells of Harvard and Yale are identical in form, being composed of rah (abbreviation of hurrah) nine times repeated, shouted in unison with the name of the university at the end. The Yale cheer is given faster than that of Harvard. Many institutions have several different yells, a favourite variation being the name of the college shouted nine times in a slow and prolonged manner. The best known of these variants is the Yale cheer, partly taken from the Frogs of Aristophanes, which runs thus:

” Brekekekex, ko-ax, ko-ax, Brekekekex, ko-ax, ko-ax, O-op, O-op, parabalou, Yale, Yale, Yale,

Rah, rah, rah, rah, rah, rah, rah, rah, rah. Yale! Yale! Yale!”

The regular cheer of Princeton is:

” H’ray, h’ray, h’ray, tiger, Siss, boom, ah; Princeton!”

This is expanded into the ” triple cheer “: ” H’ray, h’ray, h’ray, Tiger, tiger, tiger, Siss, siss, siss, Boom, boom, boom, Ah, ah, ah, Princeton, Princeton, Princeton ! ”

The ” railroad cheer ” is like the foregoing, but begun very slowly and broadly, and gradually accelerated to the end, which is enunciated as fast as possible. Many cheers are formed like that of Toronto University:

” Varsity, varsity, V-a-r-s-i-t-y (spelled) VARSIT-Y (spelled staccato) Var-si-ty, Rah, rah, rah ! ”

Another variety of yell is illustrated by that of the School of Practical Science of Toronto University:

” Who are we ? Can’t you~guess ? We are from the S.P.S. ! ”

The cheer of the United States Naval Academy is an imita- tion of a nautical syren. The Amherst cheer is:

” Amherst ! Amherst ! Amherst ! Rah ! Rah ! Amherst ! Rah ! Rah ! Rah ! Rah ! Rah ! Rah ! Rah ! Rah ! Amherst !”

Besides the cheers of individual institutions there are some common to all, generally used to compliment some successful athlete or popular professor. One of the oldest examples of these personal cheers is :

” Who was George Washington? First in war, First in peace, First in the hearts of his countrymen,”

followed by a stamping on the floor in the same rhythm.

College yells are used particularly at athletic contests. In any large college there are several leaders, chosen by the students, who stand in front and call for the different songs and cheers,

directing with their arms in the fashion of an orchestral con- ductor. This cheering and singing form one of the distinctive features of inter-collegiate and scholastic athletic contests in America.

CHEESE (Lat. caseus), a solidified preparation from milk, the essential constituent of which is the proteinous or nitrogenous substance casein. All cheese contains in addition some proportion of fatty matter or butter, and in the more valuable varieties the butter present is often greater in amount than the casein. Cheese being thusˆa compound substance of no definite composition is found in commerce of many different varieties and qualities; and such qualities are generally recognized by the names of the localities in which they are manufactured. The principal dis- tinctions arise from differences in the composition and condition of the milk operated upon, from variations in the method of preparation and curing, and from the use of the milk of other animals besides the cow, as, for example, the goat and the ewe, from the milk of both of which cheese is manufactured on a commercial scale. For details about different cheeses and cheese-making, see Dairy. From the Urdu chiz (“thing”) comes the slang expression ” the cheese,” meaning ” the perfect thing,” apparently from Anglo-Indian usage.

A useful summary of the history and manufacture of all sorts of cheeses, under their different names, is given in Bulletin 105 of the Bureau of Animal Industry (United States Dep. of Agriculture), Varieties of Cheese, by C. F. Doane and H. W. Lawson (Washington,

1908).

CHEESE CLOTH, the name given to cloth, usually made from flax or

tow yarns, of an open character, resembling a fine riddle or sieve, used for wrapping cheese. A finer quality and texture is made for women's gowns. A similar cloth is used for inside linings in the upholstery trade, and for the ground of embroidery.

CHEETA (Chita), or Hunting-Leopard (Cynaelurus jubatus, formerly known as Gueparda jubata), a member of the family Felidae, distinguished by its claws being only partially retractile (see Carnivora). The cheeta attains a length of 3 to 4 ft.; it is of a pale fulvous colour, marked with numerous spots of black on the upper surface and sides, and is nearly white beneath. The fur is somewhat crisp, altogether lacking the sleekness which characterizes the fur of the typical cats, and the tail is long and somewhat bushy at the extremity. In confinement the cheeta soon becomes fond of those who are kind to it, and gives evidence of its attachment in an open, dog-like manner. The cheeta is found throughout Africa and southern Asia, and has been em- ployed for centuries in India and Persia in hunting antelopes and other game. According to Sir W. Jones, this mode of hunting originated with Hushing, king of Persia, 865 B.C., and afterwards became so popular that certain of the Mongol emperors were in the habit of being accompanied in their sport- ing expeditions by a thousand hunting leopards. In prosecuting this sport at the present day the cheeta is conveyed to the field in a low car without sides, hooded and chained like hunting- birds in Europe in the days of falconry. When a herd of deer or antelopes is seen, the car, which bears a close resemblance to the ordinary vehicles used by the peasants, is usually brought within 200 yds. of the game before the latter takes alarm; the cheeta is then let loose and the hood removed from its eyes. No sooner does it see the herd, than dropping from the car on the side remote from it sprey, it approaches stealthily, making use of whatever means of concealment the nature of the ground permits, until observed, when making a few gigantic bounds, it generally arrives in the midst of the herd and brings down its victim with a stroke of its paw. The sportsman then approaches, draws off a bowl of the victim's blood, and puts it before the cheeta, which is again hooded and led back to the car. Should it not succeed in reaching the herd in the first few bounds, it makes no further effort to pursue, but retires seemingly dispirited to the car. In Africa the cheeta is only valued for its skin, which is worn by chiefs and other people of rank. It should be added that in India the name cheeta (chita) is applied also to the leopard.

CHEFFONIER, properly Chiffonier, a piece of furniture differentiated from the sideboard by its smaller size and by the

enclosure of the whole of the front by doors. Its name (which comes from the French for a rag-gatherer) suggests that it was originally intended as a receptacle for odds and ends which had no place elsewhere, but it now usually serves the purpose of a sideboard. It is a remote and illegitimate descendant of the cabinet; it has rarely been elegant and never beautiful. It was one of the many curious developments of the mixed taste, at once cumbrous and bizarre, which prevailed in furniture during the Empire period in England. The earliest cheffoniers date from that time; they are usually of rosewood — the favourite timber of that moment; their ” furniture ” (the technical name for knobs, handles and escutcheons) was most commonly of brass, and there was very often a raised shelf with a pierced brass gallery at the back. The doors were well panelled and often edged with brass-beading, while the feet were pads or claws, or, in the choicer examples, sphinxes in gilded bronze. Cheffoniers are still made in England in cheap forms and in great number.

CHEH-KIANG, an eastern province of China, bounded N. by the province of Kiang-su, E. by the sea, S. by the province of Fu-kien, and W. by the provinces of Kiang-si and Ngan-hui. It occupies an area of about 36,000 sq. m., and contains a popu- lation of 11,800,000. With the exception of a small portion of the great delta plain, which extends across the frontier from the province of Kiang-su, and in which are situated the famous cities of Hu Chow, Ka-hing, Hang-chow, Shao-Sing and Ning-po, the province forms a portion of the Nan-shan of south-eastern China, and is hilly throughout. The Nan-shan ranges run through the centre of the province from south-west to north- east, and divide it into a northern portion, the greater part of which is drained by the Tsien-t’ang-kiang, and a southern portion which is chiefly occupied by the Ta-chi basin. The valleys enclosed between the mountain ranges are numerous, fertile, and for the most part of exquisite beauty. The hilly portion of the province furnishes large supplies of tea, and in the plain which extends along the coast, north of Ning-po, a great quantity of silk is produced. In minerals the province is poor. Coal and iron are occasionally met with, and traces of copper ore are to be found in places, but none of these minerals exists in sufficiently large deposits to make mining remunerative. The province, however, produces cotton, rice, ground-nuts, wheat, indigo, tallow and beans in abundance. The principal cities are Hang-chow, which is famed for the beauty of its surroundings, Ning-po, which has been frequented by foreign ships ever since the Portuguese visited it in the 16th century, and Wenchow. Opposite Ning-po, at a distance of about 50 m., lies the island of Chusan, the largest of a group bearing

that general name. This island is 21 m. long, and about 50 m. in circumference. It is very mountainous, and is surrounded by numerous islands and islets. On its south side stands the walled town of Ting-hai, in front of which is the principal harbour. The population is returned as 50,000.

CHEKE, SIR JOHN (1514-1557), English classical scholar, was the son of Peter Cheke, esquire-bedell of Cambridge Univer- sity. He was educated at St John's College, Cambridge, where he became a fellow in 1529. While there he adopted the prin- ciples of the Reformation. His learning gained him an exhibition from the king, and in 1540, on Henry VIII. 's foundation of the regius professorships, he was elected to the chair of Greek. Amongst his pupils at St John's were Lord Burghley, who married Cheke's sister Mary, and Roger Ascham, who in The School- master gives Cheke the highest praise for scholarship and character. Together with Sir Thomas Smith, he introduced a new method of Greek pronunciation very similar to that com- monly used in England in the 19th century. It was strenuously opposed in the University, where the continental method prevailed, and Bishop Gardiner, as chancellor, issued a decree against it (June 1542); but Cheke ultimately triumphed. On the 10th of July 1554, he was chosen as tutor to Prince Edward, and after his pupil's accession to the throne he continued his in- structions. Cheke took a fairly active share in public life; he sat, as member for Bletchingley, for the parliaments of 1 547 and ISS2-ISS3; he was made provost of King's College, Cambridge

(April 1, 1548), was one of the commissioners for visiting that university as well as Oxford and Eton, and was appointed with seven divines to draw up a body of laws for the governance of the church. On the nth of October 1551 he was knighted; in 1553 he was made one of the secretaries of state, and sworn of the privy council. His zeal for Protestantism induced him to follow the duke of Northumberland, and he filled the office of secretary of state for Lady Jane Grey during her nine days' reign. In consequence Mary threw him into the Tower (July 27, J553), and confiscated his wealth. He was, however, released on the 13th of September 1554, and granted permission to travel abroad. He went first to Basel, then visited Italy, giving lectures in Greek at Padua, and finally settled at Strassburg, teaching Greek for his living. In the spring of 1556 he visited Brussels to see his wife; on his way back, between Brussels and Antwerp, he and Sir Peter Carew were treacherously seized (May 1 5) by order of Philip of Spain, hurried over to England, and imprisoned in the Tower. Cheke was visited by two priests and by Dr John Feckenham, dean of St Paul's,

whom he had formerly tried to convert to Protestantism, and, terrified by a threat of the stake, he gave way and was received into the Church of Rome by Cardinal Pole, being cruelly forced to make two public recantations. Overcome with shame, he did not long sur- vive, but died in London on the 13th of September 1557, carry- ing, as T. Fuller says {Church History), ” God’s pardon and all good men’s pity along with him.” About 1547 Cheke married Mary, daughter of Richard Hill, sergeant of the wine-cellar to Henry VIII., and by her he had three sons. The descendants of one of these, Henry, known only for his translation of an Italian morality play Freewyl (Tragedio del Liber Arbitrio) by Nigri de Bassano, settled at Pyrgo in Essex.

Thomas Wilson, in the epistle prefixed to his translation of the Olynthiacs of Demosthenes (1570), has a long and most interesting eulogy of Cheke; and Thomas Nash, in To the Gentlemen Students, prefixed to Robert Greene’s Menaphon (1589), calls him ” the Exchequer of eloquence, Sir Ihon Cheke, a man of men, super- naturally traded in all tongues.” Many of Cheke’s works are still in MS., some have been altogether lost. One of the most interesting from a historical point of view is the Hurt of Sedition how greueous it is to a Communewelth (1549), written on the occasion of Ket’s rebellion, republished in 1569, 1576 and 1641, on the last occasion with a life of the author by Gerard Langbaine. Others are D. Joannis Chrysostomi homiliae duae (1543), D. Joannis Chrysostomi de procidentia Dei (1545), The Gospel according to St Matthew . . . translated (c. 1550; ed. James Goodwin, 1843), De obilu Martini Buceri (1551), (Leo VI. ‘s) de Apparatu bellico (Basel, 1554; but dedicated to Henry VIII., 1544), Carmen Heroicum, aut epitaphium in Antonium Deneium (1551), De pronuntiatione Graecae . . . linguae (Basel, 1555). He also translated several Greek works, and lectured admirably upon Demosthenes.

His Life was written by John Strype (1821); additions by J. Gough Nichols in Archaeologia (i860), xxxviii. 98, 127.

CHELLIAN, the name given by the French anthropologist G. de Mortillet to the first epoch of the Quaternary period when the earliest human remains are discoverable. The word is derived from the French town Chelles in the department of Seine-et-Marne. The climate of the Chellian epoch was warm and humid as evidenced by the wild growth of fig-trees and laurels. The animals characteristic of the epoch are the Elepkas antiquus, the rhinoceros, the cave-bear, the hippopotamus and the striped hyaena. Man existed and belonged to the Neander- thal type. The implements characteristic of the period are flints chipped into leaf-shaped forms and held in the hand when used. The drift-beds

of St Acheul (Amiens) , of Menchecourt (Abbeville) , of Hoxne (Suffolk) , and the detrital laterite of Madras are con- sidered by de Mortillet to be synchronous with the Chellian beds.

See Gabriel de Mortillet, Le Prehistorique (1900) ; Lord Avebury, Prehistoric Times (1900). %

CHELMSFORD, FREDERIC THESIGER, ist Baron (1794- 1878), lord chancellor of England, was the third son of Charles Thesiger, and was born in London on the 15th of April 1794. His father, collector of customs at St Vincent's, was the son of a Saxon gentleman who had migrated to England and become secretary to Lord Rockingham, and was the brother of Sir Frederic Thesiger, naval A.D.C. to Nelson at Copenhagen. Young Frederic Thesiger was originally destined for a naval

career, and he served as a midshipman on board the " Cambrian " frigate in 1807 at the second bombardment of Copenhagen. His only surviving brother, however, died about this time, and he became entitled to succeed to a valuable estate in the West Indies, so it was decided that he should leave the navy and study law, with a view to practising in the West Indies and eventually managing his property in person. Another change of fortune, however, awaited him, for a volcano destroyed the family estate, and he was thrown back upon his prospect of a legal practice in the West Indies. He proceeded to enter at Gray's Inn in 18 13, and was called on the .18th of November 1818, another change in his prospects being brought about by the strong advice of Godfrey Sykes, a special pleader in whose chambers he had been a pupil, that he should remain to try his fortune in England. He accordingly joined the home circuit, and soon got into good practice at the Surrey sessions, while he also made a fortunate purchase in buying the right to appear in the old palace court (see Lord Steward). In 1824 he dis- tinguished himself by his defence of Joseph Hunt when on his trial at Hertford with John Thurtell for the murder of Wm. Weare; and eight years later at Chelmsford assizes he won a hard-fought action in an ejectment case after three trials, to which he attributed so much of his subsequent success that when he was raised to the peerage he assumed the title Lord Chelms- ford. In 1834 he was made king's counsel, and in 1835 was briefed in the Dublin election inquiry which unseated Daniel O'Connell. In 1840 he was elected M.P. for Woodstock. In 1844 he became solicitor-general, but having

ceased to enjoy the favour of the duke of Marlborough, lost his seat for Wood- stock and had to find another at Abingdon. In 1845 he became attorney-general, holding the post until the fall of the Peel administration on the 3rd of July 1846. Thus by three days Thesiger missed being chief justice of the common pleas, for on the 6th of July Sir Nicholas Tindal died, and the seat on the bench, which would have been Thesiger's as of right, fell to the Liberal attorney-general, Sir Thomas Wilde. Sir Frederic Thesiger remained in parliament, changing his seat, however, again in 1852, and becoming member for Stamford. During this period he enjoyed a very large practice at the bar, being employed in many causes cMebres. On Lord Derby coming into office for the second time in 1858, Sir Frederic Thesiger was raised straight from the bar to the lord chancellorship (as were Lord Brougham, Lord Selborne and Lord Halsbury). In the following year Lord Derby resigned and his cabinet was broken up. Againin 1866, on Lord Derby cominginto office for the third time, Lord Chelmsford became lord chancellor for a short period. In 1868 Lord Derby retired, and Disraeli, who took his place as prime minister, wished for Lord Cairns as lord chancellor. Lord Chelmsford was very sore at his supersession and the manner of it, but, according to Lord Malmesbury he retired under a compact made before he took office. Ten years later Lord Chelmsford died in London on the 5th of October 1878. Lord Chelmsford had married in 1822 Anna Maria Tinling. He left four sons and three daughters, of whom the eldest, Frederick Augustus, 2nd Baron Chelmsford (1827-1905), earned distinction as a soldier, while the third, Alfred Henry Thesiger (183 8- 1880) was made a lord justice of appeal and a privy councillor in 1877, at the early age of thirty-nine, but died only three years later.

See Lives of the Chancellors (1908), by J. B. Atlay, who has had the advantage of access to an unpublished autobiography of Lord Chelmsford's.

CHELMSFORD, a market town and municipal borough, and the county town of Essex, England, in the Chelmsford parlia- mentary division, 30 m. E.N.E. from London by the Great Eastern railway. Pop. (1901) 12,580. It is situated in the valley of the Chelmer, at the confluence of the Cann, and has communication by the river with Maldon and the Blackwater estuary n m. east. Besides the parish church of St Mary, a graceful Perpendicular edifice, largely rebuilt, the town has a grammar school founded by Edward VI., an endowed charity school and a museum. It is the seat of the county assizes and quarter sessions, and has a handsome shire hall; the county gaol

is near the town. Its corn and cattle markets are among the largest in

the county; for the first a fine exchange is provided. In the centre of the square in which the corn exchange is situated stands a bronze statue of Lord Chief-Justice Tindal (1776-1846), a native of the parish. There are agricultural implement and iron foundries, large electric light and engineering works, breweries, tanneries, makings and extensive corn mills. There is a race-course 2 m. south of the town. The borough is under a mayor, 6 aldermen and 18 councillors. Area 2308 acres.

A place of settlement since Palaeolithic times, Chelmsford (Chilmersford, Chelmeresford, Chelmesfard) owed its importance to its posi on on the road from London to Colchester. It con- sisted of two manors: that of Moulsham, which remained in the possession of Westminster Abbey from Saxon times till the reign of Henry VIII., when it was granted to Thomas Mildmay; and that of Bishop's Hall, which was held by the bishops of London from the reign of Edward the Confessor to 1545, when it passed to the crown and was granted to Thomas Mildmay in 1563. The medieval history of Chelmsford centred round the manor of Bishop's Hall. Early in the 12th century Bishop Maurice built the bridge over the Chelmer which brought the road from London directly through the town, thus making it an important stopping- place. The town was not incorporated until 1888. In 1225 Chelmsford was made the centre for the collection of fifteenths from the county of Essex, and in 1227 it became the regular seat of assizes and quarter-sessions. Edward I. confirmed Bishop Richard de Gravesend in his rights of frank pledge in Chelmsford in 1290, and in 1395 Richard II. granted the return of writs to Bishop Robert de Braybroke. In 1377 writs were issued for the return of representatives from Chelmsford to parliament, but no return of members has been found. In n 99 the bishop obtained the grant of a weekly market at the yearly rent of one palfrey, and in 1201 that of an annual fair, now discontinued, for four days from the feast of St Philip and St James.

CHELSEA, a western metropolitan borough of London, England, bounded E. by the city of Westminster, N.W. by Kensington, S.W. by Fulham, and S. by the river Thames. Pop. (1901) 73,842. Its chief thoroughfare is Sloane Street, containing handsome houses and good shops, running south from Knightsbridge to Sloane Square. Hence King's Road leads west, a wholly commercial highway, named in honour of Charles II., and recalling the king's private road from St James's Palace to Fulham, which was maintained until the reign of George IV. The main roads south communicate with the Victoria or Chelsea, Albert and Battersea bridges over the Thames. The beautiful Chelsea embankment, planted with trees and lined with fine houses

and, in part, with public gardens, stretches between Victoria and Battersea bridges. The better residential portion of Chelsea is the eastern, near Sloane Street and along the river; the western, extending north to Fulham Road, is mainly a poor quarter.

Chelsea, especially the riverside district, abounds in historical associations. At Cealchythe a synod was held in 785. A similar name occurs in a Saxon charter of the nth century and in Domesday; in the 16th century it is Chelcith. The later termination ey or ea was associated with the insular character of the land, and the prefix with a gravel bank (ceosol; cf. Chesil Bank, Dorsetshire) thrown up by the river; but the early suffix hythe is common in the meaning of a haven. The manor was originally in the possession of Westminster Abbey, but its history is fragmentary until Tudor times. It then came into the hands of Henry VIII., passed from him to his wife Catharine Parr, and thereafter had a succession of owners, among whom were the Howards, to whom it was granted by Queen Elizabeth, and the Cheynes, from whom it was purchased in 171 2 by Sir Hans Sloane, after which it passed to the Cadogans. The memorials which crowd the picturesque church and churchyard of St Luke near the river, commonly known as the Old Church, to a great extent epitomize the history of Chelsea. Such are those of Sir Thomas More (d. 1535); Lord Bray, lord of the manor (1539), his father and son; Lady Jane Guyldeford, duchess of Northumberland, who died ” at her maner of Chelse ”

in 1555! Lord and Lady Dacre (1594-1595); Sir John Lawrence (1638)-, Lady Jane Cheyne (1698); Francis Thomas, “director of the china porcelain manufactory, Lawrence Street, Chelsea ” (1770); Sir Hans Sloane (1753); Thomas Shadwell, poet laureate (1602); Woodfall the printer of Junius (1844), and many others. More’s tomb is dated 1532, as he set it up himself, though it is doubtful whether he lies beneath it. His house was near the present Beaufort Street. In the 18th and 19th centuries Chelsea, especially the parts about the embankment and Cheyne Walk, was the home of many eminent men, particularly of writers and artists, with whom this pleasant quarter has long been in favour. Thus in the earlier part of the period named, Atterbury and Swift lived in Church Lane, Steele and Smollett in Monmouth House. Later, the names of Turner, Rossetti, Whistler, Leigh Hunt, Carlyle (whose house in Cheyne Row is preserved as a public memorial), Count D’Orsay, and Isambard Brunei, are intimately

connected with Chelsea. At Lindsey House Count Zinzendorf established a Moravian Society (c. 1750). Sir Robert Walpole's residence was extant till 1810; and till 1824 the bishops of Winchester had a palace in Cheyne Walk. Queen's House, the home of D. G. Rossetti (when it was called Tudor House), is believed to take name from Catharine of Braganza.

Chelsea was noted at different periods for two famous places of entertainment, Ranelagh (q.v.) in the second half of the 18th century, and Cremorne Gardens (q.v.) in the middle of the 19th. Don Saltero's museum, which formed the attraction of a popular coffee-house, was formed of curiosities from Sir Hans Sloane's famous collections. It was Sloane who gave to the Apothecaries' Company the ground which they had leased in 1673 for the Physick Garden, which is still extant, but ceased in 1902 to be maintained by the Company. At Chelsea Sir John Danvers (d. 1655) introduced the Italian style of gardening which was so greatly admired by Bacon and soon after became prevalent in England. Chelsea was formerly famous for a manufacture of buns; the original Chelsea bun-house, claiming royal patron- age, stood until 1839, and one of its successors until 1888. The porcelain works existed for some 25 years before 1769, when they were sold and removed to Derby. Examples of the original Chelsea ware (see Ceramics) are of great value.

Of buildings and institutions the most notable is Chelsea Royal Hospital for invalid soldiers, initiated by Charles II. (according to tradition on the suggestion of Nell Gwynne), and opened in 1694. The hospital itself accommodates upwards of 500 men, but a system of out-pensioning was found necessary from the outset, and now relieves large numbers throughout the empire. The picturesque building by Wren stands in exten- sive grounds, which include the former Ranelagh Gardens. A theological college (King James's) formerly occupied the site; it was founded in 1610 and was intended to be of great size, but the scheme was unsuccessful, and only a small part of the build- ings was erected. In the vicinity are the Chelsea Barracks (not actually in the borough). The Royal Military Asylum for boys, commonly called the Duke of York's school, founded in 1801 by Frederick, duke of York, for the education of children connected with the army, was removed in 1909 to new quarters at Dover. Other institutions are the Whitelands training college for school-mistresses, in which Ruskin took deep interest; the St Mark's college for school-masters; the Victoria and the Cheyne hospitals for children, a cancer hospital, the South- western polytechnic, and a public library containing an excellent collection relative to loqal history.

The parliamentary borough of Chelsea returns one member, and includes, as a detached portion, Kensal Town, north of Kensington. The borough council consists of a mayor, 6 alder- men and 36 councillors. Area, 659-6 acres.

CHELSEA, a city of Suffolk county, Massachusetts, U.S.A., a suburb of Boston. Pop. (1890) 27,909; (1900) 34,072, of whom 11,203 were foreign-born; (1910) 32,452. It is situ- ated on a peninsula between the Mystic and Chelsea rivers, and Charlestown and East Boston, and is connected with East Boston and Charlestown by bridges. It is served by the Boston & Maine and (for freight) by the Boston & Albany

railways. The United States maintains here naval and marine hospitals, and the state a soldiers' home. Chelsea's interests are primarily industrial. The value of the city's factory products in 1905 was $13,879,159, the principal items being rubber and elastic goods ($3,635,211) and boots and shoes ($2,044,250.) The manufacture of stoves, and of mucilage and paste are important industries. Flexible tubing for electric wires (first made at Chelsea 1889) and art tiles are important products. The first settlement was established in 1624 by Samuel Maverick (c. 1602-c. 1670), the first settler (about 1629) of Noddle's Island (or East Boston), and one of the first slave-holders in Massachusetts; a loyalist and Churchman, in 1664 he was appointed with three others by Charles II. on an important commission sent to Massachusetts and the other New England colonies (see Nicorxs, Richard), and spent the last years of his life in New York. Until 1739, under the name of Winnisim- met, Chelsea formed a part of Boston, but in that year it was made a township; it became a city in 1857. In May 1775 a British schooner in the Mystic defended by a force of marines was taken by colonial militia under General John Stark and Israel Putnam, — one of the first conflicts of the War of Inde- pendence. A terrible fire swept the central part of the city on the 1 2th of April 1908.

See Mellen Chamberlain (and others), History of Chelsea(2 vols., Boston, 1908), published by the Massachusetts Historical Society.

CHELTENHAM, a municipal and parliamentary borough of Gloucestershire, England, 109 m. W. by N. of London by the Great Western railway; served also by the west and north line of the Midland railway. Pop. (1901) 49,439. The town is well situated in the valley of the Chelt, a small tributary of the Severn, under the high line of the Cotteswold Hills to the east, and is in high repute as a health resort. Mineral springs were accidentally discovered in 1716. The Montpellier and Pittville Springs supply handsome pump rooms

standing in public gardens, and are the property of the corporation. The Mont- pellier waters are sulphated, and are valuable for their diuretic effect, and as a stimulant to the liver and alimentary canal. The alkaline-saline waters of Pittville are efficacious against diseases resulting from excess of uric acid. The parish church of St Mary dates from the 14th century, but is almost completely modern- ized. The town, moreover, is wholly modern in appearance. Assembly rooms opened in 181 5 by the duke of Wellington were removed in 1901. A new town hall, including a central spa and assembly rooms, was opened in 1903. There are numerous other handsome buildings, especially in High Street, and the Promen- ade forms a beautiful broad thoroughfare, lined with trees. The town is famous as an educational centre. Cheltenham College (1842) provides education for boys in three departments, classical, military and commercial; and includes a preparatory school. The Ladies' College (1854), long conducted by Miss Beale (q.v.), is one of the most successful in England. The Normal Training College was founded in 1846 for the training of teachers, male and female, in national and parochial schools. A free grammar school was founded in 1568 by Richard Pate, recorder of Gloucester. The art gallery and museum may be mentioned also. The parliamentary borough returns one member. The municipal borough is under a mayor, 6 aldermen and 18 councillors. Area, 4726 acres. The urban district of Charlton Kings (pop. 3806) forms a south-eastern suburb of Cheltenham.

The site of a British village and burying-ground, Cheltei ham (Celtanhomme, Chiltham, Chelteham) was a village with a church in 803. The manor belonged to the crown; it was granted to Henry de Bohun, earl of Hereford, late in the 12th century, but in 1 199 was exchanged for other lands with the king. It was granted to William de Longespee, earl of Salisbury, in 12 19, but resumed on his death and granted in dower to Eleanor of Pro- vence in 1243. In 1252 the abbey of Fecamp purchased the manor, and it afterwards belonged to the priory of Cormeille, but was confiscated in 1415 as the possession of an alien priory, and was granted in 146 1 to the abbey of Lyon, by which it was held until, once more returning to the crown at the Dissolution,

it was granted to the family of Dutton. The town is first men- tioned in 1223, when William de Longespee leased the benefit of the markets, fairs and hundred of Cheltenham to the men of the town for three

years; the lease was renewed by Henry III. in 1226, and again in 1230 for ten years. A market town in the time of Camden, it was governed by commissioners from the 18th century in 1876, when it was incorporated; it became a parliamentary borough in 183 2. Henry III. in 1 230 had granted to the men of Cheltenham a market on each Thursday, and a fair on the vigil, feast and morrow of St James. Although Camden mentions a considerable trade in malt, the spinning of woollen yarn was the only industry in 1779. After the discovery of springs in 1 7 1 6, and the erection of a pump-room in 1 738, Cheltenham rapidly became fashionable, the visit of George III. and the royal princesses in 1788 ensuring its popularity.

SeeS. Moreau, A Tour to Cheltenham Spa (Bath, 1738).

CHELYABINSK, a town of Russia, in the Orenburg govern- ment, at the east foot of the Urals, is the head of the Siberian railway, 624 m. by rail E.N.E. of Samara and 154 m. by rail S.S.E. of Ekaterinburg. Pop. (1900) 25,505. It has tanneries and distilleries, and is the centre of the trade in corn and pro- duce of cattle for the Ural iron-works. The town was founded in 1658.

CHELYS (Gr. xˆ w . tortoise; Lat. testudo), the common lyre of the ancient Greeks, which had a convex back of tortoise- shell or of wood shaped like the shell. The word chelys was used in allusion to the oldest lyre of the Greeks which was said to have been invented by Hermes. According to tradition he was attracted by sounds of music while walking on the banks of the Nile, and found they proceeded from the shell of a tortoise across which were stretched tendons which the wind had set in vibration (Homeric Hymn to Hermes, 47-51). The word has been applied arbitrarily since classic times to various stringed instruments, some bowed and some twanged, probably owing to the back being much vaulted. Kircher (Musurgia, i. 486) applied the name of chelys to a kind of viol with eight strings. Numerous representations of the chelys lyre or testudo occur on the Greek vases, in which the actual tortoiseshell is depicted; a good illus- tration is given in Le AntichitA di Ercolano (vol. i. pi. 43). Pro- pertius (iv. 6) calls the instrument the lyra testudinea. Scaliger (on Manilius, Astronomicon, Proleg. 420) was probably the first writer to draw attention to the difference, between chelys and cithara (q.v.). (K. S.)

CHEMICAL ACTION, the term given to any process in which change in chemical composition occurs. Such processes may be set up by the application of some form of energy (heat, light, electricity, &c.) to a substance, or by the mixing of two or more substances together. If two or more substances be mixed one of three things may occur. First, the

particles may be mechani- cally intermingled, the degree of association being dependent upon the fineness of the particles, &c. Secondly, the substances may intermolecularly penetrate, as in the case of gas-mixtures and solutions. Or thirdly they may react chemically. The question whether, in any given case, we have to deal with a physical mixture or a chemical compound is often decided by the occurrence of very striking phenomena. To take a simple example: — oxygen and hydrogen are two gases which may be mixed in all proportions at ordinary temperatures, and it is easy to show that the properties of the products are simply those of mixtures of the two free gases. If, however, an electric spark be passed through the mixtures, powerful chemical union ensues, with its concomitants, great evolution of heat and consequent rise of temperature, and a compound, water, is formed which presents physical and chemical properties entirely different from those of its constituents.

In general, powerful chemical forces give rise to the evolution of large quantities of heat, and the properties of the resulting sub- stance differ vastly more from those of its components than is the case with simple mixtures. This constitutes a valuable criterion as to whether mere mixture is involved on the one hand, or strong chemical union on the other. When, however, the chemical forces are weak and the reaction, being incomplete, leads to a

state of chemical equilibrium, in which all the reacting substances are present side by side, this criterion vanishes. For example, the question whether a salt combines with water molecules when dissolved in water cannot be said even yet to be fully settled, and, although there can be no doubt that solution is, in many cases, attended by chemical processes, still we possess as yet no means of deciding, with certainty, how many molecules of water have bound themselves to a single molecule of the dissolved substance (solute) . On the other hand, we possess exact methods of testing whether gases or solutes in dilute solution react one with another and of determining the equilibrium state which is attained. For if one solute react with another on adding the latter to its solution, then corresponding to the decrease of its concentration there must also be a decrease of vapour pressure, and of solubility in other solvents; further, in the case of a mixture of gases, the concentration of each single constituent follows from its solubility in some suitable solvent. We thus obtain the answer to the question: whether the concentration of a certain constituent has decreased during mixing, i.e. whether it has reacted chemically.

When a compound can be obtained in a pure state, analysis affords us an important criterion of its chemical nature, for unlike mixtures, the

compositions of which are always variable within wider or narrower limits, chemical compounds present definite and characteristic mass-relations, which find full expres- sion in the atomic theory propounded by Dal ton (see Atom). According to this theory a mixture is the result of the mutual interpenetration of the molecules of substances, which remain unchanged as such, whilst chemical union involves changes more deeply seated, inasmuch as new molecular species appear. These new substances, if well-defined chemical compounds, have a perfectly definite composition and contain a definite, generally small, number of elementary atoms, and therefore the law of constant proportions follows at once, and the fact that only an integral number of atoms of any element may enter into the composition of any molecule determines the law of multiple proportions.

These considerations bring us face to face with the task of more closely investigating the nature of chemical forces, in other words, of answering the question: Nature of what forces guide the atoms in the formation of a new fy^^" 1 molecular species? This problem is still far from being completely answered, so that a few general remarks must suffice here.

It is remarkable that among the most stable chemical com- pounds, we find combinations of atoms of one and the same element. Thus, the stability of the di-atomic molecule N2 is so great, that no trace of dissociation has yet been proved even at the highest temperatures, and as the constituent atoms of the molecule N 2 must be regarded as absolutely identical, it is clear that " polar " forces cannot be the cause of all chemical action. On the other hand, especially powerful affinities are also at work when so-called electro-positive and electro-negative elements react. The forces which here come into play appear to be considerably greater than those just mentioned; for instance, potassium fluoride is perhaps the most stable of all known compounds.

It is also to be noticed that the combinations of the electro- negative elements (metalloids) with one another exhibit a metalloid character, and also we find, in the mutual combinations of metals, all the characteristics of the metallic state; but in the formation of a salt from a metal and a metalloid we have an entirely new substance, quite different from its components; and at the same time, the product is seen to be an electrolyte, i.e. to have the power of splitting up into a positively and a negatively charged constituent when dissolved in some solvent. These considerations lead to the conviction that forces of a " polar " origin play an important part here, and indeed we may

make the general surmise that in the act of chemical combination forces of both a non-polar and polar nature play a part, and that the latter are in all probability identical with the electric forces.

It now remains to be asked — what are the laws which govern

the action of these forces? This question is of fundamental importance, since it leads directly to those laws which regulate the chemical process. Besides the already mentioned funda- mental law of chemical combination, that of constant and multiple proportions, there is the law of chemical mass-action, discovered by Guldberg and Waage in 1867, which we will now develop from a kinetic standpoint.

Kinetic Basis of the Law of Chemical Mass-action. — We will assume that the molecular species A 1; A 2 , . . . A'i, A' 2 , . . . are present in a homogeneous system, where they can react on each other only according to the scheme

A 1 +A 2 + ...ˆ±A' 1 +A' 2 + ...; this is a special case of the general equation

»iAi+»2A 2 +. . . ˆ± re'iA'i+re' 2 A' 2 +. . ., in which only one molecule of each substance takes part in the reaction. The reacting substances may be either gaseous or form a liquid mixture, or be dissolved in some selected solvent; but in each case we may state the following considerations regarding the course of the reaction. For a transformation to take place from left to right in the sense of the reaction equation, all the molecules A 1; A 2 , . . . must clearly collide at one point; otherwise no reaction is possible, since we shall not consider side-reactions. Such a collision need not of course bring about that transposition of the atoms of the single molecules which constitutes the above reaction. Much rather must it be of such a kind as is favourable to that loosening of the bonds that bind the atoms in the separate molecules, which must precede this transposition. Of a large number of such collisions, therefore, only a certain smaller number will involve a transposition from left to right in the sense of the equation. But this number will be the same under the same external conditions, and the greater the more numerous the collisions; in fact a direct ratio must exist between the two. Bearing in mind now, that the number of collisions must be proportional to each of the concentrations of the bodies A x , A 2 , . . ., and therefore, on the

whole, to the product of all these concentrations, we arrive at the conclusion that the velocity v of the transposition from left to right in the sense of the reaction equation is v = kc t c 2 . . ., in which c\, c 2 , . . . represent the spatial concentrations, i.e. the number of gram-molecules of the substances Ai, A 2 , . . . present in one litre, and k is, at a given temperature, a constant which may be called the velocity-coefficient.

Exactly the same consideration applies to the molecules A'i, A' 2 . . . Here the velocity of the change from right to left in the sense of the reaction-equation increases with the number of collisions of all these molecules at one point, and this is proportional to the product of all the concentrations. If k! denotes the corresponding proportionality-factor, then the velocity v' of the change from right to left in the sense of the reaction-equation is v'~k'd\di . . . These spatial concentra- tions are often called the " active masses " of the reacting com- ponents. Hence the reaction-velocity in the sense of the reaction- equation from left to right, or the reverse, is proportional to the product of the " active-masses " of the left-hand or right-hand components respectively.

Neither v nor v' can be separately investigated, and the measurements of the course of a reaction always furnish only the difference of these two quantities. The reaction- chemlcaJ velocity actually observed represents the difference statics. of these two partial reaction-velocities, whilst the amount of change observed during any period of time is equal to the change in the one direction, minus the change in the opposite direction. It must not be assumed, however, that on the attainment of equilibrium all action has ceased, but rather that the velocity of change in one direction has become equal to that in the opposite direction, with the result that no further total change can be observed, i.e. the system has reached equilibrium, for which the relation v— v' = o must therefore hold, or what is the same thing

kcid . . . = k'c'ic'n . . . ; this is the fundamental law of chemical statics.

The conception that the equilibrium is not to be attributed to absolute indifference between the reacting bodies, but that these continue to exert their mutual actions undiminished and the opposing changes now balance, is of fundamental significance in the interpretation of changes of matter in general. This is generally expressed in the form: the equilibrium in this and other analogous cases is not static but dynamic. This conception was a direct result of the kinetic-molecular considerations, and was applied with special success to the

development of the kinetic theory of gases. Thus with Clausius, we conceive the equilibrium of water- vapour with water, not as if neither water vaporized nor vapour condensed, but rather as though the two processes went on unhindered in the equilibrium state, i.e. during contact of saturated vapour with water, in a given time, as many water molecules passed through the water surface in one direction as in the opposite direction. This view, as applied to chemical changes, was first advanced by A. W. Williamson (1851), and further developed by C. M. Guldberg and P. Waage and others.

From the previous considerations it follows that the reaction- velocity at every moment, i.e. the velocity with which the chemical process advances towards the chemical equilibrium state, is given by the equation kinetics.

V = v—v' = kciCi. . . —k'c'yc'i. . . ;

this states the fundamental law of chemical kinetics.

The equilibrium equation is simply a special case of this more general one, and results when the total velocity is written zero, just as in analytical mechanics the equilibrium conditions follow at once by specialization of the general equations of motion.

No difficulty presents itself in the generalization of the previous equations for the reaction which proceeds after the scheme

MiAi + wA-t- . . . = w'iA'i + n' 2 A' 2 | ....

where ti\, w 2 , . . ., n\, n\, . . . denote the numbers of molecules of the separate substances which take part in the reaction, and are therefore whole, mostly small, numbers (generally one or two, seldom three or more). Here as before, v and v' are to be regarded as proportional to the number of collisions at one point of all molecules necessary to the respective reaction, but now n\ molecules of Ai, « 2 molecules of A 2 , &c, must collide for the reaction to advance from left to right in the sense of the equation ; and similarly n\ molecules of A'i, n'% molecules of A' 2 , &c, must collide for the reaction to proceed in the opposite direction. If we consider the path of a single, arbitrarily chosen molecule over a certain time, then the number of its collisions with other similar molecules will be proportional to the concentration C of that kind of molecule to which it belongs. The number of encounters between two molecules of the kind in question, during the same time, will be in general C times as many, i.e. the number of encounters of two of the same molecules is proportional to

the square of the concentration C; and generally, the number of encounters of n molecules of one kind must be regarded as proportional to the nth power of C, i.e. O.

The number of collisions of n\ molecules of A 1(w 2 molecules of A 2 … is accordingly proportional to Ci'CJ 2 . . . , and the reaction-velocity corresponding to it is therefore

»= *qic?...,

and similarly the opposed reaction-velocity is

the resultant reaction-velocity, being the difference of these two partial velocities, is therefore

V-r-u'-KˆC? ˆ ~,

This is the most general expression of the law of chemical mass-action, for the case of homogeneous systems.

Equating V to zero, we obtain the equation for the equilibrium state, viz.

C"'Cˆ . . . /C[n "Cj"' 2 …» klk' = K ;

K is called the " equilibrium-constant."

-&'C' ni C"" 2

These formulae hold for gases and for dilute solutions, but assume the system to be homogeneous, i.e. to be either a homo- Limita- geneous gas-mixture or a homogeneous dilute solution. tions and The case in which other states of matter share in the applies- equilibrium permits of simple treatment when the th"/aws substances in question may be regarded as pure, and consequently as possessing definite vapour-pressures or solubilities at a given temperature. In this case the molecular species in question, which is, at the same time, present in excess and is hence usually, called a Bodenkorper, must possess a constant concentration in the gas-space or solution. But since the left-hand side of the last equation contains only variable quantities, it is simplest and most convenient to absorb these constant concentrations into the equilibrium-constant; whence we have the rule: leave the

molecular species present as Bodenkorper out of account, when determining the concentration-product. Guldberg and Waage expressed this in the form ” the active mass of a solid substance is constant.” The same is true of liquids when these participate in the pure state in the equilibrium, and possess therefore a definite vapour-pressure or solubility. When, finally, we are not dealing with a dilute solution but with any kind of mixture whatever, it is simplest to apply the law of mass-action to the gaseous mixture in equilibrium with this. The composition of the liquid mixture is then determinable when the vapour-pressures of the separate components are known. This, however, is not often the case; but in principle this consideration is important, since it involves the possibility of extending the law of chemical mass-action from ideal gas- mixtures and dilute solutions, for which it primarily holds, to any other system whatever.

The more recent development of theoretical chemistry, as well as the detailed study of many chemical processes which have found technical application, leads more and more con- vincingly to the recognition that in the law of chemical mass- action we have a law of as fundamental significance as the law of constant and multiple proportions. It is therefore not without interest to briefly touch upon the development of the doctrine of chemical affinity.

Historical Development of the Law of Mass-action. — The theory developed by Torbern Olof Bergman in 1775 must be regarded as the first attempt of importance to account for the mode of action of chemical forces. The essential principle of this may be stated as follows: — The magnitude of chemical affinity may be expressed by a definite number; if the affinity of the sub- stance A is greater for the substance B than for the substance C, then the latter © will be completely expelled by B from its compound with A, in the sense of the equation A-C+B = A-B + C. This theory fails, however, to take account of the influence of the relative masses of the reacting substances, and had to be abandoned as soon as such an influence was noticed. An attempt to consider this factor was made by Claude Louis Berthollet (1801), who introduced the conception of chemical equilibrium. The views of this French chemist may be summed up in the following sentence:— Different substances have differ- ent affinities for each other, which only come into play on im- mediate contact. The condition of equilibrium depends not only upon the chemical affinity, but also essentially upon the relative masses of the reacting substances.

Essentially, Berthollet’s idea is to-day the guiding principle of the doctrine of affinity. This is especially true of our con- ceptions of

many reactions which, in the sense of Bergman's idea, proceed to completion, i.e. until the reacting substances are all used up; but only for this reason, viz. that one or more of the products of the reaction is removed from the reaction mixture (either by crystallization, evaporation or some other process), and hence the reverse reaction becomes impossible. Following Berthollet's idea, two Norwegian investigators, C. M. Guldberg and Peter Waage, succeeded in formulating the influence of the reacting masses in a simple law — the law of chemical mass-action already defined. The results of their theoretical and experi- mental studies were published at Christiania in 1867 (Uttudes sur les affiniUs chimiques); this work marks a new epoch in the

history of chemistry. Even before this, formulae to describe tht progress of certain chemical reactions, which must be regarded as applications of the law of mass-action, had been put forward by Ludwig Wilhelmy (1850), and by A. G. Vernon-Harcourt and William Esson (1856), but the service of Guldberg and Waage in having grasped the law in its full significance and logically applied it in all directions, remains of course un- diminished. Their treatise remained quite unknown; and so it happened that John Hewitt Jellett (1873), J. H. van't Hoff (1877), and others independently developed the same law. The thermodynamic basis of the law of mass-action is primarily due to Horstmann, J. Willard Gibbs and van't Hoff.

Applications. — Let us consider, as an example of the appli- cation of the law of mass-action, the case of the dissociation of water-vapour, which takes place at high temperatures in the sense of the equation $2H_2 = 2H_2 + O_2$. Representing the con- centrations of the corresponding molecular species by 2 0] 2 must be constant at any given temperature. This shows that the dissociation is set back by increasing the pressure; for if the concentrations of all three kinds of molecules be increased by strong compression, say to ten times the former amounts, then the numerator is increased one thousand, the denominator only one hundred times. Hence if the original equilibrium-constant is to hold, the dissociation must go back, and, what is more, by an exactly determinable amount. At 2000 C. water-vapour is only dissociated to the extent of a few per cent; therefore, even when only a small excess of oxygen or hydrogen be present, the numerator in the foregoing expression is much increased, and it is obvious that in order to restore the equilibrium state, the concentration of the other component, hydrogen or oxygen as the case may be, must diminish. In the case of slightly dissociated substances, there- fore, even a relatively small excess of one component is sufficient to set back the dissociation substantially.

Chemical Kinetics. — It has been already mentioned that the law of chemical mass-action not only defines the conditions for chemical equilibrium, but contains at the same time the prin- ciples of chemical kinetics. The previous considerations show indeed that the actual progress of the reaction is determined by the difference of the reaction-velocities in the one and the other (opposed) direction, in the sense of the corresponding reaction- equation. Since the reaction-velocity is given by the amount of chemical change in a small interval of time, the law of chemical mass-action supplies a differential equation, which, when in- tegrated, provides formulae which, as numerous experiments have shown, very happily summarize the course of the reaction. For the simplest case, in which a single species of molecule under- goes almost complete decomposition, so that the reaction- velocity in the reverse direction may be neglected, we have the simple equation

dxldt = k{a-x), and if x — o when (=owe have by integration k=H\o S {a/(a-x)}.

We will now apply these conclusions to the theory of the ignition of an explosive gas-mixture, and in particular to the combustion of ” knallgas ” (a mixture of hydrogen Theory a! and oxygen) to water-vapour. At ordinary tempera- expio- tures knallgas undergoes practically no change, and s,ve COt it might be supposed that the two gases, oxygen and us oa ‘ hydrogen, have no affinity for each other. This conclusion, however, is shown to be incorrect by the observation that it is only necessary to add some suitable catalyst such as platinum- black in order to immediately start the reaction. We must therefore conclude that even at ordinary temperatures strong chemical affinity is exerted between oxygen and hydrogen, but that at low temperatures this encounters great frictional resist- ances, or in other words that the reaction-velocity is very small. It is a matter of general experience that the resistances which the chemical forces have to overcome diminish with rising temperature, i.e. the reaction-velocity increases with temperature. Therefore, when we warm the knallgas, the number of collisions of oxygen and hydrogen molecules favourable to the formation

of water becomes greater and greater, until at about 500° the gradual formation of water is observed, while at still higher temperatures the reaction-velocity becomes enormous. We are now in a position to

understand what is the result of a strong ‘ocal heating of the knallgas, as, for example, by an electric spark. The strongly heated parts of the knallgas combine to form water-vapour with great velocity and the evolution of large amounts of heat, whereby the adjacent parts are brought to a high temperature and into a state of rapid reaction, i.e. we observe an ignition of the whole mixture. If we suppose the knallgas to be at a, very high temperature, then its combustion will be no longer complete owing to the dissociation of water- vapour, whilst at extremely high temperatures it would practi- cally disappear. Hence it is clear that knallgas appears to be stable at low temperatures only because the reaction-velocity is very small, but that at very high temperatures it is really stable, since no chemical forces are then active, or, in other words, the chemical affinity is very small.

The determination of the question whether the failure of some reaction is due to an inappreciable reaction-velocity or to absence of chemical affinity, is of fundamental importance, and only in the first case can the reaction be hastened by catalysts.

Many chemical compounds behave like knallgas. Acetylene is stable at ordinary temperatures, inasmuch as it only decom- poses slowly; but at the same time it is explosive, for the decomposition when once started is rapidly propagated, on account of the heat evolved by the splitting up of the gas into carbon and hydrogen. At very high temperatures, however, acetylene acquires real stability, since carbon and hydrogen then react to form acetylene.

Many researches have shown that the combustion of an inflammable gas-mixture which is started at a point, e.g. by an electric spark, may be propagated in two essentially waves. ”’ different ways. The characteristic of the slower combustion consists in this, viz. that the high tempera- ture of the previously ignited layer spreads by conduction, thereby bringing the adjacent layers to the ignition-temperature; the velocity of the propagation is therefore conditioned in the first place by the magnitude of the conductivity for heat, and more particularly, in the second place, by the velocity with which a moderately heated layer begins to react chemically, and so to rise gradually in temperature, i.e. essentially by the change of reaction-velocity with temperature. A second entirely independent mode of propagation of the combustion lies at the basis of the phenomenon that an explosive gas-mixture can be ignited by strong compression or — more correctly — by the rise of temperature thereby produced. The increase of the concentrations of the reacting substances consequent upon this increase of pressure raises the reaction-velocity in accordance with the law of chemical mass-action, and so enormously

favours the rapid evolution of the heat of combustion.

It is therefore clear that such a powerful compression-wave can not only initiate the combustion, but also propagate it with extremely high velocity. Indeed a compression-wave of this kind passes through the gas-mixture, heated by the combustion to a very high temperature. It must, however, be propagated considerably faster than an ordinary compression-wave, for the result of ignition in the compressed (still unburnt) layer is the production of a very high pressure, which must in accordance with the principles of wave-motion increase the velocity of propagation. The absolute velocity of the explosion-wave would seem, in the light of these considerations, to be susceptible of accurate calculation. It is at least clear that it must be considerably higher than the velocity of sound in the mass of gas strongly heated by the explosion, and this is confirmed by actual measurements (see below) which show that the velocity of the explosion-wave is from one and a half times to double that of sound-waves at the combustion temperature.

We are now in a position to form the following picture of the processes which follow upon the ignition of a combustible gas-mixture contained in a long tube. First we have the condition of slow combustion; the heat is conveyed by conduction to the

adjacent layers, and there follows a velocity of propagation of a few metres per second. But since the combustion is accom- panied by a high increase of pressure, the adjacent, still unburnt layers are simultaneously compressed, whereby the reaction- velocity increases, and the ignition proceeds faster. This involves still greater compression of the next layers, and so if the mixture be capable of sufficiently rapid combustion, the velocity of propagation of the ignition must continually increase. As soon as the compression in the still unburnt layers becomes so great that spontaneous ignition results, the now much more pronounced compression-waves excited with simultaneous combustion must be propagated with very great velocity, i.e. we have spontaneous development of an ” explosion-wave.” M.P.E. Berthelot, who discovered the presence of such explosion- waves, proved their velocity of propagation to be independent of the pressure, the cross-section of the tubes in which the explosive gas-mixture is contained, as well as of the material of which these are made, and concluded that this velocity is a constant, characteristic of the particular mixture. The deter’ mination of this velocity is naturally of the highest intereot.

In the following table Berthelot’s results are given along with the later

(1891) concordant ones of H. B. Dixon, the velocities of propagation of explosions being given in metres per second.

Velocity of Wave in Metres per second.

Berthelot.

Dixon.

Hydrogen and oxygen, H 2 + O . Hydrogen and nitrous oxide, H 2 -j- N 2 Methane and oxygen, CH 4 +40 Ethylene „ „ C2H1 + 6O Acetylene ,, „ C2H2+5O Cyanogen ,, ,, C 2 N 2 -f40 Hydrogen and chlorine, H2+O2 , 2H 2 +Cl2

2810 2284 2287 2210 2482 2195

2821

2305 2322

2364 2391 2321 1730 1849

The maximum pressure of the explosion-wave possesses very high values; it appears that a compression of from 1 to 30-40 atmospheres is necessary to produce spontaneous ignition of mixtures of oxygen and hydrogen. But since the heat evolved in the path of the explosion causes a rise of temperature of 2ooo°-3odo°, i.e. a rise of absolute temperature about four times that directly following upon the initial compression, we are here concerned with pressures amounting to considerably more than 100 atmospheres. Both the magnitude of this pressure and the circumstance that it so suddenly arises are peculiar to the very powerful forces which distinguish the explosion-wave from the slow combustion-wave.

Nascent Stale. — The great reactive power of freshly formed or nascent substances (status nascens) may be very simply referred to the principles of mass-action. As is well known, this phenomenon is specially striking in the case of hydrogen, which may therefore be taken as a typical example. The law of mass-action affirms the action of a substance to be the greater the higher its concentration, or, for a gas, the higher its partial- pressure. Now experience teaches that those metals which liberate hydrogen from acids are able to supply the latter under extremely high pressure, and we may therefore assume that the hydrogen which results, for example, from the action of zinc upon sulphuric acid is initially under very high pressures which are then afterwards relieved. Hence the hydrogen during liberation

exhibits much more active powers of reduction than the ordinary gas.

A deeper insight into the relations prevailing here is offered from the atomistic point of view. From this we are bound to conclude that the hydrogen is in the first instance evolved in the form of free atoms, and since the velocity of the reaction $H + H = H_2$ at ordinary temperatures, though doubtless very great, is not practically instantaneous, the freshly generated hydrogen will contain a remnant of free atoms, which are able to react both more actively and more rapidly. Similar considera- tions are of course applicable to other cases.

Ion-reactions. — The application of the law of chemical masft

action is much simplified in the case in which the reaction- velocity is enormously great, when practically an instantaneous adjustment of the equilibrium results. Only in this case can the state of the system, which pertains after mixing the different components, be determined merely from knowledge of the equilibrium-constant. This case is realized in the reactions between gases at very high temperatures, which have, however, been little investigated, and especially by the reactions between electrolytes, the so-called ion-reactions. In this latter case, which has been thoroughly studied on account of its fundamental importance for inorganic qualitative and quantitative analysis, the degrees of dissociation of the various electrolytes (acids, bases and salts) are for the most part easily determined by the aid of the freezing-point apparatus, or of measurements of the electric conductivity; and from these data the equilibrium- constant K may be calculated. Moreover, it can be shown that the state of the system can be determined when the equi- librium constants of all the electrolytes which are present in the common solution are known. If this be coupled with the law that the solubility of solid substances, as with vapour-pressures, is independent of the presence of other electrolytes, it is sufficient to know the solubilities of the electrolytes in question, in order to be able to determine which substances must participate in the equilibrium in the solid state, i.e. we arrive at the theory of the formation and solution of precipitates.

As an illustration of the application of these principles, we shall deal with a problem of the doctrine of affinity, namely, that of the relative strengths of acids and bases. It of acids was q 11 * 16 an ear ly an d

often repeated observation and bases, that the various acids and bases take part with very varying intensity or avidity in those reactions in which their acid or basic nature comes into play. No success attended the early attempts at giving numerical expression to the strengths of acids and bases, i.e. of finding a numerical coefficient for each acid and base, which should be the quantita- tive expression of the degree of its participation in those specific reactions characteristic of acids and bases respectively. Julius Thomsen and W: Ostwald attacked the problem in a far-seeing and comprehensive manner, and arrived at indisputable proof that the property of acids and bases of exerting their effects according to definite numerical coefficients finds expression not only in salt-formation but also in a large number of other, and indeed very miscellaneous, reactions.

When Ostwald compared the order of the strengths of acids deduced from their competition for the same base, as determined by Thomsen's thermo-chemical or his own volumetric method, with that order in which the acids arrange themselves according to their capacity to bring calcium oxalate into solution, or to convert acetamide into ammonium acetate, or to split up methyl acetate into methyl alcohol and acetic acid catalytically, or to invert cane-sugar, or to accelerate the mutual action of hydriodic on bromic acid, he found that in all these well-investi- gated and very miscellaneous cases the same succession of acids in the order of their strengths is obtained, whichever one of the above chemical processes be chosen as measure of these strengths. It is to be noticed that all these chemical changes cited took place in dilute aqueous solution, consequently the above order of acids refers only to the power to react under these circum- stances. The order of acids proved to be fairly independent of temperature. While therefore the above investigations afforded a definite qualitative solution of the order of acids according to strengths, the determination of the quantitative relations offered great difficulties, and the numerical coefficients, determined from the separate reactions, often displayed great variations, though occasionally also surprising agreement. Especially great were the variations of the coefficients with the concentration, and in those cases in which the concentration of the acid changed considerably during the reaction, the calcu- lation was naturally quite uncertain. Similar relations were found in the investigation of bases, the scope of which, however, was much more limited.

These apparently rather complicated relations were now

cleared up at one stroke, by the application of the law of chemical mass-action on the lines indicated by S. Arrhenius in 1887, when he

put forward the theory of electrolytic dissociation to explain that peculiar behaviour of substances in aqueous solution first recognized by van't Hoff in r885. The formulae which must be made use of here in the calculation of the equilibrium-relations follow naturally by simple application of the law of mass-action to the corresponding ion-concentrations.

The peculiarities which the behaviour of acids and bases presents, and, according to the theory of Arrhenius, must present — peculiarities which found expression in the very early distinction between neutral solutions on the one hand, and acid or basic ones on the other, as well as in the belief in a polar antithesis between the two last — must now, in the light of the theory of electrolytic dissociation, be conceived as follows: —

The reactions characteristic of acids in aqueous solution, which are common to and can only be brought about by acids, find their explanation in the fact that this class of bodies gives rise on dissociation to a common molecular species, namely, the

positively charged hydrogen-ion (jj). The specific chemical actions peculiar to acids are therefore to be attributed to the hydrogen-ion just as the actions common to all chlorides are to be regarded as those of the free chlorine-ions. In like manner, the reactions characteristic of bases in solution are to be attri- buted to the negatively charged hydroxyl-ions (oh)i which result from the dissociation of this class of bodies.

A solution has an acid reaction when it contains an excess of hydrogen-ions, and a basic reaction when it contains an excess of hydroxyl-ions. If an acid and an alkaline solution be brought together mutual neutralization must result, since the positive H-ions and the negative OH-ions cannot exist together in view of the extremely weak conductivity of pure water and its conse- quent slight electrolytic dissociation, and therefore they must at once combine to form electrically neutral molecules, in the sense of the equation +

H + OH = H 2 0. In this lies the simple explanation of the " polar " difference between acid and basic solutions. This rests essentially upon the fact that the ion peculiar to acids and the ion peculiar to bases form the two constituents of water, i.e. of that solvent in which we usually study the course of the reaction. The idea of the " strength " of an acid or base at once arises. If we compare equivalent solutions of various acids, the intensity of those actions characteristic of them will be the greater the more free hydrogen-ions they contain; this is an

immediate consequence of the law of chemical mass-action. The degree of electrolytic dissociation determines, therefore, the strength of acids, and a similar consideration leads to the same result for bases.

Now the degree of electrolytic dissociation changes with concentration in a regular manner, which is given by the law of mass-action. For if C denote the concentration of the electrolyte and a its degree of dissociation, the above law states that

$$C^2 a^2 / C(i - a) = Ca^2 / (i - a) = K.$$

At very great dilutions the dissociation is complete, and equiva- lent solutions of the most various acids then contain the same number of hydrogen-ions, or, in other words, are equally strong; and the same is true of the hydroxyl-ions of bases. The dis- sociation also decreases with increasing concentration, but at different rates for different substances, and the relative ” strengths ” of acids and bases must hence change with concen- tration, as was indeed found experimentally. The dissociation- constant K is the measure of the variation of the degree of dissociation with concentration, and must therefore be regarded as the measure of the strengths of acids and bases. So that in this special case we are again brought to the result which was stated in general terms above, viz. that the dissociation-coefficient forms the measure of the reactivity of a dissolved electrolyte. Ostwald’s series of acids, based upon the investigation of the most various reactions, should therefore correspond with the order of their dissociation-constants, and further with the

order of their freezing-point depressions in equivalent solutions, since the depression of the freezing-point increases with the degree of electrolytic dissociation. Experience confirms this conclusion completely. The degree of dissociation of an acid, at a given concentration, for which its molecular conductivity is A, is shown by the theory of electrolytic dissociation to be $a. = A/A_o$«,; $A_{„}$, the molecular conductivity at very great dilu- tion in accordance with the law of Kohlrausch, is $u + v$, where u and v are the ionic-mobilities (see Conduction, Electric). Since u, the ionic-mobility of the hydrogen ion, is generally more than ten times as great as v, the ionic-mobility of the negative acid-radical, $A_{„}$ has approximately the same value (generally within less than 10 %) for the different acids, and the molecular-conductivity of the acids in equivalent concentration is at least

approximately porportional to the degree of electrolytic dissociation, i.e. to the strength.

In general, therefore, the order of conductivities is identical with that in which the acids exert their specific powers. This remarkable parallelism, first perceived by Arrhenius and Ostwald in 1885, was the happy development which led to the discovery of electrolytic dissociation (see Conduction, Electric; and Solution).

Catalysis. — We have already mentioned the fact, early known to chemists, that many reactions proceed with a marked increase of velocity in presence of many foreign substances. With Berzelius we call this phenomenon ” catalysis,” by which we understand that general acceleration of reactions which also progress when left to themselves, in the presence of certain bodies which do not change in amount (or only slightly) during the course of the reaction. Acids and bases appear to act catalytically upon all reactions involving consumption or liberation of water, and indeed that action is proportional to the concentration of the hydrogen or hydroxyl-ions. Further, the decomposition of hydrogen peroxide is ” catalysed ” by iodine- ions, the condensation of two molecules of benzaldehyde to benzoin by cyanogen-ions. One of the earliest known and technically most important instances of catalysis is that of the oxidation of sulphur dioxide to sulphuric acid by oxygen in the presence of oxides of nitrogen. Other well-known and remark- able examples are the catalysis of the combustion of hydrogen and of sulphur dioxide in oxygen by finely-divided platinum. We may also mention the interesting work of Dixon and Baker, which led to the discovery that a large number of gas-reactions, e.g. the combustion of carbon monoxide, the dissociation of sal-ammoniac vapour, and the action of sulphuretted hydrogen upon the salts of heavy metals, cease when water-vapour is absent, or at least proceed with greatly diminished velocity.

” Negative catalysis,” i.e. the retardation of a reaction by addition of some substance, which is occasionally observed, appears to depend upon the destruction of a ” positive catalyte ” by the body added.

A catalyte can have no influence, however, upon the affinity of a process, since that would be contrary to the second law of thermodynamics, according to which affinity of an isothermal process, which is measured by the maximum work, only depends upon the initial and final states. The effect of a catalyte is therefore limited to the resistances opposing the progress of a reaction, and does not influence its driving-force or affinity. Since the catalyte takes no part

in the reaction its presence has no effect on the equilibrium-constant. This, in accordance with the law of mass-action, is the ratio of the separate reaction- velocities in the two contrary directions. A catalyte must therefore always accelerate the reverse-reaction. If the velocity of formation of a body be increased by addition of some substance then its velocity of decomposition must likewise increase. We have an example of this in the well-known fact that the formation, and no less the saponification, of esters, proceeds with increased velocity in the presence of acids, while the observation that in absence of water-vapour neither gaseous ammonium chloride dissociates nor dry ammonia combines with hydrogen chloride becomes clear on the same grounds.

A general theory of catalytic phenomena does not at present

exist. The formation of intermediate products by the action of the reacting substance upon the catalyte has often been thought to be the cause of these. These intervening products, whose existence in many cases has been proved, then split up into the catalyte and the reaction-product. Thus chemists have sought to ascribe the influence of oxides of nitrogen on the formation of sulphuric acid to the initial formation of nitrosyl- sulphuric acid, $S0_2(OH)(N0_2)$, from the mixture of sulphur dioxide, oxides of nitrogen and air, which then reacted with water to form sulphuric and nitrous acids. When the velocity of such intermediate reactions is greater than that of the total change, such an explanation may suffice, but a more certain proof of this theory of catalysis has only been reached in a few cases, though in many others it appears very plausible. Hence it is hardly possible to interpret all catalytic processes on these lines.

In regard to catalysis in heterogeneous systems, especially the hastening of gas-reactions by platinum, it is very probable that it is closely connected with the solution or absorption of the gases on the part of the metal. From the experiments of G. Bredig it seems that colloidal solutions of a metal act like the metal itself. The action of a colloidal-platinum solution on the decomposition of hydrogen peroxide is still sensible even at a dilution of 1/70,000,000 grm.-mol. per litre; indeed the activity of this colloidal-platinum solution calls to mind in many ways that of organic ferments, hence Bredig has called it an ” inorganic ferment.” This analogy is especially striking in the change of their activity with time and temperature, and in the possibility, by means of bodies like sulphuretted hydrogen, hydrocyanic acid, &c, which act as strong poisons upon the latter, of “poison- ing ” the former also, i.e. of rendering it inactive. In the case of the catalytic action of water-vapour upon many processes of

combustion already mentioned, a part of the effect is prob- ably due to the circumstance, disclosed by numerous experi- ments, that the union of hydrogen and oxygen proceeds, between certain temperature limits at least, after the equation $H_2 + 2 = H_2 2$, that is, with the preliminary formation of hydrogen peroxide, which then breaks down into water and oxygen, and further, above all, to the fact that this substance results from oxygen and water at high temperatures with great velocity, though indeed only in small quantities.

The view now suggests itself, that, for example, in the com- bustion of carbon monoxide at moderately high temperatures, the reaction

(I.) $2CO + O_2 = 2CO_2$

advances with imperceptible speed, but that on the contrary the two stages

(II.) $2H_2O + O_2 = 2H_2 2$,

(IIL) $2CO + 2H_2 2 = 2CO_2 + 2H_2O$,

which together result in (I.), proceed rapidly even at moderate temperatures.

Temperature and Reaction-Velocity. — There are few natural constants which undergo so marked a change with temperature as those of the velocities of chemical changes. As a rule a rise of temperature of 10° causes a twofold or threefold rise of reaction-velocity.

If the reaction-coefficient k, in the sense of the equation derived above, viz. $k = t^{-1} \log \{a/(a-x)\}$, be determined for the inversion of cane-sugar by an acid of given concentration, the following values are obtained: —

Temperature = 25° 40 45 50 55° k = 97 73 139 268 491;

here a rise of temperature of only 30 suffices to raise the speed of inversion fifty times.

We possess no adequate explanation of this remarkable temperature influence; but some account of it is given by the molecular theory, according to which the energy of that motion of substances in homogeneous gaseous or liquid systems which constitutes heat increases with the temperature, and hence also the frequency of collision of the reacting substances. When we reflect that the velocity

of motion of the molecules of gases, and in all probability those of liquids also, are proportional to the square root of the absolute temperature, and therefore rise by

only $ % per degree at room-temperature, and that we must assume the number of collisions proportional to the velocity of the molecules, we cannot regard the actually observed increase of reaction-velocity, which often amounts to 10 or 1 2 % per degree, as exclusively due to the quickening of the molecular motion by heat. It is more probable that the increase of the kinetic energy of the atomic motions within the molecule itself is of significance here, as the rise of the specific heat of gases with temperature seems to show. The change of the reaction-coefficient k with temperature may be represented by the empirical equation log £= -AT”” 1 + B + CT, where A, B, C are positive constants. For low temperatures the influence of the last term is as a rule negligible, whilst for high temperatures the first term on the right side plays a vanishingly small part.

Definition of Chemical Affinity. — We have still to discuss the question of what is to be regarded as the measure of chemical affinity. Since we are not in a position to measure directly the intensity of chemical forces, the idea suggests itself to determine the strength of chemical affinity from the amount of the work which the corresponding reaction is able to do. To a certain extent the evolution of heat accompanying the reaction is a measure of this work, and attempts have been made to measure chemical affinities thermo-chemically, though it may be easily shown that this definition was not well chosen. For when, as is clearly most convenient, affinity is so defined that it determines under all circumstances the direction of chemical change, the above definition fails in so far as chemical processes often take place with absorption of heat, that is, contrary to affinities so defined. But even in those cases in which the course of the reaction at first proceeds in the sense of the evolution of heat, it is often observed that the reaction advances not to com- pletion but to a certain equilibrium, or, in other words, stops before the evolution of heat is complete.

A definition free from this objection is supplied by the second law of thermodynamics, in accordance with which all processes must take place in so far as they are able to do external work. When therefore we identify chemical affinity with the maximum work which can be

gained from the process in question, we reach such a definition that the direction of the process is under all conditions determined by the affinity. Further, this definition has proved serviceable in so far as the maximum work in many cases may be experimentally measured, and moreover it stands in a simple relation to the equilibrium constant K. Thermo- dynamics teaches that the maximum work A may be expressed as A= RT log K, when R denotes the gas-constant, T the absolute temperature. In this it is further assumed that both the mole- cular species produced as well as those that disappear are present in unit concentration. The simplest experimental method of directly determining chemical affinity consists in the measure- ment of electromotive force. The latter at once gives us the work which can be gained when the corresponding galvanic element supplies the electricity, and, since the chemical exchange of one gram-equivalent from Faraday's law requires 96,540 coulombs, we obtain from the product of this number and the electromotive force the work per gram-equivalent in watt-seconds, and this quantity when multiplied by 0-23872 is obtained in terms of the usual unit, the gram-calorie. Experience teaches that, especially when we have to deal with strong affinities, the affinity so deter- mined is'for the most part almost the same as the heat-evolution, whilst in the case in which only solid or liquid substances in the pure state take part in the reaction at low temperatures, heat- evolution and affinity appear to possess a practically identical value.

Hence it seems possible to calculate equilibria for low tem- peratures from heats of reaction, by the aid of the two equations

A = Q, A = RTlogK; and since the change of A with temperature, as required by the principles of thermodynamics, follows from the specific heats of the reacting substances, it seems further possible to calculate chemical equilibria from heats of reaction and specific heats. The circumstance that chemical affinity and heat-evolution so nearly coincide »t low temperatures may be derived from the

hypothesis that chemical processes are the result of foice? >ri attraction between the atoms of the different elements. If we may disregard the kinetic energy of the atoms, and this is legitimate for low temperatures, it follows that both heat-evolu- tion and chemical affinity are merely equal to the decrease of the potential energy of the above-mentioned forces, and it is at once clear that the evolution of heat during a reaction between only pure solid or pure liquid substances possesses special importance.

More complicated is the case in which gases or dissolved sub- stances

take part. This is simplified if we first consider the mixing of two mutually chemically indifferent gases. Thermo- dynamics teaches that external work may be gained by the mere mixing of two such gases (see Diffusion), and these amounts of work, which assume very considerable proportions at high temperatures, naturally affect the value of the maximum work and so also of the affinity, in that they always come into play when gases or solutions react. While therefore we regard as chemical affinity in the strictest sense the decrease of potential energy of the forces acting between the atoms, it is clear that the quantities here involved exhibit the simplest relations under the experimental conditions just given, for when only substances in a pure state take part in a reaction, all mixing of different kinds of molecules is excluded; moreover, the circumstance that the respective substances are considered at very low tempera- tures reduces the quantities of energy absorbed as kinetic energy by their molecules to the smallest possible amount.

Chemical Resistance. — When we know the chemical affinity of a reaction, we are in a position to decide in which direction the process must advance, but, unless we know the reaction- velocity also, we can in many cases say nothing as to whether or not the reaction in question will progress with a practically inappreciable velocity so that apparent chemical indifference is the result. This question may be stated in the light of the law of mass- action briefly as follows: — From a knowledge of the chemical affinity we can calculate the equilibrium, i.e. the numerical value of the constant K = kjk'; but to be completely informed of the process we must know not only the ratio of the two velocity-constants k and k', but also the separate absolute values of the same.

In many respects the following view is more comprehensive, though naturally in harmony with the one just expressed. Since the chemical equilibrium is periodically attained, it follows that, as in the case of the motion of a body or of the diffusion of a dissolved substance, it must be opposed by very great friction. In all these cases the velocity of the process at every instant is directly proportional to the driving-force and inversely pro- portional to the frictional resistance. We hence arrive at the result that an equation of the form

reaction-velocity = chemical force I chemical resistance must also hold for chemical change; here we have an analogy with Ohm's law. The " chemical force " at every instant may be calculated from the maximum work (affinity); as yet little is known about " chemical resistance," but it is not improbable that it may be directly measured or theoretically deduced. The problem of the calculation of chemical

reaction-velocity in absolute measure would then be solved; so far we possess indeed only a few general facts concerning the magnitude of chemical resistance. It is immeasurably small at ordinary temperatures for ion-reactions, and, on the other hand, fairly large for nearly all reactions in which carbon-bonds must be loosened (so-called ” inertia of the carbon-bond “) and possesses very high values for most gas-reactions also. With rising temperature it always strongly diminishes; on the other hand, at very low tempera- tures its values are always enormous, and at the absolute zero of temperature may be infinitely great. Therefore at that temperature all reactions cease, since the denominator in the above expression assumes enormous values.

It is a very remarkable phenomenon that the chemical resist- ance is often small in the case of precisely those reactions in which the affinity is also small; to this circumstance is to be traced the fact that in many chemical changes the most stable condition is not at once reached, but is preceded by the formation

of more or less unstable intermediate products. Thus the un- stable ozone is very often first formed on the evolution of oxygen, whilst in the reaction between oxygen and hydrogen water is often not at once formed, but first the unstable hydrogen peroxide as an intermediate product.

Let us now consider the chemical process in the light of the equation

reaction-velocity = chemical force/ ‘chemical resistance.

Thermodynamics shows that at very low temperatures, i.e. in the immediate vicinity of the absolute zero, there is no equilibrium, but every chemical process advances to completion in the one or the other direction. The chemical forces therefore act in the one direction towards complete consumption of the reacting substance. But since the chemical resistance is now immensely great, they can produce practically no appreciable result.

At higher temperatures the reaction always proceeds, at least in homogeneous systems, to a certain equilibrium, and as the chemical resistance now has finite values this equilibrium will always finally be reached after a longer or shorter time. Finally, at very high temperatures the chemical resistance is in every case very small, and the equilibrium is almost instantaneously reached; at the same time,

the affinity of the reaction, as in the case of the mutual affinity between oxygen and hydrogen, may very strongly diminish, and we have then chemical indifference again, not because, as at low temperatures, the denominator of the previous expression becomes very great, but because the numerator now assumes vanishingly small values. (W. N.)

CHEMISTRY (formerly “chymistry”; Gr. xˆeia; for deri- vation see Alchemy), the natural science which has for its pro- vince the study of the composition of substances. In common with physics it includes the determination of properties or characters which serve to distinguish one substance from another, but while the physicist is concerned with properties possessed by all substances and with processes in which the molecules remain intact, the chemist is restricted to those processes in which the molecules undergo some change. For example, the physicist determines the density, elasticity, hardness, electrical and thermal conductivity, thermal expansion, &c; the chemist, on the other hand, investigates changes in composition, such as may be effected by an electric current, by heat, or when two or more substances are mixed. A further differentiation of the provinces of chemistry and physics is shown by the classifications of matter. To the physicist matter is presented in three leading forms — solids, liquids and gases; and although further sub- divisions have been rendered necessary with the growth of knowledge the same principle is retained, namely, a classification based on properties having no relation to composition. The fundamental chemical classification of matter, on the other hand, recognizes two groups of substances, namely, elements, which are substances not admitting of analysis into other substances, and compounds, which do admit of analysis into simpler substances and also of synthesis from simpler substances. Chemistry and physics, however, meet on common ground in a well-defined branch of science, named physical chemistry, which is primarily concerned with the correlation of physical properties and chemical composition, and, more generally, with the elucidation of natural phenomena on the molecular theory.

It may be convenient here to state how the whole subject of chemistry is treated in this edition of the Encyclopaedia Britannica. The present article includes the following sections: —

I. History. — This section is confined to tracing the general trend of the science from its infancy to the foundations of the modern theory. The history of the alchemical period is treated in more detail in the article Alchemy, and of the iatrochemical in the article Medicine. The evolution of the notion of elements is treated under Element; the

molecular hypothesis of matter under Molecule; and the genesis of, and deductions from, the atomic theory of Dalton receive detailed analysis in the article Atom.

II. Principles. — This section treats of such subjects as nomen- clature, formulae, chemical equations, chemical change and similar subjects. It is intended to provide an introduction, necessarily brief, to the terminology and machinery of the chemist.

VI. 2

III. Inorganic Chemistry. — Here is treated “the history of descrip- tive inorganic chemistry; reference should be made to the articles on the separate elements for an account of their preparation, properties, &c.

IV. Organic Chemistry. — This section includes a brief history of the subject, and proceeds to treat of the principles underlying the structure and interrelations of organic compounds.

V. Analytical Chemistry. — This section treats of the qualitative detection and separation of the metals, and the commoner methods employed in quantitative analysis. The analysis of organic com- pounds is also noticed.

VI. Physical Chemistry.-ˆThis section is restricted to an account of the relations existing between physical properties and chemical composition. Other branches of this subject are treated in the articles Chemical Action; Energetics’; Solution; Alloys; Thermochemistry.

I. History

Although chemical actions must have been observed by man in the most remote times, and also utilized in such processes as the extraction of metals from their ores and in the arts of tanning and dyeing, there is no evidence to show that, beyond an unordered accumulation of facts, the early developments of these industries were attended by any real knowledge of the nature of the processes involved. All observations were the result of accident or chance, or possibly in some cases of experi- mental trial, but there is no record of a theory or even a general classification of the phenomena involved, although there is no doubt that the ancients had a fair knowledge of the properties and uses of the commoner substances. The origin of chemistry is intimately bound up with the arts which we have indicated; in this respect it is essentially an experimental science. A unifying principle of chemical and physical changes was provided by metaphysical conceptions of the structure of matter. We find the

notion of ” elements,” or primary qualities, which confer upon all species of matter their distinctive qualities by appropriate combination, and also the doctrine that matter is composed of minute discrete particles, ohtta prevailing in the Greek schools. These ” elements,” sophy. however, had not the significance of the elements of to-day; they connoted physical appearances or qualities rather than chemical relations; and the atomic theory of the ancients is a speculation based upon metaphysical considerations, having, in its origin, nothing in common with the modern molecular theory, which was based upon experimentally observed properties of gases (see Element; Molecule).

Although such hypotheses could contribute nothing directly to the development of a science which laid especial claim to experimental investigations, yet indirectly they stimulated inquiry into the nature of the ” essence ” with which the four ” elements ” were associated. This quinta essentia had been speculated upon by the Greeks, some regarding it as immaterial or aethereal, and others as material; and a school of philosophers termed alchemists arose who attempted the isolation of this essence. The existence of a fundamental principle, unalterable and indestructible, prevailing alike through physical and chemical changes, was generally accepted. Any change which a substance may chance to undergo was simply due to the discarding or taking up of some proportion of the primary ” elements ” or qualities: of these coverings “water,” “air,” “earth” and ” fire ” were regarded as clinging most tenaciously to the essence, while ” cold,” ” heat,” ” moistness ” and ” dryness ” were more easily cast aside or assumed. Several origins have been suggested for the word alchemy, and there seems to Ai c h emy . have been some doubt as to the exact nature and import of the alchemical doctrines. According to M. P. E. Berthelot, ” alchemy rested partly on the industrial processes of the ancient Egyptians, partly on the speculative theories of the Greek philosophers, and partly on the mystical reveries of the Gnostics and Alexandrians.” The search for this essence subsequently resolved itself into the desire to effect the trans- mutation of metals, more especially the base metals, into silver and gold. It seems that this secondary principle became the dominant idea in alchemy, and in this sense the word is used in Byzantine literature of the 4th century; Suidas, writing in

the nth century, defines chemistry as the ’” preparation of silver and gold ” (see Alchemy).

From the Alexandrians the science passed to the Arabs, who made discoveries and improved various methods of separat- ing substances, and afterwards, from the nth century, became seated in Europe, where the alchemical doctrines were assidu- ously studied until the 15th and 16th centuries. It is readily understood why men imbued with the authority of tradition should prosecute the search for a substance which would confer unlimited wealth upon the fortunate discoverer. Some alchemists honestly laboured to effect the transmutation and to discover the ” philosopher’s stone,” and in many cases believed that they had achieved success, if we may rely upon writings assigned to them. The period, however, is one of literary forgeries; most of the MSS. are of uncertain date and authorship, and moreover are often so vague and mystical that they are of doubtful scientific value, beyond reflecting the tendencies of the age. The retaining of alchemists at various courts shows the high opinion which the doctrines had gained. It is really not extraordinary that Isaac Hollandus «was able to indicate the method of the preparation of the ” philosopher’s stone ” from ” adamic ” or ” virgin ” earth, and its action when medicin- ally employed; that in the writings assigned to Roger Bacon, Raimon Lull, Basil Valentine and others are to be found the exact quantities of it to be used in transmutation; and that George Ripley, in the 15th century, had grounds for regarding its action as similar to that of a ferment.

In the view of some alchemists, the ultimate principles of matter were Aristotle’s four elements; the proximate constituents were a ” sulphur ” and a ” mercury,” the father and mother of the metals; gold was supposed to have attained to the perfection of its nature by passing in succession through the forms of lead, brass and silver; gold and silver were held to contain very pure red sulphur and white quicksilver, whereas in the other metals these materials were coarser and of a different colour. From an analogy instituted between the healthy human being and gold, the most perfect of the metals, silver, mercury, copper, iron, lead and tin, were regarded in the light of lepers that required to be healed.

Notwithstanding the false idea which prompted the researches of the alchemists, many advances were made in descriptive chemistry, the metals and their salts receiving much chemistry, attention, and several of our important acids being discovered. Towards the 16th century the failure of the alchemists to achieve their cherished purpose, and the

general increase of medical knowledge, caused attention to be given to the utilization of chemical preparations as medicines. As early as the 15th century the alchemist Basil Valentine had suggested this application, but the great exponent of this doctrine was Paracelsus, who set up a new definition: ” The true use of chemistry is not to make gold but to prepare medi- cines.” This relation of chemistry to medicine prevailed until the 17th century, and what in the history of chemistry is termed the iatrochemical period (see Medicine) was mainly fruitful in increasing the knowledge of compounds; the contributions to chemical theory are of little value, the most important con- troversies ranging over the nature of the ” elements,” which were generally akin to those of Aristotle, modified so as to be more in accord with current observations. At the same time, however, there were many who, opposed to the Paracelsian definition of chemistry, still laboured at the problem of the alchemists, while others gave much attention to the chemical industries. Metallurgical operations, such as smelting, roasting and refining, were scientifically investigated, and in some degree explained, by Georg Agricola and Carlo Biringuiccio; ceramics was studied by Bernard Palissy, who is also to be remembered as an early worker in agricultural chemistry, having made experi- ments on the effect of manures on soils and crops; while general technical chemistry was enriched by Johann Rudolf Glauber. 1

1 The more notable chemists of this period were Turquet de Mayerne(l 573-1665) , a physician of Paris, who rejected the Galenian doctrines and accepted the exaggerations of Paracelsus; Andreas

The second half of the 17th century witnessed remarkable transitions and developments in all branches of natural science, and the facts accumulated by preceding generations during their generally unordered researches were re- ye ‘

placed by a co-ordination of experiment and deduction. From the mazy and incoherent alchemical and iatrochemical doctrines, the former based on false conceptions of matter, the latter on erroneous views of life processes and physiology, a new science arose — the study of the composition of substances. The formula- tion of this definition of chemistry was due to Robert Boyle. In his Sceptical Chemist (1662) he freely criticized the prevailing scientific views and methods, with the object of showing that true knowledge could only be gained by the logical application of the principles of experiment and deduction. Boyle’s masterly exposition of this method is his most important contribution to scientific progress. At the same time he clarified the conception of elements and compounds, rejecting the

older notions, the four elements of the ” vulgar Peripateticks ” and the three principles of the ” vulgar Stagyrists,” and defining an element as a substance incapable of decomposition, and a compound as composed of two or more elements. He explained chemical combination on the hypotheses that matter consisted of minute corpuscles, that by the coalescence of corpuscles of different sub- stances distinctly new corpuscles of a compound were formed, and that each corpuscle had a certain affinity for other corpuscles.

Although Boyle practised the methods which he expounded, he was unable to gain general acceptance of his doctrine of elements; and, strangely enough, the theory which next dominated chemical thought was an alchemical th J£jy ” invention, and lacked the lucidity and perspicuity of Boyle’s views. This theory, named the phlogistic theory, was primarily based upon certain experiments on combustion and calcination, and in effect reduced the number of the alchemical principles, while setting up a new one, a principle of combustibility, named phlogiston (from (jikoyurrbs, burnt). Much discussion had centred about fire or the “igneous principle.” On the one hand, it had been held that when a substance was burned or calcined, it combined with an ” air “; on the other hand, the operation was supposed to be attended by the destruc- tion or loss of the igneous principle. Georg Ernst Stahl, following in some measure the views held by Johann Joachim Becher, as, for instance, that all combustibles contain a ” sulphur ” (which notion is itself of older date than Becher’s terra pinguis), regarded all substances as capable of resolution into two components, the inflammable principle phlogiston, and another element — ” water,” ” acid ” or ” earth.” The violence or completeness of combustion was proportional to the amount of phlogiston present. Combustion meant the liberation of phlogiston. Metals on calcination gave calces from which the metals could be recovered by adding phlogiston, and experiment showed that this could generally be effected by the action of coal or carbon, which was therefore regarded as practically pure phlogiston; the other constituent being regarded as an acid. At the hands of Stahl and his school, the phlogistic theory, by exhibiting a fundamental similarity between all processes of combustion and by its remarkable flexibility, came to be a general theory of chemical action. The objections of the antiphlogistonists, such as the fact that calces weigh more than the original metals instead of less as the theory suggests, were answered by postulat- ing that phlogiston was a principle of levity, or even completely ignored as an accident, the change of qualities being regarded as the only matter of importance. It is remarkable that this theory should have gained the esteem of the notable chemists who flourished in the 18th

century. Henry Cavendish, a care- ful and accurate experimenter, was a phlogistonist, as were J. Black, K. W. Scheele, A. S. Marggraf, J. Priestley and many others who might be mentioned.

Libavius (d. 1616), chiefly famous for his Opera Omnia Medico-chymica (.1595) ; Jean Baptiste van Helmont (1 577-1644), celebrated for his researches on gases ; F. de la Boe Sylvius (1614-1672), who regarded medicine as applied chemistry; and Otto Tachenius, who elucidated the nature of salts.

Descriptive chemistry was now assuming considerable pro- portions; the experimental inquiries suggested by Boyle were , . . being assiduously developed; and a wealth of observa- tions was being accumulated, for the explanation of which the resources of the dominant theory were sorely taxed. To quote Antoine Laurent Lavoisier, "... chemists have turned phlogiston into a vague principle, . . . which conse- quently adapts itself to all the explanations for which it may be required. Sometimes this principle has weight, and sometimes it has not; sometimes it is free fire and sometimes it is fire combined with the earthy element; sometimes it passes through the pores of vessels, sometimes these are impervious to it; it explains both causticity and non-causticity, transparency and opacity, colours and their absence; it is a veritable Proteus changing in form at each instant." Lavoisier may be justly regarded as the founder of modern or quantitative chemistry. First and foremost, he demanded that the balance must be used in all investigations into chemical changes. He established as fundamental that combustion and calcination were attended by an increase of weight, and concluded, as did Jean Rey and John Mayow in the 17th century, that the increase was due to the combination of the metal with the air. The problem could obviously be completely solved only when the composition of the air, and the parts played by its components, had been determined. At all times the air had received attention, especially since van Helmont made his far-reaching investigations on gases. Mayow had suggested the existence of two components, a spiritus nilro- aerus which supported combustion, and a spiritus iiitri acidi which extinguished fire; J. Priestley and K. W. Scheele, although they isolated oxygen, were fogged by the phlogistic tenets; and H. Cavendish, who had isolated the nitrogen of the atmosphere, had failed to decide conclusively what

had really happened to the air which disappeared during combustion.

Lavoisier adequately recognized and acknowledged how much he owed to the researches of others; to himself is due the co-ordination of these researches, and the welding of his results into a doctrine to which the phlogistic theory ultimately succumbed. He burned phosphorus in air standing over mercury, and showed that (1) there was a limit to the amount of phosphorus which could be burned in the confined air, (2) that when no more phosphorus could be burned, one-fifth of the air had disappeared, (3) that the weight of the air lost was nearly equal to the difference in the weights of the white solid produced and the phosphorus burned, (4) that the density of the residual air was less than that of ordinary air. The same results were obtained with lead and tin; and a more elaborate repetition indubitably established their correctness. He also showed that on heating mercury calx alone an ” air ” was liberated which differed from other ” airs,” and was slightly heavier than ordinary air; moreover, the weight of the ” air “set free from a given weight of the calx was equal to the weight taken up in forming the calx from mercury, and if the calx be heated with charcoal, the metal was recovered and a gas named ” fixed air,” the modern carbon dioxide, was formed. The former experiment had been performed by Scheele and Priestley, who had named the gas ” phlogisticated air “; Lavoisier subsequently named it oxygen, regarding it as the ” acid producer ” (6£6s, sour). The theory advocated by Lavoisier came to displace the phlogistic concep- tion; but at first its acceptance was slow. Chemical literature was full of the phlogistic modes of expression — oxygen was ” dephlogisticated air,” nitrogen “phlogisticated air,” &c. — and this tended to retard its promotion. Yet really the transition from the one theory to the other was simple, it being only necessary to change the ” addition or loss of phlogiston ” into the ” loss or addition of oxygen.” By his insistence upon the use of the balance as a quantitative check upon the masses involved in all chemical reactions, Lavoisier was enabled to establish by his own investigations and the results achieved by others the principle now known as the ” conservation of mass.” Matter can neither be created nor destroyed; however a chemical system be changed, the weights before and after are

equal. 1 To him is also due a rigorous examination of the nature of elements and compounds; he held the same views that were laid down by Boyle, and with the same prophetic foresight predicted that some of the elements which he himself accepted might be eventually found to be compounds.

It is unnecessary in this place to recapitulate the many results which

had accumulated by the end of the 18th century, or to discuss the labours and theories of individual workers since these receive attention under biographical headings; in this article only the salient features in the history of our science can be treated. The beginning of the 19th century was attended by far-reaching discoveries in the nature of the composition of compounds. Investigations proceeded in two directions: — (1) the nature of chemical affinity, (2) the laws of chemical combination. The first question has not yet been solved, although it has been speculated upon a mniˆ. from the earliest times. The alchemists explained chemical action by means of such phrases as ” like attracts like,” substances being said to combine when one “loved” the other, and the reverse when it ” hated ” it. Boyle rejected this terminology, which was only strictly applicable to intelligent beings; and he used the word ” affinity ” as had been previously done by Stahl and others. The modern sense of the word, viz. the force which holds chemically dissimilar substances together (and also similar substances as is seen in di-, tri-, and poly-atomic molecules), was introduced by Hermann Boerhaave, and made more precise by Sir Isaac Newton. The laws of chemical com- bination were solved, in a measure, by John Dalton, and the solution expressed as Dalton’s ” atomic theory.” Lavoisier appears to have assumed that the composition of every chemical compound was constant, and the same opinion was the basis of much experimental inquiry at the hands of Joseph Louis Proust during 1801 to 1809, who vigorously combated the doctrine of Claude Louis Berthollet (Essai de statique chimique, 1803), viz. that fixed proportions of elements and compounds combine only under exceptional conditions, the general rule being that the composition of a compound may vary continuously between certain limits. 2

This controversy was unfinished when Dalton published the first part of his New System of Chemical Philosophy in 1808, although the per solium theory was the most popular. Led thereto by speculations on gases, Dalton assumed that matter was composed of atoms, that in the elements the atoms were simple, and in compounds complex, being composed of elementary atoms. Dalton furthermore perceived that the same two elements or substances may combine in different proportions, and showed that these proportions had always a simple ratio to one another. This is the ” law of multiple proportions.” He laid down the following arbitrary rules for determining the number of atoms in a compound: — if only one compound of two elements exists, it is a binary compound and its atom is composed of one atom of each element; if two compounds exist one is binary (say A + B) and the other ternary (say A + 2B) ; if three, then one is binary and

the others may be ternary (A + 2B,and2A + B), and so on. More important is his deduction of equivalent weights, i.e. the relative weights of atoms. He took hydrogen, the lightest substance known, to be the standard. From analyses of water, which he regarded as composed of one atom of hydrogen and one of oxygen, he

1 This dictum was questioned by the researches of H. Landolt, A. Heydweiller and others. In a series of 75 reactions it was found that in 61 there was apparently a diminution in weight, but in 1908, after a most careful repetition and making allowance for all experi- mental errors, Landolt concluded that no change occurred (see Element).

2 The theory of Berthollet was essentially mechanical, and he attempted to prove that the course of a reaction depended not on affinities alone but also on the masses of the reacting components. In this respect his hypothesis has much in common with the ” law of mass-action ” developed at a much later date by the Swedish chemists Guldberg and Waage, and the American, Willard Gibbs (see Chemical Action). In his classical thesis Berthollet vigorously attacked the results deduced by Bergman, who had followed in his table of elective attractions the path traversed by Stahl and S. F. Geoffroy.

Dalton.

deduced the relative weight of the oxygen atom to be 6-5; from marsh gas and olefiant gas he deduced carbon = 5, there being one atom of carbon and two of hydrogen in the former and one atom of hydrogen to one of carbon in the latter; nitrogen had an equivalent of 5, and so on. 1

The value of Dalton’s generalizations can hardly be over- estimated, notwithstanding the fact that in several cases they needed correction. The first step in this direction was effected by the co-ordination of Gay Lussac’s observations on the combining volumes of gases. He discovered that gases always combined in volumes having simple ratios, and that the volume of the product had a simple ratio to the volumes of the reacting gases. For example, one volume of oxygen combined with two of hydrogen to form two volumes of steam, three volumes of hydrogen combined with one of nitrogen to give two volumes of ammonia, one volume of hydrogen combined with one of

chlorine to give two volumes of hydrochloric acid. An immediate inference was that the Daltonian ” atom ” must have parts which enter into combination with parts of other atoms; in other words, there must exist two orders of particles, viz. (1) particles derived by limiting mechanical subdivision, the modern molecule, and (2) particles derived from the first class by chemical subdivision, i.e. particles which are incapable of existing alone, but may exist in combination. Additional evidence as to the structure of the molecule was discussed by Avogadro in 1811, and by Ampere in 1814. From the gas-laws of Boyle and J. A. C. Charles — viz. equal changes in temperature and pressure occasion equal changes in equal volumes of all gases and vapours — Avogadro deduced the law: — Under the same conditions of temperature and pressure, equal volumes of gases contain equal numbers of molecules; and he showed that the relative weights of the molecules are determined as the ratios of the weights of equal volumes, or densities. He established the existence of molecules and atoms as we have defined above, and stated that the number of atoms in the molecule is generally 2, but may be 4, 8, &c. We cannot tell whether his choice of the powers of 2 is accident or design.

Notwithstanding Avogadro’s perspicuous investigation, and a similar exposition of the atom and molecule by A. M. Ampere, Berzelius tne v * ews therein expressed were ignored both by their own and the succeeding generation. In place of the relative molecular weights, attention was concentrated on relative atomic or equivalent weights. This may be due in some measure to the small number of gaseous and easily volatile substances then known, to the attention which the study of the organic compounds received, and especially to the energetic investigations of J. J. Berzelius, who, fired with enthusiasm by the original theory of Dalton and the law of multiple proportions, determined the equivalents of combining ratios of many elements in an enormous number of compounds. 2 He prosecuted his labours in this field for thirty years; as proof of his industry it may be mentioned that as early as 1818 he had determined the combining ratios of about two thousand simple and compound substances.

We may here notice the important chemical symbolism or notation introduced by Berzelius, which greatly contributed to the definite Chemical an< ˆ conve nient representation of chemical composition

. .. and the tracing of chemical reactions. The denotation of

no a 1 a e i emen t s by symbols had been practised by the alchemists, and it is interesting to note that the symbols allotted to the well-known elements are identical with the astrological symbols of the sun

and the other members of the solar system. Gold, the most perfect metal, had the symbol of the Sun, O ; silver, the semiperfect metal, had the symbol of the Moon, 5); copper, iron and antimony, the imperfect metals of the gold class, had the symbols of Venus $, Mars tf, and the Earth £ ; tin and lead, the imperfect metals of the silver class, had the symbols of Jupiter QJ., and Saturn T? ; while mercury, the imperfect metal of both the gold and silver class, had the symbol of the planet, § . Torbern Olof Bergman used an elaborate system in his Opuscula physica et chemica (1783); the

1 Dalton's atomic theory is treated in more detail in the article Atom.

1 Berzelius, however, appreciated the necessity of differentiating the atom and the molecule, and even urged Dalton to amend his doctrine, but without success.

elements received symbols composed of circles, arcs of circles, and

lines, while certain class symbols, such as ^\J for metals, _|-f oracids,

@ for alkalies, Q for salts, N^ for calces, &c. , were used. Compounds

were represented by copulating simpler symbols, e.g. mercury calx

was ^ Q •* Bergman's symbolism was obviously cumbrous, and

the system used in 1782 by Lavoisier was equally abstruse, since the forms gave no clue as t o composition; for instance water, oxygen,

and nitric acid were\/ >£ft<, and f~~)\ •

A partial clarification was suggested in 1787 by J. H. Hassenfratz and Adet, who assigned to each element a symbol, and to each compound a sign which should record the elements present and their relative quantities. Straight lines and semicircles were utilized for the non-metallic elements, carbon, nitrogen, phosphorus and sulphur (the " simple acidifiable bases " of Lavoisier), and circles enclosing the initial letters of their names for the metals. The " compound acidifiable bases," i.e. the hypothetical radicals of acids, were denoted by squares enclosing the initial letter of the base; an alkali was denoted by a triangle, and the particular alkali by inserting the initial letter. Compounds were denoted by joining the symbols of the components, and by varying the manner of joining compounds of the same elements were distinguished. The symbol V was used to denote a liquid, and a vertical line to denote a gas. As an example of the complexity of this system we may note the five oxides of nitrogen,

which were symbolized as

c r. f. v- and v_,

the first three representing the gaseous oxides, and the last two the liquid oxides.

A great advance was made by Dalton, who, besides introducing simpler symbols, regarded the symbol as representing not only the element or compound but also one atom of that element or compound; in other words, his symbol denoted equivalent weights. 4 This system, which permitted the correct representation of molecular composition, was adopted by Berzelius in 1814, who, having replaced the geometric signs of Dalton by the initial letter (or letters) of the Latin names of the elements, represented a compound by placing a plus sign between the symbols of its components, and the number of atoms of each component (except in the case of only one atom) by placing Arabic numerals before the symbols; for example, copper oxide was Cu + O, sulphur trioxide S-j-30. If two compounds combined, the + signs of the free compounds were discarded, and the number of atoms denoted by an Arabic index placed after the elements, and from these modified symbols the symbol of the new compound was derived in the same manner as simple compounds were built up from their elements. Thus copper sulphate was CuO + SO 3 , potassium sulphate 2S0 3 -)-PoO 2 (the symbol Po for potassium was subsequently discarded in favour of K from kaliuni). At a later date Berzelius denoted an oxide by dots, equal in number to the number of oxygen atoms present, placed over the element ; this notation survived longest in mineralogy. He also introduced barred symbols, i.e. letters traversed by a horizontal bar, todenote the double atom (or molecule). Although the system of Berzelius has been modified and extended, its principles survive in the modern notation.

In the development of the atomic theory and the deduction of the atomic weights of elements and the formulae of compounds, Dalton's arbitrary rules failed to find complete accept- Extension ance. Berzelius objected to the hypothesis that if of the two elements form only one compound, then the atomlc atoms combine one and one; and although he agreed eory ' with the adoption of simple rules as a first attempt at representing a compound, he availed himself of other data in order to gain further information as to the structure of compounds. For example, at first he represented ferrous and ferric oxides by the formulae Fe02, Fe03, and by the analogy of zinc and other basic oxides he regarded these substances as constituted similarly to Fe02, and the acidic oxides alumina and chromium oxide as similar to Fe0 3

. He found, however, that chromic acid, which he had represented as Cr06, neutralized a base containing -§ the

3 The following symbols were also used by Bergman : —

0. d). Q. 6, I ~ 30. V V, A

which represented zinc, manganese, cobalt, bismuth, nickel, arsenic, platinum, water, alcohol, phlogiston.

4 The following are the symbols employed by Dalton : —

o. 0. •. o;ts>, e, ©, ©, 0, 0, 0, o, ©.

which represent in order, . hydrogen, nitrogen, carbon, oxygen, phosphorus, sulphur, magnesia, lime, soda, potash, strontia, baryta, mercury; iron, zinc, copper, lead, silver, platinum, and gold were represented by circles enclosing the initial letter of the element.

quantity of oxygen. He inferred that chromic acid must contain only three atoms of oxygen, as did sulphuric acid S0 3 ; consequently chromic oxide, which contains half the amount of oxygen, must be Cr 2 3 , and hence ferric oxide must be Fe 2 3 . The basic oxides must have the general formula MO. To these results he was aided by the law of isomorphism formulated by E. Mitscherlich in 1820; and he confirmed his conclusions by showing the agreement with the law of atomic heat formulated by Dulong and Petit in 1819.

While successfully investigating the solid elements and their compounds gravimetrically, Berzelius was guilty of several inconsistencies in his views on gases. He denied that gaseous atoms could have parts, although compound gases could. This attitude was due to his adherence to the ” dualistic theory” of the structure of substances, which he deduced from electro- chemical researches. From the behaviour of substances on electrolysis (g.v.) he assumed that all substances had two com- ponents, one bearing a negative charge, the other a positive charge. Combination was associated with the coalescence of these charges, and the nature of the resulting compound showed the nature of the residual electricity. For example, positive iron combined with negative oxygen to form positive ferrous

oxide; positive sulphur combined with negative oxygen to form negative sulphuric acid; positive ferrous oxide combined with negative sulphuric acid to form neutral ferrous sulphate. Berzelius elevated this theory to an important position in the history of our science. He recognized that if an elementary atom had parts, his theory demanded that these parts should carry different electric charges when they entered into reaction, and the products of the reaction should vary according as a positive or negative atom entered into combination. For instance if the reaction 2H 2 +0 2 =H 2 0-r-H 2 be true, the molecules of water should be different, for a negative oxygen atom would combine in one case, and a positive oxygen atom in the other. Hence the gaseous atoms of hydrogen and oxygen could not have parts. A second inconsistency was presented when he was compelled by the researches of Dumas to admit Avogadro's hypothesis; but here he would only accept it for the elementary gases, and denied it for other substances. It is to be noticed that J. B. Dumas did not adopt the best methods for emphasizing his discoveries. His terminology was vague and provoked caustic criticism from Berzelius; he assumed that all molecules contained two atoms, and consequently the atomic weights deduced from vapour density determinations of sulphur, mercury, arsenic, and phosphorus were quite different from those established by gravimetric and other methods.

Chemists gradually tired of the notion of atomic weights on account of the uncertainty which surrounded them; and the suggestion made by W. H. Wollaston as early as 1814 to deal only with " equivalents," i.e. the amount of an element which can combine with or replace unit weight of hydrogen, came into favour, being adopted by L. Gmelin in his famous text-book.

Simultaneously with this discussion of the atom and molecule, great controversy was ranging over the constitution of com- Atomlc pounds, more particularly over the carbon or organic and mole- compounds. This subject is discussed in section IV., cuiar Organic Chemistry. The gradual accumulation of data

weights. referring to organic compounds brought in its train a revival of the discussion of atoms and molecules. A. Laurent and C. F. Gerhardt attempted a solution by investigating chemical reactions. They assumed the atom to be the smallest part of matter which can exist in combination, and the molecule to be the smallest part which can enter into a chemical reaction. Gerhardt found that reactions could be best followed if one assumed the molecular weight of an element or compound to be that weight which occupied the same volume as two unit weights of hydrogen, and this assumption led him

to double the equiva- lents accepted by Gmelin, making H = l, 0 = 16, and C = 12, thereby agreeing with Berzelius, and also to halve the values given by Berzelius to many metals. Laurent generally agreed, except when the theory compelled the adoption of formulae containing fractions of atoms; in such cases he regarded the

molecular weight as the weight occupying a volume equal to four unit weights of hydrogen. The bases upon which Gerhardt and Laurent founded their views were not sufficiently well grounded to lead to the acceptance of their results; Gerhardt himself returned to Gmelin's equivalents in his Lehrbuch der Chemie (1853) as they were in such general use.

In i860 there prevailed such a confusion of hypotheses as to the atom and molecule that a conference was held at Karlsruhe to discuss the situation. At the conclusion of the sitting, Lothar Meyer obtained a paper written by Stanislas Cannizzaro in 1858 wherein was found the final link required for the deter- mination of atomic weights. This link was the full extension of Avogadro's theory to all substances, Cannizzaro showing that chemical reactions in themselves would not suffice. He chose as his unit of reference the weight of an atom of hydrogen, i.e. the weight contained in a molecule of hydrochloric acid, thus differing from Avogadro who chose the weight of a hydrogen molecule. From a study of the free elements Cannizzaro showed that an element may have more than one molecular weight; for example, the molecular weight of sulphur varied with the tem- perature. And from the study of compounds he showed that each element occurred in a definite weight or in some multiple of this weight. He called this proportion the " atom," since it invariably enters compounds without division, and the weight of this atom is the atomic weight. This generalization was of great value inasmuch as it permitted the deduction of the atomic weight of a non-gasifiable element from a study of the : densities of its gasifiable compounds.

From the results obtained by Laurent and Gerhardt and their predecessors it immediately followed that, while an element could have but one atomic weight, it could have several equivalent weights. From a detailed study of organic compounds Ger- hardt had promulgated a " theory of types " which represented a fusion of the older radical and type theories. This theory brought together, as it were, the most varied compounds, and stimulated inquiry into many fields. According to this theory, an element in a compound had a definite saturation capacity, an idea very old in itself, being framed in the law of multiple proportions. These saturation capacities were assidu- .

ously studied by Sir Edward Frankland, who from the investigation, not of simple inorganic compounds, but of the organo-metallic derivatives, determined the kernel of the theory of valency. Frankland showed that any particular element preferentially combined with a definite number (which might vary between certain limits) of other atoms; for example, some atoms always combined with one atom of oxygen, some with two, while with others two atoms entered into combination with one of oxygen. If an element or radical combined with one atom of hydrogen, it was termed monovalent; if with two (or with one atom of oxygen, which is equivalent to two atoms of hydrogen) it was divalent, and so on. The same views were expressed by Cannizzaro, and also by A. W. von Hofmann, who materially helped the acceptance of the doctrine by the lucid exposition in his Introduction to Modern Chemistry, 1865.

The recognition of the quadrivalency of carbon by A. Kekule was the forerunner of his celebrated benzene theory in particular, and of the universal application of structural formulae to the representation of the most complex organic compounds equally lucidly as the representation of the simplest salts. Alexander Butlerow named the ” structure theory,” and contributed much to the development of the subject. He defined structure ” as the manner of the mutual linking of the atoms in the molecule,” but denied that any such structure could give information as to the orientation of the atoms in space. He regarded the chemical properties of a substance as due to’(i) the chemical atoms composing it, and (2) the structure, and he asserted that while different compounds might have the same components (isomer- ism), yet only one compound could have a particular structure. Identity in properties necessitated identity in structure.

While the principle of varying valency laid down by Frankland is still retained, Butlerow’s view that structure had no spatial significance has been modified. The researches of L. Pasteur,

Periodic law.

Summary.

J. A. Le Bel, J. Wislicenus, van’t Hoff and others showed that substances having the same graphic formulae vary in properties and reactions, and consequently the formulae need modification in order to exhibit these differences. Such isomerism, named stereo-isomerismˆ.!).), hasbeen assiduously developedduringrecentyears; it prevails among many different classes of organic compounds and many examples have been found in inorganic chemistry.

The theory of valency as a means of showing similarity of properties and relative composition became a dominant feature of chemical theory, the older hypotheses of types, radicals, &c being more or- less discarded. We have seen how its utilization in the ” structure theory ” permitted great clarification, and attempts were not wanting for the deduction of analogies or a periodicity between elements. Frank- land had recognized the analogies existing between the chemical properties of nitrogen, phosphorus, arsenic and antimony, noting that they act as

tri- or penta-valent. Carbon was joined with silicon, zirconium and titanium, while boron, being tri- valent, was relegated to another group. A general classification of elements, however, was not realized by Frankland, nor even by Odling, who had also investigated the question from the valency standpoint. The solution came about by arranging the elements in the order of their atomic weights, tempering the arrangement with the results deduced from the theory of valencies and experimental observations. Many chemists contributed to the establishment of such a periodicity, the greatest advances being made by John Newlands in England, Lothar Meyer in Germany, and D. J. Mendeleeff in St Petersburg. For the development of this classification see Element.

In the above sketch we have briefly treated the history of the main tendencies of our science from the earliest times to the establishment of the modern laws and principles. We have seen that the science took its origin in the arts practised by the Egyptians, and, having come under the influence of philosophers, it chose for its purpose the isolation of the quinta essentia, and subsequently the ” art of making gold and silver.” This spirit gave way to the physicians, who regarded ” chemistry as the art of preparing medicines,” a denotation which in turn succumbed to the arguments of Boyle, who regarded it as the ” science of the composition of substances,” a definition which adequately fits the science to-day. We have seen how his classification of substances into elements and compounds, and the definitions which he assigned to these species, have similarly been retained; and how Lavoisier established the law of the ” conservation of mass,” overthrew the prevailing phlogistic theory, and became the founder of modern chemistry by the overwhelming importance which he gave to the use of the balance. The development of the atomic theory and its concomitants — the laws of chemical combination and the notion of atoms and equivalents — at the hands of Dalton and Berzelius, the extension to the modern theory of the atom and molecule, and to atomic and molecular weights by Avogadro, Ampere, Dumas, Laurent, Gerhardt, Cannizzaro and others, have been noted. The structure of the molecule, which mainly followed investigations in organic compounds, Frankland’s conception of valency, and finally the periodic law, have also been shown in their chrono- logical order. The principles outlined above constitute the foundations of our science; and although it may happen that experiments may be made with which they appear to be not in complete agreement, yet in general they constitute a body of working hypotheses of inestimable value.

Chemical Education. — It is remarkable that systematic in- struction in the theory and practice of chemistry only received earnest attention

in our academic institutions during the opening decades of the 19th century. Although for a long time lecturers and professors had been attached to universities, generally their duties had also included the study of physics, mineralogy and other subjects, with the result that chemistry received scanty encouragement. Of practical instruction there was none other than that to be gained in a few private laboratories and in the shops of apothecaries. The necessity for experimental demon- stration and practical instruction, in addition to academic

lectures, appears to have been urged by the French chemists L. N. Vauquelin, Gay Lussac, Thenard, and more especially by A. F. Fourcroy and G. F. Rouelle, while in England Humphry Davy expounded the same idea in the experimental demonstra- tions which gave his lectures their brilliant charm. But the real founder of systematic instruction in our science was Justus von Liebig, who, having accepted the professorship at Giessen in 1824, made his chemical laboratory and course of instruction the model of all others. He emphasized that the practical training should include (1) the qualitative and quantitative analysis of mixtures, (2) the preparation of substances according to established methods, (3) original research —a course which has been generally adopted. The pattern set by Liebig at Giessen was adopted by F. Wohler at Gottingen in 1836, by R. W. Bunsen at Marburg in 1840, and by 0. L. Erdmann at Leipzig in 1843; and during the ‘fifties and ‘sixties many other labora- tories were founded. A new era followed the erection of the laboratories at Bonn and Berlin according to the plans of A. W. von Hofmann in 1867, and of that at Leipzig, designed by Kolbe in 1868. We may also mention the famous laboratory at Munich designed by A. von Baeyer in 1875.

In Great Britain the first public laboratory appears to have been opened in 1817 by Thomas Thomson at Glasgow. But the first important step in providing means whereby students could systematically study chemistry was the foundation of the College of Chemistry in 1845. This institution was taken over by the Government in 18 S3, becoming the Royal College of Chemistry, and incorporated with the Royal School of Mines; in 1881 the names were changed to the Normal School of Science and Royal School of Mines, and again in 1890 to the Royal College of Science. In 1907 it was incorporated in the Imperial College of Science and Technology. Under A. W. von Hofmann, who designed the laboratories and accepted the professorship in 1845 at the instigation of Prince Albert, and under his successor (in 1864) Sir Edward Frankland, this institution became one of the most important centres of chemical instruction. Oxford and

Cambridge sadly neglected the erection of convenient laboratories for many years, and consequently we find technical schools and other universities having a far better equipment and offering greater facilities. In the provinces Victoria University at Manchester exercised the greater impetus, numbering among its professors Sir W. H. Perkin and Sir Henry Roscoe.

In America public laboratory instruction was first instituted at Yale College during the professorship of Benjamin Silliman. To the great progress made in recent years F. W. Clarke, W. Gibbs, E. W. Morley, Ira Remsen, and T. W. Richards have especially contributed.

In France the subject was almost entirely neglected until late in the 19th century. The few laboratories existing in the opening decades were ill-fitted, and the exorbitant fees con- stituted a serious bar to general instruction, for these institutions received little government support. In 1869 A. Wurtz reported the existence of only one efficient laboratory in France, namely the Ecole Ndrmale Superieure, under the direction of H. Sainte Claire Deville. During recent years chemistry has become one of the most important subjects in the curriculum of technical schools and universities, and at the present time no general educational institution is complete until it has its full equip- ment of laboratories and lecture theatres.

Chemical Literature. — The growth of chemical literature since the publication of Lavoisier's famous Traite de chimie in 1789, and of Berzelius' Lehrbuch der Chemie in 1 808-1 8 1 8, has been enormous. These two works, and especially the latter, were the models followed by Thenard, Liebig, Strecker, Wohler and many others, including Thomas Graham, upon whose Elements of Chemistry was founded Otto's famous Lehrbuch der Chemie, to which H. Kopp contributed the general theoretical part, Kolbe the organic, and Buff and Zamminer the physico-chemical. Organic chemistry was especially developed by the publication of Gerhard.t's Traite de chimie organique in 1 853-1 856, and of Kekule's Lehrbuch, der organischen Chemie in 1861-1882. General theoretical and physical chemistry was treated with conspicuous acumen by Lothar Meyer in his Moderne Theorien, by W. Ostwald in his Lehrbuch der allgem. Chemie (1884-1887), and by Nernst in his Theoretische Chemie. In English, Roscoe and Schorlemmer's Treatise on Chemistry is a standard work; it records

a successful attempt to state the theories and facts of chemistry, not in condensed epitomes, but in an easily read form. – The Tratte de chimie minerale, edited by H. Moissan, and the Handbuch der anorganischen Chemie, edited by Abegg, are of the same type. O. Dammer's Handbuch der anorganischen Chemie and F. Beilstein's Handbuch der organischen Chemie are invaluable works of reference. Of the earlier encyclopaedias we may notice the famous Hand- worterbuch der reinen und angewandten Chemie, edited by Liebig; Fremy's Encyclopedic de chimie, Wurtz's Dictionnaire de chimie pure et appliquee, Watts' Dictionary of Chemistry, and Ladenburg's Handworterbuch der Chemie.

The number of periodicals devoted to chemistry has steadily increased since the early part of the 19th century. In England the most important is the Journal- of the 1 Chemical Society of London, first published in 1848. Since 187 1 abstracts of papers appearing in the other journals have been printed. In 1904 a new departure was made in issuing Annual Reports , containing resumes of the most important researches of the year. The Chemical News, founded by Sir W. Crookes in i860, may also be noted. In America the chief periodical is the American Chemical Journal, founded in 1879. Germany is provided with a great number of magazines. The Berichte der deutschen chemischen Gesellschaft, published by the Berlin Chemical Society, the Chemisches Centralblatt, which is con- fined to abstracts of papers appearing in other journals, the Zeitschrift fur-Chemie, and Liebig's Annalen der Chemie are the most important of the general magazines. Others devoted to special phases are the Journal fur praktische Chemie, founded by Erdmann in 1834, the Zeitschrift fur anorganische Chemie and the Zeitschrift fur physi- kalische Chemie. Mention may also be made of the invaluable Jahresberichte and the Jahrbuch der Chemie. In France, the most important journals are the Annates de chimie et de physique, founded in 1789 with the title Annates de chimie, and the Comptes rendus, published weekly by the Academie frangaise since 1835.

II. General Principles

The substances with which the chemist has to deal admit of classification into elements and compounds. Of the former about eighty may be regarded as well characterized, although many more have been described.

Elements. — The following table gives the names, symbols and atomic

weights of the perfectly characterized elements: —

International Atomic Weights, 1910. Atomic

Name. Symbol.

Aluminium

. . Al

Antimony

. Sb

Argon

. A

Arsenic

. As

Barium ..

. Ba

Beryllium or

Be

Glucinum

Gl

Bismuth ■

. Bi

Boron

. B

Bromine .

. Br

Cadmium

. Cd

Caesium .

. Cs

Calcium .

. Ca

Carbon .

. C

Cerium .

. Ce

Chlorine .

. CI

Chromium

. Cr

Cobalt .

. Co

Columbium

. Cb

or Niobiurr

1 . Nb

Copper .

. Cu

Dysprosium

■ Dy

Erbium .

. Er

Europium

. Eu

Fluorine .

. F

Gadolinium

. Gd

Gallium .

. Ga

Germanium

. Ge

Gold . .

. Au

Helium

. He

Hydrogen

. H

Indium .

. In

Iodine

. I

Iridium .

. Ir

Iron .

. Fe

Krypton .

. Kr

Lanthanum

. La

Lead .

. Pb

Lithium .

. Li

Lutecium

. Lu

Magnesium

. Mg

Manganese

. Mn

Weights.

0 = 16, 27-1 .

120-2

399 74-96

137-37

9-1

208-0

II-O

7992 112-40 132-81

40-09

12-0 140-25

35-46

52-0

58-97 93-5

63-57 162-5 167-4 152-0

19-0

157-3 69-9

7 2 -5 197-2 4-0

i.-oo8

114-8 126-92 1931 55-85 83-0 139-0 207-10 7-00

174 24-32

54-93

Name. Symbol.

Mercury

Molybdenum

Neodymium

Neon .

Nickel

Nitrogen

Osmium

Oxygen

Palladium

Phosphorus

Platinum

Potassium

Praseodymium

Radium .

Rhodium ,

Rubidium

Ruthenium

Samarium

Scandium

Selenium .

Silicon

Silver

Sodium .

Strontium

Sulphur .

Tantalum

Tellurium

Terbium .

Thallium .

Thorium .

Thulium .

Tin . .

Titanium .

Tungsten .

Uraniurn .

Vanadium

Xenon

Ytterbiiˆji (Neo-

ytterbium) Yttrium . Zinc . Zirconium

Hg

Mo

Nd

Ne

Ni

N

Os

O

Pd

P

Pt

K

Pr

Ra

Rh

Rb

Ru

Sa

Sc

Se

Si

Ag

Na

Sr

S

Ta

Te

Tb

Tl

Th

Tm

Sn

Ti

W

U

V

Xe

Yb Y Zn Zr

Atomic Weights.

= 16.

200-0 96-0

144-3

20

58-68

14-01 1909

16-00 106-7

31-0 1950

39-10 140-6 226-4 102-9

85-45 101-7 150-4

44-1

79-2

28-3 107-88

23-0

87-62

32-07

181 -o

127-5

159-2

204-0

232-42

168-5

119-0

48- 1 184-0 238-5

51-2 130-7

172 89-0 65-37 90-6

The elements are usually divided into two classes, the metallic and the non-metallic elements; the following are classed as non-metals, and the remainder as metals: —

Hydrogen Oxygen Boron Neon

Chlorine Sulphur Carbon Krypton

Selenium Silicon Xenon

Bromine

Iodine

Fluorine

Tellurium Nitrogen

Phosphorus Argon

Helium

Of these hydrogen, chlorine, fluorine, oxygen, nitrogen, argon, neon, krypton, xenon and helium are gases, bromine is a liquid, and the remainder are solids. All the metals are solids at ordinary temperatures with the exception of mercury, which is liquid. The metals are mostly bcdies of high specific gravity; they exhibit, when polished, a peculiar brilliancy or metallic lustre, and they are good conductors of heat and electricity; the non- metals, on the other hand, are mostly bodies of low specific gravity, and bad conductors of heat and electricity, and do not exhibit metallic lustre. The non-metallic elements are also sometimes termed metalloids, but this appellation, which signifies metal-like substances (Gr. elSos, like), strictly belongs to certain elements which do not possess the properties of the true metals, although they more closely resemble them than the non-metals in many respects; thus, selenium and tellurium, which are closely allied to sulphur in their chemical properties, although bad conductors of heat and electricity, exhibit metallic lustre and have relatively high specific gravities. But when the properties of the elements are carefully contrasted together it is found that no strict line of demarcation can be drawn dividing them into two classes; and if they are arranged in a series, those which are most closely allied in properties being placed next to each other, it is observed that there is a more or less regular alteration in properties from term to term in the series.

When binary compounds, or compounds of two elements, are decomposed by an electric current, the two elements make their appearance at opposite poles. Those elements which are dis- engaged at the negative pole are termed electro-positive, or positive, or

basylous elements, whilst those disengaged at the positive pole are termed electro-negative, or negative, pr chlorous elements. But the difference between these two classes of elements is one of degree only, and they gradually merge into each other; moreover the electric relations of elements are not absolute, but vary according to the state of combination in which they exist, so that it is just as impossible to divide the elements into two classes according to this property as it is to separate them into two distinct classes of metals and non-metals. The following, however, are negative towards the remaining elements which are more or less positive: — Fluorine, chlorine, bromine, iodine, oxygen, sulphur, selenium, tellurium.

The metals may be arranged in a series according to their power of displacing one another in salt solutions, thus Cs, Rb, K, Na„Mg, Al, Mn, Zn, Cd, Tl, Fe, Co, Ni, Sn, Pb, (H), Sb, Bi, As, Cu, Hg, Ag, Pd, Pt, Au.

Elements which readily enter into reaction with each other, and which develop a large amount of heat on combination, are said to have a powerful affinity for each other. The tendency of positive elements to unite with positive elements, or of negative elements to unite with negative elements, is much less than that of positive elements to unite with negative elements, and the greater the difference in properties between two elements the more powerful is their affinity for each other. Thus, the affinity of hydrogen and oxygen for each other is extremely powerful, much heat being developed by the combination of these two elements; when binary compounds of oxygen are decomposed by the electric current, the oxygen invariably appears at the positive pole, being negative to all other elements, but the hydrogen of hydrogen compounds is always disengaged at the negative pole. Hydrogen and oxygen are, therefore, of very opposite natures, and this is well illustrated by the circumstance that oxygen combines, with very few exceptions, with all the remaining elements, whilst compounds of only a limited number with hydrogen have been obtained.

Compounds.— A chemical compound contains two or more

elements; consequently it should be possible to analyse it, i.e. separate

it into its components, or to synthesize it, i.e. build it up from its components. In general, a compound has pro- perties markedly different from those of the elements of which it is composed.

Laws of Chemical Combination. — A molecule may be defined as the smallest part of a substance which can exist alone; an atom as the smallest part of a substance which can exist in com- bination. The molecule of every compound must obviously contain at least two atoms, and generally the molecules of the elements are also polyatomic, the elements with monatomic molecules (at moderate temperatures) being mercury and the gases of the argon group. The laws of chemical combination are as follows: —

i. Law of Definite Proportions. — The same compound always contains the same elements combined together in the same mass proportion. Silver chloride, for example, in whatever manner it may be prepared, invariably consists of chlorine and silver in the proportions by weight of 35-45 parts of the former and 107-03 of the latter.

2. Law of Multiple Proportions. — When the same two elements combine together to form more than one compound, the different masses of one of the elements which unite with a constant mass of the other, bear a simple ratio to one another. Thus, 1 part by weight of hydrogen unites with 8 parts by weight of oxygen, forming water, and with 16 or 8 X 2 parts of oxygen, forming hydrogen peroxide. Again, in nitrous oxide we have a compound of 8 parts by weight of oxygen and 14 of nitrogen; in nitric oxide a compound of 16 or 8 X 2 parts of oxygen and 14 of nitrogen; in nitrous anhydride a compound of 24 or 8 X 3 parts of oxygen and 14 of nitrogen; in nitric peroxide a compound of 32 or 8 X 4 parts of oxygen and 14 of nitrogen; and lastly, in nitric anhy- dride a compound of 40 or 8X5 parts of oxygen and 14 of nitrogen.

3. Law of Reciprocal Proportions. — The masses of different elements which combine separately with one and the same mass of another element, are either the same as, or simple multiples of, the masses of these different elements which combine with each other. For instance, 35-45 parts of chlorine and 79-96 parts of bromine combine with 107-93 parts of silver; and when chlorine and bromine unite it is in the proportion of 35-45 parts of the former to 79-96 parts of the latter. Iodine unites with silver in the proportion of 126-97 parts to 107-93 parts of the latter, but it combines with chlorine in two proportions, viz. in the proportion of 126-97 parts either to 35-45 or to three times 35-45 parts of chlorine.

There is a fourth law of chemical combination which only applies to gases. This law states that: — gases combine with one another in simple proportions by volume, and the volume of the product (if gaseous) has a simple ratio to the volumes of the original mixtures; in other words, the densities of gases are simply related to their combining weights.

Nomenclature. — If a compound contains two atoms it is termed a binary compound, if three a ternary, if four a quaternary, and so on. Its systematic name is formed by replacing the last syllable of the electro-negative element by ide and prefixing the name of the other element. For example, compounds of oxygen are oxides, of chlorine, chlorides, and so on. If more than one compound be formed from the same two elements, .the difference is shown by prefixing such words as mono-, di-, tri-, sesqui-, per-, sub-, &c, to the last part of the name, or the suffixes -ous and -ic may be appended to the name of the first element. For example take the oxides of nitrogen, N 2 0, NO, N2O3, NO2, N2O5; these are known respectively as nitrous oxide, nitric oxide, nitrogen trioxide, nitrogen peroxide and nitrogen pentoxide. The affixes ous and sub refer to the compounds containing more of the positive element, ic and per to those containing less.

An acid (q.v.) is a compound of hydrogen, which element can be replaced by metals, the hydrogen being liberated, giving substances named salts. An alkali or base is a substance which neutralizes an acid with the production of salts but with no

evolution of hydrogen. A base may be regarded as water in which part of the hydrogen is replaced by a metal, or by a radical which behaves as a metal. (The term radical is given to a group of atoms which persist in chemical changes, behaving as if the group were an element; the commonest is the ammonium group, NH4, which forms salts similar to the salts of sodium and potassium.) If the acid contains no oxygen it is a hydracid, and its systematic name is formed from the prefix hydro- and the name of the other element or radical, the last syllable of which has been replaced by the termination ic. For example, the acid formed by hydrogen and chlorine is termed hydrochloric acid (and sometimes hydrogen chloride). If an acid contains oxygen it is termed an oxyacid. The nomenclature of acids follows the same general lines as that for binary com pounds. If one acid be known its name is formed by the ter- mination -ic, e.g. carbonic acid; if two, the one containing the less amount of oxygen takes the termination -ous and the other the termination ic, e.g. nitrous acid, HNO2, nitric acid, HN0 3 . If more than two be known, the one inferior in oxygen content has the prefix hypo and the

termination ous, and the one superior in oxygen content has the prefix per and the termination -ic. This is illustrated in the four oxyacids of chlorine, HCIO, HCIO2, HCIO3, HCIO4, which have the names hypochlorous, chlorous, chloric and perchloric acids. An acid is said to be monobasic, dibasic, tribasic, &c, according to the number of replaceable hydrogen atoms; thus HN0 3 is monobasic, sulphuric acid H 2 S0 4 dibasic, phosphoric acid H3PO4 tribasic.

An acid terminating in -ous forms a salt ending in -ite, and an oxyacid ending in -ic forms a salt ending in ate. Thus the chlorine oxyacids enumerated above form salts named respec tively hypochlorites, chlorites, chlorates and perchlorates. Salts formed from hydracids terminate in -ide, following the rule for binary compounds. An acid salt is one in which the whole amount of hydrogen has not been replaced by metal; a normal salt is one in which all the hydrogen has been replaced ; and a basic salt is one in which part of the acid of the normal salt has been replaced by oxygen.

Chemical Formulae. — Opposite the name of each element in the second column of the above table, the symbol is given which is always employed to represent it. This symbol, however, not- only represents the particular element, but a certain definite quantity of it. Thus, the letter H always stands for 1. atom or 1 part by weight of hydrogen, the letter N for 1 atom or 14 parts of nitrogen, and the symbol CI for 1 atom or 35-5 parts of chlor- ine. 1 Compounds are in like manner represented by writing the symbols of their constituent elements side by side, and if more than one atom of each element be present, the number is indicated by a numeral placed on the right of the symbol of the element either below or above the line. Thus, hydrochloric acid is represented by the formula HC1, that is to say, it is a compound of an atom of hydrogen with an atom of chlorine, or of 1 part by weight of hydrogen with 35-5 parts by weight of chlorine; again, sulphuric acid is represented by the formula H2SO4, which is a statement that it consists of 2 atoms of hydrogen, 1 of sulphur, and 4 of oxygen, and consequently of certain relative weights of these elements. A figure placed on the right of a symbol only affects the symbol to which it is attached, but when figures are placed in front of several symbols all are affected by it, thus 2H1SO4 means H2SO4 taken twice.

The distribution of weight in chemical change is readily expressed in the form of equations by the aid of these symbols; the equation

2HCl + Zn = ZnCl 2 -|-H 2 ,

for example, is to be read as meaning that from 73 parts of

hydrochloric acid and 65 parts of zinc, 136 parts of zinc chloride and 2 parts of hydrogen are produced. The + sign is invariably employed in this way either to express combination or action upon, the meaning usually attached to the use of the sign = being that from such and such bodies such and such other bodies are formed.

1 Approximate values of the atomic weights are employed here.

Usually, when the symbols of the elements are written or printed with a figure to the right, it is understood that this indicates a molecule of the element, the symbol alone representing an atom. Thus, the symbols H 2 and P 4 indicate that the mole- cules of hydrogen and phosphorus respectively contain 2 and 4 atoms. Since, according to the molecular theory, in all cases of chemical change the action is between molecules, such symbols as these ought always to be employed. Thus, the formation of hydrochloric acid from hydrogen and chlorine is correctly represented by the equation

H 2 +C1 2 =2HC1; that is to say, a molecule of hydrogen and a molecule of chlorine give rise to two molecules of hydrochloric acid; whilst the following equation merely represents the relative weights of the elements which enter into reaction, and is not a complete ex- pression of what is supposed to take place: —

H+C1 = HC1. In all cases it is usual to represent substances by formulae which to the best of our knowledge express their molecular composition in the state of gas, and not merely the relative number of atoms which they contain; thus, acetic acid consists of carbon, hydrogen and oxygen in the proportion of one atom of carbon, two of hydrogen, and one of oxygen, but its molecular weight corresponds to the formula C 2 rL|0 2 , which therefore is always employed to represent acetic acid. When chemical change is expressed with the aid of molecular formulae not only is the distribution of weight represented, but by the mere inspection of the symbols it is possible to deduce from the law of gaseous combination mentioned above, the relative volumes which the agents and resultants occupy in the state of gas if measured at the same temperature and under the same pressure. Thus, the equation

2H 2 +0 2 =2H 2 not only represents that certain definite weights of

hydrogen and oxygen furnish a certain definite weight of the compound which we term water, but that if the water in the state of gas, the hydrogen and the oxygen are all measured at the same temperature and pressure, the volume occupied by the oxygen is only half that occupied by the hydrogen, whilst the resulting water-gas will only occupy the same volume as the hydrogen. In other words, 2 volumes of oxygen and 4 volumes of hydrogen furnish 4 volumes of water-gas. A simple equation like this, therefore, when properly interpreted, affords a large amount of information. One other instance may be given; the equation

$2NH_3 = N_2 + 3H_2$ represents the decomposition of ammonia gas into nitrogen and hydrogen gases by the electric spark, and it not only conveys the information that a certain relative weight of ammonia, consisting of certain relative weights of hydrogen and nitrogen, is broken up into certain relative weights of hydrogen and nitrogen, but also that the nitrogen will be contained in half the space which contained the ammonia, and that the volume of the hydrogen will be one and a half times as great as that of the original ammonia, so that in the decomposition of ammonia the volume becomes doubled.

Formulae which merely express the relative number of atoms of the different elements present in a compound are termed empirical formulae, and the formulae of all compounds whose molecular weights are undetermined are necessarily empirical. The molecular formula of a compound, however, is always a simple multiple of the empirical formula, if not identical with it; thus, the empirical formula of acetic acid is CH_2O, and its molecular formula is $C_2H_4O_2$, or twice CH_2O. In addition to empirical and molecular formulae, chemists are in the habit of employing various kinds of rational formulae, called structural, constitutional or graphic formulae, &c, which not only express the molecular composition of the compounds to which they apply, but also embody certain assumptions as to the manner in which the constituent atoms are arranged, and convey more or less information with regard to the nature of the compound itself, viz. the class to which it belongs, the manner in which

it is formed, and the behaviour it will exhibit under various circumstances. Before explaining these formulae it will be necessary, however, to consider the differences in combining power exhibited by the various elements.

Valency. — It is found that the number of atoms of a given element, of chlorine, for example, which unite with an atom of each of the other elements is very variable. Thus, hydrogen unites v/ith but a single

atom of chlorine, zinc with two, boron with three, silicon with four, phosphorus with five and tungsten with six. Those elements which are equivalent in combining or displacing power to a single atom of hydrogen are said to be univalent or monad elements; whilst those which are equivalent to two atoms of hydrogen are termed bivalent or dyad elements; and those equivalent to three, four, five or six atoms of hydrogen triad, tetrad, pentad or hexad elements. But not only is the combining power orvalency (atomicity) of the elements different, it is also observed that one element may combine with another in several proportions, or that its valency may vary; for example, phosphorus forms two chlorides represented by the formulae PCI3 and PCI5, nitrogen the series of oxides represented by the formulae N 2 0, NO, (N 2 3), N 2 4 , N 2 5 , molybdenum forms the chlorides M0CI2, M0CI3, M0CI4, M0CI5, MoCl 8 (?), and tungsten the chlorides WC1 2 , WCI4, WC1 5 , WC1 6 .

In explanation of these facts it is supposed that each element has a certain number of “units of affinity,” which may be entirely, or only in part, engaged when it enters into combination with other elements; and in those cases in which the entire number of units of affinity are not engaged by other elements, it is supposed that those which are thus disengaged neutralize each other, as it were. For example, in phosphorus penta- chloride the five units of affinity possessed by the phosphorus atom are satisfied by the five monad atoms of chlorine, but in the trichloride two are disengaged, and, it may be supposed, satisfy each other. Compounds in which all the units of affinity of the contained elements are engaged are said to be saturated, whilst those in which the affinities of the contained elements are not all engaged by other elements are said to be unsaturated. According to this view, it is necessary to assume that, in all unsaturated compounds, two, or some even number of affinities are disengaged; and also that all elements which combine with an even number of monad atoms cannot combine with an odd number, and vice versa, — in other words, that the number of units of affinity active in the case of any given element must be always either an even or an odd number, and that it cannot be at one time an even and at another an odd number. There are, however, a few remarkable exceptions to this ” law.” Thus, it must be supposed that in nitric oxide, NO, an odd number of affinities are disengaged, since a single atom of dyad oxygen is united with a single atom of nitrogen, which in all its compounds with other elements acts either as a triad or pentad. When nitric peroxide, N 2 4 , is converted into gas, it decomposes, and at about 180° C. its vapour entirely consists of molecules of the composition NO>; while at temperatures between this and o° C. it consists of a mixture in different proportions

of the two kinds of molecules, N 2 4 and N0 2 . The oxide N0 2 must be regarded as another instance of a compound in which an odd number of affinities of one of the contained elements are dis- engaged, since it contains two atoms of dyad oxygen united with a single atom of triad or pentad nitrogen. Again, when tungsten hexachloride is converted into vapour it is decomposed into chlorine and a pentachloride, having a normal vapour density, but as in the majority of its compounds tungsten acts as a hexad, we apparently must regard its pentachloride as a compound in which an odd number of free affinities are disengaged. Hither- to no explanation has been given of these exceptions to what appears to be a law of almost universal application, viz. that the sum of the units of affinity of all the atoms in a compound is an even number.

The number of units of affinity active in the case of any particular element is largely dependent, however, upon the nature of the element or elements with which it is associated. Thus, an atom of iodine only combines with one of hydrogen,

but may unite with three of chlorine, which never combines with more than a single atom of hydrogen; an atom of phos- phorus unites with only three atoms of hydrogen, but with five of chlorine, or with four of hydrogen and one of iodine; and the chlorides corresponding to the higher oxides of lead, nickel, manganese and arsenic, Pb0 2 , Ni 2 03, Mn0 2 and As 2 06 do not exist as stable compounds, but the lower chlorides, PbCI 2 , NiCl 2 , MnCl 2 and AsCl 3 , are very stable.

The valency of an element is usually expressed by dashes or Roman numerals placed on the right of its symbol, thus: H’, O”, B’”, C’ v , P v , Mo VI ; but in constructing graphic formulae the symbols of the elements are written with as many lines attached to each symbol as the element which it represents has units of affinity.

The periodic law (see Element) permits a grouping of the elements according to their valency as follows: — Group O: helium, neon, argon, krypton and xenon appear to be devoid of valency. Group I.: the alkali metals Li, Na, K, Rb, Cs, and also Ag, monovalent; Cu, monovalent and divalent; Au, monovalent and trivalent. Group II. : the alkaline earth metals Ca, Sr, Ba, andalso Be (Gl) , Mg, Zn, Cd,

divalent; Hg, monovalent and divalent. Group III.: B, trivalent; Al, trivalent, but possibly also tetra-or penta-valent ; Ga, divalent and trivalent; In, mono-, di- and tri-valent; Tl, monovalent and trivalent. Group IV.: C, Si, Ge, Zr, Th, tetravalent; Ti, tetravalent and hexavalent; Sn, Pb, divalent and tetravalent; Ce, trivalent and tetravalent. Group V. : N, trivalent and pentavalent, but divalent in nitric oxide; P, As, Sb, Bi, trivalent and pentavalent, the last being possibly divalent in BiO and BiCl 2 . Group VI. : O, usually divalent, but tetravalent and possibly hexavalent in oxonium and other salts; S, Se, Te, di-, tetra- and hexa-valent; Cr, di-, tri- and hexa-valent; Mo, W, di-, tri-, tetra-, penta- and hexa-valent. Group VII.: H (?), monovalent; the halogens F, Gl, Br, I, usually monovalent, but possibly also tri- and penta- valent; Mn, divalent and trivalent, and possibly heptavalent in permanganates. Group VIII.: Fe, Co, divalent and trivalent; Ni, divalent; Os, Ru, hexavalent and octavalent; Pd, Pt, divalent and tetravalent; Ir, tri-, tetra- and hexa-valent. (See also Valency.)

Constitutional Formulae. — Graphic or constitutional formulae are employed to express the manner in which the constituent atoms of compounds are associated together; for example, the trioxide of sulphur is usually regarded as a compound of an atom of hexad sulphur with three atoms of dyad oxygen, and this hypothesis is illustrated by the graphic formula

0 = S^g

When this oxide is brought into contact with water it combines with it forming sulphuric acid, H 2 S0 4 .

In this compound only two of the oxygen atoms are wholly associated with the sulphur atom, each of the remaining oxygen atoms being united by one of its affinities to the sulphur atoms, and by the remaining affinity to an atom of hydrogen; thus —

H’O^^O.

The graphic formula of a sulphate is readily deduced by re-membering that the hydrogen atoms are partially or entirely replaced. Thus acid sodium sulphate, normal sodium sulphate, and zinc sulphate have the formulae

N H a :8 > s < L a :8 > < * < 8 > s«o

Again, the reactions of acetic acid, C2H 4 2 , show that the four atoms of hydrogen which it contains have not all the same function, and also that the two atoms of oxygen have different functions; the graphic

formula which we are led to assign to acetic acid, viz.

H ‘C-C

serves in a measure to express this, three of the atoms of hydrogen being represented as associated with one of the atoms of carbon,

whilst the fourth atom is associated with an atom of oxygen which is united by a single affinity to the second atom of carbon, to which, however, the second atom of oxygen is united by both of its affinities. It is not to be supposed that there are any actual bonds of union between the atoms; graphic formulae such as these merely express the hypothesis that certain of the atoms in a compound come directly within the sphere of attrac- tion of certain other atoms, and only indirectly within the sphere of attraction of others,— an hypothesis to which chemists are led by observing that it is often possible to separate a group of elements from a compound, and to displace it by other elements or groups of elements.

Rational formulae of a much simpler description than these graphic formulae are generally employed. For instance, sulphuric acid is usually represented by the formula S0 2 (OH) 2 , which indicates that it may be regarded as a compound of the group S0 2 with twice the group OH, > Each of these OH groups is equivalent in combining or displacing power to a monad element, since it consists of an atom of dyad oxygen associated with a single atom of monad hydrogen, so that in this case the S0 2 group is equivalent to an atom of a dyad element. This formula for sulphuric acid, however, merely represents such facts as that it is possible to displace an atom of hydrogen and an atom of oxygen in sulphuric acid by a single atom of chlorine, thus forming the compound S0 3 HC1; and that by the action of water on the compound S0 2 C1 2 twice the group OH, or water minus an atom of hydrogen, is introduced in place of the two monad atoms of chlorine —

S0 2 C1 2 +2H0H = S0 2 (OH) 2 +2HC1. Water. Sulphuric acid.

Constitutional formulae like these, in fact, are nothing more than symbolic expressions of the character of the compounds which they represent, the arrangement of symbols in a certain definite manner being understood to convey certain information with regard to the compounds represented.

Groups of two or more atoms like S0 2 and OH, which are capable of playing the part of elementary atoms (that is to say, which can be

transferred from compound to compound), are termed compound radicals, the elementary atoms being simple radicals. Thus, the atom of hydrogen is a monad simple radical, the atom of oxygen a dyad simple radical, whilst the group OH is a monad compound radical.

It is often convenient to regard compounds as formed upon certain types; alcohol, for example, may be said to be a com- pound formed upon the water type, that is to say, a compound formed from water by displacing one of the atoms of hydrogen by the group of elements C 2 H S , thus —

H ˆ<,C 2 H 5

O

H

O

Water

H

Alcohol.

Constitutional formulae become of preponderating importance when we consider the more complicated inorganic and especially organic compounds. Their full significance is treated in the section of this article dealing with organic chemistry, and in the articles Isomerism and Stereoisomerism.

Chemical Action. — Chemical change or chemical action may be said to take place whenever changes occur which involve an alteration in the composition of molecules, and may be the result of the action of agents such as heat, electricity or light, or of two or more elements or compounds upon each other.

Three kinds of changes are to be distinguished, viz. changes which involve combination, changes which involve decomposi- tion or separation, and changes which involve at the same time both decomposition and combination. Changes of the first and second kind, according to our views of the constitution of mole- cules, are probably of very rare occurrence; in fact, chemical action appears almost always to involve the occurrence of both these kinds of change, for, as already pointed out, we must assume that the molecules of hydrogen, oxygen and several other elements are diatomic, or that they consist

of two atoms. Indeed, it appears probable that with few exceptions the elements

are all compounds of similar atoms united together by one or more units of affinity, according to their valencies. If this be the case, however, it is evident that there is no real distinction between the reactions which take place when two elements combine together and when an element in a compound is dis-< placed by another. The combination, as it is ordinarily termed, of chlorine with hydrogen, and the displacement of iodine in potassium iodide by the action of chlorine, may be Cited as examples; if these reactions are represented, as such feactions very commonly are, by equations which merely express the relative weights of the bodies which enter, into reaction, and of the products, thus —

H + CI = HC1

Hydrogen. Chlorine. Hydrochloric acid.

KI + CI = KC1 + I

Potassium iodide. Chlorine. Potassium chloride. Iodine.

they appear to differ in character; but if they are correctly represented by molecular equations, or equations which express the relative number of molecules which enter into reaction and which result from the reaction, it will be obvious thˆt the character of the reaction is substantially the same in both cases, and that both are instances of the occurrence of what is ordinarily termed double decomposition —

H 2 + Cl 2 = 2HC1 Hydrogen. Chlorine. Hydrochloric acid. 2KI + Cl 2 = 2KC1 + I 2 .

Potassium iodide. Chlorine. Potassium chloride. Iodine.

In all cases of chemical change energy in the form of heat is either developed or absorbed, and the amount of heat developed or absorbed in a given reaction is as definite as are the weights of the substance engaged in the reaction. Thus, in the production of hydrochloric acid from hydrogen and chlorine 22,000 calories are developed; in the

production of hydrobromic acid from hydrogen and bromine, however, only 844ocaloriesaredeveloped; and in the formation of hydriodic acid from hydrogen and iodine 6040 calories are absorbed.

This difference in behaviour of the three elements, chlorine, bromine and iodine, which in many respects exhibit considerable resemblance, may be explained in the following manner. We may suppose that in the formation of gaseous hydrochloric acid from gaseous chlorine and hydrogen, according to the equation

$H_2 + Cl_2 = HCl + HCl$, a certain amount of energy is expended in separating the atoms of hydrogen in the hydrogen molecule, and the atoms of chlorine in the chlorine molecule, from each other; but that heat is developed by the combination of the hydrogen atoms with the chlorine atoms, and that, as more energy is developed by the union of the atoms of hydrogen and chlorine than is expended in separating the hydrogen atoms from each other and the chlorine atoms from one another, the result of the action of the two elements upon each other is the development of heat, — 'the amount finally developed in the reaction being the difference between that absorbed in decomposing the elementary mole cules and that developed by the combination of the atoms of chlorine and hydrogen. In the formation of gaseous hydrobromic acid from liquid bromine and gaseous hydrogen —

$H_2 + Br_2 = HBr + HBr$, in addition to the energy expended in decomposing the hydrogen and bromine molecules, energy is also expended in converting the liquid bromine into the gaseous condition, and probably less heat is developed by the combination of bromine and hydrogen than by the combination of chlorine and hydrogen, so that the amount of heat finally.developed is much less than is developed in the formation of hydrochloric acid. Lastly, in the production of gaseous hydriodic acid from hydrogen and solid iodine —

$H_2 + I_2 = HI + HI$,

so much energy is expended in the decomposition of the hydrogen and iodine molecules and in the conversion of the iodine into the gaseous condition, that the heat which it may be supposed is developed by the combination of the hydrogen and iodine atoms is insufficient to balance the expenditure, and the final result is

therefore negative; hence it is necessary in forming hydriodic acid from its elements to apply heat continuously.

These compounds also afford examples of the fact that, generally speaking, those compounds are most readily formed, and are most stable, in the formation of which the most heat is developed. Thus, chlorine enters into reaction with hydrogen, and removes hydrogen from hydrogenized bodies, far more readily than bromine ; and hydrochloric acid is a far more stable substance than hydrobromic acid, hydriodic acid being greatly inferior even to hydrobromic acid in stability. Com- pounds formed with the evolution of heat are termed exothermic, while those formed with an absorption are termed endothermic. Explosives are the commonest examples of endothermic com- pounds.

When two substances which by their action upon each other develop much heat enter into reaction, the reaction is usually complete without the employment of an excess of either; for example, when a mixture of hydrogen and oxygen, in the pro- portions to form water—

$2H_2 + O_j = 2OH_2$, is exploded, it is entirely converted into water. This is also the case if two substances are brought together in solution, by the action of which upon each other a third body is formed which is insoluble in the solvent employed, and which also does not tend to react upon any of the substances present ; for instance, when a solution of a chloride is added to a solution of a silver salt, insoluble silver chloride is precipitated, and almost the whole of the silver is removed from solution, even if the amount of the chloride employed be not in excess of that theoretically required.

But if there be no tendency to form an insoluble compound, Or one which is not liable to react upon any of the other substances present, this is no longer the case. For example, when a solution of a ferric salt is added to a solution of potassium thiocyanate, a deep red coloration is produced, owing to the formation of ferric thiocyanate. Theoretically the reaction takes place in the case of ferric nitrate in the manner represented by the equation

$$Fe(N0_3)_3 + 3KCNS = Fe(CNS)_3 + 3KN0_3 ;$$

Ferric nitrate. Potassium thiocyanate. Ferric thiocyanate. Potassium nitrate.

but it is found that even when more than sixty times the amount of potassium thiocyanate required by this equation is added, a portion of the ferric nitrate still remains unconverted, doubtless owing to the occurrence of the reverse change—

$Fe(CNS)_3 + 3KNO_3 = Fe(NO_3)_3 + 3KCNS.$

In this, as in most other cases in which substances act upon one another under such circumstances that the resulting compounds are free to react, the extent to which the different kinds of action which may occur take place is dependent upon the mass of the substances present in the mixture. As another instance of this kind, the decomposition of bismuth chloride by water may be cited. If a very large quantity of water be added, the chloride is entirely decomposed in the manner represented by ‘ the 1 equation —

$BiCl_3 + OH_2 = BiOCl + 2HCl$, Bismuth chloride. Bismuth oxychloride.

the oxychloride being precipitated; but if smaller quantities of water be added the decomposition is incomplete, and it is found that the extent to which decomposition takes place is proportional to the quantity of water employed, the decom- position being incomplete, except in presence of large quantities of water, because of the occurrence of the reverse action —

$BiOCl + 2HCl = BiCl_3 + OH_2$.

Chemical change which merely involves simple decomposition is thus seen to be influenced by the masses of the reacting sub- stances and the presence of the products of decomposition; in other words the system of reacting substances and resultants form a mixture in which chemical action has apparently ceased, or the system is in equilibrium. Such reactions are termed reversible (see Chemical Action).

III. Inorganic Chemistry

Inorganic chemistry is concerned with the descriptive study o f the elements and their compounds, except those of carbon. Reference should be made to the separate articles on the different elements and the more important compounds for their prepara- tion, properties and uses. In this article the development of this branch of the science is treated historically.

The earliest discoveries in inorganic chemistry are to be found in the

metallurgy, medicine and chemical arts of the ancients. The Egyptians obtained silver, iron, copper, lead, zinc and tin, either pure or as alloys, by smelting the ores; mercury is men- tioned by Theophrastus (c. 300 B.C.). The manufacture of glass, also practised in Egypt, demanded a knowledge of sodium or potassium carbonates; the former occurs as an efflorescence on the shores of certain lakes; the latter was obtained from wood ashes. Many substances were used as pigments: Pliny records white lead, cinnabar, verdigris and red oxide of iron; and the preparation of coloured glasses and enamels testifies to the uses to which these and other substances were put. Salts of ammonium were also known; while alum was used as a mordant in dyeing. Many substances were employed in ancient medicine: galena was the basis of a valuable Egyptian cosmetic and drug; the arsenic sulphides, realgar and orpiment, litharge, alum, saltpetre, iron rust were also used. Among the Arabian and later alchemists we find attempts made to collate compounds by specific properties, and it is to these writers that we are mainly indebted for such terms as “alkali,” “sal,” &c. The mineral acids, hydrochloric, nitric and sulphuric acids, and also aqua regia (a mixture of hydrochloric and nitric acids) were discovered, and the vitriols, alum, saltpetre, sal-ammoniac, ammonium carbonate, silver nitrate (lunar caustic) became better known. The compounds of mercury attracted considerable attention, mainly on account of their medicinal properties; mercuric oxide and corrosive sublimate were known to pseudo-Geber, and the nitrate and basic sulphate to ” Basil Valentine.” Antimony and its compounds formed the subject of an elaborate treatise ascribed to this last writer, who also contributed to our knowledge of the compounds of zinc, bismuth and arsenic. All the com- monly occurring elements and compounds appear to have received notice by the alchemists; but the writings assigned to the alchemical period are generally so vague and indefinite that it is difficult to determine the true value of the results obtained.

In the succeeding iatrochemical period, the methods of the alchemists were improved and new ones devised. Glauber showed how to prepare hydrochloric acid, spiritus salts, by heating rock-salt with sulphuric acid, the method in common use to-day;’ and also nitric acid from saltpetre and arsenic trioxide. Libavius obtained sulphuric acid from many sub- stances, e.g. alum, vitriol, sulphur and nitric acid, by distillation. The action of these acids on many metals was also studied; Glauber obtained zinc, stannic, arsenious and cuprous chlorides by dissolving the metals in hydrochloric acid, compounds hitherto obtained by heating the metals with corrosive sublimate, and consequently supposed to contain mercury. The scientific study of

salts dates from this period, especial interest being taken in those compounds which possessed a medicinal or technical value. In particular, the salts of potassium, sodium and ammonium were carefully investigated, but sodium and potassium salts were rarely differentiated. 1 The metals of the alkaline-earths were somewhat neglected; we find Georg Agricola considering gypsum (calcium sulphate) as a compound of lime, while calcium nitrate and chloride became known at about the beginning of the 17th century. Antimonial, bismuth and arsenical compounds were assiduously studied, a direct consequence of their high medicinal importance; mercurial and silver compounds were investigated for the same reason. The general tendency of this period appears to have taken the form of improving and developing the methods of the alchemists;

1 The definite distinction between potash and soda was first established by Duhamel de Monceau (1700-1781).

few new fields were opened, and apart from a more complete knowledge of the nature of salts, no valuable generalizations were attained.

The discovery of phosphorus by Brand, a Hamburg alchemist, in 1669 excited chemists to an unwonted degree; it was also independently prepared by Robert Boyle and J. Kunckel, Brand having kept his process secret. Towards the middle of the 1 8th century two new elements were isolated: cobalt by G. Brandt in 1742, and nickel by A. F. Cronstedt in 1750. These discoveries were followed by Daniel Rutherford's isolation of nitrogen in 1772, and by K. Scheele's isolation of chlorine and oxygen in 1774 (J. Priestley discovered oxygen independently at about the same time), and his investigation of molybdic and tungstic acids in the following year; metallic molybdenum was obtained by P. J. Hjelm in 1783, and tungsten by Don Fausto d'Elhuyar; manganese was isolated by J. G. Gahn in 1774. In 1 784 Henry Cavendish thoroughly examined hydrogen, establishing its elementary nature; and he made the far-reaching discovery that water was composed of two volumes of hydrogen to one of oxygen.

The phlogistic theory, which pervaded the chemical doctrine of this period, gave rise to continued study of the products of calcination and combustion; it thus happened that the know- ledge of oxides and oxidation products was considerably developed. The synthesis of nitric acid by passing electric sparks through moist air by Cavendish is a famous piece of experimental work, for in the first place it determined the • composition of this important substance, and in the second place

the minute residue of air which would not combine, although ignored for about a century, was subsequently examined by Lord Rayleigh and Sir William Ramsay, who showed that it consists of a mixture of elementary substances — argon, krypton, neon and xenon (see Argon).

The 1 8th century witnessed striking developments in pneumatic chemistry, or the chemistry of gases, which had been begun by van Helmont, Mayow, Hales and Boyle. Gases formerly considered to be identical came to be clearly distin- guished, and many new ones were discovered. Atmospheric air was carefully investigated by Cavendish, who showed that it consisted of two elementary constituents: nitrogen, which was isolated by Rutherford in 1772, and oxygen, isolated in 1774; and Black established the presence, in minute quantity, of carbon dioxide (van Helmont's gas sylvestre). Of the many workers in this field, Priestley occupies an important position. A masterly device, initiated by him, was to collect gases over mercury instead of water; this enabled him to obtain gases previously only known in solution, such as ammonia, hydro- chloric acid, silicon fluoride and sulphur dioxide. Sulphuretted hydrogen and nitric oxide were discovered at about the same time.

Returning to the history of the discovery of the elements and their more important inorganic compounds, we come in 1789 to M. H. Klaproth's detection of a previously unknown constituent of the mineral pitchblende. He extracted a substance to which he assigned the character of an element, naming it uranium (from Ovpavos, heaven) ; but it was afterwards shown by E. M. Peligot, who prepared the pure metal, that Klaproth's product was really an oxide. This element was investigated at a later date by Sir Henry Roscoe, and more thoroughly and successfully by C. Zimmermann and Alibegoff. Pitchblende attained con- siderable notoriety towards the end of the 19th century on account of two important discoveries. The first, made by Sir William Ramsay in 1896, was that the mineral evolved a peculiar gas when treated with sulphuric acid; this gas, helium (q.v.), proved to be identical with a constituent of the sun's atmosphere, detected as early as 1868 by Sir Norman Lockyer during a spectroscopic examination of the sun's chromosphere. The second discovery, associated with the Curies, is that of the peculiar properties exhibited by the impure substance, and due to a constituent named radium. The investigation of this substance and its properties (see Radioactivity) has proceeded so far as to render it probable that the theory of the unalterability

of elements, and also the hitherto accepted explanations of various celestial phenomena — the source of solar energy and the appearances of the tails of comets — may require recasting.

In the same year as Klaproth detected uranium, he also isolated zirconia or zirconium oxide from the mineral variously known as zircon, hyacinth, jacynth and jargoon ; but he failed to obtain the metal, this being first accomplished some years later by Berzelius, who decomposed the double potassium zirconium fluoride with potassium. In the following year, 1795, Klaproth announced the discovery of a third new element, titanium; its isolation (in a very impure form), as in the case of zirconium, was reserved for Berzelius.

Passing over the discovery of carbon disulphide by W. A. Lampadius in 1796, of chromium by L. N. Vauquelin in 1797, and Klaproth's investigation of tellurium in 1798, the next important series of observations was concerned with platinum and the allied metals. Platinum had been described by Antonio de Ulloa in 1748, and subsequently discussed by H. T. Scheffer in 1752. In 1803 W. H. Wollaston discovered palladium, especially interesting for its striking property of absorbing (" occluding ") as much as 376 volumes of hydrogen at ordinary temperatures, and 643 volumes at 90°. In the following year he discovered rhodium; and at about the same time Smithson Tennant added two more to the list — iridium and osmium; the former was so named from the changing tints of its oxides (i'prt, rainbow), and the latter from the odour of its oxide (oa/xri, smell). The most recently discovered " platinum metal," ruthenium, was recognized by C. E. Claus in 1845. The great number and striking character of the compounds of this group of metals have formed the subject of many investigations, and already there is a most voluminous literature. Berzelius was an early worker in this field; he was succeeded by Bunsen, and Deville and Debray, who worked out the separation of rhodium; and at a later date by P. T. Cleve, the first to make a really thorough study of these elements and their compounds. Of especial note are the curious compounds formed by the union of carbon monoxide with platinous chloride, discovered by Paul Schutzenberger and subsequently investigated by F. B. Mylius and F. Foerster and by Pullinger; the phosphoplatinic com- pounds formed primarily from platinum and phosphorus penta- chloride; and also the " ammino " compounds, formed by the union of ammonia with the chloride, &c, of these metals, which have been studied by

many chemists, especially S. M. Jorgensen. Considerable uncertainty existed as to the atomic weights of these metals, the values obtained by Berzelius being doubtful. K. F. O. Seubert redetermined this constant for platinum, osmium and iridium; E. H. Keiser for palladium, and A. A. Joly for ruthenium.

The beginning of the 19th century witnessed the discovery of certain powerful methods for the analysis of compounds and the isolation of elements. Berzeliusfe investigation of the action of the electric current on salts clearly demonstrated the invaluable assistance that electrolysis could render to the isolator of elements; and the adoption of tlus method by Sir Humphry Davy for the analysis of the hydrates of the metals of the alkalis and alkaline earths, and the results which he thus achieved, established its potency. In 1808 Davy isolated sodium and potassium; he then turned his attention to the preparation of metallic calcium, barium, strontium and mag- nesium. Here he met with greater difficulty, and it is to be questioned whether he obtained any of these metals even in an approximately pure form (see Electrometallurgy). The discovery of boron by Gay Lussac and Davy in 1809 led Berzelius to investigate silica (silex). In the following year he announced that silica was the oxide of a hitherto unrecognized element, which he named siiicium, considering it to be a metal. This has proved to be erroneous; it is non-metallic in character, and its name was altered to silicon, from analogy with carbon and boron. At the same time Berzelius obtained the element, in an impure condition, by fusing silica with charcoal and iron in a blast furnace; its preparation in a pure condition he first accomplished in 1823, when he invented the method of heating

double potassium fluorides with metallic potassium. The success which attended his experiments in the case of silicon led him to apply it to the isolation of other elements. In 1824 he obtained zirconium from potassium zirconium fluoride; the preparation of (impure) titanium quickly followed, and in 1828 he obtained thorium. A similar process, and equally efficacious, was introduced by F. Wohler in 1827. It consisted in heating metallic chlorides with potassium, and was first applied to aluminium, which was isolated in 1827; in the following year, beryllium chloride was analysed by the same method, beryllium oxide (berylla or glucina) having been known since 1798, when it was detected by L. N. Vauquelin in the gem-stone beryl.

In 1812 B. Courtois isolated the element iodine from ” kelp,” the burnt ashes of marine plants. The chemical analogy of this substance to chlorine was quickly perceived, especially after its investigation by Davy and Gay Lussac. Cyanogen, a compound which in combination

behaved very similarly to chlorine and iodine, was isolated in 181 5 by Gay Lussac. This discovery of the first of the then-styled ” compound radicals ” exerted great influence on the prevailing views of chemical composition. Hydrochloric acid was carefully investigated at about this time by Davy, Faraday and Gay Lussac, its composition and the elementary nature of chlorine being thereby established.

In 181 7 F. Stromeyer detected a new metallic element, cad- mium, in certain zinc ores; it was rediscovered at subsequent dates by other observers and its chemical resemblance to zinc noticed. In the same year Berzelius discovered selenium in a deposit from sulphuric acid chambers, his masterly investigation including a study of the hydride, oxides and other compounds. Selenic acid was discovered by E. Mitscherlich, who also observed the similarity of the crystallographic characters of selenates and sulphates, which afforded valuable corroboration of his doc- trine of isomorphism. More recent and elaborate investigations in this direction by A. E. H. Tutton have confirmed this view.

In 18 1 8 L. J. Thenard discovered hydrogen dioxide, one of the most interesting inorganic compounds known, which has since been carefully investigated by H. E. Schone, M. Traube, Wolfenstein and others. About the same time, J. A. Arfvedson, a pupil of Berzelius, detected a new element, which he named lithium, in various minerals — notably petalite. Although unable to isolate the metal, he recognized its analogy to sodium and potassium; this was confirmed by R. Bunsen and A. Matthiessen in 1855, who obtained the metal by electrolysis and thoroughly examined it and its compounds. Its crimson flame-coloration was observed by C. G. Gmelin in 1818.

The discovery of bromine in 1826 by A. J. Balard completed for many years Berzelius’s group of ” halogen ” elements; the remaining member, fluorine, notwithstanding many attempts, remained unisolated until 1886, when Henri Moissan obtained it by the electrolysis of potassium fluoride dissolved in hydro- fluoric acid. Hydrobromic and hydriodic acids were investigated by Gay Lussac and Balard, while hydrofluoric acid received considerable attention at the hands of Gay Lussac, Thenard and Berzelius. We may, in fact, consider that the descriptive study of the various halogen compounds dates from about this time. Balard discovered chlorine monoxide in 1834, investigat- ing its properties and reactions; and his observations on hypo- chlorous acid and hypochlorites led him to conclude that ” bleach- ing-powder ” or ” chloride of lime ” was a compound or mixture in equimolecular proportions of calcium chloride and hypo- chlorite, with a little calcium hydrate. Gay Lussac investigated chloric

acid; Stadion discovered perchloric acid, since more fully studied by G. S. Serullas and Roscoe; Davy and Stadion investigated chlorine peroxide, formed by treating potassium chlorate with sulphuric acid. Davy also described and partially investigated the gas, named by him ” euchlorine,” obtained by heating potassium chlorate with hydrochloric acid; this gas has been more recently examined by Pebal. The oxy-acids of iodine were investigated by Davy and H. G. Magnus; periodic acid, discovered by the latter, is characterized by the striking complexity of its salts as pointed out by Kimmins.

In 1830 N. G. Sefstrom definitely proved the existence of a metallic element vanadium, which had been previously detected (in 1801) in certain lead ores by A. M. del Rio; subsequent elaborate researches by Sir Henry Roscoe showed many in- accuracies in the conclusions of earlier workers (for instance, the substance considered to be the pure element was in reality an oxide) and provided science with an admirable account of this element and its compounds. B. W. Gerland contributed to our knowledge of vanadyl salts and the vanadic acids. Chemically related to vanadium are the two elements tantalum and colum- bium or niobium. These elements occur in the minerals colum- bite and tantalite, and their compounds became known in the early part of the 19th century by the labours of C. Hatchett, A. G. Ekeberg, W. H. Wollaston and Berzelius. But the knowledge was very imperfect; neither was it much clarified by H. Rose, who regarded niobium oxide as the element. The subject was revived in 1866 by C. W. Blomstrand and J. C. Marignac, to whom is due the credit of first showing the true chemical relations of these elements. Subsequent researches by Sainte Claire Deville and L. J. Troost, and by A. G. Kriiss and L. E. Nilson, and subsequently (1904) by Hall, rendered notable additions to our knowledge of these elementsand their compounds. Tantalum has in recent years been turned to economic service, being employed, in the same manner as tungsten, for the pro- duction of the filaments employed in incandescent electric lighting.

In 1833 Thomas Graham, following the paths already traced out by E. D. Clarke, Gay Lussac and Stromeyer, published his masterly investigation of the various phosphoric acids and their salts, obtaining results subsequently employed by J. von Liebig in establishing the doctrine of the characterization and basicity of acids. Both phosphoric

and phosphorous acids became known, although imperfectly, towards the end of the 18th century; phosphorous acid was first obtained pure by Davy in 181 2, while pure phosphorous oxide, the anhydride of phosphorous acid, remained unknown until T. E. Thorpe's investigation of the products of the slow combustion of phos- phorus. Of other phosphorus compounds we may here notice Gengembre's discovery of phosphuretted hydrogen (phosphine) in 1783, the analogy of which to ammonia was first pointed out by Davy and supported at a later date by H. Rose; liquid phosphuretted hydrogen was first obtained by Thenard in 1838; and hypophosphorous acid was discovered by Dulong in 1816. Of the halogen compounds of phosphorus, the tri- chloride was discovered by Gay Lussac and Thenard, while the pentachloride was obtained by Davy. The oxychloride, bro- mides, and other compounds were subsequently discovered; here we need only notice Moissan's preparation of the trifluoride and Thorpe's discovery of the pentafluoride, a compound of especial note, for it volatilizes unchanged, giving a vapour of normal density and so demonstrating the stability of a pentava- lent phosphorus compound (the pentachloride and pentabromide dissociate into a molecule of the halogen element and phosphorus trichloride).

In 1840 C. F. Schonbein investigated ozone, a gas of peculiar odour (named from the Gr. oˆuv, to smell) observed in 1785 by Martin van Marum to be formed by the action of a silent electric discharge on the oxygen of the air; he showed it to be an allotropic modification of oxygen, a view subsequently confirmed by Marignac, Andrews and Soret. In 1845 a further contribution to the study of allotropy was made by Anton Schrotter, who investigated the transformations of yellow and red phosphorus, phenomena previously noticed by Berzelius, the inventor Of the term " allotropy." The preparation of crystalline boron in 1856 by W5hler and Sainte Claire Deville showed that this element also existed in allotropic forms, amorphous boron having been obtained simultaneously and independently in 1809 by Gay Lussac and Davy. Before leaving this phase of inorganic chemistry, we may mention other historical examples of allo- tropy. Of great importance is the chemical identity of the diamond, graphite and charcoal, a fact demonstrated in part by Lavoisier in 1773, Smithson Tennant in 1796, and by Sir George

Steuart-Mackenzie (1780-1848), who showed that equal weights of these three substances yielded the same weight of carbon dioxide on combustion. The allotropy of selenium was first investigated by Berzelius; and more fully in 1851 by J. W. Hittorf, who carefully investigated the effects produced by heat; crystalline selenium

possesses a very striking property, viz. when exposed to the action of light its electric conductivity increases. Another element occurring in allotropic forms is sulphur, of which many forms have been described. E. Mit- scherlich was an early worker in this field. A modification known as ” black sulphur,” soluble in water, was announced by F. L. Knapp in 1848, and a colloidal modification was described by H. Debus. The dynamical equilibrium between rhombic, liquid and monosymmetric sulphur has been worked out by H. W. Bakhuis Roozeboom. The phenomenon of allo- tropy is not confined to the non-metals, for evidence has been advanced to show that allotropy is far commoner than hitherto supposed. Thus the researches of Carey Lea, E. A. Schneider and others, have proved the existence of “colloidal silver”; similar forms of the metals gold, copper, and of the platinum metals have been described. The allotropy of arsenic and antimony is also worthy of notice, but in the case of the first element the variation is essentially non-metallic, closely resemb- ling that of phosphorus. The term allotropy has also been applied to inorganic compounds, identical in composition, but assuming different crystallographic forms. Mercuric oxide, sulphide arid iodide; arsenic trioxide; titanium dioxide and silicon dioxide may be cited as examples.

The joint discovery in 1859 of the powerful method of spectrum analysis (see Spectroscopy) by G. R. Kirchhoff and R. W. Bunsen, and its application to the detection and the characteriza- tion of elements when in a state of incandescence, rapidly led to the discovery of many hitherto unknown elements. Within two years of the invention the authors announced the discovery of two metals, rubidium and caesium, closely allied to sodium, potassium and lithium in properties, in the mineral lepidolite and in the Dtirkheim mineral water. In 1 86 1 Sir William Crookes detected thallium (named from the Gr. 0d\Xos, a green bud, on account of a brilliant green line in its spectrum) in the selenious mud of the sulphuric acid manufacture; the chemical affinities of this element, on the one hand approximating to the metals of the alkalis, and on the other hand to lead, were mainly established by C. A. Lamy. Of other metals first detected by the spectroscope mention is to be made of indium, determined by F. Reich and H. T. Richter in 1863, and of gallium, detected in certain zinc blendes by Lecoq de Boisbaudran in 1875. The spectroscope has played an all-important part in the character- ization of the elements, which, in combination with oxygen, constitute the group of substances collectively named the ” rare earths.” The substances occur, in very minute quantity, in a large number of sparingly-distributed and comparatively rare minerals — euxenite, samarksite, cerite,

yttrotantalite, &c. Scandinavian specimens of these minerals were examined by J. Gadolin, M. H. Klaproth, and especially by Berzelius; these chemists are to be regarded as the pioneers in this branch of descriptive chemistry. Since their day many chemists have entered the lists, new and powerful methods of research have been devised, and several new elements definitely characterized. Our knowledge on many points, however, is very chaotic; great uncertainty and conflict of evidence circulate around many of the ” new elements ” which have been announced, so much so that P. T. Cleve proposed to divide the ” rare earth ” metals into two groups, (1) “perfectly characterized”; (2) “not yet thoroughly characterized.” The literature of this subject is very large. The memorial address on J. C. G. de Marignac, a noted worker in this field, delivered by Cleve, a high authority on this subject, ■ before the London Chemical Society (/. C. S. Trans., 1895, p. 468), and various papers in the same journal by Sir William Crookes, Bohuslav Brauner and others should be consulted for details.

In the separation of the constituents of the complex mixture of oxides obtained from the ” rare earth ” minerals, the methods

generally forced upon chemists are those of fractional precipita- tion or crystallization; the striking resemblances of the com- pounds of these elements rarely admitting of a complete separa- tion by simple precipitation and filtration. The extraordinary patience requisite to a successful termination of such an analysis can only be adequately realized by actual research; an idea may be obtained from Crookes’s Select Methods in Analysis. Of recent years the introduction of various organic compounds as precipitants or reagents has reduced the labour of the process; and advantage has also been taken of the fairly complex double salts which these metals form with compounds. The purity of the compounds thus obtained is checked by spectroscopic observations. Formerly the spark- and absorption-spectra were the sole methods available; a third method was introduced by Crookes, who submitted the oxides, or preferably the basic sulphates, to the action of a negative electric discharge in vacuo j and investigated the phosphorescence induced spectroscopically. By such a study in the ultra-violet region of a fraction prepared from crude yttria he detected a new element victorium, and subsequently by elaborate fractionation

obtained the element itself.

The first earth of this group to be isolated (although in an impure form) was yttria, obtained by Gadolin in 1794 from the mineral gadolinite, which was named after its discoverer and investigator. Klaproth and Vauquelin also investigated this earth, but without detecting that it was a complex mixture — • a discovery reserved for C. G. Mosander. The next discovery, made independently and simultaneously in 1803 by Klaproth and by W. Hisinger and Berzelius, was of ceria, the oxide of cerium, in the mineral cerite found at Ridderhytta, Westmannland, Sweden. These crude earths, yttria and ceria, have supplied most if not all of the ” rare earth ” metals. In 1841 Mosander, having in 1839 discovered a new element lanthanum in the mineral cerite, isolated this element and also a hitherto un-recognized substance, didymia, from crude yttria, and two years later he announced the determination of two fresh constituents of the same earth, naming them erbia and terbia. Lanthanum has retained its elementary character, but recent attempts at separating it from didymia have led to the view that didymium is a mixture of two elements, praseodymium and neodymium (see Didymium). Mosander’s erbia has been shown to contain various other oxides — thulia, holmia, &c. — but this has not yet been perfectly worked out. In 1878 Marignac, having subjected Mosander’s erbia, obtained from gadolinite, to a careful examina- tion, announced the presence of a new element, ytterbium; this discovery was confirmed by Nilson, who in the following year discovered another element, scandium, in Marignac’s ytterbia. Scandium possesses great historical interest, for Cleve showed that it was one of the elements predicted by Mendeleeff about ten years previously from considerations based on his periodic classification of the elements (see Element). Other elements predicted and characterized by Mendeleeff which have been since realized are gallium, discovered in 1875, and germanium, discovered in 1885 by Clemens Winkler.

In 1880 Marignac examined certain earths obtained from the , mineral samarskite, which had already in 1878 received attention from Delafontaine and later from Lecoq de Boisbaudran. He established the existence of two new elements, samarium and gadolinium, since investigated more especially by Cleve, to whom most of our knowledge on this subject is due. In addition to the rare elements mentioned above, there are a score or so more whose existence is doubtful. Every year is attended by fresh ” discoveries ” in this prolific source of elementary substances, but the paucity of materials and the predilections of the investi- gators militate in some measure against a just valuation being accorded to such researches. After having been

somewhat neglected for the greater attractions and wider field presented by organic chemistry, the study of the elements and their inorganic compounds is now rapidly coming into favour; new investigators are continually entering the lists; the beaten paths are being retraversed and new ramifications pursued.

IV. Organic Chemistry

While inorganic chemistry was primarily developed through the study of minerals — a connexion still shown by the French appellation chimie mintrale — organic chemistry owes its origin to the investigation of substances occurring in the vegetable and animal organisms. The quest of the alchemists for the philosopher's stone, and the almost general adherence of the iatrochemists to the study of the medicinal characters and preparation of metallic compounds, stultified in some measure the investigation of vegetable and animal products. It is true that by the distillation of many herbs, resins and similar substances, several organic compounds had been prepared, and in a few cases employed as medicines; but the prevailing classifica- tion of substances by physical and superficial properties led to the correlation of organic and inorganic compounds, without any attention being paid to their chemical composition. The clarification and spirit of research so clearly emphasized by Robert Boyle in the middle of the 17th century is reflected in the classification of substances expounded by Nicolas Lemery, in 1675, in his Cows de chymie. Taking as a basis the nature of the source of compounds, he framed three classes: "mineral," comprising the metals, minerals, earths and stones; " vege- table," comprising plants, resins, gums, juices, &c; and " animal," comprising animals, their different parts and excreta. Notwithstanding the inconsistency of his allocation of substances to the different groups (for instance, acetic acid was placed in the vegetable class, while the acetates and the products of their dry distillation, acetone, &c, were placed in the mineral class), this classification came into favour. The phlogistonists en- deavoured to introduce chemical notions \o support it: Becher, in his Physica subterranea (1669), stated that mineral, vegetable and animal matter contained the same elements, but that more simple combinations prevailed in the mineral kingdom; while Stahl, in his Specimen Becherianum (1702), held the " earthy " principle to predominate in the mineral class, and the " aqueous " and " combustible " in the vegetable and animal classes. It thus happened that in the earlier treatises on phlogistic chemistry organic substances were grouped with all combustibles.

The development of organic chemistry from this time until almost the end of the 18th century was almost entirely confined to such

compounds as had practical applications, especially in pharmacy and dyeing. A new and energetic spirit was introduced by Scheele; among other discoveries this gifted experimenter isolated and characterized many organic acids, and proved the general occurrence of glycerin (Olsiiss) in all oils and fats. Bergman worked in the same direction; while Rouelle was attracted to the study of animal chemistry. Theoretical specula- tions were revived by Lavoisier, who, having explained the nature of combustion and determined methods for analysing com- pounds, concluded that vegetable substances ordinarily contained carbon, hydrogen and oxygen, while animal substances generally contained, in addition to these elements, nitrogen, and sometimes ‘ phosphorus and sulphur. Lavoisier, to whom chemistry was primarily the chemistry of oxygen compounds, having developed the radical theory initiated by Guyton de Morveau, formulated the hypothesis that vegetable and animal substances were oxides of radicals composed of carbon and hydrogen; moreover, since simple radicals (the elements) can form more than one oxide, he attributed the same character to his hydrocarbon radicals: he considered, for instance, sugar to be a neutral oxide and oxalic acid a higher oxide of a certain radical, for, when oxidized by nitric acid, sugar yields oxalic acid. At the same time, how- ever, he adhered to the classification of Lemery; and it was only when’ identical compounds were obtained from both vege- table and animal sources that this subdivision wa« discarded, and the classes were assimilated in the division organic chemistry.

At this time there existed a belief, held at a later date by Berzelius, Gmelin and many others, that the formation of organic compounds was conditioned by a so-called vital force; and the difficulty of artificially realizing this action explained the supposed impossibility of synthesizing organic compounds.

This dogma was shaken by Wohler’s synthesis of urea in 1828. But the belief died hard; the synthesis of urea remained isolated for many years; and many explanations were attempted by the vitalists (as, for instance, that urea was halfway between the inorganic and organic kingdoms, or that the carbon, from which it was obtained, retained the essentials of this hypothetical vital force) , but only to succumb at a later date to the indubitable fact that the same laws of chemical

combination prevail in both the animate and inanimate kingdoms, and that the artificial or laboratory synthesis of any substance, either inorganic or organic, is but a question of time, once its constitution is determined. 1

The exact delimitation of inorganic and organic chemistry engrossed many minds for many years; and on this point there existed considerable divergence of opinion for several decades. In addition to the vitalistic doctrine of the origin of organic compounds, views based on purely chemical considerations were advanced. The atomic theory, and its correlatives — the laws of constant and multiple proportions— had been shown to possess absolute validity so far as well-characterized inorganic com- pounds were concerned; but it was open to question whether organic compounds obeyed the same laws. Berzelius, in 1813 and 1814, by improved methods of analysis, established that the Daltonian laws of combination held in both the inorganic and organic kingdoms; and he adopted the view of Lavoisier that organic compounds were oxides of compound radicals, and therefore necessarily contained at least three elements — carbon, hydrogen and oxygen. This view was accepted in 1817 by Leopold Gmelin, who, in his Handbuch der Chemie, regarded inorganic compounds as being of binary composition (the simplest being oxides,, both acid and basic, which by combination form salts also of binary form), and organic compounds as ternary, i.e. composed of three elements; furthermore, he concluded that inorganic compounds could be synthesized, whereas organic compounds could not. A consequence of this empirical division was that marsh gas, ethylene and cyanogen were regarded as inorganic, and at a later date many other hydrocarbons of undoubtedly organic nature had to be included in the same division.

The binary conception of compounds held by Berzelius received apparent support from the observations of Gay Lussac, in 1815, on the vapour densities of alcohol and ether, which pointed to the conclusion that these substances consisted of one molecule of water and one and two of ethylene respectively; and from Pierre Jean Robiquet and Jean Jacques Colin, showing, in 1816, that ethyl chloride (hydrochloric ether) could be regarded as a compound of ethylene and hydrochloric acid. 2 Compound radicals came to be regarded as the immediate constituents of organic compounds; and, at first, a determination of their empirical composition was supposed to be sufficient to char- acterize them. To this problem there was added another in about the third decade of the 19th century — namely, to determine ‘the manner in which the atoms composing the radical were combined; this supplementary requisite was due to the dis- covery of the isomerism of

silver fulminate and silver cyana.te by Justus von Liebig in 1823, and to M. Faraday's discovery of butylene, isomeric with ethylene, in 1825.

The classical investigation of Liebig and Friedrich Wohler on the radical of benzoic acid (" Uber das Radikal der Benzoe- saure," Ann. Chem., 1832, 3, p. 249) is to be regarded as a most important contribution to the radical theory, for it was shown that a radical containing the elements carbon, hydrogen and oxygen, which they named benzoyl (the termination yl coming from the Gr. iiXij, matter), formed the basis of benzaldehyde, benzoic acid, benzoyl chloride, benzoyl bromide and benzoyl sulphide, benzamide and benzoic ether. Berzelius immediately appreciated the importance of this discovery, notwithstanding

1 The reader is specially referred to the articles Alizarin ; Indigo ; Purin and Terpenes for illustrations of the manner in which qhemists have artificially prepared important animal and vegetable products.

2 These observations were generalized by J. B, Dumas and Polydore Boullay (1806-1835) in their " etherin theory " (vide infra).

that he was compelled to reject the theory that oxygen could not play any part in a compound radical — a view which he previously considered as axiomatic; and he suggested the names " proin " or " orthrin " (from the Gr. Trpcot and opSpos, at dawn). However, in 1833, Berzelius reverted to his earlier opinion that oxygenated radicals were incompatible with his electrochemical theory; he regarded benzoyl as an oxide of the radical C14H10, which he named " picramyl " (from irucpos, bitter, and a/xvySaXr], almond), the peroxide being anhydrous benzoic acid; and he dismissed the views of Gay Lussac and Dumas that ethylene was the radical of ether, alcohol and ethyl chloride, setting up in their place the idea that ether was a suboxide of ethyl, (GHsˆO, which was analogous to K 2 0, while alcohol was an oxide of a radical C2H6; thus annihilating any relation between these two compounds. This view was modified by Liebig, who regarded ether as ethyl oxide, and alcohol as the hydrate of ethyl oxide; here, however, he was in error, for he attributed to alcohol a molecular weight double its true value. Notwithstanding these errors, the value of the " ethyl theory " was perceived; other radicals — formyl, methyl, amyl, acetyl, &c. — were characterized; Dumas, in 1837, admitted the failure of the etherin theory; and, in company with Liebig, he defined organic chemistry as the "chemistry of compound radicals." The knowledge of compound radicals received further increment at the hands of Robert W. Bunsen, the discoverer of the

cacodyl compounds.

The radical theory, essentially dualistic in nature in view of its similarity to the electrochemical theory of Berzelius, was destined to succumb to a unitary theory. Instances had already been recorded of cases where a halogen element replaced hydrogen with the production of a closely allied substance: Gay Lussac had prepared cyanogen chloride from hydrocyanic acid; Faraday, hexachlorethane from ethylene dichloride, &c. Here the electro- negative halogens exercised a function similar to electro-positive hydrogen. Dumas gave especial attention to such substitutions, named metalepsy (ixtrakqipis, exchange); and framed the following empirical laws to explain the reactions: — (1) a body containing hydrogen when substituted by a halogen loses one atom of hydrogen for every atom of halogen introduced; (2) the same holds if oxygen be present, except that when the oxygen is present as water the latter first loses its hydrogen without replacement, and then substitution according to (1) ensues. Dumas went no further that thus epitomizing his observations; and the next development was made in 1836 by Auguste Laurent, who, having amplified and discussed the applicability of Dumas' views, promulgated his Nucleus Theory, which assumed the existence of " original nuclei or radicals " {radicaux or noyaux fondamentaux) composed of carbon and hydrogen, and " derived nuclei " (radicaux or noyaux derives) formed from the original nuclei by the substitution of hydrogen or the addition of other elements, and having properties closely related to the primary nuclei.

Vigorous opposition was made by Liebig and Berzelius, the latter directing his attack against Dumas, whom he erroneously believed to be the author of what was, in his opinion, a pernicious theory. Dumas repudiated the accusation, affirming that he held exactly contrary views to Laurent; but only to admit their correctness in 1839, when, from his own researches and those of Laurent, Malaguti and Regnault, he formulated his type theory. According to this theory a " chemical type " embraced compounds containing the same number of equivalents combined in a like manner and exhibiting similar properties; thus acetic and trichloracetic acids, aldehyde and chloral, marsh gas and chloroform are pairs of compounds referable to the same type. He also postulated, with Regnault, the existence of " molecular or mechanical types " containing" substances which, although having the same number of equivalents, are essentially different in characters. His unitary conceptions may be sum- marized: every chemical compound forms a complete whole, and cannot therefore consist – of two parts; and its chemical character depends primarily upon the arrangement and number of the atoms, and, in a

lesser degree, upon their chemical nature.

More emphatic opposition to the dualistic theory of Berzelius was hardly possible; this illustrious chemist perceived that the validity of his electrochemical theory was called in question, and therefore he waged vigorous war upon Dumas and his followers. But he fought in a futile cause; to explain the facts put forward by Dumas he had to invent intricate and involved hypotheses, which, it must be said, did not meet with general acceptance; Liebig seceded from him, and invited Wohler to endeavour to correct him. Still, till the last Berzelius remained faithful to his original theory; experiment, which he had hitherto held to be the only sure method of research, he discarded, and in its place he substituted pure speculation, which greatly injured the radical theory. At the same time, however, the conception of radicals could not be entirely displaced, for the researches of Liebig and Wohler, and those made subsequently by Bunsen, demonstrated beyond all doubt the advantages which would accrue from their correct recognition.

A step forward — the fusion of Dumas,' type theory and the radical theory — was made by Laurent and Charles Gerhardt. As early as 1842, Gerhardt in his Pricis de chimie organique exhibited a marked leaning towards Dumas' theory, and it is without doubt that both Dumas and Laurent exercised con- siderable influence on his views. Unwilling to discard the strictly unitary views of these chemists, or to adopt the copulae theory of Berzelius, he revived the notion of radicals in a new form. According to Gerhardt, the process of substitution consisted of the union of two residues to form a unitary whole; these residues, previously termed " compound radicals," are atomic complexes which remain over from the interaction of two compounds. Thus, he interpreted the interaction of benzene and nitric acid as $C_6H_6 + HNO_3 = C_6H_6NO_2 + H_2O$, the "residues" of benzene being C_6H_S and H, and of nitric acid HO and NO_2. Similarly he represented the reactions investigated by Liebig and Wohler on benzoyl compounds as double decompositions.

This rejuvenation of the notion of radicals rapidly gained favour; and the complete 'fusion of the radical theory with the theory of types was not long delayed. In 1849 C. A. Wurtz discovered the amines or

substituted ammonias, previously predicted by Liebig; A. W. von Hofmann continued the investi- gation, and established their recognition as ammonia in which one or more hydrogen atoms had been replaced by hydrocarbon radicals, thus formulating the ” ammonia type.” In 1850 A. W. Williamson showed how alcohol and ether were to be regarded as derived from water by substituting one or both hydrogen atoms by the ethyl group; he derived acids and the acid anhydrides from the same type; and from a comparison of many inorganic and the simple organic compounds he con- cluded that this notion of a ” water-type ” clarified, in no small measure, the conception of the structure of compounds.

These conclusions were co-ordinated in Gerhardt’s ” new theory of types.” Taking as types hydrogen, hydrochloric acid, water and ammonia, he postulated that all organic compounds were referable to these four forms: the hydrogen type included hydrocarbons, aldehydes and ketones; the hydrochloric acid type, the chlorides, bromides and iodides; the water type, the alcohols, ethers, monobasic acids, acid anhydrides, and the analogous sulphur compounds; and the ammonia type, the amines, acid-amides, and the analogous phosphorus and arsenic compounds. The recognition of the polybasicity of acids, which followed from the researches of Thomas Graham and Liebig, had caused Williamson to suggest that dibasic acids could be referred to a double water type, the acid radical replacing an atom of hydrogen in each water molecule; while his discovery of tribasic formic ether, CH(OC 2 H>,)3, in 1854 suggested a triple water type. These views were extended by William Odling, and adopted by Gerhardt, but with modifications of Williamson’s aspects. A further generalization was effected by August Kekule, who rejected the hydrochloric acid type as unnecessary, and introduced the methane type and condensed mixed types. Pointing out that condensed types can only be fused with a radical replacing more than one atom of hydrogen, he laid the foundation of the doctrine of valency, a doctrine of incalcul-

able service to the knowledge of the structure of chemical compounds.

At about the same time Hermann Kolbe attempted a re- habilitation, with certain modifications, of the dualistic con- ception of Berzelius. He rejected the Berzelian tenet as to the unalterability of radicals, and admitted that they exercised a considerable influence upon the compounds with which they were copulated. By his own investigations and those of Sir Edward Frankland it was proved that the radical methyl existed in acetic acid; and by the electrolysis of sodium acetate, Kolbe concluded that he had isolated this radical; in this, however, he was wrong, for he really obtained ethane, C 2 H 6 ,

and not methyl, CH_3. From similar investigations of valerianic acid he was led to conclude that fatty acids were oxygen compounds of the radicals hydrogen, methyl, ethyl, &c, combined with the double carbon equivalent C_2. Thus the radical of acetic acid, acetyl, 1 was C_2H_3-C_2. (It will be noticed that Kolbe used the atomic weights H=i, C = 6, = 8, S=i6, &c; his formulae, however, were molecular formulae, i.e. the molecular weights were the same as in use to-day.) This connecting link, C_2, was regarded as essential, while the methyl, ethyl, &c. was but a sort of appendage; but Kolbe could not clearly conceive the manner of copulation.

The brilliant researches of Frankland on the organo-metallic compounds, and his consequent doctrine of saturation capacity or valency of elements and radicals, relieved Kolbe's views of all obscurity. The doctrine of copulae was discarded, and in 1859 emphasis was given to the view that all organic compounds were derivatives of inorganic by simple substitution processes. He was thus enabled to predict compounds then unknown, e.g. the secondary and tertiary alcohols; and with inestimable perspicacity he proved intimate relations between compounds previously held to be quite distinct. Lactic acid and alanine were shown to be oxy- and amino-propionic acids respectively; glycollic acid and glycocoll, oxy- and amino-acetic acids; salicylic and benzamic acids, oxy- and amino-benzoic acids.

Another consequence of the doctrine of valency was that it permitted the graphic representation of the molecule. The " structure theory " (or the mode of linking of the atoms) of carbon compounds, founded by Butlerow, Kekule and Couper and, at a later date, marvellously enhanced by the doctrine of stereo-isomerism, due to J. H. van't Hoff and Le Bel, occupies such a position in organic chemistry that its value can never be transcended. By its aid the molecule is represented as a collection of atoms connected together by valencies in such a manner that the part played by each atom is represented; isomerism, or the existence of two or more chemically different substances having identical molecular weights, is adequately shown; and, most important of all, once the structure is determined, the synthesis of the compound is but a matter of time.

In this summary the leading factors which have contributed to a correct appreciation of organic compounds have so far been considered historically, but instead of continuing this method it has been thought advisable to present an epitome of present-day conclusions, not chronologically, but as exhibiting the principles and subject-matter of our science.

Classification of Organic Compounds. An apt definition of organic chemistry is that it is ” the study of the hydrocarbons and their derivatives.” This description, although not absolutely comprehensive, serves as a convenient starting-point for a preliminary classification, since a great number of substances, including the most important, are directly referable to hydrocarbons, being formed by replacing one or more hydrogen atoms by other atoms or groups. Two distinct types of hydrocarbons exist: (1) those consisting of an open chain of carbon atoms — named the ” aliphatic series ” (aXetˆap, oil or fat), and (2) those consisting of a closed chain — the ” carbocyclic series.” The second series can be further divided

1 This must not be confused with the modern acetyl, CH 3 -CO, which at that time was known as acetoxyl.

into two groups: (i) those exhibiting properties closely analo- gous to the aliphatic series — the polymethylenes (q.v.), and (2) a series exhibiting properties differing in many respects from the aliphatic and polymethylene compounds, and characterized by a peculiar stability which is to be associated with the disposi- tion of certain carbon valencies not saturated by hydrogen— the ” aromatic series.” There also exists an extensive class of compounds termed the ” heterocyclic series ” — these compounds are derived from ring systems containing atoms other than carbon; this class is more generally allied to the aromatic series than to the aliphatic.

We now proceed to discuss the types of aliphatic compounds; then, the characteristic groupings having been established, an epitome of their derivatives will be given. Carbocyclic rings will next be treated, benzene and its allies in some detail; and finally the heterocyclic nuclei.

Accepting the doctrine of the tetravalency of carbon (its divalency in such compounds as carbon monoxide, various isocyanides, fulminic acid, &c, and its possible trivalency in M. Gomberg’s triphenyl-methyl play no part in what follows), it is readily seen that the simplest hydrocarbon has the formula CH 4 , named methane, in which the hydrogen atoms are of equal value, and which may be pictured as placed at the vertices of a tetrahedron, the carbon atom occupying the

centre. This tetrahedral configuration is based on the existence of only one methylene dichloride, two being necessary if the carbon valencies were directed from the centre of a plane square to its corners, and on the existence of two optical isomers of the formula C.A.B.D.E., C being a carbon atom and A.B. D.E. being different monovalent atoms or radicals (see Stereoisomerism). The equivalence of the four hydrogen atoms of methane rested on indirect evidence, e.g. the existence of only one acetic acid, methyl chloride, and other monosubstitution derivatives — until the experimental proof by L. Henry (Zeit. /. Phys. Chem., 1888, 2 > P- SS3), who prepared the four nitromethanes, CH 3 N0 2 , each atom in methane being successively replaced by the nitro-group.

Henry started with methyl iodide, the formula of which we write in the form Cl„H(,H c Hd. This readily gave with silver nitrite a nitromethane in which we may suppose the nitro-group to replace the a hydrogen atom, i.e. C(N02)oH 6 H e Hd. The same methyl iodide gave with potassium cyanide, acetonitril, which was hydrolysed to acetic acid; this must be C(COOH)„HtH c Hrf. Chlorination of this substance gave a monochloracetic acid ; we will assume the chlorine atom to replace the b hydrogen atom. This acid with silver nitrite gave nitroacetic acid, which readily gave the second nitromethane, CH (I (N02)f,H c H < ;, identical with the first nitromethane. From the nitroacetic acid obtained above, malonic acid was prepared, and from this a monochlormalonic acid was obtained ; we assume the chlorine atom to replace the c hydrogen atom. This acid gives with silver nitrite the corresponding nitromalonic acid, which readily yielded the third nitromethane, CH a H(,(N02) e Hrf, also identical with the first. The fourth nitromethane was obtained from the nitro- malonic acid previously mentioned by a repetition of the method by which the third was prepared; this was identical with the other three.

Let us now consider hydrocarbons containing 2 atoms of carbon. Three such compounds are possible according to the number of valencies acting' directly between the carbon atoms. Thus, if they are connected by one valency, and the remaining valencies saturated by hydrogen, we obtain the compound H3CCH3, ethane. This compound may be considered as derived from methane, CH 4 , by replacing a hydrogen atom by the monovalent group CH 3 , known as methyl; hence ethane may be named " methylmethane." If the carbon atoms are connected by two valencies, we obtain a compound H 2 C:CH 2 , ethylene; if by three valencies, HC-CH, acetylene. These last two compounds are termed unsaturated, whereas ethane is saturated. It is obvious that we have derived three combinations of carbon with hydrogen, characterized by containing a single, double, and triple

linkage; and from each of these, by the substitution of a methyl group for a hydrogen atom, compounds of the same nature result. Thus ethane gives H 3 C-CH 2 ‘CH 3 , propane; ethylene gives H 2 C:CHCH 3 , propylene; and acety- lene gives HC • C-CH 3 , allylene. By continuing the introduction of methyl groups we obtain three series of homologous hydro-

carbons given by the general formulae CHˆˆ, CnHˆ, and CnKwi, each member differing from the. preceding one of the same series by CH 2 . It will be noticed that compounds contain- ing two double linkages will have the same general formula as the acetylene series; such compounds are known as the ” diole- fines.” Hydrocarbons containing any number of double or triple linkages, as well as both double and triple linkages, are possible, and a considerable number of such compounds have been prepared.

A more complete idea of the notion of a compound radical follows from a consideration of the compound propane. We derived this substance from ethane by introducing a methvl group; hence it may be termed ” methylethane.” Equally well we may derive it from methane by replacing a hydrogen atom by the monovalent group CH 2 -CH8, named ethyl; hence propane may be considered as ” ethylmethane.” Further, since methane may be regarded as formed by the conjunction of a methyl group with a hydrogen atom, it may be named ” methyl hydride “; similarly ethane is ” ethyl hydride,” propane, ” propyl hydride,” and so on. The importance of such groups as methyl, ethyl, &c. in attempting a nomenclature of organic compounds cannot be overestimated; these compound radicals, frequently termed alkyl radicals, serve a similar purpose to the organic chemist as the elements to the inorganic chemist.

In methane and ethane the hydrogen atoms are of equal value, and no matter which one may be substituted by another element or group the same compound will result. In propane, on the other hand, the hydrogen atoms attached to the terminal carbon atoms differ from those joined to the medial atom; we may therefore expect to obtain different compounds according to the position of the hydrogen atom substituted. By intro- ducing a methyl group we may obtain CH 3 -CH 2 -CH 2 CH 3 , known as ” normal ” or n-butane, substitution occurring at a terminal atom, or CH 3 -CH(CH 3)-CH 3 , isobutane, substitution occurring at the medial atom. From n-butane we may derive, by a similar substitution of methyl groups, the two hydrocarbons:

(1) CH 3 -CH 2 -CH 2 -CH 2 CH 3 , and (2) CH 3 -CH(CH 3)-CH 2 -CH

3 ; from isobutane we may also derive two compounds, one identical with (2), and a new one (3) CH 3 (CH 3)C(CH 3)CH 3 . These three hydrocarbons are isomeric, i.e. they possess the same formula, but differ in constitution. We notice that they may be differentiated as follows: (1) is built up solely of methyl and •CH 2 – (methylene) groups and the molecule consists of a single chain; such hydrocarbons are referred to as being normal;

(2) has a branch and contains the group; CH (methine) in which the free valencies are attached to carbon atoms; such hydro- carbons are termed secondary or iso-; (3) is characterized by a carbon atom linked directly to four other carbon atoms; such hydrocarbons are known as tertiary.

Deferring the detailed discussion of cyclic or ringed hydro- carbons, a correlation of the various types or classes of compounds which may be derived from hydrocarbon nuclei will now be given. It will be seen that each type depends upon a specific radical or atom, and the copulation of this character with any hydro- carbon radical (open or cyclic) gives origin to a compound of the same class.

It is convenient first to consider the effect of introducing one, two, or three hydroxyl (OH) groups into the -CH 3 , > CH 2 , and ?»CH groups, which we have seen to characterize the different types of hydrocarbons. It may be noticed here that cyclic nuclei can only contain the groups > CH 2 . and ˆ CH, the first characterizing the polymethylene and reduced heterocyclic compounds, the second true aromatic compounds.

Substituting one hydroxyl group into each of these residues, we obtain radicals of the type-CH 2 -OH, >CHOH, and >C-OH; these compounds are known as alcohols (q.v.), and are termed primary, secondary, and tertiary respectively. Polymethylenes can give only secondary and tertiary alcohols, benzene only tertiary; these latter compounds are known as phenols. A second hydroxyl group may be introduced into the residues — CH 2 -OH and >CH-OH, with the production of radicals of the form — CH(OH) 2 and >C(OH) 2 . Compounds containing these groupings are, however, rarely observed (see Chloral), and it is generally found that when compounds of these types are expected, the elements of water are split off, and the typical groupings are reduced to — CH : O and > C : 0. Compounds containing the group — CH:0 are known as aldehydes {q.v.), while the group >C:0 (sometimes termed the carbonyl or keto group) characterizes the ketones (q.v.). A third hydroxyl group may be

introduced into the — CH : O residue with the formation of the radical — C(OH):0; this is known as the carboxyl group, and characterizes the organic acids.

Sulphur analogues of these oxygen compounds are known. Thus the thio-alcohols or mercaptans (q.v.) contain the group — CH 2 -SH; and the elimination of the elements of sulphuretted hydrogen between two molecules of a tbio-alcohol results in the formation of a thio-ether or sulphide, R 2 S. Oxidation of thio-etbers results in the formation of sulphoxides, R 2 : S : O, and sulphones, R 2 : SO2 ; oxidation of mercaptans yields sulphonic acids, R-SOjH, and of sodium mercaptides sulphinic acids, R-SO(OH). We may also notice that thio-ethers combine with alkyl iodides to form sulphine or sulphonium compounds, Rj • SI. Thio-aldehydes, thio-ketones and thio-acids also exist.

We proceed to consider various simple derivatives of the alcohols, which we may here regard as hydroxy hydrocarbons, R-OH, where R is an alkyl radical, either aliphatic or cyclic in nature.

Of these, undoubtedly the simplest are the ethers (q.v.), formed by the elimination of the elements of water between two molecules of the same alcohol, ” simple ethers,” or of different alcohols, ” mixed ethers.” These compounds may be regarded as oxides in just the same way as the alcohols are regarded as hydroxides. In fact, the analogy between the alkyl groups and metallic elements forms a convenient basis from which to consider many derivatives. Thus from ethyl alcohol there can be prepared compounds, termed esters (q.v.), or ethereal salts, exactly comparable in structure with corres- ponding salts of, say, potassium; by the action of the phosphorus haloids, the hydroxyl group is replaced by a halogen atom with the formation of derivatives of the type R-Cl(Br.I); nitric acid forms nitrates, R-0-N02; nitrous acid, nitrites, R-O-NO; sulphuric acid gives normal sulphates R2SO4, or acid sulphates, R-S04H. Organic acids also condense with alcohols to form similar compounds : the fats, waxes, and essential oils are naturally occurring substances of this class.

An important class of compounds, termed amines (q.v.), results from the condensation of alcohols with ammonia, water being eliminated

between the alcoholic hydroxyl group and a hydrogen atom of the ammonia. Three types of amines are possible and have been prepared : primary, R-NH 2 ; secondary, R 2 : NH; and tertiary, R3.N1 the oxamines, R 3 N:0, are closely related to the tertiary ammonias, which also unite with a molecule of alkyl iodide to form salts of quaternary ammonium bases, e.g. R4N-I. It is worthy of note that phosphorus and arsenic bases analogous to the amines are known (see Phosphorus and Arsenic). From the primary amines are derived the diazo compounds (q.v.) and azo compounds (q.v.); closely related are the hydrazines (q.v.). Secondary amines yield nitrosamines, R 2 N-NO, with nitrous acid. By the action of hydroxy lamine or phenylhydrazine on aldehydes or ketones, con- densation occurs between the carbonyl oxygen of the aldehyde or ketone and the amino group of the hydroxylamine or hydrazine. Thus with hydroxylamine aldehydes yield aldoximes, R-CH : N-OH, and ketones, ketoximes, R 2 C:N-OH (see Oximes), while phenyl hydrazine gives phenylhydrazones, R2C:N-NH-C 6 H 6 (see Hydra- zones). Oxyaldehydes and oxyketones (viz. compounds containing an oxy in addition to an aldehydic or ketonic group) undergo both condensation and oxidation when treated with phenylhydrazine, forming compounds known as osozones; these are of great import- ance in characterizing the sugars (q.v.).

The carboxyl group constitutes another convenient starting- point for the orientation of many types of organic compounds. This group may be considered as resulting from the fusion of a carbonyl (:CO) and a hydroxyl (H0-) group; and we may expect to meet with compounds bearing structural resemblances to the derivatives of alcohols and aldehydes (or ketones).

Considering derivatives primarily concerned with transformations of the hydroxyl group, we may regard our typical acid as a fusion of a radical R-CO — (named acetyl, propionyl, butyl, &c, generally according to the name of the hydrocarbon containing the same number of carbon atoms) and a hydroxyl group. By replacing the hydroxyl group by a halogen, acid-haloids result ; by the elimination of the elements of water between two molecules, acid-anhydrides, which may be oxidized to acid-peroxides; by replacing the hydroxyl group by the group -SH, thio-acids; by replacing it by the amino group, acid-amides (q.v.); by replacing it by the group — NH-NH 2 , acid-hydrazides. The structural relations of these compounds are here shown :

R-CO-OH; acid;

R-C0-C1; acid-chloride ; R-CO-NH,-, acid-amide ;

(R-CO) 2 0; R-CO-SH; acid-anhydride ; thio-acid ;

R-CO-NH-NH 2 . acid-hydrazide.

the

the

It is necessary clearly to distinguish such compounds as amino- (or amido-) acids and acid-amides; in the first case amino group is substituted in the hydrocarbon residue, in the second it is substituted in the carboxyl group.

By transformations of the carbonyl group, and at the same time of the hydroxyl group, many interesting types of nitrogen com- pounds may be correlated.

Thus from the acid-amides, which we have seen to be closely related to the acids themselves, we obtain, by replacing the carbonyl oxygen by chlorine, the acidamido-chlorides, R-CC1 2 -NH 2 , from which are derived the imido-chlorides, R-CC1:NH, by loss of one molecule of hydrochloric acid. By replacing the chlorine in the imido-chloride by an oxyalkyl group we obtain the imido-ethers, R-C(OR'):NH; and by an amino group, the amidines, R-C(NH 2):NH. The carbonyl oxygen may also be replaced by the oxime group, : N-OH ; thus the acids yield the hydroxamic acids, R-C(OH) : NOH, and the acid-amides the amidoximes, R-C(NH 2) : NOH. Closely related to the amidoximes are the nitrolic acids, R-C(N0 2) : NOH.

Cyclic Hydrocarbons and Nuclei.

Having passed in rapid review the various types of compounds derived by substituting for hydrogen various atoms or groups of atoms in hydrocarbons (the separate articles on specific com- pounds should be consulted for more detailed accounts), we now proceed to consider the closed chain compounds. Here we meet with a great diversity of types: oxygen, nitrogen, sulphur and other elements may, in addition to carbon, combine together in a great number of arrangements to form cyclic nuclei, which exhibit characters closely resembling open-chain compounds in so far as they yield substitution derivatives, and behave as compound radicals. In classifying closed chain compounds, the first step consists in dividing them into: (1) carbocyclic, in which the ring is composed solely of carbon atoms — these are also known as homocyclic or isocyclic on account of the identity of the members of the ring — and (2) heterocyclic, in which different elements go to make up the ring. Two primary divisions of carbocyclic compounds

may be conveniently made: (1) those in which the carbon atoms are completely saturated — these are known by the generic term polymethylenes, their general formula being $(CH_2)_n$: it will be noticed that they are isomeric with ethylene and its homologues; they differ, however, from this series in not containing a double linkage, but have a ringed structure; and (2) those containing fewer hydrogen atoms than suffice to saturate the carbon valencies— these are known as the aromatic compounds proper, or as benzene compounds, from the predominant part which benzene plays in their constitution.

It was long supposed that the simplest ring obtainable con- tained six atoms of carbon, and the discovery of trimethylene in 1882 by August Freund by the action of sodium on trimethylene bromide, $Br(CH_2)_3Br$, came somewhat as a surprise, especially in view of its behaviour with bromine and hydrogen bromide. In comparison with the isomeric propylene, $CH_3\text{-}HC{:}CH_2$, it is remarkably inert, being only very slowly attacked by bromine, which readily combines with propylene. But on the other hand, it is readily converted by hydrobromic acid into normal propyl bromide, $CH_3\text{-}CH_2CH_2Br$. The separation of carbon atoms united by single affinities in this manner at the time the observa tion was made was altogether without precedent. A similar behaviour has since been noticed in other trimethylene deri- vatives, but the fact that bromine, which usually acts so much more readily than hydrobromic acid on unsaturated compounds, should be so inert when hydrobromic acid acts readily is one still needing a satisfactory explanation. A great impetus was given to the study of polymethylene derivatives by the important and unexpected observation made by W. H. Perkin, junr., in 1883, that ethylene and trimethylene bromides are capable of acting in such a way on sodium acetoacetic ester as to form tri- and tetra- methylene rings. Perkin has himself contributed largely to our knowledge of such compounds; penta- and hexa-methylene derivatives have also received considerable attention (see Polymethylenes) .

A. von Baeyer has sought to explain the variations in stability manifest in the various polymethylene rings by a purely mechanical hypothesis, the ” strain ” or Spannungs theory (Ber., 1885, p. 2277). Assuming the four valencies of the carbon atom to be directed from the centre of a regular teta^ hedron towards its four corners, the angle at which they meet is 100 ° 28’. Baeyer supposes that in the formation of carbon

” rings ” the valencies become deflected from their positions, and that the tension thus introduced may be deduced from a com- parison of this angle with the angles at which the strained valencies would meet. He regards the amount of deflection as a measure x > f the stability of the ” ring.” The readiness with which ethylene is acted on in comparison with other types of hydrocarbon, for example, is in harmony, he considers, with the circumstance that the greatest distortion must be involved in its formation, as if deflected into parallelism each valency will be drawn out of its position through J. 109° 28’. The values in other cases are calculable from the formula 5(io 9° 28′ — a), where a is the internal angle of the regular polygon contained by sides equal in number to the number of the carbon atoms composing the ring. These values are: —

Trimethylene. i(i09°28’-6o°) = 24 44’.

Pentamethylene. i(‘io9°28’-io8°) = o°44’. 1(109′

Tetramethylene. Ki09°28’- 9 o*) = 9°44’. Hexamethylene. 28’- i20°) = -5°i6’.

The general behaviour of the several types of hydrocarbons is certainly in accordance with this conception, and it is a remark- able fact that when benzene is reduced with hydriodic acid, it is converted into a mixture of hexamethylene and methylpenta- methylene (cf. W. Markownikov, Ann., 1898, 302, p. 1); and many other cases of the conversion of six-carbon rings into five- carbon rings have been recorded (see below, Decompositions of the Benzene Ring). Similar considerations will apply to rings containing other elements besides carbon. As an illustration it may be pointed out that in the case of the two known types of lactones — the 7-lactones, which contain four carbon atoms and one oxygen atom in the ring, are more readily formed and more stable (less readily hydrolysed) than the 5-lactones, which contain one oxygen and five carbon atoms in the ring. That the number of atoms which can be associated in a ring by single affinities is limited there can be no doubt, but there is not yet sufficient evidence to show where the limit must be placed. Baeyer has suggested that his hypothesis may also be applied to explain the instability of acetylene and its derivatives, and the still greater instability of the polyacetylene compounds.

Benzene. The ringed structure of benzene, C_6H_6, was first suggested in 1865 by August Kekule, who represented the molecule by

six CH groups placed at the six angles of a regular hexagon, the sides of which denoted the valencies saturated by adjacent carbon atoms, the fourth valencies of each carbon atom being represented as saturated along alternate sides. This formula, notwithstand- ing many attempts at both disproving and modifying it, has well stood the test of time; the subject has been the basis of constant discussion, many variations have been proposed, but the original conception of Kekule remains quite as convenient as any of the newer forms, especially when considering the syntheses and decompositions of the benzene complex. It will be seen, however, that the absolute disposition of the fourth valency may be ignored in a great many cases, and consequently the complex may be adequately represented as a hexagon. This symbol is in general use; it is assumed that at each corner there is a CH group which, however, is not always written in; if a hydrogen atom be substituted by another group, then this group is attached to the corner previously occupied by the displaced hydrogen. The following diagrams illustrate these statements : — –

CH C-OH OH

HCJˆSCH /\ HCJˆScH Hclˆ JcH [ˆJ HcHˆJcH

CH CH

Benzene, Abbreviated. Oxytcnzene. Abbreviated.

‘ From the benzene nucleus we can derive other aromatic nuclei, graphically represented by fusing two or more hexagons along common sides. By fusing two nuclei we obtain the formula of naphthalene, CioHs ; by fusing three, the hydrocarbons anthracene and phenanthrene, C14H10; by fusing four, chrysene, C 18 Hi 2 , and possibly pyrene, Ci 6 Hm; by fusing five, picene, C 22 Hi4. But it must be here understood that each member of these condensed nuclei need not necessarily be identical in structure; thus the central nuclei in anthracene and phenanthrene differ very considerably from the terminal nuclei (see below, Condensed Nuclei). Other

OH

Distinc- tions between aliphatic and

aromatic com- pounds.

hydrocarbon nuclei generally classed as aromatic in character result from the union of two or more benzene nuclei joined by one or two valencies with polymethylene or oxidized poly methylene rings;

instances of such nuclei are indene, hydrindene, nuorene, and fluoranthene. From these nuclei an immense number of derivatives may be obtained, for the hydrogen atoms may be substituted by any of the radicals discussed in the preceding section on the classification of organic compounds.

We now proceed to consider the properties, syntheses, decompositions and constitution of the benzene complex. It has already been stated that benzene derivatives may be regarded as formed by the replacement of hydrogen atoms by other elements or radicals in exactly the same manner as in the aliphatic series. Important differences, however, are immediately met with when we consider the methods by which derivatives are obtained. For example: nitric acid and sulphuric acid readily react with benzene and its homologues with the production of nitro derivatives and sulphonic acids, while in the aliphatic series these acids exert no substituting action (in the case of the defines, the latter acid forms an addition product) ; another distinction is that the benzene complex is more stable towards oxidizing agents. This and other facts connected with the stability of benzenoid compounds are clearly shown when we consider mixed aliphatic-aromatic hydrocarbons, i.e. com- pounds derived by substituting aliphatic radicals in the benzene nucleus; such a compound is methylbenzene or toluene, CeH 5 -CH 3 . This compound is readily oxidized to benzoic acid, CeH 5 -COOH, the aromatic residue being unattacked; nitric and sulphuric acids produce nitrotoluenes, C6H 4 -CH 3 -N0 2 , and toluene sulphonic acids, C 6 Hi-CH 3 S0 3 H; chlorination may result in the formation of derivatives substituted either in the aromatic nucleus or in the side chain; the former substitu tion occurs most readily, chlor-toluenes, C 6 H 4 -CH 3 -C1, being formed, while the latter, which needs an elevation in temperature or other auxiliary, yields benzyl chloride, C6H 6 -CH 2 C1, and benzal chloride, CeH 5 -CHCl 2 . In general, the aliphatic residues in such mixed compounds retain the characters of their class, while the aromatic residues retain the properties of benzene.

Further differences become apparent when various typical compounds are compared. The introduction of hydroxyl groups into the benzene nucleus gives rise to compounds generic- ally named phenols, which, although resembling the aliphatic alcohols in their origin, differ from these substances in their increased chemical activity and acid nature. The phenols more closely resemble the tertiary alcohols, since the hydroxyl group is linked to a carbon atom which is united to other carbon atoms by its remaining three valencies; hence on oxidation they cannot yield the corresponding aldehydes, ketones or acids (see below, Decompositions of the Benzene Ring). The amines also exhibit

striking differences: in the aliphatic series these compounds may be directly formed from the alkyl haloids and ammonia, but in the benzene series this reaction is quite im- possible unless the haloid atom be weakened by the presence of other substituents, e.g. nitro groups. Moreover, while methyl- amine, dimethylamine, and trimethylamine increase in basicity corresponding to the introduction of successive methyl groups, phenylamine or aniline, diphenylamine, and triphenylamine are in decreasing order of basicity, the salts of diphenylamine being decomposed by water. Mixed aromatic-aliphatic amines, both secondary and tertiary, are also more strongly basic than the pure aromatic amines, and less basic than the true aliphatic compounds; e.g. aniline, $C_6H_5NH_2$, monomethyl aniline, C_6H_5-NH-CH_3, and dimethyl aniline, $C_6H_5N(CH_3)_2$, are in increasing order of basicity. These observations may be sum marized by saying that the benzene nucleus is more negative in character than the aliphatic residues.

Isomerism of Benzene Derivatives. — Although Kekule founded his famous benzene formula in 1865 on the assumptions that the six hydrogen atoms in benzene are equivalent and that the molecule is symmetrical, i.e. that two pairs of hydrogen atoms are symmetrically situated with reference to any specified hydrogen atom, the absolute demonstration of the validity of

these assumptions was first given by A. Ladenburg in 1874 (see Ber., 1874, 7, p. 1684; 1875, 8, p. 1666; Theorie der aromatischen Verbindungen, 1876). These results may be graphically represented as follows: numbering the hydrogen atoms in cyclical order from 1 to 6, then the first thesis demands that whichever atom is substituted the same compound results, while the second thesis points out that the pairs 2 and 6, and 3 and 5 are symmetrical with respect to 1, or in other words, the di-substitution derivatives 1.2 and 1.6, and also 1.3 and 1.5 are identical. Therefore three di-derivatives are possible, viz. 1.2 or 1.6, named ortho- (0), 1.3 or 1.5, named meta- (m), and 1.4, named para- compounds (p). In the same way it may be shown that three tri-substitution, three tetra-substitution, one penta-substitution, and one hexa-substitution derivative are possible. Of the tri-substitution derivatives, i.2.3.compounds are known as ” adjacent ” or ” vicinal ” (v), the 1.2.4 as ” asym metrical ” (as), the 1. 3.5 as

“symmetrical ” 0); of the tetra- substitution derivatives, 1.2.3.4- compounds are known as ” adjacent,” 1.2.3.5 as ” asymmetrical,” and 1.2.4.5 as ” sym- metrical.”

Tetra- derivatives

Di-derivatives

Tri- derivatives

O‘0-O a O’-O. CeO-O”

Here we have assumed the substituent groups to be alike; when they are unlike, a greater number of isomers is possible. Thus in the tri-substitution derivatives six isomers, and no more, are possible when two of the substituents are alike; for instance, six diaminobenzoic acids, GsHˆNHˆCOOH, are known; when all are unlike ten isomers are possible; thus, ten oxytoluic acids, C 6 H 3 CH 3 -OH-COOH, are known. In the case of tetra-substituted compounds, thirty isomers are possible when all the groups are different.

The preceding considerations render it comparatively easy to follow the reasoning on which the experimental verification of the above statements is based. The proof is divided into two Eqaiva- p arts: (r) tna t four hydrogen atoms are equal, and (2) leoceof that twQ pa ; rs Q f hydrogen atoms are symmetrical with four hydro- re f erencetoa specified hydrogen atom. In the first thesis, gen atoms. phenoloroxybenzene! C 6 H 6 -OH,inwhichwewillassumethe hydroxyl group to occupy position I, is converted into brombenzene, which is then converted into benzoic acid, C 6 H 5 COOH. From this substance, an oxybenzoic acid (meta), C 6 H4-OH-COOH, may be prepared; and the two other known oxybenzoic acids (ortho- and para-) may be converted into benzoic acid. These three acids yield on heating phenol, identical with the substance started with, and since in the three oxybenzoic acids the hydroxyl groups must occupy positions other than I, it follows that four hydrogen atoms are equal in value.

R. Hiibner and A. Petermann (Ann., 1869, 149, p. 129) provided the proof of the equivalence of the atoms 2 and 6 with respect to 1. From meta-brombenzoicacid twonitrobrombenzoic Symmetry ac ; c j s are obtained on direct nitration ; elimination of the o/pa/rs of bromine atom anc j the reduction of the nitro to an amino hyarogen g roU p ; n t nese two acids results in the formation of the same a oms. ortho-aminobenzoicacid. Hencethepositionsoccupiedby the nitro groups in the two different nitrobrombenzoic acids must be symmetrical with

respect to the carboxyl group. In 1879, Hiibner (Ann., 195, p. 4) proved the equivalence of the second pair, viz. 3 and 5, by starting out with ortho-aminobenzoic acid, previously obtained by two different methods. This substance readily yields ortho-oxybenzoic acid or salicylic acid, which on nitration yields two mononitro-oxybenzoic acids. By eliminating the hydroxy groups in these acids the same nitrobenzoic acid is obtained, which yields on reduction an aminobenzoic acid different from the starting-out acid. Therefore there must be another pair of hydrogen atoms, other than 2 and 6, which are symmetrical with respect to 1. The symmetry of the second pair was also established in 1878 by E. Wroblewsky (Ann., 192, p. 196).

Orientation of Substituent Groups. — The determination of the relative positions of the substituents in a benzene derivative constitutes an important factor in the general investigation of such compounds. Confining our attention, for the present, to di-substitution products we see that there are three distinct series of compounds to be considered. Generally if any group be replaced by another group, then the second group enters the nucleus in the position occupied by the displaced group; this

means that if we can definitely orientate three di-derivatives of benzene, then any other compound, which can be obtained from or converted into one of our typical derivatives, may be definitely orientated. Intermolecular transformations — migra- tions of substituent groups from one carbon atom to another — are of fairly common occurrence among oxy compounds at elevated temperatures. Thus potassium ortho-oxybenzoate is converted into the salt of para-oxybenzoic acid at 220 ; the three bromphenols, and also the brombenzenesulphonic acids, yield w-dioxybenzene or resorcin when fused with potash. It is necessary, therefore, to avoid reactions involving such inter- molecular migrations when determining the orientation of aromatic compounds.

Such a series of typical compounds are the benzene dicarboxylic acids (phthalic acids), $C_6H_4(COOH)_2$. C. Graebe (Ann., 1869, 149, p. 22) orientated the ortho-compound or phthalic acid from its formation from naphthalene on oxidation; the meta-compound or isophthalic acid is orientated by its production from mesitylene, shown by A. Ladenburg (Ann., 1875, 179, p. 163) to be symmetrical trimethyl benzene; terephthalic acid, the remaining isomer, must therefore be the para-compound.

P. Griess (Ber., 1872, 5, p. 192; 1874, 7, p. 1223) orientated the three

diaminobenzenes or phenylene diamines by considering their preparation by the elimination of the carboxyl group in the six diaminobenzoic acids. The diaminobenzene resulting from two of these acids is the ortho-compound ; from three, the meta- ; and from one the para- ; this is explained by the following scheme : —

p™. p™, (y»r) A pi

NH, (/^lCOOH

XOOH

0*

NH, NH,

0-

W. Korner (Gazz. Chem. Ital., 4, p. 305) in 1874 orientated the three dibrombenzenes in a somewhat similar manner. Starting with the three isomeric compounds, he found that one gave two tribrom-benzenes, another gave three, while the third gave only one. A scheme such as the preceding one shows that the first dibrombenzene must be the ortho-compound, the second the meta-, and the third the para-derivative. Further research in this direction was made by D. E. Noetling (Ber., 1885, 18, p. 2657), who investigated the nitro-, amino-, and oxy-xylenes in their relations to the three xylenes or dimethyl benzenes.

The orientation of higher substitution derivatives is determined by considering the di- and tri-substitution compounds into which they can be transformed.

Substitution of the Benzene Ring. — -As a general rule, homologues and mono-derivatives of benzene react more readily with sub-stituting agents than the parent hydrocarbon; for example, phenol is converted into tribromphenol by the action of bromine water, and into the nitrophenols by dilute nitric acid; similar activity characterizes aniline. Not only does the substituent group modify the readiness with which the derivative is attacked, but also the nature of the product. Starting with a mono- derivative, we have seen that a substituent group may enter in either of three positions to form an ortho-, meta-, or para- compound. Experience has shown that such mono-derivatives as nitro compounds, sulphonic acids, carboxylic acids, aldehydes, and ketones yield as a general rule chiefly the meta-compounds, and this is independent of the nature of the second group in- troduced; on the

other hand, benzene haloids, amino-, homologous-, and hydroxy-benzenes yield principally a mixture of the ortho- and para-compounds. These facts are embodied in the ” Rule of Crum Brown and J. Gibson ” (Jour. Chem. Soc. 61, p. 367): If the hydrogen compound of the substituent already in the benzene nucleus can be directly oxidized to the corresponding hydroxyl compound, then meta-derivatives predominate on further substitution, if not, then ortho- and para- derivatives. By further substitution of ortho- and para-di-derivatives, in general the same tri-derivative [1.2.4] is formed (Ann., 1878, 192, p. 219); meta-compounds yield [1.3.4] and [1.2.3] tri-derivatives, except in such cases as when both sub- stituent groups are strongly acid, e.g. w-dinitrobenzene, then [i.3.5]-derivatives are obtained.

Syntheses of the Benzene Ring. — The characteristic distinctions

which exist between aliphatic and benzenoid compounds make the transformations of one class into the other especially interesting.

In the first place we may notice a tendency of several aliphatic compounds, e.g. methane, tetrachlormethane, &c, to yield aromatic compounds when subjected to a high temperature, the so-called pyrogenetic reactions (from Greek wvp, fire, and yew&. < * >, I produce) ; the predominance of benzenoid, and related compounds — naphtha- lene, anthracene, phenanthrene, &c. — in coal-tar is probably to be associated with similar pyrocondensations. Long-continued treat- ment with halogens may, in some cases, result in the formation of aromatic compounds; thus perchlorbenzene, CoCIs, frequently appears as a product of exhaustive chlorination, while hexyl iodide, CbHijI, yields perchlor- and perbrom-benzene quite readily.

The trimolecular polymerization of numerous acetylene com- pounds — substances containing two trebly linked carbon atoms, — C:C — , to form derivatives of benzene is of considerable interest. M. P. E. Berthelot first accomplished the synthesis of benzene in 1870 by leading acetylene, HC • CH, through tubes heated to dull redness; at higher temperatures the action becomes reversible, the benzene yielding diphenyl, diphenylbenzene, and acetylene. The condensation

of acetylene to benzene is also possible at ordinary temperatures by leading the gas over pyrophoric iron, nickel, cobalt, or spongy platinum (P. Sabatier and J. B. Senderens). The homologues of acetylene condense more readily; thus allylene, CH • OCH3, and crotonylene, CH3-CI OCH 3 , yield trimethyl- and hexamethyl-benzene under the influence of sulphuric acid. Toluene or mono-methylbenzene results from the pyrocondensation of a mixture of acetylene and allylene. Substituted acetylenes also exhibit this form of condensation; for instance, bromacetylene, BrC : CH, is readily converted into tribrombenzene, while propiolic acid, HC ■ C-COOH, under the influence of sunlight, gives benzene tricarboxylic acid.

A larger and more important series of condensations may be grouped together as resulting from the elimination of the elements of water between carbonyl (CO) and methylene (CH 2) groups. A historic example is that of the condensation of three molecules of acetone, CH 3 -CO-CH 3 , in the presence of sulphuric acid, to s-tri- methylbenzene or mesitylene, C6H 3 (CH 3)3, first observed in 1837 by R. Kane; methylethyl ketone and methyl- n-propyl ketone suffer similar condensations to j-triethylbenzene and s-tri-n-propylbenzene respectively. Somewhat similar condensations are : of geranial or citral, (CH 3) 2 CH-CHrCH:CH-C(CH 3):CH-CHO, to />isopropyl methylbenzene or cymene; of the condensation product of methyl-ethylacrolein and acetone, CH 3 -CH 2 -CH:C(CH 3)-CH:CH-CO-CH3, to [1. 3. 4trimethylbenzene or pseudocumene ; and of the con densation product of two molecules of isovaleryl aldehyde with one of acetone, C 3 H 7 -CH 2 -CH:C(C3H T)-CH:CH-CO-CH 3 , to (i)-methyl-2-4-di-isopropyl benzene. An analogous synthesis is that of di- hydro-m-xylenefrommethylheptenone,(CH 3)2C:CH-(CH 2) 2 -CO-CHs. Certain o-diketones condense to form benzenoid quinones, two molecules of the diketone taking part in the reaction; thus diacetyl, CH 3 -CO-CO-CH 3 , yields £-xyloquinone, CeH 2 (CH 3) 2 2 {Ber., 1888,

21, p. 141 1), and acetylpropionyl, CHs'C0-CO-C 2 ri 6 , yields duro-quinone, or tetramethylquinone, C 6 (CH 3)402, Oxymethylene com-pounds, characterized by the grouping >C:CH(OH), also give benzene derivatives by hydrolytic condensation between three molecules; thus oxymethylene acetone, or formyl acetone, CHrCO-CH :CH(OH), formed by acting on formic ester with acetone in the presence of sodium ethylate, readily yields [i.3.5triacetyl benzene, C6H 3 (CO-CH 3) 3 ; oxymethylene acetic ester or formyl acetic ester or /3-oxyacrylic ester, (HO)CH :CH-C0 2 C 2 H5, formed by condensing acetic ester with formic ester, and also its dimolecular condensation product, coumalic acid, readily yields esters of [1.3.5]- benzene

tricarboxylic acid or trimesic acid (see Ber., 1887, 20, p. 2930).

In 1890, 0. Doebner (Ber. 23, p. 2377) investigated the condensation of pyroracemic acid, CH 3 -CO-COOH, with various aliphatic aldehydes, and obtained from two molecules of the acid and one of the aldehyde in the presence of baryta water alkylic isophthalic acids: with acetaldehyde [l.3.5]-methylisophthalic acid or uvitic acid, C 6 H 3 -CH 3 (COOH) 2) was obtained, with propionic aldehyde [1.3.5] ethylisophthalic acid, and with butyric aldehyde the corresponding propylisophthalic acid. We may here mention the synthesis of oxyuvitic ester (5-methyl-4-oxy-i-3-benzene dicarboxylic ester) by the condensation of two molecules of sodium acetoacetic ester with one of chloroform (Ann., 1883, 222, p. 249). Of other syntheses of true benzene derivatives, mention may be made of the formation of orcinol or [3 -5]-dioxy toluene from dehydracetic acid; and the formation of esters of oxytoluic acid (5-methyl- 3-oxy-benzoic acid), C 6 H 3 -CH 3 -OH-COOH,when acetoneoxalic ester, CH 3 -CO-CH 2 -CO-CO-C0 2 C 2 H5, is boiled with baryta (Ber., 1889,'

22, p. 3271). Of interest also are H. B. Hill and J. Torray's observations on nitromalonic aldehyde, N0 2 'CH(CHO) 2 , formed by acting on mucobromic acid, probably CHO-CBr:CBr:COOH, with alkaline nitrites; this substance condenses with acetone to give £-nitrophenol, and forms [i.3.5]-trinitrobenzene when its sodium salt is decomposed with an acid.

By passing carbon monoxide over heated potassium J. von Liebig

discovered, in 1834, an interesting aromatic compound, potassium carbon monoxide or potassium hexaoxybenzene, the nature of which was satisfactorily cleared up by R. Nietzki and T. Benckiser (Ber. 18, p. 499) in 1885, who showed that it yielded hexaoxy- benzene, C 6 (Ofi) 6 , when acted upon with dilute hydrochloric acid; further investigation of this compound brought to light a consider- able number of highly interesting derivatives (see Quinones). Another hexa-substituted benzene compound capable of direct synthesis is mellitic acid or benzene carboxylic acid, C 6 (COOH) 6 . This substance, first obtained from the mineral honeystone, alu- minium mellitate, by M. H. Klaproth in 1799, is obtained when pure carbon (graphite or charcoal) is oxidized by alkaline permanganate, or when carbon forms the positive pole in an electrolytic cell (Ber., 1883, 16, p. 1209). The composition of this substance was deter- mined by A. von Baeyer in 1870, who obtained benzene on distilling the calcium salt with lime.

Hitherto we have generally restricted ourselves to syntheses which result in the production of a true benzene ring; but there are many reactions by which reduced benzene rings are synthesized, and from the compounds so obtained true benzenoid compounds may be prepared. Of such syntheses we may notice: the con- densation of sodium malonic ester to phloroglucin tricarboxylic ester, a substance which gives phloroglucin or trioxybenzene when fused with alkalis, and behaves both as a triketohexamethylene tricarboxylic ester and as a trioxybenzene tricarboxylic ester; the condensation of succinic ester, $(CH_2C_0{}_2C_2H_5)_2$, under the influence of sodium to succinosuccinic ester, a diketohexamethylene di carboxylic ester, which readily yields dioxyterephthalic acid and hydroquinone (F. Herrmann, Ann., 1882, 211, p. 306; also see below, Configuration of the Benzene Complex) ; the condensation of acetone dicarboxylic ester with malonic ester to form triketohexamethylene dicarboxylic ester (E. Rimini, Gazz. Chem., 1896, 26, (2), p. 374); the condensation of acetone-di-propionic acid under the influence of boiling water to a diketohexamethylene propionic acid (von Pechmann and Sidgwick, Ber., 1904, 37, p. 3816). Many diketo compounds suffer condensation between two molecules to form hydrobenzene derivatives; thus o,y-di-acetoglutaric ester, $C_2H_{50}{}_2C(CH_3\text{-}CO)CH\text{-}CH_2\text{-}CH(CO\text{-}CH_3)C0_2C_2H_6$, yields a methyl- ketohexamethylene,whiley-acetobutyricester,$CH_3CO(CH_2)_2C02C_2H_6$, is converted into dihydroresorcinol or w-diketohexamethylene by sodium ethylate; this last reaction is reversed by baryta (see De- compositions of Benzene Ring). For other syntheses of hexamethylene derivatives, see Polymethylenes.

Decompositions of the Benzene Ring. — We have previously alluded to the relative stability of the benzene complex; con- sequently reactions which lead to its disruption are all the more interesting, and have engaged the attention of many chemists. If we accept Kekule's formula for the benzene nucleus, then we may expect the double linkages to be opened up partially, either by oxidation or reduction, with the formation of di-, tetra-, or hexa-hydro derivatives, or entirely, with the production of open chain compounds. Generally rupture occurs at more than one point; and rarely are the six carbon atoms of the complex regained as an open chain. Certain compounds withstand ring decomposition much more strongly than others; for instance, benzene and its homologues, carboxylic acids, and nitro com- pounds are much more stable towards oxidizing agents than amino- and oxy-benzenes, aminophenols, quinones, and oxy- carboxylic acids.

Strong oxidation breaks the benzene complex into such compounds as carbon dioxide, oxalic acid, formic acid, &c. ; such decompositions are

of little interest. More important are Kekule's „, . observations that nitrous acid oxidizes pyrocatechol or "iSatl a [i.2dioxybenzene, and protocatechuic acid or [3.4] x ° ' dioxybenzoic acid to dioxytartaric acid, (C(0H) 2 -C00H) 2 (Ann., 1883, 221, p. 230); and O. Doebner's preparation of mesotartaric acid, the internally compensated tartaric acid, (CH(OH)-C60h) s , by oxidizing phenol with dilute potassium permanganate (Ber., 1891, 24, p. 1753).

For many years it had been known that a mixture of potassium chlorate and hydrochloric or sulphuric acids possessed strong oxidizing powers. L. Carius showed that potassium chlorate and sulphuric acid oxidized benzene to trichlor- J-"' ™'*" phenomalic acid, a substance afterwards investigated by £,??, Kekule and O. Strecker (Ann., 1884, 223, p. 170), and ox ' aatioa – shown to be 0-trichloracetoacrylic acid, CCl 3 -CO-CH:CH-COOH. which with baryta gave chloroform and maleic acid. Potassium chlorate and hydrochloric acid oxidize phenol, salicylic acid (o-oxy- benzoic acid), and gallic acid ([2.3.4] trioxybenzoic acid) to tri- chlor pyroracem ic acid (isotrichlorglyceric acid), CCl3-C(OH) 2 -C0 2 H, a substance also obtained from trichloracetonitrile, CCl s -CO-CN, by hydrolysis. We may also notice the conversion of picric acid. [2.4.6]-trinitrophenol) into chloropicrin, CCI3NO2, bybleaching lime (calcium hypochlorite), and into bromopicrin, CBrjNOa, by bromine water.

ORGANIC]

CHEMISTRY

55

The action of chlorine upon di- and tri-oxybenzenes has been carefully investigated by Th. Zincke; and his researches have led to the discovery of many chlorinated oxidation products which admit of decomposition into cyclic compounds containing fewer carbon atoms than characterize the benzene ring, and in turn yielding open- chain or aliphatic compounds. In general, the rupture occurs between a -keto group (CO) and a keto-chloride group (CC1 2), into which two adjacent carbon atoms of the ring are converted by the oxidizing and substituting action of chlorine. Decompositions of this nature were first discovered in the naphthalene series, where it was found that derivatives of indene (and of hydrindene and indone) and also of benzene resulted; Zincke then extended his methods to the disintegration of the oxybenzenes and obtained analogous results, R-pentene and aliphatic derivatives being formed (R- symboiizing a ringed nucleus).

When treated with chlorine, pyrocatechol (1.2 or ortho-dioxy-benzene) (1) yields a tetrachlor ortho-quinone, which suffers further chlorination to hexachlor-o-diketo-R-hexene (2). This substance is transformed into hexachlor-R-pentene oxycarboxylic acid (3) when digested with water; and chromic acid oxidizes this substance to hexachlor-R-pentene (4). The ring of this compound is ruptured by caustic soda with the formation of perchlorvinyl acrylic acid (5), which gives on reduction ethidine propionic acid (6), a compound containing five of the carbon atoms originally in the benzene ring (see Zincke, Ber., 1894, 2 7> P- 33ˆ4) (the carbon atoms are omitted in some of the formulae).

OOH _C.ˆNo J3(\0HˆClA JClCˆttyˆtj

OH C.,lJo Cˆ/ˆH C> 2 ly C.C V C,

CH 2 CH V CG 2 H CH CH,

(>)

<2>

(3) (4)

Resorcin (1.3 or meta dioxybenzene) (1) is decomposed in a somewhat similar manner. Chlorination in glacial acetic acid solution yields pentachlor-m-diketo-R-hexene (2) and, at a later stage, heptachlor-m-diketo-R-hexene (3). These compounds are both decomposed by water, the former giving dichloraceto-trichlor- crotonic acid (4), which on boiling with water gives dichlormethyl- vinyl-a-diketone (5). The heptachlor compound when treated with chlorine water gives trichloraceto-pentachlorbutyric acid (6), which is hydrolysed by alkalis to chloroform and pentachlorglutaric acid (7), and is converted by boiling water into tetrachlor-diketo-R- pentene (8). This latter compound may be chlorinated to perchloracetoacrylic chloride (9), from which the corresponding acid (10) is obtained by treatment with water; alkalis hydrolyse the acid to chloroform and dichlormaleic acid (11).

(‘)

‘<*>

H0 2 C-CCl:CH-CCI 2 -CO.CHCI 2 I (4)

C0 2 +CIHC:CH-C0’C0-CHCI 2 (S)

HO,CCCl •CHCI-CCl.-COCCI, I (6) 1

HOjC-CClj-CHCl.CCIˆCOjH + CHCl,

(7)

CO-CC1

cioc-cci-.cci-coccu— I ˆCO (8)

. (9) CC1 = CCK

HOj,OCCT.CC!-CO-CCI 3 H0 2 C-CC1:CC1-C0 2 H + CHC1 3

(10) fn)

Hydroquinone (1.4 or para-dioxybenzene) (1) gives with chlorine, first, a tetrachlorquinone (2), and then hexachlor-p-diketo-R-hexene (3), which alcoholic potash converts into perchloracroylacrylic acid (4). This substance, and also the preceding compound, is converted by aqueous caustic soda into dichlormaleic acid, trichlorethylene, and hydrochloric acid (5) (Th. Zincke and O. Fuchs, Ann., 1892, 267, p. 1).

CO„H

cci,

, + I

CHCl CO CO * H

(4) (5)

Phloroglucin (1.3.5-trioxybenzene) (1) behaves similarly to resorcin, hexachlor [1.3.5] triketo-R-hexylene (2) being first formed. This compound is converted by chlorine water into octachloracetyl-acetone (3) ; by methyl alcohol into the ester of dichlormalonic acid and tetrachloracetone (4) ; whilst ammonia gives dichloracetamide (5) (Th. Zincke and O. Kegel, Ber., 1890, 23, p. 1706). OH

0- = CE- = Ce

OH (•)■

O

o

(3)

(1 -* c, fT ,:

y

<«>

Cl 2

(3) Cl 3 C-C0-CCl 2 -CO-CCl 3 +CO 2

(4) CIjHC-CO-CHCIj + CHjOjC-CCIˆCOj-CHj

(5) Cl 2 HCCONH 2

When phenol is oxidized in acid solution by chlorine, tetrachlor-quinone is obtained, a compound also obtainable from hydroquinone. By conducting the chlorination in alkaline solution, _ . ., A. Hantzsch (Ber., 1889, 22, p. 1238) succeeded in ob- **ˆP** '?." taining derivatives of o-diketo-R-hexene, which yield *, t , e R-pentene and aliphatic compounds on decomposition. " oa ' When thus chlorinated phenol (1) yields trichlor-o-diketo-R-hexene (2), which may be hydrolysed to an acid (3), which, in turn, suffers rearrangement to trichlor-R-pentene-oxycarboxylic acid (4). Bromine water oxidizes this substance to oxalic acid and tetrabrom- dichloracetone (5).

OH o HOOC

0_ˆ ci 2 jˆN0_ˆHCi 2 c, N

(I)

HOOC OH

HCI 2 C, NCO "I TCOOH

CI CCI

<*> (3) (4)

Cl 2 BrOCO-CBr 3 + H0 2 C-C0 2 H

(S)

The reduction of o-oxybenzoic acids by sodium in anvyl alcohol solution has been studied by A. Einhorn and J. S. Lumsden (Ann., 1895, 286, p. 257). It is probable that tetrahydro acids are first formed, which suffer rearrangement to orthoketone carboxylic acids. These substances absorb water and become pimelic acids. Thus salicylic acid yields n-pimelic acid, HOOC-(CH 2) 6 COOH, while o, m-, and p-cresotinic acids, C e H 3 (CH 3)(OH)(COOH), yield isomeric methylpimelic acids.

Resorcin on reduction gives dihydroresorcin, which G. Merling (Ann., 1894, 2 7ˆ P- 20) showed to be converted into n-glutaric acid, HOOO 3 -COOH, when oxidized with potassium permanganate; according to D. Vorlander (Ber., 1895, 28, p. 2348) it is converted into 7-acetobutyric acid, CH 3 CO-(CH2) 3 -COOH, when heated with baryta to 150-160°.

Configuration of the Benzene Complex. — The development of the ” structure theory” in about 1860- brought in its train an appreciation of the chemical structure of the derivatives of benzene. The pioneer in this field was August Kekule, who, in 1865 (Ann., 137, p. 129; see also his Lehrbuch der organischen Chemie), submitted his well-known formula for benzene, so founding the ” benzene theory ” and opening up a problem which, notwithstanding the immense amount of labour since bestowed upon it, still remains imperfectly solved. Arguing from the existence of only one mono-substitution derivative, and of three di-derivatives (statements of which the rigorous proof was then wanting), he was led to arrange the six carbon atoms in a ring, attaching a hydrogen atom to each carbon atom; being left with the fourth carbon valencies, he mutually saturated these in pairs, thus obtaining the symbol I (see below). The value of this ringed structure was readily perceived, but objections were raised with respect to Kekule’s disposal of the fourth valencies. In 1866 Sir James Dewar proposed an un- symmetrical form (II); while in 1867, A. Claus (Theoretische Betrachtungen und der en A nwendung zur Systemalik der organischen Chemie) proposed his diagonal formula (III), and two years later, A. Ladenburg (Ber., 2, p. 140) devised his prism formula (IV), the six carbon atoms being placed at the six corners of a right equilateral triangular prism, with its plane projections (V, VI).

CH HCfˆCH

C

ˆCH

C HC| <

■I

Hc fC71 CH

HC

HCiv^JcH

CH

I Kekull

HclJ

C

si O

^JcH

H

ewar

Hck(

C

mC

yen

H

alis

HC^^CH CH

IV

HC

Ladenburg

One of the earliest and strongest objections urged against Kekule's formula was that it demanded two isomeric ortho-di-substitution

derivatives ; for if we number the carbon atoms in cyclical order from I to 6, then the derivatives 1.2 and 1.6 should Objections be different. 1 Ladenburg submitted that if the 1-2 and to Kekule's 1.6 compounds were identical, then we should expect the formula. two well-known crotonic acids, CH 3 -CH : CH-COOH and CH 2 :CH-CH 2 COOH, to be identical. This view was opposed by Victor Meyer and Kekul6. The former pointed out that the supposed isomerism was not due to an arrangement of atoms, but to the dis position of a valency, and therefore it was doubtful whether such a subtle condition could exert any influence on the properties of the substance. Kekule 1 answered Ladenburg by formulating a dynamic interpretation of valency. He assumed that if we have one atom

1 It is now established that ortho compounds do exist in isomeric forms, instances being provided by chlor-, brom-, and amino-toluene, chlorphenol, and chloraniline ; but arguments, e.g. E. Knoevenagel's theory of " motoisomerism," have been brought forward to cause these facts to support Kekule.

connected by single bonds to (say) four other atoms, then in a certain unit of time it will collide with each of these atoms in turn. Now suppose two of the attached atoms are replaced by one atom, then this atom must have two valencies directed to the central atom; and consequently, in the same unit of time, the central atom will collide once with each of the two monovalent atoms and twice with the divalent. Applying this notion to benzene, let us consider the impacts made by the carbon atom (i) which we will assume to be doubly linked to the carbon atom (2) and singly linked to (6), h standing for the hydrogen atom. In the first unit of time, the impacts are 2, 6, h, 2 ; and in the second 6, 2, h, 6. If we represent graphically the impacts in the second unit of time, we perceive that they point to a configuration in which the double linkage is between the carbon atoms I and 6, and the single linkage between 1 and 2. Therefore, according to Kekule, the double linkages are in a state of continual oscillation, and if his dynamical notion of valency, or a similar hypothesis, be correct, then the difference between the 1.2 and 1.6 di-derivatives rests on the insufficiency of his formula, which represents the configuration during one set of oscillations only. The difference is only apparent, not real. An analogous oscillation prevails in the pyrazol nucleus, for L. Knorr

(Ann., 1894, 279, p. 188) has shown that 3- and 5-methylpyrazols are identical.

The explanation thus attempted by Kekule was adversely criti- cized, more especially by A. Ladenburg, who devoted much attention . . to the study of the substitution products of benzene, and

fcf,JL" to the support of his own formula. His views are presented formula ' n ^' s P am phlet : Theorie der aromalischen' Verbindungen, 1876. The prism formula also received support from the following data: protocatechuic acid when oxidized by nitrous acid gives carboxytartronic acid, which, on account of its ready de- composition into carbon dioxide and tartronic acid, was considered to be HO-C(COOH)3. This implied that in the benzene complex there was at least one carbon atom linked to three others, thus rendering Kekule's formula impossible and Ladenburg's and Claus' possible. Kekule (Ann., 1883, 221, p. 230), however, reinvestigated this acid; he showed that it was dibasic and not tribasic; that it gave tartaric acid on reduction; and, finally, that it was dioxy- tartaric acid, HOOC-C(OH) 2 -C(OH) 2 COOH. The formation of this substance readily follows from Kekule's formula, while con siderable difficulties are met with when one attempts an explanation based on Ladenburg's representation. Kekul6 also urged that the formation of trichlorphenomalic acid, shown by him and O. Strecker to be trichloracetoacrylic acid, was more favourably explained by his formula than by Ladenburg's.

Other objections to Ladenburg's formula resulted from A. von Baeyer's researches (commenced in 1886) on the reduced phthalic acids. Baeyer pointed out that although benzene deri- Baeyer's va tives were obtainable from hexamethylene compounds, researches. y et j t ^y no me ans follows that only hexamethylene compounds need result when benzene compounds are reduced. He admitted the possibility of the formulae of Kekule\ Claus, Dewar and Ladenburg, although as to the last di-trimethylene derivatives should be possible reduction products, being formed by severing two of the prism edges ; and he attempted to solve the problem by a systematic investigation of the reduced phthalic acids.

Ladenburg's prism admits of one mono-substitution derivative and three di-derivatives. Furthermore, it is in accordance with certain simple syntheses of benzene derivatives (e.g. from acetylene and acetone); but according to Baeyer (Ber., 1886, 19, p. 1797) it fails to explain the formation of dioxyterephthalic ester from succinosuccinic ester, unless we make the assumption that the transformation of these substances is attended by a migration of the substituent groups. For

succinosuccinic ester, formed by the action of sodium on two molecules of succinic ester, haseitherof theformulae (I) or (II) ; oxidation of the free acid gives dioxyterephthalic acid in which the para-positions must remain substituted as in (I) and (II). By projecting Ladenburg's prism on a plane and numbering the atoms so as to correspond with Kekule's form, viz. that 1.2 and 1.6 should be ortho-positions, 1.3 and 1.5 meta-, and 1.4 para-, and following out the transformation on the Ladenburg formula, then an ortho-dioxyterephthalic acid (IV) should result, a fact denied by experience, and inexplicable unless we assume a wandering of atoms. Kekule's formula (III), on the other hand, is in full agree- ment (Baeyer). This explanation has been challenged by Ladenburg

. K.KJ

HjCfˆNcH-COjEl

EtO,C-Hclˆ Jca 2 >. CO

C-OH C-OH (OOH

HCfˆCH-COjEt HCiˆˆC-COjEt EtO a C-(6)|ˆ](SVH

HtO„C<:V>CH a EtO„C-C V. Jch StO,C-(3)Vˆ jJ(«)OH

or

C-OH

IT.,

C-OH ill

(4)H

IV

(Ber., 1886, 19, p. 971; Ber., 1887, 20, p. 62) and by A. K. Miller (J.C.S. Trans., 1887, p. 208). The transformation is not one of the oxidation of a hexamethylene compound to a benzenoid compound, for only two hydrogen atoms are removed. Succinosuccinic ester behaves both as a ketone and as a phenol, thereby exhibiting desmotropy; assuming the ketone formula as indicating the con- stitution, then in Baeyer's equation we have a migration of a hydrogen atom, whereas to bring Ladenburg's formula into line, an oxygen atom must migrate.

The relative merits of the formulae of Kekul < 5, Claus and Dewar were next investigated by means of the reduction products of benzene, it being Baeyer's intention to detect whether double linkages were or were not present in the benzene complex.

To follow Baeyer's results we must explain his nomenclature of the reduced benzene derivatives. He numbers the carbon atoms placed at the corners of a hexagon from I to 6, and each side in the same order, so that the carbon atoms I and 2 are connected by the side I, atoms 2 and 3 by the side 2, and so on. A doubly linked pair of atoms is denoted by the sign A with the index corresponding to the side; if there are two pairs of double links, then indices corre- sponding to both sides are employed. Thus A 1 denotes a tetrahydro derivative in which the double link occupies the side 1 ; A 1 – 3 , a dihydro derivative, the double links being along the sides I and 3. Another form of isomerism is occasioned by spatial arrangements, many of the reduced terephthalic acids existing in two stereo-isomeric forms. Baeyer explains this by analogy with fumaric and maleic acids: he assumes the reduced benzene ring to lie in a plane ; when both carboxyl groups are on the same side of this plane, the acids, in general, resemble maleic acids, these forms he denotes by Tcis-cis, or shortly cis-\ when the carboxyl groups are on opposite sides, the acids correspond to fumaric acid, these forms are denoted by Tcis-trans, or shortly trans-.

By reducing terephthalic acid with sodium amalgam, care being taken to neutralize the caustic soda simultaneously formed by passing in carbon dioxide, A" dihydroterephthalic acid is obtained ; this results from the splitting of a £ara-linkage. By boiling with water the A 2 – 5 acid is converted into the A 1 ' 6 dihydroterephthalic acid. This acid is converted into the A 1 – 4 acid by soda, and into the A 2 tetrahydro acid by reduction. From this acid the A 13 dihydro and the A 1 tetrahydro acids may be obtained, from both of which the hexahydro acid may be prepared. From these results Baeyer concluded that Claus' formula with three para-linkings cannot possibly be correct, for the A 2 – 5 dihydroterephthalic acid undoubtedly has two ethylene linkages, since it readily takes up two or four atoms of bromine, and is oxidized in warm aqueous solution by alkaline potassium permanganate. But the formation of the A 2 – 5 acid as the first reduction product is not fully consistent with Kekule's symbol, for we should then expect the A 1 – 3 or the A 1 – 5 acid to be first formed (see also Polymethylenes).

The stronger argument against the ethylenoid linkages demanded by Kekule's formula is provided by the remark- able stability towards oxidizing and reducing agents which characterizes all benzenoid

compounds. From the fact that reduction products containing either one or two double linkages behave exactly as unsaturated aliphatic compounds, being readily reduced or oxidized, and combining with the halogen elements and haloid acids, it seems probable that in benzenoid compounds the fourth valencies are symmetrically distributed in such a manner as to induce a peculiar stability in the molecule. Such a configuration was proposed in 1887 by H. E. Armstrong (J.C.S. Trans., 1887, p. 258), and shortly afterwards by Baeyer (Ann., 1888, 245, p. 103). In this formula, the so-called ” centric formula,” the assumption made is that the fourth valencies are simply directed towards the centre of the ring; nothing further is said about the fourth valencies except that they exert a pressure towards the centre. Claus maintained that Baeyer’s view was identical with his own, for as in Baeyer’s formula, the fourth valencies have a different function from the peripheral valencies, being united at the centre in a form of potential union.

It is difficult to determine which configuration most accurately explains the observed facts; Kekule’s formula undoubtedly explains the synthetical production of benzenoid compounds most satisfactorily, and W. Marckwald (Ann., 1893, 274, p. 331; 1894, 279, p. 14) has supported this formula from considerations based on the syntheses of the quinoline ring. Further researches by Baeyer, and upon various nitrogenous ring systems by E. Bamberger (a strong supporter of the centric formula), have shown that the nature of the substituent groups influences the distribution of the fourth valencies; therefore it may be con- cluded that in compounds the benzene nucleus appears to be capable of existence in two tautomeric forms, in the sense that each particular derivative possesses a definite constitution. The benzene nucleus presents a remarkable case, which must be considered in the formulation of any complete theory of valency. From a study of the reduction of compounds containing two ethylenic bonds united by a single bond, termed a “conjugated system,” E. Thiele suggested a doctrine of ” partial valencies,”

which assumes that in addition to the ordinary valencies, each doubly linked atom has a partial valency, by which the atom first interacts. When applied to benzene, a twofold conjugated system is suggested in which the partial valencies of adjacent atoms neutralize, with the

formation of a potential double link. The stability of benzene is ascribed to this conjugation. 1

Physico-chemical properties have also been drawn upon to decide whether double unions are present in the benzene com- plex; but here the predilections of the observers chemteal apparently influence the nature of the conclusions to methods, be drawn from such data. It is well known that singly, doubly and trebly linked carbon atoms affect the physical properties of substances, such as the refractive index, specific volume, and the heat of combustion; and by determining these constants for many substances, fairly definite values can be assigned to these groupings. The general question of the relation of the refractive index to constitution has been especially studied by J. W. Briihl, who concluded that benzene contained 3 double linkages; whereas, in iqoi, Pellini (Gazetta, 31, i. p. 1) calculated that 9 single linkages were present. A similar contradiction apparently exists with regard to the specific volume, for while benzene has a specific volume corre- spinding to Claus' formula, toluene, or methylbenzene, rather points to Kekule's. The heat of combustion, as first determined by Julius Thomsen, agreed rather better with the presence of nine single unions. His work was repeated on a finer scale by M. P. E. Berthelot of Paris, and F. C. A. Stohmann of Leipzig; and the new data and the conclusions to be drawn from them formed the subject of much discussion, Briihl endeavouring to show how they supported Kekule's formula, while Thomsen maintained that they demanded the benzene union to have a different heat of combustion from the acetylene union. Thomsen then investigated heats of combustion of various benzenoid hydrocarbons — benzene, naphthalene, anthracene, phenanthrene, &c— in the crystallized state. It was found that the results were capable of expression by the empirical relation C H 2 !,= io4-3&+4Q-oQTO+io5-47», where C<,H 2 & denotes the formula of the hydrocarbon, m the number of single carbon linkings and n the number of double linkings, m and n being calculated on the Kekule formulae. But, at the same time, the constants in the above relation are not identical with those in the corre- sponding relation empirically deduced from observations on fatty hydrocarbons; and we are therefore led to conclude that a benzene union is considerably more stable than an ethylene union.

Mention may be made of the absorption spectrum of benzene. According to W. N. Hartley (J.C.S., 1905, 87, p. 1822), there are six bands in the ultra-violet, while E. C. C. Baly and J. N. Collie (J.C.S., 1905, 87, p. 1332; 1906, 89, p. 524) record seven. These bands are due to molecular oscillations; Hartley suggests the carbon atoms to be rotating and forming alternately single and double linkages, the

formation of three double links giving three bands, and of three single links another three; Baly and Collie, on the other hand, suggest the making and breaking of links between adjacent atoms, pointing out that there are seven combinations of one, two and three pairs of carbon atoms in the benzene molecule.

Stereo-chemical Configurations. — Simultaneously with the discussions of Kekule, Ladenburg, Claus, Baeyer and others as to the merits of various plane formulae of the benzene complex, there were published many suggestions with regard to the arrange- ment of the atoms in space, all of which attempted to explain the number of isomers and the equivalence of the hydrogen atoms. The development of stereo-isomerism at the hands of

1 Victor Meyer and G. Heyl (Ber., 1895, 28, p. 2776) attempted a solution from the following data. It is well known that di-ortho-substituted benzoic acids are esterified with difficulty. Two acids corresponding to the formula of Kekule 1 and Claus are triphenyl acrylic acid, $(C_{„}H_6)_2C : C(COOH)-C_6H_5$, and triphenyl acetic acid, $(C_6H_5)_3C-COOH$. Experiments showed that the second acid was much more difficult to esterify than the first, pointing to the conclusion that Claus' formula for benzene was more probable than Kekule' s.

J. Wislicenus, Le Bel and van 't Hoff has resulted in the intro- duction of another condition which formulae for the benzene complex must satisfy, viz. that the hydrogen atoms must all lie in one plane. The proof of this statement rests on the fact that if the hydrogen atoms were not co-planar, then substitution derivatives (the substituting groups not containing asymmetric carbon atoms) should exist in enantiomorphic forms, differing in crystal form and in their action on polarized light; such optical antipodes have, however, not yet been separated. Ladenburg's prism formula would give two enantiomorphic ortho-di-substi- tution derivatives; while forms in which the hydrogen atoms are placed at the corners of a regular octahedron would yield enantiomorphic tri-substitution derivatives.

The octahedral formula discussed by Julius Thomsen (Ber., 1886, 19, p. 2944) consists of the six carbon atoms placed at the corners of a regular octahedron, and connected together by the full lines as shown in (I) ; a plane projection gives a hexagon with diagonals (II). Reduction to hexamethylene compounds necessitates the disruption of three of the edges of the octahedron, the diagonal linkings remaining intact, or, in the plane projection, three peripheral linkages/ the hexamethylene ring assuming the form (III):

In 1888 J. E. Marsh published a paper (Phil. Mag. [V.], 26, p. 426) in which he discussed various stereo-chemical representations of the benzene nucleus. (The stereo-chemistry of carbon compounds has led to the spatial representation of a carbon atom as being situated at the centre of a tetrahedron, the four valencies being directed towards the apices; see above, and Isomerism.) A form based on Kekule's formula consists in taking three pairs of tetra- hedra, each pair having a side in common, and joining them up along the sides of a regular hexagon by means of their apices. This form, afterwards supported by Carl Graebe (Ber., 1902, 35, p. 526 ; see also Marsh's reply, Journ. Chem. Soc. Trans., 1902, p. 961) shows the proximity of the ortho-positions, but fails to explain the identity of 1.2 and 1.6 compounds. Arrangements connected with Claus' formula are obtained by placing six tetrahedra on the six triangles formed by the diagonals of a plane hexagon. The form in which the tetrahedra are all on one side, afterwards discussedby J. Loschmidt (Monats., 1890, 11, p. 28), would not give stereo-isomers ; and the arrangement of placing the tetrahedra on alternate sides, a form afterwards developed by W. Vaubel (Journ. Pr. Chem., 1894 [2], 49, p. 308), has the advantage of bringing the meta-positions on one side, and the ortho- and para- on opposite sides, thus exhibiting the' similarity actually observed between these series of compounds. Marsh also devised a form closely resembling that of Thomsen, inasmuch as the carbon atoms occupied the angles of a regular octahedron, and the diagonal linkages differed in nature from the peripheral, but differeng from Thomsen's since rupture of the diagonal and not peripheral -bonds accompanied the reduction to hexamethylene.

We may also notice the model devised by H. Sachse (Ber., 1888, 21, 2530; Zeit. fur phys. Chem., 11, p. 214; 23, p. 2062). Two parallel triangular faces are removed from a cardboard model of a regular octahedron, and on the remaining six faces tetrahedra are then placed; the hydrogen atoms are at the free angles. This configuration is, according to Sachse, more stable than any other form; no oscillation is possible, the molecule being only able to move as a whole. In 1897, J. N. Collie (Journ. Chem. Soc. Trans., p. 1013) considered in detail an octahedral form, and showed how by means of certain simple rotations of his system the formulae of Kekule and Claus could be obtained as projections. An entirely new device, suggested by B. Konig (Chem. Zeit., 1905, 29, p. 30), assumed the six carbon atoms to occupy six of the corners of a cube, each carbon atom being linked to a hydrogen atom and by single bonds to two neighbouring carbon atoms, the remaining valencies being directed to the unoccupied corners of the cube, three to each, where they are supposed to satisfy

each other.

Condensed Nuclei. Restricting ourselves to compounds resulting from the fusion of benzene rings, we have first to consider naphthalene, Ci H 8 , which consists of two benzene rings having a pair of carbon atoms in common. The next members are the isomers anthracene and phenanthrene, C14H10, formed from three benzene nuclei. Here we shall only discuss the structure of these compounds in the light of the modern benzene theories; reference should be made

to the articles Naphthalene, Anthracene and Phenan- threne for syntheses, decompositions, &c.

Naphthalene. — Of the earlier suggestions for the constitution of naphthalene we notice the formulae of Wreden (i) and (2), Berthelot and Balls (3), R. A. C. E. Erlenmeyer (4) and Adolf Claus (5).

as

03 M

(1)

<*>

(3)

(4)

(5)

The first suggestion is quite out of the question. C. Graebe in 1866 {Ann. 149, p. 20) established the symmetry of the naph- thalene nucleus, and showed that whichever half of the molecule be oxidized the same phthalic acid results. Therefore formula (2), being unsymmetrical, is impossible. The third formula is based on Dewar's benzene formula, which we have seen to be incorrect. Formula (4) is symmetrical and based on Kekule's formula: it is in full accord with the syntheses and decompositions of the naphthalene nucleus and the number of isomers found. In 1882 Claus suggested a combination of his own and Dewar's benzene formulae. This is obviously unsymmetrical, consisting of an aliphatic and an aromatic nucleus; Claus explained the formation of the same phthalic acid from the oxidation of either nucleus by supposing that if the aromatic group be oxidized, the aliphatic residue assumes the character of a benzene nucleus. Bamberger opposed Claus' formula on the following grounds: — The molecule of naphthalene is symmetrical, since 2.7 dioxy-naphthalene is readily esterified by methyl iodide and sulphuric acid to a dimethyl ether; and no more than two mono-substi- tution derivatives are known. The molecule is aromatic but not benzenoid; however, by the reduction of one half of the mole- cule, the other assumes a benzenoid character.

If /3-naphthylamine and /3-naphthol be reduced, tetrahydro products are obtained in which the amino- or oxy-bearing half of the molecule becomes aliphatic in character. The compounds so obtained, alicyclic-/3-tetrahydronaphthylamine and alicyclic-/S-tetrahydronaphthol, closely resemble 0-aminodiethylbenzene, CHˆCCjHO-CsHjNHj.andˆ-oxydiethylbenzene.CsHiCCsHsˆCjHiOH. If a-naphthylamine and a-naphthol be reduced, the hydrogen atoms attach themselves to the non-substituted half of the molecule, and the compounds so obtained resemble aminodiethylbenzene, CHa-NHafAHsk and oxydiethylbenzene, C 6 H r OH(C 2 H 5) 2 . Bam-berger's observations on reduced quinoline derivatives point to the same conclusion, that condensed nuclei are not benzenoid, but possess an individual character, which breaks down, however, when the molepule is reduced.

It remains, therefore, to consider Erlenmeyer's formula and those

derived from the centric hypothesis. The former, based on Kekule's symbol for benzene, explains the decompositions and syntheses of the ring, but the character of naphthalene is not in keeping with the presence of five double linkages, although it is more readily acted upon than benzene is. On the centric hypothesis two formulae are possible: (1) due to H.E. Armstrong, and (2) due to E. Bamberger.

(■)

< =)

In the first symbol it is assumed that one of the affinities of each of the two central carbon atoms common to the two rings acts into both rings, an assumption involving a somewhat wide departure from all ordinary views as to the manner in which affinity acts. This symbol harmonizes with the fact that the two rings are in complete sympathy, the one responding to every change made in the other. Then, on account of the relatively slight — because divided — influence which would be exercised upon the two rings by the two. affinities common to both, the remaining four centric affinities of each ring would presumably be less attracted into the ring than in the case of benzene; consequently they would be more active outwards, and com- bination would set in more readily. When, as in the formation of naphthalene tetrachloride, for example, the one ring becomes saturated, the other might be expected to assume the normal

centric form and become relatively inactive. This is absolutely the case. On the other hand, if substitution be effected in the one ring, and the affinities in that ring become attracted inwards, as apparently happens in the case of benzene, the adjoining ring should become relatively more active because the common affinities would act less into it. Hence, unless the radical introduced be one which exercises a special attractive influence, substitution should take place in preference in the previously unsubstituted ring. In practice this usually occurs ; for example, on further bromination, a-bromonaphthalene yields a mixture of the (1.4) and (1.5) dibromonaphthalenes; and when nitro- naphthalene is either brominated, or nitrated or sulphonated, the action is practically confined to the second ring. The centric formula proposed by Bamberger represents naphthalene as formed by the fusion of two benzene rings, this indicates that it is a monocyclic composed of ten atoms of carbon. The formula has the advantage that it may be constructed from tetrahedral models of the carbon atom; but it involves the assumption that the molecule has within it a mechanism, equivalent in a measure to a system of railway points, which can readily close up and pass into that characteristic of

benzene.

Anthracene and Phenanthrene. — These isomeric hydrocarbons, of the formula CiJHio, are to be regarded as formed by the fusion of three benzenoid rings as represented by the symbols: —

COD cR >

Phenanthrene

In both cases the medial ring is most readily attacked; and various formulae have been devised which are claimed by then- authors to represent this and other facts. According to Arm- strong, anthracene behaves unsymmetrically towards sub- stituents, and hence one lateral ring differs from the other; he represents the molecule as consisting of one centric ring, the remaining medial and lateral ring being ethenoid. Bamberger, on the other hand, extends his views on benzene and naphthalene and assumes the molecule to be (1). For general purposes, however, the symbol (2), in which the lateral rings are benzenoid and the medial ring fatty, represents quite adequately the syntheses, decompositions, and behaviour cf anthracene.

OS) OK)

(0

(»)

Phenanthrene is regarded by Armstrong as represented by (3), the lateral rings being benzenoid, and the medial ring fatty; Bamberger, however, regards it as (4), the molecule being

(3)

(4)

entirely aromatic. An interesting observation by Baeyer, viz. that stilbene, C 6 H S -CH:CH-C 6 H5, is very readily oxidized, while phenanthrene is not, supports, in some measure, the views of Bamberger.

Heterocyclic Compounds. During recent years an immense number of ringed or cyclic compounds have been discovered, which exhibit individual characters more closely resembling benzene, naphthalene, &c. than purely aliphatic substances, inasmuch as in general they contain double linkages, yet withstand oxidation, and behave as

nuclei, forming derivatives in much the same way as benzene. By reduction, the double linkages become saturated, and compounds result which stand in much about the same relation to the original nucleus as hexamethylene does to benzene. In general, therefore, it may be considered that the double linkages are not of exactly the same nature as the double linkage present in ethylene and ethylenoid compounds, but that they are analogous to the potential valencies of benzene. The centric hypothesis has been applied to these rings by Bamberger and others; but as in the previous rings considered, the ordinary

representation with double and single linkages generally repre- sents the syntheses, decompositions, &c; exceptions, however, are known where it is necessary to assume an oscillation of the double linkage. Five- and six-membered rings are the most stable and important, the last-named group resulting from the polymerization of many substances; three- and four-membered rings are formed with difficulty, and are easily ruptured; rings containing seven or more members are generally unstable, and are relatively little known. The elements which go to form heterocyclic rings, in addition to carbon, are oxygen, sulphur, selenium and nitrogen. It is remarkable that sulphur can replace two methine or CH groups with the production of com- pounds greatly resembling, the original one. Thus benzene, (CH) 6 , gives thiophene, (CH) 4 S, from which it is difficultly dis- tinguished; pyridine, (CH) 5 N, gives thiazole, (CH)rN-S, which is a very similar substance; naphthalene gives thionaphthen, C S H 6 S, with which it shows great analogies, especially in the derivatives. Similarly a CH group may be replaced by a nitrogen atom with the production of compounds of similar stability; thus benzene gives pyridine, naphthalene gives quinoline and isoquinoline ; anthracene gives acridine and a and /3 anthra- pyridines. Similarly, two or more methine groups may be replaced by the same number of nitrogen atoms with the forma- tion of rings of considerable stability.

Most of the simple ring systems which contain two adjacent carbon atoms may suffer fusion with any other ring (also containing two adjacent carbon atoms) with the production of nuclei of greater complexity. Such condensed nuclei are, in many cases, more readily obtained than the parent nucleus. The more important types are

derived from aromatic nuclei, benzene, naphthalene, &c. ; the ortho-di-derivatives of the first named, lending themselves particu- larly to the formation of condensed nuclei. Thus ortho-phenylene diamine yields the following products : —

aiho: > .ai > .cQ-cc > -a >

Bcnzimidizolc Aximidobcnzene Bcniptanfiiolc

Benzimidazolone Quincxtliw

In some cases oxidation of condensed benzenoid-heterocyclic nuclei results in the rupture of the heterocyclic ring with the formation of a benzene dicarboxylic acid ; but if the aromatic nucleus be weakened by the introduction of an amino group, then it is the benzenoid nucleus which is destroyed and a dicarboxylic acid of the heterocyclic ring system obtained.

Heterocyclic rings may be systematically surveyed from two aspects: (i) by arranging the rings with similar hetero-atoms according to the increasing number of carbon atoms, the so-called ” homologous series “; or (2) by first dividing the ring systems according to the number of members constituting the ring, and then classifying these groups according to the nature of the hetero-atoms, the so-called ” isologous series.” The second method possesses greater advantages, for rings of approximate stability come in one group, and, consequently, their derivatives may be expected to exhibit considerable analogies.

As a useful preliminary it is convenient to divide heterocyclic ring systems into two leading groups: (1) systems resulting from simple internal dehydration (or similar condensations) of saturated aliphatic compounds — such compounds are: the internal anhydrides or cyclic ethers of the glycols and thioglycols (ethylene oxide, &c); the cyclic alkyleneimides resulting from the splitting off of ammonia between the amino groups of diamino- paraffins (pyrrolidine, piperazine, &c); the cyclic esters of oxycarboxylic acids (lactones, lactides) ; the internal anhydrides of aminocarboxylic acids (lactams, betaines) ; cyclic derivatives of dicarboxylic acids (anhydrides, imides, alkylen-esters, alkylen- amides, &c). These compounds retain their aliphatic nature, and are best classified with open-chain compounds, into which, in general, they are readily converted. (2) Systems which are generally unsaturated compounds, often of considerable stability, and behave as nuclei; these compounds constitute a well-individualized class exhibiting closer affinities to benzenoid substances than to the open-chain series.

The transition between the two classes as differentiated above may be illustrated by the following cyclic compounds, each of which

contains a ring composed of four carbon atoms and one oxygen atom :

CHa-CH,. CH a .CO x CH.-CO. CH-CO. CH = CH.

dH 2 .cH/ ˆh 2 .ch/ 6h 2 .co/ ch.co/ ch=ch/

Tetramethylene Butyrolactone. Succinic Maleic Furfurane.

oxide. anhydride. anhydride.

The first four substances are readily formed from, and converted into, the corresponding dihydroxy open-chain compound; these substances are truly aliphatic in character. The fifth compound, on the other hand, does not behave as an unsaturated aliphatic compound, but its deportment is that of a nucleus, many substitution derivatives being capable of synthesis. Reduction, however, con- verts it into an aliphatic compound. This is comparable with the reduction of the benzene nucleus into hexamethylene, a substance of an aliphatic character.

True ring systems, which possess the characters of organic nuclei, do not come into existence in three- and four-membered rings, their first appearance being in penta-atomic rings. The three primary members are furfurane, thiophene and pyrrol, each of which contains four methine or CH groups, and an oxygen, sulphur and imido (NH) member respectively; a series of compounds containing selenium is also known. The formulae of these substances are:

CH = CH\ CH = CH. CH = CH X CH = CR

I >Se I >NH

CH=CH X CH=CH / Selenophene. Pyrrol.

By substituting one or more CH groups in these compounds by nitrogen atoms, ring-systems, collectively known as azoles, result. Obviously, isomeric ring-systems are possible, since the carbon atoms in the original rings are not all of equal value. Thus furfurane yields the following rings by the introduction of one and two nitrogen atoms :

CH = N v N = CH v N = N

CH=CH / Furfurane.

CH = CH

I >S

CH = CH /

Thiophene.

>0

CH=CH /

Isoxazole. HC = N.

>°

C'H = CH / Oxazole.

N = CH X ' I)0

CH = N/

Azoximes.

o

I

\

o

CH = CH /

Diazo-oxides.

N = CH.

I ˆO

HC = N' CH = N/ N = CH/

Furazane. Azoximes. Oxybiazole.

Thiophene yields a similar series: isothiazole (only known as the condensed ring, isobenzothiazole), thiazole, diazosulphides,

piazthioles, azosulphimes and thiobiazole (the formulae are ‘easily derived from the preceding series by replacing oxygen by sulphur). Thiophene also gives rise to triazsulphole, three nitrogen atoms being introduced. Selenophene gives the series: selenazole, diazoselenide and piaselenole, corresponding to oxazole, diazo-oxides and furazane. Pyrrol yields an analogous series: pyrazole, imidazole or glyoxaline, azimide or osotriazole, triazole and tetrazole:

CH = N

\

CH = CH’ / Pyrazole.

NH

N = CH

\

N = CH

n=ch/

Triazole.

CH = CH // Imidazole.

NH

N = N

\

ch=ch/

Azimide.

NH

NH

N = N

\

n=ch/

Tetrazole.

NH

Six-membered ring systems can be referred back, in a manner similar to the above, to pyrone, penthiophene and pyridine, the substances containing a ring of five carbon atoms, and an oxygen, sulphur and nitrogen atom respectively. As before, only true ring nuclei, and not internal anhydrides of aliphatic compounds, will be mentioned. From the pyrone ring the following series of compounds are derived (for brevity, the hydrogen atoms are not printed) :

C U C c kJ N c kJ c c kJ c N kJ N

O

O

O

yTont

Ortho-oxazine

Meta-oxaiifte or Pemoxdzolinc

Paroxazfne

Azoxizine

Penthiophene gives, by a similar introduction of nitrogen atoms, penthiazoline, corresponding to meta-oxazine, and para-thiazine,

corresponding to paroxazine (para-oxazine). Pyridine gives origin to: pyridazine or ortho-diazine, pyrimidine or meta- diazine, pyrazine or para-diazine, osotriazine, unsymmetrical triazine, symmetrical triazine, osotetrazone and tetrazine. The skeletons of these types are (the carbon atoms are omitted for brevity) :

o a cr 6 -atvcr 6»*a

N N N N .N W N , N N

Pyridine Pyridumc Pyrimidine Vyrazint

OsotetwMKS Tttr*/in<

We have previously referred to the condensation of hetero- cyclic ring systems containing two vicinal carbon atoms with benzene, naphthalene and other nuclei. The more important nuclei of this type have received special and non-systematic names; when this is not the case, such terms as phen-, benzo-, naphtho- are prefixed to the name of the heterocyclic ring. One or two benzene nuclei may suffer condensation with the furfurane, thiophene and pyrrol rings, the common carbon atoms being vicinal to the hetero-atom. The mono-benzo-derivatives are coumarone, benzothiophene and indole; the dibenzo-derivatives are diphenylene oxide, dibenzothiophene or diphenylene sulphide, and carbazole. Typical formulae are (R denoting 0, S or NH) :

CaCcO

Isomers are possible, for the condensation may be effected on the two carbon atoms symmetrically placed to the hetero-atom ; these isomers, however, are more of the nature of internal anhydrides. Benz-oxazoles and -thiazoles have been prepared, benz-isoxazoles are known as indoxazenes; benzo-pyrazoles occur in two structural forms, named indazoles and isindazoles. Derivatives of osotriazol also exist in two forms — azimides and pseudo-azimides.

Proceeding to the six-membered hetero-atomic rings, the benzo-, dibenzo- and naphtho-derivatives are frequently of great commercial and scientific importance, a-pyrone condenses with the benzene ring to form coumarin and isocoumarin; benzo-7-pyrone constitutes the nucleus of several vegetable colouring matters (chrysin, fisetin, quercetin, &c, which are derivatives of flavone or phenyl benzo-7-pyrone) ; dibenzo-7- pyrone is known as xanthone; related to this substance are fluorane (and fluorescein), fluorone, fluorime, pyronine, &c. The pyridine ring condenses with the benzene ring to form quinoline and isoquinoline; acridine and phenanthridine are dibenzo-pyridines; naphthalene gives rise to a-and |8-naphtho- quinolines and the anthrapyridines; anthracene gives anthra- quinoline; while two pyridine nuclei connected by an inter- mediate benzene nucleus give the phenanthrolines. Naph- thyridines and naphthinolines result from the condensation of two pryridine and two quinoline nuclei respectively; and quino-quinolines are unsymmetrical naphthyridine

nuclei condensed with a benzene nucleus. Benzo -orthoxazines, -metoxazines and -paroxazines are known: dibenzoparoxazine or phenoxazine is the parent of a valuable series of dyestuffs; dibenzoparathiazine or thiodiphenylamine is important from the same aspect. Benzo-ortho-diazines exist in two structural forms, cinnolin and phthalazine; benzo-meta-diazines are known as quinazolines; benzo-para-diazines are termed quinoxa- lines; the dibenzo-compounds are named phenazines, this last group including many valuable dyestuffs — indulines, safranines, &c. In addition to the types of compounds enumerated above we may also notice purin, tropine and the terpenes.

V. Analytical Chemistry This branch of chemistry has for its province the determination of the constituents of a chemical compound or of a mixture of compounds. Such a determination is qualitative, the constituent being only detected or proved to be present, or quantitative, in which the amount present is ascertained. The methods of chemical analysis may be classified according to the type of

reaction: (1) dry or blowpipe analysis, which consists in an examination of the substance in the dry condition; this includes such tests as ignition in a tube, ignition on charcoal in the blowpipe flame, fusion with borax, microcosmic salt or fluxes, and flame colorations (in quantitative work the dry methods are sometimes termed ” dry assaying “); (2) wet analysis, in which a solution of the substance is treated with reagents which produce specific reactions when certain elements or groups of elements are present. In quantitative analysis the methods can be subdivided into: (a) gravimetric, in which the constituent is precipitated either as a definite insoluble compound by the addition of certain reagents, or electrolytically, by the passage of an electric current; (b) volumetric, in which the volume of a reagent of a known strength which produces a certain definite reaction is measured; (c) colorimetric, in which the solution has a particular tint, which can be compared with solutions of known strengths.

Historical. — The germs of analytical chemistry are to be found in the writings of the pharmacists and chemists of the iatrochemical period. The importance of ascertaining the proximate composition of bodies was clearly realized by Otto Tachenius; but the first systematic investigator was Robert Boyle, to whom we owe the introduction of the term analysis. Boyle recognized many reagents which gave precipitates with certain solutions: he detected sulphuric and hydrochloric acids by the white precipitates formed with calcium chloride and silver nitrate respectively; ammonia by the white cloud formed with the vapours of nitric or hydrochloric acids; and copper by

the deep blue solution formed by a solution of ammonia. Of great importance is his introduction of vegetable juices (the so-called indicators, q.v.) to detect acids and bases. During the phlogistic period, the detection of the constituents of compounds was considerably developed. Of the principal workers in this field we may notice Friedrich Hoffmann, Andreas Sigismund Marggraf (who detected iron by its reaction with potassium ferrocyanide, and potassium and sodium by their flame colora- tions), and especially Carl Scheele and Torbern Olof Bergman. Scheele enriched the knowledge of chemistry by an immense number of facts, but he did not possess the spirit of working systematically as Bergman did. Bergman laid the foundations of systematic qualitative analysis, and devised methods by which the metals may be separated into groups according to their behaviour with certain reagents. This subdivision, which is of paramount importance in the analysis of minerals, was subse- quently developed by Wilhelm August Lampadius in his Hand-buch zur chemischen Analyse der Mineralien (1801) and by John Friedrich A. Gottling in his Praktische Anleitung zur prufenden und zurlegenden Chemie (1802).

The introduction of the blowpipe into dry qualitative analysis by Axel Fredrik Cronstedt marks an important innovation. The rapidity of the method, and the accurate results which it gave in the hands of a practised experimenter, led to its system- atization by Jons Jakob Berzelius and Johann Friedrich Ludwig Hausmann, and in more recent times by K. F. Plattner, whose treatise Die Probirkunst mit dem Lothrohr is a standard work on the subject. Another type of dry reaction, namely, the flame coloration, had been the subject of isolated notices, as, for example, the violet flame of potassium and the orange flame of sodium observed by Marggraf and Scheele, but a systematic account was wanting until Cartmell took the subject up. His results {Phil. Mag. 16, p. 382) were afterwards perfected by Robert Wilhelm Bunsen and Gustav Merz. Closely related to the flame-colora- tions, we have to notice the great services rendered by the spectroscope to the detection of elements. Rubidium, caesium, thallium, indium and gallium were first discovered by means of this instrument; the study of the rare earths is greatly facilitated, and the composition of the heavenly bodies alone determinable by it.

Quantitative chemistry had been all but neglected before the time of Lavoisier, for although a few chemists such as Tachenius, Bergman and others had realized the advantages which would accrue from a knowledge of the composition 0/

bodies by weight, and had laid down the lines upon which such determinations should proceed, the experimental difficulties in making accurate observations were enormous, and little progress could be made until the procedure was more accurately determined. Martin Heinrich Klaproth showed the necessity for igniting precipitates before weighing them, if they were not decomposed by this process; and he worked largely with Louis Nicolas Vauquelin in perfecting the analysis of minerals. K. F. Wenzel and J. B. Richter contributed to the knowledge of the quantitative composition of salts. Anton Laurent Lavoisier, however, must be considered as the first great exponent of this branch of chemistry. He realized that the composition by weight of chemical compounds was of the greatest moment if chemistry were to advance. His fame rests upon his exposition of the principles necessary to chemistry as a secience, but of his contributions to analytical inorganic chemistry little can be said. He applied himself more particularly to the oxygen compounds, and determined with a fair degree of accuracy the ratio of carbon to oxygen in carbon dioxide, but his values for theratioof hydrogen to oxygen in water, and of phosphorus to oxygen in phosphoric acid, are only approximate; he introduced no new methods either for the estimation or separation of the metals. The next advance was made by Joseph Louis Proust, whose investigations led to a clear grasp of the law of constant proportions. The formulation of the atomic theory by John Dalton gave a fresh impetus to the development of quantitative analysis; and the determination of combining or equivalent weights by Berzelius led to the perfecting of the methods of gravimetric analysis. Experimental conditions were thoroughly worked out; the necessity of working with hot or cold solutions was clearly emphasized; and the employment of small quantities of substances instead of the large amounts recommended by Klaproth was shown by him to give more consistent results.

Since the time of Berzelius many experimenters have entered the lists, and introduced developments which we have not space to mention. We may, however, notice Heinrich Rose 1 and Friedrich Wohler, 2 who, having worked up the results of their teacher Berzelius, and combined them with their own valuable observations, exerted great influence on the progress of analytical chemistry by publishing works which contained admirable accounts of the then known methods of analysis. To K. R. Fresenius, the founder of the Zeitschrift fiir anaiytische Chemie (1862), we are particularly indebted for perfecting

and systematiz- ing the various methods of analytical chemistry. By strengthen- ing the older methods, and devising new ones, he exerted an influence which can never be overestimated. His text-books on the subject, of which the Qualitative appeared in 1841, and the Quantitative in 1846, have a world-wide reputation, and have passed through several editions.

The quantitative precipitation of metals by the electric current, although known to Michael Faraday, was not applied to analytical chemistry until O. Wolcott Gibbs worked out the electrolytic separation of copper in 1865. Since then the subject has been extensively studied, more particularly by Alexander Classen, who has summarized the methods and results in his Quantitative Chemical Analysis by Electrolysis (1903). The ever-increasing importance of the electric current in metallurgy and chemical manufactures is making this method of great importance, and in some cases it has partially, if not wholly, superseded the older methods.

Volumetric analysis, possessing as it does many advantages over the gravimetric methods, has of late years been extensively developed. Gay Lussac may be regarded as the founder of the method, although rough applications had been previously made by F. A. H. Descroizilles and L. N. Vauquelin. Chlorimetry (1824), alkalimetry (1828), and the volumetric determination of silver and chlorine (1832) were worked out by Gay Lussac; but although the advantages of the method were patent, it received recognition very slowly. The application of potassium per- manganate to the estimation of iron by E. Margueritte in 1846,

1 H. Rose, Ausfuhrliches Handbuch der analytischen Chemie (1851). 2 F. Wohler, Die Mineralanalyse in Beispitlen (1861).

and of iodine and sulphurous acid to the estimation of copper and many other substances by Robert Wilhelm Bunsen, marks an epoch in the early history of volumetric analysis. Since then it has been rapidly developed, particularly by Karl Friedrich Mohr and J. Volhard, and these methods rank side by side in value with the older and more tedious gravimetric methods.

The detection of carbon and hydrogen in organic compounds by the formation of carbon dioxide and water when they are burned was first correctly understood by Lavoisier, and as he had determined the carbon and hydrogen content of these two substances he was able to devise methods by which carbon and hydrogen in organic compounds could be estimated. In his earlier experiments he burned the substance

in a known volume of oxygen, and by measuring the residual gas determined the carbon and hydrogen. For substances of a difficultly combustible nature he adopted the method in common use to-day, viz. to mix the substance with an oxidizing agent — mercuric oxide, lead dioxide, and afterwards copper oxide — and absorb the carbon dioxide in potash solution. This method has been improved, especially by Justus v. Liebig; and certain others based on a different procedure have been suggested. The estimation of nitrogen was first worked out in 1830 by Jean Baptiste Dumas, and different processes have been proposed by Will and F. Varrentrapp, J. Kjeldahl and others. Methods for the estimation of the halogens and sulphur were worked out by L. Carius (see below, § Organic Analysis).

Only a reference can be made in this summary to the many fields in which analytical chemistry has been developed. Pro- gress in forensic chemistry was only possible after the reactions of poisons had been systematized; a subject which has been worked out by many investigators, of whom we notice K. R. Fresenius, J. and R. Otto, and J. S. Stas. Industrial chemistry makes many claims upon the chemist, for it is necessary to deter- mine the purity of a product before it can be valued. This has led to the estimation of sugar by means of the polarimeter, and of the calorific power of fuels, and the valuation of ores and metals, of coal-tar dyes, and almost all trade products.

The passing of the Food and Drug Acts (187 5-1899) in England, and the existence of similar adulteration acts in other countries, have occasioned great progress in the analysis of foods, drugs, &c. For further information on this branch of analytical chemistry, see Adulteration.

There exists no branch of technical chemistry, hygiene or pharmacy from which the analytical chemist can be spared, since it is only by a continual development of his art that we can hope to be certain of the purity of any preparation. In England this branch of chemistry is especially cared for by the Institute of Chemistry, which, since its foundation in 1877, nas done much for the training of analytical chemists.

In the preceding sketch we have given a necessarily brief account of the historical development of analytical chemistry in its main branches. We shall now treat the different methods in more detail. It must be mentioned here that the reactions of any particular substance are given under its own heading, and in this article we shall only collate the various operations and outline the general procedure. The limits of space prevent any sys- tematic account of the separation of

the rare metals, the alkaloids, and other classes of organic compounds, but sources where these matters may be found are given in the list of references.

Qualitative Inorganic Analysis.

The dry examination of a substance comprises several opera- tions, which may yield definite results if no disturbing element is present; but it is imperative that any in- ˆthods. ference should be confirmed by other methods.

1. Heat the substance in a hard glass tube. Note whether any moisture condenses on the cooler parts of the tube, a gas is evolved, a sublimate formed, or the substance changes colour.

Moisture is evolved from substances containing water of crystal- lization or decomposed hydrates. If it possesses an alkaline or acid reaction, it must be tested in the first case for ammonia, and in the second case for a volatile acid, such as sulphuric, nitric, hydrochloric, &c.

Any evolved gas must be examined. Oxygen, recognized by its power of igniting a glowing splinter, results from the decomposition of oxides of the noble metals, peroxides, chlorates, nitrates and other highly oxygenized salts. Sulphur dioxide, recognized by its smell and acid reaction, results from the ignition of certain sulphites, sulphates, or a mixture of a sulphate with a sulphide. Nitrogen oxides, recognized by their odour and brown-red colour, result from the decomposition of nitrates. Carbon dioxide, recognized by turning lime-water milky, indicates decomposable carbonates or oxalates. Chlorine, bromine, and iodine, each recognizable by its colour and odour, result from decomposable haloids; iodine forms also a black sublimate. Cyanogen and hydrocyanic acid, recogniz- able by their odour, indicate decomposable cyanides. Sulphuretted hydrogen, recognized by its odour, results from sulphides containing water, and hydrosulphides. Ammonia, recognizable by its odour and alkaline reaction, indicates ammoniacal salts or cyanides Containing water.

A sublimate may be formed of: sulphur — reddish-brown drops, cooling to a yellow to brown solid, from sulphides or mixtures; iodine

— violet vapour, black sublimate, from iodides, iodic acid, or mixtures; mercury and its compounds — metallic mercury forms minute globules, mercuric sulphide is black and becomes red on rubbing, mercuric chloride fuses before subliming, mercurous chloride does not fuse, mercuric iodide gives a yellow sublimate; arsenic and its compounds— metallic arsenic gives a grey mirror, arsenious oxide forms white shining crystals, arsenic sulphides give reddish-yellow sublimates which turn yellow on cooling; antimony oxide fuses and gives a yellow acicular sublimate; lead chloride forms a white sublimate after long and intense heating.

If the substance does not melt but changes colour, we may have present: zinc oxide — from white to yellow, becoming white on cooling; stannic oxide— white to yellowish brown, dirty white on cooling; lead oxide — from white or yellowish-red to brownish-red, yellow on cooling; bismuth oxide — from white or pale yellow to orange-yellow or reddish-brown, pale yellow on cooling; manganese oxide — from white or yellowish white to dark brown, remaining dark brown on cooling (if it changes on cooling to a bright reddish- brown, it indicates cadmium oxide) ; copper oxide — from bright blue or green to black; ferrous oxide — from greyish-white to black; ferric oxide — from brownish-red to black, brownish-red on cooling; potassium chromate — yellow to dark orange, fusing at a red heat.

2. Heat the substance on a piece of charcoal in the reducing flame of the blowpipe.

(a) The substance may fuse and be absorbed by the charcoal; this indicates more particularly the alkaline metals.

(/3) An infusible white residue may be obtained.which may denote barium, strontium, calcium, magnesium, aluminium or zinc. The first three give characteristic flame colorations (see below) ; the last three, when moistened with cobalt nitrate and re-ignited, give coloured masses ; aluminium (or silica) gives a brilliant blue ; zinc gives a green ; whilst magnesium phosphates or arsenate (and to a less degree the phosphates of the alkaline earths) give a violet mass.

A metallic globule with or without an incrustation may be obtained. Gold and copper salts give a metallic bead without an incrustation. If the incrustation be white and readily volatile, arsenic is present, if more difficultly volatile and beads are present, antimony; zinc gives an incrustation yellow whilst hot, white on cooling, and volatilized with difficulty; tin gives a pale yellow incrustation, which becomes white on cooling, and does not volatilize in either the reducing or

oxidizing flames; lead gives a lemon-yellow incrustation turning sulphur-yellow on cooling, together with metallic malleable beads; bismuth gives metallic globules and a dark orange-yellow incrustation, which becomes lemon-yellow on cooling; cadmium gives a reddish-brown incrustation, which is removed without leaving a gleam by heating in the reducing flame ; silver gives white metallic globules and a dark-red incrustation.

3. Heat the substance with a bead of microcosmic salt or borax on a platinum wire in the oxidizing flame.

(a) The substance dissolves readily and in quantity, forming a bead which is clear when hot. If the bead is coloured we may have present : cobalt, blue to violet ; copper, green, blue on cooling ; in the reducing flame, red when cold; chromium, green, unaltered in the reducing flame; iron, hrownish-red, light-yellow or colourless on cooling; in the reducing flame, red while hot, yellow on cooling, greenish when cold ; nickel, reddish to browmsh-red, yellow to reddish-yeilcw or colourless on cooling, unaltered in the reducing flame; bismuth, yellowish-brown, light-yellow or colourless on cooling ; in the reducing flame, almost colourless, blackish-grey when cold; silver, light yellowish to opal, somewhat opaque when cold ; whitish-grey in the reducing flame; manganese, amethyst red, colourless in the reducing flame. If the hot bead is colourless and remains clear on cooling, v/e may suspect the presence of antimony, aluminium, zinc, cadmium, lead, calcium and magnesium. When present in sufficient quantity the five last-named give enamel-white beads; lead oxide in excess gives a yellowish bead. If the hot colourless bead becomes enamel-white on cooling even when minute quantities of the substances are employed, we may infer the presence of barium or strontium.

(0) The substance dissolves slowly and in small quantity, and forms a colourless bead which remains so on cooling. Either silica or tin may be present. If silica be present, it gives the iron bead when heated with a little ferric oxide ; if tin is present there is no change. Certain substances, such as the precious metals, are quite insoluble in the bead, but float about in it.

4. Hold a small portion of the substance moistened with hydrochloric acid on a clean platinum wire in the fusion zone of the Bunsen burner, and note any colour imparted to the flame.

Potassium gives a blue- violet flame which may be masked by the colorations due to sodium, calcium and other elements. By viewing the flame through an indigo prism it appears sky-blue, violet and

ultimately crimson, as the thickness of the prism is increased. Other elements do not interfere with this method. Sodium gives an intense and persistent yellow flame ; lithium gives a carmine coloration, and may be identified in the presence of sodium by viewing through a cobalt glass or indigo prism ; from potassium it may be distinguished by its redder colour ; barium gives a yellowish- green flame, which appears bluish-green when viewed through green glass; strontium gives a crimson flame which appears purple or rose when viewed through blue glass; calcium gives an orange-red colour which appears finch-green through green glass; indium gives a characteristic bluish-violet flame; copper gives an intense emerald-green coloration.

5. Film Reactions. — These reactions are practised in the following manner: — A thread of asbestos is moistened and then dipped in the substance to be tested; it is then placed in the luminous point of the Bunsen flame, and a small porcelain basin containing cold water placed immediately over the asbestos. The formation of a film is noted. The operation is repeated with the thread in the oxidizing flame.

Any film formed in the first case is metallic, in the second it is the oxide. The metallic film is tested with 20% nitric acid and with bleaching-powder solution. Arsenic is insoluble in the acid, but immediately dissolves in the bleaching-powder. The black films of antimony and bismuth and the grey mottled film of mercury are slowly soluble in the acid, and untouched by bleaching-powder. The black films of tin, lead and cadmium dissolve at once in the acid, the lead film being also soluble in bleaching-powder. The oxide films of antimony, arsenic, tin and bismuth are white, that of bismuth slightly yellowish ; lead yields a very pale yellow film, and cadmium a brown one; mercury yields no oxide film. The oxide films (the metallic one in the case of mercury) are tested with hydriodic acid, and with ammonium sulphide, and from the changes produced the film can be determined (see F. M. Perkin, Qualitative Chemical Analysis, 1905).

Having completed the dry analysis we may now pass on to the wet and more accurate investigation. It is first necessary to get the substance into solution. Small portions should be successively tested with water, dilute hydro- Wet th chloric acid, dilute nitric acid, strong hydrochloric acid, and a mixture of hydrochloric and nitric acids, first in the cold and then with warming. Certain substances are insoluble in all these reagents, and other methods, such as the fusion with sodium carbonate and potassium nitrate, and subsequent treat- ment with an acid, must be employed. Some of these insoluble compounds can be detected by their colour and particular re- actions. For further

information on this subject, we refer the readers to Fresenius's Qualitative Analysis.

The procedure for the detection of metals in solution consists of first separating them into groups and then examining each group separately. For this purpose the cold solution is treated with hydrochloric acid, which precipitates lead, silver and mercurous salts as chlorides. The solution is filtered and treated with an excess of sulphuretted hydrogen, either in solution or by passing in the gas; this precipitates mercury (mercuric), any lead left over from the first group, copper, bismuth, cadmium, arsenic, antimony and tin as sulphides. The solution is filtered off, boiled till free of sulphur- etted hydrogen, and ammonium chloride and ammonia added. If phosphoric acid is absent, aluminium, chromium and ferric hydrates are precipitated. If, however, phosphoric acid is present in the original substance,we may here obtain a precipitate of the phosphates of the remaining metals, together with aluminium, chromium and ferric hydrates. In this case, the precipitate is dissolved in as little as possible hydrochloric acid and boiled with ammonium acetate, acetic acid and ferric chloride. The phosphates of aluminium, chromium and iron are precipitated, and the solution contains the same metals as if phosphoric acid had been absent. To the filtrate from the aluminium, iron and chromium precipitate, ammonia and ammonium sulphide are added ; the precipitate may contain nickel, cobalt, zinc and manganese sulphides. Ammonium carbonate is added to the filtrate; this precipitates calcium, strontium and

barium. The solution contains magnesium, sodium and potassium, which are separately distinguished by the methods given under then-own headings.

We now proceed with the examination of the various group precipitates. The white precipitate formed by cold hydrochloric acid is boiled with water, and the solution filtered while hot. Any lead chloride dissolves, and may be identified by the yellow precipitate formed with potassium chromate. To the residue add ammonia, shake, then filter. Silver chloride goes into solution, and may be precipitated by dilute nitric acid. The residue, which is black in colour, consists of mercuroso-ammonium chloride, in which mercury can be confirmed

by its ordinary tests.

The precipitate formed by sulphuretted hydrogen may contain the black mercuric, lead, and copper sulphides, dark-brown bismuth sulphide, yellow cadmium and arsenious sulphides, orange-red antimony sulphide, brown stannous sulphide, dull-yellow stannic sulphide, and whitish sulphur, the last resulting from the oxidation of sulphuretted hydrogen by ferric salts, chromates, &c. Warming with ammonium sulphide dissolves out the arsenic, antimony and tin salts, which are reprecipitated by the addition of hydrochloric acid to the ammonium sulphide solution. The precipitate is shaken with ammonium carbonate, which dissolves the arsenic. Filter and confirm arsenic in the solution by its particular tests. Dissolve the residue in hydrochloric acid and test separately for antimony and tin. The residue from the ammonium sulphide solution is warmed with dilute nitric acid. Any residue consists of black mercuric sulphide (and possibly white lead sulphate), in which mercury is confirmed by its usual tests. The solution is evaporated with a little sulphuric acid and well cooled. The white precipitate consists of lead sulphate. To the filtrate add ammonia in excess: a white precipitate indicates bismuth; if the solution be blue, copper is present. Filter from the bismuth hydrate, and if copper is present, add potassium cyanide till the colour is destroyed, then pass sulphur- etted hydrogen, and cadmium is precipitated as the yellow sulphide. If copper is absent, then sulphuretted hydrogen can be passed directly into the solution.

The next group precipitate may contain the white gelatinous aluminium hydroxide, the greenish chromium hydroxide, reddish ferric hydroxide, and possibly zinc and manganese hydroxides. Treatment with casutic soda dissolves out aluminium hydroxide, which is reprecipitated by the addition of ammonium chloride. The remaining metals are tested for separately.

The next group may contain black nickel and cobalt sulphides, flesh-coloured manganese sulphide, and white zinc sulphide. The last two are dissolved out by cold, very dilute hydrochloric acid, arid the residue is tested for nickel and cobalt. The solution is boiled till free from sulphuretted hydrogen and treated with excess of sodium hydrate. A white precipitate rapidly turning brown indicates manganese. The solution with ammonium sulphide gives a white precipitate of zinc sulphide.

The next group may contain the white calcium, barium and strontium carbonates. The flame coloration (see above) may give information as to which elements are present. The carbonates are dissolved in

hydrochloric acid, and calcium sulphate solution is added to a portion of the solution. An immediate precipitate indicates barium; a precipitate on standing indicates strontium. If barium is present, the solution of the carbonates in hydrochloric acid is evaporated and digested with strong alcohol for some time ; barium chloride, which is nearly insoluble in alcohol, is thus separated, the remainder being precipitated by a few drops of hydrofluosilicic acid, and may be confirmed by the ordinary tests. The solution free from barium is treated with ammonia and ammonium sulphate, which precipitates strontium, and the calcium in the solution may be identified by the white precipitate with ammonium oxalate.

Having determined the bases, it remains to determine the acid radicals. There is no general procedure for these operations, and it is customary to test for the acids separately by special tests; these are given in the articles on the various acids. A knowledge of the solubility of salts considerably reduces the number of acids likely to be present, and affords evidence of great value to the analyst (see A. M. Comey, Dictionary of Chemical Solubilities). In the above account we have indicated the pro- cedure adopted in the analysis of a complex mixture of salts. It is unnecessary here to dwell on the precautions which can only be conveniently acquired by experience; a sound appreciation of analytical methods is only possible after the reactions and characters of individual substances have been studied, and we therefore refer the reader to the articles on the particular ele- ments and compounds for more information on this subject.

Quantitative Inorganic Analysis. Quantitative methods are divided into four groups, which we now pass on to consider in the following sequence: (a) gravimetric, (/?) volumetric, (7) electrolytic, (8) colorimetric.

(a) Gravimetric. — This method is made up of four operations: (1) a weighed quantity of the substance is dissolved in a suitable solvent; (2) a particular reagent is added which precipitates the substance it is desired to estimate; (3) the precipitate is filtered, washed and dried; (4) the filter paper containing the precipitate is weighed either as a tared filter, or incinerated and ignited either in air or in any other gas, and then weighed.

(1) Accurate weighing is all-important; for details of the various appliances and methods see Weighing Machines. (2) No general directions can be given as to the method of precipitation. Sometimes it is necessary to allow the solution to stand for a considerable time either in the warm or cold or in the light or dark ; to work with cold

solutions and then boil; or to use boiling solutions of both the substance and reagent. Details will be found in the articles on particular metals. (3) The operation of filtration and washing is very important. If the substance to be weighed changes in com- position on strong heating, it is necessary to emploj' a tared filter, i.e. a filter paper which has been previously heated to the temperature at which the substance is to be dried until its weight is constant. If the precipitate settles readily, the supernatant liquor may be decanted through the filter paper, more water added to the pre- cipitate and again decanted. By this means most of the washing, i.e. freeing from the other substances in the solution, can be accom- plished in the precipitating vessel. If, however, the precipitate refuses to settle, it is directly transferred to the filter paper, the last traces being removed by washing and rubbing the sides of the vessel with a piece of rubber, and the liquid is allowed to drain through. It is washed by ejecting a jet of water, ammonia or other prescribed liquid on to the side of the filter paper until the paper is nearly full. It can be shown that a more efficient washing results from alternately filling and emptying the funnel than by endeavouring to keep the funnel full. The washing is continued until the filtrate is free from salts or acids. (4) After washing, the funnel containing the filter paper is transferred to a drying oven. In the case of a tared filter it is weighed repeatedly until the weight suffers no change ; then knowing the weight of the filter paper, the weight of the precipitate is obtained by subtraction. If the precipitate may be ignited, it is transferred to a clean, weighed and recently ignited crucible, and the filter paper is burned separately on the lid, the ash transferred to the crucible, and the whole ignited. After ignition, it is allowed to cool in a desiccator and then weighed. Knowing the weight of the crucible and of the ash of the filter paper, the weight of the precipitate is determined. The calculation of the percentage of the particular con- stituent is simple. We know the amount present in the precipitate, and since the same amount is present in the quantity of substance experimented with, we have only to work out a sum in proportion.

(j6) Volumetric. — This method is made up of three operations: — (1) preparation of a standard solution; (2) preparation of a solution of the substance; (3) titration, or the determination of what volume of the standard solution will occasion a known and definite reaction with a known volume of the test solution.

(1) In general analytical work the standard solution contains the equivalent weight of the substance in grammes dissolved in a litre of water. Such a solution is known as normal. Thus a normal solution of sodium carbonate contains 53 grammes per litre, of sodium hydrate

40 grammes, of hydrochloric acid 36-5 grammes, and so on. By taking jˆth or rˆth of these quantities, decinormal or centinormal solutions are obtained. We see therefore that 1 cubic centimetre of a normal sodium carbonate solution will exactly neutralize 0-049 gramme of sulphuric acid, 0-0365 gramme of hydrochloric acid (i.e. the equivalent quantities), and similarly for decinormal and centinormal solutions. Unfortunately, the term normal is sometimes given to solutions which are strictly decinormal ; for example, iodine, sodium thiosulphate, &c. In technical analysis, where a solution is used for one process only, it may be prepared so that 1 cc. is equal to -oi gramme of the substance to be estimated. This saves a certain amount of arithmetic, but when the solution is applied in another determination additional calculations are necessary. Standard solutions are prepared by weighing out the exact amount of the pure substance and dissolving it in water, or by forming a solution of approximate normality, determining its exact strength by gravimetric or other means, and then correcting it for any divergence. This may be exemplified in the case of alkalimetry. Pure sodium carbonate is prepared by igniting the bicarbonate, and exactly 53 grammes are dissolved in water, forming a strictly normal solution. An approximate normal sulphuric acid is prepared from 30 ccs. of the pure acid (1-84 specific gravity) diluted to 1 litre. The solutions are titrated (see below) and the acid sol ution diluted until equal volumes are exactly equivalent. A standard sodium hydrate solution can be prepared by dissolving 42 grammes of sodium hydrate, making up to a litre, and diluting until one cubic centimetre is exactly equivalent to one cubic centimetre of the sulphuric acid. Similarly, normal solutions of-hydrochloric and nitric acids can be prepared. Where a solution is likely to change in composition on keeping, such as potassium permanganate, iodine,

sodium hydrate, &c, it is necessary to check or re-standardize it periodically.

(2) The preparation of the solution of the substance consists in dissolving an accurately determined weight, and making up the volume in a graduated cylinder or flask to a known volume.

(3) The titration is conducted by running the standard solution from a burette into a known volume of the test solution, which is usually

transferred from the stock-bottle to a beaker or basin by means of a pipette. Various artifices are employed to denote the end of the reaction. These may be divided into two groups: (1) those in which a change in appearance of the reacting mixture occurs; (2) those in which it is necessary to use an indicator which, by its change in appearance, shows that an excess of one reagent is present. In the first group, we have to notice the titration of a cyanide with silver nitrate, when a milkiness shows how far the reaction has gone ; the titration of iron with permanganate, when the faint pink colour shows that all the iron is oxidized. In the second group, we may notice the application of litmus, methyl orange or phenolphthalein in alkalimetry, when the acid or alkaline character of the solution commands the colour which it exhibits; starch paste, which forms a blue compound with free iodine in iodometry ; potassium chromate, which forms red silver chromate after all the hydrochloric acid is precipitated in solutions of chlorides; and in the estimation of ferric compounds by potassium bichromate, the indicator, potassium ferricyanide, is placed in drops on a porcelain plate, and the end of the reaction is shown by the absence of a blue coloration when a drop of the test solution is brought into contact with it.

(7) Electrolytic. — This method consists in decomposing a solution of a salt of the metal by the electric current and weigh- ing the metal deposited at the cathode.

It is only by paying great attention to the current density that good results are obtained, since metals other than that sought for may be deposited. In acid copper solutions, mercury is deposited before the copper with which it subsequently amalgamates; silver is thrown down simultaneously; bismuth appears towards the end; and after all the copper has been precipitated, arsenic and antimony may be deposited. Lead and manganese are partially separated as peroxides, but the remaining metals are not deposited from acid solutions. It is therefore necessary that the solution should be free from metals which may vitiate the results, or special precautions taken by which the impurities are rendered harmless. In such cases the simplicity of manipulation and the high degree of accuracy of the method have made it especially valuable. The electrolysis is generally conducted with platinum electrodes, of which the cathode takes the form of a piece of foil bent into a cylindrical form, the necessary current being generated by one or more Daniell cells.

(5) Colorimetric. — This method is adopted when it is necessary to determine minute traces (as in the liquid obtained in the electrolytic separation of copper) of substances which afford well-defined colour

reactions.

The general procedure is to make a series of standard solutions containing definite quantities of the substance which it is desired to estimate; such a series will exhibit tints which deepen as the quantity of the substance is increased. A known weight of the test substance is dissolved and a portion of the solution is placed in a tube similar to those containing the standard solutions. The colour- producing reagent is added and the tints compared. In the case of copper, the colour reactions with potassium ferrocyanide or ammonia are usually employed; traces of ammonia are estimated with Nessler's reagent; sulphur in iron and steel is determined by the tint assumed by a silver-copper plate suspended in the gases liberated when the metal is dissolved in sulphuric acid (Eggertz's test) (see W. Crookes, Select Methods in Analytical Chemistry).

Organic Analysis.

The elements which play important parts in organic com- pounds are carbon, hydrogen, nitrogen, chlorine, bromine, iodine, sulphur, phosphorus and oxygen. We shall here consider the qualitative and quantitative determination of these elements.

Qualitative. — Carbon is detected by the formation of carbon dioxide, which turns lime-water milky, and hydrogen by the forma- tion of water, which condenses on the tube, when the substance is heated with copper oxide. Nitrogen may be detected by the evolution of ammonia when the substance is heated with soda-lime. A more delicate method is that due to J. L. Lassaigne and improved by O. Jacobsen and C. Graebe. The substance is heated with metallic sodium or potassium (in excess if sulphur be present) to redness, the residue treated with water, filtered, and ferrous sulphate, ferric chloride and hydrochloric acid added. A blue coloration indicates nitrogen, and is due to the formation of potassium (or sodium) cyanide during the fusion, and subsequent interaction with the iron salts. The halogens may be sometimes detected by fusing with lime, and testing the solution for a bromide, chloride and iodide in the usual way. F. Beilstein determines their presence by heating the substance with pure copper oxide on a platinum wire in the B'unsen flame ; a green coloration is observed if halogens be present. Sulphur is detected by heating the substance with

sodium, dissolving the product in water, and adding sodium nitro-prusside; a bluish-violet coloration indicates sulphur (H. Vohl). Or we may use J. Horbaczewski's method, which consists in boiling the

substance with strong potash, saturating the cold solution with chlorine, adding hydrochloric acid, and boiling till no more chlorine is liberated, and then testing for sulphuric acid with barium chloride. Phosphorus is obtained as a soluble phosphate (which can be examined in the usual way) by lixiviating the product obtained when the substance is ignited with potassium nitrate and carbonate.

Quantitative. — Carbon and hydrogen are generally estimated by the combustion process, which consists in oxidizing the substance and absorbing the products of combustion in suitable carbon and apparatus. The oxidizing agent in commonest use is hydrogen. copper oxide, which must be freshly ignited before use on account of its hygroscopic nature. Lead chromate is sometimes used, and many other substances, such as platinum, manganese dioxide, &c, have been suggested. The procedure for a combustion is as follows: —

j rifoOMWIi . I'PSgS

S2H

Fig. 1. A hard glass tube slightly longer than the furnace and 12 to 15 mm. in diameter is thoroughly cleansed and packed as shown in fig. 1. The space o must allow for the inclusion of a copper spiral if the substance contains nitrogen, and a silver spiral if halogens be present, for otherwise nitrogen oxides and the halogens may be condensed in the absorption apparatus; 6 contains copper oxide; c is a space for the insertion of a porcelain or platinum boat containing a weighed quantity of the substance ; d is a copper spiral. The end d is connected to an air or oxygen supply with an intermediate drying apparatus. The other end is connected with the absorption vessels, which consist of a tube (e) containing calcium chloride, and a set of bulbs (/) containing potash solution. .Various forms of potash bulbs are employed; fig. 2 is Liebig's, fig. 3 Mohr's or Geissler's, fig. 4 is a more recent form, of which special variations have been

Fig. 2. Fig. 3. Fig. 4.

made by Anderson, Gomberg, Delisle and others. After having previously roasted the tube and copper oxide, and reduced the copper spiral a, the weighed calcium chloride tube and potash bulbs are put in position, the boat containing the substance is inserted (in the case of a difficultly combustible substance it is desirable to mix it with cupric oxide or lead chromate), the copper spiral {d) replaced, and the air and oxygen supply connected up. The apparatus is then tested for leaks. If all the connexions are sound, the copper oxide is gradually

heated from the end a, the gas-jets under the spiral d are lighted, and a slow current of oxygen is passed through the tube. The success of the operation depends upon the slow burning of the substance. Towards the end the heat and the oxygen supply are increased. When there is no more absorption in the potash bulbs, the oxygen supply is cut off and air passed through. Having replaced the oxygen in the absorption vessels by air, they are disconnected and weighed, after having cooled down to the temperature of the room. The increase in weight of the calcium chloride tube gives the weight of water formed, and of the potash bulbs the carbon dioxide.

Liquids are amenable to the same treatment, but especial care must be taken so that they volatilize slowly. Difficultly volatile liquids may be weighed directly into the boat; volatile liquids are weighed in thin hermetically sealed bulbs, the necks of which are broken just before they are placed in the combustion tube.

The length of time and other disadvantages attending the combustion method have caused investigators to devise other processes. In 1855 C. Brunner described a method for oxidizing the carbon to carbon dioxide, which could be estimated by the usual methods, by heating the substance with potassium bichromate and sulphuric acid. This process has been considerably developed by J. Messinger, and we may hope that with subsequent improvements it may be adapted to all classes of organic compounds. The oxidation, which is effected by chromic acid and sulphuric acid, is conducted in a flask provided with a funnel and escape tube, and the carbon dioxide formed is swept by a current of dry air, previously freed from carbon dioxide, through a drying tube to a set of potash bulbs and a tube containing soda-lime; if halogens are present, a small wash bottle containing potassium iodide, and a (J tube containing glass wool moistened with silver titrate on one side and strong sulphuric acid on the other, must be inserted between the flask and the drying tube. The increase in weight of the potash bulbs and soda-lime tube gives

the weight of carbon dioxide evolved. C. F. Cross and E. J. Bevan collected the carbon dioxide obtained in this way over mercury. They also showed that carbon monoxide was given off towards the end of the reaction, and oxygen was not evolved unless the tempera- ture

exceeded 100°.

Methods depending upon oxidation in the presence of a contact substance have come into favour during recent years. In that of M. Dennstedt, which was first proposed in 1902, the substance is vaporized in a tube containing at one end platinum foil, platinized quartz, or platinized asbestos. The platinum is maintained at a bright red heat, either by a gas flame or by an electric furnace, and the vapour is passed over it by leading in a current of oxygen. If nitrogen be present, a boat containing dry lead peroxide and heated to 320 is inserted, the oxide decomposing any nitrogen peroxide which may be formed. The same absorbent quantitatively takes up any halogen and sulphur which may be present. The process-is therefore adapted to the simultaneous estimation of carbon,hydrogen, the halogens and sulphur.

Nitrogen is estimated by (1) Dumas' method, which consists in heating the substance with copper oxide and measuring the volume Nitrogen. of nitrogen liberated; (2) by Will and Varrentrapp's method, in which the substance is heated with soda-lime, and the ammonia evolved is absorbed in hydrochloric acid, and thence precipitated as ammonium chlorplatinate or estimated volumetric- ally ; or (3) by Kjeldahl's method, in which the substance is dissolved in concentrated sulphuric acid, potassium permanganate added, the liquid diluted and boiled with caustic soda, and the evolved ammonia absorbed in hydrochloric acid and estimated as in Will and Varrentrapp's method.

Dumas' Method. — In this method the operation is carried out in a hard glass tube sealed at one end and packed as shown in fig. 5. The magnesite (a) serves for the generation of carbon dioxide which clears the tube of air before the compound (mixed with fine copper oxide (&)) is burned, and afterwards sweeps the liberated nitrogen into the receiving vessel (e) , which contains a strong potash solution ; c is coarse copper oxide ; and d a reduced copper gauze spiral, heated in order to decompose any nitrogen oxides. Ulrich Kreusler generates the carbon dioxide in a separate apparatus, and in this case the tube is drawn out to a capillary at the end (a). This artifice is specially valuable when the substance decomposes or volatilizes in a warm current of carbon dioxide. Various forms of the absorbing apparatus (e) have been discussed by M. Ilinski (Ber. 17, p. 1347), who has also suggested the, use of manganese car- bonate instead of magnesite, since the change of colour enables one to follow the decomposi-

Fig. 5.

tion. Substances which burn with difficulty may be mixed with mercuric oxide in addition to copper oxide.

Will and Varrentrapp’s Method. — This method, as originally proposed, is not in common use, but has been superseded by Kjeldahl’s method, since the nitrogen generally comes out too low. It is susceptible of wider application by mixing reducing agents with the soda-lime; thus Goldberg (Ber. 16, p. 2546) uses a mixture of soda-lime, stannous chloride and sulphur for nitro- and azo-com- pounds, and C. Arnold {Ber. 18, p. 806) a mixture containing sodium hyposulphite and sodium formate for nitrates.

Kjeldahl’s Method. — This method rapidly came into favour on account of its simplicity, both of operation and apparatus. Various substances other than potassium permanganate have been suggested for facilitating the operation; J. W. Gunning (Z. anal. Chem., 1889, p. 189) uses potassium sulphate; Lassar-Cohn uses mercuric oxide. The applicability of the process has been examined by F. W. Dafert (Z. anal. Chem., 1888, p. 224), who has divided nitrogenous bodies into two classes with respect to it. The first class includes those substances which require no preliminary treatment, and comprises the amides and ammonium compounds, pyridines, quinolines, alkaloids, albumens and related bodies; the second class requires preliminary treatment and comprises, with few exceptions, the nitro-, nitroso-, azo-, diazo- and amidoazo-compounds, hydrazines, deriva- tives of nitric and nitrous acids, and probably cyanogen compounds. Other improvements have been suggested by Dyer (J.C.S. Trans. 67, p. 811). For an experimental comparison of the accuracy of the Dumas, Will-Varrentrapp and Kjeldahl processes see L. L’H6te, C.R. 1889, p. 817. Debordeaux (C.R. 1904, p. 905) has obtained good results by distilling the substance with a mixture of potassium thiosulphate and sulphide.

The halogens may be estimated by ignition with quicklime, or by heating with nitric acid and silver nitrate in a sealed tube. In the

VI. 3

first method the substance, mixed with quicklime free from chlorine, is heated in a tube closed at one end in a combustion furnace. The product is dissolved in water, and the calcium n a i oeens haloid estimated in the usual way. The same decomposi- sa i p hur ‘ tion may

be effected by igniting with iron, ferric oxide and pBOS . ‘ sodium carbonate (E. Kopp, Ber. 10, p. 290) ; the operation p /, orus . is easier if the lime be mixed with sodium carbonate, or a mixture of sodium carbonate and potassium nitrate be used. With iodine compounds, iodic acid is likely to be formed, and hence the solution must be reduced with sulphurous acid before precipitation with silver nitrate. C. Zulkowsky (Ber. 18, R. 648) burns the substance in oxygen, conducts the gases over platinized sand, and collects the products in suitable receivers. The oxidation with nitric acid in sealed tubes at a temperature of 150 to 200° for aliphatic compounds, and 250 to 260° for aromatic compounds, is in common use, for both the sulphur and phosphorus can be estimated, the former being oxidized to sulphuric acid and the latter to phosphoric acid. This method was due to L. Carius (Ann. 136, p. 129). R. Klason (Ber. 19, p. 1910) determines sulphur and the halogens by oxidizing the substance in a current of oxygen and nitrous fumes, conducting the vapours over platinum foil, and absorbing the vapours in suitable receivers. Sulphur and phosphorus can sometimes be estimated by Messinger’s method, in which the oxidation is effected by potassium permanganate and caustic alkali, or by potassium bichromate and hydrochloric acid. A comparison of the various methods for estimating sulphur has been given by O. Hammarsten (Zeit. physiolog. Chem. 9, p. 273), and by Holand (Chemiker Zeitung, 1893, p. 991). H. H. Pnngsheim (Ber. 38, p. 1434) has devised a method in which the oxidation is effected by sodium peroxide; the halogens.phosphorus and sulphur can be determined by one operation,,

VI. Physical Chemistry

We have seen how chemistry may be regarded as having for its province the investigation of the composition of matter, and the changes in composition which matter or energy may effect on matter, while physics is concerned with the general properties of matter. A physicist, however, does more than merely quantitatively determine specific properties of matter; he endeavours to establish mathematical laws which co-ordinate his observations, and in many cases the equations expressing such laws contain functions or terms which pertain solely to the chemical composition of matter. One example will suffice here. The limiting law expressing the behaviour of gases under varying temperature and pressure assumes the form $pv = RT$; so stated, this law is independent of chemical composition and may be regarded as a true physical law, just as much as the law of uni- versal gravitation is a true law of physics. But this relation is not rigorously true; in fact, it does not accurately express tht behaviour of any gas. A more accurate expression (see Con- densation or Gases and Molecule)

is (J > + a/z > 2), (v— i) = RT, in which a and b are quantities which depend on the composition of the gas, and vary from one gas to another.

It may be surmised that the quantitative measures of most physical properties will be found to be connected with the chemical nature of substances. In the investigation of these relations the physicist and chemist meet on common ground; this union has been attended by fruitful and far-reaching results, and the correlation of physical properties and chemical composi- tion is one of the most important ramifications of physical chemistry. This branch receives treatment below. Of consider- able-importance, also, are the properties of solids, liquids and gases in solution. This subject has occupied a dominant position in physico-chemical research since the investigations of van't Hoff and Arrhenius. This subject is treated in the article Solution; for the properties of liquid mixtures reference should also be made to the article Distillation.

Another branch of physical chemistry has for its purpose the quantitative study of chemical action, a subject which has brought out in clear detail the analogies of chemical and physical equilibrium (see Chemical Action). Another blanch, related to energetics (q.v.), is concerned with the transformation of chemical energy into other forms of energy — heat, light, electri- city. Combustion is a familiar example of the transformation of chemical energy into heat and light ; the quantitative measures of heat evolution or absorption (heat of combustion or combina- tion), and the deductions therefrom, are treated in the article Thermochemistry. Photography (q.v.) is based on chemical action induced by luminous rays; apart from this practical

application there are many other cases in which actinic rays occasion chemical actions; these are treated in the article Photochemistry. Transformations of electrical into chemical energy are witnessed in the processes of electrolysis (q.v.; see also Electrochemistry and Electrometallurgy). The con- verse is presented in the common electric cell.

Physical Properties and Composition.

For the complete determination of the chemical structure of any compound, three sets of data are necessary: (i) the empirical chemical composition of the molecule; (2) the constitution, i.e. the manner in which the atoms are linked together; and (3) the configuration of the molecule, i.e. the arrangement of the atoms in space. Identity in composition, but difference in constitution, is generally known as ” isomerism ” (q.v.), and compounds satisfying this relation differ in many of their physical properties If, however, two compounds only differ with regard to the spatial arrangement of the atoms, the physical properties may be (1) for the most part identical, differences, however, being apparent with regard to the action of the molecules on polarized light, as is the case when the configuration is due to the presence of an asymmetric atom (optical isomerism); or (2) both chemical and physical properties may be different when the configuration is determined by the disposition of the atoms or groups attached to a pair of doubly -linked atoms, or to two members of a ring system (geometrical isomerism or allo-isomerism). Three sets of physical properties may therefore be looked for: (1) depending on composition, (2) depending on constitution, and (3) depending on configuration. The first set provides evidence as to the molecular weight of a substance: these are termed ” colligative properties.” The second and third sets elucidate the actual structure of the molecule: these are known as ” constitutional properties.”

In any attempts to gain an insight into the relations between the physical properties and chemical composition of substances, the fact must never be ignored that a comparison can only be made when the particular property under consideration is deter- mined under strictly comparable conditions, in other words, when the molecular states of the substances experimented upon are identical. This is readily illustrated by considering the pro- perties of gases — the simplest state of aggregation. According to the law of Avogadro, equal volumes of different gases under the same conditions of temperature and pressure contain equal numbers of molecules; therefore, since the density depends upon the number of molecules present in unit volume, it follows that for a comparison of the densities of gases, the determinations must be made under coincident conditions, or the observations reduced or re-computed for coincident conditions. When this is done, such densities are measures of the molecular weights of the substances in question.

Volume Relations. 1 — When dealing with colligative properties of liquids it is equally necessary to ensure comparability of con- ditions. In the article Condensation of Gases (see also Molecule) it is shown that the characteristic equation of gases and liquids is conveniently

expressed in the form (p + a/v 2) (v— b) = RT. This equation, which is mathematically deducible from the kinetic theory of gases, expresses the behaviour of gases, the phenomena of the critical state, and the behaviour of liquids; solids are not accounted for. If we denote the critical volume, pressure and temperature by Va, Pt and T*-, then it may be shown, either by considering the characteristic equation as a perfect cube in for by using the relations that dpjdv = o, d 2 pjdv 2 = o at the critical point, that V;t = 3&, ~Pk — aj 2Tb 2 , T* = 8a/ 276. Eliminating a and b between these relations, we derive P&Vfc/Tk — fR, a relation which should hold between the critical constants of any substance. Experiment, however, showed that while the quotient on the left hand of this equation was fairly constant for a great number of substances, yet its value was not fRbut jˆR; this means that the critical density is, as a general rule, 3-7 times the theoretical density. Deviation from this rule indicates molecular dissociation or association.

1 For the connexion between valency and volume, see Valency.

By actual observations it has been shown that ether, alcohol, many esters of the normal alcohols and fatty acids, benzene, and its halogen substitution products, have critical constants agreeing with this originally empirical law, due to Sydney Young and Thomas; acetic acid behaves abnormally, pointing to associated molecules at the critical point.

The critical volume provides data which may be tested for additive relations. Theoretically the critical volume is three times the volume at absolute zero, i.e. the actual volume of the molecules; this is obvious by considering the result of ‘°‘j”” ea ‘ making T zero in the characteristic equation. Experi- crlt ‘ c ˆ’ mentally (by extrapolation from the” law of the rectilinear ˆabsolute diameter “) the critical volume is four times the volume zero . at absolute zero (see Condensation of Gases). The most direct manner in which to test any property for additive relations is to determine the property for a number of elements, and then investigate whether these values hold for the elements in com- bination. Want of data for the elements, however, restricts this method to narrow limits, and hence an indirect method is necessary. It is found that isomers have nearly the same critical volume, and that equal differences in molecular content occasion equal differ- ences in critical volume. For example, the difference due to an increment of CHs is about 56-6, as is shown in the following table : —

Name.

Formula.

Crit. Vol.

Vol. per CH,

Methyl formate .

H-C0 2 CH 3

171

Ethyl formate .

H-C0 2 C 2 H 6

228 L 227.?

56-5

Methyl acetate .

CH 3 -C0 2 CH 3

227 f 22 7 5

Propyl formate .

H-C0 2 C 3 H 7

284

55-8

Ethyl acetate

CH 3 -C0 2 C 2 H 6

285 h 283-3

Methyl propionate .

C 2 H 6 -C0 2 CH 3

281J

Propyl acetate .

CH 3 -C0 2 C 3 H 7

343]

57-4

Ethyl propionate

C2HVCO2C2H5

343 I 340-7 339 f 337J

Methyl n-butyrate . Methyl isobutyrate.

lC 3 H 7 -C0 2 CH 3

Since the critical volume of normal pentane CsHn is 307-2, we have H 2 = C 6 H 12 — 5CH 2 = 307-2 — 5X56-6 = 24-2, and C = CH 2 — H 2 = 32-4. The critical volume of oxygen can be deduced from the data of the above table, and is found to be 29, whereas the experimental value is 25.

The researches of H. Kopp, begun in 1842, on the molecular volumes, i.e. the volume occupied by one gramme molecular weight of a substance, of liquids measured at their boiling-point under atmospheric pressure, brought to light a series of * f?. me additive relations which, in the case of carbon compounds, l ‘ ol “°S m render it possible to predict, in some measure, the com- po n ‘ position of the substance. In practice it is generally more convenient to determine the density, the molecular volume being then obtained by dividing the molecular weight of the substance by the density. By the indirect method Kopp derived the following atomic volumes : C. O. H. CI. Br. I. S.

11 12-2 55 228 27-8 37-5 22-6.

These values hold fairly well when compared with the experimental values determined from other compounds, and also with the mole- cular volumes of the elements themselves. Thus the actually observed densities of liquid chlorine and bromine at the boiling- points are 1-56 and 2-96, leading to atomic volumes 22-7 and 26-9, which closely correspond to Kopp’s values deduced from organic compounds.

These values, however, require modification in certain cases, for discrepancies occur which can be reconciled in some cases by assuming that the atomic value of a polyvalent element varies

according to the distribution of its valencies. Thus a double bond of oxygen, as in the carbonyl group CO, requires a larger volume than a single bond, as in the hydroxyl group- OH, being about 12-2 in the first case and 7-8 in the second. Similarly, an increase of volume is associated with doubly and trebly linked carbon atoms.

Recent researches have shown that the law originally proposed by Kopp — ” That the specific volume of a liquid compound (molecular volume) at its boiling-point is equal to the sum of the specific volumes of its constituents (atomic volumes), and that every element has a definite atomic value in its compounds ” — is by no means exact, for isomers have different specific volumes, and the volume for an increment of CH 2 in different homologous series is by no means constant ; for example, the difference among the esters of the fatty acids is about 57, whereas for the aliphatic aldehydes it is 49. We may therefore conclude that the molecular volume depends more upon the internal structure of the molecule than its empirical content. W. Ostwald {Lehr. der allg. Chem.), after an exhaustive review of the material at hand, concluded that simple additive relations did exist but with considerable deviations, which he ascribed to differ- ences in structure. In this connexion we may notice W. Stadel’s determinations :

CH„CC1, CHsCl-CHClj

108

102-8

CHClBr-CH 3 CH 2 Br-CH 2 Cl

96-5 88

PHYSICAL]

CHEMISTRY

67

These differences do not disappear at the critical point, and hence the critical volumes are not strictly additive.

Theoretical considerations as to how far Kopp was justified in choosing the boiling-points under atmospheric pressure as being comparable states for different substances now claim our attention. Van der Waal’s equation (p + a/v 1) (v — b) = RT contains two

constants a and b determined by each particular substance. If we express the pressure, volume and temperature as fractions of the critical constants, then, calling these fractions the ” reduced ” pressure, volume and temperature, and denoting them by t, and 9 respectively, the characteristic equation becomes (ir + 3/ < # > 2) (30 — 1) = 80 ; which has the same form for all substances. Obviously, therefore, liquids are comparable when the pressures, volumes and tem- peratures are equal fractions of the critical constants, In view of the extremely slight compressibility of liquids, atmospheric pressure may be regarded as a coincident condition; also C. M. Guldberg pointed out that .for the most diverse substances the absolute boiling-point is about two-thirds of the critical temperature. Hence within narrow limits Kopp’s determinations were carried out under coincident conditions, and therefore any regularities presented by the critical volumes should be revealed in the specific volumes at the boiling-point.

The connexion between the density and chemical composition of solids has not been investigated with the same completeness as in the case of gases and liq uids. The relation between the atomic Volume volumes and the atomic weights of the -solid elements trui* exhibits the periodicity which generally characterizes the of solids, elements. The molecular volume is additive in certain cases, in particular of analogous compounds of simple constitution. For instance, constant differences are found between the chlorides, bromides and iodides of sodium and potassium : —

I.

Diff.

II.

Diff.

Diff. I. & II.

KCl = 37-4 KBr = 44 -3 KI = 54-0

6-9 9-7

NaCl = 27-i NaBr = 33-8 Nal = 43-5

6-7 9-7

10-3 10-5 10-5

According to H. Schroeder the silver salts of the fatty acids exhibit additive relations; an increase in the molecule of CHj causes an increase in the molecular volume of about 15-3.

Thermal Relations.

Specific Heat and Composition.— The nature and experi- mental determination of specific heats are discussed in the article Calorimetry; here will be discussed the relations exist- ing between the heat capacities of elements and compounds.

In the article Thermodynamics it is shown that the amount of heat required to raise a given weight of a gas through a certain range of temperature is different according as the gas heat f * s maintained at constant pressure, the volume in- cases, creasing, or at constant volume, thepressure increasing. A gas, therefore, has two specific heats, generally denoted by C p and C„, when the quantity of gas taken as a unit is one gramme molecular weight, the range of temperature being i° C. It may be shown that C P C„ = R, where R is the gas constant, i.e. R in the equation PV = RT. From the ratio C p / C„ conclusions may be drawn as to the molecular condition of the gas. By considerations based on the kinetic theory of gases (see Molecule) it may be shown that when no energy is utilized in separating the atoms of a molecule, this ratio is 5/3 = 1-67. If, however, an amount of energy a is taken up in separating atoms, the ratio is expressible as C p /C»=(s+a)/(3+a), which is obviously smaller than 5/3, and decreases with increasing values of a. These relations may be readily tested, for the ratio C p /C„ is capable of easy experimental determination. It is found that mercury vapour, helium, argon and its associates (neon, krypton, &c.) have the value 1-67; hence we conclude that these gases exist as monatomic molecules. Oxygen, nitrogen, hydrogen and carbon monoxide have the value 1-4; these gases have diatomic molecules, a fact capable of demonstration by other means. Hence it may be inferred that this value is typical for diatomic molecules. Similarly, greater atomic complexity is reflected in a further decrease in the ratio C p /C„. The following table gives a comparative view of the specific heats and the ratio for molecules of variable atomic content.

The abnormal specific heats of the halogen elements may be due to a loosening of the atoms, a preliminary to the dissociation into monatomic molecules which occurs at high temperatures. In the more complex gases the specific heat varies considerably with temperature; only in the case of monatomic gases does it remain

Molecular Content.

Examples.

c„.

c„.

— p/— V»

Monatomic .

Diatomic

Triatomic

Tetratomic .

Pentatomic . Hexatomic .

Hg, Zn, Cd, He, Ar, &c. 1 H 2 , 2 , N 2 (o°-20o°) . }C1 2 , Br 2 , I 2 (o °-2oo°). (HC1, HBr, HI, NO, CO

H 2 0, H S S, N 2 0, C0 2 .

\ As 4 , P <

1 NH 3 , C 2 H 2 ....

CHCla

C2H4, C2H;jBr .

5

6-83

8-6

9-2

13-4

u-6

14 16-4

3

4-83 6-6

7-2

n-4

9-6 12 14-4

1-66 1-41 1-30 1-41

1-28

i’i75

I-2I

1-17 1-14

constant. Le Chatelier (Zeit. f. phys. Chem. i. 456) has given the formula C P = 6-5-r-aT, where a is a constant depending on the complexity of the molecule, as an expression for the molecular heat at constant pressure at any temperature T (reckoned on the absolute scale). For a further discussion of the ratio of the specific heats see Molecule.

Specific Heals of Solids. — The development of the atomic theory and the subsequent determination of atomic weights in the opening decades of the 19th century inspired A. T. Petit and P. L. Dulong to investigate relations (if any) existing between specific heats and the atomic weight. Their obser- vations on the solid elements led to a remarkable generalization, now known as Dulong and Petit’s law. This states that ” the atomic heat (the product of the atomic weight and specific heat) of all elements is a constant quantity.” The value of this constant when H = i is about 6-4; Dulong and Petit, using 0 = i, gave the value 38, the specific heat of water being unity in both cases. This law — purely empirical in origin — was strengthened by Berzelius, who redetermined many specific heats, and applied the law to determine the true atomic weight from the equivalent weight. At the same time he perceived that specific heats varied with temperature and also with allo tropes, e.g. graphite and diamond. The results of Berzelius were greatly extended by Hermann Kopp, who recognized that carbon, boron and silicon were exceptions to the law. He regarded these anomalies as solely due to the chemical nature of the elements, and ignored or regarded as insignificant such factors as the state of aggregation and change of specific heat with temperature.

The specific heats of carbon, boron and silicon subsequently formed the subject of elaborate investigations by H. F. Weber, who showed that with rise of temperature the specific (and atomic) heat increases, finally attaining a fairly constant value; diamond, graphite and the various amorphous forms of carbon having the value about 5-6 at 1000 , and silicon 5-68 at 232 ; while he concluded that boron attained a constant value of 5-5. Niison and Pettersson's observations on beryllium and germanium have shown that the atomic heats of these metals increase with rise of temperature, finally becoming constant with a value 5-6. W. A. Tilden (Phil.- Trans., 1900, p. 233) investigated nickel and cobalt over a wide range of temperature (from —182-5° to 100°); his results are: —

Cobalt.

Nickel.

From -182-5° to -78-4° . .

- 78-4° to 15 • .

15° to 100° . .

4-1687 5-4978 6-0324

4-1874 5-6784

6-3H3

It is evident that the atomic heats of these intimately associated elements approach nearer and nearer as we descend in temperature, approximating to the value 4. Other metals were tested in order to determine if their atomic heats approximated to this value at low temperatures, but with negative results.

It is apparent that the law of Dulong and Petit is not rigorously true, and that deviations are observed which invalidate the law as originally framed. Since the atomic heat of the same element varies with its state of aggregation, it must be concluded that some factor taking this into account must be introduced; moreover, the variation of specific heat with temperature introduces another factor.

We now proceed to discuss molecular heats of compounds, that is, the product of the molecular weight into the specific heat. The earliest generalization in this direction is associated with F. E. Neumann, who, in 183 1, deduced from observations on many carbonates (calcium,

magnesium, ferrous, zinc, barium and lead) that stoichiometric quantities (equimolecular weights) of compounds possess the same heat capacity. This is spoken of as ” Neumann’s law.” Regnault confirmed Neumann’s obser- vations, and showed that the molecular heat depended on the number of atoms present, equiatomic compounds having the same molecular heat. Kopp systematized the earlier observations,

and, having made many others, he was able to show that the molecular heat was an additive property, i.e. each element retains the same heat capacity when in combination as in the free state. This has received confirmation by the researches of W. A. Tilden (Phil. Trans., 1904, 203 a, p. 139) for those elements whose atomic heats vary considerably with temperature.

The specific heat of a compound may, in general, be calculated from the specific heats of its constituent elements. Conversely, if the specific heats of a compound and its constituent elements, except one, be known, then the unknown atomic heat is readily deducible. Similarly, by taking the difference of the molecular heats of compounds differing by one constituent, the molecular (or atomic) heat of this constituent is directly obtained. By this method it is shown that water, when present as ” water of crystallization,” behaves as if it were ice.

Deductions from Dulong and Petit’s Law. — Denoting the atomic weight by W and the specific heat by s, Dulong and Petit’s law states that 6-4 = Ws. Thus if s be known, an approxi- mate value of W is determinate. In the determination of the atomic weight of an element two factors must be considered: (1) its equivalent weight, i.e. the amount which is equivalent to one part of hydrogen; and (2) a factor which denotes the number of atoms of hydrogen which combines with or is equivalent to one atom of the particular element. This factor is termed the valency. The equivalent weight is capable of fairly ready determination, but the settlement of the second factor is some- what more complex, and in this direction the law of atomic heats is of service. To take an example: 38 parts of indium combine with 35-4 parts of chlorine; hence, if the formula of the chloride be InCl, InCl 2 or InCl 3 , indium has the atomic weights 38, 76 or 114. The specific heat of indium is 0-057; and the atomic heats corresponding to the atomic weights 38, 76 and 114 are 3-2, 4-3, 6-5. Dulong and Petit’s

law thus points to the value 114, which is also supported by the position occupied by this element in the periodic classification. C. Winkler decided the atomic weight of germanium by similar reasoning.

Boiling-Point and Composition. — From the relation between

the critical constants P* Vi/T* = ˆR or T*/P* = 3-7V t /R, and

since V* is proportional to the volume at absolute zero, the ratio Tjt/ Pj; should exhibit additive relations. This ratio, termed by Guye the critical coefficient, has the following approximate values: —

c. h. ci. 0. = 0. n. n = . p. £g2£,£K.

i – 35 0- 57 2-66 °'&7 1-27 i-6 i-86 3-01 o-88 1-03 Since at the boiling-point under atmospheric pressure liquids are in corresponding states, the additive nature of the critical coefficient should also be presented by boiling-points. It may be shown theoretically that the absolute boiling-point is pro- portional to the molecular volume, and, since this property is additive, the boiling-point should also be additive.

These relations have been more thoroughly tested in the case of organic compounds, and the results obtained agree in some measure with the deductions from molecular volumes. In general, isomers boil at about the same temperature, as is shown by the isomeric esters C9H18O2: —

Amyl butyrate Heptyl acetate Octyl formate

184-8°

i9i-3° 198-1°

Methyl octoate . . 192-9′

Ethyl heptoafe . . 187-1′

Propyl hexoate . . 185-5′

Butyl pentoate . . 185-8′

Equal increments in the molecule are associated with an equal rise in the boiling-point, but this increment varies in different homologous series. Thus in the normal fatty alcohols, acids, esters, nitriles and ketones, the increment per CH2 is 19 — 21°; in the alde- hydes it is 26°— 27°. In the aromatic compounds there is no regu- larity between

the increments due to the introduction of methyl groups into the benzene nucleus or side chains; the normal value of 20° — 21° is exhibited, however, by pyridine and its derivatives. The substitution of a hydrogen atom by the hydroxyl group generally occasions a rise in boiling-point at about 100°. The same increase accompanies the introduction of the amino group into aromatic nuclei.

While certain additive relations hold between some homologous series, yet differences occur which must be referred to the constitution of the molecule. As a general rule, compounds formed with a great evolution of heat have high boiling-points, and vice versa. The introduction of negative groups into a molecule alters the boiling-point according to the number of negative groups already present. This is shown in the case of the chloracetic acids :

Constitu- tive Influences.

[PHYSICAL

CH 3 C02H = n8° ClCH 2 -C0 2 H = i85°

Diff. 67°

Cl 2 CH-C0 2 H = i95°

10°

Cl 3 C-C0 2 H = i95 o -200° 3 According to van ‘t Hoff the substitution of chlorine atoms into a methyl group occasions the following increments : — CI in CH 3 66°

CI „ CH 2 C1 39°

CI „CHC1 2 13°.

The introduction of chlorine, however, may involve a fall in the boiling-point, as is recorded by Henry in the case of the chlorinated acetonitriles : —

NC-CH 3 . NC-CHjCl. NC-CHC1,. NC-CC1 3 .

81° 123° 112 83°

42° -n° -29°

The replacement of one negative group by another is accompanied by a change in the boiling-point, which is independent of the compound

in which the substitution is effected, and solely conditioned by the nature of the replaced and replacing groups. Thus bromine and iodine replace chlorine with increments of about 22° and 50° respectively.

A factor of considerable importance in determining boiling-points of isomers is the symmetry of the molecule. Referring to the esters C 9 Hi 8 C>2 previously mentioned, it is seen that the highest boiling- points belong to methyl octoate and octyl formate, the least sym- metrical, while the minimum belongs to amyl butyrate, the most symmetrical. The isomeric pentanes also exhibit a similar rela- tionCH 3 (CH2)4CH 3 =38°,(CH 5)2CHC2H 5 = 3o ,(CH3)4C=9-5 .Fora similar reason secondary alcohols boil at a lower temperature than the corresponding primary, the difference being about 19°. A. E. Earp (Phil. Mag., 1893 [5], 35, p. 458) has shown that, while an increase in molecular weight is generally associated with a rise in the boiling-point, yet the symmetry of the resulting molecule may exert such a lowering effect that the final result is a diminution in the boiling-point. The series H 2 S = 6l°, CH s SH=2i°, (CH 3) 2 S=4i° is an example; in the first case, the molecular weight is in creased and the symmetry diminished, the increase of boiling-point being 82°; in the second case the molecular weight is again increased but the molecule assumes a more symmetrical configuration, hence the comparatively slight increase of 20°. A similar depression is presented by methyl alcohol (67°) and methyl ether (—23°).

Among the aromatic di-substitution derivatives the ortho com- pounds have the highest boiling-point, and the meta boil at a higher, or about the same temperature as the para compounds. Of the tri-derivatives the symmetrical compounds boil at the lowest temperature, the asymmetric next, and the vicinal at the highest.

An ethylenic or double carbon union in the aliphatic hydrocarbons has, apparently, the same effect on the boiling-point as two hydrogen atoms, since the compounds C„H 2n+ 2 and C„H 2f . boil at about the same temperature. An acetylenic or triple linkage is associated with a rise in the boiling-point ; for example, propargyl compounds boil about 19-5° higher than the corresponding propyl compound.

Certain regularities attend the corresponding property of the melting-point. A rule applicable to organic compounds, due to Adolf v. Baeyer and supported by F. S. Kipping (Jour. Chem. Soc., J893, 63, p. 465) states, that the melting-point of any odd member of a homologous series is lower than the melting-point of the even member containing one carbon atom less. This is true of the fatty acid series, and the corresponding ketones and alcohols, and also of the succinic acid

series. Other regularities exist, but generally with many exceptions. It is to be noted that although the correlation of melting-point with constitution has not been developed to such an extent as the chemical significance of other physical properties, the melting-point is the most valuable test of the purity of a sub- stance, a circumstance due in considerable measure to the fact that impurities always tend to lower the melting-point.

Heal of Combustion and Constitution. — In the article Thermo-chemistry a general account of heats of formation of chemical compounds is given, and it is there shown that this constant measures the stability of the compound. In organic chemistry it is more customary to deal with the ” heat of combustion,” i.e. the heat evolved when an organic compound is completely burned in oxygen; the heat of formation is deduced from the fact that it is equal to the heats of formation of the products of combustion less the observed heat of combustion. The researches of Julius Thomsen and others have shown that in many cases definite conclusions regarding constitution can be drawn from quantitative measurements of the heats of combustion; and in this article a summary of the chief results will be given.

The identity of the four valencies of the carbon atom follows from the fact that the heats of combustion of methane, ethane, propane, trimethyl methane, and tetramethyl methane, have a constant difference in the order given, viz. i58-6calories ; this means

that the replacement of a hydrogen atom by a methyl group is attended by a constant increase in the heat of combustion. The same difference attends the introduction of the methyl group into many classes of compounds, for example, the paraffins, olefines, acetylenes, aromatic hydrocarbons, alcohols, aldehydes, ketones and esters, while a slightly lower value (157-1) is found in the case of the halogen compounds, nitriles, amines, acids, ethers, sulphides and nitro compounds. It therefore appears that the difference be- tween the heats of combustion of two adjacent members of a series of homologous compounds is practically a constant, and that this constant has two average values, viz. 158-6 and 157-1.

An important connexion between heats of combustion and constitution is found in the investigation of the effect of single, double and triple carbon linkages on the thermochemical constants. If twelve grammes of amorphous carbon be burnt to carbon dioxide under constant volume, the heatevolved (96-96 cal.) does not measure the entire thermal effect, but the difference between this and the heat required to break down the carbon molecule into atoms. If the number of atoms in the carbon molecule be denoted by n, and the heat required to split off each atom from the molecule by d, then the total heat required to break down a carbon molecule completely into atoms is nd. It follows that the true heat of com- bustion of carbon, i.e. the heat of combustion of one gramme-atom, is 96-96 +d. The value of d can be evaluated by considering the combustion of amorphous carbon to carbon monoxide and carbon dioxide. In the first case the thermal effect of 58-58 calories actually observed must be increased by 2d to allow for the heat absorbed in splitting off two gramme-atoms of carbon; in the second case the thermal effect of 96-96 must be increased by d as above. Now in both cases one gramme-molecule of oxygen is decomposed, and the two oxygen atoms thus formed are combined with two carbon valencies. It follows that the thermal effects stated above must be equal, i.e. 58-58 +2d = 96-96 + <2, and therefore^ = 38-38. Theabsolute heat of combustion of a carbon atom is therefore 135-34 calories, and this is independent of the form of the carbon burned.

Consider now the combustion of a hydrocarbon of the general formula C„H 2m . We assume that each carbon atom and each hydrogen atom contributes equally to the thermal effect. If a be the heat evolved by each carbon atom, and £ that by each hydrogen atom, the thermal effect may be expressed as H=«a+2w/3-A, where A is the heat required to break the molecule into its constituent atoms. If the hydrocarbon be saturated, i.e. only contain single carbon linkages, then the number of such linkages is 2n-m, and if the thermal effect of such a linkage be X, then the term Aisobviously equal to (2«-m)X. The value of H then becomes H=na+2m(i- (2n-m)X or n^--m-q, where £ and 17 are constants. Let double bonds be present, in number p, and let the energy due to such a bond be Y. Then the number of single bonds is 2n-m-2p, and the heat of combustion becomes Hi — n^+mrj +p(2X-Y). If triple bonds, q in number, occur also, and the energy of such a bond be Z, the equation for H becomes

H =ni+m> +p(2 X-Y) +2C3X-Z).

This is the general equation for calculating the heat of combustion of a hydrocarbon. It contains four independent constants; two of these may

be calculated from the heats of combustion of saturated hydrocarbons, and the other two from the combustion of hydrocarbons containing double and triple linkages. By experiment it is found that the thermal effect of a double bond is much less than the effect of two single bonds, while a triple bond has a much smaller effect than three single bonds. J. Thomsen deduces the actual values of X, Y, Z to be 14-71, 13-27 and zero; the last value he considers to be in agreement with the labile equilibrium of acetylenic compounds. One of the most important applications of these values is found in the case of the constitution of benzene, where Thomsen decides in favour of the Claus formula, involving nine single carbon linkages, and rejects the Kekule formula, which has three single and three double bonds (see section IV.).

The thermal effects of the common organic substituents have also been investigated. The thermal effect of the ” alcohol ” group C-OH may be determined by finding the heat of formation of the alcohol and subtracting the thermal effects of the remaining linkages in the molecule. The average value for primary alcohols is 44 67 cal., but many large differences from this value obtain in certain cases. The thermal effects increase as one passes from primary to tertiary alcohols, the values deduced from propyl and isopropyl alcohols and trimethyl carbinol being: — primary =45-08, secondary = 50-39, tertiary =60-98. The thermal effect of the aldehyde group has the average value 64-88 calories, i.e. considerably greater than the alcohol group. The ketone group corresponds to a thermal effect of 53-52 calories. It is remarkable that the difference in the heats of forma- tion of ketones and the paraffin containing one carbon atom less is 67-94 calories, which is the heat of formation of carbon monoxide at constant volume. It follows therefore that two hydrocarbon radicals are bound to the carbon monoxide residue with the same strength as they combine to form a paraffin. The average value for the carboxyl group is 119-75 calories, i.e. it is equal to the sum of the thermal effects of the aldehyde and carbonyl groups.

The thermal effects of the halogens are: chlorine = !5-l3 calories, bromine = 7-68; iodine = -4-25 calories. It >s remarkable that the

position of the halogen in the molecule has no effect on the heat of formation ; for example, chlorpropylene and allylchloride, and also ethylene dichloride and ethylidene dichloride, have equal heats of formation. The thermal effect of the ether group has an average value of 34-31 calories. This value does not hold in the case of

methylene oxide if we assign to it the formula H 2 C-0-CH 2 , but if the formula HaC-0-CH2 (which assumes the presence of two free valencies) be accepted, the calculated and observed heats of formation are in agreement.

The combination of nitrogen with carbon may result in the formation of nitriles, cyanides, or primary, secondary or tertiary amines. Thomsen deduced that a single bond between a carbon and a nitrogen gramme-atom corresponds to a thermal effect of 2-77 calories, a double bond to 5-44, and a treble bond to 8-31. From this he infers that cyanogen is C:N-N:C and not N;C-C;N, that hydrocyanic acid is HC-N, and acetonitrile CH 3 -C \ N. In the case of the amines he decides in favour of the formulae

H 2 C:NH 3 hIcˆ NH2 H 2 8 Cˆ NH-CH3

(primary, secondary, tertiary.

These involve pentavalent nitrogen. These formulae, however, only apply to aliphatic amines ; the results obtained in the aromatic series are in accordance with the usual formulae.

Optical Relations.

Refraction and Composition. — Reference should be made to the article Refraction for the general discussion of the pheno- menon known as the refraction of light. It is there shown that every substance, transparent to light, has a definite refractive index, which is the ratio of the velocity of light in vacuo to its velocity in the medium to which the refractive index refers. The refractive index of any substance varies with (1) the wave- length of the light; (2) with temperature; and (3) with the state of aggregation. The first cause of variation may be at present ignored; its significance will become apparent when we consider dispersion (vide infra). The second and third causes, however, are of greater importance, since they are associated with the molecular condition of the substance; hence, it is obvious that it is only from some function of the refractive index which is independent of temperature variations and changes of state (i.e. it must remain constant for the same substance at any temperature and in any form) that quantitative relations between refractivity and chemical composition can be derived.

The pioneer work in this field, now frequently denominated ” spectro-chemistry,” was done by Sir Isaac Newton, who, from theoretical considerations based on his corpuscular theory of light, determined

‘the function (w 4 — 1), where n is the refractive index, to be the expression for the refractive power; dividing this expression by the density (d), he obtained (« 2 — i)/rf, which he named the ” absolute refractive power.” To P. S. Laplace is due the theoretical proof that this function is independent of temperature and pressure, and apparent experimental confirma- tion was provided by Biot and Arago’s, and by Dulong’s observa- tions on gases and vapours. The theoretical basis upon which this formula was devised (the corpuscular theory) was shattered early in the 19th century, and in its place there arose the modern wave theory which theoretically invalidates Newton’s formula. The question of the dependence of refractive index on tempera- ture was investigated in 1858 by J. H. Gladstone and the Rev. T. P. Dale; the more simple formula (n-i)/d, which remained constant for gases and vapours, but exhibited slight discrepancies when liquids were examined over a wide range of temperature, being adopted. The subject was next taken up by Hans Landolt, who, from an immense number of observations, supported in a general way the formula of Gladstone and Dale. He introduced the idea of comparing the refractivity of equimolecular quantities of different substances by multiplying the function (n—i)ld by the molecular weight (M) of the substance, and investigated the relations of chemical grouping to refractivity. Although establishing certain general relations between atomic and molecular refractions, the results were somewhat vitiated by the inadequacy of the empirical function which he employed, since it was by no means a constant which depended only on the actual composition of the substance and was independent of its physical condition. A more accurate expression (n 2 —i)l(n 2 +2)d was

suggested in 1880 independently and almost simultaneously by L. V. Lorenz of Copenhagen and H. A. Lorentz of Leiden, from considerations based on the Clausius-Mossotti theory of dielectrics.

Assuming that the molecules are spherical, R. J. E. Clausius and O. F. Mossotti found a relation between the dielectric constant and the space actually occupied by the molecules, viz. K = (l+2o)/(l— o), or a = (K — l)/(K+2.), where K is the dielectric constant and a the fraction of the total volume actually occupied by matter. According to the electromagnetic theory of light K = N 2 , where N is the refractive

index for rays of infinite wave-length. Making this substitution, and dividing by d, the density of the substance, we obtain a/d = (N 2 — i)/(N 2 +2)a. Since a/d is the real specific volume of the molecule, it is therefore a constant; hence (N 2 — i)/(N 2 +2)

It is found experimentally that the Lorenz and Lorentz function holds fairly well, and better than the Gladstone and Dale formula. This is shown by the following observations of Riihl- mann on water, the light used being the D line of the spectrum: —

t.

(n-i)ld.

(» 2 ~i)/(n'+2)

10

20

90

IOO

0-3338 0-3338

o-3336

0-3321 0-3323

0-2061 0-2061 0-2061 0-2059

0-206 1

Eykmann's observations also support the approximate constancy of the Lorenz-Lorentz formula over wide temperature differences, but in some cases the deviation exceeds the errors of observation. The values are for the Ha line: —

Substance.

Temp.

(ra 2 -l)/(» 2 +2)d.

Isosafrol, O0H10O2

Diphenyl ethylene, C14H12

\ l T 6 \

1 141-1

\ 22°

? 143-4° \ 16-2°

? 141

0-2925 0-2962

0-3339 0-3382 0-3187 0-3225

The empirical formula (»*— i)/(» 2 +o-4)d apparently gives more constant values with change of temperature than the Lorenz- Lorentz form. The superiority of the Lorenz-Lorentz formula over the Gladstone and Dale formula for changes of state is shown by the following observations of Briihl (Zeit.f. phys. Chem., 1891, 71, p. 4). The values are for the D line:^-

either directly, by investigating the various elements, or indirectly, by considering differences in the molecular refractions of related compounds. The first method needs no explanation. The second method proceeds on the same lines as adopted for atomic volumes. By subtracting the value for CH 2 , which may be derived from two substances belonging to the same homologous series, from the molecular refraction of methane, CHi, the value of hydrogen is obtained ; subtracting this from CH 2 , the value of carbon is determined. Hjidroxylic oxygen is obtained by subtracting the molecular refractions of acetic acid and acetaldehyde. Similarly, by this method of differences, the atomic refraction of any element may be determined. It is found, however, that the same element has not always the same atomic refraction, the difference being due to the nature of the elements which saturate its valencies. Thus oxygen varies according as whether it is linked to hydrogen (hydroxylic oxygen), to two atoms of carbon (ether oxygen), or to one carbon atom (carbonyl oxygen) ; similarly, carbon varies according as whether it is singly, doubly, or trebly bound to carbon atoms.

A table of the atomic refractions and dispersions of the principal elements is here given : —

Element.

H„.

D.

H 7 .

Dispersion Ht-H,.

Hydrogen …. Oxygen, hydroxyl .

,, ether .

,, Carbonyl .

Chlorine

Bromine

Iodine

Carbon (singly bound) Double linkage of carbon Triple ,, ,, Nitrogen, singly bound and only to carbon .

1 -103 1-506

1-655 2-328 6-014 8-863 13-808

2-365 1-836

2-22 2-76

1-051 1-521 1-683 2-287 5-998 8-927 14-12 2-501 1-707

I-I39

1-525 1-667 2-414 6-190 9-211 14-582 2-404 1-859 2-41

2-95

0036 0-019

0-012 0-086

0-I76

0-348

0-774 0-039 0-23 0-19

0-19

Substance.

Temp.

Gladstone and Dale.

Lorenz and Lorentz.

Vapour.

Liquid.

Vapour.

Liquid.

Water

Carbon disulphide Chloroform ….

10° IO° IO°

0-3101

0-4347 0-2694

0-3338 0-4977 0-3000

0-2068 0-2898 01 796

0-2061 0-2805 0-1790

Landolt and Gladstone, and at a later date J. W. Briihl, have investigated the relations existing between the refractive power and composition. To Landolt is due the proof that, in general, isomers, i.e.. compounds having the same composition, have equal molecular refractions, and that equal differences in composition are associated with equal differences in refractive power. This is shown in the following table (the values are for H a) : —

Additive relations.

Substance.

Mol. Refract.

Substance.

Mol. Refract.

Diff. for CH 2 .

Ethylene chloride { r vt r\ Ethylidene chloride S L -« H41 – 12 Fumaric acid j r nn Maleicacid \ L ‘ H <°* • • o-Cresol) m-Cresol > CyHgO p-Cresol)

J 20-96

1 21-08

70-89

} 70-29

(32-52

i 32-56

(32-57

Acetic acid Propionic acid Butyric acid .

Acetaldehyde . Propionaldehyde . Butylaldehyde

12-93 17-42

22-01

11-50

15-93 20-52

\4-49 |4-59

} 4-43 i4-59

Additive relations undoubtedly exist, but many discrepancies occur which may be assigned, as in the case of molecular volumes, to differences in constitution. Atomic refractions may be obtained

Dispersion and Composition.- — In the preceding section we have seen that substances possess a definite molecular (or atomic) refraction for light of particular wave-length; the difference between the refractions for any two rays is known as the molecular (or atomic)

dispersion. Since molecular refractions are independent of temperature and of the state of aggregation, it follows that molecular dispersions must be also independent of these conditions; and hence quantitative measurements should give an indication as to the chemical composition of substances. This subject has been principally investigated by Briihl; he found that molecular dispersions of liquids and gases were independent of temperature, and fairly independent of the state of aggregation, but that no simple connexion exists between atomic refractions and dispersions (see preceding table). He also showed how changes in constitution effected dispersions to a far greater extent than they did refractions; thus, while the atomic dispersion of carbon is 0-039, the dispersions due to a double and treble linkage is 0-23 and 0-19 respectively.

Colour and Constitution.— In this article a summary of the theories which have been promoted in order to connect the colour of organic compounds with their constitution will be given, and the reader is referred to the article Colour for the physical explanation of this property, and to Vision for the physiological and psychological bearings. A clear distinction must be drawn between colour and the property of dyeing; all coloured substances are not dyes, and it is shown in the article Dyeing that the property of entering into chemical or physical combination with fibres involves properties other than those essential to colour. At the same time, however, all dyestuffs are coloured substances.

A survey of coloured substances led O. N. Witt in 1876 toformulate his ” chromophore-auxochrome ” theory. On this theory colour is regarded as due to the presence of a ” chromophore,” and dyeing power to an ” auxochrome ” ; the latter by itself cannot produce colour or dyeing power, but it is only active jn the presence of a chromophore, when it intensifies the colour and confers the property of dyeing. The principal chromophores are the azo,

— N=N — , azoxy, = N 2 0, nitro, — N0 2 , nitroso,

— NO, and carbonyl, = CO, groups. Theazo-group is particularly active, both the aliphatic and aromatic compounds being coloured. The simplest aliphatic compounds, such as diazo-methane, diazo-ethane, and azo- formic acid, are yellow; the diamide of the latter acid is orange-red. Of the

aromatic compounds azo-benzene is bright orange-red, and a-azo-naphthalene forms red needles or small steel-blue prisms. The azo-group, however, has little or no colouring effect when present in a

ring system, such as in cinnolene, phthalazine and tolazone. The nitro group has a very important action mainly on account of the readiness with which it can be introduced into the molecule, but its effect is much less than that of the azo group. The colour produced is generally yellow, which, in accordance with a general rule, is intensified with an increase in the number of groups; compare, for example, mono-, di- and tri-nitrobenzene. The nitroso group is less important. The colour produced is generally of a greenish shade; for example, nitrosobenzene is green when fused or in solution (when crystalline, it is colourless), and dinitrosoresorcin has been employed as a dyestuff under the names ” solid green ” and ” chlorine.” The carbonyl group by itself does not produce colour, but when two adjacent groups occur in the molecule, as for example in the a-diketones (such as di-acetyl and benzil), a yellow colour is produced. It also acts as a chromogenic centre when double bonds or ethylenic linkages are present, as in fluorene ketone or fluorenone. A more complex chromophoric group is the triple ethylenic

grouping Z p ˆ> C = , the introduction of which was rendered necessary by the discovery of certain coloured hydrocarbons. As a general rule, hydrocarbons are colourless ; the exceptions include the golden yellow acenaphthylene, the red bidiphenylene-ethylene, and the

derivatives of f ulvene a„ | p„ ˆ> CH 2 , which have been discussed by

J. Thiele (Ber., 1900, 33, p. 666). This grouping is not always colour-producing, since diphenyl is colourless.

The most important auxochromes are the hydroxyl (-OH) and amino (NH2) groups. According to the modern theory of auxo chromic action, the introduction of a group into the molecule is accompanied by some strain, and the alteration in colour produced is connected with the magnitude of the strain. The amino group is more powerful than the hydroxyl, and the substituted amino group more powerful still; the repeated substitution of hydroxyl groups sometimes causes an intensification and sometimes a diminution of colour.

We may here notice an empirical rule formulated by Nietzski in 1879 : — the simplest colouring substances are in the greenish-yellow and yellow, and with increasing molecular weight the colour passes into

orange, red, violet, blue and green. This rule, however, is by no means perfect. Examination of the absorption spectra of coloured compounds shows that certain groupings displace the absorption bands in one direction, and other groupings in the other. If the bands be displaced towards the violet, involving a regression through the colours mentioned above, the group is said to be ” hypso- chromic”; if the reverse occurs the group is ” bathochromic.” It may be generally inferred that an increase in molecular weight is accompanied by a change in colour in the direction of the violet.

Auxochromic groups generally aid one another, i.e. the tint deepens as the number of auxochromes increases. Also the relative position of the auxochrome to the chromophore influences colour, the ortho-position being generally the most powerful. Kauffmann (Ber., 1906, 39, p. 1959) attempted an evaluation of the effects of auxochromic groups by means of the magnetic optical constants. The method is based on the supposition that the magnetic rotation measures the strain produced in the molecule by an auxochrome, and he arranges the groups in the following order : — •0-COCH 3 -OCH s -NHCOCHs -NH 2 -N(CH 3) 2 -N(C 2 H 6) 2 -0-260 1-459 I- 949 3-321 8-587 8-816

The phenomena attending the salt formation of coloured and colouring substances are important. The chromophoric groups are rarely strongly acid or basic ; on the other hand, the auxochromes are strongly acid or basic and form salts very readily. Notable differences attend the neutralization of the chromophoric and auxo- chromic groups. With basic substances, the chromophoric combinar tion with a colourless acid is generally attended by a deepening in colour; auxochromic combination, on the other hand, with a lessen- ing. Examples of the first case are found among the colourless acridines and quinoxalines which give coloured salts ; of the second case we may notice the colourless hydrochloride and sulphate of the deep yellow o-aminobenzophenone. With acid substances, the com- bination with ” colourless ” metals, i.e. metals producing colour- less salts with acids, is attended by colour changes contrary to those given above, auxochromic combination being accompanied by a deepening, and chromophoric by a lessening of the tint.

Mention may be made of the phenomenon of halochromism, the name given to the power of colourless or faintly-coloured substances of combining with acids to form highly-coloured substances without the necessary production of a chromophoric group. The researches of Adolf von Baeyer and Villiger, Kehrmann, Kauffmann and others, show that this property is possessed by very many and varied substances. In many cases it may be connected with basic oxygen, and

the salt formation is assumed to involve the passage of divalent into tetravalent oxygen. It seems that intermolecular change also occurs, but further research is necessary before a sound theory can be stated.

Quinone Theory of Colour.— A theory of colour in opposition to the Witt theory was proposed by Henry Armstrong in 1888 and 1892. This assumed that all coloured substances were derivatives of ortho- or para-quinone (see Quinones), and although at the time of its

promotion little practical proof was given, yet the theory found wide acceptance on account of the researches of many other chemists. It follows on this theory that all coloured substances contain either of the groupings

the former being a para-quinonoid, the latter an ortho-quinonoid. While very many coloured substances must obviously contain this grouping, yet in many cases it is necessary to assume a simple intermolecular change, while in others a more complex rearrangement of bonds is necessary. Quinone, which is light yellow in colour, is the simplest coloured substance on this theory. Hydrocarbons of similar structure have been prepared by Thiele, for example, the orange-yellow tetraphenyl-ˆara-xylylene, which is obtained by boiling the bromide CeH-itCBKCeHsJak with benzene and molecular silver. The quinonoid structure of many coloured compounds has been proved experimentally, as, for example, by Hewitt for the benzene-azo-phenols, and Hantzsch for triaminotriphenyl methane and acridine derivatives; but, at the same time, many substances cannot be so explained. A notable example is provided by the phthaleins, which result by the condensation of phthalic anhydride with phenols. In the free state these substances are colourless, and were assumed to have the formula shown in 1. Solution in dilute alkali was supposed to be accompanied by the rupture of the lactone ring with the formation of the quinonoid salt shown in 2,

“°a c H<

C B H 4 < >0 6 CO

(1)

•C H,v COONa

Baeyer (Ber., 1905, 38, p. 569) and Silberrad (J own. Chem. Soc, 1906, 89, p. 1787) have disputed the correctness of this explanation, and the latter has prepared melliteins and pyromelliteins, which are highly-coloured compounds produced from mellitic and pyromellitic

acids, and which cannot be, formulated as quinones. Baeyer has suggested that the nine carbon atom system of xanthone may act as a chromophore. An alternative view, due to Green, is that the oxygen atom of the xanthone ring is tetravalent, a supposition which permits the formulation of these substances as ortho-quinonoids.

The theories of colour have also been investigated by Hantzsch, who first considered the nitro-phenols. On the chromophore- auxochrome theory (the nitro group being the chromophore, and the hydroxyl the auxochrome) it is necessary in order to explain the high colour of the metallic salts and the colourless alkyl and aryl derivatives to assume that the auxochromic action of the hydroxyl group is only brought strongly into evidence by salt formation. Armstrong, on the other hand, assumed an intermolecular change, thus; — –

/\OH

\>°« \/-

The proof of this was left for Hantzsch, who traced a connexion with the nitrolic acids of V. Meyer, which are formed when nitrous acid acts on primary aliphatic nitro compounds. Meyer formulated these compounds as nitroximes or nitro-isnitroso derivatives, viz. R-C(N0 2) (NOH). Hantzsch explains the transformation of the colourless acid into red salts, which on standing yield more stable, colourless salts, by the following scheme : —

—>

r

i =

= N0 2 Na.

NOH

RC< ˆNO !

— »

Oˆ \ONa

->

r rˆN0 2 Na K ‘ c ˆNO

Colourless, stable. Coloured, labile. Colourless, stable. He has also shown that the nitrophenols yield, in addition to the colourless true nitrophenol ethers, an isomeric series of coloured un- stable quinonoid a«-ethers, which have practically the same colour and yield the same absorption spectra as the coloured metallic salts. He suggests that the term ” quinone ” theory be abandoned, and replaced by the Umlagerungs theory, since this term implies some intermolecular rearrangement, and does not connote simply benzenoid compounds as does ” quinonoid.” H. von Liebig (Ann., 1908, 360, p. 128), from a very complete discussion of triphenyl-

methane derivatives, concluded that the grouping A -A A was tne only true organic chromophore, colour production, however, re quiring another condition, usually the closing of a ring.

The views as to the question of colour and constitution may be summarized as follows :— (1) The quinone theory (Armstrong, Gomberg, R. Meyer) regards all coloured substances as having a quinonoid structure. (2) The chromophore-auxochrome theory (Kauffmann) regards colour as due to the entry of an ” auxochrome ” into a ” chromophoric ” molecule. (3) If a colourless compound gives a coloured one on solution or b’

salt-formation, the production of colour may be explained as a particular form of ionization (Baeyer), or by a molecular re-arrangement (Hantzsch). A dynamical theory due to E. C. C. Baly regards colour as due to ” isorropesis ” or an oscillation between the residual affinities of adjacent atoms composing the molecule.

Fluorescence and Constitution. — The physical investigation of the phenomenon named fluorescence — the property of transforming incident light into light of different refrangibility — is treated in the article Fluorescence. Researches in syntheti- cal organic chemistry have shown that this ‘ property of fluorescence is common to an immense number of substances, and theories have been proposed whose purpose is to connect the property with constitution.

In 1897 Richard Meyer {Zeit. physik. Chemie, 24, p. 468)ˆ submitted the view that fluorescence was due to the presence of certain ” fluoro-phore ” groups; such groupings are the pyrone ring and its con-geners, the central rings in anthracene and acridine derivatives, and the paradiazine ring in safranines. A novel theory, proposed by J. T. Hewitt in 1900 (Zeit.f. physik. Chemie, 34, p. I ; B.A. Report, 1903, p.

628, and later papers in the Journ. Chem. Soc.), regards the property as occasioned by internal vibrations within the molecule conditioned by a symmetrical double tautomerism, _ light of one wave-length being absorbed by one form, and emitted with a different wave-length by the other. This oscillation may be represented in the case of acridine and fluorescein as

coo = ocfo = c6o ,w = tQ > tr)r

N N N CH-600H CsH «“C‘0 > C e H-COOH

This theory brings the property of fluorescence into relation with that of colour; the forms which cause fluorescence being the coloured modifications: ortho-quinonoid in the case of acridine, para-quinonoid in the case of fluorescein. H. Kauffmann (Ber., 1900, 33, p. 1731 ; 1904, 35, p. 294; 1905, 38, p. 789; Ann., 1906, 344, p. 30) suggested that the property is due to the presence of at least two groups. The first group, named the ” luminophore,” is such that when excited by suitable aetherial vibrations emits radiant energy; the other, named the ” fluorogen,” acts with the luminophore_ in some way or other to cause the fluorescence. This theory explains the fluorescence of anthranilic acid (c-amir.obenzoic acid), by regard- ing the aniline residue as the luminophore, and the carboxyl group as the fluorogen, since, apparently, the introduction of the Tatter into the non-fluorescent aniline molecule involves the production of a fluorescent substance. Although the theories of Meyer and Hewitt do not explain (in their present form) the behaviour of anthranilic acid, yet Hewitt has shown that his theory goes far to explain the fluorescence of substances in which a double symmetrical tautomerism is possible. This tautomerism may be of a twofold nature: — (1) it may involve the mere oscillation of linkages, as in acridine; or (2) it may involve the oscillation of atoms, as in fluor- escein. A theory of a physical nature, based primarily upon Sir J. J. Thomson’s theory of corpuscles, has been proposed by J. de Kowalski (Compt. rend. 1907, 144, p. 266). We may notice that ethyl oxalosuccinonitrile is the first case of a fluorescent aliphatic compound (see W. Wislicenus and P. Berg, Ber., 1908, 41, p. 3757)- Capillarity and Surface Tension. — Reference should be made to the article Capillary Action for the general discussion of this phenomenon of liquids. It is there shown that the surface tension of a liquid may be calculated from its rise in a capillary tube by the formula 7 = \rhs, where 7 is the surface tension per square centimetre, r the radius of the tube, h the height of the liquid column, and 5 the difference between the densities of the liquid and its vapour. At the critical point liquid and vapour become identical, and, consequently, as was pointed out by Frankenheim in

1841, the surface tension is zero at the critical temperature.

Mendeleeff endeavoured to obtain a connexion between surface energy and constitution; more successful were the investigations of Schiff, who found that the ” molecular surface tension,” which he defined as the surface tension divided by the molecular weight, is constant for isomers, and that two atoms of hydrogen were equal to one of carbon, three to one of oxygen, and seven to one of chlorine; but these ratios were by no means constant, and afforded practically no criteria as to the •molecular weight of any substance.

In 1886 R. Eotvos (Wied. Ann. 27, p. 452), assuming that two liquids may be compared when the ratios of the volumes of the liquids to the volumes of the saturated vapours are the same, deduced that yV °(where 7 is the surface tension, and V the molecular volume of the liquid) causes all liquids to have the same temperature

CHEMISTRY

[PHYSICAL

Relation to molecti’ tar weight,

coefficients. This theorem was investigated by Sir W. Ramsay and J. .Shields (Journ. Chem. Soc. 63, p. 1089; 65, p. 167), whose results have thrown considerable light on the subject of the molecular complexity of liquids. Ramsay and Shields suggested that there exists an equation for the surface energy of liquids, analogous to the volume-energy equation of gases, PV = RT. The relation they suspected to be of the form 7S = KT, where K is a constant analogous to R, and S the surface containing one gramme-molecule, 7 and T being the surface tension and temperature respectively. Obviously equimolecular surfaces are given by (Md)’, where M is the molecular weight of the substance, for equimolecular volumes are Mv, and corresponding surfaces the two-thirds power of this. Hence S may be replaced by (Mzj)*. Ramsay and Shields found from investiga- tions of the temperature coefficient of the surface energy that Tin the equation 7(Mz>) a =KT must be counted downwards from the critical temperature t less about 6°. Their surface energy equation therefore assumes the form 7(Mr)* = K(7-6°). Now the value of K, 7 being measured in dynes and M being the molecular weight of the substance as a gas, is in general 2-121 ; this value is never exceeded, but in many cases it is less. This diminution implies an association of molecules, the surface containing fewer molecules than it is supposed to. Suppose the coefficient of association be n, i.e. n is the mean

number of molecules which associate to form one molecule, then by the normal equation we have 7(M«») ;1 = 2-I2l(r — 6°) ; if the calculated constant be Ki, then we have also 7(M») 3 = Ki(t— 6°). By division we obtain » s = 2-i2i/Ki, or » = (2-l2i/Ki)5, the coefficient of association being thus determined.

The apparatus devised by Ramsay and Shields consisted of a capillary tube, on one end of which was blown a bulb provided with a minute hole. Attached to the bulb was a glass rod and then a tube containing iron wire. This.tube was placed in an outer tube contain- ing the liquid to be experimented with; the liquid is raised to its boiling-point, and then hermetically sealed. The whole is enclosed in a jacket connected with a boiler containing a liquid, the vapour of which serves to keep the inner tube at any desired temperature. The capillary tube can be raised or lowered at will by running a magnet outside the tube, and the heights of the columns are measured by a cathetometer or micrometer microscope.

Normal values of K were given by nitrogen peroxide, N2O4, sulphur chloride, S2O2, silicon tetrachloride, SiCU, phosphorus chloride, PCI3, phosphoryl chloride, POCl 3 , nickel carbonyl, Ni(CO) 4 , carbon disulphide, benzene, pyridine, ether, methyl propyl ketone ; associa- tion characterized many hydroxylic compounds: for ethyl alcohol the factor of association was 2 ■ 74-2-43, for n-propy 1 alcohol 2 • 86-2 • 72 , acetic acid 3-62—2-77, acetone 1-26, water 3-81—2-32; phenol, nitric acid, sulphuric acid, nitroethane, and propionitril, also exhibit association.

Crystalline Form and Composition.

The development of the theory of crystal structure, and the fundamental principles on which is based the classification of crystal forms, are treated in the article Crystallography; in the same place will be found an account of the doctrine of iso- morphism, polymorphism and morphotropy. Here we shall treat the latter subjects in more detail, viewed from the stand- point of the chemist. Isomorphism may be defined as the existence of two or more .different substances in the same crystal form and structure, polymorphism as the existence of the same substance in two or more crystal modifications, and morphotropy (after P. von Groth) as the change in crystal form due to altera- tions in the molecule of closely (chemically) related substances. In order to permit a comparison of crystal forms, from which we hope to gain an insight into the prevailing molecular con- ditions, it is necessary that some unit of crystal dimensions must be chosen. A crystal may be regarded as built up of primitive parallelepipeda, the

edges of which are in the ratio of the crystallographic axes, and the angles the axial angles of the crystals. To reduce these figures to a* common standard, so that the volumes shall contain equal numbers of molecules, the notion of molecular volumes is introduced, the arbitrary values of the crystallographic axes {a, b, c) being replaced by the topic parameters 1 (x, ˆ,

1 This was done simultaneously in 1894 by W. Muthmann and A. E. H. Tutton, the latter receiving the idea from F. Becke (see Journ. Chem. Soc, 1896, 69, p. 507; 1905, 87, p. 1183).

CHEMISTRY

PHYSICAL]

Polymorphism.— On the theory that crystal form and structure are the result of the equilibrium between the atoms and molecules composing the crystals, it is probable, a priori, that the same substance may possess different equilibrium configurations of sufficient stability, under favourable conditions, to form different crystal structures. Broadly this phenomenon is termed poly- morphism; however, it is necessary to examine closely the diverse crystal modifications in order to determine whether they are really of different symmetry, or whether twinning has occasioned the apparent difference. In the article Crystallography the nature and behaviour of twinned crystals receives full treat- ment; here it is sufficient to say that when the planes and axes of twinning are planes and axes of symmetry, a twin would exhibit higher symmetry (but remain in the same crystal system) than the primary crystal; and, also, if a crystal approximates in its axial constants to a higher system, mimetic twinning would increase the approximation, and the crystal would be pseudo-symmetric.

In general, polysymmetric and polymorphous modifications suffer transformation when submitted to variations in either temperature or pressure, or both. The criterion whether a pseudo-symmetric form is a true polymorph or not consists in the determination of the scalar properties (e.g. density, specific heat, &c.) of the original and the resulting modifica- tion, a change being in general recorded only when polymorphism exists. Change of temperature usually suffices to determine this, though in certain cases a variation in pressure is necessary; for instance, sodium magnesium uranyl acetate, $NaMg(U02)_3(C_2H_3O_2)_9 \cdot 9H_2O$ shows no change in density unless the observations are conducted under a considerable pressure. Although many pseudo-symmetric twins are transformable into the

simpler form, yet, in some cases, a true polymorph results, the change being indicated, as before, by alterations in scalar (as well as vector) properties.

For example, boracite forms pseudo-cubic crystals which become truly cubic at 265 °, with a distinct change in density; leucite behaves similarly at about 560 . Again, the pyroxenes, RSi0 3 (R = Fe, Mg, Mn, &c), assume the forms (1) monoclinic, sometimes twinned so as to become pseudo-rhombic; (2) rhombic, resulting from the pseudo-rhombic structure of (1) becoming ultramicroscopic ; and (3) triclinic, distinctly different from (1) and (2); (1) and (2) are polysymmetric modifications, while (3) and the pair (1) and (2) are polymorphs.

While polysymmetry is solely conditioned by the manner in which the mimetic twin is built up from the single crystals, there being no change in the scalar properties, and the vector properties being calculable from the nature of the twinning, in the case of polymorphism entirely different structures present themselves, both scalar and vector properties being altered; and, in the present state of our knowledge, it is impossible to foretell the characters of a polymorphous modification. We may conclude that in polymorphs the substance occurs in different phases (or molecular aggregations), and the equilibrium between these phases follows definite laws, being dependent upon tempera- ture and pressure, and amenable to thermodynamic treatment (cf. Chemical Action and Energetics). The transformation of polymorphs presents certain analogies to the solidification of a liquid. Liquids may be cooled below their freezing-point without solidification, the metastable (after W. Ostwald) form so obtained being immediately solidified on the introduction of a particle of the solid modification; and supersaturated solutions behave in a similar manner. At the same time there may be conditions of temperature and pressure at which poly- morphs may exist side by side.

The above may be illustrated by considering the equilibrium between rhombic and monoclinic sulphur. The former, which is deposited from solutions, is transformed into monoclinic sulphur at about 96°, but with great care it is possible to overheat it and even to fuse it (at 113-5°) without effecting the transformation. Monoclinic sulphur, obtained by crystallizing fused sulphur, melts at 119-5°, and admits of undercooling even to ordinary temperatures, but contact with a fragment of the rhombic modification spontane- ously brings about the transformation. From Reicher's determina- tions, the exact transition point is 95-6°; it rises with increasing oressure j,bo U t 0-05° for one atmosphere; the density of the rhombic

The overheating curve of

Fig. 6.

form is greater than that of the monoclinic. The equilibria of these modifications may be readily represented on a pressure-temperature diagram. If OT, OP (fig. 6) , be the axes of temperature and pressure, and A corresponds to the transition point (95-6°) of rhombic sulphur, we may follow out the line AB which shows the elevation of the transition point with increasing pressure. "" rhombic sulphur extends along the curve AC, where C is the melting-point of monoclinic sulphur. The line BC, repre- senting the equilibrium between mono- clinic and liquid sulphur, is thermo- dynamically calculable; the point B is found to correspond to 131 and 400 atmospheres. From B the curve of equilibrium (BD) between rhombic and liquid sulphur proceeds; and from C (along CE) the curve of equilibrium between liquid sulphur and sulphur vapour. Of especial interest is the curve BD; along this line liquid and rhombic sulphur are in equilibrium, which means that at above 131° and 400 atmospheres the rhombic (and not the monoclinic) variety would separate from liquid sulphur.

Mercuric iodide also exhibits dimorphism. When precipitated from solutions it forms red tetragonal crystals, which, on careful heating, give a yellow rhombic form, also obtained by crystallization from the fused substance, or by sublimation. The transition point is 126-3° (W. Schwarz, Zeit. f. Kryst. 25, p. 613), but both modifica- tions may exist in metastable forms at higher and lower temperatures respectively; the rhombic form may be cooled down to ordinary temperature without changing, the transformation, however, being readily induced by a trace of the red modification, or by friction. The density and specific heat of the tetragonal form are greater than those of the yellow. .

Hexachlorcthane is trimorphous, forming rhombic, triclinic and cubic crystals; the successive changes occur at about 44° and 71 , and are attended by a decrease in density.

Tetramorphism is exhibited by ammonium nitrate. According to O. Lehmann it melts at 168° (or at a slightly lower temperature in its water of crystallization) and on cooling forms optically isotropic crystals; at 125-6° the mass becomes doubly refracting, and from a solution rhombohedral (optically uniaxial) crystals are deposited ; by further cooling acicular rhombic crystals are produced at 82-8 , and at 32-4° other rhombic forms are obtained, identical with the product

obtained by crystallizing at ordinary temperatures. The reverse series of transformations occurs when this final modification is heated. M. Bellati and R. Romanese {Zeit. f. Kryst. 14, p. 78) determined the densities and specific heats of these modifications. The first and third transformations (reckoned in order with in- creasing temperature of the transition point) are attended by an increase in volume, the second with a contraction; the solubility follows the same direction, increasing up to 82-8°, then diminishing up to 125-6°, and then increasing from this temperature upwards.

The physical conditions under which polymorphous modifica- tions are prepared control the form which the substance assumes. We have already seen that temperature and pressure exercise considerable influence in this direction. In the case of separation from solutions, either by crystallization or by precipitation by double decomposition, the temperature, the concentration of the solution, and the presence of other ions may modify the form obtained. In the case of sodium dihydrogen phosphate, NaH 2 PQ 4 -H 2 0, a stable rhombic form is obtained from warm solutions, while a different, unstable, rhombic form is obtained from cold solutions. Calcium carbonate separates as hexagonal calcite from cold solutions (below 30°), and as rhombic aragonite from solutions at higher temperatures; lead and strontium carbonates, however, induce the separation of aragonite at lower temperatures. From supersaturated solutions the form unstable at the temperature of the experiment is, as a rule, separated, especially on the introduction of a crystal of the unstable form; and, in some cases, similar inoculation of the fused substance is attended by the same result. Different modifications may separate and exist side by side at one and the same time from a solution; e.g. telluric acid forms cubic and monoclinic crystals from a hot nitric acid solution, and ammonium fluosilicate gives cubic and hexagonal forms from aqueous solutions between 6° and 13°.

A comparison of the transformation of polymorphs leads to a twofold classification: (1) polymorphs directly convertible in a reversible manner— termed ” enantiotropic ” by 0. Lehmann and (2) polymorphs in which the transformation proceeds in one direction only— termed ” monotropic.” In the first class

are included sulphur and ammonium nitrate; monotropy is exhibited by aragonite and calcite.

It is doubtful indeed whether any general conclusions can yet be drawn as to the relations between crystal structure and scalar properties and the relative stability of polymorphs. As a general rule the modification stable at higher temperatures possesses a lower density; but this is by no means always the case, since the converse is true for antimonious and arsenious oxides, silver iodide and some other substances. Attempts to connect a change of symmetry with stability show equally a lack of generality. It is remarkable that a great many polymorphous substances assume more symmetrical forms at higher tempera- tures, and a possible explanation of the increase in density of such compounds as silver iodide, &c, may be sought for in the theory that the formation of a more symmetrical configuration would involve a drawing together of the molecules, and conse- quently an increase in density. The insufficiency of this argu- ment, however, is shown by the data for arsenious and anti- monious oxides, and also for the polymorphs of calcium carbonate, the more symmetrical polymorphs having a lower density.

Morphotropy. — Many instances have been recorded where sub- stitution has effected a deformation in one particular direction, the crystals of homologous compounds often exhibiting the same angles between faces situated in certain zones. The observations of Slavik (Zeii. f. Kryst., 1902, 36, p. 268) on ammonium and the quaternary ammonium iodides, of J. A. Le Bel and A. Ries (Zeit.f. Kryst., 1902, 1904, et seq.) on the substituted ammonium chlorplatinates, and of G. Mez (ibid., 1901, 35, p. 242) on substituted ureas, illustrate this point.

Ammonium iodide assumes cubic forms with perfect cubic cleavage ; tetramethyl ammonium iodide is tetragonal with perfect cleavages parallel to {100) and Jooi) — a difference due to the lengthening of the o axes; tetraethyl ammonium iodide also assumes tetragonal forms, but does not exhibit the cleavage of the tetramethyl com- pound ; while tetrapropyl ammonium iodide crystallizes in rhombic form. The equivalent volumes and topic parameters are tabulated :

NH4I. ‘

NMeJ.

NEtJ.

NPrJ.

V

X

CO

57-51 3-860 3-860 3-860

108-70 5-319 5-319 3-842

162-91 6-648 6-648 3-686

235-95 6-093

7-851 4-933

From these figures it is obvious that the first three compounds form a morphotropic series; the equivalent volumes exhibit a regular progression ; the values of x and ˆ, corresponding to the a axes, are regularly increased, while the value of w, corresponding to the c axis, remains practically unchanged. This points to the conclusion that substitution has been effected in one of the cube faces. We may therefore regard the nitrogen atoms as occupying the centres of a cubic space lattice composed of iodine atoms, between which the hydrogen atoms are distributed on the tetrahedron face normals. Coplanar substitution in four hydrogen atoms would involve the pushing apart of the iodine atoms in four horizontal directions. The magnitude of this separation would obviously depend on the magnitude of the substituent group, which may be so large (in this case propyl is sufficient) as to cause unequal horizontal deformation and at the same time a change in the vertical direction.

The measure of the loss of symmetry associated with the introduction of alkyl groups depends upon the relative magnitudes of the substituent group and the rest of the molecule; and the larger the molecule, the less would be the morphotropic effect of any particular substituent. The mere retention of the same crystal form by homologous substances is not a sufficient reason for denying a morphotropic effect to the substituent group; for, in the case of certain substances crystallizing in the cubic system, although the crystal form remains unaltered, yet the structures vary. When both the crystal form and structure are retained, the substances are said to be isomorphous.

Other substituent groups exercise morphotropic effects similar to those exhibited by the alkyl radicles; investigations have been made on halogen-, hydroxy-, and nitro-derivatives of benzene and substituted

benzenes. To Jaeger is due the deter- mination of the topic parameters of certain haloid-derivatives, and, while showing that the morphotropic effects closely resemble those occasioned by methyl, he established the important fact

that, in general, the crystal form depended upon the orientation of the substituents in the benzene complex.

Benzoic acid is pseudo-tetragonal, the principal axis being remarkably long; there is no cleavage at right angles to this axis. Direct nitration gives (principally) m-nitrobenzoic acid, also pseudo-tetragonal with a much shorter principal axis. From this two chlornitrobenzoic acids [C00H-N02-C1 = 1.3.6 and 1.3.4] may be obtained. These are also pseudotetragonat; the (1.3.6) acid has nearly the same values of x and \p as benzoic acid, but o> is increased ; compared with ra-nitrobenzoic acid, x and ˆ have been diminished, whereas a> is much increased; the (1.3.4) acid is more closely related to m-nitrobenzoic acid, \ and ip being increased, 01 diminished. The results obtained for the (1.2) and (1.4) chlorbenzoic acids also illustrate the dependence of crystal form and structure on the orientation of the molecule.

The hydroxyl group also resembles the methyl group in its morphotropic effects, producing, in many cases, no change in symmetry but a dimensional increase in one direction. This holds for benzene and phenol, and is supported by the observations of Gossner on [1. 3.5] trinitrobenzene and picric acid (1.3.5-trinitro, 2 oxybenzene); these last two substances assume rhombic forms, and picric acid differs from trinitrobenzene in having w considerably greater, with x and $ slightly less. A similar change, in one direction only, characterizes benzoic acid and salicylic acid.

The nitro group behaves very similarly to the hydroxyl group. The effect of varying the position of the nitro group in the molecule is well marked, and conclusions may be drawn as to the orientation of the groups from a knowledge of the crystal form; a change in the symmetry of the chemical molecule being often attended by a loss in the symmetry of the crystal.

It may be generally concluded that the substitution of alkyl, nitro, hydroxyl, and haloid groups for hydrogen in a molecule occasions a deformation of crystal structure in one definite direction, hence permitting inferences as to the configuration of the atoms composing the crystal; while the nature and degree of the alteration depends (1) upon the crystal structure of the unsubstituted compound; (2) on the

nature of the substituting radicle; (3) on the complexity of the substituted molecule; and (4) on the orientation of the substitution derivative.

Isomorphism. — It has been shown that certain elements and groups exercise morphotropic effects when substituted in a compound; it may happen that the effects due to two or more groups are nearly equivalent, and consequently the resulting crystal forms are nearly identical. This phenomenon was first noticed in 1822 by E. Mitscherlich, in the case of the acid phos- phate and acid arsenate of potassium, KH 2 P(As)04, who adopted the term isomorphism, and regarded phosphorus and arsenic as isomorphously related elements. Other isomorphously related elements and groups were soon perceived, and it has been shown that elements so related are also related chemically.

Tutton's investigations of the morphotropic effects of the metals potassium, rubidium and caesium, in combination with the acid radicals of sulphuric and selenic acids, showed that the replacement of potassium by rubidium, and this metal in turn by caesium.was accompanied by progressive changes in both physical and crystal- lographical properties, such that the rubidium salt was always inter- mediate between the salts of potassium and caesium (see table; the space unit is taken as a pseudo-hexagonal prism) . This fact finds a parallel in the atomic weights of these metals.

By taking appropriate differences the following facts will be observed: (1) the replacement of potassium by rubidium occasions an increase in the equivalent volumes by about eight units, and of rubi- dium by caesium by about eleven units; (2) replacement in the same order is attended by a general increase in the three topic parameters, a greater increase being met with in the replacement of rubidium by caesium; (3) the parameters x and i> are about equally increased, while the increase in a is always the greatest. Now consider the effect of replacing sulphur by selenium. It wiil be seen that (1) the increase in equivalent volume is about 6-6; (2) all the topic para- meters are increased; (3) the greatest increase is effected in the parameters x and \fr, which are equally lengthened.

These observations admit of ready explanation in the following

PHYSICAL)

CHEMISTRY

manner. The ordinary structural formula of potassium sulphate is o

k-o-s-o-k. If the crystal structure be regarded as composed of

■

o three interpenetrating point systems, one consisting of sulphur atoms, the second of four times as many oxygen atoms, and the third of twice as many potassiu-m atoms, the systems being so arranged that the sulphur system is always centrally situated with respect to the other two, and the potassium system so that it would affect the vertical axis, then it is obvious that the replacement of potassium by an element of greater atomic weight would specially increase the length of w (corresponding to the vertical axis), and cause a smaller increase in the horizontal parameters (x and ifr) ; moreover, the increments would advance with the atomic weight of the replacing metal. If, on the other hand, the sulphur system be replaced by a corresponding selenium system, an element of higher atomic weight, it would be expected that a slight increase would be observed in the vertical parameter, and a greater increase recorded equally in the horizontal parameters.

Muthmann (Zeit. f. Kryst., 1894) , in his researches on the tetragonal potassium and ammonium dihydrogen phosphates and arsenates, found that the replacement of potassium by ammonium was attended by an increase of about six units in the molecular volume, and of phosphorus by arsenic by about 4-6 units. In the topic parameters the following changes were recorded : replacement of potassium by ammonium was attended by a considerable increase in &>, x and ˆ being equally, but only slightly, increased; replacement of phosphorus by arsenic was attended by a considerable increase, equally in x and 4>, while u> suffered a smaller, but not inconsiderable, increase. It is thus seen that the ordinary plane representation of the structure of compounds possesses a higher significance than could have been suggested prior to crystallographical researches.

Identity, or approximate identity, of crystal form is not in itself sufficient to establish true isomorphism. If a substance deposits itself on the faces of a crystal of another substance of similar crystal form, the substances are probably isomorphous. Such parallel overgrowths, termed episomorphs, are very common among the potassium and sodium felspars; and K. von Hauer has investigated a number of cases in which salts exhibiting episomorphism have different colours,

thereby clearly demonstrat- ing this property of isomorphism. For example, episomorphs of white potash alum and violet chrome alum, of white mag- nesium sulphate and green nickel sulphate, and of many other pairs of salts, have been obtained. More useful is the property of isomorphous substances of forming mixed crystals, which are strictly isomorphous with their constituents, for all variations

in composition. In such crystals each component plays its own part in de- termining the physical pro- perties; in other words, any physical constant of a mixed crystal can be cal- culated as additively com- posed of the constants of the two components.

Fig. 7 represents the specific volumes of mixtures of ammonium and potassium sulphates; the ordinates re- presenting specific volumes, and the abscissae the per- centage composition of the mixture. Fig. 8 shows the variation of refractive index of mixed crystals of potash alum and thallium alum with variation in composition. In these two instances the component crystals are miscible in all proportions; but this is by no means always the case. It may happen that the crystals do not form double salts, and are only miscible in certain proportions. Two cases then arise: (1) the properties may be expressed as linear functions of the composition, the terminal values being identical with those obtained for the individual components, and there being a break in the curve corre- sponding to the absence of mixed crystals ; or (2) similar to (1) except that different values must be assigned to the terminal values in order to preserve collinearity. Fig. 9 illustrates the first case : the ordinates represent specific volumes, and the abscissae denote the composition of isomorphous mixtures of ammonium and potassium dihydrogen phosphates, which mutually take one another up to the extent of 20 % to form homogeneous crystals. The second case is illustrated in fig. 10. Magnesium sulphate (orthorhombic) takes up ferrous

10 SO 30 40 SO 60 70 SO 90

K s S0 4 =ioo%

K 2 SO»=o% (NH 4) 2 S0 4 =ioo%

Fig. 7.

Tl Alum= 0%

K Alum= oA, Tl Alum— 100 X

Fig. 8.

KH a P0 4 =ioo£ NH 4 H s P0 4 x

Fig. 9.

- M E S0.7H.O=ioo%

Fig. 10.

sulphate (monoclinic) to the extent of 19%, forming isomorphous orthorhombic crystals; ferrous sulphate, on the other hand, takes up magnesium sulphate to the extent of 54% to form monoclinic crystals. By plotting the specific volumes of these mixed crystals as ordinates, it is found that they fall on two lines, the upper corre- sponding to the orthorhombic crystals, the lower to the monoclinic. From this we may conclude that these salts are isodimorphous : the upper line represents isomorphous crystals of stable orthorhombic magnesium sulphate and unstable orthorhombic ferrous sulphate, the lower line isomor- phous crystals of stable monoclinic ferrous sul- phate and unstable monoclinic magnesium sulphate.

An important distinc- tion separates true mixed crystals and crystallized double salts, for in the latter the properties are not linear functions of the properties of the components ; generally there is a contraction in volume, while the re- fractive indices and other physical properties do not, in general, obey the additive law.

Isomorphism is most Feso-7H s o=n>oX clearly discerned be- tween elements of analogous chemical properties; and from the wide generality of such observations attempts have been made to form a classifica- tion of elements based on isomorphous replacements. The following table shows where isomorphism may be generally expected. The elements are arranged in eleven series, and the series are subdivided (as indicated by semicolons) into groups; these groups exhibit partial isomorphism with the other groups of the same series (see W. Nernst, Theoretical Chemistry).

Series 1. CI, Br, I, F; Mn (in permanganates).

2. S, Se; Te (in tellurites) ; Cr, Mn, Te (in the acids

H2RO4); As, Sb (in the glances MR,).

3. As, Sb, Bi; Te (as an element); P, Vd (in salts); N,

P (in organic bases).

4. K, Na, Cs, Rb, Li; Tl, Ag.

5. Ca, Ba, Sr, Pb; Fe, Zn, Mn, Mg; Ni, Co, Cu; Ce, La,

Di, Er, Y, Ca; Cu, Hg, Pb; Cd, Be, In, Zn; Tl, Pb.

6. Al, Fe, Cr, Mn; Ce, U (in sesquioxides).

7. Cu, Ag (when monovalent) ; Au.

«. Pt, Ir, Pd, Rh. Ru, Os; Au, Fe, Ni; Sn, Te.

9. C, Si, Ti, Zr, Th, Sn; Fe, Ti.

10. Ta, Cb (Nb).

11. Mo, W, Cr.

For a detailed comparison of the isomorphous relations of the elements the reader is referred to P. von Groth, Chemical Crystallography. Reference may also be made to Ida Freund, The Study of Chemical Composition; and to the Annual Reports of the Chemical Society for 1908, p. 258.

Bibliography. — History: F. Hoefer, Histoire de la chimie (2nd ed., 1866-1869); Hermann Kopp, Geschichte der Chemie (1869), Entwickelung der Chemie in d. neueren Zeit (1871-1874); £. von Meyer, Geschichte der Chemie (3rd ed., 1905, Eng. trans.); A. Ladenburg, Entwickelungs geschichte der Chemie (4th ed., 1907); A. Stange, Die Zeitalter der Chemie (1908). Reference may also be made to M. M. Pattison Muir, History of Chemical Theories and Laws (1907); Ida Freund, Study of Chemical Composition (1904); T. E. Thorpe, Essays in Historical Chemistry (2nd ed., 1902). See also the article Alchemy.

Principles and Physical. — W. Ostwald, Principles of Inorganic Chemistry (3rd Eng. ed., 1908), Outlines of General Chemistry, Lehrbuch der allgemeinen Chemie; W.- Nernst, Theoretische Chemie (4th ed., 1907, Eng. trans.) ; J. H. van't Hoff, Lectures on Theoretical and Physical Chemistry; J. Walker, Introduction to Physical Chemistry (4th ed., 1907); H. C. Jones, Outlines of Physical Chemistry (1903); D. Mendeleeff, Principles of Chemistry (3rd ed., 1905).

Inorganic. — Roscoe and Schoriemmer, Inorganic Chemistry (3rd ed., Non-metals, 1905; Metals, 1907); R. Abegg, Handbuch der anorganischen Chemie; Gmelin-Kraut, Handbuch der anorganischen

Chemie; O. Dammer, Handbuch der anorganischen Chemie; H. Moissan, Chimie minirale.

Organic. — F. Beilstein, Handbuch der organischen Chemie; M. M. Richter, Lexikon der Kohlenstojfverbindungen (these are primarily works of reference) ; V. Meyer and P. H. Jacobson, Lehrbuch der organischen Chemie; Richter-Anschutz, Organische Chemie (nth ed.,

vol. i., 1909, Eng. trans.) ; G. K. Schmidt, Kurzes Lehrbuch der organischen Chemie; A. Bernthsen, Organische Chemie (Eng. trans.). Practical methods are treated in Lassar-Cohn, Arbeitsmethoden fur organisch-chemische Laboratorien (4th ed., 1906-1907). Select chapters are treated in A. Lachmann, Spirit of Organic Chemistry; J. B. Cohen, Organic Chemistry (1908); A. W. Stewart, Recent Advances in Organic Chemistry (1908); and in a series of pamphlets issued since 1896 with the title Sammlung chemischer und chemisch-technischer Vortrdge.

Analytical. — For Blowpipe Analysis: C. F. Plattner, Probirkunst mit dem Lbthrohr. For General Analysis : C. R. Fresenius, Qualita- tive and Quantitative Analysis, Eng. trans, by C. E. Groves {Qualita- tive, 1887) and A. I. Cohn {Quantitative, 1903); F. P. Treadwell, Kurzes Lehrbuch der analytischen Chemie (1905) ; F. Julian, Textbook of Quantitative Chemical Analysis (1904) ; A. Classen, Ausgewdhlte Methoden der analytischen Chemie (1901-1903) ; W. Crookes, Select Methods in Chemical Analysis (1894). Volumetric Analysis: F. Sutton, Systematic Handbook of Volumetric Analysis (1904); F. Mohr, Lehrbuch der chemisch-analytischen Titrirmethode (1896). Organic Analysis: Hans Meyer, Analyse und Konstitutionsermittlung organischer Verbindungen (1909) ; Wilhelm Vaubel, Die physikalischen und chemjschen Methoden der quantitativen Bestimmung organischer Verbindungen. For the historical development of the proximate analysis of organic compounds see M. E. H. Dennstedt, Die Entwickelung der organischen Elementaranalyse (1899).

Encyclopaedias. — The early dictionaries of Muspratt and Watts are out of date ; there is a later edition of the latter by H. F. Morley and M. M. P. Muir. A. Ladenburg, Handworterbuch der Chemie, A. Wurtz, Dictionnaire de chimie, and F. Selmi, Enciclopedia di chimica, are more valuable; the latter two are kept up to date by annual supplements. (C. E.*)

CHEMNITZ (or Kemnitz), MARTIN (1522-1586), German Lutheran theologian, third son of Paul Kemnitz, a cloth- worker of noble extraction, was born at Treuenbrietzen, Brandenburg, on the 9th of November 1522. Left an orphan at the age of eleven, he worked for a time at his father's trade. A relative at Magdeburg put him to school there (1 539-1 542) . Having made a little money by teaching, he

went (1543) to the university of Frankfort-on-Oder; thence (1545) to that of Wittenberg. Here he heard Luther preach, but was more attracted by Melanchthon, who interested him in mathematics and astrology. Melanchthon gave him (1547) an introduction to his son-in-law, Georg Sabinus, at Konigsberg, where he was tutor to some Polish youths, and rector (1548) of the Kneiphof school. He practised astrology; this recommended him to Duke Albert of Prussia, who made him his librarian (1550). He then turned to Biblical, patristic and kindred studies. His powers were first brought out in contro- versy with Osiander on justification by faith. Osiander, main- taining the infusion of Christ's righteousness into the believer, impugned the Lutheran doctrine of imputation; Chemnitz defended it with striking ability. As Duke Albert sided with Osiander, Chemnitz resigned the librarianship. Returning (1553) to Wittenberg, be lectured on Melanchthon's Loci Communes, his lectures forming the basis of his own Loci Theologici (published posthumously, 1591), which constitute probably the best ex- position of Lutheran theology as formulated and modified by Melanchthon. His lectures were thronged, and a university career of great influence lay before him, when he accepted a call to become coadjutor at Brunswick to the superintendent, Joachim Morlin, who had known him at Konigsberg. He removed to Brunswick on the 15 th of December 1554, and there spent the remainder of his life, refusing subsequent offers of important offices from various Protestant princes of Germany. Zealous in the duties of his pastoral charge, he took a leading part in theological con- troversy. His personal influence, at a critical period, did much to secure strictness of doctrine and compactness of organization in the Lutheran Church. Against Crypto-Calvinists he upheld the Lutheran view of the eucharist in his Repetitio sanae doctrinae de Vera Praesentia (1560; in German, 1561). To check the reaction towards the old religion he wrote several works of great power, especially his Theologiae Jesuitarum praecipua capita (1562), an incisive attack on the principles of the society, and the Examen concilii Tridentini (four parts, 1565-66-72-73), his greatest work. His Corpus doctrinae Prutenicum (1567), drawn up in conjunction with Morlin, at once acquired great authority. In the year of its publication he became superintendent of Brunswick, and in effect the director of his church throughout Lower Saxony. His tact was equal to his learning. In conjunc-

tion with Andrea and Selnecker he induced the Lutherans of Saxony and Swabia to adopt the Formula Concordiae and so become one body. Against lax views of Socinian tendency he directed his able treatise De duabus naturis in Christo (1570). Resigning office in infirm

health (1584) he survived till the 8th of April 1586.

Lives of Chemnitz are numerous, e.g. by J. Gasmerus (1588), T. Pressel (1862), C. G. H. Lentz (1866), H. Hachfeld (1867), H. Schmid in J. J. Herzog's Realencyklopddie (1878), J. Kunze in A. Hauck's Realencyklop. filr prol. Theol. und Kirche (1897); that by Hausle, in I. Goschler's Diet, encyclopedique de la theol. cath. (1858), gives a Roman Catholic view. (A. Go.*)

CHEMNITZ, a town of Germany, in the kingdom of Saxony, the capital of a governmental district, 50 m. W.S.W. of Dresden and 51 S.E. of Leipzig by rail. Pop. (1885) 110,817; (1895) 161,017; (1905) 244,405. It lies 950 ft. above the sea, in a fertile plain at the foot of the Erzgebirge, watered by the river Chemnitz, an affluent of the Mulde. It is the chief manufacturing town in the kingdom, ranks next to Dresden and Leipzig in point of population, and is one of the principal commercial and industrial centres of Germany. It is well provided with railway communication, being directly connected with Berlin and with the populous and thriving towns of the Erzgebirge and Voigtland. Chemnitz is in general well built, the enormous development of its industry and commerce having of late years led to the laying out of many fine streets and to the embellishing of the town with handsome buildings. The centre is occupied by the market square, with the handsome medieval Rathaus, now superseded for municipal business by a modern building in the Post-strasse. In this square are monu- ments to the emperor William I., Bismarck and Moltke. The old inner town is surrounded by pleasant promenades, occupying the site of the old fortifications, and it is beyond these that industrial Chemnitz lies, girdling the old town on all sides with a thick belt of streets and factories, and ramifying far into the country. Chemnitz has eleven Protestant churches, among them the ancient Gothic church of St James, with a fine porch, and the modern churches of St Peter, St Nicholas and St Mark. There are also a synagogue and chapels of various sects. The industry of Chemnitz has gained for the town the name of " Saxon Manchester." First in importance are its locomotive and engineering works, which give employment to some 20,000 hands in 90 factories. Next come its cotton-spinning, hosiery, textile and glove manufactures, in which a large trade is done with Great Britain and the United States. It is also the seat of considerable dyeworks, bleachworks, chemical and woollen factories, and produces leather and straps, cement, small vehicles, wire-woven goods, carpets, beer and bricks. The town is well provided with technical schools for training in the various industries, including commercial, public, economic and agri- cultural schools, and has a chamber of commerce. There are also industrial and historical

museums, and collections of paint- ing and natural history. The local communications are main- tained by an excellent electric tramway system. To the north- west of the town is the Gothic church of a former Benedictine monastery, dating from 1514-1525, with a tower of 1897. Chemnitz is a favourite tourist centre for excursions into the Erzgebirge, the chain of mountains separating Saxony from Bohemia.

Chemnitz {Kaminizi) was originally a settlement of the Sorbian Wends and became a market town in 1 1 43 . Its municipal constitution dates from the 14th century, and it soon became the most important industrial centre in the mark of Meissen. A monopoly of bleaching was granted to the town, and thus a considerable trade in woollen and linen yarns was attracted to Chemnitz; paper was made here, and in the 16th century the manufacture of cloth was very flourishing. In 1 539 the Reforma- tion was introduced, and in 1546 the Benedictine monastery, founded about 1136 by the emperor Lothair II. about 2 m. north of the town, was dissolved. . During the Thirty Years' War Chemnitz was plundered by all parties and its trade was com- pletely ruined, but at the beginning of the 18th century it had begun to recover. Further progress in this direction was made

during the 19th century, especially after 1834 when Saxony joined the German Zollverein.

See Zollner, Geschichte der Fabrik- und Handelsstadt Chemnitz (1891) ; and Straumer, Die Fabrik- und Handelsstadt Chemnitz (1892).

CHEMOTAXIS (from the stem of " chemistry" and Gr. rd£is, arrangement), a biological term for the attraction exercised on living or growing organisms or their members by chemical substances; e.g. the attraction of the male cells of ferns or mosses by an organic acid or sugar-solution.

CHENAB (the Greek Acesines), one of the " Five rivers " of the Punjab, India. It rises in the snowy Himalayan ranges of Kashmir, enters British territory in the Sialkot district, and flows through the plains of the Punjab, forming the boundary between the Rechna and the Jech Doabs. Finally it joins the Jhelum at Trimmu.

The Chenab Colony, resulting from the great success of the Chenab Canal in irrigating the desert of the Bar, was formed out of the three adjacent districts of Gujranwala, Jhang, and Montgomery in 1892, and

contained in 1901 a population of 791,861. It lies in the Rechna Doab between the Chenab and Ravi rivers in the north-east of the Jhang district, and is designed to include an irrigated area of 25 million acres. The Chenab Canal (opened 1887) is the largest and most profitable per- ennial canal in India. The principal town is Lyallpur, called after Sir J. Broad wood Lyall, lieutenant-governor of the Punjab 1887- 1892, which gives its name to a district created in 1904.

CHENEDOLLE, CHARLES JULIEN LIOULT DE (1769-1833), French poet, was born at Vire (Calvados) on the 4th of November 1769. He early showed a vocation for poetry, but the outbreak of the Revolution temporarily diverted his energy. Emigrating in 1 791, he fought two campaigns in the army of Conde, and eventually found his way to Hamburg, where he met Antoine de Rivarol, of whose brilliant conversation he has left an account. He also visited Mme de Stael in her retreat at Coppet. On his return to Paris in 1799 he met Chateaubriand and his sister Lucile (Mme de Caud), to whom he became deeply attached. After her death in 1804, Chenedolle returned to Normandy, where he married and became eventually inspector of the academy of Caen (1812-1832). With the exception of occasional visits to Paris, he spent the rest of his life in his native province. He died at the chateau de Coisel on the 2nd of December 1833. He published his Genie de I'Homme in 1807, and in 1820 his Etudes poetiques, which had the misfortune to appear shortly after the Meditations of Lamartine, so that the author did not receive the credit of their real originality. Chenedolle had many sympathies with the romanticists, and was a contributor to their organ, the Musefrancaise. His other works include the Esprit de Rivarol (1808) in conjunction with F. J. M. Fayolle.

The works of Chlnedolle were edited in 1864 by Sainte-Beuve, who drew portraits of him in his Chateaubriand et son groupe and in an article contributed to the Revue des deux mondes (June 1849). See also E. Helland, Etude biographique et litleraire sur Chenedolle (1857); Cazin, Notice sur Chenedolle (1869).

CHENERY, THOMAS (1826-1884), English scholar and editor of The Times, was born in 1826 at Barbados. He was educated at Eton and Caius College, Cambridge. Having been called to the bar, he went out to Constantinople as The Times correspondent just before the Crimean War, and it was under the influence there of Algernon Smythe (afterwards Lord Strangford) that he first turned to those philological studies in which he became eminent. After the war he returned to London and wrote regularly for The Times for many years, eventually succeeding Delane as editor in 1877. He was then an experienced

publicist, particularly well versed in Oriental affairs, an indefatigable worker, with a rapid and comprehensive judgment, though he lacked Delane's intuition for public opinion. It was as an Orientalist, however, that he had meantime earned the highest reputation, his knowledge of Arabic and Hebrew being almost unrivalled and his gift for languages exceptional. In 1868 he was appointed Lord Almoner's professor of Arabic at Oxford, and retained his position until he became editor of The Times. He was one of the company of revisers of the Old Testament. He was secretary for

some time to the Royal Asiatic Society, and published learned editions of the Arabic classic The Assemblies of Al-Hariri and of the Machberoth Ithiel. He died in London on the nth of February 1884.

CHENG, Tscheng or Tschiang (Ger. Scheng), an ancient Chinese wind instrument, a primitive organ, containing the principle of the free reed which found application in the accordion, concertina and harmonium. The cheng resembles a tea-pot filled with bamboo pipes of graduated lengths. It consists of a gourd or turned wooden receptacle acting as wind reservoir, in' the side of which is inserted an insufflation tube curved like a swan's neck or the spout of a tea-pot. The cup-shaped reservoir is closed by means of a plate of horn pierced with seventeen round holes arranged round the edge in an unfinished circle, into which fit the bamboo pipes. The pipes are cylindrical as far as they are visible above the plate, but the lower end inserted in the wind reservoir is cut to the shape of a beak, somewhat like the mouth- piece of the clarinet, to receive the reed. The construction of the free reed is very simple: it consists of a thin plate of metal — gold according to the Jesuit missionary Joseph Amiot, 1 but brass in the specimens brought to Europe — of the thickness of ordinary paper. In this plate is cut a rectangular flap or tongue which remains fixed at one end, while at the other the tongue is filed so that, instead of closing the aperture, it passes freely through, vibrating as the air is forced through the pipe (see Free-Reed Vibrator). The metal plate is fastened with wax longitudinally across the diameter of the beak end of the pipe, a little layer of wax being applied also to the free end of the vibrating tongue for the purpose of tuning by adding weight and impetus. About half an inch above the horn plate a small round hole or stop is bored through the pipe, which speaks only when this hole is covered by the finger. A longitudinal aperture about an inch long cut in the upper end of the bamboo pipe serves to determine the length of the vibrating column of air proper to respond to the vibrations of the free reed. The length of the bamboo above this opening is purely ornamental, as are also four or five of the seventeen pipes which have no reeds and do not speak, being merely inserted for the purposes of

symmetry in design. The notes of the cheng, like those of the concertina, speak either by inspiration or expiration of air, the former being the more usual method. Mahillon states that performers on the cheng in China are rare, as the method of playing by inspiration induces in- flammation of the throat. 2 Amiot, who gives a description of the instrument with illustrations showing the construction, states that in the great Chinese encyclopaedia Eulh-ya, articles Yu and Ho, the Yu of ancient China was the large cheng with nineteen free reeds (twenty-four pipes), and the Ho the small cheng with thirteen reeds or seventeen pipes described in this article. The compass of the latter is given by him as the middle octave with chromatic intervals, the thirteenth note giving the octave of the first. Mahillon gives the compass of a modern cheng as follows:

■A—

bir-

* = £ee£ee£

E. F. F. Chladni, 3 who examined a cheng sent from China to Herr Miiller, organist of the church of St Nicholas, Leipzig, at the beginning of the 19th century, gives an excellent description of the instrument, reproducing in illustration a plate from Giulio Ferrario's work on costume. 4 Midler's cheng had the same compass as Mahillcn's. Chladni's article was motived by the publication of an account of the exhibition of G. J. Grenie's Orgue expressif, invented about 18 10, in the Conservatoire of

1 Memoire sur la musique des Chinois (Paris, 1779), pp. 78 and 82, pi. vi., or Memoire sur les Chinois, tome vi. pi. vi.

2 Catalogue descriptif, vol. ii. (Ghent, 1896), p. 91 ; also vol. i. (1880), pp. 29, 44, 154.

3 " Weitere Nachrichten von dem . . . chinesischen Blasinstru- mente Tscheng oder Tschiang," in Allgemeine musikalische Zeitung (Leipzig, 1821), Bd. xxiii. No. 22, pp. 369, 374 et seq., and illustration appendix ii.

4 27 Costume anticho e moderno (Milan, 1816), pi. 66, vol. i.

Paris. 1 Grenie's invention, perfected by Alexandre and Debain about 1840, produced the harmonium. Kratzenstein (see under Harmonium) of St Petersburg was the first to apply the free reed to the organ in the second half of the 18th century. In- ventions of similar instruments, which after a short life were relegated to oblivion, followed at the beginning of the 19th ceiitury. An interesting reproduction of a Persian cheng dating from the 10th or nth century is to be seen on a Persian vase described and illustrated together with a shawm in the Gazette archeologique (tome xi., 1886). (K. S.)

CHEN-HAI [CHiNHAi],a district town of China, in the province of Cheh-kiang, at the mouth of the Yung-kiang, 12 m. N.E. of Ningpo, in 29 58′ N., 121 45′ E. It lies at the foot of a hill on a tongue of land, and is partly protected from the sea on the N. by a dike about 3 m. long, composed entirely of large blocks of hewn granite. The walls are 20 ft. high and 3 m. in circumfer- ence. The defences were formerly of considerable strength, and included a well-built but now dismantled citadel on a precipitous cliff, 250 ft. high, at the extremity of the tongue of land on which the town is built. In the neighbourhood an engagement took place between the English and Chinese in 1841.

CHfiNIER, ANDR£DE(i762-i794), French poet, was born at Constantinople on the 30th of October 1762. His father, Louis Chenier, a native of Languedoc, after twenty years of successful commerce in the Levant as a cloth-merchant, was appointed to a position equivalent to that of French consul at Constantinople. His mother, Elisabeth Santi-Lomaca, whose sister was grand- mother of A. Thiers, was a Greek. When the poet was three years old his father returned to France, and subsequently from 1 768 to 1 7 7 5 served as consul-general of France in Morocco. The family, of which Andre was the third son, and Marie- Joseph (see below) the fourth, remained in France; and after a few years, during which Andre ran wild with " la tante de Carcasonne," he distinguished himself as a verse-translator from the classics at the College de Navarre (the school in former days of Gerson and Bossuet) in Paris. In 1783 he obtained a cadetship in a French regiment at Strassburg. But the glamour of the military life was as soon exhausted by Chinier as it was by Coleridge. He returned to Paris before the end of the year, was well received by his family, and mixed in the cultivated circle which frequented the salon of his mother, among them Lebrun-Pindare, Lavoisier, Lesueur, Dorat, Parmy, and a little later the painter David. He was already a poet by predilection, an idyllist and steeped in the classical archaism of the time, when, in 1784, his taste for the antique was confirmed by a visit to Rome made in the company of two schoolfellows, the brothers Trudaine. From Naples, after visiting Pompeii, he returned to Paris,

his mind fermenting with poetical images and projects, few of which he was destined to realize. For nearly three years, however, he was enabled to study and to experiment in verse without any active pressure or interruption from his family — three precious years in which the first phase of his art as a writer of idylls and bucolics, imitated to a large extent from Theocritus, Bion and the Greek anthologists, was elaborated. Among the poems written or at least sketched during this period were L'Oaristys, L'Aveugle, La Jeune Malade, Bacchus, Euphrosine and La Jeune Tarentine, the last a synthesis of his purest manner, mosaic though it is of reminiscences of at least a dozen classical poets. As in glyptic so in poetic art, the Hellenism of the time was decadent and Alexandrine rather than Attic of the best period. But Chenier is always far more than an imitator. La Jeune Tarentine is a work of personal emotion and inspiration. The colouring is that of classic mythology, but the spiritual element is as individual as that of any classical poem by Milton, Gray, Keats or Tennyson. Apart from his idylls and his elegies, Chenier also experimented from early youth in didactic and philosophic verse, and when he commenced his Hermes in 1783 his ambition was to condense the EncyclopSdie of Diderot into a poem somewhat after the manner of Lucretius. This poem was to treat of man's position in the Universe, first in an isolated state, and then in society. It remains fragmentary, and though

'See Attg. mus. Zt. (Leipzig, 1821), Bd. xxiii. Nos. 9 and 10, pp. 133 and 149 et seq.

some of the fragments are fine, its attempt at scientific exposition approximates too closely to the manner of Erasmus Darwin to suit a modern ear. Another fragment called L'lnvention sums Chenier's Ars Poetica in the verse " Sur des pensers nouveaux, faisons des vers antiques." Suzanne represents the torso of a Biblical poem on a very large scale, in six cantos.

In the meantime, Andre had published nothing, and some of these last pieces were in fact not yet written, when in November 1787 an opportunity of a fresh career presented itself. The new ambassador at the court of St James's, M. de la Luzerne, was connected in some way with the Chenier family, and he offered to take Andre" with him as his secretary. The offer was too good to be refused, but the poet hated himself on the banks of the fiere Tamise, and wrote in bitter ridicule of

" Ces Anglais. Nation toute a vendre a qui peut la payer. De contree en contree allant au monde entier, Offrir sa joie ignoble et son faste

grossier.”

He seems to have been interested in the poetic diction of Milton and Thomson, and a few of his verses are remotely inspired by Shakespeare and Gray. To say, however, that he studied English literature would be an exaggeration. The events of 1 789 and the startling success of his younger brother, Marie- Joseph, as political playwright and pamphleteer, concentrated all his thoughts upon France. In April 1790 he could stand London no longer, and once more joined his parents at Paris in the rue de Clery.

The France that he plunged into with such impetuosity was upon the verge of anarchy. A strong constitutionalist, Chenier took the view that the Revolution was already complete and that all that remained to be done was the inauguration of the reign of law. Moderate as were his views and disinterested as were his motives, his tactics were passionately and dangerously aggressive. From an idyllist and elegist we find him suddenly transformed into an unsparing master of poetical satire. His prose Avis au peuple irancais (August 24, 1790) was followed by the rhetorical Jeu de paume, a somewhat declamatory moral ode addressed ” a Louis David, peintre.” In the meantime he orated at the Feuillants Club, and contributed frequently to the Journal de Paris from November 1791 to July 1792, when he wrote his scorching Tambes to Collot d’Herbois, Sur les Suisses rSvoltSs du regiment de Chdteauvieux. The 1 oth of August uprooted his party, his paper and his friends, and the management of relatives who kept him out of the way in Normandy alone saved him from the massacre of September. In the month following these events his democratic brother, Marie- Joseph, had entered the Convention. Andrews sombre rage against the course of events found vent in the line on the Maenads who mutilated the king’s Swiss Guard, and in the Ode d Charlotte Corday congratulating France that ” Un scelerat de moins rampe dans cette fange.” At the express request of Malesherbes he furnished some arguments to the materials collected for the defence of the king. After the execu- tion he sought a secluded retreat on the Plateau de Satory at Versailles and took exercise after nightfall. There he wrote the poems inspired by Fanny (Mme Laurent Lecoulteux), including the exquisite Ode d Versailles, one of his freshest, noblest and most varied poems.

His solitary life at Versailles lasted nearly a year. On the 7th of March 1794 he was taken at the house of Mme Piscatory at Passy. Two obscure agents of the committee of public safety were in search of a marquise who had flown, but an unknown stranger was found in the house and arrested on suspicion. This was Andre, who had come on a

visit of sympathy. He was taken to the Luxembourg and afterwards to Saint-Lazare. During the 140 days of his imprisonment there he wrote the marvellous lambes (in alternate lines of 12 and 8 syllables), which hiss and stab like poisoned bullets, and which were transmitted to his family by a venal gaoler. There he wrote the best known of all his verses, the pathetic Jeune captive, a poem at once of enchantment and of despair. Suffocating in an atmosphere of cruelty and baseness, Chenier's agony found expression almost to the last in these murderous lambes which he launched against the

Convention. Ten days before the end, the painter J. B. Suvee executed the well-known portrait. He might have been over- looked but for the well-meant, indignant officiousness of his father. Marie- Joseph had done' his best to prevent this, but he could do nothing more. Robespierre, who was himself on the brink of the volcano, remembered the venomous sallies in the Journal de Paris. At sundown on the 25th of July 1794, the very day of his condemnation on a bogus charge of conspiracy, Andre Chenier was guillotined. The record of his last moments by La Touche is rather melodramatic and is certainly not above suspicion.

Incomplete as was his career — he was not quite thirty-two — his life was cut short in a crescendo of all its nobler elements. Exquisite as was already his susceptibility to beauty and his mastership of the rarest poetic material, we cannot doubt that Chenier was preparing for still higher flights of lyric passion and poetic intensity. Nothing that he had yet done could be said to compare in promise of assured greatness with the Iambes, the Odes and the Jeune Captive. At the moment he left practically nothing to tell the world of his transcendent genius, and his reputation has had to be retrieved from oblivion page by page, and almost poem by poem. During his lifetime only his Jeu de paume (1701) and Hymne sur les Suisses (1792) had been given to the world. The Jeune Captive appeared in the Dicade philosophique, Jan. 9, 1795; La Jeune Tarentine in the Mercure of March 22, 1801. Chateaubriand quoted three or four passages in his GSnie du christianisme. Fayette and Lefeuvre-Deumier also gave a few fragments; but it was not until 18 19 that a first imperfect attempt was made by H. de la Touche to collect the poems in a substantive volume. Since the appearance of the editio princeps of Chenier's poems in La Touche's volume, many additional poems and fragments have been discovered, and an edition of the complete works of the poet, collated

with the MSS. bequeathed to the Bibliotheque Nationale by Mme Elisa de Chenier in 1892, has been edited by Paul Dimoff and published by Delagrave. During the same period the critical estimates of the poet have fluctuated in a truly extraordinary manner. Sainte-Beuve in his Tableau of 1828 sang the praises of Chenier as an heroic forerunner of the Romantic movement and a precursor of Victor Hugo. Chenier, he said, had ” inspired and determined ” Romanticism. This suggestion of modernity in Chenier was echoed by a chorus of critics who worked the idea to death; in the meantime, the standard edition of Chenier’s works was being prepared by M. Becq de Fouquieres and was issued in 1862, but rearranged and greatly improved by the editor in 1872. The same patient investigator gave his New Documents on Andre Chenier to the world in 1875.

In the second volume of La Vie litteraire Anatole France contests the theory of Sainte-Beuve. Far from being an initiator, he maintains that Chenier’s poetry is the last expression of an expiring form of art. His matter and his form belong of right to the classic spirit of the 18th century. He is a contemporary, not of Hugo and Leconte de Lisle, but of Suard and Moreliet. M. Faguet sums up on the side of M. France in his volume on the 18th century (1890). Chenier’s real disciples, according to the latest view, are Leconte de Lisle and M. de Heredia, mosa’istes who have at heart the cult of antique and pagan beauty, of ” pure art ” and of ” objective poetry.” Heredia himself reverted to the judgment of Sainte-Beuve to the effect that Chenier was the first to make modern verses, and he adds, ” I do not know in the French language a more exquisite fragment than the three hundred verses of the Bucoliques.” Chenier’s influence has been specially remarkable in Russia, where Pushkin imitated him, Kogloff translated La Jeune Captive, La jeune Tarentine and other famous pieces, while the critic Vesselovsky pronounces ” II a retabli le lyrisme pur dans la poesie francaise.” The general French verdict on his work is in the main well summed by Morillot, when he says that, judged by the usual tests of the Romantic movement of the ‘twenties (love for strange literatures of the North, medievalism, novelties and experiments), Chenier would inevitably have been excluded from the cinacle of 1827. On the other hand, he exhibits a decided tendency to

the world-ennui and melancholy which was one of the earlier symptoms of the movement, and he has experimented in French verse in a manner which would have led to his excommunication by the typical performers of the 18th century. What is univer- sally admitted is that Chenier was a very great artist, who like Ronsard opened up sources of poetry in P’ ranee which had long seemed dried up. In England it is easier to feel his attraction than that of some far greater

reputations in French poetry, for, rhetorical though he nearly always is, he yet reveals something of that quality which to the Northern mind has always been of the very essence of poetry, that quality which made Sainte- Beuve say of him that he was the first great poet ” personnel et reveur ” in France since La Fontaine. His diction is still very artificial, the poetic diction of Delille transformed in the direction of Hugo, but not very much. On the other hand, his descriptive power in treating of nature shows far more art than the Trianin school ever attained. His love of the woodland and his political fervour often remind us of Shelley, and his delicate perception of Hellenic beauty, and the perfume of Greek legend, give us almost a foretaste of Keats. For these reasons, among others, Chenier, whose art is destined to so many vicissitudes of criticism in his own country, seems assured among English readers of a place among the Dii Majores of French poetry.

The Ch6nier literature of late years has beeome enormous. His fate has been commemorated in numerous plays, pictures and poems, notably in the fine epilogue of Sully Prudhomme, the Stello of A. de Vigny, the delicate statue by Puech in the Luxembourg, and the well-known portrait in the centre of the ” Last Days of the Terror.” The best editions are still those of Becq de Fouquieres (Paris, 1862, 1872 and 1881), though these are now supplemented by those of L. Moland (2 vols., 1889) and R. Guillard (2 vols., 1899). (T. Se.)

CHENIER, MARIE-JOSEPH BLAISE DE (1764-1811), French poet, dramatist and politician, younger brother of Andre de Chenier, was born at Constantinople on the nth of February 1764. 1 He was brought up at Carcassonne, and educated in Paris at the College de Navarre. Entering the army at seventeen, he left it two years afterwards; and at nineteen he produced Azimire, a two-act drama (acted in 1786), and Edgar, ou le page suppost, a comedy (acted in 1785), which were failures. His Charles IX was kept back for nearly two years by the censor. Chenier attacked the censorship in three pamphlets, and the commotion aroused by the controversy raised keen interest in the piece. When it was at last produced on the 4th of November 1789, it achieved an immense success, due in part to its political suggestion, and in part to Talma’s magnificent impersonation of Charles IX. Camille Desmoulins said that the piece had done more for the Revolution than the days of October, and a con- temporary memoir-writer, the marquis de Ferriere, says that the audience came away ” ivre de vengeance et tourmente d’une soif de sang.” The performance was the occasion of a split among the actors of the Comedie Francaise, and the new theatre in the Palais Royal, established by the dissidents, was inaugurated with Henri VIII (1791), generally recognized as

Chenier's masterpiece; Jean Calas, ou Vecole des juges followed in the same year. In 1792 he produced his Caius Gracchus, which was even more revolutionary in tone than its predecessors. It was nevertheless proscribed in the next year at the instance of the Montagnard deputy Albitte, for an anti-anarchical hemistich (Des lots et non du sang!); Finelon (1793) was suspended after a few representations; and in 1794 his Timolicn, set to Etienne M6hul's music, was also proscribed. This piece was played after the fall of the Terror, but the fratricide of Timoleon became the text for insinuations to the effect that by his silence Joseph de Chenier had connived at the judicial murder of Andr6, whom Joseph's enemies alluded to as A bel. There is absolutely nothing to support the calumny, which has often been repeated since. In fact, after some fruitless attempts to save his brother, variously related by his biographers, Joseph became aware that Andrews only chance of safety lay in being forgotten by the authorities, and that ill-advised intervention would only hasten the end. Joseph Chenier had been a member of the Convention and of

1 This is the date given by G. de Chinier in his La Verite sur la famille de Chenier (1844).

the Council of Five Hundred, and had voted for the death of Louis XVI.; he had a seat in the tribunate; he belonged to the committees of public instruction, of general security, and of public safety. He was, nevertheless, suspected of moderate sentiments, and before the end of the Terror had become a marked man. His purely political career ended in 1802, when he was eliminated with others from the tribunate for bis opposi- tion to Napoleon. In 1801 he was one of the educational jury for the Seine; from 1803 to 1806 he was inspector-general of public instruction. He had allowed himself to be reconciled with Napoleon's government, and Cyrus, represented in 1804, was written in his honour, but he was temporarily disgraced in 1806 for his Epitre a Voltaire. In 1806 and 1807 he delivered a course of lectures at the Athenee on the language and literature of France from the earliest years; and in 1808 at the emperor's request, he prepared his Tableau historique de I'etat et du progres de la litterature franqaise depuis 1789 jusqu'd 1808, a book con- taining some good criticism, though marred by the violent prejudices of its author. He died on the 10th of January 181 1. The list of his works includes hymns and national songs — among others, the famous Chant du dipart; odes, Sur la mort de Mirabeau, Sur I'oligarchie de Robespierre, &c; tragedies

which never reached the stage, Brutus et Cassius, Philippe deux, Tiber e; translations from Sophocles and Lessing, from Gray and Horace, from Tacitus and Aristotle; with elegies, dithyr- ambics and Ossianic rhapsodies. As a satirist he possessed great merit, though he sins from an excess of severity, and is sometimes malignant and unjust. He is the chief tragic poet of the revolutionary period, and as Camille Desmoulins expressed it, he decorated Melpomene with the tricolour cockade.

See the CEuvres completes de Joseph Chenier (8 vols., Paris, 1823-1826), containing notices of the poet by Arnault and Daunou; Charles Labitte, Etudes litleraires (1846) ; Henri Welschinger, Le Theatre revolutionnaire, 1789-1799 (1881); and A. Lieby, Etude sur le theatre de Marie-Joseph Chenier (1902).

CHENILLE (from the Fr. chenille, a hairy caterpillar), a twisted velvet cord, woven so that the short outer threads stand out at right angles to the central cord, thus giving a resemblance to a caterpillar. Chenille is used as a trimming for dress and furniture.

CHENONCEAUX, a village of central France, in the department of Indre-et-Loire, on the right bank of the Cher, 20 m. E. by S. of Tours on the Orleans railway. Pop. (1906) 216. Chenonceaux owes its interest to its chateau (see Architecture: Renaissance Architecture in France), a building in the Renaissance style on the river Cher, to the left bank of which it is united by a two-storeyed gallery built upon five arches, and to the right by a drawbridge flanked by an isolated tower, part of an earlier building of the 15th century. Founded in 1515 by Thomas Bohier (d. 1523), financial minister in Normandy, the chateau was confiscated by Francis I. in 1535. Henry II. presented it to his mistress Diane de Poitiers, who on his death was forced to exchange it for Chaumont-sur-Loire by Catherine de' Medici. The latter built the gallery which leads to the left bank of the Cher. Chenonceaux passed successively into the hands of Louise de Vaudemont, wife of Henry III., the house of Vend6me, and the family of Bourbon-Conde. In the 18th century it came into the possession of the farmer-general Claude Dupin (1684- 1769), who entertained the most distinguished people in France within its walls. In 1864 it was sold to the chemist Theophile Pelouze, whose wife executed extensive restorations. It sub- sequently became the property of the Credit Foncier, and again passed into private occupancy.

CHENOPODIUM, or Goose-foot, a genus of erect or prostrate herbs (natural order Chenopodiaceae), usually growing on the seashore or on waste or cultivated ground. The green angular stem is often striped

with white or red, and, like the leaves, often more or less covered with mealy hairs. The leaves are entire, lobed or toothed, often more or less deltoid or triangular in shape. The minute flowers are bisexual, and borne in dense axillary or terminal clusters or spikes. The fruit is a membranous one-seeded utricle often enclosed by the persistent calyx. Ten species occur in Britain, one of which, C. Bonus-Henricus, Good

King Henry, is cultivated as a pot-herb, in lieu of asparagusˆ under the name mercury, and all-good.

CHEOPS, in Herodotus, the name of the king who built the Great Pyramid in Egypt. Following on a period of good rule and prosperity under Rhampsinitus, Cheops closed the temples, abolished the sacrifices and made all the Egyptians labour for his monument, working in relays of 100,000 men every three months (see Pyramid). Proceeding from bad to worse, he sacrificed the honour of his daughter in order to obtain the money to complete his pyramid; and the princess built herself besides a small pyramid of the stones given to her by her lovers. Cheops reigned 50 years and was succeeded by his brother, Chephren, who reigned 56 years and built the second pyramid. During these two reigns the Egyptians suffered every kind of misery and the temples remained closed. Herodotus continues that in his own day the Egyptians were unwilling to name these oppressors and preferred to call the pyramids after a shepherd named Philition, who pastured his flocks in their neighbour- hood. At length Mycerinus, son of Cheops and successor of Chephren, reopened the temples and, although he built the Third Pyramid, allowed the oppressed people to return to their proper occupations.

Cheops, Chephren and Mycerinus are historical personages of the fourth Egyptian dynasty, in correct order, and they built the three pyramids attributed to them here. But they are wholly misplaced by Herodotus. Rhampsinitus, the predecessor of Cheops, appears to represent Rameses III. of the twentieth dynasty, and Mycerinus in Herodotus is but a few generations before Psammetichus, the founder of the twenty-sixth dynasty. Manetho correctly places the great Pyramid kings in Dynasty IV. InEgyptian the name of Cheops (ChemmisorChembisinDiodorus Siculus, Suphis in Manetho) is spelt Hwfw (Khufu), but the pronunciation, in late times perhaps Khoouf, is uncertain. The Greeks and Romans generally accepted the view that Hero- dotus supplies of his character, and moralized on the uselessness of his stupendous work; but there is nothing else to prove that the Egyptians themselves execrated his memory. Modern writers rather dwell on the perfect organization demanded by his scheme, the training of a nation to combined labour, the level attained here by art

and in the fitting of masonry, and finally the fact that the Great Pyramid was the oldest of the seven wonders of the ancient world and now alone of them survives. It seems that representations of deities, and indeed any represen- tations at all, were rare upon the polished walls of the great monuments of the fourth dynasty, and Petrie thinks that he can trace a violent religious revolution with confiscation of endowments at this time in the temple remains at Abydos; but none the less the wants of the deities were then attended to by priests selected from the royal family and the highest in the land. Khufu's work in the temple of Bubastis is proved by a surviving fragment, and he is figured slaying his enemy at Sinai before the god Thoth. In late times the priests of Denderah claimed Khufu as a benefactor; he was reputed to have built temples to the gods near the Great Pyramids and Sphinx (where also a pyramid of his daughter Hentsen is spoken of), and there are incidental notices of him in the medical and religious literature. The funerary cult of Khufu and Khafre was practised under the twenty-sixth dynasty, when so much that had fallen into disuse and been forgotten was revived. Khufu is a leading figure in an ancient Egyptian story (Papyrus Westcar), but it is unfortunately incomplete. He was the founder of the fourth dynasty, and was probably born ip Middle Egypt near Beni Hasan, in a town afterwards known as " Khufu's Nurse," but was connected with the Memphite third dynasty. Two tablets at the mines of Wadi Maghara in the peninsula of Sinai, a granite block from Bubastis, and a beautiful ivory statuette found by Petrie in the temple at Abydos, are almost all that can be definitely assigned to Khufu outside the pyramid at Giza and its ruined accompaniments. His date, according to Petrie, is 3969-3908 B.C., but in the shorter chronology of Meyer, Breasted and others he reigned (23 years) about a thousand years later, c. 2900 B.C.

See Herodotus ii. 124; Diodorus Siculus i. 64; Sethe in Pauly-Wissowa's Realencyclopadie, s.v. ; W. M. F. Petrie, History of Egypt, vol. i., and Abydos, part ii. p. 48; J. H. Breasted, History.

(F. Ll. G.)

CHEPSTOW, a market town and river-port in the southern parliamentary division of Monmouthshire, England, on the Wye, 2 m. above its junction with the Severn, and on the Great Western railway. Pop. of urban district (1901) 3067. It occupies the slope of a hill on the western (left) bank of the river, and is environed by beautiful

scenery. The church of St Mary, origin- ally the conventual chapel of a Benedictine priory of Norman foundation, has remains of that period in the west front and the nave, but a rebuilding of the chancel and transepts was effected in the beginning of the 19th century. The church contains many interesting monuments. The castle, still a magnificent pile, was founded in the nth century by William Fitz-Osbern, earl of Hereford, but was almost wholly rebuilt in the 13th. There are, however, parts of the original building in the keep. The castle occupies a splendid site on the summit of a cliff above the Wye, and covers about 3 acres. The river is crossed by a fine iron bridge of five arches, erected in 1816, and by a tubular railway bridge designed by Sir Isambard Brunei. There is a free passage on the Wye for large vessels as far as the bridge. From the narrowness and depth of the channel the tide rises suddenly and to a great height, forming a dangerous bore. The exports are timber, bark, iron, coal, cider and millstones. Some shipbuilding is carried on.

As the key to the passage of the Wye, Chepstow {Estrighorel, StriguU) was the site successively of British, Roman and Saxon fortifications. Domesday Book records that the Norman castle was built by William Fitz-Osbern to defend the Roman road into South Wales. On the confiscation of his son's estates, the castle was granted to the earls of Pembroke, and after its reversion to the crown in 1306, Edward II. in 1310 granted it to his half-brother Thomas de Brotherton. On the latter's death it passed, through his daughter Margaret, Lady Segrave, to the dukes of Norfolk, from whom, after again reverting to the crown, it passed to the earls of Worcester. It was confiscated by parliament and settled on Oliver Cromwell, but was restored to the earls in 1660. The borough must have grown up between 13 10, when the castle and vill were granted to Thomas de Brotherton, and 1432, when John duke of Norfolk died seised » of the castle, manor and borough of Struguil. In 1524 Charles, first earl of Worcester and then lord of the Marches, granted a new charter of incorporation to the bailiffs and burgesses of the town, which had fallen into decay. This was sustained until the reign of Charles II., when, some dispute arising between the earl of Bridgwater and the burgesses, no bailiff was appointed and the charter lapsed. Chepstow was afterwards governed by a board of twelve members. A port since early times, when the lord took dues of ships going up to the forest of Dean, Chepstow had no ancient market and no manufactures but that of glass, which was carried on for a short time within the ruins of the castle.

CHEQUE, or Check, in commercial law, a bill of exchange drawn on a banker and signed by the drawer, requiring the banker to pay on demand a certain sum in money to or to the order of a specified

person or to bearer. In this, its most modern sense, the cheque is the outcome of the growth of the banking system of the 19th century. For details see Banks and Bank- ing: Law, and Bill or Exchange. The word check, 1 of which ” cheque ” is a variant now general in English usage, signified merely the counterfoil or indent of an exchequer bill, or any draft form of payment, on which was registered the particulars of the principal part, as a check to alteration or forgery. The

1 The original meaning of ” check ” is a move in the game of chess which directly attacks the king; the word comes through the Old Fr. eschec, eschac, from the Med. Lat. form scaccus of the Persian shah, king, i.e. the king in the game of chess; cf. the origin of ” mate ” from the Arabic shah-mat, the king is dead. The word was early used in a transferred sense of a stoppage or rebuff, and so is applied to anything which stops or hinders a matter in progress, or which controls or restrains anything, hence a token, ticket or counterfoil which serves as a means of identification, &c.

check or counterfoil parts remained in the hands of the banker, the portion given to the customer being termed a ” drawn note ” or ” draft.” From the beginning of the 19th century the word ” cheque ” gradually became synonymous with ” draft ” as meaning a written order on a banker by a person having money in the banker’s hands, to pay some amount to bearer or to a person named. Ultimately, it entirely superseded the word ” draft,” and has now a statutory definition (Bills of Exchange Act 1882, s. 73) — ” a bill of exchange drawn on a banker payable on demand.” The word ” draft ” has come to have a wider meaning, that of a bill drawn by one person on another for a sum of money, or an order (whether on a banker or other) to pay money. The employment of cheques as a method of payment offering greater convenience than coin is almost universal in Great Britain and the United States. Of the transactions through the banks of the United Kingdom between 86 and 90% are conducted by means of cheques, and an even higher propor- tion in the United States. On the continent of Europe the use of cheques, formerly rare, is becoming more general, particularly in France, and to some extent in Germany.

CHER, a department of central France, embracing the eastern part of the ancient province of Berry, and parts of Bourbonnais, Nivernais and Orleanais, bounded N. by the department of Loiret, W. by Loir-et-Cher and Indre, S. by Allier and Creuse, and E. by Nievre. Pop. (1906) 343,484. Area 2819 sq. m. The territory of the department is elevated in the south, where one point reaches 1654 ft., and in the east. The centre is occupied by a wide calcareous table-land, to the north of

which stretches the plain of Sologne. The principal rivers, besides the Cher and its tributaries, are the Grande Sauldre and the Petite Sauldre on the north, but the Loire and Allier, though not falling within the department, drain the eastern districts, and are available for navigation. The Cher itself becomes navigable when it receives the Arnon and Yevre, and the communications of the department are greatly facilitated by the Canal du Berry, which traverses it from east to west, the lateral canal of the Loire, which follows the left bank of that river, and the canal of the Sauldre. The climate is temperate, and the rainfall moderate. Except in the Sologne, the soil is generally fertile, but varies considerably in different localities. The most productive region is that on the east, which belongs to the valley of the Loire; the central districts are tolerably fertile but marshy, being often flooded by the Cher; while in the south and south-west there is a considerable extent of dry and fertile land. Wheat and oats are largely cultivated, while hemp, vegetables and various fruits are also produced. The vine flourishes chiefly in the east of the arrondissement of Sancerre. The department contains a comparatively large extent of pasturage, which has given rise to a considerable trade in horses, cattle, sheep and wool for the northern markets. Nearly one-fifth of the whole area consists of forest. Mines of iron are worked, and various sorts of stone are quarried. Brick, porcelain and glassworks employ large numbers of the inhabitants. There are also flour-mills, dis- tilleries, oil-works, saw-mills and tanneries. Bourges and Vierzon are metallurgical and engineering centres. Coal and wine are leading imports, while cereals, timber, wool, fruit and industrial products are exported. The department is served by the Orleans railway, and possesses in all more than 300 m. of navigable waterways. It is divided into three arrondissements (29 cantons, 292 communes) cognominal with the towns of Bourges, Saint- Amand-Mont-Rond, and Sancerre, of which the first is the capital, the seat of an archbishop and of a court of appeal and headquarters of the VIII. army-corps. The department belongs to the academic (educational division) of Paris. Bourges, Saint-Amand-Mont-Rond, Vierzon and Sancerre (q.v.) are the principal towns. Mehun-sur- Yevre (pop. 5227), a town with an active manufacture of porcelain, has a Romanesque church and a chateau of the 14th century. Among the other interesting churches of the department, that at St Satur has a fine choir of the 14th and 15th centuries; those of Dun-sur-Auron, Plaimpied, Aix d'Angillon and Jeanvrin are Romanesque in style, while Aubigny-Ville has a church of the 12th, 13th and

15th centuries and a chateau of later date. Drevant, built on the site of a Roman town, preserves ruins of a large theatre and other remains. Among the megalithic monuments of Cher, the most notable is that at Villeneuve-sur-Cher, known as the Pierreˆde-la-Roche.

CHERAT, a hill cantonment and sanatorium in the Peshawar district of the North- West Frontier Province, India, 34 m. S.E. of Peshawar. It is situated at an elevation of 4500 ft., on the west of the Khattak range, which divides the Peshawar from the Kohat district. It was first used in 1861, and since then has been employed during the hot weather as a health station for the British troops quartered in the hot and malarious vale of Peshawar.

CHERBOURG, a naval station, fortified town and seaport of north-western France, capital of an arrondissement in the department of Manche, on the English Channel, 232 m. W.N.W. of Paris on the Ouest-Etat railway. Pop. (1906) town, 35,710; commune, 43,827. Cherbourg is situated at the mouth of the Divette, on a small bay at the apex of the indentation formed by the northern shore of the peninsula of Cotentin. Apart from a fine hospital and the church of La Trinite dating from the 15th century, the town has no buildings of special interest. A rich collection of paintings is housed in the h&tel de ville. A statue of the painter J. F. Millet, born near Cherbourg, stands in the public garden, and there is an equestrian statue of Napoleon I. in the square named after him. Cherbourg is a fortified place of the first class, headquarters of one of the five naval arrondissements of France, and the seat of a sub-prefect. It has tribunals of first instance and of commerce, a chamber of commerce, a lycee and a naval school. The chief industries of the town proper are fishing, saw-milling, tanning, leather- dressing, ship-building, iron and copper-founding, rope-making and the manufacture of agricultural implements. There are stone quarries in the environs, and the town has trade in farm produce.

Cherbourg derives its chief importance from its naval and commercial harbours, which are distant from each other about half a mile. The former consists of three main basins cut out of the rock, and has an area of 55 acres. The minimum depth of water is 30 ft. Connected with the harbour are dry docks, the yards where the largest ships in the French navy are con- structed, magazines, rope walks, and the various workshops requisite for a naval arsenal of the first class. The works and town are carefully guarded on every side by redoubts and fortifications, and are commanded by batteries on the surround- ing hills. There is a large naval hospital close to the harbour. The commerical harbour at the mouth of the Divette com- municates with

the sea by a channel 650 yds. long. It consists of two parts, an outer and tidal harbour 17I acres in extent, and an inner basin 15 acres in extent, with a depth on sill at ordinary spring tide of 25 ft. Outside these harbours is the triangular bay, which forms the roadstead of Cherbourg. The bay is admirably sheltered by the land on every side but the north. On that side it is sheltered by a huge breakwater, over 2 m. in length, with a width of 650 ft. at its base and 30 ft. at its summit, which is protected by forts, and leaves passages for vessels to the east and west. These passages are guarded by forts placed on islands intervening between the breakwater and the mainland, and themselves united to the land by breakwaters. The surface within these barriers amounts to about 3700 acres. Cherbourg is a port of call for the American, North German Lloyd and other important lines of transatlantic steamers. The chief exports are stone for road-making, butter, eggs and vegetables; the chief imports are coal, timber, superphosphates and wine from Algeria. Great Britain is the principal customer.

Cherbourg is supposed by some investigators to occupy the site of the Roman station of Coriallum, but nothing definite is known about its origin. The name was long regarded as a corruption of Caesaris Burgus (Caesar's Borough). William the Conqueror, under whom it appears as Carusbur, provided it with a hospital and a church; and Henry II. of England on several occasions chose it as his residence. In 1295 it was

pillaged by an English fleet from Yarmouth; and in the 14th century it frequently suffered during the wars against the English. Captured by the English in 1418 after a four months' siege, it was recovered by Charles VII. of France in 1450. An attempt was made under Louis XIV. to construct a military port; but the fortifications were dismantled in 1688, and further damage was inflicted by the English in 1758. In 1686 Vauban planned harbour- works which were begun under Louis XVI. and continued by Napoleon I. It was left, however, to Louis Philippe, and particularly to Napoleon III., to complete them, and their successful realization was celebrated in* 1858, in the presence of the queen of England, against whose dominions they had at one time been mainly directed. At the close of 1857, £8,000,000, of which the breakwater cost over £2,500,000, had been expended on the works; in 1889 a further sum of £680,000 was voted by the Chamber of Deputies for the improvement of the port.

CHERBULIEZ, CHARLES VICTOR (1829-1899), French novelist and miscellaneous writer, was born on the 19th of July 1829, at Geneva, where his father, Andre Cherbuliez (1795-1874), was a classical professor at the university. He was descended from a family of

Protestant refugees, and many years later Victor Cherbuliez resumed his French nationality, taking advantage of an act passed in the early days of the Revolution. Geneva was the scene of his early education; thence he proceeded to Paris, and afterwards tp the universities of Bonn and Berlin. He returned to his native town and engaged in the profession of teaching. After his resumption of French citizenship he was elected a member of the Academy (1881), and having received the Legion of Honour in 1870, he was promoted to be officer of the order in 1892. He died on the 1st of July 1899. Cherbuliez was a voluminous and successful writer of fiction. His first book, originally published in i860, reappeared in 1864 under the title of Un Cheval de Phidias: it is a romantic study of art in the golden age of Athens. He went on to produce a series of novels, of which the following are the best known: — Le Comle Kostia (1863), Le Prince Vitale (1864), Le Roman d'une honnete femtne (1866), L'Aventure de Ladislas Bolski (1869), Miss Rovel (1875), Samuel Brohl et Cie (1877), L'Idee de Jean T Sterol (1878), Noirs et rouges (1881), La Vocation du Comte Ghislain (1888), Vne Gageure (1890), Le Secret du pricepleur (1893), Jacquine Vanesse (1898), &c. Most of these novels first appeared in the Revue des deux mondes, to which Cherbuliez also contributed a number of political and learned articles, usually printed with the pseudonym G. Valbert. Many of these have been published in collected form under the titles L'Allemagne politique (1870), L'Espagne politique (1874), Profils Strangers (1889), L' Art et la nature (1892) , &c. The volume Etudes dc litterature et d'art (1873) includes articles for the most part reprinted from Le Temps. The earlier novels of Cherbuliez have been said with truth to show marked traces of the influence of George Sand; and in spite of modification, his method was that of an older school. He did not possess the sombre power or the intensely analytical skill of some of his later contemporaries, but his books are distinguished by a freshness and honesty, fortified by cosmo- politan knowledge and lightened by unobtrusive humour, which fully account for their wide popularity in many countries besides his own. His genius was the reverse of dramatic, and attempts to present two of his stories on the stage have not succeeded. His essays have all the merits due to liberal observation and thoroughness of treatment; their style, like that of the novels, is admirably lucid and correct. (C.)

CHERCHEL, a seaport of Algeria, in the arrondissement and department of Algiers, 55 m. W. of the capital. It is the centre of an agricultural and vine-growing district, but is commercially of no great importance, the port, which consists of part only of the inner port of Roman days, being small and the entry difficult. The town is chiefly

noteworthy for the extensive ruins of former cities on the same site. Of existing buildings the most remarkable is the great Mosque of the Hundred Columns, now used as a military hospital. The mosque contains 89 columns of diorite, surmounted by a variety of capitals brought from other buildings.

The population of the town in 1906 was 4733; of the commune of which Cherchel is the centre 11,088.

Cherchel was a city of the Carthaginians, who named it Jol. Juba II. (25 B.C.) made it the capital of the Mauretanian king- dom under the name of Caesarea. Juba's tomb, the so-called Tombeau de la Chretienne (see Algeria), is ˆk m. E. of the town. Destroyed by the Vandals, Caesarea regained some of its im- portance under the Byzantines. Taken by the Arabs it was renamed by them Cherchel. Khair-ed-Din Barbarossa captured the city in 1520 and annexed it to his Algerian pashalik. In the early years of the 18th century it was a commercial city of some importance, but was laid in ruins by a terrible earthquake in 1738. In 1840 the town was occupied by the French. The ruins suffered greatly from vandalism during the early period of French rule, many portable objects being removed to museums in Paris or Algiers, and most of the monuments destroyed for the sake of their stone. Thus the dressed stones of the ancient theatre served to build barracks; the material of the hippodrome went to build the church; while the portico of the hippodrome, supported by granite and marble columns, and approached by a fine flight of steps, was destroyed by Cardinal Lavigerie in a search for the tomb of St Marciana. The fort built by Arouj Barbarossa, elder brother of Khair-ed-Din, was completely destroyed by the French. There are many fragments of a white marble temple. The ancient cisterns still supply the town with water. The museum contains some of the finest statues discovered in Africa. They include colossal figures of Aesculapius and Bacchus, and the lower half of a seated Egyptian divinity in black basalt, bearing the cartouche of Tethmosis (Thothmes) I. This statue was found at Cherchel, and is held by some archaeologists to indicate an Egyptian settlement here about 1500 B.C.

See Africa, Roman, and the description of the museum by P. Gauckler in the Musees et collections archeologiques de VAlgerie.

CHERCHEN, a town of East Turkestan, situated at the northern foot of

the Altyn-tagh, a range of the Kuen-lun, in 85 35′ E., and on the Cherchen-darya, at an altitude of 4100 ft. It straggles mostly along the irrigation channels that go off from the left side of the river, and in 1900 had a population of about 2000. The Cherchen-darya, which rises in the Arka-tagh, a more southerly range of the Kuen-lun, in 87° E. and 36 20′ N., flows north until it strikes the desert below Cherchen, after which it turns north-east and meanders through a wide bed (300-400 ft.), beset with dense reeds and flanked by older channels. It is probable that anciently it entered the disused channel of the Ettek-tarim, but at present it joins the existing Tarim in the lake of Kara-buran, a sort of lacustrine ” ante-room ” to the Kara-koshun (N. M. Przhevalsky’s Lop-nor). At its entrance into the former lake the Cherchen-darya forms a broad delta. The river is frozen in its lower course for two to three months in the winter. From the foot of the mountains to the oasis of Cherchen it has a fall of nearly 4000 ft., whereas in the 300 m. or so from Cherchen to the Kara-buran the fall is 140c ft. The total length is 500-600 m., and the drainage basin measures 6000-7000 sq. m.

See Sven Hedin, Scientific Results of a Journey in Central Asia, i8gg-ig02, vols. i. and ii. (1905-1906) ; also Takla-Makan.

CHEREMISSES, or Tcheremisses, a Finnish people living in isolated groups in the governments of Kazan, Viatka, Novgorod, Perm, Kostroma and Ufa, eastern Russia. Their name for themselves is Mori or Mari (people) , possibly identifiable with the ancient Merians of Suzdalia. Their language belongs to the Finno-Ugrian family. They number some 240,000. There are two distinct physical types: one of middle height, black-haired, brown skin and flat-faced; the other short, fair-haired, white skinned, with narrow eyes and straight short noses. Those who live on the right bank of the Volga are sometimes known as Hill Cheremis, and are taller and stronger than those who inhabit the swamps of the left bank. They are farmers and herd horses and cattle. Their religion is a hotchpotch of Shamanism, Mahommedanism and Christianity. They are usually mono- gamous. The chief ceremony of marriage is a forcible abduction

of the bride. The women, naturally ugly, are often disfigured by sore eyes caused by the smoky atmosphere of the huts. They wear a head-dress, trimmed with glass jewels, forming a hood behind stiffened with metal. On their breasts they carry a breastplate formed of coins, small bells and copper disks.

See Smirinov, Mordres et Tcheremisses (Paris, 1895) ; J- Aber-cromby, Pre- and Proto-historic Finns (London, 1898).

CHERIBON, a residency of the island of Java, Dutch East Indies, bounded S. and W. by the Preanger regencies, N.W. by Krawang, N. by the Java Sea, and E. by the residencies of Tegal and Banyumas. Pop. (1897) 1,577,521, including 867 Europeans, 2 1 ,108 Chinese, and 2016 Arabs and other Asiatic foreigners. The natives consist of Middle Javanese in the north and Sundanese in the south. Cheribon has been for many centuries the centre of Islamism in western Java, and is also the seat of a fanatical Mahommedan sect controlled from Mecca. The native population is on the whole orderly and prosperous. The northern half of the residency is flat and marshy in places, especially in the north- western corner, while the southern half is mountainous. In the middle stands the huge volcano Cherimai, clad with virgin forest and coffee plantations, and surrounded at its foot by rice fields. South-south-west of Cherimai on the Preanger border is the Sawal volcano, at whose foot is the beautiful Penjalu lake. Sulphur and salt springs occur on the slopes of Cherimai, and near Palimanan there is a cavernous hole called Guwagalang (or Payagalang) , which exhales carbonic acid gas, and is considered holy by the natives and guarded by priests. There is a similar hole in the Preanger. The principal products of cultivation are sugar, coffee, rice and also tea and pulse (rachang), the planta- tions being for the most part owned by Europeans. The chief towns are Cheribon, a seaport and capital of the residency, the seaport of Indramaya, Palimanan, Majalengka, Kuningan and Chiamis. Cheribon has a good open roadstead. The town is very old and irregularly built, and the climate is unhealthy; nevertheless it has a lively export trade in sugar and coffee and is a regular port of call. In 1908 the two descendants of the old sultans of Cheribon still resided there in their respective Kratons or palaces, and each received an annual income of over £1500 for the loss of his privileges. A country residence belonging to one of the sultans is situated close to Cheribon and is much visited on account of its fantastic architecture. Indramaya was a considerable trading place in the days of the early Portuguese and Dutch traders. Kuningan is famous for a breed of small but strong horses.

CHERKASY (Polish, Czerkasy), a town of Russia, in the government of Kiev, 96 m. S.E. of Kiev, on the right bank of the Dnieper. Pop. (1883) 15,740; (1897) 26,619. The inhabitants (Little Russians) are mostly employed in agriculture and garden- ing; but sugar and tobacco are manufactured and spirits distilled. Cherkasy was an important town of the Ukraine in the 15th century, and remained so, under Polish rule, until the revolt of the Cossack hettnan Chmielnicki (1648). It was annexed by Russia in 1795.

CHERNIGOV, a government of Little Russia, on the left bank of the

Dnieper, bounded by the governments of Mogilev and Smolensk on the N., Orel and Kursk on the E., Poltava on the S., and Kiev and Minsk on the W. Area, 20,233 sq. m. Its surface is an undulating plain, 650 to 750 ft. high in the north and 370 to 600 ft. in the south, deeply grooved by ravines and the valleys of the rivers. In the north, beyond the Desna river, about one-third of the area is under forest (rapidly disappearing), and marshes occur along the courses of the rivers; while to the south of the Desna the soil is dry and sometimes sandy, and gradually it assumes the characters of a steppe-land as one proceeds southward. The government is drained by the Dnieper, which forms its western boundary for 180 m., and by its tributary the Desna. The latter, which flows through Chernigov for nearly 350 m., is navigable, and timber is brought down its tributaries. The climate is much colder in the wooded tracts of the north than in the south; the average yearly temperature at the city of Chernigov is 44-4° F. (January, 23°; July 68-5°).

The population reached 1,996,250 in 1883, 2,316,818 in 1897,

and 2,746,300 (estimate) in 1906. It is chiefly Little Russian (85-6%); but Great Russians (6-i%), mostly Raskolniks, i.e. nonconformists, and White Russians (S‘6%) inhabit the northern districts. There are, besides, some Germans, as well as Greeks, at Nyezhin. Agriculture is the principal occupation; in the north, however, many of the inhabitants are engaged in the timber trade, and in the production of tar, pitch, wooden wares, leather goods and so forth. Cattle-breeding is carried on in the central districts. Beet is extensively cultivated. The cultivation of tobacco is increasing. Hemp is widely grown in the north, and the milder climate of the south encourages gardening. Bee-keeping is extensively carried on by the Raskol- niks. Limestone, grindstones, china-clay and building-stone are quarried. Manufactures have begun to develop rapidly of late, the most important being sugar-works, distilleries, cloth- mills and glass-works. The government is divided into fifteen districts, their chief towns being Chernigov (g.v.), Borzna (pop. 12,458 in 1897), Glukhov (14,856), Gorodnya (4197), Konotop (23,083), Kozelets (5160), Krolevets (10,375), Mglin (7631), Novgorod-Syeversk (9185), Novozybkov (15,480), Nyezhin (32,481), Oster (5384), Sosnitsa (2507), Starodub (12,451) and Surazh (4004).

CHERNIGOV, a town of Russia, capital of the above govern- ment, on the right bank of the Desna, nearly half a mile from the river, 141 m.

by rail N.E. of Kiev on a branch line. Pop. (1897) 27,006. It is an archiepiscopal see and possesses a cathedral of the nth century. In 907 the city is mentioned in the treaty of Oleg as next in importance to Kiev, and in the nth century it became the capital of the principality of Syeversk and an important commercial city. The Mongol invasion put an end to its prosperity in 1239. Lithuania annexed it in the 14th century, but it was soon seized by Poland, which held it until the 1 7th century. In 1686 it was definitely annexed to Russia.

CHEROKEE (native Tsalagi, ” cave people “), a tribe of North American Indians of Iroquoian stock. Next to the Navaho they are the largest “tribe in the United States and live mostly in Oklahoma (formerly Indian territory). Before their removal they possessed a large tract of country now distributed among the states of Alabama, Georgia, Mississippi, Tennessee and the west of Florida. Their chief divisions were then settled around the head-waters of the Savannah and Tennessee rivers, and were distinguished as the Elati Tsalagi or Lower Cherokees, i.e. those in the plains, and Atali Tsalagi or Upper Cherokees, i.e. those on the mountains. They were further divided into seven exogamous clans. Fernando de Soto travelled through their country in 1540, and during the next three centuries they were important factors in the history of the south. They attached themselves to the English in the disputes and contests which arose between the European colonizers, formally recog- nized the English king in 1730, and in 1755 ceded a part of their territory and permitted the erection of English forts. Unfortunately this amity was interrupted not long after; but peace was again restored in 1761. When the revolutionary war broke out they sided with the royalist party. This led to their subjugation by the new republic, and they had to surrender that part of their lands which lay to the south of the Savannah and east of the Chattahoochee. Peace was made in 1781, and in 1785 they recognized the supremacy of the United States and were confirmed in their possessions. In 1820 they adopted a civilized form of government, and in 1827, as a ” Nation,” a formal constitution. The gradual advance of white immigration soon led to disputes with the settlers, who desired their removal, and exodus after exodus took place; a small part of the tribe agreed (1835) to remove to another district, but the main body remained. An appeal was made by them to the United States government; but President Andrew Jackson refused to interfere. A force of 2000 men, under the command of General Winfield Scott, was sent in 1838, and the Cherokees were compelled to emigrate to their present position. After the settlement various disagreements between the eastern and western Cherokees continued for some time, but in 1839 a union was effected. In the

Civil War they all at first sided with the

South; but before long a strong party joined the North, and this led to a disastrous internecine struggle. On the close of the contest they were confirmed in the possession of their territory, but were forced to give a portion of their lands to their eman- cipated slaves. Their later history is mainly a story of hopeless struggle to maintain their tribal independence against the white man. In 1892 they sold their western territory known as the ” Cherokee outlet.” Until 1906, when tribal government virtually ceased, the ” nation ” had an elected chief, a senate and house of representatives. Many of them have become Christians, schools have been established and there is a tribal press. Those in Oklahoma still number some 26,000, though most are of mixed blood. A group, known as the Eastern Band, some 1400 strong, are on a reservation in North Carolina. Their language consists of two dialects — a third, that of the ” Lower ” branch, having been lost. The syllabic alphabet invented in 182 1 by George Guess (Sequoyah) is the character employed.

See also Handbook of American Indians (Washington, 1907); T. V. Parker, Cherokee Indians (N. Y., 1909) ; and Indians, North American.

CHEROOT, or Sheroot (from the Tamil word ” shuruttu,” a roll) , a cigar made from tobacco grown in southern India and the Philippine Islands. It was once esteemed very highly for its delicate flavour. A cheroot differs from other cigars in having both ends cut square, instead of one being pointed, and one end considerably larger than the other.

CHERRAPUNJI, a village in the Khasi hills district of Assam. It is notable as having the heaviest known rainfall in the world. In 1861 it registered a total of 905 in., and its annual average is 458 in. This excessive rainfall is caused by the fact that Cherrapunji stands on the edge of the plateau overlooking the plains of Bengal, where it catches the full force of the monsoon as it rises from the sea. There is a good coal-seam in the vicinity.

CHERRY. As a cultivated fruit-tree the cherry is generally supposed to be of Asiatic origin, whence, according to Pliny, it was brought to Italy by Lucullus after his defeat of Mithradates, king of Pontus, 68 B.C. As with most plants which have been long and extensively cultivated, it is a matter of difficulty, if not an impossibility, to identify the parent stock of the numerous cultivated varieties of cherry; but they are generally referred to two species: Prunus Cerasus, the wild or dwarf cherry, the origin of the morello, duke and Kentish

cherries, and P. Avium, the gean, the origin of the geans, hearts and bigarreaus. Both species grow wild through Europe and western Asia to the Himalayas, but the dwarf cherry has the more restricted range of the two in Britain, as it does not occur in Scotland and is rare in Ireland. The cherries form a section Cerasus of the genus Prunus; and they have sometimes been separated as a distinct genus from the plums proper; both have a stone-fruit or drupe, but the drupe of the cherry differs from that of the plum in not having a waxy bloom; further, the leaves of the plum are rolled (convolute) in the bud, while those of the cherry are folded (con- duplicate) .

The cherries are trees of moderate size and shrubs, having smooth, serrate leaves and white flowers. They are natives of the temperate regions of both hemispheres ; and the cultivated varieties ripen their fruit in Norway as far as 63° N. The geans are generally distinguished from the common cherry by the greater size of the trees, and the deeper colour and comparative insipidity of the flesh in the ripe fruit, which adheres firmly to the ” nut ” or stone; but among the very numerous cultivated varieties specific distinctions shade away so that the fruit cannot be ranged under these two heads. The leading varieties are recognized as bigarreaus, dukes, morellos and geans. Severa’ varieties are cultivated as ornamental trees and on account of their flowers.

The cherry is a well-flavoured sub-acid fruit, and is much esteemed for dessert. Some of the varieties are particularly selected for pies, tarts, &c, and others for the preparation of preserves, and for making cherry brandy. The fruit is also very extensively employed in the preparation of the liqueurs known as kirschwasser, ratafia and maraschino. Kirschwasser is made

chiefly on- the upper Rhine from the wild’ black gean, and in the manufacture the entire fruit-flesh and kernels are pulped up and allowed to ferment. By distillation of the fermented pulp the liqueur is obtained in a pure, colourless condition. Ratafia is similarly manufactured, also by preference from a gean. Maraschino, a highly valued liqueur, the best of which is produced at Zara in Dalmatia, differs from these in being distilled from a cherry called marasca, the pulp of which is mixed with honey, honey or sugar being added to the distillate for sweetening. It is also said that the flavour is heightened by the use of the leaves of the perfumed cherry, Prunus Mahaleb, a

native of central and southern Europe.

The wood of the cherry tree is valued by cabinetmakers, and that of the gean tree is largely used in the manufacture of tobacco pipes. The American wild cherry, Prunus serotina, is much sought after, its wood being compact, fine-grained, not liable to warp, and susceptible of receiving a brilliant polish. The kernels of the perfumed cherry, P. Mahaleb, are used in confectionery and for scent. A gum exudes from the stem of cherry trees similar in its properties to gum arabic.

The cherry is increased by budding on the wild gean, obtained by sowing the stones of the small black or red wild cherries. To secure very dwarf trees the Prunus Mahaleb has been used for the May duke, Kentish, morello and analogous sorts, but it is not adapted for strong-growing varieties like the bigarreaus. The stocks are budded, or, more rarely, grafted, at the usual seasons. The cherry prefers a free, loamy soil, with a well- drained subsoil. Stiff soils and dry gravelly subsoils are both unsuitable, though the trees require a large amount of moisture, particularly the large-leaved sorts, such as the bigarreaus. For standard trees, the bigarreau section should be planted 30 ft. apart, or more, in rich soil, and the May duke, morello and similar varieties 20 or 25 ft. apart; while, as trained trees against walls and espaliers, from 20 to 24 ft. should be allowed for the former, and from 1 5 to 20 ft. for the latter. In forming the stems of a standard tree the temporary side-shoots should not be allowed to attain too great a length, and should not be more than two years old when they are cut close to the stem. The first three shoots retained to form the head should be shortened to about 15 in., and two shoots from each encouraged, one at the end, and the other 3 or 4 in. lower down. When these have become established, very little pruning will be required, and that chiefly to keep the principal branches as nearly equal in strength as possible for the first few years. Espalier trees should have the branches about a foot apart, starting from the stem with an upward curve, and then being trained horizontally. In summer pruning the shoots on the upper branches must be shortened at least a week before those on the lower ones. After a year or two clusters of fruit buds will be developed on spurs along the branches, and those spurs will continue productive for an indefinite period. For wall trees any form of training may be adopted; but as the fruit is always finest on young spurs, fan-training is probably the most advantageous. A succession of young shoots should be laid in every year. The morello, which is of twiggy growth and bears on the young wood, must be trained in the fan form, and care should be taken to avoid the very common error of crowding its branches.

Forcing. — The cherry will not endure a high temperature nor dose atmosphere. A heat of 45° at night will be sufficient at starting, this being gradually increased during the first few weeks to 55°, but lowered again when the blossom buds are about to open. After stoning the temperature may be again gradually raised to 60°, and may go up to 70 by day, or 75° by sun heat, and 6o° at night. The best forcing cherries are the May duke and the royal duke, the duke cherries being of more compact growth than the bigarreau tribe and generally setting better; nevertheless a few of the larger kinds, such as bigarreau Napoleon, black tartarian and St Margaret's, should be forced for variety. The trees may be either planted out in tolerably rich soil, or grown in large pots of good turfy friable calcareous loam mixed with rotten dung. If the plants are small, they may be put into 12-in. pots in the first instance, and after a year shifted into

15-in. pots early in autumn, and plunged in some loose or even very slightly fermenting material. The soil of the pots should be protected from snow-showers and cold rains. Occasionally trees have been taken up in autumn with balls, potted and forced in the following spring; but those which have been established a year in the pots are to be preferred. Such only as are well furnished with blossom-buds should be selected. The trees should be removed to the forcing house in the beginning of December, if fruit be required very early in the season. During the first and second weeks it may be kept nearly close; but, as vegetation advances, air becomes absolutely necessary during the day, and even at night when the weather will permit. If forcing is commenced about the middle or third week of December, the fruit ought to be ripe by about the end of March. After the fruit is gathered, the trees should be duly supplied with water at the root, and the foliage kept well syringed till the wood is mature. (See also Fruit and Flower Farming.)

CHERRYVALE, a city of Montgomery county, Kansas, U.S.A., about 140 m. S.S.E. of Kansas City. Pop, (1890) 2104; (1000) 3472, including 180 negroes; (1905, state census) 5089; (1910) 4304. It is served by the Atchison, Topeka & Santa Fe, and the main line and a branch (of which it is a terminus) of the St Louis & San Francisco railways. It is in a farming district and in the Kansas natural-gas and oil-field, and has large zinc smelters, an oil refinery, and various manufactures, including vitrified brick, flour, glass, cement and ploughs. Cherryvale was laid out in 1 87 1 by the Kansas City, Lawrence & South Kansas Railway Company (later absorbed by the Atchison, Topeka & Santa Fe). The main part of the town was destroyed by fire in 1873, but was soon rebuilt, and in 1880 Cherryvale became a city of the third and afterwards of the second

class. Natural gas, which is used as a factory fuel and for street and domestic lighting, was found here in 1889, and oil several years later.

CHERRY VALLEY, a village of Otsego county, New York, U.S.A., in a township of the same name, 68 m. N.W. of Albany. Pop. (1890) 685; (1900) 772; (1905) 746; (1910) 792; of the township (1910) 1706. It is served by the Delaware & Hudson railway. Cherry Valley is in the centre of a rich farming and dairying region, has a chair factory, and is a summer resort with sulphur and lithia springs. It was the scene of a terrible massacre during the War of Independence. The village was attacked on the nth of November 1778 by Walter Butler (d. 1781) and Joseph Brant with a force of 800 Indians and Tories, who killed about 50 men, women and children, sacked and burned most of the houses, and carried off more than 70 prisoners, who were subjected to the greatest cruelties and privations, many of them dying or being tomahawked before the Canadian settlements were reached. Cherry Valley was incorporated in 1812.

CHERSIPHRON, a Cretan architect, the traditional builder (with his son Metagenes) of the great Ionic temple of Artemis at Ephesus set up by the Greeks in the 6th century. Some remains of this temple were found by J. T. Wood and brought to the British Museum. In connexion with the pillars, which are adorned with archaic reliefs, a fragmentary inscription has been found, recording that they were presented by King Croesus, as indeed Herodotus informs us. This temple was burned on the day on which Alexander the Great was born.

CHERSO, an island in the Adriatic Sea, off the east coast of Istria, from which it is separated by the channel of Farasina. Pop. (1900) 8274. It is situated in the Gulf of Quarnero, and is connected with the island of Lussin, lying on the S.W. by a turn bridge over the small channel of Ossero, and with the island of Veglia, lying on the E. by the Canale di Mezzo. These three are the principal islands of the Quarnero group, and form together the administrative district of Lussin in the Austrian crownland of Istria. Cherso is an elongated island about 40 m. long, 1 J to 7 m. wide, and has an area of 150 sq. m. It is traversed by a range of mountains, which attain in the peak of Syss an altitude of 2090 ft. and form natural terraces, planted with vines and olive trees, specially in the middle and southern parts of the island. The northern part is covered with bushes of laurel

and mastic, but there are scarcely any large trees. There is a scarcity of springs, and the bouses are generally furnished with cisterns for rain water. In the centre of the island is an interesting lake called the Vrana or Crow's Lake, situated at an altitude of 40 ft. above, the level of the sea, 3J m. long, 1 m. wide and 184 ft. deep. This lake is in all probability fed by subterranean sources. The- chief town of the island is Cherso, situated on the west coast. It possesses a good harbour and is provided with a shipwright's wharf.

CHERSONESE, Chersonesus, or Cherronesus (Gr. ykpacK, dry, and vrjaos, island), a word equivalent to " peninsula." In ancient geography the Chersonesus Thracica, Chersonesus Taurica or Scythica, and Chersonesus Cimbrica correspond to the peninsulas of the Dardanelles, the Crimea and Jutland; and the Golden Chersonese is usually identified with the peninsula of Malacca. The Tauric Chersonese was further distinguished as the Great, in contrast to the Heracleotic or Little Chersonese at its S.W. corner, where Sevastopol now stands.

The Tauric Chersonese 1 (from 2nd century a.d. called Cherson) was a Dorian colony of Heraclea in Bithynia, founded in the 5th century B.C. in the Crimea about 2 m. S. of the modern Sevastopol. After defending itself against the kingdom of Bosporus (q.v.), and the native Scythians and Tauri, and even extending its power over the west coast of the peninsula, it was compelled to call in the aid of Mithradates VI. and his general Diophantus, c. no B.C., and submitted to the Pontic dynasty. On regaining a nominal independence, it came more or less under the Roman suzerainty. In the latter part of the 1st century a.d., and again in the succeeding century, it received a Roman garrison and suffered much interference in its internal affairs. In the time of Constantine, in return for assistance against the Bosporans and the native tribes, it regained its autonomy and received special privileges. It must, however, have been subject to the Byzantine authorities, as inscriptions testify to restorations of its walls by Byzantine officials. Under Theophilus the central government sent out a governor to take the place of the elected magistrate. Even so it seems to have preserved a measure of self-government and may be said to have been the last of the Greek city states. Its ruin was brought about by the commercial rivalry of the Genoese, who forbade the Greeks to trade there and diverted its commerce to Caffa and Sudak. Previous to this it had been the main emporium of Byzantine commerce upon the N. coast of the Euxine. Through it went the communications of the empire with the Petchenegs and other native tribes, and more especially with the Russians. The commerce of Cherson is guaranteed in the early treaties between the Greeks and Russians, and it was in Cherson, according to

Ps. Nestor's chronicle, that Vladimir was baptized in 988 after he had captured the city. The constitution of the city was at first democratic under Damiorgi, a senate and a general assembly. Latterly it appears to have become aristo- cratic, and most of the power was concentrated in the hands of the first archon or Proteuon, who in time was superseded by the strategus sent out from Byzantium. Its most interesting political document is the form of oath sworn to by all the citizens in the 3rd century B.C.

The remains of the city occupy a space about two-thirds of a mile long by half a mile broad. They are enelosed by a Byzantine wall. Foundations and considerable remains of a Greek wall going back to the 4th century B.C. have been found beneath this in the eastern or original part of the site. Many Byzantine churches, both cruciform and basilican, have been excavated. The latter survived here into the 13th century when they had long been extinct in other Greek-speaking lands. The churches were adorned with frescoes, wall and floor mosaics, some well preserved, and marble carvings similar to work found at Ravenna; The fact that the site has not been inhabited since the 14th century makes it important for our knowledge of Byzantine life. The city was used by the Romans as a place of banishment : St Clement of Rome was exiled hither and first preached the

1 In Pliny " Heraclea Chersonesus," probably owing to a confusion with the name of the mother city.

Gospel; another exile was Justinian II., who is said to 'have destroyed the city in revenge. We have a considerable series of coins from the 3rd century b.c. to about a.d. 200, and also some of Byzantine date.

See B. Koehne, Beitrdge zur Geschichte von Cherronesus in Taurien (St Petersburg, 1848) ; art. " Chersonesos " (20) by C. G. Brandis in Pauly-Wissowa, Realencyclopadie, vol. iii. 221; A. A. Bobrinskoj, Chersonesus Taurica (St Petersburg, 1905) (Russian) ; V. V. Laty- shev, Inscrr. Orae Seplentr . Ponti Euxini,vo\s.i. and iv. Reports of ex-cavations appear in the Compte rendu of the Imperial Archaeological Commission of St Petersburg from 1888 and in its Bulletin. See E. H. Minns, Scythians and Creeks (Cambridge, 1907). (E. H. M.)

CHERTSEY, a market town in the Chertsey parliamentary division of Surrey, England, 22 m. W.S.W. from London by the London & South-Western railway. Pop. of urban district (1901) 12,762. It is pleasantly situated on the right bank of the Thames, which is crossed by a bridge of seven arches, built of Purbeck stone in 1785. The parish church, rebuilt in 1808; contains a tablet to Charles James Fox, who resided at

St Anne's Hill in the vicinity, and another to Lawrence Tomson, a translator of the New Testament in the 17th century. Hardly any remains are left of a great Benedictine abbey, whose buildings at one time included an area of 4 acres. They fell into almost complete decay in the 17th century, and a " fair house " was erected out of the ruins by Sir Nicholas Carew of Beddington. The ground-plan can be traced; the fish-ponds are complete; and carved stones, coffins and encaustic tiles of a peculiar manufacture are frequently exhumed. Among the abbots the most famous was John de Rutherwyk, who was appointed in 1307, and continued, till his death in 1346, to carry on a great system of alteration and extension, which almost made the abbey a new building. The house in which the poet Cowjey spent the last years of his life remains, and the chamber in which he died is preserved unaltered. The town is the centre of a large residential district. Its principal trade is in produce for the London markets.

The first religious settlement in Surrey, a Benedictine abbey, was founded in 666 at Chertsey (Cerotesei, Certesey), the manor of which belonged to the abbot until 1 539, since when it has been a possession of the crown. In the reign of Edward the Confessor Chertsey was a large village and was made the head of Godley hundred. The increase of copyhold under Abbot John de Rutherwyk led to discontent, the tenants in 1381 rising and burning the rolls. Chertsey owed its importance primarily to the abbey, but partly to its geographical position. Ferries over the Redewynd were subjects of royal grant in 1340 and 1399; the abbot built a new bridge over the Bourne in 1333, and wholly maintained the bridge over the Thames when it replaced the 14th century ferry. In 1410 the king gave permission to build a bridge over the Redewynd. As the centre of an agri- cultural district the markets of Chertsey were important and aire still held. Three days' fairs were granted to the abbots in 1 1 29 for the feast of St Peter ad Vincula by Henry III. for Holy Rood day; in 1282 for Ascension day; and a market on Mondays was obtained in 1282. In 1 590 there were many poor, for whose relief Elizabeth gave a fair for a day in Lent and a market on Thursdays. These fairs still survive.

See Lucy Wheeler, Chertsey A bbey (London, 1905) ; Victoria County History, Surrey.

CHERUBIM, the Hebrew plural of "cherub" (kgrub), imaginary winged animal figures of a sacred character, referred to in the description of Solomon's temple (1 Kings vi. 23-35, vii. 29, viii. 6, 7), and also in that of the ark of the tabernacle (Ex. xxv. 18-22, xxvi. 1, 31, xxxvii. 7-9). The cherub-images, where such occur, represent to the imagination the supernatural bearers of Yahweh's throne or chariot, or

the guardians of His abode; the cherub-carvings at least symbolize His presence, and communicate some degree of His sanctity. In Gen. iii. 24 the cherubim are the guards of Paradise; Ezek. xxviii. 14, 16 cannot be mentioned here, the text being corrupt. We also find (1 Sam. iv. 4; 2 Sam. vi. 2) as a divine title ” that sitteth upon the cherubim”; here it is doubted whether the cherubim are the material ones in the temple, or those which faith assumes and

the artist tries to represent — the supernatural steeds upon which Yahweh issues forth to interfere in human affairs. In a poetic theophany (Ps. xviii. 10) we find ” upon a cherub ” parallel to “upon the wings of the wind” (cp. Isa. xix. 1; Ps. civ. 3). One naturally infers from this that the ” cherub ” was sometimes viewed as a bird. For the clouds, mythologically, are birds. ” The Algonkins say that birds always make the winds, that they create the waterspouts, and that the clouds are the spreading and agitation of their wings.” ” The Sioux say that the thunder is the sound of the cloud-bird flapping his wings.” If so, Ps. xviii. 10 is a solitary trace of the archaic view of the cherub. The bird, however, was probably a mythic, extra-natural bird. At any rate the cherub was suggested by and represents the storm- cloud, just as the sword in Gen. iii. 24 corresponds to the lightning. In Ezek. i. the four visionary creatures are expressly connected with a storm-wind, and a bright cloud (ver. 4). Elsewhere (xli. 18) the cherub has two faces (a man’s and a bird’s), but in i. 10 and x. 14 each cherub has four faces, a view tastefully simplified in the Johannine Apocalypse (Rev. iv. 7).

It is best, however, to separate Ezekiel from other writers, since he belongs to what may be called a great mythological revival. Probably his cherubim are a modification of older ones, which may well have been of a more sober type. His own accounts, as we have seen, vary. Probably the cherub has passed through several phases. There was a mythic bird-cherub, and then perhaps a winged animal-form, analogous to the winged figures of bulls and lions with human faces which guarded Babylonian and Assyrian temples and palaces. Another analogy is furnished by the winged genii represented as fertilizing the sacred tree — the date-palm (Tylor); here the body is human, though the face is sometimes that of an eagle. It is perhaps even more noteworthy that figures thought to be cherubs have been found at Zenjirli, within the ancient North Syrian kingdom of Ya’di (see Jeremias, Das Alte Testament im Lichte des Alien Orients, pp. 350 f.);

we may combine this with the fact that one of the great gods of this kingdom was called Rakab'el or Rekub'el (also perhaps Rakab or Rekub). A Sabaean (S. Arabian) name Karab'el also exists. The kerubim might perhaps be symbolic representatives of the god Rakab'el or Rekub'el, probably equivalent to Hadad, whose sacred animal was the bull. That the figures symbolic of Rakab or Hadad were compounded or amalgamated by the Israelites with those symbolic of Nergal (the lion-god) and Ninib (the eagle-god), is not surprising.

See further " Cherubim," in Ency. Bib. and Hast. D.B.; Cheyne, Genesis; Tylor, Proc. Soc. Bibl. Arch. xii. 383 ft.; Zimmern, Die Keilinschriften und das Alte Testament, pp. 529 f., 631 f . ; Dibelius, Die Lade Jahves (1906), pp. 72-86. (T. K. C.)

CHERUBINI, MARIA LUIGI CARLO ZENOBIO SALVATORE

(1 760-1842), Italian musical composer, was born at Florence on the 14th of September 1760, and died on the 15th of March 1842 in Paris. His father was accompanist {Maestro al Cembalo) at' the Pergola theatre. Cherubini himself, in the preface of his autograph catalogue of his own works, states, " I began to learn music at six and composition at nine, the former from my father, the latter from Bartolomeo and Alessandro Felici, and, after their death, from Bizzarri and J Castrucci." By the time he was sixteen he had composed a great deal of church music, and in 1777 he went to Bologna, where for four years he studied under Sarti. This deservedly famous master well earned the gratitude which afterwards impelled Cherubini to place one of his double choruses by the side of his own Et Vitam Venturi as the crown of his Treatise on Counterpoint and Fugue, though the juxta- position is disastrous for Sarti. But besides grounding Cherubini in the church music for which he had early shown so special a bent, Sarti also trained him in dramatic composition; some- times, like the great masters of painting, entrusting his pupil with minor parts of his own works. From 1780 onwards for the next fourteen years dramatic music occupied Cherubini almost entirely. His first complete opera, Quinto Fabio, was produced in 1780, and was followed in 1782 by Armida, Adriano in Siria, and other works. Between 1782 and 1784 the successful pro- duction of five operas in four different towns must have secured

Cherubini a dignified position amongst his Italian contemporaries; and in 1784 he was invited to London to produce two works for the Italian opera there, one of which, La Finta Principessa, was favourably received, while the other, Giulio Sabino, was, accord- ing to a

contemporary witness, ” murdered ” by the critics.

In 1 786 he left London for Paris, which became his home after a visit to Turin in 1 787-1 788 on the occasion of the production there of his Ifigenia in Aulide. With Cherubini, as with some other composers first trained in a school where the singer reigned supreme, the influence of the French dramatic sensibility prQved decisive, and his first French opera, Demopkon (1788), though not a popular success, already marks a departure from the Italian style, which Cherubini still cultivated in the pieces he introduced into the works of Anfossi, Paisiello and Cimarosa, produced by him as director of the Italian opera in Paris (estab- lished in 1789). As in Paris Gluck realized his highest ambitions, and even Rossini awoke to a final effort of something like dra- matic life in Guillaume Tell, so in Paris Cherubini became a great composer. If his melodic invention had been as warm as Gluck’s, his immensely superior technique in every branch of the art would have made him one of the greatest composers that ever lived. But his personal character shows in quaint exaggera- tion the same asceticism that in less sour and more negative form deprives even his finest music of the glow of that lofty inspiration that fears nothing.

With Lodoiska (1791) the series of Cherubini’s masterpieces begins, and by the production of Medee (1797) his reputation was firmly established. The success of this sombre classical tragedy, which shows Cherubini’s genius in its full power, is an honour to the Paris public. If Cherubini had known how to combine his high ideals with an urbane tolerance of the opinions of persons of inferior taste, the severity of his music would not have prevented his attaining the height of prosperity. But Napoleon Bonaparte irritated him by an enthusiasm for the kind of Italian music against which his whole career, from the time he became Sarti’s pupil, was a protest. When Cherubini said to Napoleon, ” Citoyen General, I perceive that you love only that music which does not prevent you thinking of your politics,” he may perhaps have been as firmly convinced of his own conciliatory manner as he was when many years afterwards he ” spared the feelings ” of a musical candidate by ” delicately ” telling him that he had ” a beautiful voice and great musical intelligence, but was too ugly for a public singer.” Napoleon seems to have disliked opposition in music as in other matters, and the academic offices held by Cherubini under him were for many years far below his deserts. But though Napoleon saw no reason to conceal his dislike of Cherubini, his appointment of Lesueur in 1804 as his chapel- master must not be taken as an evidence of his hostility. Lesueur was not a great genius, but, although recommended for the post by the retiring chapelmaster, Paesiello (one of Napoleon’s Italian favourites), he was a very meritorious and earnest Frenchman

whom the appointment saved from starvation. Cherubini's creative genius was never more brilliant than at this period, as the wonderful two-act ballet, Anacreon, shows; but his temper and spirits were not improved by a series of dis- appointments which culminated in the collapse of his prospects of congenial success at Vienna, where he went in 1805 in compliance with an invitation to compose an opera for the Imperial theatre. Here he produced, under the title of Der Wassertrdger, the great work which, on its first production on the 7th of January 1801 (26 Nivose, An 8) as Les Deux lournies, had thrilled Paris with the accents of a humanity restored to health and peace. It was by this time an established favourite in Austria. On the 25th of February Cherubini produced Faniska, but the war between Austria and France had broken out immediately after his arrival, and public interest in artistic matters was checked by the bombardment and capitulation of Vienna. Though the meeting between Cherubini and the victorious Napoleon was not very friendly, he was called upon to direct the music at Napoleon's soirees at Schonbrunn. But this had not been his object in coming to Vienna, and he soon returned to a retired and gloomy life in Paris.

His stay at Vienna is memorable for his intercourse with Beethoven, who had a profound admiration for him which he could neither realize nor reciprocate. It is too much to expect that the mighty genius of Beethoven, which broke through all rules in vindication of the principles underlying them, would be comprehensible to a mind like Cherubini's, in which, while the creative faculties were finely developed, the critical faculty was atrophied and its place supplied by a mere disciplinary code inadequate even as a basis for the analysis of his own works. On the other hand, it would be impossible to exaggerate the influence Les Deux Journies had on the lighter parts of Beethoven's Fidelio r Cherubini's librettist was also the author of the libretto from which Fidelio was adapted, and Cherubini's score was a constant object of Beethoven's study, not only before the production of the first version of Fidelio. us Leonore, but also throughout Beethoven's life. Cherubini's record of his impressions of Beethoven as a man is contained in the single phrase, " II etait toujours brusque," which at least shows a fine freedom from self-consciousness on the part of the man whose only remark on being told of the death of Brod, the famous oboist, was, " Ah, he hadn't much tone " (" Ah, petit son "). Of the overture to Leonore Cherubini only remarked that he could not tell what key it was in, and of Beethoven's later style he observed,

” It makes me sneeze.” Beethoven’s brusque- ness, notorious as it was, did not prevent him from assuring Cherubini that he considered him the greatest composer of the age and that he loved him and honoured him. In 1806 Haydn had just sent out his pathetic ” visiting card ” announcing that he was past work; Weber was still sowing wild oats, and Schubert was only nine years old. We need not, then, be surprised at Beethoven’s judgment. And though we must regret that Cherubini’s disposition prevented him from understanding Beethoven, it would be by no means true to say that he was uninfluenced at least by the sheer grandeur of the scale which Beethoven had by that time established as the permanent standard for musical art. Grandeur of proportion was, in fact, eminently characteristic • of both composers, and the colossal structure of such a movement as the duet Perfides ennemis in MedSe is almost inconceivable without the example of Beethoven’s C minor trio, op. 1, No. 3, published two years before it; while the cavatina Eterno iddio in Faniska is not only worthy of Beethoven but surprisingly like him in style.

After Cherubini’s disappointing visit to Vienna he divided his time between teaching at the conservatoire and cutting up playing-cards into figures and landscapes, which he framed and placed round the walls of his study. Not until 1800 was he aroused from this morbid indolence. He was staying in retire- ment at the country seat of the prince de Chimay, and his friends begged him to write some music for the consecration of a church there. After persistent refusals he suddenly surprised them with a mass in F for three-part chorus and orchestra. With this work the period of his great church music may be said to begin; although it was by no means the end of his career as an opera writer, which, in fact, lasted as late as his seventy- third year. This third period is also marked by some not un- important instrumental compositions. An early event in the annals of the Philharmonic Society was his invitation to London in 1815 to produce a symphony, an overture and a vocal piece. The symphony (in D) was afterwards arranged with a new slow movement as the string quartet in C (1829), a fact which, taken in connexion with the large scale of the work, illustrates Cheru- bini’s deficient sense of style in chamber music. Nevertheless all the six string quartets written between 1814 and 1837 are interesting works performed with success at the present day, though the last three, discovered in 1889, are less satisfactory than the earlier ones. The requiem in C minor (181 7) caused Beethoven to declare that if he himself ever wrote a requiem Cherubini’s would be his model.

At the eleventh hour Cherubini received recognition from Napoleon, who, during the Hundred Days, made him chevalier of the Legion of

Honour. Then, with the restoration of the Bour- bons, the very fact that Cherubini had not been persona grata

with Napoleon brought him honour and emoluments. He was appointed, jointly with Lesueur, as composer and conductor to the Chapel Royal, and in 1822 he obtained the permanent directorship of the conservatoire. This brought him into con- tact, for the most part unfriendly, with all the most talented musicians of the younger generation. It is improbable that Berlioz would have been an easy subject for the wisest and kindest of spiritual guides; but no influence, repellent or attractive, could have been more disastrous for that passionate, quick-witted and yet eminently puzzle-headed mixture of Philistine and genius, than the crabbed old martinet whose regulations forbade the students access to Gluck's scores in the library, and whose only theory of art (as distinguished from his practice) is accurately formulated in the following passage from Berlioz's Grande Traiti de I 'instrumentation et d 'orchestration: " It was no use for the modern composer to say, ' But do just listen! See how smoothly this is introduced, how well motived, how deftly connected with the context, and how splendid it sounds!' He was answered, 'That is not the point. This modulation is forbidden; therefore it must not be made.' " The lack of really educative teaching, and the actual injustice for which Cherubini's disciplinary methods were answerable, did much to weaken Berlioz's at best ill-balanced artistic sense, and it is highly probable that, but for the kindliness and com- parative wisdom of his composition master, Lesueur, he would have broken down from sheer lack of any influence which could command the respect of an excitable youth starving in the pursuit of a fine art against the violent opposition of his family. Only when Mendelssohn, at the age of seventeen, visited Paris in 1825, did Cherubini startle every one by praising a young composer to his face.

In 1833 Cherubini produced his last work for the stage, AH Baba, adapted (with new and noisy features which excited Mendelssohn's astonished disgust) from a manuscript opera, Koukourgi, written forty years earlier. It is thus, perhaps, not a fair illustration of the vigour of his old age; but the requiem in D minor (for male voices) , written in 1836, is one of his greatest works, and, though not actually his last composition, is a worthy close to the long career of an artist of high ideals who, while neither by birth nor temperament a Frenchman, must yet be counted with a still greater foreigner, Gluck, as the glory of French classical music. In this he has no parallel except his friend and contemporary, Mehul, to whom he dedicated Medee, and who dedicated to him the beautiful Ossianic one-act opera Uthal. The direct results of his teaching at the conservatoire were the steady,

though not as yet unhealthy, decline of French opera into a lighter style, under the amiable and modest Boieldieu and the irresponsible and witty Auber; for, as we have seen, Cherubini was quite incapable of making his ideals intelligible by any means more personal than his music; and the crude grammatical rules which he mistook for the eternal principles of his own and of all music had not the smallest use as a safeguard against vulgarity and pretentiousness.

Lest the passage above quoted from Berlioz should be suspected of bias or irrelevance, we cite a few phrases from Cherubini's Treatise on Counterpoint and Fugue, of which, though the letter- press is by his favourite pupil, Halevy, the musical examples and doctrine are beyond suspicion his own. Concerning the 16th-century idiom, incorrectly but generally known as the " changing note " (an idiom which to any musical scholar is as natural as " attraction of the relative " is to a Greek scholar), Cherubini remarks, " No tradition gives us any reason why the classics thus faultily deviated from the rule." Again, he discusses the use of " suspensions " in a series of chords which without them would contain consecutive fifths, and after making all the observations necessary for the rational conclusion that the question whether the fifths are successfully disguised or not depends upon the beauty and force of the suspensions, he merely remarks that " The opinion of the classics appears to me erroneous, notwithstanding that custom has sanctioned it, for, on the principle that the discord is a mere suspension of the chord, it "hould not affect the nature of the chord. But since

the classics have pronounced judgment we must of course submit." In the whole treatise not one example is given from Palestrina or any other master who handled as a living language what are now the forms of contrapuntal discipline. As a dead language Cherubini brought counterpoint up to date by abandon- ing the church modes; but in true severity of principle, as in educational stimulus, his treatise shows a deplorable falling off from the standard set a hundred years before in Fux's Gradus ad Parnassum with its delightful dialogues between master and pupil and its continual appeal to artistic experience. Whatever may have been Cherubini's success in imparting facility and certainty to his light-hearted pupils who established 19th-century French opera as a refuge from the terrors of serious art, there can be no doubt that his career as a teacher did more harm than good. In it the punishment drill of an incompetent schoolmaster was

invested with the authority of a great composer, and by it the false antithesis between the ” classical ” and the ” romantic ” was erected into a barrier which many critics still find an insuper- able obstacle to the understanding of the classical spirit. And yet as a composer Cherubini was no pseudo-classic but a really great artist, whose purity of style, except at rare moments, just failed to express the ideals he never lost sight of, because in his love of those ideals there was too much fear.

His principal works are summarized by Fetis as thirty-two operas, twenty-nine church compositions, four cantatas and several instru- mental pieces, besides the treatise on counterpoint and fugue.

Good modern full scores of the two Requiems and of Les Deux Journees (the latter unfortunately without the dialogue, which, however, is accessible in its fairly good German translation in the Reclam Bibliolhek), and also of ten opera overtures, are current in the Peters edition. Vocal scores of some of the other operas are not difficult to get. The great Credo is in the Peters edition, but is becoming scarce. The string quartets are in Payne’s Miniature Scores. It is very desirable that the operas, from Demophon onwards, should be republished in full score.

See also E. Bellasis, Cherubini (1874) ; and an article with personal reminiscences by the composer Ferdinand Hiller, in Macmillan’ s Magazine (1875). A complete catalogue of his compositions (1773-1841) was edited by Bottee du Toulmon. (D. F. T.J

CHERUEL, PIERRE ADOLPHE (1809-1891), French historian, was born at Rouen on the 17th of January 1809. He was educated at the Ecole Normale Superieure, and became a fellow (agregS) in 1830. His early studies were devoted to his native town. His Histoire de Rouen sous la domination anglaise au XV’ siecle (1840) and Histoire de Rouen pendant I’Spoque com- munale, 1150-1382 (Rouen, 1843-1844), are meritorious pro- ductions for a time when the archives were neither inventoried nor classified, and contain useful documents previously un- published. His theses for the degree of doctor, De I’adminis- tration de Louis XIV d’apres les MSmoires inidits d’Olivier d’Ormesson and De Maria Sluarta et Henrico III. (1849), led him to the study of general history. The former was expanded afterwards under the title Histoire de I’ administration monarchique en France depuis I’avenemsnt de Philippe- Auguste jusqu’d la mort de Louis XIV (1855), and in 1855 he also published his Dictionnaire historique des institutions, mceurs et coutumes de la France, of which many editions have appeared. These works may still be consulted for

the 17th century, the period upon which Cheruel concentrated all his scientific activity. He edited successively the Journal d'Olivier Lefevre d'Ormesson (1860-1862) , interesting for the history of the parlement of Paris during the minority of Louis XIV.; Lettres du cardinal Mazarin pendant son ministere (6 vols., 1870-1891), continued by the vicomte G. d'Avenel; and Memoires du due de Saint-Simon, published for the first time according to the original MSS. (2 editions, 1856-1858 and 1878-1881). To Saint-Simon also he devoted two critical studies, which are acute but not definitive: Saint- Simon considers comme historien de Louis XIV (1865) and Notice sur la vie et sur les mSmoires du due de Saint-Simon (1876). The latter may be considered as an introduction to the famous Mimoires. Among his later writings may be mentioned the Histoire de la France pendant la minorite de Louis XIV (4 vols., 1880) and Histoire de la France sous le ministere de Mazarin (3 vols., 1882-1883). These two works are valuable for abund- ance of facts, precision of details, and clear and intelligent

arrangement, but are characterized by a slightly frigid style. In their compilation Cheruel used a fair number of unpublished documents. To the student of the second half of the 1 7th century in France the works of Cheruel are a mine of information. He died in Paris on the 1st of May 1891.

CHERUSCI, an ancient German tribe occupying the basin of the Weser to the north of the Chatti. Together with the other tribes of western Germany they submitted to the Romans in 1 1-9 B.C., but in a.d. 9 Arminius, one of their princes, rose in revolt, and defeated and slew the Roman general Quintilius Varus with his whole army. Germanicus Caesar made several unsuccessful attempts to bring them into subjection again. By the end of the 1st century the prestige of the Cherusci had declined through unsuccessful warfare with the Chatti. Their territory was eventually occupied by the Saxons.

Tacitus, Annals, i. 2, 11, 12, 13; Germania, 36; Strabo, p. 291 f. ; E. Devrient, in Neue Jahrb. f. d. klass. Alter. (1900), p. 517.

CHESELDEN, WILLIAM (1688-1752), English surgeon, was born at Somerby, Leicestershire, on the 19th. of October 1688. He studied anatomy in London under William Cowper (1666- 1709), and in 1713 published his Anatomy of the Human Body, which achieved great popularity and went through thirteen editions. In 17 18 he was appointed an assistant surgeon at St Thomas's hospital (London), becoming full surgeon in the following year, and he was also chosen one of the surgeons to St George's hospital on its foundation in 1733.

He retired from St Thomas's in 1738, and died at Bath on the 10th of April 1752. Cheselden is famous for his " lateral operation for the stone," which he first performed in 1727. He also effected a great advance in ophthalmic surgery by his operation of iridec- tomy, described in 1728, for the treatment of certain forms of blindness by the production of an " artificial pupil." He at- tended Sir Isaac Newton in his last illness, and was an intimate friend of Alexander Pope and of Sir Hans Sloane.

CHESHAM, a market town in the Aylesbury parliamentary division of Buckinghamshire, England, 26 m. W.N.W. of London by the Metropolitan railway. Pop. of urban district (1901) 7245. It is pleasantly situated in the narrow valley of the river Chess, closely flanked by low wooded hills. The church of St Mary is cruciform and mainly Perpendicular. Some ancient frescoes and numerous monuments are preserved. All sorts of small dairy utensils, chairs, malt-shovels, &c, are made of beech, the growth of which forms a feature of the surrounding country. Shoemaking is also carried on. In Waterside hamlet, adjoining the town, are flour-mills, duck farms, and some of the extensive watercress beds for which the Chess is noted, as it is also for its trout-fishing.

CHESHIRE, a north-western county of England, bounded N. by Lancashire, N.E. by Yorkshire and Derbyshire, S.E. by Staffordshire, S. by Shropshire, W. by Denbighshire and Flint, and N.W. by the Irish Sea. Its area is 1027-8 sq. m. The coast-line is formed by the estuaries of the Dee and the- Mersey, which are separated by the low rectangular peninsula of Wirral. The estuary of the Dee is dry at low tide on the Cheshire shore, but that of the Mersey bears upon its banks the ports of Liverpool (in Lancashire) and Birkenhead (on the Wirral shore). The Dee forms a great part of the county boundary with Denbigh- shire and Flint, and the Mersey the boundary along the whole of the northern side. The principal river within the county is the Weaver, which crosses it with a north-westerly course, and, being joined by the Dane at Northwich, discharges into the estuary of the Mersey south of Runcorn. The surface of Cheshire is mostly low and gently undulating or flat; but the broken line of the Peckforton hills, seldom exceeding 600 ft. in height, runs north and south flanking the valley of the Weaver on the west. A low narrow gap in these hills is traversed by the small river Gowy, which rises to the east but has the greater part of its course to the west of them. Commanding this gap on the west, the Norman castle of Beeston stands on an isolated eminence. The northern part of the hills coincides approxi- mately with. the district still called Delamere Forest, formerly a chase of the earls of Chester, and finally disforested in 18 12.

CHESHIRE

In certain sequestered parts the forest has not wholly lost its ancient character. On the east Cheshire includes the western face of the broad belt of high land which embraces the Peak district of Derbyshire; these hills rise sharply to the east of Congleton, Macclesfield and Hyde, reaching a height of about 1800 ft. within Cheshire. Distributed over the county, but principally in the eastern half, are many small lakes or meres, such as Combermere, Tatton, Rostherne, Tabley, Doddington, Marbury and Mere, and it was a common practice among the gentry of the county to build their mansions on the banks of these waters. The meres form one of the most picturesque features of the county.

Geology. — With the exception of a small area of Carboniferous rocks on the eastern border, and a small patch of Lower Lias near Audlem, the whole country is occupied by Triassic strata. The great central plain is covered by red and mottled Keuper Marls. From these marls salt is obtained ; there are many beds of rock- salt, mostly thin ; two are much thicker than the others, being from 75 ft. to over 100 ft. thick. Thin beds and veins of gypsum are common in the marls. The striking features of the Peckforton Hills are due to the repeated faulting of the Lower Keuper Sandstone, which lies upon beds of Bunter Sandstone. Besides forming this well-marked ridge, the Lower Keuper Sandstones or ” Waterstones ” form several ridges north-west of Macclesfield and appear along most of the northern borders of the county and in the neighbourhood of New Brighton and Birkenhead. The Lower Keuper Sandstone is quarried near the last-named place, also at Storeton, Delamere and Manley. This is a good building stone and an important water- bearing stratum; it is often ripple-marked, and bears the footprints of the Cheirotherium. At Alderley Edge ores of copper, lead and cobalt are found. West of the Peckforton ridge, Bunter Sandstones and pebble beds extend to the border. They also form low foothills between Cheadle and Macclesfield. They fringe the northern bound- ary and appear on the south-eastern boundary as a narrow strip of hilly ground near Woore. The oldest rock exposed in the county is the small faulted anticline of Carboniferous limestone at Astbury, followed in regular succession eastward by the shale, and thin limestones and sandstones of the Pendleside series. These rocks extend from Congleton Edge to near Macclesfield, where the outcrop bends sharply eastward and runs up the Goyt valley. Some hard quartzites in the Pendleside series, known locally as ” Crowstones,” have contributed to the formation of the high Bosley Min and neigh- bouring hills. East of Bosley Min, on either side of the Goyt valley, are

the Millstone Grits and Shales, forming the elevated moorland tracts. Cloud Hill, a striking feature near Congleton, is capped by the ” Third Grit,” one of the Millstone Grit series. From Maccles- field northward through Stockport is a narrow tongue of Lower and Middle Coal-Measures — an extension of the Lancashire coalfield. Coal is mined at Neston in the Wirral peninsula from beneath the Trias; it is a connecting link between the Lancashire and Flintshire coalfields. Glacial drift is thickly spread over all the lower ground; laminated red clays, stiff clay with northern erratics and lenticular sand masses with occasional gravels, are the common types. At Crewe the drift is over 400 ft. thick. Fatches of Drift sand, with marine shells, occur on the high ground east of Macclesfield at an elevation of 1250 ft.

Agriculture and Industries. — The climate is temperate and rather damp; the soil is varied and irregular, but a large pro- portion is a thin-skinned clay. More than four-fifths of the total area is under cultivation. The crop of wheat is comparatively insignificant; but a large quantity of oats is grown, and a great proportion of the cultivated land is in permanent pasture. The vicinity of such populous centres as Liverpool and Manchester, as well as the several large towns within the county, makes cattle and dairy-farming profitable. Cheese of excellent quality is produced, the name of the county being given to a particular brand (see Dairy). Potatoes are by far the most important green crop. Fruit-growing is carried on in some parts, especially the cultivation of stone fruit and, among these, damsons; while the strawberry beds near Farndon and Holt arc celebrated. In the first half of the 19th century the condition of agriculture in Cheshire was notoriously backward; and in 1865-1866 the county suffered with especial severity from a visitation of cattle plague. The total loss of stock amounted to more than 66,000 head, and it was necessary to obtain from the Treasury a loan of £270,000 on the security of the county rate, for purposes of relief and compensation. The cheese-making industry naturally received a severe blow, yet to agriculture at large an ultimate good resulted as the possibility and even the necessity of new methods were borne in upon the farmers.

The industries of the county are various and important. The manufacture of cotton goods extends from its seat in Lancashire into Cheshire, at the town of Stockport and elsewhere in the north-east. Macclesfield and Congleton are centres of silk manufacture. At Crewe are situated the great workshops of the London & North- Western railway company, the institution of which actually brought the town into being. Another instance of the modern creation of a town by an individual industrial corporation is seen in Port Sunlight on the Mersey, where the soap-works of Messrs Lever are situated. On the

Mersey there are shipbuilding yards, and machinery and iron works. Other important manufactures are those of tools, chemicals, clothing and hats, and there are printing, bleaching and dye works, and metal foundries. Much sandstone is quarried, but the mineral wealth of the county lies in coal and salt. The second is a specially important product. Some rock-salt is obtained at Northwich and Winsford, but most of the salt is extracted from brine both here and at Lawton, Wheelock and Middlewich. At Northwich and other places in the locality curious accidents frequently occur owing to the sinking of the soil after the brine is pumped out; walls crack and collapse, and houses are seen leaning far out of the perpendicular. A little copper and lead are found.

Communications. —The county is well served with railways. The main line of the London & North- Western railway, passing north from Crewe to Warrington in Lancashire, serves no large town, but from Crewe branches diverge fanwise to Manchester, Chester, North Wales and Shrewsbury. The Great Western railway, with a line coming northward from Wrexham, obtains access through Cheshire to Liverpool and Manchester. These two companies jointly work the Birkenhead railway from Chester to Birkenhead. The heart of the county is traversed by the Cheshire Lines, serving the salt district, and reaching Chester from Manchester by way of Delamere Forest. In the east the Midland and Great Central systems enter the county, and the North Staffordshire line serves Macclesfield. The Manchester, South Junction & Altrincham and the Wirral railways are small systems serving the localities indicated by their names. The river Weaver is locked as far up as Winsford, and the transport of salt is thus expedited. The profits of the navigation, which was originally undertaken in 1720 by a few Cheshire squires, belong to the county, and are paid annually to the relief of the county rates. In the salt district through which the Weaver passes subsidence of the land has resulted in the formation of lakes of considerable extent, which act as reservoirs to supply the navigation. There are further means of inland navigation by the Grand Trunk, Shropshire Union and other canals, and many small steamers are in use. The Manchester Ship Canal passes through a section of north Cheshire, being entered from the estuary of the Mersey by locks near Eastham, and following its southern shore up to Runcorn, after which it takes a more direct course than the river.

Population and Administration. — The ancient county, which is a county palatine, has an area of 657,783 acres, with a population in 1891 of 730,058 and in 1901 of 815,099. Cheshire has been described as a suburb of Liverpool, Manchester and the Potteries of

Staffordshire, and many of those whose business lies in these centres have colonized such districts as Bowdon, Alderley, Sale and Marple near Manchester, the Wirral, and Alsager on the Staffordshire border, until these localities have come to resemble the richer suburban districts of London. On the short seacoast of the Wirral are found the popular resorts of New Brighton and Hoylake. This movement and importance of its industries have given the county a vast increase of population in modern times. In 1871 the population was 561,201; from 1801 until that year it had increased 191%. The area of the administrative county is 654,825 acres. The county contains 7 hundreds. The municipal boroughs are Birkenhead (pop. 110,915), Chester (38,309), Congleton (10,707), Crewe (42,074), Dukinfield (18,929), Hyde (32,766), Macclesfield (34,624), Stalybridge (27,673), Stockport (92,832). Chester, the county town, is a city, county of a city, and county borough, and Birkenhead and Stockport are county

boroughs. The other urban districts with their populations are as follows:—

Alderley Edge (a)

Alsager . . .

Altrincham (a)

Ashton-upon-Mersey (a) .

Bollington (a) .

Bowdon (a) ...

Bredbury and Romiley (a)

Bromborough. (ft)

Buglawton (Congleton)

Cheadle and Gatley (a) .

Compstall (a) .

Ellesmere Port and Whitby (b)

Hale (a) .

Handforth (a)

Hazel Grove and Bramhall (o

Higher Bebington (6)

Hollingworth (a)

Hoole (Chester)

2,856

2.597 16,831

5,563 5,245 2,788 7,087 1,891 1,452 7,916

875 4,082 4,562 . 911 7.934 1,540 2,447 5,341

(a)

Hoylake and West Kirby (b)

Knutsford (a) .

Lower Bebington (6)

Lymm (a) .

Marple (a) .

Middlewich

Mottram-in-Longdendale

Nantwich .

Neston and Parkgate (b)

Northwich .

Runcorn …

Sale (a)

Sandbach . ...

Tarporley .

Wallasey (b)

Wilmslow (a)

Winsford

Yeardsley-cum-Whaley (a)

10,911 5,172 8,398 4,707 5,595 4,669 3,128 7,722

4,154 17,611 16,491 12,088

5,558 2,644

53,579

7,36i

10,382 1,487

Of the townships in this table, those marked (a) are within a radius of about 15 m. from Manchester (Knutsford being taken as the limit), while those marked (b) are in the Wirral. The localities of densest population are thus clearly illustrated.

The county is in the North Wales and Chester circuit, and assizes are held at Chester. It has one court of quarter sessions, and is divided into fourteen petty sessional divisions. The boroughs already named, excepting Dukinfield, have separate commissions of the peace, and Birkenhead and Chester have separate courts of quarter sessions. There are 464 civil parishes. Cheshire is almost wholly in the diocese of Chester, but small parts are in those of Manchester, St Asaph or Lichfield. There are 268 ecclesiastical parishes or districts wholly or in part within the county. There are eight parliamentary divisions, namely, Macclesfield, Crewe, Eddisbury, Wirral, Knutsford, Altrincham, Hyde and Northwich, each returning one member; the county also includes the parliamentary borough of Birkenhead returning one member, and parts of the borough of Stockport, which returns two members, and of Ashton-under-Lyne, Chester, Stalybridge, and Warrington, which return one member each.

History. — The earliest recorded historical fact relating to the district which is now Cheshire is the capture of Chester and destruction of the native Britons by the Northumbrian king ˆEthelfrith about 614. After a

period of incessant strife between the Britons and their Saxon invaders the district was subjugated by Ecgbert in 830 and incorporated in the kingdom of Mercia. During the 9th century .flJthelwulf held his parliament at Chester, and received the homage of his tributary kings from Berwick to Kent, and in the 10th century ˆEtheifted rebuilt the city, and erected fortresses at Eddisbury and Runcorn. Edward the Elder garrisoned Thelwall and strengthened the passages of the Mersey and the Irwell. On the splitting up of Mercia in the 10th century the dependent districts along the Dee were made a shire for the fortress of Chester. The shire is first mentioned in the Abingdon Chronicle, which relates that in 980 Cheshire was plundered by a fleet of Northmen. At the time of the Domesday Survey the county was divided into twelve hundreds, exclusive of the six hundreds between the Ribble and the Mersey, now included in Lancashire, but then a part of Cheshire. These divisions have suffered great modification, both in extent and in name, and of the seven modern hundreds Bucklow alone retains its Domesday appellation. The hundreds of Atiscross and Exestan have been transferred to the counties of Flint and Denbigh, with the exception of a few townships now in the hundred of Broxton. The prolonged resistance of Cheshire to the Conqueror was punished by ruthless harrying and sweeping confiscations of property, and no Englishman retained estates of importance after the Conquest. In order that the shire might be relieved of all obligations beyond the ever-pressing necessity of defending its borders against the inroads of hostile neighbours, it was constituted a county palatine which the earl of Chester ” held as freely by his sword as the king held England by his crown.” The County had its independent parliament

consisting of the barons and clergy, and courts, and all lands except those of the bishop were held of the earl. The court of exchequer was presided over by a chamberlain, a vice-chamberlain, and a baron of the exchequer. It was principally a court of revenue, but prob- ably a court of justice also, before that of the justiciary was established, and had besides the functions of a chancery court, with an exclusive jurisdiction in equity. Other officers of the palatinate were the constable, high-steward and the Serjeants of the peace and of the forests. The abbots of St Werburgh and Combermere and all the eight barons held courts, in any of which cases of capital felony might be tried.

During the 12th and 13th centuries the county was impoverished by the constant inroads of the Welsh. In 1264 the castle and city of Chester were granted to Simon de Montfort, and in 1 267 the treaty of Shrewsbury procured a short interval of peace. Richard II., in return

for the loyal support furnished him by the county, made it a principality, but the act was revoked in the next reign. In 1403 Cheshire was the headquarters of Hotspur, who roused the people by telling them that Richard II. was still living. At the beginning of the Wars of the Roses Margaret collected a body of supporters from among the Cheshire gentry, and Lancastrian risings occurred as late as 1464. At the time of the Civil War feeling was so equally divided that an attempt was made to form an association for preserving internal peace. In 1643, however, Chester was made the head- quarters of the royalist forces, while Nantwich was garrisoned for the parliament, and the county became the scene of con- stant skirmishes until the surrender of Chester in 1646 put an end to the struggle.

From the number of great families with which it has been associated Chester has been named " the mother and nurse of English gentility." Of the eight baronies of the earldom none survives, but the title of that of Kinderton was bestowed in 1762 on George Venables- Vernon, son of Anne, sister of Peter Venables, last baron of Kinderton, from whom the present Lord Vernon of Kinderton is descended. Other great Domesda,y proprietors were William FitzNigel, baron of Halton, ancestor of the Lacys; Hugh de Mara, baron of Montalt, ancestor of the Ardens; Ranulph, ancestor of the Mainwarings; and Hamo de Massey. The Davenports, Leighs and Warburtons trace their descent back to the 12th century, and the Grosvenors are descended from a nephew of Hugh Lupus.

In the reign of Henry VIII. the distinctive privileges of Cheshire as a county palatine were considerably abridged. The right of sanctuary attached to the city of Chester was abolished; justices of the peace were appointed as in other parts of the kingdom, and in 1 542 it was enacted that in future two knights for the shire and two burgesses for the city of Chester should be returned to parliament. After the Reform Act of 1832 the county returned four members from two divisions, and Maccles- field and Stpckport returned two members each. Birkenhead secured representation in 1859. From 1868 until the Redistribu- tion Act of 1885 the county returned six members from three divisions.

From earliest times the staple products of Cheshire have been salt and cheese. The salt-pits of Nantwich, Middlewich and Northwich were in active operation at the time of Edward the Confessor, and at that date the mills and fisheries on the Dee also furnished a valuable source of revenue. Twelfth century writers refer to the excellence of Cheshire cheese, and at the time of the Civil War three hundred tons at £33 per ton were ordered in one year for the troops in Scotland. The trades of

tanners, skinners and glove-makers existed at the time of the Conquest, and the export trade in wool in the 13th and 14th centuries was considerable. The first bed of rock-salt was discovered in 1670. Weaving and wool-combing were introduced in 1674.

Antiquities. — The main interest in the architecture of the

county lies in the direction of domestic buildings rather than ecclesiastical. Old half-timbered houses are common in almost every part of the county; many of these add to the picturesque- ness of the streets in the older towns, as in the case of the famous Rows in Chester, while in the country many ancient manor- houses remain as farm-houses. Among the finest examples are Bramhall Hall, between Stockport and Macclesfield, and Moreton Old Hall, near Congleton (see House, Plate IV., fig. 13). The first, occupying three sides of a quadrangle (formerly completed by a fourth side), dates from the 13th and 14th centuries, and contains a splendid panelled hall and other rooms. Of Moreton Hall, which is moated, only three sides similarly remain; its date is of the 16th century. Other buildings of the Elizabethan period are not infrequent, such as Brereton and Dorfold Halls, while more modern mansions, set in fine estates, are numerous. Crewe Hall is a modern building on an ancient site, and Vale Royal near Winsford incorporates fragments of a Cistercian monastery founded in 1277. A noteworthy instance of the half-timbered style applied to an ecclesiastical building is found in the church of Lower Peover near Knutsford, of which only the tower is of stone. The church dates from the 13th century, and was carefully restored in 1852. Cheshire has no monastic remains of importance, save those attached to the cathedral of Chester, nor are its village churches as a rule of special interest. There is, however, a fine late Perpendicular church (with earlier portions) at Astbury near Congleton, and of this style and the Decorated the churches of Bunbury and Malpas may be noticed as good illustrations. In Chester, besides the cathedral, there is the massive Norman church of St John; and St Michael's church and the Rivers chapel at Macclesfield are noteworthy. No more remarkable religious monuments remain in the county than the two sculptured Saxon crosses in the market-place at Sandbach. Ruins of two Norman castles exist in Beeston and Halton.

Authorities. — Sir John Doddridge, History of the Ancient and Modern State of the Principality of Wales, Duchy of Cornwall, and Earldom of

Chester (London, 1630; 2nd ed., 1714); D. King, The Vale-Royall of England, or the County Palatine of Cheshire Illustrated, 4 parts (London, 1656) ; D. and S. Lysons, Magna Britannia, vol. ii. pt. ii. (London, 1810) ; J. H. Hanshall, History of the County Palatine of Chester (Chester, 1817-1823); J. O. Halliwell, Palatine Anthology (London, 1850) ; G. Orraerod, History of the County Palatine and City of Chester (London, 1819; new ed., London, 1875-1882); J. P. Earwaker, East Cheshire (2 vols., London, 1877) ; R. Wilbraham, Glossary (London, 1820; 2nd ed., London, 1826); and Glossary founded on Wilbraham by E. Leigh (London, 1877); J. Croston, Historic Sites of Cheshire (Manchester, 1883) ; and County Families of Cheshire (Manchester, 1887); W. E. A. Axon, Cheshire Gleanings (Manchester, 1884) ; Holland, Glossary of Words used in the County of Cheshire (London, 1884-1886); N. G. Philips, Views of Old Halls in Cheshire (London, 1893) ; Victoria County History, Cheshire. See also various volumes of the Chetham Society and of the Record Society of Manchester, as well as the Proceedings of the Cheshire Antiquarian Society, and Cheshire Notes and Queries.

CHESHUNT, an urban district in the Hertford parliamentary division of Hertfordshire, England, on the Lea, 14 m. N. of London by the Great Eastern railway. Pop. (1891) 9620; (1901) 12,292. The church of St Mary is Perpendicular and has been enlarged in modern times. A college was founded, for the education of young men to the ministry of the Connexion, by Selina countess of Huntingdon in 1768 at Trevecca-isaf near Talgarth, Brecknockshire. In 1792 it was moved to Cheshunt, and became known as Cheshunt College. In 1904, as it was felt that the college was unable properly to carry on its work under existing conditions, it was proposed to amalgamate it with Hackney College, but the Board of Education refused to sanction any arrangement which would set aside the require- ments of the deed of foundation, namely that the officers and students of Cheshunt College should subscribe the fifteen articles appended to the deed, and should take certain other obligations. In 1905 it was decided by the board to reorganize the college and remove it to Cambridge.

Nursery and market gardening, largely under glass, brick- making and saw-mills are the chief industries of Cheshunt. Roman coins and other remains have been found at this place, and an urn appears built into the wall of an inn. A Romano-

British village or small town is indicated. There was a Bene- dictine nunnery here in the 13th century. Of several interesting mansions in the vicinity one, the Great House, belonged to Cardinal Wolsey, and a former Pengelly House was the residence of Richard Cromwell the

Protector after his resignation. Theo- balds Park was built in the 18th century, but the original mansion was acquired by William Cecil, Lord Burghley, in 1561; being taken in 1607 by James I. from Robert Cecil, first earl of Salisbury, in exchange for Hatfield House. James died here in 1625, and Charles I. set out from here for Nottingham in 1642 at the outset of the Civil War. One of the entrances to Theobalds Park is the old Temple Bar, removed from Fleet Street, London, in 1878.

CHESIL BANK (A.S. ceosol, pebble bank), a remarkable beach of shingle on the coast of Dorsetshire, England. It is separated from the mainland for 8 m. by an inlet called the Fleet, famous for its swannery, and continues in all for 18 m. south- eastward from Abbotsbury, terminating at the so-called Isle of Portland. The height of the bank at the Portland end is 35 ft. above spring- tide level, and its breadth 200 yds. The greater height at this end accords with the general -movement of shingle along this coast from west to east; and for the same reason the pebbles of the bank decrease in size from 1 to 3 in. in diameter at Portland to the size of peas at the western end, where the breadth is only 170 yds.

CHESNELONG, PIERRE CHARLES (1820-1894), French politician, was born at Orthez in the department of the Basses- Pyrenees, on the 14th of April 1820. In 1848 he proclaimed himself a Republican; but after the establishment of the Second Empire he changed his views, and in 1865 was returned to the chamber as the official candidate for his native place. He at once became conspicuous, both for his eloquence and for his uncompromising clericalism, especially in urging the necessity for maintaining the temporal power of the papacy. In 1869 he was again returned, and, devoting himself with exceptional ability to financial questions, was in 1870 appointed to report the budget. During and after the war, for which he voted, he retired for a while into private life; but in 1872 he was again elected deputy, this time as a Legitimist, and took his seat among the extreme Right. He was the soul of the reactionary opposition that led to the fall of Thiers; and in 1873 it was he who, with Lucien Brun, carried to the comte de Chambord the proposals of the chambers. Through some misunderstanding, he reported on his return that the count had accepted all the terms offered, including the retention of the tricolour flag; and the count published a formal denial. Chesnelong now devoted himself to the establishment of Catholic universities and to the formation of Catholic working-men's clubs. In 1876 he was again returned for Orthez, but was unseated, and then beaten by the republican candidate. On the 24th of November, how- ever, he was elected to a seat in the senate, where he continued his vigorous polemic against the progressive attempts of the republican

government to secularize the educational system of France until his death in 1894.

CHESNEY, CHARLES CORNWALLIS (1826-1876), British soldier and military writer, the third son of Charles Cornwallis Chesney, captain on the retired list of the Bengal Artillery, and nephew of General F. R. Chesney, was born in Co. Down, Ireland, on the 29th of September 1826. Educated at Blundell's school, Tiverton, and afterwards at the Royal Military Academy, Woolwich, he obtained his first commission as second lieutenant of engineers in 1845, passing out of the academy at the head of his term. His early service was spent in the ordinary course of regimental duty at home and abroad, and he was stationed in New Zealand during the Crimean War. Among the various reforms in the British military system which followed from that war was the impetus given to military education; and in 1858 Captain Chesney was appointed professor of military history at Sandhurst. In 1864 he succeeded Colonel (afterwards Sir Edward) Hamley in the corresponding chair at the Staff College. The writings of these two brilliant officers had a great influence not only at home, but on the continent and in America. Chesney's

first published work (1863) was an account of the Civil War in Virginia, which went through several editions. But the work which attained the greatest reputation was his Waterloo Lectures (1868), prepared from the notes of lectures orally delivered at the Staff College. Up to that time the English literature on the Waterloo campaign, although voluminous, was made up of personal reminiscences or of formal records, useful materials for history rather than history itself; and the French accounts had mainly taken the form of fiction. In Chesney's lucid and vigorous account of the momentous struggle, while it illustrates both the strategy and tactics which culminated in the final catastrophe, the mistakes committed by Napoleon are laid bare, and for the first.time an English Writer is found to point out that the dispositions of Wellington were far from faultless. And in the Waterloo Lectures the Prussians are for the first time credited by an English pen with their proper share in the victory. The work attracted much attention abroad as well as at home, and French and German translations were published.

Chesney was for many years a constant contributor to the newspaper press and to periodic literature, devoting himself for the most part to

the critical treatment of military operations, and professional subjects generally. Some of his essays on military biography, contributed mainly to the Edinburgh Review, were afterwards published separately (1874). In 1868 he was appointed a member of the royal commission on military educa- tion, under the presidency first of Earl De Grey and afterwards of Lord Dufferin, to whose recommendations were due the improved organization of the military colleges, and the develop- ment of military education in the principal military stations of the British army. In 1871, on the conclusion of the Franco- German War, he was sent on a special mission to France and Germany, and furnished to the government a series of valuable reports on the different siege operations which had been carried out during the war, especially the two sieges of Paris. These reports were published in a large volume, which was issued confidentially. Never seeking regimental or staff preferment, Colonel Chesney never obtained any, but he held at the time of his death a unique position in the army, altogether apart from and above his actual place in it. He was consulted by officers of all grades on professional matters, and few have done more to raise the intellectual standard of the British officer. Con- stantly engaged in literary pursuits, he was nevertheless laborious and exemplary in the discharge of his public duties, while managing also to devote a large part of his time to charitable and religious offices. He was abstemious to a fault; and, overwork of mind and body telling at last on a frail constitution, he died after a short illness on the 19th of March 1876. He had become lieutenant-colonel in 1873, and at the time of his death he was commanding Royal Engineer of the London district. He was buried at Sandhurst.

CHESNEY, FRANCIS RAWDON (1780-1872), British general and explorer, was the son of Captain Alexander Chesney, an Irishman of Scottish descent who, having emigrated to South Carolina in 1772, did brilliant service under Lord Rawdon (afterwards marquess of Hastings) in the War of Independence, and subsequently received an appointment as coast officer at Annalong, Co. Down, Ireland. There F. R. Chesney was born on the 16th of March 1 789. Lord Rawdon gave the boy a cadet- ship at Woolwich, and he was gazetted to the Royal Artillery in 1805. But though he rose to be lieutenant-general and colonel-commandant of the 14th brigade Royal Artillery (1864), and general in 1868, Chesney's memory lives not for his military record, but for his connexion with the Suez Canal, and with the exploration of the Euphrates valley, which started with his being sent out to Constantinople in the course of his military duties in 1829, and his making a tour of inspection in Egypt and Syria. His report in 1830 on the feasibility of making the Suez Canal was the original basis of

Lesseps' great undertaking (in 1869 Lesseps greeted him in Paris as the "father" of the canal); and in 1831 he introduced to the home government the idea of opening a new overland route to India, by a daring and ad- venturous journey (for the Arabs were hostile and he was ignorant

of the language) along the Euphrates valley from Anah to the Persian Gulf. Returning home, Colonel Chesney (as he then was) busied himself to get support for the latter project, to which the East India Company's board was favourable; and in 1835 he was sent out in command of a small expedition, for which parliament voted £20,000, in order to test the navigability of the Euphrates. After encountering immense difficulties, from the opposition of the Egyptian pasha, and from the need of transporting two steamers (one of which was lost) in sections from the Mediterranean over the hilly country to the river, they successfully arrived by water at Bushire in the summer of 1836, and proved Chesney's view to be a practicable one. In the middle of 1837 he returned to England, and was given the Royal Geographical Society's gold medal, having meanwhile been to India to consult the authorities there; but the preparation of his two volumes on the expedition (published in 1850) was interrupted by his being ordered out in 1843 to command the artillery at Hong Kong. In 1847 his period of service was completed, and he went home to Ireland, to a life of retirement; but both in 1856 and again in 1862 he went out to the East to take a part in further surveys and negotiations for the Euphrates valley railway scheme, which, however, the government would not take up, in spite of a favourable report from the House of Commons committee in 187 1. In 1868 he published a further volume of narrative on his Euphrates expedition. He died on the 30th of January 1872.

His Life, edited by Stanley Lane Poole, appeared in 1885.

CHESNEY, SIR GEORGE TOMKYNS (1830-1895), English general, brother of Colonel C. C. Chesney, was born at Tiverton, Devonshire, on the 30th of April 1830. Educated at Blundell's school, Tiverton, and at Addiscombe, he entered the Bengal Engineers as second lieutenant in 1848. He was employed for some years in the public works department and, on the outbreak' of the Indian Mutiny in 1857, joined the Ambala column, was' field engineer at the battle of Badli-ke-serai, brigade-major of engineers throughout the siege of Delhi, and was severely wounded in the assault (medal and clasp and a brevet majority). In 1 860 he was appointed head of a new department in connexion with the public works accounts. His work on Indian Polity (1868), dealing with the administration of the several departments of

the Indian government, attracted wide attention and remains a permanent text-book. The originator of the Royal Indian Civil Engineering College at Cooper's Hill, Staines, he was also its first president (1871-1880). In 1871 he contributed to Blackwood's Magazine, " The Battle of Dorking," a vivid account of a supposed invasion of England by the Germans after their victory over France. This was republished in many editions and translations, and produced a profound impression. He was promoted lieutenant-colonel, 1869; colonel, 1877; major-general, 1886; lieutenant-general, 1887; colonel-com- mandant of Royal Engineers, 1890; and general, 1892. From 1 88 1 to 1886 he was secretary to the military department of the government of India, and was made a C.S.I, and a CLE. From 1886 to 1892, as military member of the governor-general's council, he carried out many much-needed military reforms. He was made a C.B. at the jubilee of 1887, and a K.C.B. on leaving India in 1892. In that year he was returned to parlia- ment, in the Conservative interest, as member for Oxford, and was chairman of the committee of service members of the House of Commons until his death on the 3 1st of March 1895. He wrote some novels, The Dilemma, The Private Secretary, The Lesters, &c, and was a frequent contributor to periodical literature.

CHESS, once known as " checker," a game played with certain " pieces " on a special " board " described below. It takes its name from the Persian word shah, a king, the name of one of the pieces or men used in the game. Chess is the most cosmopolitan of all games, invented in the East (see History, below), intro- duced into the West and now domiciled in every part of the world. As a mere pastime chess is easily learnt, and a very moderate amount of study enables a man to become a fair player, but the higher ranges of chess-skill are only attained by persistent labour. The real proficient or " master " not merely must know

BLACK.

the subtle variations in which the game abounds, but must be able to apply his knowledge in the face of the enemy and to call to his aid, as occasion demands, all that he has of foresight, brilliancy and resource, both in attack and in defence. Two chess players fighting over the board may fitly be compared to two famous generals encountering each other on the battlefield, the strategy and the tactics being not dissimilar in spirit.

The Board, Pieces and Moves. — The chessboard is divided (see accompanying diagrams) into sixty-four chequered squares. In diagram i, the pieces, or chess-men, are arranged for the beginning of a game, while diagram 2 shows the denomination of the squares according to the English and German systems of notation. Under diagram 1 are the names of the various ” pieces ” —each side, White or Black, having a King, a Queen, two Rooks (or Castles), two Knights, and two Bishops. The eight men in front are called Pawns. At the beginning of the game the queen always stands upon a square of her own colour. The board is so set that each player has a white square at the right hand end of the row nearest to him. The rook, knight and bishop on the right of the king are known as King’s rook, King’s knight, and King’s bishop; the other three as Queen’s rook, Queen’s knight, and Queen’s bishop.

Briefly described, the powers of the various pieces and of the pawns are as follows.

The king may move in any direction, only one square at a time, except in castling. Two kings can never be on adjacent squares.

The queen moves in any direc- tion square or diagonal, whether forward or backward. There is no limit to her range over vacant squares; an opponent she may take; a piece of her own colour stops her. She is the most power- ful piece on the board, for her action is a union of those of the rook and bishop. The rooks (from the Indian rukh and Persian rokh, meaning a soldier or warrior) move in straight lines — forward or backward — but they cannot Their range is arrangement of the” piecWat Iike tne queen’s, unlimited, with the commencement of a game, the same exceptions.

The bishops move diagonally in any direction whether backward or forward. They have an unlimited range, with the same exceptions.

The knights’ moves are of an absolutely different kind. They move from one corner of any rectangle of three squares by two to the opposite corner; thus, in diagram 3, the white knight can move to the square occupied by the black one, and vice versa, or a knight could move from C to D, or D to C. The move may be made in any direction. It is no obstacle to the knight’s move if squares A and B are occupied. It will be perceived that the knight always moves to a square of a different colour.

The king, queen, rooks and bishops may capture any foeman which stands anywhere within their respective ranges; and the knights can

capture the adverse men which stand upon the squares to which they can leap. The piece which takes occupies the square of the piece which is taken, the latter being removed from the board. The king cannot capture any man which is protected by another man.

The moves and capturing powers of the pawns are as follows:— Each pawn for his first move may advance either one or two squares straight forward, but afterwards one square only, and this whether upon starting he exercised his privilege of moving two squares or not. A pawn can never move backwards. He can capture only diagonally — one square to his right or left front. A pawn moves like a rook, captures like a bishop, but only one square at a time. When a pawn arrives at an eighth square, viz. at the extreme limit of the board, he may, at the option of his owner, be exchanged for any other piece, so that a player may, e.g., have two or more queens on the board at once.

Rk. Kt. Bp. Q. K. Bp. Kt. Kk.

DiAGRA M T-Showing the move diagonally.

” Checkand Checkmate.” Thekingcan never be captured, but when any piece or pawn attacks him, he is said to be ” in check,” and the fact of his being so attacked should be announced by the

BLACK.

a b c d e f g h

d e

WHITE.

Diagram 2. — Showing English and German Methods of Notation, adverse player saying ” check,” whereupon the king must move from the square he occupies, or be screened from check by the interposition of one of his own men, or the attacking piece must be captured. If, however, when the king is in check, none of these things can be done, it is ” checkmate ” (Persian, shah mat, the king is dead), known generally as ” mate,” whereupon the game terminates, the player whose king has been thus check- mated being the loser. When the adversary has only his king left, it is very easy to checkmate him with only a queen and king, or only a rook and king. The problem is less easy with king and two bishops, and still less easy with king, knight and bishop, in which case the opposing king has to be driven into a corner square whose colour corresponds with the bishop’s, mate being

given with the bishop. A king and two knights cannot mate. To mate with king and rook the opposing king must be driven on to one of the four side files and kept there with the rook on the next file, till it is held by the other king, when the rook mates.

The pawn gives check in the same way as he captures, viz. diagonally. One king cannot give check to another, nor may a king be moved into check.

” Check by discovery ” is given when a player, by moving one

of his pieces, checks with another of them. “Double check”

means attacking the king at once with two

pieces — one of the pieces in this case giving

check by discovery.

” Perpetual check ” occurs when one player,

seeing that he cannot win the game, finds the

men so placed that he can give check ad

infinitum, while his adversary cannot possibly

avoid it. The game is then drawn. A game is

also drawn ” if, before touching a man, the

player whose turn it is to play, claims that the Kn ‘g nt ‘ s move.

game be treated as drawn, and proves that the existing position

existed, in the game and at the commencement of his turn of play,

twice at least before the present turn.”

” Stalemate.” When a king is not in check, but his owner has

no move left save such as would place the king in check, it is

” stalemate,” and the game is drawn.

” Castling.” This is a special move permitted to the king once

only in the game. It is performed in combination with either

rook, the king being moved two squares laterally, while the rook

towards which he is moved (which must not have previously

moved from its square) is placed next him on the other side; the king must be touched first. The king cannot castle after having been once moved, nor when any piece stands between him and the rook, nor if he is in check, nor when he has to cross a square commanded by an adverse piece or pawn, nor into check. It will be perceived that after castling with the king's rook the latter will occupy the KB square, while the king stands on the KKt square, and if with the queen's rook, the latter will occupy the queen's square while the king stands on the QB square.

" Taking en passant." This is a privilege possessed by any of the pawns under the following circumstances:— If a pawn, say of the white colour, stands upon a fifth square, say upon K5 counting from the white side, and a black pawn moves from Q2 or KB 2 to Q4 or KB4 counting from the black side, the white pawn can take the black pawn en passant. For the purposes of such capture the latter is dealt with as though he had only moved to Q3 or KB3, and the white pawn taking him diagonally then occupies the square the captured pawn would have reached had he moved but one square. The capture can be made only on the move immediately succeeding that of the pawn to be captured.

" Drawn Game." This arises from a stalemate (noticed above), or from either player not having sufficient force where- with to effect checkmate, as when there are only two kings left on the board, or king and bishop against king, or king with one knight, or two knights against king, or from perpetual check. One of the players can call upon the other to give check- mate in fifty moves, the result of failure being that the game is drawn. But, if a pawn is moved, or a piece is captured, the counting must begin again.

A " minor piece " means either a knight or a bishop. " Winning the exchange " signifies capturing a rook in exchange for a minor piece. A " passed pawn " is one that has no adverse pawn either in front or on either of the adjoining files. A " file " is simply a line of squares extending vertically from one end of the board to the other. An " open file " is one on which no piece or pawn of either colour is standing. A

pawn or piece is en prise when one of the enemy's men can capture it. " Gambit " is a word derived from the Ital. gambetto, a tripping up of the heels; it is a term used to signify an opening in which a pawn or piece is sacrificed at the opening of a game to obtain an attack. An " opening," or debut, is a certain set method of commencing the game. When a player can only make one legal move, that move is called a " forced move."

Value of the Pieces. — The relative worth of the chess-men cannot be definitely stated on account of the increase or decrease of their powers according to the position of the game and the pieces, but taking the pawn as the unit the following will be an estimate near enough for practical purposes: — pawn 1, bishop 3-25, knight 3 ■ 2 5 , rook 5 , queen 9-50. Three minor pieces may mere often than not be advantageously exchanged for the queen. The knight is generally stronger than the bishop in the end game, but two bishops are usually stronger than two knights, more especially in open positions.

Laws. — The laws of chess differ, although not very materially, in different countries. Various steps have been taken, but as yet without success, to secure the adoption of a universal code. In competitions among English players the particular laws to be observed are specially agreed upon, — the regulations most generally adopted being those laid down at length in Staunton's Chess Praxis, or the modification of the Praxis laws issued in the name of the British Chess Association inˆi862.

First Move and Odds. — To decide who moves first, one player conceals a white pawn in one hand and a black pawn in the other, his adversary not seeing in which hand the different pawns are put. The other holds out his hands with the pawns concealed, and his adversary touches one. If that contains the white pawn, he takes the white men and moves first. If he draws the black pawn his adversary has the first move, since white, by convention, always plays first. Subsequently the first move is taken alter- nately. If one player, by way of odds, " gives " his adversary a pawn or piece, that piece is removed before play begins. If

the odds are " pawn and move," or " pawn and two," a black pawn, namely, the king's bishop's pawn, is removed and white plays one move, or any two moves in succession. " Pawn and two " is generally considered to be slightly less in point of odds than to give a knight or a bishop; to give a knight and a bishop is to give rather more than a rook; a rook and bishop less than a queen; two rooks rather more than a queen. The odds of " the marked pawn" can only be given to a much

weaker player. A pawn, generally KB's pawn, is marked with a cap of paper. If the pawn is captured its owner loses the game; he can also lose by being checkmated in the usual way, but he cannot give mate to his adversary with any man except the marked pawn, which may not be moved to an eighth square and exchanged for a piece.

Rules. — If a player touch one of his men he must move it, unless he says j'adoube (I adjust), or words of a similar meaning, to the effect that he was only setting it straight on its square. If he cannot legally move a touched piece, he must move his king, if he can, but may not castle; if not, there is no penalty. He must say j'adoube before touching his piece. If a player touch an opponent's piece, he must take it, if he can: if not, move his king. If he can do neither, no penalty. A move is completed and cannot be taken back, as soon as a player, having moved a piece, has taken his hand off it. If a player is called upon to mate under the fifty-move rule, " fifty moves " means fifty moves and the forty-nine replies to them. A pawn that reaches an eighth square must be exchanged for some other piece, the move not being complete until this is done; a second king cannot be selected.

Modes of Notation. — The English and German methods of describing the moves made in a game are different. According to the English method each player counts from his own side of the board, and the moves are denoted by the names of the files and the numbers of the squares. Thus when a player for his first move advances the king's pawn two squares, it is described as follows: — " 1. P- K4." The following moves, with the aid of diagram 2, will enable the reader to understand the principles of the British notation. The symbol X is used to express " takes "; a dash – to express " to."

White. Black.

1. P-K4 1. P-K4

2. KKt-KB3 2. QKt-QB3

(i.e. King's Knight to the (i.e. Queen's Knight to the

third square of the King's third square of the Queen's Bishop's file) Bishop'-s file)

3. KB-QB4 3. KB-QB4

(King's Bishop to the fourth square of the Queen's Bishop's file)

4- P-QB3 4. KKt-KB 3

5- P-Q4 5- P takes P (or PXP)

(King's pawn takes White's Queen's pawn) 6. P takes P (or PXP) 6. KB-QKt5 (ch., i.e. check)

(Queen's Bishop's pawn

takes pawn : no other pawn

has a pawn en prise)

It is now usual to express the notation as concisely as possible; thus, the third moves of White and Black would be given as 3. B – B4, because it is clear that only the fourth square of the queen's bishop's file is intended.

The French names for the pieces are, King, Roi; Queen, Dame; Rook, Tour; Knight, Cavalier; Pawn, Pion; for Bishop the French substitute Fou, a jester. Chess is Les Echecs.

The German notation employs the alphabetical characters a, b, c, d, e, f, g and h, proceeding from left to right, and the numerals 1, 2, 3, 4, 5, 6, 7 and 8, running upwards, these being always calculated from the white side of the board (see diagram 2). Thus the White Queen's Rook's square is 01, the White Queen's square is di; the Black Queen's square, d&; the White King's square, ex; the Black King's square, e8, and so with the other pieces and squares. The German names of the pieces are as follows:— King, Konig; Queen, Dame; Rook, Turm; Bishop, Laufer; Knight, Springer; Pawn, Bauer; Chess, Schach. •

The initials only of the pieces are given, the pawns (Bauern) being understood. The Germans use the following signs in their notation, viz.: — for " check " (f); " checkmate " (j); " takes " (:); " castles on king's side " (o-o); "castles on queen's side " (o-o-o); for " best move " a note of admiration (!); for " weak move" a note of interrogation (?). The opening moves just given in the English will now be given in the German notation: —

White.

1. e2— e4

2. S gi -f3

3. L fl -C4

4. C2 -C3

5. d2-d4

6. c3-d4 =

Black.

1. e7-e5

2. Sb8-c6

3. Lf8-c5

4. Sg8-f6! 5- e5-d4: 6. Lc5-b4t

In both notations the moves are often given in a tabular form, thus: —

I. Ti — rrˆ 1. 21., the moves above the line being White's

P-K4 e7-e5 6

and below the line Black's.

Illustrative Games. — The text-books should be consulted by students who wish to improve their game. The following are some of the leading openings:—

Giuoco Piano.

White.

Black.

I.

P-K4

1. P-K4

2.

KKt-B3

2. QKt-B 3

3-

B-B4

3- B-B4

4-

P-B3

4. Kt-KB 3

5-

P-Q4

5- PXP

6.

PXP

6. B-Kt5 (ch)

7-

B-Q2

7. BXB (ch)

8.

QKtXB

8. P-Q4

0.

PXP

9. KKtXP

10.

Q-Kt 3

10. QKt-K2

11.

Castles (K’

s side) Even

game

11. Castles

Ruy

Lopez.

White.

Black.

1.

P-K4

1. P-K4

2.

KKt-B3

2. QKt-B 3

3-

B-Kt 5

3- P-QR3

4′

B-R4

4- Kt-B 3

5-

P-Q4

5- PXP

6.

P-K5

6. Kt-Ks

7.

Castles

7. B-K2

8.

R-Ksq

8. Kt-B4

9-

BXKt

9- QPXB

10.

KtXP

10. Castles

11.

Kt-QB 3

Even

game

11. P-KB3

Scotch

Gambit.

White.

Black.

1.

P-K4

1. P-K4

2.

KKt-B 3

2. QKt -B 3

3-

P-Q4

3- PXP

4-

B-QB4

4. B-B4

5-

P-B3

5- Kt-B 3

6.

PXP

The position here arrived at is

the same as in the Giuoco Piano

opening above.

Evans

Gambit.

White.

Black.

1.

P-K4

1. P-K4

2.

KKt-B3

2. QKt-B 3

3-

B-B4

3- B-B4

4-

P-QKt4

4. BxKtP

5-

P-B3

5- B-B4

6.

P-Q4

6. PXP

7-

Castles

7- P-Q3

8.

PXP

8. B-Kt3

White has for its ninth move 1

three approved continuations, viz.

B-Kt2, P-

-Q5, and Kt

— B3. To take one of them : —

,9-

P-Q5

9. Kt-R4

10.

B-Kt2

10. Kt-K2

11.

B-Q3

11. Castles

12.

Kt-B 3

12. Kt — Kt3

13-

Kt-K2

13. P-QB4

14.

Q-Q2

H – g-§ 3

15-

K-Rsq

15. B-B2

16.

QR-B sq

16. R-Kt sq

This game r

nay be considered about even.

King’s Knight’s Gambit (Proper).

White. Black.

1. P-K4 1. P-K4

2. P-KB4 2. PXP

3. KKt-B 3 3 . P-KKt4 4- B-B4 4. B-Kt2

5. Castles 5. P-Q3

6. P-Q4 6. P-KR3

7. P-B3 7. Kt-K2

Black has the advantage.

Allgaier-Kieseritzki Gambit. White. Black.

P-K4 1. P-K4

P-KB4 2. PXP

Kt-KB 3 3. P-KKt 4

P-KR4 4. P-Kt5

Kt-K 5 5. KKt-B 3

B-B4 6. P-Q4

7. PXP 7. B-Kt2

8. P-Q4 8. Castles

9. BXP 9. KtXP

10. BXKt 10. QXB

11. Castles 11. P-QB4

Black has the better game.

King’s Bishop’s Gambit.

White.

Black.

1. P-K4

1.

P-K4

2. P-KB4

2.

PXP

3- B-B4

3-

P-Q4

4. BXP

4-

Q-R5 (ch)

5. K-B sq

5-

P-KKt4

6. KKt-B3

6.

Q-R4

7- P-Q4

7-

B-Kt2

8. P-KR4

8.

P-KR3

9. Kt-B 3

9-

Kt-K2

10. K — Kt sq

10.

P-Kt 5

11. Kt-K5

11.

BXKt

12. PXB

12.

QXKP

13. Q-B sq

13-

P-B6

14. P-P

14.

Q-Kt6 (ch)

15. Q-Kt2

Drawn game.

Salvio

Gambit.

White.

Black.

1. P-K4

1.

P-K4

2. P-KB4

2.

PXP

3. KKt-B 3

3-

P-KKt4

4. B-B4

4-

P-Kt 5

5- Kt-K 5

5-

Q-R5 (ch)

6. K-B sq

6.

Kt-KR 3

7- P-Q4

7-

P-B6

8. Kt-QB 3

8.

P-Q3

9- Kt-Q 3

9-

PXP (ch)

10. KXP

10.

B-Kt2

11. Kt-KB4

11.

Kt-B 3

12. B-K3

12.

Castles

13. QKt-Q5

13-

Q-Qsq

14- P-B3

White has a slight advantage.

Muzio

Gambit.

P-K4 X -P-Ki 2 –

P-KB4 PXP

KKt-B 3 B-B4 3 ‘ P-KKt4 4- P-Kt5

White.

Black.

5. Castles

5-

PXKt

6. QXP

6.

Q-B3

7- P-K5

7-

QXP

8. P-Q3

8.

B-R3

9. B-Q2

9-

Kt-Ka

10. Kt-B3

10.

QKt-B 3

n. QR-Ksq

11.

Q-KB4

12. R-K4

12.

Castles

13. QBXP

13-

B-Kt2

14. Q-K2

14.

P-Q4

15- BXBP

15

Q-Kt 4

16. P-KR4

16.

Q-Kt 3

17- KtXP

17-

KtXKt

18. BXKt

18.

B-B4

19. QR-KB4

19-

B-K3

20. BXB

20.

PXB

21. R-K4

21.

RXR (ch)

22. KXR

22.

R-B sq (ch)

23. K — Kt sq

23-

Kt-Q 5

And Black has the better

game.

CHESS

97

Black.

2. PXP

3- P-K 4

4- PXP

5- B-Q 3 Kt-KB 3

7- Castles 8. P-KR3 P-QB3

6.

Queen’s Gambit. White.

i. P-Q4 2. P-QB 4

3- P-.K3

4. BXP 5- PXP

6. Kt-KB 3

7. Castles

8. P-KR3 ».

9. Kt-QB 3 9.

The game is about equal, though White has a somewhat freer position.

The following is a selection of noteworthy games played by

great masters: —

King's Bishop's Gambit.

White. Black.

Anderssen. Kieseritzki.

1. P-K4 1. P-K4

2. P-KB4 2. PXP

3- B-B4 3- Q-R5(ch)

4. K-B sq 4- P-QKt 4

5. BxKtP 5- Kt-KB 3

6. Kt-KB 3 6. Q-R3

7. P-Q3 7- Kt-R4

8. Kt-R4 8. Q-Kt 4 9- Kt-B 5 9. P-QB3

10. P-KKt4 10. Kt-B3

11. R-Kt sq 11. PXB

12. P-KR4 12. Q-Kt3 13- P-R5 13- Q-Kt 4

14. Q-B3 14. Kt-Kt sq

15. BXP 15- Q-B3

16. Kt-B3 16. B-B4 17- Kt-Q 5 17- QXKtP

18. B-Q6 18. QXR (ch)

19. K-K2 19. BXR

20. P-K5 20. Kt-QR3

White mates in three moves.

I.

2. 3- 4- 5- 6.

7- 8.

9- 10. 11. 12.

13- 14.

15- 16.

17- 18.

19- 20. 21. 22. 23-

White. Barnes. . P-K4 Kt-KB3

P-Q4

PXKP

Kt-Kt5

P-K6

Kt-B7

B-K3

B-KKt5

KtXR

B-B4

Kt-B7

R-B sq

P-KB3

Kt-QR 3

BXB

QXKt

Castles

B-Kt 3

K-Kt sq

Kt-K 5

Kt-Q 3

KtXB

Philidor’s Defence.

And White resigns.

1

2 3 4 5 6

7′ 8

9 10 11, 12

13 14.

I5 >

16.

17 18.

19 20. 21.

22,

23′

Black. Morphy. . P-K4

■ P-Q3 . P-KB4 . BPXP

P-Q4

B-QB4

P-Q5

Q-B4

QXB

Kt-QB 3

QXP

Kt-B 3

Kt-QKt 5

BXP

Kt-Q6 (ch)

PXQ

BxKt

P-Q7 (ch)

B-84

K-B sq

R-Ksq

QXR

Bishop’s Gambit.

White.

Black.

Charousek. Tchigorin.

1. P-K4 P-K4

2. P-KB4 PXP

3. B-B4 Kt-QB 3

4. P-Q4 Kt-B 3

5. P-K5 P-Q4

6. B-Kt3 B-Kt5

7. Q-Q3 Kt-KR 4

8. Kt-KR3 Kt-Kt5

9. Q-QB3 Kt-R 3

10. Castles B — K7

11. B-R4 (ch)P-B 3

12. BXP (ch) PXB

This pretty game was played the Budapest tournament, 1896.

vi. 4

White. Charousek.

13. QXP (ch)

14. KtXP

15. BxKt

16. Kt-B3

17. P-K6

18. B-B7

19. BXQ (ch)

20. Q-Kt7 (ch)

21. R-B7 (ch)

22. QXR (ch)

23. R — K sq _ 24. P-QKt 3

in the tie match for

Black. Tchigorin. K-K2 KtXKt

P-R3 B-B5 R-B sq PXP RXB R-Q2 KXK B-K2 R-Ksq Resigns, first prize at

Queen’s Gambit Declined.

White. W. Steinitz.

1. P-Q4

2. P-QB4

3. Kt-QB 3

4. B-B4 5- P-K3

6. R-B sq

7. QPXP

8. PXP

9- Kt-B 3

10. B-O3

11. PXP

12. Castles

13. Kt-QKt5

14. P-B 15- B-K5

16. K-Rsq

17. B-Kt 3

18. Q-B2 19- QR-Q sq 20. Q-Kt 3

Black. Dr E. Lasker.

P-Q4

P-K3

Kt-KB 3

B-K2

Castles

P-B4

BXP

PXP

Kt-B 3

P-Q5

KtXP

B-KKt5

BXKt

Kt-K 3

Kt-R4

GR-Qsq

Q-R3 R-B sq

P-R3

White. W. Steinitz.

21. Kt-B3

22. QXP

23. PXKt

24. QXP 25- Q- B 4

26. P-KR4

27. B-K4

28. P-B4

29. B-Kt2

30. Q-Q3

31. Kt-K 4

32. R-B3 33- KXR

34. K-R2

35. K-Kt2

36. K-R2

37. R-QKt sq

38. R-Kt5 39- P-R3.

Resigns.

Black. Dr E. Lasker. Kt-Q 5 , KtXB (ch) R-Kt sq R-Kt 3 RXP B-R2

Q-Q3

Q-Q2

Q-Kt 5

Kt-B 4

B-K6

RXB

KtXP(ch)

KtXR (ch)

Kt-R 5 (ch)

Kt-B 4

P-R4

R-Rsq

RXP

This game was played in the St Petersburg tournament, 1895, a fine specimen of Lasker's style. The final attack, beginning with 21. with Kt-Q5, furnishes a gem of an ending.

White. Black. White. Black.

Professor Major Professor Major

Rice. Hanham. Rice. Hanham.

1. P-K4 P-K4 15. Q-R3 Kt-B7

2. P-KB4 PXP 16. RXB (ch) B-K3

3. Kt-KB 3 P-KKt4 17. K-Bsq Q-R8 (ch)

4. P-KR4 P-Kt5 18. Kt-Kt sq Kt-R6

5. Kt-I<5 Kt-KB3 19. PXKt P-B6

6. B-B4 P-Q4 20. B-Kt5 Q-Kt7(ch)

7. PXP B-Q3 21. K-Ksq P-B7(ch)

8. Castles BxKt 22. K-Q2 P-B8 = Kt

9. R-Ksq Q-K2 (ch)

10. P-B3 P-Kt6 23. K-Q3 K-Q2

11. P-Q4 Kt-Kt5 24. PXB (ch) K-B2

12. Kt-Q2 QXP 25. Q-K7 (ch) K-Kt 3

13. Kt-B 3 Q-R3 26. Q-Q8 (ch) RXQ

14. Q-R4 (ch)P-B3 27. BXQ and mates

The Rice Gambit (so called after its inventor, Prof. Isaac L. Rice of New York), whether right or not, is only possible if Black plays 7. B-Q3. Paulsen's 7. B~Kt2 is better, and avoids unnecessary complications. 8. P-Q4is the usual move. Leaving the knight en prise, followed by 9. R-Ksq, constitutes the Rice Gambit. The interesting points in the gˆame are that White subjects himself to a most violent attack with impunity, for in the end Black could not save the game by 22. P-B8 claiming a second queen with a discovered check, nor by claiming a knight with double check, as it is equally harmless to White.

White. Black. White. Black.

Steinitz. Bardeleben. Steinitz. Bardeleben.

1. P-K4 P-K4 14. R-Ksq P-KB3

2. Kt-KB 3 Kt-QB 3 15. Q-K2 Q-Q2

3. B-B4 B-B4 16. QR-Bsq P-B3

4. P-B3 Kt-B 3 17. P-Q5 PXP

5. P-Q4 PXP 18. Kt-Q4 K-B2

6. PXP B-Kt5 (ch) 19. Kt-K6 KR-QBsq

7. Kt-B 3 P-Q4 20. Q-Kt 4 P-KKt 3

8. PXP KKtXP 21. Kt-Kt5 (ch) K-K sq

9. Castles B-K3 . 22. RXKt (ch) K-B sq

10. B-KKt5 B-K2 23. R-B7 (ch) K-Kt sq

11. BXKt QBXB 24. R-Kt7 (ch) K-R sq

12. KtXB QXKt 25. RXP (ch) Resigns.

13. BXB KtXB

As a matter of fact, Bardeleben left the board here, and lost the

game by letting his clock run out the time-limit ; but Steinitz,

who remained at the board, demonstrated afterwards the following variation leading to a forced win : —

White. Steinitz.

Black. Bardeleben. K-Kt sq K-Rsq KXR K-Bsq K-K2 K-Ksq

25

26. R-Kt7 (ch)

27. Q-R 4 (ch)

28. Q-R7 (ch)

29. Q — R8 (ch) is. — rv2 35. y — yo man

30. Q-Kt 7 (ch) K-K sq This game was awarded the prize for ” brilliancy ‘

tournament, 1895.

White. Steinitz.

31. Q-Kt8 (ch)

32. Q-B7 (ch)

33. Q-B8 (ch)

34. Kt-B 7 (ch) “5- Q-Q6 mate.

Black. Bardeleben. K-Kz K-Qsq Q — K sq K-Q2

at the Hastings

9»

CHESS

Ruy Lopez.

i.

2.

3-

4- 5- 6.

7- 8.

9-

10.

ii.

12.

13-

White. Halprin. P-K4 , Kt-KB3

B-Kt5 Castles

P-Q4

PXP

P-QR4

P-K6

PXKt

Kt-B 3

Kt-Kt 5

Q-R5 BXB

Black. Pillsbury. P-K4 Kt-QB 3 Kt-B 3 KtXP Kt-Q 3 KtXB

P-Q3

PXP

Kt-K2

Kt-Kt 3

B-K2

BXKt

Q-Q2

White. Halprin. P-Kt6 Kt-Q5

, Black. Pillsbury. BPXP PXKt

16. KR-K sq (ch) K-B sq

17- R-Rs

18. RXKt

19. R-B3 (ch)

20. B-R6

21. BXP

22. R-Kt3 (qh)

23. R-B3 (ch)

24. R-Kt3 (ch)

25. R-B3 (ch)

Draw.

Kt-K4

PXR

K-Ktsq

Q-Ka

KXB

K-Bsq

K-,Kt2

K-Bsq

K-Ktsq

This brilliant game, played at the Munich tournament, 1900, would be unique had the combinations occurred spontaneously in the game. As a matter of fact, however, the whole variation had been elaborated by Maroczy and Halprin previously, on the chance of Pillsbury adopting the defence in the text. The real merit belongs to Pillsbury, who had to find the correct defence to an attack which Halprin had committed to memory and simply had to be careful to make the moves in regular order.

Sicilian Defence.

White.

Black.

White.

Black.

Pillsbury.

Mieses.

Pillsbury.

Mieses.

1. P-K4

P-QB4

16.

PXP

Kt-Q5

2. Kt-KB 3

P-K3

17-

BXR

KXB

3- P-Q4

PXP

18.

R-R2

B-K 3 ■

4. KtXP

Kt-KB 3

19-

R-Q2

R-Ksc>

5. Kt-QB 3

Kt-B 3

20.

Castles

B-Kt6

6. KKt-Kt5

B-Kt 5

21.

Q-Ktsq

B-Q 4 .

7- P-QR3

BXKt (ch)

22.

B-Qsq

BXP

8. KtXB

P-Q4

23-

KXB

Q-Kt 4 (ch)

9. PXP

PXP

24.

K-Rsq

QXR ;

10. B-KKt.5

Castles

25-

B-Kt4

Q-B5

11. B-K2

P-Q5

26.

R-Ktsq ;

P-B4

12. Kt-K 4

Q-R 4 (ch)

27.

B-R5

Kt-B6

13. P-Kt 4

Q-Kl

28.

BXKt

QXB (ch)

14. KtXKt (ch) PXKt

29.

R-Kt2

R-K7

15. B-R6

P-Q6

3°-

Q-QBsq

QXQP

Drawn e

ventually.

This brilliant game occurred

at the Paris tournament, 1900.

Evans

Gamb

IT.

White.

Black.

White.

Black.

Anderssen.

Dufresne.

Anderssen.

Dufresne.

1. P-K4

P-K4

13-

O-R4

B-Kt 3

2. Kt-KB 3

Kt-QB 3

14.

QKt-02

B-Kt2

3- B-B4 ■

B-B4

15-

Kt-K4

8～§ 4

4. P-QKt 4

BXP

16.

BXP

Q-R4

5- P-B3

B-R4

17-

Kt-B6(ch)

PXKt

6. P-Q4

7. Castles

PXP

18.

PXP

R—Ktsq

P-Q6

19-

QR-Qsq

QXKt

8. Q-Kt 3

Q-B 3

20.

RXKt (ch)

KtXR

9- P-K5

Q-Kt 3

21.

QXP (ch)

KXQ

10. R — K sq

KKt-K2

22.

B-B 5 (ch)

K-Ksq

11. B-R3

P-Kt4

23-

B-Q7(ch) BXKt mate.

K moves

12. QXP

R-QKtsq

24.

This game is most remarkable and brilliant. The coup de repos of 19. QR — Q sq is the key-move to the brilliant final combination, the depth and subtlety of which have never been equalled, except perhaps in the following game between Zukertort and Blackburne :—

White. Zukertort.

1. P-QB4

2. P-K 3 Kt-KB 3 B-K2 Castles P-Q4 Kt-B 3 P-QKt 3 B-Kt2 Kt-QKt 5 KtXB Kt-Q2 P-B 3

14. QXKt 15- BXP

16. B-Q3

17. QR-Ksq

3- 4- 5- 6.

7- 8.

9- 10. 11. 12. 13

English

Opening.

Black.

White. .

Blackburne.

Zukertort.

P-K3 Kt-KB3

18. P-K4J

19. P-K 5

P-QKt 3

20. P-B4

B-Kt2

21. R-K 3

P-Q4

22. PXPe. p.

B-Q3

23. P-B5

Castles

24. BXKt

QKt-Q2

25. PXKtP

Q-K2

26. PXP (ch)

Kt-K 5

27- P-Qsdis. (ch)

28. Q-Kt4

29. R-B8(ch)

PXKt

QKt-B 3

KtXKt

3 o. QXP (ch)

PXP

31. BXP

KR-Bsq

32. B-Kt7 (ch)

33- QXQ

R-B2

Black. Blackburne.

P-Kt 3

P-B4

KtXP

Kt-K 5

PXB

R-B7

K-Rsq

P-K4

rJ*

K-Kt2 KXR K-Ktsq Resigns.

End Games. — A game of chess consists of three branches — the opening, the middle and the end game. The openings have been analysed and are to be acquired by the study of the books on the subject. The middle game can only be acquired practically. The combinations being inexhaustible in their variety, individual ingenuity has its full scope. Those endowed with a fertile imagination will evolve plans and combinations leading to favourable issues. The less endowed player, however, is not left quite defenceless; he has necessarily to adopt a different system, namely, to try to find a weak point in the arrangement of his opponent's forces and concentrate his attack on that weak spot. As a matter of fact, in a contest between players of equal strength, finding the weak point in the opponent's armour is the only possible plan, and this may be said to be the fundamental principle of the modern school. In the good old days the battles were mostly fought in the neighbourhood of the king, each side

striving for a checkmate. Nowadays the battle may be fought anywhere. It is quite immaterial where the advantage is gained be it ever so slight. Correct continuation will necessarily increase it, and the opponent may be compelled to surrender in the end game without being checkmated, or a position may be reached when the enemies, in consequence of the continual fight, are so reduced that the kings themselves have to take the field — the end game. The end game, therefore, requires a special study. It has its special laws and the value of the pieces undergoes a considerable change. The kings leave their passive role- and become attacking forces. The pawns increase in value, whilst that of the pieces may diminish in certain cases. Two knights, for instance, without pawns, become valueless, as no checkmate can be effected with them. In the majority of cases the players must be guided by general principles, as the standard examples do not meet all cases.

The handbooks as a rule give a sprinkling of elementary endings, such as to checkmate with queen, rook, bishop and knight, two bishops, and pawn endings pure and simple, as well as pawns in connexion with pieces in various forms. Towards the end of the 19th century a valuable work on end games was published in England by the late B. Horwitz; thus for the first time a theoretical classification of the art was given. This was followed by a more comprehensive work by Professor J. Berger of Gratz, which was translated a few years later by the late Mr Freeborough.

A few specimens of the less accessible positions are given below: —

Position from a Came played by the late J. G. Campbell in 1863.

BLACK.

Obviously White has to lose the game, not being able to prevent the pawns from queening. By a re- markably ingenious device White averts the loss of the game by stalemating himself as follows: —

1. B-Q2, P-Kt7; 2. B-R5, P-Kt8 = Q; 3 . P-Kt4 stale- mate.

Position by Sarratt, 1808.

BLACK.

WHITE.

This game, played in the London tournament, i88 3 , is one of the most remarkable productions of modern times, neither surpassed nor

indeed equalled hitherto.

White wins as follows: —

1. P-Kt6, RPXP; 2. P-B6, P(Kt2)XP; 3 . P-R6 and wins by queening the pawn. If I. . . . BPXP then 2. P-R6, KtPXP; 3 . P-B6 and queens the pawn.

WHITE.

CHESS

99

Problems. — A chess problem 1 has been described as ” merely a position supposed to have occurred in a game of chess, being none other than the critical point where your antagonist announces checkmate in a given number of moves, no matter what defence you play,” but the above description conveys no idea of the

Position by B. Horwitz.

black.

As a rule the game should be drawn. Supposing by a series of checks White were to compel Black to abandon the pawn, he would move K-R8; QXP and Black is stale-mate. Therefore the ingenious way to win is : —

i. K-B4, P-B8 = Q ch; K- Kt3 and wins. Or 1 . . . . K — R8 (threatening P-B8 = Kt); then 2. Q — Q2 preliminary to K — Kt3 now wins.

WHITE.

Without Black’s pawn White could only draw. The pawn being on the board, White wins as follows : —

1. Kt-B4, “K-Kt sq; ‘2. Kt (B 4)-K 3 , K-R sq; 3. K – Kt4, K-Kt sq; 4. K – R3, K-Rsq; 5. Kt-B4, K-Kt sq; 6. Kt (B4)-Q2, K-R sq; 7. Kt – Kt3 ch, K-Kt sq; 8. Kt — B3 mate.

Position by B. Horwitz.

BLACK.

Position by B. Horwitz.

BLACK,

WHITE.

White wins with two pieces against one — a rare occurrence.

1. Kt-K6, B-R3; 2. B-Q4 ch, K-R2; 3. B-B3, B moves anywhere not en prise ; 4. B — Kt7 and Kt mates.

WHITE.

White wins as follows : —

1. P-Kt5, Kt-Kt5; 2. K-B3, Kt-K6; 3. B-K6, Kt-B8; 4. BXP, Kt-Q7 ch; 5. K-Kt4, KtXP; 6. P-Kt6, Kt-B3, ch; 7. K-Kt5, P-K 5 ; 8. KXKt, P-K6; 9. B-B4, KXB; 10. P-Kt7, P-K7; 11. P-Kt8 = Q ch, and wins by the simple process of a series of checks so timed that the king may approach systematic- ally. The fine points in this instruc- tive ending are the two bishop's moves, 3. B — K6, and 9. B — B4, the latter move enabling White to queen the pawn with a check.

Position by 0. Schubert.

BLACK.

WHITE.

degree to which problem-composing has become a specialized study. Owing its inception, doubtless, to the practice of recording critical phases from actual play, the art of problem composition has so grown in favour as to earn the title of the " poetry " of the game.

1 The earliest known problem is ascribed to an Arabian caliph of the 9th century. The first known collection is in a manuscript (in the British Museum) of King Alphonso of Castile, dated 1250; it contains 103 problems. The collection of Nicolas of Lombardy, dated 1300, comprises 192 problems.

A good chess problem exemplifies chess strategy idealized and concentrated. In examples of actual play there will necessarily remain on the board pieces immaterial to the issue (checkmate), whereas in problems the composer employs only indispensable force so as to focus attention on the idea, avoiding all material Position by F. Amelung.

BLACK.

r

White with the inferior position saves the game as follows : —

1. P-R6, PXP; 2. K-B3 dis. gh, K moves; 3. R — R2, or Kt2 ch, KXR; 4. K-Kt2 and draw, as Black has to give up the rook, and the RP cannot be queened, the Black bishop having no power on the White diagonal. Extremely subtle.

Position by B. Horwitz.

“BLACK.

WHITE.

The main idea being to checkmate with the bishop, this is accomplished thus:—!. B-K4 ch, K-R4; 2. QXR, QXQ; 3 – K-B7, Q-B sq ch; 4. KXQ, BXP; 5. K-B7, BXP; 6. B-Kt6mate.

Position by A. Troitzky.

BLACK.

WHITE.

WHITE.

White wins as follows ;—

1. P-R8 = Q, R-Kt7 ch; 2. K-Kt 5 , RXQ; 3. Kt-Q 7 ch, K-Kt2; 4. P-B6 ch, K-R2; 5- QPXKt, R-R sq; 6. Kt-B 7 ch, RXKt; 7. PXR = Kt mate.

Position by Hoffer.

BLACK.

A position from actual play. White plays 1. R — B5 threatening to win a piece. Black replies with the powerful Kt — Kt5, threatening two mates, and finally White (Mr Hoffer) finds an ingenious sacrifice of the Queen — the saving clause.

The following are the moves : —

1. R-B5, Kt-Kt5; 2- Q-Kt8 ch, K-Kt3; 3. Q-K6 ch, K-R2; 4. Q — Kt8 ch, and drawn by per- petual check, as Black cannot cap- ture the Queen with K or R without losing the game.

which would tend to “obscure the issue.” Hence the first object in a problem is to extract the maximum of finesse with a sparing use of the pieces, but ” economy of force ” must be combined with ” purity of the mate.” A very common mistake, until comparatively recent years, was that of appraising the ” economy ” of a position according to the slenderness of the force used, but economy is not a question of absolute values. The true criterion is the ratio of the force employed to the skill demanded. The earliest composers strove to give their produc- tions every appearance of real play, and indeed their compositions

partook of the nature of ingenious end-games, in which it was usual to give Black a predominance of force, and to leave the White king in apparent jeopardy. From this predicament he was extricated by a series of checking moves, usually involving a number of brilliant sacrifices. The number of moves was rarely less than five. In the course of time the solutions were reduced to shorter limits and the beauty of quiet (non-checking) moves began to make itself felt. The early transition school, as it has been called, was the first to recognize the importance of economy, i.e. the representation of the main strategic point without any extraneous force. The mode of illustrating single-theme problems, often of depth and beauty, was being constantly improved, and the problems of C. Bayer, R. Willmers, S. Loyd, J. G. Campbell, F. Healey, “J. B.” of Bridport, and W. Grimshaw are, of their kind, unsurpassed. In the year 1845 the ” Indian ” problem attracted much notice, and in 1861 appeared Healey’s famous ” Bristol ” problem. To this period must be ascribed the discovery of most of those clever ideas which have been turned to such good account by the later school. In an article written in 1899 F. M. Teed mentions the fact that his incomplete collection of ” Indians ” totalled over three hundred.

In 1870 or thereabouts, the later transition period, a more general tendency was manifest to illustrate two or more finished ideas in a single problem with strict regard to purity and economy, the theory of the art received greater attention than before and the essays of C. Schwede, Kohtz and Kockelkorn, Lehner and Gelbfuss, helped to codify hitherto unwritten rules of taste. The last quarter of the 19th century, and its last decade especially, saw a marked advance in

technique, until it became a common thing to find as much deep and quiet play embodied in a single first-class problem as in three or four of the old-time problems, and hence arose the practice of blending several distinct ideas in one elaborate whole.

In the composition of ” two-movers ” it is customary to allow greater elasticity and a less rigorous application of the principles of purity and economy. By this means a greater superficial complexity is attained; but the Teutonic and Bohemian schools, and even English and American two-move specialists, recognize that complexity, if it involves the sacrifice of first principles, is liable to abuse. The blind master, A. F. Mackenzie of Jamaica, however, with a few others (notably T. Taverner, W. Gleave, H. and E. Bettman and P. F. Blake) have won some of their greatest successes with problems which, under stricter ruling, would not be allowed.

Bohemian (Czech) composers have long stood unrivalled as exponents of that blending of ideas which is the distinguishing trait of the later problem. Such is their skill in construction that it is rare to find in a problem of the Bohemian school fewer than three or four lines of play which, in economy and purity, are unimpeachable. Amongst [the earliest composers of this class Anton Konig, the founder of the school, Makovky, Drtina, Palct and Pilnacek deserve to be honourably mentioned, but it was not until the starting of a chess column in the weekly journal Svetozor that the merits of the new school were fully asserted. It was in 187 1 that Jan Dobrusky contributed his first composition to that paper: he was followed by G. Chocholous, C. Kondelik, Pospisil, Dr Mazel, Kviciala, Kesl, Tuzar, Musil and J. Kotrc; and later still, Havel, Traxler and Z. Mach were no unworthy followers of Dobrusky.

The faculty for blending variations is not without ” the defects of its qualities,” and consequently among the less able composers a certain tendency to repeat combinations of similar companion ideas is discernible at times, while the danger that facile con- struction might usurp the place of originality and strategy was already apparent to Chocholous when, in an article on the classification of chess problems (Deutsche Schachzeitung, 1890), he warned the younger practitioners of the Bohemian school against what has been dubbed by H. Von Gottschall Varianten-leierei, or ” the grinding out of variations.” When this one reservation is made few will be inclined to dispute the pre-eminence of the Bohemian school. To some tastes, however, a greater appeal is made by the deeper play of the older German school,

the quaint fancy of the American composer Samuel Loyd, or the

severity and freedom from ” duals ” which mark the English composers.

The idea of holding a problem competition open to the world was first mooted in connexion with the chess congress of 1851, but it was in 1854 that a tourney (confined to British composers) was first held. Since then a number of important problem tournaments have been held.

ffistory of Chess. The origin of chess is lost in obscurity. Its invention has been variously ascribed to the Greeks, Romans, Babylonians, Scythians, Egyptians, Jews, Persians, Chinese, Hindus, Arabians, Araucanians, Castilians, Irish and Welsh. Some have endeavoured to fix upon particular individuals as the originators of the game; amongst others upon Japheth, Shem, King Solomon, the wife of Ravan, king of Ceylon, the philosopher Xerxes, the Greek chieftain Palamedes, Hermes, Aristotle, the brothers Lydo and Tyrrhene, Semiramis, Zenobia, Attalus (d. c. 200 B.C.), the mandarin Han- sing, the Brahman Sissa and Shatrenscha, stated to be a celebrated Persian astronomer. Many of these ascriptions are fabulous, others rest upon little authority, and some of them proceed from easily traceable errors, as where the Roman games of Ludus Latrunculorum and Ludus Calculorum, the Welsh recreation of Tawlbwrdd (throw-board) and the ancient Irish pastime of Fithcheall are assumed to be identical with chess; so far as the Romans and Welsh are concerned, the contrary can be proved, while from what little is known of the Irish game it appears not to have been a sedentary game at all. The claims of the Chinese were advocated in a letter addressed by Mr Eyles Irwin in 1 793 to the earl Charlemont. This paper was published in the Trans- actions of the Royal Irish Academy, and its purport was that chess, called in the Chinese tongue chong-ki (the ” royal game “) was invented in the reign of Kao-Tsu, otherwise Lin-Pang, then king, but afterwards emperor of Kiang-Nang, by a mandarin named Han-sing, who was in command of an army, invading the Shen-Si country, and who wanted to amuse his soldiers when in winter quarters. Thte invasion of the Shen-Si country by Han-Sing took place about 174 b.c. Capt. Hiram Cox states that the game is called by the Chinese choke-choo-hong hi, ” the play of the science of war.” (See also a paper published by the Hon. Daines Barrington in the 9th vol. of the Archaeologia.) Mr N. Bland, M.R.A.S., in his Persian Chess (London, 1850), endeavours to prove that the Persians were the inventors of chess, and maintains that the game, born in Persia, found a home in India, whence after a series of ages it was brought back to its birthplace. The view, however, which has obtained the most credence, is that which attributes the origin of chess to the Hindus. Dr Thomas

Hyde of Oxford, writing in 1694 (De Ludis Orientalibus) , seems to have been the first to propound this theory, but he appears to have been ignorant of the game itself, and the Sanskrit records were not accessible in his time. About 1 783-1 789 Sir William Jones, in an essay published in the 2nd vol. of Asiatic Researches, argued that Hindustan was the cradle of chess, the game having been known there from time immemorial by the name of chatur- anga, that is, the four angas, or members of an army, which are said in the Amarakosha to be elephants, horses, chariots and foot soldiers. As applicable to real armies, the term chaturanga is fre- quently used by the epic poets of India. Sir William Jones's essay is substantially a translation of the Bhawishya Purana, in which is given a description of a four-handed game of chess played with dice. A pundit named Rhadhakant informed him that this was mentioned in the oldest law books, and also that it was invented by the wife of Ravan, king of Lanka (Ceylon), in the second age of the world in order to amuse that monarch while Rama was besieging his metropolis. This account claims for chess an existence of 4000 or 5000 years. Sir William, however, grounds his opinions as to the Hindu origin of chess upon the testimony of the Persians and not upon the above manuscript, while he con- siders the game described therein to be more modern than the Persian gamo. Though sure that the latter came from India and was invented there, he admits that he could not find any account

of it in the classical writings of the Brahmans. He lays it down thatchess,underthe Sanskrit name chatwanga, was exported from India into Persia in the 6th century of our era; that by a natural corruption the old Persians changed the name into chatrang, but when their country was soon afterwards taken possession of by the Arabs, who had neither the initial nor final letter of the word in their alphabet, they altered it further into shatranj, which name found its way presently into modern Persian and ultimately into the dialects of India.

Capt. Hiram Cox, in a letter upon Burmese chess, written in 1799 an d published in the 7th vol. of Asiatic Researches, refers to the above essay, and considers the four-handed game described in the Sanskrit manuscript to be the most ancient form of chess, the Burmese and Persian games being second and third in order of precedence. Later, in the nth and 24th vols, of the Archaeo- logia, Mr Francis Douce and Sir Frederick Madden expressed themselves in favour of the views held by

Hyde and his followers.

InProfessorDuncan Forbes's History oj 'Chess(i86o) Capt. Cox's views, as founded upon Sir William Jones's Sanskrit manuscript, are upheld and are developed into an elaborate theory. Professor Forbes holds that the four-handed game of chaturanga described in the Bhawishya Pur ana was the primeval form of chess; that it was invented by a people whose language was Sanskrit (the Hindus) ; and that it was known and practised in India from a time lost in the depths of a remote antiquity, but for a period the duration of which may have been from 3000 to 4000 years before the 6th century of the Christian era. He endeavours to show, but adduces no proof, how the four armies commanded by four kings in Sir William Jones's manuscript became converted into two opposing armies, and how two of the kings were reduced to a subordinate position, and became " monitors " or " counsellors," one standing by the side of the White and the other of the Black king, these counsellors being the farzins from which we derive our " queens." Among other points he argues, apparently with justice, that chaturanga was evidently the root of shatranj, the latter word being a mere exotic in the language of the inhabitants of Persia.

Van der Linde, in his exhaustive work, Geschichte und Litteratur des Schachspiels (Berlin, 1874), has much to say of the origin- theories, nearly all of which he treats as so many myths. He agrees with those who consider that the Persians received the game from the Hindus; but the elaborate chaturanga theories of Forbes receive but scant mercy. Van der Linde argues that chaturanga is always used by the old Indian poets of an army and never of a game, that all Sanskrit scholars are agreed that chess is not mentioned in really ancient Hindu records; that the Puranas generally, though formerly considered to be extremely old, are held in the light of modern research to reach no farther back than the 10th century — while the copies of the Bhawishya Purana in the British Museum and the Berlin Library do not contain the extract relied upon by Forbes, though it is to be found in the Raghunandana, which was translated by Weber in 1872, and is stated by Biihler to date from the 16th century. The outcome of van der Linde's studies appears to be that chess cer- tainly existed in Hindustan in the 8th century, and that probably that country is the land of its birth. He inclines to the idea that the game originated among the Buddhists, whose religion was prevalent in India from the 3rd to the gth century. According to their ideas, war and the slaying of one's fellow-men, for any pur- poses whatever, is criminal, and the punishment of the warrior in the next world will be much worse than that of the simple murderer; hence chess was invented as a substitute for war. In opposition to Forbes, therefore, and in agreement with Sir

William Jones, van der Linde takes the view that the four-handed game of the original manuscript is a comparatively modern adaptation of the Hindu chess, and he altogether denies that there is any proof that any form of the game has the antiquity attributed to it. Internal evidence certainly seems to contradict the theory that Sir William Jones's manuscript is very ancient testimony; for it mentions two great sages, Vyasa and Gotama, the former as teaching chaturanga to Prince Yudhishthira, and the other as giving an opinion upon certain principles of the game; but this could not well be, seeing that it was played with dice, and that all

games of hazard were positively forbidden by Manu. It would appear also that Indian manuscripts are not absolutely trust- worthy as evidence of the antiquity of their contents; for the climate has the effect of destroying such writings in a period of 300 or 400 years. They must, therefore, be recopied from time to time and in this way later interpolations may easily creep in.

Von der Lasa, who had, in an article prefixed to the Hand- buch in 1864, accepted Forbes's views, withdrew his support in a review of the work just noticed, published in the September and November numbers of the Deutsche Schachzeitung, 1874, and expressed his adherence to the opinions of van der Linde.

Altogether, therefore, we find the best authorities agreeing that chess existed in India before it is known to have been played anywhere else. In this supposition they are strengthened by the names of the game and of some of the pieces. Shatranj, as Forbes has pointed out,isaforeignwordamongthePersiansandArabians, whereas its natural derivation from the termchaturanga is obvious. Again ai-jU, the Arabic name of the bishop, means the elephant, otherwise alephhind, the Indian ox. Our earliest authority on chess is Masudi, an Arabic author who wrote about a.d. 950. According to him, shatranj had existed long before his time; and though he may speak not only for his own generation but for a couple of centuries before, that will give to chess an existence of over a thousand years.

Early and Medieval Times. — The dimness which shrouds the origin of chess naturally obscures also its early history. We have seen that chess crossed over from India into Persia, and became known in the latter country by the name of shatranj. Some have understood that word to mean " the play of the king "; but undoubtedly Sir William Jones's derivation carries with it the most plausibility. How and when the game was introduced into Persia we have no means of knowing. The Persian poet Firdusi, in his historical poem, the Shahnama, gives an

account of the introduction of shatranj into Persia in the reign of Chosroes I. Anushirwan, to whom came am- bassadors from the sovereign of Hind (India), with a chess- board and men asking him to solve the secrets of the game, if he could, or pay tribute. Chosroes I. was the contemporary of Justinian, and reigned in the 6th century a.d. Professor Forbes seems to think that this poem may be looked upon as an authentic history. This appears, however, to be somewhat dangerous, especially as Firdusi lived some 450 years after the supposed event took place; but since other Persian and Arabian writers state that shatranj came into Persia from India, there appears to be a consensus of opinion that may be considered to settle the question. Thus we have the game passing from the Hindus to the Persians and thence to the Arabians, after the capture of Persia by the Caliphs in the 7 th century, and from them, directly or indirectly, to various parts of Europe, at a time which cannot be definitely fixed, but either in or before the nth century. That the source of the European game is Arabic is clear enough, not merely from the words ” check ” and ” mate,” which are evidently from Shah mat (” the king is dead “), but also from the names of some of the pieces. There are various chess legends having reference to the 7th and 8th centuries, but these may be neglected as historically useless; and equally use- less appear the many oriental and occidental romances which revolve around those two great central figures, Harun al-Rashid and Charlemagne. There is no proof that either of them knew anything of chess or, so far as the latter is concerned, that it had been introduced into Europe in his time. True, there is an account given in Gustavus Selenus, taken from various old chronicles, as to the son of Prince Okar or Otkar of Bavaria having been killed by a blow on the temple, struck by a son of Pippin after a game of chess; and there is another well-known tradition as to the magnificent chess-board and set of men said to have been sent over as a present by the empress Irene to Charle- magne. But both tales are not less mythical than the romance which relates how the great Frankish monarch lost his kingdom over a game of chess to Guerin de Montglave; for van der Linde shows that there was no Bavarian prince of the name of Okar or Otkar at the period alluded to, and as ruthlessly shatters the

tradition about Irene’s chessmen. With respect to Harun al- Rashid, among the various stories told which connect him with chess, there is one that at first sight may seem entitled to some degree of credit. In the annals of the Moslems by Abulfeda (Abu’l Fida), there is given a

copy of a letter stated to be ” From Nicephorus, emperor of the Romans, to Harun, sovereign of the Arabs,” which (using Professor Forbes’s translation) after the usual compliments runs thus:—” The empress (Irene) into whose place I have succeeded, looked upon you as a Rukh and herself as a mere Pawn; therefore she submitted to pay you a tribute more than the double of which she ought to have exacted from you. All this has been owing to female weakness and timidity. Now, however, I insist that you, immediately on reading this letter, repay to me all the sums of money you ever received from her. If you hesitate, the sword shall settle our accounts.” Harun’s reply, written on the back of the Byzantine emperor’s letter, was terse and to the point. ” In the name of God the merciful and gracious. From Harun, the commander of the faithful, to the Roman dog Nicephorus. I have read thine epistle, thou son of an infidel mother; my answer to it thou shalt see, not hear.” Harun was as good as his word, far he marched immediately as far as Heraclea, devastating the Roman territories with fire and sword, and soon compelled Nicephorus to sue for peace. Now the points which give authority to this narrative and the alleged correspondence are that the relations which they assume between Irene and Nicephorus on the one hand and the warlike caliph on the other are confirmed by the history of those times, while, also, the straightforward brevity of Harun’s reply commends itself as what one might expect from his soldier-like character. Still, the fact must be remem- bered that Abulfeda lived about five centuries after the time to which he refers. Perhaps we may assume that it is not improb- able that the correspondence is genuine; but that the words rukh and pawn may have been substituted for other terms of comparison originally used.

As to how chess was introduced into western and central Europe nothing is really known. The Spaniards very likely received it from their Moslem conquerors, the Italians not improbably from the Byzantines, and in either case it would pass northwards to France, going on thence to Scandinavia and England. Some say that chess was introduced into Europe at the time of the Crusades, the theory being that the Christian warriors learned to play it at Constantinople. This is nega- tived by a curious epistle of St Peter Damian, cardinal bishop of Ostia, to Pope Alexander II., written about a.d. 1061, which, assuming its authenticity, shows that chess was known in Italy before the date of the first crusade. The’cardinal, as it seems, had imposed a penance upon a bishop whom he had found diverting himself at chess; and in his letter to the pope he repeats the language he had held to the erring prelate, viz. ” Was it right, I say, and consistent with thy duty, to sport away thy evenings amidst the vanity of chess, and defile the hand

which offers up the body of the Lord, and the tongue that mediates between God and man, with the pollution of a sacri- legious game ? ” Following up the same idea that statutes of the church of Elna, in the 3rd vol. of the Councils of Spain, say, ” Clerks playing at dice or chess shall be ipso facto excommuni- cated.” Eudes de Sully, bishop of Paris under Philip Augustus, is stated in the Ordonn. des Rois de France to have forbidden clerks to play the game, and according to the Hist. Redes, of Fleury, St Louis, king of France, imposed a fine on all who should play it. Ecclesiastical authorities, however, seemed to have differed among themselves upon the question whether chess was or was not a lawful game according to the canons, and Peirino (De Proelat. chap. 1) holds that it was permissible for ecclesiastics to play thereat. Among those who have taken an unfavourable view of the game may be mentioned John Huss, who, when in prison, deplored his having played at chess, whereby he had lost time and run the risk of being subject to violent passions. Among authentic records of the game may be quoted the Alexiad of the princess Anna Comnena, in which she relates how her father, the emperor Alexius, used to divert his mind

from the cares of state by playing at chess with his relatives. This emperor died in n 18.

Concerning chess in England there is the usual confusion between legend and truth. Snorre Sturleson relates that as Canute was playing at chess with Earl Ulf , a quarrel arose, which resulted in the upsetting of the board by the latter, with the further consequence of his being murdered in church a few days afterwards by Canute’s orders. Carlyle, in The Early Kings of Norway, repeats this tale, but van der Linde treats it as a myth. The Ramsey Chronicle relates how bishop Utheric, coming to Canute at night upon urgent business, found the monarch and his courtiers amusing themselves at dice and chess. There is nothing intrinsically improbable in this last narrative; but Canute died about 1035, and the date, therefore, is suspiciously early. Moreover, allowance must be made for the ease with which chroniclers described other games as chess. William the Conqueror, Henry I., John and Edward I. are variously stated to have played at chess. It is generally supposed that the English court of exchequer took its name from the cloth, figured with squares like a chess-board, which covered the table in it (see Exchequer). An old writer says that at the coronation of Richard I. in 1189, six earls and barons carried a chess-board with the royal insignia to represent the exchequer court. Accord- ing to Edmonson’s Heraldry, twenty-six English families bore chess rooks in their coats of arms.

As regards the individual pieces, the king seems to have had the same move as at present; but it is said he could formerly be captured. His ” castling ” privilege is a European invention; but he formerly leaped two and even three squares, and also to his Kt 2nd. Castling dates no farther back than the first half of the 1 6th century. The queen has suffered curious changes in name, sex and power. In shatranj the piece was called farz or firz (also farzan, farzin and farzi), signifying a ” counsellor,” ” minister ” or ” general.” This was latinized into farzia or fercia. The French slightly altered the latter form into fierce, fierge, and as some say, merge, which, if true, might explain its becoming a female. Another and much more probable account has it that whereas formerly a pawn on reaching an eighth square became a farzin, and not any other piece, which promotion was of the same kind as at draughts (in French, dames) , so she became a dame or queen as in the latter game, and thence dama, donna, &c. There are old Latin manuscripts in which the terms ferzia and regina are used indifferently. The queen formerly moved only one square diagonally and was consequently the weakest piece on the board. The immense power she now possesses seems to have been conferred upon her so late as about the middle of the 15th century. It will be noticed that under the old system the queens could never meet each other, for they operated on diagonals of different colours. The bishop’s scope of action was also very limited formerly; he could only move two squares diagonally, and had no power over the intermediate square, which he could leap over whether it was occupied or not. This limitation of their powers prevailed in Europe until the 15th century. This piece, according to Forbes, was called among the Persians pil, an elephant, but the Arabs, not having the letter p in their alphabet, wrote it fil, or with their definite article al-fil, whence alphilus, alfinus, alifiere, the latter being the word used by the Italians; while the Frenchˆ perhaps get their fol and fou from the same source. The pawns formerly could move only one square at starting; their powers in this respect were increased about the early part of the 16th century. It was customary for them on arriving at an eighth square to be ex- changed only for a farzin (queen), and not any other piece; the rooks (so called from the Indian rukh and Persian rokh, meaning ” a soldier “) and the knights appear to have always had the same powers as at present. As to the chessboards, they were formerly uncoloured, and it is not until the 13th century that we hear of checkered boards being used in Europe.

Development in Play.— The change of shatranj into modern chess took place most probably first in France, and thence made its way into Spain early in the 15th century, where the new game was called Axedrezde la dama, being also adopted by the Italians

under the name of scacci alia rabiosa. The time of the first im- portant writer on modern chess, the Spaniard Ruy Lopez de Segura (1561), is also the period when the latest improvement, castling, was introduced, for his book (Libro de la invention liberal y arte del juego del Axedrez), though treating of it as already in use, also gives the old mode of play, which allowed the king a leap of two or three squares. Shortly afterwards the old shatranj disappears altogether. Lopez was the first who merits the name of chess analyst. At this time flourished the flower of the Spanish and Italian schools of chess — the former represented by Lopez, Ceron, Santa Maria, Busnardo and Avalos; the latter by Giovanni Leonardo da Cutri (il Puttino) and Paolo Boi (il Syracusano). In the years 1562-1575 both Italian masters visited Spain and defeated their Spanish antagonists. During the whole 17th century we find but one worthy to be mentioned, Giacchino Greco (il Calabrese). The middle of the 18th century inaugurates a new era in chess. The leading man of this time was Francois Andre Danican Philidor. He was born in 1726 and was trained by M. de Kermur, Sire de Legal, the star of the Cafe de la Rigence in Paris, which has been the centre of French chess ever since the commencement of the 18th century. In 1747 Philidor visited England, and defeated the Arabian player, Phillip Stamma, by 8 games to 1 and 1 draw. In 1749 he published his Analyse des tehees, a book which went through more editions and was more translated than any other work upon the game. During more than half a century Philidor travelled much, but never went to Italy, the only country where he could have found opponents of first-rate skill. Italy was represented in Philidor's time by Ercole del Rio, Lolli and Ponziani. Their style was less sound than that of Philidor, but certainly a much finer and in principle a better one. As an analyst the Frenchman was in many points refuted by Ercole del Rio (" the anonymous Modenese "). Blindfold chess-play, already exhibited in the nth century by Arabian and Persian experts, was taken up afresh by Philidor, who played on many occasions three games simultaneously without sight of board or men. These exhibitions were given in London, at the Chess Club in St James's Street, and Philidor died in that city in 1795. As eminent players of this period must be men- tioned Count Ph. J. van Zuylen van Nyevelt (1743-1826), and the German player, J. Allgaier (1763-1823), after whom a well-known brilliant variation of the King's Gambit is named. Philidor was succeeded by Alexandre Louis Honore Lebreton Deschapelles (1780-1847), who was also a famous whist player. The only player who is known to have fought Deschapelles not

unsuccessfully on even terms is John Cochrane. He also lost a match (1821) to W. Lewis, to whom he conceded the odds of ” pawn and move,” the Englishman winning one and drawing the two others. Deschapelles’ greatest pupil, and the strongest player France ever possessed, was Louis Charles Mahe de laBourdonnais, who was born in 1797 and died in 1840. His most memorable achievement was his contest with the English champion, Alexander Macdonnell, the French player winning in the pro- portion of three to two.

The English school of chess began about the beginning of the 19th century, and Sarratt was its first leader. He flourished from 1808 to 1821, and was followed by his great pupil, W. Lewis, who will be principally remembered for his writings. His literary career belongs to the period from 181 8 to 1848 and he died in 1869. A. Macdonnell (1798-1835) has been already mentioned. To the same period belong also Captain Evans, the inventor of the celebrated ” Evans Gambit ” (1828), who died at a very advanced age in 1873; Perigal, who participated in the correspondence matches against Edinburgh and Paris; George Walker, for thirty years chess editor of Bell’s Life in London; and John Cochrane, who met every strong player from Deschapelles downwards. In the same period Germany possessed but one good player, J. Mendheim of Berlin. The fifth decade of the 19th century is marked by the fact that the leadership passed from the French school to the English. After the death of la Bourdonnais, Fournie de Saint-Amant became the leading player in France; he visited England in the early part of 1843,

and successfully met the best English players, including Howard Staunton (?.».); but the latter soon took his revenge, for in November and December 1843 a great match between Staunton and Saint-Amant took place in Paris, the English champion winning by 1 1 games to 6 with 4 draws. During the succeeding eight years Staunton maintained his reputation by defeating Popert, Horwitz and Harrwitz. Staunton was defeated by Anderssen at the London tournament in 1851, and this con- cluded his match-playing career. Among the contemporaries of Staunton may be mentioned Henry Thomas Buckle, author of the History of Civilization, who defeated Kieseritzki, Anderssen and LBwenthal.

In the ten years 1830-1840 a new school arose in Berlin, the seven leaders of which have been called ” The Pleiades.” These were Bledow (1795-1846), Bilguer (1815-1840), Hanstein (1810- 1850), Mayet (1810-1868), Schorn (1802-1850), B. Horwitz (b. 1809) and von Heydebrandt und, der Lasa, once German ambassador at Copenhagen. As belonging to the same period must he mentioned the three Hungarian players, Grimm, Szen and J. Lowenthal.

Among the great masters since the middle of the 19th century Paul Morphy (1837-1884), an American, has seldom been sur- passed as a chess player. His career was short but brilliant. Born in New Orleans in 1837, he was taught chess by his father when only ten years of age, and in two years’ time became a strong player. When not quite thirteen he played three games with LQwenthal, and won two of them, the other being drawn. He was twenty years of age when he competed in the New York congress of 1857, where he won the first prize. In 1858 he visited England, and there defeated Boden, Medley, Mongredien, Owen, Bird and others. He also beat Lowenthal by 9 games to 3 and 2 drawn. In the same year he played a match at Paris with Harrwitz, winning by 5 to 2 and 1 drawn; and later on he obtained a victory over Anderssen. On two or three occasions he played blindfold against eight strong players simultaneously, each time with great success. He returned to America in 1859 and continued to play, but with decreasing interest in the game, until 1866. He died in 1884.

Wilhelm Steinitz (b. 1836) took the sixth prize at the London congress of 1862. He defeated Blackburne in a match by

7 to 1 and 2 drawn. In 1866 he beat Anderssen in a match by

8 games to 6. In 1868 he carried off the first prize in the British Chess

Association handicap, and in 1872 in the London grand tourney, also defeating Zukertort in a match by 7 games to 1 and 4 drawn. In 1873 he carried off the first prize at the Vienna congress; and in 1876 he defeated Blackburne, winning 7 games right off. In 1872-1874, in conjunction with W. N. Potter, he conducted and won a telegraphic correspondence match for London against Vienna. In Philidor's age it was considered almost incredible that he should be able to play three simultaneous games without seeing board or men, but Paulsen, Blackburne and Zukertort often played 10 or 12 such games, while as many as 14 and 15 have been so played.

In 1876 England was in the van of the world's chess army. English-born players then were Boden, Burn, Macdonnell, Bird, Blackburne and Potter; whilst among naturalized English players were Lowenthal, Steinitz, Zukertort, who died in 1888, and Horwitz. This illustrious contingent was reinforced in 1878 by Mason, an Irish-American, who came over for the Paris tournament; by Gunsberg, a Hungarian; and later by Teichmann, who also made England his home. English chess flourished under the leadership of these masters, the chief prizes in tournaments being consistently carried off by the English representatives.

To gauge the progress made by the game since about 1875 it will suffice to give the following statistics. In London Simpson's Divan was formerly the chief resort of chess players; the St George's Chess Club was the principal chess club in the West End, and the City of London Chess Club in the east. About a hundred or more clubs are now scattered all over the city. Formerly only the British Chess Association existed; after its dissolution the now defunct Counties' Chess Association took

its place, and this was superseded by the re-establishment by Mr Holler of the British Chess Association, which again fell into abeyance after having organized three international tourna- ments—London, 1886; Bradford, 1888; and Manchester, 1890 — and four national tournaments. There were various reasons why the British Chess Association ceased to exercise its functions, one being that minor associations did not feel inclined to merge their identity in a central association. The London League was established, besides the Northern Chess Union, the Southern Counties' Chess Union, the Midland Counties' Union, the Kent County Association; and there are

associations in Surrey, Sussex, Essex, Hampshire, Wiltshire, Gloucestershire, Somerset- shire, Cambridgeshire, Herefordshire, Leicestershire, North- amptonshire, Staffordshire, Worcestershire and Lancashire. All these associations are supported by the affiliated chess clubs of the respective counties. Scotland ("which has its own association), Wales and Ireland have also numerous clubs.

Still, England did not produce one new eminent player between 1875 and 1905. First-class chess remained in the hands- of the veterans Burn, Blackburne, Mason and Bird. The old amateurs passed away, their place being taken by a new generation of powerful amateurs, so well equipped that Great Britain could hold its own in an amateur contest against the combined forces of Germany, Austria, Holland and Russia. The terms master and amateur are not used in any invidious sense, but simply as designating, in the former case, first-class players, and in the latter, those just on the borderland of highest excellence. The professional element as it existed in the heydey of Simpson's Divan almost disappeared, the reason being the increased number of chess clubs, where enthusiasts and students might indulge in their favourite pastime to their heart's content, tournaments with attractive prizes being arranged during the season. The former occupation of the masters vanished in consequence; the few who remained depended upon the passing visitors from the provinces who were eager to test their strength by the standard of the master. Blackburne visited the provinces annually, keeping the interest in first-class chess alive by his simultaneous play and his extraordinary skill as a blindfold player — unsur- passed until the advent of Harry Nelson Pillsbury (1872-1906), the leading American master since Morphy.

Germany has produced great chess players in Tarrasch, E. Lasker, Lipke, Fritz, Bardeleben, Walbrodt and Mieses, besides a goodly number of amateurs. Austria produced Max Weiss, Schlechter, Marco and Hruby, to say nothing of such fine players as the Fleissigs, Dr Mertner, Dr Kaufmann, Fahndrich, Jacques Schwarz and others. Hungary was worthily represented by Maroczy, Makovetz and Brody, Maroczy being the best after Charousek's death. Russia, having lost Taenisch, Petroff and Schumoff, discovered Tchigorin, Janowsky, Schiffers, Alapin, Winawer and Taubenhaus. France showed a decline for many years, having only the veteran M. Arnous de Riviere and the naturalized M. Rosenthal left, followed by Goetz and two good amateurs, MM. Didier and Billecard. Italy had only Signor Salvioli, although Signor Reggio came to the fore. Holland had a fair number of players equal to the English amateurs, but no master since the promising young van Lennep died.

The first modern International Chess Tournament held in London in 1851 was the forerunner of various similar contests of which the following is a complete table: —

Tournaments. 1851. London. 1 Anderssen, 2 Wyvill, 3 Williams. 1857. Manchester. I Lowenthal, 2 Anderssen.

1857. New York. I Morphy, 2 L. Paulsen.

1858. Birmingham. I Lowenthal, 2 Falkbeer.-

1860. Cambridge. I Kolisch, 2 Stanley.

1861. Bristol. 1 L. Paulsen, 2 Boden.

1862. London, I Anderssen, 2 L. Paulsen, 3 Owen.

1865. Dublin. 1 Steinitz, 2 MacDonnell.

1866. Redcar. De Vere.

1866. English Championship Cup. De Vere.

1866. British Chess Association. I Steinitz, 2 Green.

1867. Paris. 1 Kolisch, 2 Winawer, 3 Steinitz.

1867. Dundee. 1 Neumann, 2 Steinitz, 3 De Vere and MacDonnell.

1868. English Championship Cup. 1 Blackburne, 2 De Vere. 1868. British Chess Association Handicap. 1 Steinitz, 2 Wisker,

3 Blackburne. 1870. Baden-Baden. I Anderssen, 2 Steinitz, 3 Blackburne and

Neumann. 1870. English Championship Cup. 1 Wisker, 2 Burn. 1870-1871. City of London Handicap. I Potter, 2 De Vere. 1871-1872. City of London Handicap. I Steinitz, 2 Keats. 1872. London. I Steinitz, 2 Blackburne, 3 Zukertort.

1872. English Championship Cup. I Wisker (becoming permanent

holder of the cup), 2 De Vere.

1873. Vienna. I Steinitz, 2 Blackburne, 3 Anderssen. 1876.. London. I Blackburne, 2 Zukertort, 3 Potter.

1878. Paris. 1 Zukertort, 2 Winawer (after a tie with Zukertort), 3 Blackburne.

1880. Wiesbaden. I, 2, and 3, a tie between Blackburne, Englisch

and A. Schwarz.

1881. Berlin. I Blackburne, 2 Zukertort, 3 Tchigorin and Winawer.

Tchigorin made his first public appearance in this contest.

1882. Vienna. 1 Steinitz and Winawer, 3 Mason.

1883. London. I Zukertort, 2 Steinitz, 3 Blackburne.

1883. Nuremberg. 1 Winawer, 2 Blackburne, 3 Mason. This tournament is a milestone in modern chess history. The prizes being comparatively small, it was thought that it necessarily must be a failure, the munificently endowed London tournament having just been completed. But, strange to say, whilst in London fourteen players competed, there were nineteen entries in Nuremberg. Winawer, not placed in the former, won the first prize in the latter.

1885. Hamburg. 1 Gunsberg; the next prizes were divided by Blackburne, Mason, Englisch, Tarrasch and Weiss.

1885. Hereford. I Blackburne, 2 and 3 Bird and Schallopp.

1886. London. I Blackburne, 2 Burn, 3 Gunsberg and Taubenhaus.

1886. Nottingham. I Burn, 2 Schallopp, 3 Gunsberg and Zukertort.

1887. Frankfort. I Mackenzie, 2 Blackburne and Weiss.

1888. Bradford. I Gunsberg, 2 Mackenzie, 3 Mason and Bardeleben.

1889. New York. 1 Tchigorin and Weiss, 3 Gunsberg.

1889. Breslau. I Tarrasch, 2 Burn, 3 Weiss.

1890. Amsterdam. 1 Burn, 2 Lasker, 3 Mason. There were only

nine competitors, Lasker unexpectedly losing to van Vliet

by a trap. 1 890. Manchester. 1 Tarrasch, 2 Blackburne, 3 Bird and Mackenzie. 1892. Dresden. I Tarrasch, 2 Makovetz and Porges. Blackburne

received a special prize.

1894. Leipzig. I Tarrasch, 2 Lipke and Teichmann.

1895. Hastings. I Pillsbury, 2 Tchigorin, 3 Lasker. This tourna-

ment is historical for the first appearance of Pillsbury, the American champion, and Maroczy, the Hungarian champion.

1896. Nuremberg. 1 Lasker, 2 Maroczy, 3 Pillsbury and Tarrasch.

1896. Budapest. I Tchigorin, 2 Charousek, 3 Pillsbury.

1897. Berlin. I Charousek, 2 Walbrodt, 3 Blackburne. Englisch

had to abandon the tournament and return to Vienna ill. He never recovered and died a few weeks later.

1898. Vienna. I Tarrasch, 2 Pillsbury, 3 Janowsky. Tarrasch

achieved a remarkable victory in this important tournament. Pillsbury's chances were better than his, but he managed to run him neck and neck and beat him in the tie match which followed.

1898. Cologne. I Burn, 2 Charousek, Cohn and Tchigorin.

1899. London. I Lasker, 2 Janowsky, Maroczy and Pillsbury.

Janowsky sacrificed the second prize by trying to win a game against Steinitz when with an easy draw in hand he could have secured the second place for himself alone.

1900. Munich. Tie between Maroczy, Pillsbury and Schlechter for

three chief prizes.

1900. Paris. I Lasker, 2 Pillsbury, 3 Maroczy and Marshall.

1901. Monte Carlo. I Janowsky, 2 Schlechter, 3 Scheve and

Tchigorin. A novel rule was introduced at this tournament, viz. the first drawn game to count \ to each player, to be replayed, and in case of a draw again to count \ each, and in case of win \ to the winner. Theoretically this seems logical, but in practice it did not work well.

1902. Monte Carlo. I Pillsbury and Maroczy, 3 Janowsky.

1902. Hanover. I Janowsky, 2 Pillsbury, 3 Atkins.

1903. Monte Carlo. I Tarrasch, 2 Maroczy, 3 Pillsbury.

1904. Monte Carlo. I Maroczy, 2 Schlechter, 3 Marshall.

1904. Cambridge Springs. 1 Marshall, 2 Lasker and Janowsky.

1905. Ostend. I Maroczy, 2 Tarrasch and Janowsky.

1905. Scheveningen. I Marshall, 2 Leussen, 3 Spielmann.

1906. Stockholm. 1 Schlechter and Bernstein, 3 Mieses. 1906. Ostend. I Schlechter, 2 Maroczy, 3 Rubenstein.

1906. Nuremberg. 1 Marshall, 2 Duras, 3 Schlechter and Fleisch-

mann.

1907. Vienna. 1 Mieses, 2 Duras, 3 Maroczy and Vidmare. 1907. Ostend. I Bernstein and Rubenstein, 3 Mieses.

1907. Ostend. 1 Tarrasch, 2 Schlechter, 3 Janowsky and Marshall. 1907. Carlsbad. 1 Rubenstein, 2 Maroczy, 3 Niemzowitch and Leonhardt.

In the absence of any recognized authority to confer the title

of chess champion of the world, it has usually been appropriated by the most successful competitor in tournaments. On this • ground Tarrasch claimed the title in 1907, although Lasker, who had twice beaten Steinitz, the previous champion, in champion- ship matches, in addition to such masters as Bird, Blackburne, Mieses and Marshall, was well qualified to assume it. Accord- ingly in arranging the programme for the tournament at Ostend in 1907 it was agreed that the winner of this contest should receive the title of tournament champion, and should play a match with Lasker for the championship of the world. Tarrasch having proved successful at Ostend, the match between him and Lasker was played at Munich in September 1908, and re- sulted in the victory of Lasker by 8 games to 3 and 5 draws.

Chess has developed various schools of play from time to time. The theory of the game, however, did not advance in proportion to the

enormous strides in its popularity. Formerly the theory of play had been enriched by such enthusiasts as Dr Max Lange, Louis Paulsen, Professor Anderssen, Neumann, Dr Suhle, Falkbeer, Kieseritzki, Howard Staunton, Dr Zukertort, W. N. Potter and Steinitz, foremost amongst them being Louis Paulsen. The openings were thoroughly overhauled, new variations dis- covered and tested in practical play over the board. These are now things of the past. The masters who find flaws in old variations and discover new ones bring them to light only in matches or tournaments, as new discoveries have now a market value and may gain prizes in matches or tournaments. The old " romantic " school consequently became extinct, and the eliminating process resulted in the retention of a small repertoire only, sufficient for practical purposes in important contests. Gambits and kindred openings containing elements of chance were avoided, and the whole stock which a first-class player requires is a thorough knowledge of the " Ruy Lopez," the " Queen's Pawn Openings," and the " French " and " Sicilian Defences " — openings which contain the least element of chance. The repertoire being restricted it necessarily follows that the scope for grand combinations is also diminished and only strategy or position play remains. The " romantic " school invariably aimed at an attack on the king's position at any cost; nowadays the struggle is to obtain a minute advantage, and the whole plan consists in finding or creating a weak spot in the opponent's arrangement of forces; such is the theory of the modern school, conceived and advocated by Steinitz. But it is a curious fact that Steinitz founded the modern school rather late in life. He felt his powers of combination waning, and being the world's champion and eager to retain that title, he started the new theory. This novel departure revolutionized chess entirely. The attacking and combination style was sacrificed to a sound, sober and dry method; but Steinitz, strange to say, was not even the best exponent of his own theory, this position falling to younger players, Siegbert Tarrasch, Schlechter, Amos Burn and Emanuel Lasker. Pillsbury and Janowsky adhered to both styles, the former in a high degree, and so did Zukertort and Charousek; Tchigorin being a free-lance with a style of his own. The old charm of the game disappeared — in match and tournament play at least — and beauty was sacrificed to exact calculation and to scoring points. This is to be regretted, for the most beautiful games still occur when a player resorts to the gambits. One of the finest games in the Hastings tourna- ment was played by Tchigorin against Pillsbury, and this was a " King's Gambit Declined." Charousek won a " Bishop's Gambit " against Dr Lasker in the Nuremberg tournament; and some brilliant games occur in the " Queen's Gambit De- clined," if either White or Black sacrifices the KP. Another reason why gambits should be

adopted by players in tourna- ments is that competitors would necessarily be readily prepared for the regulation openings, so that the gambits might take them by surprise. After all, tne new school is a natural consequence of the progress of the game. Paulsen, Anderssen and Tchigorin devoted a lifetime to the Evans Gambit, volumes of analyses were written on it, and then Lasker revives an obsolete defence, and the Evans Gambit disappears ! Zukertort achieved a great success with ” 1. Kt to KB3 ” in the London tournament, 1883,

and this, or the kindred ” 1. P to Q4 ” opening, has since become the trusty weapon in serious encounters. Lasker wrote Common Sense in Chess, and gave the best defences of the Ruy Lopez (a certain form of it); but the ” common sense ” was demolished in the Paris and Nuremberg tournaments, and old forms of that remarkable opening have to be refurbished. These instances will suffice to show the reason for the cautious style of modern times. The Moltkes have replaced the Napoleons.

The old versatility of style could be revived if club tournaments were organized differently. The players might be compelled to adopt one single opening only in a twc-round contest, each player thus having attack and defence in turn. The next season another opening would form the programme, and so on. Even in international tournaments this condition might be imposed; the theory would be enriched; full scope would be given to power of combination and ingenuity; whilst the game would be more interesting.

There are still amateurs who devote their energies to the theory of the game; but so long as innovations or new dis- coveries are not tested by masters in serious games, they are of no value. Steinitz used to keep a number of new discoveries ready to be produced in masters’ contests, the result being that his novelties were regularly demolished when it came to

The British Chess Federation was instituted in 1904, its first congress being held at Hastings in that year, when a British championship, a ladies’ championship and a first-class amateur tournament were played. These competitions have been con- tinued annually at the congresses of the federation, with the following results : —

British Championship.

1904. Hastings. 1 H. E. Atkins and W. E. Napier, 3 J. H. Black-

burne.

1905. Southport. 1 H. E. Atkins, 2 G. E. H. Bellingham and

J. H. Blackburne.

1906. Shrewsbury. I H. E. Atkins, 2 R. P. Michell, 3 G. E. Wain-

wright.

1907. Crystal Palace. I H. E. Atkins, 2 J. H. Blackburne, R. P.

Michell, E. G. Sergeant and G. E. VVainwright.

Ladies' Championship.

1904. Hastings. I Miss Finn, 2 Mrs Anderson and Mrs Herring.

1905. Southport. I Miss Finn. 2 Mrs Anderson and Mrs Houlding.

1906. Shrewsbury. I Mrs Herring, 2 Mrs Anderson, 3 Miss Ellis and

Mrs Houlding.

1907. Crystal Palace. I Mrs Herring and Mrs Houlding, 3 Mrs

Anderson.

First Class Amateur Tournament. (Section A. I W. H. Gunston, 2 H. F. Cheshire u . J and F. Brown.

1904. Hastings S Section B _ j G . E . Wainwright and C. H.

1 Sherrard, 3 W. P. M'Bean.

(Section A. 1 Dr Holmes, 2 J. Mortimer, 3 H. G.

1905. Southportˆ ,. „ £° Ie r, ai ri J ' E '/ Un ?- R

Section B. 1 F. E. Hamond, 2 F. Brown, T. J.

I Kelly and C. H. Wallwork.

1906. Shrewsbury. 1 G. Shories, J. F. Allcock, P. W. Fairweather

and E. D. Palmer.

In 1896 and following years matches between representative players of Great Britain and the United States respectively were played by cable, with the following results: —

1896. America won by 45 games to 3 J

1897. Great Britain ,, 5J ,, 4J

1898. Great Britain „ 5J „ 4!

1899. America ,, 6 ,, 4

1900. America ,, 6 ,, 4

1901. Drawn

1902. America ,, 5J ,, 4J

1903. America ,, 5i „ 4J

1907. Great Britain ,, 5! ,, 4.3

1908. America ,, 6J „ 33

1909. Great Britain ,,6 1, 4

Since 1899 cable matches have also been played annually between representatives of English and American universities; of the first six three were won by England, the remaining three

being drawn, tn England chess matches have been played annually since 1873 between the universities of Oxford and Cambridge, seven players on each side. Up to 1907 Oxford won eleven matches, Cambridge twenty-one, and three were drawn.

Literature of the Game. — The first known writer on chess was Jacobus de Cessolis (Jacopo Dacciesole), whose main object, however, though he gives the moves, &c, was to teach morals rather than chess. He was a Dominican friar, and his treatise, Solatium Ludi Scacchorum, scilicet, Libellus de Moribus Hominum et Officiis Nobilium, was written before the year 1200. It was afterwards translated into French, and in the year 1474 Caxton, under the title of The Game and Playe of Chesse, printed an English translation of the French version.

In 1490 we have the Gottinger Handschrift, a work containing nine different openings and fifty problems. The author of this manuscript is

not known. Then comes Vicent, a Spanish writer, whose book bears date 1495. Only the title-page has been preserved, the rest of the work having been lost in the first Carlist war. Of Lucena, another Spanish author who wrote in or about 1497, we are better informed. His treatise, Repeticion des Amores y Arte de Axedres, comprises various practical chess matters, including 150 positions, illustrated by 160 well-executed woodcuts. Various of these positions are identical with those in the Gottinger Handschrift. In the 16th century works upon the game were written by Damiano, Ruy Lopez and Horatio Gianutio della Mantia; in the 17th century by Salvio, Polerio, Gustavus Selenus, Carrera, Greco, Fr. Antonio and the authors of the Traite de Lausanne; in the 18th century by Bertin, Stamma, Ercole del Rio, L°Ui, Cozio, Philidor, Ponziani, Stein, van Nyevelt, Allgaier and Peter Pratt; in the 19th century by J. F. W. Koch and C. F. Koch, Sarratt, John Cochrane, Wm. Lewis, Silberschmidt, Ghulam Kassim and James Cochrane, George Walker, A. MacDonnell, Jaenisch, Petroff, von Bilguer, von der Lasa, Staunton, Kling and Horwitz, Bledow, Dubois, Kieseritzki; Max Lange, Lowenthal, Dufresne, Neumann, Suhle, Zukertort, Preti and others.

English chess owes much to W. Lewis and George Walker. But to Howard Staunton must be ascribed the most important share in creating the later popularity which the game achieved in England. Staunton's first work, The Chess Player's Handbook, was published in 1847, and again (revised) in 1848. For want of further adequate revision many of its variations are now out of date ; but taking the handbook as it was when issued, very high praise must be bestowed upon the author. His other works are: The Chess Player's Text- Book and The Chess Player's Companion (1849) (the latter being a collection of his own games), the Chess Praxis (i860), republished in 1903, his posthumous Work, Chess Theory and Practice, edited by R. B. Wormald (1876), and various smaller treatises. The laws of the game as laid down in the Praxis formed the basis of the rules adopted by the British Chess Association in 1862. Besides editing The Chess Player's Chronicle and The Chess World, he was the chess editor of The Illustrated London News from 1844 till his death in

1874.

Among continental chess authorities von Heydebrandt und der Lasa (more usually known by his second title) stood pre-eminent. The German Handbuch was completed in 1843 by von Bilguer, who died before the first edition was completed. The second, third, fourth and fi/th editions (the last published in 1874) were edited and revised by von der Lasa. . a

Among the more important modern works the following may be mentioned: Vasquez, El Ajedrez de memoria; La Odisea de Pablo Morphy (Havana, 1893); Bauer, Schachlexikon (Leipzig, 1893); Jean Dufresne, Kleines Lehrbuch des Schachspiels (6th ed., Leipzig, 1893) ; E. Freeborough and Rev. C. E. Ranken, Chess Openings, Ancient and Modern; Arnelung, Baltische SchachblStter, &c. (Berlin, 1893); Bachman, Geistreiche Schachpartien (containing a number of brilliant games) (Ansbach, 1893-1899); E. H. Bird, Chess History and Reminiscences (London, 1893) ; The Steinitz- Lasher Match (1894); Chess Novelties (1895); Max Lange, Paul Morphy (1894); C. Bardeleben and J. Mieses, Lehrbuch des Schachspiels (very useful) ; Jas. Mason, The Principles of Chess in Theory and Practice (1894); The Art of Chess (1895); Social Chess (Horace Cox, London); Dr Tarrasch, Dreihundert Schachpartien (Leipzig, 1895); Dr Eugen V. Schmidt, Syslematische Anordung von Schacheroffnungen (Veit & Co., Leipzig, 1895); Numa Preti, ABC des echecs (Paris, 1 895); C. Salvioli, Teoria generate del giuoco degli Scacchi (Livorno, 1895); W. Steinitz, Modern Chess Instructor (New York, 1895); L. Hoffer, Chess (Routledge); E. Freeborough, Select Chess End-Games (London, 1895); Euclid, The Chess Ending King and Queen against King and Rook (London, 1895); Tassilo von Heydebrandt und der Lasa, Leitfaden des Schachspiels and Zur Geschichte und Literatur des Schachspiels (Leipzig, 1897) ; Dr. Lasker, Common Sense in Chess (London, 1896); Oscar Cordel, Neuester Leitfaden des Schachspiels (Berlin, 1896); and a vast number of other publications.

Further, The London Tournament Book (1883); Twelve Tourna- ment Books of the German Chess Association (Veir & Co., Leipzig); The Hastings Tournament Book (London, 1896}; The Vienna

Tournament Book, by Halprin and Marco (1900) ; The Nuremberg Tournament Book, by Dr Tarrasch ; The Book of the London Congress, by L. Hoffer (Longman, 1899); The Paris Tournament Book (Paris, 1900), by Rosenthal, &c.

The following are some of the best works in English on chess problems: — “J. B.” of Bridport, Chess Strategy (1865); F. Healey, A Collection of 200 Chess Problems (1866); English Chess Problems, edited by James and W. T. Pierce (1876) ; H. J. C. Andrews, E. N. Frankenstein, B. G. Laws, and C. Planck, The Chess Problem Text-Book (1887) ; A. F, Mackenzie, Chess: its Poetry and its Prose (Jamaica, 1887); J. A. Miles, Chess Stars (self-mates), (1888); James Rayner, Chess Problems (1890) ; B. G. Laws, The Two-Move Chess Problem (1890); The Chess Bouquet, compiled by F. R. Gittins (1897); Mr and Mrs T. B. Rowland, The Problem Art (2nd ed., 1898); E. B.

Cook, T. Henery and C. A. Gilberg, American Chess-Nuts (1868); Samuel Loyd, Chess Strategy (1878); W. H. Lyons, Chess-Nut Burrs and how to open them (1886) ; C. A. Gilberg, Crumbs from the Chess Board (1890) ; Canadian Chess Problems, edited by C. F. Stubbs (1890) ; W. Pulitzer, Chess Harmonies (1894) ; G. E. Carpenter (N. Preti of Paris), 200 Chess Problems (1900).

CHEST (Gr. kuttti, Lat. cista, O. Eng. cist, cest, &c), a large box of wood or metal with a hinged lid. The term is also used of a variety of kinds of receptacle; and in anatomy is transferred to the portion of the body covered by the ribs and breastbone (see Respiratory System). In the more ordinary meaning chests are, next to the chair and the bed, the most ancient articles of domestic furniture. The chest was the common receptacle for clothes and valuables, and was the direct ancestor of the ” chest of drawers,” which was formed by enlarging the chest and cutting up the front. It was also frequently used as a seat. Indeed, in its origin it took in great measure the place of the chair, which, although familiar enough to the ancients, had become a luxury in the days when the chest Was already an almost universal possession. The chief use of chests was as wardrobes, but they were also often employed for the storing of valuables. In the early middle ages the rich possessed them in profusion, used them as portmanteaux, and carried them about from castle to castle. These portable receptacles were often covered with leather and emblazoned with heraldic designs. As houses gradually became less sparsely furnished, chests and beds and other movables were allowed to remain stationary, and the chest lost its covered top, and took the shape in which we best know it — that of an oblong box standing upon raised feet. As a rule it was made of oak, but it was sometimes of chestnut or other hard wood.

There are, properly speaking, three types of chest — the domestic, the ecclesiastical and the strong box or coffer. Old domestic chests still exist in great number and some variety, but the proportion of those earlier than the latter part of the Tudor period is very small; most of them are Jacobean in date. Very frequently they were made to contain the store of house- linen which a bride took to her husband upon her marriage. In the 1 7 th century Boulle and his imitators glorified the marriage- coffer until it became a gorgeous casket, almost indeed a sarco- phagus, inlaid with ivory and ebony and precious woods, and enriched with ormolu, supported upon a stand of equal magnifi- cence. The Italian marriage-chests (cassone) were also of a richness which was never attempted in England. The main characteristics of English domestic chests (which not infrequently are carved with names and dates) are panelled fronts and ends, the feet being formed

from prolongations of the ” stiles ” or side posts. There were, however, exceptions, and a certain number of 17th-century chests have separate feet, either circular or shaped after the indications of a somewhat later style. There is usually a strong architectural feeling about the chest, the front being divided into panels, which are plain in the more ordinary examples, and richly carved in the choicer ones. The plinth and frieze are often of well-defined guilloche work, or are carved with arabesques or conventionalized flowers. Architectural, detail, especially the detail of wainscoting, has indeed been followed with considerable fidelity, many of the earlier chests being carved in the linenfold pattern, while the Jacobean examples are often mere reproductions of the pilastered and recessed oaken mantelpieces of the period. Occasionally a chest is seen which is inlaid with coloured woods, or with

geometrical parquetry. Perhaps the most elaborate type of English parquetry chest is that named after the vanished Palace of Nonesuch. Such pieces are, however, rarely met with. The entire front of this type is covered with a representation of the palace in coloured woods. Another class of chest is incised, some- times rather roughly, but often with considerable geometrical skill. The more ordinary variety has been ‘of great value to the forger of antique furniture, who has used its carved panels for conversion into cupboards and other pieces, the history of which is not easily unravelled by the amateur who collects old oak without knowing much about it. Towards the end of the 17th century chests were often made of walnut, or even of exotic woods such as cedar and cypress, and were sometimes clamped with large and ornamental brass bands and hinges. The chests of the 18th century were much larger than those of the preceding period, and as often as not were furnished with two drawers at the bottom — an arrangement but rarely seen in those of the 17th century — while they were often fitted with a small internal box fixed across one end for ready access to small articles. The chest was not infrequently unpanelled and unornamented, and in the latter period of its history this became the ruling type. It will not have been forgotten that it was in an old oak chest that the real or mythical heroine of the pathetic ballad of ” The Mistletoe Bough ” concealed herself, to her undoing.

Ecclesiastical chests appear to have been used almost entirely as receptacles for vestments and church plate, and those which survive are still often employed for the preservation of parish documents. A

considerable variety of these interesting and often exceedingly elaborate chests are still left in English churches. They are usually of considerable size, and of a length disproportionate to their depth. This no doubt was to facilitate the storage of vestments. Most of them are of great antiquity. Many go back to the 14th century, and here and there they are even earlier, as in the case of the coffer in Stoke d'Abernon church, Surrey, which is unquestionably 13th-century work. One of the most remarkable of these early examples is in Newport church, Essex. It is one of the extremely rare painted coffers of the 13th century, the front carved with an upper row of shields, from which the heraldic painting has disappeared, and a lower row of roundels. Between is a belt of open tracery, probably of pewter, and the inside of the lid is decorated with oil paintings representing the Crucifixion, the Virgin Mary, St Peter, St John and St Paul. The well-known " jewel chest " in St Mary's, Oxford, is one of the earliest examples of 14th century work. Many of these ecclesiastical chests are carved with architectural motives — traceried windows most frequently, but occasionally with the linenfold pattern. There is a whole class of chests known as " tilting coffers," carved with representations of tournaments or feats of arms, and sometimes with a grotesque admixture of chivalric figures and mythical monsters. Only five or six examples of this type are known still to exist in England, and two of them are now in the Victoria and Albert Museum. It is not certain that even these few are of English origin —indeed, very many of the chests and coffers of the 16th and 1 7th centuries are of foreign make. They were imported into England chiefly from Flanders, and were subsequently carved by native artisans, as was the case with other common pieces of furniture of those periods. The huche or " hutch " was a rough type of household chest.

The word " coffer " is properly applied to a chest which was intended for the safe keeping of valuables. As a rule the coffer is much more massive in construction than the domestic chest; it is clamped by iron bands, sometimes contains secret receptacles opening with a concealed spring, and is often furnished with an elaborate and complex lock, which occupies the whole of the underside of the lid. Pieces of this type are sometimes described as Spanish chests, from the belief that they were taken from ships belonging to the Armada. It is impossible to say that this may not sometimes have been the case, but these strong boxes are frequently of English origin, although the mechanism of the locks may have been due to the subtle skill of foreign locksmiths. A typical example of the treasure chest is that which belonged

to Sir Thomas Bodley, and is preserved in the Bodleian library at

Oxford. The locks of this description of chest are of steel, and are sometimes richly damascened. It was for being implicated in the breaking open and robbing of just such a chest as this, to which the College de Navarre had confided coin to the value of 500 ecus, that Francois Villon was hanged on the gibbet of Montfaucon.

CHESTER, EARLS OF. The important palatine earldom of Chester was first held by a certain Fleming named Gherbod (fl. 1070), and then by Hugh of Avranches (d. 1101), a son of Richard, viscount of Avranches. Hugh, who was probably one of William the Conqueror's companions, was made earl of Chester in 107 1 ; he had special privileges in his earldom, and he held land in twenty counties. He was called Le Gros on account of his great bulk and Lupus on account of his ferocity. However, he regarded St Anselm as his friend, and he showed the customary liberality to religious houses. His life was mainly spent in fighting the Welsh and in Normandy, and he died on the 27 th of July noi. Hugh's only son Richard, who was childless, was drowned in the White Ship in November 1 1 20. Among sub- sequent holders were Ralph, or Randulph, de Gernon (d. n 53), who took a prominent part in the civil wars of the reign of Stephen, fighting first on one side and then on the other; and his son Hugh de Kevelioc (1147-1181), who shared in the rising against Henry II. in 1173. But perhaps the most celebrated of the early earls was" (Ralph, Ranulf, or Randulph, de Blundevill (c. 1 1 72-1 232), who succeeded his father Hugh de Kevelioc as earl in n 81, and was created earl of Lincoln in 121 7. Ranulf married Constance, widow of Henry II. 's son, Geoffrey of Brittany, and is sometimes called duke of Brittany and earl of Richmond. He fought in Wales, was on the side of John during his struggle with the barons over Magna Carta, and was one of this king's executors; he also fought for the young king Henry III. against the French invaders and their allies. In 1 2 1 8 he went on crusade to the Holy Land and took part in the capture of Damietta; then returning to England he died at Wallingford in October 1232. After speaking of Ranulf 's unique position in the kingdom, which " fitted him for the part of a leader of opposition to royal or ministerial tyranny," Stubbs sums up his character in these words: "On more than one occasion he refused his consent to taxation which he deemed unjust; his jealousy of Hubert (de Burgh), although it led him to join the foreign party in 1223, did not prevent him from more than once interposing to prevent his overthrow. He was, moreover, almost the last relic of the great feudal aristocracy of the Conquest." Although twice married he left no children, and his immense possessions passed to his four sisters. The earl's memory remained green for a long time, and in the Vision of Piers Plowman his name is linked with that of Robin Hood. In

November 1 232 the earldom of Chester was granted to his nephew John the Scot, earl of Huntingdon (c. 1207-1237), and in 1246, nine years after John had died childless, it was annexed to the English crown ” lest so fair a dominion should be divided among women.”

In 1 2 54 Prince Edward, afterwards King Edward I. , was created earl of Chester, and since this date the earldom has always been held by the heirs apparent to the English crown with the single exception of Simon de Montfort, earl of Leicester. Since 1399 the earls of Chester have been also princes of Wales, although the act of Richard II. (1398), which created Chester into a prin- cipality to be held by the king’s eldest son, was revoked by Henry IV.

CHESTER, an episcopal city and county of a city, municipal, county and parliamentary borough, and the county town of Cheshire, England, 179 m. N.W. of London. Pop. (1901) 38,309. It lies in a low plain on the Dee, principally on the north (right) bank, 6 m. above the embouchure of the river into its wide, shallow estuary. It is an important railway centre, the principal lines serving it being the London & North-Western, Great Western, Cheshire Lines and Great Central. The city is divided into four principal blocks by the four principal streets — North- gate Street, Eastgate Street, Bridge Street and Watergate Street, which radiate at right angles from the Cross, and terminate in

the four gates. These four streets exhibit in what are called ” the Rows ” a characteristic feature of the city. Their origin is a mystery, and has given rise to much controversy. In East- gate Street, Bridge Street and Watergate Street, the Rows exist on each side of the street throughout the greater part of its length, and may be described as continuous galleries open to the street, over and under which the houses lining the streets project, and which are formed as it were out of the front first- floor of the houses, approached by flights of steps from the roadway. The Rows are flagged or boarded under foot and ceiled above, thus forming a covered way, standing in the same relation to the shops, which are at their back, as the foot pavement does in other towns. In Northgate Street, on the other hand, the Row on the west side is formed as it were out of the ground floor of the houses, having cellars beneath, while on the east side the Row is formed at the same elevation as in the other three principal streets. In these streets are several examples of old timbered houses and some good modern

imitations of them, — all combining to give a picturesque and individual character to the city. Among the most interesting of the ancient houses are Derby House, bearing the date 1591, Bishop Lloyd's house, and God's Providence House in Watergate Street, and the Bear and Billet in Lower Bridge Street; the three last date from the 17th century. There is also a chamber with stone groined roof of the 14th century in the basement of a house in Eastgate Street, and another of a similar character in Watergate Street. A mortuary chapel of the early part of the 13th century exists in the basement of a house in Bridge Street.

Chester is the only city in England that still possesses its walls perfect in their entire circuit of 2 m. The gateways have all been rebuilt at various dates; the north and east gates on the site of the Roman gates. The Grosvenor bridge, a single span of stone 200 ft. in length, said to be the largest save one in Europe, carries the road to Wrexham and Shrewsbury over the Dee on the south-west; while the old bridge of seven arches is interesting on account of its antiquity and picturesqueness. The castle, with the exception of " Caesar's Tower," and a round tower with adjacent buildings, in the upper ward, was taken down towards the end of the 18th century, and replaced by a gateway, barracks, county hall, gaol and assize courts.

The cathedral church of Christ and the Virgin Mary, which stands towards the north of the city within the walls, rose on the site of a church of extreme antiquity. It appears that the dedication of this church was altered, perhaps in the reign of Athelstan, from St. Peter and St Paul to St Werburgh and St Oswald, St Werburgh being a niece of St Etheldreda of Ely. In 1093 Hugh Lupus, earl of Chester, richly endowed the founda- tion as a Benedictine monastery. The bishops of Mercia had apparently a seat at Chester, but the city had ceased to be epis- copal, until in 1075 Peter, bishop of Lichfield, removed his seat thence to Chester, having for his cathedral the collegiate church of St John. The seat of the see, however, was quickly removed again to Coventry (1102), but Cheshire continued subject to Lichfield until in 1541 Chester was erected into a bishopric by Henry VIII., the church of the dissolved abbey of St Werburgh becoming the cathedral. The diocese covers nearly the whole of Cheshire, with very small portions of Lancashire and Stafford- shire. The cathedral does not rank among the most splendid English churches, but possesses certain details of the highest interest, and gains in beauty from the tones of its red sandstone walls and the picturesque close in which it stands. It is cruciform with a central tower 127 ft. high. The south transept is larger than the north. The nave is short (145 ft.), being of six bays; the southern arcade is Decorated, while the northern, which differs in

detail, is of uncertain date. The basement of the north- western tower — all that remains of it, now used as a baptistery — is Norman, and formed part of Hugh Lupus' church; and the fabric of the north wall is also of this period. The north transept also retains Norman work, and its size shows the original plan, as the existence of the conventual buildings to the north probably rendered its extension undesirable. The south transept has aisles, with Decorated and Perpendicular windows. The fine

organ stands on a screen across the north transept; but some of its pipes are upon the choir screen, both screens being the work of Sir Gilbert Scott. The style of the choir is transitional from Early English to Decorated, and its length is 125 ft. It is a fine example, and its beauty is enhanced by the magnificent series of ancient carved wooden stalls unsurpassed in England. The Lady Chapel, east of the choir, is of rich Early English workmanship. Of the conventual buildings the cloisters are Perpendicular. The chapter-house, entered by a beautiful vestibule from the east cloister, and lined with cases containing the chapter library, is Early English (c. 1240). The refectory, adjoining the north cloister, is of the same period, with Perpen- dicular insertions; it has been curtailed in size, but retains its beautiful Early English lector's pulpit. An early Norman chamber, with massive pillars and vaulting, adjoins the west cloister, and may be the substructure of the abbot's house. The abbey gateway is of the 14th century.

Within the walls there are several churches of ancient founda- tion; thus St Peter's is said to occupy the site of a church erected by MiheMsed, queen of Mercia, and St Mary's dates from the 12th century. None, however, is of any special interest; but the church of St John, outside the walls, which as already stated became the cathedral in 1075, is a massive early Norman structure, with later additions, and, especially as regards the exterior, considerably restored in modern times. Its fine tower fell in 1 88 1. It was a collegiate church until 1547, and there are some remains of the adjoining buildings. Among numerous modern churches there may be mentioned St Mary's without the walls, built in 1887 by the duke of Westminster, of red sandstone, with a fine spire and peal of bells.

Among the chief secular buildings, the town hall replaced in 1869 -the old exchange, which had been burnt down in 1862. The Grosvenor Museum and School of Art, the foundation of which was suggested by Charles Kingsley the novelist, when canon of Chester cathedral, contains, many local antiquities, along with a fine collection of the fauna of Cheshire and the neighbourhood. The King's school was

founded by Henry VIII. (1541), who provided that twenty-four poor scholars should be taught free of cost. It was reorganized as a public school in 1873, and possesses twelve king's scholarships tenable in the school, and close scholarships tenable at the universities. Among other schools may be mentioned theP blue-coat school (1700), the Queen's school for girls (1878), the girls' school attached to the Roman Catholic convent, and the diocesan training college for schoolmasters. For recreation provision is made by the New Grosvenor Park, presented to the city in 1867 by the. marquess of Westminster; Handbridge Park, opened in 1892; and the Roodee, a level tract by the river at the base of the city wall, appropriated as a race-course. An annual race-meeting is held in May and attendedby thousands. The chief event is the race for the Chester Cup, which dates from 1540, when a silver bell was given as the prize by the Saddlers' Company. Pleasure vessels ply on the Dee in summer, and an annual regatta is held, at which all the principal northern rowing-clubs are generally represented. The town gains in prosperity from its large number of visitors. The principal industries are carried on without the walls, where there are lead, shot and paint works, leather and tobacco factories, and iron foundries. The trade gilds number twenty-four. There is a considerable amount of shipping on the Dee, the navigation having been much improved in modern times. The parliamentary borough returns one member. The municipal council consists of a mayor, 10 aldermen and 30 councillors. Area, 2862 acres.

History. — Setting aside the numerous legends with regard to the existence of a British city on the site now occupied by Chester, the earliest authentic information relating to its history is furnished by the works of Ptolemy and Antoninus. As the Roman station of Deva it was probably founded about a.d. 48 by Ostorius Scapula, and from its advantageous position, both as the key to communication with Ireland and as a bulwark against the hostile tribes of the north, it became a military and commercial centre of considerable importance. In a.d. 78-79

it was the winter-quarters of Agricola, and later became illustrious as the permanent headquarters of Legio XX. Valeria Victrix. Many inscriptions and remains of the Roman military occupation have been found, and the north and east walls stand in great part on Roman foundations. The Saxon form of the name was Leganceaster. About 614 the city was captured and destroyed by ˆEthelfrith, and

henceforth lay in ruins until jEthelflaed in 907 rebuilt the walls, restored the monastery of St Werburgh, and made the city ” nigh two such as it was before.” In the reign of ˆEthelstan a mint was set up at Chester, and in 973 it was the scene of Edgar’s truimph when, it is said, he was rowed on the Dee by six subject kings. Chester opposed a deter- mined resistance to the Conqueror, and did not finally surrender until 1070. On the erection of Cheshire to a county palatine after the Conquest, Chester became the seat of government of the palatine earls. The Domesday account of the city includes a description of the Saxon laws under which it had been governed in the time of Edward the Confessor. All the land, except the bishop’s borough, was held of the earl, and assessed at fifty hides. There were seven mint-masters and twelve magistrates, and the city paid a fee-farm rent of £45. It had been much devastated since the time of Edward the Confessor, and the number cf houses reduced by 205.

The earliest extant charter, granted by Henry II. in 1160, empowered the burgesses to trade with Durham as freely as they had done in the reign of Henry I. From this date a large collec- tion of charters enumerates privileges granted by successive earls and later sovereigns. One from Ralph or Ranulf de Blundevill, granted between n 90 and 121 1, confirms to the citizens a gild merchant and all liberties and free customs, and three from John protect their privilege of trading with Ireland. Edward I. empowered the citizens to elect coroners and to hold courts of justice, and granted them the fee-farm of the city at a yearly rent of £100. In the 14th century Chester began to lose its standing as a port through the gradual silting up of the estuary of the Dee, and the city was further impoverished by the inroads of the Welsh and by the necessity of rebuilding the Dee bridge, which had been swept away by an unusually high tide. In con- sideration of these misfortunes Richard II. remitted part of the fee-farm. Continued misfortunes led to a further reduction of the farm to £50 for a term of fifty years by Henry VI., who also made a grant for the completion of a new Dee bridge. Henry VII. reduced the fee-farm to £20, and in 1506 granted to the citizens what is known as ” the Great Charter.” This charter constituted the city a county by itself, and incorporated the governing body under the style of a mayor, twenty-four aldermen and forty common councilmen; it also instituted two sheriffs, two coroners and a recorder, and the mayor, the ex-mayors and the recorder were appointed justices of the peace. This charter was confirmed by James I. and Charles II. A charter of George III. in 1804 instituted the office of deputy-mayor. The charter of Hugh Lupus to the abbey of St Werburgh includes a grant of the tolls of the fair at the feast of St Werburgh for three days, and a subsequent charter from

Ranulf de Blundevill (12th century) licensed the abbot and monks to hold their fairs and markets before the abbey gates. A charter of John the Scot, earl of Chester, mentions fairs at the feasts of the Nativity of St John Baptist and St Michael. For many centuries the rights claimed by the abbot in connexion with the fairs gave rise to constant friction with the civic authorities, which lasted until, in the reign of Henry VIII., it was decreed that the right of holding fairs was vested exclusively in the citizens. Charles II. in 1685 granted a cattle- fair to be held on the first Thursday in February.

In 1 5 S3 Chester first returned two members to parliament, having hitherto been represented solely in the parliament «f the palatinate. By the Redistribution Act of 1885 the representa- tion was reduced to one member. The trades of tanners, skinners and glove-makers existed at the time of the Conquest, and the importation of marten skins is mentioned in Domesday. In the 14th century the woollen trade was considerable, and in 1674 weavers and wool-combers were introduced into Chester from

Norwich. The restoration of the channel of the Dee opened up a flourishing trade in Irish linen, which in 1786 was at its height, but from that date gradually diminished.

See Victoria County History, Cheshire ; R. H. Morris, Chester in the Plantagenet and Tudor Reigns (Chester, 1894) ; Joseph Heming- . way, History of the City of Chester (2 vols., Chester, 1831).

CHESTER, a city of Delaware county, Pennsylvania, U.S.A., on the Delaware river, about 13 m. S.W. of Philadelphia. Pop. (1800) 20,226; (1900) 33iQ88, of whom 5074 were foreign-born and4403 were negroes; (U. S. census, 1910) 38,537. It is served by the Baltimore & Ohio and the Philadelphia & Reading railways, by the Philadelphia, Baltimore & Washington division of the Pennsylvania system, and by steamboat lines. Chester has several interesting buildings dating from early in the 1 8th century —among them the city hall (1724), one of the oldest public buildings in the United States, and the house (1683) occupied for a time by William Penn. It is the seat of the Pennsylvania Military College (1862); and on the border of Chester, in the borough of Upland (pop. in 1900, 2131), is the Crozer Theological Seminary (Baptist), which was incorporated in 1867, opened in 1868, and named after John P. Crozer (1793-1866), by whose family it was founded. Chester has a large shipbuilding industry, and manufactories of cotton and worsted goods, iron and steel, the steel-casting industry being especially important, and large quantities of wrought iron and steel pipes being manu- factured. Dye-stuffs and leather also are

manufactured. The value of the city's factory products in 1905 was $16,644,842. Chester is the oldest town in Pennsylvania. It was settled by the Swedes about 1645, wa s called Upland and was the seat of the Swedish courts until 1682, when William Penn, soon after his landing at a spot in the town now marked by a memorial stone, gave it its present name. The first provincial assembly was convened here in December of the same year. After the battle of Brandywine in the War of Independence, Washington re- treated to Chester, and in the " Washington House," still standing, wrote his account of the battle. Soon afterwards Chester was occupied by the British. In 1701 it was incorporated as a borough; in 1795 and again in 1850 it received a new borough charter; and in 1866 it was chartered as a city. For a long time it was chiefly a small fishing settlement, its population as late as 1820 being only 657; but after the introduction of large manufacturing interests in 1850, when its population was only 1667, its growth was rapid.

See H. G. Ashmead, Historical Sketch of Chester (Chester, 1883).

CHESTERFIELD, PHILIP DORMER STANHOPE, 4 th Earl of (1694-1773), son of Philip Stanhope, third earl (1673- 1726), and Elizabeth Savile, daughter of George Savile, marquess of Halifax, was born in London on the 22nd of September 1694; Philip, the first earl (1584-1656), son of Sir John Stanhope of Shelford, was a royalist who in 1616 was created Baron Stanhope of Shelford, and in 1628 earl of Chesterfield; and his grandson the 2nd earl (1633-1714) was grandfather of the 4th earl. De- prived at an early age of his mother, the care of the boy devolved upon his grandmother, the marchioness of Halifax, a lady of culture and connexion, whose house was frequented by the most distinguished Whigs of the epoch. He soon began to prove himself possessed of that systematic spirit of conduct and effort which appeared so much in" his life and character. His education, begun under a private tutor > was continued (1712) at Trinity Hall, Cambridge; here he remained little more than a year and seems to have read hard, and to have acquired a considerable knowledge of ancient and modern languages. The great orators of all times were a special object of study with him, and he describes his boyish pedantry pleas- antly enough, but by no means without a touch of self-satisfac- tion in the memory. His university training was supplemented (17 14) by a continental tour, untrammelled by a governor; at the Hague his ambition for the applause awarded to adventure made a gamester of him, and at Paris he began, from tJw same motive, that worship of the conventional Venus, the serious inculcation of which has earned for him the largest and most unenviable part of his reputation.

no

CHESTERFIELD, LORD

The death of Anne and the accession of George I. opened up a career for him and brought him back to England, His relative James Stanhope (afterwards first Earl Stanhope), the king‘3 favourite minister, procured for him the place of gentleman of the bedchamber to the prince of Wales. In 1715 he entered the House of Commons as Lord Stanhope of Shelford and member for St Germans, and when the impeachment of James, duke of Ormonde, came before the House, he used the occasion (5th of August 1715) to put to proof his old rhetorical studies. His maiden speech was youthfully fluent and dogmatic; but on its conclusion the orator was reminded with many compli- ments, by an honourable member, that he wanted six weeks of his majority, and consequently that he was amenable to a fine of £500 for speaking in the House. Lord Stanhope quitted the Commons with a low bow and started for the continent. From Paris he rendered the government important service by gathering and transmitting information respecting the Jacobite plot; and in 1716 he returned to England, resumed his seat, and took frequent part in the debates. In that year came the quarrel between the king and the heir apparent. Stanhope, whose politic instinct obliged him to worship the rising rather than the setting sun, remained faithful to the prince, though he was too cautious to break entirely with the king’s party. He was on friendly terms with the prince’s mistress, Henrietta Howard, after- wards countess of Suffolk. He maintained a correspondence with this lady which won for him the hatred of the princess of Wales (afterwards Queen Caroline). In 1723 a vote for the government got him the place of captain of the Gentlemen Pensioners. In January 1725, on the revival of the Bath, the red riband was offered to him, but was declined.

In 1726 his father died, and Lord Stanhope became earl of Chesterfield. He took his seat in the Upper House, and his oratory, never effective in the Commons by reason of its want of force and excess of finish, at once became a power. In 1728 Chesterfield was sent to the Hague as ambassador. In this place his tact and temper, his dexterity and discrimination, enabled him to do good service, and he was rewarded with Walpole’s friendship, a Garter and the place of lord high steward. In 1732 there was born to him, by a certain Mile du Bouchet, the son, Philip Stanhope, for whose advice and instruction were after- wards written the famous Letters. He negotiated the second treaty of Vienna in 1731, and in the next year, being somewhat broken in health and fortune, he resigned his

embassy and re- turned to England.

A few months' rest enabled him to resume his seat in the Lords, of which he was one of the acknowledged leaders. He supported the ministry, but his allegiance was not the blind fealty Walpole exacted of his followers. The Excise Bill, the great premier's favourite measure, was vehemently opposed by him in the Lords, and by his three brothers in the Commons. Walpole bent before the storm and abandoned the measure; but Chesterfield was summarily dismissed from his stewardship. Fox the next two years he led the opposition in the Upper House, leaving no stone unturned to effect Walpole's downfall. In 1741 he signed the protest for Walpole's dismissal and went abroad on account of his health. He visited Voltaire at Brussels and spent some time in Paris, where he associated with the younger Crebillon, Fontenelle and Montesquieu. In 1742 Walpole fell, and Carteret was his real, though not his nominal successor. Although Walpole's administration had been overthrown largely by Chesterfield's efforts the new ministry did not count Chesterfield either in its ranks or among its supporters. He remained in opposition, distinguishing himself by the courtly bitterness of his attacks on George II., who learned to hate him violently. In 1743 a new journal, Old England; or, the Constitutional Journal appeared. For this paper Chesterfield wrote under the name of " Jeffrey Broadbottom." A number of pamphlets, in some of which Chesterfield had the help of Edmund Waller, followed. His energetic campaign against George II. and his government won the gratitude of the dowager duchess of Marlborough, who left him £20,000 as a mark of her appreciation. In 1744 the king was compelled to abandon Carteret, and the coalition or " Broad

Bottom" party, led by Chesterfield and Pitt, came into office. In the troublous state of European politics the earl's conduct and experience were more useful abroad than at home, and he was sent to the Hague as ambassador a second time. The object of his mission was to persuade the Dutch to join in the War of the Austrian Succession and to arrange the details of their assistance. The success of his mission was complete; and on his return a few weeks afterwards he received the lord-lieutenancy of Ireland — a place he had long coveted.

Short as it was, Chesterfield's Irish administration was of great service to his country, and is unquestionably that part of his political life which does him most honour. To have conceived and carried out a policy which, with certain reservations, Burke himself might have originated and owned, is indeed no small title to regard. The earl showed himself finely capable in practice as in theory, vigorous and

tolerant, a man to be feared and a leader to be followed; he took the government entirely into his own hands, repressed the jobbery traditional to the office, established schools and manufactures, and at once conciliated and kept in check the Orange and Roman Catholic factions. In 1746, however, he had to exchange the lord-lieutenancy for the place of secretary of state. With a curious respect for those theories his familiarity with the secret social history of France had caused him to entertain, he hoped and attempted to retain a hold over the king through the influence of Lady Yarmouth, though the futility of such means had already been demonstrated to him by his relations with Queen Caroline's "ma bonne Howard." The influence of Newcastle and Sandwich, however, was too strong for him; he was thwarted and over-reached; and in 1748 he resigned the seals, and returned to cards and his books with the admirable composure which was one of his most striking characteristics. He declined any knowledge of the Apology for a late Resignation, in a Letter from an English Gentleman to his Friend at The Hague, which ran through four editions in 1748, but there is little doubt that he was, at least in part, the author.

The dukedom offered him by George II., whose ill-will his fine tact had overcome, was refused. He continued for some years to attend the Upper House, and to take part in its proceed- ings. In 1751, seconded by Lord Macclesfield, president of the Royal Society, and Bradley, the eminent mathematician, he distinguished himself greatly in the debates on the calendar, and succeeded in making the new style a fact. Deafness, however, was gradually affecting him, and he withdrew little by little from society and the practice of politics. In 1755 occurred the famous dispute with Johnson over the dedication to the English Dictionary. In 1747 Johnson sent Chesterfield, who was then secretary of state, a prospectus of his Dictionary, which was acknowledged by a subscription of £10. Chesterfield appar- ently! took no further interest in the enterprise, and the book was about to appear, when he wrote two papers in the World in praise of it. It was said that Johnson was kept waiting in the anteroom when he called while Cibber was admitted. In any case tHe doctor had expected more help from a professed patron of literature, and wrote the earl the famous letter in defence of men of letters. Chesterfield's " respectable Hottentot," now identified with George, Lord Lyttelton, was long supposed, though on slender grounds, to be a portrait of Johnson. During the twenty years of life that followed this episode, Chesterfield wrote and read a great deal, but went little into society.

In 1768 died Philip Stanhope, the child of so many hopes. The constant care bestowed by his father on his education resulted in an

honourable but not particularly distinguished career for young Stanhope. His death was an overwhelming grief to Chesterfield, and the discovery that he had long been married to a lady of humble origin must have been galling in the extreme to his father after his careful instruction in worldly wisdom. Chesterfield, who had no children by his wife, Melusina von Schulefnberg, illegitimate daughter of George I., whom he married in 1733, adopted his godson, a distant cousin, named Philip Stanhope (1755-1815), as heir to the title and estates. His famous jest (which even Johnson allowed to have merit) —

CHESTERFIELDˆCHESUERTON, G. K.

in

” Tyrawley and I have been dead these two years, but we don’t choose to have it known ” — is the best description possible of his humour and condition during the latter part of this period of decline. To the deafness was added blindness, but his memory and his fine manners only left him with life; his last words (” Give Dayrolles a chair “) prove that he had neither forgotten his friend nor the way to receive him. He died on the 24th of March 1773.

Chesterfield was selfish, calculating and contemptuous; he was not naturally generous, and he practised dissimulation till it became part of his nature. In spite of his brilliant talents and of the admirable training he received, his life, on the whole, cannot be pronounced a success. His anxiety and the pains he took to become an orator have been already noticed, and Horace Walpole, who had heard all the great orators, preferred a speech of Chesterfield’s to any other; yet the earl’s eloquence is not to be compared with that of Pitt. Samuel Johnson, who was not perhaps the best judge in the world, pronounced his manners t6 have been” exquisitely elegant “; yet as a courtier he was Utterly worsted by Robert Walpole, whose manners were anything but refined, and even by Newcastle. He desired to be known as a protector of letters and literary men; and his want of heart or head over the Dictionary dedication, though explained arid excused by Croker, none the less inspired the famous change in a famous line — “Toil, envy, want, the patron, and the jail. ” His published writings have had with posterity a very indifferent success; his literary reputation rests on a volume of letters never designed to appear in print. The son for whom he worked so hard and thought so deeply failed especially where his father had most desired he should succeed.

As a politician and statesman, Chesterfield’s fame rests on his short

but brilliant administration of Ireland. As an author he was a clever essayist and epigrammatist. But he stands or falls by the Letters to his Son, first published by Stanhope's widow in 1774, and the Letters to his Godson (1890). The Letters are brilliantly written — full of elegant wisdom, of keen wit, of admirable portrait-painting, of exquisite observation and deduc- tion. Against the charge of an undue insistence on the external graces of manner Chesterfield has been adequately defended by Lord Stanhope {History, iii. 34). Against the often iterated accusation of immorality, it should be remembered that the Letters reflected the morality of the age, and that their author only systematized and reduced to writing the principles of conduct by which, deliberately or unconsciously, the best and the worst of his contemporaries were governed.

The earldom of Chesterfield passed at his death to his godson, already mentioned, as 5th earl, and so to the latter's son and grandson. On the death of the latter unmarried in 1 871, it passed in succession to two collateral heirs, the 8th and 0th earls, and so in 1887 to the latter's son as 10th earl.

See Chesterfield's Miscellaneous Works (London, 1777, 2 vols. 4to) ; Letters to his Son, &c, edited by Lord Mahon (London, 1845-1853, 5 vols.); and Letters to his Godson (1890) (edited by the earl of Carnarvon). There are also editions of the first series of letters by J. Bradshaw (3 vols., 1892) and Mr C. Strachey (2 vols., 1901). In 1893 a biography, including numerous letters first published from the Newcastle Papers, was issued by Mr W. Ernst; and in 1907 appeared an elaborate Life by W. H. Craig. (A. DO

CHESTERFIELD, a market town and municipal borough in the Chesterfield parliamentary division of Derbyshire, England, 24 m. N. by E. of Derby, on the Midland and the Great Central railways. Pop. (1891) 22,009; (1901) 27,185. It lies at the junction of two streams, the Rother and Hipper, in a populous industrial district. It is irregularly built, with narrow streets, but has a spacious market-place. The church of St Mary and All Saints is a large and beautiful cruciform building principally of the Decorated period. Its central tower carries a remarkable twisted spire of wood covered with lead, 230 ft. high; the dis- tortion has evidently taken place through the use of unseasoned timber and consequent warping of the woodwork. The church, which contains numerous interesting monuments, possesses also the unusual feature of an apsidal Decorated chapel. There is an example of flamboyant tracery in one of the ■windows. Among

public buildings, the Stephenson memorial hail (1879), containing a

free library, art and science class-rooms, a theatre and the rooms of the Chesterfield Institute, commemorates George Stephenson, the engineer, who resided at Tapton House, close to Chesterfield, in his later life; he died here in 1848, and was buried in Trinity church. Chesterfield grammar school was founded in 1574. The industries of the town include manu- factures of cotton, silk, earthenware, machinery and tobacco, with brass and iron founding; while slate and stone are quarried, and there are coal, iron and lead mines in the neighbourhood. The town is governed by a mayor, 6 aldermen and 18 councillors. Area, 1216 acres. In the immediate neighbourhood of Chester- field on the west is the urban district of Brampton and Walton (pop. 2698), to the south-east is Hasland (7427), and to the north-east Brirnington (4569).

In spite of the Roman origin suggested by its name, so few remains have beett found here that it is doubtful whether Chester- field was a Roman station. Chesterfield (Cestrefeld) owes its present name to the Saxons. It is mentioned in Domesday only as a bailiwick of Newbold belonging to the king, and granted to William Peverell. In 1204 John gave the manor to William Bruere and granted to the town all the privileges of a free borough which were enjoyed by Nottingham and Derby; but before this it seems to have had prescriptive borough rights. Later charters were granted by various sovereigns, and it was incbrporated by Elizabeth in 1598 under the style of a mayor, 6 brethren and 1 2 capital burgesses. This charter was confirmed by Charles II. (1662), and the town was so governed till the Municipal Act 1835 appointed a mayor, 3 aldermen and 12 councillors. In 1204 John granted two weekly markets, on Tuesday and Saturday, and an annual fair of eight days at the feast of the Exaltation of the Holy Cross (Sept. 14). This fair, which is still held, and another on Palm Tuesday, are mentioned in the Quo Warranto roll of 1330. The Tuesday market has long been discontinued. That Chesterfield was early a thriving centre is shown by the charter of John Lord Wake, lord of the manor, granting a gild merchant to the town. In 1266 the town was the scene of a' battle between the royal forces and the barons, when Robert de Ferrers, earl of Derby, was taken prisoner. In 1 586 there was a terrible visitation of the plague; and the parliar mentarian forces were overthrown here in the Civil War. With the development of cotton and silk industries the town has increased enormously, and is now second in importance only to Derby among the towns of the county. There is no record that it ever returned representatives to parliament.

See Stephen Glover, History and Gazetteer of the County of Derby (Derby, 1831-1833); J. Pym Yeatman, Records of the Borough of

Chesterfield (Chesterfield and Sheffield, 1884) ; Thomas Ford, History of Chesterfield (London, 1839).

CHESTER-LE-STREET, a town in the Chester-le-Street parliamentary division of Durham, England, near the river Wear, 6 m. N. of the city of Durham on the North-Eastern railway. Pop. (1901) 11,753. The parish church of St Mary and St Cuthbert is an interesting building, formerly collegiate, with a tower 156 ft. high, and a remarkable series of monumental tombs of the Lumley family, collected here from Durham cathedral and various ruined monasteries, and in some cases remade. About 1 m. along the river is Lumley Castle, the seat of the earl of Scarborough, and about 2 m. north lies Lambton Castle, the residence of the earl of Durham, built in 1797 on the site of the old House of Harraton. Collieries and iron-works employ the industrial population. Chester-le-Street is a place of considerable antiquity: It lies on a branch of the Roman north road, on which it was a station, but the name is not known. Under the' name of Cunecastre it was made the seat of a bishop in 882, and continued to be the head of the diocese till the Danish invasion of 995. During that. time the church was the repository of the shrine of St Cuthbert, which was then removed to Durham.

CHESTERTON, GILBERT KEITH (1874-), English journalist and author, who came of a family of estate-agents, was born in London on the 29th of May 1874. He was educated

at St Paul's school, which he left in 1891 with the idea of studying art. But his natural bent was literary, and he devoted himself mainly to cultivating that means of expression, both in prose and verse; he did occasional reviewing, and had some experience in a publisher's office. In 1900, having already produced a volume of clever poems, The Wild Knight, he definitely took to journalism as a career, and became a regular contributor of signed articles to the Liberal journals, the Speaker and Daily News. He established himself from the first as a writer with a distinct personality, combative to a swashbuckling degree, uncon- ventional and dogmatic; and the republication of much of his work in a series of volumes (e.g. Twelve Types, Heretics, Orthodoxy), characterized by much acuteness of criticism, a pungent style, and the capacity of laying down the law with unflagging impetuosity and humour, enhanced his reputation. His powers as a writer are best shown in his studies of Browning (in the " English Men of Letters "

series) and of Dickens; but these were only rather more ambitious essays among a medley of characteristic utterances, ranging from fiction (including The Napoleon of N otting-hill) to fugitive verse, and from artistic criticism to discussions of ethics and religion. The interest excited by his work and views was indicated and analysed in an anonymous volume (G. K. Chesterton: a Criticism) published in 1908.

CHESTERTON, an urban district in the Chesterton parlia- mentary division of Cambridgeshire, England, i| m. N. from Cambridge station, on the north bank of the Cam. Pop. (1901) 959 1 . The church of St Andrew is Decorated and Perpendicular, retaining ancient woodwork and remains of fresco painting. Along the river are several boat-houses erected by the Cambridge University Boat Club. Boat-building and tile manufacture are local industries.

CHESTNUT (nux Castanea), the common name given to two sorts of trees and their fruit, (1) the so-called ” horse-chestnut,” and (2) the sweet or ” Spanish ” chestnut.

(1) The common horse-chestnut, Aesculus Hippocastanum (Ger. Rosskastanie; Fr. marronnier d’ Inde), has been stated to be a native of Tibet, and to have been brought thence to England in 1550; it is now, however, thought to be indigenous in the mountains of northern Greece, where it occurs wild at 3000 to 4000 ft. above sea-level. Matthiolus, who attributes the origin of the name of the tree to the use of the nuts by the inhabitants of Constantinople for the relief of short-windedness and cough in horses, remarks that no ancient writer appears to have made mention of the horse-chestnut. Clusius (Rariorum plantarum hist. i. p. 8, 1601) describes it as a vegetable curiosity, of which in 1588 he had left in Vienna a living specimen, but of which he had not yet seen either the flowers or recent fruit. The dry fruit, he says, had frequently been brought from Con- stantinople into Europe.

The tree grows rapidly ; it flourishes best in a sandy, somewhat moist loam, and attains a height of 50 to 60 or more ft., assuming a pyramidal outline. Its boughs are strong and spreading. The buds, conspicuous for their size, are protected by a coat of a glutinous substance, which is impervious to water; in spring this melts, and the bud-scales are then cast off. The leaves are composed of seven radiating leaflets (long-wedge-shaped) ; when young they are downy and drooping. From the early date of its leafing year by year, a horse-chestnut in the Tuileries is known as the ” Marronnier du 20 mars.” The flowers of the horse- chestnut, which are white dashed with red

and yellow, appear in May, and sometimes, but quite exceptionally, again in autumn; they form a handsome erect panicle, but comparatively few of them afford mature fruit. The fruit is ripe in or shortly before the first week in October, when it falls to the ground, and the three-valved thorny capsule divides, disclosing the brown and at first beautifully glossy seeds, the so-called nuts, having a resemblance to sweet chestnuts, and commonly three or else two in number. For propagation of the tree, the seeds may be sown either when fresh, or, if preserved in sand or earth, in spring. Drying by exposure to the air for a month has been found to prevent their germination. Rooks are wont to remove the nuts

from the tree just before they fall, and to disperse them in various directions. The tree is rarely planted in mixed plantations where profit is an object; it interferes with its neighbours and occupies too much room. It is generally introduced near man- sion-houses for ornament and shade, and the celebrated avenues at Richmond and Bushey Park in England are objects of great beauty at the time of flowering.

The bark of the horse-chestnut contains a greenish oil, resin, a yellow body, a tannin, Casˆ Oˆ, existing likewise in the seeds and various parts of the tree, and decomposable into phloroglucin and aescigly oxalic acid, C7H 6 3 , also aesculetin hydrate, and the crystalline fluorescent compound aesculin, of the formulaC 2 iH240i3 (Rochleder and Schwarz), with which occurs a similar substance fraxin, the paviin of Sir G. G. Stokes (Q. J. Chem. Soc. xi. 17, 1859; xii. 126, i860), who suggests that its presence may perhaps account for the discrepancies in the analyses of aesculin given by different authors. From the seeds have been obtained starch (about 14%), gum, mucilage, a non-drying oil, phosphoric acid, salts of calcium, saponin, by boiling which with dilute hydro- chloric or sulphuric acid aesculic acid is obtained, quercitrin, present also in the fully developed leaves, aescigenin, C12H20O2, and aesculetin, C9H6O4, which is procurable also, but in small quantity only, from the bark. Friedrich Rochleder has described as constituent principles of the cotyledons aphrodaescin, C52H82O23, a bitter glucoside, argyraescin, C27H42O12, aescinic acid, 024ˆ0ˆ, and queraescitrin, C4iH4 6 025, found also in the leaves. To prepare pure starch from the seeds, Flandin (Compt. rend, xxvii. 391, 1848; xxviii. 138, 1849) recommends kneading them, when peeled and bruised, in an aqueous solution of j-J- T to ˆ of their weight of sodium carbonate. E. Staffel (Ann. d. Chem. u. Pharm. lxxvi., 1850, p. 379) after drying found, in spring and autumn respectively, 10-9 and 3-38% of ash in the wood, 8-68 and 6-57 in the bark, and 7-68 and 7-52 in the leaves of the horse- chestnut. The ash of the unripe fruit contains 58-77, that of the ripe kernel 61-74, and that of the green shell 75-91% of potash

(E. Wolff).

The wood of the horse-chestnut is soft, and serves only for the making of water-pipes, for turner's work and common carpentry, as a source of charcoal for gunpowder, and as fuel. Newly cut it weighs 60 lb, and dry 35 lb per cub. ft. approxi- mately. The bark has been employed for dyeing yellow and for tanning, and was formerly in popular repute as a febrifuge and tonic. The powder of the dried nuts was at one time prescribed as a sternutatory (to encourage sneezing) in the Edinburgh Pharmacopoeia. It is stated to form with alum-water a size or cement highly offensive to vermin, and with two parts of wheaten flour the material for a strong bookbinder's paste. Infusion of horse-chestnuts is found to expel worms from soil, and soon to kill them if they are left in it. The nuts furthermore have been applied to the manufacture of an oil for burning, cosmetic preparations and starch, and in Switzerland, France and Ireland, when rasped on ground, to the bleaching of flax, hemp, silk and wool. In Geneva horse-chestnuts are largely consumed by grazing stock, a single sheep receiving 2 lb. crushed morning and evening. Given to cows in moderate quantity, they have been found to enhance both the yield and flavour of milk. Deer readily eat them, and, after a preliminary steeping in lime-water, pigs also. For poultry they should be used boiled, and mixed with other nourishment. The fallen leaves are relished by sheep and deer, and afford a good litter for flocks and herds.

One variety of the horse-chestnut has variegated leaves, and another double flowers. Darwin observed that Ae. Pavia, the red buckeye of North America, shows a special tendency, under unfavourable conditions, to be double-blossomed. The seeds of this species are used to stupefy fish. The scarlet-flowered horse- chestnut, Ae. rubicunda, is a handsome tree, less in height and having a rounder head than the common form ; it is a native of North America. Another species, possessing flowers with the lower petals white with a red tinge, and the upper yellow and red with a white border, and fruit unarmed, is Ae. indica, a native of the western Himalayas. Among the North American species are the foetid or Ohio buckeye, Ae. glabra, and Ae. fiava, the sweet

buckeye. Ae. calif ornica, when full-grown and in flower, is a beautiful tree, but its leaves often fall before midsummer.

(2) The Spanish or sweet chestnut, Castanea sativa (natural order, Fagaceae), is a stately and magnificent tree, native of the countries bordering on the Mediterranean, but also ripening its fruit in sheltered situations as far north as Scotland. It lives very]ong, and attains a large size, spreading its branches widely. It has large glossy lanceolate leaves with a toothed margin. The flowers, which appear in early summer, are in pendulous, slender yellowish catkins, which bear a number of staminate flowers with a few pistillate flowers at the base. The staminate contain 8 to 20 sl.‘imens which produce an enormous amount of dusty yellow pollen, some of which gets carried by wind to the protruding stigmas of the pistillate flowers. The latter are borne three together, invested by a cupule of four green bracts, which, as the fruit matures, grow to form the tough green prickly envelope surrounding the group of generally three nuts. The largest known chestnut tree is the famous Castagno di cento cavalli, or the chestnut of a hundred horses, on the slopes of Mount Etna, a tree which, when measured about 1780 by Count Borch, was found to have a circumference of 190 ft. The timber bears a striking resemblance to that of the oak, which has been mistaken for chestnut; but it may be distinguished by the numerous fine medullary rays. Unlike oak, the wood is more valuable while young than old. When not more than fifty years old it forms durable posts for fences and gates; but at that age it often begins to deteriorate, having ring-shakes and central hollows. In a young state, when the stems are not above 2 in. in diameter at the ground, the chestnut is found to make durable hoops for casks and props for vines; and of a larger size it makes good hop-poles.

Chestnuts (the fruit of the tree) are extensively imported into Great Britain, and are eaten roasted or boiled, and mashed or otherwise as a vegetable. In a raw state they have a sweet taste, but are difficult of digestion. The trees are very abundant in the south of Europe, and chestnuts bulk largely in the food resources of the poor in Spain, Italy, Switzerland and Germany. In Italy the kernels are ground into meal, and used for thickening soups, and even for bread-making. In North America the fruits of an allied species, C. americana, are eaten both raw and cooked.

CHETTLE, HENRY (1564?! 607?), English dramatist and miscellaneous writer, was the son of Robert Chettle, a London dyer. He was apprenticed in 1577 to a stationer, and in 159 1 became a partner with William Hoskins and John Danter. In 1592 he published Robert Greene’s Groatsworth of Wit. In the preface to his Kind Herts Dreame (end of 1592) he found it necessary to disavow any share in that pamphlet, and incidentally he apologized to three persons (one of

them commonly identified with Shakespeare) who had been abused in it. Piers Plainnes Seaven Yeres Prentiship, the story of a fictitious apprenticeship in Crete and Thrace, appeared in 1595 As early as 1598 Francis Meres includes him in his Palladis Tamia as one of the ” best for comedy,” and between that year and 1603 he wrote or collaborated in some forty-nine pieces. He seems to have been generally in debt, judging from numerous entries in Henslowe’s diary of advances for various purposes, on one occasion (17th of January 1 599) to pay his expenses in the Marshalsea prison, on another (7th of March 1603) to get his play out of pawn. Of the thirteen plays usually attributed to Chettle’s sole authorship only one was printed. This was The Tragedy of Hoffmann: or a Revenge for a Father (played 1602; printed 1631), a share in which Mr Fleay assigns to Thomas Heywood. It has been suggested that this piece was put forward as a rival to Shake- speare’s Hamlet. Among the plays in which Chettle had a share is catalogued The Danish Tragedy, which was probably either identical with Hoffmann or another version of the same story. The Pleasant Comedie of Patient Grissill (1599), in which he collaborated with Thomas Dekker and William Haughton, was reprinted by the Shakespeare Society in 1841. It contains the lyric ” Art thou poor, yet hast thou golden slumbers,” which is probably Dekker’s. In November 1599 Chettle receives ten shillings for mending the first part of ” Robin Hood,” i.e. The Downfall of Robert, Earl of Huntingdon, by Anthony Munday;

and in the second part, which followed soon after and was printed in 1 601, The Death of Robert, Earle of Huntingdon, he collaborated with Munday. Both plays are printed in. Dodsley’s Select Collection of Old English Plays (ed. W. C. Hazlitt, vol. viii.). In 1603 Chettle published England’s Mourning Garment, in which are included some verses alluding to the chief poets of the time. His death took place before the appearance of Dekker’s Knight’s Conjurer in 1607, for he is there mentioned as a recent arrival in Umbo.

Hoffmann was edited by H. B(arrett) L(ennard) (1852) and by Richard Ackermann (Bamberg, 1894).

CHEVALIER, ALBERT (1861-), English comedian, began a connexion with the stage while still a child. In 1877 he was engaged as an actor under the Bancrofts in London, and for some years played ” legitimate ” parts at the Court theatre and elsewhere. In 1891, however, he began a successful music-hall career as a singer of coster songs of his own invention, a new type in which he had an immediate success, both in England and America. He subsequently organized an entertainment of his own, with sketches and songs, with which he

went on tour, estab- lishing a wide popularity as an original artist in his special line.

CHEVALIER, MICHEL (1806-1879), French economist, was born at Limoges on the 13th of January 1806. In his early manhood, while employed as an engineer, he became a convert to the theories of Saint Simon; these he ardently advocated in the Globe, the organ of the Saint Simonians, which he edited until his arrest in 1832 on a charge of outraging public morality by its publication. He was sentenced to a year's imprisonment, but was released in six months through the intervention of Thiers, who sent him on a special mission to the United States to study the question of land and water transport. In 1836 he published, in two volumes, the letters he wrote from America to the Journal des debats. These attracted so much attention that he was sent in the same year on an economic mission to England, which resulted in his publication (in 1838) of Des intirtts materiels de la France. The success of this made his position secure, and in 1840 he was appointed professor of political economy in the College de France. He sat for a short time (1845-1846) as a member of the Chamber of Deputies, but lost his seat owing to his enthusiastic adoption of the principles of free trade. Under Napoleon III. he was restored to the position of which the revolution of 1848 had temporarily deprived him. In 1850 he became a member of the Institute, and in the following year published an important work in favour of free trade, under the title of Examen du systeme commercial connu sous le nom de systeme protecteur. His chief public triumph was the important part he played in bringing about the conclusion of the commercial treaty between France and Great Britain in i860. Previously to this he had served, in 1855, upon the commission for organizing the Exhibition of 1855, and his services there led to his forming one of the French jury of awards in the London Exhibition of 1862. He was created a member of the Senate in i860, and continued for some years to take an active part in its discussions. He retired from public life in 1870, but was unceasingly industrious with his pen. He became grand officer of the Legion of Honour in 1861, and during the later years of his life received from many quarters public recognition of his eminence as a political economist. He died at his chateau near Montpellier (Herault) on the 28th of November 1879. Many of his works have been translated into English and other languages. Besides those already mentioned the more important are: Cours d'economie politique (1842-1850) ; Essais de politique industrielle (1843); De la baisse probable d'or (1859, translated into English by Cobden, On the Probable Fall of the Value of Gold, Manchester, 1859); L' Expedition du Mexique (1862); Introduction aux rapports du jury international

(1868).

CHEVALIER, ULYSSE (1841-), French bibliographer, was born at Rambouillet on the 24th of February 1841. He published a great number of documents relating to the history of Dauphin6, e.g. the cartularies of the church and the town of Die (1868), of the abbey of St AndrS le-Bas at Vienne (1869), of the abbey of Notre Dame at Bonnevaux in the diocese of Vienne (1889), of the abbey of St Chaffre at Le Monestier (1884), the

inventories and several collections of archives of the dauphins of Viennais, and a Bibliotheque liturgique in six volumes (1893-1897), the third and fourth volumes of which constitute the Repertorium kymnologicum, containing more than 20,000 articles. But his principal work, is the Repertoire des sources historiques du ntoyen Age. The first part, Bio-bibliographie(i&yj~i&&6; 2nd ed., 1005), contains the names of all the historical personages alive between the years 1 and 1500 who are mentioned in printed books, together with the precise indication of all the places where they are mentioned. The second part, Topo-bibliographie (1894- 1903), contains not only the names of places mentioned in books on the history of the middle ages, but, in a general way, every- thing not included in the Bio-biUiographie. The Repertoire as a whole contains an enormous mass of useful information, and is one of the most important bibliographical monuments ever devoted to the study of medieval history. Though a Catholic priest and professor of history at the Catholic university of Lyons, the Abbe (afterwards Canon) Chevalier knew how to maintain an inde- pendent critical attitude even in religious questions. In the controversy on the authenticity of the Holy Shroud (sudario) at Turin, he worked in the true scientific spirit by tracing back the history of that piece of stuff, which was undoubtedly used as- a shroud, but which was not produced before the 14th century and is probably no older (See Le Savnt Suaire de Lirey-ChamMry- Turin et les defenseurs de son authenticity). Similarly, in Notre Dame de Lorette; etude critique sur I'authenticite de la Santa Casa (1906), he dissipated by the aid of authentic documents the legend which had embellished and falsified the primitive history of that sanctuary.

CHEVAUX-DE-FRISE (French for " Friesland horses"; the Dutch Vriesse ruyters, " Frisian horsemen," and German Spanische Reiter, " Spanish horsemen "), a military obstacle, originating apparently in the Dutch

War of Independence, and used to close the breach of a fortress, streets, &c. It was formerly often used in field operations as a defence against cavalry; hence the name, as the Dutch were weak in the mounted arm and had therefore to check the enemy's cavalry by an artificial obstacle. Chevaux-de-frise consist of beams in which are fixed a number of spears, sword-blades, &C;, with the points projecting outwards on all sides. .

CHEVERUS, JEAN LOUIS ANNE MAGDELELNE LEFEBVRE DE (1 768-1836), French ecclesiastic, was born on the 28th of. January 1768, in Mayenne, France, where his father was general civil judge and lieutenant of police. He studied at the college of Mayenne, received the tonsure when twelve, became prior of Torbechet while still little more than a child, thence derived sufficient income for his education, entered the College of Louis le Grand in 1781, and after completing his theological studies at the. Seminary of St Magloire, was ordained deacon in October 1790, and priest by special dispensation on the 18th of December. He was immediately made canon of the cathedral of Le Mans and began to act as vicar to his uncle in Mayenne, who died in 1792. Owing to the progress of the Revolution he emigrated in 1792 to: England, and thence in 1 796 to America, settling in Boston, Mass. His interest had been aroused by Francois Antoine Matignon, a former professor at Orleans, now in charge under Bishop John Carroll of all the Catholic churches and missions in New England. Cheverus, although at first appointed to an Indian mission in Maine, remained in Boston for nearly a year, and returned thither after several months in the Penobscot and Passamaquoddy missions and visits to scattered Catholic families along the way* During the epidemic of yellow fever in 1798 he won great praise and respect for his courage and charity; and his preaching was listened to by many Protestants — indeed the subscriptions for the Church of the Holy Cross which he founded in 1803 were largely from non-Catholics. In 1808 the papal brief was issued making Boston a bishopric, suffragan to Baltimore, and Cheverus its bishop. He was consecrated on All Saints' day in 1810, at St Peter's, Baltimore, by Archbishop Carroll. On the death of the- ater his assistant bishop, Neale, urged the appointment of Cheverus as assistant to himself; Cheverus refused and warmly ass« rted his desire to remain in Boston; but, much broken by the 1

death of Matignon in 1818 and with impaired health, he soon found it necessary to leave the seat of his bishopric. In 1823, Louis XVIII. having insisted on his return to France, Cheverus became bishop of Montauban, where his tolerance captivated the Protestant clergy and laymen of the city. He was made arch- bishop of Bordeaux in 1826;

and on the 1st of February 1836, in accordance with the wish of Louis Philippe, he was made a cardinal. He died in Bordeaux on the 19th of July 1836. To Cheverus, more than to any other, is due the position that Boston now holds in the Roman Catholic Church of America, as well as the general growth of that church in New England. His character was essentially lovable: the Jews of Bordeaux and Protestants everywhere delighted to honour him.

See the rather extravagant biography by J. Huen-Dubourg, Vie du cardinal de Cheverus (Bordeaux, 1838; English version by E. Stewart, Boston, 1839).

CHEVET, the term employed in French architecture to distinguish the apsidal end of a church, in which the apses or chapels radiate round the choir aisle. The two earliest examples (nth and 12th century) are found in the churches of St Hilaire, Poitiers, and Notre Dame-du-Port, Clermont, where there are four apses. A more usual number is five, and the central apse, being of larger dimensions, becomes the Lady chapel. This was the case in Westminster Abbey, where Henry III. introduced the chevet into England; Henry VII. ‘s chapel is built on the site cf the original Lady chapel, which must have been of exceptional size, as it extended the whole length of the present structure. In Solignac, Fontevrault and Paray-le-Monial there are only three, in these cases sufficiently distant one from the other to allow of a window between. The usual number in all the great cathedrals of the 13th century, as in Bourges, Chartres, Reims, Troyes, Tours, Bayeux, Antwerp and Bruges, is five. In Beauvais, Amiens and Cologne there are seven apsidal chapels, and in Clairvaux nine radiating but rectangular chapels. In the 14th and 15th centuries the central apse was increased in size and dedicated to the Virgin Mary, as in St Ouen at Rouen.

CHEVIOT HILLS, a range forming about 35 m. of the border between England and Scotland. The boundary generally follows the line of greatest elevation, but as the slope is more gradual southward and northward the larger part of the range is in Northumberland, England, and the lesser in Roxburghshire, Scotland. The axis runs from N.E. to S.W., with a northward tendency at the eastern end, where the ridge culminates in the Cheviot, 2676 ft. Its chief elevations from this point south- westward fall abruptly to 2034 ft. in Windygate Hill, and then more gradually to about 1600 ft. above the pass, followed by a high road from Redesdale. Beyond this are Carter Fell (1815) and Peel Fell (1964), after which two lines of lesser elevation branch westward and southward to enclose Liddesdale. The hills are finely grouped, of conical and high-arched forms, and generally grass-covered. Their

flanks are scored with deep narrow glens in every direction, carrying the headwaters of the Till, Coquet and North Tyne on the south, and tributaries of the Tweed on the north. The range is famous for a valuable breed of sheep, which find abundant pasture on its smooth declivities. In earlier days it was the scene of many episodes of border warfare, and its name is inseparably associated with the ballad of Chevy phase. The main route into Scotland from England lies along the low coastal belt east, of the Till; the Till itself provided another, and Redesdale a third. There are numerous ruins of castles and ” peel towers ” or forts on the English side in this district.

Geology. — The rocks entering into the geological structure of the Cheviots belong to the Silurian, Old Red Sandstone and Carboniferous systems. The oldest strata, which are of Upper Silurian age, form inliers that have been exposed by the denudation of the younger palaeozoic rocks. One of these which occurs high up on the slopes of the Cheviots is drained by the Kale Water and the river Coquet and is covered towards the north by the Old Red Sandstone volcanic series and on the south by Carboniferous strata. Another area is traversed by the Jed Water and the Edgerston Burn and is surrounded by rocks of Old Red Sandstone age. The strata consist of greyWackes, flags and shales with seams and zones of graptolite shale which yield fossils sparingly.

On the upturned and denuded edges of the Silurian strata a great pile of contemporaneous volcanic rocks of Lower Old Red Sand- stone age rests unconformably, which consists chiefly of lavas with thin partings of tuff. A striking feature is the absence of coarse sediments, thus indicating prolonged volcanic activity. They cover an area of about 230 sq. m. in the eastern part of the Cheviots and rise to a height of 2676 ft. above the sea. The lavas comprise dark pitchstone, resembling that at Kirk Yetholm, and porphyrkic and amygdaloidal andesites and basalts. This volcanic platform is pierced by a mass of granite about 20 sq. m. in extent, which forms the highest peak in the Cheviot range. It has been described by Dr Teall as an augite-biotite-granite having strong affinities with the augite-bearing granitites of Laveline and Oberbruck in the Vosges. Both the granite and the surrounding lavas are traversed by dykes arid sills of intermediate and acid types represented by mica-porphyrites and quartz-felsites.

On their north-west margin the Lower Old Red volcanic rocks are

covered unconformably by the upper division of that system composed of red sandstones and conglomerates, which, when followed westwards, rest directly on the Silurian platform. Towards the south and east the volcanic pile is overlaid by Carboniferous strata, thus indicating a prolonged interval of denudation.

On the northern slopes of the western part of the Cheviots the representatives of the Cementstone group of the Carboniferous system come to the surface, where they consist of shales, clays, mudstones, sandstones with cementstones and occasional bands of marine limestone. These are followed in normal order by the Fell Sandstone group, comprising a succession of sandstones with inter- calations of red and green clays and impure cementstone bands. They form the higher part of the Larriston Fells and are traceable eastwards to Peel Fell, where there is evidence of successive land sur- faces in the form of dirt beds. They are succeeded by the Lewis- burn coal-bearing group, which represents the Scremerston coals.

CHEVREUL, MICHEL EUGENE (1 786-1889), French chemist, was born, on the 31st of August 1786, at Angers, where his father was a physician. At about the age of seventeen he went to Paris and entered L. N. Vauquelin's chemical laboratory, afterwards becoming his assistant at the natural history museum in the Ja'rdin des Plantes. In 1813 he was appointed professor of chemistry at the Lycee Charlemagne, and subsequently under- took the directorship of the Gobelins tapestry works, where he carried out his researches on colour contrasts (Be la lot du contraste simultani des couleurs, 1839). In 1826 he became a member of the Academy of Sciences, and in the same year was elected a foreign member of the Royal Society of London, whose Copley medal he was awarded in 1857. He succeeded his master, Vauquelin, as professor of organic chemistry at the natural history museum in 1830, and thirty-three years later assumed its directorship also; this he relinquished in 1879, though he still retained his professorship. In 1886 the completion of his hundredth year was celebrated with public rejoicings; and after his death, which occurred in Paris on the 9th of April 1889, he -was honoured with a public funeral. In 1901 a statue was erected to his memory in the museum with which he was connected for so many years. His scientific work covered a wide range, but his name is best known for the classical researches he carried out on animal fats, published in 1823 (Recherches sur les corps gras d'origine animate) . These enabled him to elucidate the true nature of soap; he was also able to discover the composition of stearin and olein, and to isolate stearic and oleic acids, the names of which were invented by him. This work led to important improvements in the processes of candle-manufacture. Chevreul was a

determined enemy of charlatanism in every form, and a complete sceptic as to the ” scientific ” psychical research or spiritualism which had begun in his time (see his Be la baguette divinatoire, et des tables tournantes, 1864).

CHEVRON (Fr. from chevre, a goat), in architecture, the beams or rafters in the roofs of a building, meeting in an angle with a fancied resemblance to the horns of a butting goat; in heraldry a bent bar on a shield, used also as a distinguishing badge of rank on the sleeves of non-commissioned officers in most armies and navies and by police and other organized bodies wearing uniform, and as a mark of good conduct in the army and navy. Chevron is also an architectural term for an inflected ornament, called also ” zig-zag,” found largely in romanesque architecture in France, England and Sicily. It is one of the most common decorations found in the voussoirs of the Norman arch, and was employed also on shafts, as in the cloisters of Monreale near

Palermo, those of St Paul outside Rome, and many churches in Germany. Its earliest appearance was in the tomb of Agamemnon at Mycenae, where the shafts flanking the entrance doorway have nine decorative chevron bands; in this case there is no doubt it was derived from the metal casing of the early wood columns.

CHEVROTAIN, a name taken from the French to designate the various representatives of the mammalian ungulate family Tragulidae. These tiny animals, commonly known as mouse- deer, are in no wise nearly related to the true deer, but constitute by themselves a special section of artiodactyle ungulates known as Tragulina, for the characteristics of which see Artiodactyla. The typical genus Tragulus, which is Asiatic, contains the smallest representatives of the family, the animals having more of the general aspects and habits of softie rodents, such as the agoutis, than of other ruminants. The longest -known species are T.jwoanicus, T, napu, T. kanchil, T. Stanley anus and T. memmina; but a number of other forms, best regarded for the most part as races, have been named. Of those mentioned, the first four are from the Malay Peninsula or the islands of the Indo-Malay Archipelago, the last from Ceylon and India. Kanchil and napu

African Water Chevrotain (Dorcatherium aquaticum).

(or napoh) are the Malay names of the species with those specific titles. The second genus, Borcatherium (or Hyomoschus), is African, and distinguished chiefly by the feet being stouter and shorter, the outer toes better developed, and the two middle metacarpals not welded together.’ Its dental formula (as that of Tragulus) is t.f, c. \,p.

%, w.f = 34. Vertebrae: C. 7, D. 13, L. 6, S. s, Ca. 12-13. The only existing species, B. aquaticum (fig.), in type is rather larger than any of the Asiatic chevrotains, which it otherwise much resembles, but is said to frequent the banks of streams, and have much the habits of pigs. It is of a rich brown colour, with back and sides spotted and striped with white; and it is evidently the survivor of an ancient form, as remains of a species only differing in size (B. crassum) have been found in the Miocene deposits of France. For long this species was sup- posed to be restricted to West Africa, but it has recently been obtained in East Central Africa, where it is represented by a local race. (R. L.*)

CHEYENNE (Sioux for ” of alien speech”), a tribe of North American Indians of Algonquian stock. They formerly lived on the Cheyenne river, North Dakota. Driven west by the Dakotas, they were found by early explorers at the eastern base of the Black Hills, South Dakota. Part of them later moved south and allied themselves with the Arapahoes. Their whole history has been one of war with their red and white neighbours. They are a powerful athletic race, mentally superior to the average American Indian. They are divided into eleven subdivisions and

formerly had a council of chiefs. They number some 3000, and are divided into northern and southern Cheyennes; the former being on a reservation in Montana, the latter in Oklahoma. In 1878-79 a band of the former revolted, and some seventy-five of them were killed.

See Handbook of American Indians (Washington, 1907); also Indians, North American.

CHEYENNE, the chief city and capital of Wyoming, U.S.A., and county-seat of Laramie county, on Crow Creek, about 106 m. N. of Denver. Pop. (1890) 11,690; (1900) 14,087, of whom 1691 were foreign-born; (1905) 13,656; (1910) 11,320. It is served by the Union Pacific, the Chicago, Burlington & Quincy, and the Colorado & Southern railways. It is situated near the southern boundary of the state, on the high plains near the E. foot of the Laramie range, at an altitude of 6050 ft.; the surrounding country is given up to mining (lignite and iron), grazing and dry-farming. Among the principal buildings are the capitol, modelled after the National Capitol at Washington; the United States government building, the Soldiers’ and

Sailors' Home, the Union Pacific depot, the high school, the Carnegie library, St Mary's cathedral (Roman Catholic), the Convent of the Holy Child Jesus, the Masonic Temple and the Elks' clubhouse. The city has two parks, and is connected by a boulevard with Fort D. A. Russell, an important United States military post, 4 m. north of the city, established in 1867 and named in honour of Major-General David Allen Russell (1820-1864) of the Union army, who was killed at Opequan, Virginia. The industrial prosperity of Cheyenne is largely due to the extensive railway shops of the Union Pacific situated here; but the city is also an important cattle market and has stock-yards. In 1905 the value of the city's factory products ($924,697) was almost one-fourth the total value of the factory products of the state. Cheyenne, settled in 1867, when the Union Pacific reached here, was named from the Cheyenne Indians. It was chosen as the site for the capital of the territory in 1869, and was incorporated in the same year.

CHEYNE, THOMAS KELLY (1841-), English divine and Biblical critic, was born in London, and educated at Merchant Taylors' School and Oxford. Subsequently he studied German theological methods at Gottingen. He was ordained in 1864, and held a fellowship at Balliol College, Oxford, 1868-1882. During the earlier part of this period he stood alone in the university as a teacher of the main conclusions of modern Old Testament criticism. In 1881 he was presented to the rectory of Tendring, in Essex, and in 1884 he was made a member of the Old Testa- ment revision company. He resigned the living of Tendring in 1885 on his appointment to the Oriel professorship, which carried with it a canonry at Rochester. In 1889 he delivered the Bampton lectures at Oxford. In 1908 he resigned his professor- ship. He consistently urged in his writings the necessity of a broad and comprehensive study of the Scriptures in the light of literary, historical and scientific considerations. His publications include commentaries on the Prophets and Hagiographa, and lectures and addresses on theological subjects. He was a joint editor of the Encyclopaedia Biblica (London, 1899-1903), a work embodying the more advanced conclusions of English biblical criticism. In the introduction to his Origin of the Psalter (London, 1891) he gave an account of his development as a critical scholar.

CHEZY, ANTOINE LEONARD DE (1773-1832), French orientalist, was born at Neuilly on the 15th of January 1773. His father, Antoine de Chezy (1718-1798), was an engineer who finally became director of the Ecole des Ponts et Chaussees. The son was intended for his father's profession; but in 1799 he obtained a post in the oriental department of the national library. About 1803 he began the study of Sanskrit,

though he possessed neither grammar nor dictionary, and by great labour he obtained sufficient knowledge of the language to be able to compose in it verses said to possess great elegance. He was the first professor of Sanskrit appointed in the College de France (1815), a chevalier of the Legion of Honour, and a member of the Academie des Inscriptions. He died in 1832. Among his works were Medjouin

et Leila (1807), from the Persian; Yadjanadatta Badha (1814) and La Reconnaissance de Sacountala (1830), from the Sanskrit; L'Anthologie irotique d'Amrou (1831), published under the pseudonym d'Apudy .

See the Memoires of the Academie des Inscriptions (new series, vol. xii.), where there is a notice of Chezy by Silvestre de Sacy.

CHHATARPUR, a native state in the Bundelkhand agency of Central India. Area, 1118 sq. m.; pop. (1901) 156,139; esti- mated revenue, £16,000. The chief, whose hereditary title is raja, is a Rajput of the Ponwar clan, whose ancestor dispossessed the descendant of Chhatar Sal, the founder of Bundelkhand independence, towards the end of the 18th century. The state was guaranteed to Kunwar Suni Singh Ponwar in 1806. In 1854 it would have lapsed to the British government for want of direct heirs, but was conferred on Jagat Raj as a special act of grace. The town of Chhatakpur, which is named after Chhatar Sal, and contains his cenotaph, is 70 m. by road S.W. of Banda. Pop. (1901) 10,029. There are manufactures of paper and coarse cutlery, and a high school. The state also contains the British cantonment of Nowgong.

CHHATTISGARH, a division of the Central Provinces of India, comprising a British division (21,240 sq. m.) and two small feudatory states, Raigarh (i486 sq. m.) and Sarangarh (540 sq. m.). In 1905 the five Oriya states of Bamra, Rairakhol, Sonpur, Patna and Kalahandi were transferred from the Central Pro- vinces to Bengal. Chhattisgarh, or " the thirty-six forts," is a low-lying plain, enclosed on every side by hills and forests, while a rocky barrier shuts it off from the Nagpur plain on the west. Two great rivers, the Nerbudda and Sone, take their rise at the side of the Amarkantak hill in the north-west corner of the division, the Nerbudda flowing nearly due west to the Bombay coast, the Sone ultimately falling into the Ganges in Lower Bengal. Protected on both sides by ranges of hills, the district was, until late years, the least known portion of the most obscure division of India, but recently it has been opened up by the Bengal-Nagpur railway, and has developed into a great grain- producing country. Its population is almost pure Hindu, except in the two great tracts of hill and forest, where the aboriginal tribes retired before the Aryan invasion. It

remained com- paratively unaffected either by the Oriya immigration on the east, or by the later influx of Mahrattas on the west. For though the Mahrattas conquered and governed the country for a period, they did not take possession of the land. In 1901 the population of the two remaining feudatory states was 125,281, Raigarh having 86,543 and Sarangarh 38,738. Much of the soil is still covered with forest, but it includes fertile rice land.

The British division of Chhattisgarh comprises the three districts of Drug (created in 1906), Raipur and Bilaspur. In 1905 the district of Sambalpur, together with the five feudatory states, was transferred to Bengal. In 1901 the population of the reduced area was 2,642,983.

CHHINDWARA, a town and district of British India, in the Nerbudda division of the Central Provinces. The site of the town is 2200 ft. above sea-level, and is surrounded by ranges of low hills. The European station extends for nearly 2 m. and is well wooded. It is considered very healthy, and forms a resort for European visitors from Nagpur and Kampti during the hot weather.

The area of the District of Chhindwara is 4631 sq. m. It has two natural subdivisipns— the hill country above the slopes of the Satpura mountains, called the Balaghat, and a tract of low land to the south called the Zerghat. The high tableland of the Balaghat lies for the most part upon the great basaltic formation which stretches across the Satpuras as far east as Jubbulpore. The country consists of a regular succession of hills and fertile valleys, formed by the small ranges which cross its surface east and west. The average height of the uplands is 2500 ft., but there are many points of greater elevation. The appearance of the Zerghat below the hills is generally open and undulating. The country is intersected by several streams, of which the Kanhan is the most considerable. Near the hills and along the streams are strips and patches of jungle; the villages are usually surrounded

with picturesque groves of tamarind, mango and other shade- giving trees. In the hill-country the climate is temperate and healthy. In the cold season ice is frequently seen in the small tanks at an elevation of about 2000 ft. Until May the hot wind is little felt, while during the rains the weather is cool and agreeable. The average annual rainfall amounts to 36 in. Pop. (1901) 407,927. There are manufactures of cotton cloth and brass- ware. Coal in this neighbourhood began to be

worked after the opening of a branch of the Bengal-Nagpur railway to Chhindwara and the coalfields to the north in 1905.

Chhindwara formed part of the dominions of the ancient Gond dynasty of Chhindwara and Nagpur, whose seat was at Deogarh until, in the 18th century, it was removed by Chand Sultan, son of Bakht Buland (founder of the short-lived greatness of the dynasty, and of the city of Nagpur) to Nagpur (see Gondwana and Nagpur).

CHIABRERA, GABRIELLO (1552-1637), Italian poet, some- times called the Italian Pindar, was of patrician descent, and was born at Savona, a little town in the domain of the Genoese republic, twenty-eight years after the birth of Ronsard, with whom he has far more in common than with the great Greek whose echo he sought to make himself. As he has told in the pleasant fragment of autobiography prefixed to his works, in which, like Caesar, he speaks of himself in the third person, he was a posthumous child; he went to Rome at the age of nine years, under the care of his uncle Giovanni. There he read with a private tutor, suffered severely from two fevers in succession, and was sent at last, for the sake of society, to the Jesuits' College, where he remained till his twentieth year, studying philosophy, as he says, " piu per trattenimento che per appren- dere," — rather for occupation than for learning's sake. Losing his uncle about this time, Chiabrera returned to Savona, " again to see his own and be seen by them." In a little while, however, he returned to Rome, and entered the household of a cardinal, where he remained for several years, frequenting the society of Paulus Manutius and of Sperone Speroni, the dramatist and critic of Tasso, and attending the lectures and hearing the con- versation of Mureto. His revenge of an insult offered him obliged him to betake himself once more to Savona, where, to amuse himself, he read poetry, and particularly Greek. The poets of his choice were Pindar and Anacreon, and these he studied till it grew to be his ambition to reproduce in his own tongue their rhythms and structures, and so to enrich his country with a new form of verse — in his own words, " like his country- man, Columbus, to find a new world or drown." His reputation ' was made at once; but he seldom quitted Savona, though often invited to do so, saving for jorrneys of pleasure, in which he greatly delighted, and for occasional visits to the courts of princes whither he was often summoned, for his verse's sake, and in his capacity as a dramatist. At the ripe age of fifty he took to himself a wife, one Lelia Pavese, by whom he had no children. After a simple and blameless life, during which he produced a vast quantity of verse — epic, tragic, pastoral, lyrical and satirical — he died in 1637, at the patriarchal age of eighty-five. An epitaph was written for him in elegant Latin by Urban VIII.; but on his tombstone are graven two

quaint Italian hexameters of his own, in which the gazer is warned from the poet's own example not to prefer Parnassus to Calvary.

A maker of odes in all their elaborate pomp of strophe and antistrophe, a master of new and complex rhythms, a coiner of ambitious words and composite epithets, an employer of audacious transpositions and inversions, and the inventor of a new system of poetic diction, — it is not surprising that Chiabrera should have been compared with Ronsard. Both were destined to suffer eclipse as great and sudden as had been their glory. Ronsard was succeeded by Malherbe and by French literature, properly so-called; Chiabrera was the last of the great Italians, and after him literature languished till the second renaissance under Manzoni. Chiabrera, however, was a man of merit, apart from that of the mere innovator. Setting aside his epics and dramas (one of the latter received the honours of translation at the hands of Nicolas Chretien, a sort of scenic du Bartas), much

of his work remains yet readable and pleasant. His grand Pindarics are dull, it is true, but some of his Canzonette, like the anacreontics of Ronsard, are exceedingly elegant and graceful. His autobiographical sketch is also extremely interesting. The simple old poet, with his adoration of Greek (when a thing pleased him greatly he was wont to talk of it as " Greek Verse "), his delight in journeys and sight-seeing, his dislike for literary talk save with intimates and equals, his vanities and vengeances, his pride in the memory of favours bestowed on him by popes and princes, his " infinita maraviglia " over Virgil's versification and metaphor, his fondness for masculine rhymes and blank verse, his quiet Christianity, is a figure deserving perhaps of more study than is likely to be bestowed on that " new world " of art which it was his glory to fancy his own, by discovery and by conquest.

The best editions of Chiabrera are those of Rome (1718, 3 vols. 8vo) ; of Venice (1731, 4 vols. 8vo) ; of Leghorn (1781, 5 vols. l2mo) ; and of Milan (1807, 3 vols. 8vo). These only contain his lyric work; all the rest he wrote has been long forgotten.

CHIANA (anc. Clanis), a river of Tuscany, which rises in the Apennines S. of Arezzo, runs through the valley of Chiusi, and after receiving the Paglia just below Orvieto, falls into the Tiber after a course of 60 m. In Roman times its waters ran entirely into the Tiber. It often caused considerable floods in the valley of Clusium (Chiusi) which were noticeable even in Rome itself, and in a.d. 15 it was proposed to divert part of its waters into the Arnus, a project which was abandoned owing to the opposi- tion of the Florentines (Tac. Ann. i. 76, 79). In the middle ages the whole of its valley from Arezzo to

Chiusi was an un- inhabitable swamp; but at the end of the 18th century the engineer Count Fossombroni took the matter in hand, and moved the watershed some 25 m. farther south, so that its waters now flow partly into the Arno and partly into the Tiber.

CHIAPAS, a Pacific coast state of southern Mexico on the Guatemalan frontier, bounded by the states of Tabasco on the N. and Vera Cruz and Oaxaca on the W. Pop. (1895) 318,730; (1900) 360,799, a large proportion of which are Indians; area, 27,222 sq. m. largely forested. The Sierra Madre crosses the southern part of the state parallel with the coast, separating the low, humid, forested districts on the frontier of Tabasco from the hot, drier, coastal plain on the Pacific. The mountain region includes a plateau of great fertility and temperate climate, which is one of the best parts of Mexico and contains the larger part of the population of the state. But isolation and lack of transportation facilities have retarded its development. The extension of the Pan-American railway across the state, from San Geronimo, on the Tehuantepec National line, to the Guate- malan frontier, is calculated to improve the industrial and social conditions of the people. The principal industries are agriculture, which is very backward, stock-raising, timber-cutting, fruit- farming and salt-making. Coffee-planting is a new industry on the Pacific slope of the Sierra Madre at elevations of 2000 to 4000 ft., and has met with considerable success. Rubber plantations have also been laid out, principally by American companies, the Castilloa elastica doing well. The exports include cattle, hides, coffee, rubber, fruit and salt. The mineral resources include gold, silver, copper and petroleum, but no mines were in operation in 1906. The capital, Tuxtla Gutierrez (pop. 9395 in 1900), is on the plateau, 3§ m. from the Rio Sabinas, and 138 m. N.E. of the Pacific port of Tonala. The former capital, San Cristobal (pop. about 5000 in 1895), about 40 m. E. of Tuxtla, is an interesting old town and the seat of the bishopric of Chiapas, founded in 1525 and made famous through its associations with Las Casas. Tapachula (pop. in 1895, 6775), the capital of the department of Soconusco, 18 m. from the Guatemalan frontier, is a rising commercial town of the new coffee district. It is 24 m. inland from the small port of San Benito, is 559 ft. above sea-level, and has a healthy climate. Other prominent towns with their populations in 1895, are Comitan, or Comitlan (9316), on the Rio Grijalva about 40 m. S.E. of San Cristobal, and chiefly distinguished for its fine church and convent dedicated to San Domingo; Pichucalco

(8549), Tenejapa (7936), San Antonio (6715), Cintalape (6455), La Concordia (6291), San Carlos (5977), and Ococingo ‘(5667).

CHIAROSCURO (from the Ital. chiaro, light or brightness, and oscuro, darkness or shade), the disposition of light and shade in a painting; the term is applied to an early method of printing wood-engravings from several blpcks, and also to a picture in black and white, or brown and white only.

CHIAVARI, a town of Liguria, Italy, in the province of Genoa, 24 m. S.E. by rail from the town of Genoa. Pop. (1901) 10,397 (town), 12,689 (commune). It is situated near the mouth of the Entella, in the centre of a fertile plain surrounded by mountains except on the S.W., where it comes down to the sea. Its buildings are mostly modern, but it has a ruined castle of 1 147. It has an active trade in agricultural products, and manufactures lace, light wicker-seated bentwood chairs, silk, &c.

CHIAVENNA (anc. Clavenna), a town of Lombardy, Italy, in the province of Sondrio, 17 m. by rail N. of Colico which lies at the N. end of the lake of Como. Pop. (1901) town 3140, commune 4732. It is well situated on the right bank of the Mera, at the mouth of the Val Bregaglia, through which the road to the Maloja Pass and the Engadine runs to the east. This line was partly followed by a Roman road, which at Casaccia, just below the last ascent to the Maloja Pass, diverged to the N. by the Septimer Pass, joining the Julier route to Coire (anc. Curia) at Stalla. The Spliigen route, which was also used by the Romans, runs N. from Chiavenna to Coire: the modern road was constructed by the Austrians in 1819-1821. Chiavenna is crowned by a ruined castle, once an important strategic point, and the seat of the counts who ruled the valley from the time of the Goths till 1194, when the district was handed over to the bishops of Coire. In the 14th century the Visconti, having become masters of the Valtellina, bought the ” county ” (contado or contea) of Chiavenna from the bishop of Coire; but it was taken by the canton of the Grisons in 1525, and the castle dismantled. In 1797 Chiavenna became part of the Cisalpine republic, and thenceforward followed the fortunes of Lombardy. The church of S. Lorenzo is baroque in style, but its baptistery contains a font of 1206 with reliefs. Chiavenna has cotton factories and breweries, and is a depot for the wine of the district.

CHIBOUQUE, or Chibouk (the Fr. form of the Turk, ckibuk, literally a stick), a long pipe, often ornamented with precious stones, smoked by the Turks.

CHIC (a French word, either a shortened form of chicane, or derived from the Ger. Schick, tact or skill), a term properly used, in French artistic slang, of a work of art possessing brilliant but superficial technical ability, or of one executed without reference to a model or study of nature. The use of the word in French dates from the reign of Louis XIV. and then denoted a lawyer who was master of ” chicane.” ” Chic,” in general use, now connotes “smartness,” in dress, speech, &c.

CHICACOLE, a town of British India in the Ganjam district of Madras, situated on the right bank of the river Languliya, here crossed by a bridge, 4 m. from the sea. Pop. (1901) 18,196. Under Mahommedan rule it was the capital of one of theNorthern Circars, and afterwards of a British district. Several old mosques remain. The town was famous for its muslins, but the industry is now decayed. The roadstead and lighthouse of Calingapatam are about 16 m. to the north, and the East Coast railway has a station 9 m. inland.

CHICAGO, a city, a port of entry and the county-seat of Cook county, Illinois, U.S.A., the second city of the United States in population, commerce and manufactures; pop. (1900) 1,698,575; and (1910) 2,185,283. It is situated at the south-west corner of Lake Michigan (lat. 41° So’, long. 87 38′ W.), about 913 m. distant by railway from New York, 912 m. from New Orleans, 2265 m. from Los Angeles, and 2330 m. from Seattle. The climate is very changeable and is much affected by the lake; changes of more than thirty degrees in temperature within 24 hours are not at all rare, and changes of twenty are common. The city is the greatest railway centre of the United States, and was for several decades practically the only commer- cial outlet of the great agricultural region of the northern Missis-

sippi Valley. Trunk lines reach E. to Montreal, Boston, New York, Philadelphia, Baltimore (the nearest point on the Atlantic coast, 854 m.); S. to Charleston, Savannah, Florida, Mobile, New Orleans, Port Arthur and Galveston; W. to the Pacific at Los Angeles, San Francisco, Seattle and Vancouver, and to most of these by a variety of routes. In 1905 about 14% of the world’s railway mileage centred in Chicago.

With its suburbs Chicago stretches along the shore of Lake Michigan about 40 m. (the city proper 26.5), and the city in 1910 had a total area of 191. 4 sq. m. 1 It spreads loosely and irregularly backward from the lake over a shallow alluvial basin, which is rimmed to the W. by a low moraine water-parting 2 that separates the drainage of the lake from thatof the Mississippi Valley. The city site has been built up out of the ” Lake Chicago ” of glacial times, which exceeded in size Lake Michigan. Three lakes — Calumet, 3122 acres; Hyde; and part of

Wolf — with a water-surface of some 4100 acres, lie within the municipal limits. The original elevation of what is now the business heart of the city was only about 7 ft. above the lake, but the level was greatly raised — in some places more than 10 ft. — over a large area, between 1855 and i860. The West Side, especially in the north-west near Humboldt Park, is much higher (extreme 75 ft.). A narrow inlet from the lake, the Chicago river, runs W. from its shore about a mile, dividing then into a north and a south branch, which run respectively to the N.W. and the S.W., thus cutting the city into three divisions known as the North, the West and the South " Sides," which are united by three car-tunnels beneath the river as well as by the bridges across it." The river no longer empties into Lake Michigan since the com- pletion of the drainage canal. Its commercial importance is very great: indeed it is probably the most important non-tidal stream of its length in the world, or if it be regarded as a harbour, one of the greatest; the tonnage of its yearly commerce far exceeds that of the Suez Canal and almost equals the tonnage of the foreign trade (the domestic excluded) of the Thames or the Mersey. The increase in size of the newer freighters that ply on the Great Lakes 4 has proved one serious difficulty, and the bridges and the river tunnels, which hinder the deeper cutting of the channel, are others. The improvement of the outer harbour by the national government was begun in 1833. Great breakwaters protect the river mouth from the silting shore currents of the lake and afford secure shelter in an outer road- stead from its storms, and there is a smaller inner-basin (about 450 acres, 16 ft. depth) as well. But the river itself which has about 15 m. of navigable channel, in part lined with docks, is the mbst important part of the harbour. Its channel has been repeatedly deepened, and in rectnt years —especially since 1896, after its control as a navigable stream passed (1890) to the federal government — widened and straightened by the removal of jutting building constructions along its shores. Grain elevators of enormous size, coal yards, lumber yards and grimy warehouses or factories crowd close upon it. The shipping facilities on the river are not so good in some ways, however, as on the Calumet in southeastern (or South) Chicago, whither there has been a strong movement of manufactures and heavy commerce.

The plan of the city is in general " regular," i.e. rigidly rect- angular, and the streets are in general wide. The evenness of the plain has saved Chicago from most of the vast expense, incurred by some American cities (notably Boston and San Francisco) in the extension or levelling of their sites and the removal of obstructions unfavourable to their development. The business district is concentrated in a small area of the South Side, just below the main river and between the

south branch and the lake. A number of the railway terminals, almost all the great wholesale and retail houses, the leading hotels and

1 In 1889 the total area (land and water) was increased from 43-8 to 169-9 sc l- m – ! ii ! 89o the land area was 163-49 s 0- m.

s About 15 ft. in elevation; hence the possibility of the drainage canal.

3 Among the last are many swing and ” jack-knife ” bridges, bascules, and a lift-bridge that can be lifted bodily 155 ft. above the channel. Steam, compressed air and electricity are used as power.

4 By 1900 almost all were being built of a length exceeding 400 ft.

public buildings are crowded within an area of about 1 -5 sq. m. The congestion of the streets— considerably lessened since the freight-subways have reduced the amount of heavy trucking- is proportionately great, and their din and crush is characteristic of the city. The residential districts, on the other hand, are unevenly and loosely spread ; many areas well within the city are only sparsely settled. A belt of ” bad lands “—occupied by factories, shanties, &c. — partially surrounds the best business district. The smoke resulting from the use of soft coal has given a drab and dingy colour- tone to the buildings. The low and even relief of the site and the long vistas of the streets do not lend themselves to the picturesque; yet this quality may be claimed for the high and broken skyline, varied colour, massive- ness, bustle and impressive commercialism of the business district. Chicago is generally credited with being the original home of the steel-frame “sky-scraper,” 1 though there are now higher buildings elsewhere in America. The. unstable soil of sand, clay and boulders that underlies the city is unfavourable to tall constructions, and necessitates extraordinary attention to foundations. The bed-rock lies, on an average, 50 ft. below the level of the lake (in places more than a hundred). To the rock the foundations are often sunk in caissons, the buildings restingon monster columns of concrete and steel. 2 In other cases great ” pads ” of the same materials, resting or ” floating ” upon the clay, sustain and distribute the weight of the building. The small extent of the business quarter adds to the effect of its tall structures. The Auditorium (1889; cost, $3,500,000), a huge building containing a hotel and a theatre (5000 seats), is one of the most massive commercial structures of the country. The Masonic Temple (cost,

$3,000,000) is the tallest in the city (302 ft.). In 1909 there were some 475 structures ten or more storeys high. Not a few are noteworthy, whether for size — as the Monadnock office building of 16 storeys, with some 6000 occupants, and the new Northwestern Railway station; or for the luxury of their interior fittings — as the La Salle, Blackstone and Sherman hotels; or for boldness and originality in the treat- ment of the 1 teel-frame type; or for association with the city's life —as the Fine Arts building, given over to varied purposes of public amusement and artistic or intellectual improvement, or (he Railway Exchange (cased in tiles), the University Club, the Chamber of Commerce and the Board of Trade; and many others are handsome and dignified examples of architecture. The Marquette building, consistently and handsomely decorated with works of art, is one of the finest office-buildings in the country. There are a number of enormous retail stores. The largest, and one of the finest in the world, is that of Marshall Field. The wholesale establishment cf the same firm is the work of H. H. Richardson, considered one of his best, and one of the most admirable examples among American commercial buildings. The city hall and county court house (cost, $4, 500,000) is an enormous double building in a free French Renaissance style, with columned facades. The new Federal building (finished in 1905; cost, $4,750,000) is a massive edifice (a low rectangle surmounted by a higher inner cross and crowned with a dome). The public library (1893-1897, $2,125,000), constructed of dark granite and limestone, with rich interior decorations of varied frescoes, mosaics, ornamental bronze and iron-work, and mottoes, is one of the handsomest libraries of the country. The Chicago Art Institute (1892-1893 ; Italian Renaissance), the Chicago Orchestra building (1904), and the Commercial National Bank, are also noteworthy. The finest residence streets are the Lake Shore Drive of the North Side and the " boulevards "— broad parkways that connect the parks of the city — of which Michigan Avenue, Drexel and Grand are the finest. The city's

1 The highest value ever paid in Chicago for land actually sold, up to 1901, was $250 per sq. ft. (1892); a few rental contracts have been based upon an assumed higher value. A municipal ordinance placing the extreme construction at 150 ft. was repealed in 1902.

2 This is true of all the new large buildings. The "old" post office, completed in 1880 at a cost of $5,375,000, was practically a crumbling ruin within fifteen years ; its foundations were inadequate. Years were spent in sinking the foundation of the new Federal building that replaced the old.

environs are not of particular beauty, but there are bluffs on the lake

to the north, and woods to the south-west, and a fair variety of pretty hill and plain; and though the Calumet and Chicago rivers have been given over to commerce, the valley of the Desplaines will be preserved in the park system. On the South Side are the Union Stockyards, established in 1865, by far the largest in the world. They cover about 500 acres, have about 45 m. of feeding and watering troughs, and can accom- modate at one time more than 400,000 hogs, cattle, sheep and horses.

Public Works and Communications. — Local transit is provided for by the suburban service of the steam railways, elevated electric roads, and a system of electric surface cars. Two great public works demand notice: the water system and the drainage canal. Water is pumped from Lake Michigan through several tunnels connecting with ” cribs ” located from 2 to 5 m. from shore. The ” cribs ” are heavy structures of timber and iron loaded with stone and enclosing the in-take cylinders, which join with the tunnels well below the bottom of the lake. The first tunnel was completed in 1867. The capacity of the tunnels was estimated in 1900 by two very competent authorities at 528 and 615 million gallons daily, respectively. The average daily supply in 1909 was 475,000,000 gallons; there were then 16-6 m. of tunnels below the lake. The wastes of the city — street washings, building sewage, the offal of slaughter-houses, and wastes of distilleries and rendering houses — were originally turned into the lake, but before 1870 it was discovered that the range of impurity extended already a mile into the lake, half-way to the water ” crib,” and it became evident that the lake could not be indefinitely contaminated. The Illinois and Michigan Canal, for which the right of way was granted in 1821 and which was built in 1836-1841 and 1845-1848, and opened in 1848 (cost, $6, 557, 681), was once thought to have solved the difficulty; it is connected with the main (southern) branch of the Chicago river, 5 m. from its mouth, with the Illinois river at La Salle, the head of steamer navigation on the Illinois river, and is the natural successor in the evolution of transportation of the old Chicago portage, 5 m. in length, between the Chicago river and the headwaters of the Kankakee ; it was so deepened as to draw water out from the lake, whose waters thus flowed toward the Gulf of Mexico. It is about 96 m. long, 40-42 ft. wide, and 4-7 ft. deep, but proved inadequate for the disposal of sewage. A solution of the problem was imperative by 1876, but almost all the wastes of the city continued nevertheless to be poured into the lake. In 1890 a sanitary district, including part of the city and certain suburban areas to be affected, was organized, and preparations made for building a greater canal that should do effectively the work it was once thought the old

canal could do. The new drainage canal, one of the greatest sanitary works of the world, constructed between 1892 and 1900 under the control of the trustees of the Sanitary District of Chicago (cost up to 1 90 1 , $3 5 ,448 , 2 9 1) , joins the south branch of the Chicago with the Desplaines river, and so with the Illinois and Mississippi, and is 28-5 m. long, 3 of which 15 m. were cut through rock; it is 22 ft. deep and has a minimum width of 164 ft. The canal, or sewer, is flushed with water from Lake Michigan, and its waters are pure within a flow of 150 m. 4 Its capacity, which was not at first fully utilized, is 600,000 cub. ft. per minute, sufficient entirely to renew the water of the Chicago river daily. A system of intercepting sewers to withdraw drainage into the lake was begun in 1898; and the construction of a canal to drain the Calumet region was begun in 1910. The Illinois and Michigan canal is used by small craft, and the new drainage canal also may be used for shipping in view of the Federal government's improvements of the rivers connecting it with the Mississippi for the construction of a ship-canal for large vessels. The canal also made possible the development (begun in 1903) of enormous

3 Total excavation, 42,397,904 cub. yds. ; of solid rock, 12,265,000.

4 It has been conclusively proved that the Illinois is purer than the Mississippi at their junction. The undiluted sewage of the old canal drove the fish from, the river, but they have come back since the opening of the new canal.

hydraulic power for the use of the city. The Illinois and Michigan Canal has been supplemented by the Illinois and Mississippi Canal, commonly known as " the Hennepin," from its starting at the great bend of the Illinois river if m. above Hennepin, not far below La Salle; the first appropriation for it was made in 1890, and work was begun in 1892 and completed in October 1907. Its course from Hennepin is by the Bureau Creek valley to the mouth of Queen river on the Rock river, thence by the Rock river and a canal around its rapids at Milan to its mouth at Rock Island on the Mississippi river. This barge canal is 80 ft. wide at water-line, 52 ft. wide at the bottom, and 7 ft. deep. Its main feeder is the Rock river, dammed by a dam nearly 1500 ft. long between Sterling and Rock Falls, Illinois, where the opening of the canal was celebrated on the 24th of October

1907.

Beginning with 1892 steam railways began the elevation (or depression) of their main tracks, of which there were in 1904 some 838 m. within the city. Another great improvement was begun in 1901 by a private telephone company. This is an elaborate system of freight subways, more than 65 m. of which, underlying the entire business district, had beenconstructedbefore 1909. It is the only subway system in the world that seeks to clear the streets by the lessening of trucking, in place of devoting itself to the transportation of passengers. Direct connexion is made with the freight stations of all railways and the basements of important business buildings, and coal, building materials, ashes and garbage, railway luggage, heavy mail and other kinds of heavy freight are expeditiously removed and delivered. Telegraph and telephone wires are carried through the tunnel, and can be readily repaired. The subway was opened for partial operation in 190s. 1

Parks. — The park system may be said to have been begun in 1869, and in 1870 aggregated 1887 acres. Chicago then acquired the name of ” The Garden City,” which still clings to her. But many other cities have later passed her (until in 1904, though the second largest of the country, she ranked only thirty-second in her holdings of park area per capita among American cities of 100,000 population). In 1908 the acreage of the municipal parks was 3179 acres, and there were 61-4 m. of boulevards. After 1900 another period of ambitious development began. The improvement of old and the creation of new ” internal ” parks, i.e. within the cordon of those older parks and boulevards that once girdled the city but have been surrounded in its later growth; the creation of a huge metropolitan ring — similar to that of Boston but vaster (35,000 acres) — of lake bluffs, hills, meadows, forests and river valley; and a great increase of ” neighbourhood parks ” in the poor districts, are included in the new undertakings. The neighbourhood park, usually located near a school, is almost all-inclusive in its provision for all comers, from babyhood to maturity, and is open all day. There are sand gardens and wading ponds and swings and day nurseries, gymnasiums, athletic fields, swimming pools and baths, reading-rooms — generally with branches of the city library • — lunch counters, civic club rooms, frequent music, assembly halls for theatricals, lectures, concerts, or meetings, penny savings banks, and in the winter skating ponds. These social centres have practically all been created since about 1895. There are also municipal baths on the lake front and elsewhere. The older parks include several of great size and beauty. Lincoln Park (area 552 acres), on the lake shore of the North Side, has been much enlarged by an addition reclaimed from the lake. It has fine monuments,

conservatories, the only zoological garden in the city, and the collections of the Academy of Sciences. A breakwater carriage drive connects with a boulevard to Fort Sheridan (27 m.) up the lake. Jackson Park (542 acres), on the lake shore of the South Side, was the main site of the World's

1 The cut was almost entirely through firm clay. It was estimated (1905) that the total freight handled weekly in the business district was nearly 500,000 tons, and the subway was designed to handle this amount when completed. The tunnels are 12-75X14 and 7-5X6 ft., all concrete. The cars are drawn by trolley wire loco- motives on a track of 2 ft. gauge.

Columbian Exposition of 1893, and contains the Field Columbian Museum, occupying the art building of the exposition. It is joined with Washington Park (371 acres) by the Midway Plais- ance, a wide boulevard, intended to be converted into a magnificent sunken water-course connecting the lagoons of the two parks with Lake Michigan. Along the Midway are the grey- stone buildings of the University of Chicago, and of its (Blaine) School of Education. On the West Side are three fine parks — Douglas, Garfield (with a fine conservatory), and Hum- boldt, which has a remarkable rose garden (respectively 182, 187 and 206 acres), and in the extreme South Side several others, including Calumet (66 acres), by the lake side, and Marquette (322 acres). Jackson Boulevard, Western Avenue Boulevard and Marshall Boulevard join the South and the West Park systems. Neither New York nor Boston has preserved as has Chicago the beauty of its water front. The shore of the North Side is quite free, and beginning a short distance above the river is skirted for almost 30 m. by the Lake Shore Drive, Lincoln Park and the Sheridan Drive. The shore of the South Side is occupied by railway tracks, but they have been sunk and the shore otherwise improved. In addition to Calumet and Jackson parks there was another just below the river, Lake Park, which has since been included in Grant Park, mostly reclaimed from the water. Here are the public library and the building of the Art Institute (opened in 1893); the park had also been pro- posed as the site of a new building for the Field Museum of Natural History. The park and boulevards along the lake in 1905 stretched 1078 m., within the city limits, or almost half the total frontage. 3 The inner " boulevards " are broad parked ways, 150 to 300 ft. wide, joining the parks; Chicago was the first American city to adopt this system.

Art. — Among the monuments erected in public places are a Columbus by D. C. French and a bronze replica of French's equestrian statue of Washington in Paris; statues of John A. Logan and Abraham

Lincoln by St Gaudens; monuments commemorating the Haymarket riot and the Fort Dearborn massacres; statues of General Grant, Stephen A. Douglas, La Salle, Schiller, Humboldt, Beethoven and Linnaeus. There is also a memorial to G. B. Armstrong (1822-1871), a citizen of Chicago, who founded the railway mail service of the United States. A city art commission approves all works of art before they become the property of the city, and at the request of the mayor acts in various ways for the city's aesthetic betterment. The Architectural Club labours for the same end. A Municipal Art League (organized in 1899) has done good work in arousing civic pride; it has undertaken, among' other things, campaigns against bill-board advertisements, 3 and against the smoke nuisance.

The Art Institute of Chicago contains valuable collections of paintings, reproductions of bronzes and sculpture, architec- tural casts, and other objects of art. Connected with it is the largest and most comprehensive art school of the county — • including newspaper illustration and a normal school for the training of teachers of drawing in the public schools. The institute was incorporated in 1879, though its beginnings go back to 1866, while the school dates from 1878. The courses in architecture are given with the co-operation of- the Armour Institute of Technology. There are also a number of notable private art collections in the city. In 1894 the Chicago Public School Art Society was founded to secure the placing of good works of art in the public schools. Picture collections are also exchanged among the neighbourhood-park homes.

Music in Chicago owes much to the German element of the population. Especially noteworthy among musical organizations

2 The Illinois Central enters the business centre by tracks laid along the lake shore. Certain rights as to reclaiming land were granted it in 1852, but the railway extended its claims indefinitely to whatever land it might reclaim. In 1883 began a great legal struggle to determine the respective rights of the United States, the state of Illinois, Chicago, and the Illinois Central in the reclaimed lands and the submerged lands adjacent. The outcome was favour- able to the city.

3 There were 50 m. of them in 1904.

are the Apollo Musical Club (1872) and The Theodore Thomas orchestra, which has disputed with the Boston Orchestra the claim to artistic primacy in the United States. Its leader from its organization in 189 1 until his death in 1905 was Theodore Thomas, who had long been identified with summer orchestral concerts in the city. In 1904 a fund was gathered by public subscription to erect a handsome building and endow the orchestra.

The Field Museum of Natural History, established (1894) largely by Marshall Field, is mainly devoted to anthropol- ogy and natural history. The nucleus of its great collection was formed by various exhibits of the Columbian Exposition which were presented to it. Its collections of American ethnology, of exceptional richness and value, are constantly augmented by research expeditions. In addition to an original endowment of $1,000,000, Mr Field bequeathed to the museum $8,000,000, Lo be utilized in part for the new building which is being erected in Jackson Park.

Libraries. — At the head of the libraries of the city stands the public library 1 (established 1872; opened 1874), supported by taxation, which on the 1st of June 1910 had 402,848 “Volumes, and in the year 1910 circulated 1,805,012 volumes. In 1889 John Crerar (1827-1889), a wealthy manufacturer of railroad supplies, left to the city for the endowment of a non- circulating library funds which in 1907 were estimated to amount to $3,400,000. The library was incorporated in 1894 and was opened in 1897; in February 1908 it had 2 16,000 volumes and 60,000 pamphlets. It occupies a floor in the Marshall Field Building on Wabash Avenue. Another reference library was established (opened in 1887) with a bequest (1868) of Walter L. Newberry. It has a rich endowment, and in February 1908 had 191,644 volumes and 43,644 pamphlets. By a plan of co-operation each of these three libraries devotes itself primarily to special fields: the John Crerar is best for the natural, physical and social sciences; the Newberry is particularly strong in history, music, medicine, rare books and fine editions; the public library covers the whole range of general literature. The library of the University of Chicago contained in 1908 some 450,000 titles. Among other collections are those of the Chicago Historical Society (1856; about 150,000 titles in 1908), the Athenaeum (1871); the Law Institute and Library (1857), which in 1908 had about 46,500 volumes; the Art Institute, the Field Museum of Natural History, the Academy of Sciences (1857) and the libraries of various schools.

Universities and Colleges. — There are three universities situated wholly or in part in the city. The leading institution is the University

of Chicago (see Chicago, University of). The pro- fessional department of North- Western University is in Chicago, while its academic department is in the suburb of Evanston. North- Western University was organized in 1851 and is under Methodist Episcopal control. Its students in 1908 (exclusive of pupils in ” co-operating ” theological schools) numbered 3850; the best equipped departments are those of dentistry, medicine and pharmacy. There are two Roman Catholic col- leges in Chicago: Loyola University (chartered in 1870), with a department of law, called Lincoln College (1908), and a medical department; and St. Stanislaus College (1870). The College of Physicians and Surgeons is the medical department of the Uni- versity of Illinois, at Champaign-Urbana. Theological schools independent of the universities include the McCormick Theo- logical Seminary (Presbyterian) ; the Chicago Theological Sem- inary (Congregational, opened 1858, and including German, Danish-Norwegian and Swedish Institutes) ; the Western Epis- copal Theological Seminary; a German Lutheran theological sem- inary, and an Evangelical Lutheran theological seminary. There are a number of independent medical schools and schools of dentistry and veterinary surgery. The Lewis Institute (bequest 1877, opened 1896), designed to give a practical education to boys and girls at a nominal cost, and the Armour Institute of

1 Thomas Hughes was a leader in gathering English gifts for such a library immediately after the ” great fire.” A nucleus of 10,500 •slurries — 7000 from England and 3500 from other countries, especially Germany — was thus secured.

Technology, one of the best technical schools of the country, provide technical education and are well endowed. The Armour Institute was founded in 1892 by Philip D. Armour, and was opened in 1 893 . It comprises the College of Engineering., including, besides the usual departments, a department of chemical engineering and a department of fire protection engineering, a department of ” commercial tests,” and the Armour Scientific Academy (preparatory) . In 1 907 the Institute had 1869 students. The Chicago Academy of “Science (1857) has a handsome building and museum collections in Lincoln Park.

The leading daily newspapers are the Record-Herald, Evening Post, News (evening) and Journal (evening), all Independent; the Inter-Ocean and Tribune, Republican; and the Evening American and Examiner, both Democratic. There are several journals in German, Bohemian, Polish, Swedish, Norwegian and Danish. Many trade papers are published in the city, which is also a centre for much of the religious publishing of the Middle West. Chicago’s position in the

labour world has made it the home of several socialist and anarchistic periodicals.

Industry and Commerce. — Chicago's situation at the head of the most south-western of the Great Lakes has given it great importance in trade and industry. The development of its extraordinary railway facilities was a recognition of its supreme advantages as the easiest outlet for the products of the Middle West, on whose wealth its prosperity is founded. The growth of its trade has been marvellous. The last years of the 19th century showed, however, an inevitable loss to Chicago in the growth of Duluth, Kansas City and other rivals in strategic situations. In particular, the struggle of the North and South railway lines in the Mississippi Valley to divert to ports on the Gulf of Mexico grain and other freight caused great losses to Chicago. An enormous increase in the cereal trade of Phila- delphia, Baltimore, Newport News and Norfolk was partly due to the traffic eastward over lines S. of Chicago. The traffic of the routes through Duluth and Canada does not, indeed, represent in the main actual losses, for the traffic is largely a new growth; but there has been nevertheless a considerable drain to these routes from American territory once tributary to Chicago. Altogether the competition of the Gulf roads and the lines running S.W. from Duluth had largely excluded Chicago by 1899 (according to her Board of Trade) from the grain trade W. of the Missouri river, and in conjunction with southerly E. and W. routes had made serious inroads upon trade E. of that river. Its facilities for receiving and distributing remain never- theless unequalled, and it still practically monopolizes the traffic between the northern Atlantic seaboard and the West. New York alone, among American cities, has a greater trade. Chicago is the greatest railway centre, the greatest grain market, the greatest live-stock market and meat-packing centre, and the greatest lumber market of the world. The clearings of her associated banks amounted to $13,781,843,612 in the year 1909. The wholesale trade was estimated in 1875 at $293,900,000 and in 1905 at $1,781,000,000. The average annual grain receipts (including flour in wheat equivalent) in the five years 1900-1904 amounted to 265,500,000 bu. (12,902,310 in 1854; 72,369,194 in 1875), and the shipments to 209,862,966 bu. The first shipment of wheat was of 78 bu. in 1838. The grain elevators are among the sights of Chicago. They are enormous storehouses into which the grain is elevated from ships and cars, sorted into grades and reloaded for shipment; all the work is done by machinery. Their capacity. in 1904 was 65,140,000 bu. 2 In the same quinquennial period, 1900-1904, the average yearly receipts of lumber aggregated 1,807,066,000 ft., 3 and of shingles, 410,711 thousand; of cattle, 3,078,734; of hogs, 8,334,9045.0ˆ sheep,

3,338,291; of butter, 239,696,921 lb; the exports of hides, 167,442,077 lb; of dressed beef, 1,126,995,490 lb; of

2 In 1900-1904 the average freight rate per bushel of wheat to New York was $0-04998 by the all-water; $0-10554 by the all-rail route. In 1859 it cost $0-1575 to send a bushel of corn to Buffalo by water; in 1890, $0-019.

3 It has been above 1,000,000,000 ft. since 1870, and has in some years risen to 2,000,000,000.

lard, 410,688,319 lb; of pork, 191,371 bbl.; of other hog products, 690,503,394 lb. The combined tonnage in and out averaged 14,135,406 tons. 1 There is a large direct trade with Europe, mainly in goods that come in bond by rail from Atlantic ports. In 1907 the value of Chicago's imports was $27,058,662, and of its exports, $5,643,302.

The value of manufactures (from establishments under the "factory system") in 1900 was $797,879,141, 71-2% of all those of Illinois, and in 1905 was $955,036,277, 67-7% of all those of the state ; in both these years Chicago was second only to New York City. Wholesale slaughtering and meat-packing (not including many by-products), valued at $256,527,949 (32-2% of the city's total) in 1900 and at $269,581,486 (28-2% of the total) in 1905, are the most important of the city's industries; in 1905 the product value in Chicago was 29-5% of that for the slaughtering and meat-packing of the entire United States. Other important manufactures are foundry and machine shop products, $44,561,071 in 1900, and $51,774,695 in 1905; and other iron and steel products, $35,058,700 in 1900 and $27,074,307 in 1905; clothing ($58,093,572 in 1000, and $64,913,481 in 1905); cars and other railway construction, $28,369,956 in 1900 and $36,080,210 in 1905; malt liquors ($14,956,865 in 1900, and $16,983,421 in 1905), and furniture ($12,344,510 in 1900 and $17,488,257 in 1905). The Illinois Steel Company has the largest rolling mills in the world. The McCormick Harvesting Machine Company is the largest concern in the world manufacturing agricultural implements. Pullman in southern Chicago, in the sparsely settled outskirts of the city, is a model little " labour town," planned and constructed with regard for both appearances and conveniences by the Pullman Palace Car Company, which has its works here. The town consists mainly of workmen's cottages. Most of the population are dependent upon the

car works. The Pullman Company owns and operates dining and sleeping cars on practically all the railways of the country. In addition to its own cars it builds ordinary passenger and freight cars on contract.

Meat-packing is the greatest local industry and is that for which Chicago is best known. In the enormous stock-yards from two-thirds to four-fifths of the cattle and hogs received are killed, and sent out in various forms of prepared meats and by- products (lard, fertilizers, glue, butterine, soap, candles, &c). 8 This industry is remarkable for the extraordinary division of labour in its processes. In the preparation of a bullock more than thirty specialties are involved, and some twenty different rates of pay. This system enabled the packing companies, until checked by the development of labour unions, to save money not only by paying low wages for crude labour and high for skilled, but to develop wonderful expertness in every line, and so ” speed up ” the workmen to a remarkable pace. 3 No more interesting field can be found for the study of the qualities of foreign races. The introduction of the refrigerator railway car in the ‘seventies of the 19th century, making possible the distant marketing of dressed meats, enormously increased the business. The workmen of the yards were organized in a national union of meat packers in 1897, and all the different classes of workmen have their separate organizations, formed mainly between 1900 and 1902. The number of women employed more than doubled in the decade 1891-1900, constituting probably about 9% of the total in the latter year.

Administration. — Chicago is governed under a general city- charter law of Illinois of 1870, accepted by the city in 1875. In November 1904 the people of Illinois adopted a constitutional amendment authorizing the legislature of the state to provide a

1 This is for the entire Chicago customs district, including Wau- kegan and Michigan City.

2 The number of hogs packed yearly averaged 7,255,245 in 1900-1904; the cattle packed, 1,955,765; the sheep shipped (partly live), 616,476 (one-fifth those received).

‘ e.g. in the most skilled labour, the speed was increased 87-5 % from 1884-1894. In 1905 a gang of 230 men would dispose of 105 animals hourly; equivalent to 131 minutes for one man in taking the animal from pen to refrigerator; the average wage was $0-2 1 per hour (highest 0-50) and the average cost per bullock, $0-46.

complete new system of local government for Chicago, but the old system continued and is here described, the new charter, from which so much had been hoped, being rejected by the voters of the city by an overwhelming majority in September 1907. A common council chosen by wards and renewed in half each year controls the budget, police, liquor licences, city contracts and the granting of franchises; it also confirms appointments made by the mayor and by a vote of two-thirds may pass legislation over his veto. The mayor, chosen for four years, is the executive head of the city, and has large power of appointment and removal , limited by a civil service law, under which he must submit reasons for removals, while two-thirds of the council may prevent them. On the other hand the mayor can veto separate items in the council's budget. The administrative departments are generally headed by single commissioners; but those of elections, education and the public library are exceptions. The council was once all important, but as early as the charter of 1851 it began to lose power to the mayor, whose directive and executive powers have steadily increased, beginning first in the financial depart- ment. Administration was once performed entirely by boards as in other American cities: every specific problem or demand for municipal activity was met by an appeal to the state legislature for special legislation and the creation of a board. The substitu- tion of single commissioners began in 1876. The state constitu- tion of 1870 forbade special legislation, prescribed a general city charter law and forbade special amendatory acts for Chicago. This stopped grave abuses, but because a large part of the state has not been interested in Chicago's special needs and demands for betterment it also saddled upon the city an organization which in 1901 remained practically the same as in 1870, when Chicago was an overgrown town of 300,000 inhabitants. Chicago was the only large city of the state, and a charter generalized from village experience was unsuitable for it. The parts of Cook county outside the city have also been very jealous of forwarding its reorganization, important features of which must be either, the complete absorption of the county or at least the reconstitu- tion of the county government, 4 which the constitution left unchanged, and which, with the city's growth, has caused clash of interests and authority. Nor is this dual government — though the city has above nine-tenths of the population and pays nine- tenths of the taxes of the county — the only anomaly. Illinois has had since 1848 a modified New England " township " local- government system, and various townships have been absorbed by Chicago, yet they all retained till after 1900 their political structure and some of their functions. There are three park com- missions, two appointed by the governor and one by circuit court judges, created for different parts of

the old city, differently constituted and all independent of the city; their jurisdiction was not enlarged as the city grew, so large portions remained free of charges for parks and boulevards. A special park commission now supplements them and lessens this anomaly though increasing administrative diversity. A sanitary and drainage district, not larger than the city area but quite different from it, was created in 1886 (present form 1890) to carry through the drainage canal. The school board has been nominally separate from and almost independent of the city government in power since 1857. The courts of law are courts of the state of Illinois, but a certain number of justices of the peace are designated by the mayor to act as police magistrates. The initiative and referendum in local matters has been made possible under a state law, and has been several times exercised in important questions. Financial arrangements have been loose and inefficient. Independent taxing power has been lavishly granted. State, county, city, three park boards, the school board, the public library board, the drainage board, and as late as 1963 ten townships, 6 exercised this sovereign right within the municipal area. Tax assessment

4 Cook county is Republican in politics generally, the rural dis- tricts being so strongly so as often to overbalance the normal Demo- cratic plurality in Chicago. Thus another ground of jealousy is found in the distribution of county offices.

8 An amendment of 1904 provided that the legislature should enact the consolidation of the townships with the city in matters of taxation, but no further steps had been taken to the end of 1907.

valuations have been excessively irregular (e.g. the ” equalized ” value for 1875 was $55,000,000 greater than that for 1892), and apparently very low. The average assessment valuation for the years from 1904 to 1908 was $438,729,897 (403-28 millions in 1904, and 477-19 millions in 1908), and in 1907 the highest taxing rate was 8%. The bonded debt in 1908 was $25,157,400, about half of it old ($11,362,726 in 1870; 4-5 millions contracted to aid the World’s Fair of 1893). In the early years following 1900 the city paid more than half of its income on police; this expenditure, per capita of population, was not high (in 1901 Boston $5-03, New York $3-21, Chicago $2-19), and the results were not exactly efficient. The difficulty is that the city is poor and can pay only for strict necessities. Its poverty is due mainly to state laws. The taxation limit on property is 1 % on the cash value, thus compelling special dependence upon all sorts of indirect taxes; the debt limit is 5% on the assessed valuation. Since iqoo relief has been given by state law in some matters, such as for the park system. The water system has been operated by the city since 1851, and has been financially very successful from the beginning: rates are far lower than in the other great cities of the country, and a handsome net revenue accrues to the treasury. 1 A municipal electric-lighting plant (1887), which was paid for gradually out of the general tax levy and was not built by the sale of bonds, gave excellent results in the city service. The city, like the state, has power to regulate the price of gas sold by private companies. The elevation of the railway tracks within the city was begun in 1892; at the close of 1908 the railway companies had accepted ordinances of the City Council for the elevation of 192-77 m. of main tracks and 947-91 m. of all tracks, and the construction of 724 subways, at an estimated cost of $65,000,000; at that time the railway companies had completed the elevation of 133-83 m. of main tracks and 776 m. of all tracks, and had constructed 567 subways, at a total expense of $52,500,000. The system of intercepting sewers begun in 1898 to complete the service of the drainage canal has been constructed with the profits of the water system.

In addition to the movement for a new charter to remove the anomalies and ease the difficulties already referred to, two great problems have been in the forefront in recent years: the lessening of municipal corruption and the control of local transit agencies.

The traction question may be said to have begun in 1865, in which year, and again in 1883, public opinion was bitterly aroused against an attempt of the traction companies to secure a ninety-nine year extension of franchises. Following 1883 all lines were consolidated

and enormously over-capitalized (in 1905 about $150,000,000 of stocks and bonds on a 6% basis, two-thirds of which rested only on the franchise). In 1895-1897 bold attempts to secure a 50-year extension of franchises were defeated by Governor John P. Altgeld (1847-1902), by the formation of a Municipal Voters' League, and by a representative committee of 100 sent from Chicago to attend the legislature at Springfield. The transit service of the city had for years been antiquated and inadequate. At the mayor's elections in 1897, 1899, 1901 and 1903 the victory lay with the opponents of the companies, and in 1905 the successful party stood for immediate municipal acquisition of all roads. Meanwhile, under the state referendum act, the city in 1902 voted overwhelmingly for municipal ownership and operation (142,826 to 27,990); the legislature in 1903 by the Mueller law gave the city the requisite powers; the people accepted the law, again declared for muni- cipal ownership, and for temporary compulsion of adequate service, and against granting any franchise to any company, by four additional votes similarly conclusive. At last, after tedious negotiations, a definite agreement was reached in 1906 assuring an early acquisition of all roads by the city. The issue of bonds for municipal railways was, however, declared unconstitutional that year; and at the municipal elections of 1907 there was a complete reversal of policy; a large majority voted this time against municipal ownership in favour of leaving the working of the street railways in private hands, and strengthening the powers of municipal control.

1 The net revenue per million gallons in 1890-1899 was $35-04.

The active campaign for the improvement of municipal service and politics may be said to have begun in 1896. A civil service system was inaugurated in 1895. The salaries of the councilmen were raised with good effect. Numerous reform associations were started to rouse public opinion, such as the Citizens' Associa- tion of Chicago, organized in 1874, the Civic Federation (1894), the Municipal Voters' League (1896), the Legislative Voters' League (1901), the Municipal Lecture Association (1902), the Referendum League of Illinois (1901), the Civil Service Reform Association of Chicago, the Civil Service Reform Association of Illinois (1902), the Merchants' Club, the City Club (1903), the Law and Order League (1904), Society of Social Hygiene (1906), and many of the women's clubs took an active part. They stood for the real enforcement of the laws, sanitation, pure food, public health, the improvement of the schools and the widening of their social influence, and (here especially the women's clubs) aesthetic, social and moral progress. The Merchants' Club reformed the city's book-keeping, and secured the establishment (1899) of the

first state pawnbrokers' society. The Civic Federation demonstrated (1896) that it could clean the central streets for slightly over half what the city was paying (the city has since saved the difference) ; it originated the movement for vacation schools and other educational advances, and started the Com- mittee of One Hundred (1897), from which sprang various other reform clubs. The Municipal Voters' League investigated and published the records of candidates for the city council, and recommended their election or defeat as the case may be. More- over, a " Municipal Museum" was organized in 1905, mainly supported by private aid, but in part by the board of education, in order to collect and make educational use of materials illustrat- ing municipal administration and conditions, physical and social.

Education and Charity. — The school board is appointed by the mayor. Since 1904 a merit system has been applied in the advancement of teachers; civil service rules cover the rest of the employees. Kindergartens were maintained without legal sanction in connexion with the public schools for several years, and for more than twenty-five years as private schools, before their legal establishment as a part of the system in 1899. Free evening schools, very practical in their courses, are utilized mainly by foreigners. Vacation schools were begun in 1896. So far as possible the school buildings are kept open for school, lectures and entertainments, serving thus as wholesome social centres; and a more adequate use is made of the large invest- ment (in 1908 about $44,500,000) which they represent. In all the public schools manual training, household arts and economy, and commercial studies are a regular part of the curriculum, A department of scientific pedagogy and child study (1900) seeks to secure a development of the school system in harmony with the results of scientific study of children (the combination of hand and brain training, the use of audito-visual methods, an elastic curriculum during the adolescent period, &c). The expenditure for all purposes by the city in 1903 for every dollar expended for schools was only $1-713; a ratio paralleled in only a few cities of the country.

Hospitals, infirmaries, dispensaries, asylums, shelters and homes for the defective, destitute, orphaned, aged, erring, friendless and incurably diseased; various relief societies, and associations that sift the good from the bad among the mendicant, the economically inefficient, and the viciously pauper, represent the charity work of the city. Among public institutions are the Cook County hospital (situated in the " Medical District " of the West Side, where various hospitals and schools are gathered near together), asylum and poor house. Since 1883 a Lincoln Park Sanitarium has been maintained for infants and

small children during warm weather. Two legal-aid societies, the Chicago Bureau of Justice (1888) and the Protective Agency for Women and Children, collect small wage claims and otherwise aid the poor or helpless. The most important charit- able societies of the city are the United Charities of Chicago (1909), the United Hebrew Charities (1857), and the Associated Jewish Charities (1900). The first is the union of the Relief and Aid Society (1857) and the Bureau of Charities (1894),

and tries to prevent overlapping of efforts and to weed out fraud. Following the gradual development of New York state laws on behalf of children was enacted the Illinois Juvenile Court Law, which came into force on the ist of July 1899 and was largely the result of Chicago's interest in juvenile reform. Much philanthropic work centres in the West Side with its hetero- geneous population. A famous institution is Hull House, a social settlement of women, which aims to be a social, charitable, and educational neighbourhood centre. It was established in 1889 by Miss Jane Addams, who became the head-worker, and Miss Ellen Gates Starr. It includes an art building, a free kinder- garten, a fine gymnasium, a creche, and a diet kitchen; and supports classes, lectures and concerts. It has had a very great influence throughout the United States. The Armour mission (1886) for the poor is organized with similar breadth of scope.

Population. — Of the total population in 1900 not less than 34-6% were foreign-born; the number of persons either born abroad, or born in the United States of foreign parentage {i.e. father or both parents foreign), was 77-4% of the population, and in the total number of males of voting age the foreign-born predominated (53-4%). Of the latter category 68-2% were already citizens by naturalization. 3-9% of the inhabitants of ten years of age or upward were illiterate (unable to write), while the percentage of foreign-born whites was 8-2% (93-9% of illiterate males of voting age) . Germans, Irish, Poles, Swedes and Bohemians made up respectively 29-1, 12-6, 8-6, 8-3 and 6-2% of the foreign-born population. It was estimated in 1903 by a very competent authority that above 500,000 persons spoke German, 12 5,000 Polish, ioo,oooSwedish,9o,oooBohemian, 50,000 Norwegian, 50,000 Yiddish, 35,000 Dutch, 25,000 Italian, 20,000 Danish, 17,000 French and 12,000 Irish (Celtic), and that each of fourteen foreign languages was spoken by more than 10,000 people: " Newspapers appear regularly in 10 languages, and church-services may be heard in

about 20 languages. Chicago is the second largest Bohemian city of the world, the third Swedish, the fourth Norwegian, the fifth Polish, the fifth German (New York being the fourth) . In all there are some 40 languages spoken by . . . over one million ” persons. 1 The death-rate of Chicago is the lowest of the great cities of the country. Births are but slightly in excess of deaths, so that the growth of the city is almost wholly from immigration. The death-rate is the lowest of the great cities of the country (16-2 in 1900; New York, 20-4; Boston, 20-1, &c).

The growth of Chicago has been remarkable even for American cities. Any resident of four-score years living in 1900 had seen it grow from a settlement of fourteen houses, a frontier military post among the Indians, to a great metropolis, fifth in size among the cities of the world. In 1828 what is now the business centre was fenced in as a pasture; in 1831 the Chicago mail was deposited in a dry-goods box; the tax-levy of 1834 was $48-90, and a well that constituted the city water-works was sunk at a cost of $95.50; in 1843 hogs were barred from the town streets. Such facts impress upon one, as nothing else can, the marvellously rapid growth of the city. In 1830 with a population of less than 100, in 1840 with 4479, the increase by percentages in succeeding decades was as follows: 507-3, 264-6, 173-6, 68-3, n8-6 and 54-4; an increase equivalent to 8-6% annually, compounded. Such a continuous ” boom ” no other American city has ever known.

History. — The river Chicago (an Indian name of uncertain meaning, but possibly from Ojibwa she-kag-ong, ” wild onion place “) was visited by Joliet and Marquette in 1673, and later by La Salle and others. It became a portage route of some importance, used by the French in passing to the lower Illinois country. In 1804 the United States established here Fort Dearborn. In 181 2, during the Indian War of Tecumseh, the garrison and settlers, who had abandoned the fort and were re- treating toward safety, were attacked and overpowered by the savages at a point now well within the city. The fort was re-established and fitfully occupied until its final abandonment

1 Prof. C. D. Buck in Decennial Publications of the University of Chicago (1903, vol. 6).

in 1837. When Cook county was organized in 183 1, Chicago, then a tiny village, became the seat of justice. It became a town in 1833 and a city in 1837. By that time Chicago was confident of its future. The federal government had begun the improvement of the harbour, and the state had started the Illinois and Michigan canal. There was a

federal land-office also, and the land speculator and town promoter had opened a chapter of history more picturesque, albeit sordid, than in any of the old French days. The giant growth of the lake trade had drawn attention before railway connexion was secure with the East in 1852, making progress even more rapid thereafter. During the Civil War a large prison-camp for Confederate prisoners, Camp Douglas, was maintained at Chicago. In 1870 the city had 306,605 inhabitants and was already a commercial centre of immense importance.

In 187 1 it suffered a terrible calamity. On the 8th of October a fire broke out near the lumber district on the West Side. Two-thirds of the city's buildings were wood, and the summer had been excessively dry, while to make conditions worse a high and veering wind fanned the flames. The conflagration leaped the river to the South and finally to the North Side, burned over an area of 3! sq. m., destroyed 17,450 buildings and property valued at $196,000,000,2 and rendered almost 100,000 people homeless; 250 lost their lives. The flames actually travelled 2j m. in an air-line within 65 hours. Thousands of persons, fleeing before the flames and fire-brands, sought refuge on the shore and even in the waters of the lake. Robbery, pillage, extortion, orgies and crime added to the general horror. In the South Side the fire was checked on the 9th by the use of gunpowder; in the North (where the water- works were early destroyed) it had extended almost to the prairie when rainfall finally ended its ravages, after about twenty-seven hours of destruction. With the exception of the San Francisco fire of 1906 this was the greatest fire of modern times. A vast system of relief was organized and received generous aid from all parts of the world. The money contributions from the United States and abroad were $4,996,782; of this foreign countries contributed nearly $1,000,000 (England half of this). These funds, which were over and above gifts of food, clothing and supplies, were made to last till the close of 1876. Out of them temporary homes were provided for nearly 40,000 people ; barracks and better houses were erected, workmen were supplied with tools, and women with sewing-machines; the sick were cared for and the dead buried; and the poorer classes of Chicago were probably never so comfortable as during the first two or three years after the fire. The rebuilding of the city was accom- plished with wonderful rapidity. Work was begun before the cinders were cold. The business district was largely rebuilt within a year, and within three there were hardly scars of the calamity. Wood was barred from a large area (and subsequently from the entire city), and a new Chicago of brick and stone, larger, finer and wealthier, had taken the place of the old. Business and population showed no set-back in their progress. The solidity and permanence of this prosperity were confirmed during

the financial panic of 1873, when Chicago banks alone, among those of the large cities of the country, continued steadily to pay out current funds.

In its later history certain special factors stand out, apart from continued commercial progress.

Chicago has been a storm centre of labour troubles, some of them of a specially spectacular character. There were great strikes in the packing industry in 1886, 1894 and 1904. But more noteworthy are the railway strike of 1894 and the unsuccess- ful teamsters' strike of 1905. The former began in the works of the Pullman Car Company, and its leader was Eugene Victor Debs (b. 1855). When the contentions of the Pullman employees were taken up by the American Railway Union the strike immediately extended to tremendous proportions. Union men

5 There was an insurance of $88,634,122 on the losses, of which about a half was recovered. F. L. Olmsted estimated that one-third of the roof surface and one-half the cubic contents of the city's buildings were destroyed.

throughout the country refused to handle Pullman cars, and since Pullman cars are almost- invariably attached to mail trains the transportation of the United States mail was thus ob- structed. Chicago, as the greatest railwaycentre of the country and the home of the strike, was naturally the seat of the most serious complications. There was much rioting and destruction of property, and the railway service was completely disorganized. President Cleveland, on the ground of preventing obstruction of the mail service, and of protecting other federal interests, ordered a small number of federal troops to Chicago. Those interests were, he contended, menaced by " domestic violence " evidently beyond the control of the state power. Governor Altgeld denied the inability of the state to deal with the diffi- culty, and entered a strong protest against Federal interference; but he himself did nothing to put down the disorder. Federal troops entered the state, and almost immediately the strike collapsed. The high officials of the Railway Union, for ignoring a court injunction restraining them from interfering with the movement of the mails, were imprisoned for long terms for contempt of court.

Out of a strike in the McCormick works in 1886 there sprang another

famous incident in Chicago's history. The " inter- national " anarchists of Chicago had been organized in "groups " about two years earlier, and were very active. They were ad- vocating a " general strike " for an eight-hour day, and the tense excitement among the labourers of the city, owing to the McCormick strike, induced unusually ultra utterances. There was a riot at the McCormick works on the 3rd of May, in which several men were killed by the police. An anarchist meeting was called for the next day at the Haymarket, a square in Randolph Street, and when the authorities judged that the speeches were too revolutionary to be allowed to continue, the police undertook to disperse the meeting. A bomb was thrown, and many policemen were injured, seven fatally. No person could be proved to have thrown the bomb, or to have been directly implicated in its throwing; but on the ground that they were morally conspirators and accomplices in the killing, because they had repeatedly and publicly advocated such acts against the servants of government, seven anarchists were condemned to death. An application to the United States Supreme Court for a writ of error was unanimously refused. 1

The four-hundredth anniversary of the discovery of America was commemorated by a World's Columbian Exposition held at Chicago. The site was in Jackson Park and the adjoining Midway, and included 686 acres, of which 188 were covered by buildings. On the 21st of October 1892 — corresponding to the 1 2th of October 1492, o.s. — the grounds were formally dedicated, and on the following 1st of May opened to the public, continuing open for six months. The number of paid admissions was 21,500,000; of total admissions 27,539,521. The buildings, planned by a commission of architects — among whom John W. Root and Daniel H. Burnbam of Chicago were responsible for the general scheme — formed a collection of remarkable beauty, to which the grounds, planned by F. L. Olmsted, .intersected by lagoons and bordered by the lake, lent an appropriate setting. The entire cost of the fair is variously estimated at from ˆ to 43 million dollars, according to the inclusiveness of the estimate; the local cost may be put at $28,151,169. Of this Chicago gave about io| millions, in addition to a preparatory house-cleaning that cost si millions; and finally a very small dividend was paid to stockholders. The whole undertaking, carried through with remarkable enterprise, was an artistic and educational triumph of the first order.

Owing to its position Chicago has long been a favourite con-

1 Four were hanged, 1 committed suicide, 2 had their death sentence commuted to life-imprisonment, the eighth was sentenced to imprisonment for 15 years. 981 men were panelled in selecting the

jury. Governor J. P. Altgeld in 1893 pardoned the three in prison on the ground that the jury was ” packed ” and consequently incompetent, that no evidence connected the prisoners with the crime, and that the presiding judge was prejudiced. See an article by Judge J. E. Gary, who presided at the trial, in the Century Magazine (April 1893).

vention city. Lincoln (i860), Grant (1868), Garfield (1880), Cleveland (1884 and 1892), Harrison (1888), Roosevelt (1904), and Taft (1908) were all nominated here for president; and in addition not a few candidates who were unsuccessful. A national peace jubilee was held here in 1898.

Authorities. — See the annual reports of city officials, board of trade, park commissions, sanitary board, &c. ; A. T. Andreas, History of Chicago (Chicago, 3 vols., 1884-1886); R. Blanchard, Discovery and Conquest of the North- West with the History of Chicago (Chicago, 2 vols., 1898-1903) ; T. Kirkland, Story of Chicago (Chicago, 1892) ; issues of the Fergus Historical Series (1876, ff.) ; T. J. Riley, A Study of the Higher Ltfe of Chicago (Chicago University, doctoral dissertation, 1905) ; S. £. Sparling, Municipal History and Present Organization of the City of Chicago (University of Wisconsin, doctoral dissertation, Madison, 1898). Periodical literature contains a vast amount of information on Chicago’s progress and conditions that is elsewhere unobtainable; exact references may be obtained in Poole’s Index to Periodical Literature.

CHICAGO, UNIVERSITY OF, one of the great educational institutions of the United States, established under Baptist auspices in the city of Chicago, and opened in 1892. 2 Though the president and two-thirds of the trustees are always Baptists, the university is non-sectarian except as regards its divinity school. An immense ambition and the extraordinary organizing ability shown by its first president, William R. Harper, deter- mined and characterized the remarkable growth of the univer- sity’s first decade of activity. The grounds include about 140 acres. Of these about 60 acres — given in part by Marshall Field and laid out by Frederick Law Olmsted — border the Midway Plaisance, connecting Washington and Jackson parks. On these grounds the main part of the university stands. The buildings are mostly of grey limestone, in Gothic style, and grouped in quadrangles. The Mitchell tower is a shortened reproduction of Magdalen tower, Oxford, and the University Commons, Hutchinson Hall, is a duplicate of Christ Church hall, Oxford. Dormitories accommodate about a fifth of the students. The quadrangles include clubs, dining halls, dormitories, gym- nasiums, assembly halls, recitation halls,

laboratories and libraries. In the first college year, 1892-1893, there were 698 students; in that of 1907-1908 there were 5038, 3 of whom 2186 were women. There are faculties of arts, literature, science, divinity, 4 medicine (organized in 1901), law (1902), education, and commerce and administration. The astronomical depart- ment, the Yerkes Observatory, is located on William's Bay, Lake Geneva, Wisconsin, about 65 m. from Chicago. It has the largest refracting telescope in the world (clear aperture 40 in., focal length about 61 ft.). The Chicago Institute, founded and endowed by Mrs Anita McCormick Blaine as an independent normal school, became a part of the university in 1901. The school of education, as a whole, brings under university influence hundreds of children from kindergarten age upwards to young manhood and womanhood, apart from the university classes proper. Chicago was the second university of the country to give its pedagogical department such scope in the union of theory and practice. The nucleus of the library (450,000 volumes in 1908) was purchased in Berlin soon after the univer- sity's organization, in one great collection of 175,000 volumes. Scholarly research has been fostered in eveiy possible way, and the university press has been active in the publication of various departmental series and the following periodicals: — Biblical World, American Journal of Theology, American Journal of Semitic Languages and Literatures, American Journal of Sociology, Journal of Political Economy, Modern Philology, Classical Philology, Classical Journal, Journal of Geology, Astrophysical Journal, Botanical Gazette, Elementary School Teacher and School Review. The courses in the College of Commerce and

2 A small Baptist college of the same name — established in 1855 on land given by S. A. Douglas — went out of existence in 1886.

3 If, however, the total is reckoned on the basis of nine months of residence the figure for 1907-1908 would be 3202.

4 The Divinity School has a graduate department and three under graduate departments, doing work in English, in Danish and Nor- wegian, and in Swedish. Allied with the Divinity School of the University is the " Disciples' Divinity House " (1894), a theological school of the Disciples of Christ.

Administration link the university closely with practical life. In extension work the university has been active from the beginning,

instruction being given not only by lectures but by correspondence (a novel and unique feature among American universities); in the decade 1892-1902, 1715 persons were prepared by the latter method for matriculation in the university (11 -6% of the total number of matriculants in the decade). Extension lectures were given in twenty-two states. At Chicago the work of the university is continuous throughout the year: the ” summer quarter ” is not as in other American schools a supplement to the teaching year, but an integral part; and it attracts the teachers of the middle western states and of the south. In the work of the first two years, known together as the Junior College, men and women are in the main given separate instruction; but in the Senior College years unrestricted co- education prevails. Students are mainly controlled by self- government in small groups (” the house system “). Relations with ” affiliated ” (private) colleges and academies and ” co- operating ” (public) high-schools also present interesting features.

The value of the property of the university in 1908 was about $25,578,000. Up to the 30th of June 1908 it had received from gifts actually paid $29,651,849, of which $22,712,631 were given by John D. Rockefeller. 1 The value of buildings in 1908 was $4,508,202, of grounds $4,406,191, and of productive funds $14,186,235. Upon the death of President Harper, Harry Pratt Judson (b. 1849), then head professor of political science and dean of the faculties of arts, became acting president, and on the 20th of January 1907 he was elected president.

See the Decennial Publications of the University (since 1903), especially vol. i. for details of history and administration.

CHICANE, the pettifogging subterfuge and delay of sharp law-practitioners, also any deliberate attempt to gain unfair advantage by petty tricks. A more common English form of the word is ” chicanery.” ” Chicane ” is technically used also as a term in the game of bridge for the points a player may score if he holds no trumps. The word is French, derived either from chaugan, Persian for the stick used in the game of ” polo,” still played on foot and called chicane in Languedoc (the military use of chicaner, to take advantage of slight variations in ground,, suits this derivation), or from chic, meaning little or petty, from the Spanish chico, small, which appears in the phrase “chic a chic,” little by little.

CHICHELEY, HENRY (1364-1443), English archbishop, founder of All Souls College, Oxford, was born at Higham Ferrers, Northamptonshire, in 1363 or 1364. Chicheley told the pope in 1443, in asking leave to

retire from the archbishopric, that he was in his eightieth year. He was the third and youngest son of Thomas Chicheley, who appears in 1368 in still extant town records of Higham Ferrers as a suitor in the mayor's court, and in 1381-1382, and again in 1384-1385, was mayor: in fact, for a dozen years he and Henry Barton, school master of Higham Ferrers grammar school, and one Richard Brabazon, filled the mayoralty in turns. His occupation does not appear; but his eldest son, William, is on the earliest extant list (1373) of the Grocers' Company, London. On the 9th of June 1405 Chicheley was admitted, in succession to his father, to a burgage in Higham Ferrers. His mother, Agnes Pincheon, is said to have been of gentle birth. There is therefore no foundation in fact for the silly story (copied into the Diet. Nat. Biog. from a local historian,

J The words "founded by John D. Rockefeller" follow the title of the university on all its letterheads and official documents. Mr Rockefeller would not allow his name to be a part of the title, nor has he permitted the designation of any building by his name. President Harper was selected by him to organize the university, and it was his will that the president and two-thirds of the trustees should be " always " Baptists. President Harper more than once stated most categorically that contrary to prevalent beliefs no donor of funds to the university " has ever (1902) by a single word or act indicated his dissatisfaction with «he instruction given to students in the university, or with the public expression of opinion made by any officer of the university "; and certainly so far as the public press reveals, no other university of the country has had so many professors who have in various lines, including economics; expressed radical views in public.

J. Cole, Wellingborough, 1838) that Henry Chicheley was picked up by William of Wykeham when he was a poor ploughboy " eating his scanty meal off his mother's lap," whatever that means. The story was unknown to Arthur Duck, fellow of All Souls, who wrote Chicheley's life in 1617. It is only the usual attempt, as in the cases of Whittington, Wolsey and Gresham, to exaggerate the rise of a successful man. The first recorded appearance of Henry Chicheley himself is at New College, Oxford, as Checheley, eighth among the undergraduate fellows, in July 1387, in the earliest extant hall-book, which contains weekly lists of those dining in Hall. It is clear from Chicheley's position in the list, with eleven fellows and eight scholars, or probationer- fellows, below him, that this entry does not mark his first appear- ance in the college, which had been going on since 1375 at least, and was chartered in 1379. He roust have come from Winchester College in one of the earliest batches of scholars from that college, the sole feeder of New College, not from St John Baptist

College, Winchester, as guessed by Dr William Hunt in the Diet. Nat. Biog. (and repeated in Mr Grant Robertson's History of All Souls College) to cover the mistaken supposition that St Mary's College was not founded till 1393. St Mary's College was in fact formally founded in 1382, and the school had been going on since 1373 (A. F. Leach, History of Winchester College), while no such college as St John's College at Winchester ever existed.

Chicheley appears in the, Hall-books of New College up to the year 1392/93, when he was a B.A. and was absent for ten weeks from about the 6th of December to the 6th of March, presumably for the purpose of his ordination as a sub-deacon, which was performed by the bishop of Derry, acting as suffragan to the bishop of London. He was then already beneficed, receiving a royal ratification of his estate as parson of Llanvarchell in the diocese of St Asaph on the 20th of March 1391/92 (Col. Pat. Rolls). In the Hall-book, marked 1393/94, but really for 1394/95, Chicheley's name does not appear. He had then left Oxford and gone up to London to practise as an advocate in the prin- cipal ecclesiastical court, the court of arches. His rise was rapid. Already on the 8th of February 1395/96 he was, on a commission with several knights and clerks to hear an appeal in a case of John Molton, Esquire v. John Shawe, citizen of London, from Sir John Cheyneˆkt., sitting for the constable of England in a court of chivalry. Like other ecclesiastical lawyers and civil servants of the day; he was paid with ecclesiastical preferments. On the 13th of April 1396 he obtained ratification of the parson- age of St Stephen's, Walbrook, presented on the 30th of March by the abbot, of Colchester, no doubt through his brother Robert, who restored the church and increased its endowment. In 1397 he was made archdeacon of Dorset by Richard Mitford, bishop of Salisbury, but litigation was still going on about it in the papal court till the 27th of June 1399, when the pope extinguished the suit, imposing perpetual silence on Nicholas Bubwith, master of the rolls, his opponent. In the first year of Henry IV. Chicheley was parson of Sherston, Wiltshire, and prebendary of Nantgwyly in the college of Abergwilly, North Wales; on the 23rd of Feb- ruary 1401/2, now called doctor of laws, he was pardoned for bringing in, and allowed to use, a bull of the pope " providing " him to the chancellorship of Salisbury cathedral, and canon- ries in the nuns' churches of Shaftesbury and Wilton in that diocese; and on the 9th of January 1402/3 he was archdeacon of Salisbury. This year his brother Robert was senior sheriff of London. On the 7th of May 1404, Pope Boniface IX. provided him to a prebend at Lincoln, notwithstanding he already held prebends at Salisbury, Lichfield, St Martin's-le-Grand and ■ Abergwyly, and the living of Brington. On

the 9th of January 1405 he found time to attend a court at Higham Ferrers and be admitted to a burgage there. In July 1405 Chicheley began a diplomatic career by a mission to the new Roman pope Innocent VII., who was professing his desire to end the schism in the papacy by resignation, if his French rival at Avignon would do likewise. Next year, on the 5th of October 1406, he was sent with Sir John Cheyne to Paris to arrange a lasting peace and the marriage of Prince Henry with the French princess Marie, which was frustrated by her becoming a nun at Poissy next year.

In 1406 renewed efforts were made to stop the schism, and Chicheley was one of the envoys sent to the new pope Gregory XII. Here he utilized his opportunities. On the 3 1st of August 1407 Guy Mone (he is always so spelt and not Mohun, and was probably from one of the Hampshire Meons; there was a John Mone of Havant admitted a Winchester scholar in 1397), bishop of St David's, died, and on the 12th of October 1407 Chicheley was by the pope provided to the bishopric of St David's. Another bull the same day gave him the right to hold all his benefices with the bishopric.

At Siena in July 1408 he and Sir John Cheyne, as English envoys, were received by Gregory XII. with special honour, and Bishop Repingdon of Lincoln, ex-Wycliffite, was one of the new batch of cardinals created on the 18th of September 1408, most of Gregory's cardinals having deserted him. These, together with Benedict's revolting cardinals, summoned a general council at Pisa. In November 1408 Chicheley was back at Westminster, when Henry IV. received the cardinal archbishop of Bordeaux and determined to support the cardinals at Pisa against both popes. In January 1409 Chicheley was named with Bishop Hallum of Salisbury and the prior of Canterbury to represent the Southern Convocation at the council, which opened on the 25th of March 1409, arriving on the 24th of April. Obedience was withdrawn from both the existing popes, and on the 26th of June a new pope elected instead of them. Chicheley and the other envoys were received on their return as saviours of .the world; though the result was summed up by a contemporary as trischism instead of schism, and the Church as giving three husbands instead of two. Chicheley now became the subject of a leading case, the court of king's bench deciding, after arguments reheard in three successive terms, that he could not hold his previous benefices with the bishopric, and that, spite of the maxim Papa potest omnia, a papal

bull could not supersede the law of the land (Year-book ii. H. iv. 37, 59, 79). Accordingly he had to resign livings and canonries wholesale (April 28, 1410). As, however, he had obtained a bull (August 20,: 1409) enabling him to appoint his successors to the vacated preferments, including his nephew William, though still an undergraduate and not in orders, to the chancellorship of Salisbury, and a prebend at Lichfield, he did not go empty away. In May 1410 he went again on an embassy to France; on the nth of September 1411 he headed a mission to discuss Henry V.‘s marriage with a daughter of the duke of Burgundy; and he was again there in November. In the interval Chicheley found time to visit his diocese for the first time and be enthroned at St David’s on the nth of May 141 1. He was with the English force under the earl of Arundel which accompanied the duke of Burgundy to Paris in October 141 1 and there defeated the Armagnacs, an exploit which revealed to England the weakness of the French. On the 30th of November 1411 Chicheley, with two other bishops and three earls and the prince of Wales, knelt to the king to receive public thanks for their administration. That he was in high favour with Henry V. is shown by his being sent with the earl of Warwick to France in July 1413 to conclude peace. Immediately after the death of archbishop Arundel he was nominated by the king to the archbishopric, elected on the 4th of March, translated by papal bull on the 28th of April, and received the pall without going to Rome for it on the 24th of July.

These dates are important as they help to save Chicheley from the charge, versified by Shakespeare {Henry V. act i. sc. 2) from Hall’s Chronicle, of having tempted Henry V. into the conquest of France for the sake of diverting parliament from the disendowment of the Church. There is no contemporary authority for the charge .which seems to appear first in Redman’s rhetorical history of Henry V., written in 1540 with an eye to the political situation at that time. As a matter of fact, the parliament at Leicester, in which the speeches were supposed to have been made, began on the 30th of April 1414 before Chicheley was archbishop. The rolls of parliament show that he wa;, not present in the parliament at all. Moreover parliament was so tai f.‘Qm pressing disendowment that on the petition of

the Commons It passed a savage act against the heresies ” com- monly called Lollardry ” which ” aimed at the destruction of the king and all temporal estates,” making Lollards felons and ordering every justice of the peace to hunt down their schools, conventicles, congregations and confederacies. •

In his capacity of archbishop, Chicheley remained what he had always

been chiefly, the lawyer and diplomatist. He was present at the siege of Rouen, and the king committed to him personally the negotiations for- the surrender of the city in January 1419 and for the marriage of Katherine. He crowned Katherine at Westminster (20thvFebruary 1421), and on the 6th of December baptized her child Henry VI. He was of course a persecutor of heretics. No one could have attained or kept the position of archbishop at the time without being so. So he presided at the trial of John Claydon, Skinner and citizen of London, who after five years' imprisqnment at various times had made 1 public abjuration before the late archbishop, Arundel, but now was found in possession of a book in English called The Lanterne of Light, which contained the heinous heresy that the principal cause of the persecution of Christians was the illegal retention by priests of the goods of this world, and that archbishops and bishops were the special seats of antichrist * As a relapsed heretic, he was "left to the secular arm" by Chicheley. On the 1st of July 14 16 Chicheley directed a half-yearly inquisition by archdeacons to hunt out heretics. On the 1 2th of February 1420 proceedings were begun before him against William Taylor, priest, who had been for fourteen years excommunicated for heresy, and was now degraded and burnt for saying that prayers ought not to be addressed to saints, but only to God. A striking contrast was exhibited in October 1424, when, a Stamford friar, John Russell, who had preached that any religious potest concumbere cum muliere and not mortally sin, was sentenced only to retract his doctrine. Further persecu- tions of a whole batch of Lollards took place in 1428. The records of convocation in Chicheley's time are a curious mixture of persecutions for heresy, which largely consisted in attacks on clerical endowments, with negotiations with the ministers of the crown for the object of cutting down to the lowest level the clerical contributions to the public revenues in respect of their endowments. Chicheley was tenacious of the privileges of his see, and this involved him in a constant struggle with Henry Beaufort, bishop of Winchester. In 1418, while Henry V. was alive, he successfully protested against Beaufort's being made a cardinal and legate a Mere to supersede the legatine jurisdiction of Canterbury. But during the regency, after Henry VI. 's accession, Beaufort was successful, and in 1426 became cardinal and legate. This brought Chicheley into collision with Martin V. The struggle between them has been represented as one of a patriotic archbishop resisting the encroachments of the papacy on the Church of England. In point of fact it was almost wholly personal, and was rather an incident in the rivalry between the duke of Gloucester and his half-brother, Cardinal Beaufort, than one involving any principle. Chicheley, by appointing a jubilee to be held at Canterbury in 1420, " after the manner of the Jubilee ordained by the Popes," threatened to

divert the profits from pilgrims from Rome to Canterbury. A ferocious letter from the pope to the papal nuncios, on the 19th of March 1423, denounced the proceeding as calculated ” to en- snare simple souls and extort from them a profane reward, thereby setting up themselves against the apostolic see and the Roman pontiff, to whom alone so great a faculty has been granted by God ” (Cal. Pap. Reg. vii. 12). Chicheley also incurred the papal wrath by opposing the system of papal provision which diverted patronage from English to Italian hands, but the immediate occasion was to prevent the introduction of the bulls making Beaufort a cardinal. Chicheley had been careful enough to obtain ” Papal provisions ” for himself, his pluralities, his bishopric and archbishopric.

But, after all, it is not as archbishop or statesman, persecutor, papalist or antipapalist that Chicheley is remembered, but for his educational foundations. He endowed a hutch, i.e. chest or loan-fund for poor scholars at New College, and another for the

university of Oxford at large. He founded no less than three colleges, two at Oxford, one at Higham Ferrers, while there is reason to believe that he suggested and inspired the foundation of Eton and of King’s College. His first college at Oxford, in perishing, gave birth to St John’s College, which now holds its site. This was St Bernard’s College, founded by Chicheley under licence in mortmain in 1437 for Cistercian monks, on the model of Gloucester Hall and Durham College for the southern and northern Benedictines. Nothing more than a site and building was required by way of endowment, as the young monks, who were sent there to study under a provisor, were supported by the houses of the order to which they belonged. The site was five acres, and the building is described in the letters patent ” as a fitting and noble college mansion in honour of the most glorious Virgin Mary and St Bernard in Northgates Street outside the Northgate of Oxford.” It was suppressed with the Cistercian abbeys in 1539, and granted on the nth of December 1546 to Christ Church, Oxford, who sold it to Sir Thomas Pope in 1553 for St John’s College.

The college at Higham Ferrers was a much earlier design. On the 2nd of May 1422 Henry V., in right of the duchy of Lancaster, ” hearing that Chicheley inflamed by the pious fervour of devotion intended to enlarge divine service and other works of piety at Higham Ferrers, in consideration of his fruitful services, often crossing the seas, yielding

to no toils, dangers or expenses '. . . especially in the conclusion of the present final peace with our dearest father the king of France," granted for 300 marks (£200) licence to found, on three acres at Higham Ferrers, a perpetual college of eight chaplains and four clerks, of whom one was to teach grammar and the other song … and six choristers to pray for himself and wife and for Henry IV. and his wife Mary . . . and to acquire the alien priory of Merseye in Essex late belonging to St Ouen's, Rouen," as endow- ment. A papal bull having also been obtained, on the 28th of August 1425, the archbishop, in the course of a visitation of Lincoln diocese, executed his letters patent founding the college, dedicating it to the Virgin, St Thomas a. Becket and St Edward the Confessor, and handed over the buildings to its members, the vicar of Higham Ferrers being made the first master or warden. He further endowed it in 1434 with lands in Bedfordshire and Huntingdonshire, and his brothers, William and Robert, gave some houses in London in 1427 and 1438. The foundation was closely modelled on Winchester College, with its warden and fellows, its grammar and song schoolmasters, but a step in advance was made by the masters being made fellows and so members of the governing body. Attached was also a bede or almshouse for twelve poor men. Both school and almshouse had existed before, and this was merely an additional endowment. The whole endowment was in 1535 worth some £200 a year, about a fifth of that of Winchester College. Unfortunately, All Souls being a later foundation, the college at Higham Ferrers was not affiliated to it, and so fell with other colleges not part of the universities. On the 18th of July 1542 it was surrendered to Henry VIII., and its possessions granted to Robert Dacres on condition of maintaining the grammar school and paying the master £10 a year, the same salary as the headmasters of Winchester and Eton, and maintaining the almshouse. Both still exist, but the school has been deprived of its house, and the Fitzwilliam family, who now own the lands, still continue to pay only £10 a year.

All Souls College was considerably later. The patent for it, dated 20th of May 1438, is for a warden and 20 scholars, to be called " the Warden and College of the souls of all the faithful departed," to study and pray " for the soul of King Henry VI. and the souls of Henry V., Thomas, duke of Clarence, and all the dukes, earls, barons, knights, squires and other nobles and subjects of our father who during the time and in the service of our father and ourselves ended their lives in the wars of the kingdom of France, and for the souls of all the faithful departed." For this, the king granted Berford's Hall, formerly Charleston's Inn, which Chicheley's trustees had granted to him so as to obtain a royal grant and indefeasible title. Richard Andrews,

the king's secretary, like Chicheley himself a scholar of Win Chester and fellow of New College, was named as first warden. A papal bull for the college was obtained on the 21st of June 1439; and further patents for endowments from the nth of May 1441 to the 28th of January 1443, when a general confirma- tion charter was obtained, for which £1000 (£30,000 at least of our money) was paid. It is commonly represented that the endowment was wholly derived from alien priories bought by Chicheley from the crown. In truth, not so large a proportion of the endowment of All Souls was derived from this source as was that of New College. The only alien priories gran ' ed were Abberbury in Oxfordshire, Wedon Pinkney in Northampton- shire, Romney in Kent, and St Clare and Llangenith in Wales, all very small affairs, single manors and rectories, and these did not form a quarter of the whole endowment. The rest, particularly the manor of Edgware, which made the fortune of the college, was bought from private owners. Early in 1443 the college was opened by Chicheley with four bishops in state. The statutes, not drawn up untii the 2nd of April 1443, raised the number of the college to forty. Like the college buildings, they are almost an exact copy of those of New College, mutatis mutandis. The college is sometimes described as being different from other colleges in being merely a large chantry to pray for the souls of the dead warriors. But it was no more a chantry than the other colleges, all of which, like the monasteries and collegiate churches, were to pray for their founders' and other specified souls. Indeed, All Souls was more of a lay foundation than its model. For while at New College only twenty out of seventy fellows were to study law instead of arts, philosophy and theology, at All Souls College sixteen were to be " jurists " and only twenty-four " artists "; and while at New College there were ten chaplains and three clerks necessarily, at All Souls the number was not defined but left optional; so that there are now only one chaplain and four bible clerks.

Ten days after he sealed the statutes, on the 12 th of April 1443, Chicheley died and was buried in Canterbury cathedral on the north side of the choir, under a fine effigy of himself erected in his lifetime. There is what looks like an excellent contemporary portrait in one of the windows of All Souls College, which is figured in the Victoria County History for Hampshire, ii. 262. , (A. F. L.)

CHICHEN-ITZA, or Chichen, an ancient ruined city of Yucatan, Mexico, situated 22 nr. W. of Valladolid. The name is derived, from that of the Itza, a tribe of the great Mayan stock, which formerly inhabited the city, and chichen, having reference probably to two wells or pools which doubtless origin- ally supplied the inhabitants with water and are still in existence. The history of the city is

unknown, though it is regarded as prob- able that it preserved its independence long after the Spaniards had taken possession of the rest of the district. The area covered by the ruins is approximately 1 sq. m., and other remains are found in the neighbouring forest. (See Central America: Archaeology.)

CHICHESTER OF BELFAST, ARTHUR CHICHESTER, Baron (1563-1625), lord-deputy of Ireland, second son of Sir John Chichester of Raleigh, Devonshire, by Gertrude, daughter of Sir William Courtenay of Powderham, was born at Raleigh in May 1563, and was educated at Exeter College, Oxford. He commanded a ship against the Spanish Armada in 1588, and is said to have served under Drake in his expedition of 1595. Having seen further service abroad, he was sent to Ireland at the end of 1598, and was appointed by the earl of Essex to the governorship of Carrickfergus. When Essex returned to England, Chichester rendered valuable service under Mountjoy in the war against the rebellious earl of Tyrone, and in 1601 Mountjoy recommended him to Cecil in terms of the highest praise as the fittest person to be entrusted with the government of Ulster. On the 15th of October 1604 Chichester was appointed lord- deputy of Ireland He announced his policy in a proclamation wherein he abolished the semi-feudal rights of the native Irish chieftains, substituting for them fixed dues, while their tenants were to become dependent ” wholly and immediately upon his

majesty.” Tyrone and other Irish dan chieftains resented this summary interference with their ancient social organization, and their resistance was strengthened by the ill-advised measures against the Roman Catholics which Chichester was compelled to take by the orders of the English ministers. He himself was moderate and enlightened in his views on this matter, and it was through his influence that the harshness of the anti-Catholic policy was relaxed in 1607. Meantime his difficulties with the Irish tribal leaders remained unsolved. But in 1607, by ” the flight of the Earls ” (see O’Neill), he was relieved of the presence of the two formidable Ulster chieftains, the earls of Tyrone and Tyrconnell. Chichester’s policy for dealing with the situation thus created was to divide the lands of the fugitive earls among Irishmen of standing and character; but the plantation of Ulster as actually carried out was much less favourable and just to the native population than the lord-deputy desired. In 1613 Chichester was raised to the peerage as Baron Chichester of Belfast, and in the following year he went to

England to give an account of the state of Ireland. On his return to Ireland he again attempted to moderate the persecuting policy against the Irish Catholics which he was instructed to enforce; and although he was to some extent successful, it was probably owing to his opposition to this policy that he was recalled in November 1614. The king, however, told him ” You may rest assured that you do leave that place with our very good grace and acceptation of your services “; and he was given the post of lord-treasurer of Ireland. After living in retirement for some years, Chichester was employed abroad in 1622; in the following year he became a member of the privy council. He died on the 19th of February 1625 and was buried at Carrickfergus.

Lord Chichester married Lettice, daughter of Sir John Perrot and widow of Walter Vaughan of Golden Grove. He had no children, and his title became extinct at his death. The heir to his estates was his brother Sir Edward Chichester (d. 1648), governor of Carrickfergus, who in 1625 was created Baron Chichester of Belfast and Viscount Chichester of Carrickfergus. This nobleman’s eldest son Arthur(i6oo-i675),who distinguished himself as Colonel Chichester in the suppression of the rebellion of 1641, was created earl of Donegall in 1647, and was succeeded in his titles by his nephew, whose great-grandson, Arthur, 5th earl of Donegall, was created Baron Fisherwick in the peerage of Great Britain (the other family titles being in the peerage of Ireland) in 1790, and earl of Belfast and marquess of Donegall in the peerage of Ireland in 1791. The present marquess of Donegall is his descendant.

See S. R. Gardiner in Did. Nat. Biog. and History of England, 1603-1642 (London, 1 883); Fynes Moryson, History of Ireland. 1599-1603 (Dublin, 1735). (R. J. M.)

CHICHESTER, a city and municipal borough in the Chichester parliamentary division of Sussex, England, 69 m. S.S.W. from London by the London, Brighton & South Coast railway. Pop. (1901) 12,224. It lies in a plain at the foot of a spur of the South Downs, a mile from the head of Chichester Harbour, an inlet of the English Channel. The cathedral church of the Holy Trinity was founded towards the close of the nth century, after the see had been removed to Chichester from Selsey in 1075. The first church was consecrated in 1108, but fires in n 14 and 1187 caused building to continue steadily until the close of the 13th century. Bishop Ralph Luffa (1091-1123) was the first great builder, and was followed by Seffrid II. (1 180-1204). Norman work appears in the nave (arcade and triforium) , choir (arcade) and elsewhere; but there is much very beautiful Early English work, the choir above the arcade and the eastern part being especially fine. The

nave is remarkable in having double aisles on each side, the outer pair being of the 13th century. The church is also unique among English cathedrals in the possession of a detached campanile, a massive and beautiful Perpendicular structure with the top storey octagonal. The principal modern restorations are the upper part of the north- west tower, which copies the Early English work of that on the south-west; and the fine central tower and spire, which had been erected at different periods in the 14th century, but col-

lapsed, doing little damage to the fabric, in 1861. Under the direction of Sir Gilbert Scott and others they were reconstructed with scrupulous care in preserving the original plan. The Lady chapel at the east end is in the main early Decorated, but greatly restored; the library is a fine late Norman vaulted room; the cloisters are Perpendicular and well restored; and the bishop's palace retains an Early English chapel. The cathedral is 393 ft. long within, 131 ft. across the transepts, and 90 ft. across the nave with its double aisles. The height of the spire is 277 ft.

At the junction of the four main streets of the town stands the market cross, an exquisite octagonal structure in ornate Perpendicular style, built by Bishop Story, c. 1500, perhaps the finest of its kind in the United Kingdom. The hospital of St Mary was founded in the 1 2th century, but the existing buildings are in a style transitional from Early English to Decorated. Its use as an almshouse is maintained. Other ancient buildings are the churches of St Olave, in the construction of which Roman materials were used; and of St Andrew, where is the tomb of the poet William Collins, whose memorial with others by the sculptor Flaxman is in the cathedral; the Guildhall, formerly a Grey Friars' chapel, of the 13th century; the Canon Gate leading into' the cathedral close; and the Vicars College. The city retains a great part of its ancient walls, which have a circuit of about a mile and a half, and, at least in part, follow the line of Roman fortifications. The principal modern buildings, besides churches and chapels, are the council house, corn exchange, market house, and museum of the Chichester Literary Society. The grammar school was founded in 1497 by Bishop Story. There is a large cattle market, and the town has a con- siderable agricultural trade, with breweries and tanneries. A canal connects with Chichester Harbour. The diocese includes the whole county of Sussex except a few parishes, with very small portions of Kent and Surrey. The municipal borough is under a mayor, six aldermen and eighteen councillors. Area, 1538 acres.

The Romano-British town on this site was perhaps Regnum or Regni. Many inscriptions, pottery, coins, &c, have been found, and part of the medieval walls contain a Roman cave. An interesting inscription from this site is preserved at Goodwood. Situated on one Roman road in direct connexion with London and another leading from east to west, Chichester (Cissaceaster, ■Cicestre) remained of considerable importance under the South Saxon kings. In 967 King Edgar established a mint here. Though Domesday Book speaks of one hundred and forty-two burgages in Chichester and a charter of Henry T. mentions the borough, the earliest extant charter is that granted by Stephen, confirming to the burgesses their customs and rights of the borough and gild merchant as they had them in the time of his grandfather. This was confirmed by Henry LL. Under Henry LLL. the fee farm rent was £38: 10s., but this was reduced by a charter of 10 Edward II; to £36, the customs of wool, hides and skins being reserved to the king. Edward III. directed that the Sussex county court should be held at Chichester, and this was confirmed in the following year. Confirmations of the previous charters were also granted by Edward III., Richard II., Henry VI., Edward IV., and Henry VIL, who gave the mayor and citizens cognizance of all kinds of pleas of assize touching lands and hereditaments of freehold tenure. A court leet, court of record and bailiffs' court of liberties still exist. The charters were also confirmed by Henry VIII. , Edward VI. , Philip and Mary, and Elizabeth. In 1604 the city was incorporated under a mayor and aldermen. Since 1295, when it first returned a member, Chichester has been regularly represented in parliament. Throughout the middle ages Chichester was a place of great commercial importance, Edward III. establishing a wool staple here in 1348. Fairs were granted by Henry I. and Henry VII. Fuller mentions the Wednesday market as being famous for corn, while Camden speaks of that on Saturday as the greatest for fish in the county. The markets and a fair on the 20th of October are still held.

Soo Victoria County History, Sussex; Alexander Hay, History 0) Chichester (Chichester, 1804).

CHICKAMAUGA CREEK, a small tributary of the Tennessee river, which it joins near Chattanooga, Tennessee, U.S.A. It gives its name to the great battle of Chickamauga in the American Civil War, fought on the io-2oth of September 1863, between the Federal army of the Cumberland under Major-General W. S. Rosecrans and the

Confederate army under General Braxton Bragg. For the general operations of Rosecrans' army in 1863 see American Civil War. A successful war of manoeuvre had brought the army of the Cumberland from Murfreesboro to Decherd, Tenn., and Bragg's army lay on the Tennessee at and above Chattanooga. Rosecrans was expected by the enemy to manoeuvre so as to gain touch with the Union forces in the upper Tennessee valley, but he formed an entirely different plan of operations. One part of the army demonstrated in front of Chattanooga, and the main body secretly crossed the river about Stevenson and Bridgeport (September 4th). The country was mountainous, the roads few and poor, and the Federals had to take full supplies of food, forage and ammunition with them, but Rosecrans was an able commander, his troops were in good hands, and he accepted the risks involved. These were intensified by the want of good maps, and, in the event, at one moment the army was placed in a position of great danger. A corps under A. McD. McCook moved south-eastward across the ridges to Alpine, another under Thomas marched via Trenton on McLemore's

CHICKAMAUGA

English Miles o 3 4 6 S

Contours' at intervals of $00 ft. '-.' ffonc/s . . " '

Railways

EmcryWallur K-

Cove. The presence of Federal masses in Lookout Valley caused Bragg to abandon Chattanooga at once, and the object of the manoeuvre was thus accomplished; but owing to the want of good maps the Union army was at the same time exposed to great danger. The head of Thomas's column was engaged at Dug Gap, on the nth, against the flank guard of Bragg's army, and at the time McCook was far away to the south, and Critten- den's corps, which had occupied Chattanooga on the 9th, was also at a distance. Thomas was isolated, but Rosecrans, like every other commander under whom he served, placed un- bounded confidence in his tenacity, and if Bragg was wrong in neglecting to attack him on the 14th, subsequent events went far to disarm criticism. By the 18th of September Rosecrans had at last collected his army on Chickamauga Creek covering Chat- tanooga. But Bragg had now received heavy reinforcements, and lay, concentrated for battle, on the other side of the Creek. The terrain of the battle of Chickamauga (19th- 20th of September) had little influence on its

course. Both armies lay in the plain, the two lines roughly parallel. Bragg's intention was to force his attack home on Rosecrans' left wing, thus cutting him off from Chattanooga and throwing him back into the mountain country whence he had come. On the 19th a serious action took place between the Confederate right and Rosecrans' left under Thomas. On the 20th the real battle began. The Confederates, in accordance with Bragg's plans, pressed hard upon Thomas, to whom Rosecrans sent reinforcements. One of the divisions detached from the centre for this purpose was by inadvertence taken out of the first line, and before the gap

could be filled the Confederate central attack, led by Longstreet and Hood, the fighting generals of Lee's army, and carried out by veteran troops from the Virginian battlefields, cut the Federal army in two. McCook's army corps, isolated on the Federal right, was speedily routed, and the centre shared its fate. Rose- crans himself was swept off the field in the rout of half of his army. But Thomas was unshaken. He re-formed the left wing in a semicircle, and aided by a few fresh brigades from Rossville, resisted for six hours the efforts of the whole Confederate army. Rosecrans in the meantime was rallying the fugitives far to the rear near Chattanooga itself. The fury of Bragg's assault spent itself uselessly on the heroic divisions under Thomas, who remained on the field till night and then withdrew in good order to Rossville. Here he remained on the 21st, imposing respect upon the victors. On the 22nd Rosecrans had re-established order, and Thomas fell back quietly to Chattanooga, whither Bragg slowly pursued. For the subsequent events of the campaign see Chattanooga. The losses in the battle bear witness to a severity in the fighting unusual even in the American Civil War. Of 70,000 Confederates engaged at least 18,000 were killed and wounded, and the Federals lost 16,000 out of about 57,000. The battlefield has been converted into a national park, and was used during the Spanish American War (1898) as a place of mobilization for the U.S. volunteers.

CHICKASAWS, a tribe of North American Indians of Musk- hogean stock, now settled in the western part of Oklahoma. Their former range was northern Mississippi and portions of Tennessee. According to their own tradition and the evidence of philology, they are closely connected with the Creeks and Choctaws; and they believe that they emigrated with these tribes from the west, crossed the Mississippi, and settled in the district that now forms the north-east part of the state of that name. Here they were visited by De Soto in 1540. From the first they were hostile to the French colonists. With the English, on the other hand, their relations were more satisfactory. In 1786 they made a treaty with the United States; and in 1793 they assisted the whites in

their operations against the Creeks. In the early years of the 19th century part of their territory was ceded for certain annuities, and a portion of the tribe migrated to Arkansas; and in 1832-1834, the remainder, amounting to about 3600, surrendered to the United States the 6,442,400 acres of which they were still possessed, and entered into a treaty with the Choctaws for incorporation with that tribe; In 1855, however, they effected a separation of this union, with which they had soon grown dissatisfied, and by payment to the Choctaws of $150,000 obtained a complete right to their present territory. In the Civil War they joined the Confederates and suffered in consequence; but their rights were restored by the treaty of 1865. In 1866 they surrendered 7,000,000 acres; and in 1873 they adopted their former slaves. They had an independent government consisting of a governor, a senate, and a house of representatives; but tribal government virtually ceased in 1906. The Chickasaws of pure or mixed blood numbered 4826 in 1900, and with the fully admitted ” citizens,” i.e. the freed slaves and adopted whites, the whole nation amounted to some 10,000.

See Handbook of American Indians (Washington, 1907). CHICKASHA, a city and the county-seat of Grady county, Oklahoma, U. S. A., near the Washita river, about 45 m. S. S. W. of Oklahoma city. Pop. (1900) 3209; (1907) 7862, including 1643 negroes; (1910) 10,320. Chickasha is served by the St Louis & San Francisco, the Chicago, Rock Island & Pacific and the Oklahoma Central railways. It is the trade centre of a very fertile section of the Washita Valley, whose principal products are Indian corn, cotton, fruits and vegetables and live-stock. The city has various manufactures, including flour, cotton-seed oil, lumber, furniture and farm implements. Chickasha was founded in 1892 and was chartered as a city in 1899.

CHICKEN-POX (Syn, varicella, a Low Latin diminutive of variola), a specific contagious disease characterized by an eruption of vesicles in the skin. The disease usually occurs in epidemics, and is one of childhood, the patients being generally

between two and six years old. The incubation period is from ten to fifteen days; there are practically no prodromal symptoms, the only indication being a slight amount of fever for some twenty- four hours, after which the eruption makes its appearance. A number of raised red papules appear on the trunk, either on the back or chest; in from

twelve to twenty-four hours these develop into tense vesicles filled with a clear fluid, which in another thirty-six hours or so becomes opalescent. During the fourth day these vesicles dry and shrivel up, and the scabs fall off, leaving as a rule no scar. Fresh spots appear during the first three days, so that at the end of that time they can be seen in all stages of growth and decay. The eruption is most marked on the chest, but it also occurs on the face and limbs, and on the mucous membrane of the mouth and palate. The temperature begins to fall after the appearance of the rash, but a certain slight amount may persist after the disappearance of all symptoms. It rarely rises above 102 F. The disease runs a very favourable course in the majority of cases, and after effects are rare. One attack does not confer immunity, and in numerous cases one individual has had three attacks. The diet should be light, and the patient should be prevented from scratching the spots, which would lead to ulceration and scarring. After the first few days there is no necessity to confine the patient to bed. In the large majority of cases, it is easy to distinguish the disease from smallpox, but in certain patients it is very difficult. The chief points in the differential diagnosis are as follows. (1) In chicken-pox the rash is distributed chiefly on the trunk, and less on the limbs. (2) Some of the vesicles are oval, whereas in smallpox they are always hemispherical. They are also more superficial, and have not at the outset the hard shotty feeling of the more virulent disease. (3) The vesicles attain their full growth within twelve to twenty-four hours. (4) The pustules are usually monocular. (5) There is no prodromal period.

CHICLANA, or Chiclana de la Frontera, a town of southern Spain, in the province of Cadiz, 12 m. by rail S.E. of Cadiz. Pop. (1900) 10,868. Chiclana occupies a fertile valley, watered by the river Lirio, and sheltered, on the north and south, by low hills covered with vines and plantations. It faces the gulf of Cadiz, 3 m. W., and, from its mild climate and pleasant surroundings, is the favourite summer residence of the richer Cadiz merchants; its hot mineral springs also attract many visitors. In the neighbourhood are the Roman ruins of Chiclana la Vieja, the town of Medina Sidonia (g.v.), and, about 5 m. S.„ the battlefield of Barrosa, where the British under Sir Thomas Graham (Lord Lynedoch) defeated the French under Marshal Victor, on the 5th of March 181 1.

CHICOPEE, a city of Hampden county, Massachusetts, U.S.A., situated on the E. side of the Connecticut river, at the mouth of the Chicopee river, immediately N. of Springfield. Pop. (1890) 14,050; (1900) 19,167, of whom 8139 were foreign-born; (1910, census) 25,401. Chicopee is served by the Boston & Maine railway. The city, which has

an area of about 25 sq. m., contains five villages. Chicopee Center, Chicopee Falls, Willimansett, Fairview and Aldenville. Chicopee Falls lies on both sides of the Chicopee river, which falls some 70 ft. in less than 3 m. and furnishes valuable power for manufactories. The most important products are cotton goods (two large factories having, together, about 200,000 spindles), fire-arms (especially the Stevens rifles), tools, rubber and elastic goods, sporting goods, swords, automobiles and agricultural implements. Here, too, is a bronze statuary foundry, in which some of the finest monuments, bronze doors, &c, in the country have been cast, including the doors of the Capitol at Washington. The bronze casting industry here was founded by Nathan Peabody Ames (1803-1847), who was first a sword-maker and in 1836 began the manufacture of cannon and church bells. The total value of the city's factory product in 1905 was '$7,715,653, an increase of 43-2% in five years. There is a public library. The municipality owns and operates the water-works system and the electric lighting plant. Chicopee was settled about 1638, was set off from Springfield as an independent township in 1848, and was chartered as a city in 1890. Chicopee Falls was the

home of Edward Bellamy. The name of the city is an Indian word meaning " cedar-tree " or " birch-bark place."

CHICORY. The chicory or succory plant, Cichorium Intybus (natural order, Compositae), in its wild state is a native of Great Britain, occurring most frequently in dry chalky soils, and by road-sides. It has a long fleshy tap-root, a rigid branching hairy stem rising to a height of 2 or 3 ft. — the leaves around the base being lobed and toothed, not unlike those of the dandelion. The flower heads are of a bright blue colour, few in number, and measure nearly an inch and a half across. Chicory is cultivated much more extensively on the continent of Europe — in Holland, Belgium, France and Germany — than in Great Britain; and as"a cultivated plant it has three distinct applications. Its roots roasted and ground are used as a substitute for, adulterant of, or addition to coffee; both roots and leaves are employed as salads; and the plant is grown as a fodder or herbage crop which is greedily consumed by cattle. In Great Britain it is chiefly in its first capacity, in connexion with coffee, that chicory is employed. A large proportion of the chicory root used for this purpose is obtained from Belgium and other neighbouring continental countries; but a considerable quantity is cultivated in England, chiefly in Yorkshire. For the preparation of chicory the older stout white roots are selected, and after washing they are sliced up into small pieces and kiln-dried. In this condition the material is sold to the chicory roaster, by whom it is roasted till it assumes a deep brown colour;

afterwards when ground it is in external characteristics very like coffee, but is destitute of its pleasing aromatic odour. Neither does the roasted chicory possess any trace of the alkaloid caffeine which gives their peculiar virtues to coffee and tea. The fact, however, that.for over a hundred years it has been successfully used as a sub- stitute for or recognized addition to coffee, while in the meantime innumerable other substances have been tried for the same pur- pose and abandoned, indicates that it is agreeable and harmless. It gives the coffee additional colour, bi tterness and body. It is at least in very extensive and general use; and in Belgium especi- ally its infusion is largely drunk as an independent beverage.

The blanched leaves are much esteemed by the French as a winter salad known by the name of Barbe de capucin. Whei* intended for winter use, chicory is sown in May or June, commonly in drills, and the plants are thinned out to 4 in. apart. If at first the leaves grow very strong, they are cut off, perhaps in the middle of August, about an inch from the ground, so as to promote the production of new leaves, and check the formation of flower-stems. About the beginning of October the plants are raised from the border, and all the large leaves cut off; the roots are also shortened, and they are then planted pretty closely together in boxes filled with rich light mould, and watered when needful. When frost comes on, the boxes are protected by any kind of litter and haulm. As the salad is wanted, they are re- moved into some place having a moderately increased tempera- ture, and where there is no light. Each box affords two crops of blanched leaves, and these are reckoned fit for cutting when about 6 in. long. Another mode of obtaining the young leaves of this plant in winter is to sow seeds in a bed of light rich mould, or in boxes in a heat of from 55 to 6o°, giving a gentle watering as required. The leaves will be fit to be cut in a fortnight after sowing, and the plants will afford a second crop.

In Belgium a variety of chicory called Wifloef is much pre- ferred as a salad to the French Barbe de capucin. The seeds are sown and the plants thinned out like those of the ordinary sort. They are eventually planted in light soil, in succession, from the end of October to February, at the bottom of trenches a foot or more in depth, and covered over with from 2 to 3 ft. of hot stable manure. In a month or six weeks, accorcring to the heat applied, the heads are fit for use and should be cut before they reach the manure. The plants might easily be forced in frames on a mild hot-bed, or in a mushroom-house, in the same way as sea-kale. In Belgium the fresh roots are boiled and eaten with butter, and throughout the Continent the roots are stored for use as salads during winter.

See also Endive {Cichorium endivia).

CHIDAMBARAM, or Chedumbrum, a town of British India, in the South Arcot district of Madras, 7 m. from the coast and 151 m. S. of Madras by rail. Pop. (1901) 19,909. The pagodas at Chidambaram are the oldest in the south of India, and portions of them are gems of art. Here is supposed to have been the northern frontier of the ancient Chola kingdom, the successive capitals of which were Uriyur on the Cauvery, Combaconum and Tanjore. The principal temple is sacred to Siva, and is said to have been rebuilt or enlarged by a leper emperor, who came south on a pilgrimage and was cured by bathing in the temple tank; upwards of 60,000 pilgrims visit the temple every December. It contains a ” hall of a thousand pillars,” one of numerous such halls in India, the exact number of pillars “in this case being 984; each is a block of solid granite, and the roof of the principal temple is of copper-gilt. Three hundred of the highest-caste Brahmins live with their families within the temple enclosure.

CHIEF (from Fr. chef, head, Lat. caput), the head or upper part of anything, and so, in heraldry, the upper part of the escutcheon, occupying one-third of the whole. When applied to a leading personage, a head man or one having the highest authority, the term chief or chieftain (Med. Lat. capitanus, O. Fr. chevetaine) is principally confined to the leader of a clan or tribe. The phrase ” in chief ” (Med. Lat. in capite) is used in feudal law of the tenant who holds his fief direct from the lord paramount (see Feudalism).

CHIEMSEE, also called Bayrisches Meer, the largest lake in Bavaria, lying on a high plateau 1600 ft. above the sea, between the rivers Inn (to which it drains through the Alz) and Salzach. With a length of 6 and a breadth of 9 m., it has an area of about 33 sq. m., and contains three islands, Herrenworth, Frauenworth and Krautinsel. The first, which has a circumference of 65 m. and is beautifully wooded, is remarkable for the romantic castle which Louis II. of Bavaria erected here. It was the seat of a bishop from 1 215 to 1805, and until 1803 contained a Benedictine monastery. The shores of the lake are flat on the north and south sides, but its other banks are flanked by undulating hills, which command beautiful and extensive views. The waters are clear and it is well stocked with trout and carp; but the fishing rights are strictly preserved. Steamers ply on the lake, and the railway from Rosenheim to Salzburg skirts the southern shores.

CHIENG MAI, the capital of the Lao state of the same name and of the provincial division of Siam called Bayap, situated in 99 o' E., 18 46′ N. The town, enclosed by massive but decaying walls, lies on the right bank of the river Me Ping, one of the branches of the Me Nam, in a plain 800 ft. above sea-level, surrounded by high, wooded mountains. It has streets intersect- ing at right angles, and an enceinte within which is the palace of the Chao, or hereditary chief. The east and west banks of the river are connected by a fine teak bridge. The American Presby- terian Mission, established here in 1867, has a large number of converts and has done much good educational work. Chieng Mai, which the Burmese have corrupted into Zimme, by which name it is known to many Europeans, has long been an important trade centre, resorted to by Chinese merchants from the north and east, and by Burmese, Shans and Siamese from the west and south. It is, moreover, the centre of the teak trade of Siam, in which many Burmese and several Chinese and European firms are engaged. The total value of the import and export trade of the Bayap division amounts to about £2,500,000 a year. The Siamese high commissioner of Bayap division has his head- quarters in Chieng Mai, and though the hereditary chief continues as the nominal ruler, as is also the case in the other Lao states of Nan, Pre, Lampun, Napawn Lampang and Tern, which make up the division, the government is entirely in the hands of that official and his staff. The government forest department, / founded in 1896, has done good work in the division, and the conservator of forests has his headquarters in Chieng Mai. The headquarters of an army division are also situated here. A British consul resides at Chieng Mai, where, in addition to the ordinary law courts, there is an international court having jurisdiction in all cases in which British subjects are parties.

The population, about 20,000, consists mainly of Laos, with many Shans, a few Burmese, Chinese and Siamese and some fifty Europeans. Hill tribes (Ka) inhabit the neighbouring mountains in large numbers.

Chieng Mai was formerly the capital of a united Lao kingdom, which, at one time independent, afterwards subject to Burma and then to Siam, and later broken up into a number of states, has finally become a provincial division of Siam. In 1902 a rising of discontented Shans took place in Bayap which at one time seemed serious, several towns being attacked and Chieng Mai itself threatened. The disturbance was quelled and the malcon- tents eventually hunted out, but not without losses which in- cluded the commissioner of Pre and a European officer of gendarmerie.

CHIERI, a town and episcopal see of Piedmont, Italy, in the province of Turin, 13 m. S.E. by rail and 8 m. by road from the town of Turin.

Pop. (1901) 11,929 (town), 13,803 (commune). Its Gothic cathedral, founded in 1037 and reconstructed in 1405, is the largest in Piedmont, and has a 13th century octagonal baptistery. Chieri was subject to the bishop of Turin in the 9th and 10th centuries, it became independent in the nth century. In 1347 it submitted voluntarily to Count Amedeus VI. of Savoy to save itself from the marquis of Monferrato, and finally came under the dominion of Savoy in the 16th century. In 1785 it was made into a principality of the duke of Aosta. It was an early centre of trade and manufacture; and in the middle of the 15th century produced about 100,000 pieces of cotton goods per annum.

See L. Cibrario, Delle stone di Chieri (Turin, 1855),

CHIETI, a city of the Abruzzi, Italy, the capital of the province of Chieti, and the seat of an archbishop, 140 m. E.N.E. of Rome by rail, and 9 m. W. of Castellammare Adriatico. Pop. (1901) 26,368. It is situated at a height of 1083 ft. above sea-level, 3 m. from the railway station, from which it is reached by an electric tramway. It commands a splendid view of the Apennines on every side except the east, where the Adriatic is seen. It is an active modern town, upon the site of the ancient Teate Marrucinorum (q.v.), with woollen and cotton manufactories and other smaller industries. The origin of the see of Chieti dates from the 4th century, S. Justinus being the first bishop. The cathedral has been spoilt by restoration, and the decoration of the exterior is incomplete; the Gothic campanile of 1335 is, •however, fine. The cathedral possesses two illuminated missals. Close by is the town hall, which contains a small picture gallery, in which, in 1905, was held an important exhibition of ancient Abruzzese art. The de Laurentiis family possesses a private collection of some importance. To the north of Chieti is the octagonal church of S. Maria del Tricaglio, erected in 131 7, which is said (without reason) to stand upon the site of a temple of Diana. The order of the Theatines, founded in 1524, takes its name from the city. Under the Lombards Chieti formed part of the duchy of Benevento; it was destroyed by Pippin in 801, but was soon rebuilt and became the seat of a count. The Normans made it the capital of the Abruzzi.

CHI-FU, Chefoo, or Yen-t'ai (as it is called by the natives), a seaport of northern China, on the southern coast of the Gulf of Chih-li, in the province of Shan-tung, near the mouth of the Yi-ho, about 30 m. E. of the city of Teng-chow-fu. It was formerly quite a small place, and had only the rank of an un- walled village; but it was chosen as the port of Teng-chow, opened to foreign trade in 1858 by the treaty of Tientsin, and it is now the residence of a Tao-t'ai, or intendant of circuit, the

centre of a gradually increasing commerce, and the seat of a British consulate, a Chinese custom-house, and a considerable foreign settlement. The native town is yearly extending, and though most of the inhabitants are small shop-keepers and coolies of the lowest class, the houses are for the most part well and solidly built of stone. The foreign settlement occupies a position between the native town and the sea, which neither affords a convenient access for shipping nor allows space for any great extension of area. Its growth, however, has hitherto been steady and rapid. Various streets have been laid out, a large

hotel erected for the reception of the visitors who resort to the place as a sanatorium in summer, and the religious wants of the community are supplied by a Roman Catholic and a Protestant church. Though the harbour is deep and extensive, and possessed of excellent anchorage, large vessels have to be moored at a considerable distance from the shore. Chi-fu has continued to show fair progress as a place of trade, but the total volume is inconsiderable, having regard to the area it supplies. In 1880 the total exports and imports were valued at £2,724,000, in 1899 they amounted to £4,228,000, and in 1904 to £4,909,908. In 1895 there entered the port 905 vessels representing a tonnage of 835,248 tons, while in 1905 the number of vessels had risen to 1842, representing a tonnage of 1,492,514 tons. The imports are mainly woollen and cotton goods, iron and opium, and the exports include bean cake, bean oil, peas, raw silk, straw-braid, walnuts, a coarse kind of vermicelli, vegetables and dried fruits. Communication with the interior is only by roads, which are extremely defective, and nearly all the traffic is by pack animals. From its healthy situation and the convenience of its anchorage, Chi-fu has become a favourite rendezvous for the fleets of the European powers in Chinese waters, and consequently it has at times been an important coaling station. It lies in close proximity to Korea, Port Arthur and Wei-hai-Wei, and it shared to some extent in the excitement to which the military and naval operations in these quarters gave rise. The Chi-fu convention was signed here in 1876 by Sir Thomas Wade and Li-Hung-Chang.

CHIGI-ALBANI, the name of a Roman princely family of Sienese extraction descended from the counts of Ardenghesca. The earliest authentic mention of them is in the 13 th century, and they first became famous in the person of Agostino Chigi (d. 1520), an immensely rich banker who built the palace and gardens afterwards

known as the Farnesina, decorated by Raphael, and was noted for the splendour of his entertainments; Pope Julius II. made him practically his finance minister and gave him the privilege cf quartering his own (Delia Rovere) arms with those of the Chigi. Fabio Chigi, on being made pope (Alexander VII.) in 1655, conferred the Roman patriciate on his family, and created his nephew Agostino prince of Farnese and duke of Ariccia, and the emperor Leopold I. created the latter Reichsfurst (prince of the Holy Roman Empire) in 1659. In 1 71 2 the family received the dignity of hereditary marshals of the Church and guardians of the conclaves, which gave them a very great importance on the death of every pope. On the marriage in 1735 of another Agostino Chigi (1710-1769) with Giulia Albani, heiress of the Albani, a Venetian patrician family, said to be of Albanian origin, her name was added to that of Chigi. The family owns large estates at Siena.

See A. von Reumont, Geschichte der Stadt Rom, vol. iii. (Berlin, 1868); Almanack de Gotha.

CHIGWELL, a parish and residential district in the Epping parliamentary division of Essex, England; with stations (Chigwell Lane and Chigwell) on two branches of the Great Eastern railway, 12 m. N.E. from London. Pop. (1901) 2508. The old village church of St Mary, principally Perpendicular, has a Norman south door. The village lies in a branch of the Roding valley, fragments of Hainault Forest lying to the south and east, bordering the village of Chigwell Row. The village of Chigwell appears in the Domesday survey. The pleasant scenery of the neighbourhood, which attracts large numbers both of visitors and of residents from London, is described in Dickens's novel, Barnaby Rudge, and the King's Head Inn, Dickens's " Maypole," still stands. The old grammar school, founded by Samuel Harsnett, archbishop of York (d. 163 1), whose fine memorial brass is in St Mary's church, has become one of the minor modern institutions of the English public school type. William Penn attended school at Chigwell from his home at Wanstead.

CHIH-LI (" Direct Rule "), the metropolitan province of China, in which is situated Peking, the capital of the empire. It contains eleven prefectural cities, and occupies an area of 58,950 sq. m. The population is 29,400,000, the vast majority

of whom are resident in the plain country. This province forms part of the great delta plain of China proper, 20,000 sq. m. of which are within the provincial boundaries; the remainder of the territory consists of the mountain ranges which define its northern and western frontier. The plain of Chih-li is formed principally by detritus

deposited by the Pei-ho and its tributary the Hun-ho (" muddy river "), otherwise known as the Yung- ting-ko, and other streams having their sources in mountains of Shan-si and other ranges. It is bounded E. by the Gulf of Chih-li and Shan-tung, and S. by Shan-tung and Ho-nan. The proportion of Mahommedans among the population is very large. In Peking there are said to be as many as 20,000 Mahom-medan families, and in Pao-ting Fu, the capital of the province, there are about 1000 followers of the prophet. The extremes of heat and cold in Chih-li are very marked. During the months of December, January and February the rivers are frozen up, and even the Gulf of Chih-li is fringed with a broad border of ice. There are four rivers of some importance in the province: the Pei-ho, with the Hun-ho, which rises in the mountains in Mongolia and, flowing to the west of Peking, forms a junction with the Pei-ho at Tientsin; the Shang-si-ho, which rises in the mountains on the north of the province of Shan-si, and takes a south-easterly course as far as the neighbourhood of Ki Chow, from which point it trends north-east and eventually joines the Hun-ho some 15 m. above Tientsin; the Pu-to-ho, which rises in Shan-si, and after running a parallel course to Shang-si-ho on the south, empties itself in the same way into the Hun-ho; and the Lan-ho, which rises in Mongolia, enters the province on the north-east after passing to the west of Jehol, passes the city of Yung-p'ing Fu in its course (which is south-easterly) through Chih-li, and from thence winds its way to the north-eastern boundary of the Gulf of Chih-li. The province contains three lakes of considerable size. The largest is the Ta-lu-tsze Hu, which lies in 37 40′ N. and 1 1 5 20′ E.; the second in importance is one which is situated to the east of Pao-ting Fu; and the third is the Tu- lu-tsze Hu, which lies east by north of Shun-te Fu. Four high roads radiate from Peking, one leading to Urga by way of Suan-hwa Fu, which passes through the Great Wall at Chang-kiu K'ow; another, which enters Mongolia through the Ku-pei K'ow to the north-east, and after continuing that course as far as Fung-ning turns in a north-westerly direction to Dolonnor; a third striking due east by way of T'ung-chow and Yung-p'ing Fu to Shan-hai Kwan, the point where the Great Wall terminates on the coast; and a fourth which trends in a south-westerly direction to Pao-ting Fu and on to T'ai-yuen Fu in Shan-si. The mountain ranges to the north of the province abound with coal, notably at Chai-tang, T'ai-gan-shan, Miao-gan-ling, and Fu-tao in the Si-shan or Western Hills. " At Chai-tang," wrote Baron von Richthofen, " I was surprised to walk over a regular succession of coal-bearing strata, the thickness of which, estimat- ing it step by step as I proceeded gradually from the lowest to the highest strata, exceeds 7000 ft." The coal here is anthracite, as is also that at T'ai-gan-shan, where are found beds of greater value than any in the neighbourhood

of Peking. In Suan-hwa Fu coal is also found, but not in such quantities as in the places above named. Iron and silver also exist in small quantities in different parts of the province, and hot and warm springs are very common at the foot of the hills along the northern and western edges of the province. The principal agricultural products are wheat, kao-liang, oats, millet, maize, pulse and potatoes. Fruits and vegetables are also grown in large quantities. Of the former the chief kinds are pears, apples, plums, apricots, peaches, persimmons and melons. Tientsin is the Treaty Port of the province.

CHIHUAHUA, a northern frontier state of Mexico, bounded N. and N.E. by the United States (New Mexico and Texas), E. by Coahuila, S. by Durango, and W. by Sinaloa and Sonora. Pop. (1895) 260,008; (1900) 327,784. Area, 87,802 sq. m. The surface of the state is in great part an elevated plateau, sloping gently toward the Rio Grande. The western side, how- ever, is much broken by the Sierra Madre and its spurs, which form elevated valleys of great fertility. An arid sandy plain

extending from the Rio Grande inland for 300 to 350 m. is quite destitute of vegetation where irrigation is not used. There is little rainfall in this region and the climate is hot and dry. The more elevated plateaus and valleys have the heavier rainfall, but the average for the state is barely 39 in.; an impermeable clay substratum prevents its absorption by the soil, and the bare surface carries it off in torrents. The great Bolson de Mapimi depression, in the S.E. part of the state, was once considered to be an unreclaimable desert, but experiments with irrigation have shown its soil to be highly fertile, and the con- version of the narrow valleys of the sierras on the west into irrigation reservoirs promises to reclaim a considerable part of its area. The only river of consequence is the Conchos, which flows north and north-east into the Rio Grande across the whole length of the state. In the north there are several small streams flowing northward into lakes. Agriculture has made little progress in Chihuahua, and the scarcity of water will always be a serious obstacle to its development outside the districts where irrigation is practicable. The climate and soil are favour- able to the production of wheat, Indian corn, beans, indigo, cotton and grapes, from which wine and brandy are made. The principal grape-producing district is in the vicinity of Ciudad Juarez. Stock-raising is an important industry in the mountainous districts of the west, where there is excellent pasturage for the greater part of the

year. The principal in- dustry of the state, however, is mining — its mineral resources including gold, silver, copper, mercury, lead and coal. The silver mines of Chihuahua are among the richest in Mexico, and include the famous mining districts of Batopilas, Chihuahuilla, Cosihuiriachic, Jesus Maria, Parral, and Santa Eulalia or Chihuahua el Viejo. There are more than one hundred of these mines, and the total annual yield at the end of the 19th century was estimated at $4,590,000. The state is traversed from north to south by the Mexican Central railway, and there are short branches to some of the mining districts.

Chihuahua originally formed part of the province of Nueva Viscaya, with Durango as the capital. In 1777 the northern provinces, known as the Provincias Internas, were separated from the viceroyalty, and in 1786 the provinces were reorganized as intendencias, but Chihuahua was not separated from Durango until 1823. An effort was made to overthrow Spanish authority in 1810, but its leader Hidalgo and two of his lieutenants were captured and executed, after which the province remained passive until the end of the struggle. The people of the state have been active partizans in most of the revolutionary outbreaks in Mexico, and in the war of 1862-66 Chihuahua was loyal to Juarez. The principal towns are the capital Chihuahua, El Parral, 120 m. S.S.E. of the state capital, in a rich mining district (pop. 14,748 in 1900), Ciudad Juarez and Jimenez, 120 m. S.E. of Chihuahua (pop. 5881 in 1900).

CHIHUAHUA, a city of Mexico, capital of the above state, on the Chihuahua river, about 1000 m. N.W. of Mexico City and 225 m. S. by E. of El Paso. Pop. (1895) 18,279; (1900) 30,405. The city stands in a beautiful valley opening northward and hemmed in on all other sides by spurs of the Sierra Madre. It is 4635 ft. above sea-level, and its climate is mild and healthy. The city is laid out regularly, with broad streets, and a handsome plaza with a monument to Hidalgo and his companions of the revolution of 1810, who were executed here. The most note- worthy of its public buildings is the fine old parish church of San Francisco, begun in 17 17 and completed in 1789, one of the best specimens of 18th-century architecture in Mexico. It was built, it is said, with the proceeds of a small tax on the output of the Santa Eulalia mine. Other prominent buildings are the government palace, the Porfirio Diaz hospital, the old Jesuit College (now occupied by a modern institution of the same character), the mint, and an aqueduct built in the 18th century. Chihuahua is a station on the Mexican Central railway, and has tramways and telephones. Mining is the principal occupation of the surrounding district, the famous Santa Eulalia or Chihuahua el Viejo mines being about 12 m. from the city.

Next in im- portance is agriculture, especially fruit-growing. Manufacturing

is making good progress, especially the weaving of cotton fabrics by modern methods. The manufacture of cotton and woollen goods are old industries in Chihuahua, but the introduction of American skill and capital toward the end of the 19th century placed them on an entirely new footing. The manufacture of gunpowder for mining operations is another old industry.

Chihuahua was founded between 1703 and 1705 as a mining town, and was made a villa in 17 15 with the title San Felipe el Real de Chihuahua. Because of the rich mines in its vicinity it soon became one of the most prosperous towns in northern Mexico, although the state was constantly raided by hostile Indians. In 1763 it had a population of nearly 5000. The war of independence was followed by a period of decline, owing to political disorder and revolution, which lasted until the presidency of General Porfirio Diaz. In the war between Mexico and the United States, Chihuahua was captured on the 1st of March 1847, by Colonel A. W. Doniphan, and again on the 7th of March by General Price. In 1864 President Juarez made the city his provisional capital for a short time.

CHILAS, a hill village in the North-West Frontier Province of India. It is dominated by a fort on the left bank of the Indus, about 50 m. below Bunji, 4100 ft. above sea-level. It was occupied by a British force early in 1893, when a determined attack was made on the place by the Kohistanis from the Indus valley districts to the south-west, aided by contingents from Darel and Tangir west of Gilgit and north of the Indus. Its importance consists in its position with reference to the Kashmir- Gilgit route via Astor, which it flanks. It is now connected with Bunji by a metalled road. Chilas is also important from its command of , a much shorter and more direct route to Gilgit from the Punjab frontier than that of Kashmir and the Burzil pass. By the Kashmir route Gilgit is 400 m. from the rail-head at Rawalpindi. The Kagan route would bring it 100 m. nearer, but the unsettled condition of the country through which the road passes has been a bar to its general use.

CHILBLAINS (or Kibe; Erythema pernio), a mild form of frostbite, affecting the fingers or toes and other parts, and causing a painful inflammatory swelling, with redness and itching of the affected part. The chief points to be noticed in its aetiology are (1) that the lesions occur in the extremities of the circulation, and (2) that they are usually started by rapid changes from heat to cold or vice versa. The

treatment is both general and local. In the general treatment, if a history of blanching fingers (fingers or hands going ” dead “) can be obtained, the chilblains may be regarded as mild cases of Raynaud’s disease, and these improve markedly under a course of nitrites. Cardiac tonics are often helpful, especially in those cases where there is some attendant lesion of the heart. But the majority of cases improve wonderfully on a good course of a calcium salt, e.g. calcium lactate or chloride; fifteen grains three times a day will answer in most cases. The patient should wash in soft tepid water, and avoid extremes of heat and cold. In the local treatment, two drugs are of great value in the early congestive stage — ichthyol and formalin. Ichthyol, 10 to 20% in lanoline spread on linen and worn at night, often dispels an attack at the beginning. Formalin is equally efficacious, but requires more skill in its use. It can be used as an ointment, 10 to 50 % fordelicate skins, stronger for coarser skins. It should be replaced occasionally by lanoline. If the stage of ulceration has been reached, a paste made from the following prescription, spread thickly on linen and frequently changed, soon cures: — Hydrarg. ammoniat. gr. v., ichthyol Tfl,x, pulveris zinci oxidi 5iv, vaseline 5ss.

CHILD, SIR FRANCIS (1642-1713), English banker, was a Wiltshire man, who, having been apprenticed to a goldsmith, became himself a London goldsmith in 1664. In 167 1 he married Elizabeth (d. 1720), daughter of another goldsmith named William Wheeler (d. 1663), and with his wife’s stepfather, Robert Blanchard (d. 1681), took over about the same time the business of goldsmiths hitherto carried on by the Wheelers. This was the beginning of Child’s Bank. Child soon gave up the business of a goldsmith and confined himself to that of a banker. He inherited some wealth and was very successful in

business; he was jeweller to the king, and lent considerable sums of money to the government. Being a freeman of the city of London, Child was elected a member of the court of common council in 1681; in 1689 he became an alderman, and in the same year a knight. He served as sheriff of London in 1691 and as lord mayor in 1699. His parliamentary career began about this time. In 1698 he was chosen member of parliament for Devizes and in 1702 for the city of London, and was again returned for Devizes in 1705 and 17 10. He died on the 4th of October 1713, and was buried in Fulham churchyard. Sir Francis, who was a benefactor to Christ’s hospital, bought Osterley Park, near Isleworth, now the residence of his descendant the earl of

Jersey.

Child had twelve sons. One, Sir Robert, an alderman, died in 1721. Another, Sir Francis (c. 1684-1740), was lord mayor of London in 1732, and a director of the East India Company. He was chosen member of parliament for the city of London in 1722, and was member for Middlesex from 1727 until his death. After the death of the younger Sir Francis at Fulham on the 20th of April 1740 the banking business passed to his brother Samuel, and the bank is still owned by his descendants, the principal proprietor being the earl of Jersey. Child's Bank was at first conducted at the Marygold, next Temple Bar in Fleet Street, London; and the present bank occupies the site formerly covered by the Marygold and the adjacent Devil tavern.

CHILD, FRANCIS JAMES (1825-1896), American scholar and educationist, was born in Boston on the 1st of February 1825. He graduated at Harvard in 1846, taking the highest rank in his class in all subjects; was tutor in mathematics in 1846-1848; and in 1848 was transferred to a tutorship in history, political economy and English. After two years of study in Europe, in 1851 he succeeded Edward T. Channing as Boylston professor of rhetoric, oratory and elocution. Child studied the English drama (having edited Four Old Plays in 1848) and Germanic philology, the latter at Berlin and Gottingen during a leave of absence, 1849-1S53; and he took general editorial supervision of a large collection of the British poets, published in Boston in 1853 and following years. He edited Spenser (5 vols., Boston, 1855), and at one time planned an edition of Chaucer, but con- tented himself with a treatise, in the Memoirs of the American Academy of Arts and Sciences for 1863, entitled " Observations on the Language of Chaucer's Canterbury Tales," which did much to establish Chaucerian grammar, pronunciation and scansion as now generally understood. His largest undertaking, however, grew out of an original collection, in his British Poets series, of English and Scottish Ballads, selected and edited by himself, in eight small volumes (Boston, 1857-1858). Thence- forward the leisure of his life — much increased by his transfer, in 1876, to the new professorship of English— was devoted to the comparative study of British vernacular ballads. He ac- cumulated, in the university library, one of the largest folklore collections in existence, studied manuscript rather than printed sources, and carried his investigations into the ballads of all other tongues, meanwhile giving a sedulous but conservative hearing to popular versions still surviving. At last his final collection was published as The English and Scottish Popidar Ballads, at first in ten parts (188 2- 1898), and then in five quarto volumes, which remain the authoritative treasury of their subject. Professor Child worked —

and overworked — to the last, dying in Boston on the nth of September 1896, having com- pleted his task save for a general introduction and bibliography. A sympathetic biographical sketch was prefixed to the work by his pupil and successor George L. Kittredge.

CHILD, SIR JOHN (d. 1690), governor of Bombay, and in fact if not in name the first governor-general of the British settlements in India, was born in London. He was sent as a little boy to his uncle, the chief of the factory at Rajapur; and in 1682 was appointed chief of the East India Company's affairs at Surat and Bombay, while at the same time his brother, Sir Josiah Child (q.v.), was governor of the company at home. The two brothers showed themselves strong men and guided the affairs of the company through the period of struggle between the

Moguls and Mahrattas. They have been credited by history with the change from unarmed to armed trade on the part of the company; but as a matter of fact both of them were loth to quarrel with the Mogul. War broke out with Aurangzeb in 1689, but in the following year Child had to sue for peace, one of the conditions being that he should be expelled from India. He escaped this expulsion by his death in 1690.

CHILD, SIR JOSIAH (1630- 1699), Euglish merchant; economist and governor of the East India Company, was born in London in 1630, the second son of Richard Child, a London merchant of old family. After serving his apprenticeship in the business, to which he succeeded, he started on his own account at Portsmouth, as victualler to the navy under the Common- wealth, when about twenty-five. He amassed a comfortable fortune, and became a considerable stock-holder in the East India Company, his interest in India being accentuated by the fact that his brother John (q.v.) was making his career there. He was returned to parliament in 1659 for Petersfield; and in later years sat for Dartmouth (1673-1678) and for Ludlow (1685- 1687). He was made a baronet in 1678. His advocacy, both by speech and by pen, under the pseudonym of Philopatris, of the East. India Company's claims to political power, as well as to the right of restricting competition with its trade, brought him to the notice of ,the shareholders, and he became a director in 1677, and, subsequently, deputy-governor and governor. In this latter capacity he was for a considerable time virtually the sole ruler of the company, and directed its policy as if it were his own private business. He and his brother have been credited with the change from unarmed to armed traffic"; but the actual renunciation of the Roe doctrine of unarmed traffic by the company was resolved upon in January 1686, under Governor Sir Joseph Ash, when Child was temporarily out of office. He died on the

22nd of June 1699. Child made several important contributions to the literature of economics; especially Brief Observations concerning Trade and the Interest of Money (1668), and A New Discourse of Trade (1668 and 1690). He was a moderate in those days of the ” mercantile system,” and has sometimes been regarded as a sort of pioneer in the development of the free-trade doctrines of the 18th century. He made various proposals for improving British trade by following Dutch ex- ample, and advocated a low rate of interest as the ” causa causans of all the other causes of the riches of the Dutch people.” This low rate of interest he thought should be created and maintained by public authority. Child, whilst adhering to the doctrine of the balance of trade, observed that a people cannot always sell to foreigners without ever b/iying from them, and denied that the export of the precious metals was necessarily detrimental. He had the mercantilist partiality for a numerous population, and became prominent with a new scheme for the relief and employment of the poor; it is noteworthy also that he advocated the reservation by the mother country of the sole right of trade with her colonies. Sir Josiah Child’s eldest son, Richard, was created Viscount Castlemain in 1718 and earl of Tylney in 1731.

See also Macaulay, History of England, vol. iv. ; R. Grant, Sketch of the History of the East India Company (1813) ; D. Macpherson, Annals of Commerce (1805) ; B. Willson, Ledger and Sword (1903).

(T. A. I.)

CHILD, LYDIA MARIA (1802-1880), American author, was born at Medford, Massachusetts, on the nth of February 1802. She was educated at an academy in her native town and by her brother Convers Francis (1795-1863), a Unitarian minister and from 1842 to 1863 Parkman professor in the Harvard Divinity School. Her first stories, Hobomok (1824) and The Rebels (1825), were popular successes. She was a schoolmistress until 1828, when she married David Lee Child (1794-1874), a brilliant but erratic Boston lawyer and journalist. From 1826 to 1834 she edited The Juvenile Miscellany, the first children’s monthly periodical in the United States. About 1831 both she and her husband began to identify themselves with the anti-slavery cause, and in 1833 she published An Appeal for that Class of Americans called Africans, a stirring portrayal of the evils oi 1 slavery, and an argument for immediate abolition, which had

a powerful influence in winning recruits to the anti-slavery cause. Henceforth her time was largely devoted to the anti-slavery cause. From 1840 to 1844, assisted by her husband, she edited the A nti-Slavery Standard in New York City. After the Civil War she wrote much in behalf of the freedmen and of Indian rights. She died at Wayland, Massachusetts, on the 20th of October 1 880. In addition to the books above mentioned, she wrote many pamphlets and short stories and The {American) Frugal House- wife (1829), one of the earliest American books on domestic economy, The Mother's Book (183 1), a pioneer cook-book republished in England and Germany, The Girls' Own Book (1831), History of Women (2 vols., 1832), Good Wives (1833), The Anti-Slavery Catechism (1836), Philothea (1836), a romance of the age of Pericles, perhaps her best book, Letters from New York (2 vols., 1843-1845), Fact and Fiction (1847), The Power of Kindness (1851), Isaac T. Hopper: a True Life (1853), The Progress of Religious Ideas through Successive Ages (3 vols., 1855), Autumnal Leaves (1857), Looking Toward Sunset (1864), The Freedman's Book (1865), A Romance of the Republic (1867), and Aspirations of the World (1878).

See The Letters of Lydia Maria Child, with a Biographical Introduction by J. G. Whittier (Boston, 1883) ; and a chapter in T. W. Higginson's Contemporaries (Boston, 1899).

CHILD, the common term for the offspring of human beings, generally below the age of puberty; the term is the correlative of " parent," and applies to either sex, though some early dialecti- cal uses point to a certain restriction to a girl. The word is derived from the A.S. did, an old Teutonic word found in English only, in other Teutonic languages kind and its variants being used, usually derived from the Indo-European root ken, seen in Gr. 7«wjs, Lat. genus, and Eng. " kin "; did has been held to be a modification of the same root, but the true root is kilth, seen in Goth, kilthei, womb, an origin which appears in the expressions "child-birth," "to be with child," and the like; the plural in A.S. was did, and later cildru, which in northern M.E. became childre or childer, a form dialectically extant, and in southern English childeren or children (with the plural termination en, as in " brethren "). There are several particular uses of " child " in the English version of the Bible, as of a ycung man in the " Song of the three holy children," of descendants or members of a race, as in " children of Abraham," and also to express origin, giving a description of character, as " children of dark ness." During the 13th and 14th centuries " child " was used, in a sense almost amounting to a title of dignity, of a young man of noble birth, probably preparing for knighthood. In the York Mysteries of about 1440 (quoted in the New

English Dictionary) occurs ” be he churl or child,” obviously referring to gentle birth, cf. William Bellenden’s translation (1553) of Livy (ii.” 124) ” than was in Rome ane nobill childe . . . namit Caius Mucius.” The spelling ” childe ” is frequent in modern usage to indicate its archaic meaning. Familiar instances are in the line of an old ballad quoted in King Lear, ” childe Roland to the dark tower came,” and in Byron’s Childe Harold. With this use may be compared the Spanish and Portuguese Infante and Infanta, and the early French use of Valet (q.v.).

Child-study. — The physical, psychological and educational development of children, from birth till adulthood, has provided material in recent years for what has come to be regarded as almost a distinct part of comparative anthropological or socio- logical science, and the literature of adolescence (q.v.) and of ” child-study ” in its various aspects has attained consider- able proportions. In England the British Child Study Association was founded in 1894, its official organ being the Paidologist, while similar work is done by the Childhood Society, and, to a certain extent, by the, Parents’ National Educational Union (which issues the Parents’

Review). In America, where specially valuable work has been done, several universities have encouraged the study (notably Chicago, while under the auspices of Professor John Dewey); and Professor G. Stanley Hall’s initiative has led to elaborate inquiries, the principal periodical for the move- ment being the Pedagogical Seminary. The impetus to this study of the child’s mind and capacities was given by the classic work of educationists like J. A. Comenius, J. H. Pestalozzi, and F. W. A. Froebel, but more recent writers have carried it much further, notably W. T. Preyer (The Mind of the Child, 1881), whose psychological studies stamp him as one of the chief pioneers in new methods of investigation. Other authorities of first-rate importance (their chief works only being given here) are J. Sully (Studies of Childhood, 1896), Earl Barnes (Studies in Education, 1896, 1902), J. M. Baldwin (Mental Development in the Child and the Race, 1895), Sigismund (Kind und Welt, 1897), A. F. Chamberlain (The Child, 1900), G. Stanley Hall (Adolescence, 1904; he had from 1882 been the leader in America of such investigations), H. Holman and R. Langdon Down (Practical Child Study, 1899), E. A. Kirkpa trick (Fundamentals of Child- study, 1903), and Prof. Tracy of Toronto (Psychology of Childhood, 5th ed., 1901); while among a number of contributions worth particular attention may be mentioned W. B. Drummond’s excellent summary, Introduction to Child Study (1907), which deals succinctly with methods and results; Irving King’s Psychology of Child Development (1906, useful for its bibliography); Prof. David R.

Major’s First Steps in Mental Growth (1906); and Miss M. Shinn’s Notes on the Development of a Child (1893) and Mrs Louise E. Hogan’s Study of a Child (1898), which are note- worthy among individual and methodical accounts of what children will do. In such books as those cited a great deal of important material has been collected and analysed, and a number of conclusions suggested which bear both on psychology and the science of education; but it must be borne in mind, as regards a great deal of the voluminous literature of the subject, that, it is often more pertinent to general psychology and hygiene than to any special conclusions as to the essential nature of a child — whatever ” a child ” generically may be as the special object of a special science. The child, after all, is in a transition stage to an adult, and there is often a tendency in modern ” child students ” to interpret the phenomena exhibited by a particular child with a parti pris, or to exaggerate child-study — which is really interesting as providing the knowledge of growth towards full human equipment — as though it involved the discovery of some distinct form of animal, of separate value on its own account. Growth. — Into the psychical characteristics and development of the child and all the interesting educational problems involved it is impossible to enter here, and reference must be made to the works cited above. But a knowledge of the more important features of normal physical development has a constant import- ance. Some of these, as matters of comparative physiology or pathology, are dealt with in other articles in this work. One of these chief matters of interest is wsight and height, and this is naturally affected by race, nutrition and environment. But while the standard in different countries somewhat differs, the British average for healthy children may here be followed. At birth the average weight of a baby is a little over 7 lb and the length about 20 in. The following are the averages for weight and height, taking the age in years of the child at the last birthday: —

Height, in inches.

Age.

- 1

2

3

4

5

6

7

8

9

10

ir

12

13

14

15

Girls . . Boys .

287 29

32-5 32‘5

35 35

38 38

40-5 41

42-8 44

44-5 46

466

47

48-7 49

5i

5i-8

53-i

53-5

55-6 55

577 57

59-8 59‘3

60-9 62

Weight, in pounds.

Age.

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

Girls . . Boys .

20 -5

25 : 5 26-5

3″ 31-2

34 35

3Q -2

41-2

417 44-4

47-5 49-7

52-1 54-9

55-5 60-4

62 67-5

(.8 72

76-4 767

87-2 82-6

o(>7

92

1027 106

CHILDEBERT— CHILDERS, H. C. E.

l 37

See also Children, Law relating to; Children's Courts; Children's Games; Infant; &c.

CHILDEBERT, the name of three Frankish kings.

Childebert I. (d. 558) was one of the four sons of Clovis. In the partition of his father's realm in 511 he received as his share the town of Paris, and the country to the north as far as the river Somme, and to the west as far as the English Channel, with the Armorican peninsula. In 524, after the murder of Chlodomer's children,

Childebert annexed the cities of Chartres and Orleans. He took part in the various expeditions against the kingdom of Burgundy, and in 534 received as his share of the spoils of that kingdom the towns of Macon, Geneva and Lyons. When Vitiges, the king of the Ostrogoths, ceded Provence to the Franks in 535, the possession of Aries and Marseilles was guaranteed to Childebert by his brothers. Childebert also made a series of expeditions against the Visigoths of Spain; in 542 he took possession of Pampeluna with the help of his brother Clotaire I., and besieged Saragossa, but was forced to retreat. From this expedition he brought back to Paris a precious relic, the tunic of St Vincent, in honour of which he built at the gates of Paris the famous monastery of St Vincent, known later as St Germain-des-Pres. He died without issue in 558, and was buried in the abbey he had founded, where his tomb has been discovered.

See " Nouveaux documents sur le tombeau de Childebert k Saint-Germain-des-Pres," in the Bulletin de la Societe des Anliquaires

(1887).

Childebert II. (570-595), king of Austrasia, was a son of Sigebert. When his father was assassinated in 575, Childebert was taken from Paris by Gundobald, one of his faithful leudes, to Metz, where he was recognized as sovereign. He was then only five years old, and during his long minority the power was disputed between his mother Brunhilda and the nobles. Chilperic, king at Paris, and King Gontran of Burgundy, sought alliance with Childebert, who was adopted by both in turn. But after the assassination of Chilperic in 584, and the dangers occasioned to the Frankish monarchy by the expedition of Gundobald in 585, Childebert threw himself unreservedly into the arms of Gontran. By the pact of Andelot in 587 Childebert was recognized as Gontran's heir, and with his uncle's help he quelled the revolts of the nobles and succeeded in seizing the castle of Woewre. Many attempts were made on his life by Fredegond, who was anxious to secure Gontran's inheritance for her son Clotaire II. On the death of Gontran in 592 Childe- bert annexed the kingdom of Burgundy, and even contemplated seizing Clotaire's estates and becoming sole king of the Franks. He died, however, in 595. Childebert II. had had relations with the Byzantine empire, and fought in 585 in the name of the emperor Maurice against the Lombards in Italy.

Childebert III. was one of the last and feeblest of the Merovingians. A son of King Theuderich III., he succeeded his brother Clovis III. in 695, and reigned until 711.

See B. Krusch, ” Zur Chronologie der merowingischen Konige,” in Forschungen zur deutschen Geschichte, xxii. 451-490. (C. Pf.)

CHILDERIC, the name of three Frankish kings.

Childeric I. (c. 437-481), king of the Salian Franks, succeeded his father Merwich (Merwing) as king about. 457. With his tribe he was established around the town of Tournai, on lands which he had received as a foederatus of the Romans, and for some time he kept the peace with his allies. About 463, in conjunction with the Roman general Egidius, he fought against the Visigoths, who hoped to extend their dominion along the banks of the Loire; after the death of Egidius he assisted Count Paul in attempting to check an invasion of the Saxons. Paul having perished in the struggle, Childeric delivered Angers from some Saxons, followed them to the islands at the mouth of the Loire, and massacred them there. He also stopped a band of the Alamanni who wished to invade Italy. These are all the facts known about him. The stories of his expulsion by the Franks; of his stay of eight years in Thuringia with King Basin and his wife Basine; of his return when a faithful servant advised him that he could safely do so by sending to him half of a piece of gold which he had broken

with him; and of the arrival at Tournai of Queen Basine* whom he married, are entirely legendary. After the fall of the Western Empire in 476 there is no doubt that Childeric regarded himself as freed from his engagements towards Rome. He died in 481 and was buried at Tournai, leaving a son Clovis (q.v.), afterwards king of the Franks. His tomb was discovered in 1653, when numerous precious objects, arms, jewels, coins and a ring with a figure of the king, were found.

Childeric II. (c. 653-673), king of Austrasia, was a son of the Frankish king Clovis II., and in 660, although a child, was proclaimed king of Austrasia, while his brother, Clotaire III., ruled over the rest of the dominions of Clovis. After the death of Clotaire in 670 he became ruler of the three Frankish kingdoms, Austrasia, Neustria and Burgundy, but soon quarrelled with some supporters in Neustria, and was assassinated whilst hunting. He was buried at St Germain near Paris.

Childeric III. (d. c. 751), king of the Franks, was the last king of the Merovingian dynasty. The throne had been vacant for seven years when the mayors of the palace, Carloman and Pippin the Short, decided in 743 to recognize Childeric as king. We cannot say whose son he was, or what bonds bound him to the Merovingian family. He took no part in public business, which was directed, as before, by the

mayors of the palace, When in 747 Carloman retired into a monastery, Pippin resolved to take the royal crown for himself; taking the decisive step in 751 after having received the celebrated answer of Pope Zacharias that it were better to name king him who possessed the power than him who possessed it not. Childeric was dethroned and placed in the monastery of St Omer; his son, Theuderich, was imprisoned at Saint-Wandrille.

See W. Junghans.ZWe GsscMchte der frankischen Konige Childerich und Clodovech (Gottingen, 1857) ; J. J. Chiflet, Anastasis Childerici I. Francorum regis (Antwerp, 1655); J. B. D. Cochet, Le Tombeau de Childeric I, roi des Francs (Paris, 1859); and E. Lavisse. Histoire de France, tome ii. (Paris, 1903).

CHILDERS, HUGH CULLING EARDLEY (1827-1896), British statesman, was born in London on the 25th of June 1827. On leaving Cambridge he went out to Australia (1850), and became a member of the government of Victoria, but in 1857 returned to England as agent-general of the colony. Entering parliament in i860 as Liberal member for Pontefract (a seat that he con- tinued to hold till 1885), he became civil lord of the admiralty in 1864, and in 1865 financial secretary to the treasury. Childers occupied a succession of prominent posts in the various Gladstone ministries. He was first lord of the admiralty from 1868 to 1871, and as such inaugurated a policy of retrenchment. Ill-health compelled his resignation of office in 1871, but next year he returned to the ministry as chancellor of the duchy of Lancaster. From 1880 to 1882 he was secretary for war, a post he accepted somewhat unwillingly; and in that position he had to bear the responsibility for the reforms which were introduced into the war office under the parsimonious conditions which were then part of the Liberal creed. During his term of office the Egyptian War occurred, in which Childers acted with creditable energy; and also the Boer War, in which he and his colleagues showed to less advantage. From 1882 to 1885 he was chancellor of the exchequer, and the beer and spirit duty in his budget of the latter year was the occasion of the government's fall. Defeated at the general election at Pontefract, he was returned as a Home Ruler (one of the few Liberals who adopted this policy before Mr Gladstone's conversion) in 1886 for South Edinburgh, and was home secretary in the ministry of 1886. When the first Home Rule bill was introduced he demurred privately to its financial clauses, and their withdrawal was largely due to his threat of resignation. He retired from parliament in 1892, and died on the 29th of January 1896, his last piece of work being the drafting of a report for the royal commission on Irish financial relations, of which he was chairman. Childers was a capable and industrious administrator of the old

Liberal school, and he did his best, in the political conditions then prevailing, to improve the naval and military administration while he was at the admiralty and war office. His own bent was towards finance, but no

striking reform is associated with his name. His most ambitious effort was his attempt to effect a conversion of consols in 1884, but the scheme proved a failure, though it paved the way for the subsequent conversion in 1888.

The Life (1901) of Mr Childers, by his son, throws some interesting side-lights on the inner history of more than one Gladstonian cabinet.

CHILDERS, ROBERT CAESAR (1838-1876), English Oriental scholar, son of the Rev. Charles Childers, English chaplain at Nice, was born in 1838. In i860 he received an appointment in the civil service of Ceylon, which he retained until 1864, when he was compelled to return to England owing to ill-health. He had studied Pali during his residence in Ceylon, under Yatra- mulle Unnanse, a learned Buddhist for whom he cherished a life-long respect, and he had gained an insight into the Sinhalese character and ways of thought. In 1869 he published the first Pali text ever printed in England, and began to prepare a Pali dictionary, the first volume of which was published in 1872, and the second and concluding volume in 1875. In the following year it was awarded the Volney prize by the Institute of France, as being the most important philological work of the year. He was a frequent contributor to the Journal of the Royal Asiatic Society, in which he published the Maha-parinibbana Sutta, the Pali text giving the account of the last days of Buddha's life. In 1872 he was appointed sub-librarian at the India Office, and in the following year he became the first professor of Pali and Buddhist literature at University College, London. He died in London on the 25th of July 1876.

CHILDREN, LAW RELATING TO. English law has always in theory given to children the same remedies as to adults for ill-usage, whether by their parents or by others, and has never recognized the patria potestas as known to the earlier Roman law; and while powers of discipline and chastisement have been regarded as necessarily incident to paternal authority, the father is civilly liable to his children for wrongs done to them. The only points in which infancy created a

defect in civil status were that infants were subject to the restraints on complete freedom of action involved in their being in the legal custody of the father, and that it was and is lawful for parents, guardians, employers and teachers to inflict corporal punishment proportioned in amount and severity to the nature of the fault committed and the age and mental capacity of the child punished. But' the court of chancery, in delegated exercise of the authority of the sovereign as parens patriae, always asserted the right to take from parents, and if necessary itself to assume the wardship of children where parental rights were abused or serious cruelty was inflicted, the power being vested in the High Court of Justice. Abuse of the power of correction was regarded as giving a cause of action or prosecution for assault; and if attended by fatal results rendered the parent liable to indictment for murder or manslaughter.

The conception of what constitutes cruelty to children un- doubtedly changed considerably with the relaxation of the accepted standard of severity in domestic or scholastic discipline and with the growth of new ideas as to the duties of parents to children, which in their latest developments tend enormously to enlarge the parental duties without any corresponding increase of filial obligations.

Starting from the earlier conception, which limited ill-treat- ment legally punishable to actual threats or blows, the common law came to recognize criminal liability in cases where persons, bound under duty or contract to supply necessaries to a child, unable by reason of its tender years to provide for itself, wilfully neglected to supply them, and thereby caused the death of the child or injury to its health, although no actual assault had been committed. Questions have from time to time arisen as to what could be regarded as necessary within this rule; and quite apart from legislation, popular opinion has influenced courts of justice in requiring more from parents and employers than used to be required. But parliament has also intervened to punish abandonment or exposure of infants of under two years, whereby their lives are endangered, or their health has been or is likely

to be permanently injured (Offences against the Person Act of 1861, s. 27), and the neglect or ill-treatment of apprentices or servants (same act, s. 26, and Conspiracy and Protection of Property Act 1875, s – 6). By the Poor Law Amendment Act 1868, parents were rendered summarily punishable who wilfully neglected to provide adequate food, clothing, medical aid or lodging for their children under fourteen years of age in their custody, whereby the health of the child was or was likely to be seriously injured. This enactment (now

superseded by later legislation) made no express exception in favour of parents who had not sufficient means to do their duty without resort to the poor law, and was construed as imposing criminal liability on parents whose peculiar religious tenets caused them advisedly to refrain from calling in a doctor to a sick child.

The chief progress in the direction of adequate protection for children prior to 1889 lay less in positive legal enactment on the subject than in the institution of an effective system of police, whereby it became possible to discover and repress cruelty punishable under the ordinary law. It is quite inaccurate to say that children had very few rights in England, or that animals were better protected. But before the constitution of the present police force, and in the absence of any proper system of public prosecution, it is undeniable that numberless cases of neglect and ill-treatment went unpunished and were treated as nobody's business, because there was no person ready to undertake in the public interest the protection of the children of cruel or negligent parents. In 1889 a statute was passed with the special object of preventing cruelty to children. This act was superseded in 1894 by a more stringent act, which was repealed by the Prevention of Cruelty to Children Act 1 904, in its turn superseded for the most part by the Children Act 1908, which introduced many new provisions in the law relating to children and specific- ally deals with the offence of " cruelty " to them. This offence can only be committed by a person over sixteen in respect of a child under sixteen of whom he has " custody," " charge " or " care." The act presumes that a child is in the custody of its parents, step-parents, or a person cohabiting with its parent, or of its guardians or persons liable by law to maintain it; that it is in the charge of a person to whom the parent has committed such charge (e.g. a schoolmaster), and that it is in the care of a person who has actual possession or control of it. Cruelty is defined as consisting in assault, ill-treatment (falling short of actual assault), neglect, abandonment or exposure of the child in a manner likely to cause unnecessary suffering or injury to health, including injury to or loss of sight, hearing or limb, or any organ of the body or any mental derangement; and the act or omission must be wilful, i.e. deliberate and intentional, and not merely accidental or inadvertent. The offence may be punished either summarily or on indictment, and the offender may be sent to penal servitude if it is shown that he was directly or indirectly interested in any sum of money payable on the death of the child, e.g. by having taken out a policy permitted under the Friendly Societies Acts. A parent or other person legally liable to maintain a child or young person will be deemed to have " neglected " him by failure to provide adequate food, clothing, medical aid, or lodging, or

if in the event of inability to provide such food, &c, by failure to take steps to procure the same under acts relating to the relief of the poor.

These statutes overlap the common law and the statutes already mentioned. Their real efficacy lies in the main in the provisions which facilitate the taking of evidence of young children, in permitting poor law authorities to prosecute at the expense of the rates, and in permitting a constable on arresting the offender to take the child away from the accused, and the court of trial on conviction to transfer the custody of the child from the offender to some fit and willing person, including any society or body corporate established for the reception of poor children or for the prevention of cruelty to children. The provisions of the acts as to procedure and custody extend not only to the offence of cruelty but also to all offences involving bodily injury to a child under sixteen, such as abandonment, assault, kidnapping and illegally engaging a child in a dangerous public

performance. The act of 1908 also makes an endeavour to check the heavy mortality of infants through “overlaying,” 1 enacting that where it is proved that the death of an infant under three years of age was caused by suffocation whilst the infant was in bed with some other person over the age of sixteen, and that that person was at the time of going to bed under the influence of drink, that other person shall be deemed to have neglected the child in manner likely to cause injury to its health, as mentioned above. The acts have been utilized with great zeal and on the whole with much discretion by various philanthropic societies, whose members make it their business to discover the ill-treated and neglected children of all classes in society, and particularly by the Society for the Prevention of Cruelty to Children, which is incorporated under royal charter of the 28th of May 1895, for the purposes inter alia of preventing the public and private wrongs of children, and the corruption of their morals and of taking action to enforce the laws for their protection. ■ >

The act of 1908 enacted more stringent provisions against baby-farming (q.v.). The Infant Life Protection Act of 1897 did not apply where only one child was taken, but now by the act of 1908, where a person undertakes for reward the nursing and maintenance of one or more infants under the age of seven years apart from their parents or having no parents, he must give notice in writing to the local authority within forty-eight hours from the reception of the child. If

an infant is already in the care of a person without reward and he undertakes to continue the nursing for reward, such undertaking is a reception of the child. The notice to the local authority must state the name, sex, date and place of birth of the infant, the name and address of the person receiving the infant and of the person from whom the infant was received. Notice must also be given of any change of address of the person having the care of the infant, or of the death of the infant, or of its removal to the Care of some other person, whose name and address must also be given. It is the duty of local authorities to provide for the carrying-out in their districts of that portion of the act which refers to nursing and maintenance of infants, to appoint infants' protection visitors, to fix the number of infants which any person may retain for nursing, to remove infants improperly kept, &c. Relatives or legal guardians of an infant who undertake its nursing and maintenance, hospitals, convalescent homes, or institutions, established for the protection and care of infants, and conducted in good faith for religious and charitable purposes, as well as boarding schools at which efficient elementary education is given, are exempt from the provisions of the act.

The acts of 1904 and 1908 deal with many other offences in relation to children and young persons. The act of 1904 intro- duced restrictions on the employment of children which lie on the border land between cruelty and the regulation of child labour. It prohibits custodians of children from taking them, or letting them be, in the street or in' public-houses to sing, play, perform or sell between 9 p.m. and 6 a.m. These pro- visions apply to boys under fourteen and girls under sixteen. There are further prohibitions (1) on allowing children under eleven to sing, play, perform or be exhibited for profit, or offer anything for sale in public-houses or places of public amuse- ment at any hour without a licence from a justice, which is granted only as to children over ten and under stringent condi- tions; (2) on allowing children under sixteen to be trained as

1 There has been some doubt as to whether it is more correct to any a person " overlays " or " overlies " a child, and the question came up in committee on the bill. According to Sir J. A. H. Murray (see Letter in The Times, 12th of May 1908) " to lie," an intransitive verb, becomes transitive when combined with a preposition, e.g. a nurse lies over a child or overlies a child; " to lay " is the causal derivative of " to lie," and is followed by two objects, e.g. to lay the table with a cloth, or to lay a cloth on the table; similarly, to over- lay a surface with varnish, or to overlay a child with a blanket, or with the nurse's or mother's body. The instrument can be left un- expressed, and a person can be said to overlay a child, i.e. with her own body, a pillow, <&c. Thus,

while " overlie " covers the case where the woman herself lies over the child, " overlay " is the more general word.

acrobats, contortionists, or circus performers, or for any datigerOus performance; and the Children's Dangerous Performances Act 1879, as amended in 1897, makes it an offence to employ a male young person under sixteen and a female under eighteen in a dangerous public performance.

The act of 1908 renders liable to a fine not exceeding £25, or alternatively, or in addition thereto, imprisonment with or with- out hard labour for any term not exceeding three months, any custodian, &c, of any child or young person who allows him to be in any street, premises or place for the purpose of begging or receiving alms, or of inducing the giving of alms, whether or not there is a pretence of singing, playing, performing or offering anything for sale. An important departure in the act of 1908 was the attempt to prevent the exposure of children to the risk of burning. Any custodian, &c, of a child under seven who allows that child to be in a room containing an open grate not sufficiently protected to guard against the risk of burning or scalding is liable on summary conviction to a fine not exceeding £10. Provision is made against allowing children between the ages of four and sixteen to be in brothels; it is also made a misdemeanour if any custodian, &c, of a girl under sixteen causes or encourages her seduction or prostitution, and any person having the custody of a young girl may be bound over to exercise proper care if it is shown to the satisfaction of a court of summary jurisdiction, on the complaint of any person, that she is exposed to such risk.

The act of 1908, following legislation in many parts of the United States and in some of the British colonies, places a penalty on selling tobacco to any person apparently under the age of sixteen, whether for his own use or not. It empowers constables and park keepers to seize tobacco in the possession of any person apparently under sixteen found smoking in any street or public place, as well as to search them; it also empowers a court, of summary jurisdiction to prevent automatic machines for the sale of tobacco being used by young persons. The act also contains useful provisions empowering the clearing of a court whilst a child or young person is giving evidence in certain cases (e.g. of decency or morality), and the forbidding children (other than infants in arms) being present in court during the trial of other persons; it places a penalty on pawnbrokers taking an article in pawn from children under fourteen; and on vagrants for preventing children above the age of five receiving education. It puts a penalty on giving intoxicating liquor to any child under the age of five, except

upon the orders of a duly qualified medical practitioner, or in case of sickness, or other urgent cause; also upon any holder of the licence of any licensed premises who allows a child to be at any time in the bar of the licensed premises; or upon any person who causes or attempts to cause a child to be in the bar of licensed premises other than railway refreshment rooms or premises used for any purpose to which the holding of a licence is merely auxiliary, or where the child is there simply for the purpose of passing through to some other part of the premises. It makes provision for the safety of children at entertainments, and consolidates the law relating to reformatory and industrial schools, and to juvenile offenders (see Juvenile Offenders).

In the act of 1908, ” child ” is defined as a person under the age of fourteen years, and ” young person ” as a person who is fourteen years and upwards and under the age of sixteen years. The act applies to Scotland and Ireland. In the application of the act to Ireland exception is made relative to the exclusion of children from bars of licensed premises, in the case of a child being on licensed premises where a substantial part of the business carried on is a drapery, grocery, hardware or other business wholly unconnected with the sale of intoxicating liquor, and the child is there for the purpose of purchasing goods other than intoxicating liquor.

British Possessions. — Legislation much on the lines of the acts of 1889-1908 has been passed in many British possessions, e.g. Tasmania (1895, 1906), Queensland (1896, 1905), Jamaica (1896), South Australia (1899, 1904), New South Wales (1892 and 1900), New Zealand (1906), Mauritius (1906), Victoria

(1905, 1906). In South Australia a State Children’s Department has been created to care for and manage the property and persons of destitute and neglected children, and the officials of the council may act in cases of cruelty to children; the legislation of Victoria and Queensland is based on that of South Australia. See also Children’s Courts, Education and Labour Legis- lation. (W, F. C.;T.A. I.)

CHILDRENITE, a rare mineral species; a hydrous basic aluminium iron phosphate, orthorhombic in crystallization. The ferrous oxide is in part replaced by manganous oxide and lime, and in the closely allied and isomorphous species eosphorite manganese predominates over iron. The general formula for the two species is Al(Fe, Mn)(OH)->P0

4 +H 2 0. Childrenite is found only as small brilliant crystals of a yellowish-brown colour, somewhat resembling chalybite in general appearance. They are usually pyramidal in habit, often having the form of double six-sided pyramids with the triangular faces deeply striated parallel to their shorter edges. Hardness 4-5-5; specific gravity 3-18-3-24. The mineral, named after the zoologist and mineralogist J. G. Children (1777-1852), secretary of the Royal Society, was detected in 1823 on specimens obtained some years previously during the cutting of a canal near Tavi- stock in Devonshire. It has also been found in a few copper mines in Cornwall and Devonshire.

Eosphorite occurs as crystals of prismatic habit with angles very nearly the same as those of childrenite. Unlike childrenite, it has a distinct cleavage in one direction, and often occurs in compact masses as well as in crystals. The colour is sometimes yellowish-white, but usually rose-pink, and on this account the mineral was named from r \uKjˆ>bpo%, dawn-bearer. Hardness 5; specific gravity 3-11-3-145. It was discovered in 1878 in a pegmatite-vein at Branchville, Connecticut, where it is associated with other rare manganese phosphates. (L. J. S.)

CHILDREN'S COURTS, or Juvenile Courts, a special system of tribunals for dealing with juvenile offenders, first suggested in the United States. The germ of such institutions was planted in Massachusetts in 1869, when a plan was introduced at Boston of hearing charges against children separately, and apart from the ordinary business of the lesser tribunals. No great progress was made in the development of the idea in Massa- chusetts, as the legal authorities were not fully convinced of the utility or need for a separate court so long as the children were kept strictly apart from adults, and this could be assured by a separate session. But the system of " probation," by which children were handed over to the kindly care and guardian- ship of an appointed officer, and thus escaped legal repression, was created about the same time in Boston and produced excellent results. The probation officer is present at the judge's side when he decides a case, and is given charge of the offender, whom he takes by the hand, either at his parent's residence or at school, and continually supervises, having power if necessary to bring him again before the judge. The example of Massa- chusetts in due course influenced other countries, and especially the British colony of South Australia, where a State Children's Department was created at Adelaide in 1895, and three years later a juvenile court was opened there for the trial of persons under eighteen and was conducted with great success, though the system of probation officers was not introduced. A juvenile court was also established at Toronto (Canada)

on the South Australian model.

The movement when once fully appreciated went ahead very rapidly. In the United States Illinois was the first state to call a distinct children's court into existence, and Judge Richard Tuthill was the pioneer at Chicago, where the court was estab- lished in 1899. Many states followed suit, including New York, Pennsylvania, Rhode Island, Wisconsin, Kansas, Colorado, Indiana and others, till the number rose to nineteen in 1906. In New York, where juvenile probation is supervised by the Society for the Protection of Children, there is a separate children's court with rooms attached, where the children for detention wait till they are brought in for trial. Brooklyn has also a children's court. In Pennsylvania, where the juvenile

court was at first opposed as unconstitutional, the difficulty was met by first bringing the child before the magistrate in the police court, a course which (though followed by his transferring the case to the special court) perpetuated the very evils the chil- dren's court was intended to avoid; the work of probation was, however, most effectively carried out, chiefly by female officers. The Chicago Juvenile Court sits twice weekly under an especially appointed judge, and policemen act as probation officers to some extent. The court of Indianapolis, however, gained the reputa- tion of being the most complete and perfect in the United States. It works with a large and highly efficient band of volunteer probation officers under a chief. The juvenile court of Denver, Colorado, attained remarkable results under Judge B. Lindsey, whose magnetic personality, wonderful comprehension of boy nature, and extraordinary influence over them achieved great results. The court meets once a, fortnight, when fresh cases are tried and boys already on probation report themselves, often to the number of two hundred at a time. The latter appear before the judge in batches, each hands in his school report in a sealed letter, and according to its purport receives praise or blame, or he may be committed to the Detention House. An efficient court was also constituted at Baltimore, Maryland, with a judge especially chosen to preside, probation being for fixed periods, varying from three months to three years, and children being brought back to the court for parole or discharge, or, if necessary, committal to the house of one of the philanthropic societies. In Washington, D.C., the system of having no distinct court or judge, but holding a separate session, was followed, and it was found that numbers of children came to the court for help and guidance, looking upon the judge for the time being as their friend and counsellor. Probation in this instance offered peculiar difficulties on account of the colour question, two-thirds of the children having negro blood and a white boy being always preferred

for a vacant situation. Throughout, the action of juvenile courts in the United States has been to bring each individual into ” human touch ” with kindly helpful workers striving to lead the young idea aright and train it to follow the straight path. It was the result always of the effort of private persons and not due to government initiative, indeed the advocates and champions of the system only established it by overcoming strong opposition from the authorities.

Progress in the same direction has been made in England. The home office had recommended London police magistrates to keep children’s cases separate from those of adults; the same practice or something analogous obtained in many county boroughs, such as Bath, Birmingham, Bristol, Bolton, Bradford, Hull, Manchester, Walsall, Halifax and others, and the Children Act 1908 definitely established children’s courts. This act enacted that courts of summary jurisdiction when hearing charges, &c, against children or young persons should, unless the child or young person is charged jointly with an adult, sit in a different building or room from that in which the ordinary sittings of the court are held, or on different days or at different times. Further- more, provision must be made for preventing persons apparently under the age of sixteen years whilst being conveyed to or from court, or whilst waiting before or after their attendance in court, from associating with adults, unless such adults are charged jointly with them. The act prohibits any persons other than members and officers of the court, the parties to the case, their solicitors, counsel and other persons directly concerned in the case, from being present in a juvenile court, except by leave of the court. Bona-fide press representatives are also excepted. The main object of the whole system is to keep the child, the embryotic offender who has probably erred from ignorance or the pressure of circumstances or misfortune, altogether free from the taint or contagion that attaches to criminal proceedings. The moral atmosphere of a legal tribunal is injurious to the youthful mind, and children who appear before a bench, whether as accused or as witness, gain a contemptuous familiarity with legal processes.

The most beneficial action of the children’s court comes from its association with the system of personal guardianship and

close supervision exercised by the probation officers, official and voluntary. Where the intervention of the newly consti- tuted tribunal

can not only save the child from evil association when first arrested, but can rescue him without condemnation and committal to prison, its functions may be relied upon to diminish crime by cutting it off at the source. Much depends upon the quality and temperament of the presiding authority. Where a judge with special aptitude can be appointed, firm, sympathetic, tactful and able to gain the confidence of those brought before him, he may do great good, by dealing with each individual and not merely with his offence, realizing that the court does not exist to condemn but to strengthen and give a fresh chance. Where the children's court is only a branch of the existing jurisdiction worked by the regular magistrate or judge fulfilling his ordinary functions and not specially chosen, the beneficial results are not so noticeable. (A. G.)

CHILDREN'S GAMES. The study of traditional games has in recent years become an important branch of folklore research in England, and has contributed not a little towards elucidating many unrecorded facts in early history. These games may be broadly divided into two kinds — dramatic games, and games of skill and chance. These differ materially in their object. Games of skill and chance are played for the purpose of winning property from a less fortunate player. The dramatic games consist of non-singing and singing games; they are divided between boys' games and girls' games. Boys' games are mostly of a contest character, girls' of a more domestic type. The boys' dramatic games have preserved some interesting beliefs and customs, but the tendency in these games, such as "prisoner's base," has been to drop the words and tune and to preserve only that part (action) which tends best for exercise and use in school playgrounds. The girls' singing-games have not developed on these lines, and have therefore not lost so much of their early characteristics. The singing games consist of words, tune and action. The words, in verse, express ideas contained in customs not now in vogue, and they may be traced back to events taking place between men and women and between people of different villages. The tunes are simple, and the same tune is frequently used for different games. The actions are illustrative of the ideas to be expressed. The players represent various objects — animals, villages and people. The singing game is therefore not a game in the usual sense of the word. There is no element of " gambling " or playing " to win " in it — no one is richer or poorer for it; it also requires a number of children to play together. It is really a " play," and has survived because it has handed down some instances of custom and belief which were deeply rooted and which made a strong appeal to the imagination of our ancestors. The singing games represent in dramatic form the survival of those ceremonial dances

common to people in early stages of development. These dances celebrated events which served to bind the people together and to give them a common interest in matters affecting their welfare. They were dramatic in character, singing and action forming a pari of them, and their performers were connected by ties of place or kindred. They are probably survivals of what we might call folk drama. In these times it was held imperative to perform religious ceremonies periodically; at sowing and harvesting to ensure good crops; in the care of cattle and on occasions of marriage, birth and death. These were matters affecting the welfare of the whole community. Events were celebrated with dance, song and feasting, and no event was too trivial to be unconnected with some belief which rendered ceremony necessary.

At first these ceremonial dances had deep religious feeling for their basis, but in process of time they became purely secular and were performed at certain seasons only, because it was the custom to do so. They then became recognized as beautiful or pleasing things in the life of the people, and so continued, altering somewhat in ideas but retaining their old dramatic forms. They were danced by old and young at festivals and Holidays, tnese being held about the same time of year as that at which the previous religious ceremonies had been held.

Singing games are danced principally in one of two methods, ” line ” and ” circle.” These represent two of the early forms of dramatic action. The ” line ” form (two lines of players standing opposite each other having a space of ground between them, advancing and retiring in turn) represents two different and opposing parties engaged in a struggle or contest. This method is used in all cases where contest is involved. The ” circle ” form, on the other hand, where all players join hands, represents those occasions when all the people of one place were engaged in celebrating events in which all were interested. Thus games celebrating sowing and harvest, and those associated with love and marriage, are played in this form. Both these methods allow of development. The circle varies from examples where all perform the same actions and say the same words to that where two or more players have principal parts, the others only singing or acting in dumb show, to examples where the singing has disappeared. The form or method of play and the actions constitute the oldest remaining parts of the game (the words being subject to alterations and loss through ignorance of their meaning), and it is to this form or method, the actions and the accompaniment of song, that they owe their survival, appealing as they do to the strong dramatic instinct of children and of uncultured folk.

It will be convenient to give a few instances of the best-known singing games. In ” line ” form, a fighting game is ” We are the Rovers.” The words tell us of two opposing parties fighting for their land; both sides alternately deride one another and end by fighting until one side is victorious. Two other ” line ” games, ” Nuts in May ” and ” Here come three dukes a-riding,” are also games of contest, but not for territory. These show an early custom of obtaining wives. They represent marriage by capture, and are played in ” line ” form because of the element of contest contained in the custom. Another form, the ” arch,” is also used to indicate contest.

Circle games, on the contrary, show such customs as harvest and marriage, with love and courting, and a ceremony and sanction by assembled friends. ” Oats and beans and barley ” and ” Sally Water ” are typical of this form. The large majority of circle games deal with love or marriage and domestic life. The customs surviving in these games deal with tribal life and take us back to ” foundation sacrifice,” ” well worship,” ” sacred- ness of fire,” besides marriage and funeral customs.

Details may be found in the periodical publications of the Folk- lore Society, and particularly in the following works: — A. B. Gomme’s Traditional Games of Great Britain (2 vols., Nutt, 1894- 1898); Gomme’s Children’s Singing Games (Nutt, 1901); Ecken- stein’s Comparative Studies in Nursery Rhymes (Duckworth, 1906); Maclagan, Games of Argyllshire, Folk-lore Society (1900); Newell’s Games of American Children (Harper Bros., New York, 1884). In Mrs Gomme’s Traditional Games, several versions of each game, together with a short account of the suggested origin and of the custom or belief indicated, are given for each game. In vol. ii. (pp. 458-531) a memoir of the history of games is given, and the customs and beliefs which originated them, reviewing the whole subject from the anthropological point of view, and showing the place which games occupy among the evidences of early man. In Miss Ecken- stein’s comparative study of nursery rhymes suggested origins are given for many of these, and an attempt made to localize certain of the customs and events. In several of the publications of the Folk- lore Society local collections of games are given, all of which may be studied with advantage. Stubbes and other early writers give many instances of boys’ games in their days, many of which still exist. Tylor and other writers on anthropology, in dealing with savage custom, confirm the views here expressed. For nursery rhymes see Halliwell, Nursery Rhymes (1845), and Chambers’s Popular Rhymes (first printed 1 841 , reprinted in 1870). The recently collected Morris Dances by Mr Cecil Sharp should also be consulted. One of the morris dances, bean-

setting, evidently dealing with planting or harvest, is danced in circle form, while others indicating fighting or rivalry are danced in line form, each line danc- ing in circle before crossing over to the opposite, side, and thus conforming to the laws already shown to exist in the more ordinary game. (A. B. G.*)

CHILDS, GEORGE WILLIAM (1829-1894), American publisher, was born in Baltimore, Maryland, on the 12th of May 1829. He was educated in the public schools, and after a brief term of service in the navy, he became in 1843 a clerk in a book-shop at Philadelphia. There, in 1847, he established an independent

book-shop, and two years later organized the publishing house of Childs & Peterson. In 1864, with Anthony J. Drexel, he pur- chased the Public Ledger, at that time a little known newspaper; he completely changed its policy and methods, and made it one of the most influential journals in the country. He died at Philadelphia on the 3rd of February 1894. Childs was widely known for his public spirit and philanthropy. In addition to numerous private benefactions in educational and charitable fields, he erected memorial windows to William Cowper and George Herbert in Westminster Abbey (1877), and to Milton in St Margaret's, Westminster (1888), a monument to Leigh Hunt at Kensal Green, a Shakespeare memorial fountain at Stratford- on-Avon (1887), and monuments to Edgar Allan Poe and to Richard A. Proctor. He gave Woodland Cemetery to the Typographical Society of Philadelphia for a printers' burial- ground, and with Anthony J. Drexel founded in 1892 a home for Union printers at Colorado Springs, Colorado.

His Recollections were published at Philadelphia in 1890.

CHILE, or Chili (derived, it is said, from the Quichua chiri, cold, or tchili, snow), a republic of South America, occupying the narrow western slope of the continent between Peru and its southern extremity. (For map see Argentina.) It extends from the northern boundary of the province of Tacna, about 17 25′ S., to Cape Horn at the extreme southern point of the Fuegian archipelago in 55 58′ 40″ S., with an extreme meridian length of 2661 m., and with a coast line considerably exceeding that figure owing to a westward curve of about 35 and an eastward trend south of 50° S. of nearly 8°. Its mainland width ranges from about 46 to 228 m., and its area,

including the islands of the southern coast, is officially computed to be 307,774 sq. m., though the Gotha computation (1904) places it at 293,062 sq. m. Chile is thus a ribbon-like strip of territory between the Andes and the Pacific, comparatively regular north of the 42nd parallel, but with an extremely ragged outline south of that line. It is bounded N. by Peru, E. by Bolivia and Argentina, S. and W. by the Pacific. Its eastern boundary lines are described under Argentina and Bolivia. The war of 1879-81 with Peru and Bolivia gave to Chile 73,993 sq. m. of territory, or one-fourth her total area. By subsequent agreements the Bolivian depart- ment of the Litoral, or Atacama, and the Peruvian department of Tarapaca, were formally ceded to Chile, and the northern frontier was removed to the river Camarones, which enters the Pacific at 19° 12′ S. Under the treaty of Ancon (20th October 1883) Chile was to retain possession of the provinces of Tacna and Arica belonging to the Peruvian department of Moquegua for a period of ten years, and then submit ” to popular vote whether those territories are to belong to Chile or Peru.” At the expiration of the period (1893) Chile evaded compliance with the agreement, and under various pretexts retained forcible posses- sion of the territory. This arbitrary retention of Tacna and Arica, which became the province of Tacna under Chilean administration, removed the frontier still farther north, to the river Sama, which separates that province from the remaining part of the Peruvian department of Moquegua. Starting from the mouth of that river, in 17° 57′ S., the disputed boundary follows its course in an irregular N.E. direction to its source in the Alto do Toledo range, thence S. and E. along the water parting to the Bolivian boundary line in the Cordillera Silillica.

Physiography. — For purposes of general topographical description Chile may be divided into three regions: the desert region of the north, the central agricultural region between the provinces of Coquimbo and Llanquihue, and the heavily-forested rainy region south of lat. 41° S. The desert region is an elevated arid plateau descending gradually from the Andes towards the coast, where it breaks down abruptly from elevations of 800 to 1500 ft. From the sea this plateau escarpment has the appearance of a range of flat topped hills closely following the coast line. The surface is made up of extensive plains covered with sand and deposits of alkaline salts, broken by ranges of barren hills having the appearance of spurs from the Andes, and by irregular lateral ranges in the vicinity of the main cordillera enclosing elevated saline plateaus. This region is rainless, barren and inhospitable, absolutely destitute of vege- tation except in some small river valleys where irrigation is possible, and on the slopes of some of the snow-covered peaks where the water from the melting snows

nourishes a scanty and coarse vege-

tation before it disappears in the thirsty sands. It is very rich in mineral and saline deposits, however. The eastern parts of this region lie within the higher ranges of the Andes and include a large district awarded to Chile in 1399 (see Argentina and Atacama). This arid, bleak area is apparently a continuation southward of the great Bolivian altaplanicie, and is known as the Puna de Atacama. Its average elevation is estimated at 11,000 to 12,000 ft. A line of volcanoes crosses it from north to south, and extensive lava beds cover a considerable part of its surface. Large shallow saline lakes are also characteristic features of this region. From 28° S. the spurs from the cordillera toward the coast are more sharply defined and enclose deeper valleys, where the cultivation of the soil becomes possible, at first through irrigation and then with the aid of light periodical rains. The slopes of the Andes are precipitous, the general surface is rough, and in the north the higher ground and coast are still barren- Beginning with the province of Aconcagua the coast elevations crystallize into a range of mountains, the Cordillera Maritima, which follows the shore line south to the province of Llanquihue, and is continued still farther south by the mountain range of Chiloe and the islands of the western coast, which are the peaks of a submerged mountain chain. Lying between this coast range and the Andes is a broad valley, or plain, extending from the Aconcagua river south to the Gulf of Ancud, a distance slightly over 620 m. with an average width of about 60 m. It is sometimes called the ” Vale of Chile,” and is the richest and most thickly- populated part of the republic. It is a highly fertile region, is well watered by numerous streams from the Andes, has a moderate rain- fall, and forms an agricultural and grazing region of great pro- ductiveness. It slopes toward the south, and its lower levels are filled with lakes and with depressions where lakes formerly existed. It is an alluvial plain for the greater part, but contains some sandy tracts, as in f}uble and Arauco; in the north very little natural forest is found except in the valleys and on the slopes of the enclosing mountain ranges, but in the south, where the rainfall is heavier, the plain is well covered with forest. South of 41° S. the country is mountainous, heavily-forested and inhospitable. There are only a few scattered settlements within its borders, and a few nomadic tribes of savages eke out a miserable existence on the coast. The deeply-indented coast line is filled with islands which preserve the general outline of the continent southward to the Fuegian archipelago, the outside groups forming a continuation of the Cor- dillera Maritima. The heavy and continuous rainfall throughout this region, especially in the latitude of Chiloe, gives rise to a large number of

rivers and lakes. Farther south this excessive precipi- tation is in the form of snow in the Cordilleras, forming glaciers at a comparatively low level which in places discharge into the inlets and bays of the sea. The extreme southern part of this region extends eastward to the Atlantic entrance to the Straits of Magellan, and includes the greater part of the large island of Tierra del Fuego with all the islands lying south and west of it. There are some com- paratively level stretches of country immediately north of the Straits, partly forested and partly grassy plains, where sheep farming has been established with some degree of success, but the greater part of this extreme southern territory is mountainous, cold, wet and inhospitable. The perpetual snow-line here descends to 3500 to 4000 ft. above sea-level, and the forest growth does not rise above an altitude of 1000 to 1500 ft.

It has been officially estimated that the arable lands of Chile comprise about twenty-five millions of acres (slightly over 39,000 sq. m.), or very nearly one-eighth of its total area. The desert regions of the north include comparatively ”' large areas of plains and gently sloping surfaces, traversed by ranges of barren hills. The remainder of the republic, probably more than three-fifths of its surface, is extremely mountainous. The western slopes of the Andes, with its spurs and lateral ranges, cover a broad zone on the eastern side of the republic, and the Cordillera” Maritima covers another broad zone on its western side from about lat. 33 ° to the southern extremity of Chiloe, or below lat. 43 . This maritime range is traversed by several river valleys, some of which, like the Bio-Bio, are broad and have so gentle a slope as to be navigable. The Andes, however, present an unbroken barrier on the east, except at a few points in the south where the general elevation is not over 5000 to 6000 ft., and where some of the Chilean rivers, as the Palena and Las Heras, have their sources on its eastern side. From the 52nd to about the 31st parallel this great mountain system, known locally as the Cordillera de los Andes, apparently consists of a single chain, though in reality it includes short lateral ranges at several points ; continuing northward several parallel ranges-appear on the Argentine side and one on the Chilean side which are ultimately merged in the great Bolivian plateau. The Chilean lateral range, which extends from the 29th to the 19th parallels, traverses an elevated desert region and possesses several noteworthy peaks, among which are Cerro Bolson, 16,017 ft-, and Cerro Dona Ines, 16,706 ft. It is broken to some extent in crossing the province of Antofagasta, the southern division being known as the Sierra de Huatacondo. At the southern frontier of Bolivia the main chain, which has served as the boundary line between Argentina and Chile, divides into two great ranges, the principal one continuing almost due north along the

eastern side of the great Bolivian alta-planicie, and the other forming its western rim, where

it is known as the Cordillera Silillica, and then following the trend of the coast north-westward into Peru becomes the Cordillera Occidental. The western slopes of the Andes are precipitous, with short spurs enclosing deep valleys. The whole system is volcanic, and a considerable number of volcanoes are still intermittently active, noticeably in central and southern Chile. The culminating point of the Chilean Andes is Aconcagua, which rises to a height of 23,097 ft.

In southern Chile the coast is highly mountainous, but the relation of these elevations to the Andes has not been clearly determined. The highest of these apparently detached groups are Mt. Maca (lat. 45° S.), 9711 ft., and Mt. Arenales (about 47 S. lat.), 11,286 ft. Cathedral Peak on Wellington Island rises to a height of 3838 ft. and the highest point on Taytao peninsula to 3937 ft. The coast range of central Chile has no noteworthy elevations, the culminating point in the province of Santiago being 7316 ft. Between central Chile and the northern desert region there is a highly mountainous district where distinct ranges or elongated spurs cross the republic from the Andes to the coast, forming transverse valleys of great beauty and fertility. The most famous of these is the ” Vale of Quillota ” between Valparaiso and Santiago. The Chilean Andes between Tacna and Valdivia are crossed by 24 passes, the majority of them at elevations exceeding 10,000 ft. The best-known of these is the Uspallata pass between Santiago and the Argentine city of Mendoza, 12,870 ft. above sea-level. The passes of central and southern Chile are used only in the summer season, but those of northern Chile are open throughout the whole year.

The volcanic origin of the Andes and their comparatively recent elevation still subject Chile, in common with other parts of the western coast region, to frequent volcanic and seismic disturbances. In some instances since European occupation, violent earthquake shocks have resulted in considerable elevations of certain parts of the coast. After the great earthquake of 1835 Captain Robert FitzRoy (1805-1865) of H.M.S. ” Beagle ” found putrid mussel- shells still adhering to the rocks 10 ft. above high water on the island of Santa Maria, 30 m. from Concepcion, and Charles Darwin declares, in

describing that disaster, that ” there can be no doubt that the land round the bay of Concepci6n was upraised two or three feet.” These upheavals, however, are not always permanent, the upraised land sometimes settling back to its former position. This happened on the island of Santa Maria after 1835. The existence of sea-shells at elevations of 350 to 1300 ft. in other parts of the republic shows that these forces, supplemented by a gradual uplifting of the coast, have been in operation through long periods of time and that the greater part of central and southern Chile has been raised from the sea in this way. These earthquake shocks have two distinct character- istics, a slight vibration, sometimes almost imperceptible, called a temblor, generally occurring at frequent intervals, and a violent horizontal or rotary vibration, or motion, also repeated at frequent intervals, called a terremoto, which is caused by a fracture or displace- ment of the earth’s strata at some particular point, and often results in considerable damage. When the earthquake occurs on the coast, or beneath the sea in its vicinity, tidal waves are sometimes formed, which cause even greater damage than the earthquake itself. Arica has been three times destroyed by tidal waves, and other small towns of the north Chilean coast have suffered similar disasters. Coquimbo was swept by a tidal wave in 1849, and Concepcion and Talcahuano were similarly destroyed in 1835. The great earth- quake which partially destroyed Valparaiso in 1906, however, was not followed by a tidal wave. These violent shocks are usually limited to comparatively small districts, though the vibrations may be felt at long distances from the centre of disturbance. In this respect Chile may be divided into at least four great earthquake areas, two in the desert region, the third enclosing Valparaiso, and the fourth extending from Concepcion to Chiloe. A study of Chilean earthquake phenomena, however, would probably lead to a division of southern Chile into two or more distinct earthquake areas.

The coast of Chile is fringed with an extraordinary number of islands extending from Chiloe S. to Cape Horn, the grouping of which . shows that they are in part the summits of a submerged

s ‘ mountain chain, a continuation southward of the Cor-

dillera Maritima. Three groups of these islands, called the Chiloe, Guaytecas and Chonos archipelagoes, lie N. of the Taytao peninsula (lat. 45 50′ to 46 55′ S.), and with the mainland to the E. form the province of Chiloe. The largest of these is the island of Chiloe, which is inhabited. Some of the smaller islands of these groups are also inhabited, though the excessive rainfall of these latitudes and the violent westerly storms render them highly unfavourable for human

occupation. Some of the smallest islands are barren rocks, but the majority of them are covered with forests. These archipelagoes are separated from the mainland in the north by the gulfs of Chacao (or Ancud) and Corcovado, 30 to 35 m. wide, which appear to be a submerged part of the great central valley of Chile, and farther south by the narrower Moraleda channel, which terminates southward in a confusing network of passages between the mainland and the islands of the Chonos group. One of the narrow parts of the Chilean mainland is to be found opposite the upper islands of this group, where the accidental juxtaposition of Magdalena island, which in- dents the continent over half a degree at this point, and the basin of Lake Fontana, which gives the Argentine boundary a sharp

wedge-shaped projection westward, narrows the distance between the two to about 26 m. The Taytao peninsula, incorrectly called the Tres Montes on some maps, is a westward projection of the mainland, with which it is connected by the narrow isthmus of Ofqui, over which the natives and early missionaries were accustomed; to carry their boats between the Moraleda Channel and Gulf of Pefias. A short ship canal here would give an uninterrupted and protected inside passage from Chacao Channel all the way to the Straits of Magellan, a distance of over 760 m. A southern incurving pro- jection of the outer shore-line of this peninsula is known as Tres Montes peninsula, the most southern point of which is a cape of the same name. Below the Taytao peninsula is the broad open Gulf of Penas, which carries the coast-line eastward fully 100 m. and is noticeably free from islands. The northern entrance to Messier Channel is through this gulf. Messier, Pitt, Sarmiento and Smyth's Channels, which form a comparatively safe and remarkably pictur- esque inside route for small steamers, about 338 m. in length, separate another series of archipelagoes from the mainland. These channels are in places narrow and tortuous. Among the islands which thickly fringe this part of the coast, the largest are Azopardo (lying within Baker Inlet), Prince Henry, Campafia, Little Wellington, Great Wellington and Mornington (of the Wellington archipelago), Madre de Dios, Duke of York, Chatham, Hanover, Cambridge, Contreras, Rennell and the Queen Adelaide group of small barren rocks and islands lying immediately north of the Pacific entrance to the Straits of Magellan. The large number of English names on this coast is due to the fact that the earliest detailed survey of this region was made by English naval officers; the charts prepared from their surveys are still in use and form the basis of all subsequent maps. None of these islands is inhabited, although some of them are of large size, the largest (Great Welling- ton) being about 100 m. long. It has likewise been determined, since the boundary

dispute with Argentina called attention to these ter- ritories and led to their careful exploration at the points in dispute, that Skyring Water, in lat. 53 S., opens westward into the Gulf of Xaultegua, which transforms Ponsonby Land and Cordoba (or Croker) peninsula into an island, to which the name of Riesco has been given. The existence of such a channel was considered probable when these inland waters were first explored in 1829 by Captain FitzRoy, but it was not discovered and surveyed until three-quarters of a century had elapsed. Belonging to the Fuegian group south of the Straits of Magellan are Desolation, Santa Ines, Clarence, Dawson, Londonderry, Hoste, Navarin and Wollaston islands, with innumerable smaller islands and rocks fringing their shores and filling the channels between them. Admirable descriptions of this inhospitable region, the farthest south of the inhabited parts of the globe, may be found in the Narrative of the Surveying Voyages of His Majesty's Ships "Adventure" and "Beagle" between the years 1826 and 1836 (3 vols., 1839).

The western and larger part of Tierra del Fuego (q.v.) belongs to Chile. About 63 m. S.W. of Cape Horn, in lat. 56* 25′ S., is the Diego Ramirez group of small, rocky islands, the most southern possession of the republic. Its westernmost possessions are Sala-y- Gomez and Easter islands, the former in about 27 S., 105 W., and the latter, the easternmost inhabited Polynesian island, in 27° 6′ S., 109 17′ W. Much nearer the Chilean coast (396 m.), lying between the 33rd and 34th parallels, are the three islands of the Juan Fer- nandez group, and rising apparently from the same submerged plateau about 500 m. farther north of the latter are the rocky islets of San Ambrosio and San Felix, all belonging to Chile. North of Chiloe there are few islands in close proximity to the coast. The more important of these are La Mocha, off the southern coast of Arauco, in lat. 38 20′ S., which is 8 m. long and rises to an elevation of 1240 ft. above the sea; Santa Maria, 30 m. south-west of Con- cepcion, which partially encloses the Bay of Arauco and is well cultivated ; and Quinquina, lying off the port of Talcahuano in the entrance to Concepci6n bay. There are a few barren islands on the desert coast, the largest of which are between Coquimbo and Caldera. Since the removal of their guano deposits they have become practi- cally worthless, except where they serve to shelter anchorages. '

The coast of northern and central Chile is singularly deficient in good harbours. Those of the desert region are only slight inden- tations in a remarkably uniform coast-line, sheltered on „ one side by a point of land, or small island. The landings " arbours – are generally dangerous because of the surf, and the anchorages are unsafe from storms on the unprotected side. Among the most frequented of these are Valparaiso,

Coquimbo, Caldera, fquique and Arica. There are some small harbours for coasting vessels of light draught along the coast of central Chile, usually at the partially obstructed mouths of the larger rivers, as San Antonio near the mouth of the Maipo, Constitution at the mouth of the Maule, and Llico on the outlet of Lake Vichuquen, but there is no harbour of importance until Concepcion (or Talcahuano) Bay is reached. There are three harbours on this bay, El Tome, Penco and Talca- huano (q.v.), the last being the largest and best-protected port on the inhabited part of the Chilean coast. Immediately south of this bay is the large Bay of Arauco, into which the Bio-Bio river dis- charges, and on which, sheltered by the island of Santa Maria, are the ports of Coronel and Lota. The next important harbour is that of El Corral, at the mouth of the Valdivia river and 15 m. below

the city of Valdivia. The Bay of San Carlos on the northern coast of Chiloe, which opens upon the narrow Chacao channel, has the port f Ancud, or San Carlos, and is rated an excellent harbour for vessels of light and medium draught. Inside the island of Chiloe the large guils of Chacao (or Ancud) and Corcovado are well pro tected from “he severe westerly storms of these latitudes, but they are little used because the approach through the Chacao channel is tortuous and only 2 to 3 m. wide, and the two gulfs, though over 30 m. wide and 150 m. long, are beset with small rocky islands. At the north end 01 the first is the Reloncavi, a large and nearly landlocked bay, on which stands Puerto Montt, the southern terminus of the Chilean central railway. The large Gulf of Pefias, south of Taytao peninsula, is open to the westerly storms of the Pacific, but it affords entrance to several natural harbours. Among these are the Gulfs of Tres Montes and San Estevan, and Tarn Bay at the entrance to Messier Channel. The next 300 m. of the Chilean coast contain numerous bays and inlets affording safe harbours, but the mainland and islands are uninhabited and the climate inhospitable. Behind Rennell Island in lat. 52 S., however, is a succession of navigable estuaries which penetrate inland nearly to the Argentine frontier. The central part of this group of estuaries is called Worsley Sound, and the last and farthest inland of its arms is Last Hope Inlet (Ultima Esperanza), on which is situated the Chilean agricultural colony of Puerto Consuelo. The Straits of Magellan, about 360 m. in length, lie wholly within Chilean territory. Midway of them is situ- ated Punta Arenas, the most southern town

and port of the republic. Except in the extreme south the hydrography of Chile is of the simplest description, all the larger rivers having their sources in the _. Andes and flowing westward to the Pacific. Their courses

rs. are necessar ;i v s hort, and only a few have navigable channels, the aggregate length of which is only 705 m. Nearly all rivers in the desert region are lost in the sands long before reaching the coast. Their waterless channels are interesting, however, as evi- dence of a time when climatological conditions on this coast were different. The principal rivers of this region are Sama (which forms the provisional boundary line with Peru), Tacna, Camarones, Loa, Copiapo, Huasco, Elqui, Limari and Choapa. The Loa is the largest, having its sources on the slopes of the Cordillera south of the Minho volcano, between 21° and 21° 30′ S. lat., and flowing south on an elevated plateau to Chiuchiu, and thence west and north in a great curve to Quillaga, whence its dry channel turns westward again and reaches the Pacific in lat. 21 ° 28′ S., a few miles south of the small port of Huanillos. Its total length is estimated at 250 m. The upper courses of the river are at a considerable elevation above the sea and receive a large volume of water from the Cor- dilleras. The water of its upper course and tributaries is sweet, and is conducted across the desert in pipes to some of the coast towns, but in its lower course, as in all the rivers of this region, it becomes brackish. The Copiapo, which once discharged into the sea, is now practically exhausted in irrigating a small fertile valley in which stands the city of that name. The Copiapo and Huasco have com- paratively short courses, but they receive a considerable volume of water from the higher sierras. The latter is also used to irrigate a small, cultivated valley. The rivers of the province of Coquimbo — the Elqui or Coquimbo, Limari and Choapa — exist under less arid conditions, and like those of the province of Aconcagua — the Ligua and Aconcagua — are used to irrigate a much larger area of culti- vated territory. The central agricultural provinces are traversed by several important rivers, all of them rising on the western slopes of the snow-clad Andes and breaking through the lower coast range to the Pacific after being extensively used to irrigate the great central valley of Chile. These are the Maip6 (Maypo or Maipu), Rapel, Mataquito, Maule, Itata, Bio-Bio, Imperial, Tolten, Valdivia or Calle-Calle, Bueno and Maullin. With the exception of the first three, these rivers have short navigable channels, but they are open only to vessels of light draught because of sand-bars at their mouths. The largest is the Bio-Bio, which has a total length of 220 m., 100 of which are navigable. These rivers have been of great service in the agricultural development of this part of Chile, affording means of

transportation where railways and highways were entirely lacking. Some of the larger tributaries of these rivers, whose economic value has been equally great, are the Mapocho, which flows through Santiago and enters the Maipo from the north; the turbulent Cachapoal, which joins the Rapel from the north; the Claro, which waters an extensive part of Jthe province of Talca and enters the Maule from the north; the Nuble, which rises in the higher Andes north of the peaks of Chilian and flows entirely across the province of Nuble to join the Itata on its western frontier; the Laja, which rises in a lake of the same name near the Argentine frontier in about lat. 35 30′ S. and flows almost due west to the Bio-Bio; and the Cautin, which rises in the north-east corner of Cautin and after a tortuous course westward nearly across that province forms the principal confluent of the Imperial. The unsettled southern regions of Chiloe (mainland) and Magallanes are traversed by a number of important rivers which have been only partially explored. They have their sources in the Andes, some of them on the eastern side of the line of highest summits. The Puelo has its origin in a lake of the same name in Argentine territory, and flows north-west through the Cordilleras into an estuary (Reloncavi Inlet) of the Gulf of Reloncavi at the northern end of the Gulf of Chacao. Its lower

course is impeded in such a manner as to form three small lakes, called Superior, Inferior and Taguatagua. A large northern tribu- tary of the Puelo, the Manso, has its sources in Lake Mascardi and other lakes and streams south-east of the Cerro Tronador, also in Argentina, and flows south-west through the Cordilleras to unite with the Puelo a few miles west of the 72nd meridian. The Relon- cavi Inlet also receives the outflow of Lake Todos los Santos through a short tortuous stream called the Petrohue. The Comau Inlet and river form the boundary line between the provinces of Llanquihue and Chiloe, and traverse a densely wooded country in a north- westerly direction from the Andes to the north-eastern shore of the Gulf of Chacao. Continuing southward, the Yelcho is the next important river to traverse this region. It drains a large area of Argentine territorj', where it is called the Rio Fetaleuf u or Fetalauquen, its principal source being a large lake of the same name. It flows south-west through the Andes, and then north-west through Lake Yelcho to the Gulf of Corcovado. The Argentine colony of the 16th of October, settled principally by Welshmen from Chubut, is located on some of the upper tributaries of this river, in about lat. 43 S. The Palena is another river of the same character, having its source in a large frontier lake called General Paz and flowing for some distance through Argentine territory before crossing into Chile. It receives one large tributary from the south, the

Rio Pico, and enters an estuary of the Gulf of Corcovado a little north of the 44th parallel. The Frias is wholly a Chilean river, draining an extensive Andean region between the 44th and 45th parallels and discharging into the Puyuguapi channel, which separates Magdalena island from the mainland. The Aisen also has its source in Argentine territory near the 46th parallel, and drains a mountainous region as far north as the 45th parallel, receiving numerous tributaries, and discharging a large volume of water into the Moraleda channel in about lat. 45 ° 20 S. The lower course of this river is essentially an inlet, and is navigable for a short distance. The next large river is the Las Heras, or Baker, through which the waters of Lakes Buenos Aires and Pueyrredon, or Cochrane, find their way to the Pacific. Both of these large lakes are crossed by the boundary line. The Las Heras discharges into Martinez Inlet, the northern part of a large estuary called Baker or Calen Inlet which penetrates the mainland about 75 m. and opens into Tarn Bay at the south-east corner of the Gulf of Pefias. Azopardo (or Merino Jarpa) island lies wholly within this great, estuary, while at its mouth lies a group of smaller islands, called Baker Islands, which separate it from Messier Channel. The course of the Las Heras from Lake Buenos Aires is south and south- west, the short range of mountains in which are found the Cerros San Valentin and Arenales forcing it southward for an outlet. Baker Inlet also receives the waters of still another large Argentine- Chilean lake, San Martin, whose far-reaching fjord-like arms extend from lat. 49° 10′ to 48 20′ S. ; its north-west arm drains into the Tcro, or La Pascua, river. Lake San Martin lies in a crooked deeply cut passage through the Andes, and the divide between its southern extremity (Laguna Tar) and Lake Viedma, which discharges through the Santa Cruz river into the Atlantic, is- so slight as to warrant the hypothesis that this was once a strait between the two oceans. After a short north-westerly course the Toro discharges into Baker Inlet in lat. 48° 15′ S., long. 73 ° 24′ W. South of the Toro there are no large rivers on this coast, but the narrow fjords penetrate deeply into the mountains and bring away the drainage of their snow-capped, storm-swept elevations. A peculiar network of fjords and connecting channels terminating inland in a peculiarly shaped body of water with long, widely branching arms, called Worsley Sound, Obstruction Sound and Last Hope Inlet, covers an extensive area between the 51st and 53rd parallels, and extends nearly to the Argentine frontier. It has the characteristics of a tidewater river and drains an extensive region. The sources of the Argentine river Coile are to be found among the lakes and streams of this same region, within Chilean territory. A noteworthy peculiarity of southern Chile, from the Taytao peninsula (about 46 50′ S. lat.) to Tierra del Fuego, is the large number of glaciers formed on the

western and southern slopes of the Cordilleras and other high elevations, which discharge direct into these deeply cut estuaries. Some of the larger lakes of the Andes have glaciers discharging into them. The formation of these icy streams at comparatively low levels, with their discharge direct into tidewater estuaries, is a phenomenon not to be found elsewhere in the same latitudes.

The lakes of Chile are numerous and important, but they are found chiefly in the southern half of the republic. In the north the only lakes are large lagoons, or morasses, on the upper Lakes saline plateaus between the 23rd and 28th parallels. They are fed from the melting snows and periodical storms of the higher Andes, and most of them are completely dry part of the year. Their waters are saturated with saline compounds, which in some cases have considerable commercial value. In central Chile above the Bio-Bio river the lakes are small and have no special geographical interest, with the exception perhaps of the Laguna del Maule, in 36° 7′ S., and Laguna de la Laja, in 37° 20′ ,which lie in the Andes near the Argentine frontier and are sources of the two rivers of the same names. Below the Bio-Bio river there is a line of large pictur- esque lakes extending from the province of Cautin, south through that of Llanquihue, corresponding in character and position to the dry lacustrine depressions extending northward in the same valley.

They lie on the eastern side near the Cordilleras, and serve the purpose of great reservoirs for the excessive precipitation of rain and snow on their western slopes. With one exception they all drain westward into the Pacific through short and partly navigable rivers, and some of the lakes are also utilized for steamship navigation. These lakes are Villarica on the southern frontier of Cautin, Rinihue and Ranco in Valdivia, and Puyehue, Rupanco, Llanquihue and Todos los Santos in Llanquihue. The largest of the number are Lakes Ranco and Llanquihue, the former with an estimated area of 200 sq. m. and the latter of 300 sq. m. Lake Todos los Santos is situated well within the Andean foothills north-east of Puerto Montt and at an elevation of 509 ft., considerably above that of the other lakes, Lake Ranco being 230 ft. above sea-level. The great Andean lakes of General Paz (near the 44th parallel), Buenos Aires (in lat. 46 30′ S.), Pueyrredon, or Cochrane (47° 15′ S.) and San Martin (49 S.), lie partly within Chilean

territory. In the extreme south are Lagoa Blanca, a large fresh-water lake in lat. 52 30′ S., and two large inland salt-water sounds, or lagoons, called Otway Water and Skyring Water, connected by FitzRoy Passage.

Geology. — Chile may be divided longitudinally into two regions which differ from each other in their geological structure. Along the coast lies a belt of granite and schist overlaid unconforrnably by Cretaceous and Tertiary deposits; inland the mountains are formed chiefly of folded Mesozoic beds, together with volcanic rocks of later date. The great longitudinal valley of Chile runs approxi- mately, but only approximately, along the boundary between the two zones. Towards the north the coastal zone disappears beneath the sea and the Andean zone reaches to the shore. The ancient rocks which form the most characteristic feature of the former do indeed occur upon the coast of Peru, but in the north of Chile they are found only in isolated masses standing close to the shore or, as at Mejillones, projecting into the sea. South of Antofagasta the old rocks form a nearly continuous band along the coast, extending as far as Cape Horn and Staten Island, and occupying the greater part of the islands of southern Chile. Lithologically they are crystalline schists, together with granite, diorite, gabbro and other igneous rocks. They are known to be pre-Jurassic, but whether they are Palaeozoic or Archaean is uncertain. They are strongly folded and are overlaid unconforrnably by Cretaceous and Tertiary deposits. In the north both the Cretaceous and Tertiary beds of this zone are limited in extent, but towards the south Mesozoic beds ; which are at least in part Cretaceous, form a band of considerable width. The Tertiary beds include both marine and terrestrial deposits, and appear to be chiefly of Miocene and Pliocene age. The whole of the north part of Tierra del Fuego is occupied by plateaus of horizontal Tertiary strata.

The Chilean Andes correspond with the Western Cordillera of Bolivia and Peru, and consist almost entirely of Jurassic and Cre- taceous beds, together with the products of the Tertiary eruptions. The Mesozoic beds are thrown into a series of parallel folds which run in the direction of the chain and which are generally free from any complications such as overthrusting or overfolding. The Cretaceous beds form a synclinal upon the eastern side of the chain (and, in general, beyond the Chilean boundary), while the Jurassic beds are thrown into a number of folds which form the axis and the western flank. Through the Mesozoic beds are intruded granitic and other igneous rocks of Tertiary age, and upon the folded Mesozoic founda- tion rise the volcanic cones of Tertiary and later date. The Trias is known only at La Ternera near Copiapo, where coal-seams with

Rhaetic plants have been found ; but the rest of the Mesozoic series, from the Lias to the Upper Cretaceous, appears to be represented without a break of more than local importance. The deposits are marine, consisting mainly of sandstone and limestone, together with tuffs and conglomerates of porphyry and porphyrite. These porphyritic rocks form a characteristic feature of the southern Andes, and were at one time supposed to be metamorphic; but they are certainly volcanic, and as they contain marine fossils they must have been laid down beneath the sea. They are not confined to any one horizon, but occur irregularly throughout the Jurassic and occasion- ally also amongst the Cretaceous strata. They form, in fact, a special facies which may frequently be traced laterally into the more normal marine deposit of the same age. The fauna of the Mesozoic beds is very rich, and includes forms which are found in northern Europe, others which occur in central Europe, and others again which are characteristic of the Mediterranean region. It lends no support to Neumayr's theory of climatic zones. A large part of the chain is covered by the products of the great volcanoes which still form the highest summits of the Chilean and Argentine Andes. The rocks are liparites, dacites, hornblende and pyroxene andesites. The recent lavas of the still active volcanoes of the south ate olivine-bearing hypersthene-andesite and basalt. 1

Climate. — The climate of Chile varies widely, from the tropical

1 See A. Pissis, " Sur la constitution geologique de la chaine des Andes entre le 16 et le 55 degre de latitude sud," Ann. des mines,_ ser. 7, vol. iii. (Mem.), 1873, pp. 402-426, pis. ix., x. ; R. A. Philippi, Die tertiaren und quartdren Versteinerungen Chiles (Leipzig, 1887), (includes also descriptions of some Cretaceous fossils), and Los Fosiles secondarios de Chile (Santiago, 1899); Karl Burckhardt, " Profils geologiques transversaux de la Cordillere argentino-chilienne. Stratigraphie et tectonique," Anales Mus.

heat and extreme arid conditions of the northern coast to the low temperatures and extreme humidity of western Tierra del Fuego and the southern coast. The high altitudes of the Andean region also introduce vertical zones of temperature, modified to some extent by the rainless plateaus of the north, and by the excessive rainfall of the south. In general terms it may be said that the extremes of temperature are not so great as in corresponding latitudes of the northern hemisphere, because of the greater expanse of water in comparison with the land areas, the summers being cooler and the winters warmer. The cold antarctic, or Humboldt, current sweeps northward along the coast and greatly modifies the heat of the arid,

tropical plateaus. The climate of northern and central Chile is profoundly affected by the high mountain barrier on the eastern frontier and by the broad treeless pampas of Argentina, which raise the easterly moisture-laden winds from the Atlantic to so high an elevation that they sweep across Chile without leaving a drop of rain. At very rare intervals light rains fall in the desert regions north of Coquimbo, but these are brought by the prevailing coast winds. With this exception these regions are the most arid on the face of the globe, highly heated by a tropical sun during the day and chilled at night by the proximity of snow-covered heights and a cold ocean current. _ Going south the temperature slowly falls and the rainfall gradually increases, the year being divided into a short rainy season and a long, dry, cloudless season. At Copiapo, in 27 22′ S., 1300 ft. above the sea, the mean annual temperature is 6o° and the rainfall about I in., but at Coquimbo, in 29 56′ S., the temperature is 59-2° and the rainfall l§ in. At Santiago, in 33° 27′ S., 1755 it. above the sea, the mean temperature is 54 and the annual rainfall 165 in., though the latter varies considerably. The number of rainy days in the year averages about 21. At Talca, in 35 36′ S. and 334 ft. above sea-level, the mean annual temperature is nearly one degree above that of Santiago, but the rainfall has increased to 19-7 in. The long dry season of this region makes ir- rigation necessary, and vegetation has something of a subtropical appearance, palms growing naturally as far south as 37 . The climate is healthy and agreeable, though the death-rate among the common people is abnormally high on account of personal habits and unsanitary surroundings. In southern Chile the climate undergoes a radical change — the prevailing winds becoming westerly, causing a long rainy season with a phenomenal rainfall. The plains as well as the western slopes of the Andes are covered with forest, the rivers become torrents, and the sky is covered with heavy clouds a great part of the year. At Valdivia, in 39 49′ S. and near the sea-level, the mean annual temperature is 52-9° and the annual rainfall 108 to 115 in., with about 150 rainy days in the year. These meteoro- logical conditions are still more accentuated at Ancud, at the north end of the island of Chiloe, in 41° 46′ S., where the mean annual temperature is 50-7° and theannual rainfall 134 in. The equable character of the climate at this point is shown by the limited range between its summer and winter temperatures, the mean for January being 56-5° and the mean for July 45-9°. The almost continual cloudiness is undoubtedly a principal cause, not only of the low summer temperatures, but also of the comparatively high winter temperatures. Frosts are infrequent, and snow does not lie long. The climate is considered to be healthful notwithstanding the excessive humidity. The 600 m. of coast from the Chonos Archi- pelago south to the

Fuegian islands have a climate closely approxi- mating that of the latter. It is wet and stormy all the year through, though the rainfall is much less than that of Ancud and Valdivia. The line of perpetual snow, which is 6000 ft. above sea-level between lat. 41 ° and 43°, descends to 3500 (to 4000) ft. in Tierra del Fuego, affording another indication of the low maximum temperatures ruling during the summer. At the extreme south, where Chilean territory extends across to the Atlantic entrance to the Straits of Magellan, a new climatic influence is encountered in the warm equatorial current flowing down the east coast of South America, which gives to eastern Tierra del Fuego a higher temperature than that of the western shore. The Andes, although much broken in these latitudes, also exert a modifying influence on these eastern districts, sheltering them from the cold westerly storms and giving them a drier climate. This accounts for the surprising meteorological data obtained from Punta Arenas, in 53 10′ S., where the mean annual temperature is 43-2° and theannual rainfall only 22-5 in. Other observations reduce this annual precipitation to less than 1 6 in. According to observations made by the Swedish Antarctic Expedition (1901-1903), at Orange Bay, Hoste Island, in lat. 55° 31′ S., long. 68° 05′ W., which is more exposed to the westerly storms, the mean temperature for 1 1 months was 41-98° and the total precipitation (rain and snow) 53-1 in. The mean maximum temperature was 49-24°, and the mean minimum 35-83°. The observations showed 284 days with rain or snow, of which 70 were with snow.

Flora.— The indigenous flora of Chile is less extensive and less interesting than those of Argentina and Brazil, but contains many peculiar genera and species. A classification of this flora necessitates

La Plata, 1900, and ” Beitrage zur Kenntnis der Jura- und Kreide-formation der Cordillere,” Palaeontographica, vol. 1. (1903-1904) pp. 1-144, pis. i.-xvi.; see also a series of papers on South Ai.r-erican geology by G. Steinmann and his collaborators in Neues Jahrb,Jut Min. Beil.-band viii. et seq.

its division into at least three general zones — the desert provinces of the north, central Chile, and the humid regions of the south. The first is an arid desert absolutely barren along part of the coast, between

Tacna and Copiapo, but with a coarse scanty vegetation near the Cordilleras along watercourses and on the slopes where moisture from the melting snows above percolates through the sand. In the valleys of the Copiapo and Huasco rivers a meagre vegetation is to be found near their channels, apart from what is produced by irrigation, but the surface of the plateau and the dry river channels below the sierras are completely barren. Continuing southward into the province of Coquimbo a gradual change in the arid conditions may be observed. The higher summits of the Cordilleras afford a larger and more continuous supply of water, and so dependent are the people in the cultivated river valleys on this source of water supply that they watch for snowstorms in the Cordilleras as an indication of what the coming season is to be. The arborescent growth near the mountains is larger and more vigorous, in which are to be found the ” algarrobo ” (Prosopis siliqvastrum) and ” chaiiar ” (Gourliea chilensis), but the only shrub to be found on the coast is a species of Skytanthus. Near the sierras where irrigation is possible, fruit-growing is so successful, especially the grape and fig, that the product is considered the best in Chile. In regard to the indigenous flora of this region John Ball 1 says: “The species which grow here are the more or less modified representatives of plants which at some former period existed under very different conditions of life.” Proceeding southward cacti become common, first a dwarfed species, and then a larger columnar form (Cereus quisco). The streams are fringed with willows; fruit trees and alfalfa fields fill the irrigated valleys, and the lower mountain slopes are better covered with a thorny arborescent growth. The divides between the streams, however, continue barren as far south as the transverse ranges of mountains across the province of Aconcagua.

To some degree the flora of central Chile is of a transition character between the northern and southern zones. It is much more than this, however, for it has a large number of genera and species peculiarly its own. A large majority of the 198 genera peculiar to the South American temperate regions belong exclusively to central Chile. This zone extends from about the 30th to the 36th parallel, perhaps a little farther south to include some characteristic types. The evergreens largely predominate here as well as in the extreme south, and on the open, sunburnt plains the vegetation takes on a sub- tropical aspect. One of the most characteristic trees of this zone is the peumo (Cryptocarya peumus), whose dense evergreen foliage is everywhere conspicuous. The quillay (Quillaja saponaria) is another characteristic evergreen tree of this region, whose bark possesses saponaceous properties. In earlier times the coquito palm (Jubaca spectabilis) was to be found throughout this part of Chile, but it has been almost

completely destroyed for its saccharine sap, from which a treacle was made. One of the most striking forest trees is the pehuen or Chilean pine {Araucaria imbricata), which often grows to a height of 100 ft. and is prized by the natives for its fruit. Three indigenous species of the beech — the roble (Fagus obliqua), coyhue (F. Dombeyi), and rauli (F. procera) — are widely diffused and highly prized for their wood, especially the first, which is misleadingly called roble (oak). Most of the woods used in construction and manu- factures are found between the Bio-Bio river and the Taytao peninsula, among which are the alerce (Fitzroya patagonica), cipres or Chiloe cypress (Libocedrus tetragona), the Chilean cypress (L. Chilensis), lingue (Persea lingue), laurel (Laurus aromatica), ayellano (Guevina avellana), luma (Myrtus luma), espino (Acacia cavenia) and many others. Several exotic species have Deen introduced into this part of Chile, some of which have thriven even better than in their native habitats. Among these are the oak, elm, beech (F. sylvatica), walnut, chestnut, poplar, willow and eucalyptus. Through the central zone the plains are open and there are forests on the mountain slopes, but in the southern zone there are no plains, with the excep- tion of small areas near the Straits of Magellan, and the forests are universal. In the variety, size and density of their growth these forests remind one of the tropics. They are made up, in great part, of the evergreen beech (Fagus betuloides), the deciduous antarctic beech (F. antarctica) , 2 and Winter's bark (Drimys Winteri), inter- mingled with a dense undergrowth composed of a great variety of shrubs and plants, among which are Maytenus magellanica. Arbutus rigida, Myrtus memmolaria, two or three species of Berberis, wild currant (Ribes antarctica), a trailing blackberry, tree ferns, reed-like grasses and innumerable parasites. On the eastern side of the Cordillera, in the extreme south, the climate is drier and open, and grassy plains are found, but on the western side the dripping forests extend from an altitude of 1000 to 1500 ft. down to the level of the sea. A peculiar vegetable product of this inclement region is a small globular fungus growing on the bark of the beech, which is a staple article of food among the Fuegians — probably the only instance where a fungus is the bread of a people.

It is generally conceded that the potato originated in southern Chile, as it is found growing wild in Chiloe and neighbouring islands and on the adjacent mainland. The strawberry is also indigenous to these latitudes on both sides of the Andes, and Chile is credited

' Notes of a Naturalist in South America, p. 134. 2 Also classified as Nothofagus (Mirb.).

with a species from which the cultivated strawberry derives some of

its best qualities. Maize and quinoa (Chenopodium quinoa) were known in Chile before the arrival of Europeans, but it is not certain that they are indigenous. Species of the bean and pepper plant are also indigenous, and the former is said to have been cultivated by the natives. Among the many economic plants which have been introduced into Chile and have become important additions to her resources, the more prominent are wheat, barley, hemp and alfalfa (Medicago saliva) , together with the staple European fruits, such as the apple, pear, peach, nectarine, grape, fig, olive and orange. The date-palm has also been introduced into the southern provinces of the desert region. Among the marine pro- ductions on the southern coast, a species of kelp, Macrocystis pyrifera, merits special mention because of its extraordinary length, its habit of clinging to the rocks in strong currents and turbulent seas, and its being a shelter for innumerable species of marine animals. Captain FitzRoy found it growing from a depth of 270 ft.,

Fauna. — The fauna of Chile is comparatively poor, both in species and individuals. A great part of the northern deserts is as barren of animal life as of vegetation, and the dense humid forests of the south shelter surprisingly few species. There are no large mammals in all this extensive region except the Cetacea and a species of the Phocidae of southern waters. Neither are there any dangerous species of Carnivora, which are represented by the timid puma (Felis concolor), three species of wildcats, three of the fox, two of Conepatus, a weasel, sea-otter and six species of seal. The rodents are the most numerously represented order, which includes the coypu or nutria (Myopotamus coypus), the chinchilla (Chinchilla laniger), the tuco-tuco (Ctenomys brasiliensis) , a rabbit, and 12 species of mice — in all some 12 genera and 25 species. The coypu, sometimes called the South American beaver, inhabits the river-banks, and is highly prized for its fur. It is also found along the river-courses of Argentina. The ruminants are represented by a few species only — the guanaco (Auchenia huanaco), vicuna (A. vicugna), huemul (Cervus chilensis). which appears on the Chilean escutcheon, and the pudu deer, a small and not very numerous species. There are two species of the Edentata, Dasypus and Pichiciego, the latter very rare, and one of the opossums. European animals, such as horses, cattle, sheep, swine and goats, have been introduced into the country and do well. Sheep-raising has also been inaugurated with some degree of success in the vicinity of the Straits of Magellan. The avifauna, with the exception of waterfowl, is also limited to comparatively few species. Birds of prey are represented by the condor, vulture, two species of the carrion-hawk (Polyborus), and owl. The Chilean slopes of the Andes appear to be a favourite haunt of

the condor, where neighbouring stock-raisers suffer severe losses at times from its attacks. The Insessores are represented by a number of species. Parrots are found as far south as Tierra del Fuego, where Darwin saw them feeding on seeds of the Winter's bark. Humming-birds have a similar range on this coast, one species (Mellisuga Kingii) being quite numerous as far south as Tierra del Fuego. A characteristic genus is that of Pteroptochus, of which there are three or four species each characterized by some conspicuous peculiarity. These are P. megapodius, called El Turco by the natives, which is noticeable for its ungainly appearance and awkward gait; the P. albicollis, which inhabits barren hillsides and is called tapacollo from the manner of carrying its tail turned far forward over its back ; the P. rubecula, of Chiloe, a small timid denizen of the gloomy forest, called the cheucau or chuca, whose two or three notes are believed by the superstitious natives to be auguries of impending success or disaster ; and an allied species (Hylactes Tamil, King) called the guid-guid or barking bird, whose cry is a close imitation ot the yelp of a small dog. The southern coast and its inland waters are frequented by several species of petrel, among which are the Procellaria gigantea, whose strength and rapacity led the Spaniards to call it quebranta huesos (breakbones) , the Puffinus cinereus, which inhabits the inland channels in large flocks, and an allied species (Puffinuria Berardii) which inhabits the inland sounds and resembles the auk in some particulars of habit and appearance. There are numerous species in these sheltered channels, inlets and sounds of geese, ducks, swans, cormorants, ibises, bitterns, red-beaks, curlew, snipe, plover and moorhens. Conspicuous among these are the great white swan (Cygnus anatoides), the black-necked swan (Anser nigricollis), the antarctic goose (Anas antarctica) and the " race-horse " or " steamer duck " (Micropterus brachypterus).

The marine fauna is less known than the others, but it is rich in species and highly. interesting in its varied forms and characteristics. The northern coast has no sheltered waters of any considerable extent, and the shore slopes abruptly to a great depth, which gives it a marine life of no special importance. In the shoal waters about Juan Fernandez are found a species of codfish (possibly Gadus macrocephalus) , differing in some particulars from the Newfoundland cod, and a large crayfish, both of which are caught for the Valparaiso market. The sheltered waters of the broken southern coast, however, are rich in fish and molluscs, especially in mussels, limpets and barnacles, which are the principal food resource of the nomadic Indian tribes of those regions. A large species of barnacle, Balanus psittacus, is found in great abundance from Conception to Puerto Montt, and is not only eaten by the natives, by whom it is called pico,

but is also esteemed a great delicacy in the markets of Valparaiso

POPULATION]

CHILE

and Santiago. Oysters of excellent flavour are found in the sheltered waters of Chiloe. The Cetacea, which frequent these southern waters, are represented by four species — two dolphins and the sperm and right whale— and the Phocidae by six species, one of which (Phoca lupina) differs but little from the common seal. Another species {Macrorhinus leoninus), popularly known as the sea-elephant, is provided with short tusks and a short trunk and sometimes grows to a length of 20 ft. Still another species, the sea-lion (Otariajubata), furnishes the natives of Tierra del Fuego with an acceptable article of food, but like the Phoca lupina it is becoming scarce.

Of Reptilia Chile is singularly free, there being recorded only eleven species — five saurians, Tour ophidians, one frog and one toad — but a more thorough survey of the uninhabited territories of the south may increase this list. 1 here are no alligators in the streams, and the tropical north has very few lizards. There are no poisonous snakes in the country, and, in a region so filled with lakes and rivers as the rainy south, only two species of batrachians. The insect life of these strangely associated regions is likewise greatly restricted by adverse climatic conditions, a considerable part of the northern desert being absolutely barren of animal and vegetable life, while the climate of Tierra del Fuego and the southern coast is highly unfavour- able to terrestrial animal life, for which reason comparatively few species are to be found. Writing of a journey inland from Iquique, Charles Darwin says {Journal of Researches, &c, p. 444) : ” Excepting the Vultur aura, ... I saw neither bird, quadruped, reptile, nor insect.” Of his entomological collection in Tierra del Fuego, which was not large, the majority were of Alpine species. Moreover, he did not find a single species common to that island and Patagonia. These conditions subsist with but few modifications, if any, from the Straits northward to the 42nd parallel, the extreme humidity, abnormal rainfall and dark skies being unfavourable to the develop- ment of insect life, while the Andes interpose an impassable barrier to migration from the countries of the eastern coast. The only venomous species to be found in central Chile is that of a spider which frequents the wheat fields in harvest time.

Population. — The population of Chile is largely concentrated in the twelve agricultural provinces between and including Coquimbo and Concepci6n, though the next six provinces to the south, of more recent general settlement, have received some foreign immigrants, and are rapidly growing. In the desert provinces the population is limited to the mining communities, and to the ports and supply stations maintained for their support and for the transport, smelting and

export of their produce. The province of Atacama has, in addition to its mining popula- tion, a considerable number of agriculturists located in a few irrigated river valleys, which class is largely increased in the adjoining province of Coquimbo. The more northern provinces, however, maintain their populations without the support of such small cultivated areas. In the southern territories unfavourable conditions of a widely different character prevail, and the population is restricted to a few small settlements and some nomadic tribes of Indians. Here, however, there are localities where settlements could be maintained by ordinary means and the population could be greatly increased. Since the census of 1895 the population of Punta Arenas has been largely increased by the discovery of gold in the vicinity. The twelve provinces first mentioned, which include the celebrated ” Vale of Chile,” comprise only 17% of the area of the republic, but the census of 1805 showed that 72% of the total population was con- centrated within their borders. The four desert provinces north of Coquimbo had only 8 % of the total, and the seven provinces and one territory south of Conception had 20%. According to the census of 1895 the total population was 2,712,145, to which the census officials added 10% to cover omissions. This shows an increase slightly over 7 % for the preceding decennial period, the population having been returned as 2,527,320 in 1885. The census returns of 1875 and 1866 gave respectively 2,068,447 and 2,084,943, showing an actual decrease in population. During these years Chile held the anomalous position of a country spending large sums annually to secure immigrants while at the same time her own labouring classes were emigrating by thousands to the neighbouring republics to improve their condition. Writing in 1879, a correspondent of The Times 1 stated that this emigration then averaged 8000 a year, and in bad times had reached as many as 30,000 in one year. The condition of the Chilean labourer has been much improved since then, however, and Chile no longer suffers so serious a loss of 1 A. Gallenga, South America (London, 1880), p. 181.

population. In 1895, the foreigners included in the Chilean population numbered 72,812, of which 42,105 were European, 29,687 American, and 1020 Asiatic, &c. According to nation- ality there were 8269 Spanish, 7809 French, 7587 Italian, 7049 German, 6241 British, 1570 Swiss, 1490 Austro-Hungarian, 13,695 Peruvian, 7531 Argentine, 6654 Bolivian, 701 American (U.S.), 797 Chinese. According to residence, 1,471,792 were inhabitants of rural districts, and 1,240,353 of towns. The registration of births, marriages and deaths is compulsory since the 1st of January 1885, but the provisions of the law are frequently eluded. Notwithstanding the healthiness of the

climate, the death-rate is high, especially in the large cities. In Santiago and Valparaiso the death-rate sometimes rises to 42 and 60 per 1000, and infant mortality is very high, being 73 % of the births in some of the provincial towns. This unfavourable state of affairs is due to the poverty, ignorance and insanitary habits of the lower classes. The government has made repeated efforts to secure immigrants from Europe, but the lands set apart for immigrant settlers are in the forested provinces south of the Bio-Bio, where the labour and hardships involved in establishing a home are great, and the protection of the law against bandits and criminal assaults is weak. The Germans have indeed settled in many parts of these southern provinces since 1845, and by keeping together have succeeded in building up several important towns and a large number of prosperous agricultural communities. One German authority (Hiiber) estimates the number of Germans in two of these pro- vinces at 5000. The arrivals, however, have been on the whole discouragingly small, the total for the years 1901-1905 being only 14,000.

Although Chileans claim a comparatively small admixture with the native races, it is estimated that the whites and Creoles of white extraction do not exceed 30 to 40% of the population, while the mestizos form fully 60%. This estimate is unquestion- ably conservative, for there has been no large influx of European blood to counterbalance the race mixtures of earlier times. The estimated' number of Indians living within the boundaries' of Chile is about 50,000, which presumably includes the nomadic tribes of the Fuegian archipelago, whose number probably does not reach 5000. The semi-independent Araucanians, whose territory is slowly being occupied by the whites^ are concentrated in the eastern forests of Bio-Bio, Malleco and Cautin, all that remains to them of the Araucania which they so bravely and successfully defended for more than three centuries. Their number does not much exceed 40,000, which is being steadily reduced by drunkenness and epidemic diseases. A small part of these Indians live in settled communities and include some very successful stock-raisers, but the greater part live apart from civilization. There are also some remnants of tribes in the province of Chiloe, which inhabit the island of that name, the Chonos and Guaytecas archipelagoes and the adjacent mainland, who have the reputation of being good boatmen and fishermen; and there are remnants of a people called Changos, on the desert coast, and traces of Calchaqui blood in the neighbouring Andean foothills.

There is a wide difference in every respect between the upper or ruling class and the common people. The former includes the landed proprietors, professional men and a part of those engaged in

commercial and industrial pursuits. These educated classes form only a small minority of the population. Many of them, especially the landed proprietors, are descendants of the original Spanish settlers and are celebrated for their politeness and hospitality. The political control of the republic was secured to them by the constitution of 1833. The common people were kept in ignorance and practically in a state of hopeless servitude. They were allowed to occupy small leaseholds on the large estates on condition of performing a certain amount of work for the landlord. Every avenue toward the betterment of their con- dition was practically closed. The condition of the itinerant labourers {peons) was still worse, the wages paid them being hardly sufficient to keep them from starvation. The Chilean peon, however, comes from a hardy stock, and has borne all

these hardships with a fortitude and patience which go far to counterbalance his faults. Recent reforms in education, &c, together with the growth of manufacturing industries, are slowly leading to improvements in the material condition of the common people.

The political organization of the country has not been favour- able to the development of artistic or scientific tastes, though Chile has produced political leaders, statesmen and polemical writers in abundance. Historical literature has been enriched by the works of Diego Barros Arana, Benjamin Vicuna Mackenna, Miguel Luis Amunategui, Carlos Walker Martinez, and others. One of the earliest native histories of Chile was that of Abbe J. Ignacio Molina, an English translation of which has long been a recognized authority; it is full of errors, however, and should be studied only in connexion with modern standard works. Among these must be included Claude Gay's monu- mental work, Historia General de Chile, and Sir C. R. Markham's admirable studies on special parts of the subject. In science, nearly all the important work has been done by foreigners, among whom are Charles Darwin, Claude Gay, Eduard Poppig, Rudolph A. Philippi and Hans Steffen, who deserves special mention for his excellent geo- graphical work in the southern Andes.

Divisions and Towns. — Chile contains 23 provinces and one terri- tory, which are subdivided into 75 departments, 855 subdelegations and 3068 districts. The territory north of the Bio-Bio was origin- ally

divided into 13 provinces, besides which the Spaniards held Chiloe, Juan Fernandez and Valdivia, the latter being merely a military outpost. During the years which have elapsed since the War of Independence the territory south of the Bio-Bio has been effectively occupied and divided into six provinces, Chiloe and the nsighbouring islands and mainland to the east became a province, and four provinces in the northern deserts were acquired from Bolivia and Peru. In addition to this, Chile claimed Patagonia and the adjacent islands, and has finally secured not only the forested

strip of territory west of the Andes, but also a large piece of the Patagonian mainland, south of lat. 52° S., the larger part of Tierra del Fuego, and all the western islands. This extensive region, comprising an area of 71,127 sq. m., has been provisionally organized as the territory of Magallanes. For a list of provinces, their areas, reduced from official returns, their populations, and the names and populations of their capitals, see the bottom of this page.

In addition to the provincial capitals there are few towns of importance. Among these may be mentioned: —

Population.

Population.

1895.

Est. 1902.

1895-

Est. 1902.

Arica

2,853

2824

Parral

8,586

10,219

Pisagua ….

3.635

4720

Constitucion

6,400

6,453

Taltal ….

5,834

6574

San Carlos .

7,051

6,579

Tocopilla ….

3,383

4752

Coronel .

4-575

5,959

Vallenar ….

5,052

5199

Lota ….

9,797

Coquimbo.

7-322

8165

Talcahuano .

10,431

13,499

Ovalle ….

5,565

5772

El Tome

3,977

6,189

Los Andes (Santa

Rosa) ....

5,504

6854

Arauco .

3,008

3,334

Quillota ….

9,621

9876

Cafiete .

2,000

2,552

Vina del Mar . .

10,651

Mulchen

4,268

4,332

Melipilla . . .

4,286

5023

Traiguen

5,732

7,099

Rengo

6,463

7232

Victoria .

6,989

10,002

Vichuquen

826

37M

La Union

2,830

3,908

Molina ….

3,609

3222

Osorno .

4,667

5,888

Castro (Chiloe) .

1,035

2,166

Popul

ation.

Provinces.

Area.

Population. Census 1895.

Capitals.

Census 1895.

Est. 1902.

Tacna

9,251

24,160

Tacna

9,418

11,504

Tarapaca ….

18,131

89,751

Iquique .

33,031

42,788

Antofagasta .

46,611

44,085

Antofagasta .

13-530

16,084

Atacama ….

30,729

59,713

Copiapo .

9,301

8,991

Coquimbo.

13461

160,898

La Serena

15,712

19,536

Aconcagua

5,487

113,165

San Felipe .

n,3i3

1 1 ,660

j Valparaiso

i,953

220,756

Valparaiso .

122,447

142,282

1 Santiago ….

5,665

415,636

Santiago .

256,403

332,059

j O’Higgins

2,342

85,277

Rancagua

6,665

7,133

Colchagua

3,856

157,566

San Fernando . .

7-447

8,164

Curico ….

2,978

103,242

Curic6

12,669

i4,34o

3,840

128,961

Talca

33,232

42,766

Linares ….

3,942

101,858

Linares .

7,331

7,256

2,475

119,791

Cauquenes .

8,574

9,895

Nuble

3,407

152,935

Chilian .

28,738

36,382

Concepcion

3,252

188,190

Concepcion .

39,837

49,351

Arauco ….

2,458

59,237

Lebii ….

2,784

3,178

Bio-Bio ….

5,246

88,749

Los Angeles .

7,868

7,777

Malleco ….

2,973

98,032

Angol

7,056

7,638

5,832

78,221

Temuco .

7,078

9,699

Valdivia ….

8,649

60,687

Valdivia

8,060

9,704

Llanquihue

45,515

78,315

Puerto Montt .

3,48o

4,r40

Chiloe

8,593

77,75o

Ancud

3,182

3,787

Magallanes (Ter.) Total, official

71,127

5,170

Punta Arenas .

3,227

8,327

307,774

2,712,145

Total according to

Gotha computation

293,062

With 10% added for

omissions .

2,983,359

Official estimate for

1902 ....

3,173,783

The population is not concentrated in large cities, but is well distributed through the cultivated parts of the country. The large number

of small towns, important as ports, market towns, or manu- facturing centres, is a natural result. Many of the foregoing towns are only villages in size, but their importance is not to be measured in this way. ‘ Arica is one of the oldest ports on the coast, and has long been a favoured port for Bolivian trade because the passes through the Cordilleras at that point are not so difficult. Moreover, the railway from Arica to La Paz will still further add to its import- ance, though it may not greatly increase its population. Another illustration is that of Vichuquen, province of Curico, situated on a tide-water lake on the coast, which is the centre of a large salt- making industry. Still another instance is that of Castro, the oldest settlement and former capital of Chiloe, which after a century of decay is increasing again through the efforts to develop the industries of that island.

Communications. — Railway construction in Chile dates from 1850, when work was begun on a short line between Copiapo and the port of Caldera, in the Atacama desert region. Since then lines have

been built by private companies from the coast at several points to inland mining centres. One of these, run- ning from Antofagasta to the Caracoles district, was afterwards extended to Oruro, Bolivia, and has become a commercial route of international importance, with a total length of 574 m., 224 of which are in Chile. It should be remembered that many of these railway enterprises of the desert region originated at a time when the territory belonged to Bolivia and Peru. The first railway to be con- structed in central Chile was the government line from Valparaiso to Santiago, 115 m. in length, which was opened to traffic in 1863. About the same time the government began the construction of a longitudinal trunk line running southward from Santiago midway between the Andes and the Coast range, and connecting with all the provincial capitals and prominent ports. This is the only railway ” system ” it is possible for Chile to have. The civil war of 1 89 1 called attention to the need of a similar inland route through the northern provinces. A branch of the Valparaiso and Santiago line runs to Los Andes, and its extension across the Andes connects with the Argentine lines from Buenos Aires to Mendoza and the Chilean frontier — all sections together forming a transcontinental route about 850 m. in length. The Transandine section of this route crosses the Cordillera through the

Uspallata pass. A further Transandine scheme provides for a line through the Pino Hachado pass (38 30′ to 39° S.), and the Argentine Great Southern Company obtained a concession in 1909 to extend its Neuquen line to the frontier of Chile. The railways of the republic had a total mileage at the end of 1906 of 2950 m., of which 1495 m. were owned by the state, and 1455 m. belonged to private companies. The private lines are located in the northern provinces and are for the most part built and maintained for the transportation of mining products and supplies.

In addition to her railway lines Chile has about 21,000 m. of public roads of all descriptions, 135 m. of tramways, and 705 m. of navigable river channels, besides a very considerable mileage of lake and coast navigation. Telegraphic communication between all the important towns of the republic, initiated in 1855 with a line between Santiago and Valparaiso, is maintained by the state, which in 1903 owned 9306 m. of line in a total of 11,080 m. Cable communication with Europe by way of Buenos Aires was opened in 1875, and is now maintained by means of two underground cables across the Andes, 32 m. in length. A West Coast cable also connects with Europe and North American states by way of Panama. There were 15,853 m. of telephone wires in the republic in 1906, all the principal cities having an admirable service. Modern postal facilities date from 1853. The Chilean post-office is administered by a director-general at Santiago, and has a high degree of efficiency and liberality, com- pared with those of other South American states. The postal rates are low, and newspapers and other periodical publications circulate free, as a means of popular instruction. The postal revenues for

1904 amounted to 2,775,730 pesos and the expenditures to 2,407,753 pesos. Chile is a member of the International Postal Union, and has arrangements with the principal commercial nations for the exchange of postal money values.

The sea has been the only means of communication with distant parts of the country, and must continue to be the chief transporta- tion route. There are said to be 56 ports on the Chilean coast, of which only 12 are prominent in foreign trade. Many of the so- called ports are only landing-places on an open coast, others are on shallow bays and obstructed river-mouths, and some are little-known harbours among the channels and islands of the south. The pro- sperity of Chile is intimately connected with her ocean-going trade, and no elaborate system of national railway lines and domestic manufactures can ever change this relationship. These conditions should have developed a large merchant marine, but the Chileans are not traders and are sailors

only in a military sense. In 1905 their ocean-going merchant marine consisted of only I48 vessels, of which 54 were steamers of 42,873 tons net, and 94 were sailing vessels of 39,346 tons. Nineteen of the 54 steamers belonged to a subsidized national line whose West Coast service once extended to San Fran- cisco, California, and a large part of the others belongs to a Lota coal-mining and copper-smelting company which employs them in carrying coal to the northern ports and bringing back metallic ores for smelting. The navigable rivers and inland lakes employ a number of small steamers. The foreign commerce of the republic is carried chiefly by foreign vessels, and the coasting trade is also open to them. Three or four foreign companies maintain a regular steamship ser- vice to Valparaiso and other Chilean ports. The shipping entries at all Chilean ports during the year 1904, both national and foreign, numbered 11,756, aggregating 17,723,138 tons, and the clear- ances 1 1,689, aggregating 17,370,763 tons. Very nearly one-half this tonnage was British, a little over 18% German, and about 29% Chilean.

Commerce. — In the aggregate, the commerce of Chile is large and important; in proportion to population it is exceeded among South American states only by Argentina, Uruguay and the Guianas. Unlike those states, it depends in great part on mining and its allied occupations. The values of imports and exports (including bullion, specie and re-exports) in pesos of i8d. during the five years 1901-

1905 were as follows : —

Year.	Imports. pesos.	Exports. pesos.
1901	139,300,766	171,844,976
1902	132,428,204	185,879,965
1903	149,081,524	210,442,144
1904	164,874,928	232,493,598
1905	188,596,418	265,209,192

The principal imports comprise live animals, fish, coffee, mate (Ilex paraguayensis) , tea, sugar, wood and its manufactures, struc- tural iron and steel, hardware and machinery, railway and telegraph supplies, lime and cement, glass and earthenware, cotton, woollen and silk manufactures, coal,' petroleum, paints, &c. Import duties are

imposed at the rates of 60, 35, 15, 5 and 25%, and certain classes of merchandise are admitted free. The higher rates are designed chiefly to protect national industries, while wines, liquors, cigars and tobacco are admitted at the lowest rate._ The 25% rate covers all articles not mentioned in the schedules, which number 2260 items. The duty free list includes raw cotton, certain descriptions of live animals, agricultural machinery and implements, metal wire, fire engines, structural iron and steel, and machinery in general. The tariff is nominally ad valorem, but as the rates are imposed on fixed official valuations it is essentially specific. The duties on

imports in 1905 amounted to 91,321,860 pesos, and in 1906 to I0 3.5°7.556 pesos. The principal exports are gold, silver, copper (bars, regulus and ores), cobalt and its ores, lead and its ores, vanadium ores, manganese, coal, nitrate of soda, borate of lime, iodine, sulphur, wheat and guano. Nitrate of soda forms from 70 to 75% of the exports, and the royalty received from it is the principal source of national revenue, yielding about £4,000,000 per annum. In 1904 mineral products made up fully seven-eighths of the exports, while agricultural and pastoral products did not quite reach one-eighth.

Agriculture. — According to the census returns about one-half the population of Chile lives in rural districts, and is engaged nominally in agricultural pursuits. What may be called central Chile is singularly well adapted to agriculture. The northern part of this region has a sub-tropical climate, light rainfall and a long, dry summer, but with irrigation it produces a great variety of products. Alfalfa, or lucerne (Medicago sativa), is grown extensively for ship- ment to the mining towns of the desert provinces. There were no less than 108,384 acres devoted to it in 1904, a considerable part of which was in the irrigated river valleys of Coquimbo and Aconcagua. Considerable attention is also given to fruit cultivation in these sub- tropical provinces, where the orange, lemon, fig, melon, pineapple and banana are produced with much success. Some districts, especially in Coquimbo, have gained a high reputation for the excel- lence of their preserved fruits. The vine is cultivated all the way from Atacama and Coquimbo, where excellent raisins are produced, south to Concepcion, where some of the best wines of Chile are manufactured. In 1904 there were 93,370 acres devoted to grape production in this region, the product for that year being 30,184,704 gallons of wine and 212,366 gallons of brandy. The universal beverage of the people — chicha — is made from Indian corn. Although wheat is produced in the northern part of this region, it is grown with greater success in the south, where the rainfall is heavier and the average temperature is lower. There were 1,044,025 acres devoted to this cereal in 1903,

which produced 17,910,614 bushels, or an average of 17 bushels (of 60 lb) to the acre. In 1904 the production was increased to 19,999,324 bushels, but in 1905 it fell off to 15,771,477 bushels. At one time Chile supplied Argentina and the entire West Coast as far north as California with wheat, but Argentina and California have become wheat producers and ex- porters, and Chile has been driven from all her old consuming markets. Great Britain is now her best customer, and Brazil takes a small quantity for milling mixtures. Chile has been badly handi- capped by her crude methods of cultivation, but these are passing away and modern methods are taking their place. Formerly wheat was grown chiefly in the region of long rainless summers, and the ripened grain was thrown upon uncovered earth floors and threshed by horses driven about over the straw, but this antiquated process was not suited to the climate and enterprise of the more southern provinces, and the modern threshing-machine has been introduced. Barley is largely produced, chiefly for home consumption. Maize (Indian corn) is grown in every part of Chile except the rainy south where the grain cannot ripen, and is a principal article of food. The green maize furnishes two popular national dishes, choclos and humitas, which are eaten by both rich and poor. Potatoes also are widely cultivated, but the humid regions of the south, particularly from Valdivia to Chiloe, produce the greatest quantity. The total annual production exceeds three million bushels. The kidney bean (Phaseolus vulgaris) is another staple product in every part of the country, and is perhaps the most popular article of food among all classes of Chileans. Peas are largely cultivated south of the Maule. Walnuts have become another important product and are exported, the average annual produce being 48,000 to 50,000 bushels. The olive was introduced from Spain in colonial times and is widely distributed through the north central provinces, but its economic importance is not great. Of the European fruits introduced into the southern provinces, the apple has been the most successful. It grows with little care and yields even better than in its original home. The peach, apricot, plum, quince and cherry are also culti- vated with success. Wild strawberries are found on both sides of the Andes; the cultivated varieties are unsurpassed, especially those of the province of Concepcion.

The pastoral industries of Chile have been developed chiefly for the home market. The climate is admirably suited to cattle-raising, as the winters are mild and pasture is to be found throughout the whole year, but the proximity of the Argentine pampas is fatal to its profitable development. The government has been trying to promote cattle-breeding by levying duties (as high as 16 pesos a head) on cattle

imported from Argentina, but with no great success. The importation, which formerly numbered about I40,oooper annum, still numbers not far from 100,000 head. There are some districts in central Chile where cattle-raising is the principal occupation, but the long dry summers limit the pasturage on the open plains and prevent the development which perhaps would otherwise result. As in Argentina, beef is generally dried in the sun to make charqui (ierked beef), in which form it is exported to the desert provinces. Horse and mule breeding are carried on to a limited extent, and since the opening of the far South more attention has been given to sheep. Goats and swine are raised in small numbers on the large estates, but in Chiloe swine-raising is one of the chief occupations

of the people. Some attention has been given to the production of butter and cheese, but the industry has attained no great importance. A new industry which has made noteworthy progress, however, is that of bee-keeping, which is greatly favoured by the mild climate and the long season and abundance of flowers.

Manufactures. — The manufacturing interests of Chile have become influential enough to force a high tariff policy upon the country. They have been restricted principally to articles of necessity — food preparations, beverages, textiles and wearing apparel, leather and leatherwork, woodwork, pottery, chemicals, ironware, &c. In earlier days, when Chile had less competition in the production of wheat, flour mills were to be found everywhere in the wheat-producing provinces, and flour was one of the leading exports. Concepcion, Talca, and other provincial capitals developed important milling industries, which were extended to all the chief towns of the newer provinces south of the Bio-Bio. There are over 500 large flour mills in Chile, the greater part of which are equipped with modern roller-process machinery. The development of the coal deposits in the provinces of Concepcion and Arauco has made possible other industries besides those of smelting mineral ores, and numerous small manufacturing establishments have resulted, especially in Santiago, Valparaiso, Copiapo and other places where no permanent water power exists. Tanning leather is an important industry, especially in the south, some of the Chilean trees, notably the algarrobilla (Balsamocarpon brevifolium) and lingue {Per sea lingue), being rich

in tannin. To provide a market for the leather produced, factories have been established for the manufacture of boots and shoes, harness and saddles, and under the protection of a high tariff are doing well. Brewing and distilling have made noteworthy progress, the domestic consumption of their products being very large. The breweries are generally worked by Germans and are situated chiefly in the south, though there are large establishments in Santiago and Valparaiso. Small quantities of their products are exported. Furniture and carriage factories, cooperages, and other manufactories of wood are numerous and generally prosperous. There are likewise a large number of factories for canning and preserving fruits and vegetables. Foundries and machine shops have been established, especially for the manufacture of railway material. The sugar beet has been added to the productions of Chile, and with it the manufacture on a small scale of beet sugar. There is one large refinery at Vina del Mar, however, which imports raw cane sugar from Peru for refining. The manufacture of textiles is carried on at Santiago and El Tome, and numerous small factories are devoted to clothing of various descriptions. The great mining industries have led to a noteworthy development in the production of chemicals, and a considerable number of factories are engaged in the production of pharmaceutical preparations, perfumeries, soaps, candles, &c.

Mining. — The most important of all the national industries, however, is that of mining. In 1903 there were 11,746 registered mines, on which mining dues were paid, the aggregate produce being valued at 178,768,170 pesos. These mines gave employment to 46,592 labourers, of whom 24,445 were employed by the nitrate companies, 13,710 in various metalliferous mines, 6437 in coal mines, and 2000 in other mines. Gold is found in nearly all the provinces from Antofagasta to Concepcion, and in Llanquihue, Chiloe and Magallanes territory, but the output is not large. There are a great many placer washings, among which are some extensive deposits near the Straits of Magellan. Silver is found principally on the elevated slopes and plateaus of the Andes in the desert provinces of the north. The second most important mining industry in Chile, however, is that of copper, which is found in the provinces of Antofagasta, Atacama, Coquimbo, Aconcagua, Valparaiso, Santiago, O'Higgins, Colchagua, Curico and Talca, but the richest deposits are in the three desert provinces. Chile was once the largest pro- ducer of copper in the world, her production in 1860-1864 being rated at 60 to 67% of the total. Low prices afterwards caused a large shrinkage in the output, but she is still classed among the principal producers. Iron mining has never been developed in Chile, although extensive deposits are said to exist.

Manganese ores are mined in Atacama and Coquimbo, and their export is large. The other metals reported in the official returns are lead, cobalt and vanadium, of which only small quantities are produced. Bolivian tin is exported from Chilean ports. Among the non-metallic minerals are nitrate of soda, borate of lime, coal, salt and sulphur, together with various products derived from these minerals, such as iodine, sulphuric acid, &c. Guano is classed among the mineral products and still figures as an export, though the richest Chilean deposits were exhausted long before the war with Peru. Of non-metalHc products nitrate of soda is by far the most important. Extensive deposits of the salt (called caliche in its crude, impure state) in the provinces of Tacna, Tarapaca, Antofagasta and Atacama owe their existence to the rainless character of the climate. Those of the first- named province have been discovered since the war between Chile and Peru, and have greatly extended the prospective life of the in- dustry. The nitrate fields, which lie between 50 and 100 m. from the coast and at elevations exceeding 2000 ft. above sea-level, have been officially estimated at 89,177 hectares (344 sq. m.) and to con- tain 2316 millions of metric quintals (254,760,000 short tons). The first export of nitrates was in 1 830, and in 1884 it reached an aggre- gate of 550,000 tons, and in 1905 of 1,603,140 tons. The latter

figure is apparently about the production agreed upon between the Chilean government and the nitrate companies to prevent over-production and a resulting decline in price. Nearly all the oficinas, or working plants, are owned and operated by British companies, and the railways of this desolate region are generally owned by the same companies and form a part of the working plant. Borate of lime also furnishes another important export, though a less valuable one than nitrate of soda. Extensive deposits of borax and common salt have been found in the same region, which with several other products of these saline deposits, such as iodine, add considerably to its exports. The coal deposits of Chile are found chiefly in the provinces of Concepcion and Arauco, the principal mines being on the coast of the Bay of Arauco at Coronel and Lota. Coal is found also in Valdivia, on the island of Chiloe, and in the vicinity of Punta Arenas on the Straits of Magellan. Sulphur is found in the volcanic regions of the north, but the principal mines are in the provinces of Talca.

The relative magnitude and value of these mineral products may be seen in the following abstract from the official returns of 1903 : —

Unit.

Quantity.

Value pesos (of i8d.).

Gold

Cobalt ore …. Lead and Vanadium ores Manganese ore . . .

Coal

Nitrates

Salt

Sulphuric acid

grammes

,» kilogrs.

..

,,

tons

metric

quintals

kilogrs.

,,

metric

quintals

kilogrs.

metric quintals kilogrs.

1,424,625

39,012,382

29.923.132

70,984

284,990

2,000

17,110,000

827,112

14,449,200

157,444 16,878,913

162,635 3,440,642 1,600,000

m,335

200

i,745,“5

1,284,308

21,438.397

9,097

99.695

682,400 8,250,720

140,102,012 1,687,327 2,363,048

324,270

337,515 176,000

267,466 800

Government. — Chile is a centralized republic, whose govern- ment is administered under the provisions of the constitution of 1833 and the amendments of the 9th of August 1888, the nth of August 1890, the 20th of August 1890, the 22nd of December 1891, and the 7th of July 1892. According to this constitution the sovereignty resides in the nation, but suffrage is restricted to married citizens over twenty-one and unmarried citizens over twenty-five years of age, not in domestic service, who can read and write, and who are the owners of real estate, or who have capital invested in business or industry, or who

receive salaries or incomes proportionate in value to such real estate as invest- ment; and as 75% of the population is classed as illiterate, and a great majority of the labouring classes is landless, badly paid, and miserably poor, it is apparent that political sovereignty in Chile is the well-guarded possession of a small minority. The dominant element in this minority is the rich landholding interest, and the constitution and the laws of the first half -century were framed for the special protection of that interest.

The supreme powers of government are vested in three distinct branches — legislative, executive and judicial. The legislative power is exercised by a national congress, which consists of two chambers- — a senate of 32 members, and a chamber of deputies of 94 members. The membership of the lower house is in the proportion of one deputy for each 30,000 of the departmental population, and each fraction over 15,000; and the senate is entitled to one-third the membership of the chamber. The senators are elected by provinces and by a direct cumulative vote, and hold office for six years, one-half of the senate being renewed every three years. The deputies are elected by departments and by a direct cumulative vote, and hold office for three years. Both senators and deputies must have reached the age of thirty-six, must have a specified income, and are required to serve without salary. A permanent committee of 14 members repre- sents the two chambers during the congressional recess and exercises certain supervisory and advisory powers in the ad- ministration of public affairs. Congress convenes each year on the 1st of June and sits until the 1st of September, but the president may prorogue an ordinary session for a period of 50

days, and with the consent of the council of state may convene it in extraordinary session. Congress has the privilege of giving or withholding its confidence in the acts of the government.

The executive is a president who is elected for a term of five years and is ineligible for the next succeeding term. He is chosen by electors, who are elected by departments in the manner prescribed for deputies and in the proportion of three electors for each deputy. These elections are held on the 25th of June in the last year of a presidential term, the electors cast their votes on the 25th of July, and the

counting takes place in a joint session of. the two chambers of congress on the 30th of August, congress in joint session having the power to complete the election when no candidate has been duly chosen by the electors. The formal installation of the president takes place on the 18th of September, the anniversary of the declaration of national independence. In addition to the prerogatives commonly invested in his office, the president is authorized to supervise the judiciary, to nominate candidates for the higher ecclesiastical offices, to intervene in the enforcement of ecclesiastical decrees, papal bulls, &c, to exercise supervisory police powers, and to appoint the intendants of provinces and the governors of departments, who in turn appoint the sub-delegates and inspectors of subordinate political divisions. The president, who is paid £2250 per annum, must be native-born, not less than thirty years of age, and eligible for election to the lower house. He is assisted and advised by a cabinet of six ministers whose departments are : interior, foreign affairs, worship and colonization, justice and public instruction, war and marine, finance, industry and public works. In case of a vacancy in the presidential office, the minister of interior becomes the ” vice-president of the republic ” and discharges the duties of the executive office until a successor can be legally elected. A council of state of 12 members, consisting of the president, 6 members appointed by congress and 5 by the president, has advisory functions, and its approval is required in many executive acts and appointments.

The provinces are administered by intendentes, and the depart- ments by gobernadores, both appointees of the national executive. The sub-delegacies are governed by sub-delegados appointed by the governors, and the districts by inspeclores appointed by the sub-delegates. Directly and indirectly ; therefore, the administra- tion of all these political divisions is in the hands of the president, who, in like manner, makes and controls the appointments of all judicial functionaries, subject, however, to receiving recom- mendations of candidates from the courts and to submitting appointments to the approval of the council of state. This gives the national executive absolute control of all administrative matters in every part of the republic. The police force also is a national organization under the immediate control of the minister of interior, and the public prosecutor in every department is a representative of the national government. There is no legislative body in any of these political divisions, nor any administrative official directly representing the people, with this exception: under the law of the 22nd of December 1891, municipalities, or communes, are created and invested with certain specified powers of local government affecting local police

services, sanitation, local improvements, primary instruction, industrial and business regulations, &c; they are authorized to borrow money for sanitary improvements, road-making, education, &c, and to impose certain specified taxes for their support; these municipalities elect their own alcaldes, or mayors, and municipal councils, the latter having legislative powers within the limits of the law mentioned.

Justice. — The judicial power consists of a Supreme Court of Justice of seven members located in the national capital, which exercises supervisory and disciplinary authority over all the law courts of the republic ; six cou ts of appeal, in Tacna, Serena, Valparaiso, Santiago, Talca and Concepcion ; tribunals of first instance in the department capitals; and minor courts, cr justices of the peace, in the sub-delegacies and districts. The jury system does not exist in Chile, and juries are unknown except in cases where the freedom of the press has been abused. All trials, therefore, are heard by one or more judges, and appeals may be taken from a lower to a higher court. The government is represented in each department by a public prosecutor. The police officials, who are under the direct

control of the minister of interior, also exercise some degree of judicial authority. This force is essentially military in its organization, and consisted in 1901 of 500 officers, 934 non-commissioned officers and 5400 police soldiers. Small forces of local policemen are supported by various municipalities. The judges of the higher courts are ap- pointed by the national executive, and those of the minor tribunals by the federal official governing the political division in which they are located.

Army. — For military purposes the republic is divided into five districts, the northern desert provinces forming the first, the central provinces as far south as the Bio-Bio the second and third, and the southern provinces and territory the fourth and fifth. Large sums of money have been expended in arms, equipment, guns and fortifications. The army is organized on the German model and has been trained by European officers who have been employed both for the school and regiment. Though the president and minister of war are the nominal heads of the army, its immediate direction is concentrated in a. general staff comprising six service departments, at the head of which is a chief of staff. After the triumph of the revolutionists in the civil war of 1 891, the army was reorganized under the direction of Colonel Emil Korner, an accomplished German officer, who subsequently served as chief of the general staff. In 1904 the permanent force consisted of 12 battalions of infantry, 6 regiments of cavalry, 4 regiments of mountain artillery, 1 regiment of horse

artillery, 2 regiments of coast artillery, and 5 companies of engineers — aggregating 915 officers and 4757 men. To this nucleus were added 6160 recruits, the contingent for that year of young men twenty-one years of age compelled to serve with the colours. Under the law of the 5th of September 1900, military service is obligatory for all citizens between eighteen and forty-five years, all young men of twenty-one years being required to serve a certain period with the regular force. After this period they are transferred to the 1st reserve for 9 years, and then to the 2nd reserve. The military rifle adopted for all three branches of the service is the Mauser, 1895 model, of 7 mm. calibre, and the batteries are provided with Krupp guns of 7 and 7-5 cm. calibre. Military instruction is given in a well- organized military school at Santiago, a war academy and a school of military engineering.

Navy. — The Chilean navy is essentially British in organization and methods, and all its best fighting ships were built in British yards. In 1906 the effective fighting force consisted of 1 battle ship, 2 belted cruisers, 4 protected cruisers, 3 torpedo gunboats, 6 destroyers and 8 modern torpedo boats. In addition to these there are several inferior armed vessels of various kinds which bring the total up to 40, not including transports and other auxiliaries. The administration of the navy, under the president and minister of war and marine, is confided to a general naval staff, called the ” Direction jeneral de la Armada,” with headquarters at Valparaiso. Its duties also include the military protection of the ports, the hydrographic survey of the coast, and the lighthouse service. The personnel com- prises about 465 officers, including those of the staff, and 4000 petty officers and men. There is a military port at Talcahuano, in Con- ception Bay, strongly fortified, and provided with arsenal and repair shops, a large dry dock and a patent slip. The naval school, which occupies one of the noteworthy edifices of Valparaiso, is attended by 90 cadets and is noted for the thoroughness of its instruction.

Education.— Under the old conservative regime very little was done for the public school outside the larger towns. As a large pro- portion of the labouring classes lived in the small towns and rural communities, they received comparatively little attention. The increasing influence of more liberal ideas greatly improved the situation with reference to popular education, and the government now makes vigorous efforts to bring its public school system within the reach of all. The constitution provides that free instruction must be provided for the people. School attendance is not com- pulsory, however, and the gain upon illiteracy (75 %) appears to be very slow. The government also gives primary instruction to recruits when

serving with the colours, which, with the increasing employ- ment of the people in the towns, helps to stimulate a desire for education among the lower classes. Education in Chile is very largely under the control of the national government, the minister of justice and public instruction being charged with the direction of all public schools from the university down to the smallest and most remote primary school. The system includes the University of Chile and National Institute at Santiago, lyceums or high schools in all the provincial capitals and larger towns, normal schools at central points for the training of public school teachers, professional and industrial schools, military schools and primary schools. Instruction in all these is free, and under certain conditions text-books are supplied. In the normal schools, where the pupils are trained to enter the public service as primary teachers, not only is the tuition free, but also books, board, lodging and everything needed in their school work. The national university at Santiago comprises faculties of theology, law and political science, medicine and pharmacy, natural sciences and mathematics, and philosophy. _ The range of studies is wide, and the attendance large. The National Institute at Santiago is the principal high school of /the secondary grade in Chile. There were 30 of these high schools for males and 12 for females in 1903, with an aggregate of 11,504 matriculated students. The normal schools for males arc located at Santiago, Chilian and

Valdivia; and for females at La Serena, Santiago and Conception. The mining schools at Copiapo, La Serena and Santiago had an aggregate attendance of 180 students in 1903, and the commercial schools at Iquique and Santiago an attendance of 214. The more important agricultural schools are located at Santiago, Chilian, Concepcion and Ancud, the Quinta Normal de Agricultura in the national capital having a large attendance. The School of Mechanic Arts and Trades (Escuela de Aries y Oficios) of Santiago has a high reputation for the practical character of its instruction, in which it is admirably seconded by a normal handicraft school (Sloyd system) and a night school of industrial drawing in the same city, and pro* fessional schools for girls in Santiago and Valparaiso, where the pupils are taught millinery, dress-making, knitting, embroidery and fancy needlework. The government also maintains schools for the blind and for the deaf and dumb. The public primary schools numbered 1961 in 1903, with 3608

teachers, 166,928 pupils enrolled, and an average attendance of 108,582. The cost of maintaining these schools was 4,146,574 pesos, or an average of £2 : 17 : 3 per pupil in attendance. In addition to the public schools there are a Roman Catholic university at Santiago, which includes law and civil engineering among its regular courses of study; numerous private schools and seminaries of the secondary grade, with a total of 11,184 students of both sexes in 1903 ; and 506 private primary schools, with an attendance of 29,684. The private schools usually conform to the official requirements in regard to studies and examinations, which facilitates subsequent admission to the university and the obtainment of degrees; probably they do better work than the public schools, especially in the German settlements of the southern provinces. A Consejo de Instruction Publica (council of public instruction) of 14 members exercises a general supervision over the higher and secondary schools. There are schools of music and fine arts in Santiago. The national library at Santiago, with 116,300 volumes in 1906, and the national observatory, are both efficiently administered. At the beginning cf the 20th century there were 41 public libraries in the republic, including public school collections, with an aggregate of 240,000 volumes.

Charities. — According to the returns of 1903 there were 88 hospitals in the republic, which reported 79,051 admissions during the year, and had 6215 patients under treatment at its close; 628,536 patients received gratuitous medical assistance at the public dispensaries during the year; there were 24 foundling hospitals with 5570 children; and there were 3092 persons in the various hospicios or asylums, and 1478 in the imbecile asylums.

Religion. — The Roman Catholic religion is declared Dy the constitution to be the religion of the state, and the inaugural oath of the president pledges him to protect it. A considerable part of its income is derived from a subsidy included in the annual budget, which ‘makes it a charge upon the national treasury like any other public service. The secular supervision of this service is entrusted to a member of the president’s cabinet, known as the minister of worship and colonization. The executive and legislative powers intervene in the appointments to the higher offices of the Church. The greater part of the population remains loyal to the established faith. The law of 1865 gives the privilege of religious worship to other faiths, and the laws of 1883 made civil marriage and the civil registry of births, deaths and marriages obligatory, and secularized the cemeteries. Under the reform of 1865 full religious freedom is practically accorded, and it is provided that the services of religious organizations other than the Roman Catholic may be held in private residences or in edifices

owned by private individuals or corporations. Of the 72,812 foreigners residing in Chile in 1895, about 16,000 were described as Protestants. Notwithstanding the opposition of some political elements to the Church, the Chileans themselves may al! be classed as Roman Catholics. The ecclesiastical organization includes one archbishop, who resides at Santiago, three bishops residing at La Serena, Concepcion and Ancud, and two vicars residing in Anto- fagasta and Tarapaca. These benefices are filled by appointments from lists of three prepared by the council of state and sent to Rome by the president, and in the case of an archbishop or bishop the appointment must also receive the appioval of the Senate. The Chilean clergy are drawn very largely from the higher classes, and their social standing is much better than in many South American states. The Church also possesses much property of its own, and is therefore able to maintain itself on a comparatively small subsidy from the public treasury, which was 985,910 pesos (£73.943) ‘ in I 9 02 – The Church maintains seminaries in all cathedral towns, and these also receive a subsidy from the government.

Finance. — For a long time Chile was considered one of the poorest states of Spanish America, but the acquisition of the rich mineral-producing provinces of the north, together with the development of new silver and copper mines in Atacama and Coquimbo, largely increased her revenues and enabled her to develop other important resources. During the decade 1831-1840 the annual revenues averaged about 2,100,000 pesos (of 48d.), which in the decade 1861-1870 had increased to an average of only 8,200,000 pesos — and this during a period of considerable agricultural activity on account of wheat exports to California and Australia. After 1870 the revenues increased more rapidly owing to the development of new mining industries, the receipts in 1879 amounting to 15,300,000 pesos, and in 1882 to 28,900,000 pesos. The revenues from the captured

Peruvian nitrate fields then became an important part of the national income, which ten years later (1902) reached an aggregate of 138,507,178 pesos (of i8d.), of which “105,072,832 pesos were in gold. In 1906 the receipts from all sources were estimated at 149,100,000 pesos, of which 62,200,000 pesos gold were credited to the tax on nitrate, 39,800,000 pesos gold to import duties, and 23,500,000 pesos currency to railway receipts. During these years of fiscal prosperity the country suffered much from financial crises caused by industrial stagnation, an excessive and depreciated paper currency and political disorder. To ensure an income that would meet its foreign engagements, the government collected the nitrate and iodine taxes and import duties in gold. As a considerable part of the

expenditures were in gold, the practice was adopted of keeping the gold and currency accounts separate. In 1895 a conversion law was passed in which the sterling value of the peso was reduced to i8d., at which rate the outstanding paper should be redeemed. A conversion fund was also created, and, although the government afterwards authorized two more large issues, the beneficial effects of this law were so pronounced that the customs regulations were modified in 1907 to permit the pay- ment of import duties in paper. The national revenue is derived chiefly from the nitrate taxes, customs duties, alcohol tax, and from railway,

Costal and telegraph receipts. There is no land tax, and licence or usiness taxes are levied by the municipalities for local purposes. The national expenditures are chiefly for the interest and amortiza- tion charges on the public debt, official salaries, military expenses in connexion with the army and navy, public works (including railway construction, port improvements, water and sewage works), the administration of the state railways, telegraph lines and post office, church subsidies, public instruction and foreign representation.

The ordinary and extraordinary receipts and expenditures for the five years 1899-1903., in gold and currency, in pesos of i8d., were as fellows : —

Receipt

s, pesos.

Expenditures, pesos.

Gold.

Paper.

Gold.

Paper.

1899

1900 1901 1902

1903

83,051,604

89,869,178

74,665,061

105,072,832

108,503,565

45,239,970 46,515,102

35.394.434 33.434.346 32,490,145

3L732,797

30,564,821 39,808,517 45,093.278 1 12,508,075

76,749.793

82,143,742

91,087,171

89,170,087′

84,721,437

For 1906 the expenditures were fixed at 149,000,000 pesos, and the revenues were estimated to produce 149,100,000 pesos, which included 62,200,000 pesos gold from nitrate taxes, 39,800,000 pesos gold and 200,000 pesos paper from import duties, 23,500,000 pesos paper from the state railways, 2,500,000 pesos paper from postal and telegraph receipts, and 15,000,000 pesos gold from loans. How the revenues are expended is shown in the estimates for 1907, in which the total expenditures were estimated at i34,83°.53 2 pesos paper and 58,796,780 pesos gold, the principal appropriations being

16.192.780 pesos paper and 99,733 gold for the war department,

10.460.781 paper and 6,315,731 gold for the marine department, 40,934,273 paper and 16,984,671 gold for railways, and 6,324,817 paper for public works. In addition to these the budget of 1906 provided for gold expenditures in 1907 of 7,000,000 pesos on sanitary works and 8,000,000 pesos on the Arica-La Paz railway. The custom of dividing receipts and expenditures into ordinary and extraordinary, of treating the receipts from loans as revenue, of adding six months to the fiscal year for closing up accounts, and of dividing receipts and expenditures into separate gold and currency accounts, leads to much confusion and complication in the returns, and is the cause of unavoidable discrepancies and contradictions. ”

In May 1906 the external debt of the republic aggregated £21,700,000, including the loans of 1905 and 1906, amounting to £5,700.000, for sanitary works and railway construction. At the same time the internal debt was 107,000,000 pesos (£8,025,000), which increases the funded indebtedness to £29,725,000. Like Brazil, Chile has been careful to preserve her foreign credit, and though an average indebtedness of about £10 per capita may seem large for a nation with so much absolute poverty among its people, the government is finding no difficulty in negotiating new loans, the mineral resources of the country and the conservative instincts of the people being considered satisfactory guarantees. According to official returns, the real-estate valuations in 1903-1904 aggregated 1,777,217,704 pesos, of which 1,020,609,215 pesos were in urban and 754,608,489 pesos in rural property. Of the total returned, 1,775,217,704 is described as taxable, and 262,626,576 pesos as non- taxable. The large and steadily increasing receipts from import duties, amounting to 91,321,860 pesos in 1905, and 103,507,556 pesos in 1906, appears to indicate an encouraging state of prosperity in the country, although an average of 345 pesos a year (nearly £2 : 12s.), in addition to the increased prices paid for home manu- factures, seems to be a very heavy indirect tax upon so poor a people.

Currency. — The monetary circulation in Chile consists almost wholly of paper currency, nominally based on a gold standard of

1 The expenditures of 1902 are also given as 25,882,702 pesos gold, and 108,844,693 pesos currency.

l8d. per peso. The conversion law of 1895 made the currency con- vertible at this rate, although the gold peso was rated at 48d. previous to that date; but the financial crisis of 1898 caused the sus- pension of specie payments, and a forced issue of additional paper led to a further postponement of conversion and the prompt with- drawal of specie from circulation. The paper circulation consists of national and bank issues. The former owes its existence very largely to the war with Peru, the civil war of 1891, and the financial troubles of 1898. On the 1st of January 1890 the national issues stood at 22,487,916 pesos, and the bank issues at 16,679,790 pesos, making a total of 39,167,706 pesos currency in circulation. This total was largely increased by

President Balmaceda in 1891. On the 31st of July 1898 the conversion of paper notes, under the law of 1st June 1895, was suspended, and the government issued 27,989,929 pesos to'the banks of issue, which was described as a loan at 2 %, and raised their outstanding circulation to 40,723,089 pesos, and at the same time issued on its own account 17,693,890 pesos and assumed responsibility for 1,193,641 pesos which had been illegally put into circulation before 1896. This gave an aggregate registered circulation of 86,045,166 pesos in 1898. In 1904 another issue of 30,000,000 pesos was authorized and the date of conversion was still further postponed, and in 1907 a more general act provided that the maximum paper circulation should not exceed 150,000,000 pesos of the value of i8d. per peso, and that new issues should be made only through the issue department and against deposits of gold, which deposits would be returned to depositors on the presentation of the currency issued. The redemption of this issue was guaran- teed by a conversion fund of 100,000,000 pesos, and by an authoriza- tion to issue a loan of 50,000,000 pesos to redeem the balance, if necessary. The conversion fund under the act of 1895 stood at 77,282,257 pesos (£5,796,170) on the 31st of May 1907. There are 23 joint-stock banks of issue, with an aggregate registered capital of 40,689,665 pesos (£3,051,724). Their circulating notes are secured by deposits in the national treasury of gold, government notes and other approved securities. There is 'no state bank, though the Bank of Chile, with its numerous agencies and its paid-up capital of 20,000,000 pesos, may be said to fill the place of such an institution. Besides these, there are four non-issue banks, two foreign banks and their agencies, and three mortgage banks, with agencies at the important provincial centres, which loan money on real-estate security and issue interest bearing hypothecary notes to bearer. There are 8 savings banks in the republic, whose aggregate deposits on the 31st of December 1906 were 14,799,728 pesos.

The monetary unit, the gold peso, does not form a part of the actual coinage. The gold coins authorized by this law are the condor of 20 pesos, the medio condor, or doblon, of 10 pesos, and the escudo of 5 pesos. The silver coins are the peso of 100 centavos and its fractional parts of 20, 10 and 5 centavos. The bronze coins are of 2J, 2, 1, and } centavos.

The metric system of weights and measures is the legal standard in Chile, but the old Spanish standards are still widely used, especially in handling mining and farm produce. Nitrate of soda is estimated in Chilean quintals (101-41 lb) in the field, and metric quintals (220-46 lb) at the port of shipment. In silver and copper mining the marc (8 oz.) is commonly used in describing the richness of the ores. Farm

produce is generally sold by the arroba or fanega ; the vara is used in lineal measurement, and the cuadra is used by country people in land measurement. (A. J. L.)

History. Chile was the recognized name of the country from the beginning of its known history. The land was originally in- habited by tribes of Indians, who, though not mere savages, were far below the level of civilization distinguishing the races of Mexico and Peru. When the country first became known to the Spaniards in the 16th century the northern tribes were found to be more civilized and much more submissive than those of the south. The difference was no doubt due to the invasion and conquest of northern Chile in the 15th century by Yupanqui, Inca of Peru, grandfather of Atahualpa,

conquest. ru ˆ er °* ˆ eru at tne ˆ me °* its conquest by Pizarro. The dominion of the Incas in Chile was probably bounded by the Rapel river (lat. 34 10′ S.), and, though their control of the country was slight, the Peruvian influence led to the introduction of a higher civilization, and, by weakening the power of the tribes, paved the way for the invasion of the Spaniards. Beyond the limits of the Inca conquest the Indians of Chile were distinguished by fierce independence of character and by their warlike qualities. Rude and ignorant as they were, they possessed a rough military organization; each community was led by its ulmen (chief), and in war the tribes fought together under an elected leader {toqui). The name of the Araucanians, the most powerful of the tribes, came to be applied to the whole confederation of Indians living south of the Bio-bio river.

The first Spanish invasion of Chile took place in 1535, when Diego de Almagro, the companion and rival of Pizarro in the conquest of Peru, marched into Chile in search of gold. Disappointed in his quest, and meeting with obstinate inyasions. resistance from the southern tribes, he returned to Peru with his whole force in 1538. In 1540 Pizarro sent Pedro de Valdivia to make a regular conquest and settlement of Chile. Valdivia founded Santiago, the present capital of Chile, in February 1541, and proceeded to build the towns of La Serena, Conception, Villarica, Imperial, Valdivia and Angol, in order to secure his hold on the country. But the Indians fought desperately for their independence, and in 1553 a general rising of the tribes ended in the defeat and death of Valdivia and in the destruction of most of his settlements. This was the beginning of nearly a century of continuous warfare. As there was no gold in the country the number of settlers was small, the loose tribal organization of the natives made it impossible to inflict a vital defeat on them, and the mountainous and thickly wooded country lent itself admirably to a warfare of surprises

and ambuscades. General after general and army after army were despatched from Spain and Peru; Chile was given a government independent of the viceroy of Lima; attack after attack was made on the Indians, their lands were laid waste, and the struggle was conducted with merciless ferocity: all in vain. Settlements and forts were never free from assault and were taken and retaken; if one Indian aimy was destroyed another took its place, if one toqui was killed another was chosen; when defeated, the Indians retired to their forests, marshes and hills, recruited their forces, and fell on the pursuing Spaniards. > In 1612 an attempt was made by a Jesuit missionary to negotiate a peace, but not till 1640 was the desperate struggle ended by the treaty of Quillin, which left the Indians all the land south of the Bio-bio river. Up to 1800 the peace was broken by three wars, in 1655, in 1723 and in 1766, the last ended by a treaty which actually gave the Araucanians the right to have a minister at Santiago.

It was this constant warfare with the Indians and the necessity for hard continuous work, owing to the lack of precious metals in Chile, that no doubt helped to produce in the settlers the strength and hardihood of character that distinguishes the Chileans among South American races. But not unnaturally the material condition of the country was the reverse of prosperous. The expenditure far exceeded the revenue. The Indian warfare occupied nearly the whole attention of the governors and much of the time of the settlers. By the Spanish colonial system the development of manufactures was prohibited and the trade of the colony was limited not only to Spain but to the one port of Cadiz. Till the 18th century ships were not allowed to sail round Cape Horn, so that the Chileans had to trade indirectly through Peru and the Argentine. Agriculture was the one resource of the colony, and wheat was grown for export to Peru, but the land was concentrated in the hands of a few big landowners, and the cultivation of the vine and olive was forbidden. At the end of the 1 7 th century Santiago was a town of poor one-storeyed houses and had only 8000 inhabitants; the other towns, Valparaiso, Conception, La Serena, were only large villages. Books were net allowed to be imported, and education was limited to such as was given here and there by priests and monks. The Indians within the limits of the Spanish colony were treated like slaves, and horribly mutilated to prevent their escape; but at the same time a gradual fusion of races was taking place, and the Chilean peasant {peon) of to-day is as much of Indian as of Spanish descent. The Araucanians, however, continued to preserve their independence; they jealously resented the intro- duction of Spanish influence, and the missionary efforts of the Jesuits met with little

success.

During the 18th century the condition of the colony was improved in many ways. The Bourbon kings of Spain were more liberal in their colonial policy. Merchant-ships were allowed to sail direct to Chile, trade with France was sometimes permitted, and a large batch of hardy emigrants was sent out

Colonist system.

from the Biscay provinces of Spain. Freed from the preoccupa- tion of the Indian wars, the governors gave more attention to the general welfare of the country: a university was started in Santiago in 1747, many towns were built about the same time, agriculture and industries were promoted and a coasting trade grew up. In 1778 Charles III. threw open all the ports of Spain to the colonies and allowed freedom of trade with France. But in general the administration of the colony was burdensome, oppressive and inefficient. The people had no voice in the government. Ruling with the help of the Royal Audience, the governor was absolute master of the country, and regulated the smallest details of life. Such time as the officials could spare from the main object of enriching themselves by extortion and corruption was given up to endless official and religious ceremonies and to petty disputes of etiquette and precedence. All the high posts and offices were filled by men sent from Spain, with the result that bitter jealousy reigned between them and the native- born colonists (criottos). The criollos as a rule filled the posts in the municipalities (cabildos), disposed of by sale, so that when the revolution broke out the cabildos naturally became the centres of the movement. As in all Spanish colonies, so in Chile, the Church played a large part in the public life. Chile was divided into the two bishoprics of Santiago and Concepci6n, and the Church managed to accumulate most of the wealth of the country. At the same time the monks and Jesuits did useful work in teaching industrial and agricultural arts, and in giving the people a certain degree of education; but the influence of the Church was used to bolster up the traditional narrow colonial system, and the constant quarrels between the clergy and the secular powers often threw the country into confusion.

At the opening of the 19th century Chile was a colony whose resources had hardly been touched, with a population of about 500,000 persons, of Spanish and mixed Spanish and Indian blood: a people endowed with the vigour of character bred by a mountainous country and a bracing climate and by a hard struggle for existence, but ignorant through lack of education, shut out by a narrow-minded commercial system from knowledge of the outside world, and destitute of the character-training that free institutions afford.

The national independence of Chile dates from the second decade of the 19th century. The revolt of England's North American colonies, and the events of the French fo™fde- Revolution naturally suggested the idea of a struggle pendeace. for independence to the Spanish colonists, and the deposition of Ferdinand VII. by Napoleon, and the ensuing disorganization of Spain, supplied the desired opportunity. In 1809 risings took place in Venezuela, in Ecuador, in Upper Peru and in the Argentine; the revolutionary fever spread to Chile, and on the 18th of September 1810 the cabildo of Santiago secured the resignation of the governor and vested his powers in an elected Junta (board) of seven members. This event was the beginning of the independence of Chile. But it was some time before independence was fully attained. The mass of the people were ignorant, intercourse between them was slight, and there was a strong section attached to the old regime. The party determined on independence was at first small, and compelled to conceal its aims till the ground had been prepared for open decisive action. Further, there were divisions between the patriots of Santiago and those of Concepci6n, and bitter jealousies between the leaders, the chief of whom were Juan Martinez de Rozas, Jose Miguel Carrera and Bernardo O'Higgins. Owing to the apathy of the people and the enmities existing among the leaders, the Spanish forces, sent by the viceroy of Peru to crush the revolutionary movement, succeeded after two years' indecisive fighting in completely defeating the patriots at Rancagua in 1814. For three years the Spaniards maintained their hold on Chile, ruling the country with tyrannical harshness, but in the spring of 181 7 a patriot force which had been organized at Mendoza in the Argentine by Jos6 de San Martin, an Argentine officer, and by O'Higgins, crossed the Andes and overwhelmed the royalists at the battle of Chacabuco. O'Higgins was named director-general of Chile, while San Martin, realizing that the

independence of each colony depended on the Spanish being expelled from the whole of South America, set about prepar- ing an invasion of Peru. The viceroy of Lima made one moie effort to uphold the power of Spain in Chile, but the army he despatched under Mariano Osorio, the victor of Rancagua, was decisively defeated at the river Maipo on

the 3rd of April 1818. By this battle the independence of Chile, formally proclaimed by O'Higgins in the previous February, was finally secured.

The next few years witnessed the expulsion of the royalists from the south of Chile, the equipment of a small fleet, placed under the command of Manuel Blanco Encalada and Lord Cochrane (earl of Dundonald), and the invasion ˆpublic of Peru by San Martin with the help of the fleet, ending in the proclamation of Peruvian independence in 1821; though the Spanish power was not finally broken until Bolivar's victory at Ayacucho in 1824. Relieved from all fear of Spanish attacks from the north, the new republic of Chile entered upon a period of internal confusion and dissension bordering upon anarchy. As soon as the necessity for establishing a stable government arose the lack of training in self-government among the Chileans became painfully obvious. O'Higgins as director- general, rightly perhaps, considered that firm orderly government was more important than the concession of liberal institutions, but his administration roused strong hostility, and in 1823 he was compelled to resign. From that date up to 1830 there were no less than ten governments, while three different constitutions were proclaimed. The nation was divided into small mutually hostile parties; there were ecclesiastical troubles owing to the hostility of the Church to the new republic; there were Indian risings in the south and royalist revolts in the island of Chiloe; the expenditure exceeded the revenue, and the employment of the old Spanish financial expedients naturally increased the general discontent. Up to 1 830 the Liberal party, which favoured a free democratic regime, held the upper hand, but in that year the Conservatives, backed by a military rising led by General Joaquin Prieto, placed themselves in power after a sanguinary battle at Lircay . Prieto was elected president in 1 83 1 , and a new constitution was drafted and promulgated in 1833, which, with some modifications, remains the constitution of Chile at the present time. This constitution invested the executive with almost dictatorial powers, and the Conservatives entered upon a long term of office.

The aim of the Conservative policy was to secure above all a strong administration; power was concentrated in the hands of a small circle; public liberties were restricted and all opposi- tion crushed by force. Inaugurated under General Prieto's administration (1831-1841) by his able minister Diego Portales, this policy was continued by his successors General Manuel Bulnes (1841-1851) and Manuel Montt (1851-1861), each of whom like Prieto was elected to a double term of office. In spite of the discontent of the Liberals, the Conservative ascend- ancy secured a long period of firm stable government, which

was essential to put an end to the confusion in public life and to give time for the people to awake to a fuller realization of the duties and responsibilities of national independence. The internal peace of the country was only disturbed three times, by Liberal risings in 1835, in 1851 and in 1859, all of which were crushed, but not without severe fighting. In 1836 Chile also became involved in a war with a confederation of Peru and Bolivia, which ended in the victory of Chile and the dissolution of the confederation.

While refusing to allow the people any share in, or control over, the government, the Conservative leaders devoted them- selves to improving the condition of the people and of the country, and under their firm rule Chile advanced rapidly in prosperity. The government established a department for education, a training college for teachers, and numerous schools and libraries; literary magazines were started and a school of art and an academy of music founded. By the consolidation of the foreign debt, by the regular payment of interest, by the establishment of several banks, and by the negotiation of commercial treaties, the financial position of the country was improved. Internal development was promoted by the working

of the silver mines of Copiapo and the coal mines of Lota, by the building of railways and erection of telegraphs, and by the colonization of the rich Valdivia province with German settlers. The Straits of Magellan were occupied; under an American engineer, William Wheelwright, a line of steamers was started on the coast, and, by a wise measure allowing merchandise to be landed free of duty for re-exportation, Valparaiso became a busy port and trading centre; while the demand for food-stuffs in California and Australia, following upon the rush for gold, gave a strong impetus to agriculture. A code of law was drawn up and promulgated, and the ecclesiastical system was organized under an archbishop appointed by the pope. To Montt, as minister under Bulnes and afterwards as president, must be given the main credit for the far-seeing policy which laid the foundations of the prosperity of Chile; and though the adminis- tration was in many ways harsh and narrow, firm government, rather than liberty that would have tended to anarchy, was essential for the success of the young republic.

After 1 86 1, however, a Liberal reaction set in, aided by divisions in the Conservative party arising mainly over church questions. Montt's successors, Jose Joaquin Perez (1861-1871), Federico Errazuriz (1871-1876) and Anibal Pinto (1876-1881), abandoned the repressive policy of their predecessors, invited the co-operation of the Liberals, and allowed discontent to vent itself freely in popular agitation. Some democratic changes were made in the constitution, notably a law forbidding the re-election of a president, and the gradual and peaceful transition to a Liberal policy was a proof of the progress which the nation had made in political training. Outside the movement for constitutional reform, the most important internal question was the successful Liberal attack on the privileged position and narrow views of the Church, which led to the birth of a strong ultra- montane party among the clergy. The government continued to be animated by a progressive spirit: schools, railways, telegraphs were rapidly extended; a steamship mail service to Europe was subsidized, and the stability of the government enabled it to raise new foreign loans in order to extinguish the old high interest-bearing loans and to meet the expenses of public works. In 1877 a financial crisis occurred, met by the emission of paper money, but the depression was only temporary, and the country soon rallied from the effects.

During this period there was desultory fighting with the Indians; there was a long boundary dispute with the Argentine, settled in 1880; and in 1865 Chilean sympathy with Peru in a quarrel with Spain led to a foolish war with Spain. The blockade of their ports and the bombardment of Valparaiso by a Spanish squadron impressed the Chileans with the necessity of possessing an adequate fleet to defend their long coast-line; and it was under President Errazuriz that the ships were obtained and the officers trained that did such good service in the great war with Peru. With a population of over two millions, a rapidly increas- ing revenue, ruled by a government that was firm and progressive and that enjoyed the confidence of all classes, Chile was well equipped for the struggle with Peru that began in 1879. ' The war of 1870-82 between Chile and Peru is the subject of a separate article (see Chile-Peruvian War). By the beginning of 1881 the war had reached a stage when Close of the final struggle was close at hand. On the 13th of with Peru. January of that year the*Chilean forces under command of General Baquedano attacked the entrenched positions of the Peruvians at daybreak in the vicinity of Chorillos, a village some few miles from Lima, and forming the outer line of defence for the capital. After a stubborn fight the day ended in victory for the attacking forces; but the losses on both sides were great, and on the following day negotiations for peace were attempted by the

representatives of the foreign powers in Lima, the object being to avoid, if possible, any further bloodshed. This attempt to end the conflict proved, however, abortive, and on the 15th of January at 2 p.m. hostilities recommenced in the neighbourhood of Miraflores. After severe fighting for some four hours the Chileans again proved victorious, and drove the Peruvians from the second line of defence back upon the city of

Lima. Lima was now at the mercy of the Chileans, and on the 17th of January a division of 4000 men of all arms, under the cornmand of General Cornelio Saavedra, was sent forward to occupy the Peruvian capital and restore order within the town limits. A portion of the Chilean forces was shortly afterwards withdrawn from Peru, and the army of occupation remaining in the conquered country was in charge of Admiral Patricio Lynch, an officer who had been specially promoted for dis- tinguished services during the war. President Anibal Pinto of Chile now set about to find means to conclude a treaty of peace with Peru, but his efforts in this direction were frustrated by the armed resistance offered in the country districts to the Chilean authorities by the remainder of the Peruvian forces under command of General Caceres. So matters continued — ■ the Chileans administering on the seaboard and in the principal towns, the Peruvians maintaining a guerilla warfare in the mountainous districts of the interior. In September 1881 the term of office of president Pinto expired, and he was succeeded in the post of chief executive of Chile by President Domingo Santa Maria. Ex-President Pinto died three years later in Valparaiso, leaving a memory respected and admired by all political parties in his country. The name of Pinto will always occupy a prominent place in the annals of Chilean history, not only because the war with Peru took place during his term of office, but also on account of the fact that it was largely due to the intelligent direction of all details by the president during the struggle that the Chilean arms proved so absolutely successful by land and sea.

Seftor Domingo Santa Maria, who now acceded to the presi- dency of Chile, was a Liberal in politics, and had previously held various important posts under the government. Under the rule of President Montt he had been an ^^ eat active member of the opposition and involved in Maria. various revolutionary conspiracies; for his participa- tion in these plots he was at one time exiled from the country, but returned and received official employment under President Perez. The principal task confronting President Santa Maria on assuming the presidency was to negotiate a treaty of peace with Peru and provide for the evacuation of the Chilean army of occupation. The presence of the Peruvian general Caceres and his

forces in the interior of Peru prevented for some two years the formation of any Peruvian national administration in Lima with which the Chilean authorities could deal. In” August of 1883 the Peruvians were defeated by the forces commanded by Admiral Lynch, and a government was then organized under the leadership of General Iglesias. A provisional treaty of peace was then drawn up and signed by General Iglesias and the Chilean representative, and this was finally ratified by the Chilean and Peruvian congresses respectively in April 1884. By the terms of this treaty Peru ceded to Chile unconditionally the province of Tarapaca, and the provinces of Tacna and Arica were placed under Chilean authority for the term of ten years, the inhabitants having then to decide by a general vote whether they remained a part of Chile or elected to belong once more to Peru. In the event of the decision being favourable to Peru a sum of 10,000,000 dollars was to be paid by Peru to Chile. On the ratification of this treaty the Chilean forces were immediately withdrawn from Lima and other points of occupation in Peruvian territory. The government of Bolivia also attempted to negotiate a treaty of peace with Chile in 1884, and for this purpose sent representatives to Santiago. No satisfactory terms, however, could be arranged, and the negotiations ended in only an armistice being agreed to, by which Chile remained in occupation of the Bolivian seaboard pending a definite settlement at some future period.

The administration of President Santa Maria met with violent opposition from the Conservatives, who included the Clerical party in their ranks, and also from a certain section of the Liberals. The dislike of the Conservatives to President Santa Maria was occasioned by his introduction of the law of civil marriage, the civil registration of births and deaths, and the freeing of the cemeteries. Hitherto no marriage was legal unless celebrated

according to the rites of the Roman Catholic religion, and all registers of births and deaths were kept by the parish priests. Civil employees were now appointed under the new laws to attend to this work. Formerly the cemeteries were entirely under the control of the Church, and, with the exception of a few places specially created for the purpose, were reserved solely for the burial of Roman Catholics. Under the new regime these cemeteries were made common to the

dead of all religions. Under President Perez, in 1865, a clause in the law of constitution had been introduced permitting the exercise of all creeds of religion, and this was now put into practice, all restrictions being removed. On several occasions, notably in 1882 and 1885, President Santa Maria used his influence in the elections of senators and deputies to congress for the purpose of creating a substantial majority in his favour. He was induced to take this course in consequence of the violent opposition raised in the chambers by the liberal policy he pursued in connexion with Church matters. This intervention caused great irritation amongst the Conservatives and dissentient Liberals, and the political situation on more than one occasion became so strained as to bring the country to the verge of armed revolution. No outbreak, however, took place, and in 1886 the five years of office for which President Santa Maria had been elected came to an end, and another Liberal, Sefior Jos6 Manuel Balmaceda, then succeeded to power.

The election of Balmaceda was bitterly opposed by the Conservatives and dissentient Liberals, but was finally success- fully carried by the official influence exercised by / ctecT * President Santa Maria. On assuming office President president. Balmaceda endeavoured to bring'about a reconciliation of all sections of the Liberal party in congress and so form a solid majority to support the administration, and to this end he nominated as ministers representatives of the different political groups. Six months later the cabinet was reorganized, and two most bitter opponents to the recent election of President Balmaceda were accorded portfolios. Believing that he had now secured the support of the majority in congress on behalf of any measures he decided to put forward, the new president initiated a policy of heavy expenditure on public works, the building of schools, and the strengthening of the naval and military forces of the republic. Contracts were given out to the value of £6,000,000 for the construction of railways in the 'southern districts; some ro,ooo,ooo dollars were expended in the erection of schools and colleges; three cruisers and two sea-going torpedo boats were added to the squadron; the construction of the naval port at Talcahuano was actively pushed forward; new armament was purchased for the infantry and artillery branches of the army, and heavy guns were acquired for the purpose of permanently and strongly fortifying the neighbourhoods of Valparaiso, Talcahuano and Iquique. In itself this policy was not unreasonable, and in many ways extremely beneficial for the country. Unfortunately corruption crept into the expenditure of the large sums necessary to carry out this programme. Contracts were given by favour and not by merit, and the progress made in the construction of

the new public works was far from satisfactory. The opposition in congress to President Balmaceda began to increase rapidly towards the close of 1887, and further gained ground in 1888. In order to ensure a majority favourable to his views, the president threw the whole weight of his official influence into the elections for senators and deputies in 1888; but many of the members returned to the chambers through this official influence joined the opposition shortly after taking their seats. In 1889 congress became distinctly hostile to the administration of President Balmaceda, and the political situation became grave, and at times threatened to involve the country in civil war. According to usage and custom in Chile, a ministry does not remain in office unless supported by a majority in the chambers. Balmaceda now found himself in the impossible position of being unable to appoint any ministry that could control a majority in the senate and chamber of deputies and at the same time be in accordance with his own views of the administration of public

affairs. At this juncture the president assumed that the con- stitution gave him the power of nominating and maintaining in office any ministers he might consider fitting persons for the purpose, and that congress had no right of interference in the matter. The chambers were now only waiting for a suitable opportunity to assert their authority. In 1890 it was stated that President Balmaceda had determined to nominate and cause to be elected as his successor at the expiration of his term of office in 1891 one of his own personal friends. This question of the election of another president brought matters to a head, and congress refused to vote supplies to carry on the government. To avoid trouble Balmaceda entered into a compromise with congress, and agreed to nominate a ministry to their liking on condition that the supplies for 1890 were voted. This cabinet, however, was of short duration, and resigned when the ministers understood the full amount of friction between the president and congress. Balmaceda then nominated a ministry not in accord with the views of congress under Sefior Claudio Vicuna, whom it was no secret that Balmaceda intended to be his successor in the presidential chair, and, to prevent any expression of opinion upon his conduct in the matter, he refrained from summoning an extraordinary session of the legislature for the discussion of the estimates of revenue and expenditure for 1891. When the 1st of January 1891 arrived, the president published a decree in the Diario Oficial to the effect that the budget of 1890 would be considered the official budget for 1891. This act was illegal and beyond the attributes of the executive power. As a protest against the action of President ott89i. ° Balmaceda, the vice-president of the senate, Sefior Waldo Silva, and the president of the

chamber of deputies, Sefior Ramon Barros Luco, issued a proclamation appointing Captain Jorje Montt in command of the squadron, and stating that the navy could not recognize the authority of Balmaceda so long as he did not administer public affairs in accordance with the constitutional law of Chile. The majority of the members of the chambers sided with this movement, and on the 7th of January Senores Waldo Silva, Barros Luco and a number of senators and deputies embarked on board the Chilean warship ” Blanco Encalada,” accompanied by the ” Esmeralda ” and ” O’Higgins ” and other vessels, sailing out of Valparaiso harbour and proceeding northwards to Tarapaca to organize armed resistance against the president (see Chilean Civil War). It was not alone this action of Balmaceda in connexion with congress that brought about the revolution. He had alienated the sympathy of the aristocratic classes of Chile by his personal vanity and ambition. The oligarchy composed of the great landowners have always been an important factor in the political life of the republic; when President Balmaceda found that he was not a persona grata to this circle he determined to endeavour to govern without their support, and to bring into the adminis- tration a set of men who had no traditions and with whom his personality would be all-powerful. The Clerical influence was also thrown against him in consequence of his radical ideas in respect of Church matters.

Immediately on the outbreak of the revolution President Balmaceda published a decree declaring Montt and his com- panions to be traitors, and without delay organized an army of some 40,000 men for the suppression of the insurrectionary movement. While both sides were preparing for extremities, Balmaceda administered the government under dictatorial powers with a congress of his own nomination. In June 1801 he ordered the presidential election to be held, and Sefior Claudio Vicuna was duly declared chosen as president of the republic for the term commencing in September 1891. The resources of Balmaceda were running short on account of the heavy military expenses, and he determined to dispose of the reserve of silver bullion accumulated in the vaults of the Casa de Moneda in accordance with the terms of the law for the conversion of the note issue. The silver was conveyed abroad in a British man- of-war, and disposed of partly for the purchase of a fast steamer to be fitted as an auxiliary cruiser and partly in payment for other kinds of war material.

The organization of the revolutionary forces went on slowly. Much difficulty was experienced in obtaining the necessary arms and ammunition. A supply of rifles was bought in the United States, and embarked on board the ” Itata,” a Chilean vessel in the service of the rebels. The United States authorities refused to allow this steamer to leave San Diego, and a guard was stationed on the ship. The ” Itata,” however, slipped away and made for the Chilean coast, carrying with her the repre- sentatives of the United States. A fast cruiser was immediately sent in pursuit, but only succeeded in overhauling the rebel ship after she was at her destination. The ” Itata ” was then ferced to return to San Diego without landing her cargo for the insur- gents. The necessary arms and ammunition were arranged for in Europe; they were shipped in a British vessel, and transferred to a Chilean steamer at Fortune Bay, in Tierra del Fuego, close to the Straits of Magellan and the Falkland Islands, and thence carried to Iquique, where they were safely disembarked early in July 1 89 1. A force of 10,000 men was now raised by the junta of the revolution, and preparations were rapidly pushed forward for a move to the south with the object of attacking Valparaiso and Santiago. Early in April a portion of the revolutionary squadron, comprising the ” Blanco Encalada ” and other ships, was sent to the southward for reconnoitring purposes and put into the port of Caldera. During the night of the 23rd of April, and whilst the ” Blanco Encalada ” was lying quietly at anchor, a torpedo boat called the ” Almirante Lynch,” belonging to the Balmaceda faction, steamed into the bay of Caldera and dis- charged a torpedo at the rebel ship. The ” Blanco Encalada ” sank in a few minutes and 300 of her crew perished.

In the middle of August 1891 the rebel forces were embarked at Iquique (where a provisional government under Captain Jorje Montt had been set up), numbering in all about 9000 men, and sailed for the south. On the 20th of August the congressist army was disembarked at Quinteros, about 20 m. north of Valparaiso, and marched to Concon, where the Balmacedists were entrenched. A severe fight ensued, in which the troops of President Balmaceda were defeated with heavy loss. This reverse roused the worst passions of the president, and he ordered the arrest and imprisonment of all persons suspected of sympathy with the revolutionary cause. The population generally were, however, distinctly antagonistic to Balmaceda; and this feeling had become accentuated since the 17th of August 1891, on which date he had ordered the execution of a number of youths belonging to the military college at San Lorenzo on a charge of seditious practices. The shooting of these boys created a feeling of horror throughout the

country, and a sensation of uncertainty as to what measures of severity might not be practised in the future if Balmaceda won the day. After the victory at Concon the insurgent army, under command of General Campos, marched in a southerly direction towards Vina del Mar, and thence to Placilla, where the final struggle in the conflict took place. Balmaceda's generals Barbosa and Alcerrica had here massed their troops in a strong position. The battle, on the 28th of August, resulted in victory for the rebels. Both the Balmacedist generals were killed and Valparaiso was at once occupied. Defeat and Three days later the victorious insurgents entered suicide of Santiago and assumed the government of the republic. Baima- After the battle of Placilla it was clear to President mia ' Balmaceda that he could no longer hope to find a

sufficient strength amongst his adherents to maintain himself in power, and in view of the rapid approach of the rebel army he abandoned his official duties to seek an asylum in the Argentine legation. The president remained concealed in this retreat until the 1 8th of September. On the evening of that date, when the term for which he had been elected president of the republic terminated, he committed suicide by shooting himself. The excuse for this act, put forward in letters written shortly before his end, was that he did not believe the conquerors would give him an impartial trial. The death of Balmaceda finished all cause of contention in Chile, and was the closing act of the most severe and bloodiest struggle that country had ever witnessed. In the various engagements throughout the conflict more than

10,000 lives were lost, and the joint expenditure of the two governments on military preparations and the purchase of war material exceeded £10,000,000 sterling.

An unfortunate occurrence soon after the close of the revolution brought strained relations for a short period between the governments of the United States and Chile. A number of men of the U.S.S. "Baltimore" having been given liberty on shore, an argument arose between some of them and a group of Chilean sailors in a drinking den in Valparaiso. Words led to blows. The Americans were badly handled, one of their number being killed and others severely hurt. The United States government characterized the affair as an outrage, demanding an indemnity as satisfaction. The Chilean authorities demurred at this attitude, and attempted to argue the matter. James G. Blaine, then secretary of state, refused peremptorily to listen to any explanations. In the end Chile paid an indemnity of $75,000 as asked, but the affair left bad feeling in its train.

The close of the revolution against Balmaceda left the govern- ment of Chile in the hands of the junta under whose guidance the military and naval operations had been organized. Admiral Jorje Montt had been the head of this President revolutionary committee, and he acted as president ˆoatf. of the provisional government when the administration of the country changed hands after the victory of the Congres- sional party. An election was now immediately ordered for the choice of a president of the republic and for representatives in the senate and chamber of deputies. Admiral Montt, as head of the executive power, stanchly refused to allow official influence to be brought to bear in any way in the presidential campaign. The great majority of the voters, however, required no pressure to decide who was in their opinion the man most fitted to ad- minister the affairs of the republic. For the first time in the history of Chile a perfectly free election was held, and Admiral Montt was duly chosen by a nearly unanimous vote to be chief magistrate for the constitutional term of five years. The senate and chamber of deputies were formally constituted in due course, and the government of the republic resumed normal conditions of existence. The new president showed admirable tact in dealing with the difficult problem he was called upon to face. Party feeling still ran high between the partisans of the two sides of the recent conflict. Admiral Montt took the view that it was politic and just to let bygones be bygones, and he acted conscientiously by this principle in all administrative measures in connexion with the supporters of the late President Balmaceda. Early in 1892 an amnesty was granted to the officers of the Balmaceda regime, and they were freely permitted to return to Chile without any attempt being made to molest them. The first political act of national importance of the new government was the grant of control to the municipalities, which hitherto had possessed little power to direct local affairs, and were not even permitted to dispose of the municipal revenues to any important amount without first obtaining the consent of the central government. Almost absolute power was now given these corporations to manage their own concerns, and the organization of the police was placed in their hands; at a later period, however, it was found necessary to modify this latter condition.

President Montt next turned his attention towards the question of how best to repair the damage occasioned to the country by eight months of civil warfare. The plan of public works authorized in 1887 was reconsidered, and the construction of portions of the various undertakings recommenced. The army and navy were reorganized. Additional instructors were brought from Germany, and all arms of the military service were placed on a thoroughly efficient footing in

matters of drill and discipline. Several new and powerful cruisers were added to the navy, and the internal economy of this branch of the national defence was thoroughly inspected and many defects were remedied. President Montt then took in hand the question of a reform of the currency, the abolition of inconvertible paper money, and the re-establishment of a gold basis as the monetary standard of the republic. This reform of the currency became the keynote of the president's policy during the remainder of

his term of office. Great opposition was raised by the repre- sentatives of the debtor class in congress to the suppression of the inconvertible paper money, but in the end President Montt carried the day, and on the nth of February 1895 a measure finally became law establishing a gold currency as the only legal tender in Chile. In July 1896 the Conversion Act was put in force, a dollar of i8d. being the monetary unit adopted. In 1895 relations with the neighbouring republic of Argentina began to become somewhat strained in regard to the interpretation of the treaty concerning the boundary between the two countries. The treaties of 1881, 1893 and 1895 left doubts in the minds of both Chileans and Argentines as to the position of the frontier line. On the 17th of April 1896 another protocol was drawn up, by which the contending parties agreed to submit any differ- ences to the arbitration of Great Britain, at the instance of one or both governments. President Montt had now fulfilled his term of office, and on the 18th of September 1896 he handed over the presidential power to his successor, Sefior Federico Errazuriz, who had been duly elected in the month of June previously.

The election for the position of president of the republic was closely contested in 1896 between Sefior Errazuriz and Sefior

Reyes, and ended in the triumph of the former candi- Errazuriz. date by tne narrow majority of one vote. The father

of the new president had been chief magistrate of Chile from 1871 to 1876, and his administration had been one of the best the country had ever enjoyed; his son had therefore traditions to uphold in the post he was now called upon to fill. At the beginning of 1897 the public attention was absorbed by foreign political questions. The problems to

be solved were the frontier difficulty with Argentina, the question of the possession of Tacna and Arica with Peru, and the necessity of fulfilling the obligation contracted with Bolivia to give that country a seaport on the Pacific coast. The treaty made in 1896 with the Argentine government, referring to the arbitration of disputed points con- cerning the boundary, became practically for the moment a dead letter, and both Argentines and Chileans began to talk openly of an appeal to arms to settle the matter once for all. The governments of both countries began to purchase large supplies of war material, and generally to make preparations for a possible conflict. In these circumstances no final settlement with Peru and Bolivia was possible, the authorities of those republics holding back to see the issue of the Chile- Argentine dispute, and Chile being in no position at the time to insist on any terms being arranged. So matters drifted until the beginning of 1898. In July of that year the crisis reached an acute stage. Both Chile and Argentina put forward certain pretensions to territory in the Atacama district to the north, and also to a section of Patagonia in the south. Neither side would give way, nor was any dis- position exhibited to refer the matter to arbitration under the protocol of 1896. The cry of an acute financial crisis emanating from the fear of war with Argentina was now raised in Chile. The president was advised that the only way of averting the financial ruin of the banking institutions of the republic was to suspend the conversion law and lend from the national treasury inconvertible notes to the banks. Sefior Errazuriz weakly gave

way, and a decree was promulgated placing the

currency once more on an inconvertible paper money Argentina, basis until 1902. In August of 1898 the Chilean

government determined to insist upon the terms of the protocol of 1896 being acted upon, and intimated to Argentina that they demanded the fulfilment of the clause relating to arbitration on disputed points. This was practically an ulti- matum, and a refusal on the part of the Argentine government to comply with the terms of the 1896 agreement meant a declara- tion of war by Chile. For a few days the issue hung in the balance, and then the Argentine government accepted the provisions made in 1896 for arbitration. The dispute concerning the Atacama district was submitted to an arbitration tribunal, consisting of the representative of the United States in Argentina, assisted by one Argentine and one Chilean commissioner. This tribunal, after due investigation, gave their decision in April

Crisis with

1899, and the verdict was accepted unreservedly by both governments. The dispute regarding the Patagonian territory was submitted to the arbitration of Great Britain, and a commission — consisting of Lord Macnaghten, Sir John Ardagh and Sir T. H. Holdich — was appointed in 1899 to hear the case.

The Argentine difficulty was ended, but Chile still had to find a settlement with Peru and Bolivia. The treaty made with the former country in 1893 was not ratified, as it was thought to concede too much to Peru, and the subsequent ad referendum treaty was rejected on account of Peru claiming that only Peruvians, and not all residents, should have the right to vote in the plebiscite to be taken by the terms of the treaty of 1883 for the possession of Tacna and Arica. By the terms of the armistice of 1883 between Chile and Bolivia, a three years' notice had to be given by either government wishing to denounce that agreement. By the protocol of 1895 Chile agreed to give to Bolivia the port of Arica, or some other suitable position on the seaboard. On these lines a settlement was proposed. ' Vitor, a landing-place a little to the south of Arica, was offered by the Chilean government to Bolivia, but refused as not complying with the conditions stated in the protocol of 1895; the Bolivians furthermore preferred to wait and see if Arica was finally ceded by Peru to Chile, and if so to claim the fulfilment of the terms of the protocol.

After the accession to office of President Errazuriz there was no stability of any ministry. Political parties in congress were so evenly balanced and so subdivided into groups that a vote against the ministry was easy to obtain, and the resignation of the cabinet immediately followed in accordance with the so-called parliamentary system in vogue in Chile. The president of the republic has no power to dissolve the chambers, to endeavour to remedy the evil by one or another political party obtaining a substantial working majority, but must wait to see the results of the triennial elections. As a consequence of these conditions Conservative, Liberal and coalition ministries held office at short intervals. These unsettled political circumstances checked any continuity of policy, and tended to block the passage of all useful legislation to help forward the economic development of the country and inhabitants; on the other hand, the financial situation was better by the end of 1899 than in the previous year, since all proposals for a fresh paper issue had been vetoed; and the elections for congress and municipal office at the opening of 1900 returned a majority favourable to a stable currency policy.

In September 1900 a fresh outburst of hostile feeling against Chile was created in Argentina by a note addressed by the Chilean government

to Bolivia, intimating that Chile was no longer inclined to hand over the port of Arica or any other port on the Pacific, but considered the time ripe for a final settlement of the questions connected with the Chilean occupation of Bolivian territory, which had now been outstanding for sixteen years. The foreign policy of Chile, as indicated by this note, was con- sidered by Argentina to be grasping and unconciliatory, and there were rumours of an anti-Chilean South American federation. Chile disclaimed any aggressive intentions; but in December the Bolivian congress declined to relinquish their claim to a port, and refused to conclude a definite treaty of peace. The year closed with a frontier incident between Chile and Argentina in the disputed territory of Ultima Esperanza, where some Argentine colonists were ejected by Chilean police; but both governments signed protocols agreeing not to take aggressive action in consequence.

At the opening of 1901 the country was chiefly interested in the forthcoming presidential election, for which the candidates were Don Pedro Montt (Conservative and Clerical) and Sefior German Riesco (Liberal). The relations n/ esco . between President Errazuriz and congress became rather strained, owing to the former's inclination to retain in office a ministry on which congress had passed a vote of censure; but Errazuriz had been in ill-health for more than a year, and on the 1st of May he resigned, and died in July. At the ensuing election Riesco was elected president. The attitude of Chile

towards the Pan-American Congress at Mexico became a matter of interest in the autumn, particularly in connexionˆ with the proposal for compulsory arbitration between all American governments. The Chilean government made it quite clear that they would withdraw from the congress if this proposal was meant to be retroactive; and their unyielding attitude testified to the apprehensions felt by Chile concerning United States interference. In October the Chilean government announced that the contemplated conversion scheme, for which gold had been accumulated, would be postponed for two years (till October 1903), the gold being held as a reserve fund pending the result of the arbitration over the Argentine frontier. This was generally considered to be a reasonable and statesmanlike course. Un- fortunately, a recrudescence of the excitement over the boundary dispute was occasioned by the irritation created in Argentina by the

fact that, pending a decision, Chile was constructing roads in the disputed territory. During December 1901 relations were exceedingly strained, and troops were called out on both sides. But at the end of the month it was agreed to leave the question to the British arbitrators, and the latter decided to send one of their number, Sir T. H. Holdich, to examine the territory.

The survey occupied some eight months, and it was not until the autumn that Sir T. H. Holdich returned to England to make

his report. The difficulty of ascertaining the true line %* e ° t ‘ ae of the watershed had been very great, but the result award.” 7 was eminently successful. The award of King Edward

was signed on the 20th of November 1902, and both parties to the litigation were satisfied. In order that future disputes might be amicably settled, a treaty was signed by which it was agreed that any question that might arise should be submitted to the arbitration of Great Britain or in default of that power to the Swiss Confederation. The removal of this source of irritation and the restoration of friendly relations between the two republics was a great relief to the finance of Chile. Had it not been for the political instability of the country, the effects of the diminution of expenditure on military and naval preparations would have effected a rapid improvement in its financial position. The constant change of ministry (there being no stable majority in the congress) prevented during 1903 any settled policy, or that confidence in the government which is the basis of commercial prosperity. In 1904, however, both trade and revenue showed signs of improvement, and the sale of the warships ” Esmeralda ” and ” Chambuco ” for £1,000,000 furnished a surplus, which was devoted to the improvement of the port of Valparaiso. This was the beginning of a period of steady industrial growth and development. The settlement of the long outstanding dispute with Bolivia in a treaty of peace signed on the 17th of October 1905 was very advantageous to both countries. By this treaty Bolivia ceded all claims to a seaport and strip of the coast, on condition that Chile constructed at her own charges a railway to Lapaz from the port of Arica, giving at the same time to Bolivia free transit across Chilean territory to the sea. A cash indemnity of £300,000 was also paid, and certain stipulations were made with regard to the construc- tion of other railways giving access from Chile to the Bolivian interior.

The prosperity of Chile was to suffer a rude shock. On the 17th of August 1906 a terrible earthquake visited Valparaiso

and the surrounding district. The town of Valparaiso ˆ?J?*™ lso was almost entirely destroyed, while Santiago and

other towns were severely shaken and suffered much

damage. It was estimated that about 3000 persons were killed, a still larger number injured, and at least 100,000 rendered homeless. The loss of property was enormous. The fire which broke out after the earthquake shock had subsided added to the horror of the catastrophe. Measures were, however, promptly taken for succouring the people, who had been driven from their homes, and the task of restoration was vigorously taken in hand. Before the end of the year the rebuilding of the city was rapidly progressing.

In 1906 Senor Pedro Montt was elected president and entered upon his office on the 17 th of September. The personality of

earth quake.

the president, however, had become of much less importance in modern Chile than in earlier days. Up to 1870 the government was in the hands of a small oligarchy of Santiago families, but the president enjoyed large powers l * e * , ‘ leat of initiative. Nowadays the congress has virtually Montt absorbed the executive power, with the result that the cabinet is often changed many times in one year. This prevents indeed any continuity of policy, for the majority in congress is perpetually fluctuating, and ministerial crises rapidly follow one another. Chile, however, except in the Balmacedist civil war, is happily distinguished by its freedom from revolution and serious political unrest. Its history in this respect is in marked contrast to that of the neighbouring South American states. The completion of the Trans-Andean railway between Valparaiso and Buenos Aires was bound to be of immense commercial and industrial value; and eventually the making of a longitudinal railway route uniting the nitrate province of the north with Santiago, and Santiago with Puerto Montt in the distant south, opened up further important prospects. Such a line of through communication, binding together the different provinces forming the long narrow strip of territory stretching along more than 2000 m. of the Pacific littoral, could only be looked forward to, both politically and economically, as an inestimable benefit to the country.

Bibliography. — General History. — The most valuable authority is D. Barros Arana’s Historia jeneral de Chile (15 vols., Santiago, 1884), from the earliest days up to 1830. Smaller handbooks cover- ing the

whole period are : A. TJ. Hancock, a History of Chile (Chicago, ‘893), the only general history in English, and containing a biblio- graphy; Gaspar Toro, Compendio de la historia de Chile (Santiago, 1879), a good clear abstract of Chilean history; and P. Valdes Vergara, Historia de Chile (Valparaiso, 1898), written primarily for schools.but containing useful sketches of leading figures in Chilean history.

Works on Special Periods. — Colonial Period: M. L. Amunatequi, Descubri miento y conquista de Chile (Santiago, 1885), a valuable detailed account of the Spanish conquest ; by same author, Los Precur sores de la independencia de Chile (Santiago, 1870), a clear useful description of the evils of the Spanish colonial system; Horacio Lara, Cronica de la Ara-ucania (Santiago, 1889), a history of the Araucanian Indians right up to recent dates; Abbe Eyza- guirre, Histoire du Chili (Lille, 1855), mainly dealing with the position of the Church during the colonial period. Perez Garcia’s Historia del reino de Chile (Santiago, 1900), an old history by a Spanish officer written about 1780, and Molina’s History of Chili in the English translation (London, 1809), will also be found useful. Useful material for research exists in J. T. Medina’s Coleccion de documenlos para la historia de Chile (Santiago, 1888), a collection of despatches and official documents; his Cosas de la colonia (Santiago, 1889), an accumulation of undigested information about life in the colonial period; and Historiadores de Chile (21 vols., Santiago, 1861), a collection of ancient chronicles and official documents up to the early part of the 17th century.

Revolutionary Period. — A. Roldan, Las Primer as Asambleas nacionales (Santiago, 1890), an account of the struggles in the first national assemblies ; A. Valdes, Revolucion Chilena y campanas de la independencia (Santiago, 1888), an account of the early fighting and rivalry of the revolutionary leaders; W. Pilling, Emancipation of South America (London, 1893), a translation of B. Mitre’s life of San Martin, describing the fighting in the wars of independence; Lord Cochrane, Narrative of Services in Chile, Peru and Brazil (London, 1859), an autobiography describing the naval exploits that helped to secure the expulsion of the Spaniards; B. Vicuna Machenna, Vida de O’Higgins (Santiago, 1882), giving a useful account of the revolutionary struggle and the main actors; and the same author’s Historia jeneral de la republica de Chile, a collection of essays on the early republican history by various writers.

Later History.— R. Sotomayor Valdes, Historia de Chili, 1831- 1871, a detailed account of the period (Sanitago, 1875) ; the same author’s Campana del ejercito Chileno en 1837 (Santiago, 1896), describing

the fighting of the first Peruvian War; B. Vicuna Machenna, D. Diego Portales (Valparaiso, 1863), a good account of the life and time of Portales, the famous minister of the Conservative party; P. B. Fiqueroa, Historia de la revolucion constituyente 1858-59 (Santiago, 1889), an account of the revolution at the end of Montt's presidency; F. Fonch, Chile in der Gegenwart (Berlin, 1870), a description of Chile at the time ; Statement on Behalf of Chile (m the Chilean-Argentine Boundary Arbitration) (6 vols., London, 1901-1902) ; Sir Thomas Holdich, Countries of the King's Award (1904) ; Beltran y Rospido, Los Pueblos hispano-americanos en el siglo XX. (Madrid, 1904) ; P. F. Martin, Through Five Republics of South America (London, 1906) ; Wright, The Republic of Chile (London, 1905) ; G. F. Scott Elliot, Chile (London, 1907) ; Sir W. M.

Conway, Aconcagua and Tierra del Fuego (London, 1902); " Chile-Argentine Arbitration" in the Geog. Journal (January 1903); C. M. Pepper, Panama to Patagonia (London, 1907) ; C. *E. Akers, History of South America, i8S4t-jqc4 (London, 1904); M. Hume, Lecture on the Republic of Chile (London, 1902).

(E.G.J. M.; C. E. A.; G. E.)

CHILEAN CIVIL WAR (1891). The Chilean civil war grew out of political dissensions between the president of Chile, J. M. Balmaceda, and his congress (see Chile: History), and began in January 1891. On the 6th, at Valparaiso, the political leaders of the Congressional party went on board the ironclad " Blanco Encalada," and Captain Jorje Montt of that vessel hoisted a broad pennant as commodore of the Congressional fleet. Prepara- tions had long been made for the naval pronunciamento, and in the end but few vessels of the Chilean navy adhered to the cause of the " dictator " Balmaceda. But amongst these were two new and fast torpedo gunboats, " Almirante Condell " and " Almirante Lynch," and in European dockyards (incomplete) lay the most powerful vessel of the navy, the " Arturo Prat," and two fast cruisers. If these were secured by the Balmacedists the naval supremacy of the congress would be seriously challenged For the present, and without prejudice to the future, command of the sea was held by Montt's squadron (January). The rank and file of the army remained faithful to the executive, and thus in the early part of the war the " Gobernistas," speaking broadly, possessed an army without a fleet, the congress a fleet without an army. Balmaceda hoped to

create a navy; the congress took steps to recruit an army by taking its sympathizers on board the fleet. The first shot was fired, on the 16th of January, by the ” Blanco ” at the Valparaiso batteries, and landing parties from the warships engaged small parties of government troops at various places during January and February. The dictator’s principal forces were stationed in and about Iquique, Coquimbo, Valparaiso, Santiago and Con- cepci6n. The troops at Iquique and Coquimbo were necessarily isolated from the rest and from each other, and military opera- tions began, as in the campaign of 1879 in this quarter, with a naval descent upon Pisagua followed by an advance inland to Dolores. The Congressional forces failed at first to make good their footing (i6th-23rd of January), but, though defeated in two or three actions, they brought off many recruits and a quantity of munitions of war. On the 26th they retook Pisagua, and on the 15th of February the Balmacedist commander, Eulojio Robles, who offered battle in the expectation of receiving reinforcements from Tacna, was completely defeated on the old battlefield of San Francisco. Robles fell back along the railway, called up troops from Iquique, and beat the invaders at Haura on the 17th, but Iquique in the meanwhile fell to the Congres- sional fleet on the 16th. The Pisagua line of operations was at once abandoned, and the military forces of the congress were moved by sea to Iquique, whence, under the command of Colonel Estanislao Del Canto, they started inland. The battle of Pozo Almonte, fought on the 7th of March, was desperately contested, but Del Canto was superior in numbers, and Robles was himself killed and his army dispersed. After this the other Balmacedist troops in the north gave up the struggle. Some were driven into Peru, others into Bolivia, and one column made a laborious retreat from Calama to Santiago, in the course of which it twice crossed the main chain of the Andes.

The Congressional Junta de Gobierno now established in Iquique prosecuted the war vigorously, and by the end of April the whole country was in the hands of the ” rebels ” from the Peruvian border to the outposts of the Balmacedists at Coquimbo and La Serena. The Junta now began the formation of a properly organized army for the next campaign, which, it was believed universally on both sides, would be directed against Coquimbo. But in a few months the arrival of the new ships from Europe would reopen the struggle for command of the sea; the torpederas ” Condell ” and ” Lynch ” had already weakened the Congres- sional squadron severely by sinking the ” Blanco Encalada ” in Caldera Bay (23rd of April), and the Congressional party could no longer aim at a methodical conquest of successive provinces, but was compelled to attempt to crush the dictator at a blow.

Where this blow was to fall was not decided up to the last moment, but the instrument which was to deliver it was prepared with all the care possible under the circumstances. Del Canto was made commander-in-chief, and an ex-Prussian officer, Emil Korner, chief of staff. The army was organized in three brigades of all arms, at Iquique, Caldera and Vallenar. Korner super- intended the training of the men, gave instruction in tactics to the officers, caused maps to be prepared, and in general took every precaution that his experience could suggest to ensure success. Del Canto was himself no mere figurehead, but a thoroughly capable leader who had distinguished himself at Tacna (1880) and Miraflores (1881), as well as in the present war. The men were enthusiastic, and the officers unusually numerous. The artillery was fair, the cavalry good, and the train and auxiliary services well organized. About one-third of the infantry were armed with the (Mannlicher) magazine rifle, which now made its first appearance in war, the remainder had the Gras and other breech-loaders, which were also the armament of the dictator's infantry. Balmaceda could only wait upon events, but he pre- pared his forces as best he was able, and his torpederas constantly harried the Congressional navy. By the end of July Del Canto and Korner had done their work as well as time permitted, and early in August the troops prepared to embark, not for Coquimbo, but for Valparaiso itself.

The expedition by sea was admirably managed, and Quinteros, N. of Valparaiso and not many miles out of range of its batteries, was occupied on the 20th of August 1891. Balmaceda was surprised, but acted promptly. The first battle was fought on the Aconcagua at Concon on the 21st. The eager infantry of the Congressional army forced the passage of the river and stormed the heights held by the Gobernistas, capturing 36 guns. The killed and wounded of the Balmacedists numbered 1600, and nearly all the prisoners, about 1500 men, enrolled themselves in the rebel army, which thus more than made good its loss of 1000 killed and wounded. The victors pressed on towards Valparaiso, but were soon brought up by the strong fortified position of the Balmacedist general Barbosa at Vina del Mar, whither Balmaceda hurried up all available troops from Valparaiso and Santiago, and even from Conception. Del Canto and Korner now resolved on a daring step. Supplies of all kinds were brough t up from Quinteros to the front, and on the 24th of August the army abandoned its line of communications and marched inland. The flank march was conducted with great skill, little opposition was encountered, and the rebels finally appeared to the south- east of Valparaiso. Here, on the 28th, took place the decisive battle of La Placilla. Concon had been

perhaps little more than the destruction of an isolated corps; the second battle was a fair trial of strength, for Barbosa was well prepared, and had under his command the greater part of the existing forces of the dictator. But the splendid fighting qualities of the Congressional troops and the superior generalship of their leaders prevailed in- the end over every obstacle. The government army was practically annihilated, 941 men were killed, including Barbosa and his second in command, and 2402 wounded. The Congressional army lost over 1800 men. Valparaiso was occupied the same evening and Santiago soon afterwards. There was no further fighting, for so great was the effect of the battles of Concon and La Placella that even the Coquimbo troops surrendered without firing a shot.

Bibliography.— Lieut. Sears and Ensign Wells, U.S.N. , The Chilian Revolution of 1891 (Office of Naval Intelligence, Washington, 1893); The Capture of Valparaiso, 1891 (Intelligence Department, War Office, London, 1892) ; Hermann Kunz, Taktische Beispiele aus den Kriegen der neuesten Zeit; der BurgerkHeg in Chile (Berlin, 1901); Revista militarˆde Chile (February-March 1892); Hugo Kunz, Der Burgerkrieg in Chile (Vienna, 1892); Militdr Wochenblatt (5th supplement, 1892); Sir W. Laird Clowes, Four Modern Naval Campaigns (London, 1902) ; Proceedings of U. S. Naval Institute (1894.) (for La Placilla); and the military and naval periodicals of

1892.

CHILE-PERUVIAN WAR (1870-1882). The proximate cause of this war was the seizure, by the authorities of Bolivia, of the effects of the Chilean Nitrate Company at Antofagasta, then part of the Bolivian province of Atacama. The first act of

hostility was the despatch of 500 soldiers to protect Chilean interests at Antofagasta. This force, under Colonel Sotomayor, landed and marched inland; the only resistance encountered was at Calama on the river Loa, where a handful of newly raised miHtia was routed (23rd March 1879). About the same time Chilean warships occupied Cobija and Tocapilla, and Sotomayor, after his victory at Calama, marched to the latter port. Bolivia had declared war on the 1st of March, but Peru not till the 5th of April: this delay gave the Chileans time to occupy every port on the Bolivian coast. Thus the Chilean admiral was able to proceed at once to the blockade of the southern ports of Peru, and in

particular Iquique, where there took place the first naval action of the war. On the 21st of April the Chilean sloop ” Esmeralda ” and the gunboat ” Covadonga “—both small and weak ships — engaged the Peruvian heavy ironclads ” Huascar ” and ” Independencia “; after a hot fight the ” Huascar ” under Miguel Grau sank the ” Esmeralda ” under Arturo Prat, who was killed, but Carlos Condell in the ” Covadonga ” manceuvred the ” Independencia ” aground and shelled her into a complete wreck. The Chileans now gave up the blockade and con- centrated all their efforts on the destruction of the ” Huascar,” while the allies organized a field army in the neighbour- hood of Tacna and a large Chilean force assembled at Anto- fagasta.

On the 8th of October 1879 the ” Huascar ” was brought to action off Angamos by the ” Blanco Encalada,” and the ” Al- mirante Cochrane.” Grau was outmatched as hopelessly and made as brave a fight as Prat at Iquique. Early in the action a shot destroyed the Peruvian’s conning tower, killing Grau and his staff, and another entered her turret, killing the flag captain and nearly all the crew of the turret guns. When the ” Huascar ” finally surrendered she had but one gun left in action, her fourth commander and three-quarters of her crew were killed and wounded, and the steering-gear had been shot away. The Peruvian navy had now ceased to exist. The Chileans resumed the blockade, and more active operations were soon undertaken. The whole force of the allies was about 20,000 men, scattered along the seaboard of Peru. The Chileans on the other hand had a striking force of 16,000 men in the neighbourhood of Antofagasta, and of this nearly half was embarked for Pisagua on the 26th of October. The expeditionary force landed, in the face of considerable opposition, on the 2nd of November, and captured Pisagua. From Pisagua the Peruvians and Bolivians fell back along the railway to their reinforcements, and when some 10,000 men had been collected they moved forward to attack the Chilean position of San Francisco near Dolores station (19th November). In the end the Chileans were victorious, but their only material gain was the possession of Iquique and the retreat of the allies, who fell back inland towards. Tarapaca. The tardy pursuit of the Chileans ended in the battle of Tarapaca on the 27th. In this the allies were at first surprised, but, rapidly recovering them- selves, took the offensive, and after a murderous fight, in which more men were killed than were wounded, the Chileans suffered a complete defeat. For some inexplicable reason the allies made no use of their victory, continued to retreat and left the Chileans in complete possession of the Tarapaca region. With this the campaign of 1879 ended. Chile had taken possession of the Bolivian seaboard and of the Peruvian province of Tarapaca, and had destroyed

the hostile navy.

The objective of the Chileans in the second campaign was the

frovince of Tacna and the field force of the allies at Tacna and Arica. he invasion was again carried out by sea, and 12,000 Chileans were landed at Pacocha (Ylo), far to the N. of Arica. Careful prepara- tions were made for a desert march, and on the 12th of March 1880 the advanced corps started inland for Moquegua, which was occupied on the 20th. Near Moquegua the Peruvians, some 2000 strong, took up an unusually strong position in the defile of Cuesta de los Angeles. But the great numerical superiority of the assailants enabled them to turn the flanks and press the front of the Peruvian position, and after a severe struggle the defence collapsed (March 22nd), In April the army began its advance southward from Moquegua to Tacna, while the Chilean warships engaged in a series of minor naval operations in and about the bay of Callao. Arica was also

watched, and the blockade was extended north of Lima. The land campaign had ere this culminated in the battle of Tacna (May 26th), in which the Chileans attacked at first in several disconnected bodies, and suffered severely until all their forces came on the field. Then a combined advance carried all before it. The allies engaged under General Narciso Campero, the new president of Bolivia, lost nearly 3000 men, and the Chileans, commanded by Manuel Baque- dano, lost 2000 out of 8500 on the field. The defeated army was completely dissolved, and it only remained for the Chileans to march on Arica from the land side. The navy co-operated with its long- range guns, on the 7th of June a general assault was made, and before nightfall the whole of the defences were in the hands of the Chileans. Their second campaign had given them entire possession of another strip of Peru (from Pisagua to Ylo), and they had shown themselves greatly superior, both in courage and leadership, to their opponents. While the army prepared for the next campaign, the Chilean navy was active ; the blockade became more stringent and several fights took place, in one of which the ” Covadonga ” was sunk; an expe- ditionary force about 3000 strong, commanded by Patricio Lynch, a captain in the Chilean navy, carried out successful raids at various places on the coast and inland.

The Chilean army was reorganized during the summer, and prepared for its next operation, this time against Lima itself. General Baquedano was in command. The leading troops disembarked at Pisco on the 18th

of November 1880, and the whole army was ready to move against the defences of Lima six weeks later. These defences consisted of two distinct positions, Chorrillos and Miraflores, the latter being about 4000 yds. outside Lima. The first line of defence was attacked by Baquedano on the 13th of January 1881. Recon- naissances proved that the Peruvian lines could not be turned, and the battle was a pure frontal attack. The defenders had 22,000 men in the lines, the Chileans engaged about 24,000. The battle of Chorrillos ended in the complete defeat of the Peruvians, less than a quarter of whose army rallied behind the Miraflores defences. The Chileans lost over 3000 men. Two days later took place the battle of Miraflores (January 15th). Here the defences were very strong, and the action began with a daring counter-attack by some Peruvians. Neither party had intended to fight a battle, for negotiations were in progress, but the action quickly became general. Its result was, as before, the complete dissolution of the defending army. Lima, in- capable of defence, was occupied by the invaders on the 17th, and on the 1 8th Callao surrendered. The resistance of the Peruvians was so far broken that Chile left only a small army of occupation to deal with the remnants of their army. The last engagement took place at Caxacamara in September 1882, when the Peruvians won an unimportant success.

See T. B. M. Mason, The War on the Pacific Coast, 1879-1881 (U.S. Office of Naval Intelligence, Washington, 1883); Captain Chateauminois (transl.), Memoire du Ministre de la Guerre du Chili sur la guerre Chilo-Peruvienne (1882); Barros Arana, Hist, de la guerre du Pacifique (1884) ; Sir W. Laird Clowes, Four Modern Naval Campaigns (London, 1902); Anon., Precis de la guerre du Pacifique (Paris, 1886) ; Clements R. Markham, The War between Peru and Chile.

CHILIASM (from Gr. x^ ta0P M°s, ySKioi, a thousand), the belief that Christ will return to reign in the body for a thousand years, the doctrine of the Millennium (q.v.).

CHILLAN, a city and the capital of the province of Nuble, in the southern part of central Chile, 35° 56′ S., 71 37′ W., 246 m. by rail S.S.W. of Santiago and about 56 m. direct (108 by rail) N.E. of Conception. Pop. (1895) 28,738; (1902, official estimate) 36,382. Chilian is one of the most active commercial cities of central Chile, and is surrounded by a rich agricultural and grazing country. Chilian was founded by Ruiz de Gamb6a in 1594. Its present site was chosen in 1836. The original site, known as Chilian Viejo, forms a suburb of the new city. The hot sulphur springs of Chilian, which were discovered in 1795, are about 45 m. E.S.E. They issue from the flanks

of the ” Volcan Viejo,” about 7000 ft. above sea-level. The highest temperature of the water issuing from these springs is a little over 13 5 . The principal volcanoes of the Chilian group are the Nevado (95-28 ft.) and the Viejo. After a repose of about two centuries the Nevado de Chilian broke out in eruption early in 1861 and caused great destruction. The eruption ceased in 1863, but broke out again in 1864.

CHILLIANWALLA, a village of British India in the Punjab, situated on the left bank of the river Jhelum, about 85 m. N.W. of Lahore. It is memorable as the scene of a battle on the 13th of January 1849, between a British force commanded by Lord Gough and the Sikh army under Sher Singh. The loss of ‘.‘de Sikhs was estimated at 4000, while that of the British in killed and wounded amounted to 2800, of whom nearly 1000 were Europeans and 89 were British and 43 native officers. An.

obelisk erected at Chillianwalla by the British government preserves the names of those who fell.

CHILLICOTHE, a city and the county-seat of Livingston county, Missouri, U.S.A., situated in the N. part of the state, on the Grand river, about 80 m. N.E. of Kansas City. Pop. (1890) 5717; (1900) 6905 (538 negroes); (1910) 6265. It is served by the Chicago, Milwaukee & St Paul, the Wabash, and the Chicago, Burlington & Quincy railways. There are various manufactures. Coal and limestone are found in the vicinity, and much live stock is raised, wool and hides being shipped from Chillicothe. Chillicothe was settled about 1830, and the town was laid out in 1837 on land granted directly by the Federal government; it was incorporated in 1855.

CHILLICOTHE, a city and the county-seat of Ross county, Ohio, U.S.A., on the W. bank of the Scioto river, on the Ohio & Erie Canal, about 50 m. S. of Columbus. Pop. (1890) 11,288; (1900) 12,976, of whom 986 were negroes, and 910 were foreign- born; (1910 census) 14,508. Chillicothe is served by the Baltimore & Ohio South-Western (which has railway shops here), and other railways. The city has two parks. There are several ancient mounds in the vicinity. Chillicothe is built on a plain about 30 ft. above the river, in the midst of a fertile agri- cultural region, and has a large trade in grain and coal, and in manufactures. The value of the city’s factory products increased from

$1,615,959 in 1900 to $3,146,890 in 1905, or 94-7%- Chillicothe was founded in 1796, and was first incorporated in 1802. In 1800-1803 it was the capital of the North-West Territory, and in 1803-1810 and 1812-1816 the capital of Ohio. Three Indian villages bore the name Chillicothe, each being in turn the chief town of the Chillicothe, one of the four tribal divisions of the Shawnee, in their retreat before the whites; the village near what is now Oldtown in Greene county was destroyed by George Rogers Clark in 1780; that in Miami county, where Piqua is now, was destroyed by Clark in 1782; and the Indian village near the present Chillicothe was destroyed in 1787 by Kentuckians.

See Henry Howe, Historical Collections of Ohio (Columbus, 1891).

CHILLINGWORTH, WILLIAM (1602-1644), English divine and controversialist, was born at Oxford in October 1602. In June 1618 he became a scholar of Trinity College, Oxford, and was made a fellow of his college in June 1628. He had some reputation as a skilful disputant, excelled in mathematics, and gained some credit as a writer of verses. The marriage of Charles I. with Henrietta Maria of France had stimulated the propaganda of the Roman Catholic Church, and the Jesuits made the universities their special point of attack. One of them, ” John Fisher,” who had his sphere at Oxford, succeeded in making a convert of young Chillingworth, and prevailed upon him to go to the Jesuit college at Douai. Influenced, however, by his godfather, “Laud, then bishop of London, he resolved to make an impartial inquiry into the claims of the two churches. After a short stay he left Douai in 1631 and returned to Oxford. On grounds of Scripture and reason he at length declared for Protestantism, and wrote in 1634, but did not publish, a confutation of the motives which had led him over to Rome. This paper was lost; the other, on the same subject, was probably written on some other occasion at the request of his friends. He would not, however, take orders. His theo- logical sensitiveness appears in his refusal of a preferment offered to him in 1635 by Sir Thomas Coventry, lord keeper of the great seal. He was in difficulty about subscribing the Thirty-nine Articles. As he informed Gilbert Sheldon, then warden of All Souls, in a letter, he was fully resolved on two points — that to say that the Fourth Commandment is a law of God appertaining to Christians is false and unlawful, and that the damnatory clauses in the Athanasian Creed are most false, and in a high degree presumptuous and schismatical. To subscribe, therefore, he felt would be to ” subscribe his own damnation.” At this time his principal work was far towards completion. It was undertaken in defence of Dr Christopher Potter, provost of Queen’s College in Oxford, who had for some time been carrying on a controversy with a

Jesuit known as Edward Knott, but

whose real name was Matthias Wilson. Potter had replied in 1633 to Knott's Charity Mistaken (1630), and Knott retaliated with Mercy and Truth. This work Chillingworth engaged to answer, and Knott, hearing of his intention and hoping to bias the public mind, hastily brought out a pamphlet tending to show that Chillingwprth was a Socinian who aimed at perverting not only Catholicism but Christianity.

Laud, now archbishop of Canterbury, was not a little solicitous about Chillingworth's reply to Knott, and at his request, as " the young man had given cause why a more watchful eye should be held over him and his writings," it was examined by the vice- chancellor of Oxford and two professors of divinity, and pub- lished with their approbation in 1637, with the title The Religion of Protestants a Safe Way to Salvation. The main argument is a vindication of the sole authority of the Bible in spiritual matters, and of the free right of the individual conscience to interpret it. In the preface Chillingworth expresses his new view about subscription to the articles. " For the Church of England," he there says, " I am persuaded that the constant doctrine of it is so pure and orthodox, that whosoever believes it, and lives according to it, undoubtedly he shall be saved, and that there is no error in it which may necessitate or warrant any man to disturb the peace or renounce the communion of it. This, in my opinion, is all intended by subscription." His scruples having thus been overcome, he was, in the following year (1638), promoted to the chancellorship of the church of Sarum, with the prebend of Brixworth [in Northamptonshire annexed to it. In the great civil struggle he used his pen against the Scots, and was in the king's army at the siege of Gloucester, inventing certain engines for assaulting the town. Shortly afterwards he accompanied Lord Hopton, general of the king's troops in the west, in his march; and, being laid up with illness at Arundel Castle, he was there taken prisoner by the parlia- mentary forces under Sir William Waller. As he was unable to go to London with the garrison, he was conveyed to Chichester, and died there in January 1644. His last days were harassed by the diatribes of the Puritan preacher, Francis Cheynell.

Besides his principal work, Chillingworth wrote a number of smaller anti-Jesuit papers published in the posthumous Additional Discourses (1687), and nine of his sermons have been preserved. In politics he was a zealous Royalist, asserting that even the unjust and tyrannous violence of princes may not be resisted, although it might be avoided in terms of the instruction, " when they persecute you in one city, flee into another." His writings long enjoyed a high popu- larity. The

Religion of Protestants is characterized by much fairness and acuteness of argument, and was commended by Locke as a discipline of ” perspicuity and the way of right reasoning.” The charge of Socimanism was frequently brought against him, but, as Tillotson thought, ” for no other cause but his worthy and successful attempts to make the Christian religion reasonable.” His creed, and the whole gist of his argument, is expressed in a single sentence, ” I am fully assured that God does not, and therefore that men ought not to, require any more of any man than this, to believe the Scripture to be God’s word, and to endeavour to find the true sense of it, and to live according to it.”

A Life by Rev. T. Birch was prefixed to the 1742 edition of Chillingworth’s Works.

CHIL06 (from Chile and hut, ” part of Chile “), a province of southern Chile, and also the name of a large island off the Chilean coast forming part of the province. The province, area 8593 sq. m., pop. (1895) 77,750, is composed of three groups of islands, Chiloe, Guaitecas and Chonos, and extends from the narrow strait of Chacao in 41° 40′ S. to the peninsula of Taytao, about 45 45′ S. The population is composed mainly of Indians, distantly related to the tribes of the mainland, and mestizos. The capital of the province is Ancud or San Carlos, at the northern end of the island of Chilo6, on the sheltered bay of San Carlos, once frequented by whalers. It is the seat of a bishopric; pop. (1905) 3182. Other towns are Castro, the former capital, on the eastern shore of Chilo6, and the oldest town of the island (founded 1566), once the seat of a Jesuit mission, and Melinca on an island of the Guaitecas group.

The island of Chiloe, which lies immediately south of the province of Llanquihue, is a continuation of the western Chilean formation, the coast range appearing in the mountainous range of western Chiloe and the islands extending south along the coast. Between this coast

range and the Andes, the gulfs of Chacao, or Ancud and Corcovado (average width, 30 m.) separate the island from the mainland. Chiloe has an extreme length north to south of about 1 18 m., and an average, width of 35 to 40 m., with an area of about 4700 so;, m. There are several lakes on the island — Cucao, 12 m. long, being the largest, — and one small river, the Pudeto, in the northern part of the

island, is celebrated as the scene of the last engagement in the war for in- dependence, the Spanish retaining possession of Chilo6 until 1826.

CHILON, of Sparta, son of Damagetus, one of the Seven Sages of Greece, nourished about the beginning of the 6th century B.C. In 560 (or 556) he acted as ephor, an office which he is even said to have founded. The tradition was that he died of joy on hearing that his son had gained a prize at the Olympic games. According to Chilon, the great virtue of man was prudence, or well-grounded judgment as to future events.

A collection of the sayings attributed to him will be found in F. W. Mullach, Fragmenta Philosophorum Graecorum, i. ; see Hero- dotus i. 69; Diogenes Laertius i. 68; Pausanias iii. 16, x. 24.

CHILPERIC, the name of two Frankish kings.

Chilperic I. (d. 584) was one of the sons of Ciotaire I. Im- mediately after the death of his father in 561 he endeavoured to take possession of the whole kingdom, seized the treasure amassed in the royal town of Berny and entered Paris. His brothers, however, compelled him to divide the kingdom with them, and Soissons, together with Amiens, Arras, Cambrai, Therouanne, Tournai and Boulogne, fell to Chilperic's share, but on the death of Charibert in 567 his estates were augmented. When his brother Sigebert married Brunhilda, Chilperic also wished to make a brilliant marriage. He had already repudiated his first wife, Audovera, and had taken as his concubine a serving-woman called Fredegond. He accordingly dismissed Fredegond, and married Brunhilda's sister, Galswintha. But he soon tired of his new partner, and one morning Galswintha was found strangled in her bed. A few days afterwards Chilperic married Fredegond. This murder was the cause of long and bloody wars, interspersed with truces, between Chilperic and Sigebert. In 575 Sigebert was assassinated by Fredegond at the very moment when he had Chilperic at his mercy. Chilperic retrieved his position, took from Austrasia Tours and Poitiers and some places in Aquitaine, and fostered discord in the king- dom of the east during the minority of Childebert II. One day, however, while returning from the chase to the town of Chelles, Chilperic was stabbed to death.

Chilperic may be regarded as the type of Merovingian sovereigns. He was exceedingly anxious to extend the royal authority. He levied numerous imposts, and his fiscal measures provoked a great sedition at Limoges in 579. He wished to bring about the subjection of the church, and to this end sold bishoprics to the highest bidder, annulled

the wills made in favour of the bishoprics and abbeys, and sought to impose upon his subjects a rationalistic conception of the Trinity. He pretended to some literary culture, and was the author of some halting verse. He even added letters to the Latin alphabet, and wished to have the MSS. rewritten with the new characters. The wresting of Tours from Austrasia and the seizure of ecclesi- astical property provoked the bitter hatred of Gregory of Tours, by whom Chilperic was stigmatized as the Nero and the Herod of his time.

See Seresia, L'Uglise et I'Htat sous les rots francs au VI' Steele (Ghent, 1888).

Chilperic II. (d. 720) was the son of Childeric II. He became king of Neustria in 715, on which occasion he changed his name from Daniel to Chilperic. At first he was a tool in the hands of Ragenfrid, the mayor of the palace. Charles Martel, however, overthrew Ragenfrid, accepted Chilperic as king of Neustria, and, on the death of Ciotaire IV., set him over the whole kingdom. The young king died soon afterwards. (C. Pf.)

CHILTERN HILLS, or The Chilterns, a range of chalk hills in England, extending through part of Oxfordshire, Bucking- hamshire and Bedfordshire. Running from S.W. to N.E., they form a well-marked escarpment north-westward, while the south-eastern slope is long. The name of Chilterns is applied to the hills between the Thames in the neighbourhood of Goring

and the headwaters of its tributary the Lea between Dunstable and Hitchin, the crest line between these points being about 55 m. in length. But these hills are part of a larger chalk system, continuing the line of the White Horse Hills from Berkshire, and themselves continued eastward by the East Anglian ridge. The greatest elevation of the Chilterns is found in the centre from Watlington to Tring, where heights from 80c to 850 ft. are frequent. Westward towards the Thames gap the elevation falls away but little, but eastward the East Anglian ridge does not often exceed 500 ft., though it continues the northward escarpment across Hertfordshire. There are several passes through the Chilterns, followed by main roads and railways converging on London, which lies in the basin of which these hills form part of the northern rim. The most remarkable passes are those near Tring, Wendover and Prince's Risborough, the floors of which are occupied by the gravels of former rivers. The Chilterns were formerly covered with a forest of beech, and there is still a local supply of this wood for the manufacture of chairs and other articles in the neighbourhood of Wycombe.

CHILTERN HUNDREDS. An old principle of English parlia- mentary law declared that a member of the House of Commons, once duly chosen, could not resign his seat. This rule was a relic of the days when the local gentry had to be compelled tc serve in parliament. The only method, therefore, of avoiding the rule came to be by accepting an office of profit from the crown, a statute of 1707 enacting that every member accepting an office of profit from the crown should thereby vacate his seat, but should be capable of re-election, unless the office in question had been created since 1705, or had been otherwise declared to disqualify for a seat in parliament. Among the posts of profit held by members of the House of Commons in the first half of the 1 8th century are to be found the names of several crown steward- ships, which apparently were not regarded as places of profit under the crown within the meaning of the act of 1707, for no seats were vacated by appointment to them. The first instance of the acceptance of such a stewardship vacating a seat was in 1740, when the house decided that Sir W. W. Wynn, on inheriting from his father, in virtue of a royal grant, the stewardship of the lordship and manor of Bromfield and Yale, had ipso facto vacated his seat. On the passing of the Place Act of 1742, the idea of utilizing the appointment to certain crown stewardships (possibly suggested by Sir W. W. Wynn's case) as a pretext for enabling a member to resign his seat was carried into practice. These nominal stewardships were eight in number, but only two sur- vived to be used in this way in contemporary practice—those of the Chilterns and Northstead; and when a member wished to vacate his seat, he was accordingly spoken of as taking the Chiltern Hundreds.

1. Steward and Bailiff of the Chiltern Hundreds, County Bucks.— The Chiltern Hundreds formed a bailiwick of the ordinary type. They are situated on the Chiltern Hills, and the depredations of the bandits, who found shelter within their recesses, became at an early period so alarming that a special officer, known as the steward of the Chiltern Hundreds, was appointed for the protection of the inha- bitants of the neighbouring districts. It is doubtful at what date the necessity for such an appointment disappeared, but the three hun- dreds of Stoke, Burnham and Desborough are still distinguished by the old name. The appointment of steward was first used for parlia- mentary purposes in 1750, the appointment being made by the chancellor of the exchequer (and at his discretion to grant or not), and the warrant bestowing on the holder " all wages, fees, allowances and other privileges and pre-eminences." Up to the 19th century there was a nominal salary of 20s. attached to the post. It was laid down in 1846 by the chancellor of the exchequer that the Chilterns could not be granted to more than one

person in the same day, but this rule has not been strictly adhered to, for on four occasions subsequent to 1850 the Chilterns were granted twice on the same day. The Chilterns might be granted to members whether they had taken the oath or not, or during a recess, though in this case a new writ could not be issued until the House met again. Each new warrant expressly revoked the grant to the last holder, the new steward retaining it in his turn until another should be appointed.

2. Steward and Bailiff of the Manor of East Hundred, or Hendred, Berks. — This stewardship was first used for parliamentary purposes in 1763, and was in more or less constant use until 1840, after which it disappeared. This manor comprised copyholds, the usual courts were held, and the stewardship was an actual and active office, the duties being executed by a deputy steward. The manor was sold by

public auction in 1823 for £910, but in some manner the crown retained the right of appointing a steward for seventeen years after that date.

3. Steward and Bailiff of the Manor of Norlhstead, Yorkshire.— This manor was crown property before 1750, but was in lease until 1838. It has no copyhold lands, nor are there any records of manor courts. There are no traces of any profits having ever been derived from the office. It was used for parliamentary purposes in 1844 and subsequently.

4. Steward of the Manor of Hempholme, Yorkshire. — This manor appears to have been of the same nature as that of Northstead. It was in lease until 1835. It was first used for parliamentary purposes in 1845 and was in constant use until 1865. It was sold in 1866.

5. Escheator of Munster. — Escheators were officers commissioned to secure the rights of the crown over property which had legally escheated to it. In Ireland mention is made of escheators as early as 1256. In 1605 the escheatorship of Ireland was split up into four, one for each province, but the duties soon became practically nominal. The escheatorship of Munster was first used for parliamentary purposes in the Irish parliament from 1793 to 1800, and in the united parliament (24 times for Irish seats and once for a Scottish seat) from 1801 to 1820. After 1820 it was discontinued and finally abolished in 1838.

6. Steward of the Manor of Old Shoreham, Sussex. — This manor belonged to the duchy of Cornwall, and it is difficult to understand how it came to be regarded as a crown appointment. It was first used for parliamentary purposes in 1756, and then, occasionally, until 1799, in which year it was sold by the duchy to the duke of Norfolk.

7. Steward of the Manor of Poynings, Sussex. — This manor reverted to the crown on the death of Lord Montague about 1804, but was leased up to about 1835. It was only twice used for parliamentary purposes, in 1841 and 1843.

8. Escheator of Ulster. — This appointment was used in the united parliament three times, for Irish seats only; the last time in 1819.

See parliamentary paper — Report from the Select Committee on House of Commons {Vacating of Seats) (1894). (T. A. I.)

CHILWA (incorrectly Shir w a), a shallow lake in south-east Africa, S.S.E. of Lake Nyasa, cut by 35° 20′ E., and lying between 1 5 and 1 5 3 5′ S. The lake is undergoing a process of desiccation, and in some dry seasons (as in 1879 and 1903) the ” open water ” is reduced to a number of large pools. Formerly the lake seems to have found an outlet northwards to the Lujenda branch of the Rovuma, but with the sinking of its level it is now sepa- rated from the Lujenda by a wooded ridge some 30 to 40 ft. above the surrounding plains. There are four islands, the largest rising 500 ft. above the water. The lake was discovered by David Livingstone in 1859 and was by him called Shirwa, from a mishearing of the native name.

CHIMAERA, in Greek mythology, a fire-breathing female monster resembling a lion in the fore part, a goat in the middle, and a dragon behind {Iliad, vi. 179), with three heads correspond- ing. She devastated Caria and Lycia until she was finally slain by Bellerophon (see H. A. Fischer, Bellerophon, 1851). The origin of the myth was the volcanic nature of the soil of Lycia (Pliny, Nat. Hist. ii. no; Servius on Aeneid, vi 288), where works have been found containing representations of the Chimaera in the simple form of a lion. In modern art the Chimaera is usually represented as a lion, with a goat’s head in the middle of the back, as in the bronze Chimaera of Arezzo (5th century). The word is now used generally to denote a fantastic idea or fiction of the imagination.

CHIMAY, a town in the extreme south-east of the province of Hainaut, Belgium, dating from the 7th century. Pop. (1904) 3383. It is more commonly spoken of as being in the district entre Sambre et Meuse.

Owing to its proximity to the French frontier it has undergone many sieges, the last of which was in 1640, when Turenne gave orders that it should be reduced to such ruin that it could never stand another. The town is chiefly famous for the castle and park that bear its name. Originally a stronghold of the Croy family, it has passed through the D'Aren- bergs to its present owners, the princes of Caraman-Chimay. The castle, which before Turenne's order to demolish it possessed seven towers, has now only one in ruins, and a modern chateau was built in the Tudor style in the 18th century. This domain carried with it the right to one of the twelve peerages of Hainaut. Madame Tallien, daughter of Dr Cabarrus, the Lady of Thermidor, married as her second husband the prince de Chimay, and held her little court here down to her death in 1835. There is a

memorial to her in the church, which also contains a fine monu- ment of Phillippe de Croy, chamberlain and comrade in arms of the emperor Charles V. John Froissart the chronicler died and was buried here. There is a statue in his honour on the Grand Place. Chimay is situated on a stream called the White Water, which in its lower course becomes the Viroin and joins the Meuse. CHIME. (1) (Probably derived from a mistaken separation into two words, chimbe bell, of chymbal or chymbel, the old form of "cymbal," Lat. cymbalum), a mechanical arrangement by which a set of bells in a church or other tower, or in a clock, are struck so as to produce a sequence of musical sounds or a tune. For the mechanism of such an arrangement in a clock and in a set of bells, see the articles Clock and Bell. The word is also applied to the tune thus played by the bells and also to the harmonious " fall " of verse, and so, figuratively, to any harmoni- ous agreement of thought or action. (2) (From Mid. Eng. chimb, a word meaning " edge," common in varied forms to Teutonic languages, cf. Ger. Kimme), the bevelled rim formed by the projecting staves at the ends of a cask.

CHIMERE (Lat. chimera, chimaera; O. Fr. chamarre, Mod. Fr. simarre; Ital. zimarra; cf. Span, zamarra, a sheepskin coat; possibly derived ultimately from Gr. x e 'M«P'os, " wintry, " i.e. a winter overcoat), in modern English use the name of a garment worn as part of the ceremonial dress of Anglican bishops. It is a long sleeveless gown of silk or satin, open down the front, gathered in at the back between the shoulders, and with slits for the arms. It is worn over the rochet (q.v.), and its colour is either black or scarlet (convocation robes). By a late abuse the sleeves of the rochet were, from motives of convenience, some- times attached to the chimere. The origin of the chimere has been the subject of much debate; but the view that it is a modification of the cope (q.v.) is now discarded, and it is practic- ally proved to be

derived from the medieval tabard (tabardum, taker da or collobium), an upper garment worn in civil life by all classes of people both in England and abroad. It has there- fore a common origin with certain academic robes (see Robes, § .Academic dress) .

The word ” chimere,” which first appears in England in the 14th century, was sometimes applied not only to the tabard worn over the rochet, but to the sleeved cassock worn under it. Thus Archbishop Scrope is described as wearing when on his way to execution (1405) a blue chimere with sleeves. But the word properly applies to the sleeveless tabard which tended to super- sede, from the 15th century onwards, the inconvenient cappa clausa (a long closed cloak with a slit in front for the arms) as the out-of-doors upper garment of bishops. These chimeres, the colours of which (murrey, scarlet, green, &c.) may possibly have denoted academical rank, were part of the civil costume of prelates. Thus in the inventory of Walter Skirlawe, bishop of Durham (1405-1406), eight chimeres of various colours are mentioned, including two for riding (pro equitatura). The chimere was, moreover, a cold weather garment. In summer its place was taken by the tippet.

In the Anglican form for the consecration of bishops the newly consecrated prelate, hitherto vested in rochet, is directed to put on ” the rest of the episcopal habit,” i.e. the chimere. The robe has thus become in the Church of England symbolical of the episcopal office, and is in effect a liturgical vestment. The rubric containing this direction was added to the Book of Common Prayer in 1662; and there is proof that the development of the chimere into at least a choir vestment was subsequent to the Reformation. Foxe, indeed, mentions that Hooper at his consecration wore ” a long scarlet chymere down to the foot ” (Acts and Mon., ed. 1563, p. 1051), a source of trouble to himself and of scandal to other extreme reformers; but that this was no more than the full civil dress of a bishop is proved by the fact that Archbishop Parker at his consecration wore surplice and tippet, and only put on the chimere, when the service was over, to go away in. This civil quality of the garment stiK survives alongside the other; the full dress of an Anglican prelate at civil functions of importance (e.g. in narliament, or at court) is still rochet and chimere.

The continental equivalent of the chimere is the zimarra or simarre, which is defined by foreign ecclesiologists (Moroni, Barbier de

Montault) as a kind of soutane (cassock), from which it is distinguished by having a small cape and short, open arms (pianches-fausses) reach- ing to the middle of the upper arm and decorated with buttons. In France and Germany it is fitted more or less to the figure; in Italy it is wider and falls down straight in front. Like the soutane, the zimarra is not proper to any particular rank of clergy, but in the case of bishops and prelates it is ornamented with red buttons and bind- ings. It never has a train (cauda). It is not universally worn, e.g. in Germany apparently only by prelates. G. Moroni identifies the zimarra with the epitogium which Domenico Magri, in his Hierolexicon (ed. 1677), calls the uppermost garment of the clergy, worn over the soutane (toga) instead of the mantellum (vestis supremo, clericorum loco pallii), with a cross-reference to Tabardum, the " usual " upper garment (pallium usuale) ; and this definition is repeated in the 8th edition of the work (1732). From this it appears that so late as the middle of the 18th century the zimarra was still in common use as an out-of-doors overcoat. But, according to Moroni, by the latter half of the 19th century the zimarra, though still worn by certain civilians (e.g. notaries and students), had become in Italy chiefly the domestic garment of the clergy, notably of superiors, parish priests, rectors, certain regulars, priests of congregations, bishops, prelates and cardinals. It was worn also by the Roman senators, and is still worn by university professors. A black zimarra lined with white, and sometimes ornamented with a white binding and gold tassels, is worn by the pope.

More analogous to the Anglican chimere in shape, though not in significance, is the purple mantelletum worn over the rochet by bishops, and by others authorized to wear the episcopal insignia, in presence of the pope or his legates. This symbolizes the temporary suspension of the episcopal jurisdiction (symbolized by the rochet) so long as the pope or his representative is present. Thus at the Curia cardinals and prelates wear the mantelletum, while the pope wears the zimarra, and the first act of the cardinal camerlengo after the pope's death is to expose his rochet by laying aside the mantelletum, the other cardinals following his example, as a symbol that during the vacancy of the papacy the pope's jurisdiction is vested in the Sacred College. On the analogy of the mantelletum certain Anglican prelates, American and colonial, have from time to time appeared in purple chimeres ; which, as the Rev. N. F. Robinson justly points out, is a most un- happy innovation, since it has no historical justification, and its symbolism is rather unfortunate.

Authorities. — See the Report of the sub-committee of Con- vocation on the ornaments of the church and its ministers, p. 31 (London,

1908); the Rev. N. F. Robinson, “The black chimere of Anglican Prelates: a plea for its retention and proper use,” in Transactions of the St Paul’s Ecclesialogical Soc. vol. iv. pp. 181-220 (London, 1898) ; Herbert Druitt, Costume on Brasses (London, 1906) ; G. Moroni, Dizionario dell’ erudizione storico-ecclesiastica (Venice, 1861), vol. 103, s.v. “Zimarra”; X. Barbier de Montault, TraitS pratique de la construction, &c, des Sglises, ii. 538 (Paris, 1878). (W. A. P.)

CHIMESYAN (Tsimshian), a tribe of North American Indians, now some 3000 in number, living around the mouth of the Skeena river, British Columbia, and on the islands near the coast. They are a powerfully built people, who tattoo and wear labrets and rings in noses and ears. They are skilful fishermen, and live in large communal houses. They are divided into clans and distinct social orders.

CHIMKENT, a town of Asiatic Russia, in the province of Syr-darya, 70 m. by rail N.N.E. of Tashkent. Pop. (1897) 10,756, mostly Sarts. It occupies a strategical position at the west end of the valley between the Alexander range and the Ala-tau (or Talas-tau), at the meeting of commercial routes from (1) Vyernyi and Siberia beyond, from the north-east, (2) the Aral Sea and Orenburg (connected with it by rail since 1905) to the north-west, and (3) Ferghana and Bokhara to the south. The citadel, which was stormed by the Russians in 1864, stands on high ground above the town, but is now in ruins. Chimkent is visited by consumptive patients who wish to try the koumiss cure. It has cotton mills and soap-works.

CHIMNEY (through the Fr. cheminSe, from caminala, sc. camera, a Lat. derivative of caminus, an oven or furnace), in architecture, that portion of a building, rising above the roof, in which are the flues conveying the smoke to the outer air. Originally the term included the fireplace as well as the chimney shaft. At Rochester Castle (1130) and Heddington, Essex, there were no external chimney shafts, and the flue was carried through the wall at some height above the fireplace. In the early examples the chimney shaft was circular, with one flue only, and was terminated with a conical cap, the smoke issuing from

openings in the side, which at Sherborne Abbey (a.d. 1300) were treated decoratively. It was not till the 15th century that the smoke issued at the top, and later in the century that more than one flue was carried up in the same shaft. There are a few examples of the clustered shaft in stone, but as a rule they are contemporaneous with the general use of brick. The brick chimney shafts, of which there are fine specimens at Hampton Court, were richly decorated with chevrons and other geometrical patterns. One of the best examples is that at

Thornton Castle, Gloucestershire.

In the 15th and 16th centuries in France the chimney shaft was recognized as an important architectural feature, and was of considerable elevation in consequence of the great height of the roofs. In the chateau of Meillant (1503) the chimney shafts are decorated with angle buttresses, niches and canopies, in the late Flamboyant style; and at Chambord and Blois they are carved with pilasters and niches with panelling above, carved with the salamander and other armorial devices. In the Roman palaces they are sometimes masked by the balustrades, and (when shown) take the form of sepulchral urns, as if to disguise their real purpose. Though not of a very architectural character, the chimneys at Venice present perhaps the greatest variety of terminations, and as a rule the smoke comes out on the sides and not through the top. (R. P. S.)

Factory Chimneys. — Chimneys, besides removing the products of combustion, also serve to provide the fire with the air requisite for burning the fuel. The hot air in the shaft, being lighter than the cold air outside it, tends to rise, and as it does so air flows in at the bottom to take its place. An ascending current is thus established in the chimney, its velocity, other things being equal, varying as the square root of the height of the shaft above the grate. The velocity also increases with increase of temperature in the gas column, but since the weight cf each cubic foot grows less as the gases expand, the amount of smoke discharged by a chimney does not increase indefinitely with the temperature; a maximum is reached when the difference in temperature between the gases in the shaft and the outside air is about 6oo° F., but the rate of increase is very slow after the difference has passed about 300 F. In designing a chimney the dimensions (height and sectional area) have to be so proportioned to the amount of fuel to be burnt in the various furnaces connected with it that at the temperature employed the products of combustion are effectively removed, due allowance being made for the frictional retardation of the current against the sides of the flues and shafts and in passing through the fire. The velocity of the current in actual chimneys varies widely, from 3 or 4 to 50 or 60 ft. a second. Increased velocity, obtainable by increasing the height of the shaft, gives increased delivering capacity, but a speed of 10 or 12 ft. a second is regarded as good practice. Ordinary factory chimneys do not in general exceed 180 or 200 ft. in height, but in some cases, especially when, as in chemical works, they are employed to get rid of objectionable vapours,' they have been made double that height, or even more. In section they are round, octagonal or square. The circular form offers the least resistance to wind pressure, and for a given height and

sectional area requires less material to secure stability than the octagonal and still less than the square; on the other hand, there is more liability to cracking. Brick is the material commonly used, but many chimneys are now made of iron or steel. Reinforced concrete is also employed.

CHIMNEYPIECE, the term given to the projecting hood which in medieval times was built over a fireplace to catch the smoke, and at a later date to the decorative framework, often carried up to the ceiling. ” Chimneypiece ” or ” mantelpiece ” is now the general term for the jambs, mantelshelf and external acces- sories of a fireplace. For many centuries the chimneypiece was the most ornamental and most artistic feature of a room, but as fireplaces have become smaller, and modern methods of heating have been introduced, its artistic as well as its practical significance has grown less.

Up to the 1 2th century rooms were warmed entirely by a hypo- caust, or with braziers, or by fires on the hearth, the smoke finding its way up to a lantern in the roof. The earliest chimneypiece known is that in the King’s House at Southampton, with Norman shafts in the joints carrying a segmental arch, which is attributed to the first half of the 12th century. At a later date, in consequence of the greater width of the fireplace, flat or segmental arches were thrown across and constructed with voussoirs, sometimes joggled, the thrust of the arch being resisted by bars of iron at the back. In domestic work of the 14th century the chimneypiece was greatly increased in order to allow of the members of the family sitting on either side of the fire on the hearth, and in these cases great beams of timber were employed to carry the hood ; in such cases the fireplace was so

deeply recessed as to become externally an important architectural feature, as at Haddon Hall. The largest chimneypiece existing is in the great hall of the Palais des Comtes at Poitiers, which is nearly 30 ft. wide, having two intermediate supports to carry the hood; the stone flues are carried up between the tracery of an immense window above. In the early Renaissance style, the chimneypiece of the Palais de Justice at Bruges is a magnificent example; the upper portion, carved in oak, extends the whole width of the room, with statues of nearly life size of Charles V. and others of the royai family of Spain. The most prolific modern designer of chimneypieces was J. B. Piranesi, who in 1765 published a large series, on which at a later

date the Empire style in France was based. In France the finest work of the early Renaissance period is to be found in the chimney- pieces, which are of infinite variety of design.

The English chimneypieces of the early 17th century, when the purer Italian style was introduced by Inigo Jones, were extremely simple in design, sometimes consisting only of the ordinary mantel- piece, with classic architraves and shelf, the upper part of the chimney breast being panelled like the rest of the room. In the latter part of the century the classic architrave was abandoned in favour of a much bolder and more effective moulding, as in the chimneypieces at Hampton Court, and the shelf was omitted.

In the 18th century the architects returned to the Inigo Jones classic type, but influenced by the French work of Louis XIV. and XV. Figure sculpture, generally represented by graceful figures on each side, which assisted to carry the shelf, was introduced, and the overmantel developed into an elaborate frame for the family portrait over the chimneypiece. Towards the close of the 18th century the designs of the brothers Adam superseded all others, and a century later they came again into fashion. The Adam mantels are in wood enriched with ornament, cast in moulds, sometimes copied from the carved wood decoration of old times. (R. P. S.)

CHIMPANZEE (Chimpanzi), the vernacular name of the highest species of the man-like apes, forming the typical repre- sentatives of the genus Anthropopithecus. Chimpanzees, of which there appear to be at least two species, range through the tropical forest-zone of Africa from the west coast to Uganda. The typical A. troglodytes has been long known to European science, Dr Tyson, a celebrated surgeon and anatomist of his time, having dissected a young individual, and described it, as a pigmy or Homo sylvestris, in a book published in 1699. Of this baby chimpanzee the skeleton may be seen in the Natural History branch of the British Museum alongside the volume in which it is described. It was not, however, till 1 788 that the chimpanzee received what is now recognized as a scientific name, having been christened in that year Simia troglodytes by the naturalist Johann Friedrich Gmelin. In his classification it was included in the same genus as the orang-utan; and it has recently been suggested that the name Simia pertains of right to the chim- panzee rather than to the orang-utan. Between the typical West African chimpanzee and the gorilla (q.v.) there is no difficulty in drawing a distinction; the difficulty comes in when we have to deal with the aberrant races, or species, of chimpanzee, some of which are so gorilla-like that it is by no means easy to deter- mine to which group they really pertain. In

height the adult male chimpanzee of the typical form does not exceed 5 ft., and the colour of the hair is a full black, while the skin, especially that of the face, is light-coloured; the ears are remarkably large and prominent, and the hands reach' only a short distance below the knees. The head is rounded and short, without prominent beetling ridges above the eyes, or a strong crest along the middle line of the back of the skull ; and the tusks of the old males are of no very great length and prominence. Moreover, there is no very marked difference in the size of the two sexes. Gentleness and docility are specially characteristic of the species, even when full-grown; while in the native state its habits are thoroughly arboreal.

In central Africa the chimpanzees assume more or less marked gorilla-like traits. The first of these aberrant types is Schweinfurth's chimpanzee (Anthropopithecus troglodytes schweinfurthi) , which inhabits the Niam-Niam country, and, although evidently belonging to the same species as the typical race, exhibits certain gorilla-like features. These traits are still more developed in the bald chimpanzee (A. tschego) of Loango, the Gabun, and other regions of French Congo, which takes its English name from the sparse covering of hair on the head. The most gorilla-like of all the races is, however, the kulu-kamba chimpanzee (A. kulu-kamba) of du Chaillu, which inhabits central Africa. The celebrated ape " Mafuka," which lived in the Dresden zoological gardens during 1875, and came from Loango, was apparently a member of this species, although it was at one time regarded as a hybrid between a chimpanzee and a gorilla. These gorilla-like traits were still more pronounced in "Johanna," a female

chimpanzee living in Barnum & Bailey's show in 1899, which has been described and figured by Dr A. Keith. The heavy ridges over the brow, originally supposed to be distinctive of the gorilla, are particu- larly well marked in "Johanna," and they would doubtless be still more noticeable in the male of the same race, which seems to be undoubtedly du Chaillu's kulu-kamba. Still the large size and prominence of the ears proclaim that both "Mafuka" and " Johanna " were chimpanzees and not gorillas. A gorilla-like feature in " Johanna " is, however, the presence of large folds at the sides (ala) of the nostrils, which are absent in the typical chim- panzee, but in the gorilla extend down to the upper lip. Chimpanzees exhibit great docility in confinement, where, however, they seldom survive for any great length of time. They likewise display a much higher degree of intelligence than any of the other man-like apes. (See Primates.) (R. L.*)

CHINA, a country of eastern Asia, the principal division of the Chinese

empire. In addition to China proper the Chinese Empire includes Manchuria, Mongolia, Tibet and Sin-kiang (East Turkestan, Kulja, Dzungaria, &c, i.e. all the Chinese dependencies lying between Mongolia on the north and Tibet on the south). Its most southern point is in 18° 50′ N.; its most northern in 53 25′ N.; its most western in 74 E., and its most eastern in 135° E. It lies, however, mainly between 20 and 50° N. and 8o° and 130 E. It is considerably larger than the whole of Europe. Though its area has not been exactly ascertained the various estimates closely approximate, varying between 4,277,060 and 4,300,000 sq. m. It is bounded N.W., N. and N.E. by Asiatic Russia, along a frontier extending some 6000 m.; E. by Korea and those parts of the Pacific known as the Yellow Sea and China Sea; S. and S.W. by the China Sea, French Indo-China, Upper Burma and the Himalayan states. It is narrowest in the extreme west. Chinese Turkestan along the meridian of Kashgar (76 E.) has a breadth of but 250 m. It rapidly broadens and for the greater part of its area is over 1800 m. across in a direct N. and S. line. Its greatest length is from the N.E. corner of Manchuria to the S.W. confines of Tibet, a- distance of 3.100 m. in a direct line. Its seaboard, about 5000 m. following the indentations of the coast, is almost, wholly in China proper, but the peninsula of Liao-tung and also the western shores of the Gulf of Liao-tung are in Manchuria.

China * proper or the Eighteen Provinces (Shih-pa-sheng) occupies the south-eastern part of the empire. It is bounded N. by Mongolia, W. by Turkestan and Tibet, S.W. by Burma, S. by Tongking and the gulf of that name, S.E. by the South China Sea, E. by the East China Sea, the Yellow Sea, Gulf of Chih-li and Manchuria. Its area is approximately 1,500,000 sq. m.

This vast country is separated from the rest of continental Asia by lofty tablelands and rugged mountain ranges, which determine the general course — west to east — of its principal rivers. On the north and west the Mongolian and Tibetan tablelands present towards China steep escarpments across which are very few passes. On the S.W. and S., on the borders of Yun-nan, high mountains and deep valleys separate China from Burma and Tongking. On the narrow N.E. frontier the transition from the Manchurian plateau to the alluvial plain of northern China is not abrupt, but, before the advent of railways, Manchuria afforded few and difficult means of access to other regions. Thus China was almost cut off from the rest of the world save by sea routes.

I. The Country

Western China consists of highlands often sparsely, and eastern China of lowlands densely peopled. Western China contains the only provinces where the population is under 100 per sq. m. From the Tibetan and Mongolian tablelands project mountain ranges which, ramifying over the western region, enclose elevated level tracts and' lower basins and valleys. East of this mountain- ous region, which extends into central China and covers probably

1 As to the origin of the names China and Cathay (the medieval ' name) see below § History. According to one theory the name China is of Malay origin, designating originally the region now called Indo-China, but transferred in early times to China proper. By the Chinese the country is often called Shih-pa-sheng, " the Eighteen Provinces," from the number of its great territorial divisions. It is also called Chung-kwo, " the Middle Kingdom," properly used of the central part of China, and Hwa-kwo, " the Flowery Kingdom."

fully half of the kingdom, are, in the north a great alluvial plain and in the south a vast calcareous tableland traversed by hill ranges of moderate elevation (see §§ Mountains and Geology). In north-eastern China there is only one mountain system, the group of hills — highest peak 5060 ft. — forming the Shan-tung peninsula. This peninsula was formerly an island, but has been attached to the mainland by the growth of the alluvial plain. Besides the broad division of the country into western and eastern China it may also be considered as divided into three regions by the basins of its chief rivers, the Hwang-ho (Yellow river) in the north, the Yangtsze-kiang in the centre, and the Si-kiang (West river) in the south. In the northern provinces of Kan-suh and Shen-si the basins of the Hwang-ho and Yangtsze- kiang are separated by a mountain chain with various names—' the eastern termination of the Kuen-lun range of central Asia. These mountains, in China, attain, in the Tsing-ling Shan, a maximum elevation of 13,000 ft. East of Shen-si, in Ho-nan the Fu-niu-shan continue the range, but with decreasing elevation, and beyond this the deltaic plain is entered.

The watershed between the Yangtsze-kiang and that of the Si-kiang is less clearly marked. It traverses the immense table- land which occupies a great part of the south-west provinces of Yun-nan and Kwei-chow and is continued eastward by the lower tableland of

Kwang-si and the Nanshan hills (whose elevation seldom exceeds 6000 ft.). The basin of the Yangtsze-kiang forms the whole of central China. Its western border, in Sze-ch'uen and Yun-nan, is wholly mountainous, with heights exceeding 19,000 ft. Central Sze-ch'uen, which is shut in by these moun- tains on the west, by the Yun-nan and Kwei-chow plateau on the south, by the Kiu-lung range on the north, and by highlands eastward (save for the narrow valley through which the Yangtsze- kiang forces its way), is a vast red sandstone tableland of about 1600 ft. elevation. It is exceedingly fertile and supports a dense population. Eastward of Sze-ch'uen the Yangtsze valley is studded with lakes. Finally it enters the deltaic plain. The basin of the Si-kiang fills the two southern provinces of Kwang-si and Kwang-tung and contains no very striking orographic features. It may be added that in the extreme S.W. portion of China is part of a fourth drainage area. Here the Mekong, Salween, Song-koi (Red river), &c. flow south to Indo-China.

The Coast. — The coast-line, following all the minor indentations, is reckoned at over 4500 m. ; if only the larger inlets and pro- montories be regarded, the coast-line is about 2150 m. in length. Its shape is that of a semicircle, with its most easterly point midway (30 N.) between its northern and southern extremities. At either end of this semicircular sweep lies a peninsula, and beyond the peninsula a gulf. In the north are the peninsula of Shan-tung and the gulf of Chih-li; in the south the Lien-chow peninsula and the gulf of Tongking. Due south of Lien-chow peninsula, separated from it by a narrow strait, is Hai-nan, the only considerable island of China. From the northern point of the gulf of Chih-li to 30 N., where is Hang-chow bay, the snores are flat and alluvial save where the Shan-tung peninsula juts out. Along this stretch there are few good natural harbours, except at the mouths of rivers and in the Shan-tung promontory; the sea is shallow and has many shoals. The waters bordering the coast of Chih-li are partly frozen in winter; at 10 m. from the shore the water is only 20 ft. deep. The proximity of Peking gives its few ports importance; that of Taku is at the mouth of the Peiho. In Shan-tung, deeply indented on its southern coast, are the ports of Chi-fu, Wei-hai-wei and Tsing-tao (the last in Kiao-chow bay). South of Shan-tung and north of the mouth of the Yangtsze huge sandbanks border the coast, with narrow channels between them and the shore. The estuary of the Yangtsze is 60 m. across; it contains islands and sandbanks, but there is easy access to Wusung (Shanghai) and other river ports. The bay of Hang- chow, as broad at its entrance as the Yangtsze estuary, forms the mouth of the Tsien-tang-kiang. The Chusan and other groups of islands lie across the entrance of the bay.

South of Hang-chow bay the character of the coast alters. In place of the alluvial plain, with flat, sandy and often marshy shores, the coast is generally hilly, often rocky and abrupt; it abounds in small indentations and possesses numerous excellent harbours; in this region are Fu-chow, Amoy, Swatow, Hongkong, Macao, Canton and other well-known ports. The whole of this coast is bordered by small islands. Formosa lies opposite the S.E. coast, the channel between it and Fu-kien province being about 100 m. wide. Formosa protects the neighbouring regions of China from the typhoons experienced farther north and farther south.

Surface. — As already indicated, one of the most noticeable features in the surface of China is the immense deltaic plain in the north-

eastern portion of the country, which, curving round the mountainous districts of Shan-tung, extends for about 700 m. in a southerly direction from the neighbourhood of Peking and varies from 150 to 500 m. in breadth. This plain is the delta of DeUalc the Yellow river and, to some extent, that of the Yangtsze- !»«”»• kiang also. Beginning in the prefecture of Yung-p’ing Fu, in the province of Chih-li, its outer limit passes in a westerly direction as far as Ch’ang-p’ing Chow, north-west of Peking. Thence running a south-south-westerly course it passes westward of CMng-ting Fu and Kwang-p’ing Fu till it reaches the upper waters of the Wei river in Ho-nan. From this point it turns westward and crosses the Hwang-ho or Yellow river in the prefecture of Hwai-k’ing. Leaving this river it takes a course a little to the east of south, and passing west of Ju-ning Fu, in the province of Ho-nan, it turns in a more easterly direction as far as Luchow Fu. From this prefecture an arm of the plain, in which lies the Chao Lake, stretches southward from the Hwai river to the Yangtsze-kiang, and trending eastward occupies the region between that river and Hangchow Bay. To the north of this arm rises a hilly district, in the centre of which stands Nanking. The greater part of this vast plain descends very gently towards the sea, and is generally below the level of the Yellow river, hence the disastrous inundations which so often accompany the rise of that river. Owing to the great quantity of soil which is brought down by the waters of the Yellow river, and to the absence of oceanic currents, this delta is rapidly increasing and the adjoining seas are as rapidly becoming shallower. As an instance, it is said that the town of P’utai was one Chinese mile 1 west of the seashore in the year 200 B.C., and in 1730 it was 140 m. inland, thus giving a yearly encroachment upon the sea of about 100 ft. Again, Sien- shwuy-kow on the Peiho was on the seashore in a.d. 500, and it is now about 18 m. inland.

Some of the ranges connected with the mountain system of central Asia which enter the western provinces of China have been mentioned above, others may be indicated here. In the „ eastern portion of Tibet the Kuen-lun range throws off ™»«”»- a number of branches, which spread first of all in a south- *”

easterly direction and eventually take a north and south course, partly in the provinces of Sze-ch’uen and Yun-nan, where they divide the beds of the rivers which flow into Siam and French Indo-China, as well as the principal northern tributaries of the Yangtsze-kiang. In the north-west, traversing the western portion of the province of Kan-suh, are parallel ranges running N.W. and S.E. and forming a prolongation of the northern Tibetan mountains. They are known as the Lung-shan, Richthofen and Nan-shan, and join on the south- east the Kuen-lun range. The Richthofen range (locally called Tien- shan, or Celestial Mountains)attains elevations of over 20,000 ft. Several of its peaks are snowclad, and there are many glaciers. Forming the northern frontier of the province of Sze-ch’uen run the Min-shan and the Kiu-lung(or Po-mlng) ranges,which, entering China in 102 E., extend in a general easterly course as far as 1 12 E. in the province of Hu-peh. These ranges have an average elevation of 8000 and 1 1 ,000 ft. respectively. In the south a number of parallel ranges spread from the Yun-nan plateau in an easterly direction as far as the province of Kwang-tung. Then turning north-eastward they run in lines often parallel with the coast, and cover large areas of the provinces of Fu-kien, Kiang-si, Cheh-kiang, Hu-nan and southern Ngan-hui, until they reach the Yangtsze-kiang; the valley of that river from the Tung-ting Lake to Chinkiang Fu forming their northern boundary. In Fu-kien these hills attain the character of a true mountain range with heights of from 6500 to nearly 10,000 ft. Besides the chief ranges there are the Tai-hang Mountains in Shan-si, and many others, among which may be mentioned the ranges — part of the escarpment of the Mongolian plateau — which form the northern frontier of Chih-li. Here the highest peak is Ta-kuang- ting-tzu (6500 ft.), about 300 m. N.N.E. of Peking and immediately north of Wei Ch’ang (the imperial hunting grounds).

Rivers and Canals. — The rivers of China are very numerous and there are many canals. In the north the rivers are only navigable by small craft ; elsewhere they form some of the most f re- quented highways in the country. The two largest rivers, ~. Ye ” ow the Yangtsze-kiang and the Hwang-ho (Yellow river), are er ” separately noticed. The Hwang-ho (length about 2400 m.) has only one important tributary in China, the Wei-ho, which rises in Kan-suh and flows through the centre of Shen-si. Below the con- fluence the Hwang-ho enters the plains.

According to the Chinese records this portion of the river has changed its course nine times during 2500 years, and has emptied itself into the sea at different mouths, the most northerly of which is represented as having been in about 39° N., or in the neighbourhood of the present mouth of the Peiho, and the most southerly being that which existed before the change in 1851-1853, in 34 N. Owing to its small value as a navi- gable highway and to its propensity to inundate the regions in its neighbourhood, there are no considerable towns on its lower course. The Yangtsze-kiang is the chief waterway of China. The river, flowing through the centre of the country, after a course of 2900 m., empties itself into the Yellow Sea in about 31 ° N. Unlike the Yellow river, the Yangtsze-kiang is dotted along its navigable portions with many rich and populous cities, among which are Nanking, An-ch'ing (Ngank'ing), Kiu-kiang, Hankow and I-ch'ang.

1 A Chinese mile, li, or fe = o-36 English mile.

From its mouth to I-ch'ang, about iooo m., the river is navigable by large steamers. Above this last-named city the navigation becomes impossible for any but light native craft or foreign vessels T? e . specially constructed for the navigation, by reason of Yangtsze- tne rapi(i s wn ; c h occur at frequent intervals in the deep ■*• mountain gorges through which the river runs between Kwei-chow and I-ch'ang. Above Kwei-chow it receives from the north many tributaries, notably the Min, which water the low table- land of central Sze-ch'uen. The main river itself has in this province a considerable navigable stretch, while below I-ch'ang it receives the waters of numerous navigable affluents. The Yangtsze system is thus all important in the economic and commercial development of China. Perhaps the most remarkable of the affluents of the Yangtsze is the Han-kiang or Han river. It rises in the PormSng mountains to the north of the city of Ning-kiang Chow in Shen-si. Taking a generally easterly course from its source as far as Fan-cheng, it from that point takes a more southerly direction and empties itself into the Yangtsze-kiang at Han-kow, " the mouth of the Han." Here it is only 200 ft. wide, while higher up it widens to 2600 ft. It is na'igable by steamers for 300 m. The summer high-water line is for a great part of its course, from I-ch'eng Hien to Han-kow, above the level of its banks. Near Sien-t'ao-chSn the elevation of the plain above low water is no more than I ft., and in summer the river rises

about 26 ft. above its lowest level. To protect themselves against inundations the natives have here, as elsewhere, thrown up high embankments on both sides of the river, but at a distance from the natural banks of about 50 to 100 ft. This intervening space is flooded every year, and by the action of the water new layers of sand and soil are deposited every summer, thus strengthening the embankments from season to season.

The Hwai-ho is a large river of east central China flowing between the Hwang-ho and the Yangtsze-kiang. The Hwai-ho and its numerous affluents (it is said to have 72 tributaries) rise in Ho-nan. The main river flows through the centre of Ngan-hui, in which province it receives from the N.W. the Sha-ho, Fei-ho and other important affluents. Formerly it received through the Sha-ho part of the waters of the Hwang-ho. The Hwai-ho flows Into the Hungtso lake, through which it feeds the Grand Canal, not far from the old course of the Hwang-ho, and probably at one time joined that river not far from its mouth. It has a length of about 800 m. and is navi- gable from the point where it leaves the hill country of Ho-nan to Lake Hungtso. It is subject to violent floods, which inundate the surrounding country for a distance of 10 to 20 m. Many of its tributaries are also navigable for considerable distances.

Next in importance to the Yangtsze-kiang as a water highway is the Yun-ho, or, as it is generally known in Europe, the Grand Canal. This magnificent artificial river reaches from Hang-chow Fu in the province of Cheh-kiang to Tientsin in Chih-li, where it unites with the Peiho, and thus may be said to extend to Tung-chow in the neighbourhood of Peking. According to the itineraries published by Pere Gandar, the total length of the canal is 3630 li, or about 1 200 m. A rough measurement, taking account only of the main bends of the canal, makes its length 850 m. After leaving Hang-chow the canal passes round the eastern border of the Tai-hu or Great Lake, surrounding in its course the beautiful city of Su-chow, and then trends in a generally north-westerly direction through the fertile districts of Kiang-su as far as Chin- kiang on the Yangtsze-kiang. In this, the southern section, the slope is gentle and water is plentiful (from 7 ft. at low water to II ft., and occasionally 13 ft. at high water). Between Su-chow and Chin-kiang the canal is often over 100 ft. wide, and its sides are in many places faced with stone. It is spanned by fine stone bridges, and near its banks are many memorial arches and lofty pagodas. In the central portion of the canal, that is between Chin-kiang and Tsing- kiang-pu, at which latter place it crosses the dry channel which marks the course of the Yellow river before 1852, the current is strong and difficult to ascend in the upward (northern) journey. This part of the

canal skirts several lakes and is fed by the Hwai-ho as it issues from the Hungtso lake. The country lying west of the canal is higher than its bed; while the country east is lower than the canal. The two regions are known respectively as Shang-ho (above the river) and Ssia-ho (below the river). Waste weirs opening on the Ssia-ho (one of the great rice-producing areas of China) discharge the surplus water in flood seasons. The northern and considerably the longest section of the canal extends from the old bed of the Yellow river to Tientsin. It largely utilizes existing rivers and follows their original windings. Between Tsing-kiang-pu and the present course of the Yellow river the canal trends N.N.W., skirting the highlands of Shan-tung. In this region it passes through a series of lagoons, which in summer form one lake — Chow-yang. North of that lake on the east bank of the canal, is the city of Tsi-ning-chow. About 25 m. N. of that city the highest level of the canal is reached at the town of Nan Wang. Here the river Wen enters the canal from the east, and about 30 m. farther N. the Yellow river is reached. On the west side of the canal, at the point where the Yellow river now cuts across it, there is laid down in Chinese maps of the 1 8th century a dry channel which is described as being that once followed by the Yellow river, i.e. before it took the channel it abandoned in 1851-1853. The passage of the Yellow river to the part of the canal lying north of that stream is difficult, and can only be effected at

certain levels of the river. Frequently the waters of the river are either too low or the current is too strong to permit a passage. Leaving this point the canal passes through a well-wooded and hilly country west of Tung-p'ing Chow and east of Tung-ch'ang Fu. At Lin-ching Chow it is joined at right angles by the Wei river in the midst of the city. Up to this point, i.e. from Tsing-kiang-pu to Lin-ching Chow, a distance of over 300 m., navigation is difficult and the water-supply often insufficient. The differences of level, 20 to 30 ft., are provided for by barrages over which the boats — having discharged their cargo — are hauled by windlasses. Below the junction with the Wei the canal borrows the channel of the river and again becomes easily navigable. Crossing the frontier into Chih-li, between Te Chow and Tsang Chow, which it passes to the west, it joins the Peiho at Tientsin, after having received the waters of the Keto river in the neighbourhood of Tsing Hien. 1

The most ancient part of the canal is the section between the Yangtsze and the Hwai-ho. This part is thought, on the strength of a passage in one of the books of Confucius, to have been built c. 486 B.C. It was

repaired and enlarged in the 3rd century a.d. The southern part, between the Yangtsze and Hang-chow, was built early in the 7th century a.d. The northern part is stated to have been constructed in the three years 1280-1283. The northern portion of the canal is now of little use as a means of communication between north and south. 2 It is badly built, neglected and charged with the mud-laden waters of the Yellow river. The ” tribute fleet ” bearing rice to Peking still uses this route; but the rice is now largely forwarded by sea. The central and southern portions of the canal are very largely used.

The Peiho (length about 350 m.) is of importance as being the high waterway to Peking. Taking its rise in the Si-shan, or Western Mountains, beyond Peking, it passes the city of T’sung-chow, the port of Peking, and Tientsin, where it meets the waters of the Hun-ho and empties itself into the gulf of Chih-li at the village ot Taku. The Peiho is navigable for small steamers as far as Tientsin during the greater part of the year, but from the end of November to the beginning of March it is frozen up.

In the southern provinces the Si-kiang, or Western river, is the most considerable. It has a length of over 1000 m. This river takes its rise in the prefecture of Kwang-nan Fu in Yun-nan, whence it reaches the frontier of Kwang-si at a distance V? * of about 90 li from its source. Then trending in a north- * /- *™W» easterly direction it forms the boundary between the two provinces for about 150 li. From this point it takes a generally south-easterly course, passing the cities of Tsien Chow, Fung-e Chow, Shang-lin Hien, Lung-ngan Hien, Yung-kang Chow and Nan-ning Fu to Yung- shan Hien. Here it makes a bend to the north-east, and continues this general direction as far as Sin-chow Fu, a distance of 800 li, where it meets and joins the waters of the Kien-kiang from the north. Its course is then easterly, and after passing Wu-chow Fu it crosses the frontier into Kwang-tung. In this part of its course it flows through a gorge 3 m. long and in places but 270 yds. in width. Both above and below this gorge it is 1 m. wide. Some 30 m. above Canton it divides into two main and several small branches. The northern branch, called Chu-kiang, or Pearl river, flows past Fat- shan and Canton and reaches the sea through the estuary called the Bocca Tigris or Bogue, at the mouth of which is the island of Hong- Kong. The southern branch, which retains the name of Si-kiang, reaches the sea west of Macao. Near the head of its delta the Si-kiang receives the Pei-kiang, a considerable river which flows through Kwang-tung in a general N. to S. direction. Like the Yangtsze- kiang the Si-kiang is known by various names in different parts of its course. From its source to Nan-ning Fu in Kwang-si it is called the Si-yang-kiang, or river of the Western Ocean ; from Nan-ning Fu to Sin-chow

Fu it is known as the Yu-kiang, or the Bending river; and over the remainder of its course it is recognized by the name of the Si-kiang, or Western river. The Si-kiang is navigable as far as Shao-king, 130 m., for vessels not drawing more than 15 ft. of water, and vessels of a light draught may easily reach Wu-chow Fu, in Kwang-si, which is situated 75 m. farther up. In winter the navi- gation is difficult above Wu-chow Fu. Above that place there is a rapid at low water, but navigation is possible to beyond Nan-ning Fu.

Lakes. — There are numerous lakes in the central provinces of China. The largest of these is the Tung-t'ing in Hu-nan, which, according to the Chinese geographers, is upwards of 800 li, or 266 m., in circumference. In native gazetteers its various portions are known under distinct names; thus it is said to include the Ts'ing-ts'ao, or Green Grass Lake; the Ung, or Venerable Lake; the Chih-sha, or Red Sand Lake; the Hwang-yih, or Imperial Post-house Lake; the Ngan-nan, or Peaceful Southern Lake; and the Ta-tung, or

1 For the Grand Canal the chief authority is Dominique Gandar, S.J., " Le Canal Imperial. Etude historique et descriptive," Vartitis sinologiques No. 4 (Shanghai, 1903) ; see also Stenz, " Der Kaiser-kanal," in Beitrdzenzur Kolonialpolitik, Band v. (Berlin, 1903-1904), and the works of Ney Elias, Sir J. F. Davis, A. Williamson, E. H. Parker and W. R. Carles.

1 Nevertheless there is considerable local traffic. The transit trade with Shan-tung, passing the Chin-kiang customs and using some 250 m. of the worst part of the canal, was valued in 1905 at 3,331,000 taels.

Great Deep Lake. In ancient times it went by the name of the Kiu-kiang Hu, or Lake of the Nine Rivers, from the fact that nine rivers flowed into it. Its chief affluents are the Siang-kiang, which rises in the highlands in the north of Kwang-si and flows in a general N.N.E. direction, and the Yuen-kiang, which flows N. and tnen E. from the eastern border of Kwei-chow. The lake is connected with the Yangtsze-kiang by two canals, the Taping and the Yochow Fu. In summer it is fed by the overflow from the Yangtsze-kiang; in winter it pours its waters into that river through the Yochow Fu canal. During the winter

and spring the water of the lake is so low that the shallow portions become islands, separated by rivers such as the Siang and Yuen, and numberless streams; but in summer, owing to the rise in the waters of the Yangtsze-kiang, the whole basin of the lake is filled. It is then about 75 m. long and 60 m. broad. About 180 m. E. of the Tung-t'ing lake is the Poyang lake, which occupies the low- lying part of the province of Kiang-si, and is con- nected with the Yangtsze by the Hu-kow canal. The Poyang lake is also subject to a wide difference between high and low water, but not quite to the same extent as the Tung-t'ing lake, and its land- marks are more distinctly defined. It is about 90 m. long by 20 broad. The T'ai lake, in the neighbourhood of Su-chow Fu, is also celebrated for its size and the beauty of its surroundings. It is about 150 m. in circumference, and is dotted over with islands, on which are built temples for the devotees of religion, and summer- houses for the votaries of pleasure from the rich and voluptuous cities of Hang-chow and Su-chow. The boundary line between the provinces of Cheh-kiang and Kiang-su crosses its blue waters, and its shores are divided among thirteen prefectures. Besides these lakes there are, among others, two in Yun-nan, the Kun-yang-hai (Tien-chi) near Yun-nan Fu, which is 40 m. long and is connected with the Yangtsze-kiang by the Pu-to river, and the Erh-hai (Urh- hai) to the east of the city of Tali.

The Great Wall. — Along the northern provinces of Chih-li, Shan-si, Shen-si and Kan-suh, over 22° of longitude (98 to 120° E.), stretches the Great Wall of China, built to defend the country against foreign aggression. It was begun in the 3rd century B.C., was repaired in the 15th century, and in the 16th century was extended by 300 m. Following the windings the wall is 1500 m. long. Starting near the seashore" at Shan-hai-kwan on the gulf of Liao-tung, where the Chinese and Manchurian frontiers meet, it goes eastward past Peking (which is about 35 m. to the south) and then trends S. and E. across Shan-si to the Hwang-ho. From the neighbourhood of Peking to the Hwang-ho there is an inner and an outer wall. The outer (northern) wall passes through Kalgan, thus guarding the pass into Mongolia. A branch wall separates the greater part of the western frontier of Chih-li from Shan-si. West of the Hwang-ho the Great Wall forms the northern frontier of Shen-si, and west of Shen-si it keeps near the northern frontier of Kan-suh, following for some distance in that province the north bank of the Hwang-ho. It ends at Kiayu-kwan (98 14′ E.) just west of Su-chow. This part of the wall was built to protect the one main artery leading from central Asia to China through Kan-suh and Shen-si by the valley of the Wei-ho, tributary of the Hwang-ho. There is a branch wall in Kan-suh running west and south to

protect the Tibetan frontier. The height of the wall is generally from 20 to 30 ft., and at intervals of some 200 yds. are towers about 40 ft. high. Its base is from 15 to 25 ft. thick and its summit 12 ft. wide. The wall is carried over valleys and mountains, and in places is over 4000 ft. above sea-level. Military posts are still maintained at the chief gates or passes — at Shan-hai-kwan, the Kalgan pass, the Yenmun pass (at the N. of Shan-si) and the Kaiyu pass in the extreme west, through which runs the caravan route to Barkal in Turkestan. Colonel A. W. S. Wingate, who in the opening years of the 20th century visited the Great Wall at over twenty places widely apart and gathered many descriptions of it in other places, states that its position is wrongly shown " on the maps of the day " (1907) in a number of places; while in others it had ceased to exist, " the only places where it forms a substantial boundary being in the valley bottoms, on the passes and where it crosses main routes. These remarks apply with particular force to the branch running south- west from the Nan-k'ow pass and forming the boundary of Chih-li and Shan-si provinces." In Colonel Wingate's opinion the wall was originally built by degrees and in sections, not of hewn stone, but of round boulders and earth, the different sections being repaired as they fell into ruin. " Only in the valley bottoms and on the passes was it composed of masonry or brickwork. The Mings rebuilt of solid masonry all those sections through which led a likely road for invading Tatars to follow, or where it could be seen at a distance from the sky-line." The building of the wall " was a sufficiently simple affair," not to be compared with the task of building the pyramids-of Egypt. 2

1 The portion of the wall which abutted on to the sea has been destroyed.

2 See the Geog. Jul. (Feb. and March 1907). For a popular account of the wall, with numerous photographs, see The Great Wall of China (London, 1909), by W. E. Giel, who in 1908 followed its course from east to west. Consult also A. Williamson, Journey in North China (London, 1870); Martin, " La Grande Muraille de la Chine," Revue scientifique (1891).

Climate. — The climate over so vast an area as China necessarily varies greatly. The southern parts of Yun-nan, Kwang-si and Kwang-tung (including the city of Canton) lie within the tropics. The northern zone (in which lies Peking) by contrast has a climate which resembles that of northern Europe, with winters of Arctic severity. The central zone (in which Shanghai is situated) has a generally temperate climate. But over both northern and central China the influence of the great plateau of Mongolia tends to establish uniform conditions

unusual in so large an area. The prevailing winds during summer — the rainy season — are south-easterly, caused by heat and the ascending current of air over the sandy deserts of central Asia, thus drawing in a current from the Pacific Ocean. In the winter the converse takes place, and the prevailing winds, descending from the Mongolian plateau, are north and north-west, and are cold and dry. From October to May the climate of central China is bracing and enjoyable. The rainfall is moderate and regular.

In northern China the inequalities both of temperature and rainfall are greater than in thd central provinces. In the province of Chih-li, for example, the heat of summer is as intense as is the cold of winter. In summer the rains often render the plain swampy, while the dry persistent westerly winds of spring create dust storms (experienced in Peking from March to June). The rainfall is, however, uncertain, and thus the harvests are precarious. The provinces of Shan-tung and Shan-si are peculiarly liable to prolonged periods of drought, with consequent severe famines such as that of 1 877-1 878, when many millions died. In these regions the air is generally extremely dry, and the daily variations of temperature consequent on excessive radiation are much greater than farther south.

Accurate statistics both of heat and rainfall are available from a few stations only. The rainfall on the southern coasts is said to be about 100 in. yearly; at Peking the rainfall is about 24 in. a year. In the coast regions the temperatures of Peking, Shanghai and Canton may be taken as typical of those of the northern, central and southern zones. In Peking (39° N.) the mean annual temperature isabout 53 F., the mean for January 23 °, for July 79 . In Shanghai (31 ° 11′ N.) 3 the mean annual temperature is 59 , the mean for January 36-2°, for July 80-4°. In Canton (23 15′ N.) the mean annual temperature is 70 , the mean for January 54 , for July 82 . The range of temperature, even within the tropics, is noteworthy. At Peking and Tientsin the thermometer in winter falls sometimes to 5 below zero and rises in summer to 105 (at Taku 107° has been recorded); in Shanghai in winter the thermometer falls to 18° and in summer rises to 102 . In Canton frost is said to have been recorded, but according to the China Sea Directory the extreme range is from 38° to I00°. 4 The climate of Shanghai, which resembles, but is not so good as, that of the Yangtsze-kiang valley generally, is fairly healthy, but there is an almost constant excess of moisture. The summer months, July to September, are very hot, while snow usually falls in December and January.

At Canton and along the south coast the hot season corresponds with the S.W. monsoon; the cool season — mid October to end of April—

with the N.E. monsoon. Farther north, at Shanghai, the S.W. monsoon is sufficiently felt to make the prevailing wind in summer southerly.

Provinces. — China proper is divided into the following provinces : Cheh-kiang, Chih-li, Fu-kien, Ngan-hui (An-hui), Ho-nan, Hu-nan, Hu-peh, Kan-suh, Kiang-si, Kiang-su, Kwang-si, Kwang-tung, Kwei-chow, Shan-si, Shan-tung, Shen-si, Sze-ch'uen and Yun-nan. See the separate notices of eacn province and the article on ShSng- king, the southern province of Manchuria. X.

Geology.

The Palaeozoic formations of China, excepting only the upper part of the Carboniferous system, are marine, while the Mesozoic and Tertiary deposits are estuarine and freshwater or else of terrestrial origin. From the close of the Palaeozoic period down to the present day the greater part of the empire has been dry land, and it is only in the southern portion of Tibet and in the western Tian Shan that any evidence of a Mesozoic sea has yet been found. The geological sequence may be summarized as follows: — –

Archean. — Gneiss, crystalline schists, phyllites, crystalline limestones. Exposed in Liao-tung, Shan-tung, Shan-si, northern Chih-li and in the axis of the mountain ranges, e.g. the Kuen-lun and the ranges of southern China.

Sinian. — Sandstones, quartzites, limestones. Sometimes rests unconformably upon the folded rocks of the Archaen system; but sometimes, according to Loczy, there is no unconformity. Covers a large area in the northern part of China proper; absent in the eastern Kuen-lun; occurs again in the ranges of S.E. China. In Liao-tung Cambrian fossils have been found near the summit of the series; they belong to the oldest fauna known upon the earth, the fauna of the Olenellus zone. It is, however, not improbable that in many places beds of considerably later date have been included in the Sinian system.

8 For Shanghai the figures are compiled from twenty-six years' observations. See China Sea Directory, vol. iii. (4th ed., 1904) p. 660.

4 The thermometer registered 23 F. in January 1893, on the river 28 m. below Canton. This is the lowest reading known. Ibid. pp. 164-105.

Ordovician. — Ordovician fossils have been found in the Lung- shan, Kiang-su (about 50 m. east of Nan-king), in the south-west of Cheh-kiang and in the south-east of Yun-nan. Ordovician beds probably occur also in the Kuen-lun.

Silurian. — Limestones and slates with Silurian corals and other fossils have been found in Sze-ch'uen.

Devonian. — Found in Kan-suh and in the Tsing-ling-shan, but becomes much more important in southern China. Occurs also on the south of the Tian-shan, in the Altyn-tagh, the Nan-shan and the western Kuen-lun.

Carboniferous. — Covers a large area in northern China, in the plateau of Shen-si and Shan-si, extending westwards in tongues between the folds of the Kuen-lun. In this region it consists of a lower series of limestones and an upper series of sandstones with seams of coal, which may perhaps be in part of Permian age. This is probably the most extensive coalfield in the world.

In south China the whole series consists chiefly of limestones, and the coal seams are comparatively unimportant. Carboniferous beds are also found in the Tian-shan, the Nan-shan, Kan-suh, on the southern borders of the Gobi, &c.

Mesozoic. — Marine Triassic beds containing fossils similarto those of the German Muschelkalk have been found by Loczy near Chung- tien, on the eastern border of the Tibetan plateau. Elsewhere, however, the Mesozoic is represented chiefly by a red sandstone, which covers the greater part of Sze-ch'uen and fills also a number of troughs amongst the older beds of southern China. No marine fos- sils are found in this sandstone, but remains of plants are numerous, and these belong to the Rhaetic, Lias and Lower Oolite. No Cretaceous beds are known in China excepting in S. Tibet (on the shores of the Tengri-nor) and in the western portion of the Tian-shan.

Cainozoic and Recent, — No marine deposits of this age are known. Although the loess of the great plain and the sand of the desert are still in process of formation, the accumulation of these deposits probably began in the Tertiary period.

Volcanic Rocks. — Amongst the Archean rocks granitic and other intrusions are abundant, but of more modern volcanic activity the remains are comparatively scanty. In south China there is no evi-

dence of Tertiary or Post-Tertiary volcanoes, but groups of volcanic cones occur in the great plain of north China. In the Liao-tung and Shan-tung peninsulas there are basaltic plateaus, and similar outpourings occur upon the borders of Mongolia. All these out- bursts appear to be of Tertiary or later data.

Loess— -One of the most characteristic deposits of China is the loess, which not merely imparts to north China the physical character of the scenery, but also determines the agricultural products, the transport, and general economic life of the people of that part of the country. It is peculiar to north China and it is not found south of the Yangtsze. The loess is a solid but friable earth of brownish-yellow colour, and when triturated with water is not unlike loam, but differs from the latter by its highly porous and tubular structure. The loess soil is extremely favourable to agriculture. (See Loess and infra, § Agriculture.)

The loess is called by the Chinese Hwang-t'u, or yellow earth, and it has been suggested that the imperial title Hwang ti, Yellow Emperor or Ruler of the Yellow, had its origin in the fact that the emperor is lord of the loess or yellow earth.

Structurally, China proper may be divided into two regions, separated from each other by the folded range of the Tsing-ling- Structure. s han, which is a continuation of the folded belt of the Kuen-lun. North of this chain the Palaeozoic beds are in general nearly horizontal, and the limestones and sandstones of the Sinian and Carboniferous systems form an extensive plateau which rises abruptly from the western margin of the great plain of northern China. The plateau is deeply carved by the rivers which flow through it; and the strata are often faulted, but they are never sharply folded. South of the Tsing-ling-shan, on the other hand, the Palaeozoic beds are thrown into a series of folds running from W. 30 S. to E. 30 N., which form the hilly region of southern China. Towards Tongking these folds probably bend southwards and join the folds of Further India. Amongst these folded beds lie trough-like depressions filled with the Mesozoic red sandstone which lies" unconformably upon the Palaeozoic rocks.

The present configuration of China is due, in a very considerable degree, to faulting. The abrupt eastern edge of the Shan-si plateau, where it overlooks the great plain, is a line of fault, or rather a series of step faults, with the downthrow on the east; and von Richthofen has shown reason to believe that this line of faulting is continued far to the south and to the north. He believed also that the present coast-line of China has to a large extent been determined by similar faults

with their downthrow on the east.

Concerning the structure of the central Asian plateau our know- ledge is still incomplete. The great mountain chains, the Kuen- lun, the Nan-shan and the Tian-shan, are belts of folding; but the Mongolian Altai is a horst — a strip of ancient rock lying between two faults and with a depressed area upon each side. In the whole of this northern region faulting, as distinct from folding, seems to have played an important part. Along the southern margin of the Tian-shan there is a remarkable trough-like depression which appears to lie between two approximately parallel faults. (P. La.)

Fauna.

China lies within two zoological provinces or regions, its southern portion forming a part of the Oriental or Indian region and having a fauna close akin to that of the western Himalaya, Burma and Siam, whereas the districts to the north of Fu-chow and south of the Yangtsze-kiang lie within the eastern Holarctic (Palaearctic) region, or rather the southern fringe of the latter, which has been separated as the Mediterranean transitional region. Of these two divisions of the Chinese fauna, the northern one is the more interesting, since it forms the chief home of a number of peculiar generic types, and also includes types represented elsewhere at the present day (exclusive in one case of Japan) only in North America. The occurrence in China of these types common to the eastern and western hemispheres is important in regard to the former existence of a land-bridge between Eastern Asia and North America by way of Bering Strait.

Of the types peculiar to China and North America the alligator of the Yangtsze-kiang is generically identical with its Mississippi relative. The spoon-beaked sturgeon of the Yangtsze and Hwang-ho is, however, now separated, as Psephurus, from the closely allied American Polyodon. Among insectivorous mammals the Chinese and Japanese shrew-moles, respectively forming the genera Vropsilus and Urotrichus, are represented in America by Neurotrichus. The giant salamander of the rivers of China and Japan and the Chinese mandarin duck are by some included in the same genera as their American representatives, while by others they are referred to genera apart. Whichever view we take does not alter their close relationship. One wapiti occurs on the Tibetan frontier, and others in Manchuria and Amurland.

As regards mammals and birds, the largest number of generic and specific types peculiar to China are met with in Sze-ch’uen. Foremost

among these is the great panda (Aeluropus melanoleucus) , representing a genus by itself, probably related to bears and to the true panda (Aelurus), the latter of which has a local race in Sze-ch'uen. Next come the snub-nosed monkeys (Rhinopithecus) , of which the typical species is a native of Sze-ch'uen, while a second is found on the upper Mekong, and a third in the mountains of central China. In the Insectivora the swimming-shrew {Nectogale) forms another generic type peculiar to Sze-ch'uen, which is also the sole habitat of the mole-like Scaptochirus, of Vropsilus, near akin to the Japanese Urotrichus, of Scaptonyx, which connects the latter with the moles (Talpa), and of Neotetracus, a relative of the Malay rat-shrews (Gymnura). Here also may be mentioned the raccoon-dog, forming the subgenus Nyctereutes, common to China and Japan. The Himalayan black and the Malay bear have each a local race in Sze-ch'uen, where the long-haired Fontanier's cat (Feiis tristis) and the Tibet cat (F. scripta) connect Indo-Malay species with the American ocelots, while the bay cat (F. temmincki), a Malay type, is represented by local forms in Sze-ch'uen and Fu-chow. The Amurland leopard and Manchurian tiger likewise constitute local races of their respective species.

Among ruminants, the Sze-ch'uen takin represents a genus (Budorcas) found elsewhere in the Mishmi Hills and Bhutan, while serows (Nemorhaedus) and gorals (Urolragus), allied to Himalayan and Burmo-Malay types, abound. The Himalayan fauna is also represented by a race of the Kashmir hangul deer. Of other deer, the original habitat of Pere David's milu (Elaphurus), formerly kept in the Peking park, is unknown. The sika group, which is peculiar to China, Japan and Formosa, is represented by Cervus hortulorum in Manchuria and the smaller C. manchuricus and sika in that province and the Yangtsze valley; while musk-deer (Moschus) abound in Kansuh and Sze-ch'uen. The small water-deer (Hydropotes or Hydrelaphus) of the Yangtsze valley represents a genus peculiar to the country, as do the three species of tufted deer (Elaphodus), whose united range extends from Sze-ch'uen to Ning-po and I-ch'ang. Muntjacs (Cervulus) are likewise very characteristic of the country, to which the white-tailed, plum-coloured species, like the Tenasserim C. crinifrons, are peculiar. The occurrence of races of the wapiti in Manchuria and Amurland has been already mentioned.

To refer in detail to the numerous forms of rodents inhabiting China is impossible here, and it must suffice to mention that the flying-squirrels (Pteromys) are represented by a large and handsome species in Sze-ch'uen, where is also found the largest kind of bamboo-rat (Rhizomys), the other species of which are natives of the western Himalaya and the Malay countries. Dwarf hamsters of the genus

Cricetulus are natives of the northern provinces. In the extreme south, in Hai-nan, is found a gibbon ape (Hylobates), while langur (Semnopithecus) and macaque monkeys (Macacus) likewise occur in the south, one of the latter also inhabiting Sze-ch'uen.

To give an adequate account of Chinese ornithology would require space many times the length of this article. The gorgeous mandarin duck (Aix galerita) has already been mentioned among generic types common to America. In marked distinction to this is the number of species of pheasants inhabiting north-western China, whence the group ranges into the eastern Himalaya. Among Chinese species are two of the three species of blood-pheasants (Ithagenes) , two tragopans (Ceriornis or Tragopan), a monal (Lophophorus), three out of the five species of Crossoptilum, the other two being Tibetan, two kinds of Pucrasia, the gorgeous golden and Amherst's pheasants alone repre- senting the genus Chrysolophus, together with several species of the typical genus Phasianus, among which it will suffice to mention the

long-tailed P. reevesi. The Himalayan bamboo-partridges (Bambusicola) have also a Chinese representative. The only other large bird that can be mentioned is the Manchurian crane, misnamed Grusjaponensis. Pigeons include the peculiar subgenus Dendroteron ; while among smaller birds, warblers, tits and finches, all of an Eastern Holarctic type, constitute the common element in the avi- fauna. Little would be gained by naming the genera, peculiar or otherwise.

China has a few peculiar types of freshwater tortoises, among which Ocadia sinensis represents a genus unknown elsewhere, while there is also a species of the otherwise Indian genus Damonia. _ The Chinese alligator, Alligator sinensis, has been already mentioned. Among lizards, the genera Plestiodon, Mabuia, Tachydromus and Gecko, of which the two latter are very characteristic of the Oriental region, range through China to Japan ; and among snakes, the Malay python (Python reticulatus) is likewise Chinese. The giant sala- mander (Cryptobranchus, or Megalobatrachus, maximus) represents, as mentioned above, a type found elsewhere only in North America, while Hynobius and Onychodactylus are peculiar generic types of salamanders. Among fishes, it must suffice to refer to the spoon-

beaked sturgeon (Psephurus) of the Yangtsze-kiang, and the numerous members of the carp family to be found in the rivers of China. From these native carp the Chinese have produced two highly coloured breeds, the goldfish and the telescope-eyed carp.

Among the invertebrates special mention may be made of the great ailanthus silk-moth (Altacus cynihia) of northern China and Japan, and also of its Manchurian relative A. pernyi ; while it may be added that the domesticated ” silkworm ” (Bombyx mori) is generally believed to be of Chinese origin, although this is not certain. Very characteristic of China is the abundance of handsomely coloured swallow-tailed butterflies of the family Papilionidae. The Chinese kermes (Coccus sinensis) is also worth mention, on account of it yielding wax. As regards land and freshwater snails, China exhibits a marked similarity to Siam and India; the two groups in which the Chinese province displays decided peculiarities of its own being Helix (in the wider sense) and Clausilia. There are, for instance, nearly half a score of subgenera of Helix whose headquarters are Chinese, while among these, forms with sinistral shells are relatively common. The genus Clausilia is remarkable on account of attaining a second centre of development in China, where its finest species, referable to several subgenera, occur. Carnivorous molluscs include a peculiar slug (Rathouisia) and the shelled genera Ennea and Streptaxis. In the western provinces species of Buliminus are abundant, and in the operculate group Hcudeia forms a peculiar type akin to Helicina, but with internal foldings to the shell.

Lastly, it has to be mentioned that the waters of the Yangtsze- kiang are inhabited by a small jelly-fish, or medusa (Limnocodium kawaii), near akin to L. sowerbii, which was discovered in the hot- house tanks in the Botanical Gardens in the Regent’s Park, London, but whose real home is probably the Amazon. (R. L. *)

Flora.

The vegetation of China is extremely rich, no fewer than 9000 species of flowering plants having been already enumerated, of which nearly a half are endemic or not known to occur elsewhere. Whole provinces are as yet only partially explored; and the total flora is estimated to comprise ultimately 12,000 species. China is the con- tinuation eastward of the great Himalayan mass, numerous chains of mountains running irregularly to the sea-board. Thousands of deep narrow valleys form isolated areas, where peculiar species have been evolved. Though the greater part of the country has long ago been cleared of its primeval forest and submitted to agriculture, there still remain some extensive forests and countless small woods in which the original flora is well preserved. Towards the north the vegetation is palaearctic, and differs little in its composition from that of Germany, Russia and Siberia. The flora of the western and central provinces is closely allied to that of the Himalayas and of Japan ; while towards the south this element mingles with species derived from Indo-China, Burma and the plain of Hindostan. Above a certain elevation, decreasing with the latitude, but approximately 6000 ft. in the Yangtsze basin, there exist in districts remote from the traffic of the great rivers, extensive forests of conifers, like those of Central Europe in character, but with different species of silver fir, larch, spruce and Cembran pine. Below this altitude the woods are com- posed of deciduous and evergreen broad-leafed trees and shrubs, mingled together in a profusion of species. Pure broad-leafed forests of one or two species are rare, though small woods of oak, of alder and of birch are occasionally seen. There is nothing comparable to the extensive beech forests of Europe, the two species of Chinese beech being sporadic and rare trees. The heaths, Calluna and Erica, which cover great tracts of barren sandy land in Europe, are absent from China, where the Ericaceous vegetation is made up of numerous species of Rhododendron, which often cover vast areas on the moun- tain slopes. Pine forests occur at low levels, but are always small in extent.

The appearance of the vegetation is very different from that of the United States, which is comparable to China in situation and in extent. Though there are 60 species of oak in China, many with mag- nificent foliage and remarkable cupules, the red oaks, so characteristic of North America, with their bristle-pointed leaves, turning beautiful

colours in autumn, are quite unknown. The great coniferous forest west of the Rocky Mountains has no analogue in China, the gigantic and preponderant Douglas fir being absent, while the giant Sequoias are represented only on a small scale by Cryptomeria, which attains half their height.

Certain remnants of the Miocene flora which have disappeared from Europe are still conspicuous and similar in North America and China. In both regions there are several species of Magnolia ; one species each of Liriodendron, Liquidambar and Sassafras ; and curious genera like Nyssa, Hamamelis, Decumaria and Gymnocladus. The swamps of the south-eastern states, in which still survive the once widely spread Taxodium or deciduous cypress, are imitated on a small scale by the marshy banks of rivers near Canton, which are clad with Glyptostrobus, the ” water-pine “of the Chinese. Pseudo- larix, Cunninghamia and Keteleeria are coniferous genera peculiar to China, which have become extinct elsewhere. The most remarkable tree in China, the only surviving link between ferns and conifers, Ginkgo biloba, has only been seen in temple gardens, but may occur wild in some of the unexplored provinces. Its leaves have been found in the tertiary beds of the Isle of Mull.

Most of the European genera occur in China, though there are curious exceptions like the plane tree, and the whole family of the Cistaceae, which characterize the peculiar maquis of the Mediterranean region. The rhododendrons, of which only four species are European, have their headquarters in China, numbering 130 species, varying in size from miniature shrubs 6 in. high to tali trees. Lysimachia, Primula, Clematis, Rubus and Gentiana have each a hundred species, extraordinary variable in habit, in size and in colour of the flowers. The ferns are equally polymorphic, numbering 400 species, and including strange genera like Archangiopteris and Cheiropteris, unknown elsewhere. About 40 species of bamboos have been distinguished; the one with a square stem from Fu-kien is the most curious.

With a great wealth of beautiful flowering shrubs and herbaceous plants, the Chinese at an early period became skilled horticulturists. The emperor Wu Ti established in III B.C. a botanic garden at Ch’ang-an, into which rare plants were introduced from the west and south. Many garden varieties originated in China. The chrysanthemum, perhaps the most variable of cultivated flowers, is derived from two wild species (small and inconspicuous plants), and is mentioned in the ancient Chinese classics. We owe to the skill of the Chinese many kinds of roses, lilies, camellias and peonies; and have introduced from China some of the most ornamental plants in cur gardens, as Wistaria, Diervilla, Kerria, Incarvillea, Deutzia, Primula sinensis, Hemerocallis, &c. The peach and several oranges are natives of China. The varnish tree (Rhus vernicifera), from which lacquer is obtained ; the tallow tree (Sapium sebiferum) ; the white mulberry, on which silkworms are fed ; and the tea plant were all first utilized by the Chinese. The

Chinese have also numerous medicinal plants, of which ginseng and rhubarb are best known. Nearly all our vegetables and cereals have their counterpart in China, where there are numerous varieties not yet introduced into Europe, though some, like the Soy bean, are now attracting great attention.

(A. He.*)

Authorities. — L. Richard (S.J.), Giographie de Vempire de Chine (Shanghai, 1905) — the first systematic account of China as a whole in modern times. The work, enlarged, revised and translated into English by M. Kennelly (S.J.), was reissued in 1908 as Richard's Comprehensive Geography of the Chinese Empire and Dependencies. This is the standard authority for the country and gives for each section bibliographical notes. It has been used in the revision of the present article. Valuable information on northern, central and western China is furnished by Col. C. C. Manifold and Col. A. W. S. Wingate in the Geog. Journ. vol. xxiii. (1904) and vol. xxix. (1907). Consult also Marshall Broomhall (ed.), The Chinese Empire: a General and Missionary Survey (London, 1907); B. Willis, E. Black- welder and others, Research in China, vol. i. part i. " Descriptive Topography and Geology," part ii. " Petrography and Zoology," and Atlas (Washington, Carnegie Institution, 1906-1907); Forbes and Hemsley, " Enumeration of Chinese Plants, ' in Journ. Linnean Soc. (Bot.), vols, xxiii. and xxxvi.; Bretschneider, History of European Botanical Discoveries in China ; E. Tiessen, China das Reich der achtzehn Provinzen, Teil i. " Die allgemeine Geographie des Landes" (Berlin, 1902); and The China Sea Directory (published by the British Admiralty), a valuable guide to the coasts: vol. ii. (5th ed., 1906) deals with Hong-Kong and places south thereof, vol. iii. (4th ed., 1906, supp. 1907) with the rest of the Chinese coast; vol. i. (5th ed., 1906) treats of the islands and straits in the S.W. approach to the China Sea. Much of China has not been surveyed, but con- siderable progress has been made since 1900. The Atlas of the Chinese Empire (London, 1908), a good general atlas, which, however, has no hill shading, gives maps of each province on the scale of I : 3,000,000. The preface contains a list of the best regional maps.

The Journal of the China Branch of the Royal Asiatic Society con- tains papers on all subjects relating to China.

II. The People

China is noted for the density of its population, but no accurate statistics are forthcoming. The province of Shan-tung is reputed

to have a population of 680 per sq. m. The provinces of central China, in the basin of the Yangtsze-kiang — namely Sze-ch'uen,

Hu-peh, Ngan-hui, Kiang-su and Cheh-kiang— contain

of the people in these provinces being represented as from 490 to 310 per sq. m. Ho-nan, which belongs partly to the basin of the Hwang-ho and partly to that of the Yangtsze- kiang, as well as the S.E. coast provinces of Fu-kien and Kwang- tung, are also densely peopled, Ho-nan being credited with 520 persons per sq. m., Fu-kien with 490 and Kwang-tung with

about 320.

The Chinese government prints from time to time in the Peking Gazette returns of the population made by the various provincial authorities. The method of numeration is to count the households, and from that to make a return of the total inhabitants of each province. There would be no great difficulty in obtaining fairly accurate returns if sufficient care were taken. It does not appear, however, that much care is taken. Mr E. H. Parker published in the Statistical Society's Journal for March 1899 tables translated from Chinese records, giving the population from year to year between 1 65 1 and i860. These tables show a gradual rise, though with many fluctuations, up till 1851, when the total population is stated to be 432 millions. From that point it decreases till i860, when it is put down at only 261 millions. The Chinese Imperial Customs put the total population of the empire in 1906 at 438,214,000 and that of China proper at 407,253,000. It has been held by several inquirers that these figures are gross over-estimates. Mr Rockhill, American minister at Peking (1905-1909), after careful inquiry 1 concluded that the inhabitants of China proper did not exceed, in 1904, 270,000,000. Other competent authorities are inclined to accept the round figure of 400,000,000 as nearer the accurate number. Eleven cities were credited in 1908 with between 500,000 and 1,000,000 inhabitants each, and smaller cities are very numerous, but the population is predominantly rural. In addition to the Chinese the population includes a number of aboriginal races such as the Lolos (q.v.), the Miaotsze (q.v.), the Ikias of Kwei-chow and Kwang-si, the Hakka, found in the south-east

provinces, and the Hoklos of Kwang-tung province. 2 The Manchus resident in China are estimated to number 4,000,000. According to the Imperial Customs authorities, the number of foreigners resident in China in 1908 was 69,852. Of these 44,143 were Japanese, 9520 Russian, 9043 British, 3637 German, 3545 American, 3353 Portuguese, 2029 French, 554 Italian and 282 Belgian.

The Chinese are a colonizing race, and in Manchuria, Mongolia and Turkestan they have brought several districts under cultivation. In the regions where they settle they become the dominant race — thus southern Manchuria now differs little from a province of China proper. In Indo-China, the Malay Peninsula and throughout the Far East Chinese are numerous as farmers, labourers and traders; in some places, such as Singapore, Chinese are among the principal merchants. This colonizing spirit is probably due more to the enterprise of the people than to the density of the population. There were Chinese settlements at places on the east coast of Africa before the 10th century A.D. Following the discovery of gold in California there was from 1850 onwards a large emigration of Chinese to that state and to other parts of America. But in 1879 Chinese exclusion acts were passed by the United States, an example followed by Australia, where Chinese immigration was also held to be a public danger. Canada also adopted the policy of excluding Chinese, but not before there had been a considerable immigration into British Columbia. Two factors, a racial and an economic, are at work to bring about these measures of exclusion. As indentured labourers Chinese have been employed in the West Indies, South America and other places (see Coolie).

In addition to several million Chinese settlers in Manchuria, and smaller numbers in Mongolia, Turkestan and Tibet, it was estimated in 1908 that there were over 9,000,000 Chinese resident beyond the empire. Of these 2,250,000 were in Formosa, which for long formed a part of the empire," and over 6,000,000 in neighbouring regions of Asia and in Pacific Islands. In the West Indies (chiefly Cuba) the number of Chinese was estimated at 100,000, in South America (Brazil, Peru and Chile) at 72,000, in the United States at 150,000, in Canada at 12,000, and in Australia and New Zealand at 35,000. There are comparatively few Chinese in Japan (if Formosa be ex- cepted) and Korea. The number is given in 1908 as 17,000 in Japan and 1 1 ,000 in Korea.

Social Life.

The awakening of the East which has followed the Russo- Japanese War of 1904-5 has affected China also. It is too soon to say how far

the influx of European ideas will be able to modify

1 See W. W. Rockhill, Inquiry into the Population of China (Washington, 1 904).

2 For a bibliography of works relating to the aboriginal races of China see Richard's Comprehensive Geography of the Chinese Empire (1908 ed.), pp. 37 J 373

the immemorial customs and traditions of perhaps the most conservative people in the world; but the process has begun, and this fact makes it difficult to give a picture of Chinese habits and customs which shall be more than historical or provisional. Moreover, the difficulty of presenting a picture which shall be true of China as a whole is enhanced by the different character- istics observable in various regions of so vast a country. The Chinese themselves, until the material superiority of Western civilization forced them to a certain degree to conform to its standards, looked down from the height of their superior culture with contempt on the " Western barbarians." Nor was their attitude wholly without justification. Their civilization was already old at a time when Britain and Germany were peopled by half-naked barbarians, and the philosophical and ethical principles on which it was based remain, to all appearances, as firmly rooted as ever. That these principles have, on the whole, helped to create a national type of a very high order few Europeans who know the Chinese well would deny. The Chinese are naturally reserved, earnest and good-natured; for the occasional outbursts of ferocious violence, notably against foreign settlements, are no index to the national character. There is a national proverb that " the men of the Four Seas are all brothers," and even strangers can travel through the country without meeting with rudeness, much less outrage. If the Chinese character is inferior to the European, this inferiority lies in the fact that the Chinaman's whole philosophy of life dis- inclines him to change or to energetic action. He is industrious; but his industry is normally along the lines marked out by authority and tradition. He is brave; but his courage does not naturally seek an outlet in war. The jealously exclusive empire, into which in the 19th century the nations of the West forced an entrance, was organized for peace; the arts of war had been all but forgotten, and soldiers were of all classes the most despised.

The whole social and political organization of the Chinese is based, in a far more real sense than in the West, on the family. The supreme

duty is that of the child to its parent; on this the whole Chinese moral system is built up. Filial piety, according to the teaching of Confucius, is the very foundation of society; the nation itself is but one great family, and the authority of the government itself is but an extension of the paternal authority, to which all its children are bound to yield implicit obedience. The western idea of the liberty and dignity of the individual, as distinct from the community to which he belongs, is wholly alien to the Chinese mind. The political unit in China is not the individual but the family, and the father of the family is supposed to be responsible for the qualities and views of all his kin. He is rewarded for their virtues, punished for their faults; the deserts of a son ennoble the father and all his ancestors, and conversely his crimes disgrace them.

An outcome of this principle is the extraordinary importance in China of funeral rites, especially in the case of the father. The eldest son, now head of the family, or, failing him, his first-born or adopted son, fixes one of the three souls of the dead in the tablet commemor- ating his virtues, burns incense to his shade, and supplies him with paper money and paper representations of everything (clothes, servants, horses) that he may require in his journey to the other world. Mourning lasts for three years, during which the mourners wear white garments and abstain from meat, wine and public gatherings. Custom, too, dictates that wherever the Chinaman may die he must be brought back for burial to the place of his birth ; one of the objects of the friendly societies is to provide funds to charter ships to transport home the bodies of those who have died abroad. Annually, in May, the white-clad people stream to the graves and mortuary temples with flowers, fruit and other offerings for the dead. Christian missionaries have found in this ancestor worship the most serious obstacle to the spread of a religion which teaches that the convert must, if need be, despise his father and his mother and follow Christ.

The same elaborate ceremonialism that characterizes the Chinese funeral customs is found also in their marriage rites and the rules of their social intercourse generally. Confucius is reported to have said that ” all virtues have their source in etiquette,” and the due observance of the ” ceremonial ” (li) in the fulfilling of social duties is that which, in Chinese opinion, distinguishes civilized from bar- barous peoples. The Board of Rites, one of the departments of the central government, exists for the purpose of giving decisions in matters of etiquette and ceremony. As to marriage, the rule that the individual counts for nothing obtains here in its fullest significance. The breeding of sons to carry on the ancestral cult is a matter of prime importance, and the marriage of a young man is arranged at the

earliest possible age. The bride and bridegroom have little voice

in the matter, the match being arranged by the parents of the parties; the lifting of the bride's veil, so that the bridegroom may see her face, is the very last act of the long and complicated ceremony.

In the traditional Chinese social system four classes are distinguished: the literary, the agricultural, the artisan and the trading class. Hereditary nobility, in the European sense, scarcely exists, and the possession of an hereditary title gives in itself no special privileges. Official position is more highly esteemed than birth and the bureaucracy takes the place of the aristocracy in the west. There are, nevertheless, besides personal decorations for merit, such as the yellow jacket, five hereditary rewards for merit ; these last only for a fixed number of lives. A few Chinese families, however, enjoy hereditary titles in the full sense, the chief among them being the Holy Duke of Yen (the descendant of Confucius). The Imperial Clansmen consist of those who trace their descent direct from the founder of the Manchu dynasty, and are distinguished by the privilege of wearing a yellow girdle; collateral relatives of the imperial house wear a red girdle. Twelve degrees of nobility (in a descending scale as one generation succeeds another) are conferred on the descendants of every emperor; in the thirteenth generation the descendants of emperors are merged in the general population, save that they retain the yellow girdle. The heads of eight houses, the " Iron-capped " (or helmeted) princes, maintain their titles in perpetuity by rule of primogeniture in virtue of having helped the Manchu in the conquest of China. Imperial princes apart, the highest class is that forming the civil service. (See also § Government and Administration.) The peasant class forms the bulk of the population. The majority of Chinese are small landowners ; their standard of living is very low in comparison with European standards. This is in part due to the system of land tenure. A parent cannot, even if he wished to do so, leave all his land to one son. There must be substantially an equal division, the will of the father notwith- standing. As early marriages and large families are the rule, this process of continual division and subdivision has brought things down to the irreducible minimum in many places. Small patches of one- tenth or even one-twentieth of an acre are to be found as the estate of an individual landowner, and the vast majority of

holdings run between one and three acres. With three acres a family is deemed very comfortable, and the possession of ten acres means luxury.

The only class which at all resembles the territorial magnates of other countries is the class of retired officials. The wealth of an official is not infrequently invested in land, and consequently there are in most provinces several families with a country seat and the usual insignia of local rank and influence. On the decease of the heads or founders of such families it is considered dignified for the sons to live together, sharing the rents and profits in common. This is sometimes continued for several generations, until the country seat becomes an agglomeration of households and the family a sort of clan. A family of this kind, with literary traditions, and with the means to educate the young men, is constantly sending its scions into the public service. These in turn bring their earnings to swell the common funds, while the rank and dignity which they may earn add to the importance and standing of the group as a whole. The members of this class are usually termed the literati or gentry.

The complex character of the Chinese is shown in various ways. Side by side with the reverence of ancestors the law recognizes the right of the parent to sell his offspring into slavery and among the poor this is not an uncommon practice, though in comparison with the total population the number of slaves is few. The kidnapping of children for sale as slaves is carried on, but there is no slave raiding. There are more female than male slaves; the descendants of male slaves acquire freedom in the fifth generation. While every Chinese man is anxious to have male children, girls are often considered superfluous.

The position of women is one of distinct inferiority; a woman is always ‘subject to the men of her family — before marriage to her father, during marriage to her husband, in widowhood to her son; these states being known as ” the three obediences.” Sons who do not, however, honour their mothers outrage public opinion. Polygamy is tolerated, secondary wives being sometimes provided by the first wife when she is growing old. Secondary wives are subordinate to first wives. A wife may be divorced for any one of seven reasons. The sale of wives is practised, but is not recognized by law. Women of the upper classes are treated with much respect. The home of a Chinese man is often in reality ruled by his mother, or by his wife as she approaches old age, a state held in veneration. Chinese women frequently prove of excellent business capacity, and those of high rank — as the recent history of China has conspicuously proved — exercise considerable influence on public affairs.

Deforming the feet of girls by binding and stopping their growth has been common for centuries. The tottering walk of the Chinese lady resulting from this deformation of the feet is the admiration of her husband and friends. Foot-binding is practised by rich and poor in all parts of the country, but is not universal. In southern and western China Hakka women and certain others never have their feet bound. It has been noted that officials (who all serve on the itinerary system) fake for secondary wives natural-footed women, who are frequently

slaves. 1 Every child is one at birth, and two on what Europeans call its first birthday, the period of gestation counting as one year.

In their social intercourse the Chinese are polite ana ceremonious ; they do not shake hands or kiss, but prostrations (kotowing), salutations with joined hands and congratulations are common. They have no weekly day of rest, but keep many festivals, the most im- portant being that of New Year's Day. Debts are supposed to be paid before New Year's Day begins and for the occasion new clothes are bought. Other notable holidays are the Festival of the First Full Moon, the Feast of Lanterns and the Festival of the Dragon Boat. A feature of the festivals is the employment of thousands of lanterns made of paper, covered with landscapes and other scenes in gorgeous colours. Of outdoor sports kite-flying is the most popular and is engaged in by adults ; shuttle-cock is also a favourite game, while cards and dominoes are indoor amusements. The theatre and marionette shows are largely patronized. The habit of opium smoking is referred to elsewhere ; tobacco smoking is general among both sexes.

Except in their head-dress and their shoes little distinction is made between the costumes of men and women. 2 Both sexes wear a long loose jacket or robe which fits closely round the neck and has wide sleeves, and wide short trousers. Over the robe shorter jackets — often sleeveless — are worn, according to the weather. For winter wear the jackets are wadded, and a Chinaman will speak of " a three, four or six coot cold day." A man's robe is generally longer than that of a woman. Petticoats are worn by ladies on ceremonial occasions and the long robe is removed when in the house. " It is considered very unwomanly not to wear trousers, and very indelicate for a man not to have skirts to his coat." No Chinese woman ever bares any part of her body in public— even the hands are concealed in the large sleeves— and the evening dress of European ladies is considered indelicate ; but Hakka women move about freely without shoes or stockings. A Chinese man will, however, in warm weather often strip naked to the waist. Coolies frequently go bare-legged; they use sandals made of rope and possess rain-coats made of palm leaves. The garments of the

poorer classes are made of cotton, generally dyed blue. Wealthy people have their clothes made of silk. Skirts and jackets are elaborately embroidered. Costly furs and fur- lined clothes are much prized, and many wealthy Chinese have fine collections of furs. Certain colours may only be used with official permission as denoting a definite rank or distinction, e.g. the yellow jacket. The colours used harmonize — the contrasts in colour seen in the clothes of Europeans is avoided. Dark purple over blue are usual colour combinations. The mourning colour is white. Common shoes are made of cotton or silk and have thick felt soles ; all officials wear boots of satin into which is thrust the pipe or the fan — the latter carried equally by men and women. The fan is otherwise stuck at the back of the neck, or attached to the girdle, which may also hold the purse, watch, snuff-box and a pair of chop-sticks.

Formerly Chinese men let their hair grow sufficiently long to gather it in a knot at the top; on the conquest of the country by the Manchu they were compelled to adopt the queue or pigtail, which is often artificially lengthened by the employment of silk thread, usually black in colour. The front part of the head is shaved. As no Chinese dress their ow« hair, barbers are numerous and do a thriving trade. Women do not shave the head nor adopt the queue. Men wear in general a close-fitting cap, and the peasants large straw hats. Circular caps, larger at the crown than round the head and with an outward slope are worn in winter by mandarins, conical straw hats in summer. Women have elaborate head ornaments, decking their hair with artificial flowers, butterflies made of jade, gold pins and pearls. The faces of Chinese ladies are habitually rouged, their eyebrows painted. Pearl or bead necklaces are worn both by men and women. Officials and men of leisure let one or two finger nails grow long and protect them with a metal case.

The staple food of the majority of the Chinese in the south and central provinces is rice; in the northern provinces millet as well as rice is much eaten. In separate bowls are placed morsels of pork, fish, chicken, vegetables and other relishes. Rice-flour, bean-meal, macaroni, and shell fish are all largely used. Flour balls cooked in sugar are esteemed. Beef is never eaten, but Mahommedans eat mutton, and there is hardly any limit to the things the Chinese use as food. In Canton dogs which have been specially fed are an article of diet. Eggs are preserved for years in a solution of salt, lime and wood-ash, or in spirits made from rice. Condiments are highly prized, as are also preserved fruits. Special Chinese dishes are soups made from sea-slugs and a glutinous substance found in certain birds' nests, ducks' tongues, sharks' fins, the brains of chickens and of fish, the sinews of

deer and of whales, fish with pickled fir-tree cones, and roots of the lotus lily. A kind of beer brewed from rice is a usual drink; samshu is a spirit distilled from the same grain and at dinners is served hot in small bowls. Excellent

1 Evidences of the social changes taking place in China are to be found in the strong movement for the education of girls, and in the formation of societies, under official patronage, to prevent the binding of women's feet.

2 It must be remembered that there is great variety in the costumes worn in the various provinces. The particulars here given are of the most general stvles of dress.

native wines are made. The Chinese are, however, abstemious with regard to alcoholic liquors. Water is drunk hot by the very poor, as a substitute for tea. Tea is drunk before and after meals in cups without handle or saucer ; the cups are always provided with a cover. Two substantial meals are taken during the day — luncheon and dinner; the last named at varying hours from four till seven o'clock. At dinner a rich man will offer his guest twenty-four or more dishes (always a multiple of 4), four to six dishes being served at a time. Food is eaten from bowls and with chop-sticks (q.v.) and little porcelain spoons. Men dine by themselves when any guests are present; dinner parties are sometimes given by ladies to ladies. Chinese cookery is excellent; in the culinary art the Chinese are reputed to be second only to the French.

Ethnologically the Chinese are classed among the Mongolian races (in which division the Manchus are also included), although they present many marked contrasts to the Mongols. The Tatars, Tibetans, Burmese, Shans, Manchu and other races — including the Arab and Japanese — have mingled with the indigenous population to form the Chinese type, while aboriginal tribes still resist the pressure of absorption by the dominant race (see ante, Population). The Chinese are in fact ethnically a very mixed people, and the pure Mongol type is uncommon among them. Moreover, natives of different provinces still present striking contrasts one to another, and their common culture is probably the strongest national link. By some authorities it

is held that the parent stock of the Chinese came from the north-west, beyond the alluvia, plain; others hold that it was indigenous in eastern China. Notwithstanding the marked differences between the inhabitants of different provinces and even between those living in the same province, certain features are common to the race. ” The stature is below the average and seldom exceeds 5 ft. 4 in., except in the North. The head is normally brachycephalic or round horizontally, and the forehead low and narrow. The face is round, the mouth large, and the chin small and receding. The cheek-bones are prominent, the eyes almond-shaped, oblique upwards and outwards, and the hair coarse, lank and inva- riably black. The beard appears late in life, and remains gener- ally scanty. The eyebrows are straight and the iris of the eye is black. The nose is generally short, broad and flat. The hands and feet are disproportionately small, and the body early inclines to obesity. The complexion varies from an almost pale-yellow to a dark-brown, without any red or ruddy tinge. Yellow, however, predominates.” 1

A few words may be added concerning the Manchus, who are the ruling race in China. Their ethnic affinities are not precisely known, but they may be classed among the Ural-Altaic tribes, although the term Ural-Altaic (q.v.) denotes a linguistic rather than a racial group. By some authorities they are called Tung-tatze, i.e. Eastern Tatars — – the Tatars of to-day being of true Mongol descent. Manchu is the name adopted in the 13th century by one of several tribes which led a nomadic life in Manchuria and were known collectively in the I ith century as Nuchihs. Some authorities regard the Khitans (whence the European form Cathay), who in the 9th and loth centuries dwelt in the upper Liao region, as the ancestors of this race. It was not until the 16th century that the people became known generally as Manchus and obtained possession of the whole of the country now bearing their name (see Manchuria). They had then a considerable mixture of Chinese and Korean blood, but had developed a diftinct nationality and kept their ancient Ural-Altaic language. In China the Manchus retained their separate nationality and semi- military organization. It was not until the early years of the 20th century that steps were officially taken to obliterate the distinction between the two races. The Manchus are a more robust race th.an the inhabitants of central and southern China, but resemble those of northern China save that their eyes are horizontally set. They are a lively and enterprising people, but have not in general the intellectual or business ability of the Chinese. They are courteous in their relations with strangers. The common people are frugal and industrious. The Manchu family is generally large. The women’s feet are unbound ; they twist their hair

round a silver bangle placed cross-wise on the top of the head. The Manchus have no literature of their own, but as the language of the court Manchu has been extensively studied in China.

Authorities. — Sir John F. Davies, China (2 vols., London, 1857) ; E. Reclus, The Universal Geography, vol. vii. (Eng. trans, ed. by E. G. Ravenstein and A. H. Keane) ; E. and O. Reclus, L' Empire du milieu (Paris, 1902) ; Sir R. K. Douglas, Society in China (London, '895) ! J-Doolittle, Social Life of the Chinese (2 vols.; New York, 1867); H. A. Giles, China and the Chinese (1902); E. Bard, Les Chinois chez eux (Paris, 1900) ; A. G. Jones, Desultory Notes on Chinese Etiquette (Shanghai, 1906) ; Mrs Archibald Little, Intimate China (London, 1899) and The Land of the Blue Gown (London, 1902) ; E. H. Parker, John Chinaman and a Few Others (London, 1901); J. Dyer-Ball, Things Chinese (Shanghai, 1903); Cheng Kitung, The Chinese Painted by Themselves (Eng. trans, by J. Millington, London, 1885); L. Richard, Comprehensive Geography of the Chinese Empire (Shanghai, 1908). (X.)

1 Richard's Comprehensive Geography, &c. (1908 edition), pp. ,14°-34i-

Religion.

The earliest traces of religious thought and practice in China point to a simple monotheism. There was a Divine Ruler of the universe, abiding on high, beyond the ken of man. This Power was not regarded as the Creator of the Tbe human race, but as a Supreme Being to whom wicked- taKh!" nesswas abhorrent and virtuous conduct a source of joy, and who dealt out rewards and punishments with unerring justice, claiming neither love nor reverence from mankind. If a man did his duty towards his neighbour, he might pass his whole time on earth oblivious of the fact that such a Power was in existence; unless perchance he wished to obtain some good or attain some end, in which case he might seek to propitiate Him by sacrifice and prayer. There was no Devil to tempt man astray, and to rejoice in his fall; neither was there any belief that righteous behaviour in this world would lead at death to absorption in the Deity. To God, understood in this sense, the people gave the name Tien, which in the colloquial language was used of the sky; and when, in the first stages of the written character, it became necessary to express the idea of Tien, they did not attempt any vague picture of the heavens, but set down the rude outline of a man. Perhaps about this period the title Shang Ti, or Supreme Ruler, came into vogue as synonymous with Tien. But although the two terms were synonyms, and both may be equally

rendered by ” God,” there is nevertheless an important distinction to be observed, much as though Tien and Shang Ti were two Persons in one substance. Tien is far more an abstract Being, while Shang Ti partakes rather of the nature of a personal God, whose anthropomorphic nature is much more strongly accentuated. Shang Ti is described as walking and talking, as enjoying the flavour of sacrifices, as pleased with music and dancing in his honour, and even as taking sides in warfare; whereas Tien holds aloof, wrapped in an impenetrable majesty, an ignotum pro mirifico. So much for religion in primeval days, gathered scrap by scrap from many sources; for nothing like a history of religion is to be found in Chinese literature.

Gradually to this monotheistic conception was added a worship of the sun, moon and constellations, of the five planets, and of such noticeable individual stars as (e.g.) Canopus, which is now looked upon as the home of the God of Longevity. Earth, too — Mother Earth — came in for her share of worship, indicated especially by the God of the Soil, and further distributed among rivers and hills. Wind, rain, heat, cold, thunder and lightning, as each became objects of desire or aversion, were invested with the attributes of deities. The various parts of the house — door, kitchen-stove, courtyard, &c. — were also conceived of as shelter- ing some spirit whose influence might be benign or the reverse. The spirits of the land and of grain came to mean one’s country, the commonwealth, the state; and the sacrifices of these spirits by the emperor formed a public announcement of his accession, or of his continued right to the throne. Side by side with such sacrificial rites was the worship of ancestors, stretching so far back that its origin is not discernible in such historical documents as we possess. In early times only the emperor, or the feudal nobles, or certain high officials, could sacrifice to the spirits of nature; the common people sacrificed to their own ancestors and to the spirits of their own homes. For three days before performing such sacrifices, a strict vigil with purification was maintained; and by the expiration of that time, from sheer concentration of thought, the mourner was able to see the spirits of the departed, and at the sacrifice next day seemed to hear their movements and even the murmur of their sighs. Ancestral worship in China has always been, and still is, worship in the strict sense of the term. It is not a memorial service in simple honour of the dead; but sacrifices are offered, and the whole ceremonial is performed that the spirits of former ancestors may be induced to extend their protection to the living and secure to them as many as possible’ of the good things of this world.

For Confucianism, which cannot, strictly speaking, be classed as a religion, see Confucius.

Around the scanty utterances of Lao Tzu or Lao-tsze (q.v. ; see also § Chinese Literature, §§' Philosophy) an attempt was made by later writers to weave a scheme of thought which Taoism. should serve to satisfy the cravings of mortals for some definite solution of the puzzle of life. Lao Tzii himself had enunciated a criterion which he called Too, or the Way, from which is derived the word Taoism; and in his usual paradoxical style he had asserted that the secret of this Way, which was at the beginning apparently nothing more than a line of right conduct, could not possibly be im- parted, even by those who understood it. His disciples, however, of later days proceeded to interpret the term in the sense of the Absolute, the First Cause, and finally as One, in whose obliterating unity all seemingly opposed conditions of time and space were indistinguish- ably blended. This One, the source of human life, was placed beyond the limits of the visible universe; and for human life to return thither at death and to enjcy immortality, it was only necessary to refine away all corporeal grossness by following the doctrines of Lao Tzii. By and by, this One came to be regarded as a fixed point of dazzling luminosity in remote ether, around which circled for ever and ever, in the supremest glory of motion, the souls of those who had left the slough of humanity behind them. These transcendental notions were entirely corrupted at a very early date by the intro- duction of belief in an elixir of life, and later still by the practice of alchemistic experiments. Opposed by Buddhism, which next laid a claim for a share in the profits of popular patronage, Taoism rapidly underwent a radical transformation. It became a religion, borrowing certain ceremonial, vestments, liturgies, the idea of a hell, arrange- ment of temples, &c, from its rival ; which rival was not slow in re- turning the compliment. As Chu Hsi said, " Buddhism stole the best features of Taoism; Taoism stole the worst features of Buddhism. It is as though one took a jewel from the other, and the loser recouped the loss with a stone." At the present day_ there is not much to choose between the two religions, which flourish peaceably together. As to their temples, priests and ceremonial, it takes an expert to distinguish one from the other.

There is no trustworthy information as to the exact date at which Buddhism first reached China. It is related that the emperor Ming Ti (a.d. 58-76) had a dream in which a golden man ap- Buddhlsm. p earec j to him, and this mysterious visitant was interpreted by the

emperor's brother to be none other than Shakyamuni Buddha, the far-famed divinity of the West. This shows that Buddhism must then have been known to the Chinese, at any rate by hearsay. The earliest alleged appearance of Buddhism in China dates from 217 B.C., when certain Shamans who came to proselytize were seized and thrown into prison. They escaped through the miraculous inter- vention of a golden man, who came to them in the middle of the night and opened their prison doors. Hsu Kuan, a writer of the Sung dynasty, quotes in his Tung Chai Chi passages to support the view that Buddhism was known in China some centuries before the reign of Ming Ti; among others, the following from the Sui Shu Ching Chi Chih: " These Buddhist writings had long been circulated far and wide, but disappeared with the advent ofthe Ch'in dynasty," under which (see § Chinese Literature, §§ History)occ\irred the Burn- ing of the Books. It is, however, convenient to begin with the alleged dream of Ming Ti, as it was only subsequent to that date that Buddhism became a recognized religion of the people. It is certain that in A.D. 65 a mission of eighteen members was despatched to Khotan to make inquiries on the subject, and that in 67 the mission returned, bringing Buddhist writings and images, and accompanied by an Indian priest, Kashiapmadanga, who was followed shortly afterwards by another priest, Gobharana. A temple was buiit for these two at Lo-yang, then the capital of China, and they settled down to the work of translating portions of the Buddhist scriptures into Chinese ; but all that now remains of their work is the Sutra of Forty-two Sections, translated by Kashiapmadanga. During the next two hundred and fifty years an unbroken line of foreign priests came to China to continue the task of translation, and to assist in spreading the faith. Such work was indeed entirely in their hands, for until the 4th century the Chinese people were prohibited from taking orders as priests; but by that date Buddhism had taken a firm hold upon the masses, and many Chinese priests were attracted towards India, despite the long and dangerous journey, partly to visit the birthplace of the creed and to see with their own eyes the scenes which had so fired their imaginations, and partly in the hope of adding'to the store of books and images already available in China (see § Chinese Literature, §§ Geography and Travel). Still, the train of Indian missionaries, moving in the opposite direction, did not cease. In 401 , Kumarajiva, the nineteenth of the Western Patriarchs and translator of the Diamond Sutra, finally took up his residence it the court of the soi-disant emperor, Yao Hsing. In 405 he became State Preceptor and dictated his commentaries on the sacred books of Buddhism to some eight hundred priests, besides composing a shdstra on Reality and Semblance. Dying in 417, his body was cremated, as is still usual with priests, but his tongue, which

had done such eminent service during life, remained unharmed in the midst of the flames. In the year 520 Bodhidharma, or Ta-mo, as he is affectionately known to the Chinese, being also called the White Buddha, reached Canton, bringing with him the sacred bowl of the Buddhist Patriarchate, of which he was the last representative in the west and the first to hold office in the east. Summoned to Nanking,

dr

he offended the emperor by asserting that real merit lay, not in works, but solely in purity and wisdom combined. He therefore retired to Lo-yang, crossing the swollen waters of the Yangtsze on a reed, a feat which has ever since had a great fascination for Chinese painters and poets. There he spent the rest of his life, teaching that religion was not to be learnt from books, but that man should seek pndfind the Buddha in his own heart. Thus Buddhism gradually made its way. It had to meet first of all the bitter hostility of the Taoists; and secondly, the fitful patronage and opposition of the court. Several emperors and empresses were infatuated supporters of the faith; one even went so far as to take vows and lead the life of an ascetic, further insisting that to render full obedience to the Buddhist commandment, ” Thou shalt not kill,” the sacrificial animals were to be made of dough. Other emperors, instigated by Confucian advisers, went to the opposite extreme of persecution, closed all religious houses, confiscated their property, and forced the priests and nuns to return to the world. From about the 1 1 th century onwards Buddhism has enjoyed comparative immunity from attack or restriction, and it now covers the Chinese empire from end to end. The form under which it appears in China is to some extent of local growth ; that is to say, the Chinese have added and subtracted not a little to and from the parent stock. The cleavage which took place under Kanishka, ruler of the Indo-Scythian empire, about the 1st century A.D., divided Buddhism into the Mahayana, or Greater Vehicle, and the Hinayana, as it is somewhat contemptuously styled, or Lesser Vehicle. The latter was the nearer of the two to the Buddhism of Shakyamuni, and exhibits rather the mystic and esoteric sides of the faith. The former, which spread northwards and on to Nepaul, Tibet, China, Mongolia and japan, leaving southern India, Burma and Siam to its rival, began early to lean towards the deification of Buddha as a personal Saviour. New Buddhas and Bodhisatvas were added, and new worlds were provided for them to live in ; in China, especially, there was an enormous extension of the mythological element. In fact, the Mahayana system of Buddhism, inspired, as has been observed, by a progressive spirit, but without contradicting the inner significance of the teachings of Buddha, broadened its scope and assimilated other religio-philosophical beliefs,

whenever this could be done to the advantage of those who came within its influ- ence. Such is the form of this religion which prevails in China, of which, however, the Chinese layman understands nothing. He goes to a temple, worships the gods with prostrations, lighted candles, incense, &c, to secure his particular ends at the moment; he may even listen to a service chanted in a foreign tongue and just as in- comprehensible to the priests as to himself. He pays his fees and departs, absolutely ignorant of the history or dogmas of^the religion to which he looks for salvation in a future state. All such knowledge, and there is now not much of it, is confined to a few of the more cultured priests.

The 7th century seems to have been notable in the religious history of China. Early in that century, Mazdaism, or the religion of Zoroaster, based upon the worship of fire, was intro- duced into China, and in 621 the first temple under that Ma ‘ dalsm – denomination was built at Ch’ang-an in Shensi, then the capital. But the harvest of converts was insignificant; the religion failed to hold its ground, and in the 9th century disappeared altogether.

Mahommedans first settled in China in the Year of the Mission, A.D. 628, under Wahb-Abi-Kabha, a maternal uncle of Mahomet, who was sent with presents to the emperor. Wahb-Abi- Kabha travelled by sea to Canton, and thence over- ” a * on j” land to Ch*ang-an, the capital, where he was well re- me ° an ‘ sm – ceived. The first mosque was built at Canton, where after several restorations, it still exists. Another mosque was erected in 742 ; but many of the Mahommedans went to China merely as traders, and afterwards returned to their own country. The true stock of the present Chinese Mahommedans was a small army of 4000 Arab soldiers sent by the caliph Abu Giafar 1 in 755 to aid in putting down a rebellion. These soldiers had permission to settle in China, where they married native wives; and four centuries later, with the conquests of Jenghiz Khan, large numbers of Arabs penetrated into the empire and swelled the Mahommedan community. Its members are now indistinguishable from the general population; they are under no civic disabilities, and are free to open mosques wherever they please, so long as, in common with Buddhists and Taoists, they exhibit the tablet of the emperor’s sovereignty in some conspicuous position.

In a.d. 631 the Nestorians sent a mission to China and intro- duced Christianity under the name of the Luminous Doctrine. In 636 they were allowed to settle at Ch’ang-an; and in ^^

638 an Imperial Decree was issued, stating that Olopun, , s j or ” a

Nestorian priest who is casually mentioned as a Persian, lanum. had presented a form of religion which his Majesty had carefully examined and had found to be in every way satisfactory, and that it would henceforth be permissible to preach this new doctrine within the boundaries of the empire. Further, the establishment of a monastery was authorized, to be served by twenty-one priests. For more than a century after this, Nestorian Christianity seems to have flourished in China. In 781 the famous Nestorian Tablet,

1 Otherwise Abu Ja'far Ibn Mahommed al-Mansur (see Caliphate, C § 2).

giving a rough outline of the object and scope of the faith, was set up at Ch'ang-an (the modern Si-gan Fu), disappearing soon after- wards in the political troubles which laid the city in ruins, to be brought to light again in 1625 by Father Semedo, S. J. The genuine- ness of this tablet was for many years in dispute, Voltaire, Renan, and others of lesser fame regarding it as a pious Jesuit fraud ; but all doubts on the subject have now been dispelled by the exhaustive monograph of Pere Havret, S. J., entitled La Stele de Si-ngan. The date of the tablet seems to mark the zenith of Nestorian Christianity in China; after this date it began to decay. Marco Polo refers to it as existing in the 13th century; but then, it fades out of sight, leaving scant traces in Chinese literature of ever having existed.

The Manichaeans, worshippers of the ChaMaean Mani or Manes, who died about A.d. 274, appear to have found their way to China „ . , _ in the year 694. In 719 an envoy from Tokharestan

. reached Ch'ang-an, bringing a letter to the emperor, in

aeism. w hich a request was made that an astronomer who

accompanied the mission might be permitted to establish places of worship for persons of the Manichaean faith. Subsequently, a number of such chapels were opened at various centres; but little is known of the history of this religion, which is often confounded by Chinese writers with Mazdeism, the fate of which it seems to have shared, also disappearing about the middle of the 9th century.

By ” the sect of those who take out the sinew,” the Chinese refer to the Jews and their peculiar method of preparing meat in order to make it kosher. Wild stories have been told of their snj. arr ; va l m China seven centuries before the Christian era, after one of the numerous upheavals mentioned in the Old Testa- ment; and again, of their having carried the Pentateuch to China shortly after the Babylonish captivity, and having founded a colony in Ho-nan in A.D. 72. The Jews really reached China for the first time in the year a.d. 1 163, and were permitted to open a syna- gogue at the modern K’ai-feng Fu in 1164. There they seem to have lived peaceably, enjoying the protection of the authorities and making some slight efforts to spread their tenets. There their descendants were found, a dwindling community, by the Jesuit Fathers of the 17th century; and there again they were visited in 1850 by a Protestant mission, which succeeded in obtaining from them Hebrew rolls of parts of the Pentateuch in the square character, with vowel points. After this, it was generally believed that the few remaining stragglers, who seemed to be entirely ignorant of everything connected with their faith, had become merged in the ordinary population. A recent traveller, however, asserts that in 1909 he found at K’ai-feng Fu a Jewish community, the members of which keep as much as possible to themselves, worshipping in secret, and preserving their ancient ritual and formulary.

See H. Hackmann, Buddhism as a Religion (1910); H. A. Giles, Religions of Ancient China (1905) ; G. Smith, The Jews at K’ae-fung-foo (1851); Dabry de Thiersant, Le Mahometisme en Chine (1878); P. Havret, S. T., La Stele chretienne de Si-ngan-fou (1895).

(H. A. Gi.)

[Christian missions, both Roman Catholic and Protestant, are established in every province in China. Freedom to embrace the chri t! Christian faith has been guaranteed by the Chinese govern- * * ment since i860, and as a rule the missionaries have free

m ss oas. SCO p e j n teac h; n g and preaching, though local disturbances are not infrequent. The number of members of the Roman Catholic Church in China was reckoned by the Jesuit fathers at Shanghai to be, in 1907, ” about one million “; in the same year the Protestant societies reckoned in all 250,000 church members. By the Chinese, Roman Catholicism is called the ” Religion of the Lord of Heaven ” ; Protestantism the ” Religion of Jesus.” For the progress and effects of Christianity in China see § History, and Missions, § China. Ed.]

Education and the Press. The educational system of China till nearly the close of the 19th century was confined in its scope to the study of Chinese classics. Elementary instruction was not provided by the state. The well-to-do engaged private tutors for their sons; the poorer boys were taught in small schools on a voluntary basis. No curriculum was compulsory, but the books used and the pro- gramme pursued followed a traditional rule. The boys (there were no schools for girls) began by memorizing the classics for four or five years. Then followed letter-writing and easy composition. This completed the education of the vast majority of the boys not intended for the public service. The chief merit of the system was that it developed the memory and the imitative faculty. For secondary education some- what better provision was made, practically the only method of attaining eminence in the state being through the schools (see § CM Service). At prefectural cities and provincial capitals colleges were maintained at the public expense, and at these institutions a more or less thorough knowledge of the classics might be obtained. At the public examinations

held periodically the exercises proposed were original poems and literary essays. Three degrees were conferred, Siu-ls'ai (budding talent), ChU-jin (promoted scholar) and Chin-shih (entered scholar). The last degree was given to those who passed the final examination at Peking, and the successful can- didates were also called metropolitan graduates.

The first education on western lines was given by the Roman Catholic missionaries. In 1852 they founded a college for the education of native priests; they also founded and maintained many primary and some higher schools — mainly if not exclusively for the benefit of their converts. The Protestant missions followed the ex- ample of the Roman Catholics, but a new departure, which has had a wide success, was initiated by the American Protestant missionary societies in founding schools — primary and higher — and colleges in which western education was given equally to all comers, Christian or non-Christian. Universities and medical schools have also been established by the missionary societies. They also initiated a move- ment for the education of girls and opened special schools for their instruction.

Missionary effort apart, the first step towards western education was the establishment of two colleges in 186 1, one at Peking, the other at Canton in connexion with the imperial maritime customs. These institutions were known as T'ung Wen Kwan, and were pro- vided with a staff of foreign professors and teachers. These colleges were mainly schools of languages to enable young Chinese to qualify as

interpreters in English, French, &c. Similar schools were established at Canton, Fuchow and one or two other places, with but indifferent results. A more promising plan was conceived in 1 880, or thereabouts, by the then viceroy of Nanking, who sent a batch of thirty or forty students to America to receive a regular training on the understanding that on their return they would receive official appointments. The promise was not kepf. . A report was spread that these students were becoming too much Americanized. They were hastily recalled, and when they returned they were left in obscurity. The next step was taken by the viceroy Chang Chih-tung after the Chino-Japanese War of 1894-95. The viceroy wrote a book, China's Only Hope, which he circulated throughout the empire, and in which he strongly advocated a reform of the traditional educational system. His scheme was to make Chinese learning the foundation on which a western education should be imparted. 1 The book was one of the factors in the 1898 reform movement, and Chang Chih- tung's proposals were condemned when that movement was sup- pressed. But after the Boxer rising the Peking government adopted his views, and in 1902 regulations were issued for the reform of the old system of public instruction. A university on western lines was established in that year at Peking, the T'ung Wen Kwan at the capital being incorporated in it. The new educational move- ment gained enormously in strength as the result of the Russo- Japanese War, and in 1906 a new system, theoretically almost perfect, was established. The new system comprises the study of the Chinese language, literature and composition, modern sciences, history and geography, foreign languages, 2 gymnastics, drill and, in the higher grades, political economy, and civil and international law.

.By 1910 primary and secondary government schools and schools for special subjects (such as agriculture and engineering) had been established in considerable numbers. In every province an Imperial University was also established. The Imperial University at Peking now teaches not only languages and Chinese subjects but also law, chemistry, mathematics, &c. A medical school was founded at Peking in 1906 through the energy of British Protestant missionaries, and is called the Union Medical College. When in 1908, the United Sta.tes, finding that the indemnity for the Boxer outrages awarded her was excessive, agreed to forgo the payment of £2,500,000, China undertook to spend an equal amount in sending students to America.

The general verdict of foreign observers on the working of the new system up to 1910 was that in many instances the teaching was ineffective, but there were notable exceptions. The best teachers, next to Europeans, were foreign or mission-trained Chinese. The Japanese

employed as teachers-were often ignorant of Chinese and were not as a rule very successful. (See further § History.) A remarkable indication of the thirst for western learning and cul- ture was the translation into Chinese and their diffusion throughout the country of numerous foreign standard and other works, including modern fiction.

The Peking Gazette, which is sometimes called the oldest paper in the world, is not a newspaper in the ordinary sense, but merely a court gazette for publishing imperial decrees and such public docu- ments as the government may wish to give out. It never contains original articles nor any discussion of public affairs. The first

1 For a summary of Chang Chih-tung's treatise, see Changing China (1910 edition), chap. xxii.

1 It was announced in June 1910 that the throne had approved a recommendation of the Board of Education that English should be the official language for scientific and technical education, and that the study of English should be compulsory in all provincial scientific and technical schools.

genuine native newspaper was published at Shanghai about 1870. It was termed the Shen Pao or Shanghai News, and was a Chinese Native speculation under foreign protection, the first editor being an Englishman. It was some years before it made much press. headway, but success came, and it was followed by various imitators, some published at Shanghai, some at other treaty ports and at Hong-Kong. In 1910 there were over 200 daily, weekly or monthly journals in China. The effect of this mass of literature on the public mind of China is of first-rate importance.

The attitude of the central government towards the native press is somewhat undefined. Official registration of a newspaper is required before postal facilities are given. There are no press laws, but as every official is a law unto himself in these matters, there is nothing to prevent him from summarily suppressing an obnoxious newspaper and putting the editor in prison. The emperor, among other reform edicts which provoked the coup d'itat of 1898, declared that newspapers were a boon to the public and appointed one of them a government organ. The empress-dowager revoked this decree, and declared that

the public discussion of affairs of state in the news- papers was an impertinence, and ought to be suppressed. Neverthe- less the newspapers continued to flourish, and their outspoken criticism had a salutary effect on the public and on the government. The official classes seem to have become alarmed at the independent attitude of the newspapers, but instead of a campaign of suppression the method was adopted, about 1908, of bringing the vernacular press under official control. This was accomplished chiefly by the purchase of the newspapers by the mandarins, with the result that at the beginning of 1910 there was said to be hardly an independent native daily newspaper left in China. The use of government funds to subsidize or to purchase newspapers and thus to stifle or mislead public opinion provoked strong protests from members of the Nanking provincial council at its first sitting in the autumn of 1909. The appropriation by the Shanghai Taot'ai of moneys belonging to the Huangpu conservancy fund for subsidizing papers ied to his im- peachment by a censor and to the return of the monejft. 1 (X.)

III. Economics Agriculture and Industry.

China is pre-eminently an agricultural country. The great majority of its inhabitants are cultivators of the soil. The holdings are in general very small, and the methods of farming primitive. Water is abundant and irrigation common over large areas. Stock-raising, except in Sze-ch'uen and Kwang-tung, is only practised to a small extent; there are few large herds of cattle or flocks of sheep, nor are there any large meadows, natural or cultivated. In Sze-ch'uen yaks, sheep and goats are reared in the mountains, and buffaloes and a fine breed of ponies on the plateau. Cattle are extensively reared in the mountainous districts of Kwang-tung. The camel, horse and donkey are reared in Chih-li. Forestry is likewise neglected. While the existing forests, found mainly in high regions in the provinces of Hu-nan, Fu-kien and Kwei-chow, are disappearing and timber has to be imported, few trees are planted. This does not apply to fruit trees, which are grown in great variety, while horticulture is also a favourite pursuit.

The Chinese farmer, if his methods be primitive, is diligent and persevering. In the richer and most thickly populated districts terraces are raised on the mountain sides, and even the tops of lofty hills are cultivated. The nature of the soil and means of irrigation as well as climate are determining factors in the nature of the crops grown; rice and cotton, for example, are grown in the most northern as well as the most southern districts of China. This is, however, exceptional and each climatic region has its characteristic cultures.

The loess soil (see § Geology) is the chief element in determining the agricultural products of north China. Loess soil bears excellent crops, and not merely on the lower grounds, but at Sola. altitudes of 6000 and 8000 ft. Wherever loess is found the

peasant can live and thrive. Only one thing is essential, and that is the annual rainfall. As, owing to the porous nature of loess, no artificial irrigation is possible, if the rain fails the crops must neces- sarily fail. Thus seasons of great famine alternate with seasons of great plenty. It appears, also, that the soil needs little or no manur- ing and very little tillage. From its extremely friable nature it is easily broken up, and thus a less amount of labour is required than in other parts The extreme porosity of the soil probably also accounts for the length of time it will go on bearing crops without becoming exhausted. The rainfall, penetrating deeply into the soil in the absence of stratification, comes into contact with the moisture retained below, which holds in solution whatever inorganic salts

1 See The Times of the 19th of February and the 3rd of May 1910.

the soil may contain, and thus the vegetation has an indefinite store to draw upon. 2

There is no one dominant deposit in south China, where red sand- stone and limestone formations are frequent. Cultivation here is not possible on the high elevations as in the north, but in the plains and river valleys the soil is exceedingly fertile, while the lower slopes of the mountains are also cultivated. In the north, moreover, but one crop, in general, can be raised in the year. In the centre two and sometimes three crops are raised yearly, and in the south, especially in the lower basin of the Si-kiang, three crops are normally gathered. In the north, too, the farmer has frequently to contend with drought or with rain or floods; in the central and southern regions the weather is more settled.

In the north of China wheat, barley, millet, buckwheat and maize are the staple crops. Beans and peas are also cultivated. Rice thrives in north-east Kan-suh, in some districts of Shan- _. .. si, in the extreme south of Shan-tung and in parts of y. ”’ the Wei-ho plain in Shen-si. Cotton is grown in Shen-si and Shan-tung. In Kan-suh and Shen-si two crops are cru P s – raised in favoured localities, cereals in spring and cotton or rice in summer. Tobacco and the poppy are also grown in several of the northern provinces. Rhubarb and fruit trees are largely cultivated in the western part of north China.

In the central provinces tea, cotton, rice and ramie fibre are the chief crops. Tea is most largely cultivated in Ngan-hui, Kiang-si, Hu-peh, Hu-nan, Sze-ch'uen and Yun-nan. Cotton is chiefly grown in Kiang-su, Ngan-hui and Hu-peh. The seed is sown in May and the crops gathered in September. The cotton is known as white and yellow, the white variety being the better and the most cultivated. The poppy is largely cultivated and, in connexion with the silk industry, the mulberry tree. The mulberry is found principally in the provinces of Sze-ch'uen, Kiang-su and Cheh-kiang. The central provinces are also noted for their gum-lac, varnish and tallow trees. The crops of the south-eastern provinces are much the same as those of the central provinces, but are predominantly rice, the sugar- cane, ground-nuts and cinnamon. Tea is the chief crop in Fu-kien. The sugar-cane is principally cultivated in Kwang-tung, Fu-kien and Sze-ch'uen. In the south-western provinces the poppy, tea, tobacco and rice are the chief crops. Wheat, maize and barley are also largely raised.

While rice does not, unlike tea and cotton, form the principal crop of any one province it is more universally cultivated than any other plant and forms an important item in the products of all the central and southern provinces. Regarding China as a whole it forms the staple product and food of the country. Two chief varieties are grown, that suited only to low-lying regions requiring ample water and the red rice cultivated in the uplands. Next to rice the most extensively cultivated plants are tea and cotton, the sugar-cane, poppy and bamboo. Besides the infinite variety of uses to which the wood of the bamboo is applied, its tender shoots and its fruit are articles of diet.

Fruit is extensively cultivated throughout China. In the northern provinces the chief fruits grown are pears, plums, apples, apricots, peaches, medlars, walnuts and chestnuts, and in Kan-suh „ .,

and Shan-tung the jujube (q.v.). Strawberries are an ™ s ”

important crop in Kan-suh. In Shan-si, S.W. Chih-li and Shan-tung the vine is cultivated ; the grapes of Shan-si are reputed to produce the best wine of China. Oranges are also grown in favoured localities in the north. The chief fruits of the central and southern provinces are the orange, lichi, mango, persimmon, banana, vine and pine- apple, but the fruits of the northern regions are also grown. The coco-nut and other palms flourish on the southern coast.

As shown above, the poppy has been grown in almost every district of China. In 1906 it was chiefly cultivated in the following provinces: Yun-nan, ,Kwei-chow, Sze-ch'uen, Kan-suh, _. Shen-si, Shan-si, Shan-

tung, Ho-nan, Kiang-su (northern part) and Cheh-kiang. The poppy is first mentioned in Chinese literature in a book written in the first half of the 8th century A.D., and its medicinal qualities are referred to in the Her- balist's Treasury of 973. It was not than nor for centuries later grown in China for the preparation of opium. 3 There is no evidence to show that the Chinese ever took opium in the shape of pills (otherwise than medicinally). The cultivation of the poppy for the manufacture of opium began in China in the 17th century, but it was not until after 1796, when the importation of foreign opium was declared illegal, that the plant was cultivated on an extensive scale. After 1906 large areas which had been devoted to the poppy were given over to other crops, in consequence of the imperial edict aimed at the suppression of opium-smoking (see § History).

Mining. — -The mineral resources of China are great, but the government has shown a marked repugnance to allow foreigners a Another peculiarity of loess in China is that it lends itself readily to the excavation of dwellings for the people. In many places whole villages live in cave dwellings dug out in the vertical wall of loess. They construct spiral staircases, selecting places where the ground is firm, and excavate endless chambers and recesses which are said to be very comfortable and salubrious.

3 See J. Edkins, The Poppy in China, and H. B. Morse, The Trade and Administration of the Chinese Empire, chap. xi.

to work mines, and the mineral wealth has been very inadequately exploited. Mining operations are controlled by the Board of Commerce. In 1907 this board drew up regulations respecting the constitution of mining and other companies. They contained many features against which foreign powers protested.

Coal, iron, copper and tin are the principal minerals found in China; there are also extensive deposits of coal and other minerals _ . in Manchuria. In China proper the largest coal measures

oa ' are found in Shan-si, Hu-nan, Kwei-chow and Sze-ch'uen.

There are also important coalfields in Chih-li, Shan-tung, Shen-si, Ho-nan,Yun-nan, Hu-peh and Kwang-tung — and almost all of the seven

other provinces have also coal measures of more or less value. The lack of transport facilities as well as the aversion from the employment of foreign capital has greatly hindered the development of mining. Numerous small mines have been worked for a long period by the natives in the province of Hu-nan. There are two principal local fields in this province, one lying in the basin of the Lei river and yielding anthracite, and the other in the basin of the Siang river yielding bituminous coal. Both rivers drain into the Yangtsze, and there is thus an easy outlet by water to Hankow. The quality of the coal, however, is inferior, as the stratification has been much disturbed, and the coal-seams have been in consequence crushed and broken. The largest coalfield in China lies in the province of Shan-si. Coal and iron have here been worked by the natives from time immemorial, but owing to the difficulty of transport they have attained only a limited local circulation. The whole of southern Shan-si, extending over 30,000 sq. m., is one vast coalfield, and contains, according to the estimate of Baron von Richthofen, enough coal to last the world at the present rate of consumption for several thousand years. The coal-seams, which are from 20 to 36 ft. in thickness, rest conformably on a substructure of limestone. The stratification is throughout undisturbed and practically horizontal. As the limestone bed is raised some 2000 ft. above the neighbouring plain the coal-seams crop out in all directions. Mining is thus carried on by adits driven into the face of the formation, rendering the mining of the coal extremely easy. The coalfield is divided into two by a mountain range of ancient granitic formation running north- east and south-west, termed the Ho-shan. It is of anterior date to the limestone and coal formations, and has not affected the uni- formity of the stratification, but it has this peculiarity, that the coal on the east side is anthracite, and that on the west side is bituminous. A concession to work coal and iron in certain specified districts in this area was granted to a British company, the Peking Syndicate, together with the right to connect the mines by railway with water navigation. The syndicate built a railway in Shan-si from P'ingyang to Tsi-chow-fu, the centre of a vast coalfield, and connected with the main Peking- Hankow line; lines to serve coal mines have also been built in Hu-nan and other provinces. The earliest in date was that to the K'aip'ing collieries in the east of the province of Chih-li, the railway connecting the mines with the seaport of Taku. The coal at K'aip'ing is a soft bituminous coal with a large proportion of dust. The output is about 1,500,000 tons per annum. A mine has also been opened in the province of Hu-peh, about 60 m. below Hankow, and near the Yangtsze, in connexion with iron- works.

Iron ore of various qualities is found almost as widely diffused as coal. The districts where it is most worked at present lie within Iron the coalfield of Shan-si, viz. at Tsi-chow-fu and P'ing-

ting-chow. The ore is a mixture of clay iron ore and spathic ore, together with limonite and hematite. It is found abundantly in irregular deposits in the Coal Measures, and is easily smelted by the natives in crucibles laid in open furnaces. This region supplies nearly the whole of north China ,with the iron required for agricultural and domestic use. The out-turn must be very considerable, but no data are available for forming an accurate estimate. The province of Sze-ch'uen also yields an abundance of iron ores of various kinds. They are worked by the natives in numerous places, but always on a small scale and for local con- sumption only. The ores occur in the Coal Measures, predominant among them being a clay iron ore. Hu-nan, Fu-kien, Cheh-kiang and Shan-tung all furnish iron ores. Iron (found in conjunction with coal) is worked in Manchuria.

Copper is found chiefly in the provinces of Kwei-chow and Yun-nan, where a rich belt of copper-bearing ores runs east and west across both provinces, and including south Sze-ch'uen. The chief centres of production are at the cities of Tung- ch'uen-fu, Chow-t'ung and Ning-yuen. The mines are worked as a government monopoly, private mining being nominally prohibited. The output is considerable, but no statistics are pub- lished by government. Rich veins of copper ore are also worked near Kiu-kiang. Tin is mined in Yun-nan, the headquarters of the industry being the city of Meng-tsze, which since 1909 has been connected with Hanoi by railway. This is an important industry, the value of tin exported in 1908 being £600,000. Tin is also mined in Hai-nan and lead in Yun-nan. Antimony ore is exported from Hu-nan; petroleum is found in the upper Yangtsze region. Quick-silver is obtained in Kwei-chow. Salt is obtained from brine wells in Shan-si and Sze-ch'uen, and by evaporation from sea water.

Copper, tin, &c

Excellent kaolin abounds in the north-eastern part of Kiang-si, and is largely used in the manufacture of porcelain.

The Chinese government has opened small gold mines at Hai-nan, in which island silver is also found. A little gold-washing is done in the sandy beds of certain rivers, for instance, the Han ^^ river and the upper Yangtsze, above Su-chow (Suifu), Precious which here goes by the name of the "Goldsand" river. me s ' The amount so extracted is extremely small and hardly pays the labour of washing, but the

existence of gold grains points to a matrix higher up. The whole of south-western China has the reputation of being highly metalliferous. Gold is obtained in some quantities on the upper waters of the Amur river, on the frontier between China and Siberia. The washings are carried on by Chinese. Gold has also been found in quartz veins at P'ing-tu, in Shan-tung, but hardly in paying quantities. There are silver mines in Yun-nan.

Manufactures. — The principal native manufactures before the competition of western nations made itself felt were — apart from the preparation of tea and other produce for the market — those of porcelain and silk. The silks and gauzes of Su- """"

chow and Nanking in the province of Kiang-su, and those Porcelain. of Hang-chow in Cheh-kiang, are highly esteemed throughout China. Silk-weaving is still carried on solely in native looms and chiefly in the cities named. The greater part of the silk spun is used in China, but a considerable export trade has grown up and 27 % of the world's supply of raw silk is from China. The reeling of silk cocoons by steam-machinery is supplanting native methods. There are filatures for winding silk at Shanghai, Canton, Chifu and other cities.

The most famous porcelain came from the province of Kiang-si, the seat of the industry being the city of King-te-chen. Imperial works were established here about the year A. D. 1000, and the finest porcelain is sent to Peking for the use of the emperor. At one time 1,000,000 work-people were said to be employed, and the kilns numbered 600. The Taiping rebels destroyed the kilns in 1 850. Some of them -have been rebuilt. " Activity begins to reign anew, but the porcelain turned out is far from equalling in colour and finish that of former times. At the present day King-te-chen has but 160 furnaces and employs 160,000 workmen." 1 The common rice bowls sold throughout China are manufactured here. The value of the export sales is said to be about £500,000 yearly.

The spinning and weaving of cotton on hand-looms is carried on almost universally. Besides that locally manufactured, the whole of the large import of Indian yarn is worked up into cloth by the women of the household. Four-fifths of the clothing Cotton, of the lower classes is supplied by this domestic industry. Of minor industries Indian ink is manufactured in Ngan-hui and Sze- ch'uen, fans, furniture, lacquer ware and matting in Kwang-tung, dyes in Cheh-kiang and Chih-li, and varnished tiles in Hu-nan. Paper, bricks and earthenware are made in almost all the provinces;

Of industries on a large scale — other than those indicated— the most important are cotton-spinning and weaving mills established by foreign companies at Shanghai. Permission to carry on this industry was refused to foreigners until the right was secured by the Japanese treaty following the war of 1894-95. Some native- owned mills had been working before that date, and were reported to have made large profits. Nine mills, with an aggregate of 400,000 spindles, were working in 1906, five of them under foreign manage- ment. There are also four or five mills at one or other of the ports working 80,000 spindles more. These mills are all engaged in the manufacture of yarn for the Chinese market, very little weaving being done. Chinese-grown cotton is used, the staple of which is short ; only the coarser counts can be spun.

At certain large centres flour and rice mills have been erected and are superseding native methods of treating wheat and rice; at Canton there are sugar refineries. At Hanyang near Hankow are large iron-works owned by Chinese. They are supplied with ore from the mines at Ta-ye, 60 m. distant, and turn out (1909) about 300 steel rails a day.

Commerce.

The foreign trade of China is conducted through the ” treaty ports,” i.e. sea and river ports and a few inland cities which by the treaty of Nanking (1842) that of Tientsin (i860) and subsequent treaties have been thrown open to foreigners for purposes of trade. (The Nanking treaty recognized five ports only as open to foreigners — Canton, 2 Amoy, Fu-chow, Ning-po and Shanghai.) These places are as follows, treat)’ ports in Manchuria being included: Amoy, Antung, Canton, Chang-sha, Dairen, Chin-kiang, Chinwantao, Ch’ungk’ing, Chifu, Fu-chow, Funing (Santuao), Hang-chow, Hankow, I-ch’ang, Kang-moon, Kiao-chow, Kiu-kiang, K’iung-chow, Kow-loon, Lappa, Lung-chow, Mengtsze, Mukden, Nanking, Nan- ning, Ning-po, Niu-chwang, Pakhoi, Sanshui, Shanghai, Shasi, Su- chow, Swatow, Szemao, Tatungkow, Tientsin, Teng-yueh, W6n- chow, Wu-chow, Wuhu, Yo-chow.

1 Richard’s Comprehensive Geography, &c. (1908 edition), p. 144.

2 In the 1 8th century foreign trade was restricted to Canton. In the 17th century, however, the Dutch traded to Formosa and Amoy, and the English to Amoy also. The Portuguese traded with Canton as early as 1517. For the early intercourse between Portugal and China see the introductory chapter in Donald Ferguson’s Letters from Portuguese

Captives in Canton (Bombay, 1902).

COMMERCE]

CHINA

179

The progress of the foreign trade of China is set out in the following table. The values are given both in currency and sterling, but it is to be remarked that during the period when silver was falling, that is, from 1875 to 1893, the silver valuation represents much more accurately variations in the volume of trade than does the gold valuation. Gold prices fell continuously during this period, while silver prices were nearly constant. Since 1893 silver prices have tended to rise, and the gold valuation is then more accurate. The conversion from silver to gold is made at the rate of exchange of the day, and therefore varies from year to year.

Table of Imports and Exports, exclusive of Bullion.

Year.

Imports.

Exports.

Value in Taels.

Equivalent in Sterling.

Value in Taels.

Equivalent in Sterling.

1875 1885 1890

1895 1898

“1904

♦1905

66,344,000 84,803,000 113,082,000 154,685,000 189,991,000 344,060,000 447,100,791

£19,903,000

22,618,000 29,213,000 25,136,000 28,498,000 49,315,000 67,065,118

77,308,000 73,899,000 96,695,000 154,964000 170,743 000 239,486 000 227,888,197

£23,193,000

19,206,000 24,980,000 25,181,000 25,612,000 34,326,000 34,183,229

- This marked increase is partly owing to a more complete presentation of statistics; in 1 903 an additional number of vessels were placed under the control of the imperial maritime customs.

In 1907 the net imports were valued at £67,664,222 and the exports at £42,961,863. In 1908 China suffered from the general depression in trade. In that year the imports were valued at £52,600,730, the exports at £36,888,050. The distribution of the trade among the various countries of the world is shown in the table which is given below. Hong-Kong is a port for trans-shipment. The imports into China from it come originally from Great Britain, India,

Imports into China, (ooo's omitted.)

35,000,000 lb and in 1904 it reached 217,171,066 lb. The imports into China from all countries for 1908 were as follows: —

Opium . Cotton goods Raw cotton . Woollen goods Metals .

£4,563,000

14,786,000

232,000

717,000

2,956,000

Coal and coke Oil, kerosene Rice . Sugar Fish, &c.

£1,124,000

2,666,000 3,543,000 3,514,000 1,028,000

The principal exports from China are silk and tea. These two articles,

indeed, up to 1880 constituted more than 80% of the whole export. Owing, however, mainly to the fall in silver, and partly also to cheap ocean freights, it has become profitable to place on the European market a vast number of miscellaneous articles of Chinese produce which formerly found no place in the returns of trade. The silver prices in China did not change materially with the fall in silver, and Chinese produce was thus able to compete favourably with the produce of other countries. The following table shows the relative condition of the export trade in 1880 and 1908: —

Exports of

1880.

1908.

Silk . . .

Tea

Miscellaneous

£9,750,000

11,774,000

4,058,000

£11,055,000

4,384,000

21,448,000

Total . . .

£25,582,000

£36,888,000

Imports from

1875-

1880.

1885.

1890.

1895.

1905.

1908.

United Kingdom

£6340

£6382

£6396

£6,357

£5,5i8

£i.97i

£9.647

Hong-Kong ….

8282

8829

9404

18,615

I4.33I

22,240

20,033

India . .

4451

6039

4306

2,661

2,753

5,220

4,066

Other British possessions

396

346

542

571

732

963

United States

304

351

884

949

827

11.538

5-499

Continent of Europe (ex-

cept Russia)

230

671

671

638

1,227

4.295

3.332 1

Russian Empire .

231

309

302

422

746

1021

1404

1,909

2.794

9.197

7,000

Exports from China, (ooo’s omitted.)

Exports to

1875-

1880.

1885.

1890.

1895-

1905-

1908.

United Kingdom

£8749

£8125

£5864

£3383

£1718

£2,710

£1.673

Hong-Kong ….

3824

4844

4232

8507

5651

12,218

12,281

India

72 «

323

157

273

449

408

545

Other British possessions

948

874

818

886

586

647

United States

2302

2906

2213

2109

2499

4.055

3. J 76

Continent of Europe (ex-

cept Russia)

2524

3760

1948

3004

3440

4.697

7 > i28f

Russian Empire .

1339

1260

1293

2288

2535

1,419

1,123

Japan

586

642

398

1248

2408

5.320

4.949

t Germany, France, Belgium and Italy only.

Germany, France, America, Australia, the Straits Settlements, &c, and the exports from China to it go ultimately to the same countries.

The chief imports are cotton goods, opium, ricf and sugar, metals, oil, coal and coke, woollen goods and raw cotton, and fish. Cotton goods are by far the most important of the imports. They come chiefly from the United Kingdom, which also exports to China woollen manufactures, metals and machinery. China is next to India the greatest consumer of Manchester goods. The export of plain cotton cloths to China and Hong-Kong has for some years averaged 500,000,000 yds. per annum. The only competitor which Great Britain

has in this particular branch of trade is the United States of America, which has been supplying China with increasing quantities of cotton goods. The value in sterling of the total imports into China from the United Kingdom long remained nearly constant, but inasmuch as the gold prices were falling the volume of the export was in reality steadily growing. The imports into England, however, of Chinese produce have fallen off, mainly because China tea has been driven out of the English market by the growth of the India and Ceylon tea trade, and also because the bulk of the China silk is now shipped directly to Lyons and other continental ports instead of to London, as formerly was the rule. The growth of the import of Indian yarn into China has been very rapid. In 1884 the import was

In the miscellaneous class the chief items of exports in 1908 were beans and beancake, £3,142,000; raw cotton, £1,379,000; hides, £1,028,000; straw braid, £1,002,000; furs and skin rugs, £760,000; paper, £458,000; and clothing, £177,000. Sugar, tobacco, mats and matting are also exported. The export of all cereals except pulse is forbidden. Of the tea exported in 1908 the greater part went to Russia and Siberia, the United States and Great Britain. There is a regular export of gold amounting on an average to about a million sterling per annum. A part of it would seem to be the hoardings of the nation brought out by the high price of gold in

terms of silver, but a part is virgin gold derived from gold workings in Manchuria on the upper waters of the Amur river.

Customs duty is levied on ex- ports a.s well as imports, both being assessed at rates based on a nominal 5 % ad vol.

Shipping and Navigation.— Besides the over-sea trade China has a large coasting and river trade which is largely carried on by British and other foreign vessels. During the year 1908, 207,605 vessels, of 83,991,289 tons (86,600 being steamers of 77,955,525 tons), entered and cleared Chinese ports. 1 Of these 28,445 vessels of 34,405,761 tons were British; 33,539 of 11,998,588 tons, Chinese vessels of foreign type; 103,124 of 4,947,272 tons, Chinese junks; 5496 vessels of 6,585,671 tons, German; 30,708 of 18,055,138 tons, Japanese; 653 of 998,775 tons, American; 3901 of 5,071,689 tons, French; 1033 of 980,635 tons, Norwegian.

Of vessels engaged in the foreign

trade only the entrances during

the year numbered 38,556 of 12,187.140 tons, and the clearances 36,602 of 12,057,126 tons. The nationality of the vessels (direct foreign trade) was mainly as follows : —

Nationality

1908.

Entrances.

Clearances.

No.

Tons.

No.

Tons.

British

German

Norwegian

French

American

Japanese

Chinese

4.569 891

255

468

136

2,187

29.775

4,678,094

1,195,775

254,211

629,680

440,602

2,587,818

2,001,872

4,614 928

259 468

131

2,046 27,888

4,754,o87

1,124,872

255,295 616,883

439.947 2,461,132

1,915.258

The tonnage of the Dutch, Austrian and Russian vessels cleared and entered was in each case between 102,000 and 127,000. Communications. External communication is carried on by ancient caravan routes crossing Central Asia, by the trans-Siberian railway, which _i_s 1 From The Statesman's Year Book, 1910 edition.

The

Pioneer Line de- stroyed.

increasingly used for passenger traffic, but chiefly by steamship, the ; teamers being almost entirely owned by foreign companies. There is regular and rapid communication with Europe (via the Suez canal rjiute) and with Japan and the Pacific coast of America. Other lines serve the African and the Australasian trade. The only important Chinese-owned steamers are those of the Chinese Merchants' Steam Navigation Company, which has its headquarters at Shanghai.

Internal communications are by river, canal, road and railway, the railways since the beginning of the 20th century having become a very important factor. In 1898 the Chinese government agreed that all 'internal waterways should be open to foreign and native steamers, and in 1907 there were on the registers of the river ports for inland water traffic 609 steamers under the Chinese flag and 255 under foreign flags.

Railways. — A short line of railway between Shanghai and Wusung was opened in 1875. The fate of this pioneer railway may be mentioned as an introduction to what follows. The railway was really built without any regular permission from the Chinese govern- ment, but it was hoped that, once finished and working, the irregularity would be overlooked in view of the manifest benefit to the people. This might have been accomplished but for an unfortunate accident which happened on the line a few months after it was opened. A Chinaman was run over and killed, and this event, of course, intensi- fied the official opposition, and indeed threatened to bring about a riot. The working of the line was stopped by order of the British minister, and thereupon negotiations were entered into with a view to selling the line to the Chinese government. A bargain was struck sufficiently favourable to the foreign promoters of the line, and it was further agreed that, pending payment of the instalments which were spread over a year, the line should continue to be worked by the company. The expectation was that when the officials once got the line into their own hands, and found it a paying concern, they would continue to run it in their own interest. Not so, however, did things fall out. The very day that the twelve months were up the line was closed; the engines were dismantled, the rails and sleepers were torn up, and the whole concern was shipped off to the distant island of Formosa, where carriages, axles and all the rest of the gear were dumped on the shore and left for the most part to disappear in the mud. The spacious area of the Shanghai station was cleared of its buildings, and thereon was erected a temple to the queen of heaven by way of purifying the sacred soil of China from such abomination. This put a stop for nearly twenty years to all efforts on the part of foreigners to introduce railways into China. The next step in railway

construction was taken by the Chinese themselves, and on the initiative of Li Hung- chang. In 1886 a company was formed under official patronage, and it built a short line, to connect the coal- mines of K'aip'ing in Chih-li with the mouth of the Peiho river at Taku. The government next authorized the formation of a Native Merchants' Company, under official control, to build a line from Taku to Tientsin, which was opened to traffic in 1888. It was not, however, till nine years later, viz. in 1897, that the line was completed as far as Peking. A British engineer, Mr Kinder, was responsible for the construction of the railway. Meantime, however, the extension had been continued north-east along the coast as far as Shanhai-Kwan, and a farther extension subsequently connected with the treaty port of Niu-chwang. The money for these extensions was mostly found by the government, and the whole line is now known as the Imperial Northern railway. The length of the line is 600 m. Meanwhile the high officials of the empire had gradually been brought round to the idea that railway develop- ment was in itself a good thing. Chang Chih-tung, then viceroy of the Canton provinces, memorialized strongly in this sense, with the condition, however, that the railways should be built with Chinese capital and of Chinese materials. In particular, he urged the _. making of a line to connect Peking with Hankow for

e era strategic purposes. The government took him at his word, and he was transferred from Canton to Hankow, with authority to proceed forthwith with his railway. True to his purpose, he at once set to work to construct iron-works at Hankow. Smelting furnaces, rolling mills, and all the machinery necessary for turning out steel rails, locomotives, &c, were erected. Several years were wasted over this preliminary work, and over £1,000.000 sterling was spent, only to find that the works after all were a practical failure. Steel rails could be made, but at a cost two or three times what they could be procured for in Europe. After the Japanese War the hope of building railways with Chinese capital was abandoned. A prominent official named Sheng Hsuan- hwai was appointed director-general of railways, and empowered to enter into negotiations with foreign financiers for the purpose of raising loans. It was still hoped that at least the main control would remain in Chinese hands, but the diplomatic pressure of France and Russia caused even that to be given up, and Great Britain insisting on equal privileges for her subjects, the future of railways in China remained in the hands of the various concession- aires. But after the defeat of Russia by Japan (1904-1905) the theory of the undivided Chinese control of railways was resuscitated. The new spirit was exemplified in the contracts for the financing and construction of three railways — the Canton-Kowloon line in

China’s

first

efforts.

of con- sessions,

1907, and the Tientsin- Yangtsze and the Shanghai-Hangchow- Ning-po lines in 1908. In the first of these instances the railway was mortgaged as security for the loan raised for its construction, and its finance and working were to be modelled on the arrangements obtaining in the case of the Imperial Northern railway, under which the administration, while vested in the Chinese government, was supervised by a British accountant and chief engineer. In the other two instances, however, no such security was offered; the Chinese government undertook the Unfettered administration of the foreign capital invested in the lines, and the Europeans connected with these works became simply Chinese employes. Moreover, in 1908 the Peking-Hankow line was redeemed from Belgian concessionaires, a 5% loan of £5,000,000 being raised for the purpose in London and Paris. In that year there was much popular outcry against foreign concessionaires being allowed to carry out the terms of their contract, and the British and Chinese corporation in consequence parted with their concession for the Su-chow, Ning-po and Hang-chow railway, making instead a loan of £1,500,000 to the ministry of communications for the provinces through which the line would run. A double difficulty was encountered in the construction and management of the railways ; the reconciliation of the privileges accorded to foreign syndicates and governments with the ” Recovery of Rights ” campaign, and the reconciliation of the claims of the central government at Peking with the demands of the . . , provincial authorities. As to the foreigners, Great Trt/Jj,*’ Britain, France, Germany, the United States, Russia and a Japan, all had claims and concessions, many of them conflicting; while as between Peking and the provinces there was a quarrel mainly concerned with the spoils and ” squeezes ” to be obtained by railway construction; in some instances the provinces proved more powerful than the central government, as in the case of the Su-chow-Ning-po line, and notably in the matter of the Tiehtsin- Pukau (Nanking) railway. In that case the provincial authorities overrode the central government, with the result that ” for whole- sale jobbery, waste and mismanagement the enterprise acquired unenviable notoriety in a land where these things are generally condoned.” The good record of one or two lines notwithstanding, the management of the railways under Chinese

control had proved, up to 1910, inefficient and corrupt. 1 Nevertheless, so great was the economic development following the opening of the line, that in Chinese hands the Peking-Hankow railway yielded a profit.

The main scheme of the railway systems of China is simple. It consists of lines, more or less parallel, running roughly north and south, linked by cross lines with coast ports, or abutting _. on navigable rivers. One great east and west line will nJL,.

run tVirnnrrn f**rntrci1 fˆninc ft-nm WanVmir +s\ ˆ.To-r-Yi ‘nan ˆ *

systems-

run through central China, from Hankow to Sze-ch’uen Connexion with Europe is afforded by the Manchuria- trans-Siberia main line, which has a general east and west direction. From Harbin on this railway a branch runs south to Mukden, which since 1908 has become an important railway centre. Thence one line goes due south to Port Arthur; another south-east to An-tung (on the Yalu) and Korea; a third south and west to Tientsin and Peking. A branch from the Mukden-Tientsin line goes round the head of the Gulf of Liao-tung and connects Niu-chwang with the Mukden-Port Arthur line. By this route it is 470 m. from Peking to Niu-chwang.

From Peking the trunk line (completed in 1905) runs south through the heart of China to Hankow on the Yangtsze-kiang. This section (754 m. long) is popularly -known as ” the Lu-Han line,” from the first part of the names of the terminal stations. The continuation south of this line from Hankow to Canton was in 1910 under construction. Thus a great north and south connexion nearly 2000 m. long is established from Canton to Harbin. From Mukden southward the line is owned and worked by China.

A railway (German concession) starts from Kiao-chow and runs westward through Shan-tung to Chinan Fu, whence an extension farther west to join the main Lu-Han line at Cheng-ting Fu in Chih-li was undertaken. Westward from Cheng-ting Fu a line financed by the F_usso-Chinese Bank runs to T’ai-yuen Fu in Shan-si.

Another main north and south railway parallel to, but east of, the Lu-Han line and following more or less the route of the Grand Canal, is designed to connect Tientsin, Su-chow (in Kiang-su), Chin-kiang, Nanking, Shanghai, Hang-chow and Ning-po. The southern section (Nanking, Shanghai, &c.) was open in 1909. This Tientsin-Nirig-po

railway connects at Chinan-Fu with the Shan- tung lines.

A third north and south line starts from Kiu-Kiang on the Yangtsze below Hankow and traversing the centre of Kiang-si province will join the Canton-Hankow line at Shao-Chow in Kwang-tung province. The construction of the first section, Kiu-Kiang to Nanchang (76 m.), began in 1910.

In southern China besides the main Canton to Hankow railway (under construction) a line (120 m. long) runs from Canton to Kowloon (opposite Hong-Kong), and there are local lines running inland from Swatow and Fuchow. The French completed in 1909 a trunk line (500 m. long) from Haiphong in Tong King to Yun-nan Fu, the capital of Yun-nan, some 200 m. being in Chinese territory. The French hold concessions for railways in Kwang-si and Kwang-tung.

1 See The Times of the 28th of March 1910.

The British government has the right to extend the Burma railway system through Yun-nan and north to the Yangtsze.

There are local lines in Hu-nan and Ho-nan which connect with the trunk line from Canton to Peking. The Peking-Kajgan line (122 m. long) is a distinct undertaking. The Chinese propose to continue it another 530 m. north-westward to Urga in Mongolia, and an eventual junction with the trans-Siberian railway in the neighbourhood of Lake Baikal is contemplated. This line would greatly shorten the distance between Moscow and Peking.

In 1910 there were open for traffic in China (not reckoning the Russian and Japanese systems in Manchuria, q.v.) over 3000 m. of railway, and 1500 m. of trunk lines were under construction.

China is traversed in all directions by roads. Very few are paved of metalled and nearly all are badly kept; speaking generally, the d a government spends nothing in keeping either the roads

rivers' and or cana l s m repair. The roads in several instances are canals subsidiary to the canals and navigable rivers as a means of communication. The ancient trade routes were twelve in number, viz.

1 : —

1. The West river route (W. from Canton).

2. The Cheling Pass route (N.W. from Canton).

3. The Meiling Pass route (N. from Canton).

4. The Min river route (N.W. from Fu-chow).

5. The Lower Yangtsze route (as farW. as Hu-peh and Hu-nan).

6. The Upper Yangtsze route (from I'chang to Sze-ch'uen).

7. The Kwei-chow route.

8. The Han river route (Hankow to Shen-si).

9. The Grand Canal (already described).

10. The Shan-si route.

11. The Kiakhta route.

12. The Manchurian route.

Of the routes named, that by the West river commands the trade of Kwang-si and penetrates to Yun-nan (where it now has to meet the competition of the French railway from Tong King) and Kwei- chow. The Cheling Pass route from Canton is so named as it crosses that pass (1500 ft. high) to reach the water-ways of Hu-nan at Chen- chow on an affluent of the Siang, and thus connects with the Yangtsze. The trade of this route — whence in former times the teas of Hu-nan (Oonam) and Hu-peh (Oopaek) reached Canton — has been largely diverted via Shanghai and up the Yangtsze. The Canton-Hankow railway also supersedes it for through traffic. The route by the Meiling Pass (1000 ft. high) links Canton and Kiu-kiang. This route is used by the King-te Chen porcelain works to send, to Canton the commoner ware, there to be painted with florid and multicoloured designs. The Min river route serves mainly the province of Fu-kien. The Lower Yangtsze is a river route, now mainly served by steamers (though the salt is still carried by junks), and the Upper Yangtsze is a river route also, but much more difficult of navigation. The Kwei-chow route is up the river Yuen from Changte and the Tung- t'ing lake. The Han river route becomes beyong Sing-nagn Fu a land route over the Tsingling mountains to the capital of Shen-si, and thence on to Kan-

suh, Mongolia and Siberia. The Shan-si route from Peking, wholly by road, calls for no detailed account; the Man- churian route is now adequately served by railways. There remains the important Kiakhta route. From Peking it goes to Kalgan (this section is now served by a railway), whence the main route traverses Mongolia, while branches serve Shan-si, Shen-si, Kan-suh, Turkestan, &c. By this route go the caravans bearing tea to Siberia and Russia. Other routes are from Yun-nan to Burma and from Sze- ch'uen province to Tibet.

The government maintains a number of courier roads, which, like the main trade roads, keep approximately to a straight line. These courier roads are sometimes cut in the steep sides of mountains or run through them in tunnels. They are, in the plains, 20 to 25 ft. wide and are occasionally paved. The chief courier roads starting from Peking go to Sze-chu'en, Yun-nan, Kweilin (in Kwang-si), Canton and Fu-chow. Canals are numerous, especially in the deltas of the Yangtsze and Si-kiang.

In the centre and south of China the roads are rarely more than 5 ft. broad and wheeled traffic is seldom possible. Bridges are generally of stone, sometimes of wood ; large rivers are crossed by Bridges of boats. In the north carts drawn by ponies, mules or oxen are employed ; in the centre and south passengers travel in sedan- chairs or in wheelbarrows, or ride on ponies. Occasionally the local authorities employ the corvee system to dig out the bed of a canal, but as a rule roads are left to take care of themselves.

Posts and Telegraphs. — Every important city is now connected by telegraph with the capital, and the service is reasonably efficient. In 1907 there were 25,913 m. of telegraph lines. Connexion is also established with the British lines in Burma and the Russian lines in Siberia. The Great Northern Telegraph Company (Danish) and the Eastern Extension Telegraph Company (British) connect Shanghai by cable with Hong-Kong, Japan, Singapore and Europe. An imperial postal service was established in 1896 under the general control of the maritime customs, 2 By an edict of November 1906 the control

1 See Morse, op. oil. chap. x.

2 The maritime customs had established a postal service for its own convenience in 1861, and it first gave facilities to the general

of the postal services was transferred to the Board of Communication. The Post Office serves all the open ports, and every important city in the interior. There were in 1910 some 4000 native post-offices,

employing 15,000 persons, of whom about 200 only were foreigners. The treaty powers however, still maintain their separate post offices at Shanghai, and several other treaty ports for the despatch and receipt of mails from Europe. During the years 1901-1908 mail matters increased from ten millions to two hundred and fifty-two millions of items; and the 250 tons of parcels handled to 27, 155 tons. In postal matters China has adopted a most progressive attitude. The imperial post conforms in all respects to the universal Postal Union regulations. (G. J.; X.)

IV. Government and Administration Changes in the traditional form of government in China — an autocracy based on parental rule — were initiated in 1905 when a commission was appointed to study the forms of government in other countries. 3 On the 1st of September 1906 an imperial edict was issued in which the establishment of parliamentary institutions in China was foreshadowed. In 1907 an. advisory council — as a sort of stepping-stone to representative government — was established by another edict. On the 27th of August 1908 an edict announced the convocation of a parliament in the ninth year from that date. An edict of the 3rd of December 1908 reaffirmed that of the 27th of August. An edict of the 31st of October 1909 fixed the classes from which an Imperial Assembly (or Senate) was to be selected, and an edict of the 9th of May 1910 gave the names of the senators, all of whom had been nominated by the throne. The assembly as thus con- stituted consisted of 200 members drawn from eight classes: (1) princes and nobles of the imperial house — 16 members; (2) Manchu and Chinese nobles — 12 members; (3) princes and nobles of dependencies — 14 members; (4) imperial clansmen other than those mentioned — 6 members; (5) Peking officials — 32 members; (6) eminent scholars — 10 members; (7) exceptional property owners — 10 members; (8) representatives of provincial assemblies — 100 members. The national assembly, which was opened by the regent on the 3rd of October 1910, thus contained the elements of a two-chambered parliament. The edict sum- moning the assembly contained the following exhortations : —

The members should understand that this assemblage of the senate is an unprecedented undertaking in China and will be the fore- runner of the creation of a parliament. They are earnestly desired to devote to it their patriotism and sincerity, to observe proper order, and to fulfil their duties in representing public opinion. Thus it is hoped that our sincere wish to effect constitutional reforms in their proper order and to aim at success may be duly satisfied.

Concurrently with these steps towards a fundamental altera- tion in

the method of government, changes were made in many departments of the state, and an elective element was intro- duced into the provincial administrations. The old conception of government with such modifications as had been made up to 1910 are set forth below.

The laws of the state prescribe the government of the country to be based on the government of the family. 4 The emperor is the sole

The Chinese

overo- ment.

and supreme head of the state, his will being absolute alike in the highest affairs and in the humblest details of private life. The highest form of legislation was an ”’”’”’• imperial decree, whether promulgated in general terms or of „ y to meet a special case. In either form it was the law of _„„, the land, and no privilege or prescriptive right could be pleaded against it. All officers of state, all judges and magistrates, hold their offices entirely at the imperial pleasure. They can be dismissed, degraded, punished, without reason assigned and without form of trial — even without knowing by whom or of what the}’ are accused. The monarch has an advisory council, but he is not bound by its advice, nor need he pretend that he is acting by and with its advice and concurrence. This condition of affairs dates back to a primitive state of society, which probably existed among the Chinese who first developed a civilized form of government. That this system should have been maintained in China through many centuries

public in 1876. An organized service for the conveyance of govern- ment despatches has existed in China for many centuries, and the commercial classes maintain at their own expense a system (” letter hongs”) for the transmission of correspondence.

3 For the causes leading to this movement and the progress of reform see § History.

4 For recent authoritative accounts of the government of China see H. B. Morse, The Trade and Administration of the Chinese Empire, chap. iii. ; Richard’s Comprehensive Geography, &c, Bk. I. § v., and The Statesman’s Year Book.

is a fact into the causes of which it is worth while to inquire. We find it pictured in the records which make up the Book of History, and we find it enforced in the writings of the great apostle of patri- archal institutions, Confucius, and in all the other works which go to make up the Confucian Canon. The reverence with which these scriptures are viewed was the principal means of perpetuating the primitive form of Chinese imperialism. The contents of their pages formed the study of every schoolboy, and supplied the themes at the competitive examinations through which every one had to pass who sought an official career. Thus the mind of the nation was constantly and almost exclusively turned towards them, and their dogmas became part and parcel of the national training. The whole theory of government is the embodiment of parental love and filial piety. As the people are the children of the emperor, so is he the Tien-tsze or the Son of Heaven.

In practice the arbitrary power of the emperor is tempered in several ways. Firstly, although the constitution conferred this _. absolute and unchecked power on the emperor, it was not

emperor ˆ or n ‘ s gratification but that he might exercise it for the ‘ good of his people. He rules by divine authority, and as the vicegerent of heaven upon earth. If he rules corruptly or unjustly, heaven will send disasters and calamity on the people as a reproof; if the rule becomes tyrannical, heaven may withdraw its favour entirely, and then rebellion may be justified. The Manchu dynasty came to the throne as foreign conquerors, nevertheless they base their right to rule, not on the power of the sword, but on divine approval. On this moral ground they claim the obedience of their subjects, and submit themselves to the corresponding obligations. The emperor, unless he has gained the throne by conquest, is selected by his predecessor or by the imperial family in conclave. He is usually a son (but seldom the eldest son) of his predecessor, and need not be the child of the empress-consort, 1 though (other things being equal) a son of the empress is preferred. Failing a son another prince of the imperial house is chosen, the choice being properly among the princes of a generation below that of the preceding emperor, so that the new emperor may be adopted as the son of his predecessor, and perform for him the due ceremonies at the ancestral tablets. Apart from this ancestor-worship the emperor worships only at the Altar of Heaven, leaving Buddhism, Taoism, and any other form of worship to his subjects. The emperor’s sacrifices and prayers to heaven are conducted with great parade and ceremony. The chief of these state observances is the sacrifice at the winter solstice, which is performed before sunrise on the morning of the 21st of December at the Temple of Heaven. The form of the altar is peculiar.

” It consists of a triple circular terrace, 210 ft. wide at the base, 150 in the middle, and 90 at the top. . . . The emperor, with his immediate suite, kneels in front of the tablet of Shang-ti (The Supreme Being, or Heaven), and faces the north. The platform is laid with marble stones, forming nine concentric circles; the inner circle consists of nine stones, cut so as to fit with close edges round the central stone, which is a perfect circle. Here the emperor kneels, and is surrounded first by the circles of the terraces and their enclosing walls, and then by the circle of the horizon. He then seems to himself and to his court to be in the centre of the universe, and turning to the north, assuming the attitude of a subject, he acknow- ledges in prayer and by his position that he is inferior to heaven, and to heaven alone. Round him on the pavement are the nine circles of as many heavens, consisting of nine stones, then eighteen, then twenty-seven, and so on in successive multiples of nine till the square of nine, the favourite number of Chinese philosophy, is reached in the outermost circle of eighty-one stones.”

On this occasion, also, a bullock of two years old, and without blemish, is offered as a whole burnt-offering in a green porcelain furnace which stands close beside the altar. The emperor’s life is largely occupied with ceremonial observances, and custom ordains that except on state occasions he should not leave the walls of the palace.

For his knowledge of public affairs the emperor is thus largely dependent upon such information as courtiers and high officers of state permit to reach him. 2 The palace eunuchs have often exercised great power, though their influence has been less under the Manchus than was the case during previous dynasties. Though in theory the throne commands the services and money of all its subjects yet the crown as such has no revenues peculiarly its own. It is dependent on contributions levied through the high officials on the several provinces, subject always to the will of the people, and without their concurrence and co-operation nothing can be done. 3 The power of the purse and the power of the sword are thus exercised mediately, and the autocratic power is in practice transferred to the general body of high functionaries, or to that clique which for the time being has

1 The empress-consort is chosen by the emperor from a number of girls selected by his ministers from the families of Manchu nobles. From the same candidates the emperor also selects secondary-empresses (usually not more than four). Concubines, not limited in number, are chosen from the daughters of Manchu nobles and free-men. All the children are equally legitimate.

2 Recent emperors have been children at accession and have been kept in seclusion.

3 See ” Democratic China ” in H. A. Giles, China and the Chinese.

the ear of the emperor, and is united enough and powerful enough to impose its will on the others.

The functionaries who thus really wield the supreme power are almost without exception civil officials. Naturally the court has shown an inclination to choose Manchu rather thanChinese, but of late years this preference has become less marked, jmverned and in the imperial appointments to provincial administra- £ lts tions the proportion of Manchus chosen was at the begin- c f vll ning of the 20th century not more than one-fifth of the service. whole number. The real reason for this change is the marked superiority of the Chinese, in whose hands the administration is stated to be safer for the Manchu dynasty. Practically all the high Chinese officials have risen through the junior ranks of the civil service, and obtained their high position as the reward — so it must be presumed— of long and distinguished public service.

Through the weakness of some of the emperors the functions of the central government gradually came to be to check the action of the provincial governments rather than assume a „ . direct initiative in the conduct of affairs. ” The central 1 JL e government may be said to criticize rather than to cen

If the central authorities take the initiative, and issue orders to the provincial authorities, it, however, does not follow that they will be carried out. The orders, if unwelcome, are not directly disobeyed, but rather ignored, or specious pleas are put forward, showing the difficulty or impossibility of carrying them out at that particular juncture. The central government always wields the power of removing or degrading a recalcitrant governor, and no case has been known where such an order was not promptly obeyed. But the central government, being composed of officials, stand by their order, and are extremely reluctant to issue such a command, especially at the bidding of a foreign power. Generally the opinion of the governors and viceroys has great weight with the central government.

Under the Ming dynasty the Nuiko or Grand Secretariat formed the supreme council of the empire. It is now of more honorific than actual importance. Active membership is limited „ . to six persons, namely, four grand secretaries and two epa assistant grand secretaries, half of

whom, according to a fjˆ*/ general rule formerly applicable to nearly all the high central offices in Peking, must be Manchu and half Chinese. It adminis- constitutes the imperial chancery Or court of archives, tratlon. and admission to its ranks confers the highest distinction attainable by Chinese officials, though with functions that are almost purely nominal. Members of the grand secretariat are distinguished by the honorary title of Chung-t'ang. The most distinguished viceroys are usually advanced to the dignity of grand secretary while continuing to occupy their posts in the provinces. The best known of recent grand secretaries was Li Hung-chang.

Under the Manchu dynasty the Grand Council {Chun Chi Ch'u) became the actual privy council of the sovereign, in whose presence its members daily transacted the business of the state. This council is composed of a small knot of men holding various high offices in the government boards 'at Peking. The literal meaning of Chun Chi Ch'u is " place of plans for the army," and the institution derives its name from the practice established by the early emperors of the Manchu dynasty of treating public affairs on the footing of a military council. The usual time of transacting business is from 4 to 6 a.m. In addition to the grand council and the grand secretariat there were boards to supervise particular departments. By a decree of the 6th of November 1906 the central administration was remodelled, subse- quent decrees making other changes. The administration in 1910 was carried on by the following agencies : —

A. Councils. — (1) The grand council. Its title was modified in 1906 and it is now known as the Grand Council of State Affairs or Privy Council. It has no special function, but deals with all matters of general administration and is presided over by the emperor (or regent). (2) The Grand Secretariat. This body gained no increase of power in 1906. (3) The advisory council or senate {Tu Cheng Yuen) created in 1907 and containing representatives of each province. It includes all members of the grand council and the grand secretariat and the heads of all the executive departments. 5 The members of these three bodies form advisory cabinets to the emperor.

B. Boards. — Besides boards concerned with the affairs of the court there were, before the pressure of foreign nations and the movement for reform caused changes to be made, six boards charged with the

4 W. F. Mayers, The Chinese Government (1878).

5 This body is superseded by the Imperial Senate summoned to meet for the first time on the 3rd of October 19 10.

conduct of public affairs. They were: (1) Li Pu, the Board of Civil Appointments, controlling all appointments in the civil service from the rank of district magistrate upwards. (2) Hu Pu, the Board of Revenue, dealing with all revenues which reached the central government. (3) Li Pu, the Board of Ceremonies. (4) Ping Pu, the Board of War. It controlled the provincial forces. The Manchu forces were an independent organization attached to the palace. (5) Hsing Pu, the Board of Punishments. It dealt with the crim- inal law only, especially the punishment of officials guilty of malpractices. (6) Kung Pu, the Board of Works. Its work was limited to the control of the construction and repair of official residences.

As rearranged and enlarged there are now the following boards, given in order of precedence : —

1. Wai-wu Pu. — This was established in 1901 in succession to the Tsung-li Yamen, 1 which was created in 1861 after the Anglo-Chinese War in 1 860 as a board for foreign affairs. Previous to that war, which established the right of foreign powers to have their representatives in Peking, all business with Western nations was transacted by provincial authorities, chiefly the viceroy at Canton. The only department at Peking which dealt specially with foreign affairs was the Li Fan Yuen, or board of control for the dependencies, wliich regulated the affairs of Mongolia, Tibet and the tributary states generally. With the advent of formally accredited ambassadors from the European powers something more than this was required, and a special board was appointed to discuss all questions with the foreign envoys. The number was originally four, with Prince Kung, a brother of the emperor Hien FSng, at their head. It was subse- quently raised to ten, another prince of the blood, Prince Ching, becoming president. The members were spoken of collectively as the prince and ministers. For a long time the board had no real power, and was looked on rather as a buffer between the foreign envoys and the real government. The importance of foreign affairs, however, especially since the Japanese War, identified the Yamen more with the grand council, several of the most prominent men being members of both. At the same time that the Tsung-li Yamen was created, two important offices were established in the provinces for dealing with foreign commercial questions, viz. the superintendencies of trade for the

northern and southern ports. The negotiations con- nected with the Boxer outbreak proved so conclusively that the machinery to the Tsung-li Yamen was of too antiquated a nature to serve the new requirements, that it was determined to abolish the Yamen and to substitute for it a board (Pu) to be styled the Wai-wu Pu, or ” board of foreign affairs.”

2. Board of Civil Appointments.

3. Board of Home Affairs.

4. Board of Finance and Paymaster General’s Department.

5. Board of Ceremonies.

6. Army Board or Ministry of War (instituted 1906).’

7. Board of Judicature.

8. Board of Agriculture, Works and Commerce (instituted 1903).

9. Board of dependencies.

10. Board of Education (instituted 1903).

11. Board of Communications (instituted 1906).

Each board has one president and two vice-presidents, with the exception of the Wai-wu Pu, which has a comptroller-general and two presidents, and the Boards of War and Education, each of which has a comptroller-general in addition to the president. According to the decree of 1906 no distinction, in filling up the various boards, is to be made between Manchu and Chinese.

Besides the boards named there are other departments of state, some of them not limited to any one branch of the public service. The more important are those that folllow : —

The Censorate (Tu Ch’a Yuen). — An institution peculiar to China. The constitution provides a paid body of men whose duty it is to in- form the emperor of all facts affecting the welfare of the people and the conduct of government, and in particular to keep an eye on the malfeasance of his officers. These men are termed Yii shih (imperial recorder), generally translated censors. Their office has existed since the 3rd century B.C. The body consists of two presidents, a Chinese and a Manchu, 24 supervising censors attached to the ministries at

Peking, and 56 censors, divided into fifteen divisions, each division taking a particular province or area, so as to embrace the whole eighteen provinces, besides one metropolitan division. The censors are privileged to animadvert on the conduct even of the emperor himself; to censure the manner in which all other officials perform or neglect their duties and to denounce them to the throne. They receive appeals made to the emperor, either by the people against the officials or by subordinate officials against their superiors. They exercise, in accord with the Board of Justice, an oversight over all criminal cases and give their opinion whenever the death penalty is

1 Yamgn is the name given to the residences of all high officials. Tsung-li YamSn = the bureau for managing each (foreign) kingdom's affairs.

2 An edict of the 15th of July 1909 created a naval and military advisory board. Up to that time the navy was controlled by the viceroys at Canton, Nanking, Fu-chow and Tientsin; the viceroys at Canton and Tientsin being ministers superintendent of the southern and northern ports respectively.

to be pronounced. They superintend the working of the different boards and are sometimes sent to various places as imperial inspectors, hence they are called erh mu kuan (the eyes and ears of the emperor). The censors exercise their office at times with great boldness; 3 their advice if unpalatable may be disregarded and the censor in question degraded. The system of the censorate lends itself to espionage and to bribery, and it is said to be more powerful for mischief than for good. With the growth in influence of the native press the institution appears to lose its raison d'etre.

The grand court of revision (Ta-li sze) or Court of Cassation exercises, in conjunction with the Board of Justice and the Censorate, a general supervision over the administration of the criminal law. These bodies are styled collectively San-fah sze (the Three High Justices).

The Hanlin College (Hanlin Yuen, literally Forest of Pencils) is composed of all the literate who have passed the palace examination and obtained the title of Hanlin or imperial academist. It has two chancellors — a Manchu and a Chinese. Its functions are of a purely literary character and it is of importance chiefly because the heads of the college, who are presumably the most eminent scholars of the empire, have the right of advising the throne on all public affairs, and are eligible as members of the grand council or of the Wai-wu Pu. The Chinese set fire to it during the fighting in Peking in June 1900 in the

hope of burning out the adjoining British legation. The whole of the library, containing some of the most valuable manuscripts in the world, was destroyed.

Each of the eighteen provinces of China proper, the three provinces of Manchuria and the province of Sin-kiang are ruled by a viceroy placed over one, two and in one instance three provinces, or by a governor over a single province either under a Prov ‘ ac ‘ a ‘ viceroy or depending directly on the central government, S °I~ˆ a ‘ the viceroy or the governor being held responsible to the m emperor for the entire administration, political, judicial, military and fiscal. The most important viceroyalties are those of Chih-li, Liang- kiang and Liang-kwang. The viceroyalty of Liang-kiang comprises the provinces of Kiang-su, Ngan-hui and Kiang-si. The viceroy resides at Nanking and hence is sometimes called the viceroy of Nanking. Similarly the viceroy of Liang-kwang (comprising the provinces of Kwang-tung and Kwangsi) through having his residence , at Canton is sometimes styled the viceroy of Canton. The three provinces adjoining the metropolitan province of Chih-li — Shan-tung, Shan-si and Hon-an — have no viceroys over them ; seven provinces — including Chih-li — have no governors, the viceroy officiating as governor. In provinces where there are both a viceroy and a governor they act conjointly, but special departments are ad- ministered by the one rather than the other. The viceroy controls the military and the salt tax; the governor the civil service generally.

The viceroy or governor is assisted by various other high officials, all of whom down to the district magistrate are nominated from Peking. The chief officials are the treasurer, the judicial com- missioner or provincial judge, and the commissioner of education (this last post being created in 1903). The treasurer controls the finances of the whole province, receiving the taxes and paying the salaries of the officials. The judge, the salt commissioner, and the grain collector are the only other officials whose authority extends over the whole province. Each province is subdivided into pre- fectures ruled by prefects, and each prefecture into districts ruled by a district magistrate, Chih-hsien, the official through whom the people in general receive the orders of the government. Two or more prefectures are united into a too or circuit, the official at the head of which is called a Taot’ai. Each town and village has also its unofficial governing body of ” gentry.” 4 The officials appointed from Peking hold office for three years, but they maybe re-appointed once, and in the case of powerful viceroys they may hold office for a prolonged period. Another rule is that no official is ever appointed to a post in the province of his birth; a rule which, however, did not apply to

Manchuria. The Peking authorities take care also in making the high appointments to send men of different political parties to posts in the same province.

The edict of the 6th of November 1906 initiating changes in the central administration was accompanied by another edict outlining changes in the provincial government, and an edict of the 22nd of July 1908 ordered the election of provincial assemblies. The edict made it clear that the functions of the assemblies were to be purely consultative. The elections took place according to the regulations, the number of members allotted to each province varying from 30 (Kirin province, Manchuria, and two others) to 140 in Chih-li. The franchise was restricted, but the returns for the first elections showed nearly 1000 voters for each representative. The first meetings of the assemblies were held in October 1909.

3 Thus in 1910 Prince Ching, president of the grand council, was, for the third time, impeached by censors, being denounced as an ” old treacherous minister,” who filled the public service with a crowd of men as unworthy as himself. The censor who made the charge was stripped of his office (see The Times of the 30th of March

1910).

4 For details of local government see Richard’s Comprehensive Geography, 1908 edition, pp. 301 et seq.

[CIVIL SERVICE

The Civil Service. — The bureaucratic element is a vital feature in the government of China, the holding of office being almost the only road to distinction. Officials are by the Chinese called collectively Kwan (rulers or magistrates) but are known to foreigners as mandarins (q.v.). The mandarins are divided into nine degrees, distinguished by the buttons worn on the top of their caps. These are as follows: — first and highest, a plain red button; second, a flowered red button; third, a transparent blue button; fourth, an opaque blue button; fifth, an un-coloured glass button; sixth, an opaque white shell button; seventh, a plain gilt button; eighth, a gilt button with flowers in relief; ninth, a gilt button with engraved flowers. The buttons indicate simply rank, not office. The peacock feathers worn in their hats are an order granted as reward of merit, and indicate neither rank nor office. The

Yellow Jacket similarly is a decora- tion, the most important in China.

The ranks of the civil service are recruited by means of examina- tions. Up to the beginning of 1906 the subjects in which candi- dates were examined were purely Chinese and literary with a smattering of history. In 1906 this system was modified and an official career was opened to candidates who had obtained honours in an examination in western subjects (see § Education) . The old system is so closely identified with the life of China that some space must be devoted to a description of it.

As a general rule students preparing for the public examination read with private tutors. There were neither high schools nor uni- versities where a regular training could be got. In most of the pro- vincial capitals, and at some other places, there were indeed institu- tions termed colleges, supported to some extent from public funds, where advanced students could prosecute their studies; but before the movement initiated by the viceroy Chang Chih-tung after the China-Japan War of 1894, they hardly counted as factors in the national education. The private tutors, on the other hand, were plentiful and cheap. After a series of preliminary trials the student obtained his first qualification by examination held before the literary chancellor in the prefecture to which he belonged. This was termed the Siuts'ai, or licentiate's degree, and was merely a quali- fication to enter for the higher examinations. The number of licentiate degrees to be given was, however, strictly limited; those who failed to get in were set back to try again, which they might do as often as they pleased. There was no limit of age. Those selected next proceeded to the great examination held at the capital of each province, once in three years, before examiners sent from Peking For the purpose. Here again the' number who passed was strictly limited. Out of 10,000 or 12,000 competitors only some 300 or 350 could obtain degrees. The others, as before, must go back and try again. This degree, termed Chiijen, or provincial graduate, was the first substantial reward of the student's ambition, and of itself qualified for the public service, though it did not immediately nor necessarily lead to active employment. The third and final examina- tion took place at Peking, and was open to provincial graduates from all parts of the empire. Out of 6000 competitors entering for this final test, which was held triennially, some 325 to 350 succeeded in obtaining the degree of Chin shih, or metropolitan graduate. These were the finally selected men who became the officials of the empire.

Several other doors were, however, open by which admission to the ranks of bureaucracy could be obtained. In the first place, to en-

courage scholars to persevere, a certain number of those who failed to reach the chii jen, or second degree, were allowed, as a reward of repeated efforts, to get into a special class from which selection for office might be made. Further, the government reserved to itself the right to nominate the sons and grandsons of distinguished deceased public servants without examination. And, lastly, by a system of " recommendation," young men from favoured institutions or men who had served as clerks in the boards, might be put on the roster for substantive appointment. The necessities of the Chinese govern- ment also from time to time compelled it to throw open a still wider door of entry into the civil service, namely, admission by purchase. During the T'aip'ing rebellion, when the government was at its wits' end for money, formal sanction was given to what had previously been only intermittently resorted to, and since then immense sums of money have been received by the sale of patents of rank, to secure either admission to office or more rapid promotion of those already employed. As a result of this policy, the country has been saddled with thousands of titular officials far in excess of the number of appointments to be given away. Deserving men were kept waiting for years, while inferior and less capable officials were pushed ahead, because they had money wherewith to bribe their way. Nevertheless the purchase system admitted into the service a number of men free from that bigoted adherence to Confucian doctrine which characterizes the literary classes, and more in touch with modern progress.

All candidates who succeed in entering the official ranks are eligible

for active employment, but as the number of candidates is far in excess of the number of appointments a period of weary waiting ensues. A few of' the best scholars get admitted at once into the Hanlin college or into one or other of the boards at Peking. The rest are drafted off in batches to the various provinces to await their turn for appointment as vacancies occur. During this period of waiting they are termed " expectants " and draw no regular pay. Occasioned service, however, falls in their way, as when they are commissioned for special duty in outlying districts, which they perform as Wei yuens, or deputies of the regular officials. The period of expectancy may be abridged by recommendation or purchase, and it is generally supposed that this last lever must invariably be resorted to to secure any lucrative local appointment. A poor but promising official is often, it is said, financed by a syndicate of relations and friends, who look to recoup themselves out of the customary perquisites which attach to the post. Appointments to the junior provincial posts are usually left to the provincial government, but the central government can always

interfere directly. Appointments to the lucrative posts of customs, taot'ai, at the treaty ports are usually made direct from Peking, and the officer selected is neither necessarily nor usually from the provincial staff. It would perhaps be safe to say that this appointment has hitherto always been the result of a pecuniary arrangement of greater or less magnitude.

During the first five years (1906-1910) of the new method, by which candidates for the civil service were required, in addition to Chinese classics, to have a knowledge of western science, „ „ great efforts were made in several provinces to train up .

a better class of public official. The old system of ad- torture ministration had many theoretical excellencies, and there had been notable instances of upright administration, but the regulation which forbade a mandarin, to hold any office for more than three years made it the selfish interest of every office-holder to get as much out of the people within his jurisdiction as he possibly could in that time. This corruption in high places had a thoroughly demoralizing effect. While among the better commercial classes Chinese probity in business relations with foreigners is proverbial, the people generally set little or no value upon truth, and this has led to the use of torture in their courts of justice; for it is argued that where the value of an oath is not understood, some other means must be resorted to to extract evidence.

Justice. — The Chih-Hsien or district magistrate decides ordinary police cases ; he is also coroner and sheriff, he hears suits for divorce and breach of promise, and is a court of first instance in all civil cases; " the penalty for taking a case first to a higher court is fifty blows with the bamboo on the naked thigh." 1 Appeal from the Hsien court lies to the Fu, or prefectural court, and thence cases may be taken to the provincial judge, who signs death warrants, while there are final courts of appeal at Peking. Civil cases are usually settled by trade gilds in towns and by village elders, or by arbitration in rural districts. Reference has been made to the use of torture. Flogging is the only form of torture which has been allowed under the Manchus. The obdurate witness is laid on his face, and the executioner delivers his blows on the upper part of the thighs with the concave side of a split bamboo, the sharp edges of which muti- late the sufferer terribly. The punishment is continued until the man either supplies the evidence required or becomes insensible. Punishment by bamboo was formally abolished by imperial edict in 1905, and other judicial reforms were instituted. They remained largely inoperative, and even in Shanghai, under the eyes of foreign residents, gross cases of the infliction of torture occurred in 1909. 2

For capital offences the usual modes of inflicting the extreme penalty of the law are — in bad cases, such as parricides, ” cutting to pieces,” and for less aggravated crimes either strangulation or decapitation. The culprit who is condemned to be ” cut to pieces ” is fastened to a cross, and while thus suspended cuts are made by the executioner on the fleshy parts of the body; and he is then beheaded. Strangulation is reserved for lesser degrees of guilt, it being con- sidered a privilege to pass out of life with a whole body. When it has been granted to a criminal of rank thus to meet his end, a silken cord is sent to him at his own home. No explanatory message is con- sidered necessary, and he is left to consummate his own doom. Popular sentiment regards decapitation as a peculiarly disgraceful mode of death. Constant practice makes the executioners wonder- fully expert in the performance of their office. No block or resting- place for the head is used. The neck is simply outstretched to its full length by the aid of an assistant, and one blow invariably leaves the body headless.

The laws are in accord with the principle which regards the family as a unit. Thus there is no bankruptcy law — if a debtor’s own estate will not suffice to pay his debts the deficiency must consular be made good by his relatives; if a debtor absconds his turlsdlo immediate family are imprisoned. By analogy if one tloa. member of a party commits an offence and the guilty person cannot be detected, the whole party must suffer. Foreigners residing in China resented the application of this principle of law to themselves. As a result extra-territorial rights were sought by European powers. They were secured by Russia as early as 1689,

1 Morse, op. cit., 1908 edition, p. 7c

- See The Times of the 28th of February F910.

but it was not until 1843 that any other nation acquired them. In that year Great Britain obtained the right to try British subjects by its own consuls, a right secured in more explicit terms by the United States and France in 1844. Now eighteen powers, including Japan, have consular courts for the trial of their own subjects according to the laws of their native lands. Mixed courts have also been estab- lished, that is, a defendant is tried in the court of his own nationality, the court

giving its decision under the supervision of a representative of the plaintiff s nationality. In practice the Chinese have seldom sent representatives to sit on the bench of consular courts, but, as the Europeans lack confidence in the administration of Chinese justice, no suit brought by a foreigner against a Chinese is decided without the presence of an assessor of the plaintiff's nationality.

Defence. — The Chinese constitution in the period before the reform edicts of 1905-1906 provided for two independent sets of military organizations — namely, the Manchu army and Army. ˆg severa i provincial armies. On the establishment

of the dynasty in 1644 the victorious troops, composed mainly of Manchus, but including also Mongols and Chinese, were permanently

fuartered in Peking, and constituted a hereditary national army, he force was divided into eight banners, and under one or other of these all Manchus and all the descendants of the members of other nationalities were enrolled. They form the bulk of the population of the " Tatar city " of Peking. Each adult male was by birth entitled to be enrolled as a soldier, and by virtue of his enrolment had a right to draw rations — i.e. his allowance of the tribute rice, whether on active service or not. Detachments from one or other of the banners were stationed as garrisons in the chief provincial centres, as at Canton, Fuchow and Hang-chow, &c, and their descendants still occupy the same position. As a fighting force the Manchu garrisons both in the capital and in the provinces had long become quite effete. In the capital, however, the elite of the Manchu soldiery were formed into a special corps termed the Peking Field Force. Its nominal strength was 20,000, the men were armed and drilled after the European fashion, and fairly well paid. There were other corps of picked Manchus better paid and better armed than the ordinary soldier, and it was computed that in 1901 the Manchu army in or near Peking could muster 40,000, all more or less efficient.

The second organization was termed the army of the Green Standard, being the Chinese provincial forces. The nominal strength was from 20,000 to 30,000 for each province, or about 500,000 in all ; the actual strength was about one-third of this. They were enrolled to keep the peace within their own province, and resembled a militia or local constabulary rather than a national army. They were generally poorly paid and equally badly drilled and armed.

The only real fighting force which China possessed at the beginning of the 20th century was made up of certain special corps which were not

provided for in the constitution, and consequently used to be termed yung, ” braves,” or irregulars, but had acquired various distinctive names. They were enlisted by provincial governors, and all had some smattering of foreign drill. They were also fairly well paid and armed. After the Chino-Japanese War of 1894-95 some of these corps were quartered near Peking and Tientsin, and came generally to be spoken of as the Army of the North.

An imperial decree issued in 1901 after the Boxer rising ordered the reorganization of the military forces of the empire, and on pro- vincial lines something was accomplished — especially in Chih-li under Yuan Shih-k’ai, who practically created ” the Army of the North.” It was not, however, until after the Russo-Japanese War that determined efforts were made to organize a national army on western lines; an army which should be responsible to the central government and not dependent upon the provincial administrations. A decree of 1905 provided (on paper) for training schools for officers in each of the provinces, middle grade military schools in selected provinces, and a training college and military high school in Peking. The Army Board was reorganized and steps taken to form a general staff. Considerable progress had been made by 1910 in the evolution of a body of efficient officers. In practice the administration re- mained largely provincial — for instance the armament of the troops was provided by the provincial governors and was far from uniform. The scheme * contemplated the creation of a force about 400,000 strong in 36 divisions and in two armies, the northern and the southern. Recruitment is on the voluntary principle, except in the case of the Manchus, who apparently enter the new army instead of the ” eight banners.” The terms of service are three years with the colours, three in the reserve and four in the territorial army. The Japanese system of training is followed. Reservists are called out for~30 days every year and the territorialists for 30 days every other year.

Up to 1909 six divisions and one mixed brigade of the northern army had been organized in Shan-tung, Chih-li and Ho-nan; else- where three divisions and six mixed brigades; total strength about 60,000 with 350 guns. (These figures do not include alt the pro- vincial foreign trained troops.) The efficiency of the troops varied ; the northern army was superior to the others in training and arma- ment. About a third of the 60,000 men of the new army were in 1909 stationed in Manchuria. (See also § History.)

1 See The Statesman’s Year-Book (1910 edition).

An imperial edict of the 15th of September 1907 reorganized the army

of the Green Standard. It was placed under the control of the minister of war and formed in battalions and squadrons. The duty of the troops in peace time remained much as previously. In war they pass under the control of regular officers, though their use outside their own provinces does not seem to be contemplated.

The Chinese navy in 1909 consisted of the 4300 ton cruiser ” Hai Chi ” (two 8-in., ten 47-in. guns) of 24 knot original speed, three 3000 ton cruisers, ” Hai Yung,” ” Hai Schew ” and ” Hai Shen ” (three 6-in., eight 4-in. guns) of 19-5 knot Navy ‘

original speed, some modern gunboats built in Japan, a few miscellaneous vessels and some old torpedo boats. With the destruction of the northern fleet by the Japanese at the capture of Wei-hai-wei in 1895, the Chinese navy may be said to have ceased to exist. Previously it consisted of two divisions, the northern and southern, of which the former was by far the more formidable. The southern was under the control of the viceroy of Nanking, and took no part in the Chino-Japanese War. While the northern fleet was grappling in a death-struggle, the southern was lying snugly in the Yangtsze waters, the viceroy of Nanking apparently thinking that as the Japanese had not attacked him there was no reason why he should risk his ships.

The New Scheme. — An edict of the 15th of July 1909 created a naval and military advisory board. Nimrod Sound, centrally situated on the coast of Cheh-kiang, was chosen as naval base, and four naval schools were ordered to be established; a navigation school at Chifu, an engineering school at Whampoa, a school for naval artificers at Fuchow, and a gunnery and musketry school at Nimrod Sound. A superior naval college was founded at Peking. The coast defences were placed under the control of the naval department, and the reorganization of the dockyards undertaken. During 1910 orders for cruisers were placed abroad.

Arsenals and Dockyards. — After the loss of Port Arthur, China possessed no dockyard which could dock vessels over 3000 tons. Many years ago the Chinese government established at Fuchow a shipbuilding yard, placing it in the hands of French engineers. Training schools both for languages and practical navigation were at the same time organized, and a training ship was procured and put under the command of a British naval officer. Some twenty- five or thirty small vessels were built in the course of as many years, but gradually the whole organization was allowed to fall into decay. Except for petty repairs this establishment was in 1909 valueless to the Chinese government. There were also small dockyards at Kiang-

nan (near Shanghai), Whampoa and Taku. There are well- equipped arsenals at Shanghai and at Tientsin, but as they are both placed up shallow rivers they are useless for naval repairs. Both are capable of turning oat heavy guns, and also rifles and ammunition in large quantities. There are also military arsenals at Nanking, Wuchang, Canton and ChSngtu.

Forts. — A great number of forts and batteries have been erected along the coast and at the entrance to the principal rivers. Chief among these, now that the Taku forts formerly commanding the entrance to Tientsin have been demolished, are the Kiangyin forts commanding the entrance to the Yangtsze, the Min forts at the entrance of the Fuchow river, and the Bogue forts at the entrance to the Canton river. These are supplied with heavy armament from the Krupp and Armstrong factories.

Finance.

In fiscal matters, as for many other purposes, the Chinese empire is an agglomeration of a number of quasi-independent units. Each province has a complete administrative staff, collects its own revenue, pays its own civil service, and other charges placed upon it, and out of the surplus contributes towards the expenses of the imperial government a sum which varies with the imperiousness of the needs of the latter and with its own comparative wealth or poverty. The imperial government does not collect directly any part of the revenues, unless the imperial maritime customs be excepted, though these, too, pass through the books of the provincial authorities. 2

It has hitherto been extremely difficult to obtain anything like trustworthy figures for the whole revenue of China, for the reason that no complete statistics are published by the central government at Peking. 3 The only available data are, first, the returns published by the imperial maritime customs for the duties levied on foreign trade; and, secondly, the memorials sent to Peking by the provincial authorities on revenue matters, certain of which are published from time to time in the Peking Gazette.

2 A few of the old native customs stations, which are deemed perquisites of the imperial court, may also be excepted, as, for instance, the native custom-house at Ca»*.on, Hwei Kwan on the Grand Canal, and various stations in the neighbourhood of Peking.

s The production of a budget in 1915 ws> .promised in one of the reform edicts of 1908.

These are usually fragmentary, being merely reports which the governor has received from his subordinates, detailing, as the case may be, the yield of the land tax or the likin for his particular district, with a dissertation on the causes which have made it more or less than for the previous period. Or the return may be one detailing the expenditure of such and such a department, or reporting the transmission of a sum in reply to a requisition of the board of revenue, with a statement of the source from which it has been met. It is only by collating these returns over a long period that anything like a complete statement can be made up. And even then these returns do not represent any- thing like the total of taxation paid by the people, but, as far as they go, they may be taken to represent the volume of taxa- tion on which the Peking government can draw revenue.

The following table, taken from a memorandum by Sir Robert Hart, dated the 25th of March 1901, shows the latest official estimate (up to 1 910) of the revenue and expenditure of China: —

Revenue. Taels. 1

Land tax 26,500,000

Provincial duties 1,600,000

,, receipts (various) 1,000,000

Grain commutation 3,100,000

Salt gabelle 13,500,000

Li-kin 16,000,000

Native customs . , 2,700,000

Maritime customs:—

Genera! cargo 17,000,000

Foreign opium 5,000,000

Native opium 1,800,000

Total 88,200,000

Expenditure.

Taels.

Provincial 20,000,000

Military and naval 35,000,000

Metropolitan 10,000,000

Bannermen (Manchu ” soldiers “) . . . 1,380,000

Palace 1,100,000

Customs 3,600,000

Legations 1,000,000

River works 940,000

Railways 800,000

Loans 24,000,000

Contingent reserve 3,300,000

Total 101,120,000

A calculation of revenue from all sources published by the Shanghai Shen Pao in 1908, apparently derived from official sources, gave a total revenue of 105,000,000 taels, or about 15 million sterling. This sum is obviously less than the actual figures. In 1907 Mr H. B. Morse, commissioner of customs and statistical secretary in the inspectorate general of customs, drew up the following table based on the amounts presumed to be paid by the tax payer: —

Imperial Adminis- tration.

Provincial Adminis- tration.

Local Adminis- tration.

I. Land Tax II. Tribute ….

III. Native Customs .

IV. Salt Gabelle . . . V. Miscellaneous

VI. Foreign Customs VII. Li-kin

Taels.

25,887,000 7,420,000 3,790,000

13,050.000 3,856,000

31,169,000

13,890,000

Taels.

67,060,000 15,582,000

1,290,000 26,000,000

5,998,000

3,942,000 22,502,000

Taels.

9,315,000

2,300,000

249,000

25,000,000

985,000

1,230,000

3,639,000

Total ….

99,062,000

142,374,000: 42,718,000

Mr Morse adds that the grand total shown, taels 284,150,000,* “is an obviously insufficient sum on which to maintain the fabric of

government in an empire like China, but it has been reached by calculations based on a few known facts and … is offered as throwing some light on a subject veiled in obscurity.” 3

1 In this article the tael used as a standard is the Haikwan {i.e. customs) tael, worth about 3s. It fluctuates with the value of silver.

2 Roughly £43,000,000.

3 Trade and Administration of the Chinese Empire (1910), p. 118.

The service of the foreign debt, together with the pressure of other needs — such as the cost of education and the army— made more manifest than previously the chaos of the Chinese fiscal system. A scheme to reform the national finances was pro- mulgated under an edict of the nth of January 1909, but it did not appear to be of a practical character.

Sources of Revenue. 1. Land Tax. — In China, as in most oriental countries, the land has from time immemorial been the mainstay of the revenue. In the early years of the present dynasty there was levied along with the land tax a poll tax on all adult males, but in 1712 the two were amalgamated, and the whole burden was thrown upon land , families not possessing land being thereafter exempted from taxation. At the same time it was decreed that the amount of the land tax as then fixed should be permanent and settled for all time coming. It would appear from the records that this promise has been kept as far as the central government has been concerned. In all its many financial difficulties it does not seem ever to have tried to increase the revenue by raising the land tax. The amount of tax leviable on each plot is entered on the title deed, and, once entered, it cannot be changed. 4 The tax on almost all lands is thus stated to be so much in silver and so much in rice, wheat or what- ever the principal crop may be. F.xcept in two provinces, however, the grain tax is now commuted and paid in silver. The exceptions are Kiang-su and Cheh-kiang, which still send forward their taxes in grain. The value of the grain forwarded (generally called tribute rice) is estimated at taels 6,500,000. The total collection in silver, as reported by the responsible officials, amounts in round numbers to taels 25,000,000. The total yield of the land tax, therefore, is taels 31,500,000, or say £4,725,000. It will readily be granted that for such a large country as China this is a very insignificant one. In India the land tax yields about £20,000,000, and China has undoubtedly a larger cultivated area, a larger population, and soil that is on the whole more fertile; but it is certain that this sum by no means represents the amounts actually

paid by the cultivators. It is the sum which the various magistrates and collectors have to account for and remit in hard cash. But as nothing is allowed them for the costs of collection, they add on a percentage beforehand to cover the cost. This they usually do by declaring the taxes leviable not in silver, but in copper ” cash, which indeed is the only currency that circulates in country places, and by fixing the rate of exchange to suit themselves. Thus while the market rate is, say, 1500 cash to the tael, they declare by general proclamation that for tax-paying purposes cash will be received at the rate of 3500 or 4000 to the tael. Thus while the nominal land tax in silver remains the same it is in effect doubled or trebled, and, what is worse, no return is made or account required of the extra sums thus levied. Each magistrate or collector is in effect a farmer. The sum standing opposite the name of his district is the sum which he is bound to return under penalty of dismissal, but all sums which he can scrape together over and above are the per- quisites of office less his necessary expenses. Custom, no doubt, sets bounds tp his rapacity. If he went too far he would provoke a riot ; but one may safely say there never is any reduction, what change can be effected being in the upward direction. According to the best information obtainable a moderate estimate of the sums actually paid by the cultivators would give two shillings per acre. This on an estimate of the area under cultivation should give for the eighteen provinces £19,000,000 as being actually levied, or more than four times what is returned.

2. The Salt Duty. — The trade in salt is a government monopoly. Only licensed merchants are allowed to deal in it, and the import of foreign salt is forbidden by the treaties. For the purpose of salt administration China is divided into seven or eight main circuits, each of which has its own sources of production. Each circuit has carefully defined boundaries, and salt produced in one circuit is not allowed to be consigned into or sold in another. There are great differences in price between the several circuits, but the consumer is not allowed to buy in the cheapest market. He can only buy from the licensed merchants in his own circuit, who in turn are debarred from procuring supplies except at the depot to which they belong. Conveyance from one circuit to another is deemed smuggling, and subjects the article to confiscation.

Duty is levied under two heads, the first being a duty proper, payable on the issue of salt from the depot, and the second being likin levied on transit or at the place of destination. The two together amount on an average to about taels 1-50 per picul of 133? ft> or 3s. 9d. per cwt. The total collection returned by the various salt electorates amounts to” taels 13,500,000 (£2,025,000) per annum. The total

consumption of salt for all China is estimated at 25 million piculs, or nearly l| million tons, which is at the rate of 9ft) per annum per head of the population. If the above amount of taels 1-50 were uniformly levied and returned, the revenue would be 37I million taels instead of 13J. In this calculation, however, no allowance is made for the cost of collection.

3. Likin on General Merchandise. — By the term likin is meant

4 Temporary reductions are granted in provinces affecvd by rebellion, drought or flood.

a tax on inland trade levied while in transit from one district to another. It was originally a war tax imposed as a temporary measure to meet the military expenditure required by theT'aip'ing and Mahommedan rebellions of 1850-1870. It is now one of the permanent sources of income, but at the same time it is in form as objectionable as a tax can be, and is equally obnoxious to the native and to the foreign merchant. Tolls or barriers are erected at frequent intervals along all the principal routes of trade, whether by land or water, and a small levy is made at each on every conceivable article of commerce. The individual levy is small, but over a long transit it may amount to 15 or 20%. The objectionable feature is the frequent stoppages with overhauling of cargo and consequent delays. By treaty, foreign goods may commute all transit dues for a single payment of one-half the import tariff duty, but this stipula- tion is but indifferently observed. It must also be remembered, per contra, that dishonest foreign merchants will take out passes to cover native-owned goods. The difficulty in securing due observance of treaty rights lies in the fact that the likin revenue is claimed by the provincial authorities, and the transit dues when commuted belong to the central government, so that the former are interested in opposing the commutation by every means in their power. As a further means of neutralizing the commutation they have devised a new form of impost, viz. a terminal tax which is levied on the goods after the termination of the transit. The amount and fre- quency of likin taxation are fixed by provincial legislation- — that is, by a proclamation of the governor. The levy is authorized in general terms by an imperial decree, but all details are left to the local authorities.

The yield of this tax is estimated at taels 13,000,000 (£1,950,000), a sum which probably represents one-third of what is actually paid by the merchants, the balance being costs of collection.

4. Imperial Maritime Customs. — -The maritime customs is the one department of finance in China which is managed with probity and honesty, and this it owes to the fact that it is worked under foreign control. It collects all the duties leviable under the treaties on the foreign trade of China, and also all duties on the coasting trade so far as carried on by vessels of foreign build, whether Chinese or foreign owned. It does not control the trade in native craft, the so-called junk trade, the duties on which are still levied by the native custom-house officials. By arrangement between the British and Chinese governments the foreign customs levy at the port of entry a likin on Indian opium of taels 80 per chest, in addition to the tariff duty of taels 30. This levy frees the opium from any further duty on transit into the interior. The revenue of the maritime customs rose from taels 8,200,000 in 1865 to taels 35,111,000 in 1905.

5. Native Customs, — The administration of the native customs continues to be similar to what prevailed in the maritime customs before the introduction of foreign supervision. Each collector is constituted a farmer, bound to account for a fixed minimum sum, but practically at liberty to retain all he may collect over and above. If he returns more he may claim certain honorary rewards as for extra diligence, but he generally manages to make out his accounts so as to show a small surplus, and no more. Only imperfect and fragmentary returns of the native collectorates have been published, but the total revenue accruing to the Chinese government from this source did not appear up to 1900 much to exceed, two million taels (£300,000). In November 1901 native customs offices within 15 m. of a treaty port were placed under the control of the maritime customs, their revenues having been hypothecated for the service of the Boxer indemnity. The result was that the amount of the native customs collected by the commissioners of customs increased from taels 2,206,000 in 1902 to taels 3,699,000 in 1906.

6. Duty on Native Opium. — The collection of the duty on opium is in the hands of the provincial officials, but they are required to rendera separate account of duty and likin collected on the drug, and to hold the sum at the disposal of the board of revenue at Peking. The annual import into China of Indian opium used to amount to about 50,000 chests, the exact amount of opium imported in 1904 being 54,750 piculs, on which the Chinese govern- ment received from duty and likin combined about 5! million taels (£825,000). The total amount of

native-grown opium was estimated in 1901 at about 400,000 chests (53,000,000 lb), and if this were taxed at taels 60 per chest, which in proportion to its price was a similar rate to that levied on Indian opium, it should give a revenue of 24 million taels. Compared with this the sums actually levied, or at least returned by the local officials as levied, were insignificant. The returns gave a total levy for all the eighteen provinces of only taels 2,200,000 (£330,000). The anti-opium smoking campaign initiated by the Chinese government in 1905 affected the revenue both by the decreased importation of the drug and the decrease in the area under poppy cultivation in China. In 1908 the opium likin revenue had fallen to taels 3,800,000.

7. Miscellaneous. — Besides the main and regular sources of in- come, the provincial officials levy sums which must in the aggregate amount to a very large figure, but which hardly find a place in the returns. The principal are land transfer fees, pawnbrokers' and other licences, duties on reed flats, commutation of corvee and personal services, &c. The fee on land transfers is 3 %, and it could be shown, from a calculation based on the extent and value of the arable land and the probable number of sales, that this item alone ought to yield an annual return of between one and two millions

sterling. Practically the whole of this is absorbed in office expenses. Under this heading should also be included certain items which though not deemed part of the regular revenue, have been so often resorted to that they cannot be left out of account. These are the sums derived from sale of office or of brevet rank, and the sub- scriptions and benevolences which under one plea or another the government succeeds in levying from the wealthy. Excluding these, the government is always ready to receive subscriptions, rewarding the donor with a grant of official rank entitling him to wear the appro- priate " button.' The right is much sought after, and indeed there are very few Chinamen of any standing that are not thus decorated, for not only does the button confer social standing, but it gives the wearer certain very substantial advantages in case he should come into contact with the law courts. The minimum price for the lowest grade is taels 120 (£18), and more of course for higher grades. The proceeds of these sales go directly to the Peking government, and do not as a rule figure in the provincial returns. The total of the miscellaneous items accruing for the benefit of the government is estimated at taels 5,500,000.

Expenditure. — In regard to expenditure a distinction has to be drawn between that portion of the revenue which is controlled by the central government, and that controlled by the several provincial authorities.

As the provinces collect the revenue, and as the authorities there are held responsible for the peace, order and good government of their respective territories, it follows that the necessary expenses of the provinces form a sort of first charge on the revenue. (As the tables given show, the provinces spend the greater part of the revenue collected.) The board of revenue at Peking, which is charged with a general supervision of finance matters all over the empire, makes up at the end of the year a general estimate of the funds that will be required for imperial purposes during the ensuing year, and apportions the amount among the several provinces and the several collectorates in each province. The estimate is submitted to the emperor, and, when sanctioned, instructions are sent to all the viceroys and governors in that sense, who, in turn, pass them on to their subordinate officers. In ordinary times these demands do not materially vary from year to year, and long practice has created a sort of equilibrium between imperial and provincial demands. The remittances to the capital are, as a rule, forwarded with reason- able regularity, mostly in the form of hard cash. There is, however, a constant pull going on between Peking and the provinces — the former always asking for more, the latter resisting and pleading impecuniosity, yet generally able to find the amounts required. The expenses which the central government has to meet are: — (1) Imperial household ; (2) pay of the Manchu garrison in and about Peking; (3) costs of the civil administration in the capital; (4) cost of the army so far as the expenses are not borne by the pro- vinces ; (5) naval expenses ; 1 (6) foreign loans — interest and sinking fund. To meet all these charges the Peking government for several years up to 1900 drew on the provinces for about taels 20,000,000 (£3,000,000), including the value of the tribute rice, which goes to the support of the Manchu bannermen. 3 No estimates are furnished of the sums allowed under such heading. The imperial household appears to receive in silver about taels 1,500,000 (£225,000) but it draws besides large supplies in kind from the provinces, e.g. silks and satins from the imperial factories at Su-chow and Hang- chow, porcelain from the Kiang-si potteries, &c, the cost of which is defrayed by the provinces. The imperial government has also at its disposal the revenue of the foreign customs. Prior to the Chino- Japanese war of 1894-95 this revenue, which, after allowing for the costs of collection, amounted to about 20,000,000 taels (£3,000,000), was nominally shared with the provinces in the proportion of four- tenths and six-tenths. The whole of the customs revenue is now pledged to foreign bondholders and absorbed by the service of the several loans. Besides supplying its own wants the imperial govern- ment has to provide for outlying portions of the empire which are unable to maintain themselves — (1)

Manchuria, (2) Kan-suh and the central Asian dominion, (3) the south-western provinces of Yun-nan, Kwei-chow and Kwang-si. Manchuria, or, as it is termed, the north-east frontier defence, costs about taels 2,000,000 over and above its own resources. The central Asian territories constitute a drain on the imperial government of about taels 4,000,000 a year. This is met by subsidies from Sze-ch'uen, Shan-si, Ho-nan and other wealthy provinces. Yun-nan, Kwei-chow and Kwang-si require aids aggregating taels 2,000,000 to keep things going.

External Debt. — Prior to the war with Japan in 1894 the foreign debt of China was almost nil. A few trifling loans had been con- tracted at 7 and 8 , but they had been punctually paid off, and only a fraction of one remained. The expenses of the war, however, and the large indemnity of taels 230,000,000 (£34,500,000) which Japan exacted, forced China for the first time into the European market as a serious borrower. The sum of £6,635,000 was raised in 1894-1895 in four small loans at 6 or 7 interest. In 1895 a

1 Information as to what extent the expenses of the new army and navy are met by the central government is lacking.

J To meet the expenditure on interest and redemption of the indemnities for the Boxer outrages the Peking government required the provincial authorities to increase their annual remittances by taels 18,700,000 during the years 1902-1910.

Franco-Russian loan of fr. 440,000,000 (£15,820,000) was raised m Paris. Two Anglo-German loans, each of £16,000,000 (one in 1896, the other in 1898) were raised through the Hong Kong and Shanghai Bank. The Franco-Russian loan bears 4% interest, the first Anglo-German 5 %, the second 4i %. The foreign loans contracted up to 1900 amounted altogether to £54,455,ooo. The charges for interest and sinking fund, which amounted to over £3,000,000, were secured on the revenue of the maritime customs, and on the likin taxes of certain specified provinces. The net income from these two sources amounted to over taels 24,000,000, equivalent at existing rate of exchange to £3,400,000, which was amply sufficient. Between 1899 and 1907 (both years inclusive) £12,200,000 was raised on loan for

railway purposes. The charges on the first loan— for £2,300,000 — were secured on the revenue of the Imperial Northern railway, the interest being 5 %. The same interest was secured on the other loans, save one for £1,000,000 in which the Hong Kong government was concerned, which bears 4 % interest.

The foreign debt also includes the indemnities exacted in 1901 by the powers for the Boxer outrages. These indemnities, secured on imperial revenue, are divided into five series amounting alto- gether to £67,500,000, the amount payable on these indemnities (at 4% interest) in 1907 being £2,824,425. The burden of meeting this amount was apportioned between the eighteen provinces — the sums allocated ranging from taeis 2,500,000 for Kiang-su to taels 300,000 for Kwei-chow. In 1909 the grand total of China's indebted- ness exceeded £140,000,000 and the interest called for the payment of £7,427,450 'in gold.

Banks and Banking. — Native banks for purposes of inland ex- change are to be found in most large cities. They are private banks using their own capital, and seldom receiving deposits from the public. The best known are the Shan-si banks, which have branches all over the empire. They work on a small capital, seldom over £50,000 each, and do a small but profitable business by selling their drafts on distant places. None of them issues notes, although they are not debarred from doing so by law. They lend money on personal security, but do not advance against shipments of goods. In some places there are small local banks, usually called cash shops, which issue paper notes for small sums and lend money out on personal security. The notes never reach more than a very limited local circulation, and pass current merely on the credit of the institution. There is no law regulating the formation of banks or the issue of notes. Pawnshops occupy a prominent position in the internal economy of China. They lend on deposit of personality at very high rates, 18 and 24%, and they receive deposits of money from the public, usually allowing 6 to 10%. They are the real banks of deposit of the country, and the better class enjoy good credit. Foreign Banks do a large business at Shanghai and other treaty ports, and a Government Bank has been established at Peking.

Currency. — In the commercial treaty between Great Britain and China of 1902 China agreed to provide a uniform national coinage. An imperial decree of October 1908 commanded the introduction of a uniform tael currency; but another decree of May 19 ro established a standard currency dollar weighing 72 candareens (a candareen is the I ooth part of the tael ounce) and subsidiary coins of fixed values in

decimal ratio. This decree properly enforced would introduce a much needed stability into the monetary system of China.

The actual currency (1910) consists of (1) Silver, which may be either uncoined ingots passing current by weight, or imported coins, Mexican dollars and British dollars; and (2) Copper ” cash, ” which has no fixed relation to silver. The standard is silver, the unit being the Chinese ounce or tael, containing 565 grains. The tael is not a coin, but a weight. Its value in sterling consequently fluctuates with the value of silver; in 1870 it was worth about 6s. 8d., in 1907 it was worth 3s. 3d. 1 The name given in China to uncoined silver in current use is ” sycee.” It is cast for convenience sake into ingots weighing one to 50 taels. Its average fineness is 916-66 per 1000. When foreign silver is imported, say into Shanghai, it can be converted into currency by a very simple process. The bars of silver are sent to a quasi-public office termed the ” Kung K’u, ” or public valuers, and by them melted down and cast into ingots of the customary size. The fineness is estimated, and the premium or betterness, together with the exact weight, is marked in ink on each ingot. The whole process only occupies a few hours, and the silver is then ready to be put into use. The Kung K’u is simply a local office appointed by the bankers of the place, and the weight and fineness are only good for that locality. The government takes no responsibility in the matter, but leaves merchants and bankers to adjust the currency as they please. For purposes of taxation and payment of duties there is a standard or treasury tael, which is about 10% heavier than the tael of commerce in use at Shanghai. Every large commercial centre has its own customary tael, the weight and therefore the value of which differ from that of every other. Silver dollars coined in Mexico, and British dollars coined in Bombay, also circulate freely at the open ports of trade and for some distance inland, passing at a little above their intrinsic value. Carolus dollars, introduced long ago and no longer coined, are retained in current use in several parts of the interior, chiefly the tea-growing districts. Being preferred by the people, and as the

1 It must be remembered that the Haikwan tael is here indicated.

supply cannot be added to, they have reached a considerable premium above their intrinsic value. Provincial mints in Canton, Wuchang, and other places have issued silver coins of the same weight and touch as the Mexican dollar, but very few have gone into use. As they possess no privilege in debt-paying power over im- ported Mexican dollars there is no inducement for the people to take them up unless they can be had at a cheaper rate than the latter, and these are laid down at so

small a cost above the intrinsic value that no profit is left to the mint. The coinage has in consequence been almost discontinued. Subsidiary coins, however, came largely into use, being issued by the local mints. One coin ” the hundredth part of a dollar ” proved very popular (the issue to the end of 1906 being computed at 12,500,000,000), but at rates corresponding closely to the intrinsic value of the metal in it. The only coin officially issued by the government— up to 1910 — was the so-called copper cash. It is a small coin which by regulation should weigh r Vof a tael, and should contain 50 parts of copper, 40 of zinc, and 10 of lead or tin, and it should bear a fixed ratio to silver of 1000 cash to one tael of silver. In practice none of these conditions was observed. Being issued from a number of mints, mostly provincial, the standard was never uniform, and in many cases debased. Excessive issues lowered the value of the coins, and for many years the average exchange was 1 600 or more per tael. The rise in copper led to the melting down of all the older and superior coins, and as for the same reason coining was suspended, the result was an appreciation of the ” cash,” so that a tael in 1909 exchanged for about 1220 cash or about 35 to a penny English. Inasmuch as the ” cash ” bore no fixed relation to silver, and was, moreover, of no uniform composition, it formed a sort of mongrel standard of its own, varying with the volume in circulation. (G. J. ; X.)

V. History (A)— European Knowledge of China up to 1615. China as known to the Ancients. — The spacious seat of ancient civilization which we call China has been distinguished by different appellations, according as it was reached by the southern sea-route or by the northern land-route traversing the longitude of Asia. In the former aspect the name has nearly always been some form of the name Sin, Chin, Sinoe, China. In the latter point of view the region in question was known to the ancients as the land of the Seres, to the middle ages as the empire of Cathay. The name of Chin has been supposed (doubtfully) to be derived from the dynasty of Ts’in, which a little more than two centuries before the Christian era enjoyed a vigorous exist- ence, uniting all the Chinese provinces under its authority, and extending its conquests far beyond those limits to the south and the west. The mention of the Chinas in ancient Sanskrit literature, both in the laws of Manu and in the Mahabharata, has often been supposed to prove the application of the name long before the predominance of the Ts4n dynasty. But the coupling of that name with the Daradas, still surviving as the people of Dardistan, on the Indus, suggests it as more probable that those Chinas were a kindred race of mountaineers, whose name as Shinas in fact likewise remains applied to a branch of the Dard races. Whether the Sinim of the prophet Isaiah should be

interpreted of the Chinese is probably not susceptible of any decision; by the context it appears certainly to indicate a people of the extreme east or south. The name probably came to Europe through the Arabs, who made the China of the farther east into Sin, and perhaps sometimes into Thin. Hence the Thin of the author of the Periplus of the Erythraean Sea, who appears to be the first extant writer to employ the name in this form (i.e. assuming Max Muller's view that he belongs to the 1st century); hence also the Sinae and Thinae of Ptolemy. It has often indeed been denied that the Sinae of Ptolemy really represented the Chinese. But if we compare the statement of Marcianus of Heraclea (a mere condenser of Ptolemy), when he tells us that the " nations of the Sinae lie at the extremity of the habitable world, and adjoin the eastern Terra Incognita," with that of Cosmas, who says, in speaking of Tzinista, a name of which no one can question the application to China, that " beyond this there is neither habitation nor navigation " — we cannot doubt the same region to be meant by both. The fundamental error of Ptolemy's conception of the Indian Sea as a closed basin rendered it impossible but that he should misplace the Chinese coast. But considering that the name of Sin has come down among the Arabs from time immemorial as applied to the Chinese, considering that in the work of Ptolemy this name certainly represented the farthest known East, and considering how inaccurate are Ptolemy's configurations and longitudes much nearer home, it seems almost as reasonable to deny the identity of his India with ours as to deny that his Sinae were Chinese.

If we now turn to the Seres we find this name mentioned by classic

authors much more frequently and at an earlier date, for the passages of Eratosthenes (in Strabo), formerly supposed to speak of a parallel passing through Thinae—&ia Qtviiv — are now known to read correctly WABrivCiv. The name Seres indeed is familiar to the Latin poets of the Augustan age, but always in a vague way, and usually with a general reference to Central Asia and the farther East. We find, however, that the first endeavours to assign more accurately the position of this people, which are those of Mela and Pliny, gravitate distinctly towards China in its northern aspect as the true ideal involved. Thus Mela describes the remotest east of Asia as occupied by the three races (proceeding from south to north), Indians, Seres and

Scyths; just as in a general way we might still say that eastern Asia is occupied by the Indies, China and Tartary.

Ptolemy first uses the names of Sera and Serice, the former for the chief city, the latter for the country of the Seres, and as usual defines their position with a precision far beyond what his knowledge justified — the necessary result of his system. Yet even his definition of Serice is most consistent with the view that this name indicated the Chinese empire in its northern aspect, for he carries it eastward to the 180th degree of longitude, which is also, according to his calculation, in a lower latitude the eastern boundary of the Sinae.

Ammianus Marcellinus devotes some paragraphs to a description of the Seres and their country, one passage of which is startling at first sight in its seeming allusion to the Great Wall, and in this sense it has been rashly interpreted by Lassen and by Reinaud. But Ammianus is merely converting Ptolemy's dry tables into fine writing, and speaks only of an encircling rampart of mountains within which the spacious and happy valley of the Seres lies. It is true that Ptolemy makes his Serice extend westward to Imaus, i.e. to Pamir. But the Chinese empire did so extend at that epoch, and we find Lieut. John Wood in 1838 speaking of " China " as lying immediately beyond Pamir, just as the Arabs of the 8th century spoke of the country beyond the Jaxartes as " Sin," and as Ptolemy spoke of " Serice " as immediately beyond Imaus.

If we fuse into one the ancient notices of the Seres and their country, omitting anomalous statements and manifest fables, the result will be somewhat as follows: " The region of the Seres is a vast and populous country, touching on the east the ocean and the limits of the habitable world, and extending west to Imaus and the confines of Bactria. The people are civilized, mild, just and frugal, eschewing collisions with their neighbours, and even shy of close intercourse, but not averse to dispose of their own products, of which raw silk is the staple, but which included also silk-stuffs, fine furs, and iron of remarkable quality." That is manifestly a definition of the Chinese.

That Greek and Roman knowledge of the true position of so remote a nation should at best have been somewhat hazy is nothing wonderful. And it is worthy of note that the view entertained by the ancient Chinese of the Roman empire and its inhabitants, under the name of Ta-lhsin, had some striking points of analogy to those views of the Chinese which are indicated in the classical descriptions of the Seres. There can be no mistaking the fact that in this case also the great object was within the horizon of vision, yet the details ascribed to it

are often far from being true characteristics, being only the accidents of its outer borders.

The Medieval Cathay. — ” Cathay ” is the name by which the Chinese empire was known to medieval Europe, and it is in its original form (Kitai) that China is still known in Russia and to most of the nations of Central Asia. West of Russia this name has long ceased to be a geographical expression, but it is asso- ciated with a remarkable phase in the history of geography and commerce. The name first became known to Europe in the 13th century, when the vast conquests of Jenghiz Khan and his house drew a new and vivid attention to Asia. For some three centuries previously the northern provinces of China had been detached from indigenous rule, and subject to northern con- querors. The first of these foreign dynasties was of a race called Khitdn issuing from the basin of the Sungari river, and supposed (but doubtfully) to have been of the blood of the modern Tunguses. The rule of this race endured for two centuries and originated the application of the name Khitdt or Khitd’i to northern China. The dynasty itself, known in Chinese history as Liao, or ” Iron,” disappeared from China 1123, but the name remained attached to the territory which they had ruled.

The Khitan were displaced by the Niichih (NyfichS or Churcht) race, akin to the modern Manchus. These reigned, under the title of Kin, or ” Golden,” till Jenghiz and his Mongols invaded them in turn. In 1234 the conquest of the Kin empire was completed, and the dynasty extinguished under Ogdai (Ogotai), the son and successor of Jenghiz Khan. Forty years later, in the reign of Kublai, grandson and ablest successor of Jenghiz, the Mongol rule was extended over southern China (1276),

which till then had remained under a native dynasty, the Sung, holding its royal residence in a vast and splendid city, now known as Hang-chow, but then as Ling-nan, or more commonly as King-sze, i.e. the court. The southern empire was usually called by the conquerors Mantzi (or as some of the old travellers write, Mangi), a name which western Asiatics seem to have identified with Mdchin (from the Sanskrit Mahdchin), one of the names by which China was known to the traders from Persian and Arabian ports.

The conquests of Jenghiz and his successors had spread not only over China and the adjoining East, but westward also over all northern Asia, Persia, Armenia, part of Asia Minor and Russia, threatening to deluge Christendom. Though the Mongol wave retired, as it seemed almost by an immediate act of Provi- dence, when Europe lay at its

feet, it had levelled or covered all political barriers from the frontier of Poland to the Yellow Sea, and when western Europe recovered from its alarm, Asia lay open, as never before or since, to the inspection of Christen- dom. Princes, envoys, priests — half-missionary, half-envoy — visited the court of the great khan in Mongolia; and besides these, the accidents of war, commerce or opportunity carried a variety of persons from various classes of human life into the depths of Asia. ” ‘Tis worthy of the grateful remembrance of all Christian people,” says an able missionary friar of the next age (Ricold of Monte Croce), ” that just at the time when God sent forth into the Eastern parts of the world the Tatars to slay and to be slain, He also sent into the West his faithful and blessed servants, Dominic and Francis, to enlighten, instruct and build up in the faith.” Whatever on the whole may be thought of the world’s debt to Dominic, it is to the two mendicant orders, but especially to the Franciscans, that we owe a vast amount of information about medieval Asia, and, among other things, the first mention of Cathay. Among the many strangers who reached Mongolia were (1 245-1 247) John de Piano Carpini and (1253) William of Rubruk (Rubruquis) in French Flanders, both Franciscan friars of high intelligence, who happily have left behind them reports of their observations.

Carpini, after mentioning the wars of Jenghiz against the Kitai, goes on to speak of that people as follows: ” Now these Kitai are heathen men, and have a written character of their own. . . . They seem, indeed, to be kindly and polished folks enough. They have no beard, and in character of countenance have a considerable resemblance to the Mongols ” [are Mongoloid, as our ethnologists would say], ” but are not so broad in the face. They have a peculiar language. Their betters as craftsmen in every art practised by man are not to be found in the whole world. Their country is very rich in corn, in wine, in gold and silver, in silk, and in every kind of produce tending to the support of mankind. ” The notice of Rubruk, shrewder and more graphic, runs thus: ” Farther on is Great Cathay, which I take to be the country which was anciently called the Land of the Seres. For the best silk stuffs are still got from them. ... The sea lies between it and India. Those Cathayans are little fellows, speaking much through the nose, and, as is general with all those eastern people, their eyes are very narrow. They are first- rate artists in every kind, and their physicians have a thorough know- ledge of the virtues of herbs, and an admirable skill in diagnosis by the pulse. . . . The common money of Cathay consists of pieces of cotton-paper, about a palm in length and breadth, upon which certain lines are printed, resembling the seal of Mangu Khan. They do their writing with a pencil, such as painters paint with,

and a single character of theirs comprehends several letters, so as to form a whole word.”

Here we have not only what is probably the first European notice of paper-money, but a partial recognition of the peculiarity of Chinese writing, and a perception that puts to shame the perverse boggling of later critics over the identity of these Cathayans with the Seres of classic fame.

But though these travellers saw Cathayans in the bazaars in the great khan’s camps, the first actual visitors of Cathay itself were the Polo family, and it is to the book of Marco Polo’s recollections mainly that Cathay owed the growing familiarity of its name in Europe during the 14th and 15th centuries. It is, however, a great mistake to suppose, as has often been assumed, that the residence of the Polos in that country remained an isolated fact. They were but the pioneers of a very considerable intercourse, which endured till the decay of the Mongol dynasty in Cathay, i.e. for about half a century.

We have no evidence that either in the 13th or 14th century Cathayans, i.e. Chinese, ever reached Europe, but it is possible that some did, at least in the former century. For, during the campaigns of Hulagu in Persia (1256-1265), and the reigns of his successors, Chinese engineers were employed on the banks of the Tigris, and Chinese astrologers and physicians could be consulted at Tabriz. Many diplomatic communications passed between the Hulaguid Ilkhans and the princes of Christendom. The former, as the great khan’s liegemen, still received from him their seals of state; and two of their letters which survive in the archives of France exhibit the vermilion impressions of those seals in Chinese characters — perhaps affording the earliest specimen of that character which reached western Europe.

Just as the Polos were reaching their native city (1295), after an absence of a quarter of a century, the forerunner of a new series of travellers was entering southern China by way of the Indian seas. This was John of Monte Corvino, another Franciscan who, already some fifty years of age, was plunging single-handed into that great ocean of paganism to preach the gospel according to his lights. After years of uphill and solitary toil converts began to multiply; coadjutors joined

him. The Papal See became cognizant of the harvest that was being reaped in the far East. It made Friar John archbishop in Cambaluc (or Peking), with patriarchal authority, and sent him batches of suffragan bishops and preachers of his own order. The Roman Church spread; churches and Minorite houses were established at Cambaluc, at Zayton or Tsuan-chow in Fu-kien, at Yang- chow and elsewhere; and the missions flourished under the smile of the great khan, as the Jesuit missions did for a time under the Manchu emperors three centuries and a half later. Archbishop John was followed to the grave, about 1328, by mourning multitudes of pagans and Christians alike. Several of the bishops and friars who served under him have left letters or other memoranda of their experience, e.g. Andrew, bishop of Zayton, John of Cora, afterwards archbishop of Sultania in Persia, and Odoric of Pordenone, whose fame as a pious traveller won from the vox populi at his funeral a beatification which the church was fain to seal. The only ecclesiastical narrative regarding Cathay, of which we are aware, subsequent to the time of Archbishop John, is that which has been gathered from the recollections of Giovanni de' Marignolli, a Florentine Franciscan, who was sent by Pope Benedict XII. with a mission to the great khan, in return for one from that potentate which arrived at Avignon from Cathay in 1338, and who spent four years (1342- 1346) at the court of Cambaluc as legate of the Holy See. These recollections are found dispersed incoherently over a chronicle of Bohemia which the traveller wrote by order of the emperor Charles IV., whose chaplain he was after his return.

But intercourse during the period in question was not confined to ecclesiastical channels. Commerce also grew up, and flourished for a time even along the vast line that stretches from Genoa and Florence to the marts of Cheh-kiang and Fu-kien. The record is very fragmentary and imperfect, but many circum- stances and incidental notices show how frequently the remote East was reached by European traders in the first half of the 14th century — a state of things which it is very difficult to realize when we see how all those regions, when reopened to knowledge two centuries later, seemed to be discoveries as new as the empires which, about the same time, Cortes and Pizarro were conquering in the West.

This commercial intercourse probably began about 1310-1320. John of Monte Corvino, writing in 1305, says it was twelve years since he had heard any news from Europe; the only Western stranger who had arrived in all that time being a certain Lombard chirurgeon (probably one of the Patarini who got hard measure at home in chose days), who had spread the most incredible blasphemies, about the Roman Curia and the order of St Francis. Yet even on his first entrance to Cathay

Friar John had been accompanied by one Master Peter of Lucolongo, whom" he describes as a faithful Christian man and a great merchant, and who seems to have remained many years at Peking. The letter of Andrew, bishop of Zayton (i3?6), quotes the opinion of Genoese merchants at that port regarding a question of exchanges. Odoric, who was in Cathay about 1 323-1327, refers for confirmation of the wonders which he related of the great city of Cansay {i.e. King-sze, or Hang-chow) to the many persons

whom he had met at Venice since his return, who had themselves been witnesses of those marvels. And Marignolli, some twenty years later, found attached to one of the convents at Zayton, in Fu-kien, a fondaco or factory for the accommodation of the Christian merchants. But by far the most distinct and notable evidence of the import- ance and frequency of European trade with Cathay, of which silk and silk goods formed the staple, is to be found in the commercial hand-book (c. 1340) of Francesco Balducci Fegolotti, a clerk and factor of the great Florentine house of the Bardi, which was brought to the ground about that time by its dealings with Edward III. of England. This book, called by its author Libro di divisamenti di Paesi, is a sort of trade-guide, devoting successive chapters to the various ports and markets of his time, detailing the nature of imports and exports at each, the duties and exactions, the local customs of business, weights, measures and money. The first two chapters of this work contain instructions for the merchant proceeding to Cathay ; and it is evident, from the terms used, that the road thither was not unfrequently travelled by European merchants, from whom Pegolotti had derived his information. The route which he describes lay by Azov, Astrakhan, Khiva, Otrar (on the Jaxartes), Alirialik (Gulja in Hi), Kan-chow (in Kan-suh), and so to Hang-chow and Peking. Particulars are given as to the silver ingots which formed the currency of Tatary, and the paper-money of Cathay. That the ventures on this trade were not insignificant is plain from the example taken by the author to illustrate the question of expenses on the journey, which is that of a merchant investing in goods there to the amount of some £12,000 (i.e. in actual gold value, not as calculated by any fanciful and fallacious equation of values).

Of the same remarkable phase of history that we are here con- sidering we have also a number of notices by Mahommedan writers. The establishment of the Mongol dynasty in Persia, by which the great khan was acknowledged as lord paramount, led (as we have already noticed in part) to a good deal of intercourse. And some of the Persian historians, writing at Tabriz, under the patronage of the Mongol princes, have told us much about Cathay, especially Rashi- duddin, the great minister and historian of the dynasty (died 1318). We have also

in the book of the Moorish traveller Ibn Batuta, who visited China about 1347-1348, very many curious and in great part true notices, though it is not possible to give credence to the whole of this episode in his extensive travels.

About the time of the traveller first named the throne of the degenerate descendants of Jenghiz began to totter to its fall, and we have no knowledge of any Frank visitor to Cathay in that age later than Marignolli; missions and merchants alike disappear from the field. We hear, indeed, once and again of ecclesiastics despatched from Avignon, but they go forth into the darkness, and are heard of no more. Islam, with all its jealousy and exclusiveness, had recovered its grasp over Central Asia; the Nestorian Christianity which once had prevailed so widely was vanishing, and the new rulers of China reverted to the old national policy, and held the foreigner at arm's length. Night descended upon the farther East, covering Cathay with those cities of which the old travellers had told such marvels, Cambaluc and Cansay, Zayton and Chinkalan. And when the veil rose before the Portuguese and Spanish explorers of the 16th century, those names are heard no more. In their stead we have China, Peking, Hangchow, Chinchew, Canton. Not only were the old names forgotten, but the fact that those places had ever been known before was forgotten also. Gradually new missionaries went forth from Rome — Jesuits and Dominicans now; new converts were made, and new vicariates constituted; but the old Franciscan churches, and the Nestorianism with which they had battled, had alike been swallowed up in the ocean of pagan indifference. In time a wreck or two floated to the surface — a MS. Latin Bible or a piece of Catholic sculpture; and when the intelligent missionaries called Marco Polo to mind, and studied his story, one and another became convinced that Cathay and China were one.

But for a long time all but a sagacious few continued to regard Cathay as a region distinct from any of the new-found Indies; whilst map-makers, well on into the 17th century, continued to represent it as a great country lying entirely to the north of China, and stretching to the Arctic Sea.

It was Cathay, with its outlying island of Zipangu (Japan), that Columbus sought to reach by sailing westward, penetrated as he was by his intense conviction of the smallness of the earth, and of the vast extension of Asia eastward ; and to the day of his death he was full of the imagination of the proximity of the domain of the great khan to the islands and coasts which he had discovered. And such imagina-tions are curiously embodied in some of the maps of the early 16th century, which intermingle on the same coast-line the new discoveries from Labrador to Brazil with the provinces and rivers of Marco Polo's Cathay.

Cathay had been the aim of the first voyage of the Cabots in 1496, and it continued to be the object of many adventurous voyages by English and Hollanders to the N.W. and N.E. till far on in the 16th century. At least one memorable land-journey also was made by Englishmen, of which the exploration of a trade-route to Cathay was a chief object—that in which Anthony Jenkinson and the two Johnsons reached Bokhara by way of Russia in 1 558-1 559- The country of which they collected notices at that city was still known to them only as Cathay, and its great capital only as Cambaluc.

Cathay as a supposed separate entity may be considered to come to an end with" the journey of Benedict Goes, the lay-Jesuit. This admirable person was, in 1603, desoatched through Central Asia by his superiors in India with the specific object of determining whether the Cathay of old European writers and of modern Mahommedans was or was not a distinct region from that China of which parallel marvels had now for some time been recounted. Benedict, as one of his brethren pronounced his epitaph, " seeking Cathay found Heaven.'i' He died at Suchow, the frontier city of China, but not before he had ascertained that China and Cathay were the same. After the publication of the narrative of his journey (in the Expeditio Christiana apud Stnas of

Trigault, 1615) inexcusable ignorance alone could continue to distinguish between them, but such ignorance lingered many years longer. (H. Y.)

(B) — Chinese Origins.

Chinese literature contains no record of any kind which might justify us in assuming that the nucleus of the nation may have immigrated from some other part of the world; and the several ingenious theories pointing to Babylonia, Egypt, India, Khotan, and other seats of ancient civilization as the starting-points of ethnical wanderings must be dismissed as untenable. Whether the Chinese were seated in their later homes from times immemorial, as their own historians assume, or whether they arrived there from abroad, as some foreign scholars have pretended, cannot be proved to the satisfaction of historical critics. Indeed, anthropological arguments seem to contradict the idea of any connexion with Babylonians, Egyptians, Assyrians, or Indians. The earliest hieroglyphics of the Chinese, ascribed by them to the Shang dynasty (second millennium B.C.), betray the Mongol character of the nation that invented them by the decided obliquity of the human eye wherever it appears in an ideograph. In a pair of eyes as shown in the most ancient pictorial or sculptural representations in the west, the four corners may be connected by a horizontal straight line; whereas lines drawn through the eyes of one of the oldest Chinese hieroglyphics cross each other at a sharp angle, as shown in the accompanying diagrams: —

ˆSX’ˆN

Egyptian.

Chinese.

This does not seem to speak for racial consanguinity any more than the well-known curled heads and bearded faces of Assyrian sculptures as compared to the straight-haired and almost beardless Chinese. Similarities in the creation of cultural elements may, it is true, be shown to exist on either side, even at periods when mutual intercourse was probably out of the question; but this may be due to uniformity in the construction of the human brain, which leads man in different parts of the world to arrive at similar ideas under similar conditions, or to prehistoric connexions which it is as impossible for us to trace now as is the origin of mankind itself. Our standpoint as regards the origin of the Chinese race is, therefore, that of the agnostic. All we can do is to reproduce the tradition as it is found in Chinese literature.

This tradition, as applying to the very earliest periods, may be nothing more than historical superstition, yet it has its historical importance. Supposing it were possible to prove that none of the persons mentioned in the Bible from Adam down to the Apostles ever lived, even the most sceptical critic would still have to admit that the history of a great portion of the human race has been materially affected by the belief in the examples of their alleged lives. Something similar may be said of the alleged earliest history of the Chinese with its model emperors and detestable tyrants, the accounts of which, whether based on reality or not, have exercised much influence on the development of the nation.

The Chinese have developed their theories of prehistoric life., Speculation as to the origin and gradual evolution of their civilization has resulted in the expression of views by authors who may have reconstructed their systems from remnants of

ancestral life revealed by excavations, or from observation of neighbouring nations living in a state of barbarism. This may account for a good deal of the repetition found in the Chinese mythological and legendary narratives, the personal and chrono- logical part of which may have been invented merely as a frame- work for illustrating social and cultural progress. The scene of action of all the prehistoric figures from P'an-ku, the first human being, down to the beginning of real history has been laid in a part of the world which has never been anything but Chinese territory. P'an-ku's epoch, millions of years ago, was followed by ten distinct periods of sovereigns, including the " Heavenly emperors," the " Terrestrial emperors," and the " Human emperors," the Yu-cliau or " Nest-builders," and Sui-jon, the " Fire Producer," the Prometheus of the Chinese, who borrowed fire from the stars for the benefit of man. Several of the characteristic phases of cultural progress and social organization have been ascribed to this mythological period. Authors of less fertile imagination refer them to later times, when the heroes of their accounts appear in shapes somewhat resembling human beings rather than as gods and demigods.

The Chinese themselves look upon Fu-hi as their first historical emperor; and they place his lifetime in the years 2852-2738 B.C. Some accounts represent him as a supernatural being; and we see him depicted as a human figure with a fish tail something like a mermaid. He is credited with having established social order among his people, who, before him, had lived like animals in the wilds. The social chaos out of which Chinese society arose is described as being characterized by the absence of family life; for " children knew only their mothers

and not their fathers.” Fu-hi introduced matrimony; and in so doing he placed man as the husband at the head of the family and abolished the original matriarchate. This quite corresponds with his views on the dualism in natural philosophy, of which he is supposed to have laid the germs by the invention of the so-called pa-kua, eight symbols, each consisting of three parallel lines, broken or continuous. The continuous lines represented the male element in nature; the broken ones, the female. It is characteristic that the same ruler who assigned to man his position as the head of the family is also credited with the invention of that natural philosophy of the ” male and female principles,” according to which all good things and qualities were held to be male, while their less sympathetic opposites were female, such as heaven and earth, sun and moon, day and night, south and north. If these traditions really represent the oldest prehistoric creations of the popular mind, it would almost seem that the most ancient Chinese shared that naive sentiment which caused our own forefathers to invent gender. The differ- ence is that, with us, the conception survives merely in the language, where the article or suffixes mark gender, whereas with the Chinese, whose language does not express gender, it survives in their system of metaphysics. For all their attempts at- fathoming the secrets of nature are based on the idea that male or female powers are inherent in all matter.

To the same Emperor Fu-hi are ascribed many of the elementary inventions which raise man from the life of a brute to that of a social being. He taught his people to hunt, to fish, and to keep flocks; he constructed musical instruments, and replaced a kind of knot-writing previously in use by a system of hieroglyphics. All this cannot of course be considered as history; but it shows that the authors of later centuries who credited Fu-hi with certain inventions were not quite illogical in starting from the matriarchal chaos, after which he is said to have organized society with occupations corresponding to those of a period of hunting, fishing and herding. This period was bound to be followed by a further step towards the final development of the nation’s social condition; and we find it quite logically succeeded by a period of agricultural life, personi- fied in the Emperor, Shon-nung, supposed to have lived in the twenty-eighth century B.C. His name may be freely translated as ” Divine Labourer” ; and to him the Chinese ascribe the invention of agricultural implements, and the discovery of the medicinal properties of numerous plants.

The third historical emperor was Huang-ti, the ” Yellow emperor,” according to the literal translation. Ssi-ma Ts’ien, the Herodotus of the Chinese, begins his history with him; but Fu-hi and Shon-nung are referred to in texts much older than this historian, though many details relating to their alleged reigns have been added in later times. Huang-ti extended the boundaries of the empire, described as being originally confined to a limited territory near the banks of the Yellow river and the present city of Si-an-fu. Here were the sites of cities used as capitals of the empire under various names during long periods since remote antiquity. To Huang-ti, whose reign is said to have commenced in 2704 according to one source and in 2491 according to another, are ascribed most of the cultural innovations which historians were not able otherwise to locate within historical times. Under Huang-ti we find the first mention of a nation called the Hun-yu, who occupied the north of his empire and with whom he is represented to have engaged in warfare. The Chinese identify this name with that of the Hiung-nu, their old hereditary enemy and the ancestors of Attila’s Huns. Even though the details of these legendary accounts may deserve little confidence, there must have been an old tradition that a nation called the Hun-yu, occupying the northern confines of China, were the ancestors of the Hiung-nu tribes, well known in historical times, a scion of whose great khans settled in territory belonging to the king of Sogdiana during the first century B.C., levied tribute from his neighbours, the Alans, and with his small but warlike horde initiated that era of migrations which led to the overrunning of Europe with Central-Asiatic Tatars.

Fu-hi, Shon-nung and Huang-ti represent a group of rulers comprised by the Chinese under the name of San-huang, i.e. ” The Three Emperors.” Although we have no reason to deny their existence, the details recorded concerning them contain enough in the way of improbabilities to justify us in considering them as mythical creations. The chronology, too, is apparently quite fictitious; for the time allotted to their reigns is much too long as a term of government for a single human life, and, on the other hand, much too short, it we measure it by the cultural progress said to have been brought about in it. Fu-hi’s period of hunting life must have lasted many generations before it led to the agricultural period represented by the name Shon-nung; and this period in turn could not possibly have led within a little more than one hundred years to the enormous progress ascribed to Huang-ti. Under the latter ruler a- regular board of historians is said to have been organized with Ts’ang-kie as president, who is known also as Shi-huang, i.e. ” the Emperor of Historians,” the reputed

inventor of hieroglyphic writing placed by some authors into the Fu-hi period and worshipped as Tz'i-shon, i.e. " God of writing," to the present day. Huang-ti is supposed to have been the first builder of temples, houses and cities; to have regulated the calendar, to which he added the intercalary month; and to have devised means of traffic by cars drawn by oxen and by boats to ply on the lakes and rivers of his empire. His wife, known as " the lady of Si-ling," is credited with the invention of the several manipulations in the rearing of silkworms and the manufacture of silk. The invention of certain flutes, combined to form a kind of reed organ, led to a deeper study of music; and in order to construct these instru- ments with the necessary accuracy a system of weights and measures had to be devised. Huang-ti's successors, Shau-hau, Chuan-hu, and Ti-k'u, were less prominent, though each of them had their particular merits.

The Model Emperors. — Most of the stories regarding the " Three Emperors " are told in comparatively late records. The Shu- king, sometimes described as the " Canon of History," our oldest source of pre-Confucian history, supposed to have been edited by Confucius himself, knows nothing of Fu-hi, Shon-nung and Huang-ti; but it begins by extolling the virtues of the emperor Yau and his successor Shun. Yau and Shun are probably the most popular names in Chinese history as taught in China. Whatever good qualities may be imagined of the rulers of a great nation have been heaped upon their heads; and the example of their lives has at all times been held up by Confucianists as the height of perfection in a sovereign's character. Yau, whose reign has been placed by the fictitious stan- dard chronology of the Chinese in the years 2357-2258, and about

200 years later by the less extravagant " Annals of the Bamboo Books," is represented as the patron of certain astronomers who had to watch the heavenly bodies; and much has been written about the reputed astronomical knowledge of the Chinese in this remote period. Names like Deguignes, Gaubil, Biot and Schlegel are among those of the investigators. On the other side are the sceptics, who maintain that later editors interpolated statements which could have been made only with the astronomical knowledge possessed by their own contemporaries. According to an old legend, Shun banished " the four wicked ones " to distant territories. One of these bore the name T'au-t'ie, i.e. " Glutton"; called also San-miau. T'au-t'iS is also the name of an ornament, very common on the surface of the most ancient bronze vessels, showing the distorted face of some ravenous animal. The San-miau as a tribe are said to have been the forefathers of the Tangutans, the Tibetans and the Miau-tz'i in the south-west of China. This legend may be interpreted as indicating that the non- Chinese races in the

south-west have come to their present seats by migration from Central China in remote antiquity. During Yau's reign a catastrophe reminding one of the biblical deluge threatened the Chinese world. The emperor held his minister of works, Kun, responsible for this misfortune, probably an inundation of the Yellow river such as has been witnessed by the present generation. Its horrors are described with poetical exaggeration in the Shu-king. When the efforts to stop the floods had proved futile for nine years, Yau wished to abdicate, and he selected a virtuous young man of the name of Shun as his successor. Among the legends told about this second model emperor is the story that he had a board before his palace on which every subject was permitted to note whatever faults he had to find with his government, and that by means of a drum suspended at his palace gate attention might be drawn to any com- plaint that was to be made to him. Since Kun had not succeeded in stopping the floods, he was dismissed and his son Yii was appointed in his stead. Probably the waters began to subside of their own accord, but Yii has been praised up as the national hero who, by his engineering works, saved his people from utter destruction. His labours in this direction are described in a special section of the Con- fucian account known as Yii-kung, i.e. " Tribute of Yii." Yti's merit has in the sequel been exaggerated so as to credit him with more than human powers. He is supposed to have cut canals through the hills, in order to furnish outlets to the floods, and to have per- formed featw. of engineering compared to which, according to Von Richthofen, the construction of the St Gotthard tunnel without blast- ing materials would be child's play, and all this within a few years.

The Hia Dynasty. — As a reward for his services Yii was selected to succeed Shun as emperor. He divided the empire into nine provinces, the description of which in the Yii-kung chapter of the " Canon of History " bears a suspicious resemblance to later accounts. Yti's reign has been assigned to the years 2205-2198, and the Hia Dynasty, of which he became the head, has been made to extend to the overthrow in 1766 B.C. of Kie, its eighteenth and last emperor, a cruel tyrant of the most vicious and contemptible character. Among the Hia emperors we find Chung-k'ang (2159-2147), whose reign has attracted the attention of European scholars by the mention of an eclipse of the sun, which his court astronomers had failed to predict. European astronomers and sinologues have brought much acumen to bear on the problem involved in the Shu-king account in trying to decide which of the several eclipses known to have occurred about that time was identical with the one observed in China under Chung-k'ang.

The Shang, or Yin, Dynasty, — This period, which preceded the

classical Ch6u dynasty, is made to extend from 1766 to n 22 B.C. We must now be prepared to see an energetic or virtuous ruler at the head of a dynasty and either a cruel tyrant or a contemptible weakling at the end of it. It seems natural that this should be so; but Chinese historians, like the writers of Roman history, have a tendency to exaggerate both good and bad qualities. Ch'ong-tang, its first sovereign, is represented as a model of goodness and of humane feeling towards his subjects. Even the animal world benefited by his kindness, inasmuch as he abolished all useless torture in the chase. His great minister I Yin, who had greatly assisted him in securing the throne, served two of his successors. P'an-k6ng (1401) and Wu-ting (1.324) are described as good rulers among a some- what indifferent set of monarchs. The Shang dynasty, like the Hia, came to an end through the reckless vice and cruelty of a tyrant (Ch6u-sin with his consort Ta-ki). China had even in those days to maintain her position as a civilized nation by keeping at bay the barbarous nations by which she was sur- rounded. Chief among these were the ancestors of the Hiung-nu

tribes, or Huns, on the northern and western boundaries. To fight them, to make pacts and compromises with them, and to befriend them with gifts so as to keep them out of the Imperial territories, had been the role of a palatinate on the western frontier, the duchy of Chou, while the court of China with its vicious emperor gave itself up to effeminate luxury. Chou-sin's evil practices had aroused the indignation of the palatine, subsequently known as Won-wang, who in vain remonstrated with the emperor's criminal treatment of his subjects. The strength and integrity of Won-wang's character had made him the corner-stone of that important epoch; and his name is one of the best known both in history and in literature. The courage with which he spoke his mind in rebuking his unworthy liege lord caused the emperor to imprison him, his great popularity alone saving his life. During his incarceration, extending over three years, he compiled the I -king, or " Canon of Changes," supposed to be the oldest book of Chinese literature, and certainly the one most extensively studied by the nation. Won-wang's son, known as Wu-wang, was destined to avenge his father and the many victims of Ch6u-sin's cruelty. Under his leadership the people rose against the emperor and, with the assistance of his allies, : ' men of the west,"

possibly ancestors of the Huns, overthrew the Shang dynasty after a decisive battle, whereupon Chou-sin committed suicide by setting fire to his palace.

Chou Dynasty. — Wu-wang, the first emperor of the new dynasty, named after his duchy of Chou on the western frontier, was greatly assisted in consolidating the empire by his brother, Chou-kung, i.e. ” Duke of Chou.” As the loyal prime-minister of Wu-wang and his successor the duke of Chou laid the founda- tion of the government institutions of the dynasty, which became the prototype of most of the characteristic features in Chinese public and social life down to recent times. The brothers and adherents of the new sovereign were rewarded with fiefs which in the sequel grew into as many states. China thus developed into a confederation, resembling that of the German empire, inasmuch as a number of independent states, each having its own sovereign, were united under one liege lord, the emperor, styled ” The Son of Heaven,” who as high priest of the nation reigned in the name of Heaven. The emperor represented the nation in sacrificing and praying to God. His relations with his vassals and government officials, and those of the heads of the vassal states with their subjects as well as of the people among themselves were regulated by the most rigid ceremonial. The dress to be worn, the speeches to be made, and the postures to be assumed on all possible occasions, whether at court or in private life, were subject to regulations. The duke of Chou, or whoever may have been the creator of this system, showed deep wisdom in his speculations, if he based that immutability of government which in the sequel became a Chinese character- istic, on the physical and moral immutability of individuals by depriving them of all spontaneous action in public and private life. Originally and nominally the emperor’s power as the ruler over his vassals, who again ruled in his name, was unquestion- able; and the first few generations of the dynasty saw no decline of the original strength of central power. A certain loyalty based on the traditional ancestral worship counteracted the desire to revolt. The rightful heir to the throne was responsible to his ancestors as his subjects were to theirs. ” We have to do as our ancestors did,” the people argued; “and since they obeyed the ancestors cf our present sovereign, we have to be loyal to him.” Interference with this time-honoured belief would have amounted to a rupture, as it were, in the nation’s religious relations, and as long as the people looked upon the emperor as the Son of Heaven, his moral power would outweigh strong armies sent against him in rebellion. The time came soon enough when central power depended merely on this spontaneous loyalty.

Not all the successors of Wu-wang profited by the lessons given them by past history. Incapacity, excessive severity and undue weakness had created discontent and loosened the rela- tions between the emperor and his vassals. Increase in the extent of the empire greatly added to this decline of central power. For the emperor's own dominion was centrally situated

vi. 7″

and surrounded by the several confederate states; its geogra- phical position prevented it from participating in the general aggrandisement of China, and increase in territory, population and prestige had become the privilege of boundary states. Tatar tribes in the north and west and the aboriginal Man barbarians in the south were forced by warfare to yield land, or enticed to exchange it for goods, or induced to mingle with their Chinese neighbours, thus producing a mixed population combining the superior intelligence of the Chinese race with the energetic and warlike spirit of barbarians. These may be the main reasons which gradually undermined the Imperial authority and brought some of the confederate states to the front, so as to overshadow the authority of the Son of Heaven himself, whose military and financial resources were inferior to those of several of his vassals. A few out of the thirty-five sovereigns of the Ch6u dynasty were distinguished by extraordinary qualities. Mu-wang of the 10th century performed journeys far beyond the western frontier of his empire, and was successful in warfare against the Dog Barbarians, described as the ancestors of the Hiung-nu, or Huns. The reign of Siian-wang (827-782 B.C.) was filled with warfare against the Tangutans and the Huns, called Hien-yun in a contemporaneous poem of the "Book of Odes"; but the. most noteworthy reign in this century is that of the lascivious Yu-wang, the oppressiveness of whose govern- ment had caused a bard represented in the " Book of Odes " to complain about the emperor's evil ways. The writer of this poem refers to certain signs showing that Heaven itself is indig- nant at Yu-wang's crimes. One of these signs was an eclipse of the sun which had recently occurred, the date and month being clearly stated. This date corresponds exactly with August 29, 776 B.C.; and astronomers have calculated that on that precise date an eclipse of the sun. was visible in North China. This, of course, cannot be a mere accident; and since the date falls into the sixth year of Yu-wang's reign, the coincidence is bound to increase our confidence in that part of Chinese history. .Our knowledge of it, however, is due to mere chance; for the record of the eclipse would probably not have been preserved until our days had it not been interpreted as a kind of lekel upharsin owing to the peculiarity of the political situation. It does not follow, therefore, as

some foreign critics assume, that the historical period begins as late as Yu-wang's reign. China has no architectural witnesses to testify to her antiquity as Egypt has in her pyramids and temple ruins; but the sacrificial bronze vessels of the Shang and Chou dynasties, with their characteristic ornaments and hieroglyphic inscriptions, seem to support the historical tradition inasmuch as natural develop- ment may be traced by the analysis of their artistic and paleo- graphic phases. Counterfeiters, say a thousand years later, could not have resisted the temptation to introduce patterns and hieroglyphic shapes of later periods; and whatever bronzes have been assigned to the Shang dynasty, i.e. some time in the second millennium B.C., exhibit the Shang characteristics. The words occurring in their inscriptions, carefully collected, may be shown to be confined to ideas peculiar to primitive states of cultural life, not one of them pointing to an invention we may suspect to be of later origin. But, apart from this, it seems a matter of individual judgment how far back beyond that indisputable year 776 B.C. a student will date the beginning of real history.

In the 7th century central authority had declined to such an extent that the emperor was merely the nominal head of the confederation, the hegemony in the empire falling in turn to one of the five principal states, for which reason the Chinese speak of a period of the " Five Leaders." The state of Ts'i, corresponding to North Shan-tung, had begun to overshadow the other states by unprecedented success in economic enterprise, due to the prudent advice of its prime minister, the philosopher Kuan-tzi. Other states attained leadership by success in warfare. Among these leaders we see duke Mu of T'sin (659 B.C.), a state on the western boundary which was so much influenced by amalgamation with its Hunnic neighbours that the purely Chinese states regarded it as a barbarian country. The emperor was in those days a mere shadow; several of his vassals had

grown strong enough to claim and be granted the title " king," and they all tried to annihilate their neighbours by ruse in diplomacy and by force of arms, without referring to their common ruler for arbitration, as they were in duty bound. In this bellum omnium contra

omnes the state of Ts'in, in spite of repeated reverses, remained in possession of the field.

The period of this general struggle is spoken of by Chinese historians as that of " The Contending States." Like that of the " Five Leaders " it is full of romance; and the examples of heroism, cowardice, diplomatic skill and philosophical equanimity which fill the pages of its history have become the subject of elegant literature in prose and poetry. The political development of the Chou dynasty is the exact counterpart of that of its spiritual life as shown in the contemporaneous literature. The orthodox conservative spirit which reflects the ethical views of the emperor and his royal partisans is represented by the name Confucius (551-479 B.C.). The great sage had collected old traditions and formulated the moral principles which had been dormant in the Chinese nation for centuries. His doctrines tended to support the maintenance of central power; so did those of other members of his school, especially Mencius. Filial love showed itself as obedience to the parents in the family and as loyalty to the emperor and his government in public life. It was the highest virtue, according to the Confucian school. The history of the nation as taught in the Shu-king was in its early part merely an illustration of Confucianist ideas about good and bad government. The perpetual advice to rulers was: " Be like Yau, Shun and Yii, and you will be right." Confucianism was dominant during the earlier centuries of the Chou dynasty, whose lucky star began to wane when doctrines opposed to it got the upper hand. The philo- sophical schools buiit up on the doctrines of Lau-tz'i had in the course of generations become antagonistic, and found favour with those who did not endorse that loyalty to the emperor demanded by Mencius ; so had other thinkers, some of whom had preached morals which were bound to break up all social relations, like the philosopher of egotism, Yang Chu, according to Mencius disloyalty personified and the very reverse of his ideal, the duke of Chou. The egotism recom- mended by Yang Chu to the individual had begun to be practised on a large scale by the contending states, their governments and sovereigns, some of whom had long discarded Confucian rites under the influence of Tatar neighbours. It appears that the anti- Confucian spirit which paved the way towards the final extinction of Wu-wang's dynasty received its chief nourishment from the Tatar element in the population of the northern and western boundary states. Among these Ts'in was the most prominent. Having placed itself in the possession of the territories of nearly all of the remaining states, Ts'in made war against the last shadow emperor, Nan-wang who had attempted to form an alliance against the powerful usurper, with the result that the western part of the Chou

dominion was lost to the aggressor.

Nan-wang died soon after (256 B.C.), and a relative whom he had appointed regent was captured in 249 B.C., when the king of Ts'in put an end to this last remnant of the once glorious Chou dynasty by annexing its territory. The king had already secured the posses- sion of the Nine Tripods, huge bronze vases said to have been cast by the emperor Yu as representing the nine divisions of his empire and since preserved in the treasuries of all the various emperors as a symbol of Imperial power. With the loss of these tripods Nan-wang had forfeited the right to call himself " Son of Heaven." Another prerogative was the offering of sacrifice to Shang-ti, the Supreme Ruler, or God, with whom only the emperor was supposed to com- municate. The king of Ts'in had performed the ceremony as early as 253 B.C. (F. H.*)

(C) — From the Ts'in Dynasty to 1875.

After the fall of the Chou dynasty a kind of interregnum followed during which China was practically without an emperor.

This was the time when the state of Ts'in asserted dynasty itself as the leader and finally as the master of all the 249-210 contending states. Its king, Chau-siang, who died in ac ' 251 B.C., though virtually emperor, abstained from

adopting the imperial title. He was succeeded by his son, Hiao- wen Wang, who died after a three days' reign. Chwan-siang Wang, his son and successor, was a man of no mark. He died in 246 B.C. giving place to Shi Hwang-ti, " the first universal emperor." This sovereign was then only thirteen, but he speedily made his influence felt everywhere. He chose Hien- yang, the modern Si-gan Fu, as his capital, and built there a

magnificent palace, which was the wonder and admira- Mwaag-tl. tion ot his contemporaries. He abolished the feudal

system, and divided the country into provinces over whom he set officers directly responsible to himself. He con- structed roads through the empire, he formed canals, and erected numerous and handsome public buildings.

Having settled the internal affairs of his kingdom, he turned his attention to the enemies beyond his frontier. Chief among these were the Hiung-nu Tatars, whose attacks had for years disquieted the Chinese and neighbouring principalities. Against these foes he marched with an army of 300,000 men, exterminating those in the

neighbourhood of China, and driving the rest into Mongolia. On his return from this campaign he was called upon to face a formidable rebellion in Ho-nan, which had been set on foot by the adherents of the feudal princes whom he had dispossessed. Having crushed the rebellion, he marched southwards and subdued the tribes on the south of the Nan-shan ranges, i.e. the inhabitants of the modern provinces of Fu-kien, Kwang-tung and Kwang-si. The limits of his empire were thus as nearly as possible those of modern China proper. One monument remains to bear witness to his energy. Finding that the northern states of Ts'in, Chao and Yen were building lines of fortification along their northern frontier for pro- tection against the Hiung-nu, he conceived the idea of building one gigantic wall, which was to stretch across the whole northern limit of the huge empire from the sea to the farthest western corner of the modern province of Kan-suh. This work was begun under his immediate supervision in 214 B.C. His reforming zeal made him unpopular with the upper classes. Schoolmen and pedants held up to the admiration of the people the heroes of the feudal times and the advantages of the system they administered. Seeing in this propaganda danger to the state Shi Hwang-ti determined to break once and for all with the past. To this end he ordered the destruc- tion of all books having reference to the past history of the empire, and many scholars were put to death for failing in obedience to it. (See infra § Chinese Literature, §§ History.) The measure was unpopular and on his death (210 B.C.) rebellion broke out. His son and successor Erh-shi, a weak and debauched youth, was murdered after having offered a feeble resistance to his enemies. His son Tsze-yung surrendered to Liu Pang, the prince of Han, one of the two generals who were the leaders of the rebellion. He after- wards fell into the hands of Hiang Yu, the other chieftain, who put him and his family and associates to death. Hiang Yu aspiring to imperial honours, war broke out between him and Liu Pang. After five years' conflict Hiang Yu was killed in a decisive battle before Wu-kiang. Liu Pang was then proclaimed emperor (206 B.C.) under the title of KaO-ti, and the new line was styled the Han dynasty.

Kao-ti established his capital at Lo-yang in Ho-nan, and afterwards removed it to Chang-an in Shen-si. Having founded his right to rebel on the oppressive nature of the laws promulgated by Shi Hwang-ti, he abolished the ˆatty ordinances of Ts'in, except that referring to the 2O6 B.C. destruction of the books— for, like his great pre- decessor, he dreaded the influence exercised by the literati — and he exchanged the worship of the gods of the soil of Ts'in for that of those of Han, his native state. His successor Hwei-ti (194- 179 B.C.), however, gave every encouragement to literature, and appointed a commission to

restore as far as possible the texts which had been destroyed by Shi Hwang-ti. In this the com- mission was very successful. It was discovered that in many cases the law had been evaded, while in numerous instances scholars were found to write down from memory the text of books of which all copies had been destroyed, though in some cases the purity of the text is doubtful and in other cases there were undoubted forgeries. A period of repose was now enjoyed by the empire. There was peace within its borders, and its frontiers remained unchallenged, except by the Hiung-nu, who suffered many severe defeats. Thwarted in their attacks on China, these marauders attacked the kingdom of the Yueh-chi, which had grown up in the western extremity of Kan-suh, and after much fighting drove their victims along the T'ien-shan- nan-lu to the territory between Turkestan and the Caspian Sea. This position of affairs suggested to the emperor the idea of forming an offensive and defensive alliance with the Yueh-chi against the Hiung-nu. With this object the general Chang K'ien was sent as an ambassador to western Tatary. After having been twice imprisoned by the Hiung-nu he returned to China. Chang K'ien had actually reached the court of the Yueh-chi, or Indo-Scythians as they were called owing to their having become masters of India later on, and paid a visit to the kingdom of Bactria, recently conquered by the Yueh-chi. His report on the several kingdoms of western Asia opened up a new world to the Chinese, and numerous elements of culture, plants and animals were then imported for the first time from the west into China. While in Bactria Chan K'ien's attention was first drawn to the existence of India, and attempts to send expeditions,

though at first fruitless, finally led to its discovery. Under Wu-ti (140-86 B.C.) the power of the Hiung-nu was broken and eastern Turkestan changed into a Chinese colony, through which caravans could safely pass to bring back merchandise and art treasures from Persia and the Roman market. By the Hans the feudal system was restored in a modified form; 103 feudal principalities were created, but they were more or less under the jurisdiction of civil governors appointed to administer the thirteen chows (provinces) into which the country was divided. About the beginning of the Christian era Wang Mang rose in revolt against the infant successor of P'ing-ti (a.d. i), and in a.d. 9 proclaimed himself emperor. He, however, only gained the suffrages of a portion of the nation, and before long his oppressive

acts estranged his supporters. In A.D. 23 Liu Siu, one of the princes of Han, completely defeated him. His head was cut off, and his body was torn in pieces by his own soldiery.

Liu Siu, was proclaimed emperor under the title of Kwang- wu-ti, reigned from a.d. 58 to 76. Having fixed on Lo-yang Eastern m Ho-nan as his capital, the line of which he was the Han first emperor became known as the Eastern Han

dynasty, dynasty. It is also known as the Later Han dynasty. A.D.23. During the reign of his successor Ming-ti, A.D. 65, Buddhism was introduced from India into China (see ante § Religion). About the same time the celebrated general Pan Ch'ao was sent on an embassy to the king of Shen-shen, a small state of Turkestan, near the modern Pidjan. Before long he added the states of Shen-shen, Khotan, Kucha and Kashgar as apanages to the Chinese crown, and for a considerable period the country enjoyed prosperity. The Han dynasty (including in the term the Eastern Han dynasty) has been considered the first national dynasty and is one of the most famous in China; nor has any ruling family been more popular. The Chinese, espe- cially the northern Chinese, still call themselves " the sons of Han." The wealth and trade as well as the culture of the country was greatly developed, and the competitive examina- tions for literary degrees instituted. The homogeneity of the nation was so firmly established that subsequent dissensions and conquests could not alter fundamentally the character of the nation.

Towards the end of the 2nd century the power of the Eastern Hans declined. In 173 a virulent pestilence, which continued for eleven years, broke out. A magical cure for this plague was said to have been discovered by a Taoist priest named Chang Chio, who in a single month won a sufficiently large following to enable him to gain possession of the northern provinces of the empire. He was, hew- ever, defeated by Ts'aou Ts'aou, another aspirant to imperial honours, whose son, Ts'aou P'ei, on the death cf Hien-ti (a.d. 220), proclaimed himself emperor, adopting the title of Wei as the appella- tion of his dynasty. There were then, however, two other J*' claimants to the throne, Liu Pei and Sun Ch'iian, and the

dynasty, three adventurers agreed to divide the empire between them. Ts'aou P'ei, under the title of We"n-ti, ruled over the kingdom of Wei (220), which occupied the whole of the central and northern portion of China. Liu Pei established the Shuh Han dynasty in the modern province of Sze-ch'uen (221), and called himself Chao- lieh-ti; and to Sun Ch'iian fell the southern provinces of the empire, from the

Yangtsze-kiang southwards, including the modern Tong- king, which he formed into the kingdom of Wu with Nan-king for his capital, adopting for himself the imperial style of Ta-t6 (a.d.

222).

China during the period of the ” Three Kingdoms ” was a house

divided against itself. Liu Pei, as a descendant of the house of

Han, looked upon himself as the rightful sovereign of

“.J*”?* „ the whole empire, and he despatched an army under

% h m Chu-ko Liang to support his claims. This army was met period. ˆ an pp os j n g force under the Wei commander Sze-ma I, of whom Chinese historians say that ” he led armies like a god,” and who, by adopting a Fabian policy, completely discomfited his adversary. But the close of this campaign brought no peace to the country. Wars became chronic, and the reins of power slipped out of the hands of emperor* into those of their generals. Foremost among these were the members of the Sze-ma family of Wei. Sze-ma I left a son, Sze-ma Chao, scarcely less distinguished than himself, and when Sze-ma Chao died his honours descended to Sze-ma Yen, who deposed the ruling sovereign of Wei, and proclaimed himself emperor of China (a.d. 265). His dynasty he styled the Western Tsin dynasty, and he adopted for himself the title of Wu-ti. The most noticeable event in this reign was the advent of the ambassadors of the emperor Diocletian in 284. For some years the neighbouring states appear to have transferred their allegiance from the house of Wei to

that of Tsin. Wu-ti’s successors proving, however, weak and incapable, the country soon fell again into disorder. The Hiung-nu renewed incursions into the empire at the beginning of the 4th century, and in the confusion which followed, an adventurer Western named Liu Yuen established himself (in 311) as emperor, J* first at P’ing-yang in Shan-si and afterwards in Lo- dynasty. yang and Chang-an. The history of this period is very chaotic. Numerous states sprang into existence, some founded by the Hiung- nu and others by the Sien-pi tribe, a Tungusic clan, inhabiting a territory to the north of China, which afterwards established the Liao dynasty in China. In 419 the Eastern Tsin dynasty came to an end, and with it disappeared for nearly two hundred years all semblance of united authority. The country became divided into two parts, the north and the south. In the north four families reigned successively, two of which were of Sien-pi origin, viz.

the Wei and the How Chow, the other two, the Pih Ts'i and the How Liang, being Chinese. In the south five different houses supplied rulers, who were all of Chinese descent.

This period of disorder was brought to a close by the establish- ment of the Suy dynasty (590). Among the officials of the ephemeral dynasty of Chow was one Yang Kien, who on his daughter becoming empress (578) was created duke of Suy. Two r. uy years later Yang Kien proclaimed himself emperor. The nynasty. country, weary of contention, was glad to acknowledge his undi- vided authority; and during the sixteen years of his reign the internal affairs of China were comparatively peaceably administered. The emperor instituted an improved code of laws, and added 5000 volumes to the 10,000 which composed the imperial library. Abroad, his policy was equally successful. He defeated the Tatars and chastised the Koreans, who had for a long period recognized Chinese suzerainty, but were torn by civil wars and were disposed to reject her authority. After his death in 604 his second son forced the heir to the throne to strangle himself, and then seized the throne. This usurper, Yang-ti, sent expeditions against the Tatars, and himself headed an expedition against the Uighurs, while one of his generals annexed the Lu-chu Islands to the imperial crown. During his reign the volumes in the imperial library were increased to 54,000, and he spent vast sums in erecting a magnificent palace at Lo-yang, and in constructing unprofitable canals. These and other extrava- gances laid so heavy a burden on the country that discontent began again to prevail, and on the emperor's return from a successful expedition against the Koreans, he found the empire divided into rebellious factions. In the troubles which followed General Li Yuen became prominent. On the death of the emperor by assassina- tion this man set Kung-ti, the rightful heir, on the throne (617) until such time as he should have matured his schemes.

Kung-ti was poisoned in the following year and Li Yuen proclaimed himself as Kao-tsu, the first emperor of the T'ang dynasty. At this time the Turks were at the height of their power in Asia (see Turks: History), and Kao- dynasty. tsu was glad to purchase their alliance with money. But divisions weakened the power of the Turks, and T'ai-tsung (reigned 627-650), Kao-tsu's son and successor, regained much of the position in Central Asia which had formerly been held by China. In 640 Hami, Turfan and the rest of the Turkish territory were again included within the Chinese empire, and four military governorships were appointed in Central Asia, viz. at Kucha, Khotan, Kharastan and Kashgar. At the same time the frontier was extended as far as eastern Persia and the Caspian Sea. So great was now the fame of China, that ambassadors from Nepal, Magadha, Persia and

Constantinople (643) came to pay their court to the emperor. Under T'ai-tsung there was national unity and peace, and in consequence agriculture and commerce as well as literature flourished. The emperor gave direct encourage- ments to the Nestorians, and gave a favourable reception to an embassy from Mahommed (see ante § Religion) . On the accession of Kao-tsung (650) his wife, Wu How, gained supreme influence, and on the death of her husband in 683 she set aside his lawful successor, Chung-tsung, and tool*, possession of the throne. This was the first occasion the country was ruled by a dowager empress. She governed with discretion, and her armies defeated the; Khitan in the north-east and also the Tibetans, who had latterly gained possession of Kucha, Khotan and Kashgar. On her death, in 705, Chung-tsung partially left the obscurity in which he had lived during his mother's reign. But his wife, desiring to play a similar role to that enjoyed by her mother-in- law, poisoned him and set his son, Jui-tsung (710), on the throne. This monarch, who was weak and vicious, was succeeded by Yuen- tsung (713), who introduced reform into the administration and encouraged literature and learning. The king of Khokand applied for aid against the Tibetans and Arabs, and Yuen-tsung

sent an army to his succour, but his general was completely defeated. During the disorder which arose in consequence of the invasion of the northern provinces by the Khitan, General An Lu-shan, an officer of Turkish descent, placed himself at the head of a revolt, and having secured Tung-kwan on the Yellow river, advanced on Chang-an. Thereupon the emperor fled, and placed his son, Su-tsung (756-762), on the throne. This sovereign, with the help of the forces of Khotan, Khokand and Bokhara, of the Uighurs and of some 4000 Arabs sent by the caliph Mansur, completely defeated An Lu-shan. During the following reigns the Tibetans made constant incursions into the western provinces of the empire, and T'ai-tsung (763-780) purchased the assistance of the Turks against those intruders by giving a Chinese princess as wife to the khan.

At this epoch the eunuchs of the palace gained an unwonted degree of power, and severalof the subsequent emperors fell victims to their plots. The T'ang dynasty, which for over a hundred years had governed firmly and for the good of the nation, began to decline. The

history of the 8th and 9th centuries is for the most part a monotonous record of feeble governments, oppressions and rebellions. Almost the only event worth chronicling is the iconoclastic policy of the emperor Wu-tsung (841-847). Viewing the increase of monasteries and ecclesiastical establishments as an evil, he abolished all temples, closed the monasteries and nunneries, and sent the inmates back to their families. Foreign priests were subjected to the same repressive legislation, and Christians, Buddhists and Magi were bidden to return whence they came. Buddhism again revived during the reign of the emperor I-tsung (860-874), who, having discovered a bone of Buddha, brought it to the capital in great state. By internal dis- sensions the empire became so weakened that the prince of Liang found no difficulty in gaining possession of the throne (907). He took the title of T'ai-tsu, being the first emperor of the Later Liang dynasty. Thus ended the T'ang dynasty, which is regarded as being the golden age of Chinese literature.

Five dynasties, viz. the Later Liang, the Later T'ang, the Later Tsin, the Later Han and the Later Chow, followed each other between the years 907 and 960. Though the monarchs of these lines nominally held sway over the empire, their real power was confined to very narrow limits. The disorders which were rife during the time when the T'ang dynasty was tottering to its fall fostered the development of independent states, and so arose Liang in Ho-nan and Shan-tung, Ki in Shen-si, Hwai-nan in Kiang-nan, Chow in Sze-ch'uen and parts of Shen-si and Hu-kwang, Wu-yue in Cheh-kiang, Tsu and King-nan in Hu-kwang, Ling-nan in Kwang-tung and the Uighurs in Tangut.

A partial end was made to this recognized disorganization when, in 960, General Chao Kw'ang-yin was proclaimed by the army emperor in succession to the youthful dynasty. Kung-ti, who was compelled to abdicate. The circum- stances of the time justified the change. It required a strong hand to weld the empire together again, and to resist the attacks of the Khitan Tatars, whose rule at this period extended over the whole of Manchuria and Liao-tung. Against these aggressive neighbours T'ai-tsu (ni Chao Kw'ang-yin) directed his efforts with varying success, and he died in 976, while the war was still being waged. His son T'ai-tsung (976-997) entered on the campaign with energy, but in the end was com- pelled to conclude a peace with the Khitan. His successor, Chen-tsung (997-1022), paid them tribute to abstain from further incursions. Probably this tribute was not sent regularly; at all events, under Jen-tsung (1023-1064), the Khitan again threatened to invade the empire, and were only bought off by the promise of an annual tribute of taels 200,000 of silver, besides a great quantity of silken piece goods. Neither was this

arrangement long binding, and so formidable were the advances made by the Tatars in the following reigns, that Hwei-tsung (1101-1126) invited the Niichih Tatars to expel the Khitan from Liao-tung. This they did, but having once possessed themselves of the country they declined to yield it to the Chinese, and the result was that a still more aggressive neighbour was established on the north-eastern frontier of China. The Niichih or Kin, as they now styled themselves, overran the provinces of Chih-li, Shen-si, Shan-si and Ho-nan, and during the reign of Kao-tsung (1127-1163) they advanced their conquests to the line of the Yangtsze-kiang. From this time the Sung ruled only over southern China; while the Kin or " Golden " dynasty reigned in the north. The Kin made Chung-tu, which occupied in part the site of the modern Peking, their usual residence. The Sung

Invasion:

12th

century.

fixed their capital at Nanking and afterwards at Hangchow. Between them and the Kin there was almost constant war.

During this period the Mongols began to acquire power in eastern Asia, and about the beginning of the 12th century the forces of Jenghiz Khan (q.v.) invaded the north-western Mongol frontier of China and the principality of Hia, which at that time consisted of the modern provinces of Shen-si and Kan-suh. To purchase the good-will of the Mongols the king of Hia agreed to pay them a tribute, and gave a princess in marriage to their ruler. In consequence of a dispute with the Kin emperor Wei-shao Wang, Jenghiz Khan determined to invade Liao-tung. He was aided by the followers of the Khitan leader Yeh-lii Ts'u-ts'ai, and in alliance with this general he captured Liao-yang, the capital city.

After an unsuccessful invasion of China in 12 12, Jenghiz Khan renewed the attack in 1213. He divided his armies into four divisions, and made a general advance southwards. His soldiers swept over Ho-nan, Chih-li and Shan-tung, destroying upwards of ninety cities. It was their boast that a horseman might ride without stumbling over the sites where those cities had stood. Panic- stricken, the emperor moved his court from Chung-tu to K'ai-feng Fu, much against the advice of his ministers, who foresaw the disastrous effect this retreat would have on the fortunes of Kin. The state of Sung, which up to this time had paid tribute, now declined to recognize Kin as its

feudal chief, and a short time after- wards declared war against its quondam ally. Meanwhile, in 1215, Yeh-lii Ts'u-ts'ai advanced into China by the Shan-hai Kwan, and made himself master of Peking, one of the few cities in Chih-li which remained to Kin. After this victory his nobles wished him to pro- claim himself emperor, but he refused, being mindful of an oath which he had sworn to Jenghiz Khan. In 12 16 Tung-kwan, a mountain pass on the frontiers of Ho-nan and Shen-si, and the scene of numerous dynastic battles (as it is the only gateway between north-eastern and north-western China), was taken by the invaders. As the war dragged on the resistance offered by the Kin grew weaker and weaker. In 1220 Chi-nan Fu, the capital of Shan-tung, was taken, and five years later Jenghiz Khan marched an army westward into Hia and conquered the forces of the king. Two years later (1227) Jenghiz Khan died.

With the view to the complete conquest of China by the Mongols, Jenghiz declined to nominate either of the eldest two sons who had been born to his Chinese wives as his heir, but chose his third son Ogdai, whose mother was a Tatar. On hearing of the death of Jenghiz Khan the Kin sent an embassy to his successor desiring peace, but Ogdai told them there would be no peace for them until their dynasty should be overthrown. Hitherto the Mongols had been without any code of laws. But the consolidation of the nation by the conquests of Jenghiz Khan made it necessary to establish a recognized code of laws, and one of the first acts of Ogdai was to form such a code. With the help also of Yeh-lii Ts'u-ts'ai, he estab- lished custom-houses in Chih-li, Shan-tung, Shan-si and Liao-tung; and for this purpose divided these provinces into ten departments. Meanwhile the war with the Kin was carried on with energy. In 1230 Si-gan Fu was taken, and sixty important posts were captured. Two years later, Tu-16, brother of Ogdai, took FSng-siang Fu and Han-chung Fu, in the flight from which last-named place 100,000 persons are said to have perished. Following the course of the river Han in his victorious career, this general destroyed 140 towns and fortresses, and defeated the army of Kin at Mount San-flng.

In 1232 the Mongols made an alliance with the state of Sung, by which, on condition of Sung helping to destroy Kin, Ho-nan was to be the property of Sung for ever. The effect of this coalition soon became apparent. Barely had the Kin emperor retreated from K'ai-fgng Fu to Ju-ning Fu in Ho- nan when the former place fell into the hands of the allies. Next fell Loyang, and the victorious generals then marched on to besiege Ju-ning Fu. The presence of the emperor gave energy to the defenders, and they held out until every animal in the city had been killed for food, until every old and useless person had suffered death

to lessen the number of hungry mouths, until so many able-bodied men had fallen that the women manned the ramparts, and then the allies stormed the walls. The emperor burned himself to death in his palace, that his body might not fall into the hands of his enemies. For a few days the shadow of the imperial crown rested on the head of his heir Chang-lin, but in a tumult which broke out amongst his followers he lost his life, and with him ended the ” Golden ” dynasty.

Notwithstanding the treaty between Ogdai and Sung, no sooner were the spoils of Kin to be divided than war broke out again between them, in prosecuting which the Mongol armies swept over the provinces of Sze-ch’uen, Hu-kwang, Kiang-nan and Ho-nan, and were checked only when they reached the walls of Lu-chow Fu in Ngan-hui. Ogdai died in 1241, and was nominally succeeded by his grandson Cheliemln. But one of his widows, Tolickona, took possession of the throne, and after exercising rule for four years, established her son Kwei-yew as great khan. In 1248 his life was

The Kin dynasty over- thrown.

cut short, and the nobles, disregarding the claims of CheliemSn, proclaimed as emperor Mangu, the eldest son of Tu-le. Under this monarch the war against Sung was carried on with energy, and Kublai, outstripping the bounds of Sung territory, made his way intb the province of Yun-nan, at that time divided into a number of independent states, and having attached them to his brother’s crown he passed on into Tibet, Tongking and Cochin-China, and thence striking northwards entered the province of Kwang-si.

On the death of Mangu in 1259 Kublai (q.v.) ascended the throne. Never in the history of China was the nation more

illustrious, nor its power more widely felt, than under

” ” his sovereignty. During the first twenty years of

emperor, his reign Sung kept up a resistance against his

authority. Their last emperor Ping-ti, seeing his cause lost, drowned himself in the sea. The Sung dynasty, which had ruled southern China

320 years, despite its misfortunes is accounted one of the great dynasties of China. During its sway arts and literature were cultivated and many eminent writers flourished. His enemies subdued, Kublai' Khan in 1280 assumed complete jurisdiction as emperor of China. He took the title of Shit-su and founded what is known as the Yuen dynasty. He built a new capital close to Chung-tu, which became known as Kaanbaligh (city of the khan), in medieval European chronicles, Cambaluc, and later as Peking. At this time his authority was acknowledged " from the Frozen Sea, almost to the Straits of Malacca. With the exception of Hindustan, Arabia and the westernmost parts of Asia, all the Mongol princes as far as the Dnieper declared themselves his vassals, and brought regularly their tribute." It was during this reign that Marco Polo visited China, and he describes in glowing colours the virtues and glories of the " great khan." His rule was characterized by discretion and munificence. He undertook public works, he patronized literature, and relieved the distress of the. poor, but the Chinese never forgot that he was an alien and regarded him as a barbarian. He died un- regretted in 1294. His son had died during his lifetime, and after some contention his grandson Timur ascended the throne under the title of Yuen-cheng. This monarch died in 1307 after an uneventful reign, and, as he left no son, Wu-tsung, a Mongol prince, became emperor. To him succeeded Jen-tsung in 1312, who made himself conspicuous by the honour he showed to the memory of Confucius, and by distributing offices more equally between Mongols and Chinese than had hitherto been done. This act of justice gave great satisfaction to the Chinese, and his death ended a peaceful and prosperous reign in 1320. At this time there appears to have been a considerable commercial intercourse between Europe and China. But after Jen-tsung's death the dynasty fell on evil days. The Mongols in adopting Chinese civilization had lost much of their martial spirit. They were still regarded as alien by the Chinese and numerous secret societies were formed to achieve their overthrow. Jen-tsung's successors were weak and incapable rulers, and in the person of Shun-ti (1333-1368) were summed up the vices and faults of his predecessors. Revolts broke out, and finally this descendant of Jenghiz Khan was compelled to fly before Chu Yuen-chang, the son of a Chinese labouring man. Deserted by his followers, he sought refuge in Ying-chang Fu, and there the last of the Yuen dynasty died. These Mongol emperors, whatever their faults, had shown tolerance to Christian missionaries and Papal legates (see ante § The Medieval Cathay).

Chu Yiien-chang met with little opposition, more especially as his first care on becoming possessed of a district was to

suppress lawlessness and to establish a settled govern- dyaasty. ment – In J 355 he captured Nanking, and proclaimed

himself duke of Wu, but carefully avoided adopting any of the insignia of royalty. Even when master of the empire, thirteen years later, he still professed to dislike the idea of assuming the imperial title. His scruples were overcome, and he declared himself emperor in 1368. He carried his arms into Tatary, where he subdued the last semblance of Mongol power in that direction, and then bent his steps towards Liao-tung. Here the Mongols defended themselves with the bravery of despair, but unavailingly, and the conquest of this province

left Hung-wu, as the founder of the new or Ming (" Bright") dynasty styled himself, without a foe in the empire.

All intercourse with Europe seems now to have ceased until the Portuguese arrived in the 16th century, but Hung-wu cultivated friendly relations with the neighbouring states. As a quondam Buddhist priest he lent his countenance to that religion to the exclusion of Taoism, whose priests had for centuries earned the contempt of all but the most ignorant by their pretended magical arts and their search after the philosopher's stone. Hung-wu died in 1398 and was succeeded by his grandson Kien-W6n. Aware that the appointment of this youth — his father was dead — would give offence to the young emperor's uncles, Hung-wu had dismissed them to their respective governments. However, the prince of Yen, his eldest surviving son, rose in revolt as soon as the news reached him of his nephew's accession, and after gaining several victories over the armies of Kien-wen he presented himself before the gates of Nanking, the capital. _ Treachery opened the gates to him, and the emperor having fled in the disguise of a monk, the victorious prince became emperor and took the title of Yung-lo (1403). At home Yuhg-lo devoted himself to the encouragement of literature and the fine arts, and, possibly from a knowledge that Kien-wen was among the Buddhist priests, he renewed the law prohibiting Buddhism. Abroad he swept Cochin-China and Tongking within the folds of his empire and carried his arms into Tatary, where he made new conquests of waste regions, and erected a monument of his victories. He died in 1425, and was succeeded by his son Hung-hi.

Hung-hi's reign was short and uneventful. He .strove to promote only such mandarins as had proved themselves to be able and honest, and to further the welfare of the people. During the reign of his successor, Siien-tS (1426-1436), the empire suffered the first loss of territory since the commencement of the dynasty. Cochin-China rebelled and

gained her independence. The next emperor, Chgng- t'ung (1436), was taken prisoner by a Tatar chieftain, a descendant of the Yuen family named Yi-sien, who had invaded the northern provinces. Having been completely defeated by a Chinese force from Liao-tung, Yi-sien liberated his captive, who reoccupied the throne, which during his imprisonment (1450-1457) had been held by his brother King-ti. The two following reigns, those of Cheng-hwa (1465-1488) and of Hung-chi (1488-1506), were quiet and peaceful.

The most notable event in the reign of the next monarch, Ch&ng-te (1506-1522), was the arrival of the Portuguese at Canton (1517). From this time dates modern European intercourse with China. Ch6ng-te suppressed a formidable insurrection headed by the prince of Ning, but disorder caused by this civil war encouraged the foreign enemies of China. From the north came a Tatar army under Yen-ta in 1542, during the reign of Kia-tsing, which laid waste the province of Shen-si, and even threatened the capital, and a little later a Japanese fleet ravaged the littoral provinces. Ill-blood had arisen between the two peoples before this, and a Japanese colony had been driven out of Ningpo by force and not without bloodshed a few years previously. Kia-tsing (d. 1567) was not equal to such emergencies, and his son Lung-king (i567-i573)sought to placate the Tatar Yen-ta by making him a prince of the empire and giving him commercial privileges, which were supplemented by the succeeding emperor Wan-li (1573-1620) by the grant of land in Shen-si. During the reign of this sovereign, in the year 1592, the Japanese successfully invaded Korea, and Taikosama, the regent of Japan, was on the point of proclaiming himself king of the peninsula,when a large Chinese force, answering to the invitation of the king, appeared and completely routed the Japanese army, at the same time that the Chinese fleet cut off their retreat by sea. In this extremity the Japanese sued for peace, and sent an embassy to Peking to arrange terms. «_._,/„ But the peace was of short duration. In 1597 the Japanese ithjaoan again invaded Korea, defeated the Chinese army, destroyed ˆ or ir ol ff the Chinese fleet and ravaged the coast. Suddenly, how- ever, when in the full tide of conquest, they evacuated Korea, which again fell under the direction of China. Four years later the mission- ary Matteo Ricci (q.v.) arrived at the Chinese court ; and though at first the emperor was inclined to send him out of the country, his abilities gradually won for him the esteem of the sovereign and his ministers, and he remained the scientific adviser of the court until his death in 1610.

About this time the Manchu Tatars, goaded into war by the injustice they were constantly receiving at the hands of the Chinese, led an army into China (in 161 6) and completely defeated the force which

was sent against them. Three years later they gained possession of the province of Liao-tung. These disasters overwhelmed the emperor, and he died of a broken heart in 1620.

In the same year T'ien-ming, the Manchu sovereign, having declared himself independent, moved the court to San-ku, to the east of Mukden, which, five years later, he made his Manchu capital. In 1627 Ts'ung-cheng, the last emperor of invasion: the Ming dynasty, ascended the Chinese throne. In nth his reign English merchants first made their appearance mntar y' at Canton. The empire was now torn by internal dissensions.

Rebel bands, enriched by plunder, and grown bold by success, began to assume the proportion of armies. Two rebels, Li Tsze-ch'eng and Shang K'o-hi, decided to divide the empire between them. Li besieged K'ai-f&ig Fu, the capital of Ho-nan, and so long and closely did he beleaguer it that in the consequent famine human flesh was regularly sold in the markets. At length an imperial force came to raise the siege, but fearful of meeting Li's army, they cut through the dykes of the Yellow River, " China's Sorrow," and flooded the whole country, including the city. The rebels escaped to the mountains, but upwards of 200,000 inhabitants perished in the flood, and the city became a heap of ruins (1642). From K'ai-feng Fu Li marched against the other strongholds of Ho-nan and Shen-si, and was so completely successful that he determined to attack Peking. A treacherous eunuch opened the gates to him, on being informed of which the emperor committed suicide. When the news of this disaster reached the general-commanding on the frontier of Manchu Tatary, he, in an unguarded moment, con- cluded a peace with the Manchus, and invited them to dispossess Li Tsze-ch'eng. The Manchus entered China, and after defeating a rebel army sent against them, they marched towards Peking. On hearing of the approach of the invaders, Li Tsze-ch'eng, after having set fire to the imperial palace, evacuated the city, but was overtaken, and his force was completely routed. The Chinese now wished the Manchus to retire, but, having taken possession of Peking, they proclaimed the ninth son of

T'ien-ming emperor of China under the title of Shun-chi, dynasty?
an< ^ adopted the name of Ta-ts'ing, or " Great Pure,"

for the dynasty (1644). Meanwhile the mandarins at Nanking had chosen an imperial prince to ascend the throne. At this most inopportune moment ” a claimant ” to the throne, in the person of a pretended son of the last emperor, appeared at court. While this contention prevailed inside Nanking the Tatar army appeared at the walls. There was no need for them to use force. The gates were thrown open, and they took possession of the city without bloodshed. Following the con- ciliatory policy they had everywhere pursued, they confirmed the mandarins in their offices and granted a general amnesty to all who would lay down their arms. As the Tatars entered the city the emperor left it, and after wandering about for some days in great misery, he drowned himself in the Yangtsze-kiang. Thus ended the Ming dynasty, and the empire passed again under a foreign yoke. By the Mings, who partly revived the feudal system by making large territorial grants to members of the reigning house, China was divided into fifteen provinces; the exist- ing division into eighteen provinces was made by the Manchus.

All accounts agree in stating that the Manchu conquerors are descendants of a branch of the family which gave the Kin dynasty to the north of China; and in lieu of any authentic account of their early history, native writers have thrown a cloud of fable over their origin (see Manchuria). In the 16th century they were strong enough to cope with their Chinese neighbours. Doubtless the Mings tried to check their ambition by cruel reprisals, but against this must be put numerous Manchu raids into Liao-tung.

The accession to the throne of the emperor Shun-chi did not restore peace to the country. In Kiang-si, Fu-kien, Kwang-tung and Kwang-si the adherents of the Ming dynasty defended themselves vigorously but unsuccessfully against the invaders, while the pirate ChSng Chi-lung, the father of the celebrated Coxinga, kept up a predatory warfare against them on the coast. Eventually he was induced to visit Peking, where he was thrown into prison and died. Coxinga, warned by his father’s example, determined to leave the mainland and to seek an empire elsewhere. His choice fell on Formosa, and having driven out the Dutch, who had established themselves in the island in 1624, he held possession until the reign of K’ang-hi, when (1682) he resigned in favour of the imperial govern- ment. Meanwhile a prince of the house of Ming was proclaimed emperor in Kwang-si, under the title of Yung-li. The Tatars having reduced Fu-kien and Kiang-si, and having taken Canton after a siege of eight months, completely routed his followers, and Yung-li was compelled to fly to Pegu. Some years later, with the help of adherents in Yun-nan and Kwei-chow, he tried to regain the throne, but his army was scattered, and he was taken prisoner and

strangled. Gradually opposition to the new regime became weaker and weaker, and the shaved head with the pig-tail — the symbol of Tatar sovereignty — became more and more adopted. In 1651 died Ana Wang, the uncle of Shun-chi, who had acted as regent during his nephew's minority, and the emperor then assumed the government

of the state. He appears to have taken a great interest in science, and to have patronized Adam Schaal, a German Jesuit, who was at that time resident at Peking. It was during his reign (1656) that the first Russian embassy arrived at the capital, but as the envoy declined to kowtow before the emperor he was sent back withomt having been admitted to an audience.

After an unquiet reign of seventeen years Shun-chi died (1661). and was succeeded by his son K'ang-hi. He came into collision with the Russians, who had reached the Amur regions about 1640 and had built a fort on the upper Amur; but by the Treaty of Nerchinsk, concluded in 1689 (the first treaty made between China and a European power), the dispute was settled, the Amur being taken as the frontier. K'ang-hi was indefatigable in administering the affairs of the empire, and he devoted much of his time to literary and scientific studies under the guidance of the Jesuits. The dictionary of the Chinese language, published under his superintendence, proves him to have been as great a scholar as his conquests over the Eleuths show him to have been famous as a general. During one of his hunting expeditions to Mongolia he caught a fatal cold, and he died in 1721. Under his rule Tibet was added to the empire, which extended from the Siberian frontier to Cochin-China, and from the China Sea to Turkestan. During his reign there was a great earthquake at Peking, in which 400,000 people are said to have perished.

K'ien-lung, who began to reign in 1735, was ambitious and warlike. He marched an army into Hi, which he converted into a Chinese province, and he afterwards added eastern Turkestan to the empire. Twice he invaded Burma, and once he penetrated into Cochin-China, but in neither country were his arms successful. He is accused of great cruelty towards his subjects, which they repaid by rebelling against him. During his reign the Mahommedan standard was first raised in Kan-suh. (Since the Mongol conquest in the 13th century there had been a considerable immigration of Moslems into western China; and numbers of Chinese had become converts). But the Mussulmans were unable to stand against the imperial troops; their armies were dispersed ; ten thousand of them were exiled ; and an order was issued that every Mahommedan in Kan-suh above the age of fifteen should be put to death (1784).

K'ien-lung wrote incessantly, both poetry and prose, collected libraries and republished works of value. His campaigns furnished him with themes for his verses, and in the Summer Palace was found a handsome manuscript copy of a laudatory poem he composed on the occasion of his war against the Gurkhas. This was one of the most successful of his military undertakings. His generals marched 70,000 men into Nepal to within 60 miles of the British frontiers, and having subjugated the Gurkhas they received the submission of the Nepalese, and acquired an additional hold over Tibet (1792). In other directions his arms were not so successful. There is no poem commemorating the campaign against the rebellious Formosans, nor lament over the loss of 100,000 men in that island, and the last few years of his reign were disturbed by outbreaks among the Miao- tsze, hill tribes living in the mountains in the provinces of Kwei-chow and Kwang-si. In 1795, after a reign of sixty years, K'ien-lung abdicated in favour of his fifteenth son, who adopted the title of Kia-k'ing as the style of his reign. K'ien-lung died at the age of eighty-eight in 1798.

During the reign of K'ien-lung commerce between Europe and Canton — the only Chinese port then open to foreign trade — had attained important dimensions. It was mainly in the hands of the Portuguese, the British and the

Trade with Europe. .

Dutch. The British trade was then a monopoly of the East India Company. The trade, largely in opium, tea and silk, was subject to many exactions and restrictions, 1 and many acts of gross injustice were committed on the persons of Englishmen. To obtain some redress the British government at length sent an embassy to Peking (1793) and Lord Macartney was chosen to represent George III. on the occasion. The mission was treated as showing that Great Britain was a state tributary to China, and Lord Macartney was received with every courtesy. But the concessions he sought were not accorded, and in this sense his mission was a failure.

Kia-k'ing's reign was disturbed and disastrous. In the northern and western provinces, rebellion after rebellion broke out, due in a great measure to the carelessness, incompetency and obstinacy of the emperor, and the coasts were infested with pirates, whose number and organization enabled them for a long time to hold the imperial fleet in check. Meanwhile the condition of the foreign merchants at Canton had net improved, and to set matters on a better footing the British government despatched a second ambassador in the person of Lord Amherst to Peking in 1816. As he declined to kowtow before the

emperor, he was not admitted to the imperial presence and the mission proved

1 See Morse's Trade and Administration of the Chinese Empire, chap. ix.

abortive. Destitute of all royal qualities, a slave to his passions, and the servant of caprice, Kia-k'ing died in 1820. The event fraught with the greatest consequences to China which occurred in his reign (though at the time it attracted little attention) was the arrival of the first Protestant missionary, Dr R. Morrison (q.v.), who reached Canton in 1807.

Tao-kwang (1820-1850), the new emperor, though possessed in his early years of considerable energy, had no sooner ascended the throne than he gave himself up to the pursuit of pleasure. The reforms which his first manifestoes foreshadowed never seriously occupied his attention. Insurrection occurred in Formosa, Kwang-si, Ho-nan and other parts of the empire, and the Triad Society, which had originated during the reign of K'ang-hi, again became formidable.

More important to the future of the country than the internal disturbances was the new attitude taken at this time towards China by the nations of Europe. Hitherto the European missionaries and traders in China had been dependent upon the goodwill of the Chinese. The Portuguese had been allowed to settle at Macao (q.v.) for some centuries; Roman Catholic missionaries since the time of Ricci had been alternately patron- ized and persecuted; Protestant missionaries had scarcely gained a foothold; the Europeans allowed to trade at Canton continued to suffer under vexatious regulations — the Chinese in general regarded Europeans as barbarians, "foreign devils." Of the armed strength of Europe they were ignorant. They were now to be undeceived, Great Britain being the first power to take action. The hardships inflicted on the British merchants at Canton became so unbearable that when, in 1834, the mono- poly of the East India Company ceased, the British government sent Lord Napier as minister to superintend the foreign trade at that port. Lord Napier was inadequately supported, and the anxieties of his position brought on an attack of fever, from which he died at Macao after a few months'

residence in China. The chief cause of complaint adduced by the mandarins was the introduction of opium by the merchants, and for years they attempted by every means in their power to put a stop to its importation. At length Captain (afterwards Admiral Sir Charles) Elliot, the superintendent of trade, in 1839 agreed that all the opium in the hands of Englishmen should be given up to the native authorities, and he exacted a pledge from the merchants that they would no longer deal in the drug. On the 3rd of April 20,283 chests of opium were handed over to the mandarins and were by them destroyed. The surrender of the War with opium led to further demands by Lin Tze-su, the Great Chinese imperial commissioner, demands which were

Britain, considered by the British government to amount to ,84 °- a casus belli, and in 1840 war was declared. In the

same year the fleet captured Chusan, and Li the following year the Bogue Forts fell, in consequence of which operations the Chinese agreed to cede Hong-Kong to the victors and to pay them an indemnity of 6,000,000 dollars. As soon as this news reached Peking, Ki Shen, who had succeeded Commissioner Lin, was dismissed from his post and degraded, and Yi Shen, another Tatar, was appointed in his room. Before the new commissioner reached his post Canton had fallen into the hands of Sir Hugh Gough, and shortly afterwards Amoy, Ning-po, Tinghai in Chusan, Chapu, Shanghai and Chin-kiang Fu shared the same fate. Nanking would also have been captured had not the imperial government, dreading the loss of the ” Southern Capital,” proposed terms of peace. Sir Henry Pottinger, who had succeeded Captain Elliot, concluded, in 1842, a treaty with the imperial commissioners, by which the four additional ports of Amoy, Fu-chow, Ningpo and Shanghai were declared open to foreign trade, and an indemnity of 21,000,000 dollars was to be paid to the British.

On the accession of Hien-fSng in 1850, a demand was raised for the reforms which had been hoped for under Tao-kwang, but Hien- Hlen-teai lgn S possessed in an exaggerated form the selfish and emoeror tyrannical nature of his father, together with a voluptu- ” ary’s craving for every kind of sensual pleasure. For some time Kwang-si had been in a very disturbed state, and when the people found that there was no hope of relief from the oppression

they endured, they proclaimed a youth, who was said to be the representative of the last emperor of the Ming dynasty, as emperor, under the title of T’ien-tS or ” Heavenly Virtue.” From Kwang-si the revolt spread into Hu-peh and Hu-nan, and then languished Jrom

want of a leader and a definite political cry. When, however, there appeared to be a possibility that, by force of arms and the per- suasive influence of money, the imperialists would re-establish theii supremacy, a leader presented himself in Kwang-si,_ whose energy ol character, combined with great political and religious enthusiasm, speedily gained for him the suffrages of the discontented. This waa Hung Siu-ts'uan. He proclaimed himself a3 sent by heaven to drive out the Tatars, and to restore in his own person the succession to China. At the same time, having been converted to Christianity and professing to abhor the vices and sins of the age, he called on all the virtuous of the land to extirpate rulers who were standing examples of all that was base and vile in human nature. Crowds soon flocked to his standard. T'ien-te" was deserted ; and putting himself at the head of his followers (who abandoned the practice of shaving the head), Hung Siu-ts'uan marched northwards and captured Wu- ch'ang on the Yangtsze-kiang, the capital of Hu-peh. Then, moving down the river, he proceeded to the attack of Nanking. Without much difficulty Hung Siu-ts'uan in 1853 established himself within its walls, and proclaimed the inauguration of the T'ai-p'ing dynasty, of which he nominated himself the first emperor under the title of T'ien Wang or " Heavenly king." During the next few years his armies penetrated victoriously as far north as Tientsin and as far east as Chin-kiang and Su-chow, while bands of sympathizers with his cause appeared in the neighbourhood of Amoy. As if still rat-p'tor

further to aid him in his schemes, Great Britain declared

rebellion.

war against the Tatar dynasty in 1857, in consequence of an outrage known as the "Arrow" affair (see Parkes, Sir Harry Smith). In December 1857 Canton was taken by the British, and a further blow was struck against the prestige of the Manchu dynasty by the determination of Lord Elgin, who had been sent as special ambassador, to go to Peking and communicate directly with the emperor. In May 1858 the Taku Forts were taken, and Lord Elgin went up the Peiho to Tientsin en route for the capital. At Tientsin, however, imperial commissioners persuaded him to conclude a treaty with them on the spot, which treaty it was agreed should be ratified at Peking in the following year. When, however, Sir Frederick Bruce, who had been appointed minister to the court of Peking, attempted to pass Taku to carry out this arrangement, the vessels escorting him were treacherously fired on from the forts and he was compelled to return. Thereupon Lord Elgin was again sent out with full powers, accompanied by a large force under the command of Sir Hope Grant.

The French (to seek reparation for the murder of a missionary in Kwang-si) took part in the campaign, and on the 1st of August i860 the allies landed without meeting with any opposition at Pei-tang, a village 12 m. north of Taku. A few days later the forts at that place were taken, and thence the allies marched to Peking. Finding further resistance to be hopeless, the Chinese opened negotiations, and as a guarantee of their good faith surrendered the An-ting gate of the capital to the allies._ On the 24th of October i860 the treaty of 1858 was ratified by Prince Kung and Lord Elgin, and a convention was signed under the terms of which the Chinese agreed to pay a war indemnity of 8,000,000 taels. The right of Europeans to travei in the interior was granted and freedom guaran- teed to the preaching of Christianity. The customs tariff then agreed upon legalized the import of opium, though the treaty of 1858, like that of 1842, was silent on the subject.

Great Britain and France were not the only powers of Europe with whom Hien-flng was called to deal. On the northern border of the empire Russia began to exercise pressure. Russia had begun to colonize the lower Amur region, and was pressing towards the Pacific. This was a remote region, only part of the Chinese empire since the Manchu conquest, and by treaties of 1858 and i860 China ceded to Russia all its territory north of the Amur and between the Ussuri and the Pacific (see Amur, province). The Russians in their newly acquired land founded the port of Vladivostok (q.v.).

Hien-fgng died in the summer of the year 1861, leaving the throne to his son T'ung-chi (1861-1875), a child of five years old, whose mother, Tsz'e Hsi (1834-1908), had been raised funtt-chl, from the place of favourite concubine to that of Imperial emperor" Consort. The legitimate empress, Tsz'e An, was childless, aowaver and the two dowagers became joint regents. The con- empr ˆ a elusion of peace with the allies was the signal for a n ˆ nt renewal of the campaign against the T'ai-p'ings, and, benefiting by the friendly feelings of the British authorities engen- dered by the return of amicable relations, the Chinese government succeeded in enlisting Major Charles George Gordon (q.v.) of the Royal Engineers in their service. In a suprisingiy short space of time this officer formed the troops, which had iormerty been under the command of an American named Ward, into a tormidable army, and without delay took the field against the rebels. From that day the fortunes of the T'ai-p'ings declined. They lost city after city, and, finally in July 1864, the imperialists, after an interval of twelve years, once more gained possession of Nanking. T'ien Wang com- mitted suicide on the capture of his capital, and with hirn fell his cause. Those of his followers who escaped the sword dispersed

throughout the country, and the T'ai-p'ings ceased to be.

With the measure of peace which was then restored to the country trade rapidly revived, except in Yun-nan, where the Mahommedan rebels, known as Panthays, under Suleiman, still kept the imperial forces at bay. Against these foes the government was careless to take active measures, until in 1872 Prince Hassan, the adopted son of Suleiman, was sent to England to gain the recognition of the queen for his father's government. This step aroused the sus- ceptibilities of the imperial government, and a large force was despatched to the scene of the rebellion. Before the year was out the Mahommedan capital Ta-li Fu fell into the hands of the im- perialists, and the followers of Suleiman were mercilessly exter- minated. In February 1 873 the two dowager empresses resigned their powers as regents. This long-expected time was seized upon by the Foreign ministers to urge their right of audience with the emperor, and on the 29th of June 1873 the privilege of gazing on the " sacred countenance " was accorded them.

The emperor T'ung-chi died without issue, and the succession to the throne, for the first time in the annals of theTs'ing dynasty, passed out of the direct line. As already stated, the first Accession emperor f t h e Ts'ing dynasty, Shih-tsu Hwangti, on %??*" gaining possession of the throne on the fall of the Ming, su, 1875, or „ Great Bright " dynasty, adopted the title of Shun- chi for his reign, which began in the year 1644. The legendary progenitor of these Manchu rulers was Aisin Giorp, whose name is said to point to the fact of his having been related to the race of Nu-chih, or Kin, i.e. Golden Tatars, who reigned in northern China during the 12th and 13th centuries. K'ang-hi (1661-1722) was the third son of Shun-chi; Yung-cheng (1722-1735) was the fourth son of K'ang-hi; K'ien-lung (1736-1795) was the fourth son of Yung- cheng; Kia-k'ing (1796-1820) was the fifteenth son of K'ien-lung; Tao-Kwang (1821-1850) was the second son of Kia-k'ing; Hien- ffing (1851-1861) was the fourth of the nine sons who were born to the emperor Tao-kwang; and T'ung-chi (1862-1875) was the only son of Hien-fgng. The choice now fell upon Tsai-t'ien (as he was called at birth), the infant son (born August 2, 1872) of Yi-huan, Prince Chun, the seventh son of the emperor Tao-kwang and brother of the emperor Hien-fSng; his mother was a sister of the empress Tsz'e Hsi, who, with the aid of Li Hung-chang, obtained his adoption and

proclamation as emperor, under the title of Kwang-su, ” Suc- cession of Glory.”

In order to prevent the confusion which would arise among the princes of the imperial house were they each to adopt an arbitrary name, the emperor K’ang-hi decreed that each of his Imperial twenty-four sons should have a personal name consisting nc t a . of two characters, the first of which should be Yung, and t° ml ad ‘ tne secon< i should be compounded with the determinative rank x ^' " to manifest," an arrangement which would, as has

been remarked, find an exact parallel in a system by which the sons in an English family might be called Louis Edward, Louis Edwin, Louis Edwy, Louis Edgar and so on. This device obtained also in the next generation, all the princes of which had Hung for their first name, and the emperor K’ien-lung (1736-1795) extended it into a system, and directed that the succeeding generations should take the four characters Yung, Mien Yih and Tsai respectively, as the first part of their names. Eight other characters, namely, P’u, Yu, Heng,K’i,Tao,K’ai, Tseng, Ki, were subsequently added, thus provid- ing generic names for twelve generations. With the generation repre- sented by Kwang-su the first four characters were exhausted, and any sons of the emperor Kwang-su would therefore have been called P’u. By the ceremonial law of the ” Great Pure ” dynasty, twelve degrees of rank are distributed among the princes of the imperial house, and are as follows: (1) Ho-shih Tsin Wang, prince of the first order; (2) To-lo Keun Wang, prince of the second order; (3) To-lo Beileh, prince of the third order; (4) Ku-shan Beitsze, prince of the. fourth order; 5 to 8, Kung, or duke (with distinctive designations); 9 to 12, Tsiang-keun, general (with distinctive desig- nations). The sons of emperors usually receive patents of the first or second order on their reaching manhood, and on their sons is bestowed the title of Beileh. A Beileh’ s sons become Beitsze; a Beitsze’s sons become Kung, and so on. (R. K. D.; X.)

(D) — From 1875 to iqoi.

The accession to the throne of Kwang-su in January 1875 attracted little notice outside China, as the supreme power

continued to be vested in the two dowager-empresses The two — (.jjg empress Tsz’e An, principal wife of the emperor tmpnsZs. Hien-feng, and the empress Tsz’e Hsi, secondary wife

of the same emperor, and mother of the emperor T’ung-chi. Yet there were circumstances connected with the emperor Kwang-su ‘s accession

which might well have arrested attention. The emperor T'ung-chi, who had himself succumbed to an ominously brief and mysterious illness, left a young widow in an advanced state of pregnancy, and had she given birth to a male child her son would have been the rightful heir to the throne. Rut even before she sickened and died — of grief, it was officially

stated, at the loss of her imperial spouse — the dowager-empresses had solved the question of the succession by placing Kwang-su on the throne, a measure which was not only in itself arbitrary, but also in direct conflict with one of the most sacred of Chinese traditions. The solemn rites of ancestor-worship, incumbent on every Chinaman, and, above all, upon the emperor, can only be properly performed by a member of a younger generation than those whom it is his duty to honour. The emperor Kwang-su, being a first cousin to the emperor T'ung-chi, was not therefore qualified to offer up the customary sacrifices before the ancestral tablets of his predecessor. The accession of an infant in the place of T'ungTchi achieved, however, for the time being what was doubtless the paramount object of the policy of the two empresses, namely, their undisturbed tenure of the regency, in which the junior empress Tsz'e Hsi, a woman of unquestionable ability and boundless ambition, had gradually become the predominant partner.

The first question that occupied the attention of the govern- ment under the new reign was one of the gravest importance, and nearly led to a war with Great Britain. The Indian government was desirous of seeing the old trade relations between Burma and the south-west provinces, which had been interrupted by the Yun-nan rebellion, re-established, and for that purpose proposed to send a mission across the frontier into China. The Peking government assented and issued passports for the party, which was under the command of Colonel „^^' Browne. Mr A. R. Margary, a young and promising Margary. member of the China consular service, who was told off to accompany the expedition as interpreter, was treacherously murdered by Chinese at the small town of Manwyne and almost simultaneously an attack was made on the expedition by armed forces wearing Chinese uniform (January 1875). Colonel Browne with difficulty made his way back to Bhamo and the expedition was abandoned.

Tedious negotiations followed, and, more than eighteen months after the outrage, an arrangement was come to on the basis of guarantees for the future, rather than vengeance for the past. The arrangement was embodied in the C ^" lo c °"' Chifu convention, dated 13th September 1876. The i8'/6. terms of the settlement comprised (1) a

mission of apology from China to the British court; (2) the promulgation throughout the length and breadth of the empire of an imperial proclamation, setting out the right of foreigners to travel under passport, and the obligation of the authorities to protect them; and (3) the payment of indemnity. Additional articles were subsequently signed in London relative to the collection of likin on Indian opium and other matters.

Simultaneously with the outbreak of the Mahommedan rebellion in Yun-nan, a similar disturbance had arisen in the north-west provinces of Shen-si and Kan-suh. central This was followed by a revolt of the whole of the ˆsta. Central Asian tribes, which for two thousand years had more or less acknowledged the imperial sway. In Kashgaria a nomad chief named Yakub Beg, otherwise known as the Atalik Ghazi, had made himself amir, and seemed likely to establish a strong rule. The fertile province of Kulja or IK, lying to the north of the T'ianshan range, was taken possession of by Russia in 1871 in order to put a stop to the prevailing anarchy, but with a promise that when China should have succeeded in re-establishing order in her Central Asian dominions it should be given back. The interest which was taken in the rebellion in Central Asia by the European powers, notably by the sultan of Turkey and the British government, aroused the Chinese to renewed efforts to recover their lost territories, and, as in the case of the similar crisis in Yun-nan, they undertook the task with sturdy deliberation. They borrowed money — £1,600,000 — for the expenses of the expedition, this being the first appearance of China as a borrower in the foreign markets, and appointed the viceroy, Tso Tsung-t'ang, commander-in-chief. By degrees the emperor's authority was established from the confines of Kan-suh to Kashgar and Yarkand, and Chinese garrisons were stationed in touch with the Russian outpost in the region of the Pamirs

(December 1877). Russia was now called upon to restore Kulja, China being in a position to maintain order. China despatched Chung-how, a Manchu of the highest rank, who had been notoriously concerned in the Tientsin massacre of 1870, to St Petersburg to negotiate a settlement. After some months of discussion a document was signed (September 1879), termed the treaty of Livadia, whereby China recovered, not ImpeT > ud m deed the whole, but a considerable

portion of the tloa. ‘ disputed territory, on her paying to Russia five million roubles as the cost of occupation. The treaty was, however, received with a storm of indignation in China. Memorials poured in from all sides denouncing the treaty and its author. Foremost among these was one by Chang Chih- tung, who afterwards became the most distinguished of the viceroys, and governor-general of Hu-peh and Hu-nan provinces. Prince Chun, the emperor’s father, came into prominence at this juncture as an advocate for war, and under these combined influences the unfortunate Chung-how was tried and condemned to death (3rd of March 1880). For some months warlike pre- parations went on, and the outbreak of hostilities was imminent. In the end, however, calmer counsels prevailed. It was decided to send the Marquis Tseng, who in the meantime had become minister in London, to Russh to negotiate. A new treaty which still left Russia in possession of part of the Ili valley was ratified on the 19th of August 1881. The Chinese govern- ment could now contemplate the almost complete recovery of the whole extensive dominions which had at any time owned the imperial sway. The regions directly administered by the officers of the emperor extended from the borders of Siberia on the north to Annam and Burma on the south, and from the Pacific Ocean on the east to Kashgar and Yarkand on the west. There was also a fringe of tributary nations which still kept up the ancient forms of allegiance, and which more or less acknowledged the dominioi of the central kingdom. The principal tributary nations then were Korea, Lu-chu, Annam, Burma and Nepal.

Korea was the first of the dependencies to come into notice. In 1866 some Roman Catholic missionaries were murdered, and about the same time an American vessel was burnt in one of the rivers and her crew murdered. China refused satisfaction; both to France and America, and suffered reprisals to be made on Korea without protest. America and Japan both desired to conclude commercial treaties for the opening up of Korea, and proposed to negotiate with China. China refused and referred them to the Korean government direct, saying she was not wont to interfere in the affairs of her vassal states. As a result Japan concluded a treaty in 1876, in which the independence of Korea was expressly recognized. This was allowed to pass without protest, but as other nations proceeded to conclude treaties on the same terms China began to perceive her mistake, and endeavoured to tack on to each a declaration by the king that he was in fact a tributary — a declaration, however, which was quietly ignored. Japan, however, was the only power with which controversy immediately arose. In 1882 a faction fight, which had long been smouldering, broke out, headed by the king’s father, the Tai Won Kun, in the course of which

the Japanese legation was attacked and the whole Japanese colony had to flee for their lives. China sent troops, and by adroitly kidnapping the Tai Won Kun, order was for a time restored. The Japanese legation was replaced, but under the protection of a strong body of Japanese troops. Further revolu- tions and riots followed, in which the troops of the two countries took sides, and there was imminent danger of war. To obviate this risk, it was agreed in 1885 between Count Ito and Li Hung- Chang that both sides should withdraw their troops, the king being advised to engage officers of a third state to put his army on such a footing as would maintain order, and each undertook to give the other notice should it be found necessary to send troops again. In this way a modus vivendi was established which lasted till 1894.

We can only glance briefly at the domestic affairs of China dur- ing the period 1875-1882. The years 1877-1878 were marked by

Korea and Japan.

a famine in Shan-si and Shan-tung, which for duration and intensity has probably never been equalled. It was computed that 12 or 13 millions perished. It was vainly hoped that this loss of life, due mainly to defective com- D ° m * stlc

. -L . affaits,

mumcations, would induce the Chinese government isrs-1882. to listen to proposals for railway construction. The Russian scare had, however, taught the Chinese the value of telegraphs, and in 1881 the first line was laid from Tientsin to Shanghai. Further construction was continued without intermission from this date. A beginning also was made in naval affairs. The arsenal at Fuchow was turning out small composite gunboats, a training ship was bought and put under the command of a British officer. Several armoured cruisers were ordered from England, and some progress was made with the fortifications of Port Arthur and Wei-hai-wei. Forts were also built and guns mounted at Fuchow, Shanghai, Canton and other vulnerable points. Money for these purposes was abundantly supplied by the customs duties on foreign trade, and China had learnt that at need she could borrow from the foreign banks on the security of this revenue.

In 1881 the senior regent, the empress Tsz'e An, was carried off by a sudden attack of heart disease, and the empress Tsz'e Hsi remained in undivided possession of the supreme power during the remainder of the emperor Kwang-su's minority. Li Hung- Chang, firmly established

at Tientsin, within easy reach of the capital, as viceroy of the home province of Chihli and super- intendent of northern trade, enjoyed a larger share of his imperial mistress's favour than was often granted by the ruling Manchus to officials of Chinese birth, and in all the graver questions of foreign policy his advice was generally decisive.

While the dispute with Japan was still going on regarding Korea, China found herself involved in a more serious quarrel in respect of another tributary state which lay on the southern frontier. By a treaty made between France Tonˆdng and Annam in 1874, the Red river or Songkoi, which, Hanoi. rising in- south-western China, flows through Tongking, was opened to trade, together with the cities of Haiphong and Hanoi situated on the delta. The object of the French was to find a trade route to Yun-nan and Sze-ch'uen from a base of their own, and it was hoped the Red river would furnish such a route. Tongking at this time, however, was infested with bands of pirates and cut-throats, many of whom were Chinese rebels or ex-rebels who had been driven across the frontier by the suppression of the Yun-nan and Taiping rebellions, conspicuous among them being an organization called the Black Flags. And when in 1882 France sent troops to Tongking to restore order (the Annamese government having failed to fulfil its promises in that respect) China began to protest, claiming that Annam was a vassal state and under her protection.

France took no notice of the protest, declaring that the claim had merely an archaeological interest, and that, in any case, China in military affairs was a quantite nigligeable. France found, — .. however, that she had undertaken a very serious task in jt ? s trying to put down the forces of disorder (see Tongking). p raace The Black Flags were, it was believed, being aided by money and arms from China, and as time went on, the French were more and more being confronted with regular Chinese soldiers. Several forts, well within the Tongking frontier, were known to be garrisoned by Chinese troops. Operations continued with more or less success during the winter and spring of 1883-1884. Both sides, however, were desirous of an arrangement, and in May 1884 a con- vention was signed between Li Hung-Chang and a Captain Fournier, who had been commissioned ad hoc, whereby China agreed to with- draw her garrisons and to open her frontiers to trade, France agreeing, on her part, to respect the fiction of Chinese suzerainty, and guarantee the frontier from attack by brigands. No date had been fixed in the convention for the evacuation of the Chinese garrisons, and Fournier endeavoured to supplement this by a memorandum to Li Hung- Chang, at the same time announcing the fact to his government. In Pursuance of this arrangement the French troops proceeded to occupy angson on the

date fixed (21st June 1884). The Chinese com- mandant refused to evacuate, alleging, in a despatch which no one in the French camp was competent to translate, that he had received no orders, and begged for a short delay to enable him to communicate with his superiors. The French commandant ordered an attack, which was repulsed with severe loss. Mutual recriminations ensued. From Paris there came a demand for a huge indemnity as reparation

for the insult. The Peking government offered to carry out the convention, and to pay a small indemnity for the lives lost through the misunderstanding. This was refused, and hostilities recom- menced, or, as the French preferred to call them, reprisals, for the fiction was still kept up that the two countries were not at war. Under cover of this fiction the French fleet peaceably entered the harbour of Fuchow, having passed the forts at the entrance to the river without hindrance. Once inside, they attacked and destroyed the much inferior Chinese fleet which was then quietly at anchor, destroying at the same time a large part of the arsenal which adjoins the anchorage (23rd August 1884). Retracing its steps, the French fleet attacked and destroyed with impunity the forts which were built to guard the entrance to the Min river, and could offer no resistance to a force coming from the rear. After this exploit the French fleet left the mainland and continued its reprisals on the coast of Formosa. Kelung, a treaty port, was bombarded and taken, October 4th. A similar attempt, however, on the neighbouring port of Tamsui was unsuccessful, the landing party having been driven back to their ships with severe loss. The attempt was not renewed, and the fleet thereafter confined itself to a semi-blockade of the island, which was prolonged into 1885 but led to no practical results. Negotiations for peace, however, which had been for some time in progress through the mediation of Sir Robert Hart, were at this juncture happily concluded (April 1885). The terms were practically those of the Fournier convention of the year before, the demand for an indemnity having been quietly dropped.

China, on the whole, came out of the struggle with greatly increased prestige. She had tried conclusions with a first-class European power and had held her own. Incorrect Increased conclusions as to the military strength of China were oTchfna. consequently drawn, not merely by the Chinese them- selves — which was excusable — but by

European and even British authorities, who ought to have been better informed. War vessels were ordered by China both from England and Germany, and Admiral Lang, who had withdrawn his services while the war was going on, was re-engaged together with a number of British officers and instructors. The completion of the works at Port Arthur was taken in hand, and a beginning was made ii > the construction of forts at Wei-hai-wei as a second naval base. A new department was created for the control of naval affairs, at the head of which was placed Prince Chun, father of the emperor, who since the downfall of Prince Kung in 1884 had been taking a more and more prominent part in public affairs.

From 1885 to 1894 the political history of China does not call for extended notice. Two incidents, however, must be recorded, (1) the conclusion in 1886 of a convention with Great Britain, in which the Chinese government undertook to recognize British sovereignty in Burma, and (2) the temporary occupation of Port Hamilton by the British fleet (May 1885-February 1887). In 1890 Admiral Lang resigned his command of the Chinese fleet. During a temporary absence of Lang's colleague, Admiral Ting, the Chinese second in command, claimed the right to take charge — a claim which Admiral Lang naturally resented. The question was referred to Li Hung- Chang, who decided against Lang, whereupon the latter threw up his commission. From this point the fleet on which so much depended began to deteriorate. Superior officers again began to steal the men's pays, the ships were starved, shells filled with charcoal instead of powder were supplied, accounts were cooked, and all the corruption and malfeasance that were rampant in the army crept back into the navy.

The year 1894 witnessed the outbreak of the war with Japan. In the spring, complications again arose with Japan over Korea, and hostilities began in July. The story of the war is told elsewhere (see Chino- Japanese War), and it is unnecessary here to recount the details of the decisive victory of Japan. A new power had arisen in the Far East, and when peace was signed by Li Hung-Chang at Shimonoseki on the 17th of April 1895 it meant the beginning of a new epoch. The terms included the cession of Liao-tung peninsula, then in actual occupation by the Japanese troops, the cession of Formosa, an indemnity of H. taels 200,000,000 (about £30,000,000) and various commercial privileges.

The signature of this treaty brought the European powers on the scene. It had been for some time the avowed ambition of Russia to obtain an ice-free port as an outlet to her Siberian

isss-

1894.

War with

Japan,

1894.

Accordingly in **££**”

possessions — an ambition which was considered by British states-men as not unreasonable. It did not, therefore, at all suit her purposes to see the rising power of Japan commanding the whole of the coast-line of Korea.

the interval between the signature and the ratification vention. of the treaty, invitations were addressed by Russia to the great powers to intervene with a view to its modifica- tion on the ground of the disturbance of the balance of power, and fhe menace to China which the occupation of Port Arthur by the Japanese would involve. France and Germany accepted the invitation, Great Britain declined. In the end the three powers brought such pressure to bear on Japan that she gave up the whole of her continental acquisitions, retaining only the island of Formosa. The indemnity was on the other hand increased by H. taels 30,000,000. For the time the integrity of China seemed to be preserved, and Russia, France and Germany could pose as her friends. Evidence was, however, soon forthcoming that Russia and France had not been disinterested in rescuing Chinese territory from the Japanese grasp. Russia now obtained the right to carry the Siberian railway across Chinese territory from Stryetensk to Vladivostok, thus avoiding a long detour, besides giving a grasp on northern Manchuria. France obtained, by a convention dated the 20th of June 1895, a rectification of frontier in the Mekong valley and certain railway and mining rights in Kiang-si and Yun-nan. Both powers obtained con- cessions of land at Hankow for the purposes of a settlement. Russia was also said to have negotiated a secret treaty, fre- quently described as the ” Cassini Convention,” but more probably signed by Li Hung-Chang at Moscow, giving her the right in certain contingencies to Port Arthur, which was to be refortified with Russian assistance. And by way of further securing her hold, Russia guaranteed a 4% loan of £15,000,000 issued in Paris to enable China to pay off the first instalment of the Japanese indemnity. . . > • 1 ■ ■

The convention between France and China of the 20th of June 1895

brought China into sharp conflict with Great Mekong Britain. China, having by the Burma convention of valley 1886 agreed to recognize British sovereignty over dispute, Burma, her quondam feudatory, also agreed to a de- ,89S ‘ limitation of boundaries at the proper time. Effect was given to this last stipulation by a subsequent convention concluded in London (1st of March 1894), which traced the boundary line from the Shan states on the west as far as the Mekong river on the east. In the Mekong valley there were two semi-independent native territories over which suzerainty had been claimed in times gone by both by the kings of Ava and by the Chinese emperors. These territories were named Meng Lun and Kiang Hung — the latter lying partly on one side and partly on the other of the Mekong river, south of the point where it issues from Chinese territory. The bountiary line was so drawn as to leave both these territories to China, but it was stipulated that China should not alienate any portion of these territories to any other power without the previous consent of Great Britain. Yielding to French pressure, and regardless of the undertaking she had entered into with Great Britain, China, in the convention with France in June 1895, so drew the boundary line as to cede to France that portion of the territory of Kiang Hung which lay on the left bank of the Mekong. Compensation was demanded by Great Britain from China for this breach of faith, and at the same time negotiations were entered into with France. These resulted in a joint declaration by the governments of France and Great Britain, dated the 15th of January 1896, by which it was agreed as regards boundary that the Mekong from the point of its confluence with the Nam Huk northwards as far as the Chinese frontier should be the dividing line between the pos- sessions or spheres of influence of the two powers. It was also agreed that any commercial privileges obtained by either power in Yun-nan or Sze-ch’uen should be open to the subjects of the other. The negotiations with China resulted in a further agree- ment, dated the 4th of February 1897, whereby considerable modifications in favour of Great Britain were made in the Burma boundary drawn by the 1894 convention.

While Russia and France were profiting by what they were pleased to call the generosity of China, Germany alone had so far „. . received no reward for her share in compelling the ˆaoc ow, retrocess j on of Liao-tung; but, in November 1897, she Artbur, proceeded to help herself by

seizing the Bay of Wei-hai- Kiaochow in the province of Shan-tung. The act was wel ‘ done ostensibly in order to compel satisfaction for the

murder of two German missionaries. A cession was ultimately made by way of a lease for a term of ninety-nine years — Germany to have full territorial jurisdiction during the continuance of the lease, with liberty to erect fortifications, build docks, and exercise all the rights of sovereignty. In December the Russian fleet was sent to winter in Port Arthur, and though this was at first de- scribed as a temporary measure, its object was speedily disclosed by a request made, in January 1898, by the Russian ambassador in London that two British cruisers, then also anchored at Port Arthur, should be withdrawn ” in order to avoid friction in the Russian sphere of influence.” They left shortly afterwards, and their departure in the circumstances was regarded as a blow to Great Britain’s prestige in the Far East. In March the Russian government peremptorily demanded a lease of Port Arthur and the adjoining anchorage of Talienwan — a demand which China could not resist without foreign support. After an acrimonious correspondence with the Russian government Great Britain acquiesced in the fait accompli. The Russian occupation of Port Arthur was immediately followed by a concession to build a line of railway from that point northwards to connect with the Siberian trunk line in north Manchuria. As a counterpoise to the growth of Russian influence in the north, Great Britain obtained a lease of Wei-hai-wei, and formally took possession of it on its evacuation by the Japanese troops in May 1898.

After much hesitation the Chinese government had at last resolved to permit the construction of railways with foreign capital. An influential official named Sheng Hsuan-hwai was appointed director-general of railways, and empowered to enter into negotiations with foreign capitalists for that purpose. A keen competition thereupon ensued between syndicates of different nationalities, and their claims being espoused by their various governments, an equally keen international rivalry was set up. Great Britain, though intimating her preference for the ” open door ” policy, meaning equal opportunity for aoon” a N> y et found herself compelled to fall in with the and general movement towards what became known as the

“spheres > < sp heres of influence " policy, and claimed the Yangtsze "ttuence." va " e y as her particular sphere. This she did by the somewhat negative method of obtaining from the Chinese government a declaration that no part of the Yangtsze valley should be alienated to any foreign power. A more formal recognition of the claim, as far as

railway enterprise was con- cerned, was embodied in an agreement (28th of April 1899) between Great Britain and Russia, and communicated to the Chinese government, whereby the Russian government agreed not to seek for any concessions within the Yangtsze valley, including all the provinces bordering on the great river, together with Cheh-kiang and Ho-nan, the British government entering into a similar undertaking in regard to the Chinese dominions north of the Great Wall. 1

In 1899 Talienwan and Kiaochow were respectively thrown open by Russia and Germany to foreign trade, and, encouraged by these measures, the United States government initiated in September of the same year a correspondence with the great European powers and Japan, with a view to securing their definite adhesion to the ” open door ” policy. The British government gave an unqualified approval to the American proposal, and the replies of the other powers, though more guarded, were accepted at Washington as satisfactory. A further and more definite step towards securing the maintenance of the ” open door ” in China was the agreement concluded in October 1900 between the British and German governments. The signatories, by the first two articles, agreed to endeavour to keep the ports on the rivers and littoral free and open to international trade and economic activity, and to uphold this rule for all Chinese territory as far as (wo

1 A supplementary exchange of notes of the same date excepted from the scope of this agreement the Shan-hai-kwan-Niu-chwang extension which had already been conceded to the Hongkong & Shanghai Bank.

in the German counterpart) they could exercise influence ; not to use the existing complications to obtain territorial advantages in Chinese dominions, and to seek to maintain undiminished the territorial condition of the Chinese empire. By a third article they reserved their right to come to a preliminary understanding for the protection of their interests in China, should any other power use those compli- cations to obtain such territorial advantages under any form what- ever. On the submission of the agreement to the powers interested, Austria, France, Italy and Japan accepted its principles without express reservation — Japan first obtaining assurances that she signed on the same footing as an original signatory. The United States accepted the first two articles, but expressed no opinion on the third. Russia construed the first as limited to ports actually open in regions where the two signatories exercise ” their ” influence, and favourably entertained it in that sense, ignoring the reference to other forms of economic activity. She fully accepted the second, and observed that in the contingency contemplated by the third, she would modify her

attitude according to circumstances.

Meanwhile, negotiations carried on by the British minister at Peking during 1898 resulted in the grant of very important privileges to foreign commerce. The payment of the second instalment of the Japanese indemnity was becoming due, and it was much discussed how and on what terms China would be able to raise the amount. The Russian government, as has been stated, had made China a loan of the sum required for the first portion of the indemnity, viz. £15,000,000, taking a charge on the customs revenue as security. The British government was urged to make a like loan of £16,000,000 botn as a matter of friendship to China and as a counterpoise to the Russian influence. An arrangement was come to accordingly, on very favourable terms financially to the Chinese, but at the last moment they drew back, being overawed, as they said, by the threatening attitude of Russia. Taking advantage of the position which this refusal gave him, the British minister obtained from the Tsung-Li-Yamen, besides the declaration as to the non-alienation of the Yangtsze valley above mentioned, an undertaking to throw the whole of the inland waterways open to steam traffic. The Chinese government at the same time undertook that the post of inspector- general of customs (then held by Sir Robert Hart) should always be held by an Englishman so long as the trade of Great Britain was greater than that of any other nation. Minor concessions were also made, but the opening of the waterways was by far the greatest advance that had been made since i860.

Of still greater importance were the railway and mining concessions granted during the same year (1898). The Chinese government had been generally disposed to railway construction since the conclusion of the Japanese War, but hoped to be able to retain the control in their own hands. The masterful methods of Russia and Germany had obliged them to surrender this control so far as concerned Manchuria and Shan-tung. In the Yangtsze valley, Sheng, the director-general of railways, had been negotiating with several competing syndicates. One of these was a Franco- Belgian syndicate, which was endeavouring to obtain the trunk line from Hankow to Peking. A British company was tendering for the same work, and as the line lay mainly within the British sphere it was considered not unreasonable to expect it should be given to the latter. At a critical moment, however, the French and Russian ministers inter- vened, and practically forced the Yamen to grant a contract in favour of the Franco-Belgian company. The Yamen had a few days before explicitly promised the British minister that the contract should not be ratified without his having an opportunity of seeing it. As a penalty for this breach of

faith, and as a set-off to the Franco- Belgian line, the British minister required the immediate grant of all the railway concessions for which British syndicates were then negotiat- ing, and on terms not inferior to those granted to the Belgian line. In this way all the lines in the lower Yangtsze, as also the Shan-si Mining Companies' lines, were secured. A contract for a trunk line from Canton to Hankow was negotiated in the latter part of 1898 by an American company.

There can be little doubt that the powers, engrossed in the diplomatic conflicts of which Peking was the centre, had entirely underrated the reactionary forces gradually mustering for a struggle against the aggressive spirit of Western civilization. The lamentable consequences of administrative corruption and incompetence, and' the superiority of foreign methods which had been amply illustrated by the Japanese War, had at first produced a considerable impression, not only upon the more enlightened commercial classes, but even upon many of the younger members of the official classes in China. The dowager-. empress, who, in spite of the emperor Kwang-su having nominally attained his majority, had retained practical control of the supreme power until the conflict with Japan, had been held, not unjustly, to blame for the disasters of the war, and even before its conclusion the young emperor was adjured by some of the most responsible among his own subjects to shake himself free from the baneful restraint of "petticoat government,"

and himself take the helm. In the following years a reform movement, undoubtedly genuine, though opinions differ as to The reform the value of the popular support which it claimed, move- spread throughout the central and southern pro- ment, vinces of the empire. One of the most significant

1898. symptoms was the relatively large demand which

suddenly arose for the translations of foreign works and similar publications in the Chinese language which philanthropic societies, such as that " for the Diffusion of Christian and General Know- ledge amongst the Chinese," had been trying for some time past to popularize, though hitherto with scant success. Chinese newspapers published in the treaty ports spread the ferment of new ideas far into

the interior. Fifteen hundred young men of good family applied to enter the foreign university at Peking, and in some of the provincial towns the Chinese themselves subscribed towards the opening of foreign schools. Reform societies, which not infrequently enjoyed official coun- tenance, sprang up in many of the large towns, and found numerous adherents amongst the younger literati. Early in 1898 the emperor, who had gradually emancipated himself from the dowager-empress's control, summoned several of the reform leaders to Peking, and requested their advice with regard to the progressive measures which should be introduced into the government of the empire. Chief amongst these reformers was Kang Yu-wei, a Cantonese, whose scholarly attainments, com- bined with novel teachings, earned for him from his followers the title of the " Modern Sage." Of his more or less active sympathizers who had subsequently to suffer with him in the cause of reform, the most prominent were Chang Yin-huan, a member of the grand council and of the Tsung-Li-Yamen, who had represented his sovereign at Queen Victoria's jubilee in 1897; Chin Pao-chen, governor of Hu-nan; Liang Chichao, the editor of the reformers' organ, Chinese Progress; Su Chiching, a reader of the Hanlin College, the educational stronghold of Chinese conservatism; and his son Su In-chi, also a Hanlin man, and provincial chancellor of public instruction in Hu-nan.

It soon became evident that there was no more enthusiastic advocate of the new ideas than the emperor himself. Within a few months the vermilion pencil gave the imperial sanction to a succession of edicts which, had they been carried into effect, would have amounted to a revolution as far-reaching as that which had transformed Japan thirty years previously. The fossilized system of examinations for the public service was to be altogether superseded by a new schedule based on foreign learning, for the better promotion of which a number of temples were to be converted into schools for Western education; a state department was to be created for the translation and dissemina- tion of the standard works of Western literature and science; even the scions of the ruling Manchu race were to be compelled to study foreign languages and travel abroad; and last, but not least, all useless offices both in Peking and in the provinces were to be abolished. A further edict was even reported to be in contemplation, doing away with the queue or pigtail, which, originally imposed upon the Chinese by their Manchu conquerors as a badge of subjection, had gradually become the most characteristic and most cherished feature of the national dress. But the bureaucracy of China, which had battened for centuries on corruption and ignorance, had no taste for self- sacrifice. Other vested interests felt themselves equally threatened, and behind

them stood the whole latent force of popular superstition and unreasoning conservatism.

The dowager-empress saw her opportunity. The Summer Palace, to which she had retired, had been for some time the centre of resistance to the new movement, and in the middle of September 1898 a report became current that, in order to put an end to the obstruction which hampered his reform policy, the emperor intended to seize the person of the dowager-empress and have her deported into the interior. Some colour was given to this report by an official announcement that the emperor would hold, a review of the foreign-drilled troops at Tientsin, and had summoned Yuan Shihkai, their general, to Peking in order to confer with him on the necessary arrangements. But the re-

formers had neglected to secure the goodwill of the army, which was still entirely in the hands of the reactionaries. During the night of the 20th of September the palace of the em- The peror was occupied by the soldiers, and on the following Empress's day Kwang-su, who was henceforth virtually a prisoner cou f in the hands of the empress, was made to issue an ""■*• edict restoring her regency. Kang Yu-wei, warned at the last moment by an urgent message from the emperor, succeeded in escaping, but many of the most prominent reformers were arrested, and six of them were promptly executed. The Peking Gazette announced a few days later that the emperor himself was dangerously ill, and his life might well have been despaired of had not the British minister represented in very emphatic terms the serious consequences which might ensue if anything happened to him. Drastic measures were, however, adopted to stamp out the reform movement in the provinces as well as in the capital. The reform edicts were cancelled, the reformers' associations were dissolved, their newspapers suppressed, and those who did not care to save themselves by a hasty recantation of their errors were imprisoned, proscribed or exiled. In October the reaction had already been accompanied by such a recrudescence of anti- foreign feeling that the foreign ministers at Peking had to bring up guards from the fleet for the protection of the legations, and to demand the removal from the capital of the disorderly Kan-suh soldiery which subsequently played so sinister a part in the troubles of June 1900. But the unpleasant impression produced by these incidents was in a great measure removed by the demonstrative reception which the empress Tsz'e Hsi gave on the 15th of October to the wives of the foreign representatives — an act of courtesy unprecedented in the annals of the Chinese court.

The reactionary tide continued to rise throughout the year 1899, but it did not appear materially to affect the foreign relations of China.

Towards the end of the year The Boxer the brutal murder of Mr Brooks, an English mis- move- sionary, in Shan-tung, had compelled attention to a m ^' popular movement which had been spreading rapidly throughout that province and the adjoining one of Chih-li with the connivance of certain high officials, if not under their direct patronage. The origin of the " Boxer " movement is obscure. Its name is derived from a literal translation of the Chinese designation, " the fist of righteous harmony." Like the kindred " Big Sword " Society, it appears to have been in the first instance merely a secret association of malcontents chiefly drawn from the lower classes. Whether the empress Tsz'e Hsi and her "Manchu advisers had deliberately set themselves from the beginning to avert the danger by deflecting what might have been a revolutionary movement into anti-foreign channels, or whether with Oriental heedlessness they had allowed it to grow until they were powerless to control it, they had unquestionably resolved to take it under their protection before the foreign representatives at Peking had realized its gravity. The outrages upon native Christians and the threats against foreigners generally went on increasing. The Boxers openly displayed on their banners the device: " Exterminate the foreigners and save the dynasty," yet the representatives of the powers were unable to obtain any effective measures against the so-called " rebels," or even a definite condemnation of their methods. 1

Four months (January-April 1900) were spent in futile inter- views with the Tsung-Li-Yamen. In May a number of Christian villages were destroyed and native converts massacred near the capital. On the 2nd of June two English missionaries, Mr Robinson and Mr Norman, were murdered at Yung Ching, 40 m. from Peking. The whole country was overrun with bands of Boxers, who tore up the railway and set fire to the stations at different points on the Peking-Tientsin line. Fortunately a

1 The religious aspect of the Boxer movement gave it strength. Its disciples believed that the spirits which defended China were incensed by the introduction of Western methods and ideals. Many of them believed themselves to be invulnerable to any Western weapon. (See Lord W. Cecil, Changing China, 1910, ch. i.)

mixed body of marines and bluejackets of various nationalities, numbering 18 officers and 389 men, had reached Peking on the 1st of June for the protection of the legations. The whole city was in a state of turmoil. Murder and pi.'lage were of daily occurrence. The reactionary Prince Tuan (grandson of the emperor Tao-kwang) and the Manchus generally, together with the Kan-suh soldiery under the notorious Tung-fu-hsiang, openly sided with the Boxers. The European residents and a large number of native converts took refuge in the British legation, where preparations were hastily made in view of a threatened attack. On the nth the chancellor of the Japanese legation, Mr Sugiyama, was murdered by Chinese soldiers. On the night of the 13th most of the foreign buildings, churches and mission houses in the eastern part of the Tatar city were pillaged and burnt, and hundreds of native Christians massacred. On the 20th of June the German minister, Bai;on von Ketteler, was murdered whilst on his way to the Tsung-Li-Yamen. At 4 p.m. on the afternoon of the 20th the Chinese troops opened fire upon the legations. The general direction of the defence was undertaken by Sir Claude Macdonald, the British minister.

Meanwhile Peking had been completely cut off since the 14th from all communication with the outside world, and in view of later- tne g rav i tv 0I tne situation, naval and military forces national were being hurried up by all the powers to the Gulf expedi- of Chih-li. On the 10th of June Admiral Sir E. Seymour iloa ' had already left Tientsin with a mixed force of 2000

British, Russian, French, Germans, Austrians, Italians, Ameri- cans and Japanese, to repair the railway and restore communica- tions with Peking. But his expedition met with unexpectedly severe resistance, and it had great difficulty in making good its retreat after suffering heavy losses. When it reached Tientsin again on the 26th of June, the British contingent of 915 men had alone lost 124 killed and wounded out of a total casualty list of 62 killed and 218 wounded. The Chinese had in the meantime made a determined attack upon the foreign settlements at Tientsin, and communication between the city and the sea being also threatened, the Taku forts at the mouth of the Pei-ho were captured by the allied admirals on the 17 th. The situation at Tientsin nevertheless continued precarious, and it was not till the arrival of considerable reinforcements that the troops of the allied powers were able to assume the offensive, taking the native city by storm on July 14th, at a cost, however, of over 700 killed and wounded. Even in this emergency inter- national jealousy had grievously delayed the necessary con- centration of forces. No power was so favourably situated to take immediate action as Japan, and the

British government, who had strongly urged her to act speedily and energetically, undertook at her request to sound the other powers with regard to her intervention. No definite objection was raised, but the replies of Germany and Russia barely disguised their ill-humour. Great Britain herself went so far as to offer Japan the assistance of the British treasury, in case financial difficulties stood in the way, but on the same day on which this proposal was telegraphed to Tokyo (6 th of July), the Japanese government had decided to embark forthwith the two divisions which it had already mobilized. By the beginning of August one of the Indian brigades had also reached Tientsin together with smaller rein- forcements sent by the other powers, and thanks chiefly to the energetic counsels of the British commander, General Sir Alfred Gaselee, a relief column, numbering 20,000 men, at last set out for Peking on the4th of August, a British naval brigade having started up river the previous afternoon. After a series of small engage- ments and very trying marches it arrived within striking distance cf Peking on the evening of the 13th. The Russians tried to steal a march upon the allies during the night, but were checked at the walls and suffered heavy losses. The Japanese attacked another point of the walls the next morning, but met with fierce opposi- tion, whilst the Americans were delayed by getting entangled in the Russian line of advance. The British contingent was more fortunate, and skilfully guided to an unguarded water-gate, General Gaselee and a party of Sikhs were the first to force their way through to the British legation. About 2 p.m.

on the afternoon of the 14th of August, the long siege was raised.

For nearly six weeks after the first interruption of communica- tions, no news reached the outside world from Peking except a few belated messages, smuggled through the Chinese lines by native runners, urging the imperative neces- fl eg ˆfJ ln sity of prompt relief. During the greater part of that legations. period the foreign quarter was subjected to heavy rifle and artillery fire, and the continuous fighting at close quarters with the hordes of Chinese regulars, as well as Boxers, decimated the scanty ranks of the defenders. The supply of both ammuni- tion and food was slender. But the heroism displayed by civilians and professional combatants alike was inexhaustible. In their anxiety to burn out the British legation, the Chinese did not hesitate to set fire to the adjoining buildings of the Hanlin, the ancient seat of Chinese classical learning, and the storehouse of priceless literary treasures and state archives. The Fu, or palace, of Prince Su, separated only by a canal from the British legation, formed the centre of the international position, and was held with indomitable valour by a small Japanese force under Colonel Sheba, assisted by a few Italian marines and volunteers of other” nationalities and a number of

Christian Chinese. The French legation on the extreme right, and the section of the city wall held chiefly by Germans and Americans, were also points of vital importance which had to bear the brunt of the Chinese attack. !

Little is known as to what passed in the councils of the Chinese court during the siege. 1 But there is reason to believe that throughout that period grave divergences of opinion existed amongst the highest officials. The attack upon the legations appears to have received the sanction of the dowager-empress, acting upon the advice of Prince Tuan and the extreme Manchu party, at a grand council held during the night of the i8th/i9th June, upon receipt of the news of the capture of the Taku forts by the international forces. The emperor himself, as well as Prince Ching and a few other influential mandarins, strongly protested against the empress's decision, but it was acclaimed by the vast majority of those present. Three members of the Tsung- Li-Yamen were publicly executed for attempting to modify the terms of an imperial edict ordering the massacre of all foreigners throughout the provinces, and most of the Manchu nobles and high officials, and the eunuchs of the palace, who played an important part in Chinese

Eolitics throughout the dowager-empress's tenure of power, were eart and soul with the Boxers. But it was noted by the defenders of the legations that Prince Ching's troops seldom took part, or only in a half-hearted way, in the fighting, which was chiefly conducted by Tung-f u-hsiang's soldiery and the Boxer levies. The modern artillery which the Chinese possessed was only spasmodically brought into play. Nor did any of the attacking parties ever show the fearlessness and determination which the Chinese had somewhat unexpectedly displayed on several occasions during the fighting at and around Tientsin. Nevertheless, the position of the defenders at the end of the first four weeks of the siege had grown well-nigh desperate. Mining and incendiarism proved far greater dangers than shot and shell. Suddenly, j ust when things were looking blackest , on the 1 7th of July the Chinese ceased firing, and a sort of informal armistice secured a period of respite for the beleaguered Europeans. The capture of the native city of Tientsin by the allied forces had shaken the self-confidence of the Chinese authorities, who had hitherto not only countenanced, but themselves directed the hostilities. 2 De- sultory fighting, nevertheless, continued, and grave fears were enter- tained that the approach of the relief column would prove the signal for a desperate attempt to rush the legations. The attempt was made, but failed. The relief, however, came not a day too soon. Of the small band of defenders which, including civilian volunteers, had never mustered 500, 65 had been killed and 131 wounded. Ammunition and

provisions were almost at an end. Even more desperate was the situation at the Pei-tang, the Roman Catholic northern cathedral and mission house, where, with the help of a small body of French and Italian marines, Mgr Favier had organized an independent centre of resistance for his community of over 3000 souls. Their rations were absolutely exhausted when, on the 15th

1 The diary of a Manchu noble printed in China under the Empress Dowager (1910) by J. O. Bland and E. Backhouse throws light on the subject. It was to Jung-Lu, father-in-law of Prince Chin, that the legations owed their escape from extermination.

a It was at this time (July 17th) that the intense anxiety of the civilized world with regard to the fate of the besieged reached its culminating point. Circumstantial accounts of the fall of the lega : tions and the massacre of their inmates were circulated in Shanghai and found general credence. It was not till near the end of the month that an authentic message from the American minister proved these fears to be premature.

of August, a relief party was despatched to their assistance from the legations.

The ruin wrought in Peking during the two months' fighting was appalling. Apart from the wholesale destruction of foreign

property in the Tatar city, arid of Chinese as well as Pekhuf" European buildings in the vicinity of the legations, the

wealthiest part of the Chinese city had been laid in ashes. The flames from a foreign drug store fired by the Boxers had spread to the adjoining buildings, and finally consumed the whole of the business quarter with all its invaluable stores of silks, curiosities, furs, &c. The retribution which overtook Peking after its capture by the international forces was scarcely less terrible. Looting was for some days almost universal. Order was, however, gradually restored, first in the Japanese and then in the British and American quarters, though several months elapsed before there was any real revival of native confidence.

So unexpected had been the rapid and victorious advance of Ihe allies, that the dowager-empress with the emperor and the Plight rest ˚f the court did not actually leave Peking until of the the day after the legations had been relieved. But Chinese the northern and western portions of the Tatar city «””*• had not yet been occupied, and the fugitives made

good their escape on the 15th. When the allies some days later inarched through the Forbidden City, they only found a few eunuchs and subordinate officials in charge of the imperial apartments. At the end of September, Field Marshal Count von Waldersee, with a German expeditionary force of over 20,000 men, arrived to assume the supreme command conferred upon him with the more or less willing assent of the other powers.

The political task which confronted the powers after the occu- pation of Peking was far more arduous than the military one.

The action of the Russians in Manchuria, even in a Restora- t rea ty p or t like Niu-chwang, the seizure of the railway order. ˆ me not on ty to the north of the Great Wall, but also

from Shan-hai-kwan to Peking, by the Russian military, authorities, and the appropriation of an extensive line of river frontage at Tientsin as a Russian ” settlement,” were difficult to reconcile with the pacific assurances of disinterestedness which Russia, like the rest of the powers, had officially given. Great anxiety prevailed as to the effect of the flight of the Chinese court in other parts of the empire. The anti-foreign movement had not spread much beyond the northern provinces, in which it had had the open support of the throne and of the highest provincial officials. But among British and Americans alone, over 200 defenceless foreigners, men, women and children, chiefly mission- aries, had fallen victims to the treachery of high-placed mandarins like Yii Hsien, and hundreds of others had had to fly for their lives, many of them owing their escape to the courageous protec- tion of petty officials and of the local gentry and peasantry. In the Yangtsze valley order had been maintained by the energy of the viceroys of Nanking and Wu-chang, who had acted ‘ throughout the critical period in loyal co-operation with the British consuls and naval commanders, and had courageously disregarded the imperial edicts issued during the ascendancy of the Boxers. After some hesitation, an Indian brigade, followed by French, German and Japanese contingents, had been landed at Shanghai for the protection of the settlements, and though the viceroy, Liu Kun-yi, had welcomed British sup- port, and even invited the joint occupation of the Yangtsze forts

by British and Chinese troops, the appearance of other European forces in the Yangtsze valley was viewed with great suspicion. In the south there weie serious symptoms of unrest, especially after Li Hung-Chang had left Canton for the north, in obedience, as he alleged at the time, to an imperial edict which, there is reason to believe, he invented for the occasion. The Chinese court, after one or two intermediate halts, had retired to Si-gan-fu, one of the ancient capitals of the empire, situated in the inaccessible province of Shen-si, over 600 m. S.W. of Peking. The influence of the ultra-reactionaries, headed by Prince Tuan and General Tung-fu-hsiang, still dominated its councils, although credentials were sent to Prince Ching and to Li Hung-Chang, who, after waiting upon events at Shanghai, had proceeded to Peking,

authorizing them to treat with the powers for the re-establish- ment of friendly relations.

The harmony of the powers, which had been maintained with some difficulty up to the relief of the legations, was subjected to a severe strain as soon as the basis of negotiations with the Chinese government came to be discussed. Measures While for various reasons Russia, Japan and the f jo ” Para ” United States were inclined to treat China with great indulgence, Germany insisted upon the signal punishment of the guilty officials as a conditio sine qua non, and in this she had the support not only of the other members of the Triple Alliance, but also of Great Britain, and to some extent even of France, who, as protector of the Roman Catholic Church in Eastern countries, could not allow the authors of the atrocities committed upon its followers to escape effectual punishment. It was not until after months of laborious negotiations that the demands to be formally made upon the Chinese government were em bodied in a joint note signed by all the foreign ministers on the 20th and 21st of December 1900. The demands were sub- stantially as follows:

Honourable reparation for the murder of von Ketteler and of Mr Sugiyama, to be made in a specified form, and expiatory monuments to be erected in cemeteries where foreign tombs had been desecrated. _” The most severe punishment befitting their crimes ” was to be inflicted on the personages designated by the decree of the 21st of September, and also upon others to be designated later by the foreign ministers, and the official examinations were to be suspended in the cities where foreigners had been murdered or ill-treated. An equitable indemnity, guaranteed by financial measures acceptable to the powers, was to be paid to states, societies and individuals, including Chinese who had suffered because of their employment by foreigners,

but not including Chinese Christians who had suffered only on account of their faith. The importation or manufacture of arms or materiel was to be forbidden; permanent legation guards were to be maintained at Peking, and the diplomatic quarter was to be fortified, while communication with the sea was to be secured by a foreign military occupation of the strategic points and by the demolition of the Chinese forts, including the Taku forts, between the capital and the coast. Proclamations were to be posted throughout China for two years, threatening death to the members of anti-foreign societies, and recording the punishment of the ringleaders in the late outrages: and the viceroys, governors and provincial officials were to be declared by imperial edict responsible, on pain of immediate dismissal and perpetual disability to hold office, for anti-foreign outbreaks or violations of treaty within their jurisdictions. China was to facilitate commercial relations by negotiating a revision of the commercial treaties. The Tsung-Li-Yamen was to be reformed and the ceremonial for the reception of foreign ministers modified as the powers should demand. Compliance with these terms was declared to be a condition precedent to the arrangement of a time limit to the occupation of Peking and of the provinces by foreign troops.

Under instructions from the court, the Chinese plenipoten- tiaries affixed their signatures on the 14th of January 1901 to a protocol, by which China pledged herself to accept these terms in principle, and the conference of ministers then proceeded to discuss the definite form in which compliance with them was to be exacted. This further stage of the negotiations proved even more laborious and protracted than the preliminary proceedings. No attempt was made to raise the question of the dowager-empress's responsibility for the anti-foreign movement, as Russia had from the first set her face against the introduction of what she euphe- mistically termed " the dynastic question." But even with regard to the punishment of officials whose guilt was beyond dispute, grave divergences arose between the powers. The death penalty was ultimately waived in the case even of such con- spicuous offenders as Prince Tuan and Tung-fu-hsiang, but the notorious Yii Hsien and two others were decapitated by the Chinese, and three other metropolitan officials were ordered to commit suicide, whilst upon others sentences of banishment, imprisonment and degradation were passed, in accordance with a list drawn up by the foreign representatives. The question of the punishment of provincial officials responsible for the massacre of scores of defenceless men, women and children was unfor- tunately reserved for separate treatment, and when it came up for discussion it became impossible to preserve even the semblance of unanimity, the

Russian minister at once taking issue with his colleagues, although he had originally pledged himself as formally as the others to the principle. Count

Lamsdorff frankly told the British ambassador at St Petersburg that Russia took no interest in missionaries, and as the foreigners massacred in the provinces belonged mostly to that class, she declined to join in the action of the other powers.

The real explanation of Russia's cynical secession from the concert of powers on this important issue must be sought in her

anxiety to conciliate the Chinese in view of the separate *""»*»? negotiations in which she was at the same time engaged churls. w it n China in respect of Manchuria. When the Boxer

movement was at its height at the end of June 1900, the Chinese authorities in Manchuria had wantonly " declared war " against Russia, and for a moment a great wave of panic seems to have swept over the Russian administration, civil and military, in the adjoining provinces. The reprisals exercised by the Russians were proportionately fierce. The massacre at Blagovyeshchensk, where 5000 Chinese — men, women and children — were flung into the Amur by the Cossacks, was only one incident in the reign of terror by which the Russians sought to restore their power and their prestige. The resistance of the Chinese troops was soon overcome, and Russian forces overran the whole province, occupying even the treaty port of Niu-chwang. The Russian government officially repudiated all responsibility for the proclamations issued by General Gribsky and others, foreshadow- ing, if not actually proclaiming, the annexation of Chinese territory to the Russian empire. But Russia was clearly bent on seizing the opportunity for securing a permanent hold upon Manchuria. In December 1900 a preliminary agreement was made between M. Korostovetz, the Russian administrator- general, and Tseng, the Tatar general at Mukden, by which the civil and military administration of the whole province was virtually placed under Russian control. In February 1901 negotiations were opened between the Russian government and the Chinese minister at St Petersburg for the conclusion of a formal convention of a still more comprehensive

character. In return for the restoration to China of a certain measure of civil authority in Manchuria, Russia was to be confirmed in the possession of exclusive military, civil and commercial rights, constituting in all but name a protectorate, and she was also to acquire preferential rights over all the outlying provinces of the Chinese empire bordering on the Russian dominions in Asia. The clauses relating to Chinese Turkestan, Kashgar, Yarkand, Khotan and Mongolia were subsequently stated to have been dropped, but the convention nevertheless provoked considerable opposition both in foreign countries and amongst the Chinese themselves. Most of the powers, including Germany, who, however, denied that the Anglo-German agree- ment of the 16th of October 1900 applied to Manchuria, 1 advised the Chinese government not to pursue separate negotiations with one power whilst collective negotiations were in progress at Peking, and both Japan and Great Britain pressed for definite information at St Petersburg with regard to the precise tenor of the proposed convention. At the same time the two viceroys of the lower Yangtsze memorialized the throne in the strongest terms against the convention, and these protests were endorsed not only by the great majority of Chinese officials of high rank throughout the provinces, but by popular meetings and influ- ential guilds and associations. Ultimately the two viceroys, Chang Chih-tung and Liu Kun-yi, 2 took the extreme step of warning the throne that they would be unable to recognize the convention, even if it were ratified, and notwithstanding the pressure exercised in favour of Russia by Li Hung-Chang, the court finally instructed the Chinese minister at St Petersburg to decline his signature. The attitude of Japan, where public

1 In negotiating this agreement Lord Salisbury appears to have been largely influenced by the aggressive features of Russia's action in North China, while Germany appears to have been actuated by a desire to forestall isolated action by Great Britain in the Yangtsze basin. In Germany the agreement was known as the Yangtsze Agreement. Great Britain held, however, that it applied equally to Manchuria.

2 Liu Kun-yi died in 1902. In the same year died Tao-mu, the viceroy of Canton. In these men China lost two of her most capable and enlightened officials.

feeling ran high, was equally significant, and on the 3rd of April the Russian government issued a circular note to the powers, stating that, as the generous intentions of Russia had been misconstrued, she withdrew the proposed convention.

The work of the conference at Peking, which had been tem- porarily disturbed by these complications, was then resumed. Friction between European troops of different nation- alities and an Anglo-Russian dispute over the construe- The peace tion of certain roads and railway sidings at Tientsin /po/”**’ showed that an international occupation was fraught with manifold dangers. The question of indemnities, however, gave rise to renewed friction. Each power drew up its own claim, and whilst Great Britain, the United States and Japan displayed great moderation, other powers, especially Germany and Italy, put in claims which were strangely out of proportion to the services rendered by their military and naval forces. It was at last settled that China should pay altogether an in- demnity of 450 million taels, to be secured (1) on the unhypothe- cated balance of the customs revenue administered by the im- perial maritime customs, the import duties being raised forthwith to an effective 5% basis; (2) on the revenues of the ” native ” customs in the treaty ports; (3) on the total revenues of the salt gabelle. Finally the peace protocol was drawn up in a form which satisfied all the powers as well as the Chinese court. The formal signature was, however, delayed at the last moment by a fresh difficulty concerning Prince Chun’s penitential mission to Berlin. This prince, an amiable and enlightened youth, 3 son of the Prince Chun who was the emperor Hien-feng’s brother, and thus himself half-brother to the emperor Kwang-su, had reached Basel towards the end of August on his way to Germany, when he was suddenly informed that he and his suite would be expected to perform kowtow before the German emperor. The prince resented this unexpected demand, and referred home for instructions. The Chinese court appear to have remained obdurate, and the German government perceived the mistake that had been made in exacting from the Chinese prince a form of homage which Western diplomacy had for more than a century refused to yield to the Son of Heaven, on the ground that it was barbarous and degrading. The point was waived, and Prince Chun was received in solemn audience by the emperor William at Potsdam on the 4th of September. Three days later, on the 7th of September, the peace protocol was signed at Peking.

The articles recorded the steps to be taken to satisfy the demands of the powers as to commerce. • Article n provided for the amendment of existing treaties of commerce and navigation, and for river conservancy measures at Tientsin and Shanghai. The British government appointed a special com- mission, with Sir J. Mackay, member of the council of India, as chief commissioner, to proceed to Shanghai to carry on the negotiations, and a commercial treaty was signed at Shanghai on the 6th of September 1902, by which existing

obstacles to foreign trade, such as likin, &c, were removed, regulations were made for > facilitating steamer navigation on inland waters, and several new ports were opened to foreign commerce.

In accordance with the terms of the protocol, all the foreign troops, except the legation guards, were withdrawn from Peking on the 17th of September, and from the rest of Chih-li, except the garrisons at the different points specified along the line of communications, by the 22nd of September. On the 7th of October it was announced that the Chinese court had left Si-gan- fu on its way back to the northern capital. A month later (7th, of November) the death of Li Hung-Chang at Peking removed, if not the greatest of Chinese statesmen, at any rate the one who had enjoyed the largest share of the empress-dowager's confidence. (V. C.)

(E) — From igoi to igio. The events connected with the Boxer rising and its sup- pression demonstrated even more forcibly than had the war with Japan in 1894-1895 the necessity for the adoption of

3 Prince Chun was born in 1882. He was the first member of the imperial family to be sent on a foreign mission.

Western methods in many departments of life and administra- tion if China was to maintain the position of a great power. The necessity for a thorough reform of the adminis- " Awaken- (- ra |-j on was w idely recognized in iooi, and among the China." progressive classes of the community much dis- appointment was manifested because the powers had failed to insist, in the conditions of peace, on a reorganization of the machinery of government. The Yangtsze viceroys, the viceroy at Canton, Yuan Shih-kai and other high mandarins repeatedly memorialized the throne to grant effective reforms. While at Si-gan-fu the court did in fact issue several reform decrees, but at the same time all authority remained in the hands of reac- tionaries. There had been an awakening in China, but another lesson — afforded a few years later by the Russo-Japanese War — was needed before the reform party was able to gain real power. For three or four years following the signing of the peace protocol of iooi it seemed indeed that there would be little change in the system of government, though in some directions a return to the old state of

affairs was neither possible nor desired. On the 7th of January 1902 the court returned to Peking — a step which marked the restoration, more or less, of normal conditions. The failure of the Boxer movement, in which, as has been shown, she was deeply implicated, had im- pressed upon the dowager empress the need for living on better terms with foreign powers, but the reform edicts issued from Si-gan-fu remained largely inoperative, though some steps were taken to promote education on Western lines, to readjust the land tax, and especially to reorganize the military forces (though on provincial rather than on a national basis). The building of railways was also pushed on, but the dowager empress was probably at heart as reactionary as she had proved in 1898. The emperor himself from his return to Peking until the day of his death appeared to have little influence on public affairs. The most disquieting feature of the situation in the years im- mediately following the return of the court to Peking was the continued efforts of Russia to obtain full control of Manchuria and a predominant influence in north China. The Chinese government was powerless to stem the advance of Russia, and the dowager empress herself was credited with indifference to the fate of Manchuria. It was the menace to other powers, notably Japan, involved in Russia's action which precipitated an issue in which the destinies of China were involved. Before considering the results of that struggle (the Russo-Japanese War) the chief events of the years 1902-1905 may be outlined.

The dowager empress from the day of her return from Si-gan-fu set herself to conciliate the foreign residents in Peking. Many Relations f° re ig n onlookers were gathered on the wall of the with Tatar city to witness the return of the court, and to

Buro- these the dowager empress made a deep bow twice, peans. aQ a pp aren tiy trivial incident which made a lasting impression. On the 1st of February following the dowager empress received the ladies of the various embassies, when she bewailed the attack on the legations, entertained her guests to tea and presented each with articles of jewelry, and from that time onward, as occasion offered, Tsz'e Hsi exchanged compli- ments and civilities with the foreign ladies in Peking. Moreover, Sir Robert Hart — after having been nearly forty years in China- was now presented at court, as well as Bishop Favier and others. Henceforth attacks on foreigners received no direct encourage- ment at court. Tung Fu-hsiang, 1 who had been banished to the remote province of Kan-suh, had at his command there his old Boxer troops, and his attitude caused anxiety at the end of 1902. He was said to have received support from Prince Tuan — who had been obliged to retire to Mongolia — but events proved that the power or

the intention of these reactionaries to create trouble had been miscalculated. There were indeed serious Boxer disturbances in Sze-ch'uen in 1902, but they were put down by a new viceroy sent from Peking. Notwithstanding the murder of fifteen missionaries during

1 Tung Fu-hsiang died in 1908. A sum of some £80,000 belonging to him, and left in the provincial treasury , was appropriated for works of public utility (see The Times, April 9th, 1910).

1902-1965, there was in general a marked improvement in the relations between the missionaries, the official classes and the bulk of the people, and an eagerness was shown in several provinces to take advantage of their educational work. This was specially marked in Hu-nan, a province which had been for long hostile to missionary endeavours. Illustrative of the attitude of numbers of high officials was the attendance of the viceroy of Sze-ch'uen, with the whole of his staff, at. the opening in 1905 at Cheng-tu of new buildings of the Canadian Methodist Mission. This friendly attitude towards the missions was due in part to the influence of Chinese educated abroad and also, to a large extent, to the desire to take advantage of Western culture. The spread of this new spirit was coincident with an agitation for independence of foreign control and the deter- mination of the Chinese to use modern methods to attain their ends. Thus in 1905 there was an extensive boycott of American goods throughout China, as a retaliatory measure for the exclusion of Chinese from the United States. Re- garding China as a whole the attitude of the people towards Europeans was held to indicate that the general view was, not that the Boxer teaching was false, but that the spirits behind Western religion were more powerful than those behind Boxer- dom. The spiritual prestige of Christianity and respect for the power of the foreigner were direct outcomes of the failure of the Boxers. 2 The British expedition to Tibet in 1904, the occupation of Lhassa in August of that year, the flight of the Dalai Lama to Mongolia, gave grave concern to the Chinese government — which showed much persistence in enforcing its suzerain rights in Tibet — but did not, apparently, cause any ill- feeling towards Great Britain among the Chinese people — who viewed with seeming equanimity the flight of the head of the Buddhist religion from the headquarters of that faith. The country generally was peaceful, a rebellion in Kwang-si — where a terrible famine occurred in 1903 — being suppressed in 1904 by the forces of the viceroy at Canton.

The expiatory measures required of China in connexion with the Boxer rising were carried through. China during 1902 recovered possession of the Peking-Tientsin railway and commer- of the city of Tientsin,

which was evacuated by the clai and foreign troops in August of that year. The foreign railway troops were also all withdrawn from Shanghai by aro ˆ ress – January 1903. The conclusion of a new commercial treaty between Great Britain and China in September 1902 has already been recorded. The payment of the indemnity instalments occasioned some dispute owing to the fall in silver in 1902, but the rise in the value of the tael in subsequent years led China to agree to the payment of the indemnity on a gold basis. The increase in revenue was a notable feature of the maritime customs in 1903-1905. This result was in part due to the new arrangements under the commercial treaty of 1902, and in part to the opening up of the country by railways. In especial the great trunk line from Peking to Hankow was pushed on. The line, including a bridge nearly 2 m. long over the Yellow river was completed and opened for traffic in 1905. The first section of the Shanghai-Nanking railway was opened in the same year. At this time the Chinese showed a strong desire to obtain the control of the various lines. During 1905, for instance, the Canton-Hankow railway concession was repurchased by the Chinese government from an American company, while the Pekin Syndicate, a British concern, also sold their railway in Ho-nan to the Chinese government.

Russia's action regarding Manchuria overshadowed, however, all other concerns during this period. The withdrawal of the proposed Russo-Chinese agreement of 1901 has been chronicled. The Russian government had, however, no intention of abandon- ing its hold on Manchuria. It aimed not only at effective military control but the reservation to Russian subjects of mining, railway and commercial rights. Both the sovereignty of China and the commercial interests of other nations were menaced. This led to action by various powers. The preamble of the Anglo- Japanese treaty of the 30th of January 1902 declared the main 2 Lord W. Cecil, op. cit. p. 9.

motives of the contracting parties to be the maintenance of the independence and territorial integrity of China and Korea, and

the securing of equal opportunities in those countries churia. ˆ or tne commerce and industry of all nations, i.e. the

policy of the ” open door.” Protests were lodged by Great Britain, Japan and the United States against the grant of exclusive rights to Russian subjects in Manchuria. Russia asserted her intention to respect the commercial rights of other nations, and on the 8th of April 1902 an agreement was signed at Peking which appeared to show the good faith of the Russian government, as it provided for the withdrawal of the Russian troops in Manchuria within eighteen months from that date. In accordance with this agreement the Shan-hai-kwan- Niu-chwang railway was transferred to China in October 1902 and the district between Shan-hai-kwan and the Liao river evacuated by Russia. But it soon appeared that Russia’s hold on the country had not relaxed. Advantage was taken of the terms of concession granted in August 1896 to the Russo- Chinese Bank 1 to erect towns for Russian colonists and to plant garrisons along the line of railway, and to exclude Chinese jurisdiction altogether from the railway zone. The so-called evacuation became in fact the concentration of the Russian forces along the line of railway. Moreover, the maritime customs at Niu-chwang were retained by the Russo-Chinese Bank despite protests from the Chinese imperial authorities, and a Russian civil administration was established at that port. The evacua- tion of southern Manchuria should have taken place in April 1903, but in that month, instead of fulfilling the conditions of the 1902 agreement, the Russian charge d’affaires in Peking made a series of further demands upon China, including the virtual reservation of the commerce of Manchuria for Russian subjects. Though Russia officially denied to the British and American governments that she had made these demands, it was demon- strated that they had been made. The United States and Japan thereupon insisted that China should conclude with them com-mercial treaties throwing open Mukden and two ports on the Yalu river to foreign trade. The American treaty was signed on the 8th of October 1903 — the day fixed for the complete evacuation of Manchuria by Russia — and the Japanese treaty on the day following. Both treaties provided that the ports should be opened after ratifications had been exchanged. From fear of Russia China, however, delayed the ratification of the treaties. Meantime, in August 1903, a regular through railway service between Moscow and Port Arthur was established. In the same month a Russian Viceroyalty of the Far East was created which in effect claimed Manchuria as a Russian province. In September Russia withdrew some of the demands she had made in April, but her concessions proved illusory. When the 8th of October passed and it was seen that the Russians had not with- drawn their troops 2 there issued for a time threats of war from Peking. Yuan Shih-kai, the viceroy of Chih-li, who had at his command some 65,000 troops trained by Japanese officers, pressed on the government the

necessity of action. At this point Japan intervened. Her interests were vitally affected by Russia's action not only in Manchuria, but in Korea, and seeing that China was powerless the Japanese government negotiated directly with St Petersburg. In these negotiations Russia showed that she would not yield her position in either country except to force. Japan chose the issue of war and proved successful.

The Russo-Japanese War did not very greatly alter China's position in Manchuria. In the southern part of that country Japan succeeded to the special privileges Russia had wrung

1 This institution was nominally a private concern which financed the Manchurian railway, but it acted as part of the Russian govern- ment machinery. The existence of the contract of the 27th of August 1896 was frequently denied until expressly admitted by the Russo-Chinese agreement of the 8th of April 1902.

2 On the 8th of October the Russian troops had been withdrawn from Mukden, but they reoccupied the town on the 28th of the same month, Admiral Alexeiev, the viceroy of the Far East, alleging that the inertia of the Chinese officials seriously hindered the work of extending civilization in Manchuria.

.from China (including the lease of Port Arthur); in the north Russia remained in possession of the railway zone. For Japan's position as at once the legatee of special privileges £ Mgo _. and the champion of China's territorial integrity of the and " the open door " see Japan, § History. How- Russo- ever, the attitude of Japan was more conciliatory J ap aae * e than that of Russia had been; Mukden and other places were thrown open to foreign trade and Chinese civil admin- istration was re-established. The important results of the war, so far as China was concerned, were not to be looked for in Manchuria, but in the new spirit generated in the Chinese. They had been deeply humiliated by the fact that in the struggle between Russia and Japan China had been treated as a negligible quantity, and that the war had been fought on Chinese territory. The lesson which the loot of Peking and the fall of the Boxers in 1900 had half taught was now thoroughly mastered; the awakening of China was complete. The war had shown that when an Eastern race adopted Western methods it was capable of defeating a European nation.

It was fortunate that among the influential advisers of the throne at this time (1905-1908) were Prince Chun (the prince who had visited Germany in 1901), Yuan Shih-kai, the viceroy of Chih-li, and Chang Chih-tung, the viceroy of Hu-kwang (i.e. the provinces of Hu-peh and

Hu-nan), all men of enlightened and strong character. In 1907 both the viceroys named were summoned to Peking and made members of the grand council, of which Prince Ching, a man of moderate views, was president. Yuan Shih-kai was an open advocate of a reform of the civil service, of the abolition of Manchu privileges, of education and other matters. He had specially advocated the reconstitution of the military forces of the empire, and in Chih-li in 1905 he demonstrated before a number of foreign military attaches the high efficiency attained by the forces of the metropolitan pro- vince. The success achieved by Yuan Shih-kai in this direction incited Chang Chih-tung to follow his example, while a decree from the throne called upon the princes and nobles of China to give their sons a military education. The formerly despised military profession was thus made honourable, and with salutary effects. The imperial princes sought high commands, officers were awarded ranks and dignities comparable with" those of civil servants, and the pay of the troops was increased. The new foreign drilled northern army was called upon to furnish a large proportion of a force sent under Prince %for m , Su into Mongolia — a country which had been on the point of falling into the hands of Russia, but over which, as one result of the Russo-Japanese War, China recovered control. In 1906 a step was taken towards the formation of a national army by withdrawing portions of the troops from provincial control and placing them under officers responsible to the central government, which also took over the charge of the provincial arsenals. In the years which followed further evidence was given of the earnestness and success with which the military forces were being reorganized. Less attention was given to naval affairs, but in the autumn of 1909 a naval commission under Tsai Hsiin, a brother of the emperor Kwang-su, was sent to Europe to report on the steps necessary for the re-establishment of a fleet. Previously (in 1907) societies had been started in several provinces to collect funds for naval purposes.

The most striking evidence of the change which had occurred was, however, the appointment (in 1905) of an Imperial Com- mission, headed by Prince Tsai Tse, to study the administrative systems of foreign countries with a view to the possible establish- ment of a representative government in China. The revolu- tionary nature of this proposal excited indignation among the adherents to the old order, and a bomb was thrown among the commissioners as they were preparing to leave Peking. 3 After visiting Japan, America and Europe the commission returned to

3 The form of outrage, probably the first of its kind in China, was itself a symptom of the changed times. The bomb injured Prince Tsai

Tse and another commissioner, and the departure of the commission was consequently delayed some months.

Peking in July 1906. 1 A committee over which Prince Ching. presided was appointed to study the commission's report, and A parlla- on the 1st of September following an edict was issued mentary in which the establishment of a parliamentary form coustitu- f government was announced, at a date not fixed. tion To fit the country for this new form of government

promised. ^^ edict went on tQ dec i are) t h e administration

muot be reformed, the laws revised, education promoted and the finances regulated. This edict, moreover, was but one of many edicts issued in 1006 and following years which showed how great a break with the past was contemplated. In November 1906 two edicts were issued with the object of reorganizing the central administrative offices. Their effect was to simplify the conduct of business, many useless posts being abolished, while an audit board was created to examine the national accounts. In November 1907 another edict was promulgated stating that for the present the formation of Houses of Lords and of Commons to determine all public questions was not practicable, but that it was proposed, as a preliminary measure, to create an Imperial Assembly. At the same time a scheme of provincial councils was ordered to be prepared. A more definite step followed in 1908 when a decree (dated the 27th of August) announced the convocation of a parliament in the ninth year from that date.

One of the changes made in the public offices brought China into conflict with Great Britain. On the 9th of May 1906 a rbe decree appointed Chinese commissioners to control the

control Imperial Maritime Customs. 2 This was the only of the department of the government under European Maritime (B r i t i s h) control, and the only department also against Customs. whicn n0 cnarge f inefficiency or corruption could be brought. The change decreed by China was in accord with the new national sentiment, but by all the foreign powers interested it was felt that it would be a retrograde step if the customs were taken out of the control of Sir Robert Hart (q.v.), who had been since 1863 inspector-general of the

customs. The British secretary of state for foreign affairs (Sir Edward Grey) at once protested against the decree of the 6th of May, pointing out that the continuation' of the established system had been stipulated for in the loan agreements of 1896 and 1898. As a result of this and other representations the Board of Control of the Customs was late in 1906 made a department of the Board of Finance. The Chinese controllers-general continued in office, and despite the' assurances given to Great Britain by China (in a note of the 6th of June 1906) that the appointment of the controllers-general was not intended to interfere with the established system of administration, the absolute authority of Sir Robert Hart was weakened. 3 Sir Robert Hart returned to England in 1908 " on leave of absence," Sir Robert Bredon, the deputy inspector-general, being placed in charge of the service under the authority of the Board of Control, of which on the 5th of April 1910 it was announced that he had been appointed a member. This step was viewed with disfavour by the British government, for, unless Sir Robert Bredon's post was to be merely a sinecure, it imposed two masters on the maritime customs. On the 20th of April Sir Robert Bredon severed his connexion with the Board of Control. At the same time Mr F. A. Aglen (the Commissioner of Customs at Hankow) became acting Inspector General (Sir Robert Hart being still nominally head of the service). The attempt on the part of the Chinese to control the customs was evidence

1 In 1907 further commissions were appointed, on the initiative of Yuan Shih-kai, to study specifically the constitutions of Great Britain, Germany and Japan.

2 This department was organized at Shanghai in 1854. The Taiping rebels being in possession of the native city, the collection of customs dues, especially on foreign ships, was placed in the hands of foreigners. This developed into a permanent institution, the European staff being mainly British.

3 The British official view, as stated in parliament on the 27th of April 1910, was that the changes resulting from the creation of the Board of Control had, so far, been purely departmental changes of form, and that the position of the inspector-general remained unaltered.

of the strength of the " young China " or Recovery of Rights party — the party which aspired to break all the chains, such as extra-territoriality, which stamped the country as not the equal of the other great nations. 4

In the steps taken to suppress opium smoking evidence was

forthcoming of the earnestness with which the governing body in China sought to better the condition of the people. Opium smoking followed, in China, the introduction of The ant ’” tobacco smoking, and is stated to have been introduced ag i ta ti n. from Java and Formosa in the early part of the 17th century. The first edict against the habit was issued in 1729. At that time the only foreign opium introduced was by the Portuguese from Goa, who exported about 200 chests 6 a year. In 1773 English merchants in India entered into the trade, which in 1 781 was taken over by the East India Company — the import in 1790 being over 4000 chests. In 1796 the importation of foreign opium was declared contraband, and between 1839 and i860 the central government attempted, without success, to suppress the trade. It was legalized in 1858 after the second ” opium war ” with Great Britain. At that time the poppy was extensively grown in China, and the bulk of the opium smoked was, and continued to be, of home manufacture. But after i860 the importation of opium from India greatly in- creased. Opium was also imported from Persia (chiefly to Formosa, which in 1895 passed into the possession of Japan). The total foreign import in 1863 was some 70,000 piculs, 6 in 1879 it was 102,000 piculs, but in 1905 had fallen to 56,000 piculs. The number of opium smokers in China in the early years of the 20th century was estimated at from 25 to 30 millions. The evil effects of opium smoking were fully recognized, and Chang Chih-tung, one of the most powerful of the opponents of the habit, was high in the councils of the dowager-empiess. On the 20th of September 1906 an edict was issued directing that the growth, sale and consumption of opium should cease in China within ten years, and ordering the officials to take measures to execute the imperial will. The measures promul- gated, in November following, made the following provisions: —

(1) The cultivation of the poppy to be restricted annually by cne-tenth of its existing area; (2) all persons using opium to be registered; (3) all shops selling opium to be gradually closed, and all places where opium is smoked to discontinue the practice within six months; (4) anti-opium societies to be officially encouraged, and medicines distributed to cure the opium-smoking habit; (5) all officials were requested to set an example to the people, and all officials under sixty were required to abandon opium smoking within six months or to withdraw from the service of the state.

It was estimated that the suppression of opium smoking would entail a yearly loss of revenue of over £1,600,000, a loss about equally divided between the central and provincial govern- ments. The first step taken to enforce the edict was the closing of the opium dens in Peking on the last day of 1906.

During 1907 the opium dens in Shanghai, Canton, Fu-chow and many other large cities were closed, and restrictions on the issue of licences were introduced in the foreign settlements ; even the eunuchs of the palace were prohibited from smoking opium under severe penalties. The central government continued during 1908 and 1909 to display considerable energy in the suppression of the use of opium, but the provincial authorities were notall equally energetic. It was noted in 1908 that while in some provinces — even in Yun-nan, where its importance tc trade and commerce and its use as currency seemed to render it very difficult to do anything effective — the governor and officials were whole-hearted in carrying out the imperial regulations, in other provinces — notably in Kwei-chcw and in the provinces of the lower Yangtsze valley — great supineness was exhibited in dealing with the subject. Lord William Cecil, however, stated that travelling in 1909 between Peking and Hankow, through country which in 1907 he had seen covered with the poppy, he could not then see a single poppy flower, and that going up the Yangtsze he found only one small patch of poppy cultivation. 7 The Peking correspondent of The Times, in a journey to Turkestan in the early part of 1910, found that in Shen-si province the people's desire to suppress the opium trade was in advance of the views of the government. Every day trains of opium carts were passed travelling under official protection. But in the adjoining province of Shan-si there had been complete

4 See The Times of the 21st of April and nth of May 1910. 6 A chest contained from 135 lb to 160 lb.

6 A picul = 133ˆ lb.

7 Changing China, p. 118.

HISTORY]

suppression of poppy cultivation and in Kan-suh the officials were con- ducting a vsry vigorous campaign against the growth of the poppy. 1

In their endeavours to suppress opium smoking the Chinese govern- ment appealed to the Indian government for help, and in 1907 received a promise that India would decrease the production of opium annually by one-tenth for four years and subsequently if China did likewise. The Indian government also assented to Indian opium being taxed equally with Chinese opium, but China did not raise the duty on foreign opium. In 1908 the Indian government undertook to reduce the amount of opium exported by 5100 chests yearly. In the same year

the opium dens in Hong-Kong were closed. In February 1909, on the initiative of the United States, an international conference was held at Shanghai to consider the opium trade and habit. At this conference the Chinese representative claimed that the consumption of opium had already been reduced by one-half — a claim not borne out by the ascertained facts. The conference was unable to suggest any heroic measures, but a number of proposals were agreed to (including the closing of opium dens in the foreign settlements), tending to the restriction of the opium trade. The conference also dealt with another and growing habit in China — the use of morphia. 2 Japan agreed to prohibit the export of morphia to China, a prohibition to which the other powers had previously agreed.

The attempts to reform the educational system of China on a comprehensive scale date from the year of the return of the court to Peking after the Boxer troubles. In 1902 JfolT ” regulations were sanctioned by the emperor which aimed at remodelling the methods of public instruction. These regulations provided among other things for the establish- ment at Peking of a university giving instruction in Western learning, a technical college, and a special department for training officials and teachers. A much more revolutionary step was taken in September 1905 when a decree appeared announcing as from the beginning of 1906 the abolition o’f the existing method of examinations. The new system was to include the study of modern sciences, history, geography and foreign languages, and in the higher grades political economy and civil and international law. Thousands of temples were converted to educational purposes. In Canton, in 1907, the old examination hall was demolished to make way for a college with every appliance on Western lines. Equal zeal was noticeable in such conservative cities as Si-gan-fu, and in remote provinces like Kan-suh. By May 1906 fifteen so-called universities had been founded. Moreover, many young Chinese went abroad to acquire education — in Japan alone in 1906 there were 13,000 students. In the same year primary schools for girls were established. 3 Perhaps the most striking evidence of the new spirit regarding education was the tenour of a communication to the throne from the head of the Confucian family. On the ˆ 31st of December 1906 an imperial edict had appeared raising Con- fucius to the same rank as Heaven and Earth — an action taken to indicate the desire of the government to emphasize the value of ethical training. In thanking the throne for the honour conferred on his ancestor the head of the family urged that at the new college founded at the birth-place of Confucius the teaching should include foreign languages, physical culture, political science and military drill. 4

While China, with the consent of the emperor and the empress-dowager, and under the guidance of Prince Ching, Yuan Shih-kai and Chang Chih-tung, was endeavouring to bring about internal reforms, her attitude to foreign powers was one of reserve and distrust. This was especially marked in the negotiations with Japan and with Russia concerning Manchuria, and was seen also in the negotiations with Great Britain concerning

1 See The Times of 7th and 8th of March and 8th of April 1910.

2 The first recorded importation of morphia into China was in 1892, and it is suggested that it was first used as an anti-opium medicine. Morphia-taking, however, speedily became a vice, and in 1902 over 195,000 oz. of morphia were imported (enough for some 300,000,000 injections). To check the evil the Chinese government during 1903 imposed a tax of about 200% ad valorem, with the result that the imports declared to the customs fell in 1905 to 54 oz. only. The falling off was explained " not by a diminished demand, but by smuggling " (Morse's Trade and Administration of the Chinese

Empire, p. 351). . . ... ^_ c

3 A regulation by the ministry of education, dated the 14th ot January 1910, ordered that no girl should be admitted to school dressed in foreign clothes or with unnatural {i.e. bound) feet.

- For the growth of the education movement see The Times, 4th of September 1909.

Tibet. It was not until April 1908, after four years' negotiations, that a convention with Great Britain respecting Tibet was signed, Chinese suzerain rights being respected. In September the Dalai Lama arrived in Peking from Mongolia and was received by the emperor, who also gave audience to a Nepalese mission. 5

The emperor Kwang-su had witnessed, without being able to guide, the new reform movement. In August 1908 an edict was issued in his name announcing the convocation of Death a parliament in nine years' time. In November he ot the died. His death occasioned no surprise, as disquieting emperor reports about his health had been current since July, and ot the but the announcement that the dowager empress died p*f on the 15th of November (the day after that on which

the emperor was officially stated to have died) was totally unexpected. She had celebrated her birthday on the 3rd of November and appeared then to be in good health. The empress dowager had taken part in the choice of a suc- cessor to the throne, Kwang-su's valedictory edict had been drawn up under her supervision, and it is believed that the emperor died seme days previous to the date officially given for his death. Kwang-su died childless and was succeeded by his infant nephew Pu-Yi (born on the 8th of February 1906), a son of Prince Chun, who was appointed regent. Prince Chun — himself then only twenty-six years old — had exercised con- siderable influence at court since his mission to Germany in 1 901, and was one of the most enlightened of the Manchu princes. The death of the dowager empress removed a powerful obstacle to a reformed regime, and with her passed away the last prominent representative of the old era in China.

The accession to the throne of Pu-Yi, who was given as reigning title Hsuan Tung ("promulgating universally"), was unaccompanied by disturbances, save for an outbreak at Ngan-king, easily suppressed. Prince Chun had "^***" the support of Yuan Shih-kai and Chang Chih-tung, 6 rung"" the two most prominent Chinese members of the government at Peking — and thus a division between the Manchus and Chinese was avoided. On the 2nd of December 1908 the young emperor was enthroned with the usual rites. On the day following another edict, which, it was stated, had had the approval of the late dowager empress, was issued, reaffirming that of the 27th of August regarding the grant of a parlia- mentary constitution in nine years' time, and urging the people to prepare themselves for the change. Other edicts sought to strengthen the position of the regent as de facto emperor. Yuan Shih-kai and Chang Chih-tung received the title of Grand Guardians of the Heir, and the year 1908 closed with the chief Chinese members of the government working, apparently, in complete harmony with the regent.

On the 1st of January 1909, however, the political situation was rudely disturbed by the dismissal from office of Yuan Shih- kai. This step led to representations by the British and American ministers to Prince Ching, the head of %'fyj**"' the foreign office, by whom assurances were given that S hlh-kal. no change of policy was contemplated by China, while the regent in a letter to President Taft reiterated the determina- tion of his government to carry through its reform policy. The dismissal of Yuan Shih-kai was believed by the Chinese to be due to his " betrayal " of the emperor Kwang-su in the 1898 reform movement. He had nevertheless refused to go to extremes on the reactionary side, and in 1900, as governor of Shan-tung, he preserved a neutrality which greatly facilitated the relief of

the Peking legations. During the last years

6 The Dalai Lama left Peking in December 1908 on his return to Lhassa, which he reached in November 1909. Differences had arisen between him and the Chinese government, which sought to make the spiritual as well as the temporal power of the Dalai Lama dependent on his recognition by the emperor of China. Early in 1910 the Dalai Lama, in consequence of the action of the Chinese amban in Lhassa, fled from that city and sought refuge in India.

6 Chang Chih-tung died in October 1909. He was a man of considerable ability, and one whose honesty and loyalty had never been doubted. He was noted as an opponent of opium smoking, and for over thirty years had addressed memorials to the throne against the use of the drug.

with Japan.

of the life of the dowager empress it was his influence which largely reconciled her to the new reform movement. Yet Kwang- su had not forgotten the coup d'etat of 1898, and it is alleged that he left a testament calling upon his brother the prince regent to avenge the wrongs he had suffered. 1 During the

greater part of the year there was serious estrangement Agreement ˆ e ˆ ween China and Japan, but on the 4th of September

a convention was signed which settled most of the

points in dispute respecting Manchuria and Korea. In Korea the boundary was adjusted so that Chientao, a mountain- ous district in eastern Manchuria regarded as the ancestral home of the reigning families of China and Korea, was de- finitely assigned to China; while in Manchuria, both as to railways and mines, a policy of co-operation was substituted for one of opposition. 2 Although Japan had made substantial concessions, those made by China in return provoked loud complaints from the southern provinces — the self-government society calling for the dismissal of Prince Ching. In northern Manchuria the Russian authorities had assumed territorial jurisdiction at Harbin, but on the 4th of May an agreement was signed recognizing Chinese

jurisdiction. 3

The spirit typified by the cry of ” China for the Chinese ” was seen actively at work in the determined efforts made to exclude

foreign capital from railway affairs. The completion Tbe in October 1909 of the Peking-Kalgan railway was

the cause of much patriotic rejoicing. The railway,

control ot railways.

a purely Chinese undertaking, is 122 m. long and took four years to build. It traversed difficult country, piercing the Nan K’ow Pass by four tunnels, one under the Great Wall being 3 580 ft. long. There was much controversy between foreign financiers, generally backed by their respective governments, as to the construction of other lines. In March 1909 the Deutsch- asiatische Bank secured a loan of £3,000,000 for the construction of the Canton-Hankow railway. This concession was contrary to an undertaking given in 1905 to British firms and was with- drawn, but only in return for the admittance of German capital in the Sze-ch’uen railway. After prolonged negotiations an agreement was signed in Paris on the 24th of May 1910 for a loan of £6,000,000 for the construction of the railway from Hankow to Sze-ch’uen, in which British, French, German and American interests were equally represented. In January 1910 the French line from Hanoi to Yunnan-fu was opened; 4 the railway from Shanghai to Nanking was opened for through traffic in 1909.

The progress of the anti-opium movement and the dispute over the control of the Imperial Maritime Customs have already Pro / clal k een chronicled. A notable step was taken in 1909 Assemblies by tne institution of elected assemblies in each of the consti- provinces. The franchise on which the members toted. were elected was very limited, and the assemblies

A Senate weTe given consultative powers only. They were *”™ e * opened on the 14th of October (the 1st day of the 9th moon). The businesslike manner in which these assemblies conducted their work was a matter of general comment among foreign observers in China. 6 In February 1910 decrees ap- peared approving schemes drawn up by the Commission for Constitutional Reforms, providing for local government in pre- fectures and departments and for the reform of the judiciary. This was followed on the 9th of May by another decree sum- moning the senate to meet for the first time on the 1st day of the 9th

moon (the 3rd of October 1910). All the members of the senate were nominated, and the majority were Manchus. Neither to the provincial assemblies nor to the senate was any power of the purse given, and the drawing up of a budget was post- poned until 1915. 6

1 See The Times of the 7th of September 1909.

2 Proposals made early in 1910 by the American secretary of state for the neutralization of the Manchurian railway received no support.

3 By a convention signed on July 4th, 1910, Russia and Japan agreed to ” maintain and respect ” the status quo in Manchuria.

4 See the Quinzaine coloniale of the 10th of December 1909. 6 See The Times of the 20th of January 1910.

6 See for the prospects of reform The Times of 30th May 1910.

The

regent's

policy.

The efforts of the central government to increase the efficiency of the army and to re-create a navy were continued in 19 10. China was credited with the intention of spending £40,000,000 on the rehabilitation of its naval and military forces. It was estimated in March 1910 that there were about 200,000 foreign- trained men, but their independent spirit and disaffection constituted a danger to internal peace. The danger was accen- tuated by the mutual jealousy of the central and provincial governments. The anti-dynastic agitation, moreover, again seemed to be growing in strength. In April 1910 there was serious rioting at Changsha, Hu-nan,a town whence a few years previously had. issued a quantity of anti-foreign literature of a vile kind. The immediate causes of the riots seem to have been many: rumours of the intention of the foreign powers to dis- member China, the establishment of foreign firms at Changsha competing with native firms and exporting rice and A f/m salt at a time when the province was suffering from dynastic famine, and the approach of Halley's comet. Probably move- the famine precipitated the outbreak, which was easily ments. crushed, as was also a rising in May at Yung chow, a R> otsla town in the south of Hu-nan. Much mission and mercan- tile property was wrecked at Changsha, but the only loss of life was the accidental drowning of three Roman Catholic priests.

An edict of the 17th of August 1910 effected considerable and unexpected changes in the personnel of the central government. Tang Shao-yi, a former lieutenant of Yuan Shih-kai, was appointed president of the Board of Communications, and to him fell the difficult task of reconciling Chinese and foreign interests in the development of the railway system. Sheng Kung-pao regarded as the chief Chinese authority on currency questions, and an advocate of the adoption of a gold standard, was attached to the Board of Finance to help in the reforms decreed by an edict of May of the same year (see ante, Currency). The issue of the edict was attributed to the influence with the regent of Prince Tsai-tao, who had recently returned from a tour in Europe, where he had specially studied questions of national defence. The changes made among the high officials tended greatly to strengthen the central administra- tion. The government had viewed

with some disquiet the Russo- Japanese agreement of the 4th of July concerning Manchuria (which was generally interpreted as in fact lessening the authority of China in that country); it had become involved in another dispute with Great Britain, which regarded some of the measures taken to suppress opium smoking as a violation of the terms of the Chifu convention, and its action in Tibet had caused alarm in India. Thus the appointment to high office of men of enlightenment, pledged to a reform policy, was calculated to restore confidence in the policy of the Peking authorities. This confidence would have been greater had not the changes indicated a struggle for supreme power between the regent and the dowager empress Lung Yu, widow of Kwang-su.

The strength of the various movements at work throughout China was at this time extremely difficult to gauge; the in- tensity of the desire for the acquisition of Western knowledge was equalled by the desire to secure the independence of the country from foreign control. The second of these desires gave tbe force it possessed to the anti-dynastic movement. At the same time some of the firmest supporters of reform were found among the Manchus, nor did there seem to be any reason to doubt the intention of the regent — if he retained power — to guide the nation through the troubled period of transition into an era of constitutional government and the full development of the resources of the empire. (X.)

Bibliographical Note. — Knowledge of the ancient history of China is necessarily derived from the native writers on the subject. Fortunately, the Chinese have always regarded the preservation of the national records as a matter of supreme importance. Con- fucius set an example in this respect, and has preserved for us in the Spring and Autumn Annals and the Shu-king, or Book of History, records of his country's progress during the past and then present centuries. The celebrated emperor Shih Hwang-ti, in establishing the empire, attempted to strengthen his cause by destroying all works on the national history. But so strongly was the historical sense inculcated in the people that immediately on the death of the

CHINA

Plate I.

A'lfl

4. 1

1 «

» 5

J. 1

1

Fig. i.-KU K’AI-CHIH. TOILET SCENE, (British Museum. 4th Cent. A.D.).

Fig. 3.— CHAO MENG-FU, AFTER WANG WEI (8th

CENT.). SCENE OX THE WANG CH’CAN.

(Dated 1309. British Museum.)

i. f^jj

^P^jHH

ps§3

ml

■Mies’”?

■I

Fig. 6.— K1U YING. COURT LADIES. (British Museum. 15th Cent.)

fefefc*-*!

!...?**;

■^

Fig, 2. -ATTRIBUTED TO WU TAOTZIJ.

SAKYAMUX1. (8th Cent.) Fig. 5. -CHIEN SHUN-CIIU. THE Fig. 7— EAGLE. By UN LIANG.

EMPEROR HUAN-YEH. (15th Cent.) (15th Cent. British Museum.)

Figs. 2, 4, and 5 are reproduced by permission of the Kokka Company, Tokyo.

Plate II.

Fig. 9.-TEMPLE VASE (c. 1200 B.C.). Fie. 10.-WINE VASE (c. 1000 B.C.). Fig. ii.-WINE VASE (c. 600 B.C.).

Fig. 12. -INLAID VESSEL

(C. 500 B.C.).

Fig. 13.— WINE VESSEL (c. 100 b.c).

Fig. 14.— INLAID VASE (c. 200 a.d.). In possession of C. J. Holmes.

•«T,

FIG. 15.— VASE (c. 1450 a.d.). Fig. 16.— WINE VESSEL (c. 1450 a.d.). Fig. 17.— TEMPLE VASE (c. 1700 a.d.).

tyrant the nation's records were again brought to light, and have been carefully preserved and edited since that time. Prof. Legge's translation of the Spring and Autumn Annals and the Shu-king, or Book of History, in the " Sacred Books of the East " series, have opened for students the stores of historical knowledge which were at the command of Confucius, and European writers on Chinese history have found in the dynastic annals a never-failing source of valuable information. It was from these works and epitomes of these that de Maillac gathered the facts for his celebrated Histoire gSnSrale de la Chine,_ and it is from similar sources that all other writers on Chinese history have drawn their inspiration.

The following works on ancient and modern Chinese history may be specially mentioned: J. A. de Moyria de Maillac, Histoire generate de la Chine (1777), &c. ; J. B. du Halde, General History of China (4 vols., 1736) ; M. de Guignes, Voyages & Peking . . . (3 vols., 1808); D. Boulger, A History of China (3 vols., 1881); Valentine Chirol, The Far Eastern Question (1896) ; E. R. Hue, The Chinese Empire (2 vols., 1855); T. T. Meadows, The Chinese and their Rebellions (1856); G. Pauthier, Histoire des relations politiques de la Chine avec les puissances occidentals depuis les temps les plus anci-ens jusqu'a nos Jours . . . (1859); Sir George Staunton, Notes of Proceedings and

Occurrences during the British Embassy to Peking in 1816 (1824); Chinese Expansion historically reviewed, a paper read before the Central Asian Society by Baron Suyematsu on January n, 1905; F. Hirth, Ancient History of China (New York, 1908) ; Prof. Herbert A. Giles's Chinese Biographical Dictionary (1897) is a storehouse of biographical detail and anecdote.

For Chinese relations with foreign powers see H. Cordier, Histoire des relations de la Chine avec les puissances occidentals, 1860-IQ02 (3 vols., Paris, 1901-1902) ; Hertslet's China Treaties. Treaties, &c., between Great Britain and China, and between China and Foreign Powers, and Orders in Council, &c, affecting British Interests in China (3rd ed., revised by G. G. P. Hertslet and E. Parkes, London, 1908) ; J. O. Bland and E. Backhouse, China under the Empress Dowager (London, 1910). More general works are Sir R. K. Douglas, China, history since the time of Marco Polo (London, 1899) ; E. H. Parker, China; Her History, Diplomacy and Commerce (London, 1901); China, Past and Present (London, 1903); A. J. Sargent, Anglo- Chinese Commerce and Diplomacy — mainly in the 19th century (Oxford, 1907). For current affairs see the authorities cited in the footnotes.

VI. Chinese Art

1. Painting. — Painting is the pre-eminent art of China, which can boast of a succession of great painters for at least twelve centuries. Though the Chinese have an instinctive gift for har- monious colour, their painting is above all an art of line. It is intimately connected with writing, itself a fine art demanding the same skill and supple power in the wielding of the brush. The most typical expression of the Chinese genius in painting is the ink sketch, such as the masters of the Sung dynasty most pre- ferred and the Japanese from the 15th century adopted for an abiding model. Utmost vigour of stroke was here combined with utmost delicacy of modulation. Rich colour and the use of gold are an integral part of the Buddhist pictures, though in the masterpieces of the religious painters a grand rhythm of linear design gives the fundamental character. Exquisite subdued colour is also found in the " flower and bird pieces " and still-life subjects of the Sung artists, and becomes more emphatic and variegated in the decorative artists of the Ming period.

Not to represent facts, but to suggest a poetic idea (often perfumed, so to speak, with reminiscence of some actual poem), has ever been the Chinese artist's aim. " A picture is a voiceless poem " is an old saying in China, where very frequently the artist was a literary man by profession. Oriental critics lay more stress on loftiness of sentiment

and tone than on technical qualities. This idealist temper helps to explain the deliberate avoidance of all emphasis on appearances of material solidity by means of chiaroscuro, &c, and the exclusive use of the light medium of water-colour. The Chinese express actual dislike for the representation of relief. Whoever compares the painting of Europe with that of Asia (and Chinese painting is the central type for the one continent, as Italian may claim to be for the other) must first understand this contrast of aim. The limita- tions of the Chinese are great, but these limitations save them from mistaking advances in science for advances in art, and from petty imitation of fact. Their religious painting has great affinity with the early religious art of Italy (e.g. that of Siena). But the ideas of the Renaissance, its scientific curiosity, its materialism, its glorification of human personality, are wholly missing in China. For Europe, Man is ever the hero and the,

foreground — hence the dominant study of the nude, and the tendency to thronged compositions, with dramatic motives of effort and conflict. The Chinese artists, weak in the plastic, weak in the architectural sense, paint mostly in a lyric mood, with a contemplative ideal. Hence the value given to space in their designs, the semi-religious passion for nature, and the supremacy of landscape. Beauty is found not only in pleasant prospects, but in wild solitudes, rain, snow and storm. The life of things is contemplated and portrayed for its own sake, not for its uses in the life of men. From this point of view the body of Chinese painting is much more modern in conception than that ‘ of Western art. Landscape was a mature and free art in China more than a thousand years ago, and her school of landscape is the loftiest yet known to the world. Nor was man ever dis- sociated from nature. As early as the 4th century Ku K’ai-chih says that in painting a certain noble character he must give him a fit background of great peaks and deep ravines. Chinese painting, in sum, finely complements rather than poorly supple- ments that of Europe; where the latter is strong, it is weak; but in certain chosen provinces it long ago found consummate ex- pression for thoughts and feelings scarcely yet expressed with us.

The origin of Chinese painting is lost in legend, though there is no reason to doubt its great antiquity. References in m s t ory: literature prove that by the 3rd century B.C. it was a Early developed art. To this period is ascribed the inven- f r I°g to tion of the hair-brush, in the use of which as an instru- ment both for writing and drawing the Chinese have attained marvellous skill; the usual material for the picture being woven silk, or, less often and since the 1st century A.D., paper. In early times wood panels were employed; and large compositions were painted on walls prepared with white lime. These

mural decorations have all disappeared. History and portraiture seem to have been the prevailing subjects; a secular art corresponding to the social ideals of Confucianism. Yet long before the introduction of Buddhism (a.d. 67) with its images and pictures, we find that the two great symbolic figures of the Chinese imagination, the Tiger and the Dragon — typifying the forces of Nature and the power of the Spirit — had been evolved in art; and to imaginative minds the mystic ideas of Lao Tzti and the legends of his hermit followers proved a fruitful field for artistic motives of a kind which Buddhism was still more to enrich and multiply. Early classifications rank Buddhist and Taoist subjects together as one class.

With the 2nd century a.d. we come to individual names of artists and to the beginnings of landscape. Ku K'ai-chih (4th century) ranks as one of the greatest names of Chinese art. A painting by him now in the British Museum (Plate I. fig. 1) shows a maturity which has nothing tentative about it. The dignified and elegant types are rendered with a mastery of sensitive brush-line which is not surpassed in later art. Ku K'ai-chih painted all kinds of subjects, but excelled in por- traiture. During the next century the criticism of painting was formulated in six canons by Hsieh Ho. Rhythm, organic or structural beauty, is the supreme quality insisted on.

During the T'ang dynasty the empire expanded to its utmost limits, stretching as far as the Persian Gulf. India was invaded; Buddhism, taught by numbers of Indian T'ang missionaries, became firmly established, and controlled dynasty the ideals and imaginations of the time. The vigorous

masters are best known for some particular one. Han Kan was famous for his horses, the models for succeeding generations of painters, both Chinese and Japanese. A specimen of his brush is in the British Museum; and in the same collection is a long roll which gives a glimpse of the landscape of this age. It is a copy by a great master of the Yuen dynasty, Chao Meng- fu, from a famous painting by Wang Wei, representing scenes on the Wang Ch'uan, the latter's home (Plate I. fig. 3 shows a fragment). With the T'ang age landscape matured, and two schools arose, one headed by Wang Wei, the other by Li Ssii-hsiin. The style of Wang Wei, who was equally famous as a poet, had

a romantic idealist character— disdainful of mere fact — which in later developments created the ” literary man’s picture ” of the Southern school, as opposed to the vigorous naturalism of the North.

Next come five brief dynasties, memorable less for any cor- pse porate style or tradition, than for some fine painters dynasties like Hsii Hsi, famous for his flowers, and Huang (A. D. 907- Ch’uan, a great master in a delicate style. Two 960) ‘ pictures by him, fowls and peonies, of extraordinary beauty, are in the British Museum.

The empire, which had been broken up, was reunited, though Sung shorn of its outer dependencies, under the house of Sung.

dynasty This was an age of culture in which the freedom of (A. D. 960- the individual was proclaimed anew; glorious in art 128tt) ‘ as in poetry and philosophy; the period which

for Asia stands in history as the Periclean age for Europe.

The religious paintings of Li Lung-mien, the grandest of Sung masters, if less forcible than those of T’ang, were unsurpassed in harmonious rhythm of design and colour. But the most character- istic painting of this period is in landscape and nature-subjects. With a passion unmatched in Europe till Wordsworth’s day, the Sung artists portrayed their delight in mountains, mists, plunging torrents, the flight of the wild geese from the reed-beds, the moonlit reveries of sages in forest solitudes, the fisherman in his boat on lake or stream. To them also, steeped in the Zen philosophy of con- templation, a flowering branch was no mere subject for a decorative study, but a symbol of the infinite life of nature. A mere hint to the spectator’s imagination is often all that they rely on ; proof of the singular fulness and reality of the culture of the time. The art of suggestion has never been carried farther. Such traditional subjects as Curfew from a Distant Temple ” and ” The Moon over Raging Waves ” indicate the poetic atmosphere of this art. Ma Yuan, Hsia Kuei and the emperor Hwei-tsung are among the greatest landscape artists of this period. They belong to the South Sung school, which loved to paint the gorges and towering rock-pinnacles of the Yangtsze. The sterner, less romantic scenery of the Hwang-Ho inspired the Northern school, of which Kuo Hsi and Li Ch’eng were famous among many others. Muh Ki was one of the greatest masters of the ink sketch; Chao Tan Lin was famed for his tigers; Li Ti for his flowers as for his landscapes; Mao I for still-life: to name a few among a host.

The Mongol dynasty continues in art the Sung tradition. Chao Meng-

fu, the greatest master of his time, belongs to both periods, and ranks with the highest names in Chinese painting. A landscape by him, copied from Wang Wei, has been already mentioned as in the British Museum, which also has two specimens of Yen Hui, a painter less known in his own country than in Japan. He painted especially figures of Taoist legend. The portrait by Ch'ien Shun-chii (Plate I. fig. 5) is a fine example of purity of line and lovely colour, reminding us of Greek art.

The simplicity of motive and directness of execution which had been the strength of the Sung art gradually gave way during the Ming era to complicated conceptions and elaborate effects. The high glow of life faded; the lyrical temper and impassioned work of the Sung time were replaced by love of ornament and elegance. In this respect Kiu Ying is typicalof the period,with his richly coloured scenes from court life (Plate I. fig. 6). None the less, there were a number of painters who still upheld the grander style of earlier ages. The greatest of these was Lin Liang (Plate I. fig. 7), whose brush work, if somewhat coarser, is as powerful as that of the Sung masters. But though individual painters of the first rank preserved the Ming age from absolute decline, it cannot be said that any new development of importance took place in a vitalizing direction.

Yuen

dynasty

(A.D.

1280-

1368).

Ming dynasty 04. D.

1368- 1644).

The present dynasty prolongs the history of Ming art. The literary school of the South became more prominent, sending out offshoots in Japan. There has been no movement Tsing of national life to be reflected in art, though a great dynasty body of admirable painting has been produced, down (from A. D. to the present day. The four landscape masters known as the " four Wangs," Yiin Shou-p'ing and Wu Li are pre-eminent names.

Sources and Authorities. — While the designs on porcelain, screens.

&c, have long been admired in the West, the paintings of which these are merely reproductions have been utterly ignored. Ignorance has gained authority with time, till the very existence of a great school of Chinese painting has been denied. Materials for study are scanty. Fires, wars and the recent armed ravages of Western civilization have left but little. The profound indifference of the Chinese to European admiration has prevented their collec- tions from being known. The Japanese, always enthusiastic students and collectors of the continental art, claim (whether justly or not, is hard to ascertain) that the finest specimens are now in their country. Many of these are reproduced in the invaluable Tokyo publications, the Kokka, Mr Tajima's Select Relics, &c, with Japanese criticisms in English. Of actual paintings the British Museum possesses a fair number, and the Louvre a few, of real importance. Copies and forgeries abound.

See H. A. Giles, Introduction to the History of Chinese Pictorial Art (1905) ; F. Hirth, Scraps from a Collector's Note-Book (1905), (supple- ments Giles's work and especially valuable for the art of the Ch'ing dynasty); S. W. Bushell, Chinese Art, vol. ii. (1906); K. Okakura, Ideals of the East (1903); M. Paleologue, L'Art chinois (1887); W. Anderson, Catalogue of Japanese and Chinese Paintings (1886); Sei-ichi Taki, " Chinese Landscape Painting," The Kokka, Nos. 191, &c. (1906) ; Chinesische Malereien aus der Sammlung Hirth (Cata- logue of an exhibition held at Dresden) (1897); W. von SeWlitz, article in Kunstchronik (1896-1897), No. 16.

2. Engraving. — According to native historians, the art of printing from wooden blocks was invented in China in the 6th century A.D., when it was employed for the publication of texts. The earliest evidence we have for the existence of wood- cuts made to reproduce pictures or drawings is a passage in a work by Chang Yen-yuan, from which it appears that these were not made before the beginning of the T'ang dynasty, under which that author lived. The method employed was to cut the design with a knife on the plank of the wood, in the manner followed by European artists till the end of the 18th century, when engraving with a burin on boxwood ousted the older process. The Japanese borrowed the art from China; and in Japan a whole school of artists arose who worked specially for the woodcutters and adapted their designs to the limitations of the material employed. In China the art has remained merely reproductive, and its history is therefore of less interest. Print- ing in colours was known to the Chinese in the 1 7th century, and probably earlier. In the British Museum is a set of prints brought from the East by Kaempfer in 1693, in which eight colours and elaborate gauffrage are used. Some fine albums of colour prints have been issued in China, but nothing equal

in beauty to the prints produced in Japan by the co-operation of woodcutter and designer. Engraving on copper was introduced to China by the Jesuits, and some well-known sets of prints illustrating campaigns in Mongolia were made in the 18th century. But the method has never proved congenial to the artists of the Far East.

See Sir R. K. Douglas, Guide to the Chinese and Japanese Illustrated Books (British Museum, 1887); W. Anderson, Japanese Wood Engraving (1895).

3. Architecture. — In architecture the Chinese genius has found but limited and uncongenial expression. A nation of painters has built picturesquely, but this picturesqueness has fought against the attainment of the finest architectural qualities. There has been little development; the arch, for instance, though known to the Chinese from very early times, has been scarcely used as a principle of design, and the cupola has been undiscovered or ignored; and though foreign architectural ideas were introduced under the influence of the Buddhist and Mahcnmedan religions, these were more or less assimilated and sabdued to the dominant Chinese design. Ruins scarcely exist and no building earlier than the nth century a.d. is known; but we know from records that the forms of architecture still

prevalent imitate in essentials those of the 4th and 5th centuries B.C. and doubtless represent an immemorial tradition.

The grand characteristic of Chinese architecture is the pre- eminent importance of the roof. The t'ing is the commonest model of building. The roof is the main feature; in fact the t'ing consists of this roof, massive and immense, with recurved edges, and the numerous short columns on which the roof rests. The columns are of wood, the straight stems of the nanmu being specially used for this purpose. The walls are not supports, but merely fill in, with stone or brickwork, the spaces between the columns. The scheme of construction is thus curiously like that of the modern American steel-framed building, though the external form may be derived from the tent of primitive nomads. The roof, being the preponderant feature, is that on 1 which the art of the architect has been concentrated. A double or a triple roof may be devised; the ridges and eaves may be decorated with

dragons and other fantastic animals, and the eaves underlaid with carved and lacquered woodwork; the roof itself is often covered with glazed tiles of brilliant hue. In spite of efforts, sometimes desperate, to give variety and individual character by ornament and detail, the general impression is one of poverty of design. ” Chinese buildings are usually one-storeyed and are developed horizontally as they are increased in size or number. The principle which determines the plan of projection is that of symmetry ” (Bushell). All important buildings must face the south, and this uniform orientation increases the general architectural monotony produced by a preponderance of horizontal lines.

A special characteristic of Chinese architecture is the pai-lou, an archway erected only by special authority, usually to com- memorate famous persons. The pai-lou is commonly made of wood with a tiled roof, but sometimes is built entirely of stone, as is the gateway at the avenue of the Ming tombs. A magnificent example of the pai-lou is that on the avenue leading to Wo Fo Ssii, the temple of the Sleeping Buddha, near Peking. This is built of marble and glazed terra-cotta. The pai-lou, like the Japanese torii, derives its origin from the toran of Indian stupas. Lofty towers called t’ai, usually square and of stone, seem to have been a common type of important building in early times. They are described in old books as erected by the ancient kings and used for various purposes. The towers of the Great Wall are of the same character, and are made of stone, with arched doors and windows. Stone, though plentiful in most provinces of the empire, has been singularly little used by the Chinese, who prefer wood or brick. M. Paleologue attributes this pre- ference of light and destructible materials to the national indifference of the Chinese to posterity and the future, their enthusiasm being wholly devoted to their ancestors and the past.

Temples are designed on the general t’ing model. The Temple of Heaven is the most imposing of the Confucian temples, conspicuous with its covering of deep-blue tiles and its triple roof. Near this is the great Altar of Heaven, consisting of three circular terraces with marble balustrades. Buddhist temples are built on the general plan of secular residences, and consist of a series of rectangular courts with the principal building in the centre, the lesser at the sides. Lama temples differ little from these except in the interior decorations and symbolism. Mahommedan mosques are far simpler and severer in internal arrangement, but outwardly these also are in the Chinese style.

The pagoda (Chinese tad), the type of Chinese architecture most

familiar to the West, probably owes its peculiar form to Buddhist influence. In the pagoda alone may be found some trace of a religious imagination such as in Europe made Gothic architecture so full and splendid an expression of the aspiring spirit. The most famous pagoda was the Porcelain Tower of Nanking, destroyed by the T'aip'ing rebels in 1854. This was covered with slabs of faience coated with coloured glazes. The ordinary pagoda is built of brick on a stone foundation; it is octagonal with thirteen storeys.

No Chinese buildings show more beauty than some of the graceful stone bridges for which the neighbourhood of Peking has been famous for centuries.

See M. Pal6ologue, L'Art chinois (1887) : S. W. Bushell, Chinese Art, vol. i. (1304); J. Fergusson, History of Architecture; Professor Chuta It6, articles in The Kokka, Nos. 197, 198. (L. B.)

4. Sculpture. — Except in the casting and decoration of bronze vessels the Chinese have not obtained distinction as sculptors. They have practised sculpture in stone from an early period, but the incised reliefs of the 2nd century B.C., a number of which are figured in Professor E. Chavannes's standard work, 1 while they display a certain spirit, lack the true plastic sense, and though the power of the Chinese draughtsmen in- creased rapidly under the T'ang and Sung dynasties, their work in stone showed no parallel progress. The feeling for solidity, which in Japan was a natural growth, was always somewhat exotic in China. With the impulse given to the arts by Buddhism a school of sculpture arose. The pilgrim Fa Hsien records sculpture of distinctive Chinese type in the 5th century. But Indian models dominated the art. Colossal Buddhas of stone were typical of the T'ang era. Little, however, remains of these earlier times, and such true sculpture in stone, wood or ivory as we know dates from the 14th and succeeding centuries. The well-known sculptures on the arch at Chu Yung Kuan (a.d. 1345) are Hindu in style, though not without elements of breadth and strength, which seem to promise a greater development than actually took place. The colossal figures guarding the approach to the Ming tombs (r5th century) show that the national taste rapidly became conventional and petrified so far as monumental sculpture was concerned, though occasional examples of devotional or portrait sculpture on a smaller scale in wood and ivory are found, which in power, grace, sincerity and restraint can rank with the work of more gifted nations. Such pieces, however, are extremely rare, and at South Kensington the ivory " Kwanyin and Child " (274. 1898) is a solitary example. As a rule the Chinese sculptor valued his art in proportion to the technical difficulties it conquered. He thus either

preferred intractable materials like jade or rock-crystal, or, if he wrought in wood, horn or ivory, sought to make his work curious or intricate rather than beautiful. There is, nevertheless, beauty of a kind in Chinese bowls of jade, and there is dignity in some of the pieces of rock-crystal, but the bulk of the carving done in wood, horn and ivory does not deserve a moment's serious thought from the aesthetic point of view. The few fine specimens may be referred to the earlier part of the Ming dynasty when Chinese art in general was sincere and simple. After the middle of the 15th century there set in the taste for profuse ornament which injured all subsequent Chinese work, and wholly ruined Chinese sculpture.

Bronzes. — In Chinese bronzes we have a more consistent and exceptional form of plastic art, which can be traced continuously for some three thousand years. These bronzes take the form of ritual or honorific vessels, and the archaic shapes used in the service of the prehistoric religion of the country are repeated and copied with slight changes in decoration or detail to the present day.

The oldest extant specimens, chiefly derived from the sack of the Summer Palace at Peking, may be referred to the Shang and Chow dynasties ˆ766-255 B.C.). These ancient pieces have a certain savage monumental grandeur of design, are usually covered with a rich and thick patina of red, green and brown, and are decorated with simple patterns — scrolls, zigzag lines and a form of what is known as the Greek key-pattern symbol- izing respectively waves, mountains and storm clouds. The animal forms used are those of the tao-tieh (glutton), a fabulous monster (possibly a conventionalized tiger) representing the powers of the earth, the serpent and the bull. These two last in later pieces combine to form the dragon, representing the power of the air. In the Chow dynasty libation vessels were also made in the form of a deer, a ram or a rhinoceros. These characteristics are shown in figures 9-17, Plate II. Fig. 9 is a temple vessel of a shape still in use, but which must date from before 1000 B.C. With this massive piece may be contrasted

1 La Sculpture sur pierre en Chine au temps des deux dynasties Han (Paris, 1893).

the flower-like wine vase shown in fig. 10, a favourite shape which is the prototype of some of the most graceful forms of Chinese porcelain and Japanese bronze. Its date is about iooo B.C. The large wine vase shown in fig. n is some 400 years later. On the body appears the head of the tao-tieh, on the handles are superbly modelled serpents. The technique, which in the previous pieces was somewhat rude, has now become perfect, yet the menacing majestic feeling remains. We see it no less clearly in fig. 12, a marvellous vessel richly inlaid with gold and silver and covered with an emerald-green patina. It may date from about 500 B.C., and indicates that even in this remote epoch the Chinese were not only daring and powerful artists but also master-craftsmen in metal.

It is indeed at this period that the art reaches its climax. The monumental grandeur of the Shang specimens is often allied to clumsiness; the later work, if more elaborate, is always less powerful. Nevertheless, it is to a later period that ninety-nine out of a hundred Chinese bronzes must be referred, and the great majority belong either to the Han and succeeding dynasties (220 b.c.-a.d. 400), or to the Renaissance of the arts which culminated under the Ming dynasty a thousand years later.

The characteristics of the first of these periods is the free use of small solid figures of animals as decoration — the phoenix, the elephant, the frog, the ox, the tortoise, and occasionally men; shapes grow less austere and less significant, as a comparison between figures n and 13 will indicate; then towards the end of the 2nd century a.d. the influence of Buddhism is felt in the general tendency towards suavity of form (fig. 14). This vase is most delicately though sparingly inlaid with silver and a few touches of gold. Some small pieces, very richly and delicately inlaid and covered with a magnificent emerald-green patina, belonging to this period, form a connecting link between the inlaid work of the Chow dynasty and that of the Sung and Ming dynasties. The mirrors with Graeco-Bactrian designs, a con- clusive proof of the external influences brought to bear upon Chinese art, are also attributed to the Han epoch.

The troubled period between a.d, 400 and a.d. 960, in spite of the interval of activity under the T'ang dynasty, produced, it would seem, but few bronzes, and those few were of no distinct or note- worthy style. Under the Sung dynasty the arts revived, and to this time some of the most splendid specimens of inlaid work belong — – pieces of workmanship and taste no less perfect than that of the Japanese, in which the gold and silver of the earlier work are occa- sionally reinforced with malachite and lapis-lazuli. The coming of Kublai Khan

and the Yuen dynasty (1280-1367) once more brought the East into contact with the West, and to this time we may assign certain fine pieces of Persian form such as pilgrim bottles. The vessels bearing Arabic inscriptions belong to the Ming dynasty (1368-1644), with which the modern history of Chinese art begins.

The work done while the Ming dynasty was still young provides the student of Chinese art with many problems, and in one or two cases even the South Kensington authorities assign to pre-Christian times pieces that are clearly of Ming workmanship. The tendency of the period was eclectic and archalstic. The products of earlier days were reproduced with perfect technical command of materials, and with admirable taste; it is indeed by an excess of these qualities that archaistic Ming work may be distinguished from the true archaic. In fig. 15 we see how the Ming bronze worker took an earlier Buddhistic form of vase and gave it a new grace that amounted almost to artifice. A parallel might be found among the products of the so-called art nouveau of to-day, in which old designs are revived with just 'that added suavity or profusion of curvature that robs them of character. Fig. 16 again might be mistaken almost for a piece of the Chow dynasty, were not the grandeur of its form modified by just so much harmony in the curvature of the body and neck, and by just so much finish in the details as to rob the design of the old majestic vigour and to mark it as the splendid effort of an age of culture, and not the natural product of a period of strength.

It is, however, in the inlaid pieces that the difference tells most clearly. Here we find the monstrous forms of the Shang and Chow dynasties revived by men who appreciated their spirit but could not help making the revival an excuse for the display of their own superior skill. The monstrous vases and incense-burners of the past thus appear once more, but are now decorated with a delicate embroidery of inlay, are polished and finished to perfection, but lose therewith just the rudeness of edge and outline which made the older work so gravely significant. At times even some grandly planned vessel will appear with such a festoon of pretty tracery wreathed about it that the incongruity is little short of ridiculous, and we recognize we have passed the turning-point to decline.

Decline indeed came rapidly, and to the latter part of the Ming

epoch we must assign those countless bronzes where dragons and flowers and the stock symbols of happiness, good luck and longevity sprawl together in interminable convolutions. When once we reach this stage of contortion, of elaborate pierced and relief work, we come

to the place in history of Chinese bronzes where serious study may cease, except in so far as the study of the symbols themselves throws light upon the history of Chinese procelain (see Ceramics)'. One class of bronze alone needs a word of notice, namely, the profusely decorated pieces which have a Tibetan origin, and are obviously no older than the end of the Ming period. Of these fig. 17 will serve as a specimen, and a comparison with fig. 9 will show how the softer rounded forms and jewelled festoons of Hindu-Greek taste enervated the grand primitive force of the earlier age, and that neither the added delicacy of texture and substance nor the vastly increased dexterity of workmanship can compensate for the vanished majesty. (C. J. H.)

VII. The Chinese Language Colloquial. — In treating of Chinese, it will be found convenient to distinguish, broadly, the spoken from the written language and to deal with each separately. This is a distinction which would be out of place if we had to do with any European, or indeed most Oriental languages. Writing, in its origin, is merely a symbolic representation of speech. But in Chinese, as we shall see, for reasons connected with the peculiar nature ot the script, the two soon began to move along independent and largely divergent lines. This division, moreover, will enable us to employ different methods of inquiry more suited to each. With regard to the colloquial, it is hardly possible to do more than consider it in the form or forms in which it exists at the present day throughout the empire of China. Although Chinese, like other living languages, must have undergone gradual changes in the past, so little can be stated with certainty about these changes that an accurate survey of its evolution is quite out of the question. Obviously a different method is required when we come to the written characters. The familiar line, " Litera scripta manet, volat irrevocabile verbum," is truer perhaps of Chinese than of any other tongue. We have hardly any clue as to how Chinese was spoken or pronounced in any given district 2000 years ago, although there are written remains dating from long before that time; and in order to gain an insight into the structure of the characters now existing, it is necessary to trace their origin and development.

Beginning with the colloquial, then, and taking a linguistic survey of China, we find not one spoken language but a number of dialects, all clearly of a common stock, yet differing from one another as widely as the various Romance aiaJeca. languages in southern Europe — say, French, Italian and Spanish. Most of these dialects are found fringing the coast-line of China, and penetrating but a comparatively short way into the interior. Smarting from the province of Kwangtung in the south, where the Cantonese and farther inland the Hakka dialects are spoken, and proceeding northwards, we pass in suc- cession the

following dialects: Swatow, Amoy— these two may almost be regarded as one— Foochow, Wenchow and Ningpo. Farther north we come into the range of the great dialect popularly known as Mandarin (Kuanhua or" official language "), which sweeps round behind the narrow strip of coast occupied by the various dialects above-mentioned, and dominates a hinterland constituting nearly four-fifths of China proper. Mandarin, of which the dialect of Peking, the capital since 1421, is now the standard form, comprises a considerable number of sub-dialects, some of them so closely allied that the speakers of one are wholly intelligible to the speakers of another, while others (e.g. the vernaculars of Yangchow, Hankow or Mid-China and Ssu-ch'uan) may almost be considered as separate dialects. Among all these, Cantonese is supposed to approximate most nearly to the primitive language of antiquity, whereas Pekingese perhaps has receded farthest from it. But although philologically and historically speaking Cantonese and certain other dialects may be of greater interest, for all practical purposes Mandarin, in the widest sense of the term, is by far the most important. Not only can it claim to be the native speech of the majority of Chinamen, but it is the recognized vehicle of oral communication between all Chinese officials, even in cases where they come from the same part of the country and speak the same patois. For

these reasons, all examples of phraseology in this article will be given in Pekingese.

So far, stress has been laid chiefly on the dissimilarity of the dialects. On the other hand, it must be remembered that they proceed from the same parent stem, are spoken by members of the same race, and are united by th§ bond of writing which is the common possession of all, and cannot be regarded as derived from one more than from another. They also share alike in the two most salient features of Chinese as a whole: (1) they are all monosyllabic, that is, each individual word consists of only one syllable; and (2) they are strikingly poor in vocables, or separate sounds for the conveyance of speech. The number of these vocables varies from between 800 and 900 in Cantonese to no more than 420 in the vernacular of Peking. This scanty number, however, is eked out by interposing an aspirate between certain initial consonants and the vowel, so that for instance

p’u is distinguished from pu. The latter is pronounced with little or no emission of breath, the ” p ” approximating the farther north one goes (e.g. at Niuchwang) more closely to a ” b.” The aspirated p’u is pronounced more like our interjection “Pooh!” To the Chinese ear, the difference between the two is very marked. It will be found, as a rule, that an Englishman imparts a slight aspirate to his p’s, t’s, k’s and ch’s, and therefore has greater difficulty with the unaspirated words in Chinese. The aspirates are better learned by the ear than by the eye, but in one way or another it is essential that they be mastered by any one who wishes to make himself intelligible to the native. The influence of the Mongolian population, assisted by the progress of time, has slowly but surely diminished the number of vocables in Pekingese. Thus the initials ts and k, when fol- lowed by the vowel i (with its continental value) have gradually become softer and more assimilated to each other, and are now all pronounced ch. Again, all consonantal endings in t and k, such as survive in Cantonese and other dialects, have entirely disappeared from Pekingese, and n and ng are the only final consonants remaining. Vowel sounds, on the other hand, have been proportionately developed, such compounds as ao, ia, iao, iu, ie, ua occurring with especial frequency. (It must be under- stood, of course, that the above are only equivalents, not in all cases very exact, for the sounds of a non-alphabetic language.)

An immediate consequence of this paucity of vocables is that one and the same sound has to do duty for different words. Reckoning the number of words that an educated man would want to use in conversation at something over four thousand, it is obvious that there will be an average of ten meanings to each sound employed. Some sounds may have fewer meanings attached to them, but others will have many more. Thus the following represent only a fraction of the total number of words pronounced shih (something like the ” shi ” in shirt) : |{* ” his- tory/’ .Jig ” to employ,” J| ” a corpse/’ -jjj ” a market/’ gjjj ” an army,” $f ” a lion,” f “ten,” $fr “to pick up,” 5 “stone,” -{£ “generation,”

Examples are : Jgt -|ft k’ung-fa, ” to be afraid,” ■£ ff kao- su, ” to tell,” ff} fc shu-mu, ” tree,” fe Jff p’i-fu, ” skin,” ffi]& man-ying,” Ml,” $ˆ ˆku-tu,” solitary.” Sometimes the two parts are not exactly synonymous, but together make up the sense required. Thus in fe ˆ i- shang, ” clothes,” i denotes more particularly clothes worn on the upper part of the body, and shang those on the lower part, jjˆ Jg, feng- huang is the name of a fabulous bird, feng being the male, and huang the female. In another very large class of expressions, the first word serves to limit and determine the special meaning of the second: ftJJ / £ .” milk-skin,” ” cream “; /ˆ | ” fire-leg,” ” ham ” ; %£ f| ” lamp-cage,”

” lantern ” ; $£ |gf ” sea-waist,” ” strait.” There are, besides, a number of phrases which are harder to classify. Thus, f; hu means ” tiger.” But in any case where ambiguity might arise, lao-hu, ” old tiger,” is used instead of the mono- syllable. $5; (another hu) is ” fox,” and g! It, an animal belong- ing to the smaller cat tribe. Together, hu-lt, they form the usual term for fox. £jj fg chih tao is literally ” to know the way,” but has come to be used simply for the verb ” to know.” These pairs or two-word phrases are of such frequent occurrence, that the Chinese spoken language might almost be described as bi-syllabic. Something similar is seen in the extensive use of suffixes or enclitics, attached to many of the commonest nouns. – nil is the word for “girl,” but in speech £r ˆ nii-tzu or fjr fjj nii‘rh is the form used. ˆ- and J3 both mean child, and must originally have been diminutives. A fairly close parallel is afforded by the German suffix chen, as in Mddchen. The suffix §J, it may be remarked, belongs especially to the Peking ver- nacular. Then, the use of so-called numeratives will often give some sort of clue as to the class of objects in which a sub- stantive may be found. When in pidgin English we speak of ” one piecee man ” or ” three piecee dollar,” the word piecee is simply a Chinese numerative in English dress. Even in ordinary English, people do not say ” four cattle ” but ” four head of cattle.” But in Chinese the use of numeratives is quite a dis- tinctive feature of the language. The commonest of them, ˆ@ ko,

can be used indifferently in connexion with almost any class of things, animal, vegetable or mineral. But there are other numeratives — at least 20 or 30 in everyday use — which are strictly reserved for limited classes of things with specific attri- butes, jfc mei, for instance, is the numerative of circular objects such as coins and rings ; |j| k’o of small globular objects — pearls, grains of rice, &c. ; Q k’ou classifies things which have a mouth— bags, boxes and so forth ; fij: chien is used of all kinds of affairs ; gg chang of chairs and sheets of paper ; j|f chih (literally half a pair) is the numerative for various animals, parts of the body, articles of clothing and ships ; fg pa for things which are grasped by a handle, such as fans and knives.

This by no means exhausts the list of devices by which the difficulties of a monosyllabic language are successfully overcome. Mention need only be made, however, of the system of ” tones,” which, as the most curious and important of all, has been kept for the last.

The tones may be defined as regular modulations of the voice by means of which different inflections can be imparted to the same sound. They may be compared with the half- involuntary modulations which express emotional feeling in our words. To the foreign ear, a Chinese sentence spoken slowly with the tones clearly brought out has a certain sing-song effect. If we speak of the tones as a ” device ” adopted in order to increase the number of vocables, this must be understood rather as a convenient way of explaining their practical

function than as a scientific account of their origin. It is absurd to suppose the tones were deliberately invented in order to fit each written character with a separate sound. A tone may be said to be as much an integral part of the word to which it belongs as the sound itself; like the sound, too, it is not fixed once and for all, but is in a constant, though very gradual, state of evolution. This fact is proved by the great differences of

intonation in the dialects. Theoretically, four tones have been distinguished — the even, the rising, the sinking and the entering — each of which falls again into an upper and a lower series. But only the Cantonese dialect possesses all these eight varieties of tone (to which a ninth has been added) , while Pekingese, with which we are especially concerned here, has no more than four: the even upper, the even lower, the rising and the sinking. The history of the tones has yet to be written, but it appears that down to the 3rd century B.C. the only tones distinguished

were the ˆP "even," Jl "rising" and A "entering." Between that date and the 4th century a.d. the ˆj sinking tone was developed. In the nth century the even tone was divided into upper and lower, and a little later the entering tone finally dis- appeared from Pekingese. The following monosyllabic dialogue gives a very fair idea of the quality of the four Pekingese tones — 1st tone: Dead (spoken in a raised monotone, with slightly plaintive inflection); 2nd tone: Dead? (simple query); 3rd lone: Dead? (an incredulous query long drawn out); ˆth tone: Dead! (a sharp and decisive answer). The native learns the tones unconsciously and by ear alone. For centuries their exist- ence was unsuspected, the first systematic classification of them being associated with the name of Shen Yo, a scholar who lived a.d. 441-513. The Emperor Wu Ti was inclined to be sceptical, and one day said to him: " Come, tell me, what are these famous four tones?" " They are ˆ -%• 3? fS whatever your Majesty pleases to make them," replied Shen Yo, skilfully selecting for his answer four words which illustrated, and in the usual order, the four tones in question. Although no native is ever taught the tones separately, they are none the less present in the words he utters, and must be acquired consciously or unconsciously by any European who wishes to be understood. It is a mistake, however, to imagine that every single

word in a sentence must necessarily be given its full tonic force. Quite a number of words, such as the enclitics mentioned above, are not intonated at all. In others the degree of emphasis depends partly on the tone itself, partly on its position in the sentence. In Pekingese the 3rd tone (which is really the second in the ordinary series, the 1st being subdivided into upper and lower) is particularly important, and next to it in this respect comes the 2nd (that is, the lower even, or 2nd division of the 1st). It may be said, roughly, that any speaker whose second and third tones are correct will at any rate be understood, even if the 1st and 4th are slurred over.

It is chiefly, however, on its marvellous script and the rich treasures of its literature that the Chinese language depends for

its unique fascination and charm. If we take a page characters. * Panted Chinese or carefully written manuscript

and compare it with a page, say, of Arabic or Sanskrit, the Chinese is seen at once to possess a marked characteristic of its own. It consists of a number of wholly independent units, each of which would fit into a small square, and is called a character. These characters are arranged in columns, beginning on the right-hand side of the page and running from top to bottom. They are words, inasmuch as they stand for articulate sounds expressing root-ideas, but they are unlike our words in that they are not composed of alphabetical elements or letters. Clearly, if each character were a distinct and arbitrarily con- structed symbol, only those gifted with exceptional powers of memory could ever hope to read or write with fluency. This, however, is far from being the case. If we go to work synthetic- ally and first see how the language is built up, it will soon appear that most Chinese characters are susceptible of some kind of analysis. We may accept as substantially true the account of native writers who tell us that means of communication other than oral began with the use of knotted cords, similar to the quippus of ancient Mexico and Peru, and that these were dis- placed later on by the practice of notching or scoring rude marks on wood, bamboo and stone. It is beyond question that the first four numerals, as written with simple horizontal strokes, date from this early period. Notching, however, carries us but a little way on the road to a system of writing, which in China,

as elsewhere, must have sprung originally from pictures. In Chinese writing, especially, the indications of such an origin are unmistakable, a few characters, indeed, even in their present form, being perfectly recognizable as pic- characters. tures of objects pure and simple. Thus, for ” sun ” the ancient Chinese drew a circle with a dot in it : 0, now

modified into H; for “moon”^, now jj ; for “God” they drew the anthropomorphic figure %, which in its modern form appears as % ; for ” mountains ” ^ now [lj ; f or ” child ” 9”, now ^ ; for ” fish ” Q, now $, ; for ” mouth ” a round hole, now tX) for “hand” ^f , now ^ ; for “well” :$, now written without the dot. Hence we see that while the origin of all writing is picto- graphic, in Chinese alone of living languages certain pictures have survived, and still denote what they had denoted in the beginning. In the script of other countries they were gradually transformed into hieroglyphic symbols, after which they either disappeared altogether or became further conventionalized into the letters of an alphabet. These picture-characters, then, accumulated little by little, until they comprised all the common objects which could be easily and rapidly delineated — sun, moon, stars, various animals, certain parts of the body, tree, grass and so forth, to the number of two or three hundred. The next step was to a few compound pictograms which would naturally suggest themselves to primitive man : jj the sun just above the horizon = ” dawn”; $; trees side by side = “a forest”; =g- a mouth with something solid coming out of it= ” the tongue “; H a mouth with vapor or breath coming out of it= ” words.” But a purely pictographic script has its limitations. The more complex natural objects hardly come within its scope; still less the whole body of abstract ideas. While writing was

still in its infancy, it must have occurred to the Chinese ^“f** 8 ” . . . . live com*

to join together two or more pictorial characters in pounds.

order that their association might suggest to the mind some third thing or idea. ” Sun ” and ” moon ” combined in this way make the character $j, which means ” bright “; woman and child make $f ” good “; ” fields ” and ” strength ” (that is, labour in the fields) produce the character j§ ” male “■; two ” men ” on ” earth ” $£. signifies ” to sit ” — before chairs were known; the “sun” seen through “trees” Si designates the east; ^ has been explained as (1) a ” pig ” under a ” roof,” the Chinese idea, common to the Irish peasant, of home, and also (2) as ” several persons ” under ” a roof,” in the same sense ; a ” woman ” under a ” roof ” makes the character % ” peace ” ; ” words ” and ” tongue ” fjj} naturally suggest ” speech ” ; two hands {fc, in the old formgj) indicate friend- ship ; ” woman ” and ” birth ” j^ =” born of a woman/’ means “clan-name,” showing that the ancient Chinese traced through the mother and not through the father. Interesting and in- genious as many of these combinations are, it is clear that their number, too, must in any practical system of writing be severely limited. Hence it is not surprising that this class of characters,

correctly called ideograms, as representing ideas and not objects, should be a comparatively small one. Up to this point there seemed to be but little chance of the written language reaching a free field for expansion. It had run so far on lines sharply distinct from those of ordinary speech. There was nothing in the character per se which gave the slightest clue to the sound of the word it represented. Each character, therefore, had to be learned and recognized by a separate effort of memory. The first step in a new, and, as it ultimately proved, the right direction, was the borrowing of a char- characters. acter already in use to represent another word identical in sound, though different in meaning. Owing to the scarcity of vocables noted above, there might be as many as ten different words in common use, each pronounced fang. Out of those ten only one, we will suppose, had a character assigned to it — namely ~}j ” square ” (originally said to be a

picture of two boats joined together). But among the other nine was fang, meaning ” street ” or ” locality,” in such common use that it became necessary to have some means of writing it. Instead of inventing an altogether new character, as they might have done, the Chinese took ~)j ” square ” and used it also in the sense of ” locality.” This was a simple expedient, no doubt, but one that, applied on a large scale, could not but lead to confusion. The corresponding difficulty which presented itself in speech was overcome, as we saw, by many devices, one of which consisted in prefixing to the word in question another which served to determine its special meaning. A native does not say fang simply when he wishes to speak of a place, but ti-jang ” earth-place.” Exactly the same device was now adopted in writing the character. To fang ” square ” was added another part meaning ” earth,” in order to show that the fang in question had to do with location on the earth’s surface. The whole character thus appeared as i£. Once this phonetic prin- ciple had been introduced, all was smooth sailing, and writing progressed by leaps and bounds. Nothing was easier now than to provide signs for the other words pronounced fang. ” A room ” was |§ door-/

considerable number of phonetics are nearly or entirely obsolete as separate characters, although their family of derivatives may be a very large one. RX, for instance, is never seen by itself, yet S£, §£, and jjj

are among the most important characters in the language. Objections have been raised in some quarters to this account of the phonetic development of Chinese. It is argued that the primitives and sub-primitives, whereby is meant any character which is capable of entering into combination with another, have really had some influence on the meaning, and do not merely possess a phonetic value. But insufficient evidence has hitherto been advanced in support of this view.

The whole body of Chinese characters, then, may conveniently be divided up, for philological purposes, into pictograms, ideo- grams and phonograms. The first are pictures of objects, the second are composite symbols standing for abstract ideas, the third are compound characters of which the more important element simply represents a spoken sound. Of course, in a strict sense, even the first two classes do not directly represent either objects or ideas, but rather stand for sounds by which these objects and ideas have previously been expressed. It may, in fact, be said that Chinese characters are ” nothing but a number of more or less ingenious devices for suggesting spoken words to a reader.” This definition exposes the inaccuracy of the popular notion that Chinese is a language of ideographs, a mistake which even the compilers of the Oxford English Dictionary have not avoided. Considering that all the earliest characters are pictorial, and that the vast majority of the remainder are constructed on phonetic principles, it is absurd to speak of Chinese characters as ” symbolizing the idea of a thing, without expressing the name of it.”

The Chinese themselves have always been diligent students of their written language, and at a very early date (probably many centuries B.C.) evolved a sixfold classification of char- acters, the so-called /ˆ ˆ liu shu, very inaccurately scripts.” translated by the Six Scripts, which may be briefly noticed: —

1. ia ˆ chih shih, indicative or self-explanatory characters. This is a very small class, including only the simplest numerals and a few others such as _fc. ” above ” and “J*” ” below.”

2. ˆ W hsiang hsing, pictographic characters.

3. 3tˆ 3& hsing shtng or Wi Sp hsieh sheng. phonetic com- pounds.

4- “ft <§£ hui i, suggestive compounds based on a natural association of ideas. To this class alone can the term " ideo- graphs " be properly applied.

5- 1$ £fe chuan chu. The meaning of this name has been much disputed, some saying that it means “turned round”; e.g. mu ” eye ” is now written @. Others understand it as com- prising a few groups of characters nearly related in sense, each character consisting of an element common to the group, together with a specific and detachable part; e.g. 3£,3%,a,n& ˆ, all of which have the meaning ” old.” This class may be ignored altogether, seeing that it is concerned not with the origin of characters but only with peculiarities in their use.

6. iia ia chia chieh, borrowed characters, as explained above, that is, characters adopted for different words simply because of the identity of sound.

The order of this native classification is not to be taken as in any sense chronological. Roughly, it may be said that the development of writing followed the course previously traced — that is, beginning with indicative signs, and going on with pictograms and ideograms, until finally the discovery of the phonetic principle did away with all necessity for other devices in enlarging the written language. But we have no direct evidence that this was so. There can be little doubt that phonetic compounds made their appearance at a very early date, probably prior to the invention of a large number of suggestive compounds, and perhaps even before the whole existing stock of pictograms had been fashioned. It is significant that numerous words of daily occurrence, which must have had a place in the earliest

stages of human thought, are expressed by phonetic characters. We can be fairly certain, at any rate, that the period of ” borrowed characters ” did not last very long, though it is thought that traces of it are to be seen in the habit of writing several characters, especially those for certain plants and animals, indifferently with or without their radicals. Thus 0t %$ ” a tadpole ” is frequently written ffl A; without the part meaning “insect” or “reptile.”

In the very earliest inscriptions that have come down to us, the so-called jfj ˆ£ ku-wen or ‘ ‘ancient figures, ‘ ‘ all the above-mentioned forms occur. None are wholly pictorial, with one or two ww unimportant exceptions. These early inscriptions are

w g ‘ found on bronzes dating from the half-legendary period

extending from the beginning of the Shang dynasty in the 1 8th century B.C., or possibly earlier, down to a point in the reign of King Hstian of the Chou dynasty, generally fixed at 827 B.C. They have been carefully reproduced and for the most part deciphered by pains-taking Chinese archaeologists, and form the subject of many voluminous works. The following may be taken as a specimen, in which it will be noticed that only the last character is unmistakably pictorial : This is read : ffl # j| frf— “ShSn made [this] precious ting.” These ancient bronzes, which mainly take the shape of bells, cauldrons and sacrificial utensils, were until within the last decade our sole source of information concerning the origin and early history of Chinese writing. But recently a large number of inscribed bone fragments have been excavated in the north of China, providing new and unexpected matter for investigation. The inscriptions on these bones have already furnished a list of nearly 2500 separate characters, of which not more than about 600 have been so far identified. They appear to be responses given by pro- fessional soothsayers to private individuals who came to them seeking the aid of divination in the affairs of their daily life. It is difficult to fix their date with much exactitude. The script, though less archaic than that of the earlier bronzes, is nevertheless of an exceedingly free and irregular type. Judging by the style of the in- scriptions alone, one would be inclined to assign them to the early years of the Chou dynasty, say 1 100 B.C. But Mr L. C. Hopkins thinks that they represent a mode of writing already obsolete at the time of their production, and retained of set purpose by the diviners from obscurantist motives, much as the ancient hieroglyphics were employed by the Egyptian priesthood. He would therefore date them about 500 years later, or only half a century before the birth of Confucius. If that is so, they are merely late specimens of the ” ancient figures ” appearing long after the latter had made way for a new and more conventionalized form of writing. This new writing is called in Chinese 4fc chuan, which is commonly rendered by the word Seal, for the somewhat unscientific reason that many ages after- wards it was generally adopted for use on seals. Under the Chou dynasty, however, as well as the two succeeding it, the meaning of the word was not ” seal,” but ” sinuous curves,’ as made in Writing. It has accordingly been suggested that this epoch marks the first introduction into China of the brush in place of the bamboo or wooden pencil with frayed end which was used with some kind of colouring matter or varnish. There are many arguments both for and against this view; but it is unquestionable, at any rate, that the introduction of a supple implement like the brush at the very time when the forms of characters were fast becoming crystallized and fixed, would be sufficient to account for a great revolution in the style of writing.

Authentic specimens of the H(j ˆj| to chuan, older or Greater Seal writing, are exceedingly rare. But it is generally believed that the inscriptions on the famous stone drums, now at Peking, date from the reign of King Hstian, and they may therefore with practical certainty be cited as examples of the Greater Seal in its original form. These ” drums ” are really ten roughly chiselled mountain boulders, which were discovered in the early part of the 7th century, lying half buried in the ground near Feng-hsiang Fu in the province of Snensi. On them are engraved ten odes, a complete ode being cut on each drum, celebrating an Imperial hunting and fishing expedition in that part of the country. A facsimile of one of these, taken from an old rubbing and reproduced in Dr Bushell’s Handbook of Chinese Art, shows that great strides had been made in this writing towards symmetry, compactness ‘and conventionalism. The vogue of the Greater Seal appears to have lasted until the reign of the First Emperor, 221-210 B.C. (see History), when a further modification took place. For many centuries China had been split up into a number of practically independent states, and this circum- stance seems to have led to considerable variations in the styles of writing. Having succeeded in unifying the empire, the First Emperor proceeded, on the advice of his minister Li Ssu, to standard- ize its script by ordaining that only the style in use in his own state of Ch’in should henceforward be employed throughout China. It is clear, then, that this new style of writing was nothing more than the Greater Seal characters in the form they had assumed after several

centuries of evolution, with numerous abbreviations and modifica- tions. It was afterwards known as the A* $&, hsiao chuan, or Lesser Seal, and is familiar to us from the Shuo Wen dictionary (see Litera- ture), Though a decided improvement on what had gone before, the Lesser Seal was destined to have but a short Career of undisputed supremacy. Reform was in the air; and something less cumbrous was soon felt to be necessary by the clerks who had to supply the immense quantity of written reports demanded by the First Emperor. Thus it came about that a yet simpler and certainly more artistic form of writing was already in use, though not universally so, not long after the decree abolishing the Greater Seal. This H£ f£ lishu, or ” official script,” as it is called, shows a great advance on the Seal character ; so much so that one cannot help suspecting the traditional account of its invention. It is perhaps more likely to have been directly evolved from the Greater Seal. If the Lesser Seal was the script of the semi-barbarous state of Ch’in, we should certainly expect to find a more highly developed system of writing in some of the other states. Unlike the Seal, the li shu is perfectly legible to one acquainted only with the

modern character, from which indeed it differs but in minor details. How long the Lesser Seal continued to exist side by side with the li shu is a question which cannot be answered with certainty. It was evidently quite obsolete, however, at the time of the compilation of the Shuo Win, about a hundred years after the Christian era. As for the Greater Seal and still earlier forms of writing, they were not merely obsolete but had fallen into utter oblivion before the Han Dynasty was fifty years old. When a number of classical texts were discovered bricked up in old houses about 150 B.C., the style of writing was considered so singular by the literati of the period that they refused to believe it was the ordinary ancient character at all, and nicknamed it k'o-t'ou shu, " tadpole character," from some fancied resemblance in shape. The theory that these tadpole characters were not Chinese but a species of cunei form script, in which the wedges might possibly suggest tadpoles, must be dismissed as too wildly improbable for serious considera- tion; but we may advert for a moment to a famous inscription in which the real tadpole characters of antiquity are said to appear. This is on a stone tablet alleged to have been erected on Mount HSng in the modern Hupeh by the legendary Emperor Yti, as a record of his labours in draining away the great flood which submerged part of China in the 23rd century B.C. After more than one fruitless search, the actual monument is said to have been discovered on a peak of the mountain in A.D. 1212, and a transcription was made, which may be seen reproduced as a curiosity in Legge's Classics, vol. iii. For several reasons, however, the whole affair must be regarded as a gross imposture.

Out of the " official script " two other forms were soon developed, namely the ˆ § ts'ao shu, or " grass character," which so curtails the usual strokes as to be comparable to a species of shorthand, requiring special study, and the jfj ˆ hsing shu or running hand, used in ordinary correspondence. Some form of grass character is mentioned as in use as early as 200 B.C. or thereabouts, though how nearly it approximated to the modern grass hand it is hard to say; the running hand seems to have come several centuries later. The final standardization of Chinese writing was due to the great calli- graphist Wang Hsi-chih of the 4th century, who gave currency to the graceful style of character known as $f (ˆ k'ai shu, sometimes referred to as the " clerkly hand." When block-printing was invented some centuries later, the characters were cut on this model, which still survives at the present day. It is no doubt owing to the early intro- duction of printing that the script of China has remained practically unchanged ever since. The manuscript rolls of the Tang and pre- ceding dynasties, recently discovered by Dr Stein in Turkestan, furnish direct evidence

of this fact, showing as they do a style of writ- ing not only clear and legible but remarkably modern in appearance.

The whole history of Chinese writing, then, is characterized by a slow progressive development which precludes the idea of sharply- marked divisions between one period and another. The Chinese themselves, however, have canonized quite a series of alleged in- ventors, starting from Fu Hsi, a mythical emperor of the third millennium B.C., who is said to have developed a complete system of written characters from the markings on the back of a dragon- horse ; hence, by the way, the origin of the dragon as an Imperial emblem. As a rule, the credit of the invention of the art of writing is given to Ts'ang Chieh, a being with fabulous attributes, who con- ceived the idea of a written language from the markings of birds' claws upon the sand. The diffusion of the Greater Seal script is traced to a work in fifteen chapters published by Shih Chou, historio- grapher in the reign of King Hsuan. The Lesser Seal, again, is often ascribed to Li Ssu himself, whereas the utmost he can have done in the matter was to urge its introduction into common use. Likewise, Ch'gng Mo, of the 3rd century B.C., is supposed to have invented the li shu while in prison, and one account attributes the Lesser Seal to him as_ well ; but the fact is that the whole history of writing, as it stands in Chinese authors, is in hopeless confusion.

Grammar. — When about to embark on the study of a foreign language, the student's first thought is to provide himself with

two indispensable aids— a dictionary and a grammar. The Chinese have found no difficulty in producing the former (see Literature) . Now what as to the grammar ? He might reason- ably expect a people so industrious in the cultivation of their language to have evolved some system of grammar which to a certain degree would help to smooth his path. And yet the contrary is the case. No set of rules governing the mutual relations of words has- ever been formulated by the Chinese, apparently because the need of such rules has never been felt. The most that native writers have done is to draw a distinction between Jf ˆ and ifiˆ " full " and " empty words/' respec- tively, the- former being subdivided into tS ˆ " living words " or verbs, and JE ˆ? " dead words" or noun-substantives. By " empty words " particles are

meant, though sometimes the expression is loosely applied to abstract terms, including verbs. The above meagre classification is their nearest approach to a conception of grammar in our sense. This in itself does not prove that a Chinese grammar is impossible, nor that, if constructed, it might not be helpful to the student. As a matter of fact, several attempts have been made by foreigners to deduce a grammatical system which should prove as rigid and binding as those of Western languages, though it cannot be said that any as yet has stood the test of time or criticism. Other writers have gone to the other extreme, and maintained that Chinese has no grammar at all. In this dictum, exaggerated as it sounds, there is a very substantial amount of truth. Every Chinese character is an indivisible unit, representing a sound and standing for a root-idea. Being free from inflection or agglutination of any kind, it is incapable of indicating in itself either gender, number or case, voice, mood, tense or person. Of European languages, English stands nearest to Chinese in this respect, whence it follows that the construction of a hybrid jargon like pidgin English presents fewer difficulties than would be the case, for instance, with pidgin German. For pidgin English simply consists in taking English words and treating them like Chinese characters, that is, divesting them of all troublesome inflections and reducing them to a set of root-ideas arranged in logical sequence. ” You wantchee my no wantchee ” is nothing more nor less than literally rendered Chinese : ffc]g£ ˆ yf §J

” Do you want me or not? ” But we may go further, and say that no Chinese character can be definitely regarded as being any particular part of speech or possessing any particular function absolutely, apart from the general tenor of its context. Thus, taken singly, the character _k conveys only the general idea “above” as opposed to “below.” According to its place in the sentence and the requirements of common sense, it may be a noun meaning ” upper person ” (that is, a ruler) ; an adjective meaning “upper,” “topmost” or “best”; an adverb meaning “above”; a preposition meaning “upon”; and finally a verb meaning ” to mount upon,” or ” to go to.” ˆ is a character that may usually be translated ” to enter ” as in /ˆ p>j ” to enter a door ” ; yet in the locution \ fc ” enter wood,” the verb becomes causative, and the meaning is ” to put into a coffin.” It would puzzle grammarians to deter- mine the precise grammatical function of any of the words in the following sentence, with the exception of {BJ (an interroga- tive, by the way, which here happens to mean ” why ” but in other contexts is equivalent to ” how,” “which “or “what”): $■ M i& 1& ” Affair why must ancient,” or in more idiomatic English, ” Why necessarily stick to the ways of the ancients in such matters?”

Ortakeaproverbialsayinglike/J? Sf M ˆ 0f M, which may be correctly rendered ” The less a man has seen, the more he has to wonder at.” It is one thing, however, to translate it correctly, and another to explain how this translation can be inferred from the individual words, of which the bald equivalents might be given as: ” Few what see, many what Strange.” To say that ” strange ” is the literal equivalent of ‘g does not mean that |g can be definitely classed as an adjective. On the other hand, it would be dangerous even to assert that the word here plays the part of an active verb, because it would

be equally permissible to translate the above ” Many things are strange to one who has seen but little.”

Chinese grammar, then, so far as it deals with the classification of separate words, may well be given up as a bad job. But there still remains the art of syntax, the due arrangement of words to form sentences according to certain established rules. Here, at any rate, we are on somewhat firmer ground ; and for many years the dictum that ” the whole of Chinese grammar depends upon position ” was regarded as a golden key to the written language of China. It is perfectly true that there are certain positions and collocations of words which tend to recur, but when one sits down to formulate a set of hard-and-fast rules governing these positions, it is soon found to be a thankless task, for the number of qualifications and exceptions which will have to be added is so great as to render the rule itself valueless. Jf§ _Jˆ means ” on a horse,” Jˆ Jˆ “to get on a horse.” But it will not do to say that a preposition becomes a verb when placed before the substantive, as many other prepositions come before and not after the words they govern. If we meet such a phrase as S|S? Sg, literally ” warn rebels,” we must not mentally label 3§r as a verb and £g as a substantive, and say to ourselves that in Chinese the verb is followed immediately by its object. Otherwise, we might be tempted to translate, ” to warn the rebels,” whereas a little reflection would show us that the conjunction of “warning” and ” rebels ” naturally leads to the meaning ” to warn (the populace or whoever it may be) against the rebels.” After all our adventurous incursions into the domain of syntax, we are soon brought back to the starting-point and are obliged to confess that each particular passage is best interpreted on its own merits, by the logic of the context and the application of common sense. There is no reason why Chinese sentences should not be dissected, by those who take pleasure in such operations, into subject, copula and predicate, but it should be early impressed upon the beginner that the profit likely to accrue to him therefrom is infinitesimal. As for fixed rules of grammatical construction, so far from being a help, he will find them a positive hindrance. It should rather be his aim to free his mind from

such trammels, and to accustom himself to look upon each character as a root-idea, not a definite part of speech.

The Book Language. — Turning now to some of the more salient characteristics of the book language, with the object of explaining how it came to be so widely separated from common speech, we might reasonably suppose that in primitive times the two stood in much closer relation to each other than now. But it is certainly a striking fact that the earliest literary remains of any magnitude that have come down to us should exhibit a style very far removed from any possible colloquial idiom. The speeches of the Book of History (see Literature) are more mani- festly fictitious, by many degrees, than the elaborate orations in Thucydides and Livy. If we cannot believe that Socrates actually spoke the words attributed to him in the dialogues of Plato, much less can we expect to find the ipsissima verba of Confucius in any of his recorded sayings. In the beginning, all characters doubtless represented spoken words, but it must very soon have dawned on the practical Chinese mind that there was no need to reproduce in writing the bisyllabic compounds of

common speech. Chien ” to see,” in its written form .HL ,• could not possibly be confused with any other chien, and it was there- fore unnecessary to go to the trouble of writing 5 JtL k’an-chien ” look-see,” as in colloquial. There was a wonderful outburst of literary activity in the Confucian era, when it would seem that the older and more cumbrous form of Seal character was still in vogue. If the mere manual labour of writing was so great, we cannot wonder that all superfluous particles or other words that could be dispensed with were ruthlessly cut away. So it came about that all the old classical works were composed in the tersest of language, as remote as can be imagined from the speech of the people. The passion for brevity and conciseness was pushed to an extreme, and resulted more often than not in such obscurity that detailed commentaries on the classics were found to be necessary, and have always constituted an important branch of Chinese literature. After the introduction of the improved style of script, and when the mechanical means of writing had been simplified, it may be supposed that literary diction also became freer and more expansive. This did happen to some extent, but the classics were held in such veneration as to exercise the profoundest influence over all succeeding schools of writers, and the divorce between literature and pooular speech became permanent and irreconcilable. The book language

absorbed all the interest and energy of scholars, and it was inevitable that this elevation of the written should be accom- panied by a corresponding degradation of the spoken word. This must largely account for the somewhat remarkable fact that the art of oratory and public speaking has never been deemed worthy of cultivation in China, while the comparatively low position occupied by the drama may also be referred to the same cause. At the same time, the term ” book language,” in its widest sense, covers a multitude of styles, some of which differ from each other nearly as much as from ordinary speech. The department of fiction (see Literature), which the lettered China- man affects to despise and will not readily admit within the charmed circle of ” literature,” really constitutes a bridge spanning the gulf between the severer classical style and the colloquial; while an elegant terseness characterises the higher- class novel, there are others in which the style is loose and shambling. Still, it remains true that no book of any first-rate literary pretensions would be easily intelligible to any class of Chinamen, educated or otherwise, if read aloud exactly as printed. The public reader of stories is obliged to translate, so to speak, into the colloquial of his audience as he goes along. There is no inherent reason why the conversation of everyday life should not be rendered into characters, as is done in foreign handbooks for teaching elementary Chinese; one can only say that the Chinese do not think it worth while. There are a few words, indeed, which, though common enough in the mouths of genteel and vulgar alike, have positively no characters to represent them. On the other hand, there is a vast store of purely book words which would never be used or understood in conversation.

The book language is not only nice in its choice of word?, it also has to obey special rules of construction. Of these, perhaps the most apparent is the carefully marked antithesis between characters in different clauses of a sentence, which results in a kind of parallelism or rhythmic balance. This parallelism is a noticeable feature in ordinary poetical composition, and may be well illustrated by the following four-line stanza:

” £j B {& ill 5§i The bright sun completes its course behind the mountains ; 31 fBJ A $$ $fc The yellow river flows away into the sea. %jfc |f ^ JJ g Would you- command a pros- pect of a thousand K? M i — M ft Climb yet one storey higher.” In the first line of this piece, every single character is balanced by a corresponding one in the

second : |3 white by H yellow, Q sun by JgJ river, and so on. In the 3rd and 4th lines, where more laxity is generally allowed, every word again has its counterpart, with the sole exception of :§£ ” wish ” and gT ” further.”

The question is often asked: What sort of instrument is Chinese for the expression of thought? As a medium for the conveyance of historical facts, subtle emotions or abstruse philosophical conceptions, can it compare with the languages of the Western world? The answers given to this question have varied considerably. But it is noteworthy that those who most depreciate the qualities of Chinese are, generally speaking, theorists rather than persons possessing a profound first-hand knowledge of the language itself. Such writers argue that want of inflection in the characters must tend to make Chinese hard and inelastic, and therefore incapable of bringing out the finer shades of thought and emotion. Answering one a priori argu- ment with another, one might fairly retort that, if anything, flexibility is the precise quality to be predicated of a language in which any character may, according to the requirements of the context, be interpreted either as noun, verb or adjective. But all such reasoning is somewhat futile. It will scarcely be con- tended that German, being highly inflected, is therefore superior in range and power to English, from which inflections have largely disappeared. Some of the early Jesuit missionaries, men of great natural ability who steeped themselves in Oriental learning, have left very different opinions on record. Chinese appeared to them as admirable for the superabundant richness of its vocabulary as for the conciseness of its literary style.

And among modern scholars there is a decided tendency to accept this view as embodying a great deal more truth than the other.

Another question, much debated years ago, which time itself is now satisfactorily answering, was whether the Chinese language would be able to assimilate the vast stock of new terminology which closer contact with the West would necessarily carry with it. Two possible courses, it seemed, were open: either fresh characters would be formed on the radical-phonetic principle, or the new idea might be expressed by the conjunction of two or more characters already existing. The former expedient had been tried on a limited scale in Japan, where in the course of time new characters were formed on the same principle as of old, which were yet purely Japanese and find no place in a Chinese dictionary. But although the field for such additions was boundless, the Chinese have all along been chary of extending the language in this way, probably because these modern terms had no Chinese sound which might have suggested some particular phonetic.

They have preferred to adopt the other method, of which # |?$ HI (rise-descend-machine) for ” lift,” and pfi ®C Hi H (discuss -govern -country -assembly) for ” parliament ” are examples. Even a metaphysical abstraction like The Absolute has been tentatively expressed by $E H*f (exclude-opposite); but in this case an equivalent was already existing in the Chinese language.

A very drastic measure, strongly advocated in some quarters, is the entire abolition of all characters, to be replaced by their equivalent sounds in letters of the alphabet. Under this scheme A would figure as jin or ren, |j§ as ma, and so on. But the pro- posal has fallen extremely flat. The vocables, as we have seen, are so few in number that only the colloquial, if even that, could possibly be transcribed in this manner. Any attempt to trans- literate classical Chinese would result in a mere jumble of sounds, utterly unintelligible, even with the addition of tone-marks. There is another aspect of the case. The characters are a potent bond of union between the different parts of the Empire with their various dialects. If they should ever fall into disuse, China will have taken a first and most fatal step towards internal disruption. Even the Japanese, whose language is not only free from dialects, but polysyllabic and therefore more suitable for romanization, have utterly refused to abandon the Chinese script, which in spite of certain disadvantages has hitherto triumphantly adapted itself to the needs of civilized intercourse.

See P. Premare, Notitiae Linguae Sinicae (1831); Ma Kien-chung, Ma shih win Vung (1899) ; L. C. Hopkins, The Six Scripts (1881) and The Development of Chinese Writing (1910); H. A. Giles, A Chinese-English Dictionary (2nd ed., 1910). (H. A. Gi.; L. Gl.)

VIII. Chinese Literature

The literature of China is remarkable (1) for its antiquity, coupled with an unbroken continuity down to the present day; (2) for the variety of subjects presented, and for the exhaustive treatment which, not only each subject, but also each sub- division, each separate item, has received, as well as for the colossal scale on which so many literary monuments have been conceived and carried out; (3) for the accuracy of its historical statements, so far as it has been possible to test them; and further (4) for its ennobling standards and lofty ideals, as well as for its wholesome purity and an almost total absence of coarseness and obscenity.

No history of Chinese literature in the Chinese language has yet been produced; native scholars, however, have adopted, for bibliographical

purposes, a rough division into four great classes. Under the first of these, we find the Confucian Canon, together with lexicographical, philological, and ‘ other works dealing with the elucidation of words. Under the second, histories of various kinds, officially compiled, privately written, constitutional, &c. ; also biography, geography and bibliography. Under the third, philosophy, religion, e.g. Buddhism; the arts and sciences, e.g. war, law, agriculture, medicine, astronomy, painting, music and archery; also a host of general works, monographs, and treatises on a number of topics, as well as encyclopaedias. The fourth class is confined to poetry of all

descriptions, poetical critiques, and works dealing with the all-important rhymes.

Poetry.— Proceeding chronologically, without reference to Chinese classification, we have to begin, as would naturally be expected, with the last of the above four classes. Man’s first literary utterances in China, as elsewhere, took the form of verse; and the earliest Chinese records in our possession are the national lyrics, the songs and ballads, chiefly of the feudal age, which reaches back to over a thousand years before Christ. Some pieces are indeed attributed to the 18th century B.C.; the latest bring us down to the 6th century B.C. Such is the collection entitled Shih Ching (or She King), popularly known as the Odes, which was brought together and edited by Confucius, 551-479 B.C., and is now included among the Sacred Books, forming as it does an important portion of the Confucian Canon. These Odes, once over three thousand in number, were reduced by Confucius to three hundred and eleven; hence they are frequently spoken of as ” the Three Hundred.” They treat of war and love, of eating and drinking and dancing, of the virtues and vices of rulers, and of the misery and happiness of the people. They are in rhyme. Rhyme is essential to Chinese poetry; there is no such thing as blank verse. Further, the rhymes of the Odes have always been, and are still, the only recognized rhymes which can be used by a Chinese poet, anything else being regarded as mere jingle. Poetical licence, however, is tolerated; and great masters have availed themselves freely of its aid. One curious result of this is that whereas in many instances two given words may have rhymed, as no doubt they did, in the speech of three thousand years ago, they no longer rhyme to the ear in the colloquial

of to-day, although still accepted as true and proper rhymes in the composition of verse.

It is noticeable at once that the Odes are mostly written in lines of four words, examples of lines consisting of any length from a single word to eight, though such do exist, being comparatively rare. These lines of four words, generally recognized as the oldest measure in Chinese poetry, are frequently grouped as quatrains, in which the first, second and fourth lines rhyme ; but very often only the second and fourth lines rhyme, and sometimes there are groups of a larger number of lines in which occasional lines are found without any rhyme at all. A few stray pieces, as old as many of those found among the Odes, have been handed down and preserved, in which the metre consists of two lines of three words followed by one line of seven words. These three lines all rhyme, but the rhyme changes with each succeeding triplet. It would be difficult to persuade the English reader that this is a very effective measure, and one in which many a gloomy or pathetic tale has been told. In order to realise how a few Chinese monosyllables in juxtaposition can stir the human heart to its lowest depths, it is necessary to devote some years to the study of the language.

At the close of the 4th century B.C., a dithyrambic measure, irregular and wild, was introduced and enjoyed considerable vogue. It has indeed been freely adopted by numerous poets from that early date down to the present day; but since the 2nd century B.C. it has been displaced from pre-eminence by the seven-word and rive- word measures which are now, after much refinement, the accepted standards for Chinese poetry. The origin of the seven-word metre is lost in remote antiquity ; the five-word metre was elaborated under the master-hand of Mei Sheng, who died 140 B.C. Passing over seven centuries of growth, we reach the T'ang dynasty, A.D. 618-905, the most brilliant epoch in the history of Chinese poetry. These three hundred years produced an extraordinarily large number of great poets, and an output of verse of almost incredible extent. In 1707 an anthology of the T'ang poets was published by Imperial order; it ran to nine hundred books or sections, and contained over forty- eight thousand nine hundred separate poems. A copy of this work is in the Chinese department of the University Library at Cambridge.

It was under the T'ang dynasty that a certain finality was reached in regard to the strict application of the tones to Chinese verse. For the purposes of poetry, all words in the language were ranged under one or the other of two tones, the even and the oblique, the former now including the two even tones, of which prior to the nth century there

was only one, and the latter including the rising, pinking and entering tones of ordinary speech. The incidence of these tones, which may be roughly described as sharps and flats, finally became fixed, just as the incidence of certain feet in Latin metres came to be governed by fixed rules. Thus, reading down- ward from right to left, as in Chinese, a five-word stanza may run : Sharp Flat Flat Sharp

sharp flat flat sharp

flat sharp flat sharp

o ° ° ■ °

flat sharp sharp flat

sharp flat sharp flat

A seven-word stanza may run :

Flat Sharp Sharp

flat sharp sharp flat

sharp flat flat sharp

sharp flat flat sharp

o o o o

flat sharp flat flat

flat sharp sharp flat

sharp flat sharp sharp

The above are only two metres out of many, but enough perhaps to give to any one who will read them with a pause or quasi-caesura, as marked by ° in each specimen, a fair idea of the rhythmic lilt of Chinese poetry. To the trained ear, the effect is most pleasing; and when this scansion, so to speak, is united with rhyme and choice diction, the result is a vehicle for verse, artificial no doubt, and elaborate, but admirably adapted to the genius of the Chinese language. Moreover, in the hands of the great poets this artificiality disappears altogether. Each word seems to slip naturally into its place; and so far from having been introduced by violence for the ends of prosody, it appears to be the very best word that could have been chosen, even had there been no trammels of any kind, so effect- ually

is the art of the poet concealed by art. From the long string of names which have shed lustre upon this glorious age of Chinese poetry, it may suffice for the present purpose to mention the follow- ing, all of the very first rank.

Meng Hao-jan, A.D. 689-740, failed to succeed at the public competitive examinations, and retired to the mountains where he led the life of a recluse. Later on, he obtained an official post; but he was of a timid disposition, and once when the emperor, attracted by his fame, came to visit him, he hid himself under the bed. His hiding-place was revealed by Wang Wei, a brother poet who was present. The latter, A.D. 699-759, in addition to being a first-rank poet, was also a landscape-painter of great distinction. He was further a firm believer in Buddhism ; and after losing his wife and mother, he turned his mountain home into a Buddhist monastery. Of all poets, not one has made his name more widely known than Li Po, or Li T'ai-po, A.D. 705-762, popularly known as the Banished Angel, so heavenly were the poems he dashed off, always under the influence of wine. He is said to have met his death, after a tipsy frolic, by leaning out of a boat to embrace the reflection of the moon. Tu Fu, A.D. 712-770, is generally ranked with Li Po, the two being jointly spoken of as the chief poets of their age. The former had indeed such a high opinion of his own poetry that he prescribed it for malarial fever. He led a chequered and wandering life, and died from the effects of eating roast beef and drinking white wine to excess, immediately after a long fast. Po Chu-i, A.D. 772-846, was a very prolific poet. He held several high official posts, but found time for a considerable output of some of the finest poetry in the language. His poems were collected by Imperial command, and engraved upon tablets of stone. In one of them he anticipates by eight centuries the famous ode by Malherbe, A Du Perrier, sur la mort de sa fille.

The T'ang dynasty with all its glories had not long passed away before another imperial house arose, under which poetry flourished again in full vigour. The poetsof the Sung dynasty, A.D. 960-1260, were many and varied in style; but their work, much of it of the very highest order, was becoming perhaps a trifle more formal and precise. Life seemed to be taken more seriously than under the gay and pleasure-loving T'angs. The long list of Sung poets includes such names as Ssu-ma Kuang, Ou-yang Hsiu and Wang An-shih, to be mentioned by and by, the first two as historians and the last as political reformer. A still more familiar name in popular estima- tion is that of Su Tung-p'o, A.D. 1031-1101, partly known for his romantic career, now in court favour, now banished to the wilds, but still more renowned as a brilliant poet and writer of fascinating essays.

The Mongols, a.d. 1260-1368, who succeeded the Sungs, and the Mings who followed the Sungs and bring us down to the year 1644, helped indeed, especially the Mings, to swell the volume of Chinese verse, but without reaching the high level of the two great poetical periods above-mentioned. Then came the present dynasty of Manchu Tatars, of whom the same tale must be told, in spite of two highly-cultured emperors, K'ang Hsi and Ch'ien Lung, both of them poets and one of them author of a collection containing no fewer than 33,950 pieces, most of which, it must be said, are but four-line stanzas, of no literary value whatever. It may be stated in this connexion that whereas China has never produced an epic in verse, it is not true that all Chinese poems are quite short, running only to ten or a dozen lines at the most. Many pieces run to several hundred lines, though the Chinese poet does not usually affect length, one of his highest efforts being the four-line stanza, known as the " stop- short," in which " the words stop while the sense goes on," ex- panding in the mind of the reader by the suggestive art of the poet. The " stop-short " is the converse of the epigram, which ends in a satisfying turn of thought to which the rest of the composition is intended to lead up; it aims at producing an impression which, so far from being final, is merely the prelude to a long series of visions and of feelings. The last of the four lines is called the " surprise line " ; but the revelation it gives is never a complete one : the words stop, but the sense goes on. Just as in the pictorial art of China,

so in her poetic art is suggestiveness the great end and aim of the artist. Beginners are taught that the three canons of verse com- position are lucidity, simplicity and correctness cf diction. Yet some critics have boldly declared for obscurity of expression, alleging that the piquancy of a thought is enhanced by its skilful conceal- ment. For the foreign student, it is not necessary to accentuate the obscurity and difficulty even of poems in which the motive is simple enough. The constant introduction of classical allusions, often in the vaguest terms, and the almost unlimited licence as to the order of words, offer quite sufficient obstacles to easy and rapid comprehension. Poetry has been denned by one Chinese writer as " clothing with words the emotions which surge through the heart." The chief moods of the Chinese poet are a pure delight in the varying phenomena of nature, and a boundless sympathy with the woes and sufferings of humanity. Erotic

poetry is not absent, but it is not a feature proportionate in extent to the great body of Chinese verse ; it is always restrained, and never lapses from a high level of purity and decorum. In his love for hill and stream which he peoples with genii, and for tree and flower which he endows with sentient souls, the Chinese poet is perhaps seen at his very best ; his views of life are somewhat too deeply tinged with melancholy, and often loaded with an overwhelming sadness ” at the doubtful doom of human kind.” In his lighter moods he draws inspiration, and in his darker moods consolation from the wine-cup. Hard-drinking, not to say drunkenness, seems to have been universal among Chinese poets, and a considerable amount of talent has been expended upon the glorification of wine. From Taoist, and especially from Buddhist sources, many poets have obtained glimpses to make them less forlorn; but it cannot be said that there is any definitely religious poetry in the Chinese language.

History. — One of the labours undertaken by Confucius was connected with a series of ancient documents — that is, ancient in his day — now passing under a collective title as Shu Ching (or Shoo King), and popularly known as the Canon, or Book, of History, Mere fragments as some of these documents are, it is from their pages of unknown date that we can supplement the pictures drawn for us in the Odes, of the early civilization of China. The work opens with an account of the legendary em- peror Yao, who reigned 2357-2255 B.C., and was able by virtue of an elevated personality to give peace and happiness to his ” black-haired ” subjects. With the aid of capable astronomers, he determined the summer and winter solstices, and calculated approximately the length of the year, availing himself, as required, of the aid of an intercalary month. Finally, after a glorious reign, he ceded the throne to a man of the people, whose only claim to distinction was his unwavering practice of filial piety. Chapter ii. deals with the reign, 2255-2205 B.C., of this said man, known in history as the emperor Shun. In accordance with the monotheism of the day, he worshipped God in heaven with prayer and burnt offerings; he travelled on tours of inspection all over his then comparatively narrow empire; he established punishments, to be tempered with mercy; he appointed officials to superintend forestry, care of animals, religious observances, and music; and he organized a system of periodical examinations for public servants. Chapter iii. is devoted to details about the Great Yii, who reigned 2205-2197 B.C., having been called to the throne for his engineering success in draining the empire of a mighty inunda- tion which early western writers sought to identify with Noah’s Flood. Another interesting chapter gives various geographical details, and enumerates the articles, gold, silver, copper,

iron, steel, silken fabrics, feathers, ivory, hides, &c, &c, brought in under the reign of the Great Yii, as tribute from neighbouring countries. Other chapters include royal proclamations, speeches to troops, announcements of campaigns victoriously concluded, and similar subjects. One peculiarly interesting document is the Announcement against Drunkenness, which seems to have been for so many centuries a national vice, and then to have practically disappeared as such. For the past two or three hundred years, drunkenness has always been the exception rather than the rule. The Announcement, delivered in the 1 2th century B.C., points out that King Wen, the founder of the Chou dynasty, had wished for wine to be used only in connexion with sacrifices, and that divine favours had always been liberally showered upon the people when such a restriction had been observed. On the other hand, indulgence in strong drink had invariably attracted divine vengeance, and the fall and dis-

ruption of states had often been traceable to that cause. Even on sacrificial occasions, drunkenness is to be condemned. ” When, however, you high officials and others have done your duty in ministering to the aged and to your sovereign, you may then eat to satiety and drink to elevation.” The Announcement winds up with an ancient maxim, ” Do not seek to see yourself reflected in water, but in others,”— whose base actions should warn you not to commit the same; adding that those who after a due interval should be unable to give up intemperate habits would be put to death. It is worth noting, in concluding this brief notice of China’s earliest records, that from first to last there is no mention whatever of any distant country from which the ” black-haired people ” may have originally come; no vestige of any allusion to any other form of civilization, such as that of Babylonia, with its cuneiform script and baked-clay tablets, from which an attempt has been made to derive the native-born civilization of China. A few odd coincidences sum up the chief argument in favour of this now discredited theory.

The next step lands us on the confines, though scarcely in the domain, of history properly so called. Among his other literary labours, Confucius undertook to produce the annals of A n „ a t s Lu, his native state; and beginning with the year 722 f the B.C., he carried the record down to his death in 479, after ˆ u s ˆˆ ej which it was continued for a few years, presumably by Tso-ch’iu Ming, the shadowy author of the famous Commentary, to which the text is so deeply indebted for vitality and illumination. The work of Confucius is known as the Ch’un Ch’iu, the Springs and Autumns, q.d. Annals. It consists of a varying number of brief entries under each year of the reign of each

successive ruler of Lu. The feudal system, initiated more than four centuries previously, and consisting of a number of vassal states owning allegiance to a central suzerain state, had already broken hopelessly down, so far as allegiance was concerned. For some time, the object of each vassal ruler had been the aggrandizement of his own state, with a view either to independence or to the hegemony, and the result was a state of almost constant warfare. Accordingly, the entries in the Ch'un Ch'iu refer largely to covenants entered into between con- tracting rulers, official visits from one to another of these rulers, their births and deaths, marriages, invasions of territory, battles, religious ceremonies, &c, interspersed with notices of striking natural phenomena such as eclipses, comets and earthquakes, and of im- portant national calamities, such as floods, drought and famine. For instance, Duke Wen became ruler of Lu in 625 B.C., and under his 14th year, 612 B.C., we find twelve entries, of which the following are specimens : —

2. In spring, in the first month, the men of the Chu State invaded

our southern border.

3. In summer, on the I-hai day of the fifth month, P'an, Marquis

of the Ch'i State, died.

5. In autumn, in the seventh month, there was a comet, which entered Pei-tou (a/3-y<) in Ursa Major).

9. In the ninth month, a son of the Duke of Ch'i murdered his ruler. Entry 5 affords the earliest trustworthy instance of a comet in China. A still earlier comet is recorded in what is known as The Bamboo Annals, but the genuineness of that work is disputed.

It will be readily admitted that the Ch'un Ch'iu, written through- out in the same style as the quotations given, would scarcely enable one to reconstruct in any detail the age it professes to record. Happily we are in possession of the Tso Chuan, a so-called com- mentary, presumably by some one named Tso, in which the bald entries in the work of Confucius are separately enlarged upon to such an extent and with such dramatic brilliancy that our com- mentary reads more like a prose epic than "a treatise consisting of a systematic series of comments or annotations on the text of a literary work." Under its guidance we can follow the intrigues, the alliances, the treacheries, the ruptures of the jealous states which constituted feudal China; in its picture pages we can see, as it were with our own eyes, assassinations,

battles, heroic deeds, flights, pursuits and the sufferings of the vanquished from the retribution exacted by the victors. Numerous wise and witty sayings are scattered through- out the work, many of which are in current use at the present day.

History as understood in Europe and the west began in China with the appearance of a remarkable man. Ssu-ma Ch'ien, who flourished 145-87 B.C., was the son of an hereditary grand astrologer, also an eager student of history and the actual planner of T,, trl the great work so successfully carried out after his death. * istorical By the time he was ten years of age, Ssii-ma Ch'ien was Hecora. already well advanced with his studies; and at twenty he set forth on a round of travel which carried him to all parts of the empire. Entering the public service, he was employed upon a mission of inspection to the newly-conquered regions of Ssuch'uan and Yunnan ; in no B.C. his father died, and he stepped into the post of grand astrologer. After devoting some time and energy to the reformation

of the calendar, he took up the work which had been begun by his father and which was ultimately given to the world as the Shih Chi, or Historical Record. This was arranged under five great headings, namely, (1) Annals of Imperial Reigns, (2) Chronological Tables, (3) Monographs, (4) Annals of Vassal Princes, and (5) Biographies.

The Historical Record begins with the so-called Yellow Emperor, who is said to have come to the throne 2698 B.C. and to have reigned a hundred years. Four other emperors are given, as belonging to this period, among whom we find Yao and Shun, already mentioned. It was China's Golden Age, when rulers and ruled were virtuous alike, and all was peace and prosperity. It is discreetly handled in a few pages by Ssu-ma Ch'ien, who passes on to the somewhat firmer but still doubtful ground of the early dynasties. Not, however, until the Chou dynasty, 1122-255 B.C., had held sway for some three hundred years can we be said to have reached a point at which history begins to separate itself definitely from legend. In fact, it is only from the 8th century before Christ that any trustworthy record can be safely dated. With the 3rd century before Christ, we are introduced to one of the feudal princes whose military genius enabled him to destroy beyond hope of revival the feudal system which had endured for eight

hundred years, and to make himself master of the whole of the China of those days. In 221 B.C. he proclaimed himself the ” First Burninst Emperor,” a title by which he has ever since been known. of the Everything, including literature, was to begin with his

Books. reign ; and acting on the advice of his prime minister, he issued an order for the burning of all books, with the excep- tion only of works relating to medicine, divination and agriculture. Those who wished to study law were referred for oral teaching to such as had already qualified in that profession. To carry out the scheme effectively, the First Emperor made a point of examining every day about 120 lb weight of books, in order to get rid of such as he considered to be useless; and he further appointed a number of inspectors to see that his orders were carried out. The result was that about four hundred and sixty scholars were put to death for having disobeyed the imperial command, while many others were banished for life. This incident is known as the Burning of the Books; and there is little doubt that, but for the devotion of the literati, Chinese literature would have had to make a fresh start in 212 B.C. As it was, books were bricked up in walls and otherwise widely concealed in the hope that the storm would blow over; and this was actually the case when the Ch’in (Ts’in) dynasty collapsed and the House of Han took its place in 206 B.C. The Confucian books were subsequently recovered from their hiding-places, together with many other works, the loss of which it is difficult now to contemplate. Unfortunately, however, a stimulus was provided, not for the recovery, but for the manufacture of writings, the previous existence of which could be gathered either from tradition or from notices in the various works which had survived. Forgery became the order of the day; and the modern student is confronted with a considerable volume of literature which has to be classified as genuine, doubtful, or spurious, according to the merits of each case. To the first class belongs the bulk, but not all, of the Confucian Canon; to the third must be relegated such books as the Tao Te Ching, to be mentioned later on.

Ssu-ma Ch’ien, dying in 87 B.C., deals of course only with the opening reigns of the Han dynasty, with which he brings to a close the first great division of his history. The second division consists of chronological tables; the third, of eight monographs on the following topics: (1) Rites and Ceremonies, (2) Music, (3) Natural Philosophy, (4) The Calendar, (5) Astronomy, (6) Religion, (7) Water-ways, and (8) Commerce. On these eight a few remarks may not be out of place, (1) The Chinese seem to have been in possession, from very early ages, of a systematic code of ceremonial observances, so that it is no surprise to find the subject included, and taking an important place, in

Ssu-ma Ch'ien's work. The Li Chi, or Book of Rites, which now forms part of the Confucian Canon, is however a comparatively modern compilation, dating only from the 1st century B.C. (2) The extraordinary similarities between the Chinese and Pythagorean systems of music force the conclusion that one of these must necessarily have been derived from the other. The Jesuit Fathers jumped to the conclusion that the Greeks borrowed their art from the Chinese ; but it is now common knowledge that the Chinese scale did not exist in China until two centuries after its appearance in Greece. The fact is that the ancient Chinese works on music perished at the Burning of the Books; and we are told that by the middle of the 2nd century B.C. the hereditary Court music-master was altogether ignorant of his art. What we may call modern Chinese music reached China through Bactria, a Greek kingdom, founded by Diodotus in 256 B.C., with which intercourse had been established by the Chinese at an early date. (3) The term Natural Philosophy can only be applied by courtesy to this essay, which deals with twelve bamboo tubes of varying lengths, by means of which, coupled with the twenty-eight zodiacal constellations and with certain calendaric accords, divine communication is established with the influences of the five elements and the points of the compass corresponding with the eight winds. (4) In this connexion, it is worth noting that in 104 B.C. the Chinese first adopted a cycle of nineteen years, a period which exactly brings together the solar and the lunar years; and further that this very cycle is said to have been introduced by Meton, 5th century B.C., and was adopted at Athens about 330 B.C., probably reaching China, via Bactria, some two centuries afterwards. (5) This chapter deals

n. 8

specially with the sun, moon and five planets, which are supposed to aid in the divine government of mankind. (6) Refers to the solemn sacrifices to Heaven and Earth, as performed by the emperor upon the summit of Mt. T'ai in Shan-tung. (7) Refers to the management of the Hoang Ho, or Yellow river, so often spoken of as " China's Sorrow," and also of the numerous canals with which the empire is intersected. (8) This chapter, which treats of the circulation of money, and its function in the Chinese theory of political economy, is based upon the establishment in 1 10 B.C. of certain officials whose business it was to regularize commerce. It was their duty to buy up the chief necessaries of life when abundant and when prices were in consequence low, and to offer these for sale when there was a shortage and when prices would otherwise have risen unduly. Thus it was hoped that a stability in commercial transactions would be attained, to the great advantage of the people. The fourth division of the Shih Chi is devoted to the

annals of the reigns of vassal princes, to be read in connexion with the imperial annals of the first division. The final division, which is in many ways the most interesting of all, gives biographical notices of eminent or notorious men and women, from the earliest ages downwards, and enables us to draw conclusions at which otherwise it would have been impossible to arrive. Con- fucius and Mencius, for instance, stand out as real personages who actually played a part in China's history; while all we can gather from the short life of Lao Tzu, a part of which reads like an inter- polation by another hand, is that he was a more or less legendary individual, whose very existence at the date usually assigned to him, 7th and 6th centuries B.C., is altogether doubtful. Scattered among these biographies are a few notices of frontier nations; e.g. of the terrible nomads known as the Hsiung-nu, whose identity with the Huns has now been placed beyond a doubt.

Ssu-ma Ch'ien's great work, on which he laboured for so many vears and which ran to five hundred and twenty-six thousand five hundred words, has been described somewhat at length for the following reason. It has been accepted as the model for all subse- quent dynastic histories, of which twenty-four have now been pub- lished, the whole being produced in 1747 in a uniform edition, bound up (in the Cambridge Library) in two hundred and nineteen large volumes. Each dynasty has found its historian in the dynasty which supplanted it; and each dynastic history is notable for the extreme fairness with which the conquerors have dealt with the vanquished, accepting without demur such records of their prede- cessors as were available from official sources. The T'ang dynasty, A.D. 618-906, offers in one sense a curious exception to the general rule. It possesses two histories, both included in the above series. The first of these, now known as the Old T'ang History, was ultimately set aside as inaccurate and inadequate, and a New T'ang History was compiled by Ou-yang Hsiu, a distinguished scholar, poet and states- man of the nth century. Nevertheless, in all cases, the scheme of the dynastic history has, with certain modifications, been that which was initiated in the 1st century B.C. by Ssu-ma Ch'ien.

The output of history, however, does not begin and end with the voluminous records above referred to, one of which, it should be mentioned, was in great part the work of a woman. ˆ. fle History has always been a favourite study with the Chinese, Mirror of and innumerable histories of a non-official character, long History. and short, complete and partial, political and constitu- tional, have been showered from age to age upon the Chinese reading world. Space would fail for the mere mention of a tithe of such works; but there is

one which stands out among the rest and is especially enshrined in the hearts of the Chinese people. This is the T'ung Chien, or Mirror of History, so called because " to view antiquity as though in a mirror is an aid in the administration of government." It was the work of a statesman of the nth century, whose name, by a coincidence, was Ssu-ma Kuang. He had been forced to retire from office, and spent nearly all the last sixteen years of his life in historical research. The Mirror of History embraces a period from the 5th century B.C. down to A.D. 960. It is written in a picturesque style ; but the arrangement was found to be unsuited to the systematic study of history. Accordingly, it was subjected to revision, and was to a great extent reconstructed by Chu Hsi, the famous commentator, who flourished A.D. 1 130-1200, and whose work is now regarded as the standard history of China.

Biography. — In regard to biography, the student is by no means limited to the dynastic histories. Many huge biographical collections have been compiled and published by private in- dividuals, and many lives of the same personages have often been written from different points of view. There is nothing very much by which a Chinese biography can be distinguished from biographies produced in other parts of the world. The Chinese writer always begins with the place of birth, but he is not so particular about the year, sometimes leaving that to be gathered from the date of death taken in connexion with the age which the person may have attained. Some allusion is usually made to ancestry, and the steps of an official career, upward by promotion or downward by disgrace, are also carefully noted.

Geography and Travel. — There is a considerable volume of

Chinese literature which comes under this head; but if we exclude certain brief notices of foreign countries, there remains nothing in the way of general geography which had been produced prior to the arrival of the Jesuit Fathers at the close of the 16th century. Up to that period geography meant the topography of the Chinese empire; and of topographical records there is a very large and valuable collection. Every prefecture and departmeat, some eighteen hundred in all, has each its own particular topography, compiled from records and from

tradition with a fullness that leaves nothing to be desired. The buildings, bridges, monuments of archaeological interest, &c, in each district, are all carefully inserted, side by side with biographical and other local details, always of interest to residents and often to the outside public. An extensive general geography of the empire was last published in 1745; and this was followed by a chronological geography in 1794.

The Chinese have always been fond of travel, and hosts of travellers have published notices, more or less extensive, of the „ different parts of the empire, and even of adjacent

nations, which they visited either as private individuals or, in the former case, as officials proceeding to distant posts. With Buddhism came the desire to see the country which was the home of the Buddha; and several important pilgrimages were undertaken with a view to bring back images and sacred writings to China. On such a journey the Buddhist priest, Fa Hsien, started in a.d. 399; and after practically walking the whole way from central China, across the desert of Gobi, on to Khoten, and across the Hindu Kush into India, he visited many of the chief cities of India, until at length reaching Calcutta he took ship, and after a most adventurous voyage, in the course of which he remained two years in Ceylon, he finally arrived safely, in a.d. 414, with all his books, pictures, and images, at a spot on the coast of Shantung, near the modern German port of Kiao-chow.

Another of these adventurous priests was Hsuan Tsang (wrongly, Yuan Chwang), who left China on a similar mission in 629, and returned in 645, bringing with him six Tsanr. hundred and fifty-seven Buddhist books, besides many images and pictures, and one hundred and fifty relics. He spent the rest of his life in translating, with the help of other learned priests, these books into Chinese, and completed in 648 the important record of his own travels, known as the Record of Western Countries.

Philosophy. — Even the briefest resume of Chinese philosophical literature must necessarily include the name of Lao Tzii, al- ia© Tzu. tnou gh his era, as seen above, and his personality are both matters of the vaguest conjecture. A number of his sayings, scattered over the works of early writers, have been pieced together, with the addition of much incomprehensible jargon, and the whole has been given to the world as the work of Lao Tzii himself, said to be of the 6th century B.C., under the title of the Too Ti Ching. The internal evidence against this book is overwhelming; e.g. one quotation had been detached from the writer who preserved it, with part of that writer’s text clinging to

it — of course by an oversight. Further, such a treatise is never mentioned in Chinese literature until some time after the Burning of the Books, that is, about four centuries after its alleged first appearance. Still, after due expurgation, it forms an almost complete collection of such apophthegms of Lao Tzii as have come down to us, from which the reader can learn that the author taught the great doctrine of Inaction — Do nothing, and all things will be done. Also, that Lao Tzii anticipated the Christian doctrine of returning good for evil, a sentiment which was highly reprobated by the practical mind of Confucius, who declared that evil should be met by justice. Among the more picturesque of his utterances are such paradoxes as, ” He who knows how to shut, uses no bolts; yet you cannot open. He who knows how to bind uses no ropes; yet you cannot untie “; ” The weak overcomes the strong; the soft overcomes the hard,” &c.

These, and many similar subtleties of speech, seem to have fired the imagination of Chuang Tzii, 4th and 3rd centuries B.C., with the

result that he put rhuch time and energy into the glorification of Lao Tzu and his doctrines. Possessed of a brilliant style and a master of irony, Chuang Tzu attacked the schools of Confucius and _. Mo Ti (see below) with so much dialectic skill that the xzS ablest scholars of the age were unable to refute his destructive criticisms. His pages abound in quaint anecdotes and allegorical instances, arising as it were spontaneously out of the questions handled, and imparting a lively interest to points which might otherwise have seemed dusty and dull. He was an idealist with all the idealist’s hatred of a utilitarian system, and a mystic with all the mystic’s contempt for a life of mere external activity. Only thirty-three chapters of his work now remain, though so many as fifty-three are known to have been still extant in the 3rd century; and even of these, several complete chapters are spurious, while in others it is comparatively easy to detect here and there the hand of the interpolator. What remains, however, after all reductions, has been enough to secure a lasting place for Chuang Tzu as the most original of China’s philosophical writers. His book is of course under the ban of heterodoxy, in common with all thought opposed to the Confucian teachings. His views as mystic, idealist, moralist and social reformer have no weight with the aspirant who has his way to make in official life; but they are a delight, and even a consolation, to many of the older men, who have no longer anything to gain or to lose. Confucius, 551-479 B.C., who imagined that his Annals of the Lu State would give him immortality, has always been much more widely appreciated as a moralist than as an historian. . w His talks with his disciples and with others have been preserved for us, together with some details of his personal and private life; and the volume in which

these are collected forms one of the Four Books of the Confucian Canon. Starting from the axiomatic declaration that man is born good and only becomes evil by his environment, he takes filial piety and duty to one'sneighbour as his chief themes, often illustrating his arguments^ with almost Johnsonian emphasis. He cherished a shadowy belief in a God, but not in a future state of reward or punishment for good or evil actions in this world. He rather taught men to be virtuous for virtue's sake. The discourses of Mencius, who followed Confucius after an interval of a hundred years, 372-289 B.C., form another of the Four Books, the remaining two of which are short philosophical Mencius. treatises, usually ascribed \ o a grandson of Confucius. Mencius devoted his life to elucidating and expanding the teachings of the Master; and it is no doubt due to him that the Confucian doctrines obtained so wide a vqgue. But he himself was more a politician and an economist (see below) than a simple preacher of morality; and hence it is that the Chinese people have accorded to him the title of The Second Sage. He is considered to have ^ n effectually " snuffed out " the heterodox school of MoTi, a philosopher of the 5th and 4th centuries B.C. who propounded a doctrine of " universal love " as the proper foundation for organized society, arguing that under such a system all the calamities that men bring upon one another would altogether disappear, and the Golden Age would be renewed. At the same time Mencius exposed y c – the fallacies of the speculations of Yang Chu, 4th century * B.C., who founded a school of ethical egoism as opposed to the exaggerated altruism of Mo Ti. According to Mencius, Yang Chu would not have parted with one hair of his body to save the whole world, whereas Mo Ti would have sacrificed all. Another early philosopher is HsUn Tzii, 3rd century B.C. He main- „ fi T _* tained, in opposition to Mencius, who upheld the Confucian dogma, and in conformity with Christian doctrine, that the nature of man at his birth is evil, and that this condition can only be changed by efficient moral training. T^.en came Yang Hsiung, 53-18 B.C., who propounded an ethical criterion midway between the yanr rival positions insisted on by Mencius and Hsun Tzii, tlslunz teaching that the nature of man at birth is neither good nor evil, but a mixture of both, and that development in either direction depends wholly upon circumstances.

There is a voluminous and interesting work, of doubtful age, which passes under the title of Huai-nan Tzii, or the Philosopher of Huai-nan. It is attributed to Liu An, prince of Huai-nan, who Hual . nan died 122 B.C., and who is further said to have written on Tz * alchemy; but alchemv was scarcely known in China at the date of his death, being introduced about that time from Greece. The author,

whoever he may have been, poses as a disciple of Lao Tzu; but the speculations of Lao Tzii, as glorified by Chuang Tzu, were then rapidly sinking into vulgar efforts to discover the elixir of life. It is very difficult in many cases of this kind to decide what books are, and what books are not, partial or complete forgeries. In the present instance, the aid of the Shuo Wen, a dictionary of the 1st century A.D. (see below), may be invoked, but not in quite so satisfactory a sense as that in which it will be seen lower down to have been applied to the Tao Ti Ching. The Shuo Wen contains a quotation said to be taken from Huai-nan Tzii; but that quotation cannot be found in the work under consideration. It may be argued that the words in question may have been taken from another work by the same author; but if so, it becomes difficult to believe* that a book, more than two hundred years old, from which the author of the Shuo Win quoted, should have been allowed to perish without leaving any trace behind. China has produced its Bentleys

in considerable numbers; but almost all of them have given their attention to textual criticism of the Confucian Canon, and few have condescended to examine critically the works of heterodox writers. The foreign student therefore finds himself faced with many knotty points he is entirely unable to solve.

Of Wang Ch'ung, a speculative and materialistic philosopher, a.d. 27-97, banned by the orthodox for his attacks on Confucius w and Mencius, only one work has survived. It consists

£*"X of eighty-four essays on such topics as the. nature of

uag ' things, destiny, divination, death, ghosts, poisons, miracles, criticisms of Confucius and Mencius, exaggeration, sacrifice and exorcism. According to Wang Ch'ung, man, endowed at birth sometimes with a good and sometimes with an evil nature, is informed with a vital fluid, which resides in the blood and is nourished by eating and drinking, its two functions being to animate the body and keep in order the mind. It is the source of all sensation, passing through the blood like a wave. When it reaches the eyes, ears and mouth, the result is sight, hearing and speech respectively. Disturbance of the vital fluid leads to insanity. Without the fluid, the body

cannot be maintained ; without the body, the fluid loses its vitality. Therefore, argues Wang Ch'ung, when the body perishes and the fluid loses its vitality, each being dependent on the other, there remains nothing for immortality in a. life beyond the grave. Ghosts he held to be the hallucinations of disordered minds, and miracles to be natural phenomena capable of simple explanations. His indict- ments of Confucius and Mencius are not of a' serious character; though, as regards the former, it must be borne in mind that the Chinese people will not suffer the faintest aspersion on the fair fame of their great Sage. It is 1 jlated in the Lun Yu that Confucius paid a visit to the notoriously immoral wife of one of the feudal nobles, and that a certain disciple was " displeased " in consequence, where- upon the Master swore, saying," If I have done any wrong, may the sky fall and crush me! " Wang Ch'ung points out that the form of oath adopted by Confucius is unsatisfactory and fails to carry con- viction. Had he said, " May I be struck dead by lightning! " his sincerity would have been more powerfully attested, because people are often struck dead by lightning; whereas the fall of the sky is too remote a contingency, such a thing never having been known to happen within the memory of man. As to Mencius, there is a passage in his works which states that a thread of predestination runs through all human life, and that those who accommodate themselves will come off better in the end than those who try to oppose ; it is in fact a statement of the oix btrhp pbpov principle. On this Wang Ch'ung remarks that the will of God is consequently made to depend on human actions; and he further strengthens his objection by showing that the best men have often fared worst. For instance, Confucius never became emperor; Pi Kan, the patriot, was dis- embowelled; the bold and faithful disciple, Tzu'Lu, was chopped into small pieces.

But the tale of Chinese philosophers is a long one. It is a depart- ment of literature in which the leading scholars of all ages have _ . . mostly had something to say. The great Chu Hsi, Ch is AD- lI 3°~ I20O > whose fame is chiefly perhaps that of a

aa£e ' commentator and whose monument is his uniform exegesis of the Confucian Canon, was also a voluminous writer on philosophy. He took a hand in the mystery which surrounds the J Ching (or Yih King), generally known as the Book of Changes, which is held by some to be the oldest Chinese work and which forms part of the Confucian Canon. It is ascribed to King W£n, the virtual founder of the Chou dynasty, 1122-249 B.C., whose son became the first sovereign and posthumously raised his father to kingly rank. It contains a fanciful system of divination, deduced originally from eight diagrams consisting of triplet combinations of a line and a broken line, either

one of which is necessarily repeated twice, and in two cases three times, in the same combination. Thus there may be three lines HE, or three broken lines 5=, and other such combinations as EH and EH. Confucius declared that he would like to give another fifty years to the elucidation of this puzzling text. Shao Yung, A.D. 1011-1077, sought the key in numbers; Ch'lng I., a.d. 1033- 1107, in the eternal fitness of things. " But Chu Hsi alone," says a writer of the 17th century, " was able to pierce through the meaning and appropriate the thoughts of the inspired man who composed it. ' No foreigner, however, has been able quite to understand what Chu Hsi did make of it, and several have gone so far as to set all native interpretations aside in favour of their own. Thus, the / Ching has been discovered by one to be a calendar of the lunar year ; by another, to contain a system of phallic worship; and by a third, to be a vocabulary of the language of a tribe, whose very existence had to be postulated for the purpose.

Political Economy. — This department of literature has been by no means neglected by Chinese writers. So early as the 7th century B.C. we find Kuan Chung, the prime minister of the Ch"i state, ch" devoting his attention to economic problems, and thereby

t'bung. making that state the wealthiest and the strongest of all the feudal kingdoms. Beginning life as a merchant, he passed into the public service, and left behind him at death a large work, parts of which, as we now possess it, may possibly have come direct from his own hand, the remainder being written up at a later date in accordance with the principles he inculcated. His ideal State was divided into twenty-one parts, fifteen of which were allotted to

officials and agriculturists, and six to manufacturers and traders. His great idea was to make his own state self-contained; and accordingly he fostered agriculture in order to be independent in time of war, and manufactures in order to increase his country's wealth in time of peace. He held that a purely agricultural popula- tion would always remain poor; while a purely manufacturing population would risk having its supplies of raw material cut off in time of war. He warmly encouraged free imports as a means of enriching his countrymen, trusting to their ability, under these conditions, to hold their own against foreign competition. He pro- tected capital, in the sense that he considered capitalists to be necessary for the development of commerce in time of peace, and for the protection of the state in time of war.

Mencius (see above) was in favour of heavily taxing merchants who tried to engross for the purpose of regrating, that is, to buy up

wholesale for the purpose of retailing at monopoly prices ; he was in fact opposed to all trusts and corners in trade. He was in favour of a tax to be imposed upon such persons as were mere consumers, living upon property which had been amassed by others and doing no work themselves. No tax, however, was to be exacted from property- owners who contributed by their personal efforts to the general welfare of the community. The object of the tax was not revenue, but the prevention of idleness with its attendant evil consequences to the state.

Wang An-shih, the Reformer, or Innovator, as he has been called, flourished a.d. 1021-1086. In 1069 he was appointed state councillor, and forthwith entered upon a series of startling reforms w which have given him a unique position in the annals of Aa-shib China. He established a state monopoly in commerce, under which the produce of a district was to be used first for the payment of taxes, then for the direct use of the district itself, and the remainder was to be purchased by the government at a cheap rate, either to be held until there was a rise in price, or to be trans-

Eorted to some other district in need of it. The people were to profit y fixity of prices and escape from further taxation ; and the government, by the revenue accruing in the process of administration. There was also to be a system of state advances to cultivators of land ; not merely to the needy, but to all alike. The loan was to be compulsory, and interest was to be paid on it at the rate of 2 % per month. The soil was to be divided into equal areas and taxed accord- ing to its fertility in each case, without reference to the number of inhabitants contained in each area. All these, and other important reforms, failed to find favour with a rigidly conservative people, and Wang An-shih lived long enough to see the whole of his policy reversed. Military Writers. — Not much, relatively speaking, has been written by the Chinese on war in general, strategy or tactics. There is, however, one very remarkable work which lias come down „

to us from the 6th century B.C., as to the genuineness of Sua-Tza. which there now seems to be no reasonable doubt. A biographical notice of the author, Sun Wu, is given in the Shih Chi (see above), from which we learn that ” he knew how to handle an army, and was finally appointed General.” His work, entitled the Art of War, is a short treatise in thirteen chapters, under the following headings: ” Laying Plans,” ” Waging War,” “Attack by Stratagem,” ” Tactical Dispositions,” ” Energy,” ” Weak Points and Strong,” ” Manoeuvr- ing,” ” Variation of Tactics,” ” The Army on the March,” ” Terrain,” ” The Nine Situations,” ” The Attack by Fire,” and ” The Use of Spies.” Although the warfare of Sun Wu’s day was the warfare of bow and

arrow, of armoured chariots and push of pike, certain principles inseparably associated with successful issue will be found enunciated in his work. Professor Mackail, in his Latin Literature (p. 86), declares that Varro's Imagines was " the first instance in history of the publication of an illustrated book." But reference to the Art Section of the history of the Western Han dynasty, 206 B.c- A.D. 25, will disclose the title of fifteen or sixteen illustrated books, one of which is Sun Wu's Art of War.

Agriculture. — In spite of the high place accorded to agriculturists, who rank second only to officials and before artisans and traders, and in spite of the assiduity with which agriculture has been practised in all ages, securing immunity from slaughter for the ploughing ox — what agricultural literature the Chinese possess may be said to belong entirely to modern times, Ch'eri Fu of the 12th century a.d. was the author of a small work in three parts, dealing with agriculture, cattle-breeding and silkworms respectively. There is also a well-known work by an artist of the early 13th century, with forty-six woodcuts illustrating the various operations of agriculture and weaving. This book was reprinted under the emperor K'ang Hsi, 1662-1723, and new illustrations with excellent perspective were provided by Chiao Ping-ch6n, an artist who had adopted foreign methods as introduced by the famous Jesuit, Matteo Ricci. The standard work on agricul- ture, entitled Nung Cheng Ch'ilan Shu, was compiled by „ .. Hsu Kuang-ch'i, 1562-1634, generally regarded as the Kuans- only influential member of the mandarinate who has ever . "" become a convert to Christianity. It is in sixty sections, the first three of which are sievoted to classical references. Then follow two sections on the division of land, six on the processes of husbandry, none on hydraulics, four on agricultural implements, six on planting, six on rearing silkworms, four on trees, one on breeding animals, one on food and eighteen on provision against a time of scarcity.

Medicine and Therapeutics. — The oldest of the innumerable medical works of all descriptions with which China has been flooded from time immemorial is a treatise which has been credited to the Yellow Emperor (see above), 2698-2598 B.C. It is entitled Plain Ques- tions of the Yellow Emperor, or Su Win for short, and takes the form of questions put by the emperor and answered by Earl Ch'i, a minister,

who was himself author of the Net Ching, a medical work no longer in existence. Without accepting the popular attribution of the Su Wen, it is most probable that it is a very old book, dating back to several centuries before Christ, and containing traditional lore of a still more remote period. The same may be said of certain works on cautery and acupuncture, both of which are still practised by Chinese doctors; and also of works on the pulse, the variations of which have been classified and allocated with a minuteness hardly credible. Special treatises on fevers, skin-diseases, diseases of the feet, eyes, heart, &c, are to be found in great quantities, as well as veterinary treatises on the treatment of diseases of the horse and the domestic buffalo. But in the whole range of Chinese medical literature there is nothing which can approach the Pen Ts'ao, or Pia Ts'ao. Materia Medica, sometimes called the Herbal, a title {i.e. Pin Ts'ao) which seems to have belonged to some book of the kind in pre-historic ages. The work under consideration was compiled by Li Shih-chSn, who completed his task in 1578 after twenty-six years' labour. No fewer than eighteen hundred and ninety-two species of drugs, animal, vegetable and mineral, are dealt with, arranged under sixty-two classes in sixteen divisions; and eight thousand one hundred and sixty prescriptions are given in con- nexion with the various entries. The author professes to quote from the original Pin Ts'ao, above mentioned; and we obtain from his extracts an insight into some curious details. It appears that formerly the number of recognized drugs was three hundred and sixty-five in all, corresponding with the days of the year. One hundred and twenty of these were called sovereigns (cf. a sovereign prescription) ; and were regarded as entirely beneficial to health, taken in any quantity or for any time. Another similar number were called ministers ; some of these were poisonous, and all had to be used with discretion. The remaining one hundred and twenty-five were agents; all very poisonous, but able to cure diseases if not taken in over-doses. The modern Pen Ts'ao, in its sixteen divisions, deals with drugs classed under water, fire, earth, minerals, herbs, grain, veget- ables, fruit, trees, clothes and utensils, insects, fishes, Crustacea, birds, beasts and man. In each case the proper name of the drug is first given, followed by its explanation, solution of doubtful points, correction of errors, means of identification by taste, use in prescrip- tions, &c. The work is fully illustrated, and there is an index to the various medicines, classed according to the complaints for which they are used.

Divination, &c. — The practice of divination is of very ancient date in China, traceable, it has been suggested, back to the Canon of Changes (see above), which is commonly used by the lettered classes for that

purpose. A variety of other methods, the chief of which is astrology, have also been adopted, and have yielded a considerable bulk of literature. Even the officially-published almanacs still mark certain days as suitable for certain undertakings, while other days are marked in the opposite sense. The spirit of Zadkiel pervades the Chinese empire. In like manner, geomancy is a subject on which many volumes have been written; and the same applies to the pseudo sciences of palmistry, physiognomy, alchemy (introduced from Greek sources) and others.

Painting. — Calligraphy, in the eyes of the Chinese, is just as much a fine art as painting; the two are, in fact, considered to have come into existence together, but as might be expected the latter occupies the larger space in Chinese literature, and forms the subject of numerous extensive works. One of the most important of these is the Hsuan Ho Hua P'u, the author of which is unknown. It contains information concerning two hundred and thirty-one painters and the titles of six thousand one hundred and ninety-two of their pictures, all in the imperial collection during the dynastic period Hsuan Ho, A.D. 1119-1126, from which the title is derived. The artists are classified under one of the following ten headings, supposed to represent the line in which each particularly excelled: Religion, Human Figures, Buildings, Barbarians (including their Animals), Dragons and Fishes, Landscape, Animals, Flowers and Birds, The Bamboo, Vegetables and Fruits.

Music. — The literature of music does not go back to a remote period. The Canon of Music, which was formerly included in the Confucian Canon, has been lost for many centuries; and the works now available, exclusive of entries in the dynastic histories, are not older than the 9th century A.D., to which date may be assigned the Chieh Ku Lu, a treatise on the deerskin drum, said to have been introduced into China from central Asia, and evidently of Scythian origin. There are several important works of the 16th and 17th centuries, in which the history and theory of music are fully discussed, and illustrations of instruments are given, with measurements in each case, and the special notation required. •

Miscellaneous. — Under this head may be grouped a vast number of works, many of them exhaustive, on such topics as archaeology, seals (engraved) , numismatics, pottery, ink (the miscalled " Indian "), mirrors, precious stones, tea, wine, chess, wit and humour, even cookery, &c. There is, indeed, hardly any subject, within

reasonable limits, which does not find some corner in Chinese

literature.

Collections. — Reprints of miscellaneous books and pamphlets in a uniform edition, the whole forming a ” library,” has long been a favourite means of disseminating useful (and other) tumrWel information. Of-these, the Lung Wei Pi Shu may be taken p/sf,, as a specimen. In bulk it would be about the equivalent of twenty volumes, 8vo, of four hundred pages to each. Among its contents we find the following. A handbook of phraseology, with explanations; a short account of fabulous regions to the N., S., E. and W. ; notes on the plants and trees of southern countries ; bio- graphical sketches of ninety-two wonderful personages; an account of the choice of an empress, with standard measurements of the height, length of limb, &c, of the ideal woman; ” Pillow Notes ” (a term borrowed by the Japanese), or jottings on various subjects, ranging from the Creation to an account of Fusang, a country where the trees are thousands of feet high and of vast girth, thus supporting the California, as opposed to the Mexico, identification of Fusang; critiques on the style of various poets, and on the indebtedness of each to earlier writers ; a list of the most famous bronze vessels cast by early emperors, with their dimensions, inscriptions, &c. ; a treatise on the bamboo; a list of famous swords, with dates of forging and inscriptions; an account of the old Mongol palace, previous to its destruction by the first Ming emperor; notes on the wild tribes of China; historical episodes; biographical notices of one hundred and four poets of the present dynasty; notes on archaeological, super- natural and other topics, first published in the 9th century; notes for bibliophiles on the care of books, and on paper, ink, pictures and bric-a-brac; a collection of famous criminal cases; night thoughts suggested by a meteor. Add to the above, numerous short stories relating to magic, dreams, bilocation, and to almost every possible phase of supernatural manifestation, and the reader will have some idea of what he may expect in an ordinary ” library ” of a popular character. It must always be remembered that with the Chinese, style is of paramount importance. Documents, the subject-matter of which would be recognized to be of no educative value, would still be included, if written in a pleasing style, such as might be serviceable as a model.

Individual A uthors. — In a similar manner it has always been custom- ary for relatives or friends, sometimes for the trade, to publish the ” complete works ” of important and often unimportant writers; usually, soon after death. And as literary distinction has hitherto almost invariably led to high office under the state, the collected works of the great majority of authors open with selected Memorials to the Throne and other documents of an official character. The public interest in

these may have long since passed away ; but they are valued by the Chinese as models of a style to be imitated, and the foreign student occasionally comes across papers on once burning questions arising out of commercial or diplomatic intercourse with western nations. Then may follow— the order is not always the same — the prefaces which the author contributed from time to time to the literary undertakings of his friends. Preface-writing is almost a department of Chinese literature. No one ever thinks of publishing a book without getting one or more of his capable associates to pro- vide prefaces, which are naturally of a laudatory character, and always couched in highly-polished and obscure terms, the difficulty of the text being often aggravated by a fanciful and almost illegible script. Prefaces written by emperors, many examples of which may be seen, are of course highly esteemed, and are generally printed in coloured ink. The next section may comprise biographical notices of eminent men and women, or of mere local celebrities, who happened to die in the author's day. Then will follow Records, a title which covers inscriptions carved on the walls of new buildings, or on memorial tablets, and also notes on pictures which the author may have seen, places which he may have visited, or allegorical incidents which he may have imagined. Then come disquisitions, or essays on various subjects; researches, being short articles of archaeo- logical interest; studies or monographs; birthday congratulations to friends or to official colleagues; announcements, as to deities, a cessation of whose worship is threatened if the necessary rain or fair weather be not forthcoming; funeral orations, letters of condolence, &c. The above items will perhaps fill half a dozen volumes; the remaining volumes, running to twenty or thirty in all, as the case may be, will contain the authors poetry, together with his longer and more serious works. The essential of such a collection is, in Chinese eyes, its completeness.

Fiction. — Although novels are not regarded as an integral part of literature proper, it is generally conceded that some novels may be profitably studied, if for no other reason, from the point of view of style. With the chib. "" novel, however, we are no longer on perfectly safe ground in regard to that decency which characterizes, as has been above stated, the vast mass of Chinese literature. Chinese novels range, in this sense, from the simplest and most un- affected tale of daily life, down to low — not the lowest — depths of objectionable pornography. The San Kuo Chih, an historical romance based upon a period of disruption at the close of the

2nd century a.d., is a delightful book, packed with episodes of battle, heroism, self-sacrifice, skilful strategy, and all that goes to make up a stirring picture of strenuous times. Its author, who might almost have been Walter Scott, cannot be named for certain; but the work itself probably belongs to the 13th century, a date at which the novel begins to make its appearance in China. Previous to that time, there had been current an immense quantity of stories of various kinds, but nothing like a novel, as we understand the term. From the 13th century onwards, the growth of the novel was continuous; and finally, in the 17th century, a point was reached which is not likely to be surpassed. The Hung Lou Ming, the author of which took

pains, for political reasons, to conceal his identity, Meat. * s a creat i°n of a very high order. Its plot is intricate

and original, and the denouement startlingly tragic. In the course of the story, the chief clue of which is love, woven in with intrigue, ambition, wealth, poverty, and other threads of human life, there occur no fewer than over four hundred characters, each one possessed of a distinctive personality drawn with marvellous skill. It contains incidents which recall the licence tolerated in Fielding; but the coarseness, like that of Fielding, is always on the surface, and devoid of the ulterior suggestiveness of the modern psychological novel. But perhaps no work of fiction has ever enjoyed such vogue among literary f, ˆ , men as a collection of stories, some graceful, some

weird, written in 1679 by P u Sunglmg, a dis- appointed candidate at the public examinations. This collection, known as the Liao Chai, is exceedingly interesting to the foreign student for its sidelights on folklore and family life; to the native scholar, who professes to smile at the subject-matter as beyond the pale of genuine literature, it is simply invalu- able as an expression of the most masterly style of which his language is capable.

Drama. — Simultaneously with the appearance of the novel, stage-plays seem to have come into existence in China. In the earliest ages there were set dances by trained performers, to the accompaniment of music and singing; and something of the kind, more or less ornate as regards the setting, has always been associated with solemn and festive occasions. But not until the days of the Mongol rule, a.d. i 260-1368, can the drama proper be said to have taken root and flourished in Chinese soil. The probability is that both the drama and the novel were intro- duced from Central Asia in the wake of the

Mongol conquerors; the former is now specially essential to the everyday happiness of the Chinese people, who are perhaps the most confirmed playgoers in the world. There is an excellent collection of one hundred plays of the Mongol dynasty, with an illustration to each, first published in 1615; there is also a further large collection, issued in 1845, which contains a great number of plays arranged under sixty headings, according to the style and

purport of each, besides many others. There is one Chi. * ""* famous play of the Mongol period which deals largely

in plot and passion, and is a great favourite with the educated classes. It is entitled Hsi Hsiatig Chi, or the Story of the Western Pavilion; and as if there was a doubt as to the reception which would be accorded to the work, a minatory sentence was inserted in the prolegomena: " If any one ventures to call this book indecent, he will certainly have his tongue torn out in hell." So far as the written play is con- cerned, its language is altogether unobjectionable; on the stage, by means of gag and gesture, its presentation is often unseemly and coarse. What the Chinese playgoer delights in, as an evening's amusement, is a succession of plays which are more of the nature of sketches, slight in construction and generally weak in plot, some of them based upon striking historical episodes, and others dealing with a single humorous incident.

Dictionaries. — The Erh Ya, or Nearing the Standard, is commonly classed as a dictionary, and is referred by native scholars generally to the 12th century B.C. The entries are arranged under nineteen heads, to facilitate reference, and explain a large number of words and phrases, including names of beasts, birds, plants and fishes. The work is well illustrated in the large modern edition ; but the actual date of composition is an entirely open question, and the insertion of

woodcuts must necessarily belong to a comparatively late age (see Military Writers).

With the Shuo Win, or Explanation of Written Words, we begin the long list of lexicographical works which constitute such a notable feature in Chinese literature. A scholar, named Hsu Shen, „. w « who died about A.D. 120, made an effort to bring together "*

and analyse all the characters it was possible to gather from the written language as it existed in his own day. He then proceeded to arrange these characters — about ten thousand in all — on a system which would enable a student to find a given word without having

possibly to search through the whole book. To do this, he simply grouped together all such as had a common part, more or less indicative of the meaning of each, much as though an English dictionary were to consist of such groups as

Dog-days Dog-kennel Dog-collar Dog-meat Dog-nap and so on.

Horse-collar Horse-flesh Horse-back Horse-fly Horse-chestnut and so on.

Hsu ShSn selected five hundred and forty of these common parts, or Radicals (see Language), a number which, as will be seen later on, was found to be cumbrously large; and under each Radical he' inserted all the characters belonging to it, but with no particular order or arrangement, so that search was still, in many cases, quite a laborious task. The explanations given were chiefly intended to establish the pictorial origin of the language; but whereas no one now disputes this as a general conclusion, the steps by which Hsu Sh©n attempted to prove his theory must in a large number of instances be dismissed as often inadequate and sometimes ridiculous. Nevertheless, it was a great achievement ; and the Shuo Wen is still indispensable to the student of the particular script in vogue a century or two before Christ. It is also of value in another sense. It may be used, with discretion, in testing the genuineness of an alleged ancient document, which, if an important or well-known document before the age of Hsu ShSn, would not be likely to contain characters not given in his work. Under this test the Tao Tt Ching, for instance, breaks down (see Huai-nan Tzu).

Passing over a long series of dictionaries and vocabularies which appeared at various dates, some constructed on Hsii ShSn's plan, with modifications and improvements, and others, known as phonetic dictionaries, arranged under the finals according to the Tones, we come to the great standard lexicon produced under the auspices, and now bearing the name of the emperor K'ang Hsi, a.d. 1662-1723. But before proceeding, a rough attempt may be made to exhibit in English terms the principle of the phonetic as compared with the radical dictionary described above. In the spoken language there would occur the word light, the opposite of dark, j£?i and this would be expressed in writing by a certain JjJSJ? 11 " symbol. Then, when it became necessary to write down light, the opposite of heavy, the result would be precisely what we see in English. But as written words increased, always with a limited number of vocables (see Language), this system was found to be impracticable, and Radicals were inserted as a means of dis- tinguishing one kind of light from another, but without altering

the original sound. Now, in the phonetic dictionary the words are no longer arranged in such groups as

Sun-light Sun-beam Sun-stroke Sun-god, &c. according to the Radicals, but in such groups as, Sun-light Moon-light Foot-light Gas-light, &c. according to the phonetics, all the above four being pronounced simply light, without reference to the radical portion which guides towards the limited sense of the term. So, in a phonetic dictionary, we should have such a group as

Brass-bound Morocco-bound Half-bound Spell-bound Homeward-bound Wind-bound and so on, all the above six being pronounced simply bound.ˆ To return to ” K’ang Hsi,” as the lexicon in_ question is familiarly styled, the total number of characters given therein iˆ anj ,/f s] m amounts to over forty-four thousand, grouped no longer under the five hundred and forty Radicals of Hsii Shtn, but under the much more manageable number of two hundred and fourteen,

as already used in earlier dictionaries. Further, as the groups of characters would now be more than four times as large as in the Shuo W&tii they were subdivided under each Radical according to’ the number of strokes in the other, or phonetic part of the character. Thus, adopting letters as strokes, for the purpose of illustration, we should have ” dog-nap ” in the group of Radical “dog” and three strokes, while ” dog-days ” and ” dog-meat ” would both be found under Radical ” dog ” with four strokes, and so on. The two hundred and fourteen Radicals are themselves arranged in groups according to the number of strokes; so that it is not a very arduous task to turn up ordinary characters in a Chinese dictionary. Finally, although Chinese is a monosyllabic and non-alphabetic language, a method has been devised, and has been in use since the 3rd century A.D., by which the sound of any word can be indicated in a dictionary otherwise than by simply quoting a word of similar sound, which of course may be equally unknown to the searcher. Thus, the sound of a word pronounced ching can be exhibited by selecting two words, one having the initial ch, and the other a final ing. E.g. the sound ching is given as chien ling; that is ch[ien l\ing = ching.

The Concordance. — Considering the long unbroken series of years

during which Chinese literature has always, in spite of many losses, been steadily gaining in bulk, it is not astonishing to find that classical, historical, mythological and other allusions to personages or events of past times have also grown out of all proportion to the brain capacity even of the most brilliant student. Designed especi- ally to meet this difficulty, there are several well-known handbooks, elementary and advanced, which trace such allusions to their source and provide full and lucid explanations; but even the most extensive ■ of these is on a scale incommensurate with the requirements of the scholar. Again, it is due to the emperor K'ang Hsi that we possess one of the most elaborate compilations of the kind ever planned and carried to completion. The P'ei Wen Yiin Fu, or Concordance to Literature, is a key, not only to allusions in general, but to all phraseology, including allusions, idiomatic expressions and other obscure combinations of words, to be found in the classics, in the dynastic histories, and in all poets, historians, essayists, and writers of recognized eminence in their own lines. No attempt at explanation is given; but enough of the passage, or passages, in which the phrase occurs, is cited to enable the reader to gather the meaning required. The trouble, of course, lies with the arrangement of these phrases in a non-alphabetic language. Recourse has been had to the Rhymes and the five Tones (see Language) ; and all phrases which end with the same word form one of a number of groups which appear under the same Rhyme, the Rhymes themselves being distributed over five Tones. Thus, to find any phrase, the first point is to discover what is its normal Rhyme ; the next is to ascertain the Tone of that Rhyme. Then, under this Tone-group the Rhyme-word will be found, and under the Rhyme-word group will be found the final word of the phrase in question. It will now only remain to run through this last group of phrases, all of which have this same final word, and the search — so vast is the collection — will usually yield a satisfactory result. The P'ei Win Yiin Fu runs of course to many volumes; a rough estimate shows it to contain over fifteen million words.

Encyclopaedias. — In their desire to bring together condensed, yet precise, information on a large variety of subjects, the Chinese may be said to have invented the encyclopaedia. Though not the earliest work of this kind, the Vai P'ing Yii Lan is the first of any great im- portance. It was produced towards the close of the 10th century A.D., under the direct supervision of the emperor, who is said to have examined three sections every day for about a year, the total number of sections being one thousand in all, arranged under fifty-five headings. Another similar work, dealing with topics drawn from the lighter literature of China, is the T'ai P'ing Kuang Chi, which was issued at about the same

date as the last-mentioned. Both of these, and especially the former, have passed through several editions. They help to inaugurate the great Sung dynasty, which for three centuries to follow effected so much in the cause of literature. Other encyclopaedias, differing in scope and in plan, appeared from time to time, but it will be necessary to concentrate attention upon Yuav Lo twoon ‘y- The third emperor of the Ming dynasty, known Ta Tien as Yung Lo, A.D. 1403-1425, issued a commission for the production of a work on a scale which was colossal even for China. His idea was to collect together all that had ever been written in the four departments of (1) the Confucian Canon, (2) History, (3) Philosophy and (4) General Literature, including astronomy, geography, cosmogony, medicine, divination, Buddhism, Taoism, arts and handicrafts; and in 1408 such an encyclopaedia was laid before the Throne, received the imperial approval and was named Yung Lo Ta Tien, or The Great Standard of Yung Lo. To achieve this, 3 commissioners, with 5 directors, 20 sub-directors and a staff of 2141 assistants, had laboured for the space of five years. Its contents ran to no fewer than 22,877 separate sections, to which must be added an index filling 60 sections. Each section contained about 20 leaves, making a total of 917,480 pages for the whole work. Each page consisted of sixteen columns of characters averaging twenty-five to each column, or a total of 366,992,000 characters, to which, in order to bring the amount into terms of English words, about another third would have to be added. This extraordinary work was never printed, as the expense would have been too great, although it was actually transcribed for that purpose ; and later on,

two more copies were made, one of which was finally stored in Peking and the other, with the original, in Nanking. Both the Nanking copies perished at the fall of the Ming dynasty; and a similar fate overtook the Peking copy, with the exception of a few odd volumes, at the siege of the legations in 1900. The latter was bound up in 11,100 volumes, covered with yellow silk, each volume being 1 ft. 8 in. in length by I ft. in breadth, and averaging over J in. in thick- ness. This would perhaps be a fitting point to conclude any notice of Chinese encyclopaedias, but for the fact that the work of Yung Lo is gone while another encyclopaedia, also on a huge scale, designed and carried out sonie centuries later, is still an important work of reference.

The T’u Shu Chi Ch’tng was planned, and to a great extent made ready, under instructions from the emperor K’ang Hsi (see above), and was finally brought out by his successor, Yung Chgng, 1723-1736. Intended to embrace all departments of ‘” s “°* knowledge, its contents were distributed over six leading categories, which for want

of better equivalents may be roughly rendered by (l) Heaven, (2) Earth, (3)JVIan, (4) Arts and Sciences, (5) Philosophy and (6) Political Science. These were subdivided into thirty-two classes; and in the voluminous index which accompanies the work a further attempt was made to bring the searcher into still closer touch with theindividual items treated. Thus, the category Heaven is subdivided into four classes, namely — again, for want of better terms— (o) The Sky and its Manifestations, (b) The Seasons, (c) Astronomy and Mathematics and (d) Natural Phenomena. Under these classes come the individual items; and here it is that the foreign student is often at a loss. For instance, class a includes Earth, in its cosmogonic sense, as the mother of mankind ; Heaven, in its original sense of God; the Dual Principle in nature; the Sun, Moon and Stars; Wind; Clouds; Rainbow; Thunder and Light- ning; Rain; Fire, &c. But Earth is itself a geographical category; and all strange phenomena relating to many of the items under class a are recorded under class d. Category No. 6, marked as Political Science, contains such classes as Ceremonial, Music and Administra- tion of Justice, alongside of Handicrafts, making it essential to study the arrangement carefully before it is possible to consult the work with ease. _ Such preliminary trouble is, however, well repaid, the amount of information given on any particular subject being practic- ally coextensive with what is known about that subject. The method of presenting such information, with variations to suit the nature of the topics handled, is to begin with historical excerpts, chronologically arranged. These are usually followed by sometimes lengthy essays dealing with the subject as a theme, taken from the writings of qualified authors, and like all the other entries, also chronologically arranged. Then come elegant extracts in prose and verse, in all of which the subject may be simply mentioned and not treated as in the essays. After these follow minor notices of incidents, historical and otherwise, and all kinds of anecdotes, derived from a great variety of sources. Occasionally, single poetical lines are brought togejther, each contributing, some thought or statement germane to the subject, expressed in elegant or forcible terms; and also, wherever practicable, biographies of men and women are inserted.

Chronological and other tables are supplied where necessary, as well as a very large number of illustrations, many of these being reproductions of woodcuts from earlier works. It is said that the T'u Shu Chi Ch'ing was printed from movable copper type cast by the Jesuit Fathers employed by the emperor K'ang Hsi at Peking; also that only a hundred copies were struck off, the type being then destroyed. An 8vo edition of the whole encyclopaedia was issued at Shanghai in 1889; this is bound up in sixteen hundred and twenty- eight handy

volumes of about two hundred pages each. A copy of the original edition stands on the shelves of the British Museum, and a translation of the Index has recently been completed.

Manuscripts and Printing. — At the conclusion of this brief survey of Chinese literature it may well be asked how such an enormous and ever-increasing mass has been handed down from generation to generation. According to the views put forth by early Chinese antiquarians, the first written records were engraved with a special knife upon bamboo slips and wooden tablets. The impracticability of such a process, as applied to books, never seems to have dawned upon those writers; and this snowball of error, started in the 7th century, long after the knife and the tablet had disappeared as implements of writing, continued to gather strength as time went on. Recent researches, however, have placed it beyond doubt that when the Chinese began to write in a literary sense, as opposed to mere scratchings on bones, they traced their characters on slips of bamboo and tablets of wood with a bamboo pencil, frayed at one end to carry the coloured liquid which stood in the place of ink. The knife was used only to erase. So things went on until about 200 B.C., when it would appear that a brush of hair was sub- stituted for the bamboo pencil; after which, silk was called into requisition as an appropriate vehicle in connexion with the more

delicate brush. But silk was expensive and difficult to handle, so that the invention of paper in a.d. 105 by a eunuch, named Ts'ai Lain, came as a great boon, although it seems clear that a certain kind of paper, made from silk floss, was in use before his date. However that may be, from the 1st century onwards the Chinese have been in possession of the same writing materials that are in use at the present day.

In a.d. 170, Ts'ai Yung, who rose subsequently to the highest offices of state, wrote out on stone in red ink the authorized text of the Five Classics, to be engraved by workmen, and thus handed down to posterity. The work covered forty-six huge tablets, of which a few fragments are said to be still in existence. A similar undertaking was carried out in 837, and the later tablets are still standing at a temple in the city of Hsi-an Fu, Shensi. With the T'ang dynasty, rubbings of famous inscriptions, wherein the germ of printing may be detected, whether for the style of the composition or for the calligraphic

excellence of the script, came very much into vogue with scholars and collectors. It is also from about the same date that the idea of multiplying on paper impressions taken from wooden blocks seems- to have arisen, chiefly' in connexion with religious pictures and prayers. The process- was not widely applied to the production of books until the 10th century, when in a.d. 932 the Confucian Canon was printed for the first time. In 981 orders were issued for the T'ai P'ing Kuang Chi, an encyclopaedia extending to many volumes (see above) to be cut on blocks for printing. Movable types of baked clay are said to have been invented by an alchemist, named Pi Sheng, about a.d. 1043 ; and under the Ming dynasty, 1368-1644, these were made first of wood, and later of copper or lead, but movable types have never gained the favour accorded to block-printing, by means of which most of China's great typographical triumphs have been achieved. The process is, and always has been, the same all over China. Two consecutive pages of a book, separated by a column containing the title, number of section, and number of leaf, are written out and pasted face downwards on a block of wood (Lindera tzu-mu, Hemsl.). This paper, where not written upon, is cut away with sharp tools, leaving the characters in relief, and of course back- wards, as in the case of European type. The block is then inked, and an impression is taken off, on one side of the paper only. This sheet is then folded down the middle of the separating column above mentioned, so that the blank halves come together, leaving two pages of printed matter outside: and when enough sheets have been brought together, they are stabbed at the open ends and form a volume, to be further wrapped in paper or pasteboard, and labelled with title, &c. It is almost superfluous to say that the pages of a Chinese book must not be cut. There is nothing inside, and, moreover, the column bearing the title and leaf-number would be cut through. The Chinese newspapers of modern times are all printed from movable types, an ordinary fount consisting of about six to seven thousand characters.

See J. Legge, The Chinese Classics (1861-1872); A. Wylie, Notes on Chinese Literature (1867); E. Chavannes, Memoires historiques (1895-1905) ; H. A. Giles, Ckuang Tzii (1889), A Chinese Biographical Dictionary (1898), and A History of Chinese Literature (1901); A. Forke, Lun-Heng (1907) ; F. Hirth, The Ancient History of China (1908); L. Giles, Sun Tzii (1910). (H. A. Gl.)

CHINA, the common name for ware made of porcelain, given because it came from China, where the first vitrified, translucent, white ware was produced. The Portuguese or Italians gave it the name of " porcelain " (q.v.). English usage was influenced by India and the East, where the Persian chini was widely prevalent as the name of the ware.

This is seen also in some of the earlier forms and pronunciations, e.g. chiney, cheney, and later chaney (see Ceramics; and for ” china-clay ” Kaolin).

CHINANDEGA, or Chinendega, the capital of the department of Chinandega in western Nicaragua, 10 m. N.N.E. of the seaport of Corinto by the Corinto-Managua railway. Pop. (1900) about 12,000. Chinandega is the centre of a fertile corn-producing district, and has a large transit trade owing to its excellent situa- tion on the chief Nicaraguan railway. Its manufactures include

coarse cloth, pottery and Indian feather ornaments. Cotton, sugar-cane and bananas are cultivated in the neighbourhood.

CHI-NAN FU, the capital of Shan-tung, China, in 36 40′ N., 1 1 7 1′ E. Pop. about 100,000. It is situated in one of the earliest settled districts of the Chinese empire. The city, which lies in the valley of the present channel of the Yellow river (Hwang-Ho), and about 4 m. south of the river, is surrounded by a triple line of defence. First is the city wall, strongly built and carefully guarded, outside this a granite wall, and beyond this again a mud rampart. Three springs outside the west gate throw up streams of tepid water to a height of about 2 ft. This water, which is highly prized for its healing qualities, fills the moat and forms a fine lake in the northern quarter of the city.

Chi-nan Fu was formerly famous tor its manufacture of silks and of imitation precious stones. It is now the chief commercial entrepdt of Western Shan-tung but no longer a manufacturing centre. A highway connects it with the Yellow river, and it is joined by a railway 280 m. long to Kiaochow. The city has a university for instruction on Western lines, and an efficient military school. American Presbyterians began mission work in the city in 1873; it is also the see of a Roman Catholic bishop.

CHINCHA ISLANDS, three small islands in the Pacific Ocean, about 12 m. from the coast of Peru (to which country they belong), opposite the town of Pisco, and 106 m. distant from Callao, in 13 38′ S., 76 28′ W. The largest of the group, known as the North Island or Isla del Norte, is only four-fifths of a mile in length, and about a third in breadth. They are of granitic formation, and rise from the sea in precipitous cliffs, worn into countless caves and hollows, which furnish convenient resting-places for the sea-fowl. Their highest points attain an elevation of 113 ft. The islands have yielded a few remains of the Chincha Indian race. They were formerly noted for vast deposits of guano, and its export was begun by the Peruvian government in 1840.

The supply, however, was exhausted in 1874. In 1853-1854 the Chincha Islands were the chief object in a contest known as the Guano War between President Echenique and General Castilla; and in April 1864 they were seized by the Spanish rear-admiral Pinzon in order to bring the Peruvian government to apologize for its treatment of Spanish immigrants.

CHINCHEW, or Chinchu, the name usually given in English charts to an ancient and famous port of China in the province of Fu-kien, of which the Chinese name is Ch'tianckow-fu or Ts'iianckow-fu. It stands in 24 57′ N., 11 8° 35′ E. The walls have a circuit of 7 or 8 m., but embrace much vacant ground. The chief exports are tea and sugar, tobacco, china-ware, nan- keens, &c. There are remains of a fine mosque, founded by the Arab traders who resorted thither. The English Presbyterian Mission has had a chapel in the city since about 1862. Beyond the northern branch of the Min (several miles from the city) there is a suburb called Loyang, approached by the most celebrated bridge in China.

Ch'uanchow, owing to the obstruction of its harbour by sand banks, has been supplanted as a port by Amoy, and its trade is carried on through the port of Nganhai. It is still, however, a large and populous city. It was in the middle ages the great port of Western trade with China, and was known to the Arabs and to Europeans asZaitun or Zayton, the name under which it appears in Abulfeda's geography and in the Mongol history of Rashlddudin, as well as in Ibn Batuta,Marco Polo and other medieval travellers. Some argument has been alleged against the identity of Zayton with Ch'uanchow, and in favour of its being rather ChangchoW (a great city 60 m. W.S.W. of Ch'uanchow), or a port on the river of Changchow near Amoy. " Port of Zayton " may have embraced the great basin called Amoy Harbour, the chief part of which lies within the Fu or department of Ch'uanchow; but there is hardly room for doubt that the Zayton of Marco Polo and Abulfeda was the Ch'uanchow of the Chinese. Ibn Batuta in- forms us that a rich silk texture made here was called Zaitilniya; and there can be little doubt that this is the real origin of the word " Satin," Zettani in medieval Italian, Aceytuni in Spanish.

CHINCHILLA, a small grey hopping rodent mammal (Chin- chilla lanigera), of the approximate size of a squirrel, inhabiting the eastern slopes of the Andes in Chile and Bolivia, at altitudes between 8000

and 12,000 ft. It typifies not only the genus Chinchilla, but the family Chinchillidae, for the distinctive features of which see Rodentia. The ordinary chinchilla is about 10 in. in length, exclusive of the long tail, and in the form of its head somewhat resembles a rabbit. It is covered with a dense soft fur f in. long on the back and upwards of an inch in length on the sides, of a delicate French grey colour, darkly mottled on the upper surf ace and dusky white beneath; the ears being long, broad and thinly covered with hair. Chinchillas live in burrows, and these subterranean dwellings undermine the ground in some parts of the Chilean Andes to such an extent as to cause danger to travellers on horseback. They associate in communities, forming their burrows among loose rocks, and coming out to feed in the early morning and towards sunset. They feed chiefly on roots and grasses, in search of which they often travel considerable distances; and when eating they sit on their haunches, holding their food in their fore-paws. The Indians in hunting them employ the grison (Galictis vittata), a member of the weasel family, which is trained to enter the crevices of the rocks where the chinchillas lie concealed during the day. The fur (q.v .) of this rodent was prized by the ancient Peruvians, who made coverlets and other articles with the skin, and at the present day the skins are exported in large numbers to Europe, where they are made into muffs, tippets and trim- mings. That chinchillas have not under such circumstances become rare, if not extinct, is owing to their extraordinary fecundity, the female usually producing five or six young twice a year. They are docile in disposition, and thus well fitted for domestication. The Peruvian chinchilla (C. brevicaudala) is larger, with relatively shorter ears and tail; while still larger species constitute the genus Lagidium, ranging from the Andes to Patagonia, and distinguished by having four in place of five front-toes, more pointed ears, and a somewhat differently formed skull. (See also Viscacha). (R. L.*)

CHINDE, a town of Portuguese East Africa, chief port for the Zambezi valley and British Central Africa, at the mouth of the Chinde branch of the Zambezi, in 18 40′ S., 36 30′ E. Pop. (1907) 2790, of whom 218 were Europeans. Large steamers are unable to cross the bar, over which the depth of water varies from 10 to 18 ft. Chinde owes its existence to the discovery in 1889 that the branch of the river on the banks of which it is built is navigable from the ocean (see Zambezi). The Portuguese in 1891 granted on lease for 99 years an area of 5 acres— subse- quently increased to 25 — to the British government, on which goods in transit to British possessions could be stored duty free. This block of land is known as the British Concession, or British Chinde. The prosperity of the town largely depends on the transit

trade with Nyasaland and North East Rhodesia. There is also a considerable export from Portuguese districts, sugar, cotton and ground nuts being largely cultivated in the Zambezi valley, and gold and copper mines worked.

CHINDWIN, a river of Burma, the largest tributary of the Irrawaddy, its entire course being in Burmese territory. It is called Ningthi by the Manipuris. The Chindwin is formed by the junction of the Tanai, the Tawan and the Taron or Tur6ng, but it is still uncertain which is the main stream. The Tanai has hitherto been looked on as the chief source. It rises in about 25° 30′ N. and 97 E., on the Shwedaung-gyi peak of the Kumon range, 12 m. N. of Mogaung, and flows due N. for the first part of its course until it reaches the Hukawng valley, when it turns to the W. and flows through the middle of the plain to the end of the valley proper. There it curves round to the S., passes through the Taron or Tur6ng valley, takes the name of the Chindwin, and maintains a general southerly course until it enters the Irrawaddy, after flowing through the entire length of the Upper and Lower Chindwin districts, in about 21 30′ N. and 95° 15′ E. Its extreme outlets are 22 m. apart, the interval forming a succession of long, low, partially populated islands. The most southerly mouth of the Chindwin is, according to

tradition, an artificial channel, cut by one of the kings of Pagan. It was choked up for many centuries until in 1824 it was opened out by an exceptional flood. The Tanai (it is frequently called Tanaikha, but kha is merely the Kachin word for river) , as long as it retains that name, is a swift, clear river, from 50 to 300 yds. wide and from 3 to 15 ft. deep. The river is navigated by native boats in the Hukawng valley, but launches cannot come up from the Chindwin proper because of the reefs below Taro.

The Tar6n, Tur6ng or Towang river seems to be the real main source of the Chindwin. It flows into the Hukawng valley from the north, and has a swift current with a succession of rapids. Its source;, are in the hills to the south of Sadiya, rising from 10,000 to n,ooo ft. above sea-level. It flows through a deep valley, with a general E. and W. direction, as far as its junction with the Loglai. It then turns S., and after draining an intricate system of hills, breaks into the Hukawng valley a few miles N. of Saraw, and joins or receives the Tanai about 10 m. above Kintaw village. Except the Tanai, the chief branches of the Upper Chindwin rise in mountains that art- covered at least with winter snows. Below the Hukawng valley the Chindwin is interrupted at several places by fails or transverse reefs. At the village of Haksa there is a fall, which necessitates tranship. ment from large boats to

canoes. Not far below this the Uyu river comes in on the left bank at Homalin, and from this point down, wards the steamers of the Irrawaddy Flotilla Company ply for the greater part of the year. The Uyu flows through a fertile and well- cultivated valley, and during the rainy season it is navigable for si distance of 150 m. from its mouth by steamers of light draught. Ordinarily regular steam communication with Homalin ceases in the dry weather, but from Kindat, nearly 150 m. below it, there are weekly steamers all the year round. Below Kindat the only con- siderable affluent of the Chindwin is the Myit-tha, which receives the Chin hills drainage. The Chindwin rises considerably during the rains, but in March and April it is here and there so shallow as to make navigation difficult even for small steam launches. Whirlpools and narrows and shifting sandbanks also give some trouble, but much has been done to improve navigation since the British annexa- tion. Kindat, the headquarters of the Upper Chindwin district, and M6nywa of the Lower, are on the banks of the river. (J. G. Sc.)

CHINDWIN, UPPER and LOWER, two districts in the Sagaing division of Upper Burma. Upper Chindwin has an area of 19,062 sq. m., and a population, according to the census of 1901, of 154,551. Lower Chindwin has an area of 3480 sq. m., and a population of 276,383. Upper Chindwin lies to the north of the lower district, and is bounded on the N. by the Chin, Naga and Kachin hills; on the E. they are bounded by the Myitkyina, Katha and Shwebo districts; Lower Chindwin is bounded on the S. by the Pak6kku and Sagaing districts; and both districts are bounded on the W. by the Chin hills, and by Pakokku on the southern stretch. The western portion of both districts is hilly, and the greater part of Upper Chindwin is of the same character. Both have valuable teak forests. The total rainfall averages in Lower Chindwin 27 and in Upper Chindwin 60 in. Coal exists in extensive fields, but these are not very accessible. Rice forms the great crop, but a certain amount of til-seed and of indigo is also cultivated. Kindat, a mere village, is the head- quarters of the upper district, and M6nywa, with a population of 7869, of the lower. Both are on the Chindwin river, and are served by the steamers of the Irrawaddy Flotilla Company. Alon, close to Monywa, and formerly the headquarters, is the terminus of the railway from Sagaing westwards, which was opened in 1900.

CHINESE PAVILLON, Turkish Crescent, Turkish Jingle, or Jincling Johnny (Fr. chapeau chinois; Ger. turkischer Halbmond, Schellenbaum; Ital. cappello Chinese), an instrument of percussion of indefinite sonorousness, i.e. not producing definite musical tones. The chapeau chinois was formerly an adjunct in military bands, but never

in the orchestra, where an instru- ment of somewhat similar shape, often confused with it and known as the Glockenspiel (q.v.), is occasionally called into requisition. The Chinese pavilion consists of a pole about 6 ft. high terminating in a conical metal cap or pavilion, hung with small jingling bells and surmounted by a crescent and a star. Below this pavilion are two or more metal bands forming a fanciful double crescent or squat lyre, likewise furnished with tiny bells. The two points of the crescent are curved over, ending in fanciful animal heads from whose mouths hang low streaming tails of horse-hair. The Chinese pavilion is played by shaking or waving the pole up and down and jingling the bells, a movement which can at best be but a slow one repeated once or

at most twice In a bar to punctuate the phrases and add brilliancy to the military music. The Turkish crescent or ” jingling Johnny,” as it was familiarly called in the British army bands, was intro- duced by the Janissaries into western Europe. It has fallen into disuse now, having been replaced by the glockenspiel or steel harmonica. Edinburgh University possesses two specimens. 1 In the 18th century at Bartholomew Fair one of the chief bands hired was one well known as playing in London on winter evenings in front of the Spring-Garden coffee house and opposite Wigley’s. This band consisted of a double drum, a Dutch organ (see Barrel-Organ), a tambourine, a violin, pipes and the Turkish jingle. 2 (K. S.)

CHINGFORD, an urban district in the Epping parliamentary division of Essex, England, iof m. N. of London (Liverpool Street station) by the Great Eastern railway. Pop. (1001) 4373. It lies between the Aver Lea and the western outskirts of Epping Forest. The church of All Saints has Early English and Per- pendicular remains. Queen Elizabeth’s or Fair Mead hunting lodge, a picturesque half-timbered building, is preserved under the Epping Forest Preservation Act. A majestic oak, one of the finest trees in the Forest, stands near it. Buckhurst Hill (an urban district; pop. 4786) lies to the N.E.

CHINGLEPUT, or Chengalpat, a town and district of British India, in the Madras presidency. The town, situated 36 m. by rail from Madras, had a population in 1901 of 10,551. With Chandragiri in North Arcot, Chingleput was once the capital of the Vijayanagar kings, after their overthrow by the Mussulmans at Talikota in 1565. In 1639 a chief, subject to these kings, granted to the East India Company the land on which Fort St George now stands. The fort built by the Vijayanagar kings in the 1 6th century was of strategic importance, owing to its swampy surroundings and the lake that flanked its side. It was taken by the French in 1751, and was retaken in 1752 by Clive, after which it proved invaluable to the British, especially when Lally in his advance on Madras left it unreduced in his rear. During the wars of the British with Hyder Ali it withstood his power, and afforded a refuge to the natives; and in 1780, after the defeat of Colonel W. Baillie, the army of Sir Hector Munro here found refuge. The town is noted for its manufacture of pottery, and carries on a trade in rice.

The District of Chingleput surrounds the city of Madras, stretching along the coast for about 115 m. The administrative headquarters are at Saidapet. Area, 3079 sq. m. Pop. (1901) 1,312,122, showing an

increase of 9% in the decade. Salt is extensively manufactured all along the coast. Cotton and silk weaving is also largely carried on, and there are numerous indigo vats, tanneries and an English cigar factory.

CHIN HILLS, a mountainous district of Upper Burma. It lies on the border between the Lushai districts of Eastern Bengal and Assam and the plains of Burma, and has an area of 8000 sq. m. It is bounded N. by Assam and Manipur, S. by Arakan, E. by Burma, and W. by Tippera and the Chittagong hill tracts. The Chins, Lushais and Kukis are to the north-east border of India what the Pathan tribes are to the north-west frontier. In 1895 the Chin Hills were declared a part of the province of Burma, and constituted a scheduled district which is now administered by a political officer with headquarters at Falam. The tract forms a parallelogram 250 m. from N. to S. by 100 to 1 50 m. wide. The country consists of a much broken and contorted mass of mountains, intersected by deep valleys. The main ranges run generally N. to S., and vary in height from 5000 to 9000 ft., among the most important being the Letha or Tang, which is the watershed between the Chindwin and Manipur rivers; the Imbukklang, which divides the Sokte tribe from the Whenchs and sheds the water from its eastern slopes into Upper Burma and that from its western slopes into Arakan; and the Rong- klang, which with its prolongations is the main watershed of the southern hills, its eastern slopes draining into the Myittha and thus into the Chindwin, while the western fall drains into the

1 See Captain C. R. Day, Descriptive Catalogue of Musical Instruments (London, 1891), p. 233.

2 See Hone's Everyday Book, i. 1248.

Boinu river, which winding through the hills discharges itself eventually in the Bay of Bengal. The highest peak yet dis- covered is the Liklang, between Rawywa and Lungno, some 70 m. S. of Haka (nearly 10,000 ft.).

It is supposed that the Kukis of Manipur, the Lushais of Bengal and Assam, and the Chins originally lived in Tibet and are of the same stock; their form of government, method of cultivation, manners and customs, beliefs and traditions all point to one origin. The slow speech, the serious manner, the respect for birth and the knowledge of pedigrees, the duty of revenge, the taste for and the treacherous method of warfare, the curse of drink, the virtue of hospitality, the clannish feeling, the vice of avarice, the filthy state of the body, mutual distrust, impatience under control, the want of power of

combination and of continued effort, arrogance in victory, speedy discouragement and panic in defeat, are common traits. The Chins, Lushais and Kukis were noted for the secrecy of their plans, the suddenness of their raids, and their extraordinary speed in retreating to their fastnesses. After committing a raid they have been known to march two days and two nights consecutively without cooking a meal or sleeping, so as to escape from any parties which might follow them. The British, since the occupation of Upper Burma, have been able to penetrate the Chin-Lushai country from both sides at once. The pacification of the Chin Hills is a triumph for British administra- tion. Roads, on which Chin coolies now readily work, have been constructed in all directions. The rivers have been bridged ; the people have taken up the cultivation of English vegetables, and the indigenous districts have been largely developed. The Chin Hills had a population (1901 census) of 87,189, while the Chins in Burma totalled 179,292. The Pakokku Chin Hills, which form a separate tract, have an area of 2260 sq. m.; pop. (1901) 13,116. (J. G. Sc.)

CHINKIANG, or Chen-Kiang-Ftj, a treaty port of China, in the province of Kiang-su, on the Yangtsze-kiang above Shanghai, from which it is distant 160 m. It is in railway communication both with Shanghai and Nanking (40 m. distant), and being at the point where the Grand Canal running N. and S. intersects the Yangtsze, which runs E. and W., is peculiarly well situated to be a commercial entrepot. The total value of exports and imports for 1904 was £4,632,992; estimated pop. 168,000. In the war of 1842 it yielded to the British only after a desperate resistance. It was laid waste by the T'aip'ing rebels in 1853, and was recaptured by the imperial forces in 1858.

CHINO-JAPANESE WAR (1894-95). The causes of this conflict arose out of the immemorial rivalry of China and Japan for influence in Korea. In the 16th century a prolonged war in the peninsula had ended with the failure of Japan to make good her footing on the mainland — a failure brought about largely by lack of naval resources. In more modern times (1875, 1882, 1884) Japan had repeatedly sent expeditions to Korea, and had fostered the growth of a progressive party in Seoul. The difficulties of 1884 were settled between China and Japan by the convention of Tientsin, wherein it was agreed that in the event of future intervention each should inform the other if it were decided to despatch troops to the peninsula. Nine years later the occasion arose. A serious rebellion induced the Korean government to apply for military assistance from China. Early in June 1894 a small force of Chinese troops were sent to Asan, and Japan, duly informed of this action, replied by furnishing her minister at Seoul with an escort, rapidly following up this step by the despatch of about 5000

troops under Major-General Oshima. A complicated situation thus arose. Chinese troops were present in Korea by the request of the government to put down rebellion. The Japanese controlled the capital, and declined to recognize Korea as a tributary of China. But she proposed that the two powers should unite to suppress the disturbance and to inaugurate certain specified reforms. China considered that the measures of reform must be left to Korea herself. The reply was that Japan considered the government of Korea " lacking in some of the elements which are essential to responsible inde- pendence." By the middle of July war had become inevitable unless the Peking government were willing to abandon all claims over Korea, and as Chinese troops were already in the country by invitation, it was not to be expected that the shadowy suzerainty would be abandoned.

At Seoul the issue was forced by the Japanese minister, who delivered an ultimatum to the Korean government on the 20th of July. On the 23rd the palace was forcibly occupied. Meanwhile China had despatched about 8000 troops to the Yalu river.

The outbreak of war thus found the Japanese in possession of Seoul and ready to send large forces to Korea, while the Chinese occupied Asan (about 40 m. south of the capital), and had a considerable body of troops in Manchuria in addition to those despatched to the Yalu river. To Japan the command of the sea was essential for the secure transport and supply of her troops. Without it the experience of the war of the 16th century would be repeated. China, too, could only utilize overland routes to Korea by submitting to the difficulties and delays entailed. To both powers the naval question was thus important.

By the time war was finally declared (August 1) hostilities had already begun. On the 25th of July Oshima set out from Seoul to attack the Chinese at Asan. On the 29th he won a victory at Song- hwan, but the Chinese commander escaped with a considerable part of his forces by a detour to Ping- Yang (Phyong-Yang). Meanwhile a portion of the Japanese fleet had encountered some Chinese war- ships and transports off Phung-Tao, and scored an important success, sinking, amongst other vessels, the transport " Kowshing " (July 25). The loss of more than 1000 Chinese soldiers in this vessel materially lightened Oshima's task. The intention of the Chinese to crush their enemies

between their forces at Asan and Ping- Yang was completely frustrated, and the Japanese obtained control of all southern Korea.

Reinforcements from Japan were now pouring into Korea, in spite of the fact that the rival navies had not yet tried conclusions, and General Nozu, the senior Japanese officer present, soon found himself in a position to move on Ping- Yang. Three columns converged upon the place on the 15th of September, and in spite of its strong walls carried it, though only after severe fighting.

Nearly all the troops on either side had been conveyed to the scene of war by sea, though the decisive contest for sea supremacy was still to be fought. The Chinese admiral Ting with the Northern Squadron (which alone took part in the war) had hitherto remained inactive in Wei-hai-wei, and on the other side Vice-Admiral Ito's fleet had not directly interfered with the hostile transports which were reinforcing the troops on the Yalu. But two days after the battle of Ping-Yang, Ting, who had conveyed a large body of troops to the mouth of the Yalu, encountered the Japanese fleet on his return journey off Hai-Yang-Tao on the 17th of September. The heavy battleships " Chen-Yuen " and " Ting- Yuen " constituted the strongest element of the Chinese squadron, for the Japanese, superior as they were in every other factor of success, had no vessels which could compare with these in the matter of protection. Ting advanced in a long irregular line abreast; the battleships in the centre, the lighter vessels on the wings. Ito's fast cruisers steamed in line ahead against the Chinese right wing, crushing their weaker opponents with their fire. In the end the Chinese fleet was defeated and scattered, but the two heavy battleships drew off without serious injury. This battle of the Yalu gave Japan command of the sea, but Ito continued to act with great caution. The remnants of the vanquished fleet took refuge in Port Arthur, whence after repairs Ting proceeded to Wei-hai-wei.

The vicjtory of Ping- Yang , had cleared Korea of the Chinese troops, but on the lower Yalu — their own frontier — large forces threatened a second advance. Marshal Yamagata therefore took the offensive with his 1st army, and on the 24th and 25th of October, under great difficulties — though without serious opposition from the enemy — forced the passage of the river and occupied Chiulien-cheng. Part of the Chinese force retired to the north-east, part to Feng-hwang- cheng and Hsiu-yuen (Siu-Yen). The Japanese 1st army advanced several columns towards the mountains of Manchuria to secure its conquests and prepare for a future advance. General Tachimi's brigade occupied Feng-hwang-cheng on the 29th of October. On the 7th of November a column from the Yalu took Takushan, and a few days later a

converging attack from these two places was made upon Hsiu-yuen, which was abandoned by the Chinese. Meanwhile Tachimi, skirmishing with the enemy on the Mukden and Liao- Yang roads, found the Chinese in force. A simultaneous forward move by both sides led to the action of Tsao-ho-ku (November 30), after which both sides withdrew — the Ch nese to the line of the mountains covering Hai-cheng, Liao-Yang and Mukden, with the Tatar general Ikotenga 's force, 14,000 strong, on the Japanese right north-east of Feng-hwang-cheng; and the Japanese to Chiulien- cheng, Takushan and Hsiu-yuen. The difficulties of supply in the hills were almost insurmountable, and no serious advance was intended by the Japanese until January 1895, when it was to be made in co-operation with the 2nd army. This army, under Marshal Oyama, had been formed in September and at first sent to Chemulpo as a support to the forces under Yamagata; but its chief task was the siege and capture of the Chinese fortress, dockyard and arsenal of Port Arthur.

The Liao-Tong peninsula was guarded by the walled city of Kinchow and the forts of Ta-lien-wan (Dalny under the Russian regime, and Tairen under the Japanese) as well as the fortifications around Port Arthur itself. On the 24th of October the disem- barkation of the 2nd army began near Pi-tsze-wo, and the successive columns of the Japanese gradually moved towards Kinchow, which

was carried without difficulty on the 6th of November. Even less resistance was offered by the modern forts of Ta-lien-wan. The Japanese now held a good harbour within a few miles of the main fortress. Here they landed siege artillery, and on the 17th of November the advance was resumed. The attack was made on the 19th at dawn. Yamaji's division (Nogi's and Nishi's brigadjs) after a trying night march assaulted and carried the western defences and moved upon the town. Hasegawa in the centre, as soon as Yamaji began to appear in rear of his opponents in the northern forts, pushed home his attack with equal success, and by 3 p.m. practically all resistance was at an end. The Japanese paid for this important success with but 423 casualties. Meanwhile the Chinese general Sung, who had marched from Hai-cheng to engage the 2nd army, appeared before Kinchow, where he received on the 22nd a severe repulse at the hands of the Japanese garrison. Marshal Oyama subsequently stationed his advanced guard towards Hai- cheng, the main body at Kinchow, and a brigade of infantry at Port Arthur. Soon after this overtures of peace were made by China; but her envoy, a foreigner unfurnished with credentials, was not received by the Tokyo government.

The Japanese 1st army (now under General Nozu) at Antung and Feng-hwang-cheng prepared, in spite of the season, to move across the mountains, and on the 3rd of December General Katsura left Antung for Hai-cheng. His line of march was by Hsi-mu-cheng, and strong flank guards followed parallel routes on either side. The march was accomplished safely and Hai-cheng occupied on the 13th of December. In the meantime Tachimi had moved northward from Feng-hwang-cheng, in order to distract the attention of the Chinee from Hai-cheng, and there were some small engagements between this force and that of Ikotenga, who ultimately retired beyond the mountains to Liao-Yang. Sung had already left Kai- ping to secure Hai-cheng when he heard of the fall of that place; his communications with Ikotenga being now severed, he swerved to the north-west and established a new base at Niu-chwang. Once on his new line Sung moved upon Hai-cheng. As it was essential that he should be prevented from joining forces with Ikotenga, General Katsura marched out of Hai-cheng to fight him. At Kang- wang-tsai (December 19th) the Chinese displayed unusual steadiness, and it cost the Japanese some 343 casualties to dislodge the enemy. The victors returned to Hai-cheng exhausted with their efforts, but secure from attack for some time to come. The advanced troops of the 2nd army (Nogi's brigade) were now ready to advance, and only the Kai-ping garrison (left behind by Sung) barred their junction with Katsura. At Kai-ping (January 10th) the resistance of the Chinese was almost as steady as at Kang-wang-tsai, and the Japanese Tost 300 killed and wounded in their successful attack. In neither of these actions was the defeated force routed, nor did it retire very far. On the 17th of January and again on the 22nd Ikotenga attacked Hai-cheng from the north, but was repulsed.

Meanwhile the 2nd army, still under Oyama, had undertaken operations against Wei-hai-wei, the second great fortress and dock-yard of northern China, where Admiral Ting's squadron had been refitting since the battle of the Yalu ; and it was hoped that both armies would accomplish their present tasks in time to advance in the summer against Peking itself. On the 18th of January a naval demonstration was made at Teng-chow-fu, 70 m. west of Wei-hai- wei, and on the 19th the Japanese began their disembarkation at Yung-cheng Bay, about 12 m. from Wei-hai-wei. The landing was scarcely opposed, and on the 26th the Japanese advance was begun. The south-eastern defences of Wei-hai-wei harbour were carried by the 6th division, whilst the 2nd division reached the inner waters of the bay, driving the Chinese before them. The fleet under Ito co-operated effectively. On the night of the 4th-5th of February the Chinese squadron in harbour was attacked by ten torpedo boats. Two boats

were lost, but the armour-clad ” Ting-Yuen ” was sunk. On the following night a second attack was made, and three more vessels were sunk. On the 9th the ” Ching-Yuen ” was sunk by the guns in one of the captured forts. On the 12th Admiral Ting wrote to Admiral Ito offering to surrender, and then took poison, other officers following his example. Wei-hai-wei was then dismantled by the Japanese, who recovered the remnant of the Chinese squadron, including the ” Chen Yuen,” and the 2nd army concentrated at Port Arthur for the advance on Peking.

While this campaign was in progress the Chinese despatched a second peace mission, also with defective credentials. The Japanese declined to treat, and the mission returned to China. In Februarv the Chinese made further’iunsuccessful attacks[on Hai-cheng. Yamaji near Kai-ping fought a severe action on the 21st, 22nd and 23rd of February at Taping-shan against a part of Sung’s army under General Ma-yu-kun. This actionwas fought with 2 ft. of snow on the ground, the thermometer registering zero F., and no less than 1500 cases of frost-bite were reported. It was the intention of General Nozu, after freeing the Hai-cheng garrison from Ikotenga, to seize Niu-chwang port. Two divisions converged on An-shan- chan, and the Chinese, threatened in front and flank, retired to Liao-Yang. Meanwhile two more attacks on Hai-cheng had been repulsed. The 3rd and 5th divisions then moved on Niu-chwang, and Yamaji’s 1st division at Kai-ping joined in the advance. The column from An-shan-chan stormed Niu-chwang, which was obstinately defended, and cost the stormers nearly 400 men. All

three divisions converged on Niu-chwang port (Yingrkow), and the final engagement took place at Tien-chwang-tai, which was captured on the 9th of March. The Chinese forces in Manchuria being thoroughly broken and dispersed, there was nothing to prevent the Japanese from proceeding to the occupation of Peking, since they could, after the break-up of the ice, land and supply large forces at Shan-hai-kwan, within 170 m. of the capital. Two more Japanese divisions were sent out, with Prince Komatsu as supreme commander. Seven divisions were at Port Arthur ready to embark, when negotiations were reopened. Li Hung-Chang proceeded to Shimonoseki, where the treaty was signed on the 17th of April 1895. An expedition was sent towards the end of March to the Pescadores, and later the Imperial Guard division was sent to Formosa.

It is impossible to estimate the Chinese losses in the war. The Japanese lost 4177 men by death in action or by sickness, and 56,862 were wounded or disabled by sickness, exclusive of the losses in the Formosa and Pescadores expeditions. Nearly two- thirds of these losses were incurred by the 1st army in the trying winter campaign in Manchuria.

The most important works dealing with the war are: Vladimir, China-Japan War (London, 1896); Jukichi Inouye, The Japan- China War (Yokohama, &c, 1896); du Boulay, Epitome of the Chino- Japanese War (London, 1896), the official publication of the British War Office; Atteridge, Wars of the Nineties, pp ; 535ˆ636 (London, 1899) ; von Kunowski and Fretzdorff, Der japanisch- chinesische Krieg (Leipzig, 1895) ; von Miiller, Der Krieg zwischen China und Japan (Berlin, 1895); Bujac, Precis de quelques cam- pagnes contemporaines : II. La Guerre sino-japonaise (Paris and Limoges).

CHINON, a town of western France, capital of an arrondisse- ment in the department of Indre-et-Loire, on the right bank of the Vienne, 32 m. S.W. of Tours on the State railway. Pop. (1906) 4071. Chinon lies at the foot of the rocky eminence which is crowned by the ruins of the famous castle. Its narrow, winding streets contain many houses of the 15th and 16th centuries. The oldest of its churches, St Mexme, is in the Romanesque style, but only the facade and nave are left. The church of St Etienne dates from the 15th century, that of St Maurice from the 12th, 15th and 1 6th centuries. The castle, which has undergone considerable modern restoration, consists of three portions. That to the east, the Chateau de St Georges, built by Henry II. of England, has almost vanished, only the foundation of the outer wall remaining. The Chateau du Milieu (nth to 15th centuries) comprises the keep, the Pavilion de l'Horloge and the Grand Logis, in the principal apartment of which the first meeting between Joan of Arc and Charles VII. took place. Of the Chateau du Coudray, which is separated by a moat from the Chateau du Milieu, the chief remains are the Tour du Moulin (10th century) and two less ancient towers. A statue of Rabelais, who was born in the vicinity of the town, stands on the river-quay. Chinon has trade in wheat, brandy, red wine and plums. Basket and rope manufacture, tanning and cooperage are among its industries. Chinon (Caino) existed before the Roman occupation of Gaul, and was from early times an important fortress. It was occupied by the Visigoths, and subsequently, after forming part of the royal domain, came to the counts of Touraine and from them to the counts of Anjou. Henry II. often resided in the castle, and died there. The place was taken by Philip Augustus in 1205 after a year's siege.

CHINOOK, a tribe of North American Indians, dwelling at the mouth of the Columbia river, Washington. They were fishermen and traders, and used huge canoes of hollowed cedar trunks. The tribe is practically extinct, but the name survives in the trade language known as ” Chinook jargon.” This has been analysed as composed of two-fifths Chinook, two-fifths other Indian tongues, and the rest English and Canadian French; but the proportion of English has tended to increase. The Chinookan linguistic family includes a number of separate tribes.

The name Chinook is also applied to a wind which blows from W. or N. over the slopes of the Rocky Mountains, where it descends as a dry wind warm in winter and cool in summer (cf. Fohn) . It is due to a cyclone passing northward, and continues from a few hours to several days. It moderates the climate of the eastern 4tockies, the snow melting quickly on account of its warmth and vanishing on account of its dryness, so that it is said to ” lick up ” the snow from the slopes.

See Gill, Dictionary of Chinook Jargon (Portland, Ore., 1891); Boas, ” Chinook Texts, in Smithsonian Report, Bureau of Ethno-

logy (Washington, 1894); J – *-” Pilling, ” Bibliography of Chinookan Languages,” Smithsonian Report, Bureau of Ethnology (Washington, 1893); Horatio Hale, Manual of Oregon Trade Language (London, 1890); G. C. Shaw, The Chinook Jargon (Seattle, 1909); Handbook of American Indians (Washington, 1907).

CHINSURA, a town of British India, on the Hugli river, 24 m. above Calcutta, formerly the principal Dutch settlement in Bengal. The Dutch erected a factory here in 1656, on a healthy spot of ground, much preferable to that on which Calcutta is situated. In 1759 a British force under Colonel Forde was attacked by the garrison of Chinsura on its march to Chander- nagore, but in less than half an hour the Dutch were entirely routed. In 1795, during the Napoleonic wars, the settlement was occupied by a British garrison. At the peace of 1814 it was restored to the Dutch. It was among the cessions in India made by the king of the Netherlands in 1825 in exchange for the British possessions in Sumatra. Hugli College is maintained by government; and there are a number of schools, several of which are carried on by Scottish Presbyterian missionaries. Chinsura is included in the Hugli municipality.

CHINTZ, a word derived from the Hindu chint, spotted or variegated. This name was given to a kind of stained or painted calico produced in India. It is now applied to a highly glazed printed calico, commonly

made in several colours on a light ground and used for bed hangings, covering furniture, &c.

CHIOGGIA, a town and episcopal see of Venetia, Italy, in the province of Venice, from which it is 185 m. S. by sea. Pop. (1901) 21,384 (town), 31,218 (commune). It is inhabited mostly by fishermen, and is situated upon an island at the S. end of the lagoons. It is traversed by one main canal, La Vena. The peculiar dialect and customs of the inhabitants still survive to some extent. It is of earlier origin than Venice, and indeed is probably identical with the Roman Portus Aedro, or Ebro, though its name is derived from the Roman Fossa Claudia, a canalized estuary which with the two mouths of the Meduacus (Brenta) went to form the harbour. In 672 it entered the league of the cities of the lagoons, and recognized the authority of the doge. In 809 it was almost destroyed by Pippin, but in 1 1 10 was made a city, remaining subject to Venice, whose fortunes it thenceforth followed. It was captured after a deter- mined resistance by the Genoese in 1379, but recovered in 1380. Chioggia is connected by rail with Rovigo, 35 m. to the south- west. (T. As.)

Naval War of Chioggia {1378-80). — The naval war of 1378- 1380, carried on by Venice against the Genoese and their allies, the lord of Carrara and the king of Hungary, is of exceptional interest as one in which a superior naval power, having suffered disaster in its home waters, and having been invaded, was yet able to win in the end by holding out till its squadrons in distant seas could be recalled for its defence.

When the war began in the spring of 1378, Venice was mainly concerned for the safety of its trading stations in the Levant and the Black Sea, which were exposed to the attacks of the Genoese. The more powerful of the two fleets which it sent out was despatched into the eastern Mediterranean under Carlo Zeno, the bailiff and captain of Negropont. A smaller force was sent to operate against the Genoese in the western Mediterranean, and was placed under the command of Vettor Pisani. The possessions of Venice on the main- land, which were then small, were assailed by Francesco Carrara and the Hungarians. Her only ally in the war, Bernabo Visconti of Milan, gave her little help on this side, but his mercenaries invaded the territory of Genoa. The danger on land seemed trifling to Venice so long as she could keep the sea open to her trade and press the war against the Genoese in the Levant.

During the first stage of the war the plans of the senate were carried out with general success. While Carlo Zeno harassed the Genoese

stations in the Levant, Vettor Pisani brought one of their- squadrons to action on the 30th of May 1378 off Punta di Ansio to the south of the Tiber, and defeated it. The battle was fought in a gale by 10 Venetian against 11 Genoese galleys. The Genoese admiral, Luigi de' Fieschi, was taken with 5 of his galleys, and others were wrecked. Four of the squadron escaped, and steered for Famagusta in Cyprus, then held by Genoa. If Pisani had directed his course to Genoa itself, which was thrown into a panic by the defeat at Anzio, it is possible that he might have dictated peace, but he thought his squadron too weak, and preferred to follow the Genoese galleys which had fled to Famagusta. During the summer of 1378 he was employed partly in attacking the enemy in Cyprus,

but mainly in taking possession of the Istrian and Dalmatian towns which supported the Hungarians from fear of the aggressive ambition of Venice. He was ordered to winter on the coast of Istria, where his crews suffered from exposure and disease. Genoa, having recovered from the panic caused by the disaster at Anzio, decided to attack Venice at home while the best of her ships were absent with Carlo Zeno. She sent a strong fleet into the Adriatic under Luciano Doria. Pisani had been reinforced early in the spring of 1378, but when he was sighted by the Genoese fleet of 25 sail off Pola in Istria on the 7th of May, he was slightly outnumbered, and his crews were still weak. The Venetian admiral would have preferred to avoid battle, and to check an attack on Venice itself, by threatening the Genoese fleet from his base on the Istrian coast. He was forced into battle by the commissioner (proveditore) Michael Steno, who as agent of the senate had authority over the admiral. The Venetians were defeated with the loss of all their galleys except six. Luciano Doria fell in the battle, and the Genoese, who had suffered severely, did not at once follow up their success. On the arrival of his suc- cessor, Pietro Doria, with reinforcements, they appeared off the Lido, the outer barrier of the lagoon of Venice, in July, and in August they entered on a combined naval and military attack on the city, in combination with the Carrarese and the Hungarians. The Venetians had closed the passages through the outer banks except at the southern end, at the island of Brondolo, and the town of Chioggia. The barrier here approaches close to the mainland, and the position facilitated the co-operation of the Genoese with the Carrarese and Hungarians, but Chioggia is distant from Venice, which could only be reached along the canals across the lagoon. The Venetians had taken up the buoys which marked the

fairway, and had placed a light squadron on the lagoon. The allies, after occupy- ing the island of Brondolo, attacked, and on the 13th of August took the town of Chioggia with its garrison of 3000 men.

There appeared to be nothing to prevent the enemy from advanc- ing to the city of Venice except the difficult navigation of the lagoon. The senate applied for peace, but when the Genoese replied that they were resolved to ” bit and bridle the horses of Saint Mark ” the Venetians decided to fight to the end. Vettor Pisani, who had been imprisoned after the defeat at Pola, but who possessed the confidence of the people and the affection of the sailors, was released and named commander-in-chief against the wish of the aristocracy. Under his guidance the Venetians adopted a singularly bold and ingenious policy of offensive defence. The heavy Genoese vessels were much hampered by the shallow water and intricate passages through the lagoon. By taking advantage of their embarrassment and his own local knowledge, Pisani carried out a series of move- ments which entirely turned the tables on the invaders. Between the 23rd and 25th of August he executed a succession of night attacks, during which he sank vessels laden with stores not only in the canals leading through the lagoon to Venice, but in the fairways leading from Chioggia to the open sea round both ends of the island of Brondolo. The Genoese were thus shut in at the very moment when they thought they were about to besiege Venice. Pisani stationed the galleys under his command in the open sea outside Brondolo, and during the rest of the year blockaded the enemy closely. The distress of the Venetians themselves was great, but the Doge Andrea Contarini and the nobles set an example by sharing the general hardships, and taking an oath not to return to Venice till they .had recovered Chioggia. Carlo Zeno had long since been ordered to return, but the slowness and difficulty of communication and movement under 14th century conditions delayed his reappear- ance. The besiegers of Chioggia were at the end of their powers of endurance, and Pisani had been compelled to give a promise that the siege would be raised, when Zeno’s fleet reached the anchorage off Brondolo on the 1st of January 1380. The attack on Chioggia was now pressed with vigour. The Genoese held out resolutely in the hope of relief from home. But the resources of Genoa had been taxed to fit out the squadrons she had already sent to sea. It was not until the 12th of May 1380 that her admiral, Matteo Maruffo, was able to reach the neighbourhood of Brondolo with a relieving force. By this time the Venetians had recovered the island, and their fleet occupied a fortified anchorage from which they refused to be drawn. Maruffo could do nothing, and on the 24th of June 1380 the defenders of Chioggia surrendered. The crisis of the war was past.

Venice, being now safe at home, recovered the command of the sea, and before the close of the year was able to make peace as a conqueror. .

Authorities. — S. Romanin, Storia documentata di Venezia (Venice, 1855); W. C. Hazlitt, History of the Venetian Republic (London, i860); Horatio F. Brown, Venice (London, 1893). (D. H.)

CHIOS, an island on the west coast of Asia Minor, called by the Greeks Chios (Xios, ‘a ti? Xto) and by the Turks Saki Adasi; the soft pronunciation of X before t in modern Greek, approxi- mating to sh, caused Xio to be Italianized as Scio. It forms, with the islands of Psara, Nikaria, Leros, Calymnus and Cos, a sanjak rjf the Archipelago vilayet. Chios is about 30 m. long from N. to S., and from 8 to 15 m. broad; pop. 64,000. It well deserves the epithet ” craggy ” (iraixaXoeo-o-a) of the Homeric hymn. Its figs were noted in ancient times, but wine and gum

mastic have always been the most important products. The climate is healthy; oranges, olives and even palms grow freely. The wine grown on the N.W. coast, in the district called by Strabo Ariusia, was known as vinum Arvisium. Early in the 7th century B.C. Glaucus of Chios discovered the process of welding iron (xoXXrycrts: see J. G. Frazer’s Pausanias, note on x. 16. 1, vol. v. pp. 313-314), and the iron stand of a large crater whose parts were all connected by this process was constructed by him, and preserved as one of the most interesting relics of antiquity at Delphi. The long line of Chian sculptors (see Greek Art) in marble bears witness to the fame of Chian art. In literature the chief glory of Chios was the school of epic poets called Homeridae, who helped to create a received text of Homer and gave the island the reputation of being the poet’s birthplace. The chief town, Chios (pop. 16,000), is on the E. coast. A theatre and a temple of Athena Poliuchus existed in the ancient city. About 6 m. N. of the city there is a curious monument of antiquity, commonly called ” the school of Homer “; it is a very ancient sanctuary of Cybele, with an altar and a figure of the goddess with her two lions, cut out of the native rock on the summit of a hill. On the west coast there is a monastery of great wealth with a church founded by Constantine IX. Monomachus (1042-1054). Starting from the city and encompassing the island, one passes in succession the promontory Posidium; Cape Phanae, the southern extremity of Chios, with a harbour and a temple of Apollo; Notium, probably the south-western point of the island; Laii, opposite the city of Chios, where the island is narrowest; the town Bolissus (now Volisso), the home of the Homerid poets; Melaena, the north-western point; the wine-growing district Ariusia; Cardamyle (now

Cardhamili); the north-eastern promontory was probably named Phlium, and the mountains that cross the northern part of the island Pelinaeus or Pellenaeus.

The history of Chios is very obscure. According to Pherecydes, the original inhabitants were Leleges, while according to other accounts Thessalian Pelasgi possessed the island before it became an Ionian state. The name Aethalia, common to Chios and Lemnos in very early times, suggests the original existence of a homogeneous population in these and other neighbouring islands. Oenopion, a mythical hero, son of Dionysus or of Rhadamanthus, was an early king of Chios. His successor in the fourth generation, Hector, united the island to the Ionian confederacy (Pausan. vii. 4), though Strabo (xiv. p. 633) implies an actual conquest by Ionian settlers. The regal government was at a later time exchanged for an oligarchy or a democracy. The names of two tyrants, Amphiclus and Polytecnus, are mentioned. The products of the island were largely exported on the ships of Miletus, with which city Chios formed a close mercantile alliance in opposition to the rival league of Phocaea and Samos. Similar commercial considerations determined the Chians in their attitude towards the Persian conquerors: in 546 they submitted to Cyrus as eagerly as'Phocaea resisted him; during the Ionian revolt their fleet of 100 sail joined the Milesians in offering a desperate opposition at Lade (494). The island was subsequently punished with great rigour by the Persians. The Chian ships, under the tyrant Strattis, served in the Persian fleet at Salamis. After its liberation in 479 Chios joined the Delian League and long remained a firm ally of the Athenians, who allowed it to retain full autonomy. But in 413 the island revolted, and was not recaptured. After the Peloponnesian War it took the first opportunity to renew the Athenian alliance, but in 357 again seceded. As a member of the Delian League it had regained its prosperity, being able to equip a fleet of 50 or 60 sail. Moreover, it was reputed one of the best-governed states in Greece, for although it was governed alternately by oligarchs and democrats neither party persecuted the other severely. It was not till late in the 4th century that civil dissension became a danger to the state, leaving it a prey to Idrieus, the dynast of Caria (346), and to the Persian admiral Memnon (333). During the Hellenistic age Chios maintained itself in a virtually independent position. It supported the Romans in their Eastern wars, and was made a " free and allied state." Under Roman and Byzantine rule industry and commerce were undisturbed, its chief export at this time being the Arvisian wine, which had become very popular. After temporary occupations by the Seljuk Turks (1089-1092) and by the Venetians (1124-1125, 1 172, 1204-1225), it was given in fief to the

Genoese family of Zaccaria, and in 1346 passed definitely into the hands of a Genoese maona, or trading company, which was organized in I36jt»*inder the name of ” the Giustiniani.” This mercantile brotherhood? formerly a privileged class, alone exploited the mastic trade ; at the same time the Greeks were allowed to retain their rights of self-government and continued to exercise their industries. In 1415 the Genoese became tributary to the Ottomans. In spite of occasional secessions

which brought severe punishment upon the island (1453, 1479)1 the rule of the Giustiniani was not abolished till 1566. Under the Ottoman government the prosperity of Chios was hardly affected. But the island underwent severe periods of suffering after its capture and reconquest from the Florentines (1595) and the Venetians (1694-1695), which greatly reduced the number of the Latins. Worst of all were the massacres of 1822, which followed upon an attack by some Greek insurgents executed against the will of the natives. In 1881 Chios was visited by a very severe earthquake in which over 5600 persons lost their lives and more than half the villages were seriously damaged. The island has now recovered its prosperity. There is a harbour at Castro, and steam flour-mills, foundries and tanneries have been established. Rich antimony and calamine mines are worked by a French undertaking, and good marble is quarried by an Italian company.

Authorities. — Strabo xiv. pp. 632 f. ; Athenaeus vi. 265-266; Herodotus i. 160-165, vi. 15-31; Thucydides viii. 14-61; Corpus Inscr. Atticarum, iv. (2), pp. 9, 10; H. Houssaye in Revue des deux mondes, xlvi. (1876), pp. I ff. ; T. Bent in Historical Review (1889), pp. 467-480; Fustel de Coulanges, Vile de Chio (ed. Jullian, Paris, 1893); for coinage, B. V. Head, Historic/, numorum (Oxford, 1887), pp. “513-515, and Numismatics: Greek. (E. Gr. ; M. O. B. C.)

CHIPPENDALE, THOMAS (d. 1779), the most famous of English cabinetmakers. The materials for the biography of Chippendale are exceedingly scanty, but he is known to have been the son of Thomas Chippendale I., and is believed to have been the father of Thomas Chippendale III. His father was a cabinet- maker and wood-carver of considerable repute in Worcester towards the beginning of the t8th century, and possibly he originated some of the forms which became characteristic of his son’s work. Thus a set of chairs and settees was

made, apparently at Worcester, for the family of Bury of Knateshill, at a period when the great cabinetmaker could have been no more than a boy, which are practically identical with much of the work that was being turned out of the family factory as late as the ‘sixties of the 18th century. Side by side with the Queen Anne or early Georgian feeling of the first quarter of the 18th century we find the interlaced splats and various other details which marked the Chippendale style. By 1 7 2 7 the elder Chippen- dale and his son had removed to London, and at the end of 1749 the younger man — his father was probably then dead — estab- lished himself in Conduit Street, Long Acre, whence in 1753 he removed to No. 60 St Martin’s Lane, which with the addition of the adjoining three houses remained his factory for the rest of his life. In 1755 his workshops were burned down; in 1760 he was elected a member of the Society of Arts; in 1766 his partner- ship with James Ranni was dissolved by the latter’s death.

It has always been exceedingly difficult to distinguish the work executed in Chippendale’s factory and under his own eye from that of the many copyists and adapters who throughout the second half of the 18th century — the golden age of English furniture — plundered remorselessly. Apart from his published designs, many of which were probably never made up, we have to depend upon the very few instances in which his original accounts enable us to earmark work which was unquestionably his. For Claydon House, the seat of the Verneys in Buckinghamshire, he executed much decorative work, and the best judges are satis- fied that the Chinese bedroom there was designed by him. At Harewood House, the seat of the earl of Harewood in Yorkshire, we are on firmer ground. The house was furnished between 1765 and 1771, and both Robert Adam and Chippendale were employed upon it. Indeed, there is unmistakable evidence to show that certain work, so closely characteristic of the Adams that it might have been assigned to them without hesitation, was actually produced by Chippendale. This may be another of the many indications that Chippendale was himself an imitator, or it may be that Adam, as architect, prescribed designs which Chip- pendale’s cabinetmakers and carvers executed. Chippendale’s bills for this Adam work are still preserved. Stourhead, the famous house of the Hoares in Wiltshire, contains much undoubted Chippendale furniture, which may, however, be the work of Thomas Chippendale III.; at Rowton Castle, Shropshire, Chippendale’s bills as well as his works still exist.

Our other main source of information is The Gentleman and Cabinet Maker’s Director, which was published by Thomas Chippendale in 1754. This book, the most important collection

of furniture designs issued up to that time in England, contains one hundred and sixty engraved plates, and the list of subscribers indicates that the author had acquired a large and distinguished body of customers. The book is of folio size; there was a second edition in 1759, and a third in 1762.

In the rather bombastic introduction Chippendale says that he has been encouraged to produce the book ” by persons of distinc- tion and taste, who have regretted that an art capable of so much perfection and refinement should be executed with so little propriety and elegance.” He has some severe remarks upon critics, from which we may assume that he had already suffered at their hands. Perhaps, indeed, Chippendale may have been hinted at in the caustic remarks of Isaac Ware, surveyor to the king, who bewailed that it was the misfortune of the world in his day ” to see an unmeaning scrawl of C’s inverted and looped together, taking the place of Greek and Roman elegance even in our most expensive decorations. It is called French, and let them have the praise of it ! The Gothic shaft and Chinese bell are not beyond nor below it in poorness of imitation.” It is the more likely that these barbs were intended for Chippendale, since he was guilty not only of many essays in Gothic, but of a vast amount of work in the Chinese fashion, as well as in the flamboyant style of Louis XV. The Director contains examples of each of the manners which aroused the scorn of the king’s surveyor. Chippendale has even shared with Sir William Chambers the obloquy of introducing the Chinese style, but he appears to have done nothing worse than “conquer,” as Alexandre Dumas used to call it, the ideas of other people. Nor would it be fair to the man who, whatever his occasional extravagances and absurdities, was yet a great designer and a great transmuter. to pretend that all his Chinese designs were contemptible. Many of them, with their geometrical lattice- work and carved tracery, are distinctly elegant and effective. Occasionally we find in one piece of furniture a combination of the three styles which Chippendale most affected at different periods — Louis XV., Chinese and Gothic — and it cannot honestly be said that the result is as incongruous as might have been expected. Some of his most elegant and attractive work is derived directly from the French, and we cannot doubt that the inspiration of his famous ribbon-backed chair came directly from some of the more artistic performances in rococo.

The primary characteristic of his work is solidity, but it is a solidity which rarely becomes heaviness. Even in his most lightsome efforts, such as the ribbon-backed chair, construction is always the first consideration. It is here perhaps that he differs most materially from his great successor Sheraton, whose ideas of construction were

eccentric in the extreme. Ft is indeed in the chair that Chippendale is seen at his best and most characteristic. From his hand, or his pencil, we have a great variety of chairs, which, although differing extensively in detail, may be roughly arranged in three or four groups, which it would sometimes be rash to attempt to date. He introduced the cabriole leg, which, despite its antiquity, came immediately from Holland; the claw and ball foot of ancient Oriental use; the straight, square, uncompromising early Georgian leg; the carved lattice- work Chinese leg; the pseudo- Chinese leg; the fretwork leg, which was supposed to be in the best Gothic taste; the inelegant rococo leg with the curled or hoofed foot; and even occasionally the spade foot, which is supposed to be characteristic of the somewhat later style of Hepplewhite. His chair-backs were very various. His efforts in Gothic were sometimes highly successful; often they took the form of the tracery of a church window, or even of an ovalled rose window. His Chinese backs were dis- tinctly geometrical, and from them he would seem to have derived some of the inspiration for the frets of the glazed book- cases and cabinets which were among his most agreeable work. The most attractive feature of Chippendale's most artistic chairs — those which, originally derived from Louis Quinze models, were deprived of their rococo extravagances — is the back, which, speaking generally, is the most elegant and pleasing thing that has ever been done in furniture. He took the old solid or slightly pierced back, and cut it up into a light openwork design

exquisitely carved — for Chippendale was a carver before every- thing — in a vast variety of designs ranging from the elaborate and extremely elegant, if much criticized, ribbon back, to a comparatively plain but highly effective splat. His armchairs, however, often had solid or stuffed backs. Next to his chairs Chippendale was most successful with settees, which almost invariably took the shape of two or three conjoined chairs, the arms, backs and legs identical with those which he used for single seats. He was likewise a prolific designer and maker of book- cases, cabinets and escritoires with doors glazed with fretwork divisions. Some of those which he executed in the style which in his day passed for Gothic are exceedingly handsome and effective. We have, too, from his hand many cases for long clocks, and a great number of tables, some of them with a remarkable degree of Gallic grace. He was especially successful in designing small tables with fretwork galleries for the display of china. His mirrors, which were often in the Chinese taste or extravagantly rococo, are

remarkable and characteristic. In his day the cabinetmaker still had opportunities for designing and con- structing the four-post bedstead, and some of Chippendale's most graceful work was lavished upon the woodwork of ,the lighter, more refined and less monumental four-poster, which, thanks in some degree to his initiative, took the place of the massive Tudor and the funereally hung Jacobean bed. From an organ case to a, washhand-stand, indeed, no piece of domestic furniture came amiss to this astonishing man, and if sometimes he was extravagant, grotesque or even puerile, his level of achieve- ment is on the whole exceedingly high.

Since the revival of interest in his work he has often been criticized with considerable asperity, but not always justly. Chippendale's work has stood the supreme test of posterity more completely than that of any of his rivals or successors; and, unlike many men of genius, we know him to have been warmly appreciated in his lifetime. He was at once an artist and a prosperous man of business. His claims to distinction are summed up in the fact that his name has by general consent been attached to the most splendid period of English furniture.

Chippendale was buried on the 13th of November 1779, apparently at the church of St Martin-in-the-Fields, and administration of his intestate estate was granted to his widow Elizabeth. He left four children, Thomas ChippendalellL, John, Charles and Mary. He was one of the assignees in bankruptcy of the notorious Theresa Cornelys of Soho Square, of whom we read in Casanova and other scandalous chronicles of the time. Thomas Chippendale III. succeeded to the business of his father and grandfather, and ,for some years the firm traded under the style of Chippendale & Haig. The factory remained in St Martin's Lane, but in 1814 an additional shop was opened at No. 57 Haymarket, whence it was in 1821 removed to 42 Jermyn Street. Like his father, Thomas Chippendale III. was a member of the Society of Arts; and he is known to have exhibited five pictures at the Royal Academy between 1784 and 1801. He died at the end of 1822 or the beginning of 1823. (j. P.-B.)

CHIPPENHAM, a market town and municipal borough in the Chippenham parliamentary division of Wiltshire, England, 94 m. W. of London by the Great Western railway. Pop. (1901) 5074. Chippenham is governed by a mayor, 4 aldermen and 12 councillors. Area, 361 acres. It lies in a hollow on the south side of the Upper Avon, here crossed by a picturesque stone bridge of 21 arches. St Andrew's church, originally Norman of the 1 2th century, has been enlarged in different styles. A paved causeway running for about 4 m. between

Chippenham Cliff and Wick Hill is named after Maud Heath, said to have been a market-woman, who built it in the 15th century, and bequeathed an estate for its maintenance. After the decline of its woollen and silk trades, Chippenham became celebrated for grain and cheese markets. There are also manufactures of broadcloth, churns, condensed milk, railway-signals, guns and carriages; besides bacon-curing works, flour mills, tanneries and large stone quarries. Bowood, the seat of the marquess of Lansdowne, is 3! m. S.E. of Chippenham. Lanhill barrow, or Hubba's Low, 2$ m. N.W., is an ancient tomb containing a kistvaen or sepulchral

chamber of stone; it is probably British, though tradition makes it the grave of Hubba, a Danish leader.

Chippenham {Chepeham, Chippeham) was the site of a royal residence where in 853 ˆEthelwulf celebrated the marriage of his daughter /Ethelswitha with Burhred, king of Mercia. The town also figured prominently in the Danish invasion of the 9th century, and in 933 was the meeting-place of the witan. In the Domesday Survey Chippenham appears as a crown manor and is not assessed in hides. The town was governed by a bailiff in the reign of Edward I., and returned two members to parliament from 1295, but it was not incorporated until 1553, when a charter from Mary established a bailiff and twelve burgesses and endowed the corporation with certain lands for the maintenance of two parliamentary burgesses and for the repair of the bridge over the Avon. In 1684 this charter was surrendered to Charles II., and in 1685 a new charter was received from James II., which was shortly abandoned in favour of the original grant. The Representation Act of 1868 reduced the number of parliamentary representatives to one, and the borough was disfranchised by the Redistribution Act of 1885. The derivation of Chippenham from cyppan, to buy, implies that the town possessed a market in Saxon times. When Henry VII. introduced the clothing manufacture into Wiltshire, Chippenham became an important centre of the industry, which has lapsed. A prize, however, was awarded to the towrt for this commodity at the Great Exhibition of 1851.

CHIPPEWA 1 FALLS, a city and the county-seat of Chippewa county, Wisconsin, U.S.A., on the Chippewa river, about 100 m. E. of St Paul, Minnesota, and 12 m. N.E. of Eau Claire, Wisconsin. Pop. (1890} 8670; (1900} 8094; (1910, census) 8893. It is served by the Minneapolis, St Paul & Sault Ste Marie, the Chicago & North- Western, and the Chicago, Milwaukee & St Paul railways, and by the electric line to Eau Claire. The first settlement on the site was made in 1837; and the city was chartered in 1870.

CHIPPING CAMPDEN, a market town in the northern parlia- mentary division of Gloucestershire, England, on the Oxford and Worcester line of the Great Western railway. Pop. (1901) 1542, It is picturesquely situated towards the north of the Cotteswold hill-district. The many interesting ancient houses afford evidence of the former greater importance of the town. The church of St James is mainly Perpendicular, and contains a number of brasses of the 15th and 16th centuries and several notable monumental tombs. A ruined manor house of the 16th century and some almshouses complete, with the church, a picturesque group of buildings; and Campden House, also of the 1 6th century, deserves notice.

Apart from a medieval tradition preserved by Robert de Brunne that it was the meeting-place of a conference of Saxon kings, the earliest record of Campden (Campedene) is in Domesday Book, when Earl Hugh is said to hold it, and to have there fifty villeins. The number shows that a large village was attached to the manor, which in n 73 passed to Hugh de Gondeville, and about 1204 to Ralph, earl of Chester. The borough must have grown up during the 12th century, for both these lords granted the burgesses charters which are known from a confirmation of 1 247, granting that they and all who should come to the market of Campedene should be quit of toll, and that if any free burgess of Campedene should come into the lord's amerciament he should be quit for i2d. unless he should shed blood or do felony. Probably Earl Ralph also granted the town a portman-mote, for the account of a skirmish in 1273 between the men of the town and the county mentions a bailiff and implies the existence of some sort of municipal government. In 1605 Campedene was incor- porated, but it never returned representatives to parliament. Camden speaks of the town as a market famous for stockings, a relic of that medieval importance as a mart for wool that had given the town the name of Chipping.

CHIPPING NORTON, a market town and municipal borough in the Banbury parliamentary division of Oxfordshire, England, 26 m. N.W. of Oxford by a branch of the Great Western railway.

1 For the Chippewa Indians see Ojibway, of which the word is a popular adaptation.

Pop. (1901) 3780. It lies on the steep flank of a hill, and consists

mainly of one very wide street. The church of St Mary the Virgin, standing on the lower part of the slope, is a fine building of the Decorated and Perpendicular periods, the hexagonal porch and the clerestory being good examples of the later style. The town has woollen and glove factories, breweries and an agricultural trade. It is governed by a mayor, 4 aldermen and 12 councillors. Area, ˆ456 acres. Chipping Norton (Chepyng- norton) was probably of some importance in Saxon times. At the Domesday Survey it was held in chief by Ernulf de Hesding; it was assessed at fifteen hides, and comprised three mills. It returned two members to parliament as a borough in 1302 and 1304-1305, but was not represented after this date, and was not considered to be a borough in 13 16. The first and only charter of incorporation was granted by James I., in 1608; it established a common council consisting of 2 bailiffs and 12 burgesses; a common clerk, 2 justices of the peace, and 2 serjeants-at-mace; and a court of record every Monday. In 1 205 William Fitz-Alan was granted a four days' fair at the feast of the Inven- tion of the Cross; and in 1276 Roger, earl of March, was granted a four days' fair at the feast of St Bar- nabastfrjln the reign of Henry VI. the market was held on Wednesday, and a fair was held at the Translation of St Thomas Becket. These continued to be held in the reign of James I., who annulled the former two fairs, and granted fairs at the feasts of St Mark, St Matthew, St Bartholomew, and SS. Simon and Jude.

CHIQUITOS (Span, "very small"), a group of tribes in the province of Santa Cruz de la Sierra, Bolivia, and between the head waters of the rivers Mamore and Itenez. When their country was first invaded they fled into the forests, and the Spaniards, coming upon their huts, the doorways of which are built excessively low, supposed them to be dwarfs: hence the name. They are in fact well formed and powerful, of middle height and of an olive com- plexion. They are an agricultural people, but made a gallant resistance to the Spaniards for nearly two centuries. In 1691, however, they made the Jesuit missionaries welcome, and rapidly became civilized. The Chiquito language was adopted as the means of communication among the converts, who soon numbered 50,000, representing nearly fifty tribes. Upon the expulsion of the Jesuits in 1767 the Chiquitos became decadent, and now number short of 20,000. Their houses, regularly ranged in streets, are built of adobes thatched with coarse grass. They manufacture copper boilers for making sugar and understand several trades, weave ponchos and hammocks and make straw hats. They are fond of singing and dancing, and are a gentle-mannered and hospitable The group is now divided into forty tribes.

CHIROMANCY (from Gr. x«P, hand, and navreia, divination), the art

of telling the character or fortune of persons by studying the lines of the palms of the hands (see Palmistry).

CHIRON, or Cheiron, in Greek mythology, one of the Centaurs, the son of Cronus and Philyra, a sea nymph. He dwelt at the foot of Mount Pelion, and was famous for his wisdom and knowledge of the healing art. He offers a remarkable contrast to the other Centaurs in manners and character. Many of the most celebrated heroes of Greece were brought up and instructed by him (Apollodorus iii. 10. 13). Accidentally pierced by a poisoned arrow shot by Heracles, he renounced his immortality in favour of Prometheus, and was placed by Zeus among the stars as the constellation Sagittarius (Apollodorus ii. 5; Ovid, Fasti, v. 414). In a Pompeian wall-painting he is shown teaching Achilles to play the lyre.

See articles in Pauly-Wissowa's Realencyclopadie and W. H. Roscher's Lexikon der Mythologie; W. Mannhardt, Wold- und Feldkulte (1904).

CHIROPODIST (an invented word from Gr. x«ip, hand, and rrow, foot), properly one who treats the ailments of the hands

and feet, or is consulted as to keeping them in good condition ; the use of the word is now restricted, however, to the care of the toes, " manicurist " having been invented for the correspond- ing attentions to the fingers. The word was first introduced in 1785, by a" corncutter " in Davies Street, London.

CHIROPTERA (Greek for " hand- wings "), an order of mammals containing the bats, all of which are unique in the class in possessing the power of true flight, and have their fore- limbs specially modified for this purpose.

The mammals comprised in this order are at once distinguished by the possession of true wings; this peculiarity being accom- panied by other modifications of bodily structure having relation to aerial locomotion. Thus, in direct contrast to all other mammals, in which locomotion is chiefly effected by action from behind, and the hind-limbs consequently greatly pre- ponderate in size over the fore, in the Chiroptera the fore-limbs, being the agents in propelling the body forward during flight, immensely exceed the short and weak hinder extremities. The

Fig. 1

Skeleton and Wing-Membranes of the Noctule Bat {Pipistrettus noctula).

ph 1 , First phalanx. pW-, Second phalanx. ph 3 , Third phalanx.

am,

f,

t,

Jb, c, pel,

thorax, giving origin to the great muscles which sustain flight,

c, Clavicle.

h, Humerus.

r, Radius.

u, Ulna.

d l , First digit.

d i ,d 3 ,d i ,d i , Other digits of the fore-limb supporting wm, the wing-mem- brane.

m,r,i. Metacarpal bones.

folk.

Antebrachial membrane.

Femur.

Tibia.

Fibula. [femoral membrane.

Calcar supporting im, the inter-

Post-calcaneal lobe.

and containing the proportionately large lungs and heart, is remarkably capacious; and the ribs are flattened and close together; while the shoulder-girdle is greatly developed in comparison with the weak pelvis. The fore-arm (fig. 1) consists of a rudimentary ulna, a long curved radius, and a carpus of six bones supporting a thumb and four elongated fingers, between which, the sides of the body, and the hinder extremities a thin expansion of skin, the wing-membrane, is

spread. The knee is directed backwards, owing to the rotation of the hind-limb, outwards by the wing-membrane; an elongated cartilaginous process (the calcar), rarely rudimentary or absent, arising from the inner side of the ankle-joint, is directed inwards, and supports part of the posterior margin of an accessory membrane of flight, extending from the tail or posterior extremity of the body to the hind-limbs, and known as the inter-femoral membrane. The penis is pendent; the testes are abdominal or inguinal; the teats, usually two in number, thoracic; the uterus is simple or with more or less long cornua; the placenta discoidal and deciduate; and the smooth cerebral hemispheres do not extend backwards over the cerebellum. The teeth comprise incisors, canines, premolars and molars; and the dental formula never

exceeds *. $, c. \, p. f , m. f; total 38. Despite the forward position of the teats, which is merely an adaptive feature, bats are evidently mammals of low organization, and are most nearly related to the Insectivora.

In consequence of the backward direction of the knee, a bat, when placed on the ground, rests on all fours, having the knees directed upwards, while the foot is rotated forwards and inwards on the ankle. Walking is thus a kind of shuffle; but, notwith- standing a general belief, bats can take wing from the walking posture.

The bones of the skeleton are characterized by their slender- ness and the great size of the medullary canals in those of the extremities. The vertebral column is short, and the vertebrae differ but slightly in number and form throughout the group. The general number of dorso-lumbar vertebrae is 17, whereof 12 are dorsal; the cervical vertebrae are broad, but short. Except in fruit-bats (Pteropodidae), the vertebrae, from the third cervical backwards, are devoid of spinous processes. From the first dorsal to the last lumbar the vertebral column forms a single curve, most pronounced in the lumbar region. The bodies of the vertebrae are but slightly movable on each other, and in old individuals become partially welded. The caudal vertebrae are cylindrical bones without processes; their number and length varying in allied species. The development of these vertebrae is correlated with habits, the long tail in the insecti- vorous species supporting and controlling the position of the interfemoral membrane which aids bats in their doubling motions when in pursuit of insects

by acting as a rudder, and assists them in the capture of the larger insects. In the fruit-bats this is not required, and the tail is rudimentary or absent. In all bats the presternum has a prominent keel for the attachment of the great pectoral muscles.

The shape of the skull varies greatly; but post-orbital pro- cesses are developed only in some Pteropodidae and a few Nycteri- dae and Emballonuridae; in Pteropus leucopterus alone does a process from the zygomatic arch meet the post-orbital so as to complete the orbital ring. Zygomatic arches, though slender, are present in all except in some of the species of Phyllostomatidae.

The milk-teeth differ from those of all other mammals in that they are unlike those of the permanent series. They are slender, with pointed recurved cusps, and are soon shed, but exist for a short time with the permanent teeth. In the Rhinolophidae the milk-teeth are absorbed before birth. The permanent teeth exhibit great variety, sometimes even in the same family, as in Phyllostomatidae, whilst in other families, as Rhinolophidae, the resemblance between the dentition of species differing in many respects is remarkable. In all they are provided with well-developed roots, and their crowns are acutely tuberculate, with more or less well-defined W-shaped cusps, in the insecti- vorous species, or variously hollowed out or longitudinally grooved in the frugivorous kinds.

The shoulder-girdle varies but slightly, the clavicle being long, strong and curved; and the scapula large, oval and tri- angular, with a long curved coracoid process. The humerus, though long, is scarcely two-thirds the length of the radius; and the rudimentary ulna is welded with the radius. A sesamoid bone exists in the tendon of the triceps muscle. The upper row of the carpus consists of the united scaphoid, lunar and cuneiform bones.

The ” hand ” has five digits, the first, fourth and fifth of which consist each of a metacarpal and two phalanges; but in the second and third the number of phalanges is different in certain families. The first digit terminates in a claw, most developed in the frugivorous species, in most of which the second digit is also clawed, although in other bats this and the remaining digits are unarmed.

In the weak pelvis the ilia are long and narrow, while in most species the pubes of opposite sides are loosely united in front in males, and widely separated in females; in the Rhinolophidae alone they form a symphysis. Only in the Molossinae is there a well-developed fibula; in the rest this bone is either very slender or cartilaginous and lizameiat

ous in its upper third, or

reduced to a small bony process above the heel, or absent. The foot consists of a short tarsus, and of slender, laterally compressed toes, with much-curved claws.

Although the brain is of a low type, probably no animals possess so delicate a sense of touch as Chiroptera. In ordinary bats tactile organs exist, not only in the bristles on the sides of the muzzle, but in the sensitive structures forming the wing-mem- branes and ears, while in many spedes leaf-like expansions surrounding the nasal apertures or extending backwards behind them are added. These nose-leaves are made up partly of the extended and thickened integument of the nostrils, and partly of the glandular eminences occupying the sides of the muzzle, in which in other bats the sensitive bristles are implanted.

In no mammals are the ears so developed or so variable in form; in most insectivorous species they are longer than the head, while in the long-eared bat their length nearly equals that of the head and body. The form is characteristic in each of the families; in most the ” earlet,” or tragus, is large, in some cases extending nearly to the outer margin of the conch; its office appears to be to intensify and prolong the waves of sound by producing undulations in them. In the Rhinolophidae, the only family of insectivorous bats wanting the tragtts, the auditory bullae reach their greatest size, and the nasal appendages their highest development. In frugivorous bats the ear is simple and but slightly variable. In all bats the ears are extremely mobile, each independently at will.

The oesophagus is narrow, especially in blood-sucking vampires. The stomach ‘ presents two types of structure, corresponding respectively to the two divisions of the order, Megachiroptera and Microchiroptera; in the former the pyloric extremity is, with one exception, elongated and folded upon itself, in the latter simple; an exceptional type is met with in the blood-suckers, where the cardiac extremity is elongated, forming a long appendage. The intestine is comparatively short, varying from one and a half to four times the length of the head and body; longest in the frugivorous, shortest in the insectivorous species. In Rhinopoma and Megaderma a small caecum has been found. The liver is characterized by the great size of the left lateral lobe, which occasionally equals half that of the whole organ; the right and left lateral fissures are usually very deep; in Megachiroptera the spigelian lobe is, with one exception, ill defined or absent, and the caudate is generally large; but in Microchiroptera the former lobe is large, while the caudate is small. The gall-bladder is

generally well developed.

In most species the hyoids are simple, consisting of a chain of slender, long, cylindrical bones connecting the basi-hyoid with the skull, while the pharynx is short, and the larynx shallow with feebly developed vocal cords, and guarded by a short pointed epiglottis. In the African epauletted bats, Epomophorus, the pharynx is long and capacious, the aperture of the larynx far removed from the fauces, and, opposite to it, opens a canal, leading from the nasal chambers, and extending along the back of the pharynx; the laryngeal cavity is spacious and its walls are ossified; the hyoids are unconnected, except by muscle with the skull; while the cerato-hyals and epi-hyals are cartila- ginous and expanded, entering into the formation of the walls of the pharynx, and (in males of some species) supporting the orifices of a pair of air-sacs communicating with the pharynx (fig. 2).

The extent and shape of the wings generally depend on the form of the bones of the fore-limbs, and on the presence or absence of the tail. The wings consist of an ” antebrachial membrane,” which extends from the point of the shoulder along the humerus and more or less of the fore-arm to the base of the thumb, the metacarpal bone of which is partially or wholly included in it; the ” wing-membrane ” spread out between the elongated fingers, and extending along the sides of the body to the posterior extremities, generally reaching to the feet; and the ” interfemoral membrane,” the most variable of all, which is supported between the extremity of the body, the legs and the calcar (fig. 1). The antebrachial and wing membranes are most developed in species fitted only for aerial locomotion which when at rest hang with the body enveloped in) the wings;

but in the Emballonuridae, and also in the Molossinae, which are the best fitted for terrestrial progression, the antebrachial membrane is reduced to a small size, and not developed along the fore-arm, leaving the thumb quite free, while the wing-

FlG. 2. — Head and Neck of Epomophorus franqueti (adult male). From Dobson. The anterior (a.ph.s) and posterior (p.ph.s) pharyngeal sacs are opened from without, the dotted lines indicating the- points where they communicate with the pharynx; s, thin membranous partition in middle line between the anterior pharyngeal sacs of opposite sides; s.m, sterno-mastoid muscle separating the anterior

from the posterior sac.

membrane is narrow and folded in repose under the fore-arm. The relative development of the interfemoral membrane has been referred to in connexion with the caudal vertebrae. Its small size in the frugivorous and blood-sucking species, which do not

require it, is easily under- stood. Scent-glands and pouches opening on the sur- face of the skin are developed in many species, but in most cases more so in males than in females (fig. 3). As a rule, bats produce only a . Fig. 3— Frontal Sac and Nose-Leaf smg i e offspring at a birth, in Male and female Masked Bat „,v V l *„.„„„„„ < .;„„„•„ „„„;;^ (Phyllorhinalarvata). From Dobson. w u hich for some time is earned

about by the female parent clinging to the fur of her breast; but certain North American bats commonly give birth to three or four young ones at a time, which are carried about in the same manner.

Bats are divisible into two suborders, Megachiroptera and Microchiroptera.

Megachiroptera. The first of these comprises the fruit-eating species, which are generally of large size, with the crowns of the cheek-teeth smooth and marked with a longitudinal groove. The bony palate is continued behind the last molar, narrowing slowly backwards; there are three phalanges in the index finger, the third phalange being terminated generally by a claw; the sides of the ear form a ring at the base; the tail, when present, is inferior to (not contained in) the interfemoral membrane ; the pyloric extremity of the stomach is generally much elongated ; and the spigelian lobe of the liver is ill-defined or absent, while the caudate is well developed. This group is limited to the tropical and sub-tropical parts of the Eastern Hemisphere.

All the members of this suborder are included in the single family Pteropodidae, the first representatives of which are the African epauletted bats, forming the genus Epomophorus. In this the dental formula is i. | (or \), c. \, p. §, m. |. Tail short or absent, when present free from the interfemoral membrane; second finger with a claw; premaxillae united in front. The species are strictly limited to Africa south of the Sahara, and are distinguished by the large and long head, expansible and often folded lips, and the white tufts of hair on the margins of the ears. The males are provided with glandular pouches, situated in the skin of the side of the neck near the point of the shoulder, which are rudimentary or absent in

FruH- eating bats.

Fig. 4. — Head of a Flying-Fox or Fruit-Bat (Pteropus personatus). From Gray.

females. In the males they are lined with glandular membrane, from which long coarse yellowish hairs project to form conspicuous epaulet-like tufts on the shoulders. The males often have a pair of air-sacs extending outwards on each side from the pharynx beneath the integument of the neck, in the position shown in fig. 2. These bats appear to live principally on figs, the juicy contents of which their voluminous lips and capacious mouths enable them to swallow without loss. The huge and ugly West African hammer-headed bat, Hypsignathus monstrosus, represents an allied genus distinguished by the absence of shoulder- pouches, and the presence of leaf-like expansions of skin on the front of the muzzle, and of distinct cusps on the outer sides of the cheek-teeth. The great ™, majority of the bats of this Q group, commonly known as . “flying-foxes,” are included in the typical genus Ptero- pus, of which the dental formula is i. §, c. \, p. f, m. §. All are of large size, and the absence of a tail, the long pointed muzzle, and the woolly fur covering the neck render their recog-nition easy. One of the species, P. edulis, inhabiting Java, measures 5 ft. across the fully extended wings, and is the largest member of the order.

The range of the genus extends from Madagascar through the Seychelles to India, Ceylon, Burma, the Malay Archipelago, Japan, New Guinea, Australia and Polynesia. Although two species in- habit the Comoro Islands, scarcely 200 m. from the mainland, not one is found in Africa; while the common Indian species is closely allied to the Madagascar flying-fox. The Malay Archipelago and Australia form the headquarters of these bats, which in some places occur in countless multitudes. The colonies exhale a strong musky odour, and when awake the occupants utter a loud incessant chatter. Wallace’s fruit-bat of Celebes and Macassar has been made the type of a separate genus, as Styloctenium wallacei. In Roussetlus (or Cynonycleris) the dentition is as in Pteropus, but the tail is short, and the fur of the nape of the neck not different from that of the back; its distribution accords with that of Pteropus, except that it includes Africa and does not reach farther east than New Ireland. R. aegyptiacus inhabits the chambers of the Great Pyramid and other deserted buildings in Egypt, and is probably the species figured in Egyptian frescoes. Boneia, with two species, from Celebes, differs in having only two upper incisors. Harpyionycteris and Scotonycteris, respectively from the Philippines and West Africa, are represented by

a single species each ; but of Cynopterus, which is mainly confined to the Indo-Malay countries, there are some half-score different

kinds. The dentition is i. , c. \, p. |, m. §, the muzzle is

shorter than in Roussettus, with the upper lip grooved in front as in Pteropus, while the tail and fur resemble those of the former genus. These bats are _ extremely voracious, a specimen of the Indian C. marginatus having eaten a banana* twice its own weight in three hours. Among several Austro-Malay genera, such as Ptenochirus and Balicnycteris, the tube-nosed bats of the genus Gelasinus (or Harpyia) are remarkable for the conformation of the nostrils (fig. 5). Cephaloles, with one species, ranging from Celebes to the Solomon group, has the dentition i. {, c. {, p. f, m. f, pre- maxillae not united in front, nostrils simple, muzzle short, index finger without a claw, tail short. As in Gelasinus, the wing- membrane arises from the

middle line of the back, to ‘ ‘ “~

which it is attached by a Fig. 5. — Head of Papuan Tube- Nosed longitudinal thin process Bat (Gelasinus major). From G. E. of skin; the wings are Dobson. naked, but the back

covered with hair. Leipenyx is an allied West African genus with one species.

The foregoing belong to the typical subfamily Pteropodince, while the remainder represent a second group, Carponycterinae (or Macro-glossinae), characterized by having the facial part of the skull pro-duced, the molar teeth narrow, and scarcely raised above the gum, and the tongue exceedingly long, attenuated in the anterior third, and armed with long recurved papillae near the tip. The single representative of the first genus, Notopteris macdonaldi, inhabiting Fiji, New Guinea and the New Hebrides, is distinguished from other bats of this family by the length of its tail, which is nearly as long

as the forearm. The dentition is *. |, c. \, p. ?, m. f, while the index finger has no claw, and the wings arise from the spine. Eonycteris, with the dentition i. §, c. \, p. |, m. f, is also represented by a single species, E. spelaea, from Tenasserim, Burma, and the Malay Peninsula and Islands, which has somewhat the appearance of a Roussettus, but the absence of a claw in the index finger and the presence of the

characteristic tongue and teeth at once distinguish it. Carponycteris (Macroglossus) and Melonycteris, the former with several and the latter with a single species, are closely allied Indo-Malay and Papuan genera, the index finger in both having a claw, but the number of the teeth being the same as in Eonycteris. C. minimus is the smallest known species of the suborder, much smaller than the serotine bat of Europe, with the fore-arm scarcely longer than that of the long- eared bat. It is nearly as common in certain parts of Burma as Cynopterus marginatus, and extends eastwards through the Malay Archipelago as far as New Ireland, where it is associated with Melonycteris melanops, distinguished by its larger size and the total absence of the tail. An allied small Carpopycteris inhabits India. Trygenycteris (Megaloglossus) woermanni, of West Africa, is the only member of the group occurring west of the Himalaya. Callinycterts of Celebes, with the dentition i. f , c. \, p. j, m.\, has a short tail and no index-claws, while Nesonycteris of the Solomons, with the den- tition i. $, c. \,p. 1, m. \, differs by the absence of the tail.

Microchiroptera. The second and larger suborder, the Microchiroptera, includes all the insectivorous species, the majority of which are of relatively Insect- small size as compared with the Megachiroptera. In these eetlmr bats, with a few specialized exceptions, the crowns of the

. fa cheek-teeth are surmounted by sharp cusps, divided by

transverse grooves. In the skull the bony palate narrows abruptly and is not continued backwards laterally behind the last molar; there is one rudimentary phalange (rarely two or none) in the index finger, which is never terminated by a claw; the outer and inner sides of the ear commence inferiorly from separate points of origin; the tail, when present, is contained in the interfemoral membrane, or appears on its upper surface; the stomach, except in the blood-sucking group, is simple ; and the spigelian lobe of the liver large, and the caudate generally small.

The bats included in this suborder are so numerous in genera (to say nothing of species) that only some of the more important types can be mentioned).

Brief references have already been made to the manner in which in many or most of these bats the tail aids in the capture of prey. From the observations of C. Oldham, it appears that these bats, when walking, carry the tail downwards and forwards, so that the membrane connecting this organ with the hind-legs forms a kind of pouch or bag. If a large insect be encountered the bat seizes it with a

snatch, and slightly spreading its folded wings and pressing them on the ground in order to steady itself, brings its feet forwards so as to increase the capacity of the tail-pouch, into which, by bending its neck and thrusting its head beneath the body, it pushes the insect. Although the latter, especially if large, will often struggle violently, when once in the pouch it but rarely escapes, from which it is subsequently extracted and devoured. It is assumed that the same method of capture is employed when on the wing; and a naturalist who has observed the long-eared bat picking moths off willows states that the bat always hovers when taking off the moth, and bends up the tail so as to form a receptacle for the insect as it drops.

In the Rhinolophidae, Horse-shoe and Leaf-nosed bats of the Old World, the nose-leaf is developed and surrounds the nasal apertures, which are situated in a depression on the upper surface of the muzzle so as to look upwards; the ears are large and generally separate, without trace of a tragus or earlet; the premaxillae are rudimentary, suspended from the nasal cartilages, and support a single pair of small incisors; the molars have acute W-shaped cusps; the skull is large, and the nasal bones which support the nose- leaf much expanded vertically and later- ally. In females a pair of teat-like appendages are found in front of the pubis; and the long tail extends to the margin of the interfemoral membrane. The middle finger has two phalanges, but From tne index is rudimentary. The fibula is rudimentary.

The Rhinolophidae are the most highly organized of insectivorous bats, in which the osseous and cutaneous systems reach the fullest development. Compared with theirs, the bones of the extremities and the wings of other bats appear coarsely formed, and their teeth seem less perfectly fitted to crush the hard bodies of insects. The complicated nasal appendages reach their highest development, and the differences in their form afford characters in the discrimination of the species, which resemble one another closely in dentition and the colour of the fur.

In the first subfamily, Rhinolophinae, /the first toe has two, and the

Fig. 6. — Head of Mitred Horseshoe Bat (Rhino- lophus mitratus). Dobson.

other toes three phalanges each ; and the ilio-pectineal spine is no< connected by bone with the antero-inferior surface of the ilium. In the horseshoe bats, Rhinolophus, the dentition is i. J, c. \, p. \,m. |. the nose-leaf has a. central process behind and between the nasal orifices, with the posterior extremity lanceolate, and the antitragus large.

Among the numerous forms R. luctus is the largest, and in- habits elevated hill-tracts in India and Malaysia; JR. hipposiderus of Europe, extending into south England and Ireland, is one of the smallest ; and R. ferrum-equinum represents the average size of the species, which are mainly distinguished from one another by the form of the nose-leaf. The last-named species extends from England to Japan, and southward to the Cape of Good Hope, but is reptesented by a number of local races. When sleeping, the horseshoe bats, at least in some instances, suspend themselves head downwards, with the wings wrapped round the body after the manner of fruit bats. The posture of ordinary bats is quite different, and while the lesser horse- shoe (R. hipposiderus) alights from the air in an inverted position, other bats, on first coming to rest, do so with the head up- wards, and then reverse their position. ' ' '''''^A 7

In the second subfamily, Hippo- p IG . 7. — Head of Squirrel siderinae (formerly called Phyl- Leaf-Bat (Phyllorhina calcarata) . lorhmae), the toes are equal and F ro m Dobson. include two phalanges each, while

the_ ilio-pectineal spine is united by a bony isthmus with a process derived from the antero-inferior surface of the ilium. Hipposiderus, Cloeotis, Rhinonycteris, Triaenops, Anthops and Coelops represent this subfamily. Hipposiderus (Phyllorhina), with many species, ranging over Asia, Africa and Australasia, and the dental formula i. h , c. \, p. I, or J, m. |, differs from Rhinolophus in the form of the nose-leaf, which is not lanceolate behind (fig. 6), and is unprovided with a central process covering the nostrils; the largest species, H. armiger, appears to be the most northerly, having been taken at Amoy in China, and in the Himalaya at an elevation of 5500 ft. Many are provided with a frontal sac behind the nose-leaf, rudi- mentary in females (see fig. 7), which can be everted at pleasure; the sides of this sac secrete a waxy substance, and its ex- tremity snpports a tuft of straight hairs. Rhinonycteris, represented by R. aurantia 1 from Australia, and Triaenops. i by T. persicus from Persia and other species from Africa and Madagascar, are closely allied genera. Triaenops (fig. 8) is characterized by the remark- able form of its nasal appen- dages and ears, and the pres- ence of a bony projection from the upper extremity of the second phalange of the fourth finger. Coelops (C. Frithi), from the Bengal Sanderbans, Java and Siam. is distinguished , by the peculiar form of its nose-leaf and the length of the metacarpal bone of the index finger, as well as by the shortness of the calcar and interfemoral membrane. Cloeotis is represented by a single East African species, and Ar.thops by one from the Solomon Islands characterized by the nose-leaf covering the whole front of the face.

The next family, Nycteridae, which is also Old World, is a small one, nearly allied to the last, in which it is included by Prof. Max Weber as a subfamily under the name of Myader- _ . malinae. It differs by the presence of a small tragus in se the ears, which are united at their bases ; and , by the van, P” 1es • nasal chamber not being inflated. The premaxillae are either small and separated in front, or rudimentary; and the first phalange of the middle finger when in repose is laid back on the metacarpus. There are only pectoral teats.

Of the two genera, Megaderma, as represented by the five species of false vampires, is distinguished by the absence of ossified pre-maxillae and upper incisors (i. % , p. 1 , the cylindrical narrow

muzzle surmounted by an erect nose-leaf the base of which conceals the nasal orifices, the immense joined eats with large bifid tragus, and the great extent of the interfemoral membrane, in the base of which the short tail is concealed. M. gigas (fig. 9), from central Queensland, is the largest species of the genus, and of the suborder. M. lyra, common in India (fore-arm 2-7 in.), has been caught in the act of sucking the blood, while flying, from a small bat which it afterwards devoured. The range of the genus includes Africa, the Iiido-Malay countries and Australasia. Nycteris, which is common

Fig. 8. — Head of Persian Leaf- Bat. (Triaenops persicus). From Dobson.

to Africa and the Malay Peninsula and Islands, has ossified pre’ maxillae and upper incisors (i. f, *. i), and a long tail, but lacks a nose-leaf. As in Megaderma, the frontal bones are deeply hollowed and expanded laterally, the muzzle presents a similar cylindrical form, and the lower jaw also projects; but, instead of a nose-leaf, the face is marked by a deep longitudinal sharp-edged groove ex-

Fig. 9.— The False Vampire {Megaderma gigas) . From Dobson.

tending from the nostrils to the band connecting the base of the large ears; the sides of this depression being margined as far back as the eyes by small horizontal cutaneous appendages. With the exception of N. javanica, the species are limited to Africa.

According to the classification followed by Dr G. E. Dobson, the extensive family of New World bats known as Phyllostomatidae was

widely sundered from the two preceding groups; but in Prof. Max Weber's system they are placed next one another — an arrangement which has the great advantage of bringing together all the bats furnished with nose-leaves. It is indeed probable that the vampires, as the members of the present family may be collectively termed, are the New World representatives of the Old World Rhinolophidae and Nycteridae.

The Phyllostomatidae are characterized by the presence of a nose-leaf, or of lappets on the chin, but the nostrils are not directed upwards. The ethmoturbinal bones of the nasal cavity form simple plates (much as in the two preceding families). The premaxillae are always well developed, with their palatal portions forming a suture and denning the boundaries of distinct palatine foramina (in place of being rudimentary, as in Nycteridae and Rhinolophidae). The large ears have a tragus. The middle finger has three phalanges, and the index one. There is an incomplete fibula. The, tail may be either long onshort. Generally the dentition is *'. f , c. {, p. f m. f.

All the bats of this family may be readily recognized by the presence of a well-developed third phalange in the middle finger,

associated either with a distinct nose-leaf, or with central upper incisors, or with both. Unlike the Rhinolo- phidae, their eyes are generally large and the tragus is well developed, maintaining almost the same form throughout the species, however much the other parts of the body may vary. Their fur is of a dull colour, and the face and back are often marked with white streaks. A few species, probably all those with the tail and interfemoral membrane well developed, feed principally on insects, while the greater number of the species of the groups Vampyreae and Glossophageae appear to live on a mixed diet of insects and fruits, and the Desmodonteae, of which two species are known, are true blood-suckers, and have their teeth and intestinal tract specially modified in accordance with their habits. The group is practically limited to the tropical and subtropical parts of Central and South America, although one species of Otopterus reaches Cali-

Fig. 10. — Head of Blainville's Vampire (Mormops blainvillei). From Dobson.

fornia. In the first subfamily, Mormopsin&t (Lobostcminae), th« nosrtils open by simple apertures at the extremity of the muzzle In front, not margined by a distinct nose-leaf; while, in compensation,

the chin is furnished with expanded leaf -like appendages. The tail is short. It includes two genera. In Chilonycteris the crown of the head is moderately elevated above the face-line, and the basi-cranial axis is almost in the same plane as the facial, while in Mormops (fig. 10) the crown of the head is greatly elevated above the face- line, ana the basi-cranial axis is nearly at right angles to the facial ; i. \, p. f , in both genera. As regards the species of Chilonycteris, the most striking feature is the occurrence of a rufous and a dark brown phase in each. In some the two phases are very marked, but in others they are connected by intermediate shades. Here may be mentioned the two species of tropical American hare-lipped bats, forming the genus Noctilio, which presents characters common to this and the following family, to which latter it is often referred. The typical N. leporinus is a bat of curious aspect, with strangely folded lips, erect skin- processes on the chin, and enormous feet and claws. The two middle incisors are close together, and so large as to conceal the small outer ones, while in the lower jaw there are but two small incisors; the premolars numbering £. These bats live near the coast, and feed oh small crabs and fishes.

Most of the remaining members of the family are included in the subfamily Phylloslomatinae, characterized by the presence of a distinct nose-leaf and the warty chin. The clitoris is imperforate, whereas it is perforated in the Mormopsinae. The incisors are generally f (occasionally $), and the molars well developed. The sub- family is divided into a number of groups or sections. The first of them, the Vampyreae, is characterized as follows: Muzzle long and narrow in front, the distance between the eyes generally less than (rarely equal to) that from the eye to the extremity of the muzzle; nose-leaf horseshoe-shaped in front, lanceolate behind; interfernoral membrane well developed; tail generally distinct, rarely absent; inner margin of the lips not fringed; i. f or f, p. § or f ; molars with W-shaped cusps, usually well developed.

Nearly all the Vampyreae appear to be insectivorous, so that the term cannot be considered indicative of habits; but a few, if not all, probably supplement their insect-diet with fruit. Vampyrus spectrum (the largest bat in the New World) is said to be wholly frugivorous, and Otopterus waterhousei appears to prey occasionally on smaller bats. The genera may be arranged in two subgroups ac- cording as the tail is produced to the margin of the interfemoral membrane or perforates it to appear on its upper surface. In the first division are included three genera, Lonchorhina, Otopterus (or Macrotus) and Dolichophyllum (or Macrophyllum) , the first represented by L. aurita, characterized by an extraordinary long nose-leaf, and peculiarly large

ears and tragus. In the second subsection are in- cluded Vampyrus, Chrotopterus, Tonatia (Lophostoma) Microny cteris, Gly phony cteris, Tr-achyops, Phylloderma, Phyttostoma, Anthorhina [Tylostoma), Mimon, Hemiderma (Carollia) and Rhinophylla • all, with the exception of the last, distinguished chiefly by the form of the skull and the presence or absence of the second lower premolar. Phyttostoma hastatum, next in point of size to Vampyrus spectrum, is a well-known species in South America; P. elongatum (fig. 11) differs in its smaller size and larger nose-leaf. Hemiderma brevicauda, a small species, closely resembles Glossophaga soricina, and forms a connecting link between this and the next group. Rhinophylla pumilio is the smallest species of the family ; further distinguished by the absence of a tail, the narrowness of its molars, which do not form W-shaped cusps, and the small size of the last upper molar, characters connecting it and the group with the Stenodermateae. Both in Hemiderma and Rhinophylla the zygo- matic arch is incomplete.

The next subsection, Glossophageae, presents the following distinctive features: Muzzle long and narrow; tongue long and extensible, attenuated towards the tip, and beset with

long filiform recurved papillae; lower T ru V- if' " /m ;; . lip with a wide groove above, and in Javelin Vampire (Pˆtotoma front margined by small warts; elongatura). nose-leaf small; tail short or none;

i- I, P- I or i or f, m. f or f or J; teeth narrow; molars with narrow W-shaped cusps, sometimes indistinct or absent ; lower incisors small or deciduous. The species included in this group represent some ten genera, distinguished principally by differences in the form and number of the teeth, and the presence or absence of the zygomatic, arch of the skull. In Glossophaga and Phyllonycteris the upper incisors form a continuous row between the canines. In Mono- phyttus and Leptonycteris (Ischnoglossa) they are separated into pairs' by a narrow interval in front; while in Lonchoglossa, Glossonycteris and Choerony cteris they are widely separated and placed in pairs near the canines. In the first four of these genera the lower incisors are present (at least to a certain age), in the last three they are deciduous even in youth. The zygomatic arch is wanting in Phyllonycteris, Glossonycleris and Choeronycteris. The typical species is Glossophaga soruina, which, as already mentioned, closely resembles Hemiderma

Lesser

Fig. 12. — Head of Long-tongued Vampire (Choeronycteris mexicana), showing brush- tipped tongue. From Dobson.

brevicauda, both in form arid dentition. Its long brush-tipped tongue (which it possesses in common with other species of the group) is used to lick out the pulpy contents of fruits having hard rinds. The food of the species of this group appears to consist of both fruit and insects, and the long tongue may be used for extracting the latter from the deep corollas of flowers. Other genera are Lonchophylla, Rhithronycteris, Hylonycteris and Lychonycteris, each with a single species (in 1904).

The third group, Stenodermateae, presents the following characteristics : — Muzzle very short and generally broad in front, the distance between the eyes nearly always exceeding (rarely equalling) the distance from the eye to the extremity of the muzzle ; nose-leaf

short, horseshoe- shaped in front, lanceolate behind (except in Brachyfhylla and Centurio) ; interfemoral mem- brane concave be- hind ; tail none ; inner margin of the lips fringed with conical papillae; *. f or f , p. I, m. I or f or |; cheek- teeth broad (except in Sturnira), molars with concave or flat crowns margined externally by raised cutting- edges. Although the Stenodermateae are generally easily dis- tinguished from the Vampyreae by the shortness and breadth of the muzzle and the form of the cheek-teeth, certain species of the latter resemble the former in external appearance, agreeing almost absolutely in the form of the nose-leaf, the ears and the tragus, and the warts on the chin. These resemblances show that, while the form of the teeth and jaws has become modified to suit the food, the external characters have remained much the same, and indicate the common origin of the two sections. The food of these bats appears to be wholly or in great part fruit. The species are divided into some eleven genera, mostly distinguished by the form of the skull and teeth. Artibeus includes the frugivorous A. perspicillatus. Stenoderma achradophilum, found in Jamaica and Cuba, with the last, from which it is scarcely distinguishable externally except by its much smaller size, differs in the absence of the horizontal plate of the premaxillae on the palate. Sturnira lilium, while agreeing with these in the form of the nose-leaf and ears, differs from all the species of the family in its longitudinally-grooved molars, which resemble those of the Pteropodidae more closely than those of any other bats; and the presence of tufts of long differently-coloured hairs over glands in the sides of the neck is another character in common with that group. Centurio senex (fig. 13)

is the type of a small genus distinguished from Stenoderma and other genera of this group by the absence of a distinct nose-leaf. Some naturalists make this genus the type of a distinct subgroup, Centurioneae. Up to io.04thegenera,exclusiveof Centurio, included in the Stenodermateae were Artibeus (with several sub- genera), Vampyrops (also with subgenera), Mesophylla, Chiroderma, Stenoderma (with 3 subgenera), Ectophylla, Ametrida (with 2 sub- genera), Pygoderma, Sturnira and Brachyphylla.

The third subfamily, Desmodonlieae, is represented only by the blood-sucking bats, and distinguished by having i. J, of which the

upper pair are cutting, the rudimentary molars, the very short interfemoral membrane, and the blood'sucking habit. They are further characterized as follows: Muzzle short and conical; nose-leaf distinct; p. f, m. } or f; upper incisors occupying the whole space between the canines; premolars narrow, with sharp-edged longitudinal crowns ; molars rudimentary or absent ; stomach elongated, and intestiniform. There are two genera, Desmodus, with- out calcar or molars, and Diphylla, with a short calcar and a single rudi- mentary molar on each side — re- stricted to Central and South America. Desmodus rufus, the com- moner species, is a little larger than the noctule bat, and abundant in certain parts of South America, where it is troublesome owing to its attacks upon domestic animals, sucking their blood and leaving them weakened from repeated bleedings. (See Vampire.)

The fourth family of bats, unlike any of the three previous ones, has a cosmopolitan distribution. These free-tailed bats, as they are f, ne . conveniently called, constituting the family Emballo-

talled nuridae, present the following distinctive features. The

bats. nostrils are of normal form and without a nose-leaf. The

premaxillae have their palatal portion imperfectly de- veloped, and united by a slender process with the maxillae. The ears are large, with a small tragus. The middle finger has two phalanges, and the index generally a single one. The fibula is in- complete. The tail is generally short, and always partly free from the interfemoral membrane. There is generally only a single pair of

Fig. 13. — Head of Masked Vampire (Centurio senex). From Dobson.

upper incisors, separated by gaps from the canines, and from one another in the middle line.

The distinctive feature of these bats is the free tail-tip, which pierces the interfemoral membrane to appear on its upper surface, and may project beyond its margin. As a rule, these bats may also be recognized by the peculiar form of the muzzle, which is obliquely truncated, the nostrils projecting more or less in front beyond the lower lip, by the first phalange of the middle finger being folded in repose forwards on the upper surface of the metacarpal bone, and by the upper incisors. Although cosmopolitan, these bats rarely extend north or south of the thirtieth parallels of latitude.

The family may be divided into two subfamilies, of which the Emballonurinoe is characterized by the incomplete premaxillae, the presence of only one phalange in the index finger, and the short tail. The dental formula is generally i. \ (sometimes f or J), c. {, p. f . m. f. This subfamily may be further subdivided into subgroups or sections of which the first, Embattonurae, is characterized by the slender tail perforating the interfemoral membrane, so as to appear on its upper surface; the_ legs long, with a slender fibula; the incisors weak; and the pre- molars f . The typical genus Emballonura presents the following features: i. f, extremity of the muzzle mora or less produced beyond the lower lip, forehead flat. The genus contains several species, Emballonura raffrayana. inhabiting islands from Madagascar From Dobson. through the Malay Archipelago and Siam

to the Navigator Islands. Coleiira, with i. \, the extremity of the muzzle broad, and the forehead concave, has two species from East Africa and the Seychelles. Rhynchonycleris is distin- guished from Coleiira by the produced extremity of the muzzle. The single species, R. naso, from Central and South America, is common in the vicinity of streams, where it is usually found during the day resting on the vertical faces of rocks, or on trunks of trees growing over water; it escapes notice owing to the greyish colour of the fur of the body and of small tufts on the antebrachial membrane counterfeiting the weathered surfaces of rocks and bark. As evening approaches it appears on the wing, flying close to the water. Saccop- teryx has i. \, and the antibrachial membrane with a pouch opening on its upper surface; it contains several species from Central and South America. This sac is developed only in the male and in the female is rudimentary. In adult males a valvular longitudinal opening occupies the upper surface of the membrane leading into a small pouch, the interior of which is lined with a glandular membrane secreting an unctuous reddish substance with a strong ammoniacal odour. Allied genera are the tropical American Peropteryx and the Brazilian Cormura. The various species of tomb-bats (Taphozous) inhabit the tropical and subtropical parts of all the eastern hemi- sphere except

Polynesia, and are distinguished by the cartilaginous premaxillaries, the deciduous pair of upper incisors, and the presence of only two pairs of lower incisors. Most of the species have a glandular sac (fig. 15) between the angles of the lower jaw, more developed in males than in females, in some species absent in the

Fig. 15. — Heads of Tomb-Bat (Taphozous longimanus), showing relative development of throat-sacs in male and female. From Dobson.

,

latter. An open throat-sac is wanting in T. melanopogon, but about its position are the openings of small pores, the secretion from which probably causes the hairs to grow long, forming the black beard found in many males. The three tropical American white bats, Diclidurus, with i. §, c. {, p. §, m. f , resemble Taphozous in the form of the head and ears, but, besides other characters, differ from all other bats in possessing a pouch, opening off the centre of the interior surface of the interfemoral membrane ; the extremity of the tail enters this, and perforates its base.

The second subfamily of the EmbaUonuridae, Rhinopomatinae, is represented only by the genus Rhinopoma, with several species ranging from Egypt through Arabia to India, Burma and Sumatra. The premaxillae (fig. 16) are complete; the index finger has two phalanges; the tail is very long and mouselike; and the dental formula i. \, c. \, p. §, m. $. Dr G. E. Dobson has remarked that these mouse-tailed bats might be elevated to the rank of a family, for it is difficult to determine their affinities, a kind of cross relationship attaching them to the Nycteridae on the one hand and to the Em- baUonuridae on the other. These bats, distinguished from all other Microchiroptera by the presence of two phalanges in the index finger

Fig. 16. — Skull of Mouse-

and the long and slender tail projecting far beyond the narrow inter-femoral membrane, inhabit the subterranean tombs in Egypt and deserted buildings generally from north-east Africa to Burma and Sumatra.

The last group, according to the system adopted by Prof. Max Weber, is that of the Vespertilionidae, which includes such typical Tvolcal k ats as tne pipistrelle, the noctule, and the long-eared Bats species. By

Mr G. S. Miller x the first section of the

‘ family — Natalinoe — is regarded as of family rank, while

the last section, or Molossinae, is included by Dr G. E. Dobson in the Emballonuridae, from the typical forms of which its members differ

widely in tail-structure. In this extended sense the family, which has a cosmopolitan distribution, may be defined as follows: — The nostrils are normal and without a nose-leaf. The ethmoturbinal bones of the nasal chamber are involuted. The palatine processes of the pre-maxillae do not form a suture. The ear is mostly large, with a tragus.

tailed” Ba”t (Rhinop7ma”mic7o~- T , he ™ id u dle fin S er (ˆfP* in Th l r °’ phyllum). X2. (From Dobson.) £[er ?) . has * wo Phalanges. The

fibula is usually rudimentary. The tail is long and does not perforate the interfemoral membrane. The incisors are generally f or £, but may be reduced to { in the Molossinae.

In the first subfamily, Nalalinae, which is exclusively tropical American, the other upper incisors are separated from one another and from the canines; palatine processes of the pre- maxillae are at least partially developed; and the dental formula

is i. f, c. {, p. 2 (mm |. i n general appearance these bats recall

the more typical Vespertilionidae, although the form of the muzzle is suggestive of the Mormopsinae among the Phyllostomatidae. Again,

while the form of the skull is vespertilione, the relation of the vomer to the front end of the premaxillae is of the phyllostomine type. • The molars and incisors are like- wise vespertilione, whereas the premolars are as distinctly phyllostomine. Finally, while the third, or middle, finger normally has two phalanges, as in typical Vespertilionidae, the second of these is elon- Fig. 17. — Head of Chilonatalus gated and in Thyroptera micropus. x 2. (From Dobson.) divided into two, as in Phyllo- stomatidae. The first two genera, Furipierus and Amorphochilus, each have a single species, the latter being distinguished from the former by the wide separation of the nostrils and the backward prolongation of the palate. In both the crown of the head is elevated, the thumb and first phalange of the middle finger are very short, and the premolars are f. The same elevation of the crown characterizes the genera Natalus and Chilonatalus (fig. 17), in which the premolars are J: in

c

Fig. 18. — Suctorial Disks in Thyroptera tricolor, a, side, and b, concave surface, of thumb disk; c, foot with disk, and calcar with projections (all much enlarged). (From Dobson.)

general appearance these bats are very like the Old World vespertilionine genus Cerivoula, except for the short triangular tragus. Lastly, Thyroptera includes two species distinguished by an additional phalange in the middle finger and by accessory clinging-01 gans attached to the extremities. In Thyroptera tricolor, i. |, p. |, from Brazil, these have the appearance of small, circular, stalked, hollow disks (fig. 18), resembling miniature sucking-cups of cuttle-fishes, and are attached to the inferior surfaces of the thumbs and the soles of the feet. By their aid the bat is able to maintain its hold when creeping over smooth vertical surfaces.

The second or typical subfamily, Vespertilioninae, includes all the remaining members of the family with the exception of the aberrant Molossinae. The upper incisors are in proximity to the canines ; the

1 Bull. Amer. Mus. Nat. Hist. vol. xii. (1899).

Fig. 19. — Head of

Scotophilus emarginatus. (From Dobson.)

premaxillae widely separated ; the ears medium or large ; the dental formula is i. f (or \), c. \, p. |(f , f , or i), m. f ; and the fibula very small and imperfect. All the members of this large cosmopolitan group are closely allied, and differ chiefly by external characters. They may be divided into subgroups. In the first of these, the Plecoteae, of which the long-eared bat (Plecotus auritus) is the type, the crown of the head is but slightly raised above the face-line, the upper incisors are close to the canines, and the nostrils are margined behind by grooves on the upper surface of the muzzle, or by rudimentary nose-leaves ; the ears being generally very large and united. Of the six genera, Plecotus, with i. § , p. f , has three species: — one the long-eared European bat referred to above; P. macrotis, restricted to North America, is distinguished by the great size of the glandular prominences of the sides of the muzzle, which meet in the centre above and behind the nostrils; the third species being also American. The second, Barbastella, with *'• J > P- li distinguished by its dentition and by the outer margin of the ear being carried forv/ards above the mouth and in front of the eye, includes the European barbastelle bat, B. barbastellus, and B. dar-

jelingensis from the Himalaya. Otonycteris, i. i, pm. J, connecting this group with the Vespertilioneae, is represented by 0. hemprichii, from North Africa and the Himalaya, and an Arabian species. The next two genera are distinguished by the presence of a rudimentary nose-leaf: Nycto- philus, i. i,P-i) with three species from Australasia; and Antrozous, i. 3, p. %, distinguished from all the other members of the subfamily by having but two lower incisors, and from other Plecoteae by the separate ears ; the two species inhabit California. The sixth genus, Euderma, is also represented by a Californian species.

The second group Vespertilioneae, with about thirteen genera, includes the great majority of the species; and a large number of these may be classed under Vespertilio, which is divisible into sub- genera, differing from one another in the number of premolars, and often ranked as separate genera. One group is represented by V. (Histiotus) magellanicus, a species remarkable for its extreme southern range, its relatives being also South American. A second group, with p. \, includes the British serotine, V. (Eptesicus) serotinus, of Europe and northern Asia, and represented in North America by the ciosely allied V. (E.) fuscus. In the typical group, which includes the Old World V. murinus, one species, V. borealis, ranges to the Arctic circle. The European noctule, V. (Pierygistes) noctula, and Leisler's bat, V. (P.) leisleri, represent another group; and the common pipistrelle, V. {Pipistrellus) pipistrellus, yet another, with p. I . The only other group that need be mentioned is one represented by the North American V. (Lasionyctetis) noctivagans, with p. §. The African Laephotes, the Chinese la, and the Papuan Fhiletor are allied genera, each with a single species. Chalinolobus and Glau- conycteris have the same general dental character as Vespertilio, but are distinguished by the presence of a lobe projecting from the lower lip near the gape; the former, with p. |, is represented by five Australasian species, one of which extends into New Zealand ; while the_ latter, with p. §, is African. The species of Glauconycteris are noticeable for their peculiarly thin membranes traversed by distinct reticulations and parallel lines. Scotophilus, with i, \, p. \, includes several species, restricted to the tropical and subtropical regions of the eastern hemisphere, though widely distri- buted within these limits. These bats, though approaching cer- tain species of Vespertilio in many points, are dis- tinguished by the single (in place of two) pair of unicuspidate upper incisors separated by a wide space and placed

close to the canines, by the small transverse first lower premolar crushed in between the canine and second premolar, and, generally, by their conical, nearly naked, muzzles and thick leathery membranes. 5. temmincki is the commonest bat in India, and appears often before

the sun has touched the horizon. 5. gigas, from equatorial Africa, is the largest species. Nyclicejus, with the same dental formula as Scotophilus, is distinguished, by the first lower premolar not being crushed in between the adjoining teeth, and the comparatively greater size of the last upper molar. It includes only the North American N. htimeralis {crepuscularis), a bat scarcely larger than the pipistrelle. The hairy-membraned bats of the genus Lasiurus (Atalapha), with i. i, p. -§ or J, are also limited to the New World, and generally characterized by the interfemoral membrane being more or less covered with hair and by the peculiar form of the tragus, which is expanded above and abruptly curved inwards. In those species which have two upper premolars the first is extremely small and internal to the tooth-row. The genus, which is divided into Lasiurus proper and Dasypterus, is further characterized by the presence of four teats in the lemale, and by the general production

Fig. 20.-

-Head of Cerivoula hardwickei. (From Dobson.)

of three or four offspring at a birth. Rhogeessa and Tomopeas are allied tropical American types. Murina, with the subgenus Harpio-cephalus, has i. f , p. §, and includes several small bats distinguished by the prominent tube-like nostrils and hairy interfemoral membrane. M. suilla, from Java, the Malay and neighbouring islands, is a well-known species, and the closely allied M. hilgendorfi is from Japan. The remaining species are from the Himalaya, Tibet and Ceylon; . and apparently restricted to the hill-tracts of the countries in which they are found. Next to Vespertilio the genus Myotis (divisible into several subgenera), with i. f, p. |, includes the largest number of species, and has rather a wider geographical distribution in both hemispheres, one species being recorded from the Navigator Islands. The species may be recognized by the peculiar character of the pairs of upper incisors on each side, the cusps of which diverge from each other, by the large number of premolars, of which the second upper is always small, and by the oval elongated ear and narrow tragus. The British M. bechsleini and M. nattereri are examples of this group. Cerivoula (Kerivoula), which also has p. |, is distinguished by the parallel upper incisors and the large second upper premolar. There are numerous African and Indo-Malayan species, of which C. picta, from India and Indo-Ma!ay, is characterized by its brilliant orange fur, and membranes variegated

with orange and black. The genus includes delicately formed insectivorous, tropical, forest-haunting bats, whose colouring approximates them to the ripe bananas among which they often pass the daytime.

Another subgroup, Minioptereae, is represented solely by the genus Miniopterus, with i. f, p. f . The incisors are separated from one another in front and from the canines; the first phalange of the middle finger is very short, the crown of the head elevated, and the tail long. The genus is represented by some half-dozen Old World species, among which the typical M. schreibersi ranges from Europe, southern Asia, and Africa to Japan and Australasia.

The last subfamily is that of the Molossinae, included by Dobson in the family Embattonuridae. In this group the premaxillae are in contact or but very slightly separated; the ears are large, with the tragus small; the dental formula is i.\ (J or £), c. \, p. § (I), m. §■; and the fibula is strongly developed. In their blunt muzzles and many other features these bats undoubtedly resemble the Embattonu- ridae, from the typical members of which they differ by the pro- duction of the thick tail far beyond the margin of the interfemoral membrane. They are further characterized by their broad and stout feet, in which the first, and in most cases also the fifth, toe is thicker than the rest, and furnished with long bent hairs; and by the presence of callosities at the base of the thumbs, and a single pair of large upper incisors occupying the centre of the space between the canines. The feet are free from the wing-membrane, which folds up under the fore-arm and legs; the interfemoral membrane is retractile, being movable backwards and forwards along the tail; this power of varying its superficial extent confers on these bats great dexterity in changing the direction of flight. All are able to walk or crawl well, and spend much of their time on trees. The genus Chiromeles, with i. \, c. \, p. f, m. |, the first hind-toe much larger than and separate from the others, and the widely sundered ears, is represented by C. torquata, a large bat of peculiar aspect, inhabiting the Indo-Malay countries. This species is nearly naked, a collar only of thinly spread hairs half surrounding the neck, and is remarkable for its enormous throat-sac and nursing-pouches. The former consists of a semicircular fold of skin forming a pouch round the neck beneath, concealing the orifices of subcutaneous pectoral glands which discharge an oily fluid of offensive smell. The nursing-pouch is formed on each ‘side by an extension of a fold of skin from the side of the body to the inferior surfaces of the humerus and femur. In the anterior part of this pouch the teat is placed. The typical genus Molossus (fig. 21) includes the mastiff-bats, characterized by the dental formula i. \ or §, p. § or f ; and by the

Fig. 21. — Head of Mastiff -bat {Molossus glaucinus). (From Dobson.)

Fig. 22. — Head of Nyc- linomops macrolis. (From Dobson.)

upper incisors being close together in front. The genus is restricted to the tropical and subtropical regions of the New World. M. obscurus, a small species common in tropical America, inhabits the hollow trunks of palms and other trees and the roofs of houses. The males and females live apart (as is the case in most if not all bats). In West Africa the mastiff-bats are represented by Eomops,

with one species; while Nyctinomops includes a number of tropica! American species more nearly related to the next genus, in which some of them (fig. 22) were formerly included. The widely spread Nyctinomus, with i. % or |, p. § or i, and the upper incisors separate in front, includes numerous species inhabiting the tropical and subtropical parts of both hemispheres. The lips of the bats of this genus are even more expansible than in Molossus, in many of the species (fig. 22) showing vertical wrinkles. N. toeniotis (or cestonii), one of the largest species, alone extends into Europe, as far north as Switzerland. N. johorensis, from the Malay Peninsula, is re- markable for the extraordinary form of its ears. N. brasiliensis is common in tropical America, and extends as far north as California. Here may be conveniently noticed two very rare and aberrant bats, Myzopoda (or Myxopoda) aurita of Madagascar, and Mystacops (or Mystacina) tuberculatus of New Zealand, the latter „ d

of which is believed to be well-nigh^ if not entirely, exter- and” minated. Their systematic position and affinities are Mvstacoos somewhat uncertain; but in the opinion of O. Thomas 1 the former should typify a separate family, Myzopodidae, in which the latter may also find a place. From all other bats Myzopoda is distinguished by the presence of a peculiar mushroom-shaped organ

Fig. 23.— Thumb and leg and foot of New Zealand bat {Mystacops tuberculatus), enlarged. (From Dobson.)

at the base of the large ear, and by the union of the tragus with the latter, on the inner base of which it forms a small projection. There are three phalanges in the middle finger; and the whole inferior surface of the thumb supports a large sessile horseshoe-shaped adhesive pad, with the circular margin directed forwards and notched along its edge, while a smaller pad occupies part of the sole of the hind-foot. Mr Thomas regards this bat as related on the one hand to the subfamily Mormopsinae of the Phyllostomatidae, and on the other

to the Natalinae among the Vespertilionidae; both these groups being regarded by him as of family rank.

Mystacops resembles Myzopoda in having three phalanges to the middle finger, but differs in that the tail perforates the interfemoral membrane to appear on its upper surface in the manner characteristic of the Embattonuridae. The greater part of the wing-membrane is exceedingly thin, but a narrow portion along the fore-arm, the sides of the body, and the legs, is thick and leathery, and beneath this thickened portion the wings are folded. Other peculiarities of structure are found in the form of the claws of the thumbs and toes, each of which has a small heel projecting from its concave surface near the base, also in the sole of the foot and inferior surface of the leg, as shown in fig. 23. The plantar Surface, including the toes, is covered with soft and very lax, deeply wrinkled skin, and each toe is marked by a central longitudinal groove with short grooves at right angles to it. The lax wrinkled integument is continued along the inferior flattened surface of the ankle and leg. These peculiarities appear to be related to climbing habits in the species.

Extinct Bats. Palaeontology tells us nothing with regard to the origin of the Chiroptera, all the known fossil species, some of which date back to the Oligocene, being more or less closely allied to existing types, and therefore of comparatively little interest. The origin of the order from primitive insectivorous mammals must have taken place at least as early as the Lower Eocene. It is, however, noteworthy that several of the earlier extinct species appear to be related to the Rhinolophidae, which is the most generalized family of the order. Remains of Pteropodidae belonging to existing genera occur in the caves of tropical countries in the eastern hemisphere; and the skeleton of an extinct generic type, Archaeopteropus, has been obtained from the Miocene lignite of Italy, which indicates a form to a certain extent transitional in character between typical fruit-bats and the insectivorous bats. The tail, for instance, which in most medern fruit-bats is rudimentary, with only three or four vertebrae, in the fossil has eight complete vertebrae; while the teeth of the 1 Proc. Zool. Soc. (London, 1904), vol. ii.

extinct form are distinctly cusped. Whether, however, the tail is longer than in the existing Notopteris of Fiji and New Guinea, or whether the molars are more distinctly cusped than is the case with the Solomon

Island Pteropus (Pteralopex), is not stated. Still, the fact that the Miocene fruit-bat does show certain signs of approximation to the insectivorous (and more generalized) section of the order is of interest. Of the Oligocene forms, Pseudorhinolophus of Europe is apparently a member of the Rhinolophidae; but the affinities of Alastor and Vesperti- liavus, which are likewise European, are more doubtful, although the latter may be related to Taphozous. The North American Vespertilio (Vespenigo) anemophilus and the European V. aquensis and V. parisiensis are, on the other hand, members of the Vespertilionidae, the last being apparently allied to the

serotine (V. serotinus) .

Authorities. — The above article is based to some extent on the article in the 9th edition of this work by G. E. Dobson, whose British Museum " Catalogue " is, however, now obsolete. Professor H. Winge's " Jordfundae og nulevende Flagermus (Chiroptera)," published in E. Mas. Lundi (Copenhagen, 1892), contains much valuable information; and for Pteropodidae Dr P. Matschie's Megachiroptera (Berlin, 1899), should be consulted. For the rest the student must refer to numerous papers by G. M. Allen, K. Andersen, F. A. Jentink, G. S. Miller, T. S. Palmer, A. G. Rehn, O. Thomas and others, in various English and American zoological serials, all of which are quoted in the volumes of the Zoological Record. (R. L. *)

CHIRU, a graceful Tibetan antelope (Pantholops Hodgsoni), of which the bucks are armed with long, slender and heavily- ridged horns of an altogether peculiar type, while the does are hornless. Possibly this handsome antelope may be the original of the mythical unicorn, a single buck when seen in profile looking exactly as if it had but one long straight horn. Although far from uncommon, chiru are very wary, and consequently difficult to approach. They are generally found in small parties, although occasionally in herds. They inhabit the desolate plateau of Tibet, at elevations of between 13,000 and 18,000 ft., and, like all Tibetan animals, have a firm thick coat, formed in this instance of close woolly hair of a grey fawn-colour. The most peculiar feature about the chiru is, however, its swollen, puffy nose, which is probably connected with breathing a highly rarefied atmosphere. A second antelope inhabiting the same country as the chiru is the goa (Gazella piclicaudata) , a member of the gazelle group characterized by the peculiar form of the horns of the bucks and certain features of coloration, whereby it is markedly distinguished from all its kindred save one or two other central Asian species. The chiru, which belongs to the typical or antilopine section of antelopes, is probably allied to the saiga. (R. L.*)

CHIRURGEON, one whose profession it is to cure disease by operating with the hand. The word in its original form is now obsolete. It derives from the Mid. Eng. cirurgien or sirurgien, through the Fr. from the Gr. xˆpoˆpy&s, one who operates with the hand (from x«‘P, hand, tpyov, work); from the early form is derived the modern word ” surgeon.” ” Chirurgeon ” is a 1 6th century reversion to the Greek origin. (See Surgery.)

CHISEL (from the O. Fr. cisel, modern ciseau, Late Lat. cisellum, a cutting tool, from caedere, to cut), a sharp-edged tool for cutting metal, wood or stone. There are numerous varieties of chisels used in different trades; the carpenter’s chisel is wooden- handled with a straight edge, transverse to the axis and bevelled on one side; stone masons’ chisels are bevelled on both sides, and others have oblique, concave or convex edges. A chisel with a semicircular blade is called a ” gouge.” The tool is worked either by hand-pressure or by blows from a hammer or mallet. The ” cold chisel ” has a steel edge, highly tempered to cut unheated metal. (See Tool.)

CHISLEHURST, an urban district in the Sevenoaks parlia- mentary division of Kent, England, iij m. S.E. of London, by the South-Eastern & Chatham railway. Pop. (1901) 7429. It is situated 300 ft. above sea-level, on a common of furze and heather in the midst of picturesque country. The church of St Nicholas (Perpendicular with Early English portions, but much restored) has a tomb of the Walsingham family, who had a lease of the manor from Elizabeth; Sir Francis Walsingham,

the statesman, being born here in 1536. Another statesman of the same age, Sir Nicholas Bacon, was born here in 1510. Near the church is an ancient cockpit. The mortuary chapel attached to the Roman Catholic church of St Mary was built to receive the body of Napoleon III., who died at Camden Place in 1873; and that of his son was brought hither in 1879. Both were afterwards removed to the memorial chapel at Farnborough in Hampshire. Camden Place was built by William Camden, the antiquary, in 1609, and in 1765 gave the title of Baron Camden to Lord Chancellor Pratt. The house was the residence not only of Napoleon III., but of the empress Eugenie and of the prince imperial, who is commemorated by a memorial cross on Chislehurst Common. The house and grounds are now occupied by a golf club. There are many villa residences in the neighbourhood of Chislehurst.

CHISWICK, an urban district in the Ealing parliamentary division of Middlesex, England, suburban to London, on the Thames, 7J m. W. by S. of St Paul’s cathedral. Pop. (1901) 29,809. The locality is largely

residential, but there are breweries, and the marine engineering works of Messrs Thornycroft on the river. Chiswick House, a seat of the duke of Devonshire, is surrounded by beautiful grounds; here died Fox (1806) and Can- ning (1827). The gardens near belonged till 1905 to the Royal Horticultural Society. The church of St Nicholas has ancient portions, and in the churchyard is the tomb of William Hogarth the painter, with commemorative lines by David Garrick. Hogarth's house is close at hand. Chiswick Hall, no longer extant, was formerly a country seat for the masters and sana- torium for the scholars of Westminster school. Here in 181 1 the Chiswick Press was founded by Charles Whittingham the elder, an eminent printer (d. 1 840) .

CHITA, a town of east Siberia, capital of Transbaikalia, on the Siberian railway, 500 m. E. of Irkutsk, on the Chita river, half a mile above its confluence with the Ingoda. Pop. (1883) 12,600; (1897) 11,480. The Imperial Russian – Geographical Society has a museum here. Several of the palace revolution- aries, known as Decembrists, were banished to this place from St Petersburg in consequence of the conspiracy of Decemberi825. The inhabitants support themselves by agriculture and by trade in furs, cattle, hides and tallow bought from the Buriats, and in manufactured wares imported from Russia and west Siberia.

CHITALDRUG, a district and town in the native state of Mysore, India. The district has an area of 4022 sq. m. and a population (1901) of 498,795. It is distinguished by its low rainfall and arid soil. It lies within the valley of the Vedavati or Hagari river, mostly dry in the hot season. Several parallel chains of hills, reaching an extreme height of 3800 ft., cross the district; otherwise it is a plain. The chief crops are cotton and flax; the chief manufactures are blankets and cotton cloth. The west of the district is served by the Southern Mahratta railway. The largest town in the district is Davangere (pop. 10,402). The town of Chitaldrug, which is the district head- quarters (pop. 1901, 5792), was formerly a military cantonment, but this was abandoned on account of its unhealthiness. It has massive fortifications erected under Hyder Ali and Tippoo Sahib towards the close of the 18th century; and near it on the west are remains of a city of the 2nd century a.d.

CHITON, the name 1 given to fairly common littoral animals of rather small size which belong to the phylum Mollusca, and, in the possession of a radula in the buccal cavity, resemble more especially the Gastropoda. Their most important characteristic in comparison with the latter is that they are, both in external and internal structure, bilaterally symmetrical. The dorsal integument or mantle bears, not a simple shell, but eight cal- careous plates in longitudinal series

articulating with each other. The ventral surface forms a flat creeping ” foot,” and between mantle and foot is a pallial groove in which there is on each side a series of gills. Originally the Chitons were placed with the limpets, Patella, in Cuvier’s Cyclobranchia, an order of the Gastropoda. In 1876 H. von Jhering demonstrated the affinities

1 The Gr. xiT&w was a garment in the shape of a loose tunic, varying at different periods : see Costume : Greek.

of Neomenia and Chaetoderma, vermiform animals destitute of shell, with the Chitons, and placed them all in a division of worms which he named Amphineura. The discovery by A. A. W. Hubrecht in 1881 of a typical molluscan radula and odontophore in a new genus Proneomenia, allied to Neomenia, showed that the whole group belonged to the Mollusca. E. Ray Lankester (Ency. Brit., oth ed., 1883) placed them under the name Isopleura as a subclass of Gastropoda. Paul Pelseneer (1906) raised the group to the rank of a class of Mollusca, under von Jhering’s name Amphineura.

The Amphineura are divided into two orders: (1) the Polyplacophora, or Chitons; (2) the Aplacophora, or forms without shells, Neomenia, Chaetoderma and their allies.

Order I. — Polyplacophora

Each of the eight valves of the shell is made up of two distinct calcareous layers: (a) an outer or upper called the tegmentum, which is visible externally; (b) a deeper layer called artieula-

Fig. 1. — Three views of Chiton.

Dorsal view of Chiton Wos- nessenksii, Midd., showing the eight shells. (After Middendorf.)

View from the pedal surface of a species of Chiton from the Indian Ocean, p, foot; o, mouth (at the other end of the foot is seen the anus raised on a papilla); kr, oral fringe; br, the numer- ous ctenidia (branchial plumes) ; spreading beyond

these, and all round the animal, is the mantle-skirt. (After Cuvier.) C. The same species of Chiton, with the shells removed and the dorsal integument re- flected, b, buccal mass; m, retractor muscles of the

buccal mass; ov, ovary; od, oviduct; i, coils of in- testines; ao, aorta; c', left auricle; c, ventricle.

mentum which is porcellaneous, quite compact, and entirely covered by the tegmentum. In the lower forms the two layers are coextensive and have smooth edges, but in the higher forms

Fig. 2. — Pallial eye and aesthetes of Acanthopleura spiniger (Moseley).

the articulamentum projects laterally beyond and beneath the tegmentum into the substance of the mantle. These projections

are termed insertion plates; they are usually slit or notched to form teeth, the edges of which may be smooth and sharp, or may be crenulated. The anterior margin of each valve except the first is provided with two projections called sutural laminae which underlie the posterior margin of the preceding valve. The tegmentum is formed by the fold of mantle covering the

pa',

ps,

pallial

.,....}

From Lankester, Treatise on Zoology.

Fig. 3. — Ventral aspect of three species of Polyplacophora showing position of gills.

A. Lepidopleurus benthus. mouth ; pa, mantle ;

B. Boreochilon cinereus. anal lobe of mantle ;

C. Schizochiton incisus. a, pallial slit; le,

anus; /, foot; g, gills; m, tentacles.

edge of the articulamentum, and extends over the latter from the sides. It is the first part of the shell formed in development. The tegmentum is much reduced in Acanthochiton, and absent in the adult Cryptochiton. The tegmentum is pierced by numerous vertical rami- fied canals which contain epithelial papillae of the epidermis. These papillae form pallial sense-organs, containing nerve-end bulbs,

covered by a dome of cuticle, and innervated from the pallial nerve-cords. They are termed according to their size, micraesthetes and mega- laesthetes. In the common species of Chiton and many others of the family Chitonidae the megalaes- thetes are developed into definite eyes, the most complicated of which have retina, pigment within the eye, cornea and crystalline lens (mtra-pigmental eyes) (fig. 2). The eyes are arranged in rows running diagonally from the median anterior beak of each valve to its lateral borders There may be only one such row on either side, or many rows. In some species the total number present amounts to thousands.

Fig. 4. — Diagrams of the alimentary canal of Amphineura (from Hubrecht). A. Neomenia and Proneomenia.

Chaetoderma.

Chiton.

Mouth.

Anus.

Alimentary canal.

Liver (digestive gland).

B. C.

“.

a, d, I,

Branchiae. — The series of gills may extend the whole length of the body in the pallial groove, or may be confined to the posterior end. Each gill has the structure of a typical molluscan ctenidium, consisting of an axis bearing an anterior and posterior row of filaments or lamellae. The gills are thus metamerically repeated; there may be from four to eighty pairs, but there i?

often a numerical asymmetry on the two sides. The largest pair of branchiae is placed immediately behind the renal openings and corresponds to the single pair of other molluscs, the organs being repeated anteriorly only (Metamacrobranchs) or anteriorly and

posteriorly (Mesomacrobranchs).

Intestine. — The digestive tube in the Polyplacophora, which are herbivorous, is longer than the body, and thrown into a few coils, the anus being median and posterior. The mouth leads into the buccal cavity, on the ventral side of which opens the radular caecum. Each transverse row of teeth of the radula contains 17 teeth, one of which is median, while the second and the fifth on each side are enlarged. Two pairs of glands open into the buccal cavity, and at the junction of pharynx and oesophagus is another pair called the sugar glands. The stomach is surrounded by the liver or digestive

A B

V

Fig. 5. — Diagrams of the excretory and reproductive organs of Amphineura (after Hubrecht).

A,

Chaetoderma.

g, External aperture of the

B,

Neomenia.

genital duct of Chiton.

c,

Proneomenia.

r, Rectum.

D,

Chiton.

CI, Cloacal or pallial chamber

0,

Ovary.

of Neomeniae and Chaeto-

P,

Pericardium.

derma.

N,

Nephridium.

Br, Ctenidia (branchial

»,

External aperture of

neph-

plumes).

ridium.

gland, consisting of two lobes which are symmetrical in the young animals, but in the adult the right lobe is anterior and smaller.

Coelom, Gonads and Excretory Organs. — As in other molluscs the coelom is represented by a large pericardial cavity, situated above the intestine posteriorly, and a generative sac which is single and median and situated in front of the pericardium, except in the Nuttalochiton hyadesi, where the gonads are in a similar position, but are paired. The excretory organs are coelomoducts with an internal ciliated opening into the pericardium and an opening to the exterior. Both the openings are close together, the external opening being just in front of the principal gill near the posterior end of the body. The renal tube is doubled on itself, its middle part where the bend occurs being situated more or less anteriorly. The excretory surface is increased by numerous ramified caeca which extend beneath the body wall laterally and ventrally, and open into the tube (fig. 6). The sexes are distinct, and the ovary is frequently greenish in colour, the testis red. The gonad is transversely wrinkled and lies between the aorta and the intestine, extending from the pericardium to the anterior end of the body. A simple gonaduct on each side arises

from the gonad near its posterior end and passes first forwards, then backwards, and lastly outwards to the external opening in the pallial groove, anterior to the renal aperture. There may be from one to nine gills between the genital and renal pores.

Heart and Vascular System. — The heart is enclosed in the pericardium, and consists of a median elongated ventricle and a pair of lateral auricles, so that the structure somewhat resembles that in the Lamellibranchiata. The openings of the auricles into the ventricle vary in different forms. In many of the lower forms (Lepidopleuridae, Mopalidae, Ischnochitonidae) the opening on each side is single and anterior. In the true Chitonidae there are generally two apertures on each side, and in two species three or four, another instance of the tendency to metameric repetition in the group. The auricles are connected with one another posteriorly behind the ventricle. The ventricle leads into a single anterior median aorta. As in other molluscs, the arteries do not extend far, but lead into inter-visceral blood-spaces. The venous blood is conducted from the tissues to a large sinus on either side above the pallial groove, and from this sinus passes to the gills by an afferent vessel in each gill on the internal or pedal margin of the axis. The oxygenated blood is carried from each gill by an efferent vessel on the external or pallial side of the axis to another longitudinal vessel which leads to the auricle on each side.

Nervous System. — There are no well-marked specialized ganglia in the central nervous system, nerve-cells being distributed uni- formly

along the cords. There are two pairs of longitudinal cords, a pedal pair situated ventrally and united beneath the intestine by numerous commissures, and a pallia! pair situated laterally and continuous with one another above the rectum (fig. 7). The four cords are all connected anteriorly with the cerebral commissure which lies above the buccal mass anteriorly. From the points where the cords meet the cerebral commissure, arise on each an anterior labial com- missure and a stomatogastric commissure. The latter bears two ganglion swellings, the buccal ganglia. The labial commissure gives off a subra- du'.ar commissure which also bears two ganglia, these being in close relation to a special sense-organ called the subra- dular organ, an epithelial pro- jection with nerve-endings, lying in front of the radula and probably gustatory in function. One osphradium or branchial olfactory organ is usually present on each side, on either side of the anus on the inner wall of the mantle, near the base of the last gill. In Lepidopleuridae an osphra- dium occurs at the base of each gill. The sense organs of the shell-valves have already been described.

Development. — The eggs may be laid separately in- vested by a chitinous en- velope, or as in Ischnochiton magdalenensis they may form strings containing nearly 200,000 eggs, or the ova may be retained in the pallial groove and undergo develop- ment there, as in Chiton polii and Hemiarthrum setulosum. One species Callistochiton viviparus is viviparous and its ova develop without a larval stage in the maternal oviduct. Segmentation is total and at first regular, and is followed by invagination, the blastopore passing to the position of the future mouth. By the development of a ciliated ring just in front of the mouth the embryo becomes a trochosphere. In the centre of the praeoral lobe is a tuft of cilia. Just behind the ciliated ring is a pair of larval eyes which disappear in the adult; these correspond to the cephalic eyes of Lamellibranchs. An ectodemic invagination forms a large mucous gland on the foot, which is more or less atrophied in adult life. The gonads originate by proliferation of the anterior wall of the pericardium. 'The shell-

(Arbeilen zool. Instil.), Vienna,

Fig. 6. — Dissection of the renal organs (nephridia) of Chiton siculus. F, Foot.

Edge of the mantle not removed

in the front part of the specimen.

Oesophagus.

Anus.

Genital duct.

External opening of the same.

Stem of the nephridium leading

to no, its external aperture. Reflected portion of the neph-

ridial stem. Fine caeca of the nephridium,

which are seen ramifying trans.

versely over the whole inner

surface of the pedal muscular

mass.

L,

af,

go

nk

ng :

valves arise as transverse thickenings of the dorsal cuticle behind the ciliated ring, the tegmentum being the first part formed.

Classification.

Suborder I. Eoplacophora, Pilsbry. — Tegmentum coextensive with articulamentum, or the latter projecting in smooth unslit

Fam. i. Lepidopleuridae. — Terminal margins of end valves never elevated ; form oval or oblong. Lepidopleurus cancellatus, Sow. North Atlantic and Mediterranean; various abyssal species. Hanleya hanleyi, Bean, north Atlantic.

B

vrv

A

Hemiarthrum Microplax.

The extinct Cryptochi-

tonidae, Pilsbry, with

other Palaeozoic genera,

narrow and elongated in

form with terminal

margins of end valves

elevated, belong to this

group.

Suborder II. Mesoplaco-

PHORA, Pilsbry. — Insertion

plates well developed and

slit.

Fam. 2. Ischnochitonidae.

— All the valves with

slits, and the inner layer

well covered by the

pouter.

Subfam. I. Ischnochito- ninae. — No shell-eyes : sutural laminae separated ; slits in the valves 1-7 do not correspond with the ribs of the tegmentum. Ishcno- chiton, Trachydermon, Chaetopleura, Stenoplax, Stenoradsia.

u

pc

After Hubrecht, foe. at.

Fig. 7. — Diagrams of the nervous system of Amphineura.

A, Proneomenia.

B, Neomenia.

C, Chaetoderma.

D, Chiton.

c, Cerebral ganglia. s, Sublingual ganglia. v, Pedal (ventral) nerve-cord. I, Visceral (lateral) nerve-cord. pc, Post -anal junction of the visceral nerve-cords.

From Gegenbaur, Elements 0/ Comp. Anatomy.

Fig. 8. — Anterior part of the nervous system of Chiton cin- ereus, in more detail.

B, Buccal ganglia (concerned

with the odontophore).

C, Cerebral nerve-mass.

P, Pedal ganglion and com- mencement of pedal nerve-cord.

pi, Visceral nerve-cord. The sublingual ganglia are not lettered.

Subfam. 2. Callochitoninae. With shell-eyes and united sutural

laminae. Callochiton laevis, North Atlantic and Mediterranean.

Subfam. 3. Callistoplacinae. No shell-eyes, slits in the valves 1-7

corresponding with the ribs of the tegmentum. Callistochiton

(viviparous). Nuttalochiton.

Fam. 3. Mopaliidae. Each intermediate valve with a singte slit ;

girdle hairy. Mopalia, Placiphorella, Plaxiphora, Placo-

phoropsis. Fam. 4. Acanthochitonidae. Valves immersed in the girdle, with

small tegmentum. Acanthochiton (A.fascicularis, North Atlantic

and Mediterranean. Spongiochiton, Katharina, Amicula, Crypto-

chiton (C. stelleri, arctic). Fam. 5. Cryptoplacidae. Vermiform, with thick girdle and small

valves; insertion and sutural plates strongly drawn forward,

sharp and smooth. Cryptoplax, Choneplax. Suborder III. Teleoplacophora, Pilsbry. — All the valves, or at

least the seven anterior, with insertion plates cut into teeth by slits.

Fam. 6. Chitonidae. Characters of the suborder. Subfam. 1. Chitoninae. No extra-pigmental eyes; insertion plates with pectinations between the fissures. Chiton, Eudoxo- chilon, Trachyodon, Radsia. Subfam. 2. Toniciinae. Extra-pigmental shell-eyes. Tonicia, Acanthopleura, Enoplochiton, Onithochiton, Schizochiton, Lorica, Loricella, Liolophura.

Order 2. — Aplacophoea, von Jhering.

Chaetoderma was first described by S. Loven, in 1841, and was for a long time believed to be a Gephyrean worm. Neomenia, mentioned first by Michael Sars in 1868 under the name Soleno- pus, was afterwards included among the Opisthobranchs by J. Koren and D. C. Danielssen. C. Gegenbaur placed the two genera in a division of Vermes which he called Solenogastres.

The chief points in which the Aplacophora differ from the Polyplacophora are: (1) they are worm-like in shape; (2) there is no distinct foot, and the mantle bears no shell-valves, but only numerous calcareous spicules; (3) the digestive tube is straight.

Neomenia and its allies are marine animals living at depths of 15 to 800 fathoms on soft muddy ground; they are found crawling on corals and hydrozoa, on which they feed. The British genera are: Neomenia, Rhopalomenia and Myzomenia. They have been taken in nearly all seas except the South Atlantic and S.E. and N.W. Pacific. About forty species are known. Chaetoderma, of which nine species have been described, has similar habits and distribution, but feeds chiefly on Protozoa. The order Aplacophora is divided into two suborders.

Suborder I. Neomeniomorpha. — Aplacophora with a distinct longitudinal ventral groove; bisexual with paired genital glands and

no distinct liver. The whole of the skin except the ventral groove corresponds to the mantle of Chiton. The cuticle, in some species very thick, contains numerous spicules which are long, hollow and calcified ; they are secreted by epithelial papillae. In some species there are also sensory papillae comparable to the aesthetes of Chitons. A small longitudinal projection in the ventral groove represents the

A, B, C, D,

Fig. 9. — Neomenia carinata, Tullberg (after Tullberg). Lateral view. a, Anterior.

Ventral view. b, Posterior extremity.

Dorsal view. c, Furrow, in which the narrow

Ventral view of a more ex- foot is concealed,

tended specimen, foot. Into the groove open mucous glands, a large one anteriorly and another opening into a posteriorly cloacal, branchial cavity.

Branchiae. — In Neomeniidae and most of the Parameniidae there is a circlet of gills on the inner walls of the cloacal chamber. These gills are simple folds or laminae of the body wall. In other species they are absent.

Intestine.— -The mouth opens into a muscular pharynx lined by a thick cuticle. Into the pharyngeal cavity open salivary glands and radular sac. The former are paired and ventral, and open on a subradular prominence. In some species there is a second dorsal pair. Neomenia and other genera have no salivary glands.

The radula when present comprises several transverse rows of teeth, and each transverse row may have several teeth (polystichous), two teeth (distichous), or one tooth (monostichous). It is a curious fact that in the original type Neomenia the radula is entirely absent, as it likewise is in several genera of Proneomeniidae. The oesophagus is short and leads into a long, straight stomach, provided with numerous symmetrical lateral caeca. The stomach opens into a short straight rectum which opens into the branchial chamber.

Coelom, Gonads and Excretory Organs.— The coelom differs from that of the Chitons in the fact that the cavities of the genital organs are continuous with it, and in the fact that there is only one pair of coelomoducts resembling the renal organs of Chitons, but serving also

as genital ducts. The gonads are paired and hermaphrodite, they form a pair of anterior prolongations of the pericardium, extending nearly to the anterior end of the body. Ova are developed on the median, spermatozoa on the outer wall of each genital tube. The pericardium is ciliated internally on its dorsal and lateral walls. The urino-genital tubes arise from the posterior angles of the peri- cardium, pass first forwards, then backwards, and unite to open by a common opening into the cloaca below the anus except in

Strophomenia, where the openings are separate. Usually each tube is provided with caecal appendages on its proximal portion, and these serve as vesiculae seminales, while the distal portion is enlarged and glandular and secretes the egg-shell.

Heart and Vascular System. — -There is a heart in the pericardium consisting of a median ventricle attached, except in Neomenia, to the dorsal wall of the pericardium, and in Neomenia a pair of auricular ducts returning blood from the gills to the ventricle. The aorta is not independent as in Chitons, but is a sinus like the other channels of the circulation. A single median ventral sinus passes backwards to the gills or cloaca. The blood is coloured red by haemoglobin in blood corpuscles.

Nervous System. — Ganglionic enlargements are more conspicuous than in the Chitons. In front of the buccal mass is a median cere- bral ganglion. From this pass off two pairs of cords, the pleural and pedal, in Proneomenia separate from their origin, in Neomenia united at first and diverging at a pleural ganglion. The pedal cords anteriorly form a pair of pedal ganglia united by a thick commissure. The supra-rectal commissure may be present and bear an ovoid ganglion; or may be wanting. With regard to sense organs the epithelial papillae of the mantle have been mentioned. There is also in some genera a median retractile sensory papilla on the dorsal posterior surface above the rectum, not covered by the cuticle.

Development has only been described in Myzomenia banyulensis, by G. Pruvot. It closely resembles in the early stages that of Chitons. The external surface of the trochosphere is formed of a number of ciliated test-cells. The ectoderm behind the ciliated ring develops spicules, and the post-oral region of the larva elongates. Later the ciliated ring or velum disappears and seven imbricated calcareous plates, made up of

flattened spicules, are formed on the dorsal surface. This appears to indicate that the Neomeniomorpha are descended from Chiton-like ancestors, and that they have lost their shell valves.

Classification of the Neomeniomorpha. — Fam. i. Lepidomeniidae.

Slender, tapering behind, with subventral cloacal orifice; thin

cuticle without papillae; flattened spicules; no gills. Lepido-

menia, Ismenia, Ichthyodes, Stylomenia, Dondersia, Nematomenia,

Myzomenia, M. banyulensis, Mediterranean and Plymouth.

Fam. 2. Neomeniidae. Short, truncate in front and behind;

cloacal orifice transverse; gills present; rather thin cuticle;

no radula. Neomenia (N. carinata, N. Atlantic and N. and

N.W. Scotland), Hemimenia.

Fam. 3. Proneomeniidae. Elongated, cylindrical, rounded at both

ends; thick cuticle with acicular spicules; radula polystichous

or wanting. Proneomenia, Amphimenia, Echinomenia, Rho-

palomenia (R. aglaopheniae, Mediterranean and Plymouth),

Notomenia, Pruvotia, Strophomenia.

Fam. 4. Parameniidae. Short and truncated in front; thick

cuticle, often without papillae; gills and ‘ radula present.

Paramenia, Macellomenia, Pararhopalia, Dinomenia, Cyclo-

menia, Proparamenia, Uncimenia, Kruppomenia.

Suborder II. Chaetodermomorpha. — Aplacophora without

distinct ventral groove, with single median unisexual gonad, with

differentiated hepatic sac, and with cloacal chamber furnished with two bipec- tinate gills. There are only two genera’ in this sub- order : Chaetoderma, and Fig. 10. — Chaetoderma nitidulum, Limifossor from Alaska. Loven (after Graff). The cephalic The characters therefore

enlargement is to the left, the anal are very uniform. The body chamber (reduced pallial chamber, con- is worm-like and cylindri- taining the concealed pair of ctenidia) cal, the posterior half a to the right. little thicker than the an-

terior; the posterior ex— tremity forms the enlarged funnel-like branchial or cloacal chamber. The anterior extremity is also somewhat enlarged. The whole surface is uniformly covered with short compressed calcareous spicula embedded in the cuticle.

Branchiae. — The single pair of branchiae are placed sym- metrically right and left of the anus, and each has the structure of a ctenidium bearing a row of lamellae on each side as in the Polyplacophora.

Intestine. — The mouth is anterior, terminal and crescentic, and beneath it is a rounded ventral shield. On the floor of the pharynx or buccal mass is a rudimentary radula, which in many species consists of a single large tooth, bearing two small teeth or a row of teeth. In other species the radula is more of the usual type consist- ing of several transverse rows of two or three teeth each. Two pairs of salivary glands open into the buccal cavity. The digestive tube is straight and simple, wider in its anterior part, into which opens the duct of the hepatic caecum (fig. 4, B). The latter extends backwards on the ventral side of the intestine.

Coelom, Gonads and Excretory Organs. — These are closely similar in their relations to those of the Neomeniomorpha. The chief difference is that the gonad or generative portion of the coelom is single and median, opening into the pericardium by a single posterior aperture. The excretory organs or coelomoducts arise from the posterior corners of the pericardium, run forwards and than back-

wards to open by separate apertures lateral to the gills (fig. 5, A). There are no accessory generative organs.

The heart and vascular system are similar to those of the Neo- meniomorpha, the only important differences being that the ventricle is nearly free in the pericardial cavity, and that the latter is traversed by the retractor muscles of the gills.

Nervous System. — There are two closely connected cerebral ganglia, from which arise the usual two pairs of nerve cords. Pallial and pedal on each side are closer together than in the other groups, and posteriorly they unite into a supra-rectal cord provided with a median ganglionic enlargement (fig. 7, C). A small stomatogastric commissure

bearing two small ganglia arises from the cerebral ganglia and surrounds the oesophagus.

The development is at present entirely unknown.

General Remarks on the Amphineura. The most important theoretical question concerning the Amphineura is how far do they represent the original condition of the ancestral mollusc? That is to say, we have to inquire which of their structural features is primitive and which modified. Their bilateral symmetry is obviously to be regarded as primitive, and the nervous system shows an original condition from which that of the asymmetrical twisted Gastropods can be derived. But in many other features both external and internal the three principal divisions differ so much from one another that we have to consider in the case of each organ-system which condition is the more primitive. According to Paul Pelseneer the Poly- placophora are the most archaic, the Aplacophora being specialized in (1) the great reduction of the foot, (2) the dis- appearance of the shell (Cryploplax among the Polyplacophora showing both reductions in progress), (3) the disappearance of the radula. But it is a widely recognized principle of morphology that a much modified animal is by no means modified to the same degree in all its organs. A form which is primitive on the whole may show a more advanced stage of evolution in some particular system of organs than another animal which is on the whole more highly developed and specialized. Thus the inde- pendent metamerism of certain organs in the Chitons is not primitive but acquired within the group: e.g. the shell valves and the ctenidia. And although embryology seems to prove that the Neomeniomorphs are derived from forms with a series of shell-valves, nevertheless it seems probable that the calcareous spicules which alone are present in adult Aplacophora preceded the solid shell in evolution.

It is held by some morphologists that the mollusc body is unsegmented, and therefore is to be compared to a single segment of a Chaetopod or Arthropod. In this case there should be only one pair of coelomoducts in the adult, the pair of true nephridia which should also occur being represented by the larval nephridia. There should also be only a single coelom, or a pair of lateral coelomic cavities. On this view then the Aplacophora are more primitive than the Polyplacophora in the relations of coelom, gonad and coelomoducts; and the genital ducts of the Chitons have arisen either by metameric repetition within the group, or by the gradual loss of an original connexion between the generative sac and the renal tube, as in Lamellibranchs and Gastropods, the generative sac acquiring a separate duct and opening to the exterior on each side.

Literature. — A. Sedgwick, ” On certain Points in the Anatomy of Chiton,” Proc. R. Soc. Lond. xxxiii., 1881; J. Blumrich, ” Das Integument der Chitonen,” Zeitsch. f.wiss. Zool. li:., 1891; A. C. Haddon, ” Report on the Polyplacophora,” Challenger Reports. Zool. pt. xliii., 1886; H. N. Moseley, “On the presence of Eyes in the Shells of certain Chitonidae, and on the structure of these Organs,” Quart. Journ. Mic. Sci. new ser. xxv., 1885; A. A. W. Hubrecht, “Proneomenia Sluiteri,” Nied. Arch. f. Zool. Suppl. I., 1881; A.’ Kowalewsky and A. F. Marion, ” Contr. a l’histoire des Solenogas’tres ou Aplacophores,” Ann. Mus. Marseille, Zool. iii., 1887; A. Kowal- ewsky, ” Sur le genre Chaetoderma,” Arch, de zool. exp’er. (3) ix., 1901; P. Pelseneer, ” Mollusca,” Treatise on Zoology, edited by E. Ray Lankester, pt. v.-, 1906; E. Ray Lankester, ” Mollusca,” in the 9th ed. of this Encyclopaedia, to which this article is much indebted. (J. T. C.)

CHITRAL, a native state in the North- West Frontier Province of India. The state of Chitral (see also Hindu Kush) is some- what larger than Wales, and supports a population of about 35,000 rough, hardy hillmen. Previous estimates put the number far higher, but as the Mehtar assesses his fighting strength at

8000 only, this number is probably not far wrong. Both the state and its capital are called Chitral, the latter being situated about 47 m. from the main watershed of the range of the Hindu Kush, which divides the waters flowing down to India from those which take their way into the Oxus. Chitral is an important state because of its situation at the extremity of the country over which the government of India exerts its influence, and for some years before 1895 it had been the object of the policy of the government of India to control the external affairs of Chitral in a direction friendly to British interests, to secure an effective guardianship over its northern passes, and to keep watch over what goes on beyond these passes. This policy resulted in a British agency being established at Gilgit (Kashmir territory), with a subordinate agency in Chitral, the latter being usually stationed at Mastuj (65 m. nearer to Gilgit than the Chitral capital), and occasional visits being paid to the capital. Chitral can be reached either by the long circuitous route from Gilgit, involving 200 m. of hill roads and the passage of the Shandur pass (12,250 ft.), or (more directly) from the Peshawar frontier at Malakand by 100 m. of route through the independent terri- tories of Swat and Bajour, involving the passage of the Lowarai (10,450 ft.). It is held by a small force as a British

outpost.

The district of Chitral is called Kashgar (or Kashkar) by the people of the country; and as it was under Chinese domination in the middle of the 18th century, and was regarded as a Buddhist centre of some importance by the Chinese pilgrims in the early centuries of our era, it is possible that it then existed as an outlying district of the Kashgar province of Chinese Turkestan, where Buddhism once flourished in cities that have been long since buried beneath the sand- waves of the Takla Matem. The aboriginal population of the Chitral valley is probably to be recognized in the people called Kho (speaking a language called Khowar), who form the majority of its inhabitants. Upon the Kho a people called Ronas have been superimposed. The Ronas, who form the chief caste and fighting race of the Chitral districts, originally came from the north, but they have adopted the language and fashions of the conquered Chitrali.

The town of Chitral (pop. in 1901, 8128), is chiefly famous for a siege which it sustained in the spring of 1895. Owing to complica- tions arising from the demarcation of the boundary of Afghanistan which was being carried out at that time, and the ambitious projects of Umra Khan, chief of Jandol, which was a tool in the hands of Sher Afzul, a political refugee from Chitral supported by the amir at Kabul, the mehtar (or ruler) of Chitral was murdered, and a small British and Sikh garrison subsequently besieged in the fort. A large torce of Afghan troops was at that time in the Chitral river valley to the south of Chitral, nominally holding the Kafirs in check during the progress of boundary demarcation. It is considered probable that some of them assisted the Chitralis in the siege. The position of the political agent Dr Robertson (afterwards Sir George Robertson) and his military force of 543 men (of whom 137 were non-combatants) was at one time critical. Two forces were organized for the relief. One was under Sir R. Low, with 15,000 men, who advanced by way of the Malakand pass, the Swat river and Dir. The other, which was the first to reach Chitral, was under Colonel Kelly, commanding the 32nd Pioneers, who was placed in command of all the troops in the Gilgit district, numbering about 600 all told, with two guns, and in- structed to advance by the Shandur pass and Mastuj. This force encountered great difficulties owing to the deep snow on the pass (12,230 ft. high), but it easily defeated the Chitrali force opposed to it and relieved Chitral on the 20th of April, the siege having begun on the 4th of March. Sher Afzul, who had joined Umra Khan, surrendered, and eventually Chitral was restored to British political control as a dependency of Kashmir. During Lord Curzon’s vice- royalty the British troops were concentrated at the extreme southern end of the Chitral country at

Kila Drosh and the force was reduced, while the posts vacated and all outlying posts were handed over to levies raised for the purpose from the Chitralis themselves. The troops in Swat were also concentrated at Chakdara and reduced in strength. The mehtar, Shuja-ul-Mulk, who was installed in September 1895, visited the Delhi durbar in January 1903.

See Sir George Robertson, Chitral (1898). (T. H. H.*)

CHITTAGONG, a seaport of British India, giving its name to a district and two divisions of Eastern Bengal and Assam. It is situated on the right bank of the Karnaphuli river, about 12 m. from its mouth. It is the terminus of the Assam-Bengal railway. The municipal area covers about 9 sq. m.; pop. (1901) 22,140. The sea-borne exports consist chiefly of jute, other items being tea, raw cotton, rice and hides. There is also a large trade by country boats, bringing chiefly cotton, rice, spices, sugar and tobacco. Since October 1905 Chittagong has become the chief port of the new province of Eastern Bengal and Assam.

The District of Chittagong is situated at the north-east corner of the province, occupying a strip of coast and hills between the sea and the mountains of Burma. Its area is 2492 sq. m. In 1901 the population was 1,353.250, showing an increase of 5% in the decade. A few unimportant ranges rise within the north-eastern portion, the highest hill being the sacred Sitakund, 1155 ft. high. The principal rivers are the Karnaphuli, on which Chittagong town is situated, navigable by sea-going ships as far as Chittagong port, and by large trading boats for a considerable distance higher up, and the Halda and the Sangu, which are also navigable by large boats. The wild animals are tigers, elephants, rhinoceros, leopards and deer. The climate is comparatively cool, owing to the sea breeze which prevails during the day; but for the same reason, the atmosphere is very moist, with heavy dews at night and fogs. Chittagong was ceded to the East India Company by Nawab Mir Kasim in 1760. The northern portion of the district is traversed by the Assam-Bengal railway. Tea. cultivation is moderately successful.

The Chittagong Hill Tracts formed an independent district from i860 to 1891, were then reduced to the status of a sub-division, but were again created a district in 1900. They occupy the ranges between Chittagong proper and the south Lushai hills. The area covers 5138 sq. m. In 1901 the population was 124,762, showing an increase of 16% in the decade. The inhabitants, who are either Arakanese or aboriginal tribes, are almost all Buddhists. The head- quarters are at Rangamati, which was wrecked by the cyclone of October 1897.

The Division of Chittagong lies at the north-east corner of the Bay of Bengal, extending northward along the left bank of the Meghna. It consists of the districts of Chittagong, the Hill Tracts, Noakhali and Tippera. Its area covers 1 1 ,773 sq. m. ; the population in 1901 was 4,737,731.

CHITTUR, a town of British India, in the North Arcot district of Madras, with a station on the South Indian railway. Pop. (1901) 10,893. Formerly a military cantonment, it is now only the civil headquarters of the district. It has an English church, mission chapel, and Roman Catholic chapel, a high school, and several literary institutes.

CHITTY, SIR JOSEPH WILLIAM (1828-1899), English judge, was born in London. He was the second son of Thomas Chitty (himself son and brother of well-known lawyers), a celebrated special pleader and writer of legal text-books, in whose pupil- room many distinguished lawyers began their legal education. Joseph Chitty was educated at Eton and Balliol, Oxford, gaining a first-class in Literae Humaniores in 1851, and being afterwards elected to a fellowship at Exeter College. His principal distinc- tions during his school and college career had been earned in athletics, and he came to London as a man who had stroked the Oxford boat and captained the Oxford cricket eleven. He became a member of Lincoln's Inn in 185 1, was called to the bar in 1856, and made a queen's counsel in 1874, electing to practise as such in the court in which Sir George Jessel, master of the rolls, presided. Chitty was highly successful in his method of dealing with a very masterful if exceedingly able judge, and soon his practice became very large. In 1880 he entered the house of commons as liberal member for Oxford (city). His parliamentary career was short, for in 1881 the Judicature Act required that the master of the rolls should cease to sit regularly as a judge of first instance, and Chitty was selected to fill the vacancy thus created in the chancery division. Sir Joseph Chitty was for sixteen years a popular judge, in the best meaning of the phrase, being noted for his courtesy, geniality, patience and scrupulous fairness, as well as for his legal attain- ments, and being much respected and liked by those practising before him, in spite of a habit of interrupting counsel, possibly acquired through the example of Sir George Jessel. In 1897, on the retirement of Sir Edward Kay, L.J., he was promoted to the court of appeal. There he more than sustained — in fact, he appreciably increased — his reputation as a lawyer and a judge, proving himself to possess considerable knowledge of the common law as well as of equity. He died in London on the 15th of February 1899. He married in 1858 Clara Jessie, daughter of Chief Baron Pollock, and left children who could thus claim descent from

two of the best-known English legal families of the 19th century.

See E. Manson, Builders of our Law (1904).

CHIUSI (anc. Clusium), a town of Tuscany, Italy, in the province of Siena, 55 m. S.E. by rail from the town of Siena, and 26 m. N.N.W. of Orvieto. Pop. (1901) 6011. It is situated

on a hill 1305 ft. above sea-level, and is surrounded by medieval walls, in which, in places, fragments of the Etruscan wall are incorporated. The cathedral of S. Mustiola is a basilica with a nave and two aisles, with eighteen columns of different kinds of marble, from ancient buildings. It has been restored and decorated with frescoes in modern times. The campanile belongs to the 13th century. The place was devastated by malaria in the middle ages, and did not recover until the Chiana valley was drained in the 18th century. For the catacombs see Clusium.

CHIVALRY (O. Fr. chevalerie, from Late Lat. caballerius) , the knightly class of feudal times, possessing its own code of rules, moral and social (see Knighthood and Chivalry). The primary sense in the middle ages is ” knights ” or ” fully armed and mounted fighting men.” Thence the term came to mean that gallantry in battle and high sense of honour in general expected of knights. Thus “to do chivalry ” was a medieval phrase for ” to act the knight.” Lastly, the word came to be used in its present very general sense of ” courtesy.” In English law chivalry meant the tenure of land by knights’ service. It was a service due to the crown, usually forty days’ military attendance annually. The Court of Chivalry was a court in- stituted by Edward III., of which the lord high constable and earl marshal of England were joint judges. When both sat the court had summary criminal jurisdiction as regards all offences committed by knights, and generally as to military matters. When the earl marshal alone presided, it was a court of honour deciding as to precedence, coats of arms, &c. This court sat for the last time in 1737. The heraldic side of its duties are now vested in the earl marshal as head of the Heralds’ College.

CHIVASSO, a town and episcopal see of Piedmont, Italy, in the province of Turin, 18 m. N.E. by rail from the town of Turin, 600 ft. above sea-level. Pop. (1901) 4169 (town), 9804 (com- mune). It is situated on the left bank of the Po, near the influx of the Oreo. The

cathedral is of the 15th century with a fine facade ornamented with statues in terra-cotta. It was an important fortress in the middle ages, and until 1804, when the French dismantled it. One tower only of the old castle of the marquesses of Monferrato, who possessed the town from 1164 to 1435, remains. Chivasso is on the main line from Turin to Milan, and is the junction of branches for Aosta and Casale Monferrato.

CHIVE (Allium Schoenoprasum), a hardy perennial plant, with small narrow bulbs tufted on short root-stocks and long cylindrical hollow leaves. It is found in the north of England and in Cornwall, and growing in rocky pastures throughout temperate and northern Europe and Asiatic Russia, and also in the mountain districts of southern Europe. It is cultivated for the sake of its leaves, which are used in salads and soups as a substitute for young onions. It will grow in any good soil, and is propagated by dividing the roots into small clumps in spring or autumn; these are planted from 8 to 12 in. apart and soon form large tufts. The leaves should be cut frequently so as to obtain them tender and succulent.

CHLOPICKI, GREGORZ JOZEF (1772-1854), Polish general, was born in March 1772 in Podolia. He was educated at the school of the Basilians at Szarogrod, from which in 1787 he ran away in order to enlist as a volunteer in the Polish army. He was present at all the engagements fought during 1792-1794, especially distinguishing himself at the battle of Raclawice, when he was General Rymkiewicz's adjutant. On the formation of the Italian legion he joined the second battalion as major, and was publicly complimented by General Oudinot for his extraordinary valour at the storming of Peschiera. He also distinguished himself at the battles of Modena, Busano, Casa-bianca and Ponto. In 1807 he commanded the first Vistulan regiment, and rendered good service at the battles of Eylau and Friedland. In Spain he obtained the legion of honour and the rank of a French baron for his heroism at the battle of Epila and the storming of Saragossa, and in 1809 was promoted to be general of brigade. In 181 2 he accompanied the Grande Armie to Russia, was seriously wounded at Smolensk, and on the reconstruction of the Polish army in 1813 was made a general

of division. On his return to Poland in 1814, he entered the Russian army with the rank of a general officer, but a personal insult from the grand duke Constantine resulted in his retiring into private life. He held aloof at first from the Polish national rising of 1830, but at the general request of his countrymen accepted the dictatorship on the 5th of December 1830; on 1 the z3rd of January 1 831, however, he

resigned in order to fight as a common soldier. At Wavre (Feb. 19) and at Grochow (Feb. 20) he displayed all his old bravery, but was so seriously wounded at the battle of Olszyna that he had to be conveyed to Cracow, near which city he lived in complete retirement till his death in 1854.

See Jozef Maczynski, Life and Death of Joseph Chlopicki (Pol.) (Cracow, 1858); Ignacy Pradzynski, The Four Last Polish Commanders (Pol.) (Posen, 1865).

CHLORAL, orTRicHLORACETALDEHYDE, CC1 3 – CHO, a substance discovered by J. von Liebig in 1832 (Ann., 1832, 1, p. 189) and further studied by J. B. A. Dumas and Staedeler. It is a heavy, oily and colourless liquid, of specific gravity 1-541 at o° C, and boiling-point 97-7° C. It has a greasy, somewhat bitter taste, and gives off a vapour at ordinary temperature which has a pungent odour and an irritating effect on the eyes. The word chloral is derived from the first syllables of chlorine and alcohol, the names of the substances employed for its preparation. Chloral is soluble in alcohol and ether, in less than its own weight of water, and in four times its weight of chloroform; it absorbs chlorine, and dissolves bromine, iodine, phosphorus and sulphur. Chloral deliquesces in the air, and is converted by water into a hydrate, with evolution of heat; it combines with alcohols and mercaptans. An ammoniacal solution of silver nitrate is reduced by chloral; and nascent hydrogen converts it into aldehyde. By means of phosphorus pentachloride, chlorine can be substituted for the oxygen of chloral, the body CCl3-CCl 2 H being produced; an analogous compound, CCl3-C(C6H 6) 2 H, is obtained by treating chloral with benzene and sulphuric acid. With an alkali, chloral gives chloroform (q.v.) and a formate; oxidizing agents give trichloracetic acid, CC13-CO (OH) . When kept for some days, as also when placed in contact with sulphuric acid or a very small quantity of water, chloral undergoes spontaneous change into the polymeride metachloral (CzChOH)*, a white porcellaneous body, slowly volatile in the air, and reconverted into chloral without melting at 180° C. Chloral unites directly with hydrocyanic acid to form j3-trichloracetonitrile, CCl 3 CH(OH) CN, and with hydroxy 1 amine it forms chlorglyoxime, C2H3CIN2O2.

Chloral is prepared by passing dry chlorine into absolute alcohol; the latter must be cooled at first, but towards the end of the operation has to be heated nearly to boiling. The alcohol is converted finally into a syrupy fluid, from which chloral is procured by treatment with sulphuric acid (see P. Fritsch, Ann., 1894, pp. 279, 288). The crude chloral is distilled over lime, and is purified by further treatment with

sulphuric acid, and by redistillation. A mixture of starch or sugar with manganese peroxide and hydrochloric acid may be employed instead of alcohol and chlorine for the manufacture of chloral (A. Staedeler, Ann. Ch. Pharm., 1847, 61, p. 101). An isomer of chloral, parachloralide, is made by passing excess of dry chlorine into absolute methyl alcohol.

Chloral hydrate, CC1 3 -CH(0H) 2) forms oblique, often very short, rhombic prisms. The crystals are perfectly transparent, only slightly odorous, free from powder, and dry to the touch, and do not become white by exposure. The melting-point of pure chloral hydrate is 57°, the boiling-point 96-98 C. When heated with sulphuric acid it is converted into anhydrous chloral and chloralide, C 6 H 2 Cl60 3 . When mixed with water, chloral hydrate causes a considerable degree of cold; and, as with camphor, small fragments of it placed on the surface of water exhibit gyratory movements. Chloral hydrate does not restore the colour to a solution of fuchsine which has been decolorized by sulphurous acid, and so one must assume that the water present is combined in the molecular condition (V. Meyer, Ber., 1880, 13, p. 2343). Chloral may be estimated by distilling the hydrate with milk of lime and measuring the volume of chloroform produced (C. H. Wood, Pharm. Journ., (3) I, p. 703), or by hydrolysis with a known volume of standard alkali and back titration with standard acid (V. Meyer, Ber., 1873, 6, p. 600). Chloral hydrate has the property of checking the decomposition of a great number

of albuminous substances, such as milk and meat ; and a mixture pf it with glycerin, according to J- Personne, is suitable for the preservation of anatomical preparations. When heated with con- centrated glycerin to a temperature of no” to 230° C, chloral hydrate yields chloroform, CHCI3, and allyl formate, HCO.

Pharmacology and Therapeutics. — The breaking up of chloral hydrate, in the presence of alkalis, with the production of chloroform and formates, led Liebreich to the conjecture that a similar decom- position might be produced in the blood ; and hence his introduction of the drug, in 1869, as an anaesthetic and hypnotic. It is now known, however, that the drug circulates in the blood unchanged, and is excreted in the form of urochloralic acid. The dose is from five to twenty grains or somewhat more, and it is often given in the form of the pnarmacopoeial Syrupus Chloral, which contains ten grains of

chloral hydrate to the fluid drachm. Chloral hydrate must be well diluted when given by the mouth, as otherwise it may cause considerable gastro-intestinal irritation. In large doses chloral hydrate is a depressant to the circulation and the respiration, and also lowers the temperature. In the above doses the drug is a powerful and safe hypnotic, acting directly on the brain, and pro- ducing no preliminary stage of excitement. Very soon — perhaps twenty minutes— after taking such a dose, the patient falls into a sleep which lasts several hours, and is not distinguishable from natural sleep. When he wakes, it is without disagreeable after-symptoms, but with a feeling of natural refreshment. The pupils are always contracted under its influence, except in large doses. There is also rapidly induced a depression of the anterior horns of grey matter in the spinal cord, and as the symptoms of strychnine poisoning are due to violent stimulation of these areas, chloral hydrate is a valuable antidote in such cases. It should not be hypodermically injected. Its disadvantages are that it is powerless when there is pain, re- sembling in this feature nearly all hypnotics except opium (morphine) and hyoscin. Its action on the gastro-intestinal canal and on the respiratory and circulatory systems renders its use inadvisable when disease of these organs is present. Its action on the spinal cord has been employed with success in cases of tetanus, whooping-cough, urinary incontinence, and strychnine poisoning. In the latter case twenty grains in ” normal saline ” solution may be directly injected into a subcutaneous vein, but not into the subcutaneous tissues.

Toxicology.— In cases of acute poisoning by chloral hydrate, the symptoms may be summarized as those of profound coma. The treatment is to give a stimulant emetic such as mustard; to keep up the temperature by hot bottles, &c. ; to prevent or disturb the patient’s morbid sleep by the injection of hot strong coffee into the rectum, and by shouting, flipping with towels, &c. ; to use artificial respiration in extreme cases; and to inject strychnine. Strychnine is much less likely, however, to save life after poisoning by chloral hydrate, than chloral hydrate is to save lite in poisoning by strychnine.

Chronic poisoning by chloral is a most pernicious drug-habit. The vice is easily and very rapidly acquired. The victim is usually excited and loquacious. He is easily fatigued an4 suffers from attacks of easily induced syncope. There are signs of gastro-in- testinal irritation, and a tendency to cutaneous eruptions of an erythematous type. The patient may succumb to a dose only slightly larger than usual. The treatment is on general principles, there being no specific remedy. The patient must be persuaded to put himself under restraint, and the drug must be stopped at once and entirely.

CHLORATES, the metallic salts of chloric acid; they are all solids, soluble in water, the least soluble being the potassium salt. They may be prepared by dissolving or suspending a metallic oxide or hydroxide in water and saturating the solution with chlorine; by double decomposition; or by neutralizing a solution of chloric acid by a metallic oxide, hydroxide or carbonate. They are all decomposed on heating, with evolution of oxygen; and in contact with concentrated sulphuric acid with liberation of chlorine peroxide. The most important is potassium chlorate, KCIO3, which was obtained in 1786 by C. L. Berthollet by the action of chlorine on caustic potash, and this method was at first used for its manufacture. The modern process consists in the electrolysis of a hot solution of potassium chloride, or, preferably, the formation of sodium chlorate by the electrolytic method and its subsequent decomposition by potassium chloride. (See Alkali Manufacture.) Potassium chlorate crystallizes in large white tablets, of a bright lustre. It melts without decomposition, and begins to give off oxygen at about 370 C. According to F. L. Teed (Proc. Ckem. Soc, 1886, p. 141), the decomposition of potassium chlorate by heat is not at all simple, the quantities of chloride and perchlorate produced depending on the tempera- ture. A very gentle heating gives decomposition approximating to the equation of 22KC10 3 = 14KC10 4 -f8KCl-f-5Q 2 > whilst on a more rapid heating the quantities correspond more nearly to 10KC10s = 6KCl04 + 4Ka + 30 2 . The decomposition is rendered

more easy and regular by mixing the salt, with powdered man- ganese dioxide. The salt finds application in the preparation of oxygen, in the manufacture of matches, for pyrotechnic purposes, and in medicine. Sodium chlorate, NaOOs, is prepared by the electrolytic process; by passing chlorine into milk of lime and decomposing the calcium chlorate formed by sodium sulphate; or by the action of chlorine on sodium carbonate at low tempera- ture (not above 35° C). It is much more soluble in water than the potassium salt.

Potassium chlorate is very valuable in medicine. Given in large doses it causes rapid and characteristic poisoning, with alterations in the blood and rapid degeneration of nearly all the internal organs; but in small doses — 5 to 15 grains — it partly undergoes reduction in the blood and tissues, the chloride being formed and oxygen being supplied to the body-cells in nascent form. Its special uses are in ulceration of the mouth or tongue (■ulcerative stomatitis), tonsillitis and pharyngitis. For these conditions it is administered in the form of a lozenge, but may also be swallowed in solution, as it is excreted by the saliva and so reaches the diseased surface. Its remarkable efficacy in healing ulcers of the mouth— for which it is the specific — has

been ascribed to a decomposition effected by the carbonic acid which is given off from these ulcers. This releases chloric acid, which, being an extremely powerful antiseptic, kills the bacteria to which the ulcers are due.

CHLORINE (symbol CI, atomic weight 35-46 (0=i6), a gaseous chemical element of the halogen group, taking its name from the colour, greenish-yellow (Gr. xˆpos). It was discovered in 1774 by Scheele, who called it dephlogisticated muriatic acid; about 1785, C. L. Berthollet, regarding it as being a compound of hydrochloric acid and oxygen, termed it oxygenized muriatic acid. This view was generally held until about 1810-1811, when Sir H. Davy showed definitely that it was an element, and gave it the name which it now bears.

Chlorine is never found in nature in the uncombined condition, but in combination with the alkali metals it occurs widely distributed in the form of rock-salt (sodium chloride) ; as sylvine and carnallite, at Stassfiirt; and to a smaller extent in various other minerals such as matlockite and horn-mercury. In the form of alkaline chlorides it is found in sea-water and various spring waters, and in the tissues of animals and plants; while, as hydrochloric acid it is found in volcanic gases.

The preparation of chlorine, both on the small scale and commercially, depends on the oxidation of hydrochloric acid; the usual oxidizing agent is manganese dioxide, which, v.'hen heated with concentrated hydrochloric acid, forms manganese chloride, water and chlorine :— $Mn0_2 + 4HCI = MnCl_2 - f2H_20 - f Cl_2$. The manganese dioxide may be replaced by various other substances, such as red lead, lead dioxide, potassium bichromate, and potassium permanganate. Instead of heating hydrochloric acid with manganese dioxide, use is frequently made of a mixture of common salt and manganese dioxide, to which concentrated sulphuric acid is added and the mixture is then heated: — $Mn0_2 + 2NaCl + 3H_2S04 = MnS0_4 + 2NaHS0_4 + 2H_20 + Cl_2$. Chlorine may also be obtained by the action of dilute sulphuric acid on bleaching powder.

Owing to the enormous quantities of chlorine required for various industrial purposes, many processes have been devised, either for the recovery of the manganese from the crude man- ganese chloride of the chlorine stills, so that it can be again utilized, or for the purpose of preparing chlorine without the necessity of using manganese in any form (see Alkali Manufacture).

Owing to the reduction in the supply of available hydrochloric acid (on account of the increasing use of the ” ammonia-soda ” process in place of the “Leblanc” process for the manufacture of soda) Weldon tried to adapt the former to the production of chlorine or hydrochloric acid. His method consisted in using magnesia instead of lime for the recovery of the ammonia (which occurs in the form of ammonium chloride in the ammonia-soda process), and then by evaporating the magnesium chloride solution and hea + ing the residue in steam, to condense the acid vapours and so obtain hydrochloric acid. One day before him E. Solvay had patented the same process, but neither of them was able to make the method a commercial successˆ However, in conjunction with Pechiney, of Salindres (near

Alais, France), the Weldon-Pechiney process was worked out. The residual magnesium chloride of the ammonia-soda process is evaporated until it ceases to give off hydrochloric acid, and is then mixed with more magnesia: the magnesium oxychloride formed is broken into small pieces and heated in a current of air, when it gives up its chlorine, partly in the uncombined condition and partly in the form of hydrochloric acid, and leaves a residue of magnesia, which can again be utilized for the decomposition of more ammonium chloride (W. Weldon, Journ. of Soc. of Chem. Industry, 1884, p. 387). Greater success attended the efforts of Ludwig Mond, of the firm of Brunner, Mond & Co. In this process the ammonium chloride is volatilized in large iron retorts lined with Doulton tiles, and then led into large upright wrought-iron cylinders lined with fire-bricks. These cylinders are filled with pills, made of a mixture of magnesia, potassium chloride and fireclay, the object of the potassium chloride being to prevent any formation of hydrochloric acid, which might occur if the magnesia was not perfectly dry. At 300° C. the ammonium chloride is decomposed by the magnesia, with the formation of magnesium chloride and ammonia. The mixture is now heated to 600° C. in a current of hot dry gas, containing no free oxygen (the gas from the carbonating plant being used), and then a current of air at the same temperature is passed in. Decomposition takes place and the issuing gas contains 18-20% of chlorine. This percentage drops gradually, and when it is reduced to about 3 % the temperature of the apparatus is lowered, by the admission of air, to about 350° C, and the air stream containing the small percentage of chlorine is led off to a second cylinder of pills, which have just been treated with ammonium

chloride vapour and are ready for the hot air current. With four cylinders the process is continuous (L. Mond, British Assoc. Reports, 1896, p. 734).

More recently, owing to the production of caustic soda by electrolytic methods, much chlorine has consequently been produced in the same manner (see Alkali Manufacture).

Chlorine is a gas of a greenish-yellow colour, and possesses a characteristic unpleasant and suffocating smell. It can be liquefied at –34 C. under atmospheric pressure, and at — 102° C. it solidifies and crystallizes. Its specific heat at constant pressure is 0-1155, and at constant volume 0-08731 (A. Strecker, Wied. Ann., 1877 [2], 13, p. 20); and its refractive index 1-000772, whilst in the liquid condition the refractive index is 1-367. The density is 2-4885 (air = 1) (Treadwell and Christie, Zeit. anorg. Chem., 1905, 47, p. 446). Its critical temperature is 146 C. Liquid and solid chlorine are both yellow in colour. The gas must be collected either by downward displacement, since it is soluble in water and also attacks mercury; or over a saturated salt solution, in which it is only slightly soluble. At ordinary temperatures it unites directly with many other elements; thus with hydrogen, com- bination takes place in direct sunlight with explosive violence; arsenic, antimony, thin copper foil and phosphorus take fire in an atmosphere of chlorine, forming the corresponding chlorides. Many compounds containing hydrogen are readily decomposed by the gas; for example, a piece of paper dipped in turpentine inflames in an atmosphere of chlorine, producing hydrochloric acid and a copious deposit of soot; a lighted taper burns in chlorine with a dull smoky flame. The solution of chlorine in water, when freshly prepared, possesses a yellow colour, but on keeping becomes colourless, on account of its decomposition into hydrochloric acid and oxygen. It is on this property that its bleaching and disinfecting power depends (see Bleaching). Water saturated with chlorine at o° C. deposits crystals of a hydrate C1 2 -8H 2 0, which is readily decomposed at a higher temperature into its constituents. Chlorine hydrate has an historical importance, as by sealing it up in a bent tube, and heating the end containing the hydrate, whilst the other limb of the tube was enclosed in a freezing mixture, M. Faraday was first able to obtain liquid chlorine.

Chlorine is used commercially for the extraction of gold (q.v.) and for the manutacture of ” bleaching powder ” and of chlorates. It also finds an extensive use in organic chemistry as a substituting and oxidizing agent, as well as for the preparation of addition com- pounds. For purposes of substitution, the free element as a rule only works slowly

on saturated compounds, but the reaction may be accelerated by the action of sunlight or on warming, or by using a ” carrier.” In these latter cases the reaction may proceed in different directions; thus, with the aromatic hydrocarbons, chlorine in the cold or in the presence of a carrier substitutes in the benzene nucleus, but in the presence of sunlight or on warming, substitution takes place in the side chain. Iodine, antimony trichloride, molybdenum pentachloride, ferric chloride, ferric oxide, antimony, tin, stannic oxide and ferrous sulphate have all been used as chlorine carriers.

The atomic weight of chlorine was determined by J. Berzenus

and by F. Penny {Phil. Trans,, 1830,, 13). J. S. Stas, from the synthesis of silver chloride, obtained the value 35-457 (0 = 16), and C. Marignac found the value 34-462. More recent determinations are: H. B. Dixon and E. C. Edgar {Phil. Trans., 1905); T. W. Richards and G. Jones (Abst. J.C.S., 1907) ; W. A. Noyes and H. C. Weber (ibid., 1908), and Edgar (ibid., 1908).

Hydrochloric Acid. — Chlorine combines with hydrogen to form hydrochloric acid, HC1, the only known compound of these two elements. The acid itself was first obtained by j. R. Glauber in about 1648, but J. Priestley in 1772 was the first to isolate it in the gaseous condition, and Sir H. Davy in 1810 showed that it contained hydrogen and chlorine only, as up to that time it was considered to contain oxygen. It may be pre- pared by the direct union of its constituents (see Burgess and Chapman, J.C.S., 1906, 89, p. 1399), but on the large scale and also for the preparation of small quantities it is made by the decomposition of salt by means of concentrated sulphuric acid, NaCl +H 2 S0 4 =NaHS04+HCl. It is chiefly obtained as a by-product in the manufacture of soda-ash by the Leblanc process (see Alkali Manufacture). The commercial acid is usually yellow in colour and contains many impurities, such as traces of arsenic, sulphuric acid, chlorine, ferric chloride and sulphurous acid; but these do not interfere with its application to the preparation of bleaching powder, in which it is chiefly consumed. Without further purification it is also used for ” souring ” in bleaching, and in tin and lead soldering.

It is a colourless gas, which can be condensed by cold and pressure to a liquid boiling at – 83-7° C.and can also be solidified, the solid melting at – 112-5° C. (K. Olszewski). Its critical temperature is 52-3° C, and its critical pressure is 86 atmos. The gas fumes strongly in moist air, and it is rapidly dissolved by water, one volume of water at 0° C. absorbing 503 volumes of the gas. The gas does not obey Henry’s law, that is, its solubility in water is not proportional to its pressure. It

is one of the ” strong ” acids, being ionized to the extent of about 91-4% in decinormal solution. The strongest aqueous solution of hydrochloric acid at 15 C. contains 42-9% of the acid, and has a specific gravity of 1-212. Perfectly dry hydro- chloric acid gas has no action on metals, but in aqueous solution it dissolves many of them with evolution of hydrogen and formation of chlorides.

The salts of hydrochloric acid, known as chlorides, can, in most cases, be prepared by dissolving either the metal, its hydroxide, oxide, or carbonate in the acid; or by heating the metal in a current of chlorine, or by precipitation. The majority of the metallic chlorides are solids (stannic chloride, titanic chloride and antimony penta- chloride are liquids) which readily volatilize on heating. Many are readily soluble in water, the chief exceptions being silver chloride, mercurous chloride, cuprous chloride and palladious chloride which are insoluble in water, and thallous chloride and lead chloride which are only slightly soluble in cold water, but are readily soluble in hot water. Bismuth and antimony chlorides are decomposed by water with production of oxychlorides, whilst titanium tetrachloride yields titanic acid under the same conditions. All the metallic chlorides, with the exception of those of the alkali and alkaline earth metals, are reduced either to the metallic condition or to that of a lower chloride on heating in a current of hydrogen ; most are decomposed by concentrated sulphuric acid. They can be dis- tinguished from the corresponding bromides and iodides by the fact that on distillation with a mixture of potassium bichromate and concentrated sulphuric acid they yield chromium oxychloride, whereas bromides and iodides by the same treatment give bromine and iodine respectively. Some metallic chlorides readily form double chlorides, the most important of these double salts being the platinochlorides of the alkali metals. The chlorides of the non- metallic elements are usually volatile fuming liquids of low boiling- point, which can be distilled without decomposition and are de- composed by water. Hydrochloric acid and its metallic salts can be recognized by the formation of insoluble silver chloride, on adding silver nitrate to their nitric acid solution, and also by the formation of chromium oxychloride (see above). Chlorides can be estimated quantitatively by conversion into silver chloride, or if in the form of alkaline chlorides (in the absence of other metals, and of any free acids) by titration with standard silver nitrate solution, using potassium chromate as an indicator.

Chlorine and oxygen do not combine directly, but compounds can be obtained indirectly. Three oxides are known: chlorine monoxide, C1 2 0, chlorine peroxide, CIO2, and chlorine heptoxide, CI2O7. _

Chlorine monoxide results on pssing chlorine over dry precipitated mercuric oxide. It is a pale yellow gas which can be condensed, on cooling, to a dark-coloured liquid boiling at 5° C. (under a pressure of 737-9 mm.). It is extremely unstable, decomposing with extreme violence on the slightest shock or disturbance, or on exposure to sunlight. It is readily soluble in water, with which it combines to form hypochloreus acid. Sulphur, phosphorus, carbon compounds,

and the alkali metals react violently with the gas, taking fire with explosive decomposition. A. J. Balard determined the volume composition of the gas by decomposition over mercury on gentle warming, followed by the absorption of the chlorine produced with potassium hydroxide, and then measured the residual oxygen.

Chlorine peroxide was first obtained by Sir H. Davy in 1815 by the action of concentrated sulphuric acid on potassium chlorate. As this oxide is a dangerous explosive, great care must be taken in its preparation; the chlorate is finely powdered and added in the cold, in small quantities at a time, to the acid contained in a retort. After solution the retort is gently heated by warm water when the gas is liberated :— $3KC10\ 3 + 2H\ 2\ S0\ 4 = KC10\ 4 + 2KHS0\ 4 + H\ 2 + C10\ 2$. A mixture of chlorine peroxide and chlorine is obtained by the action of hydrochloric acid on potassium chlorate, and similarly, on warming a mixture of potassium chlorate and oxalic acid to 70 C. on the water bath, a mixture of chlorine peroxide and carbon dioxide is obtained. Chlorine peroxide must be collected by displace- ment, as it is soluble in water and readily attacks mercury. It is a heavy gas of a deep yellow colour and possesses an unpleasant smell. It can be liquefied, the liquid boiling at 9-9° C, and on further cooling it solidifies at 79° C. It is very explosive, being resolved into its constituents by influence of light, on warming, or on application of shock. It is a very powerful oxidant ; a mixture of potassium chlorate and sugar in about equal proportions spon taneously inflames when touched with a rod moistened with con- centrated sulphuric acid, the chlorine peroxide liberated setting fire to the sugar, which goes on burning. Similarly, phosphorus can be burned under water by covering it with a little potassium chlorate and running in a thin stream of concentrated sulphuric acid (see papers by Bray, Zeii. phys. Chem., 1906, et seq.).

Chlorine heptoxide was obtained by A. Michael by slowly adding

perchloric acid to phosphoric oxide below -io° C. ; the mixture is allowed to stand for a day and then gently warmed, when the oxide distils over as a colourless very volatile oil of boiling-point 82° C. It turns to a greenish-yellow colour in two or three days and gives off a greenish gas; it explodes violently on percussion or in contact with a flame, and is gradually converted into perchloric acid by the action of water. On the addition of iodine to this oxide, chlorine is liberated and a white substance is produced, which decomposes, on heating to 380 C, into iodine and oxygen; bromine is without action (see A. Michael, Amer. Chem. Jour., 1900, vol. 23; 1901, vol.

25).

Several oxy-acids of chlorine are known, namely, hypochlorous acid, HCIO, chlorous acid, HC10 2 (in the form of its salts), chloric acid, HCIO3, and perchloric acid, HGO4. Hypochlorous acid is formed when chlorine monoxide dissolves in water, and can be pre- pared (in dilute solution) by passing chlorine through water con- taining precipitated mercuric oxide in suspension. Precipitated calcium carbonate may be used in place of the mercuric oxide, or a hypochlorite may be decomposed by a dilute mineral acid and the resulting solution distilled. For this purpose a filtered solution of bleaching-powder and a very dilute solution of nitric acid may be employed. The acid is only known in aqueous solution, and only dilute solutions can be distilled without decomposition. The solution has a pale yellow colour, and is a strong oxidizing and bleaching agent ; it is readily decomposed by hydrochloric acid, with evolution of oxygen. The salts of this acid are known as hypochlorites, and like the acid itself are very unstable, so that it is almost impossible to obtain them pure. A solution of sodium hypochlorite (Eau de Javel), which can be prepared by passing chlorine into a cold aqueous solution of caustic soda, has been extensively used for bleaching purposes. One of the most important derivatives of hypochlorous acid is bleaching powder. Sodium hypochlorite can be prepared by the electrolysis of brine solution in the presence of carbon electrodes, having no diaphragm in the electrolytic cell, and mixing the anode and cathode products by agitating the liquid. The temperature should be kept at about 15 C, and the concentration of the hypo- . chlorite produced must not be allowed to become too great, in order to prevent reduction taking place at the cathode.

Chlorous acid is not known in the pure condition; but its sodium salt is prepared by the action of sodium peroxide on a solution of chlorine peroxide:2C10 2 +Na 2 2 = 2NaC10 2 +0 2 . The silver and lead salts are unstable, being decomposed with explosive violence at 100 °

C. On adding a caustic alkali solution to one of chlorine peroxide, a mixture of a chlorite and a chlorate is obtained.

Chloric acid was discovered in 1786 by C. L. Berthollet, and is best prepared by decomposingbarium chlorate with the calculated amount of dilute sulphuric acid. The aqueous solution can be con- centrated in vacuo over sulphuric acid until it contains 40% of chloric acid. Further concentration leads to decomposition, with evolution of oxygen and formation of perchloric acid. The con- centrated solution is a powerful oxidizing agent; organic matter being oxidized so rapidly that it frequently inflames. Hydrochloric acid, sulphuretted hydrogen and sulphurous acid are rapidly oxidized by chloric acid. J. S. Stas determined its composition by the analysis of pure silver chlorate. The salts of this acid are known as chlorates {q.v.).

Perchloric acid is best prepared by distilling potassium perchlorate with concentrated sulphuric acid. According to Sir H. Roscoe, pure perchloric acid distils over at first, but if the distillation be continued

a white crystalline mass of hydrated perchloric acid, HC104-H 2 0, passes over; this is due to the decomposition of some of the acid into water and lower Oxides of chlorine, the water produced then combining with the pure acid to produce the hydrated form. This solid, on redistillation, gives the pure acid, which is a liquid boiling at 39°C. (under a pressure of 56 mm.) and of specific gravity 1-764 (V°). The crystalline hydrate melts at 50° C. The pure acid decom- poses slowly on standing, but is stable in dilute aqueous solution. It is a very powerful oxidizing agent; wood and paper in contact with the acid inflame with explosive violence. In contact with the skin it produces painful wounds. It may be distinguished from chloric acid by the fact that it does not give chlorine peroxide when treated with concentrated sulphuric acid, and that it is not reduced by sulphurous acid. The salts of the acid are known as the per- chlorates, and are all soluble in water; the potassium and rubidium salts, however, are only soluble to a slight extent. Potassium perchlorate, KCIO4, can be obtained by carefully heating the chlorate until it first melts and then nearly all solidifies again. The fused mass is then extracted with water to remove potassium chloride, and warmed with hydrochloric acid to remove unaltered chlorate, and finally extracted with water again, when a residue of practically pure perchlorate is obtained. The alkaline perchlorates are isomorphous with the permanganates.

CHLORITE, a group of green micaceous minerals which are hydrous silicates of aluminium, magnesium and ferrous iron. The name was given by A. G. ˆWerner in 1798, from xˆwpfris, ” a green stone.”

Several species and many rather ill-defined varieties have been described, but they are difficult to recognize. Like the micas, the chlorites (or ” hydromicas “) are monoclinic in crystallization and have a perfect cleavage parallel to the flat face of the scales and plates. The cleavage is, however, not quite so prominent as in the micas, and the cleavage flakes though pliable are not elastic. The chlorites usually occur as salt (H = 2~3) scaly aggregates of a dark-green colour. They vary in specific gravity between 2-6 and 3-0, according to the amount of iron present. Well-developed crystals are met with only in the species clinochlore and penninite; those of the former are six-sided plates and are optically biaxial, whilst those of the latter have the form of acute rhombohedra and are usually optically uniaxial. The species prochlorite and corundophilite also occur as more or less distinct six-sided plates. These four better crystallized species are grouped together by G. Tschermak as orthochlorites, the finely scaly and indistinctly fibrous forms being grouped by the same author as leptochlorites.

Chemically, the chlorites are distinguished from the micas by the presence of a considerable amount of water (about 13%) and by not containing alkalis; from the soft, scaly, mineral talc they differ in containing aluminium (about 20%) as an essential constituent. The magnesia (up to 36%) is often in part replaced by ferrous oxide (up to 30%), and the alu- mina to a lesser extent by ferric oxide; alumina may also be partly replaced by chromic oxide, as in the rose-red varieties kammererite and kotschubeite. The composition of both clinochlore and penninite is approximately expressed by the formula HgCMgˆeˆAˆSijOis, and the formulae of pro- chlorite and corundophilite are H4 (Mg,Fe)23Ali4Sii30 9 o and H 2 o(Mg,Fe)nAl 8 Si6045 respectively. The variation in com- position of these orthochlorites is explained by G. Tschermak by assuming them to be isomorphous mixtures of H 4 Mg 3 Si 2 09 (the serpentine molecule) and H 4 Mg3Al 2 Si09 (which is approxi- mately the composition of the chlorite amesite). The lepto- chlorites are still more complex, and the intermixture of other fundamental molecules has to be assumed; the species recognized by Dana are daphnite, cronstedtite, thuringite, stilpnomelane, strigovite, diabantite, aphrosiderite, delessite and rumpfite.

The chlorites usually occur as alteration products of other minerals, such as pyroxene, amphibole, biotite, garnet, &c, often occurring as pseudomorphs after these, or as earthy material filling cavities in igneous rocks composed of these minerals. Many altered igneous rocks owe their green colour to the presence of secondary chlorite. Chlorite is also an im- portant constituent of many schistose rocks and

phyllites, and of chlorite-schist it is the only essential constituent. Well- crystallized specimens of the species clinochlore are found with crystals of garnet in cavities in chlorite-schist at Achmatovsk near Zlatoust, in the Urals, and at the Ala valley near Turin,

Piedmont; also as large plates at West Chester in Pennsylvania and at other American localities. Crystals of penninite aire found in serpentine at Zermatt in Switzerland and' in the green schists of the Zillerthal in Tirol.

Closely allied to the chlorites is another group of micaceous minerals known as the vermiculites, which have resulted by the alteration of the micas, particularly biotite and phlogopite. The name is from the Latin vermiculor, " to breed worms," because when heated before the blowpipe these minerals ex- foliate into long worm-like threads. They have the same chemical constituents as the chlorites, but the composition is variable and indefinite, varying with that of the original mineral and the extent of its alteration. Several indistinct varieties have been named, the most important of which is jeffersonite. (L. J. S.)

CHLOROFORM (trichlor-methane) , $CHC1_3$, a valuable an- aesthetic, a colourless liquid, possessing an agreeable smell and a pleasant taste. It may be prepared by the action of bleaching powder on many carbon compounds, such, for example, as ethyl alcohol and acetone (E. Soubeiran, Ann. chim. phys., 1831 [2], 48, p. 131; J. v. Liebig, Ann., 1832, 1, p. 199), by heating chloral with alkalis (Liebig), $CCl_3CHO + NaHO = CHC1_3 + NaHC0_2$, or by heating trichloracetic acid with ammonia (J. Dumas, Ann., 1839, 32, p. 113). In the preparation of chloroform by the action of bleaching powder on ethyl alcohol it is probable that the alcohol is first oxidized to acetaldehyde, which is subsequently chlorinated and then decomposed. Chloroform solidifies in the cold and then melts at -62° C; it boils at 61-2° C, and has a specific gravity 1-52637 (o°/4°) (T. E. Thorpe). It is an exceed- ingly good solvent, especially for fats, alkaloids and iodine. It is not inflammable. The vapour of chloroform when passed through a red-hot tube yields hexachlorbenzene C_6C1_6 , per- chlorethane C_2C1_6 , and some perchlorethylene C_2CLj (W. Ramsay and S. Young, Jahresberichte, 1886, p. 628). Chromic acid converts it into phosgene (carbonyl chloride, $COCl_2$). It reacts with sodium ethylate to form ortho-formic ester, $CH(OC_2H_5)_3$, and when heated with aqueous

ammonia for some hours at 200- 2 20 C. gives carbon monoxide and ammonium formate, 2CHCI3 + 7NH 3 + 3H 2 = NH 4 -HC0 2 + CO +6NH4CI (G. Andre, Jahresb., 1886, p. 627) . When digested with phenols and caustic soda it forms oxyaldehydes (K. Reimer, Ber., 1876, 9, p. 423) ; and when heated with alcoholic potash it is converted into potassium formate, CHC1 3 + 4KHO = KHC0 2 + 3KC1 + 2H 2 0. It combines with acetoacetic ester to form the aromatic compound meta-oxyuvitic acid, C 6 H 2 -CH3-OH-(COOH) 2 . A hydrate, of composition CHC1 3 -18H 2 0, has been described (G. Chancel, Fresenius Zeitschrift f. anal. Chemie, 1886, 25, p. 118); it forms hexagonal crystals which melt at i-6° C.

Chloroform may be readily detected by the production of an isonitrile when it is heated with alcoholic potash and a primary amine; thus with aniline, phenyl isocyahide (recognized by its nauseating smell) is produced,

CHCU + CeH 6 N H 2 + 3KHO = C 6 H 6 NC + 3KC1 + 3H 2 0.

For the action and use of chloroform as an anaesthetic, see Anaesthesia. Chloroform may be given internally in doses of from one to five drops. The British Pharmacopoeia contains a watery solution—the Aqua Chloroformi—which is useful in disguising the taste of nauseous drugs; a liniment which consists of equal parts of camphor liniment and chloroform, and is a useful counter-irritant; the Spiritus Chioroformi (erroneously known as ” chloric ether “), which is a useful anodyne in doses of from five to forty drops; and the Tinctura Chioroformi et Morphinae Composita, which is the equivalent of a proprietary drug called chlorodyne. This tincture contains chloroform, mor- phine and prussic acid, and must be used with the greatest care.

Externally chloroform is an antiseptic, a local anaesthetic if allowed to evaporate, and a rubefacient, causing the vessels of the skin to dilate, if rubbed in. Its action on the stomach is practically identical with that of alcohol (q.v.), though in very much smaller doses. The uses of chloroform which fall to be mentioned here are: — as a counter-irritant; as a local anaes- thetic for toothache due to caries, it being applied on a colton- vi. 9

wool plug which is inserted into the carious cavity; as an antispasmodic in tetanus and hydrophobia; and as the best and most immediate and effective antidote in cases of strychnine poisoning.

CHLOROPHYLL (from Gr. xˆufo, green, 4>v\ov, a leaf), the green colouring matter of leaves. It is universally present in growing

vegetable cells. The pigment of leaves is a complex mixture of substances; of these one is green, and to this the name, originally given in 1817 by Pelletier and Caventou, is sometimes restricted; xanthophyll (Gr. l-av66s, yellow) is dark brown ; carotin is copper-coloured. ChlorophyU is related chemi- cally to the proteids; a decomposition product, phylloporphyrin, being very closely related to haematoporphyrin, which is a decomposition product of haemoglobin, the red colouring matter of the blood. Chlorophyll is neutral in reaction, insoluble in water, but soluble in alcohol, ether, &c, the solutions exhibiting a green colour and a vivid red fluorescence. Magnesium is a necessary constituent. (See S. B. Schryver, Science Progress,

1909, 3, P- 42S-)

CHLOROSIS (Gr. xˆpte, pale green), the botanical term for loss of colour in a plant-organ, a sign of disease; also in medicine, a form of anaemia (see Blood: Pathology).

CHLORPICRIN (Nitrochloroform), C-N0 2 C1 3 , the product of the distillation of many nitro compounds (picric acid, nitro methane, &c.) with bleaching powder; it can also be prepared by the action of concentrated nitric acid on chloral or chloroform. A. W. von Hofmann (Annalen, 1866, 139, p. 111) mixed 10 parts of bleaching powder into a paste with cold water and added a solution (saturated at 30 C.) of 1 part of picric acid. A violent reaction is set up and the chlorpicrin distils over, generally without the necessity for any external heating. It is a colourless liquid of boiling-point 112 C, and of specific gravity 1-692. It is almost insoluble in water, but is readily soluble in alcohol; it has a sharp smell, and its vapour affects the eyes very powerfully. Iron filings and acetic acid reduce it to trimethylamine, whilst alcoholic ammonia converts it into guanidine, HN:C(NH 2) 2 , and sodium ethylate into ortho-carbonic . ester, C(OC 2 H 5) 4 . The corresponding brompicrin is also known.

CHMIELNICKI, BOGDAN (c. 1593-1657), hetman of the Cossacks, son of Michael Chmielnicki, was born at Subatow, near Chigirin in the Ukraine, an estate given to the elde' Chmielnicki for his lifelong services to the Polish crown. Bogdan, after learning to read and write, a rare accomplishment in those days, entered the Cossack ranks, was dangerously wounded and taken prisoner in his first battle against the Turks, and found leisure during his two years' captivity at Constantinople to acquire the rudiments of Turkish and French. On returning to the Ukraine he settled down quietly on his paternal estate, and in all probability history would never have known his name if the

intolerable persecution of a neighbouring Polish squire, who stole his hayricks and flogged his infant son to death, had not converted the thrifty and acquisitive Cossack husband- man into one of the most striking and sinister figures of modern times. Failing to get redress nearer home, he determined to seek for justice at Warsaw, whither he had been summoned with other Cossack delegates to assist Wladislaus IV. in his long-projected war against the Turks. The king, perceiving him to be a man of some education and intelligence, appointed him pisarz or secretary of the registered Cossacks, and he subsequently served under Koniecpolski in the Ukraine campaign of 1646. His hopes of distinction were, however, cut short by a decree of the Polish diet, which, in order to vex the king, refused to sanction the continuance of the war. Chmielnicki, now doubly hateful to the Poles as being both a royalist and a Cossack, was again maltreated and chicaned, and only escaped from gaol by bribing his gaolers. Thirsting for vengeance, he fled to the Cossack settlements on the Lower Dnieper and thence sent messages to the khan of the Crimea, urging a simultaneous invasion of Poland by the Tatars and the Cossacks (1647).

On the nth of April 1648, at an assembly of the Zaporozhians (see Poland: History), he openly declared his intention of pro- ceeding against the Poles, and was elected ataman by acclamation.

At Zheltnaya Vodui (Yellow Waters) in the Ukraine he annihilated, on the 19th of May, a detached Polish army corps after three days' desperate fighting, and on the 26th routed the main Polish army under the grand hetman, Stephen Potocki, at Kruta Balka (Hard Plank), near the river Korsun. The immediate consequence of these victories was the outbreak of a " serfs' fury." Throughout the Ukraine the Polish gentry were hunted down, flayed and burnt alive, blinded and sawn asunder. Every manor-house was reduced to ashes. Every Uniat and Catholic priest was hung up before his own altar, along with a Jew and a hog. The panic-stricken inhabitants fled to the nearest strongholds, and soon the rebels were swarming all over the palatinates of Volhynia and Podolia. But the ataman was as crafty as he was cruel. Disagreeably awakened to the insecurity of his position by the refusal of the tsar and the sultan to accept him as a vassal, he feigned to resume negotiations . with the Poles in order to gain time, dismissed the Polish com- missioners in the summer of 1648 with impossible conditions, and on the 23rd of September, after a contest of

three days, utterly routed the Polish chivalry, 40,000 strong, at Pildawa, where the Cossacks are said to have reaped an immense booty after the fight was over. All Poland now lay at his feet, and the road to the defenceless capital was open before him; but he wasted the precious months in vain before the fortress of Zamosc, and was then persuaded by the new king of Poland, John Casimir, to consent to a suspension of hostilities. ,In June 1649, arrayed in cloth-of-gold and mounted on a white charger, Chmielnicki made his triumphal entry into Kiev, where, he was hailed as the Maccabaeus of the Orthodox faith, and permitted the committal of unspeakable atrocities on the Jews and Roman Catholics. At the ensuing peace congress at Pereyaslavl he demanded terms so extravagant that the Polish commissioners dared not listen to them. In 1649, therefore, the war was re- sumed. A bloody battle ensued near Zborow, on the banks of the Strypa, when only the personal valour of the Polish king, the superiority of the Polish artillery, and the defection of Chmielnicki's allies, the Tatars enabled the royal forces to hold their own. Peace was then patched up by the compact of Zborow (August 21, 1649), whereby Chmielnicki was virtually recognized as a semi-independent prince.

For the next eighteen months he was the absolute master of the Ukraine, which he divided into sixteen provinces,, made his native place Chigirin the Cossack capital, and entered into direct relations with foreign powers. Poland and Muscovy competed for his alliance, and in his more exalted moods he meditated an Orthodox crusade against the Turk at the head of the northern Slavs. But he was no statesman, and his difficulties proved overwhelming. Instinct told him that his old ally the khan of the Crimea was unreliable, and that the tsar of Muscovy was his natural protector, yet he could not make up bis mind to abandon the one or turn to the other. His attempt to carve a principality for his son out of Moldavia, which Poland regarded as her vassal, led to the outbreak in 1651 of a third war between subject and suzerain, which speedily assumed the dignity and the dimensions of a crusade. Chmielnicki was now regarded not merely as a Cossack rebel, but as the arch-enemy of Catholicism in eastern Europe, and the pope granted a plenary absolution to all who took up arms against him. But Bogdan himself was not without ecclesiastical sanction. The archbishop of Corinth girded him with a sword which had lain upon the Holy Sepulchre, and the metropolitan of Kiev absolved him from all his sins, without the usual preliminary of confession, before he rode forth to battle. But fortune, so long his friend, now deserted him, and at Beresteczko (July 1, 1651) the Cossack ataman was defeated for the first time. But even now his power was far from broken. In

1652 he openly interfered in the affairs of Transylvania and Walachia, and assumed the high-sounding ■ title of ” guardian of the Ottoman Porte.” In 1653 Poland made a supreme effort, the diet voted 17,000,000 gulden in subsidies, and John Casimir led an army of 60,000 men into the Ukraine and defeated the arch-rebel at Zranta, whereupon Chmielnicki took the oath of allegiance to the tsar (compact of Pereyaslavl, February 19,1654),

and all hope of an independent Cossack state was at an end. He died on the 7th of August 1657. With all his native ability, Chmielnicki was but an eminent savage. He was the creature of every passing mood or whim, incapable of cool and steady judgment or of the slightest self-control — an incalculable weather- cock, blindly obsequious to every blast of passion. He could destroy, but he could not create, and other people benefited by his exploits.

See P. Kulish, On the Defection of Malo-Russia from Poland (Rus.) (Moscow, 1890); S. M. Solovev, History of Russia (Rus.) (Moscow, 1857, & c 0> v °l- x -: Robert Nisbet Bain, The First Romanovs, chaps. 3-4 (London, 1905). (R. N. B.)

CHOATE, JOSEPH HODGES (1832-), American lawyer and diplomat, was born at Salem, Massachusetts, on the 24th of Januaryi832. He was the son of Dr George Choate, a physician of considerable note, and was a nephew of Rufus Choate. After graduating at Harvard College in 1852 and at the law school of Harvard University in 1854, he was admitted first to the Massachusetts (1855) and then (1856) to the New York bar, and entered the law office of Scudder & Carter in New York City. His success in his profession was immediate, and in i860 he became junior partner in the firm of Evarts, Southmayd & Choate, the senior partner in which was William M. Evarts. This firm and its successor, that of Evarts, Choate & Beaman, remained for many years among the leading law firms of New York and of the country, the activities of both being national rather than local. During these busy years Mr Choate was associated with many of the most famous litigations in American legal history, including the Tilden, A. T. Stewart, and Stanford will cases, the Kansas prohibition cases, the Chinese exclusion cases, the Maynard election returns case, and the Income Tax Suit. In 187 1 he became a member of the ” Committee of Seventy” in New York City, which was instrumental in breaking up the ” Tweed Ring,” and later assisted “in the prosecution of the indicted officials. In the retrial of the General Fitz John Porter case he obtained a reversal of the decision of the original court- martial. His greatest reputation was won perhaps in cross- examination. In politics he allied himself with the Republican party on its organization, being

a frequent speaker in presidential campaigns, beginning with that of 1856. He never held political office, although he was a candidate for the Republican senatorial nomination against Senator Thomas C. Piatt in 1897. In 1894 he was president of the New York state constitutional convention. He was appointed, by President McKinley, ambassador to Great Britain to succeed John Hay in 1899, and remained in this position until the spring of 1905. In England he won great personal popularity, and accomplished much in fostering the good relations of the two great English-speaking powers. He was one of the representatives of the United States at the second Peace Congress at the Hague in 1907.

Several of his notable public addresses have been published. The Choate Story Book (New York, 1903) contains a few of his addresaes and after-dinner speeches, and is prefaced by a brief biographical sketch.

CHOATE, RUFUS (1799-1859), American lawyer and orator, was born at Ipswich, Massachusetts, on the 1st of October 1.799, the descendant of a family which settled in Massachusetts in 1667. As a child he was remarkably precocious; at six he is said to have been able to repeat large parts of the Bible and of Pilgrim's Progress by heart. He graduated as valedictorian of his class at Dartmouth College in 18 19, was a tutor there in 18 19- 1820, spent a year in the law school of Harvard University, and studied for a like period at Washington, in the office of William Wirt, then attorney-general of the United States. He was admitted to the Massachusetts bar in 1823 and practised at what was later South Danvers (now Peabody) for five years, during which time he served in the Massachusetts House of Representatives (1825-1826) and in the state senate (1827). In 1828 he removed to Salem, where his successful conduct of several important law-suits brought him prominently into public notice. In 1830 he was elected to Congress as a Whig from the Salem district, defeating the Jacksonian candidate for re-election,

B. W. Crowninshield (177 2-185 1), a former secretary of the navy, and in 1832 he was re-elected. His career in Congress was marked by a notable speech in defence of a protective tariff. In 1834, before the completion of his second term, he resigned and established himself in the practice of law in Boston. Already his fame as a speaker had spread beyond New England, and he was much sought after as an

orator for public occasions. For several years he devoted himself unremittingly to his profession, but in 1 84 1 succeeded Daniel Webster in the United States Senate. Shortly afterwards he delivered one of his most eloquent addresses at the memorial services for President Harrison in Faneuil Hall, Boston. In the Senate he made a series of brilliant speeches on the tariff, the Oregon boundary, in favour of the Fiscal Bank Act, and in opposition to the annexation of Texas. On Webster's re-election to the Senate, Choate resumed (1845) his law practice, which no amount of urging could ever persuade him to abandon for public office, save for a short term as attorney- general of Massachusetts in 1853-1854. In 1853 he was a member of the state constitutional convention. He was a faithful supporter of Webster's policy as declared in the latter's famous " Seventh of March Speech " (1850) and laboured to secure for him the presidential nomination at the Whig national convention in 1852. In 1856 he refused to follow most of his former Whig associates into the Republican party and gave his support to James Buchanan, whom he considered the repre- sentative of a national instead of a sectional party. In July 1859 failing health led him to seek rest in a trip to Europe, but he died on the 13th of that month at Halifax, Nova Scotia, where he had been put ashore when it was seen that he probably could not outlive the voyage across the Atlantic. Choate, besides being one of the ablest of American lawyers, was one of the most scholarly of American public men, and his numerous orations and addresses were remarkable for their pure style, their grace and elegance of form, and their wealth of classical allusion.

His Works (edited, with a memoir, by S. G. Brown) were published in 2 vols, at Boston in 1862. The Memoir was afterwards published separately (Boston, 1870). See also E. G. Parker's Reminiscences of Rufus Choate (New York, i860) ; E. P. Whipple's Some Recollec- tions of Rufus Choate (New York, 1879) ; and the Albany Law Review

(1877-1878).

CHOBE, a large western affluent of the middle Zambezi (q.v.). The river was discovered by David Livingstone in 1851, and to him was known as the Chobe. It is also called the Linyante and the Kwando, the last name being that commonly used.

CHOCOLATE, a paste of the ground kernels of the cocoa bean, mixed with sugar, vanilla or other flavouring, made into a cake, which is used for the manufacture of various forms of sweetmeat, or in making the beverage, also known as " chocolate," obtained by dissolving cakes of chocolate in boiling water or milk (see Cocoa). The word came into

Eng. through the Fr. chocolat or Span, chocolate from the Mex. chocolatl. According to the New English Dictionary (quoting R. Simeon, Diet, de la langue Nahuatl), this was ” an article of food made of . . . the seeds of cacao and of the tree pochotl (Bombax, ceiba),” and was etymo- logically distinct from the Mexican cacauatl, cacao, or cocoa.

CHOCTAWS, Chahtas, or Chacatos (apparently a corruption 6i Span, chato, flattened), a tribe of North American Indians of Muskhogean stock. They are now settled in Oklahoma, but when first known to Europeans they occupied the district now forming the southern part of Mississippi and the western part of Alabama. On the settlement of Louisiana they formed an alliance with the French, and assisted them against the Natchez and Chicka- saws; but by degrees they entered into friendly relations with the English, and at last, in 1786, recognized the supremacy of the United States by the treaty of Hopewell. Their emigration westward began about 1800, and the last remains of their original territory were ceded in 1830. In their new settlements the Choctaws continued to advance in prosperity till the outbreak of the Civil War, which considerably diminished the population and ruined a large part of their property. They sided with the Confederates, and their territory was occupied by Confederate troops; and accordingly at the close of the war they were regarded as having lost their rights. Part of their land they

were forced to surrender to the government; their slaves were emancipated; and provision was claimed for them in the shape of either land or money. Since then they have considerably recovered their position. They long constituted a quasi-inde- pendent people under the title of the Choctaw nation, and were governed by a chief and a national council of forty members, according to a written constitution, dating in the main from 1838; they possessed a regular judicial system and employed trial by jury. Tribal government virtually ceased in 1906. The Choctaws number some 18,000. A few groups still linger in Mississippi and Louisiana. The Choctaw language has been re- duced to writing, and brought to some degree of literary precision. See Indians, North American; Handbook of American Indians, ed. F. W. Hodge (Washington, 1907).

CHODKIEWICZ, JAN KAROL (1 560-1 621), Polish general, was the son of Hieronymus Chodkiewicz, castellan of Wilna. After being educated at the Wilna academy he went abroad to learn the science of war, fighting in the Spanish service under Alva, and also under Maurice of Nassau. In 1593 he married the wealthy Sophia Mielecka, by whom he had one son who predeceased him. His first military

service at home was against the Cossack rising of Nalewajko as lieutenant to Zolkiewski, and he subsequently assisted Zamoyski in his victorious Mol- davian campaign. Honours and dignities were now showered upon him. In 1599 he was appointed starosta of Samogitia, and in 1600 acting commander-in-chief of Lithuania. In the war against Sweden for the possession of Livonia he brilliantly distinguished himself, capturing fortress after fortress and repuls- ing the duke of Sudermania, afterwards Charles IX, from Riga. In 1604 he captured Dorpat, twice defeated the Swedish generals at Bialy Kamien, and was rewarded with the grand baton of Lithuania. Criminally neglected by the diet, which from sneer niggardliness turned a deaf ear to all his requests for reinforce- ments and for supplies and money to pay his soldiers, Chodkiewicz nevertheless more than held his own against the Swedes. His crowning achievement was the great victory of Kirkholm (Aug. 27th, 1605), when with barely 5000 men he annihilated a threefold larger Swedish army; for which feat he received letters of congratulation from the pqpe, all the Catholic poten- tates, of Europe, and even from the sultan of Turkey and the shah of Persia. Yet this great victory was absolutely fruitless, owing to the domestic dissensions which prevailed in Poland during the following five years. Chodkiewicz's own army, unpaid for years, abandoned him at last en masse in order to plunder the estates of their political opponents, leaving the grand hetman to carry on the war as best he could with a handful of mercenaries paid out of the pockets of himself and his friends. Chodkiewicz was one of the few magnates who remained loyal to the king, and after helping to defeat the rebels in Poland a fresh invasion of Livonia by the Swedes recalled him thither, and once more he relieved Riga besides capturing Pernau. Meanwhile the war with Muscovy broke out, and Chodkiewicz was sent against Moscow with an army of 2000 men — though if there had been a spark of true patriotism in Poland he could easily have marshalled 100,000. Moreover, the diet neglected to pay for the maintenance even of this paltry 2000, with the result that they mutinied and compelled their leader to retreat through the heart of Muscovy to Smolensk. Not till the crown prince Wladislaus arrived with tardy reinforcements did the war assume a different character, Chodkiewicz opening a new career of victory by taking the fortress of Drohobu in 161 7. The Muscovite war had no sooner been ended by the treaty of Deulina than Chodkiewicz was hastily despatched southwards to defend the southern frontier against the Turks, who after the catastrophe of Cecora (see Zolkiewski) had high hopes of conquering Poland altogether. An army of 160,000 Turkish veterans led by Sultan Osman in person advanced from Adrianople towards the Polish frontier, but Chodkiewicz crossed the Dnieper in September

162 1 and entrenched himself in the fortress of Khotin right in the path of the Ottoman advance. Here for a whole month the Polish hero held the sultan at bay, till the first fall of autumn snow compelled Osman to withdraw

his diminished forces. But the victory was dearly purchased by Poland. A few days before the siege was raised the aged grand hetman died of exhaustion in the fortress (Sept. 24th, 1621).

See Adam Stanislaw Naruszewicz, Life of J. K. Chodkiewicz (Pol. ; 4th ed., Cracow, 1857-1858); Lukasz Golebiowski, The Moral Side of J. K. Chodkiewicz as indicated by his Letters (Pol. ; Warsaw, 1854). (R- N. B.)

CHODOWIECKI, DANIEL NICOLAS (1726-1801), German painter and engraver of Polish descent, was born at Danzig. Left an orphan at an early age, he devoted himself to the practice of miniature painting, the elements of which his father had taught him, as a means of support for himself and his mother. In 1743 he went to Berlin, where for some time he worked as clerk in an uncle's office, practising art, however, in his leisure moments, and gaining a sort of reputation as a painter of miniatures for snuff-boxes. The Berlin Academy, attracted by a small en- graving of his, entrusted to him the illustration of its yearly almanac. After designing and engraving several subjects from the story of the Seven Years' War, Chodowiecki produced the famous " History of the Life of Jesus Christ," a set of admirably painted miniatures, which made him at once so popular that he laid aside all occupations save those of painting and engraving. Few books were published in Prussia for some years without plate'or vignette by Chodowiecki. It is not surprising, therefore, that the catalogue of his works (Berlin, 1814) should include over 3000 items, of which, however, the picture of " Jean Calas and his Family " is the only one of any reputation. He became director of the Berlin Academy in 1 797. The title of the German Hogarth, which he sometimes obtained, was the effect of an admiration rather imaginative than critical, and was disclaimed by Chodowiecki himself. The illustrator of Lavater's Essays on Physiognomy, the painter of the " Hunt the Slipper " in the Berlin museum, had indeed but one point in common with the great Englishman — the practice of representing actual life and manners. In this he showed skilful drawing and grouping, and considerable expressional power, but no tendency whatever to the use of the

grotesque.

His brother Gottfried (1728-1781) and son Wilhelm (1765- 1803) painted and engraved after the style of Daniel, and some- times co-operated with him.

CHOERILUS. (1) An Athenian tragic poet, who exhibited plays as early as 524 B.C. He was said to have competed with Aeschylus, Pratinas and even Sophocles. According to F. G. Welcker, however, the rival of Sophocles was a son of Choerilus, who bore the same name. Suidas states that Choerilus wrote 150 tragedies and gained the prize 13 times. His works are all lost; only Pausanias (i. 14) mentions a play by him entitled Alope (a mythological personage who was the subject of dramas by Euripides and Carcinus) . His reputation as a writer of satyric dramas is attested in the well-known line

■qvlKa. y,iv fSaoiXtbs fjv XoipiXos If Sartpots.

The Choerilean metre, mentioned by the Latin grammarians, is probably so called because the above line is the oldest extant specimen. Choerilus was also said to have introduced consider- able improvements in theatrical masks and costumes.

See A. Nauck, Tragicorum Graecorum Fragmenta (1889) ; F. G. Welcker, Die griechischen Tragodien, pp. 18, 892.

(2) An epic poet of Samos, who flourished at the end of the 5th century B.C. After the fall of Athens he settled at the court of Archelaus, king of Macedonia, where he was the associate of Agathon, Melanippides, and Plato the comic poet. The only work that can with certainty be attributed to him is the Repeats or Htpouih, a history of the struggle of the Greeks against Persia, the central point of which was the battle of Salamis. His import- ance consists in his having taken for his theme national and con- temporary events in place of the deeds of old-time heroes. For this new departure he apologizes in the introductory verses (preserved in the scholiast on Aristotle, Rhetoric, in. 14), where he says that, the subjects of epic poetry being all exhausted, it was necessary to strike out a new path. The story of his intimacy with Herodotus is probably due to the fact that he imitated him and had recourse to his history for the incidents of his poem.

The Perseis was at first highly successful and was said to have been read, together with the Homeric poems, at the Panathenaea, but later critics reversed this favourable judgment. Aristotle (Topica, viii. 1) calls Choerilus's comparisons far-fetched and obscure, and the

Alexandrians displaced him by Antimachus in the canon of epic poets. The fragments are artificial in tone.

G. Kinkel, Epicorum Graecorum Frag. i. (1877); for another view of his relations with Herodotus see Muderin-K/io (1907), 29-44.

{3) An epic poet of Iasus in Caria, who lived in the 4th century B.C. He accompanied Alexander the Great on his campaigns as court-poet. He is well known from the passages in Horace {Epistles, ii. 1, 232; Ars Poetica, 357), according to which he received a piece of gold for every good verse he wrote in celebra- tion of the glorious deeds of his master. The quality of his verses may be estimated from the remark attributed to Alexander, that he would rather be the Thersites of Homer than the Achilles of Choerilus. The epitaph on Sardanapalus, said to have been translated from the Chaldean (quoted in Athenaeus, viii. p. 336), is generally supposed to be by Choerilus.

See G. Kinkel, Epicorum Graecorum Fragmenta, i. (1877); A. F. Nake, De Choerili Samii Aetate Vita et Poesi aliisque Choerilis (181 7), where the above poets are carefully distinguished; and the articles in Pauly-Wissowa's Realencydopadie, iii. 2 (1899).

CHOEROBOSCUS, GE0RGIU3 {c. a.d. 600), deacon and pro- fessor at the oecumenical school at Constantinople. He is also called chartophylax either as the holder of some ecclesiastical office or as superintendent of the university library. It is not known whether " Choeroboscus " (Gr. for ' swineherd ") is an allusion to his earlier occupation or an inherited family name. During his tenure of office he delivered a course of lectures on grammar, which has come down to us in the shape of notes taken by his pupils. He drew from the best authorities — Apollonius Dyscolus, Herodian, Orion, Theodosius of Alexandria. The lectures are written in simple style, but suffer from diffuseness. They were much used by Constantine Lascaris in his Greek grammar and by Urban of Belluno (end of 15th cent.). The chief work of Choeroboscus, which we have in its complete form, is the commentary on the canons of Theodosius on Declension and Conjugation. Mention may also be made of a treatise on orthography, of which a fragment (on Quantity) has been preserved; a tract on prosody; commentaries on Hephaestion and Dionysius Thrax; and grammatical notes on the Psalms.

See C. Krumbacher, Geschichte der byzantinischen Litteralur (1897) ; A. Hilgard, Grammatici Graeci, iv. (1889-1894), containing the text of the commentary on Theodosius, and a full account of the life and writings of Choeroboscus; L. Kohn in Pauly-Wissowa's Real-

encydopadie, iii. 2 (1889) ; Reitzenstein, Etymologika, 190, n. 4.

CHOIR (0. Fr. cuer from Lat. chorus; pronounced quire, and until the end of the 17th century so spelt, the spelling being altered to agree with the Fr. chozur), the body of singers who perform the musical portion of the service in a church, or the place set apart for them. Any organized body of singers per- forming full part choral works or oratorios is also called a choir.

In English cathedrals the choir is composed of men (vicars- choral or lay clerks) and boys (choristers). They are divided into two sets, sitting on the north and south sides of the chancel respectively, called cantoris and decani, from being on the same side as the cantor (precentor) or the decanus (dean) . This arrange- ment, together with the custom of vesting choirmen and choristers in surplices (traditional only in cathedrals and collegiate churches), has, since the middle of the 19th century, been adopted in a large number of parish and other churches. Surpliced choirs of women have occasionally been introduced, notably in America and the British colonies, but the practice has no warrant of traditional usage. In the Roman Catholic Church the choir plays a less conspicuous role than in the Church of England, its members not being regarded as ministers of the church, and non-Catholics are allowed to sing in it. The singers at Mass or other solemn services are usually placed in a gallery or some other inconspicuous place. The word ” choir,” indeed, formerly applied to all the clergy taking part in services of the church, and the restriction of the term to the singing men and boys, who were in their origin no more than the representatives

(vicars) of the clergy, is a comparatively late development. The distinction between ” choir services ” (Mattins, Vespers, Compline, &c.) — consisting of prayers, lections, the singing of the psalms, &c. — and the service of the altar was sharply drawn in the middle ages, as in the modern Roman Church. ” Choir vestments ” (surplice, &c.) are those worn by the clergy at the former, as distinguished from those used at the M$ss (see Vestments). In England at the Reformation the choir services (Mattins, Evensong) replaced the Mass as the principal popular services, and, in general, only the choir vestments were retained in use. In the English cathedrals the members of the choir often retain privileges reminiscent of an earlier definite ecclesiastical status. At Wells, for instance, the vicars-choral form a corporation

practically independent of the dean and chapter; they have their own lodgings inside the cathedral precincts (Vicars' Close) and they can only be dismissed by a vote of their own body. • ' (W. A. P.)

In an architectural sense a " choir" is strictly that part of a church which is fitted up for the choir services, and is thus limited to the space between the choir screen and the presbytery. Some confusion has arisen owing to the term being employed by medieval writers to express the entire space enclosed for the performance of the principal services of the church, and therefore to include not only the choir proper, but the presbytery. In the case of a cruciform church the choir is sometimes situated under the central tower, or in the nave, and this is the case in Westminster Abbey, where it occupies four bays to the west of the transept. The choir is usually raised one step above the nave, and its sides are fitted up with seats or stalls, of which in large buildings there are usually two or three rows rising one behind the other.

In Romanesque churches there are eastern and western choirs, and in former times the term was given to chantries and sub- sidiary chapels, which were also called chancels. In the early Christian church the ambones where the gospels and epistles were read were placed one on either side of the choir and formed part of its enclosure, and this is the case in S. Clemente, S. Lorenzo and S. Maria in Cosmedin in Rome. In England the choir seems almost universally to have assembled at the eastern part of the church to recite the breviary services, whereas on the continent it was moved from one place to another according to convenience. In Spanish churches it occupies the nave of the church, and in the church of the Escorial in Spain was at the west end above the entrance vestibule. (R. P. S.)

CHOISEUL, CESAR, Due de (1602-1675), French marshal and diplomatist, generally known for the best part of his life as the marshal du Plessis-Praslin, came of the old French family of Choiseul, which arose in the valley of the Upper Marne in the 10th century and divided into many branches, three of the names of which, Hostel, Praslin and du Plessis, were borne, at one time or another, by the subject of this article. Entering the army at the age of fourteen as proprietary colonel of an infantry regiment, he shared in almost all the exploits of the French arms during the reign of Louis XIII. He took part in the siege of La Rochelle, assisted to defend the island of Re against the attacks of the English under the duke of Buckingham, and accompanied the French forces to Italy in 1629. In 1630 he was appointed ambassador at the court of the duke of Savoy, and was engaged in diplomatic and administrative work in Italy until 1635,

when war was declared between France and Spain. In the war that followed Plessis-Praslin distinguished himself in various battles and sieges in Italy, including the action called the ” Route de Quiers ” and the celebrated four- cornered operations round Turin. In 1 640 he was made governor of Turin, and in 1642 lieutenant-general, and after further service in Italy he was made a marshal of France (1645) and appointed second in command in Catalonia. During the first War of the Fronde, which broke out in 1640, he assisted Cond6 in the brief siege of Paris; and in the second war, remaining loyal to the queen regent and the court party, he won his greatest triumph in defeating Turenne and the allied Spaniards and rebels at Rethel (or Blanc-Champ) in 1650. He then held high

office at the court of Louis XIV., became minister of state in 1652, and in November 1665 was created due de Choiseul. He was concerned in some of the negotiations between Louis and Charles II. of England which led to the treaty of Dover, and died in Paris on the 23rd of December 1675.

CHOISEUL, ETIENNE FRANCOIS, Due de (1710-1785), French statesman, was the eldest son of Francois Joseph de Choiseul, marquis de Stainville (1700-17 70), and bore in early life the title of comte de Stainville. Born on the 28th of June 1719; he entered the army, and during the War of the Austrian Succession served in Bohemia in 1741 and in Italy, where he distinguished himself at the battle of Coni, in 1744. From 1745 until 1748 he was with the army in the Low Countries, being present at the sieges of Mons, Charleroi and Maestricht. He attained the rank of, lieutenant-general, and in 1750 married Louise Honorine, daughter of Louis Francois Crozat, marquis du Chatel (d. 1750), who brought her husband a large fortune and proved a most devoted wife.

Choiseul gained the favour of Madame de Pompadour by procuring for her some letters which Louis XV. had written to his cousin Madame de Choiseul, with whom the king had formerly had an intrigue; and after a short time as bailli of the Vosges he was given the appointment of ambassador to Rome in 1753, where he was entrusted with the negotiations concerning the disturbances called forth by the bull Unigenitus. He acquitted himself skilfully in this task, and in 1757 his patroness obtained his transfer to Vienna, where he was instructed to cement the new alliance between France and Austria. His success at Vienna opened the way to a larger career, when in 1758 he supplanted Antoine Louis Rouille (1689-1761) as minister for foreign affairs and so had the direction of French foreign policy during the Seven Years’ War. At this time he was made a peer of France and

created due de Choiseul. Al- though from 1 76 1 until 1766 his cousin Cesar, due de Choiseul- Praslin (1712-1785), was minister for foreign affairs, yet Choiseul continued to control the policy of France until 1770, and during this period held most of the other important offices of state. As the author of the ” Family Compact ” he sought to retrieve by an alliance with the Bourbon house of Spain the disastrous results of the alliance with Austria; but his action came too late. His vigorous policy in other departments of state was not, however, fruitless. Coming to power in the midst of the demoral- ization consequent upon the defeats of Rossbach and Crefeld, by boldness and energy he reformed and strengthened both army and navy, and although too late to prevent the loss of Canada and India, he developed French colonies in the Antilles and San Domingo, and added Corsica and Lorraine to the crown of France. His management of home affairs in general satisfied the philosophes. He allowed the Encyclopedic to be published, and brought about the banishment of the Jesuits and the tem- porary abolition of the order by Pope Clement IV.

Choiseul’s fall was caused by his action towards the Jesuits, and by his support of their opponent La Chalotais, and of the provincial parlements. After the death of Madame de Pompa- dour in 1764, his enemies, led by Madame Du Barry and the chancellor Maupeou, were too strong for him, and in 1770 he was ordered to retire to his estate at Chanteloupe. The intrigues against him had, however, increased his popularity, which was already great, and during his retirement, which lasted until 1774, he lived in the greatest affluence and was visited by many eminent personages. Greatly to his disappointment Louis XVI. did not restore him to his former position, although the king recalled him to Paris in 1774, when he died on the 8th of May 1785, leaving behind him a huge accumulation of debt which was scrupulously discharged by his widow.

Choiseul possessed both ability and diligence, and though lacking in tenacity he showed foresight and liberality in his direction of affairs. In appearance he was a short, ill-featured man, with a ruddy countenance and a sturdy frame. His Mgmoires were written during his exile from Paris, and are merely detached notes upon different questions. Horace Walpole, in his Memoirs, gives a very vivid description of the

duke’s character, accuses him of exciting the war between Russia and

Turkey in 1768 in order to be revenged upon the tsarina Catherine II., and says of his foreign policy, ” he would project and determine the ruin of a country, but could not meditate a little mischief or a narrow benefit.” ” He dissipated the nation’s wealth and his own; but did not repair the latter by plunder of the former,” says the same writer, who in reference to Choiseul’s private life asserts that ” gallantry without delicacy was his constant pursuit.” Choiseul’s widow, a woman ” in whom industrious malice could not find an imperfection,” lived in retirement until her death on the 3rd of

December 1808.

See Memoires du due de Choiseul, edited by F. Calmettes (Paris, 1904) ; P. Boutaric, L’Ambassade de Choiseul a Vienne en I757-I75& (Paris, 1872); Due de Cars, MSmoires (Paris, 1890); F. J. de P., Cardinal de Bernis, Memoires et lettres (Paris, 1878) ; Madame de Pompadour, Correspondance (Paris, 1878); Revue historique, tomes 82 and 87 (Paris, 1903-1905) ; Horace Walpole, Memoirs of the Reign of George III., edited by G. F. R. Barker (London, 1894); G. Mangros, Le due et la duehesse de Choiseul (Paris, 1903) ; and La Disgrace du due et de la duehesse de Choiseul (Paris, 1903) ; E. Calmettes, Choiseul et Voltaire (Paris, 1902); A. Bourguet, Etudes sur la politique etrangere du due de Choiseul (Paris, 1907); and Le Due de Choiseul et Valliance espagnole (Paris, 1906). See also the Edinburgh Review for July 1908.

CHOISEUL-STAINVILLE, CLAUDE ANTOINE GABRIEL, Due de (1760-1838), French soldier, was brought up at Chante- loup, under the care of his relative, Etienne Francois, due de Choiseul, who was childless. The outbreak of the Revolution found him a colonel of dragoons, and throughout those troublous times he was distinguished for his devotion to the royal house. He took part in the attempt of Louis XVI. to escape from Paris on the 20th of June 1791; was arrested with the king, and imprisoned. Liberated in May 1792, he emigrated in October, and fought in the ” army of Conde ” against the republic. Captured in 1795, he was confined at Dunkirk; escaped, set sail for India, was wrecked on the French coast, and condemned to death by the decree of the Directory. Nevertheless, he was fortunate enough to escape once more. Napoleon allowed him to return to France in 1801, but he remained in private life until the fall of the Empire. At the Restoration he was called to the House of Peers by Louis XVIII. At the revolution of 1830 he was nominated a member of the provisional government; and he afterwards received from Louis Philippe the post of aide-de-camp to the king and governor of the Louvre. He died in Paris on the 1st of December 1838.

CHOISY, FRANCOIS TIMOLEON, Abbe de (1644-1724), French author, was born in Paris on the 16th of August 1644, and died in Paris on the 2nd of October 1724. His father was attached to the household of the duke of Orleans, and his mother, who was on intimate terms with Anne of Austria, was regularly called upon to amuse Louis XIV. By a whim of his mother, the boy was dressed like a girl until he was eighteen, and, after appearing for a short time in man's costume, he resumed woman's dress on the advice — doubtless satirical — of Madame de La Fayette. He delighted in the most extravagant toilettes until he was publicly rebuked by the due de Montausier, when he retired for some time to the provinces, using his disguise to assist his numerous intrigues. He had been made an abb6 in his childhood, and poverty, induced by his extravagance, drove him to live on his benefice at Sainte-Seine in Burgundy, where he found among his neighbours a kindred spirit in Bussy- Rabutin. He visited Rome in the suite of the cardinal de Bouillon in 1676, and shortly afterwards a serious illness brought about a sudden and rather frivolous conversion to religion. In 1685 he accompanied the chevalier de Chaumont on a mission to Siam. He was ordained priest, and received various ecclesi- astical preferments. He was admitted to the Academy in 1687, and wrote a number of historical and religious works, of which the most notable are the following: — Qitatre dialogues sur I'immortalite de I'&me . . . (1684), written with the Abbe Dangeau and explaining his conversion; Traduction de I' Imita- tion de Jesus-Christ (1692); Histoire de France sous les rbgnes de Saint Louis . . . de Charles V et Charles VI (5 vols.,

1688-1695); and Histoire de I'Eglise (n vols., 1703-1723) He is remembered, however, by his gossiping Mimoires (1737), which contain striking and accurate pictures of his time and remarkably exact portraits of his contemporaries, although he has otherwise small pretensions to historical accuracy.

The Memoires passed through many editions, and were edited in 1868 by M. de Lescure. Some admirable letters of Choisy are in- cluded in the correspondence of Bussy-Rabutin. Choisy is said to have burnt some of his indiscreet revelations, but left a considerable quantity of unpublished MS. Part of this material, giving an account of his adventures as a woman, was surreptitiously used in an anonymous Histoire de madame la comtesse de Barres (Antwerp, !735)> and again with much editing in the Vie de M. I'abbS de Choisy (Lausanne and Geneva, 1742), ascribed by Paul Lacroix to Lenglet Dufresnoy; the text was finally edited (1870) by Lacroix as Aven- tures de I'abbe de Choisy. See also Sainte-Beuve, Causeries du lundi, vol. iii.

CHOLERA (from the Gr. x°M> “>ile, and peeiv, to flow), the name given to two distinct forms of disease, simple cholera and malignant cholera. Although essentially different both as to their causation and their pathological relationships, these two diseases may in individual cases present many symptoms of mutual resemblance.

Simple Cholera (synonyms, Cholera Europaea, British Cholera, Summer or Autumnal Cholera) is the cholera of ancient medical writers, as is apparent from the accurate description of the disease given by Hippocrates, Celsus and Aretaeus. Its occurrence in an epidemic form was noticed by various physicians in the 16th century, and an admirable account of the disease was subsequently given by Thomas Sydenham in 1669-167 2. This disease is sometimes called Cholera Nostras, the word nostras, which is good Latin and used by Cicero, meaning ” be- longing to our country.” The relations between it and Asiatic cholera (see below) are obscure. Clinically they may exactly resemble each other, and bacteriology has not been able to draw an absolute line between them. The real difference is epidemio- logical, cholera nostras having no epidemic significance.

The chief symptoms in well-marked cases are vomiting and purging occurring either together or alternately. The seizure is usually sudden and violent. The contents of the stomach are first ejected, and this is followed by severe retching and vomiting of thin fluid of bilious appearance and bitter taste. The diarrhoea which accompanies or succeeds the vomiting, and is likewise of bilious character, is attended with severe griping abdominal pain, while cramps affecting the legs or arms greatly intensify the suffering. The effect upon the system is rapid and alarming, a few hours of such an attack sufficing to reduce the strongest person to a state of extreme prostration. The surface of the body becomes cold, the pulse weak, the voice husky, and the whole symptoms may resemble in a striking manner those of malignant cholera, to be subsequently described. In unfavour- able cases, particularly where the disorder is epidemic, death may result within forty-eight hours. Generally, however, the attack is arrested and recovery soon follows, although there may remain for a considerable time a degree of irritability of the alimentary canal, rendering necessary the utmost care in regard to diet.

Attacks of this kind are of frequent occurrence in summer and autumn in almost all countries. They appear specially liable to occur when cold and damp alternate with heat. Occasionally the disorder prevails so extensively as to constitute an epidemic. The exciting causes of an attack are in many cases errors in diet, particularly the use of unripe fruit and new vegetables, and the excessive drinking of cold liquids

during perspiration. Out- breaks of this disorder in a household or community can some- times be traced to the use of impure water, or to noxious emanations from the sewers.

In the treatment, vomiting should be encouraged so long as it shows the presence of undigested food, after which opiates ought to be administered. Small opium pills, or Dover's powder. or the aromatic powder of chalk with opium, are likely to be retained in the stomach, and will generally succeed in allaying the pain and diarrhoea, while ice and effervescing drinks serve

to quench the thirst and subdue the sickness. In aggravated cases where medicines are rejected, enemata of starch and laudanum, or the hypodermic injection of morphia, ought to be resorted to. Counter-irritation by mustard or turpentine over the abdomen is always of use, as is also friction with the hands where cramps are present. When sinking threatens, brandy and ammonia will be called for. During convalescence the food should be in the form of milk and farinaceous diet, or light soups, and all indigestible articles must be carefully avoided.

In the treatment of this disease as it affects young children {Cholera Infantum), most reliance is to be placed on the adminis- tration of chalk and the use of starch enemata. In their case opium in any form cannot be safely employed.

Malignant Cholera (synonyms, Asiatic Cholera, Indian Cholera, Epidemic Cholera, Algide Cholera) is one of the most severe and fatal diseases. In describing the symptoms it is customary to divide them into three stages, but it must be noted that these do not always present themselves in so distinct a form as to be capable of separate recognition. The first or premonitory stage consists in the occurrence of diarrhoea. Frequently of mild and painless character, and coming on after some error in diet, this symptom is apt to be disregarded. The discharges from the bowels are similar to those of ordinary summer cholera, which the attack closely resembles. There is, however, at first the absence of vomiting. This diarrhoea generally lasts for two or three days, and then if it does not gradually subside either may pass into the more severe pheno- mena characteristic of the second stage of cholera, or on the other hand may itself prove fatal.

The second stage is termed the stage of collapse or the algide or asphyxial stage. As above mentioned, this is often preceded by the premonitory diarrhoea, but not infrequently the pheno- mena attendant upon this stage are the first to manifest them- selves. They come on often suddenly in the night with diarrhoea of the most violent character, the matters discharged being of whey-like appearance, and commonly termed the ” rice-water ” evacuations. They contain large quantities of disintegrated epithelium from the mucous membrane of the intestines. The discharge, which is at first unattended with pain, is soon suc- ceeded by copious vomiting of matters similar to those passed from the bowels, accompanied with severe pain at the pit of the stomach, and with intense thirst. The symptoms now advance with rapidity. Cramps of the legs, feet, and muscles of the abdomen come on and occasion great agony, while the signs of collapse make their appearance. The surface of the body becomes cold and assumes a blue or purple hue, the skin is dry, sodden and wrinkled, indicating the intense draining away of the fluids of the body, the features are pinched and the eyes deeply sunken, the pulse at the wrist is imperceptible, and the voice is reduced to a hoarse whisper (the vox cholerica). There is complete suppression of the urine.

In this condition death often takes place in less than one day, but in epidemics cases are frequently observed where the collapse is so sudden and complete as to prove fatal in one or two hours even without any great amount of previous purging or vomiting. In most instances the mental faculties are com- paratively unaffected, although in the later stages there is iri general more or less apathy.

Reaction, however, may take place, and this constitutes the third stage. It consists in the arrest of the alarming symptoms characterizing the second stage, and the gradual but evident improvement in the patient’s condition. The pulse returns, the surface assumes a natural hue, and the bodily heat is restored. Before long the vomiting ceases, and although diarrhoea may continue for a time, it is not of a very severe character and soon subsides, as do also the cramps. The urine mayremain suppressed for some time, and on returning is often found to be albuminous. Even in this stage, however, the danger is not past, for relapses sometimes occur which speedily prove fatal, while again the reaction may be of imperfect character, and there may succeed an exhausting fever (the so-called typhoid stage of cholera) which may greatly retard recovery, and under which the patient

Causation.

may sink at a period even as late as two or three weeks from the commencement of the illness.

Many other complications are apt to arise during the progress of convalescence from cholera, such as diphtheritic and locai inflammatory affections, all of which are attended with grave danger.

When the attack of cholera is of milder character in all its stages than that above described, it has been named Cholerine, but the term is an arbitrary one and the disease is essentially cholera.

The bodies of persons dying of cholera are found to remain long warm, and the temperature may even rise after death. Peculiar muscular contractions have been observed to take place after death, so that the position of the limbs may become altered. The soft textures of the body are found to be dry and hard, and the muscles of a dark brown appearance. The blood is of dark colour and tarry consistence. The upper portion of the small intestines is generally found distended with the rice- water discharges, the mucous membrane is swollen, and there is a remarkable loss of its natural epithelium. The kidneys are usually in a state of acute congestion. This form of cholera belongs originally to Asia, more particularly to India, where, as well as in the Indian archipelago, epidemics are known to have occurred at various times for several centuries.

Much light has been thrown upon Asiatic cholera by Western experience; and the study of the disease by modern methods has resulted in important additions to our previous knowledge of its nature, causation, mode of dissemination and prevention.

The cause is a micro-organism identified by Koch in 1883 (see Parasitic Diseases). For some years it was called the ” comma bacillus,” from its supposed resemblance in shape to a comma, but it was subsequently found to be a vibrio or spirillum, not a bacillus. The discovery was received with much scepticism in some quarters, and the claim of Koch’s vibrio to be the true cause of cholera was long disputed, but is now universally acknowledged. Few micro-organisms have been more elaborately investigated, but very little is known of its natural history, and its epidemiological behaviour is still surrounded by obscurity. At an important discussion on the subject, held at the International Hygienic Congress in 1894, Professor Gruber of Vienna declared that the deeper investigators went the more difficult the problem became, while M. Elie Metsch- nikoff of the Pasteur Institute made a similar admission. The difficultyjiies chiefly in the variable characters assumed by the organism and the variable effects produced

by it. The type reached by cultivation through a few generations may differ so widely from the original in appearance and behaviour as to be hardly recognizable, while, on the other hand, of two organisms apparently indistinguishable one may be innocuous and the other give rise to the most violent cholera. This variability offers a possible explanation of the frequent failure to trace the origin of epidemic outbreaks in isolated places. It is commonly assumed that the micro-organism is of a specific character, and always introduced from without, when cholera appears in countries or places where it is not endemic. In some cases such introduc- tion can be proved, and in others it can be inferred with a high degree of probability, but sometimes it is impossible to trace the origin to any possible channel of communication. A remark- able case of this kind occurred at the Nietleben lunatic asylum near Halle, in 1893, in the shape of a sudden, explosive and isolated outbreak of true Asiatic cholera. It was entirely con- fined to the institution, and the peculiar circumstances enabled a very exact investigation to be made. The facts led Professor Arndt, of Greifswald, to propound a novel – and interesting theory. No cholera existed in the surrounding district and no introduction could be traced, but for several months in the previous autumn diarrhoea had prevailed in the asylum. The sewage from the establishment was disposed of on a farm, and the effluent passed into the river Saale above the intake of the water-supply for the asylum. Thus a circulation of morbid material through the persons of the inmates was established. Dr Arndt's theory was that by virtiie of this circulation cholera was

gradually developed from previously existing intestinal disease of an allied but milder type. The outbreak occurred in winter, and coincided with the freezing of the filter-beds at the water- works. The theory is worth notice, because a similar relation between the drainage and the water-supply frequently exists in places severely attacked by cholera, and it has repeatedly been observed that the latter is preceded by the prevalence of a milder form of intestinal disease. The inference is not that cholera can be developed de novo, but that the type is unstable, and that a virulent form may be evolved under favourable conditions from another so mild as to be unrecognized, and consequently undetected in its origin or introduction. This is quite in keeping with the observed variability of the micro- organism, and with the trend of modern research with regard to the relations between other pathogenic germs and the multi- farious gradations of type assumed

by other zymotic diseases. The same thing has been suggested of diphtheria.

Cholera is endemic in the East over a wide area, ranging from Bombay to southern China, but its chief home is British India.

It principally affects the alluvial soil near the mouths fc«v. enl ” °f tne g reat rivers, and more particularly the delta

of the Ganges. Lower Bengal is pre-eminently the standing focus and centre of diffusion. In some years it \s quiescent, though never absent; in others it becomes diffused, for reasons of which nothing is known, and its diffusive activity varies greatly from equally inscrutable causes. At irregular intervals this property becomes so heightened that the disease passes its natural boundaries and is carried east, north and west, it may be to Europe or beyond to the American continent. We must assume that the micro-organism, like those of other epidemic diseases, acquires greater vitality and toxic energy, or greater power of reproduction at some times than at others, but the con- ditions that govern this behaviour are quite unknown, though no problem has a more important bearing on public health. Bacteriology, as already intimated, has thrown no light upon it, nor has meteorology. Some results of modern research, indeed, tend to assign increasing importance to the relations between surface soil and certain micro-organisms, and suggest that changes in the level of the subsoil water, to which Professor Max von Pettenkoffer long ago drew attention, may be a domin- ant factor in determining the latency or activity of pathogenic germs. But this is largely a matter of conjecture, and, so far as cholera is concerned, the conditions which turn an endemic into an epidemic disease must be admitted to be still unknown.

On the other hand, the mode of dissemination is now well understood. Diffusion takes place ■ along the lines of human intercourse. The poison is carried chiefly by infected persons moving from place to place; but soiled clothes, rags and other articles that have come into contact with persons suffering from the disease may be the means of conveyance to a distance. There is no reason to suppose that it is air-borne, or that atmo- spheric influences have anything to do with its spread, except in so far as meteorological conditions may be favourable to the growth and activity of the micro-organisms. Beyond all doubt, the great manufactory of the poison is the human body, and the discharges from it are the great source of contagion. They may infect the ground, the water, or the immediate surroundings of the patient, and so pass from hand to hand, the poison finding entrance into the bodies of the healthy by means of food and drink which have

become contaminated in various ways. Flies which feed upon excreta and other foul matters may be carriers of contagion. Of all the means of local dissemination, contaminated water is by far the most important, because it affects the greatest number of people, and this is particularly the case in places which have a public water-supply. A single contaminated source may expose the entire population to danger. All severe outbreaks of an explosive character are due to this cause. It is also possible that the cholera poison multiplies rapidly in water under favour- able conditions, and that a reservoir, for instance, may form a sort of forcing-bed. But it would be a mistake to regard cholera as purely a water-borne disease, even locally. It may infect the soil in localities which have a perfectly pure water-

supply, but have defective drainage or no drainage at all, and then it will be found more difficult to get rid of, though less formidable in its effects, than when the water alone is the source of mischief. In all these respects it has a great affinity to enteric fever. With regard to locality, no situation can be said to be free from attack if the disease is introduced and the sanitary condi- tions are bad; but, speaking generally, low-lying places on alluvial soil near rivers are more liable than those standing high or on a rocky foundation. Of meteorological conditions it can only be said with certainty that a high temperature favours the development of cholera, though a low one does not prevent it. In temperate climates the summer months, and particularly August and September, are the season of its greatest activity.

Cholera spreads westwards from India by two routes — (1) by sea to the shores of the Red Sea, Egypt and the Mediterranean; and (2) by land to northern India and Afghanistan, thence to Persia and central Asia, and so to Russia. In

Western diffusion.

the great invasions of Europe during the 19th century it sometimes followed one route and sometimes the other. It was not till 18 17 that the attention of European physicians was specially directed to the disease by the outbreak of a violent epidemic of cholera at Jessore in Bengal. This was followed by its rapid spread over a large portion of British India, where it caused immense destruction of life both among natives and Europeans. During the next three years cholera continued to rage all over India, as well as in Ceylon and others of the Indian islands. The disease now began to spread over a wider extent than hitherto, invading China on the east and Persia on the west. In 1823 it had extended into Asia Minor and Russia in Asia, and it continued to advance steadily though slowly westwards, while at the same time

fresh epidemics were appearing at intervals in India. From this period up till 1830 no great extension of cholera took place, but in the latter year it reappeared in Persia and along the shores of the Caspian Sea, and thence entered Russia in Europe. Despite the strictest sanitary precautions, the disease spread rapidly through that whole empire, causing great mortality and exciting consternation everywhere. It ravaged the northern and central parts of Europe, and spread onwards to England, appearing in Sunderland in October 1831, and in London in January 1832, during which year it continued to prevail in most of the cities and large towns of Great Britain and Ireland. The disease subsequently extended into France, Spain and Italy, and crossing the Atlantic spread through North and Central America. It had previously prevailed in Arabia, Turkey, Egypt and the Nile district, and in 1835 it was general throughout North Africa. Up till 1837 cholera continued to break out in various parts of the continent of Europe, after which this epidemic disappeared, having thus within twenty years visited a large portion of the world.

About the year 1841 another great epidemic of cholera appeared in India and China, and soon began to extend in the direction traversed by the former, but involving a still wider area. It entered Europe again in 1847, and spread through Russia and Germany on to England, and thence to France, whence it passed to America, and subsequently appeared in the West Indies. This epidemic appears to have been even more deadly than the former, especially as regards Great Britain and France. A third great outbreak of cholera took place in the East in 1850, entering Europe in 1853. During the two succeed- ing years it prevailed extensively throughout the continent, and fell with severity on the armies engaged in the Crimean War. Although widely prevalent in Great Britain and Ireland it was less destructive than former epidemics. It was specially severe throughout both North and South America. A fourth epidemic visited Europe again in 1865-1866, but was on the whole less extensive and destructive than its predecessors.

By some writers the epidemic of 1853 is regarded as a re- crudescence of that of 1847. The earlier ones followed the land route by way of Afghanistan and Persia, and took several years to reach Europe. That of 1865 travelled more rapidly, being carried from Bombay by sea to Mecca, from there to Suez and Alexandria, and then on to various Mediterranean ports Within

the year it had not only spread extensively in Europe, but had reached the West Indies. In 1866 it invaded England and the United States, but during the following year it died down in the West. The subsequent history of cholera in Europe may be stated chronologically.

1860-1874. — This invasion was traced to the great gathering of pilgrims at Hardwar on the Upper Ganges in the month of April 1867. From there the returning pilgrims carried it to the Punjab, Kashmir and Afghanistan, whence it spread to Persia and the Caspian, but it did not reach Russia until 1869. During the next four years a number of outbreaks occurred in central Europe, and notably one at Munich in the winter of 1873. The irregular character of these epidemics suggests that they were rather survivals from the pandemic wave of 1867 than fresh importations, but there is no doubt that cholera was carried overland into Russia in the manner described.

188 3-1887. — This visitation, again, came by the Mediterranean. In 1883 a severe outbreak occurred in Egypt, causing a mortality of above 25,000. Its origin remained unknown. During this epidemic Koch discovered the comma bacillus. The following year cholera appeared at Toulon. It was said to have been brought in a troopship from Saigon in Cochin-China, but it may have been connected with the Egyptian epidemic. A severe outbreak followed and reached Italy, nearly 8000 persons dying in Naples alone. In 1885 the south of France, Italy, Sicily and Spain all suffered, especially the last, where nearly 120,000 deaths occurred. Portugal escaped, and the authorities there attributed their good fortune to the institution of a military cordon, in which they have had implicit confidence ever since. In 1886 the same countries suffered again, and also Austria- Hungary. From Italy the disease was carried to South America, and even travelled as far as Chile, where it had previously been unknown. In 1887 it still lingered in the Mediterranean, causing great mortality in Messina especially. According to Dr A. J. Wall, this epidemic cost 250,000 lives in Europe and at least 50,000 in America. A particular interest attaches to it in the fact that a localized revival of the disease was caused in Spain in 1890 by the disturbance of the graves of some of the victims who had died of cholera four years previously.

i8q2-i8q$. — This great invasion reverted again to the old overland route, but the march of the disease was of unprece- dented rapidity. Within less than five months it travelled from the North- West Provinces of India to St Petersburg, and probably to Hamburg, and thence in a few days to England and the United States. This speed, in such striking contrast to the slow advance of former occasions, was attributed, and no doubt rightly, to improved steam transit, and

particularly the Trans- caspian railway. The progress of the disease was traced from place to place, and almost from day to day, with great precision, showing how it moves along the chief highways and is obviously carried by man. The main facts are as follows :— Cholera was extensively and severely prevalent in India in 1891, causing 601,603 deaths, the highest mortality since 1877. In March 1892 it broke out at the Hardwar fair, a day or two before the pilgrims dispersed; on the 19th of April it was at Kabul, on the 1st of May at Herat, and on the 26th of May at Meshed. From Meshed it moved in three directions — due west to Teheran in Persia, north-east by the Transcaspian railway to Samarkand in Central Asia, and north-west by. the same line in the opposite direction to Uzun-ada on the Caspian Sea. It reached Uzun-ada on the 6th of June; crossed to Baku, June 18th; Astrakhan, June 24th; then up the Volga to Nizhniy-Novgorod, arriving at Moscow and St Petersburg early in August. The part played by steam transit is clear from the fact that the disease took no longer to travel all the way from Meshed to St Petersburg by rail and steamboat than to traverse the short distance from Meshed to Teheran by road. On the 16th of August cases began to occur in Hamburg; on the 19th of August a fireman was taken ill at Grangemouth in Scotland, where he had arrived the day before from Hamburg; and on the 31st of August a vessel reached New York from the same port with cholera on board. On the 8th of September the disease appeared in Galicia,

having moved somewhat slowly westwards across Russia into Poland, and on the 26th of September it was in Budapest. Hol- land and Servia were also attacked, while isolated cases were carried to Norway, Denmark and Italy. Meanwhile two entirely separate epidemics were in progress elsewhere. The first was confined to Arabia and the Somali coast of Africa, and was connected with the remains of an outbreak in Syria and Arabia in 1890-1891. The second arose mysteriously in France about the time when the overland invasion started from India. The first known case occurred in the prison at Nanterre, near Paris, on the 31st of March. Paris was affected in April, and Havre in July. The origin of this outbreak, which was of a much less violent character than that which came simultaneously by way of Russia, was never ascertained. Its activity was confined to France, particularly in the neighbourhood of Paris, together with Belgium and Holland, which was placed between two fires, but escaped with but little'mortality. The number of persons killed by cholera in 1892, outside of India, was reckoned at 378,449, and the vast majority of those died within six months. The countries which suffered most severely were as follows: — European Russia, 151,626; Caucasus, 69,423; Central Asian Russia,

31,804; Siberia, 15,037 — total for Russian empire, 267,890; Persia, 63,982; Somaliland, 10,000; Afghanistan, 7,000; Germany, 9563; France, 4550; Hungary, 1255; Belgium, 961. Curiously enough, the south of Europe, which had been the scene of the previous epidemic visitation, escaped. The disease was of the most virulent character. In European Russia the mortality was 45-8% of the cases, the highest rate ever known in that country; in Germany it was 51-3%; and in Austria-Hungary, 57-5%. Of all the localities attacked, the case of Hamburg was the most remarkable. The presence of cholera was first suspected on the 16th of August, when two cases occurred, but it was not officially declared until the 23rd of August. By that time the daily number of victims had already risen to some hundreds, while the experts and authorities were making up their minds whether they had cholera to deal with or not. Their decision eventually came too late and was superfluous, for by the 27th of August the people were being stricken down at the rate of 1000 a day. This rate was main- tained for four days, after which the vehemence of the pestilence began to abate. It gradually declined, and ceased on the 14th of November. During those three months 16,956 persons were attacked and 8605 died, the majority within the space of a few weeks. The town, ordinarily one of the gayest places of business and pleasure on the continent, became a city of the dead. Thousands of persons fled, carrying the disease into all parts of Germany; the rest shut themselves indoors; the shops were closed, the trams ceased to run, the hotels and restaurants were deserted, and few vehicles or pedestrians were seen in the streets. At the cemetery, which lies about 10 m. from the town, some hundreds of men were engaged day and night digging long trenches to hold double rows of coffins, while the funerals formed an almost continuous procession along the roads; even so the victims could not be buried fast enough, and their bodies lay for days in sheds hastily run up as mortuaries. Hamburg had been attacked by cholera on fourteen previous occasions, beginning with 1831, but the mortality had never approached that of 1892; in the worst year, which was 1832, there were only 3687 cases and 1765 deaths. The disease was believed to have been introduced by Jewish emigrants passing through on their way from Russia, but the importation could not be traced. The Jews were segregated and kept under careful supervision from the middle of July onwards, and no recognized case occurred among them. The total number of places in Germany in which cholera appeared in 1892 was 269, but it took no serious hold anywhere save in Hamburg. The distribution was chiefly by the waterways) which seem to affect a larger number of places than the railways as carriers of cholera. In Paris 907 persons died, and in Havre 498. Between the 18th of August and the 21st of October 38 cases were imported into

England and Scotland through eleven different ports, but the disease nowhere obtained a footing. Seven vessels brought 72 cases to the United States,

and 1 6 others occurred on shore, but there was no further dissemination.

During the winter of 1892-1893 cholera died down, but never wholly ceased in Russia, Germany, Austria-Hungary and France. With the return of warm weather it showed renewed activity, and prevailed extensively throughout Europe. The recorded mortality for the principal countries was as follows: — Russia (chiefly western provinces), 41,047; Austria-Hungary, 4669; France, 4000; Italy, 3036; Turkey, 1500; Germany, 298; Holland, 376; Belgium, 372; England, 139. Hardly any country escaped altogether; but Europe suffered less than' Arabia, Mesopotamia and Persia. Cholera broke out at Mecca in June, and owing to the presence of an exceptionally large number of pilgrims caused an appalling mortality. The chief shereef estimated the mortality at 50,000. The pilgrims carried the disease to Asia Minor and Constantinople. In Persia also a recrudescence took place and proved enormously destructive. Dr Barry estimated the mortality at 70,000. At Hamburg, where new waterworks had been installed with sand filtration, only a few sporadic cases occurred until the autumn, when a sudden but limited rush took place, which was traced to a defect in the masonry permitting unfiltered Elbe water to pass into the mains. In England cholera obtained a footing on the Humber at Grimsby, and to a lesser extent at Hull, and isolated attacks occurred in some 50 different localities. Excluding a few ship-borne cases the registered number of attacks was 287, with 135 deaths, of which 9 took place in London. It is interesting to compare the mortality from cholera in England and Wales, and in London, for each year in which it has prevailed since registration began : —

Year.

England and Wales.

London.

Deaths.

Deaths per 10,000 living.

Deaths.

Deaths per 10,000 living.

1 1848

? 1849

5 1853 1 1854 5 1865 1 1866

\ 1893

1 1894

1,908 53.293

4.419 20,097

1,297

H.378

ml

i-i

303 2-4

10-9

o-6

6-8 0-05

nil

652

14.137

883

10,738

196

5.596

9

nil

29

6l-8

3-5 42-8

o-6

18-4

0-002

nil

Preven- tion.

In 1894 no deaths from cholera were recorded in England, but on the continent it still prevailed over a wide area. In Russia over 30,000 persons died of it, in Germany about 500, but the most violent outbreak was in Galicia, where upwards of 8000 deaths were registered. In 1895 it still lingered, chiefly in Russia and Galicia, but with greatly diminished activity. In that year Egypt, Morocco and Japan were attacked, the last severely. The disease then remained in abeyance until the severe epidemic in India in 1900.

The great invasion just described was fruitful in lessons for the prevention of cholera. It proved that the one real and sufficient protection lies in a standing condition of good sanitation backed by an efficient and vigilant sanitary administration. The experience of Great Britain was a remarkable piece of evidence, but that of Berlin was perhaps even more striking, for Berlin lay in the centre of four fires, in direct and frequent communication with Hamburg, Russia, France and Austria, and without the advantage of a sea frontier. Cholera was repeatedly brought into Berlin, but never obtained a footing, and its successful repression was accomplished without any irksome

interference with traffic or the ordinary business of life. The general success of Great Britain and Germany in keeping cholera in check by ordinary sanitary means completed the conversion of all enlightened nations to the policy laid down so far back as 1865 by Sir John Simon, and advocated by Great Britain at a series of international congresses — the policy of abandoning quarantine, which Great Britain did in 1873, and trusting to sanitary measures with medical inspection of persons arriving from infected places. This principle was formally adopted at the international con-

ference held at Dresden in 1803, ativhich a convention was signed by the delegates of Germany, Austria, Belgium, France, Great Britain, Italy, Russia, Switzerland, Luxemburg, Montenegro and the Netherlands. Under this instrument the practice is broadly as follows, though the procedure varies a good deal in different countries: — Ships arriving from infected ports are inspected, and if healthy are not detained, but bilge-water and drinking-water are evacuated, and persons landing may be placed under medical supervision without detention; infected ships are detained only for purposes of disinfection; persons suffering from cholera are removed to hospital; other persons landing from an infected ship are placed under medical observation, which may mean detention for five days from the last case, or, as in Great Britain, supervision in their own homes, for which purpose they give their names and places of destination before landing. All goods are freed from restrictions, except rags and articles believed to be contaminated by cholera matters. By land, passengers from infected places are similarly inspected at the frontiers and their luggage ” disinfected ” — in all cases a pious ceremony of no practical value, involving a short but often a vexatious delay; only those found suffering from cholera can be detained. Each nation is pledged to notify the others of the existence within its own borders of a ” foyer ” of cholera, by which is meant a focus or centre of infection. The precise interpretation of the term is left to each government, and is treated in a rather elastic fashion by some, but it is generally understood to imply the occurrence of non-imported cases in such a manner as to point to the local presence of infection. The question of guarding Europe generally from the danger of diffusion by pilgrims through the Red Sea was settled at another conference held in Paris in 1894. The provisions agreed on included the inspection of pilgrims at ports of departure, deten- tion of infected or suspected persons, and supervision of pilgrim ships and of pilgrims proceeding overland to Mecca.

The substitution of the procedure above described for the old measures of quarantine and other still more drastic inter- ferences

with traffic presupposes the existence of a sanitary service and fairly good sanitary conditions if cholera is to be effectually prevented. No doubt if sanitation were perfect in any place or country, cholera, along with many other diseases, might there be ignored, but sanitation is not perfect anywhere, and therefore it requires to be supplemented by a system of notification with prompt segregation of the sick and destruction of infective material. These things imply a regular organization, and it is to the public health service of Great Britain that the complete mastery of cholera has mainly been due in recent years, and particularly in 1893. Of sanitary conditions the most important is unquestionably the water-supply. So . many irrefragable proofs of this fact were given during 189 2-1 893 that it is no longer necessary to refer to the time-honoured case of the Broad Street pump. At Samarkand three regiments were encamped side by side on a level plain close to a stream of water. The colonel of one regiment took extraordinary precau- tions, placing a guard over the river, and compelling his men to use boiled water even for washing. Not a single case of cholera occurred in that regiment, while the others, in which only ordinary precautions were taken, lost over 100 men. At Askabad the cholera had almost disappeared, when a banquet was given by the governor in honour of the tsar's name-day. Of the guests one-half died within twenty-four hours; a military band, which Was present, lost 40 men out of 50; and one regiment lost half its men and 9 officers. Within forty-eight hours 1300 persons died out of a total population of about 1 3 ,000. The water supply came from a small stream, and just before the banquet a heavy rain-storm had occurred, which swept into the stream all surface refuse from an infected village higher up and some distance from the banks. But the classical example was Hamburg. The water-supply is obtained from the Elbe, which became infected by some means not ascertained. The drainage from the town also runs into the river, and the movement of the tide was sufficient to carry the sewage matter up above the water-intake. The water itself, which is no cleaner than that of the Thames

at London Bridge, underwent no purification whatever before distribution. It passed through a couple of ponds, supposed to act as settling tanks, but owing to the growth of the town and increased demand for water it was pumped through too rapidly to permit of any subsidence. Eels and other fish con- stantly found their way into the houses, while the mains were lined with vegetation and Crustacea. The water-pipes of Ham- burg had a peculiar and abundant fauna and

flora of their own, and the water they delivered was commonly called Fleischbruhe, from its resemblance to thick soup. On the other hand, at Altona, which is continuous with Hamburg, the water was filtered through sand. In all other respects the conditions were identical, yet in Altona only 328 persons died, against 8605 in Hamburg. In some streets one side lies in Hamburg, the other in Altona, and cholera stopped at the dividing line, the Hamburg side being full of cases and the Altona side untouched. In the following year, when Hamburg had the new filtered supply, it enjoyed equal immunity, save for a short period when, as we have said, raw Elbe water accidentally entered the mains.

But water, though the most important condition, is not the only one affecting the incidence of cholera. The case of Grimsby furnished a striking lesson to the contrary. Here the disease obtained a decided hold, in spite of a pure water-supply, through the fouling of the soil by cesspits and defective drainage. At Havre also its prevalence was due to a similar cause. Further, it was conclusively proved at Grimsby that cholera can be spread by sewage-fed shell-fish. Several of the local outbreaks in England were traced to the ingestion of oysters obtained from the Grimsby beds. In short, it may be said that all insanitary conditions favour the prevalence of cholera in some degree. Preventive inoculation with an attenuated virus was introduced by W. M. W. Haffkine, and has been extensively used in India, with considerable appearance of success so far as the statistical evidence goes.

As already remarked, the latest manifestations of cholera show that it has lost none of its former virulence and fatnlity. Treatment. ˆ ne symptoms are now regarded as the effects of the toxic action of the poison formed by the micro-organisms upon the tissues and especially upon the nervous system. But this theory has not led to any effective treatment. Drugs in great variety were tried in the continental hospitals in 1892, but without any distinct success. The old controversy between the aperient and the astringent treatment reappeared. In Russia the former, which aims at evacuating the poison, was more generally adopted; in Germany the latter, which tries to conserve strength by stopping the flux, found more favour. Two methods of treatment were invariably found to give great relief, if not to prolong life and promote recovery — the hot bath and the injection of normal saline solution into the veins or the subcutaneous tissue. These two should always be tried in the cold and collapsed stages of cholera.

See Local Government Board Reports, i8g2-Qˆ-C)4-QS ; Clemow, The

Cholera Epidemic of 1892 in the Russian Empire; Wall, Asiatic Cholera; Notter, Epidemiological Society's Transactions, vol. xvii. ; Emmerich and Gemiind, Miinchen. med. Wochenschr. (1904), pp. 1086- 11 57; Wherry, Department of the Interior Bureau of Government Laboratories, No. 19 (October 1904, Manila) ; Wherry and M'Dill, Ibid. No. 31 (May 1905, Manila). _

CHOLET, a town of western France, capital of an arrondisse- ment in the department of Maine-et-Loire, 41 m. S.E. of Nantes on the Ouest-Etat railway between that town and Poitiers. Pep. (1906) 16,554. Cholet stands on an eminence on the right bank of the Moine, which is crossed by a bridge of the 15th century. A public garden occupies the site of the old castle; the public buildings and churches, the finest of which is Notre-Dame, are modern. The public institutions include the sub-prefecture, a tribunal of first instance, a chamber of commerce, a board of trade-arbitrators, and a communal college. There are granite quarries in the vicinity of the town. The chief industry is the manufacture of linen and linen handkerchiefs, which is also carried on in the neighbouring communes on a large scale. Woollen and cotton fabrics are also produced, and bleaching and the manufacture of preserved foods are carried on. Cholet

is the most important centre in France for the sale of fat cattle, sheep and pigs, for which Paris is the chief market. Megalithic monuments are numerous in the neighbourhood. The town owes the rise of its prosperity to the settlement of weavers there by Edouard Colbert, count of Maulevrier, a brother of the great Colbert. It suffered severely in the War of La Vendee of 1793, insomuch that for years afterwards it was almost without in- habitants.

CHOLON (" great market "), a town of French Indo-China, the largest commercial centre of Cochin China, 3! m. S.W. of Saigon, with which it is united by railway, steam-tramway and canal. Cholon was founded by Chinese immigrants about 1780, and is situated on the Chinese arroyo at the junction of the Lo-Gom and a canal. Its waterways are frequented by innumer- able boats and lined in some places with native dwellings built on piles, in others by quays and houses of French construction. Its population is almost entirely Asiatic, and has more than trebled since 1880. In that year it had only 45,000 inhabit- ants; in 1907 it numbered about 138,000. Of these, 42,000 were Chinese, 73,000 Annamese, and 155 French (exclusive of a garrison of 92); the remainder consisted of Cambodians and Asiatic foreigners. During the rice season the town is visited by a floating population of 21,000 persons. The Chinese are divided into congregations according to their place of origin. Cholon is administered by a municipal council,

composed of French, Annamese and Chinese traders. An administrator of native affairs, nominated by the governor, fills the office of mayor, There are a fine municipal hospital and municipal schools for boys and girls. The principal thoroughfares are lighted by electric light. The rice trade, almost monopolized by the Chinese, is the leading industry, the rice being treated in large steam mills. Tanning, dyeing, copper-founding, glass, brick and pottery manufacture, stone working, timber-sawing and junk building are also included among the industries.

CHOLONES, a tribe of South American Indians living on the left bank of the Huallaga river in the Amazon valley. The name is that given them by the Spanish. They were first met by the Franciscans, who established mission villages among them in 1676. They are a wild race but mild-mannered, very super- stitious, and pride themselves on their skill as doctors. Their chief weapon is the blow-pipe, in the use of which they are adepts.

CHOLULA, an ancient town of Mexico, in the state and on the plateau of Puebla, 8 m. by rail W. by N. of the city of that name, and 6912 ft. above sea-level. Pop. (1900, estimate) 9000. The Interoceanic railway passes through Cholula, but the city's commercial and industrial standing is overshadowed by that of its larger and more modern neighbour. At the time of the Spanish Conquest, Cholula — then known as Chololan- — was a large and important town, consecrated to the worship of the god Quetzalcoatl, who had here one of the most imposing temples in Anahuac, built on the summit of a truncated pyramid, the largest of its kind in the world. This pyramid, constructed of sun-dried bricks and earth, 177 ft. high, and covering an area of nearly 45 acres, is the most conspicuous object in the town and is surmounted by a chapel dedicated to Nuestra Senora de los Remedios. A corner of the lower terrace of this great pyramid was cut through in the construction of the Puebla road, but nothing was discovered to explain its purpose, which was probably that of furnishing an imposing site for a temple. Nothing definite is known of its age and history, as the fanatical zeal of Cortez and -his companions destroyed whatever historical data the temple may have contained. Cholula was visited by Cortez in 15 19 during his eventful march inland to Montezuma's capital, Tenochtitlan, when he treacherously massacred its inhabitants and pillaged the city, pretending to distrust the hospitable inhabitants. Cortez estimated that the town then had 20,000 habitations, and its suburbs as many more, but this was undoubtedly a deliberate exaggeration. The Cholulans were of Nahuatl origin and were semi-independent, yielding only a nominal allegiance to Montezuma. They were a trading people, holding fairs, and

exchanging their manufactures of textiles and pottery for other produce. The pyramid is believed

to have been built by a people occupying this region before the Cholulans.

CHOPIN, FREDERIC FRANCOIS (1810-1849), Polish musical composer and pianist, was born at Zelazowa-Wola, near Warsaw, on the 22nd of February 1810 {not the 1st of March 1809). His father, of French origin, born at Nancy in 1770, had married a Polish lady, Justine Krzyzanowska. Frederic was their third child. His first musical education he received from Adalbert Ziwny, a Czech musician, who is said to have been a passionate admirer of J. S. Bach. He also received a good general education at one of the first colleges of Warsaw, where he was supported by Prince Antoine Radziwill, a generous protector of artistic talent and himself well known as the composer of music to Goethe's Faust and other works. His musical genius opened to Chopin the best circles of Polish society, at that time unrivalled in Europe for its ease of intercourse, the beauty and grace of its women, and its liberal appreciation of artistic gifts. These early impressions were of lasting influence on Chopin's development. While at college he received thorough instruction in the theory of his art from Joseph Eisner, a learned musician and director of the conservatoire at Warsaw. When in 1829 he left his native town for Vienna, where his debut as a pianist took place, he was in all respects a perfectly formed and developed artist. There is in his compositions little of that gradual progress which, for instance, in Beethoven necessitates a classification of his works according to different periods. Chopin's individuality and his style were distinctly pronounced in that set of variations on " La ci darem " which excited the wondering enthusiasn of Robert Schumann. In 183 1 he left Vienna with the intention of visiting London; but on his way to England he reached Paris and settled there for the rest of his life. Here again he soon became the favourite and musical hero of society. His connexion with Madame Dudevant, better known by her literary pseudonym of George Sand (q.v.), is an important feature of Chopin's life. When in 1839 his health began to fail, George Sand went with him to Majorca, and it was mainly owing to her tender care that the composer recovered his health for a time. Chopin declared that the destruction of his relations with Madame Dudevant in 1847 broke up his life. The association of these two artists has provoked a whole literature on the nature of their relations, of which the

novelist's Un Hiver a Majorque was the beginning. The last ten years of Chopin's life were a continual struggle with the pulmonary disease to which he succumbed in Paris on the 17th of October 1849. The year before his death he visited England, where he was received with enthusiasm by his numerous admirers. Chopin died in the arms of his sister, who hastened from Poland to his death-bed. He was buried in the cemetery of Pere Lachaise. A small monument was erected to the memory of the composer at Wasswan in 1880. Portraits and medallions of Chopin were executed by Ary Scheffer and Eugene Delacroix, and by the sculptors Bary and Clesinger.

A distinguished English amateur thus records his impressions of Chopin's style of pianoforte-playing compared with those of other masters. " His technical characteristics may be broadly indicated as negation of bravura, absolute perfection of finger- play, and of the legatissimo touch, on which no other pianist has ever so entirely leant, to the exclusion of that high relief and point which the modern German school, after the examples of Liszt and Thalberg, has so effectively developed It is in these feature that we must recognize that Grundverschiedenheit (fundamental difference) which according to Mendelssohn distinguished Chopin's playing from that of these masters, and in no less degree from the example and teaching of Moscheles. . . . Imagine a delicate man of extreme refinement of mien and manner, sitting at the piano and playing with no sway of the body and scarcely any movement of the arms, depending entirely upon his narrow feminine hands and slender fingers. The wide arpeggios in the left hand, maintained in a continuous stream of tone by the strict legato and fine and constant use of the damper-pedal, formed an harmonious substructure for a wonderfully poetic cantabile. His delicate pianissimo, the ever-changing modifications of tone and time (tempo rubato) were of indescribable effect. Even in

energetic passages he scarcely ever exceeded an ordinary mezzo- forte. His playing as a whole was unique in its kind, and no traditions of it can remain, for there is no school of Chopin the pianist, for the obvious reason that he could never be regarded as a public player, and his best pupils were nearly all amateurs."

In looking through the list of his compositions, teeming with mazurkas, valses, polonaises, and other forms of national dance music, one could hardly suppose that here one of the most melancholy natures has revealed itself. This seeming paradox is solved by the type of Chopin's nationality, of which it has justly been said that its very dances are sadness intensified. But not- withstanding this strongly pronounced national type of his compositions, his music is always

expressive of his individual feel- ings and sufferings to a degree rarely met with in the annals of the art. He is indeed the lyrical composer par excellence of the modern school, and the intensity of his expression finds its equal in literature only in the songs of Heinrich Heine, to whom Chopin has been justly compared. A sensation of such high strung passion cannot be prolonged. Hence we see that the shorter forms of music, the etude, the nocturne, besides the national dances already alluded to, are chosen by Chopin in preference. Even when he treats the larger forms of the concerto or the sonata this concen trated, not to say pointed, character of Chopin's style becomes obvious. The more extended dimensions seem to encumber the freedom of his movements. The concerto for pianoforte with accompaniment of the orchestra in E may be instanced. Here the adagio takes the form of a romance, and in the final rondo the rhythm of a Polish dance becomes recognizable while the instrumentation throughout is meagre and wanting in colour. Chopin is out of his element, and even the beauty of his melodies and harmonies cannot wholly banish the impression of incon- gruity. Fortunately he himself knew the limits of his power, and with very few exceptions his works belong to that class of minor compositions of which he was an unrivalled master. Barring a collection of Polish songs, two concertos, and a very small number of concerted pieces of chamber music, almost all his works are written for the pianoforte solo; the symphony, the oratorio, the opera, he never attempted.

Chopin's works group themselves firstly into the period from Op. I to 22, which includes nearly all his attempts at large or classical forms, e.g. the works with orchestra, Op. 2 (variations on La ci darem), Opp. n and 14 (concertos), Op. 13 (Polish fantasia), Op. 14 {Krakowiak, a concerto-rondo in mazurka-rhythm), and Op. 22 (Andante spianato and Polonaise), besides the solo rondos Opp. I, 5, 16, and the variations Op. 12 and the essays in chamber music Opp. 3, 8, 65. Meanwhile, however, the mature lyric style of his second period already began with Op. 6 (4 mazurkas), and though it is not confined to small forms, the larger mature works (beginning with the ballade Op. 23 and excepting only the sonata Op. 58 and the Allegro de Concert Op. 46) are as independent of tradition as the smallest. It is well to sift the posthumous works from those published under Chopin's direction, for the last three mazurkas are the only things he did not keep back as misrepresenting him. On these principles his mature works are summed up in the 42 mazurkas (Opp. 6, 7, 17, 24, 30, 33, 41, 50, 56, 59, 63, and the beautiful con- tribution to the collection Notre temps) ; 7 polonaises (Opp. 26, 40, 53, 61); 24 preludes (in all the major and minor keys) Op. 28, and the single

larger prelude Op. 45 ; 27 etudes (12 in Op. 10, 12 in Op. 25, and 3 written for the Methode des mcthodes) ; 18 nocturnes (Opp. 9, 15, 27, 32, 37, 48, 55, 62); 4 ballades, in forms of Chopin's own invention (Opp. 23, 38, 47, 52); 4 scherzos (Opp. 20, 31, 39, 54); 8 waltzes (Opp. 18, 34, 42, 64) ; and several pieces of various de- scription, notably the great fantasia Op. 49 and the impromptus Opp. 29, 36, 51.

. The posthumous works number 35 pieces, besides a small volume of songs a few of which are of great interest.

Franz Liszt wrote a charming sketch of Chopin's life and art (F. Chopin, par F. Liszt, Paris, 1851), and a very appreciative though somewhat eccentric analysis of his work appeared anonymously in 1842 {An Essay on the Works of Frederic Chopin, London). The standard biography is the English work of Professor F. Niecks (Novello, 1888). See also W. H. Hadow, Studies in Modern Music, second series (1908). The editions of Chopin's works by his pupii Mikuli and by Klindworth are full of valuable elucidation as to methods of performance, but unfortunately they do not distinguish the commentary from the text. The critical edition published by Breitkopf and Hartel, with all its mistakes, is absolutely necessary for students who wish to know what Chopin wished to put into the hands of players of independent judgment.

CHOPSTICKS, the " pidgin-English " name for the pair of small tapering sticks used by the Chinese and Japanese in eating. " Chop " is pidgin-English for " quick," the Chinese word for the articles being kivai-tsze, meaning " the quick ones." " Chopsticks " are commonly made of wood, bone or ivory, somewhat longer and slightly thinner than a lead-pencil. Held between the thumb and fingers of the right hand, they are used as tongs to take up portions of the food, which is brought to table cut up into small and convenient pieces, or as means for sweeping the rice and small particles of food into the mouth from the bowl. Many rules of etiquette govern the proper conduct of the chop- sticks; laying them across the bowl is a sign that the guest wishes to leave the table; they are not used during a time of mourning, when food is eaten with the fingers; and various methods of handling them form a secret code of signalling.

CHORAGUS (the Lat. form of Gr. xopayos or xo/»?76s, leader of the chorus), the citizen chosen to undertake the expense of furnishing and

instructing the chorus at the Dionysiac festivals at Athens (see Liturgy and Finance). The name is given to an assistant to the professor of music at the university of Oxford, whose office was founded, with that of the professor, in 1626 by Dr William Heather.

CHORALE (from the Lat. choralis, sc. cantus; the final e is added to show the Ger. pronunciation choral), a term in music used by English writers to indicate the hymn-tunes composed or adopted for use in church by the German reformers. German writers, however, apply the terms ” Choral ” and ” Chorale- gesang,” as Luther himself would apply them, to any solemn melody used in the church. It is thus the equivalent of canto fermo; and the German rhymed versions of the biblical and other ancient canticles, such as the Magnificat and the Te Deum, are set to curious corruptions of the corresponding Gregorian tunes, which adaptations the composers of classical German music called chorales with no more scruple than they applied the name to tunes of secular origin, German or foreign. The peculiarity of German chorale-music, however, is that its use, and consequently much of its invention, not only arose in connexion with the Reformation, by which the liturgy of the church became ” understanded of the people,” but also that it belongs to a musical epoch in which symmetry of melody and rhythm was beginning to assume artistic importance. The growing sense of form shown by some of Luther’s own tunes (e.g. Vom Himmel hoch, da komm’ ich her) soon advanced, especi- ally in the tunes of Criiger, beyond any that was shown by folk- music; and it provided an invaluable bulwark against the chaos that was threatening to swamp music on all sides at the beginning of the 17th century. By Bach’s time all the poly- phonic instrumental and vocal art-forms of the 18th century were mature; and though he loved to derive the design as well as the details of a large movement from the shape of the chorale tune on which it was based, he became quite independent of any aid from symmetry in the tune as raw material. The chorus of his cantata Jesus nun sei gepreiset is one of the most perfectly designed and quite the longest of movements ever based upon a chorale-tune treated phrase by phrase. Yet the tune is one of the most intractable in the world, though its most unpromising portion is the basis of the most impressive feature in Bach’s design (the slow middle section in triple time).

The national character of the German chorale, and the recent great development of interest in folk-music, together with the unique importance of Bach’s work, have combined to tempt writers on music to over-estimate the distinctness of the art- forms based upon the German chorale. There is really nothing in these art-forms which is not continuous with the universal practice of writing counterpoint on

a canto fermo. And it should never be forgotten that, however fascinating may be the study of the relation between artistic forms and the spirit of the age, no art can successfully express more of the spirit of the age than its own technical resources will admit. Choral music in all ages has tended to consist largely of counterpoint on a canto fermo (see Contrapuntal Forms) . Where there are not many canto fermos in constant use in the church, composers

will be driven to use them rather unsystematically as special effects, and to rely for the most part on other artistic devices, though any use of melodies in long notes against quicker counter- point will be aesthetically indistinguishable from counterpoint on a canto fermo. Thus Handel in his Italian and English works wrote no entire chorale movements, yet what is the passage in the ” Hallelujah ” chorus from ” the kingdom of this world ” to the end but a treatment of the second part of the chorale Wachet auf? How shall we describe the treatment of the words ” And their cry came up unto the Lord ” in the first chorus of Israel in Egypt, except as the treatment of a phrase of chorale or canto fermo} Again, to return to the 16th century, what are the hymns of Palestrina but figured chorales? In what way, except in the lack of symmetry in the Gregorian phrasing, do they differ from the contemporary setting by Orlando di Lasso, also a Roman Catholic, of the German chorale Vater unser im Himmelreich? In modern times the use of German chorales, as in Mendelssohn’s oratorios and organ-sonatas, has had rather the aspect of a revival than of a development; though the technique and spirit of Brahms’s posthumous organ chorale- preludes is thoroughly modern and vital.

One of the most important, and practically the earliest collection of ” Chorales ” is that made by Luther and Johann Walther (1496- 157°). the Enchiridionˆ published in 1524. Next in importance we may place the Genevan Psalter (1 st ed. , Strassburg, 1 542 , final edition 1562), which is now conclusively proved to be the work of Bourgeois. From this Sternhold and Hopkins borrowed extensively (1562). The psalter of C. Goudimel (Paris, 1565) is another among many prominent collections showing the steps towards congregational singing, i.e. the restriction to ” note-against-note ” counterpoint (sc. plain harmony), and, in twelve cases, the assigning of the melody to the treble instead of to the tenor. The first hymn-book in which this latter step was acted on throughout is Osiander’s Geistliche Lieder . . . also gesetzt, dass ein christliche Gemein durchaus mit- singen.kann (1586). But many of the finest and most famous tunes are of much later origin than any such collections. Several (e.g. Ichfreue mich in dir) cannot be traced before Bach, and were very probably composed by him. (D. F. T.)

CHORIAMBIC VERSE, or Choriambics, the name given to Greek or Latin lyrical peetry in which the sound of the chori- ambus predominates. The choriambus is a verse-foot consisting of a trochee united with and preceding an iambus, «o The choriambi are never used alone, but are usually preceded by a spondee and followed by an iambus. The line so formed is called an asclepiad, traditionally because it was invented by the Aeolian poet Asclepiades of Samos. Choriambic verse was first used by the poets of the Greek islands, and Sappho, in particular, produced magnificent effects with it. The measure, as used by the early Greeks, is essentially lyrical and impassioned. Mingled with other metres, it was constantly serviceable in choral writing, to which it was believed to give a stormy and mysterious char- acter. The Greater Asclepiad was a term used for a line in which the wild music was prolonged by the introduction of a supple- mentary choriambus. This was much employed by Sappho and by Alcaeus, as well as in Alexandrian times by Callimachus and Theocritus. Among the Latins, Horace, in imitation of Alcaeus, made constant use of choriambic verse. Metrical experts distinguish six varieties of it in his Odes. This is an example of his greater asclepiad (Od. i. 11): —

Tu ne I quaesieris | scire nefas | quern mihi, quem] tibi Finem | Di dederint | Leuconoe ; | nee Babylon|ios Tentar|is numeros. | Ut melius | quicquid erit, | pati! Seu plu|res hiemes, | seu tribuit | Jupiter uljtimam, Quae nunc | oppositis | debilitat | pumicibus | mare Tyrrhe| num.

In later times of Rome, both Seneca and Prudentius wrote

choriambic verse with a fair amount of success. Swinburne

even introduced it into English poetry : —

Love, what | ailed them to leave | life that was made] lovely, we thought I with love?

What sweet | vision of sleep | lured thee away | down from the light I above? Such lines as these make a brave attempt to resuscitate the

measured sound of the greater asclepiad. (E. G.)

CHORICIUS, of Gaza, Greek sophist and rhetorician, flourished

in the time of Anastasius I. (a.d. 491-518). He was the pupil

of Procopius of Gaza, who must be distinguished from Procopius of Caesarea, the historian. A number of his declamations and descriptive treatises have been preserved. The declamations, which are in many cases accompanied by explanatory commen- taries, chiefly consist of panegyrics, funeral orations and the stock themes of the rhetorical schools. The ‘ EiriflaXa/uoi or wedding speeches, wishing prosperity to the bride and bride- groom, strike out a new line. Choricius was also the author of so-called ‘ E/cc^pdcreis, descriptions of works of art after the manner of Philostratus. The moral maxims, which were a constant feature of his writings, were largely drawn upon by Macarius Chrysocephalas, metropolitan of Philadelphia (middle of the 14th century), in his Rodonia (rose-garden), a voluminous collection of ethical sayings. The style of Choricius is praised by Photius as pure and elegant, but he is censured for lack of naturalness. A special feature of his style is the persistent avoidance of hiatus, peculiar to what is called the school of Gaza.

Editions by J. F. Boissonade (1846, supplemented by C. Graux in Revue de philologie,_i877) and R. Forster (1882-1894); see also C. Kirsten, ” Quaestiones Choricianae in Breslauer philologische . Abhandlungen, vii. (1894), aid article by W« Schmid in Pauly-Wissowa’s Realencyclopddie, iii. 2 (1899). On the Gaza school see K. Seitz, Die Schide von Gaza (Heidelberg, 1892).

CHORIN, AARON (1766-1844), Hungarian rabbi and pioneer of religious reform. He favoured the use of the organ and of prayers in the vernacular, and was instrumental in founding schools on modern lines. Chorin was thus regarded as a leader of the newer Judaism. He also interested himself in public affairs; and his sen Francis was a Hungarian deputy.

See L. Low, Gesammelte Schriften, ii. 251.

CHORIZONTES (” separators “), the name given to the Alexandrian critics who denied the single authorship of the Iliad and Odyssey, and held that the latter poem was the work of a later poet. The most important of them were the gram- marians Xeno and Hellanicus; Aristarchus was their chief opponent (see Homer). ,

CHORLEY, HENRY FOTHERGILL (1808-1872), English musical critic, one of an old Lancashire family, began in a merchant’s office, but soon took to musical journalism. He began to write for the Athenaeum in 1830, and remained its musical critic for more than a generation; and

he also became musical critic for The Times. In these positions he had much influence; he had strong views, and was a persistent opponent of innovation. In addition to musical criticism, he wrote voluminously on literature and art, besides novels, dramas and verse, and various librettos; and he published several books, including Modern German Music (1854), Handel Studies (1859), and Thirty Years' Musical Recollections (1862). He died in London on the 16th of February 1872.

See his Autobiography, Memoir and Letters, edited by H. G. Hewlett (1873).

CHORLEY, a market town and municipal borough in the Chorley parliamentary division of Lancashire, England, on the river Yarrow, 202 m. N.W. by W. from London and 22 m. N.W. from Manchester, on the Lancashire & Yorkshire and London & North- Western railways and the Leeds & Liverpool Canal. Pop. (1891) 23,087; (1901) 26,852. The church of St Lawrence is of Perpendicular and earlier date, largely restored; it contains fine woodwork and some interesting monuments. Cotton spinning and the manufacture of cotton and muslin are extensively carried on, and there are also iron and brass foundries and boiler factories. Railway-wagon building is an im- portant industry. The district contains a number of coal-mines and stone-quarries. Close to the town is the beautiful Elizabethan mansion of Astley Hall, which is said to have sheltered Oliver Cromwell after the battle of Preston (1648). The corporation consists of a mayor, 6 aldermen and 24 councillors. Area, 3614 acres.

CHORLU, TcHorlau or Schorlatj, a town of European Turkey, in the vilayet of Adrianople; on the left bank of the Chorlu, a small left-hand tributary of the Ergene, 20 m. N.E. of

Rodosto. Pop. (1905) about 12,000, of whom one-half are Greeks, one-third Turks, and the remainder Armenians and Jews. Chorlu has a station on the Constantinople-Adrianople branch of the Oriental railways. It manufactures woollen cloth {shayak) and native carpets, and exports cereals, oil-cloth, carpets, cattle, poultry, fresh meat, game, fruits, wine, alcohol, hides and bones.

CHOROGRAPHY. (1) (From the Gr. xd>pa, a tract of country, and ypauv, to write), a description or delineation on a map of a. district or tract of country; it is to be distinguished from " geography " and " topography," which treat of the earth as.a whole and of particular places respectively. The word is common in old geographical treatises, but is now superseded by the wider use of " topography." (2) (From

the Gr. x°P°s, dance), the art of dancing, or a system of notation to indicate the steps and movements in dancing.

CHORUM, the chief town of a sanjak of the Angora vilayet in Asia Minor, altitude 2300 ft., situated on the edge of a wide plain, almost equidistant from Amasia and Yuzgat. Pop. about 1 2 , 500, including a few Christians. Its importance is largely due to its situation on the great trade-route from Kaisarieh (Caesarea) by Yuzgat and Marzivan to Samsun on the Black Sea. It corresponds to the ancient Euchaita, which lay 1 5 m. E. Euchaiti was attacked by the Huns a.d. 508, and became a bishopric at an early period and a centre of religious enthusiasm, as con- taining the tomb of the revered St Theodore, who slew a dragon in the vicinity and became one of the great warrior saints of the Greek Church. Something of the old enthusiasm seems to have passed to the inhabitants of Chorum, whom most travellers have found bigoted and fanatical Mahommedans (see J. G. C.Anderson, Studia Pontica,pp. 6 ff.).

CHORUS (Gt. xopos) i properly a dance, and especially the sacred dance, accompanied by song, of ancient Greece at the festivals of the gods. The word x°P° s seems originally to have referred to a dance in an enclosure, and is therefore usually connected with the root appearing in Gr. x°pros, hedge, enclosure, Lat. hortus, garden, and in the Eng. ” yard,” ” garden ” and ” garth.” Of choral dances in ancient Greece other than those in honour of Dionysus we know of the Dance of the Crane at Delos, celebrating the escape of Theseus from the labyrinth, one telling of the struggle of Apollo and the Python at Delphi, and one in Crete recounting the saving of the new-born Zeus by the Curetes. In the chorus sung in honour of Dionysus the ancient Greek drama had its birth. From that of the winter festival, consisting of the kwhos or band of revellers, chanting the ” phallic songs,” with ribald dialogue between the leader and his band, sprang ” comedy,” while from the dithyrambic chorus of the spring festival came ” tragedy.” For the history of the chorus in. Greek drama, with the gradual subordination of the lyrical to the dramatic side in tragedy and its total disappearance in the middle and new comedy, see Drama: Greek Drama.

The chorus as a factor in drama survived only in the various imitations or revivals .of the ancient Greek theatre in other languages. A chorus is found in Milton’s Samson Agonistes. The Elizabethan dramatists applied the name to a single char- acter employed for the recitation of prologues or epilogues. Apart from the uses of the term in drama, the word ” chorus ” has been employed chiefly in music. It is used of any organized body of singers, in opera, oratorio, cantata, &c,

and, in the form ” choir,” of the trained body of singers of the musical portions of a religious service in a cathedral or church. As applied to musical compositions, a ” chorus ” is a composition written in parts, each to be sung by groups of voices in a large body of singers, and differs from ” glee ” (q.v.), where each part is for a single voice. The word is also used of that part of a song repeated at the close of each verse, in which the audience or a body of singers may join with the soloist.

In the early middle ages the name chorus was given to a primitive bagpipe without a drone. The instrument is best known by the Latin description contained in the apocryphal letter of St Jerome, ad Dardanum: ” Chorus quoque simplex, pellis cum duabus cicutis aereis, et per primam inspiratur per secundam

vocem emittit.” Several illumihated MSS. 1 from the 9th to the t ith century give fanciful drawings, accompanied by descriptions in barbarous Latin, evidently meant to illustrate those described in the letter to Dardanus. The original MS., probably an illustrated transcript of this letter, which served as a copy for the others, was apparently produced at a time when the Roman bagpipe {tibia utricularia) had fallen into disuse in- common with other musical instruments, and was unknown except to the few. The Latin description given above is correct and quite unmis- takable to any one who knows the primitive form of bagpipe; the illustrations must therefore represent theeffortof an artist to depict an unknown instrument from a description. Virdung, Luscinius and Praetorius seem to have had access to a MS. of the Dardanus letter now lost, and to have reproduced the drawings without understanding them. In a MS. of the 14th century at the British Museum, 2 containing a chronicle of the world’s history to the death of King Edward I., the chorus is mentioned and described in similar words to those quoted above; in the margin is an elementary sketch of a primitive bagpipe with blowpipe and chaunter with three holes, but no drone. Bagpipes with drones abound on sculptured monuments and in miniatures of that century. Gerbert gives illustrations of the fanciful chorus from the Dardanus letter and of two other instruments of later date; one of these represents a musician playing the Plater spiel, ‘Cos. other the bagpipe known as chevrette, in which the whole skin of the animal (a kid or pig), with head and feet, has been used for the bag. Edward Buhle, 3 in his admirable work on the musical instruments in the illuminated MSS. of the middle ages,

points out that Gerbert, 4 who gives the dates of his two MSS. as ” 6th and 9th centuries,” has a singular method of reckoning the date of a MS.; he refers to the age of a MS. at the time of writing (18th century), not to the date at which it was produced. The MS. containing the two figures of musicians mentioned above, instead of being ascribed to the 6th century, was six centuries old when Gerbert wrote in 1774, and dates therefore from the 12th century. It is interesting to note that Giraldus Cambrensis 6 mentions the chorus as one of the three instruments of Wales and Scotland, ascribing superior musical skill to the latter. Historians record that King James I. of Scotland was renowned for his skill as a performer on various musical instruments, one of which was the chorus. 6 This bears out the traditional belief that the bagpipe had been a Scottish attribute from the earliest times. The word ” chorus ” occurs once or twice in French medieval poems with other instruments, but without indication as to the kind of instrument thus designated. The word was probably the French equivalent for the Platerspiel.

See also G. Kastner, Danses des morts (pp. 200 to 202, pi. xv., No. 103) ; and Dom Pedro Cerone, El Melopeo y maestro (Naples, 1613), p. 248. (K. S.)

CHOSE (Fr. for ” thing “), a term used in English law in different senses. Chose local is a thing annexed to a place, as a mill. A chose transitory is that which is movable, and can be carried from place to place. But the use of the word ” chose ” in these senses is practically obsolete, and it is now used only in the phrases chose in action and chose in possession. A ” chose in action,” sometimes called a chose in suspense, in its more limited meaning, denotes the right of enforcing by legal pro-

1 The MSS. are a psalterium, 9th century, Bibl. publique, Angers, fol. 13a; Boulogne Psalterium glossatum c. a.d. 1000, MS. No. 20, Bibl. publique. For reproduction of musical instruments see Annates archeologiques, tome iv. (1846), p. 38; Cotton MS., Tiberius C. vi., 10th to nth century, fol. 16b, British Museum, illustrated in Strutt’s Horda Angel-cynnan, vol. ii. pis. xx. and xxi. ; MS. psalter of St Emmeran, now in Munich Staatsbibliothek, elm. 14523, fol. 51b, loth century, illustrated by Gerbert, De Cantu et Mus. Sacra, tome ii. pi. xxiii. ; Paris, Bibl. Nat. Fonds Latin, 721 1, IOth century, fol. 150 and 151a.

2 Cotton MS., Nero D. ii. f. 15a, Chronicon ab orbe condito ad obitum Regis Edwardi I., 1307.

8 Die musikalischen Instrument* in den Miniaturen desfriihen Miltelalters, part i. ” Die Blasinstrumente ” (Leipzig, 1963), p. 7, note I.

4 Op. cit. (1774), tome ii. pi. xxv. No. 13, pp. 130, 151, 152, and pi. xxxi. No. 12.

6 Topographia Hibemiae, cap. xi.

• Scotichronicon (Fordun and Bower), xvi. 28; and Dalyell, Musical Memoirs of Scotland, p. 47, pis. x. and xi.

ceedings the payment of a debt, or the obtaining money by way of damages for breach of contract, or as a recompense for a wrong. Less accurately, the money itself which could be recovered is frequently termed a chose in action, as is also sometimes the document evidencing a title to a chose in action, such as a bond or a policy of insurance, though strictly it is only the right tc recover the money which can be so termed. Choses in action were, before the Judicature Acts, either legal or equitable. Where the chose could be recovered only by an action at law, as a debt (whether arising from contract or tort), it was termed a legal chose in action; where the chose was recoverable only by a suit in equity, as a legacy or money held upon a trust, it was termed an equitable chose in action. Before the Judicature Act, a legal chose in action was not assignable, i.e. the assignee could not sue at law in his own name. To this rule there were two exceptions: — (1) the crown has always been able to assign choses in action that are certain, such as an ascertained debt, but not those that are uncertain; (2) assignments valid by operation of law, e.g. on marriage, death or bankruptcy. On the other hand, however, by the law merchant, which is part of the law of England, and which disregards the rules of common law, bills of exchange were freely assignable. The consequence was that, with these and certain statutory exceptions (e.g. actions on policies of insurance), an action on an assigned chose in action must have been brought at law in the name of the assignor, though the sum recovered belonged in equity to the assignee. All choses in action being in equity assignable, except those which are altogether incapable of being assigned, in equity the assignee might have sued in his own name, making the assignor a party as co-plaintiff or as defendant. The Judica- ture Acts made the distinction between legal and equitable choses in action of no importance. The Judicature Act of 1873, s. 25 (6), enacted that the legal right to a debt or other legal chose in action could be passed by absolute assignment in writing under the hand of the assignor.

” Chose in possession ” is opposed to chose in action, and denotes not

only the right to enjoy or possess a thing, but also the actual or constructive enjoyment of it. The possession may be absolute or qualified. It is absolute when the person is fully and completely the proprietor or owner of the thing; it is qualified when he “has not an exclusive right, or not a per- manent right, but a right which may sometimes subsist and at other times not subsist,” as in the case of animals ferae naturae. A chose in possession is freely transferable by delivery. Previ- ously to the Married Women’s Property Act 1882, a wife’s choses in possession vested in her husband immediately on her marriage, while her choses in action did not belong to the husband until he had reduced them into possession, but this difference is now practically obsolete.

CHOSROES, in Middle and Modern Persian Khosrau (” with a good name “), a very common Persian name, borne by a famous king of the Iranian legend (Kai Khosrau) ; by a Parthian king, commonly called by the Greeks Osroes (q.v.) ; and by the following two Sassanid kings.

1: Chosroes I., ” the Blessed ” (Anushirvan) , 531-579, the favourite son and successor of Kavadh I., and the most famous of the Sassanid kings. At the beginning of his reign he concluded an ” eternal ” peace with the emperor Justinian, who wanted to have his hands free for the conquest of Africa and Sicily. But his successes against the Vandals and Goths caused Chosroes to begin the war again in 540. He invaded Syria and carried the inhabitants of Antioch to his residence, where he built for them a new city near Ctesiphon under the name of Khosrau-Antioch or Chosro-Antioch. During the next years he fought successfully in Lazica or Lazistan(the ancient Colchis, q.v.), on the Black Sea, and in Mesopotamia. The Romans, though led by Belisarius, could do little against him. In 545 an armistice was concluded, but in Lazica the war went on till 556. At last, in 562, a peace was concluded for 50 years, in which the Persians left Lazistan to the Romans, and promised not to persecute the Christians, if they did not attempt to make proselytes among the Zara- thustrians; on the other hand, the Romans had again to pay

subsidies to Persia. Meanwhile in the east the Hephthalites had been attacked by the Turks, who now appear for the first time in history. Chosroes united with them and conquered Bactria, while he left the country north of the Oxus to the Turks. Many other rebellious tribes were subjected. About

570 the dynasts of Yemen, who had been subdued by the Ethi- opians of Axum, applied to Chosroes for help. He sent a fleet with a small army under Vahriz, who expelled the Ethiopians. From that time till the conquests of Mahomet, Yemen was dependent on Persia, and a Persian governor resided here. In

571 a new war with Rome broke out about Armenia, in which Chosroes conquered the fortress Dara on the Euphrates, invaded Syria and Cappadocia, and returned with large booty. During the negotiations with the emperor Tiberius Chosroes died in 579, and was succeeded by his son Hormizd IV.

Although Chosroes had in the last years of his father extirpated the heretical and communistic Persian sect of theMazdakites (see Kavadh) and was a sincere adherent of Zoroastrian orthodoxy, he was not fanatical or prone to persecution. He tolerated every Christian confession. When one of his sons had rebelled about 550 and was taken prisoner, he did not execute him; nor did he punish the Christians who had supported him. He introduced a rational system of taxation, based upon a survey of landed possessions, which his father had begun, and tried in every way to increase the welfare and the revenues of his empire. In Babylonia he built or restored the canals. His army was in discipline decidedly superior to the Romans, and apparently was well paid. He was also interested in literature and philo- sophical discussions. Under his reign chess was introduced from India, and the famous book of Kalilah and Dimnah was translated. He thus became renowned as a wise prince. When Justinian in 529 closed the university of Athens, the last seat of paganism in the Roman empire, the last seven teachers of Neoplatonism emigrated to Persia. But they soon found out that neither Chosroes nor his state corresponded to the Platonic ideal, and Chosroes, in his treaty with Justinian, stipulated that they should return unmolested.

2. Chosroes II., ” the Victorious ” (Parvez), son of Hormizd IV., grandson of Chosroes I., 590-628. He was raised to the throne by the magnates who had rebelled against Hormizd IV. in 590, and soon after his father was blinded and killed. But at the same time the general Bahram Chobin had proclaimed himself king, and Chosroes II. was not able to maintain himself. The war with the Romans, which had begun in 571, had not yet come to an end. Chosroes fled to Syria, and persuaded the emperor Maurice (q.v.) to send help. Many leading men and part of the troops acknowledged Chosroes, and in 591 he was brought back to Ctesiphon. Bahram Chobin was beaten and fled to the Turks, among whom he was murdered. Peace with Rome was then concluded. Maurice made no use of his advan- tage; he merely

restored the former frontier and abolished the subsidies which had formerly been paid to the Persians. Chosroes Ii: was much inferior to his grandfather. He was haughty and cruel, rapacious and given to luxury; he was neither a general nor an administrator. At the beginning of his reign he favoured the Christians; but when in 602 Maurice had been murdered by Phocas, he began war with Rome to avenge his death. His armies plundered Syria and Asia Minor, and in 608 advanced to Chalcedon. In 613 and 614 Damascus and Jerusalem were taken by the general Shahrbaraz, and the Holy Cross was carried away in triumph. Soon after, even Egypt was conquered. The Romans could offer but little resistance, as they were torn by internal dissensions, and pressed by the Avars and Slavs. At last, in 622, the emperor Heraclius (who had succeeded Phocas in 610) was able to take the field. In 624 he advanced into northern Media, where he destroyed the great fire-temple of Gandzak (Gazaca); in 626 he fought in Lazistan (Colchis), while Shahrbaraz advanced to Chalcedon, and tried in vain, united with the Avars, to conquer Constantinople. In 627 Heraclius defeated the Persian army at Nineveh and advanced towards Ctesiphon. Chosroes fled from his favourite residence, Dastageid (near Bagdad), without offering resistance, and as

his despotism and indolence had roused opposition everywhere, his eldest son, Kavadh II., whom he had imprisoned, was set free by some of the leading men and proclaimed king. Four days afterwards; Chosroes was murdered in his palace (February 628). Meanwhile, Heraclius returned in triumph to Constanti-| nople, in 629 the Cross was given back to him and Egypt evacu- ated, while tne Persian empire, from the apparent greatnes; which it had reached ten years ago, sank into hopeless anarchy. SeePERSlA: Ancient History. For the Roman wars see authorities quoted under Maurice and Heraclius. (Ed. M.)

CHOTA (or Chtjtia) NAGPUR, a division of British India in Bengal, consisting of five British districts and two feudatory states. It is a hilly, forest-clad plateau, inhabited mostly by aboriginal races, between the basins of the Sone, the Ganges and the Mahanadi. The five British districts are Hazaribagh, Ranchi, Palamau, Manbhum and Singhbhum. The total area of the British districts is 27,101 sq. m. The population in 1901 was 4,900,429. The tributary states are noticed separately below. The Chota Nagpur plateau is an offshoot of the great Vindhyan range, and its mean elevation is upwards of 2000 ft. above the sea-level. In the W. it rises to 3600 ft., and to the E. and S. its lower steppe, from 800 to 1000 ft. in elevation, com- prises a great portion of the Manbhum and Singhbhum districts. The whole is about 14,000 sq. m. in extent, and forms the source of the Barakhar, Damodar,

Kasai, Subanrekha, Baitarani, Brahmani, lb and other rivers. Sal forests abound. The principal jungle products are timber, various kinds of medicinal fruits and herbs, lac, tussur silk and mahud flowers, which are used as food by the wild tribes and also distilled into a strong country liquor. Coal exists in large quantities, and is worked in the Jherria, Hazaribagh, Giridih and Gobindpur districts. The chief workings are at Jherria, which were started in 1893ˆ and have developed into one of the largest coal-fields in India. Formerly gold was washed from the sands in the bed of the Subanrekha river, but the operations are now almost wholly abandoned. Iron-ores abound, together with good building stone. The indigenous inhabitants consist of non-Aryan tribes who were driven from the plains by the Hindus and took refuge in the mountain fastnesses of the Chota Nagpur plateau. The principal of them are Kols, Santals, Oraons, Dhangars, Mundas and Bhumij. These tribes were formerly turbulent, and a source of trouble to the Mahommedan governors of Bengal and Behar; but the introduction of British rule has secured peace and security, and the aboriginal races of Chota Nagpur are now peaceful and orderly subjects. The principal agricultural products are rice, Indian corn, pulses, oil-seeds and potatoes. A small quantity of tea is grown in Hazaribagh and Ranchi districts. Lac and tussur silk-cloth are largely manufactured. The climate of Chota Nagpur is dry and healthy. The Jherria extension branch of the East India railway runs to Katrasgarh, while the Bengal-Nagpur railway also serves the division.

The Chota Nagpur. States were formerly nine in number. But the five states of Chang Bhakar, Korea, Sirguja, Udaipur and Jashpur were transferred from Bengal to the Central Pro- vinces in October 1905, and the two Uriya-speaking states of Gangpur and Bonai were attached to the Orissa Tributary States. There now remain, therefore, only the two states of Kharsawan and Saraikela. At the decline of the Mahratta power in the early part of the 19th century, the Chota Nagpur states came under British protection. Before the rise of the British power in India their chiefs exercised almost absolute sovereignty in their respective territories.

See F. B. Bradley-Birt, Chota Nagpore (1903).

CHOUANS (a Bas-Breton word signifying screech-owls), the name applied to smugglers and dealers in contraband salt, who rose in insurrection in the west of France at the time of the Revolution and joined the royalists of La Vendee. It has been suggested that the name arose from the cry they used when approaching their nocturnal rendezvous; but it is more probable that it was derived from a nickname applied to their leader Jean Cottereau (1767-1794).

Originally a contraband manufacturer of salt, Cottereau along with his brothers had several times beeD

condemned and served sentence; but the Revolution, by destroying the inland customs, ruined his trade. On the 15th of August 1 792, he led a band of peasants to prevent the departure of the volunteers of St Ouen, near Laval, and retired to the wood of Misdon, where they lived in huts and subterranean chambers. The Chouans then waged a guerrilla warfare against the republicans and, sustained by the royalists and from abroad, carried on their assassinations and brigandage with success. From Lower Maine the insurrection soon spread to Brittany, and throughout the west of France. In 1793 Cottereau came to Laval with some 500 men; the band grew rapidly and swelled into a considerable army, which assumed the name of La Petite Vendee. But after the decisive defeats at Le Mans and Savenay, Cottereau retired again to his old haunts in the wood of Misdon, and resumed his old course of guerrilla warfare. Misfortunes here increased upon him, until he fell into an ambuscade and was mortally wounded. He died among his followers in February 1794. Cottereau's brothers also perished in the war, with the exception of Rene, who lived until 1846. Royalist authors have made of Cottereau a hero and martyr, titles to which his claim is not established. After the death of Cottereau, the chief leaders of the Chouans were Georges Cadoudal (g.v.) and a man who went by the name of Jambe d'Argent. For several months the Chouans continued their petty warfare, which was disgraced by many acts of ferocity and rapine; in August 1795 they dispersed; but they were guilty of several conspiracies up to 181 5. (See also Vendee.)

See the articles in La Revolution francaise, vol. 29, La Chouannerie dans la Manche; vol. 32, La Chouannerie dans I'Eure; vol. 40, La Chouannerie dans le Morbihan {1701-1794) ; Sarot, Les Tribunaux represses ordinaires de la Manche en matiere politique pendant la premiere Revolution (Paris, 1881), 4 vols.; Th. de Closmadeux, Quiberon {1795), Emigres et Chouans, commissions militaires, interro- gations et jugements (Paris, 1898), the only authority on the cele- brated affa ; r of Quiberon ; E. Daudet, La Police et les Chouans dans le Consulat et I'Empire, 1800-1815 (Parisj 1895). Also the works of Ch. L. Chessin mentioned under Vendee.

CHRESMOGRAPHION (from Gr. xpovpLs, oracle, and ypafeiv, to

write), an architectural term sometimes given to the chamber between the pronaos and the cella in Greek temples where oracles were delivered.

CHRESTIEN, FLORENT (1541-1596), French satirist and Latin poet, the son of Guillaume Chrestien, an eminent French physician and writer on physiology, was born at Orleans on the 26th of January 1541. A pupil of Henri Estienne, the Hellenist, at an early age he was appointed tutor to Henry of Navarre, afterwards Henry IV., who made him his librarian. Brought up as a Calvinist, he became a convert to Catholicism. He was the author of many good translations from the Greek into Latin verse, — amongst others, of versions of the Hero and Leander attributed to Musaeus, and of many epigrams from the Anthology. In his translations into French, among which are remarked those of Buchanan's Jephthe (1567), and of Oppian De Venatione (i57S); he is not so happy, being rather to be praised for fidelity to his original than for excellence of style. His principal claim to a place among memorable satirists is as one of the authors of the Satyre Menippee, the famous pasquinade in the interest of his old pupil, Henry IV., in which the harangue put into the mouth of cardinal de Pelve is usually attributed to him. He died on the 3rd of October 1 596 at Vendome.

CHRETIEN, or Crestien, DE TROYES, a native of Champagne, and the most famous of French medieval poets. Unfortunately we have few exact details as to his life, and opinion differs as to the precise dates to be assigned to his poems. We know that he wrote the Chevalier de la Charrctle at the command of Marie, countess of Champagne (the daughter of Louis VII. and Eleanor, who married the count of Champagne in 1164), and Le Conte del Graal or Perceval for Philip, count of Flanders, who died of the plague before Acre in 1191. This prince was guardian to the young king, Philip Augustus, and held the regency from 1180 to 1.182. As Chretien refers to the story of the Grail as the best tale told au cort roial, it seems very probable that it was composed during the period of the count's regency. It was left unfinished, and added to at divers times by at least three writers, Wauchier

de Denain, Gerbert de Montreuil and Manessier. The second of these states definitely that Chretien died before he could finish his poem. Probably the period of his literary activity lies between the dates n 50 and 1182, when his patron, Count Philip, fell into disgrace at court. The extant poems of Chretien de Troyes, in their chronological order are, Erec et Enide, CligSs, Le Chevalier de la Charrette (or Lancelot), Le Chevalier au Lion (or Yvain), and Le Conte del Graal (Perceval), all

dealing with Arthurian legend. Besides these he states in the opening lines of Cligis that he had composed a Tristan (of which so far no trace has been found), and had made certain translations from Ovid's Ars A matoria and Metamorphoses. A portion of the last has been found by Gaston Paris included in the translation of Ovid made by Chretien Legouais. There exists also a poem, Guillaume d' Angleterre, purporting to be by Chretien, but the authorship is a matter of debate. Professor Foerster claims it as genuine, and includes it in his edition of the poems, but Gaston Paris never accepted it.

Chretien's poems enjoyed widespread favour, and of the three most popular (Erec, Yvain and Perceval) there exist old Norse translations, while the two first were admirably rendered into German by Hartmann von Aue. There is an English translation of the Yvain, Ywain and Gawain, and there are Welsh versions of all three stories, though their exact relation to the French has not been determined. Chretien's style is easy and graceful, such as might be expected from a court poet; he is analytical, but not dramatic; in depth of thought and power of characterization he is decidedly inferior to Wolfram von Eschenbach, and as a poet he is probably to be ranked below Thomas, the author of the Tristan, and the translator of Thomas, Gottfried von Strassburg. Much that has been claimed as characteristic of his work has been shown by M. Willmotte to be merely reproductions of literary conceits employed by his predecessors; in the words of a recent writer, M. Bedier, " Chretien semble moins avoir ete un createur epique qu'un habile arrangeur." The special interest of his pcems lies in the problems surrounding their origin. So far as the MSS. are concerned they are the earliest Arthurian romances we possess. Did Chretien invent the genre, or did he simply turn to account the work of earlier, and less favoured, poets? Round dis point the battle still rages hotly, and though the extensive claims made by the enthusiastic editor of his works are gradually yielding to the force of critical investigation, it cannot be said that the question is in any way settled (see Arthurian Legend) .

Chretien's poems, except the Perceval,_ have been critically edited by Professor Foerster (4 vols.). There is no easily available edition of the Perceval, which was printed from the Mons MS. by M. Potvin (6 vols., 1866-1871), but is difficult to procure. For Ywain and Gawain see the edition by Schleich (1887). The German versions are in Deutsche Classiker des Mittelallers, 1888 (Iwein), 1893 (Erec); the Welsh, in Lady Charlotte Guest's translation of the Mabinogion (Nutt, 1902) ; Scandinavian translations, ed. E. Kolbing (1872). For general criticism see Willmotte, L 1 Evolution du roman francais aux environs de n$o (1903) ; also Legend of Sir Lancelot and Legend of Sir Percival

(Grimm Library); and M. Borodine, La Femme el V amour au XII' siecle, d'apres les poemes de Chretien de Troyes (1909).

CHRISM (through Lat. chrisma, from Gr. xpˆcixa, an anointing substance, XP LUV > to anoint; through a Romanic form cresma comes the Fr. crime, and Eng. " cream "), a mixture of olive oil and balm, used for anointing in the Roman Catholic church in baptism, confirmation and ordination, and in the consecrating and blessing of altars, chalices, baptismal water, &c. The consecration of the " chrism " is performed by a bishop, and since the 5th century has taken place on Maundy Thursday. In the Orthodox Church the chrism contains, besides olive oil, many precious spices and perfumes, and is known as " muron " or " myron." The word is sometimes used loosely for the unmixed olive oi' used in the sacrament of extreme unction. The " Chrisom " or " chrysom," a variant of " chrism," lengthened through pronunciation, is a white cloth with which the head of a newly baptized child was covered to prevent the holy oil from being rubbed off . If the baby died within a month of its baptism, it was shrouded in its chrisom; otherwise the cloth or its value was given to the church as an offering by the mother at her churching. Children dying within the month were called

" chrisom-children " or " chrisoms," and up to 1726 such entries occur in bills of mortality. The word was also used generally for a very young and innocent child, thus Shakespeare, Henry V., ii. 3, says of Falstaff : " A' made a finer end and went away an it had been any Chrisom Child."

CHRIST (Gr. Xpioros, Anointed), the official title given in' the New Testament to Jesus of Nazareth, equivalent to the Hebrew Messiah. See Jesus Christ; Messiah; Christianity.

CHRIST, WILHELM VON (1831-1906), German classical scholar, was born in Geisenheim in Hesse-Nassau on the 2nd of August 183 1. From 1854 till i860 he taught in the Maximilians- gymnasium at Munich, and in 1861 was appointed professor of classical philology in the university. His most important works are his Geschichte der griechischen Literatur (5th ed., 1908 f.), a history of Greek literature down to the time of Justinian, one of the best works on the subject; Metrik der Griechen und Rbmer (1879); editions of Pindar (1887); of the Poetica (1878) and Metaphysica (1895) of Aristotle; Iliad (1884).

His contributions to the Sitzungsberichte and Abhandlungen of the Bavarian Academy of Sciences are particularly valuable.

See O. Crusius, Geddchtnisrede (Munich, 1907).

CHRISTADELPHIANS (XpioroD adeXfoi, “brothers of Christ “), sometimes also called Thomasites, a community founded in 1848 by John Thomas (1805-1871), who, after studying medicine in London, migrated to Brooklyn, N.Y., U.S.A. There he at first joined the ” Campbellites,” but afterwards struck out independently, preaching largely upon the application of Hebrew prophecy and of the Book of Revelation to current and future events. Both in America and in Great Britain he gathered a number of adherents, and formed a community which has extended to several English-speaking countries. It consists of exclusive ” ecclesias,” with neither ministry nor organization. The members meet on Sundays to ” break bread ” and discuss the Bible. Their theology is strongly millenarian, centering in the hope of a world-wide theocracy with its seat at Jerusalem. Holding a doctrine of “conditional immortality,” they believe that they alone have the true exegesis of Scripture, and that the ” faith of Christendom” is” compounded of the fables predicted by Paul.” No statistics of the community are published. It prob- ably numbers from two to three thousand members. A monthly magazine, The Christadelphian, is published in Birmingham.

See R. Roberts, Dr Thomas, his Life and Work (1884).

CHRISTCHURCH, a municipal and parliamentary borough of Hampshire, England, at the confluence of the rivers Avon and Stour, ij m. from the sea, and 104 m. S.W. by W. from London by the London & South Western railway. Pop. (1901) 4204. It is famous for its magnificent priory church of the Holy Trinity. The church is cruciform, lacking a central tower, but having a Perpendicular tower at the west end. The nave and transepts are principally Norman, and very fine; the choir is Perpendicular. Early English additions appear in the nave, clerestory and elsewhere, and the rood-screen is of ornate Decorated workman- ship. Other noteworthy features are the Norman turret at the north-east angle of the north transept, covered with arcading and other ornament, the beautiful reredos, similar to that in Winchester cathedral, and several interesting monuments, among which is one to the poet Shelley. Only fragments remain of the old castle, but an interesting ruin adjoins it known as the Norman House, apparently dating from the later part of the 1 2 th century. Hosiery, and chains for clocks and watches are manufactured, and the salmon fishery is valuable. There is a small harbour, but it is dry at low water.

The parliamentary borough, returning one member, includes the town of Bourne- mouth. The municipal borough is under a mayor, 4 aldermen and 12 councillors. Area, 832 acres.

Christchurch is mentioned in Saxon documents under the name of Tweotneam or Tweonaeteam, which long survived in the form Christchurch Twineham. In 901 it was seized by Aethelwald, but was recaptured by Edward the Elder. In the Domesday Survey, under the name of Thuinam, it appears as a royal manor, comprising a mill and part of the king's forest; its value since the time of Edward the Confessor had decreased

by almost one-half. Henry I. granted Christchurch to Richard de Redvers, who erected the castle. The first charter was granted by Baldwin earl of Exeter in the 12th century; it exempted the burgesses from certain tolls and customs, including the tolls on salt within the borough, and the custody of thieves. The 2nd Earl Baldwin granted to the burgesses the tolls of the fair at St Faith and common of pasture in certain meads. The above charters were confirmed by Edward II., Henry VII. and Eliza- beth. The Holy Trinity fair is mentioned in 1 2 26. Christchurch was governed by a bailiff in the 13th century, and was not incorporated till 1670, when the government was vested in a mayor and 24 capital burgesses, but this charter was shortly abandoned. The borough was summoned to send representatives to parliament in 1307 and 1308, but no returns are registered until 1572, from which date it was represented by two members until the Reform Act of 1832 reduced the number to one. The secular canons of the church of Holy Trinity held valuable possessions in Hampshire at the time of Edward the Confessor, including a portion of Christchurch, and in 1 1 50 the establishment was constituted a priory of regular canons of St Augustine. Baldwin de Redvers confirmed the canons in their right to the first salmon caught every year and the tolls of Trinity fair. The priory, which attained to such fame that its name of Christchurch finally replaced the older name of Twineham, was dissolved in

I539-

See Victoria County History — Hampshire; Benjamin Ferrey, Antiquities of the Priory of Christchurch, 2nd edition, revised by J. Britton (London, 1841).

CHRISTCHURCH, a city near the east coast of South Island, New Zealand, to the north of Banks Peninsula, in Selwyn county, the capital of the provincial district of Canterbury and the seat of a

bishop. Pop. (1906) 49,928; including suburbs, 67,878. It stands upon the great Canterbury plain, which here is a dead level, though the monotony of the site has been much relieved by extensive plantations of English and Australian trees. A back- ground is supplied by the distant mountains to the west, and by the nearer hills to the south. The small river Avon winds through the city, pleasantly bordered by terraces and gardens. The wide streets cross one another for the most part at right angles. The predominance of stone and brick as building materialsˆ the dominating cathedral spire, and the well-planted parks, avenues and private gardens, recall the aspect of an English residential town. Christchurch is mainly dependent on the rich agricultural district which surrounds it, the plain being mainly devoted to cereals and grazing. Wool is extensively worked, and meat is frozen for export. Railways connect with Culverden to the north and with Dunedin and the south coast, with many branches through the agricultural districts; also with Lyttelton, the port of Christchurch, 8 m. S.E. There are tramways in the city, and to New Brighton, a seaside suburb, and other residential quarters. The principal public buildings are the government buildings and the museum, with its fine collection of remains of the extinct bird, moa. The cathedral is the best in New Zealand, built from designs of Sir G. Gilbert Scott in Early English style, with a tower and spire 240 ft. high. Among educational foundations are Canterbury College (for classics, science, engineering, &c), Christ's College (mainly theological) and grammar school, and a school of art. There is a Roman Catholic pro-cathedral attached to a convent of the Sacred Heart. A large extent of open ground, to the west of the town, finely planted, and traversed by the river, comprises Hagley Park, recreation grounds, the Government Domain and the grounds of the Acclimatization Society, with fish-ponds and a small zoological garden. The foundation of Christchurch is connected with the so-called " Canterbury Pilgrims," who settled in this district in 1850. Lyttelton was the original settlement, but Christchurch came into existence in 185 1, and is thus the latest of the settlements of the colony. It became a municipality in 1862. In 1903 several populous suburban boroughs were amalgamated with the city.

CHRISTIAN II. (1481-1559), king of Denmark, Norway and Sweden, son of John (Hans) and Christina of Saxony, was

born at Nyborg castle in 1481, and succeeded his father as king of Denmark and Norway in 1513. As viceroy of Norway (1506- 151 2) he

had already displayed a singular capacity for ruling under exceptionally difficult circumstances. Patriotism, insight, courage, statesmanship, energy,— these great qualities were indisputably his; but unfortunately they were vitiated by obstinacy, suspicion and a sulky craftiness, beneath which simmered a very volcano of revengeful cruelty. Another peculiarity, more fatal to him in that aristocratic age than any other, was his fondness for the common people, which was increased by his passion for a pretty Dutch girl, named Dyveke, who became his mistress in 1507 or 1509.

Christian's succession to the throne was confirmed at the Herredag, or assembly of notables from the three northern king- doms, which met at Copenhagen in 1513. The nobles and clergy of all three kingdoms regarded with grave misgivings a ruler who had already shewn in Norway that he was not afraid of enforcing his authority to the uttermost. The Rigsraads of Denmark and Norway insisted, in the liaandfaestning or charter extorted from the king, that the crowns of both kingdoms were elective and not hereditary, providing explicitly against any transgression of the charter by the king, and expressly reserving to themselves a free choice of Christian's successor after his death. But the Swedish delegates could not be prevailed upon to accept Christian as king at all. " We have," they said, " the choice between peace at home and strife here, or peace here and civil war at home, and we prefer the former." A decision as to the Swedish succession was therefore postponed. On the 12th of August 1515 Christian married Isabella of Burgundy, the grand-daughter of the emperor Maximilian. But he would not give up his liaison with Dyveke, and it was only the death of the unfortunate girl in 1517, under suspicious circumstances, that prevented serious complications with the emperor Charles V. Christian revenged himself by executing the magnate Torben Oxe, who, on very creditable evidence, was supposed to have been Dyveke's murderer, despite the strenuous opposition of Oxe's fellow-peers; and henceforth the king lost no opportunity of depressing the nobility and raising plebeians to power. His chief counsellor was Dyveke's mother Sigbrit, a born administrator and a commercial genius of the first order. Christian first appointed her controller of the Sound tolls, and ultimately committed to her the whole charge of the finances. A bourgeoise herself, it was Sigbrit's constant policy to elevate and extend the influence of the middle classes. She soon became the soul of a middle-class inner council, which competed with Rigsraad itself. The patricians naturally resented their supersession and nearly every unpopular measure was attributed to the influence of " the foul-mouthed Dutch sorceress who hath bewitched the king."

Meanwhile Christian was preparing for the inevitable war with Sweden, where the patriotic party, headed by the freely elected governor Sten Sture the younger, stood face to face with the philo-Danish party under Archbishop Gustavus Trolle. Christian, who had already taken measures to isolate Sweden politically, hastened to the relief of the archbishop, who was beleagured in his fortress of Stake, but was defeated by Sture and his peasant levies at Vedla and forced to return to Denmark. A second attempt to subdue Sweden in 1518 was also frustrated by Sture's victory at Brankyrka. A third attempt made in 1520 with a large army of French, German and Scottish mercenaries proved successful. Sture was mortally wounded at the battle of Bor- gerund, on the 19th of January, and the Danish army, unopposed, was approaching Upsala, where the members of the Swedish Riksrad had already assembled. The senators consented to render homage to Christian on condition that he gave a full indemnity for the past and a guarantee that Sweden should be ruled according to Swedish laws and custom; and a convention to this effect was confirmed by the king and the Danish Rigsraad on the 31st of March. But Sture's widow, Dame Christina Gyllenstjerna, still held out stoutly at Stockholm, and the peasantry of central Sweden, stimulated by her patriotism, flew to arms, defeated the Danish invaders at Balundsas (March

19th), and were only with the utmost difficulty finally defeated at the bloody battle of Upsala (Good Friday, April 6th). In May the Danish fleet arrived, and Stockholm was invested by land and sea; but Dame Christina resisted valiantly for four months longer, and took care, when she surrendered on the 7th of September, to exact beforehand an amnesty of the most explicit and absolute character. On the 1st of November the representatives of the nation swore fealty to Christian as hereditary king of Sweden, though the law of the land distinctly provided that the Swedish crown should be elective. On the 4th of November he was anointed by Gustavus Trolle in Stock- holm cathedral, and- took the usual oath to rule the realm through native-born Swedes alone, according to prescription. The next three days were given up to banqueting, but on the 7th of November "an entertainment of another sort began." On the evening of that day Christian summoned his captains to a private conference at the palace, the result of which was quickly apparent, for at dusk a band of Danish soldiers, with lanterns and torches, broke into the great hall and carried off several carefully selected persons. By 10 o'clock the same evening the remainder of the king's guests were safely under lock and key. All these persons had previously been marked down on Archbishop Trolle's proscription list. On the following day a council,

presided over by Trolle, solemnly pronounced judgment of death on the proscribed, as manifest heretics. At 12 o'clock that night the patriotic bishops of Skara and Strangnas were led out into the great square and beheaded. Fourteen noblemen,three burgomasters,fourteen town-councillors and about twenty common citizens of Stockholm were then drowned or decapitated. The executions continued throughout the following day; in all, about eighty-two people are said to have been thus murdered. Moreover, Christian revenged himself upon the dead as well as upon the living, for Sten Sture's body was dug up and burnt, as well as the body of his little child. Dame Christina and many other noble Swedish ladies were sent prisoners to Denmark. It has well been said that the manner of this atrocious deed (the " Stockholm Massacre " as it is generally called) was even more detestable than the deed itself. Christian suppressed his political opponents under the pretence of defending an ecclesiastical system which in his heart he despised. Even when it became necessary to make excuses for his crime, we see the same double-mindedness. Thus, while in a proclamation to the Swedish people he represented the massacre as a measure necessary to avoid a papal interdict, in his apology to the pope for the decapitation of the innocent bishops he described it as an unauthorized act of vengeance on the part of his own people.

It was with his brain teeming with great designs that Christian II. returned to his native kingdom. That the welfare of his dominions was dear to him there can be no doubt. Inhuman as he could be in his wrath, in principle he was as much a humanist as any of his most enlightened contemporaries. But he would do things his own way; and deeply distrusting the Danish nobles with whom he shared his powers, he sought helpers from among the wealthy and practical middle classes of Flanders. In June 1521 he paid a sudden visit to the Low Countries, and remained there for some months. He visited most of the large cities, took into his service many Flemish artisans, and made the personal acquaintance of Quentin Matsys and Albrecht Diirer, the latter of whom painted his portrait. Christian also entertained Erasmus, with whom he discussed the Reformation, and let fall the characteristic expression: " Mild measures are of no use; the remedies that give the whole body a good shaking are the best and surest."

Never had King Christian seemed so powerful as on his return to Denmark on the 5th of September 1521, and with the con- fidence of strength he at once proceeded recklessly to inaugurate the most sweeping reforms. Soon after his return he issued his great Landelove, or Code of Laws. For the most part this is founded on Dutch models, and testifies in a high degree to the king's progressive aims. Provision

was made for the better education of the lower, and the restriction of the political influence of the higher clergy; there were stern prohibitions against

wreckers and ” the evil and unchristian practice of selling peasants as if they were brute beasts “; the old trade gilds were retained, but the rules of admittance thereto made easier, and trade combinations of the richer burghers, to the detriment of the smaller tradesmen, were sternly forbidden. Unfortunately these reforms, excellent in themselves, suggested the standpoint not of an elected ruler, but of a monarch by right divine. Some of them were even in direct contravention of the charter; and the old Scandinavian spirit of independence was deeply wounded by the preference given to the Dutch. Sweden too was now in open revolt; and both Norway and Denmark were taxed to the uttermost to raise an army for the subjection of the sister kingdom. Foreign complications were now superadded to these domestic troubles. With the laudable object of releasing Danish trade from ˆhe grinding yoke of the Hansa, and making Copen- hagen the great emporium of the north, Christian had arbitrarily raised the Sound tolls and seized a number of Dutch ships which presumed to evade the tax. Thus his relations with the Nether- lands were strained, while with Liibeck and her allies he was openly at war. Finally Jutland rose against him, renounced its allegiance and offered the Danish crown to Duke Frederick of Holstein (January 20th, 1523). So overwhelming did Christian’s difficulties appear that he took ship to seek help abroad, and on May 1st landed at Veere in Zealand. Eight years later (October 24th, 1 531) he attempted to recover his kingdoms, but a tempest scattered his fleet off the Norwegian coast, and on the 1st of July 1 S3 2 ; by the convention of Oslo, he surrendered to his rival, King Frederick, and for the next 27 years was kept in solitary confinement, first in the Blue Tower at Copenhagen and after- wards at the castle of Kabendborg. He died in January 1559.

See K. P. Arnoldson, Nordens enhet och Kristian II. (Stockholm, 1899); Paul Frederik Barfod, Danmarks Historie fra 1319 til 1536 (Copenhagen, 1885) ; Danmarks Riges Historie, vol. 3 (Copenhagen, 1897-1905); Robert Nisbet Bain, Scandinavia, chap 2 (Cambridge, 1905). (R. N. BO-

CHRISTIAN HI. (1503-1559), king of Denmark and Norway, was the

son of Frederick I. of Denmark and his first consort, Anne of Brandenburg. His earliest teacher, Wolfgang von Utenhof, who came straight from Wittenberg, and the Lutheran Holsteiner Johann Rantzau, who became his tutor, were both able and zealous reformers. In 1521 Christian travelled in Germany, and was present at the diet of Worms, where Luther's behaviour profoundly impressed him. On his return he found that his father had been elected king of Denmark in the place of Christian II., and the young prince's first public service was the reduction of Copenhagen, which stood firm for the fugitive Christian II. He made no secret of his Lutheran views, and his outspokenness brought him into collision, not only with the Catholic Rigsraad, but also with his cautious and temporizing father. At his own court at Schleswig he did his best to introduce the Reformation, despite the opposition of the bishops. Both as stadtholder of the Duchies in 1526, and as viceroy of Norway in 1529, he displayed considerable administrative ability, though here too his religious intolerance greatly provoked the Catholic party. There was even some talk of passing him over in the succession to the throne, in favour of his half-brother Hans, who had been brought up in the old religion. On his father's death Christian was proclaimed king at the local diet of Viborg, and took an active part in the " Grevens Fejde " or " Count's War." The triumph of so fanatical a reformer as Christian brought about the fall of Catholicism, but the Catholics were still so strong in the council of state that Christian was forced to have recourse to a coup a" Hat, which he successfully accomplished by means of his German mercenaries (12th of August 1536), an absolutely inexcusable act of violence loudly blamed by Luther himself, and accompanied by the wholesale spoliation of the church. Christian's finances were certainly readjusted thereby, but the ultimate gainers by the confiscation were the nobles, and both education and morality suffered grievously in consequence. The circumstances under which Christian III. ascended the throne naturally exposed Denmark to the danger of foreign domination. It was with the help of the gentry of the duchies that Christian

had conquered Denmark. German and Holstein noblemen had led his armies and directed his diplomacy. Naturally, a mutual confidence between a king who had conquered his kingdom and a people who had stood in arms against him was not attainable immediately, and the first six years of Christian III.'s reign were marked by a contest between the Danish Rigsraad and the German counsellors, both of whom sought to rule " the pious king " exclusively. Though the Danish party won a signal victory at the outset, by obtaining the insertion in the charter of provisions stipulating that only native-born

Danes should fill the highest dignities of the state, the king's German counsellors continued paramount during the earlier years of his reign. The ultimate triumph of the Danish party dates from 1539, the dangers threatening Christian III. from the emperor Charles V. and other kinsmen of the imprisoned Christian II. convincing him of the absolute necessity of removing the last trace of dis- content in the land by leaning exclusively on Danish magnates and soldiers. The complete identification of the Danish king with the Danish people was accomplished at the Herredag of Copenhagen, 1542, when the nobility of Denmark voted Christian a twentieth part of all their property to pay off his heavy debt to the Holsteiners and Germans.

The pivot of the foreign policy of Christian III. was his alliance with the German Evangelical princes, as a counterpoise to the persistent hostility of Charles V., who was determined to support the hereditary claims of his nieces, the daughters of Christian II., to the Scandinavian kingdoms. War was actually declared against Charles V. in 1542, and, though the German Protestant princes proved faithless allies, the closing of the Sound against Dutch shipping proved such an effective weapon in King Christian's hand that the Netherlands compelled Charles V. to make peace with Denmark at the diet of Spires, the 23rd of May 1544. The foreign policy of Christian's later days was regulated by the peace of Spires. He carefully avoided all foreign complica- tions; refused to participate in the Schmalkaldic war of 1546; mediated between the emperor and Saxony after the fall of Maurice of Saxony at the battle of Sievershausen in 1553, and contributed essentially to the conclusion of peace. King Christian III. died on New Year's Day 1559. Though not perhaps a great, he was, in the fullest sense of the word, a good ruler. A strong sense of duty, genuine piety, and a cautious but by no means pusillanimous common-sense coloured every action of his patient, laborious and eventful life. But the work he left behind him is the best proof of his statesmanship. He found Denmark in ruins; he left her stronger and wealthier than she had ever been before.

See Danmarks Riges Historie, vol. 3 (Copenhagen, 1 897-1901); Huitfeld, King Christian III.'s Historie (Copenhagen, 1595); Bain, Scandinavia, cap. iv. v. (Cambridge, 1905). (R. N. B.)

CHRISTIAN IV. (1 577-1648), king of Denmark and Norway, the son of Frederick II., king of Denmark, and Sophia of Mecklen- burg, was born at Fredriksborg castle in 1577, and succeeded to the throne on the death of his father (4th of April 1588), attaining his majority on the 17th of August 1596. On the 27th of November 1597 he married Anne Catherine, a daughter of Joachim Frederick, margrave of

Brandenburg. The queen died fourteen years later, after bearing Christian six children. Four years after her death the king privately wedded a handsome young gentlewoman, Christina Munk, by whom he had twelve children, — a connexion which was to be disastrous to Denmark.

The young king's court was one of the most joyous and magnificent in Europe; yet he found time for work of the most various description, including a series of domestic reforms (see Denmark: History). He also did very much for the national armaments. New fortresses were constructed under the direction of Dutch engineers. The Danish navy, which in 1 596 consisted of but twenty-two vessels, in 161c rose to sixty, some of them being built after Christian's own designs. The formation of a national army was more difficult. Christian had to depend mainly upon hired troops, supported by native levies recruited for the most part from the peasantry on the crown domains. His first experiment with his newly organized army was successful. In

the war with Sweden, generally known as the " Kalmar War," because its chief operation was the capture by the Danes of Kalmar, the eastern fortress of Sweden, Christian compelled Gustavus Adolphus to give way on all essential points (treaty of Knared, 20th of January 1613). He now turned his attention to Germany. His object was twofold: first, to obtain the control of the great German rivers the Elbe and the Weser, as a means of securing his dominion of the northern seas; and secondly, to acquire the secularized German bishoprics of Bremen and Werden as appanages for his younger sons. He skilfully took advantage of the alarm of the German Protestants after the battle of White Hill in 1620, to secure the coadjutorship to the see of Bremen for his son Frederick (September 1621), a step followed in November by a similar arrangement as to Werden; while Hamburg by the compact of Steinburg (July 1621) was induced to acknowledge the Danish pverlordship of Holstein. The growing ascendancy of the Catholics in North Germany in and after 1623 almost induced Christian, for purely political reasons, to intervene directly in the Thirty Years' War. For a time, however, he stayed his hand, but the urgent solicitations of the western powers, and, above all, his fear lest Gustavus Adolphus should supplant him as the champion of the Protestant cause, finally led him to plunge into war against the combined forces of the emperor and the League, without any adequate guarantees of co-operation from abroad. On the 9th of May 1625

Christian quitted Denmark for the front. He had at his disposal from 19,000 to 25,000 men, and at first gained some successes; but on the 27th of August 1626 he was utterly routed by Tilly at Lutter-am-Barenberge, and in the summer of 1627 both Tilly and Wallenstein, ravaging and burning, occupied the duchies and the whole peninsula of Jutland. In his extremity Christian now formed an alliance with Sweden (1st of January 1628), whereby Gustavus Adolphus pledged himself to assist Denmark with a fleet in case of need, and shortly afterwards a Swedo-Danish army and fleet compelled Wallenstein to raise the siege of Stralsund. Thus the possession of a superior sea-power enabled Denmark to tide over her worst difficulties, and in May 1629 Christian was able to conclude peace with the emperor at Lubeck, without any diminution of territory.

Christian IV. was now a broken man. His energy was tem- porarily paralysed by accumulated misfortunes. Not only his political hopes, but his domestic happiness had suffered ship- wreck. In the course of 1628 he discovered a scandalous intrigue of his wife, Christina Munk, with one of his German officers; and when he put her away she endeavoured to cover up her own disgrace by conniving at an intrigue between Vibeke Kruse, one of her discharged maids, and the king. In January 1630 the rupture became final, and Christina retired to her estates in Jutland. Meanwhile Christian openly acknowledged Vibeke as his mistress, and she bore him a numerous family. Vibeke's children were of course the natural enemies of the children of Christina Munk, and the hatred of the two families was not without influence on the future history of Denmark. Between 1629 and 1643, however, Christian gained both in popularity and influence. During that period he obtained once more the control of the foreign policy of Denmark as well as of the Sound tolls, and towards the end of it he hoped to increase his power still further with the assistance of his sons-in-law, Korfits Ulfeld and Hannibal Sehested, who now came prominently forward.

Even at the lowest ebb of his fortunes Christian had never lost hope of retrieving them, and between 1629 and 1643 the European situation presented infinite possibilities to politicians with a taste for adventure. Unfortunately, with all his gifts, Christian was no statesman, and was incapable of a consistent policy. He would neither conciliate Sweden, henceforth his most dangerous enemy, nor guard himself against her by a definite system of counter-alliances. By mediating in favour of the emperor, after the death of Gustavus Adolphus in 1632, he tried to minimize the influence of Sweden in Germany, and did glean some minor advantages. But his whole Scandinavian policy was so irritating and vexatious that Swedish statesmen made up their minds that a war

with Denmark was only a

question of time; and in the spring of 1643 it seemed to them that the time had come. They were now able, thanks to their conquests in the Thirty Years' War, to attack Denmark from the south as well as the east; the Dutch alliance promised to secure them at sea, and an attack upon Denmark would prevent her from utilizing the impending peace negotiations to the prejudice of Sweden. In May the Swedish Riksrad decided upon war; on the 1 2th of December the Swedish marshal Lennart Torstens- son, advancing from Bohemia, crossed the northern frontier of Denmark; by the end of January 1644 the whole peninsula of Jutland was in his possession. This totally unexpected attack, conducted from first to last with consummate ability and lightning-like rapidity, had a paralysing effect upon Denmark. Fortunately, in the midst of almost universal helplessness and confusion, Christian IV. knew his duty and had the courage to do it. In his sixty-sixth year he once more displayed some- thing of the magnificent energy of his triumphant youth. Night and day he laboured to levy armies and equip fleets. Fortunately too for him, the Swedish government delayed hostilities in Scania till February 1644, so that the Danes were able to make adequate defensive preparations and save the important fortress of Malmo. Torstensson, too, was unable to cross from Jutland to Funen for want of a fleet, and the Dutch auxiliary fleet which came to his assistance was defeated between the islands of Sylt and Ronno on the west coast of Schleswig by the Danish admirals. Another attempt to transport Torstensson and his army to the Danish islands by a large Swedish fleet was frustrated by Christian IV. in person on the 1st of July 1644. On that day the two fleets encountered off Kolberge Heath, S.E. of Kiel Bay, and Christian displayed a heroism which endeared him ever after to the Danish nation and made his name famous in song and story. As he stood on the quarter-deck of the " Trinity" a cannon close by was exploded by a Swedish bullet, and splinters of wood and metal wounded the king in thirteen places, blinding one eye and flinging him to the deck. But he was instantly on his feet again, cried with a loud voice that it was well with him, and set every one an example of duty by remaining on deck till the fight was over. Darkness at last separated the contending fleets ; and though the battle was a drawn one, the Danish fleet showed its superiority by blockading the Swedish ships in Kiel Bay. But the Swedish fleet escaped, and the annihilation of the Danish fleet by the combined navies of Sweden and Holland, after an obstinate fight between Fehmarn and Laaland at the end of September, exhausted the military resources of Denmark and compelled Christian to accept the mediation of France and the United Provinces; and peace was finally

signed at Bromsebro on the 8 th of February 1645.

The last years of the king were still further embittered by sordid differences with his sons-in-law, especially with the most ambitious of them, Korfits Ulfeld. On the 21st of February 1648, at his earnest request, he was carried in a litter from Fredriksborg to his beloved Copenhagen, where he died a week later. Christian IV. was a good linguist, speaking, besides his native tongue, German, Latin, French and Italian. Naturally cheerful and hospitable, he delighted in lively society; but he was also passionate, irritable and sensual. He had courage, a vivid sense of duty, an indefatigable love of work, and all the inquisitive zeal and inventive energy of a born reformer. Yet, though of the stuff of which great princes are made, he never attained to greatness. His own pleasure, whether it took the form of love or ambition, was always his first consideration. In the heyday of his youth his high spirits and passion for adventure enabled him to surmount every obstacle with ilan. But in the decline of life he reaped the bitter fruits of his lack of self-control, and sank into the grave a weary and broken- hearted old man.

°* See Life (Dan.), by H. C. Bering Liisberg and A. L. Larsen (Copenhagen, 1890-1891); Letters (Dan.), ed. Carl Frederik Bricka and Julius Albert Fridericia (Copenhagen, 1878); Danmarks Riges Historie, vol. 4 (Copenhagen, 1897-1905); Robert Nisbet Bain, Scandinavia, cap. vii. (Cambridge, 1905). (R. N. B.)

CHRISTIAN V. (1646-1699), king of Denmark and Norway, the son of Frederick III. of Denmark and Sophia Amelia of

Brunswick-Ltineburg, was born on the 15th of April 1646 at Flensberg, and ascended the throne oil the 9th of February 1670; He was a weak despot with an exaggerated opinion of his dignity and his prerogatives. Almost his first act on ascending the throne was publicly to insult his consort, the amiable Charlotte Ameh'a of Hesse-Cassel, by introducing into court, as his officially recognized mistress, Amelia Moth, a girl of sixteen, the daughter of his former tutor, whom he made countess of Samso. His personal courage and extreme affability made him highly popular among the lower orders, but he showed himself quite incapable of taking advantage permanently of the revival of the national energy, and the extraordinary overflow of native middle-class talent, which were the immediate consequences of

the revolution of 1660. Under the guidance of his great chancellor Griffenfeldt, Denmark seemed for a brief period to have a chance of regaining her former position as a great power. But in sacrificing Griffenfeldt to the clamour of his adversaries, Christian did serious injury to the monarchy. He frittered away the resources of the kingdom in the unremunerative Swedish war of 1675-79, an d did nothing for internal progress in the twenty years of peace which followed. He died in a hunting accident on the 25th of August 1699.

See Peter Edyard Holm, Danmarks indre Historie under Ene- vaelden (Copenhagen, 1 881-1886); Adolf Ditleva Jorgensen, Peter Griffenfeldt (Copenhagen, 1893) ; Robert Nisbet Bain, Scandinavia cap. x., xi. (Cambridge, 1905).

CHRISTIAN VII. (1749-1808), king of Denmark and Norway, was the son of Frederick V., king of Denmark, and his first consort Louisa, daughter of George II. of Great Britain. He became king on his father's death on the 14th of January 1766. All the earlier accounts agree that he had a winning personality and considerable talent, but he was badly educated, systematic- ally terrorized by a brutal governor and hopelessly debauched by corrupt pages, and grew up a semi-idiot. After his marriage in 1766 with Caroline Matilda (1751-1775), daughter of Frederick, prince of Wales, he abandoned himself to the worst excesses. He ultimately sank into a condition of mental stupor, and became the obedient slave of the upstart Struensee iq.v.) . After the fall of Struensee (the warrant for whose arrest he signed with indifference), for the last six-and- twenty years of his reign, he was only nominally king. He died on the 13 th of March 1808. In 1772 the king's marriage with Caroline Matilda, who had been seized and had confessed to criminal familiarity with Struensee, was dissolved, and the queen, retaining her title, passed her remaining days at Celle, where she died on the nth of May 17.75.

See E. S. F. Reverdil, Struensee et la cour de Copenhague, 1760- 1772 (Paris, 1858); Danmarks Riges Historie, vol. v. (Copenhagen, 1897-1905); and for Caroline Matilda, Sir F. C. L. Wraxall, Life and Times of Queen Caroline Matilda (1864), and W. H. Wilkins, A Queen of Tears (1904).

CHRISTIAN VIII. (1 786-1848), king of Denmark and Norway, the eldest son of the crown prince Frederick and Sophia Frederica of Mecklenburg-Schwerin, was born on the 18th of September 1786 at Christiansborg castle. He inherited the talents of his highly gifted mother, and his amiability and handsome features made him very popular in Copenhagen. His unfortunate first marriage with his cousin

Charlotte Frederica of Mecklenburg- Schwerin was dissolved in 1810. In May 1813 he was sent as stadtholder to Norway to promote the loyalty of the Northmen to the dynasty, which had been very rudely shaken by the disastrous results of Frederick VI. ‘s adhesion to the falling fortunes of Napoleon. He did all he could personally to strengthen the bonds between the Norwegians and the royal house of Denmark, and though his endeavours were opposed by the so-called Swedish party, which desired a dynastic union with Sweden, he placed himself at the head of the Norwegian party of independence, and was elected regent of Norway by an assembly of notables on the 16th of February 1814. This election was confirmed by a Storthing held at Eidsvold on the 10th of April, and on the 17th of May Christian was elected king of Norway, despite the protests of the Swedish party. Christian next attempted to interest the great powers in his cause, but

without success. On being summoned by the commissioners of the allied powers at Copenhagen to bring about a union between Norway and Sweden in accordance with the terms of the treaty of Kiel, and then return to Denmark, he replied that, as a constitutional king, he could do nothing without the consent of the Storthing, to the convocation of which a suspension of hostilities on the part of Sweden was the condition precedent. Sweden refusing Christian’s conditions, a short campaign ensued, in which Christian was easily worsted by the superior skill and forces of the Swedish crown prince (Bernadotte). The brief war was finally concluded by the convention of Moss on the 14th of August 1814 (see Norway: History). Henceforth Christian’s suspected democratic principles made him persona mgratissima at all the reactionary European courts, his own court included, and he and his second wife, Caroline Amelia of Augustehburg, whom he married in 1815, lived in comparative retirement as the leaders of the literary and scientific society of Copenhagen. It was not till 1831 that old King Frederick gave him a seat in the council of state. On the 13th of December 1839 he ascended the Danish throne as Christian VIII. The Liberal party had high hopes of ” the giver of constitutions,” but he disappointed his admirers by steadily rejecting every Liberal project. Administrative reform was the only reform he would promise. He died of blood-poisoning on the 20th of January 1848.

See Just Matthias Thiele, Christian den Ottende (Copenhagen, 1848) ; Yngvar Nielsen, Bidrag til Norges Historie (Christiania, 1882-1886).

CHRISTIAN IX. (1818-1906), king of Denmark, was a younger son of William, duke of Schleswig-Holstein-Sonderburg-Gliicks- burg (d. 1831), a direct descendant of the Danish king Christian III. by his wife Louise, a daughter of Charles, prince of Hesse- Cassel (d. 1836), and

grand-daughter of King Frederick V. Born at Gottorp on the 8th of April 1818, Christian entered the army, and alone among the members of his family served with the Danish troops in Schleswig during the insurrection of 1848; but he was a personage of little importance until about 1852, ten years after his marriage with Louise (1817-1898), daughter of William, prince of Hesse-Cassel (d. 1867), and cousin of King Frederick VII. At this time it became imperative that satis- factory provision should be made for the succession to the Danish throne. The reigning king, Frederick VII., was childless, and the representatives of the great powers met in London and settled the crown on Prince Christian and his wife (May 1852), an arrangement which became part of the law of Denmark in 1853. The " protocol king," as Christian was sometimes called, ascended the throne on Frederick's death in November 1863, and was at once faced by formidable difficulties. Reluctantly he assented to the policy which led to war with the combined power of Austria and Prussia, and to the separation of the duchies of Schleswig, Holstein and Lauenburg from Denmark (see Schleswig-Holstein Question). Within the narrowed limits of his kingdom Christian's difficulties were more protracted and hardly less serious. During almost the whole of his reign the Danes were engaged in a political struggle between the " Right " and the " Left," the party of order and the party of progress, the former being supported in general by the Landsting, and the latter by the Folketing. The king's sympathies lay with the more conservative section of his subjects, and for many years he was successful in preventing the Radicals from coming into office. The march of events, however, was too strong for him, and in 1901 he assented in a dignified manner to the formation of a " cabinet of the Left " (see Denmark: History). In spite of these political disturbances Christian's popularity with his people grew steadily, and was enhanced by the patriarchal and unique position which in his later years he occupied in Europe. With his wife, often called "the aunt of all Europe," he was related to nearly all the European sovereigns. His eldest son Frederick had married a daughter of Charles XV. of Sweden; his second son George had been king of the Hellenes since 1863; and his youngest son Waldemar (b. 1858) was married to Marie d'Orleans, daughter of Robert, due de Chartres. Of his three daughters, Alexandra married Edward VII. of Great Britain;

Dagmar (Marie), the tsar Alexander III.; and Thyra, Ernest Augustus, duke of Cumberland. One of his grandsons, Charles, became king of Norway as Haakon VII. in 1905, and another, Constantine, crown

prince of Greece, married a sister of the German emperor William II. Christian was also the ruler of Iceland, where he was received with great enthusiasm when he visited the island in 1874. He died at Copenhagen on the 29th of January 1906, and was buried at Roskilde.

See Barfod, Kong Kristian IX.' s Regerings-Dagbog (Copenhagen, 1876); and Hans Majestet Kong Kristian IX. (Copenhagen, 1888).

CHRISTIAN, WILLIAM (1608-1663), Manx politician, a son of Ewan Christian, one of the Manx deemsters, was born on the 14th of April 1608, and was known as Illiam Dhone, or Brown William. In 1648 the lord of the Isle of Man, James Stanley, 7th earl of Derby, appointed Christian his receiver-general; and when in 1651 the earl crossed to England to fight for Charles II. he left him in command of the island militia. Derby was taken prisoner at the battle of Worcester, and his famous countess, Charlotte de la Tremouille, who was residing in Man, sought to obtain her husband's release by negotiating with the victorious parliamentarians for the surrender of the island. At once a revolt headed by Christian broke out, partly as a consequence of this step, partly owing to the discontent Caused by some agrarian arrangements recently introduced by the earl. The rebels seized many of the forts; then Christian in his turn entered into negotiations with the parliamentarians; and probably owing to his connivance the island was soon in the power of Colonel Robert Duckenfield, who had brought the parliamentary fleet to Man in October 1651. The countess of Derby was compelled to surrender her two fortresses, Castle Rushen and Peel castle, while Christian remained receiver-general, becoming governor of the island in 1656. Two years later, however, he was accused of misappropriating some money; he fled to England, and in 1660 was arrested in London. Having under- gone a year's imprisonment he returned to Man, hoping that his offence against the earl of Derby would be condoned under the Act of Indemnity of 1661; but, anxious to punish his conduct, Charles, the new earl of Derby, ordered his seizure; he refused to plead, and a packed House of Keys declared that in this case his life and property were at the mercy of the lord of the island. The deemsters then passed sentence, and in accordance therewith Christian was executed by shooting on the 2nd of January 1663. This arbitrary act angered Charles II. and his advisers; the deemsters and others were punished, and some reparation was made to Christian's family. Christian is chiefly celebrated through the Manx ballad Baase Illiam Dhone, which has been translated into English by George Borrow, and through the references to him in Sir Walter Scott's Peveril of the Peak.

See A. W. Moore, History of the Isle of Man (1900).

CHRISTIAN OF BRUNSWICK (1599-1626), bishop of Halber- stadt and a general during the earlier part of the Thirty Years' War, a younger son of Henry Julius, duke of Brunswick- Wolf en- biittel, was born at Groningen on the 20th of September 1599. Having succeeded his father as " bishop " of Halberstadt in 1616, he obtained some experience of warfare under Maurice, prince of Orange, in the Netherlands. Raising an army he entered the service of Frederick V., elector palatine of the Rhine, just after that prince had been driven from Bohemia; glorying in his chivalrous devotion to Frederick's wife Elizabeth, he attacked the lands of the elector of Mainz and the bishoprics of Westphalia. After some successes he was defeated by Tilly at Hochst in June 1622; then, dismissed from Frederick's service, he entered that of the United Provinces, losing an arm at the battle of Fleurus, a victory he did much to win. In 1623 he gathered an army and broke into lower Saxony, but was beaten by Tilly at Stadtlohn and driven back to the Netherlands. When in 1625 Christian IV., king of Denmark, entered the arena of the war, he took the field again in the Protestant interest, but after some successes he died at Wolfenbiittel on the 16th of June 1626. Christian, who loved to figure as " the friend of God, the enemy of the priests," is sometimes called " the mad bishop," and was a merciless, coarse, and blasphemous man.

CHRISTIAN CATHOLIC CHURCH, the name assumed by a religious organization founded at Zion City near Chicago, Illinois, U.S.A., in 1896, by John Alexander Dowie (q.v.). Its members added to the usual tenets of Christianity a special belief in faith-healing, and laid much stress on united consecra- tion services and the threefold immersion of believers. To assist Dowie, assistant overseers were appointed, and the operations of the community included religious, educational and commercial departments. Small branches sprang up in other parts of the United States, Mexico, Canada, Europe and Australasia. At the end of 1901 there were nearly 12,000 baptized believers. After 1903 considerable dissension arose among Dowie 's followers: he was deposed in 1906; and after his death (1907) the city gradually became a community of normal type.

CHRISTIAN CONNECTION, a denomination of Christians in North America formed by secession, under James O'Kelly (1735- 1826), of members of the Methodist Episcopal Church in North Carolina in 1793. The movement resembled those under the Campbells and Stone in Kentucky in 1801-1804, and in Lyndon, Vermont, among the Baptists in 1800. The predisposing cause in each case was the desire to be free from the " bondage of creed." Some of O'Kelly's followers joined the Disciples of Christ (q.v.). Their form of church government is Congregational; they take the Bible as the sole rule of faith and

practice, and while adopting immersion as the proper mode of baptism, freely welcome Christians of every sect to their communion. They number about 100,000 members, mainly in the states of Ohio, Indiana and Illinois. The original seceders in Virginia and North Carolina bore for a time the name ” Republican Metho- dists,” and then called themselves simply “Christians,” a designation which with the pronunciation “Christ-yans” is still often applied to them. Their position is curiously akin to that outlined by William Chillingworth (q.v.) in his famous work The Religion of Protestants (163 7- 163 8).

CHRISTIAN ENDEAVOUR SOCIETIES, organizations formed for the purpose of promoting spiritual life among young people. They date from 1881, in which year Dr Francis E. Clark (q.v.) formed a Young People’s Society of Christian Endeavour in his (Congregational) church at Portland, Maine, U.S.A. The idea was taken up elsewhere in America and spread to other countries, till, under the presidency of Dr Clark, a huge number of affiliated societies came into operation throughout the world. They take as their motto ” For Christ and the Church,” and have done much, especially in the non-episcopal churches, to prepare young men and women for active services in the Church. The organization is international and interdenominational, a World’s ChristianEndeavourUnionbeing formed ˆ1895. Themembers do not form a separate denomination, but remain attached to their re- spective churches, being grouped in voluntary district federations.

CHRISTIANIA (officially Keistiania), the capital of Norway, forming a separate county (ami), and the seat of a bishopric (stift). Pop. (1901) 229,101. It lies on the south-eastern coast, at the head of Christiania Fjord, about 80 m. from the open waters of the Skagerrack, is 59° 54′ N. (about the latitude of the southern extremity of the Shetland Islands) and 10° 45′ E., mainly on the west bank of the small Aker river. The situation is very beautiful, pine-wooded hills rising sharply behind the city, while several islands stud the fjord. The town is mainly modern, having increased rapidly in and since the second half of the 19th century, when brick and stone largely superseded wood as the building material. It is the seat of government, of the supreme courts, of the parliament (Storthing), and of a university. The harbour is of two parts, the Bjorvik, where the larger steamers He, and the Pipervik, west of this. On the promontory intervening between these two inlets stands the old fortress of Akershus, occupied as an arsenal and prison, and having a pleasant promenade upon its ramparts. Until 17 19 it was a royal palace. At the head of the Bjorvik the principal railway station (Hovedbanegaard) stands in the Jernbanetorv (railway square), and north-west from this runs the principal street, Karl-Johans-gade. In this street, passing the Vor Frelsers Kirke (Church of

our Saviour), the Storthings-Bygning

(parliament-house, 1866) is seen, facing a handsome square planted with trees. Beyond this is the National theatre (1899), with colossal statues of the dramatists Ibsen and Bjornsen. It faces the Fridericiana University, housed in three buildings dating from 1853, but founded by Frederick VI. of Denmark in 181 1, embracing the five faculties of theology, law, medicine, history and philology, mathematics and natural sciences. The equipment of the university is very complete: it has attached to it a large and valuable library, natural history, ethnological and numismatic collections, with one of Scandinavian anti- quities; also botanical gardens and an observatory. The Karl-Johans-gade gives upon the beautiful Slotspark, a wooded elevation crowned with the royal palace (slot), a plain building completed in 1848. North of the university is the museum of art, containing a noteworthy collection of sculpture and paintings of ancient and modern foreign masters, and of native works. The historical museum adjoining this contains northern antiqui- ties, including two viking's ships, excavated, in 1867 and 1880 respectively, from the burial-places of the viking chiefs who owned and, according to custom, were buried in them. Another noteworthy collection is that of industrial art. The Bank of Norway, the exchange, and the courts of law lie between the harbours. Other institutions are the Freemasons' Lodge, housed in one of the handsomest buildings in the city (1844), a conserva- tory of music, naval, military and art schools, Athenaeum, and the great Dampkjokken or kitchen (1858), where dinners are provided for the poor.

The suburbs of Christiania are attractive and rapidly growing. On the east side of the river Aker is that of Oslo, with the existing episcopal palace, and an old bishop's palace, in which James VI. of Scotland (I. of England) was betrothed to Princess Anne of Denmark (1589). In the environs of the city are the royal pleasure castle of Oscarshal (1847-1852), on the peninsula Bygdo (Ladu- gaard) to the west of the city, and the Norwegian national museum (1881), containing industrial and domestic exhibits from the various provinces. Close at hand is an interesting collection of old Norwegian buildings, brought here from all parts, and re-erected, including an example of the timber church of the 12th century (Slavekirke). A collection of ancient agricultural implements is also shown. On Hovedo (Head Island) in the fjord, immediately opposite to the Akershus, are the ruins of a

Cistercian monastery, founded in 1147 by monks from Kirkstead in Lincolnshire, England, and burnt down in 1 S3 2. There are sanatoria and inns among the surrounding hills, on which beautiful gardens are laid out, such as Hans Haugen, Frognersaeter, Holmenkollen, where the famous ski (snow-shoe) races are held in February, and , Voksenkollen. Electric tramways connect the city and suburbs, and local steamers run from the Pipervik to the neighbouring islands and fjord-side towns and villages.

Christiania has two railway stations, the Hovedbanegaard by the Bjorvik, and the Vestbanegaard by the Pipervik. From the first trains run south to Fredrikshald and Gothenburg, east to Charlottenberg and Stockholm, north to Hamar and Trondhjem, and Otta in Gudbrandsdal, and to Gjovik and the Valdres district. From the west station start the lines to Drammen, Laurvik, Skien and Kongsberg (for the Telemark district). The eastward extension of the railway between Bergen and Vossevangen, undertaken in 1896, had as its ultimate object the connexion of Christiania and Bergen by rail. With these extensive land communications Christiania is at once the principal emporium of southern Norway, and a favourite centre of the extensive tourist traffic. Regular passenger steamers serve the port from Hull, Newcastle, Grangemouth and London, from Trondhjem, Bergen and the Norwegian coast towns, from Hamburg, Amster- dam, Antwerp, &c. Except for two large shipbuilding yards, one with a floating dock, the other with a dry dock, most of the manufactories are concentrated in the suburb of Sagene, on the north side of the city, deriving their motive power from the numerous falls of the river Aker. They embrace factories for cotton and woollen spinning and weaving, paper, flour, soap and oil, bricks and tiles, matches, nails (especially horse-shoe nails), margarine, foundries and engineering shops, wood-pulp, tobacco,

matches, linen, glass, sail-cloth, hardware, gunpowder, chemicals, with sawmills, breweries and distilleries. There is also a busy trade in the preparation of granite paving-stones, and in the storing and packing of ice. Imports greatly exceed exports, the annual values being about 7ˆ and 15 millions sterling respectively. The former consist principally of grain and flour, cottons and woollens, coffee, iron (raw and manufactured), coal, bacon and salt meat, oils, sugar, machinery, flax, jute and hemp, paper- hangings, paints, colours, &c, wines and spirits, raw tobacco, copper, zinc, lead and tin, silk, molasses and other commodities. The principal exports are wood-pulp, timber, nails, paper, butter and margarine, matches, condensed milk, fish, leather and hides, ice, sealskins, &c. Of the imports, Great Britain supplies the greater part of the cotton and woollen yarn, the

machinery (including ships), and the raw metals; the United States about one-half of the oils and fats, and a large proportion of the food-stuffs, and skins, feathers, &c. Of the exports, almost the whole of the timber goes to Great Britain, together with the larger portion of the paper and food-stuffs (butter, &c.) . The harbour is ice-bound for three or four months in the winter, when ships lie at Drobak, lower down the fjord; but ice-breakers are also used. Early in 1899 the municipality voted £47,000 for the construction of a pier, a harbour for fishing-boats, protected by a mole, and a quay, 345 ft. long, on the shore underneath the Akershus. These works signalized a great scheme of improvement, involving a general rearrangement of the entire harbour.

The present suburb of Oslo represents the original city, which was founded on this site under that name (or Opslo) by Harald Sigurdsson in 1048. By the close of the 14th century it was established as the chief city of Norway. Trade was long dominated by the powerful Hanseatic League, at least until the beginning of the 16th century. The town, built mainly of wood, was no less subject to fires than all Norwegian towns have always been, and after one of these King Christian IV. refounded the capital on the new site it now occupies, and gave his name to it in 1624. By the close of the century it was fortified, but this did not prevent Charles XII. from gaining possession of it in 17 16.

See L. Daae, Det gamle Christiania, 1624-1824 (Christiania, 1890) ; Y. Nielsen, Christiania und Umgegend (Christiania, 1894); G. Amneus, La Ville de Christiania . . . Resume historique, &c. (Chris- tiania, 1900).
.... ,

CHRISTIANITY, the religion which accepts Jesus Christ as Lord and Saviour, embracing all who profess and call themselves Christians, the term derived from his formal title (xputtos, i.e. the anointed). Within this broad characterization are found many varieties of cult, organization and creed (see Church History). Christianity is classed by the students of the science of religion as a universal religion; it proclaims itself as intended for all men without distinction of race or caste, and as in posses- sion of absolute truth. In fact, Christianity has been widely accepted by varied races in very different stages of culture, and it has maintained itself through a long succession of centuries in lands where the transformations in political structure, the revolutions in social conditions, and the changes in science and philosophy, have been numerous and extreme.

Beginning in Asia, Christianity extended itself rapidly through- out the

Roman empire and beyond its borders among the barbarians. When the Empire in the 4th century adopted it, its cult, organization and teaching were carried throughout the western world. The influences and motives and processes which led to the result were many and varied, but ultimately in one way or another it became the religion of Europe and of the nations founded by the European races beyond the seas and in the northern part of Asia called Siberia. Beyond these bounds it has not greatly prospered. The explanation of the apparent bounding of Christianity by Europe and its offspring is not, however, to be found in any psychological peculiarity separating the European races from those of other continents, nor in any special characteristic of Christianity which fits it for European soil. For not only were its founder and his disciples Asiatics, and the original authoritative writings Semitic, but Asiatic tribes and nations coming into Europe have been readily converted.

Missions in Asia too have achieved sufficient success to prove that there exists no inherent obstacle either in the gospel or in the Asiatic mind. Moreover, Christianity was once represented in Asia by a powerful organization extending throughout Persia and central Asia into India (see Persia). Mutatis mutandis, the same applies to Africa also, and Christianity still survives in both continents in the Coptic, Abyssinian and Armenian Churches. The explanation is rather to be sought in the political condition of the early centuries of the Christian era, especially in the rise of Mahommedanism. This may be regarded indeed as a form of Christianity, for it is not more foreign perhaps to the prevailing type than are some sects which claim the name. It exerted a strong influence upon Europe, but its followers have been peculiarly unsusceptible to missionary labours, and even in Europe have retained the faith of the Prophet. In the limita- tions of the Roman empire and in the separation of East and West consequent upon its decline, Christianity, as a dominant religion, was confined for a thousand years to Europe, and even portions of this continent for centuries were in the hands of its great foe. The East appeared as the Mahommedan dominions, and beyond these the continents of Asia and Africa were so dimly discerned that little reciprocal influence was felt. Thus the development of the two great civilized portions of the race in Europe and Asia followed independent lines in religion as in all else; and Africa, excepting its northern border, was left un- touched by the progress of enlightenment.

Not only is Christianity thus the religion of a wide variety of races but across the divisions there cut other lines. In its organization Christianity exists in three great divisions, Roman, Greek and Protestant; and in various ancient sects in the Orient. The Roman Catholic and Greek divisions of the Christian Church are homogeneous in organization, but in Protestantism certain denominations are national, established by differing govern- ments, and others are independent of governmental aid, making a large number of differing denominations. Some of these divisions are mutually antagonistic, denying to each other the name of Christian and even the hope of salvation.

According to a second classification, Christianity may be placed among the " individual " religions, since it traces its origin, like Islam and Buddhism, to an individual as its founder. This beginning is not in the dimness of antiquity nor in a multitude of customs, beliefs, traditions, rites and personalities, as is the case with the so-called " natural " religions. It is not implied that in the formation of the " natural " religions individuals were not of great importance, nor, on the other hand, that in individual religions the founder formed his faith independently of the community of which he was a part; but only that as undoubted historic facts certain religions, in tracing their lines to individuals, thereby acquired a distinctive character, and retain the impress of their founder. Such religions begin as a reform or a protest or revolt. They proclaim either a new revelation, or the return to an ancient truth which has been forgotten or distorted. They demand repentance and change of heart, i.e. the renouncing of the ordinary faith of the community and the acceptance of a new gospel. Thus demanding an act of will on the part of individuals, they are classed once more as " ethical " religions. To be sure, the new is built upon the old — in part unconsciously — and the rejection of the faith of the past, however violent, is never thoroughgoing. In consequence the old affects the new in various ways. Thus in Buddhism the presupposi- tions which Buddha uncritically took over work out their logical results in the Mahayana, so that great sects calling themselves " Buddhist " affirm what the Master denied and deny what he taught. Christianity takes Judaism (see Hebrew Religion) for granted — rejects it in part as a merely preparatory stage, in part reinterprets it, and does not submit what it accepts to rigorous scrutiny. As a result the Old Testament (see Bible) remains not only as the larger part of the Christian canon, but, sometimes, in some churches, as obscuring its distinctive truth. Moreover, in the transference of Christianity from the Jewish to the Greek-Roman world again various elements were taken into it. More properly perhaps we might consider the Greek

and Roman civilization as the permanent element — so that the relationship to it was not different from the relationship to Judaism — in part it was denied, in part it was of purpose accepted, in still larger part unconsciously the Greek-Roman converts took over with them the presuppositions of their older world view — and thus formed the moulds into which the Christian truth was run. Here again, in some instances the pre-Christian elements so asserted themselves as to obscure the new and distinctive teaching.

Christianity, regarded objectively as one of the great religions of the world, owes its rise to Jesus of Nazareth, in ancient Galilee. (See Jesus Christ.) By reverent disciples his ancestry was traced to the royal family of David, Re ,[t tloa and his birth isascribed by the church to the miraculous Judaism. act of God. His life was spent, until the beginning of his public ministry, in humble circumstances as the son of a carpenter and his wife, Joseph and Mary. Of Joseph we hear nothing after the boyhood of Jesus, who followed the same trade, supporting himself and perhaps his mother and younger brothers and sisters. Of this period we have only a few frag- mentary anecdotes and a stray reference or two. At thirty years of age he appeared in public, and after a short period (we cannot determine how long, but possibly eighteen months) he was crucified, upon the accusation of his countrymen, by the Roman authorities. He was without technical education, but he had been carefully trained in the sacred books, as was usual with his people. Belonging neither to the aristocracy nor to the learned class, he was one of the common people yet separate from them — a separation not of race or caste or education, but of unique personality.

His career is understood only in the light of his relations to Judaism (see Hebrew Religion). This faith, in a peculiarly vivid fashion, illustrates the growth and development of religion, for its great teachers in the highest degree possessed what the Germans call God-consciousness. The Hebrew national literature centres in the thought of God. It is Yahweh who is all and in all, the father, the leader, the hope, the hero of his people. No other national literature is so continuously and so highly religious. Another factor gives it still greater interest for the student of religion,- — in it the progress of religious thought can be traced, and the varying elements of the religious life seen in harmony and in conflict.

In the early period the Hebrew religion was of the ordinary Semitic type. In its ancient stories were remnants of primitive religion, of tabu, of anthropomorphic gods, of native forms of worship, of magic and divination, of local and tribal cults. Out of these developed, by the

labours of the prophets, a religion of high spirituality and exalted ethical ideals. According to it God demands not ritual nor sacrifice nor offerings. He does not delight in prayers and praise, but he demands truth in the soul and bids man to walk humbly and deal righteously and mercifully with his brother (Micah vi. 6-8 ; Isa. i. 2-20) . He requires kindness, forgiveness and loving sacrifice from all to all (Isa. lviii.3-12). This conception of God revealed itself as so essential to the prophets that their intense national feeling was modified. God would not deliver Israel because it was his people, descended from Abraham, his chosen, but he would punish it even more severely than the other nations because it denied him by its sins (Amos iii. 1-2). Yet Israel would not be destroyed, for a spiritual remnant, loving and obeying God, would be saved and purified (Ezek. xxxvi.xxxvii.). Thus Israel survived its mis fortunes. When the national independence was destroyed, the prophetic teaching held the people together in the hope of a re-establishment of the Kingdom when all nations should be subject to it and blessed in its everlasting reign of righteousness and peace (Isa. xlix., lx.).

Some of the prophets associated the restoration of the Kingdom with the coming of the Messiah, the anointed one, who should re-establish the line of David (Isa. ix. 6 f., xi. 1 f.; Micah v. 2; Ezek. xxxiv. 23, xxxvii. 24; Zech. ix. 9; Ps. ii. 72). Others said nothing of such a one, but seemed to expect the regenera- tion of Israel through the labours, sufferings and triumphs of

the righteous remnant (Isa. liii., Ezek. xxxvi.xxxvii.). By the strong emphasis upon righteousness, the tribal Lord of Israel was revealed as the universal God, of one relationship to all men. This monotheism was not primarily cosmological nor meta physical, but ethical. The Jews showed little capacity for abstract reasoning and never pursued their inquiries to the discovery of ultimate principles. Thus they did not develop a systematic cosmology, nor formulate a system of metaphysics. Their religion was pre-eminently ” theocratic “; God was thought of as King, enthroned in heaven and supreme. In the beginning as a tribal deity his powers were limited and he was involved in the fortunes of his people. But as the conception of Yahweh was deepened and broadened, and, especially after the develop- ment of ethical monotheism, not only was he believed to possess power sufficient to ensure the triumph of his chosen people, but to be the creator and ruler of all things in heaven and on earth,

the God whom all peoples should worship and obey.

But the prophetic teaching was obscured in part by the nationalism of the prophets themselves, who exalted Israel as at once God's instrument and the peculiar object of his love; and in part by the triumph of a legal-ritualistic sacrificial system. In the downfall of Jerusalem, the experiences of the exile in Babylon, and the return to Judaea, the nation was transformed into a church. Apart from the brief Maccabaean period, the intense patriotism of the people centred in the ecclesiastical organ- ization. As a result, cult and organization and code hardened, forming a shell which proved strong enough to resist all dis- integrating tendencies. Inevitably the freedom, spirituality and universality of the prophetic teaching were obscured. In the ist century a.d. the national and priestly elements controlled; doubtless many individuals still were faithful to the purer prophetic message, though also zealous for the system of ritual and sacrifice, but for the ruling majority ritualistic service was the chief thing, justice, purity and mercy being subordinate. Hence in their view all who did not participate in the national worship and conform to the national usages were outcasts. The triumph of Israel was to be accomplished by the miraculous power of a Messiah who should descend out of heaven. His coming was delayed, in part by the opposition of demons, in part by the failure of the people to obey the law. This law embraced both moral and ceremonial elements derived from varied sources, but in the apprehension of the people it was all alike regarded as of divine origin. It was to be obeyed without question and without inquiry as to its meaning, because established by God. It was contained in the Sacred Scriptures (see Bible: Old Testament) , which had been revealed by God supernaturally, and its meaning was set forth by schools of learned men whose interpretations were authoritative. The conception of salvation was mingled with ideas derived from the East during and after the period of captivity. The priesthood held still the ancient ideas. Salvation was for the nation, and the individual was not necessarily participant in it. Life after death was disbelieved or held as the existence of shades. There could be no resurrection of the body and no immortality (in the Greek sense). With these beliefs were associated a certain worldliness and want of fervour. The more actively and aggressively religious party, on the other hand, adopted the belief in the resurrection of the body, and in the individual's participation in the Messiah's kingdom; all the pious would have their share in it, while the wicked would be outcast. But these doctrines were variously conceived. By some the Messianic kingdom was thought of as permanent, by others as intermediary, the external kingdom being transcendent. So too some thought of a literal

resurrection of the body of flesh and blood, while others thought that it would be transformed. The rudiments of some of these ideas can be found in the prophets, but their development took place after the exile, and indeed for the most part after the conclusion of the writings accounted canonical. Thus too the belief in a kingdom of demons held a large place in the mind of the people, though the references to such evil beings are almost absent from the sacred writings of the Old Testament. Again it is to the East that we must look for the origin of these ideas.

Jesus completed the prophetic teachings. He employed the old phraseology and imagery, but he was conscious that he used them in a new sense, and that he preached a new gospel of great joy. Jesus was not a historian, a critic or a J he h , theologian. He used the words of common men in the of Jesus. sense in which common men understood them. He did not employ the Old Testament as now reconstructed by scholar- ship or judged by criticism, but in its simple and obvious and traditional sense. And his background is the intellectual and religious thinking of his time. The ideas of demons and of the future, of the Bible and many other traditional conceptions, are taken over without criticism. So the idea of God which he sets forth is not that of a theologian or a metaphysician, but that of the unlearned man which even the child could understand. Yet though thus speaking in untechnical language, he revolution- ized his terms and filled them with new meaning. His emphasis is his own, and the traditional material affords merely the setting for his thought. He was not concerned with speculative questions about God, nor with abstract theories of his relation- ship to the soul and to the world. God's continual presence, his fatherly love, his transcendent righteousness, his mercy, his good- ness, were the facts of immediate experience. Not in proofs by formal logic but in the reality of consciousness was the certainty of God. Thus religion was freed from all particular and national elements in the simplest way. For Jesus did not denounce these elements, nor argue against them, nor did he seek converts outside of Israel, but he set forth communion with God as the most certain fact of man's experience and as simple reality made it accessible to every one. Thus his teaching contains the note of universality — not in terms and proclamations but as plain matter of fact. His way for others to this reality is likewise plain and level to the comprehension of the unlearned and of children.

For him repentance is put first, for how vastly changed is the conception of the religious life! The intricacies of ritual and theology are ignored, and ancient laws which contradict the fundamental beliefs are unhesitatingly abrogated or denied. He seizes upon the

most spiritual passages of the prophets, and revives and deepens them. He sums up his teaching in supreme love to God and a love for fellow-man like that we hold for ourselves (Mark xii. 2o-3r). This supreme love to God is a complete oneness with him in will, a will which is expressed in service to our fellow-men in the simplest and most natural relationship (Luke x. 2 5-3 7) . Thus religion is ethical through and through, as God's inner nature, expressed in forgiveness, mercy, righteousness and truth, is not something transcendental, but belongs to the realm of daily life. We become children of God and he our Father in virtue of a moral likeness (Matt. v. 43-48), while of any metaphysical, or (so to speak) physical relationship to God Jesus says nothing. With this clearly understood, man is to live in implicit trust in the divine love, power, knowledge and forgiveness. Hence he attains salvation, being delivered from sin and fear and death, for the divine attributes are not ontological entities to be discussed and defined in the schools, but they are realities, entering into the practical daily life. Indeed they are to be repeated in us also, so that we are to forgive our brethren as we ask to be forgiven (Matt. vi. 12; Luke xi. 4).

As religion thus becomes thoroughly, ethical, so is the notion of the Messianic kingdom transformed. Its essential character- istic is the doing of the Father's will on earth as in heaven. Jesus uses parable after parable to establish its meaning. It is a seed cast into the ground which grows and prospers (Matt. xiii. 31-32). It is a seed sown in good ground and bringing forth fruit, or in bad ground and fruitless (Luke viii. 5-8; Mark iv. 1-32). It is a pearl of great price for which a man should sell all that he possesses (Matt. xiii. 44-46). It is not come " with observation," so that men shall say " lo here and lo there " (Luke xvii. 20-21). It is not of this world, and does not possess the characteristics or the glory of the kingdom of the earth (Luke xxii. 24-26; Mark x. 13-16). It is already present among men (Luke xvii. 21). Together with these statements in our sources are still mingled fragments of the more ordinary cata- clysmic, apocalyptic conceptions, which in spite of much

ingenious exegesis, cannot be brought into harmony with Christ's predominant teaching, but remain as foreign elements in the words of the Master, possibly brought back through his disciples, or, more probably, used by Jesus uncritically — a part of the current religious imagery in which he shared.

It is often declared that in these teachings there is nothing new, and indeed analogies can be found for many sayings; yet nowhere else do we gain so strong an impression of ailty ‘ originality. The net result is not only new but re- volutionary; so was it understood by the Pharisees. They and Jesus spoke indeed the same words and appealed to the same authorities, but they rightly saw in him a revolutionist who threatened the existence of their most cherished hopes. The Messianic kingdom which they sought was opposed point by point to the kingdom of which he spoke, and their God and his Father — though called by the same sacred name — were different. Hence almost from the beginning of his public ministry they constantly opposed him, the conflict deepening into complete antagonism.

Jesus has already been termed unique, one of the common people yet separated from them, and this description applies to the breadth, depth and reality of his sympathy. In the meagre records of his life there is evidence that he deemed no form of suffering humanity foreign to himself. This was not a mere sentiment, nor was his sympathy superficial, for it constituted the essential characteristic of his personality — ” He went about doing good.” In him the will of the Father for the redemption of the race was incarnate. This led him into the society of those outcasts who were condemned and rejected by the respectable and righteous classes. In contemptuous condemnation he was called the friend of the outcasts (Matt. xi. 19; Mark ii. 16-17), and on his part he proclaimed that these sinners would enter into the Kingdom of Heaven before the self-righteous saints (Matt. xxi. 31). Even the most repulsive forms of disease and sin drew from him only loving aid, while he recognized in all other men who laboured for the welfare of their fellows the most intimate relationship to himself. These constituted his family, and these were they whom his Father will bless.

Jesus recognized his unique position; he could not be ignorant of his powers. Even the prophets had spoken in the name of God; they accepted neither book nor priesthood as authoritative, but uttered their truth as they were inspired to speak, and com- manded men to listen and obey. As in Jesus the whole prophetic line culminates, so does its consciousness. Reverent toward the Holy Scriptures, he spoke not as their expositor but with a divine power which invests his words with immediate and full authority. The prophets use the formula, ” Thus saith the Lord,” but he goes beyond them and speaks in his own name, ” Amen, I say unto you.” He knew himself as greater than the prophets, indeed as him of whom the prophets spoke — the Messiah. Only through this self-consciousness can we explain his mission and the career of his disciples. The prophets up to John foretold the

coming of the kingdom (Matt. xi. n-13; Luke xvi. 16), but Jesus opened its doors and made possible entrance into it. Where he is there it is, and hence those who follow him are God's children, and those who refuse his message are left out- side in darkness. He is to sit as enthroned, judge and king, and by him is men's future to be determined (Matt. xxv. 31 f.; Mark xiii. 26). Indeed it was his presence more than his teaching which created his church. Great as were his words, greater was his personality. His disciples misunderstood what he said, but they trusted and followed him. By him they felt themselves freed from sin and fear— and under the influence of a divine power.

Though his claims to authoritative pre-eminence thus took him out of the class of prophets and put him even above Elijah and Mo«es (Mark ix. 2-7; Luke vii. 28; Luke x. 23-24), Messianic anc * trlou gh naturally this self-assertion seemed claims. blasphemous to those who did not accept him, yet as he had transformed the traditional notion of the kingdom, so did he the current thought of the Messiah. The pre-eminence was not to be of rank and glory but of service and

self-sacrifice. In his kingdom there can be no strife for pre- cedence, since its King comes not to be ministered unto but to minister and to give his life in the service of others (Mark ix. 33 f., x. 42-45). The formal acknowledgment of the Messiah's worth and position matters little, for to call him Lord does not ensure entrance into his kingdom (Matt. vii. 21-23). It is those who fail to recognize the spirit of sympathy and self-sacrificing service as divine and blaspheme redeeming love, who are in danger of eternal sin (Mark iii. 28-29). All who do the will of the Father, i.e. who serve their fellows, are the brethren of Christ, even though they do not call him Lord (Mark iii. 31-35; Matt, vii. 21): and those are blessed who 1 minister to the needy even though ignorant of any relation to himself (Matt. xxv. 37-40). Finally, membership in his own selected company, or a place in the chosen people, is not of prime importance (Mark ix. 38-40; Luke xiii. 24-30).

Jesus also refuses to conform to the current ideas as to the estab- lishment of the kingdom. He wrought miracles, it is true, because of his divine sympathy and compassion, but he refused to show miraculous signs as a proof of his Messianic character (Mark viii. 1 2). The tradition of the people implied a sudden appearance of the Messiah, but Jesus made no claims to a supernatural origin and was content to be known as the son of Joseph and Mary (Mark vi. 3-4). His kingdom is not to be set up by wonders and miraculous powers, nor is it to be established by force (Matt. xxvi. 52). Such means would

contradict its fundamental character, for as the kingdom of loving service it can be estab- lished only by loving service. And as God is love, he can be revealed not by prodigies of power but only by a love which is faithful unto death.

Even the disciples of Jesus could not grasp the simplicity and profundity of his message; still less could his opponents. When the crisis came, he alone remained unshaken in his faith. He was accused of blasphemy to the ecclesiastical authorities and of insurrection to the civil rulers. He was condemned and crucified. His followers were scatt&ed every man to his own place as sheep without a shepherd. Of his work nothing remained, not a written word, nor more than the rudiments of an organization. The decisive event, which turned defeat into victory and re- established courage and faith, was the resurrection of Jesus from the dead and his reappearance to his disciples. Our sources will not permit the precise determination of the order or the nature of these appearances, but in any case from them arose the faith which was the basis of the Christian Church and the starting- point of its theology.

The death of Jesus as a criminal, and his resurrection, pro- foundly aroused the belief and hopes of the little group of Jews who were his followers. His person and mission assumed the first place in their affections and their thinking. He had been to them a prophet, mighty in word and deed, but he now becomes to them the Messiah, Christ. It is not his word but his person which assumes first place, and faith is acceptance of him — crucified and risen — as Messiah. Hence his followers early acquire the name Christians from the Greek form of the word. With this emphasis upon the Messiah the Jewish element would seem to be predominant, but as a matter of fact it was not so. The earlier group of disciples, it is true, did not appreciate the universality of the teaching of Jesus, and they continued zealous for the older forms, but St Paul through his prophetic conscious- ness grasped the fundamental fact and became Jesus' true interpreter. As a result Christianity was rejected by the Jews and became the conquering religion of the Roman empire. In this it underwent another modification of far-reaching consequence.

In our earliest sources — the epistles of St Paul — Christ is the pre-existent man from heaven, who had there existed in the form of God, and had come to earth by a voluntary act of christian- self-humiliation. He is before and above all things. Hyand By him all things exist. In the Johannine writings he Greek is the Son of God — the Logos who in the beginning was taou X bt – with God — of whom are all things — who lightens every man— and who was incarnate in

Jesus. Here the cosmological element is

again made prominent though not yet supreme, and the meta-physical problems are so close at hand that their discussion is imperative. Even in Paul the term Messiah thus had lost its definite meaning and became almost a proper name. Among the Greek Christians this process was complete. Jesus is the ” Son of God “; and the gr<*at problem of theology becomes explicit. Religion is in our emotions of reverence and dependence, and theology is the intellectual attempt to describe the object of worship. Doubtless the two do not exactly coincide, not only because accuracy is difficult or even impossible, but also because elements are admitted into the definition of God which are derived from various sources quite distinct from the religious experience. Like all concepts the meaning of religious terms is changed with a changing experience and a changing world-view. Transplanted into the Greek world- view, inevitably the Christian teaching was modified — indeed transformed. Questions which had never been asked came into the foreground, and the Jewish presuppositions tended to disappear. Especially were the Messianic hopes forgotten or transferred to a transcendent sphere beyond death. When the empire became Christian in the 4th century, the notion of a kingdom of Christ on earth to be introduced by a great struggle all but disappeared, remaining only as the faith of obscure groups. Immortality — the philo- sophical conception — took the place of the resurrection of the body. Nevertheless the latter continues because of its presence in the primary sources, but it is no longer a determining factor, since its presupposition — the Messianic kingdom on earth — has been obscured. As thus the background is changed from Jewish to Greek, so are the fundamental religious conceptions.

The Semitic peoples were essentially theocratic in their religion; they used the forms of the sensuous imagination in setting forth the realities of the unseen world. They were not given to metaphysical speculation, nor long insistent in their inquiries as to the meaning and origin of things. With the Greeks it was far otherwise. For them ideas and not images set forth fundamental reality, and their restless intellectual activity would be content with nothing else than the ultimate truth. Their speculation as to the nature of God had led them gradually to separate him by an infinite distance from all creation, and to feel keenly the opposition of the finite and the infinite, the perfect and the imperfect, the eternal and the temporal. To them, therefore,

Christianity presented itself not primarily as the religion of a redemption through the indwelling power of a risen saviour, as with Paul, nor even as the solution of the problem how the sins of men could be forgiven, but as the reconciliation of the antinomy of the intellect, indicated above. The incarnation became the great truth: God is no longer separated by a measure- less distance from the human race, but by his entering into humanity he redeems it and makes possible its ultimate unity with himself. Such lines of thought provoke discussion as to the relationship of Jesus to God the Father, and, at a later period, of the nature of the Holy Spirit who enters into and transforms believers.

Greek philosophy in the second century a.d. had sunk for the most part into scepticism and impotence; its original impulse had been lost, and no new intellectual power took its place; only in Alexandria was there a genuine effort make to solve the fundamental problems of God and the world. Plato had made God accessible to the highest knowledge as the transcendent idea, remote from the world. For Aristotle, too, God in his essence is far above the world and at most its first mover. The stoics, on the other hand, taught his immanence, while the eclectics sought truth by the mingling of the two ideas. They accomplished their purpose in various ways, by distinguishing between God and his power — or by the notion of a hierarchy of super-sensible beings, or in a doctrine which taught that the operations of nature are the movement of pure spirit; or by the use of the ” Word ” of ” Wisdom,” half personified as intermediate between God and the world. While these monotheistic, pantheistic doctrines were taught in the schools, the people were left to a debased polytheism and to new superstitions imported from the Orient; the philo- sophers themselves were by no means unaffected by the popular

beliefs. Mingled with all these were the ancient legends of gods and heroes, accepted as inspired scripture by the people, and by philosophers in part explained away by an allegorical exegesis and in part felt increasingly as a burden to the intelligence. In this period of degeneracy there were none the less an awakening to religious needs and a profound longing for a new revelation of truth, which should satisfy at once the intellect and the religious emotions.

Christianity came as supplying a new power; it freed philo- sophy from scepticism by giving a definite object to its efforts and a renewed confidence in its mission. Monotheism henceforth was to be the belief not of philosophers only but even of the ignorant, and in Jesus Christ the union of the divine and the human was effected. The Old

Testament, allegorically explained, became the substitute for the outgrown mythology; intellectual activity revived; the new facts gained predominant influence in philosophy, and in turn were shaped according to its canons. In theology the fundamental problems of ontological philosophy were faced; the relationship of unity to multiplicity, of noumenon to phenomena, of God to man. The new element is the historical Jesus, at once the representative of humanity and of God. As in philosophy, so now in theology, the easiest solution of the problem was the denial of one of its factors: and successively these efforts were made, until a solution was found in the doctrine of the Trinity, which satisfied both terms of the equation and became the fundamental creed of the church. Its moulds of thought are those of Greek philosophy, and into these were run the Jewish teachings. We have thus a peculiar combination — the religious doctrines of the Bible, as culminating in the person of Jesus, run through the forms of an alien philosophy.

The Jewish sources furnished the terms Father, Messiah, Son and Spirit. Jesus seldom employed the last term and St Paul's use of it is not altogether clear. Already in The Jewish literature it had been all but personified (cf. doctrine the Wisdom of Solomon) . Thus the material is Jewish, •»' th < > though already modified doubtless by Greek influence. Tria,t y- But the problem is Greek. It is not primarily ethical nor even religious, but it is metaphysical. What is the ontological relation- ship between these three factors? The answer is given in the Nicene formula, which is characteristically Greek. By it we perceive how God, the infinite, the absolute, the eternal, is yet not separated from the finite, the temporal, the relative, but, through the incarnation, enters into humanity. We further see how this entering into humanity is not an isolated act but continues in all the children of God by the indwelling spirit. Thus, according to the canons of the ancient philosophy, justice is done to all the factors of our problem— God remains as Father, the infinitely remote and absolute source of all; as Son, the Word who is revealed to man and incarnate in him; as Spirit, who dwells even in our own souls and by his substance unites us to God.

While thus the Greek philosophy furnished the dialectic and the mould for the characteristic Christian teaching, the doctrine of the Trinity preserved religious values. By Jesus the disciples had been led to God, and he was the central fact of faith. After the resurrection he was the object of praise, and soon prayers were offered in his name and to him. Already to the apostle Paul he dominates the world and is above all created things, visible and invisible, so that he has the religious value of God. It is not God as abstract, infinite and eternal, as

the far-away creator of the universe, or even as the ruler of the world, which Paul worships, but it is God revealed in Jesus Christ, the Father of Jesus Christ, the grace and mercy in Jesus Christ which deliver from evil. Metaphysics and speculative theories were valueless for Paul; he was conscious of a mighty power transforming his own life and filling him with joy, and that this power was identical with Jesus of Nazareth he knew. In all this Paul is the representative of that which is highest and best in early Christianity. Specula- tion and hyperspiritualization were ever tending to obscure this fundamental religious fact: in the interest of a higher doctrine of God his true presence in Jesus was denied, and by exaggeration of Paul's doctrine of " Christ in us " the significance of the historic Jesus was given up. The Johannine writings,

which presupposed the Pauline movement, are a protest against the hyperspiritualizing tendency. They insist that the Son of God has been incarnate in Jesus of Nazareth, and that our hands have handled and our eyes have seen the word of life. This same purpose, namely, to hold fast to the historic Jesus, triumphed in the doctrine of the Trinity; Jesus was not to be resolved into an aeon or into some mysterious tertium quid, neither God nor man, but to be recognized as very God who redeemed the soul. Through him men were to understand the Father and to understand themselves as God's children. Thus the doctrine of the Trinity satisfied at once the philosophic intelligence of scholars and the religious needs of Christians. Only thus can its adoption and ultimate acceptance be explained. Its doctrinal form is the philosophic statement of beliefs held by the common people, who had little interest in theology, but whose faith centred in Jesus. It marks the naturalization of Christianity in the Greek world for the common people who believed in Christ, and for the philosophers who justified the faith to reason.

The historic and religious values of the doctrine of the Trinity may be illustrated by way of contrast. The Mahayana systems are the union of Buddha's teaching with the forms of the Brah- man philosophy. The historic Buddha — the man Gautama — is taught as only one of a limitless series of incarnations or (better) appearances. For his life on earth with his material body was only an appearance, a seeming, a phenomenon, and simultaneously with its activities the true Buddha existed unmoved and eternal. Thus the way was opened for other apparitional Buddhas, and different sects take different ones as the

objects of faith and worship. Moreover, our true nature is also Buddha. The conscious life of all men is apparitional and illusive. Salvation is the comprehension of this fact, and in the apprehension of our essential oneness with the absolute. Hence the way of salvation is by knowledge. In the Mahayana gnosticism was triumphant, and the historic values of Gautama's teaching and personality are lost. The Mahayana illustrates in part what would have followed the triumph of gnosticism in Christianity, for not only would the historic value of the life and teaching of Jesus have been lost, but with it the significance of humanity.

It is apparent that such a doctrine as the Trinity is itself susceptible of many explanations, and minds differently con- stituted lay emphasis upon its different elements. Especially is this true as its Greek terminology was translated into Latin, and from Latin came into modern languages — the original meaning being obscured or disguised, and the original issues forgotten. For some the first thought of God, the infinite and ultimate reality lying beyond and behind all phenomena, pre- dominates. With these the historic manifestation of Jesus becomes only a guide to lead us to that immediate apprehension of God which is the end of theology, and to that immediate union with God which is the end of religion. Such an end is accom- plished either by means of pure thought or by a oneness of pure feeling, giving as results the theological or philosophical con- struction of the concept God, or a mystical ecstasy which is itself at once immediate, inexplicable and indescribable. On the other hand, minds of a different and more concrete character so emphasize the distinctions God, Son and Holy Spirit, that a tritheistic construction appears — three individuals in the one Godhead: these individuals appearing, as for example in the Father and the Son, even in opposition to each other. In general we may say then that the Trinity takes on four differing aspects in the Christian church: in its more common and easily appre- hended form as three Gods, in its ecclesiastical form as a mystery which is above reason to be accepted by faith, in its philosophic form as the highest reason which solves the ultimate problems of the universe, and finally, as a mode by which the spirit through an emotional content enters into communion with God himself.

To some Christians the doctrine of the Trinity appeared inconsistent with the unity of God which is emphasized in the Scriptures. They therefore denied it, and accepted Jesus Christ, not as incarnate God, but as God's highest creature by whom all else was created, or as the perfect man who taught the true

doctrine of God. The first view in the early Church long con- tended with the orthodox doctrine, but finally disappeared, and the second doctrine in the modern Church was set forth as easily intelligible, but has remained only as the faith of sects relatively small in number.

Allied with the doctrine of God which seeks the solution of the ultimate problem of all philosophy, the doctrine of salvation has taken the most prominent place in the Christian faith: ne so prominent, indeed, that to a large portion of believers doctrine it has been the supreme doctrine, and the doctrine of the of the deity of Jesus has been valued only because of its < ="»*»• necessity on the effect of the atonement. Jesus alone of the great founders of religion suffered an early and violent death, even the death of a criminal. It became therefore the immediate task of his followers to explain this fact. This explanation was the more urgent because under the influence of Jewish monotheism the rule of God was accepted as an undoubted presupposition, so that the death of Jesus must be in accordance with his will. The early Church naturally used the terms and phrases of the prophets. He died the death of a criminal, not for his sins, but for ours. Isaiah liii. was suggested at once and became the central ex- planation: Christ is the suffering servant who is numbered with the transgressors and who bears the sins of many.

Jesus faced this problem perhaps before the opening of his ministry, certainly from his break with the ecclesiastical authorities. As his violent death drew near, his words indicated how he preserved his deep faith unshaken while yet recognizing the seeming failure of his mission. He devotes himself more exclusively to the little body of his faithful friends and commits his mission to them. As his work is sealed by his death his body is broken and his blood is shed for them. Through this is to come the victory which is denied to his life, as the seed cast into the ground and dead brings forth fruit. Our hints are few of Jesus' teaching, but this much, at least, we cannot doubt unless we suppose that death took him unawares, or that his explanation of the impending fact took on some un- Jewish form; and further, that the earliest tradition misrepresents him. But these hypo- theses do not commend themselves, and we accept the tradition that Jesus taught that his death was an atonement for others.

Beyond this the gospel does not go. Why vicarious suffering is needed, or why the God who is the loving Father does not simply forgive, as in the parable of the prodigal son, is not asked. For after all it is not theory which is central, but the fact of the death, and the reason assigned is simply " for others."

In St Paul we find the beginnings of explanation, indeed of two explanations, and in the Epistle to the Hebrews the whole sacrificial system is found to culminate in Christ, of whom all priests and sacrifices are symbols, so that they are abolished with the coming of the great reality.

In the Greek world further questions are raised and the thought of the death as a ransom is prominent. To whom was the ransom paid? For a thousand years the answer was " to the devil." He had gained control of man by man's sin, and Christ set man free. God then, who is love, delivers us from evil through Christ, who pays the penalty of our transgression to the enemy of God and man. There were other theories also, indeed the germs of all later theories existed even in the second century, but this one prevailed. The heretic Marcion taught a variant, namely, the existence of two Gods, one of the Old Testament of law, the other of the New Testament of grace. Christ, unjustly condemned by the God of law, is given as reparation for all men who put their trust in him. From Anselm's time (12th century a.d.) this theory of Marcion's is held as orthodox in substance but is made monotheistic in form. St Anselm denied that any penalty was due to the devil, and in terms of feudal honour restated the problem. The conflict here is in God himself, so to speak, between his immutable righteousness and his limitless grace. In the sacrifice of Jesus these are reconciled. This doctrine of St Anselm's attaches itself readily to texts of St Paul, for his teachings contain undeniably the vicarious propitiatory element.

These theories have to do with the being to whom the ransom is paid or the sacrifice offered. Another group of theories deals

with the effect of the death of Christ upon the sinner. One of these is the so-called governmental theory, wherein the death of Christ is set forth as for the sake of good government, so that the forgiveness of sins shall not be thought a sign of laxity. Again, by other theologians the death of Jesus is extolled because of the moral influence it exerts, since Christ's devotion unto death incites a like devotion in us.

Excepting in relatively narrow circles these theories have been seriously studied only by professed theologians. That Christ died for us, and that we are saved by him, is indeed the living truth of the Church in all ages, and a false impression of the fact is given by dwelling upon theories as if they were central. At best they bear only

the relationship of philosophy to life.

Another explanation, or (better) system of beliefs, has been far more influential in the Church. Belief in mysterious powers attached to food, feasts, ceremonial rites and sacred things is all but universal. Primitive man seldom connects sacrifice with notions of propitiation, indeed only in highly ethicized religions is the consciousness of sin or of guilt pre-eminent. Sacrifice was believed to exert an influence on the deity which is quasi- physical, and in sacrificial feasts God and worshipper are in mysterious union. Sometimes, indeed, such contact with deity is thought to be dangerous, and the rites indicate avoidance (tabu), and sometimes it is thought desirable.

So universal are such ideas that the problem in particular religions is not their origin but their form. In the Old Testament repeatedly they are found in conflict with the prophetic ideals. Sometimes the prophets denounce them, sometimes ignore them, sometimes attempt to reform and control them. Jesus ignores them, his emphasis being so strong upon the ethical and spiritual that the rest is passed by. In the early Church, still Jewish, the belief was in the coming of a mysterious power from God which produced ecstasy and worked wonders. St Paul also believes in this, but insists that it is subordinate to the peaceable fruits of righteousness. With the naturalization of the Church in the Gentile world ethical ideas became less prominent, and the sacramental system prevailed. By baptism and the Lord's Supper grace is given (ex opere operato) , so that man is renewed and made capable of salvation. Already in the 2nd century baptism was described as a bath in which the health of the soul is restored, and the Lord's Supper as the potion of immortality. Similar notions present in the ethnic faiths take the Christian facts into their service, the belief of the multitude without essential change remaining vague and undefined. While the theologians discussed doctrine the people longed for mystery, as it satisfied their religious natures. By sacraments they felt them- selves brought into the presence of God, and to sacraments they looked for aid. Many sacraments were adopted by portions of the Church, until at last the sacred number seven was agreed upon.

As the way of salvation was modified, so too was the idea of salvation: the dream of a Messianic kingdom on earth, with its corollary the resurrection of the physical body, faded The con- awaV; especially after the Roman empire adopted salvation. Christianity; It was no longer the Jewish nation against the heathen empire, for the Jewish nation had ceased to be, and the empire and the Church were one. Salvation henceforth is not the descent of the New Jerusalem out of heaven, but the ascent of the saints to heaven; for the individual it is

not the resurrection of the body but the immortality of the soul. So Jesus is no longer Christ or Messiah, but the Son of God. These terms again are variously interpreted: heaven is still thought of by many under the imagery of the book of Revelation, and by others it is conceived as a mystical union of the soul with God through the intelligence or of feelings. Yet the older con- ceptions still continue, Christianity not becoming purely and simply Greek. Again and again individuals and groups turn back to the Semitic cycle of hopes and ideas, while the reconcilia- tion of the two systems, Jewish and Graeco-Roman, becomes the task of exegetes and theologians.

These hopes and theories of salvation, however, do not explain the power of Christianity. Jesus wearied himself with the healing of man's physical ailments, and he was remembered as the great

physician. Early Christian literature is filled with medical terms, applied (it is true) for the greater part to the cure of souls. The records of the Church are also filled with the efforts of Jesus' followers to heal the diseases and satisfy the wants of men. A vast activity animated the early Church: to heal the sick, to feed the hungry, to succour the diseased, to rescue the fallen, to visit the prisoners, to forgive the erring, to teach the ignorant, were ministries of salvation. A mighty power impelled men to deny themselves in the service of others, and to find in this service their own true life. None the less the first place is given to the salvation of the soul, since, created for an unend- ing existence, it is of transcendent importance. While man is fallen and by nature vile, nevertheless his possibilities are so vast that in comparison the affairs of earth are insignificant. The word, " What shall it profit a man if he gain the whole world and lose his own soul? " comes to mean that the individual soul outvalues the whole world. With emphasis upon God as creator and ruler, and upon man as made in God's image, endowed with an unending existence, and subject to eternal torture if not redeemed, the concept of personality has been exalted at the expense of that of nature, and the future has been magnified at the expense of the present. Thus a future heaven is man's true home, and theology instead of philosophy or natural science is his proper study.

Indeed, intellectual interest centred in religion. Natural science was forsaken, except in so far as it ministered to theology. Because the Old Testament contained references to the origin and the objects of the universe, a certain amount of natural science was necessary, but it was only in this connexion that it had any value. By Augustine's time this process is complete. His writings contain most of the knowledge of his age, but it is strictly subordinate to his theological purpose. Hence,

when the barbarians submerged southern Europe, theology alone survived. The Church entered upon a new task. In the begin- ning Christianity had been the teacher of religion to highly civilized peoples— now it became the civilizing agent to the barbarians, the teacher of better customs, the upholder of law and the source of knowledge. The learned men were monks and priests, the universities were Church institutions, and theology was the queen of the sciences.

The relation of cult to creed is still undetermined. Theoreti- cally the first depends on the second, for its purpose is twofold : the excitation of worthy religious emotions and the attaining of our desires ; and how shall these objects be an ^° ogy attained unless we know him whom we worship and worship. to whom we pray? But it is plausibly maintained that the reverse is true, namely, that theology rests on cult. In the beginnings of consciousness instinctive reactions precede definite thoughts, and even in mature life thoughts often follow acts instead of preceding them. Our religious consciousness is simply our ordinary consciousness obeying its laws. So un- purposed does cult grow up that it combines many elements of diverse origin, and is seldom precisely and wholly in accordance with the creed. No doubt the two interact, cult influencing creed and creed modifying cult— cult, perhaps, being most powerful in forming the actual religious faith of the multitude. Cult divides into two unequal • parts, the stimulation of the religious emotions and the control of piety. In the Church service it came early to centre in the sacrament of the Eucharist (q.v.). In the earliest period the services were characterized by extreme freedom, and by manifestations of ecstasy which were believed to indicate the presence of the spirit of God; but as the years went by the original enthusiasm faded away, the cult became more and more controlled, until ultimately it was com- pletely subject to the priesthood, and through the priesthood to the Church. In the Roman communion the structure of the sacred edifice, the positions and attitudes of the priest and the congregation, the order of service, emphasize the mystery and the divine efficacy of the sacrament. The worshipper feels him- self in the immediate presence of God, and enters into physical relations with him. Participation in the mass also releases from guilt, as the Lamb of God offered up atones for sin and intercedes

Polity.

with the Father in our behalf. Thus in this single act of devotion both objects of all cults are attained.

As the teaching and person of Jesus were fitted into the framework of the Greek philosophy, and the sacraments into the deeper and broader forms of popular belief, so was the organization shaped by the polity of the Roman empire. Jesus gathered his group of followers and committed to it his mission, and after his resurrection the necessities of the situation brought about the choice of quasi-officials. Later the familiar polity of the synagogue was loosely followed. A com- pleter organization was retarded by two factors, the presence of the apostles and the inspiration of the prophets. But when the apostles died and the early enthusiasm disappeared, a stricter order arose. Practical difficulties called for the enforcement of discipline, and differences of opinion for authority in doctrine; and, finally, the sacramentarian system required a priesthood. In the 2nd century the conception of a Catholic Church was widely held and a loose embodiment was given it; after the con- version of the empire the organization took on the official forms of the empire. Later it was modified by the rise of the feudal system and the re-establishment of the modern European nationalities (see Church History).

The polity of the Church was more than a formal organization ; it touched the life of each believer. Very early, Christianity was conceived to be a new system of law, and faith was interpreted as obedience. Legalism was joined with sacramentarianism, doubling the power of the priest. Through him Church discipline was administered, a complete system of ecclesiastical penalties, i.e. penance, growing up. It culminated in the doctrine of purgatory, a place of discipline, of purifying suffering after death. The Roman genius for law strengthened and systematized this tendency.

The hierarchy which centres in the pope constitutes the Church of which the sacramental system is the inner life and penance is the sanction. It is thus a divine-human organization. It teaches that the divine-human Son of God established it, and returning to heaven committed to the apostles, especially to St Peter, his authority, which has descended in an unbroken line through the popes. This is the charter of the Church, and its acceptance is the first requisite for salvation; for the Church determines doctrine, exercises discipline and administers sacra- ments. Its authority is accompanied by the spirit of God, who guides it into truth and gives it miraculous power. Outside the Church there are only the ” broken lights ” of man’s philosophy

and the vain efforts of weak human nature after virtue.

Christianity in its complete Roman development is thus the coming of the supernatural into the natural. The universe falls _. into these orders, the second for the sake of the first, as

completed nature is of and for God. Without him nature at its doctrine highest is like a beautiful statue, devoid of life; it is of of the secondary moment compared even to men, for while it Church. passes away he continues for ever. He is dependent, therefore, not upon nature, but upon God's grace for salvation, and this comes through the Church. In the book of Revelation the New Jerusalem descending from heaven to the earth may be taken as a symbol of a continuing process: the human receives the divine, as the Virgin Mary received the Holy Spirit and brought forth Jesus, perfect man and perfect God. Thus the Church ever receives God and has a twofold nature; its sacraments through material and earthly elements impart a divine power; its teachings agree with the highest truths of philosophy and science, yet add to these the knowledge of mysteries which eye hath not seen, nor ear heard, neither hath it entered into the heart of man to conceive; it sanctifies human relationships, but the happiness of earth at purest and best is only a shadow of the divine bliss which belongs to the redeemed soul. Hence man should deny the world for the sake of the other world, and the title " religious " belongs distinctly to the monastic and priestly life. Theology is the queen of the sciences, and nothing should be taught in school or university which contradicts its conclusions. Moreover, nothing should be done by the state which interferes with the transcendent interest committed to the

Church. Thus the Church touches and controls all realms of life, and the cycle is complete. It began as separate from the world and proscribed by it; next it adapted itself to the learning, the customs and the polity of the world. Finally it asserted its mastery and assumed sovereign power over all. The Church in its completed form was the outcome of a long development; if the seed was Jewish the environment was Gentile. Into the full tree were gathered the effects, not only of the initial energy, but of the forces of earth, air, water and sun. The Roman Church expressed the beliefs and answered the needs of the people, and this explains in part both its forms and its power, its long continuance and wide supremacy.

The Church was never completely successful in unifying its organization. In part it shared the destiny of the Roman empire, and with it fell into two parts, East separating from West. Indeed the East never really acknowledged Eastern the Roman primacy nor shared in

its development, church, and it still remains apart. With characteristic oriental conservatism it claims the title of ” Orthodox,” and retains the creed and organization of the early Church. In general its conception of the relation of the world to the super-world is identical with that of the Roman Church, though somewhat less defined, as its organization is less complete. It has remained in the second stage mentioned above; established, as in Russia, by the empire, it is dependent upon it and in alliance with it. In the Mahommedan dominions it has been recognized as a state within the state, and in these communities faith and patriotism are one.

The idea of the Roman Church was imperfectly embodied at the best ; the divine gift was in earthen vessels. The world was never completely cast out ; indeed the Church became the scene for ambition and the home of luxury and pleasure. Reforma- It was entangled also in the political strife of the feudal tion. ages and of the beginning of modern empires. Its control of the sciences embroiled it with its own philosophers and scholars, while saints and piare-minded ecclesiastics attempted, without success, its reform from within. Finally, through Luther, the explosion came, and western Christendom broke into two parts— Catholic and Protestant.

Protestantism in its primary principle is the return to primitive Christianity. The whole development which we have traced, culminating in the ecclesiastical-doctrinal system of the Roman Church, is regarded as a corruption, since foreign and even heathen elements have been brought in, so that the religion established by Christ is obscured or lost. For Protestants the Bible only now becomes the infallible, inspired authority in faith and morals. Interpretations by the Fathers or by the councils are to be taken only as aids to its understanding. With this principle is associated a second, the liberty of the individual; he reads the sacred Scriptures and interprets them for himself without the intervention of priests or church; and he enters by faith in Christ into communion with God, so that all believers are priests. Here may be noted a fundamental difference in the psychology of religion, since in the Roman Church the chief appeal is to the emotions, while in the Reformed it is to the intelligence. Yet this appeal to the intelligence is not rationalism: the latter makes reason the supreme authority, rejecting all which does not conform to it; the Bible is treated like any other book, to be accepted or rejected in part or in whole as it agrees with our canons of logic and our general science, while religion submits to the same process as do other departments of knowledge. But in Protestantism reason and the light of nature are in themselves as impotent as in the Roman Church. The Bible interpreted by man’s unaided intelligence is as valueless as other

writings, but it has a sacramental value when the Holy Spirit accompanies its teaching, and the power of God uses it and makes the soul capable of holiness. In all this the supernatural is as vividly realized as in the Roman Church; it is only its mediation which is different.

These principles are variously worked out in the different churches and variously expressed. In part because of historical circumstances, the divergence from the older systems is more marked in some Protestant churches than in others, yet on the

whole these two principles determine cult and in part organiza- tion. As in the Roman Church cult centres in the mass, so in the Reformed Church it centres in the sermon. The

atism' Holy Spirit, the determining factor in the religious life, uses the Bible as his means, and calls the intelligence into action. The clergyman is primarily the preacher, renewed by God's power and enlightened by the Spirit, so that he speaks with divine authority. The ancient Jewish prophetic office is revived, yet with a difference: the ancient prophets acknowledged no external authority, but the Protestant preacher is strictly subordinate to the Scriptures of which he is the interpreter. Beside the sermon the sacraments are observed as established by Christ — two in number, baptism and the Lord's Supper. But these do not exert a quasi-physical or magical influence, ex opere operate Unless there be faith in the recipient, an understanding of the meaning of the sacrament and an acceptance of it, it is valueless or harmful. Prayer and praise also are effective only as the congregation intelligently join in them; hence they are not to be solely by a priest nor in a strange tongue, as the clergyman is simply the leader of the devotions of the people. In large portions of the Church also opportunity for the free expression of the religious experience of the laity is found.

The emphasis upon the believer and his freedom from all ex- ternal authority do not result in a thoroughgoing individualism. Luther clearly held to the unity of all Christians, and Protestants are agreed in this. For them, as for the Roman Church, there is a belief in a catholic or all-embracing Church, but the unity is not that of an organization; Christians are one through an indwelling spirit; they hold the same faith, undergo the same experience and follow the same purpose. This

inner life constitutes the oneness of believers and forms the true Church which is invisible. It expresses itself in outward forms, yet there are not two Churches visible and invisible, but only one. The spiritual experience of the individual utters itself in words, and desires association with others who know the same grace. There is formed a body of teaching in which all agree, and an organization in which the common experience finds expression and aid. While then membership in this organization is not primary, it assumes a higher and even a vital importance, since a true experience recognizes the common faith and the common fellowship. Were it to refuse assent to these, doubt would be thrown upon its own trustworthiness.

Historically these principles were only in part embodied, for the Reformation was involved in political strife. The Reformers turned to the government for aid and protection, and throughout Europe turmoil and war ensued. In consequence, in the Pro- testant nations the state assumed the ultimate authority over the Church. Moreover, in the early days of the Reformation the Catholic Church charged it with a lawless individualism, a charge which was seemingly made good by an extreme divergence in theological opinion and by riots in various parts of the Protestant world. The age was indeed one of ferment, so that the foundations of society and of religion seemed threatened. The Reformers turned to the state for protection against the Roman Church, and ultimately as a refuge from anarchy, and they also returned to the theology of the Fathers as their safeguard against heresy. Instead of the simplicity of Luther's earlier writings, a dogmatic theology was formed, and a Protestant ecclesiasticism established, indistinguishable from the Roman Church in principle. The main difference was in the attitude to the Roman allegiance and to the sacramentarian system. There was thus by no means a complete return to the Bible as the sole authority, but the Bible was taken as interpreted by the earlier creeds and as worked into a doctrinal system by the scholastic philosophy. Thus Protestantism also came to identify theology with the whole range of human knowledge, and in its official forms it was as hostile to the progress of science as was the Roman Church itself.

Many Protestants rebelled against this radical departure from the principles of the Reformation and of Biblical Christianity. To them it seemed the substitution of the authority of the Church tor the authority of a living experience and of intellectual

adherence to theological propositions for faith. The freedom of the individual was denied when the state enforced religious conformity. Thus a struggle within Protestantism arose, with persecutions of

Protestants by Protestants. Moreover, many failed to find the expression of their faith in the official creed or in the established organization, and Protestantism divided into many sects and denominations, founded upon special types of religious experience or upon particular points in doctrine or in cult. Thus Protestantism presents a wide diversity in com- parison with the regularity of the Roman Church. This we should expect indeed from its insistence upon individual freedom; yet, notwithstanding certain notable exceptions, amid the diversity there is a substantial unity, a unity which in our day finds expression in common organizations for great practical ends, for example in the ” Bible Societies,” ” Tract Societies,” the ” Young Men’s Christian Associations,” ” Societies of Christian Endeavour,” &c, which disregard denominational lines.

The coming of the northern peoples into the Roman world profoundly modified Christianity. It shared indeed in the dreariness and corruption of the times commonly called ctiisti- the ” dark ages,” but when at last a productive period aalty and began the Church was the first to profit by it. Since all the modem educated men were priests, it assimilated the new”’ or/ ”’ learning — the revived Aristotelianism — and continued its control of the universities. In the 13th century it was supreme, and Christianity was identified with world systems of knowledge and politics. Both were deemed alike divine in origin, and to question their validity was an offence against God. Christianity thus had passed through three stages in politics as in science. At first it was persecuted by the state, then established by it, and finally dominated over it; so its teaching was at first alien to philosophy and despised by it, next was accepted by it and given form and rights through it, and finally became queen of the sciences as theology and ruled over the whole world of human knowledge. But the triumph by its completeness ensured new conflicts; from the disorder of the middle ages arose states which ultimately asserted complete autonomy, and in like fashion new intellectual powers came forth which ultimately established the independence of the sciences.

In the broadest sense the underlying principle of the struggle is the reassertion of interest in the world. It is no longer merely the scene for the drama of the soul and God, nor is man inde- pendent of it, but man and nature constitute an organism, humanity being a part of the vaster whole. Man’s place is not even central, as he appears a temporary inhabitant of a minor planet in one of the lesser stellar systems. Every science is involved, and theology has come into conflict with metaphysics, logic, astronomy, physics, chemistry, geology, zoology, biology, history and even economics and medicine. From the modern point of view this is unavoidable and even desirable,

since ” theology ” here represents the science of the 13th century. As in the political world the states gained first the undisputed control of matters secular, rejecting even the proffered counsel of the Church, and then proceeded to establish their sovereignty over the Church itself, so was it in the empire of the mind. The rights gained for independent research were extended over the realm of religion also; the two indeed cannot remain separate, and man must subordinate knowledge to the authority of religion — or make science supreme, submitting religion to its scrutiny and judging it like other phenomena. Under this investigation Christianity does not appear altogether exceptional. Its early logic, ontology and cosmology, with many of its dis- tinctive doctrines, are shown to be the natural offspring of the races and ages which gave them birth. Put into their historical environment they are freed from adverse criticism, and indeed valued as steps in the intellectual development of man’s mind. Advanced seriously, however, as truths to-day, they are put aside as anachronisms not worthy of dispute. The Bible is studied like other works, its origins discovered and its place in comparative religion assigned. It does not appear as altogether unique, but it is put among the other sacred books. For the great religions of the world show similar cycles of development,

similar appropriations of prevalent science and philosophy, similar conservative insistence upon ancient truth, and similar claims to an exclusive authority.

With this interest is involved an attitude of mind toward the supernatural. As already pointed out, nature and super-nature were taken as physically and spatially distinct. The latter could descend upon the former and be imparted to it, neither subject to nature nor intelligible by reason. In science the process has been reversed; nature ascends, so to speak, into the region of the supernatural and subdues it to itself; the marvellous or miraculous is brought under the domain of natural law, the canons of physics extend over metaphysics, and religion takes its place as one element in the natural relationship of man to his environment. Hence the new world-view threatens the founda- tions of the ecclesiastical edifice. This revolution in the world-view is no longer the possession of philosophers and scholars, but the multitude accepts it in part. Education in general has rendered many familiar with the teachings of science, and, moreover, its practical benefits have given authority to its maxims and theories. The world’s

problem is not only therefore acute, but the demand for its solution is wider than ever before.

The Roman Catholic Church uncompromisingly reasserts its ancient propositions, political and theological. The cause is Theatti- lost indeed in the political realm, where the Church tudeofthe is obliged to submit, but it protests and does not Roman wa ive or modify its claims (see the Syllabus of 1864, Church. paragraphs ig ff., 27, 54 and 55). In the Greek and Protestant churches this situation cannot arise, as they make no claims to governmental sovereignty. In the intellectual domain the situation is more complex. Again the Roman Church unhesitatingly reaffirms the ancient principles in their extreme form (Syllabus, paragraphs 8-9-13; Decrees of the Vatican Council, chapter 4, note especially canon 4-2). The works of St Thomas Aquinas are recommended as the standard authority in theology (Encyc. of Leo XIII., Aeterni Patris, Aug. 4, 1879). In details also the conclusions of modern science are rejected, as for example the origin of man from lower species, and, in a different sphere, the conclusions of experts as to the origins of She Bible. Faith is defined as ” assent upon authority,” and the authority is the Church, which maintains its right to supremacy over the whole domain of science and philosophy.

The Greek Church remains untouched by the modern spirit, and the Protestant Churches also are bound’ officially to the TheOreek scholastic philosophy of the 17th century; their con- aodPro- fessions of faith still assert the formation of the world testant m s ; x d a y Si anc j require assent to propositions which Chwc es. can ˆ e true on iy ;f t ne old cosmology be correct. Offici- ally then the Church identifies Christianity with the position outlined above, and hostile critics agree to this identification, rejecting the faith in the name of philosophic and scientific truth.

On the other hand there are not wanting individuals and even

large bodies of Christians who are intent upon a reinterpretation.

Even in the official circles of the Church, not excepting

Com ” the Roman Church, there are many scholars who find

promises. , ‘ . . . . ˆ

no difficulty in remaining Christian while accepting the modern scientific view of the world. This is possible to some because the situation in its sharp antithesis is not present to their minds: by making certain compromises on the one side and on the other, and by

framing private interpretations of important dogmas, they can retain their faith in both and yet preserve their mental integrity. A large literature is produced, reconciling science and theology by softening and compromising and adapting; a procedure in accordance with general historical development, for men do not love sharp antagonisms, nor are they prepared to carry principles to their logical conclusions. By a fortunate power of mind they are able to believe as truths mutually inconsistent propositions.

Thus the crisis is in fact not so acute as it might seem. No great institution lives or dies by logic. Christianity rests on great religious needs which it meets and gratifies, so that its life (like all other lives) is in unrationalized emotions. Reason seeks ever to rationalize these, an attempt which seems to destroy yet really

fulfils. As thus the restless reason tests the emotions of the soul, criticizes the traditions to which they cling, rejects the ancient dogmas in which they have been defined, the Church slowly participates in the process: silently this position and that are forsaken, legends and beliefs once of prime importance are for- gotten, or when forced into controversy many ways are found by which the old and the new are reconciled: the sharpness of distinctions can be rubbed off, expressions may be softened, definitions can be modified and half-way resting-places afforded, until the momentous transition has been made and the continuity of tradition is maintained. Finally, as the last step, even the official documents may be revised. Such a process in Christianity is everywhere in evidence, for even the Roman Church admits the modern astronomy. So too it accepts the changes in the world of politics with qualified approval. In the Syllabus of 1864 the separation of state and church was anathematized, yet in 1906 this separation in the United States was held up as an example to be followed by the French government. In the Protestant Churches the process is precisely similar. No great church has yet modified its articles of religion so as to admit, for example, that the Garden of Eden was not a definite place where Eve was tempted, yet the doctrine is contradicted with approval by individuals, and the results of modern science are accepted and taught without rebuke. In all this the Church shows its essential oneness with other organizations of society, the government, the family, which are at once deeply rooted in the past, and yet subject to the influences of the present. For Christianity is by no means wholly intellectual, nor chiefly so. It would be fully as true to facts to describe this religion as a vast scheme for the amelioration of the condition of humanity. In education, in care for the sick, the poor, the outcast, it has retained the spirit of its Lord. Though it has at times denied this spirit, been guilty of crimes, persecutions, wars and greed

— still the Church has never quite forgotten him who went about doing good, nor freed itself from the contagion of his example. No age has been so responsive to the needs of man as our own; whatever doubts men have as to the doctrines or the cults there is an agreement wider than in the past in the good works whose inspira tion is a divine love.

Yet the intellectual crisis cannot be ignored in the interest of the practical life. Men must rationalize the universe. On the one hand there are churchmen who attempt to repeat the historical process which has naturalized … f° ,

,ˆii. 1 • .\ i • 1 r °* develop-

the Church in alien soils by appropriating the forces meat.

of the new environment, and who hold that the entire process is inspired and guided by the spirit of God. Hence Christianity is the absolute religion, because it does not preclude development but necessitates it, so that the Christianity that is to come shall not only retain all that is important in the Christianity of the past and present but shall assimilate new truth. On the other hand some seek the essential Christianity in a life beneath and separable from the historic forms. In part under the in- fluence of the Hegelian philosophy, and in part because of the prevalent evolutionary scientific world-view, God is represented under the form of pure thought, and the world process as the unfolding of himself. Such truth can be apprehended by the multitude only in symbols which guide the will through the imagination, and through historic facts which are embodiment of ideas. The Trinity is the essential Christian doctrine, the historic facts of the Christian religion being the embodiment of religious ideas. The chief critical difficulty felt by this school is in identifying any concrete historic fact with the unchanging idea, thatis, in making Jesus of Nazareth the incarnation of God. God is reinterpreted, and in place of an extra-mundane creator is an omnipresent life and power. The Christian attainment is nothing else than the thorough intellectual grasp of the absolute idea and the identification of our essential selves with God. With a less thorough-going intellectualism other scholars re-interpret Christianity in terms of current scientific phraseology. Christianity is dependent upon the understanding of the universe; hence it is the duty of believers to put it into the new setting, sp that it adopts and adapts astronomy, geology, biology and

psychology. With this accomplished, Christianity will resume its ancient place. Consciously and of purpose the attempt is made to do once more what has been done repeatedly before, to restate Christianity in the terms of current science.

From all these efforts to reconstruct systematic theology with its appropriations of philosophy and science, groups of Christians turn to the inner life and seek in its realities to find the con- firmation of their faith. They also claim oneness with a long line of Christians, for in every age there have been men who have ignored the dogma and the ritual of the Church, and in contempla- tion and retirement have sought to know God immediately in their own experience. To them at best theology with its cos- mology and its logic is only a shadow of shadows, for God reveals himself to the pure in heart, and it matters not what science may say of the material and fleeting world. This spirit manifests itself in wide circles in our day. The Gordian knot is cut, for philosophy and religion no longer touch each other but abide in separate realms.

In quite a different way a still more influential school seeks essential Christianity in the sphere of the ethical life. It also would disentangle religion from cosmology and formal philosophy. It studies the historic development of the Church, noting how element after element has been introduced into the simplicity pf the gospel, and from all these it would turn back to the Bible itself. In a thorough-going fashion it would accomplish what Luther and the Reformation attempted. It regards even the earliest creeds as only more or less satisfactory attempts to translate the Christian facts into the current language of the heathen world. But the process does not stop with this re- jection of the ancient and the scholastic theology. It recognizes the scientific results attained in the study of the Bible itself, and therefore it does not seek the entire Bible as its rule of truth. To it Jesus Christ, and he alone, is supreme, but this supremacy does not carry with it infallibility in the realm of cosmology or of history. In these too Jesus participated in the views of his own time; even his teaching of God and of the future life is not lacking in Jewish elements, yet none the less he is the essential element in Christianity, and to his life-purpose must all that claims to be Christianity be brought to be judged. To this school Christianity is the culmination of the ethical monotheism of the Old Testament, which finds its highest ideal in self- sacrificing love. Jesus Christ is the complete embodiment of this ideal, in life and in death. This ideal he sets before men under the traditional forms of the kingdom of God as the object to be attained, a kingdom. which takes

upon itself the forms of the family, and realizes itself in a new relationship of universal brotherhood. Such a religion appeals for its self-verification not to its agreement with cosmological conceptions, either ancient or modern, or with theories of philosophy, however true these may be, but to the moral sense of man. On the one hand, in its ethical development, it is nothing less than the outworking of that principle of Jesus Christ which led him not only to self- sacrificing labour but to the death upon the cross. On the other hand, it finds its religious solution in the trust in a power not ourselves which makes for the same righteousness which was incarnate in Jesus Christ.

Thus Christianity, as religion, is on the one hand the adoration of God, that is, of the highest and noblest, and this highest and noblest as conceived not under forms of power or knowledge but in the form of ethical self-devotion as embodied in Jesus Christ, and on the other hand it meets the requirements of all religion in its dependence, not indeed upon some absolute idea or omni- potent power, but in the belief that that which appeals to the soul as worthy of supreme worship is also that in which the soul may trust, and which shall deliver it from sin and fear and death. Such a conception of Christianity can recognize many embodi- ments in ritual, organization and dogma, but its test in all ages and in all lands is conformity to the purpose of the life of Christ. The Lord's Prayer in its oldest and simplest form is the expression of its faith, and Christ's separation of mankind on the right hand and on the left in accordance with their service or refusal of service to their fellow-men is its own judgment of the right

of any age or church to the name Christian. This school alsn represents historic Christianity, and maintains the continuity of its life through all the ages past with Christ himself. But this continuity is not then in theological systems or creeds, nor in sacraments and cult, nor in organization, but in the noble company of all who have lived in simple trust in God and love to humanity. It is this true Church of the spirit and purpose of Jesus which has been the supreme force for the uplifting of humanity.

Christianity has passed through too many changes, and it has found too many interpretations possible, to fear the time to come. Thoroughgoing reconstruction in every item of theology and in every detail of polity there may be, yet shall the Christian life go on — the life which finds its deepest utterance in the words of Christ, " Thou shalt love the Lord thy God with all thy heart and thy neighbour as thyself "; the life which expresses its pro- foundest faith in the words Christ taught it to pray, "Our Father"; the life which finds its highest

rule of conduct in the words of its first and greatest interpreter, ” Let this mind be in you which was also in Christ Jesus our Lord.”

Bibliography. — Detailed bibliographies accompany the separate articles on subjects connected with the Christian religion and Church. In the following list a selection is given of books on the wider and general subject:—

Extent and Growth. — D. Dorchester, The Problem of Religious Progress (revised ed., 1894); S. Gulick, The Growth of the Kingdom of God (1895); James S. Dennis, Christian Missions and Social Progress (1906).

Prophets of Israel.— Rudolf Smend, Lehrbuch der alttestamentlichen Religionsgeschichte (2nd ed., 1899); A. B. Davidson, Old Testament Prophecy (1903) ; Karl Budde, Religion of Israel to the Exile (1899) ; W. Robertson Smith, The Prophets of Israel and their Place in History (1899); A. F. Kirkpatrick, Doctrine of the Prophets (3rd ed., 1901); Beruk Duhm, Die Theologie der Propheten (1875).

Judaism. — Emil Schiirer, History of the Jewish People in the Time of Jesus Christ (Eng. trans., Edinburgh, 1890); C. G. Montefiore, Lectures on the Origin and Growth of Religion as illustrated by the Religion of the Ancient Hebrews (2nd ed., 1893); W. Bousset, Die Religion des Judentums im neutestamentli'chen Zeitalter (2nd ed., 1906).

The Life and Teaching of Jesus. — Hans Heinrich Wendt, The Teaching of Jesus (1892), 2 vols. ; Oskar Holtzmann, The Life of Jesus (Eng. trans., 1904) ; Paul Wernle, Beginnings of Christianity, 2 vols. (1903-1904); T. Crawford Burkitt, The Gospel History and its Transmission (1906).

The Beginnings of Christianity. — Ernst von Dobschutz, Christian Life in the Primitive Church (Eng. trans., 1904) ; A. C. McGiffert, The Apostolic Age (1900) ; Carl Weizsacker, The Apostolic Age (Eng. trans., 1897); Otto Pfleiderer, Das Urchristentum (1902).

The Expansion' of Christianity. — Edwin Hatch, " The Influence of Greek Ideas and Usages upon the Christian Church," the Hibbert Lectures, 1888 (1890) ; Adolf Harnack, The Expansion of Christianity in the First Three Centuries (Eng. trans., 1904) ; Sir W. M. Ramsay, The Church in the Roman Empire (1893).

The History of Church and of Dogma. — Adolf Harnack, History of Dogma (Eng. trans., 1895); Reinhold Seeberg, Lehrbuch der Dogmengeschichte (1895, 2 vols.); Philip Schaff, The Creeds of Christendom (3 vols., 1881, 3rd ed.).

The Roman Church. — Joseph Wilhelm and Thomas B. Scannell, Manual of Catholic Theology (1906); J. A. Moehler, Symbolism (trans. 1844); Thomas Aquinas, The Summa (Eng. trans., 1907); William Ward, The Ideal of a Christian Church (1844).

The Greek Church. — " The Creeds of the Greek and Russian Churches," in Schaff , Creeds, vol. ii. pp. 275-542; and J. Michalcesu, Die Bekenntnisse und die wichtigsten Glaubenszeugnisse der griechisch- orientalischen Kirche (Leipzig, 1904).

Protestantism. — John Calvin, Institutio Religionis Christianae, (1536; Eng. trans., 1816); Charles Hodge, Systematic Theology (3 vols., 1872); Ernst Troeltsch, Die Absolutheit des Christentums und die Religionsgeschichte (1902) ; First Principles of the Refor- mation, or the Ninety-five Theses and the Three Primary Works, trans, by Henry Wace and C. A. Buchheinz (1883).

Christianity in the Modern World. — Andrew D. White, Conflict of Science with Theology (2 vols., 1896) ; D. F. Strauss, Der alte und der neue Glaube (1872 ; Eng. trans., 1873) ; A. J. Balfour, The Foundations of Belief (1897); J. Ward, Naturalism and Agnosticism (1899).

Modern Adaptations of Christianity. — William Adams Brown, Christian Theology in Outline (1906) ; Augustus Sabatier, Religions of Authority and the Religion of the Spirit (1904); J. A. Zahm, Evolution and Dogma (1896); John Henry Newman, An Essay on the Development of Christian Doctrine (1845); Edward Caird, The Evolution of Religion (1893) ; Otto Pfleiderer, Philosophy of Religion (Eng. trans., 1888, especially volumes 3 and 4); Newman Smyth, Old Faiths in New Lights (1879), Through Science to Faith (1902); Henry Drummond, The Ascent of Man (1894) ; William Ralph Inge, Christian Mysticism (Bampton Lecfures, 1894) ; Wilhelm Herrmann, The Communion of the Christian with God (1895) ; George William

Knox, Direct and Fundamental Proofs of the Christian Religion (1903) ; Albrecht Ritschl, Die christliche Lehre von der Rechtfertigung und Versohnung (1900). _ ,

Modern Definitions of Christianity- — Alfred Loisy, The Gospel and the Church (1904) ; Adolf Harnack, What is Christianity? (1901) ; William Adams Brown, The Essence of Christianity (1902) ; Ernest Troeltsch, Das Wesen des Christentums; J. Kaftan, Das Wesen der christlichen Religion (2nd ed., 1888); J. Caird, The Fundamental Ideas of Christianity (1899). (G. W. Kn.)

. CHRISTIANS AND (Kristiansand), a fortified seaport of Norway, the chief town of a diocese (stift), on a fjord of the Skagerrack, 17s m. S.W. of Christiania by sea. Pop. (1900) 14,701. It stands on a square peninsula flanked by the western and eastern harbours and by the Otter river. The situation, with its wooded hills and neighbouring islands, is no less beautiful than that of other south-coast towns, but the substitution of brick for wood as building material after a fire in 1892 made against the picturesqueness of the town. There is a fine cathedral, rebuilt in Gothic style after a fire in 1880. Christiansand is an important fishing centre (salmon, mackerel, lobsters), and sawmills, wood-pulp factories, shipbuilding yards and mechanical workshops are the principal industrial works. The port is the largest on the south coast, and all the coast steamers, and those serving

Christiania from London, Hull, Grangemouth, Hamburg, &c, touch here. The Saetersdal railway follows that valley north to Byglandsfiord (48 m.), whence a good road continues to Viken i Valle at the head of the valley. Flekkero, a neighbour- ing island, is a favourite pleasure resort. The town was founded in 1641 by Christian IV., after whom it was named.

CHRISTIAN SCIENCE, a system of theosophic and therapeutic doctrine, which was originated in America about 1866 by Mrs Mary Baker Glover Eddy, and has in recent years obtained a number of adherents both in the United States and in European countries. Mrs. Eddy (1821-igio ; nie Baker) was born near Concord, New Hampshire; in 1843 she married Colonel G. W. Glover (d. 1844), in 1853 she married Daniel Patterson (divorced 1873), and in 1877 Dr Asa Gilbert Eddy (d. 1883). About the year 1867 she came forward as a healer by mind-cure. She based her teaching on the Bible, and on the principles that man's essential nature is spiritual, and that, the Spirit of God being Love and Good, moral and physical evil are contrary to that Spirit, and represent an absence of the True Spirit which was in Jesus Christ. There is but one Mind, one God, one Christ, and nothing real but Mind. Matter and sickness are subjective states of error, delusions which can be dispelled by the mental process of a true knowledge of God and Christ, or Christian science. Ordinary medical science — using drugs, &c. — is therefore irrele- vant; spiritual treatment is the only cure of what is really mental error. Jesus himself healed by those means, which were therefore natural and not miraculous, and promised that those who be- lieved should do curative works like his. In 1876 a Christian Scientist Association was organized. Mrs Eddy had published in the preceding year a book entitled Science and Health, with Key to the Scriptures, which has gone through countless editions and is the gospel of Christian Science. In 1879 she became the pastor of a " Church of Christ, Scientist," in Boston, and also founded there the " Massachusetts Metaphysical College " (1881 ; closed 1889) for the furtherance of her tenets. The first denomi- national chapel outside Boston was built at Oconto, Wisconsin, in 1886; and in 1894 (enlarged and reconstructed in 1906) a great memoriaFchurch was erected in Boston. Mrs Eddy's publications also include Retrospection and Introspection (1891), Unity of Good and Unreality of Evil (1887), Rudimental Divine Science (1891), Christian Healing (1886), &c. The progress of the cult of Christian Science has been remarkable, and by the beginning of the 20th century many hundreds of Christian Science churches had been established; and the new religion found many adherents also in England. A purely local and congregational form of government was adopted, but Christian Scientists naturally looked to

the mother church in Boston, with Mrs Eddy as its guiding influence, as their centre. A monthly magazine, The Christian Science Journal (founded in 1883), and the weekly Christian Science Sentinel are published officially in Boston.

The profession of the paid Christian Science ” healer ” has been very prominent in recent years both in America and in England; and very remarkable successes have been claimed for the treatment. In some serious cases of death after illness, where a coroner’s inquest has shown that the only medical attendance was that of a Christian Science “healer,” the question of criminal responsibility has been prominently canvassed; but an indictment in England against a healer for manslaughter in 1906 resulted in an acquittal. The theosophic and the medical aspects of Christian Science may perhaps be distinguished; the latter at all events is open to grave abuse. But the modern reaction in medical practice against drugs, and the increased study of the subject of ” suggestion,” have done much to encour- age a belief in faith-healing and in ” psychotherapy ” generally. In 1908, indeed, a separate movement (Emmanuel), inspired by the success of Christian Science, and also emanating from America, was started within the Anglican Communion, its object being to bring prayer to work on the curing of disease; and this movement obtained the approval of many leaders of the church in England.

An ” authorized ” Lifeol Mrs Eddy, by Sibyl Wilbur (1908), deals with the subject acceptably to her disciples. ‘ ‘ Georgine M ilmine’s ‘ ‘ Life of M. B. G. Eddy, and History of Christian Science (1909), though not so acceptable, is a judicious critical account. A detailed indictment against the whole system, by a competent English doctor (Stephen Paget), will be found in The Faith and Works of Christian Science (1909).

CHRISTIANSUND (Kristiansund), a seaport on the west coast of Norway > in Romsdal ami (county), 259 m. N.E. by N. of Bergen, in the latitude of the Faeroe Islands. Pop. (1901) 11,982. It is built on four small islands, by which its harbour is enclosed. The chief exports are wood, cod, herrings and fish products, and butter to Great Britain. The town is served by the principal steamers between the south Norwegian ports, Hull, Hamburg, &c, and Trondhjem, and it is the chief port of the district of Nordmore. Local steamers serve the neighbouring fjords, including the Sundalsfjord, from which at Sundalsoren a driving road past the fine Dovrefjeld connects with the Gud- brandsdal route. Till 1742, when it received town privileges from Christian VI., Christiansund was called Lille-Fosen.

CHRISTIE, RICHARD COPLEY (1830-1901), English scholar and bibliophile, was born on the 22nd of July 1830 at Lenton in Nottinghamshire, the son of a miilowner. He was educated at Lincoln College, Oxford, and was called to the bar at Lincoln's Inn in 1857, and in 1872 became chancellor of the diocese of Manchester. This he resigned in 1893. He held numerous appointments, notably the professorships of history (from 1854 to 1856) and of political economy (from 1855 to 1866) at Owens College, Manchester. He always took an active interest in this college, of which he was one of the governors; in 1893 ne gave the Christie library building designed by Alfred Waterhouse, and in 1 897 he devoted £50,000 of the funds at his disposal as a trustee of Sir Joseph Whitworth's estate for the building of Whitworth Hall, which completed the front quadrangle of the college. He was an enthusiastic book collector, and bequeathed to Owens College his library of about 75,000 volumes, rich in a very complete set of the books printed by Dolet, a wonderful series of Aldines, and of volumes printed by Sebastian Gryphius. His £tienne Dolet, the Martyr of the Renaissance (1880), is the most exhaustive work on the subject. He died at Ribsden on the 9th of January 1901.

CHRISTINA (1626-1689), queen of Sweden, daughter of Gustavus Adolphus and Maria Eleonora of Brandenburg, was born at Stockholm on the 8th of December 1626. Her father died when she was only six years old. She was educated, principally, by the learned Johannes Matthiae, in as masculine a way as possible, while the great Oxenstjerna himself instructed her in politics. Christina assumed the sceptre in her eighteenth year (Dec. 8, 1644). From the moment when she took her seat at the head of the council board she impressed her veteran counsellors with the conviction of her superior genius. Axel Oxenstjerna himself said of her, when she was only fifteen: " Her majesty is not like women-folk, but is stout-hearted and of a good understanding, so that, if she be not corrupted, we have

good hopes of her." Unfortunately her brilliant and commanding qualities were vitiated by an inordinate pride and egoism, which exhibited themselves in an utter contempt for public opinion, and a prodigality utterly regardless of the necessities of the state. She seemed to consider Swedish affairs as far too petty to occupy her full attention; while her unworthy treatment of the great chancellor was mainly due to her jealousy of his extra- ordinary reputation and to the uneasy conviction that, so long as he was alive, his influence must at

least be equal to her own. Recognizing that he would be indispensable so long as the Thirty Years' War lasted, she used every effort to bring it to an end; and her impulsive interference seriously hampered the diplomacy of the chancellor, and materially reduced the ultimate gains of Sweden. The general peace congress was not opened till April 1645. The Swedish plenipotentiaries were Johan Oxenstjerna; the chancellor's son, and Adler Salvius. From the first the relations between them were strained. Young Oxenstjerna, haughty and violent, claimed, by right of birth and rank, to be caput legationis. The chancellor, at home, took his son's part, while Salvius was warmly supportediiy Christina, who privately assured him of her exclusive favour and encouraged him to hold his own. So acute did the quarrel become that there was a violent scene in full senate between the queen and the chancellor; and she urged Salvius to accelerate the negotiations, against the better judgment of the chancellor, who hoped to get more by holding out longer.

The longer Christina ruled, the more anxious for the future fate of her empire grew the men who had helped to build it up. Yet she gave fresh privileges to the towns: she encouraged trade and manufactures, especially the mining industries of the Dales; in 1649 she issued the first school ordinance for the whole kingdom; she encouraged foreign scholars to settle in Sweden; and native science and literature, under her liberal encouragement, flourished as they had never flourished before. In one respect, too, she showed herself wiser than her wisest counsellors. The senate and the estates, naturally anxious about the succession to the throne, had repeatedly urged her majesty to marry, and had indicated her cousin, Charles Gustavus, as her most befitting consort. Wearied of their importunities, yet revolting at the idea of submission to any member of the opposite ser, Christina settled the difficulty by appointing Charles her successor, and at the Riksdag of 1650 the Swedish crown was declared hereditary in Charles and his heirs male. In the summer of 1651 Christina was, with difficulty, persuaded to reconsider her resolution to abdicate, but three years later the nation had become convinced that her abdication was highly desirable, and the solemn act took place on – the 6th of July 1654 at the castle of Upsala, in the presence of the estates and the great dignitaries of the realm. Many were the causes which predisposed her to what was, after all, anything but an act of self-renunciation. First of all she could not fail to remark the increasing discontent with her arbitrary and wasteful ways. Within ten years she had created 17 counts, 46 barons and 428 lesser nobles; and, to provide these new peers with adequate appanages, she had sold or mortgaged crown property representing an annual income of 1,200,000 rix-dollars.

Signs are also not wanting that Christina was growing weary of the cares of government; while the importunity of the senate and Riksdag on the question of her marriage was a constant source of irritation. In retirement she could devote herself wholly to art and science, and the opportunity of astonishing the world b)' the unique spectacle of a great queen, in the prime of life, voluntarily resigning her crown, strongly appealed to her vivid imagination. Anyhow, it is certain that, towards the end of her reign, she behaved as if she were determined to do everything in her power to make herself as little missed as possible. From 1651 there was a notable change in her behaviour. She cast away every regard for the feelings and prejudices of her people. She ostentatiously exhibited her contempt for the Protestant religion. Her foreign policy was flighty to the verge of foolishness. She contemplated an alliance with Spain, a state quite outside the orbit of Sweden's influence, the firstfruits of which were to have been an invasion of Portugal. She utterly neglected affairs in order to plunge into a

whirl of dissipation with her foreign favourites. The situation be- came impossible, and it was with an intense feeling of relief that the Swedes saw her depart, in masculine attire, under the name of Count Dohna. At Innsbruck she openly joined the Catholic Church, and was rechristened Alexandra. In 1656, and again in 1657, she visited France, on the second occasion ordering the assassination of her major-domo Monaldischi, a crime still unex- plained. Twice she returned to Sweden (1660 and 1667) in the vain hope of recovering the succession, finally settling in Rome, where she died on the 19th of April 1689, poor, neglected and forgotten. See Francis William Bain, Queen Christina of Sweden (London, 1890); Robert Nisbet Bain, Scandinavia (Cambridge, 1905); Christina de Suede et le Cardinal Azzolino (Paris, 1899); Claretta Gaudenzio, La Regina Christina de Suezia in Italia (Turin, 1892); Hans Emil Friis, Dronning Christina (Copenhagen, 1896) ; C. N. D. Bildt; Christina de Suede et le conclave de Clement X (Paris, 1906) ; Drottning Kristinas sista dagar (Stockholm, 1897) ; and J. A. Taylor, Christina cf Sweden (1909). (R. N. B.)

CHRISTINA [Maria Christina Henrietta Desiree Felicite Reniere], for some years queen-regent of Spain (1858-), widow of Alphonso XII. and mother of Alphonso XIII. , was born at Gross Seelowitz, in Austria, on the 21st of July 1858, being the daughter of the archduke Charles Ferdinand and the archduchess Elizabeth of Austria. She was brought up by her mother as a rigid Catholic, and great care was taken with her education. At eighteen she was appointed by the emperor Francis Joseph, abbess of the House of Noble Ladies of Saint Theresa in

Prague, where she made herself very popular and distinguished herself by her intellectual parts. It is said that at the court of Vienna the archduchess saw the young prince Alphonso of Spain when he was only a pretender in exile, before the restoration of the Bourbons. A few years later, when Alphonso XII. had lost his first wife and cousin, Queen Mercedes, daughter of the due de Montpensier, his ministers, especially Sefior Canovas, urged him to marry again. He told them that if he did so it would only be with the young Austrian archduchess Maria Christina. After some negotiations between the two courts and governments it was agreed that the archduchess Elizabeth and her daughter should meet Alphonso XII. at Arcachon, in the south of France, where a few days' personal acquaintance was sufficient to make both come to a decision. The duke of Bailen went officially to Vienna to get the emperor of Austria's authorization, and on the 14th of November 1879, in the throne-room of the Imperial palace, the archduchess solemnly abdicated all her rights of succession in Austria, in accordance with the law obliging all princesses of the imperial house to do so when they wed a foreign prince. On the 17th of November the archduchess and her mother, with a numerous suite, started for Spain, arriving at the royal castle of El Pafdo, near Madrid, on the 24th of November. The wedding took place in the Atocha cathedral, on the 29th of November, in great state, and was followed by splendid festivities. Queen Christina bore her husband two daughters before he died in 1885 — Dona Mercedes, born on the nth of September 1880, and Dona Maria Theresa, born on the 12th of November 1882. During her husband's lifetime the young queen kept studiously apart from politics, so much so that her inexperience caused much anxiety in November 1885, when she was called upon to take the arduous duties of regent. During the long minority of the posthumous son of Alphonso XII., afterwards King Alphonso XIII. , the Austrian queen-regent acted in a way that obliged even the adversaries of the throne and the dynasty to respect the mother and the woman. The people of Spain, and the ever-restless civil and military politicians, found that the gloved hand of their constitutional ruler was that of a strong-minded and tenacious regent, who often asserted herself in a way that surprised them much, but always, somehow, enforced obedience and respect. More could not be expected by a foreign ruler from a nation little prone to waste attachment or demonstrative loyalty upon any- body not Castilian born and bred.

CHRISTISON, SIR ROBERT, Bart. (1797-1882), Scottish toxicologist and physician, was born in Edinburgh on the 18th of July 1797. After graduating at the university of that city in 1819, he spent a short time

in London, studying under John

Abernethy and Sir William Lawrence, and in Paris, where he learnt analytical chemistry from P. J. Robiquet and toxicology from M. J. B. Orfila. In 1822 he returned to Edinburgh as professor of medical jurisprudence, and set to work to organize the study of his subject on a sound basis. On poisons in parti- cular he speedily became a high authority; his well-known treatise on them was published in 1829, and in the course of his inquiries he did not hesitate to try such daring experiments on himself as taking large doses of Calabar bean. His attainments in medical jurisprudence and toxicology procured him the appointment, in 1829, of medical officer to the crown in Scotland, and from that time till 1866 he was called as a witness in many celebrated criminal cases. In 1832 he gave up the chair of medical jurisprudence and accepted that of medicine and therapeutics, which he held till 1877; at the same time he became professor of clinical medicine, and continued in that capacity till 1855. His fame as a toxicclogist and medical jurist, together with his work on the pathology of the kidneys and on fevers, secured him a large private practice, and he succeeded to a fair share of the honours that commonly attend the successful physician, being appointed physician to Queen Victoria in 1848 and receiving a baronetcy in 187 1. Among the books which he published were a treatise on Granular Degeneration of the Kidneys (1839), and a Commentary on the Pharmacopoeias of Great Britain (1842). Sir Robert Christison, who retained remarkable physical vigour and activity down to extreme old age, died at Edinburgh on the 23rd of January 1882. See the Life by his sons (1885-1886).

CHRISTMAS (i.e. the Mass of Christ), in the Christian Church, the festival of the nativity of Jesus Christ. The history of this feast coheres so closely with that of Epiphany (q.v.), that what follows must be read in connexion with the article under that heading.

The earliest body of gospel tradition, represented by Mark no less than by the primitive non-Marcan document embodied in the first and third gospels, begins,not with the birth and childhood of Jesus, but with his baptism; and this order of accretion of gospel matter is faithfully reflected in the time order of the inventionof feasts. The great church adopted Christmas much later than Epiphany; and before the 5th century there was no general consensus of opinion as to when it should come in the calendar, whether on the 6th of January, or the 25

th of March, or the 25th of December.

The earliest identification of the 25th of December with the birthday of Christ is in a passage, otherwise unknown and probably spurious, of Theophilus of Antioch (a.d. 171-183), preserved in Latin by the Magdeburg centuriators (i. 3, 118), to the effect that the Gauls contended that as they celebrated the birth of the Lord on the 25th of December, whatever day of the week it might be, so they ought to celebrate the Pascha on the 25th of March when the resurrection befell.

The next mention of the 25th of December is in Hippolytus' (c. 202) commentary on Daniel iv. 23. Jesus, he says, was born at Bethlehem on the 25th of December, a Wednesday, in the forty- second year of Augustus. This passage also is almost certainly interpolated. In any case he mentions no feast, nor was such a feast congruous with the orthodox ideas of that age. As late as 245 Origen, in his eighth homily on Leviticus, repudiates as sinful the very idea of keeping the birthday of Christ " as if he were a king Pharaoh." The first certain mention of Dec. 25 is in a Latin chronographer of a.d. 354, first published entire by Mommsen. 1 It runs thus in English: " Year 1 after Christ, in the consulate of Caesar and Paulus, the Lord Jesus Christ was born on the 25th of December, a Friday and 15th day of the new moon." Here again no festal celebration of the day is attested.

There were, however, many speculations in the 2nd century about the date of Christ's birth. Clement of Alexandria, towards its close, mentions several such, and condemns them as super- stitions. Some chronologists, he says, alleged the birth to have

1 In the Abhandlungen der sdchsischen Akademie der Wissen- schaften (1850). Note that in a.d. i, Dec. 25 was a Sunday and not a Friday.

occurred in the twenty-eighth year of Augustus, on the 25th of Pachon, the Egyptian month, i.e. the 20th of May. These were probably the Basilidian gnostics. Others set it on the 24th or 25th of Pharmuthi, i.e. the 19th or 20th of April. Clement himself sets it on the 17th of November, 3 B.C. The author of a Latin tract, called the De Pascha computus, written in Africa in 243, sets it by private revelation, ab ipso deo inspirali, on the 28th of March. He argues that the world was created perfect, flowers in bloom, and trees in leaf, therefore in spring; also at the equinox, and when the moon just created was full. Now the moon and sun were created on a Wednesday. The 28th of March suits all these considerations. Christ,

therefore, being the Sun of Righteousness, was born on the 28th of March. The same symbolical reasoning led Polycarp 2 (before 160) to set his birth on Sunday, when the world's creation began, but his baptism on Wednesday, for it was the analogue of the sun's creation. On such grounds certain Latins as early as 354 may have transferred the human birthday from the 6th of January to the 25th of December, which was then a Mithraic feast and is by the chrono- grapher above referred to, but in another part of his compilation, termed Natalis imiicli solis, or birthday of the uriconquered Sun. Cyprian (de orat. dom. 3 5) calls Christ Sol verus, Ambrose Sol novus nosier (Sermo vii. 13), and such rhetoric was widespread. The Syrians and Armenians, who clung to the 6th of January, accused the Romans of sun-worship and idolatry, contending with great probability that the feast of the 25th of December had been invented by disciples of Cerinthus and its lections by Artemon to commemorate the natural birth of Jesus. Chrysostom also testifies the 25th of December to have been from the begin- ning known in the West, from Thrace even as far as Gades. Ambrose, On Virgins, iii. ch. 1, writing to his sister, implies that as late as the papacy of Liberius 352-356, the Birth from the Virgin was feasted together with the Marriage of Can a and the Banquet of the 4000 (Luke ix. 13), which were never feasted on any other day but Jan. 6.

Chrysostom, in a sermon preached at Antioch on Dec. 20, 386 or 388, says that some held the feast of Dec. 25 to have been held in the West, from- Thrace as far as Cadiz, from the beginning. It certainly originated in the West, but spread quickly eastwards. In 353-361 it was observed at the court of Constantius. Basil of Caesarea (died 379) adopted it. Honorius, emperor (395-423) in the West, informed his mother and brother Arcadius (395-408) in Byzantium of how the new feast was kept in Rome, separate from the 6th of January, with its own troparia and sticharia. They adopted it, and recommended it to Chrysostom, who had long been in favour of it. Epiphanius of Crete was won over to it, as were also the other three patriarchs, Theophilus of Alexandria, John of Jerusalem, Flavian of Antioch. This was under Pope Anastasius, 398-400. John or Wahan of Nice, in a letter printed by Combefisinhis Historiamonoikelitarum, affords the above details. The new feast was communicated by Proclus, patriarch of Constantinople (434-446), to Sahak, Catholicos of Armenia, about 440. The letter was betrayed to the Persian king, who accused Sahak of Greek intrigues, and deposed him. However, the Armenians, at least those within the Byzantine pale, adopted it for about thirty years, but finally abandoned it together with the decrees of Chalcedon early in the 8th century. Many writers of the period 3 75-450, e.g. Epiphanius,

Cassian, Asterius, Basil, Chrysostom and Jerome, contrast the new feast with that of the Baptism as that of the birth after the flesh, from which we infer that the latter was generally regarded as a birth according to the Spirit. Instructive as showing that the new feast travelled from West eastwards is the fact (noticed by Usener) that in 387 the new feast was reckoned according to the Julian calendar by writers of the province of Asia, who in referring to other feasts use the reckoning of their local calendars. As early as 400 in Rome an imperial rescript includes Christmas among the three feasts (the others are Easter and Epiphany) on which theatres must be closed. Epiphany and Christmas were not made judicial non dies until 534.

2 In a fragment preserved by an Armenian writer, Ananias of Shirak.

For some years in the West (as late as 353 in Rome) the birth feast was appended to the baptismal feast on the 6th of January, and in Jerusalem it altogether supplanted it from about 360 to 440, when Bishop Juvenal introduced the feast of the 25th of December. The new feast was about the same time (440) finally established in Alexandria. The quadragesima of Epiphany (i.e. the feast of the presentation in the Temple, or hupapante) con- tinued to be celebrated in Jerusalem on the 14th of February, forty days after the 6th of January, until the reign of Justinian. In most other places it had long before been put back to the 2nd of February to suit the new Christmas. Armenian historians describe the riots, and display of armed force, without which Justinian was not able in Jerusalem to transfer this feast from the 14th to the 2nd of February.

The grounds on which the Church introduced so late as 350-440 a Christmas feast till then unknown, or, if known, precariously linked with the baptism, seem in the main to have been the following. (1) The transition from adult to infant baptism was proceeding rapidly in the East, and in the West was well-nigh completed. Its natural complement was a festal recognition of the fact that the divine element was present in Christ from the first, and was no new stage of spiritual promotion coeval only with the descent of the Spirit upon him at baptism. The general adoption of child baptism helped to extinguish the old view that the divine life in Jesus dated from his baptism, a view which led the Epiphany feast to be regarded as that of Jesus' spiritual rebirth. This aspect of the feast was therefore forgotten, and its importance in every way diminished by the new and

rival feast of Christmas. (2) The 4th century witnessed a rapid diffusion of Marcionite, or, as it was now called, Manichaean propaganda, the chief tenet of which was that Jesus either was not born at all, was a mere phantasm, or anyhow did not take flesh of the Virgin Mary. Against this view the new Christmas was a protest, since it was peculiarly the feast of his birth in the flesh, or as a man, and is constantly spoken of as such by the fathers who witnessed its institution.

In Britain the 25th of December was a festival long before the conversion to Christianity, for Bede (De temp. rat. ch. 13) relates that " the ancient peoples of the Angli began the year on the 25th of December when we now celebrate the birthday of the Lord; and the very night which is now so holy to us, they called in their tongue modranecht (mddra niht), that is, the mothers' night, by reason we suspect of the ceremonies which in that night-long vigil they performed." With his usual reticence about matters pagan or not orthodox, Bede abstains from recording who the mothers were and what the ceremonies. In 1644 the English puritans forbad any merriment or religious services by act of Parliament, on the ground that it was a heathen festival, and ordered it to be kept as a fast. Charles II. revived the feast, but the Scots adhered to the Puritan view.

Outside Teutonic countries Christmas presents are unknown. Their place is taken in Latin countries by the strenae, French Urennes, given on the 1st of January; this was in antiquity a great holiday, wherefore until late in the 4th century the Christians kept it as a day of fasting and gloom. The setting up in Latin churches of a Christmas creche is said to have been originated by St Francis.

Authorities. — K. A. H. Kellner, Heortologie (Freiburg im Br., 1906), with Bibliography; Hospinianus, De festis Christianorum (Genevae, 1574) ; Edw. Martene, De Antiquis Ecclesiae Ritibus, iii. 31 (Bassani, 1788); J. C. W. Augusti, Christl. Archaologie, vols. i. and v. (Leipzig, 1817-1831); A. J. Binterim, Denkwiirdigkeiten, v. pt. i. p. 528 (Mainz, 1825, &c.) ; Ernst Friedrich Wernsdorf, De originibus Solemnium Natalis Christi (Wittenberg, 1757, and in J. E. Volbeding, Thesaurus Commentationum, Lipsiae, 1847) ; Anton. Bynaeus, De Natali Jesu Christi (Amsterdam, 1689) ; Hermann Usener, Religionsgeschichtliche Untersuchungen (Bonn, 1889); Nik. Nilles, S.J., Kalendarium Manuale (Innsbruck, 1896); L. Duchesne, Origines du culte Chretien (30 ed., Paris, 1889). (F. C. C.)

CHRISTMAS ISLAND, a British possession under the govern- ment of the Straits Settlements, situated in the eastern part of the Indian

Ocean (in io° 25′ S., 105° 42′ E.), about 190 m. S. of Java. The island is a quadrilateral with hollowed sides, about 12 m. in greatest length and 9 in extreme breadth. It

i& probably the only tropical island that had never been inhabited by man before the European settlement. When the first settlers arrived, in 1897, it was covered with a dense forest of great trees and luxuriant under-shrubbery. The settlement in Flying Fish Cove now numbers some 250 inhabitants, consisting of Europeans, Sikhs, Malays and Chinese, by whom roads have been cut and patches of cleared ground cultivated.

The island is the flat summit of a submarine mountain more than 15,000 ft. high, the depth of the platform from which it rises being about 14,000 ft., and its height above the sea being upwards of 1000 ft. The submarine slopes are steep, and within 20 m. of the shore the depth of the sea reaches 2400 fathoms. It consists of a central plateau descending to the water in three terraces, each with its ” tread ” and ” rise.” The shore terrace descends by a steep cliff to the sea, forming the ” rise ” of a submarine ” tread ” in the form of fringing reef which surrounds the island and is never uncovered, even at low water, except in Flying Fish Cove, where the only landing-place exists. The central plateau is a plain whose surface presents “‘rounded, flat-topped hills and low ridges and reefs of limestone,” with narrow intervening valleys. On its northern aspect this plateau has a raised rim having all the appearances of being once the margin of an atoll. On these rounded hills occurs the deposit of phosphate of lime which gives the island its commercial value. The phosphatic deposit has doubtless been produced by the long-continued action of a thick bed of sea-fowl dung, which converted the carbonate of the underlying limestone into phosphate. The flat summit is formed by a succession of lime- stones — all deposited in shallow water — from the Eocene (or Oligocene) up to recent deposits in the above-mentioned atoll with islands on its reef. The geological sequence of events appears to have been the following: — After the deposition of the Eocene (or Oligocene) limestone — which reposes upon a floor of basalts and trachytes — basalts and basic tuffs were ejected, over which, during a period of very slow depression, orbitoidal limestones of Miocene age — which seem to make up the great mass of the island — were deposited; then elapsed a long period of rest, during which the atoll condition existed and the guano deposit was formed; from then down to the present time there has succeeded a series of sea-level subsidences, resulting in the formation of the terraces and the accummulation of the detritus now seen on the first inland cliff, the old submarine slope of the island. The occurrence of such a series of

Tertiary deposits appears to be unknown elsewhere. The whole series was evi- dently deposited in shallow water on the summit of a submarine volcano standing in its present isolation, and round which the ocean floor has probably altered but a few hundred feet since the Eocene age. Thus although the rocks of the southern coast of Java in their general character and succession resemble those of Christmas Island, there lies between them an abysmal trough 18,000 ft. in depth, which renders it scarcely possible that they were deposited in a continuous area, for such an enormous depression of the sea-floor could hardly have occurred since Miocene times without involving also Christmas Island. One of the main purposes of the exploration was to obtain light on the question of the foundation of atolls.

The flora consists of 129 species of angiosperms, 1 Cycas, 22 ferns, and a few mosses, lichens and fungi, 17 of which are endemic, while a considerable number — not specifically distinct — form local varieties nearly all presenting Indo-Malayan affinities, as do the single Cycas, the ferns and the cryptogams. As to its fauna, the island contains 319 species of animals — 54 only being vertebrates — 145 of which are endemic. A very remarkable distributional fact in regard to them, and one not yet fully explained, is that a large number show affinity with species in the Austro-Malayan rather than in the Indo-Malayan, their nearer, region. The ocean currents, the trade-winds blowing from the Australian mainland, and north-westerly storms from the Malayan islands, are no doubt responsible for the introduction of many, but not all, of these Malayan and Austral- asian species. The climate is healthy, the temperature varying from 75 to 84 F. The prevailing wind is the S.E. trade, which

blows the greater part of the year. The rainfall in the wet season is heavy, but not excessive, and during the dry season the ground ‘. is refreshed with occasional showers and heavy dews. Malarial fever is not prevalent, and it is interesting to note that there are no swamps or standing waters on the island.

It is not known when and by whom the island was discovered, but under the name of Moni it appears on a Dutch chart of 1666. It was first visited in 1688 by Dampier, who found it uninhabited. In 1886 Captain Maclear of H.M.S. ” Flying Fish,” having discovered an anchorage in a bay which he named Flying Fish Cove, landed a party and made a. small but interesting collection of the flora and fauna. In

the following year Captain Aldrich on H.M.S. ” Egeria ” visited it, accompanied by Mr J. J. Lister, F.R.S., who formed a larger biological and mineralogical collec- tion. Among the rocks then obtained and submitted to Sir John Murray for examination there were detected specimens of nearly pure phosphate of lime, a discovery which eventually led, in June 1888, to the annexation of the island to the British crown. Soon afterwards a small settlement was established in Flying Fish Cove by Mr G. Clunies Ross, the owner of the Keeling Islands, which lie about 750 m. to the westward. In 1891 Mr Ross and Sir John Murray were granted a lease, but on the further discovery of phosphatic deposits they disposed of their rights in 1897 to a company. In the same year a thorough scientific exploration was made, at the cost of Sir John Murray, by Mr C. W. Andrews, of the British Museum.

See C. W. Andrews, A Monograph of Christmas Island (Indian Ocean), (London, 1900).

CHRISTODORUS, of Coptos in Egypt, epic poet, flourished during the reign of Anastasius I. (a.d. 491-518). According to Suidas, he was the author of UarpLa, accounts of the founda- tion of various cities; AvSmko., the mythical history of Lydia; ‘lvavpuca, the conquest of Isauria by Anastasius; three books of epigrams; and many other works. In addition to two epigrams (Anthol. Pal. vii. 697,698) we possess a description of eighty statues of gods, heroes and famous men and women in the gymnasium of Zeuxippus at Constantinople. This inQpaots, consisting of 416 hexameters, forms the second book of the Palatine Anthology. The writer’s chief models are Homer and Nonnus, whom he follows closely in the structure of his hexameters. Opinions are divided as to the merits of the work. Some critics regard it as of great importance for the history of art and a model of description; others consider it valueless, alike from the historical, mythological and archaeo- logical points of view.

See F. Baumgarten, De Christodoro po’eta Thebano (1881), and his article in Pauly-Wissowa’s Realencyclopadie, iii. 2 (1899); W. Christ, Geschichte der griechischen Litter atur (1898).

CHRISTOPHER, SAINT {Christophorus, Christoferus), a saint honoured in the Roman Catholic (25th of July) and Orthodox Eastern (9th of May) Churches, the patron of ferrymen. Nothing that is authentic is known about him. He appears to have been originally a pagan and to have been born in Syria. He was baptized by Babylas, bishop of Antioch; preached with much success in Lycia; and was martyred about a.d. 250 during the persecution under the emperor

Decius. 1 Round this small nucleus of possibility, however, a vast mass of legendary matter gradually collected. All accounts agree that he was of great stature and singularly handsome, and that this helped him not a little in his evangelistic work. But according to a story reproduced in the New Uniat Anthology of Arcudius, and mentioned in Basil's Monologue, Christopher was originally a hideous man-eating ogre, with a dog's face, and only received his human semblance, with his Christian name, at baptism. Most of his astounding miracles are of the ordinary type. He thrusts his staff into the ground; whereupon it sprouts into a date palm, and thousands are converted. Courtesans sent to seduce him are turned by his mere aspect into Christians and martyrs. The Roman governor is confounded by his insensi-

1 Or Dagnus — perhaps to be identified with Maximinus Daza, joint emperor (with Galerius) in the East 305-311, and sole emperor 3"3i3

bility to the most refined and ingenious tortures. He is roasted over a slow fire and basted with boiling oil, but tells his tormentors that by the grace of Jesus Christ he feels nothing. When at last, in despair, they cut off his head, he had converted 48,000 people.

The more conspicuous of these legends are included in the Mozarabic Breviary and Missal, and are given in the thirty-third sermon of Peter Damien, but the best-known story is that which is given in the Golden Legend of Jacopus de Voragine. According to this, Christopher — or rather Reprobus, as he was then called— was a giant of vast stature who was in search of a man stronger than himself, whom he might serve. He left the service of the king of Canaan because the king feared the devil, and that of the devil because the devil feared the Cross. He was converted by a hermit; but as he bad neither the gift of fasting nor that of prayer, he decided to devote himself to a work of charity, and set himself to carry wayfarers over a bridgeless river. One day a little child asked to be taken across, and Christopher took him on his shoulder. When half way over the stream he staggered under what seemed to him a crushing weight, but he reached the other side and then upbraided the child for placing him in peril. " Had I borne the whole world on my back," he said, "it could not have weighed heavier than thou!" "Marvel not! " the child replied, " for thou hast borne upon thy back the world and him who created it! " It was this story that gave Christopher his immense popularity throughout Western Christendom.

See BoIIand. Acta Sand. vi. 146; Guenebault, Diet, icono- graphique des attributs des figures et des legendes des saints (Par t , 1850); Smith and Wace, Diet, of Christ. Biog. (London, 1877, &c, 4 vols.) ; A.

Sinemus, Die Legende vom h. Christophorus (Hauover, 1868) ; and other literature cited in Herzog-Hauck, Realencyk. iv. 60.

CHRISTOPHORUS, pope or anti-pope, elected in 903 against Leo V., whom he threw into prison. In January 904 he was treated in the same fashion by his competitor, Sergius III., who had him strangled.

CHRISTOPOULOS, ATHANASIOS (1772-1847), Greek poet, was born at Castoria in Macedonia. He studied at Buda and Padua, and became teacher of the children of the Vlach prince Mourousi. After the fall of that prince in 181 1, Christopoulos was employed by Prince Caradja, who had been appointed hospodar of Moldavia and Walachia, in drawing up a code of laws for that country. On the removal of Caradja, he retired into private life and devoted himself to literature. He wrote drinking songs and love ditties which are very popular among the Greeks. He is also the author of a tragedy, of Politika Parattela (a comparison of various systems of government), of translations of Homer and Herodotus, and of some philological works on the connexion between ancient and modern Greek.

His Hellenika Archaiologemata (Athens, 1853) contains an account of his life.

CHRIST'S HOSPITAL (the " Blue-coat School "), a famous English educational and charitable foundation. It was originally one of three royal hospitals in the city of London, founded by Edward VI., who is said to have been inspired by a sermon of Bishop Ridley on charity. Christ's hospital was specially devoted to fatherless and motherless children. The buildings of the monastery of Grey Friars, Newgate Street, were appro- priated to it; liberal public subscription added to the king's grant endowed it richly; and the mayor, commonalty and citizens of London were nominated its governors in its charter of 1553. At first Christ's hospital shared a common fund with the two other hospitals of thefoundation (Bridewell and St Thomas's), but the three soon became independent. Not long after its opening Christ's was providing home and education (or, in the case of the very young, nursing) for 400 children. The popular name of the Blue-coat school is derived from the dress of the boys — originally (almost from the time of the foundation) a blue gown, with knee-breeches, yellow petticoat and stockings, neck- bands and a blue cap. The petticoat and cap were given up in the middle of the 19th century, and thereafter no head-covering was worn. The buildings on the Newgate Street site underwent reconstruction from time to time, and in 1902 were vacated by

the school, which was moved to extensive new buildings at Horsham. The London buildings were subsequently taken down. The school at Horsham is conducted on the ordinary- lines of a public school, and can accommodate over 800 boys. It includes a preparatory school for boys, established in 1683 at Hertford, where the buildings have been greatly enlarged for the use of the girls' school on the same foundation. This was originally in Newgate Street, but was moved to Hertford in 1778. In the boys' school the two highest classes retain their ancient names of Grecians and Deputy Grecians. Children were formerly admitted to the schools only on presentation. Admission is now (1) by presentation of donation governors (i.e. the royal family, and contributors of £500 or more to the funds), of the council of almoners (which administers the endowments), or of certain of the city companies; (2) by competition, on the nomination of a donation governor (for boys only), or from public elementary schools in London, certain city parishes and certain endowed schools elsewhere. The main school is divided into two parts — the Latin school, corresponding to the classical side in other schools, and the mathematical school or modern side. Large pension charities are administered by the governing body, and part of the income of the hospital (about £60,000 annually) is devoted to apprenticing boys and girls, to leaving exhibitions from the school, &c.

CHRISTY, HENRY (1810-1865), English ethnologist, was born at Kingston-on-Thames en the 26th of July 1810. He entered his father's firm of hatters, in London, and later became a director of the London Joint-Stock Bank. In 1850 he started on a series of journeys, which interested him in ethnological studies. Encouraged by what he saw at the Great Exhibition of 1851, Christy devoted the rest of his life to perpetual travel and research, making extensive collections illustrating the early history of man, now in the British Museum. He travelled in Norway, Sweden, Denmark, Mexico, British Columbia and other countries; but in 1858 came the opportunity which brought him fame. It was in that year that the discoveries by Boucher de Perthes of flint-implements in France and England were first held to have clearly proved the great antiquity of man. Christy joined the Geological Society, and in company with his friend Edouard Lartet explored the caves in the valley of the Vez£re, a tributary of the Dordogne in the south of France. To his task Christy devoted money and time ungrudgingly, and an account of the explorations appeared in Comptes rendus (Feb. 29th, 1864) and Transactions of the

Ethnological Society of London (June 21st, 1864). He died, however, on the 4th of May 1865, of inflammation of the lungs supervening on a severe cold contracted during excavation work at La Palisse, leaving a half-finished book, entitled Reliquiae Aquitanicae, being contributions to the Archaeology and Palaeonto- logy of Perigord and the adjacent provinces of Southern France; this was issued in parts and completed at the expense of Christy's executors, first by Lartet and, after his death in 1870, by Pro- fessor Rupert Jones. By his will Christy bequeathed his magni- ficent archaeological collection to the nation. In 1884 it found a home in the British Museum. Christy took an earnest part in many philanthropic movements of his time, especially identifying himself with the efforts to relieve the sufferers from the Irish famine of 1847.

CHROMATIC (Gr. xP u H aTUi bs, coloured, from x/xo/itt, colour), a term meaning " coloured," chiefly used in science, particularly in the expression " chromatic aberration " or " dispersion " (see Aberration). In Greek music xpotyiaTuci) fu>vaud\ was one of three divisions — diatonic, chromatic and enharmonic — of the tetrachord. Like the Latin color, XP&M& was often used of ornaments and embellishments, and particularly of the modifica- tion of the three genera of the tetrachord. The chromatic, being subject to three such modifications, was regarded as particularly " coloured." To the Greeks chromatic music was sweet and plaintive. From a supposed resemblance to the notes of the chromatic tetrachord, the term is applied to a succession of notes outside the diatonic scale, and marked by accidentals. A " chromatic scale " is thus a series of semi-tones, and is commonly written with sharps in ascending and fiats descending. The most

correct method is to write such accidentals as do not involve a change of key.

CHROHITE, a member of the spinel group of minerals; an oxide of chromium and ferrous iron, FeCr 2 04. It is also known as chromic iron or as chrome-iron-ore, and is the chief commercial source of chromium and its compounds. It crystallizes in regular octahedra, but is usually found as grains or as granular to compact masses. In its iron-black colour with submetallic lustre and absence of cleavage it resembles magnetite (magnetic iron- ore) in appearance, but differs from this in being only slightly if at all magnetic and in the brown colour of its powder. The hardness is sJ; specific gravity 4-5. The theoretical formula FeCr-Ai corresponds with chromic oxide (Cr 2 3) 68%, and ferrous oxide 32%; the ferrous oxide is, however, usually partly replaced by magnesia, and the chromic oxide by alumina and ferric oxide, so that there may be a gradual passage to picotite or

chromespinel. Much of the material mined as ore does not contain more than 40 to 50% of chromic oxide. In the form of isolated grains the mineral is a characteristic constituent of ultrabasic igneous rocks, namely the peridotites and the serpentines which have resulted from their alteration. It is also found under similar conditions in meteoric stones and irons. Often these rocks enclose large segregated masses of granular chromite. The earliest worked deposits were those in the serpentine of the Bare Hills near Baltimore, Maryland, U.S.A.; it was also formerly extensively mined in Lancaster county, Pennsylvania, and is now mined in California, as well as in Turkey, the Urals, Dun Mountain near Nelson in New Zealand, and Unst in the Shetlands.

Chrome-iron-ore is largely used in the preparation of chromium compounds for use as pigments (chrome-yellow, &c.) and in calico-printing; it is also used in the manufacture of chrome- steel. (L. J. S.)

CHROMIUM (symbol Cr. atomic weight 52-1), one of the metallic chemical elements, the name being derived from the fine colour (Gr. xp&P°) of its compounds. It is a member of the sixth group in the periodic classification of the elements, being included in the natural family of elements containing molybdenum, tungsten and uranium. The element is not found in the free state in nature, nor to any large extent in combination, occurring chiefly as chrome-ironstone, Cr 2 3 - FeO, and occasionally being found as crocoisite, PbCr04, chrome-ochre, Cr 2 3 , and chrome- garnet, CaO-Cr 2 Cy 3Si0 2 , while it is also the cause of the colour in serpentine, chrome-mica and the emerald. It was first investi- gated in 1789 by L. N. Vauquelin and Macquart, and in 1797 by Vauquelin, who found that the lead in crocoisite was in combina- tion with an acid, which he recognized as the oxide of a new metal.

The metal can be obtained by various processes. Thus Sainte Claire Deville prepared it as a very hard substance of steel-grey colour, capable of taking a high polish, by strong ignition of chromic oxide and sugar charcoal in a lime crucible. F. Wohler reduced the sesquioxide by zinc, and obtained a shining green powder of specific gravity 6-8i, which tarnished in air and dissolved in hydrochloric acid and warm dilute sulphuric acid, but was unacted upon by concentrated nitric acid. H. Moissan {Comptes rendus, 1893, 116, p. 349; 1894, 119, p. 185) reduces the sesquioxide with carbon, in an electric furnace; the product so obtained (which contains carbon) is then strongly heated with lime, whereby most of the carbon is removed as calcium carbide, and the remainder by heating the purified product in a crucible lined with the double oxide of calcium and chromium. An easier process is that of H. Goldschmidt (Annalen,

1898, 301, p. 19) in which the oxide is reduced by metallic aluminium ; and if care is taken to have excess of the sesquioxide of chromium present, the metal is obtained quite free from aluminium. The metal as obtained in this process is lustrous and takes a polish, does not melt in the oxyhydrogen flame, but liquefies in the electric arc, and is not affected by air at ordinary temperatures. Chromium as prepared by the Goldschmidt process is in a passive condition as regards dilute sulphuric acid and dilute hydrochloric acid at ordinary temperatures; but by heating the metal with the acid it passes into the active condition, the same effect being produced by heating the inactive form with a solution of an alkaline halide.

W. Hittorf thinks that two allotropic forms of chromium exist (Zeit. fiir phys. Chem., 1898, 25, p. 729; 1899, 30, p. 481; 1900, 34, p. 385), namely active and inactive chromium; while W. Ostwald (ibid., 1900, 35, pp. 33, 204) has observed that on dissolving chromium in dilute acids, the rate of solution as measured by the evolution of gas is not continuous but periodic. It is largely made as ferro-chrome, an alloy containing about 60-70% of chromium, by reducing chromite in the electric furnace or by aluminium.

Chromium and its salts may be detected by the fact that they give a deep green bead when heated with borax, or that on fusion with sodium carbonate and nitre, a yellow mass of an alkaline chromate is obtained, which, on solution in water and acidification wi th acetic acid, gives a bright yellow precipitate on the addition of soluble lead salts. Sodium and potassium hydroxide solutions precipitate green chromium hydroxide from solutions of chromic salts; the precipitate is soluble in excess of the cold alkali, but is completely thrown down on boiling the solution. Chromic acid and its salts, the chromates and bichromates, can be detected by the violet coloration which they give on addition of hydrogen peroxide to their dilute acid solution, or by the fact that on distillation with concentrated sulphuric acid and an alkaline chloride, the red vapours of chromium oxychloride are produced. The yellow colour of normal chromates changes to red on the addition of an acid, but goes back again to yellow on making the solution alkaline. Normal chromates on the addition of silver nitrate give a red precipitate of silver chromate, easily soluble in ammonia, and with barium chloride a yellow precipitate of barium chromate, insoluble in acetic acid. Reducing agents, such as sulphurous acid and sulphuretted hydrogen, convert the chromates into chromic salts.

Chromium in the form of its salts may be estimated quantitatively by precipitation from boiling solutions with a slight excess of ammonia, and boiling until the free ammonia is nearly all expelled. The precipitate obtained is filtered, well washed with hot water, dried and then ignited until the weight is constant. In the form of a chromate, it may be determined by precipitation, in acetic acid solution, with lead acetate; the lead chromate precipitate collected on a tared filter paper, well washed, dried at 100° C. and weighed; or the chromate may be reduced by means of sulphur dioxide to the condition of a chromic salt, the excess of sulphur dioxide expelled by boiling, and the estimation carried out as above.

The atomic weight of chromium has been determined by S. G. Rawson, by the conversion of pure ammonium bichromate into the trioxide (Journal of Chem. Sec, 1899, 55, p. 2 13), the mean value obtained being 52-06; and also by C. Meinecke, who estimated the amount of silver, chromium and oxygen in silver chromate, the amount of oxygen in potassium bichromate, and the amount of oxygen and chromium in ammonium bichromate (Ann., 1891, 261, p. 339), the mean value obtained being 51-99.

Chromium forms three series of compounds, namely the chromous salts corresponding to CrO, chromous oxide, chromic salts, corresponding to Cr 2 O s , chromium sesquioxide, and the chromates corresponding to Cr0 3 , chromium trioxide or chromic anhydride. Chromium sesquioxide is a basic oxide, although like alumina it acts as an acid-forming oxide towards strong bases, forming salts called chromites. Various other oxides of chromium, intermediate in composition between the sesquioxide and trioxide, have been described, namely chromium dioxide, Cr 2 3 -CrO3, and. the oxide Cr0 3 -2Cr 2 3 .

Chromous oxide, CrO, is unknown in the free state, but in the hydrated condition as CrO-H 2 or Cr(OH) 2 it may be prepared by precipitating chromous chloride by a solution of potassium hydroxide in air-free water. The precipitate so obtained is a brown amorphous solid which readily oxidizes on exposure, and is decomposed by heat with liberation of hydrogen and formation of the sesquioxide. The sesquioxide, Cr 2 3 , occurs native, and can be artificially obtained in several different ways, e.g., by igniting the corresponding hydroxide, or chromium trioxide, or ammonium bichromate, or by passing the vapours of chromium oxychloride through a red-hot tube, or by ignition of mercurous chromate. In the amorphous state it is a dull green, almost infusible powder, but as obtained from chromium oxychloride it is deposited in the form of

dark green hexagonal crystals of specific gravity 5-2. After ignition it becomes almost insoluble in acids, and on fusion with silicates it colours them green; consequently it is used as a pigment for colouring glass

and china. By the fusion of potassium bichromate with boric acid, and extraction of the melt with water, a residue is left which pos- sesses a fine green colour, and is used as a pigment under the name of Guignet's green. _ In composition it approximates to Cr 2 O s H 2 0, but it always contains more or less boron trioxide. Several forms of hydrated chromium sesquioxide are known ; thus on precipitation of a chromic salt, free from alkali, by ammonia, a light blue precipitate is formed, which after drying over sulphuric acid, has the compo sition Cr 2 3 -7H 2 0, and this after being heated to 200 C. in a current of hydrogen leaves a residue of composition CrO-OH or Cr 2 3 H 8 which occurs naturally as chrome ochre. Other hydrated oxides such as Cr 2 3 ;2H 2 have also been described. Chromium trioxide, Cr0 3 , is obtained by adding concentrated sulphuric acid to a cold saturated solution of potassium bichromate, when it separates in long red needles; the mother liquor is drained off and the crystals are washed with concentrated nitric acid, the excess of which is removed by means of a current of dry air. It is readily soluble in water, melts at 193 C, and is decomposed at a higher temperature into chromium sesquioxide and oxygen; it is a very powerful oxid izing agent, acting violently on alcohol, converting it into acetalde- hyde, and in glacial acetic acid solution converting naphthalene and anthracene into the corresponding quinones. Heated with concen- trated hydrochloric acid it liberates chlorine, and with sulphuric acid it liberates oxygen. Gaseous ammonia passed over the oxide reduces it to the sesquioxide with formation of nitrogen and water. Dis- solved in hydrochloric acid at —20°, it yields with solutions of the alkaline chlorides compounds of the type MCl-CrOCl 3 , pointing to pentavalent chromium. For salts of this acid-forming oxide and for perchromic acid see Bichromates.

Thechromites maybe looked upon as salts of chromium sesquioxide with other basic oxides, the most important being chromite (q.v.).

Chromous chloride, CrCl 2 , is prepared by reducing chromic chloride in hydrogen; it forms white silky needles, which dissolve in water giving a deep blue solution, which rapidly absorbs oxygen, forming basic chromic salts, and acts as a very strong reducing agent. The bromide and iodide are formed in a similar manner by heating the metal in gaseous hydrobromic or hydriodic acids.

Chromous sulphate, CrS04-7H 2 0, isomorphous with ferrous sul-

phate, results on dissolving the metal in dilute sulphuric acid or, better, by dissolving chromous acetate in dilute sulphuric acid, when it separates in blue crystals on cooling the solution. On ‘ pouring a solution of chromous chloride into a saturated solution of sodium acetate, a red crystalline precipitate of chromous acetate is produced; this is much more permanent in air than the other chromous salts and consequently can be used for their preparation. Chromic salts are of a blue or violet colour, and apparently the chloride and bromide exist in a green and violet form.

Chromic chloride, $CrCl_3$, is obtained in the anhydrous form by igniting a mixture ol the sesquioxide and carbon in a current of dry chlorine; it forms violet laminae almost insoluble in water, but dissolves rapidly in presence of a trace of chromous chloride; this action has been regarded as a catalytic action, it being assumed that the insoluble chromic chloride is first reduced by the chromous chloride to the chromous condition and the original chromous chloride converted into soluble chromic chloride, the newly formed chromous chloride then reacting with the insoluble chromic chloride. Solutions of chromic chloride in presence of excess of acid are green in colour. According to A. Werner, four hydrated chromium chlorides exist, namely the green and violet salts, $CrCl_3 \cdot 6H_2O$, a hydrate, $CrCl_8 \cdot 10H_2O$ and one $CrCl_3 \cdot 4H_2O$. The violet form gives a purple solution, and all its chlorine is precipitated by silver nitrate, the aqueous solution containing four ions, probably $Cr(OH_2)_6$ and three chlorine ions. The green salt appears to dissociate in aqueous solution into two ions, namely $CrCl_2(OH_2)_4$ and one chlorine ion, since practically only one-third of the chlorine is precipitated by silver nitrate solution at 0° C. Two of the six water molecules are easily removed in a desiccator, and the salt formed, $CrCl_3 \cdot 4H_2O$, resembles the original salt in properties, only one-third of the chlorine being precipitated by silver nitrate. In accordance with his theory of the constitution of salts Werner formulates the hexa- hydrate as $CrCl_2 \cdot (OH_2)_4 \cdot Cl \cdot 2H_2O$.

Chromic bromide, $CrBr_3$, is prepared in the anhydrous form by the same method as the chloride, and resembles it in its properties. The iodide is unknown.

The fluoride, CrF_3, results on passing hydrofluoric acid over the heated chloride, and sublimes in needles. The hydrated fluoride, $CrF_3 \cdot 9H_2O$, obtained by adding ammonium fluoride to cold chromic sulphate solution, is sparingly soluble in water, and is decomposed by heat.

Oxyhalogen derivatives of chromium are known, the oxychloride, Cr0 2 Cl 2 , resulting on heating potassium bichromate and common salt with concentrated sulphuric acid. It distils over as a dark red liquid of boiling point 117 C, and is to be regarded as the acid chloride corresponding to chromic acid, Cr0 2 (OH) 2 . It dissolves iodine and absorbs chlorine, and is decomposed by water with for- mation of chromic and hydrochloric acids; it takes fire in contact with sulphur, ammonia, alcohol, &c, and explodes in contact with phosphorus; it also acts as a powerful oxidizing agent. Heated in a closed tube at 180° C- it loses chlorine and leaves a black residue of trichromyl chloride, Cr 3 0«Cl 2 , which deliquesces on exposure to air.

Analogous bromine and iodine compounds are unknown, since bromides and iodides on heating with potassium bichromate and concentrated sulphuric acid give free bromine or free iodine.

The oxyfluoride, CrOaF2, is obtained in a similar manner to the oxychloride by using fluorspar in place of common salt. It may be condensed to a dark red liquid which is decomposed by moist air into chromic acid and chromic fluoride.

The semi-acid chloride, Cr0 2 -Cl-OH, chlorochromic acid, is only known in the form of its salts, the chlorochromates.

Potassium chlorochromate, Cr0 2 -Cl-OK, is produced when potas- sium bichromate is heated with concentrated hydrochloric acid and a little water, or from chromium oxychloride and saturated potassium chloride solution, when it separates as a red crystalline salt. By suspending it in ether and passing ammonia, potassium amido- chromate, Cr0 2 -NH s OK, is obtained; on evaporating the ether solution, after it has stood for 24 hours, red prisms of the amido chromate separate; it is slowly decomposed by boiling water, and also by nitrous acid, with liberation of nitrogen.

Chromic sulphide, Cr 2 S 8 , results on heating chromium and sulphur or on strongly heating the trioxide in a current of sulphuretted hydrogen ; it forms a dark green crystalline powder, and on ignition gives the sesquioxide.

Chromic sulphate, Cr 2 (S0 4)s, is prepared by mixing the hydroxide with concentrated sulphuric acid and allowing the mixture to stand, a green solution is first formed which gradually changes to blue, and

deposits violet-blue crystals, which are purified by dissolving in water and then precipitating with alcohol. It is soluble in cold water, giving a violet solution,, which turns green on boiling. If the violet solution is allowed to evaporate slowly at ordinary tempera- tures the sulphate crystallizes out as CrˆSOja-lSHjO, but the green solution on evaporation leaves only an amorphous mass. Investi- gation has shown that the change is due to the splitting off of sul- phuric acid during the process, and that green-coloured chrom- sulphuric acids are formed thus —

$2Cr_2(SO_4)_s + H_2 = H_2SO_4 + [Cr_4O\text{-}(SO_4)_4]SO^*$ (violet) (green)

since, on adding barium chloride to the green solution, only one-third of the total sulphuric acid is precipitated as barium sulphate, whence it follows that only one- third of the original SO< ions are present in the green solution. The green salt in aqueous solution, on stand- ing, gradually passes back to the violet form. Several other com- plex chrom-sulphuric acids are known, e.g.

$[Cr_2(SO_4)_4]H_2$; $[Cr_2(SO_4)_6]H_4$; $[Cr_2(SO_4)_6]H$, (see A. Recoura, Annates de Chimie et de Physique, 1895 (7), 4, p. 505.)

Chromic sulphate combines with the sulphates of the alkali metals to form double sulphates, which correspond to the alums. Chrome alum, $K_2SO_4\text{-}Cr_2(SO_4)_a\text{-}24H_2O$, is best prepared by passing sulphur dioxide through a solution of potassium bichromate containing the calculated quantity of sulphuric acid,

$K_2Cr_2O_7 + 3SO_2 + H_2SO_4 = H_2O + K_2SO_4 + Cr_2(SO_4)$,. On evaporating the solution dark purple octahedra of the alum are obtained. It is easily soluble in warm water, the solution being of a dull blue tint, and is used in calico-printing, dyeing and tanning. Chromium ammonium sulphate, $(NH_4)_2SO_4\text{-}Cr_2(SO_4)_3\text{-}24H_2O$, results on mixing equivalent quantities of chromic sulphate and ammonium sulphate in aqueous solution and allowing the mixture to crystallize. It forms red octahedra and is less soluble in water than the corre- sponding potassium compound. The salt $CrClSO_4 8H_2$ has been described. By passing ammonia over heated chromic chloride, the nitride, CrN, is formed as a brownish powder. By the action of concentrated sulphuric acid it is transformed into chromium am monium sulphate.

Thenitrate, $Cr(NO_3)_3\text{-}9H_2O$, crystallizes in purple prisms and results on dissolving the hydroxide in nitric acid, its solution turns green on

boiling. A phosphide, PCr, is known ; it burns in oxygen forming the phosphate. By adding sodium phosphate to an excess of chrome alum the violet phosphate, CrP0 4 -6H 2 0, is precipitated ; on heating to ioo° C. it loses water and turns green. A green precipitate, perhaps CrP0 4 -3H 2 0, is obtained on adding an excess of sodium phosphate to chromic chloride solution.

Carbides of chromium are known ; when the metal is heated in an electric furnace with excess of carbon, crystalline, C 2 Crs, is formed; this scratches quartz and topaz, and the crystals are very resistant to the action of acids; CCr 4 has also been described (H. Moissan, Comples rendus, 1894, 1 19; p. 185).

Cyanogen compounds of chromium, analogous to those _ of iron, have been prepared; thus potassium chromocya-nide, K 4 Cr(CN) 6 -2H 2 0, is formed from potassium cyanide and chromous acetate ; on exposure to air it is converted into the chromicyanide, K 3 Cr(CN) 6 , which can also be prepared by adding chromic acetate solution to boiling potassium cyanidesolution. Chromic thiocyanate, Cr(SCN) 8 , an amorphous deliquescent mass, is formed by dissolving the hydroxide in thiocyanic acid and drying over sulphuric acid. The double thiocyanate, Cr(SCN) 3 -3KCNS-4HjO, is also known.

Chromium salts readily combine with ammonia to form complex salts in which the ammonia molecule is in direct combination with the chromium atom. In many of these salts one finds that the elements of water are frequently found in combination with the

metal, and further, that the ammonia molecule may be replaced by such other molecular groups as — N0 2 , &c. Of the types studied the following may be mentioned: the diammine chromium thio- cyanates, MfCr(NH 3) 2 -(SCN) 4], the chloraquotetrammine chromic salts, R 1 2 [Cr(NH3) 4 – H 2 0'Cl], the aquopentammine or roseo-chromium salts,R 1 3[Cr(NH3)5 , H20],thechlorpentammineorpurpureo-chromium salts, R 1 2 [Cr(NH 3)5-Cl], the nitrito pentammine or xanthochromium salts, R 1 2[N0 2 -(NH 3) 6 Cr], the luteo or hexammine chromium salts, R l s[(NH 3 VCr], and the rhodochromium salts: where R 1 = a mono valent acid radical and M = a monovalent basic radical. For the preparation and properties of these salts and a discussion on their constitution the papers of S. F. Jorgensen and of A. Werner in the Zeitschrift fur anorganische Ckemie from 1892 onwards should be consulted.

P. Pfeiffer (Berichte, 1904, 37, p. 4255) has shown that chromium salts of the type [CrjC2H 4 (NH 2) 2)2X 2)X exist in two stereo-

isomeric forms, namely, the cis- and trans- forms, the dithiocyan-diethylene- diamine-chromium salts being the trans- salts. Their configuration was determined by their relationship to their oxalo-derivatives ; the cis-dichloro chloride, [CrC 2 H 4 (NH2) 2 Cl 2]Cl-H 2 0, compound with

f>otassium oxalate gave a carmine red crystalline complex, salt, CrlC 2 H 4 (NH2)2iC 2 4][CrC 2 H 4 (NH 2) 2 -(C 2 O f) 2]HH 2 0, while from the trans-chloride a red complex salt is obtained containing the unaltered trans-dichloro group [CrC 2 H 4 (NH2)2-Cl2].

CHROMOSPHERE (from Gr. xpwM a > colour, and cfaipa, a sphere), in astronomy, the red-coloured envelope of the sun, outside of the photosphere. It can be seen with the eye at the beginning or ending of a total eclipse of the sun, and with a suitable spectroscope at any time under favourable conditions. (See Sun andEcirpsE.)

CHRONICLE (from Gr. xpbvos, time). The historical works written in the middle ages are variously designated by the terms “histories,” “annals,” or “chronicles”; it is difficult, however, to give an exact definition of each of these terms, since they do not correspond to determinate classes of writings. The definitions proposed by A. Giry (in La Grande Encyclopidie), by Ch. V. Langlois (in the Manuel de bibliographic historique), and by E. Bernheim (in the Lehrbuch der historischen Methode), are manifestly insufficient. Perhaps the most reasonable is that propounded by H. F. Delaborde at the ficole des Chartes, that chronicles are accounts of a universal character, while annals relate either to a locality, or to a religious community, or even to a whole people, but without attempting to treat of all periods or all peoples. The primitive type, he says, was furnished by Eusebius of Caesaxea, who wrote (c. 303) a chronicle in Greek, which was soon translated into Latin and frequently recopied throughout the middle ages; in the form of synoptic and synchronistic tables it embraced the history of the world, both Jewish and Christian, since the Creation. This ingenious opinion, however, is only partially exact, for it is certain that the medieval authors or scribes were not conscious of any well-marked distinc- tion between annals and chronicles ; indeed, they often apparently employed the terms indiscriminately.

Whether or not a distinction can be made, chronicles and annals (q.v.) have points of great similarity. Chronicles are accounts generally of an impersonal character, and often anony- mous, composed in varying proportions of passages reproduced textually from sources which the chronicler is seldom at pains to indicate, and of personal recollections the veracity of which remains to be determined. Some of them are

written with so little intelligence and spirit that one is led to regard the work of composition as a piece of drudgery imposed on the clergy and monks by their superiors. To distinguish what is original from what is borrowed, to separate fact from falsehood, and to estab- lish the value of each piece of evidence, are in such circumstances a difficult undertaking, and one which has exercised the sagacity of scholars, especially since the 17th century. The work, more- over, is immense, by reason of the enormous number of medieval chronicles, both Christian and Mahommedan.

The Christian chronicles were first written in the two learned languages, Greek and Latin. At an early stage we have proof of the employment of national languages, the most famous instances being found at the two extremities of Europe, the Anglo-Saxon Chronicle (q.v.), the most ancient form of which goes back to the 10th century, and the so-called Chronicle of Nestor, in Palaeo-Slavonic, written in the nth and 1 2th centuries.

In the 13th and 14th centuries the number of chronicles written in the vulgar tongue continued to increase, at least in continental Europe, which far outpaced England in this respect. From the 15th century, with the revived study of Greek and Roman literature, the traditional form of chronicles, as well as of annals, tended to disappear and to be replaced by another and more scientific form, based on the models of antiquity — that of the historical composition combining skilful arrangement with elegance of literary style. The transition, however, was very gradual, and it was not until the 17th century that the traditional form became practically extinct.

See E. Bernheim, Lehrbuch der historischen Methode (4th ed., 1903) ; H. Bloch, ” Geschichte der deutschen Geschichtsschreibung im Mittelalter ” in the Handbuch of G. von Below and F. Meinecke (Munich, 1903 seq.) ; Max Jansen, ” Historiographie und Quellen der deutschen Geschichte bis 1500,” in Alois Meister’s Grundris (Leipzig, 1906) ; and the Introduction (1904.) to A. Molinier’s Les Sources de I’histoire de France. (C. B.*)

CHRONICLES, BOOKS OF, two Old Testament books of the Bible. The name is derived from Chronicon, first suggested by Jerome as a rendering of the title which they bear in and dale, ˆhe Hebrew Canon, viz. Events of the Times. The full Hebrew title would be Book of

Events of the Times, and this again appears to have been a designation commonly applied to special histories in the more definite shape — Events of the Times of King David, or the like (1 Chron. xxvii. 24; Esth. x. 2, &c). The Greek translators divided the long book into two, and adopted the title Hapakenrofitva, Things omitted [scil. in the other historical books].

The book of Chronicles begins with Adam and ends abruptly in the middle of Cyrus's decree of restoration, which reappears complete at the beginning of Ezra. A closer examination of those parts of Ezra and Nehemiah which are not extracted from earlier documents or original memoirs leads to the conclusion that Chronicles-Ezra-N ehemiah was originally one work, displaying throughout the peculiarities of language and thought of a single editor, who, however, cannot be Ezra himself as tradition would have it. Thus the fragmentary close of 2 Chronicles marks the disruption of a previously-existing continuity, — due, presumably, to the fact that in the gradual compilation of the Canon the necessity for incorporating in the Holy Writings an account of the establishment of the post-Exile theocracy was felt, before it was thought desirable to supplement Samuel and Kings by adding a second history of the period before the Exile. Hence Chronicles is the last book of the Hebrew Bible, following the book of Ezra- Nehemiah, which properly is nothing else than the sequel of Chronicles.

Of the authorship of Chronicles we know only what can be determined by internal evidence. The style of the language, and also the position of the book in the Jewish Canon, stamp the book as one of the latest in the Old Testament, but lead to no exact determination of the date. 1 In 1 Chron. xxix. 7, which refers to the time of David, a sum of money is reckoned by darics, which certainly implies that the author wrote after this Persian coin had been long current in Judaea. In 1 Chron. iii. 19 sqq. the descendants of Zerubbabel seem to be reckoned to six generations (the Septuagint reads it so as to give as many as eleven genera- tions), and this agrees with the suggestion that Hattush (verse 22), who belongs to the fourth generation from Zerubbabel, was a contemporary of Ezra (Ezra viii. 2). Thus the compiler lived at least two generations after Ezra. With this it accords that in Nehemiah five generations of high priests are enumerated from Joshua (xii. 10 seq.), and that the last name is that of Jaddua, who, according to Josephus, was a contemporary of Alexander the Great (333 B.C.) . That the compiler wrote after the fall of the Persian monarchy has been argued by Ewald and others from the use of the title king of Persia (2 Chron. xxxvi. 23), and from the reference made in Neh. xii. 22 to Darius III. (336-332 B.C.). A date some time after 332 B.C. is now accepted by most modern critics. See further Ezra and

Nehemiah.

What seems to be certain and important for a right estimate of

1 See the lists in Driver, Lit. of Old Test. pp. 502 sqq. ; and the exhaustive summary by Fr. Brown in Hastings' Diet. Bible, i. 289 sqq.

the book is that the writer lived a considerable time after Ezra, and stood entirely under the influence of the religious institu- tions of the new theocracy. This standpoint determined the nature of his interest in the early history of his people. The true importance of Hebrew history had always /Jft* ctof centred in the fact that this petty nation was the people work. of Yahweh, the spiritual God. The tragic interest which distinguishes the annals of Israel from the forgotten history of Moab or Damascus lies wholly in that long contest which finally vindicated the reality of spiritual things and the supremacy of Yahweh's purpose, in the political ruin of the nation which was the faithless depository of these sacred truths. After the return from the Exile it was impossible to write the history of Israel's fortunes otherwise than in a spirit of religious pragmatism. But within the limits of the religious conception of the plan and purpose of the Hebrew history more than one point of view might be taken up. The book of Kings looks upon the history in the spirit of the prophets — in that spirit which is still echoed by Zech. i. 5 seq., but which had become extinct before the Chronicler wrote. The New Jerusalem of Ezra was organized as a municipality and a church, not as a nation. The centre of religious life was no longer the living prophetic word but the ordinances of the Pentateuch and the liturgical service of the sanctuary. The religious vocation of Israel was no longer national but ecclesiastical or municipal, and the historical continuity of the nation was vividly realized only within the walls of Jerusalem and the courts of the Temple, in the solemn assembly and stately ceremonial of a feast day. These influences naturally operated most strongly on those who were officially attached to the sanctuary. To a Levite, even more than to other Jews, the history of Israel meant above all things the history of Jerusalem, of the Temple, and of the Temple ordinances. Now the writer of Chronicles betrays on every page his essentially Levitical habit of mind. It even seems possible from a close attention to his descriptions of sacred ordinances to conclude that his special interests are those of a common Levite rather than of a priest, and that of all Levitical functions he is most partial to those of the singers, a member of whose guild he may have been. From the standpoint of the post-exilic age, the older delineation of the history of Israel, especially in the books of Samuel and Kings, could not but appear to be deficient in some directions, while in other respects its narrative seemed

superfluous or open to misunderstanding, as for example by recording, and that without condemnation, things inconsistent with the later, post-exilic law. The history of the ordinances of worship holds a very small place in the older record. Jerusalem and the Temple have not that central place in the book of Kings which they occupied in the minds of the Jewish community after the Exile. Large sections of the old history are devoted to the religion and politics of the ten tribes, which are altogether unintelligible and uninteresting when measured by a strictly Levitical standard; and in general the whole problems and struggles of the prophetic period turn on points which had ceased to be cardinal in the life of the New Jerusalem, which was no longer called to decide between the claims of the Word of Yahweh and the exigencies of political affairs and social customs, and which could not comprehend that men absorbed in deeper spiritual contests had no leisure for the niceties of Levitical legislation. Thus there seemed to be room for a new history, which should confine itself to matters still interesting to the theocracy of Zion, keeping Jerusalem and the Temple in the foreground, and developing the divine pragmatism of the history, not so much with reference to the prophetic word as to the fixed legislation of the Pentateuch, so that the whole narrative might be made to teach that the glory of Israel lies in the observance of the divine law and ritual.

For the sake of systematic completeness the book begins with Adam, as is the custom with later Oriental writers. But there was nothing to add to the Pentateuch, and the period ceateuts. from Moses to David contained little that served the purpose. The early history is therefore contracted into a series of tribal and priestly genealogies, which were doubtless by no means the least interesting part of the work at a time when every

Sources.

Israelite was concerned to prove the purity of his Hebrew descent (cp. Ezra ii. 59, 62). Commencing abruptly (after some Benjamite genealogies) with the death of Saul, the history becomes fuller and runs parallel with the books of Samuel and Kings. The limitations of the compiler’s interest in past times appear in the omission, among other particulars, of David’s reign in Hebron, of the disorders in his family and the revolt of Absalom, of the circumstances of Solomon’s accession, and of many details as to the wisdom and splendour of that

sovereign, as well as of his fall into idolatry. In the later history the ten tribes are quite neglected (" Yahweh is not with Israel," 2 Chron. xxv. 7), and political affairs in Judah receive attention, not in proportion to their intrinsic importance, but according as they serve to exemplify God's help to the obedient and His chastisement of the rebellious. That the compiler is always unwilling to speak of the misfortunes of good rulers is not necessarily to be ascribed to a deliberate suppression of truth, but shows that the book was throughout composed not in purely historical interests, but with a view to inculcating a single practical lesson. The more important additions to the older narrative consist partly of statistical lists (1 Chron. xii.), partly of full details on points connected with the history of the sanctuary and the great feasts or the archaeology of the Levitical ministry (1 Chron. xiii., xv., xvi., xxii.-xxix.; 2 Chron. xxix.-xxxi., &c), and partly of narratives of victories and defeats, of sins and punishments, of obedience and its reward, which could be made to point a plain religious lesson in favour of faithful observance of the law (2 Chron. xiii., xiv. 9 sqq. ; xx., xxi. 11 sqq., &c). The minor variations of Chronicles from the books of Samuel and Kings are analogous in principle to the larger additions and omissions, so that the whole work has a consistent and well-marked character, presenting the history in quite a different perspective from that of the old narrative.

The chronicler makes frequent reference to earlier histories which he cites by a great variety of names. That the names " Book of the Kings of Israel and Judah," " Book of the Kings of Judah and Israel," " Book of the Kings of Israel," and " Affairs of the Kings of Israel " (2 Chron. xxxiii. 18), refer to a single work is not disputed. Under one or other title this book is cited some ten times. Whether it is identical with the Midrash 1 of the book of Kings (2 Chron. xxiv. 27) is not certain. That the work so often cited is not the Biblical book of the same name is manifest from what is said of its contents. It must have been quite an extensive work, for among other things it contained genealogical statistics (1 Chron. ix. 1), and it in- corporated certain older prophetic writings — in particular, the debdrlm (" words " or " history ") of Jehu the son of Hanani (2 Chron. xx. 34) and possibly the vision of Isaiah (2 Chron. xxxii. 32). Where the chronicler does not cite this compre- hensive work at the close of a king's reign he generally refers to some special authority which bears the name of a prophet or seer (2 Chron. ix. 29; xii. 15, &c). But the book of the Kings and a special prophetic writing are not cited for the same reign. It is therefore probable that in other cases than those of Isaiah and Jehu the writings of, or rather, about the prophets which are cited in Chronicles were

known only as parts of the great ” book of the Kings.” Even the genealogical lists may have been derived from that work (1 Chron. ix. 1), though for these other materials may have been accessible.

The two chief sources of the canonical book of Kings were entitled Annals (” events of the times “) of the Kings of Israel and Judah respectively (see Kings). That the lost source of the Chronicles was not independent of these works appears probable both from the nature of the case and from the close and often verbal parallelism between many sections of the two Biblical narratives. But while the canonical book of Kings refers to separate sources for the northern and southern kingdoms, the source of Chronicles was a history of the two kingdoms com- bined, and so, no doubt, was a more recent work which in great measure was doubtless based upon older annals. Yet it

1 R.V. ” commentary,” properly, an edifying religious work, a didactic or homiletic exposition. A distinct tendency to Midrash is found even here and there in the earlier books.

contained also matter not derived from these works, for it is pretty clear from 2 Kings xxi. 17 that the Annals of the Kings of Judah gave no account of Manasseh’s repentance, which, accord- ing to 2 Chron. xxxiii. 18, 19, was narrated in the great book of the Kings of Israel. It was the opinion of Bertheau, Keil and others, that the parallelisms of Chronicles with Samuel and Kings are sufficiently explained by the ultimate common source from which both narratives drew. But most critics hold that the chronicler also drew directly from the canonical books of Samuel and Kings as he apparently did from the Pentateuch. This opinion is not improbable, as the earlier books of the Old Testa- ment cannot have been unknown in his age; and the critical analysis of the canonical book of Kings is advanced enough to enable us to say that in some of the parallel passages the chronicler uses words which were not written in the annals but by one of the compilers of Kings himself. In particular, Chronicles agrees with Kings in those short notes of the moral character of indi- vidual monarchs which can hardly be ascribed to an earlier hand than that of the redactor of the latter book. 2

For the criticism of the book it is important to institute a careful comparison of Chronicles with the parallel narratives in Samuel-Kings.” It is found that in the cases where Chronicles directly contradicts the earlier books there of history. are few in which an impartial historical judgment will decide in favour of the later account, and in any point that touches difference of usage between its time and that of the old monarchy it is of no authority. The

characteristic feature of the post-exilic age was the re-shaping of older tradition in the interest of parenetic and practical purposes, and for this object a certain freedom of literary form was always allowed to ancient historians. The typical speeches in Chronicles are of little value for the periods to which they relate, and where they are inconsistent with the evidence from earlier writings or contain inherent im- probabilities are scarcely of historical worth. According to the ordinary laws of research, the book, being written at a time long posterior to the events it records, can have only a secondary value, although that is no reason why here and there valuable material should not have been preserved. But the general picture which it gives of life under the old monarchy cannot have the same value for us as the records of the book of Kings. On the other hand, it is of distinct value for the history of its time, and presents a clear picture of the spirit of the age. The " ecclesiasti- cal chronicle of Jerusalem," as Reuss has aptly called it, repre- sents the culminating point (as far as the 0. T. Canon is con- cerned) of that theory of which examples recur in Judges, Samuel and Kings, and this treatment of history in accordance with religious or ethical doctrines finds its continuation in the didactic aims which characterize the later non-canonical writings (cf. Jubilees; Midrash).

The most prominent examples of disagreement with earlier sources may be briefly noticed. Thus, it would appear that the book has confused Jehoiakim and Jehoiachin (2 Chron. xxxvi. 5-8) and has statements which directly conflict with 2 Sam. xxi. 19 (1 Chron. xx. 5; see Goliath), and 1 Kings ix. 10 seq. (2 Chron. viii. 2); it has changed Hezekiah's submission (2 Kings xviii.) into a brave resistance (2 Chron. xxxii. 1-8) and ignored the humiliating payment of tribute by this king and by Joash (2 Kings xii. 18; 2 Chron. xxiv. 23 sqq.). 4 That Satan, and not Yahweh incited

2 The problem of the sources is one of considerable intricacy and cannot be discussed here ; the introduction to the commentaries of Benzinger and Kittel (see Bibliography below) should be consulted. The questions depend partly upon the view taken of the origin and structure of the book of Kings (q.v.) and partly upon the results of historical criticism.

8 " A careful comparison of Chronicles with Samuel and Kings is a striking object lesson in ancient historical composition. It is an almost indispensable introduction to the criticism of the Pentateuch and the older historical works" (W. H. Bennett, Chronicles, p.20 seq.).

4 But xxxii. 1-8 may preserve a tradition of the account of the city's

wonderful deliverance mentioned in Kings (see Hezekiah), and the details of the invasion of Judah in the time of Joash differ essentially from those in the earlier source. Even 2 Chron. viii. 2 cannot be regarded as a deliberate alteration since the writer does not appear to be quoting from I Kings ix. 10 sqq. (the two passages should be carefully compared), and his view of Solomon's greatness is already supported by allusions in the earlier but extremely composite sources in Kings (see Solomon).

David to number Israel (1 Chron. xxi. ; '2 Sam. xxiv. 1) accords with later theological development.

A particular tendency to arrange history according to a mechanical rule appears in the constant endeavour to show that recompense and retribution followed immediately on good or bad conduct, and especially on obedience or disobedience to prophetic advice. Thus, the invasion of Shishak (see Rehoboam) becomes a typical romance (2 Chron. xii.) ; the illness of Asa is preceded by a denunciation for relying upon Syria, and the chronology is changed to bring the fault near the punishment (2 Chron. xv. seq.). The ships which Jehosha-phat made were wrecked at Ezion-geber because he had allied him-self with Ahaziah of Israel despite prophetic warning (2 Chron. xx. 35 sqq. : I Kings xxii. 48 ; cf. similarly the addition in 2 Chron. xix. 1-3), and the later writer supposes that the " Tarshish ships " (large vessels such as were used in trading with Spain — cf. " India- men ") built in the Red Sea were intended for the Mediterranean trade (cf. 2 Chron. ix. 21 with I Kings x. 22). The Edomite revolt under Jehoram of Judah becomes the penalty for the king's apostasy (2 Chron. xxi. 10-20; 2 Kings viii. 22), Ahaziah was slain because of his friendship with Jehoram (2 Chron. xxii. 7). The Aramaean invasion in the time of Joash of Judah was a punishment for the murder of Jehoiada's son (2 Chron. xxiv.; 2 Kings xii.). Amaziah, after defeating Edom (2 Chron. xxv.,esp. verses 19-21 ; see2Kingsxiv. 10 seq.), worshipped strange gods, for which he was defeated by Joash of Israel, and subsequently met with his death (2 Chron. xxv. 27; 2 Kings xiv. 19). Uzziah's leprosy is attributed to a ritual fault (2 Chron. xxvi. 4 seq., 16 sqq. ; cf. 2 Kings xv. 3-5 ; see Uzziah). The defeat and death of the good king Josiah came through disobedi- ence to the Divine will (2 Chron. xxxv. 21 seq.; see 2 Kings xxiii. 26 sqq.).

In addition to such supplementary information, another tendency of

the chronicler is the alteration of narratives that do not agree with the later doctrines of the uniformity of religious institutions before and after the exile. Thus, the reformation of Josiah has been thrust back from his eighteenth to his twelfth year (when he was nineteen years old) apparently because it was felt that so good a king would not have tolerated the abuses of the land for so long a period, 1 but the result of this is to leave an interval of ten years between his conversion and the subsequent act of repentance (2 Chron. xxxiv. 3-6; 2 Kings xxii. seq.). References to Judaean idolatry are omitted (1 Kings xiv. 22-24; see 2 Chron. xii. 14; 2 Kings xviii. 4; 2 Chron. xxxi. 1) or abbreviated (2 Kings xxiii. 1-20; 2 Chron. xxxiv. 29-33); and if the earlier detailed accounts of Judaean heathenism were repulsive, so the tragic account of the fate of Jerusalem was a painful subject upon which the chroniclers age did not care to dwell (contrast 2 Kings xxiv. 8-xxv. with the brief 2 Chron. xxxvi. 9-21). At an age when the high places were regarded as idolatrous it was considered only natural that the good kings should not have tolerated them. So 2 Chron. xiv. 5, xvii. 6 (from unknown sources) contradict I Kings xv. 14, xxii. 43 (that Asa and Jehoshaphat did not demolish the high places), whereas xv. 16-18, xx. 31-34, are quoted from the book of Kings and give the older view The example is an illustration of the simple methods of early compilers. Further, it is assumed that the high place at Gibeon was a legitimate sanctuary (2 Chron. i. 3-6; I Kings iii. 2-4; I Chron. xxi. 28-30; 2 Sam. xxiv.); that the ark was borne not by priests (1 Kings viii. 3) but by Levites (2 Chron. v. 4), in accordance with post-exilic usage; and that the Levites, and not the foreign bodyguard of the temple, helped to place Joash on the throne (2 Chron. xxiii.). 2 Conversely 1 Chron. xv. 12 seq. explains xiii. 10 (2 Sam. vi. 7) on the view that Uzza was not a Levite, hence the catastrophe.

Throughout it is assumed that the Levitical organization had been in existence from the days of David, to whom its foundation is ascribed. In connexion with the installation of the ark consider- able space is devoted to the arrangements for the maintenance of the temple-service, upon which the earlier books are silent, and elaborate notices of the part played by the Levites and singers give expression to a view of the history of the monarchy which the book of Kings does not share. 3 Along with the exceptional interest taken in Levitical and priestly lists should be noticed the characteristic preference for genealogies. Particular prominence is given to the tribe and kings of Judah (1 Chron. ii.-iv.), and to the priests and Levites (1 Chron. vi., xv. sq., xxiii.-xxv. ; with ix. 1-34 cf. Neh. xi.). The historical value of these lists is very unequal; a careful study of the names often proves the lateness of the source, although an appreciation of the principles

of genealogies sometimes reveals important historical information; see Caleb, Genealogy, Judah. But the Levitical system as it appears in its most complete form in

1 But that this was not the invention of the chronicler appears possible from Jer. xxv. 3. Similarly, Hezekiah's reforms are dated in his first year (2 Chron. xxix. 3), against all probability; see Hezekiah (end).

2 2 Chron. xxiii. is an excellent specimen of the redaction to which older narratives were submitted; cf. also 2 Chron. xxiv. 5 seq. (2 Kings xi. 4 seq.), xxxiv. 9-14 (2 Kings xxii.), xxxv. I-19 (2 Kings xxiii. 21-23).

3 Passages in the books of Samuel and Kings which might appear to point to the contrary require careful examination; they prove to be glosses orjuterpolations, or are relatively late as a whole.

Chronicles is the result of the development of earlier schemes, of which some traces are still preserved in Chronicles itself and in Ezra-Nehemiah. (See further Levites.)

The tendency of numbers to grow is one which must always be kept in view — cf. I Chron. xviii. 4, xix. 18 (2 Sam. viii. 4 [but see LXX.], x. 18), 1 Chron. xxi. 5, 25 (2 Sam. xxiv. 9, 24); consequently little importance can be attached to details which appear to be exaggerated (1 Chron. v. 21, xii., xxii. 14: 2 Chron. xiii. 3, 17), and are found to be quite in accordance with similar peculiarities else- where (Num. xxxi. 32 seq.; Judg. xx. 2, 21, 25).

But when allowance is made for all the above tendencies of the late post-exilic age, there remains a certain amount of additional matter in Chronicles which may have been derived from relatively old sources. These items are yˆue*ˆ of purely political or personal nature and contain several details which taken by themselves have every appear- ance of genuineness. Where there can be no suspicion of such " tendency " as has been noticed above there is less ground for scepticism, and it must be remembered that the earlier books contain only a portion of the material to which the compilers had access. Hence it may well happen that the details which unfortunately cannot be checked were ultimately derived from sources as reputable as those in the books of Samuel, Kings, &c. As examples may be cited Rehoboam's buildings, &c (2 Chron. xi. 5-12, 18 sqq.); Jeroboam's attack upon Abijah (2 Chron. xiii., cf. 1 Kings xv. 7); the invasion of Zerah in Asa's reign (2 Chron. xiv.; see Asa) ; Jehoshaphat's wars and judicial measures (2 Chron. xvii. xx.; see 1 Kings xxii. 45); Jehoram's family (2 Chron. xxi. 2-4) ; relations between Jehoiada and Joash (2

Chron. xxiv. 3, 15 sqq.); conflicts between Ephraim and Judah (2 Chron. xxv. 6-13); wars of Uzziah and Jo tham (2 Chron. xxvi. seq.); events in the reign of Ahaz (2 Chron. xxviii. 8-15, 18 seq.); reforms of Hezekiah (2 Chron. xxix. sqq., cf. Jer. xxvi. 19) ; Manasseh's captivity, repentance and buildings (2 Chron. xxxiii. 10-20; see 2 Kings xxi. and Manasseh); the death of Josiah (2 Chron. xxxv. 20-25). In addition to this reference may be made to such tantalizing statements as those in 1 Chron. ii. 23 (R.V.),iv. 30-41, v. 10, 18-22, vii. 21 seq., viii. 13, xii. 15; examples of the kind of tradition, national and private, upon which writers could draw. Although in their present form the additional narratives axe. in the chronicler's style, it is not necessary to deny an older traditional element which may have been preserved in sources now lost to us. 4 f Bibliography. — Robertson Smith's article in the 9th ed. of the Ency. Brit, was modified by his later views in Old Test, in the Jewish Church 2 , pp. 140-148. Recent literature is summarized by S. R. Driver in his revision of Smith's article in Ency. Bib. and in his Lit. of Old Test., and by F. Brown in Hastings' Diet. Bib. (a very comprehensive article). Many parts of the book offer a very hard task to the expositor, especially the genealogies, where to other troubles are added the extreme corruption and many variations of the proper names in the versions; on these see the articles in the Ency. Bib. Valuable contributions to the exegesis of the book will be found in Wellhausen's Prolegomena (Eng. trans.), pp. 171-227; Benzinger in Marti's Hand-Kommentar (1901) ; Kittel in Sacred Books of the Old Test. (1895), History of the Hebrews, ii. 224 sqq. (1896), and in Nowack's Hand-Kommentar (1902). W. H. Bennett in Expositor's Bible (1894), W. E. Barnes in Cambridge Bible (1899), and Harveyjellie in the Century Bible (1906), are helpful. Among more recent investigations are those of Howorth, Proc. Soc. of Bibl. Archael. xxvii. 267-278 (Chronicles a late translation from the Aramaic). (W. R. S.; S. A. C.)

CHRONOGRAPH from Gr. xpovos, time, and ypafaiv, to write). Instruments whereby periods of time are measured and recorded are commonly called chronographs, but it would be more correct to give the name to the records produced. Instruments such as " stop watches " (see Watch), by means of which the time between events is shown on a dial, are also called chronographs; they were originally '•ightly called chronoscopes (oKxyirilv, to see).

4 The view that the chronicler invented such narratives is in-conceivable, and in the present stage of historical criticism is as unsound as an implicit reliance upon those sources in the earlier books, which in their turn are often long posterior to the events they record. Although Graf, in a critical and exhaustive study

(Geschichtlichen Bilcher des A.T., Leipzig, 1866), concluded that the Chronicles have almost no value as a documentary source of the ancient history, he subsequently admitted in private correspondence with Bertheau that this statement was too strong (preface to Bertheau's Commentary, 2nd ed., 1873).

S°2

CHRONOGRAPH

In the first experiments in ballistics by B. Robins, Count Rumford and Charles Hutton, the velocity of a projectile was found by means of the ballistic pendulum, in which the principle of momentum is applied in finding the velocity of a projectile (Principles of Gunnery, by Benjamin Robins, edited by Hutton, 1805, p. 84). It consisted of a pendulum of considerable weight, which was displaced from its position of rest by the impact of the bullet, the velocity of which was required. A modification of the ballistic pendulum was also employed by W. E. Metford (1824-1899) in his researches on different forms of rifling; the bob was made in the form of a long cylinder, weighing about 140 lb, suspended with its axis horizontal from four wires at each end, all moving points being provided with knife edges. The true length of suspension was deduced from observations of the time of a complete small oscillation. The head of the pendulum was furnished with a wooden block, which caught the fragments of bullets fired at it, and its displacement was recorded by a rod moved by the bob {The Book of the Rifle, by the Hon. T. F. Fremantle, p. 336). An improved ballistic pendulum in which the geometric method of suspension is introduced has been used by A. Mallock, to determine the resistance of the air to bullets having a velocity up to 4500 F/S. (Proc. Roy. Soc, Nov. 1904). A ballistic pendulum, carried by a geometric suspension from five points, has also been employed by C. V. Boys in a research on the elasticity of golf balls, the displacement of the bob being recorded on a sheet of smoked glass. 1 For further information on the dynamics of the subject see Text Book of Gunnery, 1897, p. 101.

In nearly all forms of chronographs in which the ballistic pendulum method is not used, the beginning and end of a period of time is recorded by means of some kind of electrically con- trolled mechanism; and in order that small fractions of a second may be measured, tuning-forks are employed, giving any con- venient number of vibrations per second, a light style or scribing point, usually of aluminium, being attached to one of the legs of the tuning-fork. A trace of the vibration is made on a surface blackened with the deposit from the smoke of a lamp. Glazed paper is often employed when the

velocity of the surface is slow, but when a high velocity of smoked surface is necessary, smoked glass offers far the least resistance to the movement of the scribing points. If the surface be cylindrical, thin sheet mica attached to it, and smoked, gives excellent results, and offers but little resistance to all the scribing points employed. The period of vibration of tuning-forks is determined by direct or in- direct comparison with the mean solar second, taken from a Standard clock, the rate of which is known from transit observa- tions (" Recherches sur les vibrations d'un diapason 6talon," R. Koenig, Wied. Ann., 1880). In the celebrated ballistic experi- ments of the Rev. F. Bashforth, the time markings were made electrically from a standard clock, and fractions of a second were estimated by interpolation. RegnaUlt (Mimoires de I'acad. des sciences, t. xxxvii.) employed both a standard clock and a tuning-fork in his determination of the velocity of sound. The effect of temperature on tuning-forks has been determined by

1 The velocity of the projectile is found thus. Let V be the velocity of the bob, due to the impact of the projectile, v the velocity of the projectile, h the height through which the bob is raised vertically, then

h = Yl, and V = V2gft.

If W be the weight of the bob, and w the weight of the projectile, then

wv = (W + w)V, and »= Cˆ + A VzgE

If / be the true length of suspension, and C the length of the chord of the arc of displacement of the bob after being struck, then

C-2«,and»-(ˆ + i)ˆC.

Also if T be the time of a complete small oscillation of the pendulum,

so that v

IS*)

2rC T •

T~\T

Lord Rayleigh and Professor H. McLeod (Proc. Roy. Soc, 1880, 26, p. 162), who found the coefficient to be o-ooou per degree C. between 9° C. and 27 C. The beginning and end of a time period is marked on a

moving surface in many ways. Usually an electromagnetic stylus is employed, in which a scribing point suddenly moves when the electric circuit is broken by a pro- jectile. Another method is to arrange the terminals of the secondary circuit of an induction coil, so that when the primary circuit is opened a small spark punctures or marks a moving surface (Helmholtz, Phil. Mag., 1853, p. 6). A photographic plate or film, moving in a dark chamber, is also used to receive markings produced by a beam of light interrupted by a small screen attached to an electromagnetic stylus, or by the legs of a tuning-fork, or by the mercury column of a capillary electro- meter. In certain researches on the explosive wave of gases the light given by the burning gases made the time trace on a rapidly moving photographic film (H. B. Dixon, Phil. Trans., 1903, 200, p. 323). In physiological chronography the stylus is in many cases actuated directly by the piece of muscle to which it is attached; when the muscle is stimulated its contraction moves the stylus on the moving surface of the myograph (M. Foster, Text Book of Physiology, 1879, p. 39).

Gun Chronographs. — Probably the earliest forms of chronographs, not based on the ballistic pendulum method, are due to Colonel Grobert, 1804, and Colonel Dabooz, 1818, both officers _ . . of the French army. In the instrument by Grobert two Iˆ large disks, attached to the same axle 13 ft. apart, were Dabooz. rapidly rotated; the shot pierced each disk, the angle between two holes giving the time of flight of the ball, when the angular velocity of the disks was known. In the instrument by Colonel Dabooz a cord passing over two light pulleys, one close to the gun, the other at a given distance from it, was stretched by a weight at the gun end and by a heavy screen at the other end. Behind this screen there was a fixed screen. The shot cut the cord and liberated the screen, which was perforated during its fall. The height of fall was measured by superposing the hole in the moving screen upon that in the fixed one. This gave the approximate time of flight of the shot over a given distance, and hence its velocity.

In the early form of chronoscope invented by Sir C. Wheatstone in 1840 the period of time was measured by means of a species of clock, driven by a weight; the dial pointer was started and „,. , stopped by the action of an electromagnet which moved a il ** ” pawl engaging with a toothed wheel fixed on the axle to which the dial pointer was attached. The instrument applied to the determination of the velocity of shot is described thus by Wheat- stone: — ” A wooden ring embraced the mouth of the gun, and a wire connected the opposite sides of the ring. At a proper distance the target was erected, and so arranged that the least motion given to it would establish a permanent contact between two metal points. One of the extremities of the wire

of the electromagnet (before mentioned) was attached to one pole of a small battery; to the other extremity of the electromagnet were attached two wires, one of which communicated with the contact piece of the target, and the other with one of the ends of the wire stretched across the mouth of the gun ; from the other extremity of the voltaic battery two wires were taken, one of which came to the contact piece of the target, and the other to the opposite extremity of the wire across the mouth of the gun. Before the firing of the gun a con- tinuous circuit existed, including the gun wire; when the target was struck the second circuit was completed; but during the passage of the projectile both circuits were interrupted, and the duration of this interruption was indicated by the chronoscope. 1 ‘

Professor Joseph Henry (Journal Franklin Inst., 1886) employed a cylinder driven by clockwork, making ten revolutions per second. The surface was divided into 100 equal parts, each equal to „ xdvn second. The time marks were made by two galvano- Henry. meter needles, when successive screens were broken by a shot. Henry also used an induction-coil spark to make the cylinder, the primary of the coil being in circuit with a battery and screen. This form of chronograph is in many respects similar to the instrument of Konstantinoff, which was constructed by L. F. C. Breguet and has been sometimes attributed to him (Comples rendus, 1845). This chronograph consisted of a cylinder 1 metre in circumference and 0-36 metre long (driven by clockwork, the rotation being regulated by a governor provided with wings. A small carriage geared to the wheelwork traversed its length, carrying electromagnetic signals. The electric chronograph signal usually consists of a small armature (furnished with a style which marks a moving surface) moving in front of an electromagnet, the armature being suddenly pulled off the poles of the electromagnet by a spring when the circuit is broken (Journal of Physiology, ix. 408). The signals in Breguet’s instrument were in a circuit, including the screens and batteries of a gun range. The measurement of time depended on the

regularity of rotation of the cylinder, on which each mm. , repre- sented tˆVts second.

In the chronograph of A. J. A. Navez (1848) the time period is found by means of a pendulum held at a large angle from the vertical Navez ˆy an e ‘ ectroma g net > which is in circuit with a screen on the gun

range. When the shot cuts this screen the circuit is broken and the pendulum liberated and set swinging. When the next screen on the range is broken by the shot, the position of the pendulum is recorded and the distance it has passed through measured on a divided arc. From this the time of traversing the space between the screens is deduced. By means of an instrument known as a disjunctor the instrumental time-loss or latency of the chronograph _ is determined. In Benton's chronograph (1859) two

- " pendulums are liberated, in the same manner as in the instrument of Navez, one on the cutting of the first screen, the other on the cutting of the second. The difference between the swings of the two pendulums gives the time period sought for. The dis- junctor is also used in connexion with this instrument. In Vignotti's chronograph (1857) again a pendulum is employed, furnished with a metal point, which moves close to paper impregnated with ferro- cyanide of potassium. The gun-range screens are included in the primary circuits of induction coils; when these circuits are broken a spark from the pointer marks the paper. From these marks the time of traverse of the shot between the screens is determined.

In the Bashforth chronograph a platform, arranged to descend slowly alongside of a vertical rotating cylinder, carries two markers, Bashforth cont roiled by electromagnets, which describe a double ' spiral on the prepared surface of the cylinder. One electromagnet is in circuit with a clock, and the marker actuated by it marks seconds on the cylinder; the circuit of the other is completed through a series of contact pieces attached to the screens through which the shot passes in succession. On the gun range, when the shot reaches the first screen, it breaks a weighted cotton thread, which keeps a flexible wire in contact with a conductor. When the thread is broken by a shot, the wire leaves the conductor and almost immediately establishes the circuit through the next screen, by engaging with a second contact, the time of the rupture being recorded on the cylinder by the second marker. The velocity with which the cylinder rotates is such that the distance between successive clock marks indicating seconds is about 18 in.; hence the marks corresponding with the severance of a thread can be allotted their value in fractions of seconds with great accuracy. The times when the shot passes successive screens being thus recorded on the spiral described by the second marker, and the distance between each screen being known, the velocity of the shot can be calculated. The chronoscope invented by Sir Andrew Noble is so well adapted to the measurement of very small intervals of time that it is usually Noble employed to ascertain the velocity acquired by a shot at

different parts of the bore in moving from a state of rest inside the gun. A series of ” cutting plugs ” is screwed into the sides of the gun at measured intervals, and in each is inserted a loop of wire which forms part of the primary circuit of an induction coil. On the passage of a shot this wire is severed by means of a small knife which projects into the bore and is actuated by the shot as it passes ; the circuit being thus broken, a spark passes between the terminals of the secondary of the coil. There is a separate coil and circuit for each plug. The recording arrangement consists of a series of disks, one for each plug, mounted on one axle and rotating at a high angular velocity. The edges of these disks are covered with a coating of lamp-black, and the secondaries of the coils are caused to discharge against them, so that a minute spot burnt in the lamp-black of each disk indicates the moment of the cutting of the wire in the correspond- ing plug. Hence measurement of the distance between two successive spots gives the time occupied by the shot in moving over the portion of the bore between two successive plugs. By the aid of a vernier, readings are made to thousandths of an inch, and the peripheral velocity of the disks being 1 100 in. a second, the machine indicates portions of time rather less than one-millionth of a second; it is, in fact, practically correct to hundred-thousandths of a second (Phil. Trans., 1875, Pt- i-)-

In the Le Boulenge chronograph (” Chronograph le Boulenge,” par M. Breger, Commission de Gavre, Sept. 1880) two screens are . used. The wire of the first forms part of the circuit of an

„ e . r electromagnet which, so long as it is energized, supports oueage. a vert i ca [ro(j called the ” chronometer.” Hence when the circuit is broken by the passage of a shot through the screen this rod drops. The wire of the second screen conveys a current through another electromagnet which supports a much shorter rod. This ” registrar,” as it is called, when released by the shot severing the wire of the second screen, falls on a disk which sets free a spring, and causes a horizontal knife to fly forward and nick- a zinc tube with which the chronometer rod is sheathed. Hence the long rod will be falling for a certain time, while the shot is travelling between the two screens, before the short rod is released ; and the longer the shot takes to travel this distance, the farther the long rod fails, and the higher up on it will be the nick made by the knife. A simple calculation connects the distance through which the rod falls with the time occupied by the shot in travelling over the distance between the screens, and thus its velocity ascertained. The nick made by the knife, if released while the chronometer rod is still suspended,

is the zero point. If both rods are released simultaneously, as is done

by breaking both circuits at once by mean3 of a ” disjunctor,” a certain time is consumed by the short rod in reaching the disk, setting free the spring and cutting a nick in the zinc ; and during this time the long rod is falling into a recess in the stand deep enough to receive its full length. The instrument is so adjusted that the nick thus made is 4*435 in. above the zero point, corresponding to 0-15 sec. This is the disjunctor reading, and requires to be frequently corrected during experiments. The instrument was modified and improved by Colonel H. C. Holden, F.R.S. For further information respecting formulae relating to it see Text Book of Gunnery (1897). The electric chronograph of the late H. S. S. Watkin consists of two long cylinders rotating on vertical axes, and between them a cylindrical weight, having a pointed head, is free to fall. „, ... The weight is furnished with an insulated wire which passes through it at right angles to its longest axis. When the weight falls the ends of the insulated wire move very close to the surfaces of the cylinders which form part of a secondary circuit of an induction coil, the primary circuit of which is opened when a screen is ruptured by a shot. A minute mark is made by the induced spark on the smoked paper with which the cylinders are covered. The time period between events is deduced from the space fallen through by the weight, and by means of a scale, graduated for a given distance between the screens, the velocity of a shot is at once found. It may be noted that the method of release is such that the falling weight is not subjected, after it has begun to fall, to a diminishing magnetic field, which would be the case if it were directly supported by an electromagnet. An iron rod when falling from an electro- magnet, during a minute portion of its fall, is subject to a diminishing force acting in the opposite sense to that of gravity, whereby its time of fall is slightly changed.

Colonel Sebert (Extraits du memorial de I’artillerie de la marine) devised a chronograph to indicate graphically the motion of recoil of a cannon when fired. A pillar fixed to the ground at s b rt the side of the gun-carriage supported a tuning-fork, the ie ‘> e “- vibration of which was maintained electrically. The fork was provided with a tracing point attached to one of the prongs, and so adjusted that it drew its path on a polished sheet of smoke-blackened metal attached to the gun-carriage, which traversed past the tracing point when the gun ran back. The fork used made 500 complete vibrations per second. A central line was drawn through the curved path of the tracing point, and every entire vibration cut the straight line twice, the interval between each intersection equalling yaVij second. The diagram so produced gave the total time of the acceler- ated motion of recoil of the gun, the maximum velocity of recoil, and the rate of acceleration

of recoil from the beginning to the end of the motion. By means of an instrument furnished with a micro- scope and micrometers, the length and amplitudeˆ and the angle at which the curved line cut the central line, were measured. At each intersection (according to the inventor) the velocity could be deduced. The motion at any intersection being compounded of the greatest velocity of the fork, while passing through the midpoint of the vibration and the velocity of recoil, the tangent made by the curve with the straight line represents the ratio of the velocity of the fork to the velocity of recoil. If a be the amplitude of vibration, con- sidered constant, v the velocity of the fork at the midpoint of its path, r the velocity of recoil, a the angle made by the tangent to the curve with the straight line at the point of intersection, and t the line of a complete vibration; then, v = 2irajt; r = v/ta.n a.

F. Jervis-Smith's tram chronograph {Patents, 1894, 1897, 1903) was devised for measuring periods of time varying from about one- fourth to one twenty-thousandth part of a second (Proc. Roy. Soc, 1889, 45, p. 452; The Tram Chronograph, by F. Jervis-Smith, F.R.S.). It consists of a metal girder having a T-shaped end. This carries two parallel steel rails, the edges of which lie in the same vertical plane. The girder, which is slightly inclined to the horizontal plane, is geometrically supported, being carried at its end, and at the extremities of the T-piece, on a V-groove, trihedral hole and plane. A carriage or tram furnished with three grooved wheels runs on the rails, and a slightly smoked glass plate is attached to its vertical side. The tram in the original instrument was propelled by a falling weight, but in an improved form one or more spiral springs are employed. All time traces are made immediately after the propelling force has ceased to act. The tram is brought to rest by a gradually applied brake, consisting of two crossed leather bands stretched by two springs ; a projection from the tram runs between the bands, and brings it to rest with but little lateral pressure. When, for certain physiological experi- ments, a low velocity of traverse is required, a heavy fly-wheel is mounted on the tram and geared to its wheels. A pillar also mounted geometrically, placed vertically in front of the carriage, carries the electromagnet style or signals and tuning-fork which can be brought into contact with the glass by means of a lever. Also styli are used which depend for their action on the displacement of one or more wires under tension or torsion carrying a current in a magnetic field, the condition being such that no magnetic lag due to iron armatures and cores exists. Two motions of a slide on the pillar, viz. of rotation and translation, allow a number of observations to be made. The traces are counted out on a sloping glass desk, and the time of flight of

a projectile between two or more screens is found. When

Jervls- Smtth.

3°4

CHRONOGRAPH

Creborc Squler.

very close readings are required, they are made by means of a traversing geometric micrometer microscope. When the distance between the screens is known, and also the time of flight, the mid-point velocity is found by applying Bashforth's formula. When the velocity of shot from a shot-gun has to be found, a thin wire stretched across the muzzle takes the place of the first screen, and a thin sheet of metal or cardboard carrying an electric contact, or a Branly coherer, the conductivity of which is restored by means of an induced current, takes the place of the second screen. The electric firing circuit is provided with a safety key attached by a cord to the man who loads the gun and prepares the electric fuse. The firing circuit is closed by inserting the key in a switch at the rear of the gun, thus preventing him from getting into the line of fire when the gun is fired by the chronograph. The tram, when the instrument is adjusted, has a practically constant velocity of traverse.

The polarizing photo-chronograph, designed and used by A. C. Crehore and G. O. Squier at the United States Artillery School (Trans. Amer. Inst. Elect. Eng. vol. 14, and Journal United States Artillery, 1895, 6, p. 271), depends for its indications upon the rotation of a beam of light by a magnetic field, produced by a solenoidal current which is opened and closed by the passage of the projectile. The general arrangement is as follows: — A beam of light from an electric lamp traverses a lens, then a Nicol prism, next a glass cylinder furnished with plane glass ends and coiled with insulated wire, then an analyser and two lenses, finally impinging on a photographic plate to which rotation is given by an electric motor, the plane of rotation being perpen- dicular to the direction of the beam of light. The same plate also records the shadow of a pierced projection attached to a tuning- fork, light from the electric lamp being diverted by a mirror for this purpose. The solenoid used to produce a magnetic field across the glass cylinder, which is filled with carbon bisulphide, is in circuit with a dynamo, resistances, and the screens on the gun range. It is a well-known phenomenon in physics that when, with the above-mentioned combination of polarizing Nicol prism and analyser, the

light is shut off by rotating the analyser, it is instantly restored when the carbon bisulphide is placed in a magnetic field. This phenomenon is utilized in this instrument. The projectile, by cutting the wire screens, causes the magnetic field to cease and light to pass. By means of an automatic switch the projectile, .after cutting a screen, restores the electric circuit, so that successive records are registered. After a record has been made it is read by means of a micrometer microscope, the angle moved through by the photographic disk is found, and hence the time period between two events. In the photo- chronograph described in Untersuchungen iiber die Vibration des Gewehrlaufs, by C. Cranz and K. R. Koch (Munich, 1899), also note on the same, Nature, 61, p. 58, a sensitive plate moving in a straight line receives the record of the movement of the barrels of firearms when discharged. It was mainly used to determine the ” angle or error of departure ” in ballistics.

In a second chronograph by Watkin (” Chronographs and their Application to Gun Ballistics,” Proc. Roy. Inst., 1896), a metal drum, Waikla divided on its edge so that when a vernier is used a minute of angle may be read, is rotated rapidly by a motor at a practically uniform speed. The points of a row of steel-pointed pins, screwed into a frame of ebonite, can be brought within yj -(, in. of the surface of the drum. Each pin is a part of the secondary circuit of an induction coil, the space between the pins and the drum forming spark-gaps. The drum is rubbed over with a weak solution of paraffin wax in benzol, which causes the markings produced by the sparks to be well defined. The records are read by means of a fine hair stretched along the drum and just clear of it, the dots being located under the hair by means of a lens. The velocity of rotation is found by obtaining spark marks, due to the primary circuits of two induction coils being successively broken by a weight falling and breaking the two electric circuits of the coils in succession at a known distance apart. This chronograph has been used for finding the velocity of projectiles after leaving the gun, and also for finding the rate at which a shot traverses the bore. For the latter purpose the shot successively cuts insulated wires fixed in plugs screwed into the gun at known intervals; each wire forms a part of the primary of an induction coil, and as each is cut a dot is made on the rotating drum by the induced spark.

In the chronograph of Marcel Deprez, a cylinder for receiving records is driven at a high velocity, 4 to 5 metres per second surface Deprez. velocity. The velocity is determined by means of an ‘ electrically-driven tuning-fork, the traces being read by means of a vernier gauge. A mercury speed indicator of the Rams- bottom type enables the rotation to be continuously controlled (A. Favarger, V Eleclricite et ses

applications a la chronometrie) .

Astronomical Chronographs.~The astronomical chronograph is an jnstrument whereby an observer is enabled to register the time Ben(i of transit of a star on a sheet of paper attached to a re-

volving cylinder. A metal cylinder covered with a sheet of paper is rotated by clockwork controlled by a conical pendulum, or by a centrifugal clock governor such as is used for driving a telescope. By means of a screw longer than the cylinder, mounted parallel with the axis of the cylinder and rotated by the clockwork, a carriage is made to traverse close to the paper. In some instruments this carriage is furnished with a metal point, and in others with a style-

graphic ink pen. The point or pen is made to touch the paper by an electromagnet, the electric current of which is closed by the observer at the transit instrument, and a mark is recorded on the revolving cylinder. The movement of the same point or pen is also controlled by a standard clock, so that at the end of each second a mark is made. The cylinder makes one revolution per minute, and the minute is indicated by the omission of the mark. In E. J. Dent's form (Nature, 23, p. 59) continuous observations can be recorded for 6f hours. The conical pendulum used to govern the rotation of the cylinder was the invention of Sir G. B. Airy. The lower end is geared to a metal plate which sweeps through an annular trough filled with glycerin and water. When the path of the pendulum exceeds a certain diameter it causes the plate to enter the liquid more deeply, its motion being thereby checked ; also, when the pendulum moves in a smaller circle the plate is lifted out of the liquid and the resistance is diminished in the same proportion as the force. The compensatory action is considerable; doubling the driving power produces no perceptible difference in the time. To prevent the injury of the conical pendulum and the wheel work by any sudden check of the cylinder, a ratch-wheel connexion is placed between the cylinder and the train of wheel work ; this enables the pendulum to run on until it gradually comes to rest. The pendulum, which weighs about 18 lb, is compensated, and makes one revolution in two seconds; it is suspended from a bracket by means of two flexible steel springs placed at right angles to one another.

The observatory of Washburn, University of Wisconsin, is furnished with a chronograph of the same type as that of Dent (Annals Harvard Coll. Obs. vol. i. pt. ii. p. 34), but in this instrument the rotation of the cylinder is controlled by a double conical pen- dulum governor of peculiar construction. When the balls fly out beyond a certain point,

one of them engages with a hook attached to a brass cylinder which embraces the vertical axle loosely. When this mass is pulled aside the work done on it diminishes the speed of the governor. The pendulum ball usually strikes the hook from 60 to 70 times per minute. Governors on this principle were adopted by Alvan Clark for driving heliostats in the United States Transit of Venus Expedition, 1874.

In the astronomical chronograph designed by Sir Howard Grubb (Proc. Inst. Mech. Eng., July 1888), the recording cylinders — two in number — are driven by a weight acting on a train of wheel arubb work controlled by an astronomical telescope governor. The peculiar feature of this instrument is that the axle is geared to a shaft which communicates motion to the cylinders through a mechanism whereby the speed of rotation is constantly corrected by a standard clock. Should the rotation fall below the correct speed it is automatically accelerated, and if its speed of rotation rises above the correct one it is retarded. The accelerator and retarder are thrown into action by electromagnets, controlled by a ” detector ” mounted on the same shaft. The rather complicated mechanism employed to effect the correction is described and fully illustrated in the reference given. The cylinders are covered with paper, but all the markings are made with a stylographic pen. The marks indicating seconds are dots, but those made by the observer are short lines. When an observation is about to be made the observer first notes the hour and minute, and, by pressing a contact key attached to a flexible cord at the transit instrument, marks the paper with a letter in Morse telegraph characters, indicating the hour and minute; he then waits till a micrometer wire cuts a star and at the instant closes the circuit, so that the second and fraction of a second are registered on the chronograph paper. When a set of observations have been taken, the paper is removed from the cylinder, and the same results are obtained by applying a suitably divided rule to the marked paper, fractions of a second being estimated by applying a piece of glass ruled with eleven straight lines converging to a point. The ends of these lines on the base of the triangle so formed are equidistant on one edge of the glass, so that when the first and last lines are so placed as to coincide with the beginning and end of the markings of a second, that second is’divided into ten equal parts. The base of the triangle is always kept parallel with the line of dots. The papers, after they have been examined and the results registered, are kept for reference.

In the astronomical chronograph of Hipp, used in determining longitudes, the movement of a recording cylinder is regulated by means of a toothed wheel, the last of a clockwork train, „.

controlled by a vibrating metal tongue; this important pp ‘

feature is described in detail in Favarger’s work cited above.

Acoustic Chronographs. — In the chronograph devised by H. V. Regnault (Acad, des Sc, 1868) to determine the velocity of sound propagated through a great length of pipe, a band of R e!mau jt. paper 27 mm. wide was continuously unrolled from a bobbin by means of an electromagnetic engine. In its passage over a pulley it passed over a smoky lamp flame, which covered it with a thin deposit of carbon. It next passed over a cylinder in contact with the style of a tuning-fork kept in vibration by electromagnets placed on either side of its prongs, the current being interrupted by the fork; it was also in contact with an electric signal controlled by a standard clock. Also an electromagnetic signal marked the beginning and end of a time period. Thus three markings were registered on the band, viz. the time of the pendulum, the vibrations of the fork, and the marking of the signal due to the opening and

closing of the current by electrical contacts attached to diaphragms on which the sound wave acted. The contacts consisted of minute hammers resting on metal points fixed to the centre of diaphragms which closed the end of the experimental pipes. The signal marked the instant at which a sound wave impinged on a diaphragm. The markings on the paper band gave the period of time between two events, and the number of vibrations of the tuning-fork per second was estimated by means of markings due to the clock. The sound wave was usually originated by firing a pistol into the pipe furnished with diaphragms and contact pieces.

In the chronographic use of the Morse telegraph instrument (Stewart and Gee, Elementary Practical Phys. p. 234) a circuit is A rtoa arranged which includes a seconds’ pendulum furnished y . p with a fine platinum wire below the bob, which sweeps

ana ferry. t i, r0U gi, a sma n mass f mercury forming a part of the circuit. There is a Morse key for closing the circuit. A fast-running Morse instrument and a battery are placed across this circuit as a shunt. A succession of dots is made on the paper ribbon by the circuit being closed by the pendulum, and the space between each adjacent dot indicates a period of one second’s duration. Also, when the key is

depressed, a mark is made on the paper. To measure a period of time, the key is depressed at the beginning and end of the period, causing two dots to be made on the ribbon; the interval between these, when measured by the intervals due to the pendulum, gives the length of the period in seconds, and also in fractions of a second, when the seconds' interval is subdivided into convenient equal parts. This apparatus has been used in determination of the velocity of sound. In the break circuit arrangement of pendulum key and Morse instrument the markings appear as breaks in a line which would other- wise be continuous. This combination was employed by Professors W. E. Ayrton and J. Perry in their determination of the acceleration of gravity at Tokio, 1877-1878 (Proc. Phys. Soc.Lond. 3, p. 268).

In the tuning-fork electro-chronograph attributed to Hipp a metal cylinder covered with smoked glazed paper is rotated uniformly by clockwork, a tuning-fork armed with a metallic style J,p * being so adjusted that it makes a clear fine line on the

smoked paper. The tuning-fork is placed in the secondary circuit of an induction coil, so that when the primary circuit is broken an induced spark removes a speck of black from the paper and leaves a mark. The time period is deduced by counting the number of vibrations and fractions of vibration of the tuning-fork as recorded by a sinuous line on the cylinder. In later forms of this instrument the cylinder advances as it rotates, and a spiral line is traced. To obtain good results the spark must be very small, for when large it often leaps laterally from the end of the style, and does not give the true position of the style when the circuit is broken. The same arrangement of tuning-fork and revolving cylinder, with the addition of a standard clock, has been used by A. M. Mayer (Trans. Mayer. ˆ at jˆ ca ˆ_ $ c i U.S.A. vol. iii.) and others for calibrating tuning-forks, and comparing their vibrations directly withthe beats of the pendulum of a standard clock the rate of which is known. The pendulum marks and breaks the primary circuit by carrying a small platinum wire through a small mercury meniscus. Better and apparently certain contacts can be obtained from platinum contact- pieces, brought together above the pendulum by means of a toothed wheel on the scape-wheel arbor. Sparking at the contact points is greatly reduced by placing a couple of lead plates in dilute sulphuric acid as a shunt across the battery circuit.

For Physiological Purposes. — A. Fick's pendulum myograph or muscle-trace recorder is described in Vierteljahrsschr. der nalurforsch. Ges. in Zurich, 1862, S. 307, and in Text-book of Physiology, M. Foster, pp. 42, 45. It was used to obtain a record of the contraction of a muscle when stimulated. In many respects the instrument is similar

to the electro-ballistic chronograph of Navez. A long pendulum, consisting of a braced metal frame, carries at its lower end a sheet of smoked glass. The pendulum swings about an axis supported by a wall bracket. Previous to an experiment, the pendulum is held on one side of its lowest position by a spring catch ; when this is depressed it is free to swing. At the end of its swing it engages with another spring catch. In front of the moving glass plate a tuning-fork is fixed, also a lever actuated by the muscle to be electrically stimulated. When the pendulum swings through its arc, it knocks over the contact key in the primary circuit of an induction coil, the secondary of which is in connexion with the muscle. The smoked plate receives the traces of the style of the tuning-fork and of the lever attached to the muscle, and also the trace of an electromagnetic signal which marks the instant at which the primary circuit is broken. After the traces are made, they are ruled through with radial lines, cutting the three traces, and the time intervals between different parts of the muscle curve are measured in terms of the period of vibration of the tuning-fork, as in other chronographs in which the tuning-fork is employed.

In the spring myograph of E. Du Bois Reymond (Munk's Physio- logie des Menschen, p. 398) a smoked glass plate attached to a metal DaBols roc * ' s s ' 1o1: y a E P' ra ' spring along two guides with a RevmoBd wf ˆ oc ˆy which is not uniform. The traces of a style ' moved by the muscle under examination, and of a tuning- fork, are recorded on the glass plate, the shooter during its traverse knocking over one or more electric keys, which break the primary cir- cuit of an induction coil, the induced current stimulating the muscle.

In the photo-electric chronograph devised by G. J. Burch, F.R.S. (Journ. of Physiology , i8,p. l25;Sec/W«'are,37,p.436),therapidmove- ments of the column of mercury in a capillary electrometer _ . used in physiological research are recorded on a sensitive '

plate moving at a uniform angular velocity. The trace of the vibrat- ing prongs of a tuning-fork of known period is also recorded on the plate, the light used being that of the electric arc. The images of the meniscus of the mercury column and of the moving fork are focused on the plate by a lens. Excellent results have been obtained with tlijs instrument.

An important development of a branch of chronography is due to E. J. Marey (Comptes rendus, 7. aout 1882, and Le Mouvement, par E. J. Marey, Paris, 1894), who employed a photographic Many plate for receiving successive pictures of moving objects, "'

at definite times, when investigating the movements of animals, birds, fishes, insects, and also microscopic objects such as vorticellae. The instrument in one of its forms consisted of a camera and lens. In front of the sensitive plate and close to it a disk, pierced with radial slits, revolved at a given angular velocity, and each time a slit passed by the plate was exposed. But since, in the time of passage of the space between the slits, the object had moved by a certain amount across the field of view, a fresh impression was produced at each exposure. The object, well illuminated by sunlight, moved in front of a black background. Since the angular velocity of the disk was known, and the number of slits, the time between the successive positions of the object was also known.

Marey {La Methode graphique, pp. 133, 142, 456), by means of pneumatic signals and a rotating cylinder covered with smoked glazed paper, measured the time of the movements of the limbs of animals. The instrument consists of a recording cylinder rotated at a uniform angular velocity by clockwork controlled by a fan governor, and pneumatic signal, constructed thus. One end of a closed shallow cylinder, about 4 cm. dia., is furnished with a stretched rubber membrane. A light lever, moving about an axis near the edge of the cylinder, is attached to the centre of the mem- brane by a short rod, its free end moving as the membrane is dis- tended. The cylinder is connected by a flexible tube with a similar cylinder and membrane, but without a lever, which is attached to that part of the body of the animal the movement of which is under investigation. The system is full of air, so that when the membrane attached to the animal is compressed, the membrane which moves the lever is distended and the lever moved. Its end, which carries a scribing point, marks the smoked paper on the rotating cylinder. The pneumatic signal is called by Marey ” tambour 1 levier.”

References to Chronographic Methods: — (1) Chronographs used in Physiology : Helmholtz, ” On Methods of measuring very small Portions of Time,” Phil. Mag. (1853), 6; Id., Verhandlungen der physikalisch-medicinischen Gesellschaft in Wilrzburg (1872) ; Harless,

Das Attwood’sche Myographion,” Abhandlungen der k. bayerischen Akademie der Wissenschaflen (1862); Id., Fall-Myographion auf- gestellt in der Wiener Wellausstellung in der Abteilung fur das Unter- richtswesen von Ungarn (Budapest, 1873) ; Hensen, Myographion mit vibratorischer Bewegung,” Arbeiten aus dem Kieler physiol. Inslit. (1868); Briicke, Sitzungsber. d Wien. Acad. (1877); Pfliiger. ‘ ‘ Myographion ohne Bewegung,’ ‘ Untersuchungen uber die Physiologie des Electrotonus (1859) ; Pouillet, Compt. rend. (1844) ; I. Munk,

Physiologie des Menschen (for Pfliiger's cylinder governed by conical pendulum); J. G. M'Kendrick, Life in Motion (1892) (for early form of cylinder chronograph by Thomas Young) ; Stirling, Outlines of Practical Physiology (for reaction-time chronographs of F. Galton and Exner). (2) Chronographs used in gun work and for other purposes: Sabine, Phil. Mag. (1876); Moisson, Notice sur la chronographie systeme Schultz (Paris, 1875); Paul la Cour, La Roue phonique (Copenhagen. 1878); Mach, " Collected Papers on Chrono- graphs," Nature, 42, p. 250; C. V. Boys, " Bullets photographed in Flight," Nature, 47, p. 415; Pneumatic Tube Co., Paris, " Chrono- graph," Nature, 9, p. 105; G. C. Foster, " Laboratory Chronograph," Nature, 13, p. 139; E. S. Holden, "Astronomical Chronograph," Nature, 26, p. 368; D'Arsonval, La Lumiire electrique (1887) ; Dunn, " The Photo-retardograph," Journal United States Artillery, 8, p. 29; E. J. Marey, La Methode graphique (for Deprez accelerographe) ; Werner Siemens, " Electric Spark Chronograph," Wied. Ann. (1845), 66. " (F. J. J.-S.)

CHRONOLOGY (Gr. xpovo\ayio., computation of time, Xpovos), the science which treats of time, its object being to arrange and exhibit the various events which have occurred in the history of the world in the order of their succession, and to ascertain the intervals of time between them. The term " chronology " is also used of the order in time itself, as adopted, and of the system by which the Order is fixed.

The preservation of any record, however rude, of the lapse of time implies some knowledge of the celestial motions, by which alone time can be accurately measured, and some advancement in the arts of civilized life, which could be attained only by the accumulated experience of many generations (see Time) . Before

the invention of letters the memory of past transactions could not be preserved beyond a few years with any tolerable degree of accuracy. Events which greatly affected the physical condition of the human race, or were of a nature to make a deep impression on the minds of the rude inhabitants of the earth, might be vaguely transmitted through several ages by traditional narrative; but intervals of time, expressed by abstract numbers, and these constantly varying besides, would soon escape the memory. The invention of the art of writing afforded the means of substituting precise and per- manent records for vague and evanescent tradition; but in the infancy of the world, mankind had learned neither to estimate accurately the duration of

time, nor to refer passing events to any fixed epoch.

For these reasons the attempt at an accurate chronology of the early ages of the world is only of recent origin. After political relations began to be established, the necessity of preserving a register of passing seasons and years would soon be felt, and the practice of recording important transactions must have grown up as a necessary consequence of social life. But of these deliberate early records a very small portion only has escaped the ravages of time and barbarism.

The earliest written annals of the Greeks, Etruscans and Romans are irretrievably lost. The traditions of the Druids perished with them. A Chinese emperor has the credit of burning ” the books ” extant in his day {about 220 B.C.), and of burying alive the scholars who were acquainted with them. And a Spanish adventurer destroyed the picture records which were found in the pueblo of Montezuma.

Of the more formal historical writings in which the first ineffectual attempts were made in the direction of systematic chronology we have no knowledge at first-hand. Of Hellanicus, the Greek logographer, who appears to have lived through the greater part of the 5th century B.C., and who drew up a chrono- logical list of the priestesses of Here at Argos; of Ephorus, who lived in the 4th century B.C., and is distinguished as the first Greek who attempted the composition of a universal history ; and of Timaeus, who in the following century wrote an elaborate history of Sicily, in which he set the example of using the Olympiads as the basis of chronology, the works have perished and our meagre knowledge of their contents is derived only from fragmentary citations in later writers. The same fate has befallen the works of Berossus and Marietho, Eratosthenes and Apollodorus. Berossus, a priest of Belus living at Babylon in the 3rd century B.C., added to his historical account of Babylonia a chronological list of its kings, which he claimed to have compiled from genuine archives preserved in the temple. Manetho, likewise a priest, living at Sebennytus in Lower Egypt in the 3rd century B.C., wrote in Greek a history of Egypt, with an account of its thirty dynasties of sovereigns, which he professed to have drawn from genuine archives in the keeping of the priests. Of these works fragments only, more or less copious and accurate, have been preserved. Eratosthenes, who in the latter half of the 2nd century B.C. was keeper of the famous Alexandrian library, not only made himself a great name by his important work on geography, but by his treatise entitled Chronographia, one of the first attempts to establish an exact scheme of general chronology, earned for himself the title of ” father of chronology.” His method of procedure, however, was usually

conjectural; and guess-work, however careful, acute and plausible, is still guess-work and not testimony. Apollodorus, an Athenian who flourished in the middle of the 2nd century B.C., wrote a metrical chronicle of events, ranging from the supposed period of the fall of Troy to his own day. These writers were followed by other investigators and systematizers in the same field, but their works are lost. Of the principal later writers whose works are extant, and to whom we owe what little knowledge we possess of the labours of their predecessors, mention will be made hereafter.

The absence or incompleteness of authentic records, however, is not the only source of obscurity and confusion in the chronology of remote ages. There can be no exact computation of time or

placing of events without a fixed point or epoch from which the reckoning takes its start. It was long before this was apprehended. When it began to be seen, various epochs were selected by various writers; and at first each small separate community had its own epoch and method of time-reckoning. Thus in one city the reckoning was by succession of kings, in another by archons or annual magistrates, in a third by succession of priests. It seems now surprising that vague counting by generations should so long have prevailed and satisfied the wants of inquiring men, and that so simple, precise and seemingly obvious a plan as counting by years, the largest natural division of time, did not occur to any investigator before Eratosthenes.

Precision, which was at first unattainable for want of an epoch, was afterwards no less unattainable from the multiplicity, and sometimes the variation, of epochs. But by a natural process the mischief was gradually and partially remedied. The ex- tension of intercourse between the various small groups or societies of men, and still more their union in larger groups, made a common epoch necessary, and led to the adoption of such a starting point by each larger group. These leading epochs continued in use for many centuries. The task of the chronologer was thus simplified and reduced to a study and comparison of dates in a few leading systems.

The most important of these systems in what we call ancient times were the Babylonian, the Greek and the Roman. The Jews had no general era, properly so called. In the history of Babylonia, the fixed point from which time was reckoned was the era of Nabonassar, 747 B.C. Among the Greeks the reckoning was by Olympiads, the point of departure being the year in which Coroebus was victor in the Olympic Games, 776 B.C. The Roman chronology started from the foundation of the city, the year of which, however, was variously given by

different authors. The most generally adopted was that assigned by Varro, 753 B.C. It is noteworthy how nearly these three great epochs approach each other, — all lying near the middle of the 8th century B.C. But it is to be remembered that the beginning of an era and its adoption and use as such are not the same thing, nor are they necessarily synchronous. Of the three ancient eras above spoken of, the earliest is that of the Olympiads, next that of the foundation of Rome, and the latest the era of Nabonassar. But in order of adoption and actual usage the last is first. It is believed to have been in use from the year of its origin. It is not known when the Romans began to use their era. The Olympiads were not in current use till about the middle of the 3rd century B.C., when Timaeus, as already mentioned, set the example of reckoning by them.

Even after the adoption in Europe of the Christian era, a great variety of methods of dating — national, provincial and ecclesiastical — grew up and prevailed for a long time in different countries, thus renewing in modern times the difficulties ex- perienced in ancient times from diversities of reckoning. An acquaintance with these various methods is indispensable to the student of the charters, chronicles and legal instruments of the middle ages.

In reckoning years from any fixed epoch in constant succession, the number denoting the years is necessarily always on the increase. But rude nations and illiterate people seldom attach any definite idea to large numbers. Hence it has been a practice, very extensively followed, to employ cycles or periods, consisting of a moderate number of years, and to distinguish and reckon the years by their number in the cycle. The Chinese and other nations of Asia reckon, not only the years, but also the months and days, by cycles of sixty. The Saros of the Chaldaeans, the Olympiad of the Greeks, and the Roman Indiction are instances of this mode of reckoning time. Several cycles were formerly known in Europe; but most of them were invented for the purpose of adjusting the solar and lunar divisions of time, and were rather employed in the regulation of the calendar than as chronological eras. They are frequently, however, of very great use in fixing dates that have been otherwise imperfectly expressed, and consequently form important elements of chronology. (W. L. R. C.)

Modern Results of Archaeological Research.

When Queen Victoria came to the English throne, 4004 B.C. was still accepted, in all sobriety, as the date of the creation of the world. Perhaps no single statement could more vividly emphasize the change in the point of view from which scholars regard the chronology of ancient history than the citation of this indisputable fact. To-day, though Bibles are still printed with the year 4004 B.C. in the margin of the first chapter of Genesis, no scholar would pretend to regard this reference seriously. On the contrary, the scholarship of to-day regards the fifth millennium B.C. as well within the historical period for such nations as the Egyptians and the Babylonians. It has come to be fully accepted that when we use such a phrase as ” the age of the world ” we are dealing with a period that must be measured not in thousands but in millions of years; and that to the age of man must be allotted a period some hundreds of times as great as the five thousand and odd years allowed by the old chronologists. This changed point of view, needless to say, has not been reached without ardent and even bitter controversy. Yet the transformation is unequivocal; and the revised concep- tion no longer seems to connote the theological implications that were at first ascribed to it. It has now become obvious that the data afforded by the Hebrew writings should never have been regarded as sufficiently accurate for the purpose of exact historical computations: that, in short, no historian working along modern scientific lines could well have made the mistake of supposing that the genealogical lists of the Pentateuch afforded an adequate chronology of world-history. But it should not be forgotten that to many generations of close scholarship these genealogical lists seemed to convey such knowledge in the most precise terms, and that at so recent a date as, for example, the year in which Queen Victoria came to the throne, it was nothing less than a rank heresy to question the historical accuracy and finality of chronologies which had no other source or foundation.

This changed point of view regarding the chronology of history may without hesitation be ascribed to the influence of evidence obtained in a single field of inquiry, the field, namely, of archaeo- logy. No doubt the evidence as to the age of the earth and as to the antiquity of man was gathered by a class of workers not formally included in the ranks of the archaeologist: workers commonly spoken of as palaeontologists, anthropologists, ethnologists and the like. But the distinction scarcely covers a real difference. The scope of the archaeologist’s studies must include every department of the ancient history of man as preserved in antiquities of whatever character, be they tumuli along the Baltic, fossil skulls and graven bones from the caves of France, the flint implements, pottery, and mummies of Egypt, tablets and bas-reliefs

from Mesopotamia, coins and sculptures of Greece and Rome, or inscriptions, waxen tablets, parchment rolls, and papyri of a relatively late period of classical antiquity. If at one time the monuments of Greece and Rome claimed the almost undisputed attention of the archaeologist, that time has long since passed. For the most important historical records that have come to us in recent decades we have to thank the Orientalist, though the classical explorer has been by no means idle. It will be sufficient here to point out in general terms the import of the message of archaeological discovery in the Victorian Era in its bearings upon the great problems of world-history.

A start was made through the efforts of the palaeontologists and geologists, with only indirect or incidental aid from the Chron-archaeologists. The new movement began actively ologyof with James Hutton in the later years of the 18th ancient century, and was forwarded by the studies of William ory ' Smith in England and of Cuvier in France; but the really efficient champion of the conception that the earth is very old was Sir Charles Lyell, who published the first edition of his epoch-making Principles of Geology only a few years before Queen Victoria came to the throne. Lyell demonstrated to the satisfaction, or — perhaps it should rather be said — to the dis-satisfaction, of his contemporaries that the story of the geological ages as recorded in the strata of the earth becomes intelligible

only when vast stretches of time are presupposed. Of course the demonstration was not accepted at once. On the contrary, the champions of the tradition that the earth was less than six thousand years old held their ground most tenaciously, and the earlier years of the Victorian era were years of bitter controversy. The result of the contest was never in doubt, however, for the geological evidence, once it had been gathered, was unequivocal; and by about the middle of the century it was pretty generally admitted that the age of the earth must be measured by an utterly different standard from that hitherto in vogue. This concession, however, by no means implied a like change of view regarding the age of man. A fresh volume of evidence required to be gathered, and a new controversy to be waged, before the old data for the creation of man could be abandoned. Lyell again was in the forefront of the progressive movement, and his work on The Antiquity of Man, published in 1863, gave currency for the first time to the new opinions. The evidence upon which these opinions were based had been gathered by such anthro- pologists as Schmerling, Boucher de Perthes and others, and it had to do chiefly with the finding of implements of human construction associated with the remains of extinct animals in the beds of caves, and with the recovery of similar antiquities from alluvial deposits the great age of which was

demonstrated by their depth. Every item of the evidence was naturally subjected to the closest scrutiny, but at last the conservatives were forced reluctantly to confess themselves beaten. Their traditional arguments were powerless before the array of data marshalled by the new science of prehistoric archaeology. Look- ing back even at the short remove of a single generation, it is difficult to appreciate how revolutionary was the conception of the antiquity of man thus inculcated. It rudely shocked the traditional attitude of scholarship towards the history of our race. It disturbed the most cherished traditions and the most sacred themes. It seemed to threaten the very foundations of religion itself. Yet the present generation accepts the antiquity of man as a mere matter of fact. Here, as so often elsewhere, the heresy of an elder day has come to seem almost an axiomatic truth. ‘

If we go back in imagination to the beginning of the Victorian era and ask what was then known of the history of Ancient Egypt, Mesopotamia and Asia Minor, we find ourselves con- fronted with a startling paucity of knowledge. The key to the mysteries of Egyptian history had indeed been found, thanks to the recent efforts of Thomas Young and Champollion, but the deciphering of inscriptions had not yet progressed far enough to give more than a vague inkling of what was to follow. It remained, then, virtually true, as it had been for two thousand years, that for all that we could learn of the history of the Old Orient in pre-classical days, we must go solely to the pages of the Bible and to a few classical authors, notably Herodotus and Diodorus. A comparatively few pages summed up, in language often vague and mystical, all that the modern world had been permitted to remember of the history of the greatest nations of antiquity. To these nations the classical writers had ascribed a traditional importance, the glamour of which still lighted their names, albeit revealing them in the vague twilight of tradition rather than in the clear light of history. It would have been a bold, not to say a reckless, dreamer who dared predict that any future researches could restore to us the lost knowledge that had been forgotten for more than two millenniums. Yet the Victorian era was scarcely ushered in before the work of rehabilitation began, which was to lead to the most astounding discoveries and to an altogether unprecedented extension of historical knowledge. Early in the ‘forties the Frenchman Botta, quickly followed by Sir Henry Layard, began making excavations on the site of ancient Nineveh, the name and fame of which were a tradition having scarcely more than mythical status. The spade of the discoverer soon showed that all the fabled glories of the ancient Assyrian capital were founded on realities, and evidence was afforded of a state of civilization and

culture such as few men supposed to have existed on the earth before the C»>lden Age of Greece. Not merely were artistic sculptures and bas-reliefs

found that demonstrated a high development of artistic genius, but great libraries were soon revealed, — books consisting of bricks of various sizes, or of cylinders of the same material, inscribed while in the state of clay with curious characters which became indelible when baking transformed the clay into brick. No one was able to guess, even in the vaguest way, the exact interpretation of these odd characters; but, on the other hand, no one could doubt that they constituted a system of writing, and that the piles of inscribed tablets were veritable books. There were numerous sceptics, however, who did not hesitate to assert that the import of the message so obviously locked in these curious inscriptions must for ever remain an absolute mystery. Here, it was said, were inscriptions written in an unknown character and in a language that for at least two thousand years had been absolutely forgotten. In such circum- stances nothing less than a miracle could enable human ingenuity to fathom the secret. Yet the feat pronounced impossible by mid-century scepticism was accomplished by contemporary scholarship, amidst the clamour of opposition and incredulity. Its success contains at once a warning to those doubters who are always crying out that we have reached the limitations of knowledge, and an encouragement and stimulus to would-be explorers of new intellectual realms.

In a few words the manner of the discovery was this. It appears at a glance that the Assyrian written character consists of groups of horizontal, vertical or oblique strokes.. The characters thus composed, though so simple as to their basal unit, are appallingly complex in their elaboration. The Assyrians with all their culture, never attained the stage of analysis which demonstrates that only a few fundamental sounds are involved in human speech, and hence that it is possible to express all the niceties of utterance with an alphabet of little more than a score of letters. Halting just short of this analysis, the Assyrian ascribed syllabic values to the characters of his script, and hence, instead of finding twenty odd characters sufficient, he required about five hundred. There was a further complication in that each one of these characters had at least two different phonetic values; and there were other intricacies of usage which, had they been foreknown by inquirers in the middle of the 19th century, might well have made the

problem of decipherment seem an utterly hopeless one. Fortunately it chanced that another people, the Persians, had adopted the Assyrian wedge-shaped stroke as the foundation of a written character, but making that analysis of which the Assyrians had fallen short, had borrowed only so many characters as were necessary to represent the alphabetical sounds. This made the problem of deciphering Persian inscriptions a relatively easy one. In point of fact this problem had been partially solved in the early days of the 19th century, thanks to the sagacious guesses of the German philo- logist Grotefend. Working with some inscriptions from Perse- polis which were found to contain references to Darius and Xerxes, Grotefend had established the phonetic values of certain of the Persian characters, and his successors were perfecting the discovery just about the time when the new Assyrian finds were made. It chanced that there existed on the polished surface of a cliff at Behistun in western Persia a tri-lingual inscription Which, according to Diodorus, had been made by Queen Semiramis of Nineveh, but which, as is now known, was really the work of King Darius. One of the languages of this inscription was Persian; another, as it now appeared, was Assyrian, the language of the newly discovered books from the libraries of Nineveh. There was reason to suppose that the inscriptions were identical in meaning; and fortunately it proved, when the inscriptions were made accessible to investiga- tion through the efforts of Sir Henry Rawlinson, that the Persian inscription contained a large number of proper names. It was well known that proper names are usually transcribed from one language into another with a tolerably close retention of their original sounds. For example, the Greek names Ptolemaios and Kleopatra became a part of the Egyptian language and appeared regularly in Egyptian inscriptions after Alexander's general became king of Egypt. Similarly, the Greek names

Kyros, Dareios snidXerxes were as close an imitation aspracticable of the native names of these Persian monarchs. Assuming, then, that the proper names found in the Persian portion of the Behistun inscription occurred also in the Assyrian portion, retaining virtually the same sound in each, a clue to the phonetic values of a large number of the Assyrian characters was obviously at hand. Phonetic values known, Assyrian was found to be a Semitic language cognate to Hebrew.

These clues were followed up by a considerable number of investigators, with Sir Henry Rawlinson in the van. Thanks to their efforts, the new science of Assyriology came into being, and before long the message of the Assyrian books had ceased to be an enigma. Of course this work was not accomplished in a day or in a year, but, considering the difficulties to be overcome, it was carried forward

with marvellous expedition. In 1857 the new scholarship was put to a famous test, in which the challenge thrown down by Sir George Cornewall Lewis and Ernest Renan was met by Rawlinson, Hincks, Oppert and Fox Talbot in a conclusive manner. The sceptics had declared that the new science of Assyriology was itself a myth: that the investigators, self-deceived, had in reality only invented a language and read into the Assyrian inscriptions something utterly alien to the minds of the Assyrians themselves. But when a committee of the Royal Asiatic Society, with George Grote at its head, decided that the translations of an Assyrian text made independently by the scholars just named were at once perfectly intelligible and closely in accord with one another, scepticism was silenced, and the new science was admitted to have made good its claims.

Naturally the early investigators did not fathom all the niceties of the language, and the work of grammatical investiga- tion has gone on continuously under the auspices of a constantly growing band of workers. Doubtless much still remains to be done; but the essential thing, from the present standpoint, is that a sufficient knowledge of the Assyrian language has been acquired to ensure trustworthy translations of the cuneiform texts. Meanwhile, the material found by Botta and Layard, and other successors, in the ruins of Nineveh, has been constantly augmented through the efforts of companies of other investigators, and not merely Assyrian, but much earlier Babylonian and Chaldaean texts in the greatest profusion have been brought to the various museums of Europe and America. The study of these different inscriptions has utterly revolutionized our knowledge of Oriental history. Many of the documents are strictly historical in their character, giving full and accurate contemporary accounts of events that occurred some thousands of years ago. Exact dates are fixed for long series of events that previously were quite unknown. Monarchs whose very names had been forgotten are restored to history, and the records of their deeds inscribed under their very eyes are before us, — contem- porary documents such as neither Greece nor Rome could boast, nor any other nation, with the single exception of Egypt, until strictly modern times. There are, no doubt, gaps in the record; there are long periods for which the chronology is still uncertain. Naturally there is an increasing vagueness as one recedes farther into the past, and for the earlier history of Chaldaea there is great uncertainty. Nevertheless, the Assyriologist speaks with a good deal of confidence of dates as remote as 3800 B.C., the time ascribed to King Sargon, who was once regarded as a mythical person, but is now known to have been an actual monarch. Indeed, there are tablets in the British Museum labelled 4500 B.C. ; and later researches, particularly those of

the expedition of the University of Pennsylvania at Nippur, have brought us evidence which, interpreted with the aid of estimates as to the average rate of accumulation of dust deposits, leads to the inference that a high state of civilization had been attained in Mesopotamia at least 9000 years ago.

While the Assyriologists have been making these astonishing revelations, the Egyptologists have not been behindhand. Such scholars as Lepsius, Brugsch, de. Rouge, Lenormant, Birch, Mariette, Maspero and Erman have perfected the studies of Young and Champollion; while at the same time these and a considerable company of other explorers, most notable of whom

are Gardner Wilkinson and Professor Flinders Petrie, have brought to light a vast accumulation of new material, much of which has the highest importance from the standpoint of the historian. Lists of kings found on the temple wall at Abydos, in the fragments of the Turin papyrus and elsewhere, have cleared up many doubtful points in the lists of Manetho, and at the same time, as Professor Petrie has pointed out, have proved to us how true a historian that much-discussed writer was. Manetho, it will be recalled, was the Egyptian who wrote the history of Egypt in Greek in the time of the Ptolemies. His work in the original unfortunately perished, and all that we know of it we learn through excerpts made by a few later classical writers. These fragments have until recently, however, given us our only clue to the earlier periods of Egyptian history. Until corroboration was ‘found in the Egyptian inscriptions themselves, not only were Manetho’s lists in doubt, but scepticism had been carried to the point of denying that Manetho himself had ever existed. This is only one of many cases where the investigations of the archaeologist have proved not iconoclastic but reconstructive, tending to restore confidence in classical traditions which the scientific historians of the age of Niebuhr and George Cornewall Lewis regarded with scepticism.

As to the exact dates of early Egyptian history there is rather more of vagueness than for the corresponding periods of Mesopo- tamia. Indeed, approximate accuracy is not attained until we are within sixteen hundred years of our own era; but the sequence of events of a period preceding this by two thousand years is well established, and the recent discoveries of Professor Petrie carry back the record to a period which cannot well be less than five thousand, perhaps not less

than six thousand years B.C. Both from Egypt and Mesopotamia, then, the records of the archaeologist have brought us evidence of the existence of a highly developed civilization for a period exceeding by hundreds, perhaps by thousands, of years the term which had hitherto been considered the full period of man's existence.

We may note at once how these new figures disturb the histori- cal balance. If our forerunners of eight or nine thousand years ago were in a noonday glare of civilization, where shall we look for the much-talked-of " dawnings of history " ? By this new standard the Romans seem our contemporaries in latter-day civilization; the " Golden Age " of Greece is but of yesterday; the pyramid-builders are only relatively remote. The men who built the temple of Bel at Nippur, in the year (say) 5000 B.C., must have felt themselves at a pinnacle of civilization and culture. As Professor Mahaffy has suggested, the era of the Pyramids may have been the veritable autumn of civilization. Where, then, must we look for its springtime ? The answer to that question must come, if it come at all, from what we now speak of as prehistoric archaeology; the monuments from Memphis and Nippur and Nineveh, covering a mere ten thousand years or so, are the records of recent history.

The efforts of the students of Oriental archaeology have been constantly stimulated by the fact that their studies brought Archae- them more or less within the field of Bible history. ologyand A fair proportion of the workers who have delved so Bible enthusiastically in the fields of Egyptian and Assyrian

- ory ' exploration would never have taken up the work at all but for the hope that their investigations might substantiate the Hebrew records. For a long time this hope proved illusory, and in the case of Egyptian archaeology the results have proved disappointing even up to the very present. Considering the important part played by the Egyptian sojourn of the Hebrews, as narrated in the Scriptures, it was certainly not an over-enthusiastic prediction that the Egyptian monuments when fully investigated would divulge important references to Joseph, to Moses, and to the all-important incidents of the Exodus; but half a century of expectant attention in this direction has led only to disappointment. It would be rash, considering the buried treasures that may yet await the future explorer, to assert that such records as those in question can never come to light. But, considering the fulness of the contemporary Egyptian records of the XIX th dynasty that are already known, it becomes

increasingly doubtful whether the Hebrews in Egypt played so important a part in history, when viewed from the Egyptian standpoint, as their own records had seemed to imply. As the forgotten history of Oriental antiquity has been restored to us, it has come to be understood that, politically speaking, the Hebrews were a relatively insignificant people, whose chief importance from the standpoint of material history was derived from the geographical accident that made them a sort of buffer between the greater nations about them. Only once, and for a brief period, in the reigns of David and Solomon did the Hebrews rise to anything like an equal plane of political import- ance with their immediate neighbours. What gave them a seeming importance in the eyes of posterity was the fact that the true history of the Egyptians, Mesopotamians, Arabians and Hittites had been well-nigh forgotten. The various litera- tures of these nations were locked from view for more than two thousand years, while the literature of Israel had not merely been preserved, but had come to be regarded as inspired and sacred among all the cultured nations of the Western world. Now that the lost literatures have been restored to us, the status of the Hebrew writings could not fail to be disturbed. Their very isolation had in some measure accounted for their seeming importance.

All true historical perspective is based upon comparison, and where only a single account has been preserved of any event or of any period of history, it is extremely difficult to judge that account with historical accuracy. An illustration of this truth is furnished in profane history by the account which Tlmcydides has given us of the Peloponnesian War. For most of the period in question Thucydides is the only source; and despite the in- herent merits of a great writer, it can hardly be doubted that the tribute of almost unqualified praise that successive genera- tions of scholars have paid to Thucydides must have been in some measure qualified if, for example, a Spartan account of the Peloponnesian War had been preserved to us. Professor Mahaffy has. pointed out that many other events in Greek history are viewed by us in somewhat perverted perspective because the great writers of Greece were Athenians rather than Spartans or Thebans. Even in so important a matter as the great conflict between Persia and Greece it has been suggested more than once that we should be able to gain a much truer view were Persian as well as Greek accounts accessible.

Not many years ago it would have been accounted a heresy to suggest that the historical books of the Old Testament had conveyed to our minds estimates of Oriental history that suffered from this same defect; but to-day no one who is competent to speak with authority pretends to doubt that such is really the fact. Even conservative

students of the Bible urge that its historical passages must be viewed precisely in the light of any other historical writings of antiquity: and the fact that the oldest Hebrew manuscript dates only from the 8th century a.d., and therefore of necessity brings to us the message of antiquity through the fallible medium of many generations of copyists, is far more clearly kept in mind than it formerly was. Every belief of mankind is in the last analysis amenable to reason, and finds its origin in evidence that can appeal to the arbitrament of common sense. This evidence may in certain cases consist chiefly of the fact that generations of our predecessors have taken a certain view regarding a certain question; indeed most of our cherished beliefs have this foundation. But when such is the case, mankind has never failed in the long run to vindicate its claim to rationality by showing a readiness to give up the old belief whenever tangible evidence of its fallaciousness was forthcoming. The case of the historical books of the Old Testament furnishes no exception. These had been sacred to almost a hundred generations of men, and it was difficult for the eye of faith to see them as other than absolutely infallible documents. Yet the very eagerness with which the champions of the Hebrew records searched for archaeological proofs of their validity was a tacit confession that even the most unwavering faith was not beyond the reach of external evidence. True, the believer sought corroboration with full faith that he would find it; but the very

fact that he could think such external corroboration valuable implied, however little he may have realized it, the subconscious concession that he must accept external evidence at its full value, even should it prove contradictory. If, then, an Egyptian inscription of the XlXth dynasty had come to hand in which the names of Joseph and Moses, and the deeds of the Israelites as a subject people who finally escaped from bondage by crossing the Red Sea, were recorded in hieroglyphic characters, such a monument would have been hailed with enthusiastic delight by every champion of the Pentateuch, and a wave of supreme satisfaction would have passed over all Christendom. It is not too much, then, to say that failure to find such a monument has caused deep disappointment to Bible scholars everywhere. It does not follow that faith in the Bible record is shaken, although in some quarters there has been a pronounced tendency to regard the history of the Egyptian sojourn as mythical; yet it cannot be denied that Egyptian records, corroborating at least some phases of the Bible story, would have been a most welcome addition to our knowledge.

Some recent finds have, indeed, seemed to make inferential reference to the Hebrews, and the marvellous collec- tion of letters of the XVIIIth dynasty found at Tel el-Amarna — letters to which we shall refer later — have the utmost importance as proving a possible early date for the Mosaic accounts. But such inferences as these are but a vague return for the labour expended, and an almost cruelly inadequate response to seemingly well-founded expectations.

When we turn to the field of Babylonian and Assyrian archaeo- logy, however, the case is very different. Here we have docu- ments in abundance that deal specifically with events more or less referred to in the Bible. The records of kings whose names hitherto were known to us only through Bible references have been found in the ruins of Nineveh and Babylon, and personages hitherto but shadowy now step forth as clearly into the light of history as an Alexander or a Caesar. Moreover, the newly discovered treasures deal with the beliefs of the people as well as with their history proper. The story of the books now spoken of as the ” Creation ” and ” Deluge” tablets of the Assyrians, in the British Museum, which were discovered in the ruins of Nineveh by Layard and by George Smith, has been familiar to every one for a good many years. The acute interest which they excited when George Smith deciphered their contents in 1872 has to some extent abated, but this is only because scholars are now pretty generally agreed as to their bearing on the corresponding parts of Genesis. The particular tablets in question date only from about the 7th century B.C., but it is agreed among Assyriologists that they are copies of older texts current in Babylonia for many centuries before, and it is obvious that the compilers of Genesis had access to the Babylonian stories. In a word, the Hebrew Genesis shows unequivocal evidence of Babylonian origin, but, in the words of Professor Sayce, it is but “a paraphrase and not a translation.” However disconcerting such a revelation as this would have been to the theologians of an elder day, the Bible scholars of our own generation are able to regard it with entire composure.

From the standpoint of the historian even greater interest attaches to the records of the Assyrian and Babylonian kings when compared with the historical books of the Old Testament. For some centuries the inhabitants of Palestine were subject to periodical attacks from the warlike inhabitants of Mesopotamia, as even the most casual reader of the Bible is aware. When it became known that the accounts of these invasions formed a part of the records preserved in the Assyrian libraries, historian and theologian alike waited with breathless interest for the exact revelations in store; and this time expectation was not dis- appointed. As, one after another, the various tablets and cylinders and annalistic tablets have been translated, it has become increasingly

clear that here are almost inexhaustible fountains of knowledge, and that sooner or later it may be possible to check the Hebrew accounts of the most important periods of their history with contemporaneous accounts written from another point of view. It is true that the cases are not very numerous where precisely the same event is described from

opposite points Of view, but, speaking in general terms rather than of specific incidents, we are already able to subject considerable portions of history to this test. The records of Shalmaneserll., Tiglath-Pileser III. and Sennacherib, kings of Assyria, of Nebuchadrezzar, king of Babylon, and of Cyrus, king of Persia, all contain direct references to Hebrew history. An obelisk of Shalmaneser II. contains explicit reference to the tribute of Jehu of Samaria, and graphically depicts the Hebrew captives. Tiglath-Pileser III., a usurper who came to the throne of Assyria in 745 B.C., and whose earlier name of Pul proved a source of confusion to the later Hebrew writers, left records that have served to clear up the puzzling chronology of a considerable period of the history of Samaria. Most interesting of all, perhaps, are the annals of Sennacherib, the destruction of whose hosts by the angel of God is so strikingly depicted in the Book of Kings. The court historian of Sennacherib naturally does not dwell upon this event, but he does tell of an invasion and conquest of Palestine. The Hebrew account of the death of Sennacherib is corroborated by a Babylonian inscription. Here, however, there is an interest- ing qualification. The account in the Book of Kings is so phrased that one might naturally infer from it that Sennacherib was assassinated by his sons immediately after his return from the disastrous campaign in Palestine; but in point of fact, as it now appears, the Assyrian king survived that campaign by twenty years. One cannot avoid the suspicion that in this instance the Hebrew chronicler purposely phrased his account to convey the impression that Sennacherib's tragic end was but the slightly delayed culmination of the punishment inflicted for his attack upon the " chosen people." On the other hand, the ambiguity may be quite unintentional, for the Hebrew writers were notoriously lacking in the true historical sense, which shows itself in a full appreciation of the value of chronology.

One of the most striking instances of the way in which mistakes of chronology may lead to the perversion of historical records is shown in the Book of Daniel in connexion with the familiar account of the capture of Babylon by Cyrus. Within the past generation records of Cyrus have been brought to light, as well as records of the conquered Babylonian king himself, which show that the Hebrew writers of the later day had a peculiarly befogged impression of a great historical event — their misconception being shared, it may be added, by the

Greek historian Herodotus. When the annalistic tablet of Cyrus was translated, it was made to appear, to the consternation of Bible scholars, that the city of Babylon had capitulated to the Persian — or more properly to the Elamite — conqueror without a struggle. It appeared, further, that the king ruling in Babylon at the time of the capitulation was named not Belshazzar, but Nabonidos. This king,as appears from his own records, had a son named Belshazzar, who commanded Babylonian armies in outlying provinces, but who never came to the throne. Nothing could well be more disconcerting than such a revelation as this. It is held, however, that the startling discrepancies are not so difficult to explain as may appear at first sight. The explanation is found, so the Assyrio- logist assures us, in the fact that both Hebrew and Greek historians, writing at a considerable interval after the events, and apparently lacking authentic sources, confused the peaceful occupation of Babylon by Cyrus with its siege and capture by a successor to that monarch, Darius Hystaspes. As to the con- fusion of Babylonian names — in which, by the way, the Hebrew and Greek authors do not agree — it is explained that the general, Belshazzar, was perhaps more directly known in Palestine than his father the king. But the vagueness of the Hebrew knowledge is further shown by the fact that Belshazzar, alleged king, is announced as the son of Nebuchadrezzar (misspelled Nebuchad- nezzar in the Hebrew writings) , while the three kings that reigned after Nebuchadrezzar, and before Nabonidos usurped the throne, are quite overlooked.

Our present concern with the archaeological evidence thus briefly outlined, and with much more of the kind, may be summed up in the question: What in general terms is the inference to be drawn by the world-historian from the Assyrian records in their bearings upon the Hebrew writings ? At first sight this

might seem an extremely difficult question to answer. Indeed, to answer it to the satisfaction of all concerned might well be pronounced impossible. Yet it Would seem as if a candid and impartial historian could not well be greatly in doubt in the matter. On the one hand, the general agreement everywhere between the Hebrew accounts and contemporaneous records from Mesopotamia proves beyond cavil that, broadly speaking, the Bible accounts are historically true, and were written by persons who in the main had access to contemporaneous docu- ments. On the other hand, the discrepancies as to details, the confusion as to exact chronology, the manifest

prejudice and partizanship, and the obvious limitations of knowledge make it clear that the writers partook in full measure of the shortcomings of other historians, and that their work must be adjudged by ordinary historical standards. As much as this is perhaps conceded by most, if not all, schools of Bible criticism of to-day. Professor Sayce, one of the most distinguished of modern Assyriologists, writing as an opponent of the purely destructive ” Higher Criticism,” demands no more than that the Book of Genesis ” shall take rank by the side of the other monuments of the past as the record of events which have actually happened and been handed on by credible men “; that it shall, in short, be admitted to be ” a collection of ancient documents which have all the value of contemporaneous testimony,” but which being in themselves ” wrecks of vast literatures which extended over the Oriental world from a remote epoch,” cannot be understood aright ” except in the light of the contemporaneous literature of which they form a portion.” From the point of view implied by such words as these, it is only necessary to recall the mental attitude of our grandfathers to appreciate in some measure the revolution in thought that has been wrought in this field within the last half-century, largely through the instrumentality of Oriental archaeology.

We have seen that the general trend of Oriental archaeology has been reconstructive rather than iconoclastic. Equally true Archae- 1& tfl i s °f re cent classical archaeology. Here no such ologyaad revolution has been effected as that which virtually classical created anew the history of Oriental antiquity; yet history. tng b earm g s f (jj e new knowledge are similar in kind if different in degree. The world had never quite forgotten the history of the primitive Greeks as it had forgotten the Mesopo tamians, the Himyaritic nations and the Hittites; but it remembered their deeds only in the form of poetical myths and traditions. These traditions, finding their clearest delineation in the lines of Homer, had been subjected to the analysis of the critical historians of the early decades of the 19th century, and their authenticity had come to be more than doubted. The philological analysis of Wolf and his successors had raised doubts as to the very existence of Homer, and at one time the main current of scholarly opinion had set strongly in the direction of the belief that the Iliad and the Odyssey were in reality but latter-day collections of divers recitals that had been handed down by word of mouth from one generation to another of bards through ages of illiteracy. It was strenuously contended that the case could not well be otherwise, inasmuch as the art of writing must have been quite unknown in Greece until after the alleged age of the traditional Homer, whose date had been variously

estimated at from 1000 to 800 B.C. by less sceptical generations. It had come to be a current belief that the Iliad was first committed to writing in the age of Peisistratus. A prominent controversialist, F. A. Paley, even went so far as to doubt whether a single written copy of the Iliad existed in Greece at the time of the Peloponnesian War. The doubts thus cast upon the age when the Homeric poems first assumed the fixed form of writing were closely associated with the universal scepticism as to the historical accuracy of any traditions whatever regarding the early history of Greece. Cautious historians had come to regard the so-called " Heroic Age " as a prehistoric period regarding which nothing definite was known, or in all probability could be known. It was ably argued by Sir George Cornewall Lewis, in connexion with his inquiries into early Roman history, that a verbal tradition is not transmitted from one

generation to another in anything like an authentic form for a longer period than about a century. If, then, the art of writing was unknown in Greece before, let us say, the 6th century B.C., it would be useless to expect that any events of Grecian history prior to about the 7th century B.C. could have been transmitted to posterity with any degree of historical accuracy.

Notwithstanding the allurements of the subject, such con- servative historians as Grote were disposed to regard the problems of early Grecian history as inscrutable, and to content themselves with the recital of traditions without attempting to establish their relationship with actual facts. It remained for the more robust faith of a Schliemann to show that such scepticism was all too faint-hearted, by proving that at such sites as Tiryns, Mycenae and Hissarlik evidences of a very early period of Greek civilization awaited the spade of the excavator. Thanks to the enthusiasm of Schliemann and his successors, we can now substitute for the mythical " Age of Heroes " a historical " Mycenaean Age " of Greece, and give tangible proof of its relatively high state of civilization. Schliemann may or may not have been correct in identifying one of the seven cities that he unearthed at Hissarlik as the fabled Troy itself, but at least his efforts sufficed to give verisimilitude to the Homeric story. With the lessons of recent Oriental archaeology in mind, few will be sceptical enough to doubt that some such contest as that described in the Iliad actually occurred. And now, thanks to the efforts of a large company of workers, notably Dr Arthur Evans and his associates in Cretan exploration, we are coming to speak with some confidence not merely of a Mycenaean but of a pre-Mycenaean Age.

As yet we see these periods somewhat darkly. The illuminative witness

of written records is in the main denied us here. Some most archaic inscriptions have been indeed found by the explorers in Crete, but these for the present serve scarcely any other purpose than to prove the antiquity of the art of writing among a people who were closely in touch with the inhabitants of Hellas proper. Most unfortunately for posterity, the Greeks wrote mainly on perishable materials, and hence the chief records even of their later civilization have vanished. The only fragments of Greek manuscripts antedating the Christian era that have been preserved to us have been found in Egypt, where a hospitable climate granted them a term of existence not to be hoped for elsewhere. No fragment of these papyri, indeed, carries us further back than the age of the Ptolemies; but the Greek inscriptions on the statues of Rameses II. at Abu-Simbel, in Nubia, give conclusive proof that the art of writing was widely disseminated among the Greeks at least three centuries before the age of Alexander. This carries us back towards the traditional age of Homer.

The Cretan inscriptions belong to a far older epoch, and are written in two non-Grecian scripts of undetermined affinities. Here, then, is direct evidence that the Aegean peoples of the Mycenaean Age knew how to write, and it is no longer necessary to assume that the verses of the Iliad were dependent on mere verbal transmission for any such period as has been supposed.

But even were direct evidence of the knowledge of the art of writing in Greece of the early day altogether lacking, none but the hardiest sceptic could doubt, in the light of recent archaeo- logical discoveries elsewhere, that the inhabitants of ancient Hellas of the ” Homeric Age ” must have shared with their contemporaries the capacity to record their thought in written words. We have seen that Oriental archaeology has in recent generations revolutionized our conceptions of the antiquity of civilization. We have seen that written documents have been preserved in Mesopotamia to which such a date as 4500 B.C. may be ascribed with a good deal of confidence; and that from the third millennium B.C. a flood of contemporary literary records comes to us both from Egypt and Mesopotamia. But until recently it had been supposed that Hellas was shut out entirely from this Oriental culture. Historians have found it hard to dispel the idea that civilization in Greece was a very late develop- ment, and that the culture of the age of Solon sprang, in fact, suddenly into existence, as it seems to do in the records of the

historian. But the excavations that have given us a knowledge of the Mycenaean Age have proved conclusively, not alone that civilization existed in Greece in an early day, but that this civilization was closely linked with the civilization of Egypt. Not only have antiquities been found in Crete that point to Egyptian inspiration, but quite recently Professor Petrie has found at Tel el-Amarna Mycenaean pottery. The latter find has a peculiar significance, since the date of the Tel el-Amarna collection is defimtely fixed between the years 1400 and .13 70 B.C.

It is demonstrated, then, that as early as the beginning of the 14th century B.C. the Mycenaean civilization was in touch with the ancient civilization of Egypt. One must not infer from this, however, that the two civilizations met on anything like an equality. Indeed, in the wonderful Tel-el-Amarna collection there is a suggestive absence of literary documents from the Aegean that demands a word of notice. The Tel el- Amarna collection, it will be recalled, consists of the royal archives of King Amenophis IV. of the XVIIIth Egyptian dynasty, who in the latter years of his reign chose to be known as Akhenaton, ” the glory of the solar disk.” This monarch had retired from Thebes and established his court on the site now known as Tel el-Amarna, where he founded the city which existed only during the brief period of thirty years ending with the death of the monarch about 1370 B.C. The date of the documents found in the royal library is, therefore, fixed within very narrow limits. The documents in question consist chiefly of letters, and constitute one of the mos,t important of archaeo- logical finds. These letters came to the king from almost every part of western Asia, including Palestine and Phoenicia, Babylonia and Asia Minor. Strangely enough, all the letters are written in the Babylonian character, and most of them are in the Babylonian language. They afford, therefore, most striking evidence of a widespread diffusion of Babylonian culture. Incidentally they prove, to the utter confusion of a certain school of Bible critics, that the art of writing was familiarly known in Canaan, and that Egypt and western Asia were in full literary connexion with one another, long before the time of the Exodus. Hence all the elaborate arguments based on the supposition that Moses probably could not write fall to the ground. On the other hand, the absence of letters from Mycenae among the tablets of Tel el-Amarna must be regarded as at least suggestive. Seemingly the widespread Babylonian culture had not reached the Aegean peoples; yet these peoples cannot have been wholly ignorant of things with which commercial intercourse brought them in contact. The point is of no very great significance, however, since no one has pretended that the Western civilization compared with the Eastern in

point of antiquity; and in any event, no amount of negative evidence weighs a grain in the balance against the positive evidence of the Cretan inscriptions.

The researches of the archaeologist are, in short, tending to reconstruct the primitive classical history; and here, as in the Orient, it is evident that historians of the earlier day were constantly blinded by a misconception as to the antiquity of civilization. Such a fruitage as that of Greek culture of the age of Pericles does not come to maturity without a long period of preparation. Here, as elsewhere, the laws of evolution hold, permitting no sudden stupendous leaps. But it required the arduous labours of the archaeologist to prove a proposition that, once proven, seems self-evident. CH. S. Wi.)

Eras and Periods.

In the article Calendar (q.v.), that part of chronology is treated which relates to the measurement of time, and the principal methods are explained that have been employed, or are still in use, for adjusting the lunar months of the solar year, as well as the intercalations necessary for regulating the civil year according to the celestial motions. But it is necessary to notice here the different Eras and Periods that have been employed by historians, and by the different nations of the world, in recording the succes- sion of time and events, to fix the epochs at which the eras respectively commenced, to ascertain the form and the initial day of the year made use of, and to establish their correspondence

with the years of the Christian era. These elements will enable us to convert, by a simple arithmetical operation, any historical date, of which the chronological characters are given according to any era whatever, into the corresponding date in the Christian era.

Julian Period. — Although the Julian period (the invention of Joseph Scaliger, in 1582) is not, properly speaking, a chrono- logical era, yet, on account of its affording considerable facilities in the comparison of different eras with one another, and in marking without ambiguity the years before Christ, it is very generally employed by chronologers. It consists of 7980 Julian years; and the first year of the Christian era corresponded with the year 4714 of the Julian period.

Olympiads. — The Olympic games, so famous in Greek history, were celebrated once every four years, between the new and full moon first following the summer solstice, on the small plain named Olympia in Elis, which was bounded on one side by the river Alpheus, on another

by the small tributary stream the Cladeus, and on the other two sides by mountains. The games lasted five days. Their origin, lost in the dimness of remote antiquity, was invested by priestly legends with a sacred char- acter. They were said to have been instituted by the Idaean Heracles, to commemorate his victory over his four brothers in a foot-race. According to a tradition, possibly more authentic, they were re-established by Iphitus, king of Elis, in concert with the Spartan Lycurgus and Cleosthenes of Pisa. The practice was long afterwards adopted of designating the Olympiad, or period of four years, by the name of the victor in the contests of the stadium, and of inscribing his name in the gymnasium of Olympia. The first who received this honour was Coroebus. The games in which Coroebus was victor, and which form the principal epoch of Greek history, were celebrated about the time of the summer solstice 776 years before the common era of the Incarnation, in the 3938th year of the Julian period, and twenty- three years, according to the account of Varro, before the foundation of Rome.

Before the introduction of the Metonic cycle, the Olympic year began sometimes with the full moon which followed, at other times with that which preceded the summer solstice, because the year sometimes contained 384 days instead of 354. But subsequently to its adoption, the year always commenced with the eleventh day of the moon which followed the solstice. In order to avoid troublesome computations, which it would be necessary to recommence for every year, and of which the results differ only by a few days, chronologers generally regard the 1st of July as the commencement of the Olympic year. Some authors, however, among whom are Eusebius, Jerome and the historian Socrates, place its commencement at the 1st of September; these, however, appear to have confounded the Olympic year with the civil year of the Greeks, or the era of the Seleucidae.

It is material to observe, that as the Olympic years and periods begin with the 1st of July, the first six months of a year of our era correspond to one Olympic year, and the last six months to another. Thus, when it is said that the first year of the Incarnation corre- sponds to the first of the 195th Olympiad, we are to understand that it is only with respect to the last six months of that year that the correspondence takes place. The first six months belonged to the fourth year of the 194th Olympiad. In referring dates expressed by Olympiads to our era, or the contrary, we must therefore dis- tinguish two cases.

15/. When the event in question happened between the 1st of January and the 1st of the following July, the sum of the Olympic year and of

the year before Christ is always equal to 776. The year of the era, therefore, will be found by subtracting the number of the Olympic year from 776. For example, Varro refers the founda- tion of Rome to the 21st of April of the third year of the sixth Olympiad, and it is required to find the year before our era. Since five Olympic periods have elapsed, the third year of the sixth Olympiad is 5X4 + 3 = 23; therefore, subtracting 23 from 776, we have 753, which is the year before Christ to which the foundation of Rome is referred by Varro.

2nd. When the event took place between the summer solstice and the 1st of January following, the sum of the Olympic year and of the year before Christ is equal to 777. The difference, therefore, between 777 and the year in one of the dates will give the year in the other date. Thus, the moon was eclipsed on the 27th of August, a little before midnight, in the year 413 before our era; and it is required

to find the corresponding year in the Olympic era. Subtract 413 from 777, the remainder is 364; and 364 divided by four gives 91 without a remainder; consequently the eclipse happened in the fourth year of the ninety-first Olympiad, which is the date to which it is referred by Thucydides.

If the year is after Christ, and the event took place in one of the first six months of the Olympic year, that is to say, between July and January, we must subtract 776 from the number of the Olympic year to find the corresponding year of our era; but if it took place in one of the last sixmonths of the Olympic year, or between January and July, we must deduct 777. The computation by Olympiads seldom occurs in historical records after the middle of the 5th century of our era.

The names of the months were different in the different Grecian states. The Attic months, of which we possess the most certain knowledge, were named as follows: —

Hecatombaeon. Gamelion.

Metageitnion. Anthesterion.

Boedromion. Elaphebolion.

Pyanepsion. Munychion.

Maemacterion. Thargelion.

Poseideon. Scirophorion.

Era of the Foundation of Rome. — After the Olympiads, the era most frequently met with in ancient history is that of the foundation of Rome, which is the chronological epoch adopted by all the Roman historians. There are various opinions respect- ing the year of the foundation of Rome. (1) Fabius Pictor places it in the latter half of the first year of the eighth Olympiad, which corresponds with the 3967th of the Julian period, and with the year 747 B.C. (2) Polybius places it in the second year of the seventh Olympiad, corresponding with 3964 of the Julian period, and 750 B.C. (3) M. Porcius Cato places it in the first year of the seventh Olympiad, that is, in 3963 of the Julian period, and

751 B.C. (4) Verrius Flaccus places it in the fourth year of the sixth Olympiad, that is, in the year 3962 of the Julian period, and

752 B.C. (5) Terentius Varro places it in the third year of the sixth Olympiad, that is, in the year 3961 of the Julian period, and 7 53 b ,c A knowledge of these different computations isnecessary, in order to reconcile the Roman historians with one another, and even any one writer with himself. Livy in general adheres to the epoch of Cato, though he sometimes follows that of Fabius Pictor. Cicero follows the account of Varro, which is also in general adopted by Pliny. Dionysius of Halicarnassus follows Cato. Modern chronologers for the most part adopt the account of Varro, which is supported by a passage in Censorinus, where it is stated that the 991st year of Rome commenced with the festival of the Palilia, in the consulship of Ulpius and Pontianus. Now this consulship corresponded with the 238th year of our era; therefore, deducting 238 from 991, we have 753 to denote the year before Christ. The Palilia commenced on the 21st of April; and all the accounts agree in regarding that day as the epoch of the foundation of Rome.

The Romans employed two sorts of years, the civil year, which was used in the transaction of public and private affairs, and the consular year, according to which the annals of their history have been composed. The civil year commenced with the calends of January, but this did not hold a fixed place in the solar vear till the time of Julius Caesarfsee Calendar). The installation of the consuls regulated the commencement of the consular year. The initial day of the consulate was never fixed, at least before the 7th century of Rome, but varied with the different accidents which in times of political commotion so

frequently occurred to accelerate or retard the elections. Hence it happens that a consular year, generally speaking, comprehends a part not only of two Julian years, but also of two civil years. The consulate is the date employed by the Latin historians generally, and by many of the Greeks, down to the 6th century of our era.

In the era of Rome the commencement of the year is placed at the 2 1st of April; an event therefore which happened in the months of January, February, March, or during the first twenty days of April, in the year (for example) 500 of Rome, belongs to the civil year 501. Before the time of the Decemvirs, however, February was the last month of the year. Many authors confound the year of Rome with the civil year, supposing them both to begin on the 1st of January. Others again confound both the year of Rome and the civil year with the Julian year, which in fact became the civil year after the regulation of the calendar by Julius Caesar. Through a like want of attention, many writers also, particularly among the moderns, have confounded the Julian and Olympic years, by making an entire Julian year correspond to an entire Olympic vear, as if both had commenced at the same epoch. Much attention to these particulars is required in the comparison of ancient dates.

The Christian Era. — The Christian or vulgar era, called also the era of the Incarnation, is now almost universally employed in Christian countries, and is even used by some Eastern nations. Its epoch or beginning is the 1st of January in the fourth year of the 194th Olympiad, the 753rd from the foundation of Rome, and the 4714th of the Julian period. This epoch was introduced in Italy in the 6th century, by Dionysius the Little, a Roman abbot, and began to be used in Gaul in the 8th, though it was not generally followed in that country till a century later. From extant charters it is known to have been in use in England before the close of the 8th century. Before its adoption the usual practice in Latin countries was to distinguish the years by their number in the cycle of Indiction.

In the Christian era the years are simply distinguished by the cardinal numbers; those before Christ being marked b.c (Before Christ), or a.c. (Ante Christum), and those after Christ a.d. (Anno Domini). This method of reckoning time is more con- venient than those which employ cycles or periods of any length whatever; but it still fails to satisfy in the simplest manner possible all the conditions that are necessary for registering the succession of events. For, since the commencement of the era is placed at an intermediate period of history, we are compelled to resort to a double manner of reckoning, backward as well as forward. Some ambiguity is also occasioned by

the want of uniformity in the method of numbering the preceding years. Astronomers denote the year which preceded the first of our era by o, and the year previous to that by 1 B.C.; but chronologers, in conformity with common notions, call the year preceding the era 1 B.C., the previous year 2 B.C., and so on. By reckoning in this manner, there is an interruption in the regular succession of the numbers; and in the years preceding the era, the leap years, instead of falling on the fourth, eighth, twelfth, &c, fall, or ought to fall, on the first, fifth, ninth, &c.

In the chronicles of the middle ages much uncertainty fre- quently arises respecting dates on account of the different epochs assumed for the beginning of the Christian year. Dionysius, the author of the era, adopted the day of the Annunciation, or the 25th of March, which preceded the birth of Christ by nine months, as the commencement of the first year of the era. This epoch therefore precedes that of the vulgar era by nine months and seven days. This marner of dating was followed in some of the Italian states, and continued to be used at Pisa even down to the year 1745. It was also adopted in some of the Papal bulls; and there are proofs of its having been employed in France about the middle of the nth century. Some chroniclers, who adhere to the day of the Annunciation as the commencement of the year, reckon from the 25th of March following our epoch, as the Florentines in the 10th century. Gregory of Tours, and some writers of the 6th and 7th centuries, make the year begin sometimes with the 1st of March, and sometimes with the 1st of January. In France, under the third race of kings, it was usual to begin the year with Easter; and this practice continued at ‘ least till the middle of the 16th century, for an edict was issued by Charles IX. in the month of January 1663, ordaining that the beginning of the year should thenceforth be considered as taking place on the 1st of January. An instance is given, in L’ Art de verifier les dates, of a date in which the year is reckoned from the 18th of March; but it is probable that this refers to the astronomical year, and that the 18th of March was taken for the day of the vernal equinox. In Germany, about the nth century, it was usual to begin the year at Christmas; and this practice also prevailed at Milan, Rome and other Italian cities, in the 13th, 14th and 15th centuries.

In England, the practice of placing the beginning of the year at Christmas was introduced in the 7th century, and traces of it are found even in the 13th. Gervase of Canterbury, who lived in the 13th century, mentions that almost all writers of his country agreed in regarding Christmas day as the first of the year, because it forms, as it were, the term at which the sun finishes and recommences his annual course. In the 12th century, however, the custom of beginning the

civil year with the day of the Annunciation, or the 25th of March, began to prevail, and

continued to be generally followed from that time till the re- formation of the calendar in 1752. The historical year has always been reckoned by English authors to begin with the 1st of January. The liturgic year of the Church of England com- mences with the first Sunday of Advent.

A knowledge of the different epochs which have been chosen for the commencement of the year in different countries is indispensably necessary to the right interpretation of ancient chronicles, charters and other documents in which the dates often appear contradictory. We may cite an example or two. It is well known that Charles the Great was crowned emperor at Rome on Christmas day in the year 800, and that he died in the year 814, according to our present manner of reckoning. But in the annals of Metz and Moissac, the coronation is stated to have taken place in the year Soi, and his death in 813. In the first case the annalist supposes the year to begin with Christ- mas, and accordingly reckons the 25th of December and all the following days of that month to belong to 801, whereas in the common reckoning they would be referred to the year 800. In the second case the year has been supposed to begin with the 25th of March, or perhaps with Easter; consequently the first three months of the year 814, reckoning from the 1st of January, would be referred to the end of the year 813. The English Revolution is popularly called the Revolution of 1688. Had the year then begun, as it now does, with the 1st of January, it would have been the revolution of 1689, William and Mary being received as king and queen in February in the year 1689; but at that time the year was considered in England as beginning on the 25th of March. Another circumstance to which it is often necessary to pay attention in the comparison of dates, is the alteration of style which took place on the adoption of the Gregorian Calendar (see Calendar).

Era of the Creation of the World. — As the Greek and Roman methods of computing time were connected with certain pagan rites and observances which the Christians held in abhorrence, the latter began at an early period to imitate the Jews in reckon- ing their years from the supposed period of the creation of the world. Various computations were made at different times, from Biblical sources, as

to the age of the world; and Des Vignoles, in the preface to his Chronology of Sacred History, asserts that he collected upwards of two hundred different calculations, the shortest of which reckons only 3483 years between the creation of the world and the commencement of the vulgar era and the longest 6984. The so-called era of the creation of the world is therefore a purely conventional and arbitrary epoch; practically, it means the year 4004 B.C., — this being the date which, under the sanction of Archbishop Usher's opinion, won its way, among its hundreds of competitors, into general acceptance.

Jewish Year and Eras. — Before the departure of the Israelites from Egypt their year commenced at the autumnal equinox; but in order to solemnize the memory of their deliverance, the month of Nisan or Abib, in which that event took place, and which falls about the time of the vernal equinox, was afterwards regarded as the beginning of the ecclesiastical or legal year. In civil affairs, and in the regulation of the jubilees and sabbatical years, the Jews still adhere to the ancient year, which begins with the month Tisri, about the time of the autumnal equinox.

After their dispersion the Jews were constrained to have recourse to the astronomical rules and cycles of the more en- lightened heathen, in order that their religious festivals might be observed on the same days in all the countries through which they were scattered. For this purpose they adopted a cycle of eighty-four years, which is mentioned by several of the ancient fathers of the church, and which the early Christians borrowed from them for the regulation of Easter. This cycle seems to be neither more nor less than the Calippic period of seventy-six years, with the addition of a Greek octaSteris, or period of eight years, in order to disguise its true source, and give it an appear- ance of originality. In fact, the period of Calippus containing 27,759 days, and the octaeteris 2922 days, the sum, which is 30,681, is exactly the number of days in eighty -four Julian years. But the addition was very far from being an improvement on the

work of Calippus; for instead of a difference of only five hours and fifty-three minutes between the places of the sun and moon, which was the whole error of the Calippic period, this difference, in the period of eighty-four years, amounted to one day, six hours and forty-one minutes. Buccherius places the beginning of this cycle in the year 162 B.C.; Prideaux in the year 291 B.C. Accord- ing to the account of Prideaux, the fifth cycle must have begun in the year 46 of Our era; and it was in this year, according to St Prosperus, that the Christians began to employ the Jewish cycle of eighty-four years, which they followed, though not uniformly, for the regulation of Easter, till the

time of the Council of Nice,

Soon after the Nicene council, the Jews, in imitation of the Christians, abandoned the cycle of eighty-four years, and adopted that of Meton, by which their lunisolar year is regulated at the present day. This improvement was first proposed by Rabbi Samuel, rector of the Jewish school of Sora in Mesopotamia, and was finally accomplished in the year 360 of our era by Rabbi Hillel, who introduced that form of the year which the Jews at present follow, and which, they say, is to endure till the coming of the Messiah.

Till the 15 th century the Jews usually followed the era of the Seleucidae or of Contracts. Since that time they have generally employed a mundane era, and dated from the creation of the world, which, according to their computation, took place 3760 years and about three months before the beginning of our era. No rule can be given for determining with certainty the day on which any given Jewish year begins without entering into the minutiae of their irregular and complicated calendar.

Era of Constantinople. — This era, which is still used in the . Greek Church, and was followed by the Russians till the time of Peter the Great, dates from the creation of the world. The Incarnation falls in the year 5509, and corresponds, as in our era, with the fourth year of the 194th Olympiad. The civil year commences with the 1st of September; the ecclesiastical year sometimes with the 21st of March, sometimes with the 1st of April. It is not certain whether the year was considered at Constantinople as beginning with September before the separa- tion of the Eastern and Western empires.

At the commencement of our era there had elapsed 5508 years and four months of the era of Constantinople. Hence the first eight months of the Christian year 1 coincide with the Con- stahtinopolitan year 5509, while the last four months belong to the year 5510. In order, therefore, to find the year of Christ corresponding to any given year in the era of Constantinople, we have the following rule: If the event took place between the 1st of January and the end of August subtract 5508 from the given year; but if it happened between the 1st of September and the end of the year, subtract 5509.

Era of Alexandria.— The chronological computation of Julius Africanus was adopted by the Christians of Alexandria, who accordingly reckoned 5500 years from the creation of Adam to the birth of Christ. But in reducing Alexandrian dates to the common era it must be observed that Julius Africanus placed the epoch of the

Incarnation three years earlier than it is placed in the usual reckoning, so that the initial day of the Christian era fell in the year 5503 of the Alexandrian era. This correspondence, however, continued only from the introduction of the era till the accession of Diocletian, when an alteration was made by dropping ten years in the Alexandrian account. Diocletian ascended the imperial throne in the year of Christ 284. According to the Alexandrian computation, this was the year 5787 of the world, and 287 of the Incarnation; but on this occasion ten years were omitted, and that year was thenceforth called the year 57 7 7 of the world, and 277 of the Incarnation. There are, consequently, two distinct eras of Alexandria, the one being used before and the other after the accession of Diocletian. It is not known for what reason the alteration was made; but it is conjectured that it was for the purpose of causing a new revolution of the cycle of nineteen years (which was introduced into the ecclesiastical computation about this time by Anatolius, bishop of Hierapolis) to begin with the first year of the reign of Diocletian. In fact, 5777 being divided by 19 leaves 1 for the year of the cycle. The Alexandrian

era continued to be followed by the Copts in the 15th century, and is said to be still used in Abyssinia.

Dates expressed according to this era are reduced to the common era by subtracting 5502, up to the Alexandrian year 5786 inclusive, and after that year by subtracting 5492; but if the date belongs to one of the four last months of the Christian year, we must subtract 5503 till the year 5786, and 5493 after that year.

Mundane Era of Antioch.— The chronological reckoning of Julius Africanus formed also the basis of the era of Antioch, which was adopted by the Christians of Syria, at the instance of Panodorus, an Egyptian monk, who flourished about the beginning of the 4th century. Panodorus struck off ten years from the account of Julius Africanus with regard to the years of the world, and he placed the Incarnation' three years later, referring it to the fourth year of the 194th Olympiad, as in the common era. Hence the era of Antioch differed from the original era of Alexandria by ten years; but after the alteration of the latter at the accession of Diocletian, the two eras coincided. In reckoning from the Incarnation, however, there is a difference of seven years, that epoch being placed, in the reformed era of Alexandria, seven years later than in the mundane era of Antioch or in the Christian era.

As the Syrian year began in autumn, the year of Christ corresponding to any year in the mundane era of Antioch is found by subtracting 5492 or 5493 according as the event falls between January and September or from September to January.

Era of Nabonassar. — This era is famous in astronomy, having been generally followed by Hipparchus and Ptolemy. It is believed to have been in use from the very time of its origin; for the observations of eclipses which were collected in Chaldaea by Callisthenes, the general of Alexander, and transmitted by him to Aristotle, were for the greater part referred to the beginning of the reign of Nabonassar, founder of the kingdom of the Babylonians. It is the basis of the famous Canon of kings, also called Mathematical Canon, preserved to us in the works of Ptolemy, which, before the astonishing discoveries at Nineveh, was the sole authentic monument of Assyrian and Babylonian history known to us. The epoch from which it is reckoned is precisely determined by numerous celestial phenomena recorded by Ptolemy, and corresponds to Wednesday at mid-day, the 26th of February of the year 747 before Christ. The year was in all respects the same as the ancient Egyptian year. On account of the difference in the length of the Julian and Baby- lonian years, the conversion of dates according to the era of Nabonassar into years before Christ is attended with considerable trouble. The surest way is to follow a comparative table. Frequently the year cannot be fixed with certainty, unless we know also the month and the day.

The Greeks of Alexandria formerly employed the era of Nabonassar, with a year of 365 days; but soon after the reforma- tion of the calendar of Julius Caesar, they adopted, like other Roman provincials,

the Julian intercalation. At this time the first of Thoth had receded to the 29th of August. In the year 136 of our era, the first of Thoth in the ancient Egyptian year corresponded with the 20th of July, between which and the • 29th of August there are forty days. The adoption of the Julian year must therefore have taken place about 160 years before the year 136 of our era (the difference between the Egyptian and Julian years being one day in four years), that is to say, about the year 25 B.C. In fact, the first of Thoth corresponded with the 29th of August in the Julian calendar, in the years 25, 24, 23 and 22 B.C.

Era of the Seleucidae, or Macedonian Era. — The era of the Seleucidae dates from the time of the occupation of Babylon by Seleucus Nicator, 311 years before Christ, in the year of Rome 442, and twelve years after the death of Alexander the Great. It was adopted not only in the monarchy of the Seleucidae but in general in all the Greek countries bordering on the Levant, was followed by the Jews till the 15th century, and is said to be used by some Arabians even at the present day. By the Jews it was called the Era of Contracts, because the Syrian

governors compelled them to make use of it in civil contracts; the writers of the books of Maccabees call it the Era of Kings. But notwithstanding its general prevalence in the East for many centuries, authors using it differ much with regard to their manner of expressing dates, in consequence of the different epochs adopted for the beginning of the year. Among the Syrian Greeks the year began with the month Elul, which corresponds to our September. The Nestorians and Jacobites at the present day suppose it to begin with the following month, or October. The author of the first book of Maccabees makes the era commence with the month Nisan, or April; and the author of the second book with the first Tishrin, or October. Albategni, a celebrated Arabian astronomer, dates from the 1st of October. Some of the Arabian writers, as Alfergani, date from the 1st of September. At Tyre the year was counted from the 19th of our October, at Gaza from the 28th of the same month, and at Damascus from the vernal equinox. These dis- crepancies render it extremely difficult to determine the exact correspondence of Macedonian dates with those of other eras; and the difficulty is rendered still greater by the want of uni- formity in respect of the length of the year. Some authors who follow the Macedonian era, use the Egyptian or vague year of 365 days; Albategni adopts the Julian year of 365J days.

According to the computation most generally followed, the year 3 1 2 of the era of the Seleucidae began on the 1st of September in the Julian year preceding the first of our era. Hence, to reduce a Macedonian date to the common era, subtract 311 years and four

months.

The names of the Syrian and Macedonian months, and their correspondence with the Roman months, are as follows : —

Syrian. Macedonian. English.

Elul. Gorpiaeus. September.

• Tishrin I. Hyperberetaeus. October.

Tishrin II. Dius. November.

Canun I. Apellaeus. December.

Canun II. Audynaeus. January.

Sabat. Peritius. February.

Adar. Dystrus. March.

Nisan. Xanthicus. April.

Ayar. Artemisius. May.

Haziran. Daesius. Tune.

Tamus. Panemus. July.

Ab. Lous. August.

Era of Alexander. — Some of the Greek historians have assumed as a chronological epoch the death of Alexander the Great, in the year 325 B.C. The form of the year is the same as in the preceding era. This era has not been much followed; but it requires to be noticed in order that it may not be confounded with the era of the Seleucidae.

Era of Tyre. — The era of Tyre is reckoned from the 19th of October, or the beginning of the Macedonian month Hyper- beretaeus, in the year 126 B.C. In order, therefore, to reduce it to the common era, subtract 125; and when the date is B.C., subtract it from 126. Dates expressed according to this era occur only on a few medals, and in the acts of certain councils.

Caesarean Era of Antioch. — This era was established to commemorate the victory obtained by Julius Caesar on the plains of Pharsalia, on the 9th of August in the year 48 B.C., and the 706th of

Rome. The Syrians computed it from their month Tishrin I.; but the Greeks threw it back to the month Gorpiaeus of the preceding year. Hence there is a difference of eleven months between the epochs assumed by the Syrians and the Greeks. According to the computation of the Greeks, the 49th year of the Caesarean era began in the autumn of the year preceding the commencement of the Christian era; and, accord- ing to the Syrians, the 49th year began in the autumn of the first year of the Incarnation. It is followed by Evagrius in his Ecclesiastical History.

Julian Era. — The Julian era begins with the 1st of January, forty-five years B.C. It was designed to commemorate the reformation of the Roman calendar by Julius Caesar.

Era of Spain, or of the Caesars. — The conquest of Spain by Augustus, which was completed in the thirty-ninth year B.C., gave rise to this era, which began with the first day of the following

year, and was long used in Spain and Portugal, and generally in all the Roman provinces subdued by the Visigoths, both in Africa and the South of France. Several of the councils of Carthage, and also that of Aries, are dated according to this era. After the 9th century it became usual to join with it in public acts the year of the Incarnation. It was followed in Catalonia till the year 1 180, in the kingdom of Aragon till 1350, in Valencia till 1358, and in Castile till 1382. In Portugal it is said to have been in use so late as the year 1415, or 1422, though it would seem that after the establishment of the Portuguese monarchy, no other era was used in the public acts of that country than that of the Incarnation. As the era of Spain began with the ist'of January, and the months and days of the year are those of the Julian calendar, any date is reduced to the common era by subtracting thirty-eight from the number of the year.

Era of Actium, and. Era of Augustus. — -This era was established to commemorate the battle of Actium, which was fought on the 3rd of September, in the year 31 B.C., and in the 15th of the Julian era. By the Romans the era of Actium was considered as beginning on the 1st of January of the 16th of the Julian era, which is the 30th B.C. The Egyptians, who used this era till the time of Diocletian, dated its commencement from the beginning of their month Thoth, or the 29th of August; and the Eastern Greeks from the 2nd of September. By the

latter it was also called the era of Antioch, and it. continued to be used till the 9th century. It must not be confounded with the Caesarean era of Antioch, which began seventeen years earlier. Many of the medals struck by the city of Antioch in honour of Augustus are dated according to this era.

Besides the era of Actium, there was also an Augustan era, which began four years later, or 27 B.C., the year in which Augustus prevailed on the senate and people of Rome to decree him the title of Augustus, and to confirm him in the supreme power of the empire.

Era of Diocletian, or Era of Martyrs. — It has been already stated that the Alexandrians, at the accession of the emperor Diocletian, made an alteration in their mundane era, by striking off ten years from their reckoning. At the same time they estab- lished a new era, which is still followed by the Abyssinians and Copts. It begins with the 29th of August (the first day of the Egyptian year) of the year 284 of our era, which was the first of the reign of Diocletian. The denomination of Era of Martyrs, subsequently given to it in commemoration of the persecution of the Christians, would seem to imply that its commencement ought to be referred to the year 303 of our era, for it was in that year that Diocletian issued his famous edict; but the practice of dating from the accession of Diocletian has prevailed. The ancient Egyptian year consisted of 365 days; but after the introduction of the Julian calendar, the astronomers of Alexandria adopted an intercalary year, and added six additional days instead of five to the end of the last month of everj' fourth year. The year thus became exactly similar to the Julian year. The Egyptian intercalary year, however, does not correspond to the Julian leap year, but is the year immediately preceding; and the intercalation takes place at the end of the year, or on the 29th of August. Hence the first three years of the Egyptian inter- calary period begin on the 29th of our August, and the fourth begins on the 30th of that month. Before the end of that year the Julian intercalation takes place, and the beginning of the following Egyptian year is restored to the 29th of August. Hence to reduce a date according to this era to our own reckoning, it is necessary, for common years, to add 283 years and 240 days; but if the date belongs to the first three months of the year following the intercalation, or, which is the same thing, if in the third year of the Julian cycle it falls between the 30th of August and the end of the year, we must add 283 years and 241 days. The Ethiopians do not reckon the years from the beginning of the era in a consecutive series, but employ a period of 532 years, after the expiration of which they again begin with 1 . This is the Dionysian or Great Paschal Period, and is formed by the multi- plication of the numbers 28 and 19, that is, of

the solar and lunar cycles, into each other.

The following are the names of the Ethiopian or Abyssinian months, with the days on which they begin in the Julian calendar, or old style : —

Mascaram . 29th August. Magabit . 25th February.

Tikmith. . 28th September. Miazia . . 27th March.

Hadar . . 28th October. Gimbot . . 26th April.

Tacsam . . 27th November. Sene. . . 26th May.

Tir . . . 27th December. Hamle . . 25th June.

Yacatit . . 26th January, Nahasse . 25th July.

The additional or epagomenal days begin on the 24th of August. In intercalary years the first seven months commence one day later. The Egyptian months, followed by the modern Copts, agree with the above in every respect excepting the names.

Indiclion. — The cycle of Indiction was very generally followed in the Roman empire for some centuries before the adoption of the Christian era. Three Indictions may be distinguished; but they differ only in regard to the commencement of the year.

1. The Constanlinopolilan Indiction, like the Greek year, commenced with the month of September. This was followed in the Eastern empire, and in some instances also in France.

2. The Imperial or Constantinian Indiction is so called because its establishment is attributed to Constantine. This was also called the Caesarean Indiction. It begins on the 24th of Sep- tember. It is not infrequently met with in the ancient chronicles of France and England.

3. The Roman or Pontifical Indiction began on the 25th of December or 1st of January, according as the Christian year was held to begin on the one or other of these days. It is often employed in papal bulls, especially after the time of Gregory VII., and traces of its use are found in early French authors.

Era of the Armenians. — The epoch of the Armenian era is that of the council of Tiben, in which the Armenians consum- mated their schism from the Greek Church by condemning the acts of the council of

Chalcedon; and it corresponds to Tuesday, the 9th of July of the year 552 of the Incarnation. In their civil affairs the Armenians follow the ancient vague year of the Egyptians; but their ecclesiastical year, which begins on the nth of August, is regulated in the same manner as the Julian year, every fourth year consisting of 366 days, so that Easter and the other festivals are retained at the same place in the seasons as well as in the civil year. The Armenians also make use of the mundane era of Constantinople, and sometimes conjoin both methods of computation in the same documents. In their correspondence and transactions with Europeans, they generally follow the era of the Incarnation, and adopt the Julian year.

To reduce the civil dates of the Armenians to the Christian era, proceed as follows. Since the epoch is the 9th of July, there were 176 days from the beginning of the Armenian era to the end of the year 552 of our era; and since 552 was a leap year, the year SS3 began a Julian intercalary period. Multiply, therefore, the number of Armenian years elapsed by 365; add the number of days from the commencement of the current year to the given date; subtract 176 from the sum, and the remainder will be the number of days from the 1st of January 553 to the given date. This number of days being reduced to Julian years, add the result to 552, and the sum gives the day in the Julian year, or old style.

In the ecclesiastical reckoning the year begins on the nth of August. To reduce a date expressed in this reckoning to the ‘ Julian date, add 551 years, and the days elapsed from the 1st of January to the 10th of August, both inclusive, of the year 552 — that is to say (since 552 is a leap year), 223 days. In leap years one day must be subtracted if the date falls between the 1st of March and 10th of August.

The following are the Armenian ecclesiastical months with theii correspondence with those of the Julian calendar: —

1. Navazardi begins …. nth August.

Hori

3. Sahmi .

4. Dre Thari

5. Kagoths

6. Aracz .

7. Malegi .

8. Arcki .

9. Arigi .

10th September. 10th October.

9th November.

9th December.

8th January.

7th February.

9th March.

8th April.

10. Mariri 8th May.

11. Marcacz 7th June.

12. Herodiez 7th July.

To complete the year five complementary days are added in common years, and six in leap years.

The Mahommedan Era, or Era of the Hegira. — The era in use among the Turks, Arabs and other Mahommedan nations is that of the Hegira or Hejra, the flight of the prophet from Mecca to Medina, 622 a.d. Its commencement, however, does not, as is sometimes stated, coincide with the very day of the flight, but precedes it by sixty-eight days. The prophet, after leaving Mecca, to escape the pursuit of his enemies, the Koreishites, hid himself with his friend Abubekr in a cave near Mecca, and there lay for three days. The departure from the cave and setting out on the way to Medina is assigned to the ninth day of the third month, Rabia I. — corresponding to the 22nd of September of the year 622 a.d. The era begins from the first day of the month of Muharram preceding trie flight, or first day of that Arabian year which coincides with Friday, July 16, 622 a.d. It is necessary to remember that by astronomers and by some historians the era is assigned to the

preceding day, July 15. It is stated by D'Herbelot that the era of the Hegira was in- stituted by Omar, the second caliph, in imitation of the Christian era of the martyrs.

Era of Yazdegerd, or Persian or Jelalaean Era. — This era begins with the elevation of Yazdegerd III. to the throne of Persia, on the 16th of June in the year of our era 632. Till the year 1079 the Persian year resembled that of the ancient Egyptians, con- sisting of 365 days without intercalation; but at that time the Persian calendar was reformed by Jelal ud-Din Malik Shah, sultan of Khorasan, and a method of intercalation adopted which, though less convenient, is considerably more accurate than the Julian. The intercalary period is 33 years, — one day being added to the common year seven times successively at the end of four years, and the eighth intercalation being deferred till the end of the fifth year. This era was at one period universally adopted in Persia, and it still continues to be followed by the Parsees of India. The months consist of thirty days each, and each day is distinguished by a different name. According to Alfergani, the names of the Persian months are as follows: —

Afrudin-meh. Merded-meh. Adar-meh.

Ardisascht-meh. Schaharir-meh. Di-meh.

Cardi-meh. Mahar-meh. Behen-meh.

Tir-meh. Aben-meh. Affirer-meh.

The five additional days (in intercalary years six) are named Musleraca.

As it does not appear that the above-mentioned rule of inter- calation was ever regularly followed, it is impossible to assign exactly the days on which the different years begin. In some provinces of India the Parsees begin the year with September, in others they begin it with October. We have stated that the era began with the 16th June 632. But the vague year, which was followed till 1079, anticipated the Julian year by one day every four years. In 447 years the anticipation would amount to about 112 days, and the beginning of the year would in conse- quence be thrown back to near the beginning of the Julian year 632. To the year of the Persian era, therefore, add 631, and the sum will be the year of our era in which the Persian year begins.

Chinese Chronology. — From the time of the emperor Yao, upwards of 2000 years B.C., the Chinese had two different years, — a civil year, which was regulated by the moon, and an astro- nomical year, which

was solar. The civil year consisted in general of twelve months or lunations, but occasionally a thir- teenth was added in order to preserve its correspondence with the solar year. Even at that early period the solar or astro- nomical year consisted of 3655 days, like our Julian year; and it was arranged in the same manner, a day being intercalated every fourth year.

According to the missionary Gaubil, the Chinese divided the day into 100 ke, each ke into 100 minutes, and each minute into 100 seconds. This practice continued to prevail till the 17th century, when, at the instance of the Jesuit Schall, president of the tribunal of mathematics, they adopted the European method

of dividing the day into twenty-four hours, each hour into sixty minutes, and each minute into sixty seconds. The civil day begins at midnight and ends at the midnight following.

Since the accession of the emperors of the Han dynasty, 206 B.C., the civil year of the Chinese has begun with the first day of that moon in the course of which the sun enters into the sign of the zodiac which corresponds with our sign Pisces. From the same period also they have employed, in the adjustment of their solar and lunar years, a period of nineteen years, twelve of which are common, containing twelve lunations each, and the remaining seven intercalary, containing thirteen lunations. It is not, however, precisely known how they distributed their months of thirty and twenty-nine days, or, as they termed them, great and small moons. This, with other matters appertaining to the calendar, was probably left to be regulated from time to time by the mathematical tribunal.

The Chinese divide the time of a complete revolution of the sun with regard to the solstitial points into twelve equal portions, each corresponding to thirty days, ten hours, thirty minutes. Each of these periods, which is denominated a tseg, is subdivided into two equal portions called chung-ki and Isie-ki, the chung-ki denoting the first half of the tseS, and the tsie-ki the latter half. Though the tseS are thus strictly portions of solar time, yet what is remarkable, though not peculiar to China, they give their name to the lunar months, each month or lunation having the name of the chung-ki or sign at which the sun arrives during that month. As the tsel is longer than a synodic revolution of the moon, the sun cannot arrive twice at a chung-ki during the same lunation; and as there are only twelve tsef, the year can contain only twelve months having different names. It must happen some- times that in the course of a lunation the sun enters into no new sign; in this case the month is intercalary, and is called by the

same name as the preceding month.

For chronological purposes, the Chinese, in common with some other nations of the east of Asia, employ cycles of sixty, by means of which they reckon their days, moons and years. The days are distributed in the calendar into cycles of sixty, in the same manner as ours are distributed into weeks, or cycles of seven. Each day of the cycle has a particular name, and as it is a usual practice, in mentioning dates, to give the name of the day along with that of the moon and the year, this arrangement affords great facilities in verifying the epochs of Chinese chronology. The order of the days in the cycle is never interrupted by any intercalation that may be necessary for adjusting the months or years. The moons of the civil year are also distinguished by their place in the cycle of sixty ; and as the intercalary moons are not reckoned, for the reasou before stated, namely, that during one of these lunations the sun enters into no new sign, there are only twelve regular moons in a year, so that the cycle is renewed every five years. Thus the first moon of the year 1873 being the first of a new cycle, the first moon of every sixth year, reckoned backwards or forwards from that date, as 1868, 1863, &c, or 1877, 1882, &c, also begins a new lunar cycle of sixty moons. In regard to the years, the arrangement is exactly the same. Each has a distinct number or name which marks its place in the cycle, and as this is generally given in referring to dates, along with the other chronological characters of the year, the ambiguity which arises from following a fluctuating or uncertain epoch is entirely obviated.

The cycle of sixty is formed of two subordinate cycles or series of characters, one of ten and the other of twelve, which are joined together so as to afford sixty different combinations. The names of the characters in the cycle of ten, which are called celestial signs, are — 1. Kea;2. Yih; 3. Ping; 4. Ting; 5. Woo; 6. Ke; 7. King; 8. Sin; 9. Jin; 10. Kwei; and in the series of 12, denominated terrestrial signs,

1. Tsze; 2. Chow; 3. Yin; 4. Maou; 5. Shin; 6. Sze; 7. Woo; 8. We; 9. Shin; 10. Yew; 11. Seiih; 12. Hae.’

The name of the first year, or of the first day, in the sexagenary cycle is formed by combining the first words in each of the above series; the second is formed by combining the second of each series, and so on to the tenth. For the next year the first word of the first series is combined with the eleventh of the second, then the second of the first series with the twelfth of the second, after this the third of the first series with the first of the second, and so on till the sixtieth combination, when the last of the first series concurs with the last of

the second. Thus Kea-tsze is the name of the first year, Yih- Chow that of the second, Kea-seuh that of the eleventh, Yih-hae that of the twelfth, Ping-tsze that of the thirteenth, and so on. The order of proceeding is obvious.

In the Chinese history translated into the Tatar dialect by order of the emperor K'ang-hi, who died in 1 721, the characters of the cycle begin to appear at the year 2357 B.C. From this it has been inferred

that the Chinese empire was established previous to that epoch; but it is obviously so easy to extend the cycles backwards indefinitely, that the inference can have very little weight. The characters given to that year 2357 B.C. are Kea-shin, which denote the 41st of the cycle. We must, therefore, suppose the cycle to have begun 2397 B.C., or forty years before the reign of Yao. This is the epoch assumed by the authors of L'Art de verifier les dates. The mathe- matical tribunal has, however, from time immemorial counted the first year of the first cycle from the eighty-first of Yao, that is to say, from the year 2277 B.C.

Since the year 163 B.C. the Chinese writers have adopted the practice of dating the year from the accession of the reigning emperor. An emperor, on succeeding to the throne, gives a name to the years of his reign. He ordains, for example, that they shall be called Ta-te. In consequence of this edict, the following year is called the first of Ta-te, and the succeeding years the second, third, fourth, &c, of Ta-te, and so on, till it pleases the same emperor or his successor to ordain that the years shall be called by some other appellation. The periods thus formed are called by the Chinese Nien-hao. Accord- ing to this method of dating the years a new era commences with every reign ; and the year corresponding to a Chinese date can only be found when we have before us a catalogue of the Nien-hao, with their relation to the years of our era.

For Hindu Chronology, see the article under that heading.

Bibliography. — In addition to the early Greek writings already named, there are the forty books (some fifteen only extant in their entirety) of universal history compiled (about 8 B.C.) by Diodorus Siculus, and arranged in the form of annals; the Pentabiblos of Julius Africanus (about 220-230 a.d.) ; the treatise of Censorinus entitled De

die natali, written 238 a.d.; the Chronicon, in two books, of Eusebius Pamphili, bishop of Caesarea (about 325 A.D.), distinguished as the first book of a purely chronological character which has come down to us; and three important works forming parts of the Corpus Scriptorum Historiae Byzantinae, namely, the Chronographia of Georgius Syncellus (800 a.d.), the Chronographia of Johannes Malalas (qth century), and the Chronicon Paschale.

Among works on Chronology, the following, which are arranged in the order of their publication, have an historical interest, as leading up to the epoch of modern research : —

‘583. De Emendatione Temporum, by Joseph Scaliger, in which were laid the foundations of chronological science.

1603. Opus Chronologicum, by Sethus Calvisius.

1627. De Docirina Temporum, by Petavius (Denis Petau), with its continuation published in 1630, and an abridgment entitled Rationarium Temporum, in 1633-1634.

1650. Annales Veteris et Novi Testamenti, by Archbishop Ussher, whose dates have by some means gained a place in the authorized version of the Bible.

1 65 1. Regia Epitome Historiae Sacrae et Profanae, by Philippe Labbe, of which a French version was also published.

1669. Inslitutionum Chronologicarum hbri duo, by Bishop Beveridge.

1672. Chronicus Canon Aegyptiacus, Ebraicus, et Graecus, by Sir John Marsham.

1687. L’Antiquite des temps retablie et dSfendue, by Paul Pezron, with its Defense, 1691.

1 701. De Veteribus Graecorum Romanorumque Cyclis, by Henry Dodwell.

1728. The Chronology of Ancient Kingdoms amended, by Sir Isaac Newton, remarkable as an attempt to construct a system on new bases, independent of the Greek chronologers.

1738. Chronologic de Vhistoire sainte, by Alphonse des Vignolles.

1744. Tablettes chronologiques de Vhistoire universelle, by N.

Lengfet-Dufresnoy.

1750. The first edition in one vol. 4to of L'Art de verifier les dates, which in its third edition (1818-1831) appeared in 38 vols. 8vo, a colossal monument of the learning and labours of various members of the Benedictine Congregation of Saint-Maur.

1752. Chronological Antiquities, by John Jackson.

1754. Chronology and History of the World, by John Blair; new edition, much enlarged (1857).

1784. A System of Chronology, by Playfair.

1799. Handbuch der Geschichte der Staaten des Alterthums, by A. H. L. Heeren.

1803. Handbuch der alien Geschichte, Geographic, und Chronologie, by G. G. Bredow, with his Historische Tabellen.

1809-1814. New Analysis of Chronology, by William Hales.

1819. Annales Veterum Regnorum, by C. G. Zumpt.

1 82 1. Tableaux historiques, chronologiques, et gtographiques, by Buret de Longchamps.

1824-1834. Fasti Hellenici, and 1845-1850, Fasti Romani, by H. Fynes Clinton. Epitomes of these elaborate works were published,

1851-1853.

1825-1826. Handbuch der mathematischen und technischen Chronologie, by Christian Ludwig Ideler; and his Lehrbuch der Chronologie,

(1831).

1833. The Chronology of History, by Sir Harris Nicolas.

1852. Fasti Temporis Catholici, by Edward Greswell; and by the same author (1854), Origines Kalendariae Italicae; and 1862, Origines Kalendariae Hellenicae.

More modern works are the Encyclopaedia of Chronology, by,B. B. Woodward and W. L. R. Cates (1872) ; and J. C. Macdonald's Chronologies and Calendars (1897). But see the separate historical articles in this work. (W. L. R. C.)

CHRUDIM, a town of Bohemia, Austria, 74 m. E.S.E. of Prague by rail. Pop. (1900) 13,017, mostly Czech. It has an important horse market, besides manufactures of sugar, spirits, beer, soda-water and agricultural machinery. There are also steam corn-mills and saw-mills. Chrudim is mentioned as the castle of a gaugrafa.& early as 993. The new town was founded by Ottokar II., who settled many Germans in it and gave it many privileges. After 142 1 Chrudim was held by the Hussites, and though Ferdinand I. confiscated most of the town property, it prospered greatly till the outbreak of the Thirty Years' War. In 1625 the greater part of its Hussite inhabitants left the town, which suffered much later on from the Swedes. Chrudim was trie birthplace of Joseph Ressel (1793-1857), honoured in Austria as the inventor of the screw propeller.

CHRYSANTHEMUM 1 {Chrysanthemum sinense; nat. ord. Compositae), one of the most popular of autumn flowers. It is a native of China, whence it was introduced to Europe. The first chrysanthemum in England was grown at Kew in 1790, whither it had been sent by Mr Cels, a French gardener. It was not, however, till 1825 that the first chrysanthemum exhibition took place in England. The small-flowered pompons, and the gro- tesque-flowered Japanese sorts, are of comparatively recent date, the former having originated from the Chusan daisy, a variety introduced by Mr Fortune in 1846, and the latter having also been introduced by the same traveller about 1862. The Japanese kinds are unquestionably the most popular for decorative purposes as well as for exhibition. They afford a wide choice in colour, form, habit and times of flowering. The incurved Chinese kinds are severely neat-looking flowers in many shades of colour. The anemone-flowered kinds have long outer or ray petals, the interior or disk petals being short and tubular. These are to be had in many pleasing colours. The pompon kinds are small flowered, the petals being short. The plants are mostly dwarf in habit. In the single varieties the outer or ray florets alone are large and attractively coloured.

Plants for the Border. — As a border plant out of doors the chrysan- themum is of the easiest culture. It is an exceptionally good town plant. By a judicious selection of varieties, flowers may be produced in abundance and in considerable variety from August to the end of November, and in favourable seasons well on towards Christmas. Since 1890 when the English market was flooded with French raised varieties of exceptional merit, the border chrysanthemum has taken first place among hardy autumn flowering plants. Most of the varieties then introduced have been superseded by many excellent kinds raised in Britain.

Propagation. — The old English method of dividing the plants in March or early April may be followed where better means of propagation are not practicable. Many of the best border varieties are shy in producing new growths (suckers) from the rootstock, and are in consequence not amenable to this method. It is better to raise the plants from cuttings. This may be begun in January for the early flowering sorts, the late kinds being propagated during February and March. They will root quite well in a cold frame, if protected during frosty weather by litter or other similar material. If the frame can be heated at will so as to maintain a fairly even temperature of from 40° to 50° Fah., roots will be made more quickly and with more certainty. A still better method is to improvise a frame near the glass in a greenhouse, where the temperature is not raised above 50° by artificial heat. This has the advantage of being accessible in all weathers. The bottom of the frame is covered with sifted coal ashes or coco-nut fibre, on which the shallow boxes or pots used in propagating are placed. These are well drained with broken crocks, the bottoms of the boxes being drilled to allow water to pass out quickly. The soil should consist of about equal parts of fibrous loam and leaf-mould, half a part of coarse silver-sand, and about a quart of vegetable ash from the garden refuse heap to each bushel of the compost. The whole should be passed through a quarter inch sieve and thoroughly mixed. The coarse leaf-mould, &c, from the sieve should be spread thinly over the drainage, and the boxes or pots filled almost to the rims with the compost, and

1 The Gr. xpveMqiov (xpiwAs, gold, and i.v0eiwv, flower) was the herbalists' name for C. segelum, the " corn marigold," with its yellow bloom, and was transferred by Linnaeus to the genus, being commonly restricted now to the species C. sinense.

covered, if possible, with a thin layer of silver-sand. It should be

Eressed firmly, watered with a fine rose, and allowed to drain for an our. The cuttings should then be dibbled into the boxes in rows, just clear, the soil being gently pressed around each. Short stout shoots which arise directly from the rootstock make the best cuttings. In their absence cuttings from the stems are used. The ideal length for a cutting is about 2\ in. Cut the stem squarely with a sharp knife just below a joint, and remove the lower leaves. Insert as soon as possible and water with a fine rose to settle the soil around them. The soil is

not allowed to become dry. The cuttings should be looked over daily, decayed leaves removed, and surplus moisture, condensed on the glass, wiped away. Ventilate gradually as rooting takes place, and, when well rooted, transfer singly into pots about 3 in. in diameter, using as compost a mixture ol two parts loam, one part leaf-mould, half a part coarse silver-sand, and a gallon of vegetable ash to every bushel of the compost. Return to the frames and keep close for a few days to allow the little plants to recover from the check occasioned by the potting. Ventilation should be gradually increased until the plants are able to bear full exposure during favourable weather, without showing signs of distress by flagging. They should be carefully protected at all times from cold cutting winds. In April, should the weather be favourable, the plants may be transferred to the borders, especially should the positions happen to be sheltered. If this is not practicable, another shift will be necessary, this time into pots about 5 in. in diameter. The soil should be similar to that advised for the previous potting, enriched with half a part of horse manure that has been thoroughly sweetened by exposure. Plant out during May. All borders intended for chrysanthemums should be well dug and manured. The strong growing kinds should be planted about 3 ft. apart, the smaller kinds being allowed a little less room.

In the summer, water in dry weather, syringe in the evenings whenever practicable, and keep the borders free from weeds by surface hoeings; stake and tie the plants as required, and pinch out the tips of the shoots until they have become sufficiently bushy by frequent branching. Pinching should not be practised later than the end of June.

Pot Plants for Decoration. — A list of a few of the thousands of varieties suitable for this purpose would be out of place here; new varieties are being constantly introduced, for these the reader is referred to trade catalogues.

The most important considerations for the beginner are (a) the choice of colours ; (b) the types of flowers ; (c) the height and habits of the varieties. Generally speaking, very tall varieties and those of weak growth and delicate constitutions should be avoided. The majority of the varieties listed for exhibition purposes are also suitable for decoration, especially the Japanese kinds. Propagation and early culture are substantially as for border plants.

As soon as the 5-in. pots are filled with roots, no time should be lost in giving them the final shift. Eight-in. pots are large enough for the general stock, but very strong growers may be given a larger size. The

soil, prepared a fortnight in advance, should consist of four parts fibrous loam, one part leaf-mould, one part horse manure prepared as advised above, half a part coarse silver-sand, half a part of vegetable ash, and a quart of bone-meal or a sprinkling of basic slag to every bushel of the mixture. Mix thoroughly and turn over at intervals of three or four days. Pot firmly, working the soil well around the roots with a lath. The main stake for the support ot the plant should now be given ; other and smaller stakes may later be necessary when the plants are grown in a bushy form, but their number should not be overdone. The stakes should be as lew as

Eossible consistent with the safety of the shoots, which should e looped up loosely and neatly. The plants should be placed in their summer quarters directly after potting. Stand them in rows in a sunny situation, the pots clear of one another, sufficient room being allowed between the rows for the cultivator to move freely among them. The main stakes are tied to rough trellis made by straining wire in two rows about 2 ft. apart between upright poles driven into the ground. Coarse coal ashes or coke breeze are the best materials to stand the pots on, there being little risk of worms working through into the pots. The plants, which are required to produce as many flowers as possible, should have their tips pinched out at frequent intervals, from the end of March or beginning of April to the last week in June, for the main season kinds; and about the middle of July for the later kinds.

Towards the end of July the plants will need feeding at the roots with weak liquid manure, varied occasionally by a very slight dusting of soluble chemical manure such as guano. The soil should be moderately moist when manure is given. In order that the flowers may be of good form, all lateral flower buds should be removed as soon as they are large enough to handle, leaving only the bud terminating each shoot. Towards the end of September — earlier should the weather prove wet and cold— remove the plants to well- ventilated greenhouses where they are intended to flower. Feeding should be continued until the flowers are nearly half open, when it may be gradually reduced. The large mop-headed blooms seen at exhibitions in November are grown in the way described, but only one or two shoots are allowed to develop on a plant, each shoot eventually having only one bloom.

The chrysanthemum is subject to the attack of black aphis and

green-fly. These pests may be destroyed, out of doors, by syringing with quassia and soft soap solutions, by dusting the affected parts with

tobacco-powder, and indoors also by fumigating. Mildew generally appears after the plants are housed. It may be destroyed by dusting the leaves attacked with sublimed sulphur. Rust is a fungoid disease of recent years. It is best checked by syringing the plants with liver of sulphur (1 oz. to 3 gallons of water) occasion- ally, a few weeks before taking the plants into the greenhouse. Earwigs and slugs must be trapped and destroyed.

Flowers for Exhibition.— FXovtets of exhibition standard must be as broad and as deep as the various varieties are capable of pro- ducing; they must be irreproachable in colour. They must also exhibit the form peculiar to the variety when at its best, very few kinds being precisely alike in this respect. New varieties are in- troduced in large numbers annually, some of which supplant the older kinds. The cultivator must therefore study the peculiarities of several new kinds each year if he would be a successful ex- hibitor.

For lists of varieties, &c. see the catalogues of chrysanthemum growers, the gardening Press, and the excellent cultural pamphlets which are published from time to time.

CHRYSANTHIUS, a Greek philosopher of the 4th century A.D., of the school of Iamblichus. He was one of the favourite pupils of Aedesius, and devoted himself mainly to the mystical side of Neoplatonism (q.v.). The emperor Julian (q.v.) went to him by the advice of Aedesius, and subsequently invited him to come to court, and assist in the projected resuscitation of Hellenism. But Chrysanthius declined on the strength of unfavourable omens, as he said, but probably because he realized that the scheme was unlikely to bear fruit. For the same reason he abstained from drastic religious reforms in his capacity as high-priest of Lydia. As a result of his moderation, he remained high-priest till his death, venerated alike by Christians and pagans. His wife Melite, who was associated with him in the priestly office, was a kinswoman of Eunapius the biographer.

CHRYSELEPHANTINE (Gr. xpwbs, gold, and k\eas, ivory), the architectural term given to statues which were built up on a wooden core, with ivory representing the flesh and gold the drapery. The two most celebrated examples are those by Pheidias of the statue of Athena in the Parthenon and of Zeus in the temple at Olympia.

CHRYSENE Ci 8 Hi 2 , a hydrocarbon occurring in the high boiling fraction of the coal tar distillate. It is produced in small quantity in the distillation of amber, on passing the vapour of phenyl-naphthyl-methane through a red-hot tube, on heating indene, or by passing the

mixed vapours of coumarone and naphthalene through a red-hot tube. It crystallizes in plates or octahedra (from benzene), which exhibit a violet fluorescence, and melt at 250° C. Chromic acid in glacial acetic acid solution oxidizes it to chrysoquinone Ci 8 H 10 O 2 , which when distilled with lead oxide gives chrysoketone C17H10O. When chrysene is fused with alkalis, chrysenic acid, Ci 7 H 12 3 , is produced, which on heating gives /9-phenyl-naphthalene. On heating chrysene with hydriodic acid and red phosphorus to 260° C, the hydro- derivatives C1SH28 and C18H30 are produced. It gives characteristic addition products with picric acid and dinitroanthraquinone. Impure chrysene is of a yellow colour; hence its name (\pvcreos, golden yellow). 1

CHRYSIPPUS (c. 280-206 B.C.), Greek philosopher, the third great leader of the Stoics. A native of Soli in Cilicia (Diog. Laert. vii. 179), he was robbed of his property and came to Athens, where he studied possibly under Zeno, certainly under Cleanthes. It is said also that he became a pupil of Arcesilaus and Lacydes, heads of the Middle Academy. This impartiality in his early studies is the key of his philosophic work, the dominant characteristic of which is comprehensiveness rather than originality. He took the doctrines of Zeno and Cleanthes and crystallized them into a definite system; he further defended them against the attacks of the Academy. His polemic skill earned for him the title of the ” Column of the Portico.” Diogenes Laertius says, ” If the gods use dialectic, they can use. none other than that of Chrysippus “; el nil 7 dp 17c Xpuo-«r#©s,* ovk &v rjv Stoix (” Without Chrysippus, there had been no Porch “). He excelled in logic, the theory of knowledge, ethics and physics. His relations with Cleanthes, contempor- aneously criticized by Antipater, are considered under Stoics.

He is said to have composed seven hundred and fifty treatises, fragments alone of which survive. Their style, we are told, was unpolished and arid in the extreme, while the argument was lucid and impartial.

See G. H. Hagedorn, Moralia Chrysippea (1685), Ethica Chrysippi (1715); J- F. Richter, De Chrysippo Stoico fastuoso (1738); F. Baguet, De Chrysippi vita doctrina et reliquiis 1,1822); C. Petersen, Philosophiae Chrysippeae fundamenta (1827); A. Gercke, “Chry- sippea” in Janrbucher fur Philologie, suppl. vol. xiv. (1885); R. Nicolai, Delogicis Chrysippi libris (1859) ; Christos Aronis, Xpfco-

iiriros ypaitixanKSs (1885); R. Hirzel, Untersuchungen zu Ciceros philo- sophischen Schriften, ii. (1882) ; L. Stein, Die Psychologie der Stoa (1886); A. B. Krische, Forschungen auf dent Gebiete der alien Philosophie (1840); J. E. Sandys, Hist. Class. Schol. i. 149.

CHRYSOBERYL, a yellow or green gem-stone, remarkable for its hardness, being exceeded in this respect only by the diamond and corundum. The name suggests that it was formerly regarded as a golden variety of beryl; and it is notable that though differ- ing widely from beryl it yet bears some relationship to it inasmuch as it contains the element beryllium. In chrysoberyl, however, the beryllium exists as an aluminate, having the formula BeAl 2 04, orBeO-Al 2 03. The analysis of a specimen of Brazilian chrysoberyl gave alumina 78-10, beryllia 17*94, and ferric oxide 4-88%. The typical yellow colour of the stone inclines in many cases to pale green, occasionally passing into shades of dark green and brown. The iron usually present in the mineral seems responsible for the green colour. Chrysoberyl is often mistaken by its colour for chrysolite (q.v.), and has indeed been termed Oriental chrysolite. In its crystalline forms it bears some relationship to chrysolite, both crystallizing in the orthorhombic system, but it is a much harder and a denser mineral. As the two stones are apt to be confounded, it may be convenient to contrast their chief characters : —

Chrysoberyl. Chrysolite.

Hardness 8-5 6-5 to 7

Specific Gravity . . . 3-65 to 3-75 3-34 to 3-37 Chemical Composition . . BeAhOi. MgjSiOi.

Chrysoberyl is not infrequently cloudy, opalescent and chatoyant, and is then known as ” cymophane ” (Gr. Kvy.a, a “cloud”). The cloudiness is referable to the presence of multitudes of microscopic cavities. Some of the cymophane, when cut with a convex surface, forms the most valuable kind of cat’s-eye (see Cat’s-Eye). A rernarkable dichroic variety of chrysoberyl is known as alexandrite (q.v.).

Most chrysoberyl comes from Brazil, chiefly from the district of Minas Novas in the state of Minas Geraes, where it occurs as small water-worn pebbles. The cymophane is mostly from the gem-gravels of Ceylon. Chrysoberyl is known as a constituent of certain kinds of granite, pegmatite and gneiss. In the United States it occurs at Haddam, Conn.; Greenfield Centre, near Saratoga Springs, N.Y. ; and in Manhattan island. It is known also in the province of Quebec,

Canada, and has been found near Gwelo in Rhodesia. (F. W. R.*)

CHRYSOCOLLA, a hydrous copper silicate occurring as a decomposition product of copper ores. It is never found as crystals, but always as encrusting and botryoidal masses with a microcrystalline structure. It is green or bluish-green in colour, and often has the appearance of opal or enamel, being translucent and having a conchoidal fracture with vitreous lustre; some- times it is earthy in texture. Not being a definite crystallized substance,, it varies widely in chemical composition, the copper oxide (CuO), for example, varying in different analyses from 17 to 67%; the formula is usually given as CuSi03-|-2H 2 0. The hardness (2-4) and specific gravity (2-0-2-8) are also variable. It has recently been suggested that the material may really be a mixture of more than one hydrous copper silicate, since differences in the microcrystalline structure of the different concentric layers of which the masses are built up may be detected. Various impurities (silica, &c.) are also commonly present, and several varieties have been distinguished by special names: thus dillenburgite, from Dillenburg in Nassau, contains copper carbonate; demidoffite and cyanochalcite contain copper phosphate; and pilarite contains alumina (perhaps as allophane). The mineral occurs in the upper parts of veins of copper ores,

and has resulted from their alteration by the action of waters containing silica in solution. Pseudomorphs of chrysocolla after various copper minerals {e.g. cuprite) are not uncommon. It is found in most copper mines.

The name chrysocolla (from -xpuabs, g°ld, and /toXXa, glue) was applied by Theophrastus and other ancient writers to materials used in soldering gold, one of which, from the island of Cyprus, may have been identical with the mineral now known by this name. Borax, which is used for this purpose, has also been called chrysocolla.

A mineral known as pitchy copper-ore (Ger. Kupferpecherz), and of some importance as an ore of copper, is usually classed as a variety of chrysocolla containing much admixed limonite. It is dark brown to black in colour, with a dull to glassy or resinous lustre, and resembles pitch in appearance. In thin sections it is translucent and optically isotropic, and recent examinations seem to prove that it is a homogeneous mineral and not a mechanical mixture of chrysocolla and limonite. (L. J. S.)

CHRYSOLITE, a transparent variety of olivine, used as a gem-stone and often called peridot. The name chrysolite, meaning ” golden stone

” (\pw6s and \Wos), has been applied to various yellowish gems, notably to topaz, to some kinds of beryl and to chrysoberyl. The true chrysolite of the modern mineralogist is a magnesium silicate, referable to the species olivine. It is appropriate to call the lighter coloured stones inclining to yellow chrysolite, and the darker green stones peridot. Certain kinds of topaz, from the Schneckenstein in Saxony, are known as Saxon chrysolite; while moldavite, a substance much like a green obsidian, is sometimes called water chrysolite or pseudo-chrysolite.

See Chrysoberyl; Olivine; Peridot.

CHRYSOLORAS, MANUEL [or Emmanuel] (c. 1355-1415), one of the pioneers in spreading Greek literature in the West, was born at Constantinople of a distinguished family, which had removed with Constantine the Great to Byzantium. He was a pupil of Gemistus (q.v.). In 1393 he was sent to Italy by the emperor Manuel Palaeologus to implore the aid of the Christian princes against the Turks. He returned to Constanti- nople, but at the invitation of the magistrates of Florence he became about 1395 professor of the Greek language in that city, where he taught three years. He became famous as a translator of Homer and Plato. Having visited Milan and Pavia, and resided for several years at Venice, he went to Rome upon the invitation of Bruni Leonardo, who had been his pupil, and was then secretary to Gregory XII. In 1408 he was sent to Paris on an important mission from the emperor Manuel Palaeologus. In 1413 he went to Germany on an embassy to the emperor Sigismund, the object of which was to fix a place for the assembling of a general council. It was decided that the meeting should take place at Constance; and Chrysoloras was on his way thither, having been chosen to represent the Greek Church, when he died suddenly on the 15th of April 141 5. Only two of his works have been printed, his Erotemata (published at Venice in 1484), which was the first Greek grammar in use in the West, and Epistolae III. de comparatione veteris et novae Romae.

John Chrysoloras, a relative of the above (variously described as his nephew, brother or son), who, like him, had studied and taught at Constantinople, and had then gone to Italy, shared Manuel’s reputation as one of those who spread the influence of Greek letters in the West. His daughter married Filelfo (q.v.).

CHRYSOPRASE (Gr. xpwbs, gold, and7rpaaw, leek), a name applied by modern mineralogists to an apple-green variety of chalcedony or hornstone, used as an ornamental stone. The colour is due to the presence of nickel, probably in the form of a hydrous silicate. By

exposure to a moderate heat, or to strong light, the chrysoprase becomes paler, or even colourless, but it may regain its colour by absorption of moisture. Chrysoprase is a mineral of rather limited distribution. Most of it comes from the neighbourhood of Frankenstein in Silesia, where it occurs in association with altered serpentine. It is found to a limited extent at Revdinsk, near Ekaterinburg, in the Urals; and it occurs also in India. It is known, too, at several localities

in North America, notably at Nickel Mount, Douglas county, Oregon, where it occurs in nickeliferous serpentine.

The chrysoprase of the moderns is certainly not the chryso- prasius of Pliny, or the xpv&KfXutos of Greek writers. The ancient stone was not improbably our chrysoberyl, and it is doubtful whether the modern chrysoprase was known until a comparatively late period. The chrysoprase of Kosemiitz, near Frankenstein in Silesia, was discovered in 1740, and used by Frederick the Great in the decoration of the palace of Sans Souci at Potsdam. But at a much earlier date the Silesian chrysoprase was used for mural decoration at the Wenzel chapel at Prague. Chrysoprase was a favourite stone in England at the beginning of the 19th century, being set round with small brilliants and used for brooches and rings. At the present time it is said to be regarded by some as a ” lucky stone.” Much commercial chrysoprase is chalcedony artificially stained by impregnation with a green salt of nickel. (F. W. R.*)

CHRYSOSTOM. St John Chrysostom {Xpwbcrotws, golden- mouthed), the most famous of the Greek Fathers, was born of a noble family at Antioch, the capital of Syria, about a.d. 345 or 347. At the school of Libanius the sophist he gave early indications of his mental powers, and would have been the successor of his heathen master, had he not been stolen away, to use the expression of his teacher, to a life of piety (like Augustine, Gregory of Nazianzus, and Theodoret) by the influence of his pious mother Anthusa. After his baptism (about 370) by Meletius, the bishop of Antioch, he gave up all his forensic prospects, and buried himself in an adjacent desert, where for nearly ten years he spent a life of ascetic self-denial and theological study, to which he was introduced by Diodorus, bishop of Tarsus, a famous scholar of the Antiochene type. Illness, however, compelled him to return to the world; and the authority of Meletius gained his services to the church. He was ordained deacon in his thirty-fifth year (381),

and afterwards presbyter (386) at Antioch. On the death of Nectarius he was appointed archbishop of Constantinople by Eutropius, the favourite minister of the emperor Arcadius. He had, ten years before this, only escaped promotion to the episcopate by a very questionable stratagem — which, however, he defends in his instructive and eloquent treatise De Sacerdotio. As a presbyter, he won high reputation by his-preaching at Antioch, more especi- ally by his homilies on The Statues, a course of sermons delivered when the citizens were justly alarmed at the prospect of severe measures being taken against them by the emperor Theodosius, whose statues had been demolished in a riot.

On the archiepiscopal throne Chrysostom still persevered in the practice of monastic simplicity. The ample revenues which his predecessors had consumed in pomp and luxury he diligently applied to the establishment of hospitals; and the multitudes who were supported by his charity preferred the eloquent discourses of their benefactor to the amusements of the theatre or of the circus. His homilies, which are still preserved, furnish ample apology for the partiality of the people, exhibiting the free command of a pure and copious vocabulary, an inexhaustible fund of metaphors and similitudes, giving variety and grace to the most familiar topics, with an almost dramatic exposure of the folly and turpitude of vice, and a deep moral earnestness. His zeal as a bishop and eloquence as a preacher, however, gained him enemies both in the church and at the court. The ecclesiastics who were parted at his command from the lay-sisters (whom they kept ostensibly as servants), the thirteen bishops whom he deposed for simony and licentiousness at a single visitation, the idle monks who thronged the avenues to the court and found themselves the public object of his scorn — all conspired against the powerful author of their wrongs. Their resentment was inflamed by a powerful party, embracing the magistrates, the ministers, the favourite eunuchs, the ladies of the court, and Eudoxia the empress herself, against whom the preacher thundered daily from the pulpit of St Sophia. A favourable pretext for gratifying their revenge was discovered in the shelter which Chrysostom had given to four Nitrian monks, known as the tall brothers, who had come to Constantinople on

being excommunicated by their bishop, Theophilus of Alexandria, a man who had long circulated in the East the charge of Origenism against Chrysostom. By Theophilus's instrumentality a synod was called to try or rather to condemn the archbishop; but fearing the violence of the mob in the metropolis, who idolized him for the fearlessness with which he exposed the vices of their superiors, it held

its sessions at the imperial estate named ” The Oak ” {Synodus ad quercum), near Chalcedon, where Rufinus had erected a stately church and monastery. A bishop and a deacon were sent to accuse the archbishop, and presented to him a list of charges, in which pride, inhospitality and Origenism were brought forward to procure the votes of those who hated him for his austerity, or were prejudiced against him as a sus- pected heretic. Four successive summonses were signified to Chrysostom, but he indignantly refused to appear until four of his notorious enemies were removed from the council. Without entering into any examination of the charges brought before them, the synod condemned him on the ground of contumacy, and, hinting that his audacity merited the punishment of treason, called on the emperor to ratify and enforce their decision. He was immediately arrested and hurried to Nicaea in Bithynia.

As soon as the news of his banishment spread through the city, the astonishment of the people was quickly exchanged for a spirit of irresistible fury, which was increased by the occurrence of an earthquake. In crowds they besieged the palace, and had already begun to take vengeance on the foreign monks and sailors who had come from Chalcedon to the metropolis, when, at the entreaty of Eudoxia, the emperor consented to his recall. His return was graced with all the pomp of a triumphal entry, but in two months after he was again in exile. His fiery zeal could not blind him to the vices of the court, and heedless of personal danger he thundered against the profane honours that were addressed almost within the precincts of St Sophia to the statue of the empress. The haughty spirit of Eudoxia was inflamed by the report of a discourse commencing with the words — ” Herodias is again furious; Herodias again dances; she once more demands the head of John “; and though the report was false, it sealed the doom of the archbishop. A new council was summoned, more numerous and more subservient to the wishes of Theophilus; and troops of barbarians were quartered in the city to overawe the people. Without examining it, the council confirmed the former sentence, and, in accordance with canon 12 of the Synod of Antioch (341), pronounced his deposition for having resumed his functions without their permission.

He was hurried away to the desolate town of Cucusus (Cocysus) , among the ridges of Mount Taurus, with a secret hope, perhaps, that he might be a victim to the Isaurians on the march, or to the more implacable fury of the monks. He arrived at his destination in safety; and the sympathies of the people, which had roused them to fire the cathedral and senate-house on the day of his exile, followed him to his obscure retreat. His influence also became more powerfully felt in the

metropolis than before. In his solitude he had ample leisure for forming schemes of missionary enterprise among Persians and Goths, and by his correspondence with the different churches he at once baffled his enemies and gave greater energy to his friends. This roused the emperor to visit him with a severer punishment, though Innocent I. of Rome and the emperor Honorius recognized his orthodoxy and besought his return. An order was despatched for his removal to the extreme desert of Pityus; and his guards so faithfully obeyed their instructions that, before he reached the sea-coast of the Euxine, he expired at Comana in Pontus, in the year 407. His exile gave rise to a schism in the church, and the Johannists (as they were called) did not return to communion with the archbishop of Constantinople till the relics of the saint were, 30 years after, brought back to the Eastern metropolis with great pomp and the emperor publicly implored forgiveness from Heaven for the guilt of his ancestors. The festival of St Chrysostom is kept in the Greek Church on the 13th of November, and in the Latin Church on the 27th of January.

‘In his general teaching Chrysostom elevates the ascetic

element in religion, and in his homilies he inculcates the need of personal acquaintance with the Scriptures, and denounces ignorance of them as the source of all heresy. If on one or two points, as, for instance, the invocation of saints, some germs of subsequent Roman teaching may be discovered, there is a want of anything like the doctrine of indulgences or of compulsory private confession. Moreover, in writing to Innocent, bishop of Rome, he addresses him as a brother metropolitan, and sends the same letter to Venerius, bishop of Milan, and Chromatius, bishop of Aquileia. His correspondence breathes a most Christian spirit, especially in its tone of charity towards his persecutors. In exegesis he is a pure Antiochene, basing his expositions upon thorough grammatical study, and proceeding from a knowledge of the original circumstances of composition to a forceful and practical application to the needs of his day and of all time. With his exegetical skill (he was inferior in pure dogma to Theodore of Mopsuestia) he united a wide sympathy and a marvellous power of oratory.

The voluminous works of Chrysostom fall into three groups. To the days of his early desert life is probably to be assigned the treatise On Priesthood, a book full of wise counsel. To the years of his

presbyterate and episcopate belong the great mass of homilies and commentaries, among which those On the Statues, and on Matthew, Romans and Corinthians, stand out pre- eminently. His letters belong to the last years, the time of exile, and with his other works are valuable sources for the history of his time.

The manuscripts are very numerous, and many of them are of great antiquity, as are the Syriac and other translations. The best edition is that of Bernard de Montfaucon in 13 vols. fol. (.1718- 1738), reproduced with some improvements by Migne (Patrol. Graec. xlvii.lxiv.) ; but this edition is greatly indebted to the one issued more than a century earlier (1612) by Sir Henry Savile, provost of Eton College, from a press established at Eton by himself, which Hallam (Lit. of Europe, iii. 10, 11) calls ” the first work of learning, on a great scale, published in England.” F. Field admir ably edited 5. Matthew (Cambridge, 1839) and Epistles of S. Paul (Oxford, 1849-1855). J. A. Bengel’s edition of De Sacerdolio (1725) has been often reprinted (e.g. Leipzig, 1887).

As authorities for the life, the most valuable are the ecclesiastical histories of Socrates, Sozomen and Theodoret; and amongst the moderns, Erasmus, Cave, Lardner and Tillemont, with the church history of Neander, and his monograph on the Life and Times of Chrysostom, translated by J. C. Stapleton. More recent are the lives by W. R. W. Stephens (London, 1871), R. W. Bush (London, 1885) and A. Peuch (Paris, 1891). F. W. Farrar’s romance Gathering Clouds gives a good picture of the man and his times. For mono- graphs on special points such as Chrysostom’s theological position and his preaching, see the very full bibliography in E. Preuschen’s article in Herzog-Hauck’s Realencyk. iv. ; also A. Harnack, Hist, of Dogma, iii. and iv. Some of the commentaries and homilies are translated in the Oxford Library of the Fathers.

CHUB (Leuciscus cephalus), a fish of the Cyprinid family, belonging to the same genus as the roach and dace. It is one of the largest of its family, attaining a length of 2 ft. and a weight of 5 to 7 lb. It does not avoid running waters, and is fond of insects, taking the fly readily, but its flesh, like that of the other Leucisci, is tasteless and full of bones. It is common in Great Britain and the continent of Europe. In America the name of ” chub ” is given to some other members of the family, and commonly to the horned dace (Semnotilus atromaculatus) ; well-known varieties are the river chub (Hybopsis kentuckiensis) and Columbia river chub (Mylochilus caurinus) .

CHUBB, CHABLBS (d. 1845), English locksmith, started a hardware

business at Winchester, subsequently removing to Portsea. Here he improved on the ” detector ” lock (q.v.), originally patented in 1818 by his brother, Jeremiah Chubb. He soon moved to London and then to Wolverhampton, where he employed two hundred hands. In 1835 he patented a process intended to render safes (q.v.) burglar-procf and fireproof, and subsequently established a large safe-factory in London. He died on the 16th of May 1845, and was succeeded in the business by his son, John Chubb (1816-1872), who patented various improvements in the products of the firm and largely increased its output. The factories were combined under one roof in a model plant, and the business grew to enormous proportions.

After John Chubb ‘s death the business was converted into a limited company under the management of his three sons.

CHUBB, THOMAS (1679-1746), English deist, the son of a maltster, was born at East Harnham, near Salisbury, on the 29th of September 1679. The death of his father (1688) cut short his education, and in 1694 he was apprenticed to a glove-maker in Salisbury, but subsequently entered the employment of a tallow- chandler. He picked up a fair knowledge of mathematics and geography, but theology was his favourite study. His habit of committing his thoughts to writing gave him a clear and fluent style. He made his first appearance as an author in the Arian controversy. A dispute having arisen about Whiston’s argument in favour of the supremacy of the one God and Father, he wrote an essay, The Supremacy of the Father Asserted, which Whiston pronounced worthy of publication, and it was printed in 1715. A number of tracts followed, which were collected in 1730. For several years Chubb lived in the house of Sir Joseph Jekyll, master of the rolls, in what capacity it is not known; there are stories of his having waited at table as a servant out of livery. His love of independence drew him back to Salisbury, where by the kindness of friends he was enabled to devote the rest of his days to his studies. He died on the 8th of February 1746. Chubb is interesting mainly as showing that the ration- alism of the intellectual classes had taken considerable hold upon the popular mind. Though he acquired little renown in England he was regarded by Voltaire and others as among the most logical of the deist school (see Deism). His principal works are A Discourse Concerning Reason (1731), The True Gospel of Jesus Christ (1739), and Posthumous Works, 2 vols. (1748), the last containing ” The Author’s Farewell to his Readers.”

CHUBUT, a territory of the southern Argentine Republic, part of what was formerly called Patagonia, bounded N. by Rio Negro, S. by Santa Cruz, E. by the Atlantic and W. by Chile. Pop. (1895) 3748; (1904,

estimate) 9060; area, 93,427 sq. m. Except for the valleys in the Andean foothills, which are fertile and well forested, and the land along the banks of the Chubut river, which flows entirely across the territory from the Andes to the Atlantic, the country is a barren waste, covered with pebbles and scanty clumps of dwarfed vegetation, with occasional shallow saline lakes. The larger rivers are the Chubut and the Senguerr, the latter flowing into Lake Colhuapi. There are a number of large lakes among the Andean foothills, the best known of which are Fontana, La Plata and General Paz, and, in the interior, Colhuapi or Colhue and Musters, the latter named after the English naval officer who traversed Patagonia in 1870. Petroleum was found at Comodoro Rivadavia, in the S. part of the territory, toward the close of 1907, at a depth of 1768 ft. Chubut is known chiefly by the Welsh colony near the mouth of the Chubut river. The chief town of the Welsh, Rawson, is the capital of the territory, and Port Madryn on Bahia Nueva is its best port. Other colonies have been founded in the fertile valleys of the Andean foothills, but their growth is greatly impeded by lack of transportation facilities. (See further Patagonia.)

CHUDE, a tribal name used in both a special and a general sense. (1) It was the name given by the Russians to certain Esthonian tribes with whom they came in contact as they spread gradually over their present empire. It would seem that the northern Chudes are the Vepsas, of whom about 21,000 are said to live near Lake Onega and in the northern parts of the govern- ment of Novgorod, and that the southern Chudes are the Votes who occupy about thirty parishes in north-west Ingria. (2) As the Russians advanced eastwards they extended the name to various tribes whom they considered to be like the Esthonians, and in popular use it has come to be applied to any ancient non- Russian people in Siberia, at least as far east as the Altai. In particular, ancient mines, tumuli and the metal work often found in them are commonly .known as Chudish. Some investigators have used the word in a more restricted sense of Permian anti- quities and their builders, but it seems to be a popular expression not corresponding to any historical or scientific division of ‘ mankind.

CHUGUYEV, a town of Russia, in the government of Kharkov, 25 m. E.S.E. of the town of Kharkov, on the right bank of the northern Donets. It is a place of some strategic importance, and had in 1897 a population of 11,877.

CHUKCHI, Chanktus (” Men “) or Tuski (” Brothers ” or “Confederates”), a Mongoloid people inhabiting the north-easternmost portion of Siberia on the shores of the Arctic Ocean and Bering Sea. They are settled in small groups along the Arctic coast between the Bering Straits and the Kolyma river, or wander as far inland as the Anadyr basin. Though their territory embraces some 300,000 odd sq. m., the most trust- worthy estimates put their numbers at but a few thousands. They were first carefully studied by the members of the Nor- denskjold expedition (1878-79), who describe them as tall, lean, with somewhat irregular features — hence de Quatrefages classes them as ” Allophylian Whites.” The accounts of their physical characteristics are somewhat confused owing to the presence of the true Eskimo in the Chukchi domain. The typical Chukchi is round-headed, and thus distinct from the long-headed Eskimo, with broad, flat features and high cheek-bones. The nose is often so buried between the puffed cheeks that a ruler might be laid across the face without touching it. The lips are thick, and the brow low. The hair is coarse, lank and black. The general muscular development is good, though usually the body is stunted. It has been suggested that they emigrated from the south, possibly from the Amur basin. In their arctic homes they long carried on war with the Ongkilon (Ang-kali) aborigines, gradually merging with the survivors and also mixing both with the Kusmen Koryaks (q.v.) and the Chuklukmuit Eskimo settled on the Asiatic side of Bering Strait. Their racial characteristics make them an ethnological link between the Mongols of central Asia and the Indians of America. Some authorities affiliate them to the Eskimo because they are believed to speak an Eskimo dialect. But this is merely a trade jargon, a hotchpotch of Eskimo, Chukchi, Koryak, English and even Hawaiian. The true Chukchi language, of which Nordenskjold collected a thousand words, is distinct from Eskimo and akin to Koryak, and Nordens- kjold sums the problem up with the remark — ” this race settled on the primeval route between the Old and New World bears an unmistakable stamp of the Mongols of Asia and the Eskimo and Indians of America.”

The Chukchi are divided into the ” Fishing Chukchi,” who have settled homes on the coast, and the ” Reindeer Chukchi,” who are nomads. The latter breed reindeer (herds of more than 10,000 are not uncommon), live on the flesh and milk, and are generally fairly prosperous; while the fishing folk are very poor, begging from their richer kinsfolk hides to make tents and clothes. The Chukchi were formerly warlike and vigorously resisted the Russians, but to-day they are the most peaceable of folks, amiable in their manners, affectionate in family life and good-humoured. But this gentleness does not

prevent them from killing off the old and infirm. They believe in a future life, but only for those who die a violent death. Thus it is regarded as an act of filial piety for a son to kill his parent or a nephew his uncle. This tribal custom is known as kamitok; and of it Mr Harry de Windt writes (Through the Gold Fields of Alaska to Bering Strait, 1898), ” The doomed one takes a lively interest in the proceedings, and often assists in the preparation for his own death. The execution is always preceded by a feast, where seal and walrus meat are greedily devoured, and whisky consumed till all are intoxicated. A spontaneous burst of singing and the muffled roll of walrus-hide drums then herald the fatal moment. At a given signal a ring is formed by the relations and friends, the entire settlement looking on from the background. The exe- cutioner (usually the victim’s son or brother) then steps forward, and placing his right foot behind the back of the condemned, slowly strangles him to death with a walrus thong. A kamitok took place during the latter part of our stay.” The Chukchi are nominally Christians, but sacrifice animals to the spirits of the rivers and mountains, and also practise Shamanism. In personal habits the people are indescribably filthy. They are polygamous, but the women are treated kindly. The children are specially

petted, and are so wrapped up to protect them from the cold that they have been described as resembling huge balls crossed by a bar, their arms having to remain outstretched owing to the bulk of their wrappings. Chukchi women are often tattooed with two black-blue convex lines running from the eye to the chin. Since their adoption of Christianity the men sometimes have a Latin cross tattooed on their chins. The Chukchi burn their dead or expose them on platforms to be devoured by ravens.

See Harry de Windt, Through the Gold Fields of Alaska to Bering Strait (1898); Dittmar, ” Uber die Koriaken u. ihnen nahe ver- wandten Tchouktchen,” in Bui. Acad. Sc. (St Petersburg), xii. p. 99; Hooper, Ten Months among the Tents of the Tuski; W. H. Dall, Contributions to North American Ethnology, vol. i. (1877).

CHULALONGKORN, PHRA PARAMINDR MAHA (1853- 1910), king of Siam, eldest son of King Maha Mongkut, was born on the 21st of September 1853. His full signature, used in all important state documents, consists of twenty-seven names, but it is by the first four that he is usually known. Educated in his childhood by English teachers, he acquired a good knowledge of the English language and of Western culture. But his surround- ings were purely oriental, and his boyhood was spent, according to custom, in a Buddhist monastery.

He succeeded to the throne on the death of his father, 1st October 1868, and was crowned on the nth of November following, a ceremony marked by the innovation of permitting the presence of Euro- peans. Until his majority in 1873 the government was carried on by a regent, the young king retiring to a Buddhist monastery, and later making a tour through India and the Dutch East Indies, an undertaking until then without precedent among the potentates of eastern Asia. He had no sooner taken the reins of power than he gave evidence of his recognition of the importance of modern culture by abolishing slavery in Siarn. He simplified court etiquette, no longer demanding, for example, that his subjects should approach him on hands and knees. Still more important, in view of the numerous races and creeds included among his subjects, was the proclamation of liberty of conscience. This was followed by the erection of schools and hospitals, the construction of roads and railways, and the further development of the army and fleet which his father had initiated. To him Siam is indebted for its standard coinage, its postal and telegraph service, and for the policing, sanitation and electric-lighting of Bangkok. Several of his sons, including the crown prince, were educated. in England, and in the summer of 1897 he hirnself visited England, arriving at Portsmouth in his yacht on the 29th of July. On the 4th of August he was received by Queen Victoria at Osborne. After a tour in Great Britain he proceeded to Berlin, Brussels, and the Hague and Paris. (See also Siam.)

CHUMBI VALLEY, a valley connecting Tibet (q.v.) with the frontier of British India. Lying on the southern slopes of the Himalayas at an altitude of about 9500 ft. above the sea, the valley is wedged in between Bhutan and Sikkim, and does not belong geographically but only politically to Tibet. This was the route by which the British mission of 1 904 advanced. Before the date of that expedition the valley had acquired a reputation for beauty and fertility, which was subsequently found to be only comparative in relation to the barrenness of the rest of the Tibetan frontier. The summer months, though not hot, are relaxing and enervating.

CHUNAR, or Chunarghur, a town and ancient fortress of India, in the district of Mirzapur, in the United Provinces, situated on the south bank of the Ganges. Pop. (1901) 9926. The fort occupies a conspicuous site on the summit of an abrupt rock which commands the river. It was at one time a place of great strength, and still contains a magazine, and is fortified with batteries. In the old citadel on the height, the remains of a Hindu palace with some interesting carvings indicate the former importance of the place. The town, which consists of one or two straggling streets, contains a handsome English

church. Chunar is first mentioned in the 16th century, when in possession of Sing Joanpore. In 1530 it became the residence of Shere Shah the Afghan, and forty-five years later was recovered by the emperor Akbar after sustaining a siege of six months. It fell into the

hands of the English under General Carnac in 1763 after a prolonged resistance which caused considerable loss to the assailants. A treaty with the nawab of Oudh was signed here by Warren Hastings on behalf of the East India Company in September 1781.

CHUNCHO, a tribe of South American Indians, living in the forests east of Cuzco, central Peru. They are a fierce and savage people who have preserved their independence. They are said to be akin to their neighbours the Antis. They dwell in communal houses, and live chiefly by hunting. Chuncho has also been used to describe one of three aboriginal stocks of Peru, the others being Quichua and Aymara.

CH'UNGK'ING, a city in the province of Szech'uen, China, on the left bank of the Yangtsze, at its point of junction with the Kialing, in 20° 33′ N., and 107 2′ E. It is surrounded by a crenelated stone wall, which is 5 m. in circumference and is pierced by nine gates. It is the commercial centre for the trade, not only of Szech'uen, but of all south-western China. The one highway between Szech'uen and the eastern provinces is the Yangtsze river route, as owing to the mountainous nature of the intervening country land transit is almost impracticable. The import trade brought up by large junks from Ich'ang, and consisting of cotton cloth, yarn, metals and foreign manufactures, centres here, and is distributed by a class of smaller vessels up the various rivers of the provinces. Native produce, such as yellow silk, white wax, hides, rhubarb, musk and opium, is here collected and repacked for conveyance to Hankow, Shanghai or other parts of the empire. The city was opened to foreign trade by convention with the British government in 1891, with the proviso, however, that foreign steamers should not be at liberty to trade there until Chinese-owned steamers had succeeded in ascending the river. This restriction was abolished by the Japanese treaty of 1895, which declared Ch'ungk'ing open on the same terms as other ports. After that date the problem of steam navigation on the section of the river between Ich'ang and Ch'ungk'ing occupied attention. By 1907 a small steamer had been navigated up the rapids, but it remained a question how far steam navigation could be made a practical success. The trade

was carried on by native craft, hauled up against the strength of the current in the worst places by a line of trackers on the bank. The great rise in the river during the summer months, at Ch'ungk'ing ordinarily 70 ft. and occasionally as much as 96 ft., added to the difficulties. The population of Ch'ungk'ing, including the city of Kiangpei on the opposite bank of the Kialing river, is about 300,000. The foreign residents are very few. In 1898 the value of the trade passing through the maritime customs was £2,614,000, and in 1904 £4,214,568, of which imports counted for £2,644,777 an(i exports for £1,569,791.

CHUPATTY, an Anglo-Indian term for an unleavened cake of bread. The word represents the Hindustani chapati, and is applied to the usual form of native bread, the staple food of upper India. The chupatty is generally made of coarse wheaten flour, patted flat with the hand, and baked upon a griddle. In the troubled times that preceded the mutiny of 1857 chupatties were circulated from village to village throughout India, apparently as a token of discontent. 1

CHUPRIYA (sometimes written Tiupriia; Croatian Cuprya), the capital of the Morava department of Servia, on the railway from Belgrade to Nish, and on the right bank of the Morava, which is navigable up to this point by small sailing-vessels. Pop. (1900) about 6000. Some of the finest Servian cattle are bred in the neighbouring lowlands, and the town has a consider- able trade in plums and other farm-produce. A light railway, leading to several important collieries, runs for 13 m. through the beech-forests and mountains on the east. Cloth is woven at Parachin, 5 m. S.; and Yagodina, 8 m. W. by N., is an im- portant market town. Among the foothills of the Golubinye Range, 7 m. E.N.E., is the 14th-century Ravanitsa monastery, with a ruined fort and an old church — their walls and frescoes pitted by Turkish bullets. There is a legend that here the Servian tsar Lazar (1374-1389) was visited by an angel, who bade him choose between an earthly and a heavenly crown. In

accordance with his choice, Lazar fell fighting at Kossovo, and was buried at Ravanitsa; his botly being afterwards transferred, through fear of the Turks, to another Ravanitsa, in eastern Slavonia. His crucifix is treasured among the monastic archives, which also contain a charter signed by Peter the Great of Russia (1672-1725). Manasia (Manasiya), the still more celebrated foundation of Stephen, the son and successor of Lazar, lies 12 m. N. of Ravanitsa. Built in a cleft among the hills which line the river Resava, an affluent of the Morava, this monastery is enclosed in a fortress, whose square towers, and curtain without loopholes or battlements, remain largely intact. Within the curtain stand the monastic buildings, a large garden and a

cruciform chapel, with many curious old stone carvings, half hidden beneath whitewash. Numerous gifts from the Russian court, such as gospels lettered in gold and silver relief, or jewelled crucifixes, are preserved on the spot; but the valuable library was removed, in the 15th century, to Mount Athos.

CHUQUISACA, a department of S.E. Bolivia, bounded N. by Cochabamba and Santa Cruz, E. by Santa Cruz and Brazil, S. by Tarija, and W. by Potosi. It lies partly upon the eastern plateau of Bolivia and partly upon the great plains of the upper La Plata basin; area, 26,418 sq. m. The Pilcomayo, a large tributary of the Paraguay, crosses N.W. to S.E. the western pari of the department. The climate of the lowlands is hot, humid and unhealthy, but that of the plateau is salubrious, though subject to greater extremes in temperature and rainfall. The seasons are sharply divided into wet and dry, the eastern plains becoming great lagoons during the wet season, and parched deserts during the dry. The mineral resources are important, but are less developed than those of Potosi and Oruro. Grazing is the principal industry of the plains, and cattle, sheep, goats and llamas are raised and cereals grown in the fertile valleys of the plateau. Three rough highways connect the department with its neighbours on the N. and W, and pack animals are the common means of transporting merchandise. The population was estimated at 204,434 m 1900, and is largely composed of Indians and mestizos. The plateau Indians are generally Aymaras, but on the eastern plains there are considerable settlements of partly civilized Chiriguanos, of Guarani origin. The depart- ment is divided into four provinces, the greater part of the lowlands being unsettled and without effective political organization. Its principal towns are Sucr6, Camargo, Padilla and Yotala.

CHURCH, FREDERICK EDWIN (1826-1900), American landscape painter, was born at Hartford, Connecticut, on the 4th of May 1826. He was a pupil of Thomas Cole at Catskill, New York, where his first pictures were painted. Developing unusual technical dexterity, Church from the beginning sought for his themes such marvels of nature as Niagara Falls, the Andes, and tropical forests — he visited South America in 1853 and 1857,— volcanoes in eruption, and icebergs, the beauties of which he portrayed with great skill in the management of light, colour, and the phenomena of rainbow, mist and sunset, rendering these plausible and effective. In their time these paintings awoke the wildest admiration and sold for extravagant prices, collectors in the United States and in Europe eagerly seeking them, though their vogue has now passed away. In 1849 Church was made a member of the National Academy of Design. His ” Great Fall at Niagara ” (1857) is in the Corcoran Art Gallery, Washington, D.C., and

alarge ” Twilight ” is in the Walters Gallery, Baltimore, Maryland. Among his other canvases are ” Andes of Ecuador ” (1855), “Heart of the Andes” (1859), “Cotopaxi” (1862), “Jerusalem” (1870), and “Morning in the Tropics” (1877). He died on the 7th of April 1900, at his house on the Hudson river above New York City, where he had lived and worked for many years. He was the most prominent member of the so- called ” Hudson River School ” of American artists.

CHURCH, GEORGE EARL (1835-1910), American geographer, was born in New Bedford, Massachusetts, on the 7th of December 1835. He was educated as a civil engineer, and was early engaged on the Hoosac Tunnel. In 1858 he joined an exploring expedition to South America. During the American Civil War he

served (1862-1865) in the Army of the Potomac, rising to the command of a brigade and the rank of colonel; and in 1866-1867 he was war correspondent of the New York Herald in Mexico. He explored the Amazon (1868-1879), and gradually became the leading authority on that region of South America, being appointed United States commissioner to report on Ecuador in 1880, and visiting Costa Rica in 1895 to report on its debt and railways. He wrote extensively on South and Central American geography, and became avice-president of the Royal Geographical Society (London), and in 1898 president of the geographical section of the British Association.

CHURCH, SIR RICHARD (1784-1873), British military officer and general in the Greek army, was the son of a Quaker, Matthew Church of Cork. He was born in 1 784, and at the age of sixteen ran away from home and enlisted in the army. For this violation of its principles he was disowned by the Society of Friends, but his father bought him a commission, dated the 3rd of July 1800, in the 13th (Somersetshire) Light Infantry. He served in the demonstration against Ferrol, and in the expedition to Egypt under Sir Ralph Abercromby in 1801. After the expulsion of the French from Egypt he returned home, but came back to the Mediterranean in 1805 among the troops sent to defend the island of Sicily. He accompanied the expedition which landed in Calabria, and fought a successful battle against the French at Maida on the 6th of July 1806. Church was present on this occasion as captain of a recently raised company of Corsican Rangers. His zeal attracted the notice of his superiors, and he had begun to show his capacity for managing and drilling foreign levies. His Corsicans formed part of the

garrison of Capri from October 1806 till the island was taken by an expedition directed against it by Murat, in September 1808, at the very beginning of his reign as king of Naples. Church, who had distinguished himself in the defence, returned to Malta after the capitulation. In the summer of 1809 he sailed with the expedition sent to occupy the Ionian Islands. Here he increased the reputation he had already gained by forming a Greek regiment in English pay. It included many of the men who were afterwards among the leaders of the Greeks in the War of Independence. Church commanded this regiment at the taking of Santa Maura, on which occasion his left arm was shattered by a bullet. During his slow recovery he travelled in northern Greece, and Macedonia, and to Constantinople. In the years of the fall of Napoleon (1813 and 1814) he was present as English military representative with the Austrian troops until the campaign which terminated in the expulsion of Murat from Naples. He drew up a report on the Ionian Islands for the congress of Vienna, in which he argued in support, not only of the retention of the islands under the British flag, but of the permanent occupation by Great Britain of Parga and of other formerly Venetian coast towns on the main- land, then in the possession of Ali Pasha of Iannina. The peace and the disbanding of his Greek regiment left him without employment, though his reputation was high at the war office, and his services were recognized by the grant of a companionship of the Bath. In 181 7 he entered the service of King Ferdinand of Naples as lieutenant-general, with a commission to suppress the brigandage then rampant in Apulia. Ample powers were given him, and he attained a full measure of success. In 1820 he was appointed governor of Palermo and commander-in-chief of the troops in Sicily. The revolution which broke out in that year led to the termination of his services in Naples. He escaped from violence in Sicily with some difficulty. At Naples he was im- prisoned and put on his trial by the government, but was acquitted and released in January 1 8 2 1 ; and King George IV. con- ferred on him a knight commandership of the Hanoverian order. The rising of the Greeks against the Turks, which began at this time, had his full sympathy from the first. But for some years he had to act only as the friend of the insurgents in England. In 1827 he took the honourable but unfortunate step of accepting the commandership-in- chief of the Greek army. At the point of anarchy and indiscipline to which they had now fallen, the Greeks could no longer form an efficient army, and could look for salvation only to foreign intervention. Sir Richard Church, who

landed in March, was sworn ” archistrategos ” on the 15th of April 1827. But he could not secure loyal co-operation or obedience. The

rout of his army in an attempt to relieve the acropolis of Athens, then besieged by the Turks, proved that it was incapable of conducting regular operations. The acropolis capitulated, and Sir Richard turned to partisan warfare in western Greece. Here his activity had beneficial results, for it led to a rectification in 1832, in a sense favourable to Greece, of the frontier drawn by the powers in 1830 (see his Observations on an Eligible Line of Frontier for Greece, London, 1830). Church had, however, surrendered his commission, as a protest against the unfriendly government of Capo d'Istria, on the 25th of August 1829. He lived for the rest of his life in Greece, was created general of the army in 1854, and died at Athens on the 30th of March 1873. Sir Richard Church married in 1826 Elizabeth Augusta Wilmot-Horton, who survived him till 1878.

See Sir Richard Church, by Stanley Lane Poole (London, 1890)', Sir Richard Church in Italy and Greece, by E. M. Church (Edinburgh, 1895), based on family papers (an Italian version, Brigantaggio e societh segrete nelle Puglie, 1817-1828, executed under the direction of Carlo Lacaita, appeared at Florence in 1899). The MS. Correspondence and Papers of Sir Richard Church, in 29 vols., now in the British Museum (Add. MSS. 36543-36571). contain invaluable material for the history of the War of Greek Independence, in- cluding a narrative of the war during Church's tenure of the command, which corrects many errors in the published accounts and successfully vindicates Church's reputation against the strictures of Finlay, Mendelssohn-Bartholdy, and other historians of the war (see Cam. Mod. Hist. x. p. 804). (D. H.)

CHURCH, RICHARD WILLIAM (1815-1890), English divine, son of John Dearman Church, brother of Sir Richard Church (q.v.), a merchant, was born at Lisbon on the 25th of April 181 5, his early years being mostly spent at Florence. After his father's death in 1828 he was sent to a school of a pronounced evangelical type at Redlands, Bristol, and went in 1833 to Wadham College, Oxford, then an evangelical college. He took first-class honours in 1836, and in 1838 was elected fellow of Oriel. One of his contemporaries, Richard Mitchell, commenting on this election, said: " There is such a moral beauty about Church that they could not help taking him." He was appointed tutor of Oriel in 1839, and was ordained the same year. He was an intimate friend of J. H. Newman at this period, and closely allied to the Tractarian party. In 1841 No. 90 of Tracts for the Times appeared, and Church resigned his tutorship. In 1844- 1845 he was junior proctor, and in that capacity, in concert with his senior colleague, vetoed a proposal to censure Tractgo publicly. In 1846 Church, with others, started The Guardian newspaper, and he was an

early contributor to The Saturday Review. In 1850 he became engaged to Miss H. F. Bennett, of a Somerset- shire family, a niece of George Moberly, bishop of Salisbury, After again holding the tutorship of Oriel, he accepted in 185s the small living of Whatley in Somersetshire, near Frome, and was married in the following year. He was a diligent parish priest and a serious student, and contributed largely to current literature. In 1869 he refused a canonry at Worcester, but in 1871 he accepted, most reluctantly (calling it ” a sacrifice en pureperte “), the deanery of St Paul’s, to which he was nominated by W. E. Gladstone.

His task as dean was a complicated one. It was (1) the restora- tion of the cathedral; (2) the adjustment of the question of the cathedral revenues with the Ecclesiastical Commissioners; (3) the reorganization of a conservative cathedral staff with anomalous vested rights. He described the intention of his appointment to be ” that St Paul’s should waken up from its long slumber.” The first year that he spent at St Paul’s was, writes one of his friends, one of ” misery ” for a man who loved study and quiet and the country, and hated official pomp and financial business and ceremonious appearances. But he performed his difficult and uncongenial task with almost in- credible success, and is said never to have made an enemy or a mistake. The dean was distinguished for uniting in a singular degree the virtues of austerity and sympathy. He was pre- eminently endowed with the faculty of judgment, characterized I by Canon Scott Holland as the gift of ” high and fine and sane

and robust decision.” Though of unimpressive stature, he had a strong magnetic influence over all brought into contact with him, and though of a naturally gentle temperament, he never hesitated to express censure if he was convinced it was deserved. In the pulpit the voice of the dean was deliberately monotonous, and he employed no adventitious gesture. He may be described as a High Churchman, but of an essentially rational type, and with an enthusiasm for religious liberty that made it impossible for him to sympathize with any unbalanced or inconsiderate demands for deference to authority. He said of the Church of England that there was ” no more glorious church in Christen- dom than this inconsistent English Church.” The dean often meditated resigning his office, though his reputation as an ecclesiastical statesman stood so high that he was regarded in 1882 as a possible successor to Archbishop Tait. But his health and mode of

life made it out of the question. In 1888 his only son died; his own health declined, and he appeared for the last time in public at the funeral of Canon Liddon in 1890, dying on 9th December 1800, at Dover. He was buried at Whatley.

The dean's chief published works are a Life of St Anselm (1 870} , the lives of Spenser (1 8 7 9) and Bacon (1 884) in Macmillan's " Men of Letters " series, an Essay on Dante (1878), The Oxford Movement (1891), together with many other volumes of essays and sermons. A collection of his journalistic articles was published in 1897 as Occasional Papers. In these writings he exhibits a great grasp of principles, an accurate mastery of detail, and the same fusion of intelligent sympathy and dispassionate judgment that appeared in his handling of business. His style is lucid, and has the charm of austerity. He stated that he had never studied style per se, but that he had acquired it by the exercise of translation from classical languages; that he watched against the temptation of using unreal and fine words; that he employed care in his choice of verbs rather than in his use of adjectives; and that he fought against self-indulgence in writing just as he did in daily life. His sermons have the same quality of self-restraint. His private letters are fresh and simple, and contain many unaffected epigrams; in writing of religious subjects he resolutely avoided dogmatism without ever sacrificing precision. The dean was a man of genius, whose moral stainless- ness and instinctive fire were indicated rather than revealed by his writings.

See Life and Letters of Dean Church, by his daughter, M. C. Church (1895); memoir by H. C. Beeching in Diet. Nat. Biog.; and D. C. Lathbury, Dean Church (1907). (A. C. Be.)

CHURCH (according to most authorities derived from the Gr. nvpioKov [bwfia], " the Lord's [house]," and common to many Teutonic, Slavonic and other languages under various forms — Scottish kirk, Ger. Kirche, Swed. kirka, Dan. kirke, Russ. tserkov, Bulg. cerkova, Czech cirkev, Finn, kirkko, &c), a word originally applied to the building used for Christian worship, and subse- quently extended to the Christian community (ecclesia) itself. Similarly the Greek word ecclesia (ewcX)j(Tia), " assembly," was very early transferred from the community to the building, and is used in both senses, especially in the modern Romance and Celtic languages (e.g. Fr. iglise, Welsh eglwys, &c).

(1) Church Architecture. — From the strictly architectural point of view the subject of church building, including the development of the various styles and the essential features of the construction and

arrangement of churches, is dealt with elsewhere (see Architecture; Abbey; Basiiica). It is, how- ever, impossible to understand the development of church architecture without realizing its intimate connexion with that of the doctrine, organization and ritual of the Christian Church as a religious community, and a brief sketch of this connexion may be given here by way of introduction to the more technical treatment of the subject. In general it may be said of church architecture, more truly than of any other, that artistically it is ” frozen music.” It is true that at all times churches have been put to secular uses; in periods of unrest, as among the Nestorian Christians now, they were sometimes built to serve at need as fortresses; their towers were used for beacons, their naves for meetings on secular affairs. But as a rule, and especially in the

great periods of church architecture, their builders were un- trammelled by any utilitarian considerations; they built for the glory of God, for their own glory perhaps, in honour of the saints; and their work, where it survives, is (as it were) a petrification of their beliefs and ideals. This is, of course, more true of the middle ages than of the times that preceded and followed them; the Church under the Roman empire hardly as yet realized the possibilities of ” sermons in stones,” and took over, with little change, the model of the secular and religious buildings of pagan Rome; the Renaissance, essentially a neo- pagan movement, introduced disturbing factors from outside, and, though develop- ing a style very characteristic of the age that produced it, started that archaeological movement which has tended in modern times to substitute mere imitations of old models for any attempt to express in church architecture the religious spirit of the age.

The earliest type of Christian Church, out of which the others developed, was the basilica. The Church, emerging in the 4th century into imperial favour, and established as part of the organization of the Roman empire, simply adopted that type of secular official building which she found convenient for her purposes. The clergy, now Roman officials, vested in the robes of the civil dignitaries (see Vestments), took their seats in the apse of the basilica where the magistrates were wont to sit, in front of them the holy table, facing the congregation. The cancelli, the lattice or.bar, which in the civil tribunal had divided the court from the litigants and the public, now served to separate clergy and laity. This arrangement still survives in some of the ancient churches of Rome; it has been revived in many Protestant places of worship. It symbolized principally an official distinction; but with the theocratizing of the empire in the East and its decay in the West the accentuation of the mystic powers of the clergy led to a more

complete separation from the laity, a tendency which left its mark on the arrangements of the churches. In the East the cancelli, under the influence possibly of the ritual of the Jewish temple, developed into the iconostasis, the screen of holy pictures, behind the closed doors of which the supreme act of the eucharistic mystery is hidden from the lay people. In the West the high altar was moved to the east end (the presbyterium) with a space before it for the assisting deacons andsubdeacons (the chancel proper) railed off as a spot peculiarly holy (now usually called the sanctuary) ; between this and the nave, where the laity were, was the choir, with seats for the clergy on either side. The whole of this space (sanctuary and choir) came to be known as the ” chancel.” This was divided from the nave, sometimes by an arch forming part of the structure of the building, sometimes by a screen, or by steps, sometimes by all three (see Chancel). The division of churches into chancel and nave, the outcome of the sacramental and sacerdotal spirit of the Catholic Church, f may be taken as generally typical of church construction in the medieval West, though there were exceptions, e.g. the round churches of the Templars. There were, however, further changes, the result partly of doctrinal developments, partly of that passion for symbolism which by the 13th century had completed the evolution of the Catholic ritual. Transepts were added, to give to the ground-plan of the building the figure of the cross. The insistence on the unique efficacy of the sacrifice of the altar led to the multiplication of masses, and so of altars, which were placed in the transepts or aisles or in chapels, dedicated to the saints whose relics they enshrined. The chief of these subsidiary chapels, that of the Blessed Virgin (or Lady chapel), behind the high altar, was often of large size. Finally, for the convenience of processions, the nave and chancel aisles were carried round behind the high altar as ambulatories.

The Romanesque churches, still reminiscent of antique models, had preserved all the simplicity of the ancient basilicas with much more than their grandeur; but the taste for religious symbolism which culminated in the 13 th century, and the imaginative genius of the northern peoples, transformed them into the marvellous dreams in stone of the ” Gothic ” period. Churches now became, in form and decoration, epitomes of the Christian scheme of salvation as the middle ages understood it.

In the plan of the buildings and their decoration everything still

remained subordinate to the high altar; but though on this and its surroundings ornament was most lavishly expended, the churches — wherever wealth permitted — were covered within and without with sculpture or painting: scenes from the Old and New Testaments, from the lives of saints, even from every-day life; figures of the Almighty, of Christ, of the Virgin Mother, of apostles, saints, confessors; pictures of the joys of heaven and the torments of hell; and outside, grimacing from every angle, demons and goblins, amusing enough to us but terrible to the age that set them there, visible embodiments of the evil spirits driven from within the sacred building by the efficacy of the holy rites.

In considering the origins of medieval churches, moreover, it must be borne in mind that as a general rule their builders were not actuated by the motives usual in modern times, at least among Protestants. The size of churches was not determined by the needs of population but by the piety and wealth of the founders; and the same applies to their number. Often they were founded as acts of propitiation of the Almighty or of the saints, and the greater their size and splendour the more effective they were held to be for their purpose. Local rivalry, too, played a large part, one wealthy abbey building ” against ” another, much in the same way as modern business houses endeavour to outshine each other in the magnificence of their buildings. Of all the mixed motives that went to the evolution of church architecture in the middle ages, this rivalry in ostenta- tion was probably the most fertile in the creation of new forms. A volume might be written on the economic effects of this locking up of vast capital in unproductive buildings. In Catholic countries (notably in Ireland) great churches are still built out of the savings of a poverty-stricken peasantry; and from this point of view the destruction of churches in the 16th century was probably a benefit to the world. This, however, is a con- sideration altogether alien to the Christian spirit, the aspiration of which is to lay up treasures not on earth but in heaven.

The Reformation was a fateful epoch in the history of church architecture. The substitution of the Bible for the Mass destroyed the raison d’etre of churches as the middle ages had made them. Pictures and stories, carved or painted, seemed no longer necessary now that the open Bible was in the hands of the common people; they had been too often prostituted, moreover, to idolatrous uses, — and ” idolatry ” was the worst of blasphemiesˆ to the re-discoverers of the Old Testament. Save in some parts of Germany, where the influence of Luther saved the churches from wreck, an iconoclastic wave spread over the greater part of Western Europe, wherever the ” new religion ” prevailed; everywhere churches were cleared of images and reduced

to the state of those described by William Harrison in his Description of England (1570), only the ” pictures in glass ” being suffered in some cases to survive for a while ” by reason of the extreme cost of replacing them.” The structures of the churches, however, remained; and these, even in countries which departed furthest from the Catholic system, served in some measure to keep its tradition alive. Protestantism has, indeed, produced a distinctive church architecture, i.e. the conventicle type, favoured more especially by the so-called ” Free Churches.” Its distinctive features are pulpit and auditorium, and it is symbolical of the complete equality of ministers and congregation. In general, however, Protestant builders have been content to preserve or to adapt the traditional models. It would be interesting in this connexion to trace the reverse effect of church architecture upon church doctrine. In England, for instance, the chancels were for the most part disused after the Reformation (see Harrison, op. cit.), but presently they came into use again, and on the Catholic revival in the Church of England in the 19th century it is certain that the medieval churches exercised an influence by giving a sense of fitness, which might otherwise have been lacking, to the restoration of medieval ritual. A similar tendency has of late years been displayed in the Established Church of Scotland.

Churches, as the outcome of the organization of the Catholic Church, are divided into classes as ” cathedral,” ” conventual ”

and ” collegiate,” ” parochial ” and ” district ” churches. It .must be noted, however, that the term cathedral (

(2) The Religious Community. — In the sense of Christian community (ecclesia) the word ” Church ” is applied in a narrow sense to any one of the numerous separate organizations into which Christendom is divided (e.g. Roman Catholic Church, Orthodox Eastern Church, Church of England, Evangelical [Lutheran] Church) — these are dealt with under their several headings — and in a comprehensive sense (with which we are now concerned) to the general body of all those ” who profess and call themselves Christians.” Religion, according to the old definition, is the bond which binds the soul of man to God. 1 It begins as the relation of a tribe to its God. Personal religious conviction grows out of the tribal (corporate) religious bond. But the social instinct is strong. Men owning the same religious convictions will naturally draw together into some sort of associa- tion. Using the word religion to cover all the imperfect ways in which men have felt after God, we note that in every case men have found the need alike of a teacher and of fellowship. Thus the idea of a church as ” the pillar and ground of the truth ” (1 Tim. iii. 15) corresponds to some of the

primary needs of man. Even at Stonehenge, the oldest relic of prehistoric religion in England, where we picture in imagination the worship of the rising sun, nature worship degraded to a horrible depth by human sacrifice, we find struggling for expression the idea of a corporate religious life. From all the lower levels where superstition and cruelty reign, from the depths of fear inspired by fetichism, we look on to the higher level of Judaism as the progressive religion of the old world. This does not mean that we shut our eyes to the ideals of Greek philosophers, with whom morality was constantly outgrowing religion. " The vision of an ideal state which the master-mind of Plato contemplated, but thought too good ever to become true in actual realization, is full of aspirations which the Christian Church claims to satisfy. The problems of the relations of the life of the State and the life of the individual, which Aristotle ever suggests and never solves, are problems with which the Christian Church has at least attempted to deal." 2

From the beginning of the history of the Jewish race the idea that the world is a kingdom under the rule of God began to find expression. The conception of Israel as " a kingdom of priests and an holy nation " (Exod. xix. 6) bore witness to it. The idea of kingship from the first was that of a ruler representing God. As time went on and even the dynasty of David failed in the persons of unworthy representatives to maintain this ideal, both psalmists and prophets taught the people to look beyond the earthly kingdom to the spiritual kingdom of which it was a type. But even Isaiah tended to think of the spiritual life and worship of the nation as a department of political organization only, controlled by the king and his princes. It was reserved for Jeremiah, in the darkest days of his life, to build up the ideal of a spiritual society which should weld Israel together, to proclaim a new covenant (xxxi. 31-34) which Jehovah would make with Israel when representatives of the previously exiled ten tribes should return with the exiles of Judah. This prophecy is instinct with the growing sense of the personal responsibility of individual men brought into communion with God. The religion of Israel from this time of the captivity ceased to be a merely national religion connected with particular forms of sacrifice in a particular land. The synagogues which traced their origin to the time of Ezekiel, when the sacrificial cultus was impossible, extended this ideal yet further. During the centuries preceding the birth of Christ there grew up an apocalyptic literature which regarded as a primary truth the conception of a

1 Lactantius, Inst. Div. iv. 28 " Vinculo pietatis obstricti, Deo religati sumus unde ipsa religio nomen accepit." The etymology tnay be wrong, but this is the popular sense of the word.

2 Darwell Stone, The Christian Church, p. 18.

kingdom of righteousness ruled over by a present God. The preaching of John the Baptist was thus in sympathy with the ideals of his generation, though the sternness of the repentance which he set forth as the necessary preparation for entrance into the new kingdom of heaven, which was to be made visible on earth, was not less repugnant to the men of his day than of later times. Christ's own teaching and that of his disciples began with the proclamation of the kingdom of God (or of heaven) (Luke iv. 43, viii. i, ix. 2; Matt. x. 7). That he intended it to find outward expression in a visible society appears from the careful way in which he trained the apostles to become leaders hereafter, crowning that work by the institution of the sacraments of baptism and the Eucharist. " It was not from accident or for convenience that Christ formed a society." 1 His parables even more than his sermons reveal the principles of his endeavour. But he seldom used the word ecclesia, church, which became the universal designation of his society.

All the more emphatic is Christ's use of the term ecclesia upon the distinct advance in faith made by the apostles when St Peter as their spokesman confessed him to be " the Christ, the Son of the living God " (Matt. xvi. 16). Instantly came the reply, " I say unto thee, that thou art Petros (rockman), and on this Petra (rock) I will build my ecclesia (church) ; and the gates of Hades shall not prevail against it." On the rock of a human character, ennobled by faith in his divine Sonship, he could raise the church of the future, which should be at the same time continuous with the old, new in spiritual power, one in worship and in work.

To the Jew the word ecclesia as used in the Septuagint suggested the assembly of the congregation of Israel. To a Greek it suggested the assembly of freeborn citizens in a city state. Without ceasing to be the congregation of Jehovah, it would claim for itself all the hopes of an ideal state over which Greek philosophers had sighed in vain.

Opinions differ upon the question whether the apostles were chosen as representatives of the ecclesia to be founded (Hort) or as men fitted to become its duly authorized teachers and leaders from the beginning (Stone). But as Mr Stone well puts it, " It would not be a necessary inference [from Dr Hort's opinion] that there ought to be no ministry

in the Christian Church.” 2

At first the church was limited to the Christian believers in the city of Jerusalem, then by persecution their company was broken up, and, since those who were scattered went everywhere preaching the word, the conception was enlarged to include all ” of the way ” (Acts ix. 2) in the Holy Land. A new epoch began from the return of St Paul and St Barnabas to Antioch after their first missionary journey, when they called together the church and narrated their experiences, and told how ” God had opened to the Gentiles the door of faith ” (Actsxiv. 27). Hitherto the term Church had been ” ideally conterminous ” with the Jewish Church. Now it was to contain members who had never in any sense belonged to the Jewish Church. Thus the way was opened for new developments and for illimitable extension. St Paul, in his address to the elders at Ephesus (Acts xx. 28), adapted the words of Ps. lxxiv. 2, ” Remember thy congregation, which thou hast purchased of old,” claiming for the Christian ecclesia the title of God’s ancient ecclesia. But he never, how- ever fiercely opposed by Judaizers, set a new ecclesia of Christ in opposition to the old. We wait, however, for the Epistles of his captivity at Rome to find the full meaning of the idea of the church dawning uoon his imagination. ” Here at least, for the first time in the Acts and Epistles, we have the ecclesia spoken of in the sense of the one universal ecclesia, and it comes more from the theological than from the historical side; i.e. less from the actual circumstances of the actual Christian communities than ; from a development of thoughts respecting the place and office of the Son of God: his headship was felt to involve the unity of all those who were united to him.” 3 Similar development of the idea of the one ecclesia as including all members of all local

1 Ecce Homo, ed. 5, p. 87. Cf. the interesting comparison between Socrates and Christ. ■ Op. cit. p. 262. f Hort. The Christian Ecclesia. p. 148.

ecclesiae does not lead St Paul to regard membership of the universal church as invisible.

But the mere history of the word ecclesia does not exhaust the subject. We must take into account not only the idea of the visible actual church, but also the ideal pictured by St Paul in the metaphors of the Body (Rom. xii. 5), the Temple (1 Cor. iii. 10-15) and the Bride of Christ (2 Cor. xi. 2). The actual church is always falling short of its profession; but its successive reforma- tions witness to the strength of its longing after the beauty of holiness.

Membership in the actual church is acquired through baptism ” in the name of the Father and of the Son and of the Holy Ghost ” (Matt, xxviii. 19). The references in the New Testament to baptism ” in the name of Jesus ” (or the Lord Jesus) (Acts ii. 38, viii. 16. x. 48, xix. 5; Rom. vi. 3; Gal. iii. 27), which are by some critics taken to refer to a primitive Christological baptismal formula, seem to refer to the confession made by the baptized, or to the new relationship into which they are brought as ” members of Christ.” 4 Candidates for baptism were exhorted to prepare for it by repentance and faith (Acts ii. 38). The laying on of hands (Heb. vi. 2), in the rite called in later times confirmation, followed baptism (Acts viii. 17). In the modern Greek Church it is administered by priests with oil which has been consecrated by the bishop, in the Roman Church by the bishop himself. Such use of the chrism can be traced from the 2nd century. The Anglican Church retains only the Biblical symbolism of ” the blessing of the hand.” Presbyterians and other Protestant churches have abandoned the use, except the Lutherans. We need not here trace the history of Christian worship, in daily services (Acts ii. 46), or on the Lord’s Day (Acts xx. 7), meeting for the Lord’s Supper (1 Cor. xi. 17-34), or for mutual edification in prayer, praise and prophecy (1 Cor. xiv.). These things represent the ideal of Christendom. In the words of an eminent Roman Catholic scholar, Monsignor Duchesne, ” Faith unites, theology of ten’separates.” It must be our task to summarize the leading ideas of the church in which all Christians are agreed.

(a) The first is certainly fellowship with Christ and with the brethren. The early Christians earnestly believed that their life was ” hidden with Christ in God ” (Col. iii. 3), and found in their union with Christ the lasting and strongest motive of love £0 the brethren. Such fellowship is attributed by St Paul pre-eminently to the work of the Holy Spirit (2 Cor. xiii. 14). Its strength is shown in England in the growing readiness of the different religious bodies to co-operate in movements for the puri- fying of public morality and for the better observance’ of Sunday.

(b) The second is unity. We have seen how St. Paul was led on to grasp the conception of one church universal manifested in all the local churches. Its unity is not purely accidental in that individuals have been forced to act together under pressure of chance circumstances. Nor is the ideal of unity adopted simply because experience teaches that ” union is strength.” Nor is it even based on the philosophical conception ot the incompleteness of the individual life. As Dr Sanday finely says, ” If the church is in something more than mere metaphor the Body of Christ, if there is circulating through

it a continual flow and return of spiritual forces, derived directly from him, if the Spirit which animates the Body is one, then the Body itself also must be in essence one. It has its centre not on earth but in heavenly places, where Christ sitteth at the right hand of God.” 6

(c) Thirdly, there is no question that the Lord intended the one fellowship of his saints to be a visible fellowship. The idea of an invisible church has only commended itself in dark hours when men despaired of unity even as an ideal. The view of Zwingli and Calvin in the 16th century was not by any means acceptable to other reformers. Luther distinguished between the Spiritual Church, which he identified with the Communion of Saints, and the Corporeal Church, the outward marks of which are Baptism, Sacrament and Gospel. But he regarded them

4 For a full defence of the authenticity of Matt, xxviii. 19, see Riggenbach, Tier Irinitarische Taufbefehl (Giitersloh, 1903).

5 The Conception of Priesthood, p. 13. –

as different aspects of the same church, and Melanchthon was even more explicit. 1 As the saint purified in heaven is he who struggled with his sins on earth, so is the church triumphant one with the church militant. In Dr Lindsay’s words, ” it is one of the privileges of faith, when strengthened by hope and by love, to see the glorious ideal in the somewhat poor material reality. It was thus that St Paul saw the universal Church of Christ made visible in the Christian community of Corinth.” 2

But it is at this point that we come to the dividing line which has been drawn by different conceptions of catholicity. Dr Lindsay goes on to argue that all insistence on the principle of historical continuity, whether urged by members of the Anglican or the Roman Catholic Church, as upholders of episcopacy, is a deliberate return to the principle of Judaism, which declared that no one who was outside the circle of the ” circumcised,” no matter how strong his faith nor how the fruits of the Spirit were manifest in his life and deeds, could plead ” the security of the Divine Covenant.” Without entering into controversy it must suffice to point out that, from the point of view of all episcopal churches, the ministry of the bishops succeeding the ministry of the apostles, however it came to pass, was for fifteen

centuries accepted as the pledge of unity. This principle, how- ever, of continuity in ministry, belongs to a different department of Christian thought from the sacrament of baptism, which really corresponds to the Jewish rites of admission to the covenant. And it has been an established principle of the undivided church since the 3rd century, the bishop of Rome in this case upholding against St Cyprian the view which subsequent generations have ratified as Catholic truth, that baptism by whomsoever admin- istered is valid if water is used with the right words. From this point, alas, divergence begins.

(d) The fourth element is authority. Probably all Christians can agree in the statement that the Christian democracy is also a theocracy, that Christ is the source of all authority. There are three passages in the Gospel which claim notice: (i.) the promise to St Peter (Matt. xvi. 1 8 f) , as spokesman for the apostles, of the key of the household of God, of power to admit and exclude ; (ii.) the promise (Matt, xviii. r5-2o) probably given to the Twelve, regarding offences against the peace of the society, advocating exclusion only when brotherly appeals had failed; (iii.) the commission of the whole ecclesia or of the Christian ministry (John xx. 22, 23). Again the root difference between the Presbyterian and Episcopalian conceptions of the church comes to light. Is the authority of the church manifested in the decisions which a local church arrives at by a majority of votes, or in the decisions of apostles and prophets after taking counsel, of the episcopate in later times, ratified by common consent of Christendom? As has been well said, ” the church is primarily a witness — the strength of its authority lies in the many sides from which the witness comes.” It witnesses to the Divine Life of Christ as a power of the present and of the future as of the past, ministered in the Word and sacraments.

(e) The church is a sacerdotal society. St Paul delighted to represent it as the ” ideal Israel,” and St John echoes the thought in the words of praise (Rev. i. 5, 6), ” Unto him that hath loved us . . . and made us to be a kingdom, and priests unto his God and Father.” This idea of the priesthood of the whole church has three elements — the divine element, the human element and self-sacrifice. The promise that Christians should be temples of the living God has been fulfilled. As Dr Milligan has said very well, ” It is not only in things to which we commonly confine the word miracle that the Divine appears. It may ap- pear not less in the whole tone and spirit of the Church’s life, in the varied Christian virtues of her members, in the general character of their Christian work, and in the grace received by them in the Christian sacraments. When that life is exhibited, as it ought to be, in its distinctively heavenly character, it bears witness to the presence of a power in Christian men which no mere recollection of a past

example, however heroic or beautiful,

1 The Conception of Priesthood, p. 29.

! Lindsay, The Church and the Ministry in the Early Centuries, p. 17-

can supply. The difficulties of exhibiting and maintaining it are probably far greater now than they were in the apostolic age; and as nothing but a present divine support can enable us to overcome these, so, when they are overcome, a testimony is given to the fact that God is with us.” 3

But this life is to be a human life still, to be in touch with all that is noble and of good report in art and literature, keenly interested in all the discoveries of science, active in all movements of social progress. It cannot, however, be denied that to live such a life, divine in its powers and human in its sympathies, demands daily and hourly self-sacrifice. As the author of the Imitation of Christ put it long ago, ” There is no living in love without pain.” The thought of self-sacrifice has been emphasized from the earliest times in the liturgies. By a true instinct the early Christian writers called widows and orphans the altar of God on which the sacrifices of almsgiving are offered up. 4 Such works of charity, however, represent only one of the channels by which self-sacrifice is ministered, to which all prayers and thanksgiving and instruction of psalms, prophecy and preaching contribute. Thus in the Eucharist the offering of the church is made one with the offering of the Great High Priest. 6

All this represents an ideal. It suggests in a modern form the perpetual paradox of the Christian life : we are what we are to be. The church is the divine society in which all other religious associations are eventually to find their home. The prayer, ” Thy kingdom come,” embraces all spiritual forces which make for righteousness. They were acknowledged in Christ’s words, ” He that is not against you is for you ” (Luke ix. 50). But the divisions of Christendom testify to the harm done by undue insistence on the claims of the individual to gain scope to extend the kingdom in his own way. As in a choir all the resources oi an individual voice are used to strengthen the general effect, so must the individual lose his life that he may find it, witnessing by his share in the common service of the church to the ultimate unity of knowledge and harmony of truth.

For the various conceptions of the church as an organized body see Church History, sec. 3, and the articles on the varioui churches. (A. E. B.)

CHURCH ARMY, an English religious organization, founded in 1882 by the Rev. Wilson Carlile (afterwards prebendary of St Paul's) , who banded together in an orderly army of " soldiers " and " officers " a few working men and women, whom he and others trained to act as " Church of England evangelists " among the outcasts and criminals of the Westminster slums. Previous experience had convinced him that the moral condition of the lowest classes of the people called for new and aggressive action on the part of the Church, and that this work was most effectively done by laymen and women of the same class as those whom it was desired to touch. " Evangelistic zeal with Church order " is the principle of the Church Army, and it is essentially a working men's and women's mission to working people. As the work grew, a training institution for evangelists was started it» Oxford, but soon moved (1886) to London, where, in Bryanston Street near the Marble Arch, the headquarters of the army are now established. Working men are trained as evangelists, and working women as mission sisters, and are supplied to the clergy. The men evangelists have to pass an examination by the arch- deacon of Middlesex, and are then (since 1896) admitted by the bishop of London as " lay evangelists in the Church " ; the mission sisters must likewise pass an examination by the diocesan inspector of schools. All Church Army workers (of whom there are over 1800 of one kind and another) are entirely under the control of the incumbent of the parish to which they are sent. They never go to a parish unless invited, nor stay when asked to go by the parish priest. Officers and sisters are paid a limited sum for their services either by the vicar or by voluntary local contributions. Church Army mission and colportage vans circulate throughout the country parishes, if desired, with

3 The Ascension, p. 254.

4 Polycarp, Phil. 4; cf. TertuIIian, Ad Uxor. i. 7.

6 This teaching is not confined to Episcopalian writers. It has been finely expressed from the Presbyterian standpoint by Dr Milligan, op. cit. p. 265 ff. ; cf. Lindsay, p. 37.

itinerant evangelists, who hold simple missions, without charge, and distribute literature. Each van missioner has a clerical " adviser." Missions are also held in prisons and workhouses, at the invitation of the authorities. In 1888 (before the similar work of the Salvation

Army was inaugurated) the Church Army established labour homes in London and elsewhere, with the object of giving a ■ ” fresh start in life ” to the outcast and destitute. These homes deal with the outcast and destitute in a plain, straightforward way. They demand that the persons should show a desire for amendment; they subject them to firm discipline, and give them hard work; they give them decent clothes, and strive to win them to a Christian life. The inmates earn their board and lodging by piece-work, for which they are paid at the current trade rates, while by a gradually lessening scale of work and pay they are stimulated to obtain situations for themselves and given time to seek for them. There are about 1 20 homes in London and the provinces, and 56 % of the inmates are found to make these the successful beginning v of an honest self-supporting life. The Church Army has lodging homes, employment bureaus, cheap food depots, old clothes department, dispensary and a number of other social works. Every winter employment is found for a great number of the unemployed in special depots, among them being the King’s Labour Tents and the Queen’s Labour Relief Depots. There is also an extensive emigration system, under which many hundreds (3000 in 1906) of carefully tested men and families, of good character, chiefly of the unemployed class, are placed in permanent employment in Canada through the agency of the local clergy. The whole of the work is done in loyal subordination to the diocesan and parochial organization of the Church of England.

See Edgar Rowans, Wilson CarlUe and the Church Army.

CHURCH CONGRESS, an annual meeting of members of the Church of England, lay and clerical, to discuss matters religious, moral or social, in which the church is interested. It has no legislative authority, and there is no voting on the questions discussed. The first congress was held in 1861 in the hall of King’s College, Cambridge, and was the outcome of the revival of convocation in 1 8 5 2 . The congress is under the presidency of the bishop in whose diocese it happens to be held. Recent places of meeting are Brighton (1901), Northampton (1902), Bristol (1903), Liverpool (1904), Weymouth (1905), Barrow-in-Furness (1906), Great Yarmouth (1907), Manchester (1908), Swansea (1909). The meetings of the congress have been mainly remarkable as illustrating the wide divergences of opinion and practice in the Church of England, no less than the broad spirit of tolerance which has made this possible and honourably differentiates these meetings from so many ecclesiastical assemblies of the past. The congress of 1908 was especially distinguished, not only for the expression of diametrically opposed views on such questions as the sacrifice of the mass or the ” higher criticism,” but for the very large

proportion of time given to the discussion of the attitude of the Church towards Socialism and kindred subjects.

CHURCH HISTORY. The sketch given below of the evolution of the Christian Church (see Church) may well be prefaced by a Church summary of the history of the great Church historians, historians, concerning whom fuller details are given in separate articles. Hegesippus wrote in the 2nd century a collection of memoirs containing accounts of the early days of the church, only fragments of which are extant. The first real church history was written by Eusebius of Caesarea in the early part of the 4th century. His work was continued in the 5th century by Philostorgius, Socrates, Sozomen and Theodoret, and in later centuries by Theodoras Lector, Evagrius, Theophanes and others. In the 14th century Nicephorus Callisti undertook a complete church history which covers in its extant form the first six centuries. In the West Eusebius' History was translated into Latin by Rufinus, and continued down to the end of the 4th century. Augustine's City of God, published in 426, was an apologetic, not an historical work, but it had great influence in our field, for in it he undertook to answer the common heathen accusation that the growing misfortunes of the empire were due to the prevalence of Christianity and the forsaking of the gods of

Rome. It was to sustain Augustine's thesis that Orosius pro- duced in 417 his Historiarum libri septem, which remained the standard text-book on world history during the middle ages. About the same time Sulpicius Severus wrote his Historia Sacra, covering both biblical and Christian history. In the 6th century Cassiodorus had a translation made of the histories of Socrates, Sozomen and Theodoret, which were woven into one continuous narrative and brought down to 518. The work was known as the Historia Ecclesiastica Tripartita, and constituted during the middle ages the principal text-book of church history in the West. Before writing his history Eusebius produced a world chronicle which was based upon a similar work by Julius Africanus and is now extant only in part. It was continued by Jerome, and became the basis of the model for many similar works of the 5th and following centuries by Prosper, Idatius, Marcellinus Comes, Victor Tununensis and others. Local histories containing more or less ecclesiastical material were written in the 6th and following centuries by Jordanes (History of the Goths), Gregory of Tours (History of the Franks), Isidore of Seville (History of the Goths, Vandals and Suevi), Bede (Ecclesiastical History of England), Paulus Diaconus (History of the Lombards), and others. Of the many historians of the middle ages, besides the authors of biographies, chronicles, cloister annals, &c, may be mentioned Haymo, Anastasius, Adam of Bremen, Ordericus Vitalis,

Honorius of Autun, Otto of Freising, Vincent of Beauvais and Antoninus of Florence.

The Protestant reformation resulted in a new development of historical writing. Polemic interest led a number of Lutheran scholars of the 16th century to publish the Magdeburg Centuries (1559 f!.), in which they undertook to show the primitive character of the Protestant faith in contrast with the alleged corruptions of Roman Catholicism. In this design they were followed by many other writers. The opposite thesis was maintained by Baronius (Annates Ecclesiastici, 1588 ff.), whose work was continued by a number of Roman Catholic scholars. Other notable Roman Catholic historians of the 17th and 18th centuries were Natalis Alexander, Bossuet, Tillemont, Fleury, Dupin and Ceillier.

Church history began to be written in a genuinely scientific spirit only in the 18th century under the leadership of Mosheim, who is commonly called the father of modern church history. With wide learning and keen critical insight he wrote a number of historical works of which the most important is his Institutiones Hist. Eccles. (1755; best English trans, by Murdock). He was followed by many disciples, among them Schroeckh (Christliche Kirchengeschichte, 1772 ff. in 45 vols.). Other notable names of the 1 8th century are Semler, Spittler, Henke and Planck.

The new historical spirit of the 19th century did much for church history. Among the greatest works produced were those of J. C. L. Gieseler (Lehrbuch der Kirchengeschichte, 1824 ff., best Eng. tr. revised and edited by H. B. Smith), exceedingly objective in character and still valuable, particularly on account of its copious citations from the sources; Neander (Allgemeine Geschichte der christlichen Religion und Kirche, 1825 ff., Eng. tr. by Torrey), who wrote in a sympathetic spirit and with special stress upon the religious side of the subject, and has been followed by many disciples, for instance, Hagenbach, Schaff and Herzog; and Baur (Das Christenthum und die christliche Kirche, 1853 ff.), the most brilliant of all, whose many historical works were dominated by the principles of the Hegelian philosophy and evinced both the merits and defects of that school. Baur has had tremendous influence, even though many of his positions have been generally discredited. The problems particularly of the primitive history were first brought into clear light by him, and all subsequent work upon the subject must acknowledge its indebtedness to him.

A new era was opened by the publication in 1857 of the second edition of Ritschl's Entstehung der alikatholischen Kirche, in which he

broke away from the Tubingen school and introduced new points of view that have revolutionized the interpretation of the early church. Of recent works the most important are the Kirchengeschichte of Carl Miiller (1892 ff.) and that of W. Moller (1889 ff., second edition by von Schuberth, 1898 ff.,

greatly enlarged and improved), the translation of the latter (1892 ff .) being the most useful text-book in English. Of modern Roman Catholic works may be mentioned those by J. A. Mohler, T. B. Alzog, F. X. Kraus, Cardinal Joseph von Hergenrother and C. J. von Hefele (edited by Knopfler.)

In addition to these general works on church history should be named the histories of doctrine by Harnack, Loofs, Seeberg and Fisher; and on the early Church the works on the apostolic age by Weizsacker (1886, English translation 1894), McGiffert (1897), and Bartlet (1899); Renan's Histoire des origines du christianisme (1867 ff., in 7 vols., translated in part); Pfleiderer's Urchristenthum (1887); S. Cheetham's History of the Christian Church during the first Six Centuries (1894); Wernle's Anfdnge unserer Religion (1901; Eng. tr. 1902 ff.); Rainy's Ancient Catholic Church (1902); Knopf's Nachapostolisches Zeitaller (1905); Duchesne's Histoire ancienne de VtLglise (vol. i., 1906). (A. C. McG.)

In the following account of the historical evolution of the History Church, the subject will be treated in three sections: — otthe (A) The ancient Church to the beginning of the pontifi-

cb****" cate of Gre S° r y the Great (A – D – 5°°); (B) The Church in the middle ages; (C) The modern Church.

A. The Ancient Church

1. Origin and Growth. — The crucifixion of Jesus Christ resulted in the scattering of his followers, but within a short time they became convinced that he had risen from the dead, and would soon return to set up the expected Messianic kingdom, and so to accomplish the true work of the Messiah (cf. Acts i. 6 ff.). They were thus enabled to retain the belief in his Messiahship which his death had threatened to destroy permanently. This belief laid upon them the responsibility of bringing as many of their countrymen as possible to recognize him as Messiah, and to prepare themselves by repentance and righteousness

for the coming kingdom (cf. Acts ii. 21, 38, iii. 19 sq.). It was with the sense of this responsibility that they gathered again in Jerusalem, the political and religious metropolis of Judaism. In Jerusalem the new movement had its centre, and the church established there is rightly known as the mother church of Christendom. The life of the early Jewish disciples, so far as we are able to judge from our meagre sources, was very much the same as that of their fellows. They continued faithful to the established synagogue and temple worship (cf. Acts iii. 1), and did not think of founding a new sect, or of separating from the household of Israel (cf. Acts x. 14, xv. 5, xxi. 21 sq.). There is no evidence that their religious or ethical ideals differed in any marked degree from those of the more serious-minded among their countrymen, for the emphasis which they laid upon the need of righteousness was not at all uncommon. In their belief, however, in the Messiahship of Jesus, and their consequent assurance of the speedy establishment by him of the Messianic kingdom, they stood alone. The first need of the hour, therefore, was to show that Jesus was the promised Messiah in spite of his crucifixion, a need that was met chiefly by testimony to the resurrection, which became the burden of the message of the early disciples to their fellow-countrymen (cf. Acts ii. 24 ff., iii. is ff., v. 31). It was this need which led also to the develop- ment of Messianic prophecy and the ultimate interpretation of the Jewish Bible as a Christian book (see Bible). The second need of the hour was to bring the nation to repentance and righteousness in order that the kingdom might come (cf. Acts iii. 19). The specific gospel of Jesus, the gospel of divine father- hood and human brotherhood, received no attention in the earliest days, so far as our sources enable us to judge.

Meanwhile the new movement spread quite naturally beyond the confines of Palestine and found adherents among the Jews of the dispersion, and at an early day among the Gentiles as well. Many of the latter had already come under the influence of Judaism, and were more or less completely in sympathy with Jewish religious principles. Among the Christians who did most to spread the gospel in the Gentile world was the apostle Paul, whose conversion was the greatest event in the history of the early

Church. In his hands Christianity became a new religion, fitted to meet the needs of all the world, and freed entirely of the local and national meaning which had hitherto attached to it. Accord- ing to the early disciples Jesus was the Jewish Messiah, arid had significance only in relation to the expected Messianic kingdom. To establish that kingdom was his one great aim. For the Gentiles he had no message except as they might become members of the family of Israel,

assuming the responsibilities and enjoying the privileges of proselytes. But Paul saw in Jesus much more than the Jewish Messiah. He saw in Christ the divine Spirit, who had come down from heaven to transform the lives of men, all of whom are sinners. Thus Jesus had the same significance for one man as for another, and Christianity was meant as much for Gentiles as for Jews. The kingdom of which the early disciples were talking was interpreted by Paul as righteousness and peace and joy in the Holy Ghost (Rom. xiv. 17), a new principle of living, not a Jewish state. But Paul taught also, on the basis of a religious experience and of a distinct theory of redemption (see McGiffert's Apostolic Age, ch. iii.), that the Christian is freed from the obligation to observe the Jewish law. He thus did away with the fundamental distinction between Jews and Gentiles. The transformed spiritual life of the believer expresses itself not in the observance of the Jewish law, but in love, purity and peace. This precipitated a very serious conflict, of which we learn some- thing from the Epistle to the Galatians and the Book of Acts (xv. and xxii.). Other fundamental principles of Paul's failed of comprehension and acceptance, but the belief finally prevailed that the observance of Jewish law and custom was unnecessary, and that in the Christian Church there is no distinction between the circumcised and the uncircumcised. Those Jewish Christians who refused to go with the rest of the Church in this matter lived their separate life, and were regarded as an heretical sect known as the Ebionites.

It was Christianity in its universal form which won its great victories, and finally became permanently established in the Roman world. The appeal which it made to that world was many-sided. It was a time of moral reformation, when men were awaking to the need of better and purer living. To all who felt this need Christianity offered high moral ideals, and a tremendous moral enthusiasm, in its devotion to a beloved leader, in its emphasis upon the ethical possibilities of the meanest, and in its faith in a future life of blessedness for the righteous. It was a time of great religious interest, when old cults were being revived and new ones were finding acceptance on all sides. Christianity, with its one God, and its promise of redemption and a blessed immortality based upon divine revelation, met as no other contemporary faith did the awakening religious needs. It was a time also of great social unrest. With its principle of Christian brotherhood, its emphasis upon the equality of all believers in the sight of God, and its preaching of a new social order to be set up at the return of Christ, it appealed strongly to multitudes, particularly of the poorer classes. That it won a permanent success, and finally took possession of the Roman world, was due to its combination of appeals. No one thing

about it commended it to all, and to no one thing alone did it owe its victory, but to the fact that it met a greater variety of needs and met them more satisfactorily than any other movement of the age. Contributing also to the growth of the Church was the zeal of its converts, the great majority of whom regarded themselves as missionaries and did what they could to extend the new faith. Christianity was essentially a proselytizing religion, not content to appeal simply to one class or race of people, and to be one among many faiths, but believing in the falsity or insufficiency of all others and eager to convert the whole world. Moreover, the feeling of unity which bound Christians everywhere together and made of them , one compact whole, and which found expression before , many generations had passed in a strong organization, did much for the spread of the Church. Identifying himself with the Christian circle from the 2nd century on, a man became a member of a society existing in all quarters of the empire, every part conscious of its oneness with the larger whole and all compactly organized to do the common work. The growth of the Church during the

earlier centuries was chiefly in the middle and lower classes, but it was not solely there. No large number of the aristocracy were reached, but in learned and philosophical circles many were won, attracted both by Christianity's evident ethical power and by its philosophical character (cf. the Apologists of the 2nd century). That it could seem at once a simple way of living for the common man and a profound philosophy of the universe for the speculative thinker meant much for its success. 1

But it did not win its victory without a struggle. Superstition, misunderstanding and hatred caused the Christians trouble for many generations, and governmental repression they had to suffer occasionally, as a result of popular disturbances. No systematic effort was made by the imperial authorities to put an end to the movement until the reign of Decius (250-251), whose policy of suppression Was followed by Diocletian (303 ff.) and continued for some years after his abdication. In spite of all opposition the Church steadily grew, until in 311 the emperor Galerius upon his death-bed granted toleration (see Eusebius, H.E. x.4, and Lactantius, De mortibus persecutorum, 34), and in 313 the emperors Constantine and Licinius published the edict of Milan, proclaiming the principle of complete religious liberty, and making Christianity a legal religion in the full sense (see Eusebius x. 5,

and Lactantius 48. Seeck, Zeitschrift filr Kirchengeschichte, xii. 381 sq., has attempted to show that the edict of Milan had no significance, but without success).

Constantine, recognizing the growing strength of the Church and wishing to enlist the loyal support of the Christians, treated them with increasing favour, and finally was baptized upon his death-bed (337). Under his successors, except during the brief reign of Julian (361-363), when the effort was made to reinstate paganism in its former place of supremacy, the Church received growing support, until, under Theodositis the Great (379-395), orthodox Christianity, which stood upon the platform adopted at Nicaea in 325, was finally established as the sole official religion of the state, and heathen worship was put under the ban. The union between Church and State thus constituted continued unbroken in the East throughout the middle ages. The division of the Empire resulted finally in the division of the Church, which was practically complete by the end of the 6th century, but was made official and final only in 1054, and the Eastern and Western halves, the Greek Catholic and the Roman Catholic Churches, went each its separate way. (See Theodosian Code, book 16, for the various imperial edicts relating to the Church, and for fuller particulars touching the relation between Church and Empire see the articles Con- stantine; Gratian; Theodosius; Justinian.)

For a long time after the establishment of Christianity as the state religion, paganism continued strong, especially in the country districts, and in some parts of the world had more adherents than Christianity, but at length the latter became, at any rate nominally, the faith of the whole Roman world. Mean- while already before the beginning of the 3rd century it went beyond the confines of the Empire in Asia, and by the end of our period was strong in Armenia, Persia, Arabia and even farther east. It reached the barbarians on the northern and western borders at an early day, and the Goths were already Christians of the Arian type before the great migrations of the 4th century began. Other barbarians became Christian, some in their own homes beyond the confines of the Empire, some within the Empire itself, so that when the hegemony of the West passed from the Romans to the barbarians the Church lived on. Thenceforth for centuries it was not only the chief religious, but also the chief civilizing, force at work in the Occident. Losing with the dissolu- tion of the Western Empire its position as the state church, it became itself a new empire, the heir of the glory and dignity of Rome, and the greatest influence making for the peace and unity of the western world.

2. The Christian Life. — The most notable thing about the life of

1 Upon the spread of the Church during the early centuries see especially Harnack's Mission und Ausbreitung des Christenthums in den ersten drei Jahrhunderten. An interesting parallel to the spread of Christianity in the Roman empire is afforded by the contem- porary Mithraism. See Cumont's Les Mysteres de Mithra (iqoo), Eng. tr. The Mysteries of Mithra (1903).

the early Christians was their vivid sense of being a people of God, called and set apart. The Christian Church in their thought was a divine, not a human, institution. It was founded and controlled by God, and even the world was created for its sake (cf. the Shepherd of Hermas, Vis. ii. 4, and 2 Clement 14). This con- ception, which came over from Judaism, controlled all the life of the early Christians both individual and social. They regarded themselves as separate from the rest of the world and bound together by peculiar ties. Their citizenship was in heaven, not on earth (cf. Phil. iii. 20, and the epistle to Diognetus, c. 5), and the principles and laws by which they strove to govern themselves were from above. The present world was but temporary, and their true life was in the future. Christ was soon to return, and the employments and labours and pleasures of this age were of small concern. Some went so far as to give up their accustomed vocations, and with such Paul had to expostulate in his epistles to the Thessalonians. A more or less ascetic mode of life was also natural under the circumstances. Not necessarily that the present world was evil, but that it was temporary and of small worth, and that a Christian's heart should be set on higher things. The belief that the Church was a supernatural institution found expression in the Jewish notion of the presence and power of the Holy Spirit. It was believed among the Jews that the Messianic age would be the age of the Spirit in a marked degree, and this belief passed over into the Christian Church and controlled its thought and life for some generations. The Holy Spirit was supposed to be manifest in various striking ways, in prophecy, speaking with tongues and miracle working. In this idea Paul also shared, but he carried the matter farther than most of his contemporaries and saw in the Spirit the abiding power and ground of the Christian life. Not simply in extraordinary phenomena, but also in the everyday life of Christians, the Holy Spirit was present, and all the Christian graces were the fruits (cf. Gal. v. 22). A result of this belief was to give their lives a peculiarly enthusiastic or inspirational character. Theirs were not the everyday experiences of ordinary men, but of men lifted out of themselves and transported into a higher sphere. With the passing of time the early enthusiasm waned, the expectation of the immediate return of Christ was widely given up, the

conviction of the Spirit's presence became less vivid, and the conflict with heresy in the 2nd century led to the substitution of official control for the original freedom (see below) . The late 2nd century movement known as Montanism was in essence a revolt against this growing secularization of the Church, but the move- ment failed, and the development against which it protested was only hastened. The Church as an institution now looked forward to a long life upon earth and adjusted itself to the new situation, taking on largely the forms and customs of the world in which it lived. This did not mean that the Church ceased to regard itself as a supernatural institution, but only that its supernatural character was shown in a different way. A Christian was still dependent upon divine aid for salvation, and his life was still supernatural at least in theory. Indeed, the early conviction of the essential difference between the life of this world and that of the next lived on, and, as the Church became increasingly a world-institution, found vent in monasticism, which was simply the effort to put into more consistent practice the other-worldly life, and to make more thoroughgoing work of the saving of one's soul. Contributing to the same result was the emphasis upon the necessity of personal purity or holiness, which Paul's contrast between flesh and spirit had promoted, and which early took the supreme place given by Christ to love and service. The growing difficulty of realizing the ascetic ideal in the midst of the world, and within the world-church, inevitably drove multitudes of those who took their religion seriously to retire from society and to seek salvation and the higher life, either in solitude, or in company with kindred spirits.

There were Christian monks as early as the 3rd century, and before the end of the 4th monasticism (q.v.) was an established institution both in East and West. The monks and nuns were looked upon as the most consistent Christians, and were honoured accordingly. Those who did not adopt the monastic life

endeavoured on a lower plane and in a less perfect way to realize the common ideal, and by means of penance to atone for the deficiencies in their performance. The existence of monasticism made it possible at once to hold up a high moral standard before the world and to permit the ordinary Christian to be content with something lower. With the growth of clerical sacerdotalism the higher standard was demanded also of the clergy, and the principle came to be generally recognized that they should live the monastic life so far as was consistent with

their active duties in the world. The chief manifestation of this was clerical celi- bacy, which had become widespread already in the 4th century. Among the laity, on the other hand, the ideal of holiness found realization in the observance of the ordinary principles of morality recognized by the world at large, in attendance upon the means of grace provided by the Church, in fasting at stated intervals, in eschewing various popular employments and amuse- ments, and in almsgiving and prayer. Christ's principle of love was widely interpreted to mean chiefly love for the Christian brotherhood, and within that circle the virtues of hospitality, charity and helpfulness were widely exercised; and if the salvation of his own soul was regarded as the most important affair of every man, the service of the brethren was recognized as an imperative Christian duty. The fulfilling of that duty was one of the most beautiful features of the life of the early Church, and it did perhaps more than anything else to make the Christian circle attractive.

3. Worship. — The primitive belief in the immediate presence of the Spirit affected the religious services of the Church. They were regarded in early days as occasions for the free exercise of spiritual gifts. As a consequence the completest liberty was accorded to all Christians to take such part as they chose, it being assumed that they did so only under the Spirit's prompting. But the result of this freedom was confusion and discord, as is indicated by Paul's First Epistle to the Corinthians (see chapters xi., xiv.). This led to the erection of safeguards, which should prevent the continuance of the unseemly conditions (on Paul's action in the matter, see McGiffert's Apostolic Age, p. 523). Particular Christians were designated to take charge of the services, and orders of worship were framed out of which grew ultimately elaborate liturgies (see Liturgy). The Lord's Supper first took on a more stereotyped character, and prayers to be used in connexion with it are found already in the Didache (chapters ix. and x.). The development cannot here be traced in detail. It may simply be said that the general tendency was on the one hand toward the elaboration and growing magnificence of the services, especially after the Church had become a state institu- tion and had taken the place of the older pagan cults, and on the other hand toward the increasing solemnity and mystery of certain parts, particularly the eucharist, the sacred character of which was such as to make it sacrilegious to admit to it the unholy, that is, outsiders or Christians under discipline (cf. Didache, ix.) . It was, in fact, from the Lord's table that offending disciples were first excluded. Out of this grew up in the 3rd or 4th century what is known as the arcani disciplina, or secret discipline of the Church, involving the concealment from the uninitiated and

unholy of the more sacred parts of the Christian cult, such as baptism and the eucharist, with their various accompaniments, including the Creed and the Lord's Prayer. The same interest led to the division of the services into two general parts, which became known ultimately as the missa catechumenorum and the missa fidelium, — that is, the more public service of prayer, praise and preaching open to all, including the catechumens or candidates for Church membership, and the private service for the administration of the eucharist, open only to full members of the Church in good and regular standing. Meanwhile, as the general service tended to grow more elaborate, the missa fidelium tended to take on the character of the current Greek mysteries (see Eucharist; Hatch, Influence of Greek Ideas and Usages upon the Christian Church, 1890; Anrich, Das antike Mysterienwesen in seinem Einfluss auf das Christentum, 1894; Wobbermin, Religionsgeschichtliche Studien zur Frage der Beeinflussung des Urchristentums durch

das antike Mysterienwesen, 1896) . Many of the terms in common use in them were employed in connexion with the Christian rites, and many of the conceptions, particularly that of sharing in immortality by communion with deity, became an essential part of Christian doctrine. Thus the early idea of the services, as occasions for mutual edification through the interchange of spiritual gifts, gave way in course of time to the theory that they consisted of sacred and mysterious rites by means of which communion with God is promoted. The emphasis accordingly came to be laid increasingly upon the formal side of worship, and a value was given to the ceremonies as such, and their proper and correct performance by duly qualified persons, i.e. ordained priests, was made the all-important thing.

4. The Church and the Sacraments. — According to Paul, man is flesh and so subject to death. Only as he becomes a spiritual being through mystical union with Christ can he escape death and enjoy eternal life in the spiritual realm. In the Epistle to the Ephesians the Christian Church is spoken of as the body of Christ (iv. 12 ff., v. 30); and Ignatius, bishop of Antioch, early in the 2nd century, combined the two ideas of union with Christ, as the necessary condition of salvation, and of the Church as the body of Christ, teaching that no one could be saved unless he were a member of the Church (cf . his Epistle to the Ephesians 4,

5, 15; Trail. 7; Phil. 3, 8; Smyr. 8; Magn. 2, 7). Traces of the same idea are found in Irenaeus (cf. Adv. Haer. iii. 24, 1, iv. 26, 2), but it is first clearly set forth by Cyprian, and receives from him its classical

expression in the famous sentence ” Salus extra ecclesiam non est” (Ep. 73, 21; cf. also Ep. 4, 4; 74,7; and De unitate ecclesiae, 6: ” habere non potest Deum patrem qui ecclesiam non habet matrem “). The Church thus became the sole ark of salvation, outside of which no one could be saved.

Intimately connected with the idea of the Church as an ark of salvation are the sacraments or means of grace. Already as early as the 2nd century the rite of baptism had come to be thought of as the sacrament of regeneration, by means of which a new divine nature is born within a man (cf. Irenaeus, Adv. Haer. i. 21, 1, iii. 17, 1; and his newly discovered Demonstration of the Apostolic Teaching, chap. 3), and the eucharist as the sacrament of the body and blood of Christ, feeding upon which one is endowed with immortality (cf. Irenaeus, Adv. Haer. iv. 18, s, v. 2, 2). In the early days the Church was thought of as a community of saints, all of whose members were holy, and as a consequence discipline was strict, and offenders excluded from the Church were commonly not readmitted to membership but left to the mercy of God. The idea thus became general that baptism, which had been almost from the beginning the rite of entrance into the Church, and which was regarded as securing the forgiveness of all pre-baptismal sins, should be given but once to any individual. Meanwhile, however, discipline grew less strict (cf. the Shepherd of Hermas, Vis. v. 3 ; M. iv. 7 ; Sim. viii.

6, ix. 19, 26, &c.) ; until finally, under the influence of the idea of the Church as the sole ark of salvation, it became the custom to readmit all penitent offenders on condition that they did adequate penance. Thus there grew up the sacrament of penan ce, which secured for those already baptized the forgiveness of post-baptismal sins. This sacrament, unlike baptism, might be continually repeated (see Penance). In connexion with the sacraments grew up also the theory of clerical sacerdotalism. Ignatius had denied the validity of a eucharist administered independently of the bishop, and the principle finally established itself that the sacraments, with an exception in cases of emergency in favour of baptism, could be performed only by men regularly ordained and so endowed with the requisite divine grace for their due administration (cf. Tertullian, De Exhort, cast. 7; De Bapt. 7, 17; De Praescriptione Haer. 41; and Cyprian, Ep. 67. For the later influence of the Donatist controversy upon the sacramental development see Donatists). Thus the clergy as distinguished from the laity became true priests, and the latter were made wholly dependent upon the former for sacramental grace, without which there is ordinarily no salvation (sec Order, Holy).

5. Christian Doctrine. — Two tendencies appeared in the thought

of the primitive Church, the one to regard Christianity as a law given by God for the government of men's lives, with the promise of a blessed immortality as a reward for its observance; the other to' view it as a means by which the corrupt and mortal nature of man is transformed, so that he becomes a spiritual and holy being. The latter tendency appeared first in Paul, afterwards in the Gospel and First Epistle of John, in Ignatius of Antioch and in the Gnostics. The former found expression in most of our New Testament writings, in all of the apostolic fathers except Ignatius, and in the Apologists of the 2nd century. The two tendencies were not always mutually exclusive, but the one or the other was predominant in every case. Towards the end of the 2nd century they were combined by Irenaeus, bishop of Lyons. To him salvation bears a double aspect, involving both release from the control of the devil and the transformation of man's nature by the indwelling of the Divine. Only he is saved who on the one hand is forgiven at baptism and so released from the power of Satan, and then goes on to live in obedience to the divine law; and on the other hand receives in baptism the germ of a new spiritual nature and is progressively transformed by feeding upon the body and blood of the divine Christ in the eucharist. This double conception of salvation and of the means thereto was handed down to the Church of subsequent generations and became fundamental in its thought. Christianity is at once a revealed law which a man must keep, and by keeping which he earns salvation, and a supernatural power whereby his nature is transformed and the divine quality of immortality imparted to it. From both points of view Christianity is a supernatural system without which salvation is impossible, and in the Christian Church it is preserved and mediated to the world.

The twofold conception referred to had its influence also upon thought about Christ. The effect of the legal view of Christianity was to make Christ an agent of God in the revelation of the divine will and truth, and so a subordinate being between God and the world, the Logos of current Greek thought. The effect of the mystical conception was to identify Christ with God in order that by his incarnation the divine nature might be brought into union with humanity and the latter be transformed. In this case too a combination was effected, the idea of Christ as the incarnation of the Logos or Son of God being retained and yet his deity being preserved by the assertion of the deity

of the Logos. The recognition of Christ as the incarnation of the Logos was practically universal before the close of the 3rd century, but his deity was still widely denied, and the Arian controversy which distracted the Church of the 4th century concerned the latter question. At the council of Nicaea in 325 the deity of Christ received official sanction and was given formulation in the original Nicene Creed. Controversy continued for some time, but finally the Nicene decision was recognized both in East and West as the only orthodox faith. The deity of the Son was believed to carry with it that of the Spirit, who was associated with Father and Son in the baptismal formula and in the current symbols, and so the victory of the Nicene Christology meant the recognition of the doctrine of the Trinity as a part of the orthodox faith (see especially the writings of the Cappadocian fathers of the late 4th century, Gregory of Nyssa, Basil and Gregory Nazianzen).

The assertion of the deity of the Son incarnate in Christ raised another problem which constituted the subject of dispute in the Christological controversies of the 4th and following centuries. What is the relation of the divine and human natures in Christ? At the council of Chalcedon in 451 it was declared that in the person of Christ are united two complete natures, divine and human,which retainaf ter the union all their properties unchanged. This was supplemented at the third council of Constantinople in 680 by the statement that each of the natures contains a will, so that Christ possesses two wills. The Western Church accepted the decisions of Nicaea, Chalcedon and Constantinople, and so the doctrines of the Trinity and of the two natures in Christ were handed down as orthodox dogma in West as well as East.

Meanwhile in the Western Church the subject of sin and grace, and the relation of divine and human activity in salvation, received especial attention; and finally, at the second council of Orange in 529, after both Pelagianism and semi-Pelagianism had been repudiated, a moderate form of Augustinianism was adopted, involving the theory that every man as a result of the fall is in such a condition that he can take no steps in the direction of salvation until he has been renewed by the divine grace given in baptism, and that he cannot continue in the good thus begun except by the constant assistance of that grace, which is mediated only by the Catholic Church. This decision was confirmed by Pope Boniface II., and became the accepted doctrine in the Western Church of the middle ages. In the East, Augustine's predestinationism had little influence, but East and West were one in their belief that human nature had been corrupted by the fall, and that salvation therefore is possible only to one who has received divine

grace through the sacraments. Agreeing as they did in this fundamental theory, all differences were of minor concern.

In general it may be said that the traditional theology of the Church took its material from various sources — Hebrew, Christian, Oriental, Greek and Roman. The forms in which it found expression were principally those of Greek philosophy on the one hand and of Roman law on the other (see Christianity).

6. Organization. — The origin and early development of ecclesiastical organization are involved in obscurity. Owing to the once prevalent desire of the adherents of one or another polity to find support in primitive precept or practice, the ques- tion has assumed a prominence out of proportion to its real im- portance, and the few and scattered references in early Christian writings have been made the basis for various elaborate theories.

In the earliest days the Church was regarded as a divine institution, ruled not by men but by the Holy Spirit. At the same time it was believed that the Spirit imparted different gifts to different believers, and each gift fitted its recipient for the performance of some service, being intended not for his own good but for the good of his brethren (cf. 1 Cor. xii.; Eph. iv. n). The chief of these was the gift of teaching, that is, of understand- ing and interpreting to others the will and truth of God. Those who were endowed more largely than their fellows with this gift were commonly known as apostles, prophets and teachers (cf. Acts xiii. 1; 1 Cor. xii. 28; Eph. ii. 20, iii. 5, iv. n ; Didache, xi.). The apostles were travelling missionaries or evangelists. There were many of them in the primitive Church, and only gradually did the term come to be applied exclusively to the twelve and Paul. There is no sign that the apostles, whether the twelve or others, held any official position in the Church. That they had a large measure of authority of course goes without saying, but it depended always upon their brethren's recognition of their possession of the divine gift of apostleship, and the right of Churches or individuals to test their claims and to refuse to listen to them if they did not vindicate their divine call was everywhere recognized. Witness, for instance, Paul's reference to false apostles in 2 Cor. xi. 13, and his efforts to establish his own apostolic character to the satisfaction of the Corinthians and Galatians (1 Cor. ix. 1 ff.; 2 Cor. x. 13; Gal. i. 8 ff.) ; witness the reference in Rev. ii. 2 to the fact that the Church at Ephesus had tried certain men who claimed to be apostles and had found them false, and also the directions given in the Didache for testing the character of those who travelled about as apostles. The passage in the Didache is especially significant: " Concerning the apostles and prophets, so do ye

according to the ordinance of the gospel. Let every apostle when he cometh to you be received as the Lord. But he shall not abide more than a single day, or if there be need a second likewise. But if he abide three days he is a false prophet. And when the apostle departeth let him receive nothing save bread until he findeth shelter. But if he ask money he is a false prophet ” (ch. xi.). It is clear that a man who is to be treated in this way by the congregation is not an official ruler over it.

Between the apostles, prophets and teachers no hard-and-fast lines can be drawn. The apostles were commonly missionary

prophets, called permanently or temporarily to the special work of evangelization (cf. Acts xiii. i; Did. xi.), while the teachers seem to have been distinguished both from apostles and prophets by the fact that their spiritual endowment was less strikingly supernatural. The indefiniteness of the boundaries between the three classes, and the free interchange of names, show how far they were from being definite offices or orders within the Church. Apostleship, prophecy and teaching were only functions, whose frequent or regular exercise by one or another, under the inspira- tion of the Spirit, led his brethern to call him an apostle, prophet or teacher.

But at an early day we find regular officers in this and that local Church, and early in the 2nd century the three permanent offices of bishop, presbyter and deacon existed at any rate in Asia Minor (cf. the Epistles of Ignatius of Antioch). Their rise was due principally to the necessity of administering the charities of the Church, putting an end to disorder and confusion in the religious services, and disciplining offenders. It was naturally to the apostles, prophets and teachers, its most spiritual men, that the Church looked first for direction and control in all these matters. But such men were not always at hand, or sometimes they were absorbed in other duties. Thus the need of sub- stitutes began to be felt here and there, and as a consequence regular offices within the local Churches gradually made their appearance, sometimes simply recognized as charged with responsibilities which they had already voluntarily assumed (cf.i. Cor. xvi. 15), sometimes appointed by an apostle or prophet or other specially inspired man (cf. Acts xiv. 23; Titus i. 5; 1 Clement 44), sometimes formally chosen by the congregation itself (cf. Acts vi., Did. xi.). These men naturally acquired more and more as time passed the control and leadership of

the Church in all its activities, and out of what was in the beginning more or less informal and temporary grew fixed and permanent offices, the incumbents of which were recognized as having a right to rule over the Church, a right which once given could not lawfully be taken away unless they were unfaithful to their trust. Not continued endowment by the Spirit, but the possession of an ecclesiastical office now became the basis of authority. The earliest expression of this genuinely official principle is found in Clement's Epistle to the Corinthians, ch. xliv. Upon these officers devolved ultimately not only the disciplinary, financial and liturgical duties referred to, but also the still higher function of instructing their fellow-Christians in God's will and truth, and so they became the substitutes of the apostles, prophets and teachers in all respects (cf. 1 Tim. iii. 2, v. 17; Titus i. 9; Did. 15; 1 Clement 44; Justin's first Apology, 67).

Whether in the earliest days there was a single officer at the head of a congregation, or a plurality of officers of equal authority, it is impossible to say with assurance. The few references which we have look in the latter direction (cf., for instance, Acts vi.; Phil. i. 1; 1 Clement 42, 44; Did. 14), but we are not justified in asserting that they represent the universal custom. The earliest distinct evidence of the organization of Churches under a single head is found in the Epistles of Ignatius of Antioch, which date from the latter part of the reign of Trajan (c. 1 1 6) . Ignatius bears witness to the presence in various Churches of Asia Minor of a single bishop in control, with whom are associated as his subordinates a number of elders and deacons. This form of organization ultimately became universal, and already before the end of the 2nd century it was established in all the parts of Christendom with which we are acquainted, though in Egypt it seems to have been the exception rather than the rule, and even as late as the middle of the 3rd century many churches there were governed by a plurality of officers instead of by a single head (see Harnack, Mission und Ausbreitung des Christenthums , pp. 337 seq.) . Where there were one bishop and a number of presbyters and deacons in a church, the presbyters constituted the bishop's council, and the deacons his assistants in the management of the finances and charities and in the conduct of the services. (Upon the minor orders which arose in the 3rd and following centuries, and became ultimately a training school for the higher clergy, see Harnack, Texte und

Untersuchungen, ii. 5 ; English translation under the title of Sources of the Apostolic Canons, 1895.)

Meanwhile the rise and rapid spread of Gnosticism produced a great crisis in the Church of the 2nd century, and profoundly affected the ecclesiastical organization. The views of the Gnostics, and of Marcion as well, seemed to the majority of Christians destructive of the gospel, and it was widely felt that they were too dangerous to be tolerated. The original dependence upon the Spirit for light and guidance was inadequate. The men in question claimed to be Christians and to enjoy divine illumination as truly as anybody, and so other safeguards appeared necessary. It was in the effort to find such safeguards that steps were taken which finally resulted in the institution known as the Catholic Church. The first of these steps was the recognition of the teaching of the apostles (that is, of the twelve and Paul) as the exclusive standard of Christian truth. This found expression in the formulation of an apostolic scripture canon, our New Testament, and of an apostolic rule of faith, of which the old Roman symbol, the original of our present Apostles' Creed, is one of the earliest examples.

Over against the claims of the Gnostics that they had apostolic authority, either oral or written, for their preaching, were set these two standards, by which alone the apostolic character of any doctrine was to be tested (cf. Irenaeus, Adv. Haer. i. 10, iii. 3, 4; and Tertullian, De Prescriptione Haer. passim). But these standards proved inadequate to the emergency, for it was possible, especially by the use of the allegorical method, to interpret them in more than one way, and their apostolic origin and authority were not everywhere admitted. In view of this difficulty, it was claimed that the apostles had appointed the bishops as their successors, and that the latter were in possession of special divine grace enabling them to transmit and to interpret without error the teaching of the apostles committed to them. This is the famous theory known as ” apostolic succession.” The idea of the apostolic appointment of church officers is as old as Clement of Rome (see 1 Clement 44) , but the use of the theory to guarantee the apostolic character of episcopal teaching was due to the exigencies of the Gnostic conflict. Irenaeus (Adv. Haer. iii. 3 ff., iv. 26, iv. 33, v. 20), Tertullian (De prescriptione, 32), and Hippolytus (Philosophumena, bk. L, preface) are our earliest witnesses to it, and Cyprian sets it forth clearly in his epistles (e.g. ££.33,43, 59,66,69). The Church was thus in possession not only of authoritative apostolic doctrine, but also of a permanent apostolic office, to which alone belonged the right to determine what that doctrine is. The combination of this idea with that of clerical sacerdotalism completed the Catholic theory of the Church and the clergy. Saving grace is recognized as apostolic grace, and the bishops as successors of the apostles become its sole transmitters. Bishops are therefore necessary to the very being of the Church, which without them is without the saving grace for the giving of which the Church exists (cf. Cyprian, Ep. 33, ” ecclesia super episcopos constituitur ” ; 66, ” ecclesia in episcopo ” ; also Ep. 59, and De imitate eccles. 17).

These bishops were originally not diocesan but congregational, that is, each church, however small, had its own bishop. This is the organization testified to by Ignatius, and Cyprian’s insistence upon the bishop as necessary to the very existence of the Church seems to imply the same thing. Congregational episcopacy was the rule for a number of generations. But after the middle of the 3rd century diocesan episcopacy began to make its appear- ance here and there, and became common in the 4th century under the influence of the general tendency toward centralization, the increasing power of city bishops, and the growing dignity of the episcopate (cf. canon 6 of the council of Sardica, and canon 57 of the council of Laodicea; and see Harnack, Mission und Ausbreitung, pp. 319 seq.). This enlargement of the

bishop's parish and multiplication of the chuches under his care led to a change in the functions of the presbyterate. So long as each church had its own bishop the presbyters constituted simply his council, but with the growth of diocesan episcopacy it became the custom to put each congregation under the care of a particular presbyter, who performed within it most of the pastoral duties

formerly discharged by the bishop himself. The presbyters, however, were not independent officers. They were only representatives of the bishop, and the churches over which they were set were all a part of his parish, so that the Cyprianic principle, that the bishop is necessary to the very being of the Church, held good of diocesan as well as of congregational episcopacy. The bishop alone possessed the right to ordain; through him aloje could be derived the requisite clerical grace; and so the clergy like the laity were completely dependent upon him.

The growth of the diocesan principle promoted the unity of the churches gathered under a common head. But unity was carried much further than this, and finally resulted in at least a nominal consolidation of all the churches of Christendom into one whole. The belief in the unity of the entire Church had existed from the beginning. Though made up of widely scattered congregations, it was thought of as one body of Christ, one people of God. This ideal unity found expression in many ways. Intercommunica- tion between the various Christian communities was very active. Christians upon a journey were always sure of a warm welcome and hospitable entertainment from their fellow-disciples. Messengers and letters were sent freely from one church to another. Missionaries and evangelists went continually from place to place. , Documents of various kinds, including gospels and apostolic epistles, circulated widely. Thus in Various ways the feeling of unity found expression, and the development of widely separated parts of Christendom conformed more or less closely to a common type. It was due to agencies such as these that the scattered churches did not go each its own way and become ultimately separate and diverse institutions. But this general unity became official, and expressed itself in organization, only with the rise of the conciliar and metropolitan systems. Already before the end of the 2nd century local synods were held in Asia Minor to deal with Montanism, and in the 3rd century provincial synods became common, and by the council of Nicaea (canon 5) it was decreed that they should be held twice every year in every province. Larger synods

representing the churches of a number of contiguous provinces also met frequently; for instance, in the early 4th century at Elvira, Ancyra, Neo-Caesarea and Aries, the last representing the entire Western world. Such gatherings were especially common during the great doctrinal controversies of the 4th century In 325 the first general or ecumenical council, representing theoretically the entire Christian Church, was held at Nicaea. Other councils of the first period now recognized as ecumenical by the Church both East and West are Constantinople I. (381), Ephesus (431), Chalcedon (451); Constantinople II. (553). All these were called by the emperor, and to their decisions he gave the force of law. Thus the character of the Church as a state institution voiced itself in them. (See Council.)

The theory referred to above, that the bishops are successors of the apostles, and as such the authoritative conservators and interpreters of apostolic truth, involves of course the solidarity of the episcopate, and the assumption that all bishops are in complete harmony and bear witness to the same body of doctrine. This assumption, however, was not always sustained by the facts. Serious disagreements even on important matters developed frequently. As a result the ecumenical council came into existence especially for the purpose of settling disputed questions of doctrine, and giving to the collective episcopate the opportunity to express its voice in a final and official way. At the council of Nicaea, and at the ecumenical councils which followed, the idea of an infallible episcopate giving authoritative and permanent utterance to apostolic and therefore divine truth, found clear expression, and has been handed down as a part of the faith of the Catholic Church both East and West. The infallibility of the episcopate guarantees the infallibility of a general council in which not the laity and not the clergy in general, but the bishops as successors of the apostles, speak officially and collectively.

Another organized expression of the unity of the Church was found in the metropolitan system, or the grouping of the churches of a province under a single head, who was usually the bishop of

the capital city, and was known as the metropolitan bishop. The Church thus followed in its organization the political divisions of the Empire (cf. for instance canon i2of the councilof Chalcedon, which forbids more than one metropolitan see in a province; also canon 17 of the same council: “And if any city has been or shall hereafter be newly erected by imperial authority, let the arrangement of ecclesiastical parishes follow the political and municipal forms “)• These metropolitan bishops were common in the East before the end of the 3rd century, and the general existence of the organization was

taken for granted by the council of Nicaea (see canons 4, 6, 7) . In the West, on the other hand, the development was much slower.

Meanwhile the tendency which gave rise to the metropolitan system resulted in the grouping together of the churches of a number of contiguous provinces under the headship of the bishop of the most important city of the district, as, for instance, Antioch, Ephesus, Alexandria, Rome, Milan, Carthage, Aries. In canon 6 of the council of Nicaea the jurisdiction of the bishops of Alexandria, Rome and Antioch over a number of provinces is recognized. At the council of Constantinople (381) the bishop of Constantinople or New Rome was ranked next after the bishop of Rome (canon 3), and at the council of Chalcedon (451) he was given authority over the churches of the political dioceses of Pontus, Asia and Thrace (canon 28). To the bishops of Rome, Constantinople, Antioch and Alexandria was added at the council of Chalcedon (session 7) the bishop of Jerusalem, the mother church of Christendom, and the bishops thus recognized as possessing supreme jurisdiction were finally known as patriarchs.

Meanwhile the Roman episcopate developed into the papacy, which claimed supremacy Over the entire Christian Church, and actually exercised it increasingly in the West from the 5th century on. This development was forwarded by Augustine, who in his famous work De civitate Dei identified the Church with the kingdom of God, and claimed that it was supreme over all the nations of the earth, which make up the civitas terrena or earthly state. Augustine's theory was ultimately accepted everywhere in the West, and thus the Church of the middle ages was regarded not only as the sole ark of salvation, but also as the ultimate authority, moral, intellectual and political. Upon this doctrine was built, not by Augustine himself but by others who came after him, the structure of the papacy, the bishop of Rome being finally recognized as the head under Christ of the civitas Dei, and so the supreme organ of divine authority on earth (see Papacy and Pope). i

Historical Sources of the First Period. — These are of the same general character for Church history as for general history — on the one hand monumental, on the other hand documentary. Among the monuments are churches, catacombs, tombs and inscriptions of various kinds, few antedating the 3rd century, and none adding greatly to the knowledge gained from documentary sources (see De Rossi, Roma sotteranea, 1864 ff., and its English abridgment by Northcote and Brownlow, 1870; Andre Perate, V Archiologie chritienne, 1892; W. Lowrie, Monuments of the Early Church, 1901, with good bibliography). The documents comprise imperial edicts, rescripts, &c, liturgies, acts of

councils, decretals and letters of bishops, references in contemporary heathen writings, and above all the works of the Church Fathers. Written sources from the 1st and 2nd centuries are relatively few, comprising, in addition to some scattered allusions by outsiders, the New Testament, the Apostolic Fathers, the Greek Apologists, Clement of Alexandria, the old Catholic Fathers (Irenaeus, Tertullian and Hippolytus) and a few Gnostic fragments. For the 3rd, and especially the 4th and following centuries, the writers are much more numerous; for instance, in the East, Origen and his disciples, and later Eusebius of Caesarea, Athanasius, Apollinaris, Basil and the two Gregories, Cyril of Jerusalem, Epiphanius, Chrysostom, Ephraim the Syrian, Cyril of Alexandria, Pseudo-Dionysius; in the West, Novatian, Cyprian, Commodian, Arnobius, Lactantius, Hilary, Ambrose, Rufinus, Jerome, Augustine, Prosper, Leo the Great, Cassian, Vincent of Lerins, Faustus, Gennadius, Ennodius, Avitus, Caesarius, Fulgentius and many others.

There are many editions of the works of the Fathers in the original, the most convenient, in spite of its defects, being that of J. P. Migne {Patrologia Graeca, 166 vols., Paris, 1857 ff. ; Patrologia Latina, 221 vols., 1844 ff.). Of modern critical editions, besides those con- taining the works of one or another individual, the best are the Berlin edition of the early Greek Fathers (Die griechischen christ- lichen Schriftsteller der ersten drei Jahrhunderte , 1897 ff.), and the

Vienna edition of the Latin Fathers (Corpus scriptorum ecclesiasti- corum Latinorum, 1867 ff.), both of first-rate importance. There is a convenient English translation of most of the writings of the ante-Nicene Fathers by Roberts and Donaldson (Ante-Nicene Christian Library, 25 vols., Edinburgh, 1868 ff., American reprint in nine vols., 1886 ff.). A continuation of it, containing selected works of the Nicene and post-Nicene period, was edited by Schaff and others under the title A Select Library of Nicene and post-Nicene Fathers (series 1 and 2; 28 vols., Buffalo and New York, 1886 ff.). On early Christian literature, in addition to the works on Church history, see especially the monumental Geschichte der altchristiichen Litteratur bis Eusebius, byHarnack (1893 ff.). The brief Geschichte der altchristiichen Litteratur in den ersten drei Jahrhunderten, by G. Kriiger (1895, English translation 1897) is a vary convenient summary. Bardenhewer's Patrologie (1894) and his Geschichte der altkirchlichen Litteratur (1902 ff.) should also be mentioned. See also Smith and Wace's invaluable Dictionary of Christian Biography (1877 ff.). (A. C.

McG.)

B. The Christian Church in the Middle Ages

The ancient Church was the church of the Roman empire. It is true that from the 4th century onwards it expanded beyond tlie borders of that empire to east and west, north and south; but the infant churches which gradually arose in Persia and Abyssinia, among some of the scattered Teutonic races, and among the Celts of Ireland, were at first not co-operating factors in the development of Christendom: they received without giving in return. True historic life is only to be found within the church of the Empire.

The middle ages came into being at the time when the political structure of the world, based upon the conquests of Alexander the Great and the achievements of Julius Caesar, began to disintegrate. They were present when the believers in Mahomet held sway in the Asiatic and African provinces which Alexander had once brought under the intellectual influence of Hellenism; while the Lombards, the West Goths, the Franks and the Anglo- Saxons had established kingdoms in Italy, Spain, Gaul and Britain. The question is: what was the position of the Church in this great change of circumstances, and what form did the Church's development take from this time onwards? In answering this question we must consider East and West separ- ately; for their histories are no longer coincident, as they had been in the time of the Roman dominion.

I. The East, (a) The Orthodox Church. — Ancient and medieval times were not separated by so deep a gulf in the East as in the West; for in the East the Empire continued to exist, although within narrow limits, until towards the end of the middle ages. Constantinople only fell in 1453. Ecclesiastical Byzantinism is therefore not a product of the middle ages: it is the outcome of the development of the eastern half of the empire from the time of Constantine the Great. Under Justinian I. all its essential features were already formed: imperial power extended – equally over State and Church; indeed, care for the preservation of dogma and for the purity of the priesthood was the chief duty of the ruler. To fulfil this duty was to serve the interests of both State and people; for thus " a fine harmony is established, and whatever good exists becomes the portion of the whole human race." Since the emperor ruled the Church there was no longer any question of independence for the bishops, least of all for the patriarch in Constantinople; they were in every respect sub- ordinate to the emperor.

The orthodoxy of the Eastern Church was also a result of the Church's development after the time of Constantine. In the long strife over dogma the old belief of the Greeks in the value of knowledge had made itself felt, and this faith was not extinct in the Eastern Church. There is no doubt that in the beginning of the middle ages both general and theological education stood higher among the Greeks than in more western countries. In the West there were no learned men who could vie with Photius (ca. 820-891) in range of knowledge and variety of scientific attainment. But the strife over dogma came to an end with the 7th century. After the termination of the monothelite con- troversy (638-680), creed and doctrines were complete; it was only necessary to preserve them intact. Theology, therefore, now resolved itself into the collection and reDroduction of the

teaching of ancient authorities. The great dogmatist of the Eastern Church, John of Damascus {ca. 699-753), who stood on the threshold of the middle ages, formulated clearly and precisely his working principle: to put forward nothing of his own, but to present the truth according to the authority of the Bible and of the Fathers of the Church. Later teachers, Euthymius Zigadenus (d. circa 1120), Nicetas Choniates (d. circa 1200), and others, proceeded further on the same lines; Euthymius, in particular, often uses an excerpt instead of giving his own exposition.

This attitude towards dogma did not mean that it was less prized thai} during the period of strife. On the contrary, the sacred formulae were revered because they were believed to contain the determination of the highest truths: the knowledge of God and of the mystery of salvation. Yet it is intelligible that religious interest should have concerned itself more keenly with the mystic rites of divine worship than with dogma. Here was more than knowledge; here were representations of a mystic sensuousness, solemn rites, which brought the faithful into immediate contact with the Divine, and guaranteed to them the reception of heavenly powers. What could be of more importance than to be absorbed in this transcendental world? We may gauge the energy with which the Greek intellect turned in this direction if we call to mind that the controversy about dogma was replaced by the controversy about images. This raged in the Eastern Church for more than a century (726-843), and only sank to rest when the worship of images was unconditionally conceded. In this connexion the image was not looked upon merely as a symbol, but as the vehicle of the presence and power of that which it represented: in the image the invisible becomes operative in the visible world. Christ did not seem to be Christ unless he were visibly represented. What an ancient teacher had said with regard to the worship of Christ as the

revelation of the Eternal Father — ” Honours paid to the earthly representative are shared by the heavenly Archetype ” — was now transferred to the painted image: it appeared as an analogy to the Incarnation. It was for this reason that the victory of image worship was celebrated by the introduction of the festival of the Orthodox Faith.

It is consistent with this circle of ideas that initiation into the profound mysteries of the liturgy was regarded, together with the preservation of dogma, as the most exalted function of theology. A beginning had been made, in the 5th century, by the neo- platonic Christian who addressed his contemporaries under the mask of Dionysius the Areopagite. He is the first of a series of theological mystics which continued through every century of the middle ages. Maximus Confessor, the heroic defender of Dyotheletism (d. 662), Symeon, the New Theologian (d. circa 1040), Nicolaus Cabasilas (d. 1371), and Symeon, like Nicholas, archbishop of Thessalonica (d. 1429), were the most conspicuous representatives of this Oriental mysticism. They left all the dogmas and institutions of the Church untouched; aspiring above and beyond these, their aim was religious experience.

It is this striving after religious experience that gives to the Oriental monachism of the middle ages its peculiar character. In the 5th and 6th centuries Egypt and Palestine had been th<": classic lands of monks and monasteries. But when, in conse quence of the Arab invasion, the monasticism of those countrieˆ was cut off from intercourse with the rest of Christendom, it decayed. Constantinople and Mount Athos gained proportion- ately in importance during the middle ages. At Constantinople the monastery of Studium, founded about 460, attained to supreme influence during the controversy about images. On Mount Athos the first monastery was founded in the year 963, and in 1045 the number of monastic foundations had reached 180. In Greek monachism the old Hellenic ideal of the wise man who has no wants (avr&pKeia) was from the first fused with the Christian conception of unreserved self-surrender to God as the highest aim and the highest good. These ideas governed it in medieval times also, and in this way monastic life received a decided bent towards mysticism: the monks strove to realize the heavenly life even upon earth, their highest aim being the contemplation of God and of His ways. The teachings of

Symeon ” the New Theologian ” on these matters lived on in the cloisters; it was taken up by the Hesychasts of the 14th century, and developed into a peculiar theory as to the perception of the Divine Light. In spite of all opposition their teaching was finally justified by the Eastern Church (sixth synod of Constanti- nople, 135 1). And rightly so, for it was the old Greek piety minted afresh.

The Eastern Church, then, throughout the middle ages, remained true in every particular to her ancient character. It cannot be said that she developed as did the Western Church during this period, for she remained what she had been; but she freely developed her original characteristics, consistently, in every direction. This too is life, though of a different type from that of the West.

That there was life in the Eastern Church is also proved by the fact that the power of expansion was not denied her. Through her agency an important bulwark for the Christian faith was created in the new nations which had sprung into existence since the beginning of the middle ages: the Bulgarians, the Servians, and the multifarious peoples grouped under the name of Russians. There is a vast difference in national character between these young peoples and the successors of the Hellenes; and it is there- fore all the more significant to find that both the Church and religious sentiment should in their case have fully preserved the Byzantine character. This proves once more the ancient capacity of the Greeks for the assimilation of foreign elements.

There was yet another outcome of this stubborn persistency of a peculiar type — the impossibility of continuing to share the life of the Western Church. Neither in the East nor in the West was a separation desired; but it was inevitable, since the lives of East and West were moving in different directions. It was the fall of Constantinople that first weakened the vital force of the Eastern Church. May we hope that the events of modern times are leading her towards a renaissance?

(b) The Neslorian and the Monophysite Churches. — Since the time when the church of eastern Syria had decided, in opposition to the church of the Empire, to cling to the ancient views of Syrian theologians — therefore also to the teaching and person of Nestorius — her relations were broken off with the church in western Syria and in Greek and Latin countries; but the power of Nestorian, or, as it Was termed, Chaldaic Christianity, was not thereby diminished. Separated from the West, it directed its energies towards the East, and here its nearest neighbour was the Persian church. The latter followed, almost without opposition, the impulse received from Syria; from the rule of the patriarch Babaeus (Syr. Bab-hai, 498-503) she may be considered

definitely Nestorian. A certain number, too, of Arabic Christians, believers living on the west coast of India, the so-called Christians of St Thomas, and finally those belonging to places nearer the middle of Asia (Merv, Herat, Samarkand), remained in communion with the Nestorian church. Thus there survived in mid-Asia a widely-scattered remnant, which, although out of touch with the ancient usages of Christian civilization, yet in no way lacked higher culture. Nestorian philosophers and medical practitioners became the teachers of the great Arabian natural philosophers of the middle ages, and the latter obtained their knowledge of Greek learning from Syriac trans- lations of the works of Greek thinkers.

Political conditions at the beginning of the middle ages favoured the Nestorian church, and the fact that the Arabs had conquered Syria, Palestine and Egypt, made it possible for her to exert an influence on the Christians in these countries. Of still more importance was the brisk commercial intercourse between central Asia and the countries of the Far East; for this led the Nestorians into China.. The inscription of Si-ngan-fu (before 781) proves a surprisingly widespread extension of the Christian faith in that country. That it also possessed adherents in southern Siberia we gather from the inscriptions of Semiryet-chensk, and in the beginning of the nth century it found its way even into Mongolia. Nowhere were the nations Christian, but the Christian faith was everywhere accepted by a not insignificant minority. The foundation of the Mongolian empire

in the beginning of the 13th century did not disturb the position of the Nestorian church; but the revival of the Mahommedan power, which was coincident with the downfall of the Mongolian empire, was pregnant with disaster for her. The greater part of Nestorian Christendom was now swallowed up by Islam, so that only remnants of this once extensive church have survived until modern times.

The middle ages were far more disastrous for the Monophysites than for the Nestorians; in their case there was no alternation of rise and decline, and we have only a long period of gradual exhaustion to chronicle. Egypt was the home of Monophysitism, whence it extended also into Syria. It was due to the great Jacob of Edessa (Jacob Baradaeus, d. 578) that it did not succumb to the persecution by the power of the Orthodox Empire, and out of gratitude to him the Monophysite Christians of Syria called themselves Jacobites. The Arab conquest (after 635) freed the Jacobite church entirely from the oppression of the Orthodox, and thereby assured its continuance. The church, however, never attained any greater development, but on the contrary continued to lose adherents from century to century. While

Jacob of Edessa is said to have ordained some 100,000 priests and deacons for his fellow-believers, in the 16th century the Jacobites of Syria were estimated at only 50,000 families.

The Monophysite church of Egypt had a like fate. At the time of the separation of the churches the Greeks here had re- mained faithful to Orthodoxy, the Copts to Monophysitism. Here too the Arab conquest {641) put an end to the oppression of the native Christians by the Greek minority; but this did not afford the Coptic church any possibility of vigorous development. It succumbed to the ceaseless alternation of tolerance and persecution which characterized the Arab rule in Egypt, and the mass of the Coptic people became unfaithful to the Church. At the time of the conquest of the country by the Turks (15 17) the Coptic church seems already to have fallen to the low condition in which the 19th century found it. Though at the time of the Arab conquest the Copts were reckoned at six millions, in 1820 the Coptic Christians numbered only about one hundred thousand, and it is improbable that their number can have been much greater at the close of the middle ages. Only in Abyssinia the daughter church of the Coptic church succeeded in keeping the whole people in the Christian faith. This fact, however, is the sole outcome of the history of a thousand years; a poor result, if measured by the standard of the rich history of the Western world, yet large enough not to exclude the hope of a new development.

II. The West, (a) The Early Middle Ages. The Catholic Church as influenced by the Foundation of the Teutonic States. — While the Eastern Church was stereotyping those peculiar characteristics which made her a thing apart, the Church of the West was brought face to face with the greatest revolution that Europe has ever experienced. At the end of the 6th century all the provinces of the Empire had become independent king- doms, in which conquerors of Germanic race formed the dominant nationality. The remnants of the Empire showed an uncommonly tough vitality. It is true that the Teutonic states succeeded everywhere in establishing themselves; but only in England and in the erstwhile Roman Germany did the Roman nationality succumb to the Teutonic. In the other countries it not only mantained itself, but was able to assimilate the ruling German race; the Lombards, West Goths, Swabians, and even the Franks in the greater part of Gaul became Romanized. Con- sequently the position of the Christian Church was never seriously affected. This is the great fact which stands out at the beginning of the history of the Church in the middle ages. The continuity of the political history of Europe was violently interrupted by the Germanic invasion, but not that of the history of the Church. For, in view of the facts above stated, it was of

small significance that in Britain Christianity was driven back into the western portion of the island still held by the Britons, and that in the countries of the Rhine andlDanube a few bishoprics disappeared. This was of the less importance, as the Church immediately made preparations to win back the lost territory. On the

frontier line of ancient and medieval times stands the figure of Gregory I., the incarnation as it were of the change that was taking place: half Father of the Church, half medieval pope. He it was who sent the monk Augustine to England, in order to win over the Anglo-Saxons to the Christian faith. Augustine was not the first preacher of the Gospel at Canterbury. A Frankish bishop, Liudhard, had laboured there before his time; but the mission of Augustine and his ordination as a bishop were decisive in the conversion of the country and the estab- lishment of the Anglo-Saxon church. On the continent an extension of the Frankish supremacy towards the east had already led to the advance of Christendom. Not only were the bishoprics in the towns of the Rhine country re-established, but as the Franks colonized the country on both sides of the Main, they carried the Christian faith into the very heart of Germany. Finally, the dependence of the Swabian and Bavarian peoples on the Frankish empire paved the way for Christianity in those provinces also. Celtic monks worked as missionaries in this part of the country side by side with Franks. In England it had not been possible to bring the old British and the young Anglo-Saxon churches into friendly union; but in spite of this the Celts did not abstain from working at the common tasks of Christendom, and the continent has much to thank them for. When the first century of the middle ages came to an end the Church had not only reoccupied the former territory of the Empire, she had already begun to overstep its limits.

In so doing she had remained as of old and had yet become new. Creed and dogma, above all, remained unchanged. The doctrinal decisions of the ancient Church remained the inde- structible canon of belief, and what the theologians of the ancient Church had taught was reverenced as beyond improve- ment. The entire form of divine worship remained therefore unaltered. Even where the Latin tongue was not understood by the people, the Church preserved it in the Mass and in the administration of the sacraments, in her exorcisms and in her benedictions. Furthermore, the organization of ecclesiastical offices remained unchanged: the division of the Church into bishoprics

and the grouping together of bishoprics into metro- politan dioceses. Finally, the property and the whole social status of the Church and of the hierarchy remained unchanged, as did also the conviction that the perfection of the Christian life was to be sought and found in the monastic profession.

Nevertheless, the new conditions did exercise the strongest influence upon the character of the Church. The churches of the Lombards, West Goths, Franks and Anglo-Saxons, all counted themselves parts of the Catholic Church; but the Catholic Church had altered its condition; it lacked the power of organization, and split up into territorial churches. Under the Empire the ecumenical council had been looked upon as the highest representative organ of the Catholic Church; but the earlier centuries of the middle ages witnessed the convocation of no ecumenical councils. Under the Empire the bishop of Rome had possessed in the Church an authority recognized and protected by the State; respect for Rome and for the successor of Saint Peter was not forgotten by the new territorial churches, but it had altered in character; legal authority had become merely moral authority; its wielder could exhort, warn, advise but could not command.

On the other hand, the kings did command in the Church. They certainly claimed no authority over faith or doctrine, and they too respected doctrinal law; but they succeeded in asserting their rights to a practical share in the government of the Church. The clergy and laity of a diocese together elected their bishop, as they had done before; but no one could become a bishop against the will of the king, and the confirmation of their choice rested with him. The bishops continued to meet in synods as before, but the councils became territorial synods; they were called together at irregular intervals by the king, and their decisions obtained legal effect only by royal sanction.

In these circumstances the intrusion of Germanic elements into ecclesiastical law is easy to understand. This is most clearly recognizable in the case of churches which arose alongside

the episcopal cathedrals. In the Empire all churches, and all the property of the Church, were at the disposal of the bishops; in Germanic countries, on the contrary, the territorial nobles were looked upon as the owners of churches built upon their lands, and these became ” proprietary churches.” The logical consequence of this was that the territorial nobles claimed the right of appointing clergy, and the enjoyment of the revenues of these churches derived from the land (tithes). Even a certain number of the monastic establishments

came in this way into the possession of the feudal landowners, who nominated abbots and abbesses as they appointed the incumbents of their churches.

With these conditions, and with the diminution of the as- cendancy of town over country that resulted from the Teutonic conquests, is connected the rise of the parochial system in the country. The parishes were further grouped together into rural deaneries and archdeaconries. Thus the diocese, hitherto a simple unit, became an elaborately articulated whole. The bishopric of the middle ages bears the same name as that of the ancient Church; but in many respects it has greatness that is new.

This transformation of old institutions is the first great result of Germanic influence in the Christian Church. It continues to the present day in the universal survival of the parochial system.

In the middle ages the civilizing task of the Church was first approached in England. This was the home of the Latin Christian literature and theology of medieval times. Aldhelm (d. 709) and the Venerable Bede (d. 735) were the first scholars of the period. England was also the home of Winfrid Bonifatius (d- 757)- We are accustomed to look upon him chiefly as a missionary; but his completion of the conversion of the peoples of central Germany (Thuringians and Hessians) and his share in that of the Frisians, are the least part of his life-work. Of more importance is the fact that, in co-operation with the bishops of Rome, he carried out the organization of the church in Bavaria, and began the reorganization of the Frankish church, which had fallen into confusion and decay during the political disorders of the last years of the Merovingians. It was Boniface, too, who, with the aid of numerous English priests, monks and nuns, introduced the literary culture of England into Germany.

Pippin (d. 768) and Charlemagne (d. 814) built on the founda- tions laid by Winfrid. For the importance of Charlemagne's work, from the point of view of the Church, consists also, not so much in the fact that, by his conversion of the Saxons, the Avars and the Wends in the eastern Alps, he substantially extended the Church's dominions, as in his having led back the Frankish Church to the fulfilment of her functions as a religious and civilizing agent. This was the purpose of his ecclesiastical legislation. The principal means to this end' taken by him was the raising of the status of the clergy. From the priests he demanded faithful- ness in preaching and teaching, from the bishops the conscientious government of their dioceses. The monasteries, too, learned to serve the Church by becoming nurseries of literary and

theological culture. For the purpose of carrying out his ideas Charlemagne gathered round him the best intellects of Europe. None was more intimately associated with him than the Anglo- Saxon Alcuin (d. 804); but he was only one among many. Beside him are the Celts Josephus Scottus and Dungal, the Lombards Paulinus and Paulus Diaconus, the West Goth Theodulf and many Franks. Under their guidance theology flourished in the Frankish empire. It was as little original as that of Bede; for on the continent, too, scholars were content to think what those of old had thought before them. But in so doing they did not only repeat the old formulae; the ideas of the men of old sprang into new life. This is shown by the searching discussions to which the Adoptionist controversy gave rise. At the same time, the controversy with the Eastern Church over the adoration .of images shows that the younger Western theology felt itself equal, if not superior to the Greek. This was in fact the case; for it knew how to treat the question, which divided the Greeks, in a more dispassionate and practical manner than they.

The second generation of Frankish theologians did not lag behind the first. Hrabanus of Fulda (who died archbishop of

Mainz in 856) was in the range of his knowledge undoubtedly Alcuin's superior. He was the first learned theologian produced by Germany. His disciple, Abbot Walafrid Strabo of Reichenau (d. 849), was the author of the Glossa Ordinaria, a work which formed tie foundation of biblical exposition throughout the middle ages. France was still more richly provided with theo- logians in the oth century: her most prominent names are Hincmar, archbishop of Reims (d. 882), Bishop Prudentius of Troyes (d. 861), the monks Servatus Lupus (d. 862), Radbert Paschasius (d. circa 860), and Ratramnus (d. after 868) ; and the last theologian who came into France from abroad, Johannes Scotus Erigena (d. circa 880). The theological method of all these was merely that of restatement. But the controversy about predestination, which, in the 9th century, Hincmar and Hrabanus fought out with the monk Gottschalk of Fulda, as well as the discussions that arose from the definition of the doctrine of transubstantiation of Radbert, enable us to gauge the intellectual energy with which theological problems were once more being handled.

Charlemagne followed his father's policy in carrying out his ecclesiastical measures in close association with the bishops of Rome.

He renewed the donation of Pippin, and as Patrician he took Rome under his protection. From Pope Adrian I. he received the Dionyso-Hadriana, the Roman collection of material bearing on the ancient ecclesiastical law. But the Teutonic elements maintained their place in the law of the Frankish Church ; and this was not altered by the fact that, since Christmas 800, the king of the Franks and Lombards had borne the title of Roman emperor. On the contrary, Rome itself was now for the first time affected by the predominance of the new empire; for Charlemagne converted the patriciate into effective sovereignty, and the successor of St Peter became the chief metropolitan of the Frankish empire.

There were, indeed, forces tending in the contrary direction; and these were present in the Frankish empire. Evidence of this is given by the canon law forgeries of the 9th century: the capitula of Angelram, the Capitularies of Benedictus Levita (see Capitulary), and the great collection of the Pseudo-Isidorian Decretals. For the moment, however, this party met with no success. Of more importance was the fact that at Rome the old conditions, the old claims, and the old law were unforgotten. Develsping the ideas of Leo I., Gelasius I. and Gregory the Great, Nicholas I. (858-867) drew a picture of the divine right and unlimited power of the bishop of Rome, which anticipated all that the greatest of his successors were, centuries later, actually to effect. The time had not, however, yet come for the establish- ment of the papal world-dominion. For, while the power of Charlemagne's successors was decaying, the papacy itself became involved in the confusion of the party strife of Italy and of the city of Rome, and was plunged in consequence into such an abyss of degradation (the so-called Pornocracy), that it was in danger of forfeiting every shred of its moral authority over Christendom.

(b) Central Period of the Middle Ages. Dominance of the Roman Spirit in the Church.— After the accession of the House of Saxony (919), the national ecclesiastical system, founded upon the principles of Carolingian law, developed in Germany with fresh energy. The union in 962 by Otto I. of the revived Empire with the German kingship brought the latter into uninterrupted contact with the papacy. The revelation of the antagonism between the German conception of ecclesiastical affairs and Roman views of ecclesiastical law was sooner or later inevitable. This was most obvious in the matter of appointment to bishoprics. At Rome canonical election was alone regarded as lawful; in Germany, on the other hand, developments since the time of Charlemagne had led to the actual appointment of bishops being in the hands of the king, although the form of ecclesiastical election was preserved. For the transference of a

bishopric a special legal form was evolved — that of investiture, the king investing the bishop elect with the see by delivering to him the ring and pastoral staff. No one found anything objectionable in this; investiture with a bishopric was parallel with the appoint- ment by a territorial proprietor to a patronal church.

The practice customary in Germany was finally transferred to Rome itself. The desperate position of the papacy in the nth century obliged Henry III. to intervene. When, on the 24th of December 1046, after three rival popes had been set aside, he nominated Suidgar, bishop of Bamberg, as bishop of Rome before all the people in St Peter's, the papacy was bestowed in the same way as a German bishopric; and what had occurred in this case was to become the rule. By procuring the transference of the patriciate from the Roman people to himself Henry assured his influence over the appointment of the popes, and accordingly also nominated the successors of Clement II.

His intervention saved the papacy. For the popes nominated by him, Leo IX. in particular, were men of high character, who exercised their office in a loftier spirit than their corrupt pre- decessors. They placed themselves at the head of the movement for ecclesiastical reform. But was it possible for the relation between Empire and Papacy to remain what Henry III. had made it?

The original sources of this reform movement lay far back, in the time of the Carolingians. It has been pointed out how Charlemagne pressed the monks into the service of his civilizing aims. We admire this; but it is certain that he thereby alienated monasticism from its original ideals. These, however, had far too strong a hold upon the Roman world for a reaction against the new tendency to be long avoided. This reaction began with the reform of Benedict of Aniane (d. 821), the aim of which was to bring the Benedictine order back to the principles of its original rules. In the next century the reform movement acquired a fresh centre in the Burgundian monastery of Cluny. The energy of a succession of distinguished abbots and the disciples whom they inspired succeeded in bringing about the victory of the reforming ideas in the French monasteries; once more the rule of St Benedict controlled the life of the monks. A large number of the reformed monasteries attached themselves to the con- gregation of Cluny, thus assuring the influence of reformed monasticism upon the Church, and securing likewise its inde- pendence of the diocesan bishops, since the abbot of Cluny was subordinate of the pope alone. (See Cluny; Benedictines and Monasticism.) At the same time that Cluny began to grow into importance, other centres of the monastic reform movement were established in Upper and Lower Lorraine; and before long the

activity of the Cluniac monks made itself felt in Italy. In Germany Poppo of Stavelot (d. 1048) was a successful champion of their ideas; in England Dunstan (d. 988 as archbishop of Canterbury) worked independently, but on similar lines. Every- where the object was the same: the supreme obligation of the Rule, the renewal of discipline, and also the economic improve- ment of the monasteries. The reform movement had originally no connexion with ecclesiastical politics; but that came later when the leaders turned their attention to the abuses prevalent among the clergy, to the conditions obtaining in the Church in defiance of the ecclesiastical law. ” Return to the canon law! ” was now the battle-cry. In the Cluniac circle was coined the principle: Canonica auctoritas Dei lex est, canon law being taken in the Pseudo-Isidorian sense. The programme of reform thus included not only the extirpation of simony and Nicolaitism, but also the freeing of the Church from the influence of the State, the recovery of her absolute control over all her possessions, the liberty of the Church and of the hierarchy.

As a result, the party of reform placed itself in opposition to those ecclesiastical conditions which had arisen since the con- version of the Teutonic peoples. It was, then, a fact pregnant with the most momentous consequences that Leo IX. attached himself to the party of reform. For, thanks to him and to the men he gathered round him (Hildebrand, Humbert and others), their principles were established in Rome, and the pope himself became the leader of ecclesiastical reform. But the carrying out of reforms led at once to dissensions with the civil power, the starting-point being the attack upon simony.

Originally, in accordance with Acts viii. 18 et seq., simony was held to be the purchase of ordination. In the 9th century the interpretation was extended to include all acquisition of

ecclesiastical offices or benefices for money or money’s worth. Since the landed proprietors disposed of churches and convents, and the kings of bishoprics and abbeys, it became possible for them too to commit the sin of simony; hence a final expansion, in the nth century, of the meaning of the term. The Pseudo- Isidprian idea being that all lay control over things ecclesiastical is wrong, all transferences by laymen of ecclesiastical offices or benefices, even though no money changed hands in the process, were now classed as simony (Humbert, Adversus Simoniacos, 1057-1058). Thus the lord who handed over a

living was a simonist, and so too was the king who invested a bishop. On this question the battle began. The Church at first refrained from contesting the rights of the landowners over their own churches, and concentrated her attack upon investiture. In 1059 the new system of papal election introduced by Nicholas II. ensured the occupation of the Holy See by a pope favourable to the party of reform; and in 1078 Gregory VII. issued his pro- hibition of lay investiture. In the years of conflict that followed Gregory looked far beyond this point; he set his aim ever higher; until, in the end, his idea was to concentrate all ecclesi- astical power in the hands of the pope, and to raise the papacy to the dominion of the world. Thus was to be realized the old dream of Augustine: that of a Kingdom of God on earth under the rule of the Church. But it was not given to Gregory to reach this goal, and his successors had to return again to the strife over investiture. The settlement of mi may be said to have embodied the only solution of the great question that was right in principle, since it pronounced in favour of a clear distinction between the spiritual and temporal spheres. However, a solution that was right in principle proved impossible in practice, and the long struggle ended in a compromise by the Concordat of Worms (1122). The essential part of this was that the Empire accepted the canonical election of bishops, and allowed the metropolitan to confer the sacred office by gift of ring and pastoral staff; while the Church acknowledged that the bishop held his temporal rights from the Empire, and was therefore to be invested with them by a touch from the royal sceptre. A similar solution was arrived at in England. Henry I. also renounced his claim to bestow ring and pastoral staff, but kept the right of induction into the temporalities (1106-1107). In France the demands of the Church were successful to the same degree as in England and Germany, but without any conflict. Thus the Germanic element in the law regarding appointment to bishoprics was eliminated. Somewhat later it disappeared also in the case of the churches of less importance, patronal rights over these being substituted for the former absolute ownership. The pontificate of Alexander III. (1159-1181) decided this.

Since the time of Charlemagne Germanic influence had pre- ponderated in the West, as is shown in the expansion of the Church no less than in matters of ecclesiastical law. The whole progress of Christianity in Europe from the 9th to the 12th century was due — if we exclude Eastern Christendom — to the Teutonic nations; neither the papacy nor the peoples of Latin race were concerned in it. German priests and bishops carried the Christian faith to the Czechs and the Moravians, laboured among the Hungarians and the Poles, and won the wide district between the Elbe and the Oder at once for

Christianity and for the German nation. Germany, too, was the starting-point for the conversion of the Scandinavian countries, which was com- pleted by English priests with the assistance of native princes.

But, even while the Teutonic peoples were thus taking the lead, we can see the Latin races beginning to assert themselves. The monastic reform movement was essentially Latin in origin; and even more significant was the fact that scholasticism, the new theology, had its home in the Latin countries. Aristotelian dialectics had always been taught in the schools; and reason as well as authority had been appealed to as the foundation of theology; but for the theologians of the 9th and 10th centuries, whose method had been merely that of restatement, ratio and auctoritas were in perfect accord. Then Berengar of Tours (d. 1088) ventured to set up reason against authority: by reason the truth must be decided. This involved the question of the

relation in theology of authority and reason, and of whether the theological method is authoritative or rational. To these ques- tions Berengar gave no answer; he was ruined by his opposition to Radbert's doctrine of transubstantiation. The Lombard Anselm (d. 1109), archbishop of Canterbury, was the first to deal with the subject. He took as his starting-point the traditional faith; but he was convinced that whoever has experience of the truths of the faith would be able to understand them. In accordance with this principle he pointed out the goal of theology and the way to its attainment: the function of theology is to demonstrate dogmas sola ratione.

It was a bold conception — too bold for the medieval world, for which faith was primarily the obligation to believe. It was easy, therefore, to understand why Anselm's method did not become the dominant one in theology. Not he, but the Frenchman Abelard (d. 1142), was the creator of the scholastic method. Abelard, too, started from tradition; but he discovered that the statements of the various authorities are very often in the relation of sic el non, yes and no. Upon this fact he based his pronounce- ment as to the function of theology: it must employ the dialectic method to reconcile the contradictions of tradition, and thus to shape the doctrines of the faith in accordance with reason. By teaching this method Abelard created the implements for the erection of the great theological systems of the schoolmen of the 12th and 13th centuries: Peter Lombard (d. 1160), Alexander of Hales (d. 1245), Albertus Magnus (d. 1280), and Thomas Aquinas (d. 1275). They adventured a complete exposition of Christian doctrine that should be altogether ecclesiastical and at the same time

altogether rational. In so doing they set to work at the same time to complete the development of ecclesi- astical dogma; the formulation of the Catholic doctrine of the Sacraments was the work of scholasticism.

Canon law is the twin-sister of scholasticism. At the very time when Peter Lombard was shaping his Sentences, the monk Gratian of Bologna was making a new collection of laws. It was not only significant that in the Concordia discordantium canonum ecclesiastical laws, whether from authentic or forged sources, were gathered together without regard to the existing civil law; of even greater eventual importance was the fact that Gratian taught that the contradictions of the canon law were to be reconciled by the same method as that used by theology to reconcile the discrepancies of doctrinal tradition. Thus Gratian became the founder of the science of canon law, a science which, like the scholastic theology, was entirely ecclesiastical and entirely rational (see Canon Law).

Like the new theology and the new science of law, the new monasticism was also rooted in Latin soil. In the first of the new orders, that of the Cistercians (1098), the old monastic ideal set forth in the Rule of Benedict of Nursia still prevailed; but in the constitution and government of the order new ideas were at work. In the Premonstratensian order, however, founded in n 20 by Norbert of Xanten, a new conception of the whole function of monachism was introduced: the duty of the priest-monk is not only to work out his own salvation, but, by preaching and cure of souls, to labour for others. This was the dominant idea of the order of friars preachers founded in 12 16, on the basis of the Premonstratensian rule, by Dominic of Osma (see Dominic, Saint, and Dominicans). It was also the basis of the order of friars minor (Franciscans, g.v.), founded in 1210. For the foundation of Francis of Assisi came into existence as a society of itinerant preachers: no one was more deeply convinced than Francis of the duty of working for others, and his own mission was, as he said, to win souls. But with this idea he fused another, namely, that it is the task of the monk to imitate the humility and poverty of Jesus; and his order thus became a mendicant order. From the earliest times the monks had renounced all private property, and no individual monk, but only the order to which he belonged, could acquire possessions. For Francis this was not enough: he put ” holy poverty ” in place of renunciation of private property, and allowed neither monk nor monastery to have any possessions whatever; for only thus is the following of Jesus complete. So

mighty was the impression made by the poverty of the Minorites, that the Dominicans promptly followed their example and likewise became mendicant.

This alone would serve to indicate the remarkable deepening of the religious life that had taken place in the Latin countries. Its beginning may be traced as early as the nth century (Pietro Damiani, q.v.), and in the 12th century the most influential exponent of this new piety was Bernard (q.v.) of Clairvaux, who taught men to find God by leading them to Christ. Con- temporary with him were Hugh (q.v.) of St Victor and his pupil Richard (q.v.) of St Victor, both monks of the abbey of St Victor at Paris, the aim of whose teaching, based on that of the Pseudo- Dionysius, was a mystical absorption of thought in the Godhead and the surrender of self to the Eternal Love. Under the influence of these ideas, in part purely Christian and in part neo-platonic, piety gained in warmth and depth and became more personal; and though at first it flourished in the monasteries, and in those of the mendicant orders especially, it penetrated far beyond them and influenced the laity everywhere.

The new piety did not set itself in opposition either to the hierarchy or to the institutions of the Church, such as the sacraments and the discipline of penance, nor did it reject those foreign elements (asceticism, worship of saints and the like) which had passed of old time into Christianity from the ancient world. Its temper was not critical, but aggressively practical. It led the Romance nations to battle for Christendom. In the nth and 12th centuries the chivalry of Spain and southern France took up the struggle with the Moors as a holy war. In the autumn of 1096 the nobles of France and Italy, joined by the Norman barons of England and Sicily, set out to wrest the Holy Land from the unbelievers; and for more than a century the cry, ” Christ’s land must be won for Christ,” exercised an unparalleled power in Western Christendom.

All this meant a mighty exaltation of the Church, which ruled the minds of men as she had hardly ever done before. Nor was it possible that the position of the bishop of Rome, the supreme head of the Western Church, should remain unaffected by it. Two of the most powerful of the German emperors, Frederick I. and his son Henry VI., struggled to renew and to maintain the imperial supremacy over the papacy. The close relations between northern Italy and the Empire, and the union of the sovereignty of southern Italy with the German crown, seemed to afford the means for keeping Rome in subjection.

But Frederick I. fought a losing battle, and when at the peace of Venice (1177) he recognized Alexander III. as pope, he relinquished the hope of carrying out his Italian policy; while Henry VI. died at the early age of thirty-two (1197), before his far-reaching schemes had been realized.

The field was thus cleared for the full development of papal power. This had greatly increased since the Concordat of Worms, and reached its height under Innocent III. (1198-1216). Innocent believed himself to be the representative of God, and as such the supreme possessor of both spiritual and temporal power. He therefore claimed in both spheres the supreme administrative, legislative and judicial authority. Just as he considered himself entitled to appoint to all ecclesiastical offices, so also he invested the emperor with his empire and kings with their kingdoms. Not only did he despatch his decretals to the universities to form the basis of the teaching of the canon law and of the decisions founded upon it, but he considered himself empowered to annul civil laws. Thus he annulled the Great Charter in 1215. Just as the Curia was the supreme court of appeal in ecclesiastical causes, so also the pope threatened disobedient princes with deposition, e.g. the emperor Otto IV. in 1 2 10, and John of England in 1212.

The old institutions of the Catholic Church were transformed to suit the new position of the pope. From 1123 onward there had again been talk of general councils; but, unlike those of earlier times, these were assemblies summoned by the pope, who confirmed their resolutions. The canonical election of bishops also continued to be discussed; but the old electors, i.e. tile clergy and laity of the dioceses, were deprived of the

right of election, this being now transferred exclusively to the cathedral chapters. The bishops kept their old title, but they described themselves accurately as ” bishops by grace of the apostolic see,” for they administered their dioceses as pleni- potentiaries of the pope; and as time went on even the Church’s criminal jurisdiction became more and more concentrated in the hands of the pope (see Inquisition).

The rule of the Church by the Roman bishop had thus become a reality; but the papal claim to supreme temporal authority proved impossible to maintain, although Innocent III. had apparently enforced it. The long struggle against Frederick II., carried on by Gregory IX. (1227-1241) and Innocent IV. (1243-1254), did not result in victory; no papal sentence, but only death itself, deprived the emperor of his dominions; and when Boniface VIII. (1294-1303), who in the bull Unam Sanctam (1302) gave the papal claims to universal

dominion their classical form, quarrelled with Philip IV. of France about the extension of the royal power, he could not but perceive that the national monarchy had become a force which it was impossible for the papacy to overcome.

(c) Close of the Middle Ages. Disintegration. — While the Church was yet at the height of her power the great revolution began, which was to end in the disruption of that union between the Temporal and the Spiritual which, under her dominion, had characterized the life of the West. The Temporal now claimed its proper rights. The political power of the Empire, indeed, had been shattered; but this left all the more room for the vigorous development of national states, notably of France and England. At the same time intellectual life was enriched by a wealth of fresh views and new ideas, partly the result of the busy inter- course with the East to which the Crusades had given the first impetus, and which had been strengthened and extended by lively trade relations, partly of the revived study, eagerly pursued, of ancient philosophy and literature (see Renaissance). Old forms became too narrow, and vigorously growing national literatures appeared side by side with the universal Latin literature. The life of the Church, moreover, was affected by the economic changes due to the rise of the power of money as opposed to the old economic system based upon land.

The effects of these changes made themselves felt on all sides, in no case more strongly than in that of the papal claims to the supreme government of the world. Theoretically they were still unwaveringly asserted; indeed it was not till this time that they received their most uncompromising expression (Augustinus Triumphus, d. 1328; Alvarus Pelagius, d. 1352). After Boniface VIII. , however, no pope seriously attempted to realize them; to do so had in fact become impossible, for from the time of their residence at Avignon (1305-1377) the popes were in a state of complete dependence upon the French crown. But even the curialistic theory met everywhere with opposition. In France Philip IV.‘s jurists maintained that the temporal power was independent of the spiritual. In Italy, a little later, Dante championed the divine right of the emperor (De Monorchia, 1311). In Germany, Marsiglio of Padua and Jean of Jandun, the literary allies of the emperor Louis IV., ventured to define anew the nature of the civil power from the standpoint of natural law, and to assert its absolute sovereignty (Defensor pads, c. 1352); while the Franciscan William of Occam (d. 1349) examined, also in Louis’ interests, into the nature of the relation between the two powers. He too concluded that the temporal power is inde- pendent of the spiritual, and is even justified in invading the sphere of the latter in cases of necessity.

While these thoughts were filling men's minds, opposition to the papal rule over the Church was also gaining continually in strength. The reasons for this were numerous, first among them being the abuses of the papal system of finance, which had to provide funds for the vast administrative machinery of the Curia. There was also the boundless abuse and arbitrary exercise of the right of ecclesiastical patronage (provisions, reservations); and further the ever-increasing traffic in dis- pensations, the abuse of spiritual punishments for worldly ends, and so forth. No means, however, existed of enforcing any

remedy until the papal schism occurred in 1378. Such a schism as this, so intolerable to the ecclesiastical sense of the middle ages, necessitated the discovery of some authority superior to the rival popes, and therefore able to put an end to their quarrelling. General councils were now once more called to mind; but these were no longer conceived as mere advisory councils to the pope, but as the highest representative organ of the universal Church, and as such ranking above the pope, and competent to demand obedience even from him. This was the view of the Germans Conrad of Gelnhausen (d. 1390) and Heinrich of Langenstein (d. 1397), as also of the Frenchmen Pierre d'Ailli (d. 1420) and Jean Charlier Gerson (d. 1429). These all recognized in the convoca- tion of a general council the means of setting bounds to the abuses in the government of the Church by an extensive reform. The council of Pisa (1409) separated without effecting anything; but the council of Constance (1414-1418) did actually put an end to the schism. The reforms begun at Constance and continued at Basel (1431-1449)- proved, however, insufficient. Above all, the attempt to set up the general council as an ordinary institu- tion of the Catholic Church failed; and the Roman papacy, restored at Constance, preserved its irresponsible and unlimited power over the government of the Church. (See Papacy; Constance, Council of, and Basel, Council of.)

Thus the attempt to reform the Church by means of Councils failed; but this very failure led to the survival of the desire for reform. It was kept alive by the most various circumstances; in the first instance by the attitude of the European states. Thanks to his recognition by the powers, Pope Eugenius IV. (1431-1447) had been victorious over the council of Basel; but neither France nor Germany was prepared to forgo the reforms passed by the council. France secured their validity, as far as she herself was concerned, by the Pragmatic Sanction of

Bourges (July 7, 1438); Germany followed with the Acceptation of Mainz (March 26, 1439). The theory of the papal supremacy held by the Curia was thus at least called in question.

The antagonism of the opposition parties was even more pronounced. The tendencies which they represented had been present when the middle ages were yet at their height; but the papacy, while at the zenith of its power, had succeeded in crushing the attacks made upon the creed of the Church by its most dangerous foes, the dualistic Cathari. On the other hand it had not been able to overcome the less radical opposition of the " Poor Man of Lyons " (Waldo, d. c. 1217), and even in the 15th century stray supporters of the Waldensian teaching were to be found in Italy, France and Germany, everywhere keeping alive mistrust of the temporal power of the Church, of her priesthood and her hierarchy. In England the hierarchy was attacked by John Wycliffe (d. 1384), its greatest opponent before Luther. Starting from Augustine's conception of the Church as the community of the elect, he protested against a church of wealth and power, a church that had become a political institution instead of a school of salvation, and against its head, the bishop of Rome. Wycliffe's ideas, conveyed to the continent, precipitated the outbreak of the Hussite storm in Bohemia. The council of Constance thought to quell it by condemnation of Wycliffe's teaching and by the execution of John Huss (1415). But in vain. The flame burst forth, not in Bohemia alone, where Huss's death gave the signal for a general rising, but also in England among the Lollards, and in Germany among those of Huss's persuasion, who had many points of agreement with the remnant of the Waldenses. (See Huss; Wycliffe; Lollards; Waldenses.) This was open opposition; but there was besides another opposing force which, though it raised no noise of controversy, yet was far more widely severed from the views of the Church than either Wycliffe or Huss: this was the Renaissance, which began its reign in Italy during the 14th century. The Re- naissance meant the emancipation of the secular world from the domination of the Church, and it contributed in no small measure to the rupture of the educated class with ecclesiastical tradition. Beauty of form alone was at first sought, and found in the antique; but, with the form, the spirit of the classical attitude towards life was revived. While the Church, like a

careful mother, sought to lead her children, never allowed to grow up, safely from time into eternity, the men of the Renaissance felt that they had come of age, and that they were entitled to make themselves at home in this world. They wished to possess the earth and enjoy it by means of secular education and culture, and an impassable gulf yawned between their views of religion and morality and those of the

Church.

This return to the ideals of antiquity did not remain confined to Italy, but the humanism of the northern countries presents no close parallel to the Italian renaissance. However much it agreed in admiration of the ancients, it differed absolutely in its preservation of the fundamental ideas of Christianity. But neither Reuchlin (d. 1522), Erasmus (d. 1536), Faber d'fitaples (d. 1536), Thomas More (d. 1535), nor the numerous others who were their disciples, or who shared their views, were in the least degree satisfied with the conditions prevailing in the Church. Their ideal was a return to that simplicity of primitive Christen- dom which they believed they found revealed in the New Testament and in the writings of the early Fathers.

To this theology could not point the way. Since the time of Duns Scotus (d. 1308) theologians had been conscious of the discrepancy between Aristotelianism and ecclesiastical dogma. Faith in the infallibility of the scholastic system was thus shaken, and the system itself was destroyed by the revival of philosophic nominalism, which had been discredited in the nth century by the realism of the great schoolmen. It now found a bo2d sup- porter in William of Occam (q.v.) , and through him became widely accepted. But nominalism was powerless to inspire theology with new life; on the contrary, its intervention only increased the inextricable tangle of the hairsplitting questions with which theology busied itself, and made their solution more and more impossible.

Mysticism, moreover, which had no lack of noteworthy supporters in the 14th and 15th centuries, and the various new departures in thought initiated by individual theologians such as Nicolaus Cusanus (d. 1464) and Wessel Gansfort (d. 1489), were not competent to restore to the Church what she had once possessed in scholasticism — that is to say, a conception of Christianity in which all Christendom recognized the convictions in which it lived and had its being.

This was all the more significant because Western Christendom in the 15th century was by no means irreligious. Men's minds were agitated by spiritual questions, and they sought salvation and the assurance of salvation, using every means prescribed by the Church: confession and the communion, indulgences and relics, pilgrimages and oblations, prayers and attendance at church; none of all these were contemned or held cheap. Yet the age had no inward peace.

After the failure of the attempts at reform by the councils, the guidance of the Church was left undisturbed in the hands of the popes,

and they were determined that it should remain so. In 1450 Eugenius IV. set up in opposition to the council of Basel a general council summoned by himself, which met first at Ferrara and afterwards at Florence. Here he appeared to score a great success. The split between East and West had led in the nth century to the rupture of ecclesiastical relations between Rome and Constantinople. This schism had lasted since the 16th of July 1054; but now a union with the Eastern Church was successfully accomplished at Florence. Eugenius certainly owed his success merely to the political necessities of the emperor of the East, and his union was forthwith destroyed owing to its repudiation by oriental Christendom; yet at the same time his decretals of union were not devoid of importance, for in them the pope reaffirmed the scholastic doctrine regarding the sacraments as a dogma of the Church, and he spoke as the supreme head of all Christendom.

This claim to the supreme government of the Church was to be steadily maintained. In the year 1512 Julius II. called together the fifth Lateran general council, which expressly recognized the subjection of the councils to the pope (Leo X.'s bull Pastor Aeternum, of the 19th of December 1516), and also declared the constitution Unam Sanctum (see above) valid in law.

But the papacy that sought to win back its old position was itself no longer the same as of old. Eugenius IV.'s successor, Nicholas V. (1447-1455), was the first of the Renaissance popes. Under his successors the views which prevailed at the secular courts of the Italian princes came likewise into play at the Curia: the papacy became an Italian princedom. Innocent VIII., Alexander VI., Julius II. were in many respects remarkable men, but they were scarcely affected by the convictions of the Christian faith. The terrible tragedy which was consummated on the 23rd of May 1498 before the Palazzo Vecchio, in Florence, casts a lurid light upon the irreconcilable opposition in which the wearers of the papal dignity stood to medieval piety; for Girolamo Savonarola was in every fibre a loyal son of the medieval Church.

Twenty years after Savonarola's death Martin Luther made public his theses against indulgences. The Reformation which thus began brought the disintegrating process of the middle ages to an end, and at the same time divided Western Catholicism in two. Yet we may say

that this was its salvation; for the struggle against Luther drove the papacy back to its ecclesiastical duties, and the council of Trent established medieval dogma as the doctrine of modern Catholicism in contradistinction to Protestantism. (See also Papacy; Renaissance; Reforma- tion, and biographies of popes, &c.)

Authorities. — For sources see U. Chevalier, Repertoire des sources historiques du moyen-age (Paris, 1903) ; A. Potthast, Biblio- theca historica medii aevi (Berlin, 1896); W. Wattenbach, Deutsch- lands Geschichtsquellen im Mittelaller (7th ed., Stuttgart, 1904) ; A. Molinier, Les Sources de I'histoire de la France (Paris, 1901). General Treatises: Philip Schaff, History of the Christian Church (12 vols., 5th ed., New York, 1889-1892), vol. iv. Medieval Chris- tianity; W. Moeller, Lehrbuch der Kirchengeschichte, vol. ii. Das Mittelaller (Freiburg, 1891); H. H. Milman, History of Latin Chris- tianity (6 vols., 2nd ed., London, 1857). Particular Treatises: J. I.ingard, The History and Antiquities of the Anglo-Saxon Church (2 vols. 3rd ed., London, 1845); E. Cnurton, The Early English Church (London, 1878) ; A. Martineau, Church History in England from the Earliest Times to the Reformation (London, 1878) ; W. Hunt, The – English Church from its Foundation to the Norman Conquest (London, 1899); W. Stubbs, Constitutional History of England (3 vols., London, 1874-1878); A. Bellesheim, Geschichte der kathol. Kirche in Schottland (2 vols., Mainz, 1883; Engl, transl. with Notes and Additions by O. H. Blair, 4 vols., Edinburgh, 1887-1890); W. Stephen, History of the Scottish Church (Edinburgh, 1894-1896, 2 vols.) ; W. D. Killen, The Ecclesiastical History of Ireland (2 vols., London, 1 875-1 878); A. Bellesheim, Geschichte der kath. Kirche in Irland (3 vols., Mainz, 1890-1891) ; F. Rettberg, Kirchengeschichte Deutschlands (2 vols. Gottingen, 1846, 1848) ; A. Hauck, Kirchen- geschichte Deulschlands (4 vols., Leipzig, 3rd ed., 1904); Gallia Christiana in provincias eccl. distributa (16 and 3 vols., Paris, 1715- 1900) ; F. N. Fager, Histoire de Veglise cathol. en France depuis son origine (19 vols., Paris, 1862-1873); Ughelli, Italia sacra (10 vols., Venice, 1717-1722) ; P. Gams, Kirchengeschichte von Spanien (5 vols., Regensburg, 1862-1879); H. Reuterdahl, Svenska Kyrkans historia (3 vols., Lund, 1838-1863); A. v. Maurer, Die Bekehrung des norwegischen Stammes (2 vols., Munich, 1855—1856) ; Bang, Udsigt over den norske Kirkes historie under Katholicismen (Chris- tiania, 1887) ; P. Gams, Series episcoporum ecclesiae catholicae (Regensburg, 1873); C. Eubel, Hierarchia catholica medii aevi (2 vols., Miinster, 1898, 1901); P. Hirischius, System des kath. Kirchenrechts (6 vols., Berlin, 1869-1896); E. Friedberg, Lehrbuch des Kirchenrechts (5th ed., Leipzig, 1903); U. Stutz, " Kirchen- recht " (Holtzendorff-Kohler,

Encyklopaedie der Rechtswissenschaft, 6th ed. II. Leipzig, 1904); B. Haureau, Histoire de la philosophie scolastique (Paris, 1872) ; F. Schwane, Dogmengeschichte der mit- tleren Zeit (Freiburg, 1882) ; A. Ebert, Allgem. Geschichte der Literatur des Mittelalters im Abendlande (3 vols., Leipzig, 1874-1887) ; C. F. v. Hefele, Conciliengeschichte (2nd ed., 9 vols., Freiburg, 1873-1890).

(A. H.*)

C. The Modern Church The issue in 1 564 of the canons of the council of Trent marks a very definite epoch in the history of the Christian Church. Up till that lime, in spite of the schism of East and West and of innumerable heresies, the idea of the Church as Catholic, not only in its faith but in its organization, had been generally accepted. From this conception the Reformers had, at the outset, no intention of departing. Their object had been to purify the Church of medieval accretions, and to restore the primitive model in the light of the new learning; the idea of rival " churches," differing in their fundamental doctrines and in their principles of organization, existing side b.v side, was as

abhorrent to them as to the most rigid partisan of Roman central- ization. The actual divisions of Western Christendom are the outcome, less of the purely religious influences of the Reformation period than of the political forces with which they were associated and confused. When it became clear that the idea of doctrinal change would find no acceptance at Rome, the Reformers appealed to the divine authority of the civil power against that of the popes; and princes within their several states succeeded, as the result of purely political struggles and combinations, in establishing the form of religion best suited to their convictions or their policy. Thus over a great part of Europe the Catholic Church was split up into territorial or national churches, which, whatever the theoretical ties which bound them together, were in fact separate organizations, tending ever more and more to become isolated and self-contained units with no formal inter- communion, and, as the rivalry of nationalities grew, w.‘th increasingly little even of intercommunication.

It was not, indeed, till the settlement of Westphalia in 1648, after the Thirty Years’ War, that this territorial division of Christendom became stereotyped, but the process had been going on for a hundred years previously; in some states, as in England and Scotland, it had long been completed; in others, as in South Germany, Bohemia and Poland, it was defeated by the political and missionary efforts of the Jesuits and other agents of the counter-Reformation. In any case, it received a

vast impetus from the action of the council of Trent. With the issue of the Tridentine canons, all hope even of compromise between the ” new ” and the ” old ” religions was definitely closed. The anathema of the Roman Church had fallen upon all the fundamental doctrines for which the Reformers had contended and died; the right of free discussion within the limits of the creeds, which had given room for the speculations of the medieval philosophers, was henceforth curtailed and confined; and the definitions of the schoolmen were for ever exalted by the authority of Rome into dogmas of the Church. The Latin Church, which, by combining the tradition of the Roman centralized organization with a great elasticity in practice and in the interpretation of doctrine, had hitherto been the moulding farce of civilization in the West, is henceforth more or less in antagonism to that civilization, which advances in all its branches — in science, in literature, in art — to a greater or less degree outside of and in spite of her, until in its ultimate and most characteristic develop- ments it falls under the formal condemnation of the pope, formulated in the famous Syllabus of 1864. Considered from the standpoint of the world outside, the Roman Church is, no less than the Protestant communities, merely one of the sects into which Western Christendom has been divided — the most im- portant and widespread, it is true, but playing in the general life and thought of the world a part immeasurably less important than that filled by the Church before the Reformation, and one in no sense justifying her claim to be considered as the sole inheritor of the tradition of the pre-Reformation Church.

If this be true of the Roman Catholic Church, it is still more so of the other great communities and confessions which emerged from the controversies of the Reformation. Of these the Anglican Church held most closely to the tradition of Catholic organization ; but she has never made any higher claim than to be one of ” the three branches of the Catholic Church,” a claim repudiated by Rome and never formally admitted by the Church of the East. The Protestant churches established on the continent, even where — as in the case of the Lutherans — they approximate more closely than the official Anglican Church to Roman doctrine and practice, make no such claim. The Bible is for them the real source of authority in doctrine; their organization is part and parcel of that of the state. They are, in fact, the state in its religious aspect, and as such are territorial or national, not Catholic. This tendency has been common in the East also, where with the growth of racial rivalries the Orthodox Church has split into a series of national churches, holding the same faith but independent as to organization.

A yet further development, of comparatively recent growth, has been

the formation of what are now commonly called in

England the ” free churches.” These represent a theory of the Church practically unknown to the Reformers, and only reached through the necessity for discovering a logical basis for the communities of conscientious dissidents from the established churches. According to this the Catholic Church is not a visibly organized body, but the sum of all ” faithful people ” throughout the world, who group themselves in churches modelled according to their convictions or needs. For the organization of these churches nodivine sanction is claimed, though all are theoretically modelled on the lines laid down in the Christian Scriptures. It follows that, while in the traditional Church, with its claim to an unbroken descent from a divine original, the individual is subordinate to the Church, in the ” free churches ” the Church is in a certain sense secondary to the individual. The believer may pass from one community to another without imperilling his spiritual life, or even establish a new church without necessarily incurring the reproach of schism. From this theory, powerful in Great Britain and her colonies, supreme in the United States of America, has resulted an enormous multiplication of sects.

It follows from the above argument that, from the period of the Reformation onward, no historical account of the Christian Church as a whole, and considered as a definite institution, is possible. The stream of continuity has been broken, and divides into innumerable channels. The only possible synthesis is that of the Christianity common to all; as institutions, though they possess many features in common, their history is separate and must be separately dealt with. The history of the various branches of the Christian Church since the Reformation will therefore be found under their several titles (see Roman Catholic Church; England, Church of; Presbyterianism; Baptists, &c, &c). (W. A. P.)

CHURCHILL, CHARLES (1731-1764), English poet and satirist, was born in Vine Street, Westminster, in February 1731. His father, rector of Rainham, Essex, held the curacy and lectureship of St John’s, Westminster, from 1733, and the son was educated at Westminster school, where he became a good classical scholar, and formed a close and lasting intimacy with Robert Lloyd. Churchill was entered at Trinity College, Cambridge, in 1749, but never resided. He had been refused at Oxford, ostensibly on the unlikely ground of lack of

classical knowledge, but more probably because of a hasty marriage which he had contracted within the rules of the Fleet in his eighteenth year. He and his wife lived in his father's house, and Churchill was afterwards sent to the north of England to prepare for holy orders. He became curate of South Cadbury, Somersetshire, and, on receiving priest's orders (1756), began to act as his father's curate at Rainham. Two years later the elder Churchill died, and the son was elected to succeed him in his curacy and lectureship. His emoluments amounted to less than £100 a year, and he increased his income by teaching in a girls' school. He fulfilled his various duties with decorum for a while, but his marriage proved unfortunate, and he spent much of his time in dissipation in the society of Robert Lloyd. He was separated from his wife in 1761, and would have been imprisoned for debt but for the timely help of Lloyd's father, who had been an usher and was now a master of Westminster school.

Churchill had already done some work for the booksellers, and his friend Lloyd had had some success with a didactic poem, " The Actor." His intimate knowledge of the theatre was now turned to account in the Rosciad, which appeared in March 1761. This reckless and amusing satire described with the most dis- concerting accuracy the faults of the various actors and actresses on the London stage. Its immediate popularity was no doubt largely due to its personal character, but its real vigour and raciness make it worth reading even now when the objects of Churchill's wit are many of them forgotten. The first impression was published anonymously, and in the Critical Review, conducted by Tobias Smollett, it was confidently asserted that the poem was the joint production of George Colman, Bonnell Thornton and Robert Lloyd. Churchill owned the authorship and immedi- ately published an Apology addressed to the Critical Reviewers, which, after developing the subject that it is only the caste of

authors that prey on their own kind, repeats the fierce attack on the stage. Incidentally it contains an enthusiastic tribute to Dryden, of whom Churchill was a not unworthy scholar. In the Rosciad he had given warm praise to Mrs Pritchard, Mrs Cibber and Mrs Clive, but no leading London actor, with the exception of David Garrick, had escaped censure, and in the Apology Garrick was clearly threatened. He deprecated criticism by showing every possible civility to Churchill, who became a terror to the actors. Thomas Davies wrote to Garrick attributing his blundering in the part of Cymbeline " to my accidentally seeing Mr Churchill in the pit, it rendering me confused and unmindful of my business." Churchill's satire made him many enemies, and inquiries into his way of life provided abundant matter

for retort. In Night, an Epistle to Robert Lloyd (1761), he answered the attacks made on him, offering by way of defence the argument that any faults were better than hypocrisy. His scandalous conduct brought down the censure of the dean of Westminster, and in 1763 the protests of his parishioners led him to resign his offices, and he was free to wear his ” blue coat with metal buttons ” and much gold lace without remonstrance from the dean. The Rosciad had been refused by several pub- lishers, and was finally published at Churchill’s own expense. He received a considerable sum from the sale, and paid his old creditors in full, besides making an allowance to his wife.

He now became a close ally of John Wilkes, whom he regularly assisted with the North Briton. The Prophecy of Famine: A Scots Pastoral (1763), his next poem, was founded on a paper written originally for that journal. This violent satire on Scottish influence fell in with the current hatred of Lord Bute, and the Scottish place-hunters were as much alarmed as the actors had been. When Wilkes was arrested he gave Churchill a timely hint to retire to the country for a time, the publisher, Kearsley, having stated that he received part of the profits from the paper. His Epistle to William Hogarth (1763) was in answer to the caricature of Wilkes made during the trial. In it Hogarth’s vanity and envy were attacked in an invective which Garrick quoted as ” shocking and barbarous.” Hogarth retaliated by a caricature of Churchill as a bear in torn clerical bands hugging a pot of porter and a club made of lies and North Britons. The Duellist (1 763) is a virulent satire on the most active opponents of Wilkes in the House of Lords, especially on Bishop Warburton. He attacked Dr Johnson among others in The Ghost as ” Pomposo, insolent and loud, Vain idol of a scribbling crowd.” Other poems are “The Conference” (1763); “The Author” (1763), highly praised by ChurchilFs contemporaries; ” Gotham ” (1764), a poem on the duties of a king, didactic rather than satiric in tone; ” The Candidate ” (1764), a satire on John Montagu, fourth earl of Sandwich, one of Wilkes’s bitterest enemies, whom he had already denounced for his treachery in the Duellist (Bk. iii.) as ” too infamous to have a friend “; ” The Farewell” (1764); “The Times” (1764); “Independence,” and an unfinished ” Journey.”

In October 1 764 he went to Boulogne to join Wilkes. There he was attacked by a fever of which he died on the 4th of November. He left his property to his two sons, and made Wilkes his literary executor with full powers. Wilkes did little. He wrote an epitaph for his friend and about half a dozen notes on his poems, and Andrew Kippis acknowledges some slight assistance from him in preparing his life of

Churchill for the Biographia Britannica (1 780) . There is more than one instance of Churchill's generosity to his friends. In 1763 he found his friend Robert Lloyd in prison for debt. He paid a guinea a week for his better mainten- ance in the Fleet, and raised a subscription to set him free. Lloyd fell ill on receipt of the news of Churchill's death, and died shortly afterwards. Churchill's sister Patty, who was engaged to Lloyd, did not long survive them. William Cowper was his schoolfellow, and left many kindly references to him.

A partial collection of Churchill's poems appeared in 1763. They are included in Chalmers's edition of the English poets, and were edited (1804) by W. Tooke. This was reprinted in the Aldine edition (1844). There is a revised edition (1892) in the same series, The Poetical Works of Charles Churchill, with a Memoir by J. L. Hannay and copious notes by W. Tooke. For Churchill's biography.

see Genuine Memoirs of Charles Churchill, with an account of and observations on his writings; together with some Original letters . . . between him and the author (1765) ; A. Kippis, in Biographia Brilannica (1780) ; also John Forster in the Edinburgh Review (January 1845).

CHURCHILL, LORD RANDOLPH HENRY SPENCER (1840- 1895), English statesman, third son of John, seventh duke of Marlborough, by Frances, daughter of the third marquess of Londonderry, was born at Blenheim Palace, on the 13th of February 1849. His early education was conducted at home, and at Mr Tabor's preparatory school at Cheam. In January 1863 he went to Eton, where he remained till July 1865. He was not specially distinguished either in school work or games while at Eton; his contemporaries describe him as a vivacious and rather unruly lad. In October 1867 he matriculated at Merton College, Oxford. He was fond of amusement, and had carried to Oxford an early taste for sport which he retained throughout life. But he read with some industry, and obtained a second class in jurisprudence and modern history in 1870. In 1874 he was elected to parliament in the Conservative interest for Woodstock, defeating Mr George Brodrick, a fellow, and afterwards warden, of Merton College. His maiden speech, delivered in his first session, made no impression on the House.

It was not till 1878 that he forced himself into public notice as the

exponent of a species of independent Conservatism. He directed a series of furious attacks against some of the occupants of the front ministerial bench, and especially that ” old gang ” who were distinguished rather for the respectability of their private characters, and the unblemished purity of their Toryism, than for striking talent. Mr Sclater-Booth (afterwards 1st Lord Basing), president of the Local Government Board, was the especial object of his ire, and that minister’s County Government Bill was fiercely denounced as the ” crowning dishonour to Tory principles,” and the ” supreme violation of political honesty.” The audacity of Lord Randolph’s attitude, and the vituperative fluency of his invective, made him a parliamentary figure of some importance before the dissolution of the 1874 parliament, though he was not as yet taken quite seriously. In the new parliament of 1880 he speedily began to play a more notable r6le. With the assistance of his devoted adherents, Sir Henry Drummond Wolff, Sir John Gorst and occasionally of Mr Arthur Balfour, and one or two others, he constituted himself at once the audacious opponent of the Liberal administration and the unsparing critic of the Conservative front bench. The ” fourth party,” as it was nicknamed, was effective at first not so much in damaging the government as in awakening the opposition from the apathy which had fallen upon it after its defeat at the polls. Churchill roused the Conservatives and gave them a fighting issue, by putting himself at the head of the resistance to Mr Bradlaugh, the member for Northampton, who, though an avowed atheist or agnostic, was prepared to take the parliamentary oath. Sir Stafford Northcote, the Conservative leader in the Lower House, was forced to take a strong line on this difficult question by the energy of the fourth party, who in this case clearly expressed the views of the bulk of the opposition. The long and acrimonious controversy over Mr Bradlaugh’s seat, if it added little to the reputation of the English legislature, at least showed that Lord Randolph Churchill was a parliamentary champion who added to his audacity much tactical skill and shrewdness. He continued to play a conspicuous part throughout the parliament of 1880- 1885, dealing his blows with almost equal vigour at Mr Gladstone and at the Conservative front bench, some of whose members, and particularly Sir Richard Cross and Mr W. H. Smith, he assailed with extreme virulence. From the beginning of the Egyptian imbroglio Lord Randolph was emphatically opposed to almost every step taken by the government. He declared that the suppression of Arabi Pasha’s rebellion was an error, and the restoration of the khedive’s authority a crime. He called Mr Gladstone the ” Moloch of Midlothian,” for whom torrents of blood had been shed in Africa. He was equally severe on the domestic policy of the administration, and was particularly bitter

in his criticism of the Kilmainharo treaty and the rapproche- ment between the Gladstonians and the Parnellites. It is true

that for some time before the fall of the Liberals in 1885 he had considerably modified his attitude towards the Irish question, and was himself cultivating friendly relations with the Home Rule members, and even obtained from them the assistance of the Irish vote in the English constituencies in the general election. By this time he had definitely formulated the policy of progressive Conservatism which was known as ” Tory democracy.” He declared that the Conservatives ought to adopt, rather than oppose, reforms of a popular character, and to challenge the claims of the Liberals to pose as the champions of the masses. His views were to a large extent accepted by the official Con- servative leaders in the treatment of the Gladstonian Franchise Bill of 1884. Lord Randolph insisted that the principle of the bill should be accepted by the opposition, and that resistance should be focused upon the refusal of the government to combine with it a scheme of redistribution. The prominent, and on the whole judicious and successful, part he played in the debates on these questions, still further increased his influence with the rank and file of the Conservatives in the constituencies. At the same time he was actively spreading the gospel of democratic Toryism in a series of platform campaigns. In 1883 and 1884 he invaded the Radical stronghold of Birmingham itself, and in the latter year took part in a Conservative garden party at Aston Manor, at which his opponents paid him the compliment of raising a serious riot. He gave constant attention to the party organization, which had fallen into considerable disorder after 1880, and was an active promoter of the Primrose League, which owed its origin to the happy inspiration of one of his own ” fourth party ” colleagues. In 1884 the struggle between stationary and progressive Toryism came to a head, and terminated in favour of the latter. At the conference of the Central Union of Conservative Associa- tions, Lord Randolph was nominated chairman, notwithstanding the strenuous opposition of the parliamentary leaders of the party. The split was averted by Lord Randolph’s voluntary resignation; but the episode had confirmed his title to a leading place in the Tory ranks. It was further strengthened by the prominent part he played in the events immediately preceding the fall of the Liberal government in 1885: and when Mr Childers’s budget resolutions were defeated by the Conservatives, aided by about half the Parnellites, Lord Randolph Churchill’s admirers were justified in proclaiming him to have been the ” oTganizer of victory.” His services were, at any rate, far too important to be refused recognition; and in Lord Salisbury’s cabinet of 1885 he was appointed to no less an office than that of secretary of

state for India. During the few months of his tenure of this great post the young free-lance of Tory democracy surprised the permanent officials and his own friends by the assiduity with which he attended to his departmental duties and the rapidity with which he mastered the complicated questions of Indian administration. In the autumn election of 1885 he contested Central Birmingham against Mr Bright, and though defeated here, was at the same time returned by a very large majority for South Paddington. In the contest which arose over Mr Gladstone's Home Rule scheme, both in and out of parliament, Lord Randolph again bore a conspicuous part, and in the electioneering campaign his activity was only second to that of some of the Liberal Unionists, the marquess of Hartington, Mr Goschen and Mr Chamberlain. He was now the recognized Conservative champion in the Lower Chamber, and when the second Salisbury administration was formed after the general election of 1886 he became chancellor of the exchequer and leader of the House of Commons. His management of the House was on the whole successful, and was marked by tact,, discretion and temper. But he had never really reconciled himself with some of his colleagues, and there was a good deal of friction in his relations with them, which ended with his sudden resignation on the 20th of December 1886. Various motives influenced him in taking this surprising step; but the only ostensible cause was that put forward in his letter to Lord Salisbury, which was read in the House of Commons on 27th January. In this document he stated that his resignation was due to his inability, as chancellor of the exchequer, to concui

in the demands made on the treasury by the ministers at the head of the naval and military establishments. It was commonly supposed that he expected his resignation to be followed by the unconditional surrender of the cabinet, and his restoration to office on his own terms. The sequel, however, was entirely different. The cabinet was reconstructed with Mr Goschen as chancellor of the exchequer (Lord Randolph had " forgotten Goschen," as he is said to have remarked), and Churchill's own career as a Conservative chief was practically closed.

He continued, for some years longer, to take a considerable share in the proceedings of parliament, giving a general, though decidedly independent, support to the Unionist administration. On the Irish question he was a very candid critic of Mr Balfour's measures, and one of his later speeches, which recalled the acrimonious violence of his

earlier period, was that which he delivered in 1800 on the report of the Parnell commission. He also fulfilled the promise made on his resignation by occasionally advocating the principles of economy and retrenchment in the debates on the naval and military estimates. In April 1889, on the death of Mr Bright, he was asked to come forward as a candidate for the vacant seat in Birmingham, and the result was a rather angry controversy with Mr Chamberlain, terminating in the so-called " Birmingham compact " for the division of representation of the Midland capital between Liberal Unionists and Conservatives. But his health was already precarious, and this, combined with the anomaly of his position, induced him to relax his devotion to parliament during the later years of the Salisbury administration. He bestowed much attention on society, travel and sport. He was an ardent supporter of the turf, and in 1889 he won the Oaks with a mare named the Abbesse de Jouarre. In 1891 he went to South Africa, in search both of health and relaxation. He travelled for some months through Cape Colony, the Transvaal and Rhodesia, making notes on the politics and economics of the countries, shooting lions, and recording his impressions in letters to a London newspaper, which were afterwards republished under the title of Men, Mines and Animals in South Africa. He returned with renewed energy, and in the general election of 1892 once more flung himself, with his old vigour, into the strife of parties. His seat at South Paddington was uncontested; but he was active on the platform, and when parliament met he returned to the opposition front bench, and again took a leading part in debate, attacking Mr Gladstone's second Home Rule Bill with especial energy. But it was soon apparent that his powers were undermined by the inroads of disease. As the session of 1893 wore on his speeches lost their old effectiveness, and in 1894 he was listened to not so much with interest as with pity. His last speech in the House was delivered in the debate on Uganda in June 1894, and was a painful failure. He was, in fact, dying of general paralysis. A journey round the world was undertaken as a forlorn hope. Lord Randolph started in the autumn of 1894, accompanied by his wife, but the malady made so much progress that he was brought back in haste from Cairo. He reached England shortly before Christmas and died in London on the 24th of January 1895.

Lord Randolph Churchill married, in January 1874, Jennie, daughter of Mr Leonard Jerome of New York, U.S.A., by whom he had two sons. In 1000 Lady Randolph Churchill married Mr G. Cornwallis-West.

His elder son, Winston Churchill (1874-), was educated at Harrow, and after serving for a few years in the army and acting as a special

correspondent in the South African War (being taken prisoner by the Boers, Nov. 15, 1899, but escaping on Dec. 12), was elected Unionist member of parliament for Oldham in October 1900. As the son of his father, his political future excited much interest. His views, however, as to the policy of the Conservative party gradually changed, and having during 1904-1905 taken an active part in assisting the Liberal party in parliament, he stood for N. W. Manchester at the general election (1906) and was triumphantly returned as a Liberal and free-trader. He was made under-secretary for the colonies in the new Liberal government. In this position he became as

conspicuous in parliament as he had already become on the platform as a brilliant and aggressive orator, and no politician of the day attracted more interest or excited more controversy. He was promoted to cabinet rank as president of the Board of Trade in Mr Asquith's government in April (1908), but was defeated at the consequent by-election in Manchester after a con- test which aroused the keenest excitement. He was then returned for Dundee, and later in theyear married Miss Clementine Hozier.

An interesting and authoritative biography of Lord Randolph, by his son Winston (who had already won his spurs as a writer in his River War, 1899, and other books on his military experiences), appeared in 1906; and a brief and intimate appreciation by Lord Rosebery, inspired by this biography, was published a few months later. Lord Randolph's earlier speeches were edited, with an introduction and notes, by Louis Jennings (2 vols., London, 1889). See also T. H. S. Escott, Randolph Spencer Churchill (1895) ; H. W. Lucy, Diary of Two Parliaments (1892) ; and Mrs Cornwallis-West, The Reminiscences of Lady Randolph Churchill {i.e. of the author) (1008). (S. J. L.)

CHURCHILL (Missinnippi or English), the name of a river of the province of Saskatchewan and district of Keewatin, Canada. It rises in La Loche (or Methy) lake, a small lake in 56 30′ N. and 109 30′ W., at an altitude of 1577 ft. above the sea, and flows E.N.E. to Hudson's Bay, passing through a number of lake expansions. Its principal tributaries are the Beaver (350 m. long), Sandy and Reindeer rivers. Between Frog and Methy portages (480 m.) it formed part of the old voyageur route to the Peace, Athabasca, and Mackenzie. It is still navigated by canoes, but has many rapids. Its principal affluent, the Reindeer, discharges the waters of Reindeer Lake (n 50 ft. above the sea, with an area of 2490 sq. m.) and Wollaston Lake (altitude, 1300ft.). The Churchillis 925 m. long. Fort Churchill, at its mouth, is the best harbour in the southern portion of Hudson's Bay. The portage of La Loche (or Methy), 123 m. in length, connects its head waters

with the Clearwater river, a tributary of the Athabasca, draining into the Arctic Ocean.

CHURCHING OF WOMEN, the Christian ceremony of thanks- giving on the part of mothers shortly after the birth of their children. It no doubt originated in the Mosaic regula- tion as to purification (Lev. xii. 6). In ancient times the ceremony was usual but not obligatory in England. In the Greek and Roman Catholic Churches to-day it is imperative. The custom is first mentioned in the pseudo-Nicene Arabic canons. No ancient form of service exists, and that which figures in the English prayer-book of to-day dates only from the middle ages. Custom differs, but the usual date of churching was the fortieth day after confinement, in accordance with the Biblical date of the presentment of the Virgin Mary and the Child Jesus at the Temple. It was formerly regarded as unlucky for a woman to leave her house to go out at all after confinement till she went to be churched. It was not unusual for the church- ing service to be said in private houses. In Herefordshire it was not considered proper for the husband to appear in church at the service, or at all events in the same pew. In some parishes there was a special pew known as ” the churching seat.” The words in the rubric requiring the woman to come ” decently apparelled ” refer to the times when it was thought unbecoming for a woman to come to the service with the elaborate head-dress then the fashion. A veil was usually worn, and in some parishes this was provided by the church, for an inventory of goods belonging to St Benet’s, Gracechurch Street, in 1560, includes ” A churching cloth, fringed, white damask.”

The ” convenient place,” which, according to the rubric, the woman must occupy, was in pre-Reformation times the church- door. In the first prayer-book of Edward VI., she was to be ” nigh unto the quire door.” In the second of his books, she was to be ” nigh unto the place where the Table standeth.” Bishop Wren’s orders for the diocese of Norwich in 1636 are ” That women to be churched come and kneel at a side near the Com- munion Table without the rail, being veiled according to custom, and not covered with a hat.” In Devonshire churching was sometimes called ” being uprose.” Churchings were formerly registered in some parishes. In pre-Reformation days it was the custom in England for women to carry lighted tapers when

being churched, in allusion to the Feast of the Purification of the

Virgin (February 2nd), the day chosen by the Roman Catholic church for the blessing of the candles for the whole year (see Candlemas). At her churching a woman was expected to make some offering to the church, such as the chrisom or alb thrown over the child at christening.

CHURCH RATE, the name of a tax formerly levied in each parish in England and Ireland for the benefit of the parish church. Out of these rates were defrayed the expenses of carrying on divine service, repairing the fabric of the church, and paying the salaries of the officials connected with it. The church rates were made by the churchwardens, together with the parishioners duly assembled after proper notice in the vestry or the church. The rates thus made were recoverable in the ecclesiastical court, or, if the arrears did not exceed £10 and no. questions were raised as to the legal liability, before two justices of the peace. Any payment not strictly recognized by law made out of the rate destroyed its validity. The church rate was a personal charge imposed on the occupier of land or of a house in the parish, and, though it was compulsory, much difficulty was found in effectually applying the compulsion. This was especially so in the case of Nonconformists, who had conscientious objec- tions to supporting the Established Church; and in Ireland, where the population was preponderatingly Roman Catholic, the grievance was specially felt and resented. The agitation against church rates led in 1868 to the passing of the Compulsory Church Rates Abolition Act. By this act church rates are no longer compulsory on the person rated, but are merely voluntary, and those who are not willing to pay them are excluded from inquiring into, objecting to, or voting in respect of their expenditure (s. 8).

CHURCHWARDEN, in England, the guardian or keeper of a church, and representative of the body of the parish. The name is derived from the original duty attached to the office,M:hat of the custody or guardianship of the fabric and furniture of the church, — which dates from the 14th century, when the responsi bility of providing for the repairs of the nave, and of furnishing the utensils for divine service, was settled on the parishioners. Churchwardens are always lay persons, and as they may, like ” artificial persons,” hold goods and chattels and bring actions for them, they are recognized in law as quasi-corporations. Resident householders of a parish are those primarily eligible as churchwardens, but non-resident householders who are habitually occupiers are also eligible, while there are a few classes of persons who are either ineligible or exempted. The appoint- ment of churchwardens is regulated by the 89th canon, which requires that the churchwardens shall be chosen by the joint consent of the

ministers and parishioners, if it may be; but if they cannot agree upon such a choice, then the minister is to choose one, and the parishioners another. If, however, there is any special custom of the place, the custom prevails, and the most common custom is for the minister to appoint one, and the parishioners another, and this has been established by English statute, in the case of new parishes, by the Church Building and New Parishes Acts 1818-1884. There are other special customs recognized in various localities, e.g. in some of the larger parishes in the north of England a churchwarden is chosen for each township of the parish; in the old ecclesiastical parishes of London both churchwardens are chosen by the parishioners; in some cases they are appointed by the select vestry, or by the lord of the manor, and in a few exceptional cases are chosen by the outgoing churchwardens.

In general, churchwardens are appointed in Easter week, usually Easter Monday or Easter Tuesday, but in new parishes the first appointment must be within twenty-one days after the consecration of the church, or two calendar months after the formation of the parish, subsequent appointments taking place at the usual time for the appointment of parish officers. Each churchwarden after election subscribes before the ordinary a declaration that he will execute his office faithfully.

The duties of churchwardens comprise the provision of necessaries for divine service, so far as the church funds or voluntary subscriptions permit, the collecting the offertory of

the congregation, the keeping of order during the divine service, and the giving of offenders into custody; the assignment of seats to. parishioners; the guardianship of the movable goods of the church; the preservation and repair of the church and churchyard, the fabric and the fixtures; and the presentment of offences against ecclesiastical law.

In the episcopal church of the United States churchwardens discharge much the same duties as those performed by the English officials; their duties, however, are regulated by canons of the diocese, not by canons general. In the United States, too, the usual practice is for the parishes to elect both the church- wardens. .

See Prideaux's Churchwarden's Guide (16th ed., London, 1895); Steer's Parish Law (6th ed., London, 1899) ; Blunt's Book of Church Law (7th ed., London, 1894).

CHURCHYARD, THOMAS (c. 1520-1604), English author, was born at

Shrewsbury about 1520, the son of a farmer. He received a good education, and, having speedily dissipated at court the money with which his father provided him, he entered the household of Henry Howard, earl of Surrey. There he remained for four years, learning something of the art of poetry from his patron; some of the poems he contributed later (1557) to Songes and Soneltes may well date from this early period. In 1541 he began his career as a soldier of fortune, being, he said, ” pressed into the service.” He fought his way through nearly every campaign in Scotland and the Low Countries for thirty years. He served under the emperor Charles V. in Flanders in 1542, returning to England after the peace of Crepy (1544). In the Scottish campaign of 1547 he was present at the barren victory of Pinkie, and in the next year was taken prisoner at Saint Monance, but aided by his persuasive tongue he escaped to the English garrison at Lauder, where he was once more besieged, only returning to England on the conclusion of peace in 1550. A broadside entitled Davy Dycars Dreame, a short and seemingly alliterative poem in the manner of Piers Plowman, brought him into trouble with the privy council, but he was dis- missed with a reprimand. This tract was the starting-point of a controversy between Churchyard and a certain Thomas Camel. The whole of the ” fly ting ” was reprinted in 1560 as The Contention betiviocte Churchyard and Camell.

In 1550 he went to Ireland to serve the lord deputy, Sir Anthony St Leger, who had been sent to pacify the country. Here Churchyard enriched himself at the expense, it is to be feared, of the unhappy Irish; but in 1552 he was in England again, trying vainly to secure a fortune by marriage with a rich widow. After this failure he departed once more to the wars to the siege of Metz (1552), and ” trailed a pike ” in the emperor’s army, until he joined the forces under William, Lord Grey of Wilton, with whom he says he served eight years. Grey was in charge of the fortress of Gaines, which was besieged by the duke of Guise in 1558. Churchyard arranged the terms of surrender, and was sent with his chief to Paris as a prisoner. He was not released at the peace of Cateau Cambresis for lack of money to pay his ransom, but he was finally set free on giving his bond for the amount, an engagement which he repudiated as soon as he was safely in England. He is not to be identified with the T. C. who wrote for the Mirror for Magistrates (ed. 1559), ” How the Lord Mowbray . . . was banished . . . and after died miserablie in exile,” which is the work of Thomas Chaloner, but ” Shore’s Wife,” his most popular poem, appeared in the 1563 edition of the same work, and to that of 1587 he contributed the ” Tragedie of Thomas Wolsey.” These are plain manly com- positions in the seven-lined Chaucerian stanza. Repeated petitions to the queen

for assistance produced at first fair words, and then no answer at all. He therefore returned to active service under Lord Grey, who was in command of an English army sent (1560) to help the Scottish rebels, and in 1564 he served in Ireland under Sir Henry Sidney. The religious disturbances in the Netherlands attracted him to Antwerp, where as the agent of William of Orange he allowed the insurgents to place him at their head, and was able to save much property from destruction. This action made him so hated by the mob that

he had to fly for his life in the disguise of a priest. In the next year he was sent by the earl of Oxford to serve definitely under the prince of Orange. After a year's service he obtained leave to return to England, and after many adventures and narrow- escapes in a journey through hostile territory he embarked for Guernsey, and thence for England. His patron, Lord Oxford, disowned him, and the poet, whose health was failing, retired to Bath. He appears to have made a very unhappy marriage at this time, and returned to the Low Countries. Falling into the hands of the Spaniards he was recognized as having had a hand in the Antwerp disturbance, and was under sentence to be executed as a spy when he was saved by the intervention of a noble lady. This experience did not deter him from joining in the defence of Zutphen in 1572, but this was his last campaign, and the troubles of the remaining years of his life were chiefly domestic.

Churchyard was employed to devise a pageant for the queen's reception at Bristol in 1574, and again at Norwich in 1578. He had published in 1575 The fkste parte of Churchyarde' s Chippes, the modest title which he gives to his works. No second part appeared, but there was a much enlarged edition in 1578. A passage in Churchyarde 's Choise (1579) gave offence to Elizabeth, and the author fled to Scotland, where he remained for three years. He was only restored to favour about 1584, and in 1593 he received a small pension from the queen. The affectionate esteem with which he was regarded by the younger Elizabethan writers is expressed by Thomas Nashe, who says (Foure Letters Confuted) that Churchyard's aged muse might well be " grand- mother to our grandiloquentest poets at this present." Francis Meres {Palladis Tamia, 1598) mentions him in conjunction with many great names among " the most passionate, among us, to bewail and bemoan the perplexities of love." Spenser, in " Colin Clout's come home again," calls him with a spice of raillery " old Palaemon " who " sung so long until quite hoarse he grew." His

writings, with the exception of his contributions to the Mirror for Magistrates, are chiefly autobiographical in character or deal with the wars in which he had a share. They are very rare, and have never been completely reprinted. Churchyard lived right through Elizabeth's reign, and was buried in St Margaret's church, Westminster, on the 4th of April 1604.

The extant works of Churchyard, exclusive of commendatory and occasional verses, include: — A lamentable and pitiful! Des- cription of the wofull warres in Flanders (1578) ; A general rehearsall of warres, called Churchyard's Choise (1579), really a completion of the Chippes, and containing, like it, a number of detached pieces ; A light Bondel of livelie Discourses, called Church- yardes Charge (1580); The Worlhines of Wales (1587), a valuable antiquarian work in prose and verse, anticipating Michael Drayton ; Churchyard's Challenge (1593); A Musicall Consort of Heavenly harmonie . . . called Churchyards Charitie (1595); A True Discourse Historically of the succeeding Governors in the Netherlands (1602).

The chief authority for Churchyard's biography is his own " Tragicall Discourse of the unhappy man's life " (Churchyardes Chippes). George Chalmers published (1817) a selection from his works relating to Scotland, for which he wrote a useful life. See also an edition of the Chippes (ed. J. P. Collier, 1870), of the Worthines of Wales (Spenser Soc. 1876), and a notice of Churchyard by H. W. Adnitt {Transactions of the Shropshire Archaeological and Nat. Hist. Soc., reprinted separately 1884).

CHURCHYARD, a piece of consecrated ground attached to a parochial church, and used as a burial place. It is distinguished from a cemetery (q.i\), which is also a place of burial, but is separate and apart from any parochial church. A cemetery in England is either the property of a private company, incorporated by special act of parliament, or of a local authority, and is subject to the Cemeteries Clauses Act 1847, incorporated in the Public Health Acts. The practice of burying in churches or churchyards is said to have been connected with the custom of praying for the dead, and it would appear that the earlier practice was burying in the church itself. In England, about the year 750, spaces of ground adjoining the churches were enclosed and appropriated to the burial of those who had been entitled to attend divine service in those churches.

The right to burial in the parish churchyard is a common law right, controlled in many points by the provisions of the law

ecclesiastical. This double character is sufficient to explain the controversy which has so long raged round the subject of burials in England. Every man, according to the common law, has a right to be buried in his own churchyard, or, as it is some- times put, in the churchyard of the parish where he dies. But the churchyard, as well as the church itself, is the freehold of the parson, who can in many respects deal with it as if it were a private estate. A statute of Edward I, (35, st. 2) speaks of the churchyard as the soil of the church, and the trees growing in the churchyard ” as amongst the goods of the church, the which laymen have no authority to dispose,” and prohibits ” the parsons from cutting down suchr trees unless required for repairs.” Notwithstanding the consecration of the church and churchyard and the fact that they^re the parson’s freehold, a right of wa, may be claimed through them by prescription. The right to burial may be subject to the payment of a fee to the incumbent, if such has been the immemorial custom of the parish, but not otherwise. The spirit of the ancient canons regarded such burial fees as of a simoniacal complexion, inasmuch as the consecrated grounds were among the res sacrae — a feeling which Lord Stowell says disappeared after the Reformation. No person can be buried in a church without the consent of the incumbent, except when the owner of a manor-house prescribes for a burying-place within the church as belonging to the manor-house. In the case of Rex v. Taylor it was held that an information was grantable against a person for opposing the burial of a parishioner; but the court would not interpose as to the person’s refusal to read the burial service because he never was baptized — that being matter for the ecclesiastical court. Strangers (or persons not dying in the parish) should not be buried, it appears, without the consent of the parishioners or churchwardens, ” whose parochial right of burial is invaded thereby.”

In Scotland the obligation of providing and maintaining the churchyard rests on the heritors of the parish. The guardianship of the churchyard belongs to the heritors and also to the kirk- session, either by delegation from the heritors, or in right of its ecclesiastical character. The right of burial appears to be strictly limited to parishioners, although an opinion has been expressed that any person dying in the parish has a right to be buried in the churchyard. The parishioners have no power of management. The presbytery may interfere to compel the heritors to provide due accommodation, but has no further jurisdiction. It is the duty of the heritors to allocate the churchyard. The Scottish law hesitates to attach the ordinary incidents of real property to the churchyard, while English law treats the ground as the parson’s freehold. It would be difficult to say who in

Scotland is the legal owner of the soil. Various opinions appear to prevail, e.g. as to grass growing on the surface and minerals found beneath. The difficulty as to religious services does not exist. On the other hand, the religious character of the ground is hostile to many of the legal rights recognized by the English law.

See also Burial and Burial Acts; Cemetery.

CHURL (A.S. ceorl, cognate with the Ger. Kerl and with similar words in other Teutonic languages), one of the two main classes, eorl and ceorl, into which in early Anglo-Saxon society the freemen appear to have been divided. In the course of time the status of the ceorl was probably reduced; but although his political power was never large, and in some directions his freedom was restricted, it hardly seems possible previous to the Norman Conquest to class him among the unfree. Some authorities, however, accept this view. At all events it is certain that the ceorl was frequently a holder of land, and a person of some position, and that he could attain the rank of a thegn. Except in Kent his wergild was fixed at two hundred shillings, or one-sixth of that of a thegn, and he is undoubtedly the twyhynde man of Anglo-Saxon law. In Kent his wergild was considerably higher, and his status probably also, but his position in this kingdom is a matter of controversy. After the Norman Conquest the ceorls were reduced to a condition of servitude, and the word translates the villanus of Domesday Book, although it also covers classes other than the villani. The form ceorl soon became cherl, as in Havelok the Dane (ante 1300) and several times in Chaucer.

and subsequently churl. Taking a less technical sense than the eeorl of Anglo-Saxon law, churl, or cherl was used in general to mean a " man," and more particularly a " husband." In this sense it was employed about iooo in a translation of the New Testamert to render the word h.vi\p (John iv; 16, 18). It was then employed to describe a "peasant," and gradually began to denote undesirable qualities. Hence comes the modern use of the word for a low-born or vulgar person, particularly one with an unpleasant, surly or miserly character.

See H. M. Chadwick, Studies on Anglo-Saxon Institutions (Cambridge, 1905) ; F. Seebohm, Tribal Custom in Anglo-Saxon Law (London, 1902).

CHURN (O. Eng. cyrin; found in various forms in most Teutonic languages, cf. Dutch karn; according to the New English Dictionary

not connected with ” quern,” a mill), a vessel in which butter is made, by shaking or beating the cream so as to separate the fatty particles which form the butter from the serous parts or buttermilk. Early churns were upright, and in shape resembled the cans now used in the transport of milk, to which the name ” churn ” is also given. The upright churn was worked by hand by a wooden ” plunger “; later came a box-shaped churn with a ” splasher ” revolving inside and turned by a handle. The modern type of churn, in large dairies worked by mechanical means, either revolves or swings itself, thus reverting to the most primitive method of butter-making, the shaking or swinging of the cream in a skin-bag or a gourd. (See Dairy.)

CHUSAN, the principal island of a group situated off the eastern coast of China, in 30 N. 122 E., belonging to the province of Cheh-kiang. It lies N.W. and S.E., and has a circumference of 51 m., the extreme length being 20, the extreme breadth 10, and the minimum breadth 6 m. The island’ is beautifully diversified with hill and dale, and well watered with numerous small streams, of which the most considerable is the Tungkiang, falling into the harbour of Tinghai. Most of the surface is capable of cultivation, and nineteen-twentieths of the inhabitants are engaged in agriculture. Wherever it is possible to rear rice every other product is neglected; yet the quantity produced is not sufficient for the wants of the inhabi- tants. Millet, wheat, sweet potatoes, yams and tares are also grown. The tea plant is found almost everywhere, and the cotton plant is largely cultivated near the sea. The capital, Tinghai, stands about half a mile from the southern shore, and is surrounded by a wall nearly 3 m. in circuit. The ditch outside the wall is interrupted on the N.W. side by a spur from a neigh- bouring hill, which projects into the town, and forms an easy access to an attacking force. The town is traversed by canals, and the harbour, which has from 4 to 8 fathoms water, is land- locked by several islands. Temple (or Joss-house) Hill, which commands the town and harbour close to the beach, is 122 ft. high. The population of the entire island is estimated at 250,000, of which the capital contains about 40,000. Chusan has but few manufactures; the chief are coarse cotton stuffs and agricultural implements. There are salt works on the coast; and the fisheries employ a number of the inhabitants. In Tinghai a considerable business is carried on in carving and varnishing, and its silver wares, are in high repute. The principal exports are fish, coarse black tea, cotton, vegetable tallow, sweet potatoes, and some wheat. Chusan was occupied by the Japanese during the Ming dynasty, and served as an important commercial entrepot. It was taken by the British forces in 1840 and 1841, and retained till 1846 as a guarantee for the fulfilment of the stipulations

of the treaty. It was also occupied by the British in i860.

CHUTF (Fr. for ” fall,” of water or the like; pronounced as ” shoot,” with which in meaning it is identical), a channel or trough, artificial or natural, down which objects such as timber, coal or grain may slide from a higher to a lower level. The word is also used of a channel cut in a dam or a river for the passage of floating timber, and in Louisiana and on the Mississippi of a channel at the side of a river, or narrow way between an island and the shore. The ” Water-Chute ” or water tobogganing, is a

Canadian pastime, which has been popular in London and else-ˆ where. A steep wooden slope terminates in a shallow lake; down this run flat-bottomed boats which rapidly increase their velocity until at the end of the ” chute ” they dash into the water.

CHUTNEY, or Chutnee (Hindustani chatni), a relish or seasoning of Indian origin, used as a condiment. It is prepared from sweet fruits such as mangoes, raisins, &c, with acid flavour- ing from tamarinds, lemons, limes and sour herbs, and with a hot seasoning of chillies, cayenne pepper and spices.

CHUVASHES, or Tchuvashes, a tribe found in eastern Russia. They form about one-fourth of the population of the government of Kazan, and live in scattered communities throughout the governments of Simbirsk, Samara, Saratov, Orenburg and Perm. They have been identified with the Burtasses of the Arab geographers, and many authorities think they are the descendants of the ancient Bolgars. In general they physically resemble the Finns, being round-headed, flat-featured and light-eyed, but they have been affected by long association with the Tatar element. In dress they are thoroughly Russianized, and they are nominally Christians, though they cling to many of the Old Shamanistic practices. They number some half a million. Their language belongs to the Tatar or Turkish group, but has been strongly influenced by the Finno-Ugrian idioms spoken round it.

See Schott, De Lingua Tschuwaschorum (Berlin, 1841).

CIALDINI, ENRICO (1811-1892), Italian soldier, politician and diplomatist, was born at Castelvetro, in Modena, on the 10th of August 181 1. In 183 1 he took part in the insurrection at Modena, fleeing afterwards to Paris, whence he proceeded to Spain to fight against the Carlists. Returning to Italy in 1848, he commanded a

regiment at the battle of Novara. In 1859 he organized the Alpine Brigade, fought at Palestro at the head of the 4th Division, and in the following year invaded the Marches, won the battle of Castelfidardo, took Ancona, and subsequently directed the siege of Gaeta. For these services he was created duke of Gaeta by the king, and was assigned a pension of 10,000 lire by parliament. In 1861 his intervention envenomed the Cavour-Garibaldi dispute, royal mediation alone preventing a duel between him and Garibaldi. Placed in command of the troops sent to oppose the Garibaldian expedition of 1862, he defeated Garibaldi at Aspromonte. Between 1862 and 1866 he held the position of lieutenant-royal at Naples, and in 1864 was created senator. On the outbreak of the war of 1866 he resumed command of an army corps, but dissensions between him and La Marmora prejudiced the issue of the campaign and contributed to the defeat of Custozza. After the war he refused the command of the General Staff, which he wished to render independent of the war office. In 1867 he attempted unsuccessfully to form a cabinet sufficiently strong to prevent the threatened Garibaldian incursion into the papal states, and two years later failed in a similar attempt, through disagreement with Lanza concerning the army estimates. On the 3rd of August 1870 he pleaded in favour of Italian intervention in aid of France, a circumstance which enhanced his influence when in July 1876 he replaced Nigra as ambassador to the French Republic. This position he held until 1882, when he resigned on account of the publication by Mancini of a despatch in which he had complained of arrogant treatment by M. Waddington. He died at Leghorn, on the 8th of September 1892. (H. W. S.)

CIBBER (or Cibert), CAIUS GABRIEL (1630-1700), Danish sculptor, was born at Flensburg. He was the son of the king's cabinetmaker, and was sent to Rome at the royal charge while yet a youth . He came to England during the Protectorate, or during the first years of the Restoration. Besides the famous statues of Melancholy and Raving Madness (" great Cibber's brazen brainless brothers "), now at South Kensington, Cibber produced the bas-reliefs round the monument on Fish Street Hill. The several kings of England and the Sir Thomas Gresham executed by him for the Royal Exchange were destroyed with the building itself in 1838. Cibber was long employed by the fourth earl of Devonshire, and many fine specimens of his work are to be seen at Chatsworth. Under that nobleman he took up arms in j688 for William of Orange, and was appointed

king's closet. He died rich, and, according to Horace Walpole, built the Danish church in London, where he lies buried beside his second wife, to whom he erected a monument. She was a Miss Colley of Glaiston, grand-daughter of Sir Anthony Colley, and the mother of his son Colley Gibber.

CIBBER, COLLEY (1671-1757), English actor and dramatist, was born in London on the 6th of November 167 1, the eldest son of Caius Gabriel Cibber, the sculptor. Sent in 1682 to the free school at Grantham, Lincolnshire, the boy distinguished himself by an aptitude for writing verse. Heproducedan" Oration " on the death of Charles II. — whom he had seen feeding his ducks in St James's Park, — and an " Ode " on the accession of James II. He was removed from school in 1687 on the chance of election to Winchester College. His father, however, had not then presented that institution with his statue of William of Wykeham, and the son was rejected, although through his mother he claimed to be of " founder's kin." The boy went to London, and indulged his passion for the theatre. He was invited to Chatsworth, the seat of William Cavendish, earl (afterwards duke) of Devonshire, for whom his father was then executing commissions, and he was on his way when the news of the landing of William of Orange was received; father and son met at Nottingham, and Colley Cibber was taken into Devonshire's company of volunteers. He served in the bloodless campaign that resulted in the coronation of the Prince of Orange, and on its conclusion presented a Latin petition to the earl imploring his interest. The earl did nothing for him, however, and he enrolled himself (1690) as an actor in Betterton's company at Drury Lane.

After playing " full three-quarters of a year " without salary, as was then the custom of all apprentice actors, he was paid ten shillings a week. His rendering of the little part of the chaplain in Otway's Orphan procured him a rise of five shillings; and a subsequent impersonation (1694) on an emergency, and at the author's request, of Lord Touchwood in The Double Dealer, advanced him, on Congreve's recommendation, to a pound a week. On this, supplemented by an allowance of £20 a year from his father, he contrived to live with his wife and family — he had married in 1693 — and to produce a play, Love's Last Shift, or the Fool in Fashion (1696). Of this comedy Congreve said that it had " a great many things that were like wit in it "; and Vanbrugh honoured it by writing his Relapse as a sequel. Cibber played the part of Sir Novelty Fashion, and his perform- ance as Lord Foppington, the same character renamed, in Vanbrugh's piece, established his reputation as an actor. In 1698 he was assailed, with other dramatists, by Jeremy Collier in the Short View. In November

1702 he produced, at Drury Lane, She Wou'd and She Wou'd Not; or the Kind Impostor, one of his best comedies; and in 1704, for himself and Mrs Oldfield, The Careless Husband, which Horace Walpole classed, with Cibber's Apology, as "worthy of immortality." In 1706 Cibber left Drury Lane for the Haymarket, but when the two companies united two years later he rejoined his old theatre through the influence of his friend Colonel Brett, a shareholder. Brett made over his share to M'ilks, Estcourt and Cibber. Complaints against the management of Christopher Rich led, in 1709, to the closing of the theatre by order of the crown, and William Collier obtained the patent. After a series of intrigues Collier was bought out by Wilks, Doggett and Cibber, under whose manage- ment Drury Lane became more prosperous than it ever had been. In 17 1 5 a new patent was granted to Sir Richard Steele, and Barton Booth was also added to the management. In 17 17 Cibber produced the Nonjuror, an adaptation from Moliere's Tartuffe; the play, for which Nicholas Rowe wrote an abusive prologue, ran eighteen nights, and the author received from George I., to whom it was dedicated, a present of two hundred guineas. Tartuffe became an English Catholic priest who incited rebellion, and there is little doubt that the Whig principles expressed in the Nonjuror led to Cibber's appointment as poet laureate (1730). It also provoked the animosity of the Jacobite and Catholic factions, and was possibly one of the causes of Pope's hostility to Cibber. Numerous " keys " to the Nonjuror appeared ini7i8. In 17 20 Drury Lane was closed for three days

by order of the duke of Newcastle, ostensibly on account of the refusal of the patentees to submit to the authority of the lord chamberlain, but really (it is asserted) because of a quarrel between Newcastle and Steele, in which the former demanded Cibber's resignation. In 1726 Cibber pleaded the cause of the patentees against the estate of Sir Richard Steele before Sir Joseph Jekyjl, master of the rolls, and won his case. In 1730 Mrs Oldfield died, and her loss was followed in 1732 by that of Wilks; Cibber now sold his share in the theatre, appearing rarely on the stage thereafter. In 1 740 he published An A pology for the Life of Colley Cibber, Comedian . . . with an Historical View of the Stage during his Own Time. " There are few," wrote Goldsmith, " who do not prefer a page of Montaigne or Colley Cibber, who candidly tell us what they thought of the world, and the world thought of them, to the more stately memoirs and transactions of Europe." But beside the personal interest, this book contains criticisms on acting of enduring value, and gives the best account there is of Cibber's contemporaries on the London stage. Samuel Johnson, who was no friend of Cibber, gave it grudging praise (see Boswell's Life of Johnson, ed. Birkbeck

Hill, vol. iii. p. 72).

In 1742 Cibber was substituted for Theobald as the hero of Pope's Dunciad. Cibber had introduced some gag into the Rehearsal, in which he played the part of Bayes, referring to the ill-starred farce of Three Hours after Marriage (1 7 1 7) . This play was nominally by Gay, but Pope and Arbuthnot were known to have had a hand in it. Cibber refused to discontinue the offensive passage, and Pope revenged himself in sarcastic allusions in his printed correspondence, in the Epistle to Dr Arbuthnot and in the Dunciad. To these, Cibber replied with A Letter from Mr Cibber to Mr Pope, inquiring into the motives that might induce him in his satirical works to be so frequently fond of Mr Cibber's name (1742). Cibber scored with an " idle story of Pope's behaviour in a tavern " inserted in this letter, and gives an account of the original dispute over the Rehearsal. By the substitution of Cibber for Theobald as hero of the Dunciad, much of the satire lost its point. Cibber's faults certainly did not include dullness. A new edition contained a prefatory discourse, probably the work of Warburton, entitled " Ricardus Aristarchus, or the Hero of the Poem," in which Cibber is made to look ridiculous from his own Apology. Cibber replied in 1744 with Another Occasional Letter . . ., and altogether he had the best of the argument. When he was seventy-four years old he made his last appearance on the stage as Pandulph in his own Papal Tyranny in the Reign of King John (Covent Garden, 15th of February 1745), a miserable paraphrase of Shakespeare's play. He died on the nth of December 1757.

Cibber's reputation has suffered unduly from the depreciation of Pope and Johnson. " I could not bear such nonsense," said Johnson of one of Cibber's odes, " and I would not let him read it to the end." Fielding attacked Cibber's style and language more than once in Joseph Andrews and elsewhere. Nevertheless, Cibber possessed wit, unusual good sense and tact; and in the Apology he showed himself the most delicate and subtle critic of acting of his time. He was frequently accused of plagiarism, and did not scruple to make use of old plays, but he is said to have been ashamed of his Shakespearian adaptations, one of which, however, Richard III. (Drury Lane, 1700), kept its place as the acting version until 1821. Cibber is rebuked for his mutila- tion of Shakespeare by Fielding in the Historical Register for 1736, where he figures as Ground Ivy.

If Cibber had not as much wit as his predecessors, he displayed in his best plays abundant animation and spirit, free from the extreme coarseness of many of his contemporaries, and a thorough knowledge of the requirements of the stage. His most successful comedies kept

their place in the acting repertory for a long time. He was an excellent actor, especially in the role of the fashionable coxcomb. Horace Walpole said that as Bayes in The Rehearsal he made the part what it was intended to be, the burlesque of a great poet, whereas David Garrick degraded him to a ” garretteer.”

The Apology was edited in 1822 by E. Bellchambers and in 1889

by R. W. Lowe, who sprinted with it other valuable theatrical books and pamphlets. It is also included in Hunt and Clarke’s Auto-biographies (1826, &c). Cibber’s Dramatic Works -were published in 1760, with an account of the life and writings of the author, and again in 1777. Besides the plays already mentioned, he wrote Woman’s Wit, or the Lady in Fashion (1697), which was altered later (1707) into The Schoolboy, or the Comical Rivals; Xerxes (1699), a tragedy acted only once; The Provoked Husband (acted 1728), completed from Vanbrugh’s unfinished Journey to London; The Rival Queens, with the Humours of Alexander the Great (acted 1 7 10), a comical tragedy; Damon and Phyllida (acted 1729), a ballad opera; and adaptations from Beaumont and Fletcher, Dryden, Moliere and Corneille. A bibliography of the numerous skits on Cibber is to be found in Lowe’s Bibliographical Account of English Theatrical Literature.

Colley Cibber’s son, Theophilus Cibber (1703-1758), also an actor and playwright, was born on the 26th of November 1703. In 1734 he was acting-manager at the Haymarket, and he subsequently played at Drury Lane, Lincoln’s Inn Fields and Covent Garden. His best impersonation was as Pistol, but he also distinguished himself in some of the fine-gentleman parts affected by his father. He was one of the ringleaders in the intrigues against John Highmore, who had bought a share in the patent of Drury Lane from Colley Cibber. Theophilus Cibber, with a number of other actors, seceded from Drury Lane, and in thus depreciating the value of the patent, for which his father had received a considerable sum, acted with doubtful honesty. He contemplated the publication of an autobiography, but was effectually dissuaded by the appearance (1 740) of a scath- ing account of his career by an unknown author, entitled An Apology for the Life of Mr T. . . . C. . . . supposed to be written by himself. In 1753 he began The Lives and Characters of the most Eminent Actors and Actresses of Great Britain and Ireland, but he went no further than the life of Barton Booth. He wrote some plays of no great merit. In 1753

appeared An Account of the Lives of the Poets of Great Britain and Ireland, with the name of ” Mr Cibber ” on the title page. The five volumes of Lives are chiefly based on the earlier works of Gerard Langbaine and Giles Jacob, and the MS. collections of Thomas Coxeter (1689- 1747). The book is said to have been largely written by Robert Shiels, Dr Johnson’s amanuensis. Theophilus Cibber perished by shipwreck on his way to Dublin to play at the Theatre Royal.

Susannah Maria Cibber (17 14-1766), wife of Theophilus, was an actress of distinction. She was the daughter of a Covent Garden upholsterer, and sister of Dr Arne (1710-1778) the composer. Mrs Cibber had a beautiful voice and began her career in opera. She was the original Galatea in Handel’s Acis and Galatea, and the contralto arias in the Messiah are said to have been written for her. She played Zarah in Aaron Hill’s version of Voltaire’s Zaire in 1736, and it was as a tragic actress, not as a singer, that her greatest triumphs were won. From Colley Cibber she learned a sing-song method of declamation. Her mannerisms, however, did not obscure her real genius, and she freed herself from them entirely when she began to act with Garrick, with whom she was associated at Drury Lane from 1 753. She died on the 30th of January 1766. She married Theopihilus Cibber in 1734, but lived with him but a short time. Appreciations of Mrs Cibber’s fine acting are to be found in many contemporary writers, one of the most discriminating being in the Rosciad of Charles Churchill.

Colley Cibber’s youngest daughter, Charlotte, married Richard Charke, a violinist, from whom she was soon separated. She began as an understudy to actresses in leading parts, but quarrelled with her manager, Charles Fleetwood, on whom she wrote a one-act skit, The Art of Management (1735). She also wrote two comedies and two-novels of small merit, and an un- trustworthy, but amusing Narrative of Life of . . . Charlotte Charke, . . . by herself (1755), reprinted in Hunt and Clarke’s Autobiographies (1822).

CIBOBIUM, a name in classical Latin for a drinking-vessel. It is the latinized form of the Gr. kijSoj/mcv, the cup-shaped seed-vessel of the Egyptian water-lily, the seeds or nuts of which were known as ” Egyptian beans.” In the early Christian

Church the ciborium was a canopy over the altar (q.v.), supported on columns, and from it hung the receptacle in which was reserved the consecrated wafer of the Eucharist. The use of the word has probably been much influenced by the early false connexion with cibus, food, cf. Agatio, bishop of Pisa (quoted in Du Cange, Gloss, s.v.), ” Ciborium vas esse ad ferendos cibos.” In the Eastern Church the columns rested

on the altar itself, in the Western they reached the ground. The name was early transferred from the canopy to the vessel containing the reserved sacrament, and in the Western Church the canopy was known as a ” baldaquin,” Ital. baldacchino, from Baldacco, the Itilian name of Bagdad, and hence applied to a rich kind of embroidered tapestry made there and much used for canopies, &c. At the present day it is usual in the Roman Church to use the term ” pyx ” (:ru£is, properly a vessel made of boxwood) for the receptacle for the reserved sacrament used in administering the viaticum to the sick or dying. Medieval pyxes and ciboria are often beautiful examples of the goldsmith’s, enameller’s and metal-worker’s craft. They take most usually the shape of a covered chalice or of a cylindrical box with conical or cylindrical cover surmounted by a cross. An exquisite ciborium fetched £6000 at the sale of the Jerdone Braikenridge collection at Christie’s in 1908. It is supposed to have come from Malmesbury Abbey, and is probably of 13th-century English make. It is of copper-gilt and ornamented with champleve enamels, apple and chrysoprase green, scarlet, mauve and white, turquoise and lapis lazuli, the flesh tints being of a pale jasper. Various subjects from the Old and New Testament, such as the sacrifice of Abel, the brazen serpent, the nativity, crucifixion and re- surrection are represented on circular medallions on the outside. It is illustrated in colours in the catalogue of the exhibition of the Burlington Fine Arts Club, 1897.

CIBRARIO, LUIGI, Count (1802-1870), Italian statesman and historian, descended from a noble but impoverished Pied- montese family, was born in Usseglia on the 23rd of February 1802. He won a scholarship at the age of sixteen, and was teaching literature at eighteen. His verses to King Charles Albert, then prince of Carignano, on the birth of his son Victor Emmanuel, attracted the prince’s attention and proved the beginning of a long intimacy. He entered the Sardinian civil service, and in 1824 was appointed lecturer on canon and civil law. His chief interest was the study of ancient documents, and he was sent to search the archives of Switzerland, France and Germany for charters relating to the history of Savoy. During the war of 1848, after the expulsion of the Austrians from Venice, Cibrario was sent to that city with Colli to negotiate its union with Piedmont. But the proposal fell through when the news of the armistice between King Charles Albert and Austria arrived, and the two delegates were made the objects of a hostile demonstration. In October 1848 Cibrario was made senator, and after the battle of Novara (March 1849), when Charles Albert abdicated and retired to a monastery near Oporto, Cibrario and Count Giacinto di Collegno were sent as representa- tives of the senate to express the sympathy of that body with the fallen king. He reached

Oporto on the 28th of May, and after staying there for a month returned to Turin, which he reached just before the news of Charles Albert's death. In May 1852 he became minister of finance in the reconstructed d'Azeglio cabinet, and later minister of education in that of Cavour. In the same year he was appointed secretary to the order of SS. Maurizio and Lazzaro. It was he who in 1853 dictated the vigorous memorandum of protest against the confiscation by Austria of the property of Lombard exiles who had been naturalized in Piedmont. He strongly supported Cavour's Crimean policy (1855), and when General La Marmora departed in command of the expeditionary force and Cavour took the war office, Cibrario was made minister for foreign affairs. He con- ducted the business of the department with great skill, and ably seconded Cavour in bringing about the admission of Piedmont to the congress of Paris on an equal footing with the great powers. On retiring from the foreign office Cibrario was created count. In i860 he acted as mediator between Victor Emmanuel's

government and the republic of San Marino, and arranged a treaty by which the latter's liberties were guaranteed. After the war of 1866 by which Austria lost Venetia, Cibrario negotiated with that government for the restitution of state papers and art treasures removed by it from Lombardy and Venetia to Vienna. He died in October 1870, near Said, on the lake of Garda.

His most important work was his Economic politica del medio evo (Turin, 1839), which enjoyed great popularity at the time, but is now of little value. His Schiavitii e servaggio (Milan, 1868-1869) gave an account of the development and abolition of slavery and serfdom. Among his historical writings the following deserve mention: — Belle artiglierie dal 1300 al 1700 (Turin, 1847); Origini .... della monorchia di Savoia (Turin, 1854); Degli ordini cavallereschi (Turin, 1846); Degli ordini religiosi (Turin, 1845); and the Memorie Segrete of Charles Albert, written by order of Victor Emmanuel but afterwards withdrawn. Cibrario was a good example of the loyal, industrious, honest Piedmontese aristocrat of the old school.

His biography has been written by F. Odorici, II Conte L. Cibrario (Florence, 1872). (L. V.*)

CICADA (Cicadidae), insects of the homopterous division of the Hemiptera, generally of large size, with the femora of the anterior legs

toothed below, two pairs of large clear wings, and prominent compound eyes. Cicadas are chiefly remarkable for the shrill song of the males, which in some cases may be heard in concert at a distance of a quarter of a mile or more. The vocal organs, of which there is a pair in the thorax, protected by an opercular plate, are quite unlike the sounding organs of other insects. Each consists in essence of a tightly stretched membrane or drum which is thrown into a state of rapid vibration by a powerful muscle attached to its inner surface and passing thence downwards to the floor of the thoracic cavity. Although no auditory organs have been found in the females, the song of the males is believed to serve as a sexual call. Cicadas are also noteworthy for their longevity, which so far as is known surpasses that of all other insects. By means of a saw-like ovipositor the female lays her eggs in the branches of trees. Upon hatching, the young, which differ from the adult in possessing long antennae and a pair of powerful fossorial anterior legs, fall to the ground, burrow below the surface, and spend a prolonged subterranean larval existence feeding upon the roots of vegetation. After many years the larva is transformed into the pupa or nymph, which is distinguishable principally by the shortness of its antennae and the presence of wing pads. After a brief existence the pupa emerges from the ground, and, holding on to a plant stem by means of its powerful front legs, sets free the perfect insect through a slit along the median dorsal line of the thorax. In some cases the pupa upon emerging constructs a chimney of soil, the use of which is not known. In one of the best-known species, Cicada septemdecim, from North America, the life-cycle is said to extend over seventeen years. Cicadas are particularly abundant in the tropics, where the largest forms are found. They also occur in temperate countries, and were well known to the ancient Greeks and Romans. One species only is found in England, where it is restricted to the southern counties but is an insect not commonly met with.

CICELY, Myrrhis odorata (natural order Umbelliferae), a perennial herb with a leafy hollow stem, 2 to 3 ft. high, much divided leaves, whitish beneath, a large sheathing base, and terminal umbels of small white flowers, the outer ones only of which are fertile. The fruit is dark brown, long (J to 1 in.), narrow and beaked. The plant is a native of central and southern Europe, and is found in parts of England and Scotland in pastures, usually near houses. It has aromatic and stimulant properties and was formerly used as a pot-herb.

CICERO, the name of two families of ancient Rome. It may perhaps be derived from cicer (pulse), in which case it would be analogous to such names as Lenttdus, Tubero, Piso. Of one family, of the plebeian

Claudian gens, only a single member, Gaius Claudius Cicero, tribune in 454 B.C., is known. The other family was a branch of the Tullii, settled from an ancient period at Arpinum. This family, four of whose members are noticed

vi. 12

specially below, did not achieve more than municipal eminence until the time of M. Tullius Cicero, the great orator.

1. Marcus Tullius Cicero (106-43 b.c), Roman orator and politician, was born at Arpinum on the 3rd of January 106 B.C. His mother, Helvia, is said to have been of good family. His father was by some said to have been descended from Attius Tullius, the Volscian host of Coriolanus, while spiteful persons declared him to have been a fuller; in any case he was a Roman knight with property at Arpinum and a house in Rome. His health was weak, and he generally lived at Arpinum, where he devoted himself to literary pursuits. Cicero spent his boyhood partly in his native town and partly at Rome. The poet Archias, he says, first inspired him with the love of literature. He was much impressed by the teaching of Phaedrus, the Epicurean, at a period before he assumed the toga virilis ; he studied dialectic under Diodotus the Stoic, and in 88 B.C. attended the lectures of Philo, the head of the Academic school, whose devoted pupil he became. He studied rhetoric under Molo (Molon) of Rhodes, and law under the guidance of Q. Mucius Scaevola, the augur and jurisconsult. After the death of the augur, he transferred himself to the care of Q. Mucius Scaevola, the pontifex maximus, a still more famous jurisconsult, nephew of the augur. His literary education at this period consisted largely of verse-writing and making translations from Greek authors. We hear of an early poem named Pontius Glaucus the subject of which is uncertain, and of translations of Xenophon's Oecono- tnica and the Phenomena of Aratus. Considerable fragments of the latter work are still extant. To this period also belongs his de Inventione rhetorica, of which he afterwards spoke lightly (de Orat. i. 5), but which enjoyed a great vogue in the middle ages. Cicero also, according to Roman practice, received military training. At the age of seventeen he served in the social war successively under Pompeius Strabo and Sulla (89 B.C.). In the war between Marius and Sulla has sympathies were with Sulla, but he did not take up arms (Sext. Rose. 136, 142).

His forensic life begins in 81 B.C., at the age of twenty-five. A speech delivered in this year, pro Quinctio, is still extant; it is concerned with a technical point of law and has little literary merit. In the following year he made his celebrated defence of Sextus Roscius on a charge of

parricide. He subsequently defended a woman of Arretium, whose freedom was impugned on the ground that Sulla had confiscated the territory of that town. Cicero then left Rome on account of his health, and travelled for two years in the East. He studied philosophy at Athens under various teachers, notably Antiochus of Ascalon, founder of the Old Academy, a combination of Stoicism, Platon- ism and Peripateticism. In Asia he attended the courses of Xenocles, Dionysius and Menippus, and in Rhodes those of Posidonius, the famous Stoic. In Rhodes also he studied rhetoric once more under Molo, to whom he ascribes a decisive influence upon the development of his literary style. He had previously affected the florid, or Asiatic, style of oratory then current in Rome. The chief faults of this were excess of orna- ment, antithesis, alliteration and assonance, monotony of rhythm, and the insertion of words purely for rhythmical effect. Molo, he says, rebuked his youthful extravagance and he came back " a changed man." 1

He returned to Rome in 77 B.C., and appears to have married at this time Terentia, a rich woman with a domineering temper, to whom many of his subsequent embarrassments were due. 2 He engaged at once in forensic and political life. He was quaestor in 75, and was sent to Lilybaeum to supervise the corn supply. His connexion with Sicily led him to come forward in 70 B.C., when curule-aedile elect, to prosecute Gaius Verres, who had oppressed the island for three years. Cicero seldom prose- cuted, but it was the custom at Rome for a rising politician to

1 Brutus, § 316 " (Molon) dedit operam . . . ut nimis redundantis nos et supra fluentis iuvenili quadam dicendi impunitate et licentia reprimeret et quasi extra ripas diffluentis toerceret."

2 According to Plutarch she urged her husband to take vigorous action against Catiline, who had compromised her half-sister Fabia, a vestal virgin ; also to give evidence against Clodius, being jealous of his sister Clodia.

win his spurs by attacking a notable offender {pro Caelio, 73). In the following year he defended Marcus (or Manius) Fonteius on a charge of extortion in Gaul, using various arguments which might equally

well have been advanced on behalf of Verres himself .

In 68 B.C. his letters begin, from which (and especially those to T. Pomponius Atticus, his ” second self “) we obtain wholly unique knowledge of Roman life and history. In 66 B.C. he was praetor, and was called upon to hear cases of extortion. In the same year he spoke on behalf of the proposal of Gaius' Manilius to transfer the command against Mithradates from Lucullus to Pompey {de Lege Manilla), and delivered his clever but dis- ingenuous defence of Aulus Cluentius {pro Cluentio). At this time he was a prospective candidate for the consulship, and was obliged by the hostility of the nobles towards ” new men ” to look for help wherever it was to be found. In 65 B.C. he even thought of defending Catiline on a charge of extortion, and delivered two brilliant speeches on behalf of Gaius Cornelius, tribune in 67 B.C., a leader of the democratic party. In 64 B.C. he lost his father and his son Marcus was born. The optimates finally decided to support him for the consulship in order to keep out Catiline, and he eagerly embraced the ” good cause,” his affection for which from this time onward never varied, though his actions were not always cons ; =tent.

The public career of Cicero henceforth is largely covered by the general article on Rome: History, II. ” The Republic,” ad fin. The year of his consulship (63) was one of amazing activity, both administrative and oratorical. Besides the three speeches against Publius Rullus and the four against Catiline, he delivered a number of others, among which that on behalf of Gaius Rabirius is especially notable. The charge was that Rabirius {q.v.) had killed Saturninus in 100 B.C., and by bringing it the .democrats challenged the right of the senate to declare a man a public enemy. Cicero, therefore, was fully aware of the danger which would threaten himself from his execution .of the Catilinarian conspirators. He trusted, however, to receive the support of the nobles. In this he was disappointed. They never forgot that he was a ” new man,” and were jealous of the great house upon the Palatine which he acquired at this time. Caesar had made every possible effort to conciliate Cicero, 1 but, when all overtures failed, allowed Publius Clodius to attack him. Cicero found himself deserted, and on the advice of Cato went into exile to avoid bloodshed. He left Rome at the end of March 58, and arrived on the 23rd of May at Thessalonica, where he remained in the deepest dejection until the end of November, when he went to Dyrrhachium (Durazzo) awaiting his recall. He left for Italy on the 4th of August 57, and on arriving at Brundisium (Brindisi) found that he had been recalled by a law passed by the comitia on the very day of his departure. On his arrival at Rome he was received with enthusiasm by all classes, but did not find

the nobles at all eager to give him compensation for the loss of his house and villas, which had been destroyed by Clodius. He was soon encouraged by the growing coolness between Pompey and Caesar to attack the acts of Caesar during his consulship, and after his successful defence of Publius Sestius on the 10th of March he proposed on the 5th of April that the senate should on the 15th of May discuss Caesar's distribution of the Campanian land. This brought about the conference of Luca (Lucca) . Cicero was again deserted by his supporters and threatened with fresh exile. He was forced to publish a " re-cantation," probably the speech de Provinciis Consularibus, and in a private letter says frankly, " I know that I have been a regular ass." His conduct for the next three years teems with inconsistencies which we may deplore but cannot pass over. He was obliged to defend in 54 Publius Vatinius, whom he had fiercely attacked during the trial of Sestius; also Aulus Gabinius, one of the consuls to whom his exile was due; and Rabirius Postumus, an agent of Gabinius. On the other hand, he made a violent speech in the senate in 55 against Lucius Piso, the col-

1 Caesar, at one time, offered him a place on the coalition, which on his refusal became a triumvirate {Att. ii. 3. 3; Prov ; Cons. 41), and afterwards a post on his commission for the division of the Campanian land, or a legatio libera.

league of Gabinius in 58. We know from his letters that he accepted financial aid from Caesar, but that he repaid the loan before the outbreak of the civil war. 2 There is no doubt that he was easily deceived. He was always an optimist, and thought that he was bringing good influence to bear upon Caesar as afterwards upon Octavian. His actions, however, when Caesar's projects became manifest, sufficiently vindicated his honesty. During these unhappy years he took refuge in literature. The de Oratore was written in 55 B.C., the de Republica in 54, and the de Legibus at any rate begun in 52. The latter year is famous for the murder of Clodius by T. Annius Milo on the Appian Way (on the 18th of January), which brought about the appointment of Pompey as sole consul and the passing of the special laws dealing with rioting and bribery. Cicero took an active part in the trials which followed, both as a defender of Milo and his adherents and as a prosecutor of the opposite faction. At the close of the year, greatly to his annoyance, he was sent to govern Cilicia under the provisions of Pompey's law (see Pompey and Rome: History). His reluctance to leave Rome, already shown by his refusal to take a province, after his praetorship and consulship, was increased by the inclination of his daughter Tullia, then a widow, to marry again. 3 During his absence she married the profligate spendthrift, P.

Cornelius Dolabella.

The province of Cilicia was a large one. It included, in addition to Cilicia proper, Isauria, Lycaonia, Pisidia, Pamphylia and Cyprus, as well as a protectorate over the client kingdoms of Cappadocia and Galatia. There was also danger of a Parthian inroad. Cicero's legate was his brother Quintius Cicero (below), an experienced soldier who had gained great distinction under Caesar in Gaul. The fears of Parthian invasion were not realized, but Cicero, after suppressing a revolt in Cappadocia, undertook military operations against the hill-tribes of the Amanus and captured the town of Pindenissus after a siege of forty-six days. A supplicalio in his honour was voted by the senate. The early months of 50 were occupied by the administration of justice, chiefly at Laodicea, and by various attempts to alleviate the distress in the province caused by the exactions of his predecessor, Appius Claudius. He had to withstand pressure from influential persons (e.g. M. Brutus.who had business interests in his province), and refused to provide his friends with wild beasts for their games in Rome. Leaving his province on the earliest opportunity, he reached Brundisium on the 24th of November, and found civil war inevitable. He went to Rome on the 4th of January, but did not enter the city, since he aspired to a triumph for his successes. 4 After the outbreak of war he was placed by Pompey in charge of the Campanian coast. After much irresolution he refused Caesar's invitations and resolved to join Pompey's forces in Greece. He was shocked by the ferocious language of his party, and himself gave offence by his bitter jests (Plut. Cic. 38). Through illness he was not present at the battle of Pharsalus, but afterwards was offered the command by Cato the Younger at Corcyra, and was threatened with death by the young Cn. Pompeius when he refused to accept it. Thinking it useless to continue the struggle, he sailed to Brundisium, where he remained until the 12th of August 47, when, after receiving a kind letter from Caesar, he went to Rome. Under Caesar's dictatorship Cicero abstained from politics. His voice was raised on three occasions only: once in the senate in 46 to praise Caesar's clemency to M. Claudius Marcellus {pro Marcello), to plead in the same year before Caesar for Quintus Ligarius, and in 45 on behalf of Deiotarus, tetrarch of Galatia, also before Caesar. He suffered greatly from family troubles at this period. In 46, his patience giving way, he divorced Terentia, and married his young and wealthy ward Publilia. Then came the greatest grief

2 Ait. vii. 8. 5 "est enim &nopov ivmroXirevoiikvov xptti>4>u\kTi}v esse."

3 She was married in 63 B.C. to C. Calpurnius Piso Frugi, whom

Cicero found a model son-in-law. He appears to have died before §6, since in that year Tullia was betrothed to Furius Crassipes (quaestor in Bithynia in 51). It is not known if this marriage actually took place.

4 That the loss of his triumph rankled in his mind may be seen from Brutus, § 255: ” hanc gloriam . . . tuae quidem supplication! non, sed triumphis multorum antepono.”

of his life, the death of Tullia, his beloved daughter. He shortly afterwards divorced Publilia, who had been jealous of Tullia’s influence and proved unsympathetic. To solace his troubles he devoted himself wholly to literature. To this period belong several famous rhetorical and philosophical works, the Brutus, Orator, Partitiones Oratoriae, Paradoxa, Academica, de Finibus, Tusculan Disputations, together with other works now lost, such as his Laus Catonis, Consolatio and Hortensius.

His repose was broken by Caesar’s murder on the 15 th of March 44, to which he was not a party. On the 17 th of March he delivered a speech in the senate urging a general amnesty like that declared in Athens after the expulsion of the Thirty Tyrants. When it became apparent that the conspirators had only removed the despot and left the despotism, he again devoted himself to philosophy, and in an incredibly short space of time produced the de Natura Deorum, de Divinatione, de Fato, Cato mdior (or de Senectute), Laelius (or de Amicitia), and began his treatise de Officiis. To this period also belongs his lost work de Gloria. He then projected a journey to Greece in order to see his son Marcus, then studying at Athens, of whose behaviour he heard unfavourable reports. He reached Syracuse on the 1st of August, having during the voyage written from memory a translation of Aristotle’s Topica. He was driven back by unfavourable winds to Leucopetra, and then, hearing better news, returned to Rome on the 21st of August. He was bitterly attacked by Marcus Antonius (Mark Antony) in the senate on the 1st of September for not being present there, and on the next day replied in his First Philippic. He then left Rome and devoted himself to the completion of the de Officiis, and to the composition of his famous Second Philippic, which was never delivered, but was circulated, at first privately, after Antony’s departure from Rome to Cisalpine Gaul on the 28th of November.

Cicero returned to Rome on the 9th of December, and from that time forward led the republican party in the senate. His policy, stated briefly, was to make use of Octavian, whose name was all-powerful with the veterans, until new legions had been raised which would follow the republican commanders {Phil. xi. 39). Cicero pledged his credit for the loyalty of Octavian, who styled him ” father ” and affected to take his advice on all occasions (Epp. ad Brut. i. 17. 5). Cicero, an incurable optimist in politics, may have convinced himself of Octavian’s sincerity. The breach, however, was bound to come, and the saying, maliciously attributed to Cicero, that Octavian was an ” excellent youth who must be praised and — sent to another place,” neatly expresses the popular view of the situation. 1 Cicero was sharply criticized by M. Junius Brutus for truckling to Octavian while showing irreconcilable enmity to Antony and Lepidus (ad Brut. i. 16. 4, i. 15. 9); but Brutus was safe in his province, and it is difficult to see what other course was open to a politician in Rome. Whether Cicero was right or wrong, none can question his amazing energy. He delivered his long series of Philippics at Rome, and kept up a correspondence with the various provincial governors and commanders, all short-sighted and selfish, and several of them half-hearted, endeavouring to keep each man in his place and to elaborate a common plan of opera- tions. He was naturally included in the list of the proscribed, though it is said that Octavian fought long on his behalf, and was slain near Formiae on the 7th of December 43. He had a ship near in which he had previously attempted to fly, but being cast back by unfavourable winds he returned to his villa, saying, ” Let me die in the country which I have often saved.” His head and hands were sent to Rome and nailed to the rostra, after Fulvia, wife of Antony and widow of Clodius, had thrust a hairpin through the tongue.

Works. — The literary works of Cicero may be classed as (1) rhetorical; (2) oratorical; (3) philosophical and political; (4) epistolary.

(i.) Rhetorical? — His chief works of this kind are: (a) de

1 Fam. xi. 20 ” laudandum adolescentem, ornandum, tollendum.” 2 With these it is usual to include a treatise to Herennius by an anonymous author, a contemporary of Sulla, in modern times gener- ally identified with a person named Cornificius, quoted by Quintilian

Oratore, a treatise in three books dedicated to his brother Quintus. The discussion is conducted in the form of a dialogue which is supposed to have occurred in 91 B.C. chiefly between the two orators

L. Crassus and M. Antonius. The first book deals with the studies necessary for an orator; the second with the treat- ment of the subject matter; the third with the form and delivery of a speech. Cicero says of this work in a letter (Fam. i. 9. 23) that it ” does not deal in hackneyed rules and embraces the whole theory of oratory as laid down by Isocrates and Aristotle.” (b) Brutus, or de claris oratoribus, a history of Roman eloquence containing much valuable information about his predecessors, drawn largely from the Chronicle (liber annalis) of Atticus (§§ 14, 15). (c) Orator, dedicated to M. Brutus, sketching a portrait of the perfect and ideal orator, Cicero’s last word on oratory. The sum of his conclusion is that the perfect orator must also be a perfect man. Cicero says of this work that he has ” con- centrated in it all his taste ” (Fam. vi. 18. 4). The three treatises are intended to form a continuous, series containing a complete system of rhetorical training .

It will be convenient to mention here a feature 01 Ciceronian prose on which singular light has been thrown by recent inquiry. In the de Oratore, iii. 173 sqq., he considers the element of rhythm or metre in prose, and in the Orator (174-226) he returns to the subject and discusses it at length. His main point is that prose should be metrical in character, though it should not be entirely metrical, since this would be poetry (Orator, 220). Greek writers relied for metrical effect in prose on those feet which were not much used in poetry. Aristotle recommended the paean w o u -• Cicero preferred the cretic – u -, which he says is the metrical equivalent of the paean. Demosthenes was especially fond of the cretic. Rhythm pervades the whole sentence but is most important at the end or clausula, where the swell of the period sinks to rest. The ears of the Romans were incredibly sensitive to such points. We are told that an assembly was stirred to wild applause by a double trochee – u u. 3 If the order were changed, Cicero says, the effect would be lost. The same rhythm should be found in the membra which compose the sentence. He quotes a passage from one of his own speeches in which any change in the order would destroy the rhythm. Cicero gives various clausulae which his ears told him to be good or bad, but his remarks are desultory, as also are those of Quintilian, whose examples were largely drawn from Cicero’s writings. It was left for modern research to discover rules of har mony which the Romans obeyed unconsciously. Other investigators had shown that Cicero’s clausulae are generally variations of some three or four forms in which the rhythm is trochaic. Dr Thaddaeus Zielinski of St Petersburg, after examining all the clausulae in Cicero’s speeches, finds that they are governed by a law. In every clausula there is a basis followed by a cadence. The basis

consists of a cretic or its metrical equivalent. 4 This is followed by a cadence trochaic in character, but varying in length. The three favourite forms are (i.) – v — „> (“■) ~u — ˆa. (“!•) _ o — v o These he styles verae (V). Other frequent clausulae, which he terms licitae (L), are those in which a long syllable is resolved, as in verse, into two shorts, e.g. esse videatur. These two classes, V and L, include 86 % of the clausulae in the orations. Some rarer clausulae which he terms M (=malae) introduce no new principle. There remain two interesting forms, viz. S (= selectae) , in which a spondee is substituted

for a trochee in the cadence, e.g. – v , this being done

for special emphasis, and P (= pessimae), where a dactyl is so used, e.g. 0-WW-P, this being the heroica clausula condemned by Quintilian. Similar rules apply to the membra of the sentence, though in these the 5 and P forms are more frequent, harmony being restored in the clausula.

These results apply not only to the speeches but also to the

(iii. 1. 21). This is a manual of rhetoric derived from Greek sources with illustrations of figures drawn from Roman orators. Cicero’s juvenile work de Inventione appears to be drawn partly from this and partly from a treatise by Hermagoras. This is a slight pro- duction and does not require detailed notice. Other minor works written in later life, such as the PartiHones Oratoriae, a catechism of rhetoric, in which instruction is given by Cicero to his son Marcus; the Topica, and an introduction to a translation of the speeches delivered by Demosthenes and Aeschines for and against Ctesiphon, styled de Optimo genere oratorum, also need only be mentioned.

‘ Orator, § 214 ” patris dictum sapiens temeritas fili comprd- bavit — hoc dichoreo tantus clamor contionis excitatus est ut admira- bile esset. Quaero, nonne id numerus efficerit? Verborum ordinem immuta, fac sic: ‘ Comprobavit fili temeritas ‘ jam nihil erit.”

4 This theory is partly anticipated by Terentianus Maurus (c. A.D. 290), who says of the cretic (v. 1440 sqq.) : —

” Plurimum orantes decebit quando paene in ultimo Obtinet sedem beatarri, terminet si clausulam Dactylus spondeus imam, nee trochaeum respuo: Plenius tractatur istud arte prosa rhetorum.”

philosophical writings and the more elaborate letters, and with modifications to other rhythmical prose, e.g. that of Pliny and Seneca. Rhythm was avoided by Caesar who was an Atticist, and by Sallust who was an archaist. Livy's practice is exactly opposite to that of Cicero, since he has a marked preference for the 5 forms, thereby exemplifying Cicero's saying that long syllables are more appropriate to history than to oratory. 1

(ii.) Speeches. — These were generally delivered before the senate or people, if political in character, and before jurors sitting in a quaestio, if judicial. The speech against Vatinius was an attack upon a witness under examination; that de Domo was made before the Pontifices; that pro C. Rabirio perduellionis reo in the course of a provocalio to the people; and those pro Ligario and pro rege Deiotaro before Caesar. The five orations com- posing the Actio Secunda in Verrem were never spoken, but written after Verres had gone into exile. The Second Philippic also was not delivered but issued as a pamphlet. Cicero's speech for Milo at his trial was not a success, though, as Quintilian (ix. 2. 54) quotes from it, as taken down by shorthand reporters, an example of a rhetorical figure well used, it cannot have been such a failure as is alleged by later writers. The extant speech was written by Cicero at his leisure. None of the other speeches are in the exact form in which they were delivered. Cicero's method was to construct a commenlarius or skeleton of his speech, which he used when speaking. If he was pleased with a speech he then wrote it out for publication. Sometimes he omitted in the written speech a subject on which he had spoken. A record of this is sometimes preserved: e.g. " de Postumi criminibus " (Mur. 51), " de teste Fufio " (Cael. 19). These com- mentarii were published by his freedman Tiro and are quoted by Asconius {ad Orat. in Toga Candida, p. 87).

Cicero in his speeches must be given all the privileges of an advocate. Sometimes he had a bad client; he naively confesses the straits to which he was put when defending Scamander (Clu. 51; cf. Phil. xiii. 26). He thought of defending Catiline, though he says that his guilt is clear as noon-day (Att. i. 1-2 and 2. 1). Sometimes the brief which he held at the moment compelled him to take a view of facts contrary to that which he had previously advocated. Thus in the pro Caecina he alleges judicial corruption against a witness, Falcula, while in the pro Cluentio he contends that the offence was not proved (Caec. 28, Clu. 103). He says quite openly that " it is a great mistake to suppose that statements in his speeches express his real opinions " (Clu. 139). It is therefore idle to reproach him with inconsistencies, though these are sometimes very singular. Thus in the pro Cornelia he speaks with praise of Aulus Gabinius, who, when a colleague vetoed his proposal,

proceeded to depose him after the precedent set by Tiberius Gracchus (Asconius in Cornel, p. 71). In the pro Cluentio, 1 1 1 , he contends that nothing is easier than for a new man to rise at Rome. In the pro Caelio he says that Catiline had in him undeveloped germs of the greatest virtues, and that it was the good in him that made him so dangerous {Cael. 12-14). He sometimes deliberately puts the case upon a wrong issue. In the pro Milone he says that either Milo must have lain in wait for Clodius or Clodius for Milo, leaving out of sight the truth, that the encounter was due to chance. He used to boast that he had cast dust into the eyes of the jury in the case of Cluentius (Quintil. ii. 17-21).

Cicero had a perfect mastery of all weapons wielded by a pleader in Rome. He was specially famous for his pathos, and for this reason, when several counsel were employed, always spoke last (Orat. 130). A splendid specimen of pathos is to be found in his account of the condemnation and execution of the Sicilian captains (Verr. (Acl.ii.) v. 106-122). Much exaggeration was permitted to a Roman orator. Thus Cicero frequently speaks as if his client were to be put to death, though a criminal could always evade capital consequences by going into exile. His enemies scoffed at his ” tear-drops.” He indulged in the more violent invective, which, though shocking to a modern reader, e.g. in his speeches against Vatinius and Piso, was not offensive to Roman taste (de Orat. ii. 216-290). He was much

1 Orator, § 212 ” cursum contentiones magis requirunt, exposi- tiones rerum tarditatem.”

criticized for his jokes, and even Quintilian (ii. 17-21) regrets that he made so many in his speeches. He could never resist the temptation to make a pun. It must be remembered, however, that he was the great wit of the period. Caesar used to have a collection of Cicero’s bon-mots brought to him. Cicero complains that all the jokes of the day were attributed to himself, including those made by very sorry jesters (Fam. vii. 32. 1). A fine specimen of sustained humour is to be found in his speech pro Murena, where he rallies the jurisconsults and the Stoics. He was also criticized for his vanity and perpetual references to his own achievements. His vanity, however, as has been admirably remarked, is essentially that of ” the peacock, not of the gander,” and is redeemed by his willingness to raise a laugh at his own expense (Strachan-Davidson, p. 192). Some critics have impugned his legal knowledge, but probably without justice. It is true that he does not claim to be a great expert, though a pupil of the Scaevolas, and when in doubt would con- sult a jurisconsult; also, that he frequently passes lightly over important points of law, but this was probably because he

was conscious of a flaw in his case.

(iii.) Political and Philosophical Treatises. — These are generally written in the form of dialogues, in which the speakers sometimes belong to bygone times and sometimes to the present. The first method was known as that of Heraclides, the second as that of Aristotle (Att. xiii. 19. 4). There is no reason to suppose that the speakers held the views with which Cicero credits them, or had such literary powers as would make them able to express such views (ib. xiii. 12. 3). The political works are de Republica and de Legibus. The first was a dialogue in six books concerning the best form of constitution, in which the speakers are Scipio Africanus Minor and members of his circle. He tells us that he drew largely from Plato, Aristotle, Theophrastus and writings of the Peripatetics. The famous " Dream of Scipio " recalls the " Vision of Er " in Plato's Republic (Book x. ad fin.). The de Legibus, a sequel to this work in imitation of Plato's Laws, is drawn largely from Chrysippus.

Cicero as a philosopher belonged to the New Academy. The followers of this school were free to hear all arguments for and against, and to accept the conclusion which for the moment appeared most probable (Acad. ii. 131). Thus in the Tusculan Disputations v. he expresses views which conflict with de Finibus iv., and defends himself on the ground that as an Academic he is free to change his mind. He was much fascinated by the Stoic morality, and it has been noticed that the Tusculan Dis- putations and de Officiis are largely Stoic in tone. He has nothing but contempt for the Epicureans, and cannot forgive their neglect of literary style. As Cicero's philosophical writings have been severely attacked for want of originality, it is only fair to recollect that he resorted to philosophy as an anodyne when suffering from mental anguish, and that he wrote incredibly fast. He issued two editions of his Academics. The first con- sisted of two books, in which Catulus and Lucullus were the chief speakers. He then rewrote his treatise in four books, making himself, Varro and Atticus the speakers. The Romans at this time had no manuals of philosophy or any philosophical writings in Latin apart from the poem of Lucretius and some unskilful productions by obscure Epicureans. Cicero set himself to supply this want. His works are confessedly in the main translations and compilations (Att. xii. 52. 3); all that he does is to turn the discussion into the form of a dialogue, to adapt it to Roman readers by illustrations from Roman history, and to invent equivalents for Greek technical terms. This is equally true of the political treatises. Thus, when Atticus criticized a strange statement in de Republ. ii. 8, that all the cities of the Peloponnese had access to the sea, he excuses himself by saying that he found it in Dicaearchus and copied it word for word

(Att. vi. 2. 3). In the same passage he used an incorrect adjective, Phliuntii for Phliasii; he says that he had already corrected his own copy, but the mistake survives in the single palimpsest in which this work has been preserved. The only merits, therefore, which can be claimed for Cicero are that he invented a philo- sophical terminology for the Romans, and that he produced a

series of manuals which from their beauty of style have had enduring influence upon mankind.

The most famous of these treatises are the following : —

De Finibus, on the Supreme Good. In Book i. L. Manlius Tor- quatus explains the Epicurean doctrine, which is refuted in ii. by Cicero. In iii. and iv. M. Porcius Cato sets forth the doctrine of the Stoics which is shown by Cicero to agree with that of Antiochus of Ascalon; in v. M. Pupius Piso explains the views of the Academics and Peripatetics.

Tusculanae Disputationes, so called from Cicero's villa at Tusculum in which the discussion is supposed to have taken place. The sub- jects treated are :— in Book i., the nature of death and the reasons for despising it; Book ii., the endurance of pain: Pain is not an evil; Book iii., wisdom makes a man insensible to sorrow; Book iv., wisdom banishes all mental disquietude ; Book v., virtue is sufficient to secure happiness. The materials are drawn largely from works of Dicaearchus.

De Deorum Natura. — The dialogue is placed in 77 B.C. In Book i. Velleius attacks other philosophies and explains the system of Epicurus. He is then refuted by Cotta. In Book ii. Balbus, speak- ing as a Stoic, discusses the existence of the gods, nature, the govern- ment of the world and providence. In Book iii. Cotta criticizes the views of Balbus. The statement of the Epicurean doctrine is drawn from the work of Phaedrus Ilepi 0tS>v, _ the criticism of this from Posidonius. The Stoic teaching is derived from Cleanthes, Chry- sippus and Zeno, and is criticized from the writings of Carneades and Clitomachus.

De Officiis, addressed to his son Marcus. In this the form of dialogue was not employed. The material is chiefly drawn from Stoic sources, e.g. works of Panaetius in Books i. and ii., of Posidonius and Hecato in Book iii.

The Academica, as they have come down to us, are a conflation from the two editions of this work. They consist of the second book from the first edition, and a portion of the first book from the second edition.

Cato maior, or de Senectute, a dialogue placed in 150 B.C. in which Cato, addressing Scipio and Laelius, set forth the praises of old age. The idea is drawn from Aristo of Chios, and the materials largely derived from Xenophon and Plato.

Laelius, or de Amicitia, a dialogue between Laelius and his sons- in-law, in which he sets forth the theory of friendship, speaking with special reference to the recent death of Scipio. Cicero here draws from a work of Theophrastus on the same subject and from Aristotle.

(iv.) Letters. — Those preserved are (1) ad Familiares, i.-xvi.; (2) ad Atticum, i.-xvi.; (3) ad Quintum, i.-iii., ad Brutum, i.-ii. Some thirty-five other books of letters were known to antiquity, e.g. to Caesar, to Pompey, to Octavian and to his son Marcus.

The collection includes nearly one hundred letters written by other persons. Thus, the eighth Book ad Fam. consists entirely of letters from Caelius to Cicer J when in Cilicia. When writing to Atticus Cicero frequently sent copies of letters which he had received. There is a great variety in the style not only of Cicero's correspondents, but also of Cicero himself. Caelius writes in a breezy, school-boy style; the Latinity of Plancus is Ciceronian in character; the letter of Sulpicius to Cicero on the death of Tullia is a masterpiece of style; Matius writes a ' most dignified letter justifying his affectionate regard for Caesar's memory. There is an amazingly indiscreet letter of Quintus to his brother's freedman, Tiro, in which he says of the consuls- elect, Hirtius and Pansa,that he would hesitate to put one of them in charge of a village on the frontier, and the other in that of the basement of a tavern {Fam. xvi. 27. 2). Several of his correspondents are indifferent stylists. Cato labours to express himself in an awkward and laconic epistle, apologizing for its length. Metellus Celer is very rude, but gives himself away in every word. Antony writes bad Latin, while Cicero himself writes in various styles. We have such a cri de cceur as his few words to one of the conspirators after Caesar's murder, " I congratulate you. I rejoice for myself. I love you. I watch your interests; I wish for your love and to be informed what you are doing and what is being done" (Fam. vi. 15). When writing to Atticus he eschews all ornamentation, uses short sentences, colloquial idioms, rare diminutives and continually quotes Greek. This use of Greek tags and quotations is also found in letters to other intimate friends, e.g.

Paetus and Caelius; also in letters written by other persons, e.g. Cassius to Cicero; Quintus to Tiro, and subsequently in those of Augustus to Tiberius. It is a feature of the colloquial style and often corre- sponds to the modern use of ” slang.” Other letters of Cicero,

especially those written to persons with whom he was not quite at his ease or those meant for circulation, are composed in his elaborate style with long periods, parentheses and other devices for obscuring thought. These are throughout rhythmical in character, like his speeches and philosophical works.

We know from Cicero’s own statement (Att. xvi. 5. 5) that he thought of publishing some of his letters during his lifetime. On another occasion he jestingly charges Tiro with wishing to have his own letters included in the “volumes” (Fam. xvi. 17. 1). It is obvious that Cicero could not have meant to publish his private letters to Atticus in which he makes confessions about himself, or those to Quintus in which he sometimes outsteps the limits of brotherly criticism, but was thinking of polished productions such as the letters to Lentulus Spinther or that to Lucceius which he describes as “very pretty” (Att. iv. 6. 4).

It is universally agreed that the letters ad Familiares were published by Tiro, whose hand is revealed by the fact that he suppresses all letters written by himself, and modestly puts at the end those written to him. That Cicero kept copies of his letters, or of many of them, we know from a passage in which, when addressing a friend who had inadvertently torn up a letter from him, he says that there is nothing to grieve about; he has himself a copy at home and can replace the loss (Fam. vii. 25. 1). Tiro may have obtained from Terentia copies of letters written to her. It has been suggested that he may also have edited the letters to Quintus, as he could obtain them from members of the family. The letters ad Familiares were generally quoted in antiquity by books, the title being taken from the first letter, e.g. Cicero ad Varronem epistula Paeti.

While the letters ad Familiares were circulated at once, those to Atticus appear to have been suppressed for a considerable time. Cornelius Nepos (Att.16) knew of their existence but distinguishes them from the published letters. Asconius (p. 87) , writing under Claudius, never quotes them, though, when discussing Cicero’s projected defence of Catiline, he could hardly have failed to do so, if he had known them. The first author who quotes them is Seneca. It is, therefore, probable that they were not published by Atticus himself, who died 32 B.C., though his hand may be seen in the suppression of all letters written by himself, but that they remained in the possession

of his family and were not published until about a.d. 60. At that date they could be pub- lished without expurgation of any kind, whereas in the letters ad Familiares the editor's hand is on one occasion (iii. 10. n) manifest. Cicero is telling Appius, his predecessor in Cilicia, of the measures which he is taking on his behalf. There then follows a lacuna. It is obvious that Tiro thought the passage compromising and struck it out. In the letters to Atticus, on the other hand, we have Cicero's private journal, his confessions to the director of his conscience, the record of his moods from day to day, without alterations of any kind.

Cicero's letters are the chief and most reliable source of information for the period. It is due to them that the Romans of the day are living figures to us, and that Cicero, in spite of, or rather in virtue of his frailties, is intensely human and sym- pathetic. The letters to Atticus abound in the frankest self- revelation, though even in the presence of his confessor his instinct as a pleader makes him try to justify himself. The historical value of the letters, therefore, completely transcends that of Cicero's other works. It is true that these are full of information. Thus we learn much from the de Legibus regarding the constitutional history of Rome, and much from the Brutus concerning the earlier orators. The speeches abound in details which may be accepted as authentic, either because there is no reason for misrepresentation or on account of their circumstan- tiality. Thus the Verrines are our chief source of information for the government of the provinces, the system of taxation, the powers of the governor. We hear from them of such interesting details as that the senate annul a judicial decision improperly arrived at by the governor, or that the college of tribunes could consider the status at Rome of a man affected by this decision (Verr. II. ii. 95-100). We have unfolded to us the monstrous system by which the governor could fix upon a remote place

for the delivery of corn, and so compel the farmer to compound by a payment in money which the orator does not blame, on the ground that it is only proper to allow magistrates to receive com wherever they wish (ib. iii. 190). From the speech pro Cluentio (145-154) we gain unique information concerning the condition of society in a country town, the extraordinary exemp- tion of equites from prosecution for judicial corruption, the administration of domestic justice in the case of slaves examined by their owner (ib. 176-187).

But we have always to be on our guard against misrepresentation, exaggeration and falsehood. The value of the letters lies in the fact that in them we get behind Cicero and are face to face with the other dramatis personae; also that we are admitted behind the scenes and read the secret history of the times. One of the most interesting documents' in the correspondence is a despatch of Caesar to his agent Oppius, written in great haste and in disjointed sentences. It runs as follows: " On the oth I came to Brundisium. Pompey is at Brundisium. He sent Magius to me to treat of. peace. I gave him a suitable answer " {Att. ix. 13, Ai.). In the de Bello civili, on the other hand, Caesar, who wishes to show that he did his best to make peace, after stating that he sent his captive Magius to negotiate, expresses mild surprise at the fact that Pompey did not send him back (Bell. Civ. i. 26). We hear of the extraordinary agreement made by two candidates for the consulship in Caesar's interest with the sitting consuls of 54 B.C., which Cicero says he hardly ventures to put on paper. Under the terms of this the consuls, who were optimates, bound themselves to betray their party by securing, apparently fraudulently, the election of the candidates while they in turn bound themselves to procure two ex-consuls who would swear that they were present in the senate when supplies were voted for the consular provinces, though no meeting of the senate had been held, and three augurs who would swear that a lex curiata had been passed, though the comitia curiata had not been convened (Att. iv. 18. 2). But perhaps the most singular scene is the council of three great ladies presided over by Servilia at Antium, which decides the movements of Brutus and Cassius in June 44 B.C., when Cassius " looking very fierce — you would say that he' was breathing fire and sword "—blustered concerning what he considered an insult, viz. a commission to supply corn which had been laid upon him; Servilia calmly remarks she will have the commission removed from the decree of the senate (Att. xv. 11. 2).

(v.) Miscellaneous.— It is not necessary to dwell upon the other forms of literary composition attempted by Cicero. He was a fluent versifier, and would write 500 verses in one night. Considerable fragments from a juvenile translation of Aratus have been preserved. His later poems upon his own consulship and his exile were soon forgotten except for certain lines which provoked criticism, such as the unfortunate verse:

" O fortunatam natam me consule Romam."

He wrote a memoir of his consulship in Greek and at one time thought of writing a history of Rome. Nepos thought that he would have been an ideal historian, but as Cicero tanks history with declamation and on one occasion with great naivete asks Lucius Lucceius (q.v.), who

was embarking on this task, to embroider the facts to his own credit, we cannot accept this criticism (Fam. vi. 2. 3).

(vi.) Authenticity.— The genuineness of certain works of Cicero has been attacked. It was for a long time usual to doubt the authenticity of the speeches post reditum and pro Marcello. 1 Recent scholars consider them genuine. As their rhythmical structure corresponds more or less exactly with the canon of authenticity formed by Zielinski from the other speeches, the question may now be considered closed. 2 Absurd suspicion has been cast upon the later speeches in Catilinam and that pro Archia. An oration pridie quant in exsilium iret is certainly a forgery, as also a letter to Octavian. There is a ” controversy ” between Cicero and Sallust which is palpably a forgery, though

1 Markland and F. A. Wolf first rejected them. 3 In the speeches generally L-j-F = 86 %. In the de Domo the proportion is 88 and in the pro Marcello 87 %.

a quotation ifrom it occurs in Qumtiiian.?: Suspicion has been attached to the letters to Brutus, which in the case of two letters (i. 16 and 17) is not unreasonable since they somewhat resemble the style of suasoriae, or rhetorical exercises, but the latest editors, Tyrrell and Purser,, regard these also as genuine.

Criticism, (i.) Ancient.— Ahet Cicero’s death his character was attacked by various detractors, such as the author of the spurious Controversial put into the mouth of Sallust, and the calumniator from Whom Dio Cassius (xlvi. 1-28) draws the libellous statements which he inserts into the speech of Q. Fufius Calenus in the senate. Of such critics, Asco’nilis (in Tog. Carid. p. 95) well says that it is best to ignore them. His prose style was attacked by Pollio as Asiatic, also bˆ his son, Asinius Galhis, who was answered by the emperor Claudius (Suet. 41). The writers of the silver age found fault with his pro- lixity, want of sparkle and epigram, arid monotony of his clausulae. 4 A certain Largius Licinius gained notoriety .by attacking his Latinity in a work styled Cideromaslix. His most devoted admirers were the younger Pliny, who reproduced his oratorical style with Con- siderable success, and Quintiliari (x. 1. 1 12), who regarded him as the perfect orator, and draws most of his. illustrations from his works. At a later period his style fascinated Christian writers, notably Lactantius, the ” Christian Cicero,” Jerome and S. Augustine, who drew freely from his rhetorical writings.

The first commentator upon Cicero was Asconius, a Roman senator

living in the reign of Claudius; who' wrote a commentary upon the speeches, in which he explains obscure historical points for the instruction of his sons (see Asconius)ˆ Passing over a number of grammatical and rhetorical writers who drew illustrations from Cicero, we may mention the Commentary of Victorinus, written in the 4th century, upon the treatise de Inventione, and that of Boethius ('A;i >. 480ˆ524) upori the Topiw. , Among scholiasts may be mentioned the Scholiasta Bobiensis who is assigned to the 5th Century; and a pseudo-Asconius, who wrote notes upon the Verrines dealing with points of grammar and rhetoric.

(ii.) Medieval Scholars— In the middle ages Cicero was chiefly known as a writer on rhetoric and morals. The works which were most read were the de Inventione and 'Topica — though neither of these was quite so popular as the treatise ad Herennium, then sup- posed to be by Cicero — and among the moral works, the de Officiis, and the Cato Maior. John of Salisbury (1110-1180) continually quotes from rhetorical and philosophical Writings, but only once from the speeches. The value set upon the work de Inventione Is shown by a passage in which Notker (d. 1022) writing to his bishop gays that he has lent a MS. containing, the Philippics and a com- mentary upon the Topics, but has received as a pledge something far more valuable, viz. the de Inventione, and the " famous commen- tary of Victorinus." 6 We have an interesting series of excerpts made by a priest pamed Hadoard,' in the 9th century, taken from all the philpspphical , writings now preserved, also from the de Oralore? ' ' .'" ' '.

The other works of Cicero are seldom mentioned. The most popular speeches were those against Catiline, the Vertines, Caesaru anae ahd Philippics, to which may be added the spurious ContrO' versia. A larger knowledge of the speeches is shown by Wibald, abbot of Corvey, who in 1146 procured from Hildesheim a MS. containing with the Philippics the speeches against Rullus, wishing to form a corpus of Ciceronian Works. 7 Gerbert (afterwards Pope Silvester II., 940-1003) was especially interested in the speeches, arid in a letter to a friend (Epist. 86) advises him to take them, with him when journeying. The letters are rarely mentioned. The abbey of Lorsch possessed in the 9th century five MSS. 'containing" Letters of Cicero," but those to Atticus are only mentioned once, in the catalogue of Cluny written in the 12th century. 8 Letters of Cicero were known to Wibald of Corvey, also to Seryatus Lupus, abbot of Ferrieres (805-832), whe prosecuted in the 9th century a search for MSS. which reminds us of the Italian humanists in the 15th century. A good deal of textual criticism must have beeri devoted to Cicero's works during this period. 1 The earliest critic was Tiro; who, as we know from Aulus Gellius (i- ,7- 1)1

corrected MSS, which were greatly valued as containing his recension. We have a very interesting colophori to the speeches against Rullus, in which Statttius Maximus states that' he had corrected the text by the help of a MS. giving the. recension of Tiro, which he had collated with five other ancient copies. 9 ….. ,, .

It is interesting to notice that Servatus Lupus did similar work in the 9th century. Thus,' writing to Ansbald of Prfim, he says, " I will collate the letters of Crcerd which you sent with' the copy

3 Quintil. iv. i., 68. It is possible that the writer may have used a quotation preserved from a real speech by/Quintilian.

4 Tacitus, Dial. 22 "omnis clausulas uno et eodem • triodo determinet." 6 Ed: P. Piper, p. 861. .1 ..,-.■

6 Phihlogus (1886), Suppl. Bd. v, , . ', . ;

' Taffe, Bill. Rer. German. ,'1,326,'-.'" ...

8 Delisle, Cabinet des MSS., ,i. 459. '" ;

9 " Statilius Maximus rursus emendavi ad Tironem et Laeccahiai num et dom. et alios veteres III." He was a grammarian whoKvEH 1 at the end of the 2nd century.

which I have so as to elicit the true readifig, if possible, by comparing tiheitwo." 1 He asks .another correspondent to. supply him with a copy of the Verrines or any other works for a similar purpose.

Brunetto Latini (d. ca. 1294), the master of Dante, translated this Caesarian&e into Italian. Dante himself appears to be acquainted only with the Laelius, Cato . Maior, de Officiis, de Finibus, d» Inventione and Parqdoxa. Petrarch says that among his country- men Cicero was a great name, but was studied by few. Petrarch himself sought for MSS. of Cicero with peculiar ardour. He found the speech pro Archia at Liege in 1333, and in 1345 at Verona made his famous discovery of the letters to Atticus, which revealed to thelworid Cicero as a man in place of the " god of eloquence " whom they had worshipped. Petrarch was under the impression in his old age that he had once possessed Cicero's lost work de Gloria, but it is probable that he was misled by one of the numerous passages in the extant writings dealing

with this subject. 2 The letters ad Familiares were discovered towards the close of the 14th century at Vercelli. The largest addition to the sum of Ciceronian writings was made by Poggio (Gian Francesco Poggio Bracciolini) in the Course of his celebrated mission to the Council of Constance (1414- 14-17)-. He brought back no less than ten speeches of Cicero previ- ously unknown to the Italians, viz. pro Sexto Roscio, pro Murena, pro Carina, de lege agraria i.-iii., pro Rabirio perduettionis reo, pro Rabirio Postumo, pro Roscio Comoedo, and in Pisonem, Ah important discovery was made at Lodi in 1422 of a MS. which, in addition to complete copies of the de Oratore and Orator, hitherto known from mutilated MSS., contained an entirely new work, the Bjutus. The second book of Cicero's letters to Brutus was first printed by Cratander of Basel in 1528 from a MS. obtained for him by Sichardus from the abbey of Lorsch.*

AH these MSS. are now lost, except that containing the Epistolae ad Familiares, a MS. written in the 9th century and now at Florence (Laur. xlix. 9). A similar fate overtook three other MSS. containing the letters to Atticus, independent of the Veronensis, viz. a mutilated MS. of Books i.-vii. discovered by Cardinal Capra in 1409, a Lorsch MS. used by Cratander ©, and a French MS. (Z), generally termed Tornaesianus from its owner, Jean de Tournes, a printer of Lyons, probably identical with No. 492 in the old Cluny catalogue, used by Turnebus, Lambinus and Bosius. A strange mystification was practised by the last named, a scholar of singular brilliancy, who claimed to have a mutilated MS. which he called his Decurtatus, bought from a common soldier who had obtained it from a sacked monastery; also to have been furnished by a friend, Pierre de Crouzeil, a doctor of Limoges, with variants taken from an old MS. found at Nbyon, and entered in the margin of a copy of the Lyons edition. The rough draft of his notes, however, upon Books x.-xvi., which afterwards came into the hands of Baluze, is preserved in the Paris library (Lat. 8538 A), in which he continually ascribes different readings to these MSS., the alteration corresponding with a change in his own conjecture. It is, therefore, obvious that he invented the readings in order to strengthen his own corrections. The book, which he termed his Crusellinus, may well be his copy of the Lyons edition of 1545 (number 8665 in the sale-catalogue of Baluze), which is described as cum notis et emendationibus MSS. manu ejusdem Bosii.*

The oldest evidence now existing for any works of Cicero is to be found in palimpsests written in the 4th or 5th century. The most interesting of these, now in the Vatican (Lat. 5757), discovered by Aagelo Mai in 1822, contains the treatise de Republica, only known from this source. Fragments of the lost speeches pro Tullio and pro

Scauro were discovered in two Milan and Turin palimpsests. The Vatican also possesses an important palimpsest of the Verrines (Reg. 2077). A palimpsest containing fragments of various orations was recently destroyed by the fire at the Turin library. The works de Oratore and Orator are well represented by ancient MSS., the two best known being one at Avranches (Abrincensis 238) and a Harleian MS. (2736), both written in the 9th century. The Brutus is only known from 15th-century transcripts of the lost cod. Lodensis.

The oldest MS. of any speeches, or indeed of any work of Cicero's, apart from the palimpsests, belongs to the Chapter-house of St Peter's in Rome (H. 25). It contains the speeches in Pisonem, pro Fonteio, pro Flacco and the Philippics. The earlier part of the- MS. was written in the 8th century. , The Paris library has two 9th-century MSS., viz. 7774 A. containing in Verrem (Act. ii.), iv. and v., and 7794, containing the post reditum speeches, together with those pro Sestio, in Vatinium, de provinciis consularibus, pro Balbo, pro Caelio. The only other' 9th-century MS. of the speeches is now in Lord Leicester's library at Holkham, No. 387. 5 It originally belonged to Cluny, being No. 498 in the old catalogue. It contains in a muti- lated form the speeches in Catilinam, pro Ligario, pro rege Deiotaro and in Verrem (Act. ii.)ii.

The speeches pro Sex. Roscio and pro Murena are only known from an ancient and illegible MS. discovered by Poggio at Cluny,

1 Epist. 69 " Tullianas epistulas quas misisti cum nostris conferri faciam ut ex utrisque, si possit fieri, Veritas exsculpatur."

1 Nolhac, Petrarque et I'humanisme, pp. 216-223. , ' Lehmann, De Ciceronis ad Atticum epp. recensendis, p. 128.

1 Fhilologus, 1 90 1, p. 216. : * Anecdota Oxoniensia, Classical Series, part ix. (W-. Petersen).

No. 496 in the old catalogue, and now lost. The most faithful transcript, was made in France (Paris, Lat. 14,749) before the MS. passed into Poggio's hand by a writer who Carefully reproduced the corruptions, sometimes ift facsimile. 6 The speeches pro Roscio Comoedo, pro Rabirio perdueliionis reo and pro Rabirio Postumo are only known from Italian copies of the transcript (now lost) made by Poggio from lost MSS. The de Officiis, Tusculan Disputations and Cato Maior are found in a number of 9th-century MSS. A collection, consisting of de Natura deorum, de Divinatione, Timaeus, de Fato, . Paradoxa, Lucullus (= Acad. Prior.) and de Legibus, is found in

several MSS. of the same date. Only one MS. of the Laelius is as old as the loth century.

The Academica Posteriora are said by editors to be found only in 15th-century MSS. A MS. in the Paris library (Lat. 6331) is, how- ever, assigned by Chatelain to the 12th century.

For the letters ad, Familiares owe chief source of information is Laur. xlix. 9 (9th century), which contains all the sixteen books. There are independent MSS. written in France and Germany in the flth and 12th centuries, containing i.-viii. and ix.-xvi. respectively. There is no extant MS. of the letters to Atticus older than the 14th century, apart from a few leaves from a 12th-century MS. discovered at or near Wiirzburg in the last century. Very great importance has been attached to a Florentine MS. (Laur. xlix. 18) M., which until recently was supposed to have been copied by Petrarch himself from the lost Veronensis. It is now known not to be in the hand of Petrarch, but it was still supposed to be the archetype of all Italian MSS., and possibly of all MSS., including the lost C and Z. It has, however, been shown by Lehmann that there is an independent group of Italian MSS., termed by him 2, containing Books i.-vii. in a mutilated form, and probably connected with the MS. of Capra. These often agree with CZ against M, and the readings of CZ2 are generally superior.

Bibliography. — It is impossible to mention more than a few works as the literature is so vast. (1) Historical. — J. L. Strachan- Davidson, Life of Cicero (Heroes of the Nations); G. Boissier, Ciciron et ses amis; Suringar, Cicero de vita sua (Leiden, 1854); W. Warde Fowler, Social Life at Rome (1908) ; introductions to Tyrrell and Purser's edition of the letters. (2) Palaeographical. — Facsimiles of the best-known MSS. are given by E. Chatelain in Paleographie des classiques latins, parts 2, 3 and 7. Information regarding various MSS. will be found in Halm, Zur Handschriften- kunde der ciceronischen Schriften (Munich, 1850); Deschamps, Essai bibliographique sur Ciceron (Paris, 1863) (an unscientific work) ; Lehmann, De Ciceronis ad Atticum epistulis recensendis (Berlin, 1892) ; Anecdota Oxoniensia, classical series, parts vii., ix., x. (3) Literary. — M. Schanz, Ceschichte der rbmischen Litteratur, i, 194-274 (Miinchen, 1890). (4) Linguistic. — Merguet, Lexicon to Oratorical and Philosophical Works; Le Breton, £tudes sur la langue et la grammaire de Ciciron (Paris, 1901); Norden, Die antike Kunstprosa (Leipzig, 1898); Th. Zielinski, Das Clauselgesetz in Ciceros Reden (Leipzig, 1904). Much information on points of Ciceronian idiom and language will be found in J. S. Reid's Acade- mica (London, 1885) and Landgraf's Pro Sext. Roscio (Erlangen, 1884). (5) Legal.— A. H. J. Greenidge, The Legal Procedure of Cicero's Time (Oxford,

1901). (6) Philosophical. — An excellent account of Cicero as a philosopher is given in the preface to Reid's edition of the Academica. (7) Editions (critical) of the complete texts.— Baiter-Halm (1845-1861); C. F. W. Miiller (1880-1896); Oxford Classical Texts. (A. C. C.)

2. Quintus Tuixius Cicero, brother of the orator and brother-in-law of T. Pomponius Atticus, was born about 102 B.C. He was aedile in 67, praetor in 62, and for the three following years propraetor in Asia, where, though he seems to have abstained from personal aggrandizement, his profligacy and ill-temper gained him an evil notoriety. After his return to Rome, he heartily supported the attempt to secure his brother's recall from exile, and was nearly murdered by gladiators in the pay of P. Clodius Pulcher. He distinguished himself as one of Julius Caesar's legates in the Gallic campaigns, served in Britain, and afterwards under his brother in Cilicia. On the outbreak of the civil war between Pompey and Caesar, Quintus, like Marcus, supported Pompey, but after Pharsalus he deserted and made peace with Caesar, largely owing to the intercession of, Marcus. Both the brothers fell victims to the proscription which followed Caesar's death, Quintus being put to death in 43, some time before Marcus. His marriage with Pomponia was very unhappy, and he was much under the influence of his slave Statius. Though trained on the same lines as Marcus he never spoke in public, and even said, " One orator in a family is enough, nay even in a city." Though essentially a soldier, he took considerable interest in literature, wrote epic poems, tragedies and annals, and translated plays of Sophocles. . There are extant

6 Anecdota Oxoniensia, Classical Series, part x. (A. C. Clark).

four letters written by him (one to his brother Marcus, andthree to his freedman Tiro) and a short paper, De Pelitione Consulatus (on canvassing for the consulship), addressed t J his brother in 64. Some consider this the work of a rhetorician of later date. A few hexameters by him on the twelve signs of the Zodiac are quoted by Ausonius.

Cicero in several of his Letters (ed. Tyrrell and Purser) ; pro Sestio, 31; Caesar, Bell. Gal.; Appian, Bell. Civ. iv. 20; Dio Cassius, xl. 7, xlvii. 10; text of the De Petit, Cons, in A. Eussner, Commen- tariolum Petitionis (1872), see also R. Y. Tyrrell in Hermathena, v. (1877), and A. Beltrami, De Commentariolo Petitionis Q. Ciceroni vindicando (1892);

G. Boissier, Cicero and His Friends (Eng. trans., 1897), especially pp. 235-241.

3. Marcus Tullius Cicero, only son of the orator and his wife Terentia, was born in 65 B.C. At the age of seventeen he served with Pompey in Greece, and commanded a squadron of cavalry at the battle of Pharsalus. In 45 he was sent to Athens to study rhetoric and philosophy, but abandoned himself to a life of dissipation. It was during his stay at Athens that his father dedicated the de Officiis to him. After the murder of Caesar (44) he attracted the notice of Brutus, by whom he was offered the post of military tribune, in which capacity he rendered good service to the republican cause. After the battle of Philippi (42), he took refuge with Sextus Pompeius in Sicily, where the remnants of the republican forces were collected. He took advantage of the amnesty granted by the treaty of Misenum (39) to return to Rome, where he took no part in public affairs, but resumed his former dissipated habits. In spite of this, he received signal marks of distinction from Octavian, who not only nominated him augur, but accepted him as his colleague in the consulship (30). He had the satisfaction of carrying out the decree which ordered that all the statues of Antony should be demolished, and thus " the divine justice reserved the completion of Antony's punishment for the house of Cicero" (Plutarch). He was subsequently appointed proconsul of Asia or Syria, but nothing further is known of his life. In spite of his debauchery, there is no doubt that he was a man of considerable education and no mean soldier, while Brutus, in a letter to his father (Epp. ad Brutum, ii. 3), even goes so far as to say that the son would be capable of attaining the highest honours without borrowing from the father's reputation.

See Plutarch, Cicero, Brutus; Appian, Bell. Civ. ii. 20. 51, iv. 20; Dio Cassius xlv. 15, xlvi. 18, li. 19; Cicero's Letters (ed. Tyrrell and Purser); G. Boissier, Cicero and His Friends (Eng. trans., 1897), pp. 104-107.

4. Quintus Tullius Cicero (c. 67-43 b.c), son of Quintus Tullius Cicero (brother of the orator). He accompanied his uncle Marcus to Cilicia, and, in the hope of obtaining a reward, repaid his kindness by informing Caesar of his intention of leaving Italy. After the battle of Pharsalus he joined his father in abusing his uncle as responsible for the condition of affairs, hoping thereby to obtain pardon from Caesar. After the death of Caesar he attached himself to Mark Antony, but, owing to some fancied slight, he deserted to Brutus and Cassius. He was included in the proscription lists, and was put to death with his father in 43. In his last moments he refused under torture to disclose

his father's hiding-place. His father, who in his conceal- ment was a witness of what was taking place, thereupon gave himself up, stipulating that he and his son should be executed at the same time.

See Cicero, ad Att. x. 4. 6, 7. 3; xiv. 20. 5; Dio Cassius xlvii. 10.

CICERONE, a guide, one who conducts visitors to museums, galleries, &c, and explains matters of archaeological, antiquarian, historic or artistic interest. The word is presumably taken from Marcus Tullius Cicero, as a type of learning and eloquence. The New English Dictionary finds examples of the use earlier in English than Italian, the earliest quotation being from Addison's Dialogues on Medals (published posthumously 1726). It appears that the word was first applied to " learned antiquarians who show and explain to foreigners the antiquities and curiosities of the country " (quotation of 1762 in the New English Dictionary).

CICHLID (Cichlidae), a family of Acanthopterygian fishes, related to the perches and wrasses, and confined to the fresh :

and brackish waters of Central and South America,:: Africaˆ Syria, and India and Ceylon. It has recently assumed special importance through the large number of genera arid species, many of them showing extraordinary modifications of the dentition, which have been discovered in tropical Africa, especi- ally in the great lakes Victoria, Tanganyika and Nyasa. About 180 species are known from Africa (with Syria and Madagascar), 150 from America, and 3 from India and Ceylon. They were formerlyˆ known under the inappropriate name of Chromides.

These fish are further remarkable for' their nursing habits. It was formerly believed that the male takes charge of {he eggs, and later the young, by sheltering them in the mouth and pharynx. This may still be true of some of the American species, but a long series of recent observations have shown that this most efficacious parental care devolves invariably on the female in the African and Syrian species. We are now acquainted with a large number of species in which this extraordinary habit has been observed, the number having lately been greatly increased by the collections made in Lakes Tanganyika and Victoria.

L. Lortet had described a fish from Lake Tiberias in which he believed he had observed the male take up the eggs after; their deposition and retain them in Ms mouth and pharynx long after eclosion, in fact until the young are able to shift for themselves, and this fish he named

Chromis paterfamilias. A. Giinther had also ascribed the same sex to a fish from Natal, Chromis philander, observed by N. Abraham to have similar habits. G. A. Boulenger has since had an opportunity to examine the latter specimen and found it to be a femak, as in all other nursing individuals from various parts of Africa, previously observed by himself; whilst J. Pellegrin has acertained the female sex of a specimen with eggs in the mouth presented to the Paris museum by L:>rtet as his Chromis paterfamilias. (= Tilapia simonis). Further observations by Pellegrin on Tilapia galilaea and Pelmatochromis lateralis, by E. Schoeller on Paralilapia multicolor, have led to the same result.

It therefore remains unproven whether in any of the African Cichlidae the buccal " incubation," as it has been called by Pellegrin, devolves on the male; the instances previously adduced being unsupported by the only trustworthy evidence — an examination of the genital glands.

The relative size and number of the eggs thus taken charge of vary very much according to the species. Thus they may be moderately large and numerous (100 to 200) in Tilapia nilotica and galilaea, larger and only about 30 in number in Paratilapia multicolor, while in Tropheus moorii, a fish measur- ing only no mm., the eggs filling the mouth and pharynx measure 4 mm. in diameter and are only four in number, they being proportionally the largest Teleostome eggs known. In Paralilapia pfefferi, a fish measuring 75 mm., the eggs found in the pharynx were only about a dozen in number, and they measure -x\ mm. in diameter. In Tilapia dardennii, which grows to a length of 240 mm., a score of eggs fills the mouth and pharynx, and each measures 5 to 6 mm. in diameter, an enormous size for so small a fish.

Pellegrin has made the interesting observation on Tilapia galilaea that while the eggs are developing in the bucopharyngeal cavity the ovarian eggs are rapidly growing towards maturity, so that a fresh deposition of ova may almost immediately follow the release of the young fishes from maternal care. (G. A. B.)

CICISBEO (Ital.; of uncertain origin; perhaps an inversion of bel cece, "beautiful chick (pea)," or from Fr. chiche beau, with same meaning), the term in Italy from the 17th century onwards for a dangler about women. The cicisbeo was the pro-' fessed gallant of a married woman, who attended her at all public entertainments, it being considered unfashionable for the husband to be escort.

CICOGNARA, LEOPOLDO, Count (1767-1834), Italian archae- ologist and writer on art, was born at Ferrara on the 17th of November 1767.

Mathematical and physical science diverted him a while; but his bent was decided, and not even the notice of such men as Spallanzani and Scarpa could make a savant of him. A residence of some years at Rome, devoted to painting

ahid the study of the antiquities and galleries of the Eternal City, wasfollowed by a visit to Naples and Sicily, and by the publica- tion, at Palermo, of his first work, a poem of no merit. The island explored, he betook himself to Florence, Milan, Bologna and Venice, acquiring a complete archaeological knowledge of these and other cities. In 1795 he took up his abode at Modena, and was for twelve years engaged in politics, becoming a member of the legislative body, a councillor of state, and minister pleni- potentiary of the Cisalpine Republic at Turin. Napoleon decorated him with the Iron Crown; and in 1808 he was made president of the Academy of the Fine Arts at Venice, a post in which he did good work for a number of years. In 1 808 appeared his treatise Del bello ragionamenti, dedicated in glowing terms to Napoleon. Thiswas followed (1813-1818) by his magnum opus, the Storia della scultura dal suo risorgimento in Italia al secolo di Napoleone, in the composition of which he had been encouraged and advised by Giordano and Wilhelm Schlegel (1767-1845). The book was designed to complete the works of Winckelmann and D'Agincourt, and is illustrated with 180 plates in outline. In 1814, on the fall of Napoleon, Cicognara was patronized by Francis I. of Austria, and published (1815-1820), under the auspices of that sovereign, his Fabbriche piu cospicue di Venezia, two superb folios, containing some 150 plates. Charged by the Venetians with the presentation of their gifts to the empress Caroline at Vienna, Cicognara added to the offering an illustrated catalogue of the objects it comprised; this book, Omaggio delle Provincie Venele alia maesta di Carolina Augusta, has since become of great value to the bibliophilist. Reduced to poverty by these splendid editorial speculations, Cicognara contrived to alienate the imperial favour by his political opinions. He left Venice for Rome; his library was offered for sale; and in 182 1 he published at Pisa a catalogue raisonne, rich in bibliographical lore, of this fine collection, the result of thirty years of loving labour, which in 1824 was purchased en bloc by Pope Leo XII., and added to the Vatican library. The other works of Cicognara are — the Memorie storiche de' litter ati ed artisti Ferraresi (181 1); the Vite de' piii insigni piltori e sculiori Ferraresi, MS.; the Memorie spetlanti alia storia della calcografta (1831); and a large number of dissertations on painting, sculpture,

engraving and other kindred subjects. (See Papoli, in No. 11 of the Exile, a print written and published by Italian refugees.). Cicognara's work in the academy at Venice, of which he became president in 1808, had important results in the increase in number of the professors, the improvement in the courses of study, the institu- tion of prizes, and the foundation of a gallery for the reception of Venetian pictures. He died on the 5th of March 1834.

See Zanetti, Cenni biografici di Leopotdo Cicognara (Venice, 1834); Malmani, Memorie del conte Leopoldo Cicognara (Venice, 1888).

CID, THE, the favourite hero of Spain, and the most prominent figure in her literature. The name, however, is so obscured by myth and fable as scarcely to belong to history. So extravagant are the deeds ascribed to him, and so marvellous the attributes with which he has been clothed by the fond idolatry of his country- men, that by some he has been classed with the Amadises and the Orlandos whose exploits he emulated. The Jesuit Masdeu stoutly denies that he had any real existence, and this heresy has not wanted followers even in Spain. The truth of the matter, however, has been expressed by Cervantes, through the mouth of the Canon in Don Quixote: " There is no doubt there was such a man as the Cid, but much doubt whether he achieved what is attributed to him." The researches of Professor Dozy, of Leiden, have amply confirmed this opinion. There is a Cid of history and a Cid of romance, differing very materially in character, but each filling a large space in the annals of his country, and exerting a singular influence in the development of the national genius.

The Cid of history, though falling short of the poetical ideal which the patriotism of his countrymen has so long cherished, is still the foremost man of the hcroical period of Spain — the greatest warrior produced out of the long struggle between Christian and Moslem, and the perfect type of the Castilian of the 1 2th century. Rodrigo Diaz, called de Bivar, from the place

of his birth, better known by the title given him by the Arabs as the Cid {El Seid, the lord), and El Campeador, the champion par excellence, was of a noble family, one of whose members in a former generation had been elected judge of Castile. The date of his birth cannot be fixed with any certainty, but it was probably between 1030 and 1040. As Rodrigo Diaz de Vivar he is first mentioned in a charter of Ferdinand I. of the year 1064. The legends which speak of the Cid as accompanying this monarch in his expeditions to France and Italy must be rejected as purely apocryphal. Ferdinand, a great and wise prince, under whom the tide of Moslem conquest was first effectually

stemmed, on his deathbed, in 1065, divided his territories among his five children. Castile was left to his eldest son Sancho, Leon to Alphonso, Galicia to Garcia, Zamora andToro to his two daughters Urraca and Elvira. The extinction of the western caliphate and the dispersion of the once noble heritage of the Ommayads into numerous petty independent states, had taken place some thirty years previously, so that Castilian and Moslem were once again upon equal terms, the country being almost equally divided between them. On both sides was civil war, urged as fiercely as that against the common enemy, in which the parties sought allies indiscriminately among Christians and Mahommedans.

No condition of affairs could be more favourable to the genius of the Cid. He rose to great distinction in the war between Sancho of Castile and Sancho of Navarre, in which he won his name of Campeador, by slaying the enemy's champion in single combat. In the quarrel between Sancho and his brotherAlphonso, Rodrigo Diaz espoused the cause of the former, and it was he who suggested the perfidious stratagem by which Sancho eventually obtained the victory and possession of Leon. – Sancho having been slain in 1072, while engaged in the siege of Zamora, Alphonso returned from exile and occupied the vacant throne. One of the most striking of the passages in the Cid's legendary history is that wherein he is represented as forcing the new king to swear that he had no part in his brother's death; but there was cause enough without this for Alphonso's animosity against the man who had helped to despoil him of his patrimony. For a time the Cid, already renowned throughout Spain for his prowess in war, was even advanced by the king's favour and entrusted with high commissions of state. In 1074 the Cid was wedded to Ximena, daughter of the count of Oviedo, and grand- daughter, by the mother's side, of Alphonso V. The original deed of the marriage-contract is extant. Some time afterwards the Cid was sent on an embassy to collect tribute from Motamid, the king of Seville, whom he found engaged in a war with Abdallah, the king of Granada. On Abdallah's side were many Castilian knights, among them Count Garcia Ordonez, a prince of the blood, whom the Cid endeavoured vainly to persuade of the disloyalty of opposing their master's ally. In the battle which ensued under the walls of Seville, Abdallah and his auxiliaries were routed with great slaughter, the Cid returning to Burgos with many prisoners and a rich booty. There fresh proofs of his prowess only served to kindle against him the rancour of his enemies and the jealousy of the king. Garcia Ordonez accused him to Alphonso of keeping back part of the tribute received from Seville, and the king took advantage of the Cid's absence on a raid against the Moors to banish him from Castile.

Henceforth Rodrigo Diaz began to live that life of a soldier of fortune which has made him famous, sometimes fighting under the Christian banner, sometimes under Moorish, but always for his own hand. At the head of a band of 300 free lances he offered his services first to the count of Barcelona; then, failing him, to Moktadir, the Arab king of Saragossa, of the race of the Beni Houd. Under Moktadir, and his successorsMoutamin and Mostain, the Cid remained for nearly eight years, fighting their battles against Mahommedan and Christian, when not engaged upon his own, and being admitted almost to a share of their royal authority. He made more than one attempt to be reconciled

with Alphonso, but, his overtures being rejected, he turned his arms against the enemies of the Beni Houd, exteuding their dominions at the expeme of the Christian states

of Aragon and Barcelona, and harrying even the border lands of Castile. Among the enterprises of the Cid the most famous was that against Valencia, then the richest and most flourishing city of the peninsula, and an object of cupidity to both Christian and Moslem. The Cid appeared before the place at the head of an army of 7000 men, for the greater part Mahommedans. In vain did the Valencians implore succour from the emir of Cordova, and from their co-religionists in other parts of the peninsula. In defiance of an army which marched to the' relief of the beleaguered city under Yusef the Almoravide, the Cid took Valencia after a siege of nine months, on the 15th of June 1094-— the richest prize which up to that time had been recovered from the Moors. The conditions of the surrender were all violated— the cadi Ibn Djahhaff burnt alive, a vast number of the citizens who had escaped death by famine slaughtered, and the possessions divided among the Campeador's companions. In other respects the Cid appears to have used his victory mildly, ruling his kingdom, which now embraced nearly the whole of Valencia and Murcia, for four years with vigour and justice. At length the Almoravides,, whom he had several times beaten, marched against him in great force, inflicting a crushing defeat at Cuenca upon the Cid's army, under his favourite lieutenant, Alvar Fanez. The blow was a fatal one to the aged and war-worn Campeador, who died of anger and grief in July 1099. His widow maintained Valencia for three years longer against the Moors, but was at last compelled to evacuate the city, taking with her the body of the Cid to be buried in the monastery of San Pedro at Cardena, in the neighbourhood of Burgos. Here, in the centre of a small chapel, surrounded by his chief com- panions "in arms, by Alvar Fanez Minaya, Pero Bermudez, Martin Antolinez and Pelaez the Asturian, were placed the remains of the mighty warrior, the truest of Spanish heroes, the embodiment of all the national virtues and most of the national vices. The bones have since been removed to the town hall of Burgos. Philip II. tried to get him canonized, but Rome objected, and not without reason.

Whatever were his qualities as a fighter, the Cid was but indifferent material out of which to make a saint, — a man who battled against Christian and against Moslem with equal zeal, who burnt churches

and mosques with equal zest, who ravaged, plundered and slew as much for a livelihood as for any patriotic or religious purpose, and was in truth almost as much of a Mussulman as a Christian in his habits and his character. His true place in history is that of the greatest of the guerrilleros — the perfect type of that sort of warrior in which, from the days of Viriathus to those of Juan Diaz, El Empecinado, the soil of Spain has been most productive.

The Cid of romance, the Cid of a thousand battles, legends and dramas, the Cid as apotheosized in literature, the Cid invoked by good Spaniards in every national crisis, whose name is a perpetual and ever-present inspiration to Spanish patriotism, is a very different character from the historical Rodrigo Diaz — the freebooter, the rebel, the consorter with the infidels and the enemies of Spain. He is the Perfect One, the Bom in a Happy Hour, ” My Cid,” the invincible, the magnanimous, the all- powerful. He is the type of knightly virtue, the mirror of patriotic duty, the flower of all Christian grace. He is Roland and Bayard in one. In the popular literature of Spain he holds a place such as has no parallel in other countries. From an almost contemporary period he has been the subject of song; and he who was chanted by wandering minstrels in the 12th century has survived to be hymned in revolutionary odes of the 19th. In a barbarous Latin poem, written in celebration of the conquest of Almeria by Alphonso VII. in the year 1147, we have the bard testifying to the supereminence of the Cid among his country’s heroes: —

” Ipse Rodericus Mio Cid semper vocatus, De quo cantatur quod ab hostibus haud superatus, Qui domuit Mauros, comites domuit quoque nostros.”

Within a hundred years of his death the Cid had become the centre of a whole system of myths. The Poema del Cid, written in the latter half of the 1 2th century, has scarcely any

trace of a historical character. Already the Cid had reached: his apotheosis, and Castilian loyalty could not consent to degrade him when banished by his sovereign :—

” Dios, que buerc vassalo si ovjese buensenor ! ” cry the weeping citizens’ of Burgos, as they speed the exile: on his way.

The Poem of the Cid is but a fragment of 3744 lines; written in a barbarous style, in rugged assonant rhymes, and a rude Alexandrine measure, but it glows with the pure fire of poetry, and is full of a noble simplicity and a true epical grandeur, invaluable as a living

picture; of the age. The ballads relating to the Cid, of which nearly two hundred are extant, are greatly inferior in merit, though some of them are not unworthy to be ranked with the best in this kind. Duran believes the greater part of them to have been written in the 16th century. A fefr betray, not more by the antiquity of their language than by their natural and simple tone, traces of an earlier age and a freer national life. They all take great liberties with history, thus belying the opinion of Sancho Panza that ” the ballads are too old to tell lies.” Such of them as are not genuine relics of the 1 2th century are either poetical versions of the leading episodes in the hero’s life as contained in the Chronicle, that Chronicle itself having been doubtless composed out of still earlier legends as sung by the wandering juglares, or pure inventions of a later time, owing their inspiration to the romances of chivalry. In these last the ballad-mongers, not to let their native hero be outdone by the Aniadises, the Esplandians, and the Felixmartes, engage him in the most extravagant adventures — making war upon the king of France and upon the emperor, receiving em- bassies from the soldan of Persia, bearding the pope at Rome, and performing other feats not mentioned even in the Poem or the Chronicle. The last and the worst of the Cid ballads are those which betray by their frigid conceits and feeble mimicry of the antique the false taste and essentially unheroic spirit of the age of Philip II. As for the innumerable other poems, dramas and tales which have been founded on the legend of the Cid, from the days of Guillen de Castro and Diamante to those of Quintana and Trueba, they serve merely to prove the abiding popularity of the national hero in his native land.

The chief sources from ■which the story of the Cid is to be gathered are, first, the .Latin chronicle discovered by Risco in the convent of San Isidro at Leon, proved by internal evidence to have been written before 1258 ; the Cronica’ General, composed by Alphonso X. in the second half of the 13th century, partly (so far as relates to the Cid) from the above, partly from contemporary Arabic histories, and partly from tradition; the Cronica del Cid, first published in 1512; by Juan de Velorado, abbot of the monastery of San Pedro at Cardena, which is a compilation from the last, interlarded with new fictions due to the piety of the compiler; lastly, various Arabic manuscripts, some of contemporary date, which are examined and their claims weighed in the second volume of Professor Dozy’s Reckerches sur I’ histoire. politique et litteraire de V Espagne pendant le moyen Age (Leiden, 1849). Huber, Miiller, and Ferdinand Wolf are among the leading authorities in the history and literature of the Cid. M. Damas Hinard has published thepoem, with a literal French translation and notes, and John Hookham Frere has rendered it into English with

extraordinary spirit and fidelity. The largest collection of the Cid ballads is that of Durant, in the Romancero general, in two volumes, forming part of Rivadeneyra's Biblioteca de dutores espanoles. (H. E. W.)

CIDER, or Cyder (from the Fr. cidre, derived from the, Lat. sicera or cisera, Gr. tr'ucepa, Heb. shSkdr, strong drink), an alcoholic beverage made from apples.

Cider and perry (the corresponding beverage made from pears) are liquors containing from as little as 2% of alcohol to 7 or 8%, seldom more, and rarely as much, produced by the vinous fermentation of the expressed juice of apples and pears; but cider and perry of prime quality can only be obtained from vintage fruit, that is, apples and pears grown for the purpose and unsuited for the most part for table use. A few table apples make good cider, but the best perry is only to be procured from pears too harsh and astringent for consumption in any other form. The making of perry is in England confined, in the main, to the counties of Hereford, Worcester and Gloucester. These three counties, together with Somerset and Devon, constitute, too, the principal cider-making district of the country; but the

- industry, which was once more widely spread,, still survives an Norfolk, and has lately been revived in Kent, though;: in; both these counties, much of the fruit used in cider-making is imported from the west country and some from the continent. : Speaking generally, the cider of Herefordshire is distinguished , for its lightness and briskness, that of Somerset for its strength, and that of Devonshire for its lusciousness.

Cider used to be made in the south of Ireland, but the industry had almost become extinct until revived by the Department of Agriculture, which in 1904 erected a ciderTinaking plant at Drogheda, Co. Louth, gave assistance to private firms at Dun- garvan, Co. Waterford, and Fermoy, Co. Cork, and provided a travelling mill and press to work in the South Riding of Co. Tipperary. The results have been highly satisfactory, a large quantity of good cider having been produced.

Inasmuch as English orchards are crowded with innumerable varieties of cider apples, many of them worthless, a committee composed of members of the Herefordshire Fruit-Growers' Association and of the

Fruit and Chrysanthemum Society was appointed in 1899 to make a selection of vintage apples and pears best suited to Herefordshire and the districts adjoining. The following is the list drawn up by the committee:—

Apples— Old Foxwhelp, Cherry Pearmain, Cowarne Red, Dymock Red, Eggleton Styre, Kingston Black or Black Taunton, Skyrme's Kernel, Spreading Redstreak, Carrion apple, Cherry Norman, Cummy Norman, Royal Wilding, Handsome Norman, Strawberry Norman, White Bache or Norman, Broad-leaved Norman, Argile Grise, Bramtot, De Boutville, Fr6quin Audievre, Medaille d'Or, the last five being French sorts introduced from Normandy about 1880, and now established in the orchards of Herefordshire.

Pears. — Taynton Squash, Barland, Oldfield, Moorcroft or Malvern Hill, Red-pear, Thurston's Red, Longland, Pine pear.

No equally authoritative selection has been made for the Somerset and Devon districts, but the following varieties of cider apples are held in good repute in those parts: — Kingston Black, Jersey Chisel, Hangdowns, Fair Maid of Devon, Woodbine, Duck's Bill, Slack-my-Girdle, Bottle Stopper, Golden Ball, Sugar-loaf, Red Cluster, Royal Somerset and Cadbury (believed to be identical with the Royal Wilding of Herefordshire). As a rule the best cider apples are of small size. " Petites pommes, gros cidre," say the French. •

Cider and perry not being taxable liquors in England, it is impossible to estimate with even an approach to accuracy the amount of the annual production of them. In 1896 Mr Sampson, the then secretary of the National Association of English Cider- makers, in his evidence before the royal commission on agricul- ture, put it at 555 million gallons. Since that date theincreased demand for these native wines has given such an impetus to the industry that this figure might with safety be doubled. In France official statistics are available, and these show not only that that country is the largest producer of cider (including perry) in the world, but that the output is yearly increasing. A great pro- portion, however, of what passes as cider in prance is boisson, i.e. cider to which water has been added in the process of making or at a subsequent stage; while much of the perry is disposed of to the makers of champagne. Although some cider is made in sixty-five departments, by far the largest amount comes from the provinces of Normandy and Brittany. In Germany cider- making is a considerable and growing industry. Manufactories on a small scale exist in north Germany, as at Gu ben and Gnin- berg, but the centre of the industry is at Frankfort-on-Main, Sachsenhausen and the

neighbourhood, where there are five large and twenty-five small factories employing upwards of 1000 hands. Large quantities of cider fruit are imported from foreign countries, as, speaking generally, the native-grown fruit used in Germany for cider-making consists of inferior and undersized table apples not worth marketing. The bottled cider for export is treated much like champagne, and is usually fortified and flavoured until, in the words of an acknowledged French authority, M. Truelle, it becomes a hybrid between cider and white wine rather than pure cider.

The practice which formerly prevailed ito England of making cider on the farm from the produce of the home orchards has within the last few years been to a large extent given up, and, as in Germany and many parts of France, farmers now sell their fruit to owners of factories where the making of cider and perry is carried on as a business of itself. In these hand or horse power is superseded by steam and sometimes by electricity, as in the factory of E. Seigel in Griinberg, and the old-fashioned appliances of the farm by modern mills and presses capable of turning out large quantities of liquor. The clearing of the juice, too, which used to be effected by running it through bags, is in the factories accomplished more quickly by forcing it through layers of compressed cotton in a machine of German origin known as Lumley's filter. The actual process of cider and perry making is simple, and resembles that of making grape wine. The fruit is ground or crushed in machines of various construction, the latest and most powerful being of American origin. The resulting pomace is pressed for the extraction of the juice, which is then run into vats, where it undergoes fermentation, which, converting the saccharine ingredients into alcohol and carbonic acid gas, turns it into cider. Cider made from a judicious mixture of several varieties of apples is to be preferred to cider made from one variety only, inasmuch as it is less difficult to find the requisite degrees of richness, astringency and flavour in several varieties than in one; but the contrary is the case with pears, of which the most noted sorts, such as the Barland, the Taynton Squash and the Oldfield, produce the best perry when unmixed with, other varieties. Some fining of an albuminous nature is generally requisite in order to clear the juice and facilitate its passage through the filter, but the less used the better. The simplest and cleanest is skim milk whipped to a froth and blended gradu^ ally with the cider as it is pumped into the mixing vat. Many nostrums are sold for the clearing of cider, but none is necessary and most are harmful.

Of late years the practice has largely obtained of using preservatives for the purpose of checking fermentation. The principal preservatives employed are salicylic and boracic acids and formalin. The two former

are ineffective except in quantities likely to prove hurtful to health, while formalin, in itself a powerful and deleterious drug, though it stops fermentation,, renders the liquor cloudy and undrinkable. Other foreign in- gredients, such as saccharin and porcherine, both coal-tar derivatives — the latter a recent discovery of a French chemist, after whom it is named — are used by many makers, chiefly for the purpose of rendering bad and therefore unwholesome cider, palatable and saleable. Provided that cider and perry be properly filtered, and attention paid to perfect cleanliness of vessels and appliances, there is no need of preservatives or sweeteners, and their use ought to be forbidden by law in England, as it is in most continental states in the case of liquors to be consumed within their borders, though not, it is significant to note, in the case of liquors intended for exportation.

The wholesome properties of cider and perry when pure and unadulterated have been recognized by medical men, who recommend them as pleasant and efficacious remedies in affec- tions of a gouty or rheumatic nature, maladies which, strange to say, these very liquors were once supposed to foster, if not actually to originate. Under a similar false impression the notion is general that hard rough cider is apt to cause diarrhoea, colic and kindred complaints, whereas, as a fact, disorders of this kind are conspicuous by their absence in those parts of the country where rough cider and perry constitute the staple drinks of the working-classes. This is especially the case in Herefordshire, which is said also to be the only county in England whence no instance of the occurrence of Asiatic cholera has ever been reported.

The importance which the cider industry has of late attained in England has been marked by the establishment of the National Fruit and Cider Institute at Long Ashton near Bristol. This institute, founded in 1903 at the instance of the Board of Agriculture, is supported by grants from the board, the Bath and West of England. Society, the councils of the cider-producing

counties of Hereford, Gloucester, Worcester, Monmouth* Devon and Somerset, and by subscription of members. The objects of the institute are the promotion of research into the causes of the changes which occur in cider and perry during fermentation, with the view of imparting to these liquors a degree of exactitude hitherto unattainable; the adoption from time to time of im- proved machinery

and methods in cider-making; the detection of adulteration; the giving of instruction in the principles and practice of cider-making; the publication of reports detailing the results of the researches undertaken at the institute; the testing and selection of the sorts of fruit best suited for vintage purposes; the propagation of useful varieties likely from neglect to go out of cultivation; and the conducting of experiments in regard to the best systems of planting and protecting young fruit trees.

Fruit-growers who look to cider-making ” as a means of utilizing windfalls and small and inferior apples of cooking and dessert varieties not worth sending to market ” should be warned that it is as important to the cider industry that good cider only should be on sale as it is to the fruit-growing industry that good fruit only should be sent to market. The juice of the apple is naturally affected by the condition of the fruit itself, and if this be unripe, unsound or worm-eaten the cider made from it will be inferior to that made from full-grown, ripe and sound fruit. If such fruit be not good enough to send to market, neither will the cider made from it be good enough to place before the public. Nevertheless, it may furnish a sufficiently palatable drink for home consumption, and may therefore be so utilized. But when, as happens from time to time in fruit-growing districts, there is a glut, and even the best table fruit is not saleable at a profit, then, indeed, cider-making is a means of storing in a liquid form what would otherwise be left to rot on the ground; whilst if a proportion of vintage fruit were mixed therewith, a drink would be produced which would not discredit the cider trade, and would bring a fair return to the maker. (C. W. R. C.)

CIENFUEGOS, NICASIO ALVAREZ DE (1764-1809), Spanish poet and publicist, was born at Madrid on the 14th of December 1764. He studied with distinction at Salamanca, where he met the poet Melendez Valdes. His poems, published in 1778, immediately attracted attention. He was successively editor of the Gaceta and Mercurio, and was condemned to death for having published an article against Napoleon; on the petition of his friends, he was respited and deported to France; he died at Orthez early in the following year. His verses are modelled on those of Melendez Valdes; though not deficient in technique or passion, they are often disfigured by spurious sentimentality and by the flimsy philosophy of the age. Cienfuegos was blamed for an unsparing use of both archaisms and gallicisms. His plays, Pilaco, Zoraida, La Condesa de Costilla and Idomeneo, four tragedies on the pseudo-classic French model, and Las Hermanas generosas, a comedy, are deservedly forgotten.

CIENFUEGOS (originally Fernandina de JaGua), one of the principal cities of Cuba, in Santa Clara province, near the central portion of the S. coast, 195 m. E.S.E. of Havana. Pop. (1907) 30,100. Cienfuegos is served by the United railways and by steamers connecting with Santiago, Batabano, Trinidad and the Isle of Pines. It lies about 6 m. from the sea on a peninsula in the magnificent landlocked bay of Jagua. Vessels drawing 16 ft. have direct access to the wharves. A circular railway about the water-front, wharves and warehouses facilitates the loading and unloading of vessels. The city streets are broad and regularly laid out. There is a handsome cathedral; and the Tomas Terry theatre (given to the city by the heirs of one of the millionaire sugar planters of the jurisdiction), the governor's house (1841-1844), the military and government hospitals, market place and railway station are worthy of note. In the Cathedral Square (Plaza de Armas), embracing two city- squares, and shaded — like all the plazas of the island — with laurels and royal palms, are a statue of Isabel the Catholic, and two marble lions given by Queen Isabel II.; elsewhere there are statues of General Clouet and Marshal Serrano, once captain-general. The city is lighted by gas and electricity, has an

abundant water-supply, and cable connexion with Europe, the United States, other Antilles and South America. The surrounding country is one of the prettiest and most fertile regions in Cuba, varied with woods, rivers, rocky gulches, beautiful cascades and charming tropic vegetation. Several of the largest and finest sugar estates in the world are situated in the vicinity, including the Soledad (with a botanical experiment station maintained by Harvard University), the Terry and others — most of them connected with the city by good drive- ways. Cienfuegos is a centre of the sugar trade on the south coast; tobacco too is exported.

The bay of Jagua was visited by Columbus. The city was founded in 1819, with the aid of the Spanish government, by a Louisianian, General Luis de Clouet; it was destroyed by a hurricane and was rebuilt in 1825. Many naturalized foreign Catholics, including Americans, were among the original settlers. The settlement was first named in honour of Ferdinand VII., and later in honour of Captain-General Jos6 Cienfuegos Jovel- lanos. The harbour was known from the earliest times, and has been declared by Mahan to be the most important of the Caribbean Sea for strategic purposes. In 1740-1745 a fortifica- tion called Nuestra Sefiora de los Angeles was erected at the entrance; it is still standing, on a steep bluff overlooking the sea, and is one of the most picturesque of the old fortifications of the island. On the nth of May 1898 a force from two vessels of the United States fleet under Admiral Schley, searching for Cervera and blockading the

port, cut two of the three cables here (at Point Colorado, at the entrance of the harbour), and for the first time in the Spanish-American War the American troops were under fire.

CIEZA, a town of south-eastern Spain, in the province of Murcia, on the right bank of the river Segura, and on the Madrid- Cartagena railway. Pop. (1900) 13,626. Cieza is built in a narrow bend of the Segura valley, which is enclosed on the north by mountains, and on the south broadens into a fertile plain, producing grain, wine, olives, raisins, oranges and esparto grass. In the town itself there are flour and paper mills, sawmills and brandy distilleries. Between 1870 and 1900 local trade and population increased rapidly, owing partly to improved means Of communication; and the appearance of Cieza is thoroughly modem.

CIGAR, the common term for tobacco-leaf prepared for smok- ing by being rolled into a short cylinder tapering to a point at the end which is placed in the mouth, the other end, which is lighted, being usually cut square (see Tobacco). The Spanish cigarro is of doubtful origin, possibly connected with cigarra, a cicada, from its resemblance to the body of that insect, or with cigarral, a word of Arabic origin meaning a pleasure garden. The explanation that it comes from a Cuban word for a certain species of tobacco is probably erroneous, since no native word of the kind is known. The diminutive, cigarette, denotes a roll of cut tobacco enclosed usually in thin paper, but sometimes also in tobacco-leaf or the husk of Indian corn.

CIGNANI, CARLO (1628-1719), Italian painter, was born of a noble family at Bologna, where he studied under Battista Cairo, and afterwards under Francesco Albani. Though an intimate friend of the latter, and his most famous disciple, Cignani was yet strongly and deeply influenced by the genius of Correggio. His greatest work, moreover, the ” Assumption of the Virgin,” round the cupola of the church of the Madonna della Fuoca at Forli, which occupied him some twenty years, and is in some respects one of the most remarkable works of art of the 17th century, is obviously inspired from the more renowned fresco of Correggio in the cupola of the cathedral of Parma. Cignani had some of the defects of his masters; his elaborate finish, his audacious artificiality in the use of colour and in composition, mark the disciple of Albani; but he imparted to his work a more intellectual character than either of his models, and is not without other remarkable merits of his own. As a man Cignani was eminently amiable, unassuming and generous. His success, however, made him many enemies; and the envy of some of these is said to have impelled them to deface certain of his works.

He accepted none of the honours offered him by the duke of Parma and other princes, but lived and died an artist. On his removal to Forli, where he died, the school he had founded at Bologna was fain in some sort to follow its master. His most famous pictures, in addition to the Assumption already cited, are — the ” Entry of Paul III. into Bologna “; the ” Francois I. Touching for King’s Evil “; a ” Power of Love,” painted under a fine ceiling by Agostino Carracci, on the walls of a room in the ducal palace at Parma; an ” Adam and Eve ” (at the Hague); and two of ” Joseph and Potiphar’s Wife ” (at Dresden and Copenhagen). His son Felice (1660-17 24) and nephew Paolo (1 700-1 764) were also painters.

CIGOLI (orCivoLi), LODOVICO CARDI DA (1559-1613), Italian painter, architect and poet, was born at Cigoli in Tuscany. Educated under Alessandro Allori and Santi di Tito, he formed a peculiar style by the study at Florence of Michelangelo, Cor- reggio, Andrea del Sarto and Pontormo. Assimilating more of the second of these masters than of all the others, he laboured for some years with success; but the attacks of his enemies, and intense application to the production of a wax model of certain anatomical preparations, induced an alienation of mind which affected him for three years. At the end of this period he visited Lombardy, whence he returned to Florence. There he painted an ” Ecce Homo,” in competition with Passignani and Caravaggio, which gained the prize. This work was afterwards taken by Bonaparte to the Louvre, and was restored to Florence in 181 5. Other important pictures are — a ” St Peter Healing the Lame Man,” in St Peter’s at Rome; a ” Conversion of St Paul,” in the church of San Paolo fuori le Mura, and a ” Story of Psyche,” in fresco, at the Villa Borghese; a ” Martyrdom of Stephen,” which earned him the name of the Florentine Cor- reggio, a ” Venus and Satyr,” a ” Sacrifice of Isaac,” a ” Stigmata of St Francis,” at Florence. Cigoli, who was made a knight of Malta at the request of Pope Paul III., was a good and solid draughtsman and the possessor of a rich and harmonious palette. He died, it is said, of grief at the failure of his last fresco (in the Roman church of Santa Maria Maggiore), which is rendered ridiculous by an abuse of perspective.

CILIA (plural of Lat. cilium, eyelash), in biology, the thread- like processes by the vibration of which many lowly organisms, or the male reproductive cells of higher organisms, move through water.

CILIATA (M. Pertz), one of the two divisions of Infusoria, characterized by the permanent possession of cilia or organs derived from these (cirrhi, membranelles, &c), and possessing a single mouth (except in the Opalinopsidae, all parasitic) . They are the most highly differentiated among the Protozoa.

CILICIA, in ancient geography, a district of Asia Minor, extending along the south coast from the Alara Su, which separated it from Pamphylia, to the Giaour Dagh (Mt. Amanus), which parted it from Syria. Its northern limit was the crest of Mt. Taurus. It was naturally divided into Cilicia Trachea, W. of the Lamas Su, and Cilicia Pedias, E. of that river.

Cilicia Trachea is a rugged mountain district formed by the spurs of Taurus, which often terminate in rocky headlands with small sheltered harbours, — a feature which, in classical times, made the coast a resort of pirates, and, in the middle ages, led to its occupation by Genoese and Venetian traders. The district is watered by the Geuk Su (Calycadnus and its tributaries), and is covered to a large extent by forests, which still, as of old, supply timber to Egypt and Syria. There were several towns but no large trade centres. In the interior were Coropissus (Da Bazar), Olba (Uzunjaburj), and, in the valley of the Calycadnus, Claudiopolis (Mut) and Germanicopolis (Ermenek). On or near the coast were Coracesium (Alaya). SWinus-Trajanopolis (Selinti) , Anemourium (Anamur), Kelenderis (Kilindria), Seleucia ad Calycadnum (Selefkeh), Corycus (Korghoz) and Elaeusa- Sebaste (Ayash) . Roads connected Laranda, north of theTaurus, with Kelenderis and Seleucia.

Cilicia Pedias included the rugged spurs of Taurus and a large plain, which consists, in great part, of a rich stoneless loam. Its eastern half is studded with isolated rocky crags, which are

crowned with the ruins of ancient strongholds, and broken by the low hills that border the plain of Issus. The plain is watered by the Cydnus (Tarsus Chai),the Sarus (Sihun) and the Pyramus (Jihun), each of which brings down much silt. The Sarus now enters the sea almost due south of Tarsus, but there are clear indications that at one period it joined the Pyramus, and that the united rivers ran to the sea west of Kara-tash. Such appears to have been the case when Alexander’s army crossed Cilicia. The plain is extremely productive, though now little cultivated. Through it ran the great highway, between the east and the west, on which stood Tarsus on the Cydnus, Adana on the Sarus, and Mopsuestia (Missis) on the Pyramus. North of the road between the two last places were Sision-Flaviopolis (Sis), Ana- zarbus (Anazarba)

and Hierapolis-Kastabala (Budrum); and on the coast were Soli-Pompeiopolis, Mallus (Kara-tash), Aegae (Ayash), Issus, Baiae (Piyas) and Alexandria ad Issum (Alexan- dretta). The great highway from the west, on its long rough descent from the Anatolian plateau to Tarsus, ran through a narrow pass between walls of rock called the CilicianGate,Ghulek Boghaz. After crossing the low hills east of the Pyramus it passed through a masonry (Cilician) gate, Demir Kapu, and entered the plain of Issus. From that plain one road ran south- ward through a masonry (Syrian) gate to Alexandretta, and thence crossed Mt. Amanus by the Syrian Gate, Beilan Pass, to Antioch and Syria; and another ran northwards through a masonry (Amanian) gate, south of Toprak Kaleh, and crossed Mt. Amanus by the Amanian Gate, Baghche Pass, to North Syria and the Euphrates. By the last pass, which was apparently unknown to Alexander, Darius crossed the mountains prior to the battle of Issus. Both passes are short and easy, and connect Cilicia Pedias geographically and politically with Syria rather than with Asia Minor. Another important road connected Sision with Cocysus and Melitene. In Roman times Cilicia exported the goats'-hair cloth, Cilicium, of which tents were made.

The Cilicians appear as Khilikku in Assyrian inscriptions, and in the early part of the first millennium B.C. were one of the four chief powers of western Asia. It is generally assumed that they had previously been subject to the Syro-Cappadocian empire; but, up to 1909 at all events, " Hittite " monuments had not been found in Cilicia; and we must infer that the " Hittite " civilizations which flourished in Cappadocia and N. Syria, communicated with each other by passes E. of Amanus and not by the Cilician Gates. Under the Persian empire Cilicia was apparently governed by tributary native kings, who bore a name or title graecized as Syennesis; but it was officially included in the fourth satrapy by Darius. Xenophon found a queen in power, and no opposition was offered to the march of Cyrus. Similarly Alexander found the Gates open, when he came down from the plateau in 332 B.C.; and from these facts it may be inferred that the great pass was not under direct Persian control, but under that of a vassal power always ready to turn against its suzerain. After Alexander's death it was long a battle ground of rival marshals and kings, and for a time fell under Ptolemaic dominion, but finally under that of the Seleucids, who, however, never held effectually more than the eastern half. Cilicia Trachea became the haunt of pirates, who were subdued by Pompey. Cilicia Pedias became Roman territory in 103 B.C., and the whole was organized by Pompey, 64 B.C., into a province which, for a short time, extended to and included part of Phrygia. It was reorganized by Caesar, 47 B.C., and about 27 B.C.

became part of the province Syria-Cilicia- Phoenice. At first the western district was left independent under native kings or priest-dynasts, and a small kingdom, under Tarkondimotus, was left in the east; but these were finally united to the province by Vespasian, a.d. 74. Under Diocletian (circa 297), Cilicia, with the Syrian and Egyptian provinces, formed the Diocesis Orientis. In the 7th century it was invaded by the Arabs, who held the country until it was reoccupied by Nicephorus II. in 965.

The Seljuk invasion of Armenia was followed by an exodus of Armenians southwards, and in 1080 Rhupen, a relative of the last king of Ani, founded in the heart of the Cilician Taurus a small

principality, which gradually expanded into the kingdom of Lesser Armenia. This Christian kingdom — situated in the midst of Moslem states, hostile to the Byzantines, giving valuable support to the crusaders, and trading with the great commercial cities of Italy— had a stormy existence of about 300 years. Gosdantin I. (1095-1100) assisted the crusaders on their march to Antioch, and was created knight and marquis. Thoros I. (1100-1123), in alliance with the Christian princes of Syria, waged successful war against Byzantines and Seljuks. Levond (Leo) II., ” the Great ” (1185-1210), extended the kingdom beyond Mount Taurus and established the capital at Sis. He assisted the crusaders, was crowned king by the archbishop of Mainz, and married one of the Lusignans of Cyprus. Haithon I. (1224-1269) made an alliance with the Mongols, who, before their adoption of Islam, protected his kingdom from the Mamelukes of Egypt. When Levond V. died (1342), John of Lusignan was crowned king as Gosdantin IV.; but he and his successors alienated the Armenians by attempting to make them conform to the Roman Church, and by giving all posts of honour to Latins, and at last the kingdom, a prey to internal dissensions, succumbed (1375) to the attacks of the Egyptians. Cilicia Trachea was occupied by the Osmanlis in the 15th century, but Cilicia Pedias was only added to the empire in 1515.

From 1833 to 1840 Cilicia farmed part of the territories administered by Mehemet Ali of Cairo, who was compelled to evacuate it by the allied powers. Since that date it has formed the vilayet of Adana (?.».).

Bibliography. — Beside the general authorities for Asia Minor, see: — W. B. Barker, Lares and Penates (1853); V. Langlois, Voyage dans la

Cilicie (1861) ; F. Beaufort, Karamania (1817) ; W. F. Ainsworth, Narrative of the Euphrates Expedition (1888), and Travels in Asia Minor (1842); R. Heberdey and A. Wilhelm, Reisen in Kilikien (1896); D. G. Hogarth and J. A. R. Munro, Mod. and Anc. Roads in E. Asia Minor (R. G. S. Supp. Papers, iii.) (1893); D, G. Hogarth, A Wandering Scholar (1896); G. L. Schlumberger, Un Empereur byzantin (1890) ; T. Kotschy, Reise in dem cilicischen Taurus (1858); H. C. Barkley, Ride through Asia Minor and Armenia (1801); E. J. Davis, Life in Asiatic Turkey (1879); J. Marquardt, Rom. Staatsverwaltung, i. (1874); J. R. S. Sterrett, Wolfe Expedition (1888). See also authorities under Armenia and Mehemet Ali. (C. W. W. ; D. G. H.)

CILLI, ULRICH, Count or (1406-1456), son of Frederick II., count of Cilli, and Elizabeth Frangepan. Of his youth we know nothing certain. About 1432 he mifljried Catherine, daughter of George Brankovich, despot of Servia.

His influence in the troubled affairs of Hungary and the Empire early overshadowed that of his father, together with whom he wias made a prince of the Empire by the emperor Sigismund (1436). Hence feuds with the Habsburgs, wounded in their rights as overlords of Cilli, ending, however, in an alliance with the Habsburg king Albert II., who made Ulrich for a short while his lieutenant in Bohemia. After Albert's death (1430) Ulrich took up the cause of his widow Elizabeth, and presided at the coronation of her infant son Ladislaus V. Posthumus (1440). 'A feud with the Hunyadis followed, em- bittered by John Hunyadi's attack on George Brankovich of Servia (1444) and his refusal to recognize Ulrich's claim to Bosnia on the death of Stephen Tvrtko (1443). In 1446 Hunyadi, now governor of Hungary, harried the Cilli territories in Croatia-Slavonia; but his power was broken at Kossovo (1448), and Count Ulrich was able to lead a successful crusade, nominally in the Habsburg interest, into Hungary (1450) . In 1452 he forced the emperor Frederick III. to hand over the boy king Ladislaus V. to his keeping, and became thus practically ruler of Hungary. In 1454 his power was increased by his. succession to his father's vast wealth; and in 1456 he was named by Ladislaus his lieutenant in Hungary. The Hunyadis now conspired to destroy him. On the 8th of November, in spite of warnings, he entered Belgrade with the king; the next day he was attacked by Laszlo Hunyadi and his friends, and done to death. With him died the male line of the counts of Cilli.

Count Ulrich's ambition was boundless, his passions un- bridled; but the hostile judgments passed by Aeneas

Sylvius and other contemporaries upon him must be read with caution.

CILLI (Slovene, Celje), a town in Styria, Austria, 82 m. S. by W. of Graz by rail. Pop. (1900) 6743. It is picturesquely situated on the left bank of the river Sann, and still has remains of the old walls and towers, with which it was once surrounded. Memorials of a still earlier period in its history — Roman anti- quities— are to be seen in the municipal museum, while its canals and sewers are also of Roman origin. These were discovered during the second half of the 19th century, and were in such a good state of preservation that after a few small repairs they are now utilized. The parish church, dating from the 14th century, with its beautiful Gothic chapel, is one of the most interesting specimens of medieval architecture. The so-called German church, in Romanesque style, belonged to the Minorite monastery, founded in 1241 and closed in 1808. The throne of the counts of Cilli is preserved here, and also the tombs of several members of the family. On the Schlossberg (1320 ft.), situated to the S.E. of the town, are the ruins of the castle of Ober-Cilli, the former residence of the counts of Cilli. Ten miles to the N. W. of Cilli are situated the baths of Neuhaus, with indifferent thermal waters (117 F.), frequented by ladies. Not far from it is the ruined castle of Neuhaus, called since 1643 Schlangen- burg, from which an extensive view of the neighbouring Alps is obtained.

Cilli is one of the oldest places in Styria, and was probably a Celtic settlement. It was taken possession of by the Romans in 15 B.C., and in a.d. 50 the emperor Claudius raised it to a Roman municipium and named it Claudia Celeja. It soon became one of the most flourishing Roman colonies, and possessed numerous great buildings, of which the temple of Mars was famous throughout the whole empire. It was incorporated with Aquileia, under Constantine; and towards the end of the 6th century was destroyed by the invading Slavs. It had a period of exceptional prosperity from the middle of the 14th to the latter half of the 15th century, under the counts of Cilli, on the extinction of which family it fell to Austria. In the 16th century it suffered greatly both from revolts of the peasantry and from the Counter- Reformation, Protestantism having made many converts in the distriqt, particularly among the nobles.

See Glantschnigg, Celeja (Cilli, 1892).

CIMABUE, GIOVANNI (1240 to about 1302), Italian painter, was born in Florence of a respectable family, which seems to have borne the name of Gualtieri, as well as that of Cimabue (Bullhead) . He took to

the arts of design by natural inclination, and sought the society of men of learning and accomplishment. Vasari, the historian of Italian painting, zealous for his own native state of Florence, has left us the generally current account of Cimabue, which later researches have to a great extent invalidated. We cannot now accept his assertion that art, extinct in Italy, was revived solely by Cimabue, after he had received some training from Greek artists invited by the Floren- tine government to paint the chapel of the Gondi in the church of S. Maria Novella; for native Italian art was not then a nullity, and this church was only begun when Cimabue was already forty years old; Even Lanzi's qualifying statement that Greek artists, although they did not paint the chapel of the Gondi, did execute rude decorations in a chapel below the existing church, and may thus have inspired Cimabue, makes little difference in the main facts. What we find as the general upshot is that some Italian painters preceded Cimabue—particularly Guido of Siena and Giuhta of Pisa; that he worked on much the same principle as they, and to a like result; but that he was neverthe- less the most advanced master of his time, and, by his own works, and the training which he imparted to his mighty pupil Giotto, he left the art far more formed and more capable of growth than he found it (see Painting).

The undoubted admiration of his contemporaries would alone demonstrate the conspicuous position which Cimabue held, and deserved to hold. For the chapel of the Rucellai in S. Maria Novella he painted in tempera a colossal " Madonna and Child with Angels," the largest altarpiece produced up to that date;

before its removal from the studio it was visited with admiration by Charles of Anjou, with a host of eminent men and gentle ladies, and it was carried to the church in a festive procession of the people and trumpeters. Cimabue was at this time living in the Borgo Allegri, then outside the walls of Florence; the legend that the name Allegri (Joyous) was bestowed on the locality in consequence of this striking popular display is more attractive than accurate, for the name existed already. Of this celebrated picture, one of the great landmarks of modern and sacred art, some details may be here given, which we condense from the History of Painting in Italy by Crowe and Cavalcaselle.

" The Virgin in a red tunic and blue mantle, with her feet resting on

an open-worked stool, is sitting on a chair hung with a white drapery flowered in gold and blue, and carried by six angels kneeling in threes above each other. A delicately engraved nimbus surrounds her head, and that of the infant Saviour on her lap, who is dressed in a white tunic, and purple mantle shot with gold. A dark-coloured frame surrounds the gabled square of the picture, delicately traced with an ornament interrupted at intervals by thirty medallions on gold ground, each of which contains the half-figure of a saint. In the face of the Madonna is a soft and melancholy expression; in the form of the infant, a certain freshness, animation and natural proportion; in the group, affection — but too rare at this period. There is sentiment in the attitudes of the angels, energetic mien in some prophets, comparative clearness and soft harmony in the colours. A certain loss of balance is caused by the overweight of the head in the Virgin as compared with the slightness of her frame. The features are the old ones of the 13th century; only softened, as regards the expression of the eye, by an exaggeration of elliptical form in the iris, and closeness of the curves of the lids. In the angels the absence of all true notions of composition may be considered striking; yet their movements are more natural and pleasing than hitherto. One indeed, to the spectator's right of the Virgin, com- bines more tender reverence in its glance than any that had yet been produced. Cimabue gave to the flesh-tints a clear and carefully fused colour, and imparted to the forms some of the rotundity which they had lost. With him vanished the sharp contrasts of hard lights, half-tones and shadows."

In a general way, it may be said that Cimabue showed himself forcible in his paintings, as especially in heads of aged or strongly characterized men; and, if the then existing development of art had allowed of this, he might have had it in him to express the beautiful as well. He, according to Vasari, was the first painter who wrote words upon his paintings, — -as, for instance, round the head of Christ in a picture of the Crucifixion, the words addressed to Mary, Mulier ecce filius luus.

Other paintings still extant by Cimabue are the following: — In the academy of Arts in Florence, a " Madonna and Child," with eight angels, and some prophets in niches, — better than the Rucellai picture in composition and study of nature, but more archaic in type, and the colour now spoiled (this work was painted for the Badia of S. Trinita, Florence); in the National Gallery, London, a "Madonna and Child with Angels," which came from the Ugo Baldi collection, and had probably once been in the church of S. Croce, Florence; in the Louvre, a " Madonna and Child," with twenty-six medallions in the frame, originally in the church of S. Francesco, Pisa. In the lower

church of the Basilica of S. Francesco at Assisi, Cimabue, succeeding Giunta da Pisa, probably adorned the south transept, — painting a colossal ” Virgin and Child between four Angels,” above the altar of the Conception, and a large figure of St Francis. In the upper church, north transept, he has the ” Saviour Enthroned and some Angels,” and, on the central ceiling of the transept, the ” Four Evangelists with Angels.” Many other works in both the lower and the upper church have been ascribed to Cimabue, but with very scanty evidence; even the above-named can be assigned to him only as matter of probability. Numerous others which he indisputably did paint have perished, — for instance, a series (earlier in date than the Rucellai picture) in the Carmine church at Padua, which were destroyed by a fire.

From Assisi Cimabue returned to Florence. In the closing years of his life he was appointed capomaestro of the mosaics of the cathedral of Pisa, and was afterwards, hardly a year before his death, joined with Arnolfo di Cambio as architect for the cathedral of Florence. In Pisa he executed a Majesty in the apse, — ” Christ in glory between the Virgin and John

the Evangelist,” a mosaic, now much damaged, which stamps him as the leading artist of his time in that material. This was probably the last work that he produced.

The debt which art owes to Cimabue is not limited to his own performances. He was the master of Giotto, whom (such at least is the tradition) he found a shepherd boy of ten, in the pastures of Vespignano, drawing with a coal on a slate the figure of a lamb. Cimabue took him to Florence, and instructed him in the art; and after his death Giotto occupied a house which had belonged to his master in the Via del Cocomero. Another painter with whom Cimabue is said to have been intimate was Gaddo Gaddi.

It had always been supposed that the bodily semblance of Cimabue is preserved to us in a portrait-figure by Simon Memmi painted in the Cappella degli Spagnuoli, in S. Maria Novella, — a thin hooded face in profile, with small beard, reddish and pointed. This is, however, extremely dubious. Simone Martini of Siena (commonly called Memmi) was born in 1283, and would therefore have been about nineteen years of age when Cimabue died; it is not certain that he painted the work in question, or that the figure represents Cimabue. The Florentine master is spoken of by a nearly contemporary commentator on Dante (the so-called Anonimo, who wrote about 1334) as arrogante e disdegnoso; so ” arrogant and scornful ” that, if any one. or if he himself, found a fault in any work of his, however

cherished till then, he would abandon it in disgust. This, however, to a modern mind, looks more like an aspiring and fastidious desire for perfection than any such form of ” arrogance and scorn ” as blemishes a man’s character. Giovanni Cimabue was buried in the cathedral of Florence, S. Maria del Fiore, with an epitaph written by one of the Nini : —

” Credidit ut Cimabos picturae castra tenere, Sic tenuit vivens; nunc tenet astra poli.”

Here we recognize distinctly a parallel to the first clause in the famous triplet of Dante:

” Credette Cimabue nella pintura Tener lo campo ; ed ora ha Giotto il grido, SI che la fama di colui s’ oscura.”

Besides Vasari, and Crowe and Cavalcaselle (re-edited by Langton), the following works may be consulted: — P. Angeli, Storia delta basilica d’ Assisi; Cole and Stillman, Old Italian Masters (1892); Mrs Ady, Painters of Florence (1900). (W. M. R.)

CIMAROSA, DOMENICO (1749-1801), Italian musical com- poser, was born at Aversa, in the kingdom of Naples, on the 17th of December 1749. His parents were poor, but anxious to give their son a good education; and after removing to Naples they sent him to a free school connected with one of the monasteries of that city. The organist of the monastery, Padre Polcano, was struck with the boy’s intellect, and voluntarily instructed him in the elements of music, as also in the ancient and modern literature of his country. To his influence Cimarosa owed a free scholarship at the musical institute of Santa Maria di Loreto, where he remained for eleven years, studying chiefly the great masters of the old Italian school. Piccini, Sacchini and other musicians of repute are mentioned amongst his teachers. At the age of twenty-three Cimarosa began his career as a composer with a comic opera called Le Stravaganze del Conte, first per- formed at the Teatro dei Fiorentini at Naples in 1772. The work met with approval, and was followed in the same year by Le Pazzie di Stellidanza e di Zoroastro, a farce full of humour and eccentricity. This work also was successful, and the fame of the young composer began to spread all over Italy. In 1774 he was invited to Rome to write an opera for the stagione of that year; and he there produced another comic opera called L’ltaliana in Londra.

The next thirteen years of Cimarosa ‘s life are not marked by any event worth mentioning. He wrote a number of operas for the various

theatres of Italy, living temporarily in Rome, in Naples, or wherever else his vocation as a conductor of his works happened to call him. From 1 784-1 787 he lived at Florence, writing exclusively for the theatre of that city. The productions of this period of his life are very numerous, consisting of operas, both comic and serious, cantatas, and various sacred

compositions. The following works may be mentioned amongst many others: — Caio Mario; the three biblical operas, Assalone, La Giuditta and II Sacrificio a" Abramo; also // Convito di Pietra; and La Ballerina amante, a pretty comic opera first performed at Venice with enormous success

About the year 1788 Cimarosa went to St Petersburg by invitation of the empress Catherine II. At her court he remained four years and wrote an enormous number of compositions, mostly of the nature of pieces a" occasion. Of most of these not even the names are on record. In 1792 Cimarosa left St Peters- burg, and went to Vienna at the invitation of the emperor Leopold II. Here he produced his masterpiece, // Matrimonio segreto, which ranks amongst the highest achievements of light operatic music. In 1793 Cimarosa returned to Naples, where // Matrimonio segreto and other works were received with great applause. Amongst the works belonging to his last stay in Naples may be mentioned the charming opera Le Astuzie feminili. This period of his life is said to have been embittered by the intrigues of envious and hostile persons, amongst whom figured his old rival Paisiello. During the occupation of Naples by the troops of the French Republic, Cimarosa joined the liberal party, and on the return of the Bourbons, was, like many of his political friends, condemned to death. By the intercession of influential admirers his sentence was commuted into banish- ment, and he left Naples with the intention of returning to St Petersburg. But his health was broken, and after much suffering he died at Venice on the nth of January 1801, of inflammation of the intestines. The nature of his disease led to the rumour of his having been poisoned by his enemies, which, however, a formal inquest proved to be unfounded. He worked till the last moment of his life, and one of his operas, Artemizia, remained unfinished at his death.

CIMBRI, a Teutonic tribe who made their first appearance in Roman history in the year 113 B.C., when they defeated the consul Gnaeus Papirius Carbo near Noreia in the modern Carinthia. It was the

common belief that they had been driven from their homes on the North Sea by inundations, but, whatever the cause of their migration, they had been wandering along the Danube for some years warring with the Celtic tribes on either bank. After the victory of 113 they passed westwards over the Rhine, threatening the territory of the Allobroges. Their request for land was not granted, and in 109 B.C. they defeated the consul Marcus Junius Silanus in southern Gaul, but did not at once follow up the victory. In 105 they returned to the attack under their king Boiorix, and favoured by the dissensions of the Roman commanders Gnaeus Mallius Maximus and Caepio, defeated them in detail and annihilated their armies at Arausio (Orange) . Again the victorious Cimbri turned away from Italy, and, after attempting to reduce the Arverni, moved into Spain, where they failed to overcome the desperate resistance of the Celtiberian tribes. In 103 they marched back through Gaul, which they overran as far as the Seine, where the Belgae made a stout resistance. Near Rouen the Cimbri were reinforced by the Teutoni and two cantons of the Helvetii. Thereupon the host marched southwards by two routes, the Cimbri moving on the left towards the passes of the Eastern Alps, while the newly arrived Teutoni and their allies made for the western gates of Italy. In 102 B.C. the Teutoni and Ambrones were totally defeated at Aquae Sextiae by Marius, while the Cimbri succeeded in passing the Alps and driving Q. Lutatius Catulus across the Adige and Po. In 101 Marius overthrew them on the Raudine Plain near Vercellae. Their king Boiorix was killed and the whole army destroyed. The Cimbri were the first in the long line of the Teutonic invaders of Italy.

The original home of the Cimbri has been much disputed. It is recorded in the Monumentum Ancyranum that a Roman fleet sailing eastwards from the mouth of the Rhine (c. a.d. 5) received at the farthest point reached the submission of a people called Cimbri, who sent an embassy to Augustus. Several early writers agree in saying that the Cimbri occupied a peninsula, and in the map of Ptolemy Jutland appears as the Cimbric Chersonese. As Ptolemy seems to have regarded the district

north of the Liimfjord (Limfjord) as a group of islands, the territory of the Cimbri, the northernmost tribe of the peninsula, would be included in the modern county {Ami) of Aalborg. This was formerly called Himbersyssel or Himmerland, forms which may very well preserve their name, especially as the name Charydes, mentioned next to them in the Monumentum Ancy- ranum, appears to survive in the modern Hardeland. Possibly also the district across the Liimfjord formerly called Thythsyssel or Thyland may in the same way preserve

the name of the Teutoni (q.v.). Strabo and other early writers relate a number of curious facts concerning the customs of the Cimbri, which are of great interest as the earliest records of the manner of life of the Teutonic nations.

Sources. — Livy, Epitome, lxvii., lxviii.; Monumentum Ancy- ranum; Pomponius Mela iii. 3; C. Plinius Secundus, Nat. Hist. iv. cap. 13 and 14, §§ 95 ff. ; Strabo p. 292 ff. ; Plutarch, Marius. passim; Florus iii. 3; Ptolemy ii. n. n f. (F. G. M. B.)

CIMICIFUGA, in botany, a small genus of herbaceous plants, of the natural order Ranunculaceae, which is widely distributed in the north temperate zone. C. foetida, bugbane, is used as a preventive against vermin; and the root of a North American species, C. racemosa, known as black snake-root, as an emetic.

CIMMERII, an ancient people of the far north or west of Europe, first spoken of by Homer (Odyssey, xi. 12-19), wno describes them as living in perpetual darkness. Herodotus (iv. n-13), in his account of Scythia, regards them as the early inhabitants of South Russia (after whom the Bosporus Cimmerius [q.v.] and other places were named), driven by the Scyths along by the Caucasus into Asia Minor, where they maintained them- selves for a century. But the Cimmerii are often mentioned in connexion with the Thracian Treres who made their raids across the Hellespont, and it is quite possible that some Cimmerii took this route, having been cut off by the Scyths as the Alani (q.v.) were by the Huns. Certain it is that in the middle of the 7 th century B.C., Asia Minor was ravaged by northern nomads (Herod, iv. 12), one body of whom is called in Assyrian sources Gimirrai and is represented as coming through the Caucasus. They were probably Iranian speakers, to judge by the few proper names preserved. The name has also been identified with the biblical Gomer, son of Japheth (Gen. x. 2, 3). To the north of the Euxine their main body was merged in the invading Scyths. Later writers identified them with the Cimbri of Jutland, who were probably Teutonized Celts, but this is a mere guess due to the similarity of name. The Homeric Cimmerii belong to an early part of the Odyssey in which the hero was conceived as wandering in the Euxine; these adventures were afterwards translated to the western Mediterranean in accordance with a wider geographical outlook.

For the Cimmerian invasions described by Herodotus, see Scythia ; Lydia;Gyges. (E. H. M.)

CIMON [Kluuv] (c. 507-449), Athenian statesman and general, was

the son of Miltiades (q.v.) and Hegesipyle, daughter of the Thracian prince Olorus. Miltiades died in disgrace, leaving unpaid the fine imposed upon him for his conduct at Paros. Cimon's first task in life, therefore, was to remove the stain on the family name by paying this fine (about £12,000). In the second Persian invasion, especially at Salamis, and in the consolidation of the Delian League, he won a high reputation for courage and integrity. At first with Aristides, and afterwards as sole commander, he directed the Athenian contingent of the fleet; on the disgrace of Pausanias he practically commanded the entire Greek fleet and drove Pausanias from his retreat in Byzantium. Having captured Eion (at the mouth of the Strymon), he expelled the Persian garrisons from the entire sea- board of Thrace with the exception of Doriscus, and, having defeated the piratical Dolopians of Scyros (470), confirmed his popularity by transferring thence to Athens the supposed bones of the Attic hero Theseus. The bones were buried in Athens, and over the tomb the Theseum (temple) was erected. In 466 Cimon proceeded to liberate the Greek cities of Lycia and Pamphylia, and at the mouth of the Eurymedon he defeated the Persians decisively by land and sea.

The Persian danger was now over, and the immediate purpose of the Delian League was achieved. Already, however, Athens had introduced the policy of coercion which was to transform the league into an empire, a policy which, after the ostracism of Themistocles and the death of Aristides, must be attributed to Cimon, whose fundamental idea was the union of the Greeks against all outsiders (see Delian League). Carystus was compelled to join the league; Naxos (c. 469) and Thasos (465- 463), which had revolted, were compelled to accept the position of tributary allies. In 464 Sparta was involved in war with her Helots (principally of Messenian origin) and was in great difficulties. Cimon, then the most prominent man in Athens, persuaded the Athenians to send assistance, on the ground that Athens could not " stand without her yoke-fellow " and leave " Hellas lame." The expedition was a failure, and Cimon was exposed to the attacks of the democrats led by Ephialtes. The history of this party struggle is not clear. The ordinary account is that Ephialtes during Cimon's absence in Messenia destroyed the powers of the Areopagus (q.v.) and then obtained the ostra- cism of Cimon, who attempted to reverse his policy. Without going fully into the question, which is full of difficulty, it may be pointed out (1) that when the Messenian expedition started Cimon had twice within the preceding year

triumphed over the opposition of Ephialtes, and (2) that presumably the Cimonian party was predominant until after the expedition proved a failure. It is therefore unlikely that, immediately after Cimon's triumph in obtaining permission to go to Messenia, Ephialtes was able to attack the Areopagus with success. The probability is that when the expedition failed, Cimon was ostracized, and that then Ephialtes defeated the Areopagus, and also made a change in foreign policy by making alliances with Sparta's enemies, Argos and Thessaly. This hypothesis alone explains the absence of any account of a third struggle between Cimon and Ephialtes over the Areopagus. The chronology would thus be: ostracism of Cimon, spring, 461; fall of the Areopagus and reversal of Philo-Laconian policy, summer, 461.

A more difficult question is involved in the date of Cimon's return from ostracism. The ordinary account says that he was recalled after the battle of Tanagra (457) to negotiate the Five Years' Truce (451 or 450). To ignore the unexplained interval of six or seven years is an uncritical expedient, which, however, has been adopted by many writers. Some maintaining that Cimon did return soon after 457, say that the truce which he arranged was really the four months' truce recorded by Diodorus (only). To this there are two main objections: (1) if Cimon returned in 457, why does the evidence of antiquity connect his return specifically with the truce of 451? and (2) why does he after' 457 disappear for six years and return again to negotiate the Five Years' Truce and to command the expedition to Cyprus? It seems much more likely that he returned in 451, at the very time when Athens returned to his old policy of friendship with Sparta and war in the East against Persia (i.e. the Cyprus expedition). Thus it would appear that from 453 onwards there was a recrudescence of conservative influence, and that for four years (453-449) Pericles was not master in Athens (see Pericles) ; this theory is corroborated by the fact that Pericles, in the alarm caused by the Egyptian failure of 454, was induced to remove the Delian treasury to Athens and to abandon his anti- Spartan policy of land empire.

Cimon died in Cyprus before the walls of Citium (449), and was buried in Athens. Later Attic orators speak in glowing terms of a " Peace " between Athens and Persia, which is sometimes connected with the name of Cimon and sometimes with that of one Callias. If any such peace was concluded, it cannot have been soon after the battle of the Eurymedon as Plutarch assumes. It can have been only after Cimon's death and the evacuation of Cyprus (i.e. c. 448). It is only in this form that the view has been maintained logically in modern times. Apart from the fact that the peace is ignored by Thucydides and that the earliest reference to it is the passage in Isocrates (Paneg. 118

and 120), there are weighty reasons which render it improbable that any formal peace can have been concluded at

that period between Athens and Persia (see further Ed. Meyer's Forschungen, ii.).

Cimon's services in connexion with the consolidation of the Empire rank with those of Themistocles and Aristides. He is described as genial, brave and generous. He threw open hiij house and gardens to his fellow-demesmen, and beautified the city with trees and buildings. But as a statesman he failed to cope with the new conditions created by the democracy of Cleisthenes. The one great principle for which he is memorable is that of the balance of power between Athens and Sparta, as respectively the naval and military leaders of a united Hellas. It has been the custom to regard Cimon as a man of little culture and refinement. It is clear, however, from his desire to adorn the city, that he was by no means without culture and imagina- tion. The truth is that, as in politics, so irveducation and attitude of mind, he represented the ideals of an age which, in the new atmosphere of democratic Athens, seemed to savour of rusticity and lack of education.

The lives of Cimon by Plutarch and Cornelius Nepos are uncritical ; the conclusions above expressed are derived from a comparison of Plutarch, Cimon, 17, Pericles, 10; Theopompus, fragm. 92; Ando- cides, de Pace, §§ 3, 4; Diodorus xi. 86 (the four months' truce). See histories of Greece (e.g. Grote, ed. 1907, I vol.); also Pericies; Delian League, with works quoted. (J. M. M.)

CIMON OF CLEONAE, an early Greek painter, who is said to have introduced great improvements in drawing. He repre- sented " figures out of the straight, and ways of representing faces looking back, up or down; he also made the joints of the body clear, emphasized veins, worked out folds and doublings in garments" (Pliny). All these improvements are such as may be traced in the drawing of early Greek red-figured vases (see Greek Art).

CINCHONA, the generic name of a number of trees which belong to the natural order Rubiaceae. Botanically the genus includes trees of varying size, some reaching an altitude of 80 ft. and upwards, with evergreen leaves and deciduous stipules. The flowers are arranged in panicles, white or pinkish in colour, with a pleasant odour, the calyx being 5-toothed superior, and the corolla tubular, 5-lobed and fringed at the margin. The stamens are 5, almost concealed by the tubular corolla, and the ovary terminates in a fleshy disk. The fruit is an ovoid

or sub- cylindrical capsule, splitting from the base, and held together at the apex. The numerous seeds are flat and winged all round. About 40 species have been distinguished, but of these not more than about a dozen have been economically utilized. The plants are natives of the western mountainous regions of South America, their geographical range extending from io° N. to 22 S. lat.; and they flourish generally at an elevation of from 5000 to 8000 ft. above sea-level, although some have been noted growing as high up as 1 1 ,000 ft. , and others have been found down to 2600 ft.

The trees are valued solely on account of their bark, which long has been the source of the most valuable febrifuge or antipyretic medicine, quinine (q.v.), that has ever been dis- covered. The earliest well-authenticated instance of the medi- cinal use of cinchona bark is found in the year 1638, when the countess of Chinchon (hence the name), the wife of the governor of Peru, was cured of an attack of fever by its administration. The medicine was recommended in her case by the corregidor of Loxa, who was said himself to have practically experienced its supreme virtues eight years earlier. A knowledge of the bark was disseminated throughout Europe by members of the Jesuit brotherhood, whence it also became generally known as Jesuits' bark. According to another account, this name arose from its value having been first discovered to a Jesuit missionary who, when prostrate with fever, was cured by the administration of the bark by a South American Indian. In each of the above instances the fever was no doubt malaria.

The procuring of the bark in the dense forests of New Granada, Ecuador, Peru and Bolivia is a work of great toil and hardship to the Indian cascarilleros or cascadores engaged in the pursuit. The trees grow isolated or in small clumps, which have to be searched out by the experienced cascarillero, who laboriously cuts his way through the dense forest ta the spot where he discovers.

a tree. Having freed the stem from adhering parasites and twining plants, he proceeds, by beating and cutting oblong pieces, to detach the stem bark as far as is within his reach. The tree is then felled, and the entire bark of stem and branches secured. The bark of the smaller branches, as it dries, curls up, forming " quills," the thicker masses from the stems constituting the " flat " bark of commerce. The drying, packing and transport of the bark are all operations of a laborious

description conducted under most disadvantageous conditions.

The enormous medicinal consumption of these barks, and the wasteful and reckless manner of procuring them in America long ago, caused serious and well-grounded apprehension that the native forests would quickly become exhausted. The atten- tion of European communities was early directed to the necessity of securing steady and permanent supplies by introducing the more valuable species into localities likely to be favourable to their cultivation. The first actual attempt to rear plants was made in Algeria in 1849; but the effort was not successful. In 1854 the Dutch government seriously undertook the task of introducing the trees into the island of Java, and an expedition for that purpose was fitted out on an adequate scale. Several hundreds of young trees were obtained, of which a small pro- portion was successfully landed and planted in Java; and as the result of great attention the cultivation of cinchona planta- tions in that island became highly prosperous and promising. The desirability of introducing cinchonas into the East Indies was urged in a memorial addressed to the East India Company between 1838 and 1842 by Sir Robert Christison and backed by Dr Forbes Royle; but no active step was taken till 1852, when, again on the motion of Dr Royle, some efforts to obtain plants were made through consular agents. In the end the question was seriously taken up, and Sir Clements R. Markham was appointed to head an expedition to obtain young trees from South America and convey them to India. The transference of the plants was attended with considerable difficulty, but in 1 86 1 under his superintendence a consignment of plants was planted in a favourable situation in the Nilgiri Hills. For several years subsequently additional supplies of plants of various species were obtained from different regions of South America, and some were also procured from the Dutch planta- tions in Java. Now the culture has spread over a wide area in southern India, in Ceylon, on the slopes of the Himalayas, and in British Burma, and has become widely spread through the tropics generally. The species grown are principally Cinchona officinalis, C. Calisaya, C. succirubra, C. pitayensis, and C. Pahudiana, some agreeing with certain soils and climates better than others, while the yield of alkaloids and the relative pro- portions of the different alkaloids differ in each species.

The official ” bark ” of the British Pharmacopoeia is that of Cinchona succirubra or red bark. It is imported in the form of quills or recurved pieces, with a rough brown outer surface and a deep red inner surface, forming a reddish brown odourless powder, which has a bitter, astringent taste. The British Pharmacopoeia directs that the bark, when used to make the various medicinal preparations, shall contain

not less than 5 nor more than 6 % of total alkaloids, of which at least one-half is to be constituted by quinine and cinchonidine. The prepara- tions of this bark are four: a liquid extract, standardized to contain 5% of total alkaloids; an acid infusion; a tincture standardized to contain 1 % of total alkaloids; and a compound tincture which must possess one-half the alkaloidal strength of the last. The only purpose for which these preparations of cinchona bark should be used is as tonics; and even when this is the desired action there are many reasons why the alkaloid should be preferred, even though the recent introduction of standardization removes one of the chief objections to their use.

The pharmacology of red bark, dependentas it is almost entirely upon the contained quinine, will not here be discussed (see Quinine). But the composition of cinchona bark is a matter of importance and interest. The bark contains, in the first place, five alkaloids, of which all but quinine may here be dealt with. Quinidine, $C_{20}H_{24}N_2O_2$, is isomeric with quinine, from which it differs in crystal- lizing in prisms instead of needles, in being dextro- and not laevo-

rotatory, and in being insoluble in ammonia except in much excess. Cinchonine has the formula $C_{19}H_{22}N_2O$, quinine being methoxy cinchonine, i.e. $C_{19}H_{21}(OCH_3)N_2O$. It occurs in inodorous, bitter, colourless prisms ; unlike the two alkaloids already named, does not yield a green colour with chlorine water and ammonia; is dextro-rotatory; not fluorescent, and practically insoluble in ammonia and in ether. A fourth alkaloid, cinchonidine, is isomeric with cinchonine, which yields it when boiled with amyl alcoholic potash, but is laevo-rotatory, slightly soluble in ether, and faintly fluorescent. When red bark is extracted with dilute hydrochloric acid, the product filtered, and excess of sodium hydrate added thereto, quinine and ., quinidine are precipitated: on concentrating the mother liquor, cinchonine falls down, and on further concen- tration with addition of still more alkali, cinchonidine is thrown out. Yellow bark, which is not official, yields 3 % of quinine, and pale bark about 10 % of total alkaloids, of which hardly any is quinine, cinchonine and quinidine being its chief constituents. The various forms of bark also yield a very small quantity of an unimportant alkaloid, conquinamine. In addition to the above, red bark contains quinic acid, $C_7H_{12}O_6$, which is closely allied to benzoic acid and is excreted in the urine as hippuric acid. There also occurs chinovic acid, derived from a glucoside chinovin, which occurs as such in the bark. Besides a trace of volatile oil which gives the bark its characteristic odour, and cinchona red (the bark pigment), there occurs about 2 % of cincho-tannic acid, closely allied to tannic acid and giving the bark its astringent property. Cinchona is never

used, however, in order to obtain an astringent action.

The importance of recognizing the complex and inconstant composition of cinchona bark lies, as in so many other instances, in this — that the physician who employs it can have only a very imperfect knowledge of the drug he is using. The latest work on the action of these alkaloids has shown that cinchonine has a tend- ency to produceˆonvulsions in certain patients, and that this action is a still more marked feature of cinchonidine and cinchonamine. Even small doses administered to epileptics increase the number of their_ attacks. They will probably be classified later among the convulsive poisons. The use of cinchona hark and its preparations, now that definite active principles can be readily obtained and pre- cisely studied, is almost entirely to be deprecated. Quinidine is almost as powerful an antidote to malaria as quinine ; cinchonidine has about two-thirds the power of quinine, and cinchonine less than one-half.

CINCINNATI, a city and the county-seat of Hamilton county, Ohio, U.S.A., on the Ohio river, opposite the mouth of the Licking, about 100 m. S.W. of Columbus, about 305 m. by rail S.E. of Chicago, and about 760 m. (by rail) W.S.W. of New York. Through the city flows Mill Creek, which empties into the Ohio. Pop. (1890 ‘) 296,908; (1900) 325,902, of whom 197,896 were of foreign parentage {i.e. either their fathers or mothers or both were foreign-born), 57,961 were foreign-born, and 14,482 were negroes; (1910) 363,591. The German is by far the most important of the foreign elements. In addition to the large number of inhabitants of German descent, there were, in 1900, 107,152 of German parentage, and of the foreign-born 38,219 came from Germany.

Cincinnati is situated on the N. side of the river upon two terraces or plateaus — the first about 60 ft., the second from 100 to 150 ft., above low water — and upon hills which enclose these terraces on three sides in the form of an amphitheatre, rising to a height of about 400 ft. on the E. and of about 460 ft. on the W., and commanding magnificent views of the river, the valley, the numerous suburbs, and the more distant wooded hills. About half of the hill-enclosed plain lies S. of the river, and it is upon this southern half that Covington, Newport, Dayton, Ludlow and other Kentucky suburbs of Cincinnati are situated . Cincinnati has a river-frontage of about 14 m., extends back about 6 m. on the W. side in the valley of Mill Creek, and occupies a total area of about 44 sq. m. Since 1867 it has been connected with Covington by a wire suspension bridge designed by John A. Roebling, and rebuilt and enlarged in 1897. This bridge is 1057 ft. long between towers (or, including the approaches, 2252 ft.

long), with a height of 101 ft. above low water, and has a double wagon road and two ways for pedestrians. By two bridges there is direct communication with Newport; by one, that of the Cincinnati Southern railway, with Ludlow; and by one (Chesapeake & Ohio; see vol. v., p. 109)

1 Previous census reports of the total population were as follows:

(1810) 2540; (1820) 9642; (1830) 24,831; (1840) 46,338; (1850)

115.435; (i860) 161,044; (1870) 216,239; (1880) 225,139. In the territory within a radius of 10 m. of the United States government building there was in 1900 a population of about 480,000.

with West Covington. On the terraces the streets generally intersect at right angles, but on the hills their directions are irregular. To the " bottoms " (which have suffered much from floods 1) between Third Street and the river the manufacturing and wholesale districts are for the most part confined, although many of these interests are now on the higher levels or in the suburbs; the principal retail houses are on the higher levels N. of Third Street, and the handsomest residences are on the picturesque hills before mentioned, in those parts of the city, formerly separate villages, known as Avondale, Mt. Auburn, Clifton, Price Hill, Walnut Hills and Mt. Lookout. The main part of the city is connected with these residential districts by electric street railways, whose routes include four inclined-plane railways, namely, Mt. Adams (268 ft. elevation), Bellevue (300 ft.), Fairview (210 ft.) and Price Hill (350 ft.), from each of which an excellent panoramic view of the city and suburbs may be obtained. There are various suburbs, chiefly residential, in the Mill Creek valley, among them being Carthage, Hartwell, Wyoming, Lockland and Glendale. Other populous and attrac- tive suburbs N. of the Ohio river are Norwood and College Hill.

Buildings, &c. — Brick, blue limestone, and a greyish buff freestone are the most common building materials, and the city has various buildings of much architectural merit. The chamber of commerce (completed 1889), designed by H. H. Richardson, is one of the finest public buildings in the United States. Its walls are of undressed granite, and it occupies a ground area of 100 by 1 50 ft. The United States government building (designed by A. B. Mullet, and built of Maine and Missouri granite) is a fine structure in classic style, 360 ft.

long and 160 ft. wide, and 4§ storeys high; its outer walls are faced with sawn freestone. It was erected in 1874-1885 and cost (including the land) $5,250,000. The city hall (332 ft. by 203 ft.), with walls ot red granite and brown sandstone, is a massive and handsome building erected at a cost of $1,600,000. The county court house (rebuilt in 1887) is in the Romanesque style, and with the gaol attached occupies an entire square. The Cincinnati hospital (completed 1869), comprising eight buildings grouped about a central court and connected by corridors, occupies a square of four acres. A new public hospital for the suburbs was projected in 1907. St Peter's (Roman Catholic) cathedral (begun 1839, consecrated 1844), Grecian in style, is a fine structure, with a graceful stone spire 224 ft. in height and a chime of 13 bells; it has as an altar-piece Murillo's " St Peter Liberated by an Angel." The church of St Francis de Sales (in Walnut Hills), built in 1888, has a bell, cast in Cincinnati, weighing fifteen tons, and said to be the largest swinging bell in the world. Several of the Protestant churches, such as the First Presbyterian (built 1835; steeple, including spire, 285 ft. high), Second Presbyterian (1872), Central Christian (1869), St Paul's Methodist Episcopal (1870), and St Paul's Protestant Episcopal pro- cathedral (1851), are also worthy of mention, and in the residential suburbs there are many fine churches. Cincinnati is the seat of a Roman Catholic archbishopric and a Protestant Episcopal and Methodist Episcopal bishopric. The Masonic temple (195 ft. long and 100 ft. wide), in the Byzantine style, is four storeys high, and has two towers of 140 ft.; the building was completed in i860 and has subsequently been remodelled. Among other prominent buildings are the Oddfellows' temple (completed 1894), the public library, the art museum (1886), a Jewish synagogue (in Avondale) , and the (Jewish) Plum Street temple (1866), Moorish in architecture. The Soldiers', Sailors' and Pioneers' building (1907) is a beautiful structure, classic in design. The business houses are of stone or brick, and many of them are attractive architecturally; there are a number of modern office buildings from 15 to 20 storeys in height. There are also several large hotels and ten theatres (besides halls and auditoriums for concerts and public gatherings), the most notable being Springer music hall.

1 The most destructive floods have been those of 1832, 1847, 1883, 1884 and 1907; the highest stage of the water before 1904 was 71 ft. I in. in 1884, the lowest I ft. II in. in 1881.

One of the most noted pieces of monumental art in the United States is the beautiful Tyler Davidson bronze fountain in Fountain Square (Fifth Street, between Walnut and Vine streets), the business centre of the city, by which (or within one block of which) all car lines run. The fountain was unveiled in 1871 and was presented to the city by Henry

Probasco (1820- 1902), a wealthy citizen, who named it in honour of his deceased brother-in-law and business partner, Mr Tyler Davidson. The design, by August von Kreling (1819-1876), embraces fifteen bronze figures, all cast at the royal bronze foundry in Munich, the chief being a female figure with outstretched arms, from whose fingers the water falls in a fine spray. This figure reaches* a height of 45 ft. above the ground. The city has, besides, monuments to the memory of Presidents Harrison and Garfield (both in Garfield Place, the former an equestrian statue by Louis T. Rebisso, and the latter by Charles H. Niehaus) ; also, in Spring Grove cemetery, a monument to the memory of the Ohio volunteers who lost their lives in the Civil War. The art museum, in Eden Park, contains paintings by celebrated Euro- pean and American artists, statuary, engravings, etchings, metal work, wood carving, textile fabrics, pottery, and an ex- cellent collection in American ethnology and archaeology. The Cincinnati Society of Natural History (incorporated 1870) has a large library and a museum containing a valuable palaeontological collection, and bones and implements from the prehistoric cemetery of the mound-builders, at Madisonville, Ohio.

Parks. — In 1908 Cincinnati had parks covering about 540 acres; there are numerous pleasant driveways both within the city limits and in the suburban districts, and several attractive resorts are within easy reach. Eden Park, of 214 acres, on Mount Adams, about 1 m. E. of the business centre and near the river, is noted for its natural beauty, greatly supplemented by the landscape-gardener's skill, and for its commanding views. The ground was originally the property of Nicholas Longworth (1782- 1863), a wealthy citizen and well-known horticulturist, who here grew the grapes from which the Catawba wine, introduced by him in 1828, was made. The park contains the art museum • and the art academy. Its gateway, Elsinore, is a medieval reproduction; other prominent features are the reservoirs, which resemble natural lakes, and a high water tower, from which there is a delightful view. In Burnet Woods Park, lying to the N.E. of Eden and containing about 163 acres, are the buildings and groundsof the University of Cincinnati, and a lake for boating and skating. The zoological gardens occupy 60 acres and contain a notable collection of animals and birds. Other pleasure resorts are the Lagoon on the Kentucky side (in Ludlow, Ky.), Chester Park, about 6 m. N. of the business centre, and Coney Island, about 10 m. up the river on the Ohio side. Washington (5ˆ6 acres), Lincoln (10 acres), Garfield and Hopkins are small parks in the city. In 1907 an extensive system of new parks, parkways and boulevards was projected. Spring Grove cemetery, about 6 m. N.W. of Fountain Square, contains 600 acres

picturesquely laid out on the park plan. It contains many handsome monuments and private mausoleums, and a beautiful mortuary chapel in the Norman style.

Water-Supply. — A new and greatly improved water-supply system for the city was virtually completed in 1907. This provides for taking water from the Ohio river at a point on the Kentucky side opposite the village of California, Ohio, and several miles above the discharge of the city sewers; for the carrying of the water by a gravity tunnel under the river to the Ohio side, the water being thence elevated by four great pumping engines, each having a daily capacity of 30,000,000 gallons, to settling basins, being then passed through filters of the American or mechanical type, and flowing thence by a gravity tunnel more than 4 m. long to the main pumping station, on the bank of the river, within the city; and for the pumping of the water thence, a part directly into the distributing pipes and a part to the principal storage reservoir in Eden Park.

Education.. — Cincinnati is an important educational centre. The University of Cincinnati, originally endowed by Charles M'Micken (d. 1858) and opened in 1873, occupies a number of

handsome buildings erected since 1895 on a campus of 43 acres in Burnet Woods Park, has an astronomical observatory on the highest point of Mt. Lookout, and is the only strictly municipal university in the ˆnited States. The institution embraces a college of liberal a'rts, a college of engineering, a college of law (united in 1897 with the law school of Cincinnati College, then the only surviving department of that college, which was founded as Lancaster Seminary in i8r5 and was chartered as Cincinnati College in 1819), a college of medicine (from 18 19 to 1896 the Medical College of Ohio; the college occupies the site of the old M'Micken homestead), a college for teachers, a graduate school, and a technical school (founded in 1886 and transferred to the university in 1901); while closely affiliated with it are the Clinical and Pathological School of Cincinnati and the Ohio College of Dentistry. With the exception of small fees charged for incidental expenses, the university is free to all students who are residents of the city; others pay $75 a year for tuition. It is maintained in part by the city, through public taxation, and in part by the income from endowment funds given by Charles M'Micken, Matthew Thorns, David Sinton and others. The government of the university is

entrusted mainly to a board of nine directors appointed by the mayor. In 1909 it had a faculty of 144 and 1364 students. Lane Theological Seminary is situated in Walnut Hills, in the north-eastern part of the city; it was endowed by Ebenezer Lane and the Kemper family; was founded in 1829 for the training of Presbyterian ministers; had for its first president (1832-1852) Lyman Beecher; and in 1834 was the scene of a bitter contest between abolitionists in the faculty and among the students, led by Theodore Dwight Weld, and the board of trustees, who forbade the discussion of slavery in the seminary and so caused about four-fifths of the students to leave, most of them going to Oberlin College. The city has also Saint Francis Xavier College (Roman Catholic, established in 1831 and until 1840 known as the Athenaeum); Saint Joseph College (Roman Catholic, 1873); Mount St Mary's of the West Seminary (Roman Catholic, theo- logical, 1848, at Cedar Point, Ohio); Hebrew Union College (1875), the leading institution in the United States for educating rabbis; the largely attended Ohio Mechanics' Institute (founded 1828), a private corporation not conducted for profit, its object being the education of skilled workmen, the training of industrial leaders, and the advancement of the mechanic arts (in 1907. there were in all departments 142 1 students, a large majority of whom were in the evening classes); an excellent art academy, modelled after that of South Kensington; the College of Music and the Conservatory of Music (mentioned below); the Miami Medical College (opened in 1852); the Pulte Medical College (homeopathic; coeducational; opened 1872); the Eclectic Medical Institute (chartered 1845); two women's medical colleges, two colleges of dental surgery, a college of pharmacy, and several business colleges. The public, district, and high schools of the city are excellent. The City (or public) library contained in 1906 301,380 vols, and 57,562 pamphlets; the University library (including medical, law and astronomical branches), 80,000 vols, (including the Robert Clarke collection, rich in Americana, and the library — about 5000 vols. — of the American Association for the Advancement of Science); the Young Men's Mercantile library, 70,000 vols.; and the Law library, 35,000 vols.; in addition, the Lloyd library and museum of botany and pharmacy, and the library of the His- torical and Philosophical Society of Ohio (1831), which contains a valuable collection of rare books, pamphlets and manuscripts, are worthy of mention.

Art, &"c. — The large German population makes the city note- worthy for its music. The first Sangerfest was held in Cincinnati in 1849, and it met here again in 1870, when a new hall was built for its accommodation. Under the leadership of Theodore Thomas

(1835-1905), the Cincinnati Musical Festival Association was incorporated, and the first of its. biennial May festivals was held in 1873. In 1875-1878 was built the large Springer music hall, named in honour of Reuben R. Springer (1 800-1 884), its greatest benefactor, who endowed the Cincinnati College of

Music (incorporated in 1878), of which Thomas was director in 1878-1881. Until his death Thomas was director of the May festivals also. The grounds for the music hall were given by the city and are perpetually exempt from taxation. The great organ in the music hall was dedicated at the third of the May festivals in 1878. The Sangerfest met in Cincinnati for the third time in 1879, and its jubilee was held here in 1899. By 1880 the May festival chorus had become a permanent organization. The city has several other musical societies — the Apollo and Orpheus clubs (1881 and 1893), a Liederkranz (1886), and a United Singing Society (1896) being among the more prominent; and there are two schools of music — the Conservatory of Music and the College of Music.

The city has large publishing interests, and various religious (Methodist Episcopal and Roman Catholic) and fraternal periodicals, and several technical journals and trade papers are published here. The principal daily newspapers are the Enquirer, a Democratic journal, established in 1842 and conducted for many years after 1852 by Washington McLean (1816-1890), and then by his son, John Roll McLean (b. 1848); the Commercial Tribune (Republican; previously the Commercial-Gazette and still earlier the Commercial, founded in 1793, The Tribune being merged with it in 1896), the Times-Star (the Times established in 1836), and the Post, established in 1881 (both evening papers); and several influential German journals, including the Volksblatt (Republican; established 1836), and the Volksfreund (Demo- cratic; established 1850).

Among the social clubs of the city are the Queen City Club, organized in 1874; the Phoenix Club, organized in 1856 and the leading Jewish club in the city; the Cuvier Club, organized in 1 87 1 and originally an association of hunters and anglers for the preservation of game and fish; the Cincinnati Club, the Business Men's Club, the University Club, the Art Club, and the Literary Club, of the last of which many prominent men, including President Hayes, have been members. This club dates from 1849, and is said to be the oldest literary club in the country. There are various commercial and trade organizations, the oldest and most influential being the Cincinnati Chamber of Commerce and Merchants' Exchange, which dates from 1839.

Administration. — The city is governed under the municipal code enacted by the state legislature in 1902, for the provisions of which see Ohio.

Among the institutions are the City infirmary (at Hartwell, a suburb), which, besides supporting pauper inmates, affords relief to outdoor poor; the Cincinnati hospital, which is supported by taxation and treats without charge all who are unable to pay; twenty other hospitals, some of which are charitable institutions; a United States marine hospital; the Longview hospital for the insane, at Carthage, 10 m. from the city, and belonging to Hamilton county, whose population consists largely of the inhabitants of Cincinnati; an insane asylum for negroes; six orphan asylums — the Cincinnati, two Protestant, two Roman Catholic, and one for negroes; a home for incurables; a day nursery; a fresh-air home and farm for poor children; the Franciscan Brothers' Protectory for boys; a children's home; two widows' homes; two old men's homes; several homes for indigent and friendless women; a foundling asylum; the rescue mission and home for erring women; a social settlement conducted by the University of Cincinnati; the house of refuge (1850) for " the reformation and education of homeless and incorrigible children under 16 years of age "; and a workhouse for adults convicted of minor offences.

Communications. — Cincinnati is a railway centre of great importance and has an extensive commerce both by rail and by river. It is served by the following railways: the Pittsburg, Cincinnati, Chicago & St Louis (Pennsylvania system), the Cleve- land, Cincinnati, Chicago & St Louis (New York Central system), the Chicago, Cincinnati & Louisville, the Cincinnati, New Orleans & Texas Pacific (the lessee of the Cincinnati Southern railway, 1 connecting Cincinnati and Chattanooga, Tenn., its line

1 The Cincinnati Southern railway is of especial interest in that it was built by the city of Cincinnati in its corporate capacity. Much

forming part of the so-called Queen & Crescent Route to New Orleans), the Erie, the Baltimore & Ohio South- Western (Balti- more & Ohio system), the Chesapeake & Ohio, the Norfolk & Western, the Louisville & Nashville, the Cincinnati, Hamilton & Dayton, the Cincinnati Northern (New York Central system), the Cincinnati & Muskingum Valley (Pennsylvania system), and the Cincinnati,

Lebanon & Northern (Pennsylvania system) . Most of these railways use the Union Station; the Pennsylvania and the Cincinnati, Hamilton & Dayton, have separate stations. The city's river commerce, though of less relative importance since the advent of railways, is large and brings to its wharves much bulky freight, such as coal, iron and lumber; it also helps to distribute the products of the city's factories; and the National government has done much to sustain this commerce by deepen- ing and lighting the channel. Formerly there was considerable commerce with Lake Erie by way of the Miami & Erie Canal to Toledo; the canal was completed in 1830 and has never been entirely abandoned.

Industries. — Although the second city in population in the state, Cincinnati ranked first in 1900 as a manufacturing centre, but lost this pre-eminence to Cleveland in 1905, when the value of Cincinnati's factory product was $166,059,050, an increase of 17-2 % over the figures for 1900. In the manufacture of vehicles, harness, leather, hardwood lumber, wood-working machinery, machine tools, printing ink, soap, pig-iron, malt liquors, whisky, shoes, clothing, cigars and tobacco, furniture, cooperage goods, iron and steel safes and vaults, and pianos, also in the packing of meat, especially pork, 1 it ranks very high among the cities of the Union. The well-known and beautiful Rookwood ware has been made in Cincinnati since 1880, at the Rookwood Pottery (on Mt. Adams), founded by Mrs Bellamy (Maria Longworth) Storer, named from her father's home near the city, the first American pottery to devote exclusive attention to art ware. The earlier wares were yellow, brown and red; then came deep greens and blues, followed by mat glazes and by " vellum " ware (first exhibited in 1904), a lustreless pottery, resembling old parchment, with its decoration painted or modelled or both. The clays used are exclusively American, much being obtained in Missouri. Among the more important manufactures of the city in 1965 were the following, with the value of the product for that year: clothing ($16,972,484), slaughtering and meat- packing products ($13,446,202), foundry and machine-shop products ($11,528,768), boots and shoes ($10,596,928), distilled liquors ($9,609,826), malt liquors ($7,702,693), and carriages and wagons ($6,323,8o3). 2

History. — Cincinnati was founded by some of the first settlers in that part of the North- West Territory which afterwards became the state of Ohio. It lies on part of the land purchased for himself and others by John Cleves Symmes (1742-1814) from the United States government in 1788, and the settlement was estab- lished near the close of the same year by immigrants chiefly from New Jersey and Kentucky. When the town was laid out early in 1 789, John Filson, one of the

founders, named it Losanti-

of the city's trade had always been with the Southern states, and the urgent need of better facilities for this trade than the river and existing railway lines afforded led to the building of this road by the city. The work was carried on under the direction of a board of five trustees appointed by the superior court of Cincinnati in accord- ance with the so-called Ferguson Act passed by the Ohio legislature in 1869, and the railway was completed to Chattanooga in February 1880. For accounts of the building and the management of the railway, see J. H. Hollander, The Cincinnati Southern Railway; A Study in Municipal Activity (Baltimore, 1894), one of the Johns Hopkins University Studies in Historical and Political Science; and The Founding of the Cincinnati Southern Railway, with an Auto- biographical Sketch by E. A. Ferguson (Cincinnati, 1905).

1 Before 1863 Cincinnati was the principal centre in the United States for the slaughtering of hogs and the packing of pork. The industry began as early as 1820 and rapidly increased in importance, but after 1863 Chicago took the lead.

2 These figures are from the U.S. census, and are of course for Cincinnati proper: some of the largest industrial establishments, however, are just outside the city limits — among these are manu- factories of soap (the Ivory Soap Works), machine tools, electrical machinery and appliances, structural and architectural iron work, and office furnishings.

ville (L for Licking; os, Latin for mouth; anti, Greek for opposite; and ville, French for town), but early in the next year Symmes caused the present name to be substituted in honour of the Order of the Cincinnati, General Arthur St Clair, the governor of the North- West Territory, being then president of the Pennsyl- vania State Society of the Cincinnati. St Clair arrived about the time the change in name was made, immediately erected Hamilton County, and made Cincinnati its seat of government; the territorial legislature also held its sessions here from the time of its first organization in 1799 until 1801, when it removed to Chillicothe. During the early years the Indians threatened the life of the settlement, and in 1 789 Fort Washington, a log building for protection against the Indians, was built in the city; General Josiah Harmar, in 1790, and General St Clair, in 1791, made unsuccessful expeditions against them, and the alarm increased until 1794, when General Wayne won a decisive victory over the savages at Maumee Rapids in the battle of Fallen Timbers, after which he secured their consent to the terms of the treaty of Greenville (1795).

Cincinnati was incorporated as a village in 1802, received a second charter in 1815, was chartered as a city in 1819, and received its second city charter in 1827 and its third in 1832; since 1851 it has been governed nominally by general laws of the state, although by the state's method of classifying cities many acts for its government have been in reality special. When first incorporated its limits were confined to an area of 3 sq. m., but by annexations in 1849 and 1850 this area was doubled; in 1854 another square mile was added; in 1869 and 1870 large additions were made, which included the villages of Sedamsville, Price Hill, Walnut Hills, Mount Auburn, Clinton- ville, Corryville, Vernon, Mount Harrison, Barrsville, Fairmount, West Fairmount, St Peters, Lick Run and Clifton Heights; in 1872 Columbia, which was settled a short time before Cincinnati, was added; in 1873 Cumminsville and Woodburn; in 1895 Avondale, Riverside, Clifton, Linwood and Westwood; in 1903 Bond Hill, Winton Place, Hyde Park and Evanston; in 1904 portions of Mill Creek township, and in 1905 a small tract in Mill Creek Valley.

In 1829 Mrs Frances Trollope established in Cincinnati, where she lived for a part of two years, a " Bazar," which as the principal means of carrying out her plan to benefit the town was entirely unsuccessful; a vivid but scarcely unbiassed picture of Cincinnati in the early thirties is to be found in her Domestic Manners of the Americans (1831). In 1845 began the marked influx of Germans, which lasted in large degree up to i860; they first limited themselves to the district " Over the Rhine " (the Rhine being the Miami & Erie Canal), in the angle north-east of the junction of Canal and Sycamore streets, but gradually spread throughout the city, although this " Over the Rhine " is still most typically German.

For more than ten years preceding the Civil War the city was much disturbed by slavery dissension — the industrial interests were largely with the South, but abolitionists were numerous and active, and the city was an important station on the " Underground Railroad," of which Dr Norton S. Townshend (1815-95) was conductor, and one of the stations was the home of Mrs. Harriet Beecher Stowe, who lived in Cincinnati from 1832 to 1850, and gathered there much material embodied in Uncle Tom's Cabin. In 1834 came the Lane Seminary controversies over slavery previously referred to. In 1835 James G. Birney established here his anti-slavery journal, The Philanthropist, but his printing shops were repeatedly mobbed and his presses destroyed, and in January of 1836 his bold speech before a mob gathered at the court-house was the only thing that saved him from personal violence, as the city authorities had warned him that they had not sufficient force to protect him.

At the time of the Civil War the city was strongly in sympathy with the North. In September 1862 the city was threatened by a Confederate force under General Kirby Smith, who led the advance of General Bragg's army (see American Civil War). On the 28th of March 1884 many of the citizens met at Music Hall to protest against the lax way in which the law was enforced, notably in the case of a recent murder, when the confessed

criminal had been found guilty of manslaughter only. An attack was made on the gaol by the lawless element outside the hall, but was futile, — the murderer having been removed by the authorities to Columbus. In its efforts to break into the gaol and court-house the mob was; confronted by the militia, and bloodshed and loss of life resulted; during the rioting the court- house was fired by the mob and practically destroyed, and many valuable records were burned. Various important political conventions have met in Cincinnati, including the national Democratic convention of 1856, the national Liberal-Republican convention of 1872, the national Republican convention of 1876, and the national Democratic convention of 1880, — by which, respectively, James Buchanan, Horace Greeley, R. B. Hayes and Winfield Scott Hancock were nominated for the presidency.

See C. T. Greve, Centennial History of Cincinnati and Representative Citizens (Chicago, 1904), the official municipal documents, the Annual Reports of the Cincinnati Chamber of Commerce, &c.

CINCINNATDS, 1 LUCIUS QUINCTIUS (b. c. 519 B.C.), one of the heroes of early Rome, a model of old Roman virtue and simplicity. A persistent opponent of the plebeians, he resisted the proposal of Terentilius Arsa (or Harsa) to draw up a code of written laws applicable equally to patricians and plebeians. He was in humble circumstances, and lived and worked on his own small farm. The story that he became impoverished by paying a fine incurred by his son Caeso is an attempt to explain the needy position of so distinguished a man. Twice he was called from the plough to the dictatorship of Rome in 458 and 439. In 458 he defeated the Aequians in a single day, and after entering Rome in triumph with large spoils returned to his farm. The story of his success, related five times under five different years, possibly rests on an historical basis, but the account given in Livy of the achievements of the Roman army is obviously incredible.

See Livy iii. 26-29; Dion. Halic. x. 23-25; Florus i. ‘it. For a critical examination of the story see Schwegler, RomisChe Geschichte, bk. xxviii. 12; Sir G. Cornewall Lewis, Credibility of early Roman History, ch. xii. 40; W. IJine, History of Rome, i. ; E. Pais, Storia di Roma, i. ch. 4 (i~

CINDERELLA (i.e. little cinder girl), the heroine of an almost universal fairy-tale. Its essential features are (1) the persecuted maiden whose youth and beauty bring upon her the jealousy of her step-mother and sisters, (2) the intervention of a fairy or other supernatural instrument on her behalf, (3) the prince who falls in love with and marries her. In the English version, a translation of Perrault’s Cendrillon, the glass slipper which she drops on the palace stairs is due to a mistranslation of pantoufle en vair (a. fur slipper) , mistaken for en verre. It has been suggested that the story originated in a nature-myth, Cinderella being the dawn, oppressed by the night-clouds (cruel relatives) and finally rescued by the sun (prince).

See Marian Rolfe Cox, Cinderella; Three Hundred and Forty-five Variants (1893); A Lang, Perrault’s Popular Tales (1888).

CINEAS, a Thessalian, the chief adviser of Pyrrhus, king of Epirus. He studied oratory in Athens, and was regarded as the most eloquent man of his age. He tried to dissuade Pyrrhus from invading Italy, and after the defeat of the Romans at Heraclea (280 B.C.) was sent to Rome to discuss terms of peace. These terms, which are said by Appian (De Rebus Samniticis, 10, n) to have included the freedom of the Greeks in Italy and the. restoration to the Bruttians, Apulians and Samnites of all that had been taken from them, were rejected chiefly through the vehement and patriotic speech of the aged Appius Claudius Caecus the censor. The withdrawal of Pyrrhus from Italy was demanded, and Cineas returned to his master with the report that Rome was a temple and its senate an assembly of kings. Two years later Cineas was sent to renew negotiations with Rome on easier terms. The result was a cessation of hostilities, and Cineas crossed over to Sicily, to prepare the ground for Pyrrhus’s campaign. Nothing more is heard of him. He is said to have made an epitome of the Tactica of Aeneas, probably referred to by Cicero, who speaks of a Cineas as the author of a treatise De Re Militari.

1 I.e. the ” curly-haired.”

See Plutarch, Pyrrhus, 11-21; Justin xviii. 2; Eutropius ii. 12; Cicero, Ad Fam. ix. 25.

CINEMATOGRAPH, or Kinematograph (from tivqfia, motion,- and yp6.tw, to depict) , an apparatus in which a series of views representing closely successive phases of a moving object are exhibited in rapid sequence, giving a picture which, owing to persistence of vision, appears to the observer to be in continuous motion. It is a development of the zoetrope or ” wheel of life,” described by W. G. Horner about 1833, which consists of a hollow cylinder turning on a vertical axis and having its surface pierced with a number of slots. Round the interior is arranged a series of pictures representing successive stages of such a subject as a galloping horse, and when the cylinder is rotated an observer looking through one of the slots sees the horse apparently in motion. The pictures were at first drawn by hand, but photo- graphy was afterwards applied to their production. E. Muy- bridge about 1877 obtained successive pictures of a running horse by employing a row of cameras, the shutters of which were opened and closed electrically by the passage of the horse in front of them, and in 1883 E. J. Marey of Paris established a studio for investigating the motion of animals by similar photographic methods.

The modern cinematograph was rendered possible by the invention of the celluloid roll film (employed by Marey in 1890), on which the serial pictures are impressed by instantaneous photography, a long sensitized film being moved across the focal plane of a camera and exposed intermittently. In one apparatus for making the exposures a cam jerks the film across the field once for each picture, the slack being gathered in on a drum at a constant rate. In another four lenses are rotated so as to give four images for each rotation, the film travelling so as to present a new portion in the field as each lens comes in place. Sixteen to fifty pictures may be taken per second. The films are developed on large drums, within which a ruby electric light may be fixed to enable the process to be watched. A positive is made from the negative thus obtained, and is passed through an optical lantern, the images being thus successively projected through an objective lens upon a distant screen. For an hour’s exhibition 50,000 to 165,000 pictures are needed. To regulate the feed in the lantern a hole is punched in the film for each picture. These holes must be extremely accurate in position; when they wear the feed becomes irregular, and the picture dances or vibrates in an unpleasant manner. Another method of exhibiting cinematographic effects is to bind the pictures together in book form by one edge, and then release them from the other in rapid succession by means of the thumb or some mechanical device as the book is bent backwards. In this case the subject is viewed, not by projection, but directly, either with the

unaided eye or through a magnifying glass.

Cinematograph films produced by ordinary photographic processes, being in black and white only, fail to reproduce the colouring of the subjects they represent. To some extent this defect has been remedied by painting them by hand, but this method is too expensive for general adoption, and moreover does not yield very satisfactory results. Attempts to adapt three-colour photography, by using simultaneously three films, each with a source of light of appropriate colour, and combining the three images on the screen, have to overcome great difficulties in regard to maintenance of register, because very minute errors of adjustment between the pictures on the films are magnified to an intolerable extent by projection. In a process devised by G. A. Smith, the results of which were exhibited at the Society of Arts, London, in December 1908, the number of colour records was reduced to two. The films were specially treated to increase their sensitiveness to red. The photographs were taken through two colour filters alternately interposed in front of the film; both admitted white and yellow, but one, of red, was in addition specially concerned with the orange and red of the subject, and the other, of blue-green, with the green, blue-green, blue and violet. The camera was arranged to take not less than 16 pictures a second through each filter, or 32 a second in all. The positive transparency made from the negative thus obtained

was used in a lantern so arranged that beams of red (composed of crimson and yellow) and of green (composed of yellow and blue) issued from the lens alternately, the mechanism presenting the pictures made with the red filter to the red beam, and those made with the green filter to the green beam. A supplementary shutter was provided to introduce violet and blue, to compensate for the deficiency in those colours caused by the necessity of cutting them out in the camera owing to the over-sensitiveness of the film to them, and the result was that the successive pic- tures, blending on the screen by persistence of vision, gave a reproduction of the scene photographed in colours which were sensibly the same as those of the original.

The cinematograph enables ” living ” or ” animated pictures ” of such subjects as an army on the march, or an express train at full speed, to be presented with marvellous distinctness and completeness of detail. Machines of this kind have been devised in enormous numbers and

used for purposes of amuse- ment under names (bioscope, biograph, kinetoscope, mutograph, &c.) formed chiefly from combinations of Greek and Latin words for life, movement, change, &c, with suffixes taken from such words as aicoirelv, to see, ypafyav, to depict; they have also been combined with phonographic apparatus, so that, for example, the music of a dance and the motions of the dancer are simultaneously reproduced to ear and eye. But when they are used in public places of entertainment, owing to the extreme inflammability of the celluloid film and its employment in close proximity to a powerful source of light and heat, such as is required if the pictures are to show brightly on the screen, precautions must be taken to prevent, as far as possible, the heat rays from reaching it, and effective means must be provided to extinguish it should it take fire. The production of films composed of non-inflammable material has also engaged the attention of inventors.

See H. V. Hopwood, Living Pictures (London, 1899), containing a bibliography and a digest of the British patents, which is supple- mented in the Optician, vol. xviii. p. 85 ; Eugene Trutat, La Photo- graphic animee (1899), which contains a list of the French patents. For the camera see also Photography: Apparatus.

CINERARIA. The garden plants of this name have originated from a species of Senecio, S. cruentus (nat. ord. Compositae), a native of tbe Canary Isles, introduced to the royal gardens at Kew in 1777. It was known originally as Cineraria cruenta, but the genus Cineraria is now restricted to a group of South African species, and the Canary Island species has been trans- ferred to the large and widespread genus Senecio. Cinerarias can be raised freely from seeds. For spring flowering in England the seeds are sown in April or May in well-drained pots or pans, in soil of three parts loam to two parts leaf-mould, with one-sixth sand; cover the seed thinly with fine soil, and press the surface firm. When the seedlings are large enough to handle, prick them out in pans or pots of similar soil, and when more advanced pot them singly in 4-in. pots, using soil a trifle less sandy. They should be grown in shallow frames facing the north, and, if so situated that the sun shines upon the plants in the middle of the day, they must be slightly shaded; give plenty of air, and never allow them to get dry. When well established with roots, shift them into 6-in. pots, which should be liberally supplied with manure water as they get filled with roots. In winter remove to a pit or house, where a little heat can be supplied whenever there is a risk of their getting frozen. They should stand on a moist bottom, but must not be subjected to cold draughts. When the flowering stems appear, give manure water at every alternate watering. Seeds sown in March, and grown on in

this way, will be in bloom by Christmas if kept in a temperature of from 40 to 45 at night, with a little more warmth in the day; and those sown in April and May will succeed them during the early spring months, the latter set of plants being subjected to a temperature of 38° or 40° during the night. If grown much warmer than this, the Cineraria maggot will make its appearance in the leaves, tunnelling its way between the upper and lower surfaces and making whitish irregular markings all over. Such affected leaves must be picked off and burned. Green fly is a

great pest on young plants, and can only be kept down by fumigating or vaporizing the houses, and syringing with a solu- tion of quassia chips, soft soap and tobacco.

CINGOLI (anc. Cingulum), a town of the Marches, Italy, in the province of Macerata, about 14 m. N.W. direct, and 17 m. by road, from the town of Macerata. Pop. (1901) 13,357. The Gothic church of S. Esuperanzio contains interesting works of art. The town occupies the site of the ancient Cingulum, a town of Picenum, founded and strongly fortified by Caesar's lieutenant T. Labienus (probably on the site of an earlier village) in 63 B.C. at his own expense. Its lofty position (2300 ft.) made it of some importance in the civil wars, but otherwise little is heard of it. Under the empire it was a municipium.

CINNA, a Roman patrician family of the gens Cornelia. The most prominent member was Lucius Cornelius Cinna, a supporter of Marius in his contest with Sulla. After serving in the war with the Marsi as praetorian legate, he was elected consul in 87 B.C. Breaking the oath he had sworn to Sulla that he would not attempt any revolution in the state, Cinna allied himself with Marius, raised an army of Italians, and took posses- sion of the city. Soon after his triumphant entry and the massacre of the friends of Sulla, by which he had satisfied his vengeance, Marius died. L. Valerius Flaccus became Cinna's colleague, and on the murder of Flaccus, Cn. Papirius Carbo. In 84, however, Cinna, who was still consul, was forced to advance against Sulla; but while embarking his troops to meet him in Thessaly, he was killed in a mutiny. His daughter Cornelia was the wife of Julius Caesar, the dictator; but his son, L. Cornelius Cinna, praetor in 44 B.C., nevertheless sided with the murderers of Caesar and publicly extolled their action.

The hero of Corneille's tragedy Cinna (1640) was Cn. Cornelius Cinna, surnamed Magnus (after his maternal grandfather Pompey), who was magnanimously pardoned by Augustus for conspiring against him.

CINNA, GAIUS HELVIUS, Roman poet of the later Ciceronian age. Practically nothing is known of his life except that he was the friend of Catullus, whom he accompanied to Bithynia in the suite of the praetor Memmius. The circumstances of his death have given rise to some discussion. Suetonius, Valerius Maximus, Appian and Dio Cassius all state that, at Caesar's funeral, a certain Helvius Cinna was killed by mistake for Cornelius Cinna, the conspirator. The last three writers mentioned above add that he was a tribune of the people, while Plutarch; referring to the affair, gives the further information that the Cinna who was killed by the mob was a poet. This points to the identity of Helvius Cinna the tribune with Helvius Cinna the poet. The chief objection to this view is based upon two lines in the 9th eclogue of Virgil, supposed to have been written 41 or 40 B.C. Here reference is made to a certain Cinna, a poet of such import- ance that Virgil deprecates comparison with him; it is argued that the manner in which this Cinna, who could hardly have been any one but Helvius Cinna, is spoken of implies that he was then alive; if so, he could not have been killed in 44. But such an interpretation of the Virgilian passage is by no means absolutely necessary; the terms used do not preclude a reference to a contemporary no longer alive. It has been suggested that it was really Cornelius, not Helvius Cinna, who was slain at Caesar's funeral, but this is not borne out by the authorities. Cinna's chief work was a mythological epic poem called Smyrna, the subject of which was the incestuous love of Smyrna (or Myrrha) for her father Cinyras, treated after the manner of the Alexandrian poets. It is said to have taken nine years to finish. A Propempticon Pollionis, a send-off to [Asinius] Pollio, is also attributed to him. In both these poems, the language of which was so obscure that they required special commentaries, his model appears to have been Parthenius of Nicaea.

See A. Weichert, Poetarum Latinorum Vitae (1830) ; L. Muller's edition of Catullus (1870), where the remains of Cinna's poems are printed; A. Kiessling, " De C. Helvio Cinna Poeta " in Commen- tationes Philologicae in honorem T. Mommsen (1878); O. Ribbeck, Geschichte der romischen Dichtung, i. (1887) ; Teuffel-Schwabe, Hist, of Roman Lit. (Eng. tr. 213, 2-5) ; Plessis, Poisie latine (1909).

CINNABAR (Ger. Zinnober), sometimes written cinnabarite, a name applied to red mercuric sulphide (HgS), or native vermilion, the common ore of mercury. The name comes from the Greek mvvhˆapi,

used by Theophrastus, and probably applied to several distinct substances. Cinnabar is generally found in a massive, granular or earthy form, of bright red colour, but it occasionally occurs in crystals, with a metallic adamantine lustre. The crystals belong to the hexagonal system, and are generally of rhombohedral habit, sometimes twinned. Cinnabar presents remarkable resemblance to quartz in its symmetry and optical characters. Like quartz it exhibits circular polarization, and A. Des Cloizeaux showed that it possessed fifteen times the rotatory power of quartz (see Polarization or Light) . Cinnabar has higher refractive power than any other known mineral, its mean index for sodium light being 3-02, whilst the index for diamond — a substance of remarkable refraction — is only 2-42 (see Refraction). The hardness of cinnabar is 3, and its specific gravity 8-998.

Cinnabar is found in all localities which yield quicksilver, notably Almaden (Spain), New Almaden (California), Idria (Austria), Landsberg, near Ober-Moschel in the Palatinate, Ripa, at the foot of the Apuan Alps (Tuscany), the mountain Avala (Servia), Huancavelica (Peru), and the province of Kwei- chow in China, whence very fine crystals have been obtained. Cinnabar is in course of deposition at the present day from the hot waters of Sulphur Bank, in California, and Steamboat Springs, Nevada.

Hepatic cinnabar is an impure variety from Idria in Carniola, in which the cinnabar is mixed with bituminous and earthy matter.

Metacinnabarite is a cubic form of mercuric sulphide, this compound being dimorphous.

For a general description of cinnabar, see G. F. Becker's Geology of the Quicksilver Deposits of the Pacific Slope, U.S. Geol. Surv. Monographs, No. xiii. (1888). (F. W. R.*)

CINNAMIC ACID, or Phenylacrylic Acid, C 9 H 8 2 or CeHs-CrLCH-COOH, an acid found in the form of its benzyl ester in Peru and Tolu balsams, in storax and in some gum- benzoins. It can be prepared by the reduction of phenyl propi- olic acid with zinc and acetic acid, by heating benzal malonic acid, by the condensation of ethyl acetate with benzaldehyde in the presence of sodium ethylate or by the so-called "Perkin reaction "; the latter being the method commonly employed. In making the acid by this process benzaldehyde, acetic an- hydride and anhydrous sodium acetate are heated for some hours to about 180 C, the resulting product is made alkaline with sodium carbonate, and any excess of benzaldehyde removed by a current of steam. The

residual liquor is filtered and acidified with hydrochloric acid, when cinnamic acid is precipi- tated, $C_6H_5CHO + CH_3COONa = C_6H_5CH{:}CH\text{-}COONa + H_2O$. It may be purified by recrystallization from hot water. Consider- able controversy has taken place as to the course pursued by this reaction, but the matter has been definitely settled by the work of R. Fittig and his pupils (Annalen, 1883, 216, pp. 100, 115; 1885, 227, pp. ss, 119), in which it was shown that the aldehyde forms an addition compound with the sodium salt of the fatty acid, and that the acetic anhydride plays the part of a dehydrating agent. Cinnamic acid crystallizes in needles or prisms, melting at 133° C; on reduction it gives phenyl propionic acid, $C_6H_6\text{-}CH_2\text{-}CH_2\text{-}COOH$. Nitric acid oxidizes it to benzoic acid and acetic acid. Potash fusion decomposes it into benzoic and acetic acids. Being an unsaturated acid it combines directly with hydrochloric acid, hydrobromic acid, bromine, &c. On nitration it gives a mixture of ortho and para nitrocinnamic acids, the former of which is of historical importance, as by converting it into orthonitrophenyl propiolic acid A. Baeyer was enabled to carry out the complete synthesis of indigo (q.v.). Reduction of orthonitrocinnamic acid gives orthoaminocinnamic acid, $C_6H_4(NH_2)CH{:}CH\text{-}COOH$, which is of theoretical import- ance, as it readily gives a quinoline derivative. An isomer of cinnamic acid known as allo-cinnamic acid is also known. For the oxy-cinnamic acids see Coumarin.

CINNAMON, the inner bark of Cinnamomum zeylanicum, a small evergreen tree belonging to the natural order Lauraceae, native to Ceylon. The leaves are large, ovate-oblong in shape, and the flowers, which are arranged in panicles, have a greenish colour and a rather disagreeable odour. Cinnamon has been known from remote antiquity, and it was so highly prized among ancient nations that it was regarded as a present fit for monarchs and other great potentates. It is mentioned in Exod. xxx. 23, where Moses is commanded to use both sweet cinnamon (Kinna- mon) and cassia, and it is alluded to by Herodotus under the name tawafioifiov, and by other classical writers. The tree is grown at Tellicherry, in Java, the West Indies, Brazil and Egypt, but the produce of none of these places approaches in quality that grown in Ceylon. Ceylon cinnamon of fine quality is a very thin smooth bark, with a light-yellowish brown colour, a highly fragrant odour, and a peculiarly sweet, warm and pleasing aromatic taste. Its flavour is due to an aromatic oil which it contains to the extent of from 0-5 to 1%. This essential oil, as an article of commerce, is prepared by roughly pounding the bark, macerating it in sea-water, and then quickly distilling the whole. It is of a golden-yellow colour, with the peculiar odour of cinnamon and a very hot aromatic taste. It

consists essenti- ally of cinnamic aldehyde, and by the absorption of oxygen as it becomes old it darkens in colour and develops resinous com- pounds. Cinnamon is principally employed in cookery as a condiment and flavouring material, being largely used in the preparation of some kinds of chocolate and liqueurs. In medicine it acts like other volatile oils and has a reputation as a cure for colds. Being a much more costly spice than cassia, that com- paratively harsh-flavoured substance is frequently substituted for or added to it. The two barks when whole are easily enough distinguished, and their microscopical characters are also quite distinct. When powdered bark is treated with tincture of iodine, little effect is visible in the case of pure cinnamon of good quality, but when cassia is present a deep-blue tint is produced, the intensity of the coloration depending on the proportion of the cassia.

CINNAMON-STONE, a variety of garnet, belonging to the lime-alumina type, known also as essonite or hessonite, from the Gr. foo-uv, ” inferior,” in allusion to its being less hard and less dense than most other garnet. It has a characteristic red colour, inclining to orange, much like that of hyacinth or jacinth. Indeed it was shown many years ago, by Sir A. H. Church, that many gems, especially engraved stones, commonly regarded as hyacinth, were really cinnamon-stone. The difference is readily detected by the specific gravity, that of hessonite being 3-64 to 3-69, whilst that of hyacinth (zircon) is about 4-6. Hessonite is rather a soft stone, its hardness being about that of quartz or 7, whilst the hardness of most garnet reaches 7-5. Cinnamon-stone comes chiefly from Ceylon, where it is found generally as pebbles, though its occurrence in its native matrix is not unknown.

CINNAMUS [Kinnamos], JOHN, Byzantine historian, flourished in the second half of the 12th century. He was imperial secretary (probably in this case a post connected with the military ad- ministration) to Manuel I. Comnenus (1143-1180), whom he accompanied on his campaigns in Europe and Asia Minor. He appears to have outlived Andronicus I., who died in 1185. Cinnamus was the author of a history of the period 1118-1176, which thus continues the Alexiad of Anna Comnena, and em- braces the reigns of John II. and Manuel I., down to the un- successful campaign of the latter against the Turks, which ended with the disastrous battle of Myriokephalon and the rout of the Byzantine army. Cinnamus was probably an eye-witness of the events of the last ten years which he describes. The work breaks off abruptly; originally it no doubt went down to the death of Manuel, and there are indications that, even in its present form, it is an abridgment. The text is in a very corrupt state. The author’s hero is

Manuel; he is strongly impressed with the superiority of the East to the West, and is a de- termined opponent of the pretensions of the papacy. But he cannot be reproached with undue bias; he writes with the

straightforwardness of a soldier, and is not ashamed on occasion to confess his ignorance. The matter is well arranged, the style (modelled on that of Xenophon) simple, and on the whole free from the usual florid bombast of the Byzantine writers.

Editio princeps, C. Tollius (1652) ; in Bonn, Corpus Scriptorum Hist. Byz., by A. Meineke (1836), with Du Cange's valuable notes; Migne, Patrologia Graeca, cxxxiii. ; see also C. Neumann, Griechische Geschichtsschreiber im 12. Jahrhundert (1888) ; H. von Kap-Herr, Die abendldndische Politik Kaiser Manuels (1881) ; C. Krumbacher, Geschichte der byzantinischen Lilteratur (1897).

CINNOLIN, C S H 6 N 2 , a compound isomeric with phthalazine, prepared by boiling dihydrocinnolin dissolved in benzene with freshly precipitated mercuric oxide. The solution is filtered and the hydrochloride of the base precipitated by alcoholic hydrochloric acid; the free base is obtained as an oil by adding caustic soda. It may be obtained in white silky needles, melting at 24-25° C. and containing a molecule of ether of crystallization by cooling the oil dissolved in ether. The free base melts at 39° C. It is a strong base, forming stable salts with mineral acids, and is easily soluble in water and in the ordinary organic solvents. It has a taste resembling that of chloral hydrate, and leaves a sharp irritation for some time on the tongue; it is also very poisonous (M. Busch and A. Rast, Berichte, 1897, 30, p. 521). Cinnolin derivatives are obtained from oxycinnolin carboxylic acid, which is formed by digesting orthophenyl propiolic acid diazo chloride with water. Oxycinnolin car- boxylic acid on heating gives oxycinnolin, melting at 225 , which with phosphorus pentachloride gives chlorcinnolin. This substance is reduced by iron filings and sulphuric acid to di hydrocinnolin.

The relations of these compounds are here shown: —

-CiOCOOH

.C-OH COOH

O-phenyl propiolic acid diazo hydroxide

m

\/\r

Oxycinnolin carboxylic acid

->

0/v si

.C-OH CH

->

A.

CINO DA PISTOIA (1270-1336), Italian poet and jurist, whose full name was Guittoncino de' Sinibaldi, was born in Pistoia, of a noble family. He studied law at Bologna under Dinus Muggelanus (Dino de Rossonis: d. 1303) and Franciscus Accursius, and in 1307 is understood to have been assessor of civil causes in his native city. In that year, however, Pistoia was disturbed by the Guelph and Ghibelline feud. The Ghibel- lines, who had for some time been the stronger party, being worsted by the Guelphs, Cino, a prominent member of the former faction, had to quit his office and the city of his birth. Pitecchio, a stronghold on the frontiers of Lombardy, was yet in the hands of Filippo Vergiolesi, chief of the Pistoian Ghibellines; Selvaggia, his daughter, was beloved by Cino (who was probably already the husband of Margherita degli Unghi); and to Pitecchio did the lawyer-poet betake himself. It is uncertain how long he remained at the fortress; it is certain, however, that he v/as not with the Vergiolesi at the time of Selvaggia's death, which happened three years afterwards (i3ro), at the Monte della Sambuca, in the Apennines, whither the Ghibellines had been compelled to shift their camp. He visited his mistress's grave on his way to Rome, after some time spent in travel in France and elsewhere, and to this visit is owing his finest sonnet. At Rome Cino held office under Louis of Savoy, sent thither by the Ghibelline leader Henry of Luxemburg, who was crowned emperor of the Romans ini3i2. Ini3i3, however, the emperor died, and the Ghibellines lost their last hope. Cino appears to have thrown up his party, and to have returned to Pistoia. Thereafter he devoted himself to law and letters. After filling several high judicial offices, a doctor of civil law of Bologna in his forty-fourth year, he lectured and taught from the professor's chair at the universities of Treviso, Siena,

Florence ˆnd Perugia in succession; his reputation and success were great, his judicial experience enabling him to travel out of the routine of the schools. In literature he continued in some sort the tradition of Dante during the interval dividing that great poet from his successor Petrarch. The latter, besides celebrating Cino in an obituary

sonnet, has coupled him and his Selvaggia with Dante and Beatrice in the fourth capitolo of his Trionfi d' Amore.

Cino, the master of Bartolus, and of Joannes Andreae the celebrated canonist, was long famed as a jurist. His commentary on the statutes of Pistoia, written within two years, is said to have great merit; while that on the code (Lectura Cino Pistoia super codice, Pavia, 1483; Lyons, 1526) is considered by Savigny to exhibit more practical intelligence and more originality of thought than are found in any commentary on Roman law since the time of Accursius. As a poet he also distinguished himself greatly. He was the friend and correspondent of Dante's later years, and possibly of his earlier also, and was certainly, with Guido Cavalcanti and Durante da Maiano, one of those who replied to the famous sonnet A ciascun' alma presa e gentil core of the Vita Nuova. In the treatise De Vulgari Eloquio Dante refers to him as one of " those who have most sweetly and suntly written poems in modern Italian," but his works, printed at Rome in 1 559, do not altogether justify the praise. Strained and rhetorical as many of his outcries are, however, Cino is .not without moments of true passion and fine natural eloquence. Of these qualities the sonnet in memory of Selvaggia, Io fui in sulV alto e in std beato monte, and the canzone to Dante, Avegnache di omaggio piii per tempo, are interesting examples.

The text-book for English readers is D. G. Rossetti's Early Italian Poets, wherein will be found not only a memoir of Cino da Pistoia, but also some admirably translated specimens of his verse — tht whole wrought into significant connexion with that friendship at Cino's which is perhaps the most interesting fact about him. See- also Ciampi, Vita e poesie di messer Cino da Pistoia (Pisa, 1813).

CINQ-MARS, HENRI COIFFIER RUZfi D'EFFIAT, Marquis de (1620-1642), French courtier, was the second son of Antoine Coifiier Ruze, marquis d'Effiat, marshal of France (1581-1632), and was introduced to the court of Louis XIII. by Richelieu, who had been a friend of his father and who hoped he would counteract the influence of the queen's favourite Mile, de Hautefort. Owing to his handsome appearance and agreeable manners he soon became a favourite of the king, and was made successively master of the wardrobe and master

of the horse. After distinguishing himself at the siege of Arras in 1640, Cinq- Mars wished for a high military command, but Richelieu opposed his pretensions and the favourite talked rashly about over-throwing the minister. He was probably connected with the abortive rising of the count of Soissons in 1641; however- that may be, in the following year he formed a conspiracy with tne duke of Bouillon and others to overthrow Richelieu. This plot was under the nominal leadership of the king's brother Gaston of Orleans. The plans of the conspirators were aided by the illness of Richelieu and his absence from the king, and at the siege of Narbonne Cinq-Mars almost induced Lcuis to agree to banish ' his minister. Richelieu, however, recovered, became acquainted with the attempt of Cinq-Mars to obtain assistance from Spain, and laid the proofs of his treason before the king, who ordered his arrest. Cinq-Mars was brought to trial, admitted his guilt, and was condemned to death. He was executed at Lyons on the 12th of September 1642. It Is possible that Cinq-Mars was urged to engage in this conspiracy by his affection for Louise Marie de Gonzaga (161 2-1667), afterwards queen of Poland, who was a prominent figure at the court of Louis XIII. ; and this tradition forms part of the plot of Alfred de Vigny's novel Cinq-Mars.

See Le P. Griffet, Histoire de Louis XIII; A. Bazin, Histoire de Louis XIII (1846); L. D'Astarac de Frontrailles, Relations des choses particulieres de la cour pendant lafaveur de M. de Cinq- Mars.

CINQUE CENTO (Italian for five hundred; short for 1500), in architecture, the style which became prevalent in Italy in the century following 1500, now usually called " 16th-century work." It was the result of the revival of classic architecture known as Renaissance, but the change had commenced already a century earlier, in the works of Ghiberti and Donatello in sculpture, and of Brunelleschi and Alberti in architecture.

CINQUE PORTS, the name of an ancient jurisdiction in the south of England, which is still maintained with considerable modifications and diminished authority. As the name implies,

the ports originally constituting the body were only five in number — Hastings, Romney, Hythe, Dover and Sandwich ; but to these were afterwards added the " ancient towns " of Winchelsea and Rye with the same privileges, and a good many other places, both corporate and

non-corporate, which, with the title of limb or member, held a subordinate position. To Hastings were attached the corporate members of Pevensey and Seaford, and the non-corporate members of Bulvarhythe, Petit Iham (Yham or Higham), Hydney, Bekesbourn, Northeye and Grenche or Grange; to Romney, Lydd, and Old Romney, Dengemarsh, Orwaldstone, and Bromehill or Promehill; to Dover, Folkestone and Faversham, and Margate, St John's, Goresend (now Birchington), Birchington Wood (now Wood- church), St Peter's, Kingsdown and Ringwould; to Sandwich, Fordwich and Deal, and Walmer, Ramsgate, Reculver, Stonor (Estanor), Sarre (or Serre) and Brightlingsea (in Essex). To Rye was attached the corporate member of Tenterden, and to a Hythe the non-corporate member of West Hythe. The juris- diction thus extends along the coast from Seaford in Sussex to Birchington near Margate in Kent; and it also includes a number of inland districts, at a considerable distance from the ports with which they are connected. The non-incorporated members are within the municipal jurisdiction of the ports to which they are attached; but the corporate members are as free within their own liberties as the individual ports themselves.

The incorporation of the Cinque Ports had its origin in the necessity for some means of defence along the southern seaboard of England, and in the lack of any regular navy. Up to the reign of Henry VII. they had to furnish the crown with nearly all the ships and men that were needful for the state; and for a long time after they were required to give large assistance to the permanent fleet. The oldest charter now on record is one belonging to the 6th year of Edward I.; and it refers to previous documents of the time of Edward the Confessor and William the Conqueror. In return for their services the ports enjoyed extensive privileges. From the Conquest or even earlier they had, besides various lesser rights — (i) exemption from tax and tallage; (2) soc and sae, or full cognizance of all criminal and civil cases within their liberties; (3) to! and team, or the right of receiving toll and the right of compelling the person in whose hands stolen property was found to name the person from- whom he received it; (4) blodwit and fled wit, or the right to punish shedders of blood and those who were seized in an attempt to escape from justice; (5) pillory and tumbrel; (6) infangentheoi and outfangentheof, or power to imprison and execute felons; (7) mundbryce (the breaking into or violation of a man's mund or property in order to erect banks or dikes as a defence against the sea); (8) waives and strays, or the right to appropriate lost property or cattle not claimed within a year and a day; (9) the right to seize all flotsam, jetsam, or ligan, or, in other words, whatever of value was cast ashore by the sea; (10) the privilege of being a gild with power to

impose taxes for the common weal; and (n) the right of assembling in portmote or parliament at Shepway or Shepway Cross, a few miles west of Hythe (but afterwards at Dover), the parliament being empowered to make by-laws for the Cinque Ports, to regulate the Yarmouth fishery, to hear appeals from the local courts, and to give decision in all cases of treason, sedition, illegal coining or concealment of treasure trove. The ordinary business of the ports was conducted in two courts known respectively as the court of brotherhood and the court of brotherhood and guestling, — the former being composed of the mayors of the seven principal towns and a number of jurats and freemen from each, and the latter including in addition the mayors, bailiffs and other representatives of the corporate members. The court of brotherhood was formerly called the brotheryecld, brodall or brodhull; and the name guestling seems to owe its origin to the fact that the officials of the ”' members ” were at first in the position of invited guests.

The highest office in connexion with the Cinque Ports is that »f the lord warden, who also acts as governor of Dover Castle, i-.nd has a maritime jurisdiction (vide infra) as admiral of the

ports. His power was formerly of great extent, but he has now practically no important duty to exercise except that of chairman of the Dover- harbour board. The emoluments of the office are confined to certain insignificant admiralty droits. The patronage attached to the office consists of the right to appoint the judge of the Cinque Ports admiralty court, the registrar of the Cinque Ports and the marshal of the court; the right of appointing salvage commissioners at each Cinque Port and the appointment of a deputy to act as chairman of the Dover harbour board in the absence of the lord warden. Walmer Castle was for long the official residence of the lord warden, but has, since the resignation of Lord Curzon in 1903, ceased to be so used, and those portions of it which are of historic interest are now open to the public. George, prince of Wales (lord warden, 1 903-1907), was the first lord warden of royal blood since the office was held by George, prince of Denmark, consort of Queen Anne.

Admiralty Jurisdiction.— The court of admiralty for the Cinque Ports exercises a co-ordinate but not exclusive admiralty jurisdiction over persons and things found within the territory of the Cinque Ports. The limits of its jurisdiction were declared at an inquisition taken at the court of admiralty, held by the seaside at Dover in 1682, to extend from Shore Beacon in Essex to Redcliff, near Seaford, in Sussex; and with regard to salvage, they comprise all the sea between Seaford in Sussex to a point five miles off Cape Grisnez on the coast of France,

and the coast of Essex. An older inquisition of 1526 is given by R.G. Marsden in his Select Pleas of the Court of Admiralty, II. xxx. The court is an ancient one. The judge sits as the official and commissary of the lord warden, just as the judge of the high court of admiralty sat as the official and commissary of the lord high admiral. And, as the office of lord warden is more ancient than the office of lord high admiral (The Lord Warden v. King in his office of Admiralty, 1831, 2 Hagg. Admy. Rep. 438), it is probable that the Cinque Ports court is the more ancient of the two.

The jurisdiction of the court has been, except in one matter of mere antiquarian curiosity, unaffected by statute. It exercises only, therefore, such jurisdiction as the high court of admiralty exercised, apart from restraining statutes of 1389 and 1391 and enabling statutes of 1840 and 1861 . Cases of collision have been tried in it (the ” Vivid,” 1 Asp. Maritime Law Cases, 601). But salvage cases (the ” Clarisse,” Swabey, 129; the ” Marie,” Law. Rep. 7 P.D. 203) are the principal cases now tried. It has no prize jurisdiction. The one case in which jurisdiction has been given to it by statute is to enforce forfeitures under the statute of 1538.

Dr (afterwards the Right Hon. Robert Joseph) Phillimore succeeded his father as judge of the court from 1855 to 1875, being succeeded by Mr Arthur Cohen, K.C. As Sir R. Phillimore was also the last judge of the high court of admiralty, from 1867 (the date of his appointment to the high court) to 1875, the two offices were, probably for the first time in history, held by the same person. Dr Phillimore’s patent had a grant of the ” place or office of judge official and commissary of the court of admiralty of the Cinque Ports, and their members and appurtenances, and to be assistant to my lieutenant of Dover castle in all such affairs and business concerning the said court of admiralty wherein yourself and assistance shall be requisite and necessary.” Of old the court sat sometimes at Sandwich, sometimes at other ports. But the regular place for the sitting of the court has for a long time been, and still is, the aisle of St James’s church, Dover. For convenience the judge often sits at the royal courts of justice. The office of marshal in the high court is represented in this court by a serjeant, who also bears a silver oar. There is a registrar, as in the high court. The appeal is to the king in council, and is heard by the judicial committee of the privy council. The court can hear appeals from the Cinque Ports salvage commissioners, such appeals being final (Cinque Ports Act 1821). Actions may be transferred to it, and appeals made to it, from the county courts in all cases , arising within the jurisdiction of the Cinque Ports as defined by that act. At the solemn installation of the lord warden the judge as the next principal officer installs him.

The Cinque Ports from the earliest times claimed to be exempt from the jurisdiction of the admiral of England. Their early charters do not, like those of Bristol and other seaports, express this exemption in terms. It seems to have been derived from the general words of the charters which preserve their liberties and privileges.

The lord warden's claim to prize was raised in, but not finally- decided by, the high court of admiralty in the " Ooster Ems," i C. Rob. 284, 1783.

See S. Jeake, Charters of the Cinque Ports (1728); Boys, Sandwich and Cinque Ports; Knocker, Grand Court of Shepway (1862); M. Burrows, Cinque Ports (1895) ; F. M. Hueffer, Cinque Ports (1900) ; Indices of the Great White and Black Books of the Cinque Ports (1905).

CINTRA, a town of central Portugal, in the district of Lisbon, formerly included in the province of Estramadura; 17 m. W.N.W. of Lisbon by the Lisbon-Cacem-Cintra railway, and 6 m. N. by E. of Cape da Roca, the westernmost promontory of the European mainland. Pop. (1900) 5914. Cintra is magnifi- cently situated on the northern slope of the Serra da Cintra, a rugged mountain mass, largely overgrown with pines, eucalyptus, cork and other forest trees, above which the principal summits rise in a succession of bare and jagged grey peaks; the highest being Cruz'Alta (1772 ft.), marked by an ancient stone cross, and commanding a wonderful view southward over Lisbon and the Tagus estuary, and north-westward over the Atlantic and the plateau of Mafra. Few European towns possess equal advantages of position and climate; and every educated Portuguese is familiar with the verses in which the beauty of Cintra is celebrated by Byron in Childe Harold (1812), and by Camoens in the national epic Os Lusiadas (1572). One of the highest points of the Serra is surmounted by the Palacio da Pena, a fantastic imitation of a medieval fortress, built on the site of a Hieronymite convent by the prince consort Ferdinand of Saxe- Coburg (d. 1885) ; while an adjacent part of the range is occupied by the Castello des Mouros, an extensive Moorish fortification, containing a small ruined mosque and a very curious set of ancient cisterns. The lower slopes of the Serra are covered with the gardens and villas of the wealthier inhabitants of Lisbon, who migrate hither in spring and stay until late autumn.

In the town itself the most conspicuous building is a 14th- i5th-

century royal palace, partly Moorish, partly debased Gothic in style, and remarkable for the two immense conical chimneys which rise like towers in the midst. The 18th-century Palacio de Seteaes, built in the French style then popular in Portugal, is said to derive its name (" Seven Ahs ") from a sevenfold echo; here, on the 22nd of August 1808, was signed the convention of Cintra, by which the British and Portuguese allowed the French army to evacuate the kingdom without molestation. Beside the road which leads for 35 m. W. to the village of Collares, celebrated for its wine, is the Penha Verde, an interesting country house and chapel, founded by Joao de Castro (1 500-1 548), fourth viceroy of the Indies. De Castro also founded the convent of Santa Cruz, better known as the Convento de Cortica or Cork convent, which stands at the western extremity of the Serra, and owes its name to the cork panels which formerly lined its walls. Beyond the Penha Verde, on the Collares road, are the palace and park of Montserrate. The palace was originally built by William Beckford, the novelist and traveller (1761-1844), and was purchased in 1856 by Sir Francis Cook, an Englishman who afterwards obtained the Portuguese title viscount of Montserrate. The palace, which contains a valuable library, is built of pure white stone, in Moorish style; its walls are elaborately sculptured. The park, with its tropical luxuriance of vegetation and its variety of lake, forest and mountain scenery, is by far the finest example of landscape gardening in the Iberian Peninsula, and probably among the finest in the world. Its high-lying lawns, which overlook the Atlantic, are as perfect as any in England, and there is one ravine containing a whole wood of giant tree-ferns from New Zealand. Other rare plants have been systematically collected and brought to Montserrate from all parts of the world by Sir Franci= Cook, and afterwards by his successor, Sir

Frederick Cook, the second viscount. The Praia das Macas, or " beach of apples," in the centre of a rich fruit-bearing valley, is a favourite sea-bathing station, connected with Cintra by an extension of the electric tramway which runs through- the town. CIPHER, or Cypher (from Arab, sifr, void), the symbol o, nought, or zero; and so a name for symbolic or secret writing (see Cryptography), or even for shorthand (q.v.), and also in elementary education for doing simple sums (" ciphering ").

CIPPUS (Lat. for a " post " or " stake "), in architecture, a low pedestal, either round or rectangular, set up by the Romans for various purposes such as military or mile stones, boundary posts, &c. The inscriptions on some in the British Museum show that they were occasionally funeral memorials.

CIPRIANI, GIOVANNI BATTISTA (1727-1785), Italian painter and engraver, Pistoiese by descent, was born in Florence in 1727. His first lessons were given him by an Englishman, Ignatius Heckford or Hugford, and under his second master, Antonio Domenico Gabbiani, he became a very clever draughtsman. He was in Rome from 1750 to 1753, where he became acquainted with Sir William Chambers, the architect, and Joseph Wilton, the sculptor, whom he accompanied to England in August 1755. He had already painted two pictures for the abbey of San Michele in Pelago, Pistoia, which had brought him reputation, and on his arrival in England he was patronized by Lord Tilney, the duke of Richmond and other noblemen. His acquaintance with Sir William Chambers no doubt helped him on, for when Chambers designed the Albany in London for Lord Holland, Cipriani painted a ceiling for him. He also painted part of a ceiling in Buckingham Palace, and a room with poetical subjects at Standlynch in Wiltshire. Some of his best and most permanent work was, however, done at Somerset House, built by his friend Chambers, upon which he lavished infinite pains. He not only prepared the decorations for the interior of the north block, but, says Joseph Baretti in his Guide through the Royal Academy (1780), “the whole of the carvings in the various fronts of Somerset Place — excepting Bacon’s bronze figures — were carved from finished drawings made by Cipriani.” These designs include the five masks forming the keystones to the arches on the courtyard side of the vestibule, and the two above the doors leading into the wings of the north block, all of which are believed to have been carved by Nollekens. The grotesque groups flanking the main doorways on three sides of the quadrangle and the central doorway on the terrace appear also to have been designed by Cipriani. The apartments in Sir William Chambers’s stately palace that were assigned to the Royal Academy, into which it moved in 1780, owed much to Cipriani’s graceful, if mannered, pencil. The central panel of the library ceiling was painted by Sir Joshua Reynolds, but the. four compartments in the coves, representing Allegory, Fable, Nature and History, were Cipriani’s. These paintings still remain at Somerset House, together with the emblematic painted ceiling, also his work, of what was once the library of the Royal Society. It was natural that Cipriani should thus devote himself to adorning the apartments of the academy, since he was an original member (1768) of that body, for which he designed the diploma so well engraved by Bartolozzi. In recognition of his services in this respect the members presented him in 1769 with a silver cup with a com- memorative inscription. He was much employed by the pub- lishers, for whom he made drawings in pen and ink, sometimes coloured. His friend Bartolozzi engraved most of them. Draw- ings by him are in both the

British Museum and Victoria and Albert Museum. His best autograph engravings are ” The Death of Cleopatra,” after Benvenuto Cellini; “The Descent of the Holy Ghost,” after Gabbiani; and portraits for Hollis’s memoirs, 1780. He painted allegorical designs for George III.‘s state coach — which is still in use — in 1782, and repaired Verrio’s paintings at Windsor and Rubens’s ceiling in the Banqueting House at Whitehall. If his pictures were often weak, his decora- tive treatment of children was usually exceedingly happy. Some of his most pleasing work was that which, directly or indirectly, he executed for the decoration of furniture. He designed many groups of nymphs and amorini and medallion subjects to form

the centre of Pergolesi’s bands of ornament, and they were continually reproduced upon the elegant satin-wood furniture which was growing popular in his later days and by the end of the 1 8th century became a rage. Sometimes these designs were inlaid in marqueterie, but most frequently they were painted upon the satin-wood by other hands with delightful effect, since in the whole range of English furniture there is nothing more enchanting than really good finished satin-wood pieces. There can be little doubt that some of the beautiful furniture designed by the Adams was actually painted by Cipriani himself. He also occasionally designed handles for drawers and doors. Cipriani died at Hammersmith in 1785 and was buried at Chelsea, where Bartolozzi erected a monument to his memory. He had married an English lady, by whom he had two sons.

CIRCAR, an Indian term applied to the component parts of a subah or province, each of which is administered by a deputy- governor. In English it is principally employed in the name of the Northern Circars, used to designate a now obsolete division of the Madras presidency, which consisted of a narrow slip of territory lying along the western side of the Bay of Bengal from 15° 40′ to 20° 17′ N. Iat. These Northern Circars were five in number, Chicacole, Rajahmundry, Ellore, Kondapalli and Guntur, and their total area was about 30,000 sq. m.

The district corresponds in the main to the modern districts of Kistna, Godavari, Vizagapatam, Ganjam and a part of Nellore. It was first invaded by the Mahommedans in 1471; in 1 541 they conquered Kondapalli, and nine years later they extended their conquests over all Guntur and the districts of Masulipatam. But the invaders appear to

have acquired only an imperfect possession of the country, as it was again wrested from the Hindu princes of Orissa about the year 1571, during the reign of Ibrahim, of the Kutb Shahi dynasty of Hyderabad or Golconda. In 1687 the Circars were added, along with the empire of Hyderabad, to the extensive empire of Aurangzeb. Salabat Jang, the son of the nizam ul mulk Asaf Jah, who was indebted for his elevation to the throne to the French East India Company, granted them in return for their services the district of Kondavid or Guntur, and soon afterwards the other Circars. In 1 7 59, by the conquest of the fortress of Masulipatam, the dominion of the maritime provinces on both sides, from the river Gundlakamma to the Chilka lake, was necessarily trans- ferred from the French to the British. But the latter left them under the administration of the nizam, with the exception of the town and fortress of Masulipatam, which were retained by the English East India Company. In 1765 Lord Clive obtained from the Mogul emperor Shah Alam a grant of the five Circars. Hereupon the fort of Kondapalli was seized by the British, and on the 1 2th of November 1766 a treaty of alliance was signed with Nizam Ali by which the Company, in return for the grant of the Circars, undertook to maintain troops for the nizam's assistance. By a second treaty, signed on the 1st of March 1768, the nizam acknowledged the validity of Shah Alam's grant and resigned the Circars to the Company, receiving as a mark of friendship an annuity of £50,000. Guntur, as the personal estate of the nizam's brother Basalat Jang, was ex- cepted during his lifetime under both treaties. He died in 1782, but it was not till 1788 that Guntur came under British admini- stration. Finally, in 1823, the claims of the nizam over the Northern Circars were bought outright by the Company, and they became a British possession.

CIRCASSIA, a name formerly given to the north-western portion of the Caucasus, including the district between the mountain range and the Black Sea, and extending to the north of the central range as far as the river Kuban. Its physical features are described in the article on the Russian province of Kuban, with which it approximately coincides. The present article is confined to a consideration of the ethnographical relations and characteristics of the people, their history being treated under Caucasia.

The Cherkesses or Circassians, who gave their name to this region, of which they were until lately the sole inhabitants, are a peculiar race, differing from the other tribes of the Caucasus in

origin and language. They designate themselves by the name of Adigheb, that of Cherkesses being a term of Russian origin. By their long-continued struggles with the power of Russia, during a period of

nearly forty years, they attracted the attention of the other nations of Europe in a high degree, and were at the same time an object of interest to the student of the history cf civilization, from the strange mixture which their customs exhibited of chivalrous sentiment with savage customs. For this reason it may be still worth while to give a brief summary of their national characteristics and manners, though these must now be regarded as in great measure things of the past.

In the patriarchal simplicity of their manners, the mental qualities with which they were endowed, the beauty of form and regularity of feature by which they were distinguished, they surpassed most of the other tribes of the Caucasus. At the same time they were remarkable for their warlike and intrepid character, their independence, their hospitality to strangers, and that love of country which they manifested in their deter- mined resistance to an almost overwhelming power during the period of a long and desolating war. The government under which they lived was a peculiar form of the feudal system. The free Circassians were divided into three distinct ranks, the princes or pshi, the nobles or uork (Tatar usden), and the peasants or hokott. Like the inhabitants of the other regions of the Caucasus, they were also divided into numerous families, tribes or clans, some of which were very powerful, and carried on war against each other with great animosity. The slaves, of whom a large proportion were prisoners of war, were generally employed in the cultivation of the soil, or in the domestic service of some of the principal chiefs.

The will of the people was acknowledged as the supreme source of authority; and every free Circassian had a right to express his opinion in those assemblies of his tribe in which the questions of peace and war, almost the only subjects which engaged their attention, were brought under deliberation. The princes and nobles, the leaders of the people in war and their rulers in peace, were only the administrators of a power which was delegated to them. As they had no written laws, the administration of justice was regulated solely by custom and tradition, and in those tribes professing Mahommedanism by the precepts of the Koran. The most aged and respected inhabitants of the various auls or villages frequently sat in judgment, and their decisions were received without a murmur by the contending parties. The Circassian princes and nobles were professedly Mahommedans; but in their religious services many of the ceremonies of their former heathen and Christian worship were still preserved. A great part of the people had remained faithful to the worship of their ancient gods — Shible, the god of thunder, of war and of justice; Tleps, the god of fire; and Seosseres, the god of water and of winds. Although the Circassians are said to have possessed minds capable of the highest

cultivation, the arts and sciences, with the exception of poetry and music, were completely neglected. They possessed no written language. The wisdom of their sages, the knowledge they had acquired, and the memory of their warlike deeds were preserved in verses, which were repeated from mouth to mouth and descended from father to son.

The education of the young Circassian was confined to riding, fencing, shooting, hunting, and such exercises as were calculated to strengthen his frame and prepare him for a life of active warfare. The only intellectual duty of the atalik or instructor, with whom the young men lived until they had completed their education, was that of teaching them to express their thoughts shortly, quickly and appropriately. One of their marriage ceremonies was very strange. The young man who had been approved by the parents, and had paid the stipulated price in money, horses, oxen, or sheep for his bride, was expected to come with his friends fully armed, and to carry her off by force from her father's house. Every free Circassian had unlimited right over the lives of his wife and children. Although polygamy was allowed by the laws of the Koran, the custom of the country forbade it, and the Circassians were generally faithful to the

marriage bond. The respect for superior age was carried to such an extent that the young brother used to rise from his seat when the elder entered an apartment, and was silent when he spoke. Like all the other inhabitants of the Caucasus, the Circassians were distinguished for two very opposite qualities — the most generous hospitality and implacable vindictiveness. Hospitality to the stranger was considered one of the most sacred duties. Whatever were his rank in life, all»the members of the family rose to receive him on his entrance, and conduct him to the principal seat in the apartment. The host was considered responsible with his own life for the security of his guest, upon whom, even although his deadliest enemy, he would inflict no injury while under the protection of his roof. The chief who had received a stranger was also bound to grant him an escort of horse to conduct him in safety on his journey, and confide him to the protection of those nobles with whom he might be on friendly terms. The law of vengeance was no less binding on the Circassian. The individual who had slain any member of a family was pursued with implacable vengeance by the relatives, until his crime was expiated by death. The murderer might, indeed, secure his safety by the payment of a certain sum of money, or by carrying off from the house of his enemy a newly- born child, bringing it up as his own, and restoring it when its

education was finished. In either case, the family of the slain individual might discontinue the pursuit of vengeance without any stain upon its honour. The man closely followed by his enemy, who, on reaching the dwelling of a woman, had merely touched her hand, was safe from all other pursuit so long as he remained under the protection of her roof. The opinions of the Circassians regarding theft resembled those of the ancient Spartans. The commission of the crime was not considered so disgraceful as its discovery; and the punishment of being compelled publicly to restore the stolen property to its original possessor, amid the derision of his tribe, was much dreaded by the Circassian who would glory in a successful theft. The greatest stain upon the Circassian character was the custom of selling their children, the Circassian father being always willing to part with his daughters, many of whom were bought by Turkish merchants for the harems of Eastern monarchs. But no degrada- tion was implied in this transaction, and the young women themselves were generally willing partners in it. Herds of cattle and sheep constituted the chief riches of the inhabitants. The princes and nobles, from whom the members of the various tribes held the land which they cultivated, were the proprietors of the soil. The Circassians carried on little or no commerce, and the state of perpetual warfare in which they lived prevented them from cultivating any of the arts of peace.

CIRCE (Gr. KipKTj), in Greek legend, a famous sorceress, the daughter of Helios and the ocean nymph Perse. Having murdered her husband, the prince of Colchis, she was expelled by her subjects and placed by her father on the solitary island of Aeaea on the coast of Italy. She was able by means of drugs and incantations to change human beings into the forms of wolves or lions, and with these beings her palace was surrounded. Here she was found by Odysseus and his companions; the latter she changed into swine, but the hero, protected by the herb moly (q.v.) , which he had received from Hermes, not only forced her to restore them to their original shape, but also gained her love. For a year he relinquished himself to her endearments, and when he determined to leave, she instructed him how to sail to the land of shades which lay on the verge of the ocean stream, in order to learn his fate from the prophet Teiresias. Upon his return she also gave him directions for avoiding the dangers of the journey home (Homer, Odyssey, x.-xii.; Hyginus, Fab. 12 s). The Roman poets associated her with the most ancient traditions of Latium, and assigned her a home on the promontory of Circei (Virgil, Aeneid, vii. 10). The metamorphoses of Scylla and of Picus, king of the Ausonians, by Circe, are narrated in Ovid {Metamorphoses, xiv.).

The Myth ofKirke, by R. Brown (1883), in which Circe is explained as

a moon-goddess of Babylonian origin, contains an exhaustive summary of facts, although many of the author's speculations may

be proved untenable (review by H. Bradley in Academy, January 19, 1884); see also J. E. Harrison, Myths of the Odyssey i C. Seeliger in W. H. Roscher's Lexikon der Mythologie.

38l

J;

CIRCEIUS MONS (mod. Monte Circeo), an isolated promontory on the S.W. coast of Italy, about 80 m. S.E. of Rome. It is a ridge of limestone about 33 m. long by 1 m. wide at the base, running from E. to W. and surrounded by the sea on all sides except the N. The land to the N. of it is 53 ft. above sea-level, while the summit of the promontory is 1775 ft. The origin of the name is uncertain: it has naturally been connected with the legend of Circe, and Victor Berard (in Les Pheniciens et I'Odyssie, ii. 261 seq.) maintains in support of the identification that Aiair], the Greek name for the island of Circe, is a faithful transliteration of a Semitic name, meaning " island of the hawk," of which vijaos KtpKijs is the translation. The difficulty has been raised, especially by geologists, that the promontory ceased to be an island at a period considerably before the time of Homer; but Procopius very truly remarked that the promontory has all the appearance of an island until one is actually upon it. Upon the E. end of the ridge of the promontory are the remains of an enceinte, forming roughly a rectangle of about 200 by 100 yds. of very fine polygonal work, on the outside, the blocks being very carefully cut and jointed and right angles being intention- ally avoided. The wall stands almost entirely free, as at Arpinum — polygonal walls in Italy are as a rule embanking walls — and increases considerably in thickness as it descends. The blocks of the inner face are much less carefully worked both here and at Arpinum. It seems to have been an acropolis, and contains no traces of buildings, except for a subterranean cistern, circular, with a beehive roof of converging blocks. The modern village of S. Felice Circeo seems to occupy the site of the ancient town, the citadel of which stood on the mountain top, for its medieval walls rest upon ancient walls of Cyclopean work of less careful construction than those of the citadel, and enclosing an area of 200 by 150 yds.

Circei was founded as a Roman colony at an early date — according to some authorities in the time of Tarquinius Superbus, but more probably about 390 B.C. The existence of a previous population, however, is very likely indicated by the revolt of Circei in the middle

of the 4th century B.C., so that it is doubtful whether the walls described are to be attributed to the Romans or the earlier Volscian inhabitants. At the end of the republic, however, or at latest at the beginning of the imperial period, the city of Circei was no longer at the E. end of the promontory, but on the E. shores of the Lago di Paola (a lagoon — now a considerable fishery — separated from the sea by a line of sandhills and connected with it by a channel of Roman date: Strabo speaks of it as a small harbour) one mile N. of the W. end of the promontory. Here are the remains of a Roman town, belonging to the 1st and 2nd centuries, extending over an area of some 600 by 500 yards, and consisting of fine buildings along the lagoons, including a large open piscina or basin, surrounded by a double portico, while farther inland are several very large and well-preserved water-reservoirs, supplied by an aqueduct of which traces may still be seen. An inscription speaks of an amphitheatre, of which no remains are visible. The transference of the city did not, however, mean the abandonment of the E. end of the promontory, on which stand the remains of several very large villas. An inscription, indeed, cut in the rock near S. Felice, speaks of this part of the promunturium Veneris (the only case of the use of this name) as belonging to the city of Circei. On the S. and N. sides of the promontory there are comparatively few buildings, while, at the W. end there is a sheer precipice to the sea. The town only acquired municipal rights after the Social War, and was a place of little importance, except as a seaside resort. For its villas Cicero compares it with Antium, and probably both Tiberius and Domitian possessed residences there. The beetroot and oysters of Circei had a certain reputation. The view from the highest summit of the promontory (which is occupied by ruins of a platform attributed with great probability to a temple of Venus or Circe) is of re- markable beauty; the whole mountain is covered with fragrant

shrubs. From any point in the Pomptine Marshes or on the coast-line of Latium the Circeiari promontory dominates the landscape in the most remarkable way.

See T. Ashby, ” Monte Circeo,” in Melanges de Vecolejrancaise de Rome, xxv. (1905) 157 seq. (T. As.)

CIRCLE (from the Lat. circulus, the diminutive of circus, a ring; the cognate Gr. word is dpnos, generally used in the form Kp’iKos), a

plane curve definable as the locus of a point which moves so that its distance from a fixed point is constant.

The form of a circle is familiar to all; and we proceed to define certain lines, points, &c, which constantly occur in studying its geometry. The fixed point in the preceding definition is termed the ” centre ” (C in fig. 1); the constant distance, e.g. CG, the ” radius.” The curve itself is sometimes termed the ” circumference.” Any line through the centre and terminated at both extremities by the curve, e.g. AB, is a “diameter”; any other line similarly terminated, e.g. EF, a ” chord.” Any line drawn from an external point to cut the circle in two points, e.g. DEF, is termed a ” secant “; if it touches the circle, e.g. DG, it is a ” tangent.” Any portion of the circumference terminated by two points, e.g. AD (fig. 2), is termed an ” arc “; and the plane figure enclosed by a chord and arc, e.g. ABD, is

termed a ” segment “;

Gˆ- \ Xˆ”” ˆˆ *f ˆ e cnor d be a dia

A t /WWmMmk J> meter, the segment is termed a ” semi- circle.” The figure included by two radii and an arc is a “sector,” e.g. ECF (fig. 2). ” Concentric circles ” are, as the name obviously shows, circles having the same centre; the figure enclosed by the circumferences of two concentric circles is an ” annulus ” (fig. 3), and of two non-con- the shaded portions in fig. 4; the

Fig. 3.

Fig. 4.

centric circles a ” lune

clear figure is sometimes termed a ” lens. ”

The circle was undoubtedly known to the early civilizations, its simplicity specially recommending it as an object for study. Euclid defines it (Book I. def. 15) as a “plane figure enclosed by one line, all the straight lines drawn to which from one point within the figure are equal to one another.” In the succeeding three definitions the centre, diameter and the semicircle are defined, while the third postulate of the same book demands the possibility of describing a circle for every ” centre ” and ” distance.” Having employed the circle for the construction and demonstration of several propositions in Books I. and II. Euclid devotes his third book entirely to theorems and problems relating to the circle, and certain lines and angles, which he defines in

introducing the propositions. The fourth book deals with the circle in its relations to inscribed and circumscribed triangles, quadrilaterals and regular polygons. Reference should be made to the article Geometry: Euclidean, for a detailed summary of the Euclidean treatment, and the elementary properties of the circle.

Analytical Geometry of the Circle. In the article Geometry: Analytical, it is shown that the general equation to a circle in rectangular Cartesian co-ordinates is x i --y i --2gx--2fy--c = o, i.e. in the general equation of the second degree the co-efficients of x % and y 2 are equal, and of xy zero. The co-ordinates of its centre are -g/c, -f/c; and its radius is (g 2 +/ 2 -c) i . The equations to the chord, tangent and normal are readily derived by the ordinary methods. Consider the two circles :—

x* + y 2 + 2gx + 2fy + c*‘0, x i + f + 2g’x + 2f’y + c’ = o.

Cartesian co-ordi- nates.

Obviously these equations show that the curves intersect in four points, two of which lie on the intersection of the line, 2{g— g’)x + 2(f — f’)y + C— c’ = o, the radical axis, with the circles, and the other two where the lines * 2 + y 2 = (tf + ty) (x — iy) = o (where i = V — 1) intersect the circles. The first pair of intersections may be either real or imaginary ; we proceed to discuss the second pair.

The Equation x 2 + y 2 = o’ denotes a pair of perpendicular imaginary lines; it follows, therefore, that circles always intersect in two imaginary points at infinity along these lines, and since the terms x 2_j_y2 occur in the equation of every circle, it is seen that all circles pass through two fixed points at infinity. The introduction of these lines and points constitutes a striking achievement in geometry, and from their association with circles they have been named the ” circular lines ” and ” circular points.” Other names for the circular lines are ” circulars ” or ” isotropic lines.” Since the equation to a circle of zero radius is r’ + y 2 = 0, i.e. identical with the circular lines, it follows that this circle consists of a real point and the two imaginary lines; conversely, the circular lines are both a pair of lines and a circle. A further deduction from the principle of continuity follows by considering the intersections of concentric circles. The equations to such circles may be expressed in the form x i \ j f = a-, x 2 -{-y 2 = / S 2 . These equations show that the circles touch where they intersect the lines x 2 --y 2 = o, i.e. concentric circles have double contact at the circular points, the chord of contact being the line at infinity.

In various systems of triangular co-ordinates the equations to circles specially related to the triangle of reference assume comparatively simple forms; consequently they provide elegant algebraical demonstrations of properties concerning a triangle and the circles intimately associated with its geometry. In this article the equations to the more important circles — the circum- scribed, inscribed, escribed, self-conjugate — will be given; reference should be made to the article Triangle for the con- sideration of other circles (nine-point, Brocard, Lemoine, &c); while in the article Geometry: Analytical, the principles of the different systems are discussed.

The equation to the circumcircle assumes the simple form Oi87 + iYa-|-<;a/S = o,thecentrebeingcos A, cos B,cosC. The inscribed circle is cos JA V a + cos JB V /3 + cos JC V 7 = 0, with centre Trlllaear a = f) = y; while the escribed circle opposite the angle A co-ordl- is cos JAV — a + sin JBV /S + sin JCv7 = o, with centre na ~te S — a = /3 = 7. Theself-conjugatecircleisa 2 sin2A + /3 2 sin2B + 7 2 sin2C = o,ortheequivalentformacosAa 2 + 6cosB/3 2 -|-ccosC7 2 = o, the centre being sec A, sec B, sec C.

The general equation to the circle in trilinear co-ordinates is readily deduced from the fact that the circle is the only curve which inter- sects the line infinity in the circular points. Consider the equation a0y + bya + CaP + (la + mP + ny)(aa + bp + cy)' = o (1).

This obviously represents a conic intersecting the circle affy + bya + ca/3 = o in points on the common chords la--mfi--ny = o, aa + bff - j-C7 = o. The line la + mP + ny is the radical axis, and since ao-j-6/3 + £7 = is the line infinity, it is obvious that equation (1) represents a conic passing through the circular points, i.e. a circle. If we compare (1) with the general equation of the second degree ua?--vfP J rivy i --2u'(}y--2v 70 + 20/ a/3 = 0, it is readily seen that for this equation to represent a circle we must have

— kabc = vc 2 + wb i ~ 2u'bc = wa 2 + uc 2 — 2v'ca = ub 2 + va? —2w'ab.

The corresponding equations in areal co-ordinates are readily derived by substituting x/a, y/b, z/c for a, ft 7 respectively in the trilinear equations. The circumcircle is thus seen Areal to be a?yz--bHx--c i xy = o, with centre sin 2A, sin 2B, co-ordl- sin 2C ; the inscribed circle is V (x cot JA) + V (y cot J B) nates. + V (z cot JC) = 0, with centre sin A, sin B, sin C; the escribed circle opposite the angle A is V (— x cot JA) + V (y tan JB) + V (z tan JC) = o, with centre —sin A, sin B, sin C; and the self- conjugate circle is # 2 cot A + y 2 cot B-f-z 2 cot C =

o, with centre tan A, tan B, tan C. Since in areal co-ordinates the line infinity is repre- sented by the equation x--y--z — o it is seen that every circle is of the form a 2 yz--b 2 zx+c 2 xy--(lx+my+nz)(x+y +z) =0. Compar- ing this equation with ux i --vy 2 --wz?--2u'yz-{-2v'zx-{-2w'xy = o, we obtain as the condition for the general equation of the second degree to represent a circle : — –

(v+w— 2u')/a i ={w+u— 2v')lb i = (u+v— 2w')lcK

In tangential (p, q, r) co-ordinates the inscribed circle has for its equationˆ — a)qr-ˆ-(s — b)rp + (s — c)pq = o,s being equal to i(a-{-b-{-c) ; an alternative form is qr cot JA --rp cot JB --pq cot JC = o ; Xaagentlal the centre is ap--bq--cr = 0, or p sinA+g sinB+rsinC = o. C o-ordi- The escribed circle opposite the angle A is —sqr+ (s—c)rp aa t es , + {s — b)pq = o or — qr cot JA --rp tan JB +pq tan JC = o, with centre — ap +bq +cr = o. The circumcircle is a V P+b V <7 +c V r = o, the centre being p sin 2h-\-q sin 2B+r sin 2C=o. The general equation to a circle in this system of co-ordinates is deduced as follows: If p be the radius and lp-\-my-\-nr = o the centre, we have P = (lpi+mqi+nri)/(l-\-m+n), in which pi, q it n is a line distant / > from the point lp+mq+nr = o. Making this equation homogeneous

CIRCLE

383

by, the relation Xa*(p— q) (p — r)=4A 2 (see Geometry: Analytical, which is generally written {ap, bq, crj 2 = 4A 2 , we obtain {ap, bq, cr\ 2 p 2 = 4A 2 \(lp--mq+nr)/(l+m--n)\ i , the accents being dropped, and p, q, r regarded as current co-ordinates. This equa- tion, which may be more conveniently written {ap, bq, cr\ 2 = (\p--nq--vrY, obviously represents a circle, the centre being \p--lxq-{-vr — o, and radius 2A/(X+ju + >'). If we make X = m = ' / =o, p is infinite, and we obtain {ap, bq, cr) 2 = o as the equation to the circular points.

Systems of Circles.

Centres and Circle of Similitude.— The " centres of similitude " of two circles may be defined as the intersections of the common tangents to the two circles, the direct common tangents giving rise to the " external centre," the transverse tangents to the " internal centre." It may be readily shown that the external and internal centres are the points where the line joining the centres of the two circles is divided

externally and internally in the ratio of their radii.

The circle on the line joining the internal and external centres of similitude as diameter is named the ” circle of similitude.” It may be shown to be the locus of the vertex of the triangle which has for its base the distance between the centres of the circles and the ratio of the remaining sides equal to the ratio of the radii of the two circles.

With a system of three circles it is readily seen that there are six centres of similitude, viz. two for each pair of circles, and it may be shown that these lie three by three on four lines, named the ” axes of similitude.” The collinear centres are the three sets of one external and two internal centres, and the three external centres.

Coaxal Circles.— A system of circles is coaxal when the locus of points from which tangents to the circles are equal is a straight line. Consider the case of two circles, and in the first place suppose them to intersect in two real points A and B. Then by Euclid iii. 36 it is seen that the line joining the points A and B is the locus of the intersection of equal tangents, for if P be any point on AB and PC and PD the tangents to the circles, then PA-PB = PC 2 = PD 2 , and therefore PC = PD. Furthermore it is seen that AB is perpendicular to the line joining the centres, and divides it in the ratio of the squares of the radii. The line AB is termed the ” radical axis.” A system coaxal with the two given circles is readily constructed by describing circles through the common points on the radical axis and any third point; the minimum circle of the system is obviously that which has the common chord of intersection for diameter, the maximum

is the radical axis — considered as a circle of infinite radius. In the case of two non-intersecting circles it may be shown that the radical axis has the same metrical relations to the line of centres.

There are several methods of con- structing the radical axis in this case. One of the simplest is : Let P and P’ (fig. 5) be the points of contact of a common tangent; .drop perpen- diculars PL, P’L’, from P and P’ to OO’, the line joining the centres, then the radical axis bisects LL’ (at X) and is perpendicular to OO’. To prove this let AB, AB 1 be the tangents from any point on the line AX. Then by Euc. i. 47, AB 2 = A0 2 -OB 2 = AX 2 +OX 2 -OP 2 ; and OX 2 = OD 2 -DX 2 = OP 2 +PD 2 -DX 2 . Therefore AB 2 = AX 2 -DX 2 +PD 2 . Similarly AB’ 2 =AX 2 -DX 2 +DP’ 2 . Since PD = PD’, it follows that AB = AB’.

To construct circles coaxal with the two given circles, draw the tangent, say XR, from X, the point where the radical axis intersects the

line of centres, to one of the given circles, and with centre X and radius XR describe a circle. Then circles having the intersections of tangents to this circle and the line of centres for centres, and the lengths of the tangents as radii, are members of the coaxal system.

In the case of non-intersecting circles, it is seen that the minimum circles of the coaxal system are a pair of points I and I', where the orthogonal circle to the system intersects the line of centres; these points are named the " limiting points." In the case of a coaxal system having real points of intersection the limiting points are imaginary. Analytically, the Cartesian

Fig. 5.

equation to a coaxal system can be written in the form x 2 +y i + 2ax ± £ 2 = o, where a varies from member to member, while k is a constant. The radical axis is x = o, and it may be shown that the length of the tangent from a point (o, h) is h 2 =*=k 2 , i.e. it is independent of a, and therefore of any particular member of the system. The circles intersect in real or imaginary points according to the lower or upper sign of £ 2 , and the limiting points are real for the upper sign and imaginary for the lower sign. The fundamental properties of coaxal systems may be summarized : —

1. The centres of circles forming a coaxal system are collinear;

2. A coaxal system having real points of intersection has imagin-

ary limiting points;

3. A coaxal system having imaginary points of intersection has

real limiting points;

4. Every circle through the limiting points cuts all circles of the

system orthogonally;

5. The limiting points are inverse points for every circle of the

system.

The theory of centres of similitude and coaxal circles affords elegant demonstrations of the famous problem: To describe a circle to touch three given circles. This problem, also termed the " Apollonian problem," was demonstrated with the aid of conic sections by

Apollonius in his book on Contacts or Tangencies; geometrical solutions involving the conic sections were also given by Adrianus Romanus, Vieta, Newton and others. The earliest analytical solution appears to have been given by the princess Elizabeth, a pupil of Descartes and daughter of Frederick V. John Casey, professor of mathematics at the Catholic university of Dublin, has given elementary demonstrations founded on the theory of similitude and coaxal circles which are reproduced in his Sequel to Euclid; an analytical solution by Gergonne is given in Salmon's Conic Sections. Here we may notice that there are eight circles which solve the problem.

Mensuration of the Circle. All exact relations pertaining to the mensuration of the circle involve the ratio of the circumference to the diameter. This ratio, invariably denoted by x, is constant for all circles, but it does not admit of exact arithmetical expression, being of the nature of an incommensurable number. Very early in the history of geometry it was known that the circumference and area of a circle of radius r could be expressed in the forms 2-wr and irr 2 . The exact geometrical evaluation of the second quantity, viz. 7tt 2 , which, in reality, is equivalent to; determining a square equal in area to a circle, engaged the attention of mathematicians for many centuries. The history of these attempts, together with modern contributions to our knowledge of the value and nature of the number ir, is given below (Squaring of the Circle).

The following table gives the values of this constant and several expi essions involving it : —

Number.

Logarithm.

Number.

Logarithm.

ir

3-1415927

0-4971499

lr2

9-8696044

0-9942997

2ir

6-2831858

0:7981799

1

ilT

12-5663708

1-0992099

0-0168869

2-2275490

i”

1-5707963

01961199

6ir2

1-0471976 0-7853982

0:020 286 1 -8950899

. Vtt

1-7724539

0-2485750

I”

0-5235988 3926991

1-7189986

V5940599

•fir

1-4645919

0-1657166

0-2617994 4-1887902

“1-4179686 0-6220886

1

0-5641896

V7514251

IT

180

0-0174533

“5-2418774

2

•V ir

1-1283792

00524551

1_

ir £

0-3183099

1-5028501

1

2Vir

0-2820948

1-4503951

1-2732395

0-1049101

•f 4

- 3T

1-2407010

0-0936671

1

4rr

0-0795775

“5-9007901

1 3

0-6203505

1-7926371

180

ir

5T2957795

1-7581226

loge n-

1-1447299

0-0587080

Useful fractional approximations are 22/7 and 355/113.

A synopsis of the leading formula connected with the circle will now be given.

1. Circle. — Data: radius = a. Circumference = 2ra. Area = xa 2 .

2. Arc and Sector. — Data: radius = o; = circular measure of angle subtended at centre by arc; c = chord of arc; c 2 = chord of semi-arc; c 4 = chord of quarter-arc.

384

CIRCLE

Exact formulae are: — Arc = a6, where may be given directly, or indirectly by the relation c = 2a sin J0. Area of sector = jo 2 9 = f radiusXarc.

Approximate formulae are: — Arc = f(8c 2 — c) (Huygen's formula); arc = j"b (c — 40C2 + 256CJ.

•3. Segment. — Data: a, 0, c, e 2 , as in (2); h = height of segment, i.e. distance of mid-point of arc from chord.

Exact formulae are : —Area = io 2 (0 – sin 0) = J

Approximate formulae are : — Area = fS (6c + 8c 2)h ; = § V (e 2 + lV)-h ; = i J 5 (7c + 3a)/f, a. being the true length of the arc.

From these results the mensuration of any figure bounded by circular arcs and straight lines can be determined, e.g. the area of a lune or meniscus is expressible as the difference or sum of two segments, and

the circumference as the sum of two arcs. (C. E.*)

Squaring of the Circle.

The problem of finding a square equal in area to a given circle, like all problems, may be increased in difficulty by the imposition of restrictions; consequently under the designation there may be embraced quite a variety of geometrical problems. It has to be noted, however, that, when the ” squaring ” of the circle is especially spoken of, it is almost always tacitly assumed that the restrictions are those of the Euclidean geometry.

Since the area of a circle equals that of the rectilineal triangle whose base has the same length as the circumference and whose altitude equals the radius (Archimedes, KvkXov ykrpr\avi, prop.i), it follows that, if a straight line could be drawn equal in length to the circumference, the required square could be found by an ordinary Euclidean construction; also, it is evident that, conversely, if a square equal in area to the circle could be obtained it would be possible to draw a straight line equal to the circumfer- ence. Rectification and quadrature of the circle have thus been, since the time of Archimedes at least, practically identical problems. Again, since the circumferences of circles are pro- portional to their diameters — a proposition assumed to be true from the dawn almost of practical geometry — the rectification of the circle is seen to be transformable into finding the ratio of the circumference to the diameter. This correlative numerical problem and the two purely geometrical problems are inseparably connected historically.

Probably the earliest value for the ratio was 3. It was so among the Jews (1 Kings vii. 23, 26), the Babylonians (Oppert, Journ. asiatique, August 1872, October 1874), the Chinese (Biot, Joum. asiatique, June 1841), and probably also the Greeks. Among the ancient Egyptians, as would appear from a calculation in the Rhind papyrus, the number (f) 4 , *’•«• 3-1605, was at one time in use. 1 The first attempts to solve the purely geometrical problem appear to have been made by the Greeks (Anaxagoras, &c.) 2 , one of whom, Hippocrates, doubtless raised hopes of a solution by his quadrature of the so-called meniscoi or lune. 3

[The Greeks were in possession of several relations pertaining to the quadrature of the lune. The following are among the more interesting. In fig. 6, ABC is an isosceles triangle right

Fig. 7

angled at C, ADB is the semicircle described on AB as diameter, AEB the circular arc described with centre C and radius CA = CB. It is easily shown that the areas of the lune ADBEA and the triangle ABC are equal. In fig. 7, ABC is any triangle

1 Eisenlohr, Ein math. Handbuch d. alten Agypter, tibers. u. erkldrt (Leipzig, 1877); Rodet, Bull, de la Soc. Math, de France, vi. pp. 139-149.

2 H. Hankel, Zur Gesch. d. Math, im Alterthum, &c, chap, v (Leipzig, 1874); M. Cantor, Vorlesungen iiber Gesch. d. Math. i. (Leipzig, 1880) ; Tannery, Mem. delaSoc ., &c, aBordeaux; Allman, in Hermathena.

3 Tannery. Bull, des sc. math. [2], x. pp. 213-226.

right angled at C, semicircles are described on the three sides, thus forming two lunes AFCDA and CGBEC. The sum of the areas of these lunes equals the area of the triangle ABC]

As for Euclid, it is sufficient to recall the facts that the original author of prop. 8 of book iv. had strict proof of the ratio being <4, and the author of prop. 15 of the ratio being >3, and to direct attention to the importance of book x. on incommensur- ables and props. 2 and 16 of book xii., viz. that ” circles are to one another as the squares on their diameters ” and that ” in the greater of two concentric circles a regular 2w-gon can be inscribed which shall not meet the circumference of the less,” however nearly equal the circles may be.

With Archimedes (287-212 B.C.) a notable advance was made. Taking the circumference as intermediate between the perimeters of the inscribed and the circumscribed regular w-gons, he showed that, the radius of the circle being given and the perimeter of some particular circumscribed regular polygon obtainable, the perimeter of the circumscribed regular polygon of double the number of sides could be calculated; that the like was true of the inscribed polygons; and that consequently a means was thus afforded of approximating to the circumference of the circle. As a matter of fact, he started with a semi-side AB of a circumscribed regular hexagon meeting the circle in B (see fig. 8), joined A and B with O the centre, bisected the angle AOB by OD, so that BD became the semi-side of a circumscribed regular 12-gon; then as AB:BO:OA::i: 1/3:2 he sought an ap- proximation to V3 and found that AB: BO $>$ 153 .-265. Next he applied his theorem 4 BO + OA: AB: : OB:BD to calculate BD; from this in turn he calculated the semi-sides of the circumscribed regular 24-gon, 48-gon and 96-gon, and so finally established for the circumscribed regular 96-gon

that perimeter : diameter <3y:i. In a quite analogous manner he proved for the inscribed regular 96-gon that perimeter : diameter >3ˆ? :i. The conclusion from these therefore was that the ratio of circumference to diameter is < 3-$- and > 3ˆ? . This is a most notable piece of work; the immature condition of arithmetic at the time was the only real obstacle preventing the evaluation of the ratio to any degree of accuracy whatever. 6

No advance of any importance was made upon the achieve- ment of Archimedes until after the revival of learning. His immediate successors may have used his method to attain a greater degree of accuracy, but there is very little evidence pointing in this direction. Ptolemy (fl. 127-151), in the Great Syntaxis, gives 3-141552 as the ratio 6 ; and the Hindus (c. a.d. 500), who were very probably indebted to the Greeks, used 62832/20000, that is, the now familiar 3-i4i6. 7

It was not until the 15th century that attention in Europe began to be once more directed to the subject, and after the resuscitation a considerable length of time elapsed before any progress was made. The first advance in accuracy was due to a certain Adrian, son of Anthony, a native of Metz (1527), and father of the 1 better-known Adrian Metius of Alkmaar. In refutation of Duchesne(Van der Eycke), he showed that the ratio was <3-Mn and >3roV, and thence made the exceedingly lucky step of taking a mean between the two by the quite unjustifiable process of halving the sum of the two numerators for a new numerator and halving the sum of the two denominators for a new denominator, thus arriving at the now well-known approximation sˆj\ or flf, which, being equal to 3-1415929. . ., is correct to the sixth fractional place. 8

4 In modern trigonometrical notation, i-fsec0:tan0 :: 1 : tan J0.

6 Tannery, ” Sur la mesure du cercle d’Archimede,” in Mem. . . . Bordeaux [2], iv. pp. 313-339; Menge, Des Archimedes Kreismessung (Coblenz, 1874).

c De Morgan, in Penny Cyclop, xix. p. 186.

7 Kern, Aryabhattlyam (Leiden, 1874), trans, by Rodet (Paris,

1879).

8 De Morgan, art. ” Quadrature of the Circle, “in English Cyclop. ; Glaisher, Mess, of Math. ii. pp. 119-128, iii. pp. 27-46; de Haan, Nicuw Archief v. Wish. i. pp. 70-86, 206-211.

The next to advance the calculation was Francisco Vieta. By finding the perimeter of the inscribed and that of the circum- scribed regular polygon of 393216 (i.e. 6X2 16) sides, he proved that the ratio was > 3-1415926535 and <3-i4i5926s37, so that its value became known (in 1579) correctly to 10 fractional places. The theorem for angle-bisection which Vieta used was not that of Archimedes, but that which would now appear in the form 1 – cos = 2 sin 2 \0. With Vieta, by reason of the advance in arithmetic, the style of treatment becomes more strictly trigono- metrical; indeed, the Univer sales Inspectiones, in which the calculation occurs, would now be called plane and spherieal trigonometry, and the accompanying Canon mathematicus a table of sines, tangents and secants. 1 Further, in comparing the labours of Archimedes and Vieta, the effect of increased power of symbolical expression is very noticeable. Archimedes's process of unending cycles of arithmetical operations could at best have been expressed in his time by a rule" in words; in the 16th century it could be condensed into a " formula." Accordingly, we find in Vieta a formula for the ratio of diameter to circumference, viz. the interminate product 2 — ■

IV I • Vi-HVl- V i + |VJ + |Vi . . . From this point onwards, therefore, no knowledge whatever of geometry was necessary in any one who aspired to determine the ratio to any required degree of accuracy; the problem being reduced to an arithmetical computation. Thus in connexion with the subject a genus of workers became possible who may be styled ” ir-computers or circle-squarers ” — a name which, if it connotes anything uncomplimentary, does so because of the almost entirely fruitless character of their labours. Passing over Adriaan van Roomen (Adrianus Romanus) of Louvain, who published the value of the ratio correct to 15 places in his Idea mathematica (1593), 3 we come to the notable computer Ludolph van Ceulen (d. 1610), a native of Germany, long resident in Holland. His book, Van den Circkel (Delft, 1596), gave the ratio correct to 20 places, but he continued his calculations as long as he lived, and his best result was published on his tombstone in St Peter’s church, Leiden. The inscription, which is not known to be now in existence, 4 is in part as follows: — .... Qui in vita sua multo labore circumferentiae circuli proxi- mam rationem ad diametrum invenit sequentem — quando diameter est I turn circuli circumferentia plus est

3141592653589793238462643383279502881

0000000000000000000000000000000000

et minus

31415926535897932384626433832795028 9

I 0000000000000000000000000000000000 . . .

This gives the ratio correct to 35 places. Van Ceulen's process was essentially identical with that of Vieta. Its numerous root extractions amply justify a stronger expression than " multo labore," especially in an epitaph. In Germany the "Ludolphische Zahl " (Ludolph's number) is still a common name for the ratio. 5 Up to this point the credit of most that had been done may be set down to Archimedes. A new departure, however, was made

by Willebrord Snell of Leiden in his Cyclometria, published in 1621. His achievement was a closely approximate geometrical solution of the problem of rectification (see fig. 9) : ACB being a semicircle whose centre is O, and AC the arc to be rectified, he pro- duced AB to D, making BD equal to the radius, joined DC,

1 Vieta, Opera math. (Leiden, 1646) ; Marie, Hist, des sciences math. iii. 27 seq. (Paris, 1884).

2 Kliigel, Math. Wbrterb. ii. 606, 607.

3 Kiistner, Gesch. d. Math. i. (Gottingen, 1 796-1 800).

4 But see Les Delices de Leide (Leiden, 1712); or de Haan, Mess, of Math. iii. 24-26.

5 For minute and lengthy details regarding the quadrature of the circle in the Low Countries, see de Haan, " Bouwstoffen voor de geschiedenis, &c," in Versl. en Mededeel. der K. Akad. van Wetensch. ix., x.,xi.,xii. (Amsterdam); also his "Notice sur quelques quad- rateurs, &c," in Bull, di bibliogr. e di storia delle sci. mat. e fis. vii.

99-144.

quam

quam

Fig. 9.

Fig. 10.

and produced it to meet the tangent at A in E ; and then his assertion (not established by him) was that AE was nearly equal to the arc AC, the error being in defect. For the purposes of the calculator a solution erring in excess was also required, and this Snell gave by slightly varying the former construction. Instead of producing AB (see fig. 10) so that BD was equal to r, he produced it only so far that, when the extremity D' was joined with C, the part D'F outside the circle was equal to r; in other words, by a non-Euclidean construction he trisected the angle AOC, for it is readily seen that, since FD' = FO = OC, the angle FOB = J AOC. 6 This couplet of constructions is as important from the calculator's point of view as it is interesting geometrically. To compare it on this score with the fundamental proposition of Archimedes, the latter must be put into a form similar to SnelPs. AMC being an arc of a circle (see fig. 11) whose centre is 0, AC its chord, and HK the tangent drawn at the middle point of the arc and bounded by OA, OC produced, then, according to Archimedes, AMCAC. In modern trigonometrical notation the propositions to be compared stand as follows: —

2 tan \8>e>2 sin §0

tan he+2 sin \e>B>ˆ±

2 +cos e

(Archimedes) ; (Snell).

It is readily shown that the latter gives the best approxima- tion to 6 ; but, while the former requires for its application a knowledge of the trigonometrical ratios of only one angle (in other words, the ratios of the sides of only one right-angled triangle), the latter requires the same for two angles, 6 and \6.

B B,f 3

Fig. 11.

Fig. 12.

Grienberger, using Snell's method, calculated the ratio correct to 39 fractional places. 7 C. Huygens, in his De Circuli Magni- tudine Inventa, 1654, proved the propositions of Snell, giving at the same time a number of other interesting theorems, for example, two inequalities which may be written as follows 8 —

chd 9 + 2ˆd! + ˆe Kchd e ‘ s[n 6) > e > chd e + i(chd 9 – sin g)-

As might be expected, a fresh view of the matter was taken by Rene Descartes. The problem he set himself was the exact converse of that of Archimedes. A given straight line being viewed as equal in length to the circumference of a circle, he sought to find the diameter of the circle. His construction is as follows (see fig. 12). Take AB equal to one-fourth of the given line; on AB describe a square ABCD; join AC; in AC produced find, by a known process, a point Ci such that, when CiB t is drawn perpendicular to AB produced and GDi perpendicular to BC produced, the rectangle BCi will be equal to jABCD; by the same process find a point C 2 such that the rectangle B1C2 will be equal to jBG; and so on ad infinitum. The diameter sought is the straight line from A to the limiting position of the series of B’s, say the straight line ABoo . As in the case of the process of

6 It is thus manifest that by his first construction Snell gave an approximate solution of two great problems of antiquity.

7 Elementa trigonometrica (Rome, 1630) ; Glaisher, Messenger of Math. iii. 35 seq.

8 See Kiessling’s edition of the De Circ. Magn. Inv. (Flensburg, 1869) ; or Pirie’s tract on Geometrical Methods of Approx. to the Value of ir (London, 1877).

II

3 86

GIjReUE

Archimedes, we may direct our, attention either to. the, infinite series of geometrical operations or to the corresponding infinite series of arithmetical operations. Denoting the number of units in AB by \c, we can express BBi, BiB 2 , . . , in terms of \c, and the identity, ABcc = AB + BBi + BiB 2 + . ■ • gives us at once an expression for the diameter in terms of the circumference. by means of an infinite series. 1 The proof of the correctness of the construction is seen to be involved: in the following theorem, which serves likewise to throw new light on the subject :— AB being any straight line whatever, and the above construction being made, then AB is the diameter of the circle circumscribed by the square ABCD (self-evident), ABi is the diameter of the circle circumscribed by the regular 8-gon having the same perimeter as the square, AB 2 is the diameter of the circle circum-scribed by the regular 16-gon having the same perimeter as the

square, and so on. Essentially, therefore, Descartes'? process is that known later as the process of isoperimeters, and often attributed wholly to Schwab. 2

In 1655 appeared the Arithmetica Infinitorum of John Wallis, where numerous problems of quadrature are dealt with, the curves being now represented in Cartesian co-ordinates, and algebra playing an important part. In a. very curious manner, by viewing the circle, y = {i — x?)\ as a member of the series of curves y = (1 -* 2) 1 , y = (1 — x 2) 2 , &c, he was led to the proposition that four times the reciprocal of the ratio of the circumference to the diameter, i.e. 4/ir, is equal to the infinite product

3- 3- 5- 5- 7- 7-9- . 2.4.4.6.6.8.8...'

and, the result having been communicated to Lord Brouncker, the latter discovered the equally curious equivalent continued fraction

i + -

3 2 5 2

2 + 2 + 2 + 2 ' ' '

The work of Wallis had evidently an important influence on the next notable personality in the history of the subject, James Gregory, who lived during the period when the higher algebraic analysis was coming into power, and whose genius helped materially to develop it. He had, however,' in a certain sense one eye fixed on the past and the other towards the future. His first contribution 3 was a variation of the method of Archimedes. The latter, as we know, calculated the perimeters of successive polygons, passing from one polygon to another of double the number of sides; in a similar manner Gregory calculated the areas. The general theorems which enabled him to do this, after a start had been made, are

A 2 „ = VA„A' n (Snell's Cyclom.),

a r 2A n A n – 2A nˆ2n /r* \

A 2 " = A-fAi; or AV + Ai; (Gre g or y).

where A„, A' n are the areas of the inscribed and the circum- scribed regular «-gons respectively. He also gave approximate rectifications of circular arcs after the manner of Huygens; and, what is very notable, he made an ingenious and, according to J. E. Montucla, successful

attempt to show that quadrature of the circle by a Euclidean construction was impossible. 4 Besides all this, however, and far beyond it in importance, was his use of infinite series. This merit he shares with his contemporaries N. Mercator, Sir I. Newton and G. W. Leibnitz, and the exact dates of discovery are a little uncertain. As far as the circle- squaring functions are concerned, it would seem that Gregory was the first (in 1670) to make known the series for the arc in terms of the tangent, the series for the tangent in terms of the arc, and the secant in terms of the arc; and in 1669 Newton showed to Isaac Barrow a little treatise in manuscript containing the series for the arc in terms of the sine, for the sine in terms of the arc, and for the cosine in terms of the arc. These discoveries

1 See Euler, ” Annotationes in locum quendam Cartesii,” jn Nov. Comm. Acad. Petrop. viii.

2 Gergonne, Annates de math. vi.

3 See Vera Circuit et Hyperbolae Quadratura (Padua, 1667); and the Appendicula to the same in his Exercitationes geometricae (London, 1668).

‘Penny Cyclop, xix. 187.

formed an epoch in the history of mathematics generally, and had, of course, a marked influence on after investigations regarding circle-quadrature. Even among the mere computers the series

6 = tan 6- i tan 3 0+i tan 5 6- . . . , specially known as Gregory’s series, has ever since been a necessity of their calling.

The calculator’s work having now become easier and more mechanical, calculation went on apace. In 1699 Abraham Sharp, on the suggestion of Edmund Halley, took Gregory’s series, and, putting tan = £V3, found the ratio equal to

'I2 I

3-3ˆ5 -3 2

7-3

i+.

from which he calculated it correct to 71 fractional places. 6 About the same time John Machin calculated it correct to 100 places, and,

what was of more importance, gave for the ratio the rapidly converging expression

16/ 1 i i_ \ 4/ j j \

5V ■ 3-5 2+ 5.5 4 7.5″ + “7 239\ I ~3ˆ39 1 + 5 : ˆ39 3 ~ ‘ ‘ 7 ‘ which long remained without explanation. 6 Fautet de Lagny, still using tan 30°, advanced to the 127th place. 7

Leonhard Euler took up the subject several times during his life, effecting mainly improvements in the theory of the various series. 8 With him, apparently, began the usage of denoting by t the ratio of the circumference to the diameter. 9

The most important publication, however, on the subject in the 18th century was a paper by J. H. Lambert, 10 read before the Berlin Academy in 1761, in which he demonstrated the irrationality of t. The general test of irrationality which he established is that, if

bˆb,—

—br-

m m to »n-n-

be an interminate continued fraction, a it a 2 , . . ., h, b, . . . be integers, ajbi,

of every one of the interminate continued fractions ˆ ± ■fd- . _ _, • • . be < 1, then the given continued fraction repre- sents an irrational quantity. If this be applied to the right-hand side of the identity

m 1 m 2

it follows that the tangent of every arc commensurable with the radius is irrational, so that, as a particular case, an arc of 45°, having its tangent rational, must be incommensurable with the radius; that is to say, 7J-/4 is an incommensurable number. 11

This incontestable result had no effect, apparently, in re- pressing the T-computers. G. von Vega in 1789, using series like Machin’s, viz. Gregory’s series and the identities *74 = 5tan-4-+2tan-y 9 (Euler, 1779), ~ x/4= tan _1 |+2tan -1 {(Hutton, 1776),

neither of which was nearly so advantageous as several found by Charles Hutton, calculated it correct to 136 places. 12 This

achievement was anticipated or outdone by an unknown calcu- lator, whose manuscript was seen in the Radcliffe library, Oxford, by Baron von Zach towards the end of the century, and contained the ratio correct to 152 places. More astonishing still have been the deeds of the tt computers of the 19th century.

5 See Sherwin's Math. Tables (London, 1705), p. 59.

8 See W. Jones, Synopsis Palmariorum Matheseos (London, 1706) ; Maseres, Scriptores Logarithmici (London, 1791 — 1796), iii. 159 seq. ; Hutton, Tracts, i. 266.

7 See Hist, de I' Acad. (Paris, 1719); 7 appears instead of 8 in the 113th place.

8 Comment. Acad. Petrop. ix., xi. ; Nov. Comm. Ac. Pet. xvi. ; Nova Acta Acad. Pet. xi.

9 Introd. in Analysin Infin. (Lausanne, 1748), chap. viii.

10 Mem. sur quelques proprietes remarquables des quantites transcen- dantes, circulaires, et logarithmiques.

11 See Legendre, Elements de geomelrie (Paris, 1794), note iv. ; Schlomilch, Handbuch d. algeb. Analysis (Jena, 1851), chap. xiii.

18 Nova Acta Petrop. ix. 41 ; Thesaurus Logarithm. Completus,

633-

CIRCLEVILLE-^-CIRCUIT

387

A condensed record -compiled by J. of Math. ii. 122) is as follows:—

W. L. Glaisher {Messenger

No. of

No. of

Date.

Computer.

fr. digits calcd.

fr. digits correct.

Place of Publication.

1842

Rutherford .

208

IS2

Trans. Roy. Soc. (London, 1841), p. 283.

1844

Dase .

205

200

Crelle’s Journ. xxvii. 198. Astron. Nachr. xxv. col. 207.

1847

Clausen .

250

248

1853

Shanks .

3i8

318

Proc. Roy. Soc. (London, 1853), 273.

1853

Rutherford .

440

440

Ibid.

1853

Shanks .

530

Ibid.

1853

Shanks .

607

W. Shanks, Rectification of the Circle (London, 1853).

1853

Richter .

333

330

Grunert’s Archiv, xxi. 119.

1854

Richter .

400

330

Ibid. xxii. 473.

1854

Richter .

400

400

Ibid, xxiii. 476.

1854

Richter .

500

500

Ibid. xxv. 472.

1873

Shanks .

707

Proc. Roy. Soc. (London), xxi.

By these computers Machin's identity, or identities analogous

to it, e.g.

x/4= tan-'l+tan-'i +tan _1 | (Dase, 1844), ir/4 = 4tan -1 i _ 'tan _1 ^i)-r-tan~ 1 ^ (Rutherford),

and Gregory's series were employed. 1

A much less wise class than the ^-computers of modern times are the pseudo-circle-squarers, or circle-squarers technically so called, that is to say, persons who, having obtained by illegiti- mate means a Euclidean construction for the quadrature or a finitely expressible value for v, insist on using faulty reasoning and defective mathematics to establish their assertions. Such persons have flourished at all times in the history of mathematics; but the interest attaching to them is more psychological than mathematical. 2

It is of recent years that the most important advances in the theory of circle-quadrature have been made. In 1873 Charles Hermite proved that the base « of the Napierian logarithms cannot be a root of a rational algebraical equation of any degree. 3 To prove the same proposition regarding x is to prove that a Euclidean construction for circle-quadrature is impossible; For in such a construction every point of the figure is obtained by the intersection of two straight lines, a straight line and a circle, or two circles; and as this implies that, when a unit of length is introduced, numbers employed, and the problem

transformed into one of algebraic geometry, the equations to be solved can only be of the first or second degree, it follows that the equation to which we must be finally led is a rational equation of even degree. Hermite 4 did not succeed in his attempt on ir; but in 1882 F. Lindemann, following exactly in Hermite's steps, accomplished the desired result. 5 (See also Trigonometry.)

References. — Besides the various writings mentioned, see for the history of the subject F. Rudio, Geschichte des Problems von der Quadratur des Zirkels (1892) ; M. Cantor, Geschichte der Mathematik (i894-i90i);Montucla, Hist. des. math. (6 vols., Paris, 1758, 2nd ed. 1799-1802); Murhard, Bibliotheca Mathematica, ii. 106-123 (Leipzig, 1798); Reuss, Repertorium Comment, vii. 42-44 (Gfit- tingen, 1808). For a few approximate geometrical solutions, see Leybourn's Math. Repository, vi. 151-154; Grunert's Archiv, xii. 98, xlix. 3; Nieuw A r chief v. Wish. iv. 200-204. F° r experi- mental determinations of jr, dependent on the theory of prob- ability, see Mess, of Math. ii. 113, 119; Casopis pro pistovdni math. afys. x. 272-275; Analyst, ix. 176. (T. Mu.) .

CIRCLEVILLE, a city and the county-seat of Pickaway county, Ohio, U.S.A., about 26 m. S. by E. of Columbus, on the Scioto river and the Ohio Canal. Pop. (1890) 6556; (1900) 6991 (55 1 negroes); (1910) 6744. It is served by the Cincinnati & Muskingum Valley (Pennsylvania lines) and the Norfolk & Western railways, and by the Scioto Valley electric line. Circle- ville is situated in a farming region, and its leading industries are the manufacture of straw boards and agricultural imple-

1 On the calculations made before Shanks, see Lehmann, " Beitrag zur Berechnung der Zahl ir," in Grunert's Archiv, xxi. 121-174.

2 See Montucla, Hist, des rech. sur la quad, du cercle (Paris, 1754, 2nd ed. 1831) ; de Morgan, Budget of Paradoxes (London, 1872).

- " Sur la fonction exponentielle," Comptes rendus (Paris), lxxvii.

18, 74, 226, 285.

- See Crelle's Journal, lxxvi. 342.

f See " Uber die Zahl *-," in Math. Ann. xx. 213.

ments, and the canning of sweet corn and other produce. The city occupies the site of prehistoric earth-works, from one of which, built in the form of a circle, it derived its name. Circleville, first settled

about 1806, was chosen as the county-seat in 1810. The court-house was built in the form of an octagon at the centre of the circle, and circular streets were laid out around it; but this arrangement proved to be inconvenient, the court-house was destroyed by fire in 1841, and at present no trace of the ancient landmarks remains. Circle- ville was incorporated as a village in 1814, and was chartered as a city in 1853.

CIRCUIT (Lat. circuitus, from circum, round, and ire, to go), the act of moving round; so circumference, or anything encircling or en- circled. The word is particularly known as a law term, signifying the periodical progress of a legal tribunal for the purpose of carrying out the administration of the law in the several provinces of a country. It has long been applied to the journey or progress which the judges have been in the habit of making through the several counties of England, to hold courts and administer justice, where recourse could not be had to the king's court at Westminster (see Assize).

In England, by sec. 23 of the Judicature Act 1875, power was conferred on the crown, by order in council, to make regulations respecting circuits, including the discontinuance of any circuit, and the formation of any new circuit, and the appointment of the place at which assizes are to be held on any circuit. Under this power an order of council, dated the 5th of February 1876, was made, whereby the circuit system was remodelled. A new circuit, called the North-Eastern circuit, was created, consisting of Newcastle and Durham taken out of the old Northern circuit, and York and Leeds taken out of the Midland circuit. Oakham, Leicester and Northampton, which had belonged to the Norfolk circuit, were added to the Midland, The Norfolk circuit and the Home circuit were abolished and a new South-Eastern circuit was created, consisting of Huntingdon, Cambridge, Ipswich, Norwich, Chelmsford, Hertford and Lewes, taken partly out of the old Norfolk circuit and partly out of the Home circuit. The counties of Kent and Surrey were left out of the circuit system ,. the assizes for these counties being held by the judges remaining in London. Subsequently Maidstone and Guildford were united under the revived name of the Home circuit for the purpose of the summer and winter assizes, and the assizes in these towns were held by one of the judges of the Western circuit, who, after disposing of the business there, rejoined his colleague in Exeter. In 1899 this arrangement was abolished, and Maid- stone and Guildford were added to the South-Eastern circuit. Other minor changes in the assize towns were made, which it is unnecessary to particularize. Birmingham first became a j circuit town in the year 1884, and the work there became, by arrangement, the joint property of the Midland and Oxford circuits. There are alternative assize towns in the following counties, viz.: — On the

Western circuit, Salisbury and Devizes for Wiltshire, and Wells and Taunton for Somerset; on the South-Eastern, Ipswich and Bury St Edmunds for Suffolk, on the North Wales circuit, Welshpool and Newtown for Mont- gomery; and on the South Wales circuit, Cardiff and Swansea for Glamorgan.

According to the arrangements in force in 1909 there are four assizes in each year. There are two principal assizes, viz. the winter assizes, beginning in January, and the summer assizes, beginning at the end of May. At these two assizes criminal and civil business is disposed of in all the circuits. There are two other assizes, viz. the autumn assizes and the Easter assizes. The autumn assizes are regulated by acts of 1876 and 1877 (Winter Assizes Acts 1876 and 1877), and orders of council made under the former act. They are held for the whole of England and Wales, but for the purpose of these assizes the work is to a large extent ” grouped,” so that not every county has a separate assize. For example, on the, South-Eastern circuit Huntingdon

is grouped with Cambridge; on the Midland, Rutland is grouped with Lincoln; on the Northern, Westmorland is grouped with Cumberland; and the North Wales and South Wales circuits are united, and no assizes are held at some of the smaller towns, /vt these assizes criminal business only is taken, except at Manchester, Liverpool, Swansea, Birmingham and Leeds. The Easter assizes are held in April and May on two circuits only, viz. at Manchester and Liverpool on the Northern and at Leeds on the North-Eastern. Both civil and criminal business is taken at Manchester and Liverpool, but criminal business only at Leeds.

Other changes were made, with a view to preventing the complete interruption of the London sittings in the common law division by the absence of the judges on circuit. The assizes were so arranged as to commence on different dates in the various circuits. For example, the summer assizes begin in the South- Eastern and Western circuits on the 29th of May; in the Northern circuit on the 28th of June; in the Midland and Oxford circuits on the 16th of June; in the North-Eastern circuit on the 6th of July; in the North Wales circuit on the 7th of July; and in the South Wales circuit on the nth of July. Again, there has been a continuous development of what may be called the single-judge system. In the early days of the new order the members of the court of appeal and the judges of the chancery division shared the

circuit work with the judges in the common law division. This did not prove to be a satisfactory arrangement. The assize work was not familiar and was un- congenial to the chancery judges, who had but little training or experience to fie them for it. Arrears increased in chancery, and the appeal court was shorn of much of its strength for a considerable part of the year. The practice was discontinued in or about the year 1884. The appeal and chancery judges were relieved of the duty of going on circuit, and an arrangement was made by the treasury for making an allowance for~expenses of circuit to the common law judges, on whom the whole work of the assizes was thrown. In order to cope with the assize work, and at the same time keep the common law sittings going in London, an experiment, which had been previously tried by Lord Cairns and Lord Cross (then home secretary) and discontinued, was revived. Instead of two judges going together to each assize town, it was arranged that one judge should go by himself to certain selected places — practically, it may be said, to all except the more important provincial centres. The only places to which two judges now go are Exeter, Winchester, Bristol, Manchester, Liverpool, Nottingham, Stafford, Birming- ham, Newcastle, Durham, York, Leeds, Chester, and Cardiff or Swansea.

It could scarcely be said that, even with the amendments introduced under orders in council, the circuit system was alto- gether satisfactory or that the last word had been pronounced on the subject. In the first report of the Judicature Commission, dated March 25th, 1869, p. 17 {Pari. Papers, 1868-1869), the majority report that ” the necessity for holding assizes in every county without regard to the extent of the business to be trans- acted in such county leads, in our judgment, to a great waste of judicial strength and a great loss of time in going from one circuit town to another, and causes much unnecessary cost and inconvenience to those whose attendance is necessary or cus- tomary at the assizes.” And in their second report, dated July 3rd, 1872 {Pari. Papers, 1872, vol. xx.), they dwell upon the advis- ability of grouping or a discontinuance of holding assizes ” in several counties, for example, Rutland and Westmorland, where it is manifestly an idle waste of time and money to have assizes.” It is thought that the grouping of counties which has been effected for the autumn assizes might be carried still further and applied to all the assizes; and that the system of holding the assizes alternately in one of two towns within a county might be extended to two towns in adjoining counties, for example, Gloucester and Worcester. The facility of railway communication renders this reform comparatively easy, and reforms in this direction have been approved by the judges, but ancient custom and local patriotism, interests, or susceptibility bar

the way. The

Assizes and Quarter Sessions Act 1908 contributed something to reform by dispensing with the obligation to hold assizes at a fixed date if there is no business to be tiansacted. Nor can it be said that the single-judge system has been altogether a, success. When there is only one judge for both civil and criminal work, he properly takes the criminal business first. He can fix only approximately the time when he can hope to be free for the civil business. If the calendar is exceptionally heavy or one or more of the criminal cases prove to be unex- pectedly long (as may easily happen) , the civil business necessarily gets squeezed into the short residue of the allotted time. Suitors and their solicitors and witnesses are kept waiting for days, and after all perhaps it proves to be impossible for the judge to take the case, and a ” remanet ” is the result. It is the opinion of persons of experience that the result has undoubtedly been to drive to London much of the civil business which properly belongs to the provinces, and ought to be tried there, and thus at once to increase the burden on the judges and jurymen in London, and to increase the costs of the trial of the actions sent there. Some persons advocate the continuous sittings of the high court in certain centres, such as Manchester, Liverpool, Leeds, Newcastle, Birmingham and Bristol, or (in fact) a de-centralization of the judicial system. There is already an excel- lent court for chancery cases for Lancashire in the county palatine court, presided over by the vice-chancellor, and with a local bar which has produced many men of great ability and even eminence. The Durham chancery court is also capable of development. Another suggestion has been made for con- tinuous circuits throughout the legal year, so that a certain number of the judges, according to a rota, should be continuously in the provinces while the remaining judges did the London business. The value of this suggestion would depend on an estimate of the number of cases which might thus be tried in the country in relief of the London list. This estimate it would be difficult to make. The opinion has also been expressed that it is essential in any changes that may be made to retain the occasional administration by judges of the high court of criminal jurisdiction, both in populous centres and in remote places. It promotes a belief in the importance and dignity of justice and the care to be given to all matters affecting a citizen’s life, liberty or character. It also does something, by the example set by judges in country districts, to check any tendency to undue severity of sentences in offences against property.

Counsel are not expected to practise on a circuit other than that to which they have attached themselves, unless they receive a special retainer. They are then said to ” go special,” and the fee in such a case

is one hundred guineas for a king's counsel, and fifty guineas for a junior. It is customary to employ one member of the circuit on the side on which the counsel comes special. Certain rules have been drawn up by the Bar Com- mittee for regulating the practice as to retainers on circuit. (1) A special retainer must be given for a particular assize (a circuit retainer will not, however, make it compulsory upon counsel retained to go the circuit, but will give the right to counsel's services should he attend the assize and the case be entered for trial); (2) if the venue is changed to another place on the same circuit, a fresh retainer is not required; (3) if the action is not tried at the assize for which the retainer is given, the retainer must be renewed for every subsequent assize until the action is disposed of, unless a brief has been delivered; (4) a retainer may be given for a future assize, without a retainer for an intervening assize, unless notice of trial is given for such intervening assize. There are also various regulations enforced by the discipline of the circuit bar mess.

In the United States the English circuit system still exists in some states, as in Massachusetts, where the judges sit in succession in the various counties of the state. The term circuit courts applies distinctively in America to a certain class of inferior federal courts of the United States, exercising juris- diction, concurrently with the state courts, in certain matters where the United States is a party to the litigation, or in cases of crime against the United States. The circuit courts act in

nine judicial circuits, divided as follows: 1st circuit, Maine, Massachusetts, New Hampshire, Rhode Island; 2nd circuit, Connecticut, New York, Vermont; 3rd circuit, Delaware, New Jersey, Pennsylvania; 4th circuit, Maryland, North Carolina, South Carolina, Virginia, West Virginia; 5th circuit, Alabama, Florida, Georgia, Louisiana, Mississippi, Texas; 6th circuit, Kentucky, Michigan, Ohio, Tennessee; yth circuit, Illinois, Indiana, Wisconsin; 8th circuit, Arkansas, Colorado, Okla- homa, Iowa, Kansas, Minnesota, Missouri, Nebraska, New Mexico, North Dakota, South Dakota, Utah, Wyoming; pth circuit, Alaska, Arizona, California, Idaho, Montana, Nevada, Oregon, Washington, and Hawaii. A circuit court of ap- peals is made up of three judges of the circuit court, the judges of the district courts of the circuit, and the judge of the Supreme Court allotted to the circuit.

In Scotland the judges of the supreme criminal court, or high court of justiciary, form also three separate circuit courts, consisting of two judges each; and the country, with the ex- ception of the Lothians, is divided into corresponding districts, called the Northern, Western and Southern circuits. On the Northern circuit, courts are held at Inverness, Perth, Dundee and Aberdeen; on the Western, at Glasgow, Stirling and Inveraray; and on the Southern, at Dumfries, Jedburgh and Ayr. Ireland is divided into the North-East and the North-West circuits, and those of Leinster, Connaught and Munster.

CIRCULAR NOTE, a documentary request by a bank to its foreign correspondents to pay a specified sum of money to a named person. The person in whose favour a circular note is issued is furnished with a letter (containing the signature of an official of the bank and the person named) called a letter of indication, which is usually referred to in the circular note, and must be produced on presentation of the note. Circular notes are generally issued against a payment of cash to the amount of the notes, but the notes need not necessarily be cashed, but may be returned to the banker in exchange for the amount for which they were originally issued. A forged signature on a circular note conveys no right, and as it is the duty of the payer to see that payment is made to the proper person, he cannot recover the amount of a forged note from the banker who issued the note. (See also Letter or Credit.)

CIRCULUS IN PROBANDO (Lat. for ” circle in proving “), in logic, a phrase used to describe a form of argument in which the very fact which one seeks to demonstrate is used as a premise, i.e. as part of the evidence on which the conclusion is based. This argument is one form of the fallacy known as petitio principii, ” begging the question.” It is most common in lengthy arguments, the complicated character of which enables the speaker to make his hearers forget the data from which he began. (See Fallacy.)

CIRCUMCISION (Lat. circum, round, and caedere, to cut), the cutting off of the foreskin. This surgical operation, which is commonly prescribed for purely medical reasons, is also an initiation or religious ceremony among Jews and Mahommedans, and is a widespread institution in many Semitic races. It remains, with Jews, a necessary preliminary to the admission of proselytes, except in some Reformed communities. The origin of the rite among the Jews is in Genesis (xvii.) placed in the age of Abraham, and at all events it must have been very ancient, for flint stones were used in the operation (Exodus iv. 25; Joshua v.2). The narrative in Joshua implies that the custom was introduced by him, not that it had merely been in abeyance in the

Wilderness. At Gilgal he ” rolled away the reproach of the Egyptians ” by circumcising the people. This obviously means that whereas the Egyptians practised circumcision the Jews in the land of the Pharaohs did not, and hence were regarded with contempt. It was an old theory (Herodotus ii. 36) that circumcision originated in Egypt; at all events it was practised in that country in ancient times (Ebers, Egypten und die Bucher Mosis, i. 278-284), and the same is true at the present day. But it is not generally thought probable that the Hebrews derived the rite directly from the Egyptians. As Driver puts it (Genesis, p. 190): ” It if possible that, as Dillmann and Nowack

suppose, the peoples of N. Africa and Asia who practised the rite adopted it from the Egyptians, but it appears in so many parts of the world that it must at any rate in these cases have originated independently.” In another biblical narrative (Exodus iv. 25) Moses is subject to the divine anger because he had not made himself ” a bridegroom of blood,” that is, had not been circum- cised before his marriage.

The rite of circumcision was practised by all the inhabitants of Palestine with the exception of the Philistines. It was an ancient custom among the Arabs, being presupposed in the Koran. The only important Semitic peoples who most probably did not follow the rite were the Babylonians and Assyrians (Sayce, Babyl. and Assyrians, p. 47). Modern investigations have brought to light many instances of the prevalence of circumcision in various parts of the world. These facts are collected by Andree and Ploss, and go to prove that the rite is not only spread through the Mahommedan world (Turks, Persians, Arabs, &c\), but also is practised by the Christian Abyssinians and the Copts, as well as in central Australia and in America. In central Australia (Spencer and Gillen, pp. 212-386) circumcision with a stone knife must be undergone by every youth before he is reckoned a full member of the tribe or is permitted to enter on the married state. In other parts, too (e.g. Loango), no uncircumcised man may marry. Circumcision was known to the Aztecs (Bancroft, Native Races, vol. iii.), and is still practised by the Caribs of the Orinoco and the Tacunas of the Amazon. The method and period of the operation vary in important particulars. Among the Jews it is performed in infancy, when the male child is eight days old. The child is named at the same time, and the ceremony is elaborate. The child is carried in to the godfather (sandek, a hebraized form of the Gr. avvreKvos, ” godfather,” post-class.), who places the child on a cushion, which he holds on his knees throughout the ceremony. The operator (mohel) uses a steel knife, and pronounces various benedictions before and after the rite is performed (see S. Singer, Authorized Daily Prayer

Book, pp. 304-307; an excellent account of the domestic festivities and spiritual joys associated with the ceremony among medieval and modern Jews may be read in S. Schechter's Studies in Judaism, first series, pp. 3 5 1 seq.) . Some tribes in South America and elsewhere are said to perform the rite on the eighth day, like the Jews. The Mazequas do it between the first and second months. Among the Bedouins the rite is performed on children of three years, amid dances and the selection of brides(Doughty, Arabia Deserta, i. 340); among the Somalis the age is seven (Reinisch, Somalis prache, p. no). But for the most part the tribes who perform the rite carry it out at the age of puberty, Many facts bearing on this point are given by B. Stade in Zeit- schriftfur die alttest. Wissenschaft, vi. (1886) pp. 132 seq.

The significance of the rite of circumcision has been much disputed. Some see in it a tribal badge. If this be the true origin of circumcision, it must go back to the time when men went about naked. Mutilations (tattooing, removal of teeth and so forth) were tribal marks, being partly sacrifices and partly means of recognition (see Mutilation). Such initiatory rites were often frightful ordeals, in which the neophyte's courage was severely tested (Robertson Smith, Religion of the Semites, p. 310). Some regard circumcision as a substitute for far more serious rites, including even human sacrifice. Utilitarian explanations have also been suggested. Sir R. Burton (Memoirs Anthrop. Soc. i. 318) held that it was introduced to promote fertility, and the claims of cleanliness have been put forward (following Philo's example, see ed. Mangey, ii. 210). Most probably, however, circumcision (which in many tribes is per- formed on both sexes) was connected with marriage, and was a preparation for connubium. It was in Robertson Smith's words " originally a preliminary to marriage, and so a ceremony of introduction to the full prerogative of manhood," the trans- ference to infancy among the Jews being a later change. On this view, the decisive Biblical reference would be the Exodus passage (iv. 25), in which Moses is represented as being in danger of his life because he had neglected the proper preliminary to marriage. In Genesis, on the other hand, circumcision is an

external sign of God's covenant with Israel, and later Judaism now regards it in this symbolical sense. Barton (Semitic Origins, p. ioo) declares that " the circumstances under which it is per- formed in Arabia point to the origin of circumcision as a sacrifice to the goddess of fertility, by which the child was placed under her protection and its

reproductive powers consecrated to her service.” But Barton admits that initiation to the connubium was the primitive origin of the rite.

As regards the non-ritual use of male circumcision, it may be added that in recent years the’ medical profession has been responsible for its considerable extension among other than Jewish children, the operation being recommended not merely in cases of malformation, but generally for reasons of health.

Authorities. — On the present diffusion of circumcision see H. Ploss, Das Kind im Branch und Sitte der Volker, i. 342 seq., and his researches in Deutsches Archiv fur Geschichte der Medizin, viii. 312-344; Andree, ” Die Beschneidung ” in Archiv fur Anthro- pologic, xiii. 76; and Spencer and Gillen, Tribes of Central Australia. The articles in the Encyclopaedia Biblica and Dictionary of the Bible contain useful bibliographies as well as historical accounts of the rite and its ceremonies, especially as concerns the Jews; The Jewish Encyclopedia in particular gives an extensive list of books on the Jewish customs connected with circumcision, and the various articles in that work are full of valuable information (vol. iv. pp. 92-102). On the rite among the Arabs, see Wellhausen, Reste arabischen Heidentums, 154. (I. A.)

CIRCUMVALLATION, LINES OF (from Lat. circum, round, and vallum, a rampart), in fortification, a continuous circle of entrenchments surrounding a besieged place. “Lines of Contravallation ” were similar works by which the besieger pro- tected himself against the attack of a relieving army from any quarter. These continuous lines of circum vallation and contra- vallation were used only in the days of small armies and small fortresses, and both terms are now obsolete.

CIRCUS (Lat. circus, Gr. kL/jkos or /cpocos, a ring or circle; probably ” circus ” and ” ring ” are of the same origin), a space, in the strict sense circular, but sometimes oval or even oblong, intended for the exhibition of races and athletic contests gener- ally. The circus differs from the theatre inasmuch as the performance takes place in a central circular space; not oil a stage at one end of the building.

1. In Roman antiquities the circus was a building for the exhibition of horse and chariot races and other amusements. It consisted of tiers of seats running parallel with the sides of the course, and forming a crescent round one of the ends. The other end was straight and at right angles to the course, so that the plan of the whole had nearly the form of an ellipse cut in half at its vertical axis. Along the transverse axis ran a fence (spina) separating the return course from the starting

one. The straight end had no seats, but was occupied by the stalls (carceres) where the chariots and horses were held in readiness. This end constituted also the front of the building with the main entrance. At each end of the course were three conical pillars (metae) to mark its limits.

The oldest building of this kind in Rome was the Circus Maximus, in the valley between the Palatine and Aventine hills, where, before the erection of any permanent structure, races appear to have been held beside the altar of the god Consus. The first building is assigned to Tarquin the younger, but for a long time little seems to have been done to complete its accommodation, since it is not till 329 B.C. that we hear of stalls being erected for the chariots and horses. It was not in fact till under the empire that the circus became a conspicuous public resort. Caesar enlarged it to some extent, and also made a canal 10 ft. broad between the lowest tier of seats (podium) and the course as a precaution for the spectators' safety when exhibitions of fighting with wild beasts, such as were afterwards confined to the amphitheatre, took place. When these exhibi- tions were removed, and the canal (euripus) was no longer necessary, Nero had it filled up. Augustus is said to have placed an obelisk on the spina between the metae, and to have built a new pulvinar, or imperial box; but if this is taken in connexion with the fact that the circus had been partially destroyed by fire in 31 B.C., it may be supposed that besides this he had

restored it altogether. Only the lower tiers of seats were of stone, the others being of wood, and this, from the liability to fire, may account for the frequent restorations to which the circus was subject; it would also explain the falling of the seats by which a crowd of people were killed in the time of Antoninus Pius. In the reign of Claudius, apparently after a fire, the carceres of stone (tufa) were replaced by marble, and the metae of wood by gilt bronze. Under Domitian, again, after a fire, the circus was rebuilt and the carceres increased to 12 instead of 8 as before. The work was finished by Trajan. See further for seating capacity, &c, Rome: Archaeology, § "Places of Amusement."

The circus was the only public spectacle at which men and women were not separated. The lower seats were reserved for persons of rank; there were also various state boxes, e.g. for the giver of the games and his friends (called cubicula or suggestus) . The principal object of attraction apart from the racing must have been the spina or low wall which ran down the middle of the course, with its obelisks, images and ornamental shrines. On it also were seven figures of dolphins and

seven oval objects, one of which was taken down at every round made in a race, so that spectators might see readily how the contest proceeded. The chariot race consisted of seven rounds of the course. The chariots started abreast, but in an oblique line, so that the outer chariot might be compensated for the wider circle it had to make at the other end. Such a race was called a missus, and as many as 24 of these would take place in a day. The competitors wore different colours, originally white and red (albata and russata), to which green (prasina) and blue (veneta) were added. Domitian introduced two more colours, gold and purple (pur- pureus et auratus panntts), which probably fell into disuse after his death. To provide the horses and large staff of attendants it was necessary to apply to rich capitalists and owners of studs, and from this there grew up in time four select companies (factiones) of circus purveyors, which were identified with the four colours, and with which those who organized the races had to contract for the proper supply of horses and men. The drivers (aurigae, agitator es), who were mostly slaves, were sometimes held in high repute for their skill, although their calling was regarded with contempt. The horses most valued were those of Sicily, Spain and Cappadocia, and great care was taken in train- ing them. Chariots with two horses (bigae) or four (quadrigae) were most common, but sometimes also they had three (trigae), and exceptionally more than four horses. Occasionally there was combined with the chariots a race of riders (desultores) , each rider having two horses and leaping from one to the other during the race. At certain of the races the proceedings were opened by a pompd or procession in which images of the gods and of the imperial family deified were conveyed in cars drawn by horses, mules or elephants, attended by the colleges of priests, and led by the presiding magistrate (in some cases by the emperor himself) seated in a chariot in the dress and with the insignia of a triumphator. The procession passed from the capitol along the forum, and on to the circus, where it was re- ceived by the people standing and clapping their hands. The presiding magistrate gave the signal for the races by throwing a white flag (mappa) on to the course.

Next in importance to the Circus Maximus in Rome was the Circus Flaminius, erected 221 B.C., in the censorship of C. Flaminius, from whom it may have taken its name; cr the name may have been derived from Prata Flaminia, where it was situated, and where also were held plebeian meetings. The only games that are positively known to have been celebrated in this circus were the Ludi Taurii and Plebeii. There is no mention of it after the i.st century. Its ruins were identified in the 16th century at S. Catarina dei Funari and the Palazzo Mattei.

A third circus in Rome was erected by Caligula in the gardens of Agrippina, and was known as the Circus Neronis, from the notoriety which it obtained through the Circensian pleasures of Nero. A fourth was constructed by Maxentius outside the Porta Appia near the tomb of Caecilia Metella, where its ruins

are still, and now afiord the only instance from which an idea of the ancient circi in Rome can be obtained. It was traced to Caracalla, till the discovery of an inscription in 1825 showed it to be the work of Maxentius. Old topographers speak of six circi, but two of these appear to be imaginary, the Circus Florae and the Circus Sallustii.

Circus races were held in connexion with the following public festivals, and generally on the last day of the festival, if it extended over more than one day:— (1) The Consualia, August 21st, December 15th; (2) Equirria, February 27th, March 14th; (3) Ludi Romani, September 4th-i9th; {4) Ludi Plebeii, November 4th-i7th; (5) Cerialia, April i2th-igth; (6) Ludi Apollinares, July 6th-i3th; (7) Ludi Megalenses, April 4th-ioth; (8) Floralia, April 28th-May 3rd.

In addition to Smith's Dictionary of Antiquities (3rd ed., 1890), see articles in Daremberg and Saglio's Dictionnaire des antiquiies, Pauly-Wissowa's Realencyclopadie der classischen Altertumswissen- schafi, iii. 2 (1899), and Marquardt, Romische Staatsverwaltung, iii. (2nd ed., 1885), p. 504. For existing remains see works quoted under Rome: Archaeology.

2. The Modern Circus. — The " circus " in modern times is a form of popular entertainment which has little in common with the institution of classical Rome. It is frequently nomadic in character, the place of the permanent building known to the ancients as the circus being taken by a tent, which is carried from place to place and set up temporarily on any site procurable at country fairs or in provincial towns, and in which spectacular performances are given by a troupe employed by the proprietor. The centre of the tent forms an arena arranged as a horse-ring, strewn with tan or other soft substance, where the performances take place, the seats of the spectators being arranged in ascending tiers around the central space as in the Roman circus. The traditional type of exhibition in the modern travelling circus consists of feats of horsemanship, such as leaping through hoops from the back of a galloping horse, standing with one foot on

each of two horses galloping side by side, turning somersaults from a springboard over a number of horses standing close together, or accomplishing acrobatic tricks on horseback. These performances, by male and female riders, are varied by the introduction of horses trained to perform tricks, and by drolleries on the part of the clown, whose place in the circus is as firmly established by tradition as in the pantomime.

The popularity of the circus in England may be traced to that kept by Philip Astley (d. 1814) in London at the end of the 18th century. Astley was followed by Ducrow, whose feats of horse- manship had much to do with establishing the traditions of the circus, which were perpetuated by Hengler's and Sanger's celebrated shows in a later generation. In America a circus-actor named Ricketts is said to have performed before George Washing- ton in 1780, and in the first half of the 19th century the establish- ments of Purdy, Welch & Co., and of van Amburgh gave a wide popularity to the circus in the United States. All former circus-proprietors were, however, far surpassed in enterprise and resource by P. T. Barnum (q.v.), whose claim to be the possessor of " the greatest show on earth " was no exaggeration. The influence of Barnum, however, brought about a considerable change in the character of the modern circus. In arenas too large for speech to be easily audible, the traditional comic dialogue of the clown assumed a less prominent place than formerly, while the vastly increased wealth of stage properties relegated to the background the old-fashioned equestrian feats, which were replaced by more ambitious acrobatic performances, and by exhibitions of skill, strength and daring, requiring the employment of immense numbers of performers and often of complicated and expensive machinery. These tendencies are, as is natural, most marked in shows given in permanent buildings in large cities, such as the London Hippodrome, which was built as a combination of the circus, the menagerie and the variety theatre, where wild animals such as lions and elephants from time to time appeared in the ring, and where convulsions of nature such as floods, earthquakes and volcanic eruptions have been produced with an extraordinary wealth of realistic display. At the Hippodrome in Paris — unlike its London namesake, a

circus of the true classical type in which the arena is entirely surrounded by the seats of the spectators — chariot races after the Roman model were held in the latter part of the 19th century, at which prizes of considerable value were given by the management.

CIRENCESTER (traditionally pronounced Ciceter), a marker, town in the Cirencester parliamentary division of Gloucestershire, England, on

the river Churn, a tributary of the Thames, 93 m. W.N.W. of London. Pop. of urban district (1901) 7536. It is served by a branch of the Great Western railway, and there is also a station on the Midland and South-Western Junction railway. This is an ancient and prosperous market town of picturesque old houses clustering round a fine parish church, with a high embattled tower, and a remarkable south porch with parvise. The church is mainly Perpendicular, and among its numerous chapels that of St Catherine has a beautiful roof of fan-tracery in stone dated 1508. Of the abbey founded in 1 1 1.7 by Henry I. there remain a Norman gateway and a few capitals. There are two good museums containing mosaics, inscriptions, carved and sculptured stones, and many smaller remains, for the town was the Roman Corinium or Durocornovium Dobunorum. Little trace of Corinium, however, can be seen in situ, except the amphitheatre and some indications of the walls. To the west of the town is Cirencester House, the seat of Earl Bathurst. The first Lord Bathurst (1684-1775) devoted himself to beautifying the fine demesne of Oakley Park, which he planted and adorned with remarkable artificial ruins. This nobleman, who became baron in 1711 and earl in 1772, was a patron of art and literature no less than a statesman; and Pope; a frequent visitor here, was allowed to design the building known as Pope's Seat, in the park, commanding a splendid prospect of woods and avenues. Swift' was another appreciative visitor. The house contains portraits by Lawrence, Gainsborough, Romney, Lely, Reynolds, Hoppner, Kneller and many others. A mile west of the town is the Royal Agricultural College, incorporated by charter in 1845. Its buildings include a chapel, a dining hall, a library, a lecture theatre, laboratories, class-rooms, private studies and dormitories for the students, apart- ments for resident professors, and servants' offices; also a museum containing a collection of anatomical and pathological preparations, and mineralogical, botanical and geological speci- mens. The college farm comprises 500 acres, 450 of which are arable; and on it are the well-appointed farm-buildings and the veterinary hospital. Besides agriculture, the course of instruction at the college includes chemistry, natural and mechanical philosophy, natural history, mensuration, surveying and drawing, and other subjects of practical importance to the farmer, proficiency in which is tested by means of sessional examinations. The industries of Cirencester comprise various branches of agriculture. It has connexion by a branch canal with the Thames and Severn canal.

Corinium was a flourishing Romano-British town, at first perhaps a cavalry post, but afterwards, for the greater part of the Roman period, purely a civilian city. At Chedworth, 7 m. N.E., is one of the most

noteworthy Roman villas in England. Cirencester (Cirneceaster, Cyrenceaster , Cyringceaster) is described in Domesday as ancient demesne of the crown. The manor was granted by William I. to William Fitzosbern; on reverting to the crown it was given in n 89, with the township, to the Augus- tinian abbey founded here by Henry I. The struggle of the townsmen to prove that Cirencester was a borough probably began in the same year, when they were amerced for a false presentment. Four inquisitions during the 13th century supported the abbot's claims, yet in 1343 the townsmen declared in a chancery bill of complaint that Cirencester was a borough distinct from the manor, belonging to the king but usurped by the abbot, who since 1308 had abated their court of provostry. Accordingly they produced a copy of a forged charter from Henry I. to the town; the court ignored this and the abbot obtained a new charter and a writ of supersedeas. For their success against, the earls of Kent and Salisbury Henry IV. in 1403 gave the townsmen a gild merchant, although two

inquisitions reiterated the abbot's rights. These were confirmed in 1 408- 1 400 and 1413; in 1418 the charter was annulled, and in 1477 parliament declared that Cirencester was not corporate. After several unsuccessful attempts to re-establish the gild merchant, the government in 1592 was vested in the bailiff of the lord of the manor. Cirencester became a parliamentary borough in 1572, returning two members, but was deprived of repre- sentation in 1885. Besides the " new market " of Domesday- Book the abbots obtained charters in 1215 and 1253 for fairs during the octaves of All Saints and St Thomas the Martyr. The wool trade gave these great importance; in 1341 there were ten wool merchants in Cirencester, and Leland speaks of the abbots' cloth-mill, while Camden calls it the greatest market for wool in England.

See Transactions of the Bristol and Gloucestershire Archaeological Society, vols, ii., ix., xviii.

CIRILLO, DOMENICO (1739-1799), Italian physician and patriot, was born at Grumo in the kingdom of Naples. Appointed while yet a young man to a botanical professorship, Cirillo went some years afterwards to England, where he was elected fellow of the Royal Society, and to France. On his return to Naples he was appointed successively to the chairs of practical and theoretical medicine. He wrote voluminously and well on scientific subjects and secured an extensive medical

practice, On the French occupation of Naples and the proclamation of the Parthenopean republic (1709), Cirillo, after at first refusing to take part in the new government, consented to be chosen a representative of the people and became a member of the legislative commission, of which he was eventually elected president. On the abandonment of the republic by the French (June 1799), Cardinal Ruffo and the army of King Ferdinand IV. returned to Naples, and the Republicans withdrew, ill-armed and inadequately provisioned, to the forts. After a short siege they surrendered on honourable terms, life and liberty being guaranteed them by the signatures of Ruffo, of Foote, and of Micheroux. But the arrival of Nelson changed the complexion of affairs, and he refused to ratify the capitulation. Secure under the British flag, Ferdinand and his wife, Caroline of Austria, showed themselves eager for revenge, and Cirillo was involved with the other republicans in the vengeance of the royal family. He asked Lady-Hamilton (wife of the British minister to Naples) to intercede on his behalf, but Nelson wrote in reference to the petition: ” Domenico Cirillo, who had been the king’s physician, might have been saved, but that he chose to play the fool and lie, denying that he had ever made any speeches against the government, and saying that he only took care of the poor in the hospitals ” {Nelson and the Neapolitan Jacobins, Navy Records Society, 1903). He was condemned and hanged on the 29th of October 1799. Cirillo, whose favourite study was botany, and who was recognized as an entomologist by Linnaeus, left many books, in Latin and Italian, all of them treating of medical and scientific subjects, and all of little value now. Exception must, however, be made in favour of the Virtu morali dell’ Asino, a pleasant philosophical pamphlet remarkable for its double charm of sense and style. He in- troduced many medical innovations into Naples, particularly inoculation for smallpox.

See C. Giglioli, Naples in 1799 (London, 1903) ; L. Conforti, Napoli nel 1799 (Naples, 1889) ; C. Tivaroni, V Italia durante il dominio francese, vol. ii. pp. 179-204. Also under Naples; Nelson and Ferdinand IV. of Naples.

CIRQUE (Lat. circus, ring), a French word used in physical geography to denote a semicircular crater-like amphitheatre at the head of a valley, or in the side of a glaciated mountain. The valley cirque is characteristic of calcareous districts. In the Chiltern Hills especially, and generally along the chalk escarpments, a flat-bottomed valley with an intermittent stream winds into the hill and ends suddenly in a cirque. There is an excellent example at Ivinghoe, Buckinghamshire, where it appears as though an enormous flat-bottomed scoop had been driven into the hillside and dragged outwards to the plain. In all

cases it is found that the valley floor consists of hard or

impervious rock above which lies a permeable or soluble stratum of considerable thickness. In the case of the chalk hills the upper strata are very porous, and the descending water with atmospheric and humous acids in solution has great solvent power. During the winter this upper layer becomes saturated and some of the water drains away along joints in the escarpment. An underground stream is thus developed carrying away a great deal of material in solution, and in consequence the ground above slowly collapses over the stream, while the cirque at the head, where the stream issues, gradually works backward and may pass completely through the hills, leaving a gap of which another drainage system may take possession. In the limestone country of the Cotteswold Hills, many small intermittent tributary streams are headed by cirques, and some of the longer dry valleys have springs issuing from beneath their lower ends, the dry valleys being collapsed areas above underground streams not yet revealed. In this case the pervious limestone is underlain by beds of impervious clay. There are many of these in the Jura Mountains. The Cirque de St Sulpice is a fine example where the impervious bed is a marly clay. *’

The origin of the glacial cirque is entirely different and is said by W. D. Johnson (Journal of Geology, xii. No. 7, 1904) to be due to basal sapping and erosion under the bergschrund of the glacier. In this he is supported by G. K. Gilbert in the same journal, who produces some remarkable examples from the Sierra Nevada in California, where the mountain fragments have been left behind ” like a sheet of dough upon a board after the biscuit tin has done its work “; sc that above the head of the glaciers ” the rock detail is rugged and splintered but its general effect is that of a great symmetrical arc.” Descending one of the bergschrunds of Mt. Lyell to a depth of 150 ft., Johnson found a rock floor cumbered with ice and blocks of rock and the rock face a literally vertical cliff ” much riven, its fracture planes outlining sharp angular masses in all stages of displacement and dislodgment.” Judging from these facts, he interprets the deep valleys with cirques at their head in formerly glaciated regions where at the head there is a ” reversed grade ” of slope, as due to ice-erosion at valley-heads where scour is impossible at the sides of the mountain but strongest under the glacier head where the ice is deepest. The opponents of ice-erosion nevertheless recognize the very frequent occurrence of glacial cirques often containing small lakes such as that under Cader Idris in Wales, or at the head of Little Timber Creek, Montana, and numerous examples in Alpine districts.

CIRTA (mod. Constantine, q.v.), an ancient city of Numidia, in Africa,

in the country of the Massyli. It was regarded by the Romans as the strongest position in Numidia, and was made by them the converging point of all their great military roads in that country. By the early emperors it was allowed to fall into decay, but was afterwards restored by Constantine, from whom it took its modern name.

CISSEY, ERNEST LOUIS OCTAVE COURTOT DE (1810-1882), French general, was born at Paris on the 23rd of September 1810, and after passing through St Cyr, entered the army in 1832, becoming captain in 1839. He saw active service in Algeria, and became chef d'escadron in 1849 and lieutenant-colonel in 1850. He took part as a colonel in the Crimean War, and after the battle of Inkerman received the rank of general of brigade. In 1863 he was promoted general of division. When the Franco- German War broke out in 1870, de Cissey was given a divisional command in the Army of the Rhine, and he was included in the surrender of Bazaine's army at Metz. He was released from captivity only at the end of the war, and on his return was at once appointed by the Versailles government to a command in the army engaged in the suppression of the Commune, a task in the execution of which he displayed great rigour. From July 187 1 de Cissey sat as a deputy, and he had already become minister of war. He occupied this post several times during the critical period of the reorganization of the French army. In 1880, whilst holding the command of the XI. corps at Nantes, he was accused of having relations with a certain Baroness Kaula, who was said to be a spy in the pay of Germany, and

he was in consequence relieved from duty. An inquiry subse- quently held resulted in de Cissey's favour (1881). He died on the 15th of June 1882 at Paris.

CISSOID (from the Gr. Kureros, ivy, and etfos, form), a curve invented by the Greek mathematician Diodes about 180 B.C., for the purpose of constructing two mean proportionals between two given lines; and in order to solve the problem of duplicating the cube. It was further investigated by John Wallis, Christiaan Huygens (who determined the length of any arc in 1657), and Pierre de Fermat (who evaluated the area between the curve and its asymptote in 1661). It is constructed in the following manner. Let APB be a semicircle, BT the tangent at B, and APT a line cutting the circle in P and BT at T; take a point Q on AT so that AQ always equals PT; then the locus of Q is the cissoid. Sir Isaac Newton devised the following mechanical construction. Take

arodLMN bent at right angles at M, such that MN = AB; let the leg LM always pass through a fixed point O on AB produced such that OA = CA, where C is the middle point of AB, and cause N to travel along the line perpendicular to AB at C; then the midpoint of MN traces the cissoid. The curve is symmetrical about the axis of x, and consists of two infinite branches asymptotic to the line BT and forming a cusp at the origin. The cartesian equation, when A is the origin and AB = 20, is y\2a— x) = x 3 ; the polar equation is r=2

The term cissoid has been given in modern times to curves generated in similar manner from other figures than the circle, and the form described above is distinguished as the cissoid of Diodes.

A cissoid angle is the angle included between the concave sides of two intersecting curves; the convex sides include the sistroid angle.

See John Wallis, Collected Works, vol. i. ; T. H. Eagles, Plane Curves (1885).

CIS-SUTLEJ STATES, the southern portion of the Punjab, India. The name, now obsolete, came into use in 1809, when the Sikh chiefs south of the Sutlej passed under British protection, and was generally applied to the country south of the Sutlej and north of the Delhi territory, bounded on the E. by the Himalayas, and on the W. by Sirsa district. Before 1846 the greater part of this territory as independent, the chiefs being subject merely to control from a political officer stationed at Umballa, and styled the agent of the governor-general for the Cis-Sutlej states. After the first Sikh War the full administration of the territory became vested in this officer. In 1849 occurred the annexation of the Punjab, when the Cis-Sutlej states com-missionership, comprising the districts of Umballa, Ferozepore, Ludhiana, Thanesar and Simla, was incorporated with the new province. The name continued to be applied to this division until 1862, when, owing to Ferozepore having been transferred to the Lahore, and a part of Thanesar to the Delhi division, it ceased to be appropriate. Since then, the tract remaining has been known as the Umballa division. Patiala, Jind and Nabha were appointed a separate political agency in 1901. Excluding Bahawalpur, for which there is no political agent, and Chamba, the other states are grouped under the commissioners of Jullunder and Delhi, and the superintendent of the Simla hill states.

CIST (Gr. KtcrTT;, Lat. cista, a box; cf. Ger. Kiste, Welsh kisl- vaen, stone-coffin, and also the other Eng. form ” chest”), in Greek archaeology, a wicker-work receptacle used in the Eleu- sinian and

other mysteries to carry the sacred vessels; also,

in the archaeology of prehistoric man, a coffin formed of flat stones placed edgeways with another flat stone for a cover. The word is also used for a sepulchral chamber cut in the rock (see Coffin).

" Cistern," the common term for a water-tank, is a derivation of the same word (Lat. cisterna; cf. "cave" and "cavern").

CISTERCIANS, otherwise Grey or White Monks (from the colour of the habit, over which is worn a black scapular or apron). In 1098 St Robert, born of a noble family in Champagne, at first a Benedictine monk, and then abbot of certain hermits settled at Molesme near Chatillon, being dissatisfied with the manner of life and observance there, migrated with twenty of the monks to a swampy place called Citeaux in the diocese of Chalons, not far from Dijon. Count Odo of Burgundy here built them s monastery, and they began to live a life of strict observance according to the letter of St Benedict's rule. In the following year Robert was compelled by papal authority to return to Molesme, and Alberic succeeded him as abbot of Citeaux and held the office till his death in 1109, when the Englishman St Stephen Harding became abbot, until 1134. For some years the new institute seemed little likely to prosper; few novices came, and in the first years of Stephen's abbacy it seemed doomed to failure. In 11 12, however, St Bernard and thirty others offered themselves to the monastery, and a rapid and wonderful development at once set in. The next three years witnessed the foundation of the four great " daughter-houses of Citeaux "—La Ferte, Pontigny, Clairvaux and Morimond. At Stephen's death there were over 30 Cistercian houses; at Bernard's (11.54) over 280; and by the end of the century over 500; and the Cistercian influence in the Church more than kept pace with this material expansion, so that St Bernard saw one of his monks ascend the papal chair as Eugenius III.

The keynote of Cistercian life was a return to a literal observ- ance of St Benedict's rule — how literal may be seen from the con- troversy between St Bernard and Peter the Venerable, abbot of Cluny (see Maitland, Dark Ages, § xxii.). The Cistercians rejected alike all mitigations and all developments, and tried to reproduce the lire exactly as it had been in St Benedict's time, indeed in various points they went beyond it in austerity. The most striking feature in the reform was the return to manual labour, and especially to field-work, which became a special characteristic of Cistercian life. In order to make time for this work they cut away the accretions to the divine office which had been steadily growing during three centuries, and in

Cluny and the other Black Monk monasteries had come to exceed greatly in length the regular canonical office: one only of these accretions did they retain, the daily recitation of the Office of the Dead (Edm. Bishop, Origin of the Primer, Early English Text Society, original series, 109, p. xxx.).

It was as agriculturists and horse and cattle breeders that, after the first blush of their success and before a century had passed, the Cistercians exercised their chief influence on the progress of civilization in the later middle ages: they were the great farmers of those days, and many of the improvements in the various farming operations were introduced and propagated by them; it is from this point of view that the importance of their extension in northern Europe is to be estimated. The Cisterdans at the beginning renounced all sources of income arising from benefices, tithes, tolls and rents, and depended for their income wholly on the land. This developed an organized system for selling their farm produce, cattle and horses, and notably contributed to the commercial progress of the countries of western Europe. Thus by the middle of the 13th century the export of wool by the English Cistercians had become a feature in the commerce of the country. Farming operations on so extensive a scale could not be carried out by the monks alone, whose choir and religious duties took up a considerable portion of their time; and so from the beginning the system of lay brothers was introduced on a large scale. The lay brothers were recruited from the peasantry and were simple uneducated men, whose function consisted in carrying out the various field- works and plying all sorts of useful trades; they formed a body

of men who lived alongside of the choir monks, but separate from them, not taking part in the canonical office, but having their own fixed round of prayer and religious exercises. A lay- brother was never ordained, and never held any office of superiority. It was by this system of lay brothers that the Cistercians were able to play their distinctive part in the progress of European civilization. But it often happened that the number of lay brothers became excessive and out of proportion to the resources of the monasteries, there being sometimes as many as 200, or even 300, in a single abbey. On the other hand, at any rate in some countries, the system of lay brothers in course of time worked itself out; thus in England by the close of the 14th century it had shrunk to relatively small proportions, and in the 1 5th century the regime of the English Cistercian houses tended to

approximate more and more to that of the Black Monks.

The Cistercian polity calls for special mention. Its lines were adumbrated by Alberic, but it received its final form at a meeting of the abbots in the time of Stephen Harding, when was drawn up the Carta Caritatis (Migne, Patrol. Lat. clxvi. 1377), a document which arranged the relations between the various bouses of the Cistercian order, and exercised a great influence also upon the future course of western monachism. From one point of view, it may be regarded as a compromise between the primitive Benedictine system, whereby each abbey was autonomous and isolated, and the complete centralization of Cluny, whereby the abbot of Cluny was the only true superior in the body. Citeaux, on the one hand, maintained the in- dependent organic life of the houses — each abbey had its own abbot, elected by its own monks; its own community, belong- ing to itself and not to the order in general; its own property and finances administered by itself, without interference from outside. On the other hand, all the abbeys were subjected to the general chapter, which met yearly at Citeaux, and consisted of the abbots only; the abbot of Citeaux was the president of the chapter and of the order, and the visitor of each and every house, with a predominant influence and the power of enforcing everywhere exact conformity to Citeaux in all details of the exterior life— observance, chant, customs. The principle was that Citeaux should always be the model to which all the other houses had to conform. In case of any divergence of view at the chapter, the side taken by the abbot of Citeaux was always to prevail (see F. A. Gasquet, Sketch of Monastic Constitutional History, pp. xxxv-xxxviii, prefixed to English trans, of Montalem- bert's Monks of the West, ed. 1895).

By the end of the 1 2th century the Cistercian houses numbered 500; in the 13th a hundred more were added; and in the 15th, when the order attained its greatest extension, there were close on 750 houses: the larger figures sometimes given are now recognized as apocryphal. Nearly half of the houses had been founded, directly or indirectly, from Clairvaux, so great was St Bernard's influence and prestige: indeed he has come almost to be regarded as the founder of the Cistercians, who have often been called Bernardines. The order was spread all over western Europe, — chiefly in France, but also in Germany, England, Scotland, Ireland, Sweden, Poland, Hungary, Italy and Sicily, Spain and Portugal,— where some of the houses, as Alcobaca, were of almost incredible magnificence. In England the first foundation was Furness (1127), and many of the most beautiful monastic buildings of the country, beautiful in themselves and beautiful in their sites, were Cistercian, — as Tintern, Rievaulx, Byland, Fountains. A hundred were established in England in the next

hundred years, and then only one more up to the Dissolution (for list, see table and map in F. A. Gasquet's English Monastic Life, or Catholic Dictionary, art. " Cistercians ").

For a hundred years, till the first quarter of the 13th century, the Cistercians supplanted Cluny as the most powerful order and the chief religious influence in western Europe. But then in turn their influence began to wane, chiefly, no doubt, because of the rise of the mendicant orders, who ministered more directly to the needs and ideas of the new age. But some of the reasons of Cistercian decline were internal. In the first place; there was

the permanent difficulty of maintaining in its first fervour a body embracing hundreds of monasteries and thousands of monks, spread all over Europe; and as the Cistercian very raison d'etre consisted in its being a " reform," a return to primitive monachism, with its field-work and severe simplicity, any failures to live up to the ideal proposed worked more disastrously among Cistercians than among mere Benedictines, who were intended to live a life of self-denial, but not of great austerity.. Relaxations were gradually introduced in regard to diet and to simplicity of life, and also in regard to the sources of income, rents and tolls being admitted and benefices incorporated, as was done among the Benedictines; the farming operations tended to produce a commercial spirit; wealth and splendour invaded many of the monasteries, and the choir monks abandoned field-work.

The later history of the Cistercians is largely one of attempted revivals and reforms. The general chapter for long battled bravely against the invasion of relaxations and abuses. In 1335 Benedict XII., himself a Cistercian, promulgated a series of regulations to restore the primitive spirit of the order, and in the 15th century various popes endeavoured to promote reforms. All these efforts at a reform of the great body of the order proved unavailing; but local reforms, producing various semi-inde- pendent offshoots and congregations, were successfully carried out in many parts in the course of the 15th and 16th centuries. In the 17th another great effort at a general reform was made, promoted by the pope and the king of France; the general chapter elected Richelieu (commendatory) abbot of Citeaux, thinking he would protect them from the threatened reform. In this they were disappointed, for he threw himself wholly on the side of reform. So great, however, was the resistance, and so serious the disturbances that ensued, that the attempt to reform Citeaux itself and the general body of the houses had again to be abandoned, and only local projects of reform could be carried out. In 1598 had arisen the reformed congregation of the Feuillants, which spread widely in France and

Italy, in the latter country under the name of ” Improved Bernardines.” The French congregation of Sept-Fontaines (1654) also deserves mention. In 1663 de Ranee reformed La Trappe (see Trappists).

The Reformation, the ecclesiastical policy of Joseph II., the French Revolution, and the revolutions of the 19th century, almost wholly destroyed the Cistercians; but some survived, and since the beginning of the last half of the 19th century there has been a considerable recovery. They are at present divided into three bodies: (1) the Common Observance, with about 30 monasteries and 800 choir monks, the large majority being in Austria-Hungary; they represent the main body of the order and follow a mitigated rule of life; they do not carry on field-work, but have large secondary schools, and are in manner of life little different from fairly observant Benedictine Black monks; of late years, however, signs are not wanting of a tendency towards a return to older ideas; (2) the Middle Observance, embracing some dozen monasteries and about 150 choir monks; (3) the Strict Observance, or Trappists (q.v.), with nearly 60 monasteries, about 1600 choir monks and 2000 lay brothers.

In all there are about 100 Cistercian monasteries and about 4700 monks, including lay brothers. There have always been a large number of Cistercian nuns; the first nunnery was founded at Tart in the diocese of Langres, n 25; at the period of their widest extension there are said to have been 900 nunneries, and the communities were very large. The nuns were devoted to contemplation and also did field-work. In Spain arid France certain Cistercian abbesses had extraordinary privileges. Numer- ous reforms took place among the nuns. The best known of all Cistercian convents was probably Port-Royal (q.v.), reformed by Angelique Arnaud, and associated with the story of the Jansenist controversy. After all the troubles of the 19th century there still exist 100 Cistercian nunneries with 3000 nuns, choir and lay; of these, 15 nunneries with 900 nuns are Trappist.

Accounts of the beginnings of the Cistercians and of the primitive life and spirit will be found in the lives of St Bernard, the best

whereof is that of Abbe” E. Vacandard (1895); also in the Life of St Stephen Harding, in the English Saints. See also Henry Collins (one of the Oxford Movement, who became a Cistercian), Spirit and Mission

of the Cistercian Order (1866). The facts afe related in Helyot, Hist, des ordres religieux (1792), v. cc. 33-46, vL cc. 1, 2. Useful sketches, with references to the literature, are supplied in Herzog, Realencyklopddie (ed. 3), art. ” Cistercienser ” ; Wetzer und Welte, Kirchenlexikon (ed. 2), art. ” Cistercienserorden ” ; Max Heimbucher, Orden und Kongregationen (1896), i. §§ 33, 34. Prof. Brewer’s discriminating, yet on the whole sympathetic, Preface to vol. iv. of the Works of Giraldus Cambrensis (Rolls Series of Chronicles and Memorials) is very instructive. Denis Murphy’s Triumphalia Monasterii S. Crucis (1891) contains a general sketch, with a particular account of the Irish Cistercians. (E. C. B.)

CITATION (Lat. citare, to cite), in law, a summons to appear, more particularly applied in England to process in the probate and divorce division of the high court. In the ecclesiastical courts, citation was a method of commencing a probate suit, answering to a writ of summons at common law, and it is now in English probate practice an instrument issuing from the principal probate registry, chiefly used when a person, having the superior right to take a grant, delays or declines to do so, and another having an inferior right desires to obtain a grant; the party having the prior right is cited to appear and either to renounce the grant or show cause why it should not be decreed to the citator. In divorce practice, when a petitioner has filed his petition and affidavit, he extracts a citation, i.e. a command drawn in the name of the sovereign and signed by one of the registrars of the court, calling upon the alleged offender to appear and make answer to the petition. In Scots law, citation is used in the sense of a writ of summons. The word in its more general literary sense means the act of quoting, or the referring to an authority in support of an argument.

CiTEAUX, a village of eastern France, in the department of C6te d’Or, 16 m. S.S.E. of Dijon by road. It is celebrated for the great abbey founded by Robert, abbot of Molesme, in 1098, which became the headquarters of the Cistercian order. The buildings which remain date chiefly from the 18th century and are of little interest. The church, destroyed in 1792, used to contain the tombs of the earlier dukes of Burgundy.

CITHAERON, now called from its pine forests Elatea, a famous mountain range (4626) ft.) in the south of Boeotia, separating that state from Megaris and Attica. It was famous in Greek mythology, and is frequently mentioned by the great poets, especially by Sophocles. It was on Cithaeron that Aetaeon was changed into a stag, that Pentheus was torn to pieces by the Bacchantes whose orgies he had been watching, and that the infant Oedipus was exposed. This mountain,

too, was the scene of the mystic rites of Dionysus, and the festival of the Daedala in honour of Hera. The carriage-road from Athens to Thebes crosses the range by a picturesque defile (the pass of Dryos-cephalae, ” Oak-heads “), which was at one time guarded on the Attic side by a strong fortress, the ruins of which are known as Ghyphto-kastro (” Gipsy Castle “). Plataea is situated on the north slope of the mountain, and the strategy of the battle of 479 B.C. was considerably affected by the fact that it was necessary for the Greeks to keep their communications open by the passes (see Plataea). The best known of these is that of Dryos- cephalae, which must then, as now, have been the direct route from Athens to Thebes. Two other passes, farther to the west, were crossed by the roads from Plataea to Athens and to Megara respectively. (E. Gr.)

CITHARA (Assyrian chetarah; Gr. KiBkpa.; Lat. cithara; per- haps Heb. kinura, kinnor), one of the most ancient stringed instruments, traced back to 1700 B.C. among the Semitic races, in Egypt, Assyria, Asia Minor, Greece and the Roman empire, whence the use of it spread over Europe. The main feature of the Greek kithara, its shallow sound-chest, being the most important part of it, is also that in which developments are most noticeable; its contour varied considerably during the many musical ages, but the characteristic in respect of which it fore- shadowed the precursors of the violin family, and by which they were distinguished from other contemporary stringed instruments

Pig. 1. — Nero Citharoedus (Mus. Pio-Clementino), showing back of a Roman Cithara.

of the middle ages, was preserved throughout in all European descendants bearing derived names. This characteristc box sound-chest (fig. 1) consisted of two resonating tables, either flat or delicately arched, connected by ribs or sides of equal width. The cithara may be regarded as an attempt by a more skilful craftsman: or race to improve upon the lyre (q.v.), while retaining some of it’s features. The construction of the cithara can fortu- nately be accurately studied from two actual specimens found in Egypt and preserved in the museums of Berlin and Leiden. The Leiden cithara (fig. 2), which forms part of the d’Anastasy Collection in the Museum of Antiquities, is in a very good state of preservation. The sound-chest, in the form of an irregular square (17 cm. X 17 cm.), is hollowed out of a solid block of wood from the base, which is open; the little bar, seen through the open base and measur- ing 25 cm. (1 in.), is also of the same piece of wood. The arms, one short and one long, are solid and are fixed to the body by means of wooden pins;

they are glued as well for greater strength. W. Pleyte, through whose courtesy the sketch was revised and corrected, states that there are no indications on the instrument of any kind of bridge or attach- ment for strings except the little half-hoop of iron wire which passes through the base from back to front. To this the strings were probably attached, and the little bar performed the double duty of sound-post and support for strengthening the tail-piece and enabling it to resist the tension of the strings. The oblique transverse bar, rendered necessary by the increasing length of the strings, was characteristic of the Egyptian cithara, 1 whereas the Asiatic arid Greek instruments were generally constructed with horizontal bars resting on arms of equal length, the pitch of the strings being varied by thickness and tension, instead of by length. (For the Berlin cithara see Lyre.)

The number of strings with which the cithara was strung varied from 4 to 19 or 20 at different times; they were added less for the purpose of increasing the compass in the modern sense than to enable the performer to play in the different modes of the Greek musical system. Terpander is credited with hav- ing increased the number of strings «*«»" sj;j m . \ BeD to seven; Euclid, quoting him as his Fi G . 2. — Ancient authority, states that "loving no more Egyptian Cithara the tetrachordal chant, we will sing aloud from Thebes. Museum new hymns to a seven-toned phorminx." of Antiquities, Leiden.

What has been said of the scale of the lyre applies also to the cithara, and need therefore not be repeated here. The strings were vibrated by means of the fingers or plectrum {tt\t)k.tpov, from irMio-eretv, to strike; Lat. plectrum, from plango, I strike). Twanging with the fingers for strings of gut, hemp or silk was undoubtedly the more artistic method, since the player was able to command various shades of expression which are impossible

1 A drawing of an Egyptian cithara, similar to the Leiden specimen, may be seen in Champollion, Monuments de VEgypte et de la Nubie, ii. pi. 175.

with a rigid plectrum. 1 Loudness of accent and great brilliancy of tone, however, can only be obtained by the use of the plectrum. Quotations from the classics abound to show what was the practice of the Greeks and Romans in this respect. The plectrum was held in the right hand, with elbow outstretchedand palm bent inwards, and the

strings were plucked with the straightened fingers of the left hand. 2 Both methods were used with intention according to the dictates of art for the sake of the variation in tone colour obtainable thereby. 3

The strings of the cithara were either knotted round the transverse tuning bar itself (zugon) or to rings threaded over the bar, which enabled the performer to increase or decrease the tension by shifting the knots or rings; or else they were wound round pegs, 4 knobs 6 or pins 6 fixed to the zugon. The other end of the strings was secured to a tail-piece after passing over a flat bridge, or the two were combined in the curious high box tail-piece which acted as a bridge. Plutarch 7 states that this contrivance was added to the cithara in the days of Cepion, pupil of Terpander. These boxes were hinged in order to allow the lid to be opened for the purpose of securing the

strings to some contrivance con- cealed therein. It is a curious fact that no sculptured cithara pro- vided with this box tail-piece is represented with strings, and in many cases there could never have been any, for the hand and arm 8 are visible across the space that would be filled by the strings, which are always carved in a solid block.

Like the lyre the cithara was made in many sizes, conditioned by the pitch and the use to which the instrument was to be put. These instruments may have been distinguished by different names; the pedis, for instance, is declared by Sappho (22nd fragment) to have been small and shrill; the phorminx, on the other hand, seems to have been identical with the cithara. 9

The Greek kiihara was. the in- strument of the professional singer or citharoedus (ictfiapqdfc) and of the instrumentalist or citharista ((aflapiarijs) , and thus served the double purpose of (1) accompanying the voice — a use placed by the Greeks far above mere instrumental music — in epic recitations and rhapsodies, in odes and lyric songs; and (2) of accompanying the dance ; it was also used for playing solos at the national games, at receptions and banquets and at trials of skill. The costume of the citharoedus and citharista was rich and recognized as being distinctive; it varied but little throughout the ages, as may be deduced from a comparison of representations of the citharoedus on a coin and on a Greek vase of the best period (fig. 4). The costume •consisted of a palla or long tunic with sleeves embroidered with gold and girt high above the waist, falling in graceful folds to the feet. This palla must not be confounded with the

1 See Plutarch, Apophthegm. Lacon.

2 Philostratus the Elder, Imagines, No Philostratus the Younger, Imagines, No. 7,

3 Tibullus, Eleg. iii. 4. 39.

4 Le Antichitd. de Ercolano, vol. iii. p. 5. “Idem, vol. iv. p. 201.

6 Thomas Hope, Costumes of the Ancients, vol. ii. p. 193; also Edward Buhle, Die musikalischen Instrumente in den Miniaturen des friihen Mittelalters (Leipzig, 1903), frontispiece.

7 See De Musica, ch. vi.

8 See Visconti, Museo Clementino, pi. 22, Erato’s cithara, and in the same work that of Apollo Citharoedus (fig., 3 above).

9 See Od. i. 153, 155; //. xviii. 569-570. In Homer the form is always nidapis.

Fig. 3. — Apollo Cithar- oedus, showing Cithara with box tail-pieces.

10, ” Amphion,’’ and Orpheus,” p. 403.

mantle of the same name worn by women. Over one shoulder, or hanging down the back, was the purple chlamys or cloak, and on his brow a golden wreath of laurels. All the citharoedi bear instruments of the type here described as the cithara, and never one of the lyre type. The records of the citharoedi extend over more than thirteen centuries and fall into two natural divisions: (1) The mythological period, approximately from the 13th century B.C. to the first Olympiad, 776 B.C.; and (2) the historical period to the days of Ptolemy, a.d. 161. One of the very few authentic Greek odes extant is a Pythian ode by Pindar, in which the phorminx of Apollo is mentioned; the solo is followed by a chorus of citharoedi. The scope of the solemn games and processions, called Panathenaea, held every four years in honour of the goddess Athena, which originally consisted principally of athletic sports and horse and chariot races, was extended under Peisistratus (c, 540 B.C.), and the celebration made to include contests of singers and instrumentalists, recitations of portions of the Iliad and Odyssey, such as are represented on the frieze of the Parthenon (in the Elgin Room at the British Museum) and later on friezes by Pheidias. It was at the same period that the first contests for solo-playing on the cithara (KiBapuniis) and for solo atdos-pteymg were instituted at the 8th Pythian Games. 10 One of the principal items at these contests for aulos and cithara was the Nomos Pythikos, descriptive of the victory of Apollo Over the python and of the defeat of the monster. 11

The Pythian Games survived the classic Greek period and were continued under Roman sway until about a.d. 394. Not only were these games held at Delphi, but smaller contests, called Pythia, modelled on the great Pythian, were instituted in various provinces of the em- pire, and more especi- ally in Asia Minor. The games lasted for several days, the first being devoted to music. To the games at Delphi came musicians from all parts of the civilized world; and the Spaniards, at the beginning of our era, had attained to such a marvellous pro- ficiency in playing the cithara, an instrument which they had learnt to know from the Phoenician colonists before the conquest by the Romans, that some of their citharoedi easily carried off the honours at the musical contests. The consul Metellus was so charmed with the music of the Spanish competitors that he sent some to Rome for the festivals, where the impression created was so great that the Spanish citharoedi obtained a permanent footing in Rome. Aulus Gellius (Noct. Att.) describes an incident at a banquet which corroborates this statement.

The degeneration of music as an art among the Romans, and its gradual degradation by association with the sensual aniusements of corrupt Rome, nearly brought about its extinction at the end of the 4th century, when the condemnation of the Church closed the theatres, and the great national games came to an end. Instrumental music was banished from civil life and from religious rites, and thenceforth the slender threads which connect the musical instruments of Greeks and Romans with those of

10 See Pausanias x. 7, § 4 et seq.

11 For a description of the Nomos Pythikos in its relation to Greek music see Kathleen Schlesinger, ” Researches into the Origin of the Organs of the Ancients,” Intern. Mus. Ges. Sbd. ii. (1901), 2, p. 177, and Strabo ix. p. 421.

Fig. 4. — Cithara or Phorminx, from a vase in the British Museum.

the middle ages must be sought among the unconverted bar- barians of northern and western Europe, who kept alive the traditions taught them by conquerors and colonists; but as civilization was in its infancy with them the instruments sent out from their workshops must have been crude and primitive. Asia, the cradle of the cithara, also became

its foster-mother; it was among the Greeks of Asia Minor that the several steps in the transition from cithara into guitar 1 (q.v.) took place.

The first of these steps produced the rotta (q.v.), by the construction of body, arms and transverse bar in one piece. The Semitic races used the rotta at a very remote period (1700 B.C.), as we know from a fresco at Beni-Hasan, dating from the reign of Senwosri II., which depicts a procession of strangers bringing tribute; among them is a bearded musician of Semitic type bearing a rotta which he holds horizontally in front of him in the Assyrian manner, and quite unlike the Greeks, who always played the lyre and cithara in an upright position. A unique specimen of this rectangular rotta was found in an Alamannic tomb of the 5th or 6th century at Oberflacht in the Black Forest. The instrument was clasped in the arms of an armed knight; it is now preserved in the Volker Museum in Berlin. This old German rotta is an exact counterpart of instruments pictured in illuminated MSS. of the 8th century, and is derived from the

cithara with rect- angular body, while from the cithara with a body having the curve of the lower half of the violin was produced a rotta with the outline of the body of the guitar. Both types were common in Europe until the 14th cen- tury, some played with a bow, others twanged by the fingers, and bearing indifferently both names, cithara and rotta. The addi- tion of a finger- board, stretching like a short neck from body to transverse bar, leaving on each side of the finger-board space for the hand to pass through in order to stop the strings, produced the crwth or crowd (q.v.), and brought about the reduction in the number of the strings to three or four. The conversion of the rotta into the guitar (q.v.) was an easy transition effected by the addition of a long neck to a body derived from the oval rotta. When the bow was applied the result was the guitar or troubadour fiddle. At first the instrument called cithara in the Latin versions of the Psalms was glossed citron, citre in Anglo-Saxon, but in the nth century the same instrument was rendered hearpan, and in French and English harpe or harp, and our modern versions have retained this translation. The cittern (q.v.), a later de- scendant of the cithara, although preserving the characteristic features of the cithara, the shallow sound-chest with ribs, adopted the pear-shaped outline of the Eastern instruments of the lute tribe. (K. S.)

CITIUM (Gr. Kition), the principal Phoenician city in Cyprus, situated at the north end of modern Larnaca, on the bay of the same name on the S.E. coast of the island. Converging currents from E. and W. meet and pass seawards off Cape Kiti a few miles south, and greatly

facilitated ancient trade. To S. and W. the site is protected by lagoons, the salt from which was one of the sources of its prosperity. The earliest remains near the site go

1 For a discussion of this question see Kathleen Schlesinger, The Instruments of the Orchestra, part ii., and especially chapters on the cithara in transition during the middle ages, and the question of the origin of the Utrecht Psalter, in which the evolution of the cithara is traced at some length.

Fig. 5. — Asiatic Cithara in transition (or rotta). From a fresco at Beni-Hasan (c. 1700 B.C.).

Fig. 6. — Roman Cithara in transi- tion, of the Lycian Apollo (Rome Mus. Capit.).

back to the Mycenaean age (c. 1400-1100 B.C.) and seem to mark an Aegean colony: 2 but in historic times Citium is the chief centre of Phoenician influence in Cyprus. That this was still a recent settlement in the 7th century is suggested by an allusion in a list of the allies of Assur-bani-pal of Assyria in 668 B.C. to a King Damasu of Kartihadasti (Phoenician for ” New-town “), where Citium would be expected. A Phoenician dedication to ” Baal of Lebanon ” found here, and dated also to the 7th century, suggests that Citium may have belonged to Tyre. The biblical name Kittim, derived from Citium, is in fact used quite generally for Cyprus as a whole; 3 later also for Greeks and Romans in general. 4 The discovery here of an official monument of Sargon II. suggests that Citium was the administrative centre of Cyprus during the Assyrian protectorate (700-668 B.C.). 6 During the Greek revolts of 500, 386 foil, and 352 B.C., Citium led the side loyal to Persia and was besieged by an Athenian force in 449 B.C.; its extensive necropolis proves that it remained a considerable city even after the Greek cause triumphed with Alexander. But like other cities of Cyprus, it suffered repeatedly from earthquake, and in medieval times when its harbour became silted the population moved to Larnaca, on the open roadstead, farther south. Harbour and citadel have now quite disappeared, the latter having been used to fill up the former shortly after the British occupation; some gain to health resulted, but an irreparable loss to science. Traces remain of the circuit wall, and of a sanctuary with copious terra-cotta offerings; the large necropolis yields constant loot to illicit excavation.

Bibliography.— W. H. Engel, Kypros (Berlin, 1841), (classical allusions); J. L. Myres, Journ. Hellenic Studies, xvii. 147 ff. (excavations); Cyprus Museum Catalogue (Oxford, 1899), p. 5-6;

153-155; Index (Antiquities); G. F. Hill, Brit. Mus. Cat. Coins 0} Cyprus (London, 1904), (Coins). (J. L. M.)

CITIZEN (a form corrupted in Eng., apparently by analogy with " denizen," from O. Fr. citeain, mod. Fr. citoyen) , etymologic- ally the inhabitant of a city, cite or civitas (see City), and in England the term still used primarily of persons possessing civic rights in a borough; thus used also of a townsman as opposed to a countryman. The more extended use of the word, however, corresponding to civitas, gives " citizen " the meaning of one who is a constituent member of a state in international relations and as such has full national rights and owes a certain allegiance (q.v.) as opposed to an " alien "; in republican countries the term is then commonly employed as the equivalent of " subject " in monarchies of feudal origin. For the rules govern- ing the obtaining of citizenship in this latter sense in the United States and elsewhere see Naturalization.

CITOLE, also spelled Sytole, Cythole, Gytolle, &c. (prob- ably a Fr. diminutive form of cithara, and not from Lat. cista, a box), an obsolete musical instrument of which the exact form is uncertain. It is frequently mentioned by poetical writers of the 13th to the 15th centuries, and is found in Wycliffe's Bible (1360) in 2 Samuel vi. 5, " Harpis and sitols and tympane." The Authorized Version has " psaltiries," and the Vulgate " lyrae." It has been supposed to be another name for the psaltery (q.v.), a box-shaped instrument often seen in the illuminated missals of the middle ages.

CITRIC ACID, Acidum cilricum, or Oxytricarballylic Acid, C 3 H 4 (OH) (CO-OH) 3 , a tetrahydroxytribasic acid, first obtained in the solid state by Karl Wilhelm Scheele,in 1784, from the juice of lemons. It is present also in oranges, citrons, currants, goose- berries and many other fruits, and in several bulbs and tubers. It is made on a large scale from lime or lemon juice, and also by the fermentation of glucose under the influence of Citromycetes pjefierianus, C. glaber and other ferments. Lemon juice is fermented for some time to free it from mucilage, then boiled

2 Cf. the name Kathian in a Ramessid list of cities of Cyprus, Oberhummer, Die Insel Cypern (Munich, 1903), p. 4.

3 Gen. x. 4; Num. xxiv. 24; Is. xxiii. 1, 12; Jer. ii. 10; Ezek. xxvii. 6.

4 Dan. xi. 30 ; I Mace. i. I ; viii. 5.

6 Schrader, "Die Sargonstele des Berliner Museums," in Abh. d. k.

Preuss. Akad. Wiss. (1881); Zur Geogr. d. assyr. Reiches (Berlin, 1890), pp. 337-344.

and filtered, and neutralized with powdered chalk and a little milk of lime; the precipitate of calcium citrate so obtained is decomposed with dilute sulphuric acid, the solution filtered, evaporated to remove calcium sulphate and concentrated, pre- ferably in vacuum pans. The acid is thus obtained in colourless rhombic prisms of the composition CsHeOv + HjO. Crystals of a different form are deposited from a strong boiling solution of the acid. About 20 gallons of lemon juice should yield about 10 lb of crystallized citric acid. The acid may also be prepared from the juice of unripe gooseberries. Calcium citrate must be manufactured with care to avoid an excess of chalk or lime, which would precipitate constituents of the juice that cause the fermentation of the citrate and the production of calcium acetate and butyrate.

The synthesis of citric acid was accomplished by L. E. Grimaux and P. Adam in 1881. Glycerin when treated with hydrochloric acid gives propenyl dichlorhydrin, which may be oxidized to .s-dichloracetone. This compound combines with hydrocyanic acid to form a nitrile which hydrolyses to dichlor- hydroxy iso-butyric acid. Potassium cyanide reacts with this acid to form the corresponding dinitrile, which is converted by hydrochloric acid into citric acid. This series of operations proves the constitution of the acid. A. Haller and C. A. Held synthesized the acid from ethyl chlor-acetoacetate (from chlorine and acetoacetic ester) by heating with potassium cyanide and saponifying the resulting nitrile. The acetone dicarboxylic acid, CO(CH 2 C0 2 H) 2 , so obtained combines with hydrocyanic acid, and this product yields citric acid on hydrolysis. –

Citric acid has an agreeable sour taste. It is soluble in fths of its weight of cold, and in half its weight of boiling water, and dissolves in alcohol, but not in ether. At 1 50° C. it melts, and on the continued application of heat boils, giving off its water of crystallization. At 17 5 C. it is resolved into water and aconitic acid, C 6 H 6 06, a substance found in Equisetum fluviatile, monks- hood and other plants. A higher temperature decomposes this body into carbon dioxide and itaconic acid, C 6 H 6 04, which, again, by the expulsion of a molecule of water, yields citraconic anhydride, C5H4O3. Citric acid digested at a temperature below 40 C, with concentrated sulphuric acid gives off carbon monoxide and forms acetone dicarboxylic acid. With fused

potash it forms potassium oxalate and acetate. It is a strong acid, and dissolved in water decomposes carbonates and attacks iron and zinc.

The citrates are a numerous class of salts, the most soluble of which are those of the alkaline metals; the citrates of the alkaline earth metals are insoluble. Citric acid, being tribasic, forms either acid monometallic, acid dimetallic or neUttal trimetallic salts; thus, mono-, di- and tri-potassium and sodium citrates are known. On warming citric acid with an excess of lime-water a precipitate of calcium citrate is obtained which is redissolved as the liquid cools.

The impurities occasionally present in commercial citric acid are salts of potassium and sodium, traces of iron, lead and copper derived from the vessels used for its evaporation and crystalliza- tion, and free sulphuric, tartaric and even oxalic acid. Tartaric acid, which is sometimes present in large quantities as an adulter- ant in commercial citric acid, may be detected in the presence of the latter, by the production of a precipitate of acid potassium tartrate when potassium acetate is added to a cold solution. Another mode of separating the two acids is to convert them into calcium salts, which are then treated with a perfectly neutral solution of cupric chloride, soluble cupric citrate and calcium chloride being formed, while Cupric tartrate remains undissolved. Citric acid is also distinguished from tartaric acid by the fact that an ammonia solution of silver tartrate produces a brilliant silver mirror when boiled, whereas silver citrate is reduced only after prolonged ebullition.

Citric acid is used in calico printing, also in the preparation of effervescing draughts, as a refrigerant and sialogogue, and occasionally as an antiscorbutic, instead of fresh lemon juice. In the form of lime juice it has long been known as an antidote for scurvy. Several of the citrates are much employed as medicines,

the most important being the scale preparations of iron. Of these iron and ammonium citrate is much used as a haematinic, and as it has hardly any tendency to cause gastric irritation or constipation it can be taken when the ordinary forms of iron are inadmissible. Iron and quinine citrate is used as a bitter stomachic and tonic. In the blood citrates are oxidized into carbonates; they therefore act as remote alkalis, increasing the alkalinity of the blood and thereby the general rate of chemical change within the body (see Acetic Acid).

CITRON, a species of Citrus (C. medico), belonging to the tribe Aurantieae, of the botanical natural order Rutaceae; the same genus furnishes also the orange, lime and shaddock. The citron is a small

evergreen tree or shrub growing to a height of about 10 ft.; it has irregular straggling spiny branches, large pale-greej; broadly oblong, slightly serrate leaves and generally unisexual flowers purplish without and white within. The large fruit it ovate or oblong, protuberant at the tip, and from 5 to 6 in. long, with a rough, furrowed, adherent rind, the inner portion of which is thick, white and fleshy, the outer, thin, greenish-yellow and very fragrant. The pulp is sub-acid and edible, and the seeds are bitter. There are many varieties of the fruit, some of them of great weight and size. The Madras citron has the form of an oblate sphere; and in the “fingered citron ” of China the lobes are separated into finger-like divisions formed by separation of the constituent carpels, as occurs sometimes in the orange.

The citron-tree thrives in the open air in China, Persia, the West Indies, Madeira, Sicily, Corsica, and the warmer parts of Spain and Italy ; and in conservatories it is often to be seen in more northerly regions. Sir Joseph Hooker (Flora of British India, i. 514) regards it as a native of the valleys at the foot of the Himalaya, and of the Khasia hills and the Western Ghauts; Dr Bonavia, however, considers it to have originated in Cochin China or China, and to have been introduced into India, whence it spread to Media and Persia. It was described by Theophrastus as growing in Media, three centuries before Christ, and was early known to the ancients, and the fruit was held in great esteem by them; but they seem to have been ac- quainted with no other member of the Aurantieae, the introduction of oranges and lemons into the countries of the Mediterranean being due to the Arabs, between the 10th and 15th centuries. Josephus tells us that ” the law of the Jews required that at the feast of tabernacles every one should have branches of palm- tree and citron-tree” (Antiq. xiii. 13. 5); and the Hebrew word tappuach, rendered ” apples ” and ” apple-tree ” in Cant. ii. 3, s, Prov. xxv. 11, &c, probably signifies the citron-tree and its fruit. Oribasius in the 4th century describes the fruit, accurately distinguishing the three parts of it. About the 3rd century the tree was introduced into Italy; and, as Gallesio in- forms us, it was much grown at Salerno in the nth century. In China citrons are placed in apartments to make them fragrant. The rind of the citron yields two perfumes, oil of cedra and oil of citron, isomeric with oil of turpentine; and when candied it is much esteemed as a dessert and in confectionery. The lemon (q.v.) is now generally regarded as a subspecies Limonum of Citrus medica.

Oribasii Sardiani, Collectorum Medicinalium Libri XVII. i. 64 (De citrio); Gallesio, Traite du citrus (181 1); Darwin, Animals and Plants under Domestication, i. 334-336 (1868); Brandis, Forest Flora of

North-West and Central India, p. 51 (1874); E. Bonavia, The Cultivated Oranges and Lemons, &c, of India and Ceylon (1890).

CITTADELLA, a town of Venetia, Italy, in the province of Padua, 20 m. N.W. by rail from the town of Padua; 160 ft. above sea-level. Pop. (1901) town, 3616; commune, 9686. The town was founded in 1220 by the Paduans to counterbalance the fortification of Castelfranco, 8 m. to the E., in 12 18 by the Trevisans, and retains its well-preserved medieval walls, sur- rounded by a wet ditch. It was always a fortress of importance, and in modern times is a centre for the agricultural produce of the district, being the junction of the lines from Padua to Bassano and from Vicenza to Treviso.

CITTA DELLA PIEVE, a town and episcopal see of Umbria, Italy, in the province of Perugia, situated 1666 ft. above the sea,

3 m. N.E. of its station on the railway between Chiusi and Orvieto. Pop. (iooi) 8381. Etruscan tombs have been found in the neighbourhood, but it is not certain that the present town stands on an ancient site. It was the birthplace of the painter Pietro Vannucci (Perugino), and possesses several of his works, but none of the first rank.

CITTA DI CASTELLO, a town and episcopal see of Umbria, Italy, in the province of Perugia, 38 m. E. of Arezzo by rail (r8 m. direct), situated on the left bank of the Tiber, 945 ft. above sea-level. Pop. (1001) of town, 6096; of commune, 26,885. It occupies, as inscriptions show, the site of the ancient Tifernum Tiberinum, near which Pliny had a villa (Epist. v. 6; cf. H. Winnefeld in Jahrbuch des deutschen archdologischen Instituts, vi. Berlin, 1891, 203), but no remains exist above ground. The town was devastated by Totila, but seems to have recovered. We find it under the name of Castrum Felicitatis at the end of the 8th century. The bishopric dates from the 7th century. The town went through various political vicissi- tudes in the middle ages, being subject now to the emperor, now to the Church, until in 1468 it came under the Vitelli: but when they died out it returned to the allegiance of the Church. It is built in the form of a rectangle and surrounded by walls of 15 18. It contains fine buildings of the Renaissance, especially the palaces of the Vitelli, and the cathedral, originally Romanesque. The 12th-century altar front of the latter in silver is fine. The Palazzo Comunale is of the 14th century. Some of

Raphael's earliest works were painted for churches in this town, but none of them remains there. There is, however, a small collection of pictures.

See Magherini Graziani, L'Arte a Cittd. di Castello (1897).

CITTA VECCHIA, or Citta Notabile, a fortified city of Malta, 7 m. W. of Valletta, with which it is connected by railway. Pop. (1901) 7515. It lies on high, sharply rising ground which affords a view of a large part of the island. It is the seat of a bishop, and contains an ornate cathedral, overthrown by an earthquake in 1693,- but rebuilt, which is said by an acceptable tradition to occupy the site of the house of the governor Publius, who welcomed the apostle Paul. It contains some rich stalls of the 15th century and other objects of interest. In the rock beneath the city there are some remarkable catacombs in part of pre-Christian origin, but containing evidence of early Christian burial; and a grotto, reputed to have given shelter to the apostle, is pointed out below the church of San Paolo. Remains of Roman buildings have been excavated in the town. About 2 m. E. of the town is the residence of the English governor, known as the palace of S. Antonio; and at a like distance to the south is the ancient palace of the grand masters of the order of St John, with an extensive public garden called II Boschetto. Citta. Vecchia was called Civitas Melita by the Romans and oldest writers, Medina {i.e. the city) by the Saracens, Notabile {locale notabile, et insigne coronae regiae, as it is called in a charter by Alphonso, 1428) under the Sicilian rule, and Citta, Vecchia (old city) by the knights. It was the capital of the island till its supersession by Valletta in 1570. (See also Malta.)

CITTERN (also Cithern, Cithron, Cythren, Citharen, &c; Fr. citre, cislre, cithre, guitar e allcmande or anglaise; Ger. Cither, Zither {mil Hals, with neck); Ital. cetera, cetra), a medieval stringed instrument with a neck terminating in a grotesque and twanged by fingers or plectrum. The popularity of the cittern was at its height in England and Germany during the 16th and n „ _ 17th centuries. The cittern con-

gj — : s> g= sisted of a pear-shaped body

!, * 3 4 similar to that of the lute but

treble mean bass tenor ., . n , . . . , . .

with a flat back and sound-board joined by ribs. The neck was provided with a fretted finger- board; the head was curved and

surmounted by a grotesque head of a woman or of an animal. 1 The strings were of wire in

1 See Shakespeare, Love's Labour's Lost, act v. sc. 2, where Boyet compares the countenance of Holofernes to a cittern head ; John Forde, Lovers' Melancholy (1629), act ii. sc. I, " Barbers shall wear thee on their citterns."

pairs of unisons; known as courses, usually four in number in England. A peculiarity of the cittern lay in the tuning of the courses, the third course known as bass being lower than the fourth styled tenor.

According to Vincentio Galilei (the father of the great astro- nomer) England was the birthplace of the cittern. 2 Several lesson books for this popular instrument were published during the 17th century in England. A very rare book (of which the British Museum does not possess a copy), The Cittharn Schoole, written by Anthony Holborne in 1597, is mentioned in Sir P. Leycester's manuscript commonplace book 3 dated 1656, " For the little Instrument called a Psittyrne Anthony Holborne and Tho. Robinson were most famous of any before them and have both of them set out a booke of Lessons for this Instrument. Holborne has composed a Basse-parte for the Viole to play unto the Psittyrne with those Lessons set out in his booke. These lived about Anno Domini 1600." Thomas Robinson's New Citharen Lessons with perfect tunings for the same from Foure course of strings to Fourteene course, &c. (printed London, 1609, by William Barley), contains illustrations of both kinds of instru- ments. The fourteen-course cittern was also known in England as Bijuga; the seven courses in pairs were stretched over the

From Thomas Robinson's New Citharen Lessons, 1609. Four-course Cittern.

finger-board, and the seven single strings, fastened to the grot- esque head, were stretched as in the lyre a vide alongside the neck; all the strings rested on the one flat bridge near the tail- piece. Robinson gives instructions for learning to play the cittern and for reading the tablature. John Playford's Mustek's Delight on the Cithren (London, 1666) also contains illustrations of the instrument as well as of the viol da Gamba and Pochette; he claims to have revived the instrument and restored it to what it was in the reign of Queen Mary.

The cittern probably owed its popularity at this time to the ease with which it might be mastered and used to accompany the voice; it was one of four instruments generally found in barbers' shops, the others

being the gittern, the lute and the virginals. The customers while waiting took down the instru- ment from its peg and played a merry tune to pass the time. 4 We read that when Konstantijn Huygens came over to England and was received by James I. at Bagshot, he played to the king on the cittern (cithara), and that his performance was duly appreciated and. applauded. He tells us that, although he learnt to play the barbiton in a few weeks with skill, he had lessons from a master for two years on the cittern. 5 On the occasion of a third visit he witnessed the performance of some fine musicians and was astonished to hear a lady, mother of twelve, singing in divine fashion, accompanying herself on the cittern; one of these artists he calls Lanivius, the British Orpheus, whose performance was really enchanting.

Michael Praetorius 6 gives various tunings for the cittern as

. 2 Dialogo delta musica (Florence, 1581), p. 147.

3 The musical extracts from the commonplace book were prepared by Dr Rimbault for the Early English Text Society. Holborne's work is mentioned in his Bibliotheca Madrigaliana. The descriptive list of the musical instruments in use in England during Leycester's lifetime (about 1656) has been extracted and published by Dr F. J, Furnivall, in Captain Cox, his Ballads and Books, or Robert Laneham's Letter (1575), (London, 1871), pp. 65-68.

4 See Knight's London, i. 142.

5 See De Vita propria sermonum inter liberos libri duo (Haarlem, 1817) and E. van der Straeten, La Musique aux Pays-Bas, ii.

348-350.

"Syntagma Musicum (1618). See also M. Mersenne, Harmonie universelle (Paris, 1636), livre il. prop. xV.", who gives different accordances.

4-oo

CITY

Italian 6 course

well as an illustration (sounded an octave higher than the notation).

French Italian 4 course

During the 18th century the cittern, citra or English guitar, had twelve wire strings in six pairs of unisons tuned thus:

ˆm mˆmˆMk

I

=p

3ˆ=

Erˆfe

- t — >-.—

The introduction of the Spanish guitar, which at once leapt into favour, gradually displaced the English variety. The Spanish guitar had gut strings twanged by the fingers. The last development of the cittern before its disappearance was the addition of keys. The keyed cithara 1 was first made by Claus & Co. of London in 1783. The keys, six in number, were placed on the left of the sound-board, and on being depressed they acted on hammers inside the sound-chest, which rising through the rose sound-hole struck the strings. Sometimes the keys were placed in a little box right over the strings, the hammers striking from above. M. J. B. Vuillaume of Paris possessed an Italian cetera (not keyed) by Antoine Stradivarius, 2 r7oo (now in the Museum of the Conservatoire, Paris), with twelve strings tuned in pairs of unisons to E, D, G, B, C, A, which was exhibited in London in 187 1.

The cittern of the 16th century was the result of certain transitions which took place during the evolution of the violin from the Greek kithara (see Cithara).

Genealogical Table of the Cittern.

Assyrian Ketharah I

Persian Rebab

Persian and Arabic Kithara

I

Moorish Guitra,

Cuitra or Guitarra

Greek Kithara

I . Roman Cithara or Fidicula

Cithara in transition or Rotta

L_

Arab Rebab European Rebec

Cithara in transition or Guitar

Guitarra Latina or Vihuela de Mano

Cittern

Spanish Guitar Ghittern

The cittern has retained the following characteristics of the archetype. (1) The derivation of the name, which after the introduction of the bow was used to characterize various instru- ments whose strings were twanged by fingers or plectrum, such as the harp and the rotta (both known as cithara), the citola and the zither. In an interlinear Latin and Anglo-Saxon version of the Psalms, dated a.d. 700 (Brit. Mus., Vesp. A. 1), cithara is translated citran, from which it is not difficult to trace the English cithron, citteran, cittarn, of the 16th century. (2) The construction of the sound-chest with flat back and sound-board connected by ribs. The pear-shaped outline was possibly borrowed from the Eastern instruments, both bowed as the rebab and twanged as the lute, so common all over Europe during the middle ages, or more probably derived from the kithara of the Greeks of Asia Minor, which had the corners rounded. These early steps in the transition from the cithara may be seen in the miniatures of the Utrecht Psalter, 3 a unique and much-copied Carolingian MS. executed at Reims (9th century) , the illustrations of which were undoubtedly adapted from an earlier psalter from the Christian East. The instruments which remained true to the prototype in outline as well as in

1 See Carl Engel, Catalogue of the Exhibition of Ancient Musical Instruments (London, 1872), Nos. 289 and 290.

2 See note above. Illustration in A. J. Hipkins, Musical Instru- ments; Historic, Rare and Unique (Edinburgh, 1888).

3 For a resum6 of the question of the origin of this famous psalter, and an inquiry into its bearing on the history of musical in- struments with

illustrations and facsimile reproductions, see Kathleen Schlesinger, The Instruments of the Orchestra, part ii. ” The Pre- cursors of the Violin Family,” pp. 127-166 (London, 1908-1909).

construction and in the derivation of the name were the ghittern and the guitar, so often confused with the cittern. It is evident that the kinship of cittern and guitar was formerly recognized, for during the 18th century, as stated above, the cittern was known as the English guitar to distinguish it from the Spanish guitar. The grotesque head, popularly considered the character- istic feature of the cittern, was probably added in the 12th century at a time when this style of decoration was very notice- able in other musical instruments, such as the cornet or Zinck, the Platerspiel, the chaunter of the bagpipe, &c. The cittern of the middle ages was also to be found in oval shape. From the 13th century representations of the pear-shaped instrument abound in miniatures and carvings. 4

A very clearly drawn cittern of the 14th century occurs in a MS. treatise on astronomy (Sloane MS. 3983, Brit. Mus.) translated from the Persian of Albumazar into Latin by Georgius Zothari Zopari Fenduli, priest and philosopher, with a prologue and numerous illustrations by his own hand; the cittern is here called giga in an inscription at the side of the drawing.

References to the cittern are plentiful in the literature of the 1 6th and 17th centuries. Robert Fludd 5 describes it thus: ” Cistrona quae quatuor tantum chordas duplicatas habet easque cupreas et ferreas de quibus aliquid dicemus quo loco.” Others are given in the New English Dictionary, ” Cittern,” and in Godefroy’s Diet, de Vane, langue franc, du IX’ au XV’ Steele. (K. S.)

CITY (through Fr. citi, from Lat. civitas). In the United Kingdom, strictly speaking, ” city ” is an honorary title, offici- ally applied to those towns which, in virtue of some pre-eminence (e.g. as episcopal sees, or great industrial centres), have by traditional usage or royal charter acquired the right to the designation. In the United Kingdom the official style of ” city ” does not necessarily involve the possession of municipal power greater than those of the ordinary boroughs, nor indeed the possession of a corporation at all (e.g. Ely). In the United States and the British colonies, on the other hand, the official application of the term ” city ” depends on the kind and extent of the municipal privileges possessed by the corporations, and charters are given raising towns to the rank of cities. Both in France and England the word is used to distinguish the older and central nucleus of some of the large towns, e.g. the Cite in Paris, and the ” square mile ” under

the jurisdiction of the lord mayor which is the ” City of London.”

In common usage, however, the word implies no more than a somewhat vague idea of size and dignity, and is loosely applied to any large centre of population. Thus while, technically, the City of London is quite small, London is yet properly de- scribed as the largest city in the world. In the United States this use of the word is still more loose, and any town, whether technically a city or not, is usually so designated, with little regard to its actual size or importance.

It is clear from the above that the word ” city ” is incapable of any very clear and inclusive definition, and the attempt to show that historically it possesses a meaning that clearly differ- entiates it from ” town ” or ” borough ” has led to some contro- versy. As the translation of the Greek ttoXis or Latin civitas it involves the ancient conception of the state or ” city-state,” i.e. of the state as not too large to prevent its government through the body of the citizens assembled in the agora, and is applied not to the place but to the whole body politic. From this conception both the word and its dignified connotation are without doubt historically derived. On the occupation of Gaul the Gallic states and tribes were called civitates by the Romans,

4 An oval cittern and a ghittern, side by side, occur in the beautiful 13th-century Spanish MS. known as Cantigas de Santa Maria in the Escorial. For a fine facsimile in colours see marquis de Valmar, Real. Acad. Esq., publ. by L. Aguado (Madrid, 1889). Repro- ductions in black and white in Juan F. Riafio, Critical and Bibliog. Notes on Early Spanish Music (London, 1887). See also K. Schlesinger, op. cit. fig. 167, p. 223, also boat-shaped citterns, fig s – 155 and 156, p. 197. Cittern with woman’s head, 15th century, on one of six bas-reliefs on the under parts of the seats of the choir of the Priory church, Great Malvern, reproduced in J. Carter’s Ancient Sculptures, &c, vol. ii. pi. following p. 12. Another without a head, ibid. pi. following p. 16, from a brass monumental plate in St Margaret’s, King’s Lynn.

6 Historia ulriusque Cosmi (Oppenheim, ed. 1617) i. 226.

and subsequently the name was confined to the chief towns of the various administrative districts. These were also the seats of the bishops. It is thus affirmed that in France from the 5th to the 1 5th century the name civitas or cite” was confined to such towns as were

episcopal sees, and Du Cange (Gloss, s.v. civilas) defines that word as urbs episcopalis, and states that other towns were termed castra or oppida. How far any such distinc- tion can be sharply drawn may be doubted. With regard to England no definite line can be drawn between those towns to which the name civitas or cite is given in medieval documents and those called burgi or boroughs (see J. H. Round, Feudal England, p. 338; F. W. Maitland, Domesday Book and After, p. 183). It was, however, maintained by Coke and Blacks tone that a city is a town incorporate which is or has been the see of a bishop. It is true, indeed, that the actual sees in England all have a formal right to the title; the boroughs erected into episcopal sees by Henry VIII. thereby became ” cities “; but towns such as Thetford, Sherborne and Dorchester are never so designated, though they are regularly incorporated and were once episcopal sees. On the other hand, it has only been since the latter part of the 19th century that the official style of “city” has, in the United Kingdom, been conferred by royal authority on certain important towns which were not episcopal sees, Birmingham in 1889 being the first to be so distinguished. It is interesting to note that London, besides 27 boroughs, now contains two cities, one (the City of London) outside, the other (the City of Westminster) included in the administrative county. For the history of the origin and development of modern city government see Borough and Commune : Medieval.

CIUDAD BOLf VAR, an inland city and river port of Venezuela, capital of the state of Bolivar, on the right bank of the Orinoco river, 240 m. above its mouth. Pop. (1891)11,686. It stands upon a small hill about 187 ft. above sea-level, and faces the river where it narrows to a width of }ess than half a mile. The city is largely built upon the hillside. It is the seat of the bishopric of Guayana (founded in 1790), and is the commercial centre of the great Orinoco basin. Among its noteworthy edifices are the cathedral, federal college, theatre, masonic temple, market, custom-house, and hospital. The mean temperature is 83°. The city has a public water-supply, a tramway line, telephone service, subfluvial cable communication with Soledad near the mouth of the Orinoco, where connexion is made with the national land lines, and regular steamship communication with the lower and upper Orinoco. Previous to the revolution of 1901-3 Ciudad Bolivar ranked fourth among the Venezuelan custom-houses, but the restrictions placed upon transit trade through West Indian ports have made her a dependency of the La Guaira custom-house to a large extent. The principal exports from this region include cattle, horses, mules, tobacco, cacao, rubber, tonka beans, bitters, hides, timber and many valuable forest products. The town was founded by Mendoza in 1764

as San Tomas de la Nueva Guayana, but its location at this particu- lar point on the river gave to it the popular name of Angostura, the Spanish term for " narrows." This name was used until 1849, when that of the Venezuelan liberator was bestowed upon it. Ciudad Bolivar played an important part in the struggle for independence and was for a time the headquarters of the revolu- tion. The town suffered severely in the struggle for its possession, and the political disorders which followed greatly retarded its growth.

CIUDAD DE CURA, an inland town of the state of Aragua, Venezuela, 55 m. S.W. of Caracas, near the Lago de Valencia. Pop. (1891) 12,198. The town stands in a broad, fertile valley, between the sources of streams running southward to the Guarico river and northward to the lake, with an elevation above sea-level of 1598 ft. Traffic between Puerto Cabello and the Guarico plains has passed through this town since early colonial times, and has made it an important commercial centre, from which hides, cheese, coffee, cacao and beans are sent down to the coast for export ; it bears a high reputation in Venezuela for commercial enterprise. Ciudad de Cura was founded in 1730, and suffered severely in the war of independence.

CIUDAD JUAREZ, formerly El Paso del Norte, a northern frontier town of Mexico, in the state of Chihuahua, 1223 m. by rail N.N.W. of Mexico City. Pop. (1895) 6917. Ciudad Juarez stands 3800 ft. above sea-level on the right bank of the Rio Grande del Norte, opposite the city of El Paso, Texas, with which it is connected by two bridges. It is the northern terminus of the Mexican Central railway, and has a large and increasing transit trade with the United States, having a custom-house and a United States consulate. It is also a military post with a small garrison. The town has a straggling picturesque appear- ance, a considerable part of the habitations being small adobe or brick cabins. In the fertile neighbouring district cattle are raised, and wheat, Indian corn, fruit and grapes are grown, wine and brandy being made. The town was founded in 1681-1682; its present importance is due entirely to the railway. It was the headquarters of -President Juarez in 1863, and was renamed in 1885 because of its devotion to his cause.

CIUDAD PORFIRIO DIAZ, formerly Piedras Negras, a northern frontier town of Mexico in the state of Coahuila, 1008 m. N. by W. from Mexico City, on the Rio Grande del Norte, 720 ft. above sea-level, opposite the town of Eagle Pass, Texas. Pop. (1900, estimate) 5000. An international bridge connects the two towns, and the Mexican International railway has its northern terminus in Mexico at this point. The town has an important transfer trade with the United States, and is the centre of a fertile district devoted to agriculture and stock-

raising. Coal is found in the vicinity. The Mexican government maintains a custom-house and military post here. The town was founded in 1849.

CIUDAD REAL, a province of central Spain, formed in 1833 of districts taken from New Castile, and bounded on the N. by Toledo, E. by Albacete, S. by Jaen and Cordova and W. by Badajoz. Pop. (1900) 321,580; area, 7620 sq. m. The surface of Ciudad Real consists chiefly of a level or slightly undulating plain, with low hills in the north-east and south-west; but along the south-western frontier the Sierra de Alcudia rises in two parallel ridges on either side of the river Alcudia, and is continued in the Sierra Madrona on the east. The river Guadiana drains almost the entire province, which it traverses from east to west; only the southernmost districts being watered by tributaries of the Guadalquivir. Numerous smaller streams flow into the Guadiana, which itself divides near Herencia into two branches, — the northern known as the Giguela, the southern as the Zancara. The eastern division of Ciudad Real forms part of the region known as La Mancha, a flat, thinly-peopled plain, clothed with meagre vegetation which is often ravaged by locusts. La Mancha (q.v.) is sometimes regarded as coextensive with the whole pro- vince. Severe drought is common here, although some of the rivers, such as the Jabalon and Azuer, issue fully formed from the chalky soil, and from their very sources give an abundant supply of water to the numerous mills. Towards the west, where the land is higher, there are considerable tracts of forest.

The climate is oppressively hot in summer, and in winter the plains are exposed to violent and bitterly cold winds; while the cultivation of grain, the vine and the olive is further impeded by the want of proper irrigation, and the general barrenness of the soil. Large flocks of sheep and goats find pasture in the plains; and the swine which are kept in the oak and beech forests furnish bacon and hams of excellent quality. Coal is mined chiefly at Puertollano, lead in various districts, mercury at Almaden. There are no great manufacturing towns. The roads are insufficient and ill-kept, especially in the north-east where they form the sole means of communication; and neither the Guadiana nor its tributaries are navigable. The main railway from Madrid to Lisbon passes through the capital, Ciudad Real, and through Puertollano; farther east, the Madrid-Linares line passes through Manzanares and Valdepenas. Branch railways also connect the capital with Manzanares, and Valdepenas with the neighbouring town of La Calzada.

The principal towns, Alcazar de San Juan (11,499), Almaden (7375),

Almodovar del Campo (12,525), Ciudad Real (15,255), Manzanares (11,229) an d Valdepenas (21,015), are described in

separate articles. Almagro (7974) and Daimiel (11,825), in the district of La Mancha known as the Campo de Calatrava, be- longed in the later middle ages to the knightly Order of Calatrava, which was founded in 1 1 58 to keep the Moors in check. Almagro was long almost exclusively inhabited by monks and knights, and contains several interesting churches and monasteries, besides the castle of the knights, now used as barracks. Almagro is further celebrated for its lace, Daimiel for its medicinal salts. Tomelloso (13,929) is one of the chief market towns of La Mancha. Education is very backward, largely owing to the extreme poverty which has frequently brought the inhabitants to the verge of famine. (See also Castile.)

CIUDAD REAL, the capital formerly of La Mancha, and since 1833 of the province described above; 107 m. S.of Madrid, on the Madrid-Badajoz-Lisbon and Ciudad Real-Manzanares railways. Pop. (1900) 15,255. Ciudad Real lies in the midst of a wide plain, watered on the north by the river Guadiana, and on the south by its tributary the Jabalon. Apart from the remnants of its 13th-century fortifications, and one Gothic church of immense size, built without aisles, the town contains little of interest; its public buildings — town-hall, barracks, churches, hospital and schools — being in no way distinguished above those of other provincial capitals. There are no important local manufactures, and the trade of the town consists chiefly in the weekly sales of agricultrual produce and live-stock. Ciudad Real was founded by AlphonsoX. of Castile (1252-1284), and fortified by him as a check upon the Moorish power. Its original name of Vittarreal was changed to Ciudad Real by John VI. in 1420. During the Peninsular War a Spanish force was defeated here by the French, on the 27th of March 1809.

CIUDAD RODRIGO, a town of western Spain, in the province of Salamanca, situated 8 m. E. of the Portuguese frontier, on the right bank of the river Agueda, and the railway from Salamanca to Coimbra in Portugal. Pop. (1900) 8930. Ciudad Rodrigo is an episcopal see, and was for many centuries an important frontier fortress! Its cathedral dates from 11 90, but was restored in the 1 5th century. The remnants of a Roman aqueduct, the foundations of a bridge across the Agueda, and other remains, seem to show that Ciudad Rodrigo

occupies the site of a Roman settlement. It was founded in the 12th century by Count Rodrigo Gonzalez, from whom its name is derived. During the Peninsular War, it was captured by the French under Marshal Ney, in 1810; but on the 19th of January 1812 it was retaken by the British under Viscount Wellington, who, for this exploit, was created earl of Wellington, duke of Ciudad Rodrigo, and marquess of Torres Vedras, in Portugal.

CIVERCHIO, VINCENZO, an early 16th-century Italian painter, born at Crema. There are altar-pieces by him at Brescia, and at Crema the altar-piece at the duomo (1509). His “Birth of Christ” is in the Brera, Milan; and at Lovere axe other of his works dating from 1539 and 1540.

CIVET, or properly Civet-cat, the designation of the more typical representatives of the mammalian family Viverridae (see Carnivora). Civets are characterized by the possession of a deep pouch in the neighbourhood of the genital organs, into which the substance known as civet is poured from the glands by which it is secreted. This fatty substance is at first semifluid and yellow, but afterwards acquires the consistency of pomade and becomes darker. It has a strong musky odour, exceedingly disagreeable to those unaccustomed to it, but ” when properly diluted ‘and combined with other scents it produces a very pleasing effect, and possesses a much more floral fragrance than musk, indeed it would be impossible to imitate some flowers without it.” The African civet {Viverra civetta) is from 2 to 3 ft. in length, exclusive of the tail, which is half the length of the body, and stands from 10 to 12 in. high. It is covered with long hair, longest on the middle line of the back, where it is capable of being raised or depresssd at will, of a dark-grey colour, with numerous transverse black bands and spots. In habits it is chiefly nocturnal, and by preference carnivorous, feeding on birds and the smaller quadrupeds, in pursuit of which it climbs trees, but it is said also to eat fruits, roots and other

vegetable matters. In a state of captivity the civet is never completely tamed, and only kept for the sake of its perfume, which is obtained in largest quantity from the male, especially when in good condition and subjected to irritation, being scraped from the pouch with a small spoon usually twice a week. The zibeth (Viverra zibetha) is a widely distributed species extending from Arabia to Malabar, and throughout several of the larger islands of the Indian Archipelago. It is smaller than the true civet, and wants the dorsal crest. In the wild state it does great damage among poultry, and frequently makes off with the young of swine and sheep. When hunted it makes a deter- mined resistance,

and emits a scent so strong as even to sicken the dogs, who nevertheless are exceedingly fond of the sport, and cannot be got to pursue any other game while the stench of the zibeth is in their nostrils. In confinement, it becomes comparatively tame, and yields civet in considerable quantity. In preparing this for the market it is usually spread out on the leaves of the pepper plant in order to free it from the hairs that have become detached from the pouch. On the Malabar coast this species is replaced by V. civettina. The small Indian civet or rasse (Viverricula malaccensis) ranges from Madagascar through India to China, the Malay Peninsula, and the islands of the Archipelago: It is almost 3 ft. long including the tail, and prettily marked with dark longitudinal stripes, and spots which have a distinctly linear arrangement. The perfume, which is extracted in the same way as in the two preceding species, is highly valued and much used by the Javanese. Al- though this animal is said to be an expert climber it usually inhabits holes in the ground. It is frequently kept in captivity in the East, and becomes tame. Fossil remains of extinct civets are found in the Miocene strata of Europe.

CIVIDALE DEL FRIULI (unc. Forum Iulii),z, town of Venetia, Italy, in the province of Udine, 10 m. E. by N. by rail from the town of Udine; 453 ft. above sea-level. Pop. (1901) town, 4143; commune, 9061. It is situated on the river Natisone, which forms a picturesque ravine here. ‘It contains some interesting relics of the art of the 8th century. The cathedral of the 15th century contains an octagonal marble canopy with sculptures in relief, with a font below it belonging to the 8th century, but altered later. The high altar has a fine silver altar front of 1 185. The museum contains various Roman and Lombard antiquities, and valuable MSS. and works of art in gold, silver and ivory formerly belonging to the cathedral chapter. The small church of S. Maria in Valle belongs to the 8th century, and contains fine decorations in stucco which probably belong to the nth or 1 2th century. The fine 15th-century Ponte del Diavolo leads to the church of S. Martino, which contains an altar of the 8th centuiy with reliefs executed by order of the Lombard king Ratchis. At Cividale were born Paulus Diaconus, the historian of the Lombards in the time of Charlemagne, and the actress Adelaide Ristori (1822-1906).

The Roman town (a municipium) of Forum Iulii was founded either by Julius Caesar or by Augustus, no doubt at the same time as the construction of the Via Iulia Augusta, which passed through Utina (Udine) on its way north. After the decay of Aquileia and luiium Carnicum (Zuglio) it became the chief town of the district of Friuli and gave its name to it. The patriarchs of Aquileia resided here from 773 to 1031, when they returned to Aquileia, and finally in 1238

removed to Udine. This last change of residence was the origin of the antagonism between Cividale and Udine, which was only terminated by their sur- render to Venice in 1419 and 1420 respectively.

CIVILIS, CLAUDIUS, or more correctly, Julius, leader of the Batavian revolt against Rome (a.d. 69-70). He was twice imprisoned on a charge of rebellion, and narrowly escaped execution. During the disturbances that followed the death of Nero, he took up arms under pretence of siding with Vespasian and induced the inhabitants of his native country to rebel. The Batavians, who had rendered valuable aid under the early emperors, had been well treated in order to attach them to the cause of Rome. They were exempt from tribute, but were obliged to supply a large number of men for the army, and the

burden of conscription and the oppressions of provincial governors were important incentives to revolt. The Batavians were immediately joined by several neighbouring German tribes, the most important of whom were the Frisians. The Roman garrisons near the Rhine were driven out, and twenty four ships captured. Two legions under Mummius Lupercus were defeated at Castra Vetera (near the modern Xanten) and surrounded. Eight cohorts of Batavian veterans joined their countrymen, and the troops sent by Vespasian to the relief of Vetera threw in their lot with them. The result of these accessions to the forces of Civilis was a rising in Gaul. Hordeonius Flaccus was murdered by his troops (70), and the whole of the Roman forces were in duced by two commanders of the Gallic auxiliaries— Julius Classicus and Julius Tutor — to revolt from Rome and join Civilis. The whole of Gaul thus practically declared itself independent, and the foundation of a new kingdom of Gaul was contemplated. The prophetess Velleda predicted the com- plete success of Civilis and the fall of the Roman Empire. Bu”t disputes broke out amongst the different tribes and rendered co-operation impossible; Vespasian, having successfully ended the civil war, called upon Civilis to lay down his arms, and on his refusal resolved to take strong measures for the suppression of the revolt. The arrival of Petillius Cerialis with a strong force awed the Gauls and mutinous troops into submission; Civilis was defeated at Augusta Treverorum (Trier, Treves) and Vetera, and forced to withdraw to the island of the Batavians. He finally came to an agreement with Cerialis whereby his country- men obtained certain advantages, and resumed amicable relations with Rome. From this time Civilis disappears from history.

The chief authority for the history of the insurrection is Tacitus, Historiae, iv. , v., whose account breaks off at the beginning of Civilis's speech to Cerialis; see also Josephus, Bellum Judaicum, vii. 4. There is a monograph by E. Meyer, Der Freihciiskrieg der Bataver miter Civilis (1856); see also Merivale, Hist, of the Romans under the Empire, ch. 58; H. Schiller, Geschichte der romischen Kaiserzeit, bk.ii.ch. 2, §54 (1883).

CIVILIZATION. The word " civilization " is an obvious derivative of the Lat. civis, a citizen, and civilis, pertaining to a citizen. Etymologically speaking, then, it would be putting no undue strain upon the word to interpret it as having to do with the entire period of human progress since mankind attained sufficient intelligence and social unity to develop a system of government. But in practice " civilization " is usually inter- preted in a somewhat narrower sense, as having application solely to the most recent and comparatively brief period of time that has elapsed since the most highly developed races of men have used systems of writing. This restricted usage- is probably explicable, in part at least, by the fact that the word, though distinctly modern in origin, is nevertheless older than the inter- pretation of social evolution that now finds universal acceptance. Only very recently has it come to be understood that primitive societies vastly antedating the historical period had attained relatively high stages of development and fixity, socially and politically. Now that this is understood, however, nothing but an arbitrary and highly inconvenient restriction of meanings can prevent us from speaking of the citizens of these early societies as having attained certain stages of civilization. It will be convenient, then, in outlining the successive stages of human progress here, to include under the comprehensive term " civiliza- tion " those long earlier periods of " savagery " and " barbarism " as well as the more recent period of higher development to which the word " civilization " is sometimes restricted.

Adequate proof that civilization as we now know it is the

result of a long, slow process of evolution was ; put forward not

long after the middle of the 19th century by the

Savagery students of palaeontology and of prehistoric archaeo- ttnd bar* , . . . ^ , , , ...

barism. l°g v – A recognition of the fact that primitive man

used implements of chipped flint, of polished stone,

and of the softer metals for successive ages, before he attained

a degree of technical skill and knowledge that would enable

him to smelt iron, led the Danish archaeologists to classify the

stages of human progress under these captions: the Rough

Stone Age; the Age of Polished Stone; the Age of Bronze; and the Age of Iron. These terms acquired almost universal recognition, and they retain popularity as affording a very broad outline of the story of human progress. It is obviously desirable, however, to fill in the outlines of the story more in detail. To some extent it has been possible to do so, largely through the efforts of ethnologists who have studied the social condi- tions of existing races of savages. A recognition of the principle that, broadly speaking, progress has everywhere been achieved along the same lines and through the same sequence of changes, makes it possible to interpret the past history of the civilized races of to-day in the light of the present-day conditions of other races that are still existing under social and political conditions of a more primitive type. Such races as the Maoris and the American Indians have furnished invaluable information to the student of social evolution; and the knowledge thus gained has been extended and fortified by the ever-expanding researches of the palaeontologist and archaeologist.

Thus it has become possible to present with some confidence a picture showing the successive stages of human development during the long dark period when our prehistoric ancestor was advancing along the toilsome and tortuous but on the whole always uprising path from lowest savagery to the stage of relative enlightenment at which we find him at the so-called “dawnings of history.” That he was for long ages a savage before he attained sufficient culture to be termed, in modern phraseology, a barbarian, admits of no question. Equally little in doubt is it that other long ages of barbarism preceded the final ascent to civilization. The precise period of time covered by these successive ” Ages ” is of course only conjectural; but something like one hundred thousand years may perhaps be taken as a safe minimal estimate. At the beginning of this long period, the most advanced race of men must be thought of as a pro- miscuous company of pre-troglodytic mammals, at least partially arboreal in habit, living on uncooked fruits and vegetables, and possessed of no arts and crafts whatever — nor even of the know- ledge of the rudest implement. At the end of the period, there emerges into the more or less clear light of history a large- brained being, living in houses of elaborate

construction, supply- ing himself with divers luxuries through the aid of a multitude of elaborate handicrafts, associated with his fellows under the sway of highly organized governments, and satisfying aesthetic needs through the practice of pictorial and literary arts of a high order. How was this amazing transformation brought about?

If an answer Can be found to that query, we shall have a clue to all human progress, not only during the prehistoric but also during the historic periods; for we may well believe that recent progress has not departed from the scheme ^""f. of development impressed on humanity during that meats. long apprenticeship. Ethnologists believe that an answer can be found. They believe that the metamorphosis from beast-like savage to cultured civilian may be proximally ex- plained (certain potentialities and attributes of the species being taken for granted) as the result of accumulated changes that found their initial impulses in a half-dozen or so of practical inventions. Stated thus, the explanation seems absurdly simple. Confessedly it supplies only a proximal, not a final, analysis of the forces impelling mankind along the pathway of progress. But it has the merit of tangibility; it presents certain highly important facts of human history vividly: and it furnishes a definite and fairly satisfactory basis for marking successive stages of incipient civilization.

In outlining the story of primitive man's advancement, upon such a basis, we may follow the scheme of one of the most philosophical of ethnologists, Lewis H. Morgan, who made a provisional analysis of the prehistoric period that still remains among the most satisfactory attempts in this direction. Morgan divides the entire epoch of man's progress from bestiality to civilization into six successive periods, which he names respec- tively the Older, Middle and Later periods of Savagery, and the Older, Middle and Later periods of Barbarism.

Speech.

Fire.

Bow and arrow.

The first of these periods, when mankind was in the lower status of savagery, comprises the epoch when articulate speech was being developed. Our ancestors of this epoch inhabited a necessarily restricted tropical territory, and subsisted upon raw nuts and fruits.

They had no know- ledge of the uses of fire. All existing races of men had advanced beyond this condition before the opening of the historical period. The Middle Period of Savagery began with a knowledge of the uses of fire. This wonderful discovery enabled the developing race to extend its habitat almost indefinitely, and to include flesh, and in particular fish, in its regular dietary. Man could now leave the forests, and wander along the shores and rivers, migrating to climates less enervating than those to which he had previously been confined. Doubtless he became an expert fisher, but he was as yet poorly equipped for hunting, being provided, probably, with no weapon more formidable than a crude hatchet and a roughly fashioned spear. The primitive races of Australia and Polynesia had not advanced beyond this middle status of savagery when they were discovered a few generations ago. It is obvious, then, that in dealing with the further progress of nascent civilization we have to do with certain favoured portions of the race, which sought out new territories and developed new capacities while many tribes of their quondam peers remained static and hence by comparison seemed to retrograde.

The next great epochal discovery, in virtue of which a portion of the race advanced to the Upper Status of Savagery, was that of the bow and arrow, — a truly wonderful implement. The possessor of this device could bring down the fleetest animal and could defend himself against the most predatory. He could provide himself not only with food but with materials for clothing and for tent-making, and thus could migrate at will back from the seas and large rivers, and far into inhospitable but invigorating temperate and sub-Arctic regions. The meat diet, now for the first time freely available, probably contributed, along with the stimulating climate, to increase the physical vigour and courage of this highest savage, thus urging him along the paths of progress. Nevertheless many tribes came thus far and no further, as witness the Atha- pascans of the Hudson's Bay Territory and the Indians of the valley of the Columbia.

We now come to the marvellous discovery that enabled our ancestor to make such advances upon the social conditions of his forbears as to entitle him, in the estimate of his remote descendants, to be considered as putting savagery behind him and as entering upon the Lower Status of Barbarism. The discovery in question had to do with the practice of the art of making pottery (see Ceramics). Hitherto man had been possessed of no permanent utensils that could withstand the action of fire. He could not readily boil water except by some such cumbersome method as the dropping of heated stones into a wooden or skin receptacle. The effect upon his dietary of having at hand earthen vessels in which meat and herbs could be boiled over a fire

must have been momentous. Various meats and many vegetables become highly palatable when boiled that are almost or quite inedible when merely roasted before a fire. Bones, sinews and even hides may be made to give up a modicum of nutriment in this way; and doubtless barbaric man, before whom starvation always loomed threateningly, found the crude pot an almost perennial refuge. And of course its use as a cooking utensil was only one of many ways in which the newly discovered mechanism exerted a civilizing influence.

The next great progressive movement, which carried man into the Middle Status of Barbarism, is associated with the domestication of animals in the Eastern hemisphere, animals. an(ˆ w ‘ tn tne use °f irrigation in cultivating the soil and of adobe bricks and stone in architecture in the Western hemisphere. The dog was probably the first animal to be domesticated, but the sheep, the ox, the camel and the horse were doubtless added in relatively rapid succession, so soon as the idea that captive animals could be of service had been

Pottery.

Iron.

clearly conceived. Man now became a herdsman, no longer dependent for food upon the precarious chase of wild animals. Milk, procurable at all seasons, made a highly important addition to his dietary. With the aid of camel and horse he could traverse wide areas hitherto impassable, and come in contact with distant peoples. Thus commerce came to play an extended role in the dissemination of both commodities and ideas. In particular the nascent civilization of the Mediterranean region fell heir to numerous products of farther Asia, — gums, spices, oils, and most important of all, the cereals. The cultivation of the latter gave the finishing touch to a comprehensive and varied diet, while emphasizing the value of a fixed abode. For the first time it now became possible for large numbers of people to form localized communities. A natural consequence was the elaboration of political systems, which, however, proceeded along lines already suggested by the experience of earlier epochs. All this tended to establish and emphasize the idea of nation- ality, based primarily on blood-relationship; and at the same time to develop within the community itself the idea of property, — that is to say, of valuable or desirable commodities which have come into the possession of an individual through his enterprise or labour, and which should therefore be subject to his voluntary disposal. At an earlier stage of development, all property had been of communal, not of individual, ownership. It appears, then, that our mid-period barbarian had

attained — if the verbal con- tradiction be permitted — a relatively high stage of civilization.

There remained, however, one master craft of which he had no conception. This was the art of smelting iron. When, ultimately, his descendants learned the wonderful secrets of that art, they rose in consequence to the Upper Status of Barbarism. This culminating practical inven- tion, it will be observed, is the first of the great discoveries with which we have to do that was not primarily concerned with the question of man's food supply. Iron, to be sure, has abundant uses in the same connexion, but its most direct and obvious utilities have to do with weapons of war and with implements calculated to promote such arts of peace as house- building, road-making and the construction of vehicles. Wood and stone could now be fashioned as never before. Houses could be built and cities walled with unexampled facility; to say nothing of the making of a multitude of minor implements and utensils hitherto quite unknown, or at best rare and costly. Nor must we overlook the aesthetic influence of edged imple- ments, with which wood and stone could readily be sculptured when placed in the hands of a race that had long been accustomed to scratch the semblance of living forms on bone or ivory and to fashion crude images of clay. In a word, man, the " tool-making animal," was now for the first time provided with tools worthy of his wonderful hands and yet more wonderful brain.

Thus through the application of one revolutionary invention after another, the most advanced races of men had arrived, after long ages of effort, at a relatively high stage of development. A very wide range of experiences had enabled man to evolve a complex body politic, based on a fairly secure social basis, and his brain had correspondingly developed into a relatively efficient and stable organ of thought. But as yet he had devised no means of communicating freely with other people at a distance except through the medium of verbal messages; nor had he any method by which he could transmit his experiences to posterity more securely than by fugitive and fallible oral tradi- tions. A vague symbolization of his achievements was preserved from generation to generation in myth-tale and epic, but he knew not how to make permanent record of his history. Until he could devise a means to make such record, he must remain, in the estimate of his descendants, a barbarian, though he might be admitted to have become a highly organized and even in a broad sense a cultured being.

At length, however, this last barrier was broken. Some race or races devised a method of symbolizing events and ultimately of making

even abstruse ideas tangible by means of writing. graphic signs. In other words, a system of writing was developed. Man thus achieved a virtual conquest over time

as he had earlier conquered space. He could now transmit the record of his deeds and his thoughts to remote posterity. Thus Ke stood at the portals of what later generations would term secure history. He had graduated out of barbarism, and become in the narrower sense of the word a civilized being. Henceforth, his knowledge, his poetical dreamings, his moral aspirations might be recorded in such form as to be read not merely by his contemporaries but by successive generations of remote posterity. The inspiring character of such a message is obvious . The validity of making this great culminating intellectual achievement the test of ” civilized ” existence need not be denied. But we should ill comprehend the character of the message which the earlier generations of civilized beings transmit to us from the period which we term the ” dawning of history ” did we not bear constantly in mind the long series of progressive stages of ” savagery ” and ” barbarism ” that of necessity preceded the final stage of ” civilization ” proper. The achievements of those earlier stages afforded the secure foundation for the pro- gress of the future. A multitude of minor arts, in addition to the important ones just outlined, had been developed; and for a long time civilized man was to make no other epochal addition to the list of accomplishments that came to him as a heritage from his barbaric progenitor. Indeed, even to this day the list of such additions is not a long one, nor, judged in the relative scale, so important as might at first thought be supposed. Whoever considers the subject carefully must admit the force of Morgan’s suggestion that man’s achievements as a barbarian, considered in their relation to the sum of human progress, ” transcend, in relative importance, all his subsequent works.”

Without insisting on this comparison, however, let us ask what discoveries and inventions man has made within the historical period that may fairly be ranked with the half-dozen great epochal achievements that have been put forward as furnishing the keys to all the progress of the prehistoric periods. In other words, let us sketch the history of progress during the ten thousand years or so that have elapsed since man learned the art of writing, adapting our sketch to the same scale which we have already applied to the unnumbered millenniums of the pre- historic period. The view of world-history thus

outlined will be a very different one from what might be expected by the student of national history; but it will present the essentials of the . progress of civilization in a suggestive light.

Without pretending to fix an exact date, — which the historical records do not at present permit, — we may assume that the

most advanced race of men elaborated a system of c/w/tea- wr iti n g no t less than six thousand years before the proper. beginning of the Christian era. Holding to the

terminology already suggested for the earlier periods, we may speak of man's position during the ensuing generations as that of the First or Lowest Status of civilization. If we review the history of this period we shall find that it extends unbroken over a stretch of at least four or five thousand years. During the early part of this period such localized civilizations as those of the Egyptians, the Sumerians, the Babylonians and the Hittites rose, grew strong and passed beyond their meridian. This sug- gests that we must now admit the word " civilization " to yet another definition, within its larger meaning: we must speak of " a civilization," as that of Egypt, of Babylonia, of Assyria, and we must understand thereby a localized phase of society bear- ing the same relation to civilization as a whole that a wave bears to the ocean or a tree to the forest. Such other localized civiliza- tions as those of Phoenicia, Carthage, Greece, Rome, Byzantium, the Sassanids, in due course waxed and waned, leaving a tre- mendous imprint on national history, but creating only minor and transitory ripples in the great ocean of civilization. Progress in the elaboration of the details of earlier methods and inventions took place as a matter of course. Some nation, probably the Phoenicians, gave a new impetus to the art of writing by develop- ing a phonetic alphabet; but this achievement, remarkable as it was in itself, added nothing fundamental to human capacity. Literatures had previously flourished through the use of hiero-

glyphic and syllabic symbols; and the Babylonian syllables continued in vogue throughout western Asia for a long time after the Phoenician alphabet had demonstrated its intrinsic superiority.

Similarly the art of Egyptian and Assyrian and Greek was but the elaboration and perfection of methods that barbaric man had practised away back in the days when he was a cave-dweller. The weapons of warfare of Greek and Roman were the spear and the bow and arrow that their ancestors had used in the period of savagery, aided by sword and helmet dating from the upper period of barbarism.

Greek and Roman government at their best were founded upon the system of gentes that barbaric man had profoundly studied, — as witness, for example, the federal system of the barbaric Iroquois Indians existing in America before the coming of Columbus. And if the Greeks had better literature, the Romans better roads and larger cities, than their predecessors, these are but matters of detailed development, the like of which had marked the progress of the more important arts and the introduction of less important ancillary ones in each antecedent period. The axe of steel is no new implement, but a mere perfecting of the axe of chipped flint. The Iliad represents the perfecting of an art that unnumbered generations of barbarians practised before their camp-fires.

Thus for six or seven thousand years after man achieved civilization there was rhythmic progress in many lines, but there came no great epochal invention to usher in a new areat ethnic period. Then, towards the close of what inventions historians of to-day are accustomed to call the middle ot ˆf t ages, there appeared in rapid sequence three or four

middle ages.

inventions and a great scientific discovery that, taken together, were destined to change the entire aspect of European civilization. The inventions were gunpowder, the mariner's compass, paper and the printing-press, three of which appear to have been brought into Europe by the Moors, whether or not they originated in the remote East. The scientific discovery which must be coupled with these inventions was the Copernican demonstration that the sun and not the earth is the centre of our planetary system. The generations of men that found them- selves (1) confronted with the revolutionary conception of the universe given by the Copernican theory; (2) supplied with the new means of warfare provided by gunpowder; (3) equipped with an undreamed-of guide across the waters of the earth; and (4) enabled to promulgate knowledge with unexampled speed and cheapness through the aid of paper and printing-press — such generations of men might well be said to have entered upon a new ethnic period. The transition in their mode of thought and in their methods of practical life was as great as can be supposed to have resulted, in an early generation, from the introduction of iron, or in a yet earlier from the invention of the bow and arrow. So the Europeans of about the 15th century of the Christian era may be said to have entered upon the Second or Middle Status of civilization.

The new period was destined to be a brief one. It bad com- passed

only about four hundred years when, towards the close of the 18th century, James Watt gave to the world the perfected steam-engine. Almost contemporane- mach i aery . ously Arkwright and Hargreaves developed revolu- tionary processes of spinning and weaving by machinery. Meantime James Hutton and William Smith and their successors on the one hand, and Erasmus Darwin, Francois Lamarck, and (a half-century later) Charles Darwin on the other, turned men's ideas topsy-turvy by demonstrating that the world as the abiding-place of animals and man is enormously old, and that man himself instead of deteriorating from a single perfect pair six thousand years removed, has ascended from bestiality through a slow process of evolution extending over hundreds of centuries. The revolution in practical life and in the mental life of our race that followed these inventions and this new presentation of truth probably exceeded in suddenness and in its far-reaching effects the metamorphosis effected at any previous transition from one ethnic period to another. The men of the 19th century, living now in the period that may be termed the Upper Status

of civilization, saw such changes effected in the practical affairs of their everyday lives as had not been wrought before during the entire historical period. Their fathers had travelled in vehicles drawn by horses, quite as their remoter ancestors had done since the time of higher barbarism. It may be doubted whether there existed in the world in the year 1800 a postal service that could compare in speed and efficiency with the express service of the Romans of the time of Caesar; far less was there a tele- graph service that could compare with that of the ancient Persians. Nor was there a ship sailing the seas that a Phoenician trireme might not have overhauled. But now within the lifetime of a single man the world was covered with a network of steel rails on which locomotives drew gigantic vehicles, laden with passengers at an hourly speed almost equalling Caesar's best journey of a day; over the land and under the seas were stretched wires along which messages coursed from continent to continent literally with the speed of lightning; and the waters of the earth were made to teem with gigantic craft propelled without sail or oar at a speed which the Phoenician captain of three thousand years ago and the English captain of the 18th century would alike have held incredible.

There is no need to give further details here of the industrial revolutions that have been achieved in this newest period of Social and civilization, since in their broader outlines at least political they

are familiar to every one. Nor need we dwell organiza- U p n the revolution in thought whereby man has for tlon ‘ the first time been given a clear inkling as to his

origin and destiny. It suffices to point out that such periods of fermentation of ideas as this suggests have probably always been concomitant with those outbursts of creative genius that gave the world the practical inventions upon which human progress has been conditioned. The same attitude of receptivity to new ideas is pre-requisite to one form of discovery as to the other. Nor, it may be added, can either form of idea become effective for the progress of civilization except in proportion as a large body of any given generation are prepared to receive it. Doubtless here and there a dreamer played with firt:, in a literal sense, for generations before the utility of fire as a practical aid to human progress came to be recognized in practice. And — to seek an illustration at the other end of the scale — we know that the advanced thinkers of Greece and Rome believed in the antiquity of the earth and in the evolution of man two thousand years before the coming of Darwin. We have but partly solved the mysteries of the progress of civilization, then, when we have pointed out that each tangible stage of progress owed its initiative to a new invention or discovery of science. To go to the root of the matter we must needs explain how it came about that a given generation of men was in mental mood to receive the new invention or discovery.

The pursuit of this question would carry us farther into the realm of communal and racial psychology — to say nothing of the realm of conjecture — than comports with the purpose of this article. It must suffice to point out that alertness of mind — that all mentality — is, in the last analysis, a reaction to the influences of the environment. It follows that man may subject himself to new influences and thus give his mind a new stimulus by changing his habitat. A fundamental secret of progress is revealed in this fact. Man probably never would have evolved from savagery had he remained in the Tropics where he doubtless originated. But successive scientific inventions enabled him, as has been suggested, to migrate to distant latitudes, and thus more or less involuntarily to become the recipient of new creative and progressive impulses. After migrations in many directions had resulted in the development of divers races, each with certain capacities and acquirements due to its unique environ- ment, there was opportunity for the application of the principle of environmental stimulus in an indirect way, through the mingling and physical intermixture of one race with another. Each of the great localized civilizations of antiquity appears to have owed its prominence in part at least — perhaps very

largely— to such intermingling of two or more races. Each of these civilizations began to decay so soon as the nation had

remained for a considerable number of generations in its localized environment, and had practically ceased to receive accretions from distant races at approximately the same stage of develop- ment. There is a suggestive lesson for present-day civiliza- tion in that thought-compelling fact. Further evidence of the application of the principle of environmental stimulus, operating through changed habitat and racial intermixture, is furnished by the virility of the colonial peoples of our own day. The receptiveness to new ideas and the rapidity of material progress of Americans, South Africans and Australians are proverbial. No one doubts, probably, that one or another of these countries will give a new stimulus to the progress of civilization, through the promulgation of some great epochal discovery, in the not distant future. Again, the value of racial intermingling is shown yet nearer home in the long-continued vitality of the British nation, which is explicable, in some measure at least, by the fact that the Celtic element held aloof from the Anglo-Saxon element century after century sufficiently to maintain racial integrity, yet mingled sufficiently to give and receive the fresh stimulus of “new blood.” It is interesting in this connexion to examine the map of Great Britain with reference to the birthplaces of the men named above as being the originators of the inventions and discoveries that made the close of the 18th century memorable as ushering in a new ethnic era. It may be added that these names suggest yet another element in the causation of progress: the fact, namely, that, however necessary racial receptivity may be to the dynamitic upheaval of a new ethnic era, it is after all individual genius that applies its detonating spark.

Without further elaboration of this aspect of the subject it may be useful to recapitulate the analysis of the evolution of civilization above given, prior to characterizing it from another standpoint. It appears that the entire Nla f period of human progress up to the present may be pngnss. divided into nine periods which, if of necessity more or less arbitrary, yet are not without certain warrant of logic. They may be defined as follows: (1) The Lower Period of Savagery, terminating with the discovery and application of the uses of fire. (2) The Middle Period of Savagery, terminating with the invention of the bow and arrow. (3) The Upper Period of Savagery, terminating with the invention of pottery. (4) The Lower Period of Barbarism, terminating with the domestication of animals. (5) The Middle Period of Barbarism, terminating with the discovery of the process of smelting iron ore. (6) The Upper Period of Barbarism, terminating with the development of a system of writing meeting the requirements

of literary composition. (7) The First Period of Civilization (proper) terminating with the introduction of gunpowder. (8) The Second Period of Civilization, terminating with the invention of ‘a practical steam-engine. (9) The Upper Period of Civilization, which is still in progress, but which, as will be suggested in a moment, is probably nearing its termination.

It requires but a glance at the characteristics of these successive epochs to show the ever-increasing complexity of the inventions that delimit them and of the conditions of life that they connote. Were we to attempt to characterize in a few phrases the entire story of achievement thus outlined, we might say that during the three stages of Savagery man was attempting to make himself master of the geographical climates. His unconscious ideal was, to gain a foothold and the means of subsistence in every zone. During the three periods of Barbarism the ideal of conquest was extended to the beasts of the field, the vegetable world, and the mineral contents of the earth’s crust. During the three periods of Civilization proper the ideal of conquest has become still more intellectual and subtle, being now extended to such abstractions as an analysis of speech-sounds, and to such intangibles as expanding gases and still more elusive electric currents: in other words, to the forces of nature, no less than to tangible substances. Hand in hand with this growing complexity of man’s relations with the external world has gone a like increase of complexity in the social and political organizations that characterize man’s relations with his fellow-

men. In savagery the family expanded into the tribe; in barbarism the tribe developed into the nation. The epoch of civilization proper is aptly named, because it has been a time in which citizenship, in the narrower national significance, has probably been developed to its apogee. Throughout this period, in every land, the highest virtue has been considered to be patriotism ,-ˆ-by which must be understood an instinctive willingness on the part of every individual to defend even with his life the interests of the nation into which he chances to be born, regardless of whether the national cause in which he struggles be in any given case good or bad, right or wrong. The communal Judgment of this epoch pronounces any man a traitor who will not uphold his own nation even in a wrong cause — and the word “traitor ” marks the utmost brand of ignominy.

But while the idea of nationality has thus been accentuated, there has been a never-ending struggle within the bounds of the Nation- nation itself to adjust the relations of one citizen to amy and another. The ideas that might makes right, that the cosmo- strong man must dominate the weak, that leadership polttan- j n t jj e commun jty properly belongs to the man who is physically most competent to lead — these ideas were a perfectly natural, and indeed an inevitable, outgrowth of the conditions under which man fought his way up through savagery and barbarism. Man in the first period of civilization inherited these ideas, along with the conditions of society that were their cdncomitants. ; So throughout the periods when the oriental civilizations of Egypt and Babylonia and Assyria and Persia were dominant, a despotic form of government was accepted afe the natural order of things. It does not appear that any other form was even considered as a practicality. A despot might indeed be overthrown, but only to make way for the coronation of another despot. A little later the Greeks and Romans modified the conception of a heaven-sent individual monarch; but they went no further than to substitute a heaven-favoured community, with specially favoured groups (Patricii) within the community. With this, national egoism reached its climax; for each people regarded its own citizens as the only exemplars of civilization, openly branding all the rest of the world as “barbarians,” fit subjects for the exaction of tribute or for the imposition of the bonds of actual slavery. During the middle ages there was a reaction towards individualism as opposed to nationalism: but the entire system of feudalism, with its clearly recognized conditions of over-lordship and of vassaldom, gave expression, no less clearly than oriental despotism and classical “demo- cracy” had done, to the idea of individual inequality; of divergence of moral and legal status based on natural inheritance. Thus this idea, a reminiscence of barbarism, maintained its dominance throughout the first period of civilization.

But gunpowder, marking the transition to the second period of civilization, came as a great levelling influence. With its aid the weakest peasant might prove more than a match for the most powerful knight. Before its assaults the castle of the lord ceased to be an impregnable fortress. And while gunpowder thus levelled down the power of the mighty, the printing-press levelled up the intelligence, and hence the power and influence of the lowly. Meantime the mariner’s compass opened up new terri- tories beyond the seas, and in due course men of lowly origin were seen to attain to wealth and power through commercial pursuits, thus tending to break in upon the established social order. In the colonial territories themselves all men were subjected more or less to the same perils and dependent upon

their own efforts. Success and prominence in the community came not as a birth- right, but as the result of demonstrated fitness. The great lesson that the interests of all members of a community are, in the last analysis, mutual could be more clearly distinguished in these small colonies than in larger and older bodies politic. Through various channels, therefore, in the successive genera- tions of this middle period of civilization, the idea gained ground that intelligence and moral worth, rather than physical prowess, should be the test of greatness; that it is incumbent on the strong in the interests of the body politic to protect the weak; and that, in the long run, the best interests of the community are conserved

if all its members, without exception, are given moral equality before the law. This idea of equal rights and privileges for all members of the community — for each individual "the greatest amount of liberty consistent with a like liberty of every other individual " — first found expression as a philosophical doctrine towards the close of the 18th century; at which time also tenta- tive efforts were made to put it into practice. It may be said therefore to represent the culminating sociological doctrine of the middle period of civilization, — the ideal towards which all the influences of the period had tended to impel the race.

It will be observed, however, that this ideal of individual equality within the body politic in no direct wise influences the status of the body politic itself as the centre of a localized civilization that may be regarded as in a sense antagonistic to all other similarly localized civilizations. If there were any such influence, it would rather operate in the direction of accentuating the patriotism of the member of a democratical community, as against that of the subject of a despot, through the sense of personal responsibility developed in the former. The develop- ments of the middle period of civilization cannot be considered, therefore, to have tended to decrease the spirit of nationality, with its concomitant penalty of what is sometimes called pro- vincialism. The history of this entire period, as commonly presented, is largely made up of the records of international rivalries and jealousies, perennially culminating in bitterly contested wars. It was only towards the close of the epoch that the desirability of free commercial intercourse among nations began to 'find expression as a philosop hical creed through the efforts of Quesnay and his followers; and the doctrine that both parties to an international commercial transaction are gainers thereby found its first clear expression in the year 1776 in the pages of Condillac and of Adam Smith.

But the discoveries that ushered in the third period of civiliza- tion

were destined to work powerfully from the outset for the breaking down of international barriers, though, of course, their effects would not be at once manifest. Thus the substitu- tion of steam power for water power, besides giving a tremendous impetus to manufacturing in general, mapped out new industrial centres in regions that nature had supplied with coal but not always with other raw materials. To note a single result, England became the manufacturing centre of the world, drawing its raw materials from every corner of the globe; but in so doing it ceased to be self-supporting as regards the production of food-supplies. While growing in national wealth, as a result of the new inventions, England has therefore lost immeasurably in national self-sufficiency and independence; having become in large measure dependent upon other countries both for the raw materials without which her industries must perish and for the foods to maintain the very life of her people.

What is true of England in this regard is of course true in greater or less measure of all other countries. Everywhere, thanks to the new mechanisms that increase industrial efficiency, there has been an increasing tendency to specialization; and since the manufacturer must often find his raw materials in one part of the world and his markets in another, this implies an ever-increasing intercommunication and interdependence between the nations. This spirit is obviously fostered by the new means of transportation by locomotive and steamship, and by the electric communication that enables the Londoner, for example, to transact business in New York or in Tokio with scarcely an hour's delay; and that puts every one in touch at to-day's breakfast table with the happenings of the entire world. Thanks to the new mechanisms, national isolation is no longer possible; globe-trotting has become a habit with thousands of individuals of man)' nations; and Orient and Occident, repre- senting civilizations that for thousands of years were almost absolutely severed and mutually oblivious of each other, have been brought again into close touch for mutual education and betterment. The Western mind has learned with amazement that the aforetime Terra Incognita of the far East has nurtured a gigantic civilization having ideals in many ways far different from our own. The Eastern mind has proved itself capable, in

self-defence, of absorbing the essential practicalities of Western civilization within a single generation. Some of the most important

problems of world-civilization of the immediate future hinge upon the mutual relations of these two long-severed communities, branched at some early stage of progress to opposite hemispheres of the globe, but now brought by the new mechanisms into daily and even hourly communication.

While the new conditions of the industrial world have thus tended to develop a new national outlook, there has come about,

as a result of the scientific discoveries already referred humanism. * °> a n0 * ess significant broadening of the mental and

spiritual horizons. Here also the trend is away from the narrowly egoistic and towards the cosmopolitan view. About the middle of the 19th century Dr Pritchard declared that many people debated whether it might not be permissible for the Australian settlers to shoot the natives as food for their dogs; some of the disputants arguing that savages were without the pale of human brotherhood. To-day the thesis that all mankind are one brotherhood needs no defence. The most primitive of existing aborigines are regarded merely as brethren who, through some defect or neglect of opportunity, have lagged behind in the race. Similarly the defective and criminal classes that make up so significant a part of the population of even our highest present-day civilizations, are no longer regarded with anger or contempt, as beings who are suffering just punish- ment for wilful transgressions, but are considered as pitiful victims of hereditary and environmental influences that they could neither choose nor control. Insanity is no longe'r thought of as demoniac possession, but as the most lamentable of diseases. The changed attitude towards savage races and defective classes affords tangible illustrations of a fundamental transforma- tion of point of view which doubtless represents the most import- ant result of the operation of new scientific knowledge in the course of the 19th century. It is a transformation that is only partially effected as yet, to be sure; but it is rapidly making headway, and when fully achieved it will represent, probably, the most radical metamorphosis of mental view that has taken place in the entire course of the historical period. The essence of the new view is this: to recognize the universality and the invariability of natural law; stated otherwise, to understand that the word " supernatural " involves a contradiction of terms and has in fact no meaning. Whoever has grasped the full import of this truth is privileged to sweep mental horizons wider by far than ever opened to the view of any thinker of an earlier epoch. He is privileged to forecast, as the sure heritage of the future, a civilization freed from the last ghost of supersti- tion — an Age of Reason in which mankind

shall at last find refuge from the hosts of occult and invisible powers, the fearsome galaxies of deities and demons, which have haunted him thus far at every stage of his long journey through savagery, barbarism and civilization. Doubtless here and there a thinker, even in the barbaric eras, may have realized that these ghosts that so influenced the everyday lives of his fellows were but children of the imagination. But the certainty that such is the case could not have come with the force of demonstration even to the most clear-sighted thinker until 19th-century science had investigated with penetrating vision the realm of molecule and atom; had revealed the awe-inspiring principle of the conservation of energy; and had offered a comprehensible explanation of the evolution of one form of life from another, from monad to man, that did not presuppose the intervention of powers more ” supernatural ” than those that operate about us everywhere to-day.

The stupendous import of these new truths could not, of course, make itself evident to the generality of mankind in a single generation, when opposed to superstitions of a thousand generations' standing. But the new knowledge has made its way more expeditiously than could have been anticipated; and its effects are seen on every side, even where its agency is scarcely recognized. As a single illustration, we may note the familiar observation that the entire complexion of orthodox teaching of religion has been more altered in the past fifty

years than in two thousand years before. This of course is not entirely due to the influence of physical and biological science \ no effect has a unique cause, in the complex sociological scheme. Archaeology, comparative philology and textual criticism have also contributed their share; and the comparative study of religions has further tended to broaden the outlook and to make for universality, as opposed to insularity, of view. It is coming to be more and more widely recognized that all theologies are but the reflex of the more or less faulty knowledge of the times in which they originate, that the true and abiding purpose of religion should be the practical betterment of humanity — the advancement of civilization in the best sense of the word; and that this end may perhaps be best subserved by different systems of theology, adapted to the varied genius of different times and divers races. Wherefore there is not the same enthusiastic desire to-day that found expression a generation ago, to impose upon the cultured millions of the East a religion that seems to them alien to their manner of thought, unsuited to their needs and less distinctly ethical in teaching than their own religions.

Such are but a few of the illustrations that might be cited from many

fields to suggest that the mind of our generation is becom- ing receptive to a changed point of view that augurs the coming of a new ethnic era. If one may be permitted to enter very tentatively the field of prophecy, it seems not unlikely that the great revolutionary invention which will close the third period of civilization and usher in a new era is already being evolved. It seems not over-hazardous to-predict that the air-ship, in one form or another, is destined to be the mechanism that will give the new impetus to human civilization; that the next era will have as one of its practical ideals the conquest of the air; and that-this conquest will become a factor in the final emergence of humanity from the insularity of nationalism to the broad view of cosmopolitanism, towards which, as we have seen, the tend- encies of the present era are verging. That the gap to be covered is a vastly wide one no one need be reminded who recalls that the civilized nations of Europe, together with America and Japan, are at present accustomed to spend more than three hundred million pounds each year merely that they may keep armaments in readiness to fly at one another's throats should occasion arise. Formidable as these armaments now seem, however, the developments of the not very distant future will probably make them quite obsolete; and sooner or later, ■ as science develops yet more deadly implements of destruction, the time must come when communal intelligence will rebel at the suicidal folly of the international attitude that characterized, for example, the opening decade of the 20th century. At some time, after the first period of cosmopolitanism shall be ushered in as a tenth ethnic period, it will come to be recognized that there is a word fraught with fuller meanings even than the word patriotism. That word is humanitarianism. The enlightened generation that realizes the full implications of that word will doubtless marvel that their ancestors of the third period of civilization should have risen up as nations and slaughtered one another by thousands to settle a dispute about a geographical boundary. Such a procedure will appear to have been quite as barbarous as the cannibalistic practices of their yet more remote ancestors, and distinctly less rational, since cannibalism might sometimes save its practiser from starvation, whereas warfare of the civilized type was a purely destructive agency.

Equally obvious must it appear to the cosmopolite of some generation of the future that quality rather than mere numbers must determine the efficiency of an> given community. Race suicide will then cease to be a bugbear; and it will no longer be considered rational to keep up the census at the cost of pro- pagating Jow orders of intelligence, to feed the ranks of paupers, defectives and criminals. On the contrary it will be thought fitting that man should become the conscious arbiter

of his own racial destiny to the extent of applying whatever laws of heredity he knows or may acquire in the interests of his own species, as he has long applied them in the case of domesticated animals. The survival and procreation of the unfit will titer, cease to be a menace to the progress of civilization. It docs not follow that

all men will be brought to a dead level of equality of body and nr'nd, nor that individual competition will cease; but the average physical mental status of the race will be raised immeasurably through the virtual elimination of that vast company of defectives which to-day constitutes so threatening an obstacle to racial progress. There are millions of men in Europe and America to-day whose whole mental equipment — despite the fact that they have been taught to read and write — is far more closely akin to the average of the Upper Period of Barbarism than to the highest standards of their own time; and these undeveloped or atavistic persons have on the average more offspring than are produced by the more highly cultured and intelligent among their con- temporaries. " Race suicide " is thereby prevented, but the pro- gress of civilization is no less surely handicapped. We may well believe that the cosmopolite of the future, aided by science, will find rational means to remedy this strange illogicality. In so doing he will exercise a more consciously purposeful function, and perhaps a more directly potent influence, in determining the line of human progress than he has hitherto attempted to assume, notwithstanding the almost infinitely varied character of the experiments through which he has worked his way from savagery to civilization.

All these considerations tend to define yet more clearly the ultimate goal towards which the progressive civilization of past

and present appears to be trending. The contempla- eroiutioa. ˆ on °* tms 6 oa l brings into view the outlines of a vastly

suggestive evolutionary cycle. For it appears that the social condition of cosmopolite man, so far as the present-day view can predict it, will represent a state of things, magnified to world-dimensions, that was curiously adumbrated by the social system of the earliest savage. At the very beginning of the journey through savagery, mankind, we may well believe, con- sisted of a limited tribe, representing no great range or variety of capacity, and an almost absolute identity of interests. Thanks to this community of interests, — which was fortified by the

recognition of blood-relationship among all members of the tribe, — a principle which we now define as ” the greatest ultimate good to the greatest number ” found practical, even if unwitting, recognition; and therein lay the germs of all the moral develop- ment of the future. But obvious identity of interests could be recognized only so long as the tribe remained very small. So soon asjts numbers became large, patent diversities of interest, based on individual selfishness, must appear, to obscure the larger harmony. And as savage man migrated hither and thither, occupying new regions and thus developing new tribes and ultimately a diversity of ” races,” all idea of community of interests, as between race and race, must have been absolutely banished. It was the obvious and patent fact that each race was more or less at rivalry, in disharmony, with all the others. In the hard struggle for subsistence, the expansion of one race meant the downfall of another. So far as any principle of ” greatest good ” remained in evidence, it applied solely to the members of one’s own community, or even to one’s particular phratry or gens.

Barbaric man, thanks to his conquest of animal and vegetable nature, was able to extend the size of the unified community, and hence to develop through diverse and intricate channels the application of the principle of ” greatest good ” out of which the idea of right and wrong was elaborated. But quite as little as the savage did he think of extending the application of the principle beyond the bounds of his own race. The laws with which he gave expression to his ethical conceptions applied, of necessity, to his own people alone. The gods with which his imagination peopled the world were local in habitat, devoted to the interests of his race only, and at enmity with the gods of rival peoples. As between nation and nation, the only principle of ethics that ever occurred to him was that might makes right. Civilized man for a long time advanced but slowly upon this view of international morality. No Egyptian or Babylonian or Hebrew or Greek or Roman ever hesitated to attack a weaker nation on the ground that it would be wrong to do so. And few indeed are the instances in which even a modern nation has

judged an international question on any other basis than that of self-interest. It was not till towards the close of the 19th century that an International Peace Conference gave tangible witness that the idea of fellowship of nations was finding recogni- tion; and in the same recent period history has recorded the first instance of a powerful nation vanquishing a weaker one without attempting to exact at least an ” indemnifying ” tribute.

But the citizen of the future, if the auguries of the present prove true,

will be able to apply principles of right and wrong without reference to national boundaries. He will understand that the interests of the entire human family are, in the last analysis, common interests. The census through which he attempts to estimate ” the greatest good of the greatest number ” must include, not his own nation merely, but the remotest member of the human race. On this universal basis must be founded that absolute standard of ethics which will determine the relations of cosmopolite man with his fellows. When this ideal is attained, mankind will again represent a single family, as it did in the day when our primeval ancestors first entered on the pathway of progress; but it will be a family whose habitat has been extended from the narrow glade of some tropical forest to the utmost habitable confines of the globe. Each member of this family will be permitted to enjoy the greatest amount of liberty consistent with the like liberty of every other member; but the interests of the few will everywhere be recognized as subservient to the interests of the many, and such recognition of mutual interests will establish the practical criterion for the interpretation of international affairs.

But such an extension of the altruistic principle by no means presupposes the elimination of egoistic impulses — of individual- ism. On the contrary, we must suppose that man at the highest stages of culture will be, even as was the P’ox™” 13 savage, a seeker after the greatest attainable degree of efficiency. comfort for the least necessary expenditure of energy. The pursuit of this ideal has been from first to last the ultimate impelling force in nature urging man forward. The only change has been a change in the interpretation of the ideal, an altered estimate as to what manner of things are most worth the purchase- price of toil and self-denial. That the things most worth the having cannot, generally speaking, be secured without such toil and self-denial, is a lesson that began* to be inculcated while man was a savage, and that has never ceased to be reiterated genera- tion after generation. It is the final test of progressive civiliza- tion that a given effort shall produce a larger and larger modicum of average individual comfort. That is why the great inventions that have increased man’s efficiency as a worker have been the necessary prerequisites to racial progress. Stated otherwise, that is why the industrial factor is everywhere the most powerful factor in civilization; and why the economic interpretation is the most searching interpretation of history at its every stage. It is the basal fact that progress implies increased average working efficiency — a growing ratio between average effort and average achievement — that gives sure warrant for such a prog- nostication as has just been attempted concerning the future industrial unification of our race. The efforts of civilized man provide him, on

the average, with a marvellous range of comforts, as contrasted with those that rewarded the most strenuous efforts of savage or barbarian, to whom present-day necessaries would have been undreamed-of luxuries. But the ideal ratio between effort and result has by no means been achieved; nor will it have been until the inventive brain of man has pro- vided a civilization in which a far higher percentage of citizens will find the life-vocations to which they are best adapted by nature, and in which, therefore, the efforts of the average worker may be directed with such vigour, enthusiasm and interest as can alone make for true efficiency; a civilization adjusted to such an economic balance that the average man may live in reasonable comfort without heart-breaking strain, and yet accumulate a sufficient surplus to ensure ease and serenity for his declining days. Such, seemingly, should be the normal goal of progressive civilization. Doubtless mankind in advancing towards that goal will institute many changes that could by no possibility be

foretold, but (to summarize the views just presented) it seems a safe augury from present-day conditions and tendencies that the important lines of progress will include (i) the organic better- ment of the race through wise application of the laws of heredity; (2) the lessening of international jealousies and the consequent minimizing of the drain upon communal resources that attends a military regime; and (3) an ever-increasing movement towards the industrial and economic unification of the world. (H.S.Wi.)

Authorities. — A list of works dealing with the savage and barbarous periods of human development will be found appended to the article Anthropology. Special reference may here be made to E. B. Tylor's Early History of Mankind (1865), Primitive Culture (1871) and Anthropology (1881); Lord Avebury's Prehistoric Times (new edition, 1900) and Origin of Civilization (new edition, 1902); A. H. Keane's Man Past and Present (1899) ; and Lewis H. Morgan's Ancient Society (1877). The earliest attempt at writing a history of civilization which has any value for the 20th-century reader was F. Guizot's in 1828-1830, a handy English translation by William Hazlitt being included in Bohn's Standard Library under the title of The History of Civilization. The earlier lectures, de- livered at the Old Sorbonne, deal with the general progress of European civilization, whilst the greater part of the work is an account of the growth of civilization in France. Guizot's attitude is somewhat antiquated, but this book still has

usefulness as a store- house of facts. T. H. Buckle's famous, work, The History of Civiliza- tion in England (1857-1861), though only a gigantic unfinished introduction to the author's proposed enterprise, holds an important place in historical literature on account of the new method which it introduced, and has given birth to a considerable number of valuable books on similar lines, such as Lecky's History of European Morals (1869) and Rise and Influence of Rationalism in Europe (1865). J. W. Draper's History of the Intellectual Development of Europe (1861) undertook, from the American stand-point, " the labour of arranging the evidence offered by the intellectual history of Europe in accordance with physiological principles, so as to illustrate the orderly progress of civilization." Its objective treat- ment and wealth of learning still give it great, value to the student. Since the third quarter of the 19th century it may be said that all serious historical work has been more or less a history of civilization as displayed in all countries and ages, and a bibliography of the works bearing on the subject would be coextensive with the cata- logue of a complete historical library. Special mention, however, may be made of such important and suggestive works as C. H. Pearson's National Life and Character (1893) ; Benjamin Kidd's Social Evolution (1894) and Principles of Western Civilization (1902); Edward Eggleston's Transit of Civilization (1901); C. Seignobos's Histoire de la civilisation (1887); C. Faulmann's Illus- trirte Culturgeschichte (1881); G. Ducoudray's Histoire de la civilisation (1886); J. von Hellwald's Kulturgeschichte (1896); J Lippert's Kulturgeschichte der Menschheit (1886); O. Henne- am- Rhyn's Die Kultur der Vergangenheit, Gegenwart und Zukunft (1890) ; G. Kurth's Origines de la civilisation moderne (1886), &c. The vast collection of modern works on sociology, from Herbert Spencer onwards, should also be consulted; see bibliography attached to the article Sociology. The historical method on which practically all the articles of the present edition of the Ency. Brit, are planned, makes the whole work itself in essentials the most comprehensive history of civilization in existence.

CIVIL LAW, a phrase which, with its Latin equivalent jus civile, has been used in a great variety of meanings. Jus civile was sometimes used to distinguish that portion of the Roman law which was the proper or ancient law of the city or state of Rome from the jus gentium, or the law common to all the nations comprising the Roman world, which was incorporated with the former through the agency of the praetorian edicts. This historical distinction remained as a permanent principle of division in the body of the Roman law. One of the first propositions of the Institutes of Justinian is the following: — " Jus autem civile vel gentium ita dividitur. Omnes populi qui legibus et

moribus reguntur partim suo proprio, partim communi omnium hominum jure utuntur; nam quod quisque populus ipsi sibi jus constituit, id ipsius civitatis proprium est, vocaturque jus civile quasi jus proprium ipsius civitatis. Quod vero naturalis ratio inter omnes homines constituit, id apud omnes peraeque custoditur, voca- turque jus gentium quasi quo jure omnes gentes utuntur." The jus gentium of this passage is elsewhere identified with jus naturale, so that the distinction comes to be one between civil law and natural or divine law. The municipal or private law of a state is sometimes described as civil law in distinction to public or international law. Again, the municipal law of a state may be divided into civil law and criminal law. The phrase, however,

is applied par excellence to the system of law created by the genius of the Roman people, and handed down by them to the nations of the modern world (see Roman Law). The civil law in this sense would be distinguished from the local or national law of modern states. The civil law in this sense is further to be distinguished from that adaptation of its principles to ecclesi- astical purposes which is known as the canon law (q.v.)<

CIVIL LIST, the English term for the account in which are contained all the expenses immediately applicable to the sup- port of the British sovereign's household and the honour and dignity of the crown. An annual sum is settled by the British parliament at the beginning of the reign on the sovereign, and is charged on the consolidated fund. But it is only from the reign of William IV. that the sum thus voted has been restricted solely to the personal expenses of the crown. Before his accession many charges properly belonging to the ordinary expenses of government had been placed on the civil list. The history of the civil list dates from the reign of William and Mary. Before the Revolution no distinction had S 0ry ' been made between the expenses of government in time of peace and the expenses relating to the personal dignity and support of the sovereign. The ordinary revenues derived from the hereditary revenues of the crown, and from certain taxes Voted for life to the king at the beginning of each reign, were supposed to provide for the support of the sovereign's dignity and the civil government, as well as for the public defence ih. time of peace. Any saving made by the king in the expenditure touching the government of the country or its defence would go to swell his privy purse. But with the Revolution a step forward was made towards the establishment of the principle that the expenses relating to the support of the crown should be separated from the ordinary expenses of the state. The evils of the old system under which no appropriation was made of the ordinary revenue granted to the crown for life had been

made manifest in the reigns of Charles II. and James II. ; it was their control of these large revenues that made them so independent of parliament. Moreover, while the civil government and the de- fences suffered, the king could use these revenues as he liked. The parliament of William and Mary fixed the revenue of the crown in time of peace at £1,200,000 per annum; of this sum about £700,000 was appropriated towards the ” civil list.” But from this the sovereign was to defray the expenses of the civil service and the payment of pensions, as well as the cost of the support of the royal household and his own personal expenses. It was from this that the term ” civil list ” arose, to distinguish it from the statement of military and naval charges. The revenue voted to meet the civil list consisted of the hereditary revenues of the crown and a part of the excise duties. Certain changes and addi- tions were made in the sources of revenue thus appropriated between the reign of William and Mary and the accession of George III., when a different system was adopted. Generally speaking, however, the sources of revenue remained as; settled at the Revolution.

Anne had the same civil list, estimated to produce an annual income of £700,000. During her reign a debt of £1,200,000 was incurred. This debt was paid by parliament and Aaae ■■ charged on the civil list itself. George I. enjoyed the George 1. same revenue by parliamentary grant, in addition to ””> . , an annual sum of £120,000 on the aggregate fund. Qear s ea – A debt of £1,000,000 was incurred, and discharged by parliament in the same manner as Anne’s debt had been. To George IL a civil list of £800,000 as a minimum was granted, parliament undertaking to make up any deficiency if the sources of income appropriated to its service fell short of that sum. Thus in 1746 a debt of £456,000 was paid by parliament on the civil listt On the accession of George III. a change was made in the system of the civil list. Hitherto the sources of revenue appropriated to the service of the civil list had been settled on the crown. If these revenues exceeded the sum they ae0r ˆ eUL were computed to produce annually, the surplus went to the king.: George III., however, surrendered the life-interest in the heredi- tary revenues and the excise duties hitherto voted to defray

the civil list expenditure, and any claim to a surplus for a fixed amount. The king still retained other large sources of revenue Which were not included in the civil list, and were free from the control of

parliament. The revenues from which the civil list had been defrayed were henceforward to be carried into, and made part of, the aggregate fund. In their place a fixed civil list was granted — at first of £723,000 per annum, to be increased to £800,000 on the falling in of certain annuities to members of the royal family. From this £800,000 the king's household and the honour and dignity of the crown were to be supported, as well as the civil service offices, pensions and other charges still laid on the list.

During the reign of George III. the civil list played ah import- ant part in the history of the struggle on the part of the king to establish the royal ascendancy. From the revenue appropri- ated to its service came a large portion of the money employed by the king in creating places and pensions for his supporters in parliament, and, under the colour of the royal bounty, bribery was practised on a large scale. No limit was set to the amount applicable to the pensions charged on the civil list, so long as the sum granted could meet the demand; and there was no principle on which the grant was regulated. Secret pensions at the king's pleasure were paid out of it, and in every way the independence of parliament was menaced; and though the more legitimate expenses of the royal household were diminished by the king's penurious style of living, and though many charges not directly connected with the king's personal expenditure were removed, the amount was constantly exceeded, and applications were made from time to time to parliament to pay off debts incurred; and thus opportunity was given for criticism. In 1769 a debt of £513,511 was paid off in arrears; and in spite of the demand for accounts and for an inquiry into the cause of the debt, the ministry succeeded in securing this vote without 'aessot 8 rantm g sucn information. All attempts to investigate •ivlilist the civil list were successfully resisted, though Lord Chatham went so far as to declare himself convinced that the funds were expended in corrupting members of parlia- ment. Again, in 1777, an application was made to parliament to pay off £618,340 of debts; and in view of the growing dis- content Lord North no longer dared to withhold accounts. Yet, in spite of strong opposition and free criticism, not only was the amount voted, but also a further £100,000 per annum, thus raising the civil list to an annual sum of £900,000.

In 1779, at a time when the expenditure of the country and the national debt had been enormously increased by the Ameri- can War, the general dissatisfaction found voice in parliament, and the abuses of the civil list were specially singled out for attack. Many petitions were presented to the House of Commons praying for its reduction, and a motion was made in the House of Lords in the same sense, though it was rejected. In 1780 Burke brought forward his scheme of

economic reform, but his name was already associated with the growing desire to remedy the evils of the civil list by the publication in 1 769 of his pamphlet on ” The Causes of the Present Discontent.” In this scheme Burke freely animadverts on the profusion and abuse of the civil list, criticizing the useless and obsolete offices and the offices performed by deputy. In every department he discovers jobbery, waste and peculation. His proposal was that the many offices should be reduced and consolidated, that the pension list should be brought down to a fixed sum of £60,000 per annum, and that pensions should be conferred only to reward merit or fulfil real public charity. All pensions were to be paid at the exchequer. He proposed also that the civil list should be divided into classes, an arrangement which later was carried into effect. In 1 780 Burke succeeded in bringing in his Establish- ment Bill; but though at first it met with considerable support, and was even read a second time, Lord North’s government defeated it in committee. The next year the bill was again introduced into the House of Commons, and Pitt made his first speech in its favour. The bill was, however, lost on the second reading.

In 1782 the Rockingham ministry, pledged to economic

reform, came into power; and the Civil List Act 1782 was introduced and carried with the express object of limiting the patronage and influence of ministers, or, in other words, the ascendancy of the crown over parliament. Aa l782 . Not only did the act effect the abolition of a number of useless offices, but it also imposed restraints on the issue of secret service money, and made provision for a more effectual supervision of the royal expenditure. As to the pension list, the annual amount was to be limited to £95,000; no pension to any one person was to exceed £1200, and all pensions were to be paid at the exchequer, thus putting a stop to the secret pensions payable during pleasure. Moreover, pensions were only to be bestowed in the way of royal bounty for persons in distress or as a reward for merit. Another very important change was made by this act: the civil list was divided into classes, and a fixed amount was to be appropriated to each class. The following were the classes: —

1. Pensions and allowances of the royal family.

2. Payment of salaries of lord chancellor, speaker and judges.

3. Salaries of ministers to foreign courts resident at the same.

4.. Approved bills of tradesmen, artificers and labourers for any article supplied and work done for His Majesty’s service.

5. Menial servants of the household.

6. Pension list.

7. Salaries of all other places payable out of the civil list revenues.

8. Salaries and pensions of treasurer or commissioners of the

treasury and of the chancellor of the exchequer.

Yet debt was still the condition of the civil list down to the end of the reign, in spite of the reforms established by the Rockingham ministry, and notwithstanding the removal from the list of many charges unconnected with the king's personal expenses. The debts discharged by parliament between 1782, the date of the passing of the Civil List Act, and the end of George III.'s reign, amounted to £2,300,000. In all, during his reign £3,398,061 of debt owing by the civil list was paid off.

With the regency the civil list was increased by £70,000 per annum, and a special grant of £100,000 was settled on the prince regent. In 1816 the annual amount was settled at £1,083,727, including the establishment of the king, now insane; though the civil list was relieved from some annuities payable to the royal family. Neverthe'ess, the fund still continued charged with such civil expenses as the salaries of judges, ambassadors and officers of state, and with pensions granted for public services. Other reforms were made as regards the definition of the several classes of expenditure, while the expenses of the royal household were henceforth to be audited by a treasury official — the auditor of the civil list. On the accession of George IV. the civil list, freed from the expenses of the late king, was settled at £845,727. On William IV. coming to the throne a sura of £510,000 per annum was fixed for the service of the civil list. The king at the same time surrendered all the sources of revenue enjoyed by his predecessors, apart from the civil list, represented by the hereditary revenues of Scotland — the Irish civil list, the droits of the crown and admiralty, the 45 % duties, the West India duties, and other casual revenues hitherto vested in the crown, and independent of parliament. The revenues of the duchy of Lancaster were still retained by the crown. In return for this surrender and the diminished sum voted, the civil list was relieved from all the charges relating rather to the civil government than to the support of the dignity of the crown and the royal household. The future expenditure was divided into five classes, and a fixed annual sum was appropriated to each class. The pension list was reduced to £75,000. The king resisted an

attempt on the part of the select committee to reduce the salaries of the officers of state on the grounds that this touched his prerogative, and the ministry of Earl Grey yielded to his remonstrance.

The civil list of Queen Victoria was settled on the same prin- ciples as that of William IV. A considerable reduc- tion was made in the aggregate annual sum voted, yˆria's from £510,000 to £385,000, and the pension list was cMiilst separated from the ordinary civil list. The civil list proper was divided into the following five classes, with a fixed sum appropriated to each: —

Privy purse Salaries of household Expenses of household Royal bounty, &c. . Unappropriated

£60,000

131,260

172,500

13,200

8,040

In addition the queen might, on the advice of her ministers, grant pensions up to £1200 per annum, in accordance with a resolution of the House of Commons of February 18th, 1834, " to such persons as have just claims on the royal beneficence or who, by their personal services to the crown, by the perform- ance of duties to the public, or by their useful discoveries in science and attainments in literature and art, have merited the gracious consideration of the sovereign and the gratitude of their country." The service of these pensions increased the annual sum devoted to support the dignity of the crown and the expenses of the household to about £409,000. The list of pensions must be laid before parliament within thirty days of 20th June. Thus the civil list was reduced in amount, and relieved from the very charges which gave it its name as distinct from the state- ment of military and naval charges. It now really only dealt with the support of the dignity and honour of the crown and the royal household. The arrangement was most successful, and during the last three reigns there was no application to parliament for the discharge of debts inctirred on the civil list.

The death of Queen Victoria rendered it necessary that a renewed provision should be made for the civil list; and King Edward VII., following former precedents, placed Act 190* unreservedly at the disposal of parliament his heredi- tary revenues. A select committee of the House of Commons was appointed to consider the provisions of the civil list for the crown, and to report also on the question of grants for the honourable support and maintenance of Her Majesty the Queen and the members of the royal family. The committee in their conclusions were guided to a considerable extent by the actual civil list expenditure during the last ten years of the last reign, and made certain recommendations which, without undue interference with the sovereign's personal arrangements, tended towards increased efficiency and economy in the support of the sovereign's household and the honour and dignity of the crown. On their report was based the Civil List Act 1901, which estab- lished the new civil list. The system that the hereditary revenues should as before be paid into the exchequer and be part of the consolidated fund was maintained. The amount payable for the civil list was increased from £385,000 to £470,000. In the application of this sum the number of classes of expenditure to which separate amounts were to be appropriated was increased from five to six. The following was the new arrangement of classes:— 1st class, Their Majesties' privy purse, £110,000; 2nd class, salaries of His Majesty's household and retired allow- ances, £125,800; 3rd class, expenses of His Majesty's household, £193,000; 4th class, works (the interior repair and decoration of Buckingham Palace and Windsor Castle), £20,000; 5th class, royal bounty, alms and special services, £13,200; 6th class, unappropriated, £8000. The system relating to civil list pensions, established by the Civil List Act 1837, continued to apply, but the pensions were not regarded as chargeable on the sum paid for the civil list. The committee also advised that the mastership of the Buckhounds should not be continued; and the king, on the advice of his ministers, agreed to accept their recommenda- tion. The maintenance of the royal hunt thus ceased to be a charge on the civil list. The annuities of £20,000 to the prince of Wales, of £10,000 to the princess of Wales, and of £18,000 to His Majesty's three daughters, were not included in the civil list, though they were conferred by the same act. Other grants made by special acts of parliament to members of the royal family were also excluded from it; these were £6000 to the princess Christian of Schleswig-Holstein, £6000 to the princess Louise (duchess of Argyll), £25,000 to the duke of Connaught, £6000 to the duchess of Albany, £6000 to the princess Beatrice (Henry of Battenberg), and £3000 to the duchess of Mecklenburg- Strelitz.

It may be interesting to compare with the British civil list the corresponding figures in other countries. These are as follows,

the figures being those, for convenience, of 1905. Spain, £280,000, exclusive of allowances to members of the royal family ; Portugal, £97.333. in addition to £1333 to the queen-consort— total Fieares la grant to the royal family, £116,700; Italy, £602,000, JJ er from which was deducted £16,000 for the children of the eoua tries. deceased Prince Amedeo, duke of Aosta, £16,000 to Prince Tommaso, duke of Genoa, and £40,000 to Queen Margherita; Belgium, £140,000; Netherlands, £50,000, with, in addition, £4000 for the maintenance of the royal palaces ; Germany, £770,500 {Krondotalions Rente), the sovereign also possessing large private property (Kronfideikommiss und Schatullguter), the revenue from which contributed to the expenditure of the court and the members of the royal family; Denmark, £55,500, in addition to £6600 to the heir-apparent; Norway, £38,888; Sweden, £72,700; Greece, £52,000, which included £4000 each from Great Britain, France and Russia; Austria-Hungary, £941, 666* made up of £387,500 as emperor of Austria but of the revenues of Austria, and £554,166 as king of Hungary out of the revenues of Hungary; Japan, £300,000; Rumania, £47,000, in addition to revenues from certain crown lands; Servia, £48,000; Bulgaria, £40,000, besides £30,000 for maintenance of palaces, &c. ; Montenegro, £8300; Russia had no civil list, the sovereign having all the revenue from the crown domains (actual amount unknown, but supposed to amount to over £4,000,000) ; the president of the French Republic had a salary of £24,000 a year, with a further £24,000 for expenses; and the president of the United States had a salary of $50,000 (from 1909, $75,000).

CIVIL SERVICE, the generic name given to the aggregate of all the public servants, or paid civil administrators and clerks, of a state. It is the machinery by which the executive, through the various administrations, carries on the central government of the country.

British Empire. — The appointments to the civil service until the year 1855 were made by nomination, with an examination not sufficient to form an intellectual or even a physical test. It was only after much consideration and almost years of dis- cussion that the nomination system was abandoned. Various commissions reported on the civil service, and orders in council were issued. Finally in 1855 a qualifying examination of a stringent character was instituted, and in 1870 the principle of open competition was adopted as a general rule. On the report of the Playfair Commission (1876), an order in council was issued dividing the civil service into an upper and lower division. The

order in council directed that a lower division should be constituted, and men and boy clerks holding per- manent positions replaced the temporary assistants and writers. The ” temporary ” assistant was not found to be advantageous to the service. In December 1886 a new class of assistant clerks was formed to replace the men copyists. In 1887 the Ridley Commission reported on the civil service establishment. In 1890 two orders in council were issued based on the reports of the Ridley Commission, which sat from 1886 to 1890. The first order constituted what is now known as the second division of the civil service. The second order in council concerned the officers of the 1st class, and provision was made for the possible promotion of the second division clerks to the first division after eight years' service.

The whole system is under the administration of the civil service commissioners, and power is given to them, with the approval of the treasury, to prescribe the subjects of examina- tion, limits of age, &c. The age is fixed for compulsory retire- ment at sixty-five. In exceptional cases a prolongation of five years is within the powers of the civil service commissioners: The examination for 1st class clerkships is held concurrently with that of the civil service of India and Eastern cadetships in the colonial service. Candidates can compete for all three or for two. In addition to the intellectual test the candidate must fulfil the conditions of age (22 to 24), must present re- commendations as to character, and pass a medical examination. This examination approximates closely to the university type of education. Indeed, there is little chance of success except for candidates who have had a successful university career, and frequently, in addition, special preparation by a private teacher. The subjects include the language and literature of England, France, Germany, Italy, ancient Greece and Rome, Sanskrit and Arabic, mathematics (pure and applied), natural science (chemistry, physics, zoology, &c), history (English, Greek, Roman and general modern), political economy and

economic history, mental and moral philosophy, Roman and English law and political science. The candidate is obliged to reach a certain standard of knowledge in each subject before any marks at all are allowed him. This rule was made to prevent success by mere cramming, and to ensure competent knowledge on the basis of real study.

The maximum scale of the salaries of clerks of Class I. is as follows: — 3rd class, £200 a year, increasing by £20 a year to £500; 2nd class, £600, increasing by £25 a year to £800; 1st class, £850, increasing by £50 a year to £1000. Their pensions are fixed by the Superannuation Act 1859, 22 Vict. c. 26:—

” To any person who shall have served ten years and upwards, and under eleven years, an annual allowance of ten-sixtieths of the annual salary and emoluments of his office :

” For eleven years and under twelve years, an annual allowance of eleven-sixtieths of such salary and emoluments :

” And in like manner a further addition to the annual allow- ance of one-sixtieth in respect of each additional year of such service, until the completion of a period of service of forty years, when the annual allowance of forty-sixtieths may be granted; and no ad- ditions shall be made in respect of any service beyond forty years.”

The ” ordinary annual holidays allowed to officers ” (1st class) ” shall not exceed thirty-six week-days during each of their first ten years of service and forty-eight week-days thereafter.” Order in Council, 15th August 1890.

” Within that maximum heads of departments have now, as they have hitherto had, an absolute discretion in fixing the annual leave.”

Sick leave can be granted on full salary for not more than six months, on half-salary for another six months.

The scale of salary for 2nd division clerks begins at £70 a year, increasing by £5 to £100; then £100 a year, increasing by £7, 10s. to £190; and then £190 a year, increasing by £10 to £250. The highest is £300 to £500. Advancement in the 2nd division to the higher ranks depends on merit, not seniority. The ordinary annual holiday of the 2nd division clerks is 14 working days for the first five years, and 21 working days afterwards. They can be allowed sick leave for six months on full pay and six months on half pay. The subjects of their examination are: (1) hand writing and orthography, including copying MS.; (2) arithmetic;

(3) English composition; (4) precis, including indexing and digest of returns; (5) book-keeping and shorthand writing; (6) geo- graphy and English history; (7) Latin; (8) French; (9) Ger- man; (10) elementary mathematics; (11) inorganic chemistry with elements of physics. Not more than four of the subjects

(4) to (n) can be taken. The candidate must be between the ages of 17 and 20. A certain number of the places in the 2nd division were reserved for the candidates from the boy clerks appointed under the old system. The competition is severe, only about one out of every ten candidates being successful. Candi- dates are allowed a choice of departments subject to the exigencies of the services.

There is also a class of boy copyists who are almost entirely employed in London, a few in Dublin and Edinburgh, and, very seldom, in some provincial towns. The subjects of their examination are: Obligatory — handwriting and orthography, arithmetic and English composition. Optional — (any two of the following): (1) copying MS.; (2) geography; (3) English history; (4) translation from one of the following languages — Latin, French or German ;

(5) Euclid, bk. i. and ii., and algebra, up to and including simple equations; (6) rudiments of chemistry and physics. Candidates must be between the ages of 15 and 18. They have no claims to superannuation or compensation allowance. Boy copyists are not retained after the age of 20.

Candidates for the civil service of India take the same ex- amination as for 1st class clerkships. Candidates successful in the examination must subsequently spend one year in England. They receive for that year £1 50 if they elect to live at one of the universities or colleges approved by the secretary of state for India. They are submitted to a final examination in the following subjects — Indian Penal Code and the Code of Criminal Procedure, the principal vernacular language of the province to which they are assigned, the Indian Evidence Act (these three subjects are compulsory), either Hindu and Mahommedan Law, or Sanskrit, Arabic or Persian, Burmese (for Burma only). A candidate may not take Arabic or Sanskrit both in the first examination and in the final. They must also pass a thorough examination in riding.

On reaching India their salary begins at 400 rupees a month. They may take, as leave, one-fourth of the time on active service in periods strictly limited by regulation. After 25 years' service (of which 21 must be active service) they can retire on a pension of £1000 a year. The unit of administration is the district. At the head of the district is an executive officer called either collector-magistrate or deputy-commissioner. In most provinces he is responsible to the commissioner, who corresponds directly with the provincial government. The Indian civilian after four years' probation in both branches of the service is called upon to elect whether he will enter the revenue or judicial department, and this choice as a rule is held to

be final for his future work.

Candidates for the Indian Forest Service have to pass a com- petitive examination, one of the compulsory subjects being German or French. They have also to pass a severe medical examination, especially in their powers of vision and hearing. They must be between the dges of 18 and 22. Successful candidates are required to pass a three years' course, with a final examination, seven terms of the course at an approved school of forestry, the rest of the time receiving practical instruction in continental European forests. On reaching India they start as assistant conservators at 380 rupees a month. The highest salary, that of inspector-general of forests, in the Indian Forest Service is 2650 rupees a month.

The Indian Police Service is entered by a competitive examination of very much the same kind as for the forest service, except that special subjects such as German and botany are not included. The candidates are limited in age to 19 and 21. They must pass a riding examination. A free passage out is given them. They are allotted as probationers, their wishes being consulted as far as possible as to their province. A probationer receives 300 rupees a month. A district superintendent can rise to 1200 rupees a month, while there are a few posts with a salary of 3000 rupees a month in the police service. The leave and pension in both these departments follow the general rules for Indian services.

The civil service also includes student interpreterships for China, Japan and Siam, and for the Ottoman dominions, Persia, Greece and Morocco. Both these classes of student interpreters are selected by open competition. Their object is to supply the consular service in the above-named countries with persons having a thorough knowledge of the language of the country in which they serve.

In the first case, China, Japan, &c, they learn their language in the country itself, receiving £200 as probationers. Then they be- come assistants in a consulate. The highest post is that of consul- general. In the case of student interpreters for the Ottoman do- minions, Persia, Greece and Morocco, the successful candidates learn their languages at Oxford. Turkish is taught gratuitously, but they pay the usual fees for other languages. At Oxford they receive £200 a year for two years. On leaving Oxford they become assistants under the embassy at Constantinople, the legations at Teheran, Athens or Morocco, or at one of H.B.M. consulates. As assistants they receive £300 a year. The consuls, the highest post to which they can reach, receive in the Levant from £500 to £1600 a year. The civil services of Ceylon, Hong-

Kong, the Straits Settlements, and the Malay Peninsula are supplied by the Eastern cadetships. The limits of age for the examination are 18 and 24. The cadets are required to learn the native language of the colony or dependency to which they are assigned. In the case of the Straits Settlements and Malay cadets they may have to learn Chinese or Tamil, as well as the native language. The salaries are: passed cadets, 3500 rupees per annum, gradually increasing until first-class officers receive from 12,000 to 18,000 rupees per annum. They are allowed three months' vacation on full pay in two years, and leave of absence on half-pay after six years' service, or before that if urgently needed. They can retire for ill-health after ten years with fifteen-sixtieths of their annual salary. Otherwise they can add one-sixtieth of their annual salary to their pension for every additional year's service up to thirty-five years' service.

In spite of the general rule of open competition, there are still a few departments where the system of nomination obtains, accompanied by a severe test of knowledge, either active or implied. Such are the foreign office, British Museum, and board of education.

The employment of women in the civil service has been principally developed in the post office. Women are employed in the post office as female clerks, counter clerks, telegraphists, returners, sorters and post-mistresses all over the United King- dom, The board of agriculture, the customs and the India office employ women. The department of agriculture, the board of education generally, the local government board, all to a certain

extent employ women, whilst in the home office there are an increasing number of women inspectors of workshops and

factories.

In 1881 the postmaster-general took a decided step in favour of female employment, and with the consent of the treasury instituted female clerkships. Female clerks do not come in contact with the public. Their duties are purely clerical, and entirely in the account- ant-general's department at the savings bank. Their leave is One month per annum ; their pension is on the ordinary civil service scale. The examination is competitive; the subjects are hand- writing and spelling, arithmetic, English composition, geography, English history,

French or German. Candidates must be between the ages of 18 and 20. Whether unmarried or widows they must resign on marriage. The class of girl clerks take the same subjects in a competitive examination. They must be between the ages of 16 and 18; they serve only in the Savings Bank department. If competent they can pass on later to female clerkships. The salaries of the female clerkships range from £200 to £500 in the higher grade, £55 to £190 in the 2nd class, whilst girl clerks are paid from £35 to £40, with the chance of advancement to higher posts.

United States.— Civil service reform, like other great adminis- trative reforms, began in America in the latter half of the 19th century. Personal and partisan government, with all the en- tailed evils of the patronage system, culminated in Great Britain during the reign of George III., and was one of the efficient causes of the American revolution. Trevelyan characterizes the use of patronage to influence legislation, and the giving of colonial positions as sinecures to the privileged classes and personal favourites of the administration, by saying, ” It was a system which, as its one achievement of the first order, brought about the American War, and made England sick, once and for all, of the very name of personal government.” It was natural that the founders of the new government in America, after breaking away from the mother-country, should strive to avoid the evils which had in a mecsure brought about the revolution. Their intention that the administrative officers of the government should hold office during good behaviour is manifest, and was given thorough and practical effect by every administration during the first forty years of the life of the government. The constitution fixed no term of office in the executive branch of the government except those of president and vice-president; and Madison, the expounder of the constitution, held that the wanton removal of a meritorious officer was an impeachable offence. Not until nine years after the passage of the Fbur Years’ Tenure of Office Act in 1820 was there any material’ departure from this traditional policy of the government. This act (suggested by an appointing officer who wished to use the power it gave in order to secure his own nomination for the presidency, and passed without debate and apparently without any adequate conception of its full effect) opened the doors of the service to all the evils of the ” spoils system.” The foremost statesmen of the time were not slow to perceive the baleful possibilities of this legislation, Jefferson, 1 Webster, Clay, Calhoun, Benton and many others being recorded as condemning and deploring it in the strongest terms. The transition to the ” spoils system ” was not, however, immediate, and for the next nine years the practice of reappointing all meritorious officers was practically

universal; but in 1829 this practice ceased, and the act of 1820 lent the sanction of law to the system of proscriptions which followed, which was a practical application of the theory that ” to the victor belong system.” the spoils of the enemy.” In 1836 the provisions of this law, which had at first been confined mainly to officers connected with the collection of revenue, were extended to include also all postmasters receiving a compensation of f 1000 per annum or more. It rapidly became the practice to regard all these four years’ tenure offices as agencies not so much for the transaction of the public business as for the advancement of political ends. The revenue service from being used for political purposes merely came to be used for corrupt purposes as well, with the result that in one administration frauds were practised upon the government to the extent of $7 5,000,000. The corrupt- 1 See letter to Monroe, November 29th, 1820, Jefferson’s Writings, vii. 190. A quotation from this letter is given at p. 454 of the Fifteenth Report of the U.S. Civil Service Commission.

The “spoils

ing influences permeated the whole body politic. Political re- tainers were selected for appointment not on account of their ability to do certain work but because they were followers of certain politicians; these ” public servants ” acknowledged no obligation except to those politicians, and their public duties, if not entirely disregarded, were negligently and inefficiently performed. Thus grew a saturnalia of spoils and corruption which culminated in the assassination of a president.

Acute conditions, not theories, give rise to reforms. In the congressional election of November 1882, following the assassination of President Garfield as an incident in the operaˆ tion of the spoils system, the voice of the people commanding reform was unmistakable. Congress assembled in December 1882, and during the same month a bill looking to the improvement of the civil service, which had been pending in the Senate for nearly two years, was finally taken up and considered by that body. In the debate upon this bill its advocates declared that it would ” vastly improve the whole civil service of the country,” which they characterized as being at that time ” inefficient, expensive and extravagant, and in many instances corrupt.” 2 This bill passed the Senate on the 27th of December

1882, and the House on the 4th of January 1883, and ˆ£ 0/ was signed by the president on the 16th of January

1883, coming into full operation on the 16th of July 1883. It is now

the national civil service law. The fundamental prin- ciples of this law are: — (1) selection by competitive examina- tion for all appointments to the ” classified service,” with a period of probationary service before absolute appointment; (2) apportionment among the states and territories, according to population, of all appointments in the departmental service at Washington; (3) freedom of all the employees of the govern- ment from any necessity to contribute to political campaign funds or to render political services. For putting these principles into effect the Civil Service Commission was created, and penalties were imposed for the solicitation or collection from government employees of contributions for political purposes, and for the use of official positions in coercing political action. The com- mission, in addition to its regular duties of aiding in the prepara- tion of civil service rules, of regulating and holding examinations, and certifying the results thereof for use in making appointments, and of keeping records of all changes in the service, was given authority to investigate and report upon any violations of the act or rules. The “classified ” service to which the act applies has grown, by the action of successive presidents in progressively including various branches of trie service within it, from 13,924 positions in 1883 to some 80,000 (in round numbers) in 1900, constituting about 40 % of the entire civil service of the govern- ment and including practically all positions above the grade of mere labourer or workman to which appointment is not made directly by the president with the consent of the Senate. 3 A very large class to which the act is expressly applicable, and which has been partly brought within its provisions by executive action, is that of fourth-class postmasters, of whom there are between 70,000 and 80,000 (about 15,00© classified in 1909).

In order to provide registers of eligibles for the various grades of positions in the classified service, the United States Civil Service Commission holds annually throughout the country about 300 different kinds of examinations. In the work of preparing these examinations and of marking the papers of competitors in them the commission is authorized by law to avail itself, in addition to its own corps of trained men, of the services of the scientific and other experts in the various executive departments. In the work of holding the examina- tions it is aided by about 1300 local boards of examiners, which are its local representatives throughout the country and are

J See Senate Report No. $76, 47th Congress, 1st session; also U.S. Civil Service Commission’s Third Report, p. 16 et seq., Tenth Report, pp. 136, 137, and Fifteenth Report, pp. 483, 484.

3 The progressive classification of the executive civil service, showing the growth of the merit system, is discussed, with statistics, in the U.S. Civil Service Commission's Sixteenth Report, pp. 129-137. A revision of this discussion, with important additions, appears" in the Seventeenth Report.

located at the principal post offices, custom houses and other government offices, being composed of three or more Federal employees in those offices. About 50,000 persons annually compete in these examinations, and about 10,000 of those who are successful receive appointments through regular certification. Persons thus appointed, however, must serve six months " on probation " before their appointment can be made absolute. At the end of this probation, if his service has not been satis- factory, the appointee is simply dropped; and the fact that less than 1 % of those appointed prove thus deficient on trial is high testimony to the practical nature of the examinations held by the commission, and to their aptness for securing persons qualified for all classes of positions.

The effects of the Civil Service Act within the scope of its actual operation have amply justified the hopes and promises of its advocates. After its passage, absentee holders of lucrative appointments were required to report for duty or to sever their connexion with the service. Improved methods were adopted in the departments, and superfluous and useless work was no longer devised in order to provide a show of employment and a locus standi for the parasites upon the public service. Individual clerks were required, and by reason of the new conditions were enabled, to do more and better work; and this, coupled with the increase in efficiency in the service on aqp ount of new blood coming in through the examinations, made possible an actual decrease in the force required in many offices, notwithstanding the natural growth in the amount of work to be done. 1 Ex- perience proves that the desire to create new and unnecessary positions was in direct proportion to the power to control them, for where the act has taken away this power of control the desire had disappeared naturally. There is no longer any desire on the part of heads of departments to increase the number or salaries of classified positions which would fall by law within the civil service rules and be subject to competitive examinations. Thus the promises of improvement and economy in the service have been fulfilled.

The chief drawback to the full success of the act within its intended scope of operation has been the withholding of certain positions in the service from the application of the vital principle of competition. The Civil Service Act contem- plated no exceptions, within the limits to which it was made applicable, to the general principle of competition upon merit for entrance to the service. In framing the first civil service rules, however, in 1883, the president, yielding to the pressure of the heads of some of the departments, and against the urgent protest of the Civil Service Commission, excepted from the requirement of examination large numbers of positions in the higher grades of the service, chiefly fiduciary and administrative positions such as cashiers, chief clerks and chiefs of division. These positions being thus continued under the absolute control of the appointing officer, the effect of their exception from examination was to retain just that much of the old or " spoils " system within the nominal jurisdiction of the new or " merit " system. Even more: under the old system, while appointments from the outside had been made regardless of fitness, still those appointments had been made in the lower grades, the higher positions being filled by promotion within the service, usually of the most competent, but under the new system with its exceptions, while appointments to the lower grades were filled on the basis of merit, the pressure for spoils at each change of administration forced inexperienced, political or personal favourites in at the top. This blocked promotions and demoralized the service. Thus, while the general effect of the act was to limit very greatly the number of vicious appointments, at the same time the effect of these exceptions was to confine them to the upper grades, where the demoralizing effect of each upon the service would be a maximum. By constant efforts the Civil Service Commission succeeded in having position after position withdrawn from this excepted class, until by the action of the president, on the 6th of May 1896, it was finally reduced almost to a minimum. By subsequent

1 For details justifying these statements, see U.S. Civil Service Commission's Fourteenth Report, pp. 12-14.

presidential action, however, on the 29th of May 1899, the excepted class was again greatly extended. 2

A further obstacle to the complete success of the merit system, and one which prevents the carrying forward of the reform to the extent to which it has been carried in Great Britain, is inherent in the Civil Service Act itself. All postmasters who receive compensation of $1000 or more per annum, and all collectors of customs and collectors of internal revenue, are appointed by the president and confirmed by the

Senate, and are therefore, by express provision of the act, not ” required to be classified.” The universal practice of treating these offices as political agencies instead of as administrative business offices is therefore not limited by the act. Such officers are active in political work throughout the country, and their official position adds greatly to their power to affect the political prospects of the leaders in their districts. Accordingly the Senate, from being, as originally intended, merely a confirming body as to these officers, has become in a large measure, actually if not formally, a nominating body, and holds with tenacity to the power thus acquired by the individual senators. Thorough civil service reform requires that these positions also, and all those of fourth-class postmasters (partly classified by order of 1st Dec. 1908), be made subject to the merit system, for in them is the real remaining stronghold of the spoils system. Even though all their subordinates be appointed through examination, it will be impossible to carry the reform to ultimate and complete success so long as the officers in charge are appointed mainly for political reasons and are changed with every change of administration.

The purpose of the act to protect the individual employees in the service from the rapacity of the ” political barons ” has been measurably, if not completely, successful. The power given the Civil Service Commission, to investigate and report upon violations of the law, has been used to bring to light such abuses as the- levying of political contributions, and to set the machinery of the law in motion against them. While compara- tively few actual prosecutions have been brought about, and although the penalties imposed by the act for this offence have been but seldom inflicted, still the publicity given to all such cases by the commission’s investigations has had a wholesome deterrent effect. Before the passage of the act, positions were as a general rule held upon a well-understood lease- tenure, the political contributions for them being as securely and as certainly collected as any rent. Now, however, it can be said that these forced contributions have almost entirely disappeared. The efforts which are still made to collect political funds from govern- ment employees in evasion of the law are limited in the main to persuasion to make ” voluntary ” contributions, and it has been possible so to limit and obstruct these efforts that their practical effect upon the character of the service is now very small.

The same evils that the Federal Civil Service Act was designed to remedy exist to a large degree in many of the state govern- ments, and are especially aggravated in the administra- tion of the local governments of some of the larger state . cities. The chief, if not the

only, test of fitness for tlom office in many cases has been partly loyalty, honesty and capacity being seldom more than secondary considerations. The result has been the fostering of dishonesty and extravagance, which have brought weakness and gross corruption into the administration of the local governments. In consequence of this there has been a constantly growing tendency, among the more intelligent class of citizens, to demand that honest business methods be applied to local public service, and that appointments be made on the basis of intelligence and capacity, rather than of party allegiance. The movement for the reform of the civil service of cities is going hand in hand with the movement for general municipal reform, those reformers regarding the merit

2 For the scope of these exceptions, see Civil Service Rule VI., at p. 57 of the U.S. Civil Service Commission's Fifteenth and Sixteenth Reports. A statement of the number of positions actually affected by this action of the president appears in the Seventeenth Report.

system of appointments as not merely the necessary and only safe bulwark to preserve the results of their labours, but also as the most efficient means for bringing about other reforms. Hence civil service reform is given a leading position in all programmes for the reform of state and municipal governments. This has undoubtedly been due, in the first instance, at least, to the success which attended the application of the merit system to the Federal service, municipal and state legislation following in the wake of the national civil service law. In New York an act similar to the Federal Civil Service Act was passed on the 4th of May 1883, and in 1894 the principles of the merit system were introduced by an amendment into the state constitution, and made applicable to cities and villages as well. In Massa- chusetts an act was passed on the 3rd of June 1884 which in its general features was based upon the Federal act and the New York act. Similar laws were passed in Illinois and Wisconsin in 1895, and in New Jersey in 1008; the laws provide for the adoption of the merit system in state and municipal govern- ment. In New Orleans, La., and in Seattle, Wash., the merit system was introduced by an amendment to the city charter in 1896. The same result was accomplished by New Haven, Conn., in 1897, and by San Francisco, Cal., in 1899. In still other cities the principles of the merit system have been enacted into law, in some cases applying to the entire service and in others to only a part of it.

The application of the merit system to state and municipal governments has proved successful wherever it has been given a fair trial. 1 As experience has fostered public confidence in the system, and at the same time shown those features of the law which are most vulnerable, and the best means for fortifying them, numerous and important improvements upon the pioneer act applying to the Federal service have been introduced in the more recent legislation. This is particularly true of the acts now in force in New York (passed in 1899) and in Chicago. The power of the commission to enforce these acts is materially greater than the power possessed by the Federal commission. In making investigations they are not confined to taking the testimony of voluntary witnesses, but may administer oaths, and compel testimony and the production of books and papers where necessary; and in taking action they are not confined to the making of a report of the findings in their investigations, but may themselves, in many cases, take final judicial action. Further than- this, the payment of salaries is made dependent upon the certificate of the commission that the appointments of the recipients were made in accordance with the civil service law and rules. Thus these commissions have absolute power to prevent irregular or illegal appointments by refractory appointing officers. Their powers being so much greater than those of the national commission, their action can be much more drastic in most cases, and they can go more directly to the heart of an existing abuse, and apply more quickly and effectually the needed remedy.

Upon the termination of the Spanish-American War, the necessity for the extension of the principles of the merit system to the new territories, the responsibility for whose government the results of this war had thrown upon the United States, was realized. By the acts providing for civil government in Porto Rico (April 12th, 1900) and Hawaii (April 30th, 1900), the provisions of the Civil Service Act and Rules were applied to those islands. Under this legislation the classification applies to all positions which are analogous to positions in the Federal service, those which correspond to positions in the municipal and state governments being considered as local in character, and not included in the classification.

On the 19th of September 1900 the United States Philippine Commission passed an act ” for the establishment and mainten- ance of an efficient and honest civil service in the Philippine Islands.” This act, in its general features, is based upon the national civil service law, but includes also a number of the

1 In the U. S. Civil Service Commission’s Fifteenth Report, pp. 489-502, the ” growth of the civil service reform in states and cities” is

historically treated, briefly, but with some thoroughness.

stronger points to be found in the state and municipal law mentioned above. Among these are the power given the civil service board to administer oaths, summon witnesses, and require the production of official records; and the power to stop pay- ment of salaries to persons illegally appointed. Promotions are determined by competitive examinations, and are made through- out the service, as there are no excepted positions. A just right of preference in local appointments is given to natives. The president of the Philippine commission in introducing this bill said: ” The purpose of the United- States government . . . in these islands is to secure for the Filipino people as honest and as efficient a government as may be possible. ... It is the hope of the commission to make it possible for one entering the lowest ranks to reach the highest, under a tenure based solely upon merit.” Judging by past experience it is believed that this law is well adapted to accomplish the purpose above stated.

For fuller information upon the details of the present workings of the merit system in the Federal service, recourse should be had to the publications of the U.S. Civil Service Commission, which are to be found in the public libraries in all the principal cities in the United States, or which may be had free of charge upon application to the commission. The Manual of Examinations, published semi- annually, gives full information as to the character of the examina- tions held by the commission, together with the schedule of dates and places for the holding of those examinations. The Annual Reports of the commission contain full statistics of the results of its work, together with comprehensive statements as to the difficulties encountered in enforcing the law, and the means used to overcome them. In the Fifteenth Report, pp. 443-485, will be found a very valuable historical compilation from original sources, upon the ” practice of the presidents in appointments and removals in the executive civil service, from 1789 to 1883.” In the same report, pp. 511-517, is a somewhat comprehensive bibliography of “civil service ” in periodical literature in the 19th century, brought down to the end of 1898. See also C. R. Fish, The Civil Service and the Patronage (New York, 1905).

In most European countries the civil service is recruited on much the same lines as in the United Kingdom and the United States, that is, either by examination or by nomination or by both. In some cases the examination is purely competitive, in other cases, as in France, holders of university degrees get special privileges, such as being put at the head of the list, or going up a certain number of places; or, as in Germany, many departmental posts are filled by nomination,

combined with the results of general examinations, either at school or university. In the publications of the United States Department of Labour and Commerce for 1904-1905 will be found brief details of the systems adopted by the various foreign countries for appointing their civil service employees.

CIVITA CASTELLANA (anc. Falerii, q.v.), a town and episcopal see of the province of Rome, 45 m. by rail from the city of Rome (the station is 5 m. N.E. of the town). Population (1901) 5265. The cathedral of S. Maria possesses a fine portico, erected in 1 2 10 by Laurentius Romanus, his son Jacobus and his grandson Cosmas, in the cosmatesque style, with ancient columns and mosaic decorations: the interior was modernized in the 18th century, but has some fragments of cosmatesque ornamentation. The citadel was erected by Pope Alexander VI. from the designs of Antonio da Sangallo the elder, and enlarged by Julius II. and Leo X. The lofty bridge by which the town is approached belongs to the 18th century. Mount Soracte lies about 6 m. to the south-east.

CIVITA VECCHIA, a seaport town and episcopal see of Italy, in the province of Rome, 50 m. N.W. by rail and 35 m. direct from the city of Rome. Pop. (1871)8143; (1901) 17,589. It is the ancient Centum Cellae, founded by Trajan. Interesting descriptions of it are given by Pliny the Younger (Epist. vi. 31) and Rutilius Namat. i. 237. The modern harbour works rest on the ancient foundations, and near it the cemetery of detach- ments of the Classes Misenensis and Ravennas has been found (Corp. Inscr. Lot. vol. xi., Berlin, 1888, pp. 3520 seq.). Remains of an aqueduct and other Roman buildings are preserved; the imperial family had a villa here. Procopius mentions it in the 6th century as a strong and populous place, but it was destroyed in 813 by the Saracens. Leo IV. erected a new city for the inhabitants on the site where they had taken refuge, about 8 m. N.N.E. of Civita Vecchia towards the hills, near La Farnesina, where its ruins may still be seen; the city walls and some of the streets ‘and buildings may be traced, and an inscription

(which must have stood over one of the city gates) recording its foundation has been discovered. It continued to exist under the name Cencelle as a feudal castle until the 15th century. In the meantime, however, the inhabitants returned to the old town by the shore in 889 and rebuilt it, giving it the name Civitas Vetus, the modern Civita

Vecchia (see O. Marucchi in Nuovo Bullettino di archeologia cristiana, vi., 1900, p. 195 seq.). In 1508 Pope Julius II. began the construction of the castle from the designs of Bramante, Michelangelo being responsible for the addition of the central tower. It is considered by Burck- hardt the finest building of its kind. Pius IV. added a convict prison. The arsenal was built by Alexander VII. and designed by Bernini. Civita Vecchia was the chief port of the Papal State and has still a considerable trade. There are cement factories in the town, and calcium carbide is an important article of export. The principal imports are coal, cattle for the home markets, and fire-bricks from the United Kingdom. Three miles N.E. were the Aquae Tauri, warm springs, now known as Bagni della F errata: considerable remains of the Roman baths are still preserved. About 1 m. W. of these are other hot springs, those of the Ficoncella, also known in Roman times.

CLACKMANNAN, the county town of Clackmannanshire, Scotland. Pop. 1505- It lies near the north bank of the Forth, 2 m. E. of Alloa, with two stations on the North British railway. Among the public buildings are the parish church, the tower of which, standing on a commanding eminence, is a conspicuous landmark. Clackmannan Tower is now a picturesque ruin, but at one time played an important part in Scottish history, and was the seat of a lineal descendant of the Bruce family after the failure of the male line. The old market cross still exists, and close to it stands the stone that gives the town its name (Gaelic, clach, stone; Manann, the name of the district). A large spinning-mill and coalpits lend a modern touch in singular contrast with the quaint, old-world aspect of the place. About 1 m. to the S.E. is Kennet House, the seat of Lord Balfour of Burleigh, another member of the Bruce family.

CLACKMANNANSHIRE, the smallest county in Scotland, bounded S.W. by the Forth, W. by Stirlingshire, N.N.E. and N.W. by Perthshire, and E. by Fifeshire. It has an area of 35,160 acres, or about 55 sq. m. An elevated ridge starting on the west, runs through the middle of the county, widening gradually till it reaches the eastern boundary, and skirting the alluvial or carse lands in the valleys of the Forth and Devon. Still farther to the N. the Ochil hills form a picturesque feature in the landscape, having their generally verdant surface broken by bold projecting rocks and deeply indented ravines. The principal summits are within the limits of the shire, among them Ben Cleuch (2363 ft.), King’s Seat (2111 ft.), Whitewisp (2110 ft.), the Law (above Tillicoultry, 2094 ft.) and Blairdenon (2072 ft.), on the northern slope, in which the river Devon takes its rise. The rivers of importance are the Devon and the Black or South Devon. The former, noted in the upper parts for its romantic scenery and its excellent trout-fishing,

runs through the county near the base of the Ochils, and falls into the Forth at the village of Cambus, after a winding course of 33 m., although as the crow flies its source is only 5j m. distant. The Black Devon, rising in the Cleish Hills, flows westwards in a direction nearly parallel to that of the Devon, and falls into the Forth near Clackmannan. It supplies motive power to numbers of mills and collieries; and its whole course is over coal strata. The Forth is navigable as far as it forms the boundary of the county, and ships of 500 tons burden run up as far as Alloa. The only lake is Gartmorn, 1 m. long by about § of a mile broad, which has been dammed in order to furnish water to Alloa and power to mills. The Ochils are noted for the number of their glens. Though these are mostly small, they are well wooded and picturesque, and those at Menstrie, Alva, Tillicoultry and Dollar are particularly beautiful.

Geology. — This county is divided geologically into two areas, the boundary line skirting the southern margin of the Ochils and running westwards from a point north of Dollar by Alva in the direction of Airthrev in Stirlingshire. The northern portion forms part of the

volcanic range of the Ochils which belongs to the Old Red Sandstone period, and consists of a great succession of lavas — basalts and andesites — with intercalations of tuff and agglomerate. As the rocks dip gently towards the north and form the highest ground in the county they must reach a great thickness. They are pierced by small intrusive masses of diorite, north of Tillicoultry House. The weil-marked feature running E. and W. along the southern base of the Ochils indicates a line of fault or dislocation which abruptly truncates the Lower Old Red volcanic rocks and brings down an important development of Carboniferous strata occupying the southern part of the county. These belong mainly to the Coal- measures and comprise a number of valuable coal-seams which have been extensively worked. The Clackmannan field is the northern continuation of the great Lanarkshire basin which extends northwards by Slamannan, Falkirk and the Carron Ironworks to Alloa. Along the eastern margin between Cairnmuir and Bruce- field the underlying Millstone Grit, consisting mainly of false- bedded sandstones, comes to the surface. Close to the river Devon south of Dollar the Vicars Bridge Limestone, which there marks the top of the Carboniferous Limestone series, rises from beneath the Millstone Grit. The structure of the Clackmannan field is interesting. The strata are arranged in synclinal form, the highest seams being found near the Devon ironworks, and they are traversed by a series of parallel east and west faults each with a downthrow to the south, whereby the coals are repeated and the field extended. During mining operations evidence has been obtained of the existence

of a buried river-channel, filled with boulder clay and stratified deposits along the course of the Devon, which extends below the present sea-level and points to greater elevation of the land in pre-glacial time. An excellent example of a dolerite dyke trending slightly north of west occurs in the north part of the county where it traverses the volcanic rocks of Lower Old Red Sandstone age.

Industries. — The soil is generally productive and well culti- vated, though the greater part of the elevated range which is interposed between the carse lands on the Forth and the vale of Devon at the base of the Ochils on the north consists of inferior soils, often lying upon an impervious clay. Oats are the chief crop, but wheat and barley are profitably grown. Sheep- farming is successfully pursued, the Ochils affording excellent pasturage, and cattle, pigs and horses are also raised. There is ‘ a small tract of moorland in the east, called the Forest, bounded on its northern margin by the Black Devon. Iron-ore (haema- tite), copper, silver, lead, cobalt and arsenic have all been discovered in small quantity in the Ochils, between Alva and Dollar. Ironstone — found either in beds, or in oblate balls embedded in slaty clay, and yielded from 25 to 30 % of iron — is mined for the Devon iron-works, near Clackmannan. Coal has been mined for a long period. The strata which compose the field are varieties of sandstone, shale, fire-clay and argillaceous ironstone. There is a heavy continuous output of coal at the mines at Sauchie, Fishcross, Coalsnaughton, Devonside, Clack- mannan and other pits. The spinning-mills at Alloa, Tillicoultry and Alva are always busy, Alloa yarns and fingering being widely famous. The distilleries at Glenochil and Carsebridge and the breweries in Alloa and Cambus do a large export business. The minor trades include glass-blowing, pottery, coopering, tanning, iron-founding, electrical apparatus making, ship- building and paper-making.

The north British railway serves the whole county, while the Caledonian has access to Alloa.

Population and Government. — The population was 33,140 in 1891 and 32,029 in 1901, when 170 persons spoke Gaelic and English and one person Gaelic only. The county unites with Kinross-shire in returning one member to parliament. Clack- ‘ mannan (pop. 1505) is the county town, but Alloa (14,458), Alva (4624), and Tillicoultry (3338) take precedence in popula- tion and trade. Menstrie (pop. 898) near Alloa has a large furniture factory and the great distillery of Glenochil. To the north-east of Alloa is the thriving mining village of Sauchie. Clackmannan forms a sheriffdom with Stirling and Dumbarton shires, and a sheriff-substitute sits at Alloa. Most of the

schools in the shire are under school-board control, but there are a few voluntary schools, besides an exceptionally well-equipped technical school in Alloa and a well-known academy at Dollar.

See James Wallace, The Sheriffdom of Clackmannan: a Sketch of its History (Edinburgh, 1890); D. Beveridge, Between the Ochils and the Forth (Edinburgh, 1888); John Crawford. Memorials of Alloa (1885); William Gibson, Reminiscences of Dollar, Tillicoultry,

CLACTON-ON-SEA, a watering-place in the Harwich parlia- mentary division of Essex, England; 71 m. E.N.E. from London by a branch from Colchester of the Great Eastern railway; served also by steamers from London in the summer months. Pop. of urban district (1001) 7456. Clay cliffs of slight altitude rise from the sandy beach and face south-eastward. In the neighbourhood, however, marshes fringe the shore. The church of Great Clacton, at the village ij m. inland, is Norman and later, and of considerable interest. Clacton is provided with a pier, promenade and marine parade; and is the seat of various convalescent and other homes.

CLADEL, LEON (1835-1892), French novelist, was born at Montauban (Tarn-et-Garonne) on the 13th of March 1835. The son of an artisan, he studied law at Toulouse and became a solicitor's clerk in Paris. He made a reputation in a limited circle by his first book, Les Martyrs ridicules (1862), a novel for which Charles Baudelaire, whose literary disciple Cladel was, wrote a preface. He then returned to his native district of Quercy, where he produced a series of pictures of peasant life in Eral le dompteur (1865), Le Nommi Qouael (1868) and other volumes. Returning to Paris he published the two novels which are generally acknowledged as his best work, Le Bouscassie (1869) and La FUe votive de Saint BartholomSe Porte-glaive (1872). Une Maudite (1876) was judged dangerous to the public morals and cost its author a month's imprisonment. Other works by Cladel are Les Va-nu-pieds (1873), a volume of short stories; N'a qu'un mil (1882), Urbains et ruraux (1884), Gueux de marque (1887), and the posthumous Juive errante (1897). He died at Sevres on the 20th of July 1892.

See La Vie de Leon Cladel (Paris, 1905), by his daughter Judith Cladel, containing also an article on Cladel by Edmond Picard, a complete listof his works, and of the critical articles on his work.

CLAFLIN, HORACE BRIGHAM (1811-1885), American merchant, was born in Milford, Massachusetts, on the 18th of December 181 1. He was educated at Milford Academy, became a clerk in his father's store in Milford, and in 1831, with his brother Aaron and his brother-in-law Samuel Daniels, succeeded to his father's business. In 1832 the firm opened a branch store in Worcester, Mass., and in 1833 Horace B. Claflin and Daniels secured the sole control of this establishment and restricted their dealing to dry goods. In 1843 Claflin removed to New York City and became a member of the firm of Bulkley & Claflin, whosesale dry goods merchants. In 1851 and in 1864 the firm was reorganized, being designated in these respective years as Claflin, Mellin & Company and H. B. Claflin & Company. Under Claflin's management the business increased so rapidly that the sales for a time after 1865 probably exceeded those of any other mercantile house in the world. Though the firm was temporarily -embarrassed at the beginning of the Civil War, on account of its large business interests in the South, and during the financial panic of 1873, the promptness with which Mr Claflin met these crises and paid every dollar of his liabilities greatly increased his reputation for business ability and integrity. He died at Fordham, New York, on the 14th of November 1885.

CLAIRAULT (or Clairaut), ALEXIS CLAUDE (1713-1765), French mathematician, was born on the 13th or 7th of May 1713, at Paris, where his father was a teacher of mathematics. Under his father's tuition he made such rapid progress in mathematical studies that in his thirteenth year he read before the French Academy an account of the properties of four curves which he had then discovered. When only sixteen he finished a treatise, Recherches sur les courbes a double courbure, which, on its publica- tion in 1 731, procured his admission into the Academy of Sciences, although even then he was below the legal age. In 1736, together with Pierre Louis Maupertuis, he took part in the expedition to Lapland, which was undertaken for the purpose of estimating a degree of the meridian, and on his return he published his treatise Theorie de la figure de la terre (1743). In this work he promulgated the theorem, known as " Clairault's theorem," which connects the gravity at points on the surface of a rotating ellipsoid with the compression and the centrifugal force at the equator (see Earth, Figure or the). He obtained

an ingenious approximate solution of the problem of the three bodies; in 1750 he gained the prize of the St Petersburg Academy for his essay Thiorie de la lune; and in 1759 he calculated the perihelion of Halley's comet. He also detected singular solutions in differential equations of the first order, and of the second and higher degrees. Clairault died at

Paris, on the 17th of May 1765.

CLAIRON, LA (1723-1803), French actress, whose real name was Claire Joseph Hippolyte Leris, was born at Conde sur l'Escaut, Hainaut, on the 25th of January 1723, the natural daughter of any army sergeant. In 1736 she made her first stage appearance at the Comedie Italienne, in a small part in Marivaux's lie des esclaves. After several years in the provinces she returned to Paris. Her life, meanwhile, had been decidedly irregular, even if not to the degree indicated by the libellous pamphlet Histoire de la demoiselle Cronel, dite PrUillon, actrice de la Comedie de Rouen, ecrite par elle-mlme (The Hague, 1746), or to be inferred from the disingenuousness of her own Memoir es d 'Hippolyte Clairon (1798); and she had great difficulty in obtaining an order to make her debut at the Comedie Francaise. Succeeding, however, at last, she had the courage to select the title-r61e of Phedre (174s), and she obtained a veritable triumph. During her twenty-two years at this theatre, dividing the honours with her rival Mile Dumesnil, she filled many of the classical r61es of tragedy, and created a great number of parts in the plays of Voltaire, Marmontel, Saurin, de Belloy and others. She retired in 1766, and trained pupils for the stage, among them Mile Raucourt. Goldsmith called Mile Clairon " the most perfect female figure I have ever seen on any stage " (The Bee, 2nd No.) ; and Garrick, wMle recognizing her unwillingness or inability to make use of the inspiration of the instant, admitted that " she has everything that art and a good understanding with great natural spirit can give her."

CLAIRVAUX, a village of north-eastern France, in the depart- ment of Aube, 40 m. E.S.E. of Troyes on the Eastern railway to Belfort. Clairvaux (Clara Vallis) is situated in the valley of the Aube on the eastern border of the Forest of Clairvaux. Its celebrity is due to the abbey founded in n 15 by St Bernard, which became the centre of the Cistercian order. The buildings (see Abbey) belong for the most part to the 18th century, but there is a large storehouse which dates from the 12th century. The abbey, suppressed at the Revolution, now serves as a prison, containing on an average 800 inmates, who are employed in agricultural and industrial occupations. Clairvaux has iron- works of some importance.

CLAIRVOYANCE (Fr. for " clear-seeing "), a technical term in psychical research, properly equivalent to lucidity, a super- normal power of obtaining knowledge in which no part is played by (a) the ordinary processes of sense-perception or (b) super- normal communication with other intelligences, incarnate, or discarnate. The word is also used, sometimes qualified by the word telepathic, to

mean the power of gaining supernormal knowledge from the mind of another (see Telepathy). It is further commonly used by spiritualists to mean the power of seeing spirit forms, or, more vaguely, of discovering facts by some supernormal means.

Lucidity. — Few experiments have been made to test the existence of this faculty. If communications from discarnate minds are regarded as possible, there are no means of distinguish- ing facts obtained in this way from facts obtained by independent clairvoyance. In practice no evidence has been obtained pointing to the possession by a discarnate spirit of knowledge not possessed by any living person (see Medium) . As explanation of the few successful experiments in independent clairvoyance we have the choice of three explanations: (1) lucidity; (2) telepathy from living persons; (3) hyper? esthesia. The second possibility was overlooked in Richet's diagram experiments; it cannot be assumed that a picture put into an envelope and not consciously recalled has been in reality forgotten. Similarly the clairvoyant diagnosis of diseases may depend on knowledge gained tele- pathically from the patient, who may be subliminally aware of diseased states of the body. The most elaborate experiments are by Prof. Richet with a hypnotized subject who succeeded in

naming twelve cards out of sixty-eight. But no precautions were taken against hyperaesthesia further than enclosing the card in a second envelope. There is a power possessed by a certain number of people, of naming a card drawn by them or held in the hand face downwards, so that there is no normal knowledge of its suit and number. Few thorough trials have been made; but it seems to point to some kind of hyperaesthesia rather than to clair- voyance; in the Richet experiments even if the envelopes excluded hyperaesthesia of touch on the part of the medium, there may have been subliminal knowledge on Prof. Richet's part of the card which he put in the envelope. The experience known as the deja vu has sometimes been explained as due to clairvoyance.

Telepathic Clairvoyance. — For a discussion of this see Tele- pathy and Crystal-gazing. It may be noted here that some curious relation seems to exist between apparently telepathic acquisition of knowledge and the arrival of a letter, newspaper, &c, from which the same knowledge could be directly gained. We are confronted with a similar problem in attempting an explanation of the power of mediums to

state correctly facts relating to objects placed in their hands. Of a somewhat different character is retrocognition {q.v.), where the knowledge in many cases, if telepathic, must be derived from a discarnate mind.

Clairvoyance, as a term of spiritualism, with its correlative clair audience, is the name given to the power of seeing and hearing discarnate spirits of dead relatives and others, with whom the living are said to be surrounded. More vaguely it includes the power of gaining knowledge, either through the spirit world or by means of psychometry {i.e. the supernormal acquisition of knowledge about owners of objects, writers of letters, &c). Some evidence for these latter powers has been accumulated by the Society for Psychical Research, but in many cases the piecing together of normally acquired knowledge, together with shrewd guessing, suffices to explain the facts, especially where the investigator has had no special training for his task.

See Richet, Experimentelle Studien (1891); also in Proc. S.P.R. vi. 66. For a criticism see N. W. Thomas, Thought Transference, pp. 44-48. For Clairvoyance in general see F. W. H. Myers, Human Personality, and in Proc. S.P.R. xi. 334 et seq. For a criticism of the evidence see Mrs Sidgwick in Proc. S.P.R. vii. 30, 356. (N. W. T.)

CLAMECY, a town of central France, capital of an arrondisse- ment in the department of Nievre, at the confluence of the Yonne and Beuvron and on the Canal du Nivernais, 46 m. N.N.E. of Nevers on the Paris-Lyon railway. Pop. (1906) 4455. Its principal building is the church of St Martin, which dates chiefly from the 13th, 14th and 15th centuries. The tower and facade are of the 16th century. The chevet, which is surrounded by an aisle, is rectangular — a feature found in few French churches. Of the old castle of the counts of Nevers, vaulted cellars alone remain. A church in the suburb of Bethlehem, dating from the 1 2th and 13th centuries, now serves as part of an hotel. The public institutions include the sub-prefecture, tribunals of first instance and of commerce and a communal college. Among the industrial establishments are saw-mills, fulling-mills and Hour- mills, tanneries and manufactories of boots and shoes and chemicals; and there is considerable trade in wine and cattle and in wood and charcoal, which is conveyed principally to Paris, by way of the Yonne.

In the early middle ages Clamecy belonged to the abbey of St Julian at Auxerre; in the nth century it passed to the counts of Nevers, one of whom, Herve, enfranchised the inhabitants in 1 2 13. After the capture of Jerusalem by Saladin in 1188, Clamecy became the seat of

the bishops of Bethlehem, who till the Revolution resided in the hospital of Panthenor, bequeathed by William IV., count of Nevers. On the coup d'Stat of r8si an insurrection broke out in the town, and was repressed by the new authorities with great severity.

CLAN (Gaelic clann, O. Ir. eland, connected with Lat. planta, shoot or scion, the ancient Gaelic or Goidelic substituting k for p) , a group of people united by common blood, and usually settled in a common habitat. The clan system existed in Ireland and the Highlands of Scotland from early times. In its strictest sense the

system was peculiar to those countries, but, in its wider meaning of a group of kinsmen forming a self-governing community, the system as represented by the village community has been shown by Sir H. Maine and others to have existed at one time or another in all lands.

Before the use of surnames and elaborate written genealogies, a tribe in its definite sense was called in Celtic a tuath, a word of wide affinities, from a root tu, to grow, to multiply, existing in all European languages. When the tribal system began to be broken up by conquest and by the rise of towns and of terri- torial government, the use of a common surname furnished a new bond for keeping up a connexion between kindred. The head of a tribe or smaller group of kindred selected some ancestor and called himself his Ua, grandson, or as it has been anglicized O', e.g. Ua Conchobair (O' Conor), Ua Suilleabhain (O'Sullivan). All his kindred adopted the same name, the chief using no fore-name however. The usual mode of distinguishing a person before the introduction of surnames was to name his father and grandfather, e.g. Owen, son of Donal, son of Dermot. This naturally led some to form their surnames with Mac, son, instead of Ua, grandson, e.g. Mac Carlhaigh, son of Carthach (Mac Carthy) , Mac Ruaidhri, son of Rory (Macrory). Both methods have been followed in Ireland, but in Scotland Mac came to be exclusively used. The adoption of such genealogical surnames fostered the notion that all who bore the same surname were kinsmen, and hence the genealogical term clann, which properly means the descendants of some progenitor, gradually became synonymous with tuath, tribe. Like all purely genealogical terms, clann may be used in the limited sense of a particular tribe governed by a chief, or in that of many tribes claiming descent from a common ancestor. In the latter sense it was synonymous with sil, siol, seed e.g. Siol Alpine,- a great clan which included the smaller clans of the Macgregors, Grants, Mackinnons,Macnabs,Macphies, Macquarries and Macaulays.

The clan system in the most archaic form of which we have any

definite information can be best studied in the Irish tuath, or tribe. 1 This consisted of two classes: (1) tribesmen, and (2) a miscellaneous class of slaves, criminals, strangers and their descendants. The first class included tribesmen by blood in the male line, including all illegitimate children acknowledged by their fathers, and tribesmen by adoption or sons of tribeswomen by strangers, foster-sons, men who had done some signal service to the tribe, and lastly the descendants of the second class after a certain number of generations. Each tuath had a chief called a rig, king, a word cognate with the Gaulish rig-s or rix, the Latin reg-s or rex, and the Old Norse rik-ir. The tribesmen formed a number of communities, each of which, like the tribe itself, consisted of a head, ceann fine, his kinsmen, slaves and other retainers. This was the fine, or sept. Each of these occupied a certain part of the tribe-land, the arable part being cultivated under a system of co-tillage, the pasture land co- grazed according to certain customs, and the wood, bog and mountains forming the marchland of the sept being the un- restricted common land of the sept. The sept was in fact a village community.

What the sept was to the tribe, the homestead was to the sept. The head of a homestead was an aire, a representative freeman capable of acting as a witness, compurgator and bail. These were very important functions, especially when it is borne in mind that the tribal homestead was the home of many of the kinsfolk of the head of the family as well as of his own children. The descent of property being according to a gavel-kind custom, it constantly happened that when an aire died the share of his property which each member of his immediate family was en- titled to receive was not sufficient to qualify him to be an aire. In this case the family did not divide the inheritance, but remained together as ” a joint and undivided family,” one of the members being elected chief of the family or household, and in

1 The following account of the Irish clan-system differs in some respects from that in the article on Brehon Laws (q.v.) ; but it is retained here in view of the authority of the writer and the admitted obscurity of the whole subject. (Ed. E.B.)

this capacity enjoyed the rights and privileges of an aire. Sir H. S. Maine directed attention to this kind of family as an important feature of the early institutions of all Indo-European nations. Beside the ”

joint and undivided family," there was another kind of family which we might call " the joint family." This was a partnership composed of three or four members of a sept whose individual wealth was not sufficient to qualify each of them to be an aire, but whose joint wealth qualified one of the co-partners as head of the joint family tc be one.

So long as there was abundance of land each family grazed its cattle upon the tribe-land without restriction; unequal increase of wealth and growth of population naturally led to its limitation, each head of a homestead being entitled to graze an amount of stock in proportion to his wealth, the size of his homestead, and his acquired position. The arable land was no doubt applotted annually at first; graduaUy, however, some of the richer families of the tribe succeeded in evading this exchange of allotments and converting part of the common land into an estate in sevralty. Septs were at first colonies of the tribe which settled on the march-land; afterwards the conversion of part of the common land into an estate in sevralty enabled the family that acquired it to become the parent of a new sept. The same process might, however, take place within a sept without dividing it; in other words, several members of the sept might hold part of the land of the sept as separate estate. The possession of land in sevralty introduced an important distinction into the tribal system — it created an aristocracy. An aire whose family held the same land for three generations was called a flaith, or lord, of which rank there were several grades according to their wealth in land and chattels. The aires whose wealth consisted in cattle only were called bd-aires, or cow-aires, of whom there were also several grades, depending on their wealth in stock. When a bd-aire had twice the wealth of the lowest class of flaith he might enclose part of the land adjoining his house as a lawn; this was the first step towards his becoming a flaith. The relations which subsisted between the flaiths and the bd-aires formed the most curious part of the Celtic tribal system, and throw a flood of light on the origin of the feudal system. Every tribesman without exception owed ceilsinne to the rig, or chief, that is, he was bound to become his ceile, or vassal. This consisted in paying the rig a tribute in kind, for which the ceile was entitled to receive a proportionate amount of stock without having to give any bond for their return, giving him service, e.g. in building his dun, or stronghold, reaping his harvest, keeping his roads clean and in repair, killing wolves, and especially service in the field, and doing him homage three times while seated every time he made his return of tribute. Paying the " calpe " to the Highland chiefs represented this kind of vassalage, a colpdach or heifer being in many cases the amount of food-rent paid by a free or saer ceile. A tribesman might, however, if he pleased, pay

a higher rent on receiving more stock together with certain other chattels for which no rent was chargeable. In this case he entered into a contract, and was therefore a bond or daer ceile. No one need have accepted stock on these terms, nor could he do so without the consent of his sept, and he might free himself at any time from his obligation by returning what he had received, and the rent due thereon.

What every one was bound to do to his rig, or chief, he might do voluntarily to the flaith of his sept, to any flaith of the tribe, or even to one of another tribe. He might also become a bond ceile. In either case he might renounce his ceileship by returning a greater or lesser amount of stock than what he had received according to the circumstances under which he terminated his vassalage. In cases of disputed succession to the chiefship of a tribe the rival claimants were always anxious to get as many as possible to become their vassals. Hence the anxiety of minor chieftains, in later times in the Highlands of Scotland, to induce the clansmen to pay the ” calpe ” where there happened to be a doubt as to who was entitled to be chief.

The effect of the custom of gavel-kind was to equalize the wealth of each and leave no one wealthy enough to be chief.

The ” joint and undivided family ” and the formation of ” joint families,” or gilds, was one way of obviating this result; another way was the custOx-n of tanistry. The headship of the tribe was practically confined to the members of one family; this was also the case with the headship of a sept.’ Sometimes a son succeeded his father, but the rule was that the eldest and most capable member of the geilfine, that is, the relatives of the actual chief to the fifth degree, 1 was selected during his lifetime to be his successor — generally the eldest surviving brother or son of the preceding chief. The man selected as successor to a chief of a tribe, or chieftain of a sept, was called the tanist, and should be ” the most experienced, the most noble, the most wealthy, the wisest, the most learned, the most truly popular, the most powerful to oppose, the most steadfast to sue for profits and (be sued) for losses.” In addition to these qualities he should be free from personal blemishes and deformities and of fit age to lead his tribe or sept, as the case may be, to battle. 2 So far as selecting the man of the geilfine who was supposed to possess all those qualities, the office of chief of a tribe or chieftain of a sept was elective, but as the geilfine was represented by four persons, together with the chief or chieftain, the election was practically confined to one of the four. In order to support the dignity of the chief or chieftain a certain portion of the tribe or sept land was attached as an apanage to the office; this land, with the duns or fortified residences upon it, went to the suc- cessor,

but a chief's own property might be gavelled. This custom of tanistry applied at first probably to the selection of the successors of a rig, but was gradually so extended that even a bo-aireh&d a tanist.

A sept might have only one flaith, or lord, connected with it, or might have several. It sometimes happened, however, that a sept might be so broken and reduced as not to have even one man qualified to rank as a flaith. The rank of a flaith depended upon the number of his ceiles, that is, upon his wealth. The flaith of a sept, and the highest when there was more than one, was ceann fine, or head of the sept, or as he was usually called in Scotland, the chieftain. He was also called the flaith geilfine, or head of the geilfine, that is, the kinsmen to the fifth degree from among whom should be chosen the tanist, and who, according to the custom of gavel-kind, were the immediate heirs who received the personal property and were answerable for the liabilities of the sept. The flaiths of the different septs were the vassals of the rig, or chief of the tribe, and performed certain functions which were no doubt at first individual, but in time became the hereditary right of the sept. One of those was the office of maer, or steward of the chief's rents, &c. ; 3 and another that of aire titisi, leading aire, or taoisech, a word cognate with the Latin duc-s or dux, and Anglo-Saxon here-tog, leader of the " here," or army. The taoisech was leader of the tribe in battle; in later times the term seems to have been extended to several offices of rank. The cadet of a Highland clan was always called the taoisech, which has been translated captain; after the conquest of Wales the same term, tywysaug, was used for a ruling prince. Slavery was very common in Ireland and Scotland;

1 The explanation here given of geilfine is different from that given in the introduction to the third volume of the Ancient Laws of Ireland, which was followed by Sir H. S. Maine in his account of it in his Early History of Institutions, and which the present writer believes to be erroneous.

2 It should also be mentioned that illegitimacy was not a bar. The issue of " handfast" marriages in Scotland were eligible to be chiefs, and even sometimes claimed under feudal law.

3 This office is of considerable importance in connexion with early Scottish history. In the Irish annals the rig, or chief of a great tribe (mor tuath), such as of Ross, Moray, Marr, Buchan, &c, is called a mor maer, or great maer. Sometimes the same person is called king also in these annals. Thus Findlaec, or Finlay, son of Ruadhri, the father of Shakespeare's Macbeth, is called king of Moray in the Annals of Ulster, and mor maer in the Annals of Tighernach. The term is never

found in Scottish charters, but it occurs in the Book of the Abbey of Deir in Buchan, now in the library of the university of Cambridge. The Scotic kings and their successors obviously regarded the chiefs of the great tribes in question merely as their maers, while their tribesmen only knew them as kings. From these ” mor-maerships,” which corresponded with the ancient mor luatha, came most, if not all, the ancient Scottish earldoms.

in the former slaves constituted a common element in the stipends or gifts which the higher kings gave their vassal sub- reguli. Female slaves, who were employed in the houses of chiefs and fiaiths in grinding meal with the hand-mill or quern, and in other domestic work, must have been very common, for the unit or standard for estimating the wealth of a bo-aire, blood- fines, &c, was called a cumhal, the value of which was three cows, but which literally meant a female slave. The descendants of those slaves, prisoners of war, forfeited hostages, refugees from other tribes, broken tribesmen, &c, gathered round the residence of the rig and flaiths, or squatted upon their march- lands, forming a motley band of retainers which made a consider- able element in the population, and one of the chief sources of the wealth of chiefs and flaiths. The other principal source of their income was the food-rent paid by ceiles, and especially by the doer or bond ceiles, who were hence called biathachs, from biad, food. Aflaith, but not a rig, might, if he liked, go to the house of his ceile and consume his food-rent in the house of the latter.

Under the influence of feudal ideas and the growth of the modern . views as to ownership of land, the chiefs and other lords of clans claimed in modern times the right of best owing the tribe-land as turcrec, instead of stock, and receiving rent not for cattle and other chattels as in former times, but proportionate to the extent of land given to them. The turcrec-lund seems to have been at first given upon the same terms as lurcrec-stock, but gradually a system of short leases grew up; sometimes, too, it was given on mortgage. In the Highlands of Scotland ceiles who received turcrec-land were called ” taksmen.” On the death of the chief or lord, his successor either bestowed the land upon the same person or gave it to some other relative. In this way in each generation new families came into possession of land, and others sank into the mass of mere tribesmen. Some- times a “taksman” succeeded in acquiring his land in perpetuity, by gift, marriage or purchase, or even by the ” strong hand.” The universal prevalence of

exchangeable allotments, or the rundale system, shows that down to even comparatively modern times some of the land was still recognized as the property of the tribe, and was cultivated in village communities.

The chief governed the clan by the aid of a council called the sabaid (sab, a prop), but the chief exercised much power, especially over the miscellaneous body of non-tribesmen who lived on his own estate. This power seems to have extended to life and death. Several of the flaiths, perhaps, all heads of septs, also possessed somewhat extensive powers of the same kind.

The Celtic dress, at least in the middle ages, consisted of a kind of shirt reaching to a little below the knees called a lenn, a jacket called an inar, and a garment called a brat, consisting of a single piece of cloth. This was apparently the garb of the aires, who appear to have been further distinguished by the number of colours in their dress, for we are told that while a slave had clothes of one colour, a rSg tuatha, or chief of a tribe, had five, and an ollamh and a superior king six. The breeches was also known, and cloaks with a cowl or hood, which buttoned up tight in front. The lenn is the modern kilt, and the brat the plaid, so that the dress of the Irish and Welsh in former times was the same as that of the Scottish Highlander.

By the abolition of the heritable jurisdiction of the Highland chiefs, and the general disarmament of the clans by the acts passed in 1747 after the rebellion of 1745, the clan system was practically broken up, though its influence still lingers in the more remote districts. An act was also passed in 1747 for- bidding the use of the Highland garb; but the injustice and impolicy of such a law being generally felt it was afterwards repealed. (W. K. S.)

CLANRICARDE, ULICK DE BURGH (Bottrke or Burke), 1st Earl of (d. 1544), styled MacWilliam, and Ne-gan or Na- gCeann (i.e. ” of the Heads,” ” having made a mount of the heads of men slain in battle which he covered up with earth “), was the son of Richard or Rickard de Burgh, lord of Clanricarde, by a daughter of Madden of Portumna, and grandson of Ulick de

Burgh, lord of Clanricarde (1467-1487), the collateral heir male of the earls of Ulster. On the death of the last earl in 1333, his only child Elizabeth had married Lionel, duke of Clarence, and the earldom became merged in the crown, in consequence of which the de Burghs abjured English laws and sovereignty, and chose for their chiefs the sons of Sir William, the ” Red ” earl of Ulster’s brother, the elder

William taking the title of MacWilliam Eighter (Uachtar, i.e. Upper), and becoming the ancestor of the earls of Clanricarde, and his brother Sir Edmond that of Mac- William Oughter (Ochtar, i.e. Lower), and founding the family of the earls of Mayo. In 1361 the duke of Clarence was sent over as lord-lieutenant to Ireland to enforce his claims as husband of the heir general, but failed, and the chiefs of the de Burghs maintained their independence of English sovereignty for several generations. Ulick de Burgh succeeded to the headship of his clan, exercised a quasi-royal authority and held vast estates in county Galway,in Connaught, including Loughry, Dunkellin, Kil- tartan (Hilltaraght) and Athenry, as well as Clare and Leitrim. In March 1541, however, he wrote to Henry VIII., lamenting the degeneracy of his family, ” which have been brought to Irish and disobedient rule by reason of marriage and nurseing with those Irish, sometime rebels, near adjoining to me,” and placing himself and his estates in the king’s hands. The same year he was present at Dublin, when the act was passed making Henry VIII. king of Ireland. In 1543, in company with other Irish chiefs, he visited the king at Greenwich, made full submission, undertook to introduce English manners and abandon Irish names, received a regrant of the greater part of his estates with the addition of other lands, was confirmed in the captainship and rule of Clanri- carde, and was created on the 1st of July 1543 earl of Clanricarde and baron of Dunkellin in the peerage of Ireland, with unusual ceremony. ” The making of McWilliam earl of Clanricarde made all the country during his time quiet and obedient,” states Lord Chancellor Cusake in his review of the state of Ireland in 1553. 1 He did not live long, however, to enjoy his new English dignities, but died shortly after returning to Ireland about March 1544. He is called by the annalist of Loch Ce ” a haughty and proud lord,” who reduced many under his yoke, and by the Four Masters ” the most illustrious of the English in Connaught.”

Clanricarde married (1) Grany or Grace, daughter of Mulrone O’Carroll, ” prince of Ely,” by whom he had Richard or Rickard ” the Saxon,” who succeeded him as 2nd earl of Clanricarde (grandfather of the 4th earl, whose son became marquess of Clanricarde), this alliance being the only one declared valid. After parting with his first wife he married (2) Honora, sister of Ulick de Burgh, from whom he also parted. He married (3) Mary Lynch, by whom he had John, who claimed the earldom in 1568. Other sons, according to Burke’s Peerage, were Thomas ” the Athlete,” shot in 1545, Redmond ” of the Broom ” (d. 1595), and Edmund (d. 1597).

See also Annals of Ireland by the Four Masters (ed. by O. Connellan, 1846), p. 132 note, and reign of Henry VIII.; Annals of Loch Ce

(Rerum Brit. Medii Aevi Scriptores) (54) (1871); Hist. Mem. of the O'Briens, by J. O. Douoghue (i860), pp 159, 519; Ireland under the Tudors, by R. Bagwell, vol. i. ; State Papers, Ireland, Carew MSS. and Gairdner's Letters and Papers of Henry VIII.; Cotton MSS. Brit. Mus., Titus B xi. f. 388. , (P. C. Y.)

CLANRICARDE, ULICK DE BURGH (Bourke or Btjrke), Marquess or (1604-1657 or 1658), son of Richard, 4th earl of Clanricarde, created in 1628 earl of St Albans, and of Frances, daughter and heir of Sir Francis Walsingham, and widow of Sir Philip Sidney and of Robert Devereux, earl of Essex, was born in 1604. He was summoned to the House of Lords as Lord Burgh in 1628, and succeeded his father as 5th earl in 1635. He sat in the Short Parliament of 1640 and attended Charles I. in the Scottish expedition. On the outbreak of the Irish rebellion Clanricarde had powerful inducements for joining the Irish — the ancient greatness and independence of his family, his devotion to the Roman Catholic Church, and strongest of all, the ungrateful treatment meted out by Charles I. and Wentworth to his father, one of Elizabeth's most stanch adherents in Ireland, whose lands were appropriated by the crown and whose death, it was popularly 1 Cal. of State Pap., Carew MSS. 1515-1574, p. 246.

asserted, was hastened by the harshness of the lord-lieutenant. Nevertheless at the crisis his loyalty never wavered. Alone of the Irish Roman Catholic nobility to declare for the king, he returned to Ireland, took up his residence at Portumna, kept Galway, of which he was governor, neutral, and took measures for the defence of the county and for the relief of the Protestants, making " his house and towns a refuge, nay, even a hospital for the distressed English." 1 In 1643 he was one of the com- missioners appointed by the king to confer with the Irish con- federates, and urged the wisdom of a cessation of hostilities in a document which he publicly distributed. He was appointed commander of the English forces in Connaught in 1644, and in 1646 was created a marquess and a privy councillor. He sup- ported the same year the treaty between Charles I. and the confederates, and endeavoured after its failure to persuade Preston, the general of the Irish, to agree to a peace; but the latter, being advised by Rinuccini, the papal nuncio, refused in December. Together with Ormonde, Clanricarde opposed the nuncio's policy; and the royalist inhabitants of Galway having through the latter's influence rejected the cessation of hostilities, arranged with Lord Inchiquin in

1648, he besieged the town and compelled its acquiescence. In 1649 he reduced Sligo. On Ormonde's departure in December 1650 Clanricarde was appointed deputy lord-lieutenant, but he was not trusted by the Roman Catholics, and was unable to stem the tide of the parlia- mentary successes. In 1651 he opposed the offer of Charles, duke of Lorraine, to supply money and aid on condition of being acknowledged " Protector " of the kingdom. In May 1652 Galway surrendered to the parliament, and in June Clanricarde signed articles with the parliamentary commissioners which allowed his departure from Ireland. In August he was excepted from pardon for life and estate, but by permits, renewed from time to time by the council, he was enabled to remain in England for the rest of his life, and in 1653 £500 a year was settled upon him by the council of state in consideration of the protection which he had given to the Protestants in Ireland at the time of the rebellion. He died at Somerhill in Kent in 1657 or 1658 and was buried at Tunbridge.

The " great earl," as he was called, supported Ormonde in his desire to unite the English royalists with the more moderate Roman Catholics on the basis of religious toleration under the authority of the sovereign, against the papal scheme advocated by Rinuccini, and in opposition to the parliamentary and Puritan policy. By the author of the Aphorismical Discovery, who represents the opinion of the native Irish, he is denounced as the " masterpiece of the treasonable faction," " a foe to his king, nation and religion," and by the duke of Lorraine as " a traitor and a base fellow "; but there is no reason to doubt Clarendon's opinion of him as " a person of unquestionable fidelity- . . . and of the most eminent constancy to the Roman Catholic religion of any man in the three kingdoms," or the verdict of Hallam, who describes him " as perhaps the most unsullied character in the annals of Ireland."

He married Lady Anne Compton, daughter of William Compton, 1st earl of Northampton, but had issue only one daughter. On his death, accordingly, the marquessate and the English peerages became extinct, the Irish titles reverting to his cousin Richard, 6th earl, grandson of the 3rd earl of Clanricarde. Henry, the 12th earl (1 742-1 797), was again created a marquess in 1789. but the marquessate expired at his death without issue, the earldom going to his brother. In 1825 the 14th earl (1802-1874) was created a marquess; he was ambassador at St Petersburg, and later postmaster-general and lord privy seal, and married George Canning's daughter. His son (b. 1832), who achieved notoriety in the Irish land agitation, succeeded him as 2nd marquess.

Bibliography. — See the article ” Burgh, Ulick de,” in the Diet. of Nat. Biography, and authorities there given; Hist, of the Irish Confederation, by R. Bellings, ed. by J. T. Gilbert (1882); Aphorismical Discovery (Irish Archaeological Society, 1879); Memoirs of the Marquis of Clanricarde (1722, repr. 1744); Memoirs of Ulick,

ˆHis’t. MSS. Comm.: MSS- of Earl of Egmont, i. 223.

Marquis of Clanricarde, by John, nth earl (1757); Life of Ormonde, by T. Carte (1851) ; S. R. Gardiner’s Hist, of the Civil War and of the Commonwealth; Thomason Tracts (Brit. Mus.) E 371 (n), 456 (10); Cal. of State Papers, Irish, esp. Introd. 1633-1647 and Domestic; Hist. MSS. Comm., MSS. of Marq. of Ormonde and Earl of Egmont. (P. C. Y.)

CLANVOWE, SIR THOMAS, the name of an English poet first mentioned in the history of English literature by F. S. Ellis in 1896, when, in editing the text of The Book of Cupid, God of Love, or The Cuckoo and the Nightingale, for the Kelmscott Press, he stated that Professor Skeat had discovered that at the end of the best of the MSS. the author was called Clanvowe. In 1897 this information was confirmed and expanded by Professor Skeat in the supplementary volume of his Clarendon Press Chaucer (1894- 1897) . The beautiful romance of The Cuckoo and the Nightingale was published by Thynne in 1 53 2, and was attributed by him, and by successive editors down to the days of Henry Bradshaw, to Chaucer. It was due to this error that for three centuries Chaucer was supposed to be identified with the manor of Wood- stock, and even painted, in fanciful pictures, as lying

“Under a maple that is fair and green, Before the chamber-window of the Queen At Wodestock, upon the greene lea.”

But this queen could only be Joan of Navarre, who arrived in 1403, three years after Chaucer’s death, and it is to the spring of that year that Professor Skeat attributes the composi- tion of the poem. Sir Thomas Clanvowe was of a Herefordshire family, settled near Wigmore. He was a prominent figure in the courts of Richard II. and Henry IV., and is said to have been a friend of Prince Hal. He was one of those who ” had begun to mell of Lollardy, and drink the gall of heresy. ” He was one of the twenty-five knights who accompanied John Beaufort (son of John of Gaunt) to Barbary in 1390.

The date of his birth is unknown, and his name is last mentioned in 1404. The historic and literary importance of The Cuckoo and the

Nightingale is great. It is the work of a poet who had studied the prosody of Chaucer with more intelligent care than either Occleve or Lydgate, and who therefore forms an important link between the 14th and 1 5th centuries in English poetry. Clanvowe writes with a surprising delicacy and sweetness, in a five-line measure almost peculiar to himself. Professor Skeat points out a unique characteristic of Clanvowe's versification, namely, the unprecedented freedom with which he employs the suffix of the final e, and rather avoids than seeks elision. The Cuckoo and the Nightingale was.imitated by Milton in his sonnet to the Nightin gale, and was rewritten in modern English by Wordsworth. It is a poem of so much individual beauty, that we must regret the apparent loss of everything else written by a poet of such unusual talent.

See also a critical edition of the Boke of Cupide by Dr Erich Vollmer (Berlin, 1898). (E. G.)

CLAPAREDE, JEAN LOUIS REN£ ANTOINE &DOUARD

(1832-1870), Swiss naturalist, was born at Geneva on the 24th of April 1832. He belonged to a French family, some members of which had taken refuge in that city after the revocation of the Edict of Nantes. In 1 8 5 2 he began to study medicine and natural science at Berlin, where he was greatly influenced by J. Miiller and C. G. Ehrenberg, the former being at that period engaged in his important researches on the Echinoderms. In 1855 he accompanied Miiller to Norway, and there spent two months on a desolate reef that he might obtain satisfactory observations. The latter part of his stay at Berlin he devoted, along with J. Lachmann, to the study of the Infusoria and Rhizopods. In 1857 he obtained the degree of doctor, and in 1862 he was chosen professor of comparative anatomy at Geneva. In 1839 he visited England, and in company with W. B. Carpenter made a voyage to the Hebrides; and in 1863 he spent some months in the Bay of Biscay. On the appearance of Darwin's work on the Origin of Species, he adopted his theories and published a valuable series of articles on the subject in the Revue Germanique (1861). During 1865 and 1866 ill-health rendered him incapable of work, and he determined to pass the winter of 1866-1867 in

Naples. The change of climate produced some amelioration, and his energy was attested by two elaborate volumes on the Annelidae of the

gulf. He again visited Naples with advantage in 1868; but in 1870, instead of recovering as before, he grew worse, and on the 31st of May he died at Siena on his way home. His Recherches sur la structure des annelides sedentaires were published posthumously in 1873.

CLAPPERTON, HUGH (1788-1827), Scottish traveller in West- Central Africa, was born in 1788 at Annan, Dumfriesshire, where his father was a surgeon. He gained some knowledge of practical mathematics and navigation, and at thirteen was apprenticed on board a vessel which traded between Liverpool and North America. After having made several voyages across the Atlantic he was impressed for the navy, in which he soon rose to the rank of midshipman. During the Napoleonic wars he saw a good deal of active service, and at the storming of Port Louis, Mauritius, in November 18 10, he was first in the breach and hauled down the French flag. In 18 14 he went to Canada, was promoted to the rank of lieutenant, and to the command of a schooner on the Canadian lakes. In 181 7, when the flotilla on the lakes was dismantled, he returned home on half-pay.

In 1820 Clapperton removed to Edinburgh, where he made the acquaintance of Walter Oudney, M.D., who aroused in him an interest in African travel. Lieut. G. F. Lyon, R.N., having returned from an unsuccessful attempt to reach Bornu from Tripoli, the British government determined on a second expedi- tion to that country. Dr Oudney was appointed by Lord Bathurst, then colonial secretary, to proceed to Bornu as consul with the object of promoting trade, and Clapperton and Major Dixon Denham (q.v.) were added to the party. From Tripoli, early in 1822, they set out southward to Murzuk, and from this point Clapperton and Oudney visited the Ghat oasis. Kuka, the capital of Bornu, was reached in February 1823, and Lake Chad seen for the first time by Europeans. At Bornu the travellers were well received by the sultan; and after remaining in the country till the 14th of December they again set out for the purpose of exploring the course of the Niger. At Murmur, on the road to Kano, Oudney died (January 1824). Clapperton con- tinued his journey alone through Kano to Sokoto, the capital of the Fula empire, where by order of Sultan Bello he was obliged to stop, though the Niger was only five days' journey to the west. Worn out with his travel he returned by way of Zaria and Katsena to Kuka, where he again met Denham. The two travellers then set out. for Tripoli, reached on the 26th of January 1825. An account of the travels was published in 1826 under the title of Narrative of Travels and Discoveries in Northern and Central Africa in the years 1822-1824.

Immediately after his return Clapperton was raised to the rank of

commander, and sent out with another expedition to Africa, the sultan Bello of Sokoto having professed his eagerness to open up trade with the west coast. Clapperton landed at Badagry in the Bight of Benin, and started overland for the Niger on the 7th of December 1825, having with him his servant Richard Lander (q.v.), Captain Pearce, R.N., and Dr Morrison, navy surgeon and naturalist. Before the month was out Pearce and Morrison were dead of fever. Clapperton continued his journey, and, passing through the Yoruba country, in January 1826 he crossed the Niger at Bussa, the spot where Mungo Park had died twenty years before. In July he arrived at Kano. Thence he went to Sokoto, intending afterwards to go to Bornu. The sultan, however, detained him, and being seized with dysentery he died near Sokoto on the 13th of April 1827.

Clapperton was the first European to make known from personal observation the semi-civilized Hausa countries, which he visited soon after the establishment of the Sokoto empire by the Fula. In 1829 appeared the Journal of a Second Expedition into the Interior of Africa, &c, by the late Commander Clapperton, to which was prefaced a biographical sketch of the explorer by his uncle, Lieut. -colonel S. Clapperton. Lander, who had brought back the journal of his master, also published Records of Captain Clapperton's Last Expedition to Africa . . . with the subsequent Adventures of the Author (2 vols., London, 1830).

CLAQUE (Fr. claquer, to clap the hands), an organized body of professional applauders in the French theatres. The hiring of persons to applaud dramatic performances was common in classical times, and the emperor Nero, when he acted, had his performance greeted by an encomium chanted by five thousand of his soldiers, who were called Angustals. The recollection of this gave the 16th-century French poet, Jean Daurat, an idea which has developed into the modern claque. Buying up a number of tickets for a performance of one of his plays, he dis- tributed them gratuitously to those who promised publicly to express their approbation. It was not, however, till 1820 that a M. Sauton seriously undertook the systematization of the claque, and opened an office in Paris for the supply of claqueurs. By 1830 the claque had become a regular institution. The manager of a theatre sends an order for any number of claqueurs. These people are usually under a chef de claque, whose duty it is to judge where their efforts are needed and to start the demonstra- tion of approval. This takes several forms. Thus there are commissaires, those who learn the piece by heart, and call the attention of their neighbours to its good points between the acts. The rieurs are those who laugh loudly at the jokes. The pleureurs, generally women, feign tears, by holding their hand-

kerchiefs to their eyes. The chatouilleurs keep the audience in a good humour, while the bisseurs simply clap their hands and cry bis I bis! to secure encores.

CLARA, SAINT (1194-1253), foundress of the Franciscan nuns, was born of a knightly family in Assisi in 1194. At eighteen she was so impressed by a sermon of St Francis that she was filled with the desire to devote herself to the kind of life he was leading. She obtained an interview with him, and to test her resolution he told her to dress in penitential sackcloth and beg alms for the poor in the streets of Assisi. Clara readily did this, and Francis, satisfied as to her vocation, told her to come to the Portiuncula arrayed as a bride. The friars met her with lighted candles, and at the foot of the altar Francis shore off her hair, received her vows of poverty, chastity and obedience, and invested her with the Franciscan habit, 12 12. He placed her for a couple of years in a Benedictine convent in Assisi, until the convent at St Damian's, close to the town, was ready. Her two younger sisters, and, after her father's death, her mother and many others joined her, and the Franciscan nuns spread widely and rapidly (see Clares, Poor). The relations of friendship and sympathy between St Clara and St Francis were very close, and there can be no doubt that she was one of the truest heirs of Francis's inmost spirit. After his death Clara threw herself wholly on the side of those who opposed mitigations in the rule and manner of life, and she was one of the chief upholders of St Francis's primitive idea of poverty (see Franciscans). She was the close friend of Brother Leo and the other " Companions of St Francis," and they assisted at her death. For forty years she was abbess at St Damian's, and the great endeavour of her life was that the rule of the nuns should be purged of the foreign elements that had been introduced, and should become wholly conformable to St Francis's spirit. She lived just long enough to witness the fulfilment of her great wish, a rule such as she desired being approved by the pope two days before her death on the nth of August 1253.

The sources for her life are to be found in the Bollandist Acta Sanctorum on the nth of August, and sketches in such Lives of the Saints as Alban Butler's. See also Wetzer und Welte, Kirchen- lexicon (2nd ed.), art. " Clara." (E. C. B.)

CLARE, the name of a famous English family. The ancestor of this historic house, " which played," in Freeman's words, " so great a part alike in England, Wales and Ireland," was Count Godfrey, eldest of the illegitimate sons of Richard the Fearless, duke of Normandy. His son, Count Gilbert of Brionne, had two sons, Richard, lord of Bienfaite and Orbec, and Baldwin, lord of Le Sap and Meulles, both of whom

accompanied the Conqueror to England. Baldwin, known as ” De Meulles ” or ” of Exeter,” received the hereditary shrievalty of Devon with great estates in the West Country, and left three sons, William, Robert and Richard, of whom the first and last were in turn

sheriffs of Devon. Richard, known as ” de Bienfaite,” or ” of Tunbridge,” or ” of Clare,” was’ the founder of the house of Clare.

Richard derived his English appellation from his strongholds at Tunbridge and at Clare, at both of which his castle-mounds still remain. The latter, on the borders of Essex and Suffolk, was the head of his great “honour” which lay chiefly in the eastern counties. Appointed joint justiciar in the king’s absence abroad, he took a leading part in suppressing the revolt of 1075. By his wife, Rohese, daughter of Walter Giffard, through whom great Giffard estates afterwards came to his house, he left five sons and two daughters. Roger was his heir in Normandy, Walter founded Tintern Abbey, Richard was a monk, and Robert, receiving the forfeited fief of the Baynards in the eastern counties, founded, through his son Walter, the house of Fitz- Walter (extinct 1432), of whom the most famous Was Robert FitzWalter, the leader of the barons against King John. Of this house, spoken of by Jordan Fantosme as ” Clarreaus,” the Daventrys of Daventry (extinct 1380) and Fawsleys of Fawsley (extinct 1392) were cadets. One of Richard’s two daughters married the famous Walter Tirel.

Gilbert, Richard’s heir in England, held his castle of Tunbridge against William Rufus, but was wounded and captured. Under Henry I., who favoured the Clares, he obtained a grant of Cardigan, and carried his arms into Wales. Dying about 1115, he left four sons, of whom Gilbert, the second, inherited Chep- stow, with Nether-Gwent, from his uncle, Walter, the founder of Tintern, and was created earl of Pembroke by Stephen about 1 138; he was father of Richard Strongbow, earl of Pembroke (q.v.). The youngest son Baldwin fought for Stephen at the battle of Lincoln (1141) and founded the priories of Bourne and Deeping on lands acquired with his wife. The eldest son Richard, who was slain by the Welsh on his way to Cardigan in 1135 or 1 136, left two sons Gilbert and Roger, of whom Gilbert was created earl of Hertfordshire by Stephen.

It was probably because he and the Clares had no interests in Hertfordshire that they were loosely and usually styled the earls of (de) Clare. Dying in 1152, Gilbert was succeeded by his brother Roger,

of whom Fitz-Stephen observes that ” nearly all the nobles of England were related to the earl of Clare, whose sister, the most beautiful woman in England, had long been desired by the king ” (Henry II.). He was constantly fighting the Welsh for his family possessions in Wales and quarrelled with Becket over Tunbridge Castle. In 1173 or 1174 he was succeeded by his son Richard as third earl, whose marriage with Amicia, daughter and co-heir of William, earl of Gloucester, was destined to raise the fortunes of his house to their highest point. He and his son Gilbert were among the ” barons of the Charter,” Gilbert, who became fourth earl in 1217, obtained also, early in 1218, the earldom of Gloucester, with its great territorial ” Honour,” and the lordship of Glamorgan, in right of his mother; ” from this time the house of Clare became the acknowledged head of the baronage.” Gilbert had also inherited through his father his grandmother’s ” Honour of St Hilary ” and a moiety of the Giffard fief; but the vast possessions of his house were still further swollen by his marriage with a daughter of William (Marshal), earl of Pembroke, through whom his son Richard succeeded in 1245 to a fifth of the Marshall lands including the Kilkenny estates in Ireland. Richard’s successor, Gilbert, the ” Red ” earl, died in 1295, the most powerful subject in the kingdom.

On his death his earldoms seem to have been somewhat mysteriously deemed to have passed to his widow Joan, daughter of Edward I.; for her second husband, Ralph de Monthermer, was summoned to parliament in right of them from 1299 to 1306. After her death, however, in 1307, Earl Gilbert’s son and name- sake was summoned in 1308 as earl of Gloucester and Hertford, though only sixteen. A nephew of Edward II. and brother-in- law of Gaveston, he played a somewhat wavering part in the struggle between the king and the barons. Guardian of the realm in 1311 and regent in 1313, he fell gloriously at Bannock- burn (June 24th, 13 14), when only twenty-three, rushing on

the enemy ” like a wild boar, making his sword drunk with their blood.”

The earl was the last of his mighty line, and his vast posses- sions in England (in over twenty counties), Wales and Ireland fell to his three sisters, of whom Elizabeth, the youngest, wife of John de Burgh, obtained the “Honour of Clare” and trans- mitted it to her son William de Burgh, 3rd earl of Ulster, whose daughter brought it to Lionel, son of King Edward III., who was thereupon created duke of Clarence, a

title associated ever since with the royal house. The ” Honour of Clare,” vested in the crown, still preserves a separate existence, with a court and steward of its own.

Clare College, Cambridge, derived its name from the above Elizabeth, ” Lady of Clare,” who founded it as Clare Hall in .

1347-

Clare County in Ireland derives its name from the family, though whether from Richard Strongbow, or from Thomas de Clare, a younger son, who had a grant of Thomond in 1276, has been deemed doubtful.

Clarenceux King of Arms, an officer of the Heralds’ College, derives his style, through Clarence, from Clare.

See J. H. Round’s Geoffrey de Mandeville, Feudal England, Commune of London, and Peerage Studies; also his ” Family of Clare ” in Arch. Journ. lvi., and ” Origin of Armorial Bearings ” in lb. li. ; Parkinson’s ” Clarence, the origin and bearers of the title,” in The Antiquary, v.; Clark’s “Lords of Glamorgan” in Arch. Journ. xxxv.; Planche’s “Earls of Gloucester” in Journ. Arch. Assoc. xxvi. ; Dugdale’s Baronage, vol. i., and Monasticon Anglicanum; G. E. C[okayne]‘s Complete Peerage. (J. H. R.)

CLARE, JOHN (1793-1864), English poet, commonly known as “the Northamptonshire Peasant Poet,” the son of a farm labourer, was born at Helpstone near Peterborough, on the 13th of July 1793. At the age of seven he was taken from school to tend sheep and geese; four years later he began to work on a farm, attending in the winter evenings a school where he is said to have learnt some algebra. He then became a pot-boy in a public-house and fell in love with Mary Joyce, but her father, a prosperous farmer, forbade her to meet him. Subse- quently he was gardener at Burghley Park. He enlisted in the militia, tried camp life with gipsies, and worked as a lime burner in 1817, but in the following year he was obliged to accept parish relief. Clare had bought a copy of Thomson’s Seasons out of his scanty earnings and had begun to write poems. In 1819 a bookseller at Stamford, named Drury, lighted on one of Clare’s poems, The Setting Sun, written on a scrap of paper enclosing a note to his predecessor in the business. He be- friended the author and introduced his poems to the notice of John Taylor, of the publishing firm of Taylor & Hussey, who issued the Poems Descriptive of Rural Life and Scenery in 1820. This book was highly praised, and in the next year his Village Minstrel and other

Poems were published. He was greatly patronized; fame, in the shape of curious visitors, broke the tenor of his life, and the convivial habits that he had formed were indulged more freely. He had married in 1820, and an annuity of 15 guineas from Lord Exeter, in whose service he had been, was supplemented by subscription, and he became pos- sessed of £45 annually, a sum far beyond what he had ever earned, but new wants made his income insufficient, and in 1823 he was nearly penniless. The Shepherd's Calendar (1827) met with little success, which was not increased by his hawking it himself. As he worked again on the fields his health tem- porarily improved; but he soon became seriously ill. Lord Fitzwilliam presented him with a new cottage and a piece of ground, but Clare could not settle in his new home. Gradually his mind gave way. His last and best work, the Rural Muse (1835), was noticed by " Christopher North " alone. He had for some time shown symptoms of insanity; and in July 1837 he was removed to a private asylum, and afterwards to the North- ampton general lunatic asylum, where he died on the 20th of May 1864. Clare's descriptions of rural scenes show a keen and loving appreciation of nature, and his love-songs and ballads charm by their genuine feeling; but his vogue was no doubt largely due to the interest aroused by his humble position in life.

CLARE, LORD

See the Life of John Clare, by Frederick Martin (1865) ; and Life and Remains of John Clare, by J. L. Cherry (1873), which, though not so complete, contains some of the poet's asylum verses and prose fragments.

CLARE, JOHN FITZGIBBON, ist Earl op (1749-1802), lord chancellor of Ireland, was the second son of John Fitzgibbon, who had abandoned the Roman Catholic faith in order to pursue a legal career. He was educated at Trinity College, Dublin, where he was highly distinguished as a classical scholar, and at Christ Church, Oxford, where he graduated in 1770. In 1772 he was called to the Irish bar, and quickly acquired a very lucrative practice; he also inherited his father's large fortune on the death of his elder brother. In 1778 he entered the Irish House 01 Commons as member for Dublin University, and at first gave a general support to the popular party led by Henry Grattan (q.v.). He was, however, from the first hostile to that part of Grattan's policy which aimed at removing the disabilities of the Roman Catholics; he endeavoured to impede the Relief Bill of 1778 by raising difficulties about its effect on the Act of Settlement.

He especially distrusted the priests, and many years later explained that his life-long resistance to all concession to the Catholics was based on his ” unalterable opinion ” that ” a conscientious Popish ecclesiastic never will become a well- attached subject to a Protestant state, and that the Popish clergy must always have a commanding influence on every member of that communion.” As early as 1780 Fitzgibbon began to separate himself from the popular or national party, by opposing Grattan’s declaration of the Irish parliament’s right to independence. There is no reason to suppose that in this change of view he was influenced by corrupt or personal motives. His cast of mind naturally inclined to authority rather than to democratic liberty; his hostility to the Catholic claims, and his distrust of parliamentary reform as likely to endanger the connexion of Ireland with Great Britain, made him a sincere opponent of the aims which Grattan had in view. In reply, however, to a remonstrance from his constituents Fitzgibbon promised to support Grattan’s policy in the future, and described the claim of Great Britain to make laws for Ireland as ” a daring usurpation of the rights of a free people.”

For some time longer there was no actual breach between him and Grattan. Grattan supported the appointment of Fitzgibbon as attorney-general in 1783, and in 1785 the latter highly eulo- gized Grattan’s character and services to the country in a speech in which he condemned Flood’s volunteer movement. He also opposed Flood’s Reform Bill of 1784; and from this time forward he was in fact the leading spirit in the Irish government, and the stiffest opponent of all concession to popular demands. In 1784 the permanent committee of revolutionary reformers in Dublin, of whom Napper Tandy was the most conspicuous, invited the sheriffs of counties to call meetings for the election of delegates to attend a convention for the discussion of reform; and when the sheriff of the county of Dublin summoned a meeting for this purpose Fitzgibbon procured his imprisonment for contempt of court, and justified this procedure in parliament, though Lord Erskine declared it grossly illegal. In the course of the debates on Pitt’s commercial propositions in 1785, which Fitzgibbon supported in masterly speeches, he referred to Curran in terms which led to a duel between the two lawyers, when Fitzgibbon was accused of a deliberation in aiming at his opponent that was contrary to etiquette. His antagonism te Curran was life-long and bitter, and after he became chancellor his hostility to the famous advocate was said to have driven the latter out of practice. In January 1787 Fitzgibbon introduced a stringent bill for repressing the Whiteboy outrages. It was supported by Grattan, who, however, procured the omission of a clause enacting that any Roman Catholic chapel near which an illegal

oath had been tendered should be immediately demolished. His influence with the majority in the Irish parliament defeated Pitt's proposed reform of the tithe system in Ireland, Fitzgibbon refusing even to grant a committee to investigate the subject. On the regency question in 1789 Fitzgibbon, in opposition to Grattan, supported the doctrine of Pitt in a series of powerful

speeches which proved him a great constitutional lawyer; he intimated that the choice for Ireland might in certain eventu- alities rest between complete separation from England and legislative union; and, while he exclaimed as to the latter alternative, " God forbid that I should ever see that day!" he admitted that separation would be the worse evil of the two.

In the same year Lord Lifford resigned the chancellorship, anri Fitzgibbon was appointed in his place, being raised to the peerage as Baron Fitzgibbon. His removal to the House of Lords greatly increased his power. In the Commons, though he had exercised great influence as attorney-general, his position had been secondary; in the House of Lords and in the privy council he was little less than despotic. " He was," says Lecky, " by far the ablest Irishman who had adopted without restriction the doctrine that the Irish legislature must be maintained in a condition of permanent and unvarying subjection to the English executive." But the English ministry were now embarking on a policy of conciliation in Ireland. The Catholic Relief Bill of 1 793 was forced on the Irish executive by the cabinet in London, but it passed rapidly and easily through the Irish parliament. Lord Fitzgibbon, while accepting the bill as inevitable under the circumstances that had arisen, made a most violent though exceedingly able speech against the principle of concession, which did much to destroy the conciliatory effect of the measure; and as a consequence of this act he began persistently to urge the necessity for a legislative union. From this date until the union was carried, the career of Fitzgibbon is practically the history of Ireland. True to his inveterate hostility to the popular claims, he was opposed to the appointment of Lord Fitzwilliam (q.v.) as viceroy in 1795, and was probably the chief influence in procuring his recall; and it was Fitzgibbon who first put it into the head of George III. that the king would violate his coronation oath if he consented to the admission of Catholics to parliament. When Lord Camden, Fitzwilliam's successor in the viceroyalty, arrived in Dublin on the 31st of March 1795, Fitzgibbon's carriage was violently assaulted by the mob, and he himself was wounded; and in the riots that ensued his house was also attacked. But as if to impress upon the Catholics the hopelessness of their case, the government who had made Fitzgibbon a viscount

immediately after his attack on the Catholics in 1793 now bestowed on him a further mark of honour. In June 1795 he was created earl of Clare. On the eve of the rebellion he warned the government that while emancipation and reform might be the objects aimed at by the better classes, the mass of the disaffected had in view ” the separation of the country from her connexion with Great Britain, and a fraternal alliance with the French Republic.” Clare advocated stringent measures to prevent an outbreak; but he was neither cruel nor immoderate, and was inclined to mercy in dealing with individuals. He attempted to save Lord Edward Fitzgerald (q.v.) from his fate by giving a friendly warning to his friends, and promising to facilitate his escape from the country; and Lord Edward’s aunt, Lady Louisa Conolly, who was con- ducted to his death-bed in prison by the chancellor in person, declared that ” nothing could exceed Lord Clare’s kindness.” His moderation and humanity after the rebellion was extolled by Cornwallis. He threw his great influence on the side of clemency, and it was through his intervention that Oliver Bond, when sentenced to death, was reprieved; and that an arrangement was made by which Arthur O’Connor, Thomas Emmet and other state prisoners were allowed to leave the country.

In October 1798 Lord Clare, who since 1793 had been con- vinced of the necessity for a legislative union if the connexion between Great Britain and Ireland was to be maintained, and who was equally determined that the union must be unaccom- panied by Catholic emancipation, crossed to England and successfully pressed his views on Pitt. In 1799 he induced the Irish House of Lords to throw out a bill for providing a permanent endowment of Maynooth. On the 10th of February 1800 Clare in the House of Lords moved the resolution approving the union in a long and powerful speech, in which he reviewed the history of Ireland since the Revolution, attributing the evils of recent years to the independent constitution of 1782, and speaking of Grattan

in language of deep personal hatred. He was not aware of the assurance which Cornwallis had been authorized to convey to the Catholics that the union was to pave the way for emancipation, and when he heard of it after the passing of the act he bitterly complained that Pitt and Castlereagh had deceived him. After the union Clare became more violent than ever in his opposition to any policy of concession in Ireland. He died on the 28th of January 1802; his

funeral in Dublin was the occasion of a riot organized ” by a gang of about fourteen persons under orders of a leader.” His wife, in compliance with his death-bed request, destroyed all his papers. His two sons, John (1792-1851) and Richard Hobart (1793-1864), succeeded in turn to the earldom, which became extinct on the death of the latter, whose only son, John Charles Henry, Viscount Fitzgibbon (1829-1854), was killed in the charge of the Light Brigade at Balaklava.

Lord Clare was in private life an estimable and even an amiable man; many acts of generosity are related of him; the determina- tion of his character swayed other wills to his purpose, and his courage was such as no danger, no obloquy, no public hatred or violence could disturb. Though not a great orator like Flood or Grattan, he was a skilful and ready debater, and he was by far the ablest Irish supporter of the union. He was, however, arrogant, overbearing and intolerant to the last degree. He was the first Irishman since the Revolution to hold the office of lord chancellor of Ireland. ” Except where his furious personal anti- pathies and his ungovernable arrogance were called into action, he appears to have been,” says Lecky, ” an able, upright and energetic judge “; but as a politician there can be little question that Lord Clare’s bitter and unceasing resistance to reasonable measures of reform did infinite mischief in the history of Ireland, by inflaming the passions of his countrymen, driving them into rebellion, and perpetuating their political and religious divisions.

See W. E. H. Lecky, History of Ireland in the Eighteenth Century (5 vols., London, 1892); J. R. O’Flanagan, The Lives of the Lord Chancellors and Keepers of the Great Seal in Ireland (2 vols., London, 1870); Cornwallis Correspondence, ed. by C. Ross (3 vols., London, 1859); Charles Phillips, Recollections of Curran and some of his Contemporaries (London, 1822); Henry Grattan, Memoirs of the Life and Times of the Right Honble. Henry Grattan (5 vols., London, 1839-1846); Lord Auckland, Journal and Correspondence (4 vols., London, 1861); Charles Coote, History of the Union of Great Britain and Ireland (London, 1802). (R. J. M.)

CLARE, a county in the province of Munster, Ireland, bounded N. by Galway Bay and Co. Galway, E. by Lough Derg, the river Shannon, and counties Tipperary and Limerick, S. by the estuary of the Shannon, and W. by the Atlantic Ocean. The area is 852,389 acres, or nearly 1332 sq. m. Although the surface of the county is hilly, and in some parts even mountainous, it nowhere rises to a great elevation. Much of the western baronies of Moyarta and Ibrickan is composed of bog land. Bogs are frequent also in the mountainous districts

elsewhere, except in the limestone barony of Burren, the inhabitants of some parts of which supply themselves with turf from the opposite shores of Connemara. Generally speaking, the eastern parts of the county are mountainous, with tracts of rich pasture-land interspersed; the west abounds with bog; and the north is rocky and best adapted for grazing sheep. In the southern part, along the banks of the Fergus and Shannon, are the bands of rich low grounds called corcasses, of various breadth, indenting the land in a great variety of shapes. They are composed of deep rich loam, and are distinguished as the black corcasses, adapted for tillage, and the blue, used more advantageously as meadow land. The coast is in general rocky, and occasionally bold and precipitous in the extreme, as may be observed at the picturesque cliffs of Moher within a few miles of Enriistimon and Lisdoonvarna,. which rise perpendicularly at O'Brien's Tower to an elevation of 580 ft. The coast of Clare is indented with several bays, the chief of which are Ballyvaghan, Liscannor and Malbay; but from Black Head to Loop Head, that is, along the entire western boundary of the county formed by the Atlantic, there is no safe harbour except Liscannor Bay. Malbay takes its name from its dangers to navigators, and the whole coast has been the scene of many fatal disasters. The county possesses only one large river,

the Fergus; but nearly 100 m. of its boundary-line are washed by the river Shannon, which enters the Atlantic Ocean between this county and Kerry. The numerous bays and creeks on both sides of this great river render its navigation safe in every wind; but the passage to and from Limerick is often tedious, and the port of Kilrush has from that cause gained in importance. The river Fergus is navigable from the Shannon to the town of Clare, which is the terminating point of its natural navigation, and the port of all the central districts of the county.

There are a great number of lakes and tarns in the county, of which the largest are Loughs Muckanagh, Graney, Atedaun and Dromore; but they are more remarkable for beauty than for size or utility, with the exception of the extensive and navigable Lough Derg, formed by the river Shannon between this county and Tipperary. The salmon fishery of the Shannon, both as a sport and as an industry, is famous; the Fergus also holds salmon, and there is much good trout-fishing in the lakes for which Ennis is a centre, and in the streams of the Atlantic sea- board. Clare is a county which, like all the western counties of Ireland, repays visitors in search of the pleasures of seaside resorts, sport, scenery or antiquarian interest. Yet, again like other western counties, it was long before it was rendered accessible. Communications, however, are now satisfactory.

Geology. — Upper Carboniferous strata cover the county west of Ennis, the coast-sections in them being particularly fine. Shales and sandstones alternate, now horizontal, as in the Cliffs of Moher, now thrown into striking folds. The Carboniferous Limestone forms a barren terraced country, often devoid of soil, through the Burren in the north, and extends to the estuary of the Fergus and the Shannon. On the east, the folding has brought up two bold masses of Old Red Sandstone, with Silurian cores. Slieve Bernagh, the more southerly of these, rises to 1746 ft. above Killaloe, and the hilly country here traversed by the Shannon is in marked contrast with the upper course of the river through the great limestone plain.

Minerals. — Although metals and minerals have been found in many places throughout the county, they do not often show themselves in sufficient abundance to induce the application of capital for their extraction. The principal metals are lead, iron and manganese. The Milltown lead mine in the barony of Tulla is probably one of the oldest mines in Ireland, and formerly, if the extent of the ancient excavations may be taken as a guide, there must have been a very rich deposit. Copper pyrites occurs in several parts of Burren, but in small quantity. Coal exists at Labasheeda on the right bank of the Shannon, but the few and thin seams are not productive. The nodules of clay-ironstone in the strata that overlie the limestone were mined and smelted down to 1750. Within half a mile of the Milltown lead mine are immense natural vaulted passages of limestone, through which the river Ardsullas winds a singular course. The lower limestone of the eastern portion of the county has been found to contain several very large deposits of argentiferous galena. Flags, easily quarried, are procured near Kilrush, and thinner flags near Ennistimon. Slates are quarried in several places, the best being those of Broadford and Killaloe, which are nearly equal to the finest procured ilPWales. A species of very fine black marble is obtained near Ennis; it takes a high polish, and is free from the white spots with which the black Kilkenny marble is marked.

The mineral springs, which are found in many places, are chiefly chalybeate. That of Lisdoonvarna, a sulphur spa, about 8 m. from Ennistimon, has been celebrated since the 18th century for its medicinal qualities, and now attracts a large number of visitors annually. It lies 9 m. by road N. of Ennistimon. There, are chalybeate springs of less note at Kilkishen, Burren, Broad- foot, Lehinch, Kilkee, Kilrush, Killadysart, and near Milltown Malbay. Springs called by the people ” holy ” or ” blessed ” wells, generally mineral waters, are common; but the belief in their power of performing cures in inveterate maladies is nearly extinct.

Watering-places. — The Atlantic Ocean and the estuary of the Shannon afford many situations admirably adapted for summer bathing-places. Among the most frequented of these localities are Milltown Malbay; with one of the best beaches on the western coast; and the neighbouring Spanish Point (named from the scene of the wreck of two ships of the Armada) ; Lehinch, about

2 m. from Ennistimon on Liscannor Bay, and near the interesting cliffs of Moher, has a magnificent beach. Kilkee is the most fashionable watering-place on the western coast of Ireland; and Kilrush on the Shannon estuary is also favoured.

Industries. — The soil and surface of the county are in general better adapted for grazing than for tillage, and the acreage devoted to the former consequently exceeds three times that of the latter. Agriculture is in a backward state, and not a fifth of the total area is under cultivation, while the acreage shows a decrease even in the principal crops of oats and potatoes. Cattle, sheep, poultry and pigs, however, all receive considerable attention. Owing to the mountainous nature of the county nearly one-seventh of the total area is quite barren.

There are no extensive manufactures, although flannels and friezes are made for home use, and hosiery of various kinds, chiefly coarse and strong, is made around Ennistimon and other places. There are several fishing stations on the coast, and cod, haddock, ling, sole, turbot, ray, mackerel and other fish abound, but the rugged nature of the coast and the tempestuous sea greatly hinder the operations of the fishermen. Near Pooldoody is the great Burren oyster bed called the Red Bank, where a large establishment is maintained, from which a constant supply of the excellent Red Bank oysters is furnished to the Dublin and other large markets. Crabs and lobsters are caught on the shores of the Bay of Galway in every creek from Black Head to Ardfry. In addition to the Shannon salmon fishery mentioned above, eels abound in every rivulet, and form an important article of consumption.

The Great Southern & Western railway line from Limerick to Sligo intersects the centre of the county from north to south. From Ennis on this line the West Clare railway runs to Ennis- timon on the coast, where it turns south and follows the coast by Milltown Malbay to Kilkee and Kilrush. Killaloe in the east of the county is the terminus of

a branch of the Great Southern & Western railway.

Population and Administration. — The population (126,244 in 1891; 112,334 in 1901; almost wholly Roman Catholic and rural) shows a decrease among the most serious of the Irish counties, and the emigration returns are proportionately heavy. The principal towns, all of insignificant size, are Ennis (pop. 5093, the county town), Kilrush (4179), Kilkee (1661) and Killaloe (885); but several of the smaller settlements, as resorts, are of more than local importance. The county, which is divided into 11 baronies, contains 79 parishes, and includes the Protest- ant diocese of Kilfenora, the greater part of Killaloe, and a very small portion of the diocese of Limerick. It is within the Roman Catholic dioceses of Killaloe and Limerick. The assizes are held at Ennis, and quarter sessions here and at Ennistimon, Killaloe, Kilrush and Tulla. The county is divided into the East and West parliamentary divisions, each returning one member.

History. — This county, together with part of the neighbouring district, was anciently called Thomond, that is, North Munster, and formed part of the monarchy of the celebrated Brian Boroihme, who held his court at Kincora near Killaloe, where his palace was situated on the banks of the Shannon. The site is still distinguished by extensive earthen ramparts. Settle- ments were effected by the Danes, and in the 13th century by the Anglo-Normans, but without permanently affecting the possession of the district by its native proprietors. In 1543 Murrogh O'Brien, after dispossessing his nephew and vainly attempting a rebellion against the English rule, proceeded to England and submitted to Henry VIII., resigning his name and possessions. He soon received them back by an English tenure, together with the title of earl of Thomond, on condition of adopting the English dress, manners and customs. In 1565 this part of Thomond (sometimes called O'Brien's country) was added to Connaught, and made one of the six new counties into which that province was divided by Sir Henry Sidney. It was named Clare, the name being traceable either to Richard de Clare (Strongbow), earl of Pembroke, or to his younger brother, Thomas de Clare, who obtained a grant of Thomond

from Edward I. in 1276, and whose family for some time main- tained a precarious position in the district. Towards the close of the reign of Elizabeth, Clare was detached from the govern- ment of Connaught and given a separate administration; but at the Restoration it was reunited to Munster.

Antiquities.— The county abounds with remains of antiquities, both

military and ecclesiastical, especially in the north-western part. There still exist above a hundred fortified castles, several of which are inhabited. They are mostly of small extent, a large portion being fortified dwellings. The chief of them is Bunratty Castle, built in 1277, once inhabited by the earls of Thomond, 10 m. W. of Limerick, on the Shannon. Those of Ballykinvarga, Ballynalackan and Lemaneagh, all in the north- west, should also be mentioned. Raths or encampments are to be found in every part. They are generally circular, com- posed either of large stones without mortar or of earth thrown up and surrounded by one or more ditches. The list of abbeys and other religious houses formerly flourishing here (some now only known by name, but many of them surviving in ruins) comprehends upwards of twenty. The most remarkable are — Quin, considered one of the finest and most perfect specimens of ancient monastic architecture in Ireland; Corcomroe; Ennis, in which is a very fine window of uncommonly elegant workman- ship; and those on Inniscattery or Scattery Island, in the Shannon, said to have been founded by St Senan (see Kilrush). Kilfenora, 5 m. N.E. of Ennistimon, was until 1752 a separate diocese, and its small cathedral is of interest, with several neighbouring crosses and a holy well. The ruined churches of Kilnaboy, Nouhaval and Teampul Cronan are the most noteworthy of many in the north-west. Five round towers are to be found in various stages of preservation — at Scattery Island, Drumcliffe, Dysert O'Dea, Kilnaboy and Inniscaltra (Lough Derg). The cathedral of the diocese of Killaloe is at the town of that name. Cromlechs are found, chiefly in the rocky limestone district of Burren in the N.W., though there are some in other baronies. That at Ballygannor is formed of a stone 40 ft. long and 10 broad.

See papers by T. J. Westropp in Proceedings of the Royal Irish Academy — " Distribution of Cromlechs in County Clare" (1897); and " Churches of County Clare, and Origin of Ecclesiastical Divisions " (1900).

CLAREMONT, a city of Sullivan county, New Hampshire, U.S.A., situated in the W. part of the state, bordering on the Connecticut river. Pop. (1890) 5565; (1900) 6498 (1442 for- eign-born); (1910) 7529. Area, 6 sq. m. It is served by two branches of the Boston & Maine railway. In Claremont is the Fiske free library (1873), housed in a Carnegie building (1904). The Stevens high school is richly endowed by the gift of Paran Stevens, a native of Claremont. The city contains several villages, the principal being Claremont, Claremont Junction and West Claremont. Sugar river, flowing through the city into the Connecticut and falling 223 ft. within the city limits, furnishes good water-power. Among the manufactures are woollen and cotton goods,

paper, mining and quarrying machinery, rubber goods, linens, shoes, wood trim and pearl buttons. The first settlement here was made in 1762, and a township was organized in 1764; in 1908 Claremont was chartered as a city. It was named from Claremont, Lord Clive's country place.

CLARENCE, DUKES OF. The early history of this English title is identical with that of the family of Clare (q.v.), earls of Gloucester, who are sometimes called earls of Clare, of which word Clarence is a later form. The first duke of Clarence was Lionel of Antwerp (see below), third son of Edward III., who was created duke in 1362, and whose wife Elizabeth was a direct descendant of the Clares, the " Honour of Clare " being among the lands which she brought to her husband. When Lionel died without sons in 1368 the title became extinct; but in 141 2 it was revived in favour of Thomas (see below), the second son of Henry IV. The third creation of a duke of Clarence took place in 146 1, and was in favour of George (see below), brother of the King Edward IV. When this duke, accused by

the king, was attainted and killed in 1478, his titles and estates were forfeited. There appears to have been no other creation of a duke of Clarence until 1789, when William, third son of George III., was made a peer under this title. Having merged in the crown when William became king of Great Britain and Ireland in 1830, the title of duke of Clarence was again revived in 1890 in favour of Albert Victor (1864-1892), the elder son of King Edward VII., then prince of Wales, only to become extinct for the fifth time on his death in 1892.

Lionel of Antwerp, duke of Clarence (1338-1368), third son of Edward III., was born at Antwerp on the 29th of November 1338. Betrothed when a child to Elizabeth (d. 1363), daughter and heiress of William de Burgh, 3rd earl of Ulster (d. 1332), he was married to her in 1352; but before this date he had entered nominally into possession of her great Irish inheritance. Having been named as his father's representative in England in 1345 and again in 1346, Lionel was created earl of Ulster, and joined an expedition into France in 1355, but his chief energies were reserved for the affairs of Ireland. Appointed governor of that country, he landed at Dublin in 1361, and in November of the following year was created duke of Clarence, while his father made an abortive attempt to secure for him the crown of Scotland. His efforts to secure an effective authority over his Irish

lands were only moderately successful; and after v holding a parliament at Kilkenny, which passed the celebrated statute of Kilkenny in 1367, he threw up his task in disgust and returned to England. About this time a marriage was arranged between Clarence and Violante, daughter of Galeazzo Visconti, lord of Pavia (d. 1378); the enormous dowry which Galeazzo promised with his daughter being exaggerated by the rumour of the time. Journeying to fetch his bride, the duke was received in great state both in France and Italy, and was married to Violante at Milan in June 1368. Some months were then spent in festivities, during which Lionel was taken ill at Alba, where he died on the 7th of October 1368. His only child Philippa, a daughter by his first wife, married in 1368 Edmund Mortimer, 3rd earl of March (1351-1381), and through this union Clarence became the ancestor of Edward IV. The poet Chaucer was at one time a page in Lionel's household.

Thomas, duke of Clarence (c. 1388-1421), who was nominally lieutenant of Ireland from 1401 to 1413, and was in command of the English fleet in 1405, acted in opposition to his elder brother, afterwards King Henry V., and the Beauforts during the later part of the reign of Henry IV.; and was for a short time at the head of the government, leading an unsuccessful expedition into France in 1412. When Henry V., however, became king in 1413 no serious dissensions took place between the brothers, and as a member of the royal council Clarence took part in the preparations for the French war. He was with the English king at Harfleur, but not at Agincourt, and shared in the expedition of 141 7 into Normandy, during which he led the assault on Caen, and distinguished himself as a soldier in other similar undertak- ings. When Henry V. returned to England in 1421, the duke remained in France as his lieutenant, and was killed at Beauge whilst rashly attacking the French and their Scottish allies on the -22nd of March 1421. He left no legitimate issue, and the title again became extinct.

George, duke of Clarence (1449-147 8), younger son of Richard, duke of York, by his wife Cicely, daughter of Ralph Neville, ist earl of Westmorland, was born in Dublin on the 21st of October 1449. Soon after his elder brother became king as Edward IV. in March 1461, he was created duke of Clarence, and his youth was no bar to his appointment as lord-lieutenant of Ireland in the following year. Having been mentioned as a possible husband for Mary, daughter of Charles the Bold, after- wards duke of Burgundy, Clarence came under the influence of Richard Neville, earlof Warwick, and in July 1469 was married at Calais to the earl's elder daughter Isabella. With his father- in-law he then acted in a disloyal manner towards the king.

Both supported the rebels in the north of England, and when their treachery was discovered Clarence was deprived of his office as lord-lieutenant and fled to France. Returning to

England with Warwick in September 1470, he witnessed the restoration of Henry VI., when the crown was settled upon himself in case the male line of Henry's family became extinct. The good understanding, however, between Warwick and his son-in-law was not lasting, and Clarence was soon secretly re- conciled with Edward. The public reconciliation between the brothers took place when the king was besieging Warwick in Coventry, and Clarence then fought for the Yorkists at Barnet and Tewkesbury. After Warwick's death in April 1471 Clarence appears to have seized the whole of the vast estates of the earl, and in March 1472 was created by right of his wife earl of Warwick and Salisbury. He was consequently greatly dis- turbed when he heard that his younger brother Richard, duke of Gloucester, was seeking to marry Warwick's younger daughter Anne, and was claiming some part of Warwick's lands. A violent quarrel between the brothers ensued, but Clarence was unable to prevent Gloucester from marrying, and in 1474 the king interfered to settle the dispute, dividing the estates between his brothers. In 1477 Clarence was again a suitor for the hand of Mary, who had just become duchess of Burgundy. Edward objected to the match, and Clarence, jealous of Gloucester's influence, left the court. At length Edward was convinced that Clarence was aiming at his throne. The duke was thrown into prison, and in January 1478 the king unfolded the charges against his brother to the parliament. He had slandered the king; had received oaths of allegiance to himself and his heirs; had prepared for a new rebellion; and was in short incorrigible. Both Houses of Parliament passed the bill of attainder, and the sentence of death which followed was carried out on the 17th or 18th of February 1478. It is uncertain what share Gloucester had in his brother's death; but soon after the event the rumour gained ground that Clarence had been drowned in a butt of malmsey wine. Two of the duke's children survived their father: Margaret, countess of Salisbury (1473-1541), and Edward, earl of Warwick (1475-1499), who passed the greater part of his life in prison and was beheaded in November 1499.

On the last-named see W. Stubbs, Constitutional History, vol. iii. (Oxford, 1895) ; Sir J. H. Ramsay, Lancaster and York (Oxford, 1892); C. W. C. Oman, Warwick the Kingmaker (London, 1891). On the title generally see G. E. C(okayne), Complete Peerage (1887-

1898).

CLARENDON, EDWARD HYDE, ist Earl of (1609-1674), English historian and statesman, son of Henry Hyde of Din ton, Wiltshire, a member of a family for some time established at Norbury, Cheshire, was born on the 18th of February 1609. He entered Magdalen Hall, Oxford, in 1622 (having been refused a demyship at Magdalen College), and graduated B.A. in 1626. Intended originally for holy orders, the death of two elder brothers made him his' father's heir, and in 1625 he entered the Middle Temple. At the university his abilities were more conspicuous than his industry, and at the bar his time was devoted more to general reading and to the society of eminent scholars and writers than to the study of law treatises. This wandering from the beaten track, however, was not without its" advantages. In later years Clarendon declared " next the immediate blessing and providence of God Almighty " that he " owed all the little he knew and the little good that was in him to the friendships and conversation … of the most excellent men in their several kinds that lived in that age." 1 These in- cluded Ben Jonson, Selden, Waller, Hales, and especially Lord Falkland; and from their influence and the wide reading in which he indulged, he doubtless drew the solid learning and literary talent which afterwards distinguished him.

In 1629 he married his first wife, Anne, daughter of Sir George Ayliffe, who died six months afterwards; and secondly, in 1634, Frances, daughter of Sir Thomas Aylesbury, Master of Requests. In 1633 he was called to the bar, and obtained quickly a good position and practice. His marriages had gained for him in- fluential friends, and in December 1634 he was made keeper of the writs and rolls of the common pleas; while his able conduct of the petition of the London merchants against Portland earned Laud's approval. He was returned to the Short Parliament 1 Life, i. 25.

in 1640 as member for Wootton Bassett. Respect and venera- tion for the law and constitution of England were already fundamental principles with Hyde, and the flagrant violations and perversions of the law which characterized the twelve preceding years of absolute rule drove him into the ranks of the popular party. He served on numerous and important com- mittees, and his parliamentary action was directed chiefly to- wards the support and restoration of the law. He assailed the jurisdiction of the earl marshal's court, and in the Long Parlia- ment, in which he sat for Saltash, renewed his attacks and practically effected its suppression. In 1641 he served on the

committees for inquiring into the status of the councils of Wales and of the North, distinguished himself by a speech against the latter, and took an important part in the proceedings against the judges. He supported Strafford's impeachment, and did not .vote against the attainder, subsequently making an un- successful attempt through Essex to avert the capital penalty. 1 Hyde's allegiance, however, to the church of England was as staunch as his support of the law, and was soon to separate him from the popular faction. In February 1641 he opposed the reception of the London petition against episcopacy, and in May the project for unity of religion with the Scots, and the bill for the exclusion of the clergy from secular office. He showed special energy in his opposition to the Root and Branch Bill, and, though made chairman of the committee on the bill on the nth of July in order to silence his opposition, he caused by his successful obstruction the failure of the measure. In consequence he was summoned to the king's presence, and encouraged in his attitude, and at the beginning of the second session was regarded as one of the king's ablest supporters in the Commons. He considered the claims put forward at this time by parliament as a violation and not as a guarantee of the law and constitution. He opposed the demand by the parliament to choose the king's ministers, and also the Grand Remonstrance, to which he wrote a reply published by the king.

He now definitely though not openly joined the royal cause, and refused office in January 1642 with Colepeper and Falkland in order to serve the king's interests more effectually. Charles undertook to do nothing in the Commons without their advice. Nevertheless a few days afterwards, without their knowledge and by the advice of Lord Digby, he attempted the arrest of the five members, a resort to force which reduced Hyde to despair, and which indeed seemed to show that things had gone too far for an appeal to the law. He persevered, nevertheless, in his legal policy, to which Charles after the failure of his project again returned, joined the king openly in June, and continued to compose the king's answers and declarations in which he appealed to the " known Laws of the land " against the arbitrary and illegal acts of a seditious majority in the parliament, his advice to the king being " to shelter himself wholly under the law, . . . pre- suming that the king and the law together would have been strong enough for any encounter." Hyde's appeal had great influence, and gained for the king's cause half the nation. It by no means, however, met with universal support among the royalists, Hobbes jeering at Hyde's love for " mixed monarchy," and the courtiers expressing their disapproval of the " spirit of accommo- dation " which " wounded the regality." It was destined to failure owing principally to the invincible distrust of

Charles created in the parliament leaders, and to the fact that Charles was simultaneously carrying on another and an inconsistent policy, listening to very different advisers, such as the queen and Digby, and resolving on measures (such as the attempt on Hull) without Hyde's knowledge or approval.

War, accordingly, in spite of his efforts, broke out. He was expelled the House of Commons on the nth of August 1642, and was one of those excepted later from pardon. He showed great activity in collecting loans, was present at Edgehill, though not as a combatant, and followed the king to Oxford, residing at All Souls College from October 1642 till March 1645. O n the 22nd of

1 Hist, of the Rebellion, iii. 164, the account being substantially accepted by Gardiner, in spite of inaccuracies in details {Hist. ix. 341, note).

February he was made a privy councillor and knighted, and on the 3rd of March appointed chancellor of the exchequer. He was an influential member of the " Junto " which met every week to discuss business before it was laid before the council. His aim was to gain over some of the leading Parliamentarians by personal influence and personal considerations, and at the Uxbridge negotiations in January 1645, where he acted as principal manager on the king's side, while remaining firm on the great political questions such as the church and the militia, he tried to win individuals by promises of places and honours. He promoted the assembly of the Oxford parliament in December 1643 as a counterpoise to the influence and status of the Long Parliament. Hyde's policy and measures, however, all failed. They had been weakly and irregularly supported by the king, and were fiercely opposed by the military party, who were jealous of the civil influence, and were urging Charles to trust to force and arms alone and eschew all compromise and concessions. Charles fell now under the influence of persons devoid of all legal and constitutional scruples, sending to Glamorgan in Ireland " those strange powers and instructions inexcusable to justice, piety and prudence." 2

Hyde's influence was much diminished, and on the 4th of March 1645 he left the king for Bristol as one of the guardians of the prince of Wales and governors of the west. Here the disputes between the council and the army paralysed the proceedings, and lost, according to Hyde, the finest opportunity since the outbreak of the war of raising a strong force and gaining substantial victories in that part of the country. After Hopton's defeat on the 16th of February 1646, at Torrington, Hyde accompanied the prince, on the 4th of March, to

Stilly, and on the 17th of April, for greater security, to Jersey. He strongly disapproved of the prince's removal to France by the queen's order and of the schemes of assistance from abroad, refused to accompany him, and signed a bond to prevent the sale of Jersey to the French supported by Jermyn. He opposed the projected sacrifice of the church to the Scots and the grant by the king of any but personal or temporary concessions, declaring that peace was only possible " upon the old foundations of government in church and state." He was especially averse to Charles's tampering with the Irish Romanists. " Oh, Mr Secretary," he wrote to Nicholas, " those stratagems have given me more sad hours than all the mis- fortunes in war which have befallen the king and look like the effects of God's anger towards us." 3 He refused to compound for his own estate. While in Jersey he resided first at St Helier and afterwards at Elizabeth Castle with Sir George Carteret. He composed the first portion of his History and kept in touch with events by means of an enormous correspondence. In 1648 he published A Full answer to an infamous and traiterous Pamphlet . . ., a reply to the resolution of the parliament to present no more addresses to the king and a vindication of Charles.

On the outbreak of the second Civil War Hyde left Jersey (26th of June 1648) to join the queen and prince at Paris. He landed at Dieppe, sailed from. that port to Dunkirk, and thence followed the prince to the Thames, where Charles had met the fleet, but was captured and robbed by a privateer, and only joined the prince in September after the latter's return to the Hague. He strongly disapproved of the king's concessions at Newport. When the army broke off the treaty and brought Charles to trial he endeavoured to save his life, and after the execution drew up a letter to the several European sovereigns invoking their assistance to avenge it. Hyde strongly opposed Charles II. 's ignominious surrender to the Covenanters, the alliance with the Scots, and the Scottish expedition, desiring to accomplish whatever was possible there through Montrose and the royalists, and inclined rather to an attempt in Ireland. His advice was not followed, and he gladly accepted a mission with Cottington to Spain to obtain money from the Roman Catholic powers, and to arrange an alliance between Owen O'Neill and Ormonde for the recovery of Ireland, arriving at Madrid on the 26th of November 1649. The defeat, however, of Charles at Dunbar, and the confirmation of Cromwell's ascendancy, influenced the Spanish government 2 Clarendon St. Pap. ii. 337. 3 Ibid.

against them, and they were ordered to leave in December 1650. Hyde arrived at Antwerp in January 1651, and in December rejoined Charles at Paris after the latter's escape from Worcester. He now became one of his chief advisers, accompanying him in his change qf residence to Cologne in October 1654 and to Bruges in 165&, and was appointed lord chancellor on the 13th of January 1658. His influence was henceforth maintained in spite of the intrigues of both Romanists and Presbyterians, as well as the violent and openly displayed hostility of the queen, and was employed unremittingly in the endeavour to keep Charles faithful to the church and constitution, and in the prevention of unwise concessions and promises which might estrange the general body of the royalists. His advice to Charles was to wait upon the turn of events, " that all his activity was to consist in carefully avoiding to do anything that might do him hurt and to expect some blessed conjuncture." 1 In 1656, during the war between England and Spain, Charles received offers of help from the latter power provided he could gain a port in England, but Hyde discouraged small isolated attempts. He expected much from Cromwell's death. The same year he made an alliance with the Levellers, and was informed of their plots to assassinate the protector, without apparently expressing any disapproval. 2 He was well supplied with information from England, 3 and guided the action of the royalists with great ability and wisdom during the interval between Cromwell's death and the Restoration, urged patience, and advocated the obstruction of a settlement between the factions contending for power and the fomentation of their jealousies, rather than premature risings.

The Restoration was a complete triumph for Hyde's policy. He lays no stress on his own great part in it, but it was owing to him that the Restoration was a national one, by the consent and invitation of parliament representing the whole people and not through the medium of one powerful faction enforcing its will upon a minority, and that it was not only a restoration of Charles but a restoration of the monarchy. By Hyde's advice concessions to the inconvenient demands of special factions had been avoided by referring the decision to a " free parliament," and the declaration of. Breda reserved for parlia- ment the settlement of the questions of amnesty, religious toleration and the proprietorship of forfeited lands.

Hyde entered London with the king, all attempts at effecting his fall having failed, and immediately obtained the chief place in the government, retaining the chancellorship of the exchequer till the 13th <*f May 1661, when he surrendered it to Lord Ashley. He took his seat as speaker of the House of Lords and in the court of chancery on the ist of June 1660. On the 3rd of November 1660 he was made

Baron Hyde of Hindon, and on the 20th of April 1661 Viscount Cornbury and earl of Clarendon, receiving a grant from the king of £20,000 and at different times of various small estates and Irish rents. The marriage of his daughter Anne to James, duke of York, celebrated in secret in September 1660, at first alarmed Clarendon on account of the public hostility he expected thereby to incur, but finding his fears unconfirmed he acquiesced in its public recognition in December, and thus became related in a special manner to the royal family and the grandfather of two English sovereigns. 4

Clarendon's position was one of great difficulties, but at the same time of splendid opportunities. In particular a rare occasion now offered itself of settling the religious question on a broad principle of comprehension or toleration; for the monarchy had been restored not by the supporters of the church alone but largely by the influence and aid of the nonconformists and also of the Roman Catholics, who were all united at that happy

1 Hist, of the Rebellion, xiii. 140.

2 Clarendon State Papers, iii. 316, 325, 341, 343.

3 Hist. MSS. Comm.: MSS. of F. W. Leyborne-Popkam, 227.

4 Anne Hyde (1637-1671), eldest daughter of the chancellor, was the mother by James of Queen Mary and Queen Anne, besides six other children, including four sons who all died in infancy. She became a Roman Catholic in 1670 shortly before her death, and was buried in the vault of Mary, queen of Scots, in Henry VII. 's chapel in Westminster Abbey.

moment by a common loyalty to the throne. Clarendon appears to have approved of comprehension but not of toleration. He had already in April 1660 sent to discuss terms with the leading Presbyterians in England, and after the Restoration offered bishoprics to several, including Richard Baxter. He drew up the royal declaration of October, promising limited episcopacy and a revised prayer-book and ritual, which was subsequently thrown out by parliament, and he appears to have anticipated some kind of settlement from the Savoy Conference which sat in April 1661. The failure of the latter proved perhaps that the differences were too great for compromise, and widened the breach. The parliament immediately proceeded to pass the series of narrow and tyrannical measures against the dissenters known as the Clarendon Code. The Corporations Act, obliging members of corporations to denounce the Covenant and take the

sacrament according to the Anglican usage, became law on the 20th of December 1661, the Act of Uniformity enforcing the use of the prayer-book on ministers, as well as a declaration that it was unlawful to bear arms against the sovereign, on the 19th of May 1662, and these were followed by the Conventicle Act in 1664 suppressing conventicles and by the Five-Mile Act in 1665 forbidding ministers who had refused subscription to the Act of Uniformity to teach or reside within 5 m. of a borough. Clarendon appears to have reluctantly acquiesced in these civil measures rather than to have originated them, and to have endeavoured to mitigate their injustice and severity. He supported the con- tinuance of the tenure by presbyterian ministers of livings not held by Anglicans and an amendment in the Lords allowing a pension to those deprived, earning the gratitude of Baxter and the nonconformists. On the 17th of March 1662 he introduced into parliament a declaration enabling the king to dispense with the Act of Uniformity in the case of ministers of merit. 6 But once committed to the narrow policy of intolerance, Claren- don was inevitably involved in all its consequences. His char- acteristic respect for the law and constitution rendered him hostile to the general policy of indulgence, which, though the favourite project of the king, he strongly opposed in the Lords, and in the end caused its withdrawal. He declared that he could have wished the law otherwise, ” but when it was passed, he thought it absolutely necessary to see obedience paid to it without any connivance.” 6 Charles was greatly angered. It was believed in May 1663 that the intrigues of Bennet and Buckingham, who seized the opportunity of ingratiating them- selves with the king by zealously supporting the indulgence, had secured Clarendon’s dismissal, and in July Bristol ventured to accuse him of high treason in the parliament; but the attack, which did not receive the king’s support, failed entirely and only ended in the banishment from court of its promoter. Clarendon’s opposition to the court policy in this way acquired a personal character, and he was compelled to identify himself more com- pletely with the intolerant measures of the House of Commons. Though not the originator of the Conventicle Act or of the Five- Mile Act, he has recorded his approval, 7 and he ended by taking alarm at plots and rumours and by regarding the great party of nonconformists, through whose co-operation the monarchy had been restored, as a danger to the state whose ” faction was their religion.” 8

Meanwhile Clarendon’s influence and direction had been predominant in nearly all departments of state. He supported the exception of the actual regicides from the Indemnity, but only ten out of the twenty-six condemned were executed, and Clarendon, with the king’s support, prevented the passing of a bill in 1661 for the execution of thirteen

more. He upheld the Act of Indemnity against all the attempts of the royalists to upset it. The conflicting claims to estates were left to be decided by the law. The confiscations of the usurping government accord- ingly were cancelled, while the properly executed transactions

6 See Hist. MSS. Comm.: Various Collections, ii. 118, and MSS. of Duke of Somerset, 94.

6 Continuation, 339. ‘ lb. jn, 776.

8 Lister’s Life of Clarendon, ii. 295; Hist. MSS. Comm.: Various Collections, ii. 379.

between individuals were necessarily upheld. There can be little doubt that the principle followed was the only safe one in the prevailing confusion. Great injustice was indeed suffered by individuals, but the proper remedy of such injustice was the benevolence of the king, which there is too much reason to believe proved inadequate and partial. The settlement of the church lands which was directed by Clarendon presented equal difficulties and involved equal hardships. In settling Scotland Clarendon’s aim was to make that kingdom dependent upon England and to uphold the Cromwellian union. He proposed to establish a council at Whitehall to govern Scottish affairs, and showed great zeal in endeavouring to restore episco- pacy through the medium of Archbishop Sharp. His influence, however, ended with the ascendancy of Lauderdale in 1663. He was, to some extent at least, responsible for the settlement in Ireland, but, while anxious for an establishment upon a solid Protestant basis, urged ” temper and moderation and justice ” in securing it. He supported Ormonde’s wise and enlightened Irish administration, and in particular opposed persistently the prohibition of the import of Irish cattle into England, incurring thereby great unpopularity. He showed great activity in the advancement of the colonies, to whom he allowed full freedom of religion. He was a member of the council ‘for foreign plantations, and one of the eight lords proprietors of Carolina in 1663; and in 1664 sent a commission to settle disputes in New England. In the department of foreign affairs he had less influence. His policy was limited to the maintenance of peace ” necessary for the reducing [the king’s] own dominions into that temper of subjection and obedience as they ought to be in.” 1 In 1664 he demanded, on behalf of Charles, French support, and a loan of £50,000 against dis- turbance at home,

and thus initiated that ignominious system of pensions and dependence upon France which proved so injurious to English interests later. But he was the promoter neither of the sale of Dunkirk on the 27th of October 1662, the author of which seems to have been the earl of Sandwich, 2 nor of the Dutch War. He attached considerable value to the possession of the former, but when its sale was decided he con- ducted the negotiations and effected the bargain. He had zealously laboured for peace with Holland, and had concluded a treaty for the settlement of disputes on the 4th of September 1662. Commercial and naval jealousies, however, soon involved the two states in hostilities. Cape Corso and other Dutch possessions on the cost of Africa, and New Amsterdam in America, were seized by squadrons from the royal navy in 1664, and hostilities were declared on the 22nd of February 1665. Clarendon now gave his support to the war, asserted the extreme claims of the English crown over the British seas, and contem- plated fresh cessions from the Dutch and an alliance with Sweden and Spain. According to his own account he initiated the policy of the Triple Alliance, 3 but it seems clear that his inclination towards France continued in spite of the intervention of the latter state in favour of Holland; and he took part in the negotiations for ending the war by an undertaking with Louis XIV. implying a neutrality, while the latter seized Flanders. The crisis in this feeble foreign policy and in the general official mismanagement was reached in June 1667, when the Dutch burnt several ships at Chatham and when ” the roar of foreign guns were heard for the first and last time by the citizens of London.” 4

The whole responsibility for the national calamity and disgrace, and for the ignominious peace which followed it, was unjustly thrown on the shoulders of Clarendon, though it must be admitted that the disjointed state of the administration and want of control over foreign policy were largely the causes of the disaster, and for these Clarendon’s influence and obstruction of official reforms were to some extent answerable. According to Sir William Coventry, whose opinion has weight and who acknow- ledges the chancellor’s fidelity to the king, while Clarendon ” was

1 Continuation, 1 170.

2 Hist. MSS. Comm.: MSS. of F. W. Leyborne-Popham, 250. 4 Macaulay’s Hist, of England, i. 193.

3 Continuation, 1066.

so great at the council board and in the administration of matters,

there was no room for anybody to propose any remedy to what was remiss … he managing all things with that greatness which will now be removed.” 6 He disapproved of the system of boards and committees instituted during the Commonwealth, as giving too much power to the parliament, and regarded the administra- tion by the great officers of state, to the exclusion of pure men of business, as the only method compatible with the dignity and security of the monarchy. The lowering of the prestige of the privy council, and its subordination first to the parliament and afterwards to the military faction, he considered as one of the chief causes of the fall of Charles I. He aroused a strong feeling of hostility in the Commons by his opposition to the appropriation of supplies in 1665, and to the audit of the war accounts in 1666, as ” an introduction to a commonwealth ” and as ” a new encroach- ment,” and by his high tone of prerogative and authority, while by his advice to Charles to prorogue parliament he incurred their resentment and gave colour to the accusation that he had advised the king to govern without parliaments. He was unpopular among all classes, among the royalists on account of the Act of Indemnity, among the Presbyterians because of the Act of Uniformity. It was said that he had invented the maxim ” that the king should buy and reward his enemies and do little for his friends, because they are his already. ” 6 Every kind of mal- administration was currently ascribed to him, of designs to govern by a standing army, and of corruption. He was credited with having married Charles purposely to a barren queen in order to raise his own grandchildren to the throne, with having sold Dunkirk to France, and his magnificent house in St James’s was nicknamed ” Dunkirk House,” while on the day of the Dutch attack on Chatham the mob set up a gibbet at his gate and broke his windows. He had always been exceedingly unpopular at court, and kept severely aloof from the revels and licence which reigned there. Evelyn names ” the buffoons and the misses to whom he was an eyesore.” 7 He was intensely disliked by the royal mistresses, whose favour he did not condescend to seek, and whose presence and influence were often the subject of his reproaches. 8 A party of younger men of the king’s own age, more congenial to his temperament, and eager to drive the old chancellor from power and to succeed him in office, had for some time been endeavouring to undermine his influence by ridicule and intrigue. Surrounded by such general and violent animosity, Clarendon’s only hope could be in the support of the king. But the chancellor had early and accurately gauged the nature and extent of the king’s attachment to him, which proceeded neither from affection nor gratitude but ” from his aversion to be troubled with the intricacies of his affairs,” and in 1661 he had resisted the importunities of Ormonde to resign the great seal for the

lord treasurership with the rank of ” first minister,” ” a title newly translated out of French into English,” on account of the obloquy this position would incur and the further dependence which it entailed upon the inconstant king. 9 Charles, long weary of the old chancellor’s rebukes, was especially incensed at this time owing to his failure in securing Frances Stuart (la Belle Stuart) for his seraglio, a disappointment which he attributed to Clarendon, and was now alarmed by the hostility which his administration had excited. He did not scruple to sacrifice at once the old adherent of his house and fortunes. ” The truth is,” he wrote Ormonde, ” his behaviour and humour was grown so insupportable to myself and all the world else that I could no longer endure it, and it was impossible for me to live with it and do these things with the Parliament that must be done, or the government will be lost.” 10 By the direction of Charles, James advised Clarendon to resign before the meeting of parliament, but in an interview with the king on the 26th of August Clarendon refused to deliver up the seal unless dismissed, and urged him not to take a step ruinous to the interests both of the chancellor

6 Pepys’s Diary, Sept. 2, 1667.

6 Hist. MSS. Comm., 7th Rep. 162. 7 Diary, iii. 95, 96.

8 Lives from the Clarendon Gallery, by Lady Th. Lewis, i. 39; Burnet’s Hist, of his own Times, i. 209.

9 Continuation, 88. 10 Lister’s Life of Clarendon, ii. 416.

himself and of the crown. 1 He could not believe his dismissal was really intended, but on the 30th of August he was deprived of the great seal, for which the king received the thanks of the parlia- ment on the 16th of October. On the 12th of November his im- peachment, consisting of various charges of arbitrary government, corruption and maladministration, was brought up to the Lords, but the latter refused to order his committal, on the ground that the Commons had only accused him of treason in general without specifying any particular charge’. Clarendon wrote humbly to the king asking for pardon, and that the prosecution might be prevented, but Charles had openly taken part against him, and, though desiring his escape, would not order or assist his departure for fear of the Commons. Through the bishop of Hereford, however, on the 29th of November he pressed Clarendon to

fly, promising that he should not during his absence suffer in his honour or fortune. Clarendon embarked the same night for Calais, where he arrived on the 2nd of December. The Lords immediately passed an act for his banishment and ordered the petition forwarded by him to parliament to be burnt.

The rest of Clarendon's life was passed in exile. He left Calais for Rouen on the 25th of December, returning on the 21st of January 1668, visiting the baths of Bourbon in April, thence to Avignon in June, residing from July 1668 till June 1671 at Montpellier, whence he proceeded to Moulins and to Rouen again in May 1674. His sudden banishment entailed great personal hardships. His health at the time of his flight was much impaired, and on arriving at Calais he fell dangerously ill; and Louis XIV., anxious- at this time to gain popularity in England, sent him peremptory and repeated orders to quit France. He suffered severely from gout, and during the greater part of his exile could not walk without the aid of two men. At Evreux, on the 23rd of April 1668, he was the victim of a murderous assault by English sailors, who attributed to him the non-payment of their wages, and who were on the point of despatching him when he was rescued by the guard. For some time he was not allowed to see any of his children; even corre- spondence with him was rendered treasonable by the Act of Banishment; and it was not apparently till 1671, 1673 and 1674 that he received visits from his sons, the younger, Lawrence Hyde, being present with him at his death.

Clarendon bore his troubles with great dignity and fortitude. He found consolation in religious duties, and devoted a portion of every day to the composition of his Contemplations on the Psalms, and of his moral essays. Removed effectually from the public scene, and from all share in present politics, he turned his attention once more to the past and finished his History and his Autobiography. Soon after reaching Calais he had written, on the 17th of December 1667, to the university of Oxford, desiring as his last request that the university should believe in his innocence and remember him, though there could be no further mention of him in their public devotions, in their private prayers. 2 In 1668 he wrote to the duke and duchess of York to remonstrate on the report that they had turned Roman Catholic, to the former urging " You cannot be without zeal for the Church to which your blessed father made himself a sacrifice," adding that such a change would bring a great storm against the Romanists. He entertained to the last hopes of obtaining leave to return to England. He asked for permission in June 167 1 and in August 1674. In the dedication of his Brie} View of Mr Hobbes's Book Leviathan he repeats " the hope which sustains my weak, decayed spirits that your Majesty will at some time call to

your remembrance my long and incorrupted fidelity to your person and your service “; but his petitions were not even answered or noticed. He died at Rouen on the 9th of December 1674. He was buried in Westminster Abbey at the foot of the steps at the entrance to Henry VII. ‘s chapel. He left two sons, Henry, 2nd earl of Clarendon, and Lawrence, earl of Rochester, his daughter Anne, duchess of York, and a third son, Edward, having predeceased him. His male descendants became extinct on the death of the 4th earl of Clarendon and 2nd earl of Rochester in 1753, the title of Clarendon being

1 Continuation, 1137. 2 Clarendon St. Pap. iii. Suppl. xxxvii.

revived in 1776 in the person of Thomas Villiers, who had married the granddaughter and heir of the last earl.

As a statesman Clarendon had obvious limitations and failings. He brought to the consideration of political questions an essenti- ally legal but also a narrow mind, conceiving the law, ” that great and admirable mystery,” and the constitution as fixed, unchangeable and sufficient for all time, in contrast to Pym, who regarded them as living organisms capable of continual development and evolution; and he was incapable of compre- hending and governing the new conditions and forces created by the civil wars. His character, however, and therefore to some extent his career, bear the indelible marks of greatness. He left the popular cause at the moment of its triumph and showed in so doing a strict consistency. In a court degraded by licence and self-indulgence, he maintained his self-respect and personal dignity regardless of consequences, and in an age of almost universal corruption and self-seeking he preserved a noble integrity and patriotism. At the Restoration he showed great moderation in accepting rewards. He, refused a grant of 10,000 acres in the Fens from the king on the ground that it would create an evil precedent, and amused Charles and James by his indignation at the offer of a present of £10,000 from the French minister Fouquet, the only present he accepted from Louis XIV. being a set of books printed at the Louvre. His’ income, however, as lord chancellor was very large, and Clarendon maintained considerable state, considering it due to the dignity of the monarchy that the high officers should carry the external marks of greatness. The house built by him in St James’s was one of the most magnificent ever seen in England, and was filled with a collection of portraits, chiefly those of contemporary statesmen and men of letters. It cost Clarendon £50,000, in- volved him deeply jn debt and was considered one of the chief causes of the ” gust of envy ” that caused his fall. 3 He is described as ” a fair, ruddy, fat, middle-statured, handsome man,” and his appearance was stately and

dignified. He expected deference from his inferiors, and one of the chief charges which he brought against the party of the young politicians was the want of respect with which they treated himself and the lord treasurer. His industry and devotion to public business, of which proofs still remain in the enormous mass of his state papers and correspondence, were exemplary, and were rendered all the more conspicuous by the negligence, inferiority in business, and frivolity of his successors. As lord chancellor Clarendon made no great impression in the court of chancery. His early legal training had long been interrupted, and his political preoccupations probably rendered necessary the delegation of many of his judicial duties to others. According to Speaker Onslow his decrees were always made with the aid of two judges. Burnet praises him, however, as ” a very good chancellor, only a little too rough but very impartial in the administration of justice,”, and Pepys, who saw him presiding in his court, perceived him to be ” a most able and ready man.” 4 According to Evelyn, ” though no considerable lawyer ” he was ” one who kept up the fame and substance of things in the nation with . . . solemnity.” He made good appointments to the bench and issued some important orders for the reform of abuses in his court. 6 As chancellor of Oxford University, to which office he was elected on the 27th of October 1660, Clarendon promoted 1 he restoration of order and various educa- tional reforms. In 1753 his manuscripts were left to the university by his great-grandson Lord Cornbury, and in 1868 the money gained by publication was spent in erecting the Clarendon Laboratory, the profits of the History having provided in 1713 a building fcr the university press adjoining the Sheldonian theatre, known since the removal of the press to its present quarters as the Clarendon Building.

Clarendon had risen to high office largely through his literary and oratorical gifts. His eloquence was greatly admired by

3 Evelyn witnessed its demolition in 1683 — Diary, May 19th, Sept. 18th; Lives from the Clarendon Gallery, by Lady Th. Lewis, i. 40.

4 Diary, July 14th, 1664. 6 Lister, ii. 528.

Evelyn and Pepys, though Burnet criticises it as too copious. He was a great lover of books and collected a large library, was well read in the Roman and in the contemporary histories both foreign and English, and could appreciate Carew, Ben Jonson and Cowley. As a writer and

historian Clarendon occupies a high place in English literature. His great work, the History of the Rebellion, is composed in the grand style. A characteristic feature is the wonderful series of well-known portraits, drawn with great skill and liveliness and especially praised by Evelyn and by Macaulay. The long digressions, the lengthy sentences, and the numerous parentheses do not accord with modern taste and usage, but it may be observed that these often follow more closely the natural involutions of the thought, and express the argument more clearly, than the short disconnected sentences, now generally employed, while in rhythm and dignity Clarendon's style is immeasurably superior. The composition, however, of the work as a whole is totally wanting in proportion, and the book is overloaded with state papers, misplaced and tedious in the narrative. In considering the accuracy of the history it is important to remember the dates and circumstances of the composition of its various portions. The published History is mainly a compilation of two separate original manuscripts, the first being the history proper, written between 1646 and 1648, with the advantage of a fresh memory and the help of various documents and authorities, and ending in March 1644, and the second being the Life, extending from 1609 to 1660, but composed long afterwards in exile and without the aid of papers between 1668 and 1670. The value of any statement, therefore, in the published History depends chiefly on whether it is taken from the History proper or the Life. In 167 1 these two manuscripts were united by Clarendon with certain alterations and modifications making Books i.-vii.of the published History, while Books viii.xv. were written subsequently, and, being composed for the most part without materials, are generally inaccurate, with the notable exception of Book ix., made up from two narratives written at Jersey in 1646, and containing very little from the Life. Sincerity and honest conviction are present on every page, and the in accuracies are due not to wilful misrepresentation, but to failure of memory and to the disadvantages under which the author laboured in exile. But they lessen considerably the value of his work, and detract from his reputation as chronicler of con- temporary events, for which he was specially fitted by his practical experience in public business, a" qualification declared by himself to be the " genius, spirit and soul of an historian." In general, Clarendon, like many of his contemporaries, failed signally to comprehend the real issues and principles at stake in the great struggle, laying far too much stress on personalities and never understanding the real aims and motives of the Presbyterian party. The work was first published in 1 702-1 704 from a copy of a transcript made by Clarendon's secretary, with a few unimportant alterations, and was the object of a violent attack by John Oldmixon

for supposed changes and omissions in Clarendon and Whitelocke compared (1727) and again in a preface to his History of England (1730), repelled and refuted by John Burton in the Genuineness of Lord Clarendon's History Vindicated (1744). The history was first published from the original in 1826; the best edition being that of 1888 edited by W. D. Macray and issued by the Clarendon Press. The Lord Clarendon's History . . . Compleated, a supplement containing portraits and illustrative papers, was published in 1717, and An Appendix to the History, containing a life, speeches and various pieces, in 1724. The Sutherland Clarendon in the Bodleian library at Oxford contains several thousand portraits and illustrations of the History. The Life of Edward, earl of Clarendon . . .[and the] Continuation of the History . . ., the first consisting of that portion of the Life not included in the History, and the second of the account of Clarendon's administration and exile in France, begun in 1672, was published in 1759, the History of the Reign of King Charles II. from the Restoration . . ., published about 1755, being a surreptitious edition of this work, of which the latest and best edition is that of the Clarendon Press of 1857. Clarendon was also the author of The Difference and Disparity

between the Estate and Condition of George, duke of Buckingham and Robert, earl of Essex, a youthful production vindicating Buckingham, printed in Reliquiae Wottonianae (1672), i. 184; Animadversions on a Book entitled Fanaticism (1673); A Brief View . . . of the dangerous . . . errors in . . . Mr Hobbes's book entitled " Leviathan " (1676); The History of the Rebellion and Civil War in. Ireland (17 19); A Collection of Several Pieces of Edward, earl of Clarendon, containing reprints of speeches from the journals of the House of. Lords and of the History of the Rebellion in Ireland (1727); A Collection of Several Tracts containing his Vindication in answer to his impeachment, Reflections upon several Christian Duties, Two Dialogues on Education and on the want of Respect due to age, and Contemplations on the Psalms (1727); Religion and Policy (1811); Essays moral and entertaining on the various faculties and passions of the human mind (1815, and in British Prose Writers, 1819, vol. i.); Speeches in Rushworth's Collections (1692), pt. iii. vol. i. 230, 333; Declarations and Manifestos (Clarendon being the author of nearly all on the king's side between March 1642 and March 1645, the first being the answer to the Grand Remonstrance in January 1642, but not of the answer to the XIX. Propositions or the apology for the King's attack upon Brentford) in the published History, Rushworth's Collections, E. Husband's Collections of Ordinances and Declarations (1646), Old Parliamentary History (1751-1762), Somers Tracts, State Tracts,

Harleian Miscellany, Thomasson Tracts (Brit. Mus.),E. 157 (14); and a large number of anonymous pamphlets aimed against the parliament, including Transcendent and Multiplied Rebellion and Treason (1645), A Letter from a True and Lawful Member of Parliament . . . to one of the Lords of his Highness's Council (1656), and Two Speeches made in the House of Peers on Monday igth Dec. [1642] . . . (Somers Tracts, Scott, vi. 576); Second Thoughts (n.d., in favour of a limited toleration) is ascribed to him in the Catalogue in the British Museum; A Letter . . . to one of the Chief Ministers of the Nonconforming Party . . . (Saumur, 7th May 1674) has been attributed to him on insufficient evidence.

Clarendon's correspondence, amounting to over 100 volumes, is in the Bodleian library at Oxford, and other letters are to be found in Additional MSS. in the British Museum. Selections have been published under the title of State Papers Collected by Edward, earl of Clarendon (Clarendon State Papers) between 1767 and 1786, and the collection has been calendared up to 1657 in 1869, 1872, 1876. Other letters of Clarendon are to be found in Lister's Life of Clarendon, Hi.; Nicholas Papers (Camden Soc, 1886); Diary of J. Evelyn, appendix; Sir R. Fanshaw's Original Letters (1724); Warburton's Life of Prince Rupert (1849): Barwick's Life of Barwick (1724); Hist. MSS. Comm. 10th Rep pt. vi. pp. 193-216, and in the Harleian Miscellany.

Bibliography. — Clarendon's autobiographical works and Letters enumerated above, and the MS. Collection in the Bodleian library. The Lives of Clarendon by T. H. Lister (1838), and by C. H. Firth in the Diet, of Nat. Biography (with authorities there collected), completely supersede all earlier accounts including that in Lives of All the Lord Chancellors (1708), in Macdiarmid's Lives of British Statesmen (1807), and in the different Lives by Wood in Athenae Oxonienses (Bliss), iii. 1018; while those in J. H. Browne's Lives of the Prime Ministers of England (1858), in Lodge's Portraits, in Lord Campbell's Lives of the Chancellors, iii. no (1845), and in Foss's Judges, supply no further information. In Historical Inquiries respecting the Character of Edward Hyde, earl of Clarendon, various charges against Clarendon were collected by G. A. Ellis (1827) and answered by Lister, vol. ii. 529, and by Lady Th. Lewis in Lives of the Contemporaries of Lord Clarendon (1852), i. preface pt. i. For criticisms of the History see Gardiner's Civil Wars (1893), iii. 121; Ranke's Hist, of England, vi. 3-29; Die Politik Karls des Ersten . . . und Lord Clarendon's Darstellung, by A. Buff (1868) ; article in the. Diet, of Nat. Biog. by C. H. Firth, and especially a series of admirable articles by the same author in the Eng. Hist. Review (1904). For description of the MS., Macray's edition of the History (1888), Lady Th. Lewis's Lives from

the Clarendon Gallery, i. introd. pt. ii. ; for list of earlier editions, Ath. Oxon. (Bliss) iii. 1017. Lord Lansdowne defends Sir R. Granville against Clarendon's strictures in the Vindication (Genuine Works of G. Granville, Lord Lansdowne,]• 5°3 [I 73 2 D. and Lord Ashburnham defends John Ashburnham in A Narrative by John Ashburnham (1830). See also Notes at Meetings of the Privy Council between Charles II. and the Earl of Clarendon (Roxburghe Club. 1896); General Orders of the High Court of Chancery, by J. Beames (1815), 147-221 ; S. R. Gardiner's

Hist, of England, of the Civil War and of the Commonwealth; Lord Clarendon, by A. Chassant (account of the assault at Evreux) (1891) ; Annals of the Bodleian Library, by W. D. Macray (1868); Masson's Life of Milton; Life of Sir G. Savile, by H. C. Foxcroft (1898): Cal. of St. Pap. Dom., esp. 1667-1668, 58, 354, 370; Hist. MSS. Comm. SeHes, MSS. of J. M. Heathcote and Various Collections, vol. ii. ; Add. MSS. in the British Museum; Notes and Queries, 6 ser. v. 283, 9 ser. xi. 182, 1 ser. ix. 7; Pepys's Diary; J. Evelyn's Diary and Correspondence; Gen. Catalogue in British Museum; Edward Hyde, earl of Clarendon (1909), a lecture delivered at Oxford during the Clarendon centenary by C. H. Firth. (P. C. Y.)

CLARENDON, GEORGE WILLIAM FREDERICK VILLIERS,

4TH Earl osfin the Villiers line) (1800-1870), English diplomatist and statesman, was born in London on the 12th of January 1S00. He was the eldest son of Hon. George Villiers (1750-1827, youngest son of the 1st earl of Clarendon (second creation), by Theresa, only daughter of the first Lord Boringdon, and grand- daughter of the first Lord Grantham. The earldom of the lord chancellor Clarendon became extinct in the Hyde line by the death of the 4th earl, his last male descendant. Jane Hyde, countess of Essex, the sister of that nobleman (she died in 1724), left two daughters; of these the eldest, Lady Charlotte, became heiress of the Hyde family. She married Thomas Villiers (1709- 1786), second son of the 2nd earl of Jersey, who served with distinction as English minister in Germany, and in 1776 the earldom of Clarendon was revived in his favour. The connexion with the Hyde family was therefore in the female line and somewhat remote. But a portion of the pictures and plate of the great chancellor was preserved to this branch of the family, and remains at The Grove, their family seat at Hertfordshire. The 2nd and 3rd earls were sons of the 1st, and, neither of them having sons, the title passed, on the death of the 3rd earl (John Charles) in 1838, to their younger

brother's son.

Young George Villiers entered upon life in circumstances which gave small promise of the brilliancy of his future career. He was well born; he was heir presumptive to an earldom; and his mother was a woman of great energy, admirable good sense, and high feeling. But the means of his family were contracted; his education was desultory and incomplete; he had not the advantages of a training either at a public school or in the House of Commons. He went up to Cambridge at the early age of sixteen, and entered St John's College on the 29th of June 1816. In 1820, as the eldest son of an earl's brother with royal descent, he was enabled to take his M.A. degree under the statutes of the university then in force. In the same year he was appointed attache to the British embassy at St Petersburg, where he remained three years, and gained that practical knowledge of diplomacy which was of so much use to him in after-life. He had received from nature a singularly handsome person, a polished and engaging address, a ready command of languages, and a remarkable power of composition.

Upon his return to England in 1823 he was appointed to a commissionership of customs, an office which he retained for about ten years. In 1831 he was despatched to France to negotiate a commercial treaty, which, however, led to no result. On the 16th of August 1833 he was appointed minister at the court of Spain. Ferdinand VII. died within a month of his arrival at Madrid, and the infant queen Isabella, then in the third year of her age, was placed by the old Spanish law of female inheritance on her contested throne. Don Carlos, the late king's brother, claimed the crown by virtue of the Salic law of the House of Bourbon which Ferdinand had renounced before the birth of his daughter. Isabella II. and her mother Christina, the queen regent, became the representatives of constitutional monarchy, Don Carlos of Catholic absolutism. The conflict which had divided the despotic and the constitutional powers of Europe since the French Revolution of 1830 broke out into civil war in Spain, and by the Quadruple Treaty, signed on the 22nd of April 1834, France and England pledged themselves to the defence of the constitutional thrones of Spain and Portugal. For six years Villiers continued to give the most active and intelligent support to the Liberal government of Spain. He was accused, though unjustly, of having favoured the revolution

of La Granja, which drove Christina, the queen mother, out o\ the kingdom, and raised Espartero to the regency. He un- doubtedly

supported the chiefs of the Liberal party, such as Espartero, against the intrigues of the French court; but the object of the British government was to establish the throne of Isabella on a truly national and liberal basis and to avert those complications, dictated by foreign influence, which eventu- ally proved so fatal to that princess. Villiers received the grand cross of the Bath in 1838 in acknowledgment of his services, and succeeded, on the death of his uncle, to the title of earl of Clarendon; in the following year, having left Madrid, he married Katharine, eldest daughter of James Walter, first earl of Verulam.

In January 1840 he entered Lord Melbourne's administration as lord privy seal, and from the death of Lord Holland in the autumn of that year Lord Clarendon also held the office of chancellor of the duchy of Lancaster until the dissolution of the ministry in 1841. Deeply convinced that the maintenance of a cordial understanding with France was the most essential condition of peace and of a liberal policy in Europe, he reluctantly concurred in the measures proposed by Lord Palmerston for the expulsion of the pasha of Egypt from Syria; he strenuously advocated, with Lord Holland, a more conciliatory policy towards France; and he was only restrained from sending in his resignation by the dislike he felt to break up a cabinet he had so recently joined.

The interval of Sir Robert Peel's great administration (1841- 1846) was to the leaders of the Whig party a period of repose; but Lord Clarendon took the warmest interest in the triumph of the principles of free trade and in the repeal of the corn-laws, of which his brother, Charles Pelham Villiers (q.v.), had been one of the earliest champions. For this reason, upon the forma- tion of Lord John Russell's first administration, Lord Clarendon accepted the office of president of the Board of Trade. Twice in his career the governor-generalship of India was offered him, and once the governor-generalship of Canada; — these he refused from reluctance to withdraw from the politics of Europe. But in 1847 a sense of duty compelled him to take a far more laborious and uncongenial appointment. The desire of the cabinet was to abolish the lord-lieutenancy of Ireland, and Lord Clarendon was prevailed upon to accept that office, with a view to transform it ere long into an Irish secretaryship of state. But he had not been many months in Dublin before he acknowledged that the difficulties then existing in Ireland could only be met by the most vigilant and energetic authority, exercised on the spot. The crisis was one of extraordinary peril. Agrarian crimes of horrible atrocity had increased threefold. The Catholic clergy were openly disaffected. This was the second year of the Irish famine, and extraordinary measures were required to regulate the bounty of the government and the nation. In

1848 the revolution in France let loose fresh elements of discord, which culminated in an abortive insurrection, and for a lengthened period Ireland was a prey to more than her wonted symptoms of disaffection and disorder. Lord Clarendon remained viceroy of Ireland till 1852, and left behind him permanent marks of improvement. His services were expressly acknowledged in the queen's speech to both Houses of Parliament on the 5th of September 1848 — this being the first time that any civil services obtained that honour; and he was made a knight of the Garter (retaining also the grand cross of the Bath by special order) on the 23rd of March 1849.

Upon the formation of the coalition ministry between the Whigs and the Peelites, in 1853, under Lord Aberdeen, Lord Clarendon became foreign minister. The country was already " drifting " into the Crimean War, an expression of his own which was never forgotten. Clarendon was not responsible for the policy which brought war about; but when it occurred he employed every means in his power to stimulate and assist the war departments, and above all he maintained the closest relations with the French. The tsar Nicholas had speculated on the impossibility of the sustained joint action of France and England in council and in the field. It was mainly by Lord Clarendon at Whitehall and by Lord Raglan before Sevastopol

th"t such a combination was rendered practicable, and did eventually triumph over the enemy. The diplomatic conduct of such an alliance for three years between two great nations jealous of their military honour and fighting for no separate political advantage, tried by excessive hardships and at moments on the verge of defeat, was certainly one of the most arduous duties ever performed by a minister. The result was due in the main to the confidence with which Lord Clarendon had inspired the emperor of the French, and to the affection and regard of the empress, whom he had known in Spain from her childhood.

In 1856 Lord Clarendon took his seat at the congress of Paris convoked for the restoration of peace, as first British pleni- potentiary. It was the first time since the appearance of Lord Castlereagh at Vienna that a secretary of state for foreign affairs had been present in person at a congress on the continent. Lord Clarendon's first care was to obtain the admission of Italy to the council chamber as a belligerent power, and to raise the barrier which still excluded Prussia as a

neutral one. But in the general anxiety of all the powers to terminate the war there was no small danger that the objects for which it had been undertaken would be abandoned or forgotten. It is due entirely to the firmness of Lord Clarendon that the principle of the neutralization of the Black Sea was preserved, that the Russian attempt to trick the allies out of the cession in Bessarabia was defeated, and that the results of the war were for a time secured. The congress was eager to turn to other subjects, and perhaps the most important result of its deliberations was the celebrated Declaration of the Maritime Powers, which abolished privateering, defined the right of blockade, and limited the right of capture to enemy's property in enemy's ships. Lord Clarendon has been accused of an abandonment of what are termed the belligerent rights of Great Britain, which were undoubtedly based on the old maritime laws of Europe. But he acted in strict conformity with the views of the British cabinet, and the British cabinet adopted those views because it was satisfied that it was not for the benefit of the country to adhere to practices which exposed the vast mercantile interests of Britain to depredation, even by the cruisers of a secondary maritime power, and which, if vigorously enforced against neutrals, could not fail to embroil her with every maritime state in the world.

Upon the reconstitution of the Whig administration in 1859, Lord John Russell made it a condition of his acceptance of office under Lord Palmerston that the foreign department should be placed in his own hands, which implied that Lord Clarendon should be excluded from office, as it would have been inconsistent alike with his dignity and his tastes to fill any other post in the government. The consequence was that from 1859 till 1864 Lord Clarendon remained out of office, and the critical relations arising out of the Civil War in the United States were left to the guidance of Earl Russell. But he re-entered the cabinet in May 1864 as chancellor of the duchy of Lancaster; and upon the death of Lord Palmerston in 1865, Lord Russell again became prime minister, when Lord Clarendon returned to the foreign office, which was again confided to him for the third time upon the formation of Mr Gladstone's administration in 1868. To the last moment of his existence, Lord Clarendon continued to devote every faculty of his mind and every instant of his life to the public service; and he expired surrounded by the boxes and papers of his office on the 27th of June 1870. No man owed more to the influence of a generous, unselfish and liberal dis- position. If he had rivals he never ceased to treat them with the consideration and confidence of friends, and he cared but little for the ordinary prizes of ambition in comparison with the advancement of the cause of peace and progress.

He was succeeded as sth earl by his eldest son, Edward Hyde Villiers (b. 1846), who became lord chamberlain in 1900.

See also the article (by Henry Reeve) in Fraser's Magazine, August

1876.

CLARENDON, HENRY HYDE, 2ND Earl or (1638-1709), English statesman, eldest son of the first earl, was born on the 2nd of June 1638. He accompanied his parents into exile and

assisted his father as secretary, returning with them in 1660. In 1661 he was returned to parliament for Wiltshire as Lord Cornbury. He became secretary in 1662 and lord chamberlain to the queen in 1665. He took no part in the life of the court, and on the dismissal of his father became a vehement opponent of the administration, defended his father in the impeachment, and subsequently made effective attacks upon Buckingham and Arlington. In 1674 he became earl of Clarendon by his father's death, and in 1679 was made a privy councillor. He was not included in Sir W. Temple's council of that year, but was reappointed in 1680. In 1682 he supported Halifax's proposal of declaring war on France. On the accession of James in 1685 he was appointed lord privy seal, but shortly afterwards, in September, was removed from this office to that of lord- lieutenant of Ireland. Clarendon was embarrassed in his estate, and James required a willing agent to carry out his design by upsetting the Protestant government and the Act of Settlement. Clarendon arrived in Dublin on the 9th of January 1686. He found himself completely in the power of Tyrconnel, the commander-in-chief; and though, like his father, a staunch Protestant, elected this year high steward of Oxford University, and detesting the king's policy, he obeyed his orders to introduce Roman Catholics into the government and the army and upon the bench, and clung to office till after the dismissal of his brother, the earl of Rochester, in January 1687, when he was recalled and succeeded by Tyrconnel. He now supported the church in its struggle with James, opposed the Declaration of Indulgence, wrote to Mary an account of the resistance of the bishops, 1 and visited and advised the latter in the Tower. He had no share, however, in inviting William to England. He assured James in September that the Church would be loyal, advised the calling of the parliament, and on the desertion of his son,' Lord Cornbury, to William on the 14th of November, expressed to the king and queen the most poignant grief. In the council held on the 27th, however, he made a violent and unseasonable attack upon James's conduct, and on the 1st of December set out to meet William, joined him on the 3rd at Berwick

near Salisbury, and was present at the conference at Hungerford on the 8th, and again at Windsor on the 16th. His wish was apparently to effect some compromise, saving the crown for James. According to Burnet, he advised sending James to Breda, and according to the duchess of Marlborough to the Tower, but he himself denies these statements. 2 He opposed vehemently the settlement of the crown upon William and Mary, voted for the regency, and refused to take the oaths of the new sovereigns, remaining a non-juror for the rest of his life. He subsequently retired to the country, engaged in cabals against the government, associated himself with Richard Graham, Lord Preston, and organizing a plot against William, was arrested on the 24th of June 1690 by order of his niece, Queen Mary, and placed in the Tower. Liberated on the 15th of August, he im- mediately recommenced his intrigues. On Preston's arrest on the 31st of December, a compromising letter from Clarendon was found upon him, and he was named by Preston as one of his accomplices. He was examined before the privy council and again imprisoned in the Tower on the 4th of January 1691, remaining in confinement till the 3rd of July. This closed his public career. In 1702, on Queen Anne's accession, he presented himself at court, " to talk to his niece," but the queen refused to see him till he had taken the oaths. He died on the 31st of October 1709, and was buried in Westminster Abbey.

His public career had been neither distinguished nor useful, but it seems natural to ascribe its failure to small abilities and to the conflict between personal ties and political convictions which drew him in opposite directions, rather than, following Macaulay, to motives of self-interest. He was a man of some literary taste, a fellow of the Royal Society (1684), the author of The History and Antiquities of the Cathedral Church of Winchester . . . continued by S. Gale (1715), and he collaborated with his brother Rochester in the publication of his father's History (1702-1704). He

1 Hist. MSS. Comm.: MSS. of the Duke of Buccleuch, ii. 31. 2 Correspondence and Diary (1828), ii. 286.

married (i) in 1660, Theodosia, daughter of Lord Capel, and (2) in 1670, Flower, daughter of William Backhouse of Swallowfield in Berkshire, and widow of William Bishopp and of Sir William Backhouse, Bart. He was succeeded by his only son, Edward (1661-1724), as 3rd earl of Clarendon; and, the latter having no

surviving son, the title passed to Henry, 2nd earl of Rochester (1672-1753), at whose death without male heirs it became extinct in the Hyde line.

CLARENDON, CONSTITUTIONS OF, a body of English laws issued at Clarendon in n 64, by which Henry II. endeavoured to settle the relations between Church and State. Though they purported to declare the usages on the subject which prevailed in the reign of Henry I. they were never accepted by the clergy, and were formally renounced by the king at Avranches in September 1172. Some of them, hcwever, were in part at least, as they all purported to be, declaratory of ancient usage and remained in force after the royal renunciation. Of the sixteen provisions the one which provoked the greatest opposition was that which declared in effect that criminous clerks were to be summoned to the king's court, and from there, after formal accusation and defence, sent to the proper ecclesiastical court for trial. If found guilty they were to be degraded and sent back to the king's court for punishment. Another provision, which in spite of all opposi- tion obtained a permanent place in English law, declared that all suits even between clerk and clerk concerning advowsons and presentations should be tried in the king's court. By other provisions appeals to Rome without the licence of the king were forbidden. None of the clergy were to leave the realm, nor were the king's tenants-in-chief and ministers to be excommunicated or their lands interdicted without the royal permission. Pleas of debt, whether involving a question of good faith or not, were to be in the jurisdiction of the king's courts. Two most interesting provisions, to which the clergy offered no opposition, were: (1) if a dispute arose between a clerk and a layman concerning a tenement which the clerk claimed as free-alms (frankalmoign) and the layman as a lay-fee, it should be determined by the recognition of twelve lawful men before the king's justice whether it belonged to free-alms or lay-fee, and if it were found to belong to free-alms then the plea was to be held in the ecclesiastical court, but if to lay-fee, in the court of the king or of one of his magnates; (2) a declaration of the procedure for election to bishoprics and royal abbeys, generally considered to state the terms of the settlement made between Henry I. and Anselm in

1107.

Authorities. — J. C. Robertson, Materials for History of Thomas Becket, Rolls Series (1875-1885) ; Sir F. Pollock and F. W. Maitland, History of English Law before the Time of Ed. I. (Cambridge, 1898), and F. W. Maitland, Roman Canon Law in the Church of England (1898); the text of the Constitutions is printed by W. Stubbs in Select

Charters (Oxford, 1895). (G. J. T.)

CLARES, POOR, otherwise Clarisses, Franciscan nuns, so called from their foundress, St Clara (q.v.) . She was professed by St Francis in the Portiuncula in 1212, and two years later she and her first companions were established in the convent of St Damian's at Assisi. The nuns formed the " Second Order of St Francis," the friars being the " First Order," and the Tertiaries (q.v.) the "Third." Before Clara's death in 1253,- the Second Order had spread all over Italy and into Spain, France and Germany; in England they were introduced c. 1293 and estab- lished in London, outside Aldgate, where their name of Minoresses survives in the Minories; there were only two other English houses before the Dissolution. St Francis gave the nuns no rule, but only a " Form of Life " and a " Last Will," each only five lines long, and coming to no more than an inculcation of his idea of evangelical poverty. Something more than this became necessary as soon as the institute began to spread; and during Francis's absence in the East, 12 19, his supporter Cardinal Hugolino composed a rule which made the Franciscan nuns practically a species of unduly strict Benedictines, St Francis's special characteristics being eliminated. St Clara made it her life work to have this rule altered, and to get the Franciscan character of the Second Order restored; in 1247 a " Second Rule " was approved which went a long way towards satisfying

her desires, and finally in 1253 a " Third," which practically gave what she wanted. This rule has come to be known as the " Rule of the Clares "; it is one of great poverty, seclusion and austerity of life. Most of the convents adopted it, but several clung to that of 1 247 . To bring about conformity, St Bonaventura, while general (1264), obtained papal permission to modify the rule of 1253, somewhat mitigating its austerities and allowing the convents to have fixed incomes, — thus assimilating them to the Conventual Franciscans as opposed to the Spirituals. This rule was adopted in many convents, but many more adhered to the strict rule of 1 2 53 . Indeed a counter- tendency towards a greater strictness set in, and a number of reforms were initiated, intro- ducing an appalling austerity of life. The most important of these reforms were the Coletines (St Colette, c. 1400) and the Capucines (c. 1540; see Capuchins). The half-dozen forms of the Franciscan rule for women here mentioned are still in use in different convents, and there are also a great number of religious institutes for women based on the rule of the Tertiaries. By the term " Poor Clares " the Coletine nuns are now commonly understood; there are various convents of these nuns, as of other Franciscans, in -England and Ireland. Franciscan nuns have always been very numerous; there are now about 150 convents of the various observances of the Second

Order, in every part of the world, besides innumerable institutions of Tertiaries.

See Helyot, Hist, des ordres religieux (1792), vii. cc. 25-28 and 38-42; Wetzer and Welte, Kirchenlexikon (2nd ed.), art. ” Clara “; Max Heimbucher, Orden und Kongregationen (1896), i. §§ 47, 48, who gives references to all the literature. For a scientific study of the beginnings see Lempp, ” Die Anfange des Klarissenordens in Zeitschrift fiir Kirchengeschichte, xiii. (1892), 181 ff. (E. C. B.)

CLARET (from the Fr. vin claret, mod. clairet, wine of a light clear colour, from Lat. clarus, clear), the English name for the red Bordeaux wines. The term was originally used in France for light-yellow or light-red wines, as distinguished from the vins rouges and the vins blancs; later it was applied to red wines generally, but is rarely used in French, and never with the particular English meaning (see Wine). r

CLARETIE, JULES ARSENE ARNAUD (1840-), French man of letters and director of the Theatre Francais, was born at Limoges on the 3rd of December 1840. After studying at the lycee Bonaparte in Paris, he became an active journalist, achiev- ing great success as dramatic critic to the Figaro and to the Opinion nationale. He was a newspaper correspondent during the Franco-German War, and during the Commune acted as staff- officer in the National Guard. In 1885 he became director of the Theatre Francais, and from that time devoted his time chiefly to its administration. He was elected a member of the Academy in 1888, and took his seat in Feburary 1889, being received by Ernest Renan. The long list of his works includes Histoire de la revolution de 1870-1871 (new ed., 5 vols., 1875-1876); Cinq ans apres; V Alsace et la Lorraine depuis V annexion (1876); some annual volumes of reprints of his articles in the weekly press, entitled La Vie a Paris; La Vie moderne au thidtre (1868-1869); Moliere, sa vie et son auvre (1871); Histoire de la litterature franqaise, goo-igoo (2nd ed. 1905); Candidat! (1887), a novel of contemporary life; Brichanteau, comedien francais (1896); several plays, some of which are based on novels of his own— Les MuscadinsiiS 1 ;ˆ , Le Regiment de Champagne(\ˆii) , Les Mirabeau (1879), Monsieur le ministre (1883), and others; and the opera, La Navarraise, based on his novel La Cigarette, and written with Henri Cain to the music of Massenet. La Navarraise was first produced at Covent Garden (June 1894) with Mme Calve in the part of Anita. His CEuvres completes were published in 1897-

1904.

CLARI, GIOVANNI CARLO MARIA, Italian musical com- poser, chapel-master at Pistoia, was born at Pisa about the year 1669. The time of his death is unknown. He was the most celebrated pupil of Colonna, chapel-master of S. Petronio, at Bologna. He became maestro di cappella at Pistoia about 1712, at Bologna in 1720, and at Pisa in 1736. He is supposed to have died about 1745. The works by which Clari distinguished himself pre-eminently are his vocal duets and trios, with a basse continue, published between 1740 and 1747. These compositions,

which combine graceful melody with contrapuntal learning, were much admired by Cherubini. They appear to have been admired by Handel also, since he did not hesitate to make appropriations from them. Clari composed one opera, II Savio delirante, produced at Bologna in 1695, and a large quantity of church music, several specimens of which were printed in Novello's Fitzwilliam Music.

CLARINA, a comparatively new instrument of the wood-wind class (although actually made of metal), a hybrid possessing characteristics of both oboe and clarinet. The clarina was invented by W. Heckel of Biebrich-am-Rhein, and has been used since 1801 at the Festspielhaus, Bayreuth, in Tristan und Isolde, as a substitute for the Holzlrompete made according to Wagner's instructions. The clarina has been found more practical and more effective in producing the desired tone-colour. The clarina is a metal instrument with the conical bore and fingering of the oboe and the clarinet single-reed mouthpiece. The compass of the

Notation. $m. Real sounds. ft».

^

3=

instrument is as shown, and it stands in the key of Bt>. Like the clarinet, the clarina is a transposing instrument, for which the music must be written in a key a tone higher than that of the composition. The timbre resulting from the combination of conical bore and single-reed mouthpiece has in the lowest register affinities with the cor anglais, in the middle with the saxophone, and in the highest with the clarinet. Other German orchestras have followed the example of Bayreuth. The clarina has also been found very effective as a solo

instrument. (K. S.)

CLARINET, or Clarionet (Fr. clarinette; Ger. Clarinetle, Klarinett; Ital. clarinetto, chiarinetto) , a wood-wind instrument having a cylindrical bore and played by means of a single-reed mouthpiece. The word ” clarinet ” is said to be derived from clarinetto, a diminutive of clarino, the Italian for (1) the soprano trumpet, (2) the highest register of the instrument, (3) the trumpet played musically without the blare of the martial instrument. The word ” clarionet ” is similarly derived from ” clarion,” the English equivalent of clarino. It is suggested that the name clarinet or clarinetto was bestowed on account of the resemblance in timbre between the high registers of the clarino and clarinet. By adding the speaker-hole to the old chalumeau, J. C. Denner gave it an additional compass based on the over- blowing of the harmonic twelfth, and consisting of an octave and a half of harmonics, which received the name of clarino, while the lower register retained the name of chalumeau. There is something to be said also in favour of another suggested deriva- tion from the Italian chiarina, the name for reed instruments and the equivalent for tibia and aulos. At the beginning of the 18th century in Italy clarinetto, the diminutive of clarino, would be masculine, whereas chiarinetta or clarinelta would be feminine, 1 as in Doppelmayr’s account of the invention written in 1730. The word ” clarinet ” is sometimes used in a generic sense to denote the whole family, which consists of the clarinet, or discant corresponding to the violin, oboe, &c; the alto clarinet in E; the basset horn in F (q-V.); the bass clarinet (q.v.), and the pedal clarinet (q.v.).

The modern clarinet consists of five (or four) separate pieces : (1) the mouthpiece; (2) the bulb; (3) the upper middle joint, or left-hand joint; (4) the lower middle joint, or right-hand joint 2 ; (5) the bell; which (the bell excepted) when joined together, form a tube with a continuous cylindrical bore, 2 ft. or more in length, according to the pitch of the instrument. The mouthpiece, including the beating or single-reed common to the whole clarinet family, has the appearance of a beak with the point bevelled off and thinned at the edge to correspond with the end of

1 See Gottfried Weber’s objection to this derivation in ” tjber Clarinette und Basset-horn,” Caecilia (Mainz, 1829), vol. xi. pp. 36 and 37, note.

2 Nos. 3 and 4 are sometimes made in one, as for instance in Messrs Rudall, Carte & Company’s modification, the Klussmann patent.

the reed shaped like a spatula. The under part of the mouthpiece (fig. 2) is flattened in order to form a table for the support of the reed which is adjusted thereon with great nicety, allowing just the amount of play requisite to set in vibration the column of air within the tube.

The mouthpiece, which is subject to con- tinual fluctuations of dampness and dryness, and to changes of temperature, requires to be made of a material having great powers of resistance, such as cocus wood, ivory or vulcanite, which are mostly used for the purpose in England. A longitudinal aperture 1 in. long and j in. wide, communicating with the bore, is cut in the table and covered by the reed. The aperture is thus closed except towards the point, where, for the distance of § to j in., the reed is thinned and the table curves backwards towards the point, leaving a gap between the ends of the mouthpiece and of the reed of 1 mm. or about the thickness of a sixpence for the B flat clarinet. The curve of the table and the size of the gap are there fore of considerable importance. The reed is cut from a joint of the Arundo donax or sativa, which grows wild in the regions bordering on the Mediterranean. A flat slip of the reed is cut, flattened on one side and thinned to a very delicate edge on the other. At first the reed was fastened to the table by means of many turns of a fine waxed cord. The metal band adjusted by means of two screws, known as the ” ligature,” was introduced about 18 17 by Ivan Miiller. The reed is set in vibration by the breath of the performer, and being flexible it beats against the table, opening and closing the gap at a rate depending on the rate of the vibrations it sets up in the air column, this rate varying according to the length of the column as determined by opening the lateral holes and keys. A cylindrical tube played by means of a reed has the acoustic properties of a stopped pipe, i.e. the funda- mental tone produced by the tube is an Fig. 1. — Clarinet octave lower than the corresponding tone of (Albert Model), an open pipe of the same length, and over- blows a twelfth; whereas tubes having a conical bore like the oboe, and played by means of a reed, speak as open pipes and overblow an octave. This forms the fundamental difference between the instruments of the oboe and clarinet families. Wind instruments de- pending upon lateral holes for the produc- tion of their scale must either have as many holes pierced in the bore as they require notes, or make use of the property possessed by the air-column of dividing into harmonics or partials of the funda- mental tones. Twenty to twenty-two holes is the number generally accepted as the practical limit for the clarinet; beyond that number the fingering and mechanism become too complicated. The compass of the clarinet is therefore extended through the medium of the harmonic overtones. In stopped pipes a node is formed near the

mouthpiece, and they are therefore only able to produce the uneven harmonics, such as the 1st, 3rd, 5th, 7th, &c, correspond- ing to the fundamental, and the diatonic intervals of the 5th one octave above, and of the 3rd and 7th two octaves above the fundamental. By pressing the reed with the lip near the base where it is thicker and stiff er, and increasing the pressure of the breath, the air-column is forced to divide and to sound the

Fig. 2. — Clarinet Mouthpiece, a, the mouthpiece showing the position of the bore inside; b, the single or beating reed.

harmonics, a principle well understood by the ancient Greeks and Romans in playing upon the aulos and tibia. 1 This is easier to accomplish with the double reed than with the beating reed; in fact with a tube of wide diameter, such as that of the modern clarinet, it would not be possible by this means alone to do justice to the tone of the instrument or to the music now written for it. The bore of the aulos was very much narrower than that of the clarinet.

In order to facilitate the production of the harmonic notes on the clarinet, a small hole, closed by means of a key and called the " speaker," is bored near the mouthpiece. By means of this small hole the air-column is placed in communication with the external atmosphere, a ventral segment is formed, and the air-column divides into three equal parts, producing a triple number of vibrations resulting in the third note of the harmonic series, at an interval of a twelfth above the fundamental. 2 In a wind instrument with lateral holes the fundamental note corre- sponding to any particular hole is produced when all the holes below that hole are open and it itself and all above it are closed, the effective length of the resonating tube being shortened as each of the closed holes is successively uncovered. In order to obtain a complete chromatic scale on the clarinet at leˆst eighteen holes are required. This series produces with the bell-note a succession of nineteen semitones, giving the range of a twelfth and known as the fundamental scale or chalumeau register, so called, no doubt, because it was the compass (without chromatic semitones) of the more primitive predecessor of the clarinet, known as the chalumeau, which must not be confounded with the shawm or schalmey of the middle ages.

The fundamental scale of the modern clarinet in C extends from

$

IT

The next octave and a half is obtained by opening

the speaker key, whereby each of the fundamental notes is reproduced a twelfth higher; the bell-note thus jumps from E to Bif, the first key gives instead of F its twelfth C#, and so on, extending

the compass to

1 =

: , which ends the natural compass of the

instrument, although a skilful performer may obtain another octave by cross-fingering. The names of the holes and keys on the clarinet are derived not from the notes of the fundamental scale, but from the name of the twelfth produced by overblowing with the speaker key open; for instance, the first key near the bell is known not as the E key but as the Bif. The use of the speaker key forms the greatest technical difficulty in learning to play the clarinet, on account of the thumb having to do double duty, closing one hole and raising the lever of the speaker key simultaneously. In a clarinet designed by Richard Carte this difficulty was ingeniously overcome by placing the left thumb-hole towards the front, and closing it by a thumb-lever or with a ring action by the first or second finger of the left hand, thus leaving the thumb free to work the speaker key alone.

There is good reason to think that the ancient Greeks understood the advantage of a speaker-hole, which they called Syrinx, for facilitating the production of harmonics on the aulos. The credit of the discovery of this interesting fact is due to A. A. Howard, 3 of Harvard University; it explains many passages in the classics which before were obscure (see Aulos). Plutarch relates 4 that Telephanes of Megara was so incensed with the syrinx that he never allowed his instrument-makers to place one on any of his auloi; he even went so far as to absent himself, principally on account of the syrinx, from the Pythian games. Telephanes was a great virtuoso who scorned the use of a speaker-hole, being able to obtain his har- monics on the aulos by the mere control of lips and teeth.

The modern clarinet has from thirteen to nineteen keys, some being normally open and others closed. In order to understand why, when once the idea of adding keys to the chalumeau had been conceived,

the number rose so slowly, keys being added one or two at a time by makers of various nationalities at long intervals, it is

1 Aristotle (de Audib. 802 b 18, and 804 a) and Porphyry (ed. Wallis, pp. 249 and 252) mention that if the performer presses the zeuge (mouthpiece) or the glottal (reeds) of the pipes, a sharper tone is produced.

2 Cf. V. C. Mahillon, Elements d'acoustique musicale et instrumentale (Brussels, 1874), p. 161; and Fr. Zamminer, Die Musik und die musikalischen Instrumente in ihrer Beziehung zu den Gesetzen der Akustik . . . (Giessen, 1855), pp. 297 and 298.

3 " The Aulos or Tibia," Harvard Studies, iv. (Boston, 1893).

4 De Musica, 1 138.

necessary to consider the effect of boring holes in the side of a cylindrical tube. If it were possible to proceed from an absolute theoretical basis, there would be but little difficulty; there are, however, practical reasons which make this a matter of great difficulty. According to V. Mahillon, 6 the theoretical length of a Bb clarinet (French pitch diapason normal A = 435 vibrations), is 39 cm. when the internal diameter of the bore measures exactly 1-4 cm. Any increase in the diameter of the cylindrical bore for a given length of tube raises the pitch proportionally and in the same way a decrease lowers it. A bore narrow in proportion to the length facilitates the production of the harmonics, which is no doubt the reason why the aulos was made with a very narrow diameter, and produced such deep notes in proportion to its length. In determining the position of the holes along the tube, the thickness of the wood to be pierced must be taken into consideration, for the length of the passage from the main bore to the outer air adds to the length of the resonating column; as, however, the clarinet tube is reckoned as a closed one, only half the extra length must be taken into account. When placed in its correct theoretical position, a hole should have its diameter equal to the diameter of the main bore, which is the ideal condition for obtaining a full, rich tone; it is, however, feasible to give the hole a smaller diameter, altering its position by placing it nearer the mouthpiece. These laws, which were likewise known to the Greeks and Romans, 6 had to be rediscovered by experience in the 18th and 19th centuries, during which the mechanism of the key system was repeatedly improved. Due consideration having been given to these points, it will also be necessary to remember that the stopping of the seven open holes leaves only the two little fingers (the thumb of the right hand

being in the ordinary clarinet engaged in supporting the instrument) free at all times for key service, the other fingers doing duty when momentarily disengaged. The fingering of the clarinet is the most difficult of any instrument in the orchestra, for it differs in all four octaves of its compass. Once mastered, however, it is the same for all clarinets, the music being always written in the key of C.

The actual tonality of the clarinet is determined by the diatonic scale produced when, starting with keys untouched and finger and thumb-holes closed, the fingers are raised one by one from the holes. In the Bb clarinet, the real sounds thus produced are

I

-i-r-*-

3EE3EE&

^

being part of the scale of B[? major. By the closing of two open keys, the lower Eb and D are added.

The following are the various sizes of clarinets with the key proper to each :

Eb, a minor third above the C clarinet.

Bb, a tone below ,, ,,

The high F, 4 tones above „ „

The D, 1 tone above „ „

The low G, a fourth below ,, „

The A, a minor third below „

The Bif 1 semitone below ,, ,,

The alto clarinet in Eb, a fifth below the Bb clarinet.

The tenor or basset horn, in F, a fifth below the C clarinet.

The bass clarinet in Bb, an 8 ve below that in Bb.

The pedal clarinet in Bb, an 8 Te below the bass clarinet.

The clarinets in Bb and A are used in the orchestra; those in C and Eb in military bands.

History. — Although the single beating-reed associated with the instruments of the clarinet family has been traced in ancient Egypt, the double reed, characteristic of the oboe family, being of simpler construction, was probably of still greater antiquity. An ancient Egyptian pipe found in a mummy-case and now preserved in the museum at Turin was found to contain a beating- reed sunk 3 in. below the end of the pipe, which is the principle of the drone. It would appear that the double chalumeau, called arghoul (q.v.) by the modern Egyptians, was known in ancient Egypt, although it was not perhaps in common use. The Musee Guimet possesses a copy of a fresco from the tombs at Saqqarah (executed under the direction of Mariette Bey) as- signed to the 4th or 5th dynasty, on which is shown a concert with dancing; the instruments used are two harps, the long oblique flute " nay," blown from the end without any mouthpiece or embouchure, arid an instrument identified as an arghoul 7

6 Op. cit. pp. 160 et seq. ; and Wilhelm Altenburg, Die Klarinette (Heilbronn, 1904), p. 9, who refers to Mahillon.

6 See Macrobius, Comm. in somnium Scipionis, ii. 4. 5 " nee secus probamus in tibiis de quarum foraminibus vicinis inflantis ori sonus acutus emittitur, de longinquis autem et termino proximis, gravior: item acutior per patentiora foramina, gravior per angusta."

7 See Victor Loret, L'Ugypte au temps des Pharaons — la vie, le science, et I'art (Paris, 1889), illustration p. 139 and p. 143. The author gives no information about this fresco except that it is in the

from its resemblance to the modern instrument of the same name. This is believed to be the only illustration of the ancient double chalumeau yet found in Egypt, with the single exception of a hieroglyph occurring also once only, i.e. the sign read As-il, consisting of a cylindrical pipe with a beak mouthpiece bound round with a cord tied in a bow. The bow is taken to indicate the double parallel pipes bound together; the same sign without the bow occurs frequently and is read Ma-it, 1 and is considered to be the generic name for reed wind instruments. The beating- reed was probably introduced into classic Greece from Egypt or Asia Minor. A few ancient Greek

instruments are extant, five of which are in the British Museum. They are as nearly cylindri- cal as would be the natural growing reed itself. The probability is that both single and double reeds were at times used with the Greek aulos and the Roman tibia. V. Mahillon and A. A. Howard of Harvard have both obtained facsimiles of actual instruments, some found at Pompeii and now deposited in the museum at Naples, and others in the British Museum. Experi- ments made with these instruments, whose original mouthpieces have perished, show that with pipes of such narrow diameter the fundamental scale and pitch are the same whether sounded by means of a single or of a double reed, but the modern combina- tion of single reed and cylindrical tube alone gives the full pure tone quality. The subject is more fully discussed in the article Aulos. 2 The Roman tibia, if monuments can be trusted, sometimes had a beak-shaped mouthpiece, as for instance that attached to a pipe discovered at Pompeii, or that shown in a scene on Trajan's column. 3 It is probable that when, at the decline of the Roman empire, instrumental music was placed by the church under a ban — and the tibia more especially from its association with every form of licence and moral depravity — this instrument, sharing the common fate, survived chiefly among itinerant musicians who carried it into western Europe, where it was preserved from complete extinction. An instrument of difficult technique requiring an advanced knowledge of acoustics was not, however, likely to flourish or even to be understood among nations whose culture was as yet in its infancy.

The tide of culture from the Byzantine empire filtered through to the south and west, leaving many traces; a fresh impetus was received from the east through the Arabs; and later, as a result of the Crusades, the prototype of the clarinet, together with the practical knowledge necessary for making the instru- ment and playing upon it, may have been re-introduced through any one or all of these sources. However this may be, the instrument was during the Carolingian period identified with the tibia of the Romans until such time as the new western civilization ceased to be content to go back to classical Rome for its models, and began to express itself, at first naively and awkwardly, as the nth century dawned. The name then changed to the derivatives of the Greek kalamos, assuming an almost bewildering variety of forms, of which the commonest are chalemie, chalumeau, schalmey, scalmeye, shawm, calemel, kalemele. 4 The derivation of the name seems to point to a Byzantine rather than an Arab source for the revival of the instruments which formed the prototype of both oboe and clarinet, but it must not be forgotten that the instruments with a conical bore — more especially those played by a reed — are

primarily of Asiatic origin. At the beginning of the 13th century

Musee Guimet. It is probably identical with the second of the mural paintings described on p. 190 of Petit guide illustre au Musee Guimet, par L. de Milloue.

1 See Victor Loret, ” Les flutes egyptiennes antiques,” Journal asiatique (Paris, 1889), [8], xiv. pp. 129, 130, 132.

2 See also A. A. Howard, ” Study on the Aulos or Tibia,” Harvard Studies, vol. iv. (Boston, 1893) ; E C. Gevaert, Musique de Vantiquite; Carl von Jan, article ” Floete ” in August Baumeister’s Denkmaler des klassischen Alterthums (Leipzig, 1884-1888), vol. i. ; Dr Hugo Riemann, Handbuch der Musikgesch. vol. i. p. 90, &c. (Leipzig, 1904) ; all of whom have not come to the same conclusions.

5 Wilhelm Froehner, La Colonne trajane (Paris, 1872), t. ii. pi. 76.

4 ” Aveuc aus ert vestus Guis

Ki leur cante et Kalemele, En la muse au grant bourdon.”

J. A. U. Scheler’s Trouveres beiges.

in France, where the instrument remained a special favourite until it was displaced by the clarinet, the chalumeau is mentioned in some of the early romances: — ” Tabars et chalemiaux et estrumens sonner ” (Aye d’ Avignon, v. 4137); ” Grelles et chelimiaus et buisines bruians ” (Gui de Bourgogne, v. 1374), &c. By the end of the 13 th century, the German equivalent Schalmey appears in the literature of that country, — ” Pusunen und Schalmeyen schal moht niemen da gehoeren wal ” (Frauen- dienst, 492, fol. 5, Ulrich von Lichten stein). The schalmey or shawm is frequently represented in miniatures from the 13 th century, but it must have been known long before, since it was at that period in use as the chaunter of the bag-pipe (q.v.), a fully-developed complex instrument which presupposes a separate previous existence for its component parts.

We have no reason to suppose that any distinction was drawn between the single and double reed instruments during the early middle ages — if indeed the single reed was then known at all — for the derivatives of kalamos were applied to a variety of pipes. The first clear and unmistakable drawing yet found of the single reed occurs in Mersenne’s Harmonic universelle (p. 282), where the primitive reed pipe is shown with the beating-reed detached from the tube of the instrument itself, by making a lateral slit and then splitting back a little tongue of reed towards a knot. Mersenne calls this the simplest form of chalumeau or wheat-stalk (tuyau de ble). It is evident that no significance was then attached to the form of the vibrating reed, whether single or double, for Mersenne and other writers of his time call the chaunters of the musette and cornemuse chalumeaux whether they are of cylindrical or of conical bore. The difference in timbre produced by the two kinds of reeds was, however, understood, for Mersenne states that a special kind of cornemuse was used in concert with the hautbois de Poitou (an oboe whose double reed was enclosed in an air chamber) and was distinguished from the shepherd’s cornemuse by having double reeds through- out, whereas the drones of the latter instrument were furnished with beating reeds. It is therefore evident that as late as 1636 (the date at which Mersenne wrote) in France the word ” chalu- meau ” was not applied to the instrument transformed some sixty years later into the clarinet, nor was it applied exclusively to any one kind of pipe except when acting

as the chaunter of the bagpipe, and that independently of any structural charac- teristics. The chaunter was still called chalumeau in 1737. 5 Of the instrument which has been looked upon as the chalumeau, there is but little trace in Germany or in France at the beginning of the 17th century. A chalumeau with beak mouthpiece and characteristic short cylindrical tube pierced with six holes figures among the musical instruments used for the triumphal procession of the emperor Maximilian I., commemorated by a fine series of plates, 6 engraved on wood by Hans Burgkmair, the friend and colleague of A. Durer. On the same plate (No. 79) are five schalmeys with double reeds and five chalumeaux with single-reed beak mouthpieces: the latter instruments were in all probability made in the Netherlands, which excelled from the 1 2th century in the manufacture of all musical instruments. No single-reed instrument, with the exception of the regal (q.v.), is figured by S. Virdung, 7 M. Agricola 8 or M. Praetorius. 9

A good idea of the primitive chalumeau may be gained from a reproduction of one of the few specimens from the 16th or 17th century still extant, which belonged to Cesare Snoeck and was exhibited at the Royal Military Exhibition in London in 1890. 10 The tube is stopped at the mouthpiece end by a natural joint of

B See Ernest Thoinan, Les Hotteterre et les Chedeville, celebres facteurs de flutes, hautbois, bassons et musettes (Paris, 1894), P- l 5 et seq., and Methode pour la musette, &c, par Hotteterre le Romain (Paris, 1737).

8 The whole series of 135 plates has been reproduced in Jahrb. d. Samml. des Allerh. Kaiserhauses (Vienna, 1883-1884).

7 Musica getutscht und auszgezogen (Basel, i 51 1).

8 Musica Instrumentalis Deudsch (Nuremberg, 1528 and 1545).

9 Syntagma Musicum (Wolfenbiittel, 1618). This work and those mentioned in the two previous notes have been reprinted by the Ges. f. Musikforschung in vols, xi., xx. and xiii. of Publikationen (Berlin).

10 See Descriptive Catalogue, by Capt. C. R. Day (London, 1891), pi. iv. A and p. no, No. 221.

(a)

the reed, and a tongue has been detached just under the joint ;

there are six finger-holes and one for the thumb. An instrument

almost identical with the above, but with a rudimentary bell,

and showing plainly the detached tongue, is

jjl figured by Jost Amman in 1589. 1 A plate in

dJj Diderot and d'Alembert's Encyclopedie 2 shows a

less primitive instrument, outwardly cylindrical

and having a separate mouthpiece joint and a

clarinet reed but no keys. A chalumeau without

keys, but consisting apparently of three joints —

mouthpiece, main tube and bell, — is figured on

the title-page of a musical work 3 dated 1690;

it is very similar to the one represented in fig. 3,

except that only six holes are visible.

In his biographical notice of J. Christian Denner (1655-1707), J. G. Doppelmayr 4 states that at the beginning of the 18th century " Denner invented a new kind of pipe, the so- called clarinet, which greatly delighted lovers of music; he also made great improvements in the stock or rackett-fagottos, known in the olden time and finally also in the chalumeaux." It is probable that the improvements in the chalumeau to which Doppelmayr alludes with- out understanding them consisted (a) in giving the mouthpiece the shape of a beak and adding a separate reed tongue as in that of the modern clarinet, unless this change had already taken place in the Netherlands, the country which the unremitting labours of E. van der Straeten 5 have revealed as taking the lead in Europe from the 14th to the 16th century in the construc- tion of musical instruments of all kinds; (b) in the boring of two additional holes for A and B near the mouthpiece and covering them with two keys; (c) in replacing the long cylindrical mouthpiece joint by a bulb, thus restoring one of the characteristic features of the tibia, 6 known (i) Back view, as the oXˆios. There are a few of these

improved chalumeaux in existence, two being in the Bavarian national museum at Munich, the one in high A, in a bad state of preservation, the second in C, marked J. C. Denner, of which V. Mahillon has made a facsimile 7 for the museum of the Brussels Conservatoire. There are two keys and eight holes; the first consists of two small holes on the same level giving a semitone if only one be closed. If the thumb-key be left open, the sounds of the fundamental scale (shown in the black notes below) rise a twelfth to form the second register (the white notes)

ˆ a. ■« ft 3 –

(b)

(From Diderot

and d'Alembert's

Encyclopedic.)

Fig. 3. Chalumeau,

1767.

(a) Front,

=*==

dte:

ˆ=rfc

— — zzz rz ˆ * * —

ˆ IS" ~* * "*"

O # ~I- 2345678 K. K

This early clarinet or improved chalumeau has a clarinet mouth-piece, but no bulb; it measures 50 cm. (20 in.), whereas the one in A mentioned above is only 28 cm. in length, the long cylindrical tube between mouthpiece and key-joint, afterwards turned into the bulb, being absent. Mahillon was probably the first to point out that the so-called invention of the clarinet by J. C. Denner consisted in providing a device — the speaker-key — to facilitate the production of the harmonics of the fundamental. Can we be sure that the same result was not obtained on the old chalumeau

1 Wappenbuch, p. in, ” Musica.”

2 Paris, 1767, vol. v. ” Planches,” pi. ix. 20, 21, 22.

3 Dr Theofilo Muffat, ” Componimenti musicali per il cembalo,” in Denkmdler d. Tonkunst in Osterreich, Bd. iii.

1 Historische Nachricht von den Niirnbergischen Maihematicis u. Kunstlem, &c. (Nuremberg, 1730), p. 305.

5 Histoire de la musique aux Pays Bas avant le XIX” Steele.

6 For a facsimile of one of the Pompeii tibiae, see Capt. C. R. Day, op. cit. pi. iv. C. and p. 109.

7 Catalogue descriplif (Ghent, 1896), vol. ii. p. 211, No. 91 1, where an illustration is given. See also Capt. C. R. Day, op. cit. pi. iv. B and Errata where the description is printed.

before keys were added, by partially uncovering the hole for the thumb ?

The Berlin museum possesses an early clarinet with two keys, marked J. B. Oberlender, derived from the Snoeck collection. Paul de Wit’s collection has a similar specimen by Enkelmer. The Brussels Conservatoire possesses clarinets with two keys by Flemish makers, G. A. Rottenburgh and J. B. Willems 8 ; the latter, with a small bulb and bell, is in G a fifth above the C clarinet. The next improvements in the clarinet, made in 1720, are due to J. Denner, probably a son of J. C. Denner. They consisted in the addition of a bell and in the removal of the speaker-hole and key nearer the mouthpiece, involving the reduction of the diameter of the hole. The effect of this change of position was to turn the Bˆ into Bb, for J. Denner introduced into the hole, nearly as far as the axis of the bore, a small metal drainage tube 9 for the moisture of the breath. In the modern clarinet, the same result is attained by raising this little tube slightly above the surface of the main tube, placing a key on the top of it, and bending the lever. In order to produce the missing Btj, J. Denner lengthened the tube and pierced another hole, the low E, covered by an open key with a long lever which, when closed, gives the desired B as its twelfth, thus forming a connexion between the two registers. A clarinet with three keys, of similar construction (about 1750), marked J. W. Kenigsperger, is pre- served in the Bavarian national museum, at Munich. Another in Bt> marked Lindner 10 belongs to the collection at Brussels. About the middle of the 18th century, the number of keys was raised to five, some say 11 by Barthold Fritz of Brunswick

(1697-1766), who added keys for C# and D#.

According to Altenburg 12 the Et> or D# key is due to the virtuoso Joseph Beer (1744-1811). The sixth key was added about 1790 by the celebrated French virtuoso Xavier Lefebure (or Lefevre),

and produced G#.

Anton Stadler and his brother,

both clarinettists in the Vienna court orchestra and instrument-makers, are said to have lengthened the tube of the Bb clarinet, extending the compass down to C (real sound Bb). It was for the Stadler brothers that Mozart wrote his quintet for strings, with a fine obbligato for the clarinet in A (1789), and the clarinet concerto with orchestra in 1791.

This, then, was the state of the clarinet in 18 10 when Ivan Miiller, then living in Paris, carried the number of keys up to thirteen, and made several structural improvements already mentioned, which gave us the modern instrument and in- augurated a new era in the construction and technique of the clarinet. Mtiller's system is still adopted in principle by most clarinet makers. The instrument was successively improved during the 19th century by the Belgian makers Bachmann, the elder Sax, Albert and C. Mahillon, whose invention in 1862 of the Cft key with double action is now generally adopted. In Paris the labours of Lefebure, Buffet-Crampon, and Goumas are pre-eminent. In 1842 H. E. Klose conceived the idea of adapting to the clarinet the ingenious mechanism of movable rings, invented by Boehm for the flute, and he entrusted the execution of this innovation to Buffet-Crampon; this is the type of clarinet generally adopted in French orchestras. From this adaptation has sprung the erroneous notion that Klose's clarinet was constructed according to the Boehm system; Klose's lateral divisions of the tube do not follow those applied by Boehm to the flute.

In England the clarinet has also passed through several progressive stages since its introduction about 1770, and first of

8 For a description with illustration see V. Mahillon's Catalogue descriplif (Ghent, 1896), vol. ii. p. 215, No. 916.

9 See Wilhelm Altenburg, op. cit. p. 6.

10 See V. Mahillon, Catal. descript. (1896), p. 213, No. 913.

11 H. Welcker von Gontershausen, Die musikalischen Tonwerk- zeuge (Frankfort-on-Main, 1855), p. 141.

12 Op. cit. p. 6.

all at the hands of Cornelius Ward. The principal improvements were due to Richard Carte, who took out a patent in 1858 for an improved Boehm clarinet which possessed some claim to the name, since Boehm's principle of boring the holes at theoretically- correct intervals and of venting the holes by means of open holes below was carried out. Carte made several modifications of his original patent, his chief endeavour being to so dispose the key-work as to reduce the difficulties in fingering. By the extension of the principle of the ring action, the work of the third and little fingers of the left hand was simplified and the fingering of certain difficult notes and shakes greatly facilitated. Messrs Rudall, Carte & Company have made further improvements in the clarinet, which are embodied in Klussmann's patent (fig. 4); these consist in the introduction of the duplicate G# key, a note which has hitherto formed a serious obstacle to perfect execution. The duplicate key, operated by the third or second finger of the right hand, releases the fourth finger of the left hand. The old G# is still re- tained and may be used in the usual way if desired. The body of the instrument is now made in one joint, and the position of the G$ hole is mathematically correct, whereby perfect intonation for C#, G# and Ft) is secured. Other improvements were made in Paris by Messrs Evette & Schaeffer and by M. Paradis, 1 a clarinet-player in the band of the Garde Republicaine, and very great improvements in boring and in key mechanism were effected by Albert of Brussels (see fig. 1).

The clarinet appears to have received appreciation in the Netherlands earlier than in its own native land. According to W. Altenburg {op. cit. p. n), 2 a MS. is preserved in the cathedral at Antwerp of a mass written by A. J. Faber in 1720, which is scored for a clarinet. Johann Mattheson, 3 Kapellmeister at Hamburg, mentions clarinet music in 1713, although Handel, whose rival he was, does not appear to have known the instrument. Joh. Christ. Bach scored for the clarinet in 1763 in his opera Orione performed in London, and Rameau had already employed the instrument in 1751 in a theatre for his pastoral entitled Acante el Cephise.* The clarinet was formally introduced into the orchestra in Vienna in 1767, 5 Gluck having contented himself

with the use of the chalumeau in Orfeo (1762) and in Alceste (1767). 6 The clarinet had already been adopted in military bands in France in 1755, where it very speedily com- pletely replaced the oboe. One of Napoleon Bonaparte's bands is said to have had no less than twenty clarinets.

For further information on the clarinet at the beginning of the 19th century, consult the Methods by Ivan Miiller and Xavier Leffibure, and Joseph Froehlich's admirable work on the instruments of the orchestra; and Gottfried Weber's articles in Ersch and Gruber's Encyclopaedia. See also Basset Horn; Bass Clarinet and Pedal Clarinet. – (K. S.)

CLARK, SIR ANDREW, Bart. (1826-1893), British physician, was born at Aberdeen on the 28th of October 1826. His father, who also was a medical man, died when he was only a few years

1 See Capt. C. R. Day, op. cit. p. 106.

2 V. Mahillon, Catal. desc. (1880), p. 182, refers his statement to the Chevalier L. de Burbure.

3 Das neu-eroffnete Or Chester (Hamburg, 1713).

4 Mahillon, Catal. desc. (1880), vol. i. p. 182.

6 See Chevalier Ludwig von Koechel, Die kaiserliche Hofmusik-kapelle zu Wien, 1 543-1867 (Vienna, 1869). 4 In the Italian edition of 1769 the part is scored for clarinet.

Fig. 4. — Clarinet (Boehm model , Kluss- mann's patent).

old. After attending school in Aberdeen, he was sent by his guardians to Dundee and apprenticed to a druggist; then returning to Aberdeen he began his medical studies in the uni- versity of that city. Soon, however, he went to Edinburgh, where in the extra-academical school he had a student's career of the most brilliant description, ultimately becoming assistant to J. Hughes Bennett in the pathological department of the Royal Infirmary, and assistant demonstrator of anatomy to Robert Knox. But symptoms of pulmonary phthisis brought his academic life to a close, and in the hope that the sea might benefit his health he joined the medical department of the navy in 1848. Next year he became pathologist to the Haslar hospital, where T. H. Huxley was one of his colleagues, and in 1853 he was the successful candidate for the newly-instituted post of curator to the museum of the London hospital. Here he intended to devote all his

energies to pathology, but circumstances brought him into active medical practice. In 1854, the year in which he took his doctor's degree at Aberdeen, the post of assistant- physician to the hospital became vacant and he was prevailed, upon to apply for it. He was foiid of telling how his phthisical tendencies gained him the appointment. " He is only a poor Scotch doctor," it was said, " with but a few months to live; let him have it." He had it, and two years before his death publicly declared that of those who were on the staff of the hospital at the time of his selection he was the only one remaining alive. In 1854 he became a member of the College of Physicians, and in 1858 a fellow, and then went in succession through all the offices of honour the college has to offer, ending in 1888 with the presidency, which he continued to hold till his death. From the time of his selection as assistant physician to the London hospital, his fame rapidly grew until he became a fashionable doctor with one of the largest practices in London, counting among his patients some of the most distinguished men of the day. The great number of persons who passed through his consulting-room every morning rendered it inevitable that to a large extent his advice should become stereotyped and his prescriptions often reduced to mere stock formulae, but in really serious cases he was not to be surpassed in the skill and carefulness of his diagnosis and in his attention to detail. In spite of the claims of his practice he found time to produce a good many books, all written in the precise and polished style on which he used to pride himself. Doubtless owing largely to personal reasons, lung diseases and especially fibroid phthisis formed his favourite theme, but he also discussed other subjects, such as renal inadequacy, anaemia, constipation, &c. He died in London on the 6th of November 1893, after a paralytic stroke which was probably the result of persistent overwork.

CLARK, FRANCIS EDWARD (1851-), American clergy- man, was born of New England ancestry at Aylmer, Province of Quebec, Canada, on the 12th of September 1851. He was the son of Charles C. Symmes, but took the name of an uncle, the Rev. E. W. Clark, by whom he was adopted after his father's death in 1853. He graduated at Dartmouth College in 1873 and at Andover Theological Seminary in 1876, was ordained in the Congregational ministry, and was pastor of the Williston Congre- gational church at Portland, Maine, from 1876 to 1883, and of the Phillips Congregational church, South Boston, Mass., from 1883 to 1887. On the 2nd of February 1881 he founded at Portland the Young People's Society of Christian Endeavor, which, beginning as a small society in a single New England church, developed into a great interdenominational organiza- tion, which in

1908 had 70,761 societies and more than 3,500,000 members scattered throughout the United States, Canada, Great Britain, Australia, South Africa, India, Japan and China. After 1887 he devoted his time entirely to the extension of this work, and was president of the United Societies of Christian Endeavor and of the World's Christian Endeavor Union, and editor of the Christian Endeavor World (originally The Golden Rule) . Among his numerous publications are The Children and the Church (1882) ; Looking Out on Life (1883) ; Young People's Prayer Meetings (1884); Some Christian Endeavor Saints (1889); World- Wide Endeavor (1895); A New Way Round an Old World (1900).

See his The Young People's Christian Endeavor, where it began, &c. (Boston, 1895) ; Christian Endeavor Manual (Boston, 1903) ; and Christian Endeavor in All Lands: Record of Twenty-five Years of Progress (Philadelphia, 1907).

CLARK, GEORGE ROGERS (1752-1818), American frontier military leader, was born near Charlottesville, in Albemarle county, Virginia, on the 19th of November 1752. Early in life he became a land-surveyor; he took part in Lord Dunmore's War (1774), and in 1775 went as a surveyor for the Ohio Company to Kentucky (then a district of Virginia), whither he removed early in 1776. His iron will, strong passions, audacious courage and magnificent physique soon made him a leader among his frontier neighbours, by whom in 1776 he was sent as a delegate to the Virginia legislature. In this capacity he was instrumental in bringing about the organization of Kentucky as a county of Virginia, and also obtained from Governor Patrick Henry a supply of powder for the Kentucky settlers. Convinced that the Indians were instigated and supported in their raids against the American settlers by British officers stationed in the forts north of the Ohio river, and that the conquest of those forts would put an end to the evil, he went on foot to Virginia late in 1777 and submitted to Governor Henry and his council a plan for offensive operations. On the 2nd of January 1778 he was commissioned lieutenant-colonel, received £1200 in de- preciated currency, and was authorized to enlist troops; and by the end of May he was at the falls of the Ohio (the site of Louisville) with about 175 men. The expedition proceeded to Fort Kaskaskia, on the Mississippi, in what is now Illinois. This place and Cahokia, also on the Mississippi, near St Louis, were defended by small British garrisons, which depended upon the support of the French habitants. The French being willing to accept the authority of Virginia, both forts were easily taken. Clark gained the friendship of

Father Pierre Gibault, the priest at Kaskaskia, and through his influence the French at Vincennes on the Wabash were induced (late in July) to change their allegiance. On the 17th of December Lieut.-Governor Henry Hamilton, the British commander at Detroit, recovered Vincennes and went into winter quarters. Late in February 1779 he was surprised by Clark and compelled to give up Vincennes and its fort, Fort Sackville, and to surrender himself and his garrison of about 80 men, as prisoners of war. With the exception of Detroit and several other posts on the Canadian frontier the whole of the North-West was thus brought under American influence; many of the Indians, previously hostile, became friendly, and the United States was put in a position to demand the cession of the North-West* in the treaty of 1783. For this valuable service, in which Clark had freely used his own private funds, he received practically no recompense either from Virginia or from the United States, and for many years before his death he lived in poverty. To him and his men, however, the Virginia legislature granted 150,000 acres of land in 1781, which was subsequently located in what are now Clark, Floyd and Scott counties, Indiana; Clark's individual share was 8049 acres, but from this he realized little. Clark built Fort Jefferson on the Mississippi, 4 or 5 m. below the mouth of the Ohio, in 1780, destroyed the Indian towns Chillicothe and Piqua in the same year, and in November 1782 destroyed the Indian towns on the Miami river. With this last expedition his active military service virtually ended, and in July 1783 he was relieved of his command by Virginia. Thereafter he lived on part of the land granted to him by Virginia or in Louisville for the rest 'of his life. In 1793 he accepted from Citizen Genet a commission as " major-general in the armies of France, and commander-in-chief of the French Revolutionary Legion in the Mississippi Valley," and tried to raise a force for an attack upon the Spanish possessions in the valley of the Mississippi. The scheme, however, was abandoned after Genet's recall. Disappointed at what he regarded as his country's ingratitude, and broken down by excessive drinking and paralysis, he lost his once powerful influence and lived in comparative isolation until his death, near Louisville, Kentucky, on the 13th of February

1818.

CLARK, G. R.— CLARK, J. L.

See W. H. English, Conquest of the Country north-west of the River Ohio, 177S-1783, and Life of George Rogers Clark (2 vols., Indianapolis and Kansas City, 1896), an accurate and detailed work, which represents an immense amount of research among both printed and manuscript sources. Clark's own accounts of his expeditions, and

other interesting documents, are given in the appendix to this work.

Clark, William (1 770-1838), the well-known explorer, was the youngest brother of the foregoing. He was born in Caroline county, Virginia, on the 1st of August 1770. At the age of fourteen he removed with his parents to Kentucky, settling at the falls of the Ohio (Louisville). He entered the United States army as a lieutenant of infantry in March 1792, and served under General Anthony Wayne against the Indians in 1794. In July 1796 he resigned his commission on account of ill-health. In 1803-1806, with Meriwether Lewis (q.v.), he commanded the famous exploring expedition across the continent to the mouth of the Columbia river, and was commissioned second lieutenant in March 1804 and first lieutenant in January 1806. In February he again resigned from the army. He then served for a few years as brigadier-general of the Louisiana territorial militia, as Indian agent for " Upper Louisiana," as territorial governor of Missouri in 1813-1820, and as superin- tendent of Indian affairs at St Louis from 1822 until his death there on the 1st of September 1838.

CLARK, SIR JAMES (1788-1870), English physician, was born at Cullen, Banffshire, and was educated at the grammar school of Fordyce and at the universities of Aberdeen and Edinburgh. He served for six years as a surgeon in the army; then spent some time in travelling on the continent, in order to investigate the mineral waters and the climate of various health resorts; and for seven years he lived in Rome. In 1826 he began to practise in London. In 1835 he was appointed physician to the duchess of Kent, becoming physician in ordinary to Queen Victoria in 1837. In 1838 he was created a baronet. He pub- lished The Influence of Climate in Chronic Diseases, containing valuable meteorological tables (1829), and a Treatise on Pul- monary Consumption (1835).

CLARK, JOHN BATES (1847-), American economist,

was born at Providence, Rhode Island, on the 26th of January 1847. Educated at Brown University, Amherst College, Heidel- berg and Zurich, he was appointed professor of political economy at Carleton College, Minnesota, in 1877. In 1881 he became professor of history and political science in Smith College, Massachusetts; in 1892 professor of political economy in Amherst College. He was appointed professor of political economy at Columbia University in 1895. Among his works are: The Philosophy of Wealth (1885); Wages (1889); Capital and Us Earnings (1898); The Control of Trusts (1901); The Problem of Monopoly (1904); and Essentials of Economic Theory (1907).

CLARK, JOSIAH LATIMER (182 2-1898), English engineer and electrician, was born on the 10th of March 1822 at Great Marlow, Bucks. His first interest was in chemical manufacturing, but in 1848 he became assistant engineer at the Menai Straits bridge under his elder brother Edwin (1814-1894), the inventor of the Clark hydraulic lift graving dock. Two years later, when his brother was appointed engineer to the Electric Telegraph Company, he again acted as his assistant, and subsequently succeeded him as chief engineer. In 1854 he took out a patent " for conveying letters or parcels between places by the pressure of air and vacuum," and later was concerned in the construction of a large pneumatic despatch tube between the general post office and Euston station, London. About the same period he was engaged in experimental researches on the propagation of the electric current in submarine cables, on which he published a pamphlet in 1855, and in 1859 he was a member of the com- mittee which was appointed by the government to consider the numerous failures of submarine cable enterprises. Latimer Clark paid much attention to the subject of electrical measure- ment, and besides designing various improvements in method and apparatus and inventing the Clark standard cell, he took a leading part in the movement for the systematization of electrical standards, which was inaugurated by the paper which he and Sir

C. T. Bright read on the question before the British Association in 1861. With Bright also he devised improvements in the insula- tion of submarine cables. In the later part of his life he was a member of several firms engaged in laying submarine cables, in manufacturing electrical appliances, and in hydraulic engineering. He died in London on the 30th of October 1898. Besides pro- fessional papers, he published an Elementary Treatise on Electrical Measurement (1868), together with two books on astronomical subjects, and a memoir of Sir W. F. Cooke.

CLARK, THOMAS (1801-1867), Scottish chemist, was born at Ayr on the 31st of March 1801.. In 1826 he was appointed lecturer on chemistry at the Glasgow mechanics' institute, and in 1831 he took the degree of M.D. at the university of that city. Two years later he became professor of chemistry in Marischal College, Aberdeen, but was obliged to give up the duties of that position in 1844 through ill-health, though nominally he remained professor till i860. His name is chiefly known in connexion with his process for softening hard waters, and his water tests, patented in 1841. The last twenty years before his death at Glasgow on the 27 th of November 1867 were occupied with

the study of the historical origin of the Gospels.

CLARK, WILLIAM GEORGE (1821-1878), English classical and Shakespearian scholar, was born at Barford Hall, Darlington, in March 182 1. He was educated at Sedbergh and Shrewsbury schools and Trinity College, Cambridge, where he was elected fellow after a brilliant university career. In 1857 he was appointed public orator. He travelled much during the long vacations, visiting Spain, Greece, Italy and Poland. His Peloponnesus (1858) was an important contribution to the knowledge of the country at that time. In 1853 Clark had taken orders, but left the Church in 1870 after the passing of the Clerical Disabilities Act, of which he was one of the promoters. He also resigned the public oratorship in the same year, and in consequence of illness left Cambridge in 1873. He died at York on the 6th of November 1878. He bequeathed a sum of money to his old college for the foundation of a lectureship in English literature. Although Clark was before all a classical scholar, he published little in that branch of learning. A contemplated edition of the works of Aristophanes, a task for which he was singularly fitted, was never published. He visited Italy in 1868 for the express purpose of examining the Ravenna and other MSS., and on his return began the notes to the Acharnians, but they were left in too incomplete a state to admit of publication in book form even after his death (see Journal of Philology, viii., 1879). He established the Cambridge Journal of Philology, and co- operated with B. H. Kennedy and James Riddell in the pro- duction of the well-known Sabrinae Corolla. The work by which he is best known is the Cambridge Shakespeare (1863-1866), containing a collation of early editions and selected emendations, edited by him at first with John Glover and afterwards with W. Aldis Wright. Gazpacho (i8s3)gives an account of his tour in Spain; his visits to Italy at the time of Garibaldi's insurrection, and to Poland during the insurrection of 1863, are described in Vacation Tourists, ed. F. Galton, i. and iii.

H. A. J. Munro in Journal of Philology (viii. 1879) describes Clark as " the most accomplished and versatile man he ever met "; see also notices by W. Aldis Wright in Academy (Nov. 23, 1878); R. Burn in Athenaeum (Nov. 16, 1878); The Times (Nov. 8, 1878); Notes and Queries, 5th series, x. (1878), p. 400.

CLARKE, ADAM (i762?i832), British Nonconformist divine, was born at Moybeg, Co. Londonderry, Ireland, in 1760 or 1762. After receiving a very limited education he was apprenticed to a linen manufacturer, but, finding the employ ment uncongenial, he resumed school-life at the institution founded by Wesley at Kingswood, near Bristol. In 1782 he entered on the duties of the ministry, being appointed by Wesley to

the Bradford (Wiltshire)circuit. His popularity as a preacher was very great, and his influence in the denomination is indicated by the fact that he was three times (1806, 1814, 1822) chosen to be president of the conference. He served twice on the London circuit, the second period being extended considerably longer than the rule allowed, at the special request of the British and Foreign Bible Society, who had employed him in the preparation

of their Arabic Bible. Though ardent in his pastoral work, he found time for diligent study of Hebrew and other Oriental languages, undertaken chiefly with the view of qualifying himself for the great work of his life, his Commentary on the Holy Scriptures (8 vols., 1810-1826). In 1802 he published a Biblio- graphical Dictionary in six volumes, to which he afterwards added a supplement. He was selected by the Records Commis- sion to re-edit Rymer's Foedera, a task which after ten years' labour (1808-1818) he had to resign. He also wrote Memoirs of the Wesley Family (1823), and edited a large number of religious works. Honours were showered upon him (he was M.A., LL.D. of Aberdeen), and many distinguished men in church and state were his personal friends. He died in London on the 16th of August 1832.

His Miscellaneous Works were published in 13 vols. (1836), and a Life (3 vols.) by his son, J. B. B. Clarke, appeared in 1833.

CLARKE, SIR ANDREW (1824-1902), British soldier and administrator, son of Colonel Andrew Clarke, of Co. Donegal, Ireland, governor of West Australia, was born at Southsea, England, on the 27th of July 1824, and educated at King's school, Canterbury. He entered the Royal Military Academy, Woolwich, and obtained his commission in the army in 1844 as second lieutenant in the Royal Engineers. He was appointed to his father's staff in West Australia, but was transferred to be A.D.C. and military secretary to the governor of Tasmania; and in 1847 he went to New Zealand to take part in the Maori War, and for some years served on Sir George Grey's staff. He was then made surveyor-general in Victoria, took a prominent part in framing its new constitution, and held the office of minister of public lands during the first administration (1855- 1857). He returned to England in 1857, and in 1863 was sent on a special mission to the West Coast of Africa. In 1864 he was appointed director of works for the navy, and held this post for nine years, being responsible for great improvements in the naval arsenals at Chatham, Portsmouth and Plymouth, and for fortifications at Malta, Cork, Bermuda and

elsewhere. In 1873 he was made K.C.M.G., and became governor of the Straits Settlements, where he did most valuable work in consolidating British rule and ameliorating the condition of the people. From 1875 to 1880 he was minister of public works in India; and on his return to England in 1881, holding then the rank of lieutenant-colonel in the army, he was first appointed commandant at Chatham and then inspector-general of fortifica- tions (188 2-1 886). Having attained the rank of lieutenant- general and been created G.C.M.G., he retired from official life, and in 1886 and 1893 unsuccessfully stood for parliament as a supporter of Mr Gladstone. During his last years he was agent- general for Victoria. He died on the 29th of March 1902. Both as a technical and strategical engineer and as an Imperial administrator Sir Andrew Clarke was one of the ablest and most useful public servants of his time; and his contributions to periodical literature, as well as his official memoranda, contained valuable suggestions on the subjects of imperial defence and imperial consolidation which received too little consideration at a period when the home governments were not properly alive to their importance. He is entitled to remembrance as one of those who first inculcated, from a wide practical experience, the views of imperial administration and its responsibilities, which in his last years he saw accepted by the bulk of his country- men.

CLARKE, CHARLES COWDEN (1 787-1877), English author and Shakespearian scholar, was born at Enfield, Middlesex, on the 15th of December 1787. His father, John Clarke, was a schoolmaster, among whose pupils was John Keats. Charles Clarke taught Keats his letters, and encouraged his love of poetry. He knew Charles and Mary Lamb, and afterwards became acquainted with Shelley, Leigh Hunt, Coleridge and Hazlitt. Clarke became a music publisher in partnership with Alfred Novello, and married in 1828 his partner's sister, Mary Victoria (1 809-1 898), the eldest daughter of Vincent Novello. In the year after her marriage Mrs Cowden Clarke began her valuable Shakespeare concordance, which was eventually

issued in eighteen monthly parts (1844-1845), and in volume form in 1845 as The Complete Concordance to Shakespeare, being a Verbal Index to all the Passages in the Dramatic Works of the Poet. This work superseded the Copious Index to . . . Shake- speare (1790) of Samuel Ayscough, and the Complete Verbal Index . . . (1805-1807) of Francis Twiss. Charles Cowden Clarke published many useful books, and

edited the text for John Nichol's edition of the British poets; but his most import- ant work consisted of lectures delivered between 1834 and 1856 on Shakespeare and other literary subjects. Some of the more notable series were published, among them being Shakespeare's Characters, chiefly those subordinate (1863), and Moliere's Characters (1865). In 1859 he published a volume of original poems, Carmina Minima. For some years after their marriage the Cowden Clarkes lived with the Novellos in London. • In 1849 Vincent Novello with his wife removed to Nice, where he was joined by the Clarkes in 1856. After his death they lived at Genoa at the " Villa Novello." They collaborated in The Shakespeare Key, unlocking the Treasures of his Style . . .(1879), and in an edition of Shakespeare for Messrs Cassell, which was issued in weekly parts, and completed in 1868. It was reissued in 1886 as Cassell's Illustrated Shakespeare. Charles Clarke died on the 13th of March 1877 at Genoa, and his wife survived him until the 12th of January 1898. Among Mrs Cowden Clarke's other works may be mentioned The Girlhood' of Shakespeare's Heroines (3 vols., 1850-1852), and a translation of Berlioz's Treatise upon Modern Instrumentation and Orchestration (1856).

See Recollections of Writers (1898), a joint work by the Clarkes containing letters and reminiscences of their many literary friends; and Mary Cowden Clarke's autobiography, My Long Life (1896). A charming series of letters (1850-1861), addressed by her to an American admirer ot her work, Robert Balmanno, was edited by Anne Upton Nettleton as Letters to an Enthusiast (Chicago, 1902).

CLARKE, EDWARD DANIEL (1769-1822), English mineral- ogist and traveller, was born at Willingdon, Sussex, on the 5th of June 1769, and educated first at Tonbridge. In 1786 he ob- tained the office of chapel clerk at Jesus College, Cambridge, but the loss of his father at this time involved him in difficulties. In 1790 he took his degree, and soon after became private tutor to Henry Tufton, nephew of the duke of Dorset. In 1792 he obtained an engagement to travel with Lord Berwick through Germany, Switzerland and Italy. After crossing the Alps, and visiting a few of the principal cities of Italy, including Rome, he went to Naples, where he remained nearly two years. Having returned to England in the summer of 1794, he became tutor in several distinguished families. In 1799 he set out with a Mr Cripps on a tour through the continent of Europe, beginning with Norway and Sweden, whence they proceeded through Russia and the Crimea to Constantinople, Rhodes, and afterwards to Egypt and Palestine. After the capitulation of Alexandria, Clarke was of considerable use in securing for England the statues, sarcophagi, maps, manuscripts, &c, which had been collected by the French savants. Greece was the

country next visited. From Athens the travellers proceeded by land to Constantinople, and after a short stay in that city directed their course homewards through Rumelia, Austria, Germany and France. Clarke, who had now obtained considerable repu- tation, took up his residence at Cambridge. He received the degree of LL.D. shortly after his return in 1803, on account of the valuable donations, including a colossal statue of the Eleusinian Ceres, which he had made to the university. He was also presented to the college living of Harlton, near Cam- bridge, in 1805, to which, four years later, his father-in-law added that of Yeldham. Towards the end of 1808 Dr Clarke was appointed to the professorship of mineralogy in Cambridge, then first instituted. Nor was his perseverance as a traveller otherwise unrewarded. The MSS. which he had collected in the course of his travels were sold to the Bodleian library for £1000; and by the publication of his travels he realized altogether a clear profit of £6595. Besides lecturing on mineralogy and discharging his clerical duties, Dr Clarke eagerly prosecuted the study of chemistry, and made several discoveries, principally by means of the gas blow-pipe, which he had brought to a high

degree of perfection. He was also appointed university librarian in 181 7, and was one of the founders of the Cambridge Philo- sophical Society in 181 9. He died in London on the 9th of March 1822. The following is a list of his principal works: — Testimony of Authors respecting the Colossal Statue of Ceres in the Public Library, Cambridge (8vo, 1801-1803); The Tomb of Alexander, a Dissertation on the Sarcophagus brought from Alex- andria, and now in the British Museum (4to, 1805); A Methodical Distribution of the Mineral Kingdom (fol., Lewes, 1807); A Description of the Greek Marbles brought from the Shores of the Euxine, Archipelago and Mediterranean, and deposited in the University Library, Cambridge (8vo, 1809); Travels in various Countries of Europe, Asia and Africa (4to, 1810-1819; 2jided.,

1811-1823).

See Life and Remains, by Rev. W. Otter (1824).

CLARKE, SIR EDWARD GEORGE (1841-), English lawyer and politician, son of J. G. Clarke of Moorgate Street, London, was born on the 15th of February 1841. In 1859 he became a writer in the India office, but resigned in the next year, and became a law reporter. He obtained a Tancred law scholar- ship in 1 86 1, and was called to the bar at Lincoln’s Inn in 1864. He joined the home circuit, became Q.C. in 1880, and a bencher of Lincoln’s Inn in 1882. In November 1877 he

was successful in securing the acquittal of Chief-Inspector Clarke from the charge brought against certain Scotland Yard officials of conspiracy to defeat justice, and his reputation was assured by his defence of Patrick Staunton in the Penge murder case (1877), and of Mrs Bartlett against the charge of poisoning her husband (1886). Among other notable cases he was counsel for the plaintiff in the libel action brought by Sir William Gordon-Cumming (1890) against Mr and Mrs Lycett Green and others for slander, charging him with cheating in the game of baccarat (in this case the prince of Wales, afterwards Edward VII., gave evidence), and he appeared for Dr Jameson, Sir John Willoughby and others when they were tried (1896) under the Foreign Enlistment A :X. He was knighted in 1886. He was returned as Conservative member for Southwark at a by-election early in 1880, but failed to retain his seat at the general election which followed a month or two later; he found a seat at Plymouth, however, which he retained until 1900. He was solicitor-general in the Conservative administra- tion of 1886-1892, but declined office under the Unionist govern- ment of 1895 when the law officers of the crown were debarred from private practice. The most remarkable, perhaps, of his speeches in the House of Commons was his reply to Mr Gladstone on the second reading of the Home Rule Bill in 1893. In 1899 differences which arose between Sir Edward Clarke and his party On the subject of the government's South African policy led to his resigning his seat. At the general election of 1906 he was returned at the head of the poll for the city of London, but he offended a large section of his constituents by a speech against tariff reform in the House of Commons on the 12th of March, and shortly afterwards he resigned his seat on grounds of health. He published a Treatise on the Law of Extradition (4th ed., 1903), and also three volumes of his political and forensic speeches.

CLARKE, JAMES FREEMAN (1810-1888), American preacher and author, was born in Hanover, New Hampshire, on the 4th of April 1810. He was prepared for college at the public Latin school of Boston, and graduated at Harvard College in 1829, and at the Harvard Divinity School in 1833. He was then ordained as minister of a Unitarian congregation at Louisville, Kentucky, which was then a slave state. Clarke soon threw himself heart and soul into the national movement for the abolition of slavery, though he was never what was then called in America a " radical abolitionist." In 1839 he returned to Boston, where he and his friends established (1841) the " Church of the Disciples." It brought together a body of men and women active and eager in applying the Christian religion to the social problems of the day, and he would have said that the feature which distinguished

it from any other church was that they also were ministers of the highest religious life. Ordination could make no distinction between him and them. Of this church he was the minister from 1841 until 1850 and from 1854 until his death. He was alsq

secretary of the Unitarian Association and, in 1867-1871 professor of natural religion and Christian doctrine at Harvard. From the beginning of his active life he wrote freely for the press. From 1836 until 1839 he was editor of the Western Messenger, a magazine intended to carry to readers in the Mississippi Valley simple statements of ” liberal religion,” involving what were then the most radical appeals as to national duty, especially the abolition of slavery. The magazine is now of value to collectors because it contains the earliest printed poems of Ralph Waldo Emerson, who was Clarke’s personal friend. Most of Clarke’s earlier published writings were addressed to the immediate need of establishing a larger theory of religion than that espoused by people who were still trying to be Calvinists, people who maintained what a good American phrase calls ” hard-shelled churches.” But it would be wrong to call his work controversial. He was always declaring that the business of the Church is Eirenic and not Polemic. Such books as Orthodoxy: Its Truths and Errors (1866) have been read more largely by members of orthodox churches than by Unitarians. In the great moral questions of his time Clarke was a fearless and practical advocate of the broadest statement of human rights. Without caring much what company he served in, he could always be seen and heard, a leader of unflinching courage, in the front rank of the battle. He published but few verses, but at the bottom he was a poet. He was a diligent and accurate scholar, and among the books by which he is best known is one called Ten Great Religions (2 vols., 1871-1883). Few Americans have done more than Clarke to give breadth to the published discussion of the subjects of literature, ethics and religious philosophy. Among his later books are Every-Day Religion (1886) and Sermons on the Lord’s Prayer (1888). He died at Jamaica Plain, Mass., on the 8th of June 1888.

His Autobiography, Diary and Correspondence, edited by Edward Everett Hale, was published in Boston in 1891. (E. E. H.)

CLARKE, JOHN SLEEPER (1833-1809), American actor, was born in Baltimore, Maryland, on the 3rd of September 1833, and was educated for the law. He made his first appearance in Boston as Frank

Hardy in Paul Pry in 1851. In 1859 he married Asia Booth, daughter of Junius Brutus Booth, and he was associated with his brother-in-law Edwin Booth in the manage- ment of the Winter Garden theatre in New York, the Walnut Street theatre in Philadelphia and the Boston theatre. In 1867 he went to London, where he made his first appearance at the St James's as Major Wellington de Boots in Stirling Coynes's Everybody's Friend, rewritten for him and called The Widow's Hunt. His success was so great that he remained in England for the rest of his life, except for four visits to America. Among his favourite parts were Toodles, which ran for 200 nights at the Strand, Dr Pangloss in The Heir-at-law, and Dr OUapod in The Poor Gentleman. He managed several London theatres, includ- ing the Haymarket, where he preceded the Bancrofts. He retired in 1889, and died on the 24th of September 1899. His two sons also were actors.

CLARKE, MARCUS ANDREW HISLOP (1846-1881), Australian author, was born in London on the 24th of April 1846. He was the only son of William Hislop Clarke, a barrister of the Middle Temple who died in 1863. He emigrated :~~ hwith to Australia, where his uncle, James Langton Clarke, was a county court judge. He was at first a clerk in the bank of Australasia, but showed no business ability, and soon proceeded to learn farming at a station on the Wimmera river, Victoria. He was already writing stories for the Australian Magazine, when in 1867 he joined the staff of the Melbourne Argus through the introduc- tion of Dr Robert Lewins. He also became secretary (1872) to the trustees of the Melbourne public library and later (1876) assistant librarian. He founded in 1868 the Yorick Club, which soon numbered among its members the chief Australian men of letters. The most famous of his books is For the Term of his Natural Life (Melbourne, 1874), a powerful tale of an Australian penal settlement, which originally appeared in serial form in a Melbourne paper. He also wrote The Peripatetic Philosopher (1869), a series of amusing papers reprinted from The Austral-

asian; Long Odds (London, 1870), a novel; and numerous comedies and pantomimes, the best of which was Twinkle, Twinkle, Little Star (Theatre Royal, Melbourne; Christmas, 1873). He married an actress, Marian Dunn. In spite of his popular success Clarke was constantly involved in pecuniary difficulties, which are said to have hastened his dea-th at Melbourne on the 2nd of August 1881. .

See The Marcus Clarke Memorial Volume (Melbourne, 1884), containing selections from his writings with a biography and list of works, edited by Hamilton Mackinnon.

CLARKE, MARY ANNE (e.1776-1852), mistress of Frederick duke of York, second son of George III., was born either in London or at Oxford. Her father, whose name was Thompson, seems to have been a tradesman in rather humble circumstances. She married before she was eighteen, but Mr Clarke, the pro- prietor of a stonemasonry business, became bankrupt, and she left him. After other liaisons, she became in 1803 the mistress of the duke of York, then commander-in-chief, maintaining a large and expensive establishment in a fashionable district. The duke's promised allowance was not regularly paid, and to escape her financial difficulties Mrs Clarke trafficked in her protector's position, receiving money from various promotion-seekers, military, civil and even clerical, in return for her promise to secure them the good services of the duke. Her procedure became a public scandal, and in 1809 Colonel Wardle, M.P., brought eight charges of abuse of military patronage against the duke in the House of Commons, and a committee of inquiry was appointed, before which Mrs Clarke herself gave evidence. The result of the inquiry clearly established the charges as far as she was con- cerned, and the duke of York was shown to have been aware of what was being done, but to have derived no pecuniary benefit himself. He resigned his appointment as commander-in-chief, and terminated his connexion with Mrs Clarke, who subsequently obtained from him a considerable sum in cash and a pension, as the price for withholding the publication of his numerous letters tc her. Mrs Clarke died at Boulogne on the 21st of June 1852.

See Taylor, Authentic Memoirs of Mrs Clarke; Clarke (? pseud.), Life of Mrs M. A. Clarke; Annual Register, vol. li.

CLARKE, SAMUEL (1675-1729), English philosopher and divine, son of Edward Clarke, an alderman, who for several years was parliamentary representative of the city of Norwich, was born on the nth of October 1675, and educated at the free school of Norwich and at Caius College, Cambridge. The philosophy of Descartes was the reigning system at the university; Clarke, however, mastered the new system of Newton, and contributed greatly to its extension by publishing an excellent Latin version of the TraitS de physique of Jacques Rohault (1620-1675) with valuable notes, which he finished before he was twenty-two years of age. The system of Rohault was founded entirely upon Cartesian principles, and was previously known only through the medium of a rude Latin version. Clarke's translation (1697) continued to be used as a text-book in the university till sup- planted by the treatises of Newton, which it had been designed to introduce. Four editions were issued, the last and best being that of 1718. It was translated into English in 1723 by his brother Dr John

Clarke (1682-1757), dean of Sarum.

Clarke afterwards devoted himself to the study of Scripture in the original, and of the primitive Christian writers. Having taken holy orders, he became chaplain to John Moore (1646-1714), bishop of Norwich, who was ever afterwards his friend and patron. In 1699 he published two treatises, — one entitled Three Practical Essays on Baptism, Confirmation and Repentance, and the other, Some Reflections on that part of a book called Amyntor, or a Defence of Milton's Life, which relates to the Writings of the Primitive Fathers, and, the Canon of the New Testament. In 1701 he published A Paraphrase upon the Gospel of St Matthew, which was followed, in 1702, by the Paraphrases upon the Gospels of St Mark and St Luke, and soon afterwards by a third volume upon St John. They were subsequently printed together in two volumes and have since passed through several editions. He intended to treat in the same manner the remaining books of the New Testament, but his design was unfulfilled.

Meanwhile he had been presented by Bishop Moore to the rectory of Drayton, near Norwich. As Boyle lecturer, he dealt in 1704 with the Being and Attributes of God, and in 1705 with the Evidences of Natural and Revealed Religion. These lectures, first printed separately, were afterwards published together under the title of A Discourse concerning the Being and Attributes of God, the Obligations of Natural Religion, and the Truth and Certainty of the Christian Revelation, in opposition to Hobbes, Spinoza, the author of the Oracles of Reason, and other Denier s of Natural and Revealed Religion.

In 1706 he wrote a refutation of Dr Henry Dodwell's views on the immortality of the soul, and this drew him into controversy with Anthony Collins, He also wrote at this time a translation of Newton's Optics, for which the author presented him with £500. In the same year through the influence of Bishop Moore, he obtained the rectory of St Benet's, Paul's Wharf, London. Soon afterwards Queen Anne appointed him one of her chaplains in ordinary, and in 1709 presented him to the rectory of St James's, Westminster. He then took the degree of doctor in divinity, defending as his thesis the two propositions: Nullum fidei Christianae dogma, in Sacris Scripturis traditum, est rectae rationi dissentaneum, and Sine actionum humanarum libertate nulla potest esse religio. During the same year, at the request of the author, he revised Whiston's English translation

of the Apostolical Constitutions.

In 1 71 2 he published a carefully punctuated and annotated edition (folio 1712, octavo 1720) of Caesar's Commentaries, with elegant engravings, dedicated to the duke of Marlborough. During the same year he published his celebrated treatise on The Scripture Doctrine of the Trinity. It is divided into three parts. The first contains a collection and exegesis of all the texts in the New Testament relating to the doctrine of the Trinity; in the second the doctrine is set forth at large, and explained in particular and distinct propositions; and in the third the principal passages in the liturgy of the Church of England relating to the doctrine of the Trinity are considered. Whiston informs us that, some time before the publication of this book, a message was sent to him from Lord Godolphin "that the affairs of the public were with difficulty then kept in the hands of those that were for liberty; that it was therefore an unseasonable time for the publication of a book that would make a great noise and disturbance; and that therefore they desired him to forbear till a fitter opportunity should offer itself," — a message that Clarke of course entirely disregarded. The ministers were right in their conjectures; and the work not only provoked a great number of replies, but occasioned a formal complaint from the Lower House of Convocation. Clarke, in reply, drew up an apologetic preface, and afterwards gave several explanations, which satisfied the Upper House; and, on his pledging himself that his future conduct would occasion no trouble, the matter dropped.

In 1715 and 1716 he had a discussion with Leibnitz relative to the principles of natural philosophy and religion, which was at length cut short by the death of his antagonist. A collection of the papers which passed between them was published in 171 7 (cf . G. v. Leroy, Die philos. Probleme in dem Briefwechsel Leibniz und Clarke, Giessen, 1893). In 1719 he was presented by Nicholas 1st Baron Lechmere, to the mastership of Wigston's hospital in Leicester. In 1724 he published seventeen sermons, eleven of which had not before been printed. In 1727, on the death of Sir Isaac Newton, he was offered by the court the place of master of the mint, worth on an average from £1200 to £1500 a year. This secular preferment, however, he absolutely refused. In 1728 was published " A Letter from Dr Clarke to Benjamin Hoadly, F.R.S., occasioned by the controversy relating to the Proportion of Velocity and Force in Bodies in Motion," printed in the Philosophical Transactions. In 1729 he published the first twelve books of Homer's Iliad. This edition, dedicated to William Augustus, duke of Cumberland, was highly praised by Bishop Hoadly. On Sunday, the nth of May 1729, when going out to preach before the judges at Serjeants' Inn, he was seized with a sudden illness, which

caused his death on the Saturday following (May 17, 1729).

Soon after his death his brother Dr John Clarke, dean of Sarum, published, from his original manuscripts, An Exposition of the Church Catechism, and ten volumes of sermons. The Exposition is composed of the lectures which he read every Thursday morning, for some months in the year, at St James's church. In the latter part of his life he revised them with great care, and left them completely prepared for the press. Three years after his death appeared also the last twelve books of the Iliad, published by his son Samuel Clarke, the first three of these books and part of the fourth having, as he states, been revised and annotated by his father.

In disposition Clarke was cheerful and even playful. An intimate friend relates that he once found him swimming upon a table. At another time Clarke on looking out at the window saw a grave blockhead approaching the house; upon which he cried out, "Boys, boys, be wise; here comes a fool." Dr Warton, in his observations upon Pope's line,

" Unthought-of frailties cheat us in the wise," says, " Who could imagine that Locke was fond of romances; that Newton once studied astrology; that Dr Clarke valued himself on his agility, and frequently amused himself in a private room of his house in leaping over the tables and chairs ? "

Philosophy. — Clarke, though in no way an original thinker, was eminent in theology, mathematics, metaphysics and philology, but his chief strength lay in his logical power. The materialism of Hobbes, the pantheism of Spinoza, the empiricism of Locke, the determinism of Leibnitz, Collins' necessitarianism, Dodwell's denial of the natural immortality of the soul, rationalistic attacks on Christianity, and the morality of the sensationalists — all these he opposed with a thorough conviction of the truth of the principles which he advocated. His fame as theologian and philosopher rests to a large extent on his demonstration of the existence of God and his theory of the foundation of rectitude. The former is not a purely a priori argument, nor is it presented as such by its author. It starts from a fact and it often explicitly appeals to facts. The intelligence, for example, of the self-existence and original cause of all things is, he says, " not easily proved a priori," but " demon- strably proved a posteriori from the variety and degrees of perfection in things, and the order of causes and effects, from the intelligence that created beings are confessedly endowed with, and from the beauty, order, and final purpose of things." The propositions maintained in the argument are — " (1)

That something has existed from eternity; (2) that there has existed from eternity some one immutable and independent being; (3) that that immutable and independent being, which has existed from eternity, without any external cause of its existence, must be self-existent, that is, neces- sarily existing; (4) what the substance or essence of that being is, which is self-existent or necessarily existing, we have no idea, neither is it at all possible for us to comprehend it ; (5) that though the substance or essence of the self-existent being is itself absolutely incomprehensible to us, yet many of the essential attributes of his nature are strictly demonstrable as well as his existence, and, in the first place, that he must be of necessity eternal; (6) that the self -existent being must of necessity be infinite and omnipresent; (7) must be but one; (8) must be an intelligent being; (9) must be not a necessary agent, but a being endued with liberty and choice; (10) must of necessity have infinite power; (n) must be infinitely wise, and (12) must of necessity be a being of infinite goodness, justice, and truth, and all other moral perfections, such as become the supreme governor and judge of the world."

In order to establish his sixth proposition, Clarke contends that time and space, eternity and immensity, are not substances, but attributes — the attributes of a self-existent being. Edmund Law, Dugald Stewart, Lord Brougham, and many other writers, have, in consequence, represented Clarke as arguing from the existence of time and space to the existence of Deity. This is a serious mistake. The existence of an immutable, independent, and necessary being is supposed to be proved before any reference is made to the nature of time and space. Clarke has been generally supposed to have derived the opinion that time and space are attributes of an infinite immaterial and spiritual being from the Scholium Generate, first published in the second edition of Newton's Principia (1714). The truth is that his work on the Being and Attributes of God appeared nine years before that Scholium. The view propounded by Clarke may have been derived from the Midrash, the Kabbalah, Philo, Henry More, or Cudworth, but not from Newton. It is a view difficult to prove, and probably few will acknowledge that Clarke has conclusively proved it.

His ethical theory of " fitness " (see Ethics) is formulated on the analogy of mathematics. He held that in relation to the will things possess an objective fitness similar to the mutual consistency of things in the physical universe. This fitness God has given to actions, as he has given laws to Nature; and the fitness is as im- mutable as the laws. The theory has been unfairly criticized by

Jouffroy, Amedee Jacques, Sir James Mackintosh, Thomas Brown and others. It is said, for example, that Clarke made virtue consist in conformity to the relations of things universally, although the whole tenor of his argument shows him to have had in view con- formity to such relations only as belong to the sphere of moral agency. It is true that he might have emphasized the relation of moral fitness to the will, and in this respect J. F. Herbart (g.v.) improved on Clarke's statement of the case. To say, however, that Clarke simply confused mathematics and morals by justifying the moral criterion on a mathematical basis is a mistake. He compared the two subjects for the sake of the analogy.

Though Clarke can thus be defended against this and similar criticism, his work as a whole can be regarded only as an attempt to present the doctrines of the Cartesian school in a form which would not shock the conscience of his time. His work contained a measure of rationalism sufficient to arouse the suspicion of orthodox theologians, without making any valuable addition to, or modi- fication of, the underlying doctrine.

Authorities. — See W. Whiston's Historical Memoirs, and the preface by Benjamin Hoadly to Clarke's Works (4 vols., London, 1738-1742). See further on his general philosophical position J. Hunt's Religious Thought in England, passim, but particularly in vol. ii. 447-457, and vol. iii. 20-29 an d 109-115, &c. ; Rob. Zimmer- mann in the Denkschriften d. k. Akademie der Wissenschaften, Phil.- Hist. Classe, Bd. xix. (Vienna, 1870); H. Sidgwick's Methods of Ethics (6th ed., 1901), p. 384; A. Bain's Moral Science (1872), p. 562 foil., and Mental Science (1872), p. 416; Sir L. Stephen's English Thought in the Eighteenth Century (3rd ed., 1902), c. iii.; J. E. le Rossignol, Ethical Philosophy of S. Clarke (Leipzig, 1892).

CLARKE, THOMAS SHIELDS (i860-), American artist, was born in Pittsburg, Pennsylvania, on the 25th of April i860, and graduated at Princeton in 1882. He was a pupil of the Art Students' League, New York, and of the Ecole des Beaux Arts, Paris, under J. L. Gerome; later he entered the atelier of Dagnan-Bouveret, and, becoming interested in sculpture, worked for a while under Henri M. Chapu. As a sculptor, he received a medal of honour in Madrid for his " The Cider Press," now in the Golden Gate Park, San Francisco, California, and he made four caryatides of " The Seasons " for the Appellate Court House, New York. He designed an " Alma Mater " for Princeton University, and a model is in the library. Among his paintings are his " Night Market in

Morocco ” (Philadelphia Art Club), for which he received a medal at the International Exposition in Berlin in 1891, and his ” A Fool’s Fool,” exhibited at the Salon in 1887 and now in the collection of the Pennsyl- vania Academy of Fine Arts, Philadelphia.

CLARKE, WILLIAM BRANWHITE (1798-1878), British geologist, was born at East Bergholt, in Suffolk, on the 2nd of June 1798. He received his early education at Dedham grammar school, and in 181 7 entered Jesus College, Cambridge; he took his B.A. in 1821, was ordained and became M.A. in 1824. In 182 1 he was appointed curate of Ramsholt in Suffolk, and he acted in his clerical capacity in other places until 1839. Having become interested in geology through the teachings of Sedgwick, he utilized his opportunities and gathered many interesting facts on the geology of East Anglia which were embodied in a paper ” On the Geological Structure and Phenomena of Suffolk ” (Trans. Geol. Soc. 1837). He also communicated a series of papers on the geology of S.E. Dorsetshire to the Magazine of Nat. Hist. (1837-1838). In 1839, after a severe illness, he left England for New South Wales, mainly with the object of benefit- ing by the sea voyage. He remained, however, in that country, and came to be regarded as the ” Father of Australian Geology.” From the date of his arrival in New South Wales until 1870 he was in clerical charge first of the country from Paramatta to the Hawkesbury river, then of Campbelltown, and finally of Willoughby. He zealously devoted attention to the geology of the country, with results that have been of paramount import- ance. In 1 84 1 he discovered gold, being the first explorer who had obtained it in situ in the country, finding it both in the detrital deposits and in the quartzites of the Blue Mountains, and he then declared his belief in its abundance. In 1849 he made the first actual discovery of tin in Australia and in 1859 he made known the occurrence of the diamond. He was also the first to indicate the presence of Silurian rocks, and to deter- mine the age of the coal-bearing rocks in New South Wales. In 1869 he announced the discovery of remains of Dinornis in

Queensland. He was a trustee of the Australian museum at Sydney, and an active member of the Royal Society of New South Wales. In i860 he published Researches in the Southern Gold-fields of New South Wales. He was elected F.R.S. in 1876, and in the following year was awarded the Murchison medal by the Geological Society of London. His contributions to Australian scientific journals were numerous. He died near Sydney, on the 17th of June 1878.

CLARKSON, THOMAS (1760-1846), English anti-slavery agitator, was born on the 28th of March 1760, at Wisbeach, in Cambridgeshire,

where his father was headmaster of the free grammar school. He was educated at St Paul's school and at St John's College, Cambridge. Having taken the first place among the middle bachelors as Latin essayist, he succeeded in 1785 in gaining a similar honour among the senior bachelors. The subject appointed by the vice-chancellor, Dr Peckhard, was one in which he was himself deeply interested — Anne liceat invitos in servitutem dare? (Is it right to make men slaves against their will?). In preparing for this essay Clarkson consulted a number of works on African slavery, of which the chief was Benezet's Historical Survey of New Guinea; and the atrocities of which he read affected him so deeply that he de- termined to devote all his energies to effect the abolition of the slave trade, and gave up his intention of entering the church.

His first measure was to publish, with additions, an English translation of his prize essay (June 1786). He then commenced to search in all quarters for information concerning slavery. He soon discovered that the cause had already been taken up to some extent by others, most of whom belonged to the Society of Friends, and among the chief of whom were William Dillwyn, Joseph Wood and Granville Sharp. With the aid of these gentlemen, a committee of twelve was formed in May 1787 to do all that was possible to effect the abolition of the slave trade. Meanwhile Clarkson had also gained the sympathy of Wilberforce, Whitbread, Sturge and several other men of influence. Travel- ling from port to port, he now commenced to collect a large mass of evidence; and much of it was embodied in his Summary View of the Slave Trade, and the Probable Consequences of its Abolition, which, with a number of other anti-slavery tracts, was published by the committee. Pitt, Grenville, Fox and Burke looked favourably on the movement; in May 1788 Pitt introduced a parliamentary discussion on the subject, and Sir W. Dolben brought forward a bill providing that the number of slaves carried in a vessel should be proportional to its tonnage. A number of Liverpool and Bristol merchants obtained permission from the House to be heard by council against the bill, but on the 1 8th of June it passed the Commons. Soon after Clarkson published an Essay on the Impolicy of the Slave Trade; and for two months he was continuously engaged in travelling that he might meet men who were personally acquainted with the facts of the trade. From their lips he collected a considerable amount of evidence; but only nine could be prevailed upon to promise to appear before the privy council. Meanwhile other witnesses had been obtained by Wilberforce and the committee, and on the 12th of May 1789 the former led a debate on the subject in the House of Commons, in which he was seconded by Burke and supported by Pitt and Fox.

It was now the beginning of the French Revolution, and in the hope that he might arouse the French to sweep away slavery with other abuses, Clarkson crossed to Paris, where he remained six months. He found Necker head of the government, and obtained from him some sympathy but little help. Mirabeau, however, with his assistance, prepared a speech against slavery, to be delivered before the National Assembly, and the Marquis de la Fayette entered enthusiastically into his views. During this visit Clarkson met a deputation of negroes from Santo Domingo, who had come to France to present a petition to the National Assembly, desiring to be placed on an equal footing with the whites; but the storm of the Revolution permitted no sub- stantial success to be achieved. Soon after his return home he engaged in a search, the apparent hopelessness of which finely displays his unshrinking laboriousness and his passionate

enthusiasm. He desired to find some one who had himself witnessed the capture of the negroes in Africa; and a friend having met by chance a man-of-war's-man who had done so, Clarkson, though ignorant of the name and address of the sailor, set out in search of him, and actually discovered him. His last tour was undertaken in order to form anti-slavery committees in all the principal towns. At length, in the autumn of 1794, his health gave way, and he was obliged to cease active work. He now occupied his time in writing a History of the Abolition of the Slave Trade, which appeared in 1808. The bill for the abolition of the trade became law in 1807; but it was still necessary to secure the assent of the other powers to its principle. To obtain this was, under pressure of the public opinion created by Clarkson and his friends, one of the main objects of British diplomacy at the Congress of Vienna, and in February 1815 the trade was condemned by the powers. The question of concerting practical measures for its abolition was raised at the Congress of Aix-la-Chapelle in 1818, but without result. On this occasion Clarkson personally presented an address to the emperor Alexander I., who communicated it to the sovereigns of Austria and Prussia. In 1823 the Anti-Slavery Society was formed, and Clarkson was one of its vice-presidents. He was for some time blind from cataract; but several years before his death on the 26th of September 1846, his sight was restored.

Besides the works already mentioned, he published the Portraiture of Quakerism (1806), Memoirs of William Perm (1813), Researches,

Antediluvian, Patriarchal and Historical (1836), intended as a history of the interference of Providence for man's spiritual good, and Strictures on several of the remarks concerning himself made in the Life of Wilberforce, in which his claim as originator of the anti-slavery movement is denied.

See the lives by Thomas Elmes (1876) and Thomas Taylor (1839).

CLARKSVILLE, a city and the county-seat of Montgomery county, Tennessee, U.S.A., situated in the N. part of the state, about 50 m. N.W. of Nashville, on the Cumberland river, at the mouth of the Red river. Pop. (1890) 7924; (1900) 9431, of whom 5094 were negroes; (1910 census) 8548. It is served by the Louisville & Nashville, and the Illinois Central railways, and by passenger and freight steamboat lines on the Cumberland river. The city hall, and the public library are among the principal public buildings, and the city is the seat of the Tennessee Odd Fellows'home,andof the South- Western Presbyterian University, founded in 1875. Clarksville lies in the centre of the dark tobacco belt — commonly known as the " Black Patch " — and is an important tobacco market, with an annual trade in that staple of about $4,000,000, most of the product being exported to France, Italy, Austria and Spain. The city is situated in a region well adapted for the growing of wheat, Indian corn, and vegetables, and for the raising of live-stock; and Clarksville is a shipping point for the lumber — chiefly oak, poplar and birch — and the iron-ore of the surrounding country, a branch of the Louisville. & Nashville railway extending into the iron district. The city's principal manufactures are flour and grist mill products, chewing and smoking tobacco and snuff, furniture, lumber, iron, and pearl buttons. The value of the factory product in 1905 was $2,210,112, being 32% greater than in 1900. The municipality owns its water-works. Clarksville was first settled as early as 1780, was named in honour of General George Rogers Clark, and was chartered as a city in 1850.

CLASSICS. The term " classic " is derived from the Latin epithet classicus, found in a passage of Aulus Gellius (xix. 8. 15), where a " script or ' classicus ' " is contrasted with a " scriplor proletarius." The metaphor is taken from the division of the Roman people into classes by Servius Tullius, those in the first class being called classici, all the rest infra classem, and those in the last proletarii. 1 The epithet " classic " is accordingly applied (1) generally to an author of the first rank, and (2) more

1 The above derivation is in accordance with English usage. In the New English Dictionary the earliest example of the word " classical "

is the phrase ” classical and canonical,” found in the Europae Speculum of Sir Edwin Sandys (1599), and, as applied to a writer, it is explained as meaning ” of the first rank or authority.” This exactly corresponds with the meaning of classicus in the above passage of Gellius. On the other hand, the French word classigue (in Littre’s view) primarily means ” used in class.”

particularly to a Greek or Roman author of that character. Similarly, ” the classics” is a synonym for the choicest products of the literature of ancient Greece and Rome. It is to this sense of the word that the following article is devoted in two main divisions: (A) the general history of classical (i.e. Greek and Latin) scholarship, and (B) its place in higher education. (A) General History of the Study of the Classics We may consider this subject in four principal periods: — (i.) the Alexandrian, c. 300-1 B.C.; (ii.) the Roman, a.d. c. 1-530; (iii.) the Middle Ages, c. 530-1350; and (iv.) the Modem Age, c. 1350 to the present day.

(i.) The Alexandrian Age. — The study of the Greek classics begins with the school of Alexandria. Under the rule of Ptolemy Philadelphus (285-247 B.C.), learning found a home in the Alexandrian Museum and in the great Alexandrian Library. The first four librarians were Zenodotus, Eratosthenes, Aristo- phanes of Byzantium, and Aristarchus. Zenodotus produced before 274 the first scientific edition of the Iliad and Odyssey, an edition in which spurious lines were marked, at the beginning, with a short horizontal dash called an obelus (—) . He also drew up select lists of epic and lyric poets. Soon afterwards a classified catalogue of dramatists, epic and lyric poets, legislators, philo- sophers, historians, orators and rhetoricians, and miscellaneous writers, with a brief biography of each, was produced by the scholar and poet Callimachus (ft. 260). Among the pupils of Callimachus was Eratosthenes who, in 234, succeeded Zenodotus as librarian. Apart from his special interest in the history of the Old Attic comedy, he was a man of vast and varied learning; the founder of astronomical geography and of scientific chrono- logy; and the first to assume the name of $1X6X0705. The greatest philologist of antiquity was, however, his successor, Aristophanes of’ Byzantium (195), who reduced accentuation and punctuation to a definite system, and used a variety of critical symbols in his recension of the Iliad and Odyssey. He also edited Hesiod and Pindar, Euripides and Aristophanes, besides composing brief introductions to the several plays, parts of which are still extant. Lastly, he established a scientific system of lexicography and drew up lists of the ” best authors.” Two critical editions of the Iliad and Odyssey were produced by his successor, Aristarchus, who was librarian until 146 B.C. and was the founder of scientific

scholarship. His distinguished pupil, Dionysius Thrax (born c. 166 B.C.), drew up a Greek grammar which continued in use for more than thirteen centuries. The most industrious of the successors of Aristarchus was Didymus (c. 65 b.c-a.d. 10), who, in his work on the Homeric poems, aimed at restoring the lost recensions of Aristarchus. He also composed commentaries on the lyric and comic poets and on Thucydides and Demosthenes; part of his commentary on this last author was first published in 1904. He was a teacher in Alexandria (and perhaps also in Rome); and his death, about a.d. 10, marks the close of the Alexandrian age. He is the industrious compiler who gathered up the remnants of the learning of his predecessors and transmitted them to posterity. The poets of that age, including Callimachus and Theocritus, were subsequently expounded by Theon, who flourished under Tiberius, and has been well described as " the Didymus of the Alexandrian poets."

The Alexandrian canon of the Greek classics, which probably had its origin in the lists drawn up by Callimachus, Aristophanes of Byzantium and Aristarchus, included the following authors: —

Epic poets (5) : Homer, Hesiod, Peisander, Panyasis, Antimachus.

Iambic poets (3) : Simonides of Amorgos, Archilochus, Hipponax.

Tragic poets (5) : Aeschylus, Sophocles, Euripides, Ion, Achaeus.

Comic poets, Old (7) : Epicharmus, Cratinus, Eupolis, Aristo- phanes, Pherecrates, Crates, Plato. Middle (2) : Antiphanes, Alexis. New (5) : Menander, Philippides, Diphilus, Philemon, Apollodorus.

Elegiac poets (4) : Callinus, Mimnermus, Philetas, Callimachus.

Lyric poets (9): Alcman, Alcaeus, Sappho, Stesichorus, Pindar, Bacchylides, Ibycus, Anacreon, Simonides of Ceos.

Orators (10) : Demosthenes, Lysias, Hypereides, Isocrates, Aeschines, Lycurgus, Isaeus, Antiphon, Andocides, Deinarchus.

Historians (10) : Thucydides, Herodotus, Xenophon, Philistius, Theopompus, Ephorus, Anaximenes, Callisthenes, Hellanicus, Polybius.

The latest name in the above list is that of Polybius, who died about 123 B.C. Apollonius Rhodius, Aratus and Theocritus were subsequently added to the ” epic ” poets. Philosophers, such as Plato and Aristotle, were possibly classed in a separate ” canon. ”

While the scholars of Alexandria were mainly interested in the verbal criticism of the Greek poets, a wider variety of studies was the characteristic of the school of Pergamum, the literary rival of Alexandria. Pergamum was a home of learning for a large part of the 150 years of the Attalid dynasty, 283-133 B.C.

The grammar of the Stoics, gradually elaborated by Zeno, Cleanthes and Chrysippus, supplied a terminology which, in words such as ” genitive,” ” accusative ” and ” aorist,” has become a permanent part of the grammarian’s vocabulary; and the study of this grammar found its earliest home in Per- gamum.

From about 168 B.C. the head of the Pergamene school was Crates of Mallus, who (like the Stoics) was an adherent of the principle of ” anomaly ” in grammar, and was thus opposed – to Aristarchus of Alexandria, the champion of ” analogy.” He also opposed Aristarchus, and supported the Stoics, by insisting on an allegorical interpretation of Homer. He is credited with having drawn up the classified lists of the best authors for the Pergamene library. His mission as an envoy to the Roman senate, ” shortly after the death of Ennius ” in 169 B.C., had a remarkable influence on literary studies in Rome. Meeting with an accident while he was wandering on the Palatine, and being detained in Rome, he passed part of his enforced leisure in giving lectures (possibly on Homer, his favourite author), and thus succeeded in arousing among the Romans a taste for the scholarly study of literature. The example set by Crates led to the production of a new edition of the epic poem of Naevius, and to the public recitation of the Annals of Ennius, and (two generations later) the Satires of Lucilius.

(ii.) The Roman Age. — (a) Latin Studies. — In the 1st century B.C. the foremost scholar in Rome was L. Aelius Stilo (c. 154- c. 74), who is described by Cicero as profoundly learned in Greek and Latin literature, and as an accomplished critic of Roman antiquities and of ancient authors. Of the plays then passing under the name of Plautus, he recognized twenty-five as genuine. His most famous pupil was Varro (116-27), the six surviving books of whose great work on the Latin language are mainly concerned with the great grammatical controversy on analogy and anomaly — a controversy which also engaged the attention of Cicero and Caesar, and of the elder Pliny and Quintilian. The twenty -one plays of Plautus accepted by Varro are

doubtless the twenty now extant, together with the lost Vidularia. The influence of Varro's last work on the nine disciplinae, or branches of study, long survived in the seven " liberal arts " recognized by St Augustine and Martianus Capella, and in the trivium and quadrivium of the middle ages.

Part of Varro's treatise on Latin was dedicated to Cicero (106- 43), who as an interpreter of Greek philosophy to his fellow- countrymen enlarged the vocabulary of Latin by his admirable renderings of Greek philosophical terms, and thus ultimately gave us such indispensable words as " species," "quality " and " quantity."

The earliest of Latin lexicons was produced about 10 B.C. by Verrius Flaccus in a work, De Verborum Significatu, which survived in the abridgment by Festus (2nd century a.d.) and in the further abridgment dedicated by Paulus Diaconus to Charles the Great.

Greek models were diligently studied by Virgil and Horace. Their own poems soon became the theme of criticism and of comment; and, by the time of Quintilian and Juvenal, they shared the fate (which Horace had feared) of becoming text- books for use in schools.

Recensions of Terence, Lucretius and Persius, as well as Horace and Virgil, were produced by Probus (d. a.d. 88), with critical symbols resembling those invented by the Alexandrian scholars. His contemporary Asconius is best known as the author of an extant historical commentary on five of the speeches

of Cicero. In a.d. 88 Quintilian was placed at the head of the first state-supported school in Rome. His comprehensive work on the training of the future orator includes an outline of general education, which had an important influence on the humanistic schools of the Italian Renaissance. It also presents us with a critical survey of the Greek and Latin classics arranged under the heads of poets, historians, orators and philosophers (book x. chap. i.). The lives of Roman poets and scholars were among the many subjects that exercised the literary skill of Hadrian's private secretary, Suetonius. One of his lost works is the principal source of the erudition of Isidore of Seville (d. a.d. 636), whose comprehensive encyclopaedia was a favourite text-book in the middle ages. About the time of the death of Suetonius (a.d. 160) a work entitled the Nodes Atticae was begun by Aulus Gellius. The author is an industrious student and a typical scholar, who frequents libraries and is interested in the MSS. of old Latin authors. Early in the 4th century the study of grammar was represented in northern Africa by the Numidian tiro, Nonius Marcellus (fl. 323), the author of an

encyclopaedic work in three parts, lexicographical, grammatical and antiquarian, the main value of which lies in its quotations from early Latin literature. About the middle of the same century grammar had a far abler exponent at Rome in the person of Aelius Donatus, the preceptor of St Jerome, as well as the author of a text-book that remained in use throughout the middle ages. The general state of learning in this century is illustrated by Ausonius (c. 310-393), the grammarian and rhetorician of Bordeaux, the author of the Mosella, and the probable inspirer of the memorable decree of Gratian (376), providing for the appointment and the payment of teachers of rhetoric and of Greek and Latin literature in the principal cities of Gaul. His distinguished friend, Q. Aurelius Symmachus, the consul of a.d. 391, aroused in his own immediate circle an interest in Livy, the whole of whose history was still extant. Early in the '5th century other aristocratic Romans interested themselves in the textual criticism of Persius and Martial. Among the contemporaries of Symmachus, the devoted adherent of the old Roman religion, was St Jerome (d. 420), the most scholarly representative of Christianity in the 4th century, the student of Plautus and Terence, of Virgil and Cicero, the translator of the Chronology of Eusebius, and the author of the Latin version of the Bible now known as the Vulgate. St Augustine (d. 430) confesses to his early fondness for Virgil, and also tells us that he received his first serious impressions from the Hortensius of Cicero, an eloquent exhortation to the study of philosophy, of which only a few fragments survive. In his survey of the " liberal arts " St Augustine imitates (as we have seen) the Disciplinae of Varro, and in the greatest of his works, the De Civitate Dei (426), he has preserved large portions of the Antiquitates of Varro and the De Republica of Cicero. About the same date, and in the same province of northern Africa, Martianus Capella produced his allegorical work on the " liberal arts," the principal, and, indeed, often the only, text-book of the medieval schools.

In the second half of the 5th century the foremost representa- tive of Latin studies in Gaul was Apollinaris Sidonius (fl. 470), whose Letters were modelled on those of the younger Pliny, while his poems give proof of a wide though superficial acquaintance with classical literature. He laments the increasing decline in the classical purity of the Latin language.

An interest in Latin literature lived longest in Gaul, where schools of learning flourished as early as the 1st century at Autun, Lyons, Toulouse, Nimes, Vienne, Narbonne and Marseilles; and, from the 3rd century onwards, at Trier, Poitiers, Besancon and Bordeaux.

About ten years after the death of Sidonius we find Asterius, the consul of 494, critically revising the text of Virgil in Rome. Boethius, who early in life formed the ambitious plan of expound- ing and reconciling the opinions of Plato and Aristotle, continued in the year of his sole consulship (510) to instruct his fellow- countrymen in the wisdom of Greece. He is a link between the ancient world and the middle ages, having been the last of the learned Romans who understood the language and studied the

literature of Greece, and the first to interpret to the middle ages the logical treatises of Aristotle. He thereby gave the signal for the age-long conflict between Nominalism and Realism, which exercised the keenest intellects among the Schoolmen, while the crowning work of his life, the Consolalio Philosophiae (524), was repeatedly expounded and imitated, and reproduced in renderings that were among the earliest literary products of the vernacular languages of modern Europe. His contemporary, Cassiodorus (c. 480-c. 575), after spending thirty years in the service of the Ostrogothic dynasty at Ravenna, passed the last thirty-three years of his long life on the shores of the Bay of Squillace, where he founded two monasteries and diligently trained their inmates to become careful copyists. In his latest work he made extracts for their benefit from the pages of Priscian (fl. 512), a transcript of whose great work on Latin grammar was completed at Constanti- nople by one of that grammarian's pupils in 527, to be re-produced in a thousand MSS. in the middle ages. More than ten years before Cassiodorus founded his monasteries in the south of Italy, Benedict of Nursia (480-543) had rendered a more permanent service to the cause of scholarship by building, amid the ruins of the temple of Apollo on the crest of Monte Cassino, the earliest of those homes of learning that have lent an undying distinction to the Benedictine order. The learned labours of the Benedictines were no part of the original requirements of the rule of St Benedict; but before the founder's death his favourite disciple had planted a monastery in France, and the name of that disciple is permanently associated with the learned labours of the Benedictines of the Congregation of St Maur (see Maurists).

(b) Greek Studies. — Meanwhile, the study of the Greek classics was ably represented at Rome in the Augustan age by Dionysius of Halicarnassus (fl. 30-8 B.C.), the intelligent critic of the ancient Attic orators, while the 1st century of our era is the probable date of the

masterpiece of litefary criticism known as the treatise On the Sublime by Longinus (q.v.).

The 2nd century is the age of the two great grammarians, Apollonius Dyscolus (the founder of scientific grammar and the creator of the study of Greek syntax) and his son Herodian, the larger part of whose principal work dealt with the subject of Greek accentuation. It is also the age of the lexicographers of Attic Greek, the most important of whom are Phrynichus, Pollux (fl. a.d. 180) and Harpocration.

In the 4th century Demosthenes was expounded and imitated by the widely influential teacher, Libanius of Antioch (c. 314- c. 393), the pagan preceptor of St Chrysostom. To the same century we may assign the grammarian Theodosius of Alexandria, who, instead of confining himself (like Dionysius Thrax) to the tenses of tvtttoj in actual use, was the first to set forth all the imaginary aorists and futures of that verb, which have thence descended through the Byzantine age to the grammars of the Renaissance and of modern Europe.

In the 5th century we may place Hesychius of Alexandria, the compiler of the most extensive of our ancient Greek lexicons, and Proclus, the author of a chrestomathy, to the extracts from which (as preserved by Photius) we owe almost all our knowledge of the contents of the lost epics of early Greece. In the same century the study of Plato was represented by Synesius of Cyrene (c. 370-c. 413) and by the Neoplatonists of Alexandria and of Athens. The lower limit of the Roman age of classical studies may be conveniently placed in the year 529. In that year the monastery of Monte Cassino was founded in the West, while the school of Athens was closed in the East. The Roman age thus ends in the West with Boethius, Cassiodorus and St Benedict, and in the East with Priscian and Justinian.

(iii.) The Middle Ages. — (a) In the East, commonly called the Byzantine Age, c. 530-1350. In this age, grammatical learning was represented by Choeroboscus, and lexicography by Photius (d. 891), the patriarch of Constantinople, who is also the author of a Bibliotheca reviewing and criticizing the contents of 280 MSS., and incidentally preserving important extracts from the lost Greek historians.

In the time of Photius the poets usually studied at school were Homer, Hesiod, Pindar; certain select plays of Aeschylus {Prometheus, Septetn. and Persae), Sophocles (Ajox, Electra and Oedipus Tyr annus), and Euripides (Hecuba, Orestes, Phoe- nissae, and, next to these, Alcestis, Andromache, Hippolylus, Medea, Rhesus, Troades,)

also Aristophanes (beginning with the Plutus), Theocritus, Lycophron, and Dionysius Periegetes. The principal prose authors were Thucydides, parts of Plato and Demosthenes, with Aristotle, Plutarch's Lives, and, above all, Lucian, who is often imitated in the Byzantine age.

One of the distinguished pupils of Photius, Arethas, bishop of Caesarea in Cappadocia (c. 907-932), devoted himself with remarkable energy to collecting and expounding the Greek classics. Among the important MSS. still extant that were copied at his expense are the Bodleian Euclid (888) and the Bodleian Plato (895). To the third quarter of the 10th century we may assign the Greek lexicon of Suidas, a combination of a lexicon and an encyclopaedia, the best articles being those on the history of literature.

Meanwhile, during the " dark age " of secular learning at Constantinople (641-850), the light of Greek learning had spread eastwards to Syria and Arabia. At Bagdad, in the reign of Mamun (813-833), the son of Harun al-Rashid, philosophical works were translated by Syrian Christians from Greek into Syriac and from Syriac into Arabic. It was in his reign that Aristotle was first translated into Arabic, and, shortly afterwards, we have Syriac and Arabic renderings of commentators on Aristotle, and of portions of Plato, Hippocrates and Galen; while in the 10th century new translations of Aristotle and his commentators were produced by the Nestorian Christians.

The Arabic translations of Aristotle passed from the East to the West by being transmitted through the Arab dominions in northern Africa to Spain, which had been conquered by the Arabs in the 8th century. In the 12th century Toledo was the centre of the study of Aristotle in the West, and it was from Toledo that the knowledge of Aristotle spread to Paris and to other seats of learning in western Europe.

The 1 2th century in Constantinople is marked by the name of Tzetzes (c. ino-e. 1180), the author of a mythological, literary and historical miscellany called the Chiliad.es, in the course of which he quotes more than four hundred authors. The prolegomena to his scholia on Aristophanes supply us with valuable informatidn on the Alexandrian libraries. The most memorable name, however, among the scholars of this century is that of Eustathius, whose philological studies at Constantinople preceded his tenure of the archbishopric of Thessalonica (1175- 1192). The opening pages of his commentaries on the Iliad and the Odyssey dwell with enthusiasm on the abiding influence of Homer on the literature of Greece.

While the Byzantine MSS. of the nth century (such as the Laurentian MSS. of Aeschylus and Sophocles, and the Ravenna MS. of Aristophanes) maintain the sound traditions of the Alexandrian and Roman ages, those of the times of the Palaeologi give proof of a frequent tampering with the metres of the ancient poets in order to bring them into conformity with theories recently invented by Moschopulus and Triclinius. The scholars of these times are the natural precursors of the earliest repre- sentatives of the Revival of Learning in the West. Of these later Byzantines the first in order of date is the monk Planudes (d. 1330), who devoted his knowledge of Latin to producing excellent translations of Caesar's Gallic War as well as Ovid's Metamorphoses and Heroides, and the classic work of Boethius; he also compiled (in 1302) the only Greek anthology known to scholars before the recovery in 1607 of the earlier and fuller anthology of Cephalas (fl. 917).

The scholars of the Byzantine age cannot be compared with the great Alexandrians, but they served to maintain the con- tinuity of tradition by which the Greek classics selected by the critics of Alexandria were transmitted to modern Europe.

(b) In the West (c. 530-c. 1350).— At the portal of the middle ages stands Gregoiy the Great (c. 540-604), who had little (if any) knowledge of Greek and had no sympathy with the secular

side of the study of Latin. A decline in grammatical learning is exemplified in the three Latin historians of the 6th century, Jordanes, Gildas and Gregory of Tours (d. 594), who begins his history of the Franks by lamenting the decay of Latin literature in Gaul. The historian of Tours befriended the Latin poet, Venantius Fortunatus (d. c. 600), who is still remembered as the writer of the three well-known hymns beginning Salve festa dies, Vexilla regis prodeunt, and Pange lingua gloriosi proelium certaminis. The decadence of Latin early in the 7th century is exemplified by the fantastic grammarian Virgilius Maro, who also illustrates the transition from Latin to Provencal, and from quantitive to accentual forms of verse.

While Latin was declining in Gaul, even Greek was not unknown in Ireland, and the Irish passion for travel led to the spread of Greek learning in the west of Europe. The Irish monk Columban, shortly before his death in 615, founded in the neighbourhood of Pavia the

monastery of Bobbio, to be the repository of many Latin MSS. which were ultimately dispersed among the libraries of Rome, Milan and Turin. About the same date his fellow-traveller, Gallus, founded above the Lake of Constance the monastery of St Gallen, where Latin MSS. were preserved until their recovery in the age of the Renaissance. During the next twenty-five years Isidore of Seville (d. 636) produced in his Origines an encyclopaedic work which gathered up for the middle ages much of the learning of the ancient world.

In Italy a decline in the knowledge of Greek in the 5th and 6th centuries led to an estrangement between the Greek and Latin Churches. The year 690 is regarded as the date of the temporary extinction of Greek in Italy, but, in the first quarters of the 8th and the 9th centuries, the iconoclastic decrees of the Byzantine emperors drove many of the Greek monks and their lay adherents to the south of Italy, and even to Rome itself.

In Ireland we find Greek characters used in the Book of Armagh (c. 807) ; and, in the same century, a Greek psalter was copied by an Irish monk of Liege, named Sedulius (fl. 850), who had a wide knowledge of Latin literature. In England, some sixty years after the death of Augustine, the Greek archbishop of Canterbury, Theodore of Tarsus (d. 690) founded a school for the study of Greek, and with the help of an African monk named Hadrian made many of the English monasteries schools of Greek and Latin learning, so that, in the time of Bede (d. 735), some of the scholars who still survived were “as familiar with Greek and Latin as with their mother-tongue.” Among those who had learned their Greek at Canterbury was Aldhelm (d. 709), “the first Englishman who cultivated classical learning with any success.” While Aldhelm is known as “the father of Anglo- Latin verse,” Latin prose was the literary medium used by Bede in his celebrated Ecclesiastical History of England (731). Nine years after the death of Bede (735), Boniface, “the apostle of Germany,” sanctioned the founding of Fulda (744), which soon rivalled St Gallen as a school of learning. Alcuin (d. 804), who was probably born in the year of Bede’s death, tells us of the wealth of Latin literature preserved in the library at York. Through the invitation of Charles the Great, he became associated with the revival of learning which marks the reign of that monarch, by presiding over the School of the Palace (782-790), and by exercising a healthy influence as abbot of St Martin’s at Tours (796-804). Among the friends of Alcuin and the advisers of Charles was Theodulfus, bishop of Orleans and abbot of Fleury (d. 821), who is memorable as an accomplished Latin poet, and as the initiator of free education. Einhard (d. 840), in his classic life of Charles the Great, models his style on that of Suetonius, and shows his familiarity

with Caesar and Livy and Cicero, while Rabanus Maurus (d. 856), who long presided over Einhard's school of Fulda, was the first to introduce Priscian into the schools of Germany. His pupil, Walafrid Strabo, the abbot of Reichenau (d. 849), had a genuine gift for Latin poetry, a gift agreeably exemplified in his poem on the plants in the monastic garden. In the same century an eager interest in the Latin classics is displayed by Servatus Lupus, who was educated at Fulda, and was abbot of Ferrieres for the last twenty years of his life (d. 862). In his literary spirit he is a precursor of the

humanists of the Renaissance. Under Charles the Bald (d. 877) there was a certain revival of interest in literature, when John the Scot (Erigena) became, for some thirty years (c. 845-875), the head of the Palace School. He was familiar with the Greek Fathers, and was chosen to execute a Latin rendering of the writings of "Dionysius the Areopagite," the patron saint of France. In the preface the translator praises the king for prompting him not to rest satisfied with the literature of the West, but to have recourse to the "most pure and copious waters of the Greeks." In the next generation Remi of Auxerre was the first to open a school in Paris (900). Virgil is the main authority quoted in Remi's Commentary on Donatus, which remained in use until the Renaissance. During the two centuries after John the Scot, • the study of Greek declined in France. In England the 9th century closes with Alfred, who, with the aid of the Welsh monk, Asser, produced a series of free translations from Latin texts, including Boethiusand Orosius and Bede, and the Cura Pastoralis of Gregory the Great.

In the 10th century learning flourished at Aachen under Bruno, brother of Otto I. and archbishop of Cologne (953-965), who had himself learned Greek from certain Eastern monks at the imperial court, and who called an Irish bishop from Trier to teach Greek at the imperial capital. He also encouraged the transcription of Latin MSS., which became models of style to Widukind of Corvey, the imitator of Sallust and Livy. In the same century the monastery of Gandersheim, south of Hanover, was the retreat of the learned nun Hroswitha, who celebrated the exploits of Otho in leonine hexameters, and composed in prose six moral and religious plays in imitation of Terence. One of the most prominent personages of the century was Gerbert of Aurillac, who, after teaching at Tours and Fleury, became abbot of Bobbio, archbishop of Reims, and ultimately pope under the name of Silvester II. (d. 1003). He frequently quotes from the speeches of Cicero, and it has been surmised that the survival of those speeches may have been due to the influence of Gerbert. The most original hellenist of this age is Luitprand, bishop of Cremona (d. 972), who acquired some

knowledge of Greek during his repeated missions to Constantinople. About the same time in England Oswald of York, who had himself been educated at Fleury, invited Abbo (d. 1004) to instruct the monks of the abbey recently founded at Ramsey, near Huntingdon. At Ramsey he wrote for his pupils a scholarly work dealing with points of prosody and pronunciation, and exhibiting an accurate know- ledge of Virgil and Horace. During the same half-century, iElfric, the abbot of Eynsham (d. c. 1030), aided Bishop .(Ethelwold in making Winchester famous as a place of education. It was there that he began his Latin Grammar, his Glossary (the earliest Latin-English dictionary in existence), and his Collo- quium, in which Latin is taught in a conversational manner.

In France, the most notable teacher in the first quarter of the nth century was Fulbert, bishop of Chartres (d. 1029). In and after the middle of that century the Norman monastery of Bee flourished under the rule of Lanfranc and Anselm, both of whom had begun their career in northern Italy, and closed it at Canter- bury. Meanwhile, in Germany, the styles of Sallust and Livy were being happily imitated in the Annals of Lambert of Hersfeld (d. 1077). In Italy, where the study of Latin literature seems never to have entirely died out, young nobles and students preparing for the priesthood were not infrequently learning Latin together, in private grammar schools under liberal clerics, such as Anselm of Bisate (fl. 1050), who describes himself as divided in his allegiance between the saints and the muses. Learning flourished at Monte Cassino under the rule of the Abbot Desiderius (afterwards Pope Victor III.). In this century that famous monastery had its classical chronicler in Leo Marsicanus, and its Latin poet in Alfanus, the future archbishop of Salerno.

The Schoolmen devoted most of their attention to Aristotle, and we may here briefly note the successive stages in their gradually increasing knowledge of his works. Until n 28 only the first two of the five parts of the Organon were known, and those solely in Latin translations from the original. After that date two more became known; the whole was familiar to John

of Salisbury in 1159; while the Physics and Metaphysics came into notice about 1200. Plato was mainly represented by the Latin translation of the Timaeus. Abelard (d. 1142) was acquainted with no Greek works except in Latin translations, but he has left his mark on

the history of European education. The wide popularity of his brilliant lectures in the “schools” of Paris made this city the resort of the many students who were ultimately organized as a ” university ” (c. 1170). John of Salisbury attended Abelard’s lectures in 1136, and, after spending two years in the study of logic in Paris, passed three more in the scholarly study of Latin literature at Chartres, where a sound and healthy tradition, originally due to Bernard of Chartres (fl. 1 1 20) , was still perpetuated by his pupils. In that school the study of ” figures of speech ” was treated as merely introductory to that of the classical texts. Stress was laid on the sense as well as the style of the author studied. Discussions on set subjects were held, select passages from the classics learned by heart, while written exercises in prose and verse were founded on the best ancient models. In the general scheme of education the authority followed was Quintilian. John of Salisbury (d. 1 1 80), the ripest product of this school, is the most learned man of his time. His favourite author is Cicero, and in all the Latin literature accessible to him he is the best-read scholar of his age. Among Latin scholars of the next generation we have Giraldus Cambrensis (d. c. 1222), the author of topographical and historical writings on Ireland and Wales, and of other works teeming with quotations from the Latin classics. During the middle ages Latin prose never dies out. It is the normal language of literature. In England it is used by many chroniclers and historians, the best known of whom are William of Malmesbury (d. 1142) and Matthew Paris (d. 1259). In Italy Latin verse had been felicitously applied to historic themes by William of Apulia (fl. 1 100) and other Latin poets (1088-1247). In the 1 2 th century England claims at least seven Latin poets, one of these being her only Latin epic poet, Joseph of Exeter (d. 1210), whose poem on the Trojan war is still extant. The Latin versifier, John of Garlandia, an Englishman who lived mainly in France (fl. 1 204-1 252), produced several Latin vocabularies which were still in use in the boyhood of Erasmus. The Latin poets of French birth include Gautier and Alain de Lille (d. c. 1203), the former being the author of the Alexandreis, and the latter that of the Anti-Claudianus, a poem familiar to Chaucer.

During the hundred and thirty years that elapsed between the early translations of Aristotle executed at Toledo about 1 1 50 and the death in 1 28 1 of William of Moerbeke, the translator of the Rhetoric and the Politics, the knowledge of Aristotle had been greatly extended in Europe by means of translations, first from the Arabic, and, next, from the original Greek. Aris- totle had been studied in England by Grosseteste (d. 1253), and expounded abroad by the great Dominican, Albertus Magnus (d. 1280), and his famous pupil, Thomas Aquinas (d.

1274). Among the keenest critics of the Schoolmen and of the recent translations of Aristotle was Roger Bacon (d. 1294), whose Opus majus has been recognized as the Encyclopidie and the Organon of the 13th century. His knowledge of Greek, as shown in his Greek Grammar (first published in 1902), was clearly derived from the Greeks of his own day. The medieval dependence on the authority of Aristotle gradually diminished. This was partly due to the recovery of some of the lost works of ancient literature, and the transition from the middle ages to the revival of learning was attended by a general widening of the range of classical studies and by a renewed interest in Plato.

The classical learning of the middle ages was largely second- hand. It was often derived from glossaries, from books of elegant extracts, or from comprehensive encyclopaedias. Among the compilers of these last were Isidore and Hrabanus, William of Conches and Honorius of Autun, Bartholomaeus Anglicus (fl. 1250), Vincent of Beauvais (d. 1264), and, lastly, Brunetto Latini (d. 1290), the earlier contemporary of Dante. For Aristotle, as interpreted by Albertus Magnus and Thomas Aquinas, Dante has the highest regard. To the Latin transla-

tions of Aristotle and to his interpreters he refers in more than three hundred passages, while the number of his references to the Latin translation of the Timaeus of Plato is less than ten. His five great pagan poets are Homer, Virgil, Horace, Ovid, Lucan; Statius he regards as a ” Christian ” converted by Virgil’s Fourth Eclogue. His standard authors in Latin prose are Cicero, Livy, Pliny, Frontinus and Orosius. His knowledge of Greek was practically nil. Latin was the language of his political treatise, De Monarchia, and even that of his defence of the vulgar tongue, De Vulgari Eloquio. He is, in a limited sense, a precursor of the Renaissance, but he is far more truly to be regarded as the crowning representative of the spirit of the middle ages.

(iv.) The Modern Age. — (a) Our fourth period is ushered in by the age of the Revival of Learning in Italy (c. 1350-1527). Petrarch (1304-1374) has been well described as u .

“£he first of modern men.” In contrast with the Schoolmen of the middle ages, he has no partiality for Aristotle. He was interested in Greek, and, a full century before the fall of Constantinople, he was in possession of MSS. of Homer and Plato, though his knowledge of the language was limited to the barest rudiments. For that knowledge, scanty as it was, he was indebted to Leontius Pilatus, with whose aid Boccaccio (13 13- 1375) became ” the first of modern men ” to study Greek to some purpose during the three years that Leontius spent as

his guest in Florence (1360-1363). It was also at Florence that Greek was taught in the next generation by Chrysoloras (in 1396-1400). Another generation passed, and the scholars of the East and West met at the council of Florence (1439) One of the envoys of the Greeks, Gemistus Pletho, then inspired Cosimo dei Medici with the thought of founding an academy for the study of Plato. The academy was founded, and, in the age of Lorenzo, Plato and Plotinus were translated into Latin by Marsilio Ficino (d. 1499). The Apology and Crito, the Phaedo, Phaedrus and Gorgias of Plato, as well as speeches of Demosthenes and Aeschines, with the Oeconomics, Ethics and Politics of Aristotle, had already been translated by Leonardo Bruni (d. 1444); the Rhetoric by Filelfo (1430), and Plato's Republic by Decembrio (1439). A comprehensive scheme for translating the principal Greek prose authors into Latin was carried out at Rome by the founder of the manuscript collections of the Vatican, Nicholas V. (1447-1455), who had belonged to the literary circle of Cosimo at Florence. The translation of Aristotle was entrusted to three of the learned Greeks who had already arrived in Italy, Trapezuntius, Gaza and Bessarion, while other authors were undertaken by Italian scholars such as Guarino, Valla, Decembrio and Perotti. Among the scholars of Italian birth, probably the only one in this age who rivalled the Greeks as a public expositor of their own literature was Politian (1454-1494), who lectured on Homer and Aristotle in Florence, translated Herodian, and was specially interested in the Latin authors of the Silver Age and in the text of the Pandects of Justinian. It will be observed that the study of Greek had been resumed in Florence half a century before the fall of Constantinople, and that the principal writers of Greek prose had been translated into Latin before that event.

Meanwhile, the quest of MSS. of the Latin classics had been actively pursued. Petrarch had discovered Cicero's Speech pro Archia at Liege (1333) and the Letters to Atticus and Quintus at Verona (1345). Boccaccio had discovered Martial and Ausonius, and had been the first of the human'sts to be familiar with Varro and Tacitus, while Salutati had recovered Cicero's letters Ad Familiares (1389). During the council of Constance, Poggio, the papal secretary, spent in the quest of MSS. the interval between May 1415 and November 1417, during which he was left at leisure by the vacancy in the apostolic see.

Thirteen of Cicero's speeches were found by him at Cluny and Langres, and elsewhere in France or Germany; the commentary of Asconius, a complete Quintilian, and a large part of Valerius Flaccus were discovered at St Gallen. A second expedition to that monastery and to others in the neighbourhood led to the recovery of Lucretius,

Marcellinus, while the SUvae of Statius were recovered shortly afterwards. A complete MS. of Cicero, De Oratore, Brutus and Orator, was found by Bishop Landriani at Lodi (1421). Cornelius Nepos was discovered by Traversari in Padua (1434). The Agricola, Germania and Dialogue of Tacitus reached Italy from Germany in 1455, and the early books of the Annals in 1508. Pliny's Panegyric was discovered by Aurispa at Mainz (1433), and his correspondence with Trajan by Fra Giocondo in Paris about 1500.

Greek MSS. were brought from the East by Aurispa, who in 1423 returned with no less than two hundred and thirty-eight, including the celebrated Laurentian MS. of Aeschylus, Sophocles and Apollonius Rhodius. A smaller number was brought from Constantinople by Filelfo (1427), while Quintus Smyrnaeus was discovered in south Italy by Bessarion, who presented his own collection of MSS. to the republic of Venice and thus led to the foundation of the library of St Mark's (1468). As the emissary of Lorenzo, Janus Lascaris paid two visits to the East, returning from his second visit in 1492 with two hundred MSS. from Mount Athos.

The Renaissance theory of a humanistic education is illus- trated by several treatises still extant. In 1392 Vergerio addressed to a prince of Padua the first treatise which methodi- cally maintains the claims of Latin as an essential part of a liberal education. Eight years later, he was learning Greek from Chrysoloras. Among the most distinguished pupils of the latter was Leonardo Bruni, who, about 1405, wrote "the earliest humanistic tract on education expressly addressed to a lady." He here urges that the foundation of all true learning is a " sound and thorough knowledge of Latin," and draws up a course of reading, in which history is represented by Livy, Sallust, Curtius, and Caesar; oratory by Cicero; and poetry by Virgil. The same year saw the birth of Maffeo Vegio, whose early reverence for the muse of Virgil and whose later devotion to the memory of Monica have left their mark on the educational treatise which he wrote a few years before his death in 1458. The authors he recommends include " Aesop " and Sallust, the tragedies of Seneca and the epic poets, especially Virgil, whom he interprets in an allegorical sense. He is in favour of an early simultaneous study of a wide variety of subjects, to be followed later by the special study of one or two. Eight years before the death of

Vegio, Aeneas Sylvius Piccolomini (Pius II.) had composed a brief treatise on education in the form of a letter to Ladislaus, the young king of Bohemia and Hungary. The Latin poets to be studied include Virgil, Lucan, Statius, Ovid's Metamorphoses, and (with certain limitations) Horace, Juvenal and Persius, as well as Plautus, Terence and the tragedies of Seneca; the prose authors recommended are Cicero, Livy and Sallust. The first great school of the Renaissance Was that established by Vittorino da Feltre at Mantua, where he resided for the last twenty-two years of his life (1424-1446). Among the Latin authors studied were Virgil and Lucan, with selections from Horace, Ovid and Juvenal, besides Cicero and Quintilian, Sallust and Curtius, Caesar and Livy. The Greek authors were Homer, Hesiod, Pindar and the dramatists, with Herodotus, Xenophon and Plato, Isocrates and Demosthenes, Plutarch and Arrian.

Meanwhile, Guarino had been devoting five years to the training of the eldest son of the marquis of Ferrara. At Ferrara he spent the last thirty years of his long life (1370-1460), producing text- books of Greek and Latin grammar, and translations from Strabo and Plutarch. His method may be gathered from his son's treatise, De Ordine Docendi et Studendi. In that treatise the essential marks of an educated person are, not only ability to write Latin verse, but also, a point of " at least equal import- ance," " familiarity with the language and literature of Greece." " Without a knowledge of Greek, Latin scholarship itself is, in any real sense, impossible " (1459).

By the fall of Constantinople in 1453, " Italy (in the eloquent phrase of Carducci) became sole heir and guardian of the ancient civilization," but its fall was in no way necessary for the revival of learning, which had begun a century before. Bessarion, Theodorus Gaza, Georgius Trepezuntius, Argyropulus, Chal-

condyles, all had reached Italy before 1453. A few more Greeks fled to Italy after that date, and among these were Janus Lascaris, Musurus and Callierges. All three were of signal service in devoting their knowledge of Greek to perpetuating and popularizing the Greek classics with the aid of the newly- invented art of printing. That art had been introduced into Italy by the German printers, Sweynheym and Pannartz, who had worked under Fust at Mainz. At Subiaco and at Rome they had produced in 1465-1471 the earliest editions of Cicero, De Oratore and the Letters, and eight other Latin authors.

The printing of Greek began at Milan with the Greek grammar of Constantine Lascaris (1476). At Florence the earliest editions of Homer (1488) and Isocrates (1493) had been produced by Demetrius

Chalcondyles, while Janus Lascaris was the first to edit the Greek anthology, Apollonius Rhodius, and parts of Euripides, Callimachus and Lucian (1494-1496). In 1494-1515 Aldus Manutius published at Venice no less than twenty-seven editiones principes of Greek authors and of Greek works of reference, the authors including Aristotle, Theophrastus, Theocritus, Aristophanes, Thucydides, Sophocles, Herodotus, Euripides, Demosthenes (and the minor Attic orators), Pindar, Plato and Athenaeus. In producing Plato, Athenaeus and Aristophanes, the scholar-printer was largely aided by Musurus, who also edited the Aldine Pausanias (1516) and the Etymo- logicum printed in Venice by another Greek immigrant, Callierges (1499).

The Revival of Learning in Italy ends with the sack of Rome (1527). Before 1525 the study of Greek had begun to decline in Italy, but meanwhile an interest in that language had been transmitted to the lands beyond the Alps.

In the study of Latin the principal aim of the Italian humanists was the imitation of the style of their classical models. In the case of poetry, this imitative spirit is apparent in Petrarch's Africa, and in the Latin poems of Politian, Pontano, Sannazaro, Vida and many others. Petrarch was not only the imitator of Virgil, who had been the leading name in Latin letters through- out the middle ages; it was the influence of Petrarch that gave a new prominence to Cicero. The imitation of Cicero was carried on with varying degrees of success by humanists such as Gas- parino da Barzizza (d. 1431), who introduced a new style of epistolary Latin; by Paolo Cortesi, who discovered the impor- tance of a rhythmical structure in the composition of Ciceronian prose (1490); and by the accomplished secretaries of Leo X., Bembo and Sadoleto. Both of these papal secretaries were mentioned in complimentary terms by Erasmus in his celebrated dialogue, the Ciceronianus (1528), in which no less than one hundred and six Ciceronian scholars of all nations are briefly and brilliantly reviewed, the slavish imitation of Cicero de- nounced, and the law laid down that " to speak with propriety we must adapt ourselves to the age in which we live — an age that differs entirely from that of Cicero." One of the younger Ciceronians criticized by Erasmus was Longolius, who had died at Padua in 1522. The cause of the Ciceronians was de- fended by the elder Scaliger in 1531 and 1536, and by fitienne Dolet in 1535, and the controversy was continued by other scholars down to the year 16 10. Meanwhile, in Italy, a strict type of Ciceronianism was represented by Paulus Manutius (d. 1574), and a freer and more original form of Latinity by Muretus (d. 1585).

Before touching on the salient points in the subsequent centuries, in

connexion with the leading nations of Europe, we may briefly note the cosmopolitan position of Erasmus (1466-1536), who, although he was a native of the Netherlands, was far more closely connected with France, England, Italy, Germany and Switzerland, than with the land of his birth. He was still a school-boy at Deventer when his high promise was recognized by Rudolf Agricola, " the first (says Erasmus) who brought from Italy some breath of a better culture." Late in 1499 Erasmus spent some two months at Oxford, where he met Colet; it was in London that he met More and Linacre and Grocyn, who had already ceased to lecture at Oxford. At Paris, in 1500, he was fully conscious that " without Greek the amplest

knowledge of Latin was imperfect"; and, during his three years in Italy (1506- 1509), he worked quietly at Greek in Bologna and attended the lectures of Musurus in Padua. In October 1 51 1 he was teaching Greek to a little band of students in Cam- bridge; at Basel in 1516 he produced his edition of the Greek Testament, the first that was actually published; and during the next few years he was helping to organize the college lately founded at Louvain for the study of Greek and Hebrew, as well as Latin. Seven years at Basel were followed by five at Freiburg, and by two more at Basel, where he died. The names of all these places are suggestive of the wide range of his influence. By his published works, his Colloquies, his Adages and his Apophthegms, he was the educator of the nations of Europe. An educational aim is also apparent in his editions of Terence and of Seneca, while his Latin translations made his contem- poraries more familiar with Greek poetry and prose, and his Paraphrase promoted a better understanding of the Greek Testament. He was not so much a scientific scholar as a keen and brilliant man of letters and a widely influential apostle of humanism.

In France the most effective of the early teachers of Greek was Janus Lascaris (1495-1503). Among his occasional pupils France was Budaeus (d. 1540), who prompted Francis I. to found in 1530 the corporation of the Royal Readers in Greek, as well as Latin and Hebrew, afterwards famous under the name of the College de France. In the study of Greek one of the earliest links between Italy and Germany a man was Rudolf Agricola, who had learned Greek under Gaza at Ferrara. It was in Paris that his younger con- temporary Reuchlin acquired part of that proficiency in Greek which attracted the notice of Argyropulus, whose admiration of Reuchlin is twice

recorded by Melanchthon, who soon after- wards was pre-eminent as the ” praeceptor ” of Germany.

In the age of the revival the first Englishman who studied Greek was a Benedictine monk, William of Selling (d. 1494),

Eneland w ^° P a ˆ two v ˆ is to Italy. At Canterbury he inspired with his own love of learning his nephew, Linacre, who joined him on one of those visits, studied Greek at Florence under Politian and Chalcondyles, and apparently stayed in Italy from 1485 to 1499. His translation of a treatise of Galen was printed at Cambridge in 1521 by Siberch, who, in the same year and place, was the first to use Greek type in England. Greek had been first taught to some purpose at Oxford by Grocyn on his return from Italy in 149 1. One of the younger scholars of the day was William Lilye, who picked up his Greek at Rhodes on his way to Palestine and became the first high-master of the school founded by Colet at St Paul’s (1510). •

(b) That part of the Modern Period of classical studies which succeeds the age of the Revival in Italy may be subdivided into three periods distinguished by the names of the nations most prominent in each.

1 . The first may be designated the French period. It begins with the foundation of the Royal Readers by Francis I. in 1530, and it may perhaps be regarded as extending to 1 700. period* This P er i°d is marked by a many-sided erudition rather than by any special cult of the form of the classical languages. It is the period of the great polyhistors of France. It includes Budaeus and the elder Scaliger (who settled in France in 1529), with Turnebus and Lambinus, and the learned printers Robertus and Henricus Stephanus, while among its foremost names are those of the younger (and greater) Scaliger, Casaubon and Salmasius. Of these, Casaubon ended his days in England (16 14); Scaliger, by leaving France for the Netherlands in 1 593, for a time at least transferred the supremacy in scholarship from the land of his birth to that of his adoption. The last sixteen years of his life (1 593-1609) were spent at Leiden, which was also for more than twenty years (1631-1653) the home of Salmasius, and for thirteen (1579-1592) that of Lipsius (d.1606). In the 17th century the erudition of France is best represented by “Henricus Valesius,” Du Cange and Mabillon. In the same period Italy was represented by Muretus, who

had left France in 1563, and by her own sons, Nizolius, Victorius, Robortelli and Sigonius, followed in the 17th century by R. Fabretti. The Netherlands, in the 16th, claim W. Canter as well as Lipsius, and,

in the 17th, G.J. Vossius, Johannes Meur- sius, the elder and younger Heinsius, Hugo Grotius, J. F. Gronovius, J. G. Graevius and J. Perizonius. Scotland, in the 16th, is represented by George Buchanan; England by Sir John Cheke, Roger Ascham, and Sir Henry Savile, and, in the 17th, by Thomas Gataker, Thomas Stanley, Henry Dodwell, and Joshua Barnes; Germany by Janus Gruter, Ezechiel Spanheim and Chr. Cellarius, the first two of whom were also connected with other countries.

We have already seen that a strict imitation of Cicero was one of the characteristics of the Italian humanists. In and after the middle of the 16th century a correct and pure Latinity was promoted by the educational £ a tf™ ‘ system of the Jesuits; but with the growth of the vernacular literatures Latin became more and more exclusively the language of the learned. Among the most conspicuous Latin writers of the 17th century are G. J. Vossius and the Heinsii, with Salmasius and his great adversary, Milton. Latin was also used in works on science and philosophy, such as Sir Isaac Newton’s Principia (1687), and many of the works of Leibnitz (1646-1705). In botany the custom followed by John Ray (1627-1705) in his Historia Plantarum and in other works was continued in 1760 by Linnaeus in his Sy sterna Naturae. The last important work in English theology written in Latin was George Bull’s Defensio Fidei Nicenae (1685). The use of Latin in diplomacy died out towards the end of the 17th century; but, long after that date negotiations with the German empire were conducted in Latin, and Latin was the language of the debates in the Hungarian diet down to 1825.

2. During the 18th century the classical scholarship of the Netherlands was under the healthy and stimulating influence of Bentley (1662-1742), -who marks the beginning Tbe

of the English and Dutch period, mainly represented English in Holland by Bentley’s younger contemporary and and Dutch correspondent, Tiberius Hemsterhuys (1685-1766), p and the latter scholar’s great pupil David Ruhnken (1723-1798). It is the age of historical and literary, as well as verbal, criticism. Both of these were ably represented in the first half of the century by Bentley himself, while, in the twenty years between 1782 and 1803, the verbal criticism of the tragic poets of Athens was the peculiar province of Richard Porson (1759-1808), who was born in the same year as F. A. Wolf. Among other repre- sentatives of England were Jeremiah Markland and Jonathan Toup, Thomas Tyrwhitt and Thomas Twining, Samuel Parr and Sir William Jones; and of the Netherlands, the two Bur- manns and L. Kiister, Arnold Drakenborch and Wesseling,

Lodewyk Valckenaer and Daniel Wyttenbach (1 746-1829). Germany is represented by Fabricius and J. M. Gesner, J. A. Ernes ti and J. J. Reiske, J. J. Winckelmann and Chr. G. Heyne; France by B. de Montfaucon and J. B. G. D. Villoison; Alsace by French subjects of German origin, R. F. P. Brunck and J. Schweighauser; and Italy by E. Forcellini and Ed. Corsini.

3. The German period begins with F. A. Wolf (1759-1824), whose Prolegomena to Homer appeared in 1795. He is the founder of the systematic and encyclopaedic type

of scholarship embodied in the comprehensive term J

Altertumswissenschaft, or ” a scientific knowledge period.

of the old classical world.” The tradition of Wolf

was ably continued by August Bockh (d. 1867), one of the

leaders of the historical and antiquarian school, brilliantly

represented in the previous generation by B. G. Niebuhr (d.

1831).

In contrast with this school we have the critical and gram- matical school of Gottfried Hermann (d. 1848). During this period, while Germany remains the most productive of the nations, scholarship has been more and more international and cosmopolitan in its character.

igth Century. — We must here be content with simply recording the names of a few of the more prominent representatives of

Germany.

the ioth century in some of the most obvious departments of classical learning. Among natives of Germany the leading

scholars have been, in Greek, C. F. W. Jacobs, C. A.

Lobeck, L. Dissen, I. Bekker, A. Meineke, C. Lehrs, W. Dindorf, T. Bergk, F. W. Schneidewin, H. Kochly, A. Nauck, H. Usener, G. Kaibel, F. B’.ass and W. Christ; in Latin, C. Lachmann, F. Ritschl, M. Haupt, C.

Halm, M. Hertz, A. Fleck- eisen, E. Bahrens, L. Miiller and O. Ribbeck. Grammar and kindred subjects have been represented by P. Buttmann, A. Matthiae. F. W. Thiersch, C. G. Zumpt, G. Bernhardy, C. W. Kriiger, R. Ktihner and H. L. Ahrens; and lexicography by F. Passow and C. E. Georges. Among editors of Thucydides we have had E. F. Poppo and J. Classen; among editors of Demosthenes or other orators, G. H. Schafer, J. T. Vomel, G. E. Benseler, A. Westermann, G. F. Schomann, H. Sauppe, and C. Rehdantz (besides Blass, already mentioned). The Platonists include F. Schleiermacher, G. A. F. Ast, G. Stallbaum and the many-sided C. F. Hermann; the Aristotelians, C. A. Brandis, A. Trendelenburg, L. Spengel, H. Bonitz, C. Prantl, J. Bernays and F. Susemihl. The history of Greek philosophy was written by F. Ueberweg, and, more fully, by E. Zeller. Greek history was the domain of G. Droysen, Max Duncker, Ernst Curtius, Arnold Schafer and Adolf Holm; Greek antiquities that of M. H. Meier and G. F. Schomann and of G. Gilbert; Greek epigraphy that of J. Franz, A. Kirchhoff, W. von Hartel, U. Kohler, G. Hirschfeld and W. Dittenberger; Roman history and constitutional antiquities that of Theodor Mommsen (1817-1903), who was associated in Latin epigraphy with E. Hiibner and W. Henzen. Classical art and archaeology were represented by F. G. Welcker, E. Gerhard, C. O. Miiller, F. Wieseler, O. Jahn, C. L. Urlichs, H. Brunn, C. B. Stark, J. Overbeck, W. Helbig, O. Benndorf and A. Furtwangler; mythology (with cognate subjects) by G. F. Creuzer, P. W. Forchhammer, L. Preller, A. Kuhn, J. W. Mannhardt and E. Rohde; and com- parative philology by F. Bopp, A. F. Pott, T. Benfey, W. Corssen, Georg Curtius, A. Schleicher and H. Steinthal. The history of classical philology in Germany was written by Conrad Bursian

(1830-1883).

In France we have J. F, Boissonade, J. A. Letronne, L. M. Quicherat, M, P. Littre, B. Saint-Hilaire, J. V. Duruy, B. E.

Miller, £. Egger, C. V. Daremberg, C, Thurot, L. E.

Benoist, O. Riemann and C. Graux; (in archaeology) A. C. Quatremere de Quincy, P. le Bas, C. F. M. Texier, the due de Luynes, the Lenormants (C. and F.), W. H. Waddington

and O. Rayet; and (in comparative philology) Victor Holland', Henry. Greece was ably represented in France by

A. Koraes. In Belgium we have P. Willems and the Baron De Witte (long resident in France); in Holland, C. G. Cobet; in Denmark, J. N. Madvig. Among the scholars

of Great Britain and Ireland may be mentioned:

P. Elmsley, S. Butler, T. Gaisford, P. P. Dobree, J. H. Monk, C. J. Blomfield, W. Veitch, T. H. Key, B. H. Kennedy, W. Ramsay, T. W. Peile, R. Shilleto, W. H.Thompson, J. W. Donaldson, Robert Scott, H. G. Liddell, C. Badham, G. Rawlinson, F. A. Paley, B. Jowett, T. S. Evans, E. M. Cope, H.A.J. Munro,W. G. Clark, Churchill Babington, H. A. Holden, J. Riddeil, J. Conington, W. Y. Sellar, A. Grant, W. D. Geddes, D.B. Monro, H. Nettleship, A. Palmer, R. C. Jebb, A. S. Wilkins, W. G. Rutherford and James Adam; among historians and archaeologists, W. M. Leake, H. Fynes- Clinton, G. Grote and C. Thirlwall, T. Arnold, G. Long and Charles Merivale, Sir Henry Maine, Sir Charles Newton and A. S. Murray, Robert Burn and H. F. Pelham. Among comparative philologists Max Miiller belonged to Germany by birth and to England by adoption, while, in the United States, his ablest counterpart was W.D. Whitney. B. L. Gildersleeve, W. W. Goodwin, Henry Drisler, J. B. Greenough and G. M. Lane were prominent American classical scholars.

The 19th century in Germany was marked by the organization of the great series of Greek and Latin inscriptions, and by the foundation of the Archaeological Institute in Rome (1829), which was at first international in its character. The Athenian

England.

Institute was founded in 1874. Schools at Athens and Rome were founded by France in 1846 and 1873, by the United States of America in 1882 and 1895, and by England in 1883 and 1901; and periodicals are published by the schools of all these four nations. An interest in Greek studies (and especially Sclloo,s 0/ in art and archaeology) has been maintained in *J°J” * *” England by the Hellenic Society, founded in 1879, with its organ the Journal of Hellenic Studies. A further interest in Greek archaeology has been awakened in all civilized lands by the excavations of Troy, Mycenae, Tiryns, Epidaurus, Sparta, Olympia, Dodona, Delphi, Delos and of important sites in Crete. The extensive discoveries of papyri in Egypt have greatly extended our knowledge of the administration of that country in the times of the Ptolemies, and have materially added to the existing remains of Greek literature. Scholars have been enabled to realize in their own experience some of the enthusiasm that attended the recovery of lost classics during the Revival of Learning. They have found themselves living in a new age of editiones principes, and have eagerly welcomed the first publica- tion of Aristotle’s Constitution of Athens (1891), Herondas (1891) and Bacchylides (1897), as well as

the Persae of Timotheus of Miletus (1903), with some of the Paeans of Pindar (1907) and large portions of the plays of Menander (1898-1899 and 1907). The first four of these were first edited by F. G. Kenyon, Timotheus by von Wilamowitz-Mollendorff , Menander partly by J. Nicole and G. Lefebre and partly by B. P. Grenfell and A. S. Hunt, who have also produced fragments of the Paeans of Pindar and many other classic texts (including a Greek con- tinuation of Thucydides and a Latin epitome of part of Livy) in the successive volumes of the Oxyrhynchus papyri and other kindred publications.

Authorities. — For a full bibliography of the history of classical philology, see E. Hiibner, Grundriss zu Vorlesungen iiber die Geschichte und Encyklopadie der klassischen Philologie (2nd ed., 1889) ; and for a brief outline, C. L. Urlichs in Iwan von Muller's Handbuch, vol. i. (2nd ed., 1891). 33-145; S. Reinach, Manuel de philologie classique (2nd ed… 1883-1884; nouveau tirage 1907), 1-22; and A. Gude- mann, Grundris (Leipzig, 1907), pp. 224 seq. For the Alexandrian period, F. Susemihl, Gesch. der griechischen Litteratur in der Alexan-, drinerzeit (2 vols., 1891-1892) ; cf. F. A. Eckstein, Nomenclator Philologorum (1871), and W. Pokel, Philologisches Schriftsteller- Lexikon (1882). For the period ending a.d. 400, see A. Grafenhan, Gesch. der klass. Philologie (4 vols., 1843-1850); for the Byzantine period, C. Krumbacher in Iwan von Miiller, vol. ix. (1) (2nd ed., 1897); for the Renaissance, G. Voigt, Die Wiederbelebung des class. Altertums (3rd ed., 1894, with bibliography); L. Geiger, Renais- sance und Humanismus in Italien und Deutschland (1882, with bibliography); J. A. Symonds, Revival of Learning (1877, &c.) ; R. C. Jebb, in Cambridge Modern History, i. (1902), 532-584; and J. E. Sandys, Harvard Lectures on the Revival of Learning (1905) ; also P. de Nolhac, Petrarque et Vhumanisme (2nd ed., 1907). On the history of Greek scholarship in France, £. Egger, L Histoire d'hellenisme en France (1869); Mark Pattison, Essays, i., and Life of Casaubon; in Germany, C. Bursian, Gesch. der class. Philologie in Deutschland (1883); in Holland, L. Miiller, Gesch. der class. Philologie in den Niederlanden (1869); in Belgium, L. C. Roersch in E. P. van Bemmei's Patria Bslgica, vol. iii. (1875), 407-432; and in England, R. C. Jebb, " Erasmus " (1890) and " Bentley " (1882), and " Porson " (in Diet. Nat. Biog.). On the subject as a whole see J. E. Sandys, History of Classical Scholarship (with chronological tables, portraits and facsimiles), vol. i. ; From the Sixth Century B.C. to the end of the Middle Ages (1903, 2nd ed., 1906); vols. ii. and iii., From the Revival of Learning to the Present Day (1908), including the history of scholarship in all the countries of Europe and in the United States of America. See also the separate bio- graphical articles in this

Encyclopaedia.

(B) The Study of the Classics in Secondary Education After the Revival of Learning the study of the classics owed much to the influence and example of Vittorino da Feltre, Budaeus, Erasmus and Melanchthon, who were among the leading representatives of that revival in Italy, France, England and Germany.

1. In England, the two great schools of Winchester (1382) and Eton (1440) had been founded during the life of Vittorino, but before the revival had reached Britain. The first school 1 which came into being under the immediate influence of humanism was that founded at St Paul's by Dean 1 See also the article Schools.

Colet (1510), the friend of Erasmus, whose treatise De pueris instituendis (1529) has its English counterpart in the Governor of Sir Thomas Elyot (1531). The highmaster of St Paul's was to be "learned in good and clean Latin, and also in Greek, if such may be gotten." The master and the second master of Shrewsbury (founded 1551) were to be " well able to make a Latin verse, and learned in the Greek tongue." The influence of the revival extended to many other schools, such as Christ's Hospital (1552), Westminster (1560), and Merchant Taylors' (1561); Repton (1557), Rugby (1567) and Harrow (1571).

At the grammar school of Stratford-on-Avon, about 1571- 1577, Shakespeare presumably studied Terence, Horace, Ovid Shake- an(* the Bucolics of Baptista Mantuanus (1502). In speare and the early plays he quotes Ovid and Seneca. Similarly, '*« in Titus Andronicus (iv. 2) he says, of Integer vitae:

grammar- „ , Tig & verse in H orace; j k now J t we Q. J rea d j t in

the grammar long ago. In Henry VI. part 11. sc. 7, when Jack Cade charges Lord Say with having " most traitorously corrupted the youth of the realm in erecting a grammar-school," Lord Say replies that " ignorance is the curse of God, knowledge the wing wherewith we fly to heaven." In the Taming of the Shrew (I. i. 157) a line is quoted as from Terence (Andria, 74) : " redime te captum quam queas minimo." This is taken verbatim from Lilye's contribution to the Brevis Instituiio, originally composed by Colet, Erasmus and Lilye for

St Paul's School (1527), and ultimately adopted as the books"* ' Eton

of Grant (1575) was succeeded by that of Camden (1595), founded mainly on a Paduan text-book, and apparently adopted in 1596 by Sir Henry Savile at Eton, where it long remained in use as the Eton Greek Grammar, while at West- minster itself it was superseded by that of Busby (1663). The text-books to be used at Harrow in 1590 included Hesiod and some of the Greek orators and historians.

In one of the Paston Letters (i. 301), an Eton boy of 1468 quotes two Latin verses of his own composition. Nearly a century later,

on New Year's Day, 1560, forty -four boys of the school

presented Latin verses to Queen Elizabeth. The queen's former tutor, Roger Ascham, in his Scholemaster (1570), agrees with his Strassburg friend, J. Sturm, in making the imitation of the Latin classics the main aim of instruction. He is more original when he insists on the value of translation and retransla- tion for acquiring a mastery over Latin prose composition, and when he protests against compelling boys to converse in Latin too soon. Asckam's influence is apparent in the Positions of Mulcaster, who in 1581 insists on instruction in English before admission to a grammar-school, while he is distinctly in advance of his age in urging the foundation of a special college for the training of teachers.

Cleland's Institution of a Young Nobleman (1607) owes much to the Italian humanists. The author follows Ascham in protesting Cieland against compulsory Latin conversation, and only

slightly modifies his predecessor's method of teaching Latin prose. When Latin grammar has been mastered, -he bids the teacher lead his pupil " into the sweet fountain and spring of all Arts and Science," that is, Greek learning which is " as profitable for the understanding as the Latin tongue for speaking." In the study of ancient history, " deeds and not words " are the prime interest. " In Plutarch pleasure is so mixed and confounded with profit, that I esteem the reading of him as a paradise for a curious spirit to walk in at all time." Baconinhis Advancement of Learning (1605) notesitas " the first distemper of learning when men study words and not matter " (I. iv. 3) ; he also observes that the Jesuits " have much

quickened and strengthened the state of learning "

MH°on (-*-■ v '- I &- ^ e * s on t ^ le s '^ e °^ reI ° rrn m education; Petty. he waves the humanist aside with the words: vetustas cessit,

ratio vicit. Milton, in his Tractate on Education (1644), advances further on Bacon's lines, protesting against the length of time spent on instruction in language, denouncing merely verbal knowledge, and recommending the study of a large number of classical authors for the sake of their subject-

Ascham.

Locke.

matter, and with a view to their bearing on practical life. His ideal place of education is an institution combining a school and a university. Sir William Petty, the economist (1623-1687), urged the establishment of ergastula literaria for instruction of a purely practical kind. Locke, who had been educated at Winchester and had lectured on Greek at Oxford (1660), nevertheless almost completely eliminated Greek from the scheme which he unfolded in his Thoughts on Education (1693). With Locke, the moral and practical qualities of virtue and prudence are of the first consideration. Instruction, he declares, is but the least part of education; his aim is to train, not men of letters or men of science, but practical men armed for the battle of life. Latin was, above all, to be learned through use, with as little grammar as possible, but with the reading of easy Latin texts, and with no repetition, no composition. Greek he absolutely proscribes, reserving a knowledge of that language to the learned and the lettered, and to professional scholars.

Throughout the 18th century and the early part of the 19th, the old routine went on in England with little variety, and with no sign of expansion. The range of studies was Arnold widened, however, at Rugby in 1828-1842 by Thomas Arnold, whose interest in ancient history and geography, as a necessary part of classical learning, is attested by his edition of Thucydides; while his influence was still further extended when those who had been trained in his traditions became head masters of other schools.

During the rest of the century the leading landmarks are the three royal commissions known by the names of their chairmen: (1) Lord Clarendon's on nine public schools, Eton, Winchester, Westminster, Charterhouse, Harrow, Rugby, Shrewsbury, St Paul's and Merchant Taylors' (1861-1864), resulting in the Public Schools Act of 1868; (2) Lord Taunton's on 782 endowed schools (1864-1867), followed by the act of 1869; and (3) Mr Bryce's on secondary education (1894-1895).

A certain discontent with the current traditions of classical training

found expression in the Essays on a Liberal Education (1867). The author of the first essay, C. S. Parker, Coatro- closed his review of the reforms instituted in Germany versyon and France by adding that in England there had cl * ss,c * i been but little change. The same volume included a critical examination of the ” Theory of Classical Education ” by Henry Sidgwick, and an attack on compulsory Greek and Latin verse composition by F. W. Farrar. The claims of verse composition have since been judiciously defended by the Hon. Edward Lyttelton (1897), while a temperate and effective restatement of the case for the classics may be found in Sir Richard Jebb’s Romanes Lecture on ” Humanism in Education ”

(1899).

The question of the position of Greek in secondary education has from time to time attracted attention in connexion with the requirement of Greek in Responsions at Oxford, and in the Previous Examination at Cambridge.

In the Cambridge University Reporter for November 9, 1870, it was stated that, ” in order to provide adequate encouragement for the study of Modern Languages and Natural Science,” the commissioners for endowed schools had pu isory determined on the establishment of modern schools of Greek.” the first grade in which Greek would be excluded. The commissioners feared that, so long as Greek was a sine qua non at the universities, these schools would be cut off from direct connexion with the universities, while the universities would in some degree lose their control over a portion of the higher culture of the nation. On the 9th of March 187 1 a syndicate recommended that, in the Previous Examination, French and German (taken together) should be allowed in place of Greek; on the 27 th of April this recommendation (which only affected candidates for honours or for medical degrees) was rejected by 51 votes to 48.

All the other proposals and votes relating to Greek in the Previous Examination in 1870-1873, 1878-1880, and 1891-1892 are set forth in the Cambridge University Reporter for November 11, 1904, pp. 202-205. In November 1903 a syndicate was

appointed to consider the studies and examinations of the uni- versity, their report of November 1904 on the Previous Examina- tion was

fully discussed, and the speeches published in the Reporter fcr December 17, 1904. In the course of the discussion Sir Richard Jebb drew attention to the statistics collected by the master of Emmanuel, Mr W. Chawner, showing that, out of 86 head masters belonging to the Head Masters' Conference whose replies had been published, " about 56 held the opinion that the exemption from Greek for all candidates for a degree would endanger or altogether extinguish the study of Greek in the vast majority of schools, while about 21 head masters held a different opinion." On the 3rd of March 1905 a proposal for accepting either French or German as an alternative for either Latin or Greek in the Previous Examination was rejected by 1559 to 1052 votes, and on the 26th of May 1906 proposals distinguishing between students in letters and students in science, and {inter alia) requiring the latter to take either French or German for either Latin or Greek in the Previous Examination, were rejected by 746 to 241.

Meanwhile, at Oxford a proposal practically making Greek optional with all undergraduates was rejected, in November 1902, by 189 votes to 166; a preliminary proposal permitting students of mathematics or natural science to offer one or more modern languages in lieu of Greek was passed by 164 to 162 in February 1904, but on the 29th of November the draft of a statute to this effect was thrown out by 200 to 164. In the course of the controversy three presidents of the Royal Society, Lord Kelvin, Lord Lister and Sir W. Huggins, expressed the opinion that the proposed exemption was not beneficial to science students.

Incidentally, the question of " compulsory Greek " has stimulated a desire for greater efficiency in classical teaching. In jh e December 1903, a year before the most important of

Classical the public discussions at Cambridge, the Classical Associa-Association was founded in London. The aim of that association is " to promote the development, and maintain the well-being, of classical studies, and in particular (a) to impress upon public opinion the claim of such studies to an eminent place in the national scheme of education; (b) to improve the practice of classical teaching by free discussion of its scope and methods; (c) to encourage investigation and call attention to new discoveries; (d) to create opportunities of friendly intercourse and co-operation between all lovers of classical learning in this country."

The question of the curriculum and the time-table in secondary education has occupied the attention of the Classical Association, the

British Association and the Education Department cuium. ” °f Scotland. The general effect of the recommenda- tions already made would be to begin the study of foreign languages with French, and to postpone the study of Latin to the. age of twelve and that of Greek to the age of thirteen. At the Head Masters' Conference of December 1907 a proposal to lower the standard of Greek in the entrance scholarship examina- tions of public schools was lost by 10 votes to 16, and the ” British Association report ” was adopted with reservations in 1908. In the case of secondary schools in receipt of grants of public money (about 700 in England and 100 in Wales in 1907-1908), ” the curriculum, and time-table must be approved by the Board of Education.” The Board has also a certain control over the curriculum of schools under the Endowed Schools Acts and the Charitable Trusts Acts, and also over that of schools voluntarily applying for inspection with a view to being recognized as efficient.

Further efficiency in classical education has been the aim of the movement in favour of the reform of Latin pronunciation. In Reform 187 1 this movement resulted in Munro and Palmer's in Latin Syllabus of Latin Pronunciation. The reform was pmauncia- carr i ec j forward at University College, London, by °”' Professor Key and by Professor Robinson Ellis in 1873,

and was accepted at Shrewsbury, Marlborough, Liverpool College, Christ's Hospital, Dulwich, and the City of London school. It was taken up anew by the Cambridge Philological Society in 1886, by the Modern Languages Association in 1901, by

the Classical Association in 1904-1905, and the Philological Societies of Oxford and Cambridge in 1906. The reform was, accepted by the various bodies of head masters and assistant masters in December 1906-January 1907, and the proposed scheme was formally approved by the Board of Education in February 1907.

See W. H. Woodward, Studies in Education during the Age of the Renaissance (1906), chap. xiii. ; Acland and Llewellin Smith, Studies in Secondary Education, with introduction by James Bryce (1892); Essays on a Liberal Education, ed. F. W. Farrar (1867); R. C. Jebb, ” Humanism in Education,” Romanes Lecture of 1899, reprinted with other lectures on cognate subjects in Essays and Addresses (1907); Foster Watson, The Curriculum and Practice of the English Grammar Schools up to 1660 (1908); “Greek at Oxford,” by a Resident, in The Times (December 27, 1904); Cambridge University Reporter (November n and December 17, 1904) ; British Association Report on Curricula of Secondary Schools (with an independent paper by

Professor Armstrong on ” The Teaching of Classics “), (December 1907); W. H. D. Rouse in The Year’s Work in Classical Studies (1907 and 1908), chap. i. ; J. P. Postgate, How to pronounce Latin (Appendix B, on ” Recent Pro- gress “), (1907). For further bibliographical details see pp. 875-890 of Dr Karl Breul’s ” Grossbritannien ” in Baumeister’s Handbuch, I. ii. 737-892 (Munich, 1897).

2. In France it was mainly with a view to promoting the study of Greek that the corporation of Royal Readers was founded by Francis I. in 1530 at the prompting of prance. Budaeus. In the university of Paris, which was originally opposed to this innovation, the statutes of 1598 prescribed the study of Homer, Hesiod, Pindar, Theocritus; Plato, Demosthenes and Isocrates (as well as the principal Latin classics), and required the production of three exercises in Greek or Latin in each week.

From the middle of the 16th century the elements of Latin were generally learned from unattractive abridgments of the grammar of the Flemish scholar, van Pauteren or Despautere (d. 1520), which, in its original folio llots editions of 1537-1338, was an excellent work. The unhappy lot of those who were compelled to learn their Latin from the current abridgments was lamented by a Port-Royalist in a striking passage describing the gloomy forest of le pays de Despautere (Guyot, quoted in Sainte-Beuve’s Port-Royal, iii. 429). The first Latin grammar written in French was that of Pere de Condren of the Oratoire (c. 1642), which was followed by the Port-Royal Methode latine of Claude Lancelot (1644), and by the grammar composed by Bossuet for the dauphin, and also used by Fenelon for the instruction of the due de Bourgogne. In the second half of the 17th century the rules of grammar and rhetoric were simplified, and the time withdrawn from the practice of composition (especially verse composition) trans- ferred to the explanation and the study of authors.

Richelieu, in 1640, formed a scheme for a college in which Latin was to have a subordinate place, while room was to be found for the study of history and science, Greek, and Richelieu, French and modern languages. Bossuet, in educating Bossuet, the dauphin, added to the ordinary classical routine F ˆ aelo “> represented by the extensive series of the ” Delphin eary ‘ Classics ” the study of history and of science. A greater origin- ality in the method of teaching the ancient languages was exemplified by Fenelon, whose views were partially reflected by the Abbe Fleury, who also desired the simplification of grammar, the diminution of composition, and even the sup- pression of Latin verse. Of the ordinary teaching of Greek in his day, Fleury wittily observed that most boys ” learned just enough of that language

to have a pretext for saying for the rest of their lives that Greek was a subject easily forgotten.”

In the 18th century Rollin, in his TraiU des etudes (1726), agreed with the Port – Royalists in demanding that Latin grammars should be written in French, that the rules „ „. should be simplified and explained by a sufficient number of examples, and that a more important place should be assigned to translation than to composition. The supremacy of Latin was the subject of a long series of attacks in the same century. Even at the close of the previous century the brilliant achievements of French literature had prompted La Bruyere

to declare in Des ouvrages de I’esprit (about 1680), ” We have at last thrown off the yoke of Lalinism “; and, in the same year, Jacques Spon claimed in his correspondence the right to use the French language in discussing points of archaeology.

Meanwhile, in 1563, notwithstanding the opposition of the university of Paris, the Jesuits had succeeded in founding the

Collegium Claromontanum. After the accession of Jesuits. Henry IV. they were expelled from Paris and other

important towns in 1594, and not allowed to return until 1609, when they found themselves confronted once more by their rival, the university of Paris. They opened the doors of their schools to the Greek and Latin classics, but they represented the ancient masterpieces dissevered from their original historic environment, as impersonal models of taste, as isolated standards of style. They did much, however, for the cultivation of original composition modelled on Cicero and Virgil. They have been charged with paying an exaggerated attention to form, and with neglecting the subject-matter of the classics. This neglect is attributed to their anxiety to avoid the ” pagan ” element in the ancient literature. Intensely conservative in their methods, they kept up the system of using Latin in their grammars (and in their oral instruction) long after it had been abandoned by others.

The use of French for these purposes was a characteristic of the ” Little Schools ” of the Jansenists of Port-Royal(i643-i66o).

The text-books prepared for them by Lancelot included Royal. not 0Iu

y tne above-mentioned Latin grammar (1644)

but also the Methode grecque of 1655 and the Jardin des ratines grecques (1657), which remained in use for two cen- turies and largely superseded the grammar of Clenardus (1636) and the Tirocinium of Pere Labbe (1 648) . Greek began to decline in the university about 1650, at the very time when the Port- Royalists were aiming at its revival. During the brief existence of their schools their most celebrated pupils were Tillemont and Racine.

The Jesuits, on the other hand, claimed Corneille and Moliere, as well as Descartes and Bossuet, Fontenelle, Montesquieu and Voltaire. Of their Latin poets the best-known were Denis Petau (d. 1652), Rene Rapin (d. 1687) and N. E. Sanadon (d. 1733). In 176? the Jesuits were suppressed, and more than one hundred schools were thus deprived of their teachers. The university of Paris, which had prompted their suppression, and the parlia- ment, which had carried it into effect, made every endeavour to replace them. The university took possession of the Collegium Claromontanum, then known as the College Louis-leGrand, and transformed it into an icole normale. Many of the Jesuit schools were transferred to the congregations of the Oratoire and the Benedictines, and to the secular clergy. On the eve of the Revolution, out of a grand total of 562 classical schools, 384 were in the hands of the clergy and 178 in those of the congregations.

The expulsion of the Jesuits gave a new impulse to the attacks directed against all schemes of education in which Latin held

a prominent position. At the moment when the edulatkia unrvers ity of Paris was, by the absence of its rivals, attacked, placed in complete control of the education of France,

she found herself driven to defend the principles of classical education against a crowd of assailants. All kinds of devices were suggested for expediting the acquisition of Latin; grammar was to be set aside; Latin was to be learned as a “living language”; much attention was to be devoted^ to acquiring an extensive vocabulary; and, ” to save time,” composition was to be abolished. To facilitate the reading of Latin texts, the favourite method was the use of interlinear translations, originally proposed by Locke, first popularized in France by Dumarsais (1722), and in constant vogue down to the time of the Revolution.

Early in the 18th century Rollin pleaded for the ” utility of Greek,” while he described that language as the heritage of the university of Paris. In 1753 Berthier feared that in thirty years no one would be

able to read Greek. In 1768 Rolland declared that the university, which held Greek in high honour,

nevertheless had reason to lament that her students learnt little of the language, and he traced this decline to the fact that attend- ance at lectures had ceased to be compulsory. Greek, however, was still recognized as part of the examination held for the appointment of schoolmasters.

During the 18th century, in Greek as well as in Latin, the general aim was to reach the goal as rapidly as possible, even at the risk of missing it altogether. On the eve of the Revolution, France was enjoying the study of the By eoltbe institutions of Greece in the attractive pages of the Voyage du jeune Anacharsis (1789), but the study of Greek was menaced even more than that of Latin. For fifty years before the Revolution there was a distinct dissatisfaction with the routine of the schools. To meet that dissatisfaction, the teachers had accepted new subjects of study, had improved their methods, and had simplified the learning of the dead languages. But even this was not enough. In the study of the classics, as in other spheres, it was revolution rather than evolution that was loudly demanded.

The Revolution was soon followed by the long-continued battle of the ” Programmes.” Under the First Republic the schemes of Condorcet (April 1792) and J. Lakanal Plrsf (February 1795) were superseded by that of P. C. F. Republic Daunou (October 1795), which divided the pupils of the ” central schools ” into three groups, according to age, with corresponding subjects of study: (1) twelve to fourteen,— drawing, natural history, Greek and Latin, and a choice of modern languages; (2) fourteen to sixteen, — mathematics, physics, chemistry; (3) over sixteen, — general grammar, literature, history and constitutional law..

In July 1801, under the consulate, there were two courses, (1) nine to twelve, — elementary knowledge, including elements of Latin; (2) above twelve, — a higher course, with two consulate. alternatives, ” humanistic ” studies for the ” civil,” and purely practical studies for the ” military ” section. The law of the 1st of May 1802 brought the lycies into existence, the subjects being, in Napoleon’s own phrase, ” mainly Latin and mathematics.”

At the Restoration (1814) the military discipline of the lycees was replaced by the ecclesiastical discipline of the ” Royal Colleges.” The reaction of 1815-1821 in favour of classics was followed by the more liberal programme of «„„ ra ” Vatimesnil (1829), including, for those who had no taste for a classical education, certain ” special courses ” (1830), which were the germ of the enseignement special and the

enseigne- ment moderne.

Under Louis Philippe (1830-1848), amid all varieties of administration there was a consistent desire to hold the balance fairly between all the conflicting subjects of study. After the revolution of 1848 the difficulties raised by the excessive num- ber of subjects were solved by H. N. H. Fortoul's expedient of " bifurcation," the alternatives being letters and science. In 1863, under Napoleon III., Victor Duruy encouraged the study of history, and also did much for classical learning by founding the Ecole des Hautes Etudes. In 1872, under the Third Republic, Jules Simon found time for hygiene, geography and modern languages by abolishing Latin verse composition and reducing the number of exercises in Latin prose, while Remblic he insisted on the importance of studying the inner meaning of the ancient classics. The same principles were carried out by Jules Ferry (1880) and Paul Bert (1881-1882). In the scheme of 1890 the Latin course of six years began with ten hours a week and ended with four; Greek was begun a year later with two hours, increasing to six and ending with four.

The commission of 1899, under the able chairmanship of M. Alexandre Ribott published an important report, which was followed in 1902 by the scheme of M. Georges Leygues. The preamble includes a striking tribute to the advantages that France had derived from the study of the classics : —

" L'etude de l'antiquite grecque et latine a donne au genie francais une mesure, une clarte et une elegance incomparables. C'est par elle que notre philosophic nos lettres et nos arts ont brille d'un si

vif eclat; c'est par elle que notre influence morale s'est exercee en souveraine dans le monde. Les humanites doivent etre protegees contre toute atteinte et fortifiees. Elles font partie du patrimoine national.

" L'esprit classiquc n'est pas . . . incompatible avec l'esprit moderne. II est de tous les temps, parce qu'il est le culte de la raison claire et fibre, la recherche de la beaute harmonieuse et simple dans toutes les manifestations de la pensee."

By the scheme introduced in these memorable terms the course of seven years is divided into two cycles, the first cycle (of four years) having two parallel courses: (i) without Greek or Latin, and (2) #vith

Latin, and with optional Greek at the beginning of the third year. In the second cycle (of three years) those who have been learning both Greek and Latin, and those who have been learning neither, continue on the same lines as before; while those who have been learning Latin only may either (1) discontinue it in favour of modern languages and science, or (2) continue it with either. As an alternative to the second cycle, which normally ends in the examination for the baccalaureat, there is a shorter course, mainly founded on modern languages or applied science and ending in a public examination without the baccalaureat. The baccalaureat, how- ever, has been condemned by the next minister, M. Briand, who prefers to crown the course with the award of a school diploma

(1907).

See H. Lantoine, Htstoire ae V enseignemmt secondaire en France au XVII' siicle (1874); A. Sicard, Les Etudes classiques avant la Revolution (1887) j Sainte-Beuve, Port-Royal, vols. i.v. (1840 1859), especially iii. 383-588; O. Greard, Education et instruction, 4 vols., especially " Enseignement secondaire," vol. ii. pp. 1-90, with conspectus of programmes in the appendix (1889); A. Ribot, La Reforme de I' enseignement secondaire (1900); G. Leygues, Plan A' etudes, &c. (1902); H. H. Johnson, " Present State of Classical Studies in France," in Classical Review (December 1907). See also the English Education Department's Special Reports on Education in France (1899). The earlier literature is best represented in England by Matthew Arnold's Schools and Universities in France (1868; new edition, 1892) and A French Eton (1864).

3. The history of education in Germany since 1500 falls into three periods: (c) the age of the Revival of Learning and the Reformation (1500-1650), (b) the age of French in- fluence (1650-1800), and © the 19th century.

(a) During the first twenty years of the 16th century the reform of Latin instruction was carried out by setting aside the old medieval grammars, by irtroducing new manuals of classical literature, and by prescribing the study of classical authors and the imitation of classical models. In all these points the lead was first taken by south Germany, and by the towns along the Rhine down to the Netherlands. The old schools and universities were being quietly interpenetrated by the new spirit of humanism, when the sky was suddenly darkened by the clouds of religious conflict. In 1525-1535 there was a marked depression in the classical studies of Germany. Erasmus, writing to W. Pirck- heimer in 1528, exclaims: " Wherever the spirit of Luther

prevails, learning goes to the ground. ” Such a fate was, however, averted by the intervention of Meianchthon (d. 1560), the pr ■acceptor Germaniae, who was the embodiment of the thoa. ‘ spirit °f the new Protestant type of education, with its union of evangelical doctrine and humanistic culture. Under his influence, new schools rapidly rose into being at Magdeburg, Eisleben and Nuremberg (1521-1526). During more than forty years of academic activity he not only provided manuals of Latin and Greek grammar and many other text-books that long remained in use, but he also formed for Germany a well- trained class of learned teachers, who extended his influence throughout the land. His principal ally as an educator and as a writer of text-books was Camerarius (d. 1574). Precepts of style, and models taken from the best Latin authors, were the means whereby a remarkable skill in the imitation of Cicero was attained at Strassburg during the forty -four years of the headmastership of Johannes von Sturm (d. 1589), who had himself been influenced by the De disciplinis of J. L. Vives (1531), and in all his teaching aimed at the formation of a sapiens atque eloquens pietas. Latin continued to be the living language of learning and of literature, and a correct and elegant Latin style was regarded as the mark of I

Germany.

The Jesuits.

an educated person. Greek was taught in all the great schools, but became more and more confined to the study of the Greek Testament. In 1550 it was proposed in Brunswick to banish all ” profane ” authors from the schools, and in J he Oreek 1589 a competent scholar was instructed to write a Xea*” sacred epic on the kings of Israel as a substitute for the works of the “pagan” poets. In 1637, when the doubts of Scaliger and Heinsius as to the purity of the Greek of the New Testament prompted the rector of Hamburg to introduce the study of classical authors, any reflection on the style of the Greek Testa- ment was bitterly resented.

The Society of Jesus was founded in 1540, and by 1600 most of the teachers in the Catholic schools and universities of Germany were Jesuits. The society was ” dissolved ” in 1773, but survived its dissolution. In accordance with the Ratio Studiorum of Aquaviva (1599), which long remained unaltered and was only partially revised by J. Roothaan (1832), the main subjects of instruction were the litter ae humaniores diver sarum linguarum. The chief place among these was naturally assigned to Latin, the language of the society and of the Roman Church. The Latin grammar in use was that of the Jesuit rector

of the school at Lisbon, Alvarez (1572). As in the Protestant schools, the principal aim was the attainment of eloquentia. A comparatively subordinate place was assigned to Greek, especially as the importance attributed to the Vulgate weakened the motive for studying the original text. It was recognized, however, that Latin itself (as Vives had said) was ” in no small need of Greek,” and that, ” unless Greek was learnt in boyhood, it would hardly ever be learnt at all.” The text-book used was the Institutiones linguae Graecae of the German Jesuit, Jacob Gretser, of Ingolstadt (c. 1590), and the reading in the highest class included portions of Demosthenes, Isocrates, Plato, Thucydides, Homer, Hesiod, Pindar, Gregory of . Nazianzus, Basil and Chrysostom. The Catholic and Pro- testant schools of the 16th century succeeded, as a rule, in giving a command over a correct Latin style and a taste for literary form and for culture. Latin was still the language of the law- courts and of a large part of general literature. Between Luther and Lessing there was no great writer of German prose.

(b) In the early part of the period 1650-1800, while Latin continued to hold the foremost place, it was ceasing to be Latin of the strictly classical type. Greek fell still further into the background; and Homer and Demosthenes TI »>«geoi gradually gave way to the Greek Testament. Between ˆ“aueace. 1600 and 1775 there was a great gap in the production of new editions of the principal Greek classics. The spell wa9 only partially broken by J. A. Emesti’s Homer (1759 f.) and Chr. G. Heyne’s Pindar (1773 f.).

The peace of Westphalia (1648) marks a distinct epoch in the history of education in Germany. Thenceforth, education became more modern and more secular. The long „ . wars of religion in Germany, as in France and England, and were followed by a certain indifference as to disputed secular points of theology. But the modern and secular type edacatloa – of education that now supervened was opposed by the pietism of the second half of the 17 th century, represented at the newly- founded university of Halle (1694) by A. H. Francke, the pro- fessor of Greek (d. 1727), whose influence was far greater than thatof Chr. Cellarius (d. 1707), the founder of the first philological Seminar (1697). Francke’s contemporary, Chr. Thomasius (d. 1728), was never weary of attacking scholarship of the old humanistic type and everything that savoured of antiquarian pedantry, and it was mainly his influence that made German the language of university lectures and of scientific and learned literature. A modern education is also the aim of the general introduction to the nova methodus of Leibnitz, where the study of Greek is recommended solely for the sake of the Greek Testament (1666). Meanwhile, Ratichius (d. 1635) had in vain pretended to teach Hebrew, Greek and Latin in the space of six

months (161 2), but he had the merit of maintaining that the study of a language should begin with the study of an author. Comenius (d. 167 1) had proposed to teach Latin by drilling his

Herder.

pupils in a thousand graduated phrases distributed over a hundred instructive chapters, while the Latin authors were banished because of their difficulty and their ” paganism” (1631). One of the catchwords of the day was to insist on a knowledge of things instead of a knowledge of words, on ” real- ism ” instead of ” verbalism.”

Urder the influence of France the perfect courtier became the ideal in the German education of the upper classes of

the 17th and 18th centuries. A large number of akademien. aristocratic schools (Ritter- Akademien) were founded,

beginning with the Collegium Ulustre of Tubingen (1589) and ending with the Hohe Karlschule of Stuttgart (1775). In these schools the subjects of study included mathematics and natural sciences, geography and history, and modern languages (especially French), with riding, fencing and dancing; Latin assumed a subordinate place, and classical composition in prose or verse was not considered a sufficiently courtly accom- plishment. The youthful aristocracy were thus withdrawn from the old Latin schools of Germany, but the aristocratic schools vanished with the dawn of the 19th century, and the ordinary public schools were once more frequented by the young nobility.

(c) The Modern Period. — In the last third of the 18th century two important movements came into play, the ” naturalism ”

of Rousseau and the ” new humanism.” While The “new Rousseau ‘sought his ideal in a form of education and ism.” 01 culture that was in close accord with nature, the

German apostles of the new humanism were convinced that they had found that ideal completely realized in the old Greek world. Hence the aim of education was to make young people thoroughly ” Greek,” to fill them with the ” Greek ” spirit, with courage and keenness in the quest of truth, and with a devotion to all that was beautiful. The link

between the

naturalism of Rousseau and the new humanism is

to be found in J.G. Herder, whose passion for all that is Greek inspires him with almost a hatred of Latin. The new humanism was a kind of revival of the Renaissance, which had been retarded by the Reformation in Germany and by the Counter-Reformation in Italy, or had at least been degraded to the dull classicism of the schools. The new humanism agreed with the Renaissance in its unreserved recognition of the old classical world as a perfect pattern of culture. But, while the Renaissance aimed at reproducing the Augustan age of Rome, the new humanism found its golden age in Athens. The Latin Renaissance in Italy aimed at recovering and verbally imitating the ancient literature; the Greek Renaissance in Germany sought inspiration from the creative originality of Greek literature with a view to producing an original literature in the German language. The movement had its effect on the schools by discouraging the old classical routine of verbal imitation, and giving a new prominence to Greek and to German. The new humanism found a home in Gottingen (1783) in the days of J. M. Gesner and C. G. Heyne. It was represented at Leipzig by Gesner's successor, Ernesti (d. 1781); and at Halle by F. A. Wolf, who in 1783 was appointed professor of education by Zedlitz, the minister of Frederick the Great. In literature, its leading names were Winckelmann, Lessing and Voss, and Herder, Goethe and Schiller. The tide of the new movement had reached its height about 1800. Goethe and Schiller were con- vinced that the old Greek world was the highest revelation of humanity; and the universities and schools of Germany were reorganized in this spirit by F. A. Wolf and his illustrious pupil, Wilhelm von Humboldt. In 1809-1810 Humboldt was at the

head of the educational section of the Prussian Home

School office, and, in the brief interval of a year and a half, reorgaaiza* , , ...

Hon. gave to the general system of education the direction

which it followed (with slight exceptions) throughout

the whole century. In 1810 the examen pro facilitate docendi

first made the profession of a schoolmaster independent of that

of a minister of religion. The new scheme drawn up by J. W.

Siivern recognized four principal co-ordinated branches of

learning: Latin, Greek, German, mathematics. All four were

studied throughout the school, Greek being begun in the fourth of the nine classes, that corresponding to the English ” third form.” The old Latin school had only one main subject, the study of Latin style (combined with a modicum of Greek). The new gymnasium aimed at a wider education, in which literature was represented by Latin, Greek and German, by the side of mathematics and natural science, history and religion. The uniform employment of the term Gymnasium for the highest type of a Prussian school dates from 181 2. The leaving examination {Abgangsprufung) , instituted in that year, required Greek transla-. tion at sight, with Greek prose composition, and ability to speak and to write Latin. In 1818-1840 the leading spirit on the board of education was Johannes Schulze, and a complete and comprehensive system of education continued to be the ideal kept in view. Such an education, however, was found in practice to involve a prolongation of the years spent at school and a correspondingly later start in life. It was also attacked on the ground that it led to ” overwork.” This attack was partially met by the scheme of 1837. Schulze’s period of prominence in Berlin closely corresponded to that of Herbart at Konigsberg (1809-1833) and Gottingen (1833-1841), who insisted that for boys of eight to twelve there was no better text-book than the Greek Odyssey, and this principle was brought into practice at Hanover by his distinguished pupil, Ahrens.

The Prussian policy of the next period, beginning with the accession of Friedrich Wilhelm IV. in 1840, was to lay a new stress on religious teaching, and to obviate the risk of overwork resulting from the simultaneous study of all subjects by the encouragement of specialization in a few. Ludwig Wiese’s scheme of 1856 insisted on the retention of Latin verse as well as Latin prose, and showed less favour to natural science, but it awakened little enthusiasm, while the attempt to revive the old humanistic Gymnasium led to a demand for schools of a more modern type, which issued in the recognition of the Real- gymnasium (1859).

In the age of Bismarck, school policy in Prussia had for its aim an increasing recognition of modern requirements. In 1875 Wiese was succeeded by Bonitz, the eminent Aristotelian scholar, who in 1849 had introduced mathematics and natural science into the schools of Austria, and had substituted the wide reading of classical authors for the prevalent practice of speaking and writing Latin. By his scheme of 1882 natural science recovered its former position in Prussia, and the

hours assigned in each week to Latin were diminished from 86 to 77. But neither of the two great parties in the educational world was satisfied; and great expectations were aroused when the question of reform was taken up by the German emperor, William II., in 1890. The result of the conference of December 1890 was a compromise between the conservatism of a majority of its members and the forward policy of the emperor. The scheme of 1892 reduced the number of hours assigned to Latin from 77 to 62, and laid special stress on the German essay; but the modern training given by the Realgymnasium was still unrecognized as an avenue to a university education. A conference held in June 1900, in which the speakers included Mommsen and von Wilamowitz, Harnack and Diels, was followed by the ” Kiel Decree ” of the 26th of November. In that decree the emperor urged the equal recognition of the classical and the modern Gymnasium, and emphasized the importance of giving more time to Latin and to English in both. In the teaching of Greek, ” useless details ” were to be set aside, and special care devoted to the connexion between ancient and modern culture, while, in all subjects, attention was to be paid to the classic precept: multum, non multa.

By the scheme of 1901 the pupils of the Realgymnasium, the Oberrealschule and the Gymnasium were admitted to the uni- versity on equal terms in virtue of their leaving-certificates, but Greek and Latin were still required for students of classics or divinity.

For the Gymnasium the aim of the new scheme is, in Latin, ” to supply boys with a sound basis of grammatical training, with a view to their understanding the more important classical

writers of Rome, and being thus introduced to the intellectual life and culture of the ancient world “; and, in Greek, ” to give them a sufficient knowledge of the language with a view to their obtaining an acquaintance with some of the Greek classical Works which are distinguished both in matter and in style, and thus gaining an insight into the intellectual life and culture of Ancient Greece.” In consequence of these changes Greek is now studied by a smaller number of boys, but with better results, and a new lease of life has been won for the classical Gymnasium.

Lastly, by the side of the classical Gymnasium, we now have the ” German Reform Schools ” of two different types, that of Altona (dating

from 1878) and that of Frankfort-on-the-Main (1892). The leading principle in both is the postponement of the time for learning Latin. Schools of the Frankfort type take French as their only foreign language in the first three years of the course, and aim at achieving in six years as much as has been achieved by the Gymnasia in nine; and it is maintained that, in six years, they succeed in mastering a larger amount of Latin literature than was attempted a generation ago, even in the best Gymnasia of the old style. It may be added that in all the German Gymnasia, whether reformed or not, more time is given to classics than in the corresponding schools in England.

See F. Paulsen, Geschichte des gelehrten Unterrichts vom Ausgang its Mittelalters bis auf die Gegenwart mil besonderer Riicksicht auf den klassischen Unterricht (2 vols., 2nd ed., 1896); Das Realgym- nasium und die humanistische Bildung (1889) ; Die hoheren Schulen und das Universitatsstudium im 20. Jahrhundert (1901); “Das moderne Bildungswesen ” in Die Kulture der Gegenwart, vol. i. (1904) ; Das deutsche Bildungswesen in seiner gesckichtlichen Entwickelung (1906) (with the literature there quoted, pp. 190-192), translated by Dr T. Lorenz, German Education, Past and Present (1908); T. Ziegler, Notwendigkeit . . . des Realgymnasiums (Stuttgart, 1894); F. A. Eckstein, Lateinischer und griechischer Unterricht (1887); O. Kohl, “Griechischer Unterricht” (Langensalza, 1896) in W. Rein’s Handbuch; A. Baumeister’s Handbuch (1895), especi- ally vol. i. I (History) and i. 2 (Educational Systems) ; P. Stotzner, Das offentliche Unterrichtswesen Deutschlands in der Gegenwart (1901) ;

F. Seiler, Geschichte des deutschen Unterrichtswesens (2 vols., 1906) ; Verhandlungen of June 1900 (2nd ed., 1902); Lehrplane, &c. (1901); Die Reform des hoheren Schulwesens, ed. W. Lexis (1902) ; A. Harnack’s Vortrag and W. Parow’s Erwiderung (1905) ; H. Miiller, Das hohere Schulwesen Deutschlands am Anfang des 20. Jahrhunderts (Stuttgart, 1904) ; O. Steinbart, Durchfiihrung des preussischen Schulreform in ganz Deutschland (Duisburg, 1904) ; J. Schipper, Alte Bildung und moderne Cultur (Vienna, 1901); Papers by M. E. Sadler: (1) ” Problems in Prussian Secondary Education ” (Special Reports of Education Dept., 1899); (2) ” The Unrest in Secondary Education in Germany and Elsewhere ” (Special Reports of Board of Education, vol. 9, 1902); J. L. Paton, The Teaching of Classics in Prussian Secondary Schools (on “German Reform Schools”) (1907, Wyman, London) ; J. E. Russell, German Higher Schools (New York, 1899); and (among earlier English publications) Matthew Arnold’s Higher Schools and Universities in Germany (1874, reprinted from Schools and Universities on the Continent, 1865).

(4) In the United States of America the highest degree of educational development has been subsequent to the Civil War.

The study of Latin begins in the ” high schools,” the States. average age of admission being fifteen and the normal

course extending over four years. Among classical teachers an increasing number would prefer a longer course extending over six years for Latin, and at least three for Greek, and some of these would assign to the elementary school the first two of the proposed six years of Latin study. Others are content with the late learning of Latin and prefer that it should be preceded by a thorough study of modern languages (see Prof. B. I. Wheeler, in Baumeister’s Handbuch, 1897, ii. 2, pp. 584-586). It was mainly owing to a pamphlet issued in 1871 by Prof.

G. M. Lane, of Harvard, that a reformed pronunciation of Latin

was adopted in all the colleges and schools of the Latia United States. Some misgivings on this reform found

tiaa.” ‘ expression in a work on the Teaching of Latin, pub- lished by Prof. C. E. Bennett of Cornell in 1901, a year in which it was estimated that this pronunciation was in use by more than 96% of the Latin pupils in the secondary schools.

Some important statistics as to the number studying Latin and Greek in the secondary schools were collected in 1900 by a committee of twelve educational experts representing all parts of the Union, with a view to a uniform course of instruction being

pursued in all classical schools. They had the advantage of the co-operation of Dr W. T. Harris, the U.S. commissioner of education, and they were able to report that, in all the five groups into which they had divided the states, the number of pupils pursuing the study of Latin and Greek showed a remark- able advance, especially in the most progressive states of the middle west. The number learning Latin had increased from 100,144 in 1890 to 314,856 in 1899-1900, and those learning Greek from 1 2 ,869 to 24,869. Thus the number learning Latin at the later date was three times, and the number learning Greek twice, as many as those learning Latin or Greek ten years previously. But the total number in 1900 was 630,048; so that, notwithstanding this proof of progress, the number learning Greek in 1900 was only about one twenty-fifth of the total number, while the number learning Latin was as high as half.

The position of Greek as an ” elective ” or ” optional ” subject (notably at Harvard), an arrangement regarded with approval by some eminent educational authorities and with regret by others, probably has some effect on the high schools in the small number of those who learn Greek, and in their lower rate of increase, as compared with those who learn Latin. Some evidence as to the quality of the study of those languages in the schools is supplied by English commissioners in the Reports of the Mosely Com- mission. Thus Mr Papillon considered that, while the teaching of English literature was admirable, the average standard of Latin and Greek teaching and attainment in the upper classes was “below that of an English public school”; he felt, however, that the secondary schools of the United States had a ” greater variety of the curriculum to suit the practical needs of life,” and that they existed, not ” for the select few,” but ” for the whole people ” (pp. 250 f.).

For full information see the ” Two volumes of Monographs prepared for the United States Educational Exhibit at the Paris Exposition of 1900,” edited by Dr N. Murray Butler; the Annual Reports of the U.S. commissioner of education (Washington) ; and the Reports of the Mosely Commission to the United States of America (London, 1904). Cf. statistics quoted in G. G. Ramsay’s ” Address on Efficiency in Education ” (Glasgow, 1902, 17-20), from the Transactions of the Amer. Philol. Association, xxx. (1899), pp. Ixxvii-cxxii ; also Bennett and Bristol, The Teaching of Latin and Greek in the Secondary School (New York, 1901). (J. E. S.*)

CLASSIFICATION (Lat. classis, a class, probably from the root col-, da-, as in Gr. KixAeco, clamor), a logical process, common to all the special sciences and to knowledge in general, consisting in the collection under a common name of a number of objects which are alike in one or more respects. The process consists in observing the objects and abstracting from their various qualities that characteristic which they have in common. This characteristic constitutes the definition of the ” class ” to which they are regarded as belonging . It is this process by which we arrive first at “species” and then at “genus,” i.e. at all scientific generalization. Individual things, regarded as such, constitute a mere aggregate, unconnected with one another, and so far unexplained; scientific knowledge consists in systematic classi- fication. Thus if we observe the heavenly bodies individually we can state merely that they have been observed to have certain motions through the sky, that they are luminous, and the like. If, however, we compare them one with another, we discover that, whereas all partake in the general movement of the heavens, some have a movement of their own. Thus we arrive at a system of

classification according to motion, by which fixed stars are differentiated from planets. A further classification according to other criteria gives us stars of the first magnitude and stars of the second magnitude, and so forth. We thus arrive at a systematic understanding expressed in laws by the application of which accurate forecasts of celestial phenomena can be made. Classification in the strict logical sense consists in discovering the casual interrelation of natural objects; it thus differs from what is often called ” artificial ” classification, which is the preparation, e.g. of statistics for particular purposes, adminis- trative and the like.

Of the systems of classification adopted in physical science, only one requires treatment here, namely, the classification of

the sciences as a whole, a problem which has from the time of Aristotle attracted considerable attention. Its object is to delimit the spheres of influence of the positive sciences and show how they are mutually related. Of such attempts three are specially noteworthy, those of Francis Bacon, Auguste Comte and Herbert Spencer.

Bacon’s classification is based on the subjective criterion of the various faculties which are specially concerned. He thus distinguished History (natural, civil, literary, ecclesiastical) as the province of memory, Philosophy (including Theology) as that of reason, and Poetry, Fables and the like, as that of imagination. This classification was made the basis of the Encyclopedic Comte adopted an entirely different system based on an objective criterion. Having first enunciated the theory that all science passes through three stages, theological, meta- physical and positive, he neglects the two first, and divides the last according to the ” things to be classified,” in view of their real affinity and natural connexions, into six, in order of decreas- ing generality and increasing complexity— mathematics, astro- nomy, physics, chemistry, physiology and biology (including psychology), and sociology. This he conceives to be not only the logical, but also the historical, order of development, from the abstract and purely deductive to the concrete and inductive). Sociology is thus the highest, most complex, and most positive of the sciences. Herbert Spencer, condemning this division as both incomplete and theoretically unsound, adopted a three-fold division into (1) abstract science (including logic and mathematics) dealing with the universal forms under which all knowledge of phenomena is possible, (2)

abstract-concrete science (including mechanics, chemistry, physics), dealing with the elements of phenomena themselves, i.e. laws of forces as deducible from the persistence of forces, and (3) concrete science (e.g. astronomy, biology, sociology), dealing with “phenomena themselves in their totalities,” the universal laws of the continuous redistribu- tion of Matter and Motion, Evolution and Dissolution.

Beside the above three systems several others deserve brief mention. In Greece at the dawn of systematic thought the physical sciences were few in number; none the less philosophers were not agreed as to their true relation. The Platonic school adopted a triple classification, physics, ethics and dialectics; Aristotle’s system was more complicated, nor do we know precisely how he subdivided his three main classes, theoretical, practical and poetical (i.e. technical, having to do with iroirjois, creative). The second class covered ethics and politics, the latter of which was often regarded by Aristotle as including ethics; the third includes the useful and the imitative sciences; the first includes metaphysics and physics. As regards pure logic Aristotle sometimes seems to include it with metaphysics and physics, sometimes to regard it as ancillary to all the sciences.

Thomas Hobbes (Leviathan) drew up an elaborate paradigm of the sciences, the first stage of which was a dichotomy into ” Naturall Philosophy ” (” consequences from the accidents of bodies naturall “) and ” Politiques and Civill Philosophy ” (” consequences from accidents of Politique bodies “). The former by successive subdivisions is reduced to eighteen special sciences; the latter is subdivided into the rights and duties of sovereign powers, and those of the subject.

Jeremy Bentham and A. M. Ampere both drew up elaborate systems based on the principle of dichotomy, and beginning from the distinction of mind and body. Bentham invented an artificial terminology which is rather curious than valuable. The science of the body was Somatology, that of the mind Pneu- matology. The former include Posology (science of quantity, mathematics) and Poiology (science of quality); Posology includes Morphoscopic (geometry) and Alegomorphic(arithmetic). See further Bentham’s Chrestomathia and works quoted under Bentham, Jeremy.

Carl Wundt criticized most of these systems as taking too little account of the real facts, and preferred a classification based on the standpoint of the various sciences towards their subject- matter. His system may, therefore, be described as conceptional. It distinguishes philosophy, which deals with facts in their widest

universal relations, from the special sciences, which consider facts in the light of a particular relation or set of relations.

All these systems have a certain value, and are interesting as throwing light on the views of those who invented them. It will be seen, however, that none can lay claim to unique validity. The fundamenla divisionis, though in themselves more or less logical, are quite arbitrarily chosen, generally as being germane to a preconceived philosophical or scientific theory.

CLASTIDIUM (mod. Casteggio), a village of the Anamares, in Gallia Cispadana, on the Via Postumia, 5 rn. E. of Iria (mod. Voghera) and 31 m. W. of Placentia. Here in 222 B.C. M. Claudius Marcellus defeated the Gauls and won the spolia opima; in 218 Hannibal took it and its stores of corn by treachery. It never had an independent government, and not later than 190 B.C. was made part of the colony of Placentia (founded 219). In the Augustan division of Italy, however, Placentia belonged to the 8th region, Aemilia, whereas Iria certainly, and Clastidium possibly, belonged to the oth, Liguria (see Th. Mommsen in Corp. Inscrip. Lat. vol. v. Berlin, 1877, p. 828). The remains visible at Clastidium are scanty; there is a fountain (the Fontana d'Annibale), and a Roman bridge, which seems .to have been constructed of tiles, not of stone, was discovered in 1857, but destroyed.

See C. Giulietti, Casteggio, notizie storiche II. Avanzi di antichitd. (Voghera, 1893).

CLAUBERG, JOHANN (1622-1665), German philosopher, was born at Solingen, in Westphalia, on the 24th of February 1622. After travelling in France and England, he studied the Cartesian philosophy under John Raey at Leiden. He became (T649) professor of philosophy and theology at Herborn, but subsequently (1651), in consequence of the jealousy of his colleagues, accepted an invitation to a similar post at Duisburg, where he died on the 31st of January 1665. Clauberg was one of the earliest teachers of the new doctrines in Germany and an exact and methodical commentator on his master's writings. His theory of the connexion between the soul and the body is in some respects analogous to that of Malebranche; but he is not therefore to be regarded as a true forerunner of Occasionalism, as he uses " Occasion " for the stimulus which directly produces a mental phenomenon, without postulating the intervention of God (H. Muller, /. Clauberg und seine Stellung im Cartesia- nismus). His view of the relation of God to his creatures is held to foreshadow the pantheism of Spinoza. All creatures exist only through the continuous creative

energy of the Divine Being, and are no more independent of his will than are our thoughts independent of us, — or rather less, for there are thoughts which force themselves upon us whether we will or not. For metaphysics Clauberg suggested the names ontosophy or ontology, the latter being afterwards adopted by Wolff. He also devoted considerable attention to the German languages, and his re- searches in this direction attracted the favourable notice of Leibnitz. His chief works are: De conjunctione animae et corporis humani; Exercitationes centum de cognitione Dei et nostri; Logica vetus et nova; Initiatio philosophi, seu Dubitatio Cartesiana; a commentary on Descartes' Meditations; and Ars etymologica Teutonum.

A collected edition of his philosophical works was published at Amsterdam (1691), with life by H. C. Hennin; see also E. Zeller, Geschichte der deutschen Philosophic seit Leibnitz (1873).

CLAUDE, JEAN (1619-1687), French Protestant divine, was born at La Sauvetat-du-Dropt near Agen. After studying at Montauban, he entered the ministry in 1645. He was for eight years professor of theology in the Protestant college of Nimes; but in 1661, having successfully opposed a scheme for re-uniting Catholics and Protestants, he was forbidden to preach in Lower Languedoc. In 1662 he obtained a post at Montauban similar to that which he had lost; but after four years he was removed from this also. He next became pastor at Charenton near Paris, where he engaged in controversies with Pierre Nicole (Reponse aux deux traitis intitules la perpetuite de la foi, 1665), Antoine Arnauld (Reponse au lime de M. Arnauld, 1670), and J. B. Bossuet (Reponse au livre de M. I'eveque de Meaux, 1683).

On the revocation of the edict of Nantes he fled to Holland, and received a pension from William of Orange, who commissioned him to write an account of the persecuted Huguenots (Plaintes des protestants cruellement opprimSs dans le royaume de France, 1686). The book was translated into English, but by order of James II. both the translation and the original were publicly burnt by the common hangman on the 5th of May 1686, as containing " expressions scandalous to His Majesty the king of France." Other works by him were Reponse au livre de P. Nouet sur V eucharistie (1668); (Euvres posthumes (Amsterdam, 1688), containing the Traite de la composition d'un sermon, translated into English in 1778.

See biographies by J. P. Niceron and Abel Rotholf de la Deveze; E. Haag, La France protestante, vol. iv. (1884, new edition).

CLAUDE OF LORRAINE, or Claude Gelee (1600-1682), French landscape-painter, was born of very poor parents at the village of Chamagne in Lorraine. When it was discovered that he made no progress at school, he was apprenticed, it is commonly said, to a pastry-cook, but this is extremely dubious. At the age of twelve, being left an orphan, he went to live at Freiburg on the Rhine with an elder brother, Jean Gelee, a wood-carver of moderate merit, and under him he designed arabesques and foliage. He afterwards rambled to Rome to seek a livelihood; but from his clownishness and ignorance of the language, he failed to obtain permanent employment. He next went to Naples, to study landscape painting under Godfrey Waals, a painter of much repute. With him he remained two years; then he returned to Rome, and was domesticated until April 1625 with another landscape-painter, Augustin Tassi, who hired him to grind his colours and to do all the household drudgery.

His master, hoping to make Claude serviceable in some of his greatest works, advanced him in the rules of perspective and the elements of design. Under his tuition the mind of Claude began to expand, and he devoted himself to artistic study with great eagerness. He exerted his utmost industry to explore the true principles of painting by an incessant examination of nature; and for this purpose he made his studies in the open fields, where he very frequently remained from sunrise till sunset, watching the effect of the shifting light upon the landscape. He generally sketched whatever he thought beautiful or striking, marking every tinge of light with a similar colour; from these sketches he perfected his landscapes. Leaving Tassi, he made a tour in Italy, France and a part of Germany, including his native Lorraine, suffering numerous misadventures by the way. Karl Dervent, painter to the duke of Lorraine, kept him as assistant for a year; and he painted at Nancy the architectural subjects on the ceiling of the Carmelite church. He did not, however, relish this employment, and in 1627 returned to Rome. Here, painting two landscapes for Cardinal Bentivoglio, he earned the protection of Pope Urban VIII. and from about 1637 he rapidly rose into celebrity. Claude was acquainted not only with the facts, but also with the laws of nature; and the German painter Joachim von Sandrart relates that he used to explain, as they walked together through the fields, the causes of the different appearances of the same landscape at different hours of the day, from the reflections or refractions of light, or from the morning and evening dews or vapours, with all the precision of a natural philosopher. He elaborated his pictures with great care; and if any performance fell

short of his ideal, he .altered, erased and repainted it several times over.

His skies are aerial and full of lustre, and every object har- moniously illumined. His distances and colouring are delicate, and his tints have a sweetness and variety till then unexampled. He frequently gave an uncommon tenderness to his finished trees by glazing. His figures, however, are very indifferent; but he was so conscious of his deficiency in this respect, that he usually engaged other artists to paint them for him, among whom were Courtois and Filippo Lauri. Indeed, he was wont to say that he sold his landscapes and gave away his figures. In order to avoid a repetition of the same subject, and also to detect the very numerous spurious copies of his works, he made tinted outline drawings (in six paper books prepared for this purpose) of all

those pictures which were transmitted to different countries; and on the back of each drawing he wrote the name of the purchaser. These books he named Libri di verita. This valuable work(now belonging to the duke of Devonshire) has been engraved and published, and has always been highly esteemed by students of the art of landscape. Claude, who had suffered much from gout, died in Rome at the age of eighty-two, on the 21st (or perhaps the 23rd) of November 1682, leaving his wealth, which was considerable, between his only surviving relatives, a nephew and an adopted daughter (? niece).

Many choice specimens of his genius may be seen in the National Gallery and in the Louvre; the landscapes in the Altieri and Colonna palaces in Rome are also of especial celebrity. A list has been printed showing no less than 92 examples in the various public galleries of Europe. He himself regarded a land- scape which he painted in the Villa Madama, being a cento of various views with great abundance and variety of leafage, and a composition of Esther and Ahasuerus, as his finest works; the former he refused to sell, although Clement IX. offered to cover its surface with gold pieces. He etched a series of twenty-eight landscapes, fine impressions of which are greatly prized. Full of amenity, and deeply sensitive to the graces of nature, Claude was long deemed the prince of landscape painters, and he must always be accounted a prime leader in that form of art, and in his day a great enlarger and refiner of its province.

Claude was a man of amiable and simple character, very kind to his pupils, a patient and unwearied worker; in his own sphere of study, his mind was stored (as we have seen) with observation and knowledge, but he continued an unlettered man till his death. Famous

and highly patronized though he was in all his later years, he seems to have been very little known to his brother artists, with the single exception of Sandrart. This painter is the chief direct authority for the facts of Claude's life (Academia Artis Pictoriae, 1683); Baldinucci, who obtained information from some of Claude's immediate survivors, relates various incidents to a different effect (Notizie dei professori del disegno) .

See also Victor Cousin, Sur Claude GeUe (1853) ; M. F. Sweetser, Claude Lorrain (1878); Lady Dilke, Claude Lorrain (1884).

(W. M. R.)

CLAUDET, ANTOINE FRANCOIS JEAN (1797-1867), French photographer, was born at Lyons on the 12th of August 1797. Having acquired a share in L. J. M. Daguerre's invention, he was one of the first to practise daguerreotype portraiture in England, and he improved the sensitizing process by using chlorine in addition to iodine, thus gaining greater rapidity of action. In 1848 he produced the photographometer, an instrument designed to measure the intensity of photogenic rays; and in 1849 he brought out the focimeter, for securing a perfect focus in photo- graphic portraiture. He was elected a fellow of the Royal Society in 1853, and in 1858 he produced the stereomonoscope, in reply to a challenge from Sir David Brewster. He died in London on the 27th of December 1867.

CLAUDIANUS, CLAUDIUS, Latin epic poet and panegyrist, flourished during the reign of Arcadius and Honorius. He was an Egyptian by birth, probably an Alexandrian, but it may be conjectured from his name and his mastery of Latin that he was of Roman extraction. His own authority has been assumed for the assertion that his first poetical Compositions were in Greek, and that he had written nothing in Latin before a.d. 395; but this seems improbable, and the passage (Carm. Min. xli. 13) which is taken to prove it does not necessarily bear this meaning. In that year he appears to have come to Rome, and made his debut as a Latin poet by a panegyric on the consulship of Olybrius and Probinus, the first brothers not belonging to the imperial family who had ever simultaneously filled the office of consul. This piece proved the precursor of the series of panegyrical poems which compose the bulk of his writings. In Birt's edition a complete chronological list of Claudian's poems is given, and also in J. B. Bury's edition of Gibbon (iii. app. i. p. 485), where the dates given differ slightly from those in the present article.

In 396 appeared the encomium on the third consulship of the emperor

Honorius, and the epic on the downfall of Rufinus, the

unworthy minister of Arcadius at Constantinople. This revolu- tion was principally effected by the contrivance of Stilicho, the great general and minister of Honorius. Claudian's poem appears to have obtained his patronage, or rather perhaps that of his wife Serena, by whose interposition the poet was within a year or two enabled to contract a wealthy marriage in Africa {Epist. 2). Previously to this event he had produced (398) his panegyric on the fourth consulship of Honorius, his epithalamium on the marriage of Honorius to Stilicho's daughter, Maria, and his poem on the Gildonic war, celebrating the repression of a revolt in Africa. To these succeeded his piece on the consulship of Manlius Theodorus (399), the unfinished or mutilated invective against the Byzantine prime minister Eutropius in the same year, the epics on Stilicho's first consulship and on his repulse of Alaric (400 and 403), and the panegyric on the sixth consulship of Honorius (404). From this time all trace of Claudian is lost, and he is generally supposed to have perished with his patron Stilicho in 408. It may be conjectured that he must have died in 404, as he could hardly otherwise have omitted to celebrate the greatest of Stilicho's achievements, the destruction of the barbarian host led by Radagaisus in the following year. On the other hand, he may have survived Stilicho, as in the dedication to the second book of his epic on the Rape of Proserpine (which Birt, however, assigns to 395-397), he speaks of his disuse of poetry in terms hardly reconcilable with the fertility which he displayed during his patron's lifetime. From the manner in which Augustine alludes to him in his De civilate Dei, it may be inferred that he was no longer living at the date of the composition of that work, between 415 and 428.

Besides Claudian's chief poems, his lively Fescennines on the emperor's marriage, his panegyric on Serena, and the Giganlo-machia, a fragment of an unfinished Greek epic, may also be mentioned. Several poems expressing Christian sentiments are undoubtedly spurious. Claudian's paganism, however, neither prevented his celebrating Christian rulers and magistrates nor his enjoying the distinction of a court laureate. It is probable that he was nominally a Christian, like his patron Stilicho and Ausonius, although at heart attached to the old religion. The very decided statements of Orosius and Augustine as to his heathenism may be explained by the pagan style of Claudian's political poems. We have his own authority

for his having been honoured by a bronze statue in the forum, and Pomponius Laetus discovered in the 15th century an inscription (C.I.L. vi. 1710) on the pedestal, which, formerly considered spurious, is now generally regarded as genuine.

The position of Claudian — the last of the Roman poets — is unique in literature. It is sufficiently remarkable that, after nearly three centuries of torpor, the Latin muse should have experienced any revival in the age of Honorius, nothing less than amazing that this revival should have been the work of a foreigner, most surprising of all that a just and enduring celebrity should have been gained by official panegyrics on the generally un- interesting transactions of an inglorious epoch. The first of these particulars bespeaks Claudian's taste, rising superior to the prevailing barbarism, the second his command of language, the third his rhetorical skill. As remarked by Gibbon, " he was endowed with the rare and precious talent of raising the meanest, of adorning the most barren, and of diversifying the most similar topics." This gift is especially displayed in his poem on the downfall of Rufinus, where the punishment of a public male- factor is exalted to the dignity of an epical subject by the magnificence of diction and the ostentation of supernatural machinery. The noble exordium, in which the fate of Rufinus is propounded as the vindication of divine justice, places the subject at once on a dignified level; and the council of the infernal powers has afforded a hint to Tasso, and through him to Milton. The inevitable monotony of the panegyrics on Honorius is relieved by just and brilliant expatiation on the duties of a sovereign. In his celebration of Stilicho's victories Claudian found a subject more worthy of his powers, and some passages, such as the description of the flight of Alaric, and of Stilicho's arrival at Rome, and the felicitous parallel between his triumphs

and those of Marius, rank among the brightest ornaments of Latin poetry. Ckwdian's panegyric, however lavish and regardless of veracity, is in general far less offensive than usual in his age, a circumstance attributable partly to his more refined taste and partly to the genuine merit of his patron Stilicho. He is a valuable authority for the history of his times, and is rarely to be convicted of serious inaccuracy in his facts, whatever may be thought of the colouring he chooses to impart to them. He was animated by true patriotic feeling, in the shape of a reverence for Rome as the source and symbol of law, order and civilization. Outside the sphere of actual life he is less successful ; his Rape of Proserpine, though the beauties of detail are as great as usual, betrays his deficiency in the creative power requisite for dealing with a purely ideal subject. This denotes the rhetorician

rather than the poet, and in general it may be said that his especial gifts of vivid natural description, and of copious illustration, derived from extensive but not cumbrous erudition, are fully as appropriate to eloquence as to poetry. In the general cast of his mind and character of his writings, and especially, in his faculty for bestowing enduring interest upon occasional themes, we may fitly compare him with Dryden, remembering that while Dryden exulted in the energy of a vigorous and fast-developing language, Claudian was cramped by an artificial diction, confined to the literary class.

The editio princeps of Claudian was printed at Vicenza in 1482; the editions of J. M. Gesner (1759) and P. Burmann (1760) are still valuable for their notes, The first critical edition was that of L. Jeep (1876-1879), now superseded by the exhaustive work of T. Birt, with bibliography, in Monumenta Germaniae Historica (x., 1892; smaller ed. founded on this by J. Koch, Teubner series, 1893). There is a separate edition with commentary and verse translation of // Ratto di Prosperpina, by L. Garces de Diez (1889) ; the satire In Eutropium is discussed by T. Birt in Zwei politische Satiren des a'ten Rom (1888). There is a complete English verse translation of little merit by A. Hawkins (181.7). See the articles by Ramsay in Smith's Classical Dictionary and Vollmer in Pauly-Wissowa's Realencyclo- pddie der classischen Altertumswissenschaft, iii. 2 (1899) ; also J. H. E. Crees, Claudian as an Historian (1908), the " Cambridge Historical Essay" for 1906 (No. 17) ; T. Hodgkin, Claudian, the last of the Roman Poets (1875).

CLAUDIUS [Tiberius Claudius Drusus Nero Germanicus], Roman emperor a.d. 41-54, son of Drusus and Antonia, nephew of the emperor Tiberius, and grandson of Livia, the wife of Augustus, was born at Lugdunum (Lyons) on the 1st of August 10 B.C. During his boyhood he was treated with contempt, owing to his weak and timid character and his natural infirmities; the fact that he was regarded as little better than an imbecile saved him from death at the hands of Caligula. He chiefly devoted himself to literature, especially history, and until his accession he took no real part in public affairs, though Caligula honoured him with the dignity of consul. He was four times married: to Plautia Urgulanilla, whom he divorced because he suspected her of designs against his life; to Aelia Petina, also divorced; to the infamous Valeria Messallina (q.v.); and to his niece Agrippina.

In a.d. 41, on the murder of Caligula, Claudius was seized by the praetorians, and declared emperor. The senate, which had entertained the idea of restoring the republic, was obliged to acquiesce. One of Claudius's first acts was to proclaim an amnesty for all except Cassius

Chaerea, the assassin of his pre- decessor, and one or two others. After the discovery of a conspiracy against his life in 42, he fell completely under the influence of Messallina and his favourite freedmen Pallas and Narcissus, who must be held responsible for acts of cruelty which have brought undeserved odium upon the emperor. There is no doubt that Claudius was a liberal-minded man of kindly nature, anxious for the welfare of his people. Humane regulations were made in regard to freedmen, slaves, widows and orphans; the police system was admirably organized; commerce was put on a sound footing; the provinces were governed in a spirit of liberality; the rights of citizens and admission to the senate were extended to communities outside Italy. The speech of Claudius delivered (in the year 48) in the senate in support of the petition of the Aeduans that their senators should have the jus petendorum honorum (claim of

admission to the senate and magistracies) at Rome has been partly preserved on the fragment of a bronze tablet found at Lyons in 1524; an imperial edict concerning the citizenship of the Anaunians (15th of March 46) was found in the southern Tirol in 1869 (C.I.L. v. 5050). Claudius was especially fond of building. He completed the great aqueduct (Aqua Claudia) begun by Caligula, drained the Lacus Fucinus, and built the harbour of Ostia. Nor were his military operations unsuccessful. Mauretania was made a Roman province; the conquest of Britain was begun; his distinguished general Domitius Corbulo (q.v.) gained considerable successes in Germany and the East. The intrigues of Narcissus caused Messallina to be put to death by order of Claudius, who took as his fourth wife his niece Agrippina, a woman as criminal as any of her predecessors. She prevailed upon him to set aside his own son Britannicus in favour of Nero, her son by a former marriage; and in 54, to make Nero's position secure, she put the emperor to death by poison . The apotheosis of Claudius was the subject of a lampoon by Seneca called apokolokyntosis, the " pumpkinification " of Claudius.

Claudius was a prolific writer, chiefly on history, but his works are lost. He wrote (in Greek) a history of Carthage and a history of Etruria: (in Latin) a history of Rome from the death of Caesar, an autobiography, and an essay in defence of Cicero against the attacks of Asinius Gallus. He also introduced three new letters into the Latin alphabet: J for the consonantal V,) for BS and PS, ˆ for the intermediate sound between I and U.

Authorities. — Ancient: the Annals of Tacitus, Suetonius and Dio Cassius. Modern : H. Lehmann, Claudius und seine Zeit, with introductory chapter on the ancient authorities (1858); Lucien Double, L Empereur Claude (1876); A. Ziegler, Die politische Seite der Regierung des Kaisers Claudius (1885) ; H. F. Pelham in Quarterly Review (April 1905), where certain administrative and political changes introduced by Claudius, for which he was attacked by his contemporaries, are discussed and defended; Merivale, Hist, of the Romans under the Empire, chs. 49, 50; H. Schiller, Geschichte der romischen Kaiserzeit, i., pt. I ; H. Furneaux's ed. of the Annals of Tacitus (introduction).

CLAUDIUS, the name of a famous Roman gens. The by-form Clodius, in its origin a mere orthographical variant, was regularly used for certain Claudii in late republican times, but otherwise the two forms were used indifferently. The gens contained a patrician and a plebeian family; the chief representatives of the former were the Pulchri, of the latter the Marcelli (see Marcellus). The following members of the gens deserve particular mention.

1. Appius Sabinus Inregillensis, or Regillensis, Claudius, so called from Regillum (or Regilli) in Sabine territory, founder of the Claudian gens. His original name was Attus or Attius Clausus. About 504 B.C. he settled in Rome, where he and his followers formed a tribe. In 495 he was consul, and his cruel enforcement of the laws of debtor and creditor, in opposition to his milder colleague, P. Servilius Priscus, was one of the chief causes of the " secession " of the plebs to the Sacred Mount. On several occasions he displayed his hatred of the people, although it is stated that he subsequently played the part of mediator.

Suetonius, Tiberius, i.; Livy ii. 16-29; Dion. Halic. v. 40, vi.

23. 24.

2. Claudius, Appius, surnamed Crassus, a Roman patrician, consul in 471 and 451 B.C., and in the same and following year one of the decemvirs. At first he was conspicuous for his aristocratic pride and bitter hatred of the plebeians. Twice they refused to fight under him, and fled before their enemies. He retaliated by decimating the army. He was banished, but soon returned, and again became consul. In the same year (451) he was made one of the decemviri who had been appointed to draw up a code of written laws. When it was decided to elect decemvirs for another year, he who had formerly been looked upon as the champion of the aristocracy, suddenly came forward as

the friend of the people, and was himself re-elected together with several plebeians. But no sooner was the new body in office, than it treated both patricians and plebeians with equal violence, and refused to resign at the end of the year. Matters

were brought to a crisis by the affair of Virginia. Enamoured of the beautiful daughter of the plebeian centurion Virginius, Claudius attempted to seize her by an abuse of justice. One of his clients, Marcus Claudius, swore that she was the child of a slave belonging to him, and had been stolen by the childless wife of the centurion. Virginius was summoned from the army, and on the day of trial was present to expose the conspiracy. Nevertheless, judgment was given according to the evidence of Marcus, and Claudius commanded Virginia to be given up to him. In despair, her father seized a knife from a neighbouring stall and plunged it in her side. A general insurrection was the result; and the people seceded to the Sacred Mount. The decemvirs were finally compelled to resign and Appius Claudius died in prison, either by his own hand or by that of the execu- tioner. For a discussion of the character of Appius Claudius, see Mommsen's appendix to vol. i. of his History of Rome. He holds that Claudius was never the leader of the patrician party, but a patrician demagogue who ended by becoming a tyrant to patricians as well as plebeians. The decemvirate, one of the triumphs of the plebs, could hardly have been abolished by that body, but would naturally have been overthrown by the patricians. The revolution which ruined Claudius was a return to the rule of the patricians represented by the Horatii and Valerii. Livy iii. 32-58 ; Dion. Halic. x. 59, xi. 3.

3. Claudius, Appius, surnamed Caecus, Roman patrician and author. In3i2B. c. he waselected censor without having passed through the office of consul. His censorship — which he retained for five years, in spite of the lex Aemilia which limited the tenure of that office to eighteen months — was remarkable for the actual or attempted achievement of several great constitutional changes. He filled vacancies in the senate with men of low birth, in some cases even the sons of freedmen (Diod. Sic. xx. 36; Livy ix. 30; Suetonius, Claudius, 24). His most important political innovation was the abolition of the old free birth, ' freehold basis of suffrage. He enrolled the freedmen and landless citizens both in the centuries and in the tribes, and, instead of assigning them to the four urban tribes, he distributed them through all the tribes and thus gave them practical control of the elections. In 304, however, Q. Fabius Rullianus limited the landless and poorer freedmen to the four urban tribes, thus annulling the effect of Claudius's arrangement. Appius Claudius transferred the charge of the public worship of Hercules in the Forum Boarium from the

Potitian gens to a number of public slaves. He further invaded the exclusive rights of the patricians by directing his secretary Gnaeus Flavius (whom, though a freedman, he made a senator) to publish the legis actiones (methods of legal practice) and the list of dies fasti (or days on which legal business could be trans- acted) . Lastly, he gained enduring fame by the construction of a road and an aqueduct, which — a thing unheard of before — he called by his own name (Livy ix. 29; Frontinus, De Aquis, 115; Diod. Sic. xx. 36). In 307 he was elected consul for the first time. In 298 he was interrex; in 296, as consul, he led the army in Samnium, and although, with his colleague, he gained a victory over the Etruscans and Samnites, he does not seem to have specially distinguished himself as a soldier (Livy x. 19). Next year he was praetor, and he was once dictator. His character, like his namesake the decemvir's is not easy to define. In spite of his political reforms, he opposed the admission of the plebeians to the consulship and priestly offices; and, although these reforms might appear to be democratic in character and calculated to give preponderance to the lowest class of the people, his probable aim was to strengthen the power of the magistrates (and lessen that of the senate) by founding it on the popular will, which would find its expression in the urban inhabitants and could be most easily influenced by the magistrate. He was already blind and too feeble to walk, when Cineas, the minister of Pyrrhus, visited him, but so vigorously did he oppose every concession that all the eloquence of Cineas was in vain, and the Romans forgot past misfortunes in the inspiration of Claudius's patriotism (Livy x. 13; Justin xviii. 2; Plutarch, Pyrrhus, 19). The story of his blindness, however, may be merely a method of

accounting for his cognomen. Tradition regarded it as the punishment of his transference of the cult of Hercules from the Potitii.

Appius Claudius Caecus is also remarkable as the first writer mentioned in Roman literature. His speech against peace with Pyrrhus was the first that was transmitted to writing, and thereby laid the foundation of prose composition. He was the author of a collection of aphorisms in verse mentioned by Cicero (of which a few fragments remain), and of a legal work entitled De Usurpa- tionibus. It is very likely also that he was concerned in the drawing up of the Legis Actiones published by Flavius. The famous dictum " Every man is the architect of his own fortune " is attributed to him. He also interested himself in grammatical questions, distinguished the two sounds R and

S in writing, and .did away with the letter Z.

See Mommsen's appendix to his Roman History (vol. i.) ; treatises by W. Siebert (1863) and F. D. Gerlach (1872), dealing especially with the censorship of Claudius.

4. Claudius, Publius, surnamed Pulcher, son of (3). He was the first of the gens who bore this surname. In 249 he was consul and appointed to the command of the fleet in the first Punic War. Instead of continuing the siege of Lilybaeum, he decided to attack the Carthaginians in the harbour of Drepanum, and was completely defeated. The disaster was commonly attributed to Claudius's treatment of the sacred chickens, which refused to eat before the battle. " Let them drink then," said the consul, and ordered them to be thrown into the sea. Having been recalled and ordered to appoint a dictator, he gave another instance of his high-handedness by nominating a subordinate official, M. Claudius Glicia, but the nomination was at once over- ruled. Claudius himself was accused of high treason and heavily fined. He must have died before 246, in which year his sister Claudia was fined for publicly expressing a wish that her brother Publius could rise from the grave to lose a second fleet and thereby diminish the number of the people. It is supposed that he committed suicide.

Livy, Epit., 19; Polybius i. 49; Cicero, De Divinatione, i. 16, ii. 8; Valerius Maximus i. 4, viii. I.

5. Claudius, Appius, surnamed Pulcher, Roman statesman and author. He served under his brother-in-law Lucullus in Asia (72 B.C.) and was commissioned to deliver the ultimatum to Tigranes, which gave him the choice of war with Rome or the surrender of Mithradates. In 57 he was praetor, in 56 pro- praetor in Sardinia, and in 54 consul with L. Domitius Aheno- barbus. ' Through the intervention of Pompey, he became reconciled to Cicero, who had been greatly offended because Claudius had indirectly opposed his return from exile. In this and certain other transactions Claudius seems to have acted from avaricious motives, — a result of his early poverty. In 53 he entered upon the governorship of Cilicia, in which capacity he seems to have been rapacious and tyrannical. During this period he carried on a correspondence with Cicero, whose letters to him form the third book of the Epistolae ad Familiares. Claudius resented the appointment of Cicero as his successor, avoided meeting him, and even issued orders after his arrival in the province. On his return to Rome Claudius was impeached by P. Cornelius Dolabella on the ground of having violated the sovereign rights of the people. This led him to make advances to

Cicero, since it was necessary to obtain witnesses in his favour from his old province. He was acquitted, and a charge of bribery against him also proved unsuccessful. In 50 he was censor, and expelled many of the members of the senate, amongst them the historian Sallust on the ground of immorality. His connexion with Pompey brought upon him the enmity of Caesar, at whose march on Rome he fled from Italy. Having been appointed by Pompey to the command in Greece, in obedience to an ambiguous oracle he crossed over to Euboea, where he died about 48, before the battle of Pharsalus. Claudius was of a distinctly religious turn of mind, as is shown by the interest he took in sacred buildings (the temple at Eleusis, the sanctuary of Amphiaraus at Oropus). He wrote a work on augury, the first book of which he dedicated to Cicero. He was also extremely

superstitious, and believed in invocations of the dead. Cicero had a high opinion of his intellectual powers, and considered him a great orator (see Orelli, Onomasticon Tullianum) .

A full account of all the Claudii will be found in Pauly-Wissowa's Realencyclopddie der classischen Altertumswissenschaft, iii. 2 (1899).

CLAUDIUS, MARCUS AURELIUS, surnamed Gothicus, Roman emperor a.d. 268-270, belonged to an obscure Illyrian family. On account of his military ability he was placed in command of an army by Decius; and Valerian appointed him general on the Illyrian frontier, and ruler of the provinces of the lower Danube. During the reign of Gallienus, he was called to Italy in order to crush Aureolus; and on the death of the emperor (268) he was chosen as his successor, in accordance, it was said, with his express desire. Shortly after his accession he routed the Alamanni on the Lacus Benacus (some doubt is thrown upon this); in 269 a great victory over the Goths at Naissus in Moesia gained him the title of Gothicus. In the following year he died of the plague at Sirmium, in his fifty- sixth year. He enjoyed great popularity, and appears to have been a man of ability and character.

His life was written by Trebellius Pollio, one of the Scriptores Historiae Augustae; see also Zosimus i. 40-43, the histories of Th. Bernhardt and H. Schiller, and special dissertations by A. Duncker on the life of Claudius (1868) and the defeat of the Alamanni (Annalen des Vereins fur nassauische Altertumskunde, 1879); Homo, De Claudia Gothico (1900); Pauly-Wissowa, Realencyclopddie, ii. 2458 ff. (Henze).

CLAUDIUS, MATTHIAS (1740-1815), German poet, other- wise known by the nom de plume of Asmus, was born on the 15 th of August 1740

at Reinfeld, near Liibeck, and studied at Jena. He spent the greater part of his life in the little town of Wands- beck, near Hamburg, where he earned his first literary reputation by editing from i77itoi775,a newspaper called the Wandsbecker Bote (Wandsbeck Messenger), in which he published a large number of prose essays and poems. They were written in pure and simple German, and appealed to the popular taste; in many there was a vein of extravagant humour or even burlesque, while others were full of quiet meditation and solemn sentiment. In his later days, perhaps through the influence of Klopstock, with whom he had formed an intimate acquaintance, Claudius became strongly pietistic, and the graver side of his nature showed itself. In 1814 he removed to Hamburg, to the house of his son-in-law, the publisher Friedrich Christoph Perthes, where he died on the 21st of January 1815.

Claudius's collected works were published under the title of Asmus omnia sua secum portans, oder Sdmtliche Werke des Wands- becker Bolen (8 vols., 1775-1812; 13th edition, by C. Redich, 2 vols., 1902). His biography has been written by Wilhelm Herbst (4th ed., 1878). See also M. Schneidereit, M. Claudius, seine Weltanschauung und Lebensweisheit (1898).

CLAUSEL (more correctly Clauzel), BERTRAND, Count (1772-1842), marshal of France, was born at Mirepoix (Ariege) on the 12th of December 1772, and served in the first campaign of the French Revolutionary Wars as one of the volunteers of 1 791. In June 1795, having distinguished himself repeatedly in the war on the northern frontier (1792-1793) and the fighting in the eastern Pyrenees (1793-1794), Clausel was made a general of brigade. In this rank he served in Italy in 1798 and 1799, and in the disastrous campaign of the latter year he won great distinction at the battles of the Trebbia and of Novi. In 1802 he served in the expedition to S. Domingo. He became a general of division in December 1802, and after his return to France he was in almost continuous military employment there until in 1806 he was sent to the army of Naples. Soon after this Napoleon made him a grand officer of the Legion of Honour. In 1808-1809 he was with Marmont in Dalmatia, and at the close of 1809 he was appointed to a command in the army of Portugal under Massena.

Clausel took part in the Peninsular campaigns of 18 10 and 181 1, including the Torres Vedras campaign, and under Marmont he did excellent service in re-establishing the discipline, efficiency and mobility of the army, which had suffered severely in the retreat from Torres Vedras. In the Salamanca campaign (1812) the result of

Clausel's work was shown in the marching powers

of the French, and at the battle of Salamanca, Clausel, who had succeeded to the command on Marmont being wounded, and had himself received a severe wound, drew off his army with the greatest skill, the retreat on Burgos being conducted by him in such a way that the pursuers failed to make the slightest impres- sion, and had themselves in the end to retire from the siege of Burgos (1812). Early in 1813 Clausel was made commander of the Army of the North in Spain, but he was unable to avert the great disaster of Vittoria. Under the supreme command of Soult he served through the rest of the Peninsular War with unvarying distinction. On the first restoration in 1814 he submitted unwillingly to the Bourbons, and when Napoleon returned to France, he hastened to join him. During the Hundred Days he was in command of an army defending the Pyrenean frontier. Even after Waterloo he long refused to recognize the restored government, and he escaped to America, being condemned to death in absence. He took the first oppor- tunity of returning to aid the Liberals in France (1820), sat in the chamber of deputies from 1827 to 1830, and after the revolu- tion of 1830 was at once given a military command. At the head of the army of Algiers, Clausel made a successful campaign, but he was soon recalled by the home government, which desired to avoid complications in Algeria. At the same time he was made a marshal of France (February 183 1). For some four years thereafter he urged his Algerian policy upon the chamber of deputies, and finally in 1835 was reappointed commander-in- chief. But after several victories, including the taking of Mascara in 1835, the marshal met with a severe repulse at Constantine in 1836. A change of government in France was primarily responsible for the failure, but public opinion attributed it to Clausel, who was recalled in February 1837. He thereupon retired from active service, and, after vigorously defending his conduct before the deputies, he ceased to take part in public affairs. He lived in complete retirement up to his death at Secourrieu (Garonne) on the 21st of April 1842.

CLAUSEN, GEORGE (1852-), English painter, was born in London, the son of a decorative artist. He attended the design classes at the South Kensington schools from 1867-1873 with great success. He then worked in the studio of Edwin Long, R.A., and subsequently in Paris under Bouguereau and Robert- Fleury. He became one of the foremost modern painters of landscape and of peasant life, influenced to a

certain extent by the impressionists with whom he shared the view that light is the real subject of landscape art. His pictures excel in render- ing the appearance of things under flecking outdoor sunlight, or in the shady shelter of a barn or stable. His ” Girl at the Gate ” was acquired for the nation by the Chan trey Trustees and is now at the National Gallery of British Art (Tate Gallery). He was elected associate of the Royal Academy in 1895, and as professor of painting gave a memorable series of lectures to the students of the schools, — published as Six Lectures on Painting (1904) and Aims and Ideals in Art (1906).

CLAUSEWITZ, KARL VON (1 780-1831), Prussian general and military writer, was born at Burg, near Magdeburg, on the 1st of June 1 780. His family, originally Polish, had settled in Germany at the end of the previous century. Entering the army in 1792, he first saw service in the Rhine campaigns of 1 793-1 794, receiving his commission at the siege of Mainz. On his return to garrison duty he set to work so zealously to remedy the defects in his education caused by his father’s poverty, that in 1801 he was admitted to the Berlin Academy for young officers, then directed by Scharnhorst. Scharnhorst, attracted by his pupil’s industry and force of character, paid special attention to his training, and profoundly influenced the development of his mind. In 1803, on Scharnhorst’s recommendation, Clausewitz was made ” adjutant ” (aide-de-camp) to Prince August, and he served in this capacity in the campaign of Jena (1806), being captured along with the prince by the French at Prenzlau. A prisoner in France and Switzerland for the next two years, he returned to Prussia in 1809; and for the next three years, as a depart- mental chief in the ministry of war, as a teacher in the military school, and as military instructor to the crown prince,

he assisted Scharnhorst in the famous reorganization of the Prussian army. In 1810 he married the countess Marie von Briihl.

On the outbreak of the Russian war in 181 2, Clausewitz, like many other Prussian officers, took service with his country’s nominal enemy. This step he justified in a memorial, published for the first time in the Leben Gneisenaus by Pertz (Berlin, 1869). At first adjutant to General Phull, who had himself been a Prussian officer, he served later under Pahlen at Witepsk and Smolensk, and from the final Russian position at Kaluga he was sent to the army of Wittgenstein. It was Clausewitz who negotiated the convention of Tauroggen, which separated the cause of Yorck’s Prussians from that of the French, and began the War of Liberation (see Yoeck von Wartenburg; also Blumenthal’s Die Konvention von Tauroggen, Berlin, 1901). As a Russian officer he

superintended the formation of the Landwehroi east Prussia (see Stein, Baron vom), and in the campaign of 1813 served as chief of staff to Count Wallmoden. He conducted the fight at Gohrde, and after the armistice, with Gneisenau's permission, published an account of the campaign {Der Feldzug von i8ij bis zum Wajjenstillstand, Leipzig, 1813). This work was long attributed to Gneisenau himself. After the peace of i8r4 Clausewitz re-entered the Prussian service, and in the Waterloo campaign was present at Ligny and Wavre as General Thielmann's chief of staff. This post he retained till 18 18, when he was pro- moted major-general and appointed director of the Allgemeine Kriegsschule. Here he remained till in 1830 he was made chief of the 3rd Artillery Inspection at Breslau. Next year he became chief of staff to Field-marshal Gneisenau, who commanded an army of observation on the Polish frontier. After the dissolution of this army Clausewitz returned to his artillery duties; but on the 18th of November 1831 he died at Breslau of cholera, which had proved fatal to his chief also, and a little previously, to his old Russian commander Diebitsch on the other side of the frontier.

His collected works were edited and published by his widow, who was aided by some officers, personal friends of the general, in her task. Of the ten volumes of Hinterlassene Werke uber Krieg und Kriegfiihrung (Berlin, 1832-1837, later edition called Clausewitz's Gesammte Werke, Berlin, 1874) the first three contain Clausewitz's masterpiece, Vom Kriege, an exposition of the philosophy of war which is absolutely unrivalled. He produced no " system " of strategy, and his critics styled his work "negative" and asked "Qu'a-t-il fonde?" What he had " founded " was that modern strategy which, by its hold on the Prussian mind, carried the Prussian arms to victory in 1866 and 1870 over the " systematic " strategists Krismanic and Bazaine, and his philosophy of war became, not only in Germany but in many other countries, the essential basis of all serious study of the art of war. The English and French translations (Graham, On War, London, 1873; Neuens, La Guerre, Paris, 1849-1852; or Vatry, Theorie de la grande guerre, Paris, 1899), with the German original, place the work at the disposal of students of most nationalities. The remaining volumes deal with military history: vol. 4, the Italian campaign of 1796-97; vols. 5 and 6, the campaign of 1799 in Switzerland and Italy; vol. 7, the' wars of 1812, 1813 to the armistice, and 1814; vol. 8, the Waterloo Campaign; vols. 9 and 10, papers on the campaigns of Gustavus Adolphus, Turenne, Luxemburg, Miinnich, John Sobieski, Frederick the Great, Ferdinand of Brunswick, &c. He also wrote Uber das Leben und den Charakter von Scharnhorst (printed in Ranke's Tiistorisch-politischer Zeitschrijt, 1832). A manuscript on the catastrophe of 1806

long remained unpublished. It was used by v. Hopfner in his history of thM war, and eventually published by the Great General Staff in 1888 (French translation, 1903). Letters from Clausewitz to his wife were published in Zeilschriftfiir preussische Landeskunde (1876). His name is borne by the 28th Field Artillery regiment of the German army.

See Schwartz, Leben des General von Clausewitz und der Frau Marie von Clausewitz (2 vols., Berlin, 1877); von Meerheimb, Karl von Clausewitz (Berlin, 1875), also Memoir in Allgemeine deutsche Biographie; Bernhardi, Leben des Generals von Clausewitz (10th Supplement, Militdr. Wochenblatl, 1878).

CLAUSIUS, RUDOLF JULIUS EMMANUEL (1822-1 German physicist, was born on the 2nd of January 1822 at Koslin, in Pomerania. After attending the Gymnasium at Stettin, he studied at Berlin University from 1840 to 1844. I n 1848 he took his degree at Halle, and in 1850 was appointed professor of physics in the royal artillery and engineering school at Berlin. Late in the same year he delivered his inaugural lecture as Privatdocent in the university. In 1855 he became an ordinary professor at Zurich Polytechnic, accepting at the same time a professorship in the university of Zurich. In 1867 he moved to Wurzburg as professor of physics, and two years later was appointed to the same chair at Bonn, where he died on the 24th of August 1888. During the Franco-German War he was at the head of an ambulance corps composed of Bonn students, and received the Iron Cross for the services he rendered at Vionville and Gravelotte. The work of Clausius, who was a mathematical rather than an experimental physicist, was concerned with many of the most abstruse problems of molecular physics. By his restatement of Carnot's principle he put the theory of heat on a truer and sounder basis, and he deserves the credit of having made thermodynamics a science; he enunciated the second law, in a paper contributed to the Berlin Academy in 1850, in the well- known form, " Heat cannot of itself pass from a colder to a hotter body." His results he applied to an exhaustive development of the theory of the steam-engine, laying stress in particular on the conception of entropy. The kinetic theory of gases owes much to his labours, Clerk Maxwell calling him its principal founder. It was he who raised it, on the basis of the dynamical theory of heat, to the level of a theory, and he carried out many numerical determinations in connextion with it, e.g. of the mean free path of a molecule. To Clausius also was due an important advance in the theory of

electrolysis, and he put forward the idea that molecules in electrolytes are continually interchanging atoms, the electric force not causing, but merely directing, the interchange. This vxew found little favour until 1887, when it was taken up by S. A. Arrhenius, who made it the basis of the theory of electrolytic dissociation. In addition to many scientific papers he wrote Die Potentialfunktion und das Potential, 1864, and Abhandlungen ilber die mechanische Wdrmetheorie, 1864-1867.

CLAUSTHAL, or Klausthal, a town of Germany, in the Prussian Harz, lying on a bleak plateau, i860 ft. above sea-level, 50. m. by rail W.S.W. of Halberstadt. Pop. (1905) 8565. Clausthal is the chief mining town of the Upper Harz Mountains, and practically forms one town with Zellerf eld, which is separated from it by a small stream, the Zellbach. The streets are broad, opportunity for improvement having been given by fires in 1844 and 1854; the houses are mostly of wood. There are an Evangelical and a Roman Catholic church, and a gymnasium. Clausthal has a famous mining college with a mineralogical museum, and a disused mint. Its chief mines are silver and lead, but it also smelts copper and a little gold. Four or five sanatoria are in the neighbourhood. The museum of the Upper Harz is at Zellerf eld.

Clausthal was founded about the middle of the 12th century in consequence probably of the erection of a Benedictine monas- tery (closed in 1431), remains of which still exist in Zellerfeld. At the beginning of the 16th century the dukes of Brunswick made a new settlement here, and under their directions the mining, which had been begun by the monks, was carried on more energetically. The first church was built at Clausthal in 1570. In 1864 the control of the mines passed into the hands of the state.

CLAVECIN, the French for clavisymbal or harpsichord (Ger. Clavicymbel or Dockenklavier) , an abbreviation of the Flemish clavisinbal and Ital. clavicimbalo, a keyboard musical instrument in which the strings were plucked by means of a plectrum consisting of a quill mounted upon a jack.

See Pianoforte; Harpsichord.

CLAVICEMBALO, or Gravicembalo (from Lat. clavis, key, and cymbalum, cymbal; Eng. clavicymbal, clavisymbal; Flemish, clavisinbal; Span, clavisinbanos) , a keyboard musical instru- ment with strings plucked by means of small quill or leather

plectra. ” Cymbal ” (Gr. kvˆoKov, from tciy,ˆ, a hollow vessel) was the old European term for the dulcimer, and hence its place in the formation of the word.

See Pianoforte; Spinet; Virginal.

CLAVICHORD, or Clarichord (Fr. manicorde; Ger. Clavi- chord; Ital. manicordo; Span, manicordio 1) , a medieval stringed keyboard instrument, a forerunner of the pianoforte (q.v.), its strings being set in vibration by a blow from a brass tangent instead of a hammer as in the modern instrument. The clavi- chord, derived from the dulcimer by the addition of a keyboard, consisted of a rectangular case, with or without legs, often very elaborately ornamented with paintings and gilding. The earliest instruments were small and portable, being placed upon a table or stand. The strings, of finely drawn brass, steel or iron wire, were stretched almost parallel with the keyboard over the narrow belly or soundboard resting on the soundboard bridges, often three in number, and wound as in the piano round wrest or tuning pins set in a block at the right-hand side of the sound- board and attached at the other end to hitch pins. The bridges served to direct the course of the strings and to conduct the sound waves to the soundboard. The scaling, or division of the strings determining their vibrating length, was effected by the •position of the tangents. These tangents, small wedge-shaped blades of brass, beaten out at the top, were inserted in the end of the arm of the keys. As the latter were depressed by the fingers the tangents rose to strike the strings and stop them at the proper length from the belly-bridge. Thus the string was set in vibration between the point of impact and the belly-bridge just as long as the key was pressed down. The key being released, the vibrations were instantly stopped by a list of cloth acting as damper and interwoven among the strings behind the line of the tangents.

There were two kinds of clavichords — the fretted or gebunden and the fret-free or bund-frei. The term ” fretted ” was applied to those clavichords which, instead of being provided with a string or set of strings in unison for “each note, had one set of strings acting for three or four notes, the arms of the keys being twisted in order to bring the contact of the tangent into the acoustically correct position under the string. The ” fret-free ” were chromatically-scaled instruments. The first bund-frei clavichord is attributed to Daniel Faber of Crailsheim in Saxony about 1720. This important change in construction increased the size of the instrument, each pair of unison strings requiring a key and tangent of its own, and led to the introduction of the system of tuning by equal temperament upheld by J. S. Bach. Clavichords were made with pedals. 2

The tone of the clavichord, extremely sweet and delicate, was characterized by a tremulous hesitancy, which formed its great charm while rendering it suitable only for the private music room or study. Between 1 883- and 1 893 renewed attention was drawn to the instrument by A. J. Hipkins's lectures and recitals on keyboard instruments in London, Oxford and Cam- bridge; and Arnold Dolmetsch reintroduced the art of making clavichords in 1894. (K. S.)

CLAVICYTHERIUM, a name usually applied to an upright spinet (q.v.), the soundboard and strings of which were vertical instead of horizontal, being thus perpendicular to the keyboard; but it would seem that the clavicytherium proper is distinct from the upright spinet in that its strings are placed horizontally. In the early clavicytherium there was, as in the spinet, only one string (of gut) to each key, set in vibration by means of a small quill or leather plectrum mounted on a jack which acted as in the spinet and harpsichord (q.v.). The clavicytherium or keyed

1 The words clavicorde, clavicordo and clavicordio, respectively French, Italian and Spanish, were applied to a different type of instrument, the spinet (q.v.).

2 See Sebastian Virdung, Musica getutscht und auszgezogen (Basel, 1511) (facsimile reprint Berlin, 1882, edited by R. Eitner) ; J. Verschuere Reynvaan, Musijkaal Kunst-Woordenboek (Amsterdam, J 795) (a very scarce book, of which the British Museum does not possess a copy) ; Jacob Adlung, Musica Mechanica Organoedi (Berlin, 1768), vol. ii. pp. 158-9; A. J. Hipkins, The History of the Pianoforte (London, 1896), pp. 61 and 62.

cythera or cetra, names which in the 14th and 15th centuries had been applied somewhat indiscriminately to instruments having strings stretched over a soundboard and plucked by fingers or plectrum, was probably of Italian 1 or possibly of south German origin. Sebastian Virdung, 2 writing early in the 16th century, describes the clavicytherium as a new invention, having gut strings, and gives an illustration of it. (See Pianoforte.) A certain amount of uncertainty exists as to its exact construction, due to the extreme rarity of unrestored specimens extant, and to the almost total absence of trustworthy practical information.

In a unique specimen with two keyboards dating from the 16th or 17th century, which is in the collection of Baron Alexandre Kraus, 3 what appear to be vibrating strings stretched over a soundboard perpendicular to the keyboard are in reality the wires forming part of the mechanism of the action. The arrange- ment of this mechanism is the distinctive feature of the clavi- cytherium, for the wires, unlike the strings of the upright spinet, increase in length from left to right, so that the upright harp- shaped back has its higher side over the treble of the keyboard instead of over the bass. The vibrating strings of the clavi- cytherium in the Kraus Museum are stretched horizontally over two kinds of psalteries fixed one over the other. The first, serving for the lower register, is of the well-known trapezoid shape and lies over the keyboards; it has 30 wire strings in pairs of unisons corresponding to the 15 lowest keys. The second psaltery resembles the kanoun of the Arabs, and has 36 strings in courses of 3 unisons corresponding to the next 12 keys, and 88 very thin strings in courses of 4, completing the 49 keys; the compass thus has a range of four octaves from C to C. The quills of the jacks belonging to the two keyboards are of different length and thickness. The jacks, which work as in the spinet, are attached to the perpendicular wires, disposed in two parallel rows, one for each keyboard.

There is a very fine specimen of the so-called clavicytherium (upright spinet) in the Donaldson museum of the Royal College of Music, London, acquired from the Correr collection at Venice in 1885. 4 The instrument is undated, but A.J. Hipkins 6 placed it early in the 16th or even at the end of the 15th century. There is German writing on the inside of the back, referring to some agreement at Ulm. The case is of pine-wood, and the natural keys of box-wood. The jacks have the early steel springs, and in 1885 traces were found in the instrument of original brass plectra, all of which point to a very early date.

A learned Italian, Nicolo Vicentino, 6 living in the 16th century, describes an archicembalo of his own invention, at which the per- former had to stand, having four rows of keys designed to obtain a complete mesotonic pure third tuning. This was an attempt to reintroduce the ancient Greek musical system. This instrument was probably an upright harpsichord or clavicembalo.

For the history of the clavicytherium considered as a forerunner of the pianoforte see Pianoforte. (K. S.)

CLAVIE, BURNING THE, an ancient Scottish custom still observed at Burghead, a fishing village on the Moray Firth, near Forres. The ” clavie ” is a bonfire of casks split in two, lighted on the 12th of

January, corresponding to the New Year of the old calendar. One of these casks is joined together again by a huge nail (Lat. clams; hence the term). It is then filled with tar, lighted and carried flaming round the village and finally up to a headland upon which stands the ruins of a Roman altar, locally called ” the Douro.” It here forms the nucleus of the bonfire, which is built up of split casks. When the burning tar-barrel falls in pieces, the people scramble to get a lighted

1 Mersenne, Harmonie universelle (Paris, 1636), p. 113, calls the clavicytherium ” une nouvelle forme d’epinette dont on use en Italie,” and states that the action of the jacks and levers is parallel from back to front.

2 Musica getutscht und auszgezogen (Basel, 1511).

3 See “Une Piece unique du Musee Kraus de Florence” in Annates de Valliance scientijique universelle (Paris, 1907).

4 See illustration by William Gibb in A. J. Hipkins’s Musical Instruments, Historic, Rare and Unique (1888).

5 History of the Pianoforte, Novello’s Music Primers, No. 52 (1896), P-75-

6 L’Antica Musica ridotta moderna prattica (Rome ; 1555).

piece with which to kindle the New Year’s fire on their cottage hearth. The charcoal of the clavie is collected and is put in pieces up the cottage chimneys, to keep spirits and witches from coming down.

CLAVIERE, ETIENNE (1735-1793), French financier and poli- tician, was a native of Geneva. As one of the democratic leaders there he was obliged in 1782 to take refuge in England, upon the armed interference of France, Sardinia and Berne in favour of the aristocratic party. There he met other Swiss, among them Marat and Etienne Dumont, but their schemes for a new Geneva in Ireland — which the government favoured — were given up when Necker came to power in France, and Claviere, with most of his comrades, went to Paris. There in 1789 he and Dumont allied themselves with Mirabeau, secretly collaborating for him on the Courrier de Provence and also in preparing the speeches which Mirabeau delivered as his own. It was mainly by his use of Claviere that Mirabeau sustained his reputation as a financier. But Claviere also published some pamphlets under his own name, and through these and his friendship with J. P. Brissot, whom he had met in London, he became minister of finance in the Girondist ministry, from March to the 12th of June 1792. After the

10th of August he was again given charge of the finances in the provisional executive council, though with but indifferent success. He shared in the fall of the Girondists, was arrested on the 2nd of June 1793, but somehow was left in prison until the 8th of December, when, on receiving notice that he was to appear on the next day before the Revolutionary Tribunal, he committed suicide.

CLAVIJO, RUY GONZALEZ DE (d. 1412), Spanish traveller of the 15th century, whose narrative is the first important one of its kind contributed to Spanish literature, was a native of Madrid, and belonged to a family of some antiquity and position. On the return of the ambassadors Pelayo de Sotomayor and Hernan Sanchez de Palazuelos from the court of Timur, Henry III. of Castille determined to send another embassy to the new lord of Western Asia, and for this purpose he selected Clavijo, Gomez de Salazar (who died on the outward journey), and a master of theology named Fray Alonzo Paez de Santa Maria. They sailed from St Mary Port near Cadiz on the 22nd of May 1403, touched at the Balearic Isles, Gaeta and Rhodes, spent some time at Constantinople, sailed along the southern coast of the Black Sea to Trebizond, and proceeded inland by Erzerum, the Ararat region, Tabriz, Sultanieh, Teheran and Meshed, to Samarkand, where they were well received by the conqueror. Their return was at last accomplished, in part after Timur's death, and with countless difficulties and dangers, and they landed in Spain on the 1st of March 1406. Clavijo proceeded at once to the court, at that time in Alcala de Henares, and served as chamberlain till the king's death (in the spring of 1406-1407); he then returned to Madrid, and lived there in opulence till his own death on the 2nd of April 141 2. He was buried in the chapel of the monastery of St Francis, which he had rebuilt at great expense.

There are two leading MSS. of Clavijo's narrative — (a) London, British Museum, Additional MSS., 16,613 fols. 1, n-125, v.; (b) Madrid, National Library, 9218 ; and two old editions of the original Spanish — (1) by Gongalo Argote de Molina (Seville, 1582), (2) by Antonio de Sancha (Madrid, 1782), both having the misleading titles, apparently invented by Molina, of Historia del gran Tamorlan, and Vida y hazanas del gran Tamorlan (the latter at the beginning of the text itself) ; a better sub-title is added, viz. Itinerario y enarracion del viage y relacion de la, embaxada que Ruy Gonzalez de Clavijo le hizo. Both editors, and especially Sancha, supply general ex- planatory dissertations. The Spanish text has also been published, with a Russian translation, in vol. xxviii. (pp. 1-455) of the Publi- cations of the Russian Imperial Academy of Sciences {Section of Russian Language, &c), edited by I. I. Sreznevski (1881). An English version, by Sir

Clements Markham, was issued by the Hakluyt Society in 1859 (Narrative of the Embassy of R . . . G . . . de Clavijo to the Court of Timour). The identification of a great number of the places mentioned by Clavijo is a matter of considerable difficulty, and has given rise to some discussion (see Khanikof's list in Geo- graphical Magazine (1874), and Sreznevski's Annotated Index in the Russian edition of 1881). A short account of Clavijo's life is given by Alvarez y Baena in the Hijos de Madrid, vol. ix. See alsa C, R. Beazley, Dawn of Modern Geography, iii. 332-56.

CLAVIJO Y FAJARDO, J0S6 (1730-1806), Spanish publicist, was born at Lanzarote (Canary Islands) in 1730. He settled in Madrid, became editor of El Pensador, and by his campaign against the public performance of autos sacramentales secured their prohibition in 1765. In 1770 he was appointed director of the royal theatres, a post which he resigned in order to take up the editorship of the Mercurio historico y politico de Madrid: at the time of his death in 1806 he was secretary to the Cabinet of Natural History. He had in abundance the courage, per- severance and gift of pungent expression which form the equip- ment of the aggressive journalist, but his work would long since have been forgotten were it not that it put an end to a peculiarly national form of dramatic exposition, and that his love affair with one of Beaumarchais' sisters suggested the theme of Goethe's first publication, Clavigo.

CLAY, CASSIUS MARCELLUS (1810-1903), American poli- tician, was born in Madison county, Kentucky, on the 19th of October 1810. He was the son of Green Clay (1757-1826), a Kentucky soldier of the war of 181 2 and a relative of Henry Clay. He was educated at Centre College, Danville, Kentucky, and at Yale, where he graduated in 1832. Influenced to some extent by William Lloyd Garrison, he became an advocate of the abolition of slavery, and on his return to his native state, at the risk of social and political ostracism, he gave utterance to his belief. He studied law, but instead of practising devoted himself to a political career. In 1835, 1837 and 1840 he was elected as a Whig to the Kentucky legislature, where he advocated a system of gradual emancipation, and secured the establishment of a public school system, and a much-needed reform in the jury system. In 1841 he was defeated on account of his abolition views. In 1844 he delivered campaign speeches for Henry Clay throughout the North. In 1845 he established, at Lexington, Kentucky, an anti-slavery publication known

as The True American, but in the same year his office and press were wrecked by a mob, and he removed the publication office to Cincinnati, Ohio. During this and the earlier period of his career his zeal and hot temper involved him in numerous personal encounters and several duels, in all of which he bore himself with a reckless bravery. In the Mexican War he served as a captain of a Kentucky company of militia, and was taken prisoner, while reconnoitring, during General Scott's advance on the City of Mexico. He left the Whig party in 1850, and as an anti-slavery candidate for governor of Kentucky polled 5000 votes. In 1856 he joined the Republican party, and wielded considerable influence as a Southern representative in its councils. In i860 he was a leading candidate for the vice-presidential nomination. In 1 86 1 he was sent by President Lincoln as minister to Russia; in 1862 he returned to America to accept a commission as major- general of volunteers, but in March 1863 was reappointed to his former post at St Petersburg, where he remained until 1869. Disapproving of the Republican policy of reconstruction, he left the party, and in 1872 was one of the organizers of the Liberal-Republican revolt, and was largely instrumental in securing the nomination of Horace Greeley for the presidency. In the political campaigns of 1876 and 1880 he supported the Democratic candidate, but rejoined the Republican party in the campaign of 1884. He died at Whitehall, Kentucky, on the 22nd of July

1903.

See his autobiography, The'Life, Memoirs, Writings, and Speeches of Cassius Marcellus Clay (Cincinnati, 1896); and The Writings of Cassius Marcellus Clay (edited with a " Memoir " by Horace Greeley. New York, 1848).

CLAY, CHARLES (1801-1893), English surgeon, was born at Bredbury, near Stockport, on the 27th of December 1801. He began his medical education as a pupil of Kinder Wood in Manchester (where he used to attend John Dalton's lectures on chemistry), and in 182 1 went to Edinburgh to continue his studies there. Qualifying in 1823, he began a general practice in Ashton-under-Lyne, but in 1839 removed to Manchester to practise as an operative and consulting surgeon. It was there that, in 1842, he first performed the operation of ovariotomy with which his name is associated. On this occasion it was

perfectly successful, and when in 1865 he published an analysis of 1 1 1 cases he was able to show a mortality only slightly above 30%. Although his merits in this matter have sometimes been denied, his claim to the title " Father of Ovariotomy " is now generally conceded,

and it is admittted that he deserves the credit not only of having shown how that operation could be made a success, but also of having played an important part in the advance of abdominal surgery for which the 19th century was conspicuous. In spite of the claims of a heavy practice, Clay found time for the pursuit of geology and archaeology. Among the books of which he was the author were a volume of Geological Sketches of Manchester (1839) and a History of the Currency of the Isle of Man (1849), and his collections included over a thousand editions of the Old and New Testaments and a remarkably complete series of the silver and copper coins of the United States. He died at Poulton-le-Fylde, near Preston, on the 19th of September 1893.

CLAY, FREDERIC (1838-1889), English musical composer, the son of James Clay, M.P., who was celebrated as a player of whist and a writer on that subject, was born in Paris on the 3rd of August 1838. He studied music under W. B. Molique in Paris and Moritz Hauptmann at Leipzig. With the exception of a few songs and two qantatas, The Knights of the Cross (1866) and Lalla Rookh (1877), — the latter of which contained his well- known song ” I'll sing thee songs of Araby,” — his compositions were all written for the stage. Clay's first public appearance was made with an opera entitled Court and Cottage, the libretto of which was written by Tom Taylor. This was produced at Covent Garden in 1862, and was followed by Constance (1865), Ages Ago (1869), and Princess Toto (1875), to name only three of many works which have long since been forgotten. The last two, which were written to libretti by W. S. Gilbert, are among Clay's most tuneful and most attractive works. He wrote part of the music for Babil and Bijou (1872) and The Black Crook (1873), both of which were produced at the Alhambra. He also furnished incidental music for a revival of Twelfth Night and for the production of James Albery's Oriana. His last works, The Merry Duchess (1883) and The Golden Ring (1883), the latter written for the reopening of the Alhambra, which had been burned to the ground the year before, showed an advance upon his previous work, and rendered all the more regrettable the stroke of paralysis which crippled his physical and mental'energies during the last few years of his life. He died at Great Marlow on the 24th of November 1889.

CLAY, HENRY (1777-1852), American statesman and orator, was born in Hanover county, Virginia, on the 12th of April 1777, and died in Washington on the 29th of June 1852. Few public characters in the United States have been the subject of more heated controversy. His enemies denounced him as a pretender, a selfish intriguer, and an abandoned profligate; his supporters placed him among the sages and

sometimes even among the saints. He was an arranger of measures and leader of political forces, not an originator of ideas and systems. His public life covered nearly half a century, and his name and fame rest entirely upon his own merits. He achieved his success despite serious obstacles. He was tail, rawboned and awkward; his early instruction was scant; but he ” read books,” talked well, and so, after his admission to the bar at Richmond, Virginia, in 1797, and his removal next year to Lexington, Kentucky, he quickly acquired a reputation and a lucrative income from his law practice.

Thereafter, until the end of life, and in a field where he met, as either friend or foe, John Quincy Adams, Gallatin, Madison, Monroe, Webster, Jackson, Calhoun, Randolph and Benton, his political activity was wellnigh ceaseless. At the age of twenty-two (1799), he was elected to a constitutional convention in Kentucky; at twenty-six, to the Kentucky legislature; at twenty-nine, while yet under the age limit of the United States constitution, he was appointed to an unexpired term (1806-1807) in the United States Senate, where, contrary to custom, he at once plunged into business, as though he had been there all his life. He again served in the Kentucky legislature

(1808-1809), was chosen speaker of its lower house, and achieved distinction by preventing an intense and widespread anti-British feeling from excluding the common law from the Kentucky code. A year later he was elected to another unexpired term in the United States Senate, serving in 1810-1811. At thirty-four (181 1) he was elected to the United States House of Representa- tives and chosen speaker on the first day of the session. One of the chief sources of his popularity was his activity in Congress in promoting the war with Great Britain in 181 2, while as one of the peace commissioners he reluctantly signed the treaty of Ghent on the 24th of December 1814. During the fourteen years following his first election, he was re-elected five times to the House and to the speakership; retiring for one term (1821-1823) to resume his law practice and retrieve his fortunes. He thus served as speaker in 1811-1814, in 1815-1820 and in 1823-1825. Once he was unanimously elected by his constituents, and once nearly defeated for having at the previous session voted to increase congressional salaries. He was a warm friend of the Spanish-American revolutionists (1818) and of the Greek insurgents (1824). From 1825 to 1829 he served as secretary of state in President John Quincy Adams’s cabinet, and in 1831 he was elected to the United

States Senate, where he served until 1842, and again from 1849 until his death.

From the beginning of his career he was in favour of internal improvements as a means of opening up the fertile but inaccess- ible West, and was opposed to the abuse of official patronage known as ” the spoils system.” The most important of the national questions with which Clay was associated, however, were the various phases of slavery politics and protection to home industries. The most prominent characteristics of his public life were his predisposition to ” compromises ” and “pacifications” which generally failed of their object, and his passionate patriotic devotion to the Union.

His earliest championship of protection was a resolution introduced by him in the Kentucky legislature (1808) which

favoured the wearing by its members of home-made asaPro-* c l° tnes ; and one in the United States Senate (April teciionist. 1 8 10), on behalf of home-grown and home-made

supplies for the United States navy, but only to the point of making the nation independent of foreign supply. In 1816 he advocated the Dallas tariff, in which the duties ranged up to 35% on articles of home production, the supply of which could satisfy the home demand; the avowed purpose being to build up certain industries for safety in time of war. In 1824 he advocated high duties to relieve the prevailing distress, which he pictured in a brilliant and effective speech. Although the distress was caused by the reactionary effect of a disordered currency and the inflated prices of the war of 181 2, he ascribed it to the country’s dependence on foreign supply and foreign markets. Great Britain, he said, was a shining example of the wisdom of a high tariff. No nation ever flourished without one. He closed his principal speech on the subject in the House of Representatives with a glowing appeal in behalf of what he called ” The American System.” In spite of the opposition of Webster and other prominent statesmen, Clay succeeded in enacting a tariff which the people of the Southern states de- nounced as a ” tariff of abominations.” As it overswelled the revenue, in 1832 he vigorously favoured reducing the tariff rates on all articles not competing with American products. His speech in behalf of the measure was for years a protection text-book; but the measure itself reduced the revenue so little and provoked such serious threats of nullification and secession in South Carolina, that, to prevent bloodshed and to forestall a free trade measure from the next Congress, Clay brought forward in 1833 a compromise gradually reducing the tariff rates to an average of 20%. To the Protectionists

this was ” like a crash of thunder in winter “; but it was received with such favour by the country generally, that its author was hailed as ” The Great Pacificator,” as he had been thirteen years before at the time of the Missouri Compromise (see below). As, however, the discontent with the tariff in the South was only a symptom of the real trouble there — the sensitiveness of the slave-power, — Clay

subsequently confessed his serious doubts of the policy of his interference.

He was only twenty-two, when, as an opponent of slavery, he vainly urged an emancipation clause for the new constitution of Kentucky, and he never ceased regretting that its failure put his state, in improvements and progress, behind its free neigh- bours. In 1820 he congratulated the new South American republics on having abolished slavery, but the same year the threats of the Southern states to destroy the Union led him to advocate the ” Missouri Compromise,” which, while keeping slavery out of all the rest of the territory acquired by the ” Louisiana Purchase ” north of Missouri’s southern boundary line, permitted it in that state. Then, greeted with the title of ” The Great Pacificator ” as a reward for his success, he retired temporarily to private life, with a larger stock of popu- larity than he had ever had before. Although at various times he had helped to strengthen the law for the recovery of fugitive slaves, declining as secretary of state to aid Great Britain in the further suppression of the slave trade, and demanding the return of fugitives from Canada, yet he heartily supported the colonizing of the slaves in Africa, because slavery was the ” deepest stain upon the character of the country,” opposition to which could not be repressed except by ” blowing out the moral lights around,” and ” eradicating from the human soul the light of reason and the law of liberty.” When the slave power became more aggressive, in and after the year 1 83 1 , Clay defended the right of petition for the abolition of slavery in the District of Columbia, and opposed Calhoun’s bill forbidding the use of the mails to ” abolition ” newspapers and documents. He was luke- warm toward recognizing the independence of Texas, lest it should aid the increase of slave territory, and generally favoured the freedom of speech and press as regards the question of slavery; yet his various concessions and compromises resulted, as he him- self declared, in the abolitionists denouncing him as a slave- holder, and the slaveholders as an abolitionist. In 1839, only twelve months after opposing the pro-slavery demands, he pre- pared an elaborate speech, in order ” to set himself right with the South,” which, before its delivery, received pro-slavery approval. While affirming that he was ” no friend of slavery ” he held abolition and the abolitionists responsible for the hatred,

strife, disruption and carnage that menaced the nation. In response, Calhoun extended to him a most hearty welcome, and assigned him to a place on the bench of the penitents. Being a candidate for the presidency Clay had to take the insult without wkicing. It was in reference to this speech that he made the oft-quoted remark that he ” would rather be right than be president.” While a candidate for president in 1844, he opposed in the ” Raleigh letter ” the annexation of Texas on many grounds except that of its increasing the slave power, thus displeasing both the men of anti-slavery and those of pro-slavery sentiments. In 1847, after the conquest of Mexico, he made a speech against the annexation of that country or the acquiring of any foreign territory for the spread of slavery. Although in 1849 ne again vainly proposed emancipation in Kentucky, he was unanimously elected to the United States Senate, where in 1850 he temporarily pacified both sections of the country by successfully offering, for the sake of the ” peace, concord and harmony of these states,” a measure or series of measures that became known as the “Compromiseof 1850.” ItadmittedCaliforniaasafree state, organized Utah and New Mexico as Territories without reference to slavery, and enacted a more efficient fugitive slave law. In spite of great physical weakness he made several earnest speeches in behalf of these measures to save the Union.

Another conspicuous feature of Clay’s public career was his absorbing and rightful, but constantly ungratified, ambition to be president of the United States. His name in connexion therewith was mentioned comparatively early, and in 1824, with W. H. Crawford, Andrew Jackson, and John Quincy Adams, he was a candidate for that office. There being no choice by the people, and the House of Representatives having elected Adams, Clay was accused by Jackson and his friends of making a corrupt bargain whereby, in payment of his vote and influence

for Adams, he was appointed secretary of state. This made Jackson Clay’s lifelong enemy, and ever after kept Clay busy explaining and denying the allegation. In 1832 Clay was unani- mously nominated for the presidency by the National Republicans; Jackson, by the Democrats. The main issue was the policy of continuing the United States Bank, which in 1811 Clay had opposed, but in 18 16 and always subsequently warmly favoured. A majority of the voters approved of Jackson’s fight against what Clay had once denounced as

a dangerous and unconstitu- tional monopoly. Clay made the mistake of supposing that he could arouse popular enthusiasm for a moneyed corporation in its contest with the great military ” hero of New Orleans.” In 1839 he was a candidate for the Whig nomination, but by a secret ballot his enemies defeated him in the party convention, held in December of that year, and nominated William Henry Harrison. The result threw Clay into paroxysms of rage, and he violently complained that his friends always used him as their candidate when he was sure to be defeated, and betrayed him when he or any one could have been elected. In 1844 he was nominated by the Whigs against James K. Polk, the Demo- cratic candidate. By an audacious fraud that represented him as an enemy, and Polk as a friend of protection, Clay lost the vote of Pennsylvania; and he lost the vote of New York by his own letter abating the force of his previous opposition to the annexation of Texas. Even his enemies felt that his defeat by Polk was almost a national calamity. In 1848, Zachary Taylor, a Mexican War hero, and hardly even a convert to the Whig ■ party, defeated Clay for the nomination, Kentucky herself deserting her ” favourite son.”

Clay’s quick intelligence and sympathy, and his irreproachable conduct in youth, explain his precocious prominence in public affairs. In his persuasiveness as an orator and his charming personality lay the secret of his power. He had early trained himself in the art of speech-making, in the forest, the field and even the barn, with horse and ox for audience. By contempor- aries his voice was declared to be the finest musical instrument that they ever heard. His eloquence was in turn majestic, fierce, playful, insinuating; his gesticulation natural, vivid, large, powerful. In public he was of magnificent bearing, possessing the true oratorical temperament, the nervous exalta- tion that makes the orator feel and appear a superior being, transfusing his thought, passion and will into the mind and heart of the listener; but his imagination frequently ran away with his understanding, while his imperious temper and ardent combativeness hurried him and his party into disadvantageous positions. The ease, too, with which he outshone men of vastly greater learning lured him from the task of intense and arduous study. His speeches were characterized by skill of statement, ingenious grouping of facts, fervent diction, and ardent patriot-, ism; sometimes by biting sarcasm, but also by superficial research, half-knowledge and an unwillingness to reason a proposition to its logical results. In private, his never-failing courtesy, his agreeable manners and a noble and generous heart for all who needed protection against the powerful or the lawless, endeared him to hosts of friends. His popularity was as great and as inexhaustible among his neighbours as among his fellow-citizens generally. He pronounced upon himself a

just judgment when he wrote: ” If any one desires to know the leading and paramount object of my public life, the preservation of this Union will furnish him the key.”

See Calvin Colton, The Works of Henry Clay (6 vols., New York, 1857; new ed., 7 vols., New York, 1S98), the first three volumes ot which are an account of Clay’s ” Life and Times”; Carl Schurz, Henry Clay (2 vols., Boston, 1887), in the ” American Statesmen” series,; and the life by T. Hart Clay (1910). (C. S.)

CLAY (from O. Eng. claeg, a word common in various forms to Teutonic languages, cf. Ger. Klei), commonly denned as a fine-grained, almost impalpable substance, very soft, more or less coherent when dry, plastic and retentive of water when wet; it has an ” earthy ” odour when breathed upon or moistened, and consists essentially of hydrous aluminium silicate with various impurities. Of clay are formed a great number of rocks, which collectively are known as ” clay-rocks ” or ” pelitic rocks ”

(from Gr. irrfkos, clay), e.g. mudstone, shale, slate: these exhibit in greater or less perfection the properties above described according to their freedom from impurities. In nature, clays are rarely free from foreign ingredients, many of which can be detected with the unaided eye, while others may be observed by means of the microscope. The commonest impurities are: — (1) organic matter, humus, &c. (exemplified by clay-soils with an admixture of peat, oil shales, carbonaceous shales); (2) fossils (such as plants in the shales of the Lias and Coal Measures, shells in clays of all geological periods and in fresh water marls) ; (3) carbonate of lime (rarely altogether absent, but abundant in marls, cement-stones and argillaceous limestones); (4) sulphide of iron, as pyrite or marcasite (when finely diffused, giving the clay a dark grey-blue colour, which weathers to brown — e.g. London Clay; also as nodules and concretions, e.g. Gault) ; (5) oxides of iron (staining the clay bright red when ferric oxide, red ochre; yellow when hydrous, e.g. yellow ochre); (6) sand or detrital silica (forming loams, arenaceous clays, argillaceous sandstones, &c). Less frequently present are the following: — rock salt (Triassic clays, and marls of Cheshire, &c.) ; gypsum (London Clay, Triassic clays) ; dolomite, phosphate of lime, vivianite (phosphate of iron), oxides of manganese, copper ores (e.g. Kupferschiefer), wavellite and amber. As the impurities increase in amount the clay rocks pass gradually into argillaceous sands and sandstones, argil- laceous limestones and dolomites, shaly coals and clay ironstones.

Natural clays, even when most, pure, show a considerable range of

composition, and hence cannot be regarded as consisting of a single mineral; clay is a rock, and has that variability which characterizes all rocks. Of the essential properties of clay some are merely physical, and depend on the minute size of the particles. If any rock be taken (even a piece of pure quartz) and crushed to a very fine powder, it will show some of the peculi- arities of clays; for example, it will be plastic, retentive of moisture, impermeable to water, and will shrink to some extent if the moist mass be kneaded, and then allowed to dry. It happens, however, that many rocks are not disintegrated to this extreme degree by natural processes, and weathering invariably accom- panies disintegration. Quartz, for example, has little or no cleavage, and is not attacked by the atmosphere. It breaks up into fragments, which become rounded by attrition, but after they reach a certain minuteness are borne along by currents of water or air in a state of suspension, and are not further reduced in size. Hence sands are more coarse grained than clays. A great number of rock- forming minerals, however, possess a good cleavage, so that when bruised they split into thin fragments; many of these minerals decompose somewhat readily, yielding secondary minerals, which are comparatively soft and have a scaly character, with eminently perfect cleavages, which facilitate splitting into exceedingly thin plates. The principal substances of this description are kaolin, muscovite and chlorite. Kaolin and muscovite are formed principally after felspar (and the felspars are the commonest minerals of all crystalline rocks); also from nepheline, leucite, scapolite and a variety of other rock-forming minerals. Chlorite arises from biotite, augite and hornblende. Serpentine, which may be fibrous or scaly, is a secondary product of olivine and certain pyroxenes. Clays consist essentially of the above ingredients (although serpentine is not known to take part in them to any extent, it is closely allied to chlorite). At the same time other substances are produced as decomposition goes on. They are principally finely divided quartz, epidote, zoisite, rutile, limonite, calcite, pyrites, and very small particles of these are rarely absent from natural clays. These fine-grained materials are at first mixed with broken and more or less weathered rock fragments and coarser mineral particles in the soil and subsoil, but by the action of wind and rain they are swept away and deposited in distant situations. ” Loess ” is a fine calcareous clay, which has been wind-borne, and subsequently laid down on the margins of dry steppes and deserts. Most clays are water- borne, having been carried from the surface of the land by

rain and transported by the brooks and rivers into lakes or the sea. In this state the fine particles are known as ” mud.” They are deposited where the currents are checked and the water becomes very still. If temporarily laid down in other situations they are ultimately lifted again and removed. A little clay, stirred up with water in a glass vessel, takes hours to settle, and even after two or three days some remains in suspension ; in fact, it has been suggested that in such cases the clay forms a sort of “colloidal solution” in the water. Traces of dissolved salts, such as common salt, gypsum or alum, greatly accelerate deposition. For these reasons the principal gathering places of fine pure clays are deep, still lakes, and the sea bottom at considerable distances from the shore. The coarser materials settle nearer the land, and the shallower portions of the sea floor are strewn with gravel and sand, except in occasional depressions and near the mouths of rivers where mud may gather. Farther out the great mud deposits begin, extending from 50 to 200 m. from the land, according to the amount of sediment brought in, and the rate at which the water deepens. A girdle of mud accumulations encircles all the continents. These sediments are fine and tenacious; their principal components, in addition to clay, being small grains of quartz, zircon, tourmaline, hornblende, felspar and iron compounds. Their typical colour is blackish- blue, owing to the abundance of sulphuretted hydrogen; when fresh they have a sulphurous odour, when weathered they are brown, as their iron is present as hydrous oxides (limonite, &c). These deposits are tenanted by numerous forms of marine life, and the sulphur they contain is derived from decomposing organic matter. Oecasionally Water-logged plant debris is mingled with the mud. In a few places a red colour prevails, the iron being mostly oxidized; elsewhere the muds are green owing to abundant glauconite. Traced landwards the muds become more sandy, while on their outer margins they grade into the abysmal deposits, such as the globigerina ooze (see Ocean and Oceanography). Near volcanoes they contain many volcanic minerals, and around coral islands they are often in large part calcareous.

Microscopic sections of some of the more coherent clays and shales may be prepared by saturating them with Canada balsam by long boiling, and slicing the resultant mass in the same manner as one of the harder rocks. They show that clay rocks contain abundant very small grains of quartz (about o-oi to 0-05 mm. in diameter), with often felspar, tourmaline, zircon, epidote, rutile and more or less calcite. These may form more than one-third of an ordinary shale; the greater part, however, consists of still smaller scales of other minerals (o-oi mm. in diameter and less than this). Some of these are

recognizable as pale yellowish and white mica; others seem to be chlorite, the remainder is perhaps kaolin, but, owing to the minute size of the flakes, they yield very indistinct reactions to polarized light. They are also often stained with iron oxide and organic substances, and in consequence their true nature is almost impossible to determine. It is certain, however, that the finer-grained rocks are richest in alumina, and in combined water; hence the inference is clear that kaolin or some other hydrous aluminium silicate is the dominating constituent. These results are confirmed by the mechanical analysis of clays. This process consists in finely pulverizing the soil or rock, and levigating it in vessels of water. A series of powders is obtained progressively finer according to the time required to settle to the bottom of the vessel. The clay is held to include those particles which have less than 0-005 mm – diameter, and contains a higher percentage of alumina than any of the other ingredients.

As might be inferred from the differences they exhibit in other respects, clay rocks vary greatly in their chemical composition. Some of them contain much iron (yellow, blue and red clays); others contain abundant calcium carbonate (calcareous clays and marls). Pure clays, however, may be found almost quite free from these substances. Their silica ranges from about 60 to 45%, varying in accordance with the amount of quartz and alkali-felspar present. It is almost always more than would be the case if the rock consisted of kaolin mixed with muscovite.

Alumina is high in the finer clays (18 to 30%), and they are the most aluminous of all sediments, except bauxite. Magnesia is never absent, though its amount may be less than 1%; it is usually contained in minerals of the chlorite group, but partly also in dolomite. The alkalis are very interesting; often they form s or 10% of the whole rock; they indicate abundance of white micas or of undecomposed particles of felspar. Some clays , however, such as fireclays, contain very little potash or soda, while they are rich in alumina; and it is a fair inference that hydrated aluminous silicates, such as kaolin, are well represented in these rocks. There are, in fact, a few clays which contain about 45 % of alumina, that is to say, more than in pure kaolin. It is probable that these are related to bauxite and certain kinds of latcrite.

A few of the most important clay rocks, such as china-clay, brick-clay, red-clay and shale, may be briefly described here.

China-clay is white, friable and earthy. It occurs in regions of granite, porphyry and syenite, and usually occupies funnel- shaped cavities of

no great superficial area, but of considerable depth. It consists of very fine scaly kaolin, larger, shining plates of white mica, grains of quartz and particles of semi-decomposed felspar, tourmaline, zircon and other minerals, which originally formed part of the granite. These clays are produced by the decomposition of the granite by acid vapours, which are dis- charged after the igneous rock has solidified ("fumarole or pneumatolytic action"). Fluorine and its compounds are often supposed to have been among the agencies which produce this change, but more probably carbonic acid played the principal r61e. The felspar decomposes into kaolin and quartz; its alkalis are for the most part set free and removed in solution, but are partly retained in the white mica which is constantly found in crude china-clays. Semi-decomposed varieties of the granite are known as china-stone. The kaolin may be washed away from its original site, and deposited in hollows or lakes to form beds of white clay, such as pipe-clay; in this case it is always more or less impure. Yellow and pinkish varieties of china-clay and pipe-clay contain a small quantity of oxide of iron. The best known localities for china-clay are Cornwall, Limoges (France), Saxony, Bohemia and China; it. is found also in Pennsylvania, N. Carolina and elsewhere in the United States.

Fire-clays include all those varieties of clay which are very refractory to heat. They must contain little alkalis, lime, magnesia and iron, but some of them are comparatively rich in silica. Many of the clays which pass under this designation belong to the Carboniferous period, and are found underlying seams of coal. Either by rapid growth of vegetation, or by subsequent percolation of organic solutions, most of the alkalis and the lime have been carried away.

Any argillaceous material, which can be used for the manu- facture of bricks, may be called a brick-clay. In England, Kimmeridge Clay, Lias clays, London Clay and pulverized shale and slate are all employed for this purpose. Each variety needs special treatment according to its properties. The true brick-clays, however, are superficial deposits of Pleistocene or Quaternary age, and occur in hollows, fillcd-up lakes and deserted stream channels. Many of them are derived from the glacial boulder-clays, or from the washing away of the finer materials contained in older clay formations. They are always very impure.

The red-clay is an abysmal formation, occurring in the sea bottom in the deepest part of the oceans. It is estimated to cover over fifty millions of square miles, and is probably the most extensive deposit which is in course of accumulation at the present day. In addition to the reddish or brownish argillaceous matrix it contains fresh or decomposed crystals of volcanic minerals, such as felspar, augite,

hornblende, olivine and pumiceous or palagonitic rocks. These must either have been ejected by submarine volcanoes or drifted by the wind from active vents, as the fine ash discharged by Krakatoa was wafted over the whole globe. Larger rounded lumps of pumice, found in the clay, have probably floated to their present situations, and sank when decomposed, all their cavities becoming filled

with sea water. Crystals of zeolites (phillipsite) form in the red-clay as radiate, nodular groups. Lumps of manganese oxide, with a black, shining outer surface, are also characteristic of this deposit, and frequently encrust pieces of pumice or animal remains. The only fossils of the clay are radiolaria, sharks' teeth and the ear-bones of whales, precisely those parts of the skeleton of marine creatures which are hardest and can longest survive exposure to sea-water. Their comparative abundance shows how slowly the clay gathers. Small rounded spherules of iron, believed by some to be meteoric dust, have also been obtained in some numbers. Among the rocks of the continents nothing exactly the same as this remarkable deposit is known to occur, though fine dark clays, with manganese nodules, are found in many localities, accompanied by other rocks which indicate deep-water conditions of deposit.

Another type of red-clay is found in caves, and is known as cave-earth or red-earth (terra rossa). It is fine, tenacious and bright red, and represents the insoluble and thoroughly weathered impurities which are left behind when the calcareous matter is removed in solution by carbonated waters. Similar residual clays sometimes occur on the surface of areas of limestone in hollows and fissures formed by weathering.

Boulder-clay is a coarse unstratified deposit of fine clay, with more or less sand, and boulders of various sizes, the latter usually marked with glacial striations.

Some clay rocks which have been laid down by water are very uniform through their whole thickness, and are called mud-stones. Others split readily into fine leaflets or laminae parallel to their bedding, and this structure is accentuated by the presence of films of other materials, such as sand or vegetable debris. Laminated clays of this sort are generally known as shales; they occur in many formations but are very common in the Carboniferous. Some of them contain

much organic debris, and when distilled yield paraffin oil, wax, compounds of ammonia, &c. In these oil-shales there are clear, globular, yellow bodies which seem to be resinous. It has been suggested that the admixture of large quantities of decomposed fresh-water algae among the original mud is the origin of the paraffins. In New South Wales, Scotland and several parts of America such oil-shales are worked on a commercial scale. Many shales contain great numbers of ovoid or rounded septarian nodules of clay ironstone. Others are rich in pyrites, which, on oxidation, produces sulphuric acid; this attacks the aluminous silicates of the clay and forms aluminium sulphate (alum shales). The lias shales of Whitby contain blocks of semi-mineralized wood, or jet, which is black with a resinous lustre, and a fibrous structure. The laminated structure of shales, though partly due to successive very thin sheets of deposit, is certainly de- pendent also on the vertical pressure exerted by masses of super- incumbent rock; it indicates a transition to the fissile character of clay slates. (J. S. F.)

CLAY CROSS, an urban district in the Chesterfield parlia- mentary division of Derbyshire, England, near the river Amber, on the Midland railway, 5 m. S. of Chesterfield. Pop. (.1901) 8358. The Clay Cross Colliery and Ironworks Company, whose mines were for a time leased by George Stephenson, employ a great number of hands.

CLAYMORE (from the Gaelic claidheamh mdr, ” great sword “), the old two-edged broadsword with cross hilt, of which the guards were usually turned down, used by the Highlanders of Scotland. The name is also wrongly applied to the single-edged basket-hilted sword adopted in the 16th century and still worn as the full-dress sword in the Highland regiments of the British army.

CLAYS, PAUL JEAN (1810-1000), Belgian artist, was born at Bruges in 1819, and died at Brussels in 1900. He was one of the most esteemed marine painters of his time, and early in his career he substituted a sincere study of nature for the extravagant and artificial conventionality of most of his predecessors. When he began to paint, the sea was considered by continental artists as worth representing only under its most tempestuous aspects. Artists cared only for the stirring drama of storm and wreck,

and they clung still to the old-world tradition of the romantic school. Clays was the first to appreciate the beauty of calm waters reflecting the slow procession of clouds, the glories of sunset illuminating the sails of ships or gilding the tarred sides of heavy fishing-boats. He painted the peaceful life of rivers, the poetry of wide estuaries, the

regulated stir of roadsteads and ports. And while he thus broke away from old traditions he also threw off the trammels imposed on him by his master, the marine painter Theodore Gudin (1802-1880). Endeavouring only to give truthful expression to the nature that delighted his eyes, he sought to render the limpid salt atmosphere, the weight of waters, the transparence of moist horizons, the gem-like sparkle of the sky. A Fleming in his feeling for colour, he set his palette with clean strong hues, and their powerful harmonies were in striking contrast with the rusty, smoky tones then in favour. If he was not a ” luminist ” in the modern use of the word, he deserves at any rate to be classed with the founders of the modern naturalistic school. This conscientious and healthy interpretation, to which the artist remained faithful, without any important change, to the end of an unusually long and laborious career, attracted those minds which aspired to be bold, and won over those which were moderate. Clays soon took his place among the most famous Belgian painters of his generation, and his pictures, sold at high prices, are to be seen in most public and private galleries. We may mention, among others, ” The Beach at Ault,” ” Boats in a Dutch Port,” and ” Dutch Boats in the Flushing Roads,” the last in the National Gallery, London. In the Brussels gallery are ” The Port of Antwerp,” ” Coast near Ostend,” and a ” Calm on the Scheldt “; in the Antwerp museum, ” The Meuse at Dordrecht “; in the Pinakothek at Munich, ” The Open North Sea “; in the Metropolitan Museum of Fine Arts, New York, ” The Festival of the Freedom of the Scheldt at Antwerp in 1863 “; in the palace of the king of the Belgians, ” Arrival of Queen Victoria at Ostend in 1857 “; in the Bruges academy, ” Port of Feirugudo, Portugal.” Clays was a member of several Academies, Belgian and foreign, and of the Order of Leopold, the Legion of Honour, &c.

See Camille Lemonnier, Histoire des Beaux-Arts (Brussels, 1887).

(O. M.*)

CLAYTON, JOHN MIDDLETON (1796-1856), American politician, was born in Dagsborough, Sussex county, Delaware, on the 24th of July 1796. He came of an old Quaker family long prominent in the political history of Delaware. He graduated at Yale in 1813, and in 18 19 began to practise law at Dover, Delaware, “where for a time he was associated with his cousin, Thomas Clayton (1778-1854), subsequently a United States senator and chief-justice of the state. He soon gained a large practice. He became a member of the state House of Repre- sentatives in 1824, and from December 1826 to October 1828 was secretary of state of Delaware. In 1829, by a combination of anti-Jackson forces in the state legislature, he was elected to the

United States Senate. Here his great oratorical gifts gave him a high place as one of the ablest and most eloquent opponents of the administration. In 183 1 he was a member of the Delaware constitutional convention, and in 1835 he was returned to the Senate as a Whig, but resigned in the following year. In 1837- 1839 ne was chief justice of Delaware. In 1845 he again entered the Senate, where he opposed the annexation of Texas and the Mexican War, but advocated the active prosecution of the latter once it was begun. In March 1849 he became secretary of state in the cabinet of President Zachary Taylor, to whose nomination and election his influence had contributed. His brief tenure of the state portfolio, which terminated on the 22nd of July 1850, soon after Taylor's death, was notable chiefly for the negotiation with the British minister, Sir Henry Lytton Bulwer, of the Clayton-Bulwer Treaty (q.v.). He was once more a member of the Senate from March 1853 until his death at Dover, Delaware, on the 9th of November 1856. By his contemporaries Clayton was considered one of the ablest debaters and orators in the Senate.

See the memoir by Joseph P. Comegys in the Papers of the His- torical Society of Delaware, No. 4 (Wilmington, 1882).

CLAYTON-BULWER TREATY, a famous treaty between the United States and Great Britain, negotiated in 1850 by John M. Clayton and Sir Henry Lytton Bulwer (Lord Dalling), in con- sequence of the situation created by the project of an inter- oceanic canal across Nicaragua, each signatory being jealous of the activities of the other in Central America. Great Britain had large and indefinite territorial claims in three regions — Belize or British Honduras, the Mosquito Coast and the Bay Islands. 1 On the other hand, the United States, without terri- torial claims, held in reserve, ready for ratification, treaties with Nicaragua and Honduras, which gave her a certain diplomatic vantage with which to balance the de facto dominion of Great Britain. Agreement on these points being impossible and agreement on the canal question possible, the latter was put in the foreground. The resulting treaty had four essential points. It bound both parties not to " obtain or maintain " any ex- clusive control of the proposed canal, or unequal advantage in its use. It guaranteed the neutralization of such canal. It declared that, the intention of the signatories being not only the accomplishment of " a particular object " — i.e. that the canal, then supposedly near realization, should be neutral and equally free to the two contracting powers — " but also to establish a general principle," they agreed " to extend their protection

by treaty stipulation to any other practicable communications, whether by canal or railway, across the isthmus which connects North and South America." Finally, it stipulated that neither signatory would ever " occupy, or fortify, or colonize, or assume or exercise any dominion over Nicaragua, Costa Rica, the Mos- quito Coast or any part of Central America," nor make use of any protectorate or alliance, present or future, to such ends.

The treaty was signed on the 19th of April, and was ratified by both governments; but before the exchange of ratifications Lord Palmerston, on the 8th of June, directed Sir H. Bulwer to make a " declaration " that the British government did not understand the treaty " as applying to Her Majesty's settlement at Honduras, or its dependencies." Mr Clayton made a counter- declaration, which recited that the United States did not regard the treaty as applying to " the British settlement in Honduras commonly called British-Honduras . . . nor the small islands in the neighbourhood of that settlement which may be known as its dependencies"; that the treaty's engagements did apply to all the Central American states, " with their just limits and proper dependencies "; and that these declarations, not being submitted to the United States Senate, could of course not affect the legal import of the treaty. The interpretation of the declara- tions soon became a matter of contention. The phraseology reflects the effort made by the United States to render impossible a physical control of the canal by Great Britain through the territory held by her at its mouth — the United States losing the above-mentioned treaty advantages, — just as the explicit abnegations of the treaty rendered impossible such control politically by either power. But great Britain claimed that the excepted " settlement " at Honduras was the " Belize " covered by the extreme British claim; that the Bay Islands were a dependency of Belize; and that, as for the Mosquito Coast, the abnegatory clauses being wholly prospective in intent, she was not required to abandon her protectorate. The United States contended that the Bay Islands were not the " dependencies " of Belize, these being the small neighbouring islands mentioned in the same treaties; that the excepted " settlement " was the British-Hpnduras of definite extent and narrow purpose recog- nized in British treaties with Spain; that she had not con- firmed by recognition the large, indefinite and offensive claims whose dangers the treaty was primarily designed to lessen; and that, as to the Mosquito Coast, the treaty was retrospective, and mutual in the rigour of its requirements, and as the United States had no de facto possessions, while Great Britain had, the clause

1 The claims to a part of the first two were veryold in origin, but all

were heavily clouded by interruptions of possession, contested interpretations of Spanish-British treaties, and active controversy with the Central American States. The claim to some of the terri- tory was new and still more contestable. See particularly on these claims Travis's book cited below.

binding both not "to " occupy " any part of Central America or the Mosquito Coast necessitated the abandonment of such territory as Great Britain was already actually occupying or exercising dominion over; and the United States demanded the complete abandonment of the British protectorate over the Mosquito Indians. It seems to be a just conclusion that when in 1852 the Bay Islands were erected into a British " colony " this was a flagrant infraction of the treaty; that as regards Belize the American arguments were decidedly stronger, and more correct historically; and that as regards the Mosquito question, inasmuch as a protectorate seems certainly to have been recognized by the treaty, to demand its absolute abandon- ment was unwarranted, although to satisfy the treaty Great Britain was bound materially to weaken it.

In 1859-1860, by British treaties with Central American states, the Bay Islands and Mosquito questions were settled nearly in accord with the American contentions. 2 But by the same treaties Belize was accorded limits much greater than those contended for by the United States. This settlement the latter power accepted without cavil for many years.

Until 1866 the policy of the United States was consistently for inter-oceanic canals open equally to all nations, and un- equivocally neutralized; indeed, until 1880 there was practically no official divergence from this policy. But in 1880-1884 a variety of reasons were advanced why the United States might justly repudiate at will the Clayton-Bulwer Treaty. 3 The new policy was based on national self-interest. The arguments advanced on its behalf were quite indefensible in law and history, and although the position of the United States in 1850-1860 was in general the stronger in history, law and political ethics, that of Great Britain was even more conspicuously the stronger in the years 1880-1884. In 1885 the former government re- verted to its traditional policy, and the Hay-Pauncefote Treaty of 1902, which replaced the Clayton-Bulwer Treaty, adopted the rule of neutralization for the Panama Canal.

See the collected diplomatic correspondence in I. D. Travis, History of the Clayton-Bulwer Treaty (Ann Arbor, Mich., 1899) ; J. H. Latane, Diplomatic Relations of the United States and Spanish America

(Baltimore, 1900); T. J. Lawrence, Disputed Questions of Modern International Law (2nd ed., Cambridge, England, 1885); Sir E. L. Bulwer in 99 Quarterly Rev. 235-286, and Sir H. Bulwer in 104 Edinburgh Rev. 280-298.

CLAY-WITH-FLINTS, in geology, the name given by W- Whi taker in 1861 to a peculiar deposit of stiff red, brown or yellow clay containing unworn whole flints as well as angular shattered fragments, also with a variable admixture of rounded flint, quartz, quartzite and other pebbles. It occurs ” in sheets or patches of various sizes over a large area in the south of England, from Hertfordshire on the north to Sussex on the south, and from Kent on the east to Devon on the west. It almost always lies on the surface of the Upper Chalk, but in Dorset it passes on to the Middle and Lower Chalk, and in Devon it is found on the Chert-Beds of the Selbornian group ” (A. J. Jukes-Browne, ” The Clay-with-Flints, its Origin and Distribution,” Q.J.G.S., vol. lxii., 1906, p. 132). Many geologists have supposed, and some still hold, that the Clay-with-Flints is the residue left by the slow solution and disintegration of the Chalk by the processes of weathering; on the other hand, it has long been known that the deposit very frequently contains materials foreign to the Chalk, derived either from the Tertiary rocks or from overlying drift. In the paper quoted above, Jukes-Browne ably summarizes

2 The islands were ceded to Honduras. The Mosquito Coast was recognized as under Nicaraguan rule limited by an attenuated British protectorate over the Indians, who were given a reservation and certain peculiar rights. They were left free to accept full Nicaraguan rule at will. This they did in 1894.

3 It was argued, e.g., that the ” general principle ” of that engagement was contingent on the prior realization of its ” particular object,” which had failed, and the treaty had determined as a special contract; moreover, none of the additional treaties to embody the ” general principle ” had been negotiated, and Great Britain had not even offered co-operation in the protection and neutrality- guarantee of the Panama railway built in 1850-1855, so that her rights had lapsed; certain engagements of the treaty she had vio- lated, and therefore the whole treaty was voidable, &c.

the evidence against the view that the deposit is mainly a Chalk

residue, and brings forward a good deal of evidence to show that many patches of the Clay-with-Flints lie upon the same plane and may be directly associated with Reading Beds. He concludes “that the material of the Clay-with-Flints has been chiefly and almost entirely derived from Eocene clay, with addition of some flints from the Chalk; that its presence is an indication of the previous existence of Lower Eocene Beds on the same site and nearly at the same relative level, and, conse- quently, that comparatively little Chalk has been removed from beneath it. Finally, I think that the tracts of Clay-with- Flints have been much more extensive than they are now ” (loc. cil. p. 159).

It is noteworthy that the Clay-with-Flints is developed over an area which is just beyond the limits of the ice sheets of the Glacial epoch, and the peculiar conditions of late Pliocene and Pleistocene times; involving heavy rains, snow and frost, may have had much to do with the mingling of the Tertiary and Chalky material. Besides the occurrence in surface patches, Clay-with-Flints is very commonly to be observed descending in “pipes” often to a considerable depth into the Chalk; here, if anywhere, the residual chalk portion of the deposit should be found, and it is surmised that a thin layer of very dark clay with darkly stained flints, which appears in contact with the sides and bottom of the pipe, may represent all there is of insoluble residue.

A somewhat similar deposit, a ” conglomerat de silex ” or ” argile d silex,” occurs at the base of the Eocene on the southern and western borders of the Paris basin, in the neighbourhood of Chartres, Thimerais and Sancerrois. (J. A. H.)

CLAZOMENAE (mod. Kelisman), an ancient town of Ionia and a member of the Ionian Dodecapolis (Confederation of Twelve Cities), on the Gulf of Smyrna, about 20 m. W. of that city. Though not in existence before the arrival of the Ionians in Asia, its original founders were largely settlers from Phlius and Cleonae. It stood originally on the isthmus connecting the mainland with the peninsula on which Erythrae stood; but the inhabitants, alarmed by the encroachments of the Persians, removed to one of the small islands of the bay, and there established their city. This island was connected with the mainland by Alexander the Great by means of a pier, the remains of which are still visible. During the 5th century it was for some time subject to the Athenians, but about the middle of the Peloponnesian war (412 B.C.) it revolted. After a brief resistance, however, it again acknowledged the Athenian supremacy, and repelled a Lacedaemonian attack. Under the Romans Clazomenae was included in the province of Asia, and enjoyed an immunity from taxation. The site can still be made out, in the neighbourhood of Vourla, but nearly every portion of its ruins has

been removed. It was the birthplace of the philosopher Anaxagoras. It is famous for its painted terra-cotta sarcophagi, which are the finest monuments of Ionian painting in the 6th century B.C. (E. Gr.)

CLEANTHES (c. 301-232 or 252 B.C.), Stoic philosopher, born at Assos in the Troad, was originally a boxer. With but four drachmae in his possession he came to Athens, where he listened first to the lectures of Crates the Cynic, and then to those of Zeno, the Stoic, supporting himself meanwhile by working all night as water-carrier to a gardener (hence his nickname Qfieavrhris) . His power of patient endurance, or perhaps his slowness, earned him the title of ” the Ass “; but such was the esteem awakened by his high moral qualities that, on the death of Zeno in 263, he became the leader of the school. He continued, however, to support himself by the labour of his own hands. Among his pupils were his successor, Chrysippus, and Antigonus, king of Macedon, from whom he accepted 2000 minae. The manner of his death was characteristic. A dangerous ulcer had compelled him to fast for a time. Subse- quently he continued his abstinence, saying that, as he was already half-way on the road to death, he would not trouble to retrace his steps.

Cleanthes produced very little that was original, though he

wrote some fifty works, of which fragments have come down to us. The principal is the large portion of the Hymn to Zeris which has been preserved in Stobaeus. He regarded the sun as the abode of God, the intelligent providence, or (in accordance with Stoical materialism) the vivifying fire or aether of the universe. Virtue, he taught, is life according to nature; but pleasure is not according to nature. He originated a new theory as to the individual existence of the human soul; he held that the degree of its vitality after death depends upon the degree of its vitality in this life. The principal fragments of Cleanthes’s works are contained in Diogenes Laertius and Stobaeus; some may be found in Cicero and Seneca.

See G. C. Mohinke, Kleanthes der Stoiker (Greifswald, 1814); C. Wachsmuth, Commentationes de Zenone Citiensi et Cleanthe Assio (Gottingen, 1874-1875); A. C. Pearson, Fragments of Zeno and Cleanthes (Camb., 1891); article by E. Wellmann in Ersch and Gruber’s Allgemeine Encyklopadie ; R. Hirzel, Unlersuchungen zu Ciceros philosophischen Schriften, ii. (1882), containing a vindication of the originality of Cleanthes; A. B. Krische, Forschungen auf dent Gebiete der alten Philosophie (1840) ; also works quoted under Stoics.

CLEARCHUS, the son of Rhamphias, a Spartan general and

condottiere. Born about the middle of the 5th century B.C., Clearchus was sent with a fleet to the Hellespont in 411 and became governor {apiMarqs) of Byzantium, of which town he was proxenus. His severity, however, made him unpopular, and in his absence the gates were opened to the Athenian besieging army under Alcibiades (409) . Subsequently appointed by the ephors to settle the political dissensions then rife at Byzantium and to protect the city and the neighbouring Greek colonies from Thracian attacks, he made himself tyrant of Byzantium, and, when declared an outlaw and driven thence by a Spartan force, he fled to Cyrus. In the ” expedition of the ten thousand ” undertaken by Cyrus to. dethrone his brother Artaxerxes Mnemon, Clearchus led the Peloponnesians, who formed the right wing of Cyrus’s army at the battle of Cunaxa (401). On Cyrus’s death Clearchus assumed the chief command and conducted the retreat, until, being treacherously seized with his fellow-generals by Tissaphernes, he was handed over to Artaxerxes and executed (Thuc. viii. 8. 39, 80; Xen. Hellenica, i. 3. 15-19; Anabasis, i. ii.; Diodorus xiv. 12. 19-26). In character he was a typical product of the Spartan educational system, He was a warrior to the finger-tips (iro\eiJ.ucbs ko.1 ˆ>iXoir6Xe/xos £orxarcos. Xen. Anab. ii. 6. 1), and his tireless energy, unfaltering courage and strategic ability made him an officer of no mean order. But he seems to have had no redeeming touch of refinement or humanity.

CLEARFIELD, a borough and the county-seat of Clearfield county, Pennsylvania, U.S.A., on the W. branch of the Susque- hanna river, in the W. central part of the state. Pop. (1890) 2248; (1900) 5081 (310 foreign-born); (1910)6851. It is served by the New York Central & Hudson River, the Pennsylvania, and the Buffalo, Rochester & Pittsburg railways. The borough is about 1 105 ft. above sea-level, in a rather limited space between the hills, which command picturesque views of the narrow valley. The river runs through the borough. Coal and fireclay abound in the vicinity, and these, with leather, iron, timber and the pro- ducts of the fertile soil, are the bases of its leading industries. Before the arrival of the whites the place had been cleared of timber (whence its name), and in 1805 it was chosen as a site for the county-seat of the newly erected county and laid out as a town; in 1840 it was incorporated as a borough.

CLEARING-HOUSE, the general term for a central institution employed in connexion with large and interrelated businesses for the purpose of facilitating the settlement of accounts.

Banking. — The London Clearing-House was established between 1750 and 1770 as a place where the clerks of the bankers of the city

of London could assemble daily to exchange with one another the cheques drawn upon and bills payable at their respective houses. Before the clearing-house existed, each banker had to send a clerk to the places of business of all the other bankers in London to collect the sums payable by them in respect of cheques and bills; and it is obvious that much

time was consumed by this process, which involved the use of an unnecessary quantity of money and corresponding risks of safe carriage. In 1775 a room in Change Alley was settled upon as a common centre of exchange; this was afterwards removed to Post Office Court, Lombard Street. This clearing centre was at first confined to the bankers— at that time and long afterwards exclusively private bankers — doing business within the city, and the bankers in the west end of the metropolis used some one or other of the city banks as their agent in clearing. When the joint-stock banks were first established, the jealousy of the existing banks was powerful enough to exclude them altogether from the use of the Clearing-House; and it was not until 1854 that this feeling was removed so as to allow them to be admitted.

At first the Clearing-House was simply a place of meeting, but it came to be perceived that the sorting and distribution of cheques, bills, &c, could be more expeditiously conducted by the appointment of two or three common clerks to whom each banker's clerk could give all the instruments of exchange he wished to collect, and from whom he could receive all those payable at his own house. The payment of the balance settled the transaction, but the arrangements were afterwards so perfected that the balance is now settled by means of transfers made at the Bank of England between the Clearing-House account and those of the various banks, the Clearing-House, as well as each banker using it, having an account at the Bank of England. The use of the Clearing-House was still further extended in 1858, so as to include the settlement of exchanges between the country bankers of England. Before that time each country banker receiving cheques on other country bankers sent them to those other bankers by post (supposing they were not carrying on business in the same place), and requested that the amount should be paid by the London agent of the banker on whom the cheques were drawn to the London agent of the banker remitting them. Cheques were thus collected by correspondence, and each remittance involved a separate payment in London. Since 1858,

accordingly, a country banker sends cheques on other country banks to his London correspondent, who exchanges them at the Clearing-House with the correspondents of the bankers on whom they are drawn.

The Clearing-House consists of one long 100m, lighted from the roof. Around the walls and down the centre are placed desks, allotted to the various banks, according to the amount of their business. The desks are arranged alphabetically, so that the clerks may lose no time in passing round the room and delivering their ” charges ” or batches of cheques to the representatives of the various banks. There are three clearings in London each day. The first is at 10.30 a.m., the second at noon, and the third at 2.30 p.m. It is the busiest of all, and continues until five minutes past four, when the last delivery must be made. The three clearings were, in 1907, divided into town, metropolitan and country clearings, each with a definite area. All the clearing banks have their cheques marked with the letters ” T,” ” M ” and ” C,” according to the district in which the issuing bank is situated. Every cheque issued by the clearing banks, even though drawn in the head office of a bank, goes through the Clearing-House.

The amount of business transacted at the Clearing-House varies very much with the seasons of the year, the busiest time being when dividends are paid and stock exchange settlements are made, but the volume of transactions averages roughly from 200 to 300 millions sterling a week, and the yearly clearances amount to something like £12,000,000,000. There are provincial clearing-houses at Manchester, Liverpool, Birmingham, New- castle-on-Tyne, Leeds, Sheffield, Leicester and Bristol. There are also clearing-houses in most of *he large towns of Scotland and Ireland. In New York and the other large cities of the United States there are clearing-houses providing accommodation for the various banking institutions (see Banks and Banking).

The progress of banking on the continent of Europe has been slow in comparison with that of the United Kingdom, and the use of cheques is not so general, consequently the need for clearing-houses is not so great. In France, too, the greater

proportion of the banking business is carried on through three banks only, the Banque de France, the Societe Generate and the Credit Lyonnais, and a great part of their transactions are settled at their own head offices. But at the same time large sums pass through the Paris Chambre de Compensation (the clearing- house), established in 1872.

There are clearing-houses also in Berlin, Hamburg and many other European cities.

Railways. — The British Railway Clearing-House was estab- lished in 1842, its purpose, as defined by the Railway Clearing- House Act of 1850, being ” to settle and adjust the receipts arising from railway traffic within, or partly within, the United Kingdom, and passing over more than one railway within the United Kingdom, booked or invoiced at throughout rates or fares.” It is an independent body, governed by a committee which is composed of delegates (usually the chairman or one of the directors) from each of the railways that belong to it. Any railway company may be admitted a party to the clearing-system with the assent of the committee, may cease to be a member at a month’s notice, and may be expelled if such expulsion be voted for by two-thirds of the delegates present at a specially convened meeting. The cost of maintaining it is defrayed by contributions from the companies proportional to the volume of business passed through it by each. It has two main functions. (1) When passengers or goods are booked through between stations belonging to different railway companies at an inclusive charge for the whole journey, it distributes the money received in due proportions between the companies concerned in rendering the service. To this end it receives, in the case of passenger traffic, a monthly return of the tickets issued at each station to stations on other lines, and, in the case of goods traffic, it is supplied by both the sending and receiving stations (when these are on different companies’ systems) with abstracts showing the character, weight, &c, of the goods that have travelled between them. By the aid of these particulars it allocates the proper share of the receipts to each company, having due regard to the distance over which the traffic has been carried on each line, to the terminal services rendered by each company, to any incidental expenses to which it may have been put, and to the existence of any special agree- ments for the division of traffic. (2) To avoid the inconvenience of a change of train at points where the lines of different com- panies meet, passengers are often, and goods and minerals generally, carried in through vehicles from their starting-point to their destination. In’ consequence, vehicles belonging to one company are constantly forming part of trains that belong to, and run over the lines of, other companies, which thus have the temporary use of rolling stock that does not belong to them. By the aid of a large staff of ” number takers ” who are stationed at junctions all over the country, and whose business is to record particulars of the vehicles which pass through those junctions, the Clearing-House follows the movements of vehicles which have left

their owners' line, ascertains how far they have run on the lines of other companies, and debits each of the latter with the amount it has to pay for their use. This charge is known as " mileage "; another charge which is also determined by the Clearing-House is " demurrage," that is, the amount exacted from the detaining company if a vehicle is not returned to its owners within a prescribed time. By the exercise of these functions the Clearing-House accumulates a long series of credits to, and debits against, each company; these are periodically added up and set against each other, with the result that the accounts between it and the companies are finally settled by the transfer of comparatively small balances. It also distributes the money paid by the post-office to the railways on account of the conveyance of parcel-post traffic, and through its lost luggage department many thousands of articles left in railway carriages are every year returned to their owners. Its situation in London further renders it a convenient meeting-place for several " Clear- ing-House Conferences " of railway officials, as of the general managers, the goods managers, and the superintendents of the line, held four times a year for the consideration of questions in which all the companies are interested. The Irish Railway

Clearing-House, established in 1848, has its headquarters in Dublin, and was incorporated by act of parliament in i860. – General. — The principle of clearing adopted by banks and railways has been applied with considerable success in other businesses.

In 1874 the London Stock Exchange Clearing-House was established for the purpose of settling transactions in stock, the clearing being effected by balance-sheets and tickets; the balance of stock to be received or delivered is shown on a balance-sheet sent in by each member, and the items are then cancelled against one another and tickets issued for the balances outstanding. The New York Stock Exchange Clearing-House was established in 1892. The settlements on the Paris Bourse are cleared within the Bourse itself, through the Compagnie des Agents de Change de Paris.

In 1888 a society was formed in London called the Beetroot Sugar Association for clearing bargains in beetroot sugar. For every 500 bags of sugar of a definite weight which a broker sells, he issues a filler e (a form something like a dock- warrant), giving particulars as to the ship, the warehouse, trade-marks, &c. The filiere contains also a series of

transfer forms which are filled up and signed by each successive holder, so transferring the property to a new purchaser. The new purchaser also fills up a coupon attached to the transfer, quoting the date and hour of sale. This coupon is detached by the seller and retained by him as evidence to determine any liability through subsequent delay in the delivery of the sugar. Any purchaser requiring delivery of the sugar forwards the filiere to the clearing-house, and the officials then send on his name to the first seller who tenders him the warrant direct. These filieres pass from hand to hand within a limit of six days, a stamp being affixed on each transfer as a clearing-house fee. The difference between each of the successive transactions is adjusted by the clearing-house to the profit or loss of the seller.

The London Produce Clearing-House was established in 1888 for regulating and adjusting bargains in foreign and colonial produce. The object of the association is to guarantee both to the buyer and the seller the fulfilment of bargains for future delivery. The transactions on either side are allowed to accumu- late during a month and an adjustment made at the end by a settlement of the final balance owing. On the same lines are the Caisse de Liquidation at Havre and the Waaren Liquidations Casse at Hamburg. The Cotton Association also has a clearing- house at Liverpool for clearing the transactions which arise from dealings in cotton.

Authorities. — W. Howarth, Our Clearing System and Clearing Houses (1897), The Banks in the Clearing House (1905) ; J. G. Cannon, Clearing-houses, their History, Methods and Administration (1901); H. T. Easton, Money, Exchange and Banking (1905) ; and the various volumes of the Journal of the Institute of Bankers. (T. A. I.)

CLEAT (a word common in various forms to many Teutonic languages, in the sense of a wedge or lump, cf. ” clod ” and ” clot “), a wedge-shaped piece of wood fastened to ships’ masts and elsewhere to prevent a rope, collar or the like from slipping, or to act as a step; more particularly a piece of wood or metal with double or single horns used for belaying ropes. A ” cleat ” is also a wedge fastened to a ship’s side to catch the shores in a launching cradle or dry dock. ” Cleat ” is also used in mining for the vertical cleavage-planes of coal.

CLEATOR MOOR, an urban district in the Egremont parlia- mentary division of Cumberland, England, 4 m. S.E. of White- haven, served by the Furness, London & North-Western and Cleator & Workington Junction railways. Pop. (1901) 8120. The town lies between the valleys of the Ehen and its tributary the Dub Beck, in a district rich in coal and iron ore. The mining of these, together with blast furnaces

and engineering works, occupies the large industrial population.

CLEAVERS, or Goose-geass, Galium Aparine (natural order Rubiaceae), a common plant in hedges and waste places, with a long, weak, straggling, four-sided, green stem, bearing whorls of 6 to 8 narrow leaves, 5 to 2 in. long, and, like the angles of the stem, rough from the presence of short, stiff, downwardly-pointing,

hooked hairs. The small, white, regular flowers are borne, a few together, in axillary clusters, and are followed by the large, hispid, two-celled fruit, which, like the rest of the plant, readily clings to a rough surface, whence the common name. The plant has a wide distribution throughout the north temperate zone, and is also found in temperate South America.

CLEBURNE, a town and the county-seat of Johnson county, Texas, U.S.A., 25 m. S. of Fort Worth. Pop. (1890) 3278;

(1900) 7493, including 611 negroes; (1910)10,364. Itisservedby the Gulf, Colorado & Santa F6, the Missouri, Kansas & Texas, and the Trinity & Brazos Valley railways. It is the centre of a prosperous farming, fruit and stock-raising region, has large railway repair shops, flour-mills, cotton gins and foundries, a canning factory and machine shops. It has a Carnegie library, and St Joseph's Academy (Roman Catholic; for girls). The town was named in honour of Patrick Ronayne Cleburne (1828- 1864), a major-general of the Confederate army, who was of Irish birth, practised law in Helena, Arkansas, served at Shiloh, Perryville, Stone River, Chickamauga, Missionary Ridge, Ring- gold Gap, Jonesboro and Franklin, and was killed in the last- named battle; he was called the " Stonewall of the West."

CLECKHEATON, an urban district in the Spen Valley parlia- mentary division of the West Riding of Yorkshire, England, 55 m. S. by E. of Bradford, on the Lancashire & Yorkshire, Great Northern and London & North-Western railways. Pop.

(1901) 12,524. A chamber of commerce has held meetings here since 1878. The industries comprise the manufacture of woollens, blankets, flannel, wire-card and machinery.

CLEETHORPES, a watering-place of Lincolnshire, England; within the parliamentary borough of Great Grimsby, 3 m. S.E. of that town by a branch of the Great Central railway. Pop. of urban district of Cleethorpe with Thrunscoe (1901) 12,578. Cleethorpes faces eastward to the North Sea, but its shore of fine sand, affording good bathing,

actually belongs to the estuary of the Humber. There is a pier, and the sea-wall extends for about a mile, forming a pleasant promenade. The suburb of New Clee connects Cleethorpes with Grimsby. The church of the Holy Trinity and St Mary is principally Norman of various dates, but work of a date apparently previous to the Conquest appears in the tower. Cleethorpes is greatly favoured by visitors from the midland counties, Lancashire and Yorkshire.

CLEFT PALATE and HARE-LIP, in surgery. Cleft Palate is a congenital cleavage, or incomplete development in the roof of the mouth, and is frequently associated with hare-lip. The infan.t is prevented from sucking, and an operation is necessary. Cleft-palate is often a hereditary defect. The most favourable time for operating is between the age of two weeks and three months, and if the cleft is closed at this early date, not only are the nutrition and general development of the child greatly improved, but the voice is probably saved from much of the unpleasant tone which is usually associated with a defective roof to the mouth and is apt to persist even if a cleft has been successfully operated on later in childhood. The greatest advance which has been made in the operative treatment of cleft palate is due to the teaching of Dr Truman W. Brophy, who adopted the ingenious plan of thrusting together to the middle line of the mouth the halves of the palate which nature bad unfortun- ately left apart. But, as noted above, this operation must, to give the best results, be undertaken in the earliest months of infancy. After the cleft in the palate has been effectually dealt with, the hare-lip can be repaired with ease and success.

Hare-lip. — In the hare the splitting of the lip is in the middle line, but in the human subject it is on one side, or on both sides of the middle line. This is accounted for on developmental grounds: a cleft in the exact middle line is of extremely rare occurrence. Hare-lip is often associated with cleft palate. Though we are at present unable to explain why development should so frequently miss the mark in connexion with the forma- tion of the lip and palate, it is unlikely that maternal impressions have anything to do with it. As a rule, the supposed ” fright ” comes long after the lips are developed. They are completely formed by the ninth week. Heredity has a powerful influence

in many cases. The best time for operating on a hare-lip depends upon

various circumstances. Thus, if it is associated with cleft palate, the palatine cleft has first to be closed, in which case the child will probably be several months old before the lip is operated on. If the infant is in so poor a state of nutrition that it appears unsuitable for surgical treatment, the operation must be post- poned until his condition is sufficiently improved. But, assuming that the infant is in fair health, that he is taking his food well and thriving on it, that he is not troubled by vomiting or diarrhoea, and that the hare-lip is not associated with a defective palate, the sooner it is operated on the better. It maybe successfully done even within a few hours of birth. When a hare-lip is unassociated with cleft palate, the infant may possibly be enabled to take the breast within a short time of the gap being closed. In such a case the operation may be advisably undertaken within the first few days of birth. The case being suitable, the operation may be conveniently undertaken at any time after the tenth day. (E. O.*)

CLEISTHENES, the name of two Greek statesmen, (i) of Athens, (2) of Sicyon, of whom the first is far the more important.

1. Cleisthenes, the Athenian statesman, was the son of Megacles and Agariste, daughter of Cleisthenes of Sicyon. He thus belonged, through his father, to the noble family of the Alcmaeonidae (q.v.), who bore upon them the curse of the Cylon- ian massacre, and had been in exile during the rule of the Peisi- stratids. In the hope of washing out the stigma, which damaged their prestige, they spent the latter part of their exile in carrying out with great splendour the contract given out by the Amphic- tyons for the rebuilding of the temple at Delphi (destroyed by fire in 548 B.C.). By building the pronaos of Parian marble instead of limestone as specified in the contract, they acquired a high reputation for piety; the curse was consigned to oblivion, and their reinstatement was imposed by the oracle itself upon the Spartan king, Cleomenes (q.v.). Cleisthenes, to whom this far-seeing atonement must probably be attributed, had also on his side (1) the malcontents in Athens who were disgusted with the growing severity of Hippias, and (2) the oligarchs of Sparta, partly on religious grounds, and partly owing to their hatred of tyranny. Aristotle's Constitution of Athens, however, treats the alliance of the Peisistratids with Argos, the rival of Sparta in the Peloponnese, as the chief ground for the action of Sparta (c. 19). In c. 513 B.C. Cleisthenes invaded Attica, but was defeated by the tyrant's mercenaries at Leipsydrium (S. of Mt. Parnes). Sparta then, in tardy obedience to the oracle, threw off her alliance with the Peisistratids, and, after one failure, expelled Hippias in 511-510 B.C., leaving Athens once again at the mercy of the powerful families.

Cleisthenes, on his return, was in a difficulty; he realized that Athens would not tolerate a new" tyranny, nor were the other nobles willing to accept him as leader of a forebta" constitutional oligarchy. It was left for him to " take policy. the people into partnership " as Peisistratus had in a different way done before him. Solon's reforms had failed, primarily because they left unimpaired the power of the great landed nobles, who, in their several districts, doubled the r61es of landlord, priest and patriarch. This evil of local influence Peisistratus had concealed by satisfying the nominally sovereign people that in him they had a sufficient representative. It was left to Cleisthenes to adopt the remaining remedy of giving substance to the form of the Solonian constitution. His first attempts roused the aristocrats to a last effort; Isagoras appealed to the Spartans (who, though they disliked tyranny, had no love for democracy) to come to his aid. Cleisthenes retired on the arrival of a herald from Cleomenes, reviving the old question of the curse; Isagoras thus became all-powerful 1 and expelled seven hundred families. The democrats, however,

1 The archonship of Isagoras in 508 is important as showing that Cleisthenes, three years after his return, had so far failed to secure the support of a majority in Athens. There is no sufficient reason for supposing that the election of Isagoras was procured by Cleo- menes ; all the evidence points to its having been brought about in the ordinary way. Probably, therefore, Cleisthenes did not take the people thoroughly into partnership till after the spring of 508.

rose, and after besieging Cleomenes and Isagoras in the Acropolis, let them go under a safe-conduct, and brought back the exiles.

Apart from the reforms which Cleisthenes was now able to establish, the period of his ascendancy is a blank, nor are we told when and how it came to an end. It is clear, however — and it is impossible in connexion with the Pan-hellenic patriotism to which Athens laid claim, to overrate the importance of the fact — that Cleisthenes, hard pressed in the war with Boeotia, Euboea and Sparta (Herod, v. 73 and foil.), sent ambassadors to ask the help of Persia. The story, as told by Herodotus, that the ambassadors of their own accord agreed to give " earth and water " (i.e. submission) in return for Persian assistance, and that the Ecclesia subsequently disavowed their action as un-authorized, is scarcely credible. Cleisthenes (1) was in full control and must have instructed the ambassadors; (2) he knew that any help from Persia meant submission. It is practi- cally certain, therefore, that he (cf. the Alcmaeonids and the story of the shield at Marathon) was the first to " medize " (see Curtius, History of Greece). Probably he had

hoped to persuade the Ecclesia that the agreement was a mere form. Aelian says that he himself was a victim to his own device of ostracism (q.v.); this, though apparently inconsistent with the Constitution of Athens (c. 22), may perhaps indicate that his political career ended in disgrace, a hypothesis which is explicable on the ground of this act of treachery in respect of the attempted Persian alliance. Whether to Cleisthenes are due the final success over Boeotia and Euboea, the planting of the 4000 cleruchs on the Lelantine Plain, and the policy of the Aeginetan War (see Aegina), in which Athens borrowed ships from Corinth, it is impossible to determine. The eclipse of Cleisthenes in all records is one of the most curious facts in Greek history. It is also curious that we do not know in what official capacity Cleisthenes carried his reforms. Perhaps he was given extra-ordinary ad hoc powers for a specified time; conceivably he used the ordinary mechanism. It seems clear that he had fully considered his scheme in advance, that he broached it before the last attack of Isagoras, and that it was only after the final expulsion of Isagoras and his Spartan allies that it became possible for him to put it into execution.

Cleisthenes aimed at being the leader of a self-governing people; in other words he aimed at making the democracy actual. He realized that the dead-weight which held the democracy down was the influence on politics thˆ S S of the local religious unit. Therefore his prime object reforms. was to dissociate the clans and the phratries from politics, and to give the democracy a totally new electoral basis in which old associations and vested interests would be split up and become ineffective. It was necessary that no man should govern a pocket-constituency merely by virtue of his religious, financial or ancestral prestige, and that there should be created a new local unit with administrative powers of a democratic character which would galvanize the lethargic voters into a new sense of responsibility and independence. His first step was to abolish the four Solonian tribes and create ten new ones. 2 Each of the new tribes was subdivided into ” demes ’” (roughly “townships”); this organization did not, except politically, supersede the system of clans and tribes.” phratries whose old religious signification remained untouched. The new tribes, however, though geographically arranged, did not represent local interests. Further, the tribe names were taken from legendary heroes (Cecropis, Pandionis, Aegeis recalled the storied kings of Attica), and, therefore, contributed to the idea of a national unity; even Ajax, the eponym of the tribe Aeantis, though not Attic, was famous as an ally (Herod, v. 66) and ranked as a national hero. Each tribe had its shrine and its particular hero-cult, which, however, was free from local

association and the dominance of particular

2 The explanation given for this step by Herodotus (v. 67) is an amusing example of his incapacity as a critical historian. To compare Cleisthenes of Sicyon (see below), bent on humiliating the Dorians of Sicyon by giving opprobrious names to the Dorian tribes, with his grandson, whose endeavour was to elevate the very persons whose tribal organization he replaced, is clearly absurd.

Demes.

families. This national idea Cleisthenes further emphasized by setting up in the market-place at Athens a statue of each tribal hero.

The next step was the organization of the deme. Within each tribe he grouped ten demes (see below), each of which had (1) its hero and its chapel, and (2) its census-list kept by the demarch. The demarch (local governor), who was elected popularly and held office for one year, presided over meetings affecting local administration and the provision of crews for the state-navy, and was probably under a system of scrutiny like the dokimasia of the state-magistrates. According to the Aristotelian Constitution of Athens, Cleisthenes further divided Attica into three districts, Urban and Suburban, Inland {Mesogaios), and Maritime (Paralia), each of which w r as sub-divided into, ten triltyes; each tribe had three trittyes in each of these districts. The problem of establishing this decimal system in connexion with the demes and trittyes is insoluble. Herodotus says that there were ten 1 demes to each tribe (5f/ca ets tos v\6s) ; but each tribe was composed of three trittyes, one in each of the three districts. Since the deme was, as will be seen, the electoral unit, it is clear that in tribal voting the object of ending the old threefold schism of the Plain, the Hill and the Shore was attained, but the relation of deme and trittys is obviously of an unsymmetrical kind. The Constitution of Athens says nothing of the ten-deme-to-each-tribe arrangement, and there is no sufficient reason for supposing that the demes originally were exactly a hundred in number. We know the names of 168 demes, and Polemon (3rd century B.C.) enumerated 173. It has been suggested that the demes did originally number exactly a hundred, and that new demes were added as the popu- lation increased. This theory, however, presupposes that the demes were originally equal in numbers. In the 5th and 4th centuries this was certainly not the case;

the number of demes- men in some cases was only one hundred or two hundred, whereas the deme Acharnae is referred to as a ” great part ” of the whole state, and is known to have furnished three thousand hoplites. The theory is fundamentally at fault, inasmuch as it regards the deme as consisting of all those resident within Us borders. In point of fact membership was hereditary, not residential; Demosthenes “of the Paeanian deme” might live where he would without severing his deme connexion. Thus the increase of population could be no reason for creating new demes. This distinction in a deme between demesmen and residents belonging to another deme (the tyKturqiAvoC) , who paid a deme-tax for their privilege, is an important one. It should further be noted that the demes belonging to a particular tribe do not, as a fact, appear always in three separate groups; the tribe Aeantis consisted of Phalerum and eleven demes in the district of Marathon; other tribes had demes in five or six groups. It must, therefore, be admitted that the problem is insoluble for want of data. Nor are we better equipped to settle the relation between the Cleisthenean division into Urban, Maritime and Inland, and the old divisions of the Plain, the Shore and the Upland or Hill. The ” Maritime ” of Cleisthenes and the old ” Shore ” are certainly not coincident, nor is the ” Inland ” identical with the ” Upland.”

Lastly, it has been asked whether we are to believe that Cleisthenes invented the demes. To this the answer is in the negative. The demes were undoubtedly primitive divisions of Attica; Herodotus (ix. 73) speaks of the Dioscuri as ravaging the demes of Decelea (see R. W. Macan ad loc.) and we hear of opposition between the city and the demes. The most logical conclusion perhaps is that Cleisthenes, while he did create the demes which Athens itself comprised, did not create the country demes, but merely gave them definition as political divisions. Thus the city itself had six demes in five different tribes, and the other five tribes were represented in the suburbs and the Peiraeus. It is clear that in the Cleisthenean system there was one great source of danger, namely that the residents in and about Athens must always have had more weight in elections than those in

1 Wilamowitz-Moellendorff (Arist. und Aihen, pp. 149-150) suggests itKaxa, ” in ten batches,” instead of Sima.

distant demes. There can be little doubt that the preponderat- ing influence of the city was responsible for the unwisdom of the later imperial policy and the Peloponnesian war.

A second problem is the franchise reform of Cleisthenes. Aristotle in the Politics (iii. 2. 3 = 1275 b) says that Cleisthenes created new

citizens by enrolling in the tribes ” many resident aliens and emancipated slaves.” 2 But the Aristotelian Con- stitution of Athens asserts that he gave ” citizenship to the masses.” These two statements are not compatible. It is perfectly clear that Cleisthenes is to be regarded as a democrat, and it would have been no bribe to the £ fa ˆ & people merely to confer a boon on aliens and slaves. Moreover, a revision of the citizen-roll (diapsephismus) had recently taken place (after the end of the tyranny) and a great many citizens had been struck off the roll as being of impure descent (olt < $ ytvei ixrj Kadapoi). This class had existed from the time of Solon, and, through fear of political extinction by the oligarchs, had been favourable to Peisistratus. Cleis- thenes may have enfranchised aliens and slaves, but it seems certain that he must have dealt with these free Athenians who had lost their rights. Now Isagoras presumably did not carry out this revision of the roll (diapsephismus) ; as " the friend of the tyrants " (so Ath. Pol. 20; by Meyer, Busolt and others contest this) he would not have struck a blow at a class which favoured his own views. A reasonable hypothesis is that Cleisthenes was the originator of the measure of expulsion, and that he now changed his policy, and strengthened his hold on the democracy by reinstating the disfranchised in much larger numbers. The new citizens, whoever they were, must, of course, have been enrolled also in the (hitherto exclusive) phratry lists and the deme-rolls.

The Boule (q.v.) was reorganized to suit the new tribal arrange- ment, and was known henceforward as the Council of the Five Hundred, fifty from each tribe. Its exact constitution yt > e is unknown, but it was certainly more democratic council than the Solonian Four Hundred. Further, the aBd boards system of ten tribes led in course of time to the con- struction of boards of ten to deal with military and civil affairs, e.g. the Strategi (see Strategus), the Apodectae, and others. Of these the former cannot be attributed to Cleisthenes, but on the evidence of Androtion it is certain that it was Cleisthenes who replaced the Colacretae 3 by the Apodectae (“receivers”), who were controllers and auditors of the finance department, and, before the council in the council-chamber, received the revenues. The Colacretae, who had done this work before, remained in authority over the internal expenses of the Pry- taneum. A further change which followed from the new tribal system was the reconstitution of the army; this, however, probably took place about 501 B.C., and cannot be attributed directly to Cleisthenes. It has been said that the deme became the local political unit, replacing the naucrary (q.v.). But the naucraries still supplied the fleet, and were increased in number from forty-eight to fifty; if each naucrary still supplied a ship and two

mounted soldiers as before, it is interesting to learn that, only seventy years before the Peloponnesian War, Athens had but fifty ships and a hundred horse. 4

The device of ostracism is the final stone in the Cleisthenean structure. An admirable scheme in theory, and, at first, in practice, it deteriorated in the 5th century into a mere party

2 It should be observed that there are other translations of the difficult phrase t-kvovs ical bov\ous ju€toikous.

3 Colacretae were very ancient Athenian magistrates; either (1) those who ” cut up the joints ” in the Prytaneum (kwXci, Keipoi), or (2) those who ” collected the joints” (kSAgi, aydpio) which were left over from public sacrifices, and consumed in the Prytaneum. These officials were again important in the time of Aristophanes (Wasps, 693, 724; Birds, 1541), and they presided, over the payment of the dicasts instituted by Pericles. They are not mentioned, though they may have existed, after 403 B.C. At Sicyon also magistrates of this name are found.

4 It is, however, more probable that the right reading of the passage is Una iTTTreis instead of Svo, which would give a cavalry force in early Athens of 480, a reasonable number in proportion to the total fighting strength.

weapon, and in the case of Hyperbolus (417) became an absurdity.

In conclusion it should be noticed that Cleisthenes was the founder of the Athens which we know. To him was due the spirit of nationality, the principle of liberty duly apportioned and controlled by centralized and de- centralized administration, which prepared the ground for the rich developments of the Golden Age with its triumphs of art and literature, politics and philosophy. It was Cleisthenes who organized the structure which, for a long time, bore the heavy burden of the Empire against impossible odds, the structure which the very different genius of Pericles was able to beautify. He was the first to appreciate the unique power in politics, literature and society of an organized public opinion.

Authorities. — Ancient: Aristotle, Constitution of Athens (ed. J. E. Sandys), cc. 20-22, 41 ; Herodotus v. 63-73, vi. 131 ; Aristotle, Politics, iii. 2, 3 (= 1275 b, for franchise reforms). Modern: Histories of Greece in general, especially those of Grote and Curtius (which, of course, lack the information contained in the Constitution of Athens), and J. B. Bury. See also E. Meyer, Geschichte des Altertums (vol. ii.); G. Busolt, Griech. Gesch. (2nd ed., 1893 foil.); Milchhofer, ” tlber die Demenordnung des Kleisthenes ” in appendix to Abhand- lung d. Berl. Akad. (1892); R. Loeper in Athen. Mitteil. (1892), pp. 319-433; A. H. J. Greenidge, Handbook of Greek Constitutional History (1896); Gilbert, Greek Constitutional Antiquities (Eng. trans., 1895) ; R. W. Macan, Herodotus iv.vi., vol. ii. (1895), pp. 127 148; U. von Wilamowitz-Moellendorff, Arist. und Athen. See also Boule; Ecclesia; Ostracism; Naucrary; Solon.

2. Cleisthenes of Sicyon (c. 600-570), grandfather of the above, became tyrant of Sicyon as the representative of the conquered Ionian section of the inhabitants. He emphasized the destruction of Dorian predominance by giving ridiculous epithets to their tribal units, which from Hylleis, Dymanes and Pamphyli become Hyatae (“Swine-men”), Choireatae (“Pig- men “) and Oneatae (” Ass-men “). He also attacked Dorian Argos, and suppressed the Homeric ” rhapsodists ” who sang the exploits of Dorian heroes. He championed the cause of the Delphic oracle against the town of Crisa (Cirrha) in the Sacred War (c. 590) . Crisa was destroyed, and Delphi became one of the meeting-places of the old amphictyony of Anthela, henceforward often called the Delphic amphictyony. The Pythian games, largely on the initiative of Cleisthenes, were re-established with new magnificence, and Cleisthenes won the first chariot race in 582. He founded Pythian games at Sicyon, and possibly built a new Sicyonian treasury at Delphi. His power was s© great that when he offered his daughter Agariste in marriage, some of the most prominent Greeks sought the honour, which fell upon Megacles, the Alcmaeonid. The story of the rival wooers with the famous retort, ” Hippocleides don’t care,” is told in Herod. vi. 125; see also Herod, v. 67 and Thuc. 1. 18.

Cleisthenes is also the name of an Athenian, pilloried by Aristo- phanes (Clouds, 354; Thesm. 574) as a fop and a profligate. (J. M. M.)

CLEITARCHUS, one of the historians of Alexander the Great, son of Deinon, also an historian, was possibly a native of Egypt, or at least spent a considerable time at the court of Ptolemy Lagus. Quintilian (Instit. x. 1. 74) credits him with more ability than trustworthiness, and Cicero {Brutus, 11) accuses him of giving a fictitious account of the death of Themistocles. But there is no doubt that his history was

very popular, and much used by Diodorus Siculus, Quintus Curtius, Justin and Plutarch, and the authors of the Alexander romances. His unnatural and exaggerated style became proverbial.

The fragments, some thirty in number, chiefly preserved in Aelian and Strabo, will be found in C. Miiller's Scriptores Rerum Alexandri Magni (in the Didot Arrian, 1846); monographs by C. Raun, De Clitarcho Diodori, Curtii, Justini auctore (1868), and F. Reuss, " Hellenistische Beitrage " in Rhein. Mus. lxiii. (1908), pp. 58-78.

CLEITHRAL (Gr. KKtWpov, an enclosed or shut-up place), an architectural term applied to a covered Greek temple, in j contradistinction to hypaethral, which designates one that is uncovered; the roof of a cleithral temple completely covers it.

CLEITOR, or Clitor, a town of ancient Greece, in that part of

Arcadia which corresponds to the modern eparchy of Kalavryta

in the nomos of Elis and Achaea. It stood in a fertile plain to

the south of Mt Chelmos, the highest peak of the Aroanian

Mountains, and not far from a stream of its own name, which joined the Aroanius, or Katzana. In the neighbourhood was a fountain, the waters of which were said to deprive those who drank them of the taste for wine. The town was a place of con- siderable importance in Arcadia, and its inhabitants were noted for their love of liberty. It extended its territory over several neighbouring towns, and in the Theban war fought against Orchomenus. It joined the other Arcadian cities in the founda- tion of Megalopolis. As a member of the Achaean league it was besieged by the Aetolians in 220 B.C., and was on several occasions the seat of the federal assemblies. It coined money up to the time of Septimius Severus. The ruins, which bear the common name of Paleopoli, or Old City, are still to be seen about 3 m. from a village that preserves the ancient designation. The greater part of the walls which enclose an area of about a mile and several of the semi-circular towers with which they were strengthened can be clearly made out; and there are also remains of three Doric temples and a small theatre.

CLELAND, WILLIAM (i66i?i68 9), Scottish poet and soldier, son of Thomas Cleland, gamekeeper to the marquis of Douglas, was born about 1661. He was probably brought up on the marquess of Douglas's estate in Lanarkshire, and was educated at St Andrews University. Immediately on leaving college he joined the army of the Covenanters, and was present at Drumclog, where, says Robert Wodrow, some attributed to Cleland the manoeuvre which led to the victory. He also fought at Bothwell Bridge. He and his brother James were described in a royal proclamation of the 16th of June 1679 among the leaders of the insurgents. He escaped to Holland, but in 1685 was again in. Scotland in connexion with the abortive invasion of the earl of Argyll. He escaped once more, to return in 1688 as agent for William of Orange. He was appointed lieutenant colonel of the Cameronian regiment raised from the minority of the western Covenanters who consented to serve under William III. The Cameronians were entrusted with the defence of Dun- keld, which they held against the fierce assault of the Highlanders on the 26th of August. The repulse of the Highlanders before Dunkeld ended the Jacobite rising, but Cleland fell in the struggle. He wrote A Collection of several Poems and Verses composed upon various occasions (published posthumously, 1697). Of "Hullo, my fancie, whither wilt thou go?" only the last nine stanzas are by Cleland. His poems have small literary merit, and are written, not in pure Lowland Scots, but in English with a large admixture of Scottish words. The longest and

most important of them are the'" mock poems " " On the Expedition of the Highland Host who came to destroy the western shires in winter 1678 " and " On the clergie when they met to consult about taking the Test in the year 1681."

An Exact Narrative of the Conflict of Dunkeld . . . collected from several officers of the regiment . . . appeared in 1689.

CLEMATIS, in botany, a genus of the natural order Ranun- culaceae, containing nearly two hundred species, and widely distributed. It is represented in England by Clematis Vitalba, " old man's beard " or " traveller's joy," a common plant on chalky or light soil. The plants are shrubby climbers with gener- ally compound opposite leaves, the stalk of which is sensitive to contact like a tendril, becoming twisted round suitable objects and thereby giving support to the plant. The flowers are arranged in axillary or terminal clusters; they have no petals, but white or coloured, often very large sepals, and an indefinite number of stamens and carpels. They contain no honey, and are visited by insects for the sake of the pollen, which is plentiful. The fruit is a head of achenes, each bearing the long-bearded persistent style, suggesting the popular name. This feathery style is an important agent in the distribution of the seed by means of the wind. Several of the species, especially the large-flowered ones, ate lavourite garden plants, well adapted for covering trellises or walls, or trailing over the ground. Many garden forms have been produced by hybridization; among the best known is C. Jackmanni, due to Mr George Jackman of Woking.

Further information may be obtained from The Clematis as a Garden Flower, by Thos. Moore and George Jackman. See also G. Nicholson, Dictionary of Gardening, i. (1885) and Supplements.

CLEMENCEAU, GEORGES (1841- •), French statesman, was born at Mouilleron-en-Pareds, Vendee, on the 28th of September 1841. Having adopted medicine as his profession, he settled in 1869 in Montmartre; and after the revolution of 1870 he had become sufficiently well known to be nominated mayor of the 18th arrondissement of Paris (Montmartre) — an unruly district over which it was a difficult task to preside. On the 8th of February 1871 he was elected as a Radical to the National Assembly for the department of the Seine, and voted' against the peace preliminaries. The execution, or rather murder, of Generals Lecomte and Clement Thomas by the

communists on 18th March, which he vainly tried to prevent, brought him into collision with the central committee sitting at the hotel de ville, and they ordered his arrest, but he escaped; he was accused, however, by various witnesses, at the subsequent trial of the murderers (November 29th), of not having intervened when he might have done, and though he was cleared of this charge it led to a duel, for his share in which he was prosecuted and sentenced to a fine and a fortnight's imprisonment. y

Meanwhile, on the 20th of March 1871, he had introduced in the National Assembly at Versailles, on behalf of his Radical colleagues, the bill establishing a Paris municipal council of eighty members ; but he was not returned himself at the elections of the 26th of March. He tried with the other Paris mayors to mediate between Versailles and the hotel de ville, but failed, and accordingly resigned his mayoralty and his seat in the Assembly, and temporarily gave up politics; but he was elected to the Paris municipal council on the 23rd of July 187 1 for the Clignancourt quartier, and retained his seat till 1876, passing through the offices of secretary and vice-president, and becoming president in 1875. In 1876 he stood again for the Chamber of Deputies, and was elected for the 18th arrondissement. He joined the Extreme Left, and his energy and mordant eloquence speedily made him the leader of the Radical section. In 1877, after the Seize Mai (see France: History), he was one of the republican majority who denounced the Broglie ministry, and he took a leading part in resisting the anti-republican policy of which the Seize Mai incident was a symptom, his demand in 1879 for the indictment of the Broglie ministry bringing him into particular prominence. In 1880 he started his newspaper, La Justice, which became the principal organ of Parisian Radical- ism; and from this time onwards throughout M. Grevy's presidency his reputation as a political critic, and as a destroyer of ministries who yet would not take office himself, rapidly grew. He led the Extreme Left in the Chamber. He was an active opponent of M. Jules Ferry's colonial policy and of the Oppor- tunist party, and in 1885 it was his use of the Tongking disaster which principally determined the fall of the Ferry cabinet. At the elections of 1885 he advocated a strong Radical pro-, gramme, and was returned both for his old seat in Paris and for the Var, selecting the latter. Refusing to form a ministry to replace the one he had overthrown, he supported the Right in keeping M. Freycinet in power in 1886, and was responsible for the inclusion of General Boulanger in the Freycinet cabinet as war minister. When Boulanger (q.v.) showed himself as an ambitious pretender, Clemenceau withdrew his support and became a vigorous combatant against the Boulangist movement,

though the Radical press and a section of the party continued to patronize the general.

By his exposure of the Wilson scandal, and by his personal plain speaking, M. Clemenceau contributed largely to M. Gr6vy's resignation of the presidency in 1887, having himself declined Grevy's request to form a cabinet on the downfall of that of M. Rouvier; and he was primarily responsible, by advising his followers to vote neither for Floquet, Ferry nor Freycinet, for the election of an "outsider" as president in M. Carriot. He had arrived, however, at the height of his influence, and several factors now contributed to his decline. The split in the Radical party over Boulangism weakened his hands, and its collapse made his help unnecessary to the moderate republicans. A further misfortune occurred in the Panama affair, Clemenceau's relations with Cornelius Herz leading to his being involved

in the general suspicion; and, though he remained the leading spokesman of French Radicalism, his hostility to the Russian alliance so increased his unpopularity that in the election for 1893 he was defeated for the Chamber, after having sat in it continuously since 1876. After his defeat for the Chamber, M. Clemenceau confined his political activities to journalism, his career being further overclouded — so far as any immediate possibility of regaining his old ascendancy was concerned — by the long-drawn-out Dreyfus case, in which he took an active and honourable part as a supporter of M. Zola and an opponent of the anti-Semitic and Nationalist campaign. In 1900 he withdrew from La Justice to found a weekly review, Le Bloc, which lasted until March 1902. On the 6th of April 1902 he was elected senator for the Var, although he had previously continually demanded the suppression of the Senate. He sat with the Socialist Radicals, and vigorously supported the Combes ministry. In June 1903 he undertook the direction of the journal L'Aurore, which he had founded. In it he led the campaign for the revision of the Dreyfus affair, and for the separation of Church and State.

In March 1906 the fall of the Rouvier ministry, owing to the riots provoked by the inventories of church property, at last brought Clemenceau to power as minister qtthe interior in the Sarrien cabinet. The strike of miners in the Pas de Calais after the disaster at Courrieres, leading to the threat of disorder on the 1st of May 1906, obliged him to employ the military; and his attitude in the matter alienated the Socialist party, from which he definitely broke in his notable reply in the Chamber to Jean Jaures in June 1906. This speech marked him out as the strong man of the day in French politics; and when the Sarrien ministry resigned in October, he

became premier. During 1907 and 1908 his premiership was notable for the way in which the new entente with England was cemented, and for the successful part which France played in European politics, in spite of diffi- culties with Germany and attacks by the Socialist party in connexion with Morocco (see France: History). But on July 20th, 1909, he was defeated in a discussion in the Chamber on the state of the navy, in which bitter words were exchanged between him and Delcasse; and he at once resigned, being succeeded as premier by M. Briand, with a reconstructed cabinet.

CLEMENCfN, DIEGO (1765-1834), Spanish scholar and politician, was born on the 27th of September 1765, at Murcia, and was educated there at the Colegio de San Fulgencio. Abandoning his intention of taking orders, he found employment at Madrid in 1788 as tutor to the sons of the countess-duchess de Benavente, and devoted himself to the study of archaeology. In 1807 he became editor of the Gaceta de Madrid, and in the following year was condemned to death by Murat for publishing a patriotic article; he fled to Cadiz, and under the Junta Central held Various posts from which he was dismissed by the reac- tionary government of 1814. During the liberal regime of 1820-1823 Clemencln took office as colonial minister, was exiled till 1827, and in 1833 published the first volume of his edition (1833-1839) x>f Don Quixote. Its merits were recognized by his appointment as royal librarian, but he did not long enjoy his triumph: he died on the 30th of July 1834. His commentary on Don Quixote owes something to John Bowie, and is disfigured by a patronizing, carping spirit; nevertheless it is the most valuable work of its kind, and is still unsuperseded. Clemencin is also the author of an interesting Elogio de la reina Isabel la Caldlica, published as the sixth volume of the Memorias of the Spanish Academy of History, to which body he was elected on the 1 2th of September 1800.

CLEMENT (Lat. Clemens, i.e. merciful; Gr. KXifawjs), the name of fourteen popes and two anti-popes.

Clement I., generally known as Clement of Rome, or Clemens Romantjs (Jlor. c. AS>. 96), was one of the “Apostolic Fathers,” and in the lists of bishops of Rome is given the third or fourth place — Peter, Linus, (Anencletus) , Clement. There is no ground for identifying him with the Clement of Phil. iv. 3. He may have been a freedman of T. Flavius Clemens, who was consul

with his cousin, the Emperor Demitian, in a.d. 95. A oth- century tradition says he was martyred in the Crimea in 102; earlier authorities say he died a natural death; he is com- memorated on the 23rd of November.

In The Shepherd of Hermas (q.v.) (Vis. n. iv. 3) mention is made of one Clement whose office it is to communicate with other churches, and this function agrees well with what we find in the letter to the church at Corinth by which Clement is best known. Whilst being on our guard against reading later ideas into the title ” bishop ” as applied to Clement, there is no reason to doubt that he was one of the chief personalities in the Christian community at Rome, where since the time of Paul the separate house congregations (Rom. xvi.) had been united into one church officered by presbyters and deacons (Clem. 40-42). The letter in question was occasioned by a dispute in the church of Corinth, which had led to the ejection of several presbyters from their office. It does not contain Clement’s name, but is addressed by ” the Church of God which sojourneth in Rome to the Church of God which sojourneth in Corinth.” But there is no reason for doubting the universal tradition which ascribes it to Clement, or the generally accepted date, c. a.d. 96. No claim is made by the Roman Church to interfere on any ground of superior rank; yet it is noteworthy that in the earliest document outside the canon which we can securely date, the church in the imperial city comes forward as a peacemaker to compose the troubles of a church in Greece. Nothing is known of the cause of the discontent; no moral offence is charged against the presbyters, and their dismissal is regarded by Clement as high-handed and unjustifiable, and as a revolt of the younger members of the community against the elder. After a laudatory account of the past conduct of the Corinthian Church, he enters upon a denunciation of vices and a praise of virtues, and illustrates his various topics by copious citations from the Old Testament scriptures. Thus he paves the way for his tardy rebuke of present disorders, which he reserves until two-thirds of his epistle is completed. Clement is exceedingly discursive, and his letter reaches twice the length 6f the Epistle to the Hebrews. Many of his general exhortations are but very indirectly connected with the practical issue to which the epistle is directed, and it is very probable that he was drawing largely upon the homiletical material with which he was accustomed to edify his fellow-Christians at Rome.

This view receives some support from the long liturgical prayer at the close, which almost certainly represents the intercession used in the Roman eucharists. But we must not allow such a theory to blind us to the true wisdom with which the writer defers his censure. He knows

that the roots of the quarrel lie in a wrong condition of the church's life. His general exhortations, courteously expressed in the first person plural, are directed towards a wide reformation of manners. If the wrong spirit can be exorcised, there is hope that the quarrel will end in a general desire for reconciliation. The most permanent interest of the epistle lies in the conception of the grounds on which the Christian ministry rests according to the view of a prominent teacher before the 1st century has closed. The orderliness of nature is appealed to as expressing the mind of its Creator. The orderliness of Old Testament worship bears a like witness; everything is duly fixed by God; high priests, priests and Levites, and the people in the people's place. Similarly in the Christian dispensation all is in order due. " The apostles preached the gospel to us from the Lord Jesus Christ; Jesus Christ was sent from God. Christ then is from God, and the apostles from Christ. . . . They appointed their first-fruits, having tested them by the Spirit, as bishops and deacons of those who should believe. . . . Our apostles knew through our Lord Jesus Christ that there would be strife about the name of the bishop's office. For this cause therefore, having received perfect foreknowledge, they appointed the aforesaid, and after- wards gave a further injunction (eTrivo/j.T]v has now the further evidence of the Latin legem) that, if these should fall asleep, other approved men should succeed to their ministry. . . . It will be no small sin in us if we eject from the bishop's

office those who have offered the gifts blamelessly and holily " (cc. xlii. xliv.).

Clement's familiarity with the Old Testament points to his being a Christian of long standing rather than a recent convert. We learn from his letter (i. 7) that the church at Rome, though suffering persecution, was firmly held together by faith and love, and was exhibiting its unity in an orderly worship. The epistle was publicly read from time to time at Corinth, and by the 4th century this usage had spread to other churches. We even find it attached to the famous Alexandrian MS. (Codex A) of the New Testament, but this does not imply that it ever reached canonical rank. For the mass of early Christian literature that was gradu- ally attached to his name see Clementine Literature.

The epistle was published in 1633 by Patrick Young from Cod. Alexandrinus, in which a. leaf near the end was missing, so that the great prayer (cc. lv.lxiv.) remained unknown. In 1875 (six years after J. j}. Lightfoot's first edition) Bryennius (q.v.) published a complete text from the MS. in Constantinople (dated 1055), from which in 1883 he gave us the Didoche. In 1876 R. L. Bensly found a complete Syriac text in a MS. recently obtained by the University library at Cambridge.

Lightfoot made use of these new materials in an Appendix (1877) ; his second edition, on which he had been at work at the time of his death, came out in 1890. This must remain the standard edition, notwithstanding Dom Morin's most interesting discovery of a Latin version (1894), which was prob ably made in the 3rd century, and is a valuable addition to the authorities for the text. Its evidence is used in a small edition of the epistle by R. Knopf (Leipzig, 1899). See also W. Wrede, Unter- suchungen zum ersten Clemensbrief (1891), and the other literature cited in Herzog-Hauck's Realencyklop&die, vol. iv. (A. J . G. ; J. A. R.)

Clement II. (Suidger) became pope on the 25th of December

1046. He belonged to a noble Saxon family, was bishop of Bam- berg, and chancellor to the emperor Henry III., to whom he was indebted for his elevation to the papacy upon the abdication of Gregory VI. He was the first pope placed on the throne by the power of the German emperors, but his short pontificate was only signalized by the convocation of a council in which decrees were enacted against simony. He died on the 9th of October

1047, and was buried at Bamberg. (L. D.*) Clement III. (Paolo Scolari), pope from 1187 to 1191, a

Roman, was made cardinal bishop of Palestrina by Alexander III. in 1180 or 1181. On the 19th of December 1187 he was chosen at Pisa to succeed Gregory VIII. On the 31st of May 11 88 he concluded a treaty with the Romans which removed difficulties of long standing, and in April 1 1 89 he made peace with the emperor Frederick I. Barbarossa. He settled a controversy with William of Scotland concerning the choice of the archbishop of St Andrews, and on the 13th of March 1188 removed the Scottish church from under the legatine jurisdiction of the archbishop of York, thus making it independent of all save Rome. In spite of his con- ciliatory policy, Clement angered Henry VI. of Germany by bestowing Sicily on Tancred. The crisis was acute when the pope died, probably in the latter part of March 1191.

See " Epistolae et Privilegia," in J. P. Migne, Patrologiae cursus computus, torn. 204 (Paris, 1853), 1253 ft'.; additional material in Neues Archiv fur die altere deutsche Geschichtskunde, 2. 219; 6. 293; 14. 178-182; P. Jaffe, Regesta Pontificum Romanorum, torn. 2 (2nd edition, Leipzig, 1888), 535 ft". (W. W. R.*)

Clement IV. (Gui Foulques), pope from 1265 to 1268, son of a successful lawyer and judge, was born at St Gilles-sur-Rh6ne. He

studied law, and became a valued adviser of Louis IX. of France. He married, and was the father of two daughters, but after the death of his wife took orders. In 1257 he became bishop of Le Puy; in 1259 he was elected archbishop of Nar- bonne; and on the 24th of December 1261 Urban iV. created him cardinal bishop of Sabina. He was appointed legate in England on the 22nd of November 1263, and before his return was elected pope at Perugia on the 5th of February 1265. On the 26th of February he invested Charles of Anjou with the kingdom of Sicily; but subsequently he came into conflict with Charles, especially after the death of Manfred in February 1266. To the cruelty and avarice of Charles he opposed a generous humanity. When Conradin, the last of the Hohenstaufen, appeared in Italy the pope excommunicated him and his sup- porters, but it is improbable that he was in the remotest degree

responsible for his execution. At Viterbo, where he spent most of his pontificate, Clement died on the 29th of November 1268, leaving a name unsullied by nepotism. As the benefactor and protector of Roger Bacon he has a special title to the gratitude of posterity. ..

See A. Potthast, Regesta Pontificum Romanorum, vol. .11. (Berlin, (875), 1542 ff.; E. Jordan, Us Registres de Clement IV (Pans, 1893 ff.); Herzog-Hauck, Realencyklopddie (3rd ed., vol iv., Leipzig, 1898), 144 f.; J. Heidemann, Papst Clemens IV., I. Tetl: Das Vorleben desPapstes und sein Legationsregister = Kirchengeschtchthche btudien, herausgegeben von Kndpfler, &c, 6. Band, 4. Heft (Minister, 1903), reprints Processus legationis in Angliam. (W. W. K.)

Clement V. (Bertrand de Gouth), pope from 1305 to 13 14, was born of a noble Gascon family about 1264. After studying the arts at Toulouse and law at Orleans and Bologna, he became a canon at Bordeaux and then vicar-general to his brother the archbishop of Lyons, who in 1294 was created cardinal bishop of Albano. Bertrand was made a chaplain to Boniface VIII., who in 1295 nominated him bishop of Cominges (Haute Garonne), and in 1299 translated him to the archbishopric of Bordeaux. Because he attended the synod at Rome in 1302 in the con- troversy between France and the Pope, he was considered a supporter of Boniface VIII. , yet was by no means unfavourably regarded at the French court. At Perugia on the 5th of June 1305 he was chosen to succeed Benedict XL; the cardinals by a vote of ten to five electing one neither an Italian nor a cardinal, in

order to end a conclave which had lasted eleven months. The chronicler Villani relates that Bertrand owed his election to a secret agreement with Philip IV., made at St Jean d'Angely in Saintonge; this may be dismissed as gossip, but it is probable that the future pope had to accept certain con- ditions laid down by the cardinals. At Bordeaux Bertrand was formally notified of his election and urged to come to Italy; but he caused his coronation to take place at Lyons on the 14th of November 1305. From the beginning Clement V. was sub- servient to French interests. Among his first acts was the creation of nine French cardinals. Early in 1306 he modified or explained away those features of the bulls Clericis Laicos and Unam sanctam which were particularly offensive to the king Most of the year 1306 he spent at Bordeaux because of ill-health; subsequently he resided at Poitiers and elsewhere, and in March 1309 the entire papal court settled at Avignon, an imperial fief held by the king of Sicily. Thus began the seventy years " Babylonian captivity of the Church. On the 13th of October 1307 came the arrest of all the Knights Templar in France, the breaking of a storm conjured up by royal jealousy and greed. From the very day of Clement's coronation the king had charged the Templars with heresy, immorality and abuses, and the scruples of the weak pope were at length over- come by apprehension lest the State should not wait for the Church but should proceed independently against the alleged heretics' as well as by the royal threats of pressing the accusation of heresy against the late Boniface VIII. In pursuance of the king's wishes Clement summoned the council of Vienne (see Vienne Council or), which was unable to conclude that the Templars were guilty of heresy. The pope abolished the order, however, as it seemed to be in bad repute and had outlived its usefulness. Its French estates were granted to the Hospitallers, but actually Philip IV. held them until his death.

In his relations to the Empire Clement was an opportunist. He refused to use his full influence in favour of the candidacy of Charles of Valois, brother of Philip IV., lest France became too powerful; and recognized Henry of Luxemburg, whom hi£- representatives crowned emperor at the Lateran in 1312. When Henry, however, came into conflict with Robert of Naples, ClemePt supported Robert and threatened the emperor with ban ana interdict. But the crisis passed with the unexpected death of Henry, soon followed by that of the pope on the 20th of Anril 1314 at Roquemaure-sur-Rhone. Though the sale of offices and oppressive taxation which disgraced his pontificate may in part be explained by the desperate condition of the papal finances and by his saving up gold for a crusade, nevertheless he indulged in unbecoming pomp. Showing favouritism toward

his family and his nation, he brought untold disaster on the Church.

Bibliography —See ” Clementis V. . . . et aliorum epistolae,” in S Baluzius, Vitae Paparum Avenionensium, torn. ii. (Paris, 1693), 55 ff.; ” Tractatus cum Henrico VII. imp. Germ, anno 1309,” in Pertz Monumenta Germaniae historica, legum ii. 1. 492-496; J. F. Rabanis, Clement V et Philippe le Bel. Suivie du journal de la msite pastorale de Bertrand de Got dans la province ecclesiastique de Bordeauxˆ en 1304 et 1305 (Paris, 1858) ; ” Clementis Papae V. Constitutiones, in Corpus luris Canonici, ed. Aemilius Friedberg, vol. 11. (Leipzig, 1881) 1125-1200; P. B. Gams, Series Episcoporum Ecclesiae Catho’licae (Regensburg, 1873) ; Wetzer und Welte, Kirchenlexikon, vol. iii. (2nd ed., Freiburg, 1884), 462-473; Regestum Clementis Papae V. ex Vaticanis archetypis cura et studio monachorum ord. Ben. (Rome, 1885-1802), 9 vols, and appendix; J. Gmelin, Schuld oder Unschuld des Templerordens (Stuttgart, 1893) ; Gachon, Pieces relatifs au debat du pape Clement V avec I’empSreur Henri VII (Montpelher 1894) ;Lacoste, Nouvelles E~tudes sur ClSmentV(i8g6) ; Herzog-Hauck, Realencyklopddie, vol. iv. (3rd ed., Leipzig, 1898) 144 f. ; J. Losertn, Geschichte des spdteren Mittelalters (Munich, 1903) ; and A. Eitel, Der Kirchenstaat unter Klemens V. (Berlin, 1907). (W. W. K.)

Clement VI. (Pierre Roger), pope from the 7th of May 134* to the 6th of December 1352, was born at Maumont in Limousin in 1 291, the son of the wealthy lord of Rosieres, entered the Benedictine order as a boy, studied at Paris, and became suc- cessively prior of St Baudil, abbot of Fecamp, bishop of Arras, chancellor of France, archbishop of Sens and archbishop of Rouen. He was made cardinal-priest of Sti Nereo ed Achilleo and administrator of the bishopric of Avignon by Benedict XII. in 1338, and four years later succeeded him as pope. He con- tinued to reside at Avignon despite the arguments of envoys and the verses of Petrarch, but threw a sop to the Romans by reducing the Jubilee term from one hundred years to fifty. He appointed Cola di Rienzo to a civil position at Rome, and, although at first approving the establishment of the tribunate, he later sent a legate who excommunicated Rienzo and, with the help of the aristocratic faction, drove him from the city (December 1347). Clement continued the struggle of his pre- decessors with the emperor Louis the Bavarian, excommunicating him after protracted negotiations on the 13th of April 1346, and directing the election of Charles of Moravia, who received general recognition after the death of Louis in October 1347, and put an end to the schism which had long divided Germany. Clement proclaimed a crusade in 1343, but nothing was accom- plished beyond a naval attack on Smyrna (29th of October 1344)- He also carried on fruitless negotiations for church unity with the

Armenians and with the Greek emperor, John Cantacuzenus. He tried to end the Hundred Years' War between England and France, but secured only a temporary truce. He excommuni- cated Casimir of Poland for marital infidelity and forced him to do penance. He successfully resisted encroachments on ecclesi- astical jurisdiction by the kings of England, Castile and Aragon. He made Prague an archbishopric in 1344, and three years later founded the university there. During the disastrous plague of 1347-1348 Clement did all he could to alleviate the distress, and condemned the Flagellants and Jew-baiters. He tried Queen Joanna of Naples for the murder of her husband and acquitted her. He secured full ownership of the county of Avignon through purchase from Queen Joanna (9th of June 1348) and renunciation of feudal claims by Charles IV. of France, and considerably enlarged the papal palace in that city. To supply money for his many undertakings Clement revived the practice of selling reservations and expectancies, which had been abolished by his predecessor. Oppressive taxation and unblushing nepotism were Clement's great faults. On the other hand, he was famed for his engaging manners, eloquence and theological learning. He died on the 6th of December 1352, and was buried in the Benedictine abbey at Auvergne, but his tomb was destroyed by Calvinists in 1562. His successor was Innocent VI.

The chief sources for the life of Clement VI. are in Baluzius, Vitae Pap. Avenion., vol. i. (Paris, 1693); E. Werunsky, Excerpta ex reeistris Clementis VI. et Innocentii VI. (Innsbruck, 1885); and F. Cerasoli, Clemente VI. e Giovanni I. di Napoh—Documentt inedite dell' Archivio Vaticano (1896, &c).

See L. Pastor, History of the Popes, vol. i., trans, by F. I. Antrobus (London 1899); F. Gregorovius, Rome in the Middle Ages, vol. vi. trans by Mrs G. W. Hamilton (London, 1900-1902); J.B.Chnstopne,

Histoire de la papautS pendant le XI V" silcle, vol. ii. (Paris, 1 853) ; also article by L. Kiipper in the Kirchenlexikon (2nd ed.). (C. H. Ha.)

Clement VII. (Robert of Geneva), (d. 1394), antipope, brother of Peter, count of Genevois, was connected by blood or marriage with most of the sovereigns of Europe. After occupying the episcopal sees of Therouanne and Cambrai, he attained to the cardinalate at an early age. In 1377, as legate of Pope Gregory XI. in the Romagna, he

directed, or rather assisted in, the savage suppression of the revolt of the inhabitants of Cesena against the papal authority. In the following year he took part in the election of Pope Urban VI. at Rome, and was perhaps the first to express doubts as to the validity of that tumultuous ejection. After withdrawing to Fondi to reconsider the election, the cardinals finally resolved to regard Urban as an intruder and the Holy See as still vacant, and an almost unanimous vote was given in favour of Robert of Geneva (20th of September 1378), who took the name of Clement VII. Thus originated the Great Schism of the West.

To his high connexions and his adroitness, as well as to the gross mistakes of his rival, Clement owed the immediate support of Queen Joanna of Naples and of several of the Italian barons; and the king of France, Charles V., who seems to have been sounded beforehand on the choice of the Roman pontiff, soon became his warmest protector. Clement eventually succeeded in winning to his cause Scotland, Castile, Aragon, Navarre, a great part of the Latin East, and Flanders. He had adherents, besides, scattered through Germany, while Portugal on two occasions acknowledged him, but afterwards forsook him. From Avignon, however, where he had immediately fixed his residence, his eyes were always turned towards Italy, his purpose being to wrest Rome from his rival. To attain this end he lavished his gold — or rather the gold provided by the clergy in his obedience — without stint, and conceived a succession of the most adventurous projects, of which one at least was to leave a lasting mark on history.

By the bait of a kingdom to be carved expressly out of the States of the Church and to be called the kingdom of Adria, coupled with the expectation of succeeding to Queen Joanna, Clement incited Louis, duke of Anjou, the eldest of the brothers of Charles V., to take arms in his favour. These tempting offers gave rise to a series of expeditions into Italy carried out almost exclusively at Clement's expense, in the first of which Louis lost his life. These enterprises on several occasions planted Angevin domination in the south of the Italian peninsula, and their most decisive result was the assuring of Provence to the dukes of Anjou and afterwards to the kings of France. After the death of Louis, Clement hoped to find equally brave and interested champions in Louis' son and namesake; in Louis of Orleans, the brother of Charles VI.; in Charles VI. himself; and in John III., count of Armagnac. The prospect of his briliant progress to Rome was ever before his eyes; and in his thoughts force of arms, of French arms, was to be the instrument of his glorious triumph over his competitor.

There came a time, however, when Clement and more particu- larly

his following had to acknowledge the vanity of these illusive dreams; and before his death, which took place on the 16th of September 1394, he realized the impossibility of over- coming by brute force an opposition which was founded on the convictions of the greater part of Catholic Europe, and discerned among his adherents the germs of disaffection. By his vast expenditure, ascribable not only to his wars in Italy, his incessant embassies, and the necessity of defending himself in the Comtat Venaissin against the incursions of the adventurous Raymond of Turenne, but also to his luxurious tastes and princely habits, as well as by his persistent refusal to refer the question of the schism to a council, he incurred genera' reproach. Unity was the crying need; and men began to fasten upon him the responsi- bility of the hateful schism, not on the score of insincerity — which would have been very unjust, — but by reason of his obstinate persistence in the course he had chosen.

See N. Valois, La France el le grand schisme d'occident (Paris, 1896). (N. V.)

Clement VII. (Giulio de' Medici), pope from 1523 to 1534, was the son of Giuliano de' Medici, assassinated in the conspiracy of the Pazzi at Florence, and of a certain Fioretta, daughter of Antonia. Being left an orphan he was taken into his own house by Lorenzo the Magnificent and educated with his sons. In 1494 Giulio went with them into exile; but, on Giovanni's restora- tion to power, returned to Florence, of which he was made archbishop by his cousin Pope Leo X., a special dispensation being granted on account of his illegitimate birth, followed by a formal declaration of the fact that his parents had been secretly married and that he was therefore legitimate. On the 23rd of September 1513 the pope conferred on him the title of cardinal and made him legate at Bologna. During the reign of the pleasure-loving Leo, Cardinal Giulio had practically the whole papal government in his hands and displayed all the qualities of a good administrator; and when, on the death of Adrian VI. — whose election he had done most to secure — he was chosen pope (Nov. 18, 1523), his accession was hailed as the dawn of a happier era. It soon became clear, however, that the qualities which had made Clement an excellent second in command were not equal to the exigencies of supreme power at a time of peculiar peril and difficulty.

Though free from the grosser vices of his predecessors, a man of taste, and economical without being avaricious, Clement VII. was essentially a man of narrow outlook and interests. He failed to understand the great spiritual movement which was convulsing the Church; and instead of bending his mind to the problem of the Reformation, he

from the first subordinated the cause of Catholicism and of the world to his interests as an Italian prince and a Medici. Even in these purely secular affairs, moreover, his timidity and indecision prevented him from pursuing a consistent policy; and his ill fortune, or his lack of judgment, placed him, as long as he had the power of choice, ever on the losing side.

Clement's accession at once brought about a political change in favour of France; yet he was unable to take a strong line, and wavered between the emperor and Francis I., concluding a treaty of alliance with the French king, and then, when the crushing defeat of Pavia had shown him his mistake, making his peace with Charles (April 1, 1525), only to break it again by countenancing Girolamo Morone's League of Freedom, of which the aim was to assert the independence of Italy from foreign powers. On the betrayal of this conspiracy Clement made a fresh submission to the emperor, only to follow this, a year later, by the Holy League of Cognac with Francis I. (May 22, 1526). Then followed the imperial invasion of Italy and Bourbon's sack of Rome (May 1527) which ended the Augustan age of the papal city in a horror of fire and blood. The pope himself was besieged in the castle of St Angelo, compelled on the 6th of June to ransom himself with a payment of 400,000 scudi, and kept in confinement until, on the 26th of November, he accepted the emperor's terms, which besides money payments included the promise to convene a general council to deal with Lutheranism. On the 6th of December Clement escaped, before the day fixed for his liberation, to Orvieto, and at once set to work to establish peace. After the signature of the treaty of Cambrai on the 3rd of August 1529 Charles met Clement at Bologna and received from him the imperial crown and the iron crown of Lombardy. The pope was now restored to the greater part of his temporal power; but for some years it was exercised in subservience to the emperor. During this period Clement was mainly occupied in urging Charles to arrest the progress of the Reformation in Germany and in efforts to elude the emperor's demand for a general council, which Clement feared lest the question of the mode of his election and his legitimacy should be raised. It was due to his dependence on Charles V., rather than to any conscientious scruples, that Clement evaded Henry VIII. 's demand for the nullification of his marriage with Catherine of Aragon, and so brought about'the breach between England and Rome. Some time before his death, however, the dynastic interests of his family led him once mere to a rapprochement with France. On the 9th of June 1531 an agreement was

signed for the marriage of Henry of Orleans with Catherine de' Medici; but it was not till October 1533 that Clement met Francis at Marseilles, the wedding being celebrated on the 27th. Before, however, the new political alliance, thus cemented, could take effect, Clement died, on the 25th of September 1534.

See E. Casanova, Letters di Carlo V. a Clemente VII. (Florence, 1893); Hugo Lammer, Monumenta Vaticana, &c. (Freiburg, 1861); P. Balan, Monumenta saeculi XVI. hist, illustr. (Innsbruck, 1885); ib. Mon. Reform. Luther (Regensburg, 1884); Stefan Ehses, Rom. Dokum. z. Gesch. der Ehescheidung Heinrichs VIII. (Paderborn, 1893) ; Calendar of State Papers (London, 1869, &c.) ; J. J. I. yon Dollinger, Beitrage zur politischen, kirchlichen und Kulturgeschichte (3 vols., Vienna, 1882); F. Guicciardini, Istoria a" Italia; L. von Ranke, Die romischen Papste in den letzten vier Jahrhunderten, and Deutsche Gesch. im Zeitalter der Reformation ; W. Hellwig, Die politischen Beziehungen Clement's VII. zu Karl V., 1526 (Leipzig, 1889); H. Baumgarten, Gesch. Karls V. (Stuttgart, 1888); F.

Creighton, Hist, of the Papacy during the Period of the Reformation (London, 1882) ; and H. M. Vaughan, The Medici Popes (1908). Further references will be found in Herzog-Hauck, Realencyklopadie, s. Clemens VII. See also Cambridge Modern History, vol. ii. chap. i. and bibliography. (W. A. P.)

Clement VIII. (Aegidius Mufioz), antipope from 1425 to the 26th of July 1429, was a canon at Barcelona until elected at Peniscola by three cardinals whom the stubborn antipope Benedict XIII. had named on his death-bed. Clement was immediately recognized by Alphonso V. of Aragon, who was hostile to Pope Martin V. on account of the latter's opposition to his claims tc the kingdom of Naples, but abdicated as soon as an agreement was reached between Alphonso and Martin through the exertions of Cardinal Pierre de Foix, an able diplomat and relation of the king's. Clement spent his.last years as bishop of Majorca, and died on the 28th of December 1446.

See. L. Pastor, History of the Popes, vol. i. trans, by F. I. Antrobus (London, 1899) ; M. Creighton, History of the Papacy, vol. ii. r (London, 1899) ; and consult bibliography on Martin V. (C. H. Ha.)

Clement VIII. (Ippolito Aldobrandini), pope from 1592 to 1605, was born at Fano,in 1,535. He became a jurist and filled several important offices. In 1585 he was made a cardinal, and subsequently discharged

a delicate mission to Poland with skill.. His moderation and experience commended him to his fellow cardinals, and on the 30th of January 1 592 he was elected pope, to succeed Innocent IX. While not hostile to Philip II., Clement desired to emancipate the papacy from undue Spanish influence, and to that end cultivated closer, relations with France. In 1595 he granted absolution to Henry IV., and so removed the last objection to the acknowledgment of his legitimacy. The peace of Vervins (1598), which marked the end of Philip's opposition to Henry, was mainly the work of the pope. Clement also enter- tained hopes of recovering England. He corresponded with James I. and with his queen, Anne of Denmark, a convert to Catholicism. But James was only half in earnest, and, besides, dared not risk a breach with his subjects. Upon the failure of the line of Este, Clement claimed the reversion of Ferrara and reincorporated it into the States of the Church (1598). He remonstrated against the exclusion of the Jesuits from France, and obtained their readmission. But in their doctrinal contro- versy with the Dominicans (see Molina, Luis) he refrained from a decision, being unwilling to offend either party. Under Clement the publication of the revised edition of the Vulgate, begun by Sixtus V., was finished; the Breviary, Missal and Pontifical received certain corrections; the Index was expanded; the Vatican library enlarged; and the Collegium Clementinum founded. Clement was an unblushing nepotist; three of his nephews he made cardinals, and to one of them gradually surrendered the control of affairs. But on the other hand among those whom he promoted to the cardinalate were such men as Baronius, Bellarmine and Toledo. During this pontificate occurred the burning of Giordano Bruno for heresy; and the tragedy of the Cenci (see the respective articles). Clement died on the 5th of March 1605, and was succeeded by Leo XL

See the contemporary life by Ciaconius, Vitae et res gestae sum- morum Pontiff. Rom. (Rome, 1601-1602); Francolini, Ippolito

Aldobrandini, che fu Clemente VIII. (Perugia, 1867); Ranke's, excellent sketch, Popes (Eng. trans. Austin), ii. 234 seq. ; v. Reumont, Gesch. der Stadt Rom, iii. 2, 599 seq. ; Brosch, Gesch. des Kirchen- staates (1880), i. 301 seq. (T. F. C.)

Clement IX. (Giulio Rospigliosi) was born in 1600, became successively auditor of the Rota, archbishop of Tarsus in partibus, and cardinal, and was elected pope on the 20th of June 1667. He effected a temporary adjustment of the Jansenist contro- versy; was instrumental in concluding the peace of Aix-la- Chapelle (1668); healed a long-standing breach between the Holy See and Portugal; aided Venice against the Turks, and laboured unceasingly for the relief

of Crete, the fall of which hastened his death on the 9th of October 1669.

See Oldoin, continuator of Ciaconius, Vitae et res gestae sun*- morum Pontiff. Rom.; Palazzi, Gesta Pontiff. Rom. (Venice, 1687- 16S8), iv. 621 seq. (both contemporary); Ranke, Popes (Eng. trans. Austin), iii. 59 seq.; and v. Reumont, Gesch. der Stadt Rom, iii. 2, 634 seq. (T. F. C.)

Clement X. (Emilio Altieri) was born in Rome, on the 13th of July 1590. Before becoming pope, on the 29th of April 1670 he had been auditor in Poland, governor of Ancona, and nuncio in Naples. His advanced age induced him to resign the control of affairs to his adopted nephew, Cardinal Paluzzi, who embroiled the papacy in disputes with the resident ambassadors, and incurred the enmity of Louis XIV., thus provoking the long controversy over the regalia (see Innocent XL). Clement died on the 22nd of July 1676.

See Guarnacci, Vitae et res gestae Pontiff. Rom. (Rome, 1731), (contin. of Ciaconius), i. 1 seq.; Palazzi, Gesta Pontiff. Rom. (Venice, 1 687-1 688), iv. 655 seq.; and Ranke, Popes (Eng. trans. Austin), iii. 172 seq. (T. F. C.)

Clement XI. (Giovanni Francesco Albani), pope from 1700 to 1721, was born in Urbino, on the 22nd of July 1649, received an extraordinary education in letters, theology and law, filled various important offices in the Curia, and finally, on the 23rd of November 1700, succeeded Innocent XII. as pope. His private life and his administration were blameless, but it was his mis- fortune to reign in troublous times. In the war of the Spanish Succession he would willingly have remained neutral, but found himself between two fires, forced first to recognize Philip V., then driven by the emperor to recognize the Archduke Charles. In the peace of Utrecht he was ignored; Sardinia and Sicily, Parma and Piacenza, were disposed of without regard to papal claims. When he quarrelled with the duke of Savoy, and revoked his investiture rights in Sicily (1715), his interdict was treated with contempt. The prestige of the papacy had hardly been lower within two centuries. About 1702 the Jansenist controversy broke out afresh. Clement reaffirmed the infallibility of the pope, in matters of fact (1705), and, in 1713, issued the bull Unigenifus, condemning 101 Jansenistic propositions extracted from the Moral Reflections of Pasquier Quesnel. The rejection of this bull by certain bishops led to a new party division and a further prolonging of the controversy (see Jansenism and Quesnel, Pasquier). Clement also forbade the practice of the Jesuit missionaries in China of ”

accommodating ” their teachings to pagan notions or customs, in order to win converts. Clement was a polished writer, and a generous patron of art and letters. He died on the 19th of March 1721.

For contemporary lives see Elci, The Present State of the Court «f Rome, trans, from the Ital. (London, 1706); Polidoro, De Vita et Reb. Gest. Clem. XL (Urbino, 1727); Reboulet, Hist, de Clem. XL. Pape (Avignon, 1752); Guarnacci, Vitae et res gest. Pontiff. Rom* (Rome, 1751); Sandini, Vitae Pontiff Rom. (Padua, 1739); Buder, Leben u. Thaten dementis XL (Frankfort, 1720-1721). See also Clementis XL Opera Omnia (Frankfort, 1729); the detailed ” Studii sul pontificate di Clem. XL,” by Pometti in the Archimo delta R. Soc. romana di sloria patria, vols. 21, 22, 23 (1898-19)00), and the extended bibliography in Hergenrother, Allg. Kirchengesch. (1880), iii. 506. (T. F. C.)

Clement XII. (Lorenzo Corsini), pope from 1730 to 1740, succeeded Benedict XIII. on the 12th of July 1730, at the age of seventy-eight. The rascally Cardinal Coscia, who had deluded Benedict, was at once brought to justice and forced to disgorge his dishonest gains. Politically the papacy had sunk to the level of pitiful helplessness, unable to resist the aggressions oi the Powers, who ignored or coerced it at will. Yet Clement,

entertained high hopes for Catholicism; he laboured for a union with the Greek Church, and was ready to facilitate the return of the Protestants of Saxony. He deserves well of posterity for his services to learning and art; the restoration of the Arch of Constantine; the enrichment of the Capitoline museum with antique marbles and inscriptions, and of the Vatican library with oriental manuscripts (see Assemani) ; and the embellishment of the city with many buildings. He died on the 6th of February 1740, and was succeeded by Benedict XIV.

See Guarnacci, Vitae et res gestae Pontiff. Rom. (Rome, 1751) ; Sandini, Vitae Pontiff. Rom. (Padua, 1739); Fabroni, Be Vita et Reb. Gest. dementis XII. (Rome, 1760); Ranke, Popes (Eng. trans. Austin), iii. 191 seq.; v. Reumont, Gesch. der Stadt Rom, iii. 2, 653 seq. (T. F. C.)

Clement XIII. (Carlo della Torre Rezzonico), pope from 1758 to 1769, was born in Venice, on the 7th of March 1693, filled various

important posts in the Curia, became cardinal in 1737, bishop of Padua in 1743, and succeeded Benedict XIV. as pope on the 6th of July 1758. He was a man of upright, moderate and pacific intentions, but his pontificate of eleven years was anything but tranquil. The Jesuits had fallen upon evil days; in 1758 Pombal expelled them from Portugal; his example was followed by the Bourbon countries — France, Spain, the Two Sicilies and Parma (1764-1768). The order turned to the pope as its natural protector; but his protests (cf. the bull Apostolicum pascendi munus, 7th of January 1765) were unheeded (see Jesuits). A clash with Parma occurred to aggra- vate his troubles. The Bourbon kings espoused their relative's quarrel, seized Avignon, Benevento and Ponte Corvo, and united in a peremptory demand for the suppression of the Jesuits (January 1769). Driven to extremities, Clement con- sented to call a Consistory to consider the step, but on the very eve of the day set for its meeting he died (2nd of February 1769), not without suspicion of poison, of which, however, there appears to be no conclusive evidence.

A contemporary account of Clement was written by Augustin de Andres y Sobifias, . . . el nacimiento, estudios y empleos de . . . Clem. XIII. (Madrid, 1759). Ravignan's Clement XIII. e Clement XIV. (Paris, 1854) is partisan but free from rancour; and appends many interesting documents. See also the bibliographical note under Clement XIV. infra.; and the extended bibliography in Hergen- rother, Allg. Kirchengesch. (1880), iii. 509. (T. F. C.)

Clement XIV. (Lorenzo Ganganelli), pope from 1769 to 1774, son of a physician of St Arcangelo, near Rimini, was born on the 31st of October 1705, entered the Franciscan order at the age of seventeen, and became a teacher of theology and philo- sophy. As regent of the college of S. Bonaventura, Rome, he came under the notice of Benedict XIV., who conceived a high opinion of his talents and made him eonsulter of the Inquisi- tion. Upon the recommendation of Ricci, general of the Jesuits, Clement XIII. made him a cardinal; but, owing to his dis- approval of the pope's policy, he found himself out of favour and without influence. The conclave following the death of Clement XIII. was the most momentous of at least two centuries. The fate of the Jesuits hung in the balance; and the Bourbon princes were determined to have a pope subservient to their hostile designs. The struggle was prolonged three months. At length, on the 19th of May 1769, Ganganelli was chosen, not as a declared enemy of the Jesuits, but as being least objection- able to each of the contending factions. The charge of simony was inspired by Jesuit hatred; there is absolutely no evidence that Ganganelli pledged himself to suppress the order.

The outlook for the papacy was dark; Portugal was talking of a patriarchate; France held Avignon; Naples held Ponte Corvo and Benevento; Spain was ill-affected; Parma, defiant; Venice, aggressive; Poland meditating a restriction of the rights of the nuncio. Clement realized the imperative necessity of conciliating the powers. He suspended the public reading of the bull In Coena Domini, so obnoxious to civil authority; resumed relations with Portugal; revoked the monilorium of his predecessor against Parma. But the powers were bent upon the destruction of the Jesuits, and they had the pope at their mercy. Clement looked abroad for help, but found none. Even Maria Theresa, his last hope, suppressed the order in Austria.

Temporizing and partial concessions were of no avail. At last, convinced that the peace of the Church demanded the sacrifice, Clement signed the brief Dominus ac Redemptor, dissolving the order, on the 21st of July 1773. The powers at once gave substantial proof of their satisfaction; Benevento, Ponte Corvo, Avignon and the' Venaissin were restored to the Holy See. But it would be unfair to accept this as evidence of a bargain. Clement had formerly indignantly rejected the suggestion of such an exchange of favours.

There is no question of the legality of the pope's act; whether he was morally culpable, however, continues to be a matter of bitter controversy. On the one hand, the suppression is de- nounced as a base surrender to the forces of tyranny and irreligion, an act of treason to conscience, which reaped its just punishment of remorse; on the other hand, it is as ardently maintained that Clement acted in full accord with his conscience, and that the order merited its fate by its own mischievous activities which made it an offence to religion and authority alike. But whatever the guilt or innocence of the Jesuits, and whether their suppression were ill-advised or not, there appears to be no ground for impeaching the motives of Clement, or of doubting that he had the approval of his conscience. The stories of his having swooned after signing the brief, and of having lost hope and even reason, are too absurd to be entertained. The decline in health, which set in shortly after the suppression, and his death (on the 22nd of September 1774) proceeded from wholly natural causes. The testimony of his physician and of his confessor ought to be sufficient to discredit the oft-repeated story of slow poisoning (see Duhr, Jesuiten Fabeln, 4th ed., 1904, pp. 69 seq.).

The suppression of the Jesuits bulks so large in the pontificate of Clement that he has scarcely been given due credit for his praiseworthy attempt to reduce the burdens of taxation and to reform the financial administration, nor for his liberal encourage- ment of art

and learning, of which the museum Pio-Clementino is a lasting monument.

No pope has been the subject of more diverse judgments than Clement XIV. Zealous defenders Credit him with all virtues, and bless him as the instrument divinely ordained to restore the peace of the Church; virulent detractors charge him with in- gratitude, cowardice and double-dealing. The truth is at neither extreme. Clement's was a deeply religious and poetical nature, animated by a lofty and refined spirit. Gentleness, equanimity and benevolence were native to him. He cherished high purposes and obeyed a lively conscience. But he instinctively shrank from conflict; he lacked the resoluteness and the sterner sott of courage that grapples with a crisis.

Caraccioli's Vie de CUment XIV (Paris, 1775) (freq. translated), is incomplete, uncritical and too laudatory. The middle of the 19th century saw quite a spirited controversy over Clement XIV. ; St Priest, in his Hist, de la chute des Jesuites (Paris, 1846), represented Clement as lamentably, almost culpably, weak; Cretineau- Joly, in his Hist. . . . de la Comp. de Jesus (Paris, 1 844-1 845, and his Clement XIV et les Jesuites (Paris, 1847), was outspoken and bitter in his condemnation; this provoked Theiner' s Gesch. des Pontificals Clemens' XIV. (Leipzig and Paris, 1852), a vigorous defence based upon original documents to which, as custodian of the Vatican archives, the author Had freest access; Cretineau-Joly replied with Le Pape Clement XIV; Letires au P. Theiner (Paris, 1852). Ravi- gnan's Clem. XIII. e Clem. XIV. (Paris, 1854) is a weak, half- hearted apology for Clement XIV- See also v. Reumont, Ganganelli, Papst Clemens XIV. (Berlin, 1847); and Reinerding, Clemens XIV. u. d. Aufhebung der Gesellschaft Jesu (Augsburg, 1854). The letters of Clement have frequently been printed; the genuineness of Caraccioli's collection (Paris, 1776; freq. translated) has been questioned, but most of the letters are now generally accepted as genuine; see also Clementis XIV. Epp : ac Brevia, ed. Theiner (Paris, 1852). An extended bibliography is to be found in Hergen- rother, Allg. Kirchengesch. (1880), iii. 510 seq. (T. F. C.)

CLEMENT OF ALEXANDRIA [Clemens Alexandrinus), Greek Father of the Church. The little we know of him is mainly derived from his own works. He was probably born about a.d. 150 of heathen parents in Athens. The earliest writer after himself who gives us any information with regard to him is Eusebius. The only points on which his works now extant inform us. axe his date and bis instructors. In the Stromateis,

while attempting to show that the Jewish Scriptures were older than any writings of the Greeks, he invariably brings down his dates to the death of Commodus, a circumstance which at once suggests that he wrote in the reign of the emperor Severus, from 193 to 211 a.d. (see Strom, lib. i. cap. xxi. 140, p. 403, Potter's edition). The passage in regard to his teachers is corrupt, and the sense is therefore doubtful (Strom, lib. i. cap. i. n, p. 322, P.). " This treatise," he says, speaking of the Stromateis, " has not been contrived for mere display, but memoranda are treasured up in it for my old age to be a remedy for forgetf ulness, — an image, truly, and an outline of those clear and living discourses, and those men truly blessed and noteworthy I was privileged to hear. One of these was in Greece, the Ionian, the other was in Magna Graecia; the one of them was from Coele Syria, the other from Egypt; but there were others in the East, one of whom belonged to the Assyrians, but the other was in Palestine, originally a Jew. The last of those whom I met was first in power. On falling in with him I found rest, having tracked him while he lay concealed in Egypt. He was in truth the Sicilian bee, and, plucking the flowers of the prophetic and apostolic meadow, he produced a wonderfully pure knowledge in the souls of the listeners."

Some have supposed that in this passage seven teachers are named, others that there are only five, and various conjectures have been hazarded as to what persons were meant. The only one about whom conjecture has any basis for speculating is the last, for Eusebius states (H.E. v. 1 1) that Clement made mention of Pantaenus as his teacher in the Hypotyposes. The reference in this passage is plainly to one whom he might well designate as his teacher.

To the information which Clement here supplies subsequent writers add little. By Eusebius and Photius he is called Titus Flavius Clemens, and " the Alexandrian " is added to his name. Epiphanius tells us that some said Clement was an Alexandrian, others that he was an Athenian (Haer. xxxii. 6), and a modern writer imagined that he reconciled this discordance by the supposition that he was born at Athens, but lived at Alexandria. We know nothing of his conversion except that he passed from heathenism to Christianity. This is expressly stated by Eusebius (Praep. Evangel, lib. ii. cap. 2), though it is likely that Eusebius had no other authority than the works of Clement. These works, however, warrant the inference. They show a singularly minute acquaintance with the ceremonies of pagan religion, and there are indications that Clement himself had been initiated in some of the mysteries (Protrept. cap. ii. sec. 14, p. 13, P.). There is no

means of determining the date of his conversion. He attained the position of presbyter in the church of Alexandria (Eus. H.E. vi. 11, and Jerome, De Vir. III. 38), and became perhaps the assistant, and certainly the successor of Pantaenus in the catechetical school of that place. Among his pupils were Origen (Eus. H.E. vi. 7) and Alexander, bishop of Jerusalem (Eus. H.E. vi. 14.). How long he continued in Alexandria, and when and where he died, are all matters of pure conjecture. The only further notice of Clement that we have in history is in a letter written in 211 by Alexander, bishop of Jerusalem, to the Antiochians, and preserved by Eusebius (H.E. vi. 11). The words are as follows: — "This letter I sent through Clement the blessed presbyter, a man virtuous and tried, whom ye know and will come to know completely, who being here by the providence and guidance of the Ruler of all strengthened and increased the church of the Lord." A statement of Eusebius in regard to the persecution of Severus in 202 (H.E. vi. 3) would render it likely that Clement left Alexandria on that occasion. It is conjectured that he went to his old pupil Alexander, who was at that time bishop of Flaviada in Cappadocia, and that when his pupil was raised to the see of Jerusalem Clement followed him there. The letter implies that he was known to the Antiochians, and that it was likely he would be still better known. Some have conjectured that he returned to Alexandria, but there is not the shadow of evidence for such conjecture. Alexander, writing to Origen (c. 216), mentions Clement as dead (Eus. H.E. vi. 14, 9).

Eusebius and Jerome give us lists of the works which Clement left behind him. Photius has also described some of them. They are as follows: — (1) Ilpds "EXXˆvas X670S & irporpeirrueAs, A Hortatory Address to the Greeks. (2) '0 11018076)765, The Tutor, in three books. (3) Srpujuarcis, or Patch-work, in eight books. (4) TZs o

TrXotirios; Who is the Rich Man that is Saved ? (5) Eight books of "TiroTUTrciwes, Adumbrations or Outlines. (6) On the Passover. (7) Dis- courses on Fasting. (8) On Slander. (9) Exhortation to Patience, or to the Newly Baptized. (10) The Kavi > v &cKX7)

Of these, the first four have come down to us complete, or nearly complete. The first three form together a progressive introduction to Christianity corresponding to the stages through which the (iiio-Tijs passed at Eleusis — purification, initiation, revelation. The Hortatory Address to the Greeks is an appeal to them to give up the worship of their gods, and to devote themselves to the worship of the one living and true God. Clement exhibits the absurdity and immor- ality of the stories told with regard to the pagan deities, the cruelties perpetrated in their worship, and the utter uselessness of bowing down before

images made by hands. He at the same time shows the Greeks that their own greatest philosophers and poets recognized the unity of the divine Being, and had caught glimpses of the true nature of God, but that fuller light had been thrown on this subject by the Hebrew prophets. He replies to the objection that it was not right to abandon the customs of their forefathers, and points them to Christ as their only safe guide to God.

The Paedagogue is divided into three books. In the first Clement discusses the necessity for and the true nature of the Paedagogus, and shows how Christ as the Logos acted as Paedagogus, and still acts. In the second and third books Clement enters into particulars, and explains how the Christian following the Logos or Reason ought to behave in the various circumstances of life — in eating, drinking, furnishing a house, in dress, in the relations of social life, in the care of the body, and similar concerns, and concludes with a general description of the life of a Christian. Appended to the Paedagogue are two hymns, which are, in all probability, the production of Clement, though some have conjectured that they were portions of the church service of that time, or pa/tareis were bags in which bedclothes (aTpiinara) were kept. The phrase was used as a book- title by Origen and others, and is equivalent to our ” miscellanies.” It is difficult to give a brief account of the varied contents of the book. Sometimes Clement discusses chronology, sometimes philo- sophy, sometimes poetry, entering into the most minute critical and chronological details; but one object runs through all, and this is to show what the true Christian Gnostic is, and what is his relation to philosophy. The work was in eight books. The first seven are complete. The eighth now extant is really an incomplete treatise on logic. Some critics have rejected this book as spurious, since its matter is so different from that of the rest. Others, however, have held to its genuineness, because in a Patch-work or Book of Miscellanies the difference of subject is no sound objection, and because Photius seems to have regarded our present eighth book as genuine (Phot. cod. iii. p. 89b, Bekker).

The treatise Who is the Rich Man that is Saved ? is an admirable exposition of the narrative contained in St Mark’s Gospel x. 17-31. Here Clement argues that wealth, if rightly used, is not unchristian.

The Hypotyposes 1 in eight books, have not come down to us. Cassiodorus translated them into Latin, freely altering to suit his own ideas of orthodoxy. Both Eusebius and Photius describe the work. It was a short commentary on all the books of Scripture, including some of the apocryphal works, such as the Epistle of Barnabas and the Revelation of Peter. Photius speaks in strong language of the impiety

of some opinions in the book (Bibl. cod. 109, p. 89 a Bekker), but his statements are such as to prove conclusively that he must have had a corrupt copy, or read very carelessly, or grossly misunderstood Clement. Notes in Latin on the first epistle of Peter, the epistle of Jude, and the first two of John have come down to us; but whether they are the translation of Cassiodorus, or indeed a translation of Clement's work at all, is a matter of dispute.

The treatise on the Passover was occasioned by a work of Melito on the same subject. Two fragments of this treatise were given by Petavius, and are contained in the modern editions.

We know nothing of the work called The Ecclesiastical Canon from any external testimony. Clement himself often mentions the iiv, and defines it as the agreement and harmony of the law and the prophets with the covenant delivered at the appearance of Christ (Strom, vi. cap. xv. 125, p. 803, P.). No doubt this was the subject of the treatise. Jerome and Photius call the work Ecclesiastical Canons, but this seems to be a mistake.

Of the other treatises mentioned by Eusebius and Jerome nothing is known. A fragment of Clement, quoted by Antonius Melissa, is most probably taken from the treatise on slander.

Besides the treatises mentioned by Eusebius, fragments of treatises on Providence and the Soul have been preserved. Mention is also made of a work by Clement on the Prophet Amos, and another on Definitions.

In addition to these Clement often speaks of his intention to write on certain subjects, but it may well be doubted whether in most cases, if not all, he intended to devote separate treatises to

1 Zahn thinks we have part of them in the Adumbrationes Clem. Alex, in epistolas canonicas (Codex Lindum, 96, sec. ix.). They were perhaps intended as a completion of the preceding course.

them. Some have found an allusion to the treatise on the Soul already mentioned. The other subjects are Marriage (ya.fu.iids \6-yos), Continence, the Duties of Bishops. Presbyters, Deacons and Widows, Prophecy, the Soul, the Transmigration of the Soul and the Devil, Angels, the Origin of the World, First Principles and the Divinity of the Logos, Allegorical Interpretations of Statements made with regard

to God's anger and similar affections, the Unity of the Church, and the Resurrection.

Two works are incorporated in the editions of Clement which are not mentioned by himself or any ancient writer. They are *Ek tw Qeodorov /cat rijs aparoXtKiJs KaXovfikvTjs SiHaaKaklas Kara Tovs ObaktvTivov xP& vov s iiriTonai, and 'Ek tojp irpoˆrjrt.Kwi' kicXoyai. The first, if it is the work of Clement, must be a book merely of excerpts, for it contains many opinions which Clement opposed. Mention is made of Pantaenus in the second, and some have thought it more worthy of him than the first. Others have regarded it as a work similar to the first, and derived from Theodorus.

Clement occupies a profoundly interesting position in the history of Christianity. He is the first to bring all the culture of the Greeks and all the speculations of the Christian heretics to bear on the exposition of Christian truth. He does not attain to a systematic exhibition of Christian doctrine, but he paves the way for it, and lays the first stones of the foundation. In some respects Justin anticipated him. He also was well acquainted with Greek philosophy, and took a genial view of it; but he was not nearly so widely read as Clement. The list of Greek authors whom Clement has quoted occupies upwards of fourteen of the quarto pages in Fabricius's Bibliotheca Graeca. He is at home alike in the epic and the lyric, the tragic and the comic poets, and his knowledge of the prose writers is very extensive. Some, however, of the classic poets he appears to have known only from anthologies; hence he was misled into quoting as from Euripides and others verses which were written by Jewish forgers. He made a special study of the philosophers. Equally minute is his knowledge of the systems of the Christian heretics. And in all cases it is plain that he not merely read but thought deeply on the questions which the civilization of the Greeks and the various writings of poets, philosophers and heretics raised. But it was in the Scriptures that he found his greatest delight. He believed them to contain the revelation of God's wisdom to men. He quotes all the books of the Old Testament except Ruth and the Song of Solomon, and amongst the sacred writings of the Old Testament he evidently included the book of Tobit, the Wisdom of Solomon and Ecclesiasticus. He is equally full in his quotations from the New Testament, for he quotes from all the books except the epistle to Philemon, the second epistle of St Peter, and the epistle of St James, and he quotes from The Shepherd of Hermas, and the epistles of Clemens Romanus and of Barnabas, as inspired. He appeals also to many of the lost gospels, such as those of the Hebrews, of the Egyptians and of Matthias.

Notwithstanding this adequate knowledge of Scripture, the modern theologian is disappointed to find very little of what he deems characteristically Christian. In fact Clement regarded Christianity as a philosophy. The ancient philosophers sought through their philosophy to attain to a nobler and holier life, and this also was the aim of Christianity. The difference between the two, in Clement's judgment, was that the Greek philosophers had only glimpses of the truth, that they attained only to fragments of the truth, while Christianity revealed in Christ the absolute and perfect truth. All the stages of the world's history were therefore preparations leading up to this full revelation, and God's care was not confined to the Hebrews alone. The worship of the heavenly bodies, for instance, was given to man at an early stage that he might rise from a con- templation of these sublime objects to the worship of the Creator. Greek philosophy in particular was the preparation of the Greeks for Christ. It was the schoolmaster or paedagogue to lead them to Christ. Plato was Moses atticizing. Clement varies in his statement how Plato got his wisdom or his fragments of the Reason. Sometimes he thinks that they came direct from God, like all good things, but he is also fond of maintaining that many of Plato's best thoughts were borrowed from the Hebrew prophets; and he makes the same statement in regard to the wisdom of the other philosophers. But however this may be,

Christ was the end to which all that was true in philosophies pointed. Christ himself was the Logos, the Reason. God the Father was ineffable. The Son alone can manifest Him fully. He is the Reason that prevades the universe, that brings out all goodness, that guides all good men. It was through possessing somewhat of this Reason that the philosophers attained to any truth and goodness; but in Christians he dwells more fully and guides them through all the perplexities of life. Photius, prob- ably on a careless reading of Clement, argued that he could not have believed in a real incarnation. But the words of Clement are quite precise and their meaning indisputable. The real difficulty attaches not to the Second Person, but to the First. The Father in Clement's mind becomes the Absolute of the philosophers, that is to say, not the Father at all, but the Monad, a mere point devoid of all attributes. He believed in a personal Son of God who was the Reason and Wisdom of God; and he believed that this Son of God really became incarnate though he speaks of him almost invariably as the Word, and attaches little value to his human nature. The object of his incarnation and death was to free man from his sins, to lead him into the path of wisdom, and thus in the end elevate him to the position of a god. But man's salvation was to be gradual. It began with faith, passed from that to love, and ended in full and complete

knowledge. There could be no faith without knowledge. But the knowledge is imperfect, and the Christian was to do many things in simple obedience without knowing the reason. But he has to move upwards continually until he at length does nothing that is evil, and he knows fully the reason and object of what he does. He thus becomes the true Gnostic, but he can become the true Gnostic only by contemplation and by the practice of what is right. He has to free himself from the power of passion. He has to give up all thoughts of pleasure. He must prefer goodness in the midst of torture to evil with unlimited pleasure. He has to resist the temptations of the body, keeping it under strict control, and with the eye of the soul undimmed by corporeal wants and impulses, contemplate God the supreme good, and live a life according to reason. In other words, he must strive after likeness to God as he reveals himself in his Reason or in Christ. Clement thus looks entirely at the en- lightened moral elevation to which Christianity raises man. He believed that Christ instructed men before he came into the world, and he therefore viewed heathenism with kindly eye. He was also favourable to the pursuit of all kinds of knowledge. All'enlightenment tended to lead up to the truths of Christianity, and hence knowledge of every kind not evil was its handmaid. Clement had at the same time a strong belief in evolution or development. The world went through various stages in prepara- tion for Christianity. The man goes through various stages before he can reach Christian perfection. And Clement conceived that this development took place not merely in this life, but in the future through successive grades. The Jew and the heathen had the gospel preached to them in the world below by Christ and his apostles, and Christians will have to pass through pro- cesses of purification and trial after, death before they reach knowledge and perfect bliss.

The beliefs of Clement have caused considerable difference of opinion among modern scholars. He sought the truth from whatever quarter he could get it, believing that all that is good comes from God, wherever it be found. He belongs therefore to no school of philosophers. He calls himself an Eclectic. He was in the main a Neoplatonist, drawing from that school his doctrines of the Monad and his strong tendency towards mysticism. For his moral doctrine he borrowed freely from Stoicism. Aristotelian features may be found but are quite subordinate. But Clement always regards the articles of the Christian creed as the axioms of a new philosophy. Daehne had tried to show that he was Neoplatonic, and Reinkens has maintained that he was essentially Aristotelian. His mode of viewing Christianity does not fit into any classification. It is the result of the period in which he lived, of his wide culture and the simplicity and noble purity of his

character.

It is needless to say that his books well deserve study, but

the study is not smoothed by simplicity of style. Clement professed to despise rhetoric, but was himself a rhetorician, and his style is turgid, involved and difficult. He is singularly simple in his character. In discussing marriage he refuses to use any but the plainest language. A euphemism is with him a falsehood. But he is temperate in his opinions; and the practical advices in the second and third books of the Paedagogue are remarkably sound and moderate. He is not always very critical, and he is passionately fond of allegorical interpretations, but these were the faults of his age.

All early writers speak of Clement in the highest terms of laudation, and he certainly ought to have been a saint in any Church that reveres saints. But Clement is not a saint in the Roman Church. He was a saint up till the time of Benedict XIV., who read Photius on Clement, believed him, and struck the Alexandrian's name out of the calendar. But many Roman Catholic writers, though they yield a practical obedience to the papal decision, have adduced good reason why it should be reversed (Cognat, p. 451).

Editions. — The standard edition of the collected works will be that of O. Stahlin (first vol. containing Protrepticus and Paedagogus, Leipzig, 1905). Separate editions of Strom, vii., Hort and Major (1902); Q.D.S., Barnard in Texts and Studies, v. 2 (1897); W. Dindorf's edition in 4 vols. (Oxford, 1869) is little more than a reprint of the text of Bishop Potter, 1715. For the Fragments see Zahn, Forschungen zur Gesch. des neut. Kanons, part iii., or Harnack and Preuschen, Gesch. der altch. Lilt., vol. i.

Literature. — A copious bibliography will be found in Harnack, Chronologie, vol. ii., or in Bardenhewer, Gesch. der altk. Lit. Either of these will supply the names of works upon Clement's biblical text, his use of Stoic writers, his quotations from heathen writers, and his relation to heathen philosophy. A valuable book is de Faye, Clem. d'Alex. (1898). For his theological position see Harnack, Dogmengeschichte; Hort, Six Lectures on the Ante-Nicene Fathers; Westcott, " Clem, of Alex." in Diet. Christ. Biog. ; Bigg, Christian Platonists of Alex. (1886). A book on Clement's relation to Mysticism is wanted. (C.

Bi. ; J. D.)

CLEMENT, FRANCOIS (1714-1793), French historian, was born at Beze, near Dijon, and was educated at the Jesuit College at Dijon. At the age of seventeen he entered the society of the Benedictines of Saint Maur, and worked with such intense application that at the age of twenty-five he was obliged to take a protracted rest. He now resided in Paris, where he wrote the nth and 12th vols, of the Histoire litter aire de la France, and edited (with Dom Brial) the 12th and 13th vols, of the Recueil des historiens des Gauls et de la France. The king appointed him on the committee which was engaged in publishing charters, diplomas and other documents connected with French history (see Xavier Charmes, Le Comite des travaux historiques et scientifiques, vol. i., 1886, passim); and the Academy of Inscriptions chose him as a member (1785). Dom Clement also revised the Art de verifier les dates, edited in 1750 by Dom Clemencet. Three volumes with the Indexes appeared from 1783 to 1792. He was engaged in preparing another volume including the period before the Christian era, when he died suddenly of apoplexy, at the age of sixty-nine. The work was afterwards brought down from 1770 to 1827 by Julien de Courcelles and Fortia d'Urban.

CLEMENT, JACQUES (1567-1589), murderer of the French king Henry III., was born at Sorbon in the Ardennes, and became a Dominican friar. Civil war was raging in France, and Clement became an ardent partisan of the League; his mind appears to have become unhinged by religious fanaticism, and he talked of exterminating the heretics, and formed a plan to kill Henry III. His project was encouraged by some of the heads of the League; he was assured of temporal rewards if he succeeded, and of eternal bliss if he failed. Having obtained letters for the king, he left Paris on the 31st of July 1589, and reached St Cloud, the headquarters of Henry, who was besieging Paris. On the following day he was admitted to the royal presence, and presenting his letters he told the king that he had an important and confidential message to deliver. The attend- ants then withdrew, and while Henry was reading the letters Clement mortally wounded him with a dagger which had been concealed beneath his cloak. The assassin was at once killed by the attendants who rushed in, and Henry died early on the

following day. Clement's body was afterwards quartered and burned. This deed, however, was viewed with far different feelings in Paris and by the partisans of the League, the murderer being regarded as a martyr and extolled by Pope Sixtus V., while even his canonization was discussed.

See E. Lavisse, Histoire de France, tome vi. (Paris, 1904).

CLEMENTI, MUZIO (c. 1751-1832), Italian pianist and com- poser, was born at Rome between 1750 and 1752. His father, a jeweller, encouraged his son's early musical talent. Buroni and Cordicelli were his first masters, and at the age of nine Clemen ti's theoretical and practical studies had advanced to such a degree that he was able to win the position of organist at a church. He continued his studies under Santarelli and Carpani, and at the age of fourteen wrote a mass which was performed in public. About 1766 Beckford, the author of Valhek, persuaded Clementi to follow him to England, where the young composer lived in retirement at one of the country seats of his protector in Dorsetshire until 1770. In that year he first appeared in London, where his success both as composer and pianist was rapid and brilliant. In 1777 he was for some time employed as conductor of the Italian opera, but he soon afterwards left London for Paris. Here also his concerts were crowded by enthusiastic audiences, and the same success accom- panied Clementi on a tour about the year 1780 to southern Germany and Austria. At Vienna, which he visited between 1781 and 1782, he was received with high honour by the emperor Joseph II., in whose presence he met Mozart, and fought a kind of musical duel with him. His technical skill proved to be equal if not superior to that of his rival, who on the other hand infinitely surpassed him by the passionate beauty of his inter- pretation. It is worth noting that one of the finest of Clementi's sonatas, that in B flat, shows an exactly identical opening theme with Mozart's overture to the Flauto Magico.

In May 1782 Clementi returned to London, where for the next twelve years he continued his lucrative occupations of fashionable teacher and performer at the concerts of the aristocracy. He took shares in the pianoforte business of a firm which went bankrupt in 1800. He then established a pianoforte and music business of his own, under the name of Clementi & Co. Other members were added to the firm, including Collard and Davis, and the firm was ultimately taken over by Messrs Collard alone. Amongst his pupils on the pianoforte during this period may be mentioned John Field, the composer of the celebrated Nocturnes. In his company Clementi paid, in 1804, a visit to Paris, Vienna, St Petersburg, Berlin and other cities. While he was in Berlin, Meyerbeer became one of his pupils. He also revisited his own country after an absence of more than thirty years. In 1810 Clementi returned to London, but refused to play again in public, devoting the remainder of his life to com- position. Several symphonies belong to this time, and were played with much success at contemporary concerts, but none of them seem to have been

published. His intellectual and musical faculties remained unimpaired until his death, on the 9th of March 1832, at Evesham, Worcester.

Of Clementi's playing in his youth, Moscheles wrote that it was " marked by a most beautiful legato, a supple touch in lively passages, and a most unfailing technique." Mozart may be said to have closed the old and Clementi to have founded the newer school of technique on the piano. Amongst Clementi's composi- tions the most remarkable are sixty sonatas for pianoforte, and the great collection of Etudes called Gradus ad Parnassum.

CLEMENTINE LITERATURE, the name generally given to the writings which at one time or another were fathered upon Pope Clement I. (q.v.), commonly called Clemens Roman us, who was early regarded as a disciple of St Peter. Thus they are for the most part a species of the larger pseudo-Petrine genus. Chief among them are: (1) The so-called Second Epistle; (2) two Epistles on Virginity; (3) the Homilies and Recognitions; (4) the Apostolical Constitutions (q.v.); and (5) five epistles forming part of the Forged Decretals (see Decretals). The present article deals mainly with the third group, to which the title " Clementine literature " is usually confined, owing to the stress

laid upon it in the famous Tubingen reconstruction of primitive Christianity, in which it played a leading part; but later criti- cism has lowered its importance as its true date and historical relations have been progressively ascertained, (i) and (2) became " Clementine " only by chance, but (3) was so originally by literary device or fiction, the cause at work also in (4) and (5). But while in all cases the suggestion of Clement's authorship came ultimately from his prestige as writer of the genuine Epistle of Clement (see Clement I.), both (3) and (4) were due to this idea as operative on Syrian soil; (5) is a secondary formation based on (3) as known to the West.

(1) The " Second Epistle of Clement."— This, is really the earliest extant Christian homily (see Apostolic Fathers). Its theme is the duty of Christian repentance, with a view to obedience to Christ's precepts as the true confession and homage which He requires. Its special charge is " Preserve the flesh pure and the seal {i.e. baptism) unstained " (viii. 6) . But the peculiar way in which it enforces its morals in terms of the Platonic contrast between the spiritual and sensuous worlds, as archetype and temporal manifestation, suggests a

special local type of theology which must be taken into account in fixing its provenance. This theology, the fact that the preacher seems to quote the Gospel according to the Egyptians (in ch. xii. and possibly else- where) as if familiar to his hearers, and indeed its literary affinities generally, all point to Alexandria as the original home of the homily, at a date about 1 20-140 (see Zeit.f. N. T. Wissenschaftj vii. 1 23 ff) . Neither Corinth (as Lightfoot) nor Rome (as Harnack, who assigns it to Bishop Soter, c. 166-174) satisfies all the internal conditions, while the Eastern nature of the external evidence and the homily's quasi-canonical status in the Codex-Alexandrinus strongly favour an Alexandrine origin.

(2) The Two Epistles to Virgins, i.e. to Christian celibates of both sexes. These are known in their entirety only in Syriac, and were first published by Wetstein (1752), who held them genuine. This view is now generally discredited, even by Roman Catholics like Funk, their best recent editor (Patres Apost., vol. ii.). External evidence begins with Epiphanius (Haer. xxx. 15) and Jerome (Ad Jovin. i. 12); and the silence of Eusebius tells heavily against their existence before the 4th century, at any rate as writings of Clement. The Monophysite Timothy of Alexandria (a.d. 457) cites one of them as Clement's, while Antiochus of St Saba (c. a.d. 620) makes copious but unacknow- ledged extracts from both in the original Greek. There is no trace of their use in the West. Thus their Syrian origin is manifest, the more so that in the Syriac MS. they are appended to the New Testament, like the better-known epistles of Clement in the Codex Alexandrinus. Indeed, judging from another Syriac MS. of earlier date, which includes the latter writings in its canon, it seems that the Epistles on Virginity gradually replaced the earlier pair in certain Syrian churches — even should Lightfoot be right in doubting if this had really occurred by Epiphanius's day (S. Clement of Rome, i. 412).

Probably these epistles did not originally bear Clement's name at all, but formed a single epistle addressed to ascetics among an actual circle of churches. In that case they, or rather it, may date from the 3rd century in spite of Eusebius's silence, and are not pseudo-Clementine in any real sense. It matters little whether or not the false ascription was made before the division into two implied already by Epiphanius (c. a.d. 375). Special occasion for such a hortatory letter may be discerned in its polemic against intimate relations between ascetics of opposite sex, implied to exist among its readers, in contrast to usage in the writer's own locality. Now we know that spiritual unions, prompted originally by highstrung Christian idealism as to a religious fellowship transcending the law of nature in relation to sex, did exist between persons living under vows of celibacy during the 3rd

century in particular, and not least in Syria (cf. the case of Paul of Samosata, c. 265, and the Synod of Ancyra in Galatia, c. 314). It is natural, then, to see in the original epistle a protest against the dangers of such spiritual bold- ness (cf. ” Subintroductae ” in Herzog-Hauck’s Realencyklo- padie), prior perhaps to the famous case at Antioch just noted.

Possibly it is the feeling of south Syria or Palestine that here expresses itself in remonstrance against usages prevalent in north Syria. Such a view finds support also in the New Testament canon implied in these epistles.

(3) M The Epistle of Clement to James (the Lord’s brother). This was originally part of (3) [b], in connexion with which its origin and date are discussed. But as known to the West through Rufinus’s Latin version, it was quoted as genuine by the synod of Vaison (a.d. 442) and throughout the middle ages. It became ” the starting point of the most momentous and gigantic of medieval forgeries, the Isidorian Decretals,” ” where it stands at the head of the pontifical letters, extended to more than twice its original length.” This extension perhaps occurred during the 5th century. At any rate the letter in this form, along with a ” second epistle to James ” (on the Eucharist, church furniture, &c), dating from the early 6th century, had separate currency long before the 9th century, when they were incorporated in the Decretals by the forger who raised the Clementine epistles to five (see Lightfoot, Clement, i. 414 ff.).

(3) [b] The ” Homilies ” and ” Recognitions.”—” The’ two chief extant Clementine writings, differing considerably in some respects in doctrine, are both evidently the outcome of a peculiar speculative type of Judaistic Christianity, for which the most characteristic name of Christ was ‘ the true Prophet.’ The frame- work of both is a narrative purporting to be written by Clement (of Rome) to St James, the Lord’s brother, describing at the beginning his own conversion and the circumstances of his first acquaintance with St Peter, and then a long succession of incidents accompanying St Peter’s discourses and disputations, leading up to a romantic recognition of Clement’s father, mother and two brothers, from whom he had been separated since child- hood. The problems discussed under this fictitious guise are with rare exceptions fundamental problems for every age; and, whatever may be thought of the positions maintained, the discussions are hardly ever feeble or trivial. Regarded simply as mirroring the past, few, if any, remains of Christian antiquity present us with so vivid a picture of the working of men’s minds under the influence of the new leaven which had entered into the world ” (Hort, Clem.

Recog., p. xiv,).

The indispensable preliminary to a really historic view of these writings is some solution of the problem of their mutual relations. The older criticism assumed a dependence of one upon the other, and assigned one or both to the latter part of the 2nd century. Recent criticism, however, builds on the principle, which emerges alike from the external and internal evidence (see Salmon in the Diet, of Christian Biography), that both used a common basis. Our main task, then, is to define the nature, origin and date of the parent document, and if possible its own literary antecedents. Towards the solution of this problem two contri- butions of prime importance have recently been made. The earlier of these is by F. J. A. Hort, and was delivered in the form of lectures as far back as 1884, though issued posthumously only in 1901; the other is the elaborate monograph of Dr Hans Waitz (1904).

Criticism. — (i.) External Evidence as to the Clementine Romance. The evidence of ancient writers really begins, not with Origen, 1 but with Eusebius of Caesarea, who in his Eccl. Hist. iii. 38, writes as follows: ” Certain men have quite lately brought forward as written by him (Clement) other verbose and lengthy writings, containing dialogues of Peter, forsooth, and Apion, whereof not the slightest mention is to be found among the ancients, for they do not even preserve in purity the stamp of the Apostolic orthodoxy.” Apion, the Alexandrine grammarian

1 Dr Armitage Robinson, in his edition of the Philocalia (extracts made c. 358 by Basil and Gregory from Origen’s writings), proved that the passage cited below is simply introduced as a parallel to an extract of Origen’s ; while Dom Chapman, in the Journal of Theol. Studies, iii. 436 ff., made it probable that the passages in Origen’s Comm. on Matthew akin to those in the Opus Imperf. in Matth. are insertions in the former, which is extant only in a Latin version. Subsequently he suggested (Zeitsch. f. N. T. Wissenschaft, ix. 33 f.) that the passage in the Philocalia is due not to its authors but to an early editor, since it is the only citation not referred to Origen.

and foe of Judaism, whose criticism was ansrwered by Josephus, appears in this character both in Homilies and Recognitions, though mainly in the former (iv. 6-vii. 5). Thus Eusebius implies (1) a

spurious Clementine work containing matter found also in our Homilies at any rate; and (2) its quite recent origin. Next we note that an extract in the Philocalia is introduced . as follows: ” Yea, and Clement the Roman, a disciple of Peter the Apostle, after using words in harmony with these on the present problem, in conversation with his father at Laodicea in the Circuits, speaks a very necessary word for the end of arguments touching this matter, viz. those things which seem to have proceeded from genesis (= astrological destiny), in the fourteenth book.” The extract answers to Recognitions, x. 10-13, but it is absent from our Homilies. Here we observe that (1) the extract agrees this time with Recognitions, not with Homilies; (2) its framework is that of the Clementine romance found in both; (3) the tenth and last book of Recognitions is here parallel to book xiv. of a work called Circuits {Periodoi).

This last point leads on naturally to the witness of Epiphanius (c-375), who, speaking of Ebionites or Judaizing Christians of various sorts, and particularly the Essene type, says (Haer. xxx. 15) that ” they use certain other books likewise, to wit, the so-called Circuits of Peter, which were written by the hand of Clement, falsifying their contents, though leaving a few genuine things.” Here Ephiphanius simply assumes that the Ebionite Circuits of Peter was based on a genuine work of the same scope, and goes on to say that the spurious elements are proved such by contrast with the tenor of Clement’s ” encyclic epistles” {i.e. those to virgins, (2) above); for these enjoin virginity (celibacy), and praise Elijah, David, Samson, and all the prophets, whereas the Ebionite Circuits favour marriage (even in Apostles) and depreciate the prophets between Moses and Christ, ” the true Prophet.” ” In the Circuits, then, they adapted the whole to their own views, representing Peter falsely in many ways, as that he was daily baptized for the sake of purification, as these also do; and they say that he likewise abstained from animal food and meat, as they themselves also do.” Now all the points here noted in the Circuits can be traced in our Homilies and Recognitions, though toned down in different degrees.

The witness of the Arianizing Opus Imperfectum in Matthaeum {c. 400) is in general similar. Its usual form of citation is ” Peter in Clement ” (apud Clementem). This points to ” Clement ” as a brief title for the Clementine Periodoi, a title actually found in a Syriac MS. of a.d. 411 which contains large parts of Recogni- tions and Homilies, and twice used by Rufinus, e.g. when he proposes to inscribe his version of the Recognitions ” Rufinus Clemens.” Rufinus in his preface to this work — in which for the first time we meet the title Recognition^) — observes that there are two editions to which the

name applies, two collections of books differing in some points but in many respects containing the same narrative. This he remarks in explanation of the order of his version in some places, which he feels may strike his friend Gaudentius as unusual, the inference being that the other edition was the better-known one, although it lacked ” the transformation of Simon ” {i.e. of Clement’s father into Simon’s likeness), which is common to the close both of our Recognitions and Homilies, and so probably belonged to the Circuits. We may assume, too {e.g. on the basis of our Syriac MS.), that the Greek edition of the Recognitionˆ) actually used by Rufinus was much nearer the text of the Periodoi of which we have found traces than we should imagine from its Latin form.

So far we have no sure trace of our Homilies at all, apart from the Syriac version. Even four centuries later, Photius, in refer- ring to a collection of books called both Acts of Peter and the Recognition of Clement, does not make clear whether he means Homilies or Recognitions or either. ” In all the copies which we have seen (and they are not a few) after those different epistles (viz. ‘ Peter to James ‘ and ‘ Clement to James,’ prefixed, the one in some MSS. the other in others) and titles, we found without variation the same treatise, beginning, I, Clement, &c.” But it is not clear that he had read more than the opening of

these MSS. The fact that different epistles are prefixed to the same work leads him to conjecture ” that there were two editions made of the Acts of Peter (his usual title for the collection), but in course of time the one perished and that of Clement prevailed.” This is interesting as anticipating a result of modern criticism, as will appear below. The earliest probable reference to our Homilies occurs in a work of doubtful date, the pseudo- Athanasian Synopsis, which mentions ” Clementines, whence came by selection and rewriting the true and inspired form.” Here too we have the first sure trace of an expurgated recension, made with the idea of recovering the genuine form assumed, as earlier by Epiphanius, to he behind an unorthodox recension of Clement’s narrative. As, moreover, the extant Epitome is based on our Homilies, it is natural to suppose it was also the basis of earlier orthodox recensions, one or more of which may be used in certain Florilegia of the 7 th century and later. Nowhere do we find the title Homilies given to any form of the Clementine collection in antiquity.

(ii.) The Genesis of the Clementine Literature. It has been need- ful to cite so much of the evidence proving that our Homilies and Recognitions are both recensions of a common basis, at first known as

the Circuits of Peter and later by titles connecting it rather with Clement, its ostensible author, because it affords data, also for the historical problems touching (a) the contents and origin of the primary Clementine work, and {b) the conditions under which our extant recensions of it arose.

{a) The Circuits of Peter, as defined on the one hand by the epistle of Clement to James originally prefixed to it and by patristic evidence, and on the other by the common element in our Homilies and Recognitions, may be conceived as follows. It contained accounts of Peter's teachings and discussions at various points on a route beginning at Caesarea, and extending northwards along the coast-lands of Syria as far as Antioch. During this tour he meets with persons of typically erroneous views, which it was presumably the aim of the work to refute in the interests of true Christianity, conceived as the final form of divine revelation — a revelation given through true prophecy embodied in a succession of persons, the chief of whom were Moses and the prophet whom Moses foretold, Jesus the Christ. The prime exponent of the spurious religion is Simon Magus. A second protagonist of error, this time of Gentile philosophic criticism directed against fundamental Judaism, is Apion, the notorious anti-Jewish Alexandrine grammarian of Peter's day; while the r61e of upholder of astrological fatalism {Genesis) is played by Faustus, father of Clement, with whom Peter and Clement debate at Laodicea. Finally, all thisis already embedded in a setting determined by the romance of Clement and his lost relatives, " recognition " of whom forms the denouement of the story.

There is no reason to doubt that such, roughly speaking, were the contents of the Clementine work to which Eusebius alludes slightingly, in connexion with that section of it which had to his eye least verisimilitude, viz. the dialogues between Peter and Apion. Now Eusebius believed the work to have been of quite recent and suspicious origin. This points to a date about the last quarter of the 3rd century; and the prevailing doctrinal tone of the contents, as known to us, leads to the same result. The standpoint is that of the peculiar Judaizing or Ebonite Christianity due to persistence among Christians of the tendencies known among pre-Christian Jews as Essene. The Essenes, while clinging to what they held to be original Mosaism, yet conceived and practised their ancestral faith in ways which showed distinct traces of syncretism, or the operation of influences foreign to Judaism proper. They thus occupied an ambiguous position on the borders of Judaism. Similarly Christian Essen- ism was syncretist in spirit, as we see from its best-known representatives, the Elchasaites, of whom we first hear about 220,

when a certain Alcibiades of Apamea in Syria (some 60 m. south of Antioch) brought to Rome the Book of Helxai — the manifesto of their distinctive message (Hippol., Philos. ix. 13) — and again some twenty years later, when Origen refers to one of their leaders as having lately arrived at Caesarea (Euseb. vi. 38).

The first half of the 3rd century was marked, especially in Syria, by a strong tendency to syncretism, which may well have stirred certain Christian Essenes to fresh propaganda. Other writings than the Book of Helxai, representing also other species of the same genus, would take shape. Such may have been some of the pseudo-apostolic Acts to which Epiphanius alludes as in use among the Ebionites of his own day: and such was probably the nucleus of our Clementine writings, the Periodoi of Peter.

Harnack {Chronologie, ii. 522 f.), indeed, while admitting that much (e.g. in Homilies, viii. 5-7) points the other way, prefers the view that even the Circuits were of Catholic origin (Chapman, as above, says Arian, soon after 325), regarding the syncretistic Jewish-Christian features in it as due either to its earlier basis or to an instinct to preserve continuity of manner (e.g. absence of explicit reference to Paul). Hort, on the con- trary, assumes as author ” an ingenious Helxaite . . . perhaps stimulated by the example of the many Encratite Periodoi ” (p. 131), and writing about a.d. 200.

Only it must not be thought of as properly Elchasaite, since it knew no baptism distinct from the ordinary Christian one. It seems rather to represent a later and modified Essene Chris- tianity, already half-Catholic, such as would suit a date after 250, in keeping with Eusebius’s evidence. Confirmation of such a date is afforded by the silence of the Syrian Didascalia, itself perhaps dating from about 250, as to any visit of Simon Magus to Caesarea, in contrast to the reference in its later form, the Apostolical Constitutions (c. 350-400), which is plainly coloured (vi. 0) by the Clementine story. On the other hand, the Didas- calia seems to have been evoked partly by Judaizing propaganda in north Syria. If, then, it helps to date the Periodoi as after 250, it may also suggest as place of origin one of the large cities lying south of Antioch, say Laodicea (itself on the coast about 30 m. from Apamea), where the Clementine story reaches its climax. The intimacy of local knowledge touching this region implied in the narrative common to Homilies and Recognitions is notable, and tells

against an origin for the Periodoi outside Syria (e.g. in Rome, as Waitz and Harnack hold, but Lightfoot disproves, Clem. i. 55 f., 64,100, cf. Hort, p. 131). Further, though the curtain even in it fell on Peter at Antioch itself (our one complete MS. of the Homilies is proved by the Epitome, based on the Homilies, to be' here abridged), the interest of the story culminates at Laodicea.

If we assume, then, that the common source of our extant Clementines arose in Syria, perhaps c. 26s, 1 had it also a written source or sources which we can trace? Though Hort doubts it, most recent scholars (e.g. Waitz, Harnack) infer the existence of at least one source, " Preachings (Kerygmata) of Peter," containing no reference at all to Clement. Such a work seems implied by the epistle of Peter to James and its appended adjuration, prefixed in our MSS. to the Homilies along with the epistle of Clement to James. Thus the later work aimed at superseding the earlier, much as Photius suggests (see above). It was, then, to these " Preachings of Peter " that the most Ebionite features, and especially the anti-Pauline allusions under the guise of Simon still inhering in the Periodoi (as implied by Homilies in particular), originally belonged. The fact, however, that these were not more completely suppressed in the later work, proves that it, too, arose in circles of kindred, though largely modified, Judaeo-Christian sentiment (cf. Homilies, vii., e.g. ch. 8). The differences of standpoint may be due not only to lapse of time, and the emergence of new problems on the horizon of Syrian Christianity generally, but also to change in locality and in the degree of Greek culture represented by the two works. A probable date for the " Preachings " used in the Periodoi is c. 200. 2

1 While Hort and Waitz say c. 200, Harnack says c. 260. The reign of Gallienus (260-268) would suit the tone of its reference-s to the Roman emperor (Waitz, p. 74), and also any polemic against the Neoplatonic philosophy of revelation by visions and dreams which it may contain.

2 Even Waitz agrees to this, though he argues back to a yet earlier anti-Pauline (rather than anti-Marcionite) form, composed in Caesarea, c. 135.

If the home of the Periodoi was the region of the Syrian Laodicea, we can readily explain most of its characteristics. Photius refers to the " excellences of its language and its learn- ing "; while Waitz describes the aim and spirit of its contents as those of an apology for Christianity against heresy and paganism, in the widest sense of the word, written in order to win over both Jews (cf. Recognitions, i.

53-70) and pagans, but mainly the latter. In particular it had in view persons of culture, as most apt to be swayed by the philosophical tendencies in the sphere of religion prevalent in that age, the age of neo- Platonism. It was in fact designed for propaganda among religious seekers in a time of singular religious restlessness and varied inquiry, and, above all, for use by catechumens (cf. Ep. Clem. 2, 13) in the earlier stages of their preparation for Christian baptism. To such its romantic setting would be specially adapted, as falling in with the literary habits and tastes of the period; while its doctrinal peculiarities would least give offence in a work of the aim and character iust described.

As regards the sources ˆ the narrative part of the Periodoi, it is possible that the ” recognition ” motif was a literary common- place. The account of Peter’s journeyings was no doubt based largely on local Syrian tradition, perhaps as already embodied in written Acts of Peter (so Waitz and Harnack), but differing from the Western type, e.g. in bringing Peter to Rome long before Nero’s reign. As for the allusions, more or less indirect, to St Paul behind the figure of Simon, as the arch-enemy of the truth— allusions which first directed attention to the Clementines in the last century — there can be no doubt as to their presence, but only as to their origin and the degree to which they are so meant in Homilies and Recognitions. There is certainly ” an application to Simon of words used by or of St Paul, or of claims made by or in behalf of St Paul ” (Hort), especially in Homilies (ii. 17 f., xi. 35, xvii. 19), where a consciousness also of the double reference must still be present, though this does not seem to be the case in Recognitions (in Rufinus’s Latin.) Such covert reference to Paul must designedly have formed part of the Periodoi, yet as adopted from its more bitterly anti-Pauline basis, the ” Preachings of Peter ” (cf. Homilies, ii. 17 f. with Ep. Pet. ad Jac. 2), which probably shared most of the features of Ebionite Essenism as described by Epiphanius xxx. 15 f. (in- cluding the qualified dualism of the two kingdoms — the present one of the devil, and the future one of the angelic Christ — which appears also in the Periodoi, cf. Ep. Clem, ad Jac. 1 fin.).

(b) That the Periodoi was a longer work than either our Homilies or Recognitions is practically certain; and its mere bulk may well, as Hort suggests (p. 88), have been a chief cause of the changes of form. Yet Homilies and Recognitions are abridgments made on different principles and convey rather different impressions to their readers. ” The Homilies care most for doctrine,” especially philosophical doctrine, ” and seem to transpose very freely for doctrinal purposes ” (e.g. matter in xvi.-xix. is placed at the end for effect, while xx. 1-10 gives additional emphasis to the Homilies’ theory of evil, perhaps over

against Manichaeism). ” The Recognitions care most for the story,” as a means of religious edification, ” and have preserved the general framework much more nearly.” They arose in different circles: indeed, save the compiler of the text repre- sented by the Syriac MS. of 411 a.d., “not a single ancient writer shows a knowledge of both books in any form.” But Hort is hardly right in suggesting that, while Homilies arose in Syria, Recognitions took shape in Rome. Both probably arose in Syria (so Lightfoot), but in circles varying a good deal in religious standpoint. 3 Homilies was a sort of second edition, made largely in the spirit of its original and perhaps in much the same locality, with a view to maintaining and propagating the doctrines of a semi-Judaic Christianity (cf. bk. vii.), as it existed a generation or two after the Periodoi appeared. The Recognitions, in both recensions, as is shown by the fact that it was read in the original with general admiration not only by Rufinus but also by others in the West, was more Catholic in tone and aimed chiefly at

3 Dom Chapman maintains that the Recognitions (c. 370-390,) even attack the doctrine of God in the Homilies or their archetype.

commending the Christian religion over against all non-Christian rivals or gnostic perversions. That is, more than one effort of this sort had been made to adapt the story of Clement’s Recogni- tions to general Christian use. Later the Homilies underwent further adaptation to Catholic feeling even before the Epitome, in its two extant forms, was made by more drastic methods of expurgation. One kind of adaptation at least is proved to have existed before the end of the 4th century, namely a selection of certain discourses from the Homilies under special headings, following on Recognitions, i.-iii., as seen in a Syriac MS. of a.d. 411. As this MS. contains transcriptional errors, and as its archetype had perhaps a Greek basis, the Recognitions may be dated c. 3 50-3 7 5 1 (its Chris tology suggested to Rufinus an Arianism like that of Eunomius of Cyzicus, c. 362), and the Homilies prior even to 350. But the different circles represented by the two make relative dating precarious.

Summary. — The Clementine literature throws light upon a very obscure phase of Christian development, that of Judaeo- Christianity, and proves that it embraced more intermediate types, between Ebionism proper and Catholicism, than has generally been realized. Incidentally, too, its successive forms illustrate many matters of belief

and usage among Syrian Christians generally in the 3rd and 4th centuries, notably their apologetic and catechetical needs and methods. Further, it discusses, as Hort observes, certain indestructible problems which much early Christian theology passes by or deals with rather perfunctorily; and it does so with a freshness and reality which, as we compare the original 3rd-century basis with the conven- tional manner of the Epitome, we see to be not unconnected with origin in an age as yet free from the trammels of formal ortho- doxy. Again it is a notable specimen of early Christian pseudepi- graphy, and one which had manifold and far-reaching results. Finally the romance to which it owed much of its popular appeal, became, through the medium of Rufinus's Latin, the parent of the late medieval legend of Faust, and so the ancestor of a famous type in modern literature.

Literature. — For a full list of this down to 1904 see Hans Waitz, " Die Pseudoklementinen " (Texle u. Untersuchungen zur Gesch. der altchr. Literatur, neue Folge, Bd. x. Heft 4), and A. Harnack, Chronologie der altchr. Litteratur (1904), ii. 518 f. In English, besides Hort's work, there are articles by G. Salmon, in Diet, of Christ. Biog., C. Bigg, Studia Biblica, ii., A. C. Headlam, Journal of Theol. Studies, iii. (J- V. B.)

CLEOBULUS, one of the Seven Sages of Greece, a native and tyrant of Lindus in Rhodes. He was distinguished for his strength and his handsome person, for the wisdom of his sayings, the acuteness of his riddles and the beauty of his lyric poetry. Diogenes Laertius quotes a letter in which Cleobulus invites Solon to take refuge with him against Peisistratus; and this would imply that he was alive in 560 B.C. He is said to have held advanced views as to female education, and he was the father of the wise Cleobuline, whose riddles were not less famous than his own (Diogenes Laertius i. 89-93).

See F. G. Mullach, Fragmenta Philosophorum Craecorum, i.

CLEOMENES (K\ij£vr)s) , the name of three Spartan kings of the Agiad line.

Cleomenes I. was the son of Anaxandridas, whom he suc- ceeded about 520 B.C. His chief exploit was his crushing victory near Tiryns over the Argives, some 6000 of whom he burned to death in a sacred grove to which they had fled for refuge (Herodotus vi. 76-82). This secured for Sparta the undisputed hegemony of the Peloponnese. Cleomenes' interposition in the politics of central Greece was less successful. In 510 he marched to Athens with a Spartan force to aid in expelling the Peisistratidae, and subsequently returned to support the

oligar- chical party, led by Isagoras, against Cleisthenes (q.v.). He expelled seven hundred families and transferred the govern- ment from the council to three hundred of the oligarchs, but being blockaded in the Acropolis he was forced to capitulate. On his return home he collected a large force with the intention of

1 Dom Chapman (ut supra, p. 158) says during the Neoplatonist reaction under Julian 361-363, to which period he also assigns the Homilies.

making Isagoras despot of Athens, but the opposition of the Corinthian allies and of his colleague Demaratus caused the expedition to break up after reaching Eleusis (Herod, v. 64-76; Aristotle, Ath. Pol. 19, 20). In 491 he went to Aegina to punish the island for its submission to Darius, but the intrigues of his colleague once again rendered his mission abortive. In revenge Cleomenes accused Demaratus of illegitimacy and secured his deposition in favour of Leotychides (Herod, vi. 50-73). But when it was discovered that he had bribed the Delphian priestess to substantiate his charge he was himself obliged to flee; he went first to Thessaly and then to Arcadia, where he attempted to foment an anti-Spartan rising. About 488 B.C. he was recalled, but shortly afterwards, in a fit of madness, he committed suicide (Herod, vi. 74, 75). Cleomenes seems to have received scant justice at the hands of Herodotus or his informants, and Pausanias (iii. 3, 4) does little more than condense Herodotus's narrative. In spite of some failures, largely due to Demaratus's jealousy, Cleomenes strengthened Sparta in the position, won during his father's reign, of champion and leader of the Hellenic race; it was to him, for example, that the Ionian cities of Asia Minor first applied for aid in their revolt against Persia (Herod, v. 49-51).

For the chronology see J. Wells, Journal of Hellenic Studies (1905), p. 193 ff., who assigns the Argive expedition to the outset of the reign, whereas nearly all historians have dated it in or about 495 B.C.

Cleomenes II. was the son of Cleombrotus I., brother and successor of Agesipolis II. Nothing is recorded of his reign save the fact that it lasted for nearly sixty -one years (370-309 B.C.).

Cleomenes III., the son and successor of Leonidas II., reigned about 235-219 B.C. He made a determined attempt to reform the social condition of Sparta along the lines laid down by Agis IV., whose widow Agiatis he married; at the same time he aimed at restoring Sparta's hegemony in the Peloponnese. After twice defeating the forces of the Achaean League in Arcadia, near Mount Lycaeum and at

Leuctra,he strengthened his position by assassinating four of the ephors, abolishing the ephorate, which had usurped the supreme power, and banishing some eighty of the leading oligarchs. The authority of the council was also curtailed, and a new board of magistrates, the patronomi, became the chief officers of state. He appointed his own brother Eucleidas as his colleague in succession to the Eurypontid Archidamus, who had been murdered. His social reforms included a redistribution of land, the remission of debts, the restoration of the old system of training (0170)717) and the admission of picked perioeci into the citizen body. As a general Cleomenes did much to revive Sparta's old prestige. He defeated the Achaeans at Dyme, made himself master of Argos, and was eventually joined by Corinth, Phlius, Epidaurus and other cities. But Aratus, whose jealousy could not brook to see a Spartan at the head of the Achaean league called in Antigonus Doson of Macedonia, and Cleomenes, after conducting successful expeditions to Megalopolis and Argos, was finally defeated at Sellasia, to the north of Sparta, in 222 or 221 B.C. He took refuge at Alexandria with Ptolemy Euergetes, but was arrested by his successor, Ptolemy Philopator, on a charge of conspiracy. Escaping from prison he tried to raise a revolt, but the attempt failed and to avoid capture he put an end to his life. Both as general and as politician Cleomenes was one of Sparta's greatest men, and with him perished her last hope of recovering her ancient supermacy in Greece.

See Polybius ii. 45-70, v. 35-39, viii. 1; Plutarch, Cleomenes; Aratus, 35-46; Philopoemen, 5, 6; Pausanias ii. 9; Gehlert, De Cleomene (Leipzig, 1883); Holm, History of Greece, iv. cc. 10, 15.

(M. N. T.)

CLEON (d. 422 B.C.), Athenian politician during the Pelopon- nesian War, was the son of Cleaenetus, from whom he inherited a lucrative tannery business. He was the first prominent repre- sentative of the commercial class in Athenian politics. He came into notice first as an opponent of Pericles, to whom his advanced ideas were naturally unacceptable, and in his opposition somewhat curiously found himself acting in concert with the aristocrats, who equally hated and feared Pericles. During the dark days of 430, after the unsuccessful expedition of Pericles to

Peloponnesus, and when the city was devastated by the plague, Cleon headed the opposition to the Periclean regime. Pericles was accused by Cleon of maladministration of public money, with the result that he was actually found guilty (see Grote's Hist, of Greece, abridged ed., 1007, p. 406, note 1). A revulsion of feeling, however, soon took place. Pericles was reinstated, and Cleon now for a time fell into the background. The death of Pericles (429) left the field clear for him. Hitherto he had only been a vigorous opposition speaker, a trenchant critic and accuser of state officials. He now came forward as the professed champion and leader of the democracy, and, owing to the moderate abilities of his rivals and opponents, he was for some years undoubtedly the foremost man in Athens. Although rough and unpolished, he was gifted with natural eloquence and a powerful voice, and knew exactly how to work upon the feelings of the people. He strengthened his hold on the poorer classes by his measure for trebling the pay of the jurymen, which provided the poorer Athenians with an easy means of livelihood. The notorious fondness of the Athenians for litigation increased his power; and the practice of " sycophancy " (raking up material for false charges; see Sycophant), enabled him to remove those who were likely to endanger his ascendancy. Having no further use for his former aristocratic associates, he broke off all connexion with them, and thus felt at liberty to attack the secret combinations for political purposes, the oligarchical clubs to which they mostly belonged. Whether he also introduced a property-tax for military purposes, and even held a high position in connexion with the treasury, is uncertain. His ruling principles were an inveterate hatred of the nobility, and an equal hatred of Sparta. It was mainly through him that the opportunity of concluding an honourable peace (in 425) was lost, and in his determination to see Sparta humbled he misled the people as to the extent of the resources of the state, and dazzled them by promises of future benefits.

In 427 Cleon gained an evil notoriety by his proposal to put to death indiscriminately all the inhabitants of Mytilene, which had put itself at the head of a revolt. His proposal, though accepted, was, fortunately for the credit of Athens, rescinded, although, as it was, the chief leaders and prominent men, numbering about 1000, fell victims. In 425, he reached the summit of his fame by capturing and transporting to Athens the Spartans who had been blockaded in Sphacteria (see Pylos). Much of the credit was probably due to the military skill of his colleague Demosthenes; but it must be admitted that it was due to Cleon's determination that the Ecclesia sent out the additional force which was needed. It was almost certainly due to Cleon that the

tribute of the ” allies ” was doubled in 425 (see Delian League). In 422 he was sent to recapture Amphipolis, but was outgeneralled by Brasidas and killed. His death removed the chief obstacle to an arrangement with Sparta, and in 421 the peace of Nicias was concluded (see Peloponnesian War).

The character of Cleon is represented by Aristophanes and Thucydides in an extremely unfavourable light. But neither can be considered an unprejudiced witness. The poet had a grudge against Cleon, who had accused him before the senate of having ridiculed (in his Babylonians) the policy and institutions of his country in the presence of foreigners and at the time of a great national war. Thucydides, a man of strong oligarchical pre- judices, had also been prosecuted for military incapacity and exiled by a decree proposed by Cleon. It is therefore likely that Cleon has had less than justice done to him in the portraits handed down by these two writers.

Authorities. — For the literature on Cleon see C. F. Hermann, Lehrbuch der griechischen Antiquilaten, i. pt. 2 (6th ed. by V. Thumser, 1892), p. 709, and G. Busolt, Griechische Geschichte, iii. pt. 2 (1904), p. 988, note 3. The following are the chief authorities: — (a) Favourable to Cleon. — C. F. Ranke, Commentatio de Vita Aristo- phanis (Leipzig, 1845); J. G. Droysen, Aristophanes, ii., introd. to the Knights (Berlin, 1837); G. Grote, Hist, of Greece, chs. 50, 54; W. Oncken, A then und Hellas, ii. p. 204 (Leipzig, 1866) ; H. Miiller-Strubing, Aristophanes und die historische Kritik (Leipzig, 1873) ; J. B. Bury, Hist, of Greece, i. (1902). (b) Unfavourable. — J. F. Kortum, GeschichUiche Forschungen (Leipzig, 1863), and Zur Geschichte hellenischen Staatsverfassungen (Heidelberg, 1821): F. Passow,

Vermischte Schriften (Leipzig, 1843); C. Thirlwall, Hist, of Greece, ch. 21; E. Curtius, Hist, of Greece (Eng. tr. iii. p. 112; J. Schvarcz, Die Demokratie (Leipzig, 1882); H. Delbrfick, Die Strategic des Perikles (Berlin, 1890); E. Meyer, Forschungen zur alien Geschichte, ii- P- 333 (Halle, 1899). The balance between the two extreme views is fairly held by J. Beloch, Die attische Politik seit Perikles (Leipzig, 1884), and Griechische Geschichte, i. p. 537; and by A. Holm, Hist, of Greece, ii. (Eng. tr.), cb. 23, with the notes.

CLEOPATRA, the regular name of the queens of Egypt in the Ptolemaic dynasty after Cleopatra, daughter of the Seleucid Antiochus the Great, wife of Ptolemy V., Epiphanes. The best known was the daughter of Ptolemy XIII. Auletes, born 69 (or 68) B.C. At the age of seventeen she became queen of Egypt jointly with her younger brother Ptolemy Dionysus, whose wife, in accordance with Egyptian custom,

she was to become. A few years afterwards, deprived of all royal authority, she withdrew into Syria, and made preparation to recover her rights by force of arms. At this juncture Julius Caesar followed Pompey into Egypt. The personal fascinations of Cleopatra induced him to undertake a war on her behalf, in which Ptolemy lost his life, and she was replaced on the throne in conjunction with a younger brother, of whom, however, she soon rid herself by poison. In Rome she lived openly with Caesar as his mistress until his assassination, when, aware of her unpopularity, she returned at once to Egypt. Subsequently she became the ally and mistress of Mark Antony (see Antonius). Their connexion was highly unpopular at Rome, and Octavian (see Augustus) declared war upon them and defeated them at Actium (31 B.C.). Cleopatra took to flight, and escaped to Alexandria, where Antony joined her. Having no prospect of ultimate success, she accepted the proposal of Octavian that she should assassinate Antony, and enticed him to join her in a mausoleum which she had built in order that ” they might die together.” Antony committed suicide, in the mistaken belief that she had already done so, but Octavian refused to yield to the charms of Cleopatra who put an end to her life, by applying an asp to her bosom, according to the common tradition, in the thirty-ninth year of her age (29th of August, 30 B.C.). With her ended the dynasty of the Ptolemies, and Egypt was made a Roman province. Cleopatra had three children by Antony, and by Julius Caesar, as some say, a son, called Caesarion, who was put to death by Octavian. In her the type of queen characteristic of the Macedonian dynasties stands in the most brilliant light. Imperious will, masculine boldness, relentless ambition like hers had been exhibited by queens of her race since the old Macedonian days before Philip and Alexander. But the last Cleopatra had perhaps some special intellectual endowment. She surprised her generation by being able to speak the many tongues of her subjects. There may have been an individual quality in her luxurious profligacy, but then her predecessors had not had the Roman lords of the world for wooers.

For the history of Cleopatra see Antonius, Marcus; Caesar, Gaius Julius; Ptolemies. The life of Antony by Plutarch is out main authority; it is upon this that Shakespeare’s Antony and Cleopatra is based. Her life is the subject of monographs by Stahr (1879, an apologia), and Houssaye, Aspasie, Cleopatre, &c. (1879).

CLEPSYDRA (from Gr. K\kirreiv, to steal, and vbwp, water), the chronometer of the Greeks and Romans, which measured time by the flow of water. In its simplest form it was a short-necked earthenware globe of known capacity, pierced at the bottom with several small holes, through which the water escaped or ” stole away.” The

instrument was employed to set a limit to the speeches in courts of justice, hence the phrases aquam dare, to give the advocate speaking time, and aquam perdere, to waste time. Smaller clepsydrae of glass were very early used in place of the sun-dial, to mark the hours. But as the length of the hour varied according to the season of the year, various arrangements, of which we have no clear account, were necessary to obviate this and other defects. For instance, the flow of water varied with the temperature and pressure of the air, and secondly, the rate of flow became less as the vessel emptied itself. The latter defect was remedied by keeping the level of the water in the clepsydra uniform, the volume of that discharged being noted. Plato is said to have invented a complicated clepsydra to indicate the

hours of the night as well as of the day. In the clepsydra or hydraulic clock of Ctesibius of Alexandria, made about 135 B.C., the movement of water-wheels caused the gradual rise of a little figure, which pointed out the hours with a little stick on an index attached to the machine. The clepsydra is said to have been known to the Egyptians. There was one in the Tower of the Winds at Athens; and the turret on the south side of the tower is supposed to have contained the cistern which supplied the water. See Marquardt, Das Privatleben der Romer, i. (2nd cd., 1886), p. 792; ?G. Bilfinger, Die Zeittnesser der antiken V biker (1&86), and Die antiken Stundenangaben (1888).

CLERESTORY, or Clearstory (Ital. chiaro piano, Fr. claire- voie, claire Stage, Ger. Lichtgaden) , in architecture, the upper storey of the nave of a church, the walls of which rise above the aisles and are pierced with windows (” clere ” being simply ” clear,” in the sense of ” lighted “). Sometimes these win- dows are very small, being mere quatrefoils or spherical triangles. In large buildings, however, they are important objects, both for beauty and utility. The windows of the clerestories of Norman work, even in large churches, are of less import- ance than in the later styles. In Early English they became larger; and in the Decorated they are more important still, being lengthened as the triforium diminishes. In Perpendicu- lar work the latter often disappears altogether, and in many later churches, as at Taunton, and many churches in Norfolk and Suffolk, the clerestories are close ranges of windows. The term is equally applicable to the Egyptian temples, where the lighting of the hall of columns was obtained over the stone roofs of the adjoining aisles, through slits pierced in vertical slabs of stone. The Romans also in their baths and palaces employed the same

method, and probably derived it from the Greeks; in the palaces at Crete, however, light- wells would seem to have been employed.

CLERFAYT (or Clairfayt), FRANQOIS SEBASTIEN CHARLES JOSEPH DE CROIX, Count of (1733-1798), Austrian field marshal, entered the Austrian army in 1753. In the Seven Years' War he greatly distinguished himself, earning rapid promotion, and receiving the decoration of the order of Maria Theresa. At the conclusion of the peace, though still under thirty, he was already a colonel. During the outbreak of the Netherlands in 1787, he was, as a Walloon by birth, subjected to great pressure to induce him to abandon Joseph II., but he resisted all overtures, and in the following year went to the Turkish war in the rank of lieutenant field marshal. In an independent command Clerfayt achieved great success, defeating the Turks at Mehadia and Calafat. In 1792, as one of the most distinguished of the emperor's generals, he received the command of the Austrian contingent in the duke of Brunswick's army, and at Croix-sous-Bois his corps inflicted a reverse on the troops of the French revolution. In the Netherlands, to which quarter he was transferred after Jemappes, he opened the campaign of 1793 with the victory of Aldenhoven and the relief of Maes- tricht, and on March 18th mainly brought about the complete defeat of Dumouriez at Neerwinden. Later in the year, however, his victorious career was checked by the reverse at Wattignies, and in 1794 he was unsuccessful in West Flanders against Pichegru. In the course of the campaign Clerfayt succeeded the duke of Saxe-Coburg in the supreme command, but was quite unable to make head against the French, and had to recross the Rhine. In 1795, now field marshal, he commanded on the middle Rhine against Jourdan, and this time the fortune of war changed. Jourdan was beaten at Hochst and Mainz brilliantly relieved. But the field marshal's action in concluding an armistice with the French not being approved by Thugut, he resigned the command, and became a member of the Aulic Council in Vienna. He died in 1798. A brave and skilful soldier, Clerfayt perhaps achieved more than any other Austrian commander (except the archduke Charles) in the hopeless struggle of small dynastic armies against a " nation in arms."

See von Vivenot, Thugut, Clerfayt, und Wiirmser (Vienna, 1869).

CLERGY (M.E. clergie, O. Fr. clergie, from Low Lat. form clericia [Skeatl, by assimilation with O. Fr. clergie, Fr. clerge,

from Low Lat. clericatus), a collective term signifying in English strictly the body of " clerks," i.e. men in holy orders (see Clerk) . The word has, however, undergone sundry modifications of meaning. Its

M.E. senses of ” clerkship ” and ” learning ” have long since fallen obsolete. On the other hand, in modern times there has been an increasing tendency to depart from its strict application to technical ” clerks,” and to widen it out so as to embrace all varieties of ordained Christian ministers. While, however, it is now not unusual to speak of ” the Nonconformist clergy,” the word ” clergyman ” is still, at least in the United Kingdom, used of the clergy of the Established Church in con- tradistinction to “minister.” As applied to the Roman Catholic Church the word embraces the whole hierarchy, whether its clerici be in holy orders or merely in minor orders. The term has also been sometimes loosely used to include the members of the regular orders; but this use is improper, since monks and friars, as such, have at no time been clerici. The use of the word ” clergy ” as a plural, though the New English Dictionary quotes the high authority of Cardinal Newman for it, is less rare than wrong; in the case cited ” Some hundred Clergy ” should have been ” Some hundred of the Clergy.”

In distinction to the ” clergy ” we find the ” laity ” (Gr. Xdos, people), the great body of ” faithful people ” which, in nearly every various conception of the Christian Church, stands in relation to the clergy as a flock of sheep to its pastor. This distinction was of early growth, and developed, with the increas- ing power of the hierarchy, during the middle ages into a very lively opposition (see Order, Holy; Church History; Papacy; Investitures). The extreme claim of the great medieval popes, that the priest, as ” ruler over spiritual things,” was as much superior to temporal rulers as the soul is to the body (see Innocent III.), led logically to the vast privileges and immunities enjoyed by the clergy during the middle ages. In those countries where the Reformation triumphed, this triumph represented the victory of the civil over the clerical powers in the long contest. The victory was, however, by no means complete. The Presbyterian model was, for instance, as sacerdotal in its essence as the Catholic; Milton complained with justice that ” new presbyter is but old priest writ large,” and declared that ” the Title of Clergy St Peter gave to all God’s people,” its later restriction being a papal and prelatical usurpa- tion (i.e. 1 Peter v. 3, for K\fjpos and ickriptcv) .

Clerical immunities, of course, differed largely at different times and in different countries, the extent of them having been gradually curtailed from a period a little earlier than the close of the middle ages. They consisted mainly in exemption from public burdens, both as regarded person and pocket, and in immunity from lay jurisdiction. This last enormous privilege, which became one of the main and most efficient instruments of the subjection of Europe to clerical tyranny, extended to matters both civil and criminal; though, as Bingham

shows, it did not (always and everywhere) prevail in cases of heinous crime (Origines Eccles. bk. v.).

This diversity of jurisdiction, and subjection of the clergy only to the sentences of judges bribed by their esprit de corps to judge leniently, led to the adoption of a scale of punishments for the offences of clerks avowedly much lighter than that which was inflicted for the same crimes on laymen; and this in turn led to the survival in England, long after the Reformation, of the curious legal fiction of benefit of clergy (see below) , used to mitigate the extreme harshness of the criminal law.

CLERGY, BENEFIT OF, an obsolete but once very important feature in English criminal law. Benefit of clergy began with the claim on the part of the ecclesiastical authorities in the 1 2th century that every clericus should be exempt from the jurisdiction of the temporal courts and be subject to the spiritual courts alone. The issue of the conflict was that the common law courts abandoned the extreme punishment of death assigned to some offences when the person convicted was a clericus, and tie church was obliged to accept the compromise and let a secondary punishment be inflicted. The term ” clerk ” or clericus always included a large number of persons in what

were called minor orders, and in 1350 the privilege was extended to secular as well as to religious clerks; and, finally, the test of being a clerk was the ability to read the opening words of verse 1 of Psalm li., hence generally known as the ” neck-verse.” Even this requirement was abolished in 1705. In 1487 it was enacted that every layman, when convicted of a clergyable felony, should be branded on the thumb, and disabled from claiming the benefit a second time. The privilege was extended to peers, even if they could not read, in 1547, and to women, partially in 1622 and fully in 1692. The partial exemption claimed by the Church did not apply to the more atrocious crimes, and hence offences came to be divided into clergyable and unclergyable. According to the common practice in England of working out modern improvements through antiquated forms, this exemption was made the means of modifying the severity of the criminal law. It became the practice to claim and be allowed the benefit of clergy; and when it was the intention by statute to make a crime really punishable with death, it was awarded ” without benefit of clergy.” The benefit of clergy was abolished by a statute of 1827,

but as this statute did not repeal that of 1547, under which peers were given the privilege, a further statute was passed in 1841 putting peers on the same footing as commons and clergy.

For a full account of benefit of clergy see Pollock and Maitland, History of English Law, vol. i. 424-440; also Stephen, History of the Criminal Law of England, vol. i. ; E. Priedberg, Corpus juris canonici (Leipzig, 1879-1881).

CLERGY RESERVES, in Canada. By the act of 1701, establishing the provinces of Upper and Lower Canada, the British government set apart one-eighth of all the crown lands for the support of ” a Protestant clergy.” These reservations, after being for many years a stumbling-block to the economic development of the province, and the cause of much bitter political and ecclesiastical controversy, were secularized by the Canadian parliament in 1854, and the proceeds applied to other purposes, chiefly educational. Owing to the wording of the imperial act, the amount set apart is often stated as one-seventh, and was sometimes claimed as such by the clergy.

CLERK 1 (from A.S. cleric or clerc, which, with the similar Fr. form, comes direct from the Lat. clericus), in its original sense, as used in the civil law, one who had taken religious orders of whatever rank, whether ” holy ” or ” minor.” The word clericus is derived from the Greek kXtjpikos, ” of or pertain- ing to an inheritance,” from Kkfjpos, “lot,” “allotment,” “estate,” ” inheritance “; but the authorities are by no means agreed in which sense the root is connected with the sense of the deriva- tive, some conceiving that the original idea was that the clergy received the service of God as their lot or portion; others that they were the portion of the Lord; while others again, with more reason as Bingham {Orig. Eccl. lib. i. cap. 5, sec. 9) seems to think, maintain that the word has reference to the choosing by lot, as in early ages was the case of those to whom public offices were to be entrusted.

In the primitive times of the church the term canon was used as synonymous with clerk, from the names of all the persons in the service of any church having been inscribed on a roll, or icavwv, whence they were termed canonici, a fact which shows that the practice of the Roman Catholic Church of including all persons of all ranks in the service of the church, ordained or unordained, in the term clerks, or clergy, is at least in con- formity with the practice of antiquity. Thus, too, in English ecclesiastical law, a clerk was any one who had been admitted to the ecclesiastical state, and had taken the tonsure. The application of the word in this sense gradually

underwent a change, and ” clerk ” became more especially the term applied to those in minor orders, while those in ” major ” or ” holy ” orders were designated in full ” clerks in holy orders,” which in English law still remains the designation of clergymen of the Established Church. After the Reformation the word ” clerk ”

1 The accepted English pronunciation, ” dark,” is found in southern English as early as the 15th century; but northern dialects still preserve the e sound (” clurk “), which is the common oro- nunciation in America.

was still further extended to include laymen who performed duties in cathedrals, churches, &c, e.g. the choirmen, who were designated ” lay clerks.” Of these lay clerks or choirmen there was always one whose duty it was to be constantly present at every service, to sing or say the responses as the leader or representative of the laity. His duties were gradually enlarged to include the care of the church and precincts, assisting at baptisms, marriages, &c, and he thus became the precursor of the later parish clerk. In a somewhat similar sense we find bible clerk, singing clerk, &c. The use of the word ” clerk ” to denote a person ordained to the ministry is now mainly legal or formal. The word also developed in a different sense. In medieval times the pursuit of letters and general learning was confined to the clergy, and as they were practically the only persons who could read and write all notarial and secretarial work was discharged by them, so that in time the word was used with special reference to secretaries, notaries, accountants or even mere penmen. This special meaning developed into what is now one of the ordinary senses of the word. We find, accordingly, the term applied to those officers of courts, corporations, &c, whose duty consists in keeping records, correspondence, and generally managing business, as clerk of the market, clerk of the petty bag, clerk of the peace, town clerk, &c. Similarly, a clerk also means any one who in a subordinate position is engaged in writing, making jentries, ordinary correspondence, or similar ” clerkly ” work. In the United States the word means also an assistant in a commercial house, a retail salesman.

CLERKE, AGNES MARY (1842-1907), English astronomer and scientific writer, was born on the 10th of February 1842, and died in London on the 20th of January 1907. She wrote extensively on various scientific subjects, but devoted herself more especially to astronomy. Though not a practical astro- nomer in the ordinary sense, she possessed remarkable skill in collating, interpreting and summarizing the results of astronomi- cal research, and as a historian her work has an important place in scientific literature. Her chief

works were A Popular History of Astronomy during the igth Century, first edition 1885, fourth 1902; The System of the Stars, first edition 1890, second 1005; and Problems in Astrophysics, 1903. In addition she wrote Familiar Studies in Homer (1892), The Herschels and Modern Astronomy (1895), Modern Cosmogonies (1906), and many valuable articles, such as her contributions to the En- cyclopaedia Britannica. In 1903 she was elected an honorary member of the Royal Astronomical Society.

CLERKENWELL, a district on the north side of the city of London, England, within the metropolitan borough of Finsbury (q.v.). It is so called from one of several wells or springs in this district, near which miracle plays were performed by the parish clerks of London. This well existed until the middle of the 19th century. Here was situated a priory, founded in n 00, which grew to great wealth and fame as the principal institution in England of the Knights Hospitallers of the Order of St John of Jerusalem. Its gateway, erected in 1504, and remaining in St John's Square, served various purposes after the suppression of the monasteries, being, for example, the birthplace of the Gentleman's Magazine in 1731, and the scene of Dr Johnson's work in connexion with that journal. In modern times the gatehouse again became associated with the Order, and is the headquarters of the St John's Ambulance Association. An Early English crypt remains beneath the neighbouring parish church of St John, where the notorious deception of the " Cock Lane Ghost," in which Johnson took great interest, was exposed. Adjoining the priory was St Mary's Benedictine nunnery, St James's church (1792) marking the site, and preserving in its vaults some of the ancient monuments. In the 17th century Clerkenwell became a fashionable place of residence. A prison erected here at this period gave place later to the House of Detention, notorious as the scene of a Fenian outrage in 1867, when it was sought to release certain prisoners by blowing up part of the building. Clerkenwell is a centre of the watch-making and ,' dweller's industries, long established here; and the Northampton

Polytechnic Institute, Northampton Square, a branch of the City Polytechnic, has a department devoted to instruction in these trades.

CLERMONT-EN-BEAUVAISIS, or Clermont-de-l'Oise. a town of northern France, capital of an arrondissement in the department of Oise, on the right bank of the Breche, 41 m. N. of Paris on the

Northern railway to Amiens. Pop. (1906) 4014. The hill on which the town is built is surmounted by a keep of the 14th century, the relic of a fortress the site of which is partly occupied by a large penitentiary for women. The church dates from the 14th to the 16th centuries. The h6tel-de-ville, built by King Charles IV., who was born at Clermont in 1 294, is the oldest in the north of France. The most attractive feature of the town is the Promenade du Chatellier on the site of the old ramparts. Clermont is the seat of a sub-prefect and has a tribunal of first instance, a communal college and a large lunatic asylum. It manufactures felt and corsets, and carries on a trade in horses, cattle and grain.

The town was probably founded during the time of the Norman invasions, and was an important military post, during the middle ages. It was several times taken and retaken by the contend- ing parties during the Hundred Years' War, and the Wars of Religion, and in 1615 Henry II., prince of Conde, was besieged and captured there by the marshal d'Ancre.

Counts of Clermont. Clermont was at one time the seat of a countship, the lords of which were already powerful in the nth century. Raoul de Clermont, constable of France, died at Acre in 1 1 9 1, leaving a daughter who brought Clermont to her husband, Louis, count of Blois and Chartres. Theobald, count of Blois and Clermont, died in 12 18 without issue, and King Philip Augustus, having received the countship of Clermont from the collateral heirs of this lord, gave it to his son Philip Hurepel,whose daughter Jeanne, and his widow, Mahaut, countess of Dammartin, next held the countship. It was united by Saint Louis to the crown, and afterwards given by him (1269) to his son Robert, from whom sprang the house of Bourbon. In 1524 the countship of Clermont was confiscated from the constable de Bourbon, and later (1540) given to the duke of Orleans, to Catherine de' Medici (1562), to Eric, duke of Brunswick (1569), from whom it passed to his brother-in-law Charlespf Lorraine (1 596) , and finally to Henry II. , prince of Conde (161 1). In 1641 it was again confiscated from Louis de Bourbon, count of Soissons, then in 1696 sold to Louis Thomas Amadeus of Savoy, count of Soissons.in 1702 to Francoise de Brancas, princesse d'Harcourt, and in 1719 to Louis-Henry, prince of Conde. From a branch of the old lords of Clermont were descended the lords of Nesle and Chantilly.

CLERMONT-FERRAND, a city of central France, capital of the department of Puy-de-D6me, 113 m. W. of Lyons on the Paris-Lyon railway. Pop. (1906) town, 44,113; commune, 58,363. Clermont-Ferrand is situated on an eminence on the western border of the fertile

plain of Limagne. On the north, west and south it is surrounded by hills, with a background of mountains amongst which the Puy-de-D6me stands out prominently. A small river, the Tiretaine, borders the town on the north. Since 1 73 1 it has been composed of the two towns of Clermont and Montferrand, now connected by a fine avenue of walnut trees and willows, 2 m. in length, bordered on one side by barracks. The watering-place of Royat lies a little more than a mile to the west. Clermont has several handsome squares ornamented with fountains, the chief of which is a graceful structure erected by Bishop Jacques d'Amboise in 1515. The streets of the older and busier quarter of Clermont in the neighbourhood of the cathedral and the Place de Jaude, the principal square, are for the most part narrow, sombre and bordered by old houses built of lava; boulevards divide this part from more modern and spacious quarters, which adjoin it. To the south lies the fine promenade known as the Jardin Lecoq.

The principal building is the cathedral, a Gothic edifice begun in the 13th century. It was not completed, however, till the 19th century, when the west portal and towers and two bays of the nave were added, according to the plans of Viollet- le-Duc. The fine stained glass of the windows dates from the

13th to the 15th centuries. A monument of the Crusades with a statue of Pope Urban II. stands in the Cathedral square. The church of Notre-Dame du Port is a typical example of the Romanesque style of Auvergne, dating chiefly from the nth and 1 2th centuries. The exterior of the choir, with its four radiating chapels, its jutting cornices supported by modillions and columns with carved capitals, and its mosaic decoration of black and white stones, is the most interesting part of the exterior The rest of the church comprises a narthex surmounted by a tower, three naves and a transept, over which rises another tower. There are several churches of minor importance in the town. Among the old houses one, dating from the 16th century, was the birthplace of Blaise Pascal, whose statue stands in a neighbouring square. There is a statue of General Louis Charles Desaix de Veygoux in the Place de Jaude. Montferrand has several interesting houses of the 15th and 16th centuries, and a church of the T3th,i4th and 15th centuries.

Clermont-Ferrand is the seat of a bishopric and a prefecture and headquarters of the XIII. army corps; it has tribunals of first instance and of commerce, a board of trade-arbitrators, a chamber of commerce, an exchange and a branch of the Bank of France. The town is the centre of an educational division (acadtmie), and has faculties of science and of literature. It also has lycees and training colleges for

both sexes, ecclesiastical seminaries, a preparatory school of medicine and pharmacy, schools of architecture, music, commerce and industry, museums of art and antiquities and natural history and a library. A great variety of industries is carried on, the chief being the manufacture of semolina and other farinaceous foods, con- fectionery, preserved fruit and jams, chemicals and rubber goods. Li'fcjueurs, chicory, chocolate, candles, hats, boots and shoes, and woollen and linen goods are also made, and tanning is practised. Clermont is the chief market for the grain and other agricultural produce of Auvergne and Velay. Its waters are in local repute. On the bank of the Tiretaine there is a remarkable calcareous spring, the fountain of St Allyre, the copious deposits of which have formed a curious natural bridge over the stream.

Clermont is identified with the ancient Augustonemetum, the chief town of the Arverni, and it still preserves some remains of the Roman period. The present name, derived from Clarus Mons and originally applied only to the citadel, was used of the town as early as the 9th century. During the disintegration of the Roman empire Clermont suffered as much perhaps from capture and pillage as any city in the country; its history during the middle ages chiefly records the struggles between its bishops and the counts of Auvergne, and between the citizens and their overlord the bishop. It was the seat of seven ecclesiastical councils, held in the years 535, 549, 587, 1095, 1110, 1124 and 1130; and of these the council of 1095 is for ever memorable as that in which Pope Urban II. proclaimed the first crusade. In the wars against the English in the 14th and 15th centuries and the religious wars of the 16th century the town had its full participation; and in 1665 it acquired a terrible notoriety by the trial and execution of many members of the nobility of Auvergne who had tyrannized over the neighbouring districts. The proceedings lasted six months, and the episode is known as les Grands Jours de Clermont. Before the Revolution the town possessed several monastic establishments, of which the most important were the abbey of Saint Allyre, founded, it is said, in the 3rd century by St Austremonius (St Stremoine) , the apostle of Auvergne and first bishop of Clermont, and the abbey of St Andre, where the counts of Clermont were interred.

CLERMONT-GANNEAU, CHARLES SIMON (1846-), French Orientalist, the son of a sculptor of some repute, was born in Paris on the 19th of February 1846. After an education at the Ecole des Langues Orientales, he entered the diplo- matic service as dragoman to the consulate at Jerusalem, and afterwards at Constantinople. He laid the foundation of his reputation by his discovery (in 1870) of the " stele " of Mesha (Moabite Stone), which bears the oldest Semitic

inscription known. In 1874 he was employed by the British government to take charge of an archaeological expedition to Palestine, and was

subsequently entrusted by his own government with similar missions to Syria and the Red Sea. He was made chevalier of the Legion of Honour in 1875. After serving as vice-consul at Jaffa from 1880 to 1882, he returned to Paris as " secretaire- interprete " for oriental languages, and in 1886 was appointed consul of the first class. He subsequently accepted the post of director of the Ecole des Langues Orientales and professor at the College de France. In 1889 he was elected a member of the Academie des Inscriptions et Belles Lettres, of which he had been a correspondent since 1880. In 1896 he was promoted to be consul-general, and was minister plenipotentiary in 1906. He was the first in England to expose the famous forgeries of Hebrew texts offered to the British Museum by M.W.Shapira(

His chief publications, besides a number of contributions to journals, are: — Palestine inconnue (1886), Etudes d' archeologie orientate (1880, &c), Les Fraudes archeologiques (1885), Recueil d' archeologie orientate (1885, &c), Album d antiquites orientales (1897, &c).

CLERMONT-L'HERAULT, or Clermont de Lodeve, a town of southern France in the department of Herault, 10 m. S.S.E. by rail of Lodeve. Pop. (1906) 4731. The town is built on the slope of a hill which is crowned by an ancient castle and skirted by the Rhonel, a tributary of the Lergue. It has an interesting church of the 13th and 14th centuries. The chief manufacture is that of cloth for military clothing, and woollen goods, an industry which dates from the latter half of the 17th century. Tanning and leather-dressing are also carried on, and there is trade in wine, wool and grain. Among the public institutions are a tribunal of commerce, a chamber of arts and manufactures, a board of trade-arbitration and a communal college. The town was several times taken and retaken in the religious wars of the 1 6th century.

CLERMONT-TONNERRE, the name of a French family, members of which played some part in the history of France, especially in Dauphine, from about 1100 to the Revolution. Sibaud, lord of Clermont in Viennois, who first appears in 1080, was the founder of the family. His descendant, another Sibaud, commanded some troops

which aided Pope Calixtus II. in his struggle with the anti-pope Gregory VIII. ; and in return for this service it is said that the pope allowed him to add certain em- blems — two keys and a tiara — to the arms of his family. A direct descendant, Ainard (d. 1349), called vicomte de Clermont, was granted the dignity of captain-general and first baron of Dauphine by his suzerain Humbert, dauphin of Viennois, in 1340; and in 1547 Clermont was made a county for Antoine (d. 1578), who was governor of Dauphine and the French king's lieutenant in Savoy. In 1572 Antoine's son Henri was created a duke, but as this was only a " brevet " title it did not descend to his Son. Henri was killed before La Rochelle in 1573. In 1596 Henri's son, Charles Henri, count of Clermont (d. 1640), added Tonnerre to his heritage; but in 1648 this county was sold by his son and successor, Frangois (d. 1679).

A member of a younger branch of Charles Henri's descendants was Gaspard de Clermont-Tonnerre (1688-1781). This soldier served his country during a long period, fighting in Bohemia and Alsace, and then distinguishing himself greatly at the battles of Fontenoy and Lawfeldt. In 1775 he was created duke of Clermont-Tonnerre, and made a peer of France; as the senior marshal (cr. 1747) of France he assisted as constable at thecorona- tion of Louis XVI. in 1774. His son and successor, Charles Henri Jules, governor of Dauphine, was guillotined in July 1794, a fate which his grandson, Gaspard Charles, had suffered at Lyons in the previous year. A later duke, Aim6 Marie Gaspard (1779- 1865), served for some years as a soldier, afterwards becoming minister of marine and then minister of war under Charles X.,

and retiring into private life after the revolution of 1830. Aime's grandson, Roger, duke of Clermont-Tonnerre, was born in 1842.

Among other distinguished- members of this family was Catherine (c. 1545-1603), only daughter of Claude de Clermont- Tonnerre. This lady, dame d'honneur to Henry II. 's queen, Catherine de' Medici, and afterwards wife of Albert de Gondi, due de Retz, won a great reputation by her intellectual attain- ments, being referred to as the " tenth muse " and the " fourth grace." One of her grandsons was the famous cardinal de Retz. Other noteworthy members of collateral branches of the family were: Francois (1629-1701), bishop of Noyon from 1661 until his death, a member of the French Academy, notorious for his inordinate vanity; Stanislas M. A., comte de Clermont-Tonnerre (q.v.) ; and Anne Antoine Jules (1749-1830), cardinal and bishop of Chalons, who was a member of the states-general in 1789, afterwards retiring into Germany, and after the

return of the Bourbons to France became archbishop of Toulouse.

CLERMONT-TONNERRE, STANISLAS MARIE ADELAIDE, Comte de (1757-1792), French politican, was born at Pont-a- Mousson on the 10th of October 1757. At the beginning of the Revolution he was a colonel, with some reputation as a free- mason and a Liberal. He was elected to the states-general of 1789 by the noblesse of Paris, and was the spokesman of the minority of Liberal nobles who joined the Third Estate on the 25th of June. He desired to model the new constitution of France on that of England. He was elected president of the Constituent Assembly on the 17th of August 1789; but on the rejection by the Assembly of the scheme elaborated by the first constitutional committee, he attached himself to the party of moderate royalists, known as monarchiens, led by P. V. Malouet. His speech in favour of reserving to the crown the right of absolute veto under the new constitution drew down upon him the wrath of the advanced politicians of the Palais Royal; but in spite of threats and abuse he continued to advocate a moderate liberal policy, especially in the matter of removing the political disabilities of Jews and Protestants and of extending the system of trial by jury. In January 1790 he collaborated with Malouet in founding the Club des Impartiaux and the Journal des Impartiaux, the names of which were changed in November to the Societe des Amis de la ConstitutionMonarchique and Journal de la Sociite, &°c. in order to emphasize their opposi- tion to the Jacobins (Societe des Amis de la Constitution). This club was denounced by Barnave in the Assembly (January 21st, 1791), and on the 28th of March it was attacked by a mob, whereupon it was closed by order of the Assembly. Clermont- Tonnerre was murdered by the populace during the rising of the 9th and 10th of August 1792. He was an excellent orator, having acquired practice in speaking, before the Revolution, in the masonic lodges. He is a good representative of the type of the grands seigneurs holding advanced and liberal ideas, who helped to bring about the movement of 1789, and then tried in vain to arrest its course.

See Recueil des opinions de Stanislas de Clermont-Tonnerre (4 vols., Paris, 1791), the text of his speeches as published by himself; A. Aulard, Les Orateurs de la Constituante (2nd ed., Paris, 1905).

CLERUCHY (Gr. Kkqpovxlo., from KKrjpos, a lot, txtiv, to have), in ancient Greek history a kind of colony composed of Athenian x citizens planted, practically as a garrison, in a conquered country. Strictly, the settlers (cleruchs) were not colonists, inasmuch as they retained their status as citizens of Athens (e.g. d Srjˆos 6 kv ‘Hˆaiorip), and their allotments were politically part of Attic soil. These

settlements were of three kinds: (1) where the earlier inhabitants were extirpated or expatriated, and the settlers occupied the whole territory; (2) where the settlers occupied allotments in the midst of a conquered people; and (3) where the inhabitants gave up portions of land to settlers in return for certain pecuniary concessions. The primary object (cf. the 4000 cleruchs settled in 506 B.C. upon the lands of the conquered oligarchs of Euboea, known as the Hippobotae) was unquestionably military, and in the later days of the Delian

1 It seems (Strabo, p. 635) that similar colonies were sent out by the Milesians, e.g. to Leros.

League the system was the simplest precaution against dis- affection on the part of the allies, the strength of whose resent- ment may be gathered from an inscription (Hicks and Hill, 101 [81]), which, in setting forth the terms of the second Delian Confederacy, expressly forbids the holding of land by Athenians in allied territory.

A secondary object of the cleruchies was social or agrarian, to provide a source of livelihood to the poorer Athenians. Plutarch (Pericles, n) suggests that Pericles by this means rid the city of the idle and mischievous loafers; but it would appear that the cleruchs were selected by lot, and in any case a wise policy would not deliberately entrust important military duties to recognized wastrels. When we remember that in 50 years of the 5th century some 10,000 cleruchs went out, it is clear that the drain on the citizen population was considerable.

It is impossible to decide precisely how far the state retained control over the .cleruchs. Certainly they were liable to military service and presumably to that taxation which fell upon Athenians at home. That they were not liable for the tribute which members of the Delian League paid is clear from the fact that the assessments of places where cleruchs were settled immedi- ately went down considerably (cf. the Periclean cleruchies, 450-445); indeed, this follows from their status as Athenian citizens, which is emphasized by the fact that they retained their membership of deme and tribe. In internal government the cleruchs adopted the Boule and Assembly system of Athens itself; so we read of Polemarchs, Archons Eponymi, Agoranomi, Strategi, in various places. With a measure of local self-govern- ment there was also combined a certain central authority (e.g. in the matter of

jurisdiction, some case being tried by the Nautodicae at Athens) ; in fact we may assume that the more important cases, particularly those between a cleruch and a citizen at home, were tried before the Athenian dicasts. In a few cases, the cleruchs, e.g. in the case of Lesbos (427), were apparently allowed to remain in Athens receiving rent for their allotments from the original Lesbian owners (Thuc. iii. 50); but this represents the perversion of the original idea of the cleruchy to a system of reward and punishment.

See G. Gilbert, Constitutional Antiquities of Athens and Sparta (Eng. trans., London, 1895), but note that Brea, wrongly quoted as an example, is not a cleruchy but a colony (Hicks and Hill, 41 [29]) ; A. H. J. Greenidge, Handbook of Greek Constitutional Antiquities (London, 1896) ; for the Periclean cleruchs see Pericles; Delian League.

CLERVAUX (clara vallis), a town in the northern province of Oesling, grand-duchy of Luxemburg, on the Clerf, a tributary of the Sure. Pop. (1905) 866. In old days it was the fief of the de Lannoy family, and the present proprietor is the bearer of a name not less well known in Belgian history, the count de Berlaymont. The old castle of the de Lannoys exists, and might easily be restored, but its condition is now neglected and dilapidated. In 1798 the people of Clervaux specially distin- guished themselves against the French in an attempt to resist the institution of the conscription. The survivors of what was called the Kloppel-krieg (the ” cudgel war “) were shot, and a fine monument commemorates the heroism of the men of Clervaux.

CLETUS, formerly regarded as the name of one of the early successors of St Peter in the see of Rome, or, according to Epiphanius and Rufinus, as sharing the direction of the Roman Church with Linus during Peter’s lifetime. He has been identified beyond doubt with Anencletus (q.v.). See Pere Colombier, in Rev. des questions hist. Ap. 1st, 1876, p. 413.

CLEVEDON, a watering-place in the northern parliamentary division of Somersetshire, England, on the Bristol Channel, 1 5J m. W. of Bristol on a branch of the Great Western railway. Pop. of urban district (1901) 5900. The cruciform church of St Andrew has Norman and later portions; it is the burial-place of Henry Ha’Jam the historian, and members of his family, including his sons Arthur and Henry. Clevedon Court is a remarkable medieval mansion, dating originally from the early part of the 14th century, though much altered in the Elizabethan and other periods. The house is considered to be the original

of ” Castlewood ” in Thackeray’s Esmond; the novelist was acquainted with the place through his friendship with the Rev. William Brookfield and his wife, the daughter of Sir Charles Elton of Clevedon Court.

CLEVELAND, BARBARA VILLIERS, Duchess or (1641- 1709), mistress of the English king Charles II., was the daughter of William Villiers, 2nd Viscount Grandison (d. 1643), by his wife Mary (d. 1684), daughter of Paul, 1st Viscount Bayning. In April 1659 Barbara married Roger Palmer, who was created earl of Castlemaine two years later, and soon after this marriage her intimacy with Charles II. began. The king was probably the father of her first child, Anne, born in February 1 66 1 , although the paternity was also attributed to one of her earliest lovers, Philip Stanhope, 2nd earl of Chesterfield (1633-1713). Mistress Palmer, as Barbara was called before her husband was made an earl, was naturally much disliked by Charles’s queen, Catherine of Braganza, but owing to the insistence of the king she was made a lady of the bedchamber to Catherine, and began to mix in the political intrigues of the time, showing an especial hatred towards Edward Hyde, earl of Clarendon, who recipro- cated this feeling and forbad his wife to visit her. Her house became a rendezvous for the enemies of the minister, and according to Pepys she exhibited a wild paroxysm of delight when she heard of Clarendon’s fall from power in 1667. Whilst enjoying the royal favour Lady Castlemaine formed liaisons with various gentlemen, which were satirized in public prints, and a sharp quarrel which occurred between her and the king in 1667 was partly due to this cause. But peace was soon made, and her influence, which had been gradually rising, became supreme at court in 1667 owing to the marriage of Frances Stuart (la belle Stuart) (1648- 1702) with Charles Stuart, 3rd duke of Richmond (1640-1672). Accordingly Louis XIV. in- structed his ambassador to pay special attention to Lady Castlemaine, who had become a Roman Catholic in 1663.

In August 1670 she was created countess of Southampton and duchess of Cleveland, with remainder to her first and third sons, Charles and George Palmer, the king at this time not admitting the paternity of her second son Henry; and she also received many valuable gifts from Charles. An annual income of £4700 from the post office was settled upon her, and also other surns chargeable upon the revenue from the customs and the excise, whilst she obtained a large amount of money from seekers after office, and in other ways. Nevertheless her extravagance and her losses at gaming were so enormous that she was unable to keep up her London residence, Cleveland House, St James’s, and was obliged to sell the contents of her residence at Cheam. About 1670 her influence over Charles began to decline. She consoled herself meanwhile with lovers of a less exalted station in life, among them

John Churchill, afterwards duke of Marlborough, and William Wycherley; by 1674 she had been entirely supplanted at court by Louise de Keroualle, duchess of Portsmouth. Soon afterwards the duchess of Cleveland went to reside in Paris, where she formed an intrigue with the English ambassador, Ralph Montagu, afterwards duke of Montagu (d. 1709), who lost his position through some revelations which she made to the king. She returned to England just before Charles's death in 1685. In July 1705 her husband, the earl of Castlemaine, whom she had left in 1662, died; and in the same year the duchess was married to Robert (Beau) Feilding (d. 1712), a union which was declared void in 1707, as Feilding had a wife living. She died at Chiswick on the 9th of October 1709.

Bishop Burnet describes her as " a woman of great beauty, but most enormously vicious and ravenous, foolish but imperious, ever uneasy to the king, and always carrying on intrigues with other men, while yet she pretended she was jealous of him." Dryden addressed Lady Castlemaine in his fourth poetical Epistle in terms of great adulation, and Wycherley dedicated to her his first play, Love in a Wood. Her portrait was frequently painted by Sir Peter Lely and others, and many of these portraits are now found in various public and private collections. By Charles II. she had three sons and either one or two daughters.

She had also in 1686 a son by the actor Cardonnell Goodman (d. 1699), and one or two other daughters.

Her eldest son, Charles Fitzroy (1662-1730), was created in 1675 earl of Chichester and duke of Southampton, and became duke of Cleveland and earl of Southampton on his mother's death. Her second son, Henry (1663-1690), was created earl of Euston in 1672 and duke of Grafton in 1675; by his wife Isabella, daughter of Henry Bennet, earl of Arlington, he was the direct ancestor of the later dukes of Grafton; he was the most popular and the most able cf the sons of Charles II., saw a considerable amount of military service, and met his death through a wound received at the storming of Cork. Her third son, George (1665-1716), was created duke of Northumberland in 1683, and died without issue, after having served in the army. Her daughters were Anne (1661-1722), married in 1674 to Thomas Lennard, Lord Dacre (d. 1715), who was created earl of Sussex in 1684; Charlotte (1664-1718), married in 1677 to Edward Henry Lee,

earl of Lichfield (d. 1716); and Barbara (1672-1737), the reputed daughter of John Churchill, who entered a nunnery in France, and became by James Douglas, afterwards 4th duke of Hamilton (1658-1712), the mother of an illegitimate son, Charles Hamilton (1691-1754).

The first husband of the duchess, Roger Palmer, earl of Castlemaine (1634-1705), diplomatist and author, was an ardent Roman Catholic, who defended his co-religionists in several publications. Having served in the war against Holland in 1665-67, he wrote in French an account of this struggle, which was translated into English and published by T. Price in London in 1671. Having been denounced by Titus Oates as a Jesuit, he was tried and acquitted, afterwards serving James II. as ambassador to Pope Innocent XL, a mission which led to a brief imprisonment after the king's flight from England. Subsequently his Jacobite sympathies caused him to be suspected by the government, and his time was mainly spent either in prison or in exile. The earl died at Oswestry on the 21st of July 1705.

The title of duke of Cleveland, which had descended in 1709 to Charles Fitzroy, together with that of duke of Southampton, became extinct when Charles's son William, the 2nd duke, died without issue in 1774. One of the first duke's daughters, Grace, was married in 1725 to Henry Vane, 3rd Baron Barnard, after- wards earl of Darlington (d. 1758), and their grandson William Henry Vane (1 766-1842) was created duke of Cleveland in 1833. The duke was succeeded in the title in turn by three of his sons, who all died without male issue; and consequently when Harry George, the 4th duke, died in 1 89 1 the title again became extinct.

Previous to the creation of the dukedom of Cleveland there was an earldom of Cleveland which was created in 1626 in favour of Thomas, 4th Baron Wentworth (1591-1667), and which became extinct on his death.

See the article Charles II. and the bibliography thereto; G. S. Steinmann, Memoir of Barbara, duchess of Cleveland (London, 1871), and Addenda (London, 1874) ; and the articles (" Villiers, Barbara" and " Palmer, Roger ") in the Dictionary of National Biography, vols, xliii. and lviii. (London, 1895-1899).

CLEVELAND (or Cleiveland), JOHN (1613-1658), English poet and satirist, was born at Loughborough, where he was baptized on the 20th of June 1613. His father was assistant to the rector and afterwards vicar of Hinckley. John Cleveland was educated at

Hinckley school under Richard Vines, who is described by Fuller as a champion of the Puritan party. In his fifteenth year he was entered at Christ's College, Cambridge, and in 1634 was elected to a fellowship at St John's. He took his M.A. degree in 1635, and was appointed college tutor and reader in rhetoric. His Latinity and oratorical powers were warmly praised by Fuller, who also commends the " lofty fancy " of his verse. He eagerly opposed the candidature of Oliver Cromwell as M.P. for Cambridge, and when the Puritan party triumphed there Cleveland, like many other Cambridge students, found his way (1643) to Oxford. His gifts as a satirist were already known, and he was warmly received by the king, whom he followed (1645) to Newark. In that year he was formally deprived of his

Cambridge fellowship as a " malignant." He was judge- advocate in the garrison at Newark, and under' the governor defended the town until in 1646 Charles I. ordered the surrender of the place to Leslie; when there is a curious story that the Scottish general contemptuously dismissed him as a mere ballad-monger. He saw Charles's error in giving himself into the hands of the Scots, and his indignation when they surrendered the king to the Parliament is expressed in the vigorous verses of " The Rebel Scot," the sting of which survives even now. Cleveland wandered over the country depending on the alms of the Royalists for bread. He at length found a refuge at Norwich in the house of Edward Cooke, but in 1655 he was arrested as being of no particular occupation, and moreover a man whose great abilities " rendered him able to do the greater disservice." He spent three months in prison at Yarmouth, but was released by order of Cromwell, to whom he addressed a manly appeal, in which he declared his fidelity to the royal house, pointing out at the same time that his poverty and inoffensiveness were sufficient a'ssurance that his freedom was no menace to Cromwell's govern- ment. He was released early in 1656, and seems to have renewed his wanderings, finding his way eventually to Gray's Inn, where Aubrey says he and Samuel Butler had a " club " every night. There he died on the 29th of April 1658.

Cleveland's poems were more highly esteemed than Milton's by his contemporaries, and his popularity is attested by the very numerous editions of his works. His poems are therefore of great value as an index to the taste of the 17 th century. His verse is frequently obscure and full of the far-fetched conceits of the " metaphysical " poets, none of whom surpassed the in- genuity of " Fuscara, or the Bee Errant." His satires are vigorous personal attacks, the interest of which is, from the nature of the subject, often ephemeral; but the energy of his invective leaves no room for obscurity in such pieces as " Smec-

tymnuus, or the Club Divines," " Rupertismus " and " The Rebel Scot."

Cleveland's works are: " Character of a London Diurnal," a broadside; Monumentum regale. . . (1649), chiefly by Cleveland, containing three of his elegies on the king; " The King's Dis- guise " (1646); " On the Memory of Mr Edward King," in the collection of verse which also included Milton's " Lycidas," and many detached poems.

For a bibliographical account of Cleveland's peoms see J. M. Berdan, The Poems of John Cleveland (New York, 1903), in which there is a table of the contents of twenty-three editions, of which the chief are: The Character of a London Diurnal, with Several Select Poems (1647) ; Poems. By John Cleavland. With additions, never before printed (1659) ; /. Cleaveland Revived . . . (1659), in which the editor, E. Williamson, says he inserted poems by other authors, trusting to the critical faculty of the readers to distinguish Cleveland's work from the rest; Clievelandi Vindiciae . . . (1677), edited by two of Cleveland's former pupils, Bishop Lake and S. Drake, who profess to take out the spurious pieces; and a careless compilation, The Works of John Cleveland . . . (1687), containing poems taken from all these sources. A prefatory note by Williamson makes it clear that only a small proportion of Cleveland's political poems have survived, many of them having been dispersed in MS. among his friends and so lost, and that he refused to authenticate an edition of his works, although most of the earlier collections were genuine.

CLEVELAND, STEPHEN GROVER (1837-1908), president of the United States from 1885 to 1889, and again from 1893 to 1897, was born, the fifth in a family of nine children, in the village of Caldwell, Essex county, New Jersey, on the 18th of March 1837. His father, Richard F. Cleveland, a clergyman of the Presbyterian Church, was of good colonial stock, a descendant of Moses Cleveland, who emigrated from Ipswich, England, to Massachusetts in 1635. The family removed to Fayetteville, N.Y., and afterwards to Clinton, N.Y. It was intended that young Grover should be educated at Hamilton College, but this was prevented by his father's death in 1 8 5 2 . A few years later he drifted westward with twenty-five dollars in his pocket, and the autumn of 1855 found him in a law office in the city of Buffalo. At the end of four years (1859), he was admitted to the bar.

In 1863 he was appointed assistant district attorney of Erie county, of which Buffalo is the chief city. This was his first

public office, and it came to him, like all later preferments, without any solicitation of his own. Two years later (1865) he was the Democratic candidate for district attorney, but was defeated. In 1869 Cleveland was nominated by the Democratic party for the office of sheriff, and, despite the fact &at Erie county was normally Republican by a decisive majority, was elected. The years immediately succeeding his retirement from the office of sheriff in 1873 he devoted exclusively to the practice of law, coming to be generally recognized as one of the leaders of the western New York bar. In the autumn of 1881 he was nominated by the Democrats for mayor of Buffalo. The city government had been characterized by extravagance and maladministration, and a revolt of the independent voters at the polls overcame the usual Republican majority and Cleveland was elected. As mayor he attracted wide attention by his inde- pendence and business-like methods, and under his direction the various departments of the city government were thoroughly reorganized. His ability received further recognition when in 1882 he was nominated by his party as its candidate for governor. The Republican party in the state was at that time weakened by the quarrels between the "Stalwart" and "Halfbreed" factions within its ranks; and the Democrats were thus given an initial advantage which was greatly increased by the Republicans' nomination for governor of Charles J. Folger (1818-1884), then secretary of the treasury. Secretary Folger was a man of high character and ability, who had been chief justice of the New York supreme court when placed in control of the treasury department by President Arthur in 188 1. But the cry of Federal interference was raised as a result of the methods employed in securing his nomination, and this, together with the party division and the popularity of Cleveland, brought about Cleveland's election by the unprecedented plurality of 192,854. As governor Cleveland's •course was marked by the sterling qualities that he had displayed in his other public positions. His appointees were chosen for their business qualifications. The demands of party leaders were made subordinate to public interests. He promoted the passage of a good civil service law. All bills passed by the legislature were subjected to the governor's laborious personal scrutiny, and the veto power was used without fear or favour.

In 1884 the Democratic party had been out of power in national affairs for twenty-three years. In this year, however, the generally disorganized state of the Republican party seemed to give the Democrats an unusual opportunity. Upon a platform which called for radical reforms in the administrative depart- ments, the civil service,

and the national finances, Cleveland was nominated for president, despite the opposition of the strong Tammany delegation from his own state. The nominee of the Republican party, James G. Blaine (q. v.) of Maine, had received the nomination only after a contest in which violent personal animosities were aroused. The campaign that followed was one of the bitterest political contests in American history. The Republican party was still further weakened by the defection of a large body of independents, known as ” Mugwumps.” The result was close, but Cleveland carried New York, and was elected, obtaining a majority in the electoral college of 219 to 182.

Cleveland’s first term was uneventful, but was marked by firmness, justice and steady adherence on his part to the principles which he deemed salutary to the nation. He was especially concerned in promoting a non-partisan civil service. Congress in 1883 had passed the ” Pendleton Bill ” (introduced by Senator George H. Pendleton) to classify the subordinate places in the service, and to make entrance to it, and promotion therein, •depend upon competitive examination of applicants, instead of mere political influence. The first test of the efficiency and permanence of this law came with the shifting of political power at Washington. The new president stood firmly by the new law. It applied only to places of the rank of clerkships, but the pre- sident was authorized to add others to the classified service from time to time. He added n, 757 during his first term.

President Cleveland made large use of the veto power upon bills passed by Congress, vetoing or “pocketing” during his first term 413 bills, more than two-thirds of which were private

pension bills. The most important bill vetoed was the Dependent Pension Bill, a measure of extreme profligacy, opening the door, by the vagueness of its terms, to enormous frauds upon the treasury. In 1887 there was a large and growing surplus in the treasury. As this money was drawn from the channels of business and locked up in the public vaults, the president looked upon the condition as fraught with danger to the commercial com- munity and he addressed himself to the task of reducing taxation. About two-thirds of the public revenue was derived from duties on imports, in the adjustment of which the doctrine of protection to native industry had a large place. Cleveland attacked the system with great vigour in his annual message of 1887. He did not propose the adoption of free trade, but the administration tariff measure, known as the Mills Bill, from its introducer Congressman Roger Q. Mills (b. 1832) of Texas, passed the House, and although “withdrawn owing to amendments in the Republican Senate, it alarmed and exasperated the protected classes, among whom were

many Democrats, and spurred them to extraordinary efforts to prevent his re-election.

In the following year (1888), however, the Democrats re- nominated Cleveland, and the Republicans nominated Benjamin Harrison of Indiana. The campaign turned on the tariff issue, and Harrison was elected, receiving 233 electoral votes to 168 for Cleveland, who however received a popular plurality of more than 100,000. Cleveland retired to private life and resumed the practice of the law in New York. He had married on the 2nd of June 1886 Miss Frances Folsom, a daughter of a former law partner in Buffalo.

Congress had passed a law in 1878 requiring the treasury department to purchase a certain amount of silver bullion each month and coin it into silver dollars to be full legal tender. As no time had been fixed for this operation to cease, it amounted to an unlimited increase of a kind of currency that circulated at a nominal value much above its real value. Both political parties were committed to this policy, and strong passions were aroused whenever it was called in question. Cleveland had written a letter for publication before he became president, saying that a financial crisis of great severity must result if this coinage were continued, and expressing the hope that Congress would speedily put an end to it. In 1890 Congress, now con- trolled by the Republican party, passed the McKinley Bill, by which the revenues of the government were reduced by more than $60,000,000 annually, chiefly through a repeal of the sugar duties. At the same time expenditures were largely increased by liberal pension legislation, and the government's purchase of silver bullion almost doubled by the provisions of the new Sherman Silver Purchase Act of 1890.

In 1892 Cleveland was nominated for president a third time in succession. President Harrison was nominated by the Republicans. Cleveland received 277 electoral votes and Harrison 145, and 22 were cast for James B. Weaver (b. 1833) of Iowa, the candidate of the " People's " party. Cleveland's second term embraced some notable events. The most important was the repeal of the silver legislation, which had been a growing menace for fifteen years. Nearly $600,000,000 of "fiat money" had been thrust into the channels of commerce in addition to $346,000,000 of legal tender notes that had been issued during the Civil War. A reserve of $100,000,000 of gold had been accumulated for the redemption of these notes. In April 1893 the reserve fell below this sum. President Cleveland called an extra session of Congress to repeal the Silver Law. The House promptly passed the repealing act. In the Senate there was a protracted struggle. The Democrats now had a majority of that body

and they were more decidedly pro-silver than the Re- publicans. The president had undertaken to coerce his own party to do something against its will, and it was only by the aid of the Republican minority that the passage of the repealing bill was at last made possible (October 30th). The mischief, how- ever, was not ended. The deficit in the treasury made it inevit- able that the gold reserve should be used to meet current ex- penses. Holders of the government's legal tender notes anticipat- ing this fact presented them for redemption. Borrowing was

resorted to by the government. Bonds were issued and sold to the amount of $162,000,000. The business world was in a state of constant agitation. Bank failures were numerous and commercial distress widespread. Among the consequences of the panic was a reduction of wages in many employments, accom- panied by labour troubles more or less serious. The centre of disturbance was the Pullman strike at Chicago (q.v.), whence the disorder extended to the Pacific coast, causing riot and bloodshed in many places. President Cleveland waited a reason- able time, as he conceived, fcr Governor Altgeld of Illinois to put an end to the disorder in that state. On the 6th of July 1894, despite Governor Altgeld's protest, he directed the military forces of the United States to clear the way for trains carrying the mails. The rioters in and around Chicago were dispersed in a single day, and within a week the strike was broken.

Another important event was the action of the government as regards the question of arbitration between Great Britain and Venezuela (q.v.), in which Richard Olney, the secretary of state, played a somewhat aggressive part. On the 17th of December 1895 President Cleveland sent to Congress a special message calling attention to Great Britain's action in regard to the disputed boundary line between British Guiana and Venezuela, and declaring the necessity of action by the United States to prevent an infringement of the Monroe Doctrine. Congress at once appiopriated funds for an American commission to investigate the matter. The diplomatic situation became for the moment very acute, but after a short period of bellicose talk the common-sense of both countries prevailed. Negotiations with Great Britain ensued, and before the American special commission finished its work, Great Britain had agreed, November 1896, to arbitrate on terms which safeguarded the national dignity on both sides.

Cleveland's independence was nowhere more strikingly shown during his second term than in his action in regard to the tariff legislation of his party in Congress. A tariff bill introduced in the House by William Lyne Wilson (1843- 1900), of West Virginia, chairman of the Committee of Ways and Means, was so amended in the Senate, through the instrumentality of Senator Arthur Pue Gorman and a coterie of anti-administration democratic senators, that when the bill eventually came before him, although unwilling to veto it, the president signified his dissatisfaction with its too high rates by allowing it to become a law without his signature. Cleveland's second administration began by vigorous action in regard to Hawaii; he at once withdrew from the Senate the annexation treaty which President Harrison had negotiated.

During his second term Cleveland added 44,004 places in the civil service to the classified list, bringing them within the rules of the merit system. This was a greater number than all that had been placed in the list before, and brought the whole number up to 86,932. Toward the end of his second term the president became very much out of accord with his party on the free-silver question, in consequence of which the endorsement of the administration was withheld by the Democratic national conven- tion at Chicago in 1896. In the ensuing campaign the president and his cabinet, with the exception of Hoke Smith (b. 1855), ' secretary of the interior, who resigned, gave their support to Palmer and Buckner, the National, or " Sound Money " Demo- •aratic nominees.

Cleveland's second term expired on the 4th of March 1897, and he then retired into private life, universally respected and constantly consulted, in the university town of Princeton, New Jersey, where he died on the 24th of June 1908. He was a trustee of Princeton University and Stafford Little lecturer on public affairs. Chosen in 1905 as a member of a committee of three to act as trustees of the majority of the stock of the Equit- able Life Assurance Company, he promoted the reorganization and the mutualization of that company, and acted as rebate referee for it and for the Mutual and New York Life insurance companies. He published Presidential Problems (New York, 1904), made up in part of lectures at Princeton University, and Fishing and Hunting Sketches (1906).

A large amount of magazine literature has been devoted to President Cleveland's career. W. O. Stoddard's Graver Cleveland (1888; " Lives of the Presidents" series) and J. Lowry Whittle's Grover Cleveland (1896; "Public Men of To-day" series) are judicious volumes; and "Campaign Biographies" (1884) were written by W. Dorsheimer, F. E.

Goodrich, P. King and D. Welch. See articles by Woodrow Wilson (Atlantic Monthly, vol. 79; “Cleveland as President”); Carl Schurz (McClure’s Magazine, vol. ix. ; ” Second Administration of Grover Cleve- land”); William Allen White (McClure’s, vol. 18, “Character Sketch of Cleveland “), and Henry L. Nelson (North American Review, vol. 188). Also Jesse L. Williams, Mr Cleveland: A Personal Impression (1909), and G. W. Parker, Recollections of Grover Cleveland (1909). (H. We)

CLEVELAND, a city and port of entry in the state of Ohio, U.S.A., and the county-seat of Cuyahoga county, the sixth largest city in the United States. It is on Lake Erie at the mouth of Cuyahoga river, about 260 m. N.E. of Cincinnati, 357 m. E. of Chicago, and 623 m. W. by N. of New York. Pop. (1890) 261,353; (1900) 381,768, of whom 124,631 were foreign- born, 288,591 were of foreign parentage (i.e. having one or both parents foreign-born), and 5988 were negroes; (1910) 560,663. Of the 124,631, who in 1900 were foreign-born, Germans were greatly predominant (40,648, or 32-6%), with the Bohemians (13,599, or IO- 9%) and Irish (13,120, or io-6%) next in importance, the Bohemians being later comers than the Irish.

The city commands pleasant views from its position on a plateau, which, at places on bluffs along the shore, has elevations of about 75 ft. above the water below, and rises gradually toward the S.E. to 115 ft. and on the extreme E. border to more than 200 ft. above the lake, or about 800 ft. above sea-level; the surface has, however, been cut deeply by the Cuyahoga, which here pursues a meandering course through a valley about J m. wide, and is also broken by several smaller streams. The city’s shore-line is more than 12 m. long. The city varies considerably in width, and occupies a total area of about 41 sq. m., much the greater part of which is E. of the river. The streets are of unusual width (varying” from 60 ft. to 132 ft.); are paved chiefly with Medina dressed stone, brick and asphalt; and, like the parks, are so well shaded by maples, elms and other trees, that Cleveland has become known as the ” Forest City.” The municipality maintains an efficient forestry depart- ment. About J m. from the lake and the same distance E. of the river is the Public Square, or Monumental Park, in the business centre of the city. Thence the principal thoroughfares radiate. The river is spanned with bridges, and its valley by two viaducts, the larger of which (completed in 1878 at a cost of more than $2,000,000), 321 1 ft. long, 64 ft. wide, and 68 ft. above water, connects Superior Avenue on the E. with Detroit Avenue on the W. The Central Viaduct, finished in 1888, extends from Central Avenue to W. 14th Street, and there connects with a smaller viaduct across Walworth Run, the combined length of the two being about

4000 ft. Another viaduct (about 830 ft. long) crosses Kingsbury Run a short distance above its mouth. Lower Euclid Avenue (the old country road to Euclid, 0., and Erie, Pa.) is given up to com- mercial uses; the eastern part of the avenue has handsome houses with spacious and beautifully ornamented grounds, and is famous as one of the finest residence streets in the country. Sections of Prospect Avenue, E. 40th, E. 93rd, E. 75th, E. 55th, W. 44th and E. 79th streets also have many fine residences. The principal business thoroughfares are Superior Avenue (132 ft. wide), the W. part of Euclid Avenue, and Ontario St. The manufacturing quarters are chiefly in the valley of the Cuyahoga, and along the railway tracks entering the city, chiefly on the E. side. In 1902 the city arranged for grouping its public buildings — in the so-called ” Group Plan ” — at a cost of $25,000,000. The court-house and city hall are on the bluff overlooking Lake Erie; 1000 ft. south are the Federal post- office and the public library. The Mall connecting the court- house and city hall with the post-office and library is 600 ft. wide; on one side of it is the grand music-hall, on the other a fine art gallery. The six granite buildings forming this quadrangle were built under the supervision of Arnold Brunner, a govern- ment architect, and of John M. Carrere and D. H. Burnham,

who planned the buildings at the Pan-American Exposition and the Chicago World’s Fair respectively. The city has, besides, numerous fine office buildings, including that of the Society for Savings (an institution in which each depositor is virtually a stockholder), the Citizens’, Rose, Williamson, Rocke- feller, New England and Garfield buildings; and several beautiful churches, notably the Roman Catholic and Trinity cathedrals, the First Presbyterian (” Old Stone “), the Second Presbyterian, the First Methodist and Plymouth (Congregational) churches. The Arcade, between Euclid and Superior avenues, and the Colonial Arcade, between Euclid and Prospect avenues, are office and retail store buildings worthy of mention. The former, finished in 1889, is 400 ft. long, 180 ft. wide, and 140 ft. high, with a large interior court, overlooked by five balconies. The Colonial Arcade contains a hotel as well; it was finished in 1898. In the Public Square is a soldiers’ and sailors’ monument consist- ing of a granite shaft rising from a memorial room to a height of 125 ft., and surmounted with a figure of Liberty; in the same park, also, is a bronze statue of Moses Cleaveland, the founder of the city. On a commanding site in Lake View Cemetery is the Garfield Memorial (finished in 1890) in the form of a tower (165 ft. high), designed by

George Keller and built mostly of Ohio sandstone; in the base is a chapel containing a statue of Garfield and several panels on which are portrayed various scenes in his life; his remains are in the crypt below the statue. A marble statue of Commodore Oliver H. Perry, erected in commemoration of his victory on Lake Erie in 1813, is in Wade Park, where there is also a statue of Harvey Rice (1800-1891), who reformed the Ohio public school system and wrote Pioneers of the Western Reserve (1882) and Sketches of Western Life (1888).

The parks contain altogether more than 1 500 acres. A chain of parks connected by driveways follows the picturesque valley of Doan Brook on the E. border of the city. At the mouth of the brook and on the lake front is the beautiful Gordon Park of 1 2 2 acres, formerly the private estate of William J. Gordon but given by him to the city in 1893; from this extends up the Doan Val- ley the large Rockefeller Park, which was given to the city in 1896 by John D. Rockefeller and others, and which extends to and adjoins Wade Park (85 acres; given by J. H. Wade) in which are a zoological garden and a lake. Lake View Park along the lake shore contains only 10ˆ acres, but is a much frequented resting- place near the business centre of the city, and affords pleasant views of the lake and its commerce. Monumental Park is divided into four sections (containing about 1 acre each) by Superior Avenue and Ontario Street. Of the several cemeteries, Lake View (about 300 acres), on an elevated site on the E. border, is by far the largest and most beautiful, its natural beauty having been enhanced by the landscape gardener. Besides Garfield, John Hay and Marcus A. Hanna are buried here.

Education. — Cleveland has an excellent public school system. A general state law enacted in 1904 placed the management of school affairs in the hands of an elective council of seven members, five chosen at large and two by districts. This board has power to appoint a school director and a superintendent of instruction. The superintendent appoints the teaching force, the director all other employes; appointments are subject to confirmation by the board, and all employes are subject to removal by the executive officials alone. The ” Cleveland plan,” in force in the public schools, minimizes school routine, red tape and frequent examinations, puts great stress on domestic and manual training courses, and makes promotion in the grammar schools depend on the general knowledge and development of the pupil, as estimated by a teacher who is supposed to make a careful study of the individual. In 1909 there were 8 high schools and 90 grammar schools in the city; more than $2,500,000 is annually expended by Cleveland on its public schools. Besides the public school system there are many parochial schools; the University school, with

an eight years' course; the Western Reserve University, with its medical school (opened in 1843), the Franklin T. Backus Law School (1892), the dental department (1892), Adelbert College (until 1882 the Western Reserve College, founded in 1826, at Hudson, Ohio), the College for Women (1888), and the

Library school (1904); St Ignatius College (Roman Catholic, conducted by the Fathers of the Society of Jesus; incorporated 1890), which has an excellent meteorological observatory; St Mary's theological seminary (Roman Catholic) ; the Case School of Applied Science, founded in 1880 by Leonard Case (1820-1880), and opened in 1881; the Cleveland College of Physicians and Surgeons (founded in 1863; from 1869 until 1896 the medical department of the University of Wooster; since 1896 a part of Ohio Wesleyan University, Delaware, Ohio), the Cleveland Homeopathic Medical College, the Cleveland School of Pharmacy, the Cleveland Art School, and a school for the deaf, dumb and blind. In 1907-1908 Western Reserve University had 193 instructors and 914 students (277 in Adelbert College; 269 in College for Women; 20 in graduate department; and 102 in medical, 133 in law, 75 in dental and 51 in Library school); and the Case School of Applied Science 40 instructors and 440 students. The public library contained 330,000 volumes in 1908, the Case library (subscription) 65,000 volumes, the Hatch lihrary of Adelbert College about 56,000 volumes, the library of the Western Reserve Historical Society 22,500 volumes, and the Cleveland law library, in the court house, 20,000 volumes. '

The city has a highly developed system of charitable and corrective institutions. A farm of more than 1600 acres, the Cleveland Farm Colony, 1 1 m. from the city, takes the place of workhouses, and has many cottages in which live those of the city's poor who were formerly classed as paupers and were sent to poorhouses, and who now apply their labour to the farm and are relieved from the stigma that generally attaches to inmates of poorhouses. On the " farm " the city maintains an " infirmary village," a tuberculosis sanatorium, a detention hospital, a convalescent hospital and houses of correction. On a farm 22 m. from the city is the Boyville Home (maintained in connexion with the juvenile court) for " incorrigible " boys. The " cottage " plan has been adopted; each cottage is presided over by a man and wife whom the boys call father and mother. The boys have a government of their own, elect their officials from among them-selves, and inflict such punishment on any of their number as the boys deem merited. Besides the city, there are the Northern Ohio (for the insane, founded in 1855), the Cleveland general. Lake Side (endowed), St Alexis and the Charity hospitals (the last managed by Sisters of

Charity). The Goodrich House (1897), the Hiram House and the Alta House are among the best equipped and most efficient social settlements in the country. Cleveland has also its orphan asylums, homes for the aged, homes for incurables, and day nurseries, besides a home for sailors, homes for young working women, and retreats for unfortunate girls. The various charity and benevolent institu- tions are closely bound together on a co-operative basis by the agency of the associated charities.

The principal newspapers of the city are the Plain Dealer (1841, independent), the Press (1878, independent), the Leader (1847, Republican), and the News (1889, Republican). Bohemian, Hungarian and German dailies are published.

Municipal Enterprise. — Municipal ownership has been a great- er issue in Cleveland than in any other large city in the United States, chiefly because of the advocacy of Tom Loftin Johnson (born 1854), a street-railway owner, iron manufacturer, an ardent single-taxer, who was elected mayor of the city in 1901, 1903, 1905 and 1907. The municipality owns the water-works, a small electric-light plant, the garbage plant and bath houses The city water is pumped to reservoirs, through a tunnel 9 ft. i diameter 60 ft. below the bottom of the lake, from an intak* situated a distance of 26,500 ft. from the shore. The system has a delivery capacity of 80,000,000 gallons daily. The department serves about 70,000 consumers. All water is metered and sella for 40 cents per thousand cub. ft., or 5 barrels for 1 cent. The municipal electric-lighting plant does not seriously compete with the private lighting company. The municipal garbage plant (destructor) collects and reduces to fertilizer ico tons of garbage per day. The sale of the fertilizer more than pays for the cost of reduction, and the only expense the city has is in collecting it. In the city's six bath houses the average number of baths per day,

per house, in 1906, was 1165. The municipal street cleaning department cleans all streets by the wet process. To do this the city maintained (1906) 24 flushing wagons working 2 shifts of 8 hours each per day. A new street car company began operations on the 1st of November 1006, charging a 3 cent fare. The grants of this company were owned by the Forest City Railway Company and the property was leased to the Municipal Traction Company (on behalf of the public — the city itself not being empowered to own and operate

street railways). In 1908 the Cleveland Electric Street Railway Corporation (capital $23,000,000), which owned most of the electric lines in the city, was forced to lease its property to the municipality's holding company, receiving a " security franchise," providing that under certain circumstances (e.g. if the holding company should default in its payment of interest) the property was to revert to the corporation, which was then to charge not more than twenty-five cents for six tickets. In October 1908, at a special election, the security franchise was invalidated, and the entire railway system was put in the hands of receivers. In 1909 Johnson was defeated. In 1910 a 25-year franchise was granted to the Cleveland Rail- way Company, under which a 3-cent fare is required if the com- pany can earn 6$ on that basis, and 4 cents (7 tickets for 25 cents) is the maximum fare, with a cent transfer charge, re- turned when the transfer is used.

Commerce. — To meet the demands of the rapidly increasing commerce the harbour has been steadily improved. In 1908 it consisted of two distinct parts, the outer harbour being the work of the federal government, and the inner harbour being under the control of the city. The outer harbour was formed by two breakwaters enclosing an area of 2 m. long and 1700 ft. wide; the main entrance, 500 ft. wide, lying opposite the mouth of the Cuyahoga river, 1350 ft. distant. The depth of the harbour ranges from 21 to 26 ft.; and by improving this entrance, so as to make it 700 ft. wide, and 1000 ft. farther from the shore, and extending the east breakwater 3 m., the capacity of the outer harbour has been doubled. The inner harbour comprises the Cuyahoga, the old river bed, and connecting slips. The channel at the mouth of the river (325 ft. wide) is lined on the W. side by a concrete jetty 1054 ft. long, and on the E. side by commercial docks. The river and old river bed furnish about 13 m. of safe dock frontage, the channel having been dredged for 6 m. to a depth of 21 ft. The commerce of the harbour of Cleveland in 1907 was 12,872,448 tons.

Cleveland's rapid growth both as a commercial and as a manufacturing city is due largely to its situation between the iron regions of Lake Superior and the coal and oil regions of Pennsylvania and Ohio. Cleveland is a great railway centre and is one of the most important ports on the Great Lakes. The city is served by the Lake Shore & Michigan Southern; the New York, Chicago & St Louis; the Cleveland, Cincinnati, Chicago & St Louis; the Pennsylvania; the Erie; the Baltimore & Ohio; and the Wheeling & Lake Erie railways; by steamboat lines to the principal ports on the Great Lakes; and by an extensive system of inter-urban electric lines. Cleveland is the largest ore market in the world, and its huge ore docks are among its most

interesting features; the annual receipts and shipments of coal and iron ore are enormous. It is also the largest market for fresh-water fish in America, and handles large quantities of lumber and grain. The most important manufactures are iron and steel, carriage hardware, electrical supplies, bridges, boilers, engines, car wheels, sewing machines, printing presses, agri- cultural implements, and various other commodities made wholly or chiefly from iron and steel. Other important manufactures are automobiles (value, 1905, $4,256,979) and telescopes. More steel wire, wire nails, and bolts and nuts are made here than in any other city in the world (the total value for iron and steel products as classified by the census was, in 1905, $42,930,995, and the value of foundry and machine-shop products in the same year was $18,832,487), and more merchant vessels than in any other American city. Cleveland is the headquarters of the largest shoddy mills in the country (value of product, 1905, $1,084,594), makes much clothing (1905, $10,426,535), manu-

factures a large portion of the chewing gum made in the United States, and is the site of one of the largest refineries of the Standard Oil Company. The product of Cleveland breweries in 1905 was valued at $3,986,059, and of slaughtering and meat- packing houses in the same year at $10,426,535. The total value of factory products in 1905 was $172,115,101, an increase of 36-4% since 1900; and between 1900 and 1905 Cleveland became the first manufacturing city in the state.

Government. — Since Cleveland became a city in 1836 it has undergone several important changes in government. The charter of that year placed the balance of power in a council composed of three members chosen from each ward and as many aldermen as there were wards, elected on a general ticket. From 1852 to 1891 the city was governed under general laws of the state which entrusted the more important powers to several administrative boards. Then, from 1891 to 1903, by what was practically a new charter, that which is known as the ” federal plan ” of government was tried; this centred power in the mayor by making him almost the only elective officer, by giving to him the appointment of his cabinet of directors — one for the head of each of the six municipal departments — and to each director the appointment of his subordinates. The fed- eral plan was abandoned in 1903, when a new municipal code went into effect, which was in operation until 1909, when the Paine Law established a board of control, under a government resembling the old federal plan. (For laws of 1903 and 1909 see Ohio.) Few if any cities in the Union have, in recent years, been better governed than Cleveland, and this seems to be due largely to the keen interest in municipal affairs which has been shown by her citizens. Especially has this been manifested by the

Cleveland Chamber of Commerce and by the Municipal Association, an organization of influential professional and business men, which, by issuing bulletins concerning candi- dates at the primaries and at election time, has done much for the betterment of local politics. • The Cleveland Chamber of Commerce, an organization of 1600 leading business men, is a power for varied good in the city; besides its constant and aggressive work in promoting the commercial interests of the city, it was largely influential in the federal reform of the consular service; it studied the question of overcrowded tenements and secured the passage of a new tenement law with important sanitary provisions and a set minimum of air space; it urges and promotes home-gardening, public baths and play-grounds, and lunch-rooms, &c, for employes in factories; and it was largely instrumental in devising and carrying out the so-called ” Group Plan ” described above.

History. — A trading post was established at the mouth of the Cuyahoga river as early as 1786, but the place was not per- manently settled until 1796, when it was laid out as a town by Moses Cleaveland (1754-1806), who was then acting as the agent of the Connecticut Land Company, which in the year before had purchased from the state of Connecticut a large portion of the Western Reserve. In 1800 the entire Western Reserve was erected into the county of Trumbull and a township government was given to Cleveland; ten years later Cleveland was made the seat of government of the new county of Cuyahoga, and in 1814 it was incorporated as a village. Cleveland’s growth was, how- ever, very slow until the opening of the Ohio canal as far as Akron in 1827; about the same time the improvement of the harbour was begun, and by 1832 the canal was opened to the Ohio river. Cleveland thus was connected with the interior of the state, for whose mineral and agricultural products it became the lake outlet. The discovery of iron ore in the Lake Superior region made Cleveland the natural meeting-point of the iron ore and the coal from the Ohio, Pennsylvania and West Virginia mines; and it is from this that the city’s great com- mercial importance dates. The building of railways during the decade 1850ˆ1860 greatly increased this importance, and the city grew with great rapidity. The growth during the Civil War was partly due to the rapid development of the manu- facturing interests of the city, which supplied large quantities of iron products and of clothing to the Federal government

The population of 1076 in 1830 increased to 6071 in 1840, to 17,034 m 1850, to 43,417 in i860, to 92,829 m i87oand to 160,146 in 1880. Until 1853 the city was confined to the E. side of the river, but in that year Ohio City, which was founded in 1807, later incorporated as the village of Brooklyn, and in 1836 chartered as a city (under the name Ohio City), was annexed. Other annexations followed: East Cleveland in 1872, Newburg in 1873, West Cleveland and Brooklyn in 1893, and Glenville and South Brooklyn in 1905. In recent history the most notable events not mentioned elsewhere in this article were the elaborate celebration of the centennial cf the city in 1896 and the street railway strike of 1899, in which the workers attempted to force a redress of grievances and a recognition of their union. Mobs attacked the cars, and cars were blown up by dynamite. The strikers were beaten, but certain abuses were corrected. There was a less violent street car strike in 1908, af-ter the assumption of control by the Municipal Traction Company, which refused to raise wages according to promises made (so the employees said) by the former owner of the railway; the strikers were unsuccessful.

Authorities. — Manual of the City Council (1879); Annuals of the Cleveland Chamber of Commerce (1894-); E. M. Avery, Cleveland in a Nutshell: An Historical and Descriptive Ready- reference Book (Cleveland, 1893) ; James H. Kennedy, A History of the City of Cleveland (Cleveland, 1896); C. A. Urann, Centennial History of Cleveland (Cleveland 1896); C. Whittlesey, The Early History of Cleveland (Cleveland, 1867) ; C. E. Bolton, A Few Civic Problems of Greater Cleveland (Cleveland, 1897) ; ” Plan of School Administration,” by S. P. Orth, in vol, xix. Political Science Quarterly (New York, 1904) ; Charles Snavely, A History of tlie City Govern- ment of Cleveland (Baltimore, 1902) ; C. C. Williamson, The Finances of Cleveland (New York, 1907); “The Government of Cleveland, Ohio,” by Lincoln Steffens, in McClure’s Magazine, vol. xxv. (New York, 1905) ; and C. F. Thwing, ” Cleveland, the Pleasant City,” in Powell’s Historic Towns of the Western States (New York, 1901).

CLEVER, an adjective implying dexterous activity of mind or body, and ability to meet emergencies with readiness and adroitness. The etymology and the early history of the word are obscure. The earliest instance quoted by the New English Dictionary is in the Bestiary of c. 1200 {An Old English Mis- cellany, ed. R. Morris, 1872, E.E.T.S. 49) — ” On the clothed the neddre (adder) is cof (quick) and the devel cliver on sinnes,” i.e. quick to seize hold of; this would connect the word with a M. Eng. ” cliver ” or ” clivre,” a talon or claw (so H. Wedgwood, Diet, of Eng. Etytn.). The ultimate original would be the root appearing in ” claw,” ” cleave,” ” cling, ” ” clip,” &c, meaning to ”

stick to." This original sense probably survives in the frequent use of the word for nimble, dexterous, quick and skilful in the use of the hands, and so it is often applied to a horse, " clever at his fences." The word has also been connected with O. Eng. gleaw, wise, which became in M. Eng. gleu, and is cognate with Scottish gleg, quick of eye. As to the use of the word, Sir Thomas Browne mentions it among " words of no general reception in English but of common use in Norfolk or peculiar to the East Angle countries " {Tract, viii. in Wilkins's ed. of Works, iv. 205). The earlier uses of the word seem to be confined to that of bodily dexterity. In this sense it took the place of a use of " deliver " as an adjective, mean- ing nimble, literally " free in action," a use taken from Fr. delivre (Late Lat. deliberare, to set free), cf. Chaucer, Prologue to Caht. Tales, 84, " wonderly deliver and grete of strength," and Romaunt of the Rose, 831, " Deliver, smert and of gret might." It has been suggested that " clever " is a corruption of " deliver " in this sense, but this is not now accepted. The earliest use of the word for mental quickness and ability in the New English Dictionary is from Addison in No. 22 of The Freeholder (1716).

CLEVES (Ger. Cleve or Kleve), a town of Germany in the kingdom of Prussia, formerly the capital of the duchy of its own name, 46 m. N.W. of Diisseldorf, 12 m. E. of Nijmwegen, on the main Cologne-Amsterdam railway. Pop. (1900) 14,678. The town is neatly built in the Dutch style, lying on three small hills in a fertile district near the frontier of Holland, about 2 m. from the Rhine, with which it is connected by a canal (the Spoykanal). The old castle of Schwanenburg (formerly the residence of the

dukes of Cleves), has a massive tower (Schwanenturm) 180 ft. high. With it is associated the legend of the " Knights of the Swan," immortalized in Wagner's Lohengrin. The building has been restored in modern times to serve as a court of justice and a prison. The collegiate church (Stiftskirche) dates from about 1340, and contains a number of fine ducal monuments. Another church is the Annexkirche, formerly a convent of the Minorites; this dates from the middle of the 15th century. The chief manu- factures are boots and shoes, tobacco and machinery; there is also some trade in cattle. To the south and west of the city a large district is laid out as a park, where there is a statue to the memory of John Maurice of Nassau-Siegen (1604-16 79), who governed Cleves from 1650 to 1679, and in the western part there are mineral wells with a pump room and bathing establishment. Owing to the beautiful woods which surround it and its medicinal waters Cleves has become a favourite summer resort.

The town was the seat of the counts of Cleves as early as the nth

century, but it did not receive municipal rights until 1242. The duchy of Cleves, which lay on both banks of the Rhine and had an area of about 850 sq. m., belonged before the year 1000 to a certain Rutger, whose family became extinct in 1368. It then passed to the counts of La Marck and was made a duchy in 141 7, being united with the neighbouring duchies of Jiilich and Berg in 1521. The Reformation was introduced here in 1533, but it was not accepted by all the inhabitants. The death without direct heirs of Duke John William in 1609 led to serious complications in which almost all the states of Europe were concerned; however, by the treaty of Xanten in 16 14, Cleves passed to the elector of Brandenburg, being afterwards incorporated with the electorate by the great elector, Frederick William. The French held Cleves from 1757 to 1762 and in 1795 the part of the duchy on the left bank of the Rhine was ceded to France; the remaining portion suffered a similar fate in 1805. After the conclusion of peace in 18 15 it was restored to Prussia, except some small portions which were given to the kingdom of Holland.

See Char, Geschichte des Herzogtums Kleve (Cleves, 1845); Velsen, Die Stadt Kleve (Cleves, 1846) ; R. Scholten, Die Stadt Kleve (Cleves, 1879-1881). For Anne of Cleves see that article.

CLEYNAERTS (Clenardtjs or Clenard), NICOLAS (1495- 1542), Belgian grammarian and traveller, was born at Diest, in Brabant, on the 5th of December 1495. Educated at the university of Louvain, he became a professor of Latin, which he taught by a conversational method. He applied himself to the preparation of manuals of Greek and Hebrew grammar, in order to simplify the difficulties of learners. His Tabulae in grammaticen hebraeam (1529), Instituiiones in linguam graecam (1530), and Meditationes graecanicae (1531) appeared at Louvain. The Institutiones and Meditationes passed through a number of editions, and had many commentators. He maintained a prin- ciple revived in modern teaching, that the learner should not be puzzled by elaborate rules until he has obtained a working ac- quaintance with the language. A desire to read the Koran led him to try to establish a connexion between Hebrew and Arabic. These studies resulted in a scheme for proselytism among the Arabs, based on study of the language, which should enable Europeans to combat the errors of Islam by peaceful methods. In prosecution of this object he travelled in 1532 to Spain, and after teaching Greek at Salamanca was summoned to the court of Portugal as tutor to Don Henry, brother of John III. He found another patron in Louis Mendoza, marquis of Mondexas, governor-general of Granada. There with the help of a Moorish slave he gained a knowledge of Arabic. He tried in vain to gain access to the Arabic MSS. in the possession of the Inquisition, and

finally, in 1540, set out for Africa to seek information for himself. He reached Fez, then a flourishing seat of Arab learning, but after fifteen months of privation and suffering was obliged to return to Granada, and died in the autumn of 1542. He was buried in the Alhambra palace.

See his Latin letters to his friends in Belgium, Nicolai Clenardi, Peregrinationum ac de rebus machometicis epistolae elegantissimae (Louvain, 1550), and a more complete edition, Nic. Clenardi

Epistolarum libri duo (Antwerp, 1561), from the house of Plantin; also Victor Chauvin and Alphonse Roersch, ” Etude sur la vie et les travaux de Nicolas Clenard ” in Memoires couronnes (vol. lx., 1900- 1901) of the Royal Academy of Belgium, which contains a vast amount of information on Cleynaerts and an extensive bibliography of his works, and of notices of him by earlier commentators.

CLICHTOVE, JOSSE VAN (d. 1543), Belgian theologian, received his education at Louvain and at Paris under Jacques Lefebvre d’Etaples. He became librarian of the Sorbonne and tutor to the nephews of Jacques d’Amboise, bishop of Clermont and abbot of Cluny. In 15 19 he was elected bishop of Tournai, and in 1521 was translated to the see of Chartres. He is best known as a distinguished antagonist of Martin Luther, against whom he wrote a good deal. When Cardinal Duprat convened his Synod of Paris in 1528 to discuss the new religion, Clichtove was summoned and was entrusted with the task of collecting and summarizing the objections to the Lutheran doctrine. This he did in his Compendium veritatum . . . contra erroneas Luther anorum assertiones (Paris, 1529). He died at Chartres on the 22nd of September 1543.

CLICHY, or Clichy-la-Garenne, a town of northern France, in the department of Seine, on the right bank of the Seine, immedi- ately north of the fortifications of Paris, of which it is a manu- facturing suburb. Pop. (1906) 41,516. Its church was built in the 17 th century under the direction of St Vincent de Paul, who had previously been cure of Clichy. Its industries include the manufacture of starch, rubber, oil and grease, glass, chemicals, soap, &c. Clichy, under the name of Clippiacum, was a residence of the Merovingian kings.

CLIFF-DWELLINGS, the general archaeological term for the

habitations of primitive peoples, formed by utilizing niches or caves in high cliffs, with more or less excavation or with additions in the way of masonry. Two special sorts of cliff- dwelling are distinguished by archaeologists, (1) the cliff-house, which is actually built on levels in the cliff, and (2) the'cavate house, which is dug out, by using natural recesses or openings. A great deal of attention has been given to the North American cliff-dwellings, particularly among the canyons of the south-west, in Arizona, New Mexico, Utah and Colorado, some of which are still used by Indians. There has been considerable discussion as to their antiquity, but modern research finds no definite justification for assigning them to a distinct primitive race, or farther back than the ancestors of the modern Pueblo Indians. The area in which they occur coincides with that in which other traces of the Pueblo tribes have been found. The niches which were utilized are often of considerable size, occurring in cliffs of a thousand feet high, and approached by rock steps or log- ladders.

See the article, with illustrations and bibliography, in the Hand- book of American Indians (Washington, 1907).

CLIFFORD, the name of a famous English family and barony, taken from the village of Clifford in Herefordshire, although the family were mainly associated with the north of England.

Robert de Clifford (c. 1275-1314), a son of Roger de Clifford (d. 1282), inherited the estates of his grandfather, Roger de Clifford, in 1286; then he obtained through his mother part of the extensive land of the Viponts, and thus became one of the most powerful barons of his age. A prominent soldier during the reigns of Edward I. and Edward II., Clifford was summoned to parliament as a baron in 1299, won great renown at the siege of Carlaverock Castle in 1300, and after taking part in the movement against Edward II. 's favourite, Piers Gaveston, was killed at Bannockburn. His son Roger, the 2nd baron (1290- 1322), shared in the rebellion of Thomas, earl of Lancaster, and was probably executed at York on the 23-rd of March 1322. Robert's grandson Roger, the 5th baron (1333-1389), and the latter's son Thomas, the 6th baron (c. 1363-c. 1391). served the English kings on the Scottish borders and elsewhere. The same is true of Thomas, the 8th baron (1414-1455), who was killed at the first battle of St Albans in May 1455.

Thomas's son John, the 9th baron (c. 1435-1461), was more famous. During the Wars of the Roses he fought for Henry VI., earning by his cruelties the name of the " butcher "; after the

battle of Wakefield in 1460 he murdered Edmund, earl of Rutland, son of Richard, duke of York, exclaiming, according to the chronicler Edward Hall, ” By God’s blood thy father slew mine; and so will I do thee and all thy kin.” Shakespeare refers to this incident in King Henry VI., and also represents Clifford as taking part in the murder of York. It is, however, practically certain that York was slain during the battle, and not afterwards like his son. Clifford was killed at Ferrybridge on the 28th of March 1461, and was afterwards attainted. His young son Henry, the 10th baron (c. 1454-15 23), lived disguised as a shepherd for some years, hence he is sometimes called the ” shepherd lord.” On the accession of Henry VII. the attainder was reversed and ; he received his father’s estates. He spent a large part of his time at Barden in Lancashire, being interested in astronomy and astrology. Occasionally, however, he visited London, and he fought at the battle of Flodden in 15 13. This lord, who died on the 23rd of April 1523, is celebrated by Words- worth in the poems ” The white doe of Rylstone ” and ” Song at the feast of Brougham Castle.” Henry, the nth baron, was created earl of Cumberland in 1525, and from this time until the extinction of the title in 1643 the main line of the Cliffords was associated with the earldom of Cumberland (q.v.).

Richard Clifford, bishop of Worcester and London under Henry IV. and Henry V., was probably a member of this family. This prelate, who was very active at the council of Constance, died on the 20th of August 142 1.

On the death of George, 3rd earl of Cumberland, in 1605, the barony of Clifford, separated from the earldom, was claimed by his daughter Anne, countess of Dorset, Pembroke and Montgomery; and in 1628 a new barony of Clifford was created in favour of Henry, afterwards 5th and last earl of Cumberland. After Anne’s death in 1676 the claim to the older barony passed to her daughter Margaret (d. 1676), wife of John Tufton, 2nd earl of Thanet, and her descendants, whose title was definitely recognized in 1691. After the Tuftons the barony was held with intervening abeyances by the Southwells and the Russells, and to this latter family the present Lord De Clifford belongs. 1

When the last earl of Cumberland died in 1643 the newer barony of Clifford passed to his daughter Elizabeth, wife of Richard Boyle, 2nd earl of Cork, and from the Boyles it passed to the Cavendishes, falling into abeyance on the death of William Cavendish, 6th duke of Devonshire, in 1858.

The barony of Clifford of Lanesborough was held by the Boyles from 1644 to 1753, and the Devonshire branch of the family still holds the

barony of Clifford of Chudleigh, which was created in 1672.

See G. E. C(okayne), Complete Peerage (1887-1898); and T. D. Whitaker, History of Craven (1877).

CLIFFORD, JOHN (1836-), British Nonconformist minister and politician, son of a warp-machinist at Sawley, Derbyshire, was born on the 16th of October 1836. As a boy he worked in a lace factory, where he attracted the notice of the leaders of the Baptist community, who sent him to the academy at Leicester and the Baptist college at Nottingham to be educated for the ministry. In 1858 he was called to Praed Street chapel, Paddington (London), and while officiating there he attended University College and pursued his education by working at the British Museum. He matriculated at London University (1859), and took its B.A. degree (1861), B.Sc. (1862), M.A. (1864), and LL.B. (1866), and in 1883 he was given the honorary degree of D.D. by Bates College, U.S.A., being known therefrom as Dr Clifford. This degree, from an American college of minor academic status, afterwards led to sarcastic allusions, but Dr Clifford had not courted it, and his London University achievements were evidence enough of his intellectual equipment. At Praed Street chapel he gradually obtained a

‘The original writ of summons (1299) was addressed in Latin, Roberto domino de Clifford, i.e. Robert, lord of Clifford, and subse- quently the barons styled themselves indifferently Lords Clifford or de Clifford, until in 1777 the nth lord definitively adopted the latter form. The ” De ” henceforth became part of the name, having quite lost its earliest significance, and with unconscious tautology the barony is commonly referred to as that of De Clifford.

large following, and in 1877 Westbourne Park chapej. was opened for him. As a preacher, writer, propagandist and ardent Liberal politician, he became a power in the Nonconformist body. He was president of the London Baptist Association in 1879, of the Baptist Union in 1888 and 1899, and of the National Council of Evangelical Churches in 1898. His chief prominence in politics, however, dates from 1903 onwards in consequence of his advocacy of ” passive resistance ” to the Education Act of 1902. Into this movement he threw himself with militant ardour, his own goods being distrained upon, with those of numerous other Nonconformists, rather than that any contribution should be made by them in taxation for the purpose of an Education Act which in their opinion was calculated to support denominational religious teaching in the schools. The ” passive resistance ” movement, with Dr Clifford as its chief leader, had a large share in the defeat of the Unionist government in January 1906, and his efforts were then directed to getting a new act passed which should be undenominational in character. The rejection of Mr Birrell’s bill in 1906 by the House of Lords was accordingly accompanied by denunciations of that body from Dr Clifford and his followers; but as year by year went by, up to 1909, with nothing but failure on the part of the Liberal ministry to arrive at any solution of the education problem, — failure due now not to the House of Lords but to the inherent difficulties of the subject (see Education), — it became increasingly clear to the public generally that the easy denunciations of the act of 1902, which had played so large a part in the elections of 1906, were not so simple to carry into practice, and that a compromise in which the denominationalists would have their say would have to be the result. Meanwhile ” passive resistance ” lost its interest, though Dr Clifford and his followers continued to protest against their treatment.

CLIFFORD, WILLIAM KINGDON (1845-1879), English mathematician and philosopher, was born on the 4th of May 1845 at Exeter, where his father was a prominent citizen. He was educated at a private

school in his native town, at King's College, London, and at Trinity College, Cambridge, where he was elected fellow in 1868, after being second wrangler in 1867 and second Smith's prizeman. In 187 1 he was appointed professor of mathematics at University College, London, and in 1874 became fellow of the Royal Society. In 1875 he married Lucy, daughter of John Lane of Barbados. In 1876 Clifford, a man of high-strung and athletic, but not robust, physique, began to fall into ill-health, and after two voyages to the South, died during the third of pulmonary consumption at Madeira, on the 3rd of March 1879, leaving his widow with two daughters. Mrs W. K. Clifford soon earned for herself a prominent place in English literary life as a novelist, and later as a dramatist. Her best-known story, Mrs Keith's Crime (1885), was followed by several other volumes, the best of which is Aunt Anne (1893) ; and the literary talent in the family was inherited by her daughter Ethel (Mrs Fisher Dilke), a writer of some charming verse.

Owing to his early death, Professor Clifford's abilities and achievements cannot be fairly judged without reference to the opinion formed of him by his contemporaries. He impressed every one as a man of extraordinary acuteness and originality; and these solid gifts were set off to the highest advantage by quickness of thought and speech, a lucid style, wit and poetic fancy, and a social warmth which made him delightful as a friend and companion. His powers as a mathematician were of the highest order. It harmonizes with the concrete visualizing turn of his mind that, to quote Professor Henry Smith, "^Clifford was above all and before all a geometer." In this he was an innovator against the excessively analytic tendency of Cambridge mathematicians. In his theory of graphs, or geometrical repre- sentations of algebraic functions, there are valuable suggestions which have been worked out by others. He was much interested, too, in universal algebra, non-Euclidean geometry and elliptic functions, his papers " Preliminary Sketch of Bi-quaternions " (1873) and" OntheCanonicalFormandDissectionofaRiemann's Surface " (1877) ranking as classics. Another important paper

is his " Classification of Loci " (1878). He also published several papers on algebraic forms and projective geometry.

As a philosopher Clifford's name is chiefly associated with two phrases of his coining, " mind- stuff " and the " tribal self." The former symbolizes his metaphysical conception, which was suggested to him by his reading of Spinoza. " Briefly put," says Sir F. Pollock, " the conception is that mind is the one ultimate reality; not mind as we know it in the complex forms of conscious feeling and thought, but

the simpler elements out of which thought and feeling are built up. The hypothetical ultimate element of mind, or atom of mind-stuff, precisely corre- sponds to the hypothetical atom of matter, being the ultimate fact of which the material atom is the phenomenon. Matter and the sensible universe are the relations between particular organisms, that is, mind organized into consciousness, and the rest of the world. This leads to results which would in a loose and popular sense be called materialist. But the theory must, as a metaphysical theory, be reckoned on the idealist side. To speak technically, it is an idealist monism." The other phrase, " tribal self," gives the key to Clifford's ethical view, which explains conscience and the moral law by the development in each individual of a " self," which prescribes the conduct conducive to the welfare of the " tribe." Much of Clifford's contemporary prominence was due to his attitude towards religion. Animated by an intense love of truth and devotion to public duty, he waged war on such ecclesiastical systems as seemed to him to favour obscurantism, and to put the claims of sect above those of human society. The alarm was greater, as theology was still unreconciled with the Darwinian theory; and Clifford was regarded as a dangerous champion of the anti- spiritual tendencies then imputed to modern science.

His works, published wholly or in part since hisdeath, are Elements of Dynamic (1879-1887) ; Seeing and Thinking, popular science lectures (1879) ; Lectures and Essays, with an introduction by Sir F. Pollock (1879) ; Mathematical Papers, edited by R. Tucker, with an introduction by Henry J. S. Smith (1882); and The Common Sense of the Exact Sciences, completed by Professor Karl Pearson (1885).

CLIFFORD OF CHUDLEIGH, THOMAS CLIFFORD, ist

Baron (1630-1673), English lord treasurer, a member of the ancient family of Clifford, descended from Walter de Clifford of Clifford Castle in Herefordshire, was the son of Hugh Clifford of Ugbrook near Exeter, and of Mary, daughter of Sir George Chudleigh of Ashton, Devonshire. He was born on the ist of August 1630, matriculated in 1647 at Exeter College, Oxford, where he showed distinguished ability, supplicated for the B.A. degree in 1650, and entered the Middle Temple in 1648. He represented Totnes in the convention parliament and in that of 1661; and he joined the faction of young men who spoke " confidently and often," and who sought to rise to power by attacking Clarendon. The chancellor, according to Burnet, had repulsed his advances on account of his Romanism, and Clifford accordingly offered his services to Arlington, whose steady supporter he now became.

On the 1 6th of February 1663 Clifford obtained the reversion of a tellership in the exchequer, and in 1664, on the outbreak of the Dutch war, was appointed commissioner for the care of the sick, wounded and prisoners, with a salary of £1200. He was knighted, and was present with James at the victory off Lowestoft over the Dutch on the 3rd of June 1665, was rewarded with the prize-ship ” Patriarch Isaac,” and in August, under the earl of Sandwich, took a prominent part in the unsuccessful attempt to capture the Dutch East India fleet in Bergen harbour. In August he was appointed by Arlington’s influence ambassador with Henry Coventry to the north of Europe. Subsequently he served again with the fleet, was present with Albemarle at the indecisive fight on the ist to the 4th of June 1666, and at the victory on the 25th cf July. In October 1667 he was one of those selected by the Commons to prepare papers concerning the naval operations. He showed great zeal and energy in naval affairs, and he is described by Pepys as ” a very fine gentleman, and much set by at court for his activity in going to sea and stoutness everywhere and stirring up and down.” He became the same year controller of the household and a privy councillor,

in 1667 a commissioner for the treasury, and in 1668 treasurer of the household. In the Commons he supported the court, opposing the bill for frequent parliaments in 1668 and the Coventry Act (see Coventry, Sir John) in 1670.

Clifford was an ardent Roman Catholic, a supporter of the royal prerogative and of the French alliance. He regarded with favour the plan of seeking French assistance in order to force Romanism and absolute government upon the country, and his complete failure to understand the real political position and the interests of the nation is reflected in the advice he was said to have given to Charles, to accept the pension from Louis, and ” be the slave of one man rather than of 500.” As one of the Cabal ministry, therefore, he co-operated very zealously with the king in breaking through the Triple Alliance and in effecting the understanding with France. He was the only minister besides Arlington entrusted with the secret treaty of Dover of 1670, signing both this agreement and also the ostensible treaty im- parted to all the members of the Cabal, and did his utmost to urge Charles to join France in the attack upon the Dutch, whom he detested as republicans and Protestants. In 1672, during the absence of Arlington and Coventry abroad, Clifford acted as principal secretary of state, and

was chiefly responsible for the ” stop of the exchequer,” and probably also for the attack upon the Dutch Smyrna fleet. He was appointed this year a com- missioner to inquire into the settlement of Ireland. On the 22nd of April he was raised to the peerage as Baron Clifford of Chud- lcigh, and on the 28th of November, by the duke of York’s interest, he was made lord treasurer; his conduct to Arlington, whose claims to the office he had pretended to press, was, according to Evelyn, the only act of ” real ingratitude ” in his career. Arlington, however, quickly discovered a means of securing Clifford’s fall. The latter was strongly in favour of Charles’s policy of indulgence, and supported the declaration of this year, urging the king to overcome the resistance of parliament by a dissolution. Arlington advocated the contrary policy of concession, and after Charles’s withdrawal of the declaration gave his support to the Test Act of 1673. Clifford spoke with great vehemence against the measure, describing it as ” monstrum horrendum ingens,” but his speech only increased the anti-Roman Catholic feeling in parliament and ensured the passing of the bill. In consequence Clifford, as a Roman Catholic, followed the duke of York into retirement. His resignation caused con- siderable astonishment, since he had never publicly professed his religion, and in 167 1 had even built a new Protestant chapel at his home at Ugbrook. According to Evelyn, however, his conduct was governed by a promise previously given to James. He gave up the treasuryship and his seat in the privy council in June. On the 3rd of July 1673 he received a general pardon from the king. In August he said a last farewell to Evelyn, and in less than a month he died at Ugbrook. In Evelyn’s opinion the cause of death was suicide, but his suspicions do not appear to have received any contemporary support. Clifford was one of the worst advisers of Charles II., but a sincere and consistent one. Evelyn declares him ” a valiant, uncorrupt gentleman, ambitious, not covetous, generous, passionate, a most constant, sincere friend.” He married Elizabeth, daughter of William Martin of Lindridge, Devonshire, by whom he had fifteen children, four sons and seven daughters surviving him. He was succeeded as 2nd baron by Hugh, his fifth, but eldest surviving son, the ancestor of the present Lord Clifford of Chudleigh. (P. C. Y.)

CLIFTON, a suburb and residential district of Bristol, England, adjoining it on the west; 122 m. W. of London by the Great Western railway. The river Avon (q.v.) here runs in a gorge, followed closely by a railway on either side, and having several quarries, which have in a measure spoiled the beauty of its hanging woods. At a height of 245 ft. above high water Isambard Brunei’s famous suspension bridge bestrides this gorge. It was begun in 1832 and completed in 1864. It

has a span of 702 ft., and its total weight is 1500 tons, and it is calculated to bear a burden of o tons per sq. in. The long famous hot springs of Clifton, to which, in fact, the town was indebted for its rise, issue from an aperture at the foot of St Vincent's Rock, in the

portion of Clifton known as Hotwells. The water has a tempera- ture of about 76 F. A hydropathic establishment is attached to them. Immediately above the suspension bridge the Clifton ' Rocks railway ascends from the quays by the river-side to the heights above. The Clifton and Durdham Downs (both on the Gloucestershire side of the river), form the principal pleasure- grounds of Bristol. They lie high above the river, extend for some 5000 acres, and command a beautiful prospect over the city, with its picturesque irregular site and many towers, and over the surrounding well-wooded country.

Three ancient British earthworks bear witness to an early settlement on the spot, and a church was in existence as far back as the time of Henry II., when it was bestowed by William de Clyfton on the abbot of the Austin canons in Bristol; but there are no longer any architectural vestiges of an earlier date than the 1 8th century. Clifton gives name to a Roman Catholic bishopric. Of the churches the most important are St Andrew's parish church; All Saints, erected in 1863 after the designs of G. E. Street, and remarkable for the width of its nave and the narrow- ness of its aisles; and the Roman Catholic pro-cathedral church of the Holy Apostles, with a convent and schools attached. Clifton College, a cluster of buildings in Gothic style, was founded in 1862 by a limited liability company, and takes rank among the principal modern English public schools. Down the river from Clifton is Shirehampton, a favourite resort from Bristol.

CLIM (or Clym) OF THE CLOUGH, a legendary English archer, a supposed companion of the Robin Hood band. He is commemorated in the ballad Adam Bell, Clym of the Cloughe and Wyllyam of Cloudeslee. The three were outlaws who had many adventures of the Robin Hood type. The oldest printed copy of this ballad is dated 1550.

CLIMACTERIC (from the Gr. k\i(io.kt7ip, the rung or step of a xX(jua£ or ladder), a critical period in human life; in a medical sense, the period known as the " change of life," marked in women by the menopause. Certain ages, especially those which are multiples of seven or nine, have been superstitiously regarded as particularly critical; thus the sixty- third and the eighty -first year of life have been called the " grand climacteric." The word is also used, generally, of any turning-point in the history of a nation, a career or the like.

CLIMATE AND CLIMATOLOGY. The word clima (from Gr. tcXivew, to lean or incline; whence also the English ” clime,” now a poetical term for this or that region of the earth, regarded as characterized by climate), as used by the Greeks, probably referred originally either to the supposed slope of the earth towards the pole, or to the inclination of the earth’s axis. It was an astronomical or a mathematical term, not associated with any idea of physical climate. A change of clima then meant a change of latitude. The latter was gradually seen to mean a change in atmospheric conditions as well as in length of day, and clima thus came to have its present meaning. ” Climate ” is the average condition of the atmosphere. ” Weather ” denotes a single occurrence, or event, in the series of conditions which make up climate. The climate of a place is thus in a sense its average weather. Climatology is the study or science of climates.

Relation of Meteorology and Climatology.— Meteorology and climatology are interdependent. It is impossible to distinguish sharply between them. In a strict sense, meteorology deals with the physics of the atmosphere. It considers the various atmo- spheric phenomena individually, and seeks to determine their physical causes and relations. Its view is largely theoretical. When meteorology (q.v.) is considered in its broadest meaning, climatology is a subdivision of it. Climatology is largely descriptive. It aims at giving a clear picture of the interaction of the various atmospheric phenomena at any place on the earth’s surface. Climatology may almost be defined as geographi- cal meteorology. Its main object is to be of practical service to man. Its method of treatment lays most, emphasis on the elements which are most important to life. Climate and crops, climate and industry, climate and health, are subjects of vital interest to man.

The Climatic Elements and their Treatment. — Climatology has

to deal with the same groups of atmospheric conditions as those with which meteorology is concerned, viz. temperature (including radiation) ; moisture (including humidity, precipitation and cloudiness}; wind (including storms); pressure; evaporation, and also, but of less importance, the composition and chemical, optical and electrical phenomena of the atmosphere. The characteristics of each of these so-called climatic elements are set forth in a standard series of numerical values, based on careful, systematic, and long-continued meteorological records, corrected and compared by well-known

methods. Various forms of graphic presentation are employed to emphasize and simplify the numerical results. In Hann's Handbuch der Klimatologie, vol i., will be found a general discussion of the methods of presenting the different climatic elements. The most complete guide in the numerical, mathematical and graphic treatment of meteorological data for climatological purposes is Hugo Meyer's Anleitung zur Bearbeitung meteorologischer Beobo-chtungen fiir die Klimato- logie (Berlin, 1891). '

Climate deals first of all with average conditions, but a satis- factory presentation of a climate must include more than mere averages. It must take account, also, of regular and irregular daily, monthly and annual changes, and of the departures, mean and extreme, from the average conditions which may occur at the same place in the course of time. The mean minimum and maximum temperatures or rainfalls of a month or a season are important data. Further, a determination of the frequency of occurrence of a given condition, or of certain values of that condition, is important, for periods of a day, month or year, as for example the frequency of winds according to direction or velocity; or of different amounts of cloudiness'; or of temperature changes of a certain number of degrees; the number of days with and without rain or snow in any month, or year, or with rain of a certain amount, &c. The probability of occurrence of any condition, as of rain in a certain month; or of a temperature of 3 2°, for example, is also a useful thing to know.

Solar Climate. — Climate, in so far as it is controlled solely by the amount of solar radiation which any place receives by reason of its latitude, is called solar climate. Solar climate alone would prevail if the earth had a homogeneous land surface, and if there were no atmosphere. For under these conditions, without air or ocean currents, the distribution of temperature at any place would depend solely on the arnount of energy received from the sun and upon the loss of heat by radiation. And these two factors would have the same value at all points on the same latitude circle.

The relative amounts of insolation received at different latitudes and at different times have been carefully determined. The values all refer to conditions at the upper limit of the earth's atmosphere, i.e. without the effect of absorption by the atmosphere. The accompanying figure (fig. 1), after Davis, shows the distribution of insolation in both hemispheres at different latitudes and at different times in the year. The lati- tudes are given at the left margin and the time of year at the right margin. The values of insolation are shown by the vertical distance above the plane of the two margins.

At the equator, where the day is always twelve hours long, there are two maxima of insolation at the equinoxes, when the sun is vertical at noon, and two minima at the solstices when the sun is farthest off the equator. The values do not vary much through the year because the sun is never very far from the zenith, and day and night are always equal. As latitude in- creases, the angle of insolation becomes more oblique and the intensity decreases, but at the same time the length of day rapidly increases during the summer, and towards the pole of the hemisphere which is having its summer the gain in insolation from the latter cause more than compensates for the loss by the former. The double period of insolation above noted for the equator prevails as far as about lat. 12° N. and S.; at lat. 15° the two maxima have united in one, and the same is true of the minima. At the pole there is one maximum at the summer solstice, and no insolation at all while the sun is below the horizon.

On the 21st of June the equator has a day twelve hours long, but the sun does not reach the zenith, and the amount of insola- tion is therefore less than at the equinox. On the northern tropic, however, the sun is vertical at noon, and the day is more than twelve hours long. Hence the amount of insolation re- ceived at this latitude i.3 greater than that received on the equinox at the equator. From the tropic to the pole the sun stands lower and lower at noon, ana the value of insolation would steadily decrease with latitude if it were not for the increase in the length of day. Going polewards from the northern tropic on the 21st of June, the value of insolation increases for a time, because, although the sun is lower, the number of hours during which it shines is greater. A maximum value is reached at about lat. 43° N. The decreasing altitude of the sun then more than compensates for the increasing length of day, and the value of insolation diminishes, a minimum being reached at about lat. 62 . Then the rapidly increasing length of day towards the pole again brings about an increase in the value of insolation, until a maximum is reached at the pole which is greater than the value received at the equator at any time. The length of day is the same on the Arctic circle as at the pole itself, but while the altitude of the sun varies during the day on the former, the altitude at the pole remains 23J throughout the 24 hours. The result is to

From Davis's Elementary Meteorology.

Fig. 1. — Distribution of Insolation over the Earth's Surface.

give the pole a maximum. On the 21st of June there are there- fore two maxima of insolation, one at lat. 435° and one at the north pole.

From lat. 43ˆ° N., insolation decreases to zero on the Antarctic circle, for sunshine falls more and more obliquely, and the day becomes shorter and shorter. Beyond lat. 665 S. the night lasts 24 hours. On the 21st of December the conditions in southern latitudes are similar to those in the northern hemi- sphere on the 21st of June, but the southern latitudes have higher values of insolation because the earth is then nearer the sun.

At the equinox the days are equal everywhere, but the noon sun is lower and lower with increasing latitude in both hemi- spheres until the rays are tangent to the earth's surface at the poles (except for the effect of refraction). Therefore, the values of insolation diminish from a maximum at the equator to a minimum at both poles.

The effect of the earth's atmosphere is to weaken the sun's rays. The more nearly vertical the sun, the less the thickness of atmosphere traversed by the rays. The values of insolation at the earth's surface, after passage through the atmosphere, have been calculated. They vary much with the condition of the an- as to dust, clouds, water vapour, &c. As a rule, even when the sky is clear, about one-half of the solar radiation is lost during the day by atmospheric absorption. The great weakening of insola- tion at the pole, where the sun is very low, is especially noticeable. The following table (after Angot) shows the effect of the earth's atmosphere (co-efficient of transmission 0-7) upon the value of • insolation received at sea-level.

Values of Daily Insolation at the Upper Limit of the Earth's Atmosphere and

at Sea-Level.

Lat.

Upper Limit of Atmosphere.

Earth's Surface.

Equator.

40°.

N.Pole.

Equator.

40°.

N. Pole.

Winter solstice . Equinoxes Summer solstice

948 1000

888

360 773 1

i”5

1210

552 612 517

124 411 660

494

The following table gives, according to W. Zenker, the relative thickness of the atmosphere at different altitudes of the sun, and also the amount of transmitted insolation: — •

fact, in the higher latitudes, the former sometimes follow the meridians more closely than they do the parallels of latitude. Hence it has been suggested that the zones be limited by isotherms rather than by parallels of latitude, and that a closer approach be thus made to the actual conditions of climate. Supan 1 (see fig. 2) has suggested limiting the hot belt, which corresponds to, but is slightly greater than, the old torrid zone, by the two mean annual isotherms of 68° — a temperature which approximately coincides with the polar limit of the trade-winds and with the polar limit of palms. The hot belt widens somewhat over the

Relative Distances traversed by Solar Rays through the Atmosphere, and Intensities of Radiation per Unit Areas.

Altitude of sun

Relative lengths of path through the atmosphere

Intensity of radiation on a surface nor- mal to the rays . . .

Intensity of radiation on a horizontal surface

0°

5°

10°

20°

30°

40 =

50°

60 °

70°

80°

90°

447

io-8

5-7

2-92

2-00

1-56

i-3i

i-i5

i-o6

1-02

I-OO

o-o

0-15

031

0-51

0-62

o-68

0-72

o-75

0-76

0-77

0-78

0-0

O-OI

0-05

0-17

0-31

0-44

o-55

0-65

0-72

0-76

078

Physical Climate. — The distribution of insolation explains many of the large facts of temperature distribution, for example, the decrease of temperature from equator to poles; the double maximum of temperature on and near the equator; the increas- ing seasonal contrasts with increasing latitude, &c. But the regular distribution of solar climate between equator and poles which would exist on a

homogeneous earth, whereby similar conditions prevail along each latitude circle, is very much modified by the unequal distribution of land and water; by differences of altitude; by air and ocean currents, by varying conditions of cloudiness, and so on. Hence the climates met with along the same latitude circle are no longer alike. Solar climate is greatly modified by atmospheric conditions and by the surface features of the earth. The uniform arrangement of solar climatic belts, arranged latitudinally, is interfered with, and what is known as physical climate results. According to the dominant control we have solar, continental and marine, and mountain climates. In the first-named, latitude is the essential; in the second and third, the influence of land or water; in the fourth, the effect of altitude.

Classification of the Zones by Latitude Circles. — It is customary to classify climates roughly into certain broad belts. These are the climatic zones. The five zones with which we are most familiar are the so-called torrid, the two temperate, and the two frigid zones. The torrid, or better, the tropical zone, naming it by its boundaries, is limited on the north and south by the two tropics of Cancer and Capricorn, the equator dividing the zone into two equal parts. The temperate zones are limited towards the equator by the tropics, and towards the poles by the Arctic and Antarctic circles. The two polar zones are caps covering both polar regions, and bounded on the side towards the equator by the Arctic and Antarctic circles.

These five zones are classified on purely astronomical grounds. They are really zones of solar climate. The tropical zone has the least annual variation of insolation. It has the maximum annual amount of insolation. Its annual range of temperature is very slight. It is the summer zone. Beyond the tropics the contrasts between the seasons rapidly become more marked. The polar zones have the greatest variation in insolation between summer and winter. They also have the minimum amount of insolation for the whole year. They may well be called the winter zones, for their summer is so short and cool that the heat is insufficient for most forms of vegetation, especially for trees. The temperate zones are intermediate between the tropical and the polar in the matter of annual amount and of annual variation of insolation. Temperate conditions do not characterize these zones as a whole. They are rather the seasonal belts of the world.

Temperature Zones. — The classification of the zones on the basis of the distribution of sunshine serves very well for purposes of simple description, but a glance at any isothermal chart shows that the isotherms do not coincide with the latitude lines. In

continents, chiefly because of the mobility of the ocean waters, whereby there is a tendency towards an equalization of the temperature between equator and poles in the oceans, while the stable lands acquire a temperature suitable to their own latitude. Furthermore, the unsymmetrical distribution of land in the low latitudes of the northern and southern hemispheres results in an unsymmetrical position of the hot belt with reference to the equator, the belt extending farther north than south of the equator. The polar limits of the temperate zones are fixed by the isotherm of 50 for the warmest month. Summer heat is more important for vegetation than winter cold, and where the warmest month has a temperature below 50 , cereals and forest trees do not grow, and man has to adjust himself to the peculiar climatic conditions in a very special way. The two polar caps are not symmetrical as

From Grundziige der physischen Erdkunde, by permission of Veit & Co. ‘

Fig. 2. — Supan’s Temperature Zones.

regards the latitudes which they occupy. The presence of extended land masses in the high northern latitudes carries the temperature of 50° in the warmest month farther poleward there than is the case in the corresponding latitudes occupied by the oceans of the southern hemisphere, which warm less easily and are constantly in motion. Henqe the southern cold cap, which has its equatorial limits at about lat. 50° S., is of much greater extent than the northern polar cap. The northern temperate belt, in which the great land areas lie, is much broader than the southern, especially over the continents. These temperature zones emphasize the natural conditions of climate more than is the case in any subdivision by latitude circles, and they bear a fairly close resemblance to the old zonal classification of the Greeks.

Classification of the Zones by Wind Belts. — The heat zones however, emphasize the temperature to the exclusion of such

1 A. Supan, Grundziige der physischen Erdkunde (Leipzig, 1896), 88-89. Also Atlas of Meteorology, PI. 1.

important elements as wind and rainfall. • So distinctive are the larger climatic features of the great wind belts of the world, that a classification of climates according to wind systems has been

suggested. 1 As the rain-belts of the world are closely associated with these wind systems, a classification of the zones by winds also emphasizes the conditions of rainfall. In such a scheme the tropical zone is bounded on the north and south by the margins of the trade-wind belts, and is therefore larger than the classic torrid zone. This trade-wind zone is somewhat wider on the eastern side of the oceans, and properly includes within its limits the equable marine climates of the eastern margins of the ocean basins, even as far north as latitude 30 or 35°. Most of the eastern coasts of China and of the United States are thus left in the more rigorous and more variable conditions of the north temperate zone. Through the middle of the trade-wind zone extends the sub-equatorial belt, with its migrating cairns, rains and monsoons. On the polar margins of the trade-wind zone lie the sub-tropical belts, of alternating trades and westerlies. The temperate zones embrace the latitudes of the stormy westerly winds, having on their equator- ward margins the subtropical belts, and being somewhat narrower than the classic temperate zones. Towards the poles there is no obvious limit to the temperate zones, for the prevailing westerlies extend beyond the polar circles. These circles may, however, serve fairly well as boundaries, because of their import- ance from the point of view of insolation. The polar zones in the wind classification, therefore, remain just as in the older scheme.

Need of a Classification of Climates. — A broad division of the earth's surface into zones is necessary as a first step in any systematic study of climate, but it is not satisfactory when a more detailed discussion is undertaken. The reaction of the physical features of the earth's surface upon the atmosphere complicates the climatic conditions found in each of the zones, and makes further subdivision desirable. The usual method is to separate the continental (near sea-level) and the marine. An extreme variety of the continental is the desert; a modified form, the littoral; while altitude is so important a control that mountain and plateau climates are always grouped by themselves.

Marine or Oceanic Climate. — Land and water differ greatly in their behaviour regarding absorption and radiation. The former warms and cools readily, and to a considerable degree; the latter, slowly and but little. The slow changes in tempera- ture of the ocean waters involve a retardation in the times of occurrence of the maxima and minima, and a marine climate, therefore, has a cool spring and a warm autumn, the seasonal changes being but slight. Characteristic, also, of marine climates is a prevailingly higher relative humidity, a larger amount of cloudiness, and a heavier rainfall than is found over continental interiors. All of these features have their explanation in the abundant evaporation from the ocean surfaces. In the middle latitudes the

oceans have distinctly rainy winters, while over the continental interiors the colder months have a minimum of precipitation. Ocean air is cleaner and purer than land air, and is generally in more active motion.

Continental Climate.- — Continental climate is severe. The annual temperature ranges increase, as a whole, with increasing distance from the oceans. The coldest and warmest months are usually January and July, the times of maximum and minimum temperatures being less retarded than in the case of marine climates. The greater seasonal contrasts in temperature over the continents than over the oceans are furthered by the less cloudiness over the former. Diurnal and annual changes of nearly all the elements of climate are greater over continents than over oceans; and this holds true of irregular as well as of regular variations. Fig. 3 illustrates the annual march of temperature in marine and continental climates. Bagdad, in Asia Minor (Bd.), and Funchal on the island of Madeira (M.) are representative continental and marine stations for a low latitude. Nerchinsk in eastern Siberia (N.) and Valentia in south-western Ireland (V.) are good examples of continental

1 W.M.Davis, Elementary Meteorology (Boston, 1894), pp. 334-335.

and marine climates of higher latitudes in the northern hemi- sphere. The data for these and the following curves were taken from Hann's Lehrbuch der Meteorologie (1901).

Owing to the distance from the chief source of supply of water vapour — the oceans — the air over the larger land areas is naturally drier and dustier than that over the oceans. Yet even in the arid continental interiors in summer the absolute vapour content is surprisingly large, and in the hottest months the percentages of relative humidity may reach 20 % or 30 %. At the low temperatures which prevail in the winter of the higher latitudes the absolute humidity is very low, but, owing to the cold, the air is often damp. Cloudiness, as a rule, decreases inland, and with this lower relative humidity, more abundant sunshine and higher temperature, the evaporating power of a continental climate is much greater than that of the more humid,

J. F. M. A. M. J. J. A. S. 0. N. 0. J.

~~ 'a

30°

20O

50°

IQO

cloudier and cooler marine climate. Both amount and frequency of rainfall, as a rule, decrease ~ inland, but the con- ditions are very largely controlled by local topography 68° and by the prevail- ing winds. Winds average somewhat lower in velocity, and calms are more frequent, over con- tinents than over £0 oceans. The seasonal changes of pressure over the former give rise to systems of inflowing and out- flowing, so-called continental, winds, 40 sometimes so well developed as to be come true monsoons. The extreme tem- perature changes which occur over the continents are the more easily borne •>■ f M – A – M – J – J – A – s – °- N – D – J – because of the dry- F” IG – 3- — Annual March of Air Temperature, ness of the air; be- Influ f ce „ of J L ˆ nd and Wa *f ; 7 (ˆ”. Angot ‘) cause the minimum

140

•22°

Bd

N

M

M

M

Bd

y

J

/

V

Bd

__*

1

V

\

1

\

1

/

\

\

/

\

/

\

N

\

N

00

-100

-20°

-30°

M, Madeira.

V, Valentia. . Bd, Bagdad. N, Nerchinsk,

temperatures of

winter occur when there is little or no wind, and because during the warmer hours of the summer there is the most air- movement. .

Desert Climate. — An extreme type of continental climate is found in

deserts. Desert air is notably free from micro- organisms. The large diurnal temperature ranges of inland regions, which are most marked where there is little or no vegetation, give rise to active convectional currents during the warmer hours of the day. Hence high winds are common by day, while the nights are apt to be calm and relatively cool. Travelling by day is unpleasant under such conditions. Diurnal cumulus clouds, often absent because of the excessive dryness of the air, are replaced by clouds of blowing dust and sand. Many geological phenomena, and special physiographic types of varied kinds, are associated with the peculiar conditions of desert climate. The excessive diurnal ranges of temperature cause rocks to split and break up. Wind-driven sand erodes and polishes the rocks. When the separate fragments become small enough they, in their turn, are transported by the winds and further eroded by friction during their journey. Curious conditions of drainage result from the deficiency in rainfall. Rivers ” wither ” away, or end in sinks or brackish lakes.

CLIMATE

Plate I.

J2.

, _ fl _ n >3 r ct-‘C_ Circle ˆ ^^B

MEAN ANNUAL TEMPERATURE-

Temperature in degrees Fahrenneit and Centigrade

I T”

J !

J I I L.

Antarctic” -Circle:

fg?- -;.’;.’ MEAN ANNUAL PRESSURE :.■_

- .- •*. ..•—.- Pressure in inches and millimetres i-.~_% _

—!.—~’-? r ‘*r ;

1 1 r

t rˆ T I r

-i 1 r

n. S n.

ANNUAL DISTRIBUTION OF TEMPERATURE AND PRESSURE.

Plate II.

CLIMATE

CLIMATE AND CLIMATOLOGY

5i3

Desert plants protect themselves against the attacks of animals by means of thorns, and against evaporation by means of hard Surfaces and by a diminished leaf surface. The life of man in the desert is likewise strikingly controlled by the climatic peculiarities of strong sunshine, of heat, and of dust.

Coast or Littoral Climate.— Between the pure marine and the pure continental types the coasts furnish almost every grade of transition. Prevailing winds are here important controls. When these blow from the ocean, the climates are marine in character, but when they are off-shore, a somewhat modified type of con- tinental climate prevails, even up to the immediate sea-coast. Hence the former have a smaller range of temperature; their summers are more moderate and their winters milder; extreme temperatures are rare; the air is damp, and there is much cloud. All these marine features diminish with increasing distance from the ocean, especially when there are mountain ranges near the coast. In the tropics, windward coasts are usually well supplied with rainfall, and the temperatures are modified by sea breezes. Leeward coasts in the trade-wind belts 6ffer special conditions. Here the deserts often reach the sea, as on the western coasts of South America, Africa and Australia. Cold ocean currents, with prevailing winds along-shore rather than on-shore, are here hostile to rainfall, although the lower air is often damp, and fog and cloud are not uncommon.

Monsoon Climate. — Exceptions to the general rule of rainier eastern coasts in trade-wind latitudes are found in the monsoon regions, as in India, for example, where the Western coast of the peninsula is abundantly watered by the wet south-west monsoon. As monsoons often sweep over large districts, not only coast but interior, a separate group of monsoon climates is desirable. In India there are really three seasons — one cold, during the winter monsoon; one hot, in the

transition season; and one wet, during the summer monsoon. Little precipitation occurs in winter, and that chiefly in the northern provinces. In low latitudes, monsoon and non-monsoon climates differ but little, for summer monsoons and regular trade-winds may both give rains, and wind direction has slight effect upon temperature.

The winter monsoon is off-shore and the summer monseon on-shore under typical conditions, as in India. But exceptional cases are found where the opposite is true. In higher latitudes the seasonal changes of the winds, although not truly monsoonal, involve differences in temperature and in other climatic elements. The only well-developed monsoons on the coast of the continents of higher latitudes are those of eastern Asia. These are off-shore during the winter, giving dry, clear and cold weather; while the on-shore movement in summer gives cool, damp and cloudy weather.

Mountain and Plateau Climate. — Both by reason of their actual height and because of their obstructive effects, mountains influence climate similarly in all the zones. Mountains as con- trasted with lowlands are characterized by a decrease in pressure, temperature and absolute humidity; an increased intensity of insolation and radiation; usually a greater frequency of, and up to a certain altitude more, precipitation. At an altitude of 16,000 ft., more or less, pressure is reduced to about one-half of its sea-level value. The highest human habitations are found under these conditions. On high mountains and plateaus the pressure is lower in winter than in summer, owing to the fact that the atmosphere is compressed to lower levels in the winter and is expanded upwards in summer.

The intensity of insolation and of radiation both increase aloft in the cleaner, purer, drier and thinner air of mountain climates. The great intensity of the sun's rays attracts the attention of mountain-climbers at great altitudes. The vertical decrease of temperature, which is also much affected by local conditions, is especially rapid during the warmer months and hours; mountains are then cooler than lowlands. The inversions of temperature characteristic of the colder months, and of the night, give mountains the advantage of a higher temperature then — a fact of importance in connexion with the use of mountains as winter resorts. At such times the cold air flows down the mountain sides and collects in the valleys below, being replaced vi. 17

by warmer air aloft. Hence diurnal and annual ranges of temperature on the mountain tops of middle and higher latitudes are lessened, and the climate in this respect resembles a marine condition. The times of occurrence of the maximum and minimum temperature are also much

influenced by local condi- tions. Elevated enclosed valleys, with strong sunshine, often resemble continental conditions of large temperature range, and plateaus, as compared with mountains at the same altitude, have relatively higher temperatures and larger temperature ranges. Altitude tempers the heat of the low latitudes. High mountain peaks, even on the equator, can remain snow-covered all the year round.

No general law governs the variations of relative humidity with altitude, but on the mountains of Europe the winter is the driest season, and the summer the dampest. At well-exposed stations there is a rapid increase in the vapour content soon after noon, especially in summer. The same is true of cloudiness, which is often greater on mountains than at lower levels, and is usually at a maximum in summer, while the opposite is true of the lowlands in the temperate latitudes. One of the great advantages of the higher Alpine valleys in winter is their small amount of cloud. This, combined with their low wind velocity and strong insolation, makes them desirable winter health resorts. Latitude, altitude, topography and winds are the determining factors in controlling the cloudiness on mountains. In the rare, often dry, air of mountains and plateaus evaporation is rapid, the skin dries and cracks, and thirst is increased.

Rainfall usually increases with increasing altitude up to a certain point, beyond which, owing to the loss of water vapour, this increase stops. The zone of maximum rainfall averages about 6000 to 7000 ft. in altitude, more or less, in intermediate latitudes, being lower in winter and higher in summer. Mountains usually have a rainy and a drier side; the contrast between the two is greatest when a prevailing damp wind crosses the moun- tain, or when one slope faces seaward and the other landward. Mountains often provoke rainfall, and local ” islands,” or better, ” lakes,” of heavier precipitation result.

Mountains resemble marine climates in having higher wind velocities than continental lowlands. Mountain summits have a nocturnal maximum of wind velocity, while plateaus usually have a diurnal maximum. Mountains both modify the general, and give rise to local winds. Among the latter the well-known mountain and valley winds are often of considerable hygienic importance in their control of the diurnal period of humidity, cloudiness and rainfall, the ascending wind of daytime tending to give clouds and rain aloft, while the opposite conditions prevail at night.

Supan’s Climatic Provinces. — The broad classification of climates into the three general groups of marine, continental and mountain, with the subordinate divisions of desert, littoral and monsoon, is

convenient for purposes of summarizing the interaction of the climatic elements under the controls of land, water and altitude. But in any detailed study some scheme of classification is needed in which similar climates in different parts of the world are grouped together, and in which their geographic distribution receives particular consideration. An almost infinite number of classifications might be proposed; or we may take as the basis of subdivision either the special conditions of one climatic element, or similar conditions of a combination of two or more elements. Or we may take a botanical or a zoological basis. Of the various classifications which have been suggested, that of Supan gives a very rational, 1 simple and satisfactory scheme of grouping. In this scheme there are thirty-five so-called climatic provinces. 1 It emphasizes the essentials of each climate, and serves to impress these essentials upon the mind by means of a compact, well-considered verbal summary in the case of each province described. Obviously, no classification of climates which is at all complete can approach the simplicity of the ordinary classification of the zones.

1 A. Supan, Grundziige der physischen Erdkunde (3rd ed., Leipzig, 1903)1 PP- 211-214. Also Atlas of Meteorology, Pl.i.

The Characteristics of the Torrid Zone.

General: Climate and Weather. — The dominant characteristic of the torrid zone is the simplicity and uniformity of its climatic features. The tropics lack the proverbial uncertainty and changeableness of the weather of higher latitudes. Weather and climate are essentially synonymous terms. Periodic phenomena, depending upon the daily and annual march of the sun, are dominant. Non-periodic weather changes are wholly subordinate. In special regions only, and at special seasons, is the regular sequence of weather temporarily interrupted by an occasional tropical cyclone. These cyclones, although comparatively in- frequent, are notable features of the climate of the areas in which they occur, generally bringing very heavy rains. The devastation produced by one of these storms often affects the economic condition of the people in the district of its occurrence for many years.

Temperature. — The mean temperature is high, and very uniform over the whole zone. There is little variation during the year. The mean annual isotherm of 68° is a rational limit at the polar margins of the zone, and the mean annual isotherm of 8o° encloses the greater portion of the land areas, as well as much of the tropical oceans. The warmest latitude circle for the year is not the equator, but latitude io° N. The highest mean annual temperatures, shown by the isotherm of 85 , are in Central Africa, in India, the north of Australia and Central America, but, with the exception of the first, these areas are small. The tempera- tures average highest where there is little rain. In June, July and August there are large districts in the south of Asia and north of Africa with temperatures over 90°.

Over nearly all of the zone the mean annual range of tempera- ture is less than 10°, and over much of it, especially on the oceans, it is less than 5 . Even near the margins of the zone the ranges are less than 25 , as at Calcutta, Hong-Kong, Rio de Janeiro and Khartum. The mean daily range is usually larger than the mean annual. It has been well said that ” night is the winter of the tropics.” Over an area covering parts of the Pacific and Indian Oceans from Arabia to the Caroline Islands and from Zanzibar to New Guinea, as well as on the Guiana coast, the minimum temperatures do not normally fall below 68°. Towards the margins of the zone, however, the minima on the continents fall to or even below 32°. Maxima of 115° and even over 120 occur over the deserts of northern Africa. A district where the mean maxima exceed 113 extends from the western Sahara to north-western India, and over Central Australia. Near the equator the maxima are therefore not as high as those in many so-called ” temperate ” climates. The tropical oceans show remarkably small variations in temperature. The ” Challenger ” results on the equator showed a daily range of hardly 0.7 in the surface water temperature, and P. G. Schott determined the annual range as 4-1° on the equator, 4-3° at latitude io°, and 6-5° at latitude 20°.

The Seasons. — In a true tropical climate the seasons are not classified according to temperature, but depend on rainfall and the prevailing winds. The life of animals and plants in the tropics, and of man himself, is regulated very largely, in some cases almost wholly, by rainfall. Although the tropical rainy season is characteristically associated with a vertical sun, that season is not necessarily the hottest time of the year. It often goes by the name of winter for this reason. Towards the margins of the zone, with increasing annual ranges of temperature, seasons in the extra-tropical sense gradually appear.

Physiological Effects of Heat and Humidity. — Tropical heat is associated with high relative humidity except over deserts and in dry seasons. The air is therefore muggy and oppressive. The high temperatures are disagreeable and hard to bear. The ” hot-house air ” has an enervating effect. Energetic physical and mental action are often difficult or even impossible. The tonic effect of a cold winter is lacking. The most humid districts in the tropics are the least desirable for persons from higher latitudes; the driest are the healthiest. The most energetic natives are the desert-dwellers. The monotonously enervating

heat of the humid tropics makes man sensitive to slight: tempera- ture changes. The intensity of direct insolation, as well as of radiation from the earth’s surface, may produce heat prostration and sunstroke. ” Beware of the sun ” is a good rule in the tropics.

Pressure. — -The uniform temperature distribution in the tropics involves uniform pressure distribution. Pressure gradients are weak. The annual fluctuations are slight, even on the continents. The diurnal variation of the barometer is so regular and so marked that, as von Humboldt said, the time of day can be told within about twenty minutes if the reading of the barometer be known.

Winds and Rainfall. — Along the barometric equator, where the pressure gradients are weakest, is the equatorial belt of calms, variable winds and rains — the doldrums. This belt offers exceptionally favourable conditions for abundant rainfall, and is one of the rainiest regions of the world, averaging probably about 100 in. Here the sky is prevailingly cloudy; the air is hot and oppressive; heavy showers and thunderstorms are frequent, chiefly in the afternoon and evening. Here are the dense tropical forests of the Amazon and of equatorial Africa. This belt of calms and rains shifts north and south of the equator after the sun. In striking contrast are the easterly trade winds, blowing between the tropical high pressure belts and the equatorial belt of low pressure. Of great regularity, and contributing largely to the uniformity of tropical climates, the trades have long been favourite sailing routes because of the steadiness of the wind, the infrequency of storms, the brightness of the skies and the fresh- ness of the air. The trades are subject to many variations. Their northern and southern margins shift north and south after the sun; at certain seasons they are interrupted, often over wide areas near their equatorward margins, by the migrating belt of equatorial rains and by monsoons; near lands they are often interfered with by land and sea breezes: in certain regions they are invaded by violent cyclonic storms. The trades, except where they blow on to windward

coasts or over mountains, are drying winds. They cause the deserts of northern Africa and of the adjacent portions of Asia; of Australia, South Africa and southern South America. The monsoons on the southern and eastern coasts of Asia are the best known winds of their class. In the northern summer the south-west monsoon, warm and sultry, blows over the latitudes from about io° N. to and beyond the northern tropic, between Africa and the Philippines, giving rains over India, the East Indian archipelago and the eastern coasts of China. In winter, the north-east monsoon, the normal cold-season outflow from Asia combined with the north-east trade, and generally cool and dry, covers the same district, extending as far north as latitude 30 . Crossing the equator, these winds reach northern Australia and the western islands of the South Pacific as a north-west rainy monsoon, while this region in the opposite season has the normal south-east trade. Other monsoons are found in the Gulf of Guinea and in equatorial Africa. Wherever they occur, they control the seasonal changes.

Tropical rains are in the main summer rains, coming when the normal trade gives way to the equatorial belt of rains, or when the summer monsoon sets in. There are, however, many cases of a rainy season when the sun is low, expecially on windward coasts in the trades. Tropical rains come usually in the form of heavy downpours and with a well-marked diurnal period, the maximum varying with the locality between noon and midnight. Local influences are, however, very important, and in many places night rainfall maxima are found.

Land and Sea Breezes, — The sea breeze is an important climatic feature on many tropical coasts. With its regular occurrence, and its cool, clean air, it serves to make many districts habitable for white settlers, and has deservedly won the name of ” the doctor.” On not a few coasts, the sea breeze is a true prevailing wind. The location of dwellings is often deter- mined by the exposure of a site to the sea breeze.

Thunderstorms. — Local thunderstorms are frequent in the humid portions of the tropics. They have a marked diurnal periodicity, find their best opportunity in the equatorial belt

of’ ‘weak pressure gradients and high temperature, and are commonly associated with the rainy season, being most common at the beginning

and end of the regular rains. In many places, thunderstorms occur daily throughout their season, with extra- ordinary regularity and great intensity.

Cloudiness. — Taken as a whole, the tropics are not favoured with such clear skies as is often supposed. Cloudiness varies about as does the rainfall. The maximum is in the equatorial belt of calms and rains, where the sky is always more or less cloudy. The minimum is in the trade latitudes, where fair skies as a whole prevail. The equatorial cloud belt moves north and south after the sun. Wholly clear days are very rare in the tropics generally, especially near the equator, and during the rainy season heavy clouds usually cover the sky. Wholly overcast, dull days, such as are common in the winter of the temperate zone, occur frequently only on tropical coasts in the vicinity of cold ocean currents, as on the coast of Peru and on parts of the west coast of Africa.

Intensity of Sky-Light and Twilight. -'The light from tropical skies by day is trying, and the intense insolation, together with the reflection from the ground, increases the general dazzling glare under a tropical sun. During much of the time smoke from forest and prairie fires (in the dry season), dust (in deserts), and water vapour give the sky a pale whitish appearance. In the heart of the trade-wind belts at sea the sky is of a deeper blue. Twilight within the tropics is shorter than: in higher latitudes, but the coming on of night is less sudden than is gener- ally assumed.

Climatic Subdivisions. — The rational basis for a classification of the larger climatic provinces of the torrid zone is found in the general wind systems, and in their control over rainfall. Follow- ing this scheme there are: (1) the equatorial belt; (2) the trade- wind belts; (3) the monsoon belts. In each of these sub- divisions there are modifications due to marine and continental influences. In general, both seasonal and diurnal phenomena are more marked in continental interiors than on the oceans, islands and windward coasts. Further, the effect of altitude is so important that another group should be added to include (4) mountain climates.

1 . The Equatorial Belt. — Within a few degrees of the equator, and when not interfered with by other controls, the annual curve

of temperature has two maxima follow- ing the two zenithal positions of the sun, and two minima at about the time of the solstices. This equatorial type of annual march of temperature is illus- trated in the three curves for theinteridr of Africa, Batavia and Jaluit (fig. 4). The

greatest range is shown in the curve for the interior of Africa; the curve for B at avia illust rates in- sular conditions with less range, and the oceanic type for Jaluit, Marshall Islands, gives the least range. This double maximum is not a universal phenomenon, there being many cases where but a single maximum occurs.

As the belt of rains swings back and forth across the equator after the sun, there should be two rainy seasons with the sun vertical, and two dry seasons when the sun is farthest from the zenith, and while the trades blow. These conditions prevail on the equator, and as far north and south of the equator (about ib -i2°) as sufficient time elapses between the two zenithal positions of the sun for the two rainy seasons to be distinguished

70 < *

Fig. 4. — Annual march of temperature: equatorial type. A, Africa, interior; B, Batavia; J, Jaluit, Marshall Islands.

p.n

/

/

H.

from one another. In this belt, under normal conditions, there is therefore no dry season of any considerable duration. The double rainy season is clearly seen in equatorial Africa and in parts of equatorial South America. The maxima lag somewhat behind the vertical sun, coming in April and November, and are un- symmetrically developed, the first maximum being the principal one. The minima are also unsymmetrically developed, and the so-called ” dry seasons ” are seldom wholly rainless. This rainfall type with double maxima and minima has been called the equatorial type, and is illustrated in the following curves for

South Africa and Quito (fig. 5). The monthly rainfalls are given

in thousandths of the .-»««.. . .. rAUn •

„„„„,i rˆo*, on,., ,„.„„„ J. F. M. A. M. J. J. A. S. 0. N. 0. J.

annual mean. ineioooTHS

mean annual rainfall 250 at Quito is 42-12 in. Thesedouble rainy and dry seasons are easily modified by other con- ditions, as by the mon- soons of the Indo- Australian area, so that there is no rigid. belt of equatorial rains extending around the world. In South America, east of the Andes, the distinction between rainy and dry seasons is often much confused. In this equa- torial belt the cloudi- ness is high through- out the year, averaging •7 to 8, with a rela tively small annual period. The curve fol- lowing, E (fig. 6), is fairly typical, but the annual period varies greatly under local controls.

At greater distances from the equator than about io° or 12 the sun is still vertical twice a year within the tropics, but the

M

Q.

S.A

V

200 150 100 50

ISO

100 50

200 150

fOO

50

200

150

100

50

200 150 100 50

200 150 100 : 50

° J. F. M. A. M. J. “J. A. S. Q. N. D. J.

Fig. 5. — Annual march of rainfall in the tropics.

S.A, South Africa. M, Mexico.

Q, Quito. H, Hilo.

S.P, Sao Paulo. P.D, Port Darwin.

A

interval between these two dates is so short that the two rainy seasons merge into one, in summer, and there, is also but one dry season, in winter. This is the so-called tropical type of rainfall, and is found where the: trade belts are encroached upon by the equatorial rains during the migration of these rains into each hemisphere. It is illustrated in the curves for Sao Paulo, Brazil, and for the city of

Mexico (fig. 5). The – -•»■ F – M -ˆ M – J – J – A – s. mean annual rainfall at Sao Paulo is 54-13 in. and at Mexico 22-99 i n – The districts of tropical rains of this type lie along the equatorial margins of the torrid zone, outside of the lati- tudes of the equatorial type of rainfall. The rainy season becomes

E

E

1

V

V

>

ˆ

M

A

\

M

Fig. 6. — Annual march of cloudiness in the tropics. E, Equatorial type; M, Monsoon type.

shorter with increasing distance from the equator. The weather of the opposite seasons is strongly contrasted. The single dry season lasts longer than either dry season in the equatorial belt, reaching eight months in typical cases, with the wet season lasting four months. The lowlands often become dry and parched during the long dry trade-wind season (winter)

5-i6

CLIMATE AND CLIMATOLOGY

and vegetation withers away, while grass and flowers grow in great abundance and all life takes on new activity during the time when the equatorial rainy belt with its calms, variable winds and heavy rains is over them (summer). The Sudan lies between the Sahara and the equatorial forests of Africa. It receives rains, and its vegetation grows actively, when the doldrum belt is north of the equator (May- August). But when the trades blow (December-March) the ground is parched and dusty. The Venezuelan llanos have a dry season in the northern winter, when the trade blows. The rains come in May-October. The compos of Brazil, south of the equator, have their rains in October-April, and are dry the remainder of- ..„„„.„„ the year. The Nile

I00- . J ‘, F, , M ; ■ ■ ■ i ■ , . ■ ■ J -, 100”— fl — “suits

from the rainfall on

the mountains of Abyssinia during the northward mi- gration of the belt of equatorial rains. The so-called 9™ tropical type of temperature varia- tion, with one maxi- mum and one mini- mum, is illustrated in the accompany- ing curves for Wadi 80° Haifa, in upper Egypt ; Alice Springs, Australia; Nagpur, India; Honolulu, Hawaii; and Jamestown, St Helena (fig. 7). The , effect of the rainy season is often shown in a dis- placement of the time of maximum temperature to an earlier month than the usual one. 60° 2. Trade -Wind Belts. — The trade belts near sea-level are characterized by fair weather, steady winds, infrequent light rains or even 5qq an almost complete J. F. M. A. M. J.

J. A. S. 0. N. D. J. absence of rain, Fig. 7. — Annual march of temperature: very regular, al- tropical type. W, Wadi Haifa; A, Alice though slight Springs; H Honolulu; J, Jamestown, St annua l and diurnal Helena; JN, Nagpur. , .

ranges of tempera- ture, and a constancy and regularity of weather. The climate of the ocean areas in the trade- wind belts is indeed the simplest and most equable in the world, the greatest extremes over these oceans being found to leeward of the larger lands. On the lowlands swept over by the trades, beyond the polar limits of the equatorial rain belt (roughly between lats. 20 and 30), are most of the great deserts of the world. These deserts extend directly to the water's edge on the leeward western coasts of Australia, South Africa and South America.

The ranges and extremes of temperature are much greater over the continental interiors than over the oceans of the trade- wind belts. Minima of 32° or less occur during clear, quiet nights, and daily ranges of over 50 are common. The mid- summer mean temperature rises above 90 , with noon maxima of 110 or more in the non-cloudy, dry air of a desert day. The days, with high, dry winds, carrying dust and sand, with extreme

70°

SO 01

heat, accentuated by the absence of vegetation, are disagreeable, but the calmer nights, with active radiation under clear skies, are much more comfortable. The nocturnal temperatures are even not seldom too low for comfort in the cooler season, when thin sheets of ice may form.

While the trades are drying winds as long as they blow strongly over the oceans, or over lowlands, they readily become rainy if they are cooled by ascent over a mountain or highland. Hence the windward (eastern) sides of mountains or bold coasts in the trade-wind belts are well watered, while the leeward sides, or interiors, are dry. Mountainous islands in the trades, like the Hawaiian islands, many of the East and West Indies, the Philippines, Borneo, Ceylon, Madagascar, Teneriffe, &c, shew marked differences of this sort. The eastern coasts of Guiana, Central America, south-eastern Brazil, south-eastern Africa, and eastern Australia are well watered, while the interiors are dry. The eastern highland of Australia constitutes a more effective barrier than that in South Africa; hence the Australian

interior has a more extended desert. South America in the south-east trade belt is not well enclosed on the east, and the most arid portion is an interior district close to the eastern base of the Andes where the land is low. Even far inland the Andes again provoke precipitation along their eastern base, and the narrow Pacific coastal strip, to leeward of the Andes, is a very pronounced desert from near the equator to about lat. 30 S. The cold ocean waters, with prevailing southerly (drying) winds alongshore, are additional factors causing this aridity. Highlands in the trade belts are therefore moist on their windward slopes, and become oases of luxuriant plant growth, while close at hand, on the leeward sides, dry savannas or deserts may be found. The damp, rainy and forested windward side of Central America was from the earliest days of European occupation left to the natives, while the centre of civilization was naturally established on the more open and sunny south-western side.

The rainfall associated with the conditions just described is known as the trade type. These rains have a maximum in winter, when the trades are most active. In cases where the trade blows steadily throughout the year against mountains cr bold coasts, as on the Atlantic coast of Central America, there is no real dry season. The curve for Hilo (mean annual rainfall 145-24 in.) on the windward side of the Hawaiian Islands, shows typical conditions (see fig. 5). The trade type of rainfall is often much complicated by the combination with it of the tropical type and of the monsoon type. In the Malay archipelago there are also complications of equatorial and trade rains; likewise in the West Indies.

3. Monsoon Belts. — In a typical monsoon region the rains follow the vertical sun, and therefore have a simple annual period much like that of the tropical type above described. This monsoon type of rainfall is well illustrated in the curve for Port Darwin (mean annual rainfall 62-72 in.), in Australia (see fig. 5). This summer monsoon rainfall results from the inflow of a body of warm, moist air from the sea upon a land area; there is a consequent retardation of the velocity of the air currents, as the result of friction, and an ascent of the air, the rainfall being particularly heavy where the winds have to climb over high lands. In India, the precipitation is heaviest at the head of the Bay of Bengal (where Cherrapunji, at the height of 445 S ft. in the Khasi Hills, has a mean annual rainfall of between 400 and 509 in.), along the southern base of the Hima- layas (60 to 160 in.), on the bold western coast of the peninsula (80 to 120 in. and over), and on the mountains of Burma, (up to 160 in.). In the rain-shadow of the Western Ghats, the Deccan often suffers from drought and famine unless the monsoon rains are abundant and well distributed. The

prevailing direc- tion of the rainy monsoon wind in India is south-west; on the Pacific coast of Asia, it is south-east. This monsoon district is very large, including the Indian Ocean, Arabian Sea, Bay of Bengal, and adjoining continental areas; the Pacific coast of China, the Yellow and , Japan seas, and numerous islands from Borneo to Sakhalin on the north and to the Ladrorie Islands on the east. A typical temperature curve for a monsoon

district is that for Nagpur, in the Indian Deccan (fig. 7), and a typical monsoon cloudiness curve is given in fig. 6, the maximum coming near the time of the vertical sun, in the rainy season, and the minimum in the dry season.

In the Australian monsoon region, which reaches across New Guinea and the Sunda Islands, and west of Australia, in the Indian Ocean, over latitudes o°-io° S., the monsoon rains come with north-west winds in the period between November and March or April.

The general rule that eastern coasts in the tropics are the rainiest finds exceptions in the case of the rainy western coasts in India and other districts with similar monsoon rains. On the coast of the Gulf of Guinea, for example, there is a small rainy monsoon area during the summer; heavy rains fall on the seaward slopes of the Cameroon Mountains. Gor6e, lat. 15° N., on the coast of Senegambia, gives a fine example of a rainy (summer) and a dry (winter) monsoon. Numerous combinations of equatorial, trade and monsoon rainfalls are found, often creating great complexity. The islands of the East Indian archi-pelago furnish many examples of such curious complications.

4. Mountain Climate. — In the torrid zone altitude is chiefly important because of its effect in tempering the heat of the lowlands, especially at night. If tropical mountains are high enough, they carry snow all the year round, even on the equator, and the zones of vegetation may range from the densest tropical forest at their base to the snow on their sumrriits. The highlands and mountains within the tropics are thus often sharply con- trasted with the lowlands, and offer more agreeable and more healthy conditions for white settlement. They are thus often sought by residents from colder latitudes as the most attractive' resorts. In India, the hill stations are crowded during the hot months by civilian and military officials. The climate of many tropical plateaus and mountains has the reputation of being a ”

perpetual spring." Thus on the interior plateau of the tropical Cordilleras of South America, and on the plateaus of tropical Africa, the heat is tempered by the altitude, while the lowlands and coasts are very hot. The rainfall on tropical mountains and highlands often differs considerably in amount from that on the lowlands, and other features common to mountain climates the world over are also noted.

The Characteristics of the Temperate Zones.

General. — As a whole, the " temperate zones " are temperate only in that their mean temperatures and their physiological effects are intermediate between those of the tropics and those of the polar zones. A marked changeableness of the weather is a striking characteristic of these zones. Apparently irregular and haphazard, these continual weather changes, although they are essentially non-periodic, nevertheless run through a fairly systematic series. Climate and weather are by no means synonymous over most of the extra-tropical latitudes.

Temperature. — The mean annual temperatures at the margins of the north temperate zone differ by more than 70 . The ranges between the mean temperatures of hottest and coldest months reach 120° at their maximum in north-eastern Siberia, and 80° in North America. A January mean of -60° and a July mean of 95 , and maxima of over 120 and minima of -90 , occur in the same zone. Such great ranges characterize the extreme land climates. Under the influence of the oceans, the windward coasts have much smaller ranges. The annual ranges in middle and higher latitudes exceed the diurnal, the conditions of much of the torrid zone thus being exactly reversed. Over much of the oceans of the temperate zones the annual range is less than io°. In the south temperate zone there are no extreme ranges, the maxima, slightly over 30 , being near the margin of the zone in the interior of South America, South Africa and Australia. In these same localities the diurnal ranges rival those of the north temperate zone.

The north-eastern Atlantic and north-western Europe are about 35 too warm for their latitude in January, while north- eastern Siberia is 30 too cold. The lands north of Hudson Bay are 25 too cold, and the waters of the Alaskan Bay 20 too

warm. In July, and in the southern hemisphere, the anomalies are small. The lands which are the centre of civilization in Europe average too warm for their latitudes. The diurnal variability of temperature is greater in the north temperate zone than elsewhere in the world, and

the same month may differ greatly in its character in different years. The annual tempera- ture curve has one maximum and one minimum. In the continental type the times of maximum and minimum are about one month behind the dates of maximum and minimum insola- tion. In the marine type the retardation may amount to nearly two months. Coasts and islands have a tendency to a cool spring and warm autumn; continents, to similar temperatures in both spring and fall.

Pressure and Winds.— The prevailing winds are the ” wester- lies,” which are much less regular than the trades. They vary greatly in velocity in different regions and in different seasons, and are stronger in winter than in summer. They are much interfered with, especially in the higher northern latitudes, by seasonal changes of temperature and pressure over the continents, whereby the latter establish, more or less successfully, a system of obliquely outflowing winds in winter and of obliquely inflowing winds in summer. In summer, when the lands have low pressure, the northern oceans are dominated by great oval areas of high pressure, with outflowing spiral eddies, while in winter, when the northern lands have high pressure, the northern portions of the oceans develop cyclonic systems of inflowing winds over their warm waters. AH these great continental and oceanic systems of spiralling winds are important climatic controls.

The westerlies are also much confused and interrupted by storms, whence their designation of stormy westerlies. So common are such interruptions that the prevailing westerly wind direction is often difficult to discern without careful observation. Cyclonic storms are most numerous and best developed in winter. Although greatly interfered with near sea-level by continental changes of pressure, by cyclonic and anticyclonic whirls, and by local inequalities of the surface, the eastward movement of the atmosphere remains very constant aloft. The south temperate zone being chiefly water, the westerlies are but little disturbed there by continental effects. Between latitudes 40° and 6o° S. the ” brave west winds ” blow with a constancy and velocity found in the northern hemisphere only on the oceans, and then in a modified form. Storms, frequent and severe, characterize these southern hemisphere westerlies, and easterly wind directions are temporarily noted during their passage. Voyages to the west around Cape Horn against head gales, and in cold wet weather, are much dreaded. South of Africa and Australia, also, the westerlies are remarkably steady and strong. The winter in these latitudes is stormier than the summer, but the seasonal difference is less than north of the equator.

Rainfall. — Rainfall is fairly abundant over the oceans and also over a

considerable part of the lands (30-80 in. and more). It comes chiefly in connexion with the usual cyclonic storms, or in thunderstorms. So great are the differences, geographic and periodic, in rainfall produced by differences in temperature, topography, cyclonic conditions, &c, that only the most general rules can be laid down. The equatorward margin of the tem- perate zone rains is clearly defined on the west Coasts, at the points where the coast deserts are replaced by belts of light or moderate rainfall. Bold west coasts, on the polar side of lat. 40 , are very rainy (100 in. and more a year in the most favourable situations). The hearts of the continents, far from the sea, and especially when well enclosed by mountains, or when blown over by cool ocean winds which warm while crossing the land, have light rainfall (less than 10-20 in.). East coasts are wetter than interiors, but drier than west coasts. Winter is the season of / maximum rainfall over oceans, islands and west coasts, for the westerlies are then most active, cyclonic storms are most numer- ous and best developed, and the cold lands chill the inflowing damp air. At this season, however, the low temperatures, high pressures, and tendency to outflowing winds over the continents are unfavourable to rainfall, and the interior land areas as a rule

then have their minimum. The warmer months bring the maximum rainfall over the continents. Conditions are then favourable for inflowing damp winds from the adjacent oceans; there is the best opportunity for convection; thunder-showers readily develop on the hot afternoons; the capacity of the air for water vapour is greatest. The marine type of rainfall, with a winter maximum, extends in over the western borders of the continents, and is also found in the winter rainfall of the sub- tropical belts. Rainfalls are heaviest along the tracks of most frequent cyclonic storms.

For continental stations the typical daily march of rainfall shows a chief maximum in the afternoon, and a secondary maximum in the night or early morning. The chief minimum comes between 10 a.m. and 2 p.m. Coast stations generally have a night maximum and a minimum between 10 a.m. and 4 p.m.

Humidity and Cloudiness. — S. A. Arrhenius gives the mean cloudiness for different latitudes as follows: —

70 N.

6o°

50°

40°

30°

20°

10°

Eq.

10°

20°

30°

. 40°

5o°

6o°S.

59

61

48

49

42

40

50

58

57

48

46

56

66

75

The higher latitudes of the temperate zones thus have a mean cloudiness which equals and even exceeds that of the equatorial belt. The amounts are greater over the oceans and coasts than inland. The belts of minimum cloudiness are at about lat. 30 N. and S. Over the continental interiors the cloudiest season is summer, but the amount is never very large. Otherwise, winter is generally the cloudiest season and with a fairly high mean annual amount.

The absolute humidity as a whole decreases as the temperature falls. The relative humidity averages 90 %, more or less, over the oceans, and is high under the clouds and rain of cyclonic storms, but depends, on land, upon the wind direction, winds from an ocean or from a lower latitude being damper, and those from a continent or from a colder latitude being drier.

Seasons. — Seasons in the temperate zones are classified according to temperature," not, as in the tropics, by rainfall. The four seasons are important characteristics, especially of the middle latitudes of the north temperate zone. Towards the equatorial margins of the zones the difference in temperature between summer and winter becomes smaller, arid the transition seasons weaken and even disappear. At the polar margins the change from winter to summer, and vice versa, is so sudden that there also the transition seasons disappear.

These seasonal changes are of the greatest importance in the life of man. The monotonous heat of the tropics and the con- tinued cold of the polar zones are both depressing. Their tendency is to operate against man's highest development. The seasonal changes of the temperate zones stimulate man to activity. They develop him, physically and mentally. They encourage higher civilization. A cold, stormy winter necessitates forethought in the preparation during the summer of clothing, food and shelter. Development must result from such conditions. In the warm, moist tropics life is too easy; in the cold polar zones it is too hard. Near the poles, the growing season is too short; in the moist tropics it is so long that there is little inducement to labour at any special time. The regularity, and the need, of outdoor work during a part of the year afei important factors in the development of man in the temperate zones.

Weather. — An extreme changeableness of the weather, depend- ing on the succession of cyclones and anticyclones, is another characteristic. For most of the year, and most of the zone, settled weather is unknown. The changes are most rapid in the northern portion of the north temperate zone, especially on the continents, where the cyclones travel fastest. The nature of these changes depends on the degree of development, the velocity of progression, the track, and other conditions of the disturbance which produces them. The particular weather types resulting from this control give the climates their distinctive character.

The types vary with the season and with the geographical position. They result from a combination, more or less irregular,

of periodic diurnal elements, under the regular control of the sun; and of non-periodic cyclonic and anticyclonic elements. In summer, on land, when the Cyclonic element is weakest and the solar control is the strongest, the dominant types are associated with the regular changes from day to night. Daytime cumulus clouds; diurnal variation in wind velocity; afternoon thunder- storms, with considerable regularity, characterize the warmest months over the continents and present an analogy with tropical conditions. Cyclonic and anticyclonic spells of hotter or cooler, rainy or dry, weather, with varying- winds differing in the temperatures and the moisture which they bring, serve to break the regularity of the diurnal types. In winter the non-periodic, cyclonic control is strongest. The irregular changes from clear to cloudy, from warmer to colder, from dry air to snow or rain, extend over large areas, and show little diurnal control. Spring and fall are transition Seasons, and have transition weather types. The south temperate zone oceans have a constancy of non- periodic cyclonic weather changes through the year which is only faintly imitated over the oceans of the northern hemisphere. Winter types differ little from summer. The diurnal control is never very strong. Stormy weather prevails throughout the year although the weather changes are more frequent and stronger in the’ Colder months.

Climatic Subdivisions. — There are fundamental differences between the north and south temperate zones. The latter zone is sufficiently individual to be given a place by itself. The marginaj sub-tropical belts must also be considered as a separate group by themselves. The north temperate zone as a whole includes large areas of land, stretching over many degrees of latitude, as well as of water. Hence it embraces so remarkable a diversity of climates that no single district can be taken as typical of the whole. The simplest and most rational scheme for a classifica- tion of these climates is based on the fundamental

differences which depend upon land and- water, upon the prevailing winds, and upon altitude. Thus there are the ocean areas and the land areas. The latter are then subdivided into western (windward) and eastern (leeward) coasts, and interiors. Mountain climates remain as a separate group.

South Temperate Zowe.-r-Because of the large ocean surface, the whole meteorological regime in the south temperate zone is more uniform than in the northern. The south temperate zone may properly be called ” temperate.” Its temperature changes are small; its prevailing winds are stronger and steadier than in the northern hemisphere; its seasons are more uniform; its weather is prevailingly stormier, more changeable, and more under cyclonic control. The uniformity of the climatic conditions over the far southern oceans is monotonously unattractive. The continental areas are small, and develop to a limited degree only the more marked seasonal and diurnal changes which are characteristic of lands in general. The summers are less stormy than the winters, but even the summer temperatures are not high. Such an area as that of New Zealand, with its mild climate and fairly regular rains, is really at the margins of the zone, and has much more favourable conditions than the islands farther south. These islands, in the heart of this zone, have dull, cheer- less and inhospitable climates. The zone enjoys a good reputa- tion for healthfulness, which fact has been ascribed chiefly to the strong and active air movement, the relatively drier air than in corresponding northern latitudes, and the cool summers. It must be remembered, also, that the lands are mostly in the sub-tropical belt, which possesses peculiar climatic advantages, as will be seen.

Sub-tropical Belts: Mediterranean Climates. — At the tropical margins of the temperate zones are the so-called sub-tropical belts. Their rainfall regime is alternately that of the westerlies and of the trades. They are thus associated, now with the temperate and now with the torrid zones. In winter the equatorward migration of the great pressure and wind systems brings these latitudes under the control of the westerlies, whose frequent irregular storms give a moderate Winter precipitation.

These winter. rains are not steady and continuous, but are separ- ated by spells of fine sunny weather. The amounts vary greatly. 1 In summer, when the trades are extended polewards by the out- flowing

equatorward winds on the eastern side of the ocean anticyclones, mild, dry and nearly continuous fair weather prevails, with general northerly winds.

The sub-tropical belts of winter rains and dry summers-are not very clearly defined. They are mainly limited to the western coasts of the continents, and to the islands off these coasts in latitudes between about 28° and 40 . The sub-tropical belt is exceptionally wide in the old world, and reaches far inland there, embracing the countries bordering on the Mediterranean in southern Europe and northern Africa, and then extending eastward across the Dalmatian coast and the southern part of the Balkan peninsula into Syria, Mesopotamia, Arabia north of the tropic, Persia and the adjacent lands. The fact that the Mediterranean countries are so generally included has led to the use of the name " Mediterranean climate." Owing to the great irregularity of topography and outline, the Mediterranean province embraces many varieties of climate, but the dominant characteristics are the mild temperatures, except on the higher elevations, and the sub-tropical rains.

On the west coasts of the two Americas the sub-tropical belt of winter rains is clearly seen in California and in northern Chile, on the west of the coast mountain ranges. Between the region which has rain throughout the year from the stormy westerlies, and the districts which are permanently arid under the trades, there is an indefinite belt over which rains fall in winter. In southern Africa, which is controlled by the high pressure areas of the South Atlantic and south Indian, oceans, the south-western coastal belt has winter rains, decreasing to the north, while the east coast and adjoining interior have summer rains, from the south-east trade. Southern Australia is climatic- ally similar to South Africa. In summer the trades give rainfall on the eastern coast, decreasing inland. In winter the westerlies give moderate rains, chiefly on the south-western coast.

The sub-tropical climates follow the tropical high pressure belts across the oceans, but they do not retain their distinctive character far inland from the west coasts of the continents (except in the Mediterranean case) , nor on the east coasts. On the latter, summer monsoons and the occurrence of general summer rains interfere, as in eastern Asia and in Florida,.

Strictly winter rains are typical of the coasts and. islands of this belt. The more continental areas have a tendency to spring and autumn rains. The rainy and dry seasons are most marked at the equatorward margins of the belt. With increasing latitude, the rain is more evenly

distributed through the year, the summer becoming more and more rainy until, in the con- tinental interiors of

toqoTHS

200

ISO

(00

50

200

150

100

50

J. F. M. A. M. J s J. A. S. 0. N. D. J.

w

__ ‘

r

•

■

v

k M.

J. F. M. A. M. J. J. A. S. 0. N. D J.

Fig. 8. — Annual March of Rainfall: Sub- tropical Type. W.A, Western Australia; M, Malta.

the higher latitudes, the summer becomes the season of maxi- mum rainfall. The monthly distribution of rainfall in two sub- tropical regions is shown in the accom- panying curves for Malta and for Western Australia (fig. 8). In Alexandria the dry season lasts nearly

eight months; in

Palestine, from six to seven months; in Greece, about four months. The sub-tropical rains are peculiarly well developed on the eastern coast of the Atlantic Ocean.

The winter rains which migrate equatorward are separated by the Sahara from the equatorial rains which migrate poleward. An unusually extended migration of either of these rain belts may bring them close together, leaving but a small part, if any,

1 Approximately Lisbon has 28-60 in.; Madrid, 16-50; Algiers, 28-15; Nice, 33-00; Rome, 29-90; Ragusa, 63-90.

of- the intervening desert actually rainless. The Arabian desert occupies a somewhat similar position. Large variations in the annual rainfall may be expected towards the equatorial margins of the sub-tropical belts.

The main features of the sub-tropical rains east of the Atlantic are repeated on the Pacific coasts of the two Americas. In North America the rainfall decreases from Alaska, Washington and northern Oregon southwards to lower California, and the length of the summer dry season increases. At San Diego, six months (May-October) have each less than 5% of the annual precipitation, and four of these have 1%. The southern ex- tremity of Chile, from about latitude 38 S. southward, has heavy rainfall throughout the year from the westerlies, with a winter maximum. Northern Chile is persistently dry. Between these two there are winter rains and dry summers. Neither Africa nor Australia extends far enough south to show the different members of this system well. New Zealand is almost wholly in the prevailing westerly belt. Northern India is unique in having summer monsoon rains and also winter rains, the latter from weak cyclonic

storms which corre- I0QQ, J -, % M -, A , M , J -, J -, A -, s , °, \ \ j ,ioqo spond with the sub- tropical winterrains.

From the position of the sub-tropical belts to leeward of the oceans, and at the equatorial margins of the temperate zones, it follows that their temperatures are not extreme. Further, the protection afforded by moun- tain ranges, as by the Alps in Europe and the Sierra Ne- vada in the United States, is an import- ant factor in keep- ing out extremes of winter cold. The annual march . and ranges of tempera-

FlG – 9-— Annual March of Temperature for turp Henenrl 1]nnn

selected Sub-tropical Stations. C, Cordoba; ture depend upon A Auckland . Ba Bermuda; Bd, Bagdad, position with refer- ence to continental or marine influences. This is seen in the accompanying data and curves for Bagdad, Cordoba (Argentina) , Bermuda and Auckland (fig. 9) . The Mediterranean basin is particularly favoured in winter, not only in the protection against cold afforded by the mountains but also in the high temperature of the sea itself. The southern Alpine valleys and the Riviera are well situated, having good protection and a southern exposure. The coldest month usually has a mean temperature well above 32 . Mean minimum temperatures of about, and somewhat below, freezing occur in the northern portion of the district, and in the more continental localities minima a good deal lower have been observed. Mean maximum temperatures of about 95 occur in northern Italy, and of still higher degrees in the southern portions. Somewhat similar conditions obtain in the sub-tropical district of North America. Under the control of passing cyclonic storm areas, hot or cold winds, which often owe some of their special characteristics to the topography, bring into the sub-tropical belts, from higher or lower latitudes, unseasonably high or low temperatures. These winds have been given special names (mistral, sirocco, bora, &c).

These belts are among the least cloudy districts in the world. The accompanying curve, giving an average for ten stations. shows the small annual amount of cloud, the winter maximum and the marked summer minimum, in a typical sub-tropical

climate (fig. 10). The winter rains do not bring continuously overcast skies, and a summer month with a mean cloudiness

of 10% is not excep- -=ˆ,itr tional in the drier parts of the sub-tropics.

With prevailing fair skies, even tempera- tures, and moderate rain-fall, the sub-tropical belts possess many climatic advantages which fit them for health resorts.

J.

F.

M.

A.

M.

J.

J.

A.

S.

0.

N.

0.

J.

S

9 9

7 6

S

- 3 2

I

Fig. io. — Annual March of Cloudiness

in a Sub-tropical Climate (Eastern Medi- terranean).

The long list of well- known resorts on the Mediterranean coast, and the shorter list for California, bear witness to this fact.

North Temperate Zone: West Coasts. — Marine climatic types are carried by the prevailing westerlies on to the western coasts of the continents, giving them mild winters and cool summers, abundant rainfall, and a high degree of cloudiness and relative humidity. North-western Europe is particularly favoured because of the remarkably high temperatures of the North Atlantic Ocean. January means of 40° to 50 in the British Isles and on the northern French coast occur in the

same latitudes as those of o° and io° in the far interior of Asia. In July means 6o° to 70 in the former contrast with 70 to 8o° in the latter districts. The conditions are somewhat similar in North America. Along the western coasts of North America and of Europe the mean annual ranges are under 25 — actually no greater than some of those within the tropics. Irregular cyclonic temperature changes are, however, marked in the temperate zone, while absent in the tropics. The curves for the Scilly Isles and for Thorshavn, Faroe Islands, illustrate the insular type of temperature on the west coasts (fig. 11). The annual march of rainfall, with the marked maximum in the fall and winter which is characteristic of the marine regime, is illustrated in the curve for north-western Europe (fig. 12). On the northern Pacific coast of North America

the distribution is similar, and in the southern hemisphere the western coasts of southern South America, Tasmania and New Zealand show the same type. The cloudiness and relative humidity average high on wes— tern coasts, with the maximum in the colder season.

The west coasts therefore, including the important cli- matic province of western Europe, and

rOOOTHS

150 100 50

250 200 150 100 50

100 60

150 100 50

J. F. M. A. M. J. J. A. S. 0. N. 0. J.

NA

mi

r\

J. F. M.AM.J, J. A. S. 0. N. D. J. Fig. 12. — Annual March of Rainfall: Tern’

perate Zone. C.E, Central Europe; A, the coast provinces of Northern Asia; N A Atlantic coast of nort h-wcstern North North America ;N.W.E, North-west Europe. . . , T „

r America, New Zea- land and southern Chile, have as a whole mild winters, equable temperatures, small ranges, and abundant rainfall, fairly well distributed through the year. The summers are relatively cool. Continental Interiors.— The equable climate of the western coasts changes, gradually or suddenly, into the more extreme climates of the interiors. In Europe, where no high mountain ranges intervene, the transition is gradual, and broad stretches of country have the benefits of the tempering influence of the

Fig. 11. — Annual March of Temperature for Selected Stations in the Temperate Zones. S. I., Scilly Isles. S, Semipalatinsk. Sa, Sakhalin.

P, Prague. K. Kiakta. T, Thorshavn.

C, Charkow. B, Blagovyeshchensk. Y, Yakutsk.

80O,- J , T -, M -, A -, M -, J -, J -, A -, S -, a , W -, P -, J -, 80O

J. F. M. A. M. J. J. A. S. 0. N. D. J. Fig. 11.

Atlantic. In North America the change is abrupt, and comes on crossing the lofty Western mountain barrier. The curves in fig. 11 illustrate well the gradually increasing continentality of the climate with increasing distance inland in Eurasia.

The continental interiors of the north temperate zone have the greatest extremes in the world. Towards the Arctic circle the winters are extremely severe, and January mean temperatures of -io° and -20 occur over considerable areas. At the cold pole of north-eastern Siberia a January mean of -60° is found. Mean minimum temperatures of -40 occur in the area from eastern Russia, over Siberia and down to about latitude 50° N. Over no small part of Siberia minimum temperatures below 70 may be looked for every winter. Thorshavn and Yakutsk are excellent examples of the temperature differences along the same latitude line (see fig. 11). The winter in this interior region is dominated by a marked high pressure. The weather is pre vailingly clear and calm. The ground is frozen all the year round below a slight depth over wide areas. The extremely low temperatures are most trying when the steppes are swept by icy storm winds {bur an, pur go), carrying loose snow, and often resulting in loss of life. In the North American interior the winter cold is somewhat less severe. North American winter weather in middle latitudes is often

interrupted by cyclones, which, under the steep poleward temperature gradient then prevailing, cause frequent, marked and sudden changes in wind direction and temperature over the central and eastern United States. Cold waves and warm waves are common, and blizzards resemble the buran or purga of Russia and Siberia. With cold northerly winds, temperatures below freezing are carried far south towards the tropic.

The January mean temperatures in the southern portions of the continental interiors average about 50° or 6o°. In summer the northern continental interiors are warm, with July means of 6o° and thereabouts. These temperatures are not much higher than those on the west coasts, but as the northern interior winters are much colder than those on the coasts, the interior ranges are very large. Mean maximum temperatures of 86° occur beyond the Arctic circle in north-eastern Siberia, and beyond latitude 6o° in North America. In spite of the extreme winter cold, agriculture extends remarkably far north in these regions, because of the warm, though short, summers, with favourable rainfall distribution. The summer heat is sufficient to thaw the upper surface of the frozen ground, and vegetation prospers for its short season. At this time great stretches of flat surface become swamps. The southern interiors have torrid heat in summer, temperatures of over 90° being recorded in the south-western United States and in southern Asia. In these districts the diurnal ranges of temperature are very large, often exceeding 40°, and the mean maxima exceed no°.

The winter maximum rainfall of the west coasts becomes a summer maximum in the interiors. The change is gradual in Europe, as was the change in temperature, but more sudden in North America. The curves for central Europe and for northern Asia illustrate these continental summer rains (see fig. 12). The summer maximum becomes more marked with the increasing continental character of the climate. There is also a well- marked decrease in the amount of rainfall inland. In western Europe the rainfall averages 20 to 30 in., with much larger amounts (reaching 80-100 in. and even more) on the bold west coasts, as in the British Isles and Scandinavia, where the moist Atlantic winds are deflected upwards, and also locally on moun- tain ranges, as on the Alps. There are small rainfalls (below 20 in.) in eastern Scandinavia and on the Iberian peninsula. Eastern Europe has generally less than 20 in., western Siberia about 1 s in., and eastern Siberia about 10 in. In the southern part of the great overgrown continent of Asia an extended region of steppes and deserts, too far from the sea to receive sufficient precipitation, shut in, furthermore, by mountains, controlled in summer by drying northerly winds,

receives less than 10 in. a year, and in places less than 5 in. In this interior district of Asia population is inevitably small and suffers under a condition of hopeless aridity.

The North American interior has more favourable rainfall con- ditions than Asia, because the former continent is not overgrown. The heavy rainfalls on the western slopes of the Pacific coast mountains correspond, in a general way, With those on the west coast of Europe, although they are heavier (over 100 in. at a maximum) . The close proximity of the mountains to the Pacific, however, involves a much more rapid decrease of rainfall inland than is x the case in Europe, as may be seen by comparing the isohyetal lines 1 in the two cases. A considerable interior region is left with deficient rainfall (less than 10 in.) in the south-west. The eastern portion of the continent is freely open to the Atlantic and the Gulf of Mexico, so that moist cyclonic winds have access, and rainfalls of over 20 in. are found everywhere east of the 100th meridian. These conditions are much more favourable than those in eastern Asia. The greater part of the interior of North America has the usual warm-season rains. In the interior basin, between the Rocky and Sierra Nevada mountains, the higher plateaus and mountains receive much more rain than the desert lowlands. Forests grow on the higher elevations, while irrigation is necessary for agriculture on the lowlands. The rainfall here comes largely from thunderstorms.

In South America the narrow Pacific slope has heavy rainfall (over 80 in.). East of the Andes the plains are dry (mostly less than 10 in.). The southern part of the continent is very narrow, and is open to the east, as well as more open to the west owing to the decreasing height of the mountains. Hence the rainfall increases somewhat to the south, coming in connexion with passing cyclones. Tas- _

10

9

P. m:

w. j.

mania and New Zealand ‘° have most rain on their ,? western slopes.

In a typical conti- nental climate the winter, except for radia- tion fogs, is very clear, and the summer the

cloudiest season, as is _ . , , , , , , „

well shown in the accom- T £ˆgˆfe? gˆSTfe panymg curve for A[Eastern Asia; M, mountain, eastern Asia (A, fig. 13).

In a more moderate continental climate, such as that of central Europe (E, fig. 13), and much of the United States, the winter is the cloudiest season. In the first case the mean cloudiness is small; in the second there is a good deal of cloud all the year round.

East Coasts. — The prevailing winds carry the continental climates of the interiors off over the eastern coasts of the temperate zone lands, and even for some distance on to the adjacent oceans. The east coasts therefore have continental climates, with modifications resulting from the presence of the oceans to leeward, and are necessarily separated from the west coasts, with which they have little in common. On the west coasts of the north temperate lands the isotherms are far apart. On the east coasts they are crowded together. The east coasts share with the interiors large annual and cyclonic ranges of temperature. A glance at the isothermal maps of the world will show at once how favoured, because of its position to leeward of the warm North Atlantic waters, is western Europe as compared with eastern North America. A similar contrast, less marked, is seen in eastern Asia and western North America. In eastern Asia there is some protection, by the coast mountains, against the extreme cold of the interior, but in North America there is no such barrier, and severe cold winds sweep across the Atlantic coast states, even far to the south. Owing to the prevailing offshore winds, the oceans to leeward have relatively little effect.

As already noted, the rainfall increases from the interiors towards the east coasts. In North America the distribution through the year is very uniform, with some tendency to a summer maximum, as in the interior (N.A, fig. 12).

In eastern Asia the winters are relatively dry and clear, under

1 i.e. lines drawn on a map to connect all places having an equal rainfall. ‘

the influence of the cold offshore monsoon, and the summers are warm and rainy. Rainfalls of 40 in. are found on the east coasts of Korea, Kamchatka and Japan, while in North America, which is more open, they reach farther inland. Japan, although occupying an insular

position, has a modified continental rather than a marine climate. The winter monsoon, after crossing the water, gives abundant rain on the western coast, while the winter is relatively dry on the lee of the mountains, on the east. Japan has smaller temperature ranges than the mainland. ■ ■ • >

Mountain Climates. — The mountain climates of the temperate zone have the usual characteristics which are associated with altitude everywhere. If the altitude is sufficiently great the decreased temperature gives mountains a polar climate, with the difference that the summers are relatively cool while the winters are mild owing to inversions of temperature in anticyclonic weather. Hence the annual ranges are smaller than over lowlands. At such times of inversion the mountain-tops often appear as local areas of higher temperature in a general region of colder air over the valleys and lowlands. The increased intensity of insolation aloft is an important factor in giving certain mountain resorts their deserved popularity in winter (e.g. Davos and Meran). Of Meran it has been well said that from December to March the nights are winter, but the days are mild spring. The diurnal ascending air currents of summer usually give mountains their maximum cloudiness and highest relative humidity in the warmer months, while winter is the drier and clearer season. This is shown in curve M, fig. 13. The clouds of winter are low, those of summer are higher. Hence the annual march of cloudi- ness on mountains is usually the opposite of that on lowlands.

Characteristics of the Polar Zones.

General. — The temperate zones merge into the polar zones at the Arctic and Antarctic circles, or, if temperature be used as the basis of classification, at the isotherms of 50° for the warmest month, as suggested by Supan. The longer or shorter absence of the sun gives the climate a peculiar character, not found elsewhere.

Beyond the isotherm of 50° for the warmest month forest trees and cereals do not grow. In the northern hemisphere this line is well north of the Axctic circle in the continental climate of Asia, and north of it also in north-western North America and in northern Scandinavia, but falls well south in eastern British America, Labrador and Greenland, and also in the North Pacific Ocean. In the southern hemisphere this isotherm crosses the southern extremity of South America, and runs fairly east and west around the globe there. The conditions of life are necessarily very specialized for the peculiar climatic features which are met with in these zones. There is a minimum of life, but more in the north polar than the south polar zone. Plants are few and lowly.

Land animals which depend upon plant food must therefore likewise be few in number. Farming and cattle- raising cease. Population is small and scattered. There are no permanent settlements at all within the Antarctic circle. Life is a constant struggle for existence. Man seeks his food by the chase on land, but chiefly in the sea. He lives along, or near, the sea- coast. The interior lands, away from the sea, are deserted. Gales and snow and cold cause many deaths on land, and, especially during fishing Mean

expeditions, at sea. Under such hard conditions of securing food, famine is a likely occurrence.

In the arctic climate vegetation must make rapid growth in the short, cool summer. In the highest latitudes the summei? temperatures are not high enough to melt snow on a level. Exposure is therefore of the greatest importance. Arctic plants grow and blossom with great rapidity and luxuriance where the exposure is favourable, and where the water from the melting snow can run off. The soil then dries quickly, and can be effectively warmed. Protection against cold winds is another important factor in the growth of vegetation. Over great stretches of the northern plains the surface only is thawed out in the warmer months, and swamps, mosses and lichens are

found above eternally frozen ground. Direct insolation is very effective in high latitudes. Where the exposure is favourable, snow melts in- the sun when the temperature of the air in the shade is far below freezing.

Arctic and antarctic zones differ a good deal in the distribution and arrangement of land and water around and in them. The southern zone is surrounded by a wide belt of open sea; the northern, by land areas. The northern is therefore much affected by the conditions of adjacent continental masses. Nevertheless, the general characteristics are apparently much the same over both, so far as is now known, the antarctic differing from the arctic chiefly in having colder summers and in the regularity of its pressure and winds. Both zones have the lowest mean annual temperatures in their respective hemispheres, and hence may properly be called the cold zones.

Temperature— At the solstices the two poles receive the largest amounts of insolation which any part of the earth's surface ever receives. It would seem, therefore, that the temperatures at the poles should then be the highest in the world, but as a matter of fact they are nearly or quite the lowest. Temperatures do not follow insolation in this case because much of the latter never reaches the earth's surface; because most of the energy which does reach the surface is

expended in melting the snow and ice of the polar areas; and because the water areas are large, and the duration of insolation is short.

A set of monthly isothermal charts of the north polar area, based on all available observations, has been prepared by H. Mohn and published in the volume on Meteorology of the Nansen expedition. In the winter months there are three cold poles, in Siberia, in Greenland and at the pole itself. In January the mean temperatures at these three cold poles are -40°, -40 and -40 respectively. The Siberian cold pole becomes a maximum of temperature during the summer, but the Greenland and polar minima remain throughout the year. In July the temperature distribution shows considerable uniformity; the gradients are relatively weak. A large area in the interior of Greenland, and one of about equal extent around the pole, are within the isotherm of 32°. For the year a large area around the pole is enclosed by the isotherm of -4°, with ah isotherm of the same value in the interior of Greenland, but a local area of -7-6° is noted in Greenland, and one of -11-2° is centred at fat. 8o° N. and long. 170 E.

The north polar chart of annual range of temperature shows a maximum range of about 120° in Siberia; of 8o c in North America; of 75>6° at the North Pole, and of 72° in Greenland. The North Pole obviously has a continental climate. The minimum ranges are on the Atlantic and Pacific Oceans. The mean annual isanomalies show that the interior of Greenland has a negative anomaly in all months. The Norwegian sea area is 45° too warm in January and February. Siberia has + io-8° in summer, and —45° in January. Between Bering Strait and the pole there is a negative anomaly in all months. The influence of the Gulf Stream drift is clearly seen on the chart, as it is also on that of mean annual ranges.

For the North Pole Mohn gives the following results, obtained by graphic methods: — Temperatures at the North Pole.

Jan.

Feb.

Mar.

Apr.

May.

June.

July.

Aug.

Sept.

Oct.

Nov.

Dec.

Year.

-41-8°

-41-8°

-3i-o°

-18-4°

8-6°

28-4°

30-2°

26-6°

,.8-6°

-11-2°

-27-4°

-36-4°

-8-9°

It appears that the region about the North Pole is the coldest place in the northern hemisphere for the mean of the year, and that the interior ice desert of Greenland, together with the inner polar area, are together the coldest parts of the northern hemi- sphere in July. In January, however, Verkhoyansk, in north- eastern Siberia, just within the Arctic circle, has a mean tempera- ture of about — 6o°, while the inner polar area and the northern interior of Greenland have only — 40°. Thus far no minima as low as those of north-eastern Siberia have

been recorded in the Arctic.

For the Antarctic our knowledge is still very fragmentary,

and relates chiefly to the summer months. Hann has determined the mean temperatures of the higher southern latitudes as follows: — 1

Mean Temperatures of High Southern Latitudes. S. Lat. . . .50° 6o° 70° 8o°

Mean Annual . 41-9 28-4 11-3 — 3-6

January . . . 46-9 37-8 30-6 20-3

July . . . 37-2 1.8-3 -8-0 -247

From lat. 70 S. polewards, J. Hann finds that the southern hemisphere is colder than the northern. Antarctic summers are decidedly cold. The mean annual temperatures experienced have been in the vicinity of io °, and the minima of an ordinary antarctic winter go down to -40° and below, but so far no minima of the severest Siberian intensity have been noted. The maxima have varied between 35 and 50°.

The temperatures at the South Pole itself furnish an interesting subject for speculation. It is likely that near the South Pole will prove to be the coldest point on the earth's surface for the year, as the distribution of insolation would imply, and as the conditions of land and ice and snow there would suggest. The lowest winter and summer temperatures in the southern hemi- sphere will almost certainly be found in the immediate vicinity of the pole. It must not be supposed that the isotherms in the antarctic region run parallel with the latitude lines. They bend polewards and equatorwards at different meridians, although much less so than in the Arctic.

The annual march of temperature in the north polar zone, for which we have the best comparable data, is peculiar in having a much-retarded minimum in February or even in March — -the result of the long, cold winter. The temperature rises rapidly towards summer, and reaches a maximum in July. Autumn is warmer than spring.

The continents do not penetrate far enough into the arctic zone to develop a pure continental climate in the highest latitudes.

Verkhoyansk, in lat. 67 6′ N., furnishes an excellent example of an exaggerated continental type for the margin of the zone, with an annual range of 120 . One-third as large a range is found on Novaya Zemlya. Polar climate as a whole has large annual and small diurnal ranges, but sudden changes of wind may cause marked irregular temperature changes within twenty- four hours, especially in winter. The smaller ranges are associ- ated with greater cloudiness, and vice versa. The mean diurnal variability is very small in summer, and reaches its maximum in winter, about 7 in February, according to Mohn.

Pressure and Winds. — Owing to the more symmetrical dis- tribution of land and water in the southern than in the northern polar area, the pressures and winds have a simpler arrangement in the former, and may be first considered. The rapid southward decrease of pressure, which is so marked a feature of the higher latitudes of the southern hemisphere on the isobaric charts of the world, does not continue all the way to the South Pole. Nor do the prevailing westerly winds, constituting the ” circumpolar whirl,” which are so well developed over the southern portions of the southern hemisphere oceans, blow all the way home to the South Pole. The steep poleward pressure gradients of these southern oceans end in a trough of low pressure, girdling the earth at about the Antarctic circle. From here the pressure increases again towards the South Pole, where a permanent inner polar anticyclonic area is found, with outflowing winds deflected by the earth’s rotation into easterly and south-easterly directions. These easterly winds have been observed by the recent expedi- tions which have penetrated far enough south to cross the low- pressure trough. The limits between the prevailing westerlies and the outflowing winds from the pole (” easterlies “) vary with the longitude and migrate with the seasons. The change in passing from one wind system to the other is easily observed. This south polar anticyclone, with its surrounding low-pressure girdle, migrates with the season, the centre apparently shifting polewards in summer and towards the eastern hemisphere in winter. The outflowing winds from the polar anticyclones sweep down across the inland ice. Under certain topographic 1 Nature, lxxi. (Jan. 5, 1905), p. 221.

conditions, descending across mountain ranges, as in the case of the Admiralty Range in Victoria Land, these winds may develop high velocity and take on typical f’ohn character- istics, i raising the temperature to an unusually high degree! Fokn winds are also known on both coasts of Greenland, when a passing cyclonic depression draws the air down from the icy interior. These Greenland John winds are important climatic elements, for they blow down warm and dry,

raising the tempera- ture even 30° or 40 above the winter mean, and melting the snow.

In the Arctic area the wind systems are less clearly defined and the pressure distribution is much less regular, oh account of the irregular distribution of land and water. The isobaric charts published in the report of the Nansen expedition show that the North Atlantic low-pressure area is more or less well developed in all months. Except in June, when it lies over southern Greenland, this tongue-shaped trough of low pressure lies in Davis strait, to the south-west or west of Iceland, and over the Norwegian Sea. In winter it greatly extends its limits farther east into the inner Arctic Ocean, to the north of Russia and Siberia. The Pacific minimum of pressure is found south of Bering Strait and in Alaska. Between these two regions of lower pressure the divide extends from North America to eastern Siberia. This divide has been called by Supan the ” Arktische Wind-scheide.” The pressure gradients are steepest in winter. At the pole itself pressure seems to be highest in April and lowest from June \o September. The annual range is only about 0-20 in.

The prevailing westerlies, which in the high southern latitudes are so symmetrically developed, are interfered with to such an extent by the varying pressure controls over the northern continents and oceans in summer and winter that they are often hardly recognizable on the wind maps. The isobaric and wind charts show that on the whole the winds blow out from the inner polar basin, especially in winter and spring.

Rain and Snow. — Rainfall on the whole decreases steadily from equator to poles. The amount of precipitation must of necessity be comparatively slight in the polar zones, chiefly because of the small capacity of the air for water vapour at the low temperatures there prevailing; partly also because of the decrease, or absence, of local convectional storms and thunder- showers. Locally, under exceptional conditions, as in the case of the western coast of Norway, the rainfall is a good deal heavier. Even cyclonic storms cannot yield much precipitation. The extended snow and ice fields tend to give an exaggerated idea of the actual amount of precipitation. It must be remembered, however, that evaporation is slow at low temperatures, and melting is not excessive. Hence the polar store of fallen snow is well preserved: interior snowfields, ice sheets and glaciers ars produced.

The commonest form of precipitation is naturally snow, the summer limit of which, in the northern hemisphere, is neal the Arctic circle,

with the exception of Norway. So far as exploration has yet gone into the highest latitudes, rain falls in summer, and it is doubtful whether there are places where all the precipitation falls as snow. The snow of the polar regions is characteristically fine and dry. At low polar temperatures flakes of snow are not found, but precipitation is in the form of ice spicules. The finest glittering ice needles often fill the air, even on clear days, and in calm weather, and gradually descend- ing to the surface, slowly add to the depth of snow on the ground. Dry snow is also blown from the snowfields on windy days, interfering with the transparency of the air.

Humidity, Cloudiness and Fog. — The absolute humidity must be low in polar latitudes, especially in winter, on account of the low temperatures. Relative humidity varies greatly, and very low readings have often been recorded. Cloudiness seems to decrease somewhat towards the inner polar areas, after passing the belt of high cloudiness in the higher latitudes of the temperate zones. In the marine climates of high latitudes the summer, which is the calmest season, has the maximum cloudiness; the winter, with more active wind movement, is clearer. The

curve here given illustrates these conditions (fig. 14). The summer maximum is largely due to fogs, which are produced where warm, damp air is chilled by coming in contact with ice. They are also formed over open waters, as among the Faeroe Islands, for example, and open water spaces, in the midst of an ice-covered sea, are commonly detected at a distance by means of the “steam fog” which rises from them. Fogs are less

common in winter, when they occur as radiation fogs, of no great thick- ness. The small winter cloudiness, which is re- ported also from the ant- arctic zone, corresponds with the low absolute humidity and small pre- cipitation. The coasts and islands bathed by

6

S

4 3

i

I

Fig.

Jj

r.

M.

4.

M.

J.

J.

A.

S.

0.

N.

D.

J.

s

.

14. — Annual March of Cloudiness in Polar Latitudes (marine type).

the warm waters of the Gulf Stream drift usually have a higher cloudiness in winter than in summer. The place of fog is in winter taken by the fine snow crystals, which often darken the air like fog When strong winds raise the dry snow from the surfaces on which it is

lying. Cumulus cloud forms are rare, even in summer, and it is doubtful whether the cloud occurs at all in its typical development. Stratus is probably the commonest cloud of high latitudes, often covering the sky for days without a break. Cirrus cloud forms probably decrease polewards.

Cyclones and Weather. — The prevailing westerlies continue up into the margins of the polar zones. Many of their cyclonic storms also continue on to the polar zones, giving sudden and irregular pressure and weather changes. The inner polar areas seem to be beyond the reach of frequent and violent cyclonic disturbance. Calms are more common; the weather is quieter and fairer; precipitation is less. Most of the observations thus far obtained from the Antarctic come from this marginal zone of great cyclonic activity, violent winds, and wet, disagreeable, inhospitable weather, and therefore do not show the features of the actual south polar climate.

During the three years of the ” Fram’s ” drift depressions passed on all sides of her, with a preponderance on the west. The direction of progression averaged nearly due east, and the hourly velocity 27 to 34 m., which is about that in the United States. For the higher latitudes, most of the cyclones must pass by on the equatorial side of the observer, giving ” backing ” winds in the northern hemisphere. The main cyclonic tracks are such that the wind characteristically backs in Iceland, and still more so in Jan Mayen and on the eastern coast of Greenland, these districts lying on the north and west of the path of progres- sion. Frightful winter storms occasionally occur along the east coast of Greenland and off Spitzbergen.

For much of the year in the polar zones the diurnal control is weak or absent. The successive spells of stormy or of fine weather are wholly cyclonically controlled. Extraordinary records of storm and gale have been brought back from the far south and the far north. Wind direction and temperature vary in relation to the position of the cyclone. During the long dreary winter night the temperature falls to very low readings. Snowstorms and gales alternate at irregular short intervals with calmer spells of more extreme cold and clearer skies. The periods of greatest cold in winter are calm. A wind from any direction will bring a rise in temperature. This probably results from the fact that the cold is the result of local radiation, and a wind interferes with these conditions by importing higher temperatures, or by mixing upper and lower strata. During the long summer days the temperature rises well above the winter mean, and under favourable conditions certain phenomena, such as the diurnal variation in wind velocity, for example,, give evidence of the diurnal control. But the

irregular cyclonic weather changes continue, in a modified form. There is no really warm season. Snow still falls frequently. The summer is essentially only a modified winter, especially in the Antarctic. In summer clear spells are relatively warm, and winds bring

lower temperatures. In spite of its lack of high temperatures, the northern polar summer, near the margins of the zone, has many attractive qualities in its clean, pure, crisp, dry air, free from dust and impurities; its strong insolation; its slight precipitation.

Twilight and Optical Phenomena. — The monotony and darkness of the polar night are decreased a good deal by the long twilight. Light from moon and stars, and from the aurora, also relieves the darkness. Optical phenomena of great variety, beauty and complexity are common. Solar and lunar haloes, and coronae, and mock suns and moons are often seen. Auroras seem to be less common and less brilliant in the Antarctic than in the Arctic. Sunset and sunrise colours within the polar zones are described as being extraordinarily brilliant and im- pressive.

Physiological Effects. — The north polar summer, as has been pointed out, in spite of its drawbacks, is in some respects a pleasant and healthful season. But the polar night is mono- tonous, depressing, repelling. Sir W. E. Parry said that it would be difficult to conceive of two things which are more alike than two polar winters. An everlasting uniform snow covering; rigidity; lifelessness; silence — except for the howl of the gale or the cracking of the ice. Small wonder that the polar night has sometimes unbalanced men's minds. The first effects are often a strong desire for sleep, and indifference. Later effects have been sleeplessness and nervousness, tending in extreme cases to insanity; anaemia, digestive troubles. Extraordinarily low winter temperatures are easily borne if the air be dry and still. Zero weather seems pleasantly refreshing if clear and calm. But high relative humidity and wind — even a light breezeˆgive the same degree of cold a penetrating feeling of chill which may be unbearable. Large temperature ranges are endured without danger in the polar winter when the air is dry. When exposed to direct insolation the skin burns and blisters; the lips swell and crack. Thirst has been much complained of by polar explorers, and is due to the active evaporation from the warm body into the dry, relatively cold air. There is no doubt that polar air is singularly free from micro-organisms — a fact which is due chiefly to lack of communication with other parts of the world. Hence many diseases which are common in temperate zones, " colds " among them, are rare.

Changes of Climate.

Popular Belief in Climatic Change. — Belief in a change in the climate of one's place of residence, within a few generations, and even within the memory of living men, is widespread. Evidence is constantly being brought forward of apparent climatic variations of greater or less amount which are now taking place. Thus we have many accounts of a gradual desicca- tion which seems to have been going on over a large region in Central Asia during historical times. In northern Africa certain ancient historical records have been taken by different writers to indicate a general decrease of rainfall during the last 3000 or more years. In his crossing of the Sahara between Algeria and the Niger, E. F. Gautier found evidence of a former large popula- tion. A gradual desiccation of the region is therefore believed to have taken place, but to-day the equatorial rain belt seems to be again advancing farther north, giving an increased rainfall. Farther south, several lakes have been reported as decreasing in size, e.g. Chad and Victoria; and wells and springs as running dry. In the Lake Chad district A. J. B. Chevalier reports the discovery of vegetable and animal remains which indicate an invasion of the Sudan by a Saharan climate. It is often held that a steady decrease in rainfall has taken place over Greece, Syria and other eastern Mediterranean lands, resulting in a gradual and inevitable deterioration and decay of their people.

What Meteorological Records show. — As concerns the popular impression regarding change of climate, it is clear at the start that no definite answer can be given on the basis of tradition or of general impression. The only answer of real value must be based on the records of accurate instruments, properly exposed and carefully read. When such instrumental records

ire carefully examined, from the time when they were first kept, which in a few cases goes back about 1 50 years, there is found no good evidence of any progressive change in temperature, or in the amount of rain and snow. Even when the most accurate instrumental records are available, care must be taken to inter- pret them correctly. Thus, if a rainfall or snowfall record of several years at some station indicates an apparent increase or decrease in the amount of precipitation, it does not necessarily follow that this means a permanent, progressive change in climate, which is to continue indefinitely. It may simply mean that there have been a few years of

somewhat more precipitation, and that a period of somewhat less precipitation is to follow.

Value of Evidence concerning Changes of Climate. — The body of facts which has been adduced as evidence of progressive changes of climate within historical times is not yet sufficiently large and complete to warrant any general correlation and study of these facts as a whole. But there are certain considera- tions which should be borne in mind in dealing with this evidence before any conclusions are reached. In the first place, changes in the distribution of certain fruits and cereals, and in the dates of the harvest, have often been accepted as undoubted evidence of changes in climate. Such a conclusion is by no means inevit- able, for many changes in the districts of cultivation of various crops have naturally resulted from the fact that these same crops are in time found to be more profitably grown, or more easily prepared for market, in another locality. In France, C. A. Angot has made a careful compilation of the dates of the vintage from the 14th, century down to the present time, and finds no support for the view so commonly held there that the climate has changed for the worse. At the present time, the average date of the grape harvest in Aubonne is exactly the same as at the close of the 16th century. After a careful study of the conditions of the date tree, from the 4th century, B.C., D. Eginitis concludes that the climate of the eastern portion of the Mediter- ranean basin has not changed appreciably during twenty-three centuries.

Secondly, a good many of the reports by explorers from little- known regions are contradictory. This shows the need of caution in jumping at conclusions of climatic change. An increased use of water for irrigation may cause the level of water in a lake to fall. Periodic oscillations, giving higher and then lower water, do not indicate progressive change in one direction. Many writers have seen a law in what was really a chance coincidence.

Thirdly, where a progressive desiccation seems to have taken place, it is often a question whether less rain is actually falling, or whether the inhabitants have less capacity and less energy than formerly. Is the change from a once cultivated area to a barren expanse the result of decreasing rainfall, or of the emigra- tion of the former inhabitants to other lands? The difference between a country formerly well irrigated and fertile, and a present-day sandy, inhospitable waste may be the result of a former compulsion of the people, by a strong governing power, to till the soil and to irrigate, while now, without that compulsion, no attempt is made to keep up the work. A region of deficient rainfall, once thickly settled and prosperous, may readily

become an apparently hopeless desert, even without the inter- vention of war and pestilence, if man allows the climate to master him. In many cases the reports of increasing dryness really concern only the decrease in the water supply from rivers and springs, and it is well known that a change in the cultivation of the soil, or in the extent of the forests, may bring about marked changes in the flow of springs and rivers without any essential change in the actual amount of rainfall.

Lastly, a region whose normal rainfall is at best barely sufficient for man's needs may be abandoned by its inhabitants during a few years of deficient precipitation, and not again occupied even when, a few years later, normal or excessive rainfall occurs.

Periodic Oscillations of Climate: Sun-spot Period.— The discovery of a distinct eleven-year periodicity in the magnetic phenomena of the earth naturally led to investigations of similar periods in meteorology. The literature on this subject has assumed large proportions. The results, however, have not been I

satisfactory. The problem is difficult and obscure. Fluctua- tions in temperature and rainfall, occurring in an eleven-year period, have been made out for certain stations but the varia- tions are slight, and it is not yet clear that they are sufficiently marked, uniform and persistent over large areas to make practical application of the periodicity in forecasting possible. In some cases the relation to sun-spot periodicity is open to debate; in others, the results are contradictory.

W. P. Koppen has brought forward evidence of a sun-spot period in the mean annual temperature, especially in the tropics, the maximum temperatures coming in the years of sun-spot minima. The whole amplitude of the variation in the mean annual temperatures, from sun-spot minimum to sun-spot maximum, is, however, only 1-3° in the tropics and a little less than 1° in the extra-tropics. More recently Nordmann (for the years 1870-1900) has continued Koppen's investigation.

In 1872 C. Meldrum, then Director of the Meteorological Observatory at Mauritius, first called attention to a sun-spot periodicity in rainfall and in the frequency of tropical cyclones in the South Indian Ocean. The latter are most numerous in years of sun-spot maxima, and decrease in frequency with the approach of sun-spot minima. Poey found later a similar relation in the case of the West Indian hurricanes. Meldrum's conclusions regarding rainfall were that, with

few exceptions, there is more rain in years of sun-spot maxima. S. A. Hill found it to be true of the Indian summer monsoon rains that there seems to be an excess in the first half of the cycle, after the sun-spot maximum. The winter rains of northern India, however, show the opposite relation; the minimum following, or coinciding with, the sun-spot maximum. Particular attention has been paid to the sun-spot cycle of rainfall in India, because of the close relation between famines and the summer monsoon rainfall in that country. Sir Norman Lockyer and Dr W. J. S. Lockyer have recently studied the variations of rainfall in the region surrounding the Indian Ocean in the light of solar changes in temperature. They find that India has two pulses of rainfall, one near the maximum and the other near the minimum of the sun-spot period. The famines of the last fifty years have occurred in the intervals between these two pulses, and these writers believe that if as much had been known in 1836 as is now known, the probability of famines at all the subsequent dates might have been foreseen.

Relations between the sun-spot period and various other meteorological phenomena than temperature, rainfall and tropical cyclones have been made the subject of numerous investigations, but on the whole the results are still too uncertain to be of any but a theoretical value. Some promising conclusions seem, however, to have been reached in regard to pressure variations, and their control over other climatic elements.

Briickner's 55 – Year Cycle. — Of more importance than the results thus far reached for the sun-spot period are those which clearly establish a somewhat longer period of slight fluctuations or oscillations of climate, known as the Bruckner cycle, after Professor Bruckner of Bern, who has made a careful investiga- tion of the whole subject of climatic changes and finds evidence of a 35-year periodicity in temperature and rainfall. In a cycle whose average length is 35 years, there comes a series of years which are somewhat cooler and also more rainy, and then a series of years which are somewhat warmer and drier. The interval in some cases is twenty years; in others it is fifty. The average interval between two cool and moist, or warm and dry, periods is about 35 years. The mean amplitude of the temperature fluctuation, based on large numbers of data, is a little less than 2 . The fluctuations in rainfall are more marked in interiors than on coasts. The general mean amplitude is 12 , or, ex- cluding exceptional districts, 24. Regions whose normal rainfall is small are most affected.

The following table shows the dates and characters of Bruckner's

periods: —

Warm 1746-1755 1791-1805 1821-1835 1851-1870 r- . .

Dry . 1756-1770 1781-1805 1826-1840 1856-1870

Cold . 1731-1745 1756-1790 1806-1820 1836-1850 1871-1885

Wet . 1736-1755 1771-1780 1806-1825 1841-1855 1871-1885

Interesting confirmation of Bruckner's 35-year period has been found by E. Richter in the variations of the Swiss glaciers, but as these glaciers differ in length, they do not all advance and retreat at the same time. The advance is seen during the cold and damp periods. Briickner has found certain districts in which the phases and epochs of the climatic cycle are exactly reversed. These exceptional districts are almost altogether limited to marine climates. There is thus a sort of compensation between oceans and continents. The rainier periods on the continents are accompanied by relatively low pressures, while the pressures are high and the period dry over the oceans and vice versa. The cold and rainy periods are also marked by a decrease in all pressure differences. It is obvious that changes in the general distribution of atmospheric pressures, over extended areas, are closely associated with fluctuations in temperature and rainfall. These changes in pressure distribution must in some way be associated with changes in the general circulation of the atmosphere, and these again must depend upon some external controlling cause or causes. W. J. S. Lockyer has called attention to the fact that there seems to be a periodicity of about 35 years in solar activity, and that this corresponds with the BrUckner period.

It is clear that the existence of a 35-year period will account for many of the views that have been advanced in favour of a progressive change of climate. A succession of a few years wetter or drier than the normal is likely to lead to the conclusion that the change is permanent. Accurate observations extending over as many years as possible, and discussed without prejudice, are necessary before any conclusions are drawn. Observations for one station during the wetter part of a cycle should not be compared with observations for another station during the drier part of the same, or of another cycle.

There are evidences of longer climatic cycles than eleven or 35 years.

Bruckner calls attention to the fact that sometimes two of his periods seem to merge into one. E. Richter shows much the same thing for the Alpine glaciers. Evidence of considerable climatic changes since the last glacial period is not lacking. But as yet nothing sufficiently definite to warrant general con- clusions has been brought forward.

Geological Changes in Climate. — Changes of climate in the geological past are known with absolute certainty to have taken place: periods of glacial invasion, as well as periods of mote genial conditions. The evidence, and the causes of these changes have been discussed and re-discussed, by writers almost without number, and from all points of view. Changes in the intensity of insolation; in the sun itself; in the conditions of the earth's atmosphere; in the astronomical relations of earth and sun; in the distribution of land and water; in the position of the earth's axis; in the altitude of the land; in the presence of volcanic dust; — now cosmic, now terrestrial conditions — have been suggested, combated, put forward again. None of these hypotheses has prevailed in preference to others. No actual proof of the correctness of this or that theory has been brought forward. No general agreement has been reached.

Conclusion. — Without denying the possibility, or even the probability, of the establishment of the fact of secular changes, there is as yet no sufficient warrant for believing in considerable permanent changes over large areas. Dufour, after a thorough study of all available evidence, has concluded that a change of climate has not been proved. There are periodic oscillations of slight amount. A 35-year period is fairly well established, but is nevertheless of considerable irregularity, and cannot as yet be practically applied in forecasting. Longer periods are suggested, but not made out. As to causes, variations in solar activity are naturally receiving attention, and the results thus far are promising. But climate is a great complex, and complete and satisfactory explanations of all the facts will be difficult, perhaps impossible, to reach. At present, indeed, the facts which call for explanation are still in most cases but poorly determined, and the processes at work are insufficiently under- stood. Climate is not absolutely a constant. The pendulum swings to the right and to the left. And its swing is as far to the right as to the left. Each generation lives through a part of

one, or two, or even three oscillations. A snapshot view of these oscillations makes them seem permanent. As Supan has well said, it was formerly believed that climate changes locally, but progressively and permanently. It is now believed that oscilla- tions of climate aire limited in time, but occur over wide areas.

Literature.— Scientific climatology is based upon numerical results, obtained by systematic, long continued, accurate meteoro- logical observations. The essential part of its literature is therefore found in the collections of data published by the various meteoro- logical services. The only comprehensive text-book of climatology is the Randbuch der Klimatologie of Professor Julius Hann, of the university of Vienna (Stuttgart, 1897). This is the standard book on the subject, and upon it is based much of the present article, and of other recent discussions of climate. The first volume deals with general climatology, and has been translated into English (London and New York, 1903). Reference should be made to this book for further details than are here given. The second and third volumes are devoted to the climates of the different countries of the world. Woeikof's Die Klimate der Erde (Jena, 1887) is also a valuable refer- ence book. The standard meteorological journal of the world, the Meteorologische Zeitschrift (Braunschweig, monthly), is indispensable to any one who wishes to keep in touch with the latest publications. The Quarterly Journal of the Royal Meteorological Society (London), Symons's Monthly Meteorological Magazine (London), and the Monthly Weather Review (Washington, D.C.) are also valuable. The newest and most complete collection of charts is that in the A Has of Meteorology (London, 1 899) , in which also there is an excellent working bibliography. For the titles of more recent publications reference may be made to the International Catalogue of Scientific Literature {Meteorology). (R. De C. W.)

Climate in the Treatment of Disease. — The most important qualities ' of the atmosphere in relation to health are (i.) the chemical composition, (ii.) the solids floating in it, (iii.) the mean and extreme temperatures, (iv.) the degree of humidity, (v,) the diathermancy, (vi.) the intensity of light, (vii.) the electrical conditions, (viii)the density and pressure, and (ix.) the prevailing winds. Generally speaking, the relative purity of the air — i.e. absence of septic solid particles— is an important consideration; while cold acts as a stimulant and tonic, increasing the amount of carbon dioxide exhaled in the twenty-four hours. Different individuals, however, react both to heat and cold very differently. At health resorts, where the temperature may vary between 55 and 70 F., strong individuals gradually lose strength and begin to suffer from various degrees of lassitude; whereas a delicate person: under the same conditions gains vigour both of mind and body, puts on weight, and is less liable to disease. And a corresponding intensity of cold acts in the reverse manner in each case. Thus a health resort with a moderate degree of heat is very valuable for delicate or elderly people, and those who are temporarily

weakened by illness. Cold, however, when combined with wind and damp must be specially avoided by the aged, the delicate, and those prone to gouty and rheumatic affections. The moisture of the atmosphere controls the distri- bution of warmth on the earth, and is closely bound up with the prevailing winds, temperature, light and pressure. In dry air the evaporation from both skin and lungs is increased, especially if the sunshine be plentiful and the altitude high. In warm moist air strength is lost and there is a distinct tendency to intestinal troubles. In moist cold air perspiration is checked, and rheumatic and joint affections are very common. The main differences between mountain air and that of the plains depend on the former being more rarefied, colder, of a lower absolute humidity, and offering less resistance to the sun's rays. As the altitude is raised, circulation and respiration are quickened, iprobably as an effort on the part of the organism to compensate for: the diminished supply of oxygen, and somewhat more gradually the number of red blood corpuscles increases, this increase persisting for a considerable time after a return to lower ground. In addition to these changes there is a distinct tendency to diminished proteid metabolism, resulting in an in- crease of weight owing to the storage of proteid in the tissues. Thus children and young people whose development is not yet complete are especially likely to benefit by the impetus given to growth and the blood-forming organs, and the therapeutic value in their case rarely fails. For older people, however, the benefit depends on whether their organs of circulation and respiration

are sufficiently vigorous to respond to the increased demands on them. For anaemia, pulmonary tuberculosis, pleural thicken- ing, deficient expansion of the lungs, neurasthenia, and 'the debility following fevers and malaria, mountain air is invaluable. But where there is valvular disease of the heart, or rapidly advancing disease of the lungs, it is to be avoided. Light, especially direct sunlight, is of primary importance, the lack of it tending to depression and dyspeptic troubles. Probably its germicidal power accounts for the aseptic character of the air of the Alps, the desert and other places.

Sir Hermann Weber has defined a " good " climate as that in which all the organs and tissues of the body are kept evenly at work in alternation with rest. Thus a climate with constant moderate variations in its principal factors is the best for the maintenance of health. But the best climate for an invalid depends on the particular

weakness from which he may suffer. Pulmonary tuberculosis stands first in the importance of the effects of climate. The continuous supply of pure fresh air is the main desideratum, a cool climate being greatly superior to a tropical one. Exposure to strong winds is harmful, since it increases the tendency to cough and thus leads to loss of body temperature, which is in its turn made up at the expense of increased metabolism. A high altitude, from the purity and stimulating properties of the air, is of value to many mild or very early cases, but where the disease is extensive, where the heart is irritable, or where there is any tendency to insomnia, high altitudes are contra-indicated, and no such patient should be sent higher than some 1 500 ft. Where the disease is of long standing, with much expectoration, or accompanied by albu- minuria, the patient appears to do best in a humid atmosphere but little above the sea-level. The climate of Egypt is especially suitable for cases complicated with bronchitis or bronchiectasis, but is contra-indicated where there is attendant diarrhoea. Madeira and the Canaries are useful when emphysema is present or where there is much irritability of constitution. Bronchitis in young people is best treated by high altitudes, but in older patients by a moist mild climate, except where much expectora- tion is present.

The influence of atmospheric conditions on the functions of the nose is very marked. Within the ordinary ranges of humidity and temperature the nasal mucous membrane completely saturates the air with aqueous vapour before it reaches the pharynx. In cold and dry mountain climates there is a very free nasal secretion, far beyond what is needed for the saturation of the air; and at low levels the reverse action takes place, the nose becoming ” stuffy.” The mechanism on which thir depends is found in the erectile tissue, and anything favouring the engorgement of the veins, such as weak heart action, chronic bronchitis or kidney troubles, &c, leads to a corresponding turgidity of the nose and sinuses. In addition to barometric and other influences, it has been found that light produces collapse of this tissue, smoke having a similar effect. On this latter effect probably depends the fact that many asthmatics are better in a city like London than elsewhere, the smoke relieving the turgescence of the inferior turbinals of the nose. In the treatment of pathological nasal conditions, all cases of obstruction from whatsoever cause are best in a dry atmosphere, and where there is atrophy and a deficient flow of mucus in a moist atmosphere. If the mucous membrane is irritable a dry sheltered spot on a sandy soil and in the neighbourhood of pine trees is by far the best.

Scrofulous children, namely, those in whom the resistance to micro-organisms and their products is low, pre-eminently require sea air,

and had better be educated at some seaside place. Where the child is very delicate, with small power of reaction, the winter should be passed on some mild coast resort. Gouty and rheumatic affections require a dry soil and warm dry climate, cold and moist winds being especially injurious.

For heart affections high altitudes are to be avoided, though some physicians make an exception of mitral cases where the compensation is good. Moderate elevations of 500 to 1500 ft. are preferable to the sea-level.

In diseases of the kidneys, a warm dry climate, by stimulating the action of the skin, lessens the work to be done by these organs, and thus is the most beneficial. Extremes of heat and cold and elevated regions are all to be avoided.

CLIMAX, JOHN (c. 525-600 a.d.), ascetic and mystic, also called Scholasticus and Sina'ites. After having spent forty years in a cave at the foot of mount Sinai, he became abbot of the monastery. His life has been written by Daniel, a monk belong- ing to the monastery of Raithu, on the Red Sea. He derives his name Climax (or Climacus) from his work of the same name (KXt/wi£ tpC HapadeLcrov, ladder to Paradise), in thirty sections, corresponding to the thirty years of the life of Christ. It is written in a simple and popular style. The first part treats of the vices that hinder the attainment of holiness, the second of the virtues of a Christian.

Editions. — J. P. Migne, Patrologia graeca, lxxxviii. (including the biography by Daniel); S. Eremites (Constantinople, 1883); see also C. Krumbacher, Geschichte der byzantinischen Litteratur (1897) ; Gass-Kriiger in Herzog-Hauck, Realencyklopddie fur protestantische Theologie, Bd. 9 (1901). The Ladder has been translated into several foreign languages—into English by Father Robert, Mount St Bernard's Abbey, Leicestershire (1856).

CLIMBING 1 FERN, the botanical genus Lygodium, with about twenty species, chiefly in the warmer parts of the Old World, of interest from its climbing habit. The plants have a creeping stem, on the upper face of which is borne a row of leaves. Each leaf has a slender stem-like axis, which twines round a support and bears leaflets at intervals; it goes on growing indefinitely. It is a favourite warm greenhouse plant.

CLINCHANT, JUSTIN (1820-1881), French soldier, entered the army from St Cyr in 1841. From 1847 to 1852 he was employed in the Algerian campaigns, and in 1854 and 1855 in the Crimea. At the

assault on the Malakoff (Sept. 8th, 1855) he greatly distinguished himself at the head of a battalion. During the 1859 campaign he won promotion to the rank of lieul.-colonel, and as a colonel he served in the Mexican War. He was made general of brigade in 1866, and led a brigade of the Army of the Rhine in 1870. His troops were amongst those shut up in Metz, and he passed into captivity, but soon escaped. The government of national defence made him general of division and put him at the head of the 20th corps of the Army of the East. He was under Bourbaki during the campaign of the Jura, and when Bourbaki attempted to commit suicide he succeeded to the command (Jan. 23rd, 1871), only to be driven with 84,000 men over the Swiss frontier at Pontarlier. In 1871 Clinchant commanded the 5th corps operating against the Commune. He was military governor of Paris when he died in 1881.

CLINIC; CLINICAL (Gr. kXLvt], a bed), an adjective strictly connoting association with the bedside, and so used in ecclesiology of baptism of the sick or dying, but more particularly in medicine to characterize its aspect as associated with practice on the living patient. Thus clinical experience is opposed to what is learnt from laboratory research or theoretical considerations. The substantive ” clinic ” is technically employed for a medical school or class where instruction is given in practical work as illustrated by the examination and treatment of actual cases of disease.

CLINKER, (1) (From an old Dutch word klinkaerd, from klinken, to ring), a hard paving brick, a brick with a vitrified surface, or a fused mass of brick; also the incombustible residue of coal, which occurs, half-fused into hard masses, in grates or furnaces; a fused mass of lava. (2) (From clvw.h, or clench, a common Teutonic word, meaning ” to fasten together “), a term appearing usually in the form ” clinker-built ” as opposed to ” cravel-built,” for a boat whose strakes overlap and are not fastened ” flush.”

CLINOCLASITE, a rare mineral consisting of the basic copper arsenate (CuOH) 3 As0 4 . It crystallizes in the monoclinic

1 The word ” climb ” (O.E. climban), meaning strictly to ascend (or similarly descend) by progressive self-impulsion, with some apparent degree of laborious effort and by means of contact with the surface traversed, is connected with the same root as in ” cleave ” and “cling.” For Alpine climbing, &c, see Mountaineering.

system and possesses a perfect cleavage parallel to the basal plane; this cleavage is obliquely placed with respect to the prism faces of the crystal, hence the name clinoclase or clino- clasite, from Gr. kKLvhv, to incline, and kK&v, to break. The crystals are deep blue in colour, and are usually radially arranged in hemispherical groups. Hardness 2J-3; specific gravity L-ifi. The mineral was formerly found with other copper arsenates in the mines of the St Day district of Cornwall. It has also bean found near Tavistock in Devonshire, near Sayda (or Saida) in Saxony, and in the Tintic district of Utah. It is a mineral of secondary origin, having resulted by the decomposition of copper ores and mispickel in the upper part of mineral veins. The corresponding basic copper phosphate, (CuOH) 3 PC>4, is the mineral pseudomalachite, which occurs as green botryoidal masses resembling malachite in appearance.

CLINTON, DE WITT (1 769-1828), American political leader, was born on the 2nd of March 1769 at Little Britain, Orange county, New York. His father, James Clinton (1736-1812), served as a captain of provincial troops in the French and Indian War, and as a brigadier-general in the American army in the War of Independence, taking part in Montgomery's attack upon Quebec in 1775, unsuccessfully resisting at Fort Montgomery, along the Hudson, in 1777 the advance of Sir Henry Clinton, accompanying General John Sullivan in 1779 in his expedition against the Iroquois in western New York, and in 1781 taking part in the siege of Yorktown, Virginia. De Witt Clinton graduated at Columbia College in 1 786, and in 1 790 was admitted to the bar. From 1790 to 1795 he was the private secretary of his uncle, George Clinton, governor of New York and a leader of the Republican party. He was a member of the New York assembly from January to April 1798, and in August of that year entered the state senate, serving until April 1802. He at once became a dominant factor in New York politics, and for the next quarter of a century he played a leading role in the history of the common- wealth. From 1801 to 1802 and from 1806 to 1807 he was a member of the Council of Appointment, and realizing the power this body possessed through its influence over the selection of a vast number of state, county and municipal officers, he secured in 1801, while his uncle was governor, the removal of a number of Federalist office-holders, in order to strengthen the Republican organization by new appointments. On this account Clinton has generally been regarded as the originator of the " spoils system " in New York; but he was really opposed to the wholesale proscription of opponents that became such a feature of American politics in later years. It was his plan to fill the more important offices

with Republicans, as they had been excluded from appointive office during the Federalist ascendancy, and to divide the smaller places between the parties somewhat in accordance with their relative strength. 1 In counties where the Federalists had a majority very few removals were made.

In 1802 Clinton became a member of the United States Senate, but resigned in the following year to become mayor of New York city, an office he held from 1803 to 1807, from 1808 to 18 10, and from 181 1 to 1815. During his mayoralty he also held other offices, being a member of the state senate from 1806 to 181 1 and lieutenant-governor from 1811 to 1813. In 1812, after a congressional caucus at Washington had nominated Madison for a second term, the Republicans of New York, desiring to break up the so-called Virginia dynasty as well as the system of con- gressional nominations, nominated Clinton for the presidency by a legislative caucus. Opponents of a second war with Great Britain had revived the Federalist organization, and Federalists from eleven states met in New York and agreed to support Clinton, not on account of his war views, which were not in accord with their own, but as a protest against the policy of Madison. In the election Clinton received 89 electoral votes and Madison 128.

As a member of the legislature Clinton was active in securing

1 In 1801 a state convention adopted an amendment to the con- stitution giving the council an equal voice with the governor in the matter of appointments; but Clinton, who is often represented as the father of this movement, though chosen as a member of the convention, did not attend its meetings.

the abolition of slavery and of imprisonment for debt, and in perfecting a system of free public schools. In 18 10 he was a member of a commission to explore a route for a canal between Lake Erie and the Hudson river, and in 181 1 he and Gouverneur Morris were sent to Washington to secure Federal aid for the andertaking, but were unsuccessful. The second war with Great Britain prevented any immediate action by the state, but in 1816 Clinton was active in reviving the project, and a new commission was appointed, of which he became president. His connexion with this work so enhanced his popularity that he was chosen governor by an overwhelming majority and served for two triennial terms (1817-1823). As governor he devoted his energies to the construction of the canal, but the opposition to his admin- istration, led by Martin Van Buren and Tammany Hall, became so formidable by 1822 that he declined to

seek a third term. His successful opponents, however, overreached themselves when in 1824 they removed him from the office of canal commissioner. This partisan action aroused such indignation that at the next election he was again chosen governor, by a large majority, and served from 1825 until his death. As governor he took part in the formal ceremony of admitting the waters of Lake Erie into the canal in October 1825, and thus witnessed the completion of a work which owed more to him than to any other man. Clinton died at Albany, N.Y., on the nth of February 1828. In addition to his interest in politics and public improvements, he devoted much study to the natural sciences; among his published works are a Memoir on the Antiquities of Western New York (1818), and Letters on the Natural History and Internal Resources of New York (1822).

See J. Renwick's Life of De Witt Clinton (New York, 1845); D. Hosack's Memoir of De Witt Clinton (New York, 1829) ; W. W. Campbell's Life and Writings of De Witt Clinton (New York, 1849) ; and H. L. McBain's De Witt Clinton and the Origin of the Spoils System in New York (New York, 1907).

CLINTON, GEORGE (1739-1812), American soldier and political leader, was born at Little Britain, Ulster (now Orange) county, New York, on the 26th of July 1739. His father, Charles Clinton (1690-1773), who was born of English parents in Co. Longford, Ireland, emigrated to America in 1729, and commanded a regiment of provincial troops in the French and Indian War. The son went to sea at the age of sixteen, but, finding the sailor's life distastefuljoined his father's regiment and accompanied him as lieutenant in the expedition against Fort Frontenac in 1758. After the war he practised law in his native town and held a number of minor civil offices in Ulster county. From 1768 to 1775 he sat in the New York provincial assembly, and in the controversies with. Great Britain zealously championed the colonial cause. In 1774 he was a member of the New York committee of correspondence, and in 1775 was chosen a member of the second Continental Congress. In December of this year he was appointed a brigadier-general of militia by the New York provincial congress, and in the following summer, being ordered by Washington to assist in the defence of New York, he left Philadelphia shortly after voting for the Declaration of Inde- pendence, but too soon to attach his signature to that document. He had also been chosen a deputy to the provincial congress (later the state convention) for 1776-1777, but his various other duties prevented his attendance.

General Clinton took part in the battle of White Plains (October 28th, 1776), and later was charged with the defence of the High- lands of

the Hudson, where, with De Witt Clinton, in October 1777, he offered a firm but unsuccessful resistance to the advance of Sir Henry Clinton. In March of this year he had been appointed by Congress a brigadier-general in the Continental army, and he thus held two commissions, as the state convention refused to accept his resignation as brigadier-general of militia. So great was Clinton's popularity at this time that at the first election under the new state constitution he was chosen both governor and lieutenant-governor; he declined the latter office, and on the 30th of July 1777 entered upon his duties as governor, which were at first largely of a military nature. In 1 780 he took the field and checked the advance of Sir John Johnson and the

Indians in the Mohawk Valley. In his administration Clinton was energetic and patriotic, and though not possessing the intellectual attainments of some of his New York contemporaries, he was more popular than any of them, as is attested by his serivice as governor for eighteen successive years (1777-1795), and for another triennial term from 1801 to 1804. In the elections of 1780, 1783 and 1786 he had no opponent. In 1800- 1801 he was a member of the assembly. In the struggle in New York over the adoption of the Federal Constitution he was one of the leaders of the opposition, but in the state convention of 1788, over which he presided, 'his party was defeated, and the constitution was ratified. In national politics he was a follower of Thomas Jefferson, and in state politics he led the faction known as " Clintonians," which was for a long time dominant. In 1789, 1792 and 1 796 Clinton received a number of votes in the electoral college, but not a sufficient number to secure him the vice- presidency, which was then awarded to the recipient of the second highest number of votes. In 1804, however, after the method of voting had been changed, he was nominated for the vice-presi- dency by a Congressional caucaus, and was duly elected. In 1808 he sought nomination for the presidency, and was greatly dis- appointed when this went to Madison. He was again chosen as vice-president, however, and died at Washington before the expiration of his term, on the 20th of April 181 2. He was buried in the Congressional Cemetery, from which in May 1908 his remains were transferred to Kingston, N.Y. His casting vote in the Senate in 181 1 defeated the bill for the renewal of the charter of the Bank of the United States.

The Public Papers of George Clinton (6 vols., New York, 1899- 1902) have been published by the state of New York.

CLINTON, SIR HENRY (c. 1738-1795), British general, was the son of admiral George Clinton (governor of Newfoundland and subsequently of New York), and grandson of the 6th earl of Lincoln. After serving in the New York militia, he came to England and joined the Coldstream Guards. In 1758 he became captain and lieutenant-colonel in the Grenadier Guards, and in 1760-62 distinguished himself very greatly as an aide-de-camp to Ferdinand of Brunswick in the Seven Years' War. He was promoted colonel in 1762, and after the peace received the colonelcy of a regiment of foot, becoming major-general in 1772. From 1772 to 1784, thanks to the influence of his cousin, the 2nd duke of Newcastle, he had a seat in parliament, first for Borough-bridge and subsequently for Newark, but for the greater part of this time he was on active service in America in the War of Independence. He took part in the battles of Bunker Hill and Long Island, subsequently taking possession of New York. For his share in the battle of Long Island he was made a lieutenant- general and K.B. After Saratoga he succeeded Sir William Howe as commander-in-chief in North America. He had already been made a local general. He at once concentrated the British forces at New York, pursuing a policy of foraying expeditions in place of regular campaigns. In 1779 he invaded South Carolina, and in 1780 in conjunction with Admiral M. Arbuthnot won an important success in the capture of Charleston. Friction, however, was constant between him and Lord Cornwallis, his second in command, and in 1782, after the capitulation of Corn-wallis at York town, he was superseded by Sir Guy Carle ton. Returning to England, he published in 1783 his Narrative of the Campaign of 17 81 in North America, which provoked an acri-monious reply from Lord Cornwallis. He was elected M.P. for Launceston in 1790, and in 1794 was made governor of Gibraltar, where he died on the 23rd of December 1795.

His elder son, Sir William Henry Clinton (1769-1846), entered the British army in 1784, and served in the campaigns of 1793-94 in the Low Countries. In 1796 he became aide-de-camp to the duke of York, and in 1799 he was entrusted with a mission to the Russian army in Italy, returning to the duke in time for the Dutch expedition of 1799. He was promoted colonel in 1801, and took part in the expedition which took possession of Madeira, which he governed up to 1802. His next important service was in 1807, when he went to Sweden on a military mission. Pro- moted major-general in 1808, he served from 1812 to 1814 in the

Mediterranean and in Catalonia, and in the latter year he com-manded against Marshal Suchet. He had become a lieutenant- general in 1813, and in 181 5 he was made a G.C.B. He com- manded the

British troops inPortugal, 1826-28, and was promoted full general in 1830. He died at Cockenhatch, near Royston, Herts, on the 15th of February 1846.

The younger son, Sir Henry Clinton (1771-1829), entered the army in 1787 and saw some service with the Prussians in Holland in 1789. He served on the staff of the duke of York in 1793-94, becoming brevet-major in 1794, and lieutenant-colonel of a line regiment in 1796. In 1797-98 he was aide-de-camp to Lord Cornwallis in the Irish rebellion, and in 1799 he was sent with Lord William Bentinck to the Russian headquarters in Italy, being present at the Trebbia, at Novi, and in the fighting about the St Gotthard. During a short period of service in India Clinton distinguished himself at Laswari. He accompanied the Russian headquarters in the Austerlitz campaign, and was adjutant-general to his intimate friend, Sir John Moore, in the Corunna campaign of 1808-9. Promoted major-general in 1810, he returned to the Peninsula to fill a divisional command under Wellington in 1811. His division played a notable part in the capture of the forts at Salamanca and in the battle of Salamanca (181 2), and he was given the local rank of lieutenant-general early in 1813. For his conduct at Vitoria he was made a K.B., and he took his part in the subsequent victories of the Nive, Orthes and Toulouse. At the end of the war he was made a lieutenant- general and inspector-general of infantry. Clinton commanded a division with distinction at Waterloo. He died on the nth of December 1829.

CLINTON, HENRY FYNES (1781-1852), British classical scholar and chronologist, was born at Gamston in Nottingham- shire on the 14th of January 1781. He was descended from Henry, second earl of Lincoln; for some generations his family bore the name of Fynes, but his father resumed the older family name of Clinton in 182 1. He was educated at Westminster school and Christ Church, Oxford, where he studied classical literature and history. From 1806 to 1826 he was M.P. for Aldborough. He died at Welwyn, Herts, where he had purchased the residence, and estate of the poet Young, on the 24th of October 1852. His reading was extraordinarily methodical (see his Literary Remains). The value of his Fasti, which set classical chronology on a scientific basis, can scarcely be over- estimated, even though subsequent research has corrected some of his conclusions.

His chief works are: Fasti Hellenici, the Civil and Literary Chronology of Greece from the 55th to the 124th Olympiad (1824-1851), including dissertations on points of Greek history and Scriptural chronology; and Fasti Romani, the Civil and Literary Chronology of Rome and Constantinople from the Death of Augustus to the Death of

Heraclius (1845-1850). In 1851 and 1853 respectively he published epitomes of the above. The Literary Remains of H. F. Clinton (the first part of which contains an autobiography written in 1818) were edited by C. J. F. Clinton in 1854.

CLINTON, a city and the county-seat of Clinton county, Iowa, U.S.A., on the Mississippi river, in the extreme eastern part of the state. Pop. (1890) 13,619; (1900) 22,698 (5434 being foreign- born,); (1905) 22,756; (1910)25,577. The great increase during the decade 1890-1900 was partly due to the absorption by Clinton in 1895 of the city of Lyons (pop. in 1890, 5700). Clinton is served by the Chicago & North-Western (which has machine- shops here), the Chicago, Burlington & Quincy, the Chicago, Milwaukee & St Paul, and the Chicago, Rock Island & Pacific railways, and is connected with Davenport by an electric line. The river is spanned here by a railway bridge. A large portion of the city stands between the river and a series of bluffs. Clinton is the seat of Wartburg College (1869), a German Evangelical Lutheran institution, and of the Clinton Business College. Among the public buildings are the city hall, the court-house, the Federal building and the Carnegie library. As a manu- facturing centre Clinton has considerable importance; among its manufactures are furniture, blinds, wire-cloth, papier-machfe goods, gas-engines, farm wagons, harness and saddlery, door locks, pressed brick, flour, and glucose products. There is also

a large sugar refinery. The value of the factory product in 1900 was $6,203,316; in 1905, $4,906,355. The American Protective Association (A.P.A.),a secret order opposed to Roman Catholi- cism, was formed here in 1887. The city was founded in 1855 by the Iowa Land Company, and was incorporated first in 1857, and again in 1867, this time under a general law of the state for the incorporation of cities. The county, from which the city took its name, was named in honour of De Witt Clinton.

CLINTON, a township of Worcester county, Massachusetts, U.S.A., in the central part of the state, on the Nashua river, about 15 m. N.N.E. of Worcester. Pop. (1890) 10,424; (1900) 13,667, of whom 5504 were foreign-born; (1910, U. S. census) 13,075. The township is traversed by the Boston & Maine, and New York, New Haven & Hartford railways. It contains 7 sq. m. of varied and picturesque hilly country on the E. slope of the highland water-parting between the Connecticut river and the Atlantic. There is charming scenery along the Nashua river, the chief stream. The S.W. corner of the township is now part of

an immense water reservoir, the Wachusett dam and reservoir (excavated 1896-1905; circumference, 35-2 m.), on the S. branch of the Nashua, which will hold 63,000 million gallons of water for the supply of the metropolitan region around Boston. On this is situated the village of Clinton, which has large manufactories, among whose products are cotton and woollen fabrics, carpets, wire-cloth, iron and steel, and combs. The textile and carpet mills are among the most famous in the United States. In 1 905 the total factory product of the township was valued at $5,457,865, the value of cotton goods, carpets and wire-work constituting about nine-tenths of the total. The prominence of the township as a manufacturing centre is due to Erastus Brigham Bigelow (1814-1879), one of the incorporators of the Massachusetts Institute of Technology, who devised power-looms for the weaving of a variety of figured fabrics, — coach-lace, counterpanes, ginghams, silkbrocatel, tapestry carpeting, ingrain and Brussels carpets, — and revolu- tionized their manufacture. In 1843 he and his brother Horatio N. Bigelow established in Clinton the Lancaster Mills for. the manufacture of ginghams. From 1845 to 1851 he perfected his loom for the weaving of Brussels and Wilton carpets, the greatest of his inventions; and he established the Bigelow Carpet Mills here. He also invented the loom for the weaving of wire-cloth. It is claimed that the first production in the United States of finished cotton cloths under one roof and under the factory system was not at Waltham in 1816, but at Clinton in 1813; neither place was the first to spin by power, nor the first to produce finished cloths without the factory system. The comb industry dates from the eighteenth century. The first of the modern textile mills were established in 1838 for the manu- facture of coach-lace. Clinton was a part of Lancaster, now a small farming township (pop. in 1910, 2464), until 1850, when it was set off as an independent township. The earliest settle- ment goes back to 1645.

See A. E. Ford, History of the Origin of the Town of Clinton, Massachusetts, 1653-1865 (Clinton, 1896).

CLINTON, a city and the county-seat of Henry county, Missouri, U.S.A., on the Grand river, 87 m. S.E. of Kansas City. Pop. (1890) 4737; (1900) 5061 (470 being negroes); (1910)4992. It is served by the St Louis & San Francisco, the Missouri, Kansas & Texas, and the Kansas City, Clinton & Springfield railways. The city is situated on the border of a rolling prairie about 770 ft. above the sea. The vicinity abounds in coal, but is principally agricultural, and Clinton's chief interest is in trade with it. The principal manufactures are flour and pottery. Clinton was laid out in 1836 and was incorporated in 1865.

CLINTON, a village of Oneida county, New York, U.S.A., on the Oriskany Creek, about 9 m. S.W. of Utica. Pop. (1890) 1269; (1900) 1340; (1905) 1315; (1910) 1236. It is served by the New York, Ontario & Western railway, and is connected with Utica by an electric line. Several fine mineral springs in the vicinity have given Clinton some reputation as a health resort. There are iron mines, blast furnaces, and iron smelters. Clinton is the seat of Hamilton College (non-sectarian), which

was opened as the Hamilton Oneida Academy in 1798, and was chartered under its present name in 181 2. It was founded by the Rev. Samuel Kirkland (1 741-1808), a missionary among the Oneida Indians; its corner-stone was laid by Baron Steuben; its shade trees were furnished by Thomas Jefferson; and its name was received from Alexander Hamilton, one of its early trustees. It had in 1907-1008 20 instructors, 178 students, and a library of 47,000 volumes and 30,000 pamphlets. At Clinton are also excellent minor schools. Litchfield Observatory is connected with the college, and was long in charge of the well- known astronomer, Christian H. F. Peters (1813-1890), who discovered here more than 40 asteroids and made extensive investigations concerning comets. The village was settled about 1786 by pioneers from New England, was named in honour of George Clinton, and was incorporated in 1842.

CLINTONITE, a group of micaceous minerals known as the ” brittle micas.” Like the micas and chlorites, they are mono- clinic in crystallization and have a perfect cleavage parallel to the fiat surface of the plates or scales, but differ markedly from these in the brittleness of the laminae; they are also considerably harder, the hardness of chloritoid being as high as 6| on Mohs’ scale. They differ chemically from the micas in containing less silica and no alkalis, and from the chlorites in containing much less water; in many respects they are intermediate between the micas and chlorites.

The following species are distinguished : —

Margarite is a basic calcium aluminium silicate, H 2 CaAl4Si 2 0i 2 , and is classed by some authors as a lime-mica. It forms white pearly scales, and was at first known as pearl-mica and after- wards as margarite, from napyaplrqs , a pearl. It is a character- istic associate of corundum, of which it is frequently an alteration product (facts which suggested the synonymous names corun- dellite and emery lite), and is found in the emery deposits of Asia Minor and the Grecian

Archipelago, and with corundum at several localities in the United States.

Seybertile, Brandisite and Xantkophyllite are closely allied species consisting of basic magnesium, calcium and aluminium silicate, and have been regarded as isomorphous mixtures of a silicate (H 2 CaMg4Si 3 0i 2) and an aluminate (H 2 CaMgAl s Oi 2). Seybertite (the original clintonite) occurs as reddish-brown to copper-red, brittle, foliated masses in metamorphic limestone at Amity, New York; brandisite as yellowish-green hexagonal prisms in metamorphic limestone in the Fassathal, Tirol; xantho- phyllite as yellow folia and as distinct crystals (waluewite) in chloritic schists in the Urals.

Chloritoid has the formula H 2 (Fe,Mg)Al 2 Si07. It forms tabular crystals and scales, with indistinct hexagonal outlines, which are often curved or bent and aggregated in rosettes. The colour is dark grey or green; a characteristic feature is the pleochroism, the pleochroic colours varying from yellowish- green to indigo-blue. Hardness, 6J; specific gravity, 3-4-3-6. It occurs as isolated scales scattered through schistose rocks and phyllites of dynamo-metamorphic origin. The ottrelites of the phyllites and ottrelite-schists of Ottrez and other localities in the Belgian Ardennes is a manganiferous variety of chloritoid, but owing to enclosed impurities the analyses differ widely from those of typical chloritoid. (L. J. S.)

CLISSON, OLIVIER DE (1336-1407), French soldier, was the son of the Olivier de Clisson who was put to death in 1343 on the suspicion of having wished to give up Nantes to the English. He was brought up in England, where his mother, Jeanne de Belleville, had married her second husband. On his return to Brittany he took arms on the side of de Montfort, distinguishing himself at the battle of Auray (1364), but in consequence of differences with Duke John IV. went over to the side of Blois. In 1370 he joined Bertrand du Guesclin, who had lately become constable of France, and followed him in all his campaigns against the English. On the death of du Guesclin Clisson received the constable's sword (1380). He fought with the citizens of Ghent, defeating them at Roosebek (1382), later on commanded the army in Poitou and Flanders (1389), and made an unsuccessful attempt to invade England. On his return to Paris, in 1392,

an attempt was made to assassinate him by Pierre de Craon, at the instigation of John IV. of Brittany. In order to punish the latter, Charles VI., accompanied by the constable, marched on Brittany, but it was on this expedition that the king was seized with madness. The uncles of Charles VI. took proceedings against Clisson, so that he had to take refuge in Brittany. He was reconciled with John IV., and after the duke's death, in 1399, he became protector of the duchy, and guardian of the young princes. He had gathered vast wealth before his death on the 23rd of April 1407.

CLISSON, a town of western France, in the department of Loire-Inferieure, prettily situated at the confluence of the Sevre Nantaise and the Moine 17 m. S.E. of Nantes by rail. Pop. (1906) 2244. The town gave its name to the celebrated family of Clisson, of which the most famous member was Olivier de Clisson. It has the imposing ruins of their stronghold, parts of which date from the 13 th century. The town and castle were destroyed in 1792 and 1793 during the Vendean wars. The sculptor F. F. Lemont afterwards bought the castle, and the town was rebuilt in the early part of the 19th century according to his plans. There are picturesque parks on the banks of the rivers. The Moine is crossed by an old Gothic bridge and by a fine modern viaduct.

CLITHEROE, a market town and municipal borough in the Clitheroe parliamentary division of Lancashire, England, 220 m. N.N.W. from London and 35 m. N. by W. from Manchester, on the Lancashire & Yorkshire railway. Pop. (1901) 11,414. It is finely situated in the valley of the Ribble, at the foot of Pendle Hill, a steep plateau-like mass rising to 183 1 ft. The church of St Mary Magdalene, though occupying an ancient site, is wholly modernized. There are a grammar school, founded in 1554, and a technical school. On a rocky elevation commanding the valley stands the keep and other fragments of a Norman castle, but part of the site is occupied by a modern mansion. The industrial establishments comprise cotton-mills, print-works, paper-mills, foundries, and brick and lime works. The corpora- tion consists of a mayor, 4 aldermen and 12 councillors. Area, 2385 acres.

Stonyhurst College, 5 m. S.W. of Clitheroe, is the principal establishment in England for Roman Catholic students. The Jesuits of St Omer, after emigrating to Bruges and Liege, were disorganized by the revolutionary troubles at the close of the 18th century, and a large body came to England, when Thomas Weld, in 1795, conferred his property of Stonyhurst upon them. The fine and extensive buildings, of which the nucleus is a mansion of the 17th century, contain a

public school for boys and a house of studies for Jesuit ecclesiastics, while there is a preparatory school at a short distance. Every branch of study is prosecuted, the college including such institutions as an observatory, laboratories and farm buildings.

The Honour of Clitheroe, the name of which is also .written Clyderhow and Cletherwoode, was first held by Roger de Poictou, who was almost certainly the builder of the castle, which was dismantled in 1649. He granted it to Robert de Lacy, in whose family it remained with two short intervals until it passed by marriage to Thomas, earl of Lancaster, in 13 10. It formed part of the duchy of Lancaster till Charles H. at the Restoration bestowed it on General Monk, from whose family it descended through the house of Montague to that of Buccleuch. The Clitheroe Estate Company are the present lords of the Honour. The first charter was granted about 1283 to the burgesses by Henry de Lacy, second earl of Lincoln, confirming the liberties granted by the first Henry de Lacy, who is therefore sometimes said, although probably erroneously, to have granted a charter about 1 147. The 1283 charter was confirmed by Edward III. in 1346, Henry V. in 1413-1414, Henry VIII. in 1542, and James I. in 1604. Of the fairs, those on December 7th to 9th and March 24th to 26th are held under a charter of Henry IV. in 1409. A weekly market has been held on Saturday since the Conqueror's days. In 1558 the borough was granted two members of parlia- ment, and continued to return them till 1832, when the number was reduced to one. Under the Redistribution Act of 1885 the

borough was disfranchised. The municipal government was formerly vested in an in-bailiff and an out-bailiff elected annually from the in and out burgesses. A court-leet and court-baron used to be held half-yearly, but both are now obsolete. The present corporation governs under the Municipal Corporation Act (1837). There was a church or chapel here in early times, and a chaplain is mentioned in Henry II. 's reign.

CLITOMACHUS, Greek philosopher, was a Carthaginian originally named Hasdrubal, who came to Athens about the middle of the 2nd century b.c. at the age of twenty-four. He made himself well acquainted with Stoic and Peripatetic philo- sophy; but he studied principally under Carneades, whose views he adopted, and whom he succeeded as chief of the New Academy in 129 B.C. He made it his business to spread the knowledge of the doctrines of Carneades, who left nothing in writing himself. Clitomachus' works were some four hundred in number; but we possess scarcely anything but a few titles, among which are De suslinendis assensionib'us (Hepl iiroxys, " on

suspension of judgment “) and Hepi alpe&wv (an account of various philo- sophical sects). In 146 he wrote a treatise to console his country- men after the ruin of their city, in which he insisted that a wise man ought not to feel grieved at the destruction of his country. Cicero highly commends his works and admits his own debt in the Academics to the treatise Uepl exoxijs. Parts of Cicero’s De Natura and De Divinatione, and the treatise De Fato are also in the main based upon Clitomachus.

See E. Wellmann in Ersch and Gruber’s Allgemeine Encyclopadie ; R. Hirzel, Untersuchungen zu Ciceros philosophischen Schriften, i. (1877); Diog. Laert. iv. 67-92; Cicero, Acad. Pr. ii. 31, 32, and Tusc. iii. 22 ; and article Academy, Greek.

CLITUMNUS, a river in Umbria, Italy, which rises from a very abundant spring by the road between the ancient Spoletium and Trebia, 8 m. from the former, 4 m. from the latter, and after a short course through the territory of the latter town joins the Tinia, a tributary of the Tiber. The spring is well described by Pliny (Epist. viii. 8) : it was visited by Caligula and by Honorius, and is still picturesque — a clear pool surrounded by poplars and weeping willows. The stream was personified as a god, whose ancient temple lay near the spring, and close by Other smaller shrines; the place, therefore, occurs under the name Sacraria (the shrines) as a Roman post station. The building generally known as the Tempio di Clitunno, close to the spring, is, however, an ancient tomb, converted into a Christian church in the early middle ages, the decorative sculptures, which are obviously contemporary with those of S. Salvatore at Spoleto, belonging to the 4th or 6th century according to some authorities, to the 1 2th according to others.

See H. Grisar, Nuovo bullettino di archeologia cristiana (Rome, 1895) i. 127; A. Venturi, Storia dell’ arte italiana (Milan, 1904), iii. 9°3-

CLIVE, CAROLINE (1801-1873), English authoress, was born in London on the 24th of June 1801, the daughter of Mr Meysey- Wigley, M.P. for Worcester. She married, in 1840, the Rev. Archer Clive. She published, over the signature ” V.,” eight volumes of poetry, but is best known as the author of Paul Ferroll (1855), a sensational novel, and Why Paul Ferroll killed his Wife (i860). She died on the 13th of July 1873, at Whit- field, Herefordshire.

CLIVE, CATHERINE [Kitty] (1711-1785), British actress, was born, probably in London, in 1711. Her father, William Raftor, an Irishman of good family but small means, had held a captain’s commission in

the French army under Louis XIV. From her earliest years she showed a talent for the stage, and about 1728 became a member of the company at Drury Lane, of which Colley Cibber was then manager. Her first part was that of the page Ismenes (" with a song ") in the tragedy Mithri- dates. Shortly afterwards she married George Clive, a barrister and a relative of the 1st Lord Clive, but husband and wife soon separated by mutual consent. In 173 1 she definitely established her reputation as a comic actress and singer in Charles Coffey's farce-opera adaptation, The Devil to Pay, and from this time she was always a popular favourite. She acted little outside Drury Lane, where in 1747 she became one of the original

members of Garrick's company. She took part, however, in some of the oratorios of Handel, whose friend she was. In 1769, having been a member of Garrick's company for twenty-two years, she quitted the stage, and lived for sixteen years in retirement at a villa at Twickenham, which had been given her some time previously by her friend Horace Walpole. Mrs Clive had small claim to good looks, but as an actress of broad comedy she was unreservedly praised by Goldsmith, Johnson and Garrick. She had a quick temper, which on various occasions involved her in quarrels, and at times sorely tried the patience of Garrick, but her private life remained above suspicion, and she regularly supported her father and his family. She died at Twickenham on the 6th of December 1785. Horace Walpole placed in his garden an urn to her memory, bearing an inscription, of which the last two lines run:

" The comic muse with her retired And shed a tear when she expired."

See Percy Fitzgerald, Life of Mrs Catherine Clive (1888) ; W. R. Chetwood, General History of the Stage (1749); Thomas Davies, Memoirs of the Life of David Garrick (1784).

CLIVE, ROBERT CLIVE, Baron (1725-1774), the statesman and general who founded the empire of British India, was born on the 29th of September 1725 at Styche, the family estate, in the parish of Moreton Say, Market Drayton, Shropshire. We learn from himself, in his second speech in the House of Commons in 1773, that as the estate yielded only £500 a year, his father followed the profession of the law also. The Clives, or Clyves, were one of the oldest families in the county of Shropshire, having held the manor of that name in the reign of Henry

II. One Clive was Irish chancellor of the exchequer under Henry VIII.; another was a member of the Long Parliament; Robert's father for many years represented Montgomeryshire in parlia- ment. His mother, to whom he was tenderly attached, an'd who had a powerful influence on his career, was a daughter, and with her sister Lady Sempill co-heir, of Nathaniel Gaskell of Man- chester. Robert was their eldest son. With his five sisters, all of whom were married in due time, he ever maintained the most affectionate relations. His only brother survived to 1825.

Young Clive was the despair of his teachers. Sent from school to school, and for only a short time at the Merchant Taylors' school, which then as now had a high reputation, he neglected his books for perilous adventures. But he was not so ignorant as his biographers represent. He could read Horace in after life ; and he must have laid in his youth the foundation of that clear and vigorous English style which marked all his despatches, and made Lord Chatham declare of one of his speeches in the House of Commons that it was the most eloquent he had ever heard. From his earliest years, however, his ambition was to lead his fellows; but he never sacrificed honour, as the word was then understood, even to the fear of death. At eighteen he was sent out to Madras as a " factor " or " writer " in the civil service of the East India Company. The detention of the ship in Brazil for nine months enabled him to acquire the Portuguese language, which, at a time when few or none of the Company's servants learned the vernaculars of India, he often found of use. For the first two years of his residence he was miserable. He felt keenly the separation, from home; he was always breaking through the restraints imposed on young " writers "; and he was rarely out of trouble with his fellows, with one of whom he fought a duel. Thus early, too, the effect of the climate on his health began to show itself in those fits of depression during one of which he afterwards prematurely ended his life. The story is told of him by his companions, though he himself never spoke of it, that he twice snapped a pistol at his head in vain. His one solace was found in the governor's library, where he sought to make up for past carelessness by a systematic course of study. He was just of age, when in 1746 Madras was forced to capitulate to Labour- donnais during the War of the Austrian Succession. The breach of that capitulation by Dupleix, then at the head of the French settlements in India, led Clive, with others, to escape from the town to the subordinate Fort St David, some 20 m. to the south. There, disgusted with the state of affairs and the purely com-

mercial duties of an East Indian civilian, as they then were, Clive obtained an ensign's commission.

At this time India was ready to become the prize of the first conqueror who to the dash of the soldier added the skill of the administrator. For the forty years since the death of the emperor Aurangzeb, the power of the Great Mogul had gradually fallen into the hands of his provincial viceroys or subadhars. The three greatest of these were the nawab of the Deccan, or south and central India, who ruled from Hyderabad, the nawab of Bengal, whose capital was Murshidabad, and the nawab or wazir of Oudh. The prize lay between Dupleix, who had the genius of an administrator, or rather intriguer, but was no soldier, and Clive, the first of a century's brilliant succession of those " soldier-politicals," as they are called in the East, to whom Great Britain owes the conquest and consolidation of its greatest dependency. Clive successively established British ascendancy against French influence in the three great provinces under these nawabs. But his merit lies especially in the ability and foresight with which he secured for his country, and for the good of the natives, the richest of the three, Bengal. First, as to Madras and the Deccan, Clive had hardly been able to commend himself to Major Stringer Lawrence,the commander of the British troops, by his courage and skill in several small engagements, when the peace of Aix-la-Chapelle (1748) forced him to return to his civil duties for a short time. An attack of the malady which so severely affected his spirits led him to visit Bengal, where he was soon to distinguish himself. On his return he found a contest going on between two sets of rival claimants for the position of viceroy of the Deccan, and for that of nawab of the Carnatic, the greatest of the subordinate states under the Deccan. Dupleix, who took the part of the pretenders to power in both places, was carrying all before him. The British had been weakened by the withdrawal of a large force under Admiral Boscawen, and by the return home, on leave, of Major Lawrence. But that officer had appointed Clive commissary for the supply of the troops with provisions, with the rank of captain. More than one disaster had taken place on a small scale, when Clive drew up a plan for dividing the enemy's forces, and offered to carry it out himself. The pretender, Chanda Sahib, had been made nawab of the Carnatic with Dupleix's assistance, while the British had taken up the cause of the more legitimate successor, Mahommed Ali. Chanda Sahib had left Arcot, the capital of the Carnatic, to reduce Trichinopoly, then held by a weak English battalion. Clive offered to attack Arcot in order to force Chanda Sahib to raise the siege of Trichinopoly. But Madras and Fort St David could supply him with only 200 Europeans and 300 sepoys. Of the eight officers who led them, four were civilians like Clive himself, and six had never been in action. His force had but three field-pieces. The circumstances that Clive, at the head of this handful, had been seen

marching during a storm of thunder and lightning, frightened the enemy into evacuating the fort, which the British at once began to strengthen against a siege. Clive treated the great population of the city with so much consideration that they helped him, not only to fortify his position, but to make successful sallies against the enemy. As the days passed on, Chanda Sahib sent a large army under his son and his French supporters, who entered Arcot and closely besieged Clive in the citadel.

Macaulay gives the following brilliant account of the siege: — ” Raja Sahib proceeded to invest the fort, which seemed quite incapable of sustaining a siege. The walls were ruinous, the ditches dry, the ramparts too narrow to admit the guns, and the battle- ments too low to protect the soldiers. The little garrison had been greatly reduced by casualties. It now consisted of 120 Europeans and 200 sepoys. Only four officers were left, the stock of provisions was scanty, and the commander who had to conduct the defence under circumstances so discouraging was a young man of five and twenty, who had been bred as a book-keeper. During fifty days the siege went on, and the young captain maintained the defence with a firmness, vigilance and ability which would have done honour to the oldest marshal in Europe. The breach, however, increased day by day. Under such circumstances, any troops so scantily provided with officers might have been expected to show signs of insubor- dination; and the danger was peculiarlyˆ great in a force composed of men differing widely from each other in extraction, colour, language,

manners and religion. But the devotion of the little band to its chief surpassed anything that is related of the Tenth Legion of Caesar, or the Old Guard of Napoleon. The sepoys came to Give, not to complain of their scanty fare, but to propose that all the grain should be given to the Europeans, who required more nourishment than the natives of Asia. The thin gruel, they said, which was strained away from the rice would suffice for themselves. History contains no more touching instance of military fidelity, or of the influence of a commanding mind. An attempt made by the governor of Madras to relieve the place had failed ; but there was hope from another quarter. A body of 3000 Mahrattas, half soldiers, half robbers, under the command of a chief named Murari Rao had been hired to assist Mahommed AH; but thinking the French power irresistible, and the triumph of Chanda Sahib certain, they had hitherto remained inactive on the frontiers of

the Carnatic. The fame of the defence of Arcot roused them from their torpor ; Murari Rao declared that he had never before believed that Englishmen could fight, but that he would willingly help them since he saw that they had spirit to help themselves. Raja Sahib learned that the Mahrattas were in motion, and it was necessary for him to be expeditious. He first tried negotiations — he offered large bribes to Clive, which were rejected with scorn ; he vowed that if his proposals were not accepted, he would instantly storm the fort, and put every man in it to the sword. Clive told him, in reply, with characteristic haughtiness, that his father was a usurper, that his army was a rabble, and that he would do well to think twice before he sent such poltroons into a breach defended by English soldiers. Raja Sahib determined to storm the fort. The day was well suited to a bold military enter- prise. It was the great Mahommedan festival, the Muharram, which is sacred to the memory of Husain, the son of Ali. Clive had received secret intelligence of the design, had made his arrangements, and, exhausted by fatigue, had thrown himself on his bed. He was awakened by the alarm, and was instantly at his post. The enemy advanced, driving before them elephants whose foreheads were armed with iron plates. It was expected that the gates would yield to the shock of these living battering-rams. But the huge beasts no sooner felt the English musket balls than they turned round and rushed furiously away, trampling on the multitude which had urged them forward. A raft was launched on the water which filled one part of the ditch. Clive perceiving that his gunners at that post did not understand their business, took the management of a piece of artillery himself, and cleared the raft in a few minutes. Where the moat was dry, the assailants mounted with great boldness; but they were received with a fire so heavy and so well directed, that it soon quelled the courage even of fanaticism and of intoxication. The rear ranks of the English kept the front ranks supplied with a constant succession of loaded muskets, and every shot told on the living mass below. The struggle lasted about an hour; 400 of the assailants fell; the garrison lost only five or six men. The besieged passed an anxious night, looking for a renewal of the attack. But when day broke, the enemy were no more to be seen. They had retired, leaving to the English several guns and a large quantity of ammunition.”

In India, we might say in all history, there is no parallel to this exploit of 1751 till we come to the siege of Lucknow in 1857. Clive, now reinforced, followed up his advantage, and Major Lawrence returned in time to carry the war to a successful issue. In 1754 the first of the Carnatic treaties was made provisionally, between T. Saunders, the Company’s resident at Madras, and M. Godeheu, the French

commander, in which the English protege, Mahommed Ah, was virtually recognized as nawab, and both nations agreed to equalize their possessions. When war again broke out in 1756, and the French, during Give's absence in Bengal, obtained successes in the northern districts, his efforts helped to drive them from their settlements. The Treaty of Paris in 1763 formally confirmed Mahommed Ali in the position which Clive had won for him. Two years after, the Madras work of Clive was completed by a firman from the emperor of Delhi, recognizing the British possessions in southern India.

The siege of Arcot at once gave Clive a European reputation. Pitt pronounced the youth of twenty-seven who had done such deeds a "heaven-born general," thus endorsing the generous appreciation of his early commander, Major Lawrence. When the court of directors voted him a sword worth £700, he refused to receive it unless Lawrence was similarly honoured. He left Madras for home, after ten years' absence, early in 1753, but not before marrying Miss Margaret Maskelyne, the sister of a friend, and of one who was afterwards well known as astronomer royal. All his correspondence proves him to have been a good husband and father, at a time when society was far from pure, and scandal made havoc of the highest reputations. In after days, when Clive's uprightness and stern reform of the Company's

civil and military services made him many enemies, a biography of him appeared under the assumed name of Charles Carracioli, Gent. All the evidente is against the probability of its scandalous stories being true. Clive as a young man occasionally indulged in loose or free talk among intimate friends, but beyond this nothing has been proved to his detriment. After he had been two years at home the state of affairs in India made the directors anxious for his return. He was sent out, in 1756, as governor of Fort St David, with the reversion of the government of Madras, and he received the commission of lieutenant-colonel in the king's army. He took Bombay on his way, and there commanded the land force which captured Gheria, the stronghold of the Mahratta pirate, Angria. In the distribution of prize money which followed this expedition he showed no little self- denial. He took his seat as governor of Fort St David on the day on which the nawab of Bengal captured Calcutta, and thither the Madras government at once sent him, with admiral Watson. He entered on the second period of his career.

Since, in August 1690, Job Charnock had landed at the village of Sutanati with a guard of one officer and 30 men, the infant capital of Calcutta had become a rich centre of trade. The successive nawabs or viceroys of Bengal had been friendly to it, till, in 1 756, Suraj-ud-

Dowlah succeeded his uncle at Murshidabad. His predecessor's financial minister had fled to Calcutta to escape the extortion of the new nawab, and the English governor refused to deliver up the refugee. Enraged at this, Suraj-ud- Dowlah captured the old fort of Calcutta on the 20th of June, and plundered it of more than two millions sterling. Many of the English fled to ships and dropped down the river. The 146 who remained were forced into " the Black Hole " in the stifling heat of the sultriest period of the year. Only 23 came out alive. The fleet was as strong, for those days, as the land force was weak. Disembarking his troops some miles below the city, Clive marched through the jungles, where he lost his way owing to the treachery of his guides, but soon invested Fort William, while the fire of the ships reduced it, on the 2nd of January 1757. On the 4th of February he defeated the whole army of the nawab, which had taken up a strong position just beyond what is now the most northerly suburb of Calcutta. The nawab hastened to conclude a treaty, under which favourable terms were con- ceded to the Company's trade, the factories and plundered property were restored, and an English mint was established. In the accompanying agreement, offensive and defensive, Clive appears under the name by which he was always known to the natives of India, Sabut Jung, or " the daring in war." The hero of Arcot had, at Angria's stronghold, and now again under the walls of Calcutta, established his reputation as the first captain of the time. With 600 British soldiers, 800 sepoys, 7 field-pieces and 500 sailors to draw them, he had routed a force of 34,000 men with 40 pieces of heavy cannon, 50 elephants, and a camp that extended upwards of four miles in length. His own account, in a letter to the archbishop of Canterbury, gives a modest but vivid description of the battle, the importance of which has been overshadowed by Plassey. In spite of his double defeat and the treaty which followed it, the madness of the nawab burst forth again. As England and France were once more at war, Clive sent the fleet up the river against Chandernagore, while he besieged it by land. After consenting to the siege, the nawab sought to assist the French, but in vain. The capture of their principal settlement in India, next to Pondicherry, which had fallen in the previous war, gave the combined forces prize to the value of £130,000. The rule of Suraj-ud-Dowlah became as intolerable to his own people as to the British. They formed a confederacy to depose him, at the head of which was Jafar Ali Khan, his commander-in-chief. Associating with himself Admiral Watson, Governor Drake and Mr Watts, Give made a treaty in which it was agreed to give the office of viceroy of Bengal, Behar and Orissa to Jafar, who "was to pay a million sterling to the Company for its losses in Calcutta and the cost of its troops, half a million to the British inhabitants of Calcutta,

£200,000 to the native inhabitants, and £70,000 to its Armenian merchants. Up to this point all is clear. Suraj-ud-Dowlah was

hopeless as a ruler. His relations alike to his master, the merely titular emperor of Delhi, and to the people left the province open to the strongest. After ‘ ‘ the Black Hole,’ * the battle of Calcutta, and the treachery at Chandernagore in spite of the treaty which followed that battle, the East India Company could treat the nawab only as an enemy. Clive, it is true, might have disregarded all native intrigue, marched on Murshidabad, and at once held the delta of the Ganges in the Company’s name. But the time was not ripe for this, and the consequences, with so small a force, might have been fatal. The idea of acting directly as rulers, or save under native charters and names, was not developed by events for half a century. The political morality of the time in Europe, as well as the comparative weakness of the Company in India , led Clive not only to meet the dishonesty of his native associate by equal dishonesty, but to justify his conduct by the declaration, years after, in parliament, that he would do the same again. It became necessary to employ the richest Bengali trader, Omichund, as an agent between Jafar Ali and the British officials. Master of the secret of the confederacy against Suraj- ud-Dowlah, the Bengali threatened to betray it unless he was guaranteed, in the treaty itself, £300,000. To dupe the villain, who was really paid by both sides, a second, or fictitious treaty, was shown him with a clause to this effect. This Admiral Watson refused to sign; ” but,” Clive deponed to the House of Commons, ” to the best of his remembrance, he gave the gentleman who carried it leave to sign his name upon it; his lordship never made any secret of it; he thinks it warrantable in such a case, and would do it again a hundred times; he had no interested motive in doing it, and did it with a design of disappointing the expectations of a rapacious man.” Such is Clive’s own defence of the one act which, in a long career of abounding temptations, was of questionable honesty.

The whole hot season of 1757 was spent in these negotiations, till the middle of June, when Clive began his march from Chander- nagore, the British in boats, and the sepoys along the right bank of the Hugli That river above Calcutta is, during the rainy season, fed by the overflow of the Ganges to the north through three streams, which in the hot months are nearly dry. On the left bank of the Bhagirathi, the most westerly of these, 100 m. above Chandernagore, stands

Murshidabad, the capital of the Mogul viceroys of Bengal, and then so vast that Clive compared it to the London of his day. Some miles farther down is the field of Plassey, then an extensive grove of mango trees, of which enough yet remains, in spite of the changing course of the stream, to enable the visitor to realize the scene. On the 21st of June Clive arrived on the bank opposite Plassey, in the midst of that outburst of rain which ushers in the south-west monsoon of India. His whole army amounted to 1100 Europeans and 2100 native troops, with 9 field-pieces. The nawab had drawn up 18,000 horse, 50,000 foot and 53 pieces of heavy ordnance, served by French artillerymen. For once in his career Clive hesitated, and called a council of sixteen officers to decide, as he put it, ” whether in our present situation, without assistance, and on our own bottom, it would be prudent to attack the nawab, or whether we should wait till joined by some country power ? ” Clive himself headed the nine who voted for delay; Major (afterwards Sir) Eyre Coote led the seven who counselled immediate attack. But, either because his daring asserted itself, or because, also, of a letter that he received from Jafar Ali, as has been said, Clive was the first to change his mind and to communicate with Major Eyre Coote. One tradition, followed by Macaulay, represents him as spending an hour in thought under the shade of some trees, while he resolved the issues of what was to prove one of the decisive battles of the world. Another, turned into verse by Sir Alfred Ly all, pictures his resolution as the result of a dream. However that may be, he did well as a soldier to trust to the dash and even rashness that had gained Arcot and triumphed at Cal- cutta, and as a statesman, since retreat, or even delay, would have put back the civilization of India for years. When, after the heavy rain, the sun rose brightly on the ‘22nd, the 3200 men and the 9 guns crossed the river and took possession of the grove and its tanks of water, while Clive established his head-

quarters in a hunting lodge. On the 23rd the engagement took place and lasted the whole day. Except the 40 Frenchmen and the guns which they worked, the enemy did little to reply to the British cannonade which, with the 39th Regiment, scattered the host, inflicting on it a loss of 500 men. Clive restrained the ardour of Major Kilpatrick, for he trusted to Jafar Ali’s abstin- ence, if not desertion to his ranks, and knew the importance of sparing his own small force. He lost hardly a white soldier; in all 22 sepoys were killed and 50 wounded. His own account, written a month after the battle to the secret committee of the court of directors, is not less unaffected than that in which he had announced the defeat of the nawab at Calcutta. Suraj-ud- Dowlah fled from the field on a camel, secured what wealth

he Could, and came to an untimely end. Clive entered Murshidabad, and established Jafar Ali in the position which his descendants have ever since enjoyed, as pensioners, but have not infrequently abused. When taken through the treasury, amid a million and a half sterling's worth of rupees, gold and silver plate, jewels and rich goods, and besought to ask what he would, Clive was content with £160,000, while half a million was distributed among the army and navy, both in addition to gifts of £24,000 to each member of the Company's committee, and besides the public compensation stipulated for in the treaty. It was to this occasion that he referred in his defence before the House of Commons, when he declared that he marvelled at his moderation. He sought rather to increase the shares of the fleet and the troops at his own expense, as he had done at Gheria, and did more than once afterwards, with prize of war. What he did take from the grateful nawab for himself was less than the circumstances justified from an Oriental point of view, was far less than was pressed upon him, not only by Jafar Ali, but by the hundreds of native nobles whose gifts Clive steadily refused, and was openly acknowledged from the first. He followed a usage fully recog- nized by the Company, although the fruitful source of future evils which he himself was again sent out to correct. The Company itself acquired a revenue of £100,000 a year, and a contribution towards its losses and military expenditure of a million and a half sterling. Such was Jafar Ali's gratitude to Clive that he after- wards presented him with the quit-rent of the Company's lands in and around Calcutta, amounting to an annuity of £27,000 for life, and left him by will the sum of £70,000, which Clive devoted to the army.

While busy with the civil administration, the conqueror of Plassey continued to follow up his military success. He sent Major Coote in pursuit of the French almost as far as Benares. He despatched Colonel Forde to Vizagapatam and the northern districts of Madras, where that officer gained the battle of Condore, pronounced by Broome " one of the most brilliant actions on military record." He came into direct contact, for the first time, with the Great Mogul himself, an event which resulted in the most important consequences during the third period of his career. Shah Alam, when shakzada, or heir-apparent, quarrelled with his father Alam Gir II., the emperor, and united with the viceroys of Oudh and Allahabad for the con- quest of Bengal. He advanced as far as Patna, which he besieged with 40,000 men. Jafar Ali, in terror, sent his son to its relief, and implored the aid of Clive. Major Caillaud defeated the prince's army and dispersed it. Finally, at this period, Clive repelled the aggression of the Dutch, and avenged the massacre of Amboyna, on that occasion when he wrote his famous

letter, ” Dear Forde, fight them immediately; I will send you the order of council to-morrow.” Meanwhile he never ceased to improve the organization and drill of the sepoy army, after a European model, and enlisted into it many Mahommedans of fine physique from upper India. He refortified Calcutta. In 1760, after four years of labour so incessant and results so glorious, his health gave way and he returned to England. ” It appeared,” wrote a contemporary on the spot, “as if the soul was departing from the government of Bengal.” He had been formally made governor of Bengal by the court of directors at a time when his nominal superiors in Madras sought to recall him to their help there. But he had discerned the importance of the province

even during his first visit to its rich delta, mighty rivers and teeming population. It should be noticed, also, that he had the kingly gift of selecting the ablest subordinates, for even thus early he had discovered the ability of young Warren Hastings, destined to be his great successor, and, a year after Plassey, made him resident at the nawab’s court.

In 1760, at thirty-five years of age, Give returned to England with a fortune of at least £300,000 and the quit-rent of £27,000 a year, after caring for the comfort of his parents and sisters, and giving Major Lawrence, his old commanding officer, who had early encouraged his military genius, £500 a year. The money had been honourably and publicly acquired, with the approval of the Company. The amount might have been four times what it was had Clive been either greedy after wealth or ungenerous to the colleagues and the troops whom he led to victory. In the five years of his conquests and administration in Bengal, the young man had crowded together a succession of exploits which led Lord Macaulay, in what that historian termed his ” flashy ” essay on the subject, to compare him to Napoleon Bonaparte. But there was this difference in Clive’s favour, due not more to the circumstances of the time than to the object of his policy — he gave peace, security, prosperity and such liberty as the case allowed of to a people now reckoned at nearly three hundred millions, who had for centuries been the prey of oppression, while Napoleon’s career of conquest was inspired only by personal ambition, and the absolutism he established vanished with his fall. During the three years that Clive remained in England he sought a political position, chiefly that he might influence the course of events in India, which he had left full of promise. He had been well received at court, had been made Baron

Clive of Plassey, in the peerage of Ireland, had bought estates, and had got not only himself, but his friends returned to the House of Commons after the fashion of the time. Then it was that he set himself to reform the home system of the East India Company, and began a bitter warfare with Mr Sulivan, chairman of the court of directors, whom in the end he defeated. In this he was aided by the news of reverses in Bengal. Vansittart, his successor, having no great influence over Jafar Ali Khan, had put Kasim Ali Khan, the son-in-law, in his place in consideration of certain payments to the English officials. After a brief tenure Kasim Ali had fled, had ordered Walter Reinhardt (known to the Mahommedans as Sumru), a Swiss mercenary of his, to butcher the garrison of 150 English at Patna, and had disappeared under the protection of his brother viceroy of Oudh. The whole Company's service, civil and military, had become demoralized by gifts, and by the monopoly of the inland as well as export trade, to such an extent that the natives were pauperized, and the Company was plundered of the revenues which Clive had acquired for them. The court of proprietors, accordingly, who elected the directors, forced them, in spite of Sulivan, to hurry out Lord Clive to Bengal with the double powers of governor and commander-in-chief.

What he had done for Madras, what he had accomplished for Bengal proper, and what he had effected in reforming the Company itself, he was now to complete in less than two years, in this the third period of his career, by putting his country politically in the place of the emperor of Delhi, and preventing for ever the possibility of the corruption to which the British in India had been driven by an evil system. On the 3rd of May 1765 he landed at Calcutta to learn that Jafar Ali Khan had died, leaving him personally £70,000, and had been succeeded by his son, though not before the government had been further demoralized by taking £100,000 as a gift from the new nawab; while Kasim Ali had induced not only the viceroy of Oudh, but the emperor of Delhi himself, to invade Behar. After the first mutiny in the Bengal army, which was suppressed by blowing the sepoy ringleader from a gun, Major Munro, " the Napier of those times," scattered the united armies on the hard- fought field of Buxar. The emperor, Shah Alam, detached himself from the league, while the Oudh viceroy threw himself on the mercy of the British. Clive had now an opportunity of repeating in Hindustan, or Upper India, what he had accom-

plished for the good of Bengal. He might have secured what are now called the United Provinces, and have rendered unnecessary the campaigns of Wellesley and Lake. But he had other work in the consolidation of rich Bengal itself, making it a base from which the

mighty fabric of British India could afterwards steadily and proportionally grow. Hence he returned to the Oudh viceroy all his territory save the provinces of Allahabad and Kora, which he made over to the weak emperor. But from that emperor he secured the most important document in the whole of British history in India up to that time, which appears in the records as ” firmaund from the King Shah Aalum, granting the dewany of Bengal, Behar and Orissa to the Companyˆ 1765.” The date was the 12th of August, the place Benares, the throne an English dining-table covered with embroidered cloth and surmounted by a chair in Clive’s tent. It is all pictured by a Mahommedan contemporary, who indignantly exclaims that so great a ” transaction was done and finished in less time than would have been taken up in the sale of a jackass.” By this deed the Company became the real sovereign rulers of thirty millions of people, yielding a revenue of four millions sterling. All this had been accomplished by Clive in the few brief years since he had avenged ” the Black Hole ” of Calcutta. This would be a small matter, or might even be a cause of reproach, were it not that the Company’s undisputed sovereignty- proved, after a sore period of transition, the salvation of these millions. The lieutenant-governorship of Bengal since Clive’s time has grown so large and prosperous that in 1905 it was found advis- able to divide it into two separate provinces. But Clive, though thus moderate and even generous to an extent which called forth the astonishment of the natives, had all a statesman’s foresight. On the same date he obtained not only an imperial charter for the Company’s possession in the Carnatic also, thus completing the work he began at Arcot, but a third firman for the highest of all the lieutenancies of the empire, that of the Deccan itself. This fact is mentioned in a letter from the secret committee of the court of directors to the Madras government, dated the 27th of April 1768. Still so disproportionate did the British force seem, not only to the number and strength of the princes and people of India, but to the claims and ambition of French, Dutch and Danish rivals, that Clive’s last advice to the directors, as he finally left India in 1767, was this: ” We are sensible that, since the acquisition of the dewany, the power formerly belonging to the soubah of those provinces is totally, in fact, vested ill the East India Company. Nothing remains to him but the name and shadow of authority. This name, however, this shadow, it is indispensably necessary we should seem to venerate.” On a wider arena, even that of the Great Mogul himself, the shadow was kept up till it obliterated itself in the massacre of English people in the Delhi palace in 1857; and Queen Victoria was proclaimed, first, direct ruler on the 1st of November 1858, and then empress of India on the 1st of January 1877.

Having thus founded the empire of British India, Clive's painful duty was to create a pure and strong administration, such as alone would justify its possession by foreigners. The civil service was de-orientalized by raising the miserable salaries which had tempted its members to be corrupt, by forbidding the acceptance of gifts from natives, and by exacting covenants under which participation in the inland trade was stopped. Not less important were his military reforms. With his usual tact and nerve he put down a mutiny of the English officers, who chose to resent the veto against receiving presents and the reduction of batta at a time when two Mahratta armies were marching on Bengal. His reorganization of the army, on the lines of that which he had begun after Plassey, and which was neglected during his second visit to England, has since attracted the admiration of the ablest Indian officers. He divided the whole into three brigades, so as to make each a complete force, in itself equal to any single native army that could be brought against it. He had not enough British artillerymen, however, and would not make the mistake of his successors, who trained natives to work the guns, which were turned against the British

with such effect in 1857. It is sufficient to say that after the Mutiny the government returned to his policy, and not a native gunner is now to be found in the Indian army.

Clive's final return to England, a poorer man than he went out, in spite of still more tremendous temptations, was the signal for an outburst of his personal enemies, exceeded only by that which the malice of Sir Philip Francis afterwards excited against Warren Hastings. Every civilian whose illicit gains he had cut off, every officer whose conspiracy he had foiled, every proprietor or director, like Sulivan, whose selfish schemes he had thwarted, now sought their opportunity. He had, with consistent generosity, at once made over the legacy of £70,000 from the grateful Jafar Ah, as the capital of what has since been known as " the Clive Fund," for the support of invalided European soldiers, as well as officers, and their widows, and the Company had allowed 8 % on the sum for an object which it was otherwise bound to meet. General John Burgoyne, of Saratoga memory, did his best to induce the House of Commons, in which Lord Clive was now member for Shrewsbury, to impeach the man who gave his country an empire, and the people of that empire peace and justice, and that, as we have seen, without blot on the gift, save in the

matter of Omichund. The result, after the brilliant and honourable defences of his career which will be found in Almon's Debates for 1773, was a compromise that saved England this time from the dishonour which, when Warren Hastings had to run the gauntlet, put it in the same category with France in the treatment of its public benefactors abroad. On a division the House, by 155 to 95, carried the motion that Lord Clive " did obtain and possess himself " of £234,000 during his first administration of Bengal; but, refusing to express an opinion on the fact, it passed unanim- ously the second motion, at five in the morning, " that Robert, Lord Clive, did at the same time render great and meritorious services to his country." The one moral question-, the one questionable transaction in all that brilliant and tempted life — the Omichund treaty — was not touched.

Only one who can personally understand what Clive's power and services had been will rightly realize the effect on him, though in the prime of life, of the discussions through which he had been dragged. In the greatest of his speeches, in reply to Lord North, he said, — " My situation, sir, has not been an easy one for these twelve months past, and though my conscience could never accuse me, yet I felt for my friends who were involved in the same censure as myself. ... I have been examined by the select committee more like a sheep-stealer than a member of this House." Fully accepting that statement, and believing him to have been purer than his accusers in spite of temptations un- known to them, we see in Clive's end the result merely of physical suffering, of chronic disease which opium failed to abate, while the worry and chagrin caused by his enemies gave it full scope. This great man, who did more for his country than any soldier till Wellington, and more for the people and princes of India than any statesman in history, died by his own hand on the 22nd of November 1774 in his fiftieth year.

The portrait of Clive, by Dance, in the council chamber of Government House, Calcutta, faithfully represents him. He was slightly above middle-size, with a countenance rendered heavy and almost sad by a natural fulness above the eyes. Reserved to the many, he was beloved by his own family and friends. His encouragement of scientific undertakings like Major James Rennell's surveys, and of philological researches like Francis Gladwin's, gained him to two honorary distinctions of F.R.S. and LL.D.

His son and successor Edward (1754-1839) was created earl of Powis in 1804, his wife being the sister and heiress of George Herbert, earl of Powis (1755-1801). He is thus the ancestor of the later earls of Powis, who took the name of Herbert instead of that of Clive in 1807.

See Sir A. J. Arbuthnot.‘Lord Clive (” Builders of Great Britain” series) (1899) ; Sir C. Wilson, Lord Clive (” English Men of Action ” series) (1890) ; G. B. Malleson, Lord Clive (” Rulers of India ” series) (1890); F. M. Holmes, Four Heroes of India (1892); C. Caraccioli, Life of Lord Clive (1775).

CLOACA, the Latin term given to the sewers laid to drain the low marshy grounds between the hills of Rome. The most important, which drained the forum, is known as the Cloaca Maxima and dates from the 6th century B.C. This was 10 ft. 6 in. wide, 14 ft. high, and was vaulted with three consecutive rings of voussoirs in stone, the floor being paved with polygonal blocks of lava.

CLOCK. The measurement of time has always been based on the revolution of the celestial bodies, and the period of the apparent revolution of the sun, i.e. the interval between two consecutive crossings of a meridian, has been the usual standard for a day. By the Egyptians the day was divided into 24 hours of equal length. The Greeks adopted a different system, dividing the day, i.e. the period from sunrise to sunset, into 12 hours, and also the night. Whence it followed that it was only at two periods in the year that the length of the hours during the day and night were uniform (see Calendar). In consequence, those who adopted the Greek system were obliged to furnish their water- clocks (see Clepsydra) with a compensating device so that the equal hours measured by those clocks should be rendered un- equal, according to the exigencies of the season. The hours were divided into minutes and seconds, a system derived from the sexagesimal notation which prevailed before the decimal system was finally adopted. Our mode of computing time, and our angular measure, are the only relics of this obsolete system.

The simplest measure of time is the revolution of the earth round its axis, which so far as we know is uniform, perfectly regular, and has not varied in speed during any period of human observation. The time of such a revolution is called a sidereal day, and is divided into hours, minutes and seconds. The period of rotation of the earth is practially measured by observations of the fixed stars (see Time), the period between two successive transits of the same star across a meridian constituting the sidereal day. But as the axis of the earth slowly revolves round in a cone, whereby the phenomenon known as the precession of the equinoxes is produced, it follows that the astronomical sidereal day is not the true period of the earth’s rotation on its axis, but varies from it by less than a twenty millionth part, a fraction so small as to be inappreciable. But the civil day depends not on the revolution of the earth with regard to the stars, but on its

revolution as compared with the position of the sun. Therefore each civil day is on the average longer than a sidereal one by nearly four minutes, or, to be exact, each sidereal day is to an average civil day as -99727 to 1, and the sidereal hour, minute and second are also shorter in like proportion. Hence a sidereal clock has a shorter, quicker-moving pendulum than an ordinary clock.

Ordinary civil time thus depends on the apparent revolution of the sun round the earth. As, however, this is not uniform, it is needful for practical convenience to give it an artificial uniformity. For this purpose an imaginary sun, moving round the earth with the average velocity of the real sun, and called the ” mean ” sun, is taken as the measure of civil time. The day is divided into 24 hours, each hour into 60 minutes, and each minute into 60 seconds. After that the sexagesimal division system is abandoned, and fractions of seconds are estimated in decimals.

A clock consists of a train of wheels, actuated by a spring or weight, and provided with a governing device which so regulates the speed as to render it uniform. It also has a mechanism by which it strikes the hours on a bell or gong (cp. Fr. cloche, Ger. Glocke, a bell; Dutch klok, bell, clock), whereas, strictly, a timepiece does not strike, but simply shows the time.

The earliest clocks seem to have come into use in Europe during the 13th century. For although there is evidence that they may have been invented some centuries sooner, yet until that date they were probably only curiosities. The first form they took was that of the balance clock, the invention of which is ascribed, but on very insufficient grounds, to Pope Silvester II. in a.d. 996. A clock was put up in a former clock tower at West- minster with some great bells in 1288, out of a fine imposed on a chief-justice who had offended the government, and the motto DisciUjustitiam, moniti, inscribed upon it. The bells were sold.

or rather, it is said, gambled away, by Henry VIII. In 1292 a clock in Canterbury cathedral is mentioned as costing £30, and another at St Albans, by R. Wallingford, the abbot in’ 1326, is said to have been such as there was not in all Europe, showing various astronomical phenomena. A description of one in Dover Castle with the date 1348 on it was published by Admiral W. H. Smyth (1788-1865) in 1851, and the clock itself was exhibited going, in the Scientific Exhibition of

1876. A very similar one, made by Henry de Vick for the French king Charles V. in 1379 was much like the common clocks of the 18th century, except that it had a vibrating balance instead of a pendulum. The works of one of these old clocks still exist in a going condition at the Victoria and Albert Museum. It came from Wells cathedral, having previously been at Glastonbury abbey. These old clocks had what is called a verge escapement, and a balance. The train of wheels ended with a crown wheel, that is, a wheel serrated with teeth like those of a saw, placed parallel with its axis (fig. 1). These teeth, D, engaged with pallets CB, CA, mounted on a verge or staff placed parallel to the face of the crown wheel. As the crown wheel was turned round the teeth pushed the pallets alternately until one or the other slid past a tooth, and thus let the crown wheel rotate. When one pallet had slipped over a tooth, the other pallet caught a corre- sponding tooth on the opposite side of the wheel. The verge

was terminated by a balance rod placed at right angles to it with a ball at each end. It is evident that when the force of any tooth on the crown wheel began to act on a pallet, it communicated motion to the balance and thus caused it to rotate. This motion would of course be accelerated, not uniformly, but according to some law dependent on the shape of the teeth and pallets. When the motion had reached its maximum, the tooth slipped past the pallet. The other pallet now engaged another tooth on the op- posite side of the wheel. The motion of the balls, however, went on and they continued to swing round, but

Fig. 1.- Verge Escapement.™ 5 time thev ˆ ere °ˆ os ˆ h y

the pressure of the tooth, for a

time they overcame that pressure, and drove the tooth back, causing a recoil. As, however, every motion if subjected to an adverse acceleration (i.e. a retardation) must come to rest, the balls stopped, and then the tooth, which had been forced to recoil, advanced in its turn, and the swing was repeated. The arrangement was thus very like a huge watch balance wheel in which the driving weight acted in a very irregular manner, not only as a driving force, but also as a regulating spring. The going of such clocks was influenced greatly by friction and by the oil on the parts, and never could be satisfactory, for the time varied with every variation in the swing of the balls, and this again with every variation of the effective t driving force.

The first great step in the improvement of the balance clock was a very simple one. In the 17th century Galileo had discovered the isochronism of the pendulum, but he made no practical use of it,

except by the invention of a little instrument for enabling doctors to count their patients' pulse-beats. His son, however, is supposed to have applied the pendulum to clocks. There is at the Victoria Fig. 2. Galileo's anc i Albert Museum a copy of an early clock, fcscapement. sa;d tQ be Galileo > Sj in which the pins on a

rotating wheel kick a pendulum outwards, remaining locked after having done so till the pendulum returns and unlocks the next pin, which then administers another kick to the pendulum (fig. 2). The interest of the specimen is that it contains the germ of the

chronometer escapement and free pendulum, which is possibly destined to be the escapement of the future. The essential component parts of a clock are: —

1. The pendulum or time-governing device;

2. The escapement, whereby the pendulum controls the speed of going;

3. The train of wheels, urged round by the weight or main- spring, together with the recording parts, i.e. the dial, hands and hour motion wheels;

4. The striking mechanism.

The general construction of the going part of all clocks, except large or turret clocks, is substantially the same, and fig. 3 is a section of any or- dinary house clock. B is the barrel with the cord coiled round it, generally 16 times for the 8 days; the barrel is fixed to its arbor K, which is prolonged into the winding square com- ing up to the face or dial of the clock; the dial is here shown as fixed either by small screws x, or by a socket and pin 2, to the pro- longed pillars p, p, which (4 or 5 in number) connect the plates or frame of the clock together, though the dial is commonly set on to the front plate by another set of pillars of its own. The great wheel G rides on the arbor, and is con- nected with the barrel by the ratchet R, the action of which is shown more fully in fig. 25. The intermediate wheel r in this drawing is for a purpose which will be described hereafter, and for the present it may be considered as omitted, and the click of the ratchet R as fixed to the great wheel. The great wheel drives the pinion c which is called the centre pinion, on the arbor of the centre wheel C, which goes through to the dial, and carries the long, or minute-hand; this wheel always turns in an hour, and the great wheel generally in 12 hours, by having 12 times as many teeth as the centre pinion. The centre wheel drives

the ” second wheel ” D by its pinion d, and that again drives the scape-wheel E by its pinion e. If the pinions d and e have each 8 teeth or leaves (as the teeth of pinions are usually called), C will have 64 teeth and D 60, in a clock of which the scape- wheel turns in a minute, so that the seconds hand maybe set on its arbor prolonged to the diaL A represents the pallets of the escapement, which will be described presently, and their arbor a goes through a large hole in the back plate near F, and its back pivot turns in a cock OFQ screwed on to the back plate. From, the pallet arbor at F descends the crutch F/, ending in the fork f, which embraces the pendulum P, so that as the pendulum vibrates, the crutch and the pallets necessarily vibrate with it. The pendulum is hung by a thin spring S from the cock Q, so that the bending point of the spring may be just opposite the end of the pallet arbor, and the edge of the spring as close to the end of that arbor as possible. We may now go to the front (or left hand) of the clock, and

Fig. 3. — Section of House Clock.

describe the dial or ” motion-work.” The minute hand fits on to a squared end of a brass socket, which is fixed to the wheel M, and fits close, but not tight, on the prolonged arbor of the centre wheel. Behind this wheel is a bent spring which is (or ought to be) set on the same arbor with a square hole (not a round one as it sometimes is) in the middle, so that it must turn with the arbor; the wheel is pressed up against this spring, and kept there, by a cap and a small pin through the end of the arbor. The consequence is, that there is friction enough between the spring and the wheel to carry the hand round, but not enough to resist a moderate push with the finger for the purpose of altering the time indicated. This wheel M, which is sometimes called the minute-wheel, but is better called the hour-wheel as it turns in an hour, drives another wheel N, of the same number of teeth, which has a pinion attached to it; and that pinion drives the twelve-hour wheel H, which is also attached to a large socket or pipe carrying the hour hand, and riding on the former socket, or rather (in order to relieve the centre arbor of that extra weight) on an intermediate socket fixed to the bridge L, which is screwed to the front plate over the hour-wheel M. The weight W, which drives the train and gives the impulse to the pendulum through the escapement, is generally hung by a catgut line passing through a pulley attached to the weight, the other end of the cord being tied to some convenient place in the clock frame or seat-board, to which it is

fixed by screws through the lower pillars.

Pendulum. — Suppose that we have a body P (fig. 4) at rest, and that it is material, that is to say, has ” mass.” And for ˆ simplicity let us consider it a ball of fWˆWSUWˆ0 some heavy matter. Let it be free P to move horizontally, but attached Fig. 4. to a fixed point A by means of a

spring. As it can only move horizontally and not fall, the earth’s gravity will be unable to impart any motion to it. Now it is a law first discovered by Robert Hooke (1635-1703) that if any elastic spring be pulled by a force, then, within its elastic limits, the amount by which it will be extended is propor- tional to the force. Hence then, if a body is pulled out against a spring, the restitutional force is proportional to the displace- ment. If the body be released it will tend to move back to its initial position with an acceleration proportioned to its mass and to its distance from rest. A body thus circumstanced moves with harmonic motion, vibrating like a stretched piano string, and the peculiarity of its motion is that it is isochronous. That is to say, the time of returning to its initial position is the same, whether it makes a large movement at a high velocity under a strong restitutional force, or a small movement at a lower velocity under a smaller restitutional force (see Mechanics). In consequence of this fact the balance wheel of a watch is isochronous or nearly so, notwithstanding variations in the amplitude of its vibrations. It is like a piano string which sounds the same note, although the sound dies away as the amplitude of its vibrations diminishes.

A pendulum is isochronous for similar reasons. If the bob be drawn aside from D to C (fig. 5), then the restitutional force tending to bring it back to rest is ap- proximately the force which gravitation would exert along the tangent CA, i.e.

. _,,.. BC displacement BC gcos ACW= goC = length of pendulum’

.m Since 5 is constant, and the length of the / pendulum does not vary, it follows that when a pendulum is drawn aside through a small arc the force tending to bring it back to rest is proportional to the dis- placement (approximately). Thus the pendulum bob under the influence of gravity, if the arc of swing is small, acts as though instead of being acted on by gravity it was acted on by a spring tending to drag it towards D, and therefore is isochronous. The qualification ” If the arc of swing is small ” is introduced because, as was discovered by Christiaan Huygens, the arc of vibration of a truly isochronous pendulum should

Fig. 5.

not be a circle with centre O, but a cycloid DM, generated by the rolling of a circle with diameter DQ = |OD, upon a straight line QM. However, for a short distance near the bottom, the circle so nearly coincides with the cycloid that a pendulum swinging in the usual circular path is, for small arcs, isochronous for practical purposes.

The formula representing the time of oscillation of a pendulum, in a circular arc, is thus found: — Let OB (fig. 6) be the pendulum, B be the position from which the bob is let go, and P be its position at some period during its swing. Put FC = h, and MC=x, and OB=Z. Now when a body is allowed to move under the force of gravity in any path from a height h, the velocity it attains is the same as a body would attain falling freely vertically through t he dist anc e h. Wh ence if v be the velocity of the bob at P, v = V 2gFM = tJ 2g(.h— x). Let Pp=ds, and the vertical distance of p below P = dx, then P/> = velocity at PXdt;

that is, dt = dslv. Also ~j- = tj-r = — .

dx MP V*(2/-x)' Idx 1

whence dt = — = -_

» V*(2/-X)

n

■>! 2g(h~x) dx

V

Expanding the second part we have I. // dx

W;

V 1 —x/21

dt—

(‘?

-)■

i -yjx(h-x) If this is integrated between the limits of o and h, we have

‘ViK + ~)

where t is the time of swing from B to A._The terms after the second may be neglected. The first term, v V II g, is the time of swing in a cycloid. The second part represents the addition necessary if the swing is circular and not eycloidal, and therefore expresses the “circular error.” Now/t = BC 2 //» = 2!rW/36o 2 , where 8 is half the angle of swing expressed in degrees; hence h/ 81 = 0* 152520, and the

formula becomes < = 7t A/- (1 + ———) . V|\ 5 2 520/

Hence the ratio of the time of swing of an ordinary pendulum of any

length, with a semiarc of swing = degrees is to the time of swing

of a corresponding eycloidal pendulum as 1 + ˆ/52520:1. Also

the difference of time of swing caused by a small increase 0′ in the

semiarc of swing = 289’/ 52520 second per second, or 3-300′ seconds

per day. _ Hence in the case of a seconds pendulum whose semiarc

of swing is 2° an increase of -1° in this semiarc of 2° would cause

the clock to lose 3.3X2X0.1 = -66 second a day.

Huygens proposed to apply his discovery to clocks, and since the evolute of a cycloid is an equal cycloid, he suggested the use of a flexible pendulum swinging between eycloidal cheeks. But this was only an example of theory pushed too far, because the friction on the eycloidal cheeks involves more error than they correct, and other disturbances of a higher degree of importance are left uncorrected. In fact the application of pendulums to clocks, though governed in the abstract by theory, has to be modified by experiment.

Neglecting the circular error, if L be the length of a pendulum and I the acceleration of gravity at the place where the pendulum is, then T, the time of a single vibration = irsJ(L/g). From this formula it follows that the times of vibration of pendulums are directly proportional to the square root of their lengths, and in- versely proportional to the square root of the acceleration of gravity at the olace where the pendulum is swinging. The value of g for London is 32-2 ft. per second per second, whence it results that the length of a pendulum for London to beat seconds of mean solar time = 39-l4 in. nearly, the length of an astronomical pendulum to beat seconds of sidereal time

being 38-87 in.

This length is calculated on the supposition that the arc of swing is eycloidal and that the whole mass of the pendulum is concentrated at a point whose distance, called the radius of oscillation, from the point of suspension of the pendulum is 39-14 in. From this it might be imagined that if a sphere, say of iron, were suspended from a light rod, so that its centre were 39-14 in. below its point of support, it would vibrate once per second. This, however, is not the case. For as the pendulum swings, the ball also tends to turn in space to and fro round a horizontal axis perpendicular to the direction of its motion. Hence the force stored up in the pendulum is expended, not only in making it swing, but also in causing the ball to oscillate to and fro through a small angle about a horizontal axis. We have therefore to consider not merely the vibrations of the rod, but the oscillations of the bob. The moment of the momentum of the system round the point of suspension, called its moment of inertia, is com- posed of the sum of the mass of each particle multiplied into the square of its distance from the axis of rotation. Hence the moment

Regula- tion.

of inertia of the body I =S(fna 2). If k be defined by the relation 2(mo 2) = 2(m) X**, then k is called the radius of gyration. If k be the radius of gyration of a bob round a horizontal axis through its centre of gravity, h the distance of its centre of gravity below its point of suspension, and k' the radius of gyration of the bob round the centre of suspension, then k' 2 = h'> +k 1 . If / be the length of a simple pen- dulum that oscillates in the same time, then lh = k' t — h a --k' i . Now k can be calculated if we know the form of the bob, and I is the length of the simple pendulum = 39-14 in.; hence h, the distance of the centre of gravity of the bob below the point of suspension, can be found.

In an ordinary pendulum, with a thin rod and a bob, this distance h is not very different from the theoretical length, /- 39-14 in., of a simple theoretical pendulum in which the rod has no weight and the bob is only a single heavy point. For the effect of the weight of the rod is to throw the centre of oscillation a little above the centre of gravity of the bob, while the effect of the size of the bob is to throw the centre of oscillation a little down. In ordinary practice it is usual to make the

pendulum so that the centre of gravity is about 39 in. below the upper free end of the suspension spring and leave the exact length to be determined by

trial.

Since T =xV L/g, we have, by differentiating, dhlh = 2dT/T, that is, any small percentage of increase in L will correspond to double the percentage of increase in T. Therefore with a seconds pen- dulum, in order to make a second's difference in a day, equivalent to 1/86,400 of the pendulum's rate of vibration, since there are 86,400 seconds in 24 hours, we must have a difference of length amounting to 2/86,400 = 1/43,200 of the length of the rod. This is 39- 138/43,200 = -000906 in. Hence if under the pendulum bob be put a nut working a screw of 32 threads to the inch and having its head divided into 30 parts, a turn of this nut through one division will alter the length of the pendulum by 0009 in. and change the rate of the clock by about a second a day. To accelerate the clock the nut has always to be turned to the right, or as you would drive in a corkscrew and vice versa. But in astrono mical and in large turret clocks, it is desirable to avoid stopping or in any way disturbing the pendulum; and for the finer adjustments other methods of regulation are adopted. The best is that of fixing a collar, as shown in fig. 7 at C, about midway down the rod, capable of having very small weights laid upon it, this being the place where the addition of any small weight produces the greatest effect, and where, it may be added, any moving of that weight up or down on the rod produces the least effect. If M is the weight of the pendulum and / its length (down to the centre of oscillation), and m a small weight added at the distance n below the centre of suspension or above the c.o. (since they are reciprocal), t the time of vibration, and - it the acceleration due to adding m; then

Fig. 7. — Section of Westminster Clock Pendulum.

-dt m ln_ tP\ . / = 2M \l Pj ”

from which it is evident that if n=Z/2, then = dt/t = ml$M. But as there are 86400 seconds in a day, — dT, the daily acceleration, =86400 dt, or 10800 tn/M, or if m is the 10800th of the weight of the pendulum it will accelerate the clock a second a day, or 10 grains will do that on a pendulum of 15 lb weight (7000 gr. being =1 lh.), or an ounce on a pendulum of 6 cwt. In like manner if »=//3 from either top or bottom, m must =M/7200 to accelerate the clock a second a day. The higher up the collar the less is the risk of disturb- ing the pendulum in putting on or taking off the regulating weights,

but the bigger the weight required to produce the effect. The weights should be made in a series, and marked J, §, 1, 2, according to the number of seconds a day by which they will accelerate; and the pendulum adjusted at first to lose a little, perhaps a second a day, when there are no weights on the collar, so that it may always have some weight on, which can be diminished or increased from time to time with certainty, as the rate may vary.

The length of pendulum rods is also affected by temperature and also, if they are made of wood, by damp. Hence, to ensure good Co m . time-keeping qualities in a clock.itis necessary (1) to make

sensation. tne r °d s °f materials that are as little affected by such influences as possible, and (2) to provide means of com- pensation by which the effective length of the rod is kept constant in spite of expansion or contraction in the material of which it is composed. Fairly good pendulums for ordinary use may be made out of very well dried wood, soaked in a thin solution of shellac in spirits of wine, or in melted paraffin wax; but wood shrinks in

so uncertain a manner that such pendulums are not admissible for clocks of high exactitude. Steel is an excellent material for pen- dulum rods, for the metal is strong, is not stretched by the weight of the bob, and does not suffer great changes in molecular structure in the course of time. But a steel rod expands on the average lineally by -0000064 of its length for each degree F. by which its temperature rises; hence an expansion of -00009 m – on a pendulum rod of 39-14 in., that is 000023 of its length, will be caused by an increase of temperature of about 4 F., and that is sufficient to make the clock lose a second a day. Since the summer and winter tem peratures of a room may differ by as much as 50 F., the going of a clock may thus be affected by an error of 12 seconds a day. With a pendulum rod of brass, which has a coefficient of expansion of •00001, a clock might gain one-third of a minute daily in winter as Compared with its rate in summer. The coefficients of linear ex- pansion per degree F. of some other materials used in making pen- dulums are as follows: white deal, -0000024; flint glass, -0000048; iron, -000007; lead, -000016; zinc, -000016; and mercury, -000033. The solid or cubical expansions of these bodies are three times the above quantities respectively.

The first method of compensating a pendulum was invented in 1722 by George Graham, ,who proposed to use a bob of mercury, taking advantage of the high coefficient of expansion of that metal. As now employed, the mercurial pendulum consists of a rod of steel terminating in a stirrup of the same metal on which rests a glass vessel

full of mercury, having its centre of gravity about 39 in. below the point of suspension of the pendulum. For each Fahrenheit degree of temperature the centre of gravity of the bob is lowered by the expansion of the rod about j-sVo of an inch. The glass vessel and the mercury in it have therefore to be so contrived, that their centre of gravity will rise jˆ 5 in. per degree F. The glass having a small coefficient of expansion, the lateral expansion of the mercury will be checked by it, and this will help to raise the column. For the linear coefficient of expansion of glass is -0000048 per degree F., whence the sectional area of a glass vessel increases by -0000096 per degree F., and therefore the coefficient of vertical expansion of a column of mercury whose volumetric expansion coefficient is -oooi per degree F. is (-oooi — -0000096) = -0000904. Let * be the height of the vessel necessary to compensate a steel rod upon the bottom of which it rests. Then, the coefficient of expansion of steel being •0000066 per degree F., we have

-(•0000904 — -0000066) = -0000066X39-14, whence x = 6\ in.

It must, however, be remembered that the glass jar has some weight and that it does not rise by anything like the amount of the mercury. This tends to keep the centre of gravity down. So that the height of mercury of 6| in. will not be sufficient to effect the compensation, and about 6f to 7 in. will be required. Some authors specify 7 in. ; this is when the diameter of the jar is small. A certain amount of negative compensation must also be deducted to allow for the changes of temperature in the air, as will presently be seen; this amounts in the case of mercury to about | in.

In consequence of the complication of all these calculations it is usual to allow about 6| to 7 in. of mercury in the glass vessel and to adjust the exact amount of mercury by trial.

Another very good form of mercurial pendulum was proposed by E. J. Dent; it consists of a cast-iron jar into the top of which the steel pendulum rod is screwed, having its end plunged into the mercury contained in the jar. By this means the mercury, jar and rod rapidly acquire the same temperature. This pendulum is less likely to break than the form just described. The depth of mercury required in an iron jar is stated by Lord Grimthorpe to be 8£ to 9 in. The reason why it is greater than it is when a glass jar is employed is that iron has a larger coefficient of expansion than glass, and that it is also heavier-. In all cases, however, of mercury pendulums experiment seems to be the only ultimate test of the quantity of mercury required, for the results are so complicated by the behaviour of the oil and the barometric

errors that at its best the regulation of a clock can only be ultimately a matter of scientifically guided compromise. A small amount of compensation of a purely experi- mental character is also allowed to compensate the changes which temperature effects on the suspension spring. This is sometimes made as much as . of the length correction.

As an alternative to the mercurial pendulum other systems have been employed. The ” gridiron ” pendulum consists of a group of alternate rods of steel and brass, so arranged that the expansion of the brass acts upwards and counteracts that of the steel downwards. It was invented in 1726 by John Harrison. Assuming that 9 rods are used— 5 of steel and 4 of brass — their lengths may be as follows from pin to pin: — Centre steel rod 31-5 in.; 2 steel rods next the centre 24-5 in.; 2 steel rods farthest from centre 29-5 in.; from the lower end of outside steel rods to centre of bob 3 in. ; total 89-5 in. Of the 4 brass rods the 2 outside ones are 26-87 •”•; and the two inside ones 22-25 in.; total 49-12 in. Thus the expansion of 88| in. of steel is counteracted by the expansion of 49! in. of brass. Everything depends, however, on the expansion coefficient of the steel and brass employed, the requirement in every case being that of total lengths of the brass and iron should be in proportion to the linear coefficients of expansion of those metals. The above figures.

are for a very soft brass and steel. Thos. Reid, with more ordinary steel and brass, prescribed a ratio of 112 to 71, Lord Grimthorpe a ratio of 100 to 61. It is absolutely necessary to put the actual rods to be used for making the pendulum in a hot water bath, and measure their expansions with a microscope.

John Smeaton, taking advantage of a far greater expansion co- efficient of zinc as compared with brass, proposed to use a steel rod with a collar at the bottom, on which rested a hard drawn zinc rod. From this rod hung a steel tube to which the bob was attached. The total length of the steel rod and of the steel tube down to the centre of the bob was made to the total length of the zinc tube, in the ratio of 5 to 2 (being the ratio of the expansions of zinc and steel) ; for a 39- 14 in.pendulum we should therefore want a zinc tube equal in length to J (39-14) =26i in. In practice the zinc tube is made about 27 in. long, and then gradually cut down by trial. In fact the weight of a heavy pendulum squeezes the zinc, and it is impossible by mere theory to determine what will be its behaviour. The zinc tube must be of rolled

zinc, hard drawn through a die, and must not be cast. Ventilating holes must be made in suitable places in the steel tube and the collar on which it rests, to ensure that changes of temperature are rapidly communicated throughout the system.

A pendulum with a rod of dry varnished deal is tolerably compensated by a bob of lead or of zinc ioj to 13 in. in height, resting on a nut at the bottom of the rod.

The old methods of pendulum compensation for heat may now be considered as superseded by the invention of ” invar,” a com- larar. bination of nickel and steel, due to Charles E. Guillaume,

of the International Office of Weights and Measures at Sevres near Paris. This alloy has a linear coefficient of expansion on the average of 000001 per degree centigrade, that is to say, only about j 1 ! that of ordinary steel. Hence it can be easily compensated by means of brass, lead or any other suitable metal. Brass is usually employed. In the invar pendulum introduced into Great Britain by Mr Agar Baugh a departure is made from the previous practice of merely calculating the length of the compensator, fasten ing it to the lower part of the pendulum, and attaching it to the centre of the bob. In the case of these pendulums, accurate com- putations are made of the moments of inertia of every separate individual part. Thus, for instance, since an addition of volume due to the effect of heat to the upper part of the bob has a different effect upon the moment of inertia from that of an equal quantity added to the lower part of the bob, the bob is suspended not from its centre, but from a point about ˆ in. below it, the distance varying according to the shape of the bob, so that the heat expansion of the bob may cause its centre of gravity to rise and compensate the effect of its increased moment of inertia. Again the suspension spring is measured for isochronism, and an alloy of steel prepared for it which does not alter its elasticity with change of temperature. Moreover, since rods of invar steel subjected to strain do not acquire their final coefficients of expansion and elasticity for some time, the invar is artificially ” aged ” by exposure to strain and heat.

These considerations serve as a guide in arranging for the compensation of the expansion of the rod and bob due to change of temperature. But they are not the only ones required; we nave also to deal with changes due to the density of the air in which the pendulum is moving. A body suspended in a fluid loses in weight by an amount equal to the weight of the fluid displaced, whence it follows that a pendulum suspended in air has not the weight which ought truly to correspond to its mass. M remains constant while Mg is less than in a

vacuum. If the density of the air remained constant, this loss of weight, being constant, could be allowed for and would make no difference to the time-keeping. The period of swing would only be a little increased over what it would be in vacuo. But the weight of a given volume of air varies both with the baro- metric pressure and also with temperature. If the bob be of type metal it weighs less in air than in a vacuum by about 000103 P ar t. and for each 1 ° F. rise in temperature (the barometer remaining con stant and therefore the pressure remaining the same), the variation of density causes the bob to gain -00000024 of its weight. This, of course, makes the pendulum go quicker. Since the time of vibration varies as the inverse square root of g, it follows that a small increment of weight, the mass remaining constant, produces a diminution of one half that increment in time of swing. Hence, then, a rise of temperature of 1 ° F. will produce a diminution in the time of swing of -00000012th part or -0104 second in a day. But in making this calculation it has been assumed that the mass moved remains unaltered by the temperature. This is not so. A pendulum when swinging sets in motion a volume of air dependent on the size of the bob, but in a 10 lb bob nearly equal to its own volume. Hence while the rise of i° of temperature increases the weight by. •00000012th part, it also decreases the mass by about the same proportion, and therefore the increase of period due to a rise of temperature of l°F. will, instead of being -0104 second a day, be about -02 second. This must be compensated negatively by

lengthening the pendulum by about — – - in. for each degree of rise

of temperature, which will require a piece of brass about 2 in. long. It follows, therefore, that with an invar rod having a linear expansion coefficient of -0000002 per degree F., which requires a piece of brass about -8 in. long to compensate it, the compensation which

is to regulate both the expansion of the rod and also that of the air must be -8 in. -2 in., or -1-2 in.; so that the bob must be hung downwards from a piece of brass nearly ij in. in length. If the co-efficient of expansion of the invar were -00000053 per degree F., then the two corrections, one for the expansion of the rod and the other for the expansion of the air, would just neutralize one another, and the pendulum rod would require no compensator at all. There are a number of other refinements which might be added, but which are too long for insertion here. By taking in all the sources of error of higher orders, it has been possible to calculate a pendulum so accurately that, when the clock is loaded with the weight sufficient to give the pendulum the arc of swing for which it is designed, a rate of error has been produced of only half a minute in a year. These refinements,

however, are only required for clocks of precision; for ordinary clocks an invar pendulum with a lead bob and brass compensator is quite sufficient.

Invar pendulum rods are often made of steel with coefficients of expansion of about -0000012 linear per i° C; such a bob as this would require about 6-7 cm. of brass to compensate it, and, deduct- ing 5 cm. of brass for the air compensation, this leaves about 1-7 cm. of positive compensation for the pendulum. But as has been said, the exact deduction depends on the shape and size of the bob, and the metal of which it is made. The diameters of the rods are 8 mm. for a 15 R> bob, 5 mm. for a 4 ft) bob, and 12 to 15 mm. for a 60 lb bob. The bob is either a single cylinder or two cylinders with the rod between them. Lenticular and spherical bobs are not used. The great object is to allow the air ready access to all parts of the rod and compensator, so that they are all heated or cooled simul- taneously. The bobs are usually made of a compound of lead,- antimony, and tin, which forms a hard metal, free from bubbles and with a specific gravity of about 10. The usual weight of the bobs of the best pendulums for an ordinary astronomical clock is about 15 lb. A greater weight than this is found liable to make the support of the pendulum rock and to put an undue strain on the parts, without any corresponding advantage. The rods used are all artificially aged, and have their heat expansion measured. No adjusting screw at the bottom is provided, tne regulation being done by the addition of weights half way up the rod. An adjusting screw at the bottom has the disadvantage that it is impossible to know on which of the threads the rod is really resting; hence extra com- pensation may be introduced when not required. It is considered better that the supports of the bob should be rigid and invariable.

The effect of changes in the pressure of the air as shown by a barometer is too important to be omitted in the design of a good clock. But we do not propose to give more than a mere Baro- indication of the principles which govern compensation metrical for this effect, since the full discussion of the problem error. would be too protracted. We have seen that the action of the air in affecting the time of oscillation of a pendulum depends chiefly on the fact that its buoyancy makes the pendulum lighter, so that while the mass of the bob which has to be moved remains the same or nearly the same, the acceleration of gravity on it has less effect. A volume of air at ordinary temperature and pressure has, as has been said, -000103 the weight of an equal volume of type metal, whence it_ follows that the acceleration of gravity on a type metal bob in air is -999897 of the acceleration of gravity on the bob in vacuo. If, therefore, we diminish

the value of g in the formula T = W”L7i by -000103, we shall have the difference of time of vibration of a type metal bob in air, as compared with its time in vacuo, and this, by virtue of the principle used when discussing the increase of time of oscillation due to increased pendulum lengths, is j(-oooi03) second in one second, or about 4J seconds in a day of 86,400 seconds. It follows that a barometric pressure of 30 in. causes a loss of 4 \ seconds in the day, equivalent to -15 second per day for each inch of difference of the barometer. But, as has already been explained, the effect of the mass of the air transported with the pendulum must also be taken into account and therefore the above figures must be doubled or nearly doubled. A difference of 30 in. of barometric pressure would thus make a difference of 9 seconds per day in the rate of the pendulum, and the clock would lose about \ of a second a day for each inch of rise of the barometer, the result being of the same magnitude as would be produced by a fall of temperature of 15 F. in the air. Either of these effects would require a shortening of the pendulum of inftra in. This estimate is not far from the truth, for observations taken at various European observatories on various clocks, and collected by Jakob Hilnker, give a mean of -15 second of retardation per day per centimetre of barometric pressure, or -37 second per day for each inch rise of the barometer.

In order to counteract variations in going which must thus obviously be produced by variations of barometrical pressure, attempts have been made purposely to disturb the isochronism of the pendulum, by making the arcs of vibration abnormally large. Again, the bob has been fitted with a piece of iron, which is subjected to the attraction of a piece of magnetized steel floating on the mercury in the open end of a barometer tube, so that when the barometer falls the attraction is increased and the pendulum retarded. Again, mercury barometers have been attached to pendulums. A simple method is to fix an aneroid barometer with about seven compart-, ments on the pendulum about 5 to 6 in. below the suspension spring,

and to attach to the top of it a suitable weight which is lowered as the barometric pressure increases. One of the best methods of neutralizing the effects of variations of barometric pressure is to enclose the whole clock in an air-tight case, which may either be a large glass cylinder or a square case with a stout plate-glass front. This renders it independent of outside variations, whether of tem- perature or

pressure, and keeps the density of the air inside the case uniform. If the case could be completely, or almost completely, exhausted of air, and kept so exhausted, of course the pendulum would experience the minimum of resistance and would have to be lengthened a little. But in practice it is impossible to secure the maintenance of a good vacuum without sealing up the case in such a way as to render repairs very difficult, and this plan is therefore rarely resorted to. What is usually done is to put the clock in a metal case covered with a thick sheet of plate glass bedded in india-rubber strips, and held down by an iron flanged lid or frame firmly fixed by means of small bolts. An air-pump is attached to the case, a turn-off tap being inserted, and by a few strokes the pressure of the air inside the case can be lowered to (say) 29 in., or a little below the usual barometric height at the place where the clock is. The difference of pressure being small, the tendency of air from outside to leak in is also small, and if the workmanship is good the inside pressure will remain unaltered for many days. In any case the difference produced by leakage will be small, and will not greatly affect the going of the clock. With care, and a daily or weekly touch of the pump, the pressure inside can be kept practically constant, and hence the atmospheric error will be eliminated. The cover has also incidentally the effect of keeping damp and fumes from the clock and thus preserving it from rust, especially if a vessel with quicklime or some hygroscopic material be put in the case.

Cases have considerable effect on the air, which moves with a pendulum and is flung off from it at each vibration; the going rate of a chronometer can be altered by removing the case. It is therefore desirable that cases enclosing pendulums should be roomy. Many

Ceople prefer to omit the air-tight case, and to keep a record of arometric, thermometric and hygrometric changes, applying corrections based on these to the times shown by the clock.

It was formerly usual to suspend pendulums by means of a single spring about 3 in. wide riveted with chops of metal. The upper chop Suaaen- ˆad a P’ n driven through it, which rested in grooves steaof so as to a ” ow the pendulum to hang vertically. The pendulums. ‘ 3est m ˚dern pendulums are now made with two parallel ‘ springs put a little less than an inch apart. The edges of the chops where the springs enter are slightly rounded so as to avoid too sharp bending of the springs. Suspension of pendulums on knife edges was tried by B. L. Vulliamy and others, but did not prove a success.

It was once thought that lenticular pendulum bobs resisted the air less

than those of other shapes, but it was forgotten that their large surface offered more ” skin friction.” They are now no longer used, nor are spheres on account of difficulty of construction. A cylinder is the best form of bob; it is sometimes rounded at the top and bottom.

Escapements. — The term escapement is applied to any arrange- ment by which, as the wheels rotate, periodic impulses are given to the pendulum, while at the same time the motion of the wheels is arrested until the vibration of the pendulum has been com- pleted. It thus serves as a mechanism for both counting and impelling. Since the vibrations of a pendulum through small arcs are performed in times independent of the length of the arc, it follows that if a pendulum hanging at rest receive an impulse it will swing out and in again, and the time of its excursion outwards and of its return will remain the same whatever (within limits) be the arc of the swing, and whatever be the impulse given to it. If the impulse is big, it starts with a high velocity, but makes a larger excursion outwards, and the distance it has to travel counteracts its increase of speed, so that its time remains the same. Hence a pendulum, if free to swing outwards and in again, without impediment, will adapt the length of its swing to the impulse it has received, and any interference with it, as by the locking or unlocking of the escapement, will be far less deleterious to its isochronism when such interference occurs at the middle of its path rather than at the ends. It follows that the best escapement will be one which gives an impulse to the pendulum for a short period at the lowest point of its path, and then leaves it quite free to move as it chooses until the time comes for the next impulse.

But a pendulum is not quite truly isochronous, and has its time slightly affected by an increase of its arc; it is therefore desirable that the impulses given to it shall always be equal. If the escapement forms the termination of a clock-train impelled by a weight, the driving force of the escapement is apt to vary

escape’ meat.

Anchor escape- ment.

according to the friction of the wheels, while every change in temperature causes a difference in the thickness of the oil. It is therefore desirable, if possible, to secure uniformity of impulse — say, by causing the train of wheels to lift up a certain specified weight, and let it drop on the pendulum at regular intervals, or by some equivalent method.

The two requirements above stated have given rise respectively to what are known as detached escapements, and remontoires, which will be described presently. In the first place, however, it is desirable to describe the principal forms of escapement in ordinary use.

The balance escapement, which has been already mentioned, was in use before the days of pendulums. It was to a „ , balance escapement that Huygens applied the pendulum, tsa,aace by removing the weight from one arm and increasing the length of the other arm.

Very shortly afterwards R. Hooke invented the anchor or recoil escapement. This is represented in fig. 8, where a tooth of the escape-wheel is just escaping from the right pallet, and another tooth at the same time falls upon the left-hand pallet at some distance from its point. As the pendulum moves on in the same direction, the tooth slides farther up the pallet, thus producing a recoil, as in the crown-wheel escapement. The act- ing faces of the pallets should be convex. For when they are flat, and of course still more when they are concave, the points of the teeth always wear a hole in the pallets at the extremity of their usual swing, and the motion is obviously easier and therefore better when the pallets are made convex; in fact, they then approach more nearly to the ” dead ” escapement, which will be de- scribed presently. The effect of some escapements is not only to counteract the circular error, or the natural increase of the time of a pendulum as the arc increases, but to over- balance it by an error of the contrary kind. The recoil escapement does so; for it is almost invariably found that whatever may be the shape of these pallets, the clock loses as the arc of the pendulum falls off, and vice versa. It is unfortunately impossible so to arrange the pallets that the circular error may be thus exactly neutralized, because the escapement error depends, in a manner reducible to no law, upon variations in friction of the pallets themselves and of the clock train, which produce different effects; and the result is that it is impossible to obtain very accurate time- keeping from any clock of this construction. The point in which the anchor escapement was superior to all that had gone before, was that it would work well with a small arc of swing of the pendulum. The balance escapement, even when adapted to a pendulum, neces-g, sitated a swing of some 20 , and hence the circular error, that is to say, the deviation of the path from a true cycloid, was considerable. But with an anchor escapement the pendu- lum swing need be only 3° or 4 . On the other hand, it violates the conditions above laid down for a perfect escape- ment, inasmuch as the pendu-lum is never free, but at the end of its swing is still operated on by the escapement, which it causes to recoil.

To get rid of this defect the dead escapement, or, as the French call it, I'echappement d, repos, was invented by G. Graham. It is represented in fig. 9. It will be observed that the teeth of the scape-wheel have their points set the opposite way to those of the recoil escapement. The tooth B is here represented in the act of dropping on to the right-hand pallet as the

Fig. 8.-

Anchor or Recoil Escape ment.

Fig. 9. — Dead Escapement.

Dead

escape'

meats.

tooth A escapes from the left pallet. But instead of the pallet having a continuous face as in the recoil escapement, it is divided into two, of which BE on the right pallet, and FA on the left, are called the impulse faces, and BD, FG, the dead faces. The dead faces are portions of circles (not necessarily of the same circle), having the axis of the pallets C for their centre; and the consequence evidently is, that as the pendulum goes on, carrying the pallet still nearer to the wheel than the position in which a tooth falls on to the corner A or B of the impulse and the dead faces, the tooth still rests on the dead faces without any recoil, until the pendulum returns and lets the tooth slide down the impulse face, giving the impulse to the pendulum as it goes. In order to diminish the friction and the necessity for using oil as far as possible, the best clocks are made with jewels (sapphires are the best for the purpose) let into the pallets.

The pallets are generally made to embrace about one-third of the circumference of the wheel, and it is not at all desirable that they should embrace more; for the longer they are, the longer is the run of the teeth upon them, and the greater the friction. In some clocks the seconds hand moves very slowly and rests a very short time; this shows that the impulse is long in proportion to the arc of swing. In others the contrary is the case. A not uncommon proportion is that out of a total arc of swing of 3 , 3°, or about one degree on each side of

the vertical, are occupied in receiving the impulse. In other words, the points F and A should subtend an angle of 2° at the centre C. It is not to be forgotten that the scape- wheel tooth does not overtake the face of the pallet immediately, on account of the moment of inertia of the wheel. The wheels of astronomical clocks, and indeed of all English house clocks, are generally made too heavy, especially the scape-wheel, which, by increasing the moment of inertia, causes a part of the work to be lost in giving blows, instead of being all used up in gentle pushes.

A very useful form of the dead escapement, which is adopted in many of the best turret clocks, is called the ” pin- wheel escape- ment.” Fig. 10 will sufficiently explain its action and construc- tion. Its advantages are — that it does not require so much accuracy as the other; if a pin gets broken it is easily replaced, whereas in the other the wheel is ruined if the point of a tooth is injured; a wheel of given size will work with more pins than teeth, and therefore a train of less velocity will do, and that sometimes amounts to a saving of one wheel in the train, and a good deal of friction; and the blow on both pallets being down- er wi,„„i tr ,.„„„„„ * wards, instead of one up and the

-Pin-Wheel Escapement. other ‘ dowll) th(? actio £ fa more

steady; all which things are of more consequence in the heavy and rough work of a turret clock than in an astronomical one. It has been found expedient to make the dead faces not quite dead, but with a very slight recoil, which rather tends to check the variations of arc, and also the general disposition to lose time if the arc is increased; when so made the escapement is generally called ” half- dead.”

In the dead escapement, during each excursion of the pendulum the repose surface of the pallets rubs against the points of the teeth of the scape-wheel. Thus the pendulum is subject to a constant retardation by friction. Curiously enough, this friction, which at first sight might appear a defect, is an advantage, and to a large extent accounts for the excellence of the escapement. For if the driving force of the clock is increased so that the impulse on the pallets is greater, the velocity of the pendulum is increased. But this very increase of the driving force causes a greater pressure of the teeth of the scape-wheel on the rest-faces of the pallets, and hence counteracts the increased drive of the pendulum by an in- creased frictional retardation. If the clock weight be enormously increased, the frictional retardation becomes increased relatively in a greater proportion than the drive, so that as the weight of the clock is increased the pendulum’s time of vibration is first diminished, until at last a neutral point is reached and finally the

increased loading of the clock weight begins to make the time of vibration increase again. It is the neutral point which it is desirable to arrange for, and only trial and experience can so fit the shape and size of the pallets, scape- wheel and clock weight to one another, as to secure that a moderate variation of the driving power neither accelerates nor retards the motion of the pendulum, while at the same time such an arc of vibration is secured as shall be least subject to barometric error, and not have too great a circular error. The celebrated clockmaker B. L. Vulliamy (1780-1854) greatly improved Graham's escapement by careful experiment, and other makers introduced further improvements into the shape of the scape-wheel and pallets, so that the best form of the deadbeat escapement is now fairly well determined and is given in books upon horology. For small clocks a little slope is given to the rest-faces so as to

Fig. 10.-

diminish the friction retardation. This is known as the half-dead escapement. The pin-wheel escapement, if properly constructed, is also " dead," that is to say, the outward swing of the pendulum is unfettered except by the slight friction of the teeth against the dead faces of the pallets.

In order to diminish the effect of the impact of the scape- wheel on the pallets, and of the crutch on the pendulum rod, the plan has been tried of making the crutch into an elastic spring. In theory this of course would not destroy the isochronism of the pendulum, for it would only be to apply upon the pendulum a force at right angles to the rod, and varying as the displacement. Hence any acceleration given by such a spring would, like the action of gravity, be harmonic, and it is an analytical principle that harmonic motions superposed on one another still remain harmonic. Hence, then, the action of a spring superadded upon the action of gravity on a pen- dulum still leaves the motion harmonic. But changes of tempera- ture would affect the spring considerably. In the case of such a spring the repose faces of Graham's escapement might be minimized and the escapement checked each side by a stop, so as to prevent the pallets from rubbing on the points of the scape-wheel. Graham's escapement can, if well made, be arranged so as not to vary more than an average of 3*5 of a second from its mean daily rate, and this is so good a result that many people doubt whether further effort in the direction of inventing new escapements will result in any better form. Two adaptations of Graham's escapement have been made,

Fig. 11. — Riefler's Escapement.

one by Clemens Riefler of Nesselwang, and the other by L. Strasser of Glashutte, Saxony, which give good results in practice. Riefler's scheme is to mount the upper block, into which the suspension spring is fastened, upon knife edges, and rock it to and fro by the action of a modified Graham's escapement, thus giving impulses to the pendulum. Fig. 11 shows the arrangement. PP are the agates upon which the knife edges CC rest. A is the anchor, RH the scape-wheels, and S the pallets.

Strasser's clock is arranged on the same idea as that of Riefler, only that the rocking motion is given, not to the springs that carry the pendulum, but to a second pair of springs placed outside of them and

Carallel to them. The weight of the pendulum is therefore carried y an upper stationary block, but above that a second block is Subjected to the rocking motion of the anchor. The general design is shown in fig. 12. The pallets are each formed of two stones, so contrived as to minimize the banging of the teeth of the scape-wheel. Both Riefler's and Strasser's clocks aim at having a virtually free pendulum; in fact, they are in reality adaptations of the principle of the spring-clutch to Graham's escapement. The weak point in both is the tampering with the suspension.

The dead escapement is not, however, truly free. In order to make a free escapement it would be necessary to provide that as soon as the pendulum approached its centre position, _ . . some pin or projecting point upon it should free the e jL,„ e . escapement wheel, a tooth of which should thus be enabled me at to leap upon the back of the pendulum, give it a short push, and then be locked until the pendulum had returned and again swung forward. An arrangement of this kind is shown in fig. 13. Let A be a block of metal fixed on the lower end of a pendulum rod. On the block let a small pall B be fastened, free to move round a

centre C and resting against a stop D. Let E be a ˆleaved scape- wheel, the teeth of which as they come round rest against the bent pall GFL at G. The pall is prevented from flying too far back by a pin H, and kept up to position by a very delicate spring K. As soon

Fig. 12. — Strasser's Escapement (Strasser & Rohde).

as the pendulum rod, moving from left to right, has arrived at the

position shown in the figure, the pall B will engage the arm FL, force it forwards, and by raising G will liberate the scape-wheel, a tooth of which, M, will thus close upon the heel N of the block A, and urge it forward. As soon, however, as N has arrived at G the tooth M will slip off the block A and rest on the pall G, and the impulse will cease. The pendulum is now perfectly free or ” detached,” and can swing on unimpeded as far as it chooses. On its return from right to left, the pall B slips over the pall L without disturbing it, and the pendulum is still free to make an excursion towards the left. On its return journey from left to right the process is again repeated. Such an escapement operates once every 2 seconds. One made on a some- what similar plan was applied to a clock by Robert-Houdin, about 1830, and afterwards by Mr Haswell, and another by Sir George Airy.

Fig. 13. — Free Escapement. Fig. 14. — Free Escapement

(old form). But the principlewas already an old one, as maybe seen from fig. 14, which was the work of an anonymous maker in the 18th century. A consideration of this escapement will show that it is only the application of the detached chronometer escapement to a clock.

Even detached escapements, however, are not perfect. In order that an escapement should be perfect, the impulse given to the pen- dulum should be always exactly the same. It may be asked why, if the time of oscillation of the pendulum be independent of the amplitude of the arc of vibration, and hence of the impulse, it is necessary that the impulse should be uniform. Theanwser is that the arc of vibration not being a true cycloid, as it should be if true isochronism is to be secured, but being the arc of a circle, any change of amplitude of vibration produces a change of time in the swing given by the formula §(a 2 — 6 2) = loss in seconds per day, where a and b are the semi-arcs of vibration estimated in degrees. Thus 10′ in- crease of arc in a swing of 4 , that is to say, •! in. increase of arc in a total arc of 2j in., produces an error of about a second a day. Now cold weather, by making the oil thick and thus clogging the wheels, will easily produce such a change of arc; dust will also make a change even though the clock weight, acted on by gravity, still exerts a uniform pull. Besides, if the clock has work to do of a varying amount— as when the hands of a turret clock are acted on by a heavy wind pressure tending sometimes to retard them, sometimes to drive them on — then it is clear that the impulses given by the scape-wheel to the pendulum may be very unequal, and that the arc of vibration of the pendulum may thus be seriously affected and its isochronism disturbed.

To abolish errors arising from the changes in the force driving the

escapement, what is known as the ” remontoire ” system was Remoa-adopted. It first came into use for watches, which was toirg, perhaps natural, seeing that the driving force of a watch

is not a uniform weight like that of a clock, but depends on springs, which are far less trustworthy. The idea of a remontoire

is to disconnect the escapement from the clock train, and to give the escapement a driving power of its own, acting as directly as possible on the pallets without the intervention of a clock-train containing many wheels. The escapement is thus as it were made into a separate clock, which of course needs repeated winding, and this winding is effected by the clock-train. From this it results that variations in the force transmitted by the clock-train merely affect the speed at which the ” rewinding ” of the escapement is effected, but do not affect the force exerted by the driving power of the escapement.

There are several modes of carrying out this plan. The first of them is simply to provide the scape-wheel with a weight or spring of its own, which spring is wound up by the clock-train Train as often as it runs down. Contrivances of this kind are remon- called train remontoires. In arranging such a remontoire tolres ‘ it is obvious that the clock-train must be provided with a stop to prevent it from overwinding the scape-wheel weight or spring, and further, that there must be on the scape-wheel some sort of stud or other contrivance to release the clock-train as soon as the scape-wheel weight or spring has run down and needs rewinding. We believe the first maker of a large clock with a train remontoire was Thomas Reid of Edinburgh, who described his apparatus in his book on Horology (18 19). The scape- wheel was driven by a small weight hung by a Huygens’s endless chain, of which one of the pulleys was fixed to the arbor, and the other rode upon the arbor, with the pinion attached to it, and the pinion was driven and the weight wound up by the wheel below (which we will call the third wheel), as follows. Assuming the scape-wheel to turn in a minute, its arbor has a notch cut half through it on opposite sides in two places near to each other; on the arbor of the wheel, which turns in ten minutes, suppose, there is another wheel with 20 spikes sticking out of its rim, but alternately in two different planes, so that one set of spikes can only pass through one of the notches in the scape-wheel arbor, and the other set only through the other. Whenever, then, the scape-wheel completes a half-turn, one spike is let go, and the third wheel is able to move, and with it the whole clock-train and the hands, until the next spike of the other set is stopped by the scape-wheel arbor; at the same time the pinion on that arbor is turned half round, winding up the remontoire weight, but without taking its pressure off the

scape-wheel. Reid says that, so long as this appar- atus was kept in good order, the clock went better than it did alter it was removed in consequence of its getting out of order from the constant banging of the spikes against the arbor.

A clock at the Royal Exchange, London, was made in 1844 on the same principle, except that, instead of the endless chain, an internal wheel was used, with the spikes set on it externally, which is one of the modes by which an occasional secondary motion may be given to a wheel without disturbing its primary and regular motion. The following is a more simple arrangement of a gravity train remontoire, much more frequently used in principle. Let E in fig. 15 be the scape-wheel turning in a minute, and e its pinion, which is driven by the wheel D having a pinion d driven by the wheel C, which we may suppose to turn in an hour. The arbors of the scape-wheel and hour-wheel are distinct, their pivots meeting in a bush fixed some- where between the wheels. The pivots of the wheel D are set in the frame AP, which rides on the arbors of the hour-wheel and scape-

//^'/""""X

Fig. 15. — Gravity Train Remontoire.

wheel, or on another short arbor between them. The hour-wheel also drives another wheel G, which again drives the pinion / on the arbor which carries the two arms/ A,/ B; and on the same arbor is set a fly with a ratchet, like a common striking fly, and the numbers of the teeth are so arranged that the fly will turn once for each turn of the scape-wheel. The ends of the remontoire arms / A, / B are capable of alternately passing the notches cut half through the arbor of the scape-wheel, as those notches successively come into the proper position at the end of every half -minute; as soon as that happens the hour-wheel raises the movable wheel D and its frame through a small angle; but, nevertheless, that wheel keeps pressing on the scape-wheel as if it were not moving, the point of contact of the wheel C and the pinion d being the fulcrum or centre of motion of the lever A d P. It will be observed that the remontoire arms / A,

/ B have springs set on them to diminish the blow on the scape- wheel arbor, as it is desirable not to have the fly so large as to make the motion of the train, and consequently of the hands, too slow, to be

distinct.

Another kind of remontoire is on the principle of one bevelled wheel lying between two others at right angles to it. The first of the bevelled wheels is driven by the train, and the third is fixed to the arbor of the scape-wheel; and the intermediate bevelled wheel, of any size, rides on its arbor at right angles to the other two arbors which are in the same line. The scape-wheel will evidently turn with the same average velocity as the first bevelled wheel, though the intermediate one may move up and down at intervals. The transverse arbor which carries it is let off and lifted a little at half-minute intervals, as in the remontoire just now described; and it gradually works down as the scape-wheel turns under its pressure, until it is freed again and lifted by the clock-train.

In all these gravity remontoires, however, only the friction of the heavy parts of the train and the dial-work is got rid of, and the scape-wheel is still subject to the friction of the remontoire wheels, which, though much less than the other, is still something considerable. Accordingly, attempts have frequently been made to drive the scape-wheel by a spiral spring, like the mainspring of a watch. One of these was described in the 7th edition of this encyclopaedia; and Sir G. Airy invented another on the same principle, of which one specimen is still going well. One of the best forms of such a remon- toire is shown in fig. 16, in which A, B, D, E, e,/are the same things

as in fig. 15. But e, the scape- wheel pinion, is no longer fixed to the arbor, nor does it ride on the arbor, as had been the case in all the previous spring remontoires, thereby producing probably more friction than was saved in other respects; but it rides on a stud k, which is set in the clock frame. On the face of the pinion is a plate, of which the only use is to carry a pin h (and consequently its shape is immaterial), and in front of the plate is set a bush b, with a hole through it, of which half is occupied by the end of the stud k, to which the bush is fixed by a small pin, and the other half is the pivot-hole for the scape- wheel arbor. On the arbor is set the remontoire spring s (a moderate-sized musical-box spring is generally used), of which the outer end is bent into a loop to take hold of the pin h. In fact, there are two pins at h, one a little behind the other, to keep the coils of the spring from touching each other. Now, it is evident that the spring may be wound up half or a quarter of a turn at the proper intervals without taking the force off the scape- wheel, and also without affecting it by any friction whatever. When the scape-wheel turns in a minute, the letting-off would be done as before described, by a couple of notches in the scape-wheel arbor through which the spikes A, B, as

in fig. 15, would pass alternately! During the half-minute that the spring is running down the impulse on the pendulum constantly diminishes; but this error is small if the spring be properly shaped, and besides, being periodic, does not affect the average time-keeping of the clock. It would be inad- missible in astronomical clocks where each particular second has always to be true. In clocks with only three wheels in the train it is best to make the scape-wheel turn in two minutes. In that case four notches and four remontoire arms are required, and the fly makes only a quarter of a turn. Lord Grimthorpe made the follow- ing provision for diminishing the friction of the letting-off work The fly pinion /has only half the number of teeth of the scape-wheel pinion, being a lantern pinion of 7 or 8, while the other is a leaved pinion of 14 or 16, and therefore the same wheel D will properly drive both, as will be seen hereafter. The scape-wheel arbor ends in a cylinder about | in. in diameter, with two notches at right angles cut in its face, one of them narrow and deep, and the other broad and shallow, so that a long and thin pin B can pass only through one, and a broad and short pin A through the other. Consequently at each quarter of a turn of the scape-wheel, the remontoire fly, on which the pins A, B are set on springs, as in fig. 15, can turn half round. It is set on its arbor/ by a square ratchet and click, which enables the spring to be adjusted to the requisite tension to obtain the proper vibration of the pendulum. A better construction, afterwards introduced, is to make the fly separate from the letting- off arms, whereby the blow on the cylinder is diminished, the fly being allowed to go on as in the gravity escapement. It should be observed, however, that even a spring remontoire requires a larger

Spring Remontoire.

weight than the same clock without one; but as none of that ad- ditional force reaches the pendulum, that is of no consequence. The variation of force of the remontoire spring from temperature, as it only affects the pendulum through the medium of the dead escape- ment, is far too small to produce any appreciable effect ; and it is found that clocks of this kind, with a compensated pendulum 8 ft. long, and weighing about 2 cwt. , will not vary above a second a month, if the pallets are kept clean and well oiled. No turret clock without either a train remontoire or a gravity escapement will approach that degree of accuracy.

The introduction of this remontoire led to another very important alteration in the construction of large clocks. Hitherto it had always been considered necessary, with a view to diminish the friction as far as possible, to make the wheels of brass or gun-metal, with the teeth

cut in an engine. The French clockmakers had begun to use cast iron striking parts, and cast iron wheels had been oc- casionally used in the going part of inferior clocks for the sake of cheapness; but they had never been used in any clock making preten- sions to accuracy. But in consequence of the success of a clock shown in the 1851 Exhibition, it was determined by Sir G. Airy and Lord Grimthorpe (then E. Denison),who were jointly consulted by the Board of Works about the great Westminster clock in 1852, to alter the original requisition for gun-metal wheels there to cast iron. But cast iron wheels must drive cast iron pinions, for they will wear out steel. The next kind of remontoire still leaves the scape-wheel linked up with the clock-train, but makes it wind up the pallets which are held raised up till their action is wanted, when they are allowed to drop gently on the crutch or the pendulum rod. In this case the two arms of the anchor are usually divided and mounted on separate shafts so as to act independently. This idea was fiist started by Thomas Mudge (1717-1794) and Alexander Cumming (1733-1814). Mudge's escapement is shown in fig. 17. The tooth A of the scape- wheel is resting against the stop or detent a at the end of the pallet CA, from the axis or arbor of which descends the half- nrmM fork CP to touch the pendulum. From the other pallet UfavH y CB descends the other half-fork CO. The two arbors are esca P«- set as near the point of suspension, or top of the pendulum ™ente. spring, as possible. The pendulum, as here represented, must be moving to the right, and just leaving contact with the left pallet and going to take up the right one;' as soon as it has raised that pallet a little it will evidently unlock the wheel and let it turn, and then the tooth B will raise the left pallet until it is caught by the stop b on that pallet, and then it will stay until the pendulum returns and releases it by raising that pallet still higher. Each pallet therefore descends with the pendulum to a lower point than that where it is taken up, and the difference between them is supplied by the lifting of each pallet by the clock, which does not act on the pendulum at all; so that_ the pendulum is independent of all variations of force and friction in the train. This escapement is said by Lord Grim-

Fig. 18. — Bloxam's Gravity Escapement.

Fig. 17. — Mudge's Gravity Escape- ment.

thorpe, in his Rudimentary Treatise on Clocks, first published in 1850, to be liable to trip, the pallets being apt to be jerked by the pendulum, so that the teeth slip past the hook, and the wheel flies round, lnis, however, appears entirely a matter of construction. 1 he really weak point is that while the impulses on the pendulum due to the

gravitational fall of the arms are uniform, the force which has to be exercised by the pendulum in unlocking them from the scape-wheel vanes with the pressure of the clock-train. Hence we miss the compensation which is so beautiful a result of Graham's escapement. To avoid this, J. M. Bloxam, a barrister, proposed about the middle of the 19th century his legged gravity escapement (.rig. 18). iSy this arrangement the parts of the scape- wheel which

lifted the gravity arms were brought as near to the axis of the scape-wheel as possible, while the locking arms were brought as far from the axis as possible so that the oressure should be light. The pallet arbors were cranked, to embrace the pendulum-spring, so that their centres of motion might coincide with that of the pendulum as nearly , as possible — perhaps an unnecessary refinement ; at least the three-legged and four-legged gravity escapements answer very well with the pallet arbors set on each side of the top of the spring. The size of the wheel determines the length of the pallets, as they must be at such an angle to each other that the radii of the wheel when in con- tact with each stop may be at right angles to the pallet arm ; and therefore, for a wheel of this size, the depth of locking can only be very small. The pinion in Bloxam's clock only raises the pallet through 40′ at each beat; i.e. the angle which we call 7, viz. the amplitude of the pendulum when it begins to lift the pallet, is only 20'; and probably, if it were increased to anything like a/ V 2, where a is the semiarc of swing, the escapement would trip immediately. The two broad pins marked E, F, are the fork-pins, and A and B are the stops. The clock which Bloxam had went very well; bilt it had an extremely fine train, with pinions of 18; and nobody else appears to have been able to make one to answer.

Bloxam's escapement was modified in form by Lord Grimthorpe, his chief improvement being the addition of a fly vane, which, how- ever, had previously been used for remontoires to steady the motion. He tried various modifications of construction, but finally adopted the " four-legged " and " double-three-legged " forms as being the most satisfactory, the former for regulators and the latter for large clocks. Fig. 19 is a back view of the escapement part of an astrono- mical clock with the four-legged wheel; seen from the front the

Fig.

19.- — Four-legged Gravity Fig. 20. — Double Three-legged Escapement. Escapement.

wheel would turn the other way. The long locking teeth are made about 2 in. long from the centre, and the lifting pins, of which four point forwards while four other intermediate ones point backwards, are at not more than £„ of the distance between the centres EC, of the scape-wheel and pallets ; or rather C is the top of the pendulum spring to which the pallets Cs, Cs' converge, though the resultant of their action is a little below C. It is not worth while to crank them as Bloxam did, in order to make them coincide exactly with the top of the pendulum, as the friction of the beat pins on the pendulum is insignificant, and even then would not be quite de- stroyed. The pallets are not in the same plane, but one is behind and the other in front of the wheel, with one stop pointing backwards and the other forwards to receive the teeth alternately— it does not matter which; in this figure the stop s is behind and the stop s' forward. The pendulum is now going to the right, and just beginning to lift the right pallet and free the stop s' ; then the wheel will begin to turn and lift the other pallet by one of the pins which is now lowest, and which moves through 45° across the line of centres, and therefore lifts with very little friction. It goes on till the tooth now below s reaches s and is stopped there. Meanwhile the pallet Cs' goes on with the pendulum as far as it may go, to the end of the arc which we have called a, starting from 7; but it falls with the pen- dulum again, not only to 7 but to -7 on the other side of o, so that the impulse is due to the weight of each pallet alternately falling through 27; and the magnitude of the impulse also depends on the obliqueness of the pallet on the whole, i.e. on the distance of its centre of gravity from the vertical through C. The fly KK' is set on with a friction spring like the common striking-part fly, and should be as long as there is room for, length being much more effective than width.

The double three-legged gravity escapement, which was first used in the Westminster clock, is shown in fig. 20. The principle of it is the same as of the four-legs; but instead of the pallets being one behind and the other in front of the wheel, with two sets of lifting

pins, there are two wheels ABC, abc, with the three lifting pins and the two pallets between them like a lantern pinion. One stop B points forward and the other A backward. The two wheels have their teeth set intermediately or 60° apart, though that is not essential, and the angle of 120 may be divided between them in any other proportions,

as 70° and 50 , and in that way the pallets may be still more oblique than 30° from the vertical, which, however, is found enough to prevent tripping even if the fly gets loose, which is more likely to happen from carelessness in large clocks than in astronomical ones.

Of course the fly for those escapements in large clocks, with weights heavy enough to drive the hands in all weather, must be much larger than in small ones. For average church clocks with 1 1 sec. pendulum the legs of the scape- wheels are generally made 4 in. long and the fly from 6 to 7 in. long in each vane by l| or I J wide. For l§ sec. pendulums the scape-wheels are generally made 4j radius. At Westminster they are 6 in.

Lord Grimthorpe considered that these escapements act better, especially in regulators, if the pallets do not fall quite on the lifting pins, but on a banking, or stop at any convenient place, so as to leave the wheel free at the moment of starting; just as the striking of a common house clock will sometimes fail to start unless the wheel with the pins has a little run before a pin begins to lift the hammer. The best way to manage the banking is to make the beat-pins long enough to reach a little way behind the pendulum, and let the banking be a thin plate of any metal screwed adjustably to the back of the case. This plate cannot well be shown in the drawings together with the pendulum, which, it may be added, should take up one pallet just when it leaves the other.

In chronometer spring remontoires the pendulum, as it goes by, flips a delicate spring and releases a small weight or spring which has been wound up in readiness by the action of the scape- wheel and which by leaping on to the pendulum gives it a push. One on this principle made about the middle of the 19th century by Robert Houdin is to be seen at the Conservatoire des Arts et Metiers. It is very com- plicated. The following is more simple. In fig. 21 a scape-wheel AB has 30 pins and 360 teeth. It is engaged with a fly vane EP mounted on a pinion of 12 teeth. Each pin as it passes raises an impulse arm CD which is hooked upon a detent K. A pall NM then engages the fly vane and prevents the scape-wheel from moving farther. The impulse arm being now set, as the plate F attached to the lower end of the pendulum flies past from left to right a pall

Chrono- meter spring re- montoire.

Fig. 21. — Chronometer Spring Remontoire.

G knocks aside the detent K, and allows a pin O projecting from the

end of the impulse arm to fall upon an inclined pallet h, which is thus urged forward. As soon as the pallet has left the pin, the impulse arm in its further fall strikes N, which disengages the pall at P and allows the scape-wheel to move on and again wind up the impulse arm CD, which is then again locked by the detent K. On the return journey of the pendulum the light pall G, which acts the part of a chronometer spring, flips over the detent. The pallet is double sided, h and V , so that if by chance the clock runs down while the pendulum swings from left to right the impulse arm will be simply raised and not smashed. It has a flat apex, on which the pin falls before descending. The impulse given depends on the weight of the impulse arm and may be varied at pleasure. The work done in un- locking the detent is invariable, as it depends on the pressure of the fly vane at P and is independent of the clock-train. The duration of the impulse is very short — only about tV of the arc of swing. It is given exactly at the centre of the swing, and when not under impulse the pendulum is detached.

Clock Wheels. — Since, as we have seen, any increase in the arc of a pendulum is accompanied by a change in its going ratˆ-

it is very desirable to keep the force which acts on the pendulum uniform. This in fact is the great object of the best escapements. Inasmuch as the impulse on the pendulum, derived from the work done by a tailing weight or an unwinding spring, is transmitted through a train of wheels, it is desirable that that transmission should be as free from friction and as regular as possible. This involves care in the shaping of the teeth. The object to be aimed at is that as the wheel turns round the ratio of the power of the driver to that of the driven wheel (” runner ” or ” follower “) should never vary. That is to say, whether the back part of the tooth of the driver is acting on the tip of the tooth of the follower, or the tip of the driver is acting on the back part of the tooth of the follower, the leverage ratio shall always be uniform. For simplicity of manufacture the pinion wheels are always constructed with radial leaves, so that the surface of each tooth is a plane passing through the axis of the wheel. The semicircular rounding of the end of the tooth is merely ornamental. The question therefore is, suppose that it is desired by means of a tooth on a wheel to push a plane round an axis, what is the shape that

must be given to that tooth in order that the leverage ratio may remain unaltered ?

If a curved surface, known as a ” cam,” press upon a plane one, both being hinged or centred upon pivots A and B respectively

(fig. 22), then the line of action and reaction at D, the cfoUal point where they touch, will be perpendicular to their teeth. surfaces at the point of contact — that is perpendicular

to BD, and the ratio of leverage will obviously be AE : BD, or AC : CB. Hence to cause the leverage ratio of the cam to the plane always to remain unaltered, the cam must

Fig. 22. — Cam and Plane.

Fig. 23.

be so shaped that in any position the ratio AC : CB will remain unchanged. In other words the shape of the cam must be such that, as it moves and pushes BD before it, the normal at the point of contact must always pass through the fixed point C.

If a circle PMB roll upon another circle SPT (fig. 23) any point M on it will generate an epicycloid MN. The radius of curvature of the curve at M will always be MP, for the part at M is being produced by rotation round the point P. It follows that a line from B to M will always be tangential to the epicycloid. If the epicycloid be a cam moving as a centre round the centre R (not shown in the figure) of the circle SPT, the leverage it will exert upon a plane surface BM moving round a parallel axis at B, will always be as BP to PR, that is, a constant; whence MN is the proper shape of a tooth to act on a pinion with radial arms and centred at B. In designing a pair of wheels to transmit motion, which is to be multiplied say 6 times in the transmission (about the usual ratio for clock wheels), if we take two circles (called the ” pitch circles “) touching one

another with radii as 1:6, then the circumference of the smaller will roll 6 times round that of the larger. The smaller wheel will have a number of teeth, say 8 to 16, each of them being sectors of the circle (fig. 24). If there are 16 teeth, then on the surface of the driving wheel there will be 96 teeth. Each of these teeth will be shaped as the curve of an epicycloid formed by the rolling on the big circle of a circle whose diameter is the radius of the pitch circle of the pinion. Points of the teeth so formed are cut off, so as to allow of the pinion having a solid core to support it, and gaps are made into the pitch circle to

admit the rounded

Fig. 24.

ends of the leaves of the pinon wheel. Thus a cog-wheel is shaped out.

Clock wheels are made of hard hammered brass cut out by a wheel cutting machine. This machine consists of a vertical spindle on the top of which the wheel to be cut is fixed on a firmly resisting plate of metal of slightly smaller diameter, so as to allow the wheel to overlap. A cutter with the edges most delicately ground to the exact shape of the gap between two teeth is caused to rotate 3000-4000 times a minute, and brought down upon the edge of the wheel. The shavings that come off are like fine dust, but the cutter is pushed on so as to plunge right through the rim of the wheel in a direction parallel to the axis. In this way one gap is cut. The vertical spindle is now rotated one division, by means of a dividing plate, and another tooth is cut, and so the operation goes on round the wheel.

It is not desirable in clocks that the pinion wheels which are driven should have too few teeth, for this throws all the work on a pair of surfaces before the centres and is apt to produce a grinding motion. Theoretically the more leaves a pinion has the better. Pinions can be made with leaves of thin stee) watch-spring. In this case quite small pinions can have 20 leaves or more. The teeth in the driving wheels then become mere notches for which great accuracy of shape is not necessary. Such wheels are easy to make and run well. Lantern pinion* are also excellent and are much used in American clocks. They are easy to make in an ordinary lathe. The cog-wheels must, however, be specially shaped to fit them. They consist of a number of round pins arranged in a circle round the axis of the wheel and parallel to it. The ends are secured in flanges like the wires of a squirrel cage. The teeth of cog-wheels engage them and thus drive the wheel round. They were much used at one time but are now falling out of favour again.

It is possible to make toothed wheels that drive with perfect uniformity by using for the curve of the teeth involutes of circles. These involutes are traced out by a point on a string that is gradually unwound from a circle. They are teeth. in fact epicycloids traced by a rolling circle of infinite radius, i.e. a straight line. Involute teeth have the advantage that they roll on one another instead of sliding. When badly made they put considerable strain on the axes or shafts that carry them. Hence they have not been regarded with great favour by clockmakers.

By the pitch of a wheel is meant the number of teeth to' the inch of circumference or diameter of the wheel; the former is called the circumferential pitch, the latter the diametral pitch. Thus if we say that a wheel has 40 diametral pitch we mean that it has 40 teeth to each inch of diameter. The circumferential pitch is of course got by dividing the diametral pitch by ir. Wheel-cutters are made for all sizes of pitches. If it were needed to make a pair of wheels the ratio of whose motion was say 6 : 1 and we determined to use a dia- metral pitch of 30 to the inch, that is teeth about iV in. wide at the base, and if the smaller circle were to have 20 teeth, we should need a blank of a diameter of JH7 + A = f fj in. for the smaller wheel, and one of Vif + ˆirˆW" m – for the larger wheel which would have 120 teeth to the inch and be 4-06 in diameter to the tips of the teeth. The smaller toothed wheel would be -73 of an inch in diameter over all. The pitch circles of the wheels would be f and 4 in. respectively. For fine wheel work, where the driver is always much larger than the driven wheel, the epicycloidal tooth appears preferable, as it is generally considered to put less side strain on the pinion wheel. But the relative merits of the two systems have never been properly tested for clock work. .

Going Barrels. — A clock which is capable of going accurately must have some contrivance to keep it going while it is being wound up. In the old-fashioned house clocks, which were wound up by merely pulling one of the strings, and in which one such winding served for both the going and striking parts, this was done by what is called the endless chain of Huygens, which consists of a string or chain with the ends joined together, and passing over two pulleys on the arbors of the great wheels,

Pitch.

with deep grooves and spikes in them, to prevent the chain from slipping. In one of the two loops or festoons which hang from the upper pulleys is a loose pulley without spikes, carrying the clock-weight, and in the other a small weight only heavy enough to keep the chain close to the upper pulleys. Now, suppose one of those pulleys to be on the arbor of the great wheel of the strik- ing part, with a ratchet and click, and the other pulley fixed to the arbor of the great wheel of the going part; then (whenever the clock is not striking) the weight may be pulled up by pulling down that part of the string which hangs from the other side of the striking part; and yet the weight will be

acting on the going part all the time. It would be just the same if the striking part and its pulley were wound up with a key, instead of the string being pulled, and also the same, if there were no striking part at all, but the second pulley were put on a blank arbor, except that in that case the weight would take twice as long to run down, supposing that the striking part generally requires the same weight X fall as the going part.

This kind of going barrel, however, is evidently not suited to the delicacy of an astronomical clock; and Harrison's going ratchet is now universally adopted in such clocks, and also in chronometers and watches for keeping the action of the train on the escapement during the winding. Fig. 25 (in which the same letters are used as in the corresponding parts of fig. 3)

t_ shows its construction. The -ˆZJ click of the barrel-ratchet R is set upon another larger ratchet-wheel with its teeth pointing the opposite way, and its click rT is set in the clock frame. That ratchet is connected with the great wlieel by a spring ss' pressing against the two pins s in the ratchet and s' in the wheel. When the weight is wound up (which is equivalent to taking it off), the click Tr prevents that ratchet from turning back or to the right; and as the spring ss' is kept

t- tr • • /- • r. . u a. by tne weight in a state

FiG.2 5 .-HamsonsGoing-Ratchet. of ^^ equivalent to the

weight itself it will drive the wheel to the left for a short distance, when its end s is held fast, with the same force as if that end was pulled forward by the weight; and as the great wheel has to move very little during the short time the clock is winding, the spring will keep the clock going long enough.

In the commoner kind of turret clocks a more simple apparatus is used, which goes by the name of the bolt and shutter, because it consists of a weighted lever with a broad end, which shuts up the winding-hole. When it is lifted a spring-bolt attached to the lever, or its arbor, runs into the teeth of one of the wheels, and the weight x>i the lever keeps the train going until the bolt has run itself out of gear. Clocks are not always driven by weights. When accuracy is not necessary, but portability is desirable, springs are used. The old form of spring became weaker as it was unwound and necessitated the use of a device called a fusee or spiral drum. This apparatus will be found described in the article Watch.

Striking Mechanism. — There are two kinds of striking work used in clocks. The older of them, the locking-plate system, which is still used in most foreign clocks, and in turret clocks in England also, will not allow the striking of any hour to be either omitted or repeated, without making the next hour strike wrong; whereas in the rack system, which is used in all English house clocks, the number of blows to be struck depends merely on the position of a wheel attached to the going part, and therefore the striking of any hour may be omitted or repeated without derang- ing the following ones. We shall only describe the second of these, which is the more usual in modern timepieces.

Fig. 26 is a front view of a common English house clock with the face taken off, showing the repeating or rack striking move- ment. Here, as in fig. 3 , M is the hour- wheel, on the pipe of which the minute-hand is set, N the reversed hour-wheel, and n its pinion, driving the 12-hour wheel H, on whose socket is fixed what is called the snail Y, which belongs to the striking work exclusively. The hammer is ra.‘sed by the eight pins in the rim of the second wheel in the striking train, in the manner which is obvious.

The hammer does not quite touch the bell, as it would jar in striking if it did, and prevent the full sound. The form of the hammer-shank at the arbor where the spring S acts upon it is such that the spring both drives the hammer against the bell when the tail T is raised, and also checks it just before it reaches the bell, the blow on the bell thus being given by the hammer having acquired momentum enough to go a little farther than its place of rest. Sometimes two springs are used, one for impelling

Fig. 26. — Front view of common English House Clock.

the hammer, and the other for checking it. But nothing will check the chattering of a heavy hammer, except making it lean forward so as to act, partially at least, by its weight. The pinion of the striking- wheel generally has eight leaves, the same number as the pins; and as a clock strikes 78 blows in 12 hours, the great wheel will turn in that time if it has 78 teeth instead of 06, which the great wheel of the going part has for a centre pinion of eight. The striking-wheel drives the wheel above it once round for each blow, and that wheel drives a fourth (in which there is a single pin P), six. or any other integral number of turns, for one turn of its own, and that drives a fan-fly to moderate the velocity of the train by the resistance of the air, an expedient at least as old as De Vick’s clock in 13 70.

The wheel N is so adjusted that, within a few minutes of the hour, the pin in it raises the lifting-piece LONF so far that that piece lifts the click C out of the teeth of the rack BKRV, which immediately falls back (helped by a spring near the bottom) as far as its tail V can go by reason of the snail Y, against which it falls; and it is so arranged that the number of teeth which pass the click is proportionate to the depth of the snail; and as there is one step in the snail for each hour, and it goes round with the hour-hand, the rack always drops just as many teeth as the

number of the hour to be struck. This drop makes the noise of ” giving warning.” But the clock is not yet ready to strike till the lifting piece has fallen again; for, as soon as the rack was let off, the tail of the gathering pallet G,on the prolonged arbor of the third wheel, was enabled to pass the pin K of the rack on which it was pressing before, and the striking train began to move; but before the fourth wheel had got half round, its pin P was caught by the end of the lifting-piece, which is bent back and goes through a hole in the plate, and when raised stands in the way of the pin P, so that the train cannot go on till the lifting-pieCe drops, which it does exactly at the hour, by the pin N then slipping past it. Then the train is free; the striking wheel begins to lift the hammer, and the gathering pallet gathers up the rack, a tooth for each blow, until it has returned to the place at which the pallet is stopped by the pin K coming under it. In this figure the lif ting-piece is prolonged to F, where there is a string hung to it, as this is the proper place for such a string when it is wanted for the purpose of learning the hour in the dark, and not (as it is generally put) on the click C; for if it is put there and the string is held a little too long, the clock will strike too many; and if the string accidentally sticks in the case, it will go on striking till it is run down — neither of which things can happen when the string is put on the lifting-piece.

The snail is sometimes set on a separate stud with the apparatus called a star-wheel and jumper. On the left side of the frame we have placed a lever x, with the letters st below it, and si above. If it is pushed up to si, the other end will come against a pin in the rack, and prevent it from falling, and will thus make the clock silent; and this is much more simple than the old-fashioned ” strike and silent ” apparatus, which we shall therefore not describe, especially as it is seldom used now.

If the clock is required to strike quarters, a third ” part ” or train of wheels is added on the right hand of the going part; and its general construction is the same as the hour-striking part; only there are two more bells, and two hammers so placed that one is raised a little after the other. If there are more quarter- bells than two, the hammers are generally raised by a chime- barrel, which is merely a cylinder set on the arbor of the striking- wheel (in that case generally the third in the train), with short pins stuck into it in the proper places to raise the hammers in the order required for the tune of the chimes. The quarters are usually made to let off the hour, and this connexion may be made in two ways. If the chimes are different in tune for each quarter, and not merely the same tune repeated two, three and four times, the repetition movement must not be used for them, as it would throw the tunes into confusion, but the old locking-plate move- ment, as in turret clocks; and therefore, if we conceive the hour lifting-piece connected with the quarter locking-plate, as it is with the wheel N, in fig. 26, it is evident that the pin will discharge the hour striking part as the fourth quarter finishes.

But where the repetition movement is required for the quarters, the matter is not quite so simple. The principle of it may shortly be described thus. The quarters themselves have a rack and snail, &c, just like the hours, except that the snail is fixed on one of the hour-wheels M or N, instead of on the twelve-hour wheel, and has only four steps in it. Now suppose the quarter-rack to be so placed that when it falls for the fourth quarter (its greatest drop), it falls against the hour lifting-piece somewhere between O and N, so as to raise it and the click C. Then the pin Q will be caught by the click Qq, and so the lifting-piece will remain up until all the teeth of the quarter-rack are gathered up; and as that is done, it may be made to disengage the click Qq, and so complete the letting off the hour striking part. This click Qq has no existence except where there are quarters.

The method in which an alarum is struck may be understood by reference to either of the recoil escapements (figs. 1 and 7). If a short hammer instead of a long pendulum be attached to the axis of the pallets, and the wheel be driven with sufficient force, it will evidently swing the hammer rapidly backwards and forwards; and the position and length of the hammer-head may be so adjusted as to strike a bell inside, first on one side and then on the other. As to the mode of letting off the alarum

at the time required: if it was always to be let off at the same time all that would be necessary would be to set a pin in the twelve-hour wheel at the proper place to raise the lifting-piece which lets off the

alarum at that time. But as the time must be capable of alteration, this discharging pin must be set in another wheel (without teeth), which rides with a friction- spring on the socket of the twelve-hour wheel, with a small movable dial attached to it, having figures so arranged with reference to the pin that whatever figure is made to come to a small pointer set as a tail to the hour hand, the alarum shall be let off at that hour.

The watchman's or tell-tale clock, used when it is desired to make sure of a watchman being on the spot and awake all the night, is a clock with a set of spikes, generally 48 or 96, sticking out all round the dial, and a handle somewhere in the case, by pulling which one of the spikes which is opposite to it, or to some lever connected with it is pressed in. This wheel of spikes is carried round with the hour-hand, which in these clocks is generally a twenty-four hour one. It is evident that every spike which is seen still sticking out in the morning indicates that at the particular time to which that spike belongs the Watchman was not there to push it in — or at any rate, that he did not. At some other part of their circuit, the inner ends of the pins are carried over a roller or an inclined plane which pushes them out again ready for business the next night. The time at which workmen arrive at their work may be recorded by providing each of them with a numbered key with which he stamps his number on a moving tape, on which also the time is marked by a clock.

Church and Turret Clocks. — Seeing that a clock — at least the going part of it — is a machine in which the only work to be done is the overcoming of its own friction and the resistance of the air, it is evident that when the friction and resistance are much increased it may become necessary to resort to expedients for neutralizing their effects, which are not required in a smaller machine with less friction. In a turret clock the friction is enormously increased by the great weight of all the parts; and the resistance of the wind, and sometimes snow, to the motion of the hands, further aggravates the difficulty of maintaining a constant force on the pendulum; and besides that, there is the exposure of the clock to the dirt and dust which are always found in towers, and of the oil to a temperature which nearly or quite freezes it all through the usual cold of winter. This last circumstance alone will generally make the arc of the pendulum at least half a degree more in summer than in winter; and inasmuch as the time is materially affected by the force which arrives at the pendulum, as well as the friction on the pallets when it does arrive there, it is evidently impossible for any turret clock of the ordinary construction/especially with large dials, to keep any constant rate through the various changes of temperature, weather and dirt to which it is exposed.

Hence special precautions, such as the use of remontoires and gravity escapements, have' to be observed in the design of large clocks that have any pretensions to accuracy, in order to ensure that the arc of the pendulum is not affected by external circumstances, such as wind-pressure on the hands or dirt in the wheel-train. But such have been the improvements effected in electric clocks, that rather than go to the trouble and expense required by such precautions, it appears far preferable to keep an accurate time- piece in some sheltered position and use it with a source of electricity to drive the hands of the large dial.

Electrical Clocks. — One of the first attempts to apply electricity to clocks was made by Alexander Bain in 1840-1850. About the same time Sir C. Wheatstone, R. L. Jones, C. Shepherd, Paul Gamier and Louis Breguet invented various forms of electrical time-keepers. It is not proposed here to go into the history of these abortive attempts. Those who desire to follow them may consult Bain, An Account of Some Applications of the Electric Fluid to the UsefulArts{i84$) ,&ndShort History of Electric Clocks (1852); Sir Charles Wheatstone, Trade Circular of the British Telegraph Manufactory; C. Shepherd, On the Application of Electro-magnetism as a Motor for Clocks (1851), and a list of

Fig. 27. — Turret Clock for Hidalgo, Mexico, driving references in the Appendix to Tobler's Die electrischen Uhren (Leipzig, 1883), and a list of books given by F. Hope Jones, Proc. Inst. Elec. Eng., 1900, vol. 20. The history of electrical clocks is a long and complicated matter, for there are some 600 or 700 patents for these clocks in Europe and America, some containing the germs of valuable ideas but most pure rubbish. All that can be done is to select one or two prominent types of each class and give a brief description of their general construction.

It is in the apparently simple matter of making and keeping the electrical contact that most of the systems of electrical time- keeping have failed, for want of attention to the essential conditions of the problem. In practice every metal is covered with a thin film of non-conducting oxide over which is another film of moisture, oil, dirt or air. Hence what is wanted is a good vigorous push of a blunted point or edge preferably obliquely upon a more or less yielding surface so as to get a rubbing action. Thus if the stiff spring a b (fig. 28) were stabbed down on the oblique surface C D a good contact would

invariably result, provided that the metals employed were gold, platinum or some not easily oxidizable metal. Or again, if a mercury surface be simply touched with a pin, the slight sparking that is produced on making the current will soon form a little pile of dirty oxide at the point of entry, and the contact will frequently fail. If it be necessary to have a mercury contact, the pin must be well driven in below the surface of the mercury or else swept through it as an oar is swept through the water. Another form of electrical contact that acts well is a knife edge brought into contact with a series of fine elastic strips of metal laid parallel to one another like the fingers of a hand. The best metal for contacts, if they are to bear hard usage, is either silver or gold or a mixture of 40% iridium with 60% of platinum. A pressure of some 15 grammes, at least, is needful to secure a good contact. As to the source of current for driving electrical clocks, if Leclanche cells be used they should preferably be kept in the open air under cover so as not to dry up. If direct electric current is available from electric light mains or the accumulators used for lighting a private house, so much the better. Of course the pressure of 50 or 100 volts used for lighting would be far too great for clock-driving, where only the pressure of a few volts is required. But it is easy by the insertion of suitable resistances, as for instance one or more incandescent lamps, to weaken down

the pressure of the lighting system and make it available for electric clocks, bells or other similar purposes. Electricity is applied to clocks in three main ways: — (1) in actuating timepieces which measure their own time and must therefore be provided with pendulums or balance wheels;

(2) in reproducing on one or more dials the movements of the hands of a master, clock, by the aid of electric impulses sent at regular intervals, say of a minute or a half -minute; and

(3) in synchronizing ordinary clocks by occasional impulses sent from some accurate regulator at a distance.

Electrically driven timepieces may be divided under two heads: — (a) those in which the electric current drives either the pendulum or some lever which operates upon it, which lever or pendulum in turn drives the clock hands; and (b) those time- pieces which are driven by a weight or spring which is periodically wound up by electricity — in fact electrical remontoires.

The simplest clock of the first four 8 ft. dials. character that could be imagined

would be constructed by fastening an electromagnet with a soft iron core to the bottom of a pendulum, and causing it to be attracted as the pendulum swings by another electromagnet fixed vertically under it (fig. 29). As the pendulum approached the vertical and was say half an inch from its lowest point, the current would be switched on, and switched off as soon as the pendulum got to its lowest point. A very small attraction with this arrangement, probably about a grain weight, acting through the | in. would drive a heavy pendulum. A switch would have to be worked in connexion with the pendulum. A strip of ebonite with a small face of metal on the end of one side, such as a b (fig. 29) might be pivoted at one end on the pendulum with a weak spring to keep it where free along the rod. As the pendulum swung by this would be swept on its journey from left to right against a fixed pin P. This would complete the electric circuit down through the pendu- lum rod, round the coil on the bottom of the pendulum, through the switch into the pin P, thence through the fixed electromagnet, and so back to the battery. On the return journey no contact would be made because only the ebonite face of the switch would touch P. The pendulum would thus receive an impulse every other vibration. We have de- scribed this switch, not to advocate it, but to warn against its use. For the contact would be quite insufficient. In order that the switch might not unduly retard the pendulum it must be light, but this would make the pressure on P too light to be trustworthy. Moreover, the strength of the impulse would vary with the strength of the battery, and hence the arc would be repeatedly uneven.

In contrast with this, let us consider a clock that is now giving excellent results at the Observatory of Neuchatel in Switzerland on Hipp's system (La Pendule Slectrique de precision, Neuchatel, 1884 and 1891). The pendulum (fig. 30) consists of two rods of steel joined by four bridges, one just below the suspension spring, the next about 12 in. lower, the next about half way down, and the last supporting a glass vessel of mercury which forms the bob. On the third of them is placed an iron armature,

OP

Fig. 29. — Electrical Clock (faulty design).

55°

CLOCK

which works between the poles of an electromagnet fixed to the case,

and by which the pendulum is actuated. The circuit is closed and broken by a flipper, which is swayed to and fro by a block fixed to the pendulum at the second bridge. As long as the flipper is merely swayed, no contact takes place, but when the arc of vibration of the pendulum is diminished the flipper does not clear the block but is caught by a nick in it, and forced downwards. In this way the circuit is closed. Fig. 31 is a dia- gram of the apparatus. When the block g attached to the pendulum catches and presses down the flipper s, the lever / Z is rocked over, so that a contact is made at k, and the current which enters the lever / through the knife edge m, runs through the second lever n n, down through the knife edge , to the battery, and through the electromagnet b which causes the armature a to be attracted. As the block g goes on and releases s, the lever / again falls upon the rest p, the lever n follows it a part of the way till it is stopped by the contact q; this shortcircuits the electromagnet and _ prevents to a large extent the formation 11 of an induced current. It is claimed that sparking is by this method almost entirely ,_ avoided. It is only when s is caught in the

J notch of the block g that 5 is pressed down,

so that the electric attraction only takes place every few vibrations. This ingenious arrangement makes the working of the clock nearly independent of the strength of the battery, for if the battery is strong the impulses are fewer and the average arc remains the same. The clock is enclosed in an airtight glass case so as to avoid barometric error. It was tested in 1905 at the Neuchatel observatory. In winter in a room of a mean temperature of 35° F. it was J sec. too slow, in summer when the temperature was 70 , it was ˆ sec. too fast. In the succeeding winter it became 53 sec. too slow again, thus gain ing a little in summer and losing in

1 !

(” 1

Fig. 30. — Hipp Elec- trica! Clock (Peyer, Favarger et Cie.).

Battery

Fig. 31. — Contact Arrange- ment of Hipp Clock.

winter. Its average variation from its daily rate was, however, only -033 sec.

In another system originated by G. Froment, a small weight is raised

by electricity and allowed to fall upon an arm sticking out at right angles to the pendulum in the plane of its motion, so as to urge it onwards. The weight is only allowed to rest on the arm during the downward swing of the pendulum. The method is not theoretically good, as the impulse is given at the end of the vibration of the pendulum instead of at its middle position.

In the clock invented by C. Fery (chef des travaux pratiques at the Ecole de Physique et Chimie, Paris), an electric impulse is given at every vibration, not by a battery but by means of the uniform movement of an armature which is alternately pulled away from and pushed towards a permanent horseshoe magnet. Currents are thus induced in a bobbin of fine wire placed between the poles of the horseshoe macnit. The movements of the

armature are produced by another horseshoe magnet actuated by the primary current from a battery which is turned on and off by the swinging of the pendulum. The energy of the induced current that drives the clock depends solely on the total move- ment of the armature, and is independent of whether that movement be executed slowly or rapidly, and therefore of the strength of the battery.

Electrical retnontoires possess great advantages if they can be made to operate with certainty. For they can be made to wind up a scape-wheel just as is done in the case of the arrangement shown in fig. 16 so as to constitute a spring remontoire, or better still they can be made to raise a weight as in the case of the gravity train remontoire (fig. 15) but without the complications of wheel-work shown in that contrivance. Of this type one of the best known is that of H. Chesters Pond. A mainspring fixed on the arbor of the hour wheel is wound up every hour by means of another toothed wheel riding loose on the same arbor and driven by a small dynamo, to which the other end of the mainspring is attached. As soon as the hour wheel has made one revolution (driven round by the spring) , a contact switch is closed whereupon

Fig. 32. — Hope Jones Electrical Remontoire.

the dynamo winds up the spring again exactly as the train and fly wind up the spring in fig. 15. These clocks require a good deal of power, and not being always trustworthy seem to have gone out of use. A contrivance of this kind now in use is that patented by F. Hope Jones and G. B. Bowell, and is represented in fig. 32. A pendulum is driven by the scape-wheel A, and pallets B B in the usual way. The scape-wheel is driven by another wheel C which, in turn, is driven by

the weighted lever D supported by click E engaging the ratchet wheel F. This lever is centred at G and has an extension H at right angles to it. J is an armature of soft iron pivoted at K and worked by the electromagnet M. D gradually falls in the act of driving the clock by turning the wheels C and A until the contact plate on the arm H meets with the contact screw L at the end of the arma- ture J, thus completing the electrical circuit from terminal T to terminal T' through the electromagnet M, and through any number of step-by-step dial movements which may be included in the same series circuit. The armature is then drawn towards the magnet with rapid acceleration, carrying the lever D with it. The armature is suddenly arrested by the poles of the magnet, but the momentum of the lever D carries it farther, and the click E engages another tooth of the ratchet F. A quick break of the circuit is thus secured, and the contact at L is a good one, first because the whole of the energy required to keep the clock going, or in other words the energy required to raise the lever D is

mechanically transmitted through its surfaces at each operation, and secondly, owing to the arrangement of the fulcrums at G and K which secure a rubbing contact. The duration of the con- tact is just that necessary to accomplish the work which has to be done, and it is remarkable that when used to operate large circuits of electrically propelled dials the duration accommodates itself to their exact requirements and the varying conditions of battery and self-induction. The ratchet wheel F is usually mounted loosely upon its arbor and is connected to the wheel C by means of a spiral spring, which in conjunction with the back-stop click P maintains the turning force on the wheelwork at the instant when the lever D is being raised.

Electrically driven dials usually consist of a ratchet wheel driven by an electrically moved pall. Care has to be taken that the pushes of the pall do not cause the ratchet wheel to be impelled too far. The anchor escapement of a common grand- father's clock can be made to drive the works by means of an electromagnet, the pendulum being removed. With a common anchor escapement the scape-wheel can be driven round by wagging the anchor to and fro. All then that is necessary is to fix a piece of iron on the anchor so that its weight pulls the anchor over one way, while an electromagnet pulls the iron the other. Impulses sent through the electromagnet will then drive the clock. If the clock is wound up in the ordinary way

the motion will be so much helped that the electric current has very little to do, and thus may be very feeble. Fig. 33 shows the dial-driving de- vice of Hope Jones's clock. Each time that a current is sent by the master- clock, the electromagnet B attracts the pivoted armature C, and when the current ceases the lever D with the projecting arm E is driven back to its old position by the spring F, thus driving the wheel A forward one division. G is a back-stop click, and H, I, fixed stops.

It seems doubtful whether in large towns a number of dials could be electrically driven from a distance because of the large amount of power that would have to be transmitted. But for large buildings, such as hotels, they are excellent. One master- clock in the cellar will drive a hundred or so placed over the building. The master-clock may itself be driven by electricity, but it will require the services from time to time of some one to correct' the time. Even this labour may be avoided if the master-clock is synchronized, and as synchronization requires but a small expenditure of force, it can be done over large areas. Hence the future of the clock seems to be a series of master-clocks, electrically driven, and synchronized one with another, in various parts of a city, from each of which a number of dials in the vicinity are driven. Electrical synchronization was worked out by Louis Breguet and others, and a successful system was perfected in England by J. A. Lund. The leading principle of the best systems is at each hour to cause a pair of fingers or some equivalent device to close upon the minute hand and put it exactly to the hour. Other systems are designed to retard or to accelerate the pendulum, but the former appears the more practical method. There is probably a future before synchroniza- tion which will enable the services of a clockmaker to be largely dispensed with and relegate his work merely to keeping the instruments in repair.

Miscellaneous Clocks. — Some small clocks are made to go for a year. They have a heavy balance wheel of brass weighing about 2 lb and about 2% in. in diameter, suspended from a point above its centre by a fine watch spring about 4 in. long. The crutch engages with the upper part of the spring, and as the

Fig. 33. — Hope Jones's Dial-driving Device.

balance wheel swings the pallets are actuated. The whole clock is but a large watch with a suspended balance wheel, oscillating once in about 8 seconds. Unless the suspension spring be compensated for temperature, such clocks gain very much in winter.

An ingenious method of driving a clock by water has been proposed. As the pendulum oscillates to one side, an arm on it rises and at last lightly touches a drop of water hanging from a very fine nozzle; this drop is taken off and carried away by the arm, to be subsequently removed by adhesion to an escape funnel placed below the arm. Hence at each double vibration of the pendulum part of the work done by a drop of water falling through a short distance is communicated to the pendu- lum, which is thus kept in motion as long as the water lasts. At this rate a gallon of water ought to drive the clock for 40 hours. Care of course must be taken to keep the water in the reservoir at a constant level, so that the drops formed shall be uniform.

If it were worth while, no doubt the oscillations of a pendulum working in a vacuum could be maintained by the communication and discharge at each oscillation of a slight charge of electricity; or again, heat might at each oscillation be communicated to a thermo-electric junction, and the resulting current used to drive the pendulum.

The expansions and contractions of metal rods under the influence of the changes of temperature which take place in the course of each night and day have also been employed to keep a clock wound up, and if there were any need for it no doubt a small windmill rotating at the top of a tower would easily keep a turret clock fully wound, by a simple arrangement which would gear the going barrel of the clock to the wind vane motion, whenever the weight had fallen too low, and release it when the winding up was completed. Even a smoke jack would do the same office for a kitchen clock.

The methods of driving astronomical telescopes by means of clockwork will be found in the article Telescope. Measurements of small intervals of time are performed by means of chrono- graphs which in principle depend on the use of isochronous vibrating tuning-forks in place of pendulums. In practice it is needful in most cases that an observer should intervene in time measurements, although perhaps by means of a revolving photographic film a transit of the sun might be timed with extraordinary accuracy. But if the transit of, a star across a wire is to be observed, there is no mode at present in use of doing so except by the use of the human eye, brain and hand. Hence in all such observations there is an element of personal error. Unfortunately we cannot apply a microscope to time as we can to space and make the cycle of events that takes place in a second last say for five minutes so as to time them truly. By personal observations the divisions of a second cannot in general be made more accurately than to -fa or -fV of a second. The most rapid music player does not strike a note more than 10 or 12 times in a second. It is only in case of

recurring phenomena that we can make personal observations more accurate than this by taking the mean of a large number of observations, and allowing for personal error. For the purpose of determining longitude at sea accuracy to -fa of a second of time would find the place to about 20 yards. It seems to follow that the extent to which astronomical clocks can be made accurate, viz. to -fa of a second average variation from their mean daily rate, or one two-and-a-half millionth of 24 hours, is a degree of accuracy sufficient for present purposes, and it seems rather doubtful whether mechanical science will in the case of clocks be likely to reach a much higher figure.

In the 17th century it was a favourite device to make a clock show sidereal time as well as mean solar time. The length of the sidereal day is to the mean solar day as -99727 to 1, and various attempts have been made by trains of wheels to obtain this relation — but all are somewhat complicated.

Magical clocks are of several kinds. One that was in vogue about 1880 had a bronze figure on the top with outstretched arm holding in its hand the upper part of the spring of a pendulum,

about 10 in. long. The pendulum had apparently no escapement and the puzzle was how it was maintained in motion. It was impossible to detect the mystery by the aid of the eye alone ; the truth, however, was that the whole figure swung to and fro at each oscillation of the pendulum, to an amount of :r&Ty°f an hich on the outside rim of the base. A movement of :rSr f an ‘ nc ‘ 1 per half second of time is imperceptible; it would be equivalent to perception of motion of the minute hand of a clock about 6 in. in diameter, which is almost impossible. The connexion of the figure to the anchor of the escapement was very complicated, but clocks of the kind kept fair time. A straw, poised near the end on a needle and with the short end united by a thread to the bronze figure, makes the motion apparent at once and discloses the trick. Another magical clock consists of two disks of thin sheet glass mounted one close behind the other, one carrying the minute hand and the other the hour hand . The disks rest on rollers which rotate and turn them round. The front and back of the movable disks are covered by other disks of glass surrounded by a frame, so that the whole looks simply like a single sheet of glass mounted in a frame, in the centre of which the hands rotate, without

any visible connexion with the works of the clock.

Clocks have been made with a sort of balance wheel consisting of a thread with a ball at the end which winds backwards and forwards spirally round a rod. In others a swing or see-saw is attached to the pendulum, or a ship under canvas is made to oscillate in a heavy sea. In others the time is measured by the fall of a ball down an inclined plane, the time of fall being given by the formula /= V (25/gsina), where j is the length of the incline and a the inclination. But friction so modifies the result as to render experiment the only mode of adjusting such a clock. Sometimes a clock is made to serve as its own weight, as for instance when a clock shaped like a monkey is allowed to slide down a rope wound round the going barrel. Or the clock is made of a cylindrical shape outside and provided with a weighted arm instead of a going barrel; on being put upon an incline, it rolls down, and the fall supplies the motive power.

Clocks are frequently provided with chimes moved exactly like musical boxes, except that the pins in the barrel, instead of flipping musical combs, raise hammers which fall upon bells. The driving barrel is let off at suitable intervals. The. cuckoo clock is a pretty piece of mechanism. By the push of a wire given to the body of the bird, it is bent forward, the wings and tail are raised and the beak opened. At the same time two weighted bellows measuring about 1X2 in. are raised and successively let drop. These are attached to small wooden organ pipes, one tuned a fifth above the other, which produce the notes. Phonographs are also attached to clocks, by which the hours are called instead of rung.

Clocks are also constructed with conical pendulums. It is a property of the conical pendulum that if swung round, the time of one complete revolution is the same as that of the double vibration of a pendulum equal in length to the vertical distance of the bob of the conical pendulum below its point of support. It follows that if the driving force of such a pendulum can be kept constant (as it easily can by an electric contact which is made at every revolution during which it falls below a certain point) the clock will keep time; or friction can be introduced so as to reduce the speed whenever the pendulum flies round too fast and hence the bob rises. Or again by suitable arrangements the bob may be made to move in certain curves so as to be isochronous. Plans of this kind are employed rather to drive telescopes, phonographs and other machines requiring uniform and steady movement.

Comical and performing clocks were very popular in the 1 5th and 1 6th centuries. One at Basel in Switzerland was arranged so as gradually to protrude a long tongue as the pendulum vibrated. It is still to be seen there in the museum. The famous clock at Strassburg, originally constructed in 1574, remade in 1842, displays a whole series of scenes, including processions of the apostles and other persons, and a cock that crows. A fine clock at Venice has two rather stiff bronze giants that strike the hours.

Clocks with complicated movements representing the positions of the heavenly bodies and the days of the week and month, allowance being made for leap year, were once the delight of the curious. Repeating clocks, which sounded the hours when a string was pulled, were once popular. The string simply raised the lifting piece and let the clock strike as the hands would do when they came to the hour. This was of use in the old days when the only mode of striking a light at night was with a flint, and steel, but lucifer matches and the electric light have rendered these clocks obsolete.

Testing Clocks. — The average amount by which a clock gains or loses is called its mean or average daily rate. A large daily rate of error is no proof that a clock is a bad one, for it might be completely removed by pendulum adjustment. What is required is that the daily rate shall be uniform, that is, that the clock shall not be gaining (or losing) more on one day than on another, or at one period of the same day than at another. In fig. 34 A B is a curve in which the abscissae represent intervals of time, the ordinates the number of seconds at any time by which the clock is wrong. The curve C D is one in which the ordinates are proportional to the tangents of the angles of inclination of the curve A B to the axis of x, that is dyjdx. Whenever the line A B is horizontal, C D cuts the axis of x. In a clock having no variation in its daily rate the curve A B would become a straight line, though it might be inclined to the axis of *, and C D, also a straight line, would be parallel to the axis of *, though it might not coincide with it. In a clock set to exact time and having no variations of daily rate, both the curves would be straight lines and would coin- cide with the axis of x. The curve C D, known as the curve

J^ _ _ ..

t 5 S

-, „_ _

~~ s> s«?'-"

-"" B

G

— '^- — 'i—,

sz::::v::— »

::^: i it

t

r _

4^-t

rrz.

Fig. 34. — Curve of Variation of daily rate.

of variation of daily rate, will generally be found to follow changes of day and night, and of tem- perature, and the fluctuations of the barometer and hygrometer; it is the curve which reveals the true character of the clock. Hence in testing a clock two things have to be determined: first, the daily rate of error, and second, the average variations from that daily rate, in other words the irregularities of going. To test a clock well six months' or a year's trial is needed, and it is desirable to have it subjected to considerable changes of temperature.

The bibliography of horology is very extensive. Among modern works Lord Grimthorpe's Rudimentary Treatise on Clocks, Watches and Bells (8th edition, London, 1903) is perhaps the most convenient. Many references to older literature will be found in Themas Reid's Treatise on Clock and Watchmaking (1849). (G. ; H. H. C.)

Decorative Aspects. — In art the clock occupies a position of considerable distinction, and antique examples are prized and collected as much for the decorative qualities of their cases as for the excellence of their time-keeping. French and English cabinet-makers have especially excelled, although in entirely different ways, in the making of clock cases. The one aimed at comely utility, often made actually beautiful by fit proportion and the employment of finely grained woods; the other sought a bold and dazzling splendour in

which ornament overlay material. It was not in either country until the latter part of the 17th century that the cabinet-maker's opportunity came. The bracket or chamber clock gave comparatively little scope to the worker in wood — in its earlier period, indeed, it was almost invariably encased in brass or other metal; and it was not until the introduction of the long pendulum swinging in a small space that it became customary to encase clocks in de- corative woodwork. * The long or " grandfather " clock dates from about the fourth quarter of the 17th century — what is, perhaps, the earliest surviving English dated specimen is inscribed with the date 1681. Originally it was a development

of the dome-shaped bracket clock, and in the older examples the characteristic dome or canopy is preserved. The first time- keepers of this type had oaken cases — indeed oak was never entirely abandoned; but when walnut began to come into favour a few years later that beautifully marked wood was almost invariably used for the choicest and most costly specimens. Thus in 1698 the dean and chapter of St Paul's cathedral paid the then very substantial price of £14 for an inlaid walnut long- cased eight-day clock to stand in one of the vestries. The rapidity with which the new style came into use is suggested by the fact that while very few long clocks can be certainly dated before 1690, between that year and the end of the century there are many examples. Throughout the 18th century they were made in myriads all over England, and since they were a prized possession it is not surprising that innumerable examples have survived. Vary as they may in height and girth, in wood and dial, they are all essentially alike. In their earlier years their faces were usually of brass engraved with cherubs' heads or conventional designs, but eventually the less rich white face grew common. There are two varieties — the eight-day and the thirty-hour. The latter is but little esteemed, notwithstanding that it is often as decorative as the more expensive clock. The favourite walnut case of the late 17th and early 18th century gave place in the course of a generation to mahogany, which retained its primacy until the introduction of cheaper clocks brought about the supersession of the long-cased variety. Many of these cases were made in lacquer when that material was in vogue; satinwood and other costly foreign timbers were also used for bandings and inlay. The most elegant of the " grand- father " cases are, however, the narrow-waisted forms of the William and Mary period in walnut inlay, the head framed in twisted pilasters. Long clocks of the old type are still made

in small numbers and at high prices; they usually contain chimes. During the later period of their popularity the heads of long clocks were often filled in with painted disks representing the moon, by which its course could be followed. Such conceits as ships moving on waves or time with wings were also in favour. The northern parts of France likewise produced tall clocks, usually in oaken cases; those with Louis Quinze shaped panels are often very decorative. French love of applied ornament was, however, generally inimical to the rather uncompromising squareness of the English case, and the great Louis Quinze and Louis Seize cabinetmakers made some magnificent and monu- mental clocks, many of which were ” long ” only as regards the case, the pendulum being comparatively short, while sometimes the case acted merely as a pedestal for a bracket-clock fixed on the top. These pieces were usually mounted very elaborately in gilt bronze, cast and chased, and French bracket and chamber clocks were usually of gilded metal or marble, or a combination of the two; this essentially late 18th-century type still persists. English bracket clocks .contemporary with them were most frequently of simple square or arched form in mahogany. The “grandfather” case was also made in the Low Countries, of generous height, very swelling and bulbous.

See F. J. Britten, Old Clocks and Watches and their Makers (2nd edition, London, 1904) ; Mathieu Planchon, L’Horloge, son histoire retrospective, pittoresque et artistique (Paris, 1899). (J. P.-B.)

CLODIA, VIA, an ancient high-road of Italy. Its course, for the first 11 m., was the same as that of the Via Cassia; it then diverged to the N.N.W. and ran on the W. side of the Lacus Sabatinus, past Forum Clodii and Blera. At Forum Cassii it may have rejoined the Via Cassia, and it seems to have taken the same line as the latter as far as Florentia (Florence). But beyond Florentia, between Luca (Lucca) and Luna, we find another Forum Clodii, and the Antonine Itinerary gives the route from Luca to Rome as being by the Via Clodia — wrongly as regards the portion from Florentia southwards, but perhaps rightly as regards that from Luca to Florentia. In that case the Clodius whose name the road bears, possibly C. Clodius Vestalis (c. 43 B.C.), was responsible for the construction of the first portion and of that from Florentia to Luca (and Luna), and the founder of the two Fora Clodii. The name seems, in imperial

times, to have to some extent driven out that of the Cassia, and both roads were administered, with other minor roads, by the same curator.

See Ch. Hulsen in Pauly-Wissowa, Realencyclopddie, iv. 63; cf. Cassia,

Via. (T. As.)

CLODIUS, 1 PUBLIUS (c. 93-52 B.C.), surnamed Pulcher, Roman politician. He took part in the third Mithradatic war under his brother-in-law Lucius Licinius Lucullus, but considering himself treated with insufficient respect, he stirred up a revolt; another brother-in-law, Q. Marcius Rex, governor of Cilicia, gave him the command of his fleet, but he was captured by pirates. On his release he repaired to Syria, where he nearly lost his life during a mutiny instigated by himself. Returning to Rome in 65, he prosecuted Catiline for extortion, but was bribed by him to procure acquittal. There seems no reason to believe that Clodius was implicated in the Catilinarian conspiracy; indeed, according to Plutarch (Cicero, 29), he rendered Cicero every assistance and acted as one of his body-guard. The affair of the mysteries of the Bona Dea, however, caused a breach between Clodius and Cicero in December 62. Clodius, dressed as a woman (men were not admitted to the mysteries), entered the house of Caesar, where the mysteries were being celebrated, in order to carry on an intrigue with Caesar's wife. He was detected and brought to trial, but escaped condemnation by bribing the jury. Cicero's violent attacks on this occasion inspired Clodius with the desire for revenge. On his return from Sicily (where he had been quaestor in 61) he renounced his patrician rank, and, having with the connivance of Caesar been adopted by a certain P. Fonteius, was elected tribune of the people (10th of December 59). His first act was to bring forward certain laws calculated to secure him the popular favour. Corn, instead of being sold at a low rate, was to be distributed gratui- tously once a month; the right of taking the omens on a fixed day and (if they were declared unfavourable) of preventing the assembly of the comitia, possessed by every magistrate by the terms of the Lex Aelia Fufia, was abolished; the old clubs or gilds of workmen were re-established; the censors were forbidden to exclude any citizen from the senate or inflict any punishment upon him unless he had been publicly accused and condemned. He then contrived to get rid of Cicero (q.v.) and the younger Cato (q.v.), who was sent to Cyprus as praetor to take possession of the island and the royal treasures. Cicero's property was confiscated by order of Clodius, his house on the Palatine burned down, and its site put up to auction. It was purchased by Clodius himself, who, not wishing to appear in the matter, put up some one to bid for him. After the departure of Caesar for Gaul, Clodius became practically master of Rome with the aid of armed ruffians and a system of secret societies. In 57 one of the tribunes proposed the recall of Cicero, and Clodius resorted to force to prevent the passing of the decree, but was foiled by Titus Annius Milo (q.v.), who brought up an

armed band sufficiently strong to hold him in check. Clodius subsequently attacked the workmen who were rebuilding Cicero's house at the public cost, assaulted Cicero himself in the street, and set fire to the house of Q. Cicero. In 56, when curule aedile, he impeached Milo for public violence (de vi) , when defending his house against the attacks of Clodius, and also charged him with keeping armed bands in his service. Judicial proceedings were hindered by outbreaks of disturbance, and the matter was finally dropped. In 53, when Milo was a candidate for the consulship, and Clodius for the praetorship, the rivals collected armed bands and fights took place in the streets of Rome, and on the 20th of January 52 Clodius was slain near Bovillae.

His sister, Clodia, wife of Q. Caecilius Metellus Celer, was notorious for her numerous love affairs. It is now generally admitted that she was the Lesbia of Catullus (Teuffel-Schwabe, Hist, of Roman Lit., Eng. tr., 214, 3). For her intrigue with M. Caelius Rufus, whom she afterwards pursued with unrelenting

1 It is suggested (W. M. Lindsay, The Latin Language, p. 41) that he changed his name Claudius into the plebeian form Clodius, in order to gain the favour of the -mob.

hatred and accused of attempting to poison her, see Cicero, Pro Caelio, where she is represented as a woman of abandoned character.

Authorities. — Cicero, Letters (ed. Tyrrell and Purser), Pro Caelio, pro Sestio, pro Milone, pro Domo sua, de Haruspicum Responsis, in Pisonem; Plutarch, Lucullus, Pompey, Cicero, Caesar; Dio Cassius xxxvi. 16, 19, xxxvii. 45, 46, 51, xxxviii. 12-14, xxxix. 6, 11, xl. 48. See also I. Gentile, Clodio e Cicerone (Milan, 1876); E. S. Beesley. " Cicero and Clodius," in Fortnightly Review, v. ; G. Lacour-Gayet, De P. Clodio Pulchro (Paris, 1888), and in Revue historique (Sept. 1889); H. White, Cicero, Clodius and Milo (New York, 1900); G. Boissier, Cicero and his Friends (Eng. trans., 1897).

CLOGHER, a market village of Co. Tyrone, Ireland, in the south parliamentary division, on the Clogher Valley light railway. Pop. (1901) 225. It gives name to dioceses of the Church of Ireland and the Roman Catholic Church, but the seat of the Roman Catholic bishop is at Monaghan, with the cathedral. The Protestant cathedral, dedicated

to St Macartin, dates from the 18th and early 19th century, but St Macartin (c. 500) was a disciple of St Patrick, and it is said that St Patrick himself founded a bishopric here. The name is derived from the Irish clock, a pillar stone, such as were worshipped and regarded as oracles in many parts of pagan Ireland; the stone was preserved as late as the 15th century in the cathedral, and identity is even now claimed for a stone which lies near the church.

CLOISTER (Lat. claustrum; Fr. clottre; Ital. chiostro; Span, claustro; Ger. Kloster). The word “cloister,” though now restricted to the four-sided enclosure, surrounded with covered ambulatories, usually attached to coventual and cathedral churches, and sometimes to colleges, or by a still further limitation to the ambulatories themselves, originally signified the entire monastery. In this sense it is of frequent occurrence in earlier English literature (e.g. Shakespeare, Meas. for Meas. i. 3, ” This day my sister should the cloister enter”), and is still employed in poetry. The Latin claustrum, as its derivation implies, primarily denoted no more than the enclosing wall of a religious house, and then came to be used for the whole building enclosed within the wall. To this sense the German ” Kloster ” is still limited, the covered walks, or cloister in the modern sense, being called ” Klostergang,” or “Kreuzgang.” In French the word clottre retains the double sense.

In the special sense now most common, the word ” cloister ” denotes the quadrilateral area in a monastery or college of canons, round which the principal buildings are ranged, and which is usually provided with a covered way or ambulatory running all round, and affording a means of communication between the various centres of the ecclesiastical life, without exposure to the weather. According to the Benedictine arrangement, which from its suitability to the requirements of monastic life was generally adopted in the West, one side of the cloister was formed by the church, the refectory occupying the side opposite to it, that the worshippers might have the least annoyance from the noise or smell of the repasts. On the eastern side the chapter-house was placed, with other apartments belonging to the common life of the brethren adjacent to it, and, as a common rule, the dormitory occupied the whole of the upper story. On the opposite or western side, were generally the cellarer’s lodgings, with the cellars and store-houses, in which the provisions necessary for the sustenance of the con- fraternity were housed. In Cistercian monasteries the western side was usually occupied by the ” domus conversorum,” or lodgings of the lay-brethren, with their day -rooms and workshops below, and dormitory above. The cloister, with its surrounding buildings, generally stood on the south side of the church, to secure as

much sunshine as possible. A very early example of this disposition is seen in the plan of the monastery of St Gall (see Abbey, fig. 3). Local requirements, in some instances, caused the cloister to be placed to the north of the church. This is the case in the English cathedrals, formerly Benedictine abbeys, of Canterbury, Gloucester and Chester, as well as in that of Lincoln. Other examples of the northward situation are at Tintern, Buildwas and Sherborne. Although the covered

ambulatories are absolutely essential to the completeness of a monastic cloister, a chief object of which was to enable the inmates to pass from one part of the monastery to another without inconvenience from rain, wind, or sun, it appears that they were sometimes wanting. The cloister at St Albans seems to have been deficient in ambulatories till the abbacy of Robert of Gorham, 1151-1166, when the eastern walk was erected. This, as was often the case with the earliest ambulatories, was of wood covered with a sloping roof or " penthouse." We learn from Osbern's account of the conflagration of the monastery of Christ Church, Canterbury, 1067, that a cloister with covered ways existed at that time, affording communication between the church, the dormitory and the refectory. We learn from an early drawing of the monastery of Canterbury that this cloister was formed by an arcade of Norman arches supported on shafts, and covered by a shed roof. A fragment of an arcaded cloister of this pattern is still found on the eastern side of the infirmary- cloister of the same foundation. This earlier form of cloister has been generally superseded in England by a range of windows, usually unglazed, but sometimes, as at Gloucester, provided with glass, lighting a vaulted ambulatory, of which the cloisters of Westminster Abbey, Salisbury and Norwich are typical examples. The older design was preserved in the South, where " the cloister is never a window, or anything in the least approach- ing to it in design, but a range of small elegant pillars, sometimes single, sometimes coupled, and supporting arches of a light and elegant design, all the features being of a character suited to the place where they are used, and to that only " (Fergusson, Hist, of Arch. i. p. 610). As examples of this description of cloister, we may refer to the exquisite cloisters of St John Lateran, and St Paul's without the walls, at Rome, where the coupled shafts and arches are richly ornamented with ribbons of mosaic, and those of the convent of St Scholastica at Subiaco, all of the 13th century, and to the beautiful cloisters at Aries, in southern France; those of Aix, Fontfroide, Elne, &c, are of the same type; as also the Romanesque cloisters at Zurich, where the design suffers from the deep abacus having only a single slender shaft to support it, and at Laach, where the quadrangle

occupies the place of the ” atrium ” of the early basilicas at the west end, as at St Clement’s at Rome, and St Ambrose at Milan. Spain also presents some magnificent cloisters of both types, of which that of the royal convent of Huelgas, near Burgos, of the arcaded form, is, according to Fergusson, ” unrivalled for beauty both of detail and design, and is perhaps unsurpassed by anything in its age and style in any part of Europe.” Few cloisters are more beautiful than those of Monreale and Cefalu in Sicily, where the arrangement is the same, of slender columns in pairs with capitals of elaborate foliage supporting pointed arches of great elegance of form.

All other cloisters are surpassed in dimensions and in sump- tuousness of decoration by the ” Campo Santo ” at Pisa. This magnificent cloister consists of four ambulatories as wide and lofty as the nave of a church, erected in 1278 by Giovanni Pisano round a cemetery composed of soil brought from Palestine by Archbishop Lanfranchi in the middle of the 12 th century. The window-openings are semicircular, filled with elaborate tracery in the latter half of the 15th century. The inner walls are covered with frescoes invaluable in the history of art by Orcagna, Simone Memmi, Buffalmacco, Benozzo Gozzoli, and other early painters of the Florentine school. The ambulatories now serve as a museum of sculpture. The internal dimensions are 415 ft. 6. in. in length, 137 ft. 10 in. in breadth, while each ambulatory is 34 ft. 6. in. wide by 46 ft. high.

The cloister of a religious house was the scene of a large part of the life of the inmates of a monastery. It was the place of education for the younger members, and of study for the elders. A canon of the Roman council held under Eugenius II., in 826, enjoins the erection of a cloister as an essential portion of an ecclesiastical establishment for the better discipline and instruc- tion of the clerks. Peter of Blois (Serm. 25) describes schools for the novices as being in the west walk, and moral lectures delivered in that next the church. At Canterbury the monks’

school was in the western ambulatory, and it was in the same walk that the novices were taught at Durham (Willis, Monastic Buildings of Canterbury, p. 44; Rites of Durham, p. 71). The other alleys, especially that next the church, were devoted to the studies of the elder monks. The constitutions of Hildemar and Dunstan enact that between the services of the church the brethren should sit in the cloister and read

theology. For this purpose small studies, known as ” carrols,” i.e. a ring or enclosed space, were often found in the recesses of the windows. Of this arrangement there are examples at Gloucester, Chester and elsewhere. The use of these studies is thus described in the Rites of Durham: — ” In every wyndowe ” in the north alley ” were iii pewes or carrells, where every one of the olde monkes had his carrell severally by himselfe, that when they had dyned they dyd resorte to that place of cloister, and there studyed upon their books, every one in his carrell all the afternonne unto evensong tyme. This was there exercise every daie.” On the opposite wall were cupboards full of books for the use of the students in the carrols. The cloister arrangements at Canterbury were similar to those just described. New studies were made by Prior De Estria in 1317, and Prior Selling (1472-1494) glazed the south alley for the use of the studious brethren, and con- structed ” the new framed contrivances, of late styled carrols ” (Willis, Mon. Buildings, p. 45). The cloisters were used not for study only but also for recreation. The constitutions of Arch- bishop Lanfranc, sect. 3, permitted the brethren to converse together there at certain hours of the day. To maintain necessary discipline a special officer was appointed under the title of prior claustri. The cloister was always furnished with a stone bench running along the side. It was also provided with a lavatory, usually adjacent to the refectory, but sometimes standing in the central area, termed the cloister-garth, as at Durham. The cloister-garth was used as a place of sepulture, as well as the surrounding alleys. The cloister was in some few instances of two stories, as at Old St Paul’s, and St Stephen’s chapel, West- minster, and occasionally, as at Wells, Chichester and Hereford, had only three alleys, there being no ambulatory under the church wall.

The larger monastic establishments had more than one cloister; there was usually a second connected with the infirmary, of which there are examples at Westminster Abbey and at Canterbury; and sometimes one giving access to the kitchen and other domestic offices.

The cloister was not an appendage of monastic houses ex- clusively. It was also attached to colleges of secular canons, as at the cathedrals of Lincoln, Salisbury, Wells, Hereford and Chichester, and formerly at St Paul’s and Exeter. It is, however, absent at York, Lichfield, Beverley, Ripon, Southwell and Wim- borne. A cloister forms an essential part of the colleges of Eton and Winchester, and of New College and Magdalen at Oxford, and was designed by Wolsey at Christ Church. These were used for religious processions and lectures, for ambulatories for the studious at all times, and for places of exercise for the inmates generally in wet weather, as well as in some instances

for sepulture.

For the arrangements of the Carthusian cloisters, as well as for some account of those appended to the monasteries of the East, see Abbey. (E. V.)

CLONAKILTY, a seaport and market town of Co. Cork, Ireland, in the south parliamentary division, at the head of Clonakilty Bay, 33 m. S.W. of Cork on a branch of the Cork, Bandon & South Coast railway. Pop. of urban district (1901), 3098. It was brought into prosperity by Richard Boyle, first earl of Cork, and was granted a charter in 1613; but was partly demolished on the occasion of a fight between the English and Irish in 1641. It returned two members to the Irish parliament until the union. In the 1 8th century there was an extensive linen industry. The present trade is centred in brewing, corn-milling, yarn and farm-produce. The harbour-mouth is obstructed by a bar, and there is a pier for large vessels at Ring, a mile below the town. The fisheries are of importance. A ruined church on the island of Inchdorey, and castles on Galley Head, at Dunnycove, and at

Dunowen, together with a stone circle, are the principal antiquities in the neighbourhood.

CLONES, a market town of Co. Monaghan, Ireland, in the north parliamentary division, 64J m. S.W. by W. from Belfast, and 93I m. N.W. from Dublin by the Great Northern railway, on which system it is an important junction, the lines from Dublin, from Belfast, from Londonderry and Enniskillen, and from Cavan converging here. Pop. of urban district (1901), 2068. The town has a considerable argicultural trade, and there are corn mills and manufactures of agricultural implements. A former lace-making industry is extinct. The market-place, called the Diamond, occupies the summit of the slight elevation on which the town is situated. Clones was the seat of an abbey founded in the 6th century by St Tighernach (Tierney), to whom the Protestant parish church is dedicated. Remains of the abbey include a nave and tower of the 1 2 th century, and a curious shrine formed out of a great block of red sandstone. Other antiquities are a round tower of rude masonry, 75 ft. high but lacking the cap; a rath, or encampment, and an ancient market cross in the Diamond.

CLONMACNOISE, one of the most noteworthy of the numerous early religious settlements in Ireland, on the river Shannon, in King's county, 9 m. S. of Athlone. An abbey was founded here by St Kieran in 541, which as a seat of learning gained a European fame, receiving offerings, for example, from Charles the Great, whose companion

Alcuin the scholar received part of his educa- tion from the great teacher Colcu at Conmacnoise. Several books of annals were compiled here, and the foundation became the seat of a bishopric, but it was plundered and wasted by the English in 1552, and in 1568 the diocese was united with that of Meath. The most remarkable literary monument of Clonmac- noise is the Book of the Dun Cow, written about 1100, still preserved (but in an imperfect form) by the Royal Irish Academy, and containing a large number of romances. It is a copy of a much earlier original, which was written on the skin of a favourite cow of St Kieran, whence the name of the work. The full title of the foundation is the " Seven Churches of Clonmacnoise," and remains of all these are extant. The Great Church, though rebuilt by a chief named McDermot, in the 14th century, retains earlier remains in a fine west doorway; the other churches are those of Fineen, Conor, St Kieran, Kelly, Melaghlin and Dowling. There are two round towers; O'Rourke's, lacking the roof, but occupying a commanding situation on rising ground, is dated by Petrie from the early 10th century, and stands 62 ft. in height; and McCarthy's, attached to Fineen's church, which is more perfect, but rather shorter, and presents the unusual feature of a doorway level with the ground, instead of several feet above it as is customary. There are three crosses, of which the Great Cross, made of a single stone and 15 ft. in height, is splendidly carved, with tracery and inscriptions. It faces the door of the Great Church, and is of the same date. A large number of inscribed stones dating from the 9th century and after are preserved in the churches. There are further remains of the Castle and Episcopal palace, a fortified building of the 14th century, and of a nunnery of the 1 2 th century. In the neighbourhood are seen striking examples of the glacial phenomenon of eskers, or gravel ridges.

CLONMEL, a municipal borough and the county town of Co. Tipperary, Ireland, in the east parliamentary division, 112 m. S.W. from Dublin on a branch from Thurles of the Great Southern & Western railway, which makes a junction here with the Waterford and Limerick line of the same company. Pop. (1901) 10,167. Clonmel is built on both sides of the Suir, and also occupies Moore and Long Islands, which are connected with the mainland by three bridges. The principal buildings are the parish church, two Roman Catholic churches, a Franciscan friary, two convents, an endowed school dating from 1685, and the various county buildings. The beauty of the environs, and especially of the river, deserves mention; and their charm is enhanced by the neighbouring Gal tee, Knockmealdown and other mountains, among which Slievenaman (2364 ft.) is conspicuous. A woollen manufacture was established in 1667, and was ex- tensively

carried on until the close of the 18th century The

town contains breweries, flour-mills and tanneries, and has a considerable export trade in grain, cattle, butter and provisions. It stands at the head of navigation for barges on the Suir. It was the centre of a system, established by Charles Bianconi (1786- 1875) in 1815 and subsequently, for the conveyance of travellers on light cars, extending over a great part of Leinster, Munster and Connaught. It is governed by a mayor and corporation, which, though retained under the Local Government (Ireland) Act of 1898, has practically the status of an urban district council. By the same act a part of the town formerly situated in county Waterford was added to county Tipperary. It was a parliamentary borough, returning one member, until 1885; having returned two members to the Irish parliament until the union.

The name, Cluain mealla, signifies the Vale of Honey. In 1269 the place was chosen as the seat of a Franciscan friary by Otho de Grandison, the first English possessor of the district; and it frequently comes into notice in the following centuries. In 1641 it declared for the Roman Catholic party, and in 1650 it was gallantly defended by Hugh O'Neill against the English under Cromwell. Compelled at last to capitulate, it was completely dismantled, and was never again fortified. Remains of the wall are seen in the churchyard, and the West Gate still stands in the main street.

CLOOTS, JEAN BAPTISTE DU VAL DE GRACE, Baron von (1755-1794), better known as Anacharsis Cloots, a noteworthy figure in the French Revolution, was born near Cleves, at the castle of Gnadenthal. He belonged to a noble Prussian family of Dutch origin. The young Cloots, heir to a great fortune, was sent at eleven years of age to Paris to complete his education. There he imbibed the theories of his uncle the Abbe Cornelius de Pauw (1739-1799), philosopher, geographer and diplomatist at the court of Frederick the Great. His father placed him in the military academy at Berlin, but he left it at the age of twenty and traversed Europe, preaching his revolutionary philosophy as an apostle, and spending his money as a man of pleasure. On the breaking out of the Revolution he returned in 1789 to Paris, thin king the opportunity favourable for establishing his dream of a universal family of nations. On the 19th of June 1790 he appeared at the bar of the Assembly at the head of thirty-six foreigners; and, in the name of this "embassy of the human race,"

declared that the world adhered to the Declaration of the Rights of Man and of the Citizen. After this he was known as ” the orator of the human race,” by which title he called himself, dropping that of baron, and substituting for his baptismal names the pseudonym of Anacharsis, from the famous philosophical romance of the Abbe Jean Jacques Barthelemy. In 1792 he placed 12,000 livres at the disposal of the Republic — ” for the arming of forty or fifty fighters in the sacred cause of man against tyrants.” The 10th of August impelled him to a still higher flight; he declared himself the personal enemy of Jesus Christ, and abjured all revealed religions. In the same month he had the rights of citizenship conferred on him; and, having in September been elected a member of the Convention, he voted the king’s death in the name of the human race, and was an active partisan of the war of propaganda. Excluded at the instance of Robespierre from the Jacobin Club, he was soon afterwards implicated in an accusation levelled against the Hebertists. His innocence was manifest, but he was condemned, and guillotined on the 24th of March 1794.

Cloots’ main works are : La Certitude des preuves du mahome’- tisme (London, 1780), published under the pseudonym of Ali-Gur- Ber, in answer to Bergier’s Certitude des preuves du christianisme ; L’Orateur du genre humain, ou Dipdches du Prussien Cloots au Prussien Herzberg (Paris, 1791), and La RSpublique universelle

(1792).

The biography of Cloots by G. Avenel (2 vols., Paris, 1865) is too eulogistic. See the three articles by H. Baulig in La Revolution francaise, t. 41 (1901).

CLOQUET, a city of Carlton county, Minnesota, U.S.A., on the St Louis river, 28 m. W. by S. of Duluth. Pop. (1890) 2530; (1900) 3072; (1905, state census) 6117, of whom 2755 were

foreign-born (716 Swedes, 689 Finns, 685 Canadians, 334 Norwegians); (1910) 7031. Cloquet is served by the Northern Pacific, the Great Northern, the Duluth & North-Eastern, and (for freight only) the Chicago, Milwaukee & St Paul railways. The river furnishes good water-power, and the city has various manufactures, including lumber, paper, wood pulp, match blocks and boxes. The first mill was built in 1878, and the village was named from the French word claquet (sound of the mill). Cloquet was incorporated as a village in 1883 and was chartered as a city in 1903.

CLOSE, MAXWELL HENRY (1822-1903), Irish geologist, was born in

Dublin in 1822. He was educated at Weymouth and at Trinity College, Dublin, where he graduated in 1846; and two years later he entered holy orders. For a year he was curate of All Saints, Northampton; from 1849 to 1857 he was rector of Shangton in Leicestershire; and then for four years he was curate of Waltham-on- the- Wolds. In 186 1, on the death of his father, he returned to Dublin, and while giving his services to various churches in the city, devoted himself almost wholly to literary and scientific pursuits, and especially to the glacial geology of Ireland, on which subject he became an acknowledged authority. His paper, read before the Geological Society of Ireland in 1866, on the ” General Glaciation of Ireland ” is a masterly description of the effects of glaciation, and of the evidence in favour of Jthe action of land-ice. Later on he dis- cussed the origin of the elevated shell-bearing gravels near Dublin, and expressed the view that they were accumulated by floating ice when the land had undergone submergence. He was for a time treasurer of the Royal Irish Academy, an active member of the Royal Dublin Society, and president in 1878 of the Royal Geological Society of Ireland. Astronomy and physics, as well as the ancient language and antiquities of Ireland, “attracted his attention. He died in Dublin on the 1 2th of September 1903.

The obituary by Prof. G. A. J. Cole in Irish Naturalist, vol. xii. (1903) pp. 301-306, contains a list of publications and portrait.

CLOSE (from Lat. clausum, shut), a closed place or enclosure. In English law, the term is applied to a portion of land, enclosed or not, held as private property, and to any exclusive interest in land sufficient to maintain an action for trespass quare clausum fregit. The Word is also used, particularly in Scotland, of the entry or passage, including the common staircase, of a block of tenement houses, and in architecture for the precincts of a cathedral or abbey.

The adjective ” close ” (i.e. closed) is found in several phrases, such as ” close time ” or ” close season ” (see Game Laws) ; close borough, one of which the rights and privileges were enjoyed by a limited class (see Borough); close rolls and writs, royal letters, &c, addressed to particular persons, under seal, and not open to public inspection (see Record; Chancery; Letters Patent). From the sense of “closed up,” and so ” confined,” comes the common meaning of ” near.”

CLOSURE (Fr. cldture), the parliamentary term for the closing of debate according to a certain rule, even when certain members are anxious to continue the debate. (See Parliament: Procedure.)

CLOT, ANTOINE BARTHELEMY (1793-1868), French physician,

known as Clot Bey, was born at Grenoble on the 7th of November 1793, and graduated in medicine and surgery at Montpellier. After practising for a time at Marseilles he was made chief surgeon to Mehemet AH, viceroy of Egypt. At Abuzabel, near Cairo, he founded a hospital and schools for all branches of medical instruction, as well as for the study of the French language; and, notwithstanding the most serious religious difficulties, instituted the study of anatomy by means of dissection. In 1832 Mehemet Ali gave him the dignity of bey without requiring him to abjure his religion; and in 1836 he received the rank of general, and was appointed head of the medical administration of the country. In 1849 he returned to Marseilles, though he revisited Egypt in 1856. He died at Mar- seilles on the 28th of August 1868. His publications included: Relation des 6pidimies de cholera qui ont regni a VHeggiaz,

a Suez, et en t-gypte (1832); De la peste observie en Hgypte (1840); AperQU g&n&ral sur l'£gypte (1840); Coup d'osil sur la peste et les quarantaines (1851); De I'ophthalmie (1864). CLOTAIRE (Chlothachar), the name of four Frankish kings. Clotaire I. (d. 561) was one of the four sons of Clovis. On the death of his father in 511 he received as his share of the kingdom the town of Soissons, which he made his capital, the cities of Laon, Noyon, Cambrai and Maastricht, and the lower course of the Meuse. But he was very ambitious, and sought to extend his domain. He was the chief instigator of the murder of his brother Clodomer's children in 524, and his share of the spoils consisted of the cities of Tours and Poitiers. He took part in the various expeditions against Burgundy, and after the destruction of that kingdom in 534 obtained Grenoble, Die and some of the neighbouring cities. When Provence was ceded to the Franks by the Ostrogoths, he received the cities of Orange, Carpentras and Gap. In 53 1 he marched against the Thuringi with his brother Theuderich(Thierry)L, and in 542 with his brother Childebert against the Visigoths of Spain. On the death of his great-nephew Theodebald in 555, Clotaire annexed his territories; and on Childebert's death in 558 he became king of all Gaul. He also ruled over the greater part of Germany, made expeditions into Saxony, and for some time exacted from the Saxons an annual tribute of 500 cows. The end of his reign was troubled by internal dissensions, his son Chram rising against him on several occasions. Following Chram into Brittany, where the rebel had taken refuge, Clotaire shut him up with his wife and children in a cottage, to which he set fire. Overwhelmed with remorse, he went to Tours to

implore forgiveness at the tomb of St Martin, and died shortly afterwards.

Clotaire II. (d. 629) was the son of Chilperic I. On the assassination of his father in 584 he was still in his cradle. He was, however, recognized as king, thanks to the devotion of his mother Fredegond and the protection of his uncle Gontran, king of Burgundy. It was not until after the death of his cousin Childebert II. in 595 that Clotaire took any active part in affairs. He then endeavoured to enlarge his estates at the expense of Childebert's sons, Theodebert, king of Austrasia, and Theuderich II., king of Burgundy; but after gaining a victory at Laffaux (597), he was defeated at Dormelles (600), and lost part of his kingdom. After the war between Theodebert and Theuderich and their subsequent death, the nobles of Austrasia and Burgundy appealed to Clotaire, who, after putting Brun- hilda to death, became master of the whole of the Frankish kingdom (613). He was obliged, however, to make great con- cessions to the aristocracy, to whom he owed bis victory. By the constitution of the 18th of October 614 he gave legal force to canons which had been voted some days previously by a' council convened at Paris, but not without - attempting to modify them by numerous restrictions. He extended the competence of the ecclesiastical tribunals, suppressed unjust taxes and undertook to select the counts from the districts they had to administer. In 623 he made his son Dagobert king of the Austrasians, and gradually subdued all the provinces that had formerly belonged to Childebert II. He also guaranteed a certain measure of independence to the nobles of Burgundy, giving them the option of having a special mayor of the palace, or of dispensing with that officer. These concessions procured him a reign of comparative tranquillity. He died on the 1 8th of October 629, and was buried at Paris in the church of St Vincent, afterwards known as St Germain des Pres.

Clotaire III. (652-673) was a son of King Clovis II. In 657 he became the nominal ruler of the three Frankish kingdoms, but was deprived of Austrasia in 663, retaining Neustria and Burgundy until his death.

Clotaire IV. (d. 719) was king of Austrasia from. 717 to 719- _ (C. Pf.)

CLOTH, properly a covering, especially for the body, clothing, then the material of which such a covering is made; hence any material woven of wool or hair, cotton, flax or vegetable fibre.

In commercial usage, the word is particularly applied to a fabric made of wool. The word is Teutonic, though it does not appear in all the branches of the language. It appears in German as Kleid, dress

{Kleidung, clothing), and in Dutch as Heed. The ultimate origin is unknown ; it may be .connected with the root kit- meaning to stick, cling to, which appears in ” clay,” ” cleave ” and other words. The original meaning would be either that which clings to the body, or that which is pressed or ” felted ” together. The regular plural of ” cloth ” was ” clothes,” which is now confined in meaning to articles of clothing, garments, in which sense the singular ” cloth ” is not now used. For that word, in its modern sense of material, the plural ” cloths ” is used. This form dates from the beginning of the 17th century, but the distinction in meaning between ” cloths ” and ” clothes ” is a 19th-century one.

CLOTHIER, a manufacturer of cloth, or a dealer who sells either the cloth or made-up clothing. In the United States the word formerly applied only to those who dressed or fulled cloth during the process of manufacture, but now it is used in the general sense, as above.

CLOTILDA, SAINT (d. 544), daughter of the Burgundian king Chilperic, and wife of Clovis, king of the Franks. On the death of Gundioc, king of the Burgundians, in 473, his sons Gundobald, Godegesil and Chilperic divided his heritage between them; Chilperic apparently reigning at Lyons, Gundobald at Vienne and Godegesil at Geneva. According to Gregory of Tours, Chilperic was slain by Gundobald, his wife drowned, and of his two daughters, Chrona took the veil and Clotilda was exiled. This account, however, seems to have been a later invention. At Lyons an epitaph has been discovered of a Burgundian queen, who died in 506, and was most probably the mother of Clotilda. Clotilda was brought up in the orthodox faith. Her uncle Gundobald was asked for her hand in marriage by the Frankish king Clovis, who had just conquered northern Gaul, and the marriage was celebrated about 493. On this event many romantic stories, all more or less embroidered, are to be found in the works of Gregory of Tours and the chronicler Fredegarius, and in the Liber historiae Francorum. Clotilda did not rest until her husband had abjured paganism and embraced the orthodox Christian faith (496). With him she built at Paris the church of the Holy Apostles, afterwards ■ known . as Ste Genevieve. After the death of Clovis in 511 she retired to the abbey of St Martin at Tours. In 523 she incited her sons against her uncle Gundobald and provoked the Burgundian war. In the following year she tried in vain to protect the rights of her grandsons, the children of Clodomer, against the claims of her sons Childebert I. and Clotaire I., and was equally unsuccessful in her efforts to prevent the civil discords between her children. She died in 544, and was buried by her husband’s side in the church of the Holy Apostles.

There is a mediocre Life in Mon. Germ. Hist.: Script, rer. Mcrov., vol. ii. See also G. Kurth, Sainte Clotilde (2nd ed., Paris, 1897).

(C. Pf.)

CLOUD (from the same root, if not the same word, as ” clod,” a word common in various forms to Teutonic languages for a mass or lump; it is first applied in the usual sense in the late 13th century; the Anglo-Saxon clad is only used in the sense of ” a mass of rock,” woken being used for ” cloud “), a mass of condensed vapour hanging in the air at some height from the earth.

Classification of Clouds. — The earliest serious attempt to name the varieties of cloud was made by J. B. Lamarck in 1801, but he only used French terms, and those were not always happily chosen. The field was therefore still clear when in 1803 Luke Howard published, in Tillock’s Philosophical Magazine, an entirely independent scheme in which the terms were all Latin, and were applied with such excellent judgment that his system remains as the broad basis of those in use to-day. He recognized three primary types of cloud — Cirrus, Cumulus and Stratus — and four derivative or compound forms, — Cirro-cumulus, Cirro-stratus, Cumulo-stratus and Cumulo-cirro-stratus 01 Nimbus.

ss*

CLOUD

His own definitions were : —

(i) Cirrus. — Parallel, flexuous or diverging fibres, extensible in any or all directions.

(2) Cumulus. — Convex or conical heaps, increasing upward from a horizontal base.

(3) Stratus. — A widely-extended continuous horizontal sheet, increasing from below.

(4) Cirro-cumulus. — Small, well-defined, roundish masses, in close horizontal arrangement.

(5) Cirro-stratus. — Horizontal or slightly inclined masses, attenuated towards a part or the whole of their circumferences, bent downward, or undulated, separate or in groups consisting of small clouds having these characters.

(6) Cumulo-stratus. — The cirro-stratus blended with the cumulus, and either appearing intermixed with the heaps of the latter or superadding a widespread structure to its base.

(7) Cumulo-cirro-stratus, or nimbus. — The rain-cloud : a cloud or system of clouds from which rain is falling. It is a horizontal sheet, above which the cirrus spreads, while the cumulus enters it laterally and from beneath.

This system was universally adopted, and apart from some ambiguity in the definitions of cumulo-stratus and nimbus, it was sufficiently detailed for many purposes, such as the general relations between clouds and the movements of the barometer. When, however, such questions as the mode of origin of parti- cular forms of cloud came to be investigated, it was at once felt that Howard's classes were too wide, and something much more detailed was required. The result has been the promulgation from time to time of revised schemes, most of these being based on Howard's work, and differing from him by the introduction of new terms or of subdivisions of his types. Some of these new terms have come more or less into use, such as A. Poey's pallium to signify a uniform sheet, but as a general rule the pro- posals were not accompanied by a clear enough exposition of their precise meaning for others to be quite sure of the author's intention. Other writers not appreciating how fully Howard's names had become established, boldly struck out on entirely new lines. The most important of these were probably those due respectively to (1) Poey, published in the Annuaire de la soci&g meUorologique de France, 1865, (2) M. l'Abbe Maze, published in the MSmoires du congres metior ologique inter- national, 1889, and (3) Frederic Gaster, Quart. Jour. R. Meteoro- logical Society, 1893. In all of these Howard's terms are used, but the systems were much more elaborate, and the verbal descriptions sometimes difficult to follow.

In his book Cloudland (1894) Clement Ley published a novel system. He grouped all clouds under four heads, in accordance with the mode in which he believed them to be formed. I. Clouds of Radiation.

Nebula Fog.

Nebula Stillans Wet fog.

Nebula Pulverea Dust fog.

II. Clouds of Interfret. Nubes Informis. Scud.

Stratus Quietus Quiet cloud.

Stratus Lenticularis Lenticular cloud.

Stratus Maculosus Mackerel cloud.

Stratus Castellatus Turret cloud.

Stratus Precipitans Plane shower.

III. Clouds of Inversion.

Cumulo-rudimentum

Cumulus

Cumulo-stratus

Cumulo-stratus Mammatus

Cumulo-nimbus

Cumulo-nimbus Nivosus

Cumulo-nimbus Grandineus

Cumulo-nimbus Mammatus

Nimbus

Nimbus nivosus

Nimbus grandineus

IV. Clouds of Inclination. Nubes Fulgens Luminous cloud.

Cirrus Curl cloud.

Cirro-filum Gossamer cloud.

Cirro- velum Veil cloud.

Cirro-macula Speckle cloud.

Cirro-velum Mammatum. 1 Draped veil cloud.

1 Varieties.

Rudiment.

Heap cloud.

Anvil cloud.

Tubercled anvil cloud.

Shower cloud.

Snow shower.

Hail shower.

Festooned shower cloud.

Rainfall cloud.

Snowfall.

Hailfall.

It will be seen that Ley's scheme is really an amplification of Howard's. The term " Interfret " is defined as the interaction of horizontal currents of different velocities. Inversion is a synonym for vertical convection, and Inclination is used to imply that such clouds consist of sloping lines of falling ice particles.

While Ley had been finishing his work and seeing it through the press, H. Hildebrand-Hildebrandsson and R. Abercromby had devised another modification which differed from Howard's chiefly by the introduction of a new class, which they distin- guished by the use of the prefix Alto. This scheme was formally adopted by the International Meteorological Conference held at Munich in 1891, and a committee was appointed to draw up an atlas showing the exact forms typical of each variety con- sidered. Finally in August 1894 a small sub-committee consist- ing of Messrs H. Hildebrand-Hildebrandsson, A. Riggenbach- Burckhardt and Teisserenc de Bort was charged with the task of producing the atlas. Their task was completed in 1896, and meteorologists were at last supplied with a fairly detailed scheme, and one which was adequately illustrated, so that there could be no doubt of the authors' meaning. It is as follows: — The International Classification.

(a) Separate or globular masses (most frequently seen in dry weather).

(b) Forms which are widely extended, or completely cover the sky (in wet weather).

A. Upper clouds, average altitude 9000 metres. 1

a. 1. Cirrus.

b. 2. Cirro-stratus.

B. Intermediate clouds, between 3000 m. and 7000 m.

a. 3. Cirro-cumulus. 4. Alto-cumulus.

b. 5. Alto-stratus.

C. Lower clouds, 2000 m.

a. 6. Strato-cumulus.

b. 7. Nimbus.

D. Clouds of Diurnal Ascending Currents.

a. 8. Cumulus, apex 1800 m., base 1400 m.

b. 9. Cumulo-nimbus, apex 3000 m. to 8000 m., base

1400 m.

E. High Fogs, under 1000 m.

10. Stratus.

Explanations.

1. Cirrus (Ci.). — Detached clouds, delicate and fibrous-looking, taking the form of feathers, generally of a white colour, sometimes arranged in belts which cross a portion of the sky in great circles and by an effect of perspective, converge towards one or two points of the horizon (the Ci.-S. and the Ci.-Cu. often contribute to the formation of these belts). See Plate, fig. 1.

2. Cirro-stratus (Ci.S.). — A thin, whitish sheet, at times com pletely covering the sky, and only giving it a whitish appearance (it is then sometimes called cirro-nebula) , or at others presenting, more or less distinctly, a formation like a tangled web. This sheet often produces halos around the sun and moon. See fig. 2.

3. Cirro-cumulus (Ci.-Cu.). — Small globular masses, or white flakes without shadows, or having very slight shadows, arranged in groups

and often in lines. See fig. 3.

4. Alto-cumulus (A.-Cu.). — Largish globular masses, white or greyish, partially shaded, arranged in groups or lines, and often so closely packed that their edges appear confused. The detached masses are generally larger and more compact (changing to S.-Cu.) at the centre of the group; at the margin they form into finer flakes (changing to Ci.-Cu.). They often spread themselves out in lines in one or two directions. See fig. 4.

5. Alto-stratus (A.-S.). — A thick sheet of a grey or bluish colour, showing a brilliant patch in the neighbourhood of the sun or moon, and without causing halos, sometimes giving rise to coronae. This form goes through all the changes like Cirro-stratus, but according to measurements made at Upsala, its altitude is one-half as great. See fig. 5.

6. Strato-cumulus (S.-Cu.). — Large globular masses or rolls of dark cloud, frequently covering the whole sky, especially in winter, and occasionally giving it a wavy appearance. The layer is not, as a rule, very thick, and patches of blue sky are often seen through intervening spaces. All sorts of transitions between this form and Alto-cumulus are seen. It may be distinguished from nimbus by its globular or rolled appearance, and also because it does not bring rain. See fig. 6.

1 1 metre = 3-28 ft.

CLOUD

Plate.

i

Fig. i.— CIRRUS

mm

i

! • • * _ F j

j 3H

Fig. 4.— ALTO-CUMULUS.

At

n. sss.

Fig. 9.— NIMBUS.

Fig. 10— CUMULO-NIMBUS.

7. Nimbus (N.), Rain Cloud. — A thick layer of dark clouds, without shape and with ragged edges, from which continued rain or snow generally falls. Through openings in these clouds an upper layer of cirro-stratus or alto-stratus may almost invariably be seen. If the layer of nimbus separates up into shreds, or if small loose clouds are visible floating at a low level, underneath a large nimbus they may be described as fracto-nimbus (Scud of sailors) . See fig. 9.

8. Cumulus (Cu.) {Wool-pack Clouds). — Thick clouds of which the upper surface is dome-shaped and exhibits protuberances while the base is horizontal. These clouds appear to be formed by a diurnal ascensional movement which is almost always observable. When the cloud is opposite the sun, the surfaces usually presented to the observer have a greater brilliance than the margins of the protuberances. When the light falls aslant, these clouds give deep shadows, but if they are on the same side as the sun they appear dark, with bright edges. See fig. 7.

The true cumulus has clear superior and inferior limits. It is often broken up by strong winds, and the detached portions undergo continual changes. These altered forms may be distinguished by the name of Fracto-cumulus.

9. Cumulo-nimbus (Cu.-N.) ; The Thunder-cloud; Shower-cloud. — Heavy masses of clouds, rising in the form of mountains, turrets or anvils, generally having a sheet or screen of fibrous appearance above (false cirrus) and underneath, a mass of cloud similar to nimbus. From the base there generally fall local showers of rain or snow (occasionally hail or soft hail). Sometimes the upper edges have the compact form of cumulus, rising into massive peaks round which the delicate false cirrus floats, and sometimes the edges themselves separate into a fringe of filaments similar to that of cirrus. This last form is particularly common in spring showers. See fig. 10.

The front of thunderclouds of wide extent frequently presents the form of a large bow spread over a portion of the sky which is uniformly

brighter in colour.

10. Stratus “(S-). — A horizontal sheet of lifted fog. When this sheet is broken up into irregular shreds by the wind, or by the summits of mountains, it may be distinguished by the name of Fracto-stratus. See fig. 8.

The scheme also provides that where a stratus or nimbus takes a lumpy form, this fact shall be described by the adjective cumuliformis, and if its base shows downward projecting bosses the word mammato is prefixed.

Issued as it has been with the authority of an international congress of specialists, this scheme has been generally accepted, and must be regarded as the orthodox system, and for the great majority of observations it is quite detailed enough. But it does not give universal satisfaction. Cirrus clouds, for instance, exhibit many forms, and these so diverse that they must be due to very different causes. Hence for the minuter study of cloud forms a more elaborate scheme is still needed.

Hence in 1896 H. H. Clayton of the Blue Hill observatory, Massachusetts, published in the Annals of the astronomical observatory of Harvard College a highly detailed scheme in which the International types and a number of subdivisions were grouped under four classes — stratiforms or sheet clouds; cumuliforms or woolpack clouds; flocciforms, including strato- cumulus, alto-cumulus and cirro-cumulus; and cirriforms or hairy clouds. The International terms are embodied and the special varieties are distinguished by the use of prefixes such as tracto-cirrus or cirrus bands, grano-cirro-cumulus or granular cirrus, &c.

Again in 1904 F. L. Obenbach of the Cleveland observatory devised a different system, published in the annual report, in which the International types are preserved, but each is sub- divided into a number of species. In the absence of any atlas to define the precise meaning of the descriptions given, neither of these American schemes has come into general use.

Further proposals were put forward by A. W. Clayden in Cloud Studies (1 905) . His scheme accepts the whole of the International names which he regards as the cloud genera, and suggests specific Latin names for the chief varieties, accompanying the descriptions by photographs. The proposed scheme is as follows.

Genus.

Species.

Cirrus

Cirro-nebula

Cirrus haze.

Cirro-filum

Thread cirrus

Cirrus Excelsus

High

,, Ventosus

Windy „

,, Nebulosus

Hazy ,,

,, Caudatus

Tailed

„ Vittatus

Ribbon „

„ Inconstans

Change ,,

,, Communis

Common „

Cirro-stratus

Cirro-cumulus Alto-clouds

Alto-clouds

Stratus

Cumulus

Communis

Nebulosus

Vittatus

Cumulosus

Cirro-macula

Nebulosus

Alto-stratus

,, ,, maculosus , , , , f ractus

Alto-strato-cumulus

Alto-cumulus informis ,, ,, nebulosus

Alto-cumulus castellatus ,, ,, glomeratus ,, ,, communis ,, ,, stratiformis

Stratus maculosus ,, ,, radius

,, ,, lenticularis

Strato-cumulus

Cumulus minor ,, major

Cumulo-nimbus

Common Ci. S. Hazy ,,

Ribbon ,, Flocculent Ci.-S. Speckle cloud. Hazy Ci. cu.

Mackerel sky.

Turret cloud. High ball cumulus.

Flat alto-cum.

Roll cloud. Fall cloud.

Small cumulus. Large cumulus. Storm cloud.

The term nimbus is to be applied to any cloud from which rain is falling, but if the true form of the cloud is visible the term should be used as a qualifying adjective. The prefix fracto- or the adjective fractus should be used when the cloud is under- going disintegration or appears ragged or broken. Mammato- is used in the ordinary sense, and finally undatus or waved is to be added to the name of any cloud showing a wave-like or rippled structure. (A. W. C.)

CLOUDBERRY, Rubus Chamaemorus, a low-growing creeping herbaceous plant, with stem not prickly, and with simple obtusely lobed leaves and solitary white flowers, resembling those of the blackberry, but larger — one inch across, — and with stamens and pistils on different plants. The orange-yellow fruit is about half an inch long and consists of a few large drupes with a pleasant flavour. The plant occurs in the mountainous parts of Great Britain, and is widely distributed through the more northerly portions of both hemispheres. In northern Denmark and Sweden the fruit is gathered in large quantities and sold in the markets.

CLOUD-BURST, a sudden and violent storm of rain. • The name probably originated from the idea that the clouds were solid masses full of water that occasionally burst with disastrous results. A whirlwind passing over the sea sometimes carries the water upwards in a whirling vortex; passing over the land its motion is checked and a deluge of water falls. Occasionally on high lands far from the sea violent storms occur, with rain that seems to descend in sheets, sweeping away bridges and culverts and tearing up roads and streets, being due to great and rapid condensation and vortical whirling of the resulting heavy clouds (see Meteorology).

CLOUDED LEOPARD (Felis nebulosa or macroscelis) , a large arboreal cat from the forests of south-east Asia, Sumatra, Java, Borneo and Formosa. This cat, often called the clouded tiger, is beautifully marked, and has an elongated head and body, long tail and rather short limbs. The canine teeth are pro- portionately longer than in any other living cat. Little is known of the habits of the clouded leopard, but it preys on small mammals and birds, and rarely comes to the ground. The native Malay name is Arimaudahan (” tree-tiger “). The species is nearly related to the small Indian marbled cat (F. marmorata) , and Fontaniers cat (F. tristis) of Central Asia. (R. L.*)

CLOUET, FRANCOIS (d. 1572), French miniature painter. The earliest reference to him is the document dated December 1541 (see Clouet,

Jean), in which the king renounces for the benefit of the artist his father's estate which had escheated to the crown as the estate of a foreigner. In it the younger Janet is said to have " followed his father very closely in the science of his art." Like his father, he held the office of groom of the chamber and painter in ordinary to the king, and so far as salary is concerned, he started where his father left off. A long list of drawings contains those which are attributed to this artist, but we still lack perfect certainty about his works. There is, however, more to go upon than there was in the case of his father.

as the praises of Francois Clouet were sung by the writers of the day, his name was carefully preserved from reign to reign, and there is an ancient and unbroken tradition in the attribution of many of his pictures. There are not, however, any original attestations of his works, nor are any documents known which would guarantee the ascriptions usually accepted. To him are attributed the portraits of Francis I. at the Uffizi and at the Louvre, and various drawings relating to them. He probably also painted the portrait of Catherine de' Medici at Versailles and other works, and in all probability a large number of the drawings ascribed to him were from his hand. One of his most remarkable portraits is that of Mary, queen of Scots, a drawing in chalks in the Bibliotheque Nationale, and of similar character are the two portraits of Charles IX. and the one at Chantilly of Marguerite of France. Perhaps his masterpiece is the portrait of Elizabeth of Austria in the Louvre.

He resided in Paris in the rue de Ste Avoye in the Temple quarter, close to the Hotel de Guise, and in 1568 is known to have been under the patronage of Claude Gouffier de Boisy, Seigneur d'Oiron, and his wife Claude de Baune. Another ascertained fact concerning Francois Clouet is that in 1571 he was " summoned to the office of the Court of the Mint," and his opinion was taken on the likeness to the king of a portrait struck by the mint. He prepared the death-mask of Henry II., as in 1547 he had taken a similar mask of the face and hands of Francis I., in order that the effigy to be used at the funeral might be prepared from his drawings; and on each of these occasions he executed the painting to be used in the decorations of the church and the banners for the great ceremony.

Several miniatures are believed " to be his work, one very remarkable portrait being the half-length figure of Henry II. in the collection of Mr

J. Pierpont Morgan. Another of his portraits is that of the due d'Alencon in the Jones collection at South Kensington, and certain representations of members of the royal family which were in the Hamilton Palace collection and the Magniac sale are usually ascribed to him. He died on the 22nd of December 1572, shortly after the massacre of St Bartholomew, and his will, mentioning his sister and his two illegitimate daughters, and dealing with the disposition of a considerable amount of property, is still in existence. His daughters subsequently became nuns.

His work is remarkable for the extreme accuracy of the drawing, the elaborate finish of all the details, and the exquisite complete- ness of the whole portrait. He must have been a man of high intelligence, and of great penetration, intensely interested in his work, and with considerable ability to represent the character of his sitter in his portraits. His colouring is perhaps not specially remarkable, nor from the point of style can his pictures be considered specially beautiful, but in perfection of drawing he has hardly any equal.

To Monsieur Louis Dimier, the leading authority upon his works, and to his volume on French Painting in the Sixteenth Century, as well as to the works of MM. Bouchot, La Borde and Maulde-La Claviere, the present writer is indebted for the information contained in this article. (G. C. W.)

CLOUET, JEAN (d. c. 1541). French miniature painter, generally known as Janet. The authentic presence of this artist at the French court is first to be noted in 1516, the second year of the reign of Francis I. By a deed of gift made by the king to the artist's son of his father's estate, which had escheated to the crown, we learn that he was not actually a Frenchman, and never even naturalized. He is supposed to have been a native of the Low Countries, and probably his real name was Clowet. His position was that of groom of the chamber to the king, and he received a stipend at first of 180 livres and later of 240. He lived several years in Tours, and there it was he met his wife, who was the daughter of a jeweller. He is recorded as living in Tours in 1522, and there is a reference to his wife's residence in the same town in 1523, but in 1529 they were both settled in Paris, probably in the neighbourhood of the parish of Stc Innocerft, in the cemetery of whicn they were buried. He stood godfather at a christening on the 8th of July 1540, but

was no longer living in December 1541, and therefore died between those two dates.

His brother, known as Clouet de Navarre, was in the service of Margu6rite d'Angouleme, sister of Francis I., and is referred to in a letter written by Marguerite about 1529. Jean Clouet had two children, Francois and Catherine, who married Abel Foulon, and left one son, who continued the profession of Francois Clouet after his decease. Jean Clouet was undoubtedly a very skilful portrait painter, but it must be acknowledged without hesitation that there is no work in existence which has been proved to be his. There is no doubt that he painted a portrait of the mathematician, Oronce Fine, in 1530, - when Fine was thirty-six years old, but the portrait is now known only by a print. Janet is generally believed, however, to have been responsible for a very large number of the wonderful portrait drawings now preserved at Chantilly, and at the Bibliotheque Nationale, and to him is attributed the portrait of an unknown man at Hampton Court, that of the dauphin Francis, son of Francis I. at Antwerp, and one other portrait, that of Francis I. in the Louvre.

Seven miniature portraits in the Manuscript of the Gallic War in the Bibliotheque Nationale (13,429) are attributed to Janet with very strong probability, and to these may be added an eighth in the collection of Mr J. Pierpont Morgan, and repre- senting Charles de Cosse, Marechal de Brissac, identical in its characteristics with the seven already known. There are other miniatures in the collection of Mr Morgan, which may be attri- buted to Jean Clouet with some strong degree of probability, inasmuch as they closely resemble the portrait drawings at Chantilly and in Paris which are taken to be his work. In his oil paintings the execution is delicate and smooth, the outlines hard, the texture pure, and the whole work elaborately and very highly finished in rich, limpid colour. The chalk drawings are of remarkable excellence, the medium being used by the artist with perfect ease and absolute sureness, and the mingling of colour being in exquisite taste, the modelling exceedingly subtle, and the drawing careful, tender and emphatic. The collection of drawings preserved in France, and attributed to this artist and his school, comprises portraits of all the important persons of the time of Francis I. In one album of drawings the portraits are annotated by the king himself, and his merry reflections, stinging taunts or biting satires, add very largely to a proper understanding of the life of his time and court. Definite evidence, however, is still lacking to establish the attribution of the best of these drawings and of certain oil paintings to the Jean Clouet who was groom of the chambers to the king.

The chief authority in France on the work of this artist is Monsieur Louis Dimier, and to his works, and to information derived direct from him, the present writer is indebted for almost all the information

given in this article. (G. C. W.)

CLOUGH, ANNE JEMIMA (1820-1892), English educationalist, was born at Liverpool on the 20th of January 1820, the daughter of a cotton merchant. She was the sister of Arthur Hugh Clough, the poet. When two years old she was' taken with the rest of the family to Charleston, South Carolina. It was not till 1836 that she returned to England, and though her ambition was to write, she was occupied for the most part in teaching. Her father's failure in business led her to open a school in 1841. This was carried on until 1846. In 1852, after making some technical studies in London and working at the Borough Road and the Home and Colonial schools, she opened another small school of her own at Ambleside in Westmorland. Giving this up some ten years later, she lived for a time with the widow of her brother Arthur Hugh Clough — who had died in 1861— in order that she might educate his children. Keenly interested in the education of women, she made friends with Miss Emily Davies, Madame Bodichon, Miss Buss and others. After helping to found the North of England council for promoting the higher education of women, she acted as its secretary from 1867 to 1870 and as its president from 1873 to 1874. When it was decided to open a house for the residence of women students at Cambridge, Miss Clough was chosen as its first principal.

This hostel, started in Regent Street, Cambridge,in 1871 with five students, and continued at Merton Hall in 1872, led to the building of Newnham Hall, opened in 1875, and to the erection of Newnham College on its present basis in 1880. Miss Clough's personal charm and high aims, together with the development of Newnham College under her care, led her to be regarded as one of the foremost leaders of the women's educational move- ment. She died at Cambridge on the 27th of February 1892. Two portraits of Miss Clough are at Newnham College, one by Sir W. B. Richmond, the other by J. J. Shannon.

See Memoir of Anne Jemima Clough, by Blanche Athena Clough

(1897).

CLOUGH, ARTHUR HUGH (1819-1861), English poet, was born at Liverpool on the 1st of January 1819. He came of a good Welsh stock by his father, James Butler Clough, and of a Yorkshire one by his mother, Anne Perfect. In 1822 his father, a cotton merchant, moved to

the United States, and Clough's childhood was spent mainly at Charleston, South Carolina, much under the influence of his mother, a cultivated woman, full of moral and imaginative enthusiasm. In 1828 the family paid a visit to England, and Clough was left at school at Chester, whence he passed in 1829 to Rugby, theji under the sway of Dr Thomas Arnold, whose strenuous views on life and education he accepted to the full. Cut off to a large degree from home relations, he passed a somewhat reserved and solitary boyhood, devoted to the well-being of the school and to early literary efforts in the Rugby Magazine, In 1836 his parents returned to Liverpool, and in 1837 he went with a scholarship to Balliol College, Oxford. Here his contemporaries included Benjamin Jowett, A. P. Stanley, J. C. Shairp, W. G. Ward, Frederick Temple and Matthew Arnold.

Oxford, in 1837, was in the full swirl of the High Church movement led by J. H. Newman. Clough was for a time carried away by the flood, and, although he recovered his equilibrium, it was not without an amount of mental disturbance and an expenditure of academic time, which perhaps accounted for his failure to obtain more than a second class in his final examination. He missed a Balliol fellowship, but obtained one at Oriel, with a tutorship, and lived the Oxford life of study, speculation, lectures and reading-parties for some years longer. Gradually, however, certain sceptical tendencies with regard to the current religious and social order grew upon him to such an extent as to render his position as an orthodox teacher of youth irksome, and in 1848 he resigned it. The immediate feeling of relief showed itself in buoyant, if thoughtful, literature, and he published poems both new and old. Then he travelled, seeing Paris in revolution and Rome in siege, and in the autumn of 1849 took up new duties as principal of University Hall, a hostel for students at University College, London. He soon found that he disliked London, in spite of the friendship of the Carlyles, nor did the atmosphere of Unitarianism prove any more con- genial than that of Anglicanism to his critical and at bottom conservative temper. A prospect of a post in Sydney led him to engage himself to Miss Blanche Mary Shore Smith, and when it disappeared he left England in 1852, and went, encouraged by Emerson, to Cambridge, Massachusetts. Here he remained some months, lecturing and translating Plutarch for the book- sellers, until in 1853 the offer of an examinership in the Education Office brought him to London once more. He married, and pursued a steady official career, diversified only by an appoint- ment in 1856 as secretary to a commission sent to study certain aspects of foreign military education. At this, as at every period of his life, he enjoyed the warm respect and admiration of a small circle of friends, who learnt to look to him alike

for un- selfish sympathy and for spiritual and practical wisdom. In i860 his health began to fail. He visited first Malvern and Freshwater, and then the East, France and Switzerland, in search of recovery, and finally came to Florence, where he was struck down by malaria and paralysis, and died on the 13th of November 1861. Matthew Arnold wrote upon him the exquisite lament of Thyrsis.

Shortly before he left Oxford, in the stress of the Irish potato- I

famine, Clough wrote an ethical pamphlet addressed to the undergraduates, with the title, A Consideration of Objections against the Retrenchment Association at Oxford (1847). His Homeric pastoral The Bothie of Toper-na-Fuosich, afterwards rechristened Tober-na-Vuolich (1848), was inspired by a long vacation after he had given up his tutorship, and is full of socialism, reading-party humours and Scottish scenery. Am- barvalia (1849), published jointly with his friend Thomas Burbidge, contains shorter poems of various dates from 1840, or earlier, onwards. Amours de Voyage, a novel in verse, was written at Rome in 1849; Dipsychus, a rather amorphous satire, at Venice in 1850; and the idylls which make up Mari Magno, or Tales on Board, in 1861. A few lyric and elegiac pieces, later in date than the Ambarvalia, complete the tale of Clough's poetry. His only considerable enterprise in prose was a revision of the 17th century translation of Plutarch by Dryden and others, which occupied him from 1852, and was published as Plutarch's Lives (1859).

No part of Clough's life was wholly given up to poetry, and he probably had not the gift of detachment necessary to produce great literature in the intervals of other occupations. He wrote but little, and even of that little there is a good deal which does not aim at the highest seriousness. He never became a great craftsman. A few of his best lyrics have a strength of melody to match their depth of thought, but much of what he left consists of rich ore too imperfectly fused to make a splendid or permanent possession. Nevertheless, he is rightly regarded, like his friend Matthew Arnold, as one of the most typical English poets of the middle of the 19th century. His critical instincts and strong ethical temper brought him athwart the popular ideals of his day both in conduct and religion. His verse has upon it the melancholy and the perplexity of an age of transition. He is a sceptic who by nature should have been with the believers. He stands between two worlds, watching one crumble behind him, and only able to look forward by the sternest exercise of faith to the reconstruction that lies ahead in the other. On the technical side, Clough's work is interesting to students of metre, owing to the experiments which he made, in the Bothie and elsewhere, with English hexameters and other

types of verse formed upon classical models.

Clough's Poems were collected, with a short memoir by F. T. Palgrave, in 1862; and his Letters and Remains, with a longer memoir, were privately printed in 1865. Both volumes were pub- lished together in 1869 and have been more than once reprinted. Another memoir is Arthur Hugh Clough: A Monograph (1883), by S. Waddington. Selections from the poems were made by Mrs Clough for the Golden Treasury series in 1894, and by E. Rhys in 1896. (E. K. C.)

CLOUTING, the technical name given to a light plain cloth used for covering butter and farmers' baskets, and for dish and pudding cloths. The same term is often given to light cloths of the nursery diaper pattern.

CLOVELLY, a fishing village in the Barnstaple parliamentary division of Devonshire, England, n m. W.S.W. of Bideford. Pop. (1901) 621. It is a cluster of old-fashioned cottages in a unique position on the sides of a rocky cleft in the north coast; its main street resembles a staircase which descends 400 ft. to the pier, too steeply to allow of any wheeled traffic. Thick woods shelter it on three sides, and render the climate so mild that fuchsias and other delicate plants flourish in midwinter. All Saints' church, restored in 1866, is late Norman, containing several monuments to the Carys, lords of the manor for 600 years. The surrounding scenery is famous for its richness of colour, especially in the grounds of Cary Court, and along " The Hobby," a road cut through the woods and overlooking the sea. Clovelly is described by Dickens in A Message from the Sea.

CLOVER, in botany, the English name for plants of the genus Trifolium, from Lat. tres, three, and folium, a leaf, so called from the characteristic form of the leaf, which has three leaflets (trifoliate), hence the popular name trefoil. It is a member of the family Leguminosae, and contains about three hundred species, found chiefly in north temperate regions, but also, like other north temperate genera, on the mountains in

the tropics. The plants are small annual or perennial herbs with trifoliate (rarely 5- or 7-foliate) leaves, with stipules adnate to the leaf-stalk, and heads or dense spikes of small red, purple, white, or rarely yellow flowers; the small, few-seeded pods are enclosed in the

calyx. ‘Eighteen species are native in Britain, and several are extensively cultivated as fodder-plants. T. pratense, red or purple clover, is the most widely cultivated.

This plant, either sown alone or in mixture with rye-grass, has for a long time formed the staple crop for soiling; and so long as it grew freely, its power of shooting up again after repeated mowings, the bulk of crop thus obtained, its palatableness to stock and feeding qualities, the great range of soils and climate in which it grows, and its fitness either for pasturage or soiling, well entitled it to this preference. Except on certain rich calcareous clay soils, it has now, however, become an exceedingly precarious crop. The seed, when genuine, which unfortunately is very often not the case, germinates as freely as ever, and no greater difficulty than heretofore is experienced in having a full plant during autumn and the greater part of winter; but over most part of the country, the farmer, after having his hopes raised by seeing a thick cover of vigorous-looking clover plants over his field, finds to his dismay, by March or April, that they have either entirely disappeared, or are found only in capricious patches here and there over the field. No satisfactory explanation of this ” clover-sickness ” has yet been given, nor any certain remedy, of a kind to be applied to the soil, discovered. One important fact is, however, now well established, viz. that when the cropping of the land is so managed that clover does not recur at snorter intervals than eight years, it grows with much of its pristine vigour. The knowledge of this fact now determines many farmers in varying their rotation so as to secure this important end. At one time there was a somewhat prevalent belief that the introduction of beans into the rotation had a specific influence of a beneficial kind on the clover when it came next to be sown; but the true explanation seems to be that the beans operate favourably only by the incidental cir- cumstance of almost necessarily lengthening the interval betwixt the recurrences of clover.

When the four-course rotation is followed, no better plan of managing this process has been yet suggested than to sow beans, pease, potatoes or tares, instead of clover, for one round, making the rotation one of eight years instead of four. The mechanical condition of the soil seems to have something to do with the success or failure of the clover crop. We have’ often noticed that headlands, or the converging line of wheel-tracks near a gateway at which the preceding root crop had been carted from a field, have had a good take of clover, when on the field generally it had failed. In the same way a field that has been much poached by sheep while consuming turnips upon it, and which has afterwards been ploughed up in an unkindly state, will have the clover prosper upon it, when it fails in other cases where the soil

appears in far better condition. If red clover can be again made a safe crop, it will be a boon indeed to agriculture. Its seeds are usually sown along with a grain crop, any time from the 1st of February to May, at the rate of 12 lb to 20 lb per acre when not combined with other clovers or grasses.

Italian rye-grass and red clover are now frequently sown in mixture for soiling, and succeed admirably. It is, however, a wiser course to sow them separately, as by substituting the Italian rye-grass for clover, for a single rotation, the farmer not only gets a crop of forage as valuable in all respects, but is enabled, if he choose, to prolong the interval betwixt the sowings of clover to twelve years, by sowing, as already recommended, pulse the first round, Italian rye-grass the second, and clover the third.

These two crops, then, are those on which the arable-land farmer mainly relies for green forage. To have them good, he must be prepared to make a liberal application of manure. Good farm-yard dung may be applied with advantage either in autumn or spring, taking care to cart it upon the land only when it is dry enough to admit of this being done without injury. It must also be spread very evenly so soon as emptied from the

carts. But it is usually more expedient to use either guano, nitrate of soda, or soot for this purpose, at the rates respectively of i cwt., 1 cwt. and 20 bushels. If two or more of these sub- stances are used, the quantities of each will be altered in pro- portion. They are best also to be applied in two or three portions at intervals of fourteen to twenty days, beginning towards the end of December, and only when rain seems imminent or has just fallen.

When manure is broadcast over a young clover field, and presently after washed in by rain, the effect is identical with that of first dissolving it in water, and then distributing the dilution over the surface, with this difference, namely, that the first plan costs only the price of the guano, &c, and is avail- able at any time and to every one, whereas the latter implies the construction of tanks and costly machinery.

T. incarnatum, crimson or Italian clover, though not hardy enough to withstand the climate of Scotland in ordinary winters, is a most valuable forage crop in England. It is sown as quickly as possible after the removal of a grain crop at the rate of 18 lb to 20 lb per acre. It is found to succeed better when only the surface of the soil is stirred by the scarifier and harrow than when a ploughing i% given. It grows

rapidly in spring, and yields an abundant crop of green food, peculiarly palatable to live stock. It is also suitable for making [into hay. Only one cutting, however, can be obtained, as it does not shoot again after being mown.

T. repens, white or Dutch clover, is a perennial abundant in meadows and good pastures. The flowers are white or pinkish, becoming brown and deflexed as the corolla fades. T. hybridum, Alsike or Swedish clover, is a perennial which was introduced early in the 19th century and has now become naturalized in Britain. The flowers are white or rosy, and resemble those of the last species. T. medium, meadow or zigzag clover, a perennial with straggling flexuous stems and rose-purple flowers, is of little agricultural value. Other British species are: T. arvense, hare's-foot trefoil, found in fields and dry pastures, a soft hairy plant with minute white or pale pink flowers and feathery sepals; T. fragiferum, strawberry clover, with densely- flowered, globose, rose-purple heads and swollen calyxes; T. procumbens, hop trefoil, on dry pastures and roadsides, the heads of pale yellow flowers suggesting miniature hops; and the somewhat similar T. minus, common in pastures and road- sides, with smaller heads and small yellow flowers turning dark brown. The last named is the true shamrock. Specimens of shamrock and other clovers are not infrequently found with four leaflets, and, like other rarities, are considered lucky. Calvary clover is a member of the closely allied genus Medicago— M. Echinus, so called from the curled spiny pod; it has small heads of yellow clover-like flowers, and is a native of the south of France.

CLOVES, the dried, unexpanded flower-buds of Eugenia caryophyllata, a tree belonging to the natural order Myrtaceae. They are so named from the French word clou, on account of their resemblance to a nail. The clove tree is a beautiful evergreen which grows to a height of from 30 to 40 ft., having large oval leaves and crimson flowers in numerous groups of terminal clusters. The flower-buds are at first of a pale colour and gradually become green, after which they develop into a bright red, when they are ready for collecting. Cloves are rather more than half an inch in length, and consist of a long cylindricarcalyx, terminating in four spreading sepals, and four unopened petals which form a small ball in the centre. The tree is a native of the small group of islands in the Indian Archi- pelago called the Moluccas, or Spice Islands; but it was long cultivated by the Dutch in Amboyna and two or three small neighbouring islands. Cloves were one of the principal Oriental spices that early excited the cupidity of Western commercial communities, having been the basis of a rich and lucrative trade from an early part of the Christian era. The Portuguese,

by doubling the Cape of Good Hope, obtained possession of the principal portion of the clove trade, which they continued to hold for nearly a century, when, in 1605, they were expelled

from the Moluccas by the Dutch. That power exerted great and inhuman efforts to obtain a complete monopoly of the trade, attempting to extirpate all the clove trees growing in their native islands, and to concentrate the whole production in the Amboyna Islands. With great difficulty the French succeeded in introducing the clove tree into Mauritius in the year 1770; subsequently the cultivation was introduced into Guiana, Brazil, most of the West Indian Islands and Zanzibar. The chief commercial sources of supply are now Zanzibar and its neighbouring island Pemba on the East African coast, and Amboyna. Cloves are also grown in Java, Sumatra, Reunion, Guiana and the West India Islands.

Cloves as they come into the market have a deep brown colour, a powerfully fragrant odour, and a taste too hot and acrid to be pleasant. When pressed with the nail they exude a volatile oil with which they are charged to the unusual pro- portion of about 18 %. The oil is obtained as a commercial product by submitting the cloves with water to repeated distillation. It is, when new and properly prepared, a pale yellow or almost colourless fluid, becoming after some time of a brown colour; and it possesses the odour and taste peculiar to cloves. The essential oil of cloves — the Oleum Caryophylli of the British Pharmacopoeia — is a mixture of two substances, one of which is oxidized, whilst the other is not. Eugenol, or eugenic acid, $C_{10}H_{12}O_2$, is the chief constituent. It is capable of forming definite salts. The other constituent is a hydro- carbon $C_{15}H_{24}$, of which the distilling point differs from that of eugenol, and which solidifies only with intense cold. Oil of cloves is readily soluble in alcohol and ether, and has a specific gravity of about 1-055. its dose is 5-3 minims. Besides this oil, cloves also contain two neutral bodies, eugenin and caryo- phyllin, the latter of which is an isomer of camphor. They are of no practical importance. The British Pharmacopoeia con- tains an infusion of cloves (Infusum Caryophylli), of which the strength is 1 part in 40 of boiling water and the dose £-1 oz. Cloves are employed principally as a condiment in culinary operations, in confectionery, and in the preparation of Kqueurs. In medicine they are tonic and carminative, but they are little used except as adjuncts to other substances on account of their flavour, or with purgatives to prevent

nausea and griping. The essential oil forms a convenient medium for using cloves for flavouring purposes, it possesses the medicinal properties characteristic of a volatile oil, and it is frequently employed to relieve toothache. Oil of cloves is regarded by many dental surgeons as the most effective local anaesthetic they possess in cases where it is desired, before cutting a sensitive tooth for the purpose of filling it, to lower the sensibility of the dentine. For this purpose the cavity must be exposed to cotton wool saturated with the oil for about ten days.

CLOVIO, GIORGIO GIULIO (1498-1578), Italian painter, by birth a Croat and by profession a priest, is said to have learned the elements of design in his own country, and to have studied afterwards with intense diligence at Rome under Giulio Romano, and at Verona under Girolamo de' Libri. He excelled in histori- cal pieces and portraits, painting as for microscopical examina- tion, and yet contriving to handle his subjects with great force and precision. His book of twenty-six pictures representing the procession of Corpus Domini, in Rome, was the work of nine years, and the covers were executed by Benvenuto Cellini. The British Museum has his twelve miniatures of the victories of the emperor Charles V. In the Vatican library is preserved a manuscript life of Frederick, duke of Urbino, superbly illus- trated by Clovio,who is facile princeps among Italian miniaturists. He was called Macedo, or Macedone, to connect him with his supposed Macedonian ancestry.

CLOVIS [Chlodovech] (c. 466-511), king of the Salian Franks, son of Childeric I., whom he succeeded in 481 at the age of fifteen. At that date the Salian Franks had advanced as far as the river Somme, and the centre of their power was at Tournai. On the history of Clovis between the years 481 and 486 the records are silent. In 486 he attacked Syagrius, a Roman general who, after the fall of the western empire in 476, had

carved out for himself a principality south of the Somme, and is called by Gregory of Tours " rex Romanorum." After being defeated by Clovis at the battle of Soissons, Syagrius sought refuge with the Visigothic king Alaric II., who handed him over to the conqueror. Henceforth Clovis fixed his residence at Soissons, which was in the midst of public lands, e.g. Berny- Riviere, Juvigny, &c. The episode of the vase of Soissons 1 has a legendary character, and all that it proves is the deference shown by the pagan king to the orthodox clergy. Clovis un- doubtedly extended his dominion over the whole of Belgica Secunda, of which Reims was the capital, and conquered the neighbouring cities in detail. Little is known of the history of these

conquests. It appears that St Genevieve defended the town of Paris against Clovis for along period,and that Verdun-sur- Meuse, after a brave stand, accepted an honourable capitulation thanks to St Euspitius. In 491 some barbarian troops in the service of Rome, Arboruchi {‘ kpiMpvxoi) , Thuringians, and even Roman soldiers who could not return to Rome, went over to Clovis and swelled the ranks of his army.

In 493 Clovis married a Burgundian princess, Clotilda, niece of Gundobald and Godegesil, joint kings of Burgundy. This princess was a Christian, and earnestly desired the conversion of her husband. Although Clovis allowed his children to be baptized, he remained a pagan himself until the war against the Alemanni, who at that time occupied the country between the Vosges, and the Rhine and the neighbourhood of Lake Constance. By pushing their incursions westward they came into collision with Clovis, who marched against them and defeated them in the plain of the Rhine. The legend runs that, in the thickest of the fight, Clovis swore that he would be converted to the God of Clotilda if her God would grant him the victory. After subduing a part of the Alemanni, Clovis went to Reims, where he was baptized by St Remigius on Christmas day 496, together with three thousand Franks. The story of the phial of holy oil (the Sainte Ampoule) brought from heaven by a white dove for the baptism of Clovis was invented by Archbishop Hincmar of Reims three centuries after the event.

The baptism of Clovis was an event of very great importance. From that time the orthodox Christians in the kingdom of the Burgundians and Visigoths looked to Clovis to deliver them from their Arian kings. Clovis seems to have failed in the case of Burgundy, which was at that time torn by the rivalry between Godegesil and his brother Gundobald. Godegesil appealed for help to Clovis, who defeated Gundobald on the banks of the Ouche near Dijon, and advanced as far as Avignon (500), but had to retire without being able to retain any of his conquests. Immediately after his departure Gundobald slew Godegesil at Vienne, and seized the whole of the Burgundian kingdom. Clovis was more fortunate in his war against the Visigoths. Having completed the subjugation of the Alemanni in 506, he marched against the Visigothic king Alaric II. in the following year, in spite of the efforts of Theodoric, king of the Ostrogoths, to prevent the war. After a decisive victory at Vouille near Poitiers, in which Clovis slew Alaric with his own hand, the whole of the kingdom of the Visigoths as far as the Pyrenees was added to the Frankish empire, with the exception of Septimania, which, together with Spain, remained in possession of Alaric’s grandson Amalaric, and Provence,

which was seized by Theodoric and annexed to Italy. In 508 Clovis received at Tours the insignia of the consulship from the eastern emperor, Anastasius, but the title was purely honorific. The last years of his life Clovis spent in Paris, which he made the capital of his kingdom, and where he built the church of the Holy Apostles, known later as the church of St Genevieve. By murdering the petty Frankish

1 The story is as follows. The vase had been taken from a church by a Frankish soldier after the battle of Soissons, and the bishop had requested Clovis that it might be restored. But the soldier who had taken it refused to give it up, and broke it into fragments with his francisca, or battle-axe. Some time afterwards, when Clovis was reviewing his troops, he singled out the soldier who had broken the vase, upbraided him for the neglect of his arms, and dashed his francisca to the ground. As the man stooped to pick it up, the king clove his skull with the words: ” Thus didst thou serve the vase of Soissons.”

kings who reigned at Cambrai, Cologne and other residences, he became sole king of all the Frankish tribes. He died in 511.

Clovis was the true founder of the Frankish monarchy. He reigned over the Salian Franks by hereditary right; over the other Frankish tribes by reason of his kinship with their kings and by the choice of the warriors, who raised him on the shield ; and he governed the Gallo-Romans by right of conquest. He had the Salic law drawn up, doubtless between the years 486 and 507; and seems to have been represented in the cities by a new functionary, the graf, comes, or count. He owed his success in great measure to his alliance with the church. He took the property of the church under his protection, and in 511 convoked a council at Orleans, the canons of which have come down to us. But while protecting the church, he maintained his authority over it. He intervened in the nomination of bishops, and at the council of Orleans it was decided that no one, save a son of a priest, could be ordained clerk without the king’s order or the permission of the count.

The chief source for the life of Clovis is the Historia Francorum (bk. ii.) of Gregory of Tours, but it must be used with caution. Among modern works, see W. Junghans, Die Geschichte der frdnki- schen Kbnige Childerich und Clodovech (Gottingen, 1857); F. Dahn,

Urgeschichte der germanischen und romanischen Volker, vol. iii. (Berlin, 1883); WT Schultze, Deutsche Geschichte v. d. Urzeit bis zu den Karolingern, vol. ii. (Stuttgart, 1896); G. Kurth, Clovis (2nd ed., Paris, 1901). (C. Pf.)

CLOWN (derived by Fuller, in his Worthies, from Lat. colonus, a husbandman; but apparently connected with ” clod ” and with similar forms in Teutonic and Scandinavian languages), a rustic, boorish person; the comic character in English panto- mime, always dressed in baggy costume, with face whitened and eccentrically painted, and a tufted wig. The character probably descends from representations of the devil in medieval miracle-plays, developed partly through the stage rustics and partly through the fools or jesters (also called clowns) of the Elizabethan drama. The whitened face and baggy costume indicate a connexion also with the continental Pierrot. The prominence of the clown in pantomime (q.v.) is a comparatively modern development as compared with that of Harlequin.

CLOYNE, a small market town of Co. Cork, Ireland, in the east parliamentary division, 15 m. E. S. E. of the city of Cork. Pop. (1001) 827. It gives its name to a Roman Catholic diocese, the cathedral of which is at Queenstown. Cloyne was the seat of a Protestant diocese until 1835, when it was united to that of Cork. It was originally a foundation of the 6th century. The cathedral church, dedicated to its founder St Colman, a disciple of St Finbar of Cork, is a plain cruciform building mainly of the 14th century, with an earlier oratory in the churchyard. It contains a few handsome monuments to its former bishops, but until 1890, when a monument was erected, had nothing to preserve the memory of the illustrious Dr George Berkeley, who held the see from 1734 to 1753. Opposite the cathedral is a very fine round tower 100 ft. in height, though the conical roof has long been destroyed. The Roman Catholic church is a spacious building of the early 19th century. The town was several times plundered by the Danes in the 9th century; it was laid waste by Dermot O’Brien in 1071, and was burned in 1 137. In 1430 the bishopric was united to that of Cork; in 1638 it again became independent, and in 1660 it was again united to Cork and Ross. In 1678 it was once more declared independent, and so continued till 1835. The name, Cluain- Uamha, signifies ” the meadow of the cave,” from the curious limestone caves in the vicinity. The Pipe Roll of Cloyne, compiled by Bishop Swaffham in 1364, is a remarkable record embracing a full account of the feudal tenures of the see, the nature of the impositions, and the duties the puri homines Sancti Colmani were bound to perform at a very early period. The roll is preserved in the record office, Dublin. It was edited by Richard Caulfield in 1859.

CLUB (connected with ” clump “),(i) a thick stick, used as a weapon, or heavy implement for athletic exercises (” Indian club,” &c); (2) one of the four suits of playing-cards, — the translation of the Spanish basto — represented by a black trefoil

(taken from the French, in which language it is trhfle); (3) a term given to a particular form of association of persons. It is to this third sense that this article is devoted.

By the term ” club,” the most general word for which is in Gr. ercupia, in Lat. sodalitas, is here meant an association within the state of persons not united together by any natural ties of kinship, real or supposed. Modern clubs are dealt with below, and we begin with an account of Greek and Roman clubs. Such clubs are found in all ancient states of which we have any detailed knowledge, and seem to have dated in one form or another from a very early period. It is not unreasonable to suppose, in the absense of certain information, that the rigid system of groups of kin, i.e. family, gens, phratria, &c, affording no principle of association beyond the maintenance of society as it then existed, may itself have suggested the formation of groups of a more elastic and expansive nature; in other words, that clubs were an expedient for the deliverance of society from a too rigid and conservative principle of crystallization.

Greek.— The most comprehensive statement we possess as to the various kinds of clubs which might exist in a single Greek state is contained in a law of Solon quoted incidentally in the Digest of Justinian (47-22), which guaranteed the administrative independence of these associations provided they kept within the bounds of the law. Those mentioned (apart from demes and phratries, which were not clubs as here understood) are associations for religious purposes, for burial, for trade, for, privateering (eve \eiav), and for the enjoyment of common meals. Of these by far the most important are the religious clubs, about which we have a great deal of information, chiefly from inscriptions; and these may be taken as covering those for burial purposes and for common meals, for there can be no doubt that all such unions had originally a religious object of some kind. But we have to add to Solon’s list the political ercupiai which we meet with in Athenian history, which do not seem to have always had a religious object, whatever their origin may have been; and it may be convenient to clear the ground by considering these first.

In the period between the Persian and Peloponnesian wars we hear of hetairies within the two political parties, oligarchic and democratic; Themistocles is said (Plut. Aristides, 2) to have belonged to one,

Pericles' supporters seem to have been thus organized (Plut. Per. 7 and 13), and Cimon had a hundred hetairoi devoted to him (Plut. Cim. 17). These associations were used, like the collegia sodalicia at Rofaie (see below), for securing certain results at elections and in the law-courts (Thuc. viii. 54), and were not regarded as harmful or illegal. But the bitterness of party struggles in Greece during the Peloponnesian War changed them in many states into political engines dangerous to the constitution, and especially to democratic institutions; Aristotle mentions (Politics, p. 13 10 a) a secret oath taken by the members of oligarchic clubs, containing the promise, " I will be an enemy to the people, and will devise all the harm I can against them." At Athens in 413 B.C. the conspiracy against the democracy was engineered by means of these clubs, which existed not only there but in the other cities of the empire (Thuc. viii. 48 and 54), and had now become secret conspiracies ((rvvufioo-Lcu) of a wholly unconstitutional kind. On this subject see Grote, Hist, of Greece, v. 360; A. H. J. Greenidge, Handbook of Greek Constitutional History, 208 foil.

Passing over the clubs for trade or plunder mentioned in Solon's law, of which we have no detailed knowledge, we come to the religious associations. These were known by several names, especially thiasi, eranoi and or geones, and it is not possible to distinguish these from each other in historical times, though they may have had different origins. They had the common object of sacrifice to a particular deity; the thiasi and or geones seem to be connected more especially with foreign deities whose rites were of an orgiastic character. The organization of these societies is the subject of an excellent treatise by Paul Foucart (Les Associations religieuses chez les Grecs, Paris, 1873), still indispensable, from which the following particulars are chiefly drawn. For the greater part of them the evidence consists of

inscriptions from various parts of Greece, many of which were published for the first time by Foucart, and will be found at the end of his book.

The first striking point is that the object of all these associa- tions is to maintain the worship of some foreign deity, i.e. of some deity who was not one of those admitted and guaranteed by the state — the divine inhabitants of the city, as they may be called. For all these the state made provision of priests, temples, sacrifices, &c; but for all

others these necessaries had to be looked after by private individuals associated for the purpose. The state, as we see from the law of Solon quoted above, made no difficulty about the introduction of foreign worships, provided they did not infringe the law and were not morally unwholesome, and regarded these associations as having all the rights of legal corporations. So we find the cult of deities such as Sabazius, Mater Magna (see Great Mother of the Gods) and Attis, Adonis, Isis, Serapis, Men Tyrannos, carried on in Greek states, and especially in seaports like the Peiraeus, Rhodes, Smyrna, without protest, but almost certainly without moral benefit to the worshippers. The famous passage in Demosthenes (de Corona, sect. 259 foil.) shows, however, that the initiation at an early age in the rites of Sabazius did not gain credit for Aeschines in the eyes of the best men. We are not surprised to find that, in accordance with the foreign character of the cults thus main- tained, the members of the associations are rarely citizens by birth, but women, freedmen, foreigners and even slaves. Thus in an inscription found by Sir C. Newton at Cnidus, which contains a mutilated list of members of a thiasos. one only out of twelve appears to be a Cnidian citizen, four are slaves, seven are probably foreigners. Hence we may conclude that these associations were of importance, whether for good or for evil, in organizing and encouraging the foreign population in the cities of Greece.

The next striking fact is that these associations were organized, as we shall also find them at Rome, in imitation of the con- stitution of the city itself. Each had its law, its assembly, its magistrates or officers (i.e. secretary, treasurer) as well as priests or priestesses, and its finance. The law regulated the conditions of admission, which involved an entrance fee and an examination (SoiafiaaLa) as to character; the contributions, which had to be paid by the month, and the steps to be taken to enforce payment, e.g. exclusion in case of persistent neglect of this duty; the use to be made of the revenues, such as the building or maintenance of temple or club-house, and the cost of crowns or other honours voted by the assembly to its officers. This assembly, in accordance with the law, elected its officers once a year, and these, like those of the state itself, took an oath on entering office, and gave an account of their stewardship at the end of the year. Further details on these points of internal government will be found in Foucart's work (pp. 20 foil.), chiefly derived from inscriptions of the orgeones engaged in the cult of the Mother of the Gods at the Peiraeus. The important question whether these religious associations were in any sense benefit clubs, or relieved the sick and needy, is answered by him emphatically in the negative.

As might naturally be supposed, the religious clubs increased rather

than diminished in number and importance in the later periods of Greek history, and a large proportion of the inscrip- tions relating to them belong to the Macedonian and Roman empires. One of the most interesting, found in 1868, belongs to the 2nd century a.d., viz. that which reveals the worship of Men Tyrannos at Laurium (Foucart, pp. 119 foil.). This Phrygian deity was introduced into Attica by a Lycian slave, employed by a Roman in working the mines at Laurium. He founded the cult and the eranos which was to maintain it, and seems also to have drawn up the law regulating its ritual and government. This may help us to understand the way in which similar associations of an earlier age were instituted.

Roman. — At Rome the principle of private association was recognized very early by the state; sodalitates for religious purposes are mentioned in the XII. Tables (Gaius in Digest, 47. 22. 4), and collegia opificum, or trade gilds, were believed

to have been instituted by Numa, which probably means that they were regulated by the jus divinum as being associated with particular worships. It is difficult to distinguish between the two words collegium and sodalitas; but collegium is the wider of the two in meaning, and may be used for associations of all kinds, public and private, while sodalitas is more especially a union for the purpose of maintaining a cult. Both words indicate the permanence of the object undertaken by the associa- tion, while a societas is a temporary combination without strictly permanent duties. With the societates publicanorum and other contracting bodies of which money-making was the main object, we are not here concerned.

The collegia opificum ascribed to Numa (Plut. Numa, 17) include gilds of weavers, fullers, dyers, shoemakers, doctors, teachers, painters, &c, as we learn from Ovid, Fasti, iii. 819 foil., where they are described as associated with the cult of Minerva, the deity of handiwork; Plutarch also mentions flute-players, who were connected with the cult of Jupiter on the Capitol, and smiths, goldsmiths, tanners, &c. It would seem that, though these gilds may not have had a religious origin as some have thought, they were from the beginning, like all early institutions, associated with some cult; and in most cases this was the cult of Minerva. In her temple on the Aventine almost all these collegia had at once their religious centre and their business headquarters. When during the Second Punic War a gild of poets was instituted, this too had its meeting-place in the same temple. The object of the gild in each case was no doubt to protect and advance the interests of the trade, but on this point we have no sufficient evidence, and can only follow the analogy of similar institutions in

other countries and ages. We lose sight of them almost entirely until the age of Cicero, when they reappear in the form of political clubs {collegia sodalicia or compitalicia) chiefly with the object of securing the election of candidates for magistracies by fair or foul means — usually the latter (see esp. Cic. pro Plancio, passim). These were suppressed by a senatusconsultum in 64 B.C., revived by Clodius six years later, and finally abolished by Julius Caesar, as dangerous to public order. Probably the old trade gilds had been swamped in the vast and growing population of the city, and these, inferior and degraded both in personnel and objects, had taken their place. But the principle of the trade gild reasserts itself under the Empire, and is found at work in Rome and in every municipal town, attested abundantly by the evidence of inscriptions. Though the right of permitting such associations belonged to the government alone, these trade gilds were recognized by the state as being instituted ” ut necessariam operam puhlicis utili- tatibus exhiberent ” (Digest, 50. 6. 6). Every kind of trade and business throughout the Empire seems to have had its collegium, as is shown by the inscriptions in the Corpus from any Roman municipal town; and the life and work of the lower orders of the municipales are shadowed forth in these interesting survivals. The primary object was no doubt still to protect the trade; but as time went on they tended to become associations for feasting and enjoyment, and more and more to depend on the munificence of patrons elected with the object of eliciting it. Fuller information about them will be found in G. Boissier, La Religion romaine d’Auguste aux Antonins, ii. 286 foil., and S. Dill, Roman Society from Nero to Marcus Aurelius, pp. 264 foil. How far they formed a basis or example for the gilds of the early middle ages is a difficult question which cannot be answered here (see Gilds); it is, however, probable that they gradually lost their original business character, and became more and more associations for procuring the individual, lost as he was in the vast desert of the empire, some little society and enjoyment in life, and the certainty of funeral rites and a permanent memorial after death.

We may now return to the associations formed for the main- tenance of cults, which were usually called sodalitates, though the word collegium was also used for them, as in the case of the college of the Arval Brothers (q.v.). Of the ancient Sodales Titii nothing is known until they were revived by Augustus; but it seems probable that when a gens or family charged with

the maintenance of a particular cult had died out, its place was supplied by a sodalitas (Marquardt, Staatsverwaltung, iii. 134). The introduction of new cults also led to the institution of new associations; thus in 495 B.C. when the worship of Minerva was introduced, a collegium mercatorum was founded to maintain it, which held its feast on the dies natalis (dedication day) of the temple (Liv. ii. 27. 5); and in 387 the ludi Capitolini were placed under the care of a similar association of dwellers on the Capitoline hill. In 204 B.C. when the Mater Magna was intro- duced from Pessinus (see Grf.at Mother of the Gods) a sodalitas (or sodalitales) was instituted which, as Cicero tells us (de Senect. 13. 45) used to feast together during the ludi Megalenses. All such associations were duly licensed by the state, which at all times was vigilant in forbidding the main- tenance of any which it deemed dangerous for religious or political reasons; thus in 186 B.C. the senate, by a decree of which part is preserved (C.I.L. i. 43), made all combination for promoting the Bacchic religious rites strictly illegal. But legalized sodali- tales are frequent later; the temple of Venus Genetrix, begun by Julius and finished by Augustus, had its collegium (Pliny, N.H. ii. 93), and sodalitates were instituted for the cult of the deified emperors Augustus, Claudius, &c.

We thus arrive by a second channel at the collegia of the empire. Both the history of the trade gilds and that of the religious collegia or sodalitates conduct us by a course of natural development to that extraordinary system of private association with which the empire was honeycombed.

As has been already said of the trade gilds, the main objects of association seem to have been to make life more enjoyable and to secure a permanent burial-place; and of these the latter was probably the primary or original one. It was a natural instinct in the classical as in the pre-classical world to wish to rest securely after death, to escape neglect and oblivion. This is not the place to explain the difficulties which the poorer classes in the Roman empire had to face in satisfying this instinct; but since the publication of the Corpus Inscriptionum has made us familiar with the conditions of the life of these classes, there can be no doubt that this was always a leading motive in their passion for association. In the year a.d. 133 under Hadrian this instinct was recognized by law, i.e. by a senatusconsultum which has fortunately come down to us. It was engraved at the head of their own regulations by a collegium instituted for the worship of Diana and Antinous at Lanuvium, and runs thus: ” Qui stipem menstruam conferre volent in funera, in id collegium coeant, neque sub specie ejus collegii nisi semel in mense coeant conferendtˆcausa unde defuncti sepeliantur ” (C.I.L. xiv. 21

12). From the Digest, 47. 22. 1, the locus classicus on this subject, we learn that this was a general law allowing the founding of funerary associations, provided that the law against illicit collegia were complied with, and it was natural that from that time onwards such collegia should spring up in every direction. The inscription of Lanuvium, together with many others (for which see the works of Boissier and Dill already cited), has given us a clear idea of the constitution of these colleges. Their members were as a rule of the humblest classes of society, and often included slaves; from each was due an entrance fee and a monthly subscription, and a funeral grant was made to the heir of each member at his death in order to bury him in the burying-place of the college, or if they were too poor to construct one of their own, to secure burial in a public columbarium. The instinct of the Roman for organization is well illustrated in the government of these colleges. They were organized on exactly the same lines as the municipal towns of the empire; their officers were elected, usually for a year, or in the case of honorary distinctions, for life; as in a municipal town, they were called quinquennales, curalores, praefecti, &c, and quaestors superintended the finances of the association. Their place of meeting, if they were rich enough to have one, was called schola and answered the purpose of a club-house; the site or the building was often given them by some rich patron, who was pleased to see his name engraved over its doorway. Here we come upon one of those defects in the society of the empire which seem

gradually to have sapped the virility of the population — the desire to get others to do for you what you are unwilling or unable to do for yourself. The patroni increased in number, and more and more the colleges acquired the habit of depending on their benefactions, while at the same time it would seem that the primary object of burial became subordinate to the claims of the common weal. It may also be asserted with confidence, as of the Greek clubs, that these collegia rarely or never did the work of our benefit clubs, by assisting sick or infirm members; such objects at any rate do not appear in the inscriptions. The only exceptions seem to be the military collegia, which, though strictly forbidden as dangerous to discipline, continued to increase in number in spite of the law. The great legionary camps of the Roman province of Africa (Cagnat, L'Armle romaine, 457 foil.) have left us inscriptions which show not only the existence of these clubs, but the way in which their funds were spent; and it appears that they were applied to useful purposes in the life of a member as well as for his burial, e.g. to travelling expenses, or to his support after his discharge (see especially C.I.L. viii. 2552 foil.).

As the Roman empire became gradually impoverished and depopulated, and as the difficulty of defending its frontiers increased, these associations must have been slowly extinguished, and the living and the dead citizen alike ceased to be the object of care and contribution. The sudden invasion of Dacia by barbarians in a.d. 166 was followed by the extinction of one collegium which has left a record of the fact, and probably by many others. The master of the college of Jupiter Cernenius, with the two quaestors and seven witnesses, attest the fact that the college has ceased to exist. ” The accounts have been wound up, and no balance is left in the chest. For a long time no member has attended on the days fixed for meetings, and no subscriptions have been paid ” (Dill, op. cit. p. 285). The record of similar extinctions in the centuries that followed, were they extant, would show us how this interesting form of crystallization, in which the well-drilled people of the empire displayed an unusual spontaneity, gradually melted away and disappeared (see further Gilds and Charity and Charities).

Besides the works already cited may be mentioned Mommsen, ‘de Collegiis et Sodaliciis (18ˆ.3), which laid the foundation of all subsequent study of the subject; Marquardt, Staatsverwaltung, iii. 134 foil.; de Marchi, // Culto privato di Roma antica, ii. 75 foil.; Kornemann, s. v. ” Collegium ” in Pauly-Wissowa, Realencyclopddie.

(W. W. F.*)

Modern Clubs. — The word ” club,” in its modern sense of an association to promote good-fellowship and social intercourse, is not very old, only becoming common in England at the time of The Taller and The Spectator (1709-1712). It is doubtful whether its use originated in its meaning of a knot of people, or from the fact that the members ” clubbed ” together to pay the expenses of their meetings. The oldest English clubs were merely informal periodic gatherings of friends for the purpose of dining or drinking together. Thomas Occleve (temp. Henry IV.) mentions such a club called La Court de Bone Compaignie, of which he was a member. John Aubrey (writing in 1659) says: ” We now use the word clubbe for a sodality in a tavern.” Of these early clubs the most famous was the Bread Street or Friday Street Club, originated by Sir Walter Raleigh, and meeting at the Mermaid Tavern. Shakespeare, Beaumont, Fletcher, Selden and Donne were among the members. Another such club was that which met at the Devil Tavern near Temple Bar; and of this Ben Jonson is supposed to have been the founder.

With the introduction of coffee-drinking in the middle of the 17th

century, clubs entered on a more permanent phase. The coffee-houses of the later Stuart period are the real originals of the modern club-house. The clubs of the late 17 th and early 1 8th century type resembled their Tudor forerunners in being oftenest associations solely for conviviality or literary coteries. But many were confessedly political, e.g. The Rota, or Coffee Club (1659), a debating society for the spread of republican ideas, broken up at the Restoration, the Calves Head Club (c. 1693) and the Green Ribbon Club (1675) (

the members, each man's liability ending for the time being when he had paid his " score " after the meal; (2) no permanent club-house, though each clique tended to make some special coffee-house or tavern their headquarters. These coffee-house clubs soon became hotbeds of political scandal-mongering and intriguing, and in 1675 Charles II. issued a proclamation which ran, " His Majesty hath thought fit and necessary that coffee houses be (for the future) put down and suppressed," owing to the fact " that in such houses divers false, malitious and scandal- ous reports are devised and spread abroad to the Defamation of his Majesty's Government and to the Disturbance of Peace and Quiet of the Realm." So unpopular was this proclamation that it was almost instantly found necessary to withdraw it, and by Anne's reign the coffee-house club was a feature of England's social life.

From the 18th-century clubs two types have been evolved.

(1) The social and dining clubs, permanent institutions with fixed club-house. The London coffee-house clubs in increasing their members absorbed the whole accommodation of the coffee- house or tavern where they held their meetings, and this became the club-house, often retaining the name of the original keeper, e.g. White's, Brooks's, Arthur's, Boodle's. The modern club, sometimes proprietary, i.e. owned by an individual or private syndicate, but more frequently owned by the members who delegate to a committee the management of its affairs, first reached its highest development in London, where the district of St James's has long been known as " Clubland "; but the institution has spread all over the English-speaking world.

(2) Those clubs which have but occasional or periodic meetings and often possess no club-house, but exist primarily for some specific object. Such are the many purely athletic, sports and pastimes clubs,

the Jockey Club, the Alpine, chess, yacht and motor clubs. Then there are literary clubs, musical and art clubs, publishing clubs; and the name of ” club ” has been annexed by a large group of associations which fall between the club proper and mere friendly societies, of a purely periodic and temporary nature, such as slate, goose and Christmas clubs, which are not required to be registered under the Friendly Societies Act.

Thus it is seen that the modern club has little in common with its prototypes in the 18th century. Of those which survive in London the following may be mentioned: White’s, originally established in 1698 as White’s Chocolate House, became the headquarters of the Tory party, but is to-day no longer political. Brooks’s (1764), originally the resort of the Whigs, is no longer strictly associated with Liberalism. Boodle’s (1762) had a tradition of being the resort of country gentlemen, and especially of masters of foxhounds. Arthur’s (1 765), originally an offshoot of White’s, has always been purely social. The Cocoa Tree (1746) also survives as a social resort. Social clubs, without club-houses, are represented by the Literary Club (” The Club “), founded in 1764 by Sir Joshua Reynolds and Dr Johnson, and such recent institutions as the Johnson Club, Ye Sette of Odd Volumes (founded by Bernard Quasi tch) and many others.

The number of regularly established clubs in London is now upwards of a hundred. Of these the more important, with the dates of their establishment, are: Army and Navy (1837): Athenaeum (1824), founded by Sir Walter Scott and Thomas Moore ” for the association of individuals known for their scientific or literary attainments, artists of eminence in any class of the fine arts, and noblemen and gentlemen distinguished as liberal patrons of science, literature or the arts “; Bachelors’ (1881); Carlton (1832), the chief Conservative club; City Carlton (1868); Conservative (1840); Constitutional (1883); Devonshire (1875); East India United Service (1849); Garrick (183 1), “for the general patronage of the drama, for bringing together the supporters of the drama, and for the formation of a theatrical library with works on costume”; Guards (1813); Junior Athenaeum (1864); Junior Carlton (1864); Marlborough (1869); National Liberal (1882); Oriental (1824); Oxford and Cambridge (1830); Reform (1837), formerly the Liberal headquarters; Savage (1857); St James’s (1857), diplomatic;

Travellers’ (1819), for which a candidate must have ” travelled out of the British Islands to a distance of at least 500 m. from London in a direct line”; Turf (1868); Union (1822); United Service (1815); Wellington (1885); Windham (1828). Almost every interest, rank and

profession has its club. Thus there is a Press Club, a Fly-Fishers' Club, a Gun Club, an Authors', a Farmers', a Lawyers' (the Eldon) and a Bath Club. Of the purely women's clubs the most important are the Alexandra (1884), the Empress (1897), Lyceum (1904) and Ladies' Army & Navy (1904); while the Albemarle and the Sesame have a leading place among clubs for men and women. Of political clubs having no club-house, the best known are the Cobden (Free Trade, 1866) ; the Eighty (Liberal, 1880) and the United (Unionist, 1886). There are clubs in all important provincial towns, and at Edinburgh the New Club (1787), and in Dublin the Kildare Street (1790), rival those of London.

The mode of election of members varies. In some clubs the committee alone have the power of choosing new members. In others the election is by ballot of the whole club, one black ball in ten ordinarily excluding. In the Athenaeum, whilst the principle of election by ballot of the whole club obtains, the duty is also cast upon the committee of annually selecting nine members who are to be " of distinguished eminence in science, literature or the arts, or for public services," and the rule makes stringent provision for the conduct of these elections. On the committee of the same club is likewise conferred power to elect without ballot princes of the blood royal, cabinet ministers, bishops, the speaker of the House of Commons, judges, &c.

The affairs of clubs are managed by committees constituted of the trustees, who are usually permanent members, and of ordinarily twenty-four other members, chosen by the club at large, one-third of whom go out of office annually. These committees have plenary powers to deal with the affairs of the club committed to their charge, assembling weekly to transact current business and audit the accounts. Once a year a meeting of the whole club is held, before which a report is laid, and any action taken thereupon which may be necessary. (See J. Wertheimer, The Law relating to Clubs, 1903; and Sir E. Carson on Club law, in vol. iii. of The Laws of England, 1909.)

Previous to 1902 clubs in England had not come within the purview of the licensing system. The Licensing Act of 1902, however, remedied that defect, and although it was passed principally to check the abuse of " clubs " being formed solely to sell intoxicating liquors free from the restrictions of the licensing acts, it applied to all clubs in England and Wales, of whatever kind, from the humblest to the most exalted Pall Mall club. The act required the registration of every club which occupied any premises habitually used for the purposes of a club and in which intoxicating liquor was supplied to members or their guests. The secretary of every club was required to furnish to the clerk to the

justices of the petty sessional division a return giving (a) the name and objects of the club; (b) the address of the club; (c) the name of the secretary; (d) the number of members; (e) the rules of the club relating to (i.) the election of members and the admission of temporary and honorary members and of guests; (ii.) the terms of subscription and entrance fee, if any; (iii.) the cessation of membership; (iv.) the hours of opening and closing; and (v.) the mode of altering the rules. The same particulars must be furnished by a secretary before the opening of a new club. The act imposed heavy penalties for supplying and keeping liquor in an unregistered club. The act gave power to a court of summary jurisdiction to strike a club off the register on complaint in writing by any person on any of various grounds, e.g. if its members numbered less than twenty-five; if there was frequent drunkenness on the premises; if persons were habitually admitted as members without forty-eight hours' interval between nomination and admission; if the supply of liquor was not under the control of the members or the com- mittee, &c. The Licensing (Scotland) Act 1903 made Scottish clubs liable to registration in a similar manner.

In no other country did club-life attain such an early perfection

as in England. The earliest clubs on the European continent were of a political nature. These in 1848 were repressed in Austria and Germany, and the modern clubs of Berlin and Vienna are mere replicas of their English prototypes. In France, where the term cercle is most usual, the first was Le Club Politique (1782), and during the Revolution such associations proved important political forces (see Jacobins, Feuillants, Corde- liers). Of the modern purely social clubs in Paris the most notable are The Jockey Club (1833) and the Cercle de la Rue Royale.

In the United States clubs were first established after the War of Independence. One of the first in date was the Hoboken Turtle Club (1797), which still survives. Of the modern clubs in New York the Union (1836) is the earliest, and other important ones are the Century (1847), Union League (1863), University (1865), Knickerbocker (1 8 7 1) , Lotus (1 8 70) , Manhattan (1 86 5) ,and Metropolitan (1891). But club-life in American cities has grown to enormous proportions; the number of excellent clubs is now legion, and their hospitality has become proverbial. The chief clubs in each city are referred to in the

topographical articles.

Walter Arnold, Life and Death of the Sublime Society of Beefsteaks (1871) ; John Aubrey, Letters of Eminent Persons (2 vols.) ; C. Marsh, Clubs of London, with Anecdotes of their Members, Sketches of Character and Conversation (2 vols., 1832); Notes and Queries, 3rd series, vols. I, 9, 10; W. H. Pyne, Wine and Walnuts (2 vols., 1823); Admiral Smyth, Sketch of the Use and Progress of the Royal Society Club (i860); John Timbs, Club Life of London, with Anecdotes of Clubs, Coffee-Houses and Taverns [2 vols., 1866), and History of Clubs and Club Life (1872); Th. Walker, The Original, fifth edition, by W. A. Guy (1875) ; The Secret History of Clubs of all Descriptions by Ned Ward (1709); Complete and Humourous Account of all the Remarkable Clubs and Societies in the Cities of London and Westminster, by Ned Ward (7th edition, 1756); The London Clubs; their Anec- dotes, History, Private Rules and Regulations (i2mo, 1853) ; Rev. A. Hume, Learned Societies and Printing Clubs (1847); J. Strang, Glasgow and its Clubs (1857); A. F. Leach, Club Cases (1879); Col. G. J. Ivey, Clubs of the World (1880); J. Wertheimer, Law relating to Clubs (1885); L. Fagan, The Reform Club (1887); F. G. Waugh, Members of the Athenaeum Club (privately printed 1888).

CLUB-FOOT {talipes), the name given to deformities of the foot, some of which are congenital, others acquired — the latter being chiefly due to infantile paralysis. Talipes equinus is that form in which the heel does not touch the ground, the child resting on the toes. In talipes varus the foot is turned inwards and shortened, the inner edge of the foot is raised, and the child walks on the outer edge. These two conditions are often combined, the heel being drawn up and the foot twisted inward; the name given to the twofold deformity is talipes equino-varus. It is the most usual congenital form. In talipes calcaneus the toes are pointed upwards and the foot rests on the heel. This is always an acquired (paralytic) deformity.

The treatment of congenital club-foot, which is almost in- variably varus or equino-varus, should be begun as soon as ever the abnormal condition of the foot is recognized. The nurse should be shown how to twist and coax the foot into the improved position, and should so hold it in her hand many times a day. And thus by daily, or, one might almost say, hourly manipula- tions, much good may be accomplished without distress to the infant. If after weeks or months of these measures insufficient progress has been made, the subcutaneous division of a tendon or two, or of some tendons and ligaments may be necessary, the foot being subsequently fixed up in the improved position in plaster of Paris. If these subcutaneous operations also

prove disappointing, or if after their apparently successful employment the foot constantly relapses into the old position, a more radical procedure will be required. Of the many procedures which have been adopted there is, probably, none equal to that of free transverse incision introduced by the late Dr A. M. Phelps of New York. By this ” open method ” the surgeon sees exactly what structures are at fault and in need of division — skin, fasciae tendons, ligaments; everything, in short, which pre- vented the easy rectification of the deformity. After the opera- tion, the foot is fixed, without any strain, in an over-corrected position, between plaster of Paris splints. By the adoption of this method the old instrument of torture known as ” Scarpa’s

shoe ” has become obsolete, as have also some of those operations which effected improvement of the foot by the removal of portions of the bony arch. Phelps’s operation removes the deformity by increasing the length of the concave border of the foot rather than by shortening the convex borders as in cuneiform osteotomy; it is a levelling up, not a levelling down.

Talipes valgus is very rare as a congenital defect, but is common enough as a result of infantile paralysis and as such is apt to be combined with the calcanean variety. ” Flat-foot ” is some- times spoken of as spurious talipes valgus; it is due to the bony arches of the foot being called upon to support a weight beyond their power. The giving way of the arches may be due to weakness of the muscles, tendons or ligaments — probably of all three. It is often met with in feeble and nabby children, and in nurses, waiters, policemen and others whose feet grow tired from much standing. Exercises on tip-toe, especially with a skipping rope, massage, rest and tonic treatment will give relief, and shoes or boots may be supplied with the heel and sole thickened along the inner borders so that the weight may be received along the strong outer border of the foot. When the flat-footed individual stands it should be upon the outer borders of his feet, or better still, when convenient, on tip-toe, as this posture strengthens those muscles of the leg which run into the sole of the foot and hold up the bony arches. In certain extreme cases the surgeon wrenches the splay feet into an inverted position and fixes them in plaster of Paris, taking off the casing every day for the purpose of massage and exercises.

Flat-foot is often associated with knock-knee in children and young adults who are the subject of rickets.

Morton’s Disease. — In some cases of flat-foot the life of the individual

is made miserable by neuralgia at the root of the toes, which comes on after much standing or walking, the distress being so great that, almost regardless of propriety, he is com- pelled to take off his boot. The condition is known as Morton's disease or metatarsalgia. The pain is due to the nerves of the toes (which come from the sole of the foot) being pressed upon by the rounded ends of the long bones of the foot near the web of the toes. It does not generally yield to palliative measures (though rest of the foot and a change to broad-toed, easy boots may be helpful), and the only effectual remedy is resection of the head of one of the metatarsal bones, after which relief is complete and permanent.

For paralytic club-foot, in which distressing corns have been developed over the unnatural prominences upon which the sufferer has been accustomed to walk, the adoption of the most promising conservative measures are usually disappointing, and relief and happiness may be obtainable only after the performance of Syme's amputation through the ankle-joint.

CLUE, or Clew (O. Eng. cluwe), originally a ball of thread or wool, the thread of life, which, according to the fable, the Fates spin for every man. The ordinary figurative meaning, a piece of evidence leading to discovery, or a sign pointing to the right track, is derived from the story of Theseus, who was guided through the labyrinth by the ball of thread held by Ariadne.

CLUENTIUS HABITUS, AULUS, of Larinum in Samnium, the hero of a Roman cause celebre. In 74 B.C. he accused his step- father Statius Albius Oppianicus of an attempt to poison him; had it been successful, the property of Cluentius would have fallen to his mother Sassia. Oppianicus and two others were condemned, and some years later Oppianicus died in exile. But the verdict was looked upon with suspicion, and it was known for a fact that one of the jurymen had received a large sum of money for distribution amongst his colleagues. The result was the degradation of Cluentius himself and several of the jurymen. In 66, Sassia induced her stepson Oppianicus to charge Cluentius with having caused the elder Oppianicus to be poisoned while in exile. On this occasion the defence was undertaken by Cicero in the extant speech Pro Cluentio. In the end Cluentius was acquitted. Cicero afterwards boasted openly that he had thrown dust in the eyes of the jury (Quintilian, Instit. ii. 17. 21, who quotes this speech more than any other). His efforts are chiefly devoted to proving that the condemnation

of the elder Oppianicus was just and in no way the result of the jury having been bribed by Cluentius; only a small portion of the end of the speech deals with the specific charge. It was generally believed that the verdict in the former trial was an unfair one; and this opinion was most prejudicial to Cluentius. But even if it could be shown that Cluentius had bribed the jury- men, this did not prove that he had poisoned Oppianicus, although it supplied a sufficient reason for wishing to get him out of the way. The speech delivered by Cicero on this occasion is considered one' of his best.

Editions of the speech by W. Y. Fausset (1887), W. Ramsay (1883) ; see also H. Nettleship, Lectures and Essays (1885).

CLUMP, a word common to Teutonic languages, meaning a mass, lump, group or cluster of indefinite form, as a clump of grass or trees. The word is used of a wooden and clumsy shoe, made out of one piece of wood, worn by German peasants, and by transference is applied to the thick extra sole added to heavy boots for rough wear. Shoemakers speak of " clumping " a boot when it is mended by having a new sole fastened by nails and not sewn by hand to the old sole.

CLUNES, a borough of Talbot county, Victoria, Australia, 97j m. by rail N.W. of Melbourne. Pop. (iqoi) 2426. It is the centre of an agricultural, pastoral and mining district, in which gold was first discovered in 185 1. It lies in a healthy and picturesque situation at an elevation of 1081 ft. An annual agricultural exhibition and large weekly cattle sales are held in the town.

CLUNY, or Clugny, a town of east central France, in the department of Saone-et-Loire, on the left bank of the Grosne, 14 m. N.W. of Macon by road. Pop. (1906) 3105. The interest of the town lies in its specimens of medieval architecture, which include, besides its celebrated abbey, the Gothic church of Notre-Dame, the church of St Marcel with its beautiful Roman- esque spire, portions of the ancient fortifications, and a number of picturesque houses belonging to the Romanesque, Gothic and Renaissance periods. The chief remains of the abbey (see Abbey) are the ruins of the basilica of St Peter and the abbot's palace. The church was a Romanesque building, completed early in the 12th century, and until the erection of St Peter at Rome was the largest ecclesiastical building in Europe. It was in great part demolished under the First Empire, but the south transept, a high octagonal tower, the chapel of Bourbon (15th century), and the ruins of the apse still remain. In 1750 the abbey buildings were largely

rebuilt and now contain a technical school. Part of the site of the church is given up to the stabling of a government stud. The abbot's palace, which belongs to the end of the 15th century, serves as hotel-de-ville, library and museum. The town has quarries of limestone and building-stone, and manufactures pottery, leather and paper.

A mere village at the time when the abbey was founded (910), Cluny gradually increased in importance with the development of the religious fraternity, and in 1090 received a communal charter from the abbot St Hugh. In 147 1 the town was taken by the troops of Louis XL In 1529 the abbey was given " in commendam " to the family of Guise, four members of which held the office of abbot during the next hundred years. The town and abbey suffered during the Wars of Religion of the 16th century, and the abbey was closed in 1790. The residence erected in Paris at the end of the 15 th century by the abbots Jean de Bourbon and Jacques d'Amboise, and known as the Hotel de Cluny (see House, Plate L, fig. 6), is occupied by the du Sommerard collection; but the College de Cluny founded in 1269 by the abbot Yves de Vergy, as a theological school for the order, is no longer in existence.

The Order of Cluniac Benedictines. — The Monastery of Cluny was founded in 910 by William I. the Pious, count of Auvergne and duke of Guienne (Aquitaine). The first abbot was Berno, who had under his rule two monasteries in the neighbourhood. Before his death in 927 two or three more came under his control, so that he bequeathed to his successor the government of a little group of five or six houses, which became the nucleus of the order of Cluny. Berno's successor was Odo: armed with

papal privileges he set to work to make Cluny the centre of a revival and reform among the monasteries of France; he also journeyed to Italy, and induced some of the great Benedictine houses, and among them St Benedict's own monasteries of Subiaco and Monte Cassino, to receive the reform and adopt the Cluny manner of life. The process of extension, partly by founding new houses, partly by incorporating old ones, went on under Odo's successors, so that by the middle of the 12th century Cluny had become the centre and head of a great order embracing 314 monasteries — the number 2000, sometimes given, is an exaggeration — in all parts of Europe, in France, Italy, the Empire, Lorraine, Spain, England, Scotland, Poland, and even in the Holy Land. And the influence of Cluny extended far beyond the actual order: many monasteries besides Monte Cassino and Subiaco adopted its customs and manner of life without subjecting themselves to its sway; and of these, many in turn became the centres of reforms which

extended Cluny ideas and influences over still wider circles: Fleury and Hirsau may be mentioned as conspicuous examples. The gradual stages in the growth of the Cluny sphere of influence is exhibited in a map [VI. C.]in Heussi and Mulert's Handatlas zur Kirchen- geschichte, 1905.

When we turn to the inner life of Cluny, we find that the decrees of Aix-la-Chapelle, which summed up the Carolingian movement for reform (see Benedictines), were taken as the basis of the observance. Field work and manual labour were given up; and in compensation the tendency initiated by Benedict of Aniane, to prolong and multiply the church services far beyond the canonical office contemplated by St Benedict, was carried to still greater extremes, so that the services came to occupy nearly the whole day. The lessons at the night office became so lengthy that, e.g., the Book of Genesis was read through in a week; and the daily psalmody, between canonical office and extra devotions, exceeded a hundred psalms (see Edm. Bishop, Origin of the Primer, Early English Text Soc, Original Series, No. 109).

If its influence on the subsequent history of monastic and religious life and organization be considered, the most noteworthy feature of the Cluny system was its external polity, which con- stituted it a veritable " order " in the modern sense of the word, the first that had existed since that of Pachomius (see Mon- asticism). All the houses that belonged, either by foundation or incorporation, to the Cluny system were absolutely subject to Cluny and its abbot, who was " general " in the same sense as the general of the Jesuits or Dominicans, the practically absolute ruler of the whole system. The superiors of all the subject houses (usually priors, not abbots) were his nominees; every member of the order was professed by his permission, and had to pass some of the early years of his monastic life at Cluny itself; the abbot of Cluny had entire control over every one of the monks — some 10,000, it is said; it even came about that he had the practical appointment of his successor. For a description and criticism of the system, see F. A. Gasquet, Sketch of Monastic Constitutional History, pp. xxxii-xxxv (the Introduction to 2nd ed. (1895) of the English trans, of the Monks of the West) ; here it must suffice to say that it is the very antithesis of the Benedictine polity (see Benedictines).

The greatness of Cluny is really the greatness of its early abbots. If the short reign of the unworthy Pontius be excepted, Cluny was ruled during a period of about 250 years (910-1157) by a succession of seven great abbots, who combined those high qualities of character, ability and religion that were necessary for so commanding a position; they were Berno, Odo, Aymard, Majolus (Maieul), Odilo, Hugh, Peter

the Vener- able. Sprung from noble families of the neighbourhood; educated to the highest level of the culture of those times; endowed with conspicuous ability and prudence in the conduct of affairs; enjoying the consideration and confidence of popes and sovereigns; employed again and again as papal legates and imperial ambassadors; taking part in all great movements of ecclesiastical and temporal politics; refusing the first sees in Western Christendom, the cardinalate, and the papacy itself:

they ever remained true to their state as monks, without loss of piety or religion. Four of them, indeed, Odo, Maieul, Odilo and Hugh, are venerated as saints.

In the movement associated with the name of Hildebrand the influence of Cluny was thrown strongly on the side of religious and ecclesiastical reform, as in the suppression of simony and the enforcing of clerical celibacy; but in the struggle between the Papacy and the Empire the abbots of Cluny seem to have steered a middle course between Guelfs and Ghibellines, and to have exercised a moderating influence; St Hugh maintained relations with Henry IV. after his excommunication, and probably influenced him to go to Canossa. Hildebrand himself, though probably not a monk of Cluny, was a monk of a Cluniac monastery in Rome; his successor, Urban II., was actually a Cluny monk, as was Paschal II. It may safely be said that from the middle of the ioth century until the middle of the 1 2th, Cluny was the chief centre of religious influence throughout Western Europe, and the abbot of Cluny, next to the pope, the most important and powerful ecclesiastic in the Latin Church.

Everything at Cluny was on a scale worthy of so great a position. The basilica, begun 1089 and dedicated 1131, was, until the building of the present St Peter's, the largest church in Christendom, and was both in structure and ornamenta- tion of unparalleled magnificence. The monastic buildings were gigantic.

During the abbacy of Peter the Venerable (1122-1157) it became clear that, after a lapse of two centuries, a renewal of the framework of the life and a revival of its spirit had become necessary. Accordingly he summoned a great chapter of the whole order whereat the priors and representatives of the subject houses attended in such numbers that, along with the Cluny community, the assembly consisted of 1200

monks. This chapter drew up the 76 statutes associated with Peter's name, regulating the whole range of claustral life, and solemnly promulgated as binding on the whole Cluniac obedience. But these measures did not succeed in saving Cluny from a rapid decline that set in immediately after Peter's death. The monarchical status of the abbot was gradually curtailed by the holding of general chapter* at fixed periods and the appoint- ment of a board of defmitors, elected by the chapter, as a per- manent council for the abbot. ' Owing to these restrictions and still more to the fact that the later abbots were not of the same calibre as the early ones, their power and influence waned, until in 1528 (if not in 1456) the abbey fellinto " commendam." The rise of the Cistercians and the mendicant orders were contributory causes, and also the difficulties experienced in keeping houses in other countries subject to a French superior. And so the great system gradually became a mere congregation of French houses. Of the commendatory abbots the most remarkable were Cardinals Richelieu and Mazarin, who both initiated attempts to introduce reforms into the Cluny congrega- tion, the former trying to amalgamate it with the reformed congregation of St Maur, but without effect. Martene tells us that in the early years of the 18th century in the monastery of Baume, one of Berno's original group of Cluny houses— indeed the parent house of Cluny itself — no one was admitted as a monk who had not sixteen quarterings in his coat of arms. A reform movement took root in the Cluny congregation, and during the last century of its existence the monks were divided into two groups, the Reformed and the Unreformed, living according to different laws and rules, with different superiors, and sometimes independent, and even rival, general chapters. This most unhappy arrangement hopelessly impaired the vitality and work of the congregation, which was finally dissolved and suppressed in 1790, the church being deliberately destroyed.

Cluniac houses were introduced into England under the Conqueror. The first foundation was at Barnstaple; the second at Lewes by William de Warenne, in 1077, and it counted as one of the " Five Daughters of Cluny." In quick succession followed Thetford, Montacute, Wenlock, Bermondsey, and in Scotland, Paisley; a number of lesser foundations were made,

and offshoots from the English houses; so that the English Cluniac dependencies in the 13th century amounted to 40. It is said that in the reign of Edward III. they transmitted to Cluny annually the sum of £2000, equivalent to £60,000 of our money. Such a drain on the country was naturally looked on with disfavour, especially during the French wars; and so it came about that as " alien priories " they were

frequently sequestered by the crown. As the communities came to be composed more and more of English subjects, they tended to grow impatient of their subjection to a foreign house, and began to petition parliament to be naturalized and to become denizen. In 13 5 1 Lewes was actually naturalized, but a century later the prior of Lewes appears still as the abbot of Cluny's vicar in England. Though the bonds with Cluny seem to have been much relaxed if not wholly broken, the Cluniac houses continued as a separate group up to the dissolution, never taking part in the chapters of the English Benedictines. At the end theie were eight greater and nearly thirty lesser Cluniac houses: for list see Table in F. A. Gasquet's English Monastic Life; and Catholic Dictionary, art. " Cluny."

The history of Cluny up to the death of Peter the Venerable may be extracted out of Mabillon's Annates by means of the Index; the story is told in Helyot, Hist, des ordres rehgieux (1792), v. cc. 18, 19. Abridged accounts, with references to the most recent literature, may be found in Max Heimbucher, Orden und Kongregationen (1896), i. § 20; Herzog-Hauck, Realencyklopadie (ed. 3), art. " Cluni " (Grutzmacher) ; and Wetzer und Welte, Kirchenlexikon (ed. 2), art. " Clugny " (Hefele). The best modern monograph is by E. Sackur, Die Cluniacenser (1891-1894). In English a good account is given in Maitland, Dark Ages, §§ xviii.-xxvi. ; the Introduction to G. F. Duckett's Charters and Records of Cluni (1890) contains, besides general information, 'a description of the church and the buildings, and a list of the chief Cluniac houses in all countries. The story of the English houses is briefly sketched in the second chapter of F. A. Gasquet's Henry VIII. and the English Monasteries (the larger ed., 1886). ■ • ■ • (E. C. B.)

CLUSERET, GUSTAVE PAUL (1823-1900), French soldier and politician, was born at Paris. He was an officer in the garde mobile during the revolution of 1848. He took part in several expeditions in Algeria, joined Garibaldi's volunteers in i860, and in 1861 resigned his commission to take part in the Civil War in America. He served under Fremont and McClellan, and rose to the rank of general. Then, joining a band of Irish adventurers, he went secretly to Ireland, and participated in the Fenian insurrection (1866-67J. He escaped arrest on the collapse of the movement, but was condemned to death in his absence. On his return to France he proclaimed himself a Socialist, opposed militarism, and became a member of the Association internationaie des travailleurs, a cosmopolitan Socialist organization, known as the " Internationale." On the proclamation of the Third Republic in 187 1 he set to work to organize the social revolution, first at Lyons and afterwards at Marseilles. His energy, his oratorical

gifts, and his military experience gave him great influence among the working classes. On the news of the communist rising of the 18th of March 1871 he hastened to Paris, and on the 16th of April was elected a member of the commune. Disagreements with the other com- munist leaders led to his arrest on the 1st of May, on a false charge of betraying the cause. On the 24th of the same month the occupation of Paris by the Versailles troops restored him to liberty, and he succeeded in escaping from France. He did not return to the country till 1884. In 1888 and 1889 he was returned as a deputy to the chamber by Toulon. He died in 1900. Cluseret published his MSmoires (of the Commune) at Paris in 1887-1888.

CLUSIUM (mod. Chiusi, q.v.), an ancient town of Italy, one of the twelve cities of Etruria, situated on an isolated hill at the S. end of the valley of the Clanis (China). It was according to Roman tradition one of the oldest cities of Etruria and indeed of all Italy, and, if Camars (the original name of the town, according to Livy) is rightly connected with the Camertes Umbri, its foundation would go back to pre-Etruscan times. It first appears in Roman history at the end of the 7th century B.C., when it joined the other Etruscan towns against Tarquinius Priscus, and at the end ofcthe 6th century B.C. it placed itself,

under its king Lars Porsena, at the head of the attempt to re-establish the Tarquins in Rome. At the time of the invasion of the Gauls in 391 B.C., on the other hand, Clusium was on friendly terms with Rome; indeed, it was the action of the Roman envoys who had come to intercede for the people of Clusium with the Gauls, and then, contrary to international law, took part in the battle which followed, which determined the Gauls to march on Rome. Near Clusium too, according to Livy (according to Polybius ii. 19. 5, kv rfj Kaˆepricov xupo-, *•«■ in. Umbria near Camerinum), a battle occurred in 296 B.C. between the Gauls and Samnites combined, and the Romans; a little later the united forces of Clusium and Perusia were defeated by the Romans. The precise period at which Clusium came under Roman supremacy is, however, uncertain, though this must have happened before 225 B.C., when the Gauls advanced as far as Clusium. In 205 B.C. in the Second Punic War we hear that they promised ship timber and corn to Scipio. The Via Cassia, constructed after 187 B.C., passed just below the town. In the first civil war, Papirius Carbo took up his position here, and two battles occurred in the neighbourhood. Sulla appears to

have increased the number of colonists, and a statue was certainly erected in his honour here. In imperial times we hear little of it, though its grain and grapes were famous. Christianity found its way into Clusium as early as the 3rd century, and the tombstone of a bishop of a.d. 322 exists. In a.d. 540 it is named as a strong place to which Vitiges sent a garrison of a thousand men.

Of pre-Roman or Roman buildings in the town itself there are few remains, except for some fragments of the Etruscan town walls composed of rather small rectangular blocks of travertine, built into the medieval fortifications. Under it, however, extends an elaborate system of rock-cut passages, probably drains. The chief interest of the place lies in its extensive necropolis, which surrounds the city on all sides. The earliest tombs (lombe a pozzo, shaft tombs) are previous to the beginning of Greek importation. Of tombe a fosso there are none, and the next stage is marked by the so-called tombe a ziro, in which the cinerary urn (often with a human head) is placed in a large clay jar (ziro, Lat. dolium). These belong to the 7th century B.C., and are followed by the tombe a camera, in which the tomb is a chamber hewn in the rock, and which can be traced back to the beginning of the 6th century B.C. From one of the earliest of these Came the famous Francois vase; another is the tomb of Poggio Renzo, or della Scimmia (the monkey), with several chambers decorated with archaic paintings. The most remarkable group of tombs is, however, that of Poggio Gaiella, 3 m. to the N., where the hill is honey- combed with chambers in three storeys (now, however, much ruined and inaccessible), partly connected by a system of passages, and supported at the base by a stone wall which forms a circle and not a square — a fact which renders impossible its identification with the tomb of Porsena, the description of which Pliny ‘(Hist. Nat. xxxvi. 91) has copied from Varro. Other noteworthy tombs are those of the Granduca, with a single subterranean chamber carefully constructed in travertine, and containing eight sarcophagi of the same material; of Vigna Grande, very similar to this; of Colle Casuccini (the ancient stone door of which is still in working order), with two chambers, containing paintings representing funeral rites; of Poggio Moro and Valdacqua, in the former of which the paintingsarealmost destroyed, while the latter is now inaccessible.

A conception of the size of the whole necropolis may be gathered from the fact that nearly three thousand Etruscan inscriptions have come to light from Clusium and its district alone, while the part of Etruria north of it as far as the Arno has produced barely five hundred. Among the later tombs bilingual inscriptions are by no means rare, and both Etruscan and Latin inscriptions are often found in the same

cemeteries, showing that the use of the Etruscan language only died out gradually. A large number of the inscriptions are painted upon the tiles which closed the niches containing the cinerary urns. The urns themselves are small, often of terra-cotta,

originally painted, though the majority of them have lost their colour, and rectangular in shape. This style of burial seems peculiar to a district which E. Bormann (Corp. Inscr. Lat. xi., Berlin, 1887, p. 373) defines as a triangle formed by the Clanis (with the lakes of Chiusi and Montepulciano, both small, shallow and fever-breeding), on the E., the villages of Cetona, Sarteano, Castelluccio and Monticchiello on the W., and Montepulciano and Acquaviva on the N. In Roman times the territory of Clusium seems to have extended as far as Lake Trasimene. The local museum contains a valuable and important collection of objects from the necropolis, including some specially fine bucchero, sepulchral urns of travertine, alabaster and terra-cotta, painted vases, stone cippi with reliefs, &c.

Two Christian catacombs have been found near Clusium, one in the hill of S. Caterina near the railway station, the inscriptions of which seem to go back to the 3rd century, another 1 m. to the E. in a hill on which a church and monastery of S. Mustiola stood, which goes back to the 4th century, including among its inscriptions one bearing the date a.d. 303, and the tombstone of L. Petronius Dexter, bishop of Clusium, who died in a.d. 322. The total number of inscriptions known in Clusium is nearly 3000 Etruscan (Corp. Inscr. Etrusc, Berlin, 475-3306) and 500 Latin (Corp. Inscr. Lat. xi. 2090-2593). To the W. and N.W. of Chiusi— at Cetona, Sarteano, Chianciano and Montepulciano— Etruscan cemeteries have been discovered; the objects from them formed, in the latter half of the 19th century, interesting local collections described by Dennis, which have since mostly passed to larger museums or been dispersed.

See G. Dennis, Cities and Cemeteries o/Einma (London, 1883), ii. 290 seq. ; L. Giometti, Guida di Chiusi (Poggibonsi, 1904). (T. As.)

CLUWER (Cluver, Cluvier, Cluverius), PHILIP (1580- 1623), German geographer and historian, was born at Danzig in 1580. After travelling in Germany and Poland (where he learnt Polish), he began the study of law at Leiden, but he soon turned his attention to history and geography, which were then taught there by Joseph Scaliger. After campaigning in Bohemia and Hungary, suffering imprisonment, and travelling in England, Scotland and France, he finally settled in Holland, where (after 1616) he received a regular pension from Leiden Academy. In 1611 he began to publish his works. He died at

Leiden in 1623. His principal writings are: Germania Antiqua (16 1 6), Siciliae Antiquae libri duo, Sardinia et Corsica Antiqua (1619), and the posthumous Italia Antiqua (1624) and Intro- ductio in Universam Geographiam (1629).

CLYDE, COLIN CAMPBELL, Baron (1 792-1863), British soldier, was born at Glasgow on the 20th of October 1792. He received his education at the Glasgow high school, and when only sixteen years of age obtained an ensigncy in the 9th foot, through the influence of Colonel Campbell, his maternal uncle. The youthful officer had an early opportunity of engaging in active service. He fought under Sir Arthur Wellesley at Vimiera, took part in the retreat of Sir John Moore, and was present at the battle of Corunna. He shared in all the fighting of the Peninsular campaigns, and was severely wounded while leading a storming-party at the attack on San Sebastian. He was again wounded at the passage of the Bidassoa, and compelled to return to England, when his conspicuous gallantry was rewarded by promotion without purchase. Campbell held a command in the American expedition of 18 14; and after the peace of the following year he devoted himself to studying the theoretical branches of his profession. In 1823 he quelled the negro insurrection in Demerara, and two years later obtained his majority by purchase. In 1832 he became lieutenant-colonel of the 98th foot, and with that regiment rendered distinguished service in the Chinese War of 1842. Campbell was next employed in the Sikh War of 1848-49, under Lord Gough. At Chillianwalla, where he was wounded, and at the decisive victory of Gujrat, his skill and valour largely contributed to the success of the British arms; and his ” steady coolness and military precision ” were highly praised in official despatches. He was made a K.C.B. in 1849, an d specially named in the thanks of parliament.

After rendering important services in India Sir Colin Campbell

returned home in 1853. Next year the Crimean War broke out, and he accepted the command of the Highland brigade, which formed part of the duke of Cambridge’s division. The brigade and its leader distinguished themselves very greatly at the Alma; and with his ” thin red line ” of Highlanders he repulsed the Russian attack on Balaklava. At the close of the war Sir Colin was promoted to be knight grand cross of the Bath, and elected honorary D.C.L. of Oxford. His military services, however, had as yet met with tardy recognition; but, when

the crisis came, his true worth was appreciated. The outbreak of the Indian Mutiny (q.v.) called for a general of tried experience; and on the nth of July 1857 the command was offered to him by Lord Palmerston. On being asked when he would be ready to set out, the veteran replied, ” Within twenty-four hours.” He was as good as his word; he left England the next evening, and reached Calcutta on the 13th of August. After spending upwards of two months in the capital to organize his resources, he started for the front on the 27th of October, and on the 17th of November relieved Lucknow for the second time. Sir Colin, however, considered Lucknow a false position, and once more abandoned it to the rebels, retaking it in March 1858. He continued in charge of the operations in Oudh until the embers of the revolt had died away. For these services he was raised to the peerage, in 1858, as Lord Clyde; and, returning to England in the next year, he received the thanks of both Houses of Parliament and a pension of £2000 a year. He died on the 14th of August 1863.

Though not a great general, and lacking in the dash which won England so many victories in India, Lord Clyde was at once a brave soldier and a careful and prudent leader. The soldiers whom he led were devotedly attached to him; and his courteous demeanour and manly independence of character won him unvarying respect.

See Sir Owen Tudor Burne, Clyde and Strathnairn (” Rulers of India ” series, 1891); and L. Shadwell, Life of Colin Campbell, Lord Clyde (1881).

CLYDE (Welsh, Clwyd, “far heard,” “strong,” the Glotta of Tacitus), the principal river of Lanarkshire, Scotland. It is also the name of the estuary which forms the largest and finest firth on the west coast.

1. The River. — Daer Water, rising in Gana Hill (2190 ft.) on the borders of Lanarkshire and Dumfriesshire, after a course of 103 m., and Potrail Water, rising 3 m. farther W. in the same hilly country (1928 ft.), after running N.N.E. for 7 m., unite l\ m. S. of Elvanfoot to form the Clyde, of which they are the principal headstreams, though many mountain burns in these upland regions are also contributory. The old rhyme that ” Annan, Tweed and Clyde rise a’ out o’ ae hillside ” is not true, for Little Clyde Burn here referred to, rising in Clyde Law (2 190 ft.), is only an affluent and not a parent stream. From the junction of the Daer and Potrail the river pursues a direction mainly northwards for several miles, winding eastwards around Tinto Hill, somewhat north-westerly to near Carstairs, where it follows a serpentine course westwards and then southwards. From Harperfield, a point about 4 m. above Lanark, it assumes a north-westerly

direction, which, roughly, it maintains for the rest of its course as a river, which is generally held to end at Dumbarton, where it merges in the Firth. Its principal tribu- taries on the right are the Med win (16 m. long), entering near Carnwath, the Mouse (15 m.), joining it at Lanark, the South. Calder (16 m.) above Bothwell, the North Calder (12 m.) below Uddingston, the Kelvin (21 m.) at Glasgow, and the Leven (7 m.) at Dumbarton. The chief left-hand affluents are the Elvan (8 m.), entering at Elvanfoot, the Duneaton (19 m.), joining a few miles above Roberton, the Garf (65 m.) below Lamington, the Douglas (20 m.) above Bonnington, the Nethan (12 m.) at Crossford, the Avon (28 m.) at Hamilton, the Rotten Calder (10 m.) near Newton, and the Cart (1 m.), formed by the junction of the Black Cart (9 m.) and the White Cart (19 m.), below Renfrew.

The total length of the Clyde from the head of the Daer to Dumbarton is 106 m., and it drains an area estimated at 1481

sq. m. It is thus the third longest river in Scotland (being exceeded by the Spey and Tay), but in respect of the industries on its lower banks, and its sea-borne commerce, it is one of the most important rivers in the world. Near Lanark it is broken by the celebrated Falls, four in number, which are all found within a distance of 3! m. Bonnington Linn, the most graceful, 2 m. above Lanark, is divided into two parts by a mass of tree- clad rocks in mid-stream, and has a height of 30 ft. From this spot the river runs for half a mile through a rugged, red sand- stone gorge till it reaches Corra Linn, the grandest of the Falls, where in three leaps, giving it the aspect of a splendid cascade, it makes a descent of 84 ft., which, however, it accomplishes during flood at a single bound. Almost f m. below Corra Linn, Dundaff Linn is reached, a fall of only 10 ft. Farther down, 1} m. below Lanark, at Stonebyres Linn, reproducing the characteristic features of Corra Linn, the river descends in ordinary water in three leaps, and in flood in one bold drop of 80 ft. Within this space of $\ m. the river effects a total fall of 230 ft., or 6if ft. in the mile. From Stonebyres Linn to the sea the fall is practically 4 ft. in every mile. The chief villages and towns on or close to the river between its source and Glasgow are Crawford, Lamington, New Lanark, Lanark, Hamilton, Bothwell, Blantyre and Uddingston. At Bowling (pop. 1018) — • the point of transhipment for the Forth and Clyde Canal — the river widens decidedly, the fairway being indicated by a stone Wall continued seawards as far as Dumbarton. Dunglass Point, near Bowling, is the western terminus of the wall of Antoninus, or Grim's Dyke; and in the grounds of Dunglass Castle, now a picturesque fragment, stands an obelisk to Henry Bell (1767- 1 S30) , the pioneer of steam navigation in Europe.

As far down as the falls the Clyde remains a pure fishing stream, but from the point at which it begins to receive the varied tribute of industry, its water grows more and more contaminated, and at Glasgow the work of pollution is completed. Towards the end of the 18th century the river was yet fordable at the Broomie- law in the heart of Glasgow, but since that period, by unexampled enterprise and unstinted expenditure of money, the stream has been converted into a waterway deep enough to allow liners and battleships to anchor in the harbour (see Glasgow).

Clydesdale, as the valley of the upper Clyde is called, begins in the district watered by headstreams of the river, the course of which in effect it follows as far as Bothwell, a distance of 50 m. It is renowned for its breed of cart-horses (specifically known as Clydesdales), its orchards, fruit fields and market gardens, its coal and iron mines.

2. The Firth. — From Dumbarton, where the firth is commonly considered to begin, to Ailsa Craig, where it ends, the fairway measures 64 m. Its width varies from 1 m. at Dumbarton to 37 m. from Girvan to the Mull of Kintyre. The depth varies from a low-tide minimum of 22 ft. in the navigable channel at Dumbarton to nearly 100 fathoms in the Sound of Bute and at other points. The Cumbraes, Bute and Arran are the principal islands in its waters. The sea lochs all lie on the Highland shore, and comprise Gare Loch, Loch Long, Loch Goil, Holy Loch, Loch Striven, Loch Riddon and Loch Fyne. The only rivers of any importance feeding the Firth are the Ayrshire streams, of which the chief are the Garnock, Irvine, Ayr, Doon and Girvan. The tide ascends above Glasgow, where its farther rise is barred by a weir. The head-ports are Glasgow, Port Glasgow, Greenock, Arclrossan, Irvine, Troon, Ayr and Campbeltown. In addition to harbour lights, beacons on rocks, and light-ships, there are lighthouses on Ailsa Craig, Sanda, Davaar, Pladda, Holy Isle, and Little Cumbrae, and at Turnberry Point, Cloch Point and Toward Point. The health and holiday resorts on the lochs,' islands and mainland coast are numerous.

CLYDEBANK, a police burgh of Dumbartonshire, Scotland, on the right bank of the Clyde, 6 m. from Glasgow. Pop. (1891) 10,014; (1901) 21,591. There are stations at Yoker, Clydebank, Kilbowie and Dalmuir, all comprised within the burgh since 1886, served by both the North British and the Caledonian railways. In 1875 the district was almost purely rural, but since that date flourishing industries have been planted in the different

parts. At Clydebank are large shipbuilding yards and engineer- ing works; at Yoker there is some shipbuilding and a distillery; at Kilbowie the Singer Manufacturing Company have an immense factory, covering nearly 50 acres and giving employment to many thousands of operatives; at Dalmuir are the building and repairing yards of the Clyde Navigation Trust. The import- ant Rothesay Dock, under this trust, was opened by the prince and princess of Wales in April 1907. The municipality owns a fine town hall and buildings. Part of the parish extends across the Clyde into the shire of Renfrew.

CNIDUS (mod. Tekir), an ancient city of Caria in Asia Minor, situated at the extremity of the long peninsula that forms the southern side of the Sinus Ceramicus or Gulf of Cos. It was built partly on the mainland and partly on the Island of Triopion or Cape Krio, which anciently communicated with the continent by a causeway and bridge, and now by a narrow sandy isthmus. By means of the causeway the channel between island and mainland was formed into two harbours, of which the larger, or southern, now known as Port Freano, was further enclosed by two strongly-built moles that are still in good part entire. The extreme length of the city was little less than a mile, and the whole intramural area is still thickly strewn with architectural remains. The walls, both insular and continental, can be traced throughout their whole circuit; and in many places, especially round the acropolis, at the N.E. corner of the city, they are remarkably perfect. Our knowledge of the site is largely due to the mission of the Dilettanti Society in 1812, and the excava- tions executed by C. T. Newton in 1857-1858; but of recent years it has become a frequent calling station of touring steamers, which can still lie safely in the seuthern harbour. The agora, the theatre, an odeum, a temple of Dionysus, a temple of the Muses, a temple of Aphrodite and a great number of minor buildings have been identified, and the general plan of the city has been very clearly made out. The most famous statue by the elder Praxiteles, the Aphrodite, was made for Cnidus. It has perished, but late copies exist, of which the most faithful is in the Vatican gallery. In a temple-enclosure C. T. Newton discovered a fine seated statue of Demeter, which now adorns the British Museum; and about 3 m. south-east of the city he came upon the ruins of a splendid tomb, and a colossal figure of a lion carved out of one block of Pentelic marble, 10 ft. in length and 6 in height, which has been supposed to commemorate the great naval victory of Conon over the Lacedaemonians in 394 B.C. Among the minor antiquities obtained from the city itself, or the great necropolis to the east, perhaps the most interesting are the leaden KaraSecrˆtoi, or imprecationary

tablets, found in the temple of Demeter, and copied in facsimile in the appendix to the second volume of Newton's work. Peasants still find numerous antiquities, and the site would certainly repay more thorough excavation.

Cnidus was a city of high antiquity and probably of Lacedae- monian colonization. Along with Halicarnassus and Cos, and the Rhodian cities of Lindus, Camirus and Ialysus it formed the Dorian Hexapolis, which held its confederate assemblies on the Triopian headland, and there celebrated games in honour of Apollo, Poseidon and the nymphs. The city was at first governed by an oligarchic senate, composed of sixty members, known as afivrifioves, and presided over by a magistrate called an hptarr\p; but, though it is proved by inscriptions that the old names continued to a very late period, the constitution underwent a popular transformation. The situation of the city was favourable for commerce, and the Cnidians acquired consider- able wealth, and were able to colonize the island of Lipara, and founded the city of Corcyra Nigra in the Adriatic. They ulti- mately submitted to Cyrus, and from the battle of Eurymedon to the latter part of the Peloponnesian War they were subject to Athens. In 394 B.C. Conon fought off the port the battle which destroyed Spartan hegemony. The Romans easily obtained their allegiance, and rewarded them for help given against Antiochus by leaving them the freedom of their city. During the Byzantine period there must still have been a con- siderable population; for the ruins contain a large number of

buildings belonging to the Byzantine style, and Christian sepulchres are common in the neighbourhood. Eudoxus, the astronomer, Ctesias, the writer on Persian history, and Sostratus, the builder of the celebrated Pharos at Alexandria, are the most remarkable of the Cnidians mentioned in history. •

See C. T. Newton and R. P. Pullen, Hist, of Discoveries at Halicar- nassus, Cnidus, &c. (1863).

CNOSSUS, Knossos, or Gnossus, an ancient city of Crete, on the left bank of the Caeratus, a small stream which falls into the sea on the north side of the island. The city was situated about 3 m. from the coast, and, according to the old traditions, was founded by Minos, king of Crete. The locality was associated with a number of the most interesting legends of Greek mythology, particularly with those which related to Jupiter, who was said to have been born, to have been married, and to have been buried in the vicinity. Cnossus was also assigned as the site of the labyrinth in which the Minotaur was confined. The truth behind these legends has been revealed in recent

years by the excavations of Dr Evans. As the historical city was peopled by Dorians, the manners, customs and political institutions of its inhabitants were all Dorian. Along with Gortyna and Cydonia, it held for many years the supremacy over the whole of Crete; and it always took a prominent part in the civil wars which from time to time desolated the island. When the rest of Crete fell under the Roman dominion, Cnossus shared the same fate, and became a Roman colony. Aenesidemus, the sceptic philosopher, and Chersiphron, the architect of the temple of Diana at Ephesus, were natives of Cnossus.

The Site. — As the excavations at Cnossus are discussed at length in the article Crete, it must suffice here briefly to enumer- ate the more important. The chief building is the Great Palace, the so-called ” House of Minos,” the excavation of which by Arthur Evans dates from 1900: a number of rooms lying round the central paved court, oriented north and south, have been identified, among them being the throne-room with some well- preserved wall paintings and a small bathroom attached, in the north-west quarter a larger bathroom and a shrine, and residential chambers in the south and east. The latter part of the palace is composed of a number of private rooms and halls, and is especially remarkable for its skilful drainage and water-supply systems.

In 1907 excavations on the south side of the palace showed that the plan was still incomplete, and a southern cryptoporticus, and outside it a large south-west building, probably an official residence, were discovered. Of special interest was a huge circular cavity under the southern porch into which the sub- structures of the palace had been sunk. This cavity was filled with rubbish, sherds, &c, the latest of which was found to date as far back as the beginning of the Middle Minoan age, and the later work of 1908 only proved (by means of a small shaft sunk through the debris) that the rock floor was 52 ft. below the surface. The first attempt to reach the floor by a cutting in the hill-side proved abortive, but the operations of 191c led to a successful result. The cavity proved to be a great reservoh approached by a rock-cut staircase and of Early Minoan date.

In 1904-1905 a paved way running due west from the middle of the palace was excavated, and found to lead to another build- ing described as the “Little Palace” largely buried under an olive grove. The first excavations showed that this building was on the same general plan and belonged to the same period as the ” House of Minos,” though somewhat later in actual date (17th century B.C.). Large halls, which had subsequently been broken up into smaller apartments, were found, and among a great number of other artistic

remains one seal-impression of special interest showing a one-masted ship carrying a thorough- bred horse — perhaps representing the first importation of horses into Crete. A remarkable shrine with fetish idols was also dis- covered. The sacred Double-Axe symbol is prominent, as is the greater palace. By the end of 19 10 the excavation of this smaller palace was practically completed. It was found to cover an area of more than 9400 ft. with a frontage of more than 130 ft., and haˆ ‘ive stone staircases. One object of special interest found

in the course of excavation is a black steatite vessel in the form of a bull’s head. The modelling is of a very high order, and the one eye which remains perfect is cut out of rock crystal, with the pupil and iris marked by colours applied to the lower face of the crystal.

The work of excavation in the palace has been complicated by the necessity of propping up walls, floors and staircases. In some instances it has been found necessary to replace the original wooden pillars by pillars of stone. Again in the ” Queen’s Megaron ” in the east wing of the Great Palace it was found that the exposure of the remains to the violent extremes of Cretan weather must soon prove fatal to them. It was therefore decided to restore the columns and part of the wall, and to roof over the whole area.

For recent excavations see R. M. Burrows, The Discoveries in Crete (1907); A. Mosso, The Palaces of Crete (1907); Lagrange, La Crete ancienne (1908) ; Dr. Evans’s reports in The Times, Oct. 31, 1905, July 15, 1907, Aug. 27, 1908, and 1909 (Index) ; D. Mackenzie, Cretan Palaces.

COACH (through the Fr. coche, originally from the Magyar kocsi, an adjective from the Hungarian place named Kocs, between Raab and Buda, i.e. the sort of vehicle used there in the 15th century), a large kind of carriage for passengers (see Carriage). As a general term it is used (as in ” coach-building “) for all carriages, and also in combination with qualifying attributes for particular forms (stage-coach, mail-coach, mourning-coach, hackney-coach, &c); but the typical coach involves four wheels, springs and a roof. The stage-coach, with seats outside and in, was a public conveyance which was known in England from the 1 6th century, and before railways the stage-coaches had regular routes (stages) all over the country; through their carrying the mails (from 1784) the term “mail-coach” arose.

Similar vehicles were used in America and on the European continent. The diligence, though not invariably with four horses, was the Continental analogue for public conveyance, with other minor varieties such as the Stellwagen and Eilwagen.

The driving of coaches with four horses was a task in which a considerable amount of skill was required, 1 and English literature is full of the difficulties and humours of ” the road ” in old days. A form of sport thus arose for enterprising members of the nobility and gentry, and after the introduction of railways made the mail-coach obsolete as a matter of necessity, the old sport of coaching for pleasure still survived, though only to a limited extent. The Four-in-hand Club was started in England in 1856 and the Coaching Club in 1870, as the successors of the old Bensington Driving Club (1807-1852), and Four-Horse Club (1808-1829); and in America the New York Coaching Club was founded in 1875. But coaching remains the sport of the wealthier classes, although in various parts of England {e.g. London to Brighton, and in the Lake district), in America, and in Europe, public coaches still have their regular times and routes for those who enjoy this form of travel. The earliest railway vehicles for passengers were merely the road coaches of the period adapted to run on rails, and the expression ” coach- ing traffic ” is still used in England to denote traffic carried in passenger trains.

Of coaches possessing a history the two best known in the United Kingdom are the king’s state coach, and that of the lord mayor of London. The latter is the oldest, having been built, or at least first used, for the procession of Sir Charles Asgil, lord mayor elect, in November 1757. The body of this vehicle is not supported by. springs, but hung on leather straps; and the whole structure is very richly loaded with ornamental carving, gilding and paint-work. The different panels and the doors contain various allegorical groups of figures representing suitable subjects, and heraldic devices painted in a spirited manner. The royal state coach, which is described as ” the most superb carriage ever built,” was designed by Sir William Chambers, the paintings on it were executed by Cipriani, and

1 The idea of ” driving ” was responsible for the use of the term ” coach ” and ” coaching ” to mean a tutor or trainer, for examin- ations or athletic contests.

the work was completed in 1761. During the later part of Queen Victoria’s reign it was hardly ever seen, but on the accession of Edward VII. the coach was once more put in order for use on state occasions. The following is an official description of this famous

coach: —

” The whole of the carriage and body is richly ornamented with laurel and carved work, beautifully gilt. The length, 24 ft. ; width, 8 ft. 3 in. ; height, 12 ft. ; length of pole, 12 ft. 4 in. ; weight, 4 tons. The carriage and body of the coach is composed as follows : — Of four large tritons, who support the body by four braces, covered with red morocco leather, and ornamented with gilt buckles, the two figures placed in front of the carriage bear the driver, and are repre- sented in the action of drawing by cables extending round their shoulders, and the cranes and sounding shells to announce the approach of the monarch of the ocean ; and those at the back carry the imperial fasces, topped with tridents. The driver’s foot-board is a large scallop shell, ornamented with bunches of reeds and other marine plants. The pole represents a bundle of lances ; the splinter bar is composed of a rich moulding, issuing from beneath a voluted shell, and each end terminating in the head of a dolphin; and the wheels are imitated from those of the ancient triumphal chariot. The body of the coach is composed of eight palm-trees, which, branching out at the top, sustain the roof; and four angular trees are loaded with trophies allusive to the victories obtained by Great Britain during the late glorious war, supported by four lions’ heads. On the centre of the roof stand three boys, representing the genii of England, Scotland and Ireland, supporting the imperial crown of Great Britain, and holding in their hands the sceptre, sword of state, and ensigns of knighthood; their bodies are adorned with festoons of laurel, which fall from thence towards the four corners. The panels and doors are painted with appropriate emblematical devices, and the linings are of scarlet velvet richly embossed with national emblems.”

See the Badminton Driving, by the duke of Beaufort (1888) ; Rogers’s Manual of Driving (Philadelphia, 1900) ; and ” Nimrod’s ” Essays on the Road (1876).

COAHUILA, a northern frontier state of Mexico, bounded N. and N.E. by Texas, U.S.A., E. by Nuevo Leon, S. by San Luis Potosi arid Zacatecas, and W. by Durango and Chihuahua. Area, 63,569 sq. m.; pop. (1895) 237,815; (1900) 296,938. Its surface is a roughly broken plateau, traversed N.W. to S.E. by several ranges of mountains and sloping gently toward the Rio Grande. The only level tract of any size in the state is the Bolson de Mapimi, a great depression on the western side which was long considered barren and uninhabitable. It is a region of lakes and morasses, of arid plains and high temperatures, but experiments with irrigation toward the end of the 19th century were highly successful and considerable tracts have since been

brought under cultivation. In general the state is insufficiently watered, the rainfall being light and the rivers small. The rivers flow eastward to the Rio Grande. The climate is hot and dry, and generally healthy. Stock-raising was for a time the principal industry, but agriculture has been largely developed in several localities, among the chief products of which are cotton — Coahuila is the principal cotton-producing state in Mexico — Indian corn, wheat, beans, sugar and grapes. The Parras district in the southern part of the state has long been celebrated for" its wines and brandies. The mineral wealth of the state is very great, and the mining industries, largely operated with foreign capital, are important. The mineral products include silver, lead, coal, copper, and iron. The mining opera- tions are chiefly centred in the Sierra Mojada, Sierra Carmen, and in the Santa Rosa valley. The modern industrial develop- ment of the state is due to the railway lines constructed across it during the last quarter of the 19th century, and to the invest- ment of foreign capital in local enterprises. The first Spanish settlement in the region now called Coahuila was at Saltillo in 1586, when it formed part of the province of Nueva Viscaya. Later it became the province of Nueva Estremadura under the Spanish regime, and in 1824, under the new republican organiza- tion, it became the state of Coahuila and included Texas and Nuevo Leon. Later in the same year Nuevo Leon was detached, but Texas remained a part of the state until 1835. The capital of the state is Saltillo; Monclova was the capital from 1833 to 1835. Among the more important towns are Parras (pop. 6476 in 1900), 98 m. W. by N. of Saltillo in a rich grape-producing dis- trict, Ciudad Porfirio Diaz, and Monclova (pop. 6684 in 1900), 105 m. N. by W. of Saltillo, on the Mexican International railway.

COAL

COAL. In its most general sense the term " coal " includes all varieties of carbonaceous minerals used as fuel, but it is now usual in England to restrict it to the particular varieties of such minerals occurring in the older Carboniferous formations. On the continent of Europe it is customary to consider coal as divisible into two great classes, depending upon differences of colour, namely, brown coal, corresponding to the term "lignite" used in England and France, and black or stone coal, which is equivalent to coal as understood in England. Stone coal is also a local English term, but with a signification restricted to the substance known by mineralogists as anthracite. In old English writings the terms pit-coal and sea-coal are commonly used. These have reference to the mode in which the

mineral is obtained, and the manner in which it is transported to market. ” The root kol is common to all the Teutonic nations, while in French and other Romance languages derivatives of the Latin carbo are used, e.g. charbon de terre. In France and Belgium, however, a peculiar word, houille, is generally used to signify mineral coal. This word is supposed to be derived from the Walloon hole, corresponding to the medieval Latin hullae Littre suggests that it may be related to the Gothic haurja, coal. Anthracite is from the Greek avdpa£, and the term lithanthrax, stone coal, still survives, with the same meaning, in the Italian litantrace.

It must be borne in mind that the signification now attached to the word coal is different from that which formerly obtained when wood was the only fuel in general use. Coal then meant the carbonaceous residue obtained in the destructive distillation of wood, or what is known as charcoal, and the name collier was applied indifferently to both coal-miners and charcoal-burners.

The spelling ” cole ” was generally used up to the middle of the 17th century, when it was gradually superseded by the modern form, ” coal.” The plural, coals, seems to have been used from a very early period to signify the broken fragments of the mineral as prepared for use.

Coal is an amorphous substance of variable composition, and therefore cannot be as strictly defined as a crystallized or definite mineral can. It varies in colour from a light ero- brown in the newest lignites to a pure black, often with

pertles. a bluish or yellowish tint in the more compact an- thracite of the older formations. It is opaque, except in exceedingly thin slices, such as made for microscopic in- vestigation, which are imperfectly transparent, and of a dark brown colour by transmitted light. The streak is black in anthracite, but more or less brown in the softer varieties. The maximum hardness is from 2-5 to 3 in anthracite and hard bituminous coals, but considerably less in lignites, which are nearly as soft as rotten wood. A greater hardness is due to the presence of earthy impurities. The densest anthracite is often of a semi-metallic lustre, resembling somewhat that of graphite. Bright, glance or pitch coal is another brilliant variety, brittle, and breaking into regular fragments of a black colour and pitchy lustre. Lignite and cannel are usually dull and earthy, and of an irregular fracture, the latter being much tougher than the black coal. . Some lignites are, however, quite as brilliant as anthracite; cannel and jet may be turned in the lathe, and are susceptible of taking a brilliant polish. The

specific gravity is highest in anthracite and lowest in lignite, bituminous coals giving intermediate values (see Table I.). As a rule, the density increases with the amount of carbon, but in some instances a very high specific gravity is due to intermixed earthy matters, which are always denser than even the densest form of coal substance.

Coal is never definitely crystalline, the nearest approach to such a structure being a compound fibrous grouping resembling that of gypsum or arragonite, which occurs in some of the steam coals of South Wales, and is locally known as ” cone in cone,” but no definite form or arrangement can be made out of the fibres. Usually it occurs in compact beds of alternating bright and dark bands in which impressions of leaves, woody fibre and other vegetable remains are commonly found. There is generally a tendency in coals towards cleaving into cubical or prismatic

blocks, but sometimes the cohesion between the particles is so feeble that the mass breaks up into dust when struck. These peculiarities of structure may vary very considerably within small areas; and the position of the divisional planes or cleats with reference to the mass, and the proportion of small coal or slack to the larger fragments when the coal is broken up by cutting-tools, are points of great importance in the working of coal on a large scale.

The divisional planes often contain small films of other minerals, the commonest being calcite, gypsum and iron pyrites, but in some cases zeolitic minerals and galena have been observed. Salt, in the form of brine, is sometimes present in coal. Hydro- carbons, such as petroleum, bitumen, paraffin, &c, are also found occasionally in coal, but more generally in the associated sandstones and limestones of the Carboniferous formation Gases, consisting principally of light carburetted hydrogen or marsh gas, are often present in considerable quantity in coal, in a dissolved or occluded state, and the evolution of these upon exposure to the air, especially when a sudden diminution of atmospheric pressure takes place, constitutes one of the most formidable dangers that the coal miner has to encounter.

The classification of the different kinds of coal may be con- sidered from various points of view, such as their chemical composition, their behaviour when subjected to heat or when burnt, and their geological position and tlon% origin. They all contain carbon, hydrogen, oxygen and nitrogen, forming the carbonaceous or combustible portion, and some quantity of mineral matter, which remains after combustion as a residue or ” ash.” As the amount of ash varies very considerably in different coals, and stands in no ela tion to the proportion of the other

constituents, it is necessary in forming a chemical classification to compute the results of analysis after deduction of the ash and hygroscopic water. Examples of analyses treated in this manner are furnished in the last column of Table I., from which it will be seen that the nearest approach to pure carbon is furnished by anthracite, which contains above 90%. This class of coal burns with a very small amount of flame, produc- ing intense local heat and no smoke. It is especially used So* drying hops and malt, and in blast furnaces where a high tempera ture is required, but it is not suited for reverberatory furnaces.

The most important class of coals is that generally known as bituminous, from their property of softening or undergoing an apparent fusion when heated to a temperature far below that at which actual combustion takes place. oas coals. This term is founded on a misapprehension of the nature of the occurrence, since, although the softening takes place at a low temperature, still it marks the point at which destructive distillation commences, and hydrocarbons both of a solid and gaseous character are formed. That nothing analogous to bitumen exists in coals is proved by the fact that the ordinary solvents for bituminous substances, such as bisulphide of carbon and benzol, have no effect upon them, as would be the case if they contained bitumen soluble in these re-agents. The term is, however, a convenient one, and one whose use is almost a necessity, from its having an almost universal currency among coal miners. The proportion of carbon in bituminous coals may vary from 80 to 90% — the amount being highest as they approach the character of anthracite, and least in those which are nearest to lignites. The amount of hydrogen is from 4ˆ to 6%, while the oxygen may vary within much wider limits, or from about 3 to 14%. These variations in composition are attended with corresponding differences in qualities, which are distinguished by special names. Thus the semi-anthracitic coals of South Wales are known as ” dry ” or ” steam coals,” being especially valuable for use in marine steam-boilers, as they burn more readily than anthracite and with a larger amount of flame, while giving out a great amount of heat, and practically without producing smoke. Coals richer in hydrogen, on the other hand, are more useful for burning in open fires — smiths’ forges and furnaces — where a long flame is required.

The excess of hydrogen in a coal, above the amount necessary

Anthra- cite.

to combine with its oxygen to form water, is known as ” dis- posable ” hydrogen, and is a measure of the fitness of the coal for use in gas-making. This excess is greatest in what is as °° ‘ known as cannel coal, the Lancashire kennel or candle coal, so named from the bright light it gives out when burning. This, although of very small value as fuel, commands a specially high price for gas-making. Cannel is more compact and duller than ordinary coal, and can be wrought in the lathe and polished.

oxygen and hygroscopic water are much higher than in true coals. The property of caking or yielding a coherent coke is usually absent, and the ash is often very high. The specific gravity is low when not brought up by an excessive amount of earthy matter. Sometimes it is almost pasty, and crumbles to powder when dried, so as to be susceptible of use as a pigment, forming the colour known as Cologne earth, which resembles umber or sepia. In Nassau and Bavaria woody structure is very common, and it is

Table I. — Elementary Composition of Coal {the figures denote the amounts per cer

it).

Composition

calculated exclusive of

Water, Sulphur and Ash.

Localities.

Specific Gravity.

Carbon.

Hydro- gen.

Oxygen.

Nitro- gen.

Sulphur.

Ash.

Water.

Carbon.

Hydro- gen.

O.andN.

Anthracite.

i. South Wales

2. Pennsylvania

3. Peru

1-392 1-462

90-39 90-45 82-70

3-28

2-43 1-41

2-98 2-45

0-

0-83

85 ”

0-91 10-35

i-6i

4-67 3-75

2-00

0-94

93-54 94-89

97-34

3-39

2-54 1-66

3-82 2-57

I -00

Bituminous Steam and Coking Coal.

4. Risca, South Wales

5. Aberdare, „

6. Hartley, Northumberl'd

7. Dudley, Staffordshire

8. Stranitzen, Styria

1-278

75-49

86-8o

78-65

78-57 79-90

4-73 4'25 4-65 5-29 4-85

6-78

3-o6

I3-36

12-88 1-84

12-75 0-64

I-2I

0-8 3

o-55 o-39

0-20

10-67 4-40 2-49 1-03 1-66

I-I2

0-66

I-I3

86-78 92-24 80-67 79-70 81-45

5-43

4-5i

4-76

5-37 4-92

7-79 3‘25 14-5 14-9

13-63

Cannel or Gas Coal.

9. Wigan, Lancashire .

10. Boghead, Scotland

11. (Albertite) Nova Scotia

12. (Tasraanite) Tasmania

1-276

i- 18

80-07 63-10 82-67 79-34

5-53

8-91

9-14

10-41

8-08 2-12

7-25 8-19

4-93

1-50 0-96

5-32

2-70 19-78

0-91

85-48 79-61 82-67 83-80

5-9°

11-24

9-14 10-99

8-62

9-15 8-19

5-21

Lignite and Brown Coal.

13. Cologne ….

14. Bovey Tracy, Devon-

15. Trifail, Styria

I-IOO

63-29

66-31 50-72

4-98

5-63 5-34

26-24

22-86 1 0-57

33-18 2-80

■

2-36 0-90

8-49

2-36

7-86

66-97

69-53

55-II

5-27

5-90

5-8o

27-76

24-57 39-09

These properties are most highly developed in the substance known as jet, which is a variety of cannel found in the lower oolitic strata of Yorkshire, and is almost entirely used for ornamental purposes, the whole quantity produced near Whitby, together with a further supply from Spain, being manufactured into articles of jewellery at that town.

When coal is heated to redness out of contact with the air, the more volatile constituents, water, hydrogen, oxygen, and nitrogen are in great part expelled, a portion of the j£js? carbon being also volatilized in the form of hydro- carbons and carbonic oxide, — the greater part, how- ever, remaining behind, together with all the mineral matter or ash, in the form of coke, or, as it is also called, ” fixed carbon.” The proportion of this residue is greatest in the more anthracitic or drier coals, but a more valuable product is yielded by those richer in hydrogen. Very important distinctions — those of caking or non-caking — are founded on the behaviour of coals when subjected to the process of coking. The former class undergo an incipient fusion or softening when heated, so that the fragments coalesce and yield a compact coke, while the latter (also called free-burning) preserve their

form, producing a coke which is only serviceable when made from large pieces of coal, the smaller pieces being incoherent and of no value. The caking property is best developed in coals low in oxygen with 25 to 30 of volatile matters. As a matter of experience, it is found that caking coals lose that property when exposed to the action of the air for a lengthened period, or by heating to about 300° C, and that the dust or slack of non-caking coal may, in some instances, be converted into a coherent coke by exposing it suddenly to a very high temperature, or compressing it strongly before charging it into the oven.

Lignite or brown coal includes all varieties which are inter- mediate in properties between wood and coals of the older formations. A coal of this kind is generally to be

distinguished by its brown colour, either in mass or in

Lignite.

the blacker varieties in the streak. The proportion of carbon is comparatively low, usually not exceeding 70%, while the

from this circumstance that the term lignite is derived. The best varieties are black and pitchy in lustre, or even bright and scarcely to be distinguished from true coals. These kinds are most common in Eastern Europe. Lignites, as a rule, are generally found in strata of a newer geological age, but there are many instances of perfect coals being found in such strata.

By the term ” ash ” is understood the mineral matter re- maining unconsumed after the complete combustion of the carbonaceous portion of a coal. According to Couriot (Annales de la sociele geologique de Belgique, vol. xxiii. coal” p. 105) the stratified character of the ash may be rendered apparent in an X-ray photograph of a piece of coal about an inch thick, when it appears in thin parallel bands, the combustible portion remaining transparent. It may also be rendered visible if a smooth block of free-burning coal is allowed to burn away quickly in an open fire, when the ash remains in thin grey or yellow bands on the surface of the block. The composition of the ashes of different coals is subject to consider- able variation, as will be seen by Table II.

The composition of the ash of true coal approximates to that of a fire-clay, allowance being made for lime, which may be present either as carbonate or sulphate, and for sulphuric acid. Sulphur is derived

mainly from iron iacoaf. pyrites, which yields sulphates by combustion. An indication of the character of the ash of a coal is afforded by its colour, white ash coals being generally freer from sulphur than those containing iron pyrites, which yield a red ash. There are, however, several striking exceptions, as for instance in the anthracite from Peru, given in Table I., which contains more than 10% of sulphur, and yields but a very small percentage of a white ash. In this coal, as well as in the lignite of Tasmania, known as white coal or Tasmanite, the sulphur occurs in organic combination, but is so firmly held that it can only be very partially expelled, even by exposure to a very high and continued heating out of contact with the air. An anthracite occurring in connexion with the old volcanic rocks of Arthur's Seat,Edinburgh, which contains a large amount of sulphur in proportion to the

Table II

. — Composition of the Ashes of

Coals.

Silica.

Alumina.

Ferric Oxide.

Lime.

Magnesia.

Potash.

Sulphuric Acid.

Phosphoric Acid.

Total.

True Coals. Dowlais, South Wales . Ebbw Vale, ,, Konigsgrube, Silesia

Lignites. Helmstadt, Saxony Edeleney, Hungary

39-64

53-oo

55-41 44-60

17-27 36-01

39-20

35-oi

18-95 41-10

n-57

23-07

11-84

16-06 7-40

5-57

5-°5

I-8I

3-94 3-21

3-6i

23-67 15-62

2-58

2-20

1-87

1-28

2-58 3-64

2-05

1-82

2-64 2-38

4-89 1-73

o-59

33-83 12-35

3-01 0-88 0-36 0-29

98-08

99-92

99-64

100-69

97-13 98-12

Water In coal.

Ash, has been found to behave in a similar manner. Under ordinary conditions, from J to J of the whole amount of sulphur in a coal is volatilized during combustion, the remaining J to f being found in the ash.

The amount of water present in freshly raised coals varies very considerably. It is generally largest in lignites, which may sometimes contain 30% or even more, while in the coals of the coal measures it does not usually exceed from 5 to 10%. The loss of weight by exposure to the atmosphere from drying may be from 5 to £ of the total amount of water contained.

Coal is the result of the transformation of woody fibre and other vegetable matter by the elimination of oxygen and hydrogen in proportionally larger quantity than Coal" ° carbon, so that the percentage of the latter element is increased in the manner shown in Table III., given by J. Percy, the mineral matter being also changed by the re- moval of silica and alkalis and the substitution of substances analogous in composition to fire-clay. The causes and methods of these changes are, however, not very exactly defined. Accord-

Table III. — Composition of Fuels {assuming Carbon = ioo).

Carbon.

Hydro- gen.

Oxygen.

Disposable Hydrogen.

Wood . . . . . .

Peat

Lignite …. Thick Coal, S. Stafford- shire

Hartley Steam Coal . South Wales Steam

American Anthracite .

100 100 100

100 100

100 100

12-18

9-85 8-37

6-12

5-91

4-75 2-84

83-07 55-67 42-42

21-23 18-32

5-28 1-74

l-8o

2-89 3-07

3-47 3-62

ing to the elaborate researches of B. Renault (Bulletin de la SoctitZ de l' Industrie minirale, 3 ser. vol. xiii. p. 865), the agents of the transformation of cellulose into peaty substances are saprophytic fungi and bacterial ferments. As the former are only active in the air while the latter are anaerobic, the activity of either agent is conditioned by variation in the water level of the bog. The ultimate term of bacterial activity seems to be the production of ulmic acid, containing carbon 65-31 and hydrogen 3-85%, which is a powerful antiseptic. By the pro- gressive elimination of oxygen and hydrogen, partly as water and partly as carbon dioxide and marsh gas, the ratios of carbon to oxygen and hydrogen in the rendered product increase in the following manner: —

' C :H C :0

Cellulose . . . . – 7-2 09

Peat • 9-8 i-8

Lignite, imperfect 12-2 2-4

„ perfect . . ■ 12-6 36

The resulting product is a brown pasty or gelatinous substance which binds the more resisting parts of the plants into a compact mass. The same observer considers Boghead coal, kerosene shale and similar substances used for the production of mineral oils to be mainly alteration products of gelatinous fresh water algae, which by a nearly complete elimination of oxygen have oeen changed to substances approximating in composition to

vl. it

C2H3 and C3H5, where C:H = 7-o8 and C:0 + N- = 4 6-3. In cannel coals the prevailing constituents are the spores of crypto – gamic plants, algae being rare or in many cases absent. By making very thin sections and employing high magnification (1000-1200 diameters), Renault has been enabled to detect numerous forms of bacilli in the woody parts preserved in coal, one of which, Micrococcus carbo, bears a strong resemblance to the living Cladothrix found in trees buried in peat bogs. Clearer evidence of their occurrence has, however, been found in frag- ments of wood fossilized by silica or carbonate of lime which are sometimes met with in coal seams.

The subsequent change of peaty substance into coal is probably due to geological causes, i.e. chemical and physical processes similar to those that have converted ordinary sediments into rock masses. Such changes seem, however, to have been very rapidly accomplished, as pebbles of completely formed coal are commonly found in the sandstones and coarser sedimentary strata alternating with the coal seams in. many coalfields.

The variation in the composition of coal seams in different parts of the same basin is a difficult matter to explain. It has been variously attributed to metamorphism, consequent upon igneous intrusion, earth movements and other kinds of geo- thermic action, greater or less loss of volatile constituents during the period of coaly transformation, conditioned by differences of permeability in the enclosing rocks, which is greater for sandstones than for argillaceous strata, and other causes; but none of these appears to be applicable over more than limited areas. According to L. Lemiere, who has very fully reviewed the relation of composition to origin in coal seams (Bulletin de la Societe de Vlndustrie tninerale, 4 ser. vol. iv. pp. 851 and 1299, vol. v. p. 273), differences in composition are mainly original, the denser and more anthracitic varieties representing plant substance which has been more completely macerated and deprived of its putrescible constituents before submergence, or of which the deposition had taken place in shallow water, more readily accessible to atmospheric oxidizing influences than the deeper areas where conditions favourable to the elaboration of compounds richer in hydrogen prevailed.

The conditions favourable to the production of coal seem therefore to have been — forest growth in swampy ground about the mouths of rivers, and rapid oscillation of level, the coal produced during subsidence being covered up by the sediment brought down by the river forming beds of sand or clay, which, on re-elevation, formed the soil for fresh growths, the alternation being occasionally broken by the deposit of purely marine beds. We might therefore expect to find coal wherever strata of estuarine origin are developed in great mass. This is actually the case; the Carboniferous, Cretaceous and Jurassic systems (qq.i>.) contain coal-bearing strata though in unequal degrees, — the first being known as the Coal Measures proper, while the others are of small economic value in Great Britain, though more productive in workable coals on the continent of Europe. The Coal Measures which form part of the Palaeozoic or oldest of the three great geological divisions are mainly confined to the countries north of the equator. Mesozoic coals are more abundant in the southern hemisphere, while Tertiary coals seem to be tolerably uniformly

distributed irrespective of latitude.

The nature of the Coal Measures will be best understood by

it

considering in detail the areas within which they occur in Britain, together with the rocks with which they are most intimately associated. The commencement of the Carboniferous period is marked by a mass of limestones known as the Carboniferous or Sequences Mountain Limestone, which contains a large assemblage of carbon- of marine fossils, and has a maximum thickness in Herons S yj England and Wales of about 2000 ft. The upper portion of this group consists of shales and sand- stones, known as the Yoredale Rocks, which are highly developed in the moorland region between Lancashire and the north side of Yorkshire. These are also called the Upper Limestone Shale, a similar group being found in places below the limestone, and called the Lower Limestone Shale, or, in the north of England, the Tuedian group. Going northward the beds of limestone diminish in thickness, with a proportional increase in the inter- calated sandstones and shales, until in Scotland they are entirely subordinate to a mass of coal-bearing strata, which forms the most productive members of the Scotch coalfields. The next member of the series is a mass of coarse sandstones, with some slates and a few thin coals, known as the Mill-stone Grit, which is about equally developed in England and in Scotland. In the southern coalfields it is usually known by the miners' name of " Farewell rock," from its marking the lower limit of possible coal working. The Coal Measures, forming the third great member of the Carboniferous series, consist of alternations of shales and sandstones, with beds of coal and nodular ironstones, which together make up a thickness of many thousands of feet — from 12,000 to 14,000 ft. when at the maxi- mum of development. They are divisible into three parts, the Lower Coal Measures, the middle or Pennant, a mass of sandstone containing some coals, and the Upper Coal Measures, also con- taining workable coal. The latter member is marked by a thin limestone band near the top, containing Spirorbis carbonarius, a small marine univalve.

The uppermost portion of the Coal Measures consists of red sandstone so closely resembling that of the Permian group, which are next in geological sequence, that it is often difficult to decide upon the true

line of demarcation between the two formations. These are not, however, always found together, the Coal Measures being often covered by strata belonging to the Trias or Upper New Red Sandstone series.

The areas containing productive coal measures are usually known as coalfields or basins, within which coal occurs ih more or less regular beds, also called seams or veins, which can often be followed over a considerable length of country without change of character, although, like all stratified rocks, their continuity may be interrupted by faults or dislocations, also known as slips, hitches, heaves or troubles.

The thickness of coal seams varies in Great Britain from a mere film to 35 or 40 ft. ; but in the south of France and in India masses of coal are known up to 200 ft. in thickness. These very thick seams are, however, rarely constant in character for any great distance, being found commonly to degenerate into carbonaceous shales, or to split up into thinner beds by the intercalation of shale bands or partings. One of the most striking examples of this is afforded by the thick or ten-yard seam of South Staffordshire, which is from 30 to 45 ft. thick in one con- nected mass in the neighbourhood of Dudley, but splits up into eight seams, which, with the intermediate shales and sandstones, are of a total thickness of 400 ft. in the northern part of the coal- field in Cannock Chase. Seams of a medium thickness of 3 to 7 ft. are usually the most regular and continuous in character. Cannel coals are generally variable in quality, being liable to change into shales or black- band ironstones within very short horizontal limits. In some instances the coal seams may be changed as a whole, as for instance in South Wales, where the coking coals of the eastern side of the basin pass through the state of dry steam coal in the centre, and become anthracite in the western side. (H. B.)

The most important European coalfields are in Great Britain, Belgium and Germany. In Great Britain there is the South Welsh field, extending westward from the march of Monmouth-

shire to Kidwelly, and northward to Merthyr Tydfil. A midland group of coalfields extends from south Lancashire to the West Riding of Yorkshire, the two greatest industrial districts Qe0m in the country, southward to Warwickshire and graphical Staffordshire, andfromNottinghamshire on the east to distribu- Flintshire on the west. In the north of England are tloaot the rich field of Northumberland and Durham, and fijjjs. a lesser field on the coast of Cumberland (White- haven, &c). Smaller isolated fields are those. of the Forest of Dean (Gloucestershire) and the field on either side of the

Avon above Bristol.' Coal has also been found in Kent, in the neighbourhood of Dover. In Scotland coal is worked at various points (principally in the west) in the Clyde-Forth lowlands. In Belgium the chief coal-basins are those of Hainaut and Liege. Coal has also been found in an extension northward from this field towards Antwerp, while westward the same field extends into north-eastern France. Coal is widely distributed in Germany. The principal field is that of the lower Rhine and Westphalia, which centres in the industrial region of the basin of the Ruhr, a right-bank tributary of the Rhine. In the other chief industrial region of Germany, in Saxony, Zwickau andLugau, are important mining centres. In German Silesia there is a third rich field, which extends into Austria (Austrian Silesia and Galicia), for which country it forms the chief home source of supply (apart from lignite). Part of the same field also lies within Russian territory (Poland) near the point where the frontiers of the three powers meet. Both in Germany and in Austria-Hungary the production of lignite is large — in the first-named especially in the districts about Halle and Cologne; in the second in north- western Bohemia, Styria and Carniola. In France the principal coalfield is that in the north-east, already mentioned; another of importance is the central (Le Creusot,&c.) and a third, the southern, about the lower course of the Rhone. Coal is pretty widely distributed in Spain, and occurs in several districts in the Balkan peninsula. In Russia, besides the Polish field, there is an important one south of Moscow, and another in the lower valley of the Donetz, north of the Sea of Azov. The European region poorest in coal (proportionately to area) is Scandinavia, where there is only one field of economic value— a small one in the extreme south of Sweden.

In Asia the Chinese coalfields are of peculiar interest. They are widely distributed throughout China Proper, but those of the province of Shansi appear to be the richest. Proportionately to their vast extent they have been little worked. In a modified degree the same is true of the Indian fields; large supplies are unworked, but in several districts, especially about Raniganj and elsewhere in Bengal, workings are fully developed. Similarly in Siberia and Japan there are extensive supplies unworked or only partially exploited. Those in the neighbourhood of Semi- palatinsk may be instanced in the first case and those in the island of Yezo in the second. In Japan, however, several smaller fields (e.g. in the island of Kiushiu) are more fully developed. Coal is worked to some extent in Sumatra, British North Borneo, and the Philippine Islands.

In the United States of America the Appalachian mountain system, from Pennsylvania southward, roughly marks the line of the chief coal-producing region. This group of fields is followed in importance

by the ” Eastern Interior ” group in Indiana, Illinois and Kentucky, and the ” Western Interior ” group in Iowa, Missouri and Kansas. In Arkansas, Oklahoma and Texas, and along the line of the Rocky Mountains, extensive fields occur, producing lignite and bituminous coal. The last- named fields are continued northward in Canada (Crow’s Nest Pass field, Vancouver Island, &c). There is also a group of coalfields on the Atlantic seaboard of the Dominion, principally in Nova Scotia. Coal is known at several points in Alaska, and there are rich but little worked deposits in Mexico.

In the southern countries coal-production is insignificant compared with that in the northern hemisphere. In South America coal is known in Venezuela, Colombia, Peru, northern Chile, Brazil (chiefly in the south), and Argentina (Parana, the extreme south of Patagonia, and Tierra del Fuego), but in no

country are the workings extensive. Africa is apparently the continent poorest in coal, though valuable workings have been developed at various points in British South Africa, e.g. at Kronstad, &c, in Cape Colony, at Vereeniging, Boksburg and elsewhere in the Transvaal, in Natal and in Swaziland. Australia possesses fields of great value, principally in the south-east (New South Wales and Victoria), and in New Zealand considerable quantities of coal and lignite are raised, chiefly in South Island. The following table, based on figures given in the Journal of the Iron and Steel Institute, vol. 72, will give an idea of the coal production of the world: —

Table IV.

Europe : —

Tons.

United Kingdom …. 1905

236,128,936

Germany, coal .

,,

121,298,167

,, lignite

,,

52,498,507

France

,,

35.869,497

Belgium

,,

21,775,280

Austria, coal

12,585,263

,, lignite .

..

22,692,076

Hungary, coal .

1904

1,031,501

„ lignite

,,

5,447,283

Spain ….

1905

3,202,911

Russia ….

1904

19,318,000

Holland

,,

466,997

Bosnia, lignite .

1905

540,237

Rumania ,, .

1903

1 10,000

Servia

1904

183,204

Italy, coal and lignite

1905

412,916

Sweden

,,

322,384

Greece, lignite .

1904

466,997

Asia : —

India ….

1905

8,417,739

Japan

1903

10,088,845

Sumatra

1904

207,280

Africa : —

Transvaal .

1904

2,409,033

Natal

1905

1,129,407

Cape Colony

1904

154,272

America : —

United States

1905

350,821,000

Canada

1904

7,509,860

Mexico

(I

700,000

Peru

1905

72,665

Australasia : —

New South Wales

1905

6,632,138

Queensland

529,326

Victoria

153,135

Western Australia

127,364

Tasmania .

51,993

New Zealand

1,585,756

The questions, what is the total amount of available coal in the coalfields of Great Britain and Ireland, and how long it may Coa l be expected to last, have frequently been discussed

resources since the early part of the 19th century, and particular of Great attention was directed to them after the publication Britain. £ §t an i e y Jevons's book on The Coal Question in 1865. In 1866 a royal commission was appointed to inquire into the subject, and in its report, issued in 1871, estimated that the

Table V.

District.

Coalfield.

I.

II.

III.

A.

B.

C. D.

. E.

F. G.

(South Wales and Monmouthshire J Somersetshire and part of Glou- 1 cestershire

f North Stafford

South Stafford

J Lancashire . . . . . LNorth Wales

fNorthumberland

< Cumberland

Scotland

Ireland

33,443,000,339

No details

305,928,137 5,267,833,074 1,953,627,435 1,448,804,556 2,467,583,205 369,174,620 5,349,554.437 358,998,172 2,513,026,200

No details No details

7,040,348,127 2,188,938,830 6,607,700,522 21,259,767,661

No details

6,972,003,760

No details

47,394,690 899,782,727

538,179,363

321,822,653

642,124,654

48,180,921

1,111,046,710

67,165,901

776,558,371

No details

No details

1,530,722,486

661,230,025

1,336,584,176

5,579,3H,305

No details

26,470,996,579

4,198,301,099

258,533,447 4,368,050,347 1,415,448,072 1,126,981,903 1,825,458,551

320,993,699 4,238,507,727

291,832,271 1,736,467.829 19,138,006,395 7,360,725,100 5.509.625,641 1,527,708,805 5,271,116,346 15,681,456,356

174,458,000

coal resources of the country, in seams of 1 ft. thick and upwards situated within 4000 ft. of the surface, amounted to 90,207,285,398 tons. A second commission, which was appointed in 1901 and issued its final report in 1.905, taking 4000 ft. as the limit of practicable depth in working and 1 ft. as the minimum workable thickness, and after making all necessary deductions, estimated the available quantity of coal in the proved coalfields of the United Kingdom as 100,914,668,167 tons. Although in the years 1870-1903 the amount raised was 5,694,028,507 tons, this later estimate was higher by 10,707,382,769 tons than that of the previous commission, the excess being accounted for partly by the difference in the areas regarded as productive by the two commissions, and partly by new discoveries and more accurate knowledge of the coal seams. In addition it was estimated that in the proved coalfields at depths greater than 4000 ft. there were 5,239,433,980 tons, and that in concealed and unproved fields, at depths less than 4000 ft. there were 39,483,844,000 tons, together with 854,608,307 tons in that part of the Cumberland coalfield beyond 5 m. and within 12 m. of high-water mark, and 383,024,000 tons in the South Wales coal- field under the sea in St Bride's Bay and part of Carmarthen Bay.

In Table V. below column I. shows the quantity of coal still remaining unworked. in the different coalfields at depths not exceeding 4000 ft. and in seams not less than 1 ft. thick, as estimated by seven district commissioners; column II. the total estimated reductions on account of loss in working due to faults and other natural causes in seams and of coal required to be left for barriers, support of surface buildings, &c. ; and column III. the estimated net available amount remaining unworked.

As regards the duration of British coal resources, the com- missioners reported (1905): —

" This question turns chiefly upon the maintenance or the varia- tion of the annual output. The calculations of the last Coal Com- mission as

to the future exports and of Mr Jevons as to the future annual consumption make us hesitate to prophesy how long our coal resources are likely to last. The present annual output is in round numbers 230 million tons, and the calculated available resources in the proved coalfields are in round numbers 100,000 million tons, exclusive of the 40,000 million tons in the unproved coalfields, which we have thought best to regard only as probable or speculative. For the last thirty years the average increase in the output has been 2\ % per annum, and that in the exports (including bunkers) \% per annum. It is the general opinion of the Dis- trict Commissioners that owing to physical considerations it is highly probable that the present rate of increase of the putput of coal can long continue — indeed, they think that some districts have already attained their maximum output, but that on the other hand the developments in the newer coalfields will possibly increase the total output for some years.

In view of this opinion and of the exhaustion of the shallower collieries we look forward to a time, not far distant, when the rate of increase of output will be slower, to be followed by a period of stationary output, and then a gradual decline."

According to a calculation made by P. Freeh in 1900, on the basis of the then rate of production, the coalfields of central France, central Bohemia, the kingdom of Saxony, the Prussian

province of Saxony and the north of England, would be exhausted in 100 to 200 years, the other British coalfields, the Waldenburg-Schatz- lar and that of the north of France in 250 years, those of Saarbriicken, Belgium, Aachen and Westphalia in 600 to 800 years, and those of Upper Silesia in more than 1000 years. (O. J. R. H.; H. M. R.)

Coal-Mining. The opening and laying out, or, as it is generally called, "winning," of new collieries is rarely preUmia- undertaken without a ary trial preliminary examination ofcoai- of the character of the """"*""#*• strata by means of borings, either for the purpose of determining the

number and nature of the coal seams in new ground, or the position of the particular seam or seams which it is proposed to work in extensions of known coalfields.

The principle of proving a mineral field by boring is illustrated by fig.

i, which represents a line direct from the dip to the rise of the field, the inclination of the strata being one in eight. No. i bore is commenced at the dip, and reaches a seam of coal A, at 43 fathoms; at this depth it is considered proper to remove nearer t.< the outcrop so that lower strata may be bored into at a less depth, and a second bore is commenced. To find the position of No. 2, so as to form a continuous section, it is necessary to reckon the inclination of the strata, which is 1 in 8; and as

Fig. 1. — Proving by Boreholes.

bore No. 1 was 40 fathoms in depth, we multiply the depth by the rate of inclination, 40 X 8 = 320 fathoms, which gives the point at which the coal seam A should reach the surface. But there is generally a certain depth of alluvial cover which requires to be deducted, and which we call 3 fathoms, then (40 — 3 = 37) X 8 = 296 fathoms; or say 286 fathoms is the distance that the second bore should be placed to the rise of the first, so as to have, for certain, the seam of coal A in clear connexion with the seam of coal B. In bore No. 3, where the seam B, according to the same system of arrangement, should have been found at or near the surface, another seam C is proved at a considerable depth, differing in character and thickness from either of the preceding. This derangement being carefully noted, another bore to ths outcrop on the same principle is put down for the purpose of proving the seam C ; the nature of the strata at first is found to agree with the latter part of that bored through in No. 3, but immediately on crossing the dislocation seen in the figure it is changed and the deeper seam D is found.

The evidence therefore of these bores (3 and 4) indicates some material derangement, which is then proved by other bores, either towards the dip or the outcrop, according to the judgment of the borer, so as to ascertain the best position for sinking pits. (For the methods of boring see Boring.)

The working of coal may be conducted either by means of levels or galleries driven from the outcrop in a valley, or by shafts or pits sunk from the surface. In the early Methods fay & f coa l-mining, open working, or quarrying from working. tne outcrop of the seams, was practised to a consider- able extent; but there are now few if any places in England where this can be done. In 1873 there could be seen, in the thick coal seams of Bengal, near Raniganj, a seam about 50 ft. thick laid bare, over an area of several acres, by stripping off a superficial covering varying from 10 to 30 ft., in order to remove the whole of the coal without loss by pillars. Such a case, however, is

quite exceptional. The operations by which the coal is reached and laid out for removal are known as ” win- ning,” the actual working or extraction of the coal being termed ” getting.” In fig. 2 A B is a cross cut level, by which the seams of coal 1 and 2 are won, and C D a vertical shaft by which the seams 1, 2 and 3 are won. When the field is won by the former method, the coal lying above the level is said to be “level-free.” The mode of winning by level is of lass general application than that by shafts, as the capacity for production is less, owing to the smaller size of roadways by which the coal must be brought to the surface, levels of large section being expensive and difficult to keep open when the mine has been for some time at work. Shafts, on the other hand, may be made of almost any capacity, owing to the high speed in drawing which is attainable

with proper mechanism, and allow of the use of more perfect arrangements at the surface than can usually be adopted at the mouth of a level on a hill-side. A more cogent reason, how- ever, is to be found in the fact that the principal coalfields are in flat countries, where the coal can only be reached by vertical sinking.

The methods adopted in driving levels for collieries are generally similar to those adopted in other mines. The ground is secured by timbering, or more usually by arching in masonry or brick- work. Levels like that in fig. 2, which are driven across the stratification, or generally anywhere not in coal, are known as ” stone drifts.” The sinking of colliery shafts, how- ever, differs considerably from that of other mines, owing to their generally large size, and the difficulties shattsf”’ that are often encountered from water during the sinking. The actual coal measure strata, consisting mainly of shales and clays, are generally impervious to water, but when strata of a permeable character are sunk through, such as the magnesian limestone of the north of England, the Permian sandstones of the central counties, or the chalk and greensand in the north of France and Westphalia, special methods are required in order to pass the water-bearing beds, and to protect the shaft and workings from the influx of water subsequently. Of these methods one of the chief is the plan of tubbing, or lining the excavation with an impermeable casing of wood or ” ” s ‘ iron, generally the latter, built up in segments forming rings, which are piled upon each other throughout the whole depth of the water-bearing strata. This method necessitates the use of very considerable pumping power during the sinking, as the water has to be kept down in order to allow the sinkers to reach a water-tight stratum upon which the foundation of the tubbing

Fig. 2. — Shaft and Level.

can be placed. This consists of a heavy cast iron ring, known as a wedging crib, or curb, also fitted together in segments, which is lodged in a square-edged groove cut for its reception, tightly caulked with moss, and wedged into position. Upon this the tubbing is built up in segments, of which usually from 10 to 12 are required for the entire circumference, the edges being made perfectly true. The thickness varies according to the pressure expected, but may be taken at from f to i| in. The inner face is smooth, but the back is strengthened with angle brackets at the corners. A small hole is left in the centre of each segment, which is kept open during the fitting to prevent undue pressure upon any one, but is stopped as soon as the circle is completed. In the north of France and Belgium wooden tubbings, built of polygonal rings, were at one time in general use. The polygons adopted were of 20 or more sides approximating to a circular form.

The second principal method of sinking through water-bearing ground is by compressed air. The shaft is lined with a cylinder of wrought iron, within which a tubular chamber, provided with doors above and below, known as an B i^^° air-lock, is fitted by a telescopic joint, which is tightly packed so as to close the top of the shaft air-tight. Air is then forced into the inclosed space by means of a compressing engine, until the pressure is sufficient to oppose the flow of water into the excavation, and to drive out any that may collect in the bottom of the shaft through a pipe which is carried through the air-sluice to the surface. The miners work in the bottom in the same manner as divers in an ordinary diving-bell. Access to the surface is obtained through the double doors of the air-sluice,

the pressure being reduced to that of the external atmosphere when jt is desired to open the upper door, and increased to that of the working space below when it is intended to communicate with the sinkers, or to raise the stuff broken in the bottom. This method has been adopted in various sinkings on the continent of Europe.

The third method of sinking through water-bearing strata is that of boring, adopted by Messrs Kind & Chaudron in Belgium

and Germany. For this purpose a horizontal bar boring. armed with vertical cutting chisels is used, which cuts

out the whole section of the shaft simultaneously. In the first instance,

a smaller cutting frame is used, boring a hole from 3 to s ft. in diameter, which is kept some 50 or 60 ft, in advance, so as to receive the detritus, which is removed by a shell pump of large size. The large trepan or cutter weighs about 16 tons, and cuts a hole of from 9 to 15 ft. in diameter. The water-tight lining may be either a wrought iron tube, which is pressed down by jack screws as the borehole advances, or cast iron tubbing put together in short complete rings, in contra-distinction to the old plan of building them up of segments. The tubbing, which is considerably less in diameter than the borehole, is suspended by rods from the surface until a bed suitable for a foundation is reached, upon which a sliding length of tube, known as the moss box, bearing a shoulder, which is filled with dried moss, is placed. The whole weight of the tubbing is made to bear on the moss, which squeezes outwards, forming a completely water-tight joint. The interval between the back of the tubbing and the sides of the borehole is then filled up with concrete, which on setting fixes the tubbing firmly in position. With increase in depth, however, the thickness and weight of the cast iron tubbing in a large shaft become almost unmanageable; in one instance, at a depth of 1215 ft., the bottom rings in a shaft 14ˆ ft. in diameter are about 4 in. thick, which is about the limit for sound castings. It has therefore been proposed, for greater depths, to put four columns of tubbings of smaller diameters, 8§ and sJft., in the shaft, and fill up the remainder of the boring with concrete, so that with thinner and lighter castings a greater depth may be reached. This, however, has not as yet been tried. Another extremely useful method of sinking through water-bearing ground, introduced by Messrs A. & H. T. Poetsch in 1883, and originally applied to shafts passing through quicksands above brown coal seams, has been applied with advantage in opening new pits through the secondary and tertiary strata above the coal measures in the north of France and Belgium, some of the most successful examples being those at Lens, Anzin and Vicq, in the north of France basin. In this system the soft ground or fissured water-bearing rock is rendered temporarily solid by freezing the contained water within a surface a few feet larger in diameter than the size of the finished shaft, so that the ground may be broken either by hand tools or blasting in the same manner as hard rock. The miners are protected by the frozen wall, which may be 4 or 5 ft. thick. The freezing is effected by circulating brine (calcium chloride solution) cooled to 5 F. through a series of vertical pipes closed at the bottom, contained in boreholes arranged at equal distances apart around the space to be frozen, and carried down to a short distance below the bottom of the ground to be secured. The chilled brine enters through a central tube of small diameter, passes to the bottom of the outer one and rises through the latter to the surface,

each system of tubes being connected above by a ring main with the circulating pumps. The brine is cooled in a tank filled with spiral pipes, in which anhydrous ammonia, previously liquefied by compression, is vaporized in vacuo at the atmospheric temperature by the sensible heat of the return- current of brine, whose temperature has been slightly raised in its passage through the circulating tubes. When hard ground is reached, a seat is formed for the cast iron tubbing, which is built up in the usual way and concreted at the back, a small quantity of caustic soda being sometimes used in mixing the concrete to prevent freezing. In an application of this method at Vicq , two shafts of 12 and 16-4 ft. diameter, in a covering of cretaceous strata, were frozen to a depth of 300 ft. in fifty days,

the actual sinking and lining operations requiring ninety days more. The freezing machines were kept at work for 200 days, and 2191 tons of coal were consumed in supplying steam for the compressors and circulating pumps.

The introduction of these special methods has considerably simplified the problem of sinking through water-bearing strata. Some of the earlier sinkings of this kind, when pumps had to be depended on for keeping down the water, were conducted at great cost, as, for instance, at South Hetton, and more recently Ryhope, near Sunderland, through the magnesian limestone of Durham.

The size and form of colliery shafts vary in different districts. In the United States and Scotland rectangular pits secured by timber framings are still common, but the tendency is now generally to make them round, 20 ft. being about shafts the largest diameter employed. In the Midland counties, from 7 to 9 ft. is a very common size, but larger dimen- sions are adopted where a large production is required. Since the accident at Hartley colliery in 1862, caused by the breaking of the pumping-engine beam, which fell into the shaft and blocked it up, whereby the whole of the men then at work in the mine were starved to death, it has been made compulsory upon mine-owners in the United Kingdom to have two pits for each working, in place of the single one divided by walls or brattices which was formerly thought sufficient. The use of two inde- pendent connexions — whether separate pits or sections of the same pit, between the surface and the workings — is necessary for the service of the ventilation, fresh air from the surface being carried down one, known as the ” downcast,” while the foul or return air of the mine rises through the other or ” upcast ” pit back to the surface. In a heavily-watered mine it is often necessary to establish a special engine-pit, with pumps per- manently fixed, or a division of one of the pits may be devoted to this purpose.

The pumps, placed close to the point where the water accumulates, may be worked by an engine on the surface by means of heavy reciprocating rods which pass down the shaft, or by underground motors driven by steam, compressed air 01 electricity.

Where the water does not accumulate very rapidly it is a common practice to allow it to collect in a pit or sump below the working bottom of the shaft, and to draw it off in a water tub or ” hoppet ” by the main engine, when the latter is not employed in raising coal.

The laying out of a colliery, after the coal has been won, by sinkings or levels, may be accomplished in various ways, accord- ing to the nature of the coal, its thickness and dip, and the extent of ground to be worked. In the South ** ng Staffordshire and other Midland coalfields, where only workings. shallow pits are required, and the coals are thick, a pair of pits may be sunk for a very few acres, while in the North of England, on the other hand, where sinking is expensive, a» area of some thousands of acres may be commanded from the same number of pits. In the latter case, which represents the most approved practice, the sinking is usually placed about the centre of the ground, so that the workings may radiate in every direction from the pit bottom, with the view of employing the greatest number of hands to advantage. Where a large area cannot be commanded, it is best to sink to the lowest point of the field for the convenience of drawing the coal and water which become level-free in regard to the pit. Where properties are much divided, it is always necessary to maintain a thick barrier of unwrought coal between the boundary of the mine and the neighbouring workings, especially if the latter are to the dip. If a prominent line of fault crosses the area it may usually be a convenient division of the fields into sections or districts. The first process in laying out the workings consists in driving a gallery on the level along the course of the coal seam, which is known as a ” dip head level,” and a lower parallel one, in which the water collects, known as a ” lodgment level.” Galleries driven at right angles to these are known as a ” dip ” or ” rise headings,” according to their position above or belcw the pit bottom. In Staffordshire the main levels are also known as

” gate roads.” To secure the perpendicularity of the shaft, it is necessary to leave a large mass or pillar of the seam untouched around the pit bottom. This pillar is known in Scotland as the ” pit

bottom stoop.” The junction of the levels with the pit is known as the ” pit eye “; it is usually of an enlarged section, and lined with masonry or brick-work, so as to afford room for handling the wagons or trams of coal brought from the working faces. In this portion of the pit are generally placed the furnaces for ventilation, and the boilers required for working steam engines underground, as well as the stables and lamp cabin.

The removal of the coal after the roads have been driven may be effected in many different ways, according to the custom of

the district. These may, however, working a ˆ be considered as modifications coal. of two systems, viz. pillar work

and long- wall work. In the former, which is also known as “post and stall” or ” bord and pillar ” in the north of England, ” pillar and stall ” in South Wales, and “stoop and room” .in Scotland, the field Wzmmm is divided into strips by numerous openings Hl|l|ll m „ driven parallel to the main rise headings, gHgiˆˆˆK called ” bords ” or ” bord gates,” which are Sˆ again divided by cutting through them at

intervals, so as to leave a series of working. piH ars arranged chequer-wise over

the entire area. These pillars are left for the support of the roof as the work- IMIiili V.ˆ0 ings advance, so as to keep the mine open ||j|§ ||||P and free from waste. In the oldest form of JfcTj – [ˆl! H H this class of working, where the size of the • “]’,||

pillar is equal to the width of the stall or it ‘■g

excavation, about \ of the whole seam will Slimmm!,

be removed, the remainder being left in the pillars. A portion of this may be got by the process known as robbing the pillars, but the coal so obtained is liable to be very much crushed from the pressure of the superincumbent strata. This crushing may take place either from above or below, producing what are known as ‘ creeps ” or ” sits.”

A coal seam with a soft pavement and a hard roof is the most subject to a ” creep.” The first indication is a dull hollow sound heard when treading on the pavement or floor, probably occasioned

however, are so difficult to support that sits take place where the half of the coal is left in pillars. Fig. 4 will convey a general idea of the appearance of sits, — k, m, n showing different stages.

The modern method of pillar working is shown in fig. 5. In the Northumberland steam coal district, where it is carried out in the most perfect manner, the bords are s to 6 yds. in width, while the pillars are 22 yds. broad and 30 yds. long, which are subsequently got out on coming back. In the same figure is also shown the method of working whole coal and pillars at the same time, a barrier of two or three ranges of pillars or a rib of solid coal being left between the working in the solid and those in the pillars. The space from which the entire quantity of coal

Reference

I I:. tUULrJ”

IlipiiiiLJLjai

HHHg — — > ■ Direction of air current lˆpfe Air crossing ., U ‘ Doors — -{ Air split IˆZ Stoppings Brattices

m

JJdWW

j u

Wn4l *-±

Wtˆlmˆm

wˆm

■U

*’ l i r r ~n” “r Tl

**:.VL«-«-_.

Fig. 5. — Pillar Working.

: goaf,”

Fig. 3. — ” Creeps ” in Coal-Mines.

by some of the individual layers parting from each other as shown at a fig. 3; the succeeding stages of creep are shown at b, c, d,f, and g, in the same figure; the last being the final stage, when the coal begins to sustain the pressure from the overlying strata, in common with the

disturbed pavement.

Fig. 4. — ” Sits ” in Mines.

” Sits ” are the reverse of creeps; in the one case the pavement is forced up, and in the other the roof is forced or falls down, for want of proper support or tenacity in itself. This accident generally arises from an improper size of pillars; some roofs,

has been removed is known in different districts as the ” gob,” or ” waste.”

Fig. 6 represents the Lancashire system of pillar working. The area is laid out by two pairs of level drifts, parallel to each other, about 150 yds. apart, which are carried to the boundary. About 100 yds. back from the boundary a communication is made between these levels, from which other levels are driven forward, dividing the coal into ribs of about 25 or 30 yds. wide, which are then cut back by taking off the coal in slices from

Fig. 6. — Lancashire method of working Coal.

the level towards the rise in breadths of about 6 yds. By this method the whole of the coal is got backwards, the main roads being kept in solid coal; the intermediate levels not being driven till they are wanted, a greater amount of support is given, and the pillars are less crushed than is usual in pillar working.

In the South Wales system of working, cross headings are driven from the main roads obliquely across the rise to get a sufficiently easy gradient for horse roads, and from these the stalls are opened out with a narrow entrance, in order to

leave support on either side of the road, but afterwards widening to as great a breadth as the seam will allow, leaving pillars of a minimum thickness. The character of such workings is very irregular in plan, and as the ventilation is attended with con- siderable difficulty, it is now becoming generally superseded by more improved methods.

The second great principle of working is that known as long- wall or long- work, in which the coal is taken away either in broad

faces from roads about 40 or 50 yds. apart and parallel forking. to eac h ot her, or along curved faces between roads

radiating from the pit bottom — the essential feature in both cases being the removal of the whole of the coal at once, without first sub-dividing it into pillars, to be taken away at a

MCASl/ 11 FURI

Fig. 7. — Long-wall method of working Coal in Derbyshire.

second working. The roof is temporarily supported by wooden props or pack walling of stone, for a sufficient breadth along the face to protect the workmen, and allow them to work together behind. The general character of a long-wall working is shown in fig. 7, which represents an area of about 500 acres of the bottom hard steam coal at Shipley in Derbyshire. The principal road extends from the shafts southward; and on both sides of it the coal has been removed from the light-shaded area by cutting it back perpendicularly towards the boundaries, along faces about 50 yds. in length, those nearest to the shaft being kept in advance of those farther away, producing a step-shaped outline to the face of the whole coal. It will be seen that by this method the whole of the seam, with the exception of the pillars left to protect the main roadways, is removed. The roads for drawing the coal from the working faces to the shaft are kept open by walling through the waste or goaf produced by the fall of the unsupported roof. The straight roads are the air-ways for carrying pure air from the down-cast shaft to the working faces, while the .return air passes along the faces and back to the up-cast by the curved road. The above is the method of working long-wall forward, i.e. taking the coal in advance from the pit towards the boundary, with roads kept open through the gob. Another method consists in driving towards the boundary, and taking the coal backward towards the shafts, or working homeward, allowing the waste to close up without roads having to be kept open through it. This is of course preferable, but is only applicable where the owner of the mine can afford to expend the capital required to reach the limit of the field in excess of that necessary when the raising of coal proceeds pari passu with the extension of the main roads. Fig. 6 is sub- stantially a modification of this kind of long-wall work. y 0u l* Fig. 8 represents a method of working practised in

method. the South Yorkshire district, known as bords and banks. The field is divided by levels and headings into rectangular banks, while from the main levels bords or wickets about 30 yds. wide, separated

from each other by banks of about the same width, are carried forward in long-wall work, as shown on the left side of the figure, the waste being carefully packed behind so as to secure the ventilation. When these have been worked up to the extremity, as shown on the right side, the inter- mediate bank is removed by working backward towards the level. This system, therefore, combines both methods of long- wall working, but it is not generally applicable, owing to the

difficulty of ventilation, due to the great length of air-way that has to be kept open around the waste on each bank.

The relative advantages of the different methods may be generally stated as follows. Long-wall work is best suited for thin coals, and those having a good roof, i.e. one that gives way gradually and fills up the excavation made by removing the coal without scaling off suddenly and falling into the working faces, when practically the whole of the coal may be removed. Against these advantages must be placed the difficulties attending the maintenance of roads through the goaves, and in some cases the large proportion of slack to round or large coal obtained. Pillar working, in the whole coal, is generally reputed to give a more advantageous proportion of round coal to slack, the latter being more abundantly produced on the removal of the pillars, but as these form only a small portion of the whole seam, the general yield is more advantageous than in the former method. The ventilation of pillar working is often attended with difficulty, and the coal is longer exposed to the influence of the air, a point of importance in some coals, which deteriorate in quality when exposed to a hot damp atmosphere. The great increase in the size of the pillars in the best modern collieries worked upon this principle has, however, done much to approximate the two systems to an equality in other respects.

Where the whole of the coal is removed at once there is less chance of surface damage, when the mines are deep, than with pillar workings. A notable instance of this was afforded at Newstead, Notts, where the ruined front of Newstead Abbey was lowered several feet without any injury to the structure.

The working of very thick seams presents certain special peculiarities, owing to the difficulties of supporting the roof in the excavated portions, and supplying fresh air to the workings. The most typical example of this kind of thick working in England is afforded by the thick coal seams. of South Staffordshire, which consists of a series of closely associated coal seams, varying from 8 to 12 or 13, divided

from each other by their partings, but making together one great bed of from 25 to 40 ft. or more in thickness. The partings together do not amount to more than 2 or 3 ft. The method of working which has been long in use is represented in fig. 9. The main level or gate road is driven in the benches coal, or lower part of the seam, while a smaller drift for ventilation, called an air heading, is carried above it in one of the upper beds called the slipper coal. From the gate road a heading called a bolt-hole is opened, and extended into a large rectangular chamber, known as a ” side of work,” large pillars being left at regular intervals, besides smaller ones or cogs. The order in which the coal is cut is shown in the dotted and numbered squares in the figure. The coal is first cut to the top of the ˆlipper coal from below, after which the upper portion is either broken down by wedging or falls of itself. The working of these upper portions is exceedingly

dangerous, owing to the great height of the excavations, and fatal accidents from falls of roof are in consequence more common in South Staffordshire than in any other coalfield in this country. The air from the down-cast shaft enters from the gate road, and passes to the up-cast through the air heading above. About one- half of the total coal (or less) is obtained in the first working ; the roof is then allowed to fall, and when the gob is sufficiently consolidated, fresh roads are driven through it to obtain the ribs and pillars left behind by a second or even, in some cases, a third

Fig. 9. — South Staffordshire method of working Thick Coal.

working. The loss of coal by this method is very considerable, besides great risk to life and danger from fire. It has, therefore, been to some extent superseded by the long- wall method, the upper half being taken at the first working, and removed as completely as possible, working backwards from the boundaries to the shaft. The lower half is then taken in the same manner, after the fallen roof has become sufficiently consolidated to allow the mine to be re-opened.

In the working of thick seams inclined at a high angle, such as those in the south of France, and in the lignite mines of Styria and Bohemia, the method of working in horizontal slices, about 1 2 or 1 5 ft. thick, and filling up the excavation with broken rock and earth from the

surface, is now generally adopted in pre- ference to the systems formerly used. At Monceaux les Mines, in France, a seam 40 ft. thick, and dipping at an angle of 20 , is worked in the following manner. A level is driven in a sandstone forming the floor, along the course of the coal, into which com- munications are made by cross cuts at intervals of 16 yds., which are driven across to the roof , dividing up the area to be worked into panels. . These are worked backwards, the coal being taken to a height of 20 ft., the opening being packed up with stone sent down from the surface. As each stage is worked out, the floor level is connected with that next below it by means of an incline, which facilitates the introduction of the packing material. Stuff contain- ing a considerable amount of clay is found to be the best suited for the purpose of filling, as it consolidates readily under pressure.

In France and Germany the method of filling the space left by the removal of the coal with waste rock, quarried under- ground or sent down from the surface, which was originally used in connexion with the working of thick inclined seams by the method of horizontal slices, is now largely extended to long-wall workings on thin seams, and in Westphalia is made compulsory where workings extend below surface buildings, and safety pillars of unwrought coal are found to be insufficient. With careful packing it is estimated that the surface subsidence will not exceed 40% of the thickness of the seam removed, and will usually be considerably less. The material for filling may be the waste from earlier workings stored in the spoil banks at the surface; where there are blast furnaces in the neighbourhood, granulated slag mixed with earth affords excellent packing. In thick seams packing adds about sd. per ton to the cost of the coal, but in thinner seams the advantage is on the other side.

In some anthracite collieries in America the small coal or culm and other waste are washed into the exhausted workings by water which gives a compact mass filling the excavation when the water has drained away. A modification of this method, which originated in Silesia, is now becoming of importance in many European coalfields. In this the filling material, preferably sand, is sent down from the surface through a vertical steel pipe mixed with sufficient water to allow it to flow freely through distributing pipes in the levels commanding the excavations to be filled; these are closed at the bottom by screens of boards sufficiently close to retain the packing material while allowing the water to pass by the lower level to the pumping-engine which returns it to the surface.

The actual cutting of the coal is chiefly performed by manual labour,

the tool employed being a sharp-pointed double-armed pick, which is nearly straight, except when required for use in hard rock, when the arms are made with an Methods inclination or ” anchored.” The terms pike, pick, coat mandril and slitter are applied to the collier’s pick in different districts, the men being known as pikemen or hewers. In driving levels it is necessary to cut grooves vertically parallel to the walls, a process known as shearing; but the most import- ant operation is that known as holing or kirving, which consists in cutting a notch or groove in the floor of the seam to a depth of about 3 ft., measured back from the face, so as to leave the overhanging part unsupported, which then either falls of its own accord within a few hours, or is brought down either by driving wedges along the top, or by blasting. The process of holing in coal is one of the severest kinds of human labour. It has to be performed in a constrained position, and the miner lying on his side has to cut to a much greater height, in order to get room to carry the groove in to a sufficient depth, than is required to bring the coal down, giving rise to a great waste in slack as com- pared with machine work. This is some- times obviated by holing in the beds below the coal, or in any portion of a seam of inferior quality that may not be worth working. This loss is proportionately greater in thin than in thick seams, the same quantity being cut to waste in either case. The method of cutting coal on the long-wall system is seen in fig. 10, representing the work- ing at the Shipley col- liery. The coal is 40 in. thick, with a seam of fire-clay and a roof of black shale; about 6 in. of the upper part, known as the roof coal, not being worth work- ing, is left behind. A groove of triangular section of 30 in. base inclined timber props

6fe!l

Fig.

10. — Long-wail working-face- Plan and Section.

and 9 in. high is cut along the face, being placed at intervals to support the overhanging portion until the required length is cut. These are then removed, and the coal is allowed to fall, wedges or blasting being employed when necessary. The roof of the excavation is supported as the coal is removed, by packing up the waste material, and by a double row of props, 2 ft. from each other, placed temporarily along the face. These are placed 5 ft. apart,, the props of the back row alternating with those in front.

The props used are preferably of small oak or English larch, but large quantities of fir props, cut to the right length, are also imported from the north of Europe. As the work proceeds onwards, the props are withdrawn and replaced in advance, except those that may be crushed by the pressure or buried by sudden falls of the roof.

In Yorkshire hollow square pillars, formed by piling up short blocks of wood or chocks, are often used instead of props formed of a single stem.

In securing the roof and sides of coal workings, malleable iron and steel are now used to some extent instead of timber, although the consumption of the latter material is extremely large. As a substitute for timber props at the face, pieces of steel joists, with the web cut out for a short distance on either end, v/ith the flanges turned back to give a square bearing surface, have been introduced. In large levels only the cap pieces for the roof are made of steel joists, but in smaller ones complete arches made of pieces of rails fish-jointed at the crown are used. In another system introduced by the Mannesmann Tube Company the prop is made up of weldless steel tubes sliding telescopically one within the other, which are fixed at the right height by a screw clamp capable of carrying a load of 15 to 16 tons. These can be most advantageously used on thick seams 6 to 10 ft. or upwards. For shaft linings steel rings of H or channel section supported by intermediate struts are also used, and cross-bearers or buntons of steel joists and rail guides are now generally substituted for wood.

When the coal has been under-cut for a sufficient length, the struts are withdrawn, and the overhanging mass is allowed to fall during the time that the workmen are out of the pit, or it may be brought down by driving wedges, or if it be of a com- pact character a blast in a borehole near the roof may be required. Sometimes, but rarely, it happens that it is necessary to cut vertical grooves in the face to determine the limit of the fall, such limits being usually dependent upon the cleet or divisional planes in the coal, especially when the work is carried perpendicular to them or on the end.

The substitution of machinery for hand labour in cutting coal has long been a favourite problem with inventors, the earliest plan being that of Michael Meinzies, in 1761, who cutting proposed to work a heavy pick underground by power machines, transmitted from an engine at the surface, through the agencies of spear-rods and chains passing

over pulleys; but none of the methods suggested proved to be practically successful until the general introduction of compressed air into mines furnished a convenient motive power, susceptible of being carried to considerable distances without any great loss of pressure. This agent has been applied in various ways, in machines which either imitate the action of the collier by cutting with a pick or make a groove by rotating cutters attached to an endless chain or a revolving disk or wheel. The most successful of the first class, or pick machines, that of William Firth of Sheffield, consists essentially of a horizontal pick with two cutting arms placed one slightly in advance of the other, which is swung backwards and forwards by a pair of bell crank levers actuated by a horizontal cylinder engine mounted on a railway truck. The weight is about 15 cwt. At a working speed of 60 yds. per shift of 6 hours, the work done corresponds to that of twelve average men. The width of the groove cut is from 2 to 3 in. at the face, diminishing to i| in. at the back, the pro- portion of waste being very considerably diminished as com- pared with the system of holing by hand. The use of this machine has allowed a thin seam of cannel, from 10 to 14 in. in thickness, to be worked at a profit, which had formerly been abandoned as too hard to be worked by hand-labour. Pick machines have also been introduced by Jones and Levick, Bidder, and other inventors, but their use is now mostly abandoned in favour of those working continuously.

In the Gartsherrie machine of Messrs Baird, the earliest of the flexible chain cutter type, the chain of cutters works round a fixed frame or jib projecting at right angles from the engine carriage, an arrangement which makes it necessary to cut from

the end of the block of coal to the full depth, instead of holing into it from the face. The forward feed is given by a chain winding upon a drum, which hauls upon a pulley fixed to a prop about 30 yds. in advance. This is one of the most compact forms of machine, the smaller size being only 20 in. high. With an air pressure of from 35 to 40 ft. per sq. in., a length of from 300 to 350 ft. of coal is holed, 2 ft. in. deep, in the shift of from 8 to 10 hours. The chain machine has been largely developed in America in. the Jeffrey, Link Bell, and Morgan Gardner coal cutters. These are similar in principle to the Baird machine, the cutting agent being a flat link chain carrying a double set of chisel points, which are drawn across the coal face at the rate of about S ft. per second; but, unlike the older machines, in which the cutting is done in a fixed plane, the chain with its motor is made movable, and is fed forward by a rack-and-pinion motion as the cutting advances, so that the cut is limited in breadth (35 to 4 ft.), while its depth may be varied up to the maximum travel (8 ft.) of the

cutting frame. The carrying frame, while the work is going on, is fixed in position by jack' screws bearing against the roof of the seam, which, when the cut is completed, are withdrawn, and the machine shifted laterally through a distance equal to the breadth of the cut and fixed in position again. The whole operation requires from 8 to 10 minutes, giving a cutting speed of 120 to 150 sq. ft. per hour. These machines weigh from 20 to 22 cwt., and are mostly driven by electric motors of 25 up to 35 h.p. as a maximum. By reason of their intermittent action they are only suited for use in driving galleries or in pillar-and-stall workings.

A simple form of the saw or spur wheel coal-cutting machine is that of Messrs Winstanly & Barker (fig. n), which is driven

Fig. 11. — Winstanly & Barker's Coal-cutting Machine — Plan.

by a pair of oscillating engines placed on a frame running on rails in the usual way. The crank shaft carries a pinion which gears into a toothed wheel of a coarse pitch, carrying cutters at the ends of the teeth. This wheel is mounted on a carrier which, being movable about its centre by a screw gearing worked by hand, gives a radial sweep to the cutting edges. When at work it is slowly turned until the carrier is at right angles to the frame, when the cut has attained the full depth. The forward motion is given by a chain winding upon a crab placed in front, by which it is hauled slowly forward. With 25 lb pressure it will hole 3 ft. deep, at the rate of 30 yds. per hour, the cut being only 2f in. high, but it will only work on one side of the carriage. This type has been greatly improved and now is the most popular machine in Great Britain, especially in long-wall workings. W. E. Garforth's Diamond coal cutter, one of the best known, undercuts from 55 to 6 ft. In some instances electric motors have been substituted for compressed-air engines in such machines.

Another class of percussive coal-cutters of American origin is represented by the Harrison, Sullivan and Ingersoll-Sergeant machines, which are essentially large rock-drills without turning gear for the cutting tool, and mounted upon a pair of wheels placed so as to allow the tool to work on a forward slope. When in use the machine is placed upon a wooden platform inclining

towards the face, upon which the miner lies and controls the direction

of the blow by a pair of handles at the back of the machine, which is kept stationary by wedging the wheels against a stop on the platform. These machines, which are driven by compressed air, are very handy in use, as the height and direction of the cut may be readily varied; but the work is rather severe to the driver on account of the recoil shock of the piston, and an assistant is necessary to clear out the small coal from the cut, which limits the rate of cutting to about 125 sq.ft. per hour.

Another kind of application of machinery to coal mining is that of Messrs Bidder & Jones, which is intended to replace the use of blasting for bringing down the coal. It consists wedlimr °* a sma ˆ hydraulic press, which forces a set of expand- machiaes. ing bits or wedges into a bore-hole previously bored by a long screw augur or drill, worked by hand, the action of the press being continued until a sufficient strain is obtained to bring down the coal. The arrangement is, in fact, a modification of the plug and feather system used in stone quarrying for obtaining large blocks, but with the substitution of the powerful rending force of the hydraulic press for hand- power in driving up the wedges. This apparatus has been used at Harecastle in North Staffordshire, and found to work well, but with the disadvantage of bringing down the coal in un- manageably large masses. A method of wedging down coal sufficiently perfected to be of general application would add greatly to the security of colliers.

The removal of the coal broken at the working face to the pit bottom may in small mines be effected by hand labour, but more Voder- generally it is done by horse or mechanical traction, ground upon railways, the ” trams ” or ” tubs,” as the pit convey wagons are called, being where possible brought up to aace ‘ the face. In steeply inclined seams passes or shoots

leading to the main level below are sometimes used, and in Belgium iron plates are sometimes laid in the excavated ground to form a slide for the coal down to the loading place. In some instances travelling belts or creepers have been adopted, which deliver the coal with a reduced amount of breakage, but this application is not common. The capacity of the trams varies with the size of the workings and the shaft. From 5 to 7 cwt. are common sizes, but in South Wales they are larger, carrying up to one ton or more. The rails used are of flat bottomed or bridge section varying in weight from 15 to 25 lb to the yd.; they are laid upon cross sleepers in a temporary manner, so that they can be easily shifted along the working faces, but are carefully secured along main roads intended to carry traffic continuously for some time. The arrangement of the roads at the face is shown in the

plan, fig. 10. In the main roads to the pit when the distance is not considerable horse traction may be used, a train of 6 to 1 5 vehicles being drawn by one horse, but more generally the hauling or, as it is called in the north of England, the leading of the trains of tubs is effected by mechanical traction.

In a large colliery where the shafts are situated near the centre of the field, and the workings extend on all sides, both to the dip and rise, the drawing roads for the coal may be of three different kinds — (1) levels driven at right angles to the dip, suitable for horse roads, (2) rise ways, known as jinny roads, jig-brows, or up-brows, which, when of sufficient slope, may be used as self-acting planes, i.e. the loaded waggons may be made to pull back the empty ones to the working faces, and (3) dip or down-brows, requiring engine power. A road may be used as a self-acting or gravitating incline when the gradient is 1 in 30 or steeper, in which case the train is lowered by a rope passing over a pulley or brake drum at the upper end, the return empty train being attached to the opposite end of the rope and hauled up by the descending load. The arrangements for this purpose vary, of course, with the amount of work to be done with one fixing of the machinery; where it is likely to be used for a considerable time, the drum and brake are solidly constructed, and the ropes of steel or iron wire carefully guided over friction rollers, placed at intenrals between the rails to prevent them from chafing and wearing out on the ground. Where the load has to be hauled up a rising gradient, underground engines, driven by steam or compressed air or

electric motors, are used. In some cases steam generated in boilers at the surface is carried in pipes to the engines below, but there is less loss of power when compressed air is sent down in the same way. Underground boilers placed near the up-cast pit so that the smoke and gases help the ventilating furnace have been largely used but are now less favourably regarded than formerly. Water-pressure engines, driven by a column of water equal to the depth of the pit, have also been employed for hauling. These can, however, only be used advantageously where there are fixed pumps, the fall of water generating the power resulting in a load to be removed by the expenditure of an equivalent amount of power in the pumping engine above that necessary for keeping down the mine water.

The principal methods in which power can be applied to underground traction are as follows: —

1. Tail rope system.

2. Endless chain system.

3. Endless rope system on the ground.

4. Endless rope system overhead.

The three last may be considered as modifications of the same principle. In the first, which is that generally used in Northumberland and Durham, a single line of rails is used, the loaded tubs being drawn ” out bye,” i.e. towards the shaft, and the empty ones returned ” in bye,” or towards the working faces, by reversing the engine; while in the other systems, double lines, with the rope travelling continuously in the same direction, are the rule. On the tail rope plan the engine has two drums worked by spur gearing, which can be connected with, or cast loose from, the driving shaft at pleasure. The main rope, which draws out the loaded tubs, coils upon one drum, and passes near the floor over guide sheaves placed about 20 ft. apart. The tail rope, which is of lighter section than the main one, is coiled on the second drum, passes over similar guide sheaves placed near the roof or side of the gallery round a pulley at the bottom of the plane, and is fixed to the end of the train or set of tubs. When the load is being drawn out, the engine pulls directly on the main rope, coiling it on to its own drum, while the tail drum runs loose paying out its rope, a slight brake pressure being used to prevent its running out too fast. When the set arrives out bye, the main rope will be wound up, and the tail rope pass out from the drum to the end and back, i.e. twice the length of the way; the set is returned in bye, by reversing the engine, casting loose the main, and coupling up the tail drum, so that the tail rope is wound up and the main rope paid out. This method, which is the oldest, is best adapted for ways that are nearly level, or when many branches are intended to be worked from one engine, and can be carried round curves of small radius without deranging the trains; but as it is intermittent in action, considerable engine-power is required in order to get up the required speed, which is from 8 to 10 m. per hour. From 8 to 10 tubs are usually drawn in a set, the ways being often from 2000 to 3000 yds. long. In dip workings the tail rope is often made to work a pump connected with the bottom pulley, which forces the water back to the cistern of the main pumping engine in the pit.

For the endless chain system, which is much used in the Wigan district, a double line of way is necessary, one line for full and the other for empty tubs. The chain passes over a pulley driven by the engine, placed at such a height as to allow it to rest upon the tops of the tubs, and round a similar pulley at the far end of the plane. The

forward edge of the tub carries a projecting pin or horn, with a notch into which the chain falls which drags the tub forward. The road at the outer end is made of a less slope than the chain, so that on arrival the tub is lowered, clears the pin, and so becomes detached from the chain. The tubs are placed on at intervals of about 20 yds., the chain moving con- tinuously at a speed of from 25 to 4 m. per hour. This system presents the greatest advantages in point of economy of driving power, especially where the gradients are variable, but is ex- pensive in first cost, and is not well suited for curves, and branch roads cannot be worked continuously, as a fresh set of pulleys worked by bevel gearing is required for each branch.

The endless rope system may be used with either a single or

Ventlla Hon.

double line of way, but the latter is more generally advantageous. The rope, which is guided upon sheaves between the rails, is taken twice round the head pulley. It is also customary to use a stretching pulley to keep the rope strained when the pull of the load diminishes. This is done by passing a loop at the upper end round a pulley mounted in a travelling frame, to which is attached a weight of about 15 cwt. hanging by a chain. This weight pulls directly against the rope; so if the latter slacks, the weight pulls out the pulley frame and tightens it up again. The tubs are usually formed into sets of from 2* to 12, the front one being coupled up by a short length of chain to a clamping hook formed of two jaws moulded to the curve of the rope which are attached by the ” run rider,” as the driver accompanying the train is called. This system in many respects resembles the tail rope, but has the advantage of working with one-third less length of rope for the same length of way.

The endless rope system overhead is substantially similar to the endless chain. The wagons are attached at intervals by short lengths of chain lapped twice round the rope and hooked into one of the links, or in some cases the chains are hooked into hempen loops on the main rope. In mines that are worked from the outcrop by adits or day levels traction by locomotives driven by steam, compressed air or electricity is used to some extent. The most numerous applications are in America.

One of the most important branches of colliery work is the management of the ventilation, involving as it does the supply of fresh air to the men working in the pit, as well as the removal of inflammable gases that may be given off by the coal. This is effected by carrying through the workings a large volume of air which is kept continually moving in the same direction, descending from the surface by one or more pits known as intake or downcast pits, and leaving the mine by a return or upcast pit. Such a circulation of air can only be effected by mechanical means when the workings are of any extent, the methods actually adopted being — (1) The rarefaction of the air in the upcast pit by a furnace placed at the bottom; and (2) Exhaustion by machinery at the surface. The former plan, being the older, has been most largely used, but is becoming replaced by some form of machine.

The usual form of ventilating furnace is a plain fire grate placed under an arch, and communicating with the upcast shaft by an inclined drift. It is separated from the coal by a narrow passage walled and arched in brickwork on both- sides. The size of the grate varies with the requirements of the ventilation, but from 6 to 10 ft. broad and from 6 to 8 ft. long are usual dimensions. The fire should be kept as thin and bright as possible, to reduce the amount of smoke in the upcast. When the mine is free from gas, the furnace may be worked by the return air, but it is better to take fresh air directly from the downcast by a scale, or split, from the main current. The return air from fiery workings is never allowed to approach the furnace, but is carried into the upcast by a special channel, called a dumb drift, some distance above the furnace drift, so as not to come in contact with the products of combustion until they have been cooled below the igniting point of fire-damp. Where the upcast pit is used for drawing coal, it is usual to discharge the smoke and gases through a short lateral drift near the surface into a tall chimney, so as to keep the pit-top as clear as possible for working. Otherwise the chimney is built directly over the mouth of the pit.

Mechanical ventilation may be effected either by direct ex- haustion or centrifugal displacement of the air to be removed. In the first method reciprocating bells, or piston machines, or rotary machines of varying capacity like gas-works exhausters, are employed. They were formerly used on a very large scale in Belgium and South Wales, but the great weight of the moving parts makes it impossible to drive them at the high speed called for by modern requirements, so that centrifugal fans are now generally adopted instead. An early and very successful machine of this class, the Guibal fan, is represented in fig. 12. The fan has eight arms, framed together of wrought iron bars,

with diagonal struts, so as to obtain rigidity with comparative

lightness, carrying flat close-boarded blades at their extremities. It revolves with the smallest possible clearance in a chamber of masonry, one of the side walls being perforated by a large round hole, through which the air from the mine is admitted to the centre of the fan. The lower quadrant of the casing is enlarged spirally, so as to leave a narrow rectangular opening at the bottom, through which the air is discharged into a chimney of gradually increasing section carried to a height of about 25 ft. The size of the discharge aperture can be varied by means of a flexible wooden shutter sliding in a groove in a cast iron plate, curved to the slope of the casing. By the use of the spiral guide casing and the chimney the velocity of the effluent air is gradually

Fig. 12. — Guibal Fan.

reduced up to the point of final discharge into the atmosphere, whereby a greater useful effect is realized than is the case when the air streams freely from the circumference with a velocity equal to that of the rotating fan. The power is applied by steam acting directly on a crank at one end of the axle, and the diameter of the fan may be 40 ft. or more.

The Waddle fan, represented in fig. 13, is an example of another class of centrifugal ventilator, in which a close casing is not used, the air exhausted being discharged from the circum- ference directly into the atmosphere. It consists of a hollow sheet iron drum formed by two conoidal tubes, united together

Fig. 13. — Waddle Fan.

by numerous guide blades, dividing it up into a series of rect- angular tubes of diminishing section, attached to a horizontal axle by cast iron bosses and wrought iron arms. The tubes at their smallest part are connected to a cast iron ring, 10 ft. in diameter, but at their outer circumference they are only 2 ft. apart. The extreme diameter is 25 ft.

By the adoption of more refined methods of construction, especially in the shape of the intake and discharge passages for the air and the forms of the fan blades, the efficiency of the ventilating fan has been greatly increased so that the dimensions can be much reduced and a higher rate of speed adopted. Notable examples are found in the Rateau, Ser and Capell fans, and where an electric generating station is available electric motors can be advantageously used instead of

steam.

The quantity of air required for a large colliery depends upon the number of men employed, as for actual respiration from

ioo to 200 Cub. ft. per minute should be allowed. In fiery mines, however, a very much larger amount must be provided Dlstrlbu- m or der to dilute the gas to the point of safety. Hon of air Even with the best arrangements a dangerous increase under in the amount of gas is not infrequent from the sudden gTOUn • release of stored-up masses in the coal, which, over- powering the ventilation, produce magazines of explosive material ready for ignition when brought in contact with the flame of a lamp or the blast of a shot. The management of such places, therefore, requires the most constant vigilance on the part of the workmen, especially in the examination of the working places that have been standing empty during the night, in which gas may have accumulated, to see that they are properly cleared before the new shift commences.

The actual conveyance or coursing of the air from the intake to the working faces is effected by splitting or dividing the current at different points in its course, so as to carry it as directly as possible to the places where it is required. In laying out the mine it is customary to' drive the levels or roads in pairs, com- munication being made between them at intervals by cutting through the intermediate pillar; the air then passes along one and returns by the other. As the roads ad- vance other pillars are driven through in the same manner, the passages first made being closed by stoppings of broken rock, or built up with brick and mortar walls, or both. When it is desired to preserve a way from one road or similar class of working to another, double doors placed at sufficient intervals apart to take in one or more trams between them when closed are used, forming a kind of lock or sluice. These are made to shut air-tight against their frames, so as to prevent the air from taking a short cut back to the up- cast, while preserving free access between the different districts without following the whole round of the air-ways. The ventila- tion of ends is effected by means of brattices or temporary partitions of thin boards placed midway in the drift, and extend- ing to within a few feet of the face. The air passes along one side of the brattice, courses round the free end, and returns on the other side. In many cases a light but air-proof cloth, specially made for the purpose, is used instead of wood for brattices, as being

more handy and more easily removed. In large mines where the air-ways are numerous and complicated, it often happens that currents travelling in opposite directions are brought together at one point. In these cases it is necessary to cross them. The return air is usually made to pass over the intake by a curved drift carried some distance above in the solid measures, both ways being arched in brickwork, or even in some cases lined with sheet iron so as to ensure a separation not likely to be destroyed in case of an explosion (see figs. 5 and 8). The use of small auxiliary blowing ventilators underground, for carrying air into workings away from the main circuits, which was largely advocated at one time, has lost its popularity, but a useful substitute has been found in the induced draught produced by jets of compressed air or high-pressure water blowing into ejectors. With a jet of jff¥ in area > a pipe discharging if gallon of water per minute at 165 lb pressure per sq. in., a circulation of 850 cub. ft. of air per minute was produced at the end of a level, or about five times that obtained from an equal volumne of air at 60 lb pressure. The increased resistance, due to the large extension of workings from single pairs of shafts, the ventilating currents having often to travel several miles to the upcast, has led to great increase in the size and power of ventilating fans, and engines from 250 to 500 H.P. are not uncommonly used for such purposes.

The lighting of underground workings in collieries is closely connected with the subject of ventilation. In many of the smaller pits in the Midland districts of England, and generally in South Staffordshire, the coals are suffi- ciently free from gas, or rather the gases are not liable to become explosive when mixed with air, to allow the use of naked lights, candles being generally used. Oil lamps are employed in many of the Scotch collieries, and are almost universally used in

Belgium and other European countries. The buildings near the pit bottom, such as the stables and lamp cabin, and even the main roads for some distance, are often in large collieries lighted with gas brought from the surface, or in some cases the gas given off by the coal is used for the same purpose. Where the gases are fiery, the use of protected lights or safety lamps (q.v.) becomes a necessity.

The nature of the gases evolved by coal when freshly exposed to the atmosphere has been investigated by several chemists, more particularly by Lyon Playfair and Ernst von compost- Meyer. The latter observer found the gases given off tion of gas by coal from the district of Newcastle and Durham evolved by to contain carbonic acid, marsh gas or light carburetted coa1 ‘ hydrogen (the fire-damp of the

miner), oxygen and nitrogen. A later investigation, by J. W. Thomas, of the gases dissolved or occluded in coals from South Wales basin shows them to vary considerably with the class of coal. The results given below, which are selected from a much larger series published in the Journal of the Chemical Society, were obtained by heating samples of the different coals in vacuo for several hours at the tempera- ture of boiling water: —

Quality.

Colliery.

Volume per ton in cub. ft.

Composition in Volumes per cent.

Carbonic “Acid.

Oxygen.

Marsh Gas.

Nitro- gen.

Bituminous

Steam Anthracite

Cwm Clydach . Lantwit Navigation Bonville’s Court

19-72

14-34

89-62

198-95

5-44

9-43

13-21

2-62

1-05 2-25 0-49

63-76 31-95 81-64

93-13

29-75

56-34

4-66

4-25

Lighting.

In one instance about 1 % of hydride of ethyl was found in the gas from a blower in a pit in the Rhondda district, which was collected in a tube and brought to the surface to be used in lighting the engine-room and pit-bank. The gases from the bitu- minous house coals of South Wales are comparatively free from marsh gas, as compared with those from the steam coal and anthracite pits. The latter class of coal contains the largest proportion of this dangerous gas, but holds it more tenaciously than do the steam coals, thus rendering the workings com- paratively safer. It was found that, of the entire volume of occluded gas in an anthracite, only one-third could be expelled at the temperature of boiling water, and that the whole quantity, amounting te 650 cub.' ft. per ton, was only to be driven out by a heat of 300 C. Steam coals being softer and more porous give off enormous volumes of gas from the working face in most of the deep pits, many of which have been the scene of disastrous explosions.

The gases evolved from the sudden outbursts or blowers in coal, which are often given off at a considerable tension, are the most dangerous enemy that the collier has to contend with. They consist almost entirely of marsh gas, with only a small quantity of carbonic acid, usually un'der 1 %, and from 1 to 4 % of nitrogen.

Fire-damp when mixed with from four to twelve times its volume of atmospheric air is explosive; but when the proportion is above or below these limits it burns quietly with a pale blue flame.

The danger arising from the presence of coal dust in the air of dry mines, with or without the addition of fire-damp, has, since it was first pointed out by Professor W. Galloway, been made the subject of special inquiries in the principal European countries interested in coal mining; and although certain points are still debatable, the fact is generally admitted as one calling for special precautions. The

conclusions arrived at by the royal commission of 1891, which may be taken as generally representative of the views of British colliery engineers, are as follows: —

1. The danger of explosion when gas exists in very small quantities is greatly increased by the presence of coal dust.

2. A gas explosion in a fiery mine may be intensified or indefinitely propagated by the dust raisad by the explosion itself.

3. Coal dust alone, without any gas, may cause a dangerous

explosion if ignited by a blown-out shot ; but such cases are likely to be exceptional.

4. The inflammability of coal dust varies with different coals, but none can be said to be entirely free from risk.

5. There is no probability of a dangerous explosion being produced by the ignition of coal dust by a naked light or ordinary flame.

Danger arising from coal dust is best guarded against by systematically sprinkling or watering the main roads leading from the working faces to the shaft, where the dust falling from the trams in transit is liable to accumulate. This may be done by water-carts or hose and jet, but preferably by finely divided water and compressed air distributed from a network of pipes carried through the workings. This is now generally done, and in some countries is compulsory, when the rocks are deficient in natural moisture. In one instance the quantity of water required to keep down the dust in a mine raising 850 tons of coal in a single shift was 28-8 tons, apart from that required by the jets and motors. The distributing network extended to more than 30 m. of pipes, varying from 35 in. to 1 in. in diameter.

In all British coal-mines, when gas in dangerous quantities has appeared within three months, and in all places that are dry and dusty, blasting is prohibited, except with plosives' " permitted " explosives, whose composition and pro- perties have been examined at the testing station at the Royal Arsenal, Woolwich. A list of those sanctioned is published by the Home Office. They are mostly

distinguished by special trade names, and are mainly of two classes — those containing ammonium nitrate and nitrobenzene or nitronaphthalene, and those containing nitroglycerin arid nitrocellulose, which are essentially weak dynamites. The safety property attributed to them is due to the depression of the temperature of the flame or products of explosion to a point below that necessary to ignite fire-damp or coal dust in air from a blown-out shot. New explosives that are found to be satisfactory when tested are added to the list from time to time, the composition being stated in all cases.

Methods for enabling miners to penetrate into workings where the atmosphere is totally irrespirable have come into use for saving life after explosions and for repairing shafts chores. an< ˆ pit-work under water. The aerophore of A. Galibert was in its earlier form a bag of about 12 cub. ft. capacity containing air at a little above atmospheric pressure; it was carried on the back like a knapsack and supplied the means of respiration. The air was continually returned and circulated until it was too much contaminated with carbonic acid to be further used, a condition which limited the use of the apparatus to a very short period. A more extended application of the same principle was made in the apparatus of L. Denayrouze by which the air, contained in cylinders at a pressure of 300 to 3 50 lb per sq. in., was supplied for respiration through a reducing valve which brought it down nearly to atmospheric pressure. This apparatus was, however, very heavy and became un- manageable when more than an hour's supply was required. The newer forms are based upon the principle, first enunciated by Professor Theodor Schwann in 1854, of carrying compressed oxygen instead of air, and returning the products of respiration through a regenerator containing absorptive media for carbonic acid and water, the purified current being returned to the mouth with an addition of fresh oxygen. The best-known apparatus of this class is that developed by G. A. Meyer at the Shamrock colliery in Westphalia, where a body of men are kept in sys- tematic training for its use at a special rescue station. This corps rendered invaluable service at the exploring and rescue operations after the explosion at Courrieres in March 1906, the most disas- trous mining accident on record, when 1100 miners were killed. A somewhat similar apparatus called the " weg," after the initials of the inventor, is due to W. E. Garforth of Wakefield. In another form of apparatus advantage is taken of the property possessed by sodium-potassium peroxide of giving off oxygen when damped; the residue of caustic soda and potash yielded by the reaction is used to absorb the carbonic acid of the expired air. Experiments have also been made with a device in which

the air-supply is obtained by the evaporation of liquid air absorbed in asbestos.

Underground fires are not uncommon accidents in coal-mines. In the thick coal workings in South Staffordshire the slack left behind in the sides of work is especially liable to fire from so-called spontaneous combustion, due to the rapid oxidization that is set up when finely divided coal is brought in contact with air. The best remedy in such cases is to prevent the air from gaining access to the coal by building a wall round the burning portion, which can in this way be isolated from the remainder of the working, and the fire prevented from spreading, even if it cannot be extinguished. When the coal is fired by the blast of an explosion it is often necessary to isolate the mine completely by stopping up the mouths of the pits with earth, or in extreme cases it must be flooded with water or car- bonic acid before the fire can be brought under. There have been several instances of this being done in the fiery pits in the Barnsley district, notably at the great explosion at the Oaks colliery in 1866, when 360 lives were lost.

The drawing or winding of the coal from the pit bottom to the surface is one of the most important operations in coal mining, and probably the department in which ^^» “ mechanical appliances have been brought to the highest state of development.

The different elements making up the drawing arrangements of a colliery are — (1) the cage, (2) the shaft or pit fittings, (3) the drawing-rope, (4) the engine and (5) the surface arrangements. The cage, as its name implies, consists ge ‘

of one or more platforms connected by an open framework of vertical bars of wrought iron or steel, with a top bar to which the drawing-rope is attached. It is customary to have a curved sheet iron roof or bonnet when the cage is used for raising or lowering the miners, to protect them from injury by falling materials. The number of platforms or decks varies consider- ably; in small mines only a single one may be used, but in the larger modern pits two-, three- or even four-decked cages are used. The use of several decks is. necessary in old pits of small section, where only a single tram can be carried on each. In the large shafts of the Northern and Wigan districts the cages are made about 8 ft. long and 3^ ft. broad, being sufficient to carry two large trams on one deck. These are received upon a railway made of two strips of angle iron of the proper gauge for the wheels, and are locked fast by a latch falling over their ends. At Cadeby Main with four-decked cages the capacity is eight 10-cwt. tubs or 4 tons of coal.

The guides or conductors in the pit may be constructed of wood, in which case rectangular fir beams, about 3 by 4 in., are used, attached at intervals of a few feet to buntons or cross-beams built into the lining of the pit. Two guides are required for each cage; they may be placed opposite to each other, either on the long or short sides — the latter being preferable. The cage is guided by shoes of wrought iron, a few inches long and bell- mouthed at the ends, attached to the horizontal bars of the framing, which pass -loosely over the guides on three sides, but in most new pits rail guides of heavy section are used. They are applied on one side of the cage only, forming a complete vertical railway, carried by iron cross sleepers, with proper seats for the rails instead of wooden buntons; the cage is guided by curved shoes of a proper section to cover the heads of the rails. Rigid guides connected with the walling of the pit are probably the best and safest, but they have the disadvantage of being liable to distortion, in case of the pit altering its form, owing to irregular movements of the ground, or other causes. Wooden guides being of considerable size, block up a certain portion of the area of the pit, and thus offer an impediment to the ventilation, especially in upcast shafts, where the high temperature, when furnace ventilation is used, is also against their use. In the Lancashire and the Midland districts wire-rope guides have been introduced to a very considerable extent, with a view of meeting the above objections. These are simply wire-ropes, from J to 1 \ in. in diameter, hanging from a cross-bar connected with the pit-head framing at the surface, and attached to a similar

bar at the bottom, which are kept straight by a stretching weight of from 30 cwt. to 4 tons attached to the lower bar. In some cases four guides are used — two to each of the long sides of the cage; but a more general arrangement is to have three — two on one side, and the third in an intermediate position on the opposite side. Many colliery managers, however, prefer to have only two opposite guides, as being safer. The cage is connected by tubular clips, made in two pieces and bolted together, which slide over the ropes. In addition to this it is necessary to have an extra system of fixed guides at the surface and at the bottom, where it is necessary to keep the cage steady during the operations of loading and landing, there being a much greater amount of oscillation during the passage of the cage than with fixed guides. For the same reason it is necessary to give a considerable clear- ance between the two lines of guides, which are kept from 15 to 18 in. apart, to prevent the possibility of the two cages striking each other in

passing. With proper precautions, however, wire guides are perfectly safe for use at the highest travelling speed. The cage is connected with the drawing-rope by short lengths of chain from the corners, known as tackling chains, gathered

into a central ring to which the rope is attached. chˆas”” Round steel wire-ropes, about 2 in. in diameter, are

now commonly used; but in very deep pits they are sometimes tapered in section to reduce the dead weight lifted. Flat ropes of steel or iron wire were and are still used to a great extent, but round ones are now generally preferred. In Belgium and the north of France fiat ropes of aloe fibre (Manila hemp or plantain fibre) are in high repute, being considered prefer- able by many colliery managers to wire, in spite of their great weight. A rope of this class for a pit 1 200 metres deep, tapered from 15-6 in. to 9 in. in breadth and from 2 in. to ij in. in thickness, weighed 143 tons, and another at Anzin, intended to lift a gross load of 15 tons from 750 metres, is 225 in. broad and 3 in. thick at the drum end, and weighs 18 tons. Tapered round ropes, although mechanically preferable, are not advantageous in practice, as the wear being greater at the cage end than on the drum it is necessary to cut off portions of the former at intervals. Ultimately also the ropes should be reversed in position, and this can only be done with a rope of uniform section.

The engines used for winding or hoisting in collieries are usually direct-acting with a pair of horizontal cylinders coupled

directly to the drum shaft. Steam at high pressure eaxines. exhausting into the atmosphere is still commonly used,

but the great power required for raising heavy loads from deep pits at high speeds has brought the question of fuel economy into prominence, and more economical types of the two-cylinder tandem compound class with high initial steam pressure, superheating and condensing, have come in to some extent where the amount of work to be done is sufficient to justify their high initial cost. One of the earliest examples was erected at Llanbradack in South Wales in 1894, and they have been somewhat extensively used in Westphalia and the north of France. In a later example at the Bargold pit of the Powell Duffryn Steam Coal Company a mixed arrangement is adopted with horizontal high-pressure and vertical low-pressure cylinders. This engine draws a net load of 55 tons of coal from a depth of 625 yds. in 45 seconds, the gross weight of the four trams, cage and chains, and rope, with the coal, being 20 tons 12 cwt. The work of the winding

engine, being essentially of an inter- mittent character, can only be done with condensation when a central condenser keeping a constant vacuum is used, and even with this the rush of steam during winding may be a cause of disturbance. This difficulty may be overcome by using Rateau's arrangement of a low-pressure turbine between the engine and the condenser. The accumulator, which is similar in principle to the thermal storage system of Druitt Halpin, is a closed vessel completely filled with water, which condenses the excess of steam during the winding period, and becoming superheated maintains the supply to the turbine when the main engine is standing. The power so developed is generally utilized in the production of electricity, for which there is an abundant use about large collieries.

The drum, when round ropes are used, is a plain broad cylinder, with flanged rims, and cased with soft wood packing, upon which the rope is coiled; the breadth is made sufficient to take the whole length of the rope at two laps. One drum is usually fixed to the shaft, while the other is loose, with a screw link or other means of coupling, in order to be able to adjust the two ropes to exactly the same length, so that one cage may be at the surface when the other is at the bottom, without having to pay out or take up any slack rope by the engine.

For flat ropes the drum or bobbin consists of a solid disk, of the width of the rope fixed upon the shaft, with numerous parallel pairs of arms or horns, arranged radially on both sides, the space between being just sufficient to allow the rope to enter and coil regularly upon the preceding lap. This method has the advantage of equalizing the work of the engine throughout the journey, for when the load is greatest, with the full cage at the bottom and the whole length of rope out, the duty required in the first revolution of the engine is measured by the length of the smallest circumference; while the assistance derived from gravitating action of the descending cage in the same period is equal to the weight of the falling mass through a height corre- sponding to the length of the largest lap, and so on, the speed being increased as the weight diminishes, and vice versa. The same thing can be effected in a more perfect manner by the use of spiral or scroll drums, in which the rope is made to coil in a spiral groove upon the surface of the drum, which is formed by the frusta of two obtuse cones placed with their smaller diameters outwards. This plan, though mechanically a very good one, has certain defects, especially in the possibility of danger resulting from the rope slipping sideways, if the .grooves in the bed are not perfectly true. The great size and weight of such drums are also disadvantages, as giving rather unmanageable dimensions in a very deep pit. In some cases, therefore, a combined form is adopted, the body of the drum being cylindrical, and a width

equal to three or four laps conical on either side.

Counterbalance chains for the winding engines are used in the collieries of the Midland districts of England. In this method a third drum is used to receive a heavy flat link chain, shorter than the main drawing-ropes, the end of which hangs down a special or balance pit. At starting, when the full load is to be lifted, the balance chain uncoils, and continues to do so until the desired equilibrium between the working loads is attained, when it is coiled up again in the reverse direction, to be again given out on the return trip.

In Koepe's method the drum is replaced by a disk with a grooved rim for the rope, which passes from the top of one cage over the guide pulley, round the disk, and back over the second guide to the second cage, and a tail rope, passing round a pulley at the bottom of the shaft, connects the bottoms of the cages, so that the dead weight of cage, tubs and rope is completely counterbalanced at all positions of the cages, and the work of the engine is confined to the useful weight of coal raised. Motion is communicated to the rope by frictional contact with the drum, which is covered through about one-half of the circumference. This system has been used in Nottinghamshire, and at Sneyd, in North Staffordshire. In Belgium it was tried in a pit 940 metres deep, where it has been replaced by flat hempen ropes, and is now restricted to shallower workings. In Westphalia it is applied in about thirty different pits to a maximum depth of 761 metres.

A novelty in winding arrangements is the substitution of the electromotor for the steam engine, which has been effected in a few instances. In one of the best-known examples, the Zollern colliery in Westphalia, the Koepe system is used, the winding disk being driven by two motors of 1200 H.P. each on the same shaft. Motion is obtained from a continuous-current generator driven by an alternating motor with a very heavy fly-wheel, a combination known as the Ilgner transformer, which runs continuously with a constant draught on the generating station, the extremely variable demand of the winding engine during the acceleration period being met by the energy stored in the fly-wheel, which runs at a very high speed. This

Surface arrange-

arrangement works admirably as regards smoothness and safety in

running, but the heavy first cost and complication stand in the way of its general adoption. Nevertheless about 60 electric winding engines were at work or under construction in May 1906. The surface arrangements of a modern deep colliery are of considerable extent and complexity, the central feature being the head gear or pit frame carrying the guide pulleys which lead the winding ropes from the axis of the pit to the drum. This is an upright frame, usually made in wrought iron or steel strutted by diagonal thrust beams against the engine-house wall or other solid abutments, the height to the bearings of the guide pulleys being from 80 to 100 ft. or more above the ground level. This great height is necessary to obtain head-room for the cages, the landing plat- forms being usually placed at some considerable height above the natural surface. The pulleys, which are made as large as possible up to 20 ft. in diameter to diminish the effect of bending strains in the rope by change in direction, have channelled cast iron rims with wrought iron arms, a form combining rigidity with strength, in order to keep down their weight.

To prevent accidents from the breaking of the rope while the cage is travelling in the shaft, or from over-winding when in consequence of the engine not being stopped in time the cage may be drawn up to the head-gear pulleys (both of which are unhappily not uncommon), various forms of safety catches and disconnecting hooks have been adopted. The former contriv- ances consist essentially of levers or cams with toothed surfaces or gripping shoes mounted upon transverse axes attached to the sides of the cage, whose function is to take hold of the guides and support the cage in the event of its becoming detached from the rope. The opposite axes are connected with springs which are kept in compression by tension of the rope in drawing but come into action when the pull is released, the side axes then biting into wooden guides or gripping those of steel bars or ropes. The use of these contrivances is more common in collieries on the continent of Europe, where in some countries they are obligatory, than in England, where they are not generally popular owing to their uncertainty in action and the constant drag on the guides when the rope slacks.

For the prevention of accidents from over-winding, detaching hooks are used. These consist essentially of links formed of a pair of parallel plates joined by a central bolt forming a scissors joint which is connected by chain links to the cage below and the winding-rope above. The outer sides of the link are shaped with projecting lugs above. When closed by the load the width is sufficient to allow it to enter a funnel-shaped guide on a cross-bar of the frame some distance above the bank level, but on reaching the narrower portion of the

guide at the top the plates are forced apart which releases the ropes and brings the lugs into contact with the top of the cross-bar which secures the cage from falling.

Three principal patterns, those of King, Ormerod and Walker, are in use, and they are generally efficient supposing the speed of the cage at arrival is not excessive. To guard against this it is now customary to use some speed-checking appliance, independ- ent of the engine-man, which reduces or entirely cuts off the steam supply when the cage arrives at a particular point near the surface, and applies the brake if the load is travelling too quickly. Maximum speed controllers in connexion with the winding indicator, which do not allow the engine to exceed a fixed rate of speed, are also used in some cases, with recording indicators.

When the cage arrives at the surface, or rather the platform forming the working top above the mouth of the pit, it is received upon the keeps, a pair of hinged gratings which are striking k e p t j n an i nc jj ne(j position over the pit-top by counter- sereeniog. balance weights, so that they are pushed aside to allow the cage to pass upwards, but fall back and receive it when the engine is reversed. The tubs are then removed or struck by the landers, who pull them forward on to the platform, which is covered with cast iron plates; at the same time empty ones are pushed in from the opposite side. The cage is then lifted by the engine clear of the keeps, which are

opened by a lever worked by hand, and the empty tubs start on the return trip. When the cage has several decks, it is necessary to repeat this operation for each, unless there is a special provision made for loading and discharging the tubs at different levels. An arrangement of this kind for shifting the load from a large cage at one operation was introduced by Fowler at Hucknall, in Leicestershire, where the trains are received into a framework with a number of platforms corresponding to those of the cage, carried on the head of a plunger movable by hydraulic pressure in a vertical cylinder. The empty tubs are carried by a corresponding arrangement on the opposite side. By this means the time of stoppage is reduced to a minimum, 8 seconds for a three-decked cage as against 28 seconds, as the operations of lowering the tubs to the level of the pit-top, discharging, and replacing them are performed during the time that the following load is being drawn up the pit.

In the United Kingdom the drawing of coal is generally confined to the day shift of eight hours, with an output of from 100 to 150 tons per hour, according to the depth, capacity of coal tubs, and facilities for

landing and changing tubs. With Fowler's hydraulic arrangement 2000 tons are raised 600 yds. in eight hours. In the deeper German pits, where great thick- nesses of water-bearing strata have to be traversed, the first establishment expenses are so great that in order to increase output the shaft is sometimes provided with a complete double equipment of cages and engines. In such cases the engines may be placed in line on opposite sides of the pit, or at right angles to each other. It is said that the output of single shafts has been raised by this method to 3500 and 4500 tons in the double shift of sixteen hours. It is particularly well suited to mines where groups of seams at different depths are worked simultaneously. Some characteristic figures of the yield for British collieries in 1898 are given below: — •

Albion Colliery, South) 551,000 tons in a year for one Wales (shaft and one engine.

Silksworth Colliery, North-) 535,000 tons in a year for shaft umberland) 580 yds. deep, two engines.

Bolsover Colliery, Derby . 598,798 tons in 279 days, shaft

365 yds. deep.

Denaby Main Colliery,) 629,947 tons in 281 days, maxi- Yorkshire . . . . .) mum per day 2673 tons.

At Cadeby Main colliery near Doncaster in 1906, 3360 tons were drawn in fourteen hours from one pit 763 yds. deep.

The tub when brought to the surface, after passing over a weigh-bridge where it is weighed and tallied by a weigher specially appointed for the purpose by the men and the owner jointly, is run into a " tippler," a cage turning about a horizontal axis which discharges the load in the first half of the rotation and brings the tub back to the original position in the second. It is then run back to the pit-bank to be loaded into the cage at the return journey.

Coal as raised from the pit is now generally subjected to some final process of classification and cleaning before being despatched to the consumer. The nature and extent of these operations vary with the character of the coal, which if hard and free from shale partings may be finished by simple screening into large and nut sizes and smaller slack or duff, with a final hand-picking to remove shale and dust from the larger sizes. But when there is much small duff, with intermixed shale, more elaborate sizing and washing plant becomes necessary. Where hand-picking is done, the larger-sized coal, separated by 3-in.

bar screens, is spread out on a travelling band, which may be 300 ft. long and from 3 to 5 wide, and carried past a line of pickers stationed along one side, who take out and remove the waste as it passes by, leaving the clean coal on the belt. The smaller duff is separated by vibrating or rotating screens into a great number of sizes, which are cleaned by washing in continuous current or pulsating jigging machines, where the lighter coal rises to the surface and is removed by a stream of water, while the heavier waste falls and is discharged at a lower level, or through a valve at the bottom of the machine. The larger or ” nut ” sizes, from | in. upwards, are washed on plain sieve plates, but for finer-grained duff the sieve is covered with a bed of broken felspar lumps about 3 in.

thick, forming a kind of filter, through which the fine dirt passes to the bottom of the hutch. The cleaned coal is carried by a stream of water to a bucket elevator and delivered to the storage bunkers, or both water and coal may be lifted by a centrifugal pumf> into a large cylindrical tank, where the water drains away, leaving the coal sufficiently dry for use. Modern screening and washing plants, especially when the small coal forms a consider- able proportion of the output, are large and costly, requiring machinery of a capacity of ioo to 150 tons per hour, which absorbs 3 50 to 400 H.P. In this, as in many other cases, electric motors supplied from a central station are now preferred to separate steam-engines.

Anthracite coal in Pennsylvania is subjected to breaking between toothed rollers and an elaborate system of screening, before it is fit for sale. The largest or lump coal is that which remains upon a riddle having the bars 4 in. apart; the second, or steamboat coal, is above 3 in.; broken coal includes sizes above 2§ or 25 in.; egg coal, pieces above 2j in. sq.; large stove coal, 1 J in.; small stove, 1 to ij or 15 in.; chestnut coal, § to f in.; pea coal, | in.; and buckwheat coal, £ in. The most valu- able of these are the egg and stove sizes, which are broken to the proper dimensions for household use, the larger lumps bang unfit for burning in open fire-places. In South Wales a somewhat similar treatment is now adopted in the anthracite districts.

With the increased activity of working characteristic of modern coal mining, the depth of the mines has rapidly increased,

and at the present time the level of 4000 ft., formerly working,

assumed as the possible limit for working, has been

nearly attained. The following list gives the depths reached in the deepest collieries in Europe in 1900, from which it will be seen that the larger number, as well as the deepest, are in Belgium: —

Saint Henriette, C ie des Produits, Flenu, Belgium

Viviers Gilly ....

Marcinelle, No. II, Charleroi

Marchienne, No. 2 „

Agrappe, Mons

Pendleton dip workings .

Sacre Madame, Charleroi

Ashton Moss dip workings

Ronchamp, No. 11 pit

Viernoy, Anderlues .

Astley Pit, Dukinfield, dip workings

Saint Andre, Poirier, Charleroi

The greatest depth attained in the Westphalian coal is at East Recklinghausen, where there are two shafts 841 metres (2759 ft.) deep.

The subject of the limiting depth of working has been very fully studied in Belgium by Professor Simon Stassart of Mons ("Les Conditions d'exploitation a. grande profondeur en Bel- gique," Bulletin de la SociitS de Vlndustrie mintrale, 3 ser., vol. xiv.), who finds that no special difficulty has been met with in workings above 1 100 metres deep from increased temperature or atmospheric pressure. The extreme temperatures in the working faces at 1150 metres were 79 and 86° F., and the maximum in the end of a drift, 100°; and these were quite bearable on account of the energetic ventilation maintained, and the dryness of the air. The yield per man on the working faces was 4-5 tons, and for the whole of the working force underground, 0-846 tons, which is not less than that realized in shallower mines. From the experience of such workings it is

considered that 1500 metres would be a possible workable depth, the rock temperature being 132 , and those of the intake and return galleries, 92 and 108° respectively. Under such conditions work would be practically impossible except with very energetic ventilation and dry air. It would be scarcely possible to circulate more than 120,000 to 130,000 cub. ft. per minute under such conditions, and the number of working places would thus be restricted, and conse- quently the output reduced to about 500 tons per shift of 10 hours, which could be raised by a single engine at the surface without requiring any very different appliances from those in current use.

In the United Kingdom the ownership of coal, like that of

Metres.

Ft.

Belgium

. 1 150

3773

»»

• “43

3750

”

■ 1075

3527

n

. 1065

3494

”

. 1060

347«

Lancashire 1059

3474

Belgium

1055

3461

Lancashire 1024

336o

France

1015

3330

Belgium

1006

3301

Cheshire

960

3I.SO

Belgium

950

3117

other minerals, is in the proprietor of the soil, and passes with it, except when specially reserved in the sale. Coal lying under the sea below low- water mark belongs to the °Z ner ˆ crown, and can only be worked upon payment of loal.” royalties, even when it is approached from shafts sunk upon land in private ownership. In the Forest of Dean, which is the property of the crown as a royal forest,there are certain curious rights held by a portion of the inhabitants known as the Free Miners of the Forest, who are entitled to mine for coal and iron ore, under leases, known as gales, granted by the principal agent

or gaveller representing the crown, in tracts not otherwise occupied. This is the only instance in Great Britain of the custom of free coal-mining under a government grant or concession, which is the rule in almost every country on the continent of Europe. The working of collieries in the United Kingdom is subject to the provisions of the Coal Mines Regulation Act 1887, as amended by several minor acts, administered by in- Coa/ spectors appointed by the Home Office, and forming a Mines completedisciplinary codein all matters connected with Keguia- coal-mining. An important act was passed in 1908, tion Act ” limiting the hours of work below ground of miners. For a detailed account of these various acts see the article Labour Legislation.

Coal-mining is unfortunately a dangerous occupation, more than a thousand ‘deaths from accident being reported . annually by the inspectors of mines as occurring in the collieries of the United Kingdom. ... .

The number of lives lost during the year 1906 was, according to the inspectors’ returns: —

From explosions 54

,, falls of ground 547

„ other underground accidents …. 328

,, accidents in shafts 65

„ surface accidents 135

Total . 1 1 29 The principal sources of danger to the collier, as distinguished from other miners, are explosions of fire-damp and falls of roof in getting coal; these together make up about 70% of the whole number of deaths. It will be seen that the former class of accidents, though often attended with great loss of life at one time, are less fatal than the latter.

Authorities. — The most important new publication on British coal is that of the royal commission on coal supplies appointed in 1901, whose final report was issued in 1905. A convenient digest of the evidence classified according to subjects was published by the Colliery Guardian newspaper in three quarto volumes in 1905-1907, and the leading points bearing on the extension and resources of the different districts were incorporated in the fifth edition (1905) of Professor Edward Hull’s Coal Fields of Great Britain. The Report of the earlier

royal commission (1870), however, still remains of great value, and must not be considered to have had itg conclusions entirely superseded. In connexion with the re-survey in greater detail of the coalfields by the Geological Survey a series of descriptive memoirs were undertaken, those on the North Staffordshire and Leicester- shire fields, and nine parts dealing with that of South Wales, having appeared by the beginning of 1908.

An independent work on the coal resources of Scotland under the title of the Coalfields of Scotland, by R. W. Dixon, was published in

1902.

The Rhenish-Westphalian coalfield was fully described in all details, geological, technical and economic, in a work called Die Entwickelung des niederrheinisch-westfalischen Sleinkohlen Berg- baues in der zweiten Halfte des 19”” Jahrhunderts (also known by the short title of Sammelwerk) in twelve quarto volumes, issued under the auspices of the Westphalian Coal Trade Syndicate(Berlin,i9O2-i905).

The coalfields of the Austrian dominions (exclusive of Hungary) are described in Die MineralkoHen Osterreichs, published at Vienna by the Central Union of Austrian mineowners. It continues the table of former official publications in 1870 and 1878, but in much more detail than its predecessors.

Systematic detailed descriptions of the French coalfields appear from time to time under the title of £tudes sur les gites mineraux de la France from the ministry of public works in Paris.

Much important information on American coals will be found in the three volumes of Reports on the Coal Testing Plant at the St Louis Exhibition, published by the United States Geological Survey in 1906. A special work on the Anthracite Coal Industry of the United States, by P. Roberts, was published in 1901.

The most useful general work on coal mining is the Text Book of Coal Mining, by H. W. Hughes, which also contains detailed

bibliographical lists for each division of the text. The 5th edition appeared in 1904.

Current progress in mining and other matters connected with coal can best be followed by consulting the abstracts and bibliographical lists of memoirs on these subjects that have appeared in the technical journals of the world contained in the Journal of the Institute of Mining Engineers and that of the Iron and Steel Institute. The latter appears at half-yearly intervals and includes notices of pub- lications up to about two or three months before the date of its publication. (H. B.)

COALBROOKDALE, a town and district in the Wellington parliamentary division of Shropshire, England. The town has a station on the Great Western railway, 160 m. N.W. from London. The district or dale is the narrow and picturesque valley of a stream rising near the Wrekin and following a course of some 8 m. in a south-easterly direction to the Severn. Great ironworks occupy it. They were founded in 1 709 by Abraham Darby with the assistance of Dutch workmen, and continued by his son and descendants. Father and son had a great share in the discovery and elaboration of the use of pit-coal for making iron, which revolutionized and saved the English iron trade. The father hardly witnessed the benefits of the enterprise, but the son was fully rewarded. It is recorded that he watched the experimental filling of the furnace ceaselessly for six days and nights, and that, just as fatigue was overcoming him, he saw the molten metal issuing, and knew that the experiment had succeeded.

The third Abraham Darby built the famous Coalbrookdale iron bridge over the Severn, which gives name to the neighbouring town of Ironbridge, which with a portion of Coalbrookdale is in the parish of Madcley (q.v.). Fine wrought iron work is pro- duced, and the school of art is well known. There are also brick and tile works.

COAL-FISH (Gadus virens), also called green cod, black pollack, saith and sillock, a fish of the family Gadidae. It has a very wide range, which nearly coincides with that of the cod, although of a somewhat more southern character, as it extends to both east and west coasts of the North Atlantic, and is occasionally found in the Mediterranean. It is especially common in the north, though rarely entering the Baltic; it becomes rare south of the English Channel. Unlike the cod and haddock, the coal-fish is, to a great extent, a surface-swimming fish, congregating together in large schools, and moving from place to place in search of food; large specimens (3 to 3ˆ ft. long), however, prefer deep water, down to 70 fathoms. The flesh is not so highly valued as that of the cod and haddock. The lower jaw projects more or less beyond the upper, the mental barbie is small, sometimes rudimentary, the vent is below the posterior half of the first dorsal fin,

and there is a dark spot in the axil of the pectoral fin.

COALING STATIONS. Maritime war in all ages has required that the ships of the belligerents should have the use of sheltered waters for repairs and for replenishment of supplies. The operations of commerce from the earliest days demanded natural harbours, round which, as in the conspicuous instance of Syracuse, large populations gathered. Such points, where wealth and re- sources of all kinds accumulated, became objects of attack, and great efforts were expended upon their capture. As maritime operations extended, the importance of a seaboard increased, and the possession of good natural harbours became more and more advantageous. At the same time, the growing size of ships and the complexity of fitments caused by the development of the sailing art imposed new demands upon the equipment of ports alike for purposes of construction and for repairs; while the differentiation between warships and the commercial marine led to the establishment of naval bases and dockyards provided with special resources. From the days when the great sailors of Elizabeth carried war into distant seas, remote harbours began to assume naval importance. Expeditionary forces required temporary bases, such as Guantanamo Bay, in Cuba, which was so utilized by Admiral Vernon in 1741. As outlying territories began to be occupied, and jurisdiction to be exercised over their ports, the harbours available for the free use of a belligerent were gradually reduced in number, and it became occasionally necessary to take them by force. Thus, in 1782, the capture of

Trincomalee was an object of sufficient importance to justify special effort, and Suffren gained a much-needed refuge for his ships, at the same time compelling his opponent to depend upon the open roadstead of Madras, and even to send ships to Bombay. In this case a distant harbour acquired strategic importance, mainly because sheltered waters, in the seas where Hughes and Suffren strove for naval supremacy, were few and far between. A sailing man-of-war usually carried from five to six months' provisions and water for 100 to 120 days. Other needs required to be met, and during the wars of the French Revolution it was usual, when possible, to allow ships engaged in blockade to return to port every five or six weeks " to refresh." For a sailing fleet acting on the offensive, a port from which it could easily get to sea was a great advantage. Thus Raleigh protested against the use of closely landlocked harbours. " Certain it is," he wrote, " that these ships are purposely to serve His Majesty and to defend the kingdom from danger, and not to be so penned up from casualitie as that they should be less able or serviceable in times of need." Nelson for this reason made great use of Maddalena Bay, in

Sardinia, and was not greatly impressed with the strategic value of Malta in spite of its fine natural harbour. The introduction of steam gave rise to a new naval requirement — coal — which soon became vital. Commerce under steam quickly settled down upon fixed routes, and depots of coal were established to meet its needs. Coaling stations thus came into existence by a natural process, arising from the exigencies of trade, and began later to supply the needs of navies.

For many years there was no inquiry into the war requirements of the British fleet as regards coal, and no attempt to regularize or to fortify the ports at which it was stored. Suc- cessful naval war had won for Great Britain many Brtt ‘ s * points of vantage throughout the world, and in some stations. cases the strategic value of ports had been proved by actual experience. The extreme importance of the Cape of Good Hope, obscured for a time after the opening of the Suez Canal, was fully realized in sailing days, and the naval conditions of those days to some extent determined the choice of islands and harbours for occupation. There does not, however, appear te have been any careful study of relative strategic values. Treaties were occasionally drafted by persons whose geographical know- ledge was at fault, and positions were, in some cases, abandoned which ought to have been retained, or tenaciously held when they might have been abandoned. It was left to the personal exertions of Sir Stamford Raffles to secure such a supremely important roadstead as that of Singapore for the empire. Al- though, therefore, the relative values of positions was not always recognized, Great Britain obtained as a legacy from sailing days a large number of harbours admirably adapted for use as coaling stations. Since the dawn of the era of steam, she has acquired Aden, Perim, Hong-Kong, North Borneo, Fiji, part of New Guinea, Fanning Island, and many other islands in the Pacific, while the striking development of Australia and New Zealand has added to the long roll of British ports. The coaling stations, actual and potential, of the empire are unrivalled in number, in convenience of geographical distribution, and in resources. Of the numerous British ports abroad which contained coal stores, only the four so-called ” fortresses ” — Gibraltar, Malta, Halifax and Bermuda — were at first fortified as naval stations after the introduction of rifled ordnance. The term fortress is a misnomer in every case except Gibraltar, which, being a peninsula separated only by a neck of neutral ground from the territory of a foreign power, exists under fortress conditions. Large sums were ex- pended on these places with little regard to principles, and the defences of Bermuda, which were very slowly constructed, are monuments of misapplied ingenuity.

In 1878 great alarm arose from strained relations with Russia.

Rumours of the presence of Russian cruisers in many waters, and of hostile projects, were readily believed, although the Russian navy, which had just shown itself unable Carna/von to face that of Turkey, would at this period have g/on# been practically powerless. Widespread fears for the security of coaling stations led to the appointment of a strong

royal commission, under the presidency of the earl of Carnarvon, which was instructed to inquire into and report upon the pro- tection of British commerce at sea. This was the first attempt to formulate any principles, or to determine which of the many ports where coal was stored should be treated as coaling stations essential for the purposes of war, The terms of the reference to the commission were ill-conceived. The basis of all defence of sea-borne commerce is a mobile navy. It is the movement of commerce upon the sea during war, not its security in port, that is essential to the British empire, and a navy able to protect commerce at sea must evidently protect ports andcoalingstations. The first object of inquiry should, therefore, have been to lay down the necessary standard of naval force. The vital question of the navy was not referred to the royal commission, and the four fortresses were also strangely excluded from its purview. It followed inevitably that the protection of commerce was ap- proached at the wrong end, and that the labours of the com- mission were to a great extent vitiated by the elimination of the principal factor. Voluminous and important evidence, which has not been made public, was, however, accumulated, and the final report was completed in 1 88 1 . The commissioners recalled atten- tion to the extreme importance of the Cape route to the East; they carefully examined the main maritime communications of the empire, and the distribution of trade upon each; they selected certain harbours for defence, and they obtained from the War Office and endorsed projects of fortification in every case; lastly, they condemned the great dispersion of troops in the West Indies, which had arisen in days when it was a political object to keep the standing army out of sight of the British people, and had since been maintained by pure inadvertence. Although the principal outcome of the careful inquiries of the commission was to initiate a great system of passive defence, the able reports were a distinct gain. Some principles were at last formulated by authority, and the information collected, if it had been rendered accessible to the public, would have exercised a beneficial influence upon opinion. Moreover, the commis- sioners, overstepping the bounds of their

charter, delivered a wise and statesmanlike warning as to the position of the navy.

Meanwhile, the impulse of the fears of 1878 caused indifferent armaments to be sent to Cape Town, Singapore and Hong-Kong, there to be mounted after much delay in roughly designed works. At the same time, the great colonies of Australasia began to set about the defence of .their ports with commendable earnest- ness. There is no machinery for giving effect to the recommenda- tions of a royal commission, and until 1887, when extracts were laid before the first colonial Conference, the valuable report was veiled in secrecy. After several years, during which Lord Carnarvon persistently endeavoured to direct attention to the coaling stations, the work was begun. In 1885 a fresh panic arose out of the Panjdeh difficulty, which supplied an impetus to the belated proceedings. Little had then been accomplished and the works were scarcely completed before the introduction of long breech-loading guns rendered their armaments obsolete.

The fortification of the coaling stations for the British empire is still proceeding on a scale which, in some cases, cannot easily be reconciled with the principles laid down by the president of the cabinet committee of defence. At the Guildhall, London, on the 3rd of December 1896, the duke of Devonshire stated that ” The maintenance of sea supremacy has been assumed as the basis of the system of imperial defence against attack from over the sea. This is the determining factor in fixing the whole defen- sive policy of the empire.” It was, however, he added, necessary to provide against ” the predatory raids of cruisers “; but ” it is in the highest degree improbable that this raiding attack would be made by more than a few ships, nor could it be of any per- manent effect unless troops were landed. ” This is an unexcep- tionable statement of the requirements of passive defence in the case of the coaling stations of the British empire. Their protec- tion must depend primarily on the navy. Their immobile armaments are needed to ward off a raiding attack, and a few effective guns, well mounted, manned by well-trained men, and kept in full readiness, will amply suffice.

If the command of the sea is lost, large expeditionary forces can be brought to bear upon coaling stations, and their security will thus depend upon their mobile garrisons, not upon their passive defences. In any case, where coal is stored on shore, it cannot be destroyed by the fire of a ship, and it can only be appropriated by landing men. A small force, well armed and well handled, can effectually prevent a raid of this nature without any assistance from heavy guns. In war, the

possession of secure coal stores in distant ports may be a great advantage, but it will rarely suffice for the needs of a fleet engaged in offensive operations, and requiring to be accompanied or met at prearranged rendezvous by colliers from which coal can be transferred in any sheltered waters. In the British naval manoeuvres of 1892, Admiral Sir Michael Seymour succeeded in coaling his Mod j[.” squadron at sea, and by the aid of mechanical appli- tions. ances this is frequently possible. In the Spanish- American War of 1898 some coaling was thus accomplished; but Guantanamo Bay served the purpose of a coaling station during the operations against Santiago. Watering at sea was usually carried out by means of casks in sailing days, and must have been almost as difficult as coaling. As, however, it is certainty of coaling in a given time that is of primary importance, the utilization of sheltered waters as improvised coaling stations is sure to be a marked feature of future naval wars. Although coaling stations are now eagerly sought for by all powers which cherish naval ambitions, the annexation of the Hawaiian Islands by the United States being a case in point, it is probable that they will play a somewhat less important part than has been assumed. A fleet which is able to assert and to maintain the command of the sea, will not find great difficulty in its coal supply. More- over, the increased coal endurance of ships of war tends to make their necessary replenishment less frequent. On the other hand, the modern warship, being entirely dependent upon a mass of complex machinery, requires the assistance of workshops to maintain her continuous efficiency, and unless docked at intervals suffers a material reduction of speed. Prolonged operations in waters far distant from home bases will therefore be greatly facilitated in the case of the Power which possesses local docks and means of executing repairs. Injuries received in action, which might otherwise disable a ship during a campaign, may thus be remedied. During the hostilities between France and China in 1884, the French ship ” La bases. *** Galissonniere ” was struck by a shell from one of the Min forts, which, though failing to burst, inflicted serious damage. As, by a technical fiction, a state of war was not considered to exist, the ” La Galissonniere ” was repaired at Hong-Kong and enabled again to take the sea. Local stores of reserve ammunition and of spare armaments confer evident advantages. Thus, independ- ently of the question of coal supply, modern fleets employed at great distances from their bases require the assistance of ports furnished with special resources, and a power like Japan with well-equipped naval bases in the China Sea, and possessing large sources of coal, occupies, for that reason, a favoured position in regard to naval operations in the Far East. As the term ” coaling station ” refers only to a naval need which can often be

satisfied without a visit to any port, it appears less suitable to modern conditions than ” secondary base.” Secondary bases, or coaling stations, when associated with a powerful mobile navy, are sources of maritime strength in proportion to the services they can render, and to their convenience of geographical position. In the hands of an inferior naval power, they may be used, as was Mauritius in 1809-1810, as points from which to carry on operations against commerce; but unless situated near to trade routes, which must be followed in war, they are probably less useful for this purpose than in sailing days, since convoys can now be more effectively protected, and steamers have considerable latitude of courses. Isolated ports dependent on sea-borne resources, and without strong bodies of organized fighting men at their backs are now, as always, hostages offered to the power which obtains command of the sea. (G. S. C.)

COALITION (Lat. coalitio, the verbal substantive of coaJescere, to grow together), a combination of bodies or parts into one

body or whole. The word is used, especially in a political sense, of an alliance or terrporary union for joint action of various powers or states, such as the coalition of the European powers against France, during the wars of the French Revolution; and also of the union in a single government of distinct parties or members of distinct parties. Of the various coalition ministries in English history, those of Fox and North in 1782, of the Whigs and the Peelites, under Lord Aberdeen in 1852-1853, and of the Liberal Unionists and Conservatives in Lord Salisbury’s third ministry in 1895, may be instanced.

COAL-TAR, the black, viscous, sometimes semi-solid, fluid of peculiar smell, which is condensed together with aqueous ” gas liquor ” when the volatile products of the destructive distillation of coal are cooled down. It is also called ” gas-tar,” because it was formerly exclusively, and even now is mostly, obtained as a by-product in the manufacture of coal-gas, but the tar obtained from the modern coke-ovens, although not entirely identical with gas-tar, resembles it to such an extent that it is worked up with the latter, without making any distinction in practice between the two kinds. Some descriptions of gas-tar indeed differ very much more than coke-oven tar from pure coal-tar, viz. those which are formed when bituminous shale or other materials, considerably deviating in their nature from coal, are mixed with the latter for the purpose of obtaining gas of higher illuminating

power.

It may be generally said that for the purpose of tar-distillers the tar is all the more valuable the less other materials than real coal have been used by the gas-maker. All these materials — bog-head shale, bituminous lignite and so forth — by destructive distillation yield more or less paraffinoid oils, which render the purification of the benzols very difficult and sometimes nearly impossible for the purposes of the manufacturer of coal-tar colours.

Neither too high nor too low a temperature should have been observed in gas-making in order to obtain a good quality of tar. Since in recent times most gas retorts have been provided with heating arrangements based on the production of gaseous fuel from coke, which produce higher temperatures than direct firing and have proved a great economy in the process of gas-making itself, the tar has become of decidedly inferior quality for the purposes of the tar-distillers, and in particular yields much less benzol than formerly.

Entirely different from gas-tar is the tar obtained as a by- product from those (Scottish) blast furnaces which are worked with splint-coal. This tar contains very little aromatic hydro- carbons, and the phenols are of quite a different character from those obtained in the working of gas-tar. The same holds good of oil-gas tars and similar substances. These should not be worked up like gas-tars.

The ordinary yield of tar in the manufacture of coal-gas is between 4 and 5% of the weight of the coal. Rather more is obtained when passing the gas through the apparatus of E. Pelouze and P. Audouin, where it is exposed to several shocks against solid surfaces, or by carrying on the process at the lowest possible temperature, as proposed by H. J. Davis, but this ” carbonizing process ” can only pay under special circumstances, and is probably no longer in practical use.

All coal-tars have a specific gravity above that of water, in most cases between 1-12 and 1-20, but exceptionally up to 1-25. The heavier tars contain less benzol than the lighter tars, and more ” fixed carbon,” which remains behind when the tars are exhausted of benzol and is a decidedly objectionable constituent. All tars also mechanically retain a certain quantity of water (or rather gas-liquor), say, 4% on the average, which is very obnoxious during the process of distillation, as it leads to ” bump- ing,” and therefore ought to be previously removed by prolonged settling, preferably at a slightly elevated temperature, which makes the tar more fluid. The water then rises to the top, and is

removed in the ordinary way or by special ” separators.”

The tar itself is a mixture of exceedingly complex character. The great bulk of its constituents belongs to the class of ” aro- matic ” hydrocarbons, of very different composition and degrees

of volatility, beginning with the simplest and most volatile, benzene (C 6 H 6), and ending with an entirely indistinguishable mass of non-volatile bodies, which compose the pitch left behind in the tar-stills. The hydrocarbons mostly belong to the benzene series C„H 2 „_6, the naphthalene series C„H 2n _i 2 , and the an- thracene and phenanthrene series C n H 2n -i8. Small quantities of ” fatty ” (” aliphatic “) hydrocarbons are never absent, even in pure tars, and are found in considerable quantities when shales and similar matters have been mixed with the coal in the gas-retorts. They belong mostly to the paraffins C„H2„ + 2, and the defines C„H 2n . The ” asphalt ” or soluble part of the pitch is also a mixture of hydrocarbons, of the formula C„H 2n ; even the ” carbon,” left behind after treating the pitch with all possible solvents is never pure carbon, but contains a certain quantity of hydrogen, although less than any of the volatile and soluble constituents of the tar.

Besides the hydrocarbons, coal-tar contains about 2 % of the simpler phenols C„H 2 „_70H, the best known and most valuable of which is the first of the series, carbolic acid (q.v.) C6H5OH, besides another interesting oxygenized substance, cumarone CsHeO. The phenols, especially the carbolic acid, are among the more valuable constituents of coal-tar. Numerous sulphur compounds also occur in coal-tar, some of which impart to it their peculiar nauseous smell, but they are of no technical importance or value.

Still more numerous are the nitrogenated compounds contained in coal-tar. Most of these are of a basic character, and belong to the pyridine and the quinoline series. Among these we find a somewhat considerable quantity of aniline, which, however, is never obtained from the tar for commercial purposes, as its isolation in the pure state is too difficult. The pyridines are now mostly recovered from coal-tar, but only in the shape of a mixture of all members of the series which is principally employed for denaturing alcohol. Some of these nitrogenated compounds possess considerable antiseptic properties, but on the whole they are only considered as a contamination of the tar-oils.

Applications of Coal-Tar in the Crude State. — Large quantities of coal-tar are employed for various purposes without submitting it to

the process of distillation. It is mostly advisable to de- hydrate the tar as much as possible for any one of its applications, and in some cases it is previously boiled in order to remove its more volatile constituents.

No preparation whatever is needed if the tar is to be used as fuel, either for heating the gas-retorts or for other purposes. Its heating-value is equal to the same weight of best coal, but it is very difficult to burn it completely without producing a great deal of evil-smelling smoke. This drawback has been overcome by employing the same means as have been found suitable for the combustion of the heavy petroleum residues, called " masut," viz. converting the tar into a fine spray by means of steam or compressed air. When the gas-maker cannot con- veniently or profitably dispose of his tar for other purposes, he burns it by the above means under his retorts.

Several processes have also been patented for producing illuminating gas from tar, the most notable of which is the Dinsmore process. This process has been adversely criticized by very competent gas-makers, and no great success can be expected in this line.

Coal-tar is very much employed for painting wood, iron, brick- work, or stone, as a preventive against the influence of weather or the far more potent action of corrosive chemicals. This, of course, can be done only where appearance is no object, for instance in chemical works, where all kinds of erections and apparatus are protected by this cheap kind of paint. Coal-tar should not be used for tarring the woodwork and ropes of ships, a purpose for which only wood-tar has been found suitable.

One of the most considerable outlets for crude tar is in the manufacture of roofing-felt. This industry was introduced in Germany upwards of a hundred years ago, even before coal-tar was available, and has reached a very large extension both in that country and in the United States, where most of the gas-tar seems to be devoted to this purpose. In the United Kingdom

it is much less extensive. For this manufacture a special fabric is made from pure woollen fibre, on rolls of about 3 ft. width and of considerable length. The tar must be previously dehy- drated, and is preferably deprived of its more volatile portions by heating in a still. It

is heated in an iron pan to about 90 or ioo° C; the fabric is drawn through it by means of rollers which at the same time squeeze out the excess of tar; on coming out of these, the tarred felt is covered with a layer of sand on both sides by means of a self-acting apparatus; and is ultimately wound round wooden rolls, in which state it is sent out into the trade. This roofing-felt is used as a cheap covering, both by itself and as a grounding for tiles or slates. In the former case it must be kept in repair by repainting with tar from time to time, a top covering of sand or small gravel being put on after every coat of paint.

Coal-tar is also employed for the manufacture of lamp-black. This is done by burning the tar in ovens, connected with brick- chambers in which the large quantity of soot, formed in this process, deposits before the gases escape through the chimney. Numerous patents have been taken out for more efficiently collecting this soot. Most of it is employed without further manipulation for the manufacture of electric carbons, printing inks, shoe-blacking, patent leather and so forth. A finer quality of lamp-black, free from oily and empyreumatic parts, is obtained by calcining the soot in closed iron pots at a red heat.

Distillation of Coal- Tar. — Much more important than all appli- cations of crude coal-tar is the industry of separating its con- stituents from it in a more or less pure form by fractional dis- tillation, mostly followed by purifying processes. Most naturally this industry took its rise in Great Britain, where coal-gas was invented and made on a large scale before any other nation took it up, and up to this day both the manufacture of coal-gas and the distillation of the tar, obtained as a by-product thereof, are carried out on a march larger scale in that than in any other country. The first attempts in this line were made in 1815 by F. C. Accum, and in 1822 by Dr G. D. Longstaff and Dr Dalston. At first the aim was simply to obtain “naphtha,” used in the manufacture of india-rubber goods, for burning in open lamps and for some descriptions of varnish; the great bulk of the tar remained behind and was used as fuel or burned for the purpose of obtaining lamp-black.

It is not quite certain who first discovered in the coal-naphtha the presence of benzene (g.v.), which had been isolated from oil-gas by M. Faraday as far back as 1825. John Leigh claims to have shown coal-tar benzene and nitro-benzene made from it at the British Association meeting held at Manchester in 1842, but the report of the meeting says nothing about it, and the world in general learned the presence of benzene in coal-tar only from the independent discovery of A. W. Hofmann, published in 1845. And it was most assuredly in Hofmann’s

London laboratory that Charles Mansfield worked out that method of fractional distillation of the coal-tar and of isolating the single hydrocarbons which laid the foundation of that industry. His patent, numbered 11,960 and dated November nth, 1847, is the classical land-mark of it. About the same time, in 1846, Bronner, at Frankfort, brought his ” grease-remover ” into the trade, which consisted of the most volatile coal-tar oils, of course not separated into the pure hydrocarbons; he also sold water- white ” creosote ” and heavy tar-oils for pickling railway timbers, and used the remainder of the tar for the manufacture of roofing-felt. The employment of heavy oils for pickling timber had already been patented in 1838 by John Bethell, and from this time onward the distillation of coal-tar seems to have been developed in Great Britain on a larger scale, but the utiliza- tion of the light oils in the present manner naturally took place only after Sir W. H. Perkin, in 1856, discovered the first aniline colour which suddenly created a demand for benzene and its homologues. The isolation of carbolic acid from the heavier oils followed soon after; that of naphthalene, which takes place almost automatically, went on simultaneously, although the uses of this hydrocarbon for a long time remained much behind the quantities which are producible from coal-tar, until the

manufacture of synthetic indigo opened out a wide field for it. The last of the great discoveries in that line was the preparation of alizarine from anthracene by C. Graebe and C. T. Liebermann, in 1868, soon followed by patents for its practical manufacture by Sir W. H. Perkin in England, and by Graebe, Liebermann and H. Caro in Germany.

The present extension of the industry of coal-tar distilling can be only very roughly estimated from the quantity of coal-tar produced in various countries. Decidedly at the head is Great Britain, where about 700,000 tons are produced per annum, most of which probably finds its way into the tar-distilleries, whilst in Germany and the United States much less gas-tar is produced and a very large proportion of it is used for roofing-felt and other purposes.

We shall now give an outline of the processes used in the distillation of tar.

Dehydration. — The first operation in coal-tar distilling is the removal of the mechanically enclosed water. Some water is chemi- cally combined with the bases, phenols, &c, and this, of course, cannot be removed by mechanical means, but splits off only during the distillation itself, when a certain temperature has been reached. The

water mechanically present in the tar is separated by long repose in large reservoirs. Very thick viscous tars are best mixed with thinner tars, and the whole is gently heated by coils of pipes through which the heated water from the oil-condensers is made to flow. Sometimes special ” tar-separators ” are employed, working on the centrifugal principle. The water rises to the top and is worked up like ordinary gas-liquor. More water is again separated during the heating-up of the tar in the still itself, and can be removed there by a special overflow.

Tar-Stills. — The tar is now pumped into the tar-still, fig. I. This is usually, as shown, an upright wrought-iron cylinder, with an arched top, and with a bottom equally vaulted upwards for the purpose of increasing the heating surface and of raising the level of the pitch remaining at the end of the operation above the fire- flues. The fuel is consumed on the fire-grate a, and, after having

Fig. 1. — Tar-Still (sectional elevation). 1

traversed the holes bb in the annular wall e built below the still, the furnace gases are led around the still by means of the flue d, whence they pass to the chimney. Cast-iron necks are provided in the top for the outlet of the vapours, for a man-hole, supply-pipe, ther- mometer-pipe, safety valve, and for air and steam-pipes reaching down to the bottom and branching out into a number of distributing

1 The illustrations in this article are from Prof. G. Lunge’s Coal Tar and Ammonia, by permission of Friedrich Vieweg u. Sohn.

arms. Near the top there is an overflow pipe which comes into action on filling the still. In the lowest part of the bottom there is a running-off valve or tap. In some cases (but only exceptionally) a perpendicular shaft is provided, with horizontal arms, and chains hanging down from these drag along the bottom for the purpose of keeping it clean and of facilitating the escape of the vapours. This arrangement is quite unnecessary where the removal of the vapours is promoted by the injection of steam, but this steam must be care- fully dried beforehand, or, better, slightly superheated, in order to prevent explosions, which might be caused by the entry of liquid water into the tar during the later stages of the work, when the tempera- ture has arisen far above the boiling-point of water. The steam acts both by stirring up the tar and by rapidly carrying off the vapours formed in

distillation. The latter object is even more thoroughly attained by the application of a vacuum, especially during the later stage of distillation. For this purpose the receivers, in which the liquids condensed in the cooler are collected, are con- nected with an air pump or an ejector, by which a vacuum of about 4 in., say J atmosphere, is made which lowers the boiling process by about 80° C. ; this not merely hastens the process, but also produces an improvement of the quality and yield of the products, especially of the anthracene, and, moreover, lessens or altogether prevents the formation of coke on the still-bottom, which is otherwise very troublesome.

Most manufacturers emply ordinary stills as described. A few of them have introduced continu- ously acting stills, of which that constructed ‘ by Frederic Lennard has probably found a wider appli- cation than any of the others. They all work on the principle of gradually heating the tar in several com- partments, following one after the other. The fresh tar is run in at one end and the pitch is run out from the other. The vapours formed in the various compartments are separately carried away and con- densed, yielding at one and the same time those products which are obtained in the ordinary stills at the different periods of the distillation. Although in theory this continuous process has great advantages over the ordinary style of working, the complica- tion of the apparatus and practical difficulties arising in the manipulation have deterred most manufac- turers from introducing it.

The tar-stills are set in brickwork in such a manner that there is no over-heating of their contents. For this purpose the fire-grate is placed at a good distance from the bottom or even covered by a brick arch so that the flame does not touch the still-bottom at all and acts only indirectly, but the sides of the still are always directly heated. The fire-flue must not be carried up to a greater height than is necessary to provide against the overheating of any part of the still not protected inside by liquid tar, or, at. the end of the operation, by liquid pitch. The outlet pipe is equally protected against overheating and also against any stoppage by pitch solidi- fying therein. The capacity of tar-stills ranges from 5 to 50 tons. They hold usually about 10 tons, in which case they can be worked off during one day.

The vapours coming from the still are condensed in coolers of various shapes, one of which is shown in figs. 2 and 3. The cooling- pipes are best made of cast-iron, say 4 in. wide inside and laid so as to have a continuous fall towards the bottom. A steam-pipe (6) is provided for heating the cooling water, which is necessary during the later part ,of the operation to prevent the stopping up of the pipes by the

solidification of the distillates. A cock (a) allows

and a second fraction as ” light oil,” up to 210 C, but more usually these two are not separated in the first distillation, and the first or ” light oil ” fraction then embraces everything which comes over until the drops no longer float on, but show the same specific gravity as water. The specific gravity of this fraction varies from o-qi to 0-94. The next fraction is the ” middle oil ” or ” carbolic oil,” of specific gravity i-oi, boiling up to 240° C. ; it contains most of the carbolic acid and naphthalene. The next fraction is the ” heavy oil ” or ” creosote oil,” of specific gravity 1-04. Where the nature of the coals distilled for gas is such that the tar contains too little anthra- cene to be economically recovered, the creosote-oil fraction is carried right to the end ; but otherwise, that is in most cases, a last fraction

Fig. 2. — Condensing Worm (Plan).

steam to be injected into the condensing worm in order to clear any obstruction.

The cooling-pipe is at its lower end connected with receivers for the various distillates in such a manner that by the turning of a cock the flow of the distillates into the receivers can be changed at will. In a suitable place provision is made for watching the colour, the specific gravity, and the general appearance of the distillates. At the end of the train of apparatus, and behind the vacuum pump or ejector, when one is provided, there is sometimes a purifier for the gases which remain after condensation; or these gases are carried back into the fire, in which case a water-trap must be inter- posed to prevent explosions.

Distillation of the Tar. — The number of fractions taken during the distillation varies from four to six. Sometimes a first fraction is taken as ” first runnings,” up to a temperature of 105 C. in the still,

Fig. 3. — Condensing Worm (side elevation), is made at about the temperature 270° C, above which the ” anthracene oil ” or ” green oil ” is obtained up to the finish of the distillation.

During the light-oil period the firing must be performed very cautiously, especially where the water has not been well removed, to prevent bumping and boiling over. It has been observed that, apart from the water, those tars incline most to boiling over which contain an unusual quantity of ” fixed carbon.” During this period cold water must be kept running through the cooler. The distillate at once separates into water (gas-liquor) and light oil, floating at the top.

Towards the end of this fraction the distillation seems to cease, in spite of increasing the fires, and a rattling noise is heard in the still. This is caused by the combined water splitting off from the bases and phenols and causing slight explosions in the tar.

As soon as the specific gravity approaches i-o, the supply of cold water to the cooler is at least partly cut off, so that the temperature of the water rises up to 40° C. This is necessary because otherwise some naphthalene would crystallize out and plug up the pipes. If a little steam is injected into the still during this period no stoppage of the pipes need be feared in any case, but this must be done cautiously.

When the carbolic oil has passed over and the temperature in the still has risen to about 240 C, the distillate can be run freely by always keeping the temperature in the cooler at least up to 40 C. The ” creosote oil ” which now comes over often separates a good deal of solid naphthalene on cooling.

The last fraction is made, either when the ther- mometer indicates 270 C, or when ” green grease ” appears in the distillate, or simply by judging from the quantity of the distillate. What comes over now is the ” anthracene oil.” The firing may cease towards the end as the steam (with the vacuum) will finish the work by itself. The water in the cooler should now approach the boiling-point.

The point of finishing the distillation is different in various places and for various objects. It depends upon the fact whether soft or hard pitch is wanted. The latter must be made where it has to be sold at a distance, as soft pitch cannot be easily carried during the warmer season in railway trucks and not at all in ships, where it would run into a single lump. Hard pitch is also always made where as much anthracene as possible is to be obtained. For hard pitch the distillation is carried on as far as practicable without causing the residue in the still to “coke.” The end cannot be judged by the thermometer, but by the appearance and quantity of the distillate

and its specific gravity. If carried too far, not merely is coke formed, but the pitch is porous and almost useless, and the anthracene oil is contaminated with high-boiling hydrocarbons which may render it almost worthless as well. Hard pitch proper should soften at ioo° C, or little above.

Where the distillation is to stop at soft pitch it is, of course, not carried up to the same point, but wherever the pitch can be disposed of during the colder season or without a long carriage, even the hard pitch is preferably softened within the still by pumping back a sufficient quantity of heavy oil, previously deprived of anthracene. This makes it much easier to discharge the still. When the contents consist of soft pitch they are run off without much trouble, but hard pitch not merely emits extremely pungent vapours, but is mostly at so high a temperature that it takes fire in the air. Hard pitch must, therefore, always be run into an iron or brick cooler where it cools down out of contact with air, until it can be drawn out into the open pots where its solidification is completed.

Most of the pitch is used for the manufacture of ” briquettes ” (” patent fuel “), for which purpose it should soften between 55° and 8o° C. according to the requirements of the buyer. In Germany upwards of 50,000 tons are used annually in that industry; much of it is imported from the United Kingdom, whence also France and Belgium are provided. Apart from the softening point the pitch is all the more valued the more constituents it contains which are soluble in xylene. The portion insoluble in this is denoted as ” fixed carbon.” If the briquette manufacturer has bought the pitch in the hard state he must himself bring it down to the proper softening point by re-melting it with heavy coal-tar oils.

We now come to the treatment of the various fractions obtained from the tar-stills. These operations are frequently not carried out at the smaller tar-works, which sell their oils in the crude state to the larger tar-distillers.

Working up of the Light-Oil Fraction. — The greatest portion of the light-oil fraction consists of aromatic hydrocarbons, about one- fifth being naphthalene, four-fifths benzene and its homologues, in the proportion of about 100 benzene, 30 toluene, 15 xylenes, 10 trimethylbenzenes, I tetramethylbenzene. Besides these the light- oil contains 5-15% phenols, 1-3% bases, o-i sulphuretted com- pounds, o-2-o-3% nitriles, &c. It is usually first submitted to a preliminary distillation in directly fired stills, similar to the tar- stills, but with a dephlegmating head. Here we obtain (1) first runnings (up to 0.89 spec, grav.), (2) heavy benzols (up to 0.95), (3) carbolic oil (up to I - oo). The residue remaining in the still (chiefly naphthalene) goes to the middle-oil fraction.

The ” first runnings ” are now” washed ” in various ways, of which we shall describe one of the best. The oil is mixed with dilute caustic soda

solution, and the solution of phenols thus obtained is worked up with that obtained from the next fractions. After this follows a treatment with dilute sulphuric acid (spec. grav. 1-3), to extract the pyridine bases, and lastly with concentrated sulphuric acid (1-84), which removes some of the aliphatic hydrocarbons and ” unsaturated ” compounds. After this the crude benzol is thoroughly washed with water and dilute caustic soda solution, until its reaction is neutral. The mixing of the basic, acid and aqueous washing-liquids with the oils is performed by compressed air, or more suitably by mechanical stirrers, arranged on a perpendicular, or better, a horizontal shaft. Precisely the same treatment takes place with the next fraction, the ” heavy benzols,” and the oils left behind after the washing operations now go to the steam-stills. The heaviest hydrocarbons are sometimes twice subjected to the operation of washing.

The washed crude benzols are now further fractionated by dis- tillation with steam. The steam-stills are in nearly all details on the principle of the ” column apparatus ” employed in the distillation of alcoholic liquids, as represented in fig. 4. They are usually made of cast iron. The still itself is either an upright or a horizontal cylinder, heated by a steam-coil, of a capacity of from 1000 to 2000 gallons. The superposed columns contain from 20 to 50 compart- ments of a width of 2J or 3 ft. The vapours pass into a cooler, and from this the distillate runs through an apparatus, where the liquor can be seen and tested, into the receivers. The latter are so arranged that the water passing over at the same time is automatically re- moved. This is especially necessary, because the last fraction is distilled by means of pure steam.

The fractions made in the steam distillation vary at different works. In some places the pure hydrocarbons are net extracted and here only the articles called: ” 90 per cent, benzol,” ” 50 per cent, benzol,” ” solvent naphtha,” ” burning naphtha ” are made, or any other commercial articles as they are ordered. The expression ” per cent.” in this case does not signify the percentage of real benzene, but that portion which distils over up to the temperature of ioo° C, when a certain quantity of the article is heated in glass retorts of a definite shape, with the thermometer inserted in the liquid itself. By the application of well-constructed rectify ing- columns and with proper care it is, however, possible to obtain in this operation nearly pure benzene, toluene, xylene, and cumene (in the two last cases a mixture of the various isomeric hydrocarbons). These hydrocarbons contain only a slight proportion of thiophene and its isomers, which can be removed only by a treatment with fuming sulphuric acid, but this is only exceptionally done.

Sometimes the pyridine bases are recovered from the tarry acid which is obtained in the treatment of the light oil with sulphuric acid, and which contains from 10 to 30% of bases, chiefly pyridine and its homologues with a little aniline, together with resinous substances. The latter are best removed by a partial precipitation with ammonia, either in the shape of gas or of concentrated ammoni- acal liquor. This reagent is added until the acid reaction has just disappeared and a faint smell of pyridine is perceived. The mixture is allowed to settle, and it then separates into two layers. The upper layer, containing the impurities, is run off ; the lower layer, contain- ing the sulphates of ammonia and of the pyridine bases, is treated with ammonia in excess, where it separates into a lower aqueous layer of ammonium sulphate solution and an oil, consisting of crude pyridine. This is purified by fractionation in iron stills and dis- tillation over caustic soda. Most of it is used for denaturing spirit of wine in Germany, for which purpose it is re- quired to contain 90 % of bases boiling up to 140 C. (see Alcohol).

Working up of the Middle-Oil Fraction (Carbolic Oil Frac- tion). — Owing to its great percentage of naphthalene (about 40 %) this fraction is solid or semi-solid at ordinary tempera- tures. Its specific gravity is about 1-2; its colour may vary from light yellow to dark brown or black. In the latter case it must be re-distilled before further treat- ment. On cooling down, about four- fifths of the naph- thalene crystallizes out on standing from three to ten days. The crystals are freed from the mother oils by drain- ing and cold or hot pressing ; they are then washed at 100° C. with concentrated sulphuric acid, after- wards with water and re-distilled or sublimed. About 10,000 tons of naph- thalene are used an- nually in Germany, mostly for the manu- facture of many azo- colours and of syn- thetic indigo.

The oils drained from the crude naph- thalene are re-distilled and worked for carbolic acid and its isomers. For this purpose the oil is washed with a solution of caustic soda, of specific gravity I-l; the solution thus obtained is treated with sulphuric acid or with carbon dioxide, and the crude phenols now separated are fractionated in a similar manner as is done in the case of crude benzol. The pure phenol crystallizes out and is again distilled in iron stills with a silver head and .cooling worm; the remaining oils, consisting mainly of cresols, are sold as ” liquid carbolic acid ” or under other names.

Most of the oil which passes as the ” creosote-oil fraction ” is sold in the crude state for the purpose of pickling timber. It is at the ordinary temperature a semi-solid mixture of about 20 % crystallized hydrocarbons (chiefly naphthalene), and 80% of a _ dark brown,

nauseous smelling oil, of 1-04 spec, grav., and boiling between 200° and 300 C. The liquid portion contains phenols, bases, and a great number of hydrocarbons. Sometimes it is redistilled, when most of the naphthalene passes over in the first fraction, between 180 and 230° C, and crystallizes out in a nearly pure state. The oily portion remaining behind, about 60% of this distillate, contains about 30% phenols and 3% bases. It has highly disinfectant properties and is frequently converted into special disinfectants, e.g. by mixing it with four times its volume of slaked lime, which yields ” disinfectant powder ” for stables, railway cars, &c. Mixtures

Fig. 4. — Benzol Still (elevation).

of potash soaps (soft soaps) with this oil have the property of yielding with water emulsions which do not settle for a long time and are found in the trade as ” creolin,” ” sapocarbol,” ” lysol,” &c.

That description of creosote oil which is sold for the purpose of pickling railway sleepers, telegraph posts, timber for the erection of wharves and so forth, must satisfy special requirements which are laid down in the specifications for tenders to public bodies. These vary to a considerable extent. They always stipulate (i) a certain specific gravity (e.g. not below 1-035 an d not above 1-065); (2) Certain limits of boiling points (e.g. to yield at most 3% up to 150 , at most 30% between 150° and 255 , and at least 85% between 150° and 355) ; (3) a certain percentage of phenols, as shown by extraction with caustic soda solution, say 8 to 10%.

Much of this creosote oil is obtained by mixing that which has resulted in the d : .rect distillation of the tar with the liquid portion of the anthracene oils after separating the crude anthracene (see below). It is frequently stipulated that the oil should remain clear at the ordinary temperature, say 15° C, which means that no naphthalene should crystallize out.

Working up the- Anthracene Oil Fraction. — The crude oil boils between 280″ and 400 C. It is liquid at 60° C, but on cooling about 6 to 10% of crude anthracene separates as greenish-yellow, sandy crystals, containing about 30% of real anthracene, together with a large percentage of carbazol and phenanthrene. This crystalliza- tion takes about a week. The crude anthracene is separated from the

mother oils by filter presses, followed by centrifugals or by hot hydraulic presses. The liquid oils are redistilled, in order to obtain more anthracene, and the last oils go back to the creosote oil, or are employed for softening the hard pitch (vide supra). The crude anthracene is brought up to 50 or 60, sometimes to 80 %, by washing with solvent naphtha, or more efficiently with the higher boiling portion of the pyridine bases. The naphtha removes mostly only the phenan- threne, but the carbazol can be removed only by pyridine, or by sub- liming or distilling the anthracene over caustic potash. The whole of the anthracene is sold for the manufacture of artificial alizarine.

Bibliography. — The principal work on Coal-tar is G. Lunge's Coal-tar and Ammonia (3rd ed., 1900). Consult also G. P. Sadder, Handbook of Industrial Organic Chemistry (1891), and the article " Steinkohlentheer," Kraemer and Spreker, in Encyklopddisches Handbuch der technischen Chemie (4th ed., 1905, viii. 1). (G. L.)

COALVILLE, a town in the Loughborough parliamentary division of Leicestershire, England, 112 m. N.N.W. from London. Pop. of urban district (1901) 15,281. It is served by the Midland railway, and there is alsp a station (Coalville East) on the Nuneaton-Loughborough branch of the London & North- western railway. This is a town of modern growth, a centre of the coal-mining district of north Leicestershire. There are also iron foundries and brick-works. A mile north, of Coalville is Whitwick, with remains of a castle of Norman date, while to the north again are slight remains of the nunnery of Gracedieu, founded in 1240, where, after its dissolution, Francis Beaumont, the poet-colleague of John Fletcher, was born about 1 586. In the neighbourhood is the Trappist abbey of Mount St Bernard, founded in 1835, possessing a large domain, with buildings completed from the designs of A. W. Pugin in 1844.

COAST (from Lat. costa, a rib, side), the part of the land which meets the sea in a line of more or less regular form. The word is sometimes applied to the bank of a river or lake, and sometimes to a region (cf. Gold Coast, Coromandel Coast) which may include the hinterland. If the coast-line runs parallel to a mountain range, such as the Andes, it has usually a more regular form than when, as in the Has coast of west Brittany, it crosses the crustal folds. Again, a recently elevated coast is more regular than one that has been long exposed to wave action. A recently depressed coast will show the irregularities that were impressed upon the surface before submergence. Wave erosion and the action of marine currents are the chief agents in coast sculpture. A coast of homogeneous rock exposed to similar action will

present a regular outline, but if exposed to differential action it will be embayed where that action is greatest. A coast consisting of rocks of unequal hardness or of unequal structure will present headlands, ” stacks ” and ” needles ” of hard rocks, and bays of softer or more loosely aggregated rocks, when the wave and current action is similar throughout. The southern shore-line of the Isle of Wight and the western coast of Wales are simple examples of this differential resistance. In time the coast becomes ” mature ” and its outline undergoes little change as it gradually recedes, for the hard rock being now more exposed is worn away faster, but the softer rock more slowly because it is protected in the bays and re-entrants.

COAST DEFENCE, a general term for the military and naval protection and defence of a coast-line, harbours, dockyards, coaling-stations, &c, against serious attack by a strong naval force of the enemy, bombardment, torpedo boat or destroyer raids, hostile landing parties, or invasion by a large or small army. The principal means employed by the defender to cope with these and other forms of attack which may be expected in time of war or political crisis are described below. See also for further details Navy; Army; Fortification and Siege- craft; Ammunition; Ordnance; Submarine Mines; Tor- pedo. The following is a general description of modern coast defences as applied in the British service.

No system of coast defence is of any value which does not take full account of the general distribution of sea-power and the resultant strength of the possible hostile forces. By resultant strength is meant the balance of one side over the other, for it is now generally regarded as an axiom that two opposing fleets must make their main effort in seeking one another, and that the force available for attack on coast defences will be either com- posed of such ships as can be spared from the main engagement, or the remnant of the hostile fleet after it has been victorious in a general action.

Coast defences are thus the complement and to some extent the measure of naval strength. It is often assumed that this principle was neglected in the large scheme of fortification associated in England with the name of Lord Palmerston, but it is at least arguable that the engineers responsible for the details of this scheme were dependent then as now on the naval view of what was a suitable naval strength. Public opinion has since been educated to a better appreciation of the necessity for a strong navy, and, as the British navy has increased, the scale of coast defences required has necessarily waned. Such a change of opinion is always gradual, and it is difficult to name an exact date on which it may be said that modern coast defence, as practised by

British engineers, first began.

An approximation may, however, be made by taking the bombardment of Alexandria (1881) as being the parting of the ways between the old and the modern school. At that time the British navy, and in fact all other navies, had not really emerged from the stage of the wooden battleships. Guns were still muzzle-loaders, arranged mainly in broadsides, and protected by heavy armour; sails were still used as means of propulsion; torpedoes, net defence, signalling, and search-lights quite un- developed.

At this time coast defences bore a close resemblance to the ships — the guns were muzzle-loaders, arranged in long batteries like a broadside, often in two tiers. The improvement of rifled ordnance had called for increased protection, and this was found first by solid constructions of granite, and latterly by massive iron fronts. Examples of these remain in Garrison Fort, Sheer- ness, and in Hurst Castle at the west end of the Solent. The range of guns being then relatively short, it was necessary to place forts at fairly close intervals, and where the channels to be defended could' not be spanned from the shore, massive structures with two or even three tiers of guns, placed as close as on board ship and behind heavy armour, were built up from the ocean bed. On both sides the calibre and weight of guns were increasing, till the enormous sizes of 80 and 100 tons were used both ashore and afloat.

The bornbardment of Alexandria established two new principles, or new applications of old principles, by showing the value of concealment and dispersion in reducing the effect of the fire of the fleet. On the old system, two ships firing at one another or ships firing at an iron-fronted fort shot " mainly into the brown "; if they missed the gun aimed at, one to the right or left was likely to be hit; if they missed the water-line, the. upper works were in danger. At Alexandria, however, the Egyptian guns were scattered over a long line of shore, and it was soon found that with the guns and gunners available, hits could only be obtained by running in to short range and dealing with one gun at a time.

This new principle was not at once recognized, for systems

die hard, and much money and brains were invested in the then

existing system. But a modern school was gradually formed; a small group of engineer officers under the headship of Sir Andrew Clarke, the then inspector-general of fortifications, took the matter up, and by degrees the new views prevailed and the modern school of coast defence came into being between 1881 and 1885. Meanwhile important changes had been developing in the gun, the all-important weapon of coast defence, changes due mainly to the gradual supersession of the muzzle-loader by the breech-loader. The latter gave the advantages of quicker loading and more protection for the gun detachment over and above the technical improvements in the gun itself, which gave higher muzzle velocity, greater striking effect and longer effective range.

All this reacted on the general scheme of coast defence by enabling the number of guns to be reduced and the distance between forts increased. On the other hand, the ships, too, gained increased range and increased accuracy of fire, so that it became necessary in many cases to advance the general line of the coast defences farther from the harbour or dockyard to be defended, in order to keep the attackers out of range of the objective.

Another change resulted from an improvement in the method of mounting. Even in the older days discussion had arisen freely on the relative merits of barbette and casemate mounting. In the former the gun fires over a parapet, giving a larger field of view to the gun-layer, and a larger field of fire for the gun, with, however, more exposure for the detachment. The latter gives a restricted view and greater safety to the layer, but unless the casemate takes the form of a revolving turret, the arc of fire is very limited.

An important advantage of the barbette system is its cheap- ness, and thus in order to obtain with it concealment, suggestions were made for various forms of mounting which would allow of the gun, under the shock of recoil, disappearing behind the parapet to emerge only when loaded and ready for the next round. A mounting of this description for muzzle-loading guns, designed by Colonel Moncrieff , was actually in use in the defences of Alexandria and in H.M.S. ” Temeraire.”

But with the increased charges and length of breech-loading guns, a further change was desirable, and after some trials a system of disappearing mountings (see Ordnance: Garrison Mountings) was adopted into the British service.

A word must be now said on the size of gun finally adopted. At first muzzle-loaders figured largely in the British defences, even though

these were planned on modem ideas; and even in 1906 muzzle-loading guns still existed and were counted as part of the defences. The sizes of these guns varied from the 32- or 64-pounder, of which the nomenclature depends on the weight of the shell, to the 7-in.,o-in.,io-in.,ii-in.,i2-5-andfinallyi7-25-in., the size indicating the calibre. Such a multiplication of sizes was due to gradual improvements in the science of gun manu- facture, each advance being hailed as the last word to be said on the subject, and each in turn being rapidly made obsolete by something bigger and better. But with the improvements in gun design which followed the introduction of breech-loaders, the types used in coast defence were gradually narrowed down to two, the g-2-in. and the 6-in. guns. Of these, the o-2-in. was considered powerful enough to attack armour at any practical range, while the 6-in. gun was introduced to deal with lightly armed vessels at shorter ranges where 9-2-in. guns were un- necessarily powerful.

A few larger guns of 10-in. calibre have actually been used, but though the British navy has now sealed a 12-in. 50-ton gun as the stock size for battleships, for the heavy armament of the coast defences the War Office remain faithful to the o- 2-in. calibre, preferring to develop improvements rather in the direction of more rapid fire and higher muzzle velocity.

The 6-in. has also been retained and is extensively used for the smaller ports, where attack by powerful vessels is for various reasons considered improbable.

The design of the forts to contain the guns necessarily varied with the type of defence adopted, and the duties which the forts

had to fulfil. These duties may be said to be twofold, first to facilitate the service of the guns, and secondly to protect the guns and their detachments from damage by fire from ships, or by close attack from landing parties. The service of the gun is provided for by a system of cartridge and shell magazines (see Ammunition), well protected from fire and suitably arranged. The shelters for the gun detachments must be bomb-proof and fitted with some arrangements for comfort and sanitation. Formerly it was the custom to provide living accommodation for the full garrison in casemates inside each fort, but it is now considered better to provide barrack accommodation in the vicinity and to occupy forts in peace only by a few caretakers. The shelters in the fort itself can thus be kept at the minimum required when actually manning the guns. The protection of the guns and magazines against bombardment is provided, in the British service, mainly by an earthen parapet over a sub- stantial roof or wall of

concrete, but immediately round the gun an ” apron ” of concrete is necessary to withstand the shock of discharge or “blast.”

It has been already mentioned that in the old designs a large number of guns was put in each fort, but with dispersion and improved gun power this number was much reduced. At first the type of fort adopted was for four guns, of which the two in the centre were heavy and the two on the flank of medium power. Such a design was good from the point of view of the engineer; it gave an economical grouping of magazines and shelters and was easily adapted to varying sites, and the smaller guns helped the larger by covering their flanks both towards the sea and also over the land approaches. But from the point of view of the artillery officer the arrangement was faulty, for when the guns are too much separated, ranging has to be carried out separately for each gun. On the other hand, two guns of the same calibre placed near one another can be fought simultaneously and form what is known as a ” group.” In the typical 4-gun battery described above, the flank guns had to be fought independently, which >was wasteful of officers and staff. Further, in a battery of more than two guns the arc of fire of the centre guns is much restricted by that of the guns on either flank.

For these reasons it is now generally recognized that new works should be designed for only two guns of the same calibre, though 3- or 4-gun batteries are occasionally used in special circumstances.

Protection of the gun detachments against infantry attack is best provided by a line of infantry posts outside and on the flanks of the gun batteries, but as small parties may evade the outposts, or the latter may be driven in, it is necessary to place round each fort a line of obstacles sufficient to protect the guns against a rush and to cover the infantry while it rallies. This obstacle was formerly a wet or dry ditch, with escarp, counter- scarp and flanking galleries; but with the new design of parapet a simpler form of obstacle was adopted. This was obtained by carrying down and forward the slope of the parapet to a point well below the level of the surrounding ground, and then placing a stout fence at the foot of the parapet and concealed from view. It is in fact the old principle of the sunk fence, and has this further advantage, that the fence, being visible from the parapet, can be kept under fire by men posted between the guns without any special flanking galleries.

Occasionally two or more batteries are placed inside one line of obstacles, but usually each 2-gun battery is complete in itself.

Cases arise, e.g. with sites on the top of a cliff, where no obstacle is required; in such places the parapet merges into the surrounding ground.

In old days the parapet was shaped with well-defined edges and slopes. Now the parapet slopes gently down to the front and is rounded at the sides, so as to present no definite edge or angle to the enemy, and concealment is furthered by allowing grass or small scrub to grow over the parapet and round the guns. In order to obtain complete concealment from view the background behind the guns must be carefully studied from the

point of view of the attack. Sites on the sky-line, and marked contrasts of colour or shape, should be avoided. In some cases extensive planting, amounting to landscape gardening, is justi- fied. This is most easily arranged in the tropics, where plant growth is rapid. In all cases the guns and their mountings should be coloured to blend with the background and thus avoid hard lines and shadows.

Any change of principle such as that of 1885 involves improve- ments both in guns and their adjuncts. Of these latter the most important was the position-finder designed by Colonel Watkin. This instrument in its simplest form, when the observer is following a ship through the telescope of the instrument, draws on a chart the track of the ship, so that the exact bearing and distance of the latter can be ascertained at any time and com- municated to the guns by electrical and other dials, &c. The position-finder may be some distance from the guns it serves, and connected with them by electric cable. The guns can then be placed well under cover and in many cases out of sight of the target, giving a measure of protection which cannot be obtained with any system of direct laying over sights. This instrument has been applied on a high site to control guns placed low, or where guns are so placed as to be liable to obscuration by fog or mist the position-finder can be placed below the fog-line. In either case direct laying is provided for as an alternative. In some defences batteries equipped with old pattern o-in. muzzle-loading guns, mounted as howitzers for long-range firing, have been placed in folds in the ground so as to be quite invisible from the sea and therefore invulnerable. Such batteries are fought entirely by the position-finder.

The next adjunct to coast defences is the submarine mine. In Great

Britain the first submarine mining company dates from 1873, and from that date mining defences were gradually installed both at home and abroad; but the modern system of mining, which for twenty years was maintained at British ports, really started into full life under the impetus of Sir A. Clarke, about the same year (1885) in which we have dated the commencement of the modern coast defence system.

With the increased speed of warships, a method of attack on fortifications was evolved by running past the main defences and either taking them in reverse, or disregarding them and attacking the dockyard or other objective at short range. This was made more possible at most defended ports by the pushing forward of the defences which has been already alluded to, and it is especially dangerous where dockyards or towns are situated some way up a river or estuary, so that once the defences are passed there is a large stretch of water (e.g. the Thames, the Solent, and Cork harbour) in which the enemy can manoeuvre. In such cases there are two possible forms of defence, first by arranging for gun-fire behind the main gun position, usually called the defence of inner waters, and secondly by placing in the entrance and under the fire of the main gun defence some form of obstruction to detain ships under fire. This obstruction can be passive (booms, chains, rows of piles or sunken ships) or active (mines or torpedoes). Passive obstructions are only effective against comparatively small craft, and at important ports mines are the only efficient obstruction which can be used against large vessels.

After some years of experiment, English engineers adopted two main classes of mines, called ” observation ” and ” con- tact ” mines (see Submarine Mines). Both were fired by electricity, which was applied only at the moment a hostile ship was within the dangerous zone of a mine. In the observation mines the moment of applying the electric current was ascer- tained by a position-finder, which, tracing a ship’s course on a chart, made an electrical connexion at the moment the ship was over a mine. These mines were placed so as to be well below the bottom of any ships afloat and were used in channels which it was desired to leave open for the entrance of friendly vessels. Contact mines, which are moored a few feet below the surface of the water, are fired after certain electrical connexions have been made in a firing room on shore by the ship itself striking against the mine. These are used in waters which it is intended

to deny to friend and foe. Except in narrow waters where the whole width of the channel was required for friendly traffic, contact mines were generally used to limit the width of the channel to the minimum consistent with the amount of friendly traffic which would use the

port in war. It will be readily understood that by bending this channel and disclosing its exact position only to special pilots, a very complete measure of security against surprise v/ould be obtained. In English ports the practical importance of allowing free ingress for friendly traffic overruled all other considerations, and the friendly channels were always straight and coincided with some part of the usual fairway channel. They were also care- fully marked by lightships and buoys.

A variation of the submarine mine is the Brennan torpedo, purchased by the British government about 1890. This differs from the torpedo used on board ship, mainly by the fact that the engine-power which drives It is on shore and connected with the torpedo by two strong wires. These wires are wound out of the torpedo by the engine, and by varying the strain on the two wires' very accurate control of the steering can be obtained. This torpedo shares with the submarine mine the disadvantages that it must wait for the enemy to venture within its range, and with all other forms of defence (except contact mines), that it is made useless by fog or rain. As compared with a mine it has the advantage of being unaffected by tide or depth, and of form ing nc obstruction to traffic, except when actually in action. It was installed at the principal ports only.

The system of defence hitherto described is thus a main gun defence of o-2-in. and 6-in. guns pushed well forward, assisted by position-finders, mine-fields and torpedo stations, and with some gun defence of inner waters. Subject to improvements in patterns of guns and mountings— of which the most important has been the substitution of barbette mounting and shield for the recoil mounting described above — this system held the field up to 1905, when, partly as a result of the experience of the Russo-Japanese War, and partly owing to the alteration of the naval balance of power due to the destruction of the Russian fleet, both the scale and system of defence were very considerably modified.

We can now consider another branch of defence, which was evolved pari passu with the automobile torpedo, and was therefore almost non-existent in 1885. In this year the boats specially built for carrying torpedoes were little more than launches, but in the next five years was developed the type of first-class torpedo boat. This, while seaworthy, was limited as to its radius of action by the small amount of coal it would carry. But with a possibly hostile coast only a few hours' steam away, and with foreign harbours thronged with torpedo craft, it became necessary for the British government especially to consider this form of attack and its antidote. It was obvious that in

daytime and in clear weather such an attack would have little chance of success, also that in no circumstances would torpedo boats be able to damage fixed defences. Their best chance was attack by night, and the only form of attack was that referred to above as ” running past,” that is, an attempt to evade the defences and to attack ships or docks inside. The light draught of torpedo boats and their comparative invisibility favoured this form of attack.

To meet it the first requirement was some form of illumination of the defended channel. Experiments in the attack and defence of defended harbours took place at Gosport in 1879 and 1880, at Milford Haven in 1885, at Berehaven (by the royal navy) in 1886, at Langston Harbour in 1887, and a series at the Needles entrance of the Isle of Wight up to 1892. During the course of these experiments various methods of illumination were tried, but by far the best was found to be the light from an electric arc-lamp of high power projected by powerful reflectors. At first these were used as concentrated beams forming a pencil of light with an angular opening of about 2° to 3 . Such a beam directed at an incoming ship gives effective illumination up to a mile or more from the source of light, but has the disadvantage that it must be moved so as to follow the ship’s movements.

Each beam thus lights only one ship at a time, and the move- ments of several beams crossing and recrossing have a very confusing effect, with the consequent risk that a proportion of the attacking vessels may slip through unnoticed.

An alternative method of using electric lights is to arrange the projector so that the light comes out in a fan (generally of 30° divergence). Two or three such lights are usually placed side by side, forming an illuminated fan of considerable diver- gence. These fans are now used for the main defence, with in front of them one or more search-lights to warn the defences of the approach of ships. There is some loss of range when using these fans as compared with search-lights, but by occupying both sides of a channel and placing the defences against torpedo boats at the narrowest point, an effective illumination can be obtained in moderate weather.

Heavy guns can, of course, be fired against torpedo boats, but their rate of fire is relatively slow, and at first they had also the disadvantage of using black powder, the smoke of which obscured the

lights.

A small quick-firing gun using smokeless powder was seen to be a necessity. At first the 6-pounder was adopted as the stock size supplemented by machine guns for close range, but soon afterwards it became necessary to reconsider the scale of anti-torpedo boat defences, owing first to the increased size of first-class torpedo boats, and secondly to the introduction of a new type of vessel, the torpedo boat destroyer. The increased size of torpedo boats, and improved arrangements for the distribu- tion of coal on board, made these boats practically proof against 6-pounder guns and necessitated the introduction of the 12- pounder. The torpedo boat destroyer, originally introduced to chase and destroy torpedo boats, not only justified its existence by checking the construction of more torpedo boats, but in addition became itself a sea-going torpedo craft, and thus in- creased the menace to defended ports and also the area over which this form of attack would be dangerous.

This development was met by an increased number of 12- pounder guns, assisted in the more important places by 4-7-in. (and latterly 4-in.) guns, and also by an increased number of lights, both guns and lights increasing at some places nearly fourfold. But even with the best possible arrangement of this form of defence, the possibility of interference by fog, mist or rain introduces a considerable element of uncertainty.

About the same time, and largely on account of the demand for better and quicker firing, the ” automatic sight ” was intro- duced (see Ordnance : Garrison ; and Sights) . In this, a develop- ment of the principle of the position-finder, the act of bringing an object into the field of the auto-sight automatically lays the gun. In order to take full advantage of this, the ammunition was made up into a cartridge with powder and shell in one case to allow of the quickest possible loading. It may be added that the efficiency of the auto-sight depends on the gun being a certain height above the water, and that therefore the rise and fall of tide has to be allowed for in setting the sight.

In view of the possible interference by fog it was thought wise at an early stage to provide, towards the rear of the defences, some form of physical obstacle behind which ships could lie in safety. Such an obstacle had been designed in the early days by the Royal Engineers and took the form of a ” boom ” of baulks of timber secured by chains. Such booms were limited in size by considerations of expense and were only partially successful. About 1892 the British navy took the matter up and began experiments on a larger scale, substituting wire

hawsers for chains and using old gunboats to divide the booms up into sections of convenient length. The result was that booms were definitely adopted as an adjunct of coast defence. Their place is behind the lighted area, but within reach of some of the anti-torpedo boat batteries.

Other forms of obstacle to torpedo boat attack, based on a modification of contact mines or a combination of mines and passive obstructions, have been tried but never definitely adopted, though some form of under-water defence of this description seems necessary to meet attack by submarines.

We may now summarize the anti-torpedo boat defences. These are, first, an outpost or look-out line of electric search- lights, then a main lighted area composed of fixed lights with which there are a considerable number of 12-pounder or 4-in. Q.F. guns fitted with auto-sights, and behind all this, usually at the narrowest part of the entrance, the boom.

Once coast defences are designed and installed, little change is possible during an attack, so that the operation of fighting a system of defence, such as we have considered above, is mainly a matter of peace training of gun-crews, electric light men and look-outs, coupled with careful organization. To facilitate the transmission of order and intelligence, a considerable system of telephonic and other electrical communication has been estab- lished. This may be considered under the three heads of (1) orders, (2) intelligence, (3) administration.

The communication of orders follows the organization adopted for the whole fortress. Each fortress is commanded by a fortress commander, who has a suitable staff. This officer sends orders to commanders of artillery, engineers, and infantry. The artillery officer in charge of a group of batteries is called a ” fire commander”; his command is generally confined to such batteries as fire over the same area of water and can mutually support one another. Thus there may be several fire commanders at a defended port. Anti-torpedo boat batteries are not in a fire command, and are connected to the telephone system for intelligence only and not for orders. The engineers require orders for the control of electric lights or Brennan torpedo. The officer in charge of a group of lights or of a torpedo station is called a director. Though receiving orders direct from the fortress commander, he has also to co-operate with the nearest artillery commander. The infantry are posted on the flanks of the fixed defences, or on the land front. They are divided into suitable groups, each under a commanding officer, who communicates with the fortress commander. In large fortresses the

area is divided into sections, each including some portion of the artillery, engineers, and infantry defence. In such cases the section commanders receive orders from the fortress com- mander and pass them on to their subordinates.

The intelligence system includes communication with the naval signal stations in the vicinity, one of which is specially selected for each port as the warning station and is directly connected to some part of the defences. Another part of the intelligence system deals with the arrangements for examining all ships entering a harbour. This is usually effected by posting in each entrance examination vessels, which are in communica- tion by signal with a battery or selected post on shore. Any points on shore which can see the approaches are connected by a special alarm circuit, mainly for use in case of torpedo boat attack.

The administrative system of telephones is used for daily routine messages. These usually take the form of telephone lines radiating from a central exchange. In many stations the same lines may be used for command and administration, or intelligence and command, but at the larger stations each class of line is kept distinct. – (W. B. B.)

COASTGUARD, a naval force maintained in Great Britain and Ireland to suppress smuggling, aid shipwrecked vessels and serve as a reserve to the navy. The coastguard was originally designed to prevent smuggling. Before 1816 this duty was entrusted to the revenue cutters, and to a body of ” riding officers,” mounted men who were frequently supported by detachments of dragoons. The crews of the cutters and the riding officers were under the authority of the custom house in London, and were appointed by the treasury. On the conclusion of the war with Napoleon in 181 5 it was resolved to take stricter precautions against smuggling. A ” coast blockade ” was established in Kent and Sussex. The ” Ramillies ” (74) was stationed in the Downs and the ” Hyperion ” (42) at Newhaven. A number of half-pay naval lieutenants were appointed to these vessels, but were stationed with detachments of men and boats at the Martello towers erected along the coast as a defence against French invasion. They were known as the ” preventive

water guard ” or the ” preventive service.” The crews of the boats were partly drawn from the revenue cutters, and partly hired from

among men of all trades. The ” coast blockade ” was extended to all parts of the coast. The revenue cutters and the riding officers continued to be employed, and the whole force was under the direction of the custom house. The whole was divided into districts under the command of naval officers. In 1822 the elements of which the preventive water guard was composed were consolidated, and in 1829 it was ordered that only sailors or fishermen should be engaged as boatmen. In 1830 the whole service consisted of 50 revenue cutters, fine vessels of 150 and 200 tons, of the ” preventive boats,” and the riding officers. In 1831, during the administration of Sir James Graham, the service was transferred to the admiralty, though the custom house flag was used till 1857. After 1840 the men were drilled “in the common formations,” mainly with a view to being employed for the maintenance of order and in support of the police, in case of Chartist or other agitations. But in 1845 the first steps were taken to utilize the coastguard as a reserve to the navy. The boatmen were required to sign an engagement to serve in the navy if called upon. In May 1857 the service was transferred entirely to the admiralty, and the coastguard became a part of the navy, using the navy flag. The districts were placed under captains of the navy, known as district captains, in command of ships stationed at points round the coast. Since that year the coastguard has been recruited from the navy, and has been required to do regular periods of drill at sea, on terms laid down by the admiralty from time to time. It has, in fact, been a form of naval reserve.

The rise and early history of the coastguard are told in Smuggling Days and Smuggling Ways, by the Hon. Henry -N. Shore, R.N., (London, 1892). Its later history must be traced in the Queen’s (and King’s) Regulations and Admiralty Instructions of successive years. (D. H.)

COASTING, usually called tobogganing (q.v.) in Europe, the sport of sliding down snow or ice-covered hills or artificial inclines upon hand-sleds, or sledges, provided with runners shod with iron or steel. It is uncertain whether the first American sleds were copied from the Indian toboggans, but no sled without runners was known in the United States before 1870, except to the woodsmen of the Canadian border. American laws have greatly restricted, and in most places prohibited, the practice, once common, of coasting on the highways; and the sport is mainly confined to open hills and artificial inclines or chutes. Two forms of hand-sled are usual in America, the original ” clipper ” type, built low with long, pointed sides, originally shod with iron but since 1850 with reund steel runners; and the light, short ” girls’ sled,” with high skeleton sides, usually flat shod. There is also

the ” double-runner,” or ” bob-sled,” formed of two clipper sleds joined by a board and steered by ropes, a wheel or a cross-bar, and seating from four to ten persons.

In Scandinavia several kinds of sled are common, but that of the fishermen, by means of which they transport their catch over the frozen fjords, is the one used in coasting, a sport especi- ally popular in the neighbourhood of Christiania, where there are courses nearly 3 m. in length. This sled is from 4 to 6 ft. long, with skeleton sides about 7 in. high, and generally holds three persons. It is steered by two long sticks trailing behind. On the ice the fisherman propels his sled by means of two short picks. The general Norwegian name for sledge is skijalker, the primitive form being a kind of toboggan provided with broad wooden runners resembling the ski (q.v.). In northern Sweden and Finland the commonest form of single sled is the Spark- stottinger, built high at the back, the coaster standing up and steering by means of two handles projecting from the sides.

Coasting in its highest development may be seen in Switzerland, at the fashionable winter resorts of the Engadine, where it is called tobogganing. The first regular races there were organized by John Addington Symonds, who instituted an annual contest for a challenge cup, open to all comers, over the steep post-road from Davos to Klosters, the finest natural coast in Switzerland, the sled used being the primitive native Schlittli or Handschlitten, a miniature copy of the ancient horse-sledge. Soon afterwards

followed the construction of great artificial runs, the most famous being the ” Cresta ” at St Moritz, begun in 1884, which is about 1350 yds. in length, its dangerous curves banked up like those of a bicycle track. On this the annual ” Grand National ” championship is contested, the winner’s time being the shortest aggregate of three heats. In 1885 and the following year the native Schlittli remained in use, the rider sitting upright facing the goal, and steering either with the heels or with short picks. In 1887 the first American clipper sled was introduced by L. P. Child, who easily won the championship for that year on it. The sled now used by the contestants is a development of the American type, built of steel and skeleton in form. With it a speed of over 70 m. an hour has been attained. The coaster lies fiat upon it and steers with his feet, shod with spiked shoes, to render braking easier, and helped with his gloved hands. The ” double-runner ” has also been introduced into Switzerland under the name of ” bob-sleigh.”

See Ice Sports, in the Isthmian Library, London (1901) ; Toboggan- ing

at St Moritz, by T. A. Cook (London, 1896).

COATBRIDGE, a municipal and police burgh, having the privi- leges of a royal burgh, of Lanarkshire, Scotland. Pop. (1891) 15,212; (1901) 36,991. It is situated on the Monkland Canal, 8 m. E. of Glasgow, with stations on the Caledonian and North British railways. Until about 1825 it was only a village, but since then its vast stores of coal and iron have been developed, and it is now the centre of the iron trade of Scotland. Its prosperity was largely due to the ironmaster James Baird (q.v.), who erected as many as sixteen blast-furnaces in the immediate neighbourhood between 1830 and 1842. The industries of Coat- bridge produce malleable iron, boilers, tubes, wire, tinplates and railway wagons, tiles, fire-bricks and fire-clay goods. There are two public parks in the town, and its public buildings include a theatre, a technical school and mining college, hospitals, and the academy and Baird Institute at Gartsherrie. Janet Hamilton, the poetess (1795-1873), spent most of her life at Langloan — now a part of Coatbridge — and a fountain has been erected to her memory near the cottage in which she lived. For parliamentary purposes the town, which became a municipal burgh in 1885, is included in the north- west division of Lanarkshire. About 4 m. west by south lies the mining town of Baillieston (pop. 3 784) , with a station on the Caledonian railway. It has numerous collieries, a nursery and market garden.

COATESVILLE, a borough of Chester county, Pennsylvania, U.S.A., on the west branch of Brandywine Creek, 39 m. W. of ‘Philadelphia. Pop. (1890) 3680; (1900) 5721 (273 foreign-born); (1910) 11,084. It is served by the Pennsylvania and the Philadelphia & Reading railways, and interurban electric lines. For its size the borough ranks high as a manufacturing centre, iron and steel works, boiler works, brass works, and paper, silk and woollen mills being among its leading establishments. Its water-works are owned and operated by the municipality. Named in honour of Jesse Coates, one of its early settlers, it was settled about 1800, and was incorporated in 1867.

COATI, or Coati-Mundi, the native name of the members of the genus Nasua, of the mammalian family Prccyonidae. They are easily recognized by their long body and tail, and elongated, upturned snout; from which last feature the Germans call them Rilsselbaren or ” snouted bears.” In the white-nosed coati, a native of Mexico and Central America, the general hue is brown, but the snout and upper lip are white, and the tail is often banded. In the red coati, ranging from Surinam to Paraguay, the tail is marked with from seven to nine broad fulvous or rufous rings, alternating with black ones, and tipped with black. Coatis are gregarious and arboreal in habit, and feed on

birds, eggs, lizards and insects. They are common pets of the Spaniards in South America. (See Carnivora.)

COB, a word of unknown origin with a variety of meanings, which the New English Dictionary considers may be traced to the notions of something stout, big, round, head or top. In ” cobble,” e.g. in the sense of a round stone used in paving, the same word may be traced. The principal uses of ” cob ” are for a stocky strongly built horse, from 13 to 14 hands high, a small round loaf,

a round lump of coal, in which sense ” cobble ” is also used, the fruiting spike of the maize plant, and a large nut of the hazel type, more commonly known as the cob-nut.

” Cobbler,” a patcher or mender of boots and shoes, is probably from a different root. It has nothing to do with an O. Fr. coubler, Mod. coupler, to fasten together. In ” cobweb,” the web of the spider, the ” cob ” represents the older cop, coppe, spider, cf. Dutch spinnekop.

COBALT (symbol Co, atomic weight 59), one of the metallic chemical elements. The term ” cobalt ” is met with in the writings of Paracelsus, Agricola and Basil Valentine, being used to denote substances which, although resembling metallic ores, gave no metal on smelting. At a later date it was the name given to the mineral used for the production of a blue colour in glass. In 1735 G. Brandt prepared an impure cobalt metal, which was magnetic and very infusible. Cobalt is usually found associated with nickel, and frequently with arsenic, the chief ores being speiss-cobalt, $(Co,Ni,Fe)As_2$, cobaltite (q.v.), wad, cobalt bloom, linnaeite, Co_3S_4, and skutterudite, $CoAs_3$. Its presence has also been detected in the sun and in meteoric iron. For the technical preparation of cobalt, and its separation from nickel, see Nickel. The metal is chiefly used, as the oxide, for colouring glass and porcelain.

Metallic cobalt may be obtained by reduction of the oxide or chloride in a current of hydrogen at a red heat, or by heating the oxalate, under a layer of powdered glass. As prepared by the reduction of the oxide it is a grey powder. In the massive state it has a colour resembling polished iron, and is malleable and very tough. It has a specific gravity of 8-8, and it melts at 1530° C. (H. Copaux). Its mean specific heat between 9 and 97 C. is 0-10674 (H. Kopp). It is permanent in dry air, but in the finely divided state it rapidly combines with oxygen, the com- pact metal requiring a strong heating to bring about this com- bination. It decomposes steam at a red heat, and slowly dissolves in dilute hydrochloric and sulphuric acids, but more readily in nitric acid. Cobalt burns in nitric oxide at 150° C. giving the monoxide. It may be obtained in the pure state, according to C. Winkler (Zeit. fur anorg. Chem., 1895, 8, p. 1), by electrolysing the pure sulphate in the presence of ammonium sulphate and ammonia, using platinum electrodes, any occluded oxygen in the deposited metal being removed by heating in a current of hydrogen.

Three characteristic oxides of cobalt are known, the monoxide, CoO, the sesquioxide, C02O3, and tricobalt tetroxide, C03O4 ; besides these there are probably oxides of composition C0O2, CogOg, Co 6 07 and C04O5. Cobalt monoxide, CoO, is prepared by heating the hydroxide or carbonate in a current of air, or by heating the oxide C03O4 in a current of carbon dioxide. It is a brown coloured powder which is stable in air, but gives a higher oxide when heated. On heating in hydrogen, ammonia or carbon monoxide, or with carbon or sodium, it is reduced to the metallic state. It is readily soluble in warm dilute mineral acids forming cobaltous salts. Cobaltous hydroxide, Co(OH)?, is formed when a cobaltous salt is precipitated by caustic potash in the absence of air. A blue basic salt is precipi- tated first, which, on boiling, rapidly changes to the rose-coloured hydroxide. It dissolves in acids forming cobaltous salts, and on exposure to air it rapidly absorbs oxygen, turning brown in colour. A. de Schulten (Comptes Rendus, 1889, 109, p. 266) has obtained it in a crystalline form; the crystals have a specific gravity of 3-597, and are easily soluble in warm ammonium chloride solution. Cobalt sesquioxide, C02O3, remains as a dark-brown powder when cobalt nitrate is gently heated. Heated at 190-300 in a current of hydro- gen it gives the oxide C03O4, while at higher temperatures the monoxide is formed, and ultimately cobalt is obtained. Cobaltic hydroxide, Co(OH) 3 , is formed when a cobalt salt is precipitated by an alkaline hypochlorite, or on passing chlorine through water containing suspended cobaltous hydroxide or carbonate. It is a brown-black powder soluble in hydrochloric acid, chlorine being simultaneously liberated. This hydroxide is soluble in

well cooled acids, forming solutions which contain cobaltic salts, one of the most stable of which is the acetate. Cobalt dioxide, C0O2, has not yet been isolated in the pure state; it is probably formed when iodine and caustic soda are added to a solution of a cobaltous salt. By suspending cobaltous hydroxide in water and adding hydrogen peroxide, a strongly acid liquid is obtained (after filtering) which probably contains cobaltous acid, H2C0O3. The barium and magnesium salts of this acid are formed when baryta and magnesia are fused with cobalt sesquioxide. Tricobalt tetroxide, C03O4, is produced when the other oxides, or the nitrate, are heated in air.

By heating a mixture of cobalt oxalate and sal-ammoniac in air, it is obtained in the form of minute hard octahedra, which are not magnetic, and are only soluble in concentrated sulphuric acid.

The cobaltous salts are formed when the metal, cobaltous oxide, hydroxide or carbonate, are dissolved in ‘acids, or, in the case of the insoluble salts, by precipitation. The insoluble salts are rose-red or violet in colour. The soluble salts are, when in the hydrated condition, also red, but in the anhydrous condition are blue. They are precipitated from their alkaline solutions as cobalt sulphide by sulphuretted hydrogen, but this precipitation is prevented by the presence of citric and tartaric acids; similarly the presence of ammonium salts hinders their precipitation by caustic alkalis. Alkaline carbonates give precipitates of basic carbonates, the forma- tion of which is also retarded by the presence of ammonium salts. For the action of ammonia on the cobaltous salts in the presence of air see Cobaltammines (below). On the addition of potassium cyanide they give a brown precipitate of cobalt cyanide, Co(CN)2, which dissolves in excess of potassium cyanide to a green solution.

Cobalt chloride, C0CI2, in the anhydrous state, is formed by burn- ing the metal in chlorine or by heating the sulphide in a current of the same gas. It is blue in colour and sublimes readily. It dis- solves easily in water, forming the hydrated chloride, CoCb/OHiO, which may also be prepared by dissolving the hydroxide or car- bonate in hydrochloric acid. The hydrated salt forms rose-red prisms, readily soluble in water to a red solution, and in alcohol to a blue solution. Other hydrated forms of the chloride, of composition CoCl2-2HaO and CoCU-4H z O have been described (P. Sabatier, Bull. Soc. Chim. 51, p. 88 ; Bersch, Jahresb. d. Chemie, 1867, p. 291). Double chlorides of composition CoCU-NHUCl-CHˆO ; CoCl2-SnCl4-6H 2 and CoCl2-2CdCl 2 12H 2 are also known. By the addition of excess of ammonia to a cobalt chloride solution in absence of air, a greenish blue precipitate is obtained which, on heating, dissolves in the solution, giving a rose-red

liquid. This solution, on standing, deposits octahedra of the composition CoCl2-6NH 3 . These crystals when heated to 120 C. lose ammonia and are converted into the compound CoCl 2 2NH 3 (E. Fremy). The bromide, CoBr2, resembles the chloride, and may be prepared by similar methods. The hydrated salt readily loses water on heating, forming at 100° C. the hydrate CoBrˆHˆO, and at 130° C. passing into the anhydrous form. The iodide, C0I2, is produced by heating cobalt and iodine together, and forms a greyish-green mass which dissolves readily in water forming a red solution. On evaporating this solution the hydrated salt Col2-6H 2 is obtained in hexagonal prisms. It behaves in an analogous manner to CoBr2-6H20 on heating.

Cobalt fluoride, CoF2-2H20, is formed when cobalt carbonate is evaporated with an excess of aqueous hydrofluoric acid, separating in rose-red crystalline crusts. Electrolysis of a solution in hydro- fluoric acid gives cobaltic fluoride, C0F3.

Sulphides of cobalt of composition C04S3, CoS, C03S4, C02S3 and C0S2 are known. The most common of these sulphides is cobaltous sulphide, CoS, which occurs naturally as syepoorite, and can be artificially prepared by heating cobaltous oxide with sulphur, or by fusing anhydrous cobalt sulphate with barium sulphide and common salt. By either of these methods, it is obtained in the form of bronze-coloured crystals. It may be prepared in the amorphous form by heating cobalt with sulphur dioxide, in a sealed tube, at 200° C. In the hydrated condition it .is .formed by the action of alkaline sul- phides on cobaltous salts, or by precipitating cobalt acetate with sulphuretted hydrogen (in the absence of free acetic acid). It is a black amorphous powder soluble in concentrated sulphuric and hydrochloric acids, and when in the moist state readily oxidizes on exposure.

Cobaltous sulphate, CoS04-7H 2 0, is found naturally as the mineral bieberite, and is formed when cobalt, cobaltous oxide or carbonate are dissolved in dilute sulphuric acid. It forms dark red crystals isomorphous with ferrous sulphate, and readily soluble in water. By dissolving it in concentrated sulphuric acid and warming the solution, the anhydrous salt is obtained. Hydrated sulphates of composition CoSO4-6H 2 0, C0SO4-IH2O and CoS04-H 8 are also known. The heptahydrated salt combines with the alkaline sul- phates to form double sulphates of composition CoS04-M2S04-6H2O (M = K, NH 4 , &c).

The cobaltic salts corresponding to the oxide C02O3 are generally unstable compounds which exist only in solution. H. Marshall {Proc.

Roy. Soc. Edin. 59, p. 760) has prepared cobaltic sulphate Co2(S04)3-18H 2 0, in the form of small needles, by the electrolysis of cobalt sulphate. In a similar way potassium and ammonium cobalt alums have been obtained. A cobaltisulphurous acid, probably H 6 [(S0 3)6-Co2] has been obtained by E. Berglurtd (Berichte, 1874, 7, p. 469), in aqueous solution, by dissolving ammonium cobalto-cobaltisulphite (NH4) 2 Co 2 [(SO.1VC02] I4H 2 in dilute hydrochloric or nitric acids, or by decomposition of its silver salt with hydro chloric acid. The ammonium cobalto-cobaltisulphite is prepared by saturating an air-oxidized ammoniacal solution of cobaltous chloride with sulphur dioxide. The double salts containing the metal in the cobaltic form are more stable than the corre- sponding single salts, and of these potassium cobaltinitrite, Co 2 (N02)«*6ICNO2-3H20, is best known. It may be prepared by the addition of potassium nitrite to an acetic acid solution of cobalt chloride. The yellow precipitate obtained is washed with a solution

of potassium acetate and finally with dilute alcohol. The reaction proceeds according to the following equation: 2C0CI2 + IOKNO2 + 4HN0 2 = Cos(N0 2)o-6KNOj + 4Ka + 2NO + 2H 2 (A. Stromeyer, Annalen, 1855, 96, p. 220). This salt may be used for the separation of cobalt and nickel, since the latter metal does not form a similar double nitrite, but it is necessary that the alkaline earth metals should be absent, for in their presence nickel forms complex nitrites containing the alkaline earth metal and the alkali metal. A sodium cobaltinitrite is also known.

Cobalt nitrate, Co(N0 3) 2 -6H 2 0, is obtained in dark-red mono-clinic tables by the slow evaporation of a solution of the metal, its hydroxide or carbonate, in nitric acid. It deliquesces in the air and melts readily on heating. By the addition of excess of ammonia to its aqueous solution, in the complete absence of air, a blue pre- cipitate of a basic nitrate of the composition 6CoO-N 2 06-5H 2 is obtained.

By boiling a solution of cobalt carbonate in phosphoric acid, the acid phosphate CoHP04-3H 2 is obtained, which when heated with water to 250° C. is converted into the neutral phosphate Co 3 (P0 4) 2 -2H 2 (H. Debray, Ann. de chimie, 1861, [3] 61, p. 438). Cobalt ammonium phosphate, CoNH 4 PO.|T2H 2 0, is formed when a soluble cobalt salt is digested for some time with excess of a warm solution of ammonium phosphate. It separates in the form of small rose-red

crystals, which decompose on boiling with water.

Cobaltous cyanide, Co(CN) 2 -3H 2 0, is obtained when the carbonate is dissolved in hydrocyanic acid or when the acetate is precipitated by potassium cyanide. It is insoluble in dilute acids, but is readily soluble in excess of potassium cyanide. The double cyanides of cobalt are analogous to those of iron. Hydrocobaltocyanic acid is not known, but its potassium salt, K4Co(CN) 6 , is formed when freshly precipitated cobalt cyanide is dissolved in an ice-cold solution of potassium cyanide. The liquid is precipitated by alcohol, and the washed and dried precipitate is then dissolved in water and allowed to stand, when the salt separates in dark-coloured crystals. In alkaline solution it readily takes up oxygen and is converted into potassium cobalticyanide, K s Co(CN) 6 , which may also be obtained by evaporating a solution of cobalt cyanide, in excess of potassium cyanide, in the presence of air, 8KCN + 2Co(CN) 2 -f-H 2 0 + 0 = 2K 3 Co(CN)« + 2KHO. It forms monoclinic crystals which are very soluble in water. From its aqueous solution, concentrated hydro- chloric acid precipitates hydrocobalticyanic acid, HsCo(CN) 6 , as a colourless solid which is very deliquescent, and is not attacked by concentrated hydrochloric and nitric acids. For a description of the varioussalts of this acid, see P. Wesselsky, Berichte, 1869, 2, p. 588.

Cobaltammines. A large number of cobalt compounds are

known, of which the empirical composition represents them as salts

of cobalt to which one or more molecules of ammonia have been

added. These salts have been divided into the following series : — •

Diammine Series, [Co(NH 3) 2]X 4 M. In these salts X = NO2 and

M = one atomic proportion of a monovalent metal, or the

equivalent quantity of a divalent metal.

Triammine Series, [Co(NH 3) 5]X 3 . Here X = CI, NO3, N0 2 , iS0 4
,

&c. Tetrammine Series. This group may be divided into the Praseo-salts [R 2 Co(NH 3),,]X, where X = CI. Croceo-salts [(N0 2)2Co(NH 3)4]X, which may be considered

as a subdivision of the praseo-salts. Tetrammine purpureo-salts [RCo(NH 3)4-H 2 0]X 2 . Tetrammine roseo-salts [Co(NH 3)4-(H 2 0)

2]X 3 . Fuseo-salts fCo(NH 3) 4]OH-X 2 . Pentammine Series.

Pentammine purpureo-salts [R-Co(NH 3) 5]X 2 where X = CI, Br, NO s , N0 2 , |S0 4 , &c.

Pentammine roseo-salts [Co(NH 3)5-H 2 0]X 2 . Hexammine or Luteo Series [Co(NH 3) 6]X 3 . The hexammine salts are formed by the oxidizing action of air on dilute ammoniacal solutions of cobaltous salts, especially in presence of a large excess of ammonium chloride. They form yellow or bronze-coloured crystals, which decompose on boiling their aqueous solution. On boiling their solution in caustic alkalis, ammonia is liberated. The pentammine purpureo-salts are formed from the luteo-salts by loss of ammonia, or from an air slowly oxidized ammoniacal cobalt salt solution, the precipitated luteo- salt being filtered off and the filtrate boiled with concentrated acids. They are violet-red in colour, and on boiling or long standing with dilute acids they pass into the corresponding roseo-salts.

The pentammine nitrito salts are known as the xanthocobalt salts and have the general formula [N0 2 Co(NH 3);]X 2 . They are formed by the action of nitrous fumes on ammoniacal solutions of cobaltous salts, or purpureo-salts, or by the mutual reaction of chlorpurpureo-salts and alkaline nitrites. They are soluble in water and give characteristic precipitates with platinic and auric chlorides, and with potassium ferrocyanide. The pentammine roseo-salts can be ob- tained from the action of concentrated acids, in the cold, on air- oxidized solutions of cobaltous salts. They are of a reddish colour and usually crystallize well ; on heating with concentrated acids are usually transformed into the purpureo-salts. Their alkaline solutions liberate ammonia on boiling. They give a characteristic pale red precipitate with sodium pyrophosphate, soluble in an excess of the precipitant; they also form orecipitates on the addition of

platinic chloride and potassium ferrocyanide. For methods of preparation of the tetrammine and triammine salts, see O. Dammer's Handbuch der anorganischen Chemie, vol. 3 (containing a complete account of the preparation of the cobaltammine salts). The diam- mine salts are prepared by the action of alkaline nitrites on cobaltous salts in the presence of much ammonium chloride or nitrate; they are yellow or brown crystalline solids, not very soluble in cold water.

The above series of salts show striking differences in their be- haviour towards reagents; thus, aqueous solutions of the luteo chlorides are strongly ionized, as is shown by their high electric conductivity; and all their chlorine is precipitated on the addition of silver nitrate

solution. The aqueous solution, however, does not show the ordinary reactions of cobalt or of ammonia, and so it is to be presumed that the salt ionizes into [Co(NH 3)' 6 j and 3CI'. The purpureo chloride has only two-thirds of its chlorine precipitated on the addition of silver nitrate, and the electric conductivity- is much less than that of the luteo chloride; again in the praseo- salts only one-third of the chlorine is precipitated by silver nitrate, the conductivity again falling; while in the triammine salts all ionization has disappeared. For the constitution of these salts and of the " metal ammonia " compounds generally, see A. Werner, Zeit. fur anorg. Chemie, 1893 et seq., and Berichte, 1 895, et seq.'; and S. Jorgensen, Zeit. fur anorg. Chemie, 1892 et seq.

The oxycobaltammines are a series of compounds of the general type [Co20rH2(NH 3)io]X 4 first observed by L. Gmelin, and subsequently examined by E. Fremy, W. Gibbs and G. Vortmann {Monatshefte filr Chemie, 1885, 6, p. 404). They result from the cobaltammines by the direct taking up of oxygen and water. On heating, they decompose, forming basic tetrammine salts.

The atomic weight of cobalt has been frequently determined, the earlier results not being very concordant (see R. Schneider, Pog. Ann., 1857, 101, p. 387; C. Marignac, Arch. Phys. Nat. [2], 1, P- 373; W. Gibbs, Amer. Jour. Sci. [2], 25, p. 483; J. B. Dumas, Ann. Chim. Phys., 1859 [3], 55, p. 129; W. J. Russell, Jour. Chem. Soc, 1863, 16, p. 51). C. Winkler, by the analysis of the chloride, and by the action of iodine on the metal, obtained the values 59-37 and 59-07, whilst W. Hempel and H. Thiele (Zeit. J. anorg. Chem., 1896, II, p. 73), by reducing cobalto-cobaltic oxide, and by the analysis of the chloride, have obtained the values 58-56 and 58-48. G. P. Baxter and others deduced the value 58-995 (0 = i6).

Cobalt salts may be readily detected by the formation of the black sulphide, in alkaline solution, and by the blue colour they produce when fused with borax. For the quantitative determination of cobalt, it is either weighed as the oxide, Co 3 04, obtained by ignition of the precipitated monoxide, or it is reduced in a current of hydrogen and weighed as metal. For the quantitative separation of cobalt and nickel, see E. Hintz {Zeit. f. anal. Chem., 1891, 30, p. 227), and also Nickel.

COBALTITE, a mineral with the composition CoAsS, cobalt sulpharsenide. It is found as granular to compact masses, and frequently as beautifully developed crystals, which have the same symmetry as the isomorphous mineral pyrites, being cubic with parallel hemihedrism. The usual forms are the cube, octahedron and pentagonal dodecahedron (210}. The colour is silver- white with a

reddish tinge, and the lustre brilliant and metallic, hence the old name cobalt-glance; the streak is greyish-black. The mineral is brittle, and possesses distinct cleavages parallel to the faces of the cube; hardness 55; specific gravity 6-2. The brilliant crystals from Tunaberg in Sodermanland and Hakansboda in Vestmanland, Sweden, and from Skutterud near Drammen in Norway are well known in mineral collections. The cobalt ores at these localities occur with pyrites and chalcp- pyrite as bands in gneiss. Crystals have also been found at Khetri in Rajputana, and under the name sehta the mineral is used by Indian jewellers for producing a blue enamel on gold and silver ornaments. Massive cobaltite has been found in small amount in the Botallack mine, Cornwall. A variety containing much iron replacing cobalt, and known as ferrocobaltite (Ger. Stahikobalt) , occurs at Siegen in Westphalia. (L. J. S.)

COBAN, or Santo Domingo de CobAn, the capital of the department of Alta Vera Paz in central Guatemala; about 90 m. N. of the city of Guatemala, on the Cojab6n, a left-hand tributary of the Polochic. Pop. (1905) about 31,000. The town is built in a mountainous and fertile district, and consists chiefly of adobe Indian cottages, surrounded by gardens of flowering shrubs. More modern houses have been erected for the foreign residents, among whom the Germans are numerically pre- dominant. In the chief square of the town stands a 16th-century Dominican church, externally plain, but covered internally with curious Indian decorations. The municipal offices, formerlv a college for priests, are remarkable for their handsome bin.

disproportionately large gateway in Renaissance style. Despite the want of a railway, Coban bas a flourishing trade in coffee and cinchona; cocoa, vanilla and sugar-cane are also cultivated, and there are manufactures of rum, cotton fabrics, soap and cigars. The prosperity of the town is largely due to the industry of the Quecchi, Kacchi or Kakchi Indians who form the majority of the inhabitants.

Coban was founded in the 16th century by Dominican monks under Fray Pedro de Angulo, whose portrait is preserved in the church. In honour of the emperor Charles V. (1500-1558), Coban received the name of Ciudad Imperial (which soon became obsolete), together with a coat of arms and other privileges belonging to a Spanish city of the first class.

COBAR, a mining town of Robinson county, New South Wales, Australia, 459 m. N.W. by W. of Sydney by rail. Pop. (iqci) 3371. The district of which Cobar is the centre abounds in minerals of all kinds, but copper and gold are those most extensively worked. The Great Cobar copper-mine is the most important in the state, and there are a number of successful gold- mines. In addition to the mining, the district produces large quantities of wool. Cobar is a municipality, as also is the adjacent township of Gladstone, with a mining population.

COBB, HOWELL (1815-1868), American political leader, was born at Cherry Hill, Jefferson county, Georgia, on the 7th of September 1815. He graduated from Franklin College (Univer- sity of Georgia) in 1834, and two years later was admitted to the bar. From 1837 to 1840 he was solicitor- general for the western circuit of his state; from 1843 t0 I 8S I an d from 1855 to 1857 he was a member of the National House of Representatives, becoming Democratic leader in that body in 1847, and serving as speaker in 1840-1851; from 1851 to 1853 he was governor of his state; and from March 1857 to December i860 he was secretary of the treasury in President Buchanan's cabinet. He was president of the convention of the seceded states which drafted a constitution for the Confederacy. In 1861 he was appointed colonel of a regiment and two years later was made a major-general. He died in New York on the 9th of October 1868. He sided with President Jackson on the question of nulli- fication; was an efficient supporter of President Polk's admini- stration during the Mexican War; and was an ardent advocate of slavery extension into the Territories, but when the Com- promise of 1850 had been agreed upon he became its staunch supporter as a Union Democrat, and on that issue was elected governor of Georgia by a large majority. In i860, however, he ceased to be a Unionist, and became a leader of the secession movement. From the close of the war until his death he vigorously opposed the Reconstruction Acts.

COBBETT, WILLIAM (1766-1835), English politician and writer, was born near Farnham in Surrey, according to his own statement, on the 9th of March 1766. He was the grandson of a farm-labourer, and the son of a small farmer; and during his early life he worked on his father's farm. At the age of sixteen, inspired with patriotic feeling by the sight of the men-of-war in Portsmouth harbour, he thought of becoming a sailor; and in May 1783, having, -while on his way to Guildiord fair, met the London coach, he suddenly resolved to accompany it to its destination. He arrived at Ludgate Hill with exactly half-a- crown in his pocket, but an old gentleman who had travelled with him invited him to his house, and obtained for him the situa- tion of copying clerk in an attorney's office. He greatly disliked

his new occupation; and rejecting all his father's entreaties that he would return home, he went down to Chatham early in 1784 with the intention of joining the marines. By some mistake, however, he was enlisted in a regiment of the line, which rather more than a year after proceeded to St John's, New Brunswick. All his leisure time during the months he remained at Chatham was devoted to reading the contents of the circulating library of the town, and getting up by heart Lowth's English Grammar. His uniform good conduct, and the power of writing correctly which he had acquired, quickly raised him to the rank of corporal, from which, without passing through the intermediate grade of sergeant, he was promoted to that of sergeant-major. In

November 1791 he was discharged at his own request, and received the official thanks of the major and the general who signed his discharge. In February 1792 Cobbett married the daughter of a sergeant-major of artillery, whom he had met some years before in New Brunswick. But his liberty was threatened in consequence of his bringing a charge of peculation against certain officers in his old regiment, and he went over to France in March, where he studied the language and literature. In his absence, the inquiry into his charges ended in an acquittal.

In September he crossed to the United States, and supported himself at Wilmington, Delaware, by teaching English to French emigrants. Among these was Talleyrand, who employed him, according to Cobbett's story, not because he was ignorant of English, but because he wished to purchase his pen. Cobbett made his first literary sensation by his Observations on the Emigration of a Martyr to the Cause of Liberty, a clever retort on Dr Priestley, who had just landed in America complaining of the treatment he had received in England. This pamphlet was followed by a number of papers, signed " Peter Porcupine," and entitled Prospect from the Congress Gallery, the Political Censor and the Porcupine's Gazette. In the spring of 1796, having quarrelled with his publisher, he set up in Philadelphia as bookseller and publisher of his own works. On the day of opening, his windows were filled with prints of the most extrava- gant of the French Revolutionists and of the founders of the American Republic placed side by side, along with portraits of George III., the British ministers, and any one else he could find likely to be obnoxious to the people; and he continued to pour forth praises of Great Britain and scorn of the institutions of the United States, with special abuse of the French party. Abuse and threats were of course in turn showered upon him, and in August 1797, for one of his attacks on Spain, he was prosecuted, though unsuccessfully, by the Spanish ambassador.

Immediately on this he was taken up for libels upon American statesmen, and bound in recognizances to the amount of $4000, and shortly after he was prosecuted a third time for saying that Dr Benjamin Rush, who was much addicted to blood-letting, killed nearly all the patients he attended. The trial was repeatedly deferred, and was not settled till the end of 1799, when he was fined $5000. After this last misfortune, for a few months Cobbett carried on a newspaper called the Rushlight; but in June 1800 he set sail for England.

At home he found himself regarded as the champion of order and monarchy. Windham invited him to dinner, introduced him to Pitt, and begged him to accept a share in the True Briton. He refused the offer and joined an old friend, John Morgan, in opening a book shop in Pall Mall. For some time he published the Porcupine's Gazette, which was followed in January 1802 by the Weekly Political Register. ■ In 1801 appeared his Letters to Lord Hawkesbury (afterwards earl of Liverpool) and his Letters to the Rt. Hon. Henry Addington, in opposition to the proposed peace of Amiens. On the conclusion of the peace (1802) Cobbett made a still bolder protest; he determined to take no part in the general illumination, and — assisted by the sympathy of his wife, who, being in delicate health, removed to the house of a friend — he carried out his resolve, allowing his windows to be smashed and his door broken open by the angry mob. The letters to Addington are among the most polished and dignified of Cobbett's writings; but by 1803 he was once more revelling in personalities. The government of Ireland was singled out for wholesale attack; and a letter published in the Register remarked of Hardwicke, the lord-lieutenant, that the appoint- ment was like setting the surgeon's apprentice to bleed the pauper patients. For this, though not a word bad been uttered against Hardwicke's character, Cobbett was fined £500; and two days after the conclusion of this trial a second commenced, at the suit of Plunkett, the solicitor-general for Ireland which resulted in a similar fine. About this time he began to write in support of Radical views; and to cultivate the friendship of Sir Francis Burdett, from whom he received considerable sums of money, and other favours, for which he gave no very grateful return. In 1809 he was once more in the most serious trouble.

He had bitterly commented on the flogging of some militia, because their mutiny had been repressed and their sentence carried out by the aid of a body of German troops, and in con- sequence he was fined

£1000 and imprisoned for two years. His indomitable vigour was never better displayed. He still con- tinued to publish the Register, and to superintend the affairs of his farm; a hamper containing specimens of its produce and other provisions came to him every week; and he amused himself with the company of some of his children and with weekly letters from the rest. On his release a public dinner, presided over by Sir F. Burdett, was held in honour of the event. He returned to his farm at Botley in Hampshire, and continued in his old course, extending his influence by the publication of the Twopenny Trash, which, not being periodical, escaped the newspaper stamp tax. Meanwhile, however, he had contracted debts to the amount of £34,000 (for it is said that, notwithstand- ing the aversion he publicly expressed to paper currency, he had carried on his business by the aid of accommodation bills to a very large amount) ; and early in 181 7 he fled to the United States. But his pen whs as active as ever; from Long Island his MS. for the Register was regularly sent to England; and it was here that he wrote his clear and interesting English Grammar, of which 10,000 copies were sold in a month.

His return to England was accompanied by his weakest exhibition — the exhuming and bringing over of the bones of Thomas Paine, whom he had once heartily abused, but on whom he now wrote a panegyrical ode. Nobody paid any attention to the affair; the relics he offered were not purchased; and the bones were reinterred.

Cobbett's great aim was now to obtain a seat in the House of Commons. He calmly suggested that his friends should assist him by raising the sum of £5000; it would be much better, he said, than a meeting of 50,000 persons. He first offered himself for Coventry, but failed; in 1826 he was by a large number of votes last of the candidates for Preston; and in 1828 he could find no one to propose him for the office of common councillor. In 1830, that year of revolutions, he was prosecuted for inciting to rebellion, but the jury disagreed, and soon after, through the influence of one of his admirers, Mr Fielden, who was himself a candidate for Oldham, he was returned for that town. In the House his speeches were listened to with amused attention. His position is sufficiently marked by the sneer of Peel that he would attend to Mr Cobbett's observations exactly as if they had been those of a "respectable member"; and the only striking part of his career was his absurd motion that the king should be prayed to remove Sir Robert Peel's name from the list of the privy council, because of the change he had proposed in the currency in 1819. In 1834 Cobbett was again member for Oldham, but his health now began to give way, and in June 1835 he left London for his farm, where he died on the 16th of that month.

Cobbett's account of his home-life makes him appear singularly happy; his love and admiration of his wife never failed; and his education of his children seems to have been distinguished by great kindliness, and by a good deal of healthy wisdom, mingled with the prejudices due to the peculiarities of his temper and circumstances. Cobbett's ruling characteristic was a sturdy egoism, which had in it something of the nobler element of self- respect. A firm will, a strong brain, feelings not over-sensitive, an intense love of fighting, a resolve to get on, in the sense of making himself a power in the world — these are the principal qualities which account for the success of his career. His opinions were the fruits of his emotions. It was enough for him to get a thorough grasp of one side of a question, about the other side he did not trouble himself; but he always firmly seizes the facts which make for his view, and expresses them with unfail- ing clearness. His argument, which is never subtle, has always the appearance of weight, however flimsy it may be in fact. His sarcasm is seldom polished or delicate, but usually rough, and often abusive, while coarse nicknames were his special delight. His style is admirably correct and always extremely forcible.

Cobbett's contributions to periodical literature occupy 100 volumes, twelve of which consist of the papers published at Phila- delphia between 1794 and 1800, and the rest of the Weekly Political Register, which ended only with Cobbett's death (June 1835). An abridgment of these works, with notes, was published by his sons, John M. Cobbett and James P. Cobbett. Besides this he published An Account of the Horrors of the French Revolution, and a work tracing all these horrors to " the licentious politics and infidel philosophy of the present age " (both 1798); A Year's Residence in the United States; Parliamentary History of England from the Norman Conquest to 1800 (1806); Cottage Economy; Roman History; French Grammar and English Grammar, both in the form of letters ; Geographical Dictionary of England and Wales; History of the Regency and Reign of George IV., containing a defence of Queen Caroline, whose cause he warmly advocated (1830-1834); Life of Andrew Jackson, President of the United States (1834); Legacy to Labourers; Legacy to Peel; Legacy to Parsons (1835), an attack on the secular claims of the Established Church; Doom of Tithes; Rural Rides (1830; new ed. 1885), an account of his tours on horse- back through England, full of admirable descriptive writing; Advice to Young Men and Women; Cobbett's Corn (1828); and History of the Protestant Reformation in England and Ireland (1824- 1827), in which he defends the monasteries, Queen Mary and Bonner, and attacks the Reformation, Henry VIII., Elizabeth and all who helped to bring it about, with such vehemence that the

work was translated into French and Italian, and extensively circulated among Roman Catholics.

In 1798 Cobbett published in America an account of his early life, under the title of The Life and Adventures of Peter Porcupine; and he left papers relating to his subsequent career. His life has been written by R.Huish (1835), E. Smith (1878), and E. I. Carlyle (1904). See also the annotated edition of the Register (1835).

COBBOLD, THOMAS SPENCER (1828-1886), English man of science, was born at Ipswich in 1828, a son of the Rev. Richard Cobbold (1797-1877), the author of the History of Margaret Catchpole. After graduating in medicine at Edinburgh in 1851, he was appointed lecturer on botany at St Mary's hospital, London, in 1857, and also on zoology and comparative anatomy at Middlesex hospital in 1861. From 1868 he acted as Swiney lecturer on geology at the British Museum until 1873, when he became professor of botany at the Royal Veterinary College, afterwards filling a chair of helminthology which was specially created for him at that institution. He died in London on the 20th of March 1886. His special subject was helminthology, particularly the worms parasitic in man and animals, and as a physician he gained a considerable reputation in the diagnosis of cases depending on the presence of such organisms. His numerous writings include Entozoa (1864); Tapeworms (1866); Parasites (1879); Human Parasites (1882); and Parasites of Meat and Prepared Flesh Food (1884).

COBDEN, RICHARD (1804-1865), English manufacturer and Radical politician, was born at a farmhouse called Dunford, near Midhurst, in Sussex, on the 3rd of June 1804. The family had been resident in that neighbourhood for many generations, occupied partly in trade and partly in agriculture. Formerly there had been in the town of Midhurst a small manufacture of hosiery with which the Cobdens were connected, though all trace of it had disappeared before the birth of Richard. His grandfather was a maltster in that town, an energetic and "prosperous man, almost always the bailiff or chief magistrate, and taking rather a notable part in county matters. But his father, forsaking that trade, took to farming at an unpropitious time. He was amiable and kind-hearted, and greatly liked by his neighbours, but not a man of business habits, and he did not succeed in his farming enterprise. He died when his son Richard was a child, and the care of the family devolved upon the mother, who was a woman of strong sense and of great energy of character, and who, after her husband's death, left Dunford and returned to Midhurst.

The educational advantages of Richard Cobden were not very ample. There was a grammar school at Midhurst, which at one time had enjoyed considerable reputation, but which had fallen into decay. It was there that he had to pick up such rudiments of knowledge as formed his first equipment in life, but from his earliest years he was indefatigable in the work of self-cultivation. When fifteen or sixteen years of age he went to London to the warehouse of Messrs Partridge & Price, in Eastcheap, one of the partners being his uncle. His relative,

noting the lad's passionate addiction to study, solemnly warned him against indulging such a taste, as likely to prove a fatal obstacle to his success in commercial life. But the admonition was unheeded, for while unweariedly diligent in business, he was in his intervals of leisure a most assiduous student. During his residence in London he found access to the London Institution, and made ample use of its large and well-selected library.

When he was about twenty years of age he became a com- mercial traveller, and soon became eminently successful in his calling. But never content to sink into the mere trader, he sought to introduce among those he met on the " road " a higher tone of conversation than usually marks the commercial room, and there were many of his associates who, when he had attained eminence, recalled the discussions on political economy and kindred topics with which he was wont to enliven and elevate the travellers' table. In 1830 Cobden learnt that Messrs Fort, calico printers at Sabden, near Clitheroe,, were about to retire from business, and he, with two other young men, Messrs Sheriff and Gillet, who were engaged in the same commercial house as himself, determined to make an effort to acquire the succession. They had, however, very little capital among them. But it may be taken as an illustration of the instinctive confidence which Cobden through life inspired in those with whom he came into contact, that Messrs Fort consented to leave to these untried young men a large portion of their capital in the business. Nor was their confidence misplaced. The new firm had soon three establishments, — one at Sabden, where the printing works were, one in London and one in Manchester for the sale of their goods. This last was under the direct management of Cobden, who, in 1830 or 1 83 1, settled in the city with which his name became afterwards so closely associated. The success of this enterprise was decisive and rapid, and the " Cobden prints " soon became known through the country as of rare value both

for excellence of material and beauty of design. There can be no doubt that if Cobden had been satisfied to devote all his energies to commercial life he might soon have attained to great opulence, for it is understood that his share in the profits of the business he nad established amounted to from £8000 to £10,000 a year. But he had other tastes, which impelled him irresistibly to pursue those studies which, as Bacon says, ” serve for delight, for ornament and for ability.” Prentice, the historian of the Anti-Corn-Law League, who was then editor of the Manchester Times, describes how, in the year 1835, he received for publica- tion in his paper a series of admirably written letters, under the signature of ” Libra,” discussing commercial and economical questions with rare ability. After some time he discovered that the author of these letters was Cobden, whose name was until then quite unknown to him.

In 1835 he published his first pamphlet, entitled England, Ireland and A merica, by a Manchester Manufacturer. It attracted great attention, and ran rapidly through several editions. It was marked by a breadth and boldness of views on political and social questions which betokened an original mind. In this production Cobden advocated the same principles of peace, non* intervention, retrenchment and free trade to which he continued faithful to the last day of his life. Immediately after the publica- tion of this pamphlet, he paid a visit to the United States, landing in New York on the 7 th of June 1835. He devoted about three months to this tour, passing rapidly through the seaboard states and the adjacent portion of Canada, and collecting as he went large stores of information respecting the condition, resources and prospects of the great western republic. Soon after his return to England he began to prepare another work for the press, which appeared towards the end of 1836, under the title of Russia. It was mainly designed to combat a wild outbreak of Russophobia which, under the inspiration of David Urquhart, was at that time taking possession of the public mind. But it contained also a bold indictment of the whole system of foreign policy then in vogue, founded on ideas as to the balance of power and the necessity of large armaments for the protection of commerce. While this pamphlet was in the press, delicate health obliged him to leave England, and for several months, at the end

of 1836 and the beginning of 1837, he travelled in Spain, Turkey and Egypt. During his visit to Egypt he had an interview with Mehemet Ah, of whose character as a reforming monarch he did not bring away a very favourable impression. He re- turned to England in April 1837. From that time Cobden became a conspicuous figure in Manchester, taking a leading part in the local politics of the town and district.

Largely owing to his exertions, the Manchester Athenaeum was established, at the opening of which he was chosen to deliver the inaugural address. He became a member of the chamber of commerce, and soon infused new life into that body. He threw himself with great energy into the agitation which led to the incorporation of the city, and was elected one of its first aldermen. He began also to take a warm interest in the cause of popular education. Some of his first attempts in public speaking were at meetings which he convened at Manchester, Salford, Bolton, Rochdale and other adjacent towns, to advocate the establishment of British schools. It was while on a mission for this purpose to Rochdale that he first formed the acquaintance of John Bright, who afterwards became his distinguished coadjutor in the free- trade agitation. Nor was it long before his fitness for parliamen- tary life was recognized by his friends. In 1837, the death of William IV. and the accession of Queen Victoria led to a general election. Cobden was candidate for Stockport, but was defeated, though not by a large majority.

In 1838 an anti-Corn-Law association was formed at Man- chester, which, on his suggestion, was afterwards changed into a national association, under the title of the Anti-Corn-Law League (see Corn Laws). Of that famous association Cobden was from first to last the presiding genius and the animating soul. During the seven years between the formation of the league and its final triumph, he devoted himself wholly to the work of pro- mulgating his economic doctrines. His labours were as various as they were incessant — now guiding the councils of the league, now addressing crowded and enthusiastic meetings of his sup- porters in London or the large towns of England and Scotland, now invading the agricultural districts and challenging the landlords to meet him in the presence of their own farmers, to dis- cuss the question in dispute, and now encountering the Chartists, led by Feargus O'Connor. But whatever was the character of his audience he never failed, by the clearness of his statements, the force of his reasoning and the felicity of his illustrations, to make a deep impression on the minds of his hearers.

In 1 841, Sir Robert Peel having defeated the Melbourne ministry in parliament, there was a general election, when Cobden was returned for Stockport. His opponents had confidently predicted that he would fail utterly in the House of Commons. He did not wait long, after his admission into that assembly, in bringing their predictions to the test. Parliament met on the 19th of August. On the 24th, in course of the debate on the Address, Cobden delivered his first speech. " It was remarked," says Miss Martineau, in her History of the Peace, " that he was not treated in the House with the courtesy usually accorded to a

new member, and it was perceived that he did not need such observance.” With perfect self-possession, which was not dis- turbed by the jeers that greeted some of his statements, and with the utmost simplicity, directness and force, he presented the argument against the corn-laws in such a form as startled his audience, and also irritated some of them, for it was a style of eloquence very unlike the conventional style which prevailed in parliament.

From that day he became an acknowledged power in the House, and though addressing a most unfriendly audience, he compelled attention by his thorough mastery of his subject, and by the courageous boldness with which he charged the ranks of his adversaries. He soon came to be recognized as one of the fore- most debaters on those economical and commercial questions which at that time so much occupied the attention of parliament; and the most prejudiced and bitter of his opponents were fain to acknowledge that they had to deal with a man whom the most practised and powerful orators of their party found it hard to cope with, and to whose eloquence, indeed, the great statesman

m whom they put their trust was obliged ultimately to surrender. On the 17 th of February 1843 an extraordinary scene took place in the House of Commons. Cobden had spoken with great fervour of the deplorable suffering and distress which at that time prevailed in the country, for which, he added, he held Sir Robert Peel, as the head of the government, responsible. This remark, when it was spoken, passed unnoticed, being indeed nothing more than one of the commonplaces of party warfare. But a few weeks before, Mr Drummond, who was Sir Robert Peel’s private secretary, had been shot dead in the street by a lunatic. In consequence of this, and the manifold anxieties of the time with which he was harassed, the mind of the great statesman was no doubt in a moody and morbid condition, and when he arose to speak later in the evening, he referred in excited and agitated tones to the remark, as an incitement to violence against his person. Sir Robert Peel’s party, catching at this hint, threw themselves into a frantic state of excitement, and when Cobden attempted to explain that he meant official, not personal responsibility, they drowned his voice with clamorous and in- sulting shouts. But Peel lived to make ample and honourable amend for this unfortunate ebullition, for not only did he ” fully and unequivocally withdraw the imputation which was thrown out in the heat of debate under an erroneous impression,” but when

the great free-trade battle had been won, he took the wreath of victory from his own brow, and placed it on that of his old opponent, in the following graceful words: — ” The name which ought to be, and will be associated with the success of these measures, is not mine, or that of the noble Lord (Russell), but the name of one who, acting I believe from pure and disinterested motives, has, with untiring energy, made appeals to our reason, and has enforced those appeals with an eloquence the more to be admired because it was unaffected and unadorned; the name which ought to be chiefly associated with the success of these measures is the name of Richard Cobden.” Cobden had, indeed, with unexampled devotion, sacrificed his business, his domestic comforts and for a time his health to the public interests. His friends therefore felt, at the close of that long campaign, that the nation owed him some substantial token of gratitude and admiration for those sacrifices. No sooner was the idea of such a tribute started than liberal contributions came from all quarters, which enabled his friends to present him with a sum of £80,000. Had he been inspired with personal ambition, he might have entered upon the race of political advancement with the prospect of attaining the highest official prizes. Lord John Russell, who, soon after the repeal of the corn laws, suc- ceeded Sir Robert Peel as first minister, invited Cobden to join his government. But he preferred keeping himself at liberty to serve his countrymen unshackled by official ties, and declined the invitation. He withdrew for a time from England. His first intention was to seek complete seclusion in Egypt or Italy, to recover health and strength after his long and exhausting labours. But his fame had gone forth throughout Europe, and intimations reached him from many quarters that his voice would be listened to everywhere with favour, in advocacy of the doctrines to the triumph of which he had so much contributed at home. Writing to a friend in July 1846, he says — ” I am going to tell you of a fresh project that has been brewing in my brain. I have given up all idea of burying myself in Egypt or Italy. I am going on an agitating tour through the continent of Europe.” Then, referring to messages he had received from influential persons in France, Prussia, Austria, Russia and Spain to the effect mentioned above, he adds: — “Well, I will, with God’s assistance during the next twelve months, visit all the large states of Europe, see their potentates or statesmen, and endeavour to enforce those truths which have been irresistible at home. Why should I rust in inactivity? If the public spirit of my country- men affords me the means of travelling as their missionary, I will be the first ambassador from the people of this country to the nations of the continent. I am impelled to this by an instinctive emotion such as has never deceived me. I feel that I could succeed in making out a stronger case for the prohibitive nations of

Europe to compel them to adopt a freer system than

I had here to overturn our protection policy." This programme he fulfilled. He visited in succession France, Spain, Italy, Germany and Russia. He was received everywhere with marks of distinction and honour. In many of the principal capitals he was invited to public banquets, which afforded him an op- portunity of propagating those principles of which he was re- garded as the apostle. But beside these public demonstrations he sought and found access in private to many of the leading statesmen, in the various countries he visited, with a view to indoctrinate them with the same principles. During his absence there was a general election, and he was returned (1847) for Stockport and for the West Riding of Yorkshire. He chose to sit for the latter.

When Cobden returned from the continent he addressed himself to what seemed to him the logical complement of free trade, namely, the promotion of peace and the reduction of naval and military armaments. His abhorrence of war amounted to a passion. Throughout his long labours in behalf of unrestricted commerce he never lost sight of this, as being the most precious result of the work in which he was engaged,— its tendency to diminish the hazards of war and to bring the nations of the world into closer and more lasting relations of peace and friendship with each other. He was not deterred by the fear of ridicule or the reproach of Utopianism from associating himself openly, and with all the ardour of his nature, with the peace party in England. In 1 849 he brought forward a proposal in parliament in favour of international arbitration, and in 1851 a motion for mutual reduction of armaments. He was not successful in either case, not did he expect to be. In pursuance of the same object, he identified himself with a series of remarkable peace congresses- international assemblies designed to unite the intelligence and philanthropy of the nations of Christendom in a league against war — which from 1848 to 185 1 were held successively in Brussels, Paris, Frankfort, London, Manchester and Edinburgh.

On the establishment of the French empire in 1851-1852 a violent panic took possession of the public mind. The press promulgated the wildest alarms as to the intentions of Louis Napoleon, who was represented as contemplating a sudden and piratical descent upon the English coast without pretext or provocation. By a series of powerful speeches in and out of parliament, and by the publication of his masterly pamphlet, i?g3 and 1853, Cobden sought to calm the

passions of his country- men. By this course he sacrificed the great popularity he had won as the champion of free trade, and became for a time the best-abused man in England. Immediately afterwards, owing to the quarrel about the Holy Places which arose in the east of Europe, public opinion suddenly veered round, and all the suspicion and hatred which had been directed against the emperor of the French were diverted from him to the emperor of Russia, Louis Napoleon was taken into favour as England's faithful ally, and in a whirlwind of popular excitement the nation was swept into the Crimean War. Cobden, who had travelled in Turkey, and had studied the condition of that country with great care for many years, discredited the outcry about maintaining the independence and integrity of the Ottoman empire which was the battle-cryof the day. He denied that itwas possible to maintain them, and no less strenuously denied that it was desirable even if it were possible. He believed that the jealousy of Russian aggrandizement and the dread of Russian power were absurd exaggerations. He maintained that the future of European Turkey was in the hands of the Christian population, and that it would have been wiser for England to ally herself with them rather than with the doomed and decaying Mahommedan power. " You must address yourselves," he said in the House of Commons, " as men of sense and men of energy, to the question — what are you to do with the Christian population? for Mahommedanism cannot be maintained, and I should be sorry to see this country fighting for the maintenance of Mahom- medanism. . . . You may keep Turkey on the map of Europe, you may call the country by the name of Turkey if you like, but do not think you can keep up the Mahommedan rule in the country." The torrent of popular sentiment in favour of war

was, however, irresistible; and Cobden and Bright were over-whelmed with obloquy.

At the beginning of 1857 tidings from China reached England of a rupture between the British plenipotentiary in that country and the governor of the Canton provinces in reference to a small vessel or lorcha called the " Arrow," which had resulted in the English admiral destroying the river forts, burning 23 ships belonging to the Chinese navy and bombarding the city of Canton. After a careful investigation of the official documents, Cobden became convinced that those were

utterly unrighteous proceedings. He brought forward a motion in parliament to this effect, which led to a long and memorable debate, lasting over four nights, in which he was supported by Sydney Herbert, Sir James Graham, Gladstone, Lord John Russell and Disraeli, and which ended in the defeat of Lord Palmerston by a majority of sixteen. But this triumph cost him his seat in parliament. On the dissolution which followed Lord Palmerston's defeat, Cobden became candidate for Huddersfield, but the voters of that town gave the preference to his opponent, who had supported the Russian War and approved of the proceedings at Canton. Cobden was thus relegated to private life, and retiring to his country house at Dunford, he spent his time in perfect content- ment in cultivating his land and feeding his pigs.

He took advantage of this season of leisure to pay another visit to the United States. During his absence the general election of 1859 occurred, when he was returned unopposed for Rochdale. Lord Palmerston was again prime minister, and having discovered that the advanced liberal party was not so easily " crushed " as he had apprehended, he made overtures of reconciliation, and invited Cobden and Milner Gibson to become members of his government. In a frank, cordial letter which was delivered to Cobden on his landing in Liverpool, Lord Palmerston offered him the presidency of the Board of Trade, with a seat in the Cabinet. Many of his friends urgently pressed him to accept; but without a moment's hesitation he determined to decline the proposed honour. On his arrival in London he called on Lord Palmerston, and with the utmost frankness told him that he had opposed and denounced him so frequently in public, and that he still differed so widely from his views, especially on questions of foreign policy, that he could not, without doing violence to his own sense of duty and consistency, serve under him as minister. Lord Palmerston tried good-humouredly to combat his objections, but without success.

But though he declined to share the responsibility of Lord Palmerston's administration, he was willing to act as its repre- sentative in promoting freer commercial intercourse between Eng- land and France. But the negotiations for this purpose originated with himself in conjunction with Bright and Michel Chevalier. Towards the close of 1859 he called upon Lord Palmerston, Lord John Russell and Gladstone, and signified his intention to visit France and get into communication with the emperor and his ministers, with a view to promote this object. These statesmen expressed in general terms their approval of his purpose, but he went entirely on his own account, clothed at first with no official authority. On his arrival in Paris he had a long audience with Napoleon, in which he urged many

arguments in favour of re- moving those obstacles which prevented the two countries from being brought into closer dependence on one another, and he succeeded in making a considerable inpression on his mind in favour of free trade. He then addressed himself to the French ministers, and had much earnest conversation, especially with Rouher, whom he found well inclined to the economical and com- mercial principles which he advocated. After a good deal of time spent in these preliminary and unofficial negotiations, the question of a treaty of commerce between the two countries having entered into the arena of diplomacy, Cobden was requested by the British government to act as their plenipotentiary in the matter in conjunction with Lord Cowley, their ambassador in France. But it proved a very long and laborious undertaking. He had to contend with the bitter hostility of the French pro- tectionists, which occasioned a good deal of vacillation on the part of the emperor and his ministers. There were also delays,

hesitations and cavils at home, which were more inexplicable. He was, moreover, assailed with great violence by a powerful section of the English press, while the large number of minute details with which he had to deal in connexion with proposed changes in the French tariff, involved a tax on his patience and industry which would have daunted a less resolute man But there was one source of embarrassment greater than all the rest. One strong motive which had impelled him to engage in this enterprise was his anxious desire to establish more friendly relations between England and France, and to dispel those feelings of mutual jealousy and alarm which were so frequently breaking forth and jeopardizing peace between the two countries. This was the most powerful argument with which he had plied the emperor and the members of the French government, and which he had found most efficacious with them. But while he was in the midst of the negotiations, Lord Palmerston brought forward in the House of Commons a measure for fortifying the naval arsenals of England, which he introduced in a warlike speech pointedly directed against France, as the source of danger of invasion and attack, against which it was necessary to guard. This produced irritation and resentment in Paris, and but for the influence which Cobden had acquired, and the perfect trust reposed in his sincerity, the negotiations would probably have been altogether wrecked. At last, however, after nearly twelve months' incessant labour, the work was completed in November i860. " Rare," said Mr Gladstone, " is the privilege of any man who, having fourteen years ago rendered to his country one signal service, now again, within the same brief span of life, decorated neither by land nor title, bearing no mark to distin-

guish him from the people he loves, has been permitted to perform another great and memorable service to his sovereign and his country."

On the conclusion of this work honours were offered to Cobden by the governments of both the countries which he had so greatly benefited. Lord Palmerston offered him a baronetcy and a seat in the privy council, and the emperor of the French would gladly have conferred upon him some distinguished mark of his favour. But with characteristic disinterestedness and modesty he declined all such honours.

Cobden's efforts in furtherance of free trade were always subordinated to what he deemed the highest moral purposes — the promotion of peace on earth and goodwill among men. This was his desire and hope as respects the commercial treaty with France. He was therefore deeply disappointed and distressed to find the old feeling of distrust still actively fomented by the press and some of the leading politicians of the country. In 1862 he published his pamphlet entitled The Three Panics, the object of which was to trace the history and expose the folly of those periodical visitations of alarm as to French designs with which England had been afflicted for the preceding fifteen or sixteen years.

When the Civil War threatened to break out in the United States, Cobden was deeply distressed. But after the conflict became inevitable his sympathies were wholly with the North, because the South was fighting for slavery. His great anxiety, however, was that the British nation should not be committed to any unworthy course during the progress of that struggle. And when relations with America were becoming critical and menacing in consequence of the depredations committed on American commerce by vessels issuing from British ports, he brought the question before the House of Commons in a series of speeches of rare clearness and force.

For several years Cobden had been suffering severely at in- tervals from bronchial irritation and a difficulty of breathing. Owing to this he had spent the winter of i860 in Algeria, and every subsequent winter he had to be very careful and confine himself to the house, especially in damp and foggy weather. In November 1864 he went down to Rochdale and delivered a speech to his constituents — the last he ever delivered. That effort was followed by great physical prostration, and he deter mined not to quit his retirement at Midhurst until spring had fairly set in. But in the month of March there were discussions

in the House of Commons on the alleged necessity of constructing large defensive works in Canada. He was deeply impressed with the folly of such a project, and he was seized with a strong desire to go up to London and deliver his sentiments on the subject. He left home on the 21st of March, and caught a chill. He recovered a little for a few days after his arrival in London; but on the 29th there was a relapse, and on the 2nd of April 1865 he expired peacefully at his apartments in Suffolk Street.

On the following day there was a remarkable scene in the House of Commons. When the clerk read the orders of the day Lord Palmerston rose, and in impressive and solemn tones declared ” it was not possible for the House to proceed to business without every member recalling to his mind the great loss which the House and country had sustained by the event which took place yesterday morning.” He then paid a generous tribute to the virtues, the abilities and services of Cobden, and he was followed by Disraeli, who with great force and felicity of language delineated the character of the deceased statesman, who, he said, ” was an ornament to the House of Commons and an honour to England.” Bright also attempted to address the House, but, after a sentence or two delivered in a tremulous voice, he was overpowered with emotion, and declared he must leave to a calmer moment what he had to say on the life and character of the manliest and gentlest spirit that ever quitted or tenanted a human form.

In the French Corps Legislatif , also, the vice-president, Forcade la Roquette, referred to his death, and warm expressions of esteem were repeated and applauded on every side. ” The death of Richard Cobden,” said M. la Roquette, ” is not alone a misfortune for England, but a cause of mourning for France and humanity.” Drouyn de Lhuys, the French minister of foreign affairs, made his death the subject of a special despatch, desiring the French ambassador to express to the government ” the mournful sympathy and truly national regret which the death, as lamented as premature, of Richard Cobden had excited on that side of the Channel.” ” He is above all,” he added, ” in our eyes the repre- sentative of those sentiments and those cosmopolitan principles before which national frontiers and rivalries disappear; whilst essentially of his country, he was still more of his time; he knew what mutual relations could accomplish in our day for the prosperity of peoples. Cobden, if I may be permitted to say so, was an

international man.”

He was buried at West Lavington church, on the 7th of April. His grave was surrounded by a large crowd of mourners, among whom were Gladstone, Bright, Milner Gibson, Charles Villiers and a host besides from all parts of the country. In 1866 the Cobden Club was founded in London, to promote free-trade economics, and it became a centre for political propaganda on those lines; and prizes were instituted in his name at Oxford and Cambridge.

Cobden had married in 1840 Miss Catherine Anne Williams, a Welsh lady, and left five surviving daughters, of whom Mrs Cobden-Unwin (wife of the publisher Mr Fisher Unwin), Mrs Walter Sickert (wife of the painter) and Mrs Cobden-Sanderson (wife of the well-known artist in bookbinding), afterwards became prominent in various spheres, and inherited their father’s political interest. His only son died, to Cobden’s inexpressible grief, at the age of fifteen, in 1856.

The work of Cobden, and what is now called ” Cobdenism,” has in recent years been subjected to much criticism from the newer school of English economists who advocate a ” national policy ” (on the old lines of Alexander Hamilton and Friedrich List) as against his cosmopolitan ideals”. But it remains the fact that his success with the free-trade movement was for years unchallenged, and, that the leaps and bounds with which English commercial prosperity advanced after the repeal of the corn- laws were naturally associated with the reformed fiscal policy, so that the very name of protectionism came to be identified with all that was not merely heterodox but hateful. The tariff reform movement in England started by Mr Chamberlain (q.v.) had the result of giving new boldness to the opponents of Manchesterism, and the whole subject once more became controversial (see

Free Trade; Corn Laws; Protection; Tariep ; Economics). Cobden has left a deep mark on English history, but he was not himself a ” scientific economist,” and many of his confident prophecies were completely falsified. As a manufacturer, and with the circumstances of his own day before him, he considered that it was ” natural ” for Great Britain to manufacture for the world in exchange for her free admission of the more ” natural ” agricultural products of other countries. He advocated the repeal of the corn-laws, not essentially in order to make food cheaper, but because it would develop industry and enable the manufac- turers to get labour at low but sufficient wages; and he assumed that other countries would be unable to compete with England in manufactures under free trade, at the prices

which would be possible for English manufactured products. ” We advocate,” he said, ” nothing but what is agreeable to the highest behests of Christianity — to buy in the cheapest market, and sell in the dearest.” He “believed that the rest of the world must follow England’s example: “if you abolish the corn-laws honestly, and adopt free trade in its simplicity, there will not be a tariff in Europe that will not be changed in less than five years ” (January 1846). His cosmopolitanism — which makes him in the modern Imperialist’s eyes a “Little Englander” of the straitest sect — led him to deplore any survival of the colonial system and to hail the removal of ties which bound the mother country to remote dependencies; but it was, in its day, a generous and sincere reaction against popular sentiment, and Cobden was at all events an outspoken advocate of an irresistible British navy. There were enough inconsistencies in his creed to enable both sides in the recent controversies to claim him as one who if he were still alive would have supported their case in the altered circumstances; but, from the biographical point of view, these issues are hardly relevant. Cobden inevitably stands for ” Cobdenism, ” which is a creed largely developed by the modern free-trader in the course of subsequent years. It becomes equivalent to economic laisser-faire and ” Manchesterism,” and as such it must fight its own corner with those who now take into consideration many national factors which had no place in the early utilitarian individualistic regime of Cobden’s own day.

The standard biography is that by John Morley (1881). Cobden’s speeches were collected and published in 1870. The centenary of his birth in 1904 was celebrated by a flood of articles in the news- papers and magazines, naturally coloured by the new controversy in England over the Tariff Reform movement.

COBET, CAREL GABRIEL (1813-1889), Dutch classical scholar, was born at Paris on the 28th of November 1813, and educated at the Hague Gymnasium and the university of Leiden. In 1836 he won a gold medal for an essay entitled Prosopographia Xenophontea, a brilliant characterization of all the persons introduced into the Memorabilia, Symposium and Oeconomicus of Xenophon. His Observationes criticae in Platonis comici reliquias (1840) revealed his remarkable critical faculty. The university conferred on him an honorary degree, and recom- mended him to the government for a travelling pension. The ostensible purpose of his journey was to collate the texts of Simplicius, which, however, engaged but little of his time. He contrived, however, to make a careful study of almost every Greek manuscript in the Italian libraries, and returned after five years with an intimate knowledge of palaeography. In 1846 he

married, and in the same year was appointed to an extraordinary professorship at Leiden. His inaugural address, De Arte inter prelandi Grammatices et Critices Fundamentis innixa, has been called the most perfect piece of Latin prose written in the 19th century. The rest of his life was passed uneventfully at Leiden. In 1856 he became joint editor of Mnemosyne, a philological review, which he soon raised to a leading position among classical journals. He contributed to it many critical notes and emendations, which were afterwards collected in book form under the titles Novae Lectiones, Variae Lectiones and Miscellanea Critica. In 1875 he took a prominent part at the Leiden Tercentenary, and impressed all his hearers by his wonderful facility in Latin improvisation. In 1884, when his health was failing, he retired as emeritus professor. He died on the 26th of October 1889. Cobet's special weapon as a critic

was his consummate knowledge of palaeography, but he was no less distinguished for his rare acumen and wide knowledge of classical literature. He has been blamed for rashness in the emendationof difficult passages, and for neglecting the comments of other scholars. He had little sympathy for the German critics, and maintained that the best combination was English good sense with French taste. He always expressed his obliga- tion to the English, saying that his masters were three Richards — Bentley, Porson and Dawes.

See an appreciative obituary notice by W. G. Rutherford in the Classical Review, Dec. 1889; Hartman in Bursian's Biographisches Jahrbuch, 1890; Sandys, Hist. Class. Schol. (1908), iii. 282.

COBHAM, a village in the Medway parliamentary division of Kent, England, 4 m. W. of Rochester. The church (Early English and later, and restored by Sir G. G. Scott) is famous for its collection of ancient brasses, of which thirteen belonging to the years 1320-1529 commemorate members of the Brooke and Cobham families. There are some fine oak stalls and some tilting armour of the 14th century in the chancel. Cobham college, containing 20 almshouses, took the place, after the dis- solution, of a college for priests founded by Sir John de Cobham in the 14th century. The present mansion of Cobham Hall is mainly Elizabethan. The picture gallery contains a fine collection of works by the great masters, Italian, Dutch and English.

The Cobham family was established here before the reign of King

John. In 1313 Henry de Cobham was created Baron Cobham, but on the execution of Sir John Oldcastle (who had been summoned to parliament, jure uxoris, as Baron Cobham) in 141 7, the barony lay dormant till revived in 1445 by Edward, son of Sir Thomas Brooke and Joan, grand-daughter of the 3rd Baron Cobham. In 1603 Henry Brooke, Lord Cobham, was arraigned for participation in the Raleigh conspiracy, and spent the remainder of his life in prison, where he died in 16 18. With him the title expired, and Cobham Hall was granted to Lodowick Stewart, duke of Lennox, passing subsequently by descent and marriage to the earls of Darnley. The present Viscount Cobham (cr. 1 7 18) belongs to the Lyttelton family (see Lxttelton, ist Baron).

COBIJA, or Puerto La Mar (the official title given to it by the Bolivian government), a port and town of the Chilean province of Antofagasta, about 800 m. N. of Valparaiso. It is the oldest port on this part of the coast, and was for a time the principal outlet for a large mining district. It was formerly capital of the Bolivian department of Atacama and the only port possessed by Bolivia, but the seizure of that department in 1879 by Chile and the construction of the Antofagasta and Oruro railway deprived it of all importance, and its population, estimated at 6000 in 1858, has fallen to less than 500. Its harbour is comparatively safe but lacks landing facilities. Smelt- ing for neighbouring mines is still carried on, and some of its former trade remains, but the greater part of it has gone to Tocopilla and Antofagasta. The town occupies a narrow beach between the sea and bluffs, and was greatly damaged by an earthquake and tidal wave in 1877.

COBLE (probably of Celtic origin, and connected with the root ceu or cau, hollow; cf. Welsh ceubol, a ferry-boat), a flat- bottomed fishing-boat, with deep-lying rudder and lug-sail, used off the north-east coast of England.

COBLENZ (Koblenz), a city and fortress of Germany, capital of the Prussian Rhine Province, 57 m. S.E. from Cologne by rail, pleasantly situated on the left bank of the Rhine at its confluence with the Mosel, from which circumstance it derived its ancient name Canfluentes, of which Coblenz is a corruption. Pop. (1885) 31,669; (1905) 53,902. Its defensive works are extensive, and consist of strong modern forts crowning the hills encircling the town on the west, and of the citadel cf Ehrenbreit- stein (q.v.) on the opposite bank of the Rhine. The old city was triangular in shape, two sides being bounded by the Rhine and Mosel and the third by a line of fortifications. The last were razed in 1890, and the town was permitted to expand in this direction.

Immediately outside the former walls lies the new central railway station, in which is effected a junction of the

Cologne-Mainz railway with the strategical line Metz-Berlin. The Rhine is crossed by a bridge of boats 485 yds. long, by an iron bridge built for railway purposes in 1864, and, a mile above the town, by a beautiful bridge of two wide and lofty spans carrying the Berlin railway referred to. The Mosel is spanned by a Gothic freestone bridge of 14 arches, erected in 1344, and also by a railway bridge.

The city, down to 1890, consisted of the Altstadt (old city) and the Neustadt (new city) or Klemenstadt. Of these, the Altstadt is closely built and has only a few fine streets and squares, while the Neustadt possesses numerous broad streets and a handsome frontage to the Rhine. In the more ancient part of Coblenz are several buildings which have an historical interest. Prominent among these, near the point of confluence of the rivers, is the church of St Castor, with four towers. The church was originally founded in 836 by Louis the Pious, but the present Romanesque building was completed in 1208, the Gothic vaulted roof dating from 1498. In front of the church of St Castor stands a fountain, erected by the French in 1812, with an inscription to commemorate Napoleon's invasion of Russia. Not long after, the Russian troops occupied Coblenz; and St Priest, their commander, added in irony these words — " Vu et approuvS par nous, Commandant Russe de la Ville de Coblence: Janvier ler, 1814." In this quarter of the town, too, is the Liebfrauenkirche, a fine church (nave 1250, choir 1404-143 1) with lofty late Romanesque towers; the castle of the electors of Trier, erected in 1280, which now contains the municipal picture gallery; and the family house of the Metternichs, where Prince Metternich, the Austrian statesman, was born in 1773. In the modern part of the town lies the palace (Residenzschloss), with one front looking towards the Rhine, the other into the Neustadt. It was built in 1778-1786 by Clement Wenceslaus the last elector of Trier, and contains among other curiosities some fine Gobelin tapestries. From it some pretty gardens and promenades (Kaiserin Augusta Anlagen) stretch along the bank of the Rhine, and in them is a memorial to the poet Max von Schenkendorf. A fine statue to the empress Augusta, whose favourite residence was Coblenz, stands in the Luisen-platz. But of all public memorials the most striking is the colossal equestrian statue of the emperor William I., erected by the Rhine provinces in 1897 , standing on a lofty and massive pedestal, at the point where the Rhine and Mosel meet. Coblenz has also handsome law courts, government buildings, a theatre, a museum of antiquities, a conservatory of music, two high grade schools, a hospital and numerous charitable institutions. Coblenz is a principal

seat of the Mosel and Rhenish wine trade, and also does a large business in the export of mineral waters. Its manufactures include pianos, paper, cardboard, machinery, boats and barges. It is an important transit centre for the Rhine railways and for the Rhine navigation.

Coblenz (Confluentes, Covelenz, Cobelenz) was one of the military posts established by Drusus about 9 B.C. Later it was frequently the residence of the Frankish kings, and in 860 and 922 was the scene of ecclesiastical synods. At the former of these, held in the Liebfrauenkirche, took place the reconciliation of Louis the German with his half-brother Charles the Bald. In 1018 the city, after receiving a charter, was given by the emperor Henry II. to the archbishop of Trier (Treves), and it remained in the possession of the archbishop-electors till the close of the 18th century. In 1249-1254 it was surrounded with new walls by Archbishop Arnold II. (of Isenburg) ; and it was partly to overawe the turbulent townsmen that successive arch- bishops built and strengthened the fortress of Ehrenbreitstein (q.v.) that dominates the city. As a member of the league of the Rhenish cities which took its rise in the 13th century, Coblenz attained to great prosperity; and it continued to advance till the disasters of the Thirty Years' War occasioned a rapid decline. After Philip Christopher, elector of Trier, had sur- rendered Ehrenbreitstein to the French the town received an imperial garrison (1632), which was soon, however, expelled by the Swedes. They in their turn handed the city over to the French, but the imperial forces succeeded in retaking it by

storm (1636). In 1688 it was besieged by the French under Marshal de Boufflers, but they only succeeded in bombarding the Altstadt into ruins, destroying among other buildings the old merchants' hall (Kaufhaus) , which was restored in its present form in 1725. In 1786 the elector of Trier, Clement Wenceslaus of Saxony, took up his residence in the town, and gave great assistance in its extension and improvement; a few years later it became, through the invitation of his minister, Ferdinand, Freiherr von Duminique, one of the principal rendezvous of the French emigres. This drew down upon the archbishop-elector the wrath of the French republicans; in 1794 Coblenz was taken by the Revolutionary army under Marceau (who fell during the siege), and, after the peace of Luneville, it was made the chief town of the Rhine and Mosel department (1798). In 1814 it

was occupied by the Russians, by the congress of Vienna it was assigned to Prussia, and in 1822 it was made the seat of government of the Rhine province.

- See Daniel, Veutschland (Leipzig, 1895) ; W. A. Gunther, Geschichte der Stadt Koblenz (Cobl., 1815); and Bar, Urkunden und Akten zur Geschichte der Verfassung und Verwaltung der Stadt Koblenz bis zum Jahre 1500 (Bonn, l~

Head of Cobra.

COBOURG, the capital of Northumberland county, Ontario, Canada, on Lake Ontario and the Grand Trunk railway; 70m. E.N.E. of Toronto. Pop. (1901) 4239. It has a large, safe harbour, and steamboat communication with St Lawrence and Lake Ontario ports. It contains car-works, foundries, and carpet and woollen factories, and is a summer resort, especially for Americans. Victoria University, formerly situated here, was removed to Toronto in 1890.

COBRA {Naja tripudians), a poisonous Colubrine snake, belonging to the family Elapidae, known also as the hooded snake, cobra di capello or naga. In this genus the anterior ribs are elongated, and by raising and bringing forward these, the neck can be expanded at will into a broad disk or hood. It

possesses two rows of palatine teeth in the upper jaw, while the maxillary bones bear the fangs, of which the anterior one only is in connexion with the poison gland, the others in various stages of growth remaining loose in the surrounding flesh until the destruction of the poison fang brings the one immediately behind to the front, which then gets anchylosed to the maxillary bone, and into connexion with the gland secreting the poison, which in the cobra is about the size of an almond. Behind the poison fangs there are usually one or two ordinary teeth. The cobra attains a length of nearly 6 ft. and a girth of about 6 in. The typical cobra is yellowish to dark-brown, with a black and white spectacle-mark on the back of the hood, and with a pair of large black and white spots on the corresponding under-surface. There are, however, many varieties, in some of which the spectacle markings on the hood are wanting. The cobra may be regarded as nocturnal in its habits, being most active by night, although not unfrequently found in motion during the day. It usually conceals itself under logs of wood, in the roofs of huts and in holes in old walls and ruins, where it is often come upon in- advertently, inflicting a death wound before it has been observed. It feeds on small quadrupeds, frogs, lizards, insects and the eggs of birds, in search of

which it sometimes ascends trees. When seeking its prey it glides slowly along the ground, holding the anterior third of its body aloft, with its hood distended, on the alert for anything that may come in its way. ” This attitude,” says Sir J. Fayrer, ” is very striking, and few objects are more calculated to inspire awe than a large cobra when, with his hood erect, hissing loudly and his eyes glaring, he prepares to strike.” It is said to drink large quantities of water, although like reptiles in general it will live for many months without food or drink. The cobra is oviparous; and its eggs, which are from 18 to 25 in number, are of a pure white colour, somewhat resembling in

size and appearance the eggs of the pigeon, but sometimes larger. These it leaves to be hatched by the heat of the sun. It is widely distributed, from Transcaspia to China and to the Malay Islands, and is found in all parts of India, from Ceylon to the Himalayas up to about 8000 ft. above the level of the sea.

Closely allied is N. haje, the common hooded cobra of all Africa, the Spy-slange, i.e. spitting snake of the Boers.

The cobra is justly regarded as one of the most deadly of the Indian Thanatophidia. Many thousand deaths are caused annually by this unfortunately common species, but it is difficult to obtain accurate statistics. The bite of a vigorous cobra will often prove fatal in a few minutes, and as there is no practicable antidote to the poison, it is only in rare instances that such mechanical expedients as cauterizing, constriction or amputa- tion can be applied with sufficient promptitude to prevent the virus from entering the circulation. Owing to a small reward offered by the Indian government for the head of each poisonous snake, great numbers of cobras have been destroyed; but only low-caste Hindus will engage in such work, the cobra being regarded by the natives generally with superstitious reverence, as a divinity powerful to injure, and therefore to be propitiated; and thus oftentimes when found in their dwellings this snake is allowed to remain, and is fed and protected. ” Should fear,” says Sir J. Fayrer, ” and perhaps the death of some inmate bitten by accident, prove stronger than superstition, it may be caught, tenderly handled, and deported to some field, where it is released and allowed to depart in peace, not killed ” (Thanato- phidia of India). Great numbers, especially of young cobras, are killed by the adjutant birds and by the mungoos — a small mammal which attacks it with impunity, apparently not from want of susceptibility to the poison, but by its dexterity in eluding the bite of the cobra. Mere scratching or tearing does not appear to be sufficient to bring the poison from the glands; it is only when the fangs are firmly implanted by the jaws being pressed

together that the virus enters the wound, and in those circumstances it has been shown by actual experiment that the mungoos, like all other warm-blooded animals, succumbs to the poison. In the case of reptiles, the cobra poison takes effect much more slowly, while it has been proved to have no effect whatever on other venomous serpents.

In the Egyptian hieroglyphics the cobra occurs constantly with the body erect and hood expanded; its name was ouro, which signifies " king," and the animal appears in Greek literature as ouraios and basiliscus. With the Egyptian snake-charmers of the present day the cobra is as great a favourite as with their Hindu colleagues. They pretend to change the snake into a rod, and it appears that the supple snake is made stiff and rigid by a strong pressure upon its neck, and that the animal does not seem to suffer from this operation, but soon recovers from the cataleptic fit into which it has been temporarily thrown.

The cobra is the snake usually exhibited by the Indian jugglers, who show great dexterity in handling it, even when not deprived of its fangs. Usually, however, the front fang at least is extracted, the creature being thus rendered harmless until the succeeding tooth takes its place, and in many cases all the fangs, with the germs behind, are removed — the cobra being thus rendered innocuous for life. The snake charmer usually plays a few simple notes on the flute, and the cobra, apparently delighted, rears half its length in the air and sways its head and body about, keeping time to the music.

The cobra, like almost all poisonous snakes, is by no means aggressive, and when it gets timely warning of the approach of man endeavours to get out of his way. It is only when trampled upon inadvertently, or otherwise irritated, that it attempts to use its fangs. It is a good swimmer, often crossing broad rivers, and probably even narrow arms of the sea, for it has been met with at sea at least a quarter of a mile from land.

COBURG, a town of Germany, the twin capital with Gotha of the duchy of Saxe-Coburg-Gotha, on the left bank of the Itz, an affluent of the Regen, on the southern slope of the Franken- wald, the railway from Eisenach to Lichtenfels, and 40 m. S.S.E. of Gotha. Pop. (1905) 22,489. The town is for the most part

old, and contains a number of interesting buildings. The ducal palace, known as the Ehrenburg, is a magnificent building, originally erected on the site of a convent of bare-footed friars by Duke John Ernest in 1549, renovated in 1698, and restored in 181 6 by Duke Ernest I. It contains a vast and richly decorated hall, the court church and a fine picture gallery. In the gardens are the mausoleum of Duke Francis (d. 1806) and his wife, a bronze equestrian statue of Duke Ernest II. and a fountain in commemoration of Duke Alfred (duke of Edinburgh). In the market square are the medieval Rathaus, the government buildings, and a statue of Prince Albert (consort of Queen Victoria), by William Theed the younger (1804-1891). In the Schloss-platz are the Edinburgh Palace (Palais Edinburg), built in 1881, the theatre and an equestrian statue of Duke Ernest I. Among the churches the most remarkable is the Moritzkirche, with a lofty tower. The educational establish- ments include a gymnasium, founded in 1604 by Duke John Casimir (d. 1633) and thus known as the Casimirianum, a com- mercial, an agricultural and other ‘schools. The Zeughaus (armoury) contains the ducal library of 100,000 volumes, and among other public buildings may be mentioned the Augusten- stift, formerly the seat of the ministerial offices, and the Marstall (royal mews). On a commanding eminence above the town is the ancient castle of Coburg, dating from the nth century (see below). In 1781 it was turned into a penitentiary and lunatic asylum, but in 183S-1838 was completely restored, and now contains a natural history museum. The most interesting room in this building is that which was occupied by Luther in 1530, where the surroundings may have inspired, though (as is now proved) he did not compose, the famous hymn, Ein’ feste Burg ist unser Gott; the bed on which he slept, and the pulpit from which he preached in the old chapel are shown. Coburg is a place of considerable industry, the chief branches of the latter being brewing, manufactures of machinery, colours and porcelain, iron-founding and saw-milling; and there is an important trade in the cattle reared in the neighbourhood. Among various places of interest in the vicinity are the ducal residences of Callenberg and Rosenau, in the latter of which Albert, Prince Consort, was born in 1819; the castle of Lauterburg; and the village of Neuses, with the house of the poet J. M. F. Ruckert, who died here in 1866, and on the other side of the river the tomb of the poet Moritz August von Thummel (1738-1817).

The town of Coburg, first mentioned in a record of 1207, owed its existence and its name to the castle, and in the 15th and 16th centuries was of considerable importance as a halting-place on the great trade route from Nuremberg via Bamberg to the North. In 1245 the castle became the seat of the elder branch of the counts of

Henneberg (Coburg-Schmalkalden). The countships of Coburg and Schmalkalden passed by the marriage of Jutta, daughter of Hermann I. (d. 1290), to Otto V. of Branden- burg, whose grandson John, however, sold them to Henry VIII. of Henneberg, his brother-in-law. Henry's daughter Catherine (d. 1397) married Frederick III. of Meissen, and so brought the castle, town and countship into the possession of the Saxon house of Wettin. In 1549 Duke John Ernest of Saxony made Coburg his residence and turned theold castleintoafortressstrong enough to stand a three years' siege (1632-1633) during the Thirty Years' War. In 1641 Coburg fell to the dukes of Saxe- Altenburg. In 1835 it became the residence of the dukes of Saxe-Coburg. For the princes of the house of Coburg see Wettin and Saxe-Coburg.

COCA, or Cuca (Erylhroxylon coca), a plant of the natural order Ery throxylaceae, the leaves of which are used as a stimulant in the western countries of South America. 1 It resembles a blackthorn bush, and grows to a height of 6 or 8 ft. The branches are straight, and the leaves, which have a lively green tint, are thin, opaque, oval, more or less tapering at the extremities.

1 Garcilasso de la Vega, writing of the plant, says that it is called cuca by the Indians, coca by the Spaniards; and Father Bias Valera states that the leaves are called cuca both by Indians and Spaniards (The Royal Commentaries of the Yncas, 1609-1617; trans, by C R. Markham, Hakluyt Soc, 1 871). See also, on the name cuca, Chris'ti-son, Brit. Med. Journ., April 29, 1876, p. 527.

A marked characteristic of the leaf is an areolated portion bounded by two longitudinal curved lines one on each side of the midrib, and more conspicuous on the under face of the leaf. Good samples of the dried leaves are uncurled, are of a deep green on the upper, and a grey-green on the lower surface, and have a strong tea-like odour; when chewed they produce a sense of warmth in the mouth, and have a pleasant, pungent taste. Bad specimens have a camphoraceous smell and a brownish colour, and lack the pungent taste. The flowers are small, and disposed in little clusters on short stalks; the corolla is composed of five yellowish-white petals, the anthers are heart-shaped, and the pistil consists of three carpels united to form a three-chambered ovary. The flowers are succeeded by red berries. The seeds are sown in December and January in small plots (almacigas) sheltered from the sun, and the young plants when from 1 1 to 2 ft. in height are placed in holes iaspi), or, if the ground is level, in furrows (uachos) in carefully-weeded soil. The plants thrive best in hot, damp situations, such as the clearings of forests; but the leaves most

preferred are obtained in drier localities, on the sides of hills. The leaves are gathered from plants varying in age from one and a half to upwards of forty years. They are considered ready for plucking when they break on being bent. The first and most abundant harvest is in March, after the rains ; the second is at the end of June, the third in October or November. The green leaves (matu) are spread in thin layers on coarse woollen cloths and dried in the sun; they are then packed in sacks, which, in order to preserve the quality of the leaves, must be kept from damp.

In the Kew Bulletin for January 1889 is an account of the history and botany of the plant, which has been so long under cultivation in South America that its original home is doubtful. As the result of this cultivation numerous forms have arisen. The writer distinguishes from the typical Peruvian form with pointed leaves a variety novo-granatense, from New Granada, which has smaller leaves with a rounded apex. The plant is now cultivated in the West Indies, India, Ceylon, Java and elsewhere. It has been estimated that coca is used by about 8,000,000 of the human race, being consumed in Bolivia, Peru, Ecuador, Colombia and Rio Negro. In Peru the Indians carry a leathern pouch (the chuspa or huallqui) for the leaves, and a supply of pulverized unslaked lime, or a preparation of the ashes of the quinoa plant (Chenopodium Quinoa), called llipta or llucta. Three or four times a day labour is suspended for chacchar or acullicar, as the mastication of coca is termed. The leaves, deprived of their stalks, are chewed and formed into a ball (acullico) in the mouth; a small quantity of the lime or llipta is then applied to the acullico to give it a proper relish. Two or three ounces of coca are thus daily consumed by each Indian.

Coca was used by the Peruvian Indians in the most ancient times. It was employed as an offering to the sun, or to produce smoke at the great sacrifices; and the priests, it was believed, must chew it daring ti'i.e performance of religious ceremonies, otherwise the gods would not be propitiated. Coca is still held in superstitious veneration among the Peruvians, and is believed by the miners of Cerro de Pasco to soften the veins of ore, if masticated and thrown upon them.

The composition of different specimens of coca leaves is very inconstant. Besides the important alkaloid cocaine (

Coca leaves and preparations of them have no external action. Internally their action is similar to that of opium, though some- what less narcotic, and causing a dilatation of the pupil of the eye instead of a contraction. When masticated, the leaves first cause a tingling in the

tongue and mucous membrane of the mouth, owing to a stimulation of the nerves of common sensation, and then abolish taste owing to a paralysis of the terminals of the gustatory nerves. They have a definite anaesthetic action

upon the mucous membrane of the stomach, from which there come in large part those organic sensations which we interpret as hunger. Hence it is possible, under the influence of coca, to go without food or consciousness of needing it, for as long a period as three days. The drug is not a food, however, as its com- position and history in the body clearly show, and the individual who comfortably fasts under its influence nevertheless shows all the physical signs of starvation, such as loss of weight. In small doses coca stimulates the intestinal peristalsis and thus is an aperient, but in large doses it paralyses the muscular coat of the bowel, causing constipation, such as is constantly seen in coco- maniacs, and in those inhabitants of Peru and the adjacent countries who take it in excess or are markedly susceptible to its influence.

The injection of coca leaves has a very remarkable effect upon the higher tracts of the nervous system — an effect curiously contrary to that produced by their chief ingredient upon the peripheral parts of the nervous apparatus. The mental power is, at any rate subjectively, enhanced in marked degree. In the absence of extended experiments in psychological laboratories, such as have been conducted with alcohol, it is not possible to say whether the apparent enhancement of the intellect is an objectively demonstrable fact. The physical power is un- questionably increased, such muscular exercises as are involved in ascending mountains being made much easier after the chewing of an ounce or so of these leaves. Excess in coca-chewing leads in many cases to great bodily wasting, mental failure, insomnia, weakness of the circulation and extreme dyspepsia. For other pharmacological characters and the therapeutic employments of coca see Cocaine.

COCAINE, $C_{17}H_{21}NO_4$, an alkaloid occurring to the extent of about 1 % in the leaves of Erythroxylon coca (see above). It is associated with many other alkaloids: cinnamyl cocaine, $C_{19}H_{23}NO_4$; a-truxilline (CˆHaNOˆ; /3-truxilline, (CuHaNOJj; benzoylecgonine, $C_{16}H_{19}NO_2$; tropa-cocaine, Ci5Hi 3 N0 2 ; hygrine, C 8 Hi 5 NO; cuscohygrine, $C_{13}H_{24}NO_2$. These substances, which may be collectively termed ” cocaines,” are all derivatives of ecgonine (q.v.). Cocaine is

benzoylmethyl ecgonine. It crystallizes from alcohol in prisms, which are sparingly soluble in water. Its solution has a bitter taste, alkaline reaction, and is laevorotatory. Its use as a local anaesthetic (see Anaesthesia) makes it the most valuable of the coca alkaloids, and it is much used in ophthalmic practice. Applied to the conjunctiva it causes anaesthesia, dilatation of the pupil, diminution of the intraocular tension, and some interference with accommodation. The conversion of the mixture obtained by extracting coca-leaves into cocaine is effected by saponifying the esters into ecgonine and the respective acids, and then benzoylating and methylating the ecgonine. Homologues of cocaine — ethylbenzoylecgonine, &c. — have been prepared; they closely resemble natural cocaine. Cinnamyl cocaine is cinnamylmethylecgonine, i.e. cocaine in which the benzoyl group is replaced by the cinnamyl group, a- and /3-truxillines, named from their isolation from a coca of Truxillo (Peru), are two isomeric alkaloids which hydrolyse to ecgonine, methyl alcohol, and two isomeric acids, the truxillic acids, CisHi 6 04. The alkaloids are therefore methyl truxillylecgonines. The truxillic acids have been studied by K. Liebermann and his students {Ber., vols. 21-27, an d 31), and are diphenyl tetra- methylene dicarboxylic acids.

COCANADA, or Coconada, a town of British India, in the Godavari district of Madras, on the coast in the extreme north of the Godavari delta, about 315 m. N. of Madras. Pop. (1901) 48,096, showing an increase of 18% in the decade. As the administrative headquarters of the district, and the chief port on the Coromandel coast after Madras, Cocanada was formerly of considerable importance, but its shipping trade has declined, owing to the silting of the anchorage, and to the construction of the railway. It is connected by navigable channels with the canal system of the Godavari delta, and by a branch line with Samalkot on the East Coast railway. The anchorage is an open roadstead, with two lighthouses. The chief exports are rice,

cotton, sugar and oilseeds. Mills have been established for cleaning rice. The town contains a second-grade college, a high school, and a literary association.

COCCEIUS [strictly Koch], JOHANNES (1603-1669), Dutch theologian, was born at Bremen. After studying at Hamburg and Franeker, where Sixtinus Amama was one of his teachers, he became in 1630 professor of biblical philology at the ” Gym- nasium illustre “.in his native town. In 1636 he was transferred to Franeker, where he held the chair of Hebrew, and from 1643 the chair of theology also, until 1656, when he succeeded Fr. Spanheim the elder as professor of theology at Leiden. He died on the 4th of November 1669. His chief

services as an oriental scholar were in the department of Hebrew philology and exegesis. As one of the leading exponents of the ” covenant ” or ” federal ” theology, he spiritualized the Hebrew scriptures to such an extent that it was said that Cocceius found Christ everywhere in the Old Testament and Hugo Grotius found him nowhere. He taught that before the Fall, as much as after it, the relation between God and man was a covenant. The first covenant was a ” Covenant of Works.” For this was sub- stituted, after the Fall, the ” Covenant of Grace,” to fulfil which the coming of Jesus Christ was necessary. He held millenarian views, and was the founder of a school of theologians who were called after him Cocceians. His theology was founded entirely on the Bible, and he did much to promote and encourage the study of the original text. In one of his essays he contends that the observance of the Sabbath, though expedient, is not binding upon Christians, since it was a Jewish institution. His most distinguished pupil was the celebrated Campeius Vitringa. His most valuable work was his Lexicon et Commentarius Sermonis Hebraici et Chaldaici (Leiden, 1669), which has been frequently republished; his theology is fully expounded in his Summa Doctrinaede Foedere et Testamento Dei (1648).

His collected works were published in 12 folio volumes (Amster- dam, 1673-1675). See Herzog-Hauck, Realencyklopadie.

COCCIDIA, an important order of Sporozoa Ectospora, parasites possessing certain very distinctive characters. With one or two possible exceptions, they are invariably intracellular during the entire trophic life of the individual. They always attack tissue- cells, usually of an epithelium, and never blood-corpuscles. Correlated with the advanced degree of parasitism, there is a complete absence of specialization or differentiation of the cell- body, and the trophozoite is quite incapable of any kind of movement. In all cases, so far as known, the life-cycle is di- genetic, an asexual generation (produced by schizogony) alternat- ing with a sexual one (gametogony). After conjugation of two highly-differentiated gametes has taken place, a resistant oocyst is formed, which provides for the dispersal of the species; inside this sporogony (spore- and sporozoite-formation) goes on.

Hake (1839) was, perhaps, the first to describe a Coccidian, but he regarded the parasites as pathological cell-products. In 1 845 N. Lieberkiihn pointed out the resemblances History. to Gregarines, with which organisms he considered Coccidia to be allied. A year later, H. Kloss proved the existence of similar parasites in the snail, and attempted to construct their life-history; this form was subsequently

named Klossia helicina by A. Schneider. The asexual part of the life-cycle was first described by Th. Eimer in 1870, for a Coccidian infesting the mouse, which was afterwards elevated by Schneider into a distinct genus Eimeria. The generic name Coccidium was introduced by R. Leuckart in 1879, for the parasite of the rabbit. It was many years, however, before the double character of the life- cycle was realized, and the ideas of L. and R. Pfeiffer, who first suggested the possibility of an alternation of generations, for a long time found no favour. In the first decade of the 20th century great progress was accomplished, thanks largely to the researches of F. Schaudinn and M. Siedlecki, who first demonstrated the occurrence of sexual conjugation in the group; and the Coccidian life-history is now one of the best known among Sporozoa.

Coccidia appear to be confined 1 to four great phyla, Vertebrates,

1 A curious organism, parasitic in a gregarine, has lately been described by Dogiel as a coccidian, and termed Hyalosphaera.

Molluscs, Arthropodsand Annelids; the firstnamed group furnishes by far the most hosts, the parasites being frequently met with in domestic animals, both birds and mammals. Following Heats* ” fr° m the casual method of infection, the epithelium of host. the gut or of its appendages {e.g. the liver [Plate I.,

fig. i]) is a very common seat of the parasitic inva- sion. But in many cases Coccidia are found in other organs, to which they are doubtless carried by lymphatic or circulatory channels. In Molluscs, they often occur in the kidneys (fig. 2) ; in Insects, they are met with as ” coelomic ” parasites, the fat- bodies, pericardial cells, &c, being a favourite habitat; even the testis is not free from their attentions in one or two instances, though the ovary appears always immune.

The parasite invariably destroys its host-cell completely. The latter is at first stimulated to abnormal growth and activity and becomes greatly hypertrophied, the nucleus also undergoing karyolytic changes (fig. 4). The fatty materials elaborated by the host-cell are rapidly used up by the Coccidian, as nourish- ment; and at length the weakened and disorganized cell is no longer able to assimilate but dies and is gradually absorbed by the parasite, becoming reduced to a mere enclosing skin or envelope. In some cases (ex. Cyclospora

caryolytica of the mole) the parasite is actually intranuclear, the nucleus becoming greatly swollen and transformed into a huge vacuole containing it.

The effects of a Coccidian infection upon the host as a whole depend largely upon the extent to which endogenous multiplica- tion of the parasites takes place. On the one hand, schizogony may be so limited in extent as not to cause appreciable injury to the host. This seems to be often the case in forms infecting Molluscs and Arthropods. On the other hand, where schizogony is rapid and prolonged, the results are oftenserious. For,although any one individual only causes the death of a single host-cell, yet the number of the parasites may be so enormously increased by this means, that the entire affected epithelium may be overrun and destroyed. Thus are occasioned grave attacks of coccidiosis, characterized by severe enteritis and diarrhoea, which may end fatally. In the case of the Vertebrates, secondary causes, result- ing from the stoppage of the bile ducts, also help to produce death. There is, however, one factor in the endangered animal's favour. Schizogony cannot go on indefinitely; it has a limit, dependent upon the supply of host-cells, and consequently of nutriment, available. As this shows signs of becoming exhausted, by the rapid multiplication of the parasites, the latter begin to make preparations for theexogenous cycle, inaugurated bygametogony. When conjugation has taken place and sporogony is begun, the danger to the host is at an end. So that, if the acute stage of the disease is once successfully passed, the regenerative capacity of the epithelium may be able to restore something like equi- librium to the deranged metabolism in time to prevent collapse.

Coccidium sckubergi, parasitic in the intestine of a centipede (Lithobius forficatus) , may be taken as an example of a Coccidian Morpho- life-history (see Schaudinn, 1900): some of the more logy and important variations exhibited by other forms will be ufem noted afterwards. The trophozoite, or actively-grow-

hlstory. j n g p aras jt ej [a an ova j or rounded body (fig. 3, I.).

The general cytoplasm shows no differentiation into ectoplasm and endoplasm; it is uniformly alveolar in character. The nucleus is relatively large, and possesses a distinct membrane and a well-marked reticulum in which are embedded grains of chro- matin. Its most conspicuous feature is the large deeply-staining karyosome, which consists of the greater part of the chromatin of the nucleus intimately bound up with a plastinoid basis. When fully grown, the trophozoite (now a schizont) undergoes schizogony. Its nucleus divides

successively to form a number of nuclei, which travel to the periphery, and there become more or less regularly disposed (fig. 3, II. and III.). The protoplasm in the neighbourhood of each next grows out, as a projecting bud, carrying the nucleus with it. In this manner are formed a number of club-shaped bodies, the merozoites, which are at length set free from the parent-body (IV.), leaving a certain amount of residual cytoplasm behind. By the rupture of the disorganized host-

cell, 1 the fully-formed merozoites are liberated into the intestinal lumen, and seek out fresh epithelial cells. Each is more or less sickle-shaped, and capable of active movements. Once inside a new host-cell, the merozoite grows to a schizont again.

After this course has been repeated several times, gametogony sets in, the trophozoites growing more slowly and becoming the parent-cells of the sexual elements (gametocytes) , either male individuals (microgametocytes) or female ones (megagameto- cytes). A microgametocyte (fig. 3, VI. $) is characterized by its dense but finely reticular or alveolar cytoplasm, very different from the loose structure of that of a schizont. The male elements (microgametes) are formed in a manner essentially comparable to that in which the formation of merozoites takes place. Al- though the details of the nuclear changes and divisions vary somewhat, the end-result is similar, a number of little nuclear agglomerations being evenly distributed at the surface (VII. 3). Each of these elongates considerably, becoming comma-shaped and projecting from the gametocyte. Nearly all the body of the male gamete (VIII. $) consists of chromatin, the cytoplasm only forming a very delicate zone or envelope around the nucleus. From the cytoplasm two long fine fiagella grow out, one of which originates at the anterior end, the other, apparently, at the hinder end, acting as a rudder; but it is probable that this also is developed at the anterior end and attached to the side of the body. Bymeans of their fiagella the numerous microgametes break loose from the body of the microgametocyte and swim away in search of a female element.

A megagametocyte (VI. ?) is distinguished by its rather different shape, being more like a bean than a sphere until ripe for maturation, and by the fact that it stores up in its cytoplasm quantities of reserve nutriment in the form of rounded refringent plastinoid grains. Each female gametocyte gives rise to only a single female element (megagamete) , after a process of nuclear purification. The karyosome is expelled from the nucleus into thecytoplasm, where it breaks up at once into fragments (VII. 9). Meanwhile the gametocyte is becoming spherical, and its changes in shape aid in setting it free from the shrivelled host-cell. The fragments of the karyosome, which are, as it

were, squeezed out to the exterior, exert a powerful attraction upon the micro- gametes, many of which swarm round the now mature mega- gamete. The female nucleus (pronucleus) approaches the surface of the cell (VIII. $), and at this spot a little clear cytoplasmic prominence arises (cone of reception) . On coming into contact with this protuberance (probably attracted to it by the female pronucleus), a microgamete adheres. Partly by its own move- ments and partly by the withdrawal of the cone of attraction, the male penetrates into the female element and fertilization is accomplished. Only one microgamete can thus pass into the megagamete, for immediately its entry is effected a delicate membrane is secreted around the copula (zygote) , which effectu- ally excludes other less fortunate ones. This membrane rapidly increases in thickness and becomes the oocyst (IX.), and the copula is now ready to begin sporogony.

Sporogony goes on indifferently either inside the host or after the cyst has been passed out with the faeces to the exterior. The definitive nucleus of the zygote (resulting from the intimate fusion of the male and female pronuclei, by means of a somewhat elaborate ” fertilization-spindle ” [X.]) gives rise by successive direct divisions to four nuclei (XII.) , around which the protoplasm becomes segregated; these segments form the four sporoblasts. Around each sporoblast two membranes are successively secreted (exospore and endospore), which constitute the sporocyst(XIIL) ; the sporocyst and its contents forming the spore. The nucleus of each spore next divides, again directly, and this is followed by the division of the cytoplasm. As a final result, each of the four spores contains two germs (sporozoites) , and a certain amount of residual protoplasm (fig. 3, XIV.) ; this latter encloses a viscid, vacuole-like body, which aids in the subsequent de- hiscence of the sporocyst. On being eaten by a fresh host, the wall of the oocyst is dissolved at a particular region by the

1 It is important to note that in schizogony there is never any cyst or cyst-membrane formed around the parasite.

COCCIDIA

Plate I.

Fig. i— SECTION THROUGH RABBIT’S LIVER, \&&fet&& INFECTED WITH COCCIDIVM CUNICULI. \ˆi’Hˆ/

(AFTER THOMA.)

,\ e *

isfnik.

Fig. 2.—KL0SSIA IIELICINA, FROM KIDNEY OF HELIX HORTENSIS.

a, Portion of a section of the kidney showing normal epithelial cells containing concretions ©, and enlarged epithelial ceils containing the parasite (£) in various stages; b, cyst of the Klossia containing sporoblasts; c, cyst with ripe spores, each enclosing four sporozoites and a patch of residual protoplasm. (From Wasielewski, after Balbiani.)

M0i

Fig. 4— PHASES OF CARYOTROPHA MESNILII, SIEDL. (PAR. POLYMNIA NEBULOSA).

pig-

m

Fig. 3. — THE LIFE-CYCLE OF COCCIDIVM SCHUBERGI, SCHAUD. (PAR. LITHOBIUS FORFICATUS). (FROM MIN- CHIN, AFTER SCHAUDINN.)

I. IV represents the schizogony, commencing with infection of an epithelial cell by a sporozoite or merozoite. After stage IV the de velopment may start again at stage I, as indicated by the arrows; giQ or it may go on to the formation of gametocytes (V). V-VIII V represents the sexual generation. The line of development, hitherto single (I- IV) becomes split into two lines — male (VI 5, VII S, VIII *), and female (VI S, VII ?, VIII 5), culminating in the highly differentiated micro- and mega-gametes. By conjugation these two lines are again united. IX, X, show the formation of the zygote by fusion of the nuclei of the gametes. XI-XV, sporogony. H.C, host- cell; N, its nucleus; mz, merozoite; szt, schizont; ky, karyosome (or fragments of same) ; n.n, daughter-nuclei of schizont ; pl.gr, plastinoid grains; 00c, oocyst; n.zyg, zygote-nucleus (segmentation-nucleus); sp.m, spore-membrane (sporocyst) ; rp, residual protoplasm of oocyst (” reliquat kystal”); rp.sp, residual protoplasm of spore (” reliquat sporal “); sp.z, sporozoite.

a, Young schizont in a cluster of spermatogonia; the host-cell (represented granulated) and two of its neighbours are greatly hypertrophicd, with very large nuclei, and have fused into a single

mass containing the parasite (represented clear, with a thick outline). The other spermatogonia are normal, b, Intracellular schizont divided up into schizontocytes ©, each schizontocyte giving rise to a cluster of merozoites arranged as a “corps en barillet”; spg, spermatogonia; h.c, host-cell; N, nucleus of host-cell or cells; n, nucleus of parasite; szc, schizontocyte; mz, merozoites; r.b, residual bodies of the schizontocytes. (From Minchin, after Siedlecki.)

Plate II.

COCCIDIA

Fig. 5.— SCHIZOGONY OF ADELEA OVATA, A. SCHN. (PAR. LITHOBIUS FORFICATUS).

a-c, 9 generation; d-f, ,i generation, a, Full-grown 2 schizont (megaschizont) , with a large nucleus (n) containing a conspicuous karyosome (ky). b, Commencement of schizogony; the nucleus has divided up to form a number of daughter-nuclei (d.n). The karyosome of stage a has broken up into a great number of daughter- karyosomes, each of which forms at first the centre of one of the star-shaped daughter-nuclei; but in a short time the daughter- karyosomes become inconspicuous, c, Completion of schizogony ; the 9 schizont has broken up into a number of megamerozoites (9 mz) implanted on a small quantity of residual protoplasm (r.p.). Fach 9 merozoite has a chromatic nucleus (n) without a karyosome.

d, Full-grown <5 schizont (microschizont) , with nucleus («), karyo- some (ky), and a number of characteristic pigment-granules (p.gr).

e, Commencement of schizogony. The nucleus is dividing up into a number of daughter-nuclei (d.n), each with a conspicuous karyo- some (ky). f, Completion of schizogony. The numerous micro- merozoites (S mz) have each a nucleus with a conspicuous karyosome (ky) at one pole, and the protoplasm contains pigment-granules (p.gr) near the nucleus, on the .side farthest from the karyosome. (From Minchin, after Siedlecki.)

Fig. 7.— SPORES OF VARIOUS COCCIDIAN GENERA.

a, Minchinia chitonis (E.R.L.), (par. Chiton); b, Diaspora hyda- tidea, Leger (par. Polydesmus) ; c, Echinospora labbei, Leger (par. Lithobius mutabilis) ; d, Goussia motellae, Labbe ; e, Diplospora (Hyaloklossia) , lieberkuhni (Labb6) , (par. Rana esculenta) ; /, Crystal- lospora crystalloides (TheL), (par. Motella tricirrata). (From Min- chin; b and c after Leger, the others after Labb6.)

Fig. 6.-

-ASSOCIATION AND CONJUGATION ADELEA OVATA.

IN

a, Young microgametocyte (S game.) attached to a megagameto- cyte (9 game). The nucleus of the microgametocyte gives rise to 4 daughter-nuclei © which become (d) 4 microgametes (5 gam.), e, One of the microgametes penetrates the megagamete, which forms a fertilization-spindle composed of male and female chromatin (S and ? chr.). The other 3 microgametes and the residual protoplasm of the microgametocyte (r.p.) perish. The karyosome of the megagamete has disappeared, as such. /, Union of the chromatin of both elements, to produce the zygote-nucleus (n.zyg.). (From Minchin, after Siedlecki.)

Fig. 8.— SPOROGONY AND SPORE-GER- MINATION IN BARROUSSIA ORNATA, A. SCH., FROM THE GUT OF NEPA CI N ERA. a, Oocyst with sporoblasts; b, oocyst with

ripe spores; c, a spore highly magnified, showing

the single sporozoite bent on itself ; d, the spore

has split along its outer coat or epispore, but the

sporozoite is still enclosed in the endospore; e,

the sporozoite, freed from the endospore, is

emerging; /, the sporozoite has straightened itself out and is freed

from its envelopes. (From Wasielewski, after A. Schneider.)

digestive juices, which are thus enabled to reach the spores and cause the rupture of the sporocysts. As the result of in- structive experiments, Metzner has shown that it is the pancreatic and not the gastric juice by which this liberation of the germs is effected. The liberated sporozoites creep out and proceed to infect the epithelial cells. The sporozoites (XV.) are from 15-20 ix long by 4-6 jx wide; they are fairly similar to merozoites in form, structure and behaviour, the chief point of distinction being that they have no karyosome in the nucleus (cf . above) .

Comparing the life-cycle of other Coccidia with that just described; a greater or less degree of modification is frequently met with. In the process of schizogony two orders of division sometimes occur; the parent-schizont first divides up into a varying number of rounded daughter-schizonts (schizontocytes), each of which gives rise, in the usual manner, to a cluster of merozoites, 1 which thus constitute a second order of cells. Siedlecki (1902) has found this to be the case in Caryoiropha mesnilii (fig. 4),- and Woodcock (1904) has shown that it is most probably really the same process which Smith and Johnson (1902) mistook for sporogony when oririnally describing their Coccidian of the mouse, Klossietta. In Caryotropha, a perfectly similar state of affairs is seen in the formation of microgametes from the microgametocyte; this is additionally interesting as showing that this process is neither more nor less than male schizogony.

Coming to the sexual generation, considerable variation is met with as regards the period in the life-history when sexual differentiation first makes its appearance. Sexuality may become evident at the very beginning of schizogony, as, e.g. in Adelea ovata (Siedlecki, 1899), where the first-formed schizonts (those developed from the sporozoites) are differentiated into male and female (micro- and mega-schizonts) (see Plate II., fig. 5). Corre- spondingly, the merozoites, to which they give rise, are also different (micro- and mega-merozoites). In one or two cases sexuality appears even earlier in the cycle, and has thus been carried still farther back.

The Coccidia, as a whole, have not developed the phenomenon of association of the sexual individuals prior to gamete-formation which is so characteristic of Gregarines. Their method of en- deavouring to secure successful sporulation, and thus the survival of the species, has been rather by the extreme specialization of the sexual process. In place of many female elements, which the primitive or ancestral forms may be assumed to have had, 2 there is always, save possibly for one exception, 3 only a single relatively huge megagamete formed, which offers a comparatively easy goal for one of the many microgametes. Nevertheless in the effort to render fertilization absolutely certain, a few Coccidia have acquired (secondarily) the power of associating; a state of things which enables those forms, moreover, to effect an economy in the number of male gametes, only three or four being developed. Instances are seen in Adelea mesnili (Perez, 1903), A. ovata (fig. 6), and Klossia helicina (Siedlecki, 1899). It is very interesting to note that, in the two last cases, unless this association of the microgametocyte with the megagametocyte occurs, neither can the former produce male elements (micro- gametes) nor can the female individual maturate and become ready for fertilization.

(Concerning this question of association see also Gregarines.)

In sporogony, great variation is seen with respect to the number of spores and sporozoites formed; and, as in Gregarines, these characters are largely used for purposes of classification, under which heading they are better considered. Usually, the spores (fig. 7) are quite simple in outline, and not produced into

1 The merozoites are frequently arranged like the staves of a barrel — whence the term barHlet, which is frequently used.

2 In Cyclospora, Schaudinn (1902) has noted certain abnormal cases of the persistence and further multiplication of the ” reduction- nuclei ” of the female element {i.e. the nuclear portions given off during maturation), followed by multiple fertilization. This occur- rence points strongly to the conclusion that there were originally many female gametes (cf. also the sporoblasts of Gregarines).

3 The remarkable forms parasitic in Cephalopods (of late known as Eucoccidium) , if still ranked with the Coccidia, furnish an ex- ception (see below).

spines or processes; exceptions are found, however, in a few instances (e.g. Minchinia chitonis). In one case (Coccidium mitrarium), the oocyst itself, instead of being spherical, is curiously shaped like a mitre.

The life-history as a whole is invariably undergone in a single host, i.e. there is no alternation of true hosts. 4 Schaudinn, in his work on the Coccidia of Lithobius (1900), showed that the oocysts expelled with the faeces may be eaten by wood-lice (Oniscus), but when this happens they pass through the intestine of the wood-louse unaltered, the latter not being an intermediate host but merely a carrier.

The order Coccidiidea is divided into four families, characterized by the number of sporocysts (if any) found in the oocyst.

Fam. Asporocystidae, Leger. No sporozoites are Classify formed in the oocyst, the sporozoites being unenclosed cation. (gymnospores).

Genus, Legerella, Mesnil. This genus actually conforms to Aime Schneider’s original definition of Eimeria, which was founded on what were really the schizogonous generations of other forms, then thought to be distinct. In view of the great confusion attending the use of this name, however, Mesnil (1900) has suggested the new one here adopted. Two species known, L. nova and L. testiculi, both from

different species of Glomeris, a Myriapod ; the former inhabits the Malpighian tubules, the latter the testis.

Fam. Disporocystidae, Leger. The oocyst contains 2 spores.

Genus 1. Cyclospora, A. Schneider. Spores dizoic, i.e. with two sporozoites. C. glomericola, from the intestinal epithelium of Clome~is, and C. caryolytica, from the intestinal epithelium of the mole, intranuclear.

Genus 2. Diplospora, Labbe. Spores tetrazoic. D. lacazei, from many birds, is the best-known species; and others have been de- scribed from different Sauropsida. D. lieberkiihni is an interesting form occurring in the kidneys of the frog, which it reaches by way of the circulation.

Genus 3. Isospora, Schn. Spores polyzoic. Founded for /. rara, parasitic in the black slug (Limax cinereo-niger).ˆ Many authors consider that Schneider was mistaken in attributing many sporo- zoites to this form, and would unite with it the genus Diplospora.

Fam. Tetrasporocystidae, Leger. The oocyst contains 4 spores.

Genus 1. Coccidium? Leuckart. The spores are dizoic and the sporocysts rounded or oval. A very large number of species are known, mostly from Vertebrate hosts. C. cuniculi (= C. oviforme) from the rabbit (intestine and diverticula), but also occurring some- times in other domestic animals; C. falciformis, from the mouse; C. faurei from sheep; and C. schubergi, from Lithobius (a centipede), are among the best-known forms. All of them may cause disastrous epidemics of coccidiosis.

Genus 2. Paracoccidium, Laveran and Mesnil. This genus is distinguished from Coccidium by the fact that the sporocysts become dissolved up in the oocyst, thus leaving the 8 sporozoites unenclosed, recalling the condition in Legerella. P. prevoti, unique species, from the frog's intestine.

Genus 3. Crystallospora, Labbfi. Spores also dizoic, but having the form of a double pyramid. C. crystalloides from a fish, Motella tricirrata.

Genus 4. Angeiocystis, Brasil. Apparently 6 sporozoites, but the only species, A. audouiniae, has only been briefly described; from a Polychaete (Audouinia).

Fam. Polysporocystidae, Leger. The oocyst contains numerous spores.

There are several genera with monozoic spores, characterized by variations in the form and structure of the sporocysts, e.g. Barroussia, Schn. (fig. 8), Echinospora, Leger, and Diaspora, Leger; most of these forms are from Myriapods.

Genus Adelea, Schn. Dizoic spores; sporocysts round or oval, plain. Several species are included in this well-known genus, among them being A. ovata, A. mesnili, A. dimidiata; most of them are parasitic in Insects or Myriapods.

Genus Minchinia, Labbe. Dizoic spores; the sporocysts are produced at each pole into a long filament. M. chitonis, from the liver of Chiton (Mollusca).

Genus Klossia, Schn. The spores are tetrazoic (or perhaps polyzoic). K. helicina from the kidney of various land-snails is the best-known form. Usually said to have 5 to 6 spores, but Mesnil considers that the normal number is 4, as is the case in another species, K. soror.

Genus Caryotropha, Siedlecki. Many spherical spores (about 20)

4 Again with the exception of Eucoccidium.

6 Purists in systematic nomenclature maintain that this name should be relinquished in favour of Eimeria, since the latter was the first legitimate generic name given to a Coccidian. But one reason against the use of Eimeria has been stated already (it should be used for E. (Legerella) nova, if anywhere) ; and in addition, the word Coccidium and its important derivatives are now so universally established that it would be little short of ridiculous to displace them.

each with 12 sporozoites. C. mesnilii, unique species, from the spermatogonial (testis) cells of Polymnia (a Polychaete). An inter- esting point in the schizogony is the formation of schizontocytes (see above).

A Coccidian parasitic in the kidneys of the mouse has been de- scribed by Smith and Johnson (1902) and named by them Klossiella, on the ground that it possessed many spores, each with about 20 sporozoites. Woodcock has shown, however, that the authors were in all

probability dealing with a similar modification of schizo- gony to that which obtains in Caryotropha. The sporogony of this form (and hence its systematic position) remains at present, there- fore, quite unknown.

There are several doubtful or insufficiently known genera, e.g. Bananella, Goussia, Hyaloklossia, Gonobia, Pfeifferella and Rhabdo-spora, many of which probably represent only schizogonous genera-tions of other forms. (For information concerning these see Labbe,

1897.)

Lastly it remains to mention the extremely interesting forms parasitic in Cephalopods. For some years these have provided a fruitful source of discussion to systematists. Here it may be stated simply that their systematic position and nomenclature were thought to have been finally settled by the researches of Jacquemet (1903) and Liihe (1902) in the following terms: —

Genus Eucoccidium. Liihe (syn. Legerina Jacq.) , Coccidia possess- ing polysporous oocysts and lacking schizogony, parasitic in Cephalo-pods. Two well-known species : E. eberthi (Labbe) , (= Benedenia seu Klossia e. seu octopiana), parasitic in Sepia, which is tri- or tetra-zoic ; and E. octopianum (Schn.), (syn. Benedenia seu Klossia 0.) from Octopus, which is polyzoic, having 10 to 12 sporozoites. In both forms cysts containing megaspores and megasporozoites, and others containing microspores and microsporozoites are found, considered as representing sexual differentiation thrown back to the very earliest stages of the life-cycle.

Quite recently much additional light has been thrown upon our knowledge of these parasites, including a new one, E. jacquemeti. Moroff (1906) has shown that not one but many megagametes are formed, and fertilized by the microgametes. For this reason he regards them as Gregarines rather than Coccidia. Further, Leger and Duboscq (1906) have found that the characteristic coelomic parasites (Aggregata) of Crustacea, generally regarded as gymno- sporous Gregarines (i.e. Gregarines in which the sporozoites are naked) constitute in reality nothing more or less than a schizogonous generation of these Cephalopodan parasites, which have thus an alternation of true hosts. The ripe sporocysts from the Cephalopod are eaten by a particular crab (e.g. Portunus or Inachus, according to the parasite), the sporozoites are liberated and traverse the mucous membrane of the intestine, coming to rest in the surrounding lymphatic layer. Here a large ” cyst ” is formed, projecting into the body-cavity, the contents of which give rise to a great number of

merozoites. On the crab being devoured by the right species of Cephalopod, the merozoites doubtless give rise to the sexual generation again.

As the name Aggregata is much the older, and as, moreover, there is no longer any reason to retain that of Eucoccidium, these parasites must in future receive the former generic appellation. With regard to the various specific names, however, they remain quite unsettled until the life-history is properly worked out in different cases (see also Gregarines).

It seems to the writer a much more open question than Moroff and Leger and Duboscq apparently suppose, whether these para- sites are to be relegated to the Gregarines. For undoubtedly they have many Coccidian features, and on the other hand they differ in many ways from Gregarines. The chief feature of agreement with the latter order is the possession of many female gametes. As already said, there can be little doubt that this was the condition in the Coccidian ancestor, and it is by no means impossible that one or two forms existing at the present day remain primitive in that respect. On the other hand, the advanced character of the parasitism (the parasites remaining intracellular up to and including gamete- formation) ; the entire lack of the characteristic feature of associa- tion; the schizogony, which is only a very rare occurrence in Gregarines, and which, in the present case, strongly suggests the process in Caryotropha and Klossiella; and, last but not least, the varying number of the sporozoites (3 in one form, 10-15 in others), which is very different from the almost constant number (8) in Gregarines, are all characters in which these forms agree with Coccidia and not with Gregarines. Having regard to these points, the writer is inclined, for the present, to consider Aggregata as an off- shoot rather from the Coccidian than from the Gregarine branch of the Ectosporan tree.

Bibliography. — The following are some of the important papers dealing with the order : — G. Bonnet-Eymard, ” Sur l’Evolution de VEimeria nova, Schneider,” C.R. Soc. Biol. 52, p. 659, 1900; L. Brasil, ” Sur une Coccidie nouvelle, &c,” C.R.Ac. Sci. 139, p. 645, 1904; L. Cuenot, ” Ligerella testiculi n. sp., &c,” Arch. Zool. exp. (N. et R.), (3) 10, p. 49, 6 figs., 1902; M. Jacquemet, ” Sur la systematique des Coccidies des Cephalopodes,” Arch. Protistenk. 2 p., 190, 1903; A. Labb£, ” Recherches zoologiques, cytologiques et biologiques sur les Coccidies,” Arch. zool. exp. (3), 4, p. 517, 3 pis., 1897; A. Laveran, ” Surlesmodesdereproductioad’/sosˆora/ocazei,”

C.R. Soc. Biol. 50, p. 1 139, 1898; A. Laveran and F. Mesnil, ” Sur

deux Coccidies intestinales de la Rana esculenta," op. cit. 54, p. 857, 9 figs., 1902; A. Laveran and F„ Mesnil, " Sur la Coccidie trouvee dans le rein de la Rana esculenta, &c," C.R.Ac. Sci. 135, p. 82, 10 figs., 1902; A. Laveran and F. Mesnil, " Sur quelques Protozoaires parasites d'une tortue, &c." t. c. p. 609, 14 figs., 1902; L. Leger, " Sur une nouvelle Coccidie a microgametes cilies," op. cit., 127, p. 418, 1898; L. Leger, " Sur la morphologie et le developpement des microgametes des Coccidies," Arch. zool. exp. (N. et R.) (3), 6, 1898; L. Leger, " Essai sur la classification des Coccidies, &c," Ann. Mus. Nat. Hist., Marseille (2), Bull. i. p. 71, 4 pis., 1898; L. Leger " Sur la presence d'une Coccidie coelomique chez Olocrates, &c," Arch. zool. exp. (N. et R.) (3), 8, p. i., 1900; L. Leger, " Sur le genre Eimeria et la classification des Coccidies," C.R. Soc, Biol. 52, p. 575, 1900; L. Leger and O. Duboscq, " Recherches sur les Myriapodes de Corse et leurs parasites," Arch. zool. exp. (4), 1, p. 307, 24 figs., 1903; L. Leger and O. Duboscq, " Sur devolution des Gregarines gymnosporees des Crustaces," C.R.Ac. Sci. 142, p. 1225, 1906; L. Leger and O. Duboscq, " L'£volution d'une Aggregata de la seiche chez le Portunus depurator," C.R. Soc. Biol. 60, p. 1001, 1906; M. Liihe, " L v ber Geltung und Bedeutung der Gattungsnamen Eimeria und Coccidium," C. B. Bakter (1) 31 Orig, p. 771, 1902; C. B. Bakter, " Die Coccidien-Literatur der letzten vier Jahre," Zool. Centrlbl. 10, 45 pp., 1903; F. Mesnil, "Sur la conservation du nom generique Eimeria, &c," C.R. Soc. Biol. 52, p. 603, 1900; F. Mesnil, " Les Travaux recents sur les Coccidies," Bull. Inst. Pasteur, i. pp. 473, 505, 1903; R. Metzner, " Unter- suchungen an Coccidium cuniculi," Arch. Protistenk. 2, p. 13, pi. ii. 1903 ; G. Moussu and G. Marotel, " La Coccidiose du mouton et son parasite," Arch. Parasitol. 6, p. 82, 10 figs., 1902 ; T. Moroff, " Sur l'e, olution des pretendues Coccidies des Cephalopodes," C.R.Ac. Sci. 142, p. 652, 1906; C. Perez, " Le Cycle evolutif de l'Adelea mesnili, &c," Arch. Protistenk. 2, p. 1, pi. 1, 1903; F. Schaudinn, " Untersuchungen viber den Generationswechsel bei Coccidien," Zool. Jahrbilcher (Anat.) 13, p. 197, 4 pis., 1900; F. Schaudinn, " Studien iiber krankheitserregende Protozoen — I. Cyclospora caryolytica, &c," Arb. kais. Gesundh.-amte, 18, p. 378,2 pis., 1902; M. Siedlecki, " Reproduction sexuee . . . chez . . . Coccidium proprium," C.R. Soc. Biol. 50, p. 664, figs., 1898; M. Siedlecki, " Etude cytologique . . . de la Coccidie de la seiche, &c," Ann. Inst. Pasteur, 12, p. 799, 3 pis., 1898; M. Siedlecki, " Etude cytolo gique . . . de Adelea ovata," op. cit. 13, p. 169, 3 pis., 1899; M. Siedlecki, " Cycle evolutif de la Caryotropha mesnilii, &c," Bull, Ac. Cracovie, p. 561, 5 figs., 1902; T. Smith and H. P. Johnson, " On a Coccidian (Klossiella muris, gen. et spec, nov.), &c," /. exp. Med. 6, p. 303, 3 pis., 1902 ; H. M. Woodcock, " Notes on Sporozoa, I. On Klossiella muris, &c," Q.J. micr. Sci. 48, p. 153, 2 figs., 1904. (H. M.

Wo.)

COCCULUS INDICUS, the commercial name for the dried fruits of Anamirta Cocculus (natural order Menispermaceae), a large climbing shrub, native to India. It contains a bitter poisonous principle, picroloxin, used in small doses to control the night sweats of phthisis. It was formerly known as Levant nut and Levant shell, owing to the fact that it was brought to Europe by way of the Levant.

COCHABAMBA, a central department of Bolivia, occupying the eastern angle of the great Bolivian plateau, bounded N. by the department of El Beni, E. by Santa Cruz, S. by Chuquisaca and Potosi, and W. by Potosi, Oruro and La Paz. Area, 23,328 sq. m.; pop. (1900) 328,163. Its average elevation is between 8000 and 10,000 ft., and its mean temperature ranges from 50 to 6o° F., making it one of the best climatic regions in South America. The rainfall is moderate and the seasons are not strongly marked, the difference being indicated by rainfall rather than by temperature. The rainy season is from November to February. Cochabamba is essentially an agricultural depart- ment, although its mineral resources are good and include deposits of gold, silver and copper. Its temperate climate favours the production of wheat, Indian corn, barley and potatoes, and most of the fruits and vegetables of the temperate zone. Coca, cac&o, tobacco and most of the fruits and vegetables of the tropics are also produced. Its forest products include rubber and cinchona. Lack of transportation facilities, however, have been an insuperable obstacle to the development of any industry beyond local needs except those of cinchona and rubber. Sheep and cattle thrive in this region, and an experiment with silkworms gave highly successful results. The population is chiefly of the Indian and mestizo types, education is in a back- ward state, and there are no manufactures other than those of the domestic stage, the natives making many articles of wearing apparel and daily use in their own homes. Rough highways and

mule-paths are the only means of communication, but a pro- jected railway from Cochabamba (city) to Oruro, 132 m., promises to bring this isolated region into touch with the commercial world. The department is divided into nine provinces, but there is no effective local government outside the municipalities. The capital is Cochabamba; other important towns are Punata, Tarata, Totora, Mizque and Sacaba.

COCHABAMBA, a city of Bolivia, capital of the department of the same name and of the province of Cercado, situated on the Rocha, a small tributary of the Guapay river, in lat. 17 27′ S.and long. 65° 46′ W. Pop. (1900) 21,886, mostly Indians and mestizos. The city stands in a broad valley of the Bolivian plateau, 8400 ft. above sea-level, overshadowed by the snow-clad heights of Tunari and Larati, 291 m. north-north-west of Sucre and 132 m. east-north-east of Oruro, with both of which places it is connected by rough mountain roads. A subsidized stage- coach line runs to Oruro. A contract for a railway between the two cities was made in 1906, connecting with the Antofagasta and Arica lines. The climate is mild and temperate, and the surrounding country fertile and cultivated. Cochabamba is often described as the most progressive city of Bolivia, but it has been held back by its isolated situation. The warehouses of the city are well supplied with foreign goods, and trade is active in spite of high prices. The city is provided with telegraphic com- munication via Oruro, and enjoys a large part of the Amazon trade through some small river ports on tributaries of the Mamore. The city is regularly laid out, and contains many attractive residences surrounded by gardens. It is an episcopal city (since 1847), containing many churches, four conventual establishments, and a missionary college of the ” Propaganda Fide ” for the conversion of Indians. The city has a university and two colleges, but they are poorly equipped and receive very little support from the government. Cochabamba was founded in the 16th century, and for a time was called Oropesa. It took an active part in the ” war of independence,” the women dis- tinguishing themselves in an attack on the Spanish camp in 1815, and some of them being put to death in 18 18 by the Spanish forces. In 1874 the city was seized and partly destroyed by Miguel Aguirre, but in general its isolated situation has been a protection against the disorders which have convulsed Bolivia since her independence.

COCHEM, a town of Germany, in the Prussian Rhine pro- vince on the Mosel, and 30 m. W. of Coblenz by the railway to Trier, which above the town enters the longest tunnel (2! m.) in Germany. Pop. 3500. It is romantically situated in the deep and winding valley of the Mosel, at the foot of a hill surrounded by a feudal castle dating from 1051, which has been restored in its former style. There is a considerable trade in wines.

COCHERY, LOUIS ADOLPHE (1819-1900), French statesman, was born at Paris. After studying law he soon entered politics, and was on the staff of the ministry of justice after the revolution of February 1848. From the coup d’etat of 1851 to May 1869 he devoted himself to journalism. Then, elected deputy by the department of the Loiret,

he joined the group of the Left Centre, and was a supporter of the revolution of the 4th of September 1870. His talent in finance won him a distinguished place in the chamber. From 1879 till 1885 he was minister of posts and telegraphs, and in January 1888 he was elected to the senate. He died in 1900. ‘

His son, Georges Charles Paul, born in 1855, wa s in his father’s department from 1879 till 1885, deputy from 1885, five times president of the Budget Commission, minister of finance (1895-1898) and vice-president of the chamber (1898-1902), and again finance minister in the Briand Cabinet, 1909.

COCHIN, DENYS MARIE PIERRE AUGUSTIN (1851-), French politician, was born at Paris. He studied law, was elected to the chamber of deputies in 1893, and gradually became one of the leaders and principal orators of the Conservative party. He opposed the project of the income-tax in 1894, the revision of the Dreyfus case in 1899, and the separation of the church and state in 1905. He is known as an author by his works,

L’ Evolution de la vie (1895); Le Monde exterieur (1895); Contre les barbares (1899); Ententes et ruptures (1905).

COCHIN, a feudatory state of southern India, in political subordination to Madras, with an area of 1361 sq. m. It is bounded on the N. by British Malabar, on the E. by British Malabar, Coimbatore and Travancore, on the S. by Travancore, and on the W. by British Malabar and the Arabian Sea. Isolated from the main territory, and situated to the north-east of it, lies the major portion of the Chittore taluk, entirely surrounded by British territory. The whole state may be divided into three well-defined regions or zones: (1) the eastern zone, consisting of broken forested portions of the Western Ghats, which, gradually decreasing in height, merge into (2) the central belt, comprising the uplands and plains that dip towards the lagoons or ” backwaters ” along the coast (see Cochin, town), beyond which lies (3) the western zone, forming the littoral strip. The low belt which borders on the seas and the backwaters is by nature flat and swampy, but has in the course of ages become enriched by the work of man. On leaving the seaboard, an undulating country is found, diversified with grassy flats, naked hills and wooded terraces, intersected by numerous torrents and rapids, and profusely dotted with homesteads, orchards and cultivated fields, up to the very foot of the Ghats. Here the landscape, now on a grander scale, embraces great forests which form a considerable source of wealth. Of the total area of the state the forests and lagoons cover nearly 605 and 16 sq. m. respectively.

In 1901 the population was 812,025, showing an increase of 12 % in the decade. More than one-fifth are Christians, mostly Syrians and Roman Catholics. The revenue is estimated at £153,000, subject to a tribute of £13,000. During recent years the financial condition of the state has been flourishing. The principal products are rice, cocoanuts, timber, cardamoms, pepper and a little coffee. Salt is manufactured along the coast. The capital is Ernakulam, but the raja resides at Tripunthora. The principal commercial centre is Mattancheri, adjoining the British town of Cochin. The chief means of communication is by boat along the backwaters; but in 1902 a metre-gauge line was constructed by the Madras railway at the expense of the state to connect Ernakulam with Shoranur.

History. — What is now the native state of Cochin formed, until about the middle of the 9th century a.d., part of the ancient Chera or Kerala kingdom (see Kerala) . Its port of Kodungalur (Kranganur, the ancient Muziris), at the mouth of the Periyar, was from early times one of the chief centres for the trade between Europe and India; and it was at Malankara, near Kodungalur, that the apostle Thomas is traditionally said to have landed. The history of Cochin is, however, like that of the Kerala king- dom generally, exceedingly obscure previous to the arrival of the Portuguese. The rajas of Cochin, who are of pure Kshatriya blood, claim descent from the Chera king Cheraman Perumal, the last of his race to rule the vast tract from Gokarn in North Kanara to Cape Comorin. About the middle of the oth century this king, according to tradition, resigned his kingdom, embraced Islam, and went on pilgrimage to Arabia, where he died. To- wards the end of the century the Chera kingdom was overrun and dismembered by the Cholas. It was in 1498 that Vasco da Gama reached the Malabar coast; and in 1502 the Portuguese were allowed to settle in the town of Cochin, where they built a fort and began to organize trade with the surrounding country. By the end of the century their influence had become firmly established, largely owing to the effective aid they had given to the rajas of Cochin in their wars with the Zamorin of Calicut. The Syrian Christians, forming at that time a large proportion of the population, now felt the weight of Portuguese ascendancy; in 1599 Menezes, the archbishop of Goa, held a synod at Uday- amperur (Diamper), a village 12 m. south-east of Cochin, at which their tenets were pronounced heretical and their service- books purged of all Nestorian phrases. In 1663, however, Portuguese domination came to an end with the capture of Cochin by the Dutch, whose ascendancy continued for about a hundred years. In 1776 Hyder Ali of Mysore invaded the

state and forced the raja to acknowledge his suzerainty and pay tribute. In 1 791 Tippoo, son of Hyder Ali, ceded the sovereignty to the British, who entered into a treaty with the raja by which he became their vassal and paid an annual tribute of a lakh of rupees. On the 17th of October 1809, in consequence of an attempt of the hereditary chief minister Paliyath Achan, in 1808, to raise an insurrection against the British without his master's knowledge, a fresh treaty was made, by which the raja undertook to hold no correspondence with any foreign state and to admit no foreigners to his service without the sanc- tion of the British government, which, while undertaking to defend the raja's territories against all enemies, reserved the right to dismantle or to garrison any of his fortresses. In 1818 the tribute, raised to 2% lakhs in 1808, was permanently fixed at 2 lakhs. Since then, under the rule of the rajas, the state has greatly advanced in prosperity, especially under that of H.H. Sir Sri Rama Varma (b. 1852), who succeeded in 1895, was made a K.C.S.I. in 1897, and G.C.S.I. in 1903.

COCHIN, a town of British India, in the district of Malabar, Madras. Pop. (1901) 19,274. The town lies at the northern extremity of a strip of land about 12 m. in length, but in few places more than a mile in breadth, which is nearly insulated by inlets of the sea and estuaries of streams flowing from the Western Ghats. These form the Cochin backwaters, which consist of shallow lagoons lying behind the beach-line and below its level. In the monsoon the Cochin backwaters are broad navigable channels and lakes ; in the hot weather they contract into shallows in many places not 2 ft. deep. The town of Cochin is about a mile in length by half a mile in breadth. Its first European possessors were the Portuguese. Vasco da Gama founded a factory in 1502, and Albuquerque built a fort, the first European fort in India, in 1503. The British made a settlement in 1634, but retired when the Dutch captured the town in 1663. Under the Dutch the town prospered, and about 1778 an English traveller described it as a place of great trade, " a harbour filled with ships, streets crowded with merchants, and warehouses stored with goods from every part of Asia and Europe, marked the industry, the commerce, and the wealth of the inhabitants." In 1795 Cochin was captured from the Dutch by the British, and in 1806 the fortifications and public buildings were blown up by order of the authorities. The explosion destroyed much private property, and for a long time seriously affected the prosperity of the town. Considerable sea-borne trade is still carried on. A lighthouse stands on the ruins of the old fort. The chief exports are cocoanut products, for the preparation of which there are factories, and tea; and

the chief import is rice. Cochin is the only port south of Bombay in which large ships can be built.

COCHIN-CHINA, 1 a French colony in the extreme south of French Indo-China. The term formerly included the whole Annamese empire — Tongking, Annam, and Lower Cochin-China, but it now comprises only the French colony, which corresponds to Lower Cochin-China, and consists of the six southern provinces of the Annamese empire annexed by France in 1862 and 1867. Cochin-China is bounded W. by the Gulf of Siam, N.W. and N. by Cambodia, E. by Annam, and S.E. by the China Sea. Except along part of the north-west frontier, where the canal of Vinh- The divides it from Cambodia, its land-limits are conventional. Its area is about 22,000 sq. m.

In 1901 the population numbered 2,968,529, of whom 4932 were French (exclusive of French troops, who numbered 2537), 2,558, 301 Annamese, 231,902 Cambodians, 92,075 Chinese, 42,940 savages (Min Huong), the rest being Asiatics of other nationalities, together with a few Europeans other than French.

Geography. — Cochin-China consists chiefly of an immense plain, flat and monotonous, traversed by the Mekong and extend- ing from Ha-Tien in the west to Baria in the east, and from Bien-Hoa in the north-east to the southern point of the peninsula of Ca-Mau in the south-west. The last spurs of the mountains of Annam, which come to an end at Cape St Jacques, extend over parts of the provinces of Tay-Ninh, Bien-Hoa and Baria in the north-east and east of the colony, but nowhere exceed 2900 ft. 1 See also Indo-China, French ; and Annam.

in height; low hills are found in the north-western province of Chau-Doc. Cochin-China is remarkable for the abundance of its waterways. The Mekong divides at Pnom-Penh in Cam- bodia into two arms, the Fleuve superieur and the Fleuve inferieur, which, pursuing a course roughly parallel from north- west to south-east, empty into the China Sea by means of the numerous channels of its extensive delta. From June to October the inundations of the Mekong cover most of the country, portions of which, notably the Plaine des Jones in the north and a large tract of the peninsula of Ca-Mau, are little else than marshes. Besides a great number of small coastal streams there are four other rivers of secondary importance, all of which water the east of the colony, viz. the Don-Nai, which rising in the Annamese mountains flows west, then abruptly south, reaching the sea to the west of Cape St Jacques; the Saigon river, which flowing from north-west to south-east passes Saigon, the capital of the colony, 12 m. below which it unites with the Don-Nai; and the two Vaicos, which

join the Don-Nai close to its mouth. These rivers flow into the sea through numerous winding channels, forming a delta united by canals to that of the Mekong. The waterways of Cochin-China communicate by means of natural or artificial channels (arroyos) , facilitating transport and aiding in the uniform distribution of the inundation to which the country owes its fertility. Canals from Chau-Doc to Ha-Tien and from Long Xuyen to Rach-Gia join the Mekong with the Gulf of Siam. East of Cape St Jacques the mountains of Annam come down close to the sea; west of that point, as far as the southern headland of Ca-Mau, the coast-line of Cochin-China runs north-east to south-west for about 160 m. in a straight line broken only by the mouths of the Don-Nai and Mekong. From Cape Ca-Mau to Rach-Gia it runs north for a distance of 120 m., then north-west as far as Ha-Tien, where the boundary line between it and Cambodia meets the sea.

Climate and Fauna. — The climate of the country is warm, humid, and very trying to Europeans. The wet season, during which heavy rain falls almost daily, lasts from April to October, coinciding with the south-west monsoon. The hottest period lasts from the middle of April to the middle of June, the ther- mometer during that time often reaching 94° F., and never descending below 86°. The forest regions of Cochin-China harbour the tiger, panther, leopard, tiger-cat, ichneumon, wild boar, deer, buffalo, rhinoceros and elephant, as well as many varieties of monkeys and rats. Of birds some species of parrakeet, the ” mandarin ” blackbird, and the woodcock are not found in the rest of Indo-China. Duck, teal, cranes and other aquatic birds abound in the delta. Venomous reptiles are numerous, and the Mekong contains crocodiles.

Agriculture and Industries. — The cultivation of the rice-fields, which cover large extents of the plains of Cochin-China, is by far the chief industry of the colony. Pepper is grown in considerable quantities in the districts of Ha-Tien and Bien-Hoa, and sugar- canes, coffee, cotton, tobacco and jute are also produced. The buffalo, used both for transport and in the rice-fields, and swine, the flesh of which forms an important element in the native diet, are the principal domestic animals. Oxen and cows are of secondary importance and the climate is unsuitable for sheep; horses of a small breed are used to some extent. The chief industrial establishments are those for the decortication of rice at Saigon and Cholon ; they are in the hands of the Chinese, by whom most of the trade in the colony is conducted. Sugar- making, the distillation of rice-spirit, silk-weaving, fishing and the preparation of a fish-sauce (nuoc-mam) made from decayed fish, and the manufacture of salt from sea-water and of lime are carried on in many localities.

Commerce. — Rice is the chief article of export, dried or salted fish, pepper and cotton ranking next in order of value. Imports include woven goods, metals, ironware, machinery, tea, wines and spirits, mineral oils, opium, paper, and arms and powder. The ports of Saigon and Mytho are accessible to the largest vessels, and are connected by a railway (see Indo-China, French). The roadsteads of Rach-Gia, Ca-Mau, and Ha-Tien can accommodate only vessels of low tonnage. In 1905 exports

reached a value of £3,816,000, and imports a value of £4,834,000 (not including treasure and transit trade).

Government and A dministration. — Cochin-China is administered by a lieutenant-governor under the authority of the governor- general of Indo-China. He is assisted by the conseil colonial numbering sixteen members, six of whom are French citizens elected by the French, six natives elected by the natives, the other four being members of the chamber of commerce of Saigon and the conseil privS. The conseil colonial, besides its advisory functions, discusses and votes the budget, determines the nature of the taxes, has supreme control over the tariffs, and extensive powers in the administration of colonial domains. The conseil privi is a deliberative body under the presidency of the lieutenant-governor, composed of colonial officials together with two native members. The colony is divided into four circumscriptions (Saigon, My-Tho, Vinh-Long, Bassac)y at the head of each of which is an inspector of native affairs. These are subdivided into twenty provinces, each administered by an administrator of native affairs by whose side is the provincial council consisting of natives and occupied with the discussion of ways and means and questions of public works. The provinces are divided into cantons and subdivided into communes. The commune forms the basis of the native social system. Its assembly of notables or municipal council forms a sort of oligarchy, the members of which themselves elect individuals from among the more prominent inhabitants to fill vacancies. The notables elect the provincial councillors in the proportion, usually, of one to every canton, and their delegates elect the chief of the canton, who voices the wishes of the natives to the government. Local administration, e.g. supervision of markets,policing,land-transfer, &c, are carried on by a mayor and two assistants, to whom the municipal council delegates its powers. The same body draws up the list of males liable to the poll-tax and of the

lands liable to land-tax, these being the chief sources of revenue. There are French tribunals of first instance in nine of the chief towns of the colony, and in four of these there are criminal courts. These administer justice in accordance both with French law and, in the case of natives, with Annamese law, which has been codified for the purpose. Saigon has two chambers of the court of appeal of French Indo-China and a tribunal of commerce. Primary instruction is given in some six hundred schools. Cochin- China is represented in the French chamber by a deputy. The capital is Saigon (q.v.) ; of the other towns, Cholon (q.v.), My-Tho, Vinh-Long and Chau-Doc are of importance.

In 1904 the budget receipts amounted to £495,241 (as com- pared with £474,545 in 1899). To this sum the land and poll-tax and other direct taxes contributed £374,630. The main heads of expenditure, of which the total was £467,328, were as follows: —

Government £87,271

Administration 62,725

Public Works 40,454

Transport 38,173

Public Instruction 36,009

Topography and Surveying 32,036

History. — The Khmer kingdom (see Cambodia), at its zenith from the 9th to the 12th centuries, included a large portion of the modern colony of Cochin-China, the coastal portion and perhaps the eastern region being under the dominion of the empire of Champa, which broke up during the 1 5th century. This eastern region was occupied in the 17th century by the Annamese, who in the 18th century absorbed the western provinces. From this period the history of Cochin-China follows that of Annam (q.v.) till 1867, when it was entirely occupied by the French and became a French colony. In 1887 it was united with Cambodia, Annam and Tongking to form the Indo-Chinese Union (see Indo-China, French).

COCHINEAL, a natural dye-stuff used for the production of scarlet, crimson, orange and other tints, and for the preparation of lake and carmine. It consists of the females of Coccus cacti, an insect of the family Coccidae of the order Hemiptera, which feeds upon various species of the Cactaceae, more especially the nopal plant, Opuntia

coccinellifera, a native of Mexico and Peru.

The dye was introduced into Europe from Mexico, where it had been in use long before the entrance of the Spaniards in the year 1 518, and where it formed one of the staple tributes to the crown for certain districts. In 1523 Cortes received instructions from the Spanish court to procure it in as large quantities as possible. It appears not to have been known in Italy so late as the year 1548, though the art of dyeing then flourished there. Cornelius van Drebbel, at Alkmaar, first employed cochineal for the production of scarlet in 1650. Until about 1725 the belief was very prevalent that cochineal was the seed of a plant, but Dr Martin Lister in 1672 conjectured it to be a kind of kermes, and in 1703 Antony van Leeuwenhoek ascertained its true nature by aid of the microscope. Since its introduction cochineal has sup- planted kermes (Coccus ilicis) over the greater part of Europe.

The male of the cochineal insect is half the size of the female, and, unlike it, is devoid of nutritive apparatus; it has long white wings, and a body of a deep red colour, terminated by two diverging setae. The female is apterous, and has a dark-brown plano-convex body; it is found in the proportion of 150 to 200 to one of the male insect. The dead body of the mother insect serves as a protection for the eggs until they are hatched. Cochi- neal is now furnished not only by Mexico and Peru, but also by Algiers and southern Spain. It is collected thrice in the seven months of the season. The insects are carefully brushed from the branches of the cactus into bags, and are then killed by immersion in hot water, or by exposure to the sun, steam, or the heat of an oven — much of the variety of appearance in the commercial article being caused by the mode of treatment. The dried insect has the form of irregular, fluted and concave grains, of which about 70,000 go to a pound. Cochineal has a musty and bitterish taste. There are two principal varieties — silver cochineal, which has a greyish-red colour, and the furrows of the body covered with a white bloom or fine down; and black cochineal, which is of a dark reddish brown, and destitute of bloom. Granilla is an inferior kind, gathered from uncultivated plants. The best crop is the first of the season, which consists of the unimpregnated females; the later crops contain an admixture of young insects and skins, which contain propor- tionally little colouring matter.

The black variety of cochineal is sometimes sold for silver cochineal by shaking it with powdered talc or heavy-spar; but these adulterations can be readily detected by means of a lens. The duty in the United Kingdom on imported cochineal was repealed in 1845.

Cochineal owes its tinctorial power to the presence of a sub- stance termed cochinealin or carminic acid, CˆHˆOu), which may be prepared from the aqueous decoction of cochineal. Cochineal also contains a fat and wax; cochineal wax or coccerin, C3oH6o(C3iH 6 i0 3)2, may be extracted by benzene, the fat is a glyceryl myristate C-jHˆCuHsrCˆs.

COCHLAEUS, JOHANN (1479-1552), German humanist and controversialist, whose family name was Dobneck, was born of poor parents in 1479 at Wendelstein (near Nuremberg), whence his friends gave him the punning surname Cochlaeus (spiral), for which he occasionally substituted Wendelstinus. Having received some education at Nuremberg from the humanist Heinrich Grieninger, he entered (1504) the university of Cologne. In 1507 he graduated, and published under the name of Wendel- stein his first piece, In musicam exhortatorium. He left Cologne (May 1510) to become schoolmaster at Nuremberg, where he brought out several school manuals. In 1 5 1 5 he was at Bologna, hearing (with disgust) Eck's famous disputation against usury, and associating with Ulrich von Hutten and humanists. He took his doctor's degree at Ferrara (1517), and spent some time in Rome, where he was ordained priest. In 1520 he became dean of the Liebfrauenkirche at Frankfort, where he first entered the lists as a controversialist against the party of Luther, developing that bitter hatred to the Reformation which animated his forceful but shallow ascription of the movement to the meanest motives, due to a quarrel between the Dominicans and Augustinians. Luther would not meet him in discussion at Mainz in 1521. He was present at the diets of Worms, Regensburg, Spires and

Augsburg. The peasants' war drove him from Frankfort; he obtained (1526) a canonry at Mainz; in 1529 he became secretary to Duke George of Saxony, at Dresden and Meissen. The death of his patron (1539) compelled him to take flight. He became canon (September 1539) at Breslau, where he died on the 10th of January 1552. He was a prolific writer, largely of overgrown pamphlets, harsh and furious. His more serious efforts retain no permanent value. With humanist convictions, he had little of the humanist spirit. We owe to him one of the few contem- porary notices of the young Servetus.

See C. Otto, Johannes Cochlaeus, der Humanist (1874) ; Haas, in I. Goschler's Dirt, encycloped. de la thiol, cath. (1858); Brecher, in Allgemeine deutsche Biographie (1876); T. Kolde, in A. Hauck's

Realencyklopadie fur prot. Theol. u. Kirche (1898). (A. Go.*)

COCK, EDWARD (1805-1892), British surgeon, was born in 1805. He was a nephew of Sir Astley Cooper, and through him became at an early age a member of the staff of the Borough hospital in London, where he worked in the dissecting room for thirteen years. Afterwards he became in 1838 assistant surgeon at Guy's, where from 1849 to 1871 he wassurgeon, and from 1871 to 1892 consulting surgeon. He rose to be president of the College of Surgeons in 1869. He was an excellent anatomist, a bold operator, and a clear and incisive writer, and though in lecturing he was afflicted with a stutter, he frequently utilized it with humorous effect and emphasis. From 1843 to 1849 he was editor of Guy's Hospital Reports, which contain many of his papers, particularly on stricture of the urethra, puncture of the bladder, injuries to the head, and hernia. He was the first English surgeon to perform pharyngotomy with success, and also one of the first to succeed in trephining for middle meningeal haemorrhage; but the operation by which his name is known is that of opening the urethra through the perinaeum (see Guy's Hospital Reports, 1866). He died at Kingston in 1892.

COCKADE (Fr. cocarde, in 16th century coquarde, from coq, in allusion probably to the cock's comb), a knot of ribbons or a rosette worn as a badge, particularly now as part of the livery of servants. The cockade was at first the button and loop or clasp which " cocked " up the side of an ordinary slouch hat. The word first appears in this sense in Rabelais in the phrase " bonnet a la coquarde," which is explained by Cotgrave (1611) as a " Spanish cap or fashion of bonnet used by substantial men of yore . . . worne proudly or peartly on th' one side." The bunch of ribbons as a party badge developed from this entirely utilitarian button and loop. The Stuarts' badge was a white rose, and the resulting white cockade figured in Jacobite songs after the downfall of the dynasty. William III.'s cockade was of yellow, and the House of Hanover introduced theirs of black, which in its present spiked or circular form of leather is worn in England to-day by the royal coachmen and grooms, and the servants of all officials or members of the services. At the battle of Sheriffmuir in the reign of George I. the English soldiers wore a black rosette in their hats, and in a contemporary song are called " the red-coat lads wi' black cockades." At the outbreak of the French Revolution of 1789, cockades of green ribbon were adopted. These afterwards gave place to the tricolour cockade, which is said to have been a mixture of the traditional colours of Paris (red and blue) with the white of the Bourbons, the early Revolutionists being still Royalists. The French army wore the tricolour cockade until the Restoration. To-day each

foreign nation has its special coloured cockade. Thus the Austrian is black and yellow, the Bavarian light blue and white, the Belgian black, yellow and red, French the tricolour, Prussian black and white, Russian green and white, and so on, following usually the national colours. Originally the wearing of a cockade, as soon as it had developed into a badge, was restricted to soldiers, as ” to mount a cockade ” was ” to become a soldier.” There is still a trace of the cockade as a badge in certain military headgears in England and elsewhere. Otherwise it has become entirely the mark of domestic service. The military cocked hat, the lineal descendant of the bonnet a la coquarde, became the fashion in France during the reign of Louis XV.

See Genealogical Magazine, vols, i.-iii. (London, 1897-1899); Racinet, La Costume historique (6 vols., Paris, 1888).

COCKAIGNE (Cockayne), LAND OF (O. Fr. Coquaigne, mod. Fr. cocagne, “abundance,” from Ital. Cocagna; “as we say ‘ Lubberland,’ the epicure’s or glutton’s home, the land of all delights, so taken in mockerie “: Florio), an imaginary country, a medieval Utopia where life was a continual round of luxurious idleness. The origin of the Italian word has been much disputed. It seems safest to connect it, as do Grimm and Littre, ultimately with Lat. coquere, through a word meaning ” cake,” the literal sense thus being ” The Land of Cakes.” In Cockaigne the rivers were of wine, the houses were built of cake and barley- sugar, the streets were paved with pastry, and the shops supplied goods for nothing. Roast geese and fowls wandered about inviting folks to eat them, and buttered larks fell from the skies like manna. There is a 13th-century French fabliau, Cocaigne, which was possibly intended to ridicule the fable of the mythical Avalon, ” the island of the Blest.” The 13th-century English poem, The Land of Cockaygne, is a satire on monastic life. The term has been humorously applied to London, and by Boileau to the Paris of the rich. The word has been frequently confused with Cockney (q.v.).

See D. M. Meon, Fabliaux et contes (4 vols., 1808), and F. J. Furnivall, Early English Poems (Berlin, 1862).

COCKATOO (Cacatuidae) , a family of parrots characterized among Old World forms by their usually greater size, by the crest of feathers on the head, which can be raised or depressed at will, and by the absence of green in thˆir coloration. They inhabit the Indian Archipelago, New Guinea and Australia, and are gregarious, frequenting woods and feeding on seeds, fruits and the larvae of insects. Their note is generally harsh and un- musical, and although

they are readily tamed when taken young, becoming familiar, and in some species showing remarkable intelligence, their powers of vocal imitation are usually limited. Of the true cockatoos (Cacatua) the best known is the sulphur- crested cockatoo (Cacatua galerita) , of a pure white plumage with the exception of the crest, which is deep sulphur yellow, and of the ear and tail coverts, which are slightly tinged with yellow. The crest when erect stands 5 in. high. These birds are found in Australia in flocks varying from 100 to 1000 in number, and do great damage to newly-sown grain, for which reason they are mercilessly destroyed by farmers. They deposit their eggs — two in number, and of a pure white colour — in the hollows of decayed trees or in the fissures of rocks, according to the nature of the locality in which they reside. This is one of the species most usually kept in Europe as a cage bird. Leadbeater's Cockatoo (Cacatua Leadbeateri) , an inhabitant of South Australia, excels all others in the beauty of its plumage, which consists in great part of white, tinged with rose colour, becoming a deep salmon colour under the wings, while the crest is bright crimson at the base, with a yellow spot in the centre and white at the tip. It is exceedingly shy and difficult of approach, and its note is more plaintive while less harsh than that of the preceding species. In the cockatoos belonging to the genus Calyptorhynchus the general plumage is black or dark brown, usually with a large spot or band of red or yellow on the tail. The largest of these is known as the funereal' cockatoo (Calyptorhynchus funereus) , from the lugubrious note or call which it utters, resembling the two syllables Wy — la — , the native name of the species. It deposits its eggs in the hollows of the large gum-trees of Australia, and feeds largely on the larvae of insects, in search of which it peels off the bark of trees, and when thus employed it may be approached closely. The cockateel (Calopsiltacus novae- hollandiae) , the only species in the family smaller than a pigeon, and with a long pointed tail, is a common aviary bird, and breeds freely in captivity.

COCKATRICE, a fabulous monster, the existence of which was firmly believed in throughout ancient and medieval times, — descriptions and figures of it appearing in the natural history works of such writers as Pliny and Aldrovandus, those of the latter published so late as the beginning of the 17 th century. Produced from a cock's egg hatched by a serpent, it was believed to possess the most deadly powers, plants withering at its touch, and men and animals dying poisoned by its look. It stood in

COCKBURN, SIR A. J. E.

awe, however, of the cock, the sound of whose crowing killed it, and consequently travelers were wont to take this bird with them in travelling over regions supposed to abound in cockatrices. The weasel alone among mammals was unaffected by the glance of its evil eye, and attacked it at all times successfully; for when wounded by the monster's teeth it found a ready remedy in rue — the only plant which the cockatrice could not wither. This myth reminds one of the real contests between the weasel-like mungoos of India and the deadly cobra, in which the latter is generally killed. The term " cockatrice " is employed on four occasions in the English translation of the Bible, in all oi which it denotes nothing more than an exceedingly venomous reptile; it seems also to be synonymous with " basilisk," the mythical king of serpents.

COCKBURN, SIR ALEXANDER JAMES EDMUND, 10th Bart. (1802-1880), lord chief justice of England, was born on the 24th of December 1802, of ancient Scottish stock. He was the son of Alexander, fourth son of Sir James Cockburn, 6th baronet, his three uncles, who had successively held the title, dying without heirs. His father was British envoy extraordinary and minister plenipotentiary to the state of Columbia, and married Yolande, daughter of the vicomte de Vignier. Young Alexander was at one time intended for the diplomatic service, and frequently during the legal career which he ultimately adopted he was able to make considerable use of the knowledge of foreign languages, especially French, with which birth and early education had equipped him. He was educated at Trinity Hall, Cambridge, of which he was elected a fellow, and tfter- wards an honorary fellow. He entered at the Middle Temple in 1825, and was called to the bar in 1829. He joined the western circuit, and for some time such practice as he was able to obtain lay at the Devon sessions, quarter sessions at that time affording an opening and a school of advocacy to young counsel not to be found anywhere fifty years later. In London he had so little to do that only the persuasion of friends induced him to keep his London chambers open. Three years after his call to the bar, however, the Reform Bill was passed, and the petitions which followed the ensuing general election gave rise to a large number of new questions for the decision of election committees, and afforded an opening of which he promptly availed himself. The decisions of the committees had not been reported since 1 82 1 , and with M. C. Rowe, another member of the western circuit, Cockburn undertook a new series of reports. They only published one volume, but the work was well done, and in 1833 Cockburn had his first parliamentary brief.

In 1834 Cockburn w T as well enough thought of to be made a

member of the commission to inquire into the state of the corporations of England and Wales. Other parliamentary work followed; but he had ambition to be more than a parliamentary counsel, and attended diligently on his circuit, besides appearing before committees. In 1841 he was made a Q.C., and in that year a charge of simony, brought against his uncle, William, dean of York, enabled him to appear conspicuously in a case which attracted considerable public attention, the proceedings taking the form of a motion for prohibition duly obtained against the ecclesiastical court, which had deprived Dr Cockburn of his office. Not long after this, Sir Robert Peel's secretary, Edward Drummond, was shot by the crazy Scotsman, Daniel M'Naughten, and Cockburn, briefed on behalf of the assassin, not only made a very brilliant speech, which established the defence of insanity, but also secured the full publicity of a long report in the Morning Chronicle of the 6th of March 1843. Another well-known trial in which he appeared a year later was that of Wood v. Peel (The Times, 2nd and 3rd of July 1844), the issue being in form to determine the winner of a bet (the Gaming Act was passed in the following year) as to the age of the Derby winner Running Rein ■ — in substance to determine, if possible, the vexed question whether Running Rein was a four-year-old or a three-year-old when he was racing as the latter. Running Rein could not be produced by Mr Wood, and Baron Alderson took a strong view of this circumstance, so that Cockburn found himself on the losing side, while his strenuous advocacy of his client's cause had

led him into making, in his opening speech, strictures on Lord George Bentinck's conduct in the case which had better have been reserved to a later stage. He was, however, a hard fighter, but not an unfair one — a little irritable at times, but on the whole a courteous gentleman, and his practice went on increasing.

In 1847 he decided to stand for parliament, and was elected without a contest Liberal M.P. for Southampton. His speech in the House of Commons on behalf of the government in the Don Pacifico dispute with Greece commended him to Lord John Russell, who appointed him solicitor-general in 1850 and attorney-general in 1851, a post which he held till the resignation of the ministry in February 1852. During the short administra- tion of Lord Derby which followed, Sir Frederic Thesiger was attorney-general, and Cockburn was engaged against him in the case of R. v. Newman, on the prosecution of Achilli. This was the trial of a criminal information for libel filed against John Henry Newman, who had denounced a scandalous and profligate friar named Achilli, then lecturing on Roman Catholicism in England. Newman pleaded justification; but the jury who heard the case in the

Queen's Bench, with Lord Campbell presiding, found that the justification was not proved except in one particular: a verdict which, together with the methods of the judge and the conduct of the audience, attracted considerable comment. The verdirtwas set aside, and a new trial ordered, but none ever took place. In December 1852, under Lord Aberdeen's ministry, Cockburn became again attorney-general, and so remained until 1856, taking part in many celebrated trials, such as the Hopwood Will Case in 1855, and the Swynfen Will Case, but notably leading for the crown in the trial of William Palmer of Rugeley in Staffordshire — an ex-medical man who had taken to the turf, and who had poisoned a friend of similar pursuits named Cook with strychnine, in order to obtain money from his estate by forgery and otherwise. Cockburn made an exhaustive study of the medical aspects of the case, and the prisoner's comment when convicted after a twelve days' trial was, alluding to the attorney-general's advocacy, " It was the riding that did it." In 1854 Cockburn was made recorder of Bristol. In 1856 he. became chief justice of the common pleas. He inherited the baronetcy in 1858. In 1859 Lord Campbell became chancellor, and Cockburn became chief justice of the Queen's Bench, con- tinuing as a judge for twenty-four years and dying in harness. On Friday, the 19th of November 1880, he tried causes with special juries at Westminster; on Saturday, the 20th, he pre- sided over a court for the consideration of crown cases reserved; he walked home, and on that night he died of angina pectoris at his house in Hertford Street.

Sir Alexander Cockburn earned and deserved a high reputation as a judge. He was a man of brilliant cleverness and rapid intuition rather than of profound and laboriously cultivated intellect. He had been a great advocate at the bar, with a charm of voice and manner, fluent and persuasive rather than learned; but before he died he was considered a good lawyer, some assigning his unquestioned improvement in this respect to his frequent association on the bench with Blackburn. He had notoriously little sympathy with the Judicature Acts. Many were of opinion that he was inclined to take an advocate's view of the cases before him, making up his mind as to their merits prematurely and, in consequence, wrongly, as well as giving undue prominence to the views which he so formed; but he was beyond doubt always in intention, and generally in fact, scrupulously fair. It is not necessary to enumerate the many causes cttebres at which Sir Alexander Cockburn presided as a judge. It was thought that he went out of his way to arrange that they should come before him, and his successor, Lord Coleridge, writing in 1881 to Lord Bramwell, to make the offer that he should try the murderer Lefroy as a last

judicial act before retiring, added, ” Poor dear Cockburn would hardly have given you such a chance.” Be this as it may, Cockburn tried all cases which came before him, whether great or small, with the same thoroughness, courtesy and dignity, so that no counsel or suitor could complain that he had not been fully heard in a matter in which the issues were seemingly trivial; while he

certainly gave great attention to the elaboration of his judgments and charges to juries. He presided at the Tichborne trial at Bar, lasting 188 days, of which his summing-up occupied eighteen.

The greatest public occasion on which Sir Alexander Cockburn acted, outside his usual judicial functions, was that of the ” Alabama ” arbitration, held at Geneva in 1872, in which he represented the British government, and dissented from the view taken by the majority of the arbitrators, without being able to convince them. He prepared, with Mr C. F. Adams, the repre- sentative of the United States, the English translation of the award of the arbitrators, and published his reasons for dissenting in a vigorously worded document which did not meet with universal commendation. He admitted in substance the liability of England for the acts of the ‘ ! Alabama,” but not on the grounds on which the decision of the majority was based, and he held England not liable in respect of the ” Florida ” and the ” Shenandoah.”

In personal appearance Sir Alexander Cockburn was of small stature, but great dignity of deportment. He was fond of yachting and sport, and was engaged in writing a series of articles on the ” History of the Chase in the Nineteenth Century ” at the time of his death. He was fond, too, of society, and was also throughout his life addicted to frivolities not altogether consistent with advancement in a learned profession, or with the positions of dignity which he successively occupied. At the same time he had a high sense of what was due to and expected from his profession; and his utterance upon the limitations of advocacy, in his speech at the banquet given in the Middle Temple Hall to M. Berryer, the celebrated French advocate, may be called the classical authority on the subject. Lord Brougham, replying for the guests other than Berryer, had spoken of ” the first great duty of an advocate to reckon every- thing subordinate to the interests of his client.” The lord chief justice, replying to the toast of ” the judges of England,” dissented from this sweeping statement,

saying, amid loud cheers from a distinguished assembly of lawyers, ” The arms which an advocate wields he ought to use as a warrior, not as an assassin. He ought to uphold the interests of his clients per fas, not per nefas. He ought to know how to reconcile the interests of his clients with the eternal interests of truth and justice ” (The Times, 9 th of November 1864). Sir Alexander Cockburn was never married, and the baronetcy became extinct at his deatl).

Authorities. — The Times, 22nd of November 1880; Law Journal; Law Times; Solicitors’ Journal, 27th of November 1880; Law Maga- zine, new series, vol. xv. n. 193, 1851 ; Ashley’s Life of Lord Palmer- ston; Nash’s Life of Lord Westbury; ” Reminiscences of Lord Chief Justice Coleridge,” by Lord Russell of Killowen, in the North American Review, September 1894; The Greville Memoirs; Croker’s Correspondence and Diaries; Justin M’Carthy’s History of Our Own Times; Serjeant Ballantine’s Experiences; Bench and Bar, by Serjeant Robinson; Fairchild’s Life of Lord Bramwell; Manson’s Builders of Our Law; Burke’s Peerage, ed. 1879; Foster’s Peerage,

1880.

COCKBURN, ALICIA, or Alison (1713-1794), Scottish poet, authoress of one of the most exquisite of Scottish ballads, the ” Flowers of the Forest,” was the daughter of Robert Rutherfurd of Fairnalee, Selkirkshire, and was born on the 8th of October 1 7 13. There are two versions of this song, — the one by Mrs Cockburn, the other by Jean Elliot (1727-1805) of Minto. Both were founded on the remains of an ancient Border ballad. Mrs Cockburn’s — that beginning ” I’ve seen the smiling of Fortune beguiling ” — is said to have been written before her marriage in 1731, though not published till 1765. Anyhow, it was com- posed many years before Jean Elliot’s sister verses, written in 1756, beginning, “I’ve heard them liltin’ at our ewe-milkin’.” Robert Chambers states that the ballad was written on the occasion of a great commerical disaster which ruined the fortunes of some Selkirkshire lairds. Later biographers, however, think it probable that it was written on the departure to London of a certain John Aikman, between whom and Alison there appears to have been an early attachment. In 1731 Alison Rutherfurd was married to Patrick Cockburn of Ormiston. After her marriage she knew all the intellectual and aristocratic celebrities

of her day. In the memorable year 1745 she vented her Whiggism in a squib upon Prince Charlie, and narrowly escaped being taken by the Highland guard as she was driving through Edinburgh in the family coach of the Keiths of Ravelston, with the parody in her pocket. Mrs

Cockburn was an indefatigable letter- writer and a composer of parodies, squibs, toasts and ” character- sketches ” — then a favourite form of composition — like other wits of her day; but the ” Flowers of the Forest ” is the only thing she wrote that possesses great literary merit. At her house on Castle-hill, and afterwards in Crichton Street, she received many illustrious friends, among whom were Mackenzie, Robert- son, Hume, Home, Monboddo, the Keiths of Ravelston, the Balcarres family and Lady Anne Barnard, the authoress of ” Auld Robin Gray.” As a Rutherfurd she was a connexion of Sir Walter Scott’s mother, and was her intimate friend. Lockhart quotes a letter written by Mrs Cockburn in 1777, describing the conduct of little Walter Scott, then scarcely six years old, during a visit which she paid to his mother, when the child gave as a reason for his liking for Mrs Cockburn that she was a ” virtuoso like himself.” Mrs Cockburn died on the 22nd of November

1794.

See her Letters and Memorials . . . , with notes by T. Craig Brown

(1900).

COCKBURN, SIR GEORGE, Bart. (1772-1853), British admiral, second son of Sir James Cockburn, Bart., and uncle of Lord Chief Justice Cockburn, was born in London. He entered the navy in his ninth year. After serving on the home station, and fti the East Indies and the Mediterranean, he assisted, as captain of the ” Minerve ” (38) at the blockade of Leghorn in 1796, and fought a gallant action with the Spanish frigate ” Sabina ” (40) which he took. He was present at the battle of Cape St Vincent. In 1809, in command of the naval force on shore, he contributed greatly to the reduction of Martinique, and signed the capitulation by which that island was handed over to the English; for his services on this occasion he received the thanks of the House of Commons. After service in the Scheldt and at the defence of Cadiz he was sent in 181 1 on an unsuccessful mission for the reconciliation of Spain and her American colonies. He was made rear-admiral in 1812, and in 1813-14, as second in command to Warren, he took a prominent part in the American War, especially in the capture of Washington. Early in 18 15 he received the order of the Bath, and in the autumn of the same year he carried out, in the ” Northumber- land ” (74), the sentence of deportation to St Helena which had been passed upon Bonaparte. In 1818 he received the Grand Cross of his order, and was made a lord of the admiralty; and the same year he was returned to parliament for Portsmouth. He was promoted to the rank of vice-admiral in 1819, and to that of admiral

in 1837; he became senior naval lord in 1841, and held office in that capacity till 1846. From 1827 he was a privy councillor. In 185 1 he was made admiral of the fleet, and in 1852, a year before his death, inherited the family baronetcy from his elder brother, being himself succeeded by his brother William, dean of York, who died in 1858.

See O'Byrne, Naval Biography; W. James, Naval History; Gentleman's Magazine for 1853.

COCKBURN, HENRY THOMAS (1779-1854), Scottish judge, with the style of Lord Cockburn, was born in Edinburgh on the 26th of October 1779. His father, a keen Tory, was a baron of the Scottish court of exchequer, and his mother was connected by marriage with Lord Melville. He was educated at the high school and the university cf Edinburgh; and he was a member of the famous Speculative Society, to which Sir Walter Scott, Brougham and Jeffrey belonged. He entered the faculty of advocates in 1800, and attached himself, not to the party of his relatives, who could have afforded him most valuable patron- age, but to the Whig or Liberal party, and that at a time when it held out few inducements to men ambitious of success in life. On the accession of Earl Grey's ministry in 1830 he became solicitor-general for Scotland. In 1834 he was raised to the bench, and on taking his seat as a judge in the court of session he adopted the title of Lord Cockburn. Cockburn's forensic style

was remarkable for its clearness, pathos and simplicity; and his conversational powers were unrivalled among his contem- poraries. The extent of his literary ability only became known after he had passed his seventieth year, on the publication of his biography of Lord Jeffrey in 1852, and from the Memorials of his Time, which appeared posthumously in 1856. He died on the 26th of April 1854, at his mansion of Bonaly, near Edinburgh.

COCKER, EDWARD (1631-1675), the reputed author of the famous Arithmetick, the popularity of which has added a phrase (" according to Cocker ") to the list of English proverbialisms, was an English engraver, who also taught writing and arithmetic. He is credited with the authorship and execution of some fourteen sets of copy slips, one of which, Daniel's Copy-Booh, ingraven by Edward Cocker, Philomath (1664), is preserved in the British Museum. Pepys, in his Diary, makes very favourable mention of Cocker, who appears to have displayed

great skill in his art. Cocker's Arithmetick, the fifty-second edition of which appeared in 1748, and which has passed through about 112 editions in all, was not published during the lifetime of its reputed author, the first impression bearing date of 1678. Augustus de Morgan in his Arithmetical Books (1847) adduces proofs, which may be held to be conclusive, that the work was a forgery of the editor and publisher, John Hawkins; and there appears to be no doubt that the Decimal Arithmetic (1684), and the English Dictionary (second edition, 17 15), issued by Hawkins under Cocker's name, are forgeries also. De Morgan condemns the Arithmetick as a diffuse compilation from older and better works, and dates " a very great deterioration in elementary works on arithmetic " from the appearance of the book, which owed its celebrity far more to persistent puffing than to its merits. He pertinently adds, — " This same Edward Cocker must have had great reputation, since a bad book under his name pushed out the good ones."

COCKERELL, CHARLES ROBERT (1788-1863), British architect, was born in London on the 28th of April 1788. After a preliminary training in his profession, he went abroad in 1810 and studied the great architectural remains of Greece, Italy and Asia Minor. At Aegina, Phigalia and other places of interest, he conducted excavations on a large scale, enriching the British Museum with many fine fragments, and adding several valuable monographs to the literature of archaeology. Elected in 1829 an associate of the Royal Academy, he became a full member in 1836, and in 1839 he was appointed professor of architecture. On Sir John Soane's death in 1837 Cockerell was appointed architect of the Bank of England, and carried out the alterations that were judged to be necessary in that building. In addition to branch banks at Liverpool and Manchester he erected in 1840 the new library at Cambridge, and in 1845 the university galleries at Oxford, as well as the Sun and the Westminster Fire Offices in Bartholomew Lane and in the Strand; and he was joint architect of the London & Westminster Bank, Lothbury, with Sir W. Tite. On the death of Henry Lonsdale Elmes in 1847, Cockerell was selected to finish the St George's Hall, Liverpool. Cockerell's best conceptions were those inspired by classic models; his essays in the Gothic — the college at Lampeter, for instance, and the chapel at Harrow — are by no means so successful. His thorough knowledge of Gothic art, however, can be seen from his writings, On the Iconography of Wells Cathedral, and On the Sculptures of Lincoln and Exeter Cathedrals. In his Tribute to the Memory of Sir Christopher Wren (1838) he published an interesting collection of the whole of Wren's works drawn to one scale.

COCKERILL, WILLIAM (17 59-1 83 2), Anglo-French inventor and machinist, was born in England in 1759. He went to Belgium as a simple mechanic, and in 1799 constructed at Verviers the first wool-carding and wool-spinning machines on the continent. In 1807 he established a large machine workshop at Liege. Orders soon poured in on him from all over Europe, and he amassed a large fortune. In 1810 he was granted the rights of naturalization by Napoleon L, and in 181 2 handed over the management of his business to his youngest son, John Cockerill

(1 790-1 840).

Thanks to his own energy and ability, aided by the influence of King William I. of the Netherlands, John Cockerill largely extended his father's business. King William secured him a site at Seraing, where he built large works, including an iron-foundry and blast furnace. The construction of the Belgian railways in 1834 gave a great impetus to these works, branches of which had already been opened in France, Germany and Poland. In 1838 Cockerill met with a carriage accident which nearly proved fatal, and the prospect of his loss resulted in the credit of the firm being so badly shaken that in 1839 it was compelled to go into liquidation, the liabilities being estimated at 26 millions of francs, the assets at 18 millions. This reverse, however, was only temporary. John Cockerill had practically concluded negotia- tions to construct the Russian government railways, when his constitution, undermined by overwork, broke down. He died at Warsaw on the 19th of June 1840. The iron works, among the largest in Europe, are still carried on under the name of La Societe Cockerill at Seraing (q.v.).

COCKERMOUTH. a market town in the Cockermouth parlia- mentary division of Cumberland, England, 2 7 m. S. W. of Carlisle, on the Cockermouth, Keswick & Penrith, the London & North Western, and the Maryport & Carlisle railways. Pop. of urban district (1901) 5355. It is pleasantly situated on the river Derwent, at the junction of the Cocker, outlying hills of the Lake District sheltering it on the north, east and south. The castle has remains of Norman work in the keep, and other ancient portions (including the gateway) of later date, but is in part modernized as a residence. The grammar school was founded in 1676. The county industrial school is established in the town. The industries include the manufacture of woollens and confectionery, tanning and engineering, and there is a consider- able agricultural trade. There are coal mines in the neighbour- hood. A statue was erected in 1875 to the sixth earl of Mayo, who represented the borough (abolished in 1885) from 1857 to 1868. There is a Roman fort a mile west of the town, at Papcastle.

Cockermouth (Cokermuth, Cokermue) was made the head of the honour or barony of Allerdale when that barony was created and granted to Waltheof in the early part of the 12 th century. At a later date the honour of Allerdale was frequently called the honour of Cockermouth. Waltheof probably built the castle, under the shelter of which the town grew up. Although it never received any royal charter, the earliest records relating to Cockermouth mention it as a borough. In 1295 it returned two members to parliament and then not again until 1640. By the Representation of the People Act of 1867 the representation was reduced to one member, and by the Redistribution Act of 1885 it was disfranchised. In 1221 William de Fortibus, earl of Albemarle, was granted a Saturday market, which later in the year was transferred to Monday, the day on which it has con- tinued to be held ever since. The Michaelmas Fair existed in 1343, and an inquisition dated 1374 mentions two horse-fairs on Whit- Monday and at Michaelmas. In 1638 Algernon Percy, earl of Northumberland, obtained a grant of a fair every Wednesday from the first week in May till Michaelmas. The chief sources of revenue in Norman times were the valuable fisheries and numerous mills.

COCK-FIGHTING, or Cocking, the sport of pitting game-cocks to fight, and breeding and training them for the purpose. The game-fowl is now probably the nearest to the Indian jungle-fowl (Gallus ferrugineus) , from which all domestic fowls are believed to be descended. The sport was popular in ancient times in India, China, Persia and other eastern countries, and was intro- duced into Greece in the time of Themistocles. The latter, while moving with his army

against the Persians, observed two cocks fighting desperately, and, stopping his troops, inspired them by calling their attention to the valour and obstinacy of the feathered warriors. In honour of the ensuing victory of the Greeks cock- fights were thenceforth held annually at Athens, at first in a patriotic and religious spirit, but afterwards purely for the love of the sport. Lucian makes Solon speak of quail-fighting and cocking, but he is evidently referring to a time later than that

of Themistocles. From Athens the sport spread throughout Greece, Asia Minor and Sicily, the best cocks being bred in Alexandria, Delos, Rhodes and Tanagra. For a long time the Romans affected to despise this " Greek diversion," but ended by adopting it so enthusiastically that Columella (ist century a.d.) complained that its devotees often spent their whole patrimony in betting at the pit-side. The cocks were provided with iron spurs (tela), as in the East, and were often dosed with stimulants to make them fight more savagely.

From Rome cocking spread northwards, and, although opposed by the Christian church, nevertheless became popular in Great Britain, the Low Countries, Italy, Germany, Spain and her colonies. On account of adverse legislation cocking has practically died out everywhere excepting in Spain, countries of Spanish origin and the Orient, where it is still legal and extremely popular. It was probably introduced into England by the Romans before Caesar's time. William Fitz-Stephen first speaks of it in the time of Henry II. as a sport for school-boys on holidays, and particularly on Shrove Tuesday, the masters themselves directing the fights, or mains, from which they derived a material advantage, as the dead birds fell to them. It became very popular throughout England and Wales, as well as in Scotland, where it was introduced in 1681. Occasionally the authorities tried to repress it, especially Cromwell, who put an almost complete stop to it for a brief period, but the Restoration re-established it among the national - pastimes. Contemporary apologists do not, in the 1 7th century, consider its cruelty at all, but concern themselves solely with its justification as a source of pleasure. " If Leviathan took his sport in the waters, how much more may Man take his sport upon the land?" From the time of Henry VIII., who added the famous Royal Cock-pit to his palace of Whitehall, cocking was called the " royal diversion," and the Stuarts, particularly James I. and Charles II., were among its most enthusiastic devotees, their example being followed by the gentry

down to the 19th century. Gervase Markham in his Pleasures of Princes (16 14) wrote ” Of the Choyce, Ordring, Breeding and Dyeting of the fighting-Cocke for Battell,” his quaint directions being of the most explicit nature. When a cock is to be trained for the pit he must be fed ” three or foure daies only with old Maunchet (fine white bread) and spring water.” He is then set to spar with another cock, ” putting a payre of hots upon each of their heeles, which Hots are soft, bumbasted roules of Leather, covering their spurs, so that they cannot hurt each other. . . . Let them fight and buffet one another a good space. ” After exercise the bird must be put into a basket, covered with hay and set near the fire. ” Then let him sweate, for the nature of this scowring is to bring away his grease, and to breed breath, and strength.” If not killed in the fight, ” the first thing you doe, you shall search his wounds, and as many as you can find you shall with your mouth sucke the blood out of them, then wash them with warm salt water, . . . give him a roule or two, and so stove him up as hot as you can.”

Cocking-mains usually consisted of fights between an agreed number of pairs of birds, the majority of victories deciding the main; but there were two other varieties that aroused the particular ire of moralists. These were the ” battle royal,” in which a number of birds were ” set,” i.e. placed in the pit, at the same time, and allowed to remain until all but one, the victor, were killed or disabled; and the ” Welsh main,” in which eight pairs were matched, the eight victors being again paired, then four, and finally the last surviving pair. Among London cock- pits were those at Westminster, in Drury Lane, Jewin Street and Birdcage Walk (depicted by Hogarth). Over the royal pit at Whitehall presided the king’s cockmaster. The pits were circular in shape with a matted stage about 20 ft. in diameter and surrounded by a barrier to keep the birds from falling off. Upon this barrier the first row of the audience leaned. Hardly a town in the kingdom was without its cockpit, which offered the sporting classes opportunities for betting not as yet sufficiently supplied by horse-racing. With the growth of the latter sport and the increased facilities for reaching the racing centres, cocking gradually declined, especially after parliament passed

laws against it, so that gentlemen risked arrest by attending a main.

Among the best-known devotees of the sport was a Colonel Mordaunt, who, about 1780, took a number of the best English game-cocks to India. There he found the sport in high favour with the native rulers and his birds were beaten. Perhaps the most famous main in England took place at Lincoln in 1830 between the birds of Joseph Gilliver, the most celebrated breeder, or ” feeder,” of his day, and those of the earl

of Derby. The conditions called for seven birds a side, and the stakes were 5000 guineas the main and 1000 guineas each match. The main was won by Gilliver by five matches to two. His grandson was also a breeder, and the blood of his cocks still runs in the best breeds of Great Britain and America. Another famous breeder was Dr Bellyse of Audlem, the principal figure in the great mains fought at Chester during race-week at the beginning of the 19th century. His favourite breed was the white pile, and ” Cheshire piles ” are still much-fancied birds. Others were Irish brown-reds, Lancashire black-reds and Staffordshire duns.

In Wales, as well as some parts of England, cocking-mains took place regularly in churchyards, and in many instances even inside the churches themselves. Sundays, wakes and church festivals were favourite occasions for them. The habit of holding mains in schools was common from the 12th to about the middle of the 19th century. When cocking was at its height, the pupils of many schools were made a special allowance for purchasing fighting-cocks, and parents were expected to contribute to the expenses of the annual main on Shrove Tuesday, this money being called ” cockpence.” Cock-fighting was prohibited by law in Great Britain in 1849.

Cocking was early introduced into America, though it was always frowned upon in New England. Some of the older states, as Massachusetts, forbade it by passing laws against cruelty as early as 1836, and it is now expressly prohibited in Canada and in most states of the Union, or is repressed by general laws for the prevention of cruelty to animals.

Cocks are fought at an age of from one to two years. ” Heel- ing,” or the proper fastening of the spurs, and ” cutting out,” trimming the wings at a slope, and cutting the tail down by one- third of its length and shortening the hackle and rump feathers, are arts acquired by experience. The comb is cut down close, so as to offer the least possible mark for the hostile bird’s bill. The cock is then provided with either ” short heels,” spurs 15 in. or less in length, or with ” long heels,” from 2 to 2\ in. in length. The training of a cock for the pit lasts from ten days to a month or more, during which time the bird is subjected to a rigid diet and exercise in running and sparring. The birds may not be touched after being set down in the pit, unless to extricate them from the matting. Whenever a bird refuses to fight longer he is set breast to breast with his adversary in the middle of the pit, and if he then still refuses to fight he is regarded as defeated. Among the favourite breeds may be mentioned the ” Irish gilders,” ” Irish Grays,” ” Shawlnecks,” ” Gordons,” ” Eslin Red-Quills,” ”

Baltimore Topknots," " Dominiques," " War- horses " and " Claibornes."

Cock-fighting possesses an extensive literature of its own. See Gervase Markham, Pleasures of Princes (London, 1614) ; Blain, Rural Sports (London, 1853); " Game Cocks and Cock-Fighting," Outing, vol. 39; "A Modest Commendation of Cock-Fighting," Blackwood's Magazine, vol. 22; "Cock-Fighting in Schools," Chambers' Magazine, vol. 65.

COCK LANE GHOST, a supposed apparition, the vagaries of which attracted extraordinary public attention in London during 1762. At a house in Cock Lane, Smithfield, tenanted by one Parsons, knockings and other noises were said to occur at night varied by the appearance of a luminous figure, alleged to be the ghost of a Mrs Kent who had died in the house some two years before. A thorough investigation revealed that ˆParsons' daughter, a child of eleven, was the source of the disturbance. The object of the Parsons family seems to have been to accuse the husband of the deceased woman of murdering her, with a view to blackmail. Parsons was prosecuted and condemned to the pillory. Among the crowds who visited the

house was Dr Johnson, who was in consequence made the object of a scurrilous attack by the poet Charles Churchill in " The Ghost." See A. Lang, Cock Lane and Common Sense (1894). COCKLE, SIR JAMES (1819-1895), English lawyer and mathematician, was born on the 14th of January 1819. He was the second son of James Cockle, a surgeon, of Great Oakley, Essex. Educated at Charterhouse and Trinity College, Cam- bridge, he entered the Middle Temple in 1838, practising as a special pleader in 1845 and being called in 1846. Joining the midland circuit, he acquired a good practice, and on the recom- mendation of Chief Justice Sir William Erie he was appointed chief justice of Queensland in 1863. He received the honour of knighthood in 1869, retired from the bench, and returned to England in 1879.

Cockle is more remembered for his mathematical and scientific investigations than as a lawyer. Like many young mathe- maticians he attacked the problem of resolving the higher algebraic equations, notwithstanding Abel's proof that a solution by radicles was impossible. In this field Cockle achieved some notable results, amongst which is his reproduction of Sir William R. Hamilton's

modification of Abel's theorem. Algebraic forms were a favourite object of his studies, and he discovered and developed the theory of criticoids, or differential invariants; he also made contributions to the theory of differential equations. He displayed a keen interest in scientific societies. From 1863 to 1879 he was president of the Queensland Philosophical Society (now incorporated in the Royal Society of Queensland) ; on his return to England he became associated with the London Mathematical Society, of which he was president from 1886 to 1888, and the Royal Astronomical Society, serving as a member of the council from 1888 to 1892. He died in London on the 27th of January 1895.

A volume containing his scientific and mathematical researches made during the years 1864-1877 was presented to the British Museum in 1897 by his widow. See the obituary notice by the Rev. R. Harley in Proc. Roy. Soc. vol. 59.

COCKLE, in zoology, a mollusc (Cardium) of the class Lamellibranchia (q.v.). A very large number of species of Cardium have been distinguished by conchologists. Besides the common species Cardium edule, two others occur in Britain, but are not sufficiently common to be of commercial importance. One of these is C. echinatum, which is larger than the common species, reaching 3 in. in diameter, and distinguished by the presence of spines along the ribs of the shell. The other is C. norvegicum, which is also somewhat larger than C. edule, is longer dorso- ventrally than broad, and is only faintly ribbed.

The two valves of the shell of the common cockle are similar to each other, and somewhat circular in outline. The beak or umbo of each valve is prominent and rounded, and a number of sharp ridges and furrows radiate from the apex to the free edge of the shell, which is crenated. The ligament is external, and the hinge carries cardinal teeth in each valve. The interior of the shell is remarkable for the absence of pearly lustre on its interior surface. The colour externally is reddish or yellowish. The pallial line, which is the line of attachment of the mantle parallel to the edge of the shell, is not indented by a sinus at the posterior end. In the entire animal the posterior end projects slightly more than the anterior from the region of the umbones.

The animal possesses two nearly equal adductor muscles. The edges of the mantle are united posteriorly except at the anal and branchial apertures, which are placed at the ends of two very short siphons or tubular prolongations of the mantle; the siphons bear a number of short tentacles, and many of these are furnished with eye-spots. The foot is very large and powerful; it can be protruded from the anterior

aperture between the mantle edges, and its outer part is bent sharply forwards and terminates in a point. By means of this muscular foot the cockle burrows rapidly in the muddy sand of the sea-shore, and it can also when it is not buried perform considerable leaps by suddenly bending the foot. The foot has a byssus gland on its posterior surface.

On either side of the body between the mantle and the foot are two flat gills each composed of two lamellae. Cardium

belongs to the order of Lamellibranchia in which the gills present the maximum of complexity, the original vertical filaments of which they are composed being united by interfilamentar and interlamellar junctions. In other respects the anatomy of the cockle presents no important differences from that of a typical Lamellibranch. The sexes are distinct, and the generative opening is on the side of the body above the edge of the inner lamella of the inner gill. The eggs are minute, and pass out into the sea-water through the dorsal or exhalent siphon. The breeding season is April, May and June. The larva for a time swims freely in the sea-water, having a circlet of cilia round the body in front of the mouth, forming the velum. The shell is developed on the dorsal surface behind the velum, the foot on the opposite or ventral surface behind the mouth. After a few days, when the mantle bearing the shell valves has developed so much as to enclose the whole body, the young cockle sinks to the bottom and commences to follow the habits of the adult. The usual size of the cockle in its shell is from 1 to 2 in. in breadth.

The common cockle is regularly used as food by the poorer classes. It occurs in abundance on sandy shores in all estuaries. At the mouth of the Thames the gathering of cockles forms a considerable industry, especially at Leigh. On the coast of Lancashire also the fishery, if it may be so called, is of consider- able importance. The cockles are gathered by the simple process of raking them from the sand, and they are usually boiled and extracted from their shells before being sent to market. The cockle is liable to the same suspicion as the oyster of conveying the contamination of typhoid fever where the shores are pol- luted, but as it is boiled before being eaten it is probably less dangerous. ‘ (J. T, C.)

COCKNEY, a colloquial name applied to Londoners generally, but more properly confined to those born in London, or more strictly still to those born within the sound of the bells of St Mary-le-Bow church. The origin of the word has been the subject of many guesses, from that in John Minsheu’s lexicon, Ductor in linguas (161 7), which gives the tale of the town-bred child who, on hearing a horse neigh, asked

whether a ” cock neighed ” too, to the confusion of the word with the name of the Utopia, the land of Cockaigne (q.v.). The historical examination of the various uses of ” Cockney,” by Sir James Murray (see Academy, 10th of May 1890, and the New English Dictionary, s.v.) clearly shows the true derivation. The earliest form of the word is cokenay or cokeney, i.e. the ey or egg, and coken, genitive plural of ” cock,” ” cocks’ eggs ” being the name given to the small and malformed eggs sometimes laid by young hens, known in German as Hahneneier. An early quotation, in Langland’s Piers Plowman, A. vii. 272, gives the combination of ” cokeneyes ” and bacon to make a ” collop,” or dish of eggs and bacon. The word then applied to a child overlong nursed by its mother, hence to a simpleton or milksop. Thus in Chaucer, Reeve’s Tale, the word is used with daf, i.e. a fool. The particular application of the name as a term of contempt given by country folk to town-bred people, with their dandified airs and ignorance of country ways and country objects, is easy. Thus Robert Whittington or Whitinton (fl. 1520), speaks of the ” cokneys ” in such ” great cytees as London, York, Perusy ” (Perugia), show- ing the general use of the word. It was not till the beginning of the 17th century that ” cockney ” appears to be confined to the inhabitants of London.

The so-called ” Cockney ” accent or pronunciation has varied in type. In the first part of the 19th century, it was chiefly characterized by the substitution of an for a w, or vice versa. This has almost entirely disappeared, and the chief consonantal variation which exists is perhaps the change of th to / or v, as in ” fing ” for thing, or ” favver ” for father. This and the vowel- sound change from ou to ah, as in ” abaht ” for ” about,” are only heard among the uneducated classes, and, together with other characteristic pronunciations, phrases and words, have been well illustrated in the so-called ” coster ” songs of Albert Chevalier. The most marked and widely-prevalent change of vowel sound is that of ei for ai, so that ” daily ” becomes ” dyly ” and ” may ” becomes ” my.” This is sometimes so marked

that it almost amounts to incapacity to distinguish the vowels a and i, and is almost universal in large classes of the population of London. The name of the ” Cockney School of Poetry ” was applied in 1817 to the literary circle of which Leigh Hunt was the principal representative, though Keats also was aimed at. The articles in Blackwood’s Magazine, in which the name ap- peared, have generally,

but probably wrongly, been attributed to John Gibson Lockhart.

COCK-OF-THE-ROCK, the familiar name of the birds of the genus Rupicola (subfamily Rupicolinae) of the Cotingas (allied to the Manakins, q.v.), found in the Amazon valley. They are about the size of a pigeon, with orange-coloured plumage, a pronounced crest, and orange-red flesh, and build their nests on rock. The skins and feathers are highly valued for decoration.

COCKPIT, the term originally for an enclosed place in which the sport of cock-fighting (q.v.) was carried on. On the site of an old cockpit opposite Whitehall in London was a block of buildings used from the 17th century as offices by the treasury and the privy council, for which the old name survived till the early 19th century. The name was given also to a theatre in London, built in the early part of the 17th century on the site of Drury Lane theatre. As the place where the wounded in battle were tended, or where the junior officers consorted, the term was also formerly applied to a cabin used for these purposes on the lower deck of a man-of-war.

COCKROACH 1 (Blattidae), a family of orthopterous insects, distinguished by their flattened bodies, long thread-like antennae, and shining leathery integuments.. Cockroaches are nocturnal creatures, secreting themselves in chinks and crevices about houses, issuing from their retreats when the lights are extin- guished, and moving about with extraordinary rapidity in search of food. They are voracious and omnivorous, devouring, or at least damaging, whatever comes in their way, for all the species emit a disagreeable odour, which they communicate to whatever article of food or clothing they may touch.

The common cockroach {Stilopyga orientalis) is not indigenous to Europe, but is believed to have been introduced from the Levant in the cargoes of trading vessels. The wings in the male are shorter than the body; in the female they are rudimentary. The eggs, which are 16 in number, are deposited in a leathery capsule fixed by a gum-like substance to the abdomen of the female, and thus carried about till the young are ready to escape, when the capsule becomes softened by the emission of a fluid substance. The larvae are perfectly white at first and wingless, although in other respects not unlike their parents, but they are not mature insects until after the sixth casting of the skin.

The American cockroach (Periplaneta americana) is larger than the former, and is not uncommon in European- seaports trading with America, being conveyed in cargoes of grain and other food produce. It is very abundant in the Zoological Gardens in London, where it

occurs in conjunction with a much smaller imported species Phyllodromia germanica, which may also be seen in some of the cheaper restaurants.

In both of these species the females, as well as the males, are winged.

In addition to these noxious and obtrusive forms, England has a few indigenous species belonging to the genus Ectobia, which live under stones or fallen trees in fields and woods. The largest known species is the drummer of the West Indies (Blabera giganlea), so called from the tapping noise it makes on wood, sufficient, when joined in by several individuals, as usually happens, to break the slumbers of a household. It is about 2 in. long, with wings 3 in. in expanse, and forms one of the most noisome and injurious of insect pests. Wingless females of many tropical species present a close superficial resem- blance to woodlice; and one interesting apterous form known as Pseiidoglomeris, from the East Indies, is able to roll up like a millipede.

The best mode of destroying cockroaches is, when the fire and

! l The word is a corruption of Sp. cucaracha. In America it is commonly abbreviated to ” roach.”

lights are extinguished at night, to lay some treacle on a piece of wood afloat on a broad basin of water. This proves a tempta- tion to the vermin too great to be resisted. The chinks and holes from which they issue should also be filled up with unslaked lime, or painted with a mixture of borax and heated turpentine. See generally Miall and Denny, The Structure and Life History of the Cockroach (1887) I G. H. Carpenter, Insects: their Structure and Life (1899) ; Charles Lester Marlatt, Household Insects (U.S. Depart- ment of Agriculture, revised edition, 1902) ; Leland Ossian Howard, The Insect Book (1902).

COCK’S-COMB, in botany, a cultivated form of Celosia crislata (natural order Amarantaceae), in which the inflorescence is monstrous, forming a flat ” fasciated ” axis bearing numerous small flowers. The plant is a low-growing herbaceous annual, bearing a large, comb-like, dark red, scarlet or purplish mass of flowers. Seeds are sown in March or April in pans of rich, well- drained sandy soil, which are placed in a hot-bed at 65° to 70° in a moist atmosphere. The seedlings require plenty of light, and when large enough to handle are potted off and placed close to the glass in a frame under similar conditions. When the heads show they are shifted into 5-in. pots, which are plunged to their rims in ashes or coco-nut fibre refuse, in a

hot-bed, as before, close to the glass; they are sparingly watered and more air admitted. The soil recommended is a half-rich sandy loam and half-rotten cow and stable manure mixed with a dash of silver sand. The other species of Celosia cultivated are C. pyramidalis, with a pyramidal inflorescence, varying in colour in the great number of varieties, and C. argentea, with a dense white in- florescence. They require a similar cultural treatment to that given for C. crislata.

COCKTON, HENRY (1807-1853), English humorous novelist, was born in London on the 7th of December 1807. He published a number of volumes, but is best known as the author of Valentine Vox, the Ventriloquist (1840) and Sylvester Sound, the Somnambu- list (1844). He died at Bury St Edmunds on the 26th of June

1853.

COCKX (or Cock), HIERONYMUS [Jerome] (1510-1570), Flemish painter and engraver, was born at Antwerp, and in -1545 was admitted to the Gild of St Luke as a painter. It is as an engraver, however, that he is famous, a number of portraits and subject-pictures by him, and reproductions of Flemish masters, being well known. His brother Matthys (1505-1552) was also a painter.

COCOA, 2 more properly Cacao, a valuable dietary substance yielded by the seeds of several small trees belonging to the genus Theobroma, of the natural order Sterculiaceae. The whole genus, which comprises twelve species, belongs to the tropical parts of the American continent; and although the cocoa of commerce is probably the produce of more than one species, by far the greatest and most valuable portion is obtained from Theobroma Cacao. The generic name is derived from deos (god) and /3pwjua (food), and was bestowed by Linnaeus as an indication of the high appreciation in which he held the beverage prepared from the seeds, which he considered to be a food fit for the gods.

The common cacao tree is of low stature, seldom exceeding 25 ft. in height, but it is taller in its native forests than it is in cultivated plantations. The leaves are large, smooth, and glossy, elliptic-oblong and tapering in form, growing principally at the ends of branches, but sometimes springing directly from the main trunk. The flowers are small, and occur in numerous clusters on the main branches and the trunk, a very marked peculiarity which gives the matured fruit the appearance of being artificially attached to the tree. Generally only a single fruit is matured from each cluster of flowers. When ripe the fruit or ” pod ” is elliptical-ovoid in form, from 7 to 10 in. in length

and from 3 to 4J in. in diameter. It has a hard, thick, leathery rind of a rich purplish-yellow colour, externally rough and marked with ten very distinct longitudinal ribs or elevations. The

2 As a matter of nomenclature it is unfortunate that the corrupt form ” cocoa,” from a confusion with the coco-nut {q.v.), has become stereotyped. When introduced early in the 18th century it was as a trisyllable co-co-a, a mispronunciation of cacao or cocoa, the Spanish adaptation from the Mexican cacauall.

Branch of Cocoa Tree, with Fruit in section, much reduced.

interior of the fruit has five cells, in each of which is a row of from 5 to 1 2 seeds embedded in a soft delicately pink acid pulp. Each fruit thus contains from 20 to 50 or more seeds, which constitute the raw cacao or ” cacao beans ” of commerce.

The tree appears to have been originally a native of the coast lands of the Gulf of Mexico and tropical South America as far

south as the basin of the Amazon; but it can be cultivated in suitable situations within the 25 th par- allels of latitude. It flourishes best within the 15th parallels, at elevations ranging from near the sea-level up to about 2000 ft. in height. It is now cultivated in Mexico, Honduras, Guate- mala, Nicaragua, Brazil, Peru, Ecuador, New Granada, Venez- uela, Surinam,Guiana, and in many of the West Indian islands, particularly in Trini- dad, San Domingo, Grenada, Cuba, Porto Rico and Jamaica. Away from America it has been introduced, and is cultivated on a large scale in West Africa, Ceylon and the Dutch East Indies.

History. — The value of cacao was appreciated in its native country before the discovery of America by Europeans. The Spaniards found in use in Mexico a beverage known by the Aztec name of chocolath, from choco (cacao) and lath (water). W. H. Prescott records that the emperor Montezuma of Mexico was ” exceedingly fond of it … no less than 50 jars or pitchers being prepared for his own daily consumption; 2000 more were allowed for that of his household.” Bags of cacao containing a specified number of beans were also a recognized form of currency in the country. The product was early introduced into Spain, and thence to other parts of Europe. The Public Advertiser (London) of June 16, 1657, contains an announcement that ” In Bishopgate St., in

Queen's Head Alley, at a Frenchman's house, is an excellent West India drink, called chocolate, to be sold, where you may have it ready at any time, and also unmade at reasonable rates." Chocolate was a very fashionable beverage in the early part of the 18 th century.

Cultivated Varieties. — Numerous varieties of the cacao, i.e. of Theobroma Cacao, are recognized in cultivation. According to Dr P. Preuss, who has travelled extensively in the cacao pro- ducing countries of the world studying this crop, it is impossible to embody in a single table the characteristics of the world's varieties. A separate classification is needed for almost each country. In 1882 the Trinidad forms were classified by Sir D. Morris. This table was later revised by Mr J. H.Hart, and more recently Mr R. H. Lock studied the Ceylon varieties. As the Ceylon cacaos were obtained mainly from Trinidad, and as Mr Lock's results agree substantially with those of Sir D. Morris, they serve to illustrate the distinguishing characteristics of the West Indian and Ceylon forms. The main divisions are as follows:—

1. Criollo. — Pods relatively thin- walled and soft, rough, pointed at apex. The seeds or beans are plump and of pale colour. The ripe pods may be either red (colorado) or yellow (amarillo).

2. Forastero. — Pods relatively thick-walled and hard. The seeds vary in colour from pale to deep purple. Various varieties are recognized, such as cundeamor, amelonado, liso, calabacillo, differing in shape, colour and character of beans, &c, and of each of these again there may be a Colorado and amarillo sub-variety. Of special interest is calabacillo, a variety with a smooth, small pod, and deep

purple beans. It is considered by some to be sufficiently distinct to form a third type equivalent to criollo or forastero. Others again would raise amelonado to the rank of a distinct type. Of the above calabacillo is the hardiest and yields the least valuable beans; criollo is the most delicate and yields beans of the highest value, whilst forastero is intermediate in both respects. In general pale coloured beans are less bitter and more valuable than purple beans. Both, however, may occur in the same pod.

Alligator, or lagarto cacao, is the common name of a variety cultivated in Nicaragua, Guatemala, &c. Its pods are distinctly five-angled and beset with irregular, warty protuberances. Some regard it as a distinct species, T. pentagona, but others only as a variety of T. Cacao. Its produce is of high value.

T. bicolor, indigenous to Central America, is another species of some

interest. It bears small, hard woody pods about 6 in. long and 3 in. in diameter, with curious surface markings. The beans possess a fetid odour and a bitter flavour and are known as ” tiger cacao.” It is not likely to become of great commercial importance, although consumed locally where found. ” Cacao bianco ” and ” pataste ” are other names for this species.

Cultivation and Preparation. — Cacao requires for its successful cultivation a deep, well-watered and yet well-drained soil, shelter from strong winds, and a thoroughly tropical climate, with a mean annual temperature of about 8o° F., a rainfall of from 50 to 100 or more in., and freedom from long droughts. Young plants are grown from seed, which may either be sown directly in the positions the future trees are to occupy, varying according to local circumstances from 6 to 25 ft. apart in all directions, or raised in nurseries and transplanted later. The latter course is desirable when it is necessary to water and other- wise tend the seedlings. However raised, the young plants require to be shaded, and this is usually done by planting bananas, cassava or other useful crops between the rows of cacao. In some countries, but not in all, permanent shade trees are planted amongst the cacao. Various leguminous trees are commonly used, e.g. the coral tree (Erythrina spp.) sometimes known as bois immortel and madre del cacao or mother of cocoa, Albizzia Lebbek, Pithecolobium Saman, &c. The various rubber trees have been employed with success. Wind belts are also necessary in exposed situations.

Cacao comes into bearing when about five years old, the small pink flowers and the succeeding large pods being borne directly on the trunk and main branches. The pods are carefully picked when ripe, broken open, and the slimy mass of contained seeds and their enveloping mucilaginous pulp extracted. The ” beans ” are next fermented or ” sweated,” often in special houses con- structed for the purpose, or by placing them in heaps and covering with leaves or earth, or in baskets, barrels, &c, lined with banana leaves. During fermentation the beans should be stirred once daily or oftener. The time of fermentation varies from one to twelve or even more days. Pale-coloured beans usually require less time than the deep purple and bitter kinds. The method adopted also considerably modifies the time required. The process of fermenting destroys the mucilage; the seeds lose to some degree their bitter flavour and their colour also changes: the pale criollo seeds, for example, developing a cinnamon-brown colour. The ” fracture ” of the beans also characteristically alters. Fermentation is not universally practised; the purple colour and bitter taste of unfermented cacao being wanted in some markets.

After the fermentation is completed the beans may or may not be washed, opinion as to the desirability of this process varying in different countries. In any case, however, they have to be dried and cured. When climatic conditions are favourable this is commonly done by spreading the beans in thin layers on barbecues, or stone drying floors, or otherwise exposing them to the sun. Sliding roofs or other means of rapidly affording shelter are desirable in case of showers, excessive heat, and also for protection at night. Artificial drying is now often resorted to and various patterns of drying houses are in use.

The appearance of the beans may often be improved by ” claying,” a very slight coating of red earth or clay being added. Polishing the beans also gives them a brighter appearance,

removes mildew, and remnants of dried mucilage, &c. This may be done by ” dancing the cacao,” i.e. treading a heap with the bare feet, or by the use of special polishing machines. The cacao is now ready for shipment, and is usually packed in bags. Ham- burg is the chief port in the world for cacao. Until quite recently, however, this position was held by Havre, which is now second in Europe. New York imports about the same amount as Havre. London follows next in importance.

Cacao- producing Countries. — In the following table the pro- duction in tons (of 1000 kilos = 2205 lb) of the principal producing countries, arranged under continents, is given for 1905 and 1901. During this period the total world’s production has increased by about 40%, as indicated in the summary below. Study of the table will show where the increase has taken place, but attention is directed especially to the rapid development in West Africa.

America.

Ecuador

Brazil

Trinidad

San Domingo

Venezuela

Grenada

Cuba and Porto Rico

Haiti . .

Surinam .

Jamaica .

French West Indies

St. Lucia

Dominica

1905 (tons). 1901 (tons).

21,128 21,091 20,018

12,785 11,700

5.456 3,000

2 343 .1,612

1,484

1,200

700

597

Total, America

Africa.

103,114

22,896

18,324

1 1,943

6,850

7,860

4,865

i.75o

1.950

3.163

i.35o

825

765

82,541

San Thome 25,379

Gold Coast and Lagos …. 5.666

Cameroons 1,185

Congo Free State 195

1905 (tons), 1901 (tons).

Total, Africa

Asia.

Ceylon

Dutch East Indies.

Other countries

Total, Asia

World’s Production.

■ 32,425

1905 (tons).

3543 1492

5035 800

1905 (tons). Tropical America and West Indies . 103,114

West Africa 3 2 ,4 2 5

Asia 5.035

Other countries 800

16,983 997

528

18,508

1901 (tons).

2697 1277

3974 700

1901 (tons).

82,541 18,508

3.974 700

Total

141,374 105,723

Composition. — The relative weights of the various parts of a whole cacao pod are given thus by Prof. J. B. Harrison for British Guiana specimens: —

Calabacillo.

Forastero.

80-59

89-87

7-61

4-23

0-50

10-03

5-40

I0O-OO

IOO-00

Husk

Pulp

Cuticles of the beans

Kernels of the beans

The husk is composed mainly of water and cellulose woody tissue, with their usual mineral constituents, and has a low manurial value. The pulp contains sugars which become converted into alcohol during fermentation. Fibrous elements and water compose about six-tenths of the cuticles, which also contain approximately: albuminoids (6%), alkaloids (2%), fat (2%), sugars (6%), starch (7%), colouring matter (4%), tartaric acid (3%) and small quantities of various mineral constituents. The average composition of the kernels, according to Payen, is: —

Per cent.

Fat (cacao butter) 50

Starch

Albuminoids . Water Cellulose . Mineral matter Theobromine

10

20

12

2

4

2

Colouring matter (cacao-red) trace

100-00

Manufacture of Cocoa and Chocolate. — The beans are cleaned and sorted to remove foreign bodies of all kinds and also graded into sizes to secure Uniformity in roasting. The latter process is carried out in rotating iron drums in which the beans are heated to a temperature of about 260° to 280 F., and results in develop- ing the aroma, partially converting the starch into dextrin, and eliminating bitter constituents. The beans also dry and their shells become crisp. In the next process the beans are gently crushed and winnowed, whereby the light shells are removed, and after removal by sifting of the ” germs ” the beans are left in the form of the irregular cocoa-nibs occasionally seen in shops. Cocoa-nibs may be infused with water and drunk, but for most people the beverage is too rich, containing the whole of the cacao- fat or cacao-butter. This fat is extracted from the carefully ground nibs by employing great hydraulic pressure in heated presses. The fat exudes and solidifies. When fresh it is yellowish- white, but becomes quite white on keeping. It is very valuable for pharmaceutical purposes and is a constituent of many pomades. With care it can be kept for a long time without going rancid.

After the extraction of the fat the resulting mass is ground to a fine powder when it is ready for use in the ordinary way. Many preparations on the market are of course not pure cocoa but contain admixtures of various starchy and other bodies.

The shells of the beans separated by the winnowing process contain theobromine, and their infusion with water is sometimes used as a substitute for coffee, under the name ” miserabile.” More recently they have been put to good account as a cattle food.

In the preparation of chocolate the preliminary processes of cleaning, sorting, roasting and removing the shells, and grinding the nibs, are followed as for cocoa. The fat, however, is not extracted, but sugar, and sometimes other materials also, are added to the ground pasty mass, together with suitable flavouring materials, as for example vanilla. The greatest care is taken in the process and elaborate grinding and mixing machinery employed. The final result is a semi-liquid mass which is moulded into the familiar tablets or other forms in which choco- late comes on the market.

Cocoa as a beverage has a similar action to tea and coffee, inasmuch as the physiological properties of all three are due to the alkaloids and volatile oils they contain. Tea and coffee both contain the alkaloid caffeine, whilst cocoa contains theo- bromine. In tea and coffee, however, we only drink an infusion of the leaves or seeds, whilst in cocoa the whole material is taken in a state of very fine suspension, and as the preceding analysis indicates, the cocoa bean, even with the fat extracted, is of high nutritive value.

Cacao-consuming Countries. — The principal cacao-consuming countries are indicated below, which gives the imports into the countries named for 1905. These figures, as also those on production, are taken from Der Gordian.

“Tons (1000 kilos).

United States of America 34.958

Germany 29,663

France 21,748

United Kingdom 21,106

Holland 19.295

Spain Switzerland . Belgium . Austria Hungary Russia Denmark

6,102 5,218

3.019 2,668 2,230 1,125

Carry forwaid

H7,i32

COCO DE MER— COCYTUS

631

Tons (1000 kilos.)

Brought forward . 147,132

Italy 971

Sweden ■ . 9°°

Canada 7 00

Australia 600

Norway, Portugal and Finland …. 692

Total . 150,995 During recent years the use of cocoa has increased rapidly in some countries. The following table gives the increase per cent in consumption in 1905 over that in 1901 for the five chief consumers: —

Per cent.

United States 7°

Germany 61

France 21

United Kingdom II

Holland 34

(A. B. R.; W. G. F.)

COCO DE MER, or Double Coco-nut, a palm, Lodoicea Sechellarum, which is a native of the Seychelles Islands. The flowers are borne in enormous fleshy spadices, the male and female on distinct plants. The fruits, which are among the largest known, take ten years to ripen; they have a fleshy and fibrous envelope surrounding a hard nut-like portion which is generally two-lobed, suggesting a large double coco-nut. The contents of the nut are edible as in the coco-nut. The empty fruits (after germination of the seed) are found floating in the Indian Ocean, and were known long before the palm was discovered, giving rise to various stories as to their origin.

COCOMA, or Cucamas, a tribe of South American Indians living on the Maranon and lower Huallaga rivers, Peru. In 1681, at the time of the Jesuit missionaries' first visit, they had the custom of eating their dead and grinding the bones to a powder, which was mixed with a fermented liquor and drunk. When ex- postulated with by the Jesuits they said " it was better to be inside a friend than to be swallowed up by the cold earth." They are a provident, hard-working people, partly Christianized, and bolder than most of the civilized Indians. Their languages show affinity to the Tupi-Guarani stock.

COCO-NUT 1 PALM (Cocos nucifera), a very beautiful and lofty palm-tree, growing to a height of from 60 to 100 ft., with a cylindrical stem which attains a thickness of 2 ft. The tree terminates in a crown of graceful waving pinnate leaves. The leaf, which may attain to 20 ft. in length, consists of a strong mid-rib, whence numerous long acute leaflets spring, giving the whole the appearance of a gigantic feather. The flowers are arranged in branching spikes 5 or 6 ft. long, enclosed in a tough spathe, and the fruits mature in bunches of from 10 to 20. The fruits when mature are oblong, and triangular in cross section, measuring from 12 to 18 in. in length and 6 to 8 in. in diameter. The fruit consists of a thick external husk or rind of a fibrous structure, within which is the ordinary coco-nut of commerce. The nut has a very hard, woody shell, enclosing the nucleus or kernel, the true seed, within which again is a milky liquid called coco-nut milk. The palm is so widely disseminated throughout tropical countries that it is impossible to distinguish its original habitat. It flourishes with equal vigour on the coast of the East Indies, throughout the tropical islands of the Pacific, and in the West Indies and tropical America. It, however, attains its greatest luxuriance and vigour on the sea shore, and it is most at home in the innumerable small islands of the Pacific seas, of the vegetation of which it is eminently characteristic. Its wide distribution, and its existence in even the smallest coral islets of the Pacific, are due to the character of the fruit, which is eminently adapted for distribution by sea. The fibrous husk renders the fruit light and the leathery skin prevents water- logging. The seed will germinate readily on the sea-shore, the seedling growing out through the soft germ-pore on the upper

1 The spelling ” cocoa-nut,” which introduces a confusion with cocoa (g.v.) or cacao, is a corruption of the original Portuguese form, dating from (and largely due to) Johnson’s Dictionary. The spelling ” coker-nut,” introduced to aˆoid the same ambiguity, is common in England.

end of the hard nut. The fruits dropping into the sea from trees growing on any shores would be carried by tides and currents to be cast up and to vegetate on distant coasts.

The coco-nut palm, being the most useful of its entire tribe to the natives of the regions in which it grows, and furnishing many valuable and important commercial products, is the subject of careful cultivation in many countries. On the Malabar and Coromandel coasts of India the trees grow in vast numbers; and in Ceylon, which is peculiarly well suited for their cultivation, it is estimated that twenty millions of the trees flourish. The wealth of a native in Ceylon is estimated by his property in coco-nut trees, and Sir J. Emerson

Tennent noted a law case in a district court in which the subject in dispute was a claim to the 2520th part of ten of the precious palms. The cultivation of coco-nut plantations in Ceylon was thus described by Sir J. E. Tennent. ” The first operation in coco-nut planting is the forma- tion of a nursery, for which purpose the ripe nuts are placed in squares containing about 400 each; these are covered an inch deep with sand and seaweed or soft mud from the beach, and watered daily till they germinate. The nuts put down in April are sufficiently grown to be planted out before the rains of September, and they are then set out in holes 3 ft. deep and 20 to 30 ft. apart. . . . Before putting in the young plant it is customary to bed the roots with soft mud and seaweed, and for the first two years they must be watered and protected from the glare of the sun under shades made of the plaited fronds of the coco-nut palm, or the fan-like leaves of the palmyra.” The palm begins to bear fruit from the fifth to the seventh year of its age, each stock carrying from 5 to 30 nuts, the tree maturing on an average 60 nuts yearly.

The uses to which the various parts of the coco-nut palm are applied in the regions of their growth are almost endless. The nuts supply no inconsiderable proportion of the food of the natives, and the milky juice enclosed within them forms a pleasant and refreshing drink. The juice drawn from the unexpanded flower spathes forms ” toddy,” which may be boiled down to sugar, or it is allowed to ferment and is distilled, when it yields a spirit which, in common with a like product from other sources, is known as ” arrack.” As in other palms, the young bud cut out of the top of the tree forms an esculent vegetable, ” palm cabbage.” The trunk yields a timber (known in European commerce as porcupine wood) which is used for building, furni- ture, firewood, &c; the leaves are plaited into cajan fans and baskets, and used for thatching the roofs of houses; the shell of the nut is employed as a water- vessel; and the external husk or rind yields the coir fibre, with which are fabricated ropes, cordage, brushes, &c. The coco-nut palm also furnishes very important articles of external commerce, of which the principal is coco-nut oil. It is obtained by pressure or boiling from the kernels, which are first broken up into small pieces and dried in the sun, when they are known as copperah or copra. It is estimated that 1000 full-sized nuts will yield upwards of 500 ft), of copra, from which 25 gallons of oil should be obtained. The oil is a white solid substance at ordinary temperatures, with a peculiar, rather dis- agreeable odour, from the volatile fatty acids it contains, and a mild taste. Under pressure it separates into a liquid and a solid portion, the latter, coco-stearin, being extensively used in the manufacture of candles. Coco-nut oil is also used in the manu- facture

of marine soap, which forms a lather with sea-water. Coir is also an important article of commerce, being in large demand for the manufacture of coarse brushes, door mats and woven coir-matting for lobbies and passages. A considerable quantity of fresh nuts is imported, chiefly from the West Indies, into Britain and other countries; they are familiar as the reward of the popular English amusement of ” throwing at the coco-nuts “; and the contents are either eaten raw or used as material for cakes, &c, or sweetmeats (” coker-nut “).

COCYTUS (mod. Vuvo), a tributary of the Acheron, a river of Thesprotia (mod. pashalik of Iannina), which flows into the Ionian Sea about 20 m. N. of the Gulf of Arta. The name is also applied in Greek mythology to a tributary of the Acheron or of the Styx, a river in Hades. The etymology suggested is from

KuKvtiv, to wail, in allusion to the cries of the dead. Virgil describes it as the river which surrounds the underworld (Aen. vi. 132).

COD, the name given to the typical fish of the family Gadidae, of the Teleostean suborder Anacanthini, the position of which has much varied in our classifications. Having no spines to their fins, the Gadids used, in Cuvierian days, to be associated with the herrings, Salmonids, pike, &c, in the artificially-conceived order of Malacopterygians, or soft-finned bony fishes. But, on the ground of their air-bladder being closed, or deprived of a pneu- matic duct communicating with the digestive canal, such as is characteristic of the Malacopterygians, they were removed from them and placed with the fiat-fishes, or Pleuronectidae, in a suborder Anacanthini, regarded as intermediate in position between the Acanthopterygians, or spiny-finned fishes, and the Malacopterygians. It has, however, been shown that the flat- fishes bear no relationship to the Gadids, but are most nearly akin to the John Dories (see Dory).

The suborder Anacanthini is, nevertheless, maintained for the Muraenolepididae Gadids and two related families, Macruridae and Muraenolepididae, and may be thus defined: — Air-bladder without open duct. Parietal bones separated by the supra- occipital; prootic and exoccipital separated by the enlarged opisthotic. Pectoral arch suspended from the skull: no meso- coracoid arch. Ventral fins below or in front of the pectorals, the pelvic bones posterior to the clavicular

symphysis and only loosely attached to it by ligament. Fins without spines; caudal fin, if present, without expanded hypural, perfectly symmetrical, and supported by the neural and haemal spines of the posterior vertebrae, and by basal bones similar to those supporting the dorsal and anal rays. This type of caudal fin must be regarded as secondary, the Gadidae being, no doubt, derived from fishes in which the homocercal fin of the typical Teleostean had been lost.

About 120 species of Gadids are distinguished, mostly marine, many being adapted to life at great depths; all are carnivorous. They inhabit chiefly the northern seas, but many abyssal forms occur between the tropics and in the southern parts of the Atlantic and Pacific. They are represented in British waters by eight genera, and about twenty species, only one of which, the burbot {Lota vulgaris), is an inhabitant of fresh waters. Several of the marine species are of first-rate economic importance. The genus Gadus is characterized by having three dorsal and two anal fins, and a truncated or notched caudal fin. In the cod and haddock the base of the first anal fin is not, or but slightly, longer than that of the second dorsal fin; in the whiting, pout, coal-fish, pollack, hake, ling and burbot, the former is considerably longer than the latter.

The cod, Gadus morrhua, possesses, in common with the other members of the genus, three dorsal and two anal fins, and a single barbel, at least half as long as the eye, at the chin. It is a widely-distributed species, being found throughout the northern and temperate seas of Europe, Asia and America, extending as far south as Gibraltar, but not entering the Mediterranean, and inhabits water from 25 to 50 fathoms deep, where it always feeds close to the bottom. It is exceedingly voracious, feeding on the smaller denizens of the ocean — fish, crustaceans, worms and molluscs, and greedily taking almost any bait the fisherman chooses to employ. The cod spawns in February, and is exceed- ingly prolific, the roe of a single female having been known to contain upwards of eight millions of ova, and to form more than half the weight of the entire fish. Only a small proportion of these get fertilized, and still fewer ever emerge from the egg. The number of cod is still further reduced by the trade carried on in roe, large quantities of which are used in France as ground- bait in the sardine fishery, while it also forms an article of human food. The young are about an inch in length by the end of spring, but are not fit for the market till the second year, and it has been stated that they do not reach maturity, as shown by the power of reproduction, till the end of their third year. They usually measure about 3 ft. in length, and weigh from 12 to 20 lb, but specimens have been taken from 50 to 70 lb in weight.

As an article of food the cod-fish is in greatest perfection during

the three months preceding Christmas. It is caught on all parts of the British and Irish coasts, but the Dogger Bank, and Rockall, off the Outer Hebrides, have been specially noted for their cod- fisheries. The fishery is also carried on along the coast of Norfolk and Suffolk, where great quantities of the fish are caught with hook and line, and conveyed to market alive in ” well-boats ” specially built for this traffic. Such boats have been in use since the beginning of the 18th century. The most important cod- fishery in the world is that which has been prosecuted for centuries on the Newfoundland banks, where it is not uncommon for, a single fisherman to take over 500 of these fish in ten or eleven hours. These, salted and dried, are exported to all parts of the world, and form, when taken in connexion with the enormous quantity of fresh cod consumed, a valuable addition to the food resources of the human race.

The air-bladder of this fish furnishes isinglass, little, if at all, inferior to that obtained from the sturgeon, while from the liver is obtained cod-liver oil, largely used in medicine as a remedy in scrofulous complaints and pulmonary consumption (see Cod- liver Oil). ” The Norwegians,” says Cuvier, ” give cod-heads with marine plants to their cows for the purpose of producing a greater proportion of milk. The vertebrae, the ribs, and the bones in general, are given to their cattle by the Icelanders, and by the Kamtchatdales to their dogs. These same parts, properly dried, are also employed as fuel in the desolate steppes of the Icy Sea.”

At Port Logan in Wigtonshire cod-fish are kept in a large reservoir, scooped out of the solid rock by the action of the sea, egress from which is prevented by a barrier of stones, which does not prevent the free access of the water. These cod are fed chiefly on mussels, and when the keeper approaches to feed them they may be seen rising to the surface in hundreds and eagerly seeking the edge. They have become comparatively tame and familiar. Frank Buckland, who visited the place, states that after a little while they allowed him to take hold of them, scratch them on the back, and play with them in various ways. Their flavour is considered superior to that of the cod taken in the open sea. (G. A. B.)

CODA (Ital. for “tail”; from the Lat. cauda), in music, a term for a passage which brings a movement or a separate piece to a conclusion. This developed from the simple chords of a cadence into an elaborate and independent form. In a series of variations on a theme or in a composition with a fixed order of subjects, the ” coda ” is a passage

sufficiently contrasted with the conclusions of the separate variations or subjects, added to form a complete conclusion to the whole. Beethoven raised the ” coda ” to a feature of the highest importance.

CODE (Lat. codex), the term for a complete and systematic body of law, or a complete and exclusive statement of some portion of the law; and so by analogy for any system of rules or doctrine; also for an arrangement in telegraphy, signalling, &c, by which communications may be made according to rules adopted for brevity or secrecy.-

In jurisprudence the question of the reduction of laws to written codes, representing a complete and readily accessible system, is a matter of great historical and practical interest. Many collections of laws, however, which are commonly known as codes, 1 would not correspond to the definition given above. The Code of Justinian (see Justinian I.; Roman Law), the most celebrated of all, is not in itself a complete and exclusive system of law. It is a collection of imperial constitutions, just as the Pandects are a collection of the opinions of jurisconsults. The Code and the Pandects together being, as Austin says, ” digests of Roman law in force at the time of their conception,” would, if properly arranged, constitute a code. Codification in this sense is merely a question of the form of the laws, and has nothing to do with their goodness or badness from an ethical or political point of view. Sometimes codification only means the changing of unwritten into written law; in the stricter sense it means the changing of unwritten or badly-written law into law well written.

1 The most ancient code known, that of Khammurabi, is dealt with in the article Babylonian Law,

The same causes which made collections of laws necessary in the time of Justinian have led to similar undertakings among modern peoples. The actual condition of laws until the period when they are consciously remodelled is one of confusion, contradiction, repetition and disorder; and to these evils the progress of society adds the burden of perpetually increasing legislation. Some attempt must be made to simplify the task of learning the laws by improving their expression and arrange- ment. This is by no means an easy task in any country, but in England it is surrounded with peculiar difficulties. The inde- pendent character of English law has prevented an attempt to do what has already been done for other systems which have the basis of

the Roman law to fall back upon.

The most celebrated modern code is the French. The necessity of a code in France was mainly caused by the immense number of separate systems of jurisprudence existing in that country before 1789, justifying Voltaire's sarcasm that a traveller in France had to change laws about as often as he changed horses. At first published under the title of Code Civil des Franqais, it was afterwards entitled the Code Napoleon (q.v.) — the emperor Napoleon wishing to attach his name to a work which he regarded as the greatest glory of his reign. The code, it has been said, is the product of Roman and customary law, together with the ordinances of the kings and the laws of the Revolution. In form it has passed through several changes caused by the political vicissitudes of the country, and it has of course suffered from time to time important alterations in substance, but it still remains virtually the same in principle as it left the hands of its framers. The code has produced a vast number of com- mentaries, among which may be named those of A. Duranton, R. T. Troplong and J. C. F. Demolombe. The remaining French codes are the Code de procSdure civile, the Code de commerce, the Code d' instruction criminelle and the Code pSnal. The merits of the French code have entered into the discussion on the general question of codification. Austin agrees with Savigny in con- demning the ignorance and haste with which it was compiled. " It contains," says Austin, " no definitions of technical terms (even the most leading), no exposition of the rationale of dis- tinctions (even the most leading), no exposition of the broad principles and rules to which the narrower provisions expressed in the code are subordinate; hence its fallacious brevity." Codes modelled on the French code have, however, taken firm root in most of the countries of continental Europe and in other parts of the world as well, such as Latin America and several of the British colonies.

The Prussian code (Code Frederic) was published by Frederick the Great in 1 7 5 1 . It was intended to take the place of " Roman, common Saxon and other foreign subsidiary laws and statutes," the provincial laws remaining in force as before. One of the objects of the king was to destroy the power of the advocates, whom he hoped to render useless. This, with other systems of law existing in Germany, has been replaced by the Civil Code of 1900 (see Germany).

The object of all these codes has been to frame a common system to take the place of several systems of law, rather than to restate in an exact and exhaustive form the whole laws of a nation, which is the problem of English codification. The French and Prussian codes,

although they have been of great service in simplifying the law, have failed to prevent outside themselves that accumulation of judiciary and statute law which in England has been the chief motive for codification. A more exact parallel to the English problem may be found in the Code of the State of New York. The revised constitution of the state, as adopted in 1846, ” ordered the appointment of two commissions, one to reduce into a written and a systematic code the whole body of the law of the state, and the other to revise, reform, simplify and abridge the rules and practice, pleadings, &c, of the courts of record.” By an act of 1847, the state legislature declared that the body of substantive law should be contained in three codes — the Political, the Civil and the Penal. The works of both commissions, completed in 1865, filled six volumes, containing the Code of Civil Procedure

(including the law of evidence), the Book of Forms, the Code of Criminal Procedure, the Political Code, the Penal Code and the Civil Code. In the introduction to the Civil Code it was claimed that in many departments of the law the codes ” provided for every possible case, so that when a new case arises it is better that it should be provided for by new legislation.” The New York code was defective in the important points of definition and arrangement. It formed the basis, however, of the present codes of civil and criminal procedure in the state of New York. Much interest has attached to the Penal Code drawn up by Edward Livingston (q.v.) for the state of Louisiana. The system consists of a Code of Crime and Punishments, a Code of Procedure, a Code of Evidence, a Code of Reform and Prison Discipline, and a Book of Definitions. ” Though the state for which the codes were prepared,” said Chief Justice Chase, ” neglected to ‘avail itself of the labours assigned and solicited by itself, they have proved, together with their introductions, a treasure of suggestions to which many states are indebted for useful legislation.” Most of the other states in the United States have codes stating the law of pleading in civil actions, and such states are often described as code states to distinguish them from those adhering to the older forms of action, divided between those at law and those at equity. A few states have general codes of political and civil rights. The general drift of legislation and of public sentiment in the United States is towards the extension of the principle of codification, but the contrary view has been ably maintained (see J. C. Carter, Provinces of the Written and the Unwritten Law, New York, 1889). Since the time of Bentham, the codification of the law of England has been the dream of the most enlightened jurists and statesmen. In the interval between Bentham and our own time there has been an immense advance in the scientific

study of law, but it may be doubted whether the problem of codification is at all nearer solution. Interest has mainly been directed to the historical side of legal science, to the phenomena of the evolution of laws as part of the development of society, and from this point of view the question of remodelling the law is one of minor interest. To Bentham the problem presented itself in the simplest and most direct form possible. What he proposed to do was to set forth a body of laws, clearly expressed, arranged in the order of their logical connexion, exhibiting their own rationale and excluding all other law. On the other hand the problem has in some respects become easier since the time of Bentham. With the Benthamite codification the conception of reform in the substantive law is more or less mixed up. If codification had been possible in his day, it would, unless it had been accompanied by the searching reforms which have been effected since, and mainly through his influence, perhaps have been more of an evil than a good. The mere dread that, under the guise of codification or improvement in form, some change in substance may secretly be effected has long been a practical obstacle in the way of legal reform. But the law has now been brought into a state of which it may be said that, if it is not the best in all respects that might be desired, it is at least in most respects as good as the conditions of legislation will permit it to be. Codification, in fact, may now be treated purely as a question of form. What is proposed is that the law, being, as we assume, in substance what the nation wishes it to be, should be made as accessible as possible, and as intelligible as possible. These two essential conditions of a sound system of law are, we need hardly say, far from being fulfilled in England. The law of the land is embodied in thousands of statutes and tens of thousands of reports. It is expressed in language which has never been fixed by a controlling authority, and which has swayed about v/ith every change of time, place and circumstance. It has no definitions, no rational distinctions, no connexion of parts. Until the passing of the Judicature Act of 1873 it was pervaded throughout its entire sphere by the flagrant antinomy of law and equity, and that act has only ordered, not executed, its consolidation. No lawyer pretends to know more than a fragment of it. Few practical questions can be answered by a lawyer without a search into numberless acts of parliament and

reported cases. To laymen, of course, the whole law is a sealed book. As there are no authoritative general principles, it happens that the few legal maxims known to the public, being apprehended out of

relation to their authorities, are as often likely to be wrong as to be right. It is hopeless to think of making it possible for every man to be his own lawyer, but we can at least try to make it possible for a lawyer to know the whole law. The earlier advocates of codification founded their case mainly on the evils of judiciary law, i.e. the law contained in the reported decisions of the judges. Bentham's bitter antipathy to judicial legislation is well known. Austin's thirty ninth lecture (Lectures, ed. 1869) contains an exhaustive criticism of the tenable objections to judiciary law. All such law is embedded in decisions on particular cases, from which it must be extracted by a tedious and difficult process of induction. Being created for particular cases it is necessarily uncompre- hensive, imperfect, uncertain and bulky. These are evils which are ine'd.mt to the nature of judiciary laws. The defective form of the existing statute law, moreover, has also given rise to loud complaints. Year by year the mass of legislation grows larger, and as long as the basis of a system is judiciary law, it is impossible that the new statutes can be completely integrated therewith. The mode of framing acts of parliament, and especially the practice of legislating by reference to previous acts, likewise produce much uncertainty and disorder. Some progress has, however, been made by the passing from time to time of various acts codifying branches of law, such as the Bills of Exchange Act 1882, the Partnership Act 1890, the Trusts Act 1893, and the Interpretation Act 1889.

The Statute Law Revision Committee also perform a useful work in excising dead law from the statute-book, partly by repeal of obsolete and spent acts and parts of acts, and partly by pruning redundant preambles and words. The construction of a section of an act may depend on the preamble and the context, and the repeal of the preamble and certain parts of the act may therefore affect the construction of what is left. This is provided for by a clause which is said to have been settled by Lord West- bury. It provides (in effect) that the repeal of any words or expressions of enactment shall not affect the construction of any statute or part of a statute. The lawyer, therefore, cannot rely on the revised edition of the statutes alone, and it is still necessary for him to consult the complete act as it was originally enacted.

The process of gradual codification adopted in India has been recommended for imitation in England by those who have had some experience of its working. The first of the Indian codes was the Penal Code (see Criminal Law), and there are also codes of civil and criminal procedure.

Whether any attempt will ever be made to supersede this vast and unarranged mass by a complete code seems very doubtful. Writers on codification have for the most part insisted that the work should be undertaken as a whole, and that the parts should have relation to some general scheme of the law which should be settled first. The practical difficulties in the way of an undertaking so stupendous as the codification uno coetu of the whole mass of the law hardly require to be stated.

In discussions on codification two difficulties are insisted on by its opponents, which have some practical interest — (1) What is to be done in those cases for which the code has not provided? and (2) How is new law to be incorporated with the code? The objection that a code will hamper the opinions of the court, destroy the flexibility and elasticity of the common law, &c, disappears when it is stated in the form of a proposition, that law codified will cover a smaller number of cases, or will be less easily adapted to new cases, than law uncodified. The French system ordered the judges, under a penalty, to give a decision on all cases, whether contemplated or not by the code, and referred them generally to the following sources: — (1) Equite naturelle, loi naturelle; (2) loi romain; (3) loi coutumier; (4) usages, exemples, jugements, jurisprudence; (5) droit commun; (6) principes generaux, maximes, doctrine, science. The Prussian code, on the other hand, required the judges to report new cases to the head of the judicial department, and they were decided by

the legislative commission. No pro vision was made in either case for incorporating the new law with the code, an omission which Austin justly considers fatal to the usefulness of codification. It is absurd to suppose that any code can remain long without requiring substantial alteration. Cases will arise when its mean- ing must be extended and modified by judges, and every year will produce its quota of new legislation by the state. The courts should be left to interpret a code as they now interpret statutes, and provision should be made for the continual revision of the code, so that the new law created by judges or directly by the state may from time to time be worked into the code.

CODE NAPOLEON, the first code of the French civil law, known at first as the Code civil des FranQais, was promulgated in its entirety by a law of the 30th Ventose in the year XII. (31st of March 1804). On the 3rd of September 1807 it received the official name of Code Napoleon, although the part that Napoleon took in framing it was not very important. A law of 1818 restored to it its former name, but a decree of the 27th of March 1852 re-established the title of Code

Napoleon. Since the 4th of September 1870 the laws have quoted it only under the name of the Code Civil.

Never has a work of legislation been more national in the exact sense of the word. Desired for centuries by the France of the ancien rigime, and demanded by the cahiers of 1789, this ” code of civil laws common to the whole realm ” was promised by the constitution of 1701. However, the two first assemblies of the Revolution were able to prepare only a few fragments of it. The preparation of a coherent plan began with the Con- vention. The ancien rigime had collected and adjusted some of the material. There was, on the one hand, a vast juridical literature which by eliminating differences of detail, had dis- engaged from the various French ” customs ” the essential part which they had in common, under the name of ” common customary law “; on the other hand, the Roman law current in France had in like manner undergone a process of simplification in numerous works, the chief of which was that of Domat; while certain parts had already been codified in the Grandes Ordonnances, which were the work of d’ Aguesseau. This legacy from the past, which it was desired to preserve within reason, had to be combined and blended with the laws of the Revolution, which had wrought radical reforms in the conditions affecting the individual, the tenure of real property, the order of inherit- ance ˆnd the system of mortgages. Cambaceres, as the repre- sentative of a commission of the Convention, brought forward two successive schemes for the Code Civil. As a member of one of the councils, he drew up a third under the Directory, and these projected forms came in turn nearer and nearer to what was to be the ultimate form of the code. So great was the interest centred in this work, that the law of the 19th Brumaire, year VIII., which, in ratification of the previous day’s coup d’etat nominated provisional consuls and two legislative com- missions, gave injunctions to the latter to draw up a scheme for the Code Civil. This was done in part by one of the members, Jacqueminot, and finally under the constitution of the year VIII., the completion of the work was taken in hand. The legislative machinery established by this constitution, defective as it was in other respects, was eminently suited for this task. Indeed, all projected laws emanated from the government and were prepared by the newly established council of state, which was so well recruited that it easily furnished qualified men, mostly veterans of the revolution, to prepare the final scheme. The council of state naturally possessed in its legislative section and its general assembly bodies both competent and sufficiently limited to discuss the texts efficiently. The corps ligislalif had not the right of amendment, so could not disturb the harmony of the scheme. It was in the discussions of the general assembly of the

council of state that Napoleon took part, in 97 cases out of 102 in the capacity of chairman, but, interesting as his observa- tions occasionally are, he cannot be considered as a serious collaborator in this great work.

Those responsible for the scheme have in the main been very successful in their work; they have generally succeeded in fusing

the two elements which they had to deal with, namely ancient French law, and that of the Revolution. The point in which their work is comparatively weak is the system of hypothec (q.v.), because they did not succeed in steering a middle course between two opposite systems, and the law of the 23rd of March 1855 (sur la transcription en matiere hypothScaire) was necessary to make good the deficiency. A fault frequently found with the Code Civil is that its general divisions show a lack of logic and method, but the division is practically that of the Institutes of Justinian, and is about as good as any other: persons, things, inheritance, contracts and obligations, and finally, in place of actions, which have no importance for French law except from the point of view of procedure, privileges and hypothecs, as in the ancient coutumes of France, and prescription. It is, mutatis mutandis, practically the same division as that of Blackstone's Commentaries.

Of late years other objections have been expressed; serious omissions have been pointed out in the Code;, it has not given to personal property the importance which it has acquired in the course of the 19th century; it makes no provision for dealing with the legal relations between employers, and employed which modern complex undertakings involve; it does not treat of life insurance, &c. But this only proves that it could not fore- tell the future, for most of these questions are concerned with economic phenomena and social relations which did not exist at the time when it was framed. The Code needed revising and completing, and this was carried out by degrees by means of numerous important laws. In 1904, after the celebration of the centenary of the Code Civil, an extra-parliamentary commission was nominated to prepare a revision of it, and at once began the work.

The influence of the Code Civil has been very great, not only in France but also abroad. Belgium has preserved it, and the Rhine provinces only ceased to be subject to it on the promulga- tion of the civil code

of the German empire. Its ascendancy has been due chiefly to the clearness of its provisions, and to the spirit of equity and equality which inspires them. Numerous more recent codes have also taken it as a model: the Dutch code, the Italian, and the code of Portugal; and, more remotely, the Spanish code, and those of the Central and South American republics. In the present day it is rivalled by the German civil code, which, having been drawn up at the end of the 19th century, naturally does not show the same lacunae or omissions. It is inspired, however, by a very different spirit, and the French code does not suffer altogether by comparison with it either in substance or in form.

See Le Code Civil, livre du centenaire (Paris, 1904), a collection of essays by French and foreign lawyers. (J. P. E.)

CODIAEUM, a small genus of plants belonging to the natural order Euphorbiaceae. One species, C. variegatum, a native of Polynesia, is cultivated in greenhouses, under the name of croton, for the sake of its leaves, which are generally variegated with yellow, and are often twisted or have the blades separated into distinct portions.

CODICIL (Lat. codicillus, a little book or tablet, diminutive of codex), a supplement to a will (q.v.)-, containing anything which a testator desires to add, or which he wishes to retract, to explain or to alter. In English law a codicil requires to be executed with the same formalities as a will under the Wills Act 1837.

CODILLA, the name given to the broken fibres which are separated from the flax during the scutching process. On this account it is sometimes termed scutching tow. Quantities of this material are used along with heckled tow in the production of tow yarns.

CODINUS, GEORGE [Georgios Kodinos], the reputed author of three extant works in Byzantine literature. Their attribution to him is merely a matter of convenience, two of them being anonymous in the MSS. Of Codinus himself nothing is known; it is supposed that he lived towards the end of the 15th century. The works referred to are the following : —

1. Patria (Ta TLarpia rr\% Koivo-TavnvovroKeciis) , treating of the history, topography, and monuments of Constantinople.

It is divided into five sections: (a) the foundation of the city; (b) its situation, limits and topography; (c) its statues, works of art, and other notable sights; (d) its buildings; (e) the con- struction of the

church of St Sophia. It wa”s written in the reign of Basil II. (976-1025), revised and rearranged under Alexius I. Comnenus (1081-1118), and perhaps copied by Codinus, whose name it bears in some (later) MSS. The chief sources are: the Patria of Hesychius Illustrius of Miletus, an anonymous (c. 750) brief chronological record (napaorcuras ovvrofioi xP° J ‘ oca 0) and an anonymous account (Siifoojcris) of St Sophia (ed. T. Preger in Scriptores originum Constantinopolitanarum, fasc. i., 1 901, to be followed by the Patria of Codinus). Procopius, De Aedificiis and the poem of Paulus Silentiarius on the dedica- tion of St Sophia should be read in connexion with this subject.

2. De Officiis (ILepl t£ > v ‘04 > uduv), a sketch, written in an unattractive style, of court and higher ecclesiastical dignities and of the ceremonies proper to different occasions. It should be compared with the De Cerimoniis of Constantine Porphyro- genitus.

3. A chronological outline of events from the beginning of the world to the taking of Constantinople by the Turks (called Agarenes in the MS. title). It is of little value.

Complete editions are (by I. Bekker) in the Bonn Corpus scrip- torum Hist. Byz. (1839-1843, where, however, some sections of the Patria are omitted), and in J. P. Migne, Patrologia graeca, clvii. ; see also C. Krumbacher, Geschichte der byzantinischen Litteratur (1897).

COD-LIVER OIL (Oleum Morrhuae, or Oleum Jecoris Aselli), the oil obtained from the liver of the common cod (Gadus morrhua). In the early process for extracting the oil the livers were allowed to putrefy in wooden tubs, when oils of two qualities, one called ” pale oil,” and the other ” light brown oil,” succes- sively rose to the surface and were drawn off.’ A third oil was obtained by heating the liver-residues to above the boiling-point of water, whereupon a black product, technically called ” brown oil,” separated. The modern practice consists in heating the perfectly fresh, cleaned livers by steam to a temperature above that of boiling water, or, in more recent practice, to a lower temperature, the livers being kept as far as possible from contact with air. The oils so obtained are termed ” steamed-liver oils.” The ” pale ” and ” light brown ” oils are used in pharmacy; the ” brown ” oil, the cod oil of commerce, being obtained from putrid and decomposing livers, has an objectionable taste and odour and is largely employed by tanners. By boiling the livers at a somewhat high temperature, ” unracked ” cod oil is obtained, containing a considerable quantity of “stearine”; this fat, which separates on cooling, is sold as ” fish stearine ” for soap- making, or as ” fish-tallow

” for currying. The oil when freed from the stearine is known as ” racked oil.” ” Coast cod oil ” is the commercial name for the oil obtained from the livers of various kinds of fish, e.g. hake, ling, haddock, &c. The most important centres of the cod-liver oil industry are Lofoten and Romsdal in Norway; the oil is also prepared in the United States, Canada, Newfoundland, Iceland and Russia; and at one time a considerable quantity was prepared in the Shetland Islands and along the east coast of Scotland.

Cod-liver oil contains palmitin, stearin and other more complex glycerides; the ” stearine ” mentioned above, however, contains very little palmitin and stearin. Several other acids have been identified: P. M. Meyerdahl obtained 4% of palmitic acid, 20% of jecoleic acid, $C_{19}H_{36}O_2$, and 20% of therapic acid, $C_{17}H_{26}O_2$; other investigators have recognized jecoric acid, $C_{18}H_{30}O_2$, asellic acid, $Q_7H_{32}O_2$, and physetoleic acid, $C_{16}H_{30}O_2$, but some uncertainty attends these last three acids. Therapic and jecoleic acids apparently do not occur elsewhere in the animal kingdom, and it is probable that the therapeutic properties of the oil are associated with the presence of these acids, and not with the small amount of iodine present as was at one time supposed. Other constituents are cholesterol (0-46- I- 3 2 %)> traces of calcium, magnesium, sodium, chlorine and bromine, and various aliphatic amines which are really secondary products, being formed by the decomposition of the cellular tissue.

Cod-liver oil is used externally in medicine when its internal

administration is rendered impossible by idiosyncrasy or the state of the patient’s digestion. The oil is very readily absorbed from the skin and exerts all its therapeutic actions when thus exhibited. This metfiod is often resorted to in the case of infants or young children suffering from abdominal or other forms of tuberculosis. Its only objection is the odour which the patient exhales. When taken by the mouth, cod-liver oil shares with other liver-oils the property of ready absorption. It often causes unpleasant symptoms, which must always be dealt with and not disregarded, more harm than good being done if this course is not followed. Fortunately a tolerance is soon established in the majority of cases. It has been experimentally proved that this is more readily absorbed than any other oil — including other liver-oils. Much attention has been paid to the explanation of this fact, since knowledge on this point might enable an artificial product, without

the disadvantages of this oil, to be substituted for it. Very good results have been obtained from a preparation named ” lipanin,” which consists of six parts of oleic acid and ninety-four of pure olein. Cod-liver oil has the further peculiarity of being more readily oxidizable than any other oil; an obviously valuable property when it is remembered that the entire food- value of oils depends on their oxidation.

Cod-liver oil may be given in all wasting diseases, and is occasionally valuable in cases of chronic rheumatoid arthritis; but its great therapeutic value is in cases of tuberculosis of whatever kind, and notably in pulmonary tuberculosis or consumption. Its reputation in this is quite inexpugnable. It is essential to remember that ” in phthisis the key of the situation is the state of the alimentary tract,” and the utmost care must be taken to obviate the nausea, loss of appetite and diarrhoea, only too easily induced by this oil. It is best to begin with only one dose in the twenty-four hours, to be taken just before going to sleep, so that the patient is saved its unpleasant ” repetition ” from an unaccustomed stomach. In general, it is therefore wise to order a double dose at bedtime. The oil may be given in capsules, or in the form of an emulsion, with or without malt- extract, or success may be obtained by adding, to every two drachms of the oil, ten minims of pure ether and a drop of peppermint oil. The usual dose, at starting, is one or two drachms, but the oil should be given eventually in the largest quantities that the patient can tolerate.

CODRINGTON, CHRISTOPHER (1668-1710), British soldier and colonial governor, whose father was captain-general of the Leeward Isles, was born in the island of Barbados, West Indies, in 1668. Educated at Christ Church, Oxford, he was elected a fellow of All Souls, and subsequently served with the British forces in Flanders, being rewarded in 1695 with a captaincy in the Guards. In the same year he attended King William III. on his visit to Oxford, and, in the absence of the public orator, was chosen to deliver the University oration. In 1697, on the death of his father, he was appointed captain-general and com- mander-in-chief of the Leeward Isles. In 1703 he commanded the unsuccessful British expedition against Guadeloupe. After this he resigned his governorship, and spent the rest of his life in retirement and study on his Barbados estates. He died on the 7th of April 1710, bequeathing these estates to the Society for the Propagation of the Gospel in Foreign Parts for the foundation of a college in Barbados. This college, known as the Codrington college, was built in 1714-1742. To All Souls College, Oxford, he bequeathed books worth £6000 and £10,000 in money, out of which was built and endowed the Codrington library there.

CODRINGTON, SIR EDWARD (1770-1851), British admiral, belonged to a family long settled at Dodington in Gloucester- shire. He was the youngest of three brothers, who were left orphans at an early age, and were educated by an uncle, Mr Bethell. Edward Codrington was sent for a short time to Harrow, and entered the navy in July 1783. He served on the American station, in the Mediterranean and at home, till he was promoted lieutenant on the 28th of May 1783. Lord Howe selected him to be signal lieutenant on the flagship of the Channel fleet at the beginning of the revolutionary war with France. In that capacity he served in the " Queen Charlotte " (100) during the

operations which culminated in the battle of the 1st of June 1794. The notes he wrote on Barrow's account of the battle in his Life of Howe, and the reminiscences he dictated to his daughter, which are to be found in her memoir of him, are of great value for the history of the action. On the 7th of October 1794 he was promoted commander, and on the 6th of April 1795 attained the rank of post-captain and the command of the " Babet " (22). He continued to serve in the Channel, and was present at the action off L'Orient on the 23rd of June 1795- Codrington wrote notes on this encounter also, which are to be found in the memoir. They are able and valuable, but, like all his correspondence throughout his life, show that he was of a somewhat censorious disposition, was apt to take the worst view of the conduct of others, and was liable to be querulous. He next commanded the " Druid " (32) in the Channel and on the coast of Portugal, till she was paid off in 1 797. Codrington now remained on shore and on half -pay for some years. In December 1802 he married Jane, daughter of Jasper Hall of Kingston, Jamaica.

On the renewal of the war after the breach of the peace of Amiens he was appointed (May 1805) to the command of the " Orion " (74) and was attached to the fleet on the coast of Spain, then blockading Villeneuve in Cadiz. The " Orion " took a conspicuous part in the battle of Trafalgar. Codrington's correspondence contains much illuminative evidence as to the preliminaries and the events of the victory. From 1805 till 18 13 he continued to serve first in the " Orion " and then (1808) in the " Blake " (74) in European waters. He was present on the Walcheren expedition, and was very actively employed on the Mediterranean coast of Spain in co-operating with the Spaniards against the French. In 1814 he was promoted rear- admiral, at which time he was serving on the coast of North America as captain of the fleet to Sir Alexander Cochrane during the operations against Washington, Baltimore and New Orleans. In 1815 he was made K.C.B., and was promoted vice-admiral on the 10th of July 182 1. In December 1826 he was appointed to the Mediterranean command,

and sailed on the 1st of February 1827. From that date until his recall on the 21st of June 1828 he was engaged in the arduous duties imposed on him by the Greek War of Independence, which had led to anarchy and much piracy in the Levant. On the 20th of October 1827 he destroyed the Turkish and Egyptian naval forces at Navarino (q.v.), while in command of a combined British, French and Russian fleet. As the battle had been unforeseen in England, and its result was unwelcome to the ministry of the day, Codrington was entangled in a correspondence to prove that he had not gone beyond his instructions, and he was recalled by a despatch, dated the 4th of June.

After the battle Codrington went to Malta to refit his ships. He remained there till May 1828, when he sailed to join his French and Russian colleagues on the coast of the Morea. They en- deavoured to enforce the evacuation of the peninsula by Ibrahim peacefully. The Pasha made diplomatic difficulties, and on the 25th of July the three admirals agreed that Codrington should go to Alexandria to obtain Ibrahim's recall by his father Mehemet Ali. Codrington had heard on' the 22nd of June of his own supersession, but, as his successor had not arrived, he carried out the arrangement made on the 25th of July, and his presence at Alexandria led to the treaty of the 6th of August 1828, by which the evacuation of the Morea was settled. His services were recognized by the grant of the grand cross of the Bath, but there is no doubt that he was treated as a scape-gOat at least to some extent. After his return home he was occupied for a time in defending himself, and then in leisure abroad. He commanded a training squadron in the Channel in 1831 and became admiral on the 10th of January 1837. From November 1839 to December 1842 he was commander-in-chief at Portsmouth. He died on the 28th of April 1851.

Sir Edward Codrington left two sons, Sir William (1804-1884), a soldier who commanded in the Crimea, and Sir John Henry (1808-1877), a naval officer, who died an admiral of the fleet.

See Memoir of the Life of Admiral Sir Edward Codrington, by his daughter Jane, Lady Bourchier, wife of Sir T. Bourchier, R. N. (London, 1873). (D. H.)

CODRUS, in Greek legend, the last king of Athens. According to the story, it was prophesied at the time of the Dorian invasion of Peloponnesus (c. 1068 B.C.) that only the death of their king at the

enemy's hands could ensure victory to the Athenians. De- voting himself to his country, Codrus, in the disguise of a peasant, made his way into the enemy's camp, and provoked a quarrel with some Dorian soldiers. He fell, and the Dorians, on discovering that Codrus had been slain, retreated homeward, despairing of success. No one being thought worthy to succeed Codrus, the title of king was abolished, and that of archon (q.v.) substituted for it.

See Lycurgus, Leocr. xx. [= 84-87]; Justin ii. 6; Veil. Pat. 1. 2: Grote, Hist, of Greece, pt. i. ch. 18; Busolt, Gnechtsche Geschichte, 1.

CODY, WILLIAM FREDERICK (1846-), American scout and showman, known under the name of " Buffalo Bill," was born in 1846 in Scott county, Iowa. He first became known as one of the riders of the " Pony Express," a mail service established in the spring of i860 by the Central Overland California and Pike's Peak Express Company to carry the mails overland from Saint Joseph, Missouri, to Sacramento, California, a distance of 1950 m., by means of relays of ponies, each rider being expected to cover about 7S m. daily. Owing to the wildness of the country and the hostility of the Indians, both the riders and the station-keepers led lives of great hardship and danger. The " Pony Express " was discontinued in 1861 upon the completion of the Pacific Telegraph company's line, and young Cody became a scout and guide for the United States army. In 1863 he formally enlisted in the 7th regiment of Kansas cavalry, in which he served until the close of the Civil War. In 1867 he made a contract with the Kansas Pacific railway to furnish its employees with buffalo meat while the line was being extended through the wilderness, and his name of " Buffalo Bill " was given him from this circum- stance. In 1 868-1 872 he was again an army scout and guide, serving against the Sioux and Cheyennes; and in 1872 was a member of the Nebraska house of representatives. During the Sioux-Cheyenne War of 1876 he served in the 5th United States Cavalry, and at the battle of Indian Creek killed the Cheyenne chief Yellow Hand in single combat. In 1883 he organized his " Wild West Show," a spectacular performance on a large scale, his first European tour taking place in 1887. In the Nebraska national guard he again served against the Sioux in 1890-1801.

CO-EDUCATION, the term applied to the instruction and training of boys and girls, or of young people of both sexes, in the same school or institution, in the same classes and through the same courses of study. Examples of the thoroughgoing application of this principle can be found in every grade of education from the elementary school to the university. But the term " Co-education " is sometimes used in a wider sense, in order to include cases in which boys and girls, or young men

and young women of university age, are admitted to membership of the same school or college but receive instruction wholly or in part in separate classes and in different subjects. Other variable factors in co-educational systems are the extent to which men and women are mixed on the teaching staff, and the freedom of intercourse permitted between pupils of the two sexes in class, in games and in other activities of school life. In another form of combined education (preferred by Comte, Systeme de politique positive, iv. 266), pupils of the two sexes are taught successively by the same teacher. By the English Board of Education, a distinction is drawn between mixed schools and dual schools. ” Mixed schools ” are those in which, for most subjects of the curriculum, boys and girls are taught together by the same teachers: in ” dual schools ” there are separate boys’ and girls’ departments under a single principal, but with separate entrances, classrooms and playgrounds for the two sexes.

History. — Co-education in early times was occasional and sporadic. For example, women were admitted by Plato to the inner circle of the Academy on terms of equality with men. The educational endowments of Teos provided that the professors of literature should teach both boys and girls. It is uncertain whether the Roman schools in classical times were attended by both sexes. A tombstone found at Capua represents a school- master with a boy on one side and a girl on the other. Probably

co-education was practised in country districts for economical reasons; and also in the home schools organized by wealthier families (Wilkins, Roman Education, pp. 42-43). At Charles the Great’s Palace School at Aachen (a.d. 782 onwards), Alcuin taught together the young princes and their sisters, as well as grown men and women. The Humanists of the Renaissance made the full development of personality a chief aim of education, and held up literary accomplishment as a desirable mark of personal distinction both for men and women. This led to the scholarly education of girls along with boys in the home schools of some great families. Thus, at Mantua (1423 onwards), Vittorino da Feltre taught Cecilia Gonzaga with her brothers and the other boy pupils at his boarding-school; but there is no evidence that the latter was otherwise co-educational. Luther and other Reformers urged that girls as well as boys should be taught to read the Bible. Hence came the tendency to co-educa- tion of boys and girls in some elementary schools in Protestant lands. This tendency can be traced both in Scotland and in the northern parts of England. It is believed that, in the early days of New England, district schools in smaller American towns were open to boys and girls alike, but that few girls advanced beyond reading and writing (Martin, Massachusetts Public School

System, p. 130). At Dorchester, Mass., it was left to the discretion of the elders and schoolmen whether maids should be taught with the boys or not; but in practice the girls seem to have been educated apart. In 1602 the council of Ayr, Scotland, ordained that the girls who were learning to read and write at the Grammar School should be sent to the master of the Song School, ” because it is not seemly that sic lasses should be among the lads ” (Grant, History of the Burgh and Parish Schools of Scotland, p. 526 ff.). Meriden, Connecticut, seems to have made common provision for the elementary education of boys and girls in 1678. North- ampton, Mass., did the same in 1680. Deerfield, Mass., in 1698 voted that ” all families having children either male or female between the ages of six and ten years shall pay by the poll for their schooling ” — presumably in the common school.

Thus the beginnings of co-education in its modern organized form may be traced back partly to Scotland and partly to the United States. The co-education of boys and girls, carried through in varying degrees of completeness, was not uncommon in the old Endowed Schools of Scotland, and became more frequent as increasing attention was given to the education of girls. At the Dollar Institution, founded by John McNabb for the benefit of the poor of the parish of Dollar and shire of Clack- mannan (date of will, 1800), boys and girls have been educated together in certain classes since the beginning of the school in 1 8 1 8. In the eastern parts of the United States, where the Puritan tradition also prevailed, co-education struck firm root, and spread chiefly for reasons of convenience and economy (Dexter, History of Education in United States, p. 430). But throughout the west, co-education was strongly preferred in elementary and secondary schools and in universities on the further ground that it was believed to be more in accordance with the democratic principle of equal educational opportunity for the two sexes.

It should be added, however, that the leaven of Pestalozzi’s thought has worked powerfully both in Europe and America in favour of the idea of co-education. His view was that all educational institutions should, as far as possible, be modelled upon the analogy of the family and of the home. At Stanz (1798-1799) he educated together in one household boys and girls ranging in age from five to fifteen. At Burgdorf (1799- 1804) his work was in part co-educational. At Yverdun (1804- 1825) Pestalozzi established a school for girls close to his school for boys. The girls received instruction from some of the masters of the boys’ school, and girls and boys met at evening worship, in short excursions and at other times.

In England, the Society of Friends have been the pioneers of co-

education in boarding schools, both for younger children and for pupils up to fifteen or sixteen years of age. The practice of the society, though not exclusively co-educational, has long been favourable to co-education, either in its complete or restricted form, as being more in harmony with the conditions

of family life. Ackworth school was established by the London Yearly Meeting in 1779 for the education of boys and girls; but the school has never been fully co-educational, the boys and girls being taught separately except in a few classes. At Sidcot school, which was founded in 1808 by the Associated Quarterly Meetings in the west of England for the education of children of Friends, boys and girls are taught together, except in certain handicraft subjects. Several other co-educational schools were founded by the Society of Friends during the first half of the 19th century.

Since that time the movement towards co-education in secondary schools and universities has steadily gained strength in England. It has been furthered by the diffusion of Pesta- lozzian ideas and also by the influence of American example. In England, private schools have made some of the most valu- able co -educational experiments. A private boarding and day secondary school on co-educational lines was instituted by Mr W. A. Case in Hampstead in 1865. A co-educational boarding- school was founded in 1869 by Miss Lushington at Kingsley near Alton, Hants. In 1873 Mr W. H. Herford began the Ladybarn school for boys and girls at Withington in the suburbs of Man- chester. The passing of the Welsh Intermediate Education Act 1889 led to the establishment of a considerable number of new mixed or dual secondary day-schools in Wales. Many English teachers gained experience in these schools and subsequently influenced English education. The work and writings of Mr J. H. Badley at Bedales, Petersfield, a co-educational boarding- school of the first grade, gave greatly increased weight to the principle of co-education. Important additions have also been made to the fund of co-educational experience by the King Alfred's school (Hampstead), Keswick school, and West Heath school (Hampstead). In 1907 a Public Co-educational Boarding School was opened at Harpenden.

Since the Education Act 1902 became law, there has been a rapid increase of co-educational secondary day-schools of the lower grade, under county or borough education authorities, in all parts of

England. This increase is due to two chief causes, viz. (1) The co-educational tradition of some of the higher grade board schools, many of which have become secondary schools; and (2) the economy effected by establishing one co- educational secondary school, in place of two smaller schools for boys and girls separately.

The idea of co-education in secondary schools has spread in several other European countries, especially in Holland, Norway, Sweden and Denmark. In Scandinavia, the new practice appears to have begun with the establishment of a private higher secondary school, the Palmgremska Samskolan, in Stockholm, in 1876. A similar school, Nya Svenska Laroverket, was founded upon the same model in Helsingfors, Finland, in 1880. In Norway, the law of 1896 introduced co-education in all state schools. In Denmark, as in Norway, co-education was begun in private schools; on its proving a success there, it was introduced into the state schools, with two exceptions; and it is now obligatory in most state schools but optional in private schools (J. S. Thornton, Schools Public and Private in the North of Europe, 1907, p. 97). In Holland, there is now a good deal of co-education in lower secondary schools of the modern type. For example, at Utrecht, the state higher burgher school provides the same course of instruction, except in gymnastics, for boys and girls. At Almelocf, the municipal higher burgher school, though co- educational, differentiates the classes in several subjects. In Belgium, France, Germany and Austria, co-education, though frequent in elementary schools, is regarded as undesirable in secondary; but the movement in its favour in many parts of Germany seems to be gathering strength. All over Europe the Roman Catholic populations prefer the older ideal of separate schools for boys and girls.

Co-education in colleges and universities, which began at Oberlin. Ohio, in 1833, was adopted almost without exception by the state universities throughout the west of America from 1862 onwards. Since that time the idea has spread rapidly throughout Europe, and the presence of women students at

universities originally confined to men is one of the most striking educational facts of the age.

Co-education in the United Kingdom, (a) England and Wales. — The Board of Education does not possess any summary showing the number of pupils in mixed public elementary schools or in mixed departments of such schools. In 1901, out of 31,502 departments of public elementary schools in England and Wales, nearly half (15,504) were mixed departments, in which boys and girls were educated

together. But as the departments were of unequal size, it must not be inferred from this that half the children in public elementary schools in that year (5,883,762) were receiving co-education. Of the total number of departments in public elementary schools in England and Wales, the per- centage of mixed schools fell from 51-6 in 1881 to 49-4 in 1891 and 49-2 in 1901. But these percentages must not be taken to prove an absolute decline in the number of children in mixed departments.

In England, out of 492 public secondary schools which were recognized by the Board of Education for the receipt of govern- ment grant for the school year ending July 31, 1905, and which contained 85,358 pupils, 108 schools, with 21,720 pupils, were mixed; and 20 schools, with 8980 pupils, were dual schools.

Thus, of the total number of pupils in the secondary schools referred to above, a little over 25 % were in mixed schools, and about 10% were in dual schools. It is not safe to assume, however, that all the mixed schools were completely co-educa- tional in their work, or that the dual schools were not co- educational in respect of certain subjects or parts of the course. It should also be remembered that, besides the secondary schools recognized by the Board of Education for the receipt of government grant, there is a considerable number of great endowed secondary boarding-schools (" public schools " in the English use of that expression) which are for boys only. There are also at least 5000 private secondary schools, of which, in 1897 (since when no comprehensive statistical inquiry has been made) ,970, with 26,02 7 pupils, were mixed schools. But the great majority of the children in these mixed schools were under twelve years of age. The number of boys and girls over twelve years of age, in the mixed private secondary schools which were included in the 1897 return, was only 5488.

In Wales, for the school year ending July 31, 1905, out of 84 state-aided public secondary schools, n were mixed and 44 were dual schools. The number of scholars in the Welsh schools referred to above was 9340. Of these, 1457, or 15%, were in mixed schools, and 5085, or 54%, were in dual schools. The managers of dual schools in Wales have the power to arrange that boys and girls shall be taught together in any or all the classes; and, as a matter of fact, nearly all the dual schools are worked as mixed schools, though they appear in these figures under dual.

(b) Scotland. — In the public elementary schools, including the higher grade schools of Scotland, co-education is the almost universal rule.

The exceptions, which for the most part are Roman Catholic or Episcopal Church schools, tend to diminish year by year. In 1905, out of 3843 departments in the Scotch public elementary and higher grade schools, 3783 were mixed. These include the infant departments. Out of the total number of children in the public elementary and higher grade schools, includ- ing infants' departments, 98-43% were receiving co-education.

In the secondary schools of Scotland there has been in recent years little perceptible movement either towards co-education or away from it. What movement there is, favours the establish- ment of separate secondary schools for girls in the large centres of population. Out of 109 public secondary schools in Scotland in 1905-1906, 29 schools were for boys only and 40 schools for girls only. One school had boys and girls in separate depart- ments. In the remaining 39 schools, boys and girls were taken together to an extent which varied with the subjects taken; but there was nothing of the nature of a strict separation of the sexes as regards the ordinary work of the school.

(c) Ireland. — In Ireland, the percentage of pupils on the rolls of mixed national schools (i.e. schools attended by boys and

girls), to the total number of pupils on the rolls of all national schools, has slowly increased. In 1880 the percentage was 57-5; in 1898, 59-4; in 1905, 609.

The Commissioners of Intermediate Education in Ireland had on their list in 1906, 38 secondary schools which were classified by them as mixed schools. These schools were attended by 640 boys and 413 girls between 13 and 19 years of age. The commissioners do not know to what extent the boys and girls in these schools received instruction in the same classes. As, however, the schools are small, they believe that in the great majority of cases the boys and girls were taught together. In one large school not classified as mixed, the boys (117) and girls (60) were taught in the same classes.

Universities and University Colleges in the United Kingdom. — ■ Women are admitted as members of the universities of London, Durham, Manchester, Liverpool, Birmingham, Leeds, Sheffield, Wales, Edinburgh, Aberdeen, St Andrews, Glasgow, Dublin and the Royal University of Ireland. At Oxford and Cambridge women are not

admitted as members of the university, but by courtesy enjoy entrance to practically all university lectures and examinations. The social life of the men and women students is more separate in the old than in the new universities. In no grade of education in the United Kingdom has the principle of co-education made more rapid advance than in the universities. The university education of women began in London (Queen's College 1848, Bedford College 1849, both being preceded by classes in earlier years). The University of London in 1878 decided to accept from the crown a supplemental charter making every degree, honour and prize awarded by the university accessible to students of both sexes on perfectly equal terms. By charter in 1880, the Victoria University (now broken up into the universities of Manchester, Liverpool and Leeds) received power to grant degrees to women as well as to men. The charter of the university of Wales (1893) provides that " Women shall be eligible equally with men for admittance to any degree which our university is authorized to confer; every office created in the university, and the membership of every authority constituted by the charter shall be open to women equally with men." In 1889 the Universities (Scotland) Act empowered the com- missioners to make ordinances, enabling each university to admit women in graduation in one or more faculties and to provide for their instruction. At all the university colleges in the United Kingdom women are educated as well as men.

United States. — Co-education is a characteristic feature of the educational system of the different states of the American Union. Of elementary school pupils at least 96%, and of secondary school pupils 95%, are in mixed schools. In 1903, out of a total enrolment of 15,990,803 pupils in public elementary and second- ary schools and training colleges, 15,387,734 were in schools attended by pupils of both sexes. Out of 550,600 pupils on the rolls of public secondary schools (high schools) in 1902, 523,300 were in co-educational schools. The same was true of 43 % of the pupils (numbering over 100,000) in private secondary schools. In colleges and universities 62 % of all undergraduates were in co-educational institutions, to which category thirty-four American universities belong (U.S. Commissioner of Education, Report for 1903, p. 2454). In America opinion is thus pre- dominantly in favour of co-education, but there is a current of adverse criticism, especially among some who have had experience of school conditions in large cities.

General Review of the Question. — In schools for infants and younger children co-education is approved by all authorities. It is increasingly favoured on educational grounds in smaller schools for children up to 12 or 13 years of age or thereabouts. But where elementary schools

have to be large, separate depart- ments for boys and girls are generally preferable, though mixed schools are often established for reasons of economy. At the other end of the educational scale, viz. in the universities, the co-education of men and women in the same institution is fast becoming the rule. This is due partly to the prohibitive cost of duplicating teaching staff, laboratories, libraries and other equipment, partly to the desire of women to qualify themselves

for professional life by passing through the same courses of training as are prescribed for men. The degree, however, to which social intercourse is carried on between men and women students differs widely in the different co-educational univer- sities. There are occasional signs, e.g. at Chicago, of a reaction against the fullest form of academic co-education. And it is probable that the universities will provide, among many courses common to men and women, some (like engineering) suitable for men only, and others (like advanced instruction in home- science, or certain courses of professional preparation for teachers of young children) which will rarely be attended by any but women. Common use of the same university institutions is compatible with much differentiation in courses of study and with separately organized forms of collegiate life. It is with regard to the part of education which lies between the elementary schools and the universities that the sharpest division of opinion upon the principle of co-education now exists. In Europe, with the exception of Scandinavia, those who advocate co- education of the sexes in secondary schools up to 18 or 19 years of age are at present in a distinct minority, even as regards day schools, and still more when they propose to apply the same principle to boarding schools. But the application of the co- educational principle to all schools alike is favoured by an apparently increasing number of men and women. This move- ment in opinion is connected with the increase in the number of girls desiring access to secondary schools, a demand which can most easily and economically be met by granting to girls access to some of the existing schools for boys. The co-educa- tional movement is also connected with a strong view of sex equality. It is furthered by the rapidly increasing number of women teachers who are available for higher educational work. Mixed secondary schools with mixed staffs are spreading for reasons of economy in smaller towns and rural districts. In large towns separate schools are usually recommended in pre- ference, but much depends upon the social tradition of the neighbourhood. Those who advocate co-education for boys and girls in secondary schools urge it mainly on the ground of its naturalness and closer conformity to the conditions of healthy, unselfconscious

home life. They believe it to be a protective against uncleanness of talk and school immorality. They point to its convenience and economy. They welcome co-education as likely to bring with it a healthy radicalism in regard to the older tradition of studies in boys' secondary schools. They approve it as leading to mixed staffs of men and women teachers, and as the most effectual way of putting girls in a position of reasonable equality with boys in respect of intellectual and civic opportunity. On the other hand, those who oppose co-education in secondary schools rest their case upon the danger of the intellectual or physical overstrain of girls during adolescence; and upon the unequal rate of development of boys and girls during the secondary school period, the girls being more forward than the boys at first, but as a rule less able to work as hard at a somewhat later stage. The critics further complain that co-education is generally so organized that the girls' course of study is more or less assimilated to that of the boys, with the result that it cannot have the artistic and domestic character which is suitable for the majority of girls. Complaint is ajso made that the head of a co-educational school for pupils over the age of 10 is usually a man, though the health and character of girls need the care and control of a woman vested with complete authority and responsibility. While demurring to the view that co-education of the sexes would be a moral panacea, the critics of the system admit that the presence of the girls would exert a refining influence, but they believe that on the whole the boys are likely to gain less from co-education than the girls are likely to lose by it. In all these matters carefully recorded observation and experiment are needed, and it may well be found that co- education is best for some boys and for some girls, though not for all. Temperaments and dispositions differ. Some boys seem by nature more fitted for the kind of training generally given to girls; some girls are by nature fitted for the kind of training generally given to boys. The sex division does not mark off

temperaments into two sharply contrasted groups. The intro- duction of girls into boys' secondary schools may remove or mitigate coarse traditions of speech and conduct where such persist. But it would be unfortunate if stiff and pedantic traditions of secondary education were now fixed upon girls instead of being reconsidered and modified in the interests of boys also. In any case, if co-education in secondary schools is to yield the benefits which some anticipate from it, great vigil- ance, careful selection of pupils and very liberal staffing will be

necessary. Without these securities the results of co-education in secondary schools might be disappointing, disquieting or even disastrous.

Bibliography. — Plato in the Republic (v. 452-456) and Laws (vii. 804-805) argues that women should share as far as possible in education with men. Mary, Wollstonecraft, A Vindication of the Rights of Women (1792), contends that ” both sexes ought, not only in private families but in public schools, to be educated together.” J. G. Spurzheim, Principles of Education, pp. 272-288 (Edinburgh, 1821), replies to this argument. In the Board of Education Special Reports on Educational Subjects, vol. vi. (Wyman & Sons, 1900), J. H. Badley, writing on The Possibility of Co-education in English Preparatory and other Secondary Schools, is strongly in favour. ” In co-education . . . half-heartedness means failure. The more completely both sexes can be brought together upon an equal and natural footing the less the difficulties grow.” In the Board of Education Special Reports, vol. xi. (Wyman & Sons, 1902), Rev. Cecil Grant, writing on Can American Education be grafted upon the English Public School System ? answers strongly in the affirmative : co-education is recommended on eight grounds:— (1) Vast economy of expenditure; (2) return to the natural system; (3) discipline made easier; (4) intellectual stimulus; (5) a better balance in instruction; (6) im- proved manners; (7) prevention of extremes of masculinity or femininity; (8) a safeguard against the moral danger.

Co-education: a series of Essays (London, 1903), edited by Alice Woods, is in favour of co-education, nine practical workers recording their experience; this is one of the best books on the subject. J. H. Badley’s Co-education after Fifteen: its Value and Difficulties. Child Life (London, January, 1906), is candid, judicious and practical. M. E. Sadler in Reports on Secondary Education in Hampshire, Derby- shire and Essex (1904, 1905 and 1906 respectively) gives details of the curriculum of many co-educational secondary schools. In the U.S. Commissioner of Education Report for 1903, vol. i. pp. 1047- 1078, Anna Tolman Smith, writing on Co-education in the Schools and Colleges of the United States, gives an historical review of the subject with bibliography (compare bibliography in Report of U.S. Commissioner of Education for iQOO-iQoif-ˆp. 1310-1325). G.Stanley Hall on Adolescence, its Psychology and its Relations to Physiology, Anthropology, Sociology, Sex, Crime, Religion and Education, vol. li. chap, xvii., on Adolescent Girls and their education (New York, D. Appleton&Co., 1904), is strongly against co-education during adolescence. InW. Rein’ s Encyklopddisches Handbuch der Pddagogik (Lanfensalza, Beyer), art. ” Gemeinsame Erziehung fur Knaben und

ladchen," K. E. Palmgren is in favour of co-education (vol. iii. of 2nd ed. 1905). See also W. Rein, Uber gemeinsame Erziehung von Knaben una Madchen (Freiburg, 1903), and Bericht uber den I. Internationalen Kongress fur Schulhygiene (Niirnberg, 1904), vol. ii. pp. 140 ft., " Co-education in der hoheren Schulen." (M. E. S.)

COEFFETEAU, NICOLAS (1574-1623), French theologian, poet and historian, was born at Saint- Calais. He entered the Dominican order and lectured on philosophy at Paris, being also " ordinary preacher " to Henry IV., and afterwards ambassador at Rome. In 1606 he was vicar-general of the congregation of France, and received from Marie de' Medici the revenues of the sees of Lombez and Saintes. He also administered the diocese of Metz, and was nominated to that of Marseilles in 162 1, but ill- health obliged him here to take a coadjutor. Coeffeteau won considerable distinction in the controversy against the Protestant reformers and also wrote a History of Rome from Augustus to Constantine. Many of his theological writings were collected in one volume (Paris, 1622), and at the time of his death in 1623 he was engaged on a translation of the New Testament which is still in manuscript.

COEHOORN, MENNO, Baron van (1641-1704), Dutch soldier and military engineer, of Swedish extraction, was born at Leeuwarden in Friesland. He received an excellent military and general education, and at the age of sixteen became a captain in the Dutch army. He took part in the defence of Maastricht in 1673 and in the siege of Grave in the same year, where the small mortars (called coehorns) invented by him caused the French garrison considerable trouble (Seydel, Nachrichten uber Festungs- kriege, Leipzig, 18 18). He was made a colonel for his gallant

conduct at the battle of Seneff (1674), and was present also at the battles of Cassel (1677) and Saint Denis (1678).

The circumstances of the time and the country turned Coehoorn's attention to the art of fortification, and the events of the late war showed him that existing methods could no longer be relied upon. His first published work, Versterckinge de Vijfhoeks met alle syne Buytenwerken (Leeuwarden, 1682), at once aroused attention, and involved the author in a lively controversy with a rival engineer, Louys Paan (Leeuwarden, 1682, 1683; copies are in the library of the Dutch ministry of war). The military authorities were much interested in this, and entrusted Coehoorn with the reconstruction of several fortresses in the Netherlands. This task he continued throughout his career; and his experience in the work made him the worthy rival of

his great contemporary Vauban. He formulated his ideas a little later in his chief work, Nieuwe Vestingbouw op en natte of lage horizont, &c. (Leeuwarden, 1685), in which he laid down three ” systems,” the characteristic feature of which was the multi- plicity and great saliency of the works, which were calculated and in principle are still eminently suited for flat and almost marshy sites such as those of the Low Countries. He borrowed many of the details from the works of his Dutch predecessor Freytag, of Albrecht Diirer, and of the German engineer Speckle, and in general he aimed rather at the adaptation of his principles to the requirements of individual sites than at producing a geometrically and theoretically perfect fortress; and throughout his career he never hesitated to depart from his own rules in dealing with exceptional cases, such as that of Groningen. Subsequent editions of Nieuwe Vestingbouw appeared in Dutch (1702, and frequently afterwards), English (London, 1705), French (Wesel, 1705), and German (Diisseldorf, 1709).

From 1688 to the treaty of Ryswick Coehoorn served as a brigadier. At the battle of Fleurus he greatly distinguished himself, and in 1692 he defended Namur, a fortress of his own creation. Namur was taken by Vauban ; but the Dutch engineer had his revenge three years later, when the place, on which in the meantime Vauban had lavished his skill, fell to his attack. Coehoorn became lieutenant-general and inspector-general of the Netherlands fortresses, and the high- German peoples as well as his own countrymen honoured him. He commanded a corps in the army of the duke of Marlborough from 1701 to 1703, and in the constant siege warfare of these campaigns in the Low Countries his technical skill was of the highest value. The swift reduction of the fortress of Bonn and the siege cf Huy in 1703 were his crowning successes. At the opening of his following campaign he was on his way to confer with Marlborough when he died of apoplexy at Wijkel on the 17th of March 1704.

His” first system ” was applied to numerous places in Holland, notably Nijmwegen, Breda and Bergen-op-Zoom. Mannheim in Germany was also fortified in this way, while the” secondsystem ” was applied to Belgrade and Temesvar in eastern Europe.

His son, Gosewijn Theodor van Coehoorn, wrote his life (re-edited Syperstein, Leeuwarden, i860). See also v. Zastrow, Geschichteder bestdndigen Befestigung (Leipzig, 1828); von Brese-Winiari, Uber Entstehen und Wesen der neueren Befestigungsmethode (1844); Cosseran de Villenoisy, Essai historique sur la fortification (1869); Mandar, Architecture des forteresses (1801); Krayenhoff, Verhande- ling over de erste versterkingsmanier van Coehoorn (Hague, 1823);

Bosscha, Nederlandsche heldend te Land (Amsterdam, 1838) ; Dewez, Histoire de Belgique (Brussels, 1823); Ypey, Narratio de rebus gestis Mennonis Cohorni (1771); Hennert, Dissertation sur la fortification permanente (1795); Bohms, Criindliche Anleitung zur Kriegsbaukunst (1776); Axiomatas of allgemeene bekentnisse over de Vestinghbouiv door Menno Baron van Coehoorn, Uytgewerkt door E. W. Berg (MS. in Dutch Ministry of War) ; Bousmard, Essai general dt fortification (1797) ; also the article Fortification and Siegecraft.

COELENTERA, a group or grade of the animal kingdom, the zoological importance of which has risen considerably since the time (1887) of the publication of the first article under that heading in the Ency. Brit. (9th edit.), even though their numbers have been reduced by the elevation of the Sponges or Porifera to the rank of an independent Phylum under the title Parazoa (W. J. Sollas, 1884). For the Coelentera thus restricted, the term Enterocoela, in contrast to Coelomocoela (the old Coelo- mata), was suggested by E. R. Lankester (1900).

From the more complex colonial Protozoa the Coelentera are readily separated by their possession of two distinct sets of cells, with diverse functions, arranged in two definite layers, — a condition found in no Protozoan. The old criterion by which they and other Metazoa were once distinguished from Protozoa, namely, the differentiation of large and small sexual cells from each other and from the remaining cells of the body, has been broken down by the discovery of numerous cases of such differentiation among Protozoa. The Coelentera, as contrasted with other Metazoa (but not Parazoa), consist of two layers of cells only, an outer layer or ectoderm, an inner layer or endoderm. They have hence been described as Diploblastica. In the remaining Metazoa certain cells are budded off at an early stage of development from one or both of the two original layers, to form later a third layer, the mesoderm, which lies between the ectoderm and endoderm; such forms have therefore received the name Triploblastica. At the same time it is necessary to observe that it is by no means certain that the mesoderm found in various groups of Metazoa is a similar or homologous formation in all cases. A second essential difference between Coelentera and other Metazoa (except Parazoa) is that in the former all spaces in the interior of the body are referable to a single cavity of endodermal origin, the ” gastro-vascular cavity,” often termed the coelenteron: the spaces are always originally continuous

with one another, and are in almost every case permanently so. This single cavity and its lining serve apparently for all those functions (digestion, excretion, circulation and often repro- duction) which in more complex organisms are distributed among various cavities of independent and often very diverse origin.

In the Coelentera the ectoderm and endoderm are set apart from one another at a very early period in the life-history; generally either by delamination or invagination, processes described in the article Embryology. Between these two cell- layers a mesogloea (G. C. Bourne, 1887) is always intercalated as a secretion by one or both of them; this is a gelatinoid, primi- tively structureless lamella, which in the first instance serves merely as a basal support for the cells. In many cases, as, for example, in the Medusae or jelly-fish, the mesogloea may be so thick as to constitute the chief part of the body in bulk and weight. The ectoderm rarely consists of more than one layer of cells: these are divisible by structure and function into nervous, muscular and secretory cells, supported by interstitial cells. The endoderm is generally also an epithelium one cell in thickness, the cells being digestive, secretory and sometimes muscular. Reproductive sexual cells may be found in either of these two layers, according to the class and sub-class in question. The mesogloea is in itself an inert non-cellular secretion, but the immigration of muscular and other cells into its substance, from both ectoderm and endoderm, gives it in many cases a strong resemblance to the mesoderm of Triploblastica, — a resemblance which, while probably superficial, may yet serve to indicate the path of evolution of the mesoderm.

The Coelentera may thus be briefly defined as Metazoa which exhibit two embryonic cell-layers only, — the ectoderm and endoderm, — their body-cavities being referable to a single cavity or coelenteron in the endoderm. Their position in the animal kingdom and their main subdivisions may be expressed in the following table: —

I. Protozoa. II. Parazoa or Porifera. III. Metazoa.

Ceofentera = Diploblastica.

Triploblastica (including Coelomata).

I Hydromedusae.

Scypnozoa.

Ctenophora.

I Scyphomedusae.

vi. ai

Anthozoa.

In the above-given classification, the Scyphomedusae, formerly included with the Hydromedusae as Hydrozoa, are placed nearer the Anthozoa. The reasons for this may be stated briefly.

The Hydromedusae are distinguished from the Scyphozoa chiefly by negative characters; they have no stomodaeum, that is, no ingrowth of ectoderm at the mouth to form an oeso- phagus; they have no mesenteries (radiating partitions) which incompletely subdivide the coelenteron; and they have no concentration of digestive cells into special organs. Their ectodermal muscles are mainly longitudinal, their endodermal muscles are circularly arranged on the body-wall. Their sexual cells are (probably in all cases) produced from the ectoderm, and lie in those radii which are first accentuated in development. They typically present two structural forms, the non-sexual hydroid and the sexual medusoid; in such a case there is an alternation of generations (metagenesis), the hydroid giving rise to the medusoid by a sexual gemmation, the medusoid bearing sexual cells which develop into a hydroid. In some other cases medusoid develops directly from medusoid (hypogenesis), whether by sexual cells or by gemmation. The medusoids have a muscular velum of ectoderm and mesogloea only.

The Scyphozoa have the following features in common: — They typically exhibit an ectodermal stomodaeum; partitions or mesenteries project into their coelenteron from the body-wall, and on these are generally concentrated digestive cells (to form mesenterial filaments, phacellae or gastric filaments, &c.) ; the external musculature of the

body-wall is circular (except in Cerianthus) ; the internal, longitudinal; and the sexual cells probably always arise in the endoderm.

The Scyphomedusae, like the Hydromedusae, typically present a metagenesis, the non-sexual scyphistomoid (corre- sponding to the hydroid) alternating with the sexual medusoid. In other cases the medusoid is hypogenetic, medusoid producing medusoid. The sexual cells of the medusoid lie in the endoderm on interradii, that is, on the second set of radii accentuated in the course of development. The medusoids have no true velum; in some cases a structure more or less resembling this organ, termed a velarium, is present, permeated by endodermal canals.

The Anthozoa differ from the Scyphomedusae in having no medusoid form; they all more or less resemble a sea-anemone, and may be termed actinioid. They are (with rare excep- tions, probably secondarily acquired) hypogenetic, the offspring resembling the parent, and both being sexual. The sexual cells are borne on the mesenteries in positions irrespective of obvious developmental radii.

The Ctenophora are so aberrant in structure that it has been proposed to separate them from the Coelentera altogether: they are, however, theoretically deducible from an ancestor common to other Coelentera, but their extreme specialization precludes the idea of any close relationship with the rest.

As regards the other three groups, however, it is easy to conceive of them as derived from an ancestor, represented to-day to some extent by the planula-larva, which was Coelenterate in so far as it was composed of an ectoderm and endoderm, and had an internal digestive cavity (I. of the table).

At the point of divergence between Scyphozoa and Hydro- medusae (II. of the table of hypothetical descent), we may conceive of its descendant as tentaculate, capable of either floating (swimming) or fixation at will like Lucernaria to-day; and exhibiting incipient differentiation of myoepithelial cells (formerly termed neuro-muscular cells). At the parting of the ways which led, on the one hand, to modern Scyphomedusae, on the other to Anthozoa (III.), it is probable that the common ancestor was marked by incipient mesenteries and by the limita- tion of the sexual cells to endoderm. The lines of descent — II. to Hydromedusae, and III. to Scyphomedusae — represent periods during which the hypothetical ancestors II. and III., capable of either locomotion or fixation at will, were either

differentiated into alternating generations of fixed sterile nutritive hydroids (scyphistomoids) and locomotor sexual medusoids, or abandoned the power of fixation in hypogenetic cases. During the period

represented by the line of descent — III. to Anthozoa — this group abandoned its power of adult locomotion by swimming. During

Hydromedusae. Scyphomedusae. Anthozoa.

Ctenophora?

these periods were also attained those less important structural characters which these three groups present to-day. (G.H.Fo.)

COELLO, ALONSO SANCHEZ (1515-1590), Spanish painter, according to some authorities a native of Portugal, was born, according to others, at Benifacio, near the city of Valencia. He studied many years in Italy; and returning to Spain in 1541 he settled at Madrid, and worked on religious themes for most of the palaces and larger churches. He was a follower of Titian, and, like him, excelled in portraits and single figures, elaborating the textures of his armours, draperies, and such accessories in a manner so masterly as strongly to influence Velazquez in his treatment of like objects. Many of his pictures were destroyed in the fires that consumed the Madrid and Prado palaces, but many good examples are yet extant, among which may be noted the portraits of the infantes Carlos and Isabella, now in the Madrid gallery, and the St Sebastian painted in the church of San Geronimo, also in Madrid. Coello left a daughter, Isabella Sanchez, who studied under him, and painted excellent portraits.

COELLO, ANTONIO (i6io?i652), Spanish dramatist and poet, was born at Madrid about the beginning of the 17th century. He entered the household of the duke de Albuquerque, and after some years of service in the army received the order of Santiago in 1648. He was a favourite of Philip IV., who is reported to have collaborated with him; this rumour is not confirmed, but there is ample proof of Coello's collaboration with Calderon, Rojas Zorrilla, Solis and Velez de Guevara, the most dis tinguished dramatists of the age. The best of his original plays, Los Empenos de sets horas, has been wrongly ascribed

to Calderon; it was adapted by Samuel Tuke, under the title of The Adventures of five Hours, and was described by Pepys as superior to Othello.- It is an excellent example of stagecraft and animated dialogue. Coello died on the 20th of October 1652, shortly after his nomination to a post in the household of Philip IV.

COELOM AND SEROUS MEMBRANES. In human anatomy the body-cavity or coelom (Gr. koIXos, hollow) is divided into the pericardium, the two pleurae, the peritoneum and the two tunicae vaginales.

The pericardium is a closed sac which occupies the central part of the thorax and contains the heart. Like all the serous membranes it has a visceral and a parietal layer, the former of which is closely applied to the heart and consists of endothelial cells with a slight fibrous backing: to it is due the glossy appear- ance of a freshly removed heart. The parietal layer is double; externally there is a strong fibrous protective coat which is con- tinuous with the other fibrous structures in the neighbourhood, especially with the sheaths of the great vessels at the root of the heart, with prolongations of the fascia of the neck, and with the central tendon of the diaphragm, while internally is the serous layer which is reflected from the surface of the heart, where the

great vessels enter, so that everywhere the two layers of the serous membrane are in contact, and the only thing within the cavity is a drop or two of the fluid secreted by the serous walls. When the parietal layer is laid open and the heart removed by cutting through the great vessels, it will be seen that there are two lines of reflection of the serous layer, one common to the aorta and pulmonary artery, the other to all the pulmonary veins and the two venae cavae.

The pleurae very closely resemble the pericardium except that the fibrous outer coat of the parietal layer is not nearly as strong; it is closely attached to the inner surface of the chest walls and mesially to the outer layer of the pericardium; above it is thickened by a fibrous contribution from the scalene muscles, and this forms the dome of the pleura which fits into the concavity of the first rib and contains the apex of the lung. The reflection of the serous layer of the pleura, from the parietal to the visceral part, takes place at the root of the lung, where the great vessels enter, and continues for some distance below this as the liga- mentum latum pulmonis. The upper limit of the pleural cavity reaches about half an inch above the inner third of the clavicle, while, below, it may be marked out by a line drawn from the twelfth thoracic spine to the tenth rib in the mid axillary line, the eighth rib in the nipple line, and the sixth rib at its junction with the sternum. There is probably very little difference in the lower level of

the pleurae on the two sides.

The peritoneum is a more extensive and complicated membrane than either the pericardium or pleura; it surrounds the abdominal and pelvic viscera, and, like the other sacs, has a parietal and visceral layer. The line of reflection of these, thoueh a con- tinuous one, is very tortuous. The peritoneum consists of a greater and lesser sac which communicate through an opening known as the foramen of Winslow, and the most satisfactory way of understanding these is to follow the reflections first in a vertical median (sagittal) section and then in a horizontal one, the body being supposed to be in the up-right position. If a median sagittal section be studied first, and a start be made at the umbilicus (see fig. 1), the parietal peritoneum is seen to run upward, lining the anterior abdominal wall, and then to pass along the under surface of the diaphragm till its posterior third is reached; here there is a reflection on to the liver (L), forming the anterior layer of the coronary ligament of that viscus, while the mem-brane now becomes visceral and envelops the front of the liver as far back as the transverse fissure on its lower surface; here it is reflected on to the stomach (St) forming the anterior layer of the gastro-hepatic or lesser omentum. It now covers the front of the stomach, and at the lower border runs down as the anterior layer of an apron-like fold, the great omentum, which in some cases reaches as low as the pubes; then it turns up again as the posterior or fourth layer of the great omentum until the trans- verse colon © is reached, the posterior surface of which it covers and is reflected, as the posterior layer of the transverse meso-colon, to the lower part of the pancreas (P) ; after this it turns down and covers the anterior surface of the third part of the duodenum (D) till the posterior wall of the abdomen is reached, from which it is reflected on to the small intestine (I) as the anterior layer of the mesentery, a fold varying from 5 to 8 in. between its

Fig. 1. — -Diagram of vertical median section of Abdomen.

A, Aorta. D, Duodenum.

P, Pancreas. B, Bladder.

I, Intestine. St, Stomach.

R, Rectum. C, Colon.

L, Liver. V, Vagina.

(The fine dots represent the

great sac of the peritoneum, the

coarse dots the lesser sac.)

attachments. After surrounding the small intestine it becomes the posterior layer of the mesentery and so again reaches the posterior abdominal wall, down which it runs until the rectum (R) is reached. The anterior surface of this tube is covered by peritoneum to a point about 3 in. from the anus, where it is reflected on to the uterus and vagina (V) in the female and then on to the bladder (B); in the male, on the other hand, the reflection is directly from the rectum to the bladder. At the apex of the bladder, after covering the upper surface of that organ, it is lifted off by the urachus and runs up the anterior abdominal wall to the umbilicus, from which the start was made. All this is the greater sac. The tracing of the lesser sac may be conveniently started at the transverse fissure of the liver, whence the membrane runs down to the stomach (St) as the posterior layer of the lesser omentum, lines the posterior surface of the stomach, passes down as the second layer of the great omentum and up again as the third layer, covers the anterior surface of the transverse colon © and then reaches the pancreas (P) as the anterior layer of the transverse mesocolon. After this it covers the front of the pancreas and in the middle line of the body runs up below the diaphragm to within an inch of the anterior layer of the coronary ligament of the liver; here it is reflected on to the top of the Spigelian lobe of the liver to form the posterior

layer of the coronary liga- ment, covers the whole Spigelian lobe, and so reaches the transverse fissure, the starting-point. This section, therefore, shows two completely closed sacs without any visible communication. In the female, however, the great sac is not absolutely closed, for the Fallopian tubes open into it by their

H.A. P.V. B.D.

V.C.

Fig. 2.-

they communicate with H.A, Hepatic Artery, {he cavity of the uterus and so with the vagina and exterior.

A horizontal section

-Diagram of Horizontal minute ostia abdominalia, Section through upper part of 1st while at the other ends Lumbar Vertebra. A, Aorta.

Sp, Spleen. K, Kidney.

B.D, Bile duct. L, Liver. V.C, Vena Cava. St, Stomach. P, Pancreas. P.V, Portal Vein.

The dotting of the peritoneum is through the upper part of as in fi S- I – the first lumbar vertebra

will, if a fortunate one (see fig. 2), pass through the foramen of Winslow and show the communication of the two sacs. A starting-point may be made from the mid-ventral line and the parietal peritoneum traced round the left side of the body wall until the outer edge of the left kidney (K) is reached; here it passes in front of the kidney and is soon reflected off on to the spleen, which it nearly surrounds; just before it reaches the hilum of that organ, where the vessels enter, it is reflected on to the front of the stomach (St), forming the anterior layer of the gastro-spknic omentum; it soon reaches the lesser curvature of the stomach and then becomes the anterior layer of the lesser omentum, which continues until the bile duct (B.D) and portal vein (P.V) are reached at its right free extremity; here it turns completely round these structures and runs to the left again, as the posterior layer of the lesser omentum, behind the stomach (St) and then to the spleen (Sp) as the posterior layer of the gastro-splenic omentum. From the spleen it runs to the right once more, in front of the pancreas (P), until the inferior vena cava (V.C) is reached, and this point is just behind the portal vein and is the place where the lesser and greater sacs communicate, known as the foramen of Winslow. From this opening the lesser sac runs to the left, while all the rest of the peritoneal cavity in the section is greater sac. From the front of the vena cava the parietal peritoneum passes in front of the right kidney (K) and round the right abdominal wall to the mid-ventral line. The right part of this section is filled by the liver (L), which is completely surrounded by a visceral layer of peritoneum, and no reflection

is usually seen at this level between it and the parietal layer. Some of the viscera, such as the kidneys and pancreas, are retro-peritoneal; others, such as the small intestines and trans- verse colon, are surrounded, except at one point where they are attached to the dorsal wall by a mesentery or mesocolon as the reflections are called; others

again are completely surrounded, and of these the caecum is an example; while some, like the liver and bladder, have large uncovered areas, and the reflections of the membrane form ligaments which allow considerable freedom of movement.

The tunica vaginalis is the remains of a process of the peritoneum {processus vaginalis) which descends into the scrotum during foetal life some little time before the testis itself descends. After the descent of the testis the upper part usually becomes obliterated, while the lower part forms a serous sac which nearly surrounds the testis, but does not quite do so. Posteriorly the epididymis is in close contact with the testis, and here the visceral layer is not in contact; there is, however, a pocket called the digital fossa which squeezes in from the outer side between the testis and epididymis. The parietal layer lines the inner wall of its own side of the scrotum.

For a full description of the topography of the serous membranes see any of the standard text-books of anatomy, by Gray, Quain, Cunningham or Macalister. Special details will be found in Sir F. Treves' Anatomy of the Intestinal Canal and Peritoneum (London, 1885); C. B. Lockwood, Hunterian Lectures on Hernia (London, 1889); C. Addison, "Topographical Anatomy of the Abdominal Viscera in Man," Jour. Anat., vols. 34, 35; F. Dixon and A. Birming- ham, " Peritoneum of the Pelvic Cavity, ' jour. Anat. vol. 34, p. 127 ; W. Waldeyer, " Das Becken " (1899), and "Topographical Sketch of the Lateral Wall of the Pelvic Cavity," Jour. Anat. vol. 32; B. Moynihan, Retroperitoneal Hernia (London, 1899). A complete bibliography of the subject up to 1895 will be found in Quain' s Anatomy, vol. 3, part 4, p. 69.

Embryology. — As the mesoderm is gradually spreading over the embryo it splits into two layers, the outer of which is known as the somatopleure and lines the parietal or ectodermal wall,

After Young and Robinson, Cunningham's Texl-Book of Anatomy. Fig. 3. — Diagram of Longitudinal Section, showing the different areas of the Blastodermic Vesicle.

a, Pericardium. c, Ectoderm. e, Placental area.

b, Bucco-pharyngeal area. d, Entoderm.

while the inner lines the entoderm and is called the splanchno- pleure; between the two is the coelom. The pericardial area is early differentiated from the rest of the coelom and at first lies in front of

the neural and bucco-pharyngeal area; here the

After Young and Robinson, Cunningham's Text-Book of Anatomy.

Fig. 4. — Diagram of a DevelopingOvum.seenin Longitudinal Section.

/, Spinal cord. i, Brain.

g, Notochord. h, Extra embryonic coelom.

h, Dorsal wall of alimentary canal. Other numbers as in fig. 3.

mesoderm stretches right across the mid-line, which it does not in front and behind. As the head fold of the embryo is formed the pericardium is gradually turned right over, so that the dorsal side becomes the ventral and the anterior limit the posterior; this will be evident on referring to the two accompanying diagrams.

The two primitive aortae lie at first in the ventral wall of the

pericardium, but with the folding over they come to lie in the dorsal wall and gradually bulge into the cavity as they coalesce to form the heart, so that the heart drops into the dorsal side of the pericardium and draws down a fold of the membrane called the dorsal mesocardium. In mammals A. Robinson {Jour. Anat. and Phys., xxxvii. i) has shown that no ventral mesocardium exists, though in more lowly vertebrates it is present. Laterally the pericardial cavity communicates with the general cavity of the coelom, but with the growth of the Cuvierian ducts (see development of veins) these communica- tions disappear. Originally the mesocardium runs the whole length of the pericardium from before backward, but later on the middle part becomes obliterated, and so the two separate reflections from the parietal to the visceral layer, already noticed, are accounted for.

Just behind the pericardium and in front of the umbilicus, which at first are close together, the mesoderm forms a mass which is called the septum Iransversum, and into this the develop- ing lungs push bag-like protrusions of the coelom, consisting of visceral and parietal layers, and these eventually lose their connexion with the rest of the coelom, as the diaphragm develops, and become the pleural cavities. After the pericardium and pleurae have been separated off the remainder of the

coelom becomes the peritoneum. At first the stomach and intestine form a straight tube, which is connected to the dorsum of the embryo by a dorsal mesentery and to the mid-ventral wall in front of the umbilicus by a ventral mesentery. Into the ventral mesentery the liver grows as diverticula from the duodenum, so that some of the mesentery remains as the falciform ligament of the liver and some as the lesser omentum. Into the dorsal mesentery the pancreas grows, also as diverticula, from the duodenum, while the spleen is developed from the mesoderm contained in the same fold. As the stomach turns over so that its left side becomes ventral, the dorsal mesentery attached to it becomes pulled out, in such a way that part of it forms the great omentum and part the gastro-splenic omentum. After the caecum is formed as a diverticulum from the intestine it is situated close to the liver and gradually travels down into the right iliac fossa. This passage to the right is accompanied by a throwing over of the duodenal loop to the right, so that the right side of its mesentery becomes pressed against the dorsal wall of the abdomen and obliterated. This accounts for the fact that the pancreas and duodenum are only covered by peritoneum on their anterior surfaces in man. The formation of the lesser sac is due to the turning over of the stomach to the right, with the result that a cave, known sometimes as the bursa omentalis, is formed behind it. Originally, of course, the whole colon had a dorsal mesocolon continuous with the mesentery, but in the region of the ascending and descending colon this usually dis- appears and these parts of the gut are uncovered by peritoneum posteriorly. The transverse mesocolon persists and at first is quite free from the great omentum, but later, in man, the two structures fuse 1 and the fourth layer of the great omentum becomes continuous with the posterior layer of the transverse mesocolon.

For further details see Quain's Anatomy (London, 1908).

Comparative Anatomy. — In the Amphioxus the coelom is developed in the embryo as a series of bilateral pouches, called enter ocoeles, from the sides of the alimentary canal; these are therefore entodermal in their origin, as in Sagitta and the Echino- dermata among the invertebrates. In the adult the development of the atrium causes a considerable reduction of the coelom, represented by two dorsal coelomic canals communicating with a ventral canal by means of branchial canals which run down the outer side of the primary gill bars. Into the dorsal canals the nephridia open. In the intestinal region the coelom is only present on the left side.

In the higher vertebrates (Craniata) the coelom is developed by a splitting of the mesoderm into two layers, and a peri-

1 Some authorities hold that this alteration is not brought about by fusion, but by a dragging away of the posterior layer of the great omentum from the dorsal wall of the abdomen. .

cardium is constricted off from the general cavity. In all cases the ova burst into the coelom before making their way to the exterior, and in some cases, e.g. amphioxus, lamprey (Cyclo- stomata), eels and mud-fish (Dipnoi), the sperm cells do so too. The Cyclostomata have a pair of genital pores which lead from the coelom into the urino-genital sinus, and so to the exterior.

In the Elasmobranch fish there is a pericardio-peritoneal canal forming a communication between these two parts of the coelom; also a large common opening for the two oviducts in the region of the liver, and two openings, called abdominal pores, on to the surface close to the cloacal aperture. In the Teleostomi (Teleo- stean and Ganoid fish) abdominal pores are rare, but in most Teleostei (bony fish) the ova pass directly down oviducts, as they do in Arthropods, without entering the peritoneal cavity; there is little doubt, however, that these oviducts are originally coelomic in origin. In the Dipnoi (mud-fish) abdominal pores are found, and probably serve as a passage for the sperm cells, since there are no vasa deferentia. In fishes a complete dorsal mesentery is seldom found in the adult; in many cases it only remains as a tube surrounding the vessels passing to the aliment- ary canal.

In the Amphibia, Reptilia and Aves, one cavity acts as pleura and peritoneum, though in the latter the lungs are not com- pletely surrounded by a serous membrane. In many lizards the comparatively straight intestine, with its continuous dorsal mesentery and ventral mesentery in the anterior part of the abdomen, is very like a stage in the development of the human and other mammalian embryos. In the mammalia the dia- phragm is complete (see Diaphragm) and divides the pleuro- peritoneal cavity into its two constituent parts. In the lower mammals the derivatives of the original dorsal mesentery do not undergo as much fusion and obliteration as they do in adult man; the ascending and descending mesocolon is retained, and the transverse mesocolon contracts no adhesion to the great omentum. It is a common thing, however, to find a fenestrated arrangement of the great omentum which shows that its layers have oeen completely obliterated in many places.

In those animals, such as the rabbit, in which the tests are sometimes in the scrotum and sometimes in the abdomen, the communication between the peritoneum and the tunica vaginalis remains throughout

life.

For further details and literature up to 1902, see R. Wiedersheim's Vergleichende Anatomie der Wirbeltiere (Jena, 1902). (F. G. P.)

COEN, JAN PIETERSZOON (1587-1630), fourth governor- general of the Dutch East Indies, was born at Hoorn, and spent his youth at Rome in the house of the famous merchants the Piscatori. In 1607 he sailed from Amsterdam to the Indies as second commercial agent, and remained away four years. He had proved so capable that in 161 2 he was sent out a second time at the head of a trading expedition. In the following year he was made a councillor and director-general of the East Indian trade. Afterwards he became president at Bantam, and on the 31st of October 16 17 he was promoted in succession to Laurens Reaal to the post of governor-general. To his vigour and intrepidity the Dutch in no small measure owed the preservation and establishment of their empire in the East. He took and destroyed Jacatra, and founded on its ruins the capital of the Dutch East Indies, to which he gave the name of Batavia. In 1622 Coen obtained leave to resign his post and return to Holland, but in his absence great difficulties had arisen with the English at Arhboina (the so-called massacre of Amboina), and in 1627 under pressure from the directors of the East India Company he again returned as governor-general to Batavia. In 1629 he was able to beat off a formidable attack of the sultan of Mataram, sometimes styled emperor of Java, upon Batavia. He died the following year.

COENACULUM, the term applied to the eating-room of a Roman house in which the supper (coena) or latest meal was taken. It was sometimes placed in an upper storey and reached by an external staircase. The Last Supper in the New Testament was taken in the Coenaculum, the " large upper room " cited in St Mark (xiv. 15) and St Luke (xxii. 12).

CCENWULF (d. 821), king of Mercia, succeeded to the throne in 796, on the death of Ecgfrith, son of Offa. His succession is somewhat remarkable, as his direct ancestors do not seem to have held the throne for six generations. In 798 he invaded Kent, deposed and imprisoned Eadberht Praen, and made his own brother Cuthred king. Cuthred reigned in Kent from 798 to 807, when he died, and Ccenwulf seems to have taken Kent into his own hands. It was during this reign

that the archbishopric of Lichfield was abolished, probably before 803, as the Hygeberht who signed as an abbot at the council of Cloveshoe in that year was presumably the former archbishop. Ccenwulf appears from the charters to have quarrelled with Wulfred of Canterbury, who was consecrated in 806, and the dispute continued for several years. It was probably only settled at Cloveshoe in 8 2 5 , when the lawsuit of Cwcenthryth, daughter and heiress of Ccenwulf, with Wulfred was terminated. Coenwulf may have instigated the raid of jEthelmund, earl of the Hwicce, upon the accession of Ecgberht. He died in 821, and was succeeded by his brother Ceolwulf I.

See Earle and Plummer's edition of the Anglo-Saxon Chronicle, 796, 819 (Oxford, 1892); W. de G. Birch, Cartularium Saxonicum, 378 (London, 1885-1893). (F. G. M. B.)

COERCION (from Lat. coercere, to restrain), an application of moral or physical compulsion by which a person is forced to do or refrain from doing some act or set of acts apart from his own voluntary motion. Where the coercion is direct or positive, i.e. where the person is compelled by physical force to do an act contrary to his will, — for example, when a man is compelled to join a rebel army, and to serve as a soldier under threats of death, — his act is not legally a crime. Where the coercion is implied, as when a person is legally under subjection to another, the person coerced, having no will on the subject, is not responsible. But this principle is applied only within narrow limits, and does not extend to the command of a superior to an inferior; of a parent to a child; of a master to his servant or a principal to his agent. Where, however, a married woman commits a crime in the presence of her husband, she is generally presumed to have acted by his coercion, and to be entitled to acquittal, but this presumption does not extend to grave crimes, nor to those in which the principal part may be supposed to be taken by the woman, such as keeping a brothel. In civil matters, such as the making of a contract, where the law requires the free assent of the person who undertakes the obligation, coercion is a ground for invalidating the instrument.

The term " coercion " is inevitably somewhat ambiguous, and depends on the circumstances of the case. In a political sense, the application of the Crimes Act of 1887 to Ireland was called " coercion " by those opposed to the English Unionist party and government, as being special legislation differing from the ordinary law applicable in the United Kingdom.

CCEUR, JACQUES (c. 1395-1456), founder of the trade between France and the Levant, was born at Bourges, in which city his father,

Pierre Cceur, was a rich merchant. Jacques is first heard of about 1418, when he married Macee de Leodepart, daughter of Lambert de Leodepart, an influential citizen, provost of Bourges, and a former valet of John, duke of Berry. About 1429 he formed a commercial partnership with two brothers named Godard; and in 1432 he was at Damascus, buying and bartering, and transporting the wares of the Levant — gall-nuts, wools and silks, goats' hair, brocades and carpets — to the interior of France by way of Narbonne. In the same year he established himself at Montpellier, and there began those gigantic operations which have made him illustrious among financiers. Details are wanting ; but it is certain that in a few years he placed his country in a position to contend not unsuccessfully with the great trading republics of Italy, and acquired such reputation as to be able, mere trader as he was, to render material assistance to the knights of Rhodes and to Venice herself.

In 1436 Cceur was summoned to Paris by Charles VII., and made master of the mint that had been established in that city. The post was of vast importance, and the duties onerous. The country was deluged with the base moneys of three reigns, charged

with superscriptions both French and English, and Charles had determined on a sweeping reform. In this design he was ably seconded by the merchant, who, in fact, inspired or prepared all the ordinances concerning the coinage of France issued between 1435 and 1451. In 1438 he was made steward of the royal expenditure; in 1441 he and his family were ennobled by letters patent. In 1444 he was sent as one of the royal com- missioners to preside over the new parlement of Languedoc, a dignity he bore till the day of his disgrace. In 1445 his agents in the East negotiated a treaty between the sultan of Egypt and the knights of Rhodes; and in 1447, at his instance, Jean de Village, his nephew by marriage, was charged with a mission to Egypt. The results were most important; concessions were obtained which greatly improved the position of the French consuls in the Levant, and that influence in the East was thereby founded which, though often interrupted, was for several centuries a chief commercial glory of France. In the same year Cceur assisted in an embassy to Amadeus VIII., former duke of Savoy, who had been chosen pope as Felix V. by the council of Basel; and in 1448 he represented the French king at the court of Pope Nicholas V., and was able to arrange an agreement between Nicholas and Amadeus, and so to end the papal schism. Nicholas treated him with the utmost distinction, lodged him in the papal palace, and gave him a special licence to traffic with the infidels. From about this time he made large advances to Charles for carrying on his wars; and in 1449, after fighting at the king's side

through the campaign, he entered Rouen in his train.

At this moment the great trader's glory was at its height. He had represented France in three embassies, and had supplied the sinews of that war which had ousted the English from Normandy. He was invested with various offices of dignity, and possessed the most colossal fortune that had ever been amassed by a private Frenchman. The sea was covered with his ships; he had 300 factors in his employ, and houses of business in all the chief cities of France. He had built houses and chapels, and had founded colleges in Paris, at Montpellier and at Bourges. The house at Bourges (see House, Plate II. figs. 7 and 8) was of exceptional magnificence, and remains to-day one of the finest monuments of the middle ages in France. He also built there the sacristy of the cathedral and a sepulchral chapel for his family. His brother Nicholas was made bishop of Lucon, his sister married Jean Bochetel, the king's secretary, his daughter married the son of the viscount of Bourges, and his son Jean became archbishop of Bourges. But Cceur's gigantic monopoly caused his ruin. Dealing in everything, money and arms, peltry and jewels, brocades and woollens — a broker, a banker, a farmer — he had absorbed the trade of the country, and merchants complained they could make no gains on account of " that Jacquet." He had lent money to needy courtiers, to members of the royal family, and to the king himself, and his debtors, jealous of his wealth, were eager for a chance to cause his overthrow.

In February 1450 Agnes Sorel, the king's mistress, suddenly died. Eighteen months later it was rumoured that she had been poisoned, and a lady of the court who owed money to Jacques Cceur, Jeanne de Vendome, wife of Francois de Montberon, and an Italian, Jacques Colonna, formally accused him of having poisoned her. There was not even a pretext for such a charge, but for this and other alleged crimes the king, on the 31st of July 1451, gave orders for his arrest and for the seizure of his goods, reserving to himself a large sum of money for the war in Guienne. Commissioners extraordinary, the merchant's declared enemies, were chosen to conduct the trial, and an inquiry began, the judges in which were either the prisoner's debtors or the holders of his forfeited estates. He was accused of having paid French gold and ingots to the infidels, of coining light money, of kidnapping oarsmen for his galleys, of sending back a Christian slave who had taken sanctuary on board one of his ships, and of committing frauds and exactions in Languedoc to the king's prejudice. He defended himself with all the energy of his nature. His innocence was manifest; but a conviction was necessary, and in spite of strenuous efforts on the part of his friends, after twenty-two

months of confinement in five prisons, he was condemned to do public penance for his fault, to pay the king a sum equal to about £1,000,000 of modern money, and to remain a prisoner till full satisfaction had been obtained; his sentence also embraced confiscation of all his property, and exile during royal pleasure. On the 5th of June 1453 the sentence took effect; at Poitiers the shameful form of making honourable amends was gone through; and for nearly three years nothing is known of him. It is probable that he remained in prison; it is certain that his vast possessions were distributed among the intimates of Charles. In 1455 Jacques Cceur, wherever confined, contrived to escape into Provence. He was pursued; but a party, headed by Jean de Village and two of his old factors, carried him off to Tarascon, whence, by way of Marseilles, Nice and Pisa, he managed to reach Rome. He was honourably and joyfully received by Nicholas V., who was fitting out an expedition against the Turks. On the death of Nicholas, Calixtus III. continued his work, and named his guest captain of a fleet of sixteen galleys sent to the relief of Rhodes. Cceur set out on this expedition, but was taken ill at Chios, and died there on the 25th of November 1456. After his death Charles VII. showed himself well disposed to the family, and allowed Jacques Cceur's sons to come into possession of whatever was left of their father's wealth.

See the admirable monograph of Pierre Clement, Jacques Cceur et Charles VII (1858, 2nd ed. 1874); A. Valet de Viriville, Charles Sept et son epoque (3 vols., 1862- 1865) ; and Louisa Costello, Jacques Cceur, the French Argonaut (London, 1847).

CCEUR D'ALENE (" awl-heart," the French translation of the native name skitswish), a tribe of North American Indians of Salishan stock. The name is said to have been originally that of a chief noted for his cruelty. The tribe has given its name to a lake, river and range of mountains in Idaho, where on a reservation the survivors, some 400, are settled.

COFFEE (Fr: cafe", Ger. Kajjee). This important and valu- able article of food is the produce chiefly of Cojfea arabica,

a Rubiaceous plant indigenous to Abyssinia, which, however, as cultivated originally, spread outwards from the southern parts of Arabia. The name is probably derived from the Arabic K'hawah, although by some it has been traced to Kaffa, a province in Abyssinia,

in which the tree grows wild.

The genus Cojfea, to which the common coffee tree belongs, contains about 25 species in the tropics of the Old World, mainly African. Besides being found wild in Abyssinia, the common coffee plant appears to be widely disseminated in Africa, occurring wild in the Mozambique district, on the shores of the Victoria Nyanza, and in Angola on the west coast. The coffee leaf disease in Ceylon brought into prominence Liberian coffee (C. liberica), a native of the west coast of Africa, now extensively grown in several parts of the world. Other species of economic importance are Sierra Leone coffee (C. stenophylla) and Congo coffee (C. robusta), both of which have been introduced into and are cultivated on a small scale in various parts of the tropics. C. excelsa is another species of considerable promise.

The common Arabian coffee shrub is an evergreen plant, which under natural conditions grows to a height of from 18 to 20 ft., with oblong-ovate, acuminate, smooth and shining leaves, measuring about 6 in. in length by 25 wide. Its flowers, which

Fig. 1. — Branch of Coffea arabica.

are produced in dense clusters in the axils of the leaves, have a five-toothed calyx, a tubular five-parted corolla, five stamens and a single bifid style. The flowers are pure white in colour, with a rich fragrant odour, and the plants in blossom have a lovely and attractive appearance, but the bloom is very evan- escent. The fruit is a fleshy berry, having the appearance and size of a small cherry, and as it ripens it assumes a dark red colour. Each fruit contains two seeds embedded in a yellowish pulp, and the seeds are enclosed in a thin membranous endocarp (the parchment”). Between each seed and the parchment is a delicate covering called the ” silver skin.” The seeds which constitute the raw coffee ” beans ” of commerce are plano-convex in form, the flat surfaces which are laid against each other within the berry having a longitudinal furrow or groove. When only one seed is developed in a fruit it is not flattened on one side, but circular in cross section. Such seeds form ” pea-berry ” coffee.

The seeds are of a soft, semi-translucent, bluish or greenish colour, hard and tough in texture. The regions best adapted for the cultivation of coffee are well-watered mountain slopes at an elevation ranging from 1000 to 4000 ft. above sea-level, within the tropics, and possessing a mean annual temperature of about 65 to 70 F.

The Liberian coffee plant (C. liberica) has larger leaves, flowers and

fruits, and is of a more robust and hardy constitution, than Arabian coffee. The seeds yield a highly aromatic and well- flavoured coffee (but by no means equal to Arabian), and the plant is very prolific and yields heavy crops. Liberian coffee grows, moreover, at low altitudes, and flourishes in many situa- tions unsuitable to the Arabian coffee. It grows wild in great abundance along the whole of the Guinea coast.

History. — The early history of coffee as an economic product is involved in considerable obscurity, the absence of fact being compensated for by a profusion of conjectural statements and mythical stories. The use of coffee (C. arabica) in Abyssinia was recorded in the 15th century, and was then stated to have been practised from time immemorial. Neighbouring countries, how- ever, appear to have been quite ignorant of its value. Various legendary accounts are given of the discovery of the beneficial properties of the plant, one ascribing it to a flock of sheep accidentally browsing on the wild shrubs, with the result that they became elated and sleepless at night! Its physiological action in dissipating drowsiness and preventing sleep was taken advantage of in connexion with the prolonged religious service of the Mahommedans, and its use as a devotional antisoporific stirred up fierce opposition on the part of the strictly orthodox and conservative section of the priests. Coffee by them was held to be an intoxicating beverage, and therefore prohibited by the Koran, and severe penalties were threatened to those addicted to its use. Notwithstanding threats of divine retribu- tion and other devices, the coffee-drinking habit spread rapidly among the Arabian Mahommedans, and the growth of coffee and its use as a national beverage became as inseparably connected with Arabia as tea is with China. –

Towards the close of the 16th century the use of coffee was recorded by a European resident in Egypt, and about this epoch it came into general use in the near East. The appreciation of coffee as a beverage in Europe dates from the 17th century. ” Coffee-houses ” were soon instituted, the first being opened in Constantinople and Venice. In London coffee-houses date from 1652, when one was opened in St Michael’s Alley, Cornhill. They soon became popular, and the role played by them in the social life of the 1 7th and 18th centuries is well known. Germany, France, Sweden and other countries adopted them at about the same time as Great Britain. In Europe, as in Arabia, coffee at first made its way into favour in the face of various adverse and even prohibitive restrictions. Thus at one time in Germany it was necessary to obtain a licence to roast coffee. In England Charles II. endeavoured to suppress coffee-houses on the ground that they were centres of political agitation, his royal pro- clamation stating that they

were the resort of disaffected persons ” who devised and spread abroad divers false, malicious and

scandalous reports, to the defamation of His Majesty’s govern- ment, and to the disturbance of the peace and quiet of the nation.”

Up to the close of the 17th century the world’s entire, although limited, supply of coffee was obtained from the province of Yemen in south Arabia, where the true celebrated Mocha or Mokka coffee is still produced. At this time, however, plants were successfully introduced from Arabia to Java, where the cultiva tion was immediately taken up. The government of Java distributed plants to various places, including the botanic garden of Amsterdam. The Portuguese introduced coffee into Ceylon. From Amsterdam the Dutch sent the plant to Surinam in 1718, and in the same year Jamaica received it through the governor Sir Nicholas Lawes. Within a few years coffee reached the other West Indian islands, and spread generally through the tropics of the New World, which now produce by far the greater portion of the world’s supply.

Cultivation and Preparation for Market. — Coffee plants are grown from seeds, which, as in the case of other crops, should be obtained from selected trees of desirable characteristics. The seeds may be sown ” at stake,” i.e. in the actual positions the mature plants are to occupy, or raised in a nursery and after- wards transplanted. The choice of methods is usually determined by various local considerations. Nurseries are desirable where there is risk of drought killing seedlings in the open. Whilst young the plants usually require to be shaded, and this may be done by growing castor oil plants, cassava (Manihot), maize or Indian corn, bananas, or various other useful crops between the coffee, until the latter develop and occupy the ground. Sometimes, but by no means always, permanent shading is afforded by special shade trees, such as species of the coral tree (Erythrina) and other leguminous trees. Opinions as to the necessity of shade trees varies in different countries; e.g. in Brazil and at high elevations in Jamaica they are not employed, whereas in Porto Rico many look on them as absolutely essential. It is probable that in many cases where shade trees are of ad- vantage their beneficial action may be indirect, in affording protection from wind, drought or soil erosion, and, when leguminous plants are employed, in enriching the soil in nitrogen. The plants begin to come into bearing in their second or third year, but on

the average the fifth is the first year of considerable yield. There may be two, three, or even moire ” flushes ” of blossom in one year, and flowers and fruits in all stages may thus be seen on one plant. The fruits are fully ripe about seven months after the flowers open; the ripe fruits are fleshy, and of a deep red colour, whence the name of ” cherry.” When mature the fruits are picked by hand, or allowed to fall of their own accord or by shaking the plant. The subsequent preparation may be according to (1) the dry or (2) the wet method.

In the dry method the cherries are spread in a thin layer, often on a stone drying floor, or barbecue, and exposed to the sun. Protection is necessary against heavy dew or rain. The dried cherries can be stored for any length of time, and later the dried pulp and the parchment are removed, setting free the two beans contained in each cherry. This primitive and simple method is employed in Arabia, in Brazil and other countries. In Brazil it is giving place to the more modern method described below.

In the wet, or as it is sometimes called, West Indian method, the cherries are put in a tank of water. On large estates galvan- ized spouting is often employed to convey the beans by the help of running water from the fields to the tank. The mature cherries sink, and are drawn off from the tank through pipes to the pulping machines. Here they are subjected to the action of a roughened cylinder revolving closely against a curved iron plate. The fleshy portion is reduced to a pulp, and the mixture of pulp and liberated seeds (each still enclosed in its parchment) is carried away to a second tank of water and stirred. The light pulp is removed by a stream of water and the seeds allowed to settle. Slight fermentation and subsequent washings, accompanied by trampling with bare feet and stirring by rakes or special machinery, result in tjbe parchment coverings being left quite clean. The beans are now dried on barbecues, in trays, &c,

or by artificial heat if climatic conditions render this necessary. Recent experiments in Porto Rico tend to show that if the weather is unfavourable during the crop period the pulped coffee can be allowed to remain moist and even to malt or sprout without injury to’ the final value of the product when dried later. The product is now in the state known as parchment coffee, and may be exported. Before use, however, the parch-, ment must be removed. This may be done on the estate, at the port of shipment, or in the country where imported. The coffee is thoroughly dried, the parchment broken by a roller, and re- moved by winnowing. Further rubbing and winnowing removes the silver skin, and the beans are left in the condition of ordinary unroasted coffee. Grading into large, medium and small beans, to

secure the uniformity desirable in roasting, is effected by the use of a cylindrical or other pattern sieve, along which the beans are made to travel, encountering first small, then medium, and finally large apertures or meshes. Damaged beans and foreign matter are removed by hand picking. An average yield of cleaned coffee is from i| to 2 lb per tree, but much greater crops are obtained on new rich lands, and under special conditions.

Production. — The centre of production has shifted greatly since coffee first came into use in Europe. Arabia formerly supplied the world; later the West Indies and then Java took the lead, to be supplanted in turn by Brazil, which now produces about three-quarters of the world's supply and controls the market.

Brazil. — Coffee planting is the chief industry of Brazil, and coffee the principal export. The states of Sao Paulo, Rio de Janeiro, Minas GeraesandSantos.containthechiefcoffee-producinglands. Theannual output ranges from about 10,000,000 to 16,000,000 bags (of 120 lb each), whilst the world's annual consumption is more or less stationary at about 16,000,000 bags. The overwhelming importance of the Brazilian output is thus evident. Recently efforts have been made to restrict production to maintain prices, and the Coffee Convention scheme came into force in Sao Paulo on December I, 1906, and in Rio de Janeiro and Minas Geraes on January 1, 1907. The cultivation in general is very primitive in character, periodical weeding being almost all the attention the plants receive. Manuring is commonly confined to mulches of the cut weeds and addition of the coffee husks. New lands in Sao Paulo yield from 80 cwt. to 100 cwt. of cleaned coffee per 1000 trees (700 go to the acre) ; the average yield, however, is not more than 15 cwt. The plants are at their best when from 10 to 15 years old, but continue yielding for 30 years or even more.

Other South American Countries. — Venezuela, Colombia, Ecuador, Peru, and to a much less degree Bolivia and Paraguay, produce coffee, the annual crops of the two former countries being each of about £1,500,000 in value.

Central A merica. — Guatemala produces the most in this region ; the coffee estates are mainly controlled by Germans, who have brought them to a high pitch of perfection. The crop ranges in value from about £1,000,000 to £1,500,000 per annum. Costa Rica and San Salvador produce about half this amount In Nicaragua, Honduras and Panama, coffee is extensively cultivated, and all export the product.

West Indies. — Coffee is grown in most of the islands, often only for

local use. Haiti produces the largest amount, the annual value of the crop being about £500,000. Porto Rico formerly had a flourishing industry, but it has declined owing to various causes. The interior is still expected to be devoted largely to coffee, and the U.S. Department of Agriculture has carried out experiments to improve methods and ensure the cultivation of better varieties. Jamaica produces the famous Blue Mountain Coffee, which com- pares favourably with the best coffees of the world, and also ordinary or ” plain grown “; the Blue Mountain is cultivated at elevations of from 3000 to 4500 ft. Coffee usually ranks third or fourth in value amongst the exports of the island.

Africa, the native country of the coffees, does not now contribute any important amount to the world’s output. In Liberia, the Gold Coast and elsewhere on the West Coast are many plantations, but the low prices ruling of recent years have caused coffee to be neglected for more remunerative crops. Coffee is, however, still the principal export of Nyasaland (British Central Africa), where it was intro- duced as recently as 1894. The area under coffee has been greatly reduced, owing partly to more attention being paid to cotton, partly to droughts and other causes. In Somaliland and Abyssinia coffee cultivation is of very ancient date. Two kinds are exported, Harrari and Habashi. The former compares favourably with Mocha coffee. The industry could be very considerably extended. In Natal, Rhodesia, &c, coffee is grown, but not in sufficient quantity to supply the local demand.

Arabia. — The name ” Mocha ” is applied generally to coffee produced in Arabia. Turkey and Egypt obtain the best grades. Traders from these countries go to Arabia, buy the crops on the trees, and supervise its picking and preparation themselves. The coffee is prepared by the ” dry method.”

India is the principal coffee-growing region in the British empire, and produces about one-fifth of the total supply of the United Kingdom. There are some 213,000 acres under coffee, mostly in southern India. The official report states that the production of coffee is restricted for the most part to a limited area in the elevated region above the south-western coast, the coffee lands of Mysore, Coorg, and the Madras districts of Malabar and the Nilgiris, comprising 86 % of the whole area under the plant in India. About one-half of the whole coffee-

producing area is in Mysore. In Burma, Assam and Bombay, coffee is of minor importance. During 1904-1906 there was a reduction of the area under coffee in India by 21,554 acres.

Ceylon. — The history of coffee in Ceylon is practically that of the coffee-leaf disease (see below). The Dutch introduced Arabian coffee in 1720, but abandoned its cultivation later. It was revived by the British, and developed very rapidly between 1836 and 1845, when there was a temporary collapse owing to financial crisis in the United Kingdom. In 1880 the exports of coffee were of the value of about £2,784,163. Ten years later they had fallen to £430,633, owing to the ravages of the coffee-leaf disease. The output continued to decrease, and the value of the crop in 1906 was only £17,258. Liberian coffee, which is hardier and more resistant to disease, was introduced, but met with only partial success.

Dutch East Indies. — Coffee from this source passes under the general name of "Java," that island producing the greatest amount; Sumatra, Borneo and the Celebes, &c, however, also contribute. The Java plantations are largely owned by the government. Much of the coffee from these islands is of a high quality.

Australasia. — Coffee can be cultivated in the northern territories of Australia, but comparatively little is done with this crop ; Queensland produces the largest amount.

Hawaii, &c. — In all the islands of the Hawaiian group coffee is grown, but nine-tenths or more is raised in Hawaii itself, the Kona district being the chief seat of production. The exports go mostly to the United States, and there is also a large local consumption.

Coffee thrives well also in the Philippines and Guam.

The World's Trade. — The following figures, from the Year-book of the U. S. Department of Agriculture, indicate the relative importance of the coffee-exporting countries.

1904. 1905.

Country. Exports coffee Exports coffee

in lb. in lb.

America —

Brazil 1,326,027,795

Colombia . . . 130,000,000

Venezuela . . . 128,000,000

Haiti …. 81,407,346

Salvador . . . 75,3i4.°°3

Guatemala . . . 71,653,700

Mexico …. 41,855,368

Costa Rica . . . 27,730,672

Nicaragua . . . 21,661,621

Porto Rico . . . 15.330.590

Jamaica . . . 5,781,440

Asia —

Dutch East Indies . 77,168,254

British India . 36,920,464 Singapore (port of export) 12,367,156

Other countries . . . 216,891,567

1,431,328,038

(est.) 70,000,000

94.370,090 45,244,232 61,822,223 81,081,600 42,456,491 39,788,002

I8.I7I.5I5

9,046,464

72,864,649 40,340,384

11.935.034 220,132,690

Total . 2,268,109,976 2,238,581,412

In 1906 there was an increased total of 2,680, 855, 878 ft>, due to the Brazil export rising to 1,847,367,771 lb. The aggregate value of the coffee annually entering the world's markets is about

£40,000,000.

Coffee Consumption. — The United States of America consume nearly one half of all the coffee exported from the producing countries of the world. This might of course be due merely to the States containing more coffee-drinkers than other countries, but the average consumption per head in the country is about 11 to 12 lb per annum, an amount equalled or excelled only in Norway, Sweden and Holland. Whilst one great branch of the Anglo-Saxon stock is near the head of the list, it is interesting to note that the United Kingdom and also Canada and Australia are almost at the foot, using only about 1 lb of coffee per head each year. Germany, with a consumption of about 6 to 7 lb per person per annum uses considerably less than a quarter of the world's commercial crop. France, about 5 lb per head, takes about one eighth; and Austria-Hungary, about 2 lb, uses some one-sixteenth. Holland consumes approximately as much, but with a much smaller population, the Dutch using more per head than any other people — 14 lb to 15 lb per annum. Their taste is seen also in the relatively high consumption in South Africa. Sweden, Belgium and the United Kingdom, follow next in order of total amount used.

In many tropical countries much coffee is drunk, but as it is often produced locally exact figures are not available. The average consumption in the United Kingdom is about 50,000,000 lb per annum; about one-fifth only is produced in the British empire, and of this about nineteen-twentieths come from India and one-twentieth from the British West Indies.

Coffee-leaf Disease— The coffee industry in Ceylon was ruined by the attack of a fungoid disease (Hemileia vastatrix) known as the Ceylon coffee-leaf disease. This has since extended its ravages into every coffee-producing country in the Old World, and added greatly to the difficulties of successful cultivation. The fungus is a microscopic one, the minute spores of which, carried by the wind, settle and germinate upon the leaves of the plant. The

,r

FlG. 2. — Coffee-leaf Disease, Hemileia vastatrix.

1 , Part of leaf showing diseased

patches.

2, Cluster of uredospores.

3, Transverse section of a

diseased patch in the leaf showing the hyphae of the fungus pushing between the leaf-cells and tapping them for nourishment. The hyphae have broken through in the upper face and

are forming a cluster of

spores. Ripe uredospores. A teleutospore. A uredospore germinating,

the germ-tube is penetrating

the leaf. Uredospore germinating. Uredospore. Teleutospcre.

2-7, Highly magnified.

fungal growth spreads through the substance to the leaf, robbing the leaf of its nourishment and causing it to wither and fall. An infected plantation may be cleansed, and the fungus in its nascent state destroyed, by powdering the trees with a mixture of lime and sulphur, but, unless the access of fresh spores brought by the wind can be arrested, the plantations may be readily reinfected when the lime and sulphur are washed off by rain. The separation of plantations by belts of trees to windward is suggested as a check to the spread of the disease.

Microscopic Structure. — Raw coffee seeds are tough and horny in structure, and are devoid of the peculiar aroma and taste which are so characteristic of the roasted seeds. The minute structure of coffee allows it to be readily recognized by means of the microscope, and as roasting does not destroy its distinguishing peculiarities, microscopic examination forms the readiest means of determining the genuineness of any sample. The substance of the seed, according to Dr Hassall, consists ” of an assemblage

of vesicles or cells of an angular form, which adhere so firmly together that they break up into pieces rather than separate into distinct and perfect cells. The cavities of the cells include, in the form of little drops, a considerable quantity of aromatic volatile

oil, on the presence of which the fragrance and many of the active prin- ciples of the berry depend ” (see fig. 3).

Physiological Action. — Coffee belongs to the medi- cinal or auxiliary class of food substances, being solely valuable for its stimulant effect upon the nervous and vascular sys- tem. It produces a feeling of buoyancy and exhilara- tion comparable to a certain stage of alcoholic intoxication, but which does not end in depression

Fig. 3. — Microscopic structure of Coffee.

or collapse. It increases the frequency of the pulse, lightens the sensation of fatigue, and it sustains the strength under prolonged and severe muscular exertion. The value of its hot infusion under the rigours of Arctic cold has been demonstrated in the experience of all Arctic explorers, and it is scarcely less useful in tropical regions, where it beneficially stimulates the action of the skin.

The physiological action of coffee mainly depends on the pre- sence of the alkaloid caffeine, which occurs also in tea, Paraguay tea, and cola nuts, and is very similar to theobromine, the active principle in cocoa. The percentage of caffeine present varies in the different species of Cojfea. In Arabian coffee it ranges from about 0-7 to i-6%; in Liberian coffee from i-o to i-s%. Sierra Leone coffee (C. stenophylla) contains from 1-52 to 1-70%; in C. excelsa 1-89% is recorded, and as much as 1-97% in C. canephora. Four species have been shown by M. G. Bertrand to contain no caffeine at all, but instead a considerable quantity of a bitter principle. All these four species are found only in Madagascar or the neighbouring islands. Other coffees grown there contain caffeine as usual. Coffee, with the caffeine ex- tracted, has also been recently prepared for the market. The commercial value of coffee is determined by the amount of the aromatic oil, caffeone, which develops in it by the process of roasting. By prolonged keeping it is found that the richness of any seeds in this peculiar oil is increased, and with increased aroma the coffee also yields a blander and more mellow beverage. Stored coffee loses weight at first with great rapidity, as much as 8% having been found to dissipate in the first year of keeping, 5% in the second, and 2% in the third; but such loss of weight is more than compensated by improvement in quality and con- sequent enhancement of value.

Roasting. — In the process of roasting, coffee seeds swell up by the liberation of gases within their substance, — their weight decreasing in proportion to the extent to which the operation is carried. Roasting also develops with the aromatic caffeone above alluded to a bitter soluble principle, and it liberates a portion of the caffeine from its combination with the caffetannic acid. Roasting is an operation of the greatest nicety, and one, moreover, of a crucial nature, for equally by

insufficient and by excessive roasting much of the aroma of the coffee is lost; and its infusion is neither agreeable to the palate nor exhilarating in its influence. The roaster must judge of the amount of heat required for the adequate roasting of different qualities, and while that is variable, the range of roasting temperature proper for individual kinds is only narrow. In continental countries it is the practice to roast in small quantities, and thus the whole charge is well under the control of the roaster; but in Britain large roasts are the rule, in dealing with which much difficulty is experienced in producing uniform torref action, and in stopping the process at the proper moment. The coffee-roasting apparatus is usually a malleable iron cylinder mounted to revolve over the

fire on a hollow axle which allows the escape of gases generated during torref action. The roasting of coffee should be done as short a time as practicable before the grinding for use, and as ground coffee especially parts rapidly with its aroma, the grinding should only be done when coffee is about to be prepared.

Adulteration.— Although by microscopic, physical and chemical tests the purity of coffee can be determined with perfect certainty, yet ground coffee is subjected to many and extensive adultera tions (see also Adulteration). Chief among the adulterant substances, if it can be so called, is chicory; but it occupies a peculiar position, since very many people on the European continent as well as in Great Britain deliberately prefer a mixture of chicory with coffee to pure coffee. Chicory is indeed destitute of the stimulant alkaloid and essential oil for which coffee is valued; but the facts that it has stood the test of prolonged and extended use, and that its infusion is, in some localities, used alone, indicate that it performs some useful function in connexion with coffee, as used at least by Western communities. For one thing, it yields a copious amount of soluble matter in infusion with hot water, and thus gives a specious appearance of strength and substance to what maybe really only a very weak preparation of coffee. The mixture of chicory with coffee is easily detected by the microscope, the structure of both, which they retain after torref action, being very characteristic and distinct. The granules of coffee, moreover, remain hard and angular when mixed with water, to which they communicate but little colour; chicory, on the other hand, swelling up and softening, yields a deep brown colour to water in which it is thrown. The specific gravity of an infusion of chicory is also much higher than that of coffee. Among the numerous other substances used to adulterate coffee are roasted and ground roots of the dandelion, carrot, parsnip and beet; beans, lupins and other leguminous seeds; wheat, rice and various cereal grains; the seeds of

the broom, fenugreek and iris; acorns; ” negro coffee,” the seeds of Cassia occidentalis, the seeds of the ochro {Hibiscus esculentus), and also the soja or soy bean (Glycine Soya). Not only have these with many more similar substances been used as adulterants, but under various high-sounding names several of them have been introduced as substitutes for coffee; but they have neither merited nor obtained any success, and their sole effect has been to bring coffee into undeserved disrepute with the public.

Not only is ground coffee adulterated, but such mixtures as flour, chicory and coffee, or even bran and molasses, have been made up to simulate coffee beans and sold as such.

The leaves of the coffee tree contain caffeine in larger propor- tion than the seeds themselves, and their use as a substitute for tea has frequently been suggested. The leaves are actually so used in Sumatra, but being destitute of any attractive aroma such as is possessed by both tea and coffee, the infusion is not palatable. It is, moreover, not practicable to obtain both seeds and leaves from the same plant, and as the commercial demand is for the seed alone, no consideration either of profit or of any dietetic or economic advantage is likely to lead to the growth of coffee trees on account of their leaves. (A. B. R.; W. G. F.)

COFFER (Fr. cojfre, O. Fr. cofre or cofne, Lat. copkinus, cf. ” coffin “), in architecture, a sunk panel in a ceiling or vault; also a casket or chest in which jewels or precious goods were kept, and, if of large dimensions, clothes. The marriage coffers in Italy were of exceptional richness in their carving and gilding and were sometimes painted by great artists.

COFFERDAM, in engineering. To enable foundations (q.v.) to be laid in a site which is under water, the engineer sometimes surrounds it with an embankment or dam, known as a cofferdam, to form an enclosure from which the water is excluded. Where the depth of water is small and the current slight, simple clay dams may be used, but in general cofferdams consist of two rows of piles, the space between which is packed with clay puddle. The dam must be sufficiently strong to withstand the exterior pressure to which it is exposed when the enclosed space is pumped dry.

COFFEYVILLE, a city of Montgomery county, Kansas, U.S.A., on the Verdigris river, about no m. S. of Topeka and near the

southern boundary of the state. Pop. (1890) 2282; (1900) 4953, of whom 803 were negroes; (1905) 13,196; (1910) 12,687. Coffeyville is served by the Missouri Pacific, the Atchison, Topeka & Santa Fe, the Missouri, Kansas & Texas, and the Saint Louis, Iron Mountain & Southern railways, and by inter- urban electric railway to Independence. It is in the Kansas natural-gas field, ships large quantities of grain, and has a large zinc oxide smelter and a large oil refinery, and various manu- factures, including vitrified brick and tile, flour, lumber, chemicals, window glass, bottles, pottery and straw boards. The municipality owns and operates its water-works and electric lighting plant. Coffeyville, named in honour of A. M. Coffey, who was a member of the first legislature of the territory of Kansas, was founded in 1869, but in 187 1 it was removed about 1 m. from its original site, now known as ” old town.” It was incorporated as a city of the third class in 1872 and received a new charter in 1887. Coffeyville became a station on the Leavenworth, Lawrence & Galveston railway (now part of the Atchison, Topeka & Santa Fe), and for several years large numbers of cattle were driven here from Indian Territory and Texas for shipment; in fact, the city’s chief importance was as a trade centre for the north part of Indian Territory until natural gas was found here in large quantities in 1892.

COFFIN (from Lat. cophinus, Gr. ko&vos, a coffer, chest or basket, but never meaning ” coffin ” in its present sense), the receptacle in which a corpse is confined. The Greeks and Romans disposed of their dead both by burial and by cremation. Greek coffins varied in shape, being in the form of an urn, or like the modern coffins, or triangular, the body being in a sitting posture. The material used was generally burnt clay, and in some cases this had obviously been first moulded round the body, and so baked. Cremation was the commonest method of disposing of the dead among the Romans, until the Christian era, when stone coffins came into use. Examples of these have been frequently dug up in England. In 1853, during excavations for the founda- tions of some warehouses in Hayden Square, Minories, London, a Roman stone coffin was found within which was a leaden shell. Others have been found at Whitechapel, Stratford-le-Bow, Old Kent Road and Battersea Fields, and in great numbers at Colchester, York, Southfleet and Kingsholme near Gloucester. In early England stone coffins were only used by the nobles and the wealthy. Those of the Romans who were rich enough had their coffins made of a limestone brought from Assos in Troas, which it was commonly believed ” ate the body “; hence arose the name sarcophagus (q.v.).

The coffins of the Chaldaeans were generally clay urns with the top left open, resembling immense jars. These, too, must have been moulded round the body, as the size of the mouth would not admit of its introduction after the clay was baked. The Egyptian coffins, or sarcophagi, as they have been improperly called, are the largest stone coffins known and are generally highly polished and covered with hieroglyphics, usually a history of the deceased. Mummy chests shaped to the form of the body were also used. These were made of hard wood or papier mdchi painted, and like the stone coffins bore hieroglyphics. The Persians, Parthians, Medes and peoples of the Caspian are not known to have had any coffins, their usual custom being to expose the body to be devoured by beasts and birds of prey. Unhewn flat stones were sometimes used by the ancient European peoples to line the grave. One was placed at the bottom, others stood on their edges to form the sides, and a large slab was put on top, thus forming a rude cist. In England after the Roman invasion these rude cists gave place to the stone coffin, and this, though varying much in shape, continued in use until the 16th century.

The most primitive wooden coffin was formed of a tree-trunk split down the centre, and hollowed out. The earliest specimen of this type is in the Copenhagen museum, the implements found in it proving that it belonged to the Bronze Age. This type of coffin, more or less modified by planing, was used in medieval Britain by those of the better classes who could not afford stone, but the poor were buried without coffins, wrapped simply in cloth or even covered only with hay and flowers. Towards the

end of the 17 th century, coffins became usual for all classes. It is worth noting that in the Burial Service in the Book of Common Prayer the word ” coffin ” is not used.

Among the American Indians some tribes, e.g. the Sacs, Foxes and Sioux, used rough hewn wooden coffins; others, such as the Seris, sometimes enclosed the corpse between the carapace and plastron of a turtle. The Seminoles of Florida used no coffins, while at Santa Barbara, California, canoes containing corpses have been found buried though they may have been intended for the dead warrior’s use in the next world. Rough stone cists, too, have been found, especially in Illinois and Kentucky. In their tree and scaffold burial the Indians sometimes used wooden coffins, but oftener the bodies were simply wrapped in blankets. Canoes mounted on a scaffold near a river were used as coffins by some tribes, while others placed the corpse in a canoe or wicker basket and floated them out into the stream or lake (see Funeral Rites). The aborigines of Australia generally used coffins

of bark, but some tribes employed baskets of wicker- work.

Lead coffins were used in Europe in the middle ages, shaped like the mummy chests of ancient Egypt. Iron coffins were more rare, but they were certainly used in England and Scotland as late as the 17th century, when an order was made that upon bodies so buried a heavier burial fee should be levied. The coffins used in England to-day are generally of elm or oak lined with lead, or with a leaden shell so as to delay as far as possible the process of disintegration and decomposition. In America glass is sometimes used for the lids, and the inside is lined with copper or zinc. The coffins of France and Germany and the continent generally, usually differ from those of England in not being of the ordinary hexagonal shape but having sides and ends parallel. Coffins used in cremation throughout the civilized world are of some light material easily consumed and yielding little ash. Ordinary thin deal and papier mache are the favourite materials. Coffins for what is known as Earth to Earth Burial are made of wicker-work covered with a thin layer of papier mdche over cloth.

See also Funeral Rites; Cremation; Burial and Burial Acts; Embalming; Mummy, &c.

Bibliography. — Dr H. C. Yarrow, ” Study of the Mortuary Customs of the North American Indians,” Report of Bureau oj Amer. Ethnol. vol. i. (Washington, U.S. A., 1881) ; Rev. Thomas Hugo, ” On the Hayden Square Sarcophagus,” Journ. of Archaeol. Soc. vol. ix. (London, 1854) I C. V. Creagh, ” On Unusual Forms of Burial by People of the East Coast of Borneo,” J.A.I, vol. xxvi. (London, 1896-1897) ; Rev. J. Edward Vaux, Church Folk-lore (1894).

COG. (1) (From an older cogge, a word which appears in various forms in Teutonic languages, as in 0. Ger. kogge or kocke, and also in Romanic, as in O. Fr. cogue, or coque, from which the Eng. ” cock-boat ” is derived; the connexion between the Teutonic and the Romanic forms is obscure), a broadly built, round-shaped ship, used as a trader and also as a ship of war till the 15th century. (2) (A word of obscure origin, possibly connected with Fr. coche, and Ital. cocca, a notch; the Celtic forms cog and cocas come from the English), a tooth in a series of teeth, morticed on to, or. cut out of the circumference of a wheel, which works with the tooth in a corresponding series on another wheel (see Mechanics). (3) (Also of quite obscure origin), a slang term for a form of cheating at dice. The early uses of the word show that this was done not by ” loading ” the dice, as the modern use of the expression of ” cogged dice ” seems to imply, but by sleight of hand in directing the fall or in changing the dice.

COGERS HALL, a London tavern debating society. It was instituted in 1755 at the White Bear Inn (now St Bride's Tavern), Fleet Street, moved about 1850 to Discussion Hall, Shoe Lane, and in 187 1 finally migrated to the Barley Mow Inn, Salisbury Square, E.C., its present quarters. The name is often wrongly spelt Codgers and Coggers; the " o " is really long, the accepted derivation being from Descartes' Cogito, ergo sum, and thus meaning " The society of thinkers." The aims of the Cogers were " the promotion of the liberty of the subject and the freedom of the Press, the maintenance of loyalty to the laws,

the rights and claims of humanity and the practice of public and private virtue." Among its early members Cogers Hall reckoned John Wilkes, one of its first presidents, and Curran, who in 1773 writes to a friend that he spent a couple of hours every night at the Hall. Later Dickens was a prominent member.

See Peter Rayleigh, History of Ye Antient Society of Cogers (London, 1904).

COGHLAN, CHARLES FRANCIS (1841-1899), Irish actor, was born in Paris, and was educated for the law. He made his first London appearance in i860, and became the leading actor at the Prince of Wales's. He went to America in 1876, where he remained for the rest of his life, playing first in Augustin Daly's company and then in the Union Square stock company, during the long run of The Celebrated Case. He also played with his sister, and in support of Mrs Langtry and Mrs Fiske, and in 1898 produced a version of Dumas' Kean, called The Royal Box, in which he successfully starred during the last years of his life. He died in Galveston, Texas, on the 27th of November 1899.

His sister, the actress Rose Coghlan (1853-), went to America in 1871, was again in England from 1873 to 1877, playing with Barry Sullivan, and then returned to America, where she became prominent as Countess Zicka in Diplomacy, and Stephanie in Forget-me-not. She was at Wallack's almost continuously until 1888, and subsequently appeared in melo- drama in parts like the title-role of The Sporting Duchess.

COGNAC, a town of south-western France, capital of an arrondissement in the department of Charente, on the left bank of the river Charente, 32 m. W. of Angouleme on the Ouest-£tat railway,

between Angouleme and Saintes. Pop. (1 906) 18,389. The streets of the old town — which borders the river — are narrow and tortuous, but the newer parts are well provided with open spaces. The chief of these is the beautiful Pare Francois I" overlooking the Charente. In one of the squares there is a statue of Francis I., who was born here. The chief building is a church of the 12th century dedicated to St Leger, which preserves a fine Romanesque facade and a tower of the 15th century. A castle of the 15th and 16th centuries, once the residence of the counts of Angouleme, now a storehouse for brandy, and a medieval gate stand in the older part of the town. Cognac is the seat of a subprefect and has tribunals of first instance and of commerce, a council of trade arbitrators, a chamber of commerce, and consulates of the United States, Spain and Portugal. Its most important industry is the distil- lation of the brandy {q.v.) to which the town gives its name. Large quantities are carried, by way of the river, to the neigh- bouring port of Tonnay-Charente. The industries subsidiary to the brandy trade, such as the making of cases and bottles, occupy many hands. Ironware is also manufactured, and a considerable trade is maintained in grain and cattle. In 1526 Cognac gave its name to a treaty concluded against Charles V. by Francis I., the pope, Venice and Milan. Its possession was contested during the wars of religion, and in 1570 it became one of the Huguenot strongholds. In 1651 it successfully sustained a siege against Louis II., prince of Conde, leader of the Fronde.

See Le Pays du Cognac, by L. Ravaz, for a description of the district and its viticulture.

COGNITION (Latin cognitio, from cognoscere, to become acquainted with) , in psychology, a term used in its most general sense for all modes of being conscious or aware of an object, whether material or intellectual. It is an ultimate mode of consciousness, strictly the presentation (through sensation or otherwise) of an object to consciousness; in its complete form, however, it seems to involve a judgment, i.e. the separation from other objects of the object presented. The psychological theory of cognition takes for granted the dualism of the mind that knows and the object known; it takes no account of the metaphysical problem as to the possibility of a relation between the ego and the non-ego, but assumes that such a relation does exist. Cognition is therefore distinct from emotion and conation ; it has no psychological connexion with feelings of pleasure and pain, nor does it tend as such to issue in action.

For the analysis of cognition-reactions see O. Kiilpe, Outlines of

Psychology (Eng. trans., 1895), pp. 411 foil.; E. B. Titchener, Experimental Psychology (1905), ii. 187 foil. On cognition gener- ally, G. F. Stout's Analytic Psychology and Manual of Psychology; W. James's Principles of Psychology (1890), i. 216 foil.; also article Psychology.

COGNIZANCE (Lat. cognoscere, to know), knowledge, notice, especially judicial notice, the right of trying or considering a case judicially, the exercise of jurisdiction by a court of law. In heraldry a " cognizance " is an emblem, badge or device, used as a distinguishing mark by the body of retainers of a royal or noble house.

COHEN (Hebrew for "priest"), a Jewish family name, implying descent from the ancient Hebrew priests. Many families claiming such descent are, however, not named Cohen. Other forms of the name are Cohn, Co wen, Kahn.

See J. Jacobs, Jewish Encyclopedia, iv. 144.

COHN, FERDINAND JULIUS (1828-1898), German botanist, was born on the 24th of January 1828 at Breslau. He was educated at Breslau and Berlin, and in 1859 became extra- ordinary, and in 1871 ordinary, professor of botany at Breslau University. He had a remarkable career, owing to his Jewish origin. He was contemporary with N. Pringsheim, and worked with H. R. Goeppert, C. G. Nees von Esenbeck, C. G. Ehrenberg and Johannes Muller. At an early date he exhibited astonishing ability with the microscope, which he did much to improve, and his researches on cell-walls and the growth and contents of plant-cells soon attracted attention, especially as he made remarkable advances in the establishment of an improved cell- theory, discovered the cilia in, and analysed the movements of, zoospores, and pointed out that the protoplasm of the plant-cell and the sarcode of the zoologists were one and the same physical vehicle of life. Although these early researches were especially on the Algae, in which group he instituted marked reforms of the rigid system due to F. T. Kiitzing, Cohn had already displayed that activity in various departments which made him so famous as an all-round naturalist, his attention at various times being turned to such varied subjects as Aldorovanda, torsion in trees, the nature of waterspouts, the effects of lightning, physiology of seeds, the proteid crystals in the potato, which he discovered, the formation of travertin, the rotatoria, luminous worms, &c.

It is, however, in the introduction of the strict biological and philosophical analysis of the life-histories of the lower and most

minute forms of life that Cohn's greatest achievements consist, for he applied to these organisms the principle that we can only know the phases of growth of microscopic plants by watching every stage of development under the microscope, just as we learn how different are the youthful and adult appearances of an oak or a fern by direct observation. The success with which he attempted and carried out the application of cultural and developmental methods on the Algae, Fungi and Bacteria can only be fully appreciated by those familiar with the minute size and elusive evolutions of these organisms, and with the limited appliances at Cohn's command. Nevertheless his account of the life-histories of Protococcus (1850), Stephanosphaera (1852), Volvox (1856 and 1875"), Hydrodictyon (1861), and Sphaeroplea (1855-1857) among the Algae have never been put aside. The first is a model of what a study in development should be; the last shares with G. Thuret's studies on Fucus and Pringsheim's on Vaucheria the merit of establishing the existence of a sexual process in Algae. Among the Fungi Cohn contributed important researcheson Pilobolus (1851), Empusa (1855), Tarichium (1869), as well as valuable work on the nature of parasitism of Algae and Fungi.

It is as the founder of bacteriology that Cohn's most striking claims to recognition will be established. He seems to have been always attracted particularly by curious problems of fermentation and coloration due to the most minute forms of life, as evinced by his papers on Monas prodigiosa (1850) and " Uber blutahnliche Farbungen " (1850), on infusoria (1851 and 1852), on organisms in drinking-water (1853), " Die Wunder des Blutes " (1854), and had already published several works on insect epidemics (1860-1870) and on plant diseases, when his first specially bacteriological memoir (Crenothrix) appeared in

the journal, Beitrdge zur Biologie, which he then started (1870- 1871), and which has since become so renowned. Investigations on other branches of bacteriology soon followed, among which " Organismen der Pockenlymphe " (1872) and " Untersuchungen uber Bacterien " (1872-1875) are most important, and laid the foundations of the new department of science which has now its own laboratories, literature and workers specially devoted to its extension in all directions. When it is remembered that Cohn brought out and helped R. Koch in publishing his celebrated paper on Anthrax (1876), the first clearly worked out case of a bacterial disease, the significance of his influence

on bacteriology becomes apparent.

Among his most striking discoveries during his studies of the forms and movements of the Bacteria may be mentioned the nature of Zoogloea, the formation and germination of true spores — which he observed for the first time, and which he himself discovered in Bacillus subtilis — and their resistance to high temperatures, and the bearing of this on the fallacious experi- ments supposed to support abiogenesis; as well as works on the bacteria of air and water, the significance of the bright sulphur granules in sulphur bacteria, and of the iron oxide deposited in the walls of Crenothrix. His discoveries in these and in other departments all stand forth as mementoes of his acute observation and reasoning powers, and the thoughtful (in every sense of the word) consideration of the work of others, and suggestive ideas attached to his principal papers, bear the same characteristics. If we overcome the always difficult task of bridging in imagination the interval between our present plat- form of knowledge and that on which bacteriologists stood in, say, 1870, we shall not undervalue the important contributions of Cohn to the overthrow of the then formidable bugbear known as the doctrine of ” spontaneous generation,” a dogma of despair calculated to impede progress as much in its day as that of ” vitalism ” did in other periods. Cohn had also clear percep- tions of the important bearings of Mycology and Bacteriology in infective diseases, as shown by his studies in insect-killing fungi, microscopic analysis of water, &c. He was a foreign member of the Royal Society and of the Linnean Society, and received the gold medal of the latter in 1895. He died at Breslau on the 25th of June 1898.

Lists of his papers will be found in the Catalogue of Scientific Papers of the Royal Society, and in Ber. d. d. hot. Gesellsch., 1899, vol.xvii. p. (196). The latter also contains (p. (172)) a full memoir by F. Rosen. (H. M. W.)

COHN, GUSTAV (1840-), German economist, was born on the 1 2th of December 1840 at Marienwerder, in West Prussia. He was educated at Berlin and Jena universities. In 1869 he obtained a post at the polytechnic in Riga, and in 1875 was elected a professor at the polytechnic at Zurich. In 1873 he went to England for a period of study, and as a result published his Untersuchungen uber die englische Eisenbahnpolitik (Leipzig, 1874-1875). In 1884 he was appointed professor of political science at Gottingen. Cohn’s best-known works are System der National dkonomie (Stuttgart, 1885); Finanzwissenschoft (1889); Nationalokonomische Studien (1886), and Zur Geschichte und Politik des Verkehrswesens (1900).

COHOES, a city of Albany county, New York, U.S.A., about 9 m. N. of Albany, at the confluence of the Mohawk and Hudson rivers. Pop. (1890) 22,509; (1900) 23,910, of whom 7303 were foreign-born; (1910) 24,709. It is served by the New York Central & Hudson River and the Delaware & Hudson railways, by electric lines to Troy and Albany, and by the Erie and Champlain canals. It is primarily a manufacturing city. Hosiery and knit goods, cotton cloth, cotton batting, shoddy, underwear and shirts and collars are the principal products, but there are also extensive valve works and manufactories of pulp, paper and paper boxes, beer, pins and needles, tools and machinery, and sash, doors and blinds. The value of the factory products in 1905 was $10,289,822, of which $4,126,873, or 40-1%, was the value of hosiery and knit goods, Cohoes ranking fifth among the cities of the United States (of 20,000 inhabitants or more) in this industry, and showing a higher degree of specializa-

tion in it than any other city in the United States except Little Falls, N.Y. The Falls of the Mohawk, which furnish power for the majority of the manufacturing establishments, are 75 ft. high and 900 ft. broad, a large dam above the falls storing the water, which is conveyed through canals to the mills. Below the falls the river is crossed by two fine iron bridges. The city has a public library, a normal training school and the St Bernard's (Roman Catholic) Academy. Cohoes was a part of the extensive manorial grant made to Killian Van Rensselaer in 1629 and it was probably settled very soon afterwards. It was incorporated as a village in 1848 and was chartered as a city in 1870.

COHORT (Lat. cohors), originally a place enclosed: in the Roman army, the name of a unit of infantry. The troops of the first grade, the legions, were divided into cohorts, of which there were ten in each legion: the cohort thus contained 600 men. Among the troops of the second grade (the auxilia) the cohorts were independent foot regiments 500 or 1000 strong, corresponding to the alae, which were similar regiments of cavalry; they were generally posted on the frontiers of the Empire in small forts of four to eight acres, each holding one cohort or ala. The special troops of Rome itself, the Praetorian Guard, the Urbanae Cohortes, and the Vigiles (fire brigade), were divided into cohorts (see further Roman Army). The phrase cohors praetoria or cohors amicorum was sometimes used, especially during the Roman republic, to denote the suite of the governor of a province; hence developed the Praetorian cohorts which formed the emperor's bodyguard.

In biology, " cohort " is a term for a group of allied orders or families of plants or animals.

COIF (from Fr. coiffe, Ital. cuffia, a cap), a close-fitting covering for the head. Originally it was the name given to a head-cover- ing worn in the middle ages, tied like a night-cap under the chin, and worn out of doors by both sexes; this was later worn by men as a kind of night-cap or skull-cap. The coif was also a close-fitting cap of white lawn or silk, worn by English serjeants- at-law as a distinguishing mark of their profession. It became the fashion to wear on the top of the white coif a small skull-cap of black silk or velvet; and on the introduction of wigs at the end of the 17 th century a round space was left on the top of the wig for the display of the coif, which was afterwards covered by a small patch of black silk edged with white (see A. Pulling, Order of the Coif, 1897). The random conjecture of Sir H. Spelman (Glossarium arckaiologicum) that the coif was originally designed to conceal the ecclesiastical tonsure has unfortunately been quoted by annotators of Blackstone's Commentaries as well as by Lord Campbell in his Lives of the Chief Justices. It may be classed with the curious conceit, recorded in Brand's Popular Antiquities, that the coif was derived from the child's caul, and was worn on the advocate's head for luck.

COIMBATORE, a city and district of British India, in the Madras presidency. The city is situated on the left bank of the Noyil river, 305 m. from Madras by the Madras railway. In 1901 it had a population of 53,080, showing an increase of 14% in the decade. The city stands 1437 ft. above sea-level, is well laid out and healthy, and is rendered additionally attractive to European residents by its picturesque position on the slopes of the Nilgiri hills. It is an important industrial centre, carrying on cotton weaving and spinning, tanning, distilling, and the manufacture of coffee, sugar, manure and saltpetre, it has two second-grade colleges, a college of agriculture, and a school of forestry.

The District of Coimbatore has an area of 7860 sq. m. It may be described as a fiat, open country, hemmed in by moun- tains on the north, west and south, but opening eastwards on to the great plain of the Carnatic; the average height of the plain above sea-level is about 900 ft. The principal mountains are the Anamalai Hills, in the south of the district, rising at places to a height of between 8000 and 9000 ft. In the west the Palghat and Vallagiri Hills form a connecting link between the Anamalai range and the Nilgiris, with the exception of a remarkable gap known as the Palghat Pass. This gap, which completely inter- sects the Ghats, is about 20 m. wide. In the north is a range

of primitive trap-hills known" as the Cauvery chain, extending eastwards from the Nilgiris, and rising in places to a height of 4000 ft. The principal rivers are the Cauvery, Bhavani, Noyil, and Amravati. Numerous canals are cut from the rivers for the purpose of affording artificial irrigation, which has proved of immense benefit to the country. Well and tank water is also largely used for irrigation purposes. Coimbatore district was acquired by the British in 1799 at the close of the war which ended with the death of Tippoo. In 1901 the population was 2,201,782, showing an increase of 10% in the preceding decade. The principal crops are millet, rice, other food grains, pulse, oilseeds, cotton and tobacco, with a little coffee. Forests cover nearly i§ million acres, yielding valuable timber (teak, sandal-wood, &c), and affording grazing-ground for cattle. There are several factories for pressing cotton, and for cleaning coffee, oil- cake presses, tanneries and saltpetre refineries. Cereals, cotton, forest products, cattle and hides, and brass and copper vessels are the chief exports from the district. The south-west line of the Madras railway runs through the district, and the South Indian railway (of metre gauge) joins this at Erode.

COIMBRA, the capital of an administrative district formerly included in the province of Beira, Portugal; on the north bank of the river Mondego, 115 m. N.N.E. of Lisbon, on the Lisbon- Oporto railway. Pop. (1900) 18,144. Coimbra is built for the most part on rising ground, and presents from the other side of the river a picturesque and imposing appearance; though in reality its houses have individually but little pretension, and its streets are, almost without exception, narrow and mean. It derives its present importance from being the seat of the only university in the kingdom — an institution which was originally established at Lisbon in 1291, was transferred to Coimbra in 1306, was again removed to Lisbon, and was finally fixed at Coimbra in 1527. There are five faculties — theology, law, medicine, mathematics and philosophy — with more than 1300 students. The library contains about 150,000 volumes, and the museums and laboratories are on an extensive scale. In connexion with the medical faculty there are regular hospitals; the mathematical faculty maintains an observatory from which an excellent view can be obtained of the whole valley of the Mondego; and outside the town there is a botanic garden (especially rich in the flora of Brazil), which also serves as a public promenade. Among the other educational establishments are a military college, a royal college of arts, a scientific and literary institute, and an episcopal seminary.

The city is the seat of a bishop, suffragan to the archbishop of Braga; its new cathedral, founded in 1580, is of little interest; but the old is a fine specimen of 12th-century Romanesque, and retains portions of the mosque which it replaced. The principal churches, are Santa Cruz, of the 16th century, and San Salvador, founded in 1169. On the north bank of the Mondego stand the ruins of the once splendid monastery of Santa Clara, established in 1286; and on the south bank is the celebrated Quinta das lagrimas, or Villa of Tears, where Inez de Castro (q.v.) is believed to have been murdered in 1355- The town is supplied with water by means of an aqueduct of 20 arches. The Mondego is only navigable in flood, and the port of Figueira da Foz is 20 m. W. by S., so that the trade of Coimbra is mainly local; but there are important lamprey fisheries and manufactures of pottery, leather and hats.

A Latin inscription of the 4th century identifies Coimbra with the ancient Aeminium; while Condeixa (3623), 8 m. S.S.W., represents the ancient Conimbriga or Conembrica,. In the 9th century, however, when the bishopric of Conimbriga was re- moved hither, its old title was transferred to the new see, and hence arose the modern name Coimbra. The city was for a long time a Moorish stronghold, but in 1064 it was captured by Ferdinand I. of Castile and the Cid. Until 1 260 it was the capital of the country, and no fewer than six kings — Sancho I. and II., Alphonso II. and III., Pedro and Ferdinand — were born within its walls. It was also the birthplace of the poet Francisco Sa de Miranda (1495-1558), and, according to one tradition, of the more famous Luiz de Camoens (1524-1580), who was a student

at the university between 1537 and 1542. In 1755 Coimbra suffered considerably from the earthquake. In 1810 it was sacked by the French under Marshal Massena. In 1834 Dom Miguel made the city his headquarters; and in 1846 it was the scene of a Miguelist insurrection.

The administrative district of Coimbra coincides with the south-western part of Beira; pop. (1900) 332,168; area 1508 sq. m.

COIN, a town of southern Spain in the province of Malaga; 18 m. W.S.W. of the city of Malaga. Pop. (1900) 12,326. Coin is finely situated on the northern slope of the Sierra de Mijas, overlooking the small river S6co and surrounded by vineyards and plantations of oranges and lemons. There are marble quarries in the neighbourhood, and, despite the lack of a railway, Coin has a thriving agricultural trade. The population increased by more than half between 1880 and 1900.

COIN (older forms of the word are coyne, quoin and coign, all derived through the 0. Fr. coing, and cuigne from Lat. cuneus, a wedge), properly the term for a wedge-shaped die used for stamping money, and so transferred to the money so stamped; hence a piece of money. The form “quoin” is used for the external angle of a building (see Quoins), and ” coign,” also a projecting angle, survives in the Shakespearean phrase ” a coign of vantage.”

COINAGE OFFENCES. The coinage of money is in all states a prerogative of the sovereign power; consequently any in- fringement of that prerogative is always severely punished, as being an offence likely to interfere with the well-being of the state.

In the United Kingdom the statute law against offences re- lating to the coin was codified by an act of 1861. The statute provides that whoever falsely makes or counterfeits any coin resembling or apparently intended to resemble or pass for any current gold or silver coin of the realm (s. 2), or gilds, silvers, washes, cases over or colours with materials capable of producing the appearance of gold or silver a coin or a piece of any metal or mixture of metals, or files or alters it, with intent to make it resemble or pass for any current gold or silver coin (s. 3), or who buys, sells, receives or pays a false gold or silver coin at a lower rate than its denomination imports, or who receives into the United Kingdom any false coin knowing it to be counterfeit (ss. 6, 7), or who, without lawful authority or excuse, knowingly makes or mends, buys or sells, or has in his custody or possession, or conveys out of the Royal Mint any coining moulds, machines or tools, is guilty of felony (ss. 24, 25). The punishment for such offences is either penal servitude for life or for not less than three years, or imprisonment for not more than two years, with or .without hard labour. Whoever impairs, diminishes Or lightens current gold or silver coin, with mtent to pass same, is liable to penal servitude for from three to fourteen years (s. 4), and whoever has in his possession filings or clippings obtained by impairing or lightening current coin is liable to the same punishment, or to penal servitude for from three to seven years. The statute also makes provision against tendering or uttering false gold or silver coin, which is a misdemeanour, punishable by imprisonment with or without hard labour. Provision is also made with respect to falsely making, counterfeiting, tendering or uttering copper coin, exporting false coin, or defacing current coin by stamping names or words on it, and counterfeiting, tendering or uttering coin resembling or meant to pass as that of some foreign state. The act of 1861 applies to offences with respect to colonial coins as well as to those of the United Kingdom.

By the constitution of the United States, Congress has the power of coining money, regulating the value thereof and of foreign coin (Art. i. s. viii.), and the states are prohibited from coining money, or making anything but gold and silver money a tender in payment of debts (Art. i. s. x.). The counterfeiting coin or money, uttering the same, or mutilating or defacing it, is an offence against the United States, and is punishable by fine and imprisonment with hard labour for from two to ten years. It has also been made punishable by state legislation.

COIR (from Malay Kayar, cord, Kdyaru, to be twisted), a rough, strong, fibrous substance obtained from the outer husk of the coco-nut. (See Coco-Nut Palm.)

COIRE (Ger. Chur or Cur, Ital. Coira, Lat. Curia Raetorum, Romonsch Cuera), the capital of the Swiss canton of the Grisons. It is built, at a height of 1949 ft. above the sea-level, on the right bank of the Plessur torrent, just as it issues from the Schanfigg valley, and about a mile above its junction with the Rhine. It is overshadowed by the Mittenberg (east) and Pizokel (south), hills that guard the entrance to the deep-cut Schanfigg valley. In 1900 it contained 11,532 inhabitants, of whom 9288 were German-speaking, 1466 Romonsch-speaking, and 677 Italian- speaking; while 7561 were Protestants, 3962 Romanists and one a Jew. The modern part of the city is to the west, but the old portion, with all the historical buildings, is to the east. Here is the cathedral church of St Lucius (who is the patron of Coire, and is supposed to be a 2nd-century British king, though really the name has probably arisen from a confusion between Lucius of Cyrene — miswritten ” curiensis ” — with the Roman general Lucius Munatius Plancus, who conquered Raetia). Built between 1178 and 12S2, on the site of an older church, it contains many curious medieval antiquities (especially in the sacristy), as well as a picture by Angelica Kaufmann, and the tomb of the great Grisons political leader (d. 1637) Jenatsch (q.v.). Opposite is the Bishop’s Palace, and not far off is the Episcopal Seminary (built on the ruins of a 6th-century monastic foundation). Not far from these ancient monuments is the new Raetian Museum, which contains a great collection of objects relating to Raetia (including the geological collections of the Benedictine monk of Disentis, Placidus a Spescha (1752-1833), who explored the high snowy regions around the sources of the Rhine). One of the hospitals was founded by the famous Capuchin philanthropist, Father Theodosius Florentini (1808-1865), who was

long the Romanist cure of Coire, and whose remains were in 1906 trans- ferred from the cathedral here to Ingenbohl (near Schwyz), his chief foundation. Coire is 74 m. by rail from Zurich, and is the meeting-point of the routes from Italy over many Alpine passes (the Lukmanier, the Splugen, the San Bernardino) as well as from the Engadine (Albula, Julier), so that it is the centre of an active trade (particularly in wine from the Valtelline), though it possesses also a few local factories.

The episcopal see is first mentioned in 452, but probably existed a century earlier. The bishop soon acquired great temporal powers, especially after his dominions were made, in 831, dependent on the Empire alone, of which he became a prince in 1170. In 1392 he became head of the league of God's House (originally formed against him in 1367), one of the three Raetian leagues, but, in 1526, after the Reformation, lost his temporal powers, having fulfilled his historical mission (see Grisons). The bishopric still exists, with jurisdiction over the Cantons of the Grisons, Glarus, Zurich, and the three Forest Cantons, as well as the Austrian principality of Liechtenstein. The gild con- stitution of the city of Chur lasted from 1465 to 1839, while in 1874 the Burgergemeinde was replaced by an Einwohnergemeinde.

Authorities. — A. Eichhorn, Episcopatus Curiensis (St Blasien, 1797); W. von Juvalt, Forschungen iiber die Feudalzeit im Curischen Raetien, 2 parts (Zurich, 187 1); C. Kind, Die Reformation in den Bisthiimern Chur und Como (Coire, 1858); Conradin von Moor, Geschichte von Curraetien (2 vols., Coire, 1870-1874); P. C. von Planta, Das alte Raetien (Berlin, 1872); Idem, Die Curraetischen Herrschaften in der Feudalzeit (Bern, 1881); Idem, Verfassungs- geschichte der Stadt Cur im Mittelalter (Coire, 1879) ; Idem, Geschichte von Craubiinden (Bern, 1892). (W. A. B. C.)

COKE, SIR EDWARD (1552-1634), English lawyer, was born at Mileham, in Norfolk, on the 1st of February 1552. From the grammar school of Norwich he passed to Trinity College, Cam- bridge; and in 1572 he entered Lincoln's Inn. In 1578 he was called to the bar, and in the next year he was chosen reader at Lyon's Inn. His extensive and exact legal erudition, and the skill with which he argued the intricate libel case of Lord Crom- well (4 Rep. 13), and the celebrated real property case of Shelley (1 Rep. 94, 104), soon brought him a practice never before equalled, and caused him to be universally recognized as the

greatest lawyer of his day. In 1586 he was made recorder of Norwich, and in 1592 recorder of London, solicitor-general, and reader in the

Inner Temple. In 1593 he was returned as member of parliament for his native county, and also chosen speaker of the House of Commons. In 1594 he was promoted to the office of attorney-general, despite the claims of Bacon, who was warmly supported by the earl of Essex. As crown lawyer his treatment of the accused was marked by more than the harshness and violence common in his time; and the fame of the victim has caused his behaviour in the trial of Raleigh to be lastingly remembered against him. While the prisoner defended himself with the calmest dignity and self-possession, Coke burst into the bitterest invective, brutally addressing the great courtier as if he had been a servant, in the phrase, long remembered for its insolence and its utter injustice — ” Thou hast an English face, but a ‘Spanish heart! ”

In 1582 Coke married the daughter of John Paston, a gentle- man of Suffolk, receiving with her a fortune of £30,000; but in six months he was left a widower. Shortly after he sought the hand of Lady Elizabeth Hatton, daughter of Thomas, second Lord Burghley, and granddaughter of -the great Cecil. Bacon was again his rival, and again unsuccessfully; the wealthy young widow became — not, it is said, to his future comfort — Coke’s second wife.

In 1606 Coke was made chief justice of the common pleas, but in 1 6 1 3 he was removed to the office of chief justice of the king’s bench, which gave him less opportunity of interfering with the court. The change, though it brought promotion in dignity, caused a diminution of income as well as of power; but Coke received some compensation in being appointed a member of the privy council. The independence of his conduct as a judge, though not unmixed with the baser elements of prejudice and vulgar love of authority, has partly earned for- giveness for the harshness which was so prominent in his sturdy character. Full of an extreme reverence for the common law which he knew so well, he defended it alike against the court of chancery, the ecclesiastical courts, and the royal prerogative. In a narrow spirit, and strongly influenced, no doubt, by his enmity to the chancellor, Thomas Egerton (Lord Brackley), he sought to prevent the interference of the court of chancery with even the unjust decisions of the other courts. In the case of an appeal from a sentence given in the king’s bench, he advised the victorious, but guilty, party to bring an action of praemunire against all those who had been concerned in the appeal, and his authority was stretched to the utmost to obtain the verdict he desired. On the other hand, Coke has the credit of having repeatedly braved the anger of the king. He freely gave his opinion that the royal proclamation cannot make that an offence which was not an offence before. An equally famous but less satisfactory instance occurred during the trial of Edmund Peacham, a divine in whose study

a sermon had been found containing libellous accusations against the king and the govern- ment. There was nothing to give colour to the charge of high treason with which he was charged, and the sermon had never been preached or published; yet Peacham was put to the torture, and Bacon was ordered to confer with the judges individually concerning the matter. Coke declared such con- ference to be illegal, and refused to give an opinion, except in writing, and even then he seems to have said nothing decided. But the most remarkable case of all occurred in the next year (1616). A trial was held before Coke in which one of the counsel denied the validity of a grant made by the king to the bishop of Lichfield of a benefice to be held in commendam. James, through Bacon, who was then attorney-general, commanded the chief justice to delay judgment till he himself should discuss the question with the judges. At Coke's request Bacon sent a letter containing the same command to each of the judges, and Coke then obtained their signatures to a paper declaring that the attorney-general's instructions were illegal, and that they were bound to proceed with the case. His Majesty expressed his displeasure, and summoned them before him in the council- chamber, where he insisted on his supreme prerogative, which,

he said, ought not to be discussed in ordinary argument. Upon this all the judges fell on their knees, seeking pardon for the form of their letter; but Coke ventured to declare his continued belief in the loyalty of its substance, and- when asked if he would in the future delay a case at the king's order, the only reply he would vouchsafe was that he would do what became him as a judge. Soon after he was dismissed from all his offices on the following charges, — the concealment, as attorney-general, of a bond belonging to the king, a charge which could not be proved, illegal interference with the court of chancery and disrespect to the king in the case of commendams. He was also ordered by the council to revise his book of reports, which was said to contain many extravagant opinions (June 16 16).

Coke did not suffer these losses with patience. He offered his daughter Frances, then little more than a child, in marriage to Sir John Villiers, brother of the favourite Buckingham. Her mother, supported at first by her husband's great rival and her own former suitor, Bacon, objected to the match, and placed her in concealment. But Coke discovered her hiding-place; and she was forced to wed the man whom she declared that of all others she abhorred. The result was the

desertion of the husband and the fall of the wife. It is said, however, that after his daughter's public penance in the Savoy church, Coke had heart enough to receive her back to the home which he had forced her to leave. Almost all that he gained by his heartless diplomacy was a seat in the council and in the star-chamber.

In 1620 a new and more honourable career opened for him. He was elected member of parliament for Liskeard; and hence- forth he was one of the most prominent of the constitutional party. It was he who proposed a remonstrance against the growth of popery and the marriage of Prince Charles to the infanta of Spain, and who led the Commons in the decisive step of entering on the journal of the House the famous petition of the 1 8th of December 162 1, insisting on the freedom of parlia- mentary discussion, and the liberty of speech of every individual member. In consequence, together with Pym and Sir Robert Philips, he was thrown into confinement; and, when in the August of the next year he was released, he was commanded to remain in his house at Stoke Poges during his Majesty's pleasure. Of the first and second parliaments of Charles I. Coke was again a member. From the second he was excluded by being appointed sheriff of Buckinghamshire. In 1628 he was at once returned for both Buckinghamshire and Suffolk, and he took his seat for the former county. After rendering other valuable support to the popular cause, he took a most important part in drawing up the great Petition of Right. The last act of his public career was to bewail with tears the ruin which he declared the duke of Buckingham was bringing upon the country. At the close of the session he retired into private life; and the six years that remained to him were spent in revising and improving the works upon which, at least as much as upon his public career, his fame now rests. He died at Stoke Poges on the 3rd of September 1634.

Coke published Institutes (1628), of which the first is also known as Coke upon Littleton; Reports (1600-1615), in thirteen parts; A Treatise of Bail and Mainprize (1635); The Complete Copyholder (1630); A Reading on Fines and Recoveries (1684).

See Johnson, Life of Sir Edward Coke (1837); H. W. Woolrych, The Life of Sir Edward Coke (1826); Foss, Lives of the Judges; Campbell, Lives of the Chief Justices ; also English Law.

COKE, SIR JOHN (1 563-1 644), English politician, was born on the 5th of March 1563, and was educated at Trinity College, Cambridge. After leaving the university he entered public life as a servant of William Cecil, Lord Burghley, afterwards becoming deputy-treasurer

of the navy and then a commissioner of the navy, and being specially commended for his labours on behalf of naval administration. He became member of parlia- ment for Warwick in 1621 and was knighted in 1624, afterwards representing the university of Cambridge. In the parliament of 1625 Coke acted as a secretary of state; in this and later parliaments he introduced the royal requests for money, and defended the foreign policy of Charles I. and Buckingham, and afterwards the actions of the king. His actual appointment as

secretary dates from September 1625. Disliked by the leaders of the popular party, his speeches in the House of Commons did not improve the king's position, but when Charles ruled without a parliament he found Coke's industry very useful to him. The secretary retained his post until 1639, when a scapegoat was required to expiate the humiliating treaty of Berwick with the Scots, and the scapegoat was Coke. Dismissed from office, he retired to his estate at Melbourne in Derbyshire, and then resided in London, dying at Tottenham on the 8th of September 1644. Coke's son, Sir John Coke, sided with the parliament in its struggle with the king, and it is possible that in later life Coke's own sympathies were with this party, although in his earlier years he had been a defender of absolute monarchy. Coke, who greatly disliked the papacy, is described by Clarendon as " a man of very narrow education and a narrower mind "; and again he says, " his cardinal perfection was industry and his most eminent infirmity covetousness."

COKE, THOMAS (1747-1814), English divine, the first Methodist bishop, was born at Brecon, where his father was a well-to-do apothecary. He was educated at Jesus College, Oxford, taking the degree of M.A. in 1770 and that of D.C.L. in 1775. From 1772 to 1776 he was curate at South Petherton in Somerset, whence his rector dismissed him for adopting the open-air and cottage services introduced by John Wesley, with whom he had become acquainted. After serving on the London Wesleyan circuit he was in 1782 appointed president of the con- ference in Ireland, a position which he frequently held, in the intervals of his many voyages to America. He first visited that country in 1784, going to Baltimore as " superintendent " of the Methodist societies in the new world and, in 1787 the American conference changed his title to " bishop," a nomenclature which he tried in vain to introduce into the English conference, of which he was president in 1797 and 1805. Failing this, he asked Lord Liverpool to make him a bishop in India, and he was voyaging to Ceylon when he died on the 3rd of May 1814. Coke had always been a missionary enthusiast, and was the pioneer of such enterprise in his connexion. He was an ardent opponent of slavery,

and endeavoured also to heal the breach between the Methodist and Anglican communions. He published a History of the West Indies (3 vols., 1808-1811), several volumes of sermons, and, with Henry Moore, a Life of Wesley (1792).

COKE (a northern English word, possibly connected with ” colk,” core), the product obtained by strongly heating coal out of contact with the air until the volatile constituents are driven off; it consists essentially of carbon, the so-called ” fixed carbon,” together with the incombustible matters or ash con- tained in the coal from which it is derived. In addition to these it almost invariably contains small quantities of hydrogen, oxygen and nitrogen, the whole, however, not exceeding 2 or 3%. It also contains water, the amount of which may vary considerably according to the method of manufacture. When produced rapidly and at a low heat, as in gas-making, it is of a dull black colour, and a loose spongy or pumice-like texture, and ignites with comparative ease, though less readily than bituminous coal, so that it may be burnt in open fire-places; but when a long-continued heat is used, as in the preparation of coke for iron and steel melting, the product is hard and dense, is often prismatic in structure, has a brilliant semi-metallic lustre and silvery-grey colour, is a conductor of heat and electricity, and can only be burnt in furnaces provided with a strong chimney draught or an artificial blast. The strength and cohesive properties are also intimately related to the nature and com- position of the coals employed, which are said to be caking or non-caking according to the compact or fragmentary character of the coke produced.

Formerly coke was made from large coal piled in heaps with central chimneys like those of the charcoal burner, or in open rectangular clamps or kilns with air flues in the enclosing walls; but these methods are now practically obsolete, closed chambers or ovens being generally used. These vary considerably in construction, but may be classified into three principal types: — (1) direct heated ovens, (2) flue-heated ovens, (3) condensing

ovens. In the first class the heating is done by direct contact or by burning the gases given off in coking within the oven, while :n the other two the heating is indirect, the gas being burned in cellular passages or flues provided in the walls dividing the coking chambers, and the heat transmitted through the sides of the latter which are

comparatively thin. The arrangement is somewhat similar to that of a gas-works retort, whence the name of ” retort ovens ” is sometimes applied to them. The difference between the second and third classes is founded on the treatment of the gases. In the former the gas is fired in the side flues immediately upon issuing from the oven, while in the latter the gases are first subjected to a systematic treatment in condensers, similar to those used in gas-works, to remove tar, ammonia and condensable hydrocarbons, the incondensable gases being returned to the oven and burned in the heating flues. These are generally known as ” by-product ovens.”

The simplest form of coke oven, and probably that still most largely used, is the so-called ” beehive oven.” This is circular in plan, from 7 to 12 ft. in diameter, with a cylindrical wall Beehive about 2\ ft. high and a nearly hemispherical roof with a oven – circular hole at the top. The floor, made of refractory

bricks or slabs, is laid with a slight slope towards an arched opening in the ring wall, which is stopped with brickwork during the coking but opened for drawing the finished charge. The ovens are usually arranged in rows or banks of 20 to 30 or more, with their doors outwards, two rows being often placed with a longitudinal flue between them connected by uptakes with the individual ovens on either side. A railway along the top of the bank brings the coal from the screens or washery. The largest ovens take a charge of about 5 tons, which is introduced through the hole in the roof, the brick- work of the empty oven being still red hot from the preceding charge, and when levelled fills the cylindrical part nearly to the springing of the roof. The gas fires as it is given off and fills the dome with flame, and the burning is regulated by air admitted through holes in the upper part of the door stopping. The temperature being very high, a proportion of the volatile hydrocarbons is decomposed, and a film of graphitic carbon is deposited on the coke, giving it a semi-metallic lustre and silvery grey colour. When the gas is burned off, the upper part of the door is opened and the glowing charge cooled by jets of water thrown directly upon it from a hose, and it is subsequently drawn out through the open door. The charge breaks up into prisms or columns whose length corresponds to the depth of the charge, and as a rule is uniform in character and free from dull black patches or ” black ends.” The time of burning is either 48 or 72 hours, the turns being so arranged as to avoid the necessity of drawing the ovens on Sunday. The longer the heat is continued the denser the product becomes, but the yield also diminishes, as a portion of the finished coke necessarily burns to waste when the gas is exhausted. For this reason the yield on the coal charged is usually less than that obtained

in retort ovens, although the quality may be better. Coals containing at most about 35 % of volatile matter are best suited for the beehive oven. With less than 25% the gas is not sufficient to effect the coking completely, and when there is a higher percentage the coke is brittle and spongy and unsuited for blast furnace or foundry use. The spent flame from the ovens passes to a range of steam boilers before escaping by the chimney.

The retort oven, which is now generally displacing the beehive form in new installations, is made in a great variety of forms, the differences being mainly in the arrangement of the Retort heating flues, but all have the central feature, the coking oven – chamber, in common. This is a tubular chamber with

vertical sides and cylindrical roof, about 30 ft. long, from 17 to 20 in. wide, and 6 or 7 ft. high, and closed at both ends by sliding doors which are raised by crab winches when the charge is to be drawn. The general arrangements of such an oven are shown in fig. 1 , which represents one of the earliest and most popular forms, that of Evence Coppee of Brussels. The coking chambers A B connect by rect- angular posts at the springing of the roof, where the gas given off from the top of the charge is fired by air introduced through c c. The flames pass downwards through the parallel flues //along the bottom flue of one oven, and return in the opposite direction under the next to the chimney flue, a further part of the heat being inter- cepted by placing a range of steam boilers between the ovens and the chimney stack. The charging of the oven is done through the passages D D in the roof from small wagons on transverse lines of rails, the surface being raked level before the doors are closed and luted up. The time of coking is much less than in the beehive ovens and may be from 24 to 36 hours, according to the proportion of volatile matter present. When the gas is completely given off the doors are lifted and the charge is pushed out by the ram — a cast-iron plate of the shape of the cross section of the oven, at the end of a long horizontal bar, which is driven by a rack and pinion movement and pushes the block of coke out of the oven on to the wharf or bank in front where it falls to pieces and is immediately

quenched by jets of water from a hose pipe. When sufficiently cooled it is loaded into railway wagons or other conveyances for removal. The ram, together with its motor, and boiler when steam is used, is mounted upon a carriage running upon a line of rails of about 2 ft. gauge along the back of the range of ovens, so that it can be brought up to any one of them in succession.

In some cases, instead of the small coal being charged through the roof of the oven and levelled by hand, it is formed into blocks by

Transverse Section c c c c c

Fig. 1. — Coppee's Coke Oven.

being stamped in a slightly moistened condition in a mould consisting of a bottom plate or peel on a racked rod like that of the ram, with movable sides and ends. This, when the ends are removed, is pushed forward into the oven, and the bottom plate is withdrawn by reversing the rack motion. The moulding box is mounted on a carriage like that of the ram, the two being sometimes carried on the same framing. The moulding is done at a fixed station in the centre of the range of ovens by a series of cast-iron stampers driven by an electric motor. This system is useful for coals low in volatile matter, which do not give a coherent coke under ordinary conditions.

In the distilling or by-product ovens the gases, instead of being burned at the point of origin, pass by an uptake pipe in the roof about the centre of the oven into a water-sealed collecting trough or hydraulic main, whence they are drawn by Co/ " tens – exhausters through a series of air and water cooled con- la S° veas – densers and scrubbers._ In the first or atmospheric condensers the tar is removed, and in the second ammoniacal water, which is further enriched by a graduated system of scrubbing with weak ammoniacal liquor until it is sufficiently concentrated to be sent to the ammonia stills. The first treatment by scrubbing with creosote or heavy tar oil removes benzene, after which the permanent gaseous residue consisting chiefly of hydrogen and marsh gas is returned to the ovens as fuel.

In the Otto-Hoffmann oven, one of the most generally used forms, vertical side flues like those of Coppee are adopted. The returned gas enters by a horizontal flue along the bottom of the coking chamber, divided into two parts by a mid-feather wall, and is fired by heated air from a Siemens regenerator on the substructure at one end, and the flame rising through one half of the side flues to a parallel collector at the top returns downwards through the flues of the other half and passes out to the chimney through a similar regenerator at the other end. The course of the gases is reversed at intervals of about an hour, as in the ordinary Siemens furnace, each end of the. oven having its own gas supply. In the later modi- fication known as the Otto-Hilgenstock, the regenerators are aban- doned, but_ provision is made for more perfect distribution of the heat by a line of sixteen Bunsen burners in each wall ; each of these serves two flues, the course of the

flame being continuously upwards without reversal. In the newest Otto ovens the same system of burners is combined with regenerators. In the Bauer system, another vertical flue oven, each flue has its own burner, which is of a simplified construction.

In the Carves oven, tha earliest of the by-product ovens, the heating flues are arranged horizontally in parallel series along the entire length of the side walls, the gas being introduced from both ends but at different levels. This system was further developed by H. Simon of Manchester, who added a continuous air ” recuperator ” heated by the spent flame; this Simon-Carves system has been extensively adopted in Great Britain. Another horizontal flue oven, the Semet-Solvay, is distinguished by the structure of the flues, which are independent of the dividing walls of the ovens, so that the latter can be made with thinner sides than those of the earlier systems, and are more readily repaired. In the horizontal ovens it is_ sometimes difficult to maintain the heat when the flues are continuous along the whole length of the wall, especially when the heating value of the gas is reduced by the removal of the heavy hydrocarbons. This difficulty is met by dividing the flues in the middle so as to shorten the length of travel of the flame, and working each end independently. The Hilssener and Koppers systems are two of the best-known examples of this modification.

Coke from retort ovens is not so dense or brilliant as that made

in beehive ovens, but the waste being less there is a decided saving, apart from the value of the condensed products. In one instance the coke was found to be about 5 % less efficient in the blast furnace, while the yield on the coal charged was increased 10%. In the further treatment of the condensed products by distillation the tar gives burning oil and pitch, the benzene is separated from the creosote oil by steam-heated stills, and the ammoniacal liquor, after some lime has been added to decompose fixed ammonium compounds, is heated to vaporize the ammonia, which is condensed in lead or copper-lined tanks containing strong sulphuric acid to produce a crystalline powder of ammonium sulphate, which accumulates in the receiver and is fished out from time to time. The yield of by-products averages about 1 % of ammonium sulphate, about 32% of tar, and 0-6 to 09% of benzene, of the weight of the coal carbonized. After the ovens have been heated and steam supplied for the machinery of the condensing

plant and the coke ovens, there is usually a surplus of gas, which may be used for lighting or driving gas-engines. For the latter purpose, however, it is necessary to remove the last traces of tar, which acts very prejudicially in fouling the valves when the gas is not completely purified. The gas given off during the earlier part of the coking process is richer in heavy hydrocarbons and of a higher illuminating value than that of the later period when the temperature is higher. This property is utilized in several large coking plants in America, where the gas from the first ten hours' working is drawn off by a second hydraulic main and sent directly to town gas-works, where it passes through the ordinary purifying treatment, the gas from the second period being alone used for heating the ovens.

Coke is essentially a partially graphitized carbon, its density being about midway between that of coal and graphite, and it should therefore occupy less space than the original coal; but owing to the softening of the charge a spongy structure is set up by the escaping gases, which acts in the other direction, so that for equal bulk coke is somewhat lighter than coal. It is this combination of properties that gives it its chief value in iron smelting, the substance being sufficiently dense to resist oxidation by carbon dioxide in the higher regions of the furnace, while the vesicular structure gives an extended surface for the action of heated air and facilitates rapid consumption at the tuyeres. Compact coke, such as that formed on the inner sides of gas retorts (retort carbon), can only be burned with great difficulty in small furnaces of special construction, but it gives out a great amount of heat.

The most deleterious constituents of coke are ash, sulphur and volatile constituents including water. As the coke yield is only from two-thirds to three-quarters of that of the coal, the original proportion of ash is augmented by one-third or one- half in the product. For this reason it is now customary to crush and wash the coal carefully to remove intermingled patches of shale and dirt before coking, so that the ash may not if possible exceed 10% in the coke. About one-half of the sulphur in the coal is eliminated in coking, so that the percentage in the coke is about the same. It should not be much above 1 %. According to the researches of F. Wuest (Journ. Iron and Steel Inst., 1906) the sulphur is retained in a complex carbon compound which is not destroyed until the coke is actually consumed.

The older methods of coking and the earlier forms of retort ovens are described in J. Percy, Metallurgy, Jordan, Album du cours de metallurgies Phillips and Bauerman, Handbook of Metallurgy, and other text-books. A systematic series of articles on the newer forms

will be found in The Engineer, vol. 82, pp. 205-303 and vol. 83, pp. 207- 231; see also Diirre, Die neuern Koksofen (Leipzig, 1892); D. A. Louis, ” Von Bauer and Briinck Ovens,” Journ. Iron and Steel Inst., 1904, ii. p. 293; C. L. Bell, ” Hiissener Oven,” id., 1904, i. p. 188; Hurez, ” A Comparison of Different Systems of Vertical and Horizontal Flue Ovens,” Bull. soc. industrie minirale, 1903, p. 777. A well-illustrated description of the Otto system in its American modification was issued by the United Gas & Coke Company of New York, in 1906. (H. B.)

COL (Fr. for “neck,” Lat. collum), in physical geography, generally any marked depression upon a high and rugged water- parting over which passage is easy from one valley to another. Such is the Col de Balme between the Trient and Chamounix valleys, where the great inaccessible wall crowned with aiguilles running to the massif of Mt. Blanc is broken by a gentle down- ward curve with smooth upland slopes, over which a footpath gives easy passage. The col is usually formed by the head-waters of a stream eating backward and lowering the water-parting at the head of its valley. In early military operations, the march of an army was always over a col, which has at all times con-

siderable commercial importance in relation to roads in high mountain regions.

COLBERT, JEAN BAPTISTE (1619-1683), French statesman, was born at Reims, where his father and grandfather were merchants. He claimed to be the descendant of a noble Scottish family, but the evidence for this is lacking. His youth is said to have been spent in a Jesuit college, in the office of a Parisian banker, and in that of a Parisian notary, Chapelain, the father of the poet. But the first fact on which we can rely with confidence is that, when not yet twenty, he obtained a post in the war-office, by means of the influence that he possessed through the marriage of one of his uncles to the sister of Michel Le Tellier, the secretary of state for war. During some years he was employed in the inspection of troops and other work of the kind, but at length his ability, his extraordinary energy and his untiring laboriousness induced Le Tellier to make him his private secretary. These qualities, combined, it must be confessed, with a readiness to seize every opportunity of advancement, soon brought Colbert both wealth and influence. In 1647 we find him receiving the confiscated goods of his uncle Pussort, in 1648 obtaining 40,000 crowns with his wife Marie Charron, in 1649 appointed councillor of state.

It was the period of the wars of the Fronde; and in 1651 the triumph

of the Conde family drove Cardinal Mazarin from Paris. Colbert, now aged' thirty- two, was engaged to keep him acquainted with what should happen in the capital during his absence. At first Colbert's position was far from satisfactory; for the close wary Italian treated him merely as an ordinary agent. On one occasion, for example, he offered him 1000 crowns. The gift was refused somewhat indignantly; and by giving proof of the immense value of his services, Colbert gained all that he desired. His demands were not small; for, with an ambition mingled, as his letters show, with strong family affection, he aimed at placing all his relatives in positions of affluence and dignity; and many a rich benefice and important public office was appropriated by him to that purpose. For these favours, conferred upon him by his patron with no stinted hand, his thanks were expressed in a most remarkable manner; he published a letter defending the cardinal from the charge of ingratitude which was often brought against him, by enumerating the benefits that he and his family had received from him (April 1655). Colbert obtained, besides, the higher object of his ambition; the confidence of Mazarin, so far as it was granted to any one, became his, and he was entrusted with matters of the gravest importance. In 1659 he was giving directions as to the suppression of the revolt of the gentry which threatened in Normandy, Anjou and Poitou, with characteristic decision arresting those whom he suspected, and arranging every detail of their trial, the immediate and arbitrary destruction of their castles and woods, and the execution of their chief, Bonnesson. In the same year we have evidence that he was already planning his great attempt at financial reform. His earliest tentative was the drawing up of a mSmoire to Mazarin, showing that of the taxes paid by the people not one-half reached the king. The paper also contained an attack upon the superintendent Nicholas Fouquet (q.v.), and being opened by the postmaster of Paris, who happened to be a spy of Fouquet's, it gave rise to a bitter quarrel, which, however, Mazarin repressed during his lifetime.

In 1 66 1 the death of Mazarin allowed Colbert to take the first place in the administration, and he made sure of the king's favour by revealing to him some of Mazarin's hidden wealth. It was some time before he assumed official dignities; but in January 1664 he obtained the post of superintendent of buildings; in 166s 1 he was made controller-general; in 1669 he became minister of the marine; and he was also appointed minister of commerce, the colonies and the king's palace. In short, he soon acquired power in every department except that of war.

A great financial and fiscal reform at once claimed all his energies.

Not only the nobility, but many others who had no legal claim to exemption, paid no taxes; the weight of the burden fell on the wretched country-folk. Colbert sternly and fearlessly set about his task. Supported by the young king, Louis XIV..

he aimed the first blow at the greatest of the extortioners — the bold and powerful superintendent, Fouquet; whose fall, in addition, secured his own advancement.

The office of superintendent and many others dependent upon it being abolished the supreme control of the finances was vested in a royal council. The sovereign was its president; but Colbert, though for four years he only possessed the title of intendant, was its ruling spirit, great personal authority being conferred upon him by the king. The career on which Colbert now entered must not be judged without constant remembrance of the utter rottenness of the previous financial administration. His ruth- lessness in this case, dangerous precedent as it was, was perhaps necessary; individual interests could not be respected. Guilty officials having been severely punished, the fraudulent creditors of the government remained to be dealt with. Colbert's method was simple. Some of the public loans were totally repudiated, and from others a percentage was cut off, which varied, at first according to his own decision, and afterwards according to that of the council which he established to examine all claims against the state.

Much more serious difficulties met his attempts to introduce equality in the pressure of the taxes on the various classes. To diminish the number of the privileged was impossible, but false claims to exemption were firmly resisted, and the unjust direct taxation was lightened by an increase of the indirect taxes, from which the privileged could not escape. The mode of collection was at the same time immensely improved.

Order and economy being thus introduced into the working of the government, the country, according to Colbert's vast yet detailed plan, was to be enriched by commerce. Manufactures were fostered in every way he could devise. New industries were established, inventors protected, workmen invited from foreign countries, French workmen absolutely prohibited to emigrate. To maintain the character of French goods in foreign markets, as well as to afford a guarantee to the home

consumer, the quality and measure of each article were fixed by law, breach of the regulations being punished by public exposure of the delinquent and destruction of the goods, and, on the third offence, by the pillory. But whatever advantage re- sulted from this rule was more than compensated by the dis- advantages it entailed. The production of qualities which would have suited many purposes of consumption was prohibited, and the odious supervision which became necessary involved great waste of time and a stereotyped regularity which resisted all improvements. And other parts of Colbert's schemes deserve still less equivocal condemnation. By his firm maintenance of the corporation system, each industry remained in the hands of certain privileged bourgeois; in this way, too, improvement was greatly discouraged; while to the lower classes opportunities of advancement were closed. Withregard to international commerce Colbert was equally unfortunate in not being in advance of his age; the tariffs he published were protective to an extreme. The interests of internal commerce were, however, wisely consulted. Unable to abolish the duties on the passage of goods from province to province, he did what he could to induce the provinces to equalize them. The roads and canals were improved. The great canal of Languedoc was planned and constructed by Pierre Paul Riquet (1604-1680) under his patronage. To encourage trade with the Levant, Senegal, Guinea and other places, privileges were granted to companies; but, like the more important East India Company, all were unsuccessful. The chief cause of this failure, as well as of the failure of the colonies, on which he bestowed so much watchful care, was the narrowness and rigidity of the government regulations.

The greatest and most lasting of Colbert's achievements was the establishment of the French marine. The royal navy owed all to him, for the king thought only of military exploits. For its use, Colbert reconstructed the works and arsenal of Toulon, founded the port and arsenal of Rochefort, and the naval schools of Rochefort, Dieppe and Saint-Malo, and fortified, with some assistance from Vauban (who, however, belonged to the party of his rival Louvois), among other ports those of Calais, Dunkirk,

Brest and Havre. To supply it with recruits he invented his famous system of classes, by which each seaman, according to the class in which he was placed, gave six months' service every three or four or five years. For three months after his term of service he was to receive half -pay; pensions were promised; and, in short, everything was done to make the navy popular. There was one department, however, that was supplied with men on a very different principle. Letters exist written by Colbert to the judges requiring them to sentence to the oar

as many criminals as possible, including all those who had been condemned to death; and the convict once chained to the bench, the expiration of his sentence was seldom allowed to bring him release. Mendicants also, against whom no crime had been proved, contraband dealers, those who had been engaged in insurrections, and others immeasurably superior to the criminal class, nay, innocent men — Turkish, Russian and negro slaves, and poor Iroquois Indians, whom the Canadians were ordered to entrap — were pressed into that terrible service. By these means the benches of the galleys were filled, and Colbert took no thought of the long unrelieved agony borne by those who filled them.

Nor was the mercantile marine forgotten. Encouragement was given to the building of ships in France by allowing a premium on those built at home, and imposing a duty on those brought from abroad; and as French workmen were forbidden to emigrate, so French seamen were forbidden to serve foreigners on pain of death.

Even ecclesiastical affairs, though with these he had no official concern, did not altogether escape Colbert's attention. He took a subordinate part in the struggle between the king and Rome as to the royal rights over vacant bishoprics; and he seems to have sympathized with the proposal that was made to seize part of the wealth of the clergy. In his hatred of idleness, he ventured to suppress no less than seventeen f6tes, and he had a project for lessening the number of those devoted to clerical and monastic life, by fixing the age for .taking the vows some years later than was then customary. With heresy he was at first unwilling to interfere, for he was aware of the commercial value of the Huguenots; but when the king resolved to make all France Roman Catholic, he followed him and urged his subordinates to do all that they could to promote conversions.

In art and literature Colbert took much interest. He possessed a remarkably fine private library, which he delighted to fill with valuable manuscripts from every part of Europe where France had placed a consul. He has the honour of having founded the Academy of Sciences (now called the Institut de France), the Observatory, which he employed Claude Perrault to build and brought G. D. Cassini (1625-1712) from Italy to superintend, the Academies of Inscriptions and Medals, of Architecture and of Music, the French Academy at Rome, and Academies at Aries, Soissons, Nimes and many other towns, and he reorganized the Academy of Painting and Sculpture which Richelieu had established. He was a member of the French Academy; and one very characteristic rule, recorded to have been proposed by him with the intention of expediting the great Dictionary,

in which he was much interested, was that no one should be accounted present at any meeting unless he arrived before the hour of commencement and remained till the hour for leaving. In 1673 he presided over the first exhibition of the works of living painters; and he enriched the Louvre with hundreds of pictures and statues. He gave many pensions to men of letters, among whom we find Moliere, Corneille, Racine, Boileau, P. D. Huet (1630-1721) and Antoine Varillas (1626-1606), and even foreigners, as Huyghens, Vossius the geographer, Carlo Dati the Dellacruscan, and Heinsius the great Dutch scholar. There is evidence to show that by this munificence he hoped to draw out praises of his sovereign and himself; but this motive certainly is far from accounting for all the splendid, if in some cases specious, services that he rendered to literature, science and art.

Indeed to everything that concerned the interests of France Colbert devoted unsparing thought and toil. Besides all that

has been mentioned, he found time to do something for the better administration of justice (the codification of ordinances, the diminishing of the number of judges, the reduction of the expense and length of trials for the establishment of a superior system of police) and even for the improvement of the breed of horses and the increase of cattle. As superintendent of public buildings he enriched Paris with boulevards, quays and triumphal arches; he relaid the foundation-stone of the Louvre, and brought Bernin from Rome to be its architect; and he erected its splendid colonnade upon the plan of Claude Perrault, by whom Bernin had been replaced. He was not permitted, however, to complete the work, being compelled to yield to the king’s preference for residences outside Paris, and to devote himself to Marly and Versailles.

Amid all these public labours his private fortune was never neglected. While he was reforming the finances of the nation, and organizing its navy, he always found time to direct the management of his smallest farm. He died extremely rich, and left fine estates all over France. He had been created marquis de Seignelay, and for his eldest son he obtained the reversion of the office of minister of marine; his second son became arch- bishop of Rouen; and a third son, the marquis d’Ormoy, became superintendent of buildings.

To carry out his reforms, Colbert needed peace; but the war

department was in the hands of his great rival Louvois, whose influence gradually supplanted that of Colbert with the king. Louis decided on a policy of conquest. He was deaf also to all the appeals against the other forms of his boundless extravagance which Colbert, with all his deference towards his sovereign, bravely ventured to make. 1 Thus it came about that, only a few years after he had commenced to free the country from the weight of the loans and taxes which crushed her to the dust, Colbert was forced to heap upon her a new load of loans and taxes more heavy than the last. Henceforth his life was a hopeless struggle, and the financial and fiscal reform which, with the great exception of the establishment of the navy, was the most valuable service to France contemplated by him, came to nought.

Depressed by his failure, deeply wounded by the king's favour for Louvois, and worn out by overwork, Colbert's strength gave way at a comparatively early age. In 16S0 he was the constant victim of severe fevers, from which he recovered for a time through the use of quinine prescribed by an English physician. But in 1683, at the age of sixty-four, he was seized with a fatal illness, and on the 6th of September he expired. It was said that he died of a broken heart, and a conversation with the king is reported in which Louis disparagingly compared the buildings of Versailles, which Colbert was superintending, with the works constructed by Louvois in Flanders. He took to bed, it is true, immediately afterwards, refusing to receive all messages from the king; but his constitution was utterly broken before, and a post-mortem examination proved that he had been suffering from stone. His body was interred in the secrecy of night, for fear of outrage from the Parisians, by whom his name was cordially detested.

Colbert was a great statesman, who did much for France. Yet his insight into political science was not deeper than that of his age; nor did he possess any superiority in moral qualities. His rule was a very bad example of over-government. He did not believe in popular liberty;, the parlements and the states- general received no support from him. The technicalities of justice he never allowed to interfere with his plans; but he did not hesitate to shield his friends. He trafficked in public offices for the profit of Mazarin and in his own behalf. He caused the suffering of thousands in the galleys; he had no ear, it is said, for the cry of the suppliant. There was indeed a more human side to his character, as is shown in his letters, full of wise advice and affectionate care, to his children, his brothers, his cousins even. Yet to all outside he was " the man of marble." Madame de Sevigne called him " the North." To diplomacy he never pretended; persuasion and deceit were not the weapons he

1 See especially a Memoire presented to the king in 1666, pub- lished in the Lettres, &c, de Colbert, vol. ii.

employed; all his work was carried out by the iron hand of authority. He was a great statesman in that he conceived a magnificent yet practicable scheme for making France first among nations, and in that he possessed a matchless faculty for work, neither shrinking from the vastest undertakings nor scorning the most trivial details.

Numerous vies and eloges of Colbert have been published; but the most thorough student of his life and administration was Pierre Clement, member of the Institute, who in 1846 published his Vie de Colbert, and in 1861 the first of the 9 vols, of the Lettres, instructions, et memoires de Colbert. The historical introductions prefixed to each of these volumes have been published by Mme. Clement under the title of the Histoire de Colbert et de son administration (3rd ed., 1892). The best short account of Colbert as a statesman is that in Lavisse, Histoire de France (1905), which gives a thorough study of the administration. Among Colbert's papers are Memoires sur les affaires de finance de France (written about 1663), a fragment entitled Particularity secretes de la vie du Roy, and other accounts of the earlier part of the reign of Louis XIV. (J. T. S.)

COLBERT DE CROISSY, CHARLES, Marquis (1625-1696), French diplomatist, like his elder brother Jean Baptiste Colbert, began his career in the office of the minister of war Le Tellier. In 1656 he bought a counsellorship at the parlement of Metz, and in 1658 was appointed intendant of Alsace and president of the newly-created sovereign council of Alsace. In this position he had to re-organize the territory recently annexed to France. The steady support of his brother at court gained for him several diplomatic missions — to Germany and Italy (1659-1661). In 1662 he became marquis de Croissy and president a mortier of the parlement of Metz. After various intendancies, at Soissons (1665), at Amiens (1666), and at Paris (1667), he turned definitely to diplomacy. In 1668 he represented France at the conference of Aix-la-Chapelle; and in August of the same year was sent as ambassador to London, where he was to negotiate the definite treaty of alliance with Charles II. He arranged the interview at Dover between Charles and his sister Henrietta of Orleans, gained the king's personal favour by finding a mistress for him, Louise de Keroualle, maid of honour to Madame, and persuaded him to declare war against Holland. The negotiation of the treaty of Nijmwegen (1676-1678) still further increased his reputation as a diplomatist and Louis XIV. made him secretary of state for foreign affairs after the disgrace of Arnauld de Pomporme, brought about by his brother,

1679. He at once assumed the entire direction of French diplomacy. Foreign ambassadors were no longer received and diplomatic instructions were no longer given by other secretaries of state. It was he, not Louvois, who formed the idea of annexation during a time of peace, by means of the chambers of reunion. He had outlined this plan as early as 1658 with regard to Alsace. His policy at first was to retain the territory annexed by the chambers of reunion without declaring war, and for this purpose he signed treaties of alliance with the elector of Brandenburg (1681), and with Denmark (1683); but the troubles following upon the revocation of the edict of Nantes (1685) forced him to give up his scheme and to prepare for war with Germany (1688). The negotiations for peace had been begun again when he died, on the 28th of July 1696. His clerk, Bergeret, was his invaluable assistant.

Bibliography. — His papers, preserved in the Archives des affaires etrangeres at Paris, have been partially published in the Recueil des instructions donnees aux ambassadeurs et ministres de France (since 1884). See especially the volumes: — Autriche (t. i.), Suede (t. ii.), Rome (t. vi.), Baviere (t. viii.), Savoie (t. xiv.), Prusse (t. xvi.). Other documents have been published in Mignet's Negociations relatives & la succession d'Espagne, vol. iv., and in the collection of Lettres et negociations …. pour la paix de Nimegue, i6y6-i6y/ (La Haye, 1710). In addition to the Memoires of the time, see Spanheim, Relation de la cour de France en i6qo, ed. E. Bourgeois (Paris and Lyons, 1900) ; Baschet, Histoire du depot des affaires etrangeres ; C. Rousset, Histoire de Louvois (4 vols., Paris, 1863); E. Bourgeois, " Louvois, et Colbert de Croissy," in the Revue historique, vol. xxxiv. (1887); A. Waddington, Le Grand Electeur et Louis XIV (Paris, !9°5) ; G. Pagis, Le Grand Electeur et Louis XIV (Paris, 1905).

COLBURN, HENRY (d. 1855), British publisher, obtained his earliest experience of bookselling in London at the establishment of W. Earle, Albemarle Street, and afterwards as an assistant at Morgan's Library, Conduit Street, of which in 1816 he became

proprietor. He afterwards removed to New Burlington Street, where he established himself as a publisher, resigning the Conduit Street Library to Messrs Saunders & Otley. In 1814 he originated the New Monthly Magazine, of which at various times Thomas Campbell, Bulwer Lytton, Theodore Hook and Harrison Ainsworth were editors. Colburn-published in 1818 Evelyn's Diary, and in 1825 the Diary of Pepys, edited by Lord Bray- brooke, paying £2 200 for the copyright. He also issued Disraeli's first novel, Vivian Grey, and a large number of other works by Theodore Hook, G. P. R. James, Marryat and Bulwer Lytton. In 1829 Richard Bentley (q.v.) was taken into partnership; and in 1832 Colburn retired, but set up again soon afterwards in-dependently in Great Marlborough Street; his business was taken over in 1841 by Messrs Hurst & Blackett. Henry Colburn died on the 1 6 th of August 1855, leaving property to the value

of £3S > °°°-

COLBURN, ZERAH (1804-1840), American mathematical prodigy, was born at Cabot, Vermont, on the 1st of September 1804. At a very early age he developed remarkable powers of calculating with extreme rapidity, and in 1810 his father began to exhibit him. As a performing prodigy he visited Great Britain and France. From 1816 to 1819 he studied in Westminster school, London. After the death of his father in 1824 he returned to America, and from 1825 to 1834 he was a Methodist preacher. As he grew older his extraordinary calculating powers diminished. From 1835 until his death, on the 2nd of March 1840, he was professor of languages at the Norwich University in Vermont. He published a Memoir of his life in 1833.

His nephew, also named Zerah' Colburn (1832-1870), was a well-known mechanical engineer; the editor successively of the Railroad Advocate, in New York, The Engineer, in London, and Engineering, in London; ?nd the author of a work entitled The Locomotive Engine (1851).

COLBY, THOMAS FREDERICK (1784-1852), British major- general

and director of ordnance survey, was born at St Margaret's, Rochester, on the 1st of September 1784, a member of a South Wales family. Entering the Royal Engineers he began in 1802 a life-long connexion with the Ordnance Survey department. His most important work was the survey of Ireland. This he planned in 1824, and was engaged upon it until 1846. The last sheets of this survey were almost ready for issue in that year when he reached the rank of major-general, and according to the rules of the service had to vacate his survey appointment. He was the inventor of the compensation bar, an apparatus used in base-measurements. He died at New Brighton on the 9th of October 1852.

COLCHAGUA, a province of central Chile, bounded N. by Santiago and O'Higgins, E. by Argentina, S. by Curico, and W. by the Pacific. Its area is officially estimated at 3856 sq. m.; pop. (1895) 157,566. Extending across the great central valley of Chile, the province has a considerable area devoted to agri- culture, but much attention is given to cattle and mining. Its principal river is the Rapel, sometimes considered as the southern limit of the Inca empire. Its greatest tributary is the Cachapoal, in the valley of which, among the Andean foothills, are the popular thermal mineral baths of Cauquenes, 2306 ft. above sea-level. The state central railway from Santiago to Puerto Montt crosses the province and has two branches within its borders, one from Rengo to Peumo, and one from San Fernando via Palmilla to Pichilemu on the coast. The principal towns are the capital, San Fernando, Rengo and Palmilla. San Fernando is one of the several towns founded in 1742 by the governor- general Jose de Manso, and had a population of 7447 in 1895. Rengo is an active commercial town and had a population of 6463 in 1895.

COLCHESTER, CHARLES ABBOT, ist Baron (1757-1829), born at Abingdon, was the son of Dr John Abbot, rector of All Saints, Colchester, and, by his mother's second marriage, half- brother of the famous Jeremy Bentham. From Westminster school Charles Abbot passed to Christ Church, Oxford, at which he gained the chancellor's medal for Latin verse as well as the Vinerian scholarship) In 1795, after having practised twelve

years as a barrister, and published a treatise proposing the incorporation of the judicial system of Wales with that of England, he was appointed to the office previously held by his brother of clerk of the rules in the king's bench; and in June of the same year he was elected member of parliament for Helston, through the influence of the duke of Leeds. In 1796 Abbot commenced his career as a reformer in parliament by obtaining the appointment of two committees — the one to report on the arrangements which then existed as to temporary

laws or laws about to expire, the other to devise methods for the better publication of new statutes. To the latter committee, and a second committee which he proposed some years later, it is owing thatcopiesof newstatutes were thenceforth sent to all magistrates and municipal bodies. To Abbot's efforts were also due the establishment of the Royal Record Commission, the reform of the system which had allowed the public money to lie for some time at long interest in the hands of the public accountants, by charging them with payment of interest, and, most important of all, the act for taking the first census, that of 1801. On the formation of the Addington ministry in March 1801 Abbot became chief secretary and privy seal for Ireland; and in the February of the following year he was chosen speaker of the House of Commons — a position which he held with universal satisfaction till 1817, when an attack of erysipelas compelled him to retire. In response to an address of the Commons, he was raised to the peerage as Baron Colchester, with a pension of £4000, of which £3000 was to be continued to his heir. He died on the 8th of May 1829. His speeches against the Roman Catholic claims were published in 1828.

He was succeeded by his eldest son Charles (d. 1867), post- master-general in 1858; and the latter by his son Reginald Charles Edward (b. 1842), as 3rd baron.

COLCHESTER, a market town, river port and municipal and parliamentary borough of Essex, England; 52 m. N.E. by E. from London by the Great Eastern railway. Pop. (1901) 38,373. It lies on the river Colne, 12 m. from the open sea. Among numerous buildings of antiquarian interest the first is the ruined keep of the castle, a majestic specimen of Norman architecture, the largest of its kind in England, covering nearly twice the area of the White Tower in London. It was erected in the reign of William I. or William II., and is quadrangular, turreted at the angles. As in other ancient buildings in Colchester there are evidences of the use of material from the Roman town which occupied the site, but it is clearly of Norman construction. Here is the museum of the Essex Archaeological Society, with a remark- able collection of Roman antiquities, and a library belonging to the Round family, who own the castle. Among ecclesiastical buildings are remains of two monastic foundations— the priory of St Botolph, founded early in the 12th century for Augustinian canons, of which part of the fine Norman west front (in which Roman bricks occur), and of the nave arcades remain; and the restored gateway of the Benedictine monastery of St John, founded by Eudo, steward to William II. This is a beautiful specimen of Perpendicular work, embattled, flanked by spired turrets, and covered with panel work. The churches of Holy Trinity, St Martin and St Leonard at Hythe are of

antiquarian interest; the first has an apparently pre-Norman tower and the last preserves some curious frescoes.

The principal modern buildings are the town hall, corn ex- change, free library, the Eastern Counties' asylum, Essex county hospital and barracks. The town has long been an important military centre with a large permanent camp. There are a free grammar school (founded 1539), a technical and university extension college, a literary institute and medical and other societies. Castle Park is a public ground surrounding the castle. Colchester is the centre of an agricultural district, and has extensive corn and cattle markets. Industries include founding, engineering, malting, flour-milling, rose-growing and the making of clothing and boots and shoes. The oyster fisheries at the mouth of the Colne, for which the town has been famous for centuries, belong to the corporation, and are held on a ninety- nine years' lease by the Colne Fishery Company, incorporated

under an act of 1870. The harbour, with quayage at the suburb of Hythe, is controlled by the corporation. The parliamentary borough, which is co-extensive with the municipal, returns one member. The municipal corporation consists of a mayor, 8 aldermen and 24 councillors. Area 11,333 acres.

The Roman town, Colonic Victricensis Camalodunum (or Camulodunum) , was of great importance. It was founded by Claudius, early in the period of the Roman conquest, as a municipality with discharged Roman soldiers as citizens, to assist the Roman dominion and spread its civilization. Under Queen Boadicea the natives burned the town and massacred the colonists; but Camalodunum soon rose to fresh prosperity and flourished throughout the Roman period. Its walls and some other remains, including the guardroom at the principal gate, can still be clearly traced, and many such relics as sculptures, inscriptions, pavements and pottery have been discovered. When the borough originated is not known, but Domesday Book mentions two hundred and seventy-six burgesses and land in commune burgensium, a phrase that may point to a nascent municipal corporation. The first charter given by Richard I. in 11 89 granted the burghers leave to choose their bailiffs and a justice to hold the pleas of the crown within the borough, freedom from the obligation of duel, freedom of passage and pontage through England, free warren, fishery and custom as in the time of Henry I., and other privileges. An inspeximus of this

charter by Henry III. in 1252 granted the burgesses the return of certain writs. The charters were confirmed by various kings, and new grants obtained in 1447 and 1535. In 1635 Charles I. granted a fresh charter, which replaced the bailiffs by a mayor, and in 1653 Cromwell altered it to secure a permanent majority for his party on the corporation. But his action was undone in 1659, and in 1663 Charles II. granted a new charter. In 1684 the charters were surrendered, and a new one obtained reserving to the crown power to remove the mayor and alderman, and this one was further modified by James II. But the charter of 1663 was confirmed in 1693 and remained in force till 1741, when the liberties were allowed to lapse. In 1763 George III. made the borough a renewed grant of its liberties. Colchester returned two members to parliament from 1295 until 1885. Fairs were granted by Richard I. in 1189 to the hospital of St Mary Magdalene, and by Edward II. in 13 19 to the town for the eve of and feast of St Denis and the six following days — a fair which is still held. In the 13th century Colchester was sufficiently im- portant as a port to pay a fee-farm of £46, its ships plying to Winchelsea and France. Elizabeth and James I. encouraged Flemish settlers in the manufacture of baize (" bays and says "), which attained great importance, so that a charter of Charles I. speaks of burgesses industriously exercising the manufacture of cloth. Both Camden and Fuller mention the trade in barrelled oysters and candied eringo-root. The most notable event in the history of the town was its siege by Fairfax in 1648, when the raw levies of the Royalists in the second civil war held his army at bay for nearly eleven weeks, only surrendering when starved out, and when Cromwell's victory in the north made further resistance useless. Colchester was made the see of a suffragan bishop by King Henry VIII. , and two bishops were in succession appointed by him; no further appointments, however, were made until the see was re-established under Queen Victoria.

See Victoria County History, Essex; Charters and Letters Patent granted to the Borough of Colchester (Colchester, 1903) ; Morant, History of Colchester (1748); Harrod's Report on the Records of Colchester (1865); Cutts, Colchester (Historic Towns) 1888; J. H. Round, " Colchester and the Commonwealth " in Eng. Hist. Rev. vol. xv.; Benham, Red Paper Book of Colchester (1902), and Oath Book of Colchester (1907).

COLCHESTER, a township of Chittenden county, Vermont, U.S.A., on Lake Champlain, immediately N.E. of Burlington, from which it is separated by the Winooski river. Pop. (1900) 5352; (1910) 6450. It is served by the Central Vermont railway. The surface is generally gently rolling, and in places along the banks of the Winooski or Onion river,

the shore of the lake, and in the valleys, it is very picturesque. At Mallett's Bay, an arm of Lake Champlain, 2 m. long and i§ m. wide, several

large private schools hold summer sessions, iiie soil is varied, much of it being good meadow land or well adapted to the growing of grain and fruit. The township has two villages: Colchester Centre, a small, quiet settlement, and Winooski (pop. in 1900, 3783) on the Winooski river. This stream furnishes good water power, and the village has manufactories of cotton and woollen goods, lumber, woodenware, gold and silver plated ware, carriages, wagons and screens. Within the town- ship there is a United States military reservation, Fort Ethan Allen. The village was founded in 1772 by Ira Allen and for many years it was known as " Allen's Settlement "; but later it was called Winooski Falls, and in 1866 it was incorporated as the Village of Winooski.

COLCHICUM, the Meadow Saffron, or Autumn Crocus (Col- chicum autumnale), a perennial plant of the natural order, Liliaceae, found wild in rich moist meadow-land in England and Ireland, in middle and southern Europe, and in the Swiss Alps. It has pale-purple flowers, rarely more than three in number; the perianth is funnel-shaped, and produced below into a long slender tube, in the upper part of which the six stamens are inserted. The ovary is three-celled, and lies at the bottom of this tube. The leaves are three or four in number, flat, lanceolate, erect and sheathing; and there is no stem. Propagation is by the formation of new corms from the parent corm, and by seeds. The latter are numerous, round, reddish-brown, and of the size of black mustard-seeds. The corm of the meadow-saffron attains its full size in June or early in July. A smaller corm is then formed from the old one, close to its root; and this in September and October produces the crocus-like flowers. In the succeeding January or February it sends up its leaves, together with the ovary, which perfects its seeds during the summer. The young corm, at first about the diameter of the flower-stalk, grows continuously, till in the following July it attains the size of a small apricot. The parent corm remains attached to the new one, and keeps its form and size till April in the third year of its existence, after which it decays. In some cases a single corm produces several new plants during its second spring by giving rise to immature corms.

C. autumnale and its numerous varieties as well as other species of the genus, are well known in cultivation, forming some of the most beautiful of autumn-flowering plants. They are very easy to cultivate and do not require lifting. The most suitable soil is a light, sandy loam

enriched with well decomposed manure, in a rather moist situation. The corms should be planted not less than 3 in. deep. Propagation is effected by seed or increase of corms; the seed should be sown as soon as it is ripe in June or July.

Colchicum was known to the Greeks under the name of KoXxt/cov, from KoXxˆ s > or Colchis, a country in which the plant grew; and it is described by Dioscorides as a poison. In the 17th century the corms were worn by some of the German peasantry as a charm against the plague. The drug was little used till 1763, when Baron Storck of Vienna introduced it for the treatment of dropsy. Its use in febrile diseases, at one time extensive, is now obsolete. As a specific for gout colchicum was early employed by the Arabs; and the preparation known as eau mSdicinale, much resorted to in the 18 th century for the cure of gout, owes its therapeutic virtues to colchicum; but general attention was first directed by Sir Everard Home to the use of the drug in gout.

For medical purposes the corm should be collected, in the early summer and, after the outer coat has been removed, should be sliced and dried at a temperature of 130 to 150° F.

The chief constituents of colchicum are two alkaloids, colchicine and veratrine. Colchicine is the active principle and may be given in full form in doses of 3V to ˆ grain. It is a yellow, micro- crystalline powder, soluble in water, alcohol and chloroform, and forming readily decomposed salts with acids. It is the methyl ester of a neutral body colchicein, which may be obtained in white acicular crystals.

The official dose of powdered colchicum is 2 to 5 grains, which may be given in a cachet. The British Pharmacopoeia contains

(i) an extract of the fresh corm, having doses of |- to i grain, and (2) the Vinum Colchici, made by treating the dried corm with sherry and given in doses of 10 to 30 minims. This latter is the preparation still most generally used, though the presence of veratrine both in the corm and the seeds renders the use af colchicine itself theoretically preferable. The dried ripe seeds of this plant are also used in medicine. They are exceedingly hard and difficult to pulverize, odourless, bitter and readily confused with black mustard seeds. They contain a volatile oil which does not occur in the corm, and their proportion of

colchicine is higher, for which reason the Tinctura Colchici Seminum — dose 5 to 1 5 minims — is preferable to the wine prepared from the corm. At present this otherwise excellent preparation is not standardized, but the suggestion has been made that it should be standardized to contain o- 1 % of colchicine. The salicylate of colchicine is stable in water and may be given in doses of about one-thirtieth of a grain. It is often known as Colchi-Sal.

Pharmacology. — Colchicum or colchicine, when applied to the skin, acts as a powerful irritant, causing local pain and congestion. When inhaled, the powder causes violent sneezing, similar to that produced by veratrine itself, which is, as already stated, a constituent of the corm. Taken internally, colchicum or colchicine markedly increases the amount of bile poured into the alimentary canal, being amongst the most powerful of known cholagogues. Though this action doubtless contributes to its remarkable therapeutic power, it is very far from being an adequate explanation of the virtues of the drug in gout. In larger doses colchicum or colchicine acts as a most violent gastro- intestinal irritant, causing terrible pain, colic,vomiting, diarrhoea, haemorrhage from the bowel, thirst and ultimately death from collapse. This is accelerated by a marked depressant action upon the heart, similar to that produced by veratrine and aconite. Large doses also depress the nervous system, weakening the anterior horns of grey matter in the spinal cord so as ulti- mately to cause complete paralysis, and also causing a partial insensibility of the cutaneous nerves of touch and pain. The action of colchicum or colchicine upon the kidneys has been minutely studied, and it is asserted on the one hand that the urinary solids are much diminished and, on the other hand, that they are markedly increased, the specific gravity of the secretion being much raised. These assertions, and the total inadequacy of the pharmacology of colchicum, as above detailed, to explain its specific therapeutic property, show that the secret of colchicum is as yet undiscovered.

The sole but extremely important use of this drug is as a specific for gout. It has an extraordinary power over the pain of acute gout; it lessens the severity and frequency of the attacks when given continuously between them, and it markedly controls such symptoms of gout as eczema, bronchitis and neuritis, whilst it is entirely inoperative against these conditions when they are not of gouty origin. Despite the general recognition of these facts, the pharmacology of colchicum has hitherto thrown no light on the pathology of gout, and the pathology of gout has thrown no light upon the manner in which colchicum exerts its unique influence upon this disease. Veratrine is useless in the treatment of gout. A further curious

fact, doubtless of very great significance, but hitherto lacking interpretation, is that the administration of colchicum during an acute attack of gout may often hasten the oncoming of the next attack; and this property, familiar to many gouty patients, may not be affected by the administration of small doses after the attack. Altogether colchicum is a puzzle, and will remain so until the efficient poison of gout is isolated and defined. When that is done, colchicine may be found to exhibit a definite chemical interaction with this hitherto undiscovered substance.

In colchicum poisoning, empty the stomach, give white of egg, olive or salad oil, and water. Use hot bottles and stimulants, especially trying to counteract the cardiac depression by atro- pine, caffeine, strophanthin, &c.

COLCHIS, in ancient geography, a nearly triangular district of Asia Minor, at the eastern extremity of the Black Sea, bounded on the N. by the Caucasus, which separated it from Asiatic

Sarmatia, E. by Iberia, S. by the Montes Moschici, Armenia and part of Pontus, and W. by the Euxine. The ancient district is represented roughly by the modern province of Kutais (formerly Mingrelia). The name of Colchis first appears in Aeschylus and Pindar. It was inhabited by a number of tribes whose settle- ments lay chiefly along the shore of the Black Sea. The chief of those were the Lazi, Moschi, Apsilae, Abasci, Sagadae, Suani and Coraxi. These tribes differed so completely in language and appearance £*om the surrounding nations, that the ancients originated various theories to account for the phenomenon. Herodotus, who states that they, with the Egyptians and the Ethiopians, were the first to practise circumcision, believed them to have sprung from the relics of the army of Sesostris (q.v.), and thus regarded them as Egyptians. Apollonius Rhodius (Argon, iv. 279) states that the Egyptians of Colchis preserved as heirlooms a number of wooden nvpfieis (tablets) showing seas and highways with Considerable accuracy. Though this theory was not generally adopted by the ancients, it has been defended, but not with complete success, by some modern writers. It is quite possible that there was an ancient trade connexion between the Colchians and the Mediterranean peoples. We learn that women were buried, while the corpses of men were suspended on trees. The principal coast town was the Milesian colony of Dioscurias (Roman Sebastopolis; mod. Sukhum Kaleh), the ancient name being preserved in the modern C. Iskuria. The chief river was the Phasis (mod. Rion). From Colchis is derived the name of the plant Colchicum (q.v.).

Colchis was celebrated in Greek mythology as the destination of the Argonauts, the home of Medea and the special domain of sorcery. Several Greek colonies were founded there by Miletus. At a remote period it seems to have been incorporated with the Persian empire, though the inhabitants evidently enjoyed a considerable degree of independence; in this condition it was found by Alexander the Great, when he invaded Persia. From this time till the era of the Mithradatic wars nothing is known of its history. At the time of the Roman invasion it seems to have paid a nominal homage to Mithradates the Great and to have been ruled over by Machares, his second son. On the defeat of Mithradates by Pompey, it became a Roman province. After the death of Pompey, Pharnaces, the son of Mithradates, rose in rebellion against the Roman yoke, subdued Colchis and Armenia, and made head, though but for a short time, against the Roman arms. After this Colchis was incorporated with Pontus, and the Colchians are not again alluded to in ancient history till the 6th century, when, along with the Abasci or Abasgi, under their king Gobazes, whose mother was a Roman, they called in the aid of Chosroes I. of Persia (541). The importance of the district, then generally called Lazica from the Lazi (cf. mod. Lazistan) who led the revolt, was due to the fact that it was the only remain- ing bar which held the Persians, already masters of Iberia, from the Black Sea. It had therefore been specially garrisoned by Justinian under first Peter, a Persian slave, and subsequently Johannes Tzibos, who built Petra on the coast as the Roman Headquarters. Tzibos took advantage of the extreme poverty of the Lazi to create a Roman monopoly by which he became a middleman for all the trade both export and import. Chosroes at once accepted the invitation of Gobazes and succeeded in capturing Petra (a.d. 541). The missionary zeal of the Zoroastrian priests soon caused discontent among the Christian inhabitants of Colchis, and Gobazes, perceiving that Chosroes intended to Persianize the district, appealed to Rome, with the result that in 549 one Dagisthaeus was sent out with 7000 Romans and 1000 auxiliaries of the Tzani (Zani, Sanni). The ” Lazic War ” lasted till 556 with varying success. Petra was recaptured in 551 and Archaeopolis was held by the Romans against the Persian general Mermeroes. Gobazes was assassinated in 552, but the Persian general Nachoragan was heavily defeated at Phasis in 553.

By the peace of 562 the district was left in Roman possession, but during the next 1 50 years it is improbable that the Romans exercised much authority over it. In 697 we hear of a revolt against Rome led by Sergius the Patrician, who allied himself with the Arabs. Justinian II. in his second period of rule sent

Leo the Isaurian, afterwards emperor, to induce the Alans to attack the Abasgi. The Alans, having gained knowledge of the district by a trick, invaded Lazica, and, probably in 712, a Roman and Armenian army laid siege to Archaeopolis. On the approach of a Saracen force they retired, but a small plundering detachment was cut off. Ultimately Leo joined this band and aided by the Apsilian chief Marinus escaped with them to the coast.

From the beginning of the 14th to the end of the 17 th century the district under the name Mingrelia (q.v.) was governed by an independent dynasty, the Dadians, which was succeeded by a semi-independent dynasty, the Chikovans, who by 1838 had submitted to Russia, though they retained a nominal sovereignty. In 1866 the district was finally annexed by Russia.

For the kings see Stokvis, Manuel d'histoire, i. 83. (J. M. M.)

COLCOTHAR (adapted in Romanic languages from Arabic golgotar, which was probably a corruption of the Gr. x<*Akci!'0os, from xiXkos, copper, avdos, flower, i.e. copper sulphate), a name given to the brownish-red ferric oxide formed in the preparation of fuming sulphuric (Nordhausen) acid by distilling ferrous sulphate. It is used as a polishing powder, forming the rouge of jewellers, and as the pigment Indian red. It is also known as Crocus Mortis.

COLD (in O. Eng. cald and ceald, a word coming ultimately from a root cognate with the Lat. gelu, gelidus, and common in the Teutonic languages, which usually have two distinct forms for the substantive and the adjective, cf. Ger. Kdlte, kalt, Dutch koude, koud) , subjectively the sensation which is excited by contact with a substance whose temperature is lower than the normal; objectively a quality or condition of material bodies which gives rise to that sensation. Whether cold, in the objective sense, was to be regarded as a positive quality or merely as absence of heat was long a debated question. Thus Robert Boyle, who does not commit himself definitely to either view, says, in his New Experi- ments and Observations touching Cold, that " the dispute which is the primum frigidum is very well known among naturalists, some contending for the earth, others for water, others for the air, and some of the moderns for nitre, but all seeming to agree that there is some body or other that is of its own nature supremely cold and by participation of which all other bodies obtain that quality." But with the general acceptance of the dynamical theory of heat, cold naturally came to be regarded as a negative condition,

depending on decrease in the amount of the molecular vibration that constitutes heat.

The question whether there is a limit to the degree of cold possible, and, if so, where the zero must be placed, was first attacked by the French physicist, G. Amontons, in 1702-1703, in connexion with his improvements in the air-thermometer. In his instrument temperatures were indicated by the height at which a column of mercury was sustained by a certain mass of air, the volume or ” spring ” of which of course varied with the heat to which it was exposed. Amontons therefore argued that the zero of his thermometer would be that temperature at which the spring of the air in it was reduced to nothing. On the scale he used the boiling-point of water was marked at 73 and the melting-point of ice at 51 J, so that the zero of his scale was equivalent to about 240 on the centigrade scale. This remark ably close approximation to the modern value of -273° for the zero of the air-thermometer was further improved on by J. H. Lambert (Pyrometrie, 1779), who gave the value -270° and observed that this temperature might be regarded as absolute cold. Values of this order for the absolute zero were not, however, universally accepted about this period. Laplace and Lavoisier, for instance, in their treatise on heat (1780), arrived at values ranging from 1500° to 3000 below the freezing-point of water, and thought that in any case it must be at least 600° below, while John Dalton in his Chemical Philosophy gave ten calculations of this value, and finally adopted 3000 C. as the natural zero of temperature. After J. P. Joule had determined the mechanical equivalent of heat, Lord Kelvin approached the question from an entirely different point of view, and in 1848 devised a scale of absolute temperature which was inde

pendent of the properties of any particular substance and was based solely on the fundamental laws of thermodynamics (see Heat and Thermodynamics). It followed from the principles on which this scale was constructed that its zero was placed at -2 73 , at almost precisely the same point as the zero of the air-thermometer.

In nature the realms of space, on the probable assumption that the interstellar medium is perfectly transparent and diather- manous, must, as was pointed out by W. J. Macquorn Rankine, be incapable of acquiring any temperature, and must therefore be at the absolute zero. That, however, is not to say that if a suitable thermometer could be projected into space it would give a reading of 273 . On the contrary, not being a trans parent and diathermanous body, it would absorb radiation from the sun and other stars, and would thus become warmed. Professor J. H. Poynting (” Radiation in the Solar System,”

Phil. Trans., A, 1903, 202, p. 525) showed that as regards bodies in the solar system the effects of radiation from the stars are negligible, and calculated that by solar radiation alone a small absorbing sphere at the distance of Mercury from the sun would have its temperature raised to 483 Abs. (210° C), at the distance of Venus to 358° Abs. (85° C), of the earth to 300° Abs. (27 C), of Mars to 243 Abs. (- 30 C), and of Neptune to only 54° Abs. (- 219° C). The French physicists of the early part of the 19th century held a different view, and rejected the hypothesis of the absolute cold of space. Fourier, for instance, postulated a fundamental temperature of space as necessary for the explana- tion of the heat-effects observed on the surface of the earth, and estimated that in the interplanetary regions it was little less than that of the terrestrial poles and below the freezing-point of mercury, though it was different in other parts of space {Ann. chim. phys., 1824, 27, pp. 141, 150). C. S. M. Pouillet, again, calculated the temperature of interplanetary space as – 142 C. (Compies rendus, 1838, 7, p. 61), and Sir John Herschel as -150° {Ency. Brit., 8th ed., art. “Meteorology,” p. 643).

To attain the absolute zero in the laboratory, that is, to deprive a substance entirely of its heat, is a thermodynamical impossibility, and the most that the physicist can hope for is an indefinitely close approach to that point. The lowest steady temperature obtainable by the exhaustion of liquid hydrogen is about – 262 C. (n° Abs.), and the liquefaction of helium by Professor Kamerlingh Onnes in 1908 yielded a liquid having a boiling-point of about 4-3° Abs., which on exhaustion must bring us to within about 25 degrees of the absolute zero. (See Liquid Gases.)

For a “cold,” in the medical sense, see Catarrh and Respiratory System: Pathology.

COLDEN, CADWALLADER (1688-1776), American physician and colonial official, was born at Duns, Scotland, on the 17th of February 1688. He graduated at the university of Edinburgh in 1705, spent three years in London in the study of medicine, and emigrated to America in 1708. After practising medicine for ten years in Philadelphia, he was invited to settle in New York by Governor Hunter, and in tyiS, was appointed the first surveyor-general of the colony. Becoming a member of the provincial council in 1720, he served for many years as its presi- dent, and from 1761 until his death was lieutenant-governor; for a considerable part of the time, during the interim between the appointment of governors, he was acting-governor. About 1755 he retired from medical practice. As early as 1729 he had built a country house called Coldengham on the line

between Ulster and Orange counties, where he spent much of his time until 1761. Aristocratic and extremely conservative, he had a violent distrust of popular government and a strong aversion to the popular party in New York. Naturally he came into frequent conflict with the growing sentiment in the, colony in opposition to royal taxation. He was acting-governor when in 1765 the stamped paper to be used under the Stamp Act arrived in the port of New York ; a mob burned him in effigy in his own coach in Bowling Green, in sight of the enraged acting- governor and of General Gage; and Colden was compelled to surrender the stamps to the city council, by whom they were

locked up in the city hall until all attempts to enforce the new law were abandoned. Subsequently Colden secured the sus- pension of the provincial assembly by an act of parliament. He understood, however, the real temper of the patriot party, and in 1775, when the outbreak of hostilities seamed inevitable, he strongly advised the ministry to act with caution and to concede some of the colonists' demands. When the war began, he retired to his Long Island country seat, where he died on the 28th of September 1776. Colden was widely known among scientists and men of letters in England and America. He was a life-long student of botany, and was the first to introduce in America the classification system of Linnaeus, who gave the name " Coldenia " to a newly recognized genus. He was an intimate friend of Benjamin Franklin. He wrote several medical works of importance in their day, the most noteworthy being A Treatise on Wounds and Fevers (1765); he also wrote The History of the Five Indian Nations depending on the Province of New York (1727, reprinted 1866 and 1905), and an elaborate work on The Principles of Action in Matter (1751), which, with his Introduction to the Study of Physics (c. 1756), his Enquiry into the Principles of Vital Motion (1766), and his Reflections (c. 1770), mark him as the first of American materialists and one of the ablest material philosophers of his day. I. Woodbridge Riley, in American Philosophy (New York, 1907), made the first critical study of Colden's philosophy, and said of it that it combined " Newtonian mechanics with the ancient hylozoistic doctrine …" and " ultimately reached a kind of dynamic panpsychism, substance being conceived as a self-acting and universally diffused principle, whose essence is power and force."

See Alice M. Keys, Cadwallader Colden, A Representative 18th

Century Official (New York, 1906), a Columbia University doctoral dissertation; J. G. Muraford, Narrative of Medicine in America (New York, 1903); and Asa Gray, “Selections from the Scientific Correspondence of Cadwallader Colden ” in American Journal of Science, vol. 44, 1843.

His grandson, Cadwallader David Colden (1769-1834), lawyer and politician, was educated in London, but returned in 1785 to New York, where he attained great distinction at the bar. He was a colonel of volunteers during the war of 18 12, and from 1818 to 1821 was the successor of Jacob Radcliff as mayor of New York City. He was a member of the state assembly (1818) and the state senate (1825-1827), and did much to secure the construction of the Erie Canal and the organization of the state public school system; and in 1821-1823 he was a repre- sentative in Congress. He wrote a Life of Robert Fulton (1817) and a Memoir of the Celebration of the Completion of the New York Canals (1825).

COLD HARBOR, Old and New, two localities in Hanover county, Virginia, U.S.A., 10 m. N.E. of Richmond. They were the scenes of a succession of battles, on May 31- June 12, 1864, between the Union forces under command of General U. S. Grant and the Confederates under General R. E. Lee, who held a strongly entrenched line at New Cold Harbor. The main Union attack on June 3 was delivered by the II. (Hancock), VI. (Wright), aftd XVIII. (W. F. Smith) corps, and was brought to a standstill in eight minutes. An order from army headquarters to renew the attack was ignored by the officers and men at the front, who realized fully the strength of the hostile position. These troops lost as many as 5000 men in an hour’s fighting, the greater part in the few minutes of the actual assault. In the constant fighting of 31st of May to 12 th of June on this ground Grant lost 14,000 men. (See Wilderness and American Civil War.)

COLDSTREAM, a police burgh of Berwickshire, Scotland. Pop. (1901) 1482. It is situated on the north bank of the Tweed, here spanned by John Smeaton’s fine bridge of five arches, erected in, 1763-1766, 13! m. south-west of Berwick by the North Eastern railway. The chief public buildings are the town hall, library, mechanics’ institute, and cottage hospital. Some brewing is carried on. Owing to its position on the Border and also as the first ford of any consequence above Berwick, the town played a prominent part in Scottish history during many centuries. Here Edward I. crossed the stream in 1296 with his

invading host, and Montrose with the Covenanters in 1640. Of the Cistercian priory, founded about 1165 by Cospatric of Dunbar, and

destroyed by the 1st earl of Hertford in 1545, which stood a little to the east of the present market-place, no trace remains; but for nearly four hundred years it was a centre of religious fervour. Here it was that the papal legate, in the reign of Henry VIII., published a bull against the printing of the Scriptures; and by the irony of fate its site was occupied in the 19th century by an establishment, under Dr Adam Thomson, for the production of cheap Bibles. At Coldstream General Monk raised in 1659 the celebrated regiment of Foot Guards bearing its name. Like Gretna Green, Coldstream long enjoyed a notoriety as the resort of runaway couples, the old toll-house at the bridge being the usual scene of the marriage ceremony. ” Marriage House,” as it is called, still exists in good repair. Henry Brougham, afterwards lord chancellor, was married in this clandestine way, though in an inn and not at the bridge, in 1821. Birgham, 3 m. west, was once a place of no small import- ance, for there in 1188 William the Lion conferred with the bishop of Durham concerning the attempt of the English Church to impose its supremacy upon Scotland; there in 1289 was held the convention to consider the question of the marriage of the Maid of Norway with Prince Edward of England; and there, too, in 1290 was signed the treaty of Birgham, which secured the it de- pendence of Scotland. Seven miles below Coldstream on the English side, though 6 m. north-east of it, are the massive ruins of Norham Castle, made famous by Scott’s Marmion, and fiom the time of its building by Ranulph Flambard in 1121 a focus of Border history during four centuries.

COLDWATER, a city and county-seat of Branch county, Michigan, U.S.A., on Coldwater Stream (which connects two of the group of small lakes in the vicinity), about 80 m. S.S.E. of Grand Rapids. Pop. (1890) 5247; (1900) 6216, of whom 431 were foreign-born; (1904) 6225; (1910) 5945. It is served by the Lake Shore & Michigan Southern railway. It is the seat of a state public school and temporary home (opened in 1874) for dependent, neglected or ill-treated children, who are received at any age under twelve. The city is situated in a fine farming region, has an important flouring and grist mill industry, and also manufactures Portland cement, liniment, lumber, furniture, sashes, doors and blinds, brass castings, sleighs, shoes, &c. The municipality owns and operates the water-works and electric lighting plant. Coldwater was settled in 1829, was laid out as a town under the name of Lyons in 1832, received its present name in the following year, was incorporated as a village in 1837, was reached by railway and became the county-seat in 1851, and was chartered as a city in 1861.

COLE, SIR HENRY (1808-1882), English civil servant, was born at

Bath on the 15th of July 1808, and was the son of an officer in the army. At the age of fifteen he became clerk to Sir Francis Palgrave, then a subordinate officer in the record office, and, helped by Charles Buller, to whom he had been intro- duced by Thomas Love Peacock, and who became chairman of a royal commission for inquiry into the condition of the public records, worked his way up until he became an assistant keeper. He largely assisted in influencing public opinion in support of Sir Rowland Hill's reforms at the post office. A connexion with the Society of Arts caused him to drift gradually out of the record office: he was a leading member of the com- mission that organized the Great Exhibition of 1851, and upon the conclusion of its labours was made secretary to the School of Design, which by a series of transformations became in 1853 the Department of Science and Art. Under its auspices the South Kensington (now Victoria and Albert) Museum was founded in 1855 upon land purchased out of the surplus of the exhibition, and Cole practically became its director, retiring in 1873. His proceedings were frequently criticized, but the museum owes much to his energy. Indefatigable, genial and masterful, he drove everything before him, and by all sorts of schemes and devices built up a great institution, whose variety and inequality of composition seemed imaged in the anomalous structure in which it was temporarily housed. He also, though

to the financial disappointment of many, conferred a great benefit upon the metropolis by originating the scheme for the erection of the Royal Albert Hall. He was active in founding the national training schools for cookery and music, the latter the germ of the Royal College of Music. He edited the works of his benefactor Peacock; and was in his younger days largely connected with the press, and the author of many useful topo- graphical handbooks published under the pseudonym of " Felix Summerly." He died on the 18th of April 1882.

COLE, THOMAS (1801-1848), American landscape painter, was born at Bolton-le-Moors, England, on the 1st of February 1801. In 1819 the family emigrated to America, settling first in Philadelphia and then at Steubenville, Ohio, where Cole learned the rudiments of his profession from a wandering portrait painter named Stein. He went about the country painting portraits, but with little financial success. Removing to New York (1825), he displayed some landscapes in the window of an eating-house, where they attracted the attention of the painter Colonel Trumbull, who sought him out, bought one of his canvases,

and found him patrons. From this time Cole was prosperous. He is best remembered by a series of pictures consisting of four canvases representing ” The Voyage of Life,” and another series of five canvases representing ” The Course of Empire,” the latter now in the gallery of the New York Historical Society. They were allegories, in the taste of the day, and became exceedingly popular, being reproduced in engravings with great success. The work, however, was meretricious, the sentiment false, artificial and conventional, and the artist’s genuine fame must rest on his landscapes, which, though thin in the painting, hard in the handling, and not infrequently painful in detail, were at least earnest endeavours to portray the world out of doors as it appeared to the painter; their failings were the result of Cole’s environment and training. He had an influence on his time and his fellows which was considerable, and with Durand he may be said to have founded the early school of American landscape painters. Cole spent the years 1829-183 2 and 1841-1842 abroad, mainly in Italy, and at Florence lived with the sculptor Greenough. After 1827 he had a studio in the Catskills which furnished the subjects of some of his canvases, and he died at Catskill, New York, on the nth of February 1848. His pictures are in many public and private collections. His ” Expulsion from Eden ” is in the Metropolitan Museum in New York.

COLE, TIMOTHY (1852-), American wood engraver, was born in London, England, in 1852, his family emigrating to the United States in 1858. He established himself in Chicago, where in the great fire of 187 1 he lost everything he possessed. In 1875 he removed to New York, finding work on the Century (then Scribner’s) magazine. He immediately attracted attention by his unusual facility and his sympathetic interpretation of illustra- tions and pictures, and his publishers sent him abroad in 1883 to engrave a set of blocks after the old masters in the European galleries. These achieved for him a brilliant success. His repro- ductions of Italian, Dutch, Flemish and English pictures were published in book form with appreciative notes by the engraver himself. Though the advent of new mechanical processes had rendered wood engraving almost a lost art and left practically no demand for the work of such craftsmen, Mr Cole was thus enabled to continue his work, and became one of the foremost contemporary masters of wood engraving. He received a medal of the first class at the Paris Exhibition of 1900, and the only grand prize given for wood engraving at the Louisiana Purchase Exposition at St Louis, Missouri, in 1904.

COLE, VICAT (1833-1893), English painter, born at Ports- mouth on the 17th of April 1833, was the son of the landscape painter, George Cole, and in his practice followed his father’s lead with marked

success. He exhibited at the British Institu- tion at the age of nineteen, and was first represented at the Royal Academy in 1853. His election as an associate of this institution took place in 1870, and he became an Academician ten years later. He died in London on the 6th of April 1893. The wide popularity of his work was due partly to the simple directness of his technical method, and partly to his habitual choice of attractive material.

Most of his subjects were found in the counties of Surrey and Sussex, and along the banks of the Thames. One of his largest pictures, ” The Pool of London,” was bought by the Chantrey Fund Trustees in 1888, and is now in the Tate Gallery.

See Robert Chignell, The Life and Paintings of Vicat Cole, R.A. (London, 1899).

COLEBROOKE, HENRY THOMAS (1765-1837), English Orientalist, the third son of Sir George Colebrooke, 2nd baronet, was born in London on the 15th of June 1765. He was educated at home; and when only fifteen he had made considerable attainments in classics and mathematics. From the age of twelve to sixteen he resided in France, and in 1782 was appointed to a-writership in India. About a year after his arrival there he was placed in the board of accounts in Calcutta; and three years later he was removed to a situation in the revenue department at Tirhut. In 1789 he was removed to Purneah, where he investi- gated the resources of that part of the country, and published his Remarks on the Husbandry and Commerce of Bengal, privately printed in 1795, in which he advocated free trade between Great Britain and India. After eleven years’ residence in India, Colebrooke began the study of Sanskrit; and to him was confided the translation of the great Digest of Hindu Laws, which had been left unfinished by Sir William Jones. He translated the two treatises Mitacshara and Dayabhaga under the title Law of In- heritance. He was sent to Nagpur in 1799 on a special mission, and on his return was made a judge of the new court of appeal, over which he afterwards presided. In 1805 Lord Wellesley appointed him professor of Hindu Law and Sanskrit at the college of Fort William. During his residence at Calcutta he wrote his Sanskrit Grammar (1805), some papers on the religious ceremonies of the Hindus, and his Essay on the Vedas (1805), for a long time the standard work on the subject. He became member of council in 1807 and returned to England seven years later. He died on the 1 8th of March 1837. He was a director of the Asiatic Society, and many of the most valuable papers in the society’s Transac- tions were communicated by him.

His life was written by his son, Sir T. E. Colebrooke, in 1873.

COLEMANITE, a hydrous calcium borate, Ca 2 B 6 On + 5H 2 0, found in California as brilliant .monoclinic crystals. It contains 50-9% of boron trioxide, and is an important source of com- mercial borates and boracic acid. Beautifully developed crystals, up to 2 or 3 in. in length, encrust cavities in compact, white colemanite; they are colourless and transparent, and the brilliant lustre of their faces is vitreous to adamantine in character. There is a perfect cleavage parallel to the plane of symmetry of the crystals. Hardness 4-4I; specific gravity 2-42. The mineral was first discovered in 1882 in Death Valley, Inyo county, California, and in the following year it was found in greater abundance near Daggett in San Bernardino county, forming with other borates and borosilicates a bed in sedi- mentary strata of sandstones and clays; in more recent years very large masses have been found and worked in these localities, and also in Los Angeles county (see Special Report, 1905, of U.S. Census Bureau on Mines and Quarries; and Mineral Resources of the U.S., 1907).

Priceite and pandermite are hydrous calcium borates with very nearly the same composition as colemanite, and they may really be only impure forms of this species. They are massive white minerals, the former friable and chalk-like, and the latter firm and compact in texture. Priceite occurs near Chetco in Curry county, Oregon, where it forms layers between a bed of slate and one of tough blue steatite; embedded in the steatite are rounded masses of priceite varying in size from that of a pea to masses weighing 200 lb. Pandermite comes from Asia Minor, and is shipped from the port of Pandemia on the Sea of Marmora: it occurs as large nodules, up to a ton in weight, beneath a thick bed of gypsum.

Another borate of commercial importance found abundantly in the Californian deposits is ulexite, also known as boronatrocalcite or " cotton-ball," a hydrous calcium and sodium borate, CaNaB 5 09 + 8H 2 0, which forms rounded masses consisting of a loose aggregate of fine fibres. It is the principal species in the borate deposits in the Atacama region of South America. (L. J. S.)

COLENSO, JOHN WILLIAM (1814-1883), English bishop of Natal, was born at St Austell, Cornwall, on the 24th of January 1814. His family were in embarrassed circumstances, and he was indebted to relatives

for the means of university education. In 1836 he was second wrangler and Smith's prizeman at Cambridge, and in 1837 he became fellow of St John's. Two years later he went to Harrow as mathematical tutor, but the step proved an un- fortunate one. The school was just then at the lowest ebb, and Colenso not only had few pupils, but lost most of his property by a fire. He went back to Cambridge, and in a short time paid off heavy debts by diligent tutoring and the proceeds of his series of manuals of algebra (1841) and arithmetic (1843), which were adopted all over England. In 1846 he became rector of Forncett St Mary, Norfolk, and in 1853 he was appointed bishop of Natal. He at once devoted himself to acquiring the Zulu language, of which he compiled a grammar and a dictionary, and into which he translated the New Testament and other portions of Scripture. He had already given evidence, in a volume of sermons dedicated to Maurice, that he was not satisfied with the traditional views about the Bible. The puzzling questions put to him by the Zulus strengthened him in this attitude and led him to make a critical examination of the Pentateuch. His conclusions, positive and negative, were published in a series of treatises on the Pentateuch, extending from 1862 to 1879, an d> being in advance of his time, were naturally disputed in England with a fervour of conviction equal to his own. On the continent they attracted the notice of Abraham Kuenen, and furthered that scholar's in- vestigations.

While the controversy raged in England, the South African bishops, whose suspicions Colenso had already incurred by the liberalityof his views respecting polygamy among native converts and by a commentary upon the Epistle to the Romans (1861), in which he combated the doctrine of eternal punishment, met in conclave to condemn him, and pronounced his deposition (December 1863). Colenso, who had refused to appear before their tribunal otherwise than as sending a protest by proxy, appealed to the privy council, which pronounced that the metropolitan of Cape Town (Robert Gray) had no coercive jurisdiction and no authority to interfere with the bishop of Natal. No decision, therefore, was given upon the merits of the case. His adversaries, though unable to obtain his condemna- tion, succeeded in causing him to be generally inhibited from preaching in England, and Bishop Gray not only excommunicated him but consecrated a rival bishop for Natal (W. K. Macrorie), who, however, took his title from Maritzburg. The con- tributions of the missionary societies were withdrawn, but an attempt to deprive him of his episcopal income was frustrated by a decision of the courts. Colenso, encouraged by a handsome testimonial raised in England, to which many clergymen sub- scribed, returned to his diocese, and devoted the

latter years of his life to furtherlaboursasa biblical commentator and translator. He also championed the cause of the natives against Boer op- pression and official encroachments, a course by which he made more enemies among the colonists than he had ever made among the clergy. He died at Durban on the 20th of June 1883. His daughter Frances Ellen Colenso (1840-1887) published two books on the relations of the Zulus to the British (1880 and 1885), taking a pro-Zulu view; and an elder daughter, Harriette E. Colenso (b. 1847), became prominent as an advocate of the natives in opposition to their treatment by Natal, especially in the case of Dinizulu in 1888-1889 and in 1908-1909.

See his Life by Sir G. VV. Cox (2 vols., London, 1888).

COLENSO, a village of Naftal on the right or south bank of the Tugela river, 16 m. by rail south by east of Lady smith. It was the scene of an action fought on the 15th of December 1899 between the British forces under Sir Redvers Buller and the Boers, in which the former were repulsed. (See Ladysmith.)

COLEOPTERA, a term used in zoological classification for the true beetles which form one of the best-marked and most natural of the orders into which the class Hexapoda (or Insecta) has been divided. For the relationship of the Coleoptera to other orders

of insects see Hexapoda. The name (Gr. KoXeos, a sheath, and irrepa, wings) was first used by Aristotle, who noticed the firm protective sheaths, serving as coverings for the hind-wings which alone are used for flight, without recognizing their cor- respondence with the fore-wings of other insects.

These firm fore-wings, or elytra (fig. 1, A), are usually convex above, with straight hind margins (dorsa) ; when the elytra are closed, the two hind margins come together along the mid-dorsal line of the body, forming a suture. In many beetles the hind- wings are reduced to mere vestiges useless for flight, or are altogether absent, and in such cases the two elytra are often fused together at the suture; thus organs originally intended for flight have been transformed into an armour-like covering for the beetle's hind-body. In correlation with their heavy build and the frequent loss of the power of flight, many beetles are terrestrial rather than aerial in habit, though a large proportion of the order can fly well.

Aristotle's term was adopted by Linnaeus (1758), and has been universally used by zoologists. The identification of the elytra of

beetles with the fore-wings of other insects has indeed been questioned (1880) by F. Meinert, who endeavoured to compare them with the tegulae of Hymenoptera, but the older view was securely established by the demonstration in pupal elytra by J. G. Needham (1898) and W. L. Tower (1903), of nervures similar to those of the hind-wing, and by the proof that the small mem- branous structures present beneath the elytra of certain beetles, believed by Meinert to represent the whole of the true fore- wings, are in reality only the alulae.

Structure. — Besides the conspicuous character of the elytra, beetles are distinguished by the adaptation of the jaws for biting, the mandibles (fig. 1, B6) being powerful, and the first pair of maxillae (fig. 1, Be) usually typical in form. The maxillae of the second pair (fig. 1, Bd) are very intimately fused together to form what is called the " lower lip " or labium, a firm trans- verse plate representing the fused basal portions of the maxillae, which may carry a small median " ligula," representing appar- ently the fused inner maxillary lobes, a pair of paraglossae (outer maxillary lobes), and a pair of palps. The feelers of beetles differ greatly in the different families (cf. figs. 26, 96 and 26 b, c) ; the number of segments is usually eleven, but may vary from two to more than twenty.

The head is extended from behind forwards, so that the crown (epicranium) is large, while the face (clypeus) is small. The chin (gula) is a very characteristic sClerite in beetles, absent only in a few families, such as the weevils. There is usually a distinct labrum (fig. 1, Ba).

The prothorax is large and " free," i.e. readily movable on the mesothorax, an arrangement usual among insects with the power of rapid running. The tergite of the prothorax (pronotum) is prominent in all beetles, reaching back to the bases of the elytra and forming a substantial shield for the front part of the body. The tergal regions of the mesothorax and of the meta- thorax are hidden under the pronotum and the elytra when the latter are closed, except that the mesothoracic scutellum is often visible — a small triangular or semicircular plate between the bases of the elytra (fig. 1, A). The ventral region of the thoracic skeleton is complex, each segment usually possessing a median sternum with paired epi sterna (in front) and epimera (behind). The articular surfaces of the haunches (coxae) of the fore-legs are often conical or globular, so that each limb works in a ball-and-socket joint, while the hind haunches are large, displacing the ventral sclerites of the first two abdominal seg- ments (fig. 1, C). The legs themselves (fig. 1, A) are of the usual insectan

type, but in many families one, two, or even three of the five foot-segments may be reduced or absent. In beetles of aquatic habit the intermediate and hind legs are modified as swimming-organs (fig. 2, a), while in many beetles that burrow into the earth or climb about on trees the fore-legs are broadened and strengthened for digging, or lengthened and modified for clinging to branches. The hard fore-wings (elytra) are strengthened with marginal ridges, usually inflected ventrally to form epipleura which fit accurately along the edges oi the

abdomen. The upper surface of the elytron is sharply folded inwards at intervals, so as to give rise to a regular series of external longitudinal furrows (striae) and to form a set of supports between the two chitinous layers forming the elytron. The upper surface often shows a number of impressed dots (punctures). Along the sutural border of the elytron, the chitinous lamella forms a tubular space within which are numerous glands. The glands occur in groups, and lead into common ducts which open

usually so much reduced that the foremost apparent ventral sclerite of the abdomen represents the third sternite. From this point backwards the successive abdominal segments, as far as the seventh or eighth, can be readily made out. The ninth and tenth segments are at most times retracted within the eighth. The female can protrude a long flexible tube in connexion with the eighth segment, carrying the sclerites of the ninth at its extremity, and these sclerites may carry short hairy processes A

Under side.

Majcillce.. ‘-. y

Fig. 1. — Structure of Male Stag-Beetle (Lucanus cervus). A, Dorsal view; B, mouth organs; C, under side.

in several series along the suture. Sometimes the glands are found beneath the disk of the elytron, opening by pores on the surface. The hind-wings, when developed, are characteristic in form, possessing a sub-costal nervure with which the reduced radial nervure usually becomes associated. There are several curved median and cubital nervures and a single anal, but few cross nervures or areolets. The wing, when not in use, is folded

Pupa of Dyticus.

Larva of Dyticus Cybister sp. (Water-Beetle).

Fig. 2. — Water Beetles (Dyticidae). a, Beetle; 6, head of beetle with feelers and palps; c, larva; d, pupa.

both lengthwise and transversely, and doubled up beneath the elytron; to permit the transverse folding, the longitudinal nervures are interrupted.

Ten segments can be recognized — according to the studies of K. W. Verhoeff (1804-1806) — in a beetle's abdomen, but the tenth sternite is usually absent. On account of the great extension of the metathorax and the haunches of the large hind- legs, the first abdominal sternite is wanting, and the second is

— the stylets. This flexible tube is the functional ovipositor, the typical insectan ovipositor with its three pairs of processes (see Hexapoda) being undeveloped among the Coleoptera. In male beetles, however, the two pairs of genital processes (para- mera) belonging to the ninth abdominal segment are always present, though sometimes reduced. Between them is situated, sometimes asymmetrically, the prominent intromittent organ.

In the structure of the digestive system, beetles resemble most other mandibulate insects, the food-canal consisting of gullet, crop, gizzard, mid-gut or stomach, intestine and rectum. The stomach is beset throughout its length with numerous small, finger-like caecal tubes. The excretory (malpighian) tubes are few in number, either four or six. Many beetles have, in connexion with the anus, glands which secrete a repellent acid fluid, serving as a defence for the insect when attacked. The " bombardier " ground beetles (fig. 5) have this habit. Oil-beetles (figs. 23 and 24) and ladybirds (fig. 32) defend them-selves by ejecting drops of fluid from the knee-joints. The nervous system is remarkably concentrated in some beetles, the abdominal ganglia showing a tendency to become shifted forward and crowded together, and in certain chafers all the thoracic and abdominal ganglia are fused into a single nerve- centre situated in the thorax, — a degree of specialization only matched in the insectan class among the Hemiptera and some muscid flies.

Development. — The embryonic development (see Hexapoda) has been carefully studied in several genera of beetles. As regards growth after hatching, all beetles undergo a " complete " metamorphosis, the

wing-rudiments developing beneath the cuticle throughout the larval stages, and a resting pupal stage intervening between the last larval instar 1 and the imago. The coleopterous pupa (figs. 2d, 3 c) is always ” free,” the legs, wings and other appendages not being

1 Instar is a convenient term suggested by D. Sharp to indicate a stage in the life-history of an insect between two successive castings of the cuticle.

fixed to the body as in the pupa of a moth, and the likeness of pupa to perfect insect is very close.

The most striking feature in the development of beetles is the great diversity noticeable in the outward form of the larva in different families. The larva of a ground-beetle or a carnivorous water- beetle (fig. 2 c) is an active elongate grub with well-armoured cuticle. The head — carrying feelers, mandibles and two pairs of maxillae — is succeeded by the three thoracic segments, each bearing a pair of strong five-segmented legs, whose feet, like those of the adult, carry two claws. Ten segments can be distinguished in the tapering abdomen, the ninth frequently bearing a pair of tail-feelers (cerci), and the tenth, attached ventrally to the ninth, having the anai opening at its extremity and performing the function of a posterior limb, supporting and temporarily fixing the tail end of the insect on the surface over which it crawls. Such a typically ” cam- podeiform ” grub, moving actively about in pursuit of prey, is the one extreme of larval structure to be noticed among the Coleoptera. The other is exemplified by the white, wrinkled, soft-skinned, legless grub of a weevil, which lives underground feeding on roots, or burrows in the tissues of plants (fig. 3 b). Between these two

From Chittenden, Yearbook, 1894, U.S. Dept. of Agriculture.

Fig. 3. — Grain Weevils, a, Calandra granaria ; b, larva ; c, pupa ; d. C. oryzae.

extremes we find various transitional forms: an active larva, as described above, but with four-segmented, single-clawed legs, as among the rove-beetles and their allies; the body well armoured, but slender and worm-like, with very short legs as in wireworms and mealworms (figs. 18, 21 b); the body shortened, with the abdo- men swollen, but protected with tubercles and spines, and with longish legs

adapted for an active life, as in the predaceous larvae of ladybirds; the body soft-skinned, swollen and caterpillar-like, with legs well developed, but leading a sluggish underground life, as in the grub of a chafer; the body soft-skinned and whitish, and the legs greatly reduced in size, as in the wood-feeding grub of a long- horn beetle. In the case of certain beetles whose larvae do not find themselves amid appropriate food from the moment of hatching, but have to migrate in search of it, an early larval stage, with legs, is followed by later sluggish stages in which legs have disappeared, furnishing examples of what is called hypermetamorphosis. For example, the grub of a pea or bean beetle (Bruchus) is hatched, from the egg laid by its mother on the carpel of a leguminous flower, with three pairs of legs and spiny processes on the prothorax. It bores through and enters the developing seed, where it undergoes a moult and becomes legless. Similarly the newly-hatched larva of an oil-beetle (Meloe) is an active little campodeiform insect, which, hatched from an egg laid among plants, waits to attach itself to a passing bee. Carried to the bee's nest, it undergoes a moult, and becomes a fat-bodied grub, ready to lead a quiet life feeding on the bee's rich food-stores.

Distribution and Habits. — The Coleoptera are almost world- wide in their distribution, being represented in the Arctic regions and on almost all oceanic islands. Most of the dominant families— such as the Carabidae (ground-beetles), Scarabaeidae (chafers), or Curculionidae (weevils) have a distribution as wide as the order. But while some large families, such as the Staphy- linidae (rove-beetles) are especially abundant on the great northern continents, becoming scarcer in the tropics, others, the Cicindelidae (tiger-beetles), for example, are most strongly represented in the warmer regions of the earth, and become

scarce as the collector journeys far to south or north. The distribution of many groups of beetles is restricted in corre- spondence with their habits; the Cerambycidae (longhorns), whose larvae are wood-borers, are absent from timberless regions, and most abundant in the great tropical forests. Some families are very restricted in their range. The Amphizoidae, for example, a small family of aquatic beetles, are known only from western North America and Eastern Tibet, while an allied family, the Pelobiidae, inhabit the British Isles, the Mediter- ranean region, Tibet and Australia. The beetles of the British islands afford some very interesting examples of restricted distribution among species. For example, large and conspicuous European beetles, such as the stag-beetle (fig. i, Lucanus cervus) and the great water-beetle (Hydrophilus piceus, fig. 20), are confined to eastern and southern Britain, and are unknown in Ireland. On the other hand, there are Arctic species like the ground-beetle, Pelophila borealis, and south-

western species like the boring weevil, Mesites Tardyi, common in Ireland, and represented in northern or western Britain, but unknown in eastern Britain or in Central Europe. Careful study of insular faunas, such as that of Madeira by T. V. Wollaston, and of the Sandwich Islands by D. Sharp, and the comparison of the species found with those of the nearest continental land, furnish the student of geographical distribution with many valuable and suggestive facts.

Notes on habit are given below in the accounts of the various families. In general it may be stated that beetles live and feed in almost all the diverse ways possible for insects. There are carnivores, herbivores and scavengers among them. Various species among those that are predaceous attack smaller insects, hunt in packs crustaceans larger than themselves, insert their narrow heads into snail-shells to pick out and devour the occu- pants, or pursue slugs and earthworms underground. The vegetable-feeders attack leaves, herbaceous or woody stems and roots; frequently different parts of a plant are attacked in the two active stages of the life-history; the cockchafers, for example, eating leaves, and their grubs gnawing roots. Some of the scavengers, like the burying beetles, inter the bodies of small vertebrates to supply food for themselves and their larvae, or, like the ” sacred ” beetle of Egypt, collect for the same purpose stores of dung. Many beetles of different families have become the “unbidden guests” of civilized man, and may be found in dwelling-houses, stores and ships’ cargoes, eating food-stuffs, paper, furniture, tobacco and drugs. Hence we find that beetles of some kind can hold their own anywhere on the earth’s surface. Some climb trees and feed on leaves, while others tunnel between bark and wood. Some fly through the air, others burrow in the earth, while several families have become fully adapted to life in fresh water. A large number of beetles inhabit the deep limestone caves of Europe and North America, while many genera and some whole families are at home nowhere but in ants’ nests. Most remarkable is the presence of a number of beetles along the seashore between tide-marks, where, sheltered in some secure nook, they undergo immersion twice daily, and have their active life confined to the few hours of the low ebb.

Stridulating Organs. — Many beetles make a hissing or chirping sound by rubbing a ” scraper,” formed by a sharp edge or prominence on some part of their exoskeleton, over a ” file ” formed by a number of fine ridges situate on an adjacent region. These stridulating organs were mentioned by C. Darwin as prob- able examples of the action of sexual selection; they are, however, frequently present in both sexes, and in some families also in the larvae. An account of the principal types of stridulators that have been described has been published by

C. J. Gahan (1900). The file may be on the head — either upper or lower surface — and the scraper formed by the front edge of the prothorax, as in various wood-boring beetles (ˆ4 nobium and Scolytus) . Or ridged areas on the sides of the prothorax may be scraped by ” files ” on the front thighs, as in some ground-beetles. Among the longhorn beetles, the prothorax scrapes over a median file oh the mid-dorsal aspect of the mesothorax. In a large number

of beetles of different families, stridulating areas occur on various segments of the abdomen, and are scraped by the elytra. It is remarkable that these organs are found in similar positions in genera belonging to widely divergent families, while two genera of the same family may have them in different positions. It follows, therefore, ihat they have been independently acquired in the course of the evolution of the Coleoptera.

Stridulating organs among beetle-larvae have been noted, especially in the wood-feeding grub of the stag-beetles (Lucan- idae) and their allies the Passalidae, and in the dung-eating grubs of the dor-beetles (Geotrupes), which belong to the chafer family (Scarabaeidae). These organs are described by J. C. Schiodte and D. Sharp; in the stag-beetle larva a series of short tubercles on the hind-leg is drawn across the serrate edge of a plate on the haunch of the intermediate legs, while in the Passalid grub the modified tip of the hind-leg acts as a scraper, being so shortened that it is useless for locomotion, but highly specialized for producing sound. Whatever may be the true explanation of stridulating organs in adult beetles, sexual selection can have had nothing to do with the presence of these highly-developed larval structures. It has been suggested that the power of stridulation would be advantageous to wood-boring grubs, the sound warning each of the position of its neighbour, so that adjacent burrowers may not get in each other’s way. The root-feeding larvae of the cockchafer and allied members of the Scarabaeidae have a ridged area on the mandible, which is scraped by teeth on the maxillae, apparently forming a stridulating organ.

Luminous Organs. — The function of the stridulating organs just described is presumably to afford means of recognition by sound. Some beetles emit a bright light from a portion of their bodies, which leads to the recognition of mate or comrade by sight. In the wingless female glow-worm (Lampyris, fig. 15/) the luminous region is at the

hinder end, the organ emitting the light consisting, according to H. von Wielowiejski (1882), of cells similar to those of the fat-body, containing a substance that undergoes oxidation. The illumination is intermittent, and appears to be under the control of the insect's nervous system. The well-known " fire-flies " of the tropics are large click-beetles (Elateridae) , that emit light from paired spots on the prothorax and from the base of the ventral abdominal region. The luminous organs of these beetles consist of a specialized part of the fat-body, with an inner opaque and an outer transparent layer. Its structure has been described by C. Heinemann, and its physiology by R. Dubois (1886), who considers that the luminosity is due to the influence of an enzyme in the cells of the organ upon a special substance in the blood. The eggs and larvae of the fire-flies are luminous as well as the perfect beetles.

Fossil History. — The Coleoptera can be traced back farther in time than any other order of insects with complete trans- formations, ii the structures that have been described from the Carboniferous rocks of Germany are really elytra. In the Triassic rocks of Switzerland remains of weevils (Curculionidae) occur, a family which is considered by many students the most specialized of the order. And when we know that the Chrysomel- idae and Buprestidae also lived in Triassic, and the Carabidae, Elateridae, Cerambycidae and Scarabaeidae, in Liassic times, we cannot doubt that the great majority of our existing families had already been differentiated at the beginning of the Mesozoic epoch. Coming to the Tertiary we find the Oligocene beds of Aix, of east Prussia (amber) and of Colorado, and the Miocene of Bavaria, especially rich in remains of beetles, most of which can be referred to existing genera.

Classification. — The Coleoptera have been probably more assiduously studied by systematic naturalists than any other order of insects. The number of described species can now hardly be less than 100,000, but there is little agreement as to the main principles of a natural classification. About eighty-five families are generally recognized; the difficulty that confronts the zoologists is the arrangement of these families in " superfamilies " or " sub-orders." Such obvious features as the number of

segments in the foot and the shape of the feeler were used by the early entomologists for distinguishing the great groups of beetles. The arrangement dependent on the number of tarsal segments — the order being divided into tribes Pentamera, Telramera, Heteromera and Trimera — was suggested by E. L. Geoffroy in 1762, adopted by P. A. Latreille, and used largely through the 19th century. W. S. Macleay's

classification (1825), which rested principally on the characters of the larvae, is almost forgotten nowadays, but it is certain that in any systematic arrangement which claims to be natural the early stages in the life-history must receive due attention. In recent years classifications in part agreeing with the older schemes but largely original, in accord with researches on the comparative anatomy of the insects, have been put forward. Among the more con- servative of these may be mentioned that of D. Sharp (1899), who divides the order into six great series of families: Lamelli- cornia (including the chafers and stag-beetles and their allies with five-segmented feet and plate-like terminal segments to the feelers); Adephaga (carnivorous, terrestrial and aquatic beetles, all with five foot-segments); Polymorpha (including a heterogeneous assembly of families that cannot be fitted into any of the other groups) ; Heteromera (beetles with the fore and intermediate feet five-segmented, and the hind-feet four-seg- mented) ; Phytophaga (including the leaf-beetles, and longhorns, distinguished by the apparently four-segmented feet), and Rhynchophora (the weevils and their allies, with head prolonged into a snout, and feet with four segments). L. Ganglbauer (1892) divides the whole order into two sub-orders only, the Caraboidea (the Adephaga of Sharp and the older writers) and the Canthari- doidea (including all other beetles) , since the larvae of Caraboidea have five-segmented, two-clawed legs, while those of all other beetles have legs with four segments and a single claw. A. Lameere (1900) has suggested three sub-orders, the Cantharidi- formia (including the Phytophaga, the Heteromera, the Rhyn- chophora and most of the Polymorpha of Sharp's classification), the Staphyliniformia (including the rove-beetles, carrion-beetles and a few allied families of Sharp's Polymorpha) , and the Cara- bidiformia (Adephaga). Lameere's classification is founded on the number of abdominal sterna, the nervuration of the wings, the number of malpighian tubules (whether four or six) and other structural characters. Preferable to Lameere's system, because founded on a wider range of adult characters and taking the larval stages into account, is that of H. J. Kolbe (1901), who recognizes three sub-orders: (i.) the Adephaga; (ii.) the Heterophaga, including the Staphylinoidea, the Actinorhabda (Lamellicornia) , the Heterorhabda (most of Sharp's Polymorpha) , and the Anchistopoda (the Phytophaga, with the ladybirds and some allied families which Sharp places among the Poly- morpha); (iii.) the Rhynchophora.

Students of the Coleoptera have failed to agree not only on a system of classification, but on the relative specialization of some of the groups which they all recognize as natural. Lameere, for example, considers

some of his Cantharidiformia as the most primitive Coleoptera. J. L. Leconte and G. H. Horn placed the Rhynchophora (weevils) in a group distinct from all other beetles, on account of their supposed primitive nature. Kolbe, on the other hand, insists that the weevils are the most modified of all beetles, being highly specialized as regards their adult structure, and developing from legless maggots exceedingly different from the adult; he regards the Adephaga, with their active armoured larvae with two foot-claws, as the most primitive group of beetles, and there can be little doubt that the likeness between larvae and adult may safely be accepted as a primitive character among insects. In the Coleoptera we have to do with an ancient yet dominant order, in which there is hardly a family that does not show specialization in some point of structure or life-history. Hence it is impossible to form a satisfactory linear series.

In the classification adopted in this article, the attempt has been made to combine the best points in old and recent schemes, and to avoid the inconvenience of a large heterogeneous group including the vast majority of the families.

Adephaga. — This tribe includes beetles of carnivorous habit with five segments on every foot, simple thread-like feelers with none of the segments enlarged to form club or pectination, and the outer lobs (galea) of the first maxilla usually two-segmented and palpiform (fig. 4 b). The transverse fold of the hind- wing is towards the tip, about two-thirds of the wing-length from the base. At this fold the median nervure stops and is joined by a cross nervure to the radial, which can be distinguished throughout its length from the subcostal. There are four malpighian tubules. In the ovarian

Fig. 4. — Mormolyce phyllodes. Java, a, Labium ; 6, maxilla ; c, labrum; d, mandible.

tubes of Adephaga small yolk-chambers alternate with the egg-chambers, while in all other beetles there is only a single large yolk-chamber at the narrow end of the tube. The larvae (fig. 2 c) are active, with well-chitinized cuticle, often with elongate tail-feelers (cerci), and with five-segmented legs, the foot-segment carrying two claws.

The generalized arrangement of the wing-nervure and the nature of the larva, which is less unlike the adult than in other beetles,

distinguish this tribe as primitive, although the perfect insects are, in the more dominant families, distinctly specialized. Two very small families of aquatic beetles seem to stand at the base of the series, the Amphizoidae, whose larvae are broad and well armoured with

Fig. 5. — Pheropsophus Jurinei. W. Africa.

Fig. 6.-

-Carabus rutilans. Spain.

short cerci, and the Pelobiidae, which have elongate larvae, tapering to the tail end, where are long paired cerci and a median process, recalling the grub of a Mayfly.

The Dyticidae (fig. 2) are Adephaga highly specialized for life in the water, the hind-legs having the segments short, broad andfringed, so as to be well adapted for swimming, and the feet without claws. The metasternum is without the transverse linear impression that is found in most families of Adephaga. The beetles are ovoid in shape, with smooth contours, and the elytra fit over the edges of the abdomen so as to enclose a supply of air, available for use when the insect remains under water. The fore-legs of many male dyticids have the three proximal foot-segments broad and saucer-shaped, and

covered with suckers, by means of which they secure a firm hold of their mates. Larval dyticids (fig. 2 b) possess slender, curved, hollow mandibles, which are perforated at the tip and at the base, being thus adapted for sucking the juices of victims. Large dyticid larvae often attack small fishes and tadpoles. They breathe by piercing the surface film with the tail, where a pair of spiracles are situated. The pupal stage is passed in an earthen cell, just beneath the surface of the ground. Nearly 2000 species of Dyticidae are known : they are universally distributed, but are most abundant in cool countries. The Haliplidae form a small aquatic family allied to the Dyticidae. The Carabidae, or ground-beetles, comprising 13,000 species, form

Fig. 7. — Cicindela sylvatica (Wood Tiger-Beetle). Europe.

Fig. 8.-

-Manticora tuberculata. S. Africa.

the largest and most typical family of the Adephaga (figs. 4, 5, 6), the legs of all three pairs being alike and adapted for rapid running. In many Carabidae the hind- wings are reduced or absent, and the elytra

fused together along the suture. Many of our native species spend the day lurking beneath stones, and sally forth at night in pursuit of their prey, which consistsof small insects, earth worms and snails. But a number of the more brightly coloured ground-beetles run actively in the sunshine. The carabid larva is an active well-armoured grub with the legs and cerci variable in length. Great differences in the general form of the body may be observed in the family. For example, the stout, heavy body of Carabus (fig. 6) contrasts markedly with the wonderful flattened abdomen and elytra of Mormolyce (fig. 4), a Malayan genus found beneath fallen trees, a situation for which its compressed shape is admirably adapted. Blind Carabidae form a large proportion of cave- dwelling beetles, and several species of great interest live between tide-marks along the seashore.

The Cicindelidae, or tiger- beetles (figs. 7, 8) are the most highly organized of all the Adephaga. The inner lobe (lacinia) of the first maxilla terminates in an articulated hook, while in the second maxillae (labium) both inner and outer lobes (" ligula " and " para-glossae ") are much reduced. The face (clypeus) is . „ broad, extending on either side £'£)■ -c-urope. in front of the insertion of the feelers. The beetles are elegant insects with long, slender legs, running quickly, and flying in the sunshine. The pronotum and elytra are often adorned with bright colours or metallic lustre, and marked with stripes or spots. The beetles are fierce in nature and predaceous in habit, their sharp toothed mandibles being well adapted

for the capture of small insect-victims. The larvae specialized than those of other Adephaga, the head and prothorax being very large and broad, the succeeding segments slender and in- completely chitinized. The fifth abdominal segment has a pair of strong dorsal hook-like processes, by means of which the larva supports itself in the burrow which it excavates in the earth, the great head blocking the entrance with the mandibles ready to seize on any unwary insect that may venture within reach.

Two or three families may be regarded as aberrant Adephaga.

Gyrinus sulcatus (Grooved Whirli-

Antenna of Gyrinus.

Fig.

Larva of Gyrinus.

are more

The Paussidae are a very remarkable family of small beetles, mostly tropical, found only in ants' nests, or flying by night, and apparently migrating from one nest to another. The number of antennal segments varies from eleven to two. It is supposed that these beetles secrete a sweet substance on which the ants feed, but they have been seen to devour the ants' eggs and grubs. The Gyrinidae, or whirligig beetles (fig. 9), are a curious aquatic family with the feelers (fig. 9, b) short and reduced as in most Paussidae. They are flattened oval in form, circling with gliding motion over the surface film of the water, and occasionally diving, when they carry down with them a bubble of air. The fore-legs are elongate and adapted for clasping, while the short and flattened intermediate and hind legs form very perfect oar-like propellers. The larva of Gyrinus (fig. 9, c) is slender with elongate legs, and the abdominal segments carry paired tracheal gills.

Staphylinoidea. — The members of this tribe may be easily recognized by their wing-nervuration. Close to a transverse fold near the base of the wing, the median nervure divides into branches which extend to the wing-margin; there is a second transverse fold near the tip of the wing, and cross nervures are altogether wanting. There are four malpighian tubes, and all five tarsal segments are usually recognizable. With very few exceptions, the larva in this group is active and campodeiform, with cerci and elongate legs as in the Adephaga, but the leg has only four segments and one claw.

Fig. 10. — Silpha quadri- punctata. Europe.

Fig. 11. — Necrophorus vespillo (Sexton Beetle). Europe.

The Silphidae, or carrion beetles, form one of the best-known families of this group. They are rotund or elongate insects with conical front haunches, the elytra generally covering (fig. 10) the whole dorsal region of the abdomen, but sometimes leaving as many as four terga exposed (fig. 11). Some of these beetles are brightly coloured, while others are dull black. They are usually found in carrion, and the species of Necrophorus (fig. n) and Necrophaga are valuable scavengers from their habit of burying small vertebrate carcases which may serve as food for their larvae. At this work a number of individuals are associated together. The larvae that live underground have spiny dorsal plates, while those of the Silpha (fig. 10) and other genera that go openly about in search of food resemble wood-lice.

About 1000 species of Silphidae are known. Allied to the Silphidae are a number of small and obscure families, for which reference must be made to monographs of the order. Of special interest among these are the Histeridae, compact beetles (fig. 12) with very hard cuticle and somewhat abbreviated elytra, with over 2000 species, most of which live on decaying matter, and

Fig. 12. Fig. 13.

Hister iv-maculatus Oxyporus rufus.

(Mimic Beetle). Europe. Europe.

Fig. 14.

Stenus biguttatus. Europe.

the curious little Pselaphidae, with three-segmented tarsi, elongate palpi, and shortened abdomen ; the latter are usually found in ants' nests, where they are tended by the ants, which take a sweet fluid secreted among little tufts of hair on the beetles' bodies; these beetles, which are carried about by the ants, sometimes devour their larvae. The Trichopterygidae, with their delicate narrow fringed wings, are the smallest of all beetles, while the Platypsyllidae consist of only a single species of curious form found on the beaver. The Staphylinidae, or rove-beetles — a large family of nearly 10,000 species — may be known by their very short elytra, which cover only two of the abdominal segments, leaving the elongate hind-body with seven or eight exposed, firm terga (figs. 13, 14). These segments are very mobile, and as the rove-beetles run along they often curl the abdomen upwards and forwards like the tail of a scorpion. The Staphylinid larvae are typically campodeiform. Beetles and larvae are frequently carnivorous in habit, hunting for small insects under stones, or pursuing the soft-skinned grubs of

beetles and flies that bore in woody stems or succulent roots. Many Staphylinidae are constant inmates of ants' nests.

Malacodermata. — In this tribe may be included a number of families distinguished by the softness of the cuticle, the presence of seven or eight abdominal sterna and of four malpighian tubes, and the firm, well-arm- oured larva (fig. 15, c) which is often predaceous in habit. The mesothor- acic epimera bound the coxal cavities of the inter- mediate legs. The Lym- exylonidae, a small family of this group, character- ized by its slender, un- differentiated feelers and feet, is believed by Lameere to comprise the most primitive of all living

beetles, and Sharp lays F I5 ._ G low-worm. Lampyris nocti- stress on the undeveloped ˆ ffl f Male; 6> female; c {£ va (ven .

geSfy. ** “^ tral vi ™>- Euro P e –

The Lampyridae are a large family, of which the glow-worm (Lampyris) and the ” soldier beetles ” (Telephorus) are familiar examples. The female ” glow- worm ” (fig. 15, b), emitting the well-known light (see above), is wingless and like a larva ; the luminosity seems to be an attraction to the male, whose eyes are often exceptionally well developed. Some male members of the family have remarkably complex feelers. In many genera of Lampyridae the female can fly as well as the male; among these are the South European ” fireflies.”

Trichodermata. — Several families of rather soft-skinned beetles, such as the Melyridae, Cleridae (fig. 16), Corynetidae, Dermestidae (fig. 17), and Das- – _

cillidae, are included >& **-tA~** .

in this tribe. They may be distin- guished from the Malacodermata by the presence of only five or six abdominal sterna, while six mal-pighian tubes are present in some of the families. The beetles are hairy and their larvae well-armoured and often predaceous. Several species of Dermestidae are commonly found in houses, feeding on cheeses, dried meat, skins and other such substances. The ” bacon beetle ” (Dermestes lardarius), and its hard hairy larva, are well known. According to Sharp, all Dermestid larvae probably feed on dried animal matters; he mentions one species that can find sufficient food in the horsehair of furniture, and another that eats the dried insect-skins hanging in old cobwebs.

Sternoxia. — This is an important tribe of beetles, including families with four malpighian tubes and only five or six abdominal sterna, while in the thorax there is a backwardly directed process of the prosternum that fits into a mesosternal cavity. The larvae are elongate and worm-like, with short legs but often with hard strong cuticle.

The Elateridae or click beetles (fig. 18) have the prosternal process

A.

Fig. 16. — Clerus apiarus(liive Beetle). Europe.

Fig. 17. — Dermestes lardarius (Bacon Beetle).

Fig. 18.— A, Wireworm; B, pupa of Click Beetle; C, adult Click Beetle (Agriotes lineatum).

just mentioned, capable of movement in and out of the mesosternal cavity, the beetles being thus enabled to leap into the air, hence their popular name of ” click-beetles ” or ” skip-jacks. ,; The prothorax is convex in front, and is usually drawn out behind into a prominent process on either side, while the elytra are elongate and tapering.

Many of the tropical American Elateridae emit light from the spots on theprothorax and an area beneath the base of the abdomen; these are “fireflies” (see above). The larvae of Elateridae are elongate, worm-like grubs, with narrow bodies, very firm cuticle, short legs, and a distinct anal proleg. They are admirably adapted for moving through the soil, where some of them live on decaying organic matter, while others are predaceous. Several of the elaterid larvae, however, gnaw roots and are highly destructive to farm crops. These are the well-known’ ” wire-worms ” (q.v.).

The Buprestidae are distinguished from the Elateridae by the im-mobility of the prosternal process in the mesosternal cavity and by the absence of the lateral processes at the hind corners of the

prothorax. Many tropical Buprestidae are of large size (fig. 19), and exhibit magnificent metallic colours; their elytra are used as orna-ments in human dress. The larvae are remarkable for their small head, very broad thorax, with reduced legs, and narrow elongate abdomen. They feed by burrowing in the roots and stems of plants.

BOSTRYCHOIDEA.

— This tribe is dis- tinguished from the Malacoderma and allied groups by the mesothoracic epi- mera not bounding the coxal cavities of the intermediate legs. The down- wardly directed head is covered by the pronotum, and the three terminal antennal segments form a distinct club. To this group belong the Bostrychidae and Ptinidae, well known (especially the latter family) for their ravages in old timber. The larvae are stout and soft-skinned, with short legs in correlation with their burrowing habit. The noises made by some Ptinidae (Anobium) tapping on the walls of their burrows with their man-dibles give rise to the ” death tick ” that has for long alarmed the superstitious.

Clavicornia. — This is a somewhat heterogeneous group, most of whose members are characterized by clubbed feelers and simple,

unbroadened tarsal segments — usually five on each foot — but in some families and genera the males have less than the normal number on the feet of one pair. There are either four or six malpighian tubes. A large number of families, distinguished from each other by more or less trivial characters, are included here, and there is considerable diversity in the form of the larvae. The best- known family is the Hydrophilidae, in which the feelers are short with less than eleven segments and the maxillary palpi very long. Some members of this family — the large black Hydrophilus piceus (fig. 20), for example — are specialized for an aquatic life, the body being convex and smooth as in the Dyticidae, and the intermediate and hind-legs fringed for swimming. When Hydrophilus dives it carries a supply of air between the elytra andthedorsal surface of the abdomen, while air is Fig. 20. — Hydr ophilus also entangled in the pubescence which piceus (Black Water Beetle), extends beneath the abdomen on either Europe. s ‘de, being scooped in bubbles by the

terminal segments of the feelers when the insect rises to the surface. Many of the Hydrophilidae construct, for the protection of their eggs, a cocoon formed of a silky material derived froin glands opening at the tip of the abdomen. That of Hydrophilus is attached to a floating leaf, and is pro- vided with a hollow, tapering process, which projects above the surface and presumably conveys air to the enclosed eggs. Other Hydrophilidae carry their egg-cocoons about with them beneath the abdomen. Many Hydrophilidae, unmodified for aquatic life,

Catoxantha bicolor.

inhabit marshes. The larvae in this family are well-armoured, active and predaceous. Of the numerous other families of the Clavicornia may be mentioned the Cucujidae and Cryptophagidae, small beetles, examples of which may be found feeding on stored seeds or vegetable refuse, and the Mycetophagidae, which devour fungi. The Nitidulidae are a large family with 1600 species, among which members of the genus Meligethes are often found in numbers feeding on blossoms, while others live under the bark of trees and prey on the grubs of boring beetles.

Heteromera.— This tribe is distinguished by the presence of the normal five segments in the feet of the fore and intermediate legs, while only four segments are visible in the hind-foot. Considerable diversity is to be noticed in details of structure within this group, and

for an enumeration of all the various families which have been proposed and their distinguishing characters the reader is referred to one of the monographs mentioned below. Some of the best- known members of the group belong to the Tenebrionidae, a large

Fig. 21. — (a) Tenebrio molitor (Flour Beetle). Europe. (b) Larva, or mealworm.

Fig. 22. — Blaps morlisaga (Churchyard Beetle). Europe.

family containing over 10,000 species and distributed all over the world. The tenebrionid larva is elongate, with well-chitinized cuticle, short legs and two stumpy tail processes, the common meal- worm (fig. 21) being a familiar example. Several species of this family are found habitually in stores of flour or grain. The beetles have feelers with eleven segments, whereof the terminal few are thickened so as to form a club. The true ” black-beetles ” or ” churchyard beetles ” (Blaps) (fig. 22) belong to this family; like members of several allied genera they are sooty in colour, and some- what resemble ground beetles (Carabi) in general appearance.

The most interesting of the Heteromera, and perhaps of all the Coleootera, are some beetles which pass through two or more larval forms in the course of the life-history (hypermetamorphosis) . These belong to the families Rhipidophoridae and Meloidae. The latter are the oil beetles (fig. 23) or blister beetles (fig. 24), insects with rather soft cuticle, the elytra (often abbreviated) not fitting closely to the sides of the abdomen, the head constricted behind the eyes to form

Fig. 23. — Meloe proscarabaeus (Oil Beetle). Europe.

Fig. 24. — Lylta vesicatoria (Blister Beetle). Europe. ‘

a neck, and the claws of the feet divided to the base. Several of the Meloidae (such as the ” Spanish fly,” fig. 24) are of economic importance, as they contain a vesicant substance used for raising medicinal blisters on the human skin. The wonderful transforma- tions of these insects were first investigated by G. Newport in 1851, and have recently been more fully studied by C. V. Riley (1878) and J. H. Fabre. The first larval stage is the ” triungulin,” a tiny, active, armoured larva with long legs (each foot with three claws) and cercopods. In the European species of Sitaris and Meloe these little larvae have the instinct of clinging to any hairy object. All that do not happen to attach themselves to a bee of the genus Anthophora perish, but those that succeed in reaching the right host are carried to the

nest, and as the bee lays an egg in the cell the triungulin slips off her body on to the egg, which floats on the surface of the honey. After eating the contents of the egg, the larva moults and becomes a fleshy grub with short legs and with paired spiracles close to the dorsal region, so that, as it floats in and devours the

honey, it obtains a supply of air. After a resting (pseudo-pupal) stage and another larval stage, the pupa is developed. In the American Epicauta vittata the larva is parasitic on the eggs and egg- cases of a locust. The triungulin searches for the eggs, and, after a moult, becomes changed into a soft-skinned tapering larva. This is followed by a resting (pseudo-pupal) stage, and this by two successive larval stages like the grub of a chafer. The Rhipidophoridae are beetles with, short elytra, the feelers pectinate in the malesand serrate in the females. The life-history of Metoecus has been studied by T. A. Chapman, who finds that the eggs are laid in old wood, and that the triungulin seeks to attach itself to a social wasp, who carries it to her nest. There it feeds first as an internal parasite of the wasp- grub, then bores its way out, moults and devours the wasp larva from outside. The wasps are said to leave the larval or pupal Metoecus unmolested, but they are hostile to the developed beetles, which hasten to leave the nest as soon as possible.

Strepsiptera. — Much difference of opinion has prevailed with regard to the curious, tiny, parasitic insects included in this division, some authorities considering that they should be referred to a distinct order, while others would group them in the family Meloidae just described. While from the nature of their life-history there is no doubt that they have a rather close relationship to the Meloidae, their structure is so remarkable that it seems advisable to regard them as at least a distinct tribe of Coleoptera.

They may be comprised in a single family, the Stylopidae. The males are very small, free-flying insects with the prothorax, meso- thorax and elytra greatly reduced, the latter appearing as little, twisted strips, while the metathorax is relatively large, with its wings broad and capable of longitudinal folding. The feelers are branched and the jaws vestigial. The female is a segmented, worm- like creature, spending her whole life within the body of the bee, wasp or bug on which she is parasitic. One end of her body pro- trudes from between two of the abdominal segments of the host; it has been a subject of dispute

whether this protruded end is the head or the tail, but there can be little doubt that it is the latter. While thus carried about by the host-insect, the female is fertilized by the free-flying male, and gives birth to a number of tiny triungulin larvae. The chief points in the life-history of Stylops and Xenos, which are parasitic on certain bees (Andrena) and wasps (Polistes), have been investigated by K. T. E. von Siebold (1843) and N. Nassonov (1892). The little triungulins escape on to the body of the bee or wasp; then those that are to survive must leave their host for a non-parasitized insect. Clinging to her hairs they are carried to the nest, where they bore into the body of a bee or wasp larva, and after a moult become soft-skinned legless maggots. The growth of the parasitic larva does not stop the development of the host-larva, and when the latter pupates and assumes the winged form, the stylopid, which has completed its transformation, is carried to the outer world. The presence of a Stylops causes de- rangement in the body of its host, and can be recognized by various external signs. Other genera of the family are parasitic on Hemiptera — bugs and frog-hoppers — but nothing is known as to the details of their life-history.

Lamellicornia. — This is a very well-marked tribe of beetles, characterized by the peculiar elongation and flattening of three or more of the terminal antennal segments, so that the feeler seems to end in a number of leaf-like plates, or small comb-teeth (fig. 26, b, c). The wings are well developed for flight, and there is a tendency in the group, especially among the males, towards an excessive development of the mandibles or the presence of enormous, horn-like processes on the head or pronotum. There are four malpighian tubes. The larvae are furnished with large heads, powerful mandibles and well-developed legs, but the body-segments are feebly chitinized, and the tail-end is swollen. They feed in wood or spend an under- ground life devouring roots or animal excrement.

The Lucanidae or stag beetles (figs. 1 and 25) have the terminal antennal segments pectinate, and so arranged that the comb-like part of the feeler cannot be curled up, while the elytra completely cover the abdomen. There are about 600 species in the family, the males being usually larger than the females, and remarkable for the size of their mandibles. In the same species, however, great variation occurs in the development of the mandibles, and the breadth of the head varies correspondingly, the smallest type of male being but little different in appearance from the female. The larvae of Lucanidae live within the wood of trees, and may take three or four years to attain their full growth. The Passalidae are a tropical family of beetles generally considered to be intermediate between stag-beetles and

chafers, the enlarged segments of the feeler being capable of close approximation.

The Scarabaeidae or chafers are an enormous family of about 15,000 species. The plate-like segments of the feeler (fig. 26, b, c) can be brought close together so as to form a club-like termination ; usually the hinder abdominal segments are not covered by the elytra. In this family there is often a marked divergence between the sexes; the terminal antennal segments are larger in the male than in the female, and the males may carry large spinous processes on the head or prothorax, or both. These structures were believed by C. Darwin to be explicable by sexual selection. The larvae have the three pairs of legs well developed, and the hinder abdominal segments swollen. Most of the Scarabaeidae are vegetable-feeders, but one section

of the family — represented in temperate countries by the dor- beetles (Geotrupes) (fig. 28) and Aphodius, and in warmer regions by the_ " sacred " beetles of the Egyptians (Scarabaeus) (fig. 27), and allied genera — feed both in the adult and larval stages, on dung or decaying animal matter. The heavy grubs of Geotrupes, their

Fig. 26. — Melolonthafullo Fig. 25. — Cladognathus cinnamomeus. (Cockchafer). S. Europe, b, Java. Antenna of male ; c, antenna

of female.

swollen tail-ends black with the contained food-material, are often dug up in numbers in well-manured fields. The habits of Scarabaeus have been described in detail by J. H. Fabre. The female beetle in spring-time ‘collects dung, which she forms into a ball by continuous rolling, sometimes assisted by a companion. This ball is buried in a suitable place, and serves the insect as a store of food. During summer the insects rest in their underground retreats, then inautumn

Fig. 27. — Scarabaeus Aegyptiorum. Africa.

Fig. 28. — Geotrupes Black- burnei. N. America.

they reappear to bury another supply of dung, which serves as food for the larvae. Fabre states that the mother-insect carefully arranges the food-supply so that the most nutritious and easily digested portion is nearest the egg, to form the first meal of the young larva. In some species of Copris it is stated that the female

Fig. 29. — Phaneus Imperator. S. America.

Fig. 30. — Cetonia Baxii. W. Africa.

lays only two or three eggs at a time, watching the offspring grow to maturity, andlhen rearing another brood.

Among the vegetable-feeding chafers we usually find that while the perfect insect devours leaves, the larva lives underground and feeds on roots. Such are the habits of the cockchafer (Melolontha vulgaris) and other species that often cause great injury to farm and

garden crops (see Chafer). Many of these insects, such as the species of Phanaeus (fig. 29) and Cetonia (fig. 30) , are adorned with metallic or other brilliant colours. The African ” goliath-beetles ” (fig. 31) and the American ” elephant-beetles ” (Dynastes) are the largest of all insects.

Anchistopoda. — The families of beetles included by Kolbe in this group are distinguished by the possession of six malpighian tubes, and a great reduction in one or two of the tarsal segments, so that there seem to be only four or three segments in each foot ; hence the names Telramera and Trimera formerly applied to them. The larvae have soft-skinned bodies sometimes protected by rows of spiny tubercles, the legs being fairly developed in some families and greatly

segments to the foot, but there are really five, the fourth being greatly reduced. The mandibles are strong, adapted for biting the vegetable substances on which these beetles feed, and the palps of the second maxillae have three segments. Most of the Chrysornelidae are metallic in colour and convex in form; in some the head is concealed beneath the prothorax, and the so-called ” tortoise ” beetles (Cassidinae) have the elytra raised into a prominent median ridge. The most active form of larva found in this family resembles in shape that of a ladybird, tapering towards the tail end, and having the trunk segments protected by small firm sclerites. Such larvae, and also many with soft cuticle and swollen abdomen — those of the notorious ” Colorado beetle,” for example — feed openly

Fig. 32. — Anatio ocel- lata (Eyed Ladybird). Europe.

Fig. 33. — Endomychtis coccineus. Europe.

Fig.

34. — Sagra cyanea. W. Africa.

Fig. 35. — Eumorphus iv- guttatus. Sumatra.

Fig. 31. — Goliathus giganteus (Goliath_Beetle).

reduced or absent in others. As might be expected, degeneration in larval structure is correlated with a concealed habit of life.

The Coccinellidae, or ladybirds (fig. 32), are a large family of beetles, well known by their rounded convex bodies, usually shining and hairless. They have eleven segments to the feeler, which is clubbed at the tip, and apparently three segments only in each foot. Ladybirds are often brightly marked with spots and dashes, their coloration being commonly regarded as an advertisement of in- edibility. The larvae have a somewhat swollen abdomen, which is protected by bristle-bearing tubercles. Like the perfect insects, they are predaceous, feeding on plant-lice (Aphidae) and scale insects (Coccidae). Their r&le in nature is therefore beneficial to the culti- vator. The Endomychidae (fig. 33), an allied family, are mostly fungus-eaters. In the Erotylidae and a few other small related families the feet are evidently four-segmented.

The Chrysornelidae, or leaf -beetles (figs. 34, 35), are a very large family, with ” tetramerous ” tarsi; there seem to be only four

Fig. 36. — Lophonocerus’barbicornis. S. America.

on foliage. Others.with soft, white, cylindrical bodies, which recall the caterpillars of moths, burrow in the leaves or stems of plants. The larvae of the tortoise-beetles have the curious habit of forming an umbrella-like shield out of their own excrement, held in position by the upturned tail-process. The larvae of the beautiful, elongate, metallic Donaciae live in the roots and stems of aquatic plants, obtaining thence both food and air. The larva pierces the vessels of the plant with sharp processes at the hinder end of its body. In this way it is believed that the sub-aqueous cocoon in which the pupal stage is passed becomes filled with air.

The Cerambycidae, or longhorn beetles, are recognizable by their slender, elongate feelers, which are never clubbed and rarely serrate. The foot has apparently four segments, as in the Chrysornelidae. The

beetles are usually elongate and elegant in form, often adorned with bright bands of colour, and some of the tropical species attain a very large size (figs. 36, 37). The feelers are usually longer in the male than in the female, exceeding in some cases by many times the

length of the body. The larvae have soft, fleshy bodies, with the head and prothorax large and broad, and the legs very much reduced. They live and feed in the wood of trees. Consequently, beetles of this family are most abundant in forest regions, and reach their highest development in the dense virgin forests of tropical countries, South America being particularly rich in peculiar genera.

Phryneta aurocincta. West Africa.

The Bruchidae, or seed-beetles, agree with the two preceding families in tarsal structure ; the head is largely hidden by the pronotum, and the elytra are short enough to leave the end of the abdomen exposed (fig. 38). The development of the pea and bean- beetles has been carefully studied by C. V. Riley, who finds that the young larva, hatched from the egg laid on the pod, has three pairs of legs, and that these are lost after the moult that occurs when the grub has bored its way into the seed. In Great Britain the beetle, after completing its development, winters in the seed, waiting to emerge and lay its eggs on the blossom in the ensuing spring.

Fig. 38. — Bruchus piei (Pea Beetle.) Europe.

Fig. 39. — Platyrrhinus latirostris. Europe.

Rhynchophora. — The Rhynchophora are a group of beetles easily recognized by the elongation of the head into a beak or snout, which carries the feelers at its sides and the jaws at its tip. The third tarsal segment is broad and bi-lobed, and the fourth is so small that the feet seem to be only four-segmented. There are six malpighian tubes. The ventral scleriteof the head-skeleton (gula), well developed in most families of beetles, is absent among the Rhynchophora, while the palps of the maxillae are much reduced. The larvae have soft, white bodies and, with very few exceptions, no legs.

Fig. 40. — Bren- anchorago. Fig. 41. — Otiorrhyn- chus ligustici. Europe. Fig. 42. — Lixus para- plecticus. Europe. thus Tropical Countries.

Of the four families included in this group, the Anthribidae (fig. 39) have jointed, flexible palps, feelers — often of excessive length — with a short basal segment, and the three terminal segments forming

Fig. 43. — Scolytus ulmi. (Bark Beetle). Europe.

a club, and, in some genera, larvae with legs. There are nearly 1000 known species, most of which live in tropical countries. The Brenthidae are a remarkable family almost confined to the tropics ; they are elongate and narrow in form (fig. 40), with a straight, cylindrical snout which in some male beetles of the family is longer than the rest of the body.

The Curculionidae, or weevils (q.v.), comprising 23,000 species, are by far the largest family of the group. The maxillary palps are short and rigid, and there is no distinct labrum, while the feelers are usually of an ” elbowed ” form, the basal segment being very elongate (figs. 41, 42). They are vegetable feeders, both in the perfect and larval stages, and are often highly injurious. The female uses her snout as a boring instrument to prepare a suitable place for egg-laying. The larvae (fig. 3) of some weevils live in seeds; others devour roots, while the parent- beetles eat leaves; others, again, are •

found in wood or under bark. The Scolytidae, or bark-beetles, are a family of some 1500 species, closely allied to the Curculionidae, differing only in the feeble development of the snout. They have clubbed feelers, and their cylindrical bodies (fig. 43) are well adapted for their burrowing habits under the bark of trees. Usually the mother-beetle makes a fairly straight tunnel along which, at short intervals, she lays her eggs. The grubs, when hatched, start galleries nearly at right angles to this, and when fully grown form oval cells in which they pupate; from these the young beetles emerge by making circular holes directly outward through the bark.

Bibliography. — In addition to what may be found in numerous important works on the Hexapoda (q.v.) as a whole, such as J. O. Westwood’s Modern Classification of Insects, vol. i. (London, 1838); J. H. Fabre’s Souvenirs Entomologiques (Paris, 1879-1891); D. Sharp’s contribution to the Cambridge Natural History (vol. vi., London, 1899); and L. C. Miall’s Aquatic Insects (London, 1895), the special literature of the Coleoptera is enormous. Classical anatomical memoirs are those of L. Dufour {Ann. Sci. Nat. ii., iii., iv., vi., viii., xiv., 1824-1828); lb. (ser. 2, Zool.) i., 1834; and H. E. Strauss- Durkheim, Anatomie comparee des animaux articulees (Paris, 1828).

The wings of Coleoptera (including the elytra) are described and discussed by F. Meinert (Entom. Tijdsk. v., 1880); C. Hoffbauer (Zeit.f. wissen. Zool. liv., 1892) ; J. H. Comstock and J. G. Needham (Amer. Nat. xxxii., 1898); and W. L. Tower (Zool. Jahrb. Anat. xvii., 1903). The morphology of the abdomen, ovipositor and genital armature is dealt with by K. W. Verhoeff (Ent. Nachtr. xx., 1894, and Arch.f. Naturg. lxi., lxii., 1895-1896) ; and B. Wandolleck (Zool. Jahrb. Anat. xxii., 1905).

Luminous organs are described by H. von Wielowiejski (Zeits. f. wissen. Zool. xxxvii., 1882); C. Heinemann (Arch.f. mikr. Anat. xxvii., 1886); and R. Dubois (Bull. soc. zool. France, 1886); and stridulating organs by C. J. Gahan (Trans. Entom. Soc, 1900). See also C. Darwin's Descent of Man and Selection in Relation to Sex (London, 1871).

Many larvae of Coleoptera are described and beautifully figured by J. C. Schiodte (Naturh. Tidsskr. i.-xiii., 1861-1872). Hyper-metamorphosis in the Meloidae is described by G. Newport (Trans. Linn. Soc. xx., xxi., 1 851-1853); C. V. Riley (Rep. U.S. Entom. Comm. L, 1878); J. H. Fabre (Ann. Sci. Nat. (4), ix., xix., 1848- '853); H. Beauregard (Les Insectes vesicants, Paris, 1890); and A. Chabaud (Ann. Soc. Ent. France, lx., 1891); in the Bruchidae by Riley (Insect Life, iv., v., 1892- 1893; and in the Strepsiptera (Stylopidae) by K. T. E. von Siebold (Arch. f. Naturg. ix., 1843); N. Nassonov (Bull. Univ. Narsovie, 1892) ; and C. T. Brues (Zool. Jahrb. Anat. xiii., 1903).

For various schemes of classification of the Coleoptera see E. L. Geoffroy (Insectes qui se trouvent aux environs de Paris, Paris, 1762) ; A. G. Olivier (Coleopleres, Paris, 1789-1808); W. S. MacLeay (Annulosa Javanica, London, 1825) ; the general works of Westwood and Sharp, mentioned above; M. Gemminger and B. de Harold (Catalogus Coleopterorum,_ 12 vols., Munich, 1868-1872); T. Lacordaire and F. Chapuis (Genera des Coleopteres, 10 vols., Paris, 1854-1874) ; J. L. Leconte and G. H. Horn (Classification of Coleop-tera of N. America, Washington, Smithsonian Inst., 1883); L. Ganglbauer (Die Kafer von Mitteleuropa, Vienna, 1892, &c.) ; A. Lameere (Ann. Soc. Ent. Belg. xliv., xlvii., 1900-1903) ; and H. J. Kolbe (Arch.f. Naturg. lxvii., 1901).

For the British species, W. W. Fowler (Coleoptera of the British Islands, 5 vols., London, 1887-1891) is the standard work; and W. F. Johnson and J. N. Halbert's " Beetles of Ireland " (Proc. R. Irish Acad., 3, vi., 1902) is valuable faunistically. Among the large number of systematic writers on the order generally, or on special families, may be mentioned D. Sharp, T. V. Wollaston, H. W. Bates, G. C. Champion,

E. Reitter, G. C. Crotch, H. S. Gorham, M. Jacoby, L. Fairmaire and C. O. Waterhouse. (G. H. C.)

COLEPEPER, JOHN COLEPEPER (or Culpepper), 1st Baron (d. 1660), English politician, was the only son of Sir John Colepeper of Wigsell, Sussex. He began his career is

military service abroad, and came first into public notice at home through his knowledge of country affairs, being summoned often before the council board to give evidence on such matters. He was knighted, and was elected member for Kent in the Long Parliament, when he took the popular side, speaking against monopolies on the 9th of November 1640, being entrusted with the impeachment of Sir Robert Berkeley on the 12th of February 1641, supporting Strafford's attainder, and being appointed to the committee of defence on the 12th of August 1641. He separated, however, from the popular party on the Church question, owing to political rather than religious objections, fearing the effect of the revolutionary changes which were now contemplated. He opposed the London petition for the abolition of episcopacy, the project of religious union with the Scots, and the Root and Branch Bill, and on the 1st of September he moved a resolution in defence of the prayer-book. In the following session he opposed the militia bill and the Grand Remonstrance, and finally on the 2nd of January 1642 he joined the king's party, taking office as chancellor of the ex- chequer. He highly disapproved of the attempt upon the five members, which was made without his knowledge, but advised the enterprise against Hull. On the 25th of August 1642 he appeared at the bar of the House of Commons to deliver the king's final proposals for peace, and was afterwards present at Edgehill, where he took part in Prince Rupert's charge and opposed the retreat of the king's forces from the battlefield. In December he was made by Charles master of the rolls. He was a leading member of the Oxford Parliament, and was said, in opposition to the general opinion, to have counselled consider- able concessions to secure peace. His influence in military affairs caused him to be much disliked by Prince Rupert and the army, and the general animosity against him was increased by his advancement to the peerage on the 21st of October 1644 by the title of Baron Colepeper of Thoresway in Lincolnshire.

He was despatched with Hyde in charge of the prince of Wales to the West in March 1645, an d on the 2nd of March 1646, after Charles's

final defeat, embarked with the prince for Scilly, and thence to France. He strongly advocated the gaining over of the Scots by religious concessions, a policy supported by the queen and Mazarin, but opposed by Hyde and other leading royalists, and constantly urged this course upon the king, at the same time deprecating any yielding on the subject of the militia. He promoted the mission of Sir John Berkeley in 1647 to secure an understanding between Charles and the army. In 1648 he accompanied the prince in his unsuccessful naval expedition, and returned with him to the Hague, where violent altercations broke out among the royalist leaders, Colepeper going so far, on one occasion in the council, as to challenge Prince Rupert, and being himself severely assaulted in the streets by Sir Robert Walsh. He continued after the execution of the king to press the acceptance on Charles II. of the Scottish proposals. He was sent to Russia in 1650, where he obtained a loan of 20,000 roubles from the tsar, and, soon after his return, to Holland, to procure military assistance. By the treaty, agreed to between Cromwell and Mazarin, of August 1654, Colepeper was obliged to leave France, and he appears henceforth to have resided in Flanders. He accompanied Charles II. to the south of France in September 1659, at the time of the treaty of the Pyrenees. At the Restoration he returned to England, but only survived a few weeks, dying on the nth of June 1660.

Several contemporary writers agree in testifying to Colepeper's great debating powers and to his resources as an adviser, but complain of his want of stability and of his uncertain temper. Clarendon, with whom he was often on ill terms, speaks generally in his praise, and repels the charge of corruption levelled against him. That he was gifted with considerable political foresight is shown by a remarkable letter written on the 20th of September 1658 on the death of Cromwell, in which he foretells with uncommon sagacity the future developments in the political situation, advises the royalists to remain inactive till the right moment and profit by the division of their opponents, and distinguishes Monck as the one person willing and capable of

effecting the Restoration {Clarendon State Papers, iii. 412). Colepeper was twice married, (1) to Philippa, daughter of Sir John Snelling, by whom he had one son, who died young, and a daughter, and (2) to Judith, daughter of Sir J. Colepeper of Hollingbourn, Kent, by whom he had seven children. Of these Thomas (d. 1719; governor of Virginia 1680-1683) was the successor in the title, which became extinct on the death of his younger brother Chencyin 1725. (P. C. Y.)

COLERAINE, a seaport and market town of Co. Londonderry, Ireland,

in the north parliamentary division, on the Bann, 4 m. from its mouth, and 61J m. N.W. by N. from Dublin by the Northern Counties (Midland) railway. Pop. of urban district (1901) 6958. The town stands upon both sides of the river, which is crossed by a handsome stone bridge, connecting the town and its suburb, Waterside or Killowen. The principal part is on the east bank, and consists of a central square called the Diamond, and several diverging streets. Among institutions may be mentioned the public schools founded in 16 13 and maintained by the Honourable Irish Society, and the Academical Institution, maintained by the Irish Society and the London Clothworkers' Company. The linen trade has long been extensively carried on in the town, from which, indeed, a fine description of cloth is known as " Coleraines." Whisky-distilling, pork-curing, and the salmon and eel fisheries are prosecuted. The mouth of the river was formerly obstructed by a bar, but piers were constructed, and the harbours greatly improved by grants from the Irish Society of London and from a loan under the River Bann Navigation Act 1879. Coleraine ceased to return one member to the Imperial parliament in 1885; having previously returned two to the Irish parliament until the Union. It was incorporated by James I. It owed its importance mainly to the Irish Society, which was incorporated as the Compan> for the New Plantation of Ulster in 1613. Though fortified only by an earthen wall, it managed to hold out against the rebels in 1 64 1. There are no remains of a former priory, monastery and castle. A rath or encampment of large size occupies Mount Sandel, 1 m. south-east.

COLERIDGE, HARTLEY (1796-1849), English man of letters, eldest son of the poet Samuel Taylor Coleridge, was born on the 19th of September 1796, near Bristol. His early years were passed under Southey's care at Greta Hall, Keswick, and he was educated by the Rev. John Dawes at Ambleside. In 1815 he went to Oxford, as scholar of Merton College. His university career, however, was very unfortunate. He had inherited the weakness of purpose, as well as the splendid conversational powers, of his father, and lapsed into habits of intemperance. He was successful in gaining an Oriel fellowship, but at the close of the probationary year (1820) was judged to have forfeited it. The authorities could not be prevailed upon to reverse their decision; but they awarded to him a free gift of £300. Hartley Coleridge then spent two years in London, where he wrote short poems for the London Magazine. His next step was to become a partner in a school at Ambleside, but this scheme failed. In 1830 a Leeds publisher, Mr. F. E. Bingley, made a contract with him to write biographies of Yorkshire and Lanca- shire worthies. These were afterwards republished under the title of Biographia Borealis (1833)

and Worthies of Yorkshire and Lancashire (1836). Bingley also printed a volume of his poems in 1833, and Coleridge lived in his house until the contract came to an end through the bankruptcy of the publisher. From this time, except for two short periods in 1837 and 1838 when he acted as master at Sedbergh grammar school, he lived quietly at Grasmere and (1840-1849) Rydal, spending his time in study and wanderings about the countryside. His figure was as familiar as Wordsworth's, and his gentleness and simplicity of manner won for him the friendship of the country-people. In 1839 appeared his edition of Massinger and Ford, with bio- graphies of both dramatists. The closing decade of Coleridge's life was wasted in what he himself calls " the woeful impotence of weak resolve." He died on the 6th of January 1849. The prose style of Hartley Coleridge is marked by much finish and vivacity; but his literary reputation must chiefly rest on the

sanity of his criticisms, and above all on his Prometheus, an unfinished lyric drama, and on his sonnets. As a sonneteer he achieved real excellence, the form being exactly suited to his sensitive genius. Essays and Marginalia, and Poems, with a memoir by his brother Derwent, appeared in 1851.

COLERIDGE, JOHN DUKE COLERIDGE, ist Baron (1820- 1894), lord chief 'justice of England, was the eldest son of Sir John Taylor Coleridge. He was born at Heath's Court, Ottery St Mary, on the 3rd of December 1820. He was educated at Eton and Balliol College, Oxford, of which he was a scholar. He was called to the bar in 1846, and went the western circuit, rising steadily, through more than twenty years of hard work, till in 1865 he was returned as member for Exeter in the Liberal interest. The impression which he made on the heads of his party was so favourable that they determined, early in the session of 1867, to put him forward as the protagonist of their attack on the Conservative government. But that move seemed to many of their staunchest adherents unwise, and it was frustrated by the active opposition of a section, including Hastings Russell (later ninth duke of Bedford), his brother Arthur, member for Tavistock, Alexander Mitchell of Stow, A. W. Kinglake and Henry Seymour. They met to deliberate in the tea-room of the House, and were afterwards sometimes confounded with the tea-room party which was of subsequent formation and under the guidance of a different group. The protest was sufficient to prevent the contemplated attack being made, but the Liberals returned to power in good time with a large

majority behind them in 1868. Coleridge was made, first solicitor-, and then attorney-general.

As early as 1863 a small body of Oxford men in parliament had opened fire against the legislation which kept their university bound by ecclesiastical swaddling clothes. They had made a good deal of progress in converting the House of Commons to their views before the general election of 1865. That election having brought Coleridge into parliament, he was hailed as a most valuable ally, whose great university distinction, brilliant success as an orator at the bar, and hereditary connexion with the High Church party, entitled him to take the lead in a move- ment which, although gathering strength, was yet very far from having achieved complete success. The clerically-minded section of the Conservative party could not but listen to the son of Sir John Coleridge, the godson of Keble, and the grand- nephew of the man who had been an indirect cause of the Anglican revival of 1833, — for John Stuart Mill was right when he said that the poet Coleridge and the philosopher Bentham were, so far as England was concerned, the leaders of the two chief movements of their times: ” it was they who taught the teachers, and who were the two great seminal minds.”

Walking up one evening from the House of Commons to dine at the Athenaeum with Henry Bruce (afterwards Lord Aberdare) and another friend, Coleridge said: ” There is a trial coming on which will be one of the most remarkable causes celebres that has ever been heard of.” This was the Tichborne case, which led to proceedings in the criminal courts rising almost to the dignity of a political event. The Tichborne trial was the most- conspicuous feature of Coleridge’s later years at the bar, and tasked his powers as an advocate to the uttermost, though he was assisted by the splendid abilities and industry of Charles (afterwards Lord) Bowen. In November 1873 Coleridge suc- ceeded Sir W. Bovill as chief justice of the common pleas, and was immediately afterwards raised to the peerage as Baron Coleridge of Ottery St Mary. In 1880 he was made lord chief justice of England on the death of Sir Alexander Cockburn.

In jury cases his quickness in apprehending facts and his lucidity in arranging them were very remarkable indeed. He was not one of the most learned of lawyers, but he was a great deal more learned than many people believed him to be, and as an ecclesiastical lawyer had perhaps few or no superiors. His fault — a natural fault in one who had been so successful as an advocate — was that of being too apt to take one side. He allowed, also, certain political or personal prepossessions to colour the tone of his remarks from the bench. A game-preserving

landlord had not to thank the gods when his case, however buttressed by generally accepted claims, came before Coleridge. Towards the end of his life his health failed, and he became somewhat indolent. On the whole, he was not so strong a man in his judicial capacity as Campbell or Cockburn; but it must be admitted that his scholarship, his refinement, his power of oratory, and his character raised the tone of the bench while he sat upon it, and that if it has been adorned by greater judicial abilities, it has hardly ever known a greater combination of varied merits. It is curious to observe that of all judges the man whom he put highest was one very unlike himself, the great master of the rolls, Sir William Grant. Coleridge died in harness on the 14th of June 1894.

Coleridge's work, first as a barrister, and then as a judge, prevented his publishing as much as he otherwise would have done, but his addresses and papers would, if collected, fill a substantial volume and do much honour to his memory. One of the best, and one most eminently characteristic of the man, was his inaugural address to the Philosophical Institution at Edinburgh in 1870; another was a paper on Wordsworth (1873). He was an exceptionally good letter-writer. Of travel he had very little experience. He had hardly been to Paris; once, quite near the end of his career, he spent a few days in Holland, and came back a willing slave to the genius of Rembrandt; but his longest absence from England was a visit, which had some- thing of a representative legal character, to the United States. It is strange that a man so steeped in Greek and Roman poetry, so deeply interested in the past, present and future of Christi- anity, never saw Rome, or Athens, or the Holy Land. A sub- sidiary cause, no doubt, was the fatal custom of neglecting modern languages at English schools. He felt himself at a disadvantage when he passed beyond English-speaking lands, and cordially disliked the situation. No notice of Coleridge should omit to make mention of his extraordinary store of anecdotes, which were nearly always connected with Eton, Oxford, the bar or the bench. His exquisite voice, considerable power of mimicry, and perfect method of narration added greatly to the charm. He once told, at the table of Dr Jowett, master of Balliol, anecdotes through the whole of dinner on Saturday evening, through the whole of breakfast, lunch and dinner the next day, through the whole journey on Monday morning from Oxford to Paddington, without ever once repeating himself. He was frequently to be seen at the Athenaeum, was a member both of Grillion's and The Club, as well as of the Literary Society, of which he was president, and whose meetings he very rarely missed. Bishop Copleston is said to have divided the human race into three classes, — men, women and Coleridges. If he did so, he meant,

no doubt, to imply that the family of whom the poet of Christabel was the chief example regarded themselves as a class to themselves, the objects of a special dispensation. John Duke Coleridge was sarcastic and critical, and at times over-sensitive. But his strongest characteristics were love of liberty and justice. By birth and connexions a Conservative, he was a Liberal by conviction, and loyal to his party and its great leader, Mr Gladstone.

Coleridge had three sons and a daughter by his first wife, Jane Fortescue, daughter of the Rev. George Seymour of Freshwater. She was an artist of real genius, and her portrait of Cardinal Newman was considered much better than the one by Millais. She died in February 1878; a short notice of her by Dean Church of St Paul's was published in the Guardian, and was reprinted in her husband's privately printed collection of poems. Coleridge remained for some years a widower, but married in 1885 Amy Augusta Jackson Lawford, who survived him. He was succeeded in the peerage by his eldest son, Bernard John Seymour (b. 1851), who went to the bar and became a K.C. in 1892. In 1907 he was appointed a judge of the Supreme Court. The two other sons were' Stephen (b. 1854), a barrister, secretary to the Anti-Vivisection Society, and Gilbert James Duke (b. 1859).

His Life and Correspondence, edited by E. H. Coleridge, was published in 1904; see further E. Manson, Builders of our Law

(1904) ; and for the history of the Coleridge family see Lord Coleridge, The Story of a Devonshire House (1907). (M. G. D.)

COLERIDGE, SIR JOHN TAYLOR (1790-1876), English judge, the second son of Captain James Coleridge and nephew of the poet S. T. Coleridge, was born at Tiverton, Devon, and was educated at Corpus Christi College, Oxford, where he had a brilliant career. He graduated in 181 2 and was soon after made a fellow of Exeter; in 18 19 he was called to the bar at the Middle Temple and practised for some years on the western circuit. In 1824, on Gifford's retirement, he assumed the editorship of the Quarterly Review, resigning it a year afterwards in favour of Lockhart. In 1825 he published his excellent edition of Blackstone's Commentaries, and in 1832 he was made a serjeant-at-law and recorder of Exeter. In 1835 he was appointed one of the judges of the king's bench. In 1852 his university created him a D.C.L., and in 1858 he resigned his judgeship, and was made a member of the

privy council. In 1869, although in extreme old age, he produced his pleasant Memoir of the Rev. John Keble, whose friend he had been since their college days, a third edition of which was issued within a year. He died on the nth of February 1876 at Ottery St Mary, Devon, leaving two sons and a daughter; the eldest son, John Duke, 1st Baron Coleridge (q.v.), became lord chief justice of England; the second son, Henry James (1822-1893), left the Anglican for the Roman Catholic church in 1852, and became well-known as a Jesuit divine, editor of The Month, and author of numerous theological works. Sir John Taylor Coleridge's brothers, James Duke and Henry Nelson (husband of Sara Coleridge), are referred to in other articles; his brother Francis George was the father of Arthur Duke Coleridge (b. 1830), clerk of assizes on the midland circuit and author of Eton in the Forties, whose daughter Mary E. Coleridge (1861-1907) became a well-known writer of fiction.

COLERIDGE, SAMUEL TAYLOR (17 7 2-1 834), English poet and philosopher, was born on the 21st of October 1772, at his father's vicarage of Ottery St Mary's, Devonshire. His father, the Rev. John Coleridge (1719-1781), was a man of some mark. He was known for his great scholarship, simplicity of character, and affectionate interest in the pupils of the grammar school, of which he was appointed master a few months before becoming vicar of the parish (1760), reigning in both capacities till his death. He had married twice. The poet was the youngest child of his second wife, Anne Bowdon (d. 1809), a woman of great good sense, and anxiously ambitious for the success of her sons. On the death of his father, a presentation to Christ's Hospital was procured for Coleridge by the judge, Sir Francis Buller, an old pupil of his father's. He had already begun to give evidence of a powerful imagination, and he has described in a letter to his valued friend, Tom Poole, the pernicious effect which the admiration of an uncle and his circle of friends had upon him at this period. For eight years he continued at Christ's Hospital. Of these school-days Charles Lamb has given delight- ful glimpses in the Essays of Elia. The headmaster, Bowyer (as he was called, though his name was Boyer), was a severe disciplinarian, but respected by his pupils. Middleton, after- wards known as a Greek scholar, and bishop of Calcutta, reported Coleridge to Bowyer as a boy who read Virgil for amusement, and from that time Bowyer began to notice him and encouraged his reading. Some compositions in English poetry, written at sixteen, and not without a touch of genius, give evidence of the influence which Bowles, whose poems were then in vogue, had over his mind at this time. Before he left school his constitu- tional delicacy of frame, increased by swimming the New River in his clothes, began

to give him serious discomfort.

In February 1791 he was entered at Jesus College, Cambridge. A school-fellow who followed him to the university has described in glowing terms evenings in his rooms, ” when Aeschylus, and Plato, and Thucydides were pushed aside, with a pile of lexicons and the like, to discuss the pamphlets of the day. Ever and anon a pamphlet issued from the pen of Burke. There was no need of having the book before us; — Coleridge had read it in the morning, and in the evening he would repeat whole pages

verbatim.” William Frend, a fellow of Jesus, accused of sedition and Unitarianism, was at this time tried and expelled from Cambridge. Coleridge had imbibed his sentiments, and joined the ranks of his partisans. He grew discontented with university life, and in 1793, pressed by debt, went to London. Perhaps he was also influenced by his passion for Mary Evans, the sister of one of his school-fellows. A poem in the Morning Chronicle brought him a guinea, and when that was spent he enlisted in the 15th Dragoons under the name of Silas Tomkyn Comber- bache. One of the officers of the dragoon regiment, finding a Latin sentence inscribed on a wall, discovered the condition of the very awkward recruit. Shortly afterwards an old school- fellow (G. L. Tuckett) heard of his whereabouts, and by the intervention of his brother, Captain James Coleridge, his discharge was procured. He returned for a short time to Cambridge, but quitted the university without a degree in 1 794. In the same year he visited Oxford, and after a short tour in Wales went to Bristol, where he met Southey. The French Revolution had stirred the mind of Southey to its depths. Coleridge received with rapture his new friend’s scheme of Pantisocracy. On the banks of the Susquehanna was to be founded a brotherly com- munity, where selfishness was to be extinguished, and the virtues were to reign supreme. No funds were forthcoming, and in 1795, to the chagrin of Coleridge, the scheme was dropped. In 1794 The Fall of Robespierre, of which Coleridge wrote the first act and Southey the other two, appeared. At Bristol Coleridge formed the acquaintance of Joseph Cottle, the book- seller, who offered him thirty guineas for a volume of poems. In October of 1795 Coleridge married Sarah Fricker, and took up his residence at Clevedon on the Bristol Channel. A few weeks afterwards Southey married a sister of Mrs Coleridge, and on the same day quitted England for Portugal.

Coleridge began to lecture in Bristol on politics and religion. He embodied the first two lectures in his first prose publication, Condones ad Poptdum (1795). The book contained much invective against Pitt, and in after life Coleridge declared that, with this exception, and a

few pages involving philosophical tenets which he afterwards rejected, there was little or nothing he desired to retract. The first volume of Poems was published by Cottle early in 1796. Coleridge projected a periodical called The Watchman, and in 1796 undertook a journey, well described in the Bibgraphia. Liter aria, to enlist subscribers. The Watchman had a brief life of two months, but at this time Coleridge began to think of becoming a Unitarian preacher, and abandoning literature for ever. Hazlitt has recorded his very favourable impression of a remarkable sermon delivered at Shrewsbury; but there are other accounts of Coleridge's preaching not so enthusiastic. In the summer of 1795 he met for the first time the brother poet with whose name his own will be for ever associated. Wordsworth and his sister had established them- selves at Racedown in the Dorsetshire hills, and here Coleridge visited them in 1797. There are few things in literary history more remarkable than this friendship. The gifted Dorothy Wordsworth described Coleridge as " thin and pale, the lower part of the face not good, wide mouth, thick lips, not very good teeth, longish, loose, half-curling, rough, black hair," — but all was forgotten in the magic charm of his utterance. Wordsworth, who declared, " The only wonderful man I ever knew was Coleridge," seems at once to have desired to see more of his new friend. He and his sister removed in July 1797 to Alfoxden, near Nether Stowey, to be in Coleridge's neighbourhood, and in the most delightful and unrestrained intercourse the friends spent many happy days. It was the delight of each one to communicate to the other the productions of his mind, and the creative faculty of both poets was now at its best. One evening, at Watchett on the British Channel, The Ancient Mariner first took shape. Coleridge was anxious to embody a dream of a friend, and the suggestion of the shooting of the albatross came from Wordsworth, who gained the idea from Shelvocke's Voyage (1726). A joint volume was planned. Wordsworth was to show the real poetry that lies hidden in commonplace subjects, while Coleridge was to treat supernatural subjects to illustrate

the common emotions of humanity. From this sprang the Lyrical Ballads, to which Coleridge contributed The Ancient Mariner, the Nightingale and two scenes from Osorio, and after much cogitation the book was published in 1798 at Bristol by Cottle, to whose reminiscences, often indulging too much in derail, we owe the account of this remarkable time. A second edition of the Lyrical Ballads in 1800 included another poem by Coleridge — Love, to which

subsequently the sub-title was given of An Introduction to the Tale of the Dark Ladie. To the Stowey period belong also the tragedy of Osorio (afterwards known as Remorse), Kubla Khan and the first part of Christabel. In 1798 an annuity, granted him by the brothers Wedgwood, led Coleridge to abandon his reluctantly formed intention of becoming a Unitarian minister. For many years he had desired to see the continent, and in September 1798, in company with Wordsworth and his sister, he left England for Hamburg. Satyr ane's Letters (republished in Biog. Lit. 181 7) give an account of the tour. ' 1

A new period in Coleridge's life now began. He soon left the Wordsworths to spend four months at Ratzeburg, whence he removed to Gottingen to attend lectures. A great intellectual movement had begun in Germany. Coleridge was soon in the full whirl of excitement. He learnt much from Blumenbach and Eichhorn, and took interest in all that was going on around him. During his stay of nine months in Germany, he made himself master of the language to such purpose that the translation of Wallenstein — his first piece of literary work after his return to England — was actually accomplished in six weeks. It was published in 1800, and, although it failed to make any impression on the general public, it became at once prized by Scott and others as it deserved. It is matter for regret that a request to Coleridge that he should undertake to translate Faust never received serious attention from him. During these years Cole- ridge wrote many newspaper articles and some poems,, among them " Fire, Famine and Slaughter," for the Morning Post (January 8, 1798). He had vehemently opposed Pitt's policy, but a change came over his way of thought, and he found himself separatedˆfrom Fox on the question of a struggle with Napoleon. He had lost his admiration for the Revolutionists, as his " Ode to France " shows {Morning Post, April 16, 1798). Like many other Whigs, he felt that all questions of domestic policy must at a time of European peril be postponed. From this time, however, his value for the ordered liberty of constitu- tional government increased; and though never exactly to be found among the ranks of old-fashioned Constitutionalists, during the remainder of his life he kept steadily in view the principles which received their full exposition in his well- known work on Church and State. In the year 1 800 Coleridge left London for the Lakes. Here in that year he wrote the second part of Christabel. In 1803 Southey became a joint lodger with Coleridge at Greta Hall, Keswick, of which in 181 2 Southey became sole tenant and occupier.

In 1801 begins the period of Coleridge's life during which, in spite of the evidence of work shown in his compositions, he sank more and more under the dominion of opium, in which he may have first

indulged at Cambridge. Few things are so sad to read as the letters in which he ˆdetails the consequences of his transgression. He was occasionally seen in London during the first years of the century, and wherever he appeared he was the delight of admiring circles. He toured in Scotland with the Wordsworths in 1803, visited Malta in 1804, when for ten months he acted as secretary to the governor, and stayed nearly eight months at Naples and Rome in 1805-1806. In Rome he received a hint that his articles in the Morning Post had been brought to Napoleon's notice, and he made the voyage from Leghorn in an American ship. On a visit to Somersetshire in 1807 he met De Quincey for the first time, and the younger man's admiration was shown by a gift of £300, " from an unknown friend." In 1809 he started a magazine called The Friend, which continued only for eight months. At the same time Coleridge began to contribute to the Courier. In 1808 he lectured at the Royal Institution, but with little success, and

two years later he gave his lectures on Shakespeare and other poets. These lectures attracted great attention and were followed by two other series. In 181 2 his income from the Wedgwoods was reduced, and he settled the remainder on his wife. His friends were generous in assisting him with money. Eventually Mackintosh obtained a grant of £100 a year for him in 1824 during the lifetime of George IV., as one of the royal associates of the Society of Literature, and at different times he received help principally from Stuart, the publisher, Poole, Sotheby, Sir George Beaumont, Byron and Wordsworth, while his children shared Southey's home at Keswick. But between 181 2 and 18 1 7 Coleridge made a good deal by his work, and was able to send money to his wife in addition to the annuity she received. The tragedy of Remorse was produced at Drury Lane in 1813, and met with considerable success. Three years after this, having failed to conquer the opium habit, he deter- mined to enter the family of Mr James Gillman, who lived at Highgate. The letter in which he discloses his misery to this kind and thoughtful man gives a real insight into his character. Under judicious treatment the hour of mastery at last arrived. The shore was reached, but the vessel had been miserably shattered in its passage through the rocks. For the rest of his life he hardly ever left his home at Highgate. During his residence there, Christabel, written many years before, and known to a favoured few, was first published in a volume with Kubla Khan and the Pains of Sleep in 1816. He read widely and wisely, in poetry, philosophy and divinity. In 181 6 and the following year, he gave his Lay Sermons to the world. Sibylline Leaves appeared in 181 7; the Biographia Liter aria and a revised edition of The Friend soon followed. Seven years

afterwards his most popular prose work — The Aids to Reflection — first appeared. His last publication, in 1830, was the work on Church and State. It was not till 1840 that his Confessions of an Inquiring Spirit, by far his most seminal work, was posthumously published. In 1833 he appeared at the meeting of the British Association at Cambridge, but he died in the following year (25th of July 1834), and was buried in the churchyard close to the house of Mr Gillman, where he had enjoyed every consolation which friendship and love could render. Coleridge died in the com- munion of the Church of England, of whose polity and teaching he had been for many years a loving admirer. An interesting letter to his god-child, written twelve days before his death, sums up his spiritual experience in a most touching form.

Of the extraordinary influence which he exercised in conversa- tion it is impossible to speak fully here. Many of the most remarkable among the younger men of that period resorted to Highgate as to the shrine of an oracle, and although one or two disparaging judgments, such as that of Carlyle, have been recorded, there can be no doubt that since Samuel Johnson there had been no such power in England. His nephew, Henry Nelson Coleridge, gathered together some specimens of the Table Talk of the few last years. But remarkable as these are for the breadth of sympathy and extent of reading disclosed, they will hardly convey the impressions furnished in a dramatic form, as in Boswell's great work. Four volumes of Literary Remains were published after his death, and these, along with the chapters on the poetry of Wordsworth in the Biographia Liter aria, may be said to exhibit the full range of Coleridge's power as a critic of poetry. In this region he stands supreme. With regard to the preface, which contains Wordsworth's theory, Coleridge has honestly expressed his dissent: — "With many parts of this preface, in the sense attributed to them, and which the words undoubtedly seem to authorize, I never concurred; but, on the contrary, objected to them as erroneous in principle, and contradictory (in appearance at least) both to other parts of the same preface, and to the author's own practice in the greater number of the poems themselves." This disclaimer of perfect agreement renders the remaining portion of what he says more valuable. Coleridge was in England the creator of that higher criticism which had already in Germany accomplished so much in the hands of Lessing and Goethe. It is enough to refer here to the fragmentary series of his Shakespearian

criticisms, containing evidence of the ˆtruest insight, and a marvellous appreciation of the judicial ” sanity ” which raises the greatest name in literature far above even the highest of the poets who approached him.

As a poet Coleridge’s own place is safe. His niche in the great gallery of English poets is secure. Of no one can it be more emphatically said that at his highest he was ” of imagination all compact.” He does not possess the fiery pulse and humane- ness of Burns, but the exquisite perfection of his metre and the subtle alliance of his thought and expression must always secure for him the warmest admiration of true lovers of poetic art. In his early poems may be found traces of the fierce struggle of his youth. The most remarkable is the Monody on the Death oj Chatterton and the Religious Musings. In what may be called his second period, the ode entitled France, considered by Shelley the finest in the language, is most memorable. The whole soul of the poet is reflected in the Ode to Dejection. The well-known lines —

” O Lady! we receive but what we give, And in our life alone does nature live ; Ours is her wedding garment, ours her shroud,”

with the passage which follows, contain more vividly, perhaps, than anything which Coleridge has written, the expression of the shaping and colouring function which he assigns, in the Biographia Literaria, to imagination. Christabel and the Ancient Mariner have so completely taken possession of the highest place, that it is needless to do more than allude to them. The super- natural has never received such treatment as in these two wonder- ful productions of his genius, and though the first of them remains a torso, it is the loveliest torso in the gallery of English literature. Although Coleridge had, for many years before his death, almost entirely forsaken poetry, the few fragments of work which remain, written in later years, show little trace of weakness, although they are wanting in the unearthly melody which imparts such a charm to Kubla Khan, Love and Youth and Age. (G. D. B.; H. Ch.)

In the latter part of his life, and for the generation which followed, Coleridge was ranked by many young English church- men of liberal views as the greatest religious thinker of their time. As Carlyle has told in his Life of Sterling, the poet’s distinction, in the eyes of the younger churchmen with philo- sophic interests, lay in his having recovered and preserved his Christian faith after having passed through periods of rationalism and Unitarianism, and faced the full results of German criticism and philosophy. His opinions, however,

were at all periods somewhat mutable, and it would be difficult to state them in any form that would hold good for the whole even of his later writings. He was, indeed, too receptive of thought impressions of all kinds to be a consistent systemalizer. As a schoolboy, by his own account, he was for a time a Voltairean, on the strength of a perusal of the Philosophical Dictionary. At college, as we have seen, he turned Unitarian. From that position he gradu- ally moved towards pantheism, a way of thought to which he had shown remarkable leanings when, as a schoolboy, he dis- coursed of Neo-Platonism to Charles Lamb, or — if we may trust his recollection — translated the hymns of Synesius. Early in life, too, he met with the doctrines of Jacob Behmen, of whom, in the Biographia Literaria, he speaks with affection and grati- tude as having given him vital philosophic guidance. Between pantheism and Unitarianism he seems to have balanced till his thirty-fifth year, always tending towards the former in virtue of the recoil from ” anthropomorphism ” which originally took him to Unitarianism. In 1796, when he named his first child David Hartley, but would not have him baptized, he held by the ” Christian materialism ” of the writer in question, whom in his Religious Musings he terms ” wisest of mortal kind.”

When, again, he met Wordsworth in 1797, the two poets freely and sympathetically discussed Spinoza, for whom Coleridge always retained a deep admiration; and when in 1798 he gave up his Unitarian preaching, he named his second child Berkeley, signifying a new allegiance, but still without accepting Christian rites otherwise than passively. Shortly afterwards he went to

Germany, where he began to study Kant, and was much capti- vated by Lessing. In the Biographia he avows that the writings of Kant ” more than any other work, at once invigorated and disciplined my understanding”; yet the gist of his estimate there is that Kant left his system undeveloped, as regards his idea of the Noumenon, for fear of orthodox persecution — a judgment hardly compatible with any assumption of Kant’s Christian orthodoxy, which was notoriously inadequate. But after his stay at Malta, Coleridge announced to his friends that he had given up his ” Socinianism ” (of which ever afterwards he spoke with asperity), professing a return to Christian faith, though still putting on it a mystical construction, as when he told Crabb Robinson that ” Jesus Christ was a Platonic philosopher.” At this stage he was much in sympathy with the historico- rationalistic criticism of the Old Testament, as carried on in Germany; giving his assent, for instance, to the naturalistic doctrine of Schiller’s Die Sendung Moses. From about 1810 onwards, however, he openly professed Christian orthodoxy, while privately indicating views which

cannot be so described. And even his published speculations were such as to draw from J. H. Newman a protest that they took ” a liberty which no Christian can tolerate,” and carried him to ” conclusions which were often heathen rather than Christian.” This would apply to some of his positions concerning the Logos and the Trinity. After giving up Unitarianism he claimed that from the first he had been a Trinitarian on Platonic lines; and some of his latest statements of the doctrine are certainly more pantheistic than Christian.

The explanation seems to be that while on Christian grounds he repeatedly denounced pantheism as being in all its forms equivalent to atheism, he was latterly much swayed by the thought of Schelling in the pantheistic direction which was natural to him. To these conflicting tendencies were probably due his self-contradictions on the problem of original sin and the conflicting claims of feeling and reason. It would seem that, in the extreme spiritual vicissitudes of his life, conscious alter- nately of personal weakness and of the largest speculative grasp, he at times threw himself entirely on the consolations of evan- gelical faith, and at others reconstructed the cosmos for himself in terms of Neo-Platonism and the philosophy of Schelling. So great were his variations even in his latter years, that he could speak to his friend Allsop in a highly latitudinarian sense, declaring that in Christianity ” the miracles are supererogatory,” and that ” the law of God and the great principles of the Christian religion would have been the same had Christ never assumed humanity.”

From Schelling, whom he praised as having developed Kant where Fichte failed to do so, he borrowed much and often, not only in the metaphysical sections of the Biographia but in his aesthetic lectures, and further in the cosmic speculations of the posthumous Theory of Life. On the first score he makes but an equivocal acknowledgment, claiming to have thought on Schelling’s lines before reading him; but it has been shown by Hamilton and Ferrier that besides transcribing much from Schelling without avowal he silently appropriated the learning of Maass on philosophical history. In other directions he laid under tribute Herder and Lessing; yet all the while he cast severe imputations of plagiarism upon Hume and others. His own plagiarisms were doubtless facilitated by the physiological effects of opium.

Inasmuch as he finally followed in philosophy the mainly poetical or theosophic movement of Schelling, which satisfied neither the logical needs appealed to by Hegel nor the new demand for naturalistic induction, Coleridge, after arousing a great amount of philosophic interest in his own country in the second quarter of the century, has ceased to ” make a school.” Thus his significance in intellectual

history remains that of a great stimulator. He undoubtedly did much to deepen and liberalize Christian thought in England, his influence being specially marked in the school of F. D. Maurice, and in the lives of men like John Sterling. And even his many borrowings from the German were assimilated with a rare power of development.

which bore fruit not only in a widening of the field of English philosophy but in the larger scientific thought of a later generation. (J- M. Ro.)

Of Coleridge's four children, two (Hartley and Sara) are separately noticed. His second child, Berkeley, died when a baby. The third, Derwent (1 800-1 883), a distinguished scholar and author, was master of Helston school, Cornwall (1825-1841), first principal of St Mark's College, Chelsea (1841-1864), and rector of Hanwell (1864-1880); and his daughter Christabel (b. 1843) and son Ernest Hartley (b. 1846) both became well known in the world of letters, the former as a novelist, the latter as a biographer and critic.

After Coleridge's death several of his works were edited by his nephew, Henry Nelson Coleridge, the husband of Sara, the poet's only daughter. In 1847 Sara Coleridge published the Biographia Literaria, enriched with annotations and biographical supplement from her own pen. Three volumes of political writings, entitled Essays on his Own Times, were also published by Sara Coleridge in 1850. The standard life of Coleridge is that by J. Dykes Campbell (1894) ; his letters were edited by E. H. Coleridge.

COLERIDGE, SARA (1802-1852), English author, the fourth child and only daughter of Samuel Taylor Coleridge and his wife Sarah Fricker of Bristol, was born on the 23rd of December 1802, at Greta Hall, Keswick. Here, after 1803, the Coleridges, Southey and his wife (Mrs Coleridge's sister), and Mrs Lovell (another sister) , widow of Robert Lovell, the Quaker poet, all lived together; but Coleridge was often away from home; and " Uncle Southey " was a pater familias. The Wordsworths at Grasmere were their neighbours. Wordsworth, in his poem, the Triad, has left us a description, or " poetical glorification," as Sara Coleridge calls it, of the three girls — his own daughter Dora, Edith Southey and Sara Coleridge, the " last of the three, though eldest born." Greta Hall was Sara Coleridge's home until her marriage; and the little Lake colony seems to have been her only school. Guided

by Southey, and with his ample library at her command, she read by herself the chief Greek and Latin classics, and before she was five-and-twenty had learnt French, German, Italian and Spanish.

In 1822 Sara Coleridge published Account of the Abipones, a translation in three large volumes of Dobrizhoffer, undertaken in connexion with Southey's Tale of Paraguay, which had been suggested to him by Dobrizho tier's volumes; and Southey alludes to his niece, the translator (canto. iii. stanza 16), where he speaks of the pleasure the old missionary would have felt if " .... he could in Merlin's glass have seen By whom his tomes to speak our tongue were taught."

In less grandiloquent terms, Charles Lamb, writing about the Tale of Paraguay to Southey in 1825, says, " How she Dobriz- hoffered it all out, puzzles my slender Latinity to conjecture." In 1 82 5 her second work appeared, a translation from the medieval French of the " Loyal Serviteur," The Right Joyous and Pleasant History of the Feats, Jests, and Prowesses of the Chevalier Bayard, the Good Knight without Fear and without Reproach: By the Loyal Servant.

In September i8ap, at Crosthwaite church, Keswick, after an engagement of seven years' duration, Sara Coleridge was married to her cousin, Henry Nelson Coleridge (1798-1843), younger son of Captain James Coleridge (1760-1836). He was then a chancery barrister in London. The first eight years of her married life were spent in a little cottage in Hampstead. There four of her children were born, of whom two survived. In 1834 Mrs Coleridge pub- lished her Pretty Lessons in Verse for Good Children; with some Lessons in Latin in Easy Rhyme. These were originally written for the instruction of her own children, and became very popular. In 1837 the Coleridges removed to Chester Place, Regent's Park; and in the same year appeared Phantasmion, a Fairy Tale, Sara Coleridge's longest original work. The songs in Phantasmion were much admired at the time by Leigh Hunt and other critics. Some of them, such as " Sylvan Stay " and " One Face Alone," are extremely graceful and musical, and the whole fairy tale is noticeable for the beauty of the story and the richness of its language.

In 1843 Henry Coleridge died, leaving to his widow the un- finished task of editing her father's works. To these she added some compositions of her own, among which are the Essay on Rationalism, with a special application to the Doctrine of Baptismal

Regeneration, appended to Coleridge's Aids to Reflection, a Preface to the Essays on his Own Times, by S. T. Coleridge, and the Intro-

duction to the Biographia Literaria. During the last few years of her life Sara Coleridge was a confirmed invalid. Shortly before she died she amused herself by writing a little autobiography for her daughter. This, which reaches only to her ninth year, was completed by her daughter, and published in 1873, together with some of her letters, under the title Memoirs and Letters of Sara Coleridge. The letters show a cultured and highly speculative mind. They contain many apt criticisms of known people and books, and are specially interesting for their allusions to Words- worth and the Lake Poets. Sara Coleridge died in London on the 3rd of May 1852.

Her son, Herbert Coleridge (1830-1861), won a double first class in classics and mathematics at Oxford in 1852. He was secretary to a committee appointed by the Philological Society to consider the project of a standard English dictionary, a scheme of which the New English Dictionary, published by the Clarendon Press, was the ultimate outcome. His personal researches into the subject were contained in his Glossarial Index to the Printed English Literature of the Thirteenth Century (1859).

COLET, JOHN (i467?i5i9), English divine and educationist, the eldest son of Sir Henry Colet (lord mayor of London i486 and 1495), was born in London about 1467. He was educated at St Anthony's school and at Magdalen College, Oxford, where he took the M.A. degree in 1490. He already held the non resident rectory of Dennington, Suffolk, and the vicarage of St Dunstan's, Stepney, and was now collated rector of Thurning, Hunts. In 1493 he went to Paris and thence to Italy, studying canon and civil law, patristics and the rudiments of Greek. During his residence abroad he became acquainted with Budaeus (Guillaume Bude) and Erasmus, and with the teaching of Savonarola. On his return to England in 1496 he took orders and settled at Oxford, where he lectured on the epistles of St Paul, replacing the old scholastic method of interpretation by an exegesis more in harmony with the new learning. His methods did much to influence Erasmus, who visited Oxford in 1498, and in after years Erasmus received an annuity from him. Since 1494 he had been prebendary of York, and canon of St Martin le Grand, London. In 1502 he became prebendary of Salisbury, in 1505 prebendary of St Paul's, and immediately afterwards dean of the same cathedral, having previously taken the degree of doctor of divinity. Here he continued his practice of lecturing on the books of the Bible; and he soon afterwards established a perpetual divinity lecture, on three days in each week, in St Paul's church. About the year 1508, having inherited his father's large wealth, Colet formed his plan for the re-foundation of St Paul's school, which he completed in 1512, and endowed with estates of an annual

value of £122 and upwards. The celebrated grammarian William Lilly was the first master, and the company of mercers were (in 15 10) appointed trustees, the first example of non-clerical manage- ment in education. The dean's religious opinions were so much more liberal than those of the contemporary clergy (whose ignorance and corruption he denounced) that they deemed him little better than a heretic; but William Warham, the archbishop, refused to prosecute him. Similarly Henry VIII. held him in high esteem despite his sermons against the French wars. In 1514 he made the Canterbury pilgrimage, and in 1515 preached at Wolsey's installation as cardinal. Colet died of the sweating sickness on the 16th of September 1519. He was buried on the south side of the choir of St Paul's, where a stone was laid over his grave, with no other inscription than his name. Besides the preferments above mentioned, he was rector of the gild of Jesus at St Paul's and chaplain to Henry VIII.

Colet, though never dreaming of a formal breach with the Roman Church, was a keen reformer, who disapproved of auricular confession, and of the celibacy of the clergy. Though no great scholar or writer, he was a powerful force in the England of his day, and helped materially to disintegrate the medieval con- ditions still obtaining, and to introduce the humanist movement. Among his works, which were first collectively published in

1867-1876, are Absolutissimus de octo orationis partium con- structione libellus (Antwerp, 1530), Rudimenta Grammatices (London, 1539), Daily Devotions, Monition to a Godly Life, Epistolae ad Erasmum, and commentaries on different parts of the Bible.

See F. Seebohm, The Oxford Reformers; J. H. Lupton, Life of John Colet (1887) ; art. in The Times, July 7, 1909.

COLET, LOUISE (1810-1876), French poet and novelist, was born at Aix of a Provencal family named Revoil, on the 15th of September 1810. In 1835 she came to Paris with her husband Hippolyte Colet (1808-1851), a composer of music and professor of harmony and counterpoint at the conservatoire. In 1836 appeared her Fleurs du Midi, a volume of verse, of liberal tendency, followed by Penserosa (1839), a second volume of verse; by La Jeunesse de Goethe (1839), a one-act comedy; by Les Cmurs bris&s (1843), a novel; Les Funerailles de Napoleon (1840), a poem, and La Jeunesse de Mirabeau (1841), a

novel. Her works were crowned five or six times by the Institute, a distinction which she owed, however, to the influence of Victor Cousin rather than to the quality of her work. The criticisms on her books and on the prizes conferred on her by the Academy exasperated her; and in 184 1 Paris was diverted by her attempted reprisals on Alphonse Karr for certain notices in Les Guipes. In 1849 she had to defend an action brought against her by the heirs of Madame Recamier, whose correspondence with Benjamin Constant she had published in the columns of the Presse. She produced a host of writings in prose and verse, but she is perhaps best known for her intimate connexion with some of her famous contemporaries, Abel Villemain, Gustave Flaubert and Victor Cousin. Only one of her books is now of interest — Lui: roman contemporain (1859), the novel in which she told the story of her life. She died on the 8th of March 1876.

COLEUS, a genus of herbaceous or shrubby plants belonging to the natural order Labiatae, chiefly natives of the tropics. They are very ornamental plants, the colour of their leaves being exceedingly varied, and often very brilliant. They are of the easiest culture. The cuttings of young shoots should be propa- gated every year, about March, being. planted in thumb pots, in sandy loam, and placed in a close temperature of 70°. After taking root shift into 6-in. pots, using ordinary light loamy compost, containing abundance of leaf-mould and sand, and keeping them near the light. They may be passed on into larger pots as often as required, but 8-in. pots will be large enough for general purposes, as they can be fed with liquid manure. The young spring-struck plants like a warm growing atmosphere, but by midsummer they will bear more air and stand in a green- house or conservatory. They should be wintered in a tempera- ture of 60° to 65 . The stopping of the young shoots must be regulated by the consideration whether bushy or pyramidal plants are desired. Some of the varieties are half-hardy and are used for summer bedding.

COLFAX, SCHUYLER (1823-1885), American political leader, vice-president of the United States from 1869 to 1873, was born in New York city on the 23rd of March 1823. His father died before the son's birth, and his mother subsequently married a Mr Matthews. The son attended the public schools of New York until he was ten, and then became a clerk in his step-father's store, removing in 1836 with his mother and step-father to New Carlisle, Indiana. In 1841 he removed to South Bend, where for eight years he was deputy auditor (his step-father being auditor) of St Joseph county; in 184 2-1 844 he was assistant enrolling clerk of the state senate and senate reporter for the Indiana State Journal. In 1845 he established the St Joseph Valley

Register, which he published for eighteen years and made an influential Whig and later Republican journal. In 1850 he was a member of the state constitutional convention, and in 1854 took an active part in organizing the ” Anti-Nebraska men ” (later called Republicans) of his state, and was by them sent to Congress. Here he served with distinction from 1855 until 1869, the last six years as speaker of the House. At the close of the Civil War he was a leading member of the radical wing of the Republican party, advocating the disfranchisement

of all who had been prominent m the service of the Confederacy, and declaring that ” loyalty must govern what loyalty has pre- served.” In 1868 he had presidential aspirations, and was not without supporters. He accepted, however, the Republican nomination as vice-president on a ticket headed by General Grant, and was elected; but he failed in 1872 to secure renomina- tion. During the political campaign of 1872 he was accused, with other prominent politicians, of being implicated in corrupt transactions with the Credit Mobilier, and a congressional investigation brought out the fact that he had agreed to take twenty shares from this concern, and had received dividends amounting to $1 200. It also leaked out during the investigation that he had received in 1868, as a campaign contribution, a gift of $4000 from a contractor who had supplied the government with envelopes while Colfax was chairman of the post office committee of the House. At the close of his term Colfax returned to private life under a cloud, and during the remainder of his lifetime earned a livelihood by delivering popular lectures. He died at Mankato, Minnesota, on the 13th of January 1885.

See J. C. Hollister’s Life of Schuyler Colfax (New York, 1886).

COLIC (from the Gr. koKov or icGiSov, the large intestine), a term in medicine of very indefinite meaning, used by physicians outside England for any paroxysmal abdominal pain, but gener- ally limited in England to a sudden sharp pain having its origin in the pelvis of the kidney, the ureter, gall-bladder, bile-ducts or intestine. Thus it is customary to speak of renal, biliary or intestinal colic. There is a growing tendency, however, among professional men of to-day, to restrict the use of the word to a pain produced by the contraction of the muscular walls of any of the hollow viscera of which the aperture has become more or less occluded, temporarily or otherwise. For renal and biliary colic, see the articles Kidney Diseases and Liver, only intes- tinal colic being treated in this place.

In infants, usually those who are ” bottle-fed,” colic is exceed- ingly common, and is shown by the drawing up of their legs, their restlessness and their continuous eries.

Among adults one of the most serious causes is that due to lead-poisoning and known as lead colic {Syn. painters’ colic, colica Pictonum, Devonshire colic) , from its having been clearly ascertained to be due to the absorption of lead into the system (see Lead-Poisoning). This disease had been observed and described long before its cause was discovered. Its occurrence in an epidemic form among the inhabitants of Poitou was re- corded by Francois Citois (1572-1652) in 1617, under the title of Noms el popularis apud Pictones dolor colicus biliosus. The disease was thereafter termed colica Pictonum. It was supposed to be due to the acidity of the native wines, but it was afterwards found to depend on lead contained in them. A similar epidemic broke out in certain parts of Germany in the end of the 17 th century, and was at the time believed by various physicians to be caused by the admixture of acid wines with litharge to sweeten them.

About the middle of the 18th century this disease, which had long been known to prevail in Devonshire, was carefully investi- gated by Sir George Baker (1722-1809), who succeeded in tracing it unmistakably to the contamination of the native beverage, cider, with lead, either accidentally from the leadwork of the vats and other apparatus for preparing the liquor, or from its being sweetened with litharge.

In Germany a similar colic resulting from the absorption of copper occurs, but it is almost unknown in England.

The simplest form of colic is that arising from habitual constipation, the muscular wall of the' intestines contracting painfully to overcome the resistance of hardened scybalous masses of faeces, which cause more or less obstruction to the onward passage of the intestinal contents. Another equally common cause is that due to irritating or indigestible food such as apples, pears or nuts, heavy pastry, meat pies and puddings, &c. It may then be associated with either constipation or diarrhoea, though the latter is the more common. It may result from any form of enteritis as simple, mucous and ulcera- tive colitis, or an intestinal malignant growth. The presence

of ascaris lumbricoides may, by reflex action, set up a very painful nervous spasm; and certain forms of influenza (q.v.) are ushered in by colic of a very pronounced type. Many physicians describe a rheumatic colic due to cold and damp, and among women disease of the pelvic organs may give rise to an exactly similar pain. There are also those forms of colic which must be classed as functional or neuralgic, though this view of the case must never be accepted until every other possible cause is found to be un- tenable. From this short account of a few of the commoner causes of the trouble, it will be clear that colic is merely a symp- tom of disease, not a disease in itself, and that no diagnosis has been made until the cause of the pain has been determined.

Intestinal colic is paroxysmal, usually both beginning and ending suddenly. The pain is generally referred to the neigh- bourhood of the umbilicus, and may radiate all over the abdomen. It varies in intensity from a slight momentary discomfort to a pain so severe as to cause the patient to shriek or even to break out into a cold clammy sweat. It is usually relieved by pressure, and this point is one which aids in the differential diagnosis between a simple colic and peritonitis, the pain of the latter being increased by pressure. But should the colic be due to a malignant growth, or should the intestines be distended with gas, pressure will probably increase the pain. The temperature is usually subnormal, but may be slightly raised, and the puis* is in proportion.

In the treatment of simple colic the patient must be confined to bed, hot fomentations applied to the abdomen and a purge administered, a few drops of laudanum being added when the pain is exceptionally severe. But the whole difficulty lies in making the differential diagnosis. Acute intestinal obstruction (ileus) begins just as an attack

of simple colic, but the rapid increase of illness, frequent vomiting, anxious countenance, and still more the condition of the pulse, warn a trained observer of the far more serious state. Appendicitis and peritonitis, as also the gastric crises of locomotor ataxy, must all be excluded.

COLIGNY, GASPARD DE (1519-1572), admiral of France and Protestant leader, came of a noble family of Burgundy, who traced their descent from the nth century, and in the reign of Louis XI. were in the service of the king of France. His father, Gaspard de Coligny, known as the marechal de Chatillon (d. 1522), served in the Italian wars from 1495 to 1515, and was created marshal of France in 1516. By his wife, Louise de Montmorency, sister of the future constable, he had three sons: Odet, cardinal de Chatillon; Gaspard, the admiral; and Francis, seigneur d'Andelot; all of whom played an important part in the first period of the wars of religion. At twenty-two young Gaspard came to court, and there contracted a friendship with Francis of Guise. In the campaign of 1 543 Coligny distin- guished himself greatly, and was wounded at the sieges of Montmedy and Bains. In 1 544 he served in the Italian campaign under the duke of Enghien, and was knighted on the field of Ceresole. Returning to France, he took part in different military operations; and having been made colonel-general of the infantry (April 1547), exhibited great capacity and intelligence as a military reformer. He was made admiral on the death of d'Annebaut (1552). In 1557 he was entrusted with the defence of Saint Quentin. In the siege he displayed great courage, resolu- tion, and strength of character; but the place was taken, and he was imprisoned in the stronghold of L'Ecluse. On payment of a ransom of 50,000 crowns he recovered his liberty. But he had by this time become a Huguenot, through the influence of his brother, d'Andelot — the first letter which Calvin addressed to him is dated the 4th of September 1558 — and he busied himself secretly with protecting his co-religionists, a colony of whom he sent to Brazil, whence they were afterwards expelled by the Portuguese.

On the death of Henry II. he placed himself, with Louis, prince of Conde, in the front of his sect, and demanded religious tolera- tion and certain other reforms. In 1560, at the Assembly of Notables at Fontainebleau, the hostility between Coligny and Francis of Guise broke forth violently. When the civil wars began in 1562, Coligny decided to take arms only after long

hesitation, and he was always ready to negotiate. In none of these wars did he show superior genius, but he acted throughout with great prudence and extraordinary tenacity; he was " le heros de la mauvaise

fortune.” In 1569 the defeat and death of the prince of Conde at Jarnac left him sole leader ef the Protestant armies. Victorious at Amay-le-Duc, he obtained in 1570 the pacification of St Germain. Returning to the court in 1 57 1, he grew rapidly in favour with Charles XL As a means of emancipating the king from the tutelage of his mother and the faction of the Guises, the admiral proposed to him a descent on Spanish Flanders, with an army drawn from both sects and commanded by Charles in person. The king’s regard for the admiral, and the bold front of the Huguenots, alarmed the queen-mother; and the massacre of St Bartholomew was the consequence. On the 22nd of August 1572 Coligny was shot in the street by Maurevel, a bravo in the pay of the queen-mother and Guise; the bullets, however, only tore a finger from his right hand and shattered his left elbow. The king visited him, but the queen-mother prevented all private intercourse between them. On the 24th of August, the night of the massacre, he was attacked in his house, and a servant of the duke of Guise, generally known as Besme, slew him and cast him from a window into the courtyard at his master’s feet. His papers were seized and burned by the queen-mother; among them, according to Brantome, was a history of the civil war, ” tres-beau et tres-bien faict, et digne d’estre imprime.” ,

By his wife, Charlotte de Laval, Coligny nad several children, among them being Louise, who married first Charles de Teligny and afterwards William the Silent, prince of Orange, and Francis, admiral of Guienne, who was one of the devoted servants of Henry IV. Gaspard de Coligny (1584-1646), son of Francis, was marshal of France during the reign of Louis XIII.

See Jean du .Bouchet, Preuves de I’histoire gSnealogigue de Villustre maison de Coligny (Paris, 1661); biography by Frangois Hotman, 1575 (French translation, 1665); L. J. Delaborde, Gaspard de Coligny (1879-1882) ; Erich Marcks, Gaspard von Coligny, sein Leben und das Frankreich seiner Zeit (Stuttgart, 1892) ; H. Patry, ” Coligny et la Papaute,” in the Bulletin du protestantisme frangais (1902) ; A. W. Whitehead, Gaspard de Coligny, Admiral of -France (1904); and C. Merki, L’Amiral de Coligny (1909).

COLIMA, a small Pacific coast state of Mexico, lying betwetn Jalisco on the N. W. and N., and Michoacan on the E. Including the Revilla Gigedo islands its area is only 2272 sq. m., which thus makes it the second smallest of the Mexican states. Pop. (189s) 5S> 2 64; (1900) 65,115. The larger part of its territory is within the narrow, flat coastal plain, beyond which it rises toward the north-east into the foothills of the Sierra Madre, the higher masses of the range, including

the Colima volcano, lying outside the state. It is drained by the Ameria and Coahuayana rivers and their affluents, which are largely used for irrigation. There are tidewater lagoons and morasses on the coast which accentuate its malarious character. One of the largest of these, Cuitlan, immediately south of Manzanillo, is the centre of a large salt-producing industry. The soil is generally fertile and productive, but lack of transportation facilities has been a serious obstacle to any production greatly exceeding local demands. The dry and rainy seasons are sharply defined, the rainfall being abundant in the latter. The climate is hot, humid and malarious, becoming drier and healthier on the higher mountain slopes of the interior. Stock-raising is an important industry in the higher parts of the state, but the horses, mules and cattle raised have been limited to local demands. Agri- culture, however, is the principal occupation of the state, the more important products being sugar, rice, Indian corn, palm oil, coffee, indigo, cotton and cacao. The production of cacao is small, and that of indigo and cotton is declining, the latter being limited to the requirements of small local mills. There are two crops of Indian corn a year, but sugar and rice are the principal crops. The ” Caracolillo ” coffee, produced on the slopes of the mountains culminating in the volcano of Colima, is reputed the best in Mexico, and the entire crop (about 506,000 ft), in 1906) is consumed in the country at a price much above other grades. There are important mineral deposits in the

state, including iron, Copper and lead, but mining enterprise has made no progress through lack of transportation facilities. Salt is made on the coast and shipped inland, and palm-leaf hats are manufactured and exported. Hides and deerskins are also exported in large quantities. A narrow-gauge railway has been in operation between the capital and Manzanillo for many- years, and in 1907 a branch of the Mexican Central was com- pleted between Guadalajara and the capital, and the narrow- gauge line to the coast was widened to the standard gauge. The chief cities of the state are the capital Colima, Manzanillo, Comala (the second largest town in the state), 5 m. from the capital, with which it is connected by an electric railway, Ixtla- huacan Coquimatlan and Almoloyan.

COLIMA, a city of Mexico and capital of a state of the same name, 570 m. (direct) W. by S. of Mexico City and about 36 m. inland from the Pacific coast. Pop. (1895) 18,977; (1900) 20,698. Colima is picturesquely situated on the Colima river, in a large fertile valley

about 1650 ft. above the sea, and lies in the midst of fine mountain-scenery. About 30 m. to the north-east the volcano of Colima, in the state' of Jalisco, rises to an elevation of 12,685 ft.; it is the most westerly of the active volcanoes of Mexico. Colima enjoys a moderately cool and healthy climate, especially in the dry season (November to June). The city is regularly laid out and is in great part well built, with good public buildings, several churches, a theatre, two hospitals, and a handsome market completed in 1905. Tramways connect the central plaza with the railway station, cemetery, and the suburb of Villa de Alvarez, 25 m. distant, and an extension of 5 m. was projected in 1906 to Comala. The local industries include two old-fashioned cotton mills, an ice plant, corn-grinding mill, and five cigarette factories. Colima is the commercial centre for a large district, but trade has been greatly restricted by lack of transportation facilities. A railway connects with the port of Manzanillo, and the Mexican Central railway serves Colima itself. Colima was founded in 1522 by Gonzalo de Sandoval. It has not played a very prominent part in Mexican history because of its inaccessibility, and for the same reason has suffered less from revolutionary violence.

COLIN, ALEXANDRE (1526-1612), Flemish sculptor, was born at Malines. In 1563 he went, at the invitation of the emperor Ferdinand I., to Innsbruck, to work on the magnificent monument which was being erected to Maximilian I. in the nave of the Franciscan church. Of the twenty-four marble alti-rilievi, representing the emperor's principal acts and victories, which adorn the sides of this tomb, twenty were executed by Colin, apparently in three years. The work displays a remarkable combination of liveliness and spirit with extreme care and finish, its delicacy rivalling that of a fine cameo. Thorwaldsen is said to have pronounced it the finest work of its kind. Colin, who was sculptor in ordinary both to the emperor and to his son, the archduke Ferdinand of Tirol, did a great deal of work for his patrons at Innsbruck and in its neighbourhood; particular mention may be made of the sepulchres of the archduke and his first wife, Philippine Welser, both in the same church as the Maximilian monument, and of Bishop Jean Nas. His tomb in the cemetery at Innsbruck bears a fine bas-relief executed by one of his sons.

COLL, an island of the Inner Hebrides, Argyllshire, Scotland. Pop. (1901) 432. It is situated about 7 m. west of Caliach Point in Mull, and measures 12 m. from N.E. to S.W., with a breadth varying from f m. to 4 m. It is composed of gneiss, is generally rather flat, save in the west where Ben Hogh reaches a height of 339 ft., and has several lakes. The pasturage is good and the soil fairly fertile. Much dairy produce is ex- ported, besides sheep and cattle. The antiquities include

stone circles, duns, the ruins of Breachacha Castle, once a fortress of the Lords of the Isles. A steamer from Oban calls regularly at Arinagour.

COLLAERT, HANS, Flemish engraver, son of Adrian Collaert, a draughtsman and engraver of repute, was born at Antwerp about 1545. After working some years in his father's studio, he went to Rome to perfect himself in his art. His engravings

after Rubens are very highly esteemed. He left many works; among the best may be mentioned a " Life of Saint Francis," 16 prints; a " Last Judgment," folio; " Monilium, Bullarum, Inauriumque Artificiosissimae Icones," 10 prints, 1581; "The Dead Christ in his Mother's Lap "; " Marcus Curtius"; " Moses Striking the Rock," and " The Resurrection of Lazarus," after Lambert Lombard; " The Fathers of the Desert "; and " Biblia Sacra and the History of the Church," after Rubens.

COLLAR, something worn or fastened round the neck (Lat. collar e, from collum, neck), particularly a band of linen, lace or other material, which, under various shapes at different periods, has been worn by men and women to serve as a completion or finish to the neckband of a garment (see Costume); also a chain, worn as a personal ornament, a badge of livery, a symbol of office, or as part of the insignia of an order of knighthood, an application of the term with which the present article deals. The word is also applied to that part of the draught-harness of a horse which fits over the animal's neck, to which the traces are attached, and against which the strain of the drawing of the vehicle is exercised, and to a circular piece of metal passed round the joints of a rod or pipe, to prevent movement or to make the joint steam- or water-tight.

Necklaces with beads and jewels threaded thereon or the plain laces with a hanging ornament are among the common braveries of all times and countries. From these come the collar and the neck-chain. Torques or twisted collars of metal are found in burying-places of the barbarous people of northern Europe. British chiefs wore them, and gold torques were around the necks of the leaders of the first of the Saxon invaders of Britain, among whose descendants, however, the fashion seems to have lan- guished. Edward the Confessor was buried with a neck-chain of gold 2 ft. long, fastened with a jewelled locket and carrying an enamelled crucifix.

The extravagant age of Richard II. saw a great revival of the neck-chain, heavy links twisted of gold or silver. From this time onward

neck chains, with or without pendant devices, were commonly worn by men and women of the richer sort. The men abandoned them in the time of Charles I.

Closely allied to the chain are the livery collars which appeared in the 14th century, worn by those who thus displayed their alliances or their fealty. Thus Charles V. of France in 1378 granted to his chamberlain Geoffrey de Belleville the right of bearing in all feasts and in all companies the collar of the Cosse de Geneste or Broomcod, a collar which was accepted and worn even by the English kings, Charles VI. sending such collars to Richard II. and to his three uncles. This French collar, a chain of couples of broom-cods linked by jewels, is seen in the contem- porary portrait of Richard II. at Wilton. The like collar was worn by Henry IV. on the way to his crowning. During the sitting of the English parliament in 1394 the complaints of the earl of Arundel against Richard II. are recorded, one of his grievances being that the king was wont to wear the livery of the collar of the duke of Lancaster, his uncle, and that people of the king's following wore the same livery. To which the king answered that soon after the return from Spain (in 1389) of his uncle, the said duke, he himself took the collar from his uncle's neck, putting it on his own, which collar the king would wear and use for a sign of the good and whole-hearted love between them, even as he wore the liveries of his other uncles. Livery collars of the king of France, of Queen Anne and of the dukes of York and Lancaster are numbered with the royal plate and jewels which in the first year of Henry IV. had come to the king's hands. The inventory shows that Queen Anne's collar was made up of sprigs of rosemary garnished with pearls. The York collar had falcons and fetterlocks, and the Lancaster collar was doubtless that collar of Esses (or S S) used by the duke's son, Henry of Bolingbroke, as an earl, duke and king. This famous livery collar, which has never passed out of use, takes many forms, its Esses being sometimes linked together chainwise, and sometimes, in early examples, bestowed as the ornamental bosses of a garter-shaped strap-collar. The oldest effigy bearing it is that in Spratton church of Sir John Swinford, who died in

1371. Swinford was a follower of John of Gaunt, and the date of his death easily disposes of the fancy that the Esses were devised by Henry IV. to stand for his motto or " word " of Soverayne. Many explanations are given of the origin of these letters, but none has as yet been established with sufficient proof. During the reigns of Henry

IV., his son and grandson, the collar of Esses was a royal badge of the Lancastrian house and party, the white swan being its pendant. In one of Henry VI. ‘s own collars the S was joined to the Broomcod of the French device, thus symbolizing the king’s claim to the two kingdoms.

The kings of the house of York and their chief followers wore the Yorkist collar of suns and roses, with the white lion of March, the Clare bull, or Richard’s white boar for a pendant device. Henry VII. brought back the collar of Esses, a portcullis or a rose hanging from it, although in a portrait of this king, now possessed by the Society of Antiquaries, his neck bears the rose en soldi alternating with knots, and his son, when young, had a collar of roses red and white. Besides these royal collars, the 14th and 15th centuries show many of private devices. A brass at Mildenhall shows a knight whose badge of a dog or wolf circled by a crown hangs from a collar with edges suggesting a pruned bough or the ragged staff. Thomas of Markenfield (d. c. 141 5) on his brass at Ripon has a strange collar of park palings with a badge of a hart in a park, and the Lord Berkeley (d. 1392) wears one set with mermaids.

Collars of various devices are now worn by the grand crosses of the European orders of knighthood. The custom was begun by Philip of Burgundy, who gave his knights of the Golden Fleece, an order founded on the 10th of February 1429-1430, badges of a golden fleece hung from that collar of flints, steels and sparks which is seen in so many old Flemish portraits. To this day it remains the most beautiful of all the collars, keeping in the main the lines of its Flemish designer, although a vulgar fancy sometimes destroys the symbolism of the golden fleece by chang- ing it for an unmeaning fleece of diamonds. Following this new fashion, Louis XL of France, when instituting his order of St Michael in 1469, gave the knights collars of scallop shells linked on a chain. The chain was doubled by Charles VIII., and the pattern suffered other changes before the order lapsed in 1830. Until the reign of Henry VIII., the Garter, most ancient of the great knightly orders, had no collar. But the Tudor king must needs match in all things with continental sovereigns, and the present collar of the Garter knights, with its golden knots and its buckled garters enclosing white roses set on red roses, has its origin in the Tudor age. An illustration in colours of the Garter collar is given on Plate I. in the article Knighthood and Chivalry, while descriptions of the collars of the other principal orders are also given. The collar of the Thistle with the thistles and rue-sprigs is as old as the reign of James II. The Bath collar, in its first form of white knots linking closed crowns to roses and thistles issuing from sceptres, dates from 1725, up to which time the knights of the Bath had hung their medallion from a ribbon.

Founding the order of the Saint Esprit in 1578, Henry III. of France devised a collar of enflamed fleur-de-lis and cyphers of H and L, a fashion which was soon afterwards varied by Henry his successor. Elephants have been always borne on the collar of the Elephant founded in Denmark in 1478, the other links of which have taken many shapes. Another Danish order, the Dannebrog, said to be ” re-instituted ” by Christian V. in 167 1, has a collar of crosses formy alternating with the crowned letters C and W, the latter standing for Waldemar the Victorious, whom a legend of no value described as founding the order in 1 2 19. Of other European orders, that of St Andrew, founded by Peter of Russia in 1698, has eagles and Andrew crosses and cyphers, while the Black Eagle of Prussia has the Prussian eagle with thunderbolts in its claws beside roundels charged with cyphers of the letters F.R.

Plain collars of Esses are now worn in the United Kingdom by kings-of-arms, heralds and serjeants-at-arms. Certain legal dignitaries have worn them since the 16th century, the collar of the lord chief-justice having knots and roses between the

letters. Henry IV.‘s parliament in his second year restricted the free use of the king’s livery collar to his sons and to all dukes, earls, barons and bannerets, while simple knights and squires might use it when in the royal presence or in going to and from the hostel of the king. The giving of a livery collar by the king made a squire of a man even as the stroke of the royal sword made him a knight. Collars of Esses are sometimes seen on the necks of ladies. The queen of Henry IV. wears one. So do the wife of a 16th century Knightley on her tomb at Upton, and Penelope, Lady Spencer (d. 1667), on her Brington monument.

Since 1545 the lord mayor of London has worn a royal livery collar of Esses. This collar, however, has its origin in no royal favour, Sir John Alen, thrice a lord mayor, having bequeathed it to the then lord mayor and his successors ” to use and occupie yerely at and uppon principall and festivall dayes.” It was enlarged in 1567, and in its present shape has 28 Esses alternating with knots and roses and joined with a portcullis. Lord mayors of York use a plain gold chain of a triple row of links given in 1670; this chain, since the day when certain links were found wanting, is weighed on its return by the outgoing mayor. In Ireland the lord mayor of Dublin wears a collar given by Charles II., while Cork’s mayor has another which the Cork council bought of a silversmith in 1755, stipulating that it should be like the Dublin one. The lady mayoress of York wears a plain chain given with that of the lord mayor in 1670, and, like his, weighed on its return to official keeping. For some two hundred and thirty years

the mayoress of Kingston-on-Hull enjoyed a like ornament until a thrifty council in 1835 sold her chain as a useless thing.

Of late years municipal patriotism and the persuasions of enterprising tradesmen have notably increased the number of English provincial mayors wearing collars or chains of office. Unlike civic maces, swords and caps of maintenance, these gauds are without significance. The mayor of Derby is decorated with the collar once borne by a lord chief-justice of the king's bench, and his brother of Kingston-on-Thames uses without authority an old collar of Esses which once hung over a herald's tabard. By a modern custom the friends of the London sheriffs now give them collars of gold and enamel, which they retain as mementoes of their year of office. (O. Ba.)

COLLATERAL (from Med. Lat. collateralis, — cum, with, and latus, lateris, side, — side by side, hence parallel or additional), a term used in law in several senses. Collateral relationship means the relationship between persons who are descended from the same stock or ancestor, but in a different line; as opposed to lineal, which is the relationship between ascendants and descendants in a direct line, as between father and son, grandfather and grandson. A collateral agreement is an agreement made contemporaneously with a written contract as part of the transaction, but without being incorporated with it. Collateral facts, in evidence, are those facts which do not bear directly on the matters in dispute. Collateral security is an additional security for the better safety of the mortgagee, i.e. property or right of action deposited to secure the fulfilment of an obligation.

COLLATIA, an ancient town of Latium, 10 m. E. by N. of Rome by the Via Collatina. It appears in the legendary history of Rome as captured by Tarquinius Priscus. Livy tells us it was taken from the Sabines, while Virgil speaks of it as a Latin colony. In the time of Cicero it had lost all importance; Strabo names it as a mere village, in private hands, while for Pliny it was one of the lost cities of Latium. The site is undoubtedly to be sought on the hill now occupied by the large medieval fortified farmhouse of Lunghezza, immediately to the south of the Anio, which occupies the site of the citadel joined by a narrow neck to the tableland to the south-east on which the city stood: this is protected by wide valleys on each side, and is isolated at the south-east end by a deep narrow valley enlarged by cutting. No remains are to be seen, but the site is admirably adapted for an ancient settlement. The road may be traced leading to the south end of this tableland, being identical with the modern road to Lunghezza for the middle part of its course

only. The current indentification with Castellaccio, 2 m. to the south-east, is untenable.

See T. Ashby in Papers of the British School at Rome, i. 138 seq., iii. 201. (T. As.)

COLLATION (Lat. collatio, from conferre, to bring together or compare), the bringing together of things for the special purpose of comparison, and thus, particularly, the critical examination of the texts of documents or MSS. and the result of such comparison. The word is also a term in printing and bookbinding for the register of the ” signatures,” the number of quires and leaves in each quire of a book or MS. In Roman and Scots law ” collation ” answers to the English law term “hotch-pot” (q.v.). From another meaning of the Latin word, a consultation or conference, and so a treatise or homily, comes the title of a work of Johannes Cassianus (q.v.), the Conferences of the Fathers (Collationes Patrum). Readings from this and similar works were customary in monasteries; by the regula of St Benedict it is ordered that on rising from supper there should be read collationes, passages from the lives of the Fathers and other edifying works; the word is then applied to the discussions arising from such readings. On fast days it was usual in monasteries to have a very light meal after the Collatio, and hence the meal itself came to be called ” collation,” a mean- ing which survives in the modern use of the word for any light or quickly prepared repast.

COLLfi, CHARLES (1 709-1783), French dramatist and song- writer, the son of a notary, was born at Paris in 1709. He was early interested in the rhymes of Jean Heguanier, then the most famous maker of couplets in Paris. From a notary’s office Colle was transferred to that of M. de Neulan, the receiver- general of finance, and remained there for nearly twenty years. When about seventeen, however, he made the acquaintance of Alexis Piron, and afterwards, through Gallet (d. 1757), of Panard. The example of these three masters of the vaudeville, while determining his vocation, made him diffident; and for some time he composed nothing but amphigouris — verses whose merit was measured by their unintelligibility. The friendship of the younger Crebillon, however, diverted him from this by-way of art, and the establishment in 1729 of the famous ” Caveau ” gave him a field for the display of his fine talent for popular song. In 1739 the Society of the Caveau, which numbered among its members Helvetius, Charles

Duclos, Pierre Joseph Bernard, called Gentil-Bernard, Jean Philippe Rameau, Alexis Piron, and the two Crebillons, was dissolved, and was not reconstituted till twenty years afterwards. His first and his best comedy, La Verite dans le vin, appeared in 1747. Meanwhile, the Regent Orleans, who was an excellent comic actor, particularly in representations of low life, and had been looking out for an author to write suitable parts for him, made Colle his reader. It was for the duke and his associates that Colle composed the greater part of his Thedtre de sociSte. In 1763 Colle produced at the Theatre Francais Dupuis et Des- ronais, a successful sentimental comedy, which was followed in 1 771 by La Veuve, which was a complete failure. In 1774 appeared La Partie de chasse de Henri Qualre (partly taken from Dodsley's King and the Miller of Mansfield), Colle's last and best play. From 1748 to 1772, besides these and a multitude of songs, Colle was writing his Journal, a curious collection of literary and personal strictures on his boon companions as well as on their enemies, on Piron as on Voltaire, on La Harpe as on Corneille. Colle died on the 3rd of November 1783. His lyrics are frank and jovial, though often licentious. The subjects are love and wine; occasionally, however, as in the famous lyric (1756) on the capture of Port Mahon, for which the author received a pension of 600 livres, the note of patriotism is struck with no unskilful hand, while in many others Colle shows himself possessed of considerable epigrammatic force.

See also H. Bonhomme's edition (1868) of his Journal et Memoires (1748-1772); Grimm's Correspondance ; and C. A. Sainte-Beuve, Nouveaux lundis, vol. vii.

COLLECTIVISM, a term used to denote the economic principle of the ownership by a community of all the means of production

in order to secure to the people collectively an equitable dis- tribution of the produce of their associated labour. Though often used in a narrow sense to express the economic basis of Socialism, the latter term is so generally employed in the same sense that collectivism is best discussed in connexion with it (see Socialism).

COLLECTOR, a term technically used for various officials, and particularly in India for the chief administrative official of a district. The word was in this case originally a translation of tahsildar, and indicates that the special duty of the office is the collection of revenue; but the collector has also magisterial powers and is a species of autocrat within the bounds of his district. The title is confined to the regulation provinces, especi- ally Madras; in the non-regulation provinces the same duties are discharged by the deputy-commissioner

(see Commissioner).

COLLE DI VAL D' ELSA, a town and episcopal see of Italy, in the province of Siena, 5 m. by rail S. of Poggibonsi, which is 16 m. N.W. of Siena. Pop. (1901) town 1987; commune 9879. The old (upper) town (732 ft. above sea-level), contains the cathedral, dating from the 13th century, with a pulpit partly of this period; the facade has been modernized. There are also some old palaces of good architecture, and the. old house where Arnolfo di Cambio, the first architect of the cathedral at Florence (1232-1301) was born. The lower town (460 ft.) contains glass-works; the paper and iron industries (the former as old as 1377) are less important.

COLLEGE (Collegium) , in Roman law, a number of persons associated together by the possession of common functions, — a body of colleagues. Its later meaning applied to any union of persons, and collegium was the equivalent of eratpeia. In many respects, e.g. in the distinction between the responsibilities and rights of the society and those of individual members thereof, the collegium was what we should now call a corporation (q.v.). Collegia might exist for purposes of trade like the English gilds, or for religious purposes (e.g. the college of augurs, of pontifices, &c), or for political purposes, e.g. tribunorum plebis collegia. By the Roman law a collegium must have at least three members. The name is now usually applied to educational corporations, such as the colleges of Oxford and Cambridge, with which, in the numerous English statutes relating to colleges, the colleges of Winchester and Eton are usually associated. These colleges are in the eye of the law eleemosynary corporations. In some of the earlier statutes of Queen Elizabeth they are spoken of as having an ecclesiastical character, but the doctrine of the common law since the Reformation has been that they are purely lay corpora- tions, notwithstanding that most or all of their members may be persons in priest's orders. This is said to have been settled by Dr Patrick's case (Raymond's Reports, p. 101).

Colleges appear to have grown out of the voluntary association of students and teachers at the university. According to some accounts these must at one time have been numerous and flourish- ing beyond anything we are now acquainted with. We are told, for example, of 300 halls or societies at Oxford, and 30,000 students. In early times there seems to have been a strong desire to confine the scholars to certain licensed houses beyond the influence of the townspeople. Men of wealth and culture, and notably the political bishops and chancellors of England, obtained charters from the crown for the incorporation of societies of scholars, and these in time became

exclusively the places of abode for students attending the university. At the same time the corporations thus founded were not necessarily attached to the locality of the university. The early statutes of Merton College, for example, allow the residence of the college to be shifted as occasion required; and the foundations of Wolsey at Oxford and Ipswich seem to have been the same in intention. In later times (until the introduction of non-collegiate students) the university and the colleges became coextensive; every member of the university had to attach himelf to some college or hall, and every person admitted to a college or hall was obliged to matriculate himself in the university.

In Ayliffe's Ancient and Present State of the University of Oxford it is stated that a college must be " made up of three persons (at least) joined in community. And the reason of this almost seems

to speak its own necessity, without the help of any express law to countenance it: because among two persons only there cannot be, in fact, a major part ; and then if any disagreement should happen to arise between them it cannot be, in fact, brought to a conclusion by such a number alone in case both the parties should firmly adhere to their dissenting opinions ; and thus it is declared by the civil law. But by the canon law it is known to be other- wise; for by that law two persons in number may make and constitute a college, forasmuch as according to this law two persons make and constitute an assembly or congregation. The common law of England, or rather the constant usage of our princes in erecting aggregate bodies, which has established this rule among us as a law, has been herein agreeable to the method and doctrine of the civil law, for that in all their grants and charters of incorporation of colleges they have not framed any aggregate body consisting of less than three in number." Another principle, apparently derived from the civil law, is that a man cannot be a fellow in two colleges at the same time. The law of England steadily resisted any attempt to introduce the principle of in- equality into colleges. An act of 1 542, reciting that divers founders of colleges have given in their statutes a power of veto to indi- vidual members, enacts that every statute made by any such founder, whereby the grant or election of the governor or ruler with the assent of the most part of such corporation should be in any wise hindered by any one or more being the lesser number (contrary to the common law), shall be void.

The corporation consists of a head or master, fellows and scholars. Students, not being on the foundation, residing in the college, are not considered to be members of the corporation. The governing body in all cases is the head and fellows.

It is considered essential to corporations of an ecclesiastical or educational character that they should have a Visitor whose duty it is to see that the statutes of the founder are obeyed. The duties of this officer have been ascertained by the courts of law in a great variety of decided cases. Subject to such restric- tions as may be imposed on him by the statutes of the college, his duties are generally to interpret the statutes of the college in disputed cases, and to enforce them where they have been violated. For this purpose he is empowered to ” visit ” the society — usually at certain stated intervals. In questions within his jurisdiction his judgment is conclusive, but his juris- diction does not extend to any cases under the common laws of the country, or to trusts attached to the college. Generally the visitorship resides in the founder and his heirs unless he has otherwise appointed, and in default of him in the crown.

The fellowships, scholarships, &c, of colleges were until a comparatively recent date subject to various restrictions. Birth in a particular county, education at a particular school, relationship to the founder and holy orders, are amongst the most usual of the conditions giving a preferential or conclusive claim to the emoluments. Most of these restrictions have been or are being swept away. (See Universities; Oxford; Cam- bridge; &c.)

The term ” college ” (like ” academy “) is also applied to various institutions, e.g. to colleges of physicians and surgeons, and to the electoral college in the United States presidential elections, &c. For the Sacred College see Cardinal.

COLLEONI, BARTOLOMMEO (1400-1475), Italian soldier of fortune, was born at Bergamo. While he was still a child his father was attacked and murdered in his castle of Trezzo by Filippo Maria Visconti, duke of Milan. After wandering about Italy he entered the service of various condottieri, such as Braccio da Montone and Carmagnola. At the age of thirty-two he was serving the Venetian republic, and although Francesco Maria Gonzaga was commander-in-chief, Colleoni was the life and soul of the army. He recaptured many towns and districts for Venice from the Milanese, and when Gonzaga went over to the enemy he continued to serve the Venetians under Erasmo da Narni (known as Gattamelata) and Francesco A. Sforza, winning battles at Brescia, Verona and on the lake of Garda. When

peace was made between Milan and Venice in 144 1 Colleoni went over to the Milanese, together with Sforza in 1443. Butalthough

well treated at first, he soon fell under the suspicion of the treacherous Visconti and was imprisoned at Monza, where he remained until the duke's death in 1447. Milan then fell under the lordship of Sforza, whom Colleoni served for a time, but in 1448 he took leave of Sforza and returned to the Venetians. Disgusted at not having been elected captain-general, he went over to Sforza once more, but Venice could not do without him and by offering him increased emoluments induced him to return, and in 1455 he was appointed captain-general of the republic for life. Although he occasionally fought on his own account, when Venice was at peace, he remained at the disposal of the republic in time of war until his death.

Colleoni was perhaps the most respectable of all the Italian condottieri, and although he often changed sides, no act of treachery is imputed to him, nor did he subject the territories he passed through to the rapine and exactions practised by other soldiers of fortune. When not fighting he devoted his time to introducing agricultural improvements on the vast estates with which the Venetians had endowed him, and to charitable works. At his death in 1475 he left a large sum to the republic for the Turkish war, with a request that an equestrian statue of himself should be erected in the Piazza San Marco. The statue was made by Verrocchio, but as no monument was permitted in the famous Piazza it was placed opposite the hospital of St Mark by way of compromise.

See G. M. Bonomi, // Castello di Cavernago e i conti Martinengo Colleoni (Bergamo, 1884) ; for an account of his wars see S. Romanin, Storia documentata di Venezia, vol. iv. (Venice, 1855), and other histories of Venice. (L. V.*)

COLLETER (Gr. koKKos, glue), a botanical term for the gum-secreting hairs on the buds of certain plants.

COLLETTA, PIETRO (1775-1831), Neapolitan general and historian, entered the Neapolitan artillery in 1796 and took part in the campaign against the French in 1798. On the entry of the French into Naples and the establishment of the Parthe- nopean republic (1799) he adhered to the new government, and when the Bourbon king Ferdinand IV. (q.v.) reconquered the city Colletta was thrown into prison and only escaped the death penalty by means of judiciously administered bribes. Turned out of the army he became a civil engineer, but when the Bourbons were expelled a second time in 1806

and Joseph Bona- parte seized the throne of Naples, he was reinstated in his rank and served in the expedition against the brigands and rebels of Calabria. In 181 2 he was promoted general, and made director of roads and bridges. He served under Joachim Murat and fought the Austrians on the Panaro in 1815. On the restoration of Ferdinand Colletta was permitted to retain his rank in the army, and given command of the Salerno division. At the out- break of the revolution of 1820 the king called him to his councils, and when the constitution had been granted Colletta was sent to put down the separatist rising in Sicily, which he did with great severity. He fought in the constitutionalist army against the Austrians at Rieti (7th of March 1821), and on the re-estab- lishment of autocracy he was arrested and imprisoned for three months by order of the prince of Canosa, the chief of police, his particular enemy. He would have been executed had not the Austrians intervened in his favour, and he was exiled instead to Briinn in Moravia; in 1823 he was permitted to settle in Florence, where he spent the rest of his days engaged on his Storia del reame di Napoli. He died in 1831. His history (1st ed., Capolago, 1834), which deals with the reigns of Charles III. and Ferdinand IV. (1734-1825), is still the standard work for that period; but its value is somewhat diminished by the author's bitterness against his opponents and the fact that he does not give chapter and verse for his statements, many of which are based on his recollection of documents seen, but not available at the time of writing. Still, having been an actor in many of the events recorded, he is on the whole accurate and trustworthy.

See Gino Capponi's memoir of him published in the Storia del reame di Napoli (2nd ed., Florence, 1848). (L. V.*)

COLLEY, SIR GEORGE POMEROY (1835-1881), British general, third son of George Pomeroy Colley, of Rathangan,

Co. Kildare, Ireland, and grandson of the fourth Viscount Har- berton, was born on the ist of November 1835, and entered the 2nd Queen's Regiment from Sandhurst as ensign in 1852. From 1854 to i860 he served in South Africa, and was employed in surveying and as a magistrate in charge of the Bashi river district in Kaff raria. Early in 1 860 he went with his regiment to China to join the Anglo-French expedition, and took part in the capture of the Taku forts and the entry into Peking, returning to South Africa to complete his work in

Kaff raria (brevet-majority). In 1862 he entered the Staff College and passed out in one year with honours. After serving as brigade-major at Devonport for five years, he went to the War Office in 1870 to assist in the preparation of (Lord) CardwelPs measures of army reform. He was appointed professor of military administration at the Staff College in 1871. Early in 1873 he joined Sir Garnet Wolseley at the Gold Coast, where he took charge of the transport, and the success of the Ashanti expedition was in no small degree due to his exertions. He was promoted brevet-colonel and awarded the C.B. In 1875 he accompanied Wolseley to Natal (CM. G.). On his return home he was appointed military secretary to Lord Lytton, governor-general of India, and in 1877 private secretary (K.C.S.I.). In 1879 he joined Wolseley as chief of the staff and brigadier-general in S.E. Africa, but, on the murder of Cavagnari at Kabul, returned to India. In 1880 he succeeded Wolseley in S.E. Africa as high commissioner and general commanding, and conducted the operations against the rebel Boers. He was defeated at Laing's Nek and at the Ingogo river, and killed at Majuba Hill on the 27th of February 1881. He had a very high reputation not only for a theoretical knowledge of military affairs, but also as a practical soldier.

See Life of Sir George Pomeroy Colley by Lieut.-Gen. Sir W. F. Butler (London, 1899).

COLLIER, ARTHUR (1680-1732), English philosopher, was born at the rectory of Steeple Langford, Wiltshire, on the 12th of October 1680. He entered at Pembroke College, Oxford, in July 1697, but in October 1698 he and his brother William became members of Balliol. His father having died in 1697, it was arranged that the family living of Langford Magna should be given to Arthur as soon as he was old enough. He was presented to the benefice in 1704, and held it till his death. His sermons show no traces of his bold theological speculations, and he seems to have been faithful in the discharge of his duty. He was often in pecuniary difficulties, from which at last he was obliged to free himself by selling the reversion of Langford rectory to Corpus Christi College, Oxford. His philosophical opinions grew out of a diligent study of Descartes and Malebranche. John Norris of Bemerton also strongly influenced him by his Essay on the Ideal World (1701-1704). It is remarkable that Collier makes no reference to Locke, and shows no sign of having any knowledge of his works. As early as 1703 he seems to have become con- vinced of the non-existence of an external world. In 1712 he wrote two essays, which are still in manuscript, one on substance and accident, and the other called Clavis Philosophica. His chief work appeared in 17 13, under the title Clavis Universalis, or a New Inquiry after Truth, being

a Demonstration of the Non- Existence or Impossibility of an External World (printed privately, Edinburgh, 1836, and reprinted in Metaphysical Tracts, 1837, edited by Sam. Parr). It was favourably mentioned by Reid, Stewart and others, was frequently referred to by the Leib- nitzians, and was translated into German by von Eschenbach in 1756. Berkeley's Principles of Knowledge and Theory of Vision preceded it by three and four years respectively, but there is no evidence that they were known to Collier before the publication of his book.

His views are grounded on two presuppositions: — first, the utter aversion of common sense to any theory of representative perception ; second, the opinion which Collier held in common with Berkeley, and Hume afterwards, that the difference between imagination and sense perception is only one of degree. The former is the basis of the negative part of his argument; the latter supplies him with all the positive account he has to give, and that is meagre enough. The Clavis consists of two parts. After explaining that he will use the term " external world " in the sense of absolute, self -existent, independent matter, he attempts in the first part to prove that the

visible world is not t . external, by showing — first, that the seeming externality of a visible object is no proof of real externality, and Second, that a visible object, as such, is not external. The image of a centaur seems as much external to the mind as any object of sense; and since the difference between imagination and perception is only one of degree, God could so act upon the mind of a person imagining a centaur, that he would perceive it as vividly as any ■ object can be seen. Similar illustrations are used to prove the second proposition, that a visible object, as such, is not external. The first part ends with a reply to objections based on the universal consent of men, on the assurance given by touch of the extra existence of the visible world, and on the truth and goodness of God (Descartes), which would be impugned if our senses deceived us. Collier argues naively that if universal consent means the consent of those who have considered the subject, it may be claimed for his view. He thinks with Berkeley that objects of sight are quite distinct from those of touch, and that the one therefore cannot give any assurance of the other; and he asks the Cartesians to consider how far God's truth and goodness are called in question by their denial of the externality of the secondary qualities. The second part of the book is taken up with, a number of metaphysical arguments to prove the impossibility of an external world. The pivot of this part is the logical principle of contradiction. From the hypothesis of an external world a series of contradictions are deduced, such as that the world is both finite and infinite, is movable

and immovable, &c. ; and finally, Aristotle and various other philosophers are quoted, to show that the external matter they dealt with, as mere potentiality, is just nothing at all. Among other uses and consequences of his treatise, Collier thinks it furnishes an easy refutation of the Romish doctrine of transub- stantiation. If there is no external world, the distinction between substance and accidents vanishes, and these become the sole essence of material objects, so that there is no room for any change whilst they remain as before. Sir William Hamilton thinks that the logically necessary advance from the old theory of representative perception to idealism was stayed by anxiety to save this miracle of the church; and he gives Collier credit for being the first to make the discovery.

His Clavis Universalis is interesting on account of the resemblance between its views and those of Berkeley. Both were moved by their dissatisfaction with the theory of representative perception. Both have the feeling that it is inconsistent with the common sense of mankind, which will insist that the very object perceived is the sole reality. They equally affirm that the so-called representative image is the sole reality, and discard as unthinkable the unperceiving material cause of the philosophers. Of objects of sense, they say, their esse is percipi. But Collier never got beyond a bald assertion of the fact, while Berkeley addressed himself to an explanation of it. The thought of a distinction between direct and indirect perception never dawned upon Collier. To the question how all matter exists in dependence on percipient mind his only reply is, ” Just how my reader pleases, provided it be somehow.” As cause of our sensations and ground of our belief in externality, he substituted for an un- intelligible material substance an equally unintelligible operation of divine power. His book exhibits no traces of a scientific develop- ment. The most that can be said about him is that he was an intelligent student of Descartes and Malebranche, and had the ability to apply the results of his reading to the facts of his experience. In philosophy he is a curiosity, and nothing more. His biographer attributes the comparative failure of the Clavis to its inferiority in point of style, but the crudeness of his thought had quite as much to do with his failure to gain a hearing. Hamilton {Discussions, p. 197) allows greater sagacity to Collier than to. Berkeley, on the ground that he did not vainly attempt to enlist men’s natural belief against the hypothetical realism of the philosophers. But Collier did so as far as his light enabled him. He appealed to the popular conviction that the proper object of sense is the sole reality, although he despaired of getting men to give up their belief in its externality, and asserted that nothing but prejudice prevented them from doing so; and there is little doubt

that, if it had ever occurred to him, as it did to Berkeley, to explain the genesis of the notion of externality, he would have been more hopeful of commending his theory to the popular mind.

In theology Collier was an adherent of the High Church party, though his views were by no means orthodox. In the Jacobite Mist's Journal he attacked Bishop Hoadly's defence 'of sincere errors. His views on the problems of Arianism, and his attempt to reconcile it with orthodox theology, are contained in A Specimen of True Philosophy (1730, reprinted in Metaphysical Tracts, 1837) and Logology, or a Treatise on ike Logos in Seven Sermons on John i. I, 2, 3, 14 (1732, analysed in Metaph. Tracts). These may be compared with Berkeley's Siris.

See Robt. Benson, Memoirs of the Life and Writings of Arthur Collier (1837); Tennemann, History of Philosophy; Hamilton, Discussions; A. C. Fraser, edition of Berkeley's Works; G. Lyon, " Un Idealiste anglais au XVIII. siecle," in Rev. philos. (1880), x. 375-

COLLIER, JEREMY (1650-1726), English nonjuring divine, was born at Stow-with-Quy, Cambridgeshire, on the 23rd of September 1650. He was educated at Ipswich free school, over

which his father presided, and at Caius College, Cambridge, graduating B.A. in 1673 and M.A. in 1676. He acted for a short time as a private chaplain, but was appointed in 1679 to the small rectory of Ampton, near Bury St Edmunds, and in 1685 he was made lecturer of Gray's Inn.

At the Revolution he was committed to Newgate for writing in favour of James II. a tract entitled The Desertion discuss'd in a Letter to a Country Gentleman (1688), in answer to Bishop Burnet's defence of King William's position. He was released after some months of imprisonment, without trial, by the intervention of his friends. In the two following years he continued to harass the government by his publications: and in 1692 he was again in prison under suspicion of treasonable correspondence with James. His scruples forbade him to acknowledge the jurisdiction of the court by accepting bail, but he was soon released. But in 1696 for his boldness in granting absolution on the scaffold to Sir John Friend and Sir William Parkyns, who had attempted the assassination of William, he was obliged to flee, and for

the rest of his life continued under sentence of outlawry.

When the storm had blown over he returned to London, and employed his leisure in works which were less political in their tone. In 1697 appeared the first volume of his Essays on Several Moral Subjects, to which a second was added in 1705, and a third in 1709. The first series contained six essays, the most notable being that ” On the office of a Chaplain,” which throws much light on the position of a large section of the clergy at that time. Collier deprecated the extent of the authority assumed by the patron and tire servility of the poorer clergy.

In 1698 Collier produced his famous Short View of the Im- morality and Profaneness of the English Stage. . . . He dealt with the immodesty of the contemporary stage, supporting his contentions by a long series of references attesting the com- parative decency of Latin and Greek drama; with the profane language indulged in by the players; the abuse of the clergy common in the drama; the encouragement of vice by represent- ing the vicious characters as admirable and successful; and finally he supported his general position by the analysis of particular plays, Dryden’s Amphitryon, Vanbrugh’s Relapse and D’Urfey’s Don Quixote. The Book abounds in hypercriticism, particularly in the imputation of profanity; and in a useless display of learning, neither intrinsically valuable nor conducive to the argument. He had no artistic appreciation of the subject he discussed, and he mistook cause for effect in asserting that the decline in public morality was due to the flagrant indecency of the stage. Yet, in the words of Macaulay, who gives an admirable account of the discussion in his essay on the comic dramatists of the Restoration, ” when all deductions have been made, great merit must be allowed to the work.” Dryden acknowledged, in the preface to his Fables, the justice of Collier’s strictures, though he protested against the manner of the onslaught; 1 but Congreve made an angry reply; Vanbrugh and others followed. Collier was prepared to meet any number of antagonists, and defended himself in numerous tracts. The Short View was followed by a Defence (1699), a Second Defence (1700), and Mr Collier’s Dissuasive from the Playhouse, in a Letter to a Person of Quality (1703), and a Further Vindication (1708). The fight lasted in all some ten years; but Collier had right on his side, and triumphed; his position was, moreover, strengthened by the fact that he was known as a Troy and high churchman, and that his attack could not, therefore, be assigned to Puritan rancour against the stage.

From 1 701 to 1 7 2 1 Collier was employed on his Great Historical, Geographical, Genealogical and Poetical Dictionary, founded on, and partly translated from, Louis Moreri’s Dictionnaire his- torique, and in

the compilation and issue of the two volumes folio of his own Ecclesiastical History of Great Britain from the first planting of Christianity to the end of the reign of Charles II.

1 ” He is too much given to horse-play in his raillery, and comes to battle like a dictator from the plough. I will not say, ‘ the zeal of God’s house has eaten him up ‘; but I am sure it has devoured some part of his good manners and civility ” (Dryden, Works, ed. Scott, xi. 239).

(1 708-1 7 14) . The latter work was attacked by Burnet and others, but the author showed himself as keen a controversialist as ever. Many attempts were made to shake his fidelity to the lost cause of the Stuarts, but he continued indomitable to the end. In 1 71 2 George Hickes was the only survivor of the nonjuring bishops, and in the next year Collier was consecrated. He had a share in an attempt made towards union with the Greek Church. He had a long correspondence with the Eastern authorities, his last letters on the subject being written in 1725. Collier preferred the version of the Book of Common Prayer issued in 1 549, and regretted that certain practices and petitions there enjoined were omitted in later editions. His first tract on the subject, Reasons for Restoring some Prayers (1717), was followed by others. In 1718 was published a new Communion Office taken partly from Primitive Liturgies and partly from the first English Reformed Common Prayer Book, . . . which em- bodied the changes desired by Collier. The controversy that ensued made a split in the nonjuring communion. His last work was a volume of Practical Discourses, published in 1725. He died on the 26th of April 1726.

Bibliography. — There is an excellent account of Collier in A. Kippis’s Biographia Britannica, vol. iv. (1789), where some sensible observations by the editor are added to the original bio- graphy. A full list of Collier’s writings is given by the Rev. Wm. Hunt in the article in the Dictionary of National Biography. For particulars of Collier’s history as a nonjuring bishop, see Thomas Lathbury, A History of the Nonjurors . . . (1845). There is an excellent account of the Short View and the controversy arising from it in A. Beljame’s Le Public et les homtnes de lettres en Angleterre au XVIIl’ siccle (2nd ed., 1897), pp. 244-263.

COLLIER, JOHN PAYNE (1789-1883), English Shakespearian critic, was born in London, on the nth of January 1789. His father, John Dyer Collier (1762-1825), was a successful journalist, and his connexion with the press obtained for his son a position on the Morning Chronicle as leader writer, dramatic critic and reporter, which continued till 1847; ne was also for some time a reporter for

The Times. He was summoned before the House of Commons in 1819 for giving an incorrect report of a speech by Joseph Hume. He entered the Middle Temple in 1811, but was not called to the bar until 1829. The delay was partly due to his indiscretion in publishing the Criticisms on the Bar (18 19) by ” Amicus Curiae.” His leisure was given to the study of Shakespeare and the early English drama. After some minor publications he produced in 1825-1827 a new edition of Dodsley’s Old Plays, and in 1833 a supplementary volume entitled Five Old Plays. In 1831 appeared his History of English Dramatic Poetry and Annals of the Stage to the Restoration, a badly arranged, but valuable work. It obtained for him the post of librarian to the duke of Devonshire, and, subsequently, access to the chief collections of early English literature throughout the kingdom, especially to the treasures of Bridgwater House. These opportunities were unhappily misused to effect a series of literary fabrications, which may be charitably, and perhaps not unjustly, attributed to literary monomania, but of which it is difficult to speak with patience, so completely did they for a long time bewilder the chronology of Shakespeare’s writings, and such suspicion have they thrown upon MS. evidence in general. After New Facts, New Particulars and Further Parti- culars respecting Shakespeare had appeared and passed muster, Collier produced (1852) the famous Perkins Folio, a copy of the second folio (1632), so called from a name written on the title- page. On this book were numerous MS. emendations of Shake- speare said by Collier to be from the hand of ” an old corrector.” He published these corrections as Notes and Emendations to the Text of Shakespeare (1852), and boldly incorporated them in his edition (1853) of Shakespeare. Their authenticity was disputed by S. W. Singer in The Text of Shakespeare Vindicated (1853) and by E. A. Brae in Literary Cookery (1855) on internal evidence; and when in 1859 the folio was submitted by its owner, the duke of Devonshire, to experts at the British Museum, the emendations were incontestably proved to be forgeries of modern date. Collier was exposed by Mr Nicholas Hamilton in his Inquiry (i860). The point whether he was deceiver or

deceived was left undecided, but the falsifications of which he was unquestionably guilty among the MSS. at Dulwich College have left little doubt respecting it. He had produced the Memoirs of Edward Alleyn for the Shakespeare Society in 1841. He followed up this volume with the Alleyn Papers (1843) and the Diary of P. Henslowe (1845). He forged the name of Shake- speare in a genuine letter at

Dulwich, and the spurious entries in Alleyn's Diary were proved to be by Collier's hand when the sale of his library in 1884 gave access to a transcript he had made of the Diary with interlineations corresponding with the Dulwich forgeries. No statement of his can be accepted without verification, and no manuscript he has handled without careful examination, but he did much useful work. He compiled a valuable Bibliographical and Critical Account of the Rarest Books in the English Language (1865); he reprinted a great number of early English tracts of extreme rarity, and rendered good service to the numerous antiquarian societies with which he was connected, especially in the editions he produced for the Camden Society and the Percy Society. His Old Man's Diary (1871-1872) is an interesting record, though even here the taint of fabrication is not absent. Unfortunately what he did amiss is more striking to the imagination than what he did aright, and he will be chiefly remembered by it. He died at Maiden- head, where he had long resided, on the 17th of September

1883.

For an account of the discussion raised by Collier's emendations see CM. Ingleby, CompleteView of the Shakespeare Controversy (1861).

COLLIN, HEINRICH JOSEPH VON (1771-1811), Austrian dramatist, was born in Vienna, on the 26th of December 1771. He received a legal education and entered the Austrian ministry of finance where he found speedy promotion. In 1805 and in 1809, when Austria was under the heel of Napoleon, Collin was entrusted with important political missions. In 1803 he was, together with other members of his family, ennobled, and in 1809 made Hofrat. He died on the 28th of July 1811. His tragedy Regulus (1801), written in strict classical form, was received with enthusiasm in Vienna, where literary taste, less advanced than that of North Germany, was still under the ban of French classicism. But in his later dramas, Coriolan (1804), Polyxena (1804), Balboa (1806), Bianca della Porta (1808), he made some attempt to reconcile the pseudo-classic type of tragedy with that of Shakespeare and the German romanticists. As a lyric poet (Gedichte, collected 1812), Collin has left a collection of stirring W ehrmannslieder for the fighters in the cause of Austrian freedom, as well as some excellent ballads {Kaiser Max auf der Martmswand, Herzog Leupold vor Solothurn). His younger brother Matthaus von Collin (1779- 1824), was, as editor of the Wiener Jahrbiicher fur Literatur, an even more potent force in the literary life of Vienna. He was, moreover, in sympathy with the Romantic movement, and intimate with its leaders. His dramas on themes from Austrian

national history (Belas Krieg mit dem Vater, 1808, Der Tod Friedrichs des Slreitbaren, 18 13) may be regarded as the immediate precursors of Grillparzer's historical tragedies.

His Gesammelte Werke appeared in 6 vols. (18 12-18 14); he is the subject of an excellent monograph by F. Laban (1879). See also A. Hauffen, Das Drama der klassischen Periode, ii. 2 (1891), where a reprint of Regulus will be found. M. von Collin's Dramatische Dichtungenwere published in 4 vols. (1815-1817) ; his Nachgelassene Schriften, edited by J. von Hammer, in 2 vols. (1827). A study of his life and work by J. Wihan will be found in Euphorion, Ergan-zungsheft, v. (1901).

COLLIN D'HARLEVILLE, JEAN FRANCOIS (1755-1806), French dramatist, was born at Mevoisins, near Maintenon (Eure-et-Loire), on the 30th of May 1755. His first dramatic success was L Inconstant, a comedy accepted by the Comedie Francaise in 1780, but not produced there until six years later, though it was played elsewhere in 1784. This was followed by L'Optimiste, ou I'homme toujours content (1788), and Chateaux en Espagne (1789). Hisbest play, Le Vieux Celibataire, appeared in 1793. Among his other plays are — the one-act comedy Monsieur de Crac dans son petit castel (1791), Les Artistes (1796), Les Momrs du jour (1800) and Malice pour malice (1803).

Collin was one of the original members of the Institute of France, and died in Paris on the 24th of February 1806.

The 1822 edition of his Thedtre et poesies fugitives contains a notice by his friend the dramatist Andrieux. His Thedtre was also edited by L. Moland in 1876; and by Edouard Thierry in 1882.

COLLING, ROBERT (1749-1820), and CHARLES (1751-1836), English stock breeders, famous for their improvement of the Shorthorn breed of cattle, were the sons of Charles Colling, a farmer of Ketton near Darlington. Their lives are closely connected with the history of the Shorthorn breed. Of the two brothers, Charles is probably the better known, and it was his visit to the farm of Robert Bakewell at Dishley that first led the brothers to realize the possibilities of scientific cattle breeding. Charles succeeded to his father's farm at Ketton. Robert, after being first apprenticed to a grocer in Shields, took a farm at Barmpton. An animal which he bought at Charles's advice for £8 and afterwards sold to his brother, became known as the celebrated " Hubback," a bull which formed the basis of both the Ketton and Barmpton herds. The two brothers pursued the same system of " in and in " breeding which they had learned from Bakewell, and both the

Ketton and the Barmpton herds were sold by auction in the autumn of 18 10. The former with 47 lots brought £7116, and the latter with 61 lots £7852. Robert Colling died unmarried at Barmpton on the 7th of March 1820, leaving his property to his brother. Charles Colling, who is remembered as the owner of the famous bulls ” Hubback,” “Favourite” and “Comet,” was more of a specialist and a business man than his brother. He died on the 16th of January

1836.

See the Journal of the Royal Agricultural Society, 1899, for a biographical sketch of the brothers Colling, by C. J. Bates.

COLLINGWOOD, CUTHBERT COLLINGWOOD, Baron (1750- 1810), British naval commander, was born at Newcastle-upon- Tyne, on the 26th of September 1750. He was early sent to school; and when only eleven years of age he was put on board the ” Shannon,” then under the command of Captain (afterwards Admiral) Brathwaite, a relative of his own, to whose care and attention he was in a great measure indebted for that nautical knowledge which shone forth so conspicuously in his subsequent career. After serving under Captain Brathwaite for some years, and also under Admiral Roddam, he went in 1774 to Boston with Admiral Graves, and served in the naval brigade at the battle of Bunker Hill (17th of June 1775), where he gained his lieu- tenancy. In 1779 he was made commander of the ” Badger,” and shortly afterwards post-captain of the ” Hinchinbroke,” a small frigate. In the spring of 1780 that vessel, under the command of Nelson, was employed upon an expedition to the Spanish Main, where it was proposed to pass into the Pacific by navigating boats along the river San Juan and the lakes Nicaragua and Leon. The attempt failed, and most of those engaged in it became victims to the deadly influence of the climate. Nelson was promoted to a larger vessel, and Colling- wood succeeded him in the command. It is a fact worthy of record that the latter succeeded the former very frequently from the time when they first became acquainted, until the star of Nelson set at Trafalgar — giving place to that of Collingwood, less brilliant certainly, but not less steady in its lustre.

After commanding in another small frigate, Collingwood was promoted to the “Sampson” (64); and in 1783 he was appointed to the ” Mediator,” destined for the West Indies, where, with Nelson, who had a command on that station, he remained till the end of 1786. With Nelson he warmly co- operated in carrying into execution the provisions of the naviga- tion laws, which had been infringed by the United States, whose ships, notwithstanding the separation of the

countries, continued to trade to the West Indies, although that privilege was by law exclusively confined to British vessels. In 1786 Collingwood returned to England, where, with the exception of a voyage to the West Indies, he remained until 1793, in which year he was appointed captain of the ” Prince,” the flag-ship of Rear- Admiral Bowyer. About two years previous to this event he had married Miss Sarah Roddam — a fortunate alliance, which

continued to be a solace to him amidst the privations to which the life of a seaman must ever be subject.

As captain of the ” Barfleur,” Collingwood was present at the naval engagement which was fought on the 1st of June 1794; and on that occasion he displayed equal judgment and courage. On board the ” Excellent ” he shared in the victory of the 14th of February 1797, when Sir John Jervis (Lord St Vincent) humbled the Spanish fleet off Cape St Vincent. His conduct in this engagement was the theme of universal admiration through- out the fleet, and greatly advanced his fame as a naval officer. After blockading Cadiz for some time, he returned for a few weeks to Portsmouth to repair. In the beginning of 1799 Collingwood was raised to the rank of vice-admiral, and hoisting his flag in the ” Triumph,” he joined the Channel Fleet, with which he proceeded to the Mediterranean, where the principal naval forces of France and Spain were assembled. Collingwood continued actively employed in watching the enemy, until the peace of Amiens restored him once more to the bosom of his family.

The domestic repose, however, which he so highly relished, was cut short by the recommencement of hostilities with France, and in the spring of 1803 he quitted the home to which he was never again to return. The duty upon which he was employed was that of watching the French fleet off Brest, and in the discharge of it he displayed the most unwearied vigilance. Nearly two years were spent in this employment; but Napoleon had at length matured his plans and equipped his armament, and the grand struggle which was to decide the fate of Europe and the dominion of the sea was close at hand. The enemy’s fleet having sailed from Toulon, Admiral Collingwood was appointed to the command of a squadron, with orders to pursue them. The combined fleets of France and Spain, after spreading terror throughout the West Indies, returned to Cadiz. On their way thither they bore down upon Admiral Collingwood, who had only three

vessels with him; but he succeeded in eluding the pursuit, although chased by sixteen ships of the line. Ere one-half of the enemy had entered the harbour he drew up before it and resumed the blockade, at the same time employing an ingenious artifice to conceal the inferiority of his force. But the combined fleet was at last compelled to quit Cadiz; and the battle of Trafalgar immediately followed. The brilliant conduct of Admiral Collingwood upon this occasion has been much and justly applauded. The French admiral drew up his fleet in the form of a crescent, and in a double line, every alternate ship being about a cable's length to windward of her second, both ahead and astern. The British fleet bore down upon this formidable and skilfully arranged armament in two separate lines, the one led by Nelson in the " Victory," and the other by Collingwood in the " Royal Sovereign." The latter vessel was the swifter sailer, and having shot considerably ahead of the rest of the fleet, was the first engaged. " See," said Nelson, pointing to the " Royal Sovereign " as she penetrated the centre of the enemy's line, " see how that noble fellow Collingwood carries his ship into action!" Probably it was at the same instant that Collingwood, as if in response to the observation of his great commander, remarked to his captain, " What would Nelson give to be here?" The consummate valour and skill evinced by Collingwood had a powerful moral influence upon both fleets. It was with the Spanish admiral's ship that the " Royal Sovereign " closed; and with such rapidity and precision did she pour in her broadsides upon the " Santa Anrfa," that the latter was on the eve of striking in the midst of thirty-three sail of the line, and almost before another British ship had fired a gun. Several other vessels, however, seeing the imminent peril of the Spanish flag-ship, came to her assistance, and hemmed in the " Royal Sovereign " on all sides; but the latter, after suffering severely, was relieved by the arrival of the rest of the British squadron; and not long afterwards the " Santa Anna " struck her colours. The result of the battle of Trafalgar, and the expense at which it was purchased, are well known. On the death of Nelson, Collingwood assumed the supreme command; and by his skill and judgment greatly contributed to the preserva-

tion of the British ships, as well as of those which were captured from the enemy. He was raised to the peerage as Baron Collingwood of Coldburne and Heathpool, and received the thanks of both Houses of Parliament, with a pension of £2000 per annum.

From this period until the death of Lord Collingwood no great naval action was fought; but he was much occupied in important political transactions, in which he displayed remarkable tact and judgment. Being appointed to the command of the Mediter- ranean fleet, he

continued to cruise about, keeping a watchful eye upon the movements of the enemy. His health, however, which had begun to decline previously to the action of Trafalgar in 1805, seemed entirely to give way, and he repeatedly requested govern- ment to be relieved of his command, that he might return home; but he was urgently requested to remain, on the ground that his country could not dispense with his services. This conduct has been regarded as harsh; but the good sense and political sagacity which he displayed afford some palliation of the conduct of the government; and the high estimation in which he was held is proved by the circumstance that among the many able admirals, equal in rank and duration of service, none stood so prominently forward as to command the confidence of ministers and of the country to the same extent as he did. After many fruitless attempts to induce the enemy to put to sea, as well as to fall in with them when they had done so (which circumstance materially contributed to hasten his death), he expired on board the " Ville de Paris," then lying off Port Mahon, on the 7th of March 1810.

Lord Collingwood 's merits as a naval officer were in every respect of the first order. In original genius and romantic darimg he was inferior to Nelson, who indeed had no equal in an age fertile in great commanders. In seamanship, in general talent, and in reasoning upon the probability of events from a number of conflicting and ambiguous statements, Collingwood was equal to the hero of the Nile; indeed, many who were familiar with both give him the palm of superiority. His political penetration was remarkable; and so high was the opinion generally entertained of his judgment, that he was consulted in all quarters, and on all occasions, upon questions of general policy, of regulation, and even of trade. He was distinguished for benevolence and gener- osity; his acts of charity were frequent and bountiful, and the petition of real distress was never rejected by him. He was an enemy to impressment and to flogging; and so kind was he to his crew, that he obtained amongst them the honourable name of father. Between Nelson and Collingwood a close intimacy subsisted, from their first acquaintance in early life till the fall of the former at Trafalgar; and they lie side by side in the cathedral of St Paul's.

The selections from the public and private correspondence of Lord Collingwood, published in 2 vols., 8vo, in 1828, contain some of the best specimens of letter-writing in the language. See also A Fine Old English Gentleman exemplified in the Life and Character of Lord Collingwood, a Biographical Study, by William Davies (London,

1875)-

COLLINGWOOD, a city of Bourke county, Victoria, Australia, suburban to Melbourne on the N.E., on the Yarra Yarra river. Pop. (1901) 32,766. It was the first town in Victoria incor- porated after Melbourne and Geelong. It is esteemed one of the healthiest of the metropolitan suburbs.

COLLINGWOOD, a town of Simcoe county, Ontario, Canada, 90 m. N.N.W. of Toronto, on Georgian Bay, and on the Grand Trunk railway. Pop. (1901) 5755. It is the eastern terminus of two lines of steamers for the ports of Lakes Huron and Superior. It contains a large stone dry-dock and shipyard, pork factory, and saw and planing mills, and has a large lumber, grain and produce export trade, besides a shipbuilding plant and steel works.

COLLINS, ANTHONY (1676-1729), English deist, was born at Heston, near Hounslow in Middlesex, on the 21st of June 1676. He was educated at Eton and King's College, Cambridge, and was for some time a student at the Middle Temple. The most interesting episode of his life was his intimacy with Locke, who in his letters speaks of him with affection and admiration. In 1715 he settled in Essex, where he held the offices of justice of the peace and deputy-lieutenant, which he had before held in Middlesex.

He died at his house in Harley Street, London, on the 13th of December 1729.

His writings are important as gathering together the results of previous English Freethinkers. The imperturbable courtesy of his style is in striking contrast to the violence of his opponents; and it must be remembered that, in spite of his unorthodoxy, he was not an atheist or even an agnostic. In his own words, "Ignorance is the foundation of atheism, and freethinking the cure of it " {Discourse of Freethinking, 105).'

His first work of note was his Essay concerning the Use of Reason in Propositions the Evidence whereof depends on Human Testimony (1707), in which he rejected the distinction between above reason and contrary to reason, and demanded that revelation should conform to man's natural ideas of God. Like all his works, it was published anonymously, although the identity of the author was never long concealed. Six years later appeared his chief work, A Discourse of

Freethinking, occasioned by the Rise and Growth of a Sect called Freethinkers (1713). Notwithstanding the ambiguity of its title, and the fact that it attacks the priests of all churches without moderation, it contends for the most part, at least explicitly, for no more than must be admitted by every Protestant. Freethinking is a right which cannot and must not be limited, for it is the only means of attaining to a knowledge of truth, it essentially contributes to the well-being of society, and it is not only permitted but enjoined by the Bible. In fact the first introduction of Christianity and the success of all missionary enterprise involve freethinking (in its etymological sense) on the part of those converted. In England this essay, which was regarded and treated as a plea for deism, made a great sensation, calling forth several replies, among others from William Whiston, Bishop Hare, Bishop Hoadly, and Richard Bentley, who, under the signature of Phileleutherus Lipsiensis, roughly handles certain arguments carelessly expressed by Collins, but triumphs chiefly by an attack on trivial points of scholarship, his own pamphlet being by no means faultless in this very respect. Swift also, being satirically referred to in the book, made it the subject of a caricature.

In 1724 Collins published his Discourse of the Grounds and Reasons of the Christian Religion, with An Apology for Free Debate and Liberty of Writing prefixed. Ostensibly it is written in opposition to Whiston's attempt to show that the books of the Old Testament did originally contain prophecies of events in the New Testament story, but that these had been eliminated or corrupted by the Jews, and to prove that the fulfilment of prophecy by the events of Christ's life is all " secondary, secret, allegorical, and mystical," since the original and literal reference is always to some other fact. Since, further, according to him the fulfilment of prophecy is the only valid proof of Christianity, he thus secretly aims a blow at Christianity as a revelation. The canonicity of the New Testament he ventures openly to deny, on the ground that the canon could be fixed only by men who were inspired. No less than thirty-five answers were directed against this book, the most noteworthy of which were those of Bishop Edward Chandler, Arthur Sykes and Samuel Clarke. To these, but with special reference to the work of Chandler, which maintained that a number of prophecies were literally fulfilled in Christ, Collins replied by his Scheme of Literal Prophecy Considered (1727). An appendix contends against Whiston that the book of Daniel was forged in the time of Antiochus Epiphanes (see Deism).

In philosophy, Collins takes a foremost place as a defender of Necessitarianism. His brief Inquiry Concerning Human Liberty (i7iS)hasnot been excelled, at all events in its main outlines, as a

statement of the determinist standpoint. One of his arguments, however, calls for special criticism,— his assertion that it is self-evident that nothing that has a beginning can be without a cause is an unwarranted assumption of the very point at issue. He was attacked in an elaborate treatise by Samuel Clarke, in whose system the freedom of the will is made essential to religion and morality. During Clarke's lifetime, fearing perhaps to be branded as an enemy of religion and morality, Collins made no reply, but in 1729 he published an answer, entitled Liberty and Necessity.

Besides these works he wrote A Letter to Mr Dodwell, arguing that it is conceivable that the soul may be material, and, secondly, that if the soul be immaterial it does not follow, as Clarke had contended, that it is immortal; Vindication of the Divine Attri- butes (1710); Priestcraft in Perfection (1709), in which he asserts that the clause " the Church . . . Faith " in the twentieth of the Thirty-nine Articles was inserted by fraud.

See Kippis, Biographia Britannica; G. Lechler, Geschichte des englischen Deismus (1841); J. Hunt, Religious Thought in England, ii. (1871); Leslie Stephen, English Thought in the 18th Century, i. (1881) ; A. W. Benn, Hist, of English Rationalism in the igih Century (London, 1906), vol. i. ch. iii. ; J. M. Robertson, Short History of Freethought (London, 1906) ; and Deism.

COLLINS, JOHN CHURTON (1848- 1908), English literary critic, was born on the 26th of March 1848 at Bourton on the Water, Gloucestershire. From King Edward's school, Birming- ham, he went to Balliol College, Oxford, where he graduated in 1872, and at once devoted himself to a literary career, as jour- nalist, essayist and lecturer. His first book was a study of Sir Joshua Reynolds (1874), and later he edited various classical English writers, and published volumes on Bolingbroke and Voltaire in England (1886), a Study of English Literature (1891), a study of Dean Swift (1893), Essays and Studies (1895), Ephemera Critica (1901), Essaysin Poetry andCriticism(igo$) , and Rousseau and Voltaire (1908), his original essays beingsharply controversial in tone, but full of knowledge. In 1904 he became professor of English literature at Birmingham University. For many years he was a prominent University Extension lecturer, and a constant contributor to the principal reviews. On the 1 5th of September 1908 he was found dead in a ditch near Lowestoft, at which place he had been staying with a doctor for the benefit of his health. The circumstances necessitated the holding of an inquest, the verdict being that of " accidental death."

COLLINS, MORTIMER (1827-1876), English writer, was born at Plymouth, where his father, Francis Collins, was a solicitor, on the 29th of June 1827. He was educated at a private school, and after some years spent as mathematical master at Queen Eliza- beth's College, Guernsey, he went to London, where he devoted himself to journalism in the Conservative interest. In 1855 he published his Idyls and Rhymes; .and in 1865 appeared his first story, Who is the Heir? A second volume of lyrics, The Inn of Strange Meetings, was issued in 187 1; and in 1872 he produced his longest and best sustained poem, The British Birds, a com- munication from the Ghost of Aristophanes. He also wrote several capital novels, the best of which is perhaps Sweet Anne Page (1868). Some of his lyrics, in their light grace, their sparkling wit, their airy philosophy, are equal to anything of their kind in modern English. On his second marriage in 1868 he settled at Knowl Hill, Berkshire. Collins was an athlete, an excellent pedestrian, and an enthusiastic lover of country life; and from this time he rarely left his home for a day. Conservative in his political and literary tastes, an ardent upholder of Church and State, he was yet a hater of convention; and his many and very varied gifts endeared him to a large circle of friends. He died on the 28th of July 1876.

COLLINS, WILLIAM (1721-1759), English poet, was born on the 25th of December 1721. He divides with Gray the glory of being the greatest English lyrist of the 1 8th century. After some childish studies in Chichester, of which his father, a rich hatter, was the mayor, he was sent, in January 1733, to Winchester College, where Whitehead and Joseph Warton were his school- fellows. When he had been nine months at the school, Pope paid Winchester a visit and proposed a subject for a prize poem; it is legitimate to suppose that the lofty forehead, the brisk dark eyes and gracious oval of the childish face, as we know it in the only portrait existing of Collins, did not escape the great man's notice, then not a little occupied with the composition of the Essay on Man.

In 1734 the young poet published his first verses, in a sixpenny pamphlet on The Royal Nuptials, of which, however, no copy has come down to us; another poem, probably satiric, called The Battle of the Schoolbooks, was written about this time, and has also been lost. Fired by his poetic fellows to further feats in verse,

Collins produced, in his seventeenth year, those Persian Eclogues

which were the only writings of his that were valued by the world during his own lifetime. They were not printed for some years, and meanwhile Collins sent, in January and October 1739, some verses to the Gentleman's Magazine, which attracted the notice and admiration of Johnson, then still young and uninfluential. In March 1740 he was admitted a commoner of Queen's College, Oxford, but did not go up to Oxford until July 1 741, when he obtained a demyship at Magdalen College. At Oxford he con- tinued his affectionate intimacy with the Wartons, and gained the friendship of Gilbert White. Early in 1742 the Persian Eclogues appeared in London. They were four in number, and formed a modest pamphlet of not more than 300 lines in all. In a later edition, of 1759, the title was changed to Oriental Eclogues. Those pieces may be compared with Victor Hugo's Les Orientales, to which, of course, they are greatly inferior. Considered with regard to the time at which they were produced, they are more than meritorious, even brilliant, and one at least — the second — can be read with enjoyment at the present day. The rest, per- haps, will be found somewhat artificial and effete.

In November 1743 Collins was made bachelor of arts, and a few days after taking his degree published his second work, Verses humbly addressed to Sir Thomas Hanmer. This poem, written in heroic couplets, shows a great advance in individuality, and resembles, in its habit of personifying qualities of the mind, the riper lyrics of its author. For the rest, it is an enthusiastic review of poetry, culminating in a laudation of Shakespeare. It is supposed that he left Oxford abruptly in the summer of 1744 to attend his mother's death-bed, and did not return. He is said to have now visited an uncle in Flanders. His in- dolence, which had been no less marked at the university than his genius, combined with a fatal irresolution to make it extremely difficult to choose for him a path in life. The army and the church were successively suggested and rejected; and he finally arrived in London, bent on enjoying a small property as an in- dependent man about town. He made the acquaintance of Johnson and others, and was urged by those friends to undertake various important writings — a History of the Revival of Learning, several tragedies, and a version of Aristotle's Poetics, among others — all of which he began but lacked force of will to continue. He soon squandered his means, plunged, with most disastrous effects, into profligate excesses, and sowed the seed of his un- timely misfortune.

It was at this time, however, that he composed his matchless Odes — twelve in number — which appeared on the 12 th of December 1746, dated 1747. The original project was to have combined them with the odes of Joseph Warton, but the latter proved at that time to be the

more marketable article. Collins's little volume fell dead from the press, but it won him the admira- tion and friendship of the poet Thomson, with whom, until the death of the latter in 1748, he lived on terms of affectionate intimacy. In 1 749 Collins was raised beyond the fear of poverty by the death of his uncle, Colonel Martyn, who left him about £2000, and he left London to settle in his native city. He had hardly begun to taste the sweets of a life devoted to literature and quiet, before the weakness of his will began to develop in the direction of insanity, and he hurried abroad to attempt to dispel the gathering gloom by travel. In the interval he had published two short pieces of consummate grace and beauty — the Elegy on Thomson, in 1749, and the Dirge in Cymbeline, later in the same year. In the beginning of 1750 he composed the Ode on the Popular Superstitions of the Highlands, which was dedicated to the author of Douglas, and not printed till long after the death of Collins, and an Ode on the Music of the Grecian Theatre, which no longer exists, and in which English literature probably has sustained a severe loss. With this poem his literary career closes, although he lingered in great misery for nearly nine years. From Gilbert White, who jotted down some pages of invaluable recollections of Collins in 1781, and from other friends, we learn that his madness was occasionally violent, and that he was confined for a time in an asylum at Oxford. But for the most part he resided at Chichester, suffering from

extreme debility of body when the mind was clear, and incapable of any regular occupation. Music affected him in a singular manner, and it is recorded that he was wont to slip out into the cathedral cloisters during the services, and moan and howl in horrible accordance with the choir. In this miserable con- dition he passed out of sight of all his friends, and in 1756 it was supposed, even by Johnson, that he was dead; in point of fact, however, his sufferings did not cease until the 12th of June 1759. No journal or magazine recorded the death of the forgotten poet, though Goldsmith, only two months before, had begun the laudation which was soon to become universal.

No English poet so great as Collins has left behind him so small a bulk of writings. Not more than 1500 lines of his have been handed down to us, but among these not one is slovenly, and few are poor. His odes are the most sculpturesque and faultless in the language. They lack fire, but in charm and precision of diction, exquisite propriety of form, and lofty poetic suggestion they stand unrivalled. The ode named The Passions is the most popular; that To Evening is the classical example of perfect unrhymed verse. In this, and the Ode to Simplicity, one seems to be handling an antique vase of matchless delicacy and elegance. In his descriptions of nature it is unquestionable that he

owed something to the influence of Thomson. Distinction may be said to be the crowning grace of the style of Collins; its leading peculiarity is the incessant personification of some quality of the character. In the Ode on Popular Superstitions he produced a still nobler work; this poem, the most considerable in size which has been preserved, contains passages which are beyond question unrivalled for rich melancholy fulness in the literature between Milton and Keats.

The life of Collins was written by Dr Johnson; he found an enthusiastic editor in Dr Langhorne in 1765, and in 1858 a kindly-biographer in Mr Moy Thomas. (E. G.)

COLLINS, WILLIAM (1787-1847), English painter, son of an Irish picture dealer and man of letters, the author of a Life of George Morland, was born in London. He studied under Etty in 1807, and in 1809 exhibited his first pictures of repute — ” Boys at Breakfast,” and ” Boys with a Bird’s Nest.” In 181 5 he was made associate of the Royal Academy, and was elected R. A. in 1820. For the next sixteen years he was a constant exhibitor; his fishermen, shrimp-catchers, boats and nets, stretches of coast and sand, and, above all, his rustic children were universally popular. Then, however, he went abroad on the advice of Wilkie, and for two years (1837-1838) studied the life, manners and scenery of Italy. In 1839 he exhibited the first fruits of this journey; and in 1840, in which year he was appointed librarian to the Academy, he made his first appearance as a painter of history. In 1842 he returned to his early manner and choice of subject, and during the last years of life enjoyed greater popularity than ever. Collins was a good colourist and an excellent draughtsman. His earlier pictures are deficient in breadth and force, but his later work, though also carefully executed, is rich in effects of tone and in broadly painted masses. His biography by his son, W. Wilkie Collins, the novelist, appeared in 1848.

COLLINS, WILLIAM WILKIE (1824-1889), English novelist, elder son of William Collins, R.A., the landscape painter, was born in London on the 8th of January 1824. He was educated at a private school in Highbury, and when only a small boy of twelve was taken by his parents to Italy, where the family lived for three years. On their return to England Wilkie Collins was articled to a firm in the tea trade, but four years later he aban- doned that business for the law, and was entered at Lincoln’s Inn in 1846, being called to the bar three years later. He found little pleasure in his new career, however; though what he learned in it was exceedingly valuable to him later. On his father’s death in 1847 young Collins made his first essay in literature, publishing the Life of William Collins, in two volumes, in the

following year. In 1850 he put forth his first work of fiction, Antonina, or the Fall of Rome, which was clearly inspired by his life in Italy. Basil appeared in 1852, and Hide and Seek in 1854. About this time he made the acquaintance of Charles Dickens, and begar,

to contribute to Household Words, where After Dark (1856) and The Dead Secret (1857) ran serially. His great success was achieved in i860 with the publication of The Woman in White, which was first printed in All the I ‘ear Round. From that time he enjoyed as much popularity as any novelist of his day, No Name (1862), Armadale (1866), and The Moonstone, a capital detective story (1868), being among his most successful books. After The New Magdalen (1873) his ingenuity became gradually exhausted, and his later stories were little more than faint echoes of earlier successes. He died in Wimpole Street, London, on the 23rd of September 1889. Collins’s gift was of the melodramatic order, and while many of his stories made excellent plays, several of them were actually reconstructed from pieces designed originally for stage production. But if his colours were occasionally crude and his methods violent, he was at least a master of situation and effect. His trick of telling a story through the mouths of different characters is sometimes irritat- ingly disconnected; but it had the merit of giving an air of actual evidence and reality to the elucidation of a mystery. He possessed in the highest degree the gift of absorbing interest; the turns and complexities of his plots are surprisingly ingenious, and many of his characters are not only real, but uncommon. Count Fosco in The Woman in White is perhaps his masterpiece; the character has been imitated again and again, but no imitation has ever attained to the subtlety and humour of the original.

COLLODION (from the Gr. /coXXo, glue), a colourless, viscid fluid, made by dissolving gun-cotton and the other varieties of pyroxylin in a mixture of alcohol and ether. It was discovered in 1846 by Louis Nicolas Menard in Paris, and independently in 1848 by Dr J. Parkers Maynard in Boston. The quality of collodion differs according to the proportions of alcohol and ether and the nature of the pyroxylin it contains. Collodion in which there is a great excess of ether gives by its evaporation a very tough film; the film left by collodion containing a large quantity of alcohol is soft and easily torn; but in hot climates the presence of an excess of alcohol is an advantage, as it prevents the rapid evaporation of the ether. Under the microscope, the film produced by collodion of good quality appears translucent and

colourless. To preserve collodion it should be kept cool and out of the action of the light; iodized collodion that has been dis- coloured by the development of free iodine may be purified by the immersion in it of a strip of silver foil. For the iodizing of collodion, ammonium bromide and iodide, and the iodides of calcium and cadmium are the agents employed (see Photo- graphy). Collodion is used in surgery since, when painted on the skin, it rapidly dries and covers the skin with a thin film which contracts as it dries and therefore affords both pressure and protection. Flexible collodion, containing Canada balsam and castor oil, does not crack, but, on the other hand, does not contract. It is therefore of less value. Collodion is applied to small aseptic wounds, to small-pox pustules, and occasionally to the end of the urethra in boys in order to prevent nocturnal incontinence. Collodion and crystals of carbolic acid, taken in equal parts, are useful in relieving toothache due to the presence of a carious cavity. Vesicating or Blistering Collodion contains cantharidin as one of its constituents. The styptic colloid of Richardson is a strong solution of tannin in gun-cotton collodion. Similarly collodion may be impregnated with salicylic acid, carbolic acid, iodine and other substances. Small balloons are manufactured from collodion by coating the interior of glass globes with the liquid; the film when dry is removed from the glass by applying suction to the mouth of the vessel. M. E. Gripon found (Compt. rend., 1875) that collodion membranes, like glass, reflect light and polarize it both by refraction and reflection; they also transmit a very much larger proportion of radiant heat, for the study of which they are preferable to mica.

COLLOT D'HERBOIS, JEAN MARIE (1750-1796), French revolutionist, was a Parisian by birth and an actor by profession. After figuring for some years at the principal provincial theatres of France and Holland, he became director of the playhouse at Geneva. He had from the first a share in the revolutionary

tumult; but it was not until 1791 that he became a figure of importance. Then, however, by the publication of L' Almanack du Pere Gerard, 1 a little book setting forth, in homely style, the advantages of a constitutional monarchy, he suddenly acquired great popularity. His renown was soon increased by his active interference on behalf of the Swiss of the Chateau- Vieux Regi- ment, condemned to the galleys for mutiny at Nancy. His efforts resulted in their liberation; he went himself to Brest in search of them; and a civic feast was decreed on his behalf and theirs, which gave occasion for one of the few poems published during his life by Andre Chenier. But his opinions became more and more radical. He was a member of the Commune of Paris on the 10th of August 1792, and was elected

deputy for Paris to the Convention, where he was the first to demand the abolition of royalty (on the 21st of September 1792), and he voted the death of Louis XVI. ” sans sursis.” In the struggle between the Mountain and the Girondists he displayed great energy; and after the coup d’etat of the 31st of May 1793 he made himself conspicuous by his pitiless pursuit of the defeated party. In June he was made president of the Convention; and in September he was admitted to the Committee of Public Safety, on which he was very active. After having entrusted him with several missions, the Convention sent him, on the 30th of October 1793, to Lyons to punish the revolt of that city. There he introduced the Terror in its most terrible form.

In May 1794 an attempt was made to assassinate Collot; but it only increased his popularity, and this won him the hatred of Robespierre, against whom he took sides on the 9th Thermidor, when he presided over the Convention during a part of the session. During the Thermidorian reaction he was one of the first to be accused of complicity with the fallen leader, but was acquitted. Denounced a second time, he defended himself by pleading that he had acted for the cause of the Revolution, but was condemned with Barere and Billaud-Varenne to transporta- tion to Cayenne (March 179s), where he died early in 1796.

Collot d Herbois wrote and adapted from the English and Spanish many plays, one of which, Le Paysan magistrat, kept the stage for several years. L’ Almanack du Pere Gerard was reprinted under the title of Etrennes aux amis de la Constitution franqaise, ou entretiens du Pere GSrard avec ses concitoyens (Paris, 1792).

See F. A. Aulard, Les Orateurs de la Legislative et de la Convention (Paris, 1885-1886), t. ii. pp. 501-512. The principal documents relative to the trial of Collot d’Herbois, Barere and Billaud-Varenne are indicated in Aulard, Recueil des actes du comitS de salut public, t. i. pp. 5 and 6.

COLLUSION (from Lat. colludere, strictly, to play with), a secret agreement or compact for some improper purpose. In judicial proceedings, and particularly in matrimonial causes (see Divorce), collusion is a deceitful agreement between two or more persons, or between one of them and a third party, to bring an action against the other in order to obtain a judicial decision, or some remedy which would not have been obtained unless the parties had combined for the purpose or suppressed material facts or otherwise.

COLLYER, ROBERT (1823-), American Unitarian clergy- man, was

born in Keighley, Yorkshire, England, on the 8th of December 1823. At the age of eight he was compelled to leave school and support himself by work in a linen factory. He was naturally studious, however, and supplemented his scant schooling by night study. At fourteen he was apprenticed to a blacksmith, and for several years worked at this trade at Ilkley. In 1849 he became a local Methodist minister, and in the following year emigrated to the United States, where he obtained employ- ment as a hammer maker at Shoemakersville, Pennsylvania. Here he soon began to preach on Sundays while still employed in the factory on week-days. His earnest, rugged, simple style of oratory made him extremely popular, and at once secured for him a wide reputation. His advocacy of anti-slavery principles, then frowned upon by the Methodist authorities, aroused opposition, and eventually resulted in his trial for heresy and the revocation of his licence. He continued, however, as an 1 Michel Gerard was a popular Breton peasant deputy (see Jacobins).

independent preacher and lecturer, and in 1859, having joined the Unitarian Church, became a missionary of that church in Chicago, Illinois. In i860 he organized and became pastor of the Unity Church, the second Unitarian church in Chicago. Under his guidance the church grew to be one of the strongest of that denomination in the West, and Mr Collyer himself came to be looked upon as one of the foremost pulpit orators in the country. During the Civil War he was active in the work of the Sanitary Commission. In 1879 he left Chicago and became pastor of the church of the Messiah in New York city, and in 1903 he became pastor emeritus. He published: Nature and Life (1867); A Man in Earnest: Life of A. H. Conant (1868); The Life Thai Now is (1871); The Simple Truth (1877); Talks to Young Men: With Asides to Young Women (1888); Things New and Old (1893); Father Taylor (1906); and A History of the Town and Parish of Ilkley (with Horsefall Turner, 1886).

COLMAN, SAINT (d. 676), bishop of Lindisfarne, was prob- ably an Irish monk at Iona. Journeying southwards he became bishop of Lindisfarne in 661, and a favoured friend of Oswio, king of Northumbria. He was at the synod of Whitby in 664, when the great dispute between the Roman and the Celtic parties in the church was considered; as spokesman of the latter party he upheld the Celtic usages, but King Oswio decided against him and his cause was lost. After this event Colman and some monks went to Iona and then to

Ireland. He settled on the island of Inishbofin, where he built a monastery and where he died on the 8th of August 676.

Colman must be distinguished from St Colman of Cloyne (c. 522-600), an Irish saint, who became a Christian about 570; and also from another Irishman, St Colman Ela (553-610), a kinsman of St Columba. The word Colman is derived from the Latin columbus, a dove, and the Book of Leinster mentions 209 saints of this name.

COLMAN, GEORGE (173 2-1 794), English dramatist and essayist, usually called “the Elder,” and sometimes “George the First,” to distinguish him from his son, was born in 1732 at Florence, where his father was stationed as resident at the court of the grand duke of Tuscany. Colman’s father died within a year of his son’s birth, and the boy’s education was undertaken by William Pulteney, afterwards Lord Bath, whose wife was Mrs Colman’s sister. After attending a private school in Maryle- bone, he was sent to Westminster School, which he left in due course for Christ Church, Oxford. Here he made the acquaint- ance of Bonnell Thornton , the parodist, and together they founded The Connoisseur (1754-1756), a periodical which, although it reached its 140th number, “wanted weight,” as Johnson said. He left Oxford after taking his degree in 1755, and, having been entered at Lincoln’s Inn before his return to London, he was called to the bar in 1757. A friendship formed with David Garrick did not help his career as a barrister, but he continued to practise until the death of Lord Bath, out of respect for his wishes.

In 1 760 he produced his first play, Polly Honeycomb, which met with great success. In 1761 The Jealous Wife, a comedy partly founded on Tom Jones, made Colman famous. The death of Lord Bath in 1 764 placed him in possession of independent means. In 1765 appeared his metrical translation of the plays of Terence; and in 1766 he produced The Clandestine Marriage, jointly with Garrick, whose refusal to take the part of Lord Ogleby led to a quarrel between the two authors. In the next year he purchased a fourth share in the Covent Garden Theatre, a step which is said to have induced General Pulteney to revoke a will by which he had left Colman large estate 1 :. The general, who died in that year, did, however, leave him •< > considerable annuity. Colman was acting manager of Covent Garden for seven years, and during that period he produced several “adapted” plays of Shakespeare. In 1768 he was elected to the Literary Club, then nominally con- sisting of twelve members. In 1774 he sold his share in the great playhouse, which had involved him in much litigation with his partners, to Leake; and three years later he purchased of Samuel Foote, then broken in health and spirits, the little

theatre in the Haymarket. He was attacked with paralysis in

1785; in 1789 his brain became affected, and he died on the 14th of August 1794. Besides the works already cited, Colman was author of adaptations of Beaumont and Fletcher's Bonduca, Ben Jonson's Epicoene, Milton's Comus, and of other plays. He also produced an edition of the works of Beaumont and Fletcher (1778), a version of the Ars Poetica of Horace, an excellent translation from the Mercator of Plautus for Bonnell Thornton's edition (1769-1772), some thirty plays, many parodies and occasional pieces. An incomplete edition of his dramatic works was published in 1777 in four volumes.

His son, George Colman (1762-1836), known as "the Younger," English dramatist and miscellaneous writer, was born on the 21st of October 1762. He passed from Westminster school to Christ Church, Oxford, and King's College, Aberdeen, and was finally entered as a student of law at Lincoln's Inn, London. While in Aberdeen he published a poem satirizing Charles James Fox, called The Man of the People; and in 1782 he produced, at his father's playhouse in the Haymarket, his first play, The Female Dramatist, for which Smollett's Roderick Random supplied the materials. It was unanimously condemned, but Two to One (1784) was entirely successful. It was followed by Turk and no Turk (1785), a musical comedy; Inkle and Yarico (1787), an opera; Ways and Means (1788); The Iron Chest (1796), taken from William Godwin's Adventures of Caleb Williams; The Poor Gentleman (1802); John Bull, or an Englishman's Fireside (1803), his most successful piece; The Heir at Law (1808), which enriched the stage with one immortal character, "Dr Pangloss," and numerous other pieces, many of them adapted from the French.

The failing health of the elder Colman obliged him to relinquish the management of the Haymarket theatre in 1789, when the younger George succeeded him, at a yearly salary of £600. On the death of the father the patent was continued to the son; but difficulties arose in his way, he was involved in litigation with Thomas Harris, and was unable to pay the expenses of the performances at the Haymarket. He was forced to take sanctuary within the Rules of the King's Bench. Here he resided for many years continuing to direct the affairs of his theatre. Released at last through the kindness of George IV., who had appointed him exon of the Yeomen of the Guard, a dignity disposed of by Colman to the highest bidder, he was made examiner of plays by the duke of Montrose, then lord chamberlain. This office, to the disgust of all contemporary dramatists, to whose MSS. he was as illiberal as he was severe, he held till his death. Although his own productions were open to charges of indecency and profanity, he was

so severe a censor of others that he would not pass even such words as “heaven,” “provid- ence” or “angel.” His comedies are a curious mixture of genuine comic force and sentimentality. A collection of them was published (1827) in Paris, with a life of the author, by J. W. Lake.

Colman, whose witty conversation made him a favourite, was also the author of a great deal of so-called humorous poetry (mostly coarse, though much of it was popular) — My Night Gown and Slippers (1797), reprinted under the name of Broad Grins, in 1802; and Poetical Vagaries (1812). Some of his writings were published under the assumed name of Arthur Griffinhood of Turnham Green. He died in Broropton, London, on the 1 7th of October 1836. He had, as early as 1 784, contracted a runaway marriage with an actress, Clara Morris, to whose brother David Morris, he eventually disposed of his share in the Haymarket theatre. Many of the leading parts in his plays were written especially for Mrs Gibbs {nee Logan), whom he was said to have secretly married after the death of his first wife.

See the second George Colman’s memoirs of his early life, entitled Random Records (1830), and R. B. Peake, Memoirs of the Colman Family (1842).

COLMAN, SAMUEL (1832-), American landscape painter, was born at Portland, Maine, on the 4th of March 1832. He was a pupil of Ashur B. Durand in New York, and in 1860-1862 studied in Spain, Italy, France and England. In 1871-1876 he was again in Europe. In i860, with James D. Smilie, he founded

the American Water Color Society, and became its first president (1866-1867), his own water-colour paintings being particularly- fine. He was elected a member of the National Academy of Design in 1862. Among his works are ” The Ships of the Western Plains,” in the Union League Club, New York; and “The Spanish Peaks, Colorado,” in the Metropolitan Museum, New York.

COLMAR, or Kolmar, a town of Germany, in the imperial province of Alsace-Lorraine, formerly the capital of the depart- ment of Haut-Rhin in France, on the Logelbach and Lauch, tributaries of the 111, 40 m. S.S.W. from Strassburg on the main line of railway to Basel. Pop. (1905) 41,582. It is the seat of the government for Upper Alsace, and

of the supreme court of appeal for Alsace-Lorraine. The town is surrounded by pleasant promenades, on the site of the old fortifications, and has numerous narrow and picturesque streets. Of its edifices the most re- markable are the Roman Catholic parish church of St Martin, known also as the Munster, dating from the 13th and 14th centuries, the Lutheran parish church (15th century), the former Dominican monastery (1232-1289), known as “Unterlinden” and now used as a museum, the Kaufhaus (trade-hall) of the 15 th century, and the handsome government offices (formerly the Prefecture). Colmar is the centre of considerable textile industries, comprising wool, cotton and silk-weaving, and has important manufactures of sewing thread, starch, sugar and machinery. Bleaching and brewing are also carried on, and the neighbourhood is rich in vineyards and fruit-gardens. The considerable trade of the place is assisted by a chamber of commerce and a branch of the Imperial Bank (Reichsbank).

Colmar (probably the columbarium of the Romans) is first mentioned, as a royal villa, in a charter of Louis the Pious in 823, and it was here that Charles the Fat held a diet in 884. It was raised to the status of a town and surrounded with walls by Wolfelin, advocate (Landvogt) of the emperor Frederick II. in Alsace, a masterful and ambitious man, whose accumulated wealth was confiscated by the emperor in 1235, and who is said to have been murdered by his wife lest her portion should also be seized. In 1226 Colmar became an imperial city, and the civic rights (Stadtrecht) conferred on it in 1274 by Rudolph of Habsburg became the model for those of many other cities. Its civic history is much the same as that of other medieval towns: a struggle between the democratic gilds and the aristocratic “families,” which ended in 1347 in the inclusion of the former in the governing body, and in the 17th century in the complete exclusion of the latter. In 1255 Colmar joined the league of Rhenish cities, and in 1476 and 1477 took a vigorous share in the struggle against Charles the Bold. In 1632, during the Thirty Years’ War, it was taken by the Swedes, and in 1635 by the French, who held it till after the Peace of Westphalia (1649). In 1673 the French again occupied it and dismantled the fortifica- tions. In 1 68 1 it was formally annexed to France by a decree of Louis XIV. ‘s Chambre de Reunion, and remained French till 1 87 1, when it passed with Alsace-Lorraine to the new German empire.

See ” Annalen und Chronik von Kolmar,” German translation, G. H. Pabst, in Geschichtsschreiber der deutschen Vorzeit (2nd ed., G. Wattenbach, Leipzig, 1897); Sigmund Billing, Kleine Chronik der Stadt Kolmar (Colmar, 1891); Hund, Kolmar vor und wdhrend seiner Entwickelung zur Reichsstadt (Strassburg, 1899); J. Liblin, Chronique

de Colmar, 58-1400 (Mulhausen, 1867-1868); T. F. X. Hunkler, Gesch. der Stadt Kolmar (Colmar, 1838). For further references see Ulysse Chevalier, Repertoire des sources. Topo- bibliographie (Montbeliard, 1894-1899); and Waltz, Bibliographie de la ville de Colmar (Mulhausen, 1902).

COLNE, a market town and municipal borough in the Clitheroe parliamentary division of Lancashire, England, 345 m. N. by E. from Manchester by the Lancashire & Yorkshire railway; it is served also by a branch of the Midland railway from Skipton. Pop. (1901) 23,000. It stands on a hilly site above a small affluent of the river Calder. The church of St Bartholomew retains some Norman work, but is chiefly of various later periods. There is a cloth hall or piece hall, originally used as an exchange when woollens were the staple of the town. The grammar school is

of interest as the place where John Tillotson (1630-1694), archbishop of Canterbury, received early education. Colne is a place of great antiquity, and many Roman coins have been found on the site. As early as the 14th century it was the seat of a woollen manufacture; but its principal manufactures now are cottons, printed calicoes and muslin. In the neighbour- hood are several limestone and slate quarries. The town was incorporated in 1895, and the corporation consists of a mayor, 6 aldermen and 18 councillors. Area, 5063 acres.

COLOCYNTH, Coloqtjintida or Bitter Apple, Citrullus Colocynthis, a plant of the natural order Cucurbitaceae. The flowers are unisexual; the male blossoms have five stamens with sinuous anthers, the female have reniform stigmas, and an ovary with three large fleshy placentas. The fruit is round, and about the size of an orange; it has a thick yellowish rind, and a light, spongy and very bitter pulp, which yields the colocynth of druggists. The seeds, which number from 260 to 300, and are disposed in vertical rows on the three parietal placentas of the fruit, are flat and ovoid and dark-brown; they are used as food by some of the tribes of the Sahara, and a coarse oil is expressed from them. The pulp contains only about 3-5 % of fixed oil, whilst the seeds contains about 15%. The foliage resembles that of the cucumber, and the root is perennial. The plant has a wide range, being found in Ceylon, India, Persia, Arabia, Syria, North Africa, the Grecian Archipelago, the Cape Verd Islands, and the south-east of Spain. The term pakkuoth, translated “wild gourds” in 2 Kings iv. 39, is thought to refer to the fruit of the colocynth; but, according to Dr Olaf Celsius (1670-1756), a Swedish theologian and naturalist, it signifies a plant known as the squirting cucumber, Ecbalium Elaterhm.

The commercial colocynth consists of the peeled and dried fruits. In the preparation of the drug, the seeds are always removed from the pulp. Its active principle is an intensely bitter amorphous or crystalline glucoside, colocynthin, C56H 84 023, soluble in water, ether and alcohol, and decomposable by acids into glucose and a resin, colocynthein, C40H54O13. Colocynthein also occurs as such in the drug, together with at least two other resins, citrullin and colocynthiden. Colocynthin has been used as a hypodermic purgative — a class of drugs practically non- existent, and highly to be desired in numberless cases of apoplexy. The dose recommended for hypodermic injection is fifteen minims of a 1% solution in glycerin.

The British Pharmacopeia contains a compound extract of colocynth, which no one ever uses; a compound pill — dose 4 to 8 grains — in which oil of cloves is included in order to relieve the griping caused by the drug; and the Pilula Colocynthidis et Hyoscyami, which contains 2 parts of the compound pill to 1 of extract of hyoscyamus. This is by far the best preparation, the hyoscyamus being added to prevent the pain and griping which is attendant on the use of colocynth alone. The official dose of this pill is 4 to 8 grains, but the most effective and least dis- agreeable manner in which to obtain its action is to give four two-grain pills at intervals of an hour or so.

In minute doses colocynth acts simply as a bitter, but is never given for this purpose. In ordinary doses it greatly increases the secretion of the small intestine and stimulates its muscular coat. The gall-bladder is also stimulated, and the biliary function of the liver, so that colocynth is both an excretory and a secretory cholagogue. The action which follows hypodermic injection is due to the excretion of the drug from the blood into the alimentary canal. Though colocynth is a drastic hydragogue cathartic, it is desirable, as a rule:, to supplement its action by some drug, such as aloes, which acts on the large intestine, and a sedative must always be added. Owing to its irritant properties, the drug must not be used habitually, but it is very valuable in initiating the treatment of simple chronic constipa- tion, and its pharmacological properties obviously render it especially useful in cases of hepatitis and congestion of the liver.

Colocynth was known to the ancient Greek, Roman and Arabic physicians; and in an Anglo-Saxon herbal of the nth century (Cockayne, Leechdoms, &c, vol. i. p. 325, London, 1864), the following directions are given as to its use: — ” For stirring of the

inwards, take the inward neshness of the fruit, without the kernels, by weight of two pennies; give it, pounded in lithe beer to be drunk, it stirreth the inwards.”

COLOGNE (Ger. Koln, or officially, since 1900, Coin), a city and archiepiscopal see of Germany, in the Prussian Rhine province, a fortress of the first rank, and one of the most im- portant commercial towns of the empire. Pop. (1885) 239,437; (1900) 370,685; (1905) 428,503, of which about 80% are Roman Catholics. It lies in the form of a vast semicircle on the left bank of the Rhine, 44 m. by rail north-east from Aix-la-Chapelle, 24 south-east from Dusseldorf and 57 north-north-west from Coblenz. Its situation on the broad and navigable Rhine, and at the centre of an extensive network of railways, giving it direct communication with all the important cities of Europe, has greatly fostered its trade, while its close proximity to the beautiful scenery of the Rhine, has rendered it a favourite tourist resort. When viewed from a distance, especially from the river, the city, with its medieval towers and buildings, the whole sur- mounted by the majestic cathedral, is picturesque and imposing. The ancient walls and ditches, which formerly environed the city, were dismantled between 1881 and 1885, and the site of the old fortifications, bought from the government by the munici- pality, were converted into a fine boulevard, the Ring, nearly 4 m. long. Beyond the Ring, about f m. farther out, a new continuous line of wall fortifications, with outlying clusters of earthworks and forts, has since been erected; 1000 acres, now occupied by handsome streets, squares and two public parks, were thus added to the inner town, almost doubling its area.

Cologne is connected by bridges with the suburb of Deutz. Within the outer municipal boundary are included (besides Deutz) the suburbs of Bayenthal, Lindenthal, Ehrenfeld, Nippes, Siilz, Bickendorf, Niehl and Poll, protected by another widely extended circle of detached forts on both banks of the Rhine. Of the former city gates four have been retained, restored and converted into museums: the Severin gate, on the south, contains the geological section of the natural history museum; the Hahnen gate, on the west, is fitted as the historical and antiquarian museum of the city; and the Eigelstein gate, on the north, accommodates the zoological section of the natural history museum.

Cologne, with the tortuous, narrow and dark streets and lanes of the old inner town, is still regarded as one of the least attractive capital cities of Germany; but in modern times it has been greatly improved, and the evil smells which formerly character- ized it have yielded to

proper sanitary arrangements. The most important squares are the Domhof, the Heumarkt, Neumarkt, Alte Markt and Waidmarkt in the old inner, and the Hansa-platz in the new inner town. The long Hohe-strasse of the old town is the chief business street.

The cathedral or Dom, the principal edifice and chief object of interest in Cologne, is one of the finest and purest monuments of Gothic architecture in Europe (for plan, &c. see Architec- ture: Romanesque and- Gothic in Germany). It stands on the site of a cathedral begun about the beginning of the 9th century by Hildebold, metropolitan of Cologne, and finished under Willibert in 873. This structure was ruined by the Normans, was rebuilt, but in 1248 was almost wholly destroyed by fire. The foundation of the present cathedral was then laid by Conrad of Hochstaden (archbishop from 1288 to 1261). The original plan of the building has been attributed to Gerhard von Rile (d. c. 1295). In 1322 the new choir was consecrated, and the bones of the Three Kings were removed to it from the place they had occupied in the former cathedral. After Conrad's death the work of building advanced but slowly, and at the time of the Reformation it ceased entirely. In the early part of the 19th century the repairing of the cathedral was taken in hand, in 1842 the building of fresh portions necessary for the com- pletion of the whole structure was begun, and on the 15th of October 1880 the edifice, finally finished, was opened in the presence of the emperor William I. and all the reigning German princes. The cathedral, which is in the form of a cross, has a length of 480, and a breadth of 282 ft.; the height of the central

aisle is 154 ft.; that of each of the towers 5T1 ft. The heaviest of the seven bells (Kaiserglocke), cast in 1874 from the metal of French guns, weighs 543 cwt., and is the largest and heaviest bell that is rung. In the choir the heart of Marie de' Medici is buried; and in the adjoining side-chapels are monuments of the founder and other archbishops of Cologne, and the shrine of the Three Kings, which is adorned with gold and precious stones. The three kings of Cologne (Kaspar, Melchior and Balthazar) were supposed to be the three wise men who came from the East to pay adoration to the infant Christ; according to the legend, the emperor Frederick I. Barbarossa brought their bones from Milan in 1162, and had them buried in Cologne cathedral, and miraculous powers of healing were attributed to these relics. The very numerous and richly-coloured windows, presented at various times to the cathedral, add greatly to the imposing effect of the interior. The view of the cathedral has been much improved by a clearance of the old houses on the Domhof, including the archiepiscopal palace, but the new Hof, though flanked by many fine buildings, is displeasing owing to the intrusion of numerous modern palatial hotels and shops.

Among the other churches of Cologne, which was fondly styled in the middle ages the ” L holy city ” (heilige Stadt) and ” German Rome,” and, according to legend, possessed as many sacred fanes as there are days in the year, are several of interest both for their age and for the monuments and works of art they contain. In St Peter’s are the famous altar-piece by Rubens, representing the Crucifixion of St Peter, several works by Lucas van Leyden, and some old German glass-paintings. St Martin’s, built between the 10th and 12th centuries, has a fine baptistery; St Gereon’s, built in the nth century on the site of a Roman rotunda, is noted for its mosaics, and glass and oil-paintings; the Minorite church, begun in the same year as the cathedral, contains the tomb of Duns Scotus. Besides these may be mentioned the church of St Pantaleon, a 13th-century structure, with a monument to Theophano, wife of the emperor Otto II.; St Cunibert, in the Byzantine-Moorish style, completed in 1248; St Maria im Capitol, the oldest church in Cologne, dedicated in 1049 by Pope Leo IX., noted for its crypt, organ and paintings; St Cecilia, Si Ursula, containing the bones of that saint and, according to legend, of the 11,000 English virgins massacred near Cologne while on a pilgrimage to Rome; St Severin, the church of the Apostles, and that of St Andrew (1220 and 1414), which contains the remains of Albertus Magnus in a gilded shrine. Most of these, and also many other old churches, have been completely restored. Among newer ecclesiastical buildings must be mentioned the handsome Roman Catholic church in Deutz, completed in 1896, and a large synagogue, in the new town west of the Ring, finished in 1899.

Among the more prominent secular buildings are the Gur- zenich, a former meeting-place of the diets of the Holy Roman Empire, built between 1441 and 1447, of which the ground floor was in 1875 converted into a stock exchange, and the upper hall, capable of accommodating 3000 persons, is largely utilized for public festivities, particularly during the time of the Carnival: the Rathaus, dating from the 13th century, with beautiful Gobelin tapestries; the Tempelhaus, the ancestral seat of the patrician family of the Overstolzens, a beautiful building dating from the 13th century, and now the chamber of commerce; the Wallraf-Richartz Museum, in which is a collection of paintings by old Italian and Dutch masters, together with some works by modern artists; the Zeughaus, or arsenal, built on Roman foundations; the Supreme Court for the Rhine provinces; the post-office (1893); the Imperial Bank (Reichsbank) ; and the municipal library and archives. The Wolkenburg, a fine Gothic house of the 15th century, originally a patrician residence, was restored in 1874, and is now the headquarters of the famous men’s choral society of Cologne (Kolner Mannergesangverein).

A handsome central railway station (high level), on the site of the old station, and close to the cathedral, was built in 1889- 1894. The railway to Bonn and the Upper Rhine now follows the line of the ceinture of the new inner fortifications, and on this section there are thr«# city stations in addition to the central.

Like all important German towns, Cologne contains many fine monuments. The most conspicuous is the colossal equestrian statue (225 ft. high) of Frederick William III. of Prussia in the Heumarkt. There are also monuments to Moltke (1881), to Count Johann von Werth (1885), the cavalry leader of the Thirty Years' War, and to Bismarck (1879). Near the cathedral is an archiepiscopal museum of church antiquities. Cologne is richly endowed with literary and scientific institutions. It has an academy of practical medicine, a commercial high school, a theological seminary, four Gymnasia (classical schools), numer- ous lower-grade schools, a conservatory of music and several high-grade ladies' colleges. Of its three theatres, the municipal theatre (Stadttheater) is famed for its operatic productions.

Commercially, Cologne is one of the chief centres on the Rhine, and has a very important trade in corn, wine, mineral ores, coals, drugs, dyes, manufactured wares, groceries, leather and hides, timber, porcelain and many other commodities. A large new harbour, with spacious quays, has been constructed towards the south of the city. In 1903, the traffic of the port amounted to over one million tons. Industrially, also, Cologne is a place of high importance. Of the numerous manufactures, among which may be especially mentioned sugar, chocolate, tobacco and cigars, the most famous is the perfume known as eau de Cologne (q.v.) (Kblnisches Wasser, i.e. Cologne-water).

Of the newspapers published at Cologne the most important is the Kblnische Zeitung (often referred to as the " Cologne Gazette"), which has the largest circulation of any paper in Germany, and great weight and influence. It must be distin- guished from the Kolnische Volkszeitung, which is the organ of the Clerical party in the Prussian Rhine provinces.

History. — Cologne occupies the site of Oppidum Ubiorum, the chief town of the Ubii, and here in a.d. 50 a Roman colony, Colonia, was planted by the emperor Claudius, at the request of his wife Agrippina,

who was born in the place. After her it was named Colonia Agrippina or Agrippinensis. Cologne rose to be the chief town of Germania Secunda, and had the privilege of the Jus Italicum. Both Vitellius and Trajan were at Cologne when they became emperors. About 330 the city was taken by the Franks but was not permanently occupied by.them till the 5th century, becoming in 475 the residence of the Frankish king Childeric. It was the seat of a pagus or gau, and counts of Cologne are mentioned in the 9th century.

The succession of bishops in Cologne is traceable, except for a gap covering the troubled 5th century, from a.d. 313, when the see was founded. It was made the metropolitan see for the bishoprics of the Lower Rhine and part of Westphalia by Charle- magne, the first archbishop being Hildebold, who occupied the see from 785 to his death in 819. Of his successors Cne of the most illustrious was Bruno (q.v.), brother of the emperor Otto I., archbishop from 953 to 965, who was the first of the archbishops to exercise temporal jurisdiction, and was also ” archduke ” of Lorraine. The territorial power of the archbishops was already great when, in 1180, on the partition of the Saxon duchy, the duchy of Westphalia was assigned to them. In the nth century they became ex-officio arch-chancellors of Italy (see Arch-chancellor), and by the Golden Bull of 1356 they were finally placed among the electors (Kurfiirslen) of the Empire. With Cologne itself, a free imperial city, the archbishop-electors were at perpetual feud; in 1262 the archiepiscopal see was transferred to Briihl, and in 1273 to Bonn; it was not till 1671 that the quarrel was finally adjusted. The archbishopric was secularized in 1 801, all its territories on the left bank of the Rhine being annexed to France; in 1803 those on the right bank were divided up among various German states; and in 181 5 by the congress of Vienna, the whole was assigned to Prussia. The last’ archbishop-elector, Maximilian of Austria, died in 1801.

In Archbishop Hildebold’s day Cologne was still contained by the square of its Roman walls, within which stood the cathedral and the newly-founded church of St Maria (known later as ” im Capitol “); the city was, however, surrounded by a ring of churches, among which those of St Gereon, St Ursula, St Severin and St Cunibert were conspicuous. In 881 Norman

pirates, sailing up the Rhine, took and sacked the city; but it rapidly recovered, and in the nth century had become the chief trading centre of Germany. Early in the 1 2th century the city was enlarged by the inclusion of suburbs of Oversburg; Niederich and St Aposteln; in 1180 these were enclosed in a permanent rampart which, in the 13th century, was strengthened with the walls and gates that survived till

the 19th century.

The municipal history of Cologne is of considerable interest. In general it follows the same lines as that of other cities of Lower Germany and the Netherlands. At first the bishop ruled through his burgrave, advocate, and nominated jurats (scabini, Schofen). Then, as the trading classes grew in wealth, his jurisdiction began to be disputed; the conjuratio pro libertate of n 12 seems to have been an attempt to establish a commune (see Commune, Medieval). Peculiar to Cologne, however, was the Richerzeche (rigirzegheide) , a corporation of all the wealthy patricians, which gradually absorbed in its hands the direction of the city's government (the first record of its active interference is in 1225). In the 13th century the archbishops made repeated efforts to reassert their authority, and in 1259 Archbishop Conrad of Hochstaden, by appealing to the democratic element of the population, the " brotherhoods " (fraternitates) of the craftsmen, succeeded in overthrowing the Richerzeche and driving its members into exile. His successor, Engelbert II., however, attempted to overthrow the democratic constitution set up by him, with the result that in 1262 the brotherhoods combined with the patricians against the archbishop, and the Richerzeche returned to share its authority with the elected " great council " (Weiter Rat). As yet, however, none of the trade or craft gilds, as such, had a share in the government, which continued in the hands of the patrician families, membership of which was necessary even for election to the council and to the parochial offices. This continued long after the battle of Worringen (1 288) had finally secured for the city full self-government, and the archbishops had ceased to reside within its walls. In the 14th century a narrow patrician council selected from the Richerzeche, with two burgomasters, was supreme. In 1370 an insurrection of the weavers was suppressed; but in 1396, the rule of the patricians, having been weakened by internal dissensions, a bloodless revolution led to the establishment of a comparatively democratic constitution, based on the organization of the trade and craft gilds, which lasted with but slight modification till the French Revolution.

The greatness of Cologne, in the middle ages as now, was due to her trade. Wine and herrings were the chief articles of her commerce; but her weavers had been in repute from time immemorial, and exports of cloth were large, while her gold- smiths and armourers were famous. So early as the nth century her merchants were settled in London, their colony forming the nucleus of the Steelyard. When, in 1201, the city joined the Hanseatic League (q.v.) its power and repute were so great that it was made the chief place of a third of the confederation.

In spite of their feuds with the archbishops, the burghers of Cologne were stanch Catholics, and the number of the magni- ficent medieval churches left is evidence at once of their piety and their wealth. The university, founded in 1389 by the sole efforts of the citizens, soon gained a great reputation; in the 15th century its students numbered much more than a thousand, and its influence extended to Scotland and the Scandinavian kingdoms. Its decline began, however, from the moment when the Catholic sentiment of the city closed it to the influence of the Reformers; the number of its students sank to vanishing point, and though, under the influence of the Jesuits, it sub- sequently revived, it never recovered its old importance. A final blow was dealt it when, in 1777, the enlightened archbishop Maximilian Frederick (d. 1784) founded the university of Bonn, and in 1798, amid the confusion of the revolutionary epoch, it ceased to exist.

The same intolerance that ruined the university all but ruined the city too. It is difficult, indeed, to blame the burghers for resisting the dubious reforming efforts of Hermann of Wied, archbishop from 1515 to 1546, inspired mainly by secular

ambitions; but the expulsion of the Jews in 1414, and still more the exclusion, under Jesuit influence, of Protestants from the right to acquire citizenship, and from the magistracy, dealt severe blows at the prosperity of the place. A variety of other causes contributed to its decay: the opening up of new trade routes, the gradual ossification of the gilds into close and corrupt corporations, above all the wars in the Netherlands, the Thirty Years' War, and the Wars of the Spanish and Austrian Succes- sion. When in 1794 Cologne was occupied by the French, it was a poor and decayed city of some 40,000 inhabitants, of whom only 6000 possessed civic rights. When, in 1801, by the treaty of Luneville, it was incorporated in France, it was not important enough to be more than the chief town of an arrondissement. On the death of the last elector in 1801 the archiepiscopal see was left vacant. With the assignment of the city to Prussia by the congress of Vienna in 1813 a new era of prosperity began. The university, indeed, was definitively established at Bonn, but the archbishopric was restored (182 1) as part of the new ecclesiastical organization of Prussia, and the city became the seat of the president of a governmental district. Its prosperity now rapidly increased; when railways were introduced it became the meeting-place of several lines, and in 1881 its growth neces- sitated the pushing outward of the circle of fortifications.

See L. Ennen, Gesch. der Stadt Koln (5 vols., Cologne, 1863-1880) to 1648, and Frankreich und der Niederrhein (2 vols., ib., 1855, 1856), a history of the city and electorate of Cologne since the Thirty Years' War; R. Schultze and C. Steuernagel, Colonia Agrippinensis (Bonn, 1895); K. Heldmann, Der Kolngau und die Civitas Koln (Halle, 1900); L. Korth, Koln im Mittelalter (Cologne, 1890); F. Lau, Enlwickelung der kommunalen Verfassung der Stadt Koln bis zum Jahre 1306 (Bonn, 1898); K. Hegel, Stddte und Gilden der germanischen V biker im Mittelalter (2 vols., Leipzig, 1891), ii. p. 323; H. Keussen, Historische Topographie der Stadt Koln im Mittelalter (Bonn, 1906) ; W. Behnke, Aus Kolns Franzosenzeit (Cologne, 1901) ; Helmken, Koln und seine Sehenswilrdigkeiten (20th ed., Cologne, 1903). For sources see L. Ennen and G. Eckertz, Quellen zur Geschichte der Stadt Koln (6 vols., Cologne, 1860-1879); later sources will be found in U. Chevalier, Repertoire des sources hist. Topo-bibliographie (Montbeliard, 1 894-1 899), s.v. Cologne, which gives also a full list of works on everything connected with the city ; also in Dahlmann-Waitz, Quellenkunde (ed. Leipzig, 1906), p. 17, Nos. 252, 253. For the archdiocese and electorate of Cologne see Binterim and Mooren, Die Erzdiozese Koln bis zur franzosischen Staatsumwalzung, new ed. by A. Mooren in 2 vols. (Diisseldorf, 1892, i«93)-

COLOMAN (1070-1116), king of Hungary, was the son of King Geza of Hungary by a Greek concubine. King Ladislaus would have made the book-loving youth a monk, and even designated him for the see of Eger; but Coloman had no inclina- tion for an ecclesiastical career, and, with the assistance of his friends, succeeded in escaping to Poland. On the death of Ladislaus (1095), he returned to Hungary and seized the crown, passing over his legitimately born younger brother Almos, the son of the Greek princess Sinadene. Almos did not submit to this usurpation, and was more or less of an active rebel till 1 108, when the emperor Henry V. espoused his cause and invaded Hungary. The Germans were unsuccessful; but Coloman thought fit to be reconciled with his kinsman and restored to him his estates. Five years later, however, fearing lest his brother might stand in the way of his heir, the infant prince Stephen, Coloman imprisoned Almos and his son Bela in a monastery and had them blinded. Despite his adoption of these barbarous Byzantine methods, Coloman was a good king and a wise ruler. In foreign affairs he preserved the policy of St Ladislaus by endeavouring to provide Hungary with her greatest need, a suitable seaboard. In 1097 he overthrew Peter, king of Croatia, and acquired the greater part of Dalmatia, though here he encountered formidable rivals in the Greek and German emperors, Venice, the pope and the Norman-Italian dukes, all equally interested in the fate of that

province, so that Coloman had to proceed cautiously in his expansive policy. By 1102, however, Zara, Trau, Spalato and all the islands as far as the Cetina were in his hands. But it was as a legislator and administrator that Coloman was greatest (see Hungary: History). He was not only one of the most learned, but also one of the most states-manlike sovereigns of the earlier middle ages. Coloman was

twice married, (1) in 1097 to Buzella, daughter of Roger, duke of Calabria, the chief supporter of the pope, and (2) in n 12 to the Russian princess, Euphemia, who played him false and was sent back in disgrace to her kinsfolk the following year. Coloman died on the 3rd of February n 16.

COLOMB, PHILIP HOWARD (1831-1899), British vice- admiral, historian, critic and inventor, the son of General G. T. Colomb, was born in Scotland, on the 29th of May 1831. He entered the navy in 1846, and served first at sea off Portugal in 1847; afterwards, in 1848, in the Mediterranean, and from 1848 to 1851 as midshipman of the ” Reynard ” in operations against piracy in Chinese waters; as midshipman and mate of the ” Serpent ” during the Burmese War of 1852-53; as mate of the ” Phoenix ” in the Arctic Expedition of 1854; as lieu- tenant of the ” Hastings ” in the Baltic during the Russian War, taking part in the attack on Sveaborg. He became what was known at that time as a ” gunner’s lieutenant ” in 1857, and from 1859 to 1863 he served as flag-lieutenant to rear-admiral Sir Thomas Pasley at Devonport. Between 1858 and 1868 he was employed in home waters on a variety of special services, chiefly connected with gunnery, signalling and the tactical characteristics and capacities of steam warships. From 1868 to 1870 he commanded the ” Dryad,” and was engaged in the suppression of the slave trade. In 1874, while captain of the ” Audacious,” he served for three years as flag-captain to vice-admiral Ryder in China; and finally he was appointed, in 1880, to command the ” Thunderer ” in the Mediterranean. Next year he was appointed captain of the steam reserve at Ports- mouth; and ‘after serving three years in that capacity, he re- mained at Portsmouth as flag-captain to the commander-in-chief until 1886, when he was retired by superannuation before he had attained flag rank. Subsequently he became rear-admiral, and finally vice-admiral on the retired list.

Few men of his day had seen more active and more varied service than Colomb. But the real work on which his title to remembrance rests is the influence he exercised on the thought and practice of the navy. He was one of the first to perceive the vast changes which must ensue from the introduction of steam into the navy, which would

necessitate a new system of signals and a new method of tactics. He set himself to devise the former as far back as 1858, but his system of signals was not adopted by the navy until 1867.

What he had done for signals Colomb next did for tactics. Having first determined by experiment — for which he was given special facilities by the admiralty— what are the manoeuvring powers of ships propelled by steam under varying conditions of speed and helm, he proceeded to devise a system of tactics based on these data. In the sequel he prepared a new evolu- tionary signal-book, which was adopted by the royal navy, and still remains in substance the foundation of the existing system of tactical evolutions at sea. The same series of experimental studies led him to conclusions concerning the chief causes of collisions at sea; and these conclusions, though stoutly com- bated in many quarters at the outset, have since been generally accepted, and were ultimately embodied in the international code of regulations adopted by the leading maritime nations on the recommendation of a conference at Washington in 1889.

After his retirement Colomb devoted himself rather to the history of naval warfare, and to the large principles disclosed by its intelligent study, than to experimental inquiries having an immediate practical aim. As in his active career he had wrought organic changes in the ordering, direction and control of fleets, so by his historic studies, pursued after his retirement, he helped greatly to effect, if he did not exclusively initiate, an equally momentous change in the popular, and even the professional, way of regarding sea-power and its conditions. He did not invent the term ” sea-power, ” — it is, as is shown elsewhere (see Sea- Power), of very ancient origin, — nor did he employ it until Captain Mahan had made it a household word with all. But he thoroughly grasped its conditions, and in his great work on naval warfare (first published in 1891) he enunciated its principles with great cogency and with keen historic insight. The central

idea of his teaching was that naval supremacy is the condition precedent of all vigorous military offensive across the seas, and, conversely, that no vigorous military offensive can be under- taken across the seas until the naval force of the enemy has been accounted for — either destroyed or defeated and compelled to withdraw to the shelter of its own ports, or at least driven from the seas by the menace of a force it dare not encounter in the open. This broad and

indefeasible principle he enunciated and defended in essay after essay, in lecture after lecture, until what at first was rejected as a paradox came in the end to be accepted as a commonplace. He worked quite independently of Captain Mahan, and his chief conclusions were published before Captain Mahan's works appeared.

He died quite suddenly and in the full swing of his literary activity on the 13th of October 1800, at Steeple Court, Botley, Hants. His latest published work was a biography of his friend Sir Astley Cooper Key, and his last article was a critical examination of the tactics adopted at Trafalgar, which showed his acumen and insight at their best.

His younger brother, Sir John Colomb (1838-1909), was closely associated in the pioneer work done for British naval strategy and Imperial defence, and his name stands no less high among those who during this period promoted accurate thinking on the subject of sea-power. Entering the Royal Marines in 1854, he rose to be captain in 1867, retiring in 1869; and thence- forth he devoted himself to the study of naval and military problems, on which he had already published some excellent essays. His books on Colonial Defence and Colonial Opinions (1873), The Defence of Great and Greater Britain (1879), Naval Intelligence and the Protection of Commerce (1881), The Use and the Application of Marine Forces (1883), Imperial Federation: Naval and Military (1887), followed later by other similar works, made him well known among the rising school of Imperialists, and he was returned to parliament (1886-1892) as Conservative member for Bow, andafterwards (1895-1906) for Great Yarmouth. In 1887 he was created C.M.G., and in 1888 K.C.M.G. He died in London on the 27th of May 1909. In Kerry, Ireland, he was a large landowner, and became a member of the Irish privy council (1903), and in 1906 he sat on the Royal Commission dealing with congested districts.

COLOMBES, a town of France in the department of Seine, arrondissement of St Denis, 7 m. N.N.W. of Paris. Pop. (1906) 28,920. It has a 16th-century church with 12th-century tower, a race-course, and numerous villa residences and boarding-schools. Manufactures include oil, vinegar and measuring-instruments. A castle formerly stood Kfcre, in which died Henrietta Maria, queen of Charles I. of England.

COLOMBEY, a village of Lorraine, 4 m. E. of Metz, famous as the scene of a battle between the Germans and the French fought on the 14th of August 1870. It is often called the battle of Borny, from another village 2\ m. E. of Metz. (See Metz and Franco-German War.)

COLOMBIA, a republic of South America occupying the N.W. angle of that continent and bounded N. by the Caribbean Sea and Venezuela, E. by Venezuela and Brazil, S. by Brazil, Peru and Ecuador, and W. by Ecuador, the Pacific Ocean, Panama and the Caribbean Sea. The republic is very irregular in outline and has an extreme length from north to south of 1050 m., exclusive of territory occupied by Peru on the north bank of the upper Amazon, and an extreme width of 860 m. The approximate area of this territory, according to official calculations, is 481,979 sq. m., which is reduced to 465,733 sq. m. by Gotha planimetrical measurements. This makes Colombia fourth in area among the South American states.

The loss of the department of Panama left the republic with unsettled frontiers on every side, and some of the boundary disputes still unsolved in 1909 concern immense areas of territory. The boundary with Costa Rica was settled in 1900 by an award of the President of France, but the secession of Panama in 1903 gave Colombia another unsettled line on the north-west. If the line which formerly separated the Colombian departments of Cauca and Panama is taken as forming the international

boundary, this line follows the water-parting between the streams which flow eastward to the Atrato, and those which flow westward to the Gulf of San Miguel, the terminal points being near Cape Tiburon on the Caribbean coast, and at about 7° 10′ N. lat. on the Pacific coast. The boundary dispute with Venezuela was referred in 1883 to the king of Spain, and the award was made in 1891. Venezuela, however, refused to accept the decision. The line decided upon, and accepted by Colombia, starts from the north shore of Calabozo Bay on the west side of the Gulf of Maracaibo, and runs west and south-west to and along the water-parting (Sierra de Perija) between the drainage basins of the Magdalena and Lake Maracaibo as far as the source in lat. 8° 50′ N. of a small branch of the Catatumbo river, thence in a south-easterly direction across the Catatumbo and Zulia rivers to a point in 72 30′ W. long., 8° 12′ N. lat., thence in an irregular southerly direction across the Cordillera de Merida to the source of the Sarare, whence it runs eastward along that river, the Arauca, and the Meta to the Orinoco. Thence the line runs south and south-east along the Orinoco, Atabapo and Guainia to the Pedra de Cucuhy, which serves as a boundary mark for three republics. Of the eastern part of the territory lying between the Meta and the Brazilian frontier, Venezuela claims as far west as the meridian of 69 10’. Negotiations for the settlement of the boundary with Brazil (q.v.) were resumed in 1906, and were advanced in the following year to an agreement providing for the settlement of conflicting claims by a mixed commission. With Ecuador and Peru the

boundary disputes are extremely complicated, certain parts of the disputed territory being claimed by all three republics. Colombia holds possession as far south as the Napo in lat. 2° 47′ S., and claims territory occupied by Peru as far south as the Amazon. On the other hand Peru claims as far north as La Chorrera in 0° 49′ S. lat., including territory occupied by Colombia, and the eastern half of the Ecuadorean department of Oriente, and Ecuador would extend her southern boundary line to the Putumayo, in long. 71° 1′ S., and make that river her northern boundary as far north as the Peruvian claim extends. The provisional line starts from the Japura river (known as the Caqueta in Colombia) in lat. i° 30′ S., long. 69 24′ W., and runs south-west to the 70th meridian, thence slightly north of west to the Igaraparana river, thence up that stream to the Peruvian' military post of La Chorrera, in o° 49′ S. lat., thence west of south to Huiririma-chico, on the Napo. Thence the line runs north-west along the Napo, Coca and San Francisco rivers to the Andean watershed, which becomes the dividing line northward for a distance of nearly 80 m., where the line turns westward and reaches the Pacific at the head of Panguapi Bay, into which the southern outlet of the Mira river discharges (about i° 34′ N. lat.).

Physical Geography. — Colombia is usually described as an extremely mountainous country, which is true of much less than half its total area. Nearly one half its area lies south-east of the Andes and consists of extensive llanos and forested plains, traversed by several of the western tributaries of the Amazon and Orinoco. These plains slope gently toward the east, those of the Amazon basin apparently lying in great terraces whose escarpments have the char- acter of low, detached ranges of hills forming successive rims to the great basin which they partly enclose. The elevation and slope of this immense region, which has an approximate length of 640 m. and average width of 320 m., may be inferred from the elevations of the Caqueta, or Japura river, which was explored by Crevaux in 1878-1879. At Santa Maria, near the Cordillera (about 75 30′ W. long.), the elevation is 613 ft. above sea-level, on the 73rd meridian it is 538 ft., and near the 70th meridian 426 ft. — a fall of 187 ft. in a distance of about 400 m. The northern part of this great region has a somewhat lower elevation and gentler slope, and consists of open grassy plains, which are within the zone of alternating wet and dry seasons. In the south and toward the great lower basin of the Amazon, where the rainfall is continuous throughout the year, the plains are heavily forested. The larger part of this territory is unexplored except along the principal rivers, and is inhabited by scattered tribes of Indians. Near the Cordilleras and along some of the larger rivers there are a few small settlements of

whites and mestizos, but their aggregate number is small and their economic value to the republic is inconsiderable. There are some cattle ranges on the open plains, however, but they are too isolated to have much importance. A small part of the northern Colombia, on the lower courses of the Atrato and Magdalena, extending across

the country from 1 the Eastern to the Western Cordilleras with a varying width of ico to 150 m., not including the lower river basins which penetrate much farther inland, also consists of low, alluvial plains, partly covered with swamps and intricate watercourses, densely overgrown with vegetation, but in places admirably adapted to different kinds of tropical agriculture. These plains are broken in places by low ranges of hills which are usually occupied by the principal industrial settlements of this part of the republic, the lower levels being for the most part swampy and unsuited for white occupation.

The other part of the republic, which may be roughly estimated at two-fifths of its total area, consists of an extremely rugged mountainous country, traversed from south to north by the parallel river valleys of the Magdalena, Cauca and Atrato. The mountain chains which cover this part of Colombia are the northern terminal ranges of the great Andean system. In northern Ecuador the Andes narrows into

a single massive range which has the character of a confused mass of peaks and ridges on the

southern frontier of Colombia. There are several

lofty plateaus in this region which form a huge

central watershed for rivers flowing east to the

Amazon, west to the Pacific, and north to the

Caribbean Sea. The higher plateaus are called

paramos, cold, windswept, mist-drenched deserts,

lying between the elevations of 10,000 and 15,000

ft., which are often the only passes over the Cordilleras, and yet are almost impassable because of their morasses, heavy mists, and cold, piercing winds. The paramos of Cruz Verde (11,695 ft.) and Pasto, and the volcanoes of Chiles (15,900 ft.), Chumbul (15,715 ft.), and Pasto (13,990 ft.) are prominent landmarks of this desolate region.

North of this great plateau the Andes divides into three great ranges, the Western, Central and Eastern Cordilleras. The Central is the axis of the system, is distinguished by a line of lofty volcanoes and paramos, some of which show their white mantles 2000 to 3000 ft. above the line of perpetual snow (approx. 15,000 ft. in this lati- tude), and is sometimes distinguished with the name borne by the republic for the time being.

This range runs in a north-north-east direction and separates the valleys of the Magdalena and Cauca, terminating in some low hills south-west of El Banco, a small town on the lower Magdalena.

The principal summits of this range areTajumbina (13,534 ft.), Pan de Azucar (15,978 ft.), Purace (15,420 ft.), Sotara (15,420 ft.), Huila over 18,000 ft.), Tolima (18,432 ft.), Santa Isabel (16,700 ft.), Ruiz (18,373 ft.), and Mesa de Herveo (18,300 ft.).

The last named affords a magnificent spectacle from Bogota, its level top which is 5 or 6 m. across, and is formed by the nm of an immense crater, having the appearance of a table, down the sides of which for more than 3000 ft. hangs a spotless white drapery of perpetual snow. The Western Cordillera branches from the main range first and follows the coast very closely as far north as the 4th parallel, where the San Juan and Atrato rivers, thoughflowing in opposite directions and separated near the 5th parallel by a low transverse ridge, combine to interpose valleys between it and the Cordillera de Bˆudo, which thereafter becomes the true coast range. It then forms the divide between the Cauca and Atrato valleys, and terminates near the Caribbean coast. The general elevation of this range is lower than that of the others, its culminating points being the volcanoMunchique (1 1 ,850 ft.) and Cerro Leon (10,847 ft.). Therange is covered with vegetation and its Pacific slopes are precipitous and humid. The Cordillera de Baudo, which becomes the coast range above lat. 4° N., is the southern extension of the low mountainous chain forming the backbone of the Isthmus of Panama, and may be considered the southern termination of the great North American

system. Its elevations are low and heavily wooded. It divides on the Panama frontier, the easterly branch forming the watershed between the Atrato and the rivers of eastern Panama, and serving as the frontier between the two republics. The passes across these ranges are comparatively low, but they are difficult because of the precipitous character of their Pacific slopes and the density of the vegetation on them. The Eastern Cordillera is in some respects the most important of the three branches of the Colombian Andes. Its general elevation is below that of the Central Cordillera, and it has few summits rising above the line of perpetual snow, the highest being the Sierra Nevada de Cocui, in lat. 6° 30′ N. Between Cocui and the southern frontier of Colombia there are no noteworthy elevations except the so-called Paramo de Suma Paz near Bogota, the highest point of which is 14,146 ft. above sea-level, and the Chita paramo, or range, north-east of Bogota (16,700 ft.). Between the 5th and 6th parallels the range divides into two branches, the eastern passing into Venezuela, where it is called the Cordillera de Merida, and the northern continuing north and north-east as the Sierra de Perija and the Sierra de Oca, to terminate at the north-eastern extremity of the Goajira peninsula. The culminating point in the first-mentioned range is the Cerro Pintado (11,800 ft.). West of this range, and lying between the 10th parallel and the Caribbean coast, is a remarkable group of lofty peaks and knotted ranges known as the Sierra Nevada de Santa Marta, the highest snow- crowned summit of which rises 17,389 ft. above the sea according to some, and 16,728 according to other authorities. This group of

mountains, covering an approximate area of 6500 sq. m., lies immediately on the coast, and its highest summits were long considered inaccessible. It stands detached from the lower ranges of the Eastern Cordillera, and gives the impression that it is essentially independent.

The eastern Cordillera region is noteworthy for its large areas of plateau and elevated valley within the limits of the vertical temperate zone. In this region is to be found the greater part of the white population, the best products of Colombian civiliza- tion, and the greatest industrial development. The ” sabana ” of Bogota is a good illustration of the higher of these plateaus (8563 ft., according to Stieler’s Hand-Atlas), with its mild temperature, inexhaustible fertility and numerous productions of the temperate zone. It has an area of about 2000 sq. m. The lower valleys, plateaus and mountain slopes of this range are celebrated for their coffee, which, with better means of transportation, would be a greater source of prosperity for the republic than the gold-mines of Antioquia. The mountainous region of Colombia is subject to volcanic disturb- ances and earthquake shocks are frequent, especially in the south. These shocks, however, are less severe than in Venezuela or in Ecuador.

[GEOGRAPHY

There are few islands on the coast of Colombia, and the great majority of these are too small to appear on the maps in general use. l in a Gorgona is one of the larger islands on the Pacific coast, jsianas. an(j j g s ; tuatec j about 25 m. from the mainland in lat. 3 N. It is 5I m. long by if m. wide, and rises to an extreme eleva- tion of 1296 ft. above sea-level. It is a beautiful island, and is celebrated as one of Pizarro’s stopping places. It has been used by the Colombian government for political offenders. Malpelo island, 282 m. west by south of Charambira point, in lat. 3 40′ N., long. 81 ° 24′ W., nominally belongs to Colombia. It is a small, rocky, uninhabited island, rising to an elevation of 846 ft. above the sea, and has no ascertained value. The famous Pearl islands of the Gulf of Panama are claimed by Colombia, and their pearl oyster fisheries are considered a rentable asstt by the government. The group covers an area of about 450 sq. m., and consists of 16 islands and several rocks. The largest is Rey Island, which is about 17 m. long, north to south, and 8 m. broad, with an extreme elevation of 600 ft. The other larger islands are San Jose, Pedro Gonzales, Casaya, Saboga and Pacheca. There are several fishing villages whose inhabitants are largely engaged in the pearl fisheries, and a number of cocoa-nut plantations. The islands belong chiefly to Panama merchants. There are several groups of small islands on the northern coast, and a few small islands so near the mainland as to form sheltered harbours, as at Cartagena. The largest

of these islands is Baru, lying immediately south of the entrance to Cartagena harbour. North-west of Colombia in the Caribbean Sea are several small islands belonging to the republic, two of which (Great and Little Corn Is.) lie very near the coast of Nicaragua. The largest and most important of these islands is Vieja Providencia (Old Providence), 120 m. off the Mosquito Coast, 4! m. long, which supports a small population.

The rivers of Colombia may be divided, for convenience of description, into three general classes according to the destination of their Rivers waters, the Pacific, Caribbean and Atlantic — the last

‘ reaching their destination through the Amazon and Orinoco. Of these, the Caribbean rivers are of the greatest economic importance to the country, though those of the eastern plains may at some time become nearly as important as transportation routes in a region possessing forest products of great importance and rich in agricultural and pastoral possibilities. It is worthy of note that the principal rivers of these three classes — the Patia, Cauca, Magdalena, Caqueta and Putumayo — all have their sources on the high plateaus of southern Colombia and within a comparatively limited area. The Pacific coast rivers are numerous, and discharge a very large volume of water into the ocean in proportion to the area of their drainage basins, because of the heavy rainfall on the western slopes of the Coast range. The proximity of this range to the coast limits them to short, precipitous courses, with comparatively short navi- gable channels. The principal rivers of this group, starting from the southern frontier, are the Mira, Patia, Iscuande, Micai, Buena- ventura or Dagua, San Juan and Baudo. The Mira has its principal sources in Ecuador, and for a short distance forms the boundary line between the two republics, but its outlets and navigable channel are within Colombia. It has a large delta in proportion to the length of the river, which is visible evidence of the very large quantity of material brought down from the neighbouring mountain slopes. The Patia is the longest river of the Pacific group, and is the only one having its sources on the eastern side of the Western Cordillera. It is formed by the confluence of the Sotara and Guaitara at the point where the united streams turn westward to cut their way through the mountains to the sea. The Sotara or upper Patia rises on the southern slope of a transverse ridge or dyke, between the Central and Western Cordilleras, in the vicinity of Popayan, and flows southward about 120 m. to the point of confluence with the Guaitara. The latter has its sources on the elevated plateau of Tuquerres and flows north-west to meet the Sotara. The canyon of the Patia through the Western Cordillera is known as the ” Minima gorge,” and has been cut to a depth of 1676 ft., above which the perpendicular mountain

sides rise like a wall some thousands of feet more. The upper course of the Guaitara is known as the Carchi, which for a short distance forms the boundary line between Colombia and Ecuador. At one point in its course it is crossed by the Rumichaca arch, a natural arch of stone, popularly known as the ” Inca’s bridge,” which with the Minima gorge should be classed among the natural wonders of the world. There is a narrow belt of low, swampy country between the Cordillera and the coast, traversed at intervals by mountain spurs, and across this the river channels are usually navigable. _ The San Juan has built a large delta at its mouth, and is navigable for a distance of 140 m. inland, the river flowing parallel with the coast for a long distance instead of crossing the coastal plain. It rises in the angle between the Western Cordillera and a low transverse ridge connecting it with the Baudo coast range, and flows westward down to the valley between the two ranges, and then southward through this valley to about lat. 4 1 5′ N. , where it turns sharply westward and crosses a narrow belt of lowland to the coast. It probably has the largest discharge of water of the Pacific group, and has about 300 m. of navigable channels, including its tributaries, although the river itself is only 190 m. long and the sand-bars at its mouth have only 7 or 8 ft. of water on them. The San Juan is distinguished for having been one of the proposed

routes for a ship canal between the Caribbean and Pacific. At one point in its upper course it is so near the Atrato that, according to a survey by Captain C. S. Cochrane, R.N., in 1824, a canal 400 yds. long with a maximum cutting of 70 ft., together with some improve- ments in the two streams, would give free communication. His calculations were made, of course, for the smaller craft of that time.

The rivers belonging to the Caribbean system, all of which flow in a northerly direction, are the Atrato, Bacuba, Sinu, Magdalena and Zulia. The Bacuba, Suriquilla or Leon, is a small stream rising on the western slopes of the Cordillera and flowing into the upper end of the Gulf of Uraba. Like the Atrato it brings down much silt, which is rapidly filling that depression. There are many small streams and one important river, the Sinu, flowing into the sea between this gulf and the mouth of the Magdalena. The Sinu rises on the northern slopes of the Alto del Viento near the 7th parallel, and flows almost due north across the coastal plain for a distance of about 286 m. to the Gulf of Morosquillo. It has a very sinuous channel which is navigable for small steamers for some distance, but there is no good port at its outlet, and a considerable pait of the region through which it flows is malarial and sparsely settled. The most important rivers of Colombia, however, are the Magdalena and its principal tributary, the Cauca. They both rise on the high table- land of southern Colombia about

14,000 ft. above sea-level — the Magdalena in the Laguna del Buey (Ox Lake) on the Las Papas plateau, and the Cauca a short distance westward in the Laguna de Santiago on the Paramo de Guanacas — and flow northward in parallel courses with the great Central Cordillera, forming the water- parting between their drainage basins. The principal tributaries of the Magdalena are the Suaza, Neiva, Cabrera, Prado, Fusagasaga, Funza or Bogota, Carare, Opon, Sogamoso, Lebrija and Cesar, and the western the La Plata, Paez, Saldana, Cuello, Guali, Samana or Miel, Nare or Negro and Cauca. There are also many smaller streams flowing into the Magdalena from both sides of the valley. Of those named, the Funza drains the " sabana " of Bogota and is celebrated for the great fall of Tequendama, about 480 ft. in height ; the Sogamoso passes through some of the richest districts of the republic; and the Cesar rises on the elevated slopes of the Sierra Nevada de Santa Marta and flows southward across a low plain, in which are many lakes, to join the Magdalena where it bends westward to meet the Cauca. The course of the Magdalena traverses nine degrees of latitude and is nearly 1000 m. long. It is navigable for steamers up to La Dorada, near Honda, 561 m. above its mouth, which is closed by sand-bars to all but light-draught vessels, and for 93 m. above the rapids at Honda, to Girardot. The river is also navigable at high water for small steamers up to Neiva, 100 m. farther and 1535 ft. above sea-level, beyond which point it descends precipitously from the plateaus of southern Colombia. The Honda rapids have a fall of only 20 ft. in a distance of 2 m., but the current is swift and the channel tortuous for a distance of 20 m., which make it impossible for the light-draught, flat-bottomed steamers of the lower river to ascend them. The Cauca differs much from the Magdalena, although its principal features are the same. The latter descends 12,500 ft. before it becomes navigable, but at 10,000 ft. below its source the Cauca enters a long narrow valley with an average elevation of 3500 ft., where it is navigable for over 200 m., and then descends 2500 ft. through a series of impetuous rapids for a distance of about 250 m., between Cartago and Caceres, with a break of 60 m. above Antioquia, where smooth water permits isolated navigation. While, therefore, the Magdalena is navigable throughout the greater part of its course, or from Girardot to the coast, with an abrupt break of only 20 ft. at Honda which could easily be overcome, the Cauca has only 200 m. of navigable water in the upper valley and another 200 m. on its lower course before it joins the Magdalena in lat. 9 30', the two being separated by 250 m. of canyon and rapids. So difficult is the country through which the Cauca has cut its tortuous course that the fertile upper valley is completely isolated from the Caribbean, and has no other practicable outlet than the overland route

from Cali to Buenaventura, on the Pacific. The upper sources of the Cauca flow through a highly volcanic region, and are so impregnated with sulphuric and other acids that fish cannot live in them. This is especially true of the Rio Vinagre, which rises on the Purace volcano. The principal tributaries are the Piendamo, Ovejas, Palo, Amaime and Nechi, from the central Cordillera, of which the last named is the most important, and the Jamundi and a large number of small streams from the Western. The largest branch of the Cauca on its western side, however, is the San Jorge, which, though rising in the Western Cordillera on the northern slopes of the Alto del Viento, in about lat. 7 N., and not far from the sources of the Sinu and Bacuba, is essentially a river of the plain, flowing north-east across a level country filled with small lakes and subject to inundations to a junction with the Cauca just before it joins the Magdalena. Both the San Jorge and Nechi are navigable for considerable distances. The valley of the Cauca is much narrower than that of the Magdalena, and between Cartago and Caceres the mountain ranges on both sides press down upon the river and confine it to a narrow canyon. The Cauca unites with the Magdalena about 200 m. from the sea through several widely separated channels, which are continually changing through the wearing away of the alluvial banks. These changes in the channel are also at work

in the Lower Magdalena. The remaining rivers of the Caribbean system, exclusive of the smaller ones rising in the Sierra Nevada de Santa Marta, are the Zulia and Catatumbo, which rise in the mountains of northern Santander and flow across the low plains of the Venezuelan state of Zulia into Lake Maracaibo.

Of the rivers of the great eastern plains, whose waters pass through the Orinoco and Amazon to the Atlantic, little can be said beyond the barest geographical description. The size and courses of many of their affluents are still unknown, as this great region has been only partially explored. The largest of these rivers flow across the plains in an easterly direction, those of the Orinoco system inclining north- ward, and those of the Amazon system southward. The first include the Guaviare or Guayabero, the Vichada, the Meta, and the upper course of the Arauca. The Guaviare was explored by Crevaux in 1881. It rises on the eastermslopes of the Eastern Cordillera between the 3rd and

4th parallels, about 75 m. south of Bogota, and flows with a slight southward curve across the llanos to the Orinoco, into which it discharges at San Fernando de Atabapo in lat. 4° N. Its largest tributary is the Inirida, which enters from the south. The Guaviare has about 600 m. of navigable channel. The Meta rises on the opposite side of the Cordillera from Bogota, and flows with a sluggish current east-north-east across the llanos to' the Orinoco, into which it discharges below the Atures rapids, in lat. 6° 22′ N. I It is navigable throughout almost its whole length, small steamers ascending it to a point within 100 m. of Bogota. Its principal tributaries, so far as known, are the Tuca, Chire and Casanare. The principal rivers of the Amazon system are the Napo, the upper part of which forms the provisional boundary line with Ecuador, the Putumayo or lea, and the Caqueta or Japura (Yapura), which flow from the Andes entirely across the eastern plains, and the Guainia, which rises on the northern slopes of the Serra Tunaji near the provisional Brazilian frontier, and flows with a great north- ward curve to the Venezuelan and Brazilian frontiers, and is thereafter known as the Rio Negro, one of the largest tributaries of the Amazon. There are many large tributaries of these rivers in the unexplored regions of south-eastern Colombia, but their names as well as their courses are still unsettled.

The coast of Colombia faces on the Pacific Ocean and the Caribbean Sea, and is divided by the Isthmus of Panama into two completely separated parts. The Pacific coast-line, omitting minor Coasts. convolutions, has a length of about 500 m., while that of the Caribbean is about 700 m. The former has been of slight service in the development of the country because of the unsettled and unhealthy character of the coast region, and the high mountain barriers between its natural ports and the settled parts of the re- public. There are only two commercial ports on the coast, Tumaco and Buenaventura, though there are several natural harbours which would be of great service were there any demand for them. The rivers Mira, Patia and San Juan permit the entrance of small steamers, as also some of the smaller rivers. The larger bays on this coast are Tumaco, Choco, Magdalena, Cabita, Coqui, Puerto Utria, Solano, Cupica and Octavia — some of them affording ex- ceptionally safe and well-sheltered harbours. The Caribbean coast of Colombia has only four ports engaged in international trade — Barranquilla, Cartagena, Santa Marta and Rio Hacha. There are some smaller ports on the coast, but they are open only to vessels of light draft and have no trade worth mention. Barranquilla, the principal port of the republic, is situated on the Magdalena, and its seaport, or landing-place, is Puerto Colombia at the inner end of Savanilla Bay, where a steel pier 4000 ft. long has

been built out to deep water, alongside which ocean-going vessels can receive and discharge cargo. The bay is slowly filling up, however, and two other landing-places — Salgar and Savanilla — had to be abandoned before Puerto Colombia was selected. The pier-head had 24 ft. of water alongside in 1907, but the silt brought down by the Magdalena is turned westward by the current along this coast, and may at any time fill the bay with dangerous shoals. The oldest and best port on the coast is Cartagena, 65 m. south-west of Barranquilla, which has a well-sheltered harbour protected by islands, and is connected with the Magdalena at Calamar by railway. The next best port is that of Santa Marta, about 46 m. east-north-east of Barranquilla (in a straight line), with which it is connected by 23 m. of railway and 50 m. of inland navigation on the Cienaga de Santa Marta and eastern outlets of the Magdalena. Santa Marta is situated on a small, almost landlocked bay, well protected from prevailing winds by high land on the north and north-east, affording excellent anchorage in waters free from shoaling through the deposit of silt. The depth of the bay ranges from 4! to 19 fathoms. The town stands at the foot of the Sierra Nevada de Santa Marta, which restricts the area of cultivatable land in its immediate vicinity, and the enclosing high lands make the climate hot and somewhat dangerous for foreigners. Since the development of the fruit trade on the shores of the Caribbean sea and Gulf of Mexico by an im- portant American company, which owns a large tract of land near Santa Marta devoted to banana cultivation, and ha3 built a railway 50 m. inland principally for the transportation of fruit, the trade of the port has greatly increased. _ The population of this region, however, is sparse, and its growth is slow. The fourth port on this coast is Rio Hacha, an open roadstead, about 93 m. east of Santa Marta, at the mouth of the small river Rancheira descending from

the eastern slopes of the Sierra Nevada de Santa Marta. It has little trade, and the undeveloped, unpopulated state of the country behind it affords no promise of immediate growth. There are other small towns on the coast which are ports for the small vessels engaged in the coasting and river trade, but they have no international im- portance because of their inaccessibility to ocean-going steamers, or the extremely small volume of their trade. The Gulf of Uraba is a large bight or southerly extension of the Gulf of Darien. It receives the waters of the Atrato, Bacuba, and a number of small rivers, and penetrates the land about 50 m., but has very little com- mercial importance because of the unhealthy and unsettled character of the neighbouring country, and because of the bar across its entrance formed by silt from the Atrato. The Gulf of Morosquillo, a broad shallow indentation of the coast south of Cartagena, receives the

waters of the Rio Sinu, at the mouth of which is the small port of Cispata. Between the mouth of the Magdalena and Santa ‘Marta is the Cienaga de Santa Marta, a large marshy lagoon separated from the sea by a narrow sand spit, having its ” boca ” or outlet at its eastern side. There is some traffic in small steamers on its shallow waters, which is increasing with the development of fruit cultivation on its eastern and southern sides. It extends inland about 31 m., and marks a deep indentation of the coast like the Gulf of Uraba.

Geology. — The geology of Colombia is very imperfectly known, and it is only by a comparison with the neighbouring regions that it is possible to form any clear idea of the geological structure and succession. The oldest rocks are gneisses and schists, together with granite and other eruptive rocks. These are overlaid by sandstones, slates and limestones, alternating with porphyries and porphyrites. sometimes in the form of sheets, sometimes as breccias and conglomerates. Cretaceous fossils have been found abundantly in this series, but it is still possible that earlier systems may be represented. Coal-bearing beds, possibly of Tertiary age, occur in Antioquia and elsewhere. Structurally, the four main chains of Colombia differ considerably from one another in geological constitution. The low Cordilleras of the Chocos, on the west coast, are covered by soft Quaternary sandstones and marls containing shells of extant species, such as still inhabit the neighbouring ocean. The Western Cordillera is the direct continuation of the Western Cordillera of Ecuador, and, like the latter, to judge from the scattered observations which are all that are available, consists chiefly of sandstones and porphy- ritic rocks of the Cretaceous series. Between the Western and the Central Cordilleras is a longitudinal depression along which the river Cauca finds its way towards the sea. On the western side of this depression there are red sandstones with coal-seams, possibly Tertiary; the floor and the eastern side consist chiefly of ancient crystalline and schistose rocks. The Central Cordillera is the direct continuation of the Eastern Cordillera of Ecuador, and is formed chiefly of gneiss and other crystalline rocks, but sedimentary deposits of Cretaceous age also occur. Finally the Eastern branch, known as the Cordillera of Bogota, is composed almost entirely of Cretaceous beds thrown into a series of regular anticlinals and synclinals similar to those of the Jura Mountains. The older rocks occasionally appear in the centre of the anticlinals. In all these branches of the Andes the folds run approximately in the direction of the chains, but the Sierra de Santa Marta appears to belong to a totally distinct system of folding, the direction of the folds being from west to east, bending gradually towards the south-east. Although volcanoes are by no means absent,

they are much less important than in Ecuador, and their products take a far smaller share in the formation of the Andes. In Ecuador the depression between the Eastern and Western Cordil- leras is almost entirely filled with modern lavas and agglomerates; in Colombia the corresponding Cauca depression is almost free from such deposits. In the Central Cordillera volcanoes extend to about 5° N. ; in the Western Cordillera they barely enter within the limits of Colombia; in the Cordillera of Bogota they are entirely absent. 1

Climate. — Were it not for the high altitudes of western Colombia, high temperatures would prevail over the whole country, except where modified by the north-east trade winds and the cold ocean current which sweeps up the western coast. The elevated plateaus and summits of the Andes are responsible, however, for many important and profound modifications in climate, not only in respect to the lower temperatures of the higher elevations, but also in respect to the higher temperatures of the sheltered lowland valleys and the varying climatic conditions of the neighbouring plains. The republic lies almost wholly within the north torrid zone, a compara- tively small part of the forested Amazonian plain extending beyond

1 See A. Hettner and G. Linck, ” Beitrage zur Geologie und Petrographie der columbianischen Anden,” Zeits. deutsch. geol. Ges. vol. xl. (1888), pp. 204-230; W. Sievers, ” Die Sierra Nevada de Santa Marta und die Sierra de Perija,” Zeits. Ges. Erdk. Berlin, vol. xxiii. (1888), pp. 1-158 and p. 442, Pis. i. and iii. ; A. Hettner, ” Die Kordillere von Bogota,” Peterm. Mitt., Erganzungsheft 104 (1892), and ” Die Anden des westlichen Columbiens,” Peterm. Mitt. (1893), pp. 129-136; W. Reiss and A. Stiibel, Reisen in Sua America. Geologische Studien in der Republik Colombia (Berlin, 1892-1899), — a good geological bibliography will be found in part ii. of this work.

the equator into the south torrid zone. The great Andean barrier which crosses the republic from the south to north acts as a condenser to the prevailing easterly winds from the Atlantic, and causes a very heavy rainfall on their eastern slopes and over the forested Amazon plain. High temperatures as well as excessive humidity prevail throughout this region. Farther north, on the open llanos of the Orinoco tributaries, the year is divided into equal parts, an alternat-

ing wet and dry season, the sun temperatures being high followed by cool nights, and the temperatures of the rainy season being even higher. The rainfall is heavy in the wet season, causing many of the rivers to spread over extensive areas, but in the dry season the inundated plains become dry, the large rivers fed by the snows and rainfall of the Andes return within their banks, the shallow lagoons and smaller streams dry up, vegetation disappears, and the level plain becomes a desert. The northern plains of the republic are swept by the north-east trades, and here, too, the mountain barriers exercise a strongly modifying influence. The low ridges of the Sierra de Perija do not wholly shut out these moisture-laden winds, but they cause a heavy rainfall on their eastern slopes, and create a dry area on their western flanks, of which the Vale of Upar is an example. The higher masses of the Sierra Nevada de Santa Marta cover a very limited area, leaving the trade winds a comparatively unbroken sweep across the northern plains until checked by the Western Cordillera, the Panama ranges and the Sierra de Baudo, where a heavy precipitation follows. Farther south the coast ranges cause a very heavy rainfall on their western slopes, which are quite as uninhabitable because of rain and heat as are the coasts of southern Chile through rain and cold. The rainfall on this coast is said to average 73 in., though it is much higher at certain points and in the Atrato Valley. As a result the coastal plain is covered with swamps and tangled forests, and is extremely unhealthy, except at a few favoured points on the coast. High temperatures prevail throughout the greater part of the Magdalena and Cauca valleys, because the mountain ranges which enclose them shut out the prevailing winds. At Honda, on the Magdalena, 664 ft. above sea-level, the mean temperature for the year is 82° F., and the mercury frequently rises to 102 ° in the shade. These lowland plains and valleys comprise the climatic tropical zone of Colombia, which is characterized by high temperatures, and by excessive homidity and dense forests, an exception to the last-named characteristic being the open llanos where dry summers prevail. Above this tropical zone in the mountainous regions are to be found all the varying gradations of climate which we are accustomed to associate with changes in latitude. There are the subtropical districts of the valleys and slopes between 1500 and 7500 ft. elevation, which include some of the most fertile and productive areas in Colombia; the temperate districts between 7500 and 10,000 ft., the cold, bleak and inhospitable paramos between 10,000 and 15,000 ft., and above these the arctic wastes of ice and snow. The temperate and sub- tropical regions cover the greater part of the departments traversed by the Eastern Cordillera, the northern end of the Central Cordillera, the Santa Marta plateaus, and the Upper Cauca Valley. They include the larger part of

the white population and the chief pro- ductive industries of the country. There is no satisfactory record of temperatures and rainfall in these widely different climatic zones from which correct averages can be drawn and compared. Observa- tions have been made and recorded at Bogota and at some other large towns, but for the greater part of the country we have only frag- mentary reports. The mean annual temperature on the eastern plains, so far as known, ranges from 87° F. on the forested slopes to 90° and 91 ° on the llanos of the Meta and Arauca. On the Caribbean coastal plain it ranges from 8o° to 84°, but at Tumaco, on the Pacific coast, within two degrees of the equator, it is only 79 . At Medellin, in the mountainous region of Antioquia, 4950 ft. above sea-level, the mean annual temperature is 70 , and the yearly rainfall 55 in., while at Bogota, 8563 ft., the former is 57 and the latter 44 in. At Tuquerres, near the frontier of Ecuador, 10,200 ft. eleva- tion, the mean annual temperature is said to be 55 °. The changes of seasons are no less complicated and confusing. A considerable part of the republic is covered by the equatorial belt of calms, whose oscillations divide the year into a wet and dry season. This division is modified, however, by the location of mountain ranges and by elevation. In the Amazon region there is no great change during the year, and on the northern plains the so-called dry season is one of light rains except where mountain ranges break the sweep of the north-east trades. The alternating wet and dry seasons are likewise to be found on the Pacific coastal plain, though this region is not entirely dry and vegetation never dries up as on the llanos. Above the lowland plains the seasons vary in character according to geographical position and elevation. The two-season division rules in the departments of Santander and Antioquia, but without the extremes of humidity and aridity characteristic of the eastern plains. Farther south, at elevations between 800 and 9500 ft., the year is divided into four distinct seasons — two wet and two dry — the former called inviernos (winters) and the latter veranos (summers). These seasons are governed by the apparent movements of the sun, the winters occurring at the equinoxes and the summers at the solstices. The sabana of Bogota and neighbouring districts are subject to these changes of season. At higher altitudes long, cold, wet winters are experienced, with so short and cold a summer

between them that the bleak paramos are left uninhabited excepl by a few shepherds in the short dry season.

Fauna.' — The geographical position of Colombia gives to it a fauna and flora largely characteristic of the great tropical region of the Amazon on the south-east, and of the mountainous regions of Central America on the north-west. At the same time it is rich in animal and plant types of its own, especially the latter, and is considered one of the best fields in South America for the student and collector. The fauna is essentially tropical, though a few species characteristic of colder regions are to be found in the higher Andes. Of the Quadrumana there are at least seventeen distinct species, and this number may be increased after a thorough exploration of the forested eastern plains. They are all arboreal in habit, and are to be found throughout the forested lowlands and lower mountain slopes. The carnivora are represented by seven or eight species of the Felidae, the largest of which are the puma (Felis concolor) and the jaguar (F. onca). These animals, together with the smaller ocelot, have a wide geographical range, and are very numerous in the valley of the Magdalena. Two species of bear and the " coati " (Nasua) represent the plantigrades and inhabit the mountain slopes, and, of Pachydermata, the peccary (Dicotyles) and " danta " or tapir {Tapirus) have a wide distribution throughout the lowland and lower plateau forests. The Colombian tapir is known as the Tapirus Roulini, and is slightly smaller than the Brazilian species {T. americanus). There are deer in the forests and on the open savannahs, the rabbit and squirrel are to be seen on the eastern slopes of the Andes, and partly amphibious rodents, the " capybara " (Hydrochoerus) and " guagua " (Coelogenys subniger), are very numerous along the wooded watercourses. The sloth, armadillo, opossum, skunk and a species of fox complete the list of the more common quadrupeds so far as known, though it is certain that a careful biological survey would discover many others. The large rivers of Colombia and the lakes of the lowlands are filled with alligators, turtles, and fish, and several species of fish are highly esteemed by the natives as food. The saurians are represented on land by several species of lizard, some of them conspicuous for their brilliant colouring, and by the large " iguana," whose flesh is con- sidered a great delicacy. Among the ophidians, which include many harmless species, are the boa-constrictor, rattlesnake, the dreaded Lachesis and the coral snake. The " manatee " (Manatus ameri- canus) is found in the Atrato and other large Colombian rivers.

In bird and insect life Colombia is second only to Brazil. The condor,

which inhabits the higher Cordilleras, is peculiar to the whole Andean region, and is the largest of the Raptores. Among other members of this order are the eagle, osprey, vulture, buzzard, kite and hawk, with about a dozen species in all. Parrots and paroquets are numerous everywhere in the tropical and subtropical regions, as also the gorgeously coloured macaw and awkward toucan. The largest class, perhaps, is that formed by the astonishing number of water-fowl which throng the shallow lagoons and river beaches at certain seasons of the year. They are mostly migratory in habit, and are to be found in many other countries. Among these are the large white crane and small crane, the blue heron, the snowy-white egret, the roseate spoonbill {Platalea ajaja), stork, bittern and many species of ducks. The largest and most conspicuous member of this interesting family is the Mycteria americana, the gigantic stork so frequently seen in the Amazon valley, and even more numerous about the lagoons of northern Colombia. One of the best game-birds of the forest is the ” crested curassow ” (Crax alector), sometimes weighing 12 lb, which feeds on arboreal fruits and rarely comes to the ground. Colombia also possesses many species of the beautiful little humming-bird, among which are the tiny Steganura Undcrivoodi and the sword-bill, Docimastes ensiferus, which were found by Mr Albert Millican on a bleak paramo 12,000 ft. above sea-level. One of the most interesting birds found in the country is the ” weaver- bird ” (Cassicus persicus), which lives in colonies and suspends its long, pouch-like nest from the end of a horizontal branch of some high, isolated tree. In regard to insects, what has been said of Brazil will apply very closely to Colombia. Mosquitoes, butterflies, spiders, beetles and ants are infinitely numerous, and some of the species are indescribably troublesome.

Flora. — The Colombian flora is richer in species and individual characteristics than the fauna, owing in part to its greater dependence on climatic conditions. It ranges from the purely tropical types of the lowlands to the Alpine species of the more elevated paramos. It should be remembered, however, that large areas of the lowland plains have only a very limited arboreal growth. These plains include the extensive llanos of the Orinoco tributaries where coarse, hardy grasses and occasional clumps of palms are almost the only vegetation to be seen. There are other open plains in northern Colombia, sometimes covered with a shrubby growth, and the ” mesas ” (flat-topped mountains) and plateaus of the Cordilleras are frequently bare of trees. Farther up, on the cold, bleak paramos, only stunted and hardy trees are to be found. On the other hand, a luxuriant forest growth covers a very large part of the republic, including the southern plains

of the Amazon tributaries, the foot- hills, slopes and valleys of the Cordilleras, a larger part of the northern plains, and the whole surface of the Western Cordillera and coast. The most conspicuous and perhaps the most universal type in all these regions, below an approximate elevation of 16,000 ft.,

is the palm, whose varieties and uses are incredibly numerous. On the eastern plains are to be found the ” miriti ” (Maurilia Aexuosa) and the ” pirijao ” or peach palm {Guilielma speciosa), called the ” pupunha ” on the Amazon, whose fruit, fibre, leaf, sap, pith and wood meet so large a part of the primary needs of the aborigines. A noteworthy palm of the eastern Andean slopes is the ” corneto ” (Deckeria), whose tall, slender trunk starts from the apex of a number of aerial roots, rising like a cone 6 to 8 ft. above the ground. It is one of the most fruitful of palms, its clusters weighing from 120 to 200 K) each. Extensive groves of the coco-nut palm are to be found on the Caribbean coast, the fruit and fibre of which figure among the national exports. In north-eastern Colombia, where a part of the year is dry, the ” curuas ” form the prevailing species, but farther south, on the slopes of the Cordilleras up to an elevation of 10,000 ft., the wax-palm, or ” palma de cera ” (Ceroxylon andicola), is said to be the most numerous. It is a tall slender palm, and is the source of the vegetable wax so largely used in some parts ot the country in the manufacture of matches, a single stem some- times yielding 16-20 lb. Another widely distributed species in central Colombia is known as the ” palmita del Azufral ” in some localities, and as the ” palma real ” and ” palma dolce ” in others. Humboldt says it is not the ” palma real ” of Cuba (Oreodoxa regia), but in the Rio Sinu region is the Cocos butyracea, or the ” palma dolce,” from which palm wine is derived. Another palm of much economic importance in Colombia is the ” tagua ” (Phytelephas macrocarpa) .which grows abundantly in the valleys of the Magdalena, Atrato and Patia, and produces a large melon-shaped fruit in which are found the extremely hard, fine-grained nuts or seeds known in the commercial world as vegetable ivory. The Colombian ” Panama hat “is made from the fibres extracted from the ribs of the fan- shaped leaves of still another species of palm, Carludovica palmata, while in the Rio Simi region the natives make a kind of butter (” manteca de Corozo “) from the Elaeis melanococca, Mart., by peeling the nuts in water and then purifying the oil extracted in this

way by boiling. This oil was formerly used for illuminating purposes. The forests are never made up wholly of palms, but are composed of trees of widely different characters, including many common to the Amazon region, together with others found in Central American forests, such as mahogany and ” vera ” or lignum vitae {Zygophyllum arboreum). Brazilwood (Caesalpinia echinata), valuable for its timber and colouring extract, and ” roco ” (Bixa orellana), the ” urucu ” of Brazil which furnishes the anatto of commerce, are widely distributed in central and southern Colombia, and another species of the first-named genus, the C. coariaria, produces the ” divi-divi ” of the Colombian export trade — a peculiarly shaped seed-pod, rich in tannic and gallic acids, and used for tanning leather. The rubber-producing Hevea guayanensis is found in abundance on the Amazon tributaries, and the Castilloa elastica is common to all the Caribbean river valleys. Southern Colombia, especially the eastern slopes of the Andes, produces another valuable tree, the Cinchona calisaya, from the bark of which quinine is made. These are but a few of the valuable cabinet woods, dye-woods, &c, which are to be found in the forests, but have hardly been reached by commerce because of their inaccessibility and the unsettled state of the country. The adventurous orchid-hunter, however, has pene- trated deeply into their recesses in search of choice varieties, and collectors of these valuable plants are largely indebted to Colombia for their specimens of Cattleya Mendelli, Warscewiczii and Trianae ; Dowiana aurea; Odontoglossum crispum, Pescatorei, vexillarium odoratum, coronarium, Harryanum, and blandum; Miltonia vexil- laria; Oncidium carthaginense and Kramerianum; Masdevalliae, Epidendra, Schomburgkiae and many others. Colombia is also the home of the American ” Alpine rose ” (Befaria), which is to be found between 9000 and 11,000 ft. elevation, and grows to a height of 5-6 ft. Tree ferns have a remarkable growth in many localities, their stems being used in southern Cundinamarca to make corduroy roads. The South American bamboo (Bambusa guadia) has a very wide range, and is found nearly up to the limit of perpetual snow. The cactus is also widely distributed, and is represented by several well-known species. Among the more common fruit-trees, some of which are exotics, may be mentioned cacao (Theobroma), orange, lemon, lime, pine-apple, banana, guava (Psidium), breadfruit (Arto- carpus), cashew (Anacardium) , alligator pear (Persea) .with the apple, peach, pear, and other fruits of the temperate zone on the elevated plateaus. Other food and economic plants are coffee, rice, tobacco, sugar-cane, cotton, indigo, vanilla, cassava or ” yucca,” sweet and white potatoes, wheat, maize, rye, barley, and vegetables of both tropical and temperate climates. It is claimed in Colombia that a species of wild potato found on the

paramos is the parent of the cultivated potato.

Population. — The number of the population of Colombia is very largely a matter of speculation. A census was taken in 1871, when the population was 2,951,323. What the vegetative increase has been since then (for there has been no immigration) is purely conjectural, as there are no available returns of births and deaths upon which an estimate can be based. Civil war has caused a large loss of life, and the withdrawal from their

homes of a considerable part of the male population, some of them for military service and a greater number going into concealment to escape it, and it is certain that the rate of increase has been small. Some statistical authorities have adopted ij% as the rate, but this is too high for such a period. All things considered, an annual increase of 1% for the thirty-five years between 187 1 and 1906 would seem to be more nearly correct, which would give a population in the latter year — exclusive of the population of Panama — of a little over 3,800,000. The Statesman's Year Book for 1907 estimates it at 4,279,6/4 in 1905, including about 150,000 wild Indians, while Supan's Die Bevolkerung der Erde (1904) places it at 3,917,000 in 1899. Of ithe total only 10% is classed as white and 15% as Indian, 40% as mestizos (white and Indian mixture), and 35% negroes and their mixtures with the other two races. The large proportion of mestizos, if these percentages are correct, is significant because it implies a per- sistence of type that may largely determine the character of Colombia's future population, unless the more slowly increasing white element can be reinforced by immigration.

The white contingent in the population of Colombia is chiefly composed of the descendants of the Spanish colonists who settled there during the three centuries following its discovery and conquest. Mining enterprises and climate drew them into the highlands of the interior, and there they have remained down to the present day, their only settlements on the hot, unhealthy coast being the few ports necessary for commercial and political intercourse with the mother country. The isolation of these distant inland settlements has served to preserve the language, manners and physical characteristics of these early colonists with less variation than in any other Spanish-American state. They form an intelligent, high-spirited class of people, with all the defects and virtues of their ancestry. Their isolation has made them ignorant to some extent of the world's progress, while a supersensitive patriotism blinds them to the discredit and disorganization which political strife and misrule have brought upon them. A very small proportion of the white element consists of

foreigners engaged in commercial and industrial pursuits, but they very rarely become permanently identified with the fortunes of the country. The native whites form the governing class, and enjoy most of the powers and privileges of political office.

Of the original inhabitants there remain only a few scattered tribes in the forests, who refuse to submit to civilized require- ments, and a much larger number who live in organized com- munities and have adopted the language, customs and habits of the dominant race. Their total number is estimated at 15 % of the population, or nearly 600,000, including the 120,000 to 150,000 credited to the uncivilized tribes. Many of the civilized Indian communities have not become wholly Hispani- cized and still retain their own dialects and customs, their attitude being that of a conquered race submitting to the customs and demands of a social organization of which they form no part. According to Uricoechea there are at least twenty-seven native languages spoken in the western part of Colombia, fourteen in Tolima, thirteen in the region of the Caqueta, twelve in Panama, Bolivar and Magdalena, ten in Bogota and Cundinamarca, and thirty-four in the region of the Meta, while twelve had died out during the preceding century. The tribes of the Caribbean seaboard, from Chiriqui to Goajira, are generally attached to the great Carib stock; those of the eastern plains show affinities with the neighbouring Brazilian races; those of the elevated Tuquerres district are of the Peruvian type; and the tribes of Antioquia, Cauca, Popayan and Neiva preserve characteristics more akin to those of the Aztecs than to any other race. At the time of the Spanish Conquest the most important of these tribes was the Muyscas or Chibchas, who inhabited the table- lands of Bogoti and Tunja, and had attained a considerable degree of civilization. They lived in settled communities, cultivated the soil to some extent, and ascribed their progress toward civilization to a legendary cause remarkably similar 10 those of the Aztecs of Mexico and the Incas of Peru. They are represented by some tribes living on the head-waters of the Meta,

and their blood flows in the veins of the mestizos of the Bogota plateau. Their ancient language has been partly preserved through the labours of Gonzalo Bermudez, Jose Dadei, Bernardo de Lugo, and Ezequiel Uricoechea, the last having made it the subject of a special

study. According to this author the Chibchas were composed of three loosely united nationalities governed by three independent chiefs — the Zipa of Muequeta, (the present Funza), the Zaque of Hunsa (now Tunja), and the Jeque of Iraca, who was regarded as the successor of the god Nemterequeteba, whom they worshipped as the author of their civilization. The latter had his residence at Suamoz, or Sogamoso.

The Tayronas, of the Santa Marta highlands, who have totally disappeared, were also remarkable for the progress which they had made toward civilization. Evidence of this is to be found in the excellent roads which they constructed, and in the skilfully made gold ornaments which have been found in the district which they occupied, as well as in the contemporary accounts of them by their conquerors. Among the tribes which are still living in a savage state are the Mesayas, Caquetas, Mocoas, Amarizanos, Guipanabis and Andaquies of the un- settled eastern territories; the Goajiros, Motilones, Guainetas, and Cocinas of the Rio Hacha, Upar and Santa Marta districts; and the Dariens, Cunacunas, and Chocos of the Atrato basin. These tribes have successfully resisted all efforts to bring them under political and ecclesiastical control, and their subjection is still a matter of no small concern to the Colombian govern- ment. As late as the year 1900 Mr Albert Millican, while collect- ing orchids on the Opon river, a tributary of the Magdalena between Bogota and the Caribbean coast, was attacked by hostile Indians, and one of his companions was killed by a poisoned arrow. These hostile tribes are usually too small to make much trouble, but they are able to make exploration and settlement decidedly dangerous in some districts.

The mestizos, like the whites and Indians, chiefly inhabit the more elevated regions of the interior. They are of a sturdy, patient type, like their Indian ancestors, and are sufficiently industrious to carry on many of the small industries and occu- pations, and to meet the labour requirements of the inhabited plateau districts. Those of the urban middle classes are shop- keepers and artizans, and those of the lower class are domestics and day labourers. The whites of Spanish descent object to manual labour, and this places all such occupations in the hands of the coloured races. In the country the mestizos are small agriculturists, herders, labourers and fishermen; but there are many educated and successful merchants and professional men among them. There are no social barriers in their intercourse with the whites, nor race barriers against those who have political aspirations. The negroes of pure blood are to be found princi- pally on the coastal plains and in the great lowland river valleys, where they live in great part on the bounties of nature. A small percentage of them are engaged in trade

and other occupations; a few are small agriculturists.

Bogota was reputed to be a centre of learning in colonial times, but there was no great breadth and depth to it, and it produced nothing of real value. By nature the Spanish-American loves art and literature, and the poetic faculty is developed in him to a degree rarely found among the Teutonic races. Writing and reciting poetry are universal, and fill as important a place in social life as instrumental music. In Colombia, as elsewhere, much attention has been given to belles-lettres among the whites of Spanish descent, but as yet the republic has practically nothing of a permanent character to show for it. The natural sciences attracted attention very early through the labours of Jose Celestino Mutis, who was followed by a number of writers of local repute, such as Zea, Cabal, Caldas, Pombo, Cespedes, Camacho and Lozano. We are indebted to Humboldt for our earliest geographical descriptions of the northern part of the continent, but to the Italian, Augustin Codazzi, who became a Colombian after the War of Independence, Colombia is indebted for the first systematic exploration of her territory. Geo- graphical description has had a peculiar fascination for Colombian writers, and there have been a number of books issued since the

appearance of Codazzi's Resumen and Atlas. Historical writing has also received much attention, beginning with the early work of Jose Manuel Restrepo (1827), and a considerable number of histories, compendiums and memoirs have been published, but none of real importance. Some good work has been done in ethnography and archaeology by some writers of the colonial period, and by Ezequiel Uricoechea and Ernesto Restrepo.

Territorial Divisions and Towns. — Previously to 1903 the re- public was divided into nine departments, which were then reduced to eight by the secession of Panama. This division of the national territory was modified in 1905, by creating seven additional departments from detached portions of the old ones, and by cutting up the unsettled districts of Goajira and the great eastern plains into four intendencias. The fifteen departments thus constituted, with the official estimates of 1905 regarding their areas and populations, are as follows : —

Department.

Area sq. m.

Estimated Population.

Capital.

Estimated Population.

Antioquia .

24,400

750,000

Medellin

60,000

Atlantico . .

1,080

104,674

Barranquilla

40,115

Bolivar

23.940

250,000

Cartagena

14,000

Boyaca Caldas .

4.630

350,000

Tunja

10,000

7,920

150,000

Manizales

20,000

Cauca .

26,030

400,000

Popayan

10,000

Cundinamarca

5,060

225,000

Facatativa .

12,000

Galan .

6,950

300,000

San Gil .

15,000

Huila . . .

8,690

150,000

Neiva

10,000

Magdalena

20,460

100,000

Santa Marta

6,000

Narino

10,040

200,000

Pasto

6,000

Quesada .

2,900

300,000

Zipaquira

12,000

Santander.

11,970

300,000

Bucaramanga

20,000

Tolima

10,900

200,000

Ibague .

12,000

Tundama .

2,39°

300,000

Santa Rosa .

6,000

Federal District

200,000

Bogota .

120,000

Intendencias (4) Totals

277,620

444,980

4,279,674

Of these departments the original eight are Antioquia, Bolivar, Boyaca (or Bojaca), Cauca, Cundinamarca, Magdalena, San- tander and Tolima. The four intendencias are called Goajira, Meta, Alto Caqueta and Putumayo, and their aggregate area is estimated to be considerably more than half of the republic. The first covers the Goajira peninsula, which formerly belonged to the department of Magdalena, and the other three roughly correspond to the drainage basins of the three great rivers of the eastern plains whose names they bear. These territories formerly belonged to the departments of Boyaca, Cundinamarca and Cauca. The seven new departments are: Atlantico, taken from the northern extremity of Bolivar; Caldas, the southern part of Antioquia; Galan, the southern districts of Santander, including Charala, Socorro, Velez, and its capital San Gil; Huila, the southern part of Tolima, including the headwaters of the Magdalena and the districts about Neiva and La Plata; Narino, the southern part of Cauca extending from the eastern Cordillera to the Pacific coast; Quesada, a cluster of small, well- populated districts north of Bogota formerly belonging to Cundinamarca, including Zipaquira, Guatavita, Ubate and Pacho; and Tundama, the northern part of Boyaca lying on the frontier of Galan in the vicinity of its capital Santa Rosa. The Federal District consists of a small area surrounding the national capital taken from the department of Cundinamarca. These fifteen

departments are subdivided into provinces, 92 in all, and these into municipalities, of which there are 740.

The larger cities and towns of the republic other than the department capitals, with their estimated populations in 1904, are: —

Aguadas (Antioquia) .

Antioquia

Barbacoas (Narino) . Bugˆa (Cauca) Call (Cauca) Chiquinquira (Boyaca) La Mesa (Cundinamarca) Pamplona (Santander) Palmira (Cauca)

13,000 13,000 16,000 12,500 16,000 18,000 10,000 11,000 15.000

INDUSTRY]

COLOMBIA

707

Pie de Cuesta (Santander) 12,000

Puerto Nacional 16,000

Rio Negro (Antioquia) 12,000

Santa Rosa de Osos (Antioquia) . . . .11 ,000

Sonson .» 15,000

San Jose de Cucuta (Santander) 13,000

Soata (Boyaca) 16,000

Socorro (Galan) 20,000

Velez „ 15,000

Among the smaller towns which deserve mention are Ambalema on the upper Magdalena, celebrated for its tobacco and cigars; Buenaventura (q.v.) ; Chaparral (9000) , a market town of Tolima in the valley of the Saldana, with coal, iron and petroleum in its vicinity; Honda (6000), an important commercial centre at the head of navigation on the lower Magdalena; Girardot, a railway centre on the upper Magdalena; and Quibdo, a small river town at the head of

navigation on the Atrato.

Communications. — The railway problem in Colombia is one of peculiar difficulty. The larger part of the inhabited and productive districts of the republic is situated in the mountainous departments of the interior, and is separated from the coast by low, swampy, malarial plains, and by very difficult mountain chains. These centres of production are also separated from each other by high ridges and deep valleys, making it extremely difficult to connect them by a single transportation route. The one common outlet for these districts is the Magdalena river, whose navigable channel penetrates directly into the heart of the country. From Bogota the Spaniards constructed two partially-paved highways, one leading down to the Magdalena in the vicinity of Honda, while the other passed down into the upper valley of the same river in a south-westerly direction, over which communication was maintained with Popayan and other settlements of southern Colombia and Ecuador. This highway was known as the camino real. Political independence and misrule led to the abandonment of these roads, and they are now little better than the bridle-paths which are usually the only means of communication between the scattered communities of the Cordilleras. In some of the more thickly settled and prosperous districts of the Eastern Cordillera these bridle paths have been so much improved that they may be considered reasonably good mountain roads, the traffic over them being that of pack animals and not of wheeled vehicles. Navigation on the lower Magdalena closely resembles that of the Mississippi, the same type of light-draft, flat-bottomed steamboat being used, and similar obstacles and dangers to navigation being en- countered. There is also the same liability to change its channel, as shown in the case of Mompox, once an important and pros- perous town of the lower plain situated on the main channel, now a decaying, unimportant place on a shallow branch 20 m. east of the main river. Small steamers also navigate the lower Cauca and Nechi rivers, and a limited service is maintained on the upper Cauca. . ■

With three exceptions all the railway lines of the country lead to the Magdalena, and are dependent upon its steamship service for transportation to and from the coast. In 1906, according to an official statement, these lines were: (1) The Barranquilla and Savanilla (Puerto Colombia), 17! m. in length; (2) the Cartagena and Calamar, 65 m.; (3) the La Dorada & Arancaplumas (around the Honda rapids), 205 m. ; (4) the Colombian National, from Girardot to Facatativa, 80 m., of which 48! m. were completed in 1906; (5) the Girardot to Espinal, 135 m.,part of a projected line running south-west from Girardot; (6) the Sabana railway, from Bogota to Facatativa, 25 m.;

(7) the Northern, from Bogota to Zipaquira, 31 m.; (8) the Southern, from Bogota to Sibate, 18 m. ; and (9) the Puerto Berrio & Medellin, about 78 m. long, of which 36 are completed. The three lines which do not connect with the Magdalena are: (1) the Cucuta and Villamazar, 43J m., the latter being a port on the Zulia river near the Venezuelan frontier; (2) the Santa Marta railway, running inland from that port through the banana-producing districts, with 41ˆ m. in operation in 1907; and (3) the Buenaventura and Cali, 23 m. in operation inland from the former. This gives a total extension

of 383 m. in 1906, of which 226 were built to connect with steam-ship transportation on the Magdalena, 49 to unite Bogota, with neighbouring localities, and 108 to furnish other outlets for productive regions. There is no system outlined in the location of these detached lines, though in 1905-1908 President Reyes planned to connect them in such a way as to form an extensive system radiating from the national capital. Tramway lines were in operation in Bogota, Barranquilla and Cartagena in 1907.

The telegraph and postal services are comparatively poor, owing to the difficulty of maintaining lines and carrying mails through a rugged and uninhabited tropical country. The total length of telegraph lines in 1903 was 6470 m., the only cable connexion being at Buenaventura, on the Pacific coast. All the principal Caribbean ports and department capitals are connected with Bogota, but interruptions are frequent because of the difficulty of maintaining lines through so wild a country.

There are only five ports, Buenaventura, Barranquilla, Carta- gena, Santa Marta and Rio Hacha, which are engaged in foreign commerce, though Tumaco and Villamazar are favourably situated for carrying on a small trade with Ecuador and Ven- ezuela. Colombia has no part in the carrying trade, however, her merchants marine in 1905 consisting of only one steamer of 457 tons and five sailing vessels of 1385 tons. Aside from these, small steamers are employed on some of the small rivers with barges, called “bongoes,” to bring down produce and carry back merchandise to the inland trading centres. The coasting trade is insignificant, and does not support a regular service of even the smallest boats. The foreign carrying trade is entirely in the hands of foreigners, in which the Germans take the lead, with the British a close second. The Caribbean ports are in frequent communication with those of Europe and the United States.

Agriculture. — The larger part of the Colombian population is engaged in agricultural and pastoral pursuits. Maize, wheat and other

cereals are cultivated on the elevated plateaus, with the fruits and vegetables of the temperate zone, and the European in Bogota is able to supply his table very much as he would do at home. The plains and valleys of lower elevation are used for the cultivation of coffee and other sub-tropical products, the former being produced in nearly all the departments at elevations ranging from 3500 to 6500 ft. This industry has been greatly prejudiced by civil wars, which not only destroyed the plantations and interrupted trans- portation, but deprived them of the labouring force essential to their maintenance and development. It is estimated that the revolutionary struggle of 1899-1903 destroj'ed 10 % of the able- bodied agricultural population of the Santa Marta district, and this estimate, if true, will hold good for all the inhabited districts of the Eastern Cordillera. The best coffee is produced in the department of Cundinamarca in the almost inaccessible districts of Fusagasaga and La Palma. Tolima coffee is also considered to be exceptionally good. The department of Santander, however, is the largest pro- ducer, and much of its output in the past has been placed upon the market as " Maracaibo," the outlet for this region being through the Venezuelan port of that name. Coffee cultivation in the Santa Marta region is receiving much attention on account of its proximity to the coast.

The tropical productions of the lower plains include, among others, many of the leading products of the world, such as cacao, cotton, sugar, rice, tobacco, and bananas, with others destined wholly for home consumption, as yams, cassava and arracacha. Potatoes are widely cultivated in the temperate and sub-tropical regions, and sweet potatoes in the sub-tropical and tropical. Athough it is found growing wild, cacao is cultivated to a limited extent, and the product is insufficient for home consumption. Cottonis cultivated only on a small scale, although there are large areas suitable for the plant. The staple product is short, but experiments have been initiated in the Santa Marta region to improve it. Sugar cane is another plant admirably adapted to the Colombian lowlands, but it is cultivated to so limited an extent that the sugar produced is barely sufficient for home consumption. Both cultivation and manufacture have been carried on in the old time way, by the rudest of methods, and the principal product is a coarse brown sugar, called panela, universally used by the poorer classes as an article of food and for making a popular beverage. Antiquated refining processes are also used in the manufacture of an inferior white sugar, but the quantity produced is small, and it is unable to compete with beet-sugar from Germany. A considerable part of the sugar- cane produced is likewise devoted to the manufacture of ckicha (rum), the consumption of which is common among the

Indians and half-breeds of the Andean regions.

Rice is grown to a very limited extent, though it is a common article of diet and the partially submerged lowlands are naturally

adapted to its production. Tobacco was cultivated in New Granada and Venezuela in colonial times, when its sale was a royal monopoly and its cultivation was restricted to specified localities. The Colombian product is best known through the Ambalema, Girardot, and Palmira tobacco, especially the Ambalema cigars, which are considered by some to be hardly inferior to those of Havana, but the plant is cultivated in other places and would probably be an im- portant article of export were it possible to obtain labourers for its cultivation. Banana cultivation for commercial purposes is a comparatively modern industry, dating from 1892 when the first recorded export of fruit was made. Its development is due to the efforts of an American fruit-importing company, which purchased lands in the vicinity of Santa Marta for the production of bananas and taught the natives that the industry could be made profitable. A railway was built inland for the transportation of fruit to Santa Marta, and is being extended toward the Magdalenaas fast as new plantations are opened. The growth of the industry is shown in the export returns, which were 171,891 bunches for 1892, and 1,397,388 bunches for 1906, the area under cultivation being about 7000 acres in the last-mentioned year. Yams, sweet potatoes, cassava and arracacha are chiefly cultivated for domestic needs, but in common with other fruits and vegetables they give occupation to the small agriculturalists near the larger towns.

The pastoral industry dates from colonial times and engages the services of a considerable number of people, but its comparative importance is not great. The open plains, ” mesas,” and plateaus of the north support large herds of cattle, and several cattle ranches have been established on the Meta and its tributaries. Live cattle, to a limited extent, are exported to Cuba and other West Indian markets, but the chief produce from this industry is_ hides. The department of Santander devotes considerable attention to horse- breeding. Goats are largely produced for their skins, and in some localities, as in Cauca, sheep are raised for their wool. Swine are common to the whole country, and some attention has been given to the breeding of mules.

Minerals. — The mineral resources of Colombia are commonly believed to be the principal source of her wealth, and this because of the precious metals extracted from her mines since the Spanish invasion. The estimate aggregate for three and a half centuries is certainly large, but the exact amount will probably never be known, because the returns in colonial times were as defective as those of disorderly independence have been. Humboldt and Chevalier estimated the total output down to 1845 at £1,200,000, which Professor Soetbeer subsequently increased to £169,422,750. A later Colombian authority, Vicente Restrepo, whose studies of gold and silver mining in Colombia have been generally accepted as conclusive and trustworthy, after a careful sifting of the evidence on which these two widely diverse conclusions were based and an examination of records not seen by Humboldt and Soetbeer, reaches the conclusion that the region comprised within the limits of the republic, including Panama, had produced down to 1886 an aggregate of £127,800,000 in gold and £6,600,000 in silver. This aggregate he distributes as follows : —

1 6th century £10,600,000

17th ,, 34,600,000

18th ,, 41,000,000

19th ,, 41,600,000

According to his computations the eight Colombian departments, omitting Panama, had produced during this period in gold and silver : —

Antioquia £50,000,000

Cauca . 49,800,000

Tolima. . 10,800,000

Santander 3,000,000

Bolivar 1,400,000

Cundinamarca 360,000

Magdalena • . 200,000

Boyaca 40,000

£115,600,000 Three-fourths of the gold production, he estimates, was derived from alluvial deposits. Large as these aggregates are, it will be seen that the annual production was comparatively small, the highest average, that for the 19th century, being less than £500,000 a year. Toward the end of the 19th century, afrer a decline in production due to the abolition of slavery and to civil wars, in- creased interest was shown abroad in Colombian mining operations. Medellin, the capital of Antioquia, is provided with an electrolytic refining establishment, several assaying laboratories, and a mint. The department of Cauca is considered to be the richest of the republic in mineral deposits, but it is less conveniently situated for carrying on mining operations. Besides this, the extreme unhealthiness of its most productive regions, the Choc6 and Bar- bacoas districts on the Pacific slope, has been a serious obstacle to foreign enterprise. Tolima is also considered to be rich in gold and (especially) silver deposits. East of the Magdalena the production of these two metals has been comparatively small. In compensation the famous emerald mines of Muzo and Coscuez are situated in an extremely mountainous region north of Bogota and near the town of

Chiquinaquira, in the department of Boyaca. The gems are found in a matrix of black slate in what appears to be the crater of a volcano, and are mined in a very crude manner. The mines are owned by the government. The revenue was estimated at £96,000 for 1904. Platinum is said to have been discovered in Colombia in 1720, and has been exported regularly since the last years of the 1 8th century. It is found in many parts of the country, but chiefly in the Choco and Barbacoas districts, the annual export from the former beingabout lo,oooin value. Of the bulkier and less valuable minerals Colombia has copper, iron, manganese, lead, zinc and mercury. Coal is also found at several widely-separated places, but is not mined. There are also indications of petroleum in Tolima and Bolivar. These minerals, however, are of little value to the country because of their distance from the seaboards and the costs of transportation. Salt is mined at Zipaquira, near Bogota, and being a government monopoly, is a source of revenue to the national treasury.

Manufactures. — The Pradera iron works, near Bogota, carry on some manufacturing (sugar boilers, agricultural implements, &c.) in connexion with their mining and reducing operations. Pottery and coarse earthenware are made at Espinal, in Tolima, where the natives are said to have had a similar industry before the Spanish conquest. There are woollen mills at Popayan and Pasto, and small cigar-making industries at Ambalema and Palmira. Hat-making from the ” jipijapa ” fibre taken from the Carludovica palm is a domestic industry in many

localities, and furnishes an article of export. Friction matches are made from the vegetable wax extracted from the Ceroxylon palm, and are generally used throughout the interior. Rum and sugar are products of a crude manufacturing industry dating from colonial times. A modern sugar-mill and refinery at Sincerin, 28 m. from Cartagena, was the first of its kind erected in the republic. It is partially supported by the government, and the concession provides that the production of sugar shall not be less than 2,600,000 lb per annum.

Commerce.- — In the Barranquilla customs returns for 1906 the imports were valued at $6,787,055 (U.S. gold), on which the import duties were $4,333,028, or an average rate of 64%. According to a statistical summary issued in 1906 by the U.S. Bureau of Statistics,. entitled ” Commercial America in 1905,” the latest official return to the foreign trade of Colombia was said to be that of 1898, which was: imports 11,083,000 pesos, exports 19,158,000 pesos. Un- certainty in regard to the value of the peso led the compiler to omit the equivalents in U.S. gold, but according to foreign trade returns these totals represent gold values, which at 4s. per peso are: imports £2,216,600, exports £3,831,600. In his annual message to congress on the 1st of April 1907, President Reyes stated that the imports for 1904 were $14,453,000, and the exports $12,658,000, presumably U.S. gold, as the figures are taken from the Monthly Bulletin of the Bureau cf American Republics (July 1907). An approximate equivalent would be: imports £3,011,000, exports £2,637,000; which shows a small increase in the first and a very large decrease in the second. The imports include wheat flour, rice, barley, prepared foods, sugar, coal, kerosene, beer, wines and liquors, railway equipment, machinery and general hardware, fence wire, cotton and other textiles, drugs, lumber, cement, paper, &c, while the exports comprise coffee, bananas, hides and skins, tobacco, precious metals, rubber, cabinet woods, divi-divi, dye-woods, vegetable ivory, Panama hats, orchids, vanilla, &c.

Government. — The government of Colombia is that of a centralized republic composed of 15 departments, 1 federal district, and 4 intendencias (territories). It is divided into three co-ordinate branches, legislative, executive and judicial, and is carried on under the provisions of the constitution of 1886, profoundly modified by the amendments of 1905. Previous to 1886, the departments were practically independent, but under the constitution of that year the powers of the national govern- ment were enlarged and strengthened, while those of the depart- ments were restricted to purely local affairs. The departments are provided with biennial departmental assemblies, but their governors are appointees of the national executive.

The legislative branch consists of a senate and chamber of deputies, which meets at Bogota biennially (after 1908) on February 1st for an ordinary session of ninety days. The Senate is composed of 48 members — 3 from each department chosen by the governor and his departmental council, and 3 from the federal district chosen by the president himself and two of his cabinet ministers. Under this arrangement the president practically controls the choice of senators. Their term of office is four years, and is renewed at the same time and for the same period as those of the lower house. The chamber is composed of 67 members, elected by popular suffrage in the departments, on the basis of one representative for each 50.000 of population. The intendencias are represented by one member each, who is chosen by the intendant, his secretary, and 3 citizens elected

by the municipal council of the territorial capital. As the constituent assembly which amended the constitution, according to the president’s wishes in 1905, was to continue in office until 1908 and to provide laws for the regulation of elections and other public affairs, it appeared that the president would permit no expression of popular dissent to interfere with his purpose to establish a dictatorial regime in Colombia similar to the one in Mexico.

The executive power is vested in a president chosen by Con- gress for a period of four years. The first presidential period, dating from the 1st of January 1905, was for ten years, and no restriction was placed upon the choice of President Rafael Reyes to succeed himself. The constituent assembly gave the presi- dent exceptional powers to deal with all administrative matters. He is assisted by a cabinet of six ministers, interior, foreign affairs, finance, war, public instruction and public works, who are chosen and may be removed by himself. The office of vice- president is abolished, and the president is authorized to choose a temporary substitute from his cabinet, and in case of his death or resignation his successor is chosen by the cabinet or the governor of a department who happens to be nearest Bogota at the time. The president is authorized to appoint the governors of departments, the intendants of territories, the judges of the supreme and superior courts, and the diplomatic representatives of the republic. His salary, as fixed by the 1905 budget, is £3600 a year, and his cabinet ministers receive £1200 each. The council of state is

abolished and the senate is charged with the duty of confirming executive appointments.

The judicial branch of the government, like the others, has been in great measure reorganized. It consists of a supreme court of seven members at Bogota, and a superior court in each judicial district. There are various inferior courts also, includ- ing magistrates or jueces de paz, but their organization and functions are loosely defined and not generally understood outside the republic. The supreme court has appellate juris- diction in judicial matters, and original jurisdiction in impeach- ment trials and in matters involving constitutional interpretation. Under the constitution of 1886 the judges of the higher courts were appointed for life, but the reforms of 1905 changed their tenure to five years for the supreme court and four years for the superior courts, the judges being eligible for re-appointment.

The departments, which are administered by governors repre- senting the national executive, are permitted to exercise restricted legislative functions relating to purely local affairs. Municipal councils are also to be found in the larger towns. The governor is assisted by a departmental council consisting of his secretaries and the president of the Corte de Cuentas, which places the political administration of the department under the direct control of the president at Bogota.

The strength of the army is determined annually by congress, but every able-bodied citizen is nominally liable to military service. Its peace footing in 1898 was 1000 men. After the war of 1899-1903 its strength was successively reduced to 10,000 and 5000, a part of this force being employed in the useful occupation of making and repairing public roads. The navy in 1906 consisted of only three small cruisers on the Caribbean coast, and two cruisers, two gunboats, one troopship and two steam launches on the Pacific. There was also one small gun- boat on the Magdalena.

Education. — Although Bogota was reputed to be an educational centre in colonial times, so slight an influence did this exert upon the country that Colombia ended the 19th century with no effective public school system, very few schools and colleges, and fully 90 % of illiteracy in her population. This is due in great measure to the long reign of political disorder, but there are other causes as well. As in Chile, the indifference of the ruling class to the welfare of the common people is a primary cause of their ignorance and poverty, to which must be added the apathy, if not opposition, of the Church. Under such conditions primary schools in the villages and rural districts were practically unknown, and the parish priest was the only educated

person in the community. Nominally there was a school system under the supervision of the national and departmental governments, but its activities were limited to the larger towns, where there were public and private schools of all grades. There were universities in Bogota and Medellin, the former having faculties

of letters and philosophy, jurisprudence and political science, medicine and natural sciences, and mathematics and engineering, with an attendance of 1200 to 1500 students. The war of 1899-1903 so completely disorganized this institution that only one faculty, medicine and natural sciences, was open in 1907. There were also a number of private schools in the larger towns, usually maintained by religious organizations. The reform programme of President Reyes included a complete reorganization of public instruction, to which it is proposed to add normal schools for the training of teachers, and agricultural and technical schools for the better development of the country's material resources. The supreme direction of this branch of the public service is entrusted to the minister of public instruction, and state aid is to be extended to the secondary, as well as to the normal, technical and professional schools. The secondary schools receiving public aid, however, have been placed in charge of religious corporations of the Roman Catholic Church. The ex- penditure on account of public instruction, which includes schools of all grades and descriptions, is unavoidably small, the appropriation for the biennium 1905-1906 being only £167,583. The school and college attendance for 1906, according to the president's review of that year, aggregated 218,941, of whom 50,691 were in Antioquia, where the whites are more numerous'than in any other department ; 4916 in Atlantico, which includes the city of Barranquilla, and in which the negro element preponderates; and only 12,793 in the federal district and city of Bogota where the mestizo element is numerous. Although primary instruction is gratuitous it is not compulsory, and these figures clearly demonstrate that school privileges have not been extended much beyond the larger towns. The total attendance, however, compares well with that of 1897, which was 143,096, although it shows that only 5 % of the population, approximately, is receiving instruction.

Religion. — The religious profession of the Colombian people is Roman Catholic, and is recognized as such by the constitution, but the exercise is permitted of any other form of worship which is not contrary to Christian morals or to the law. There is one Protes- tant church in Bogota, but the number of non-Catholics is small and composed of foreign residents. There has been a long struggle between liberals and churchmen in Colombia, and at one time the latter completely lost their political influence over the government, but the

common people remained loyal to the Church, and the upper classes found it impossible to sever the ties which bound them to it. The constitution of 1861 disestablished the Church, confiscated a large part of its property, and disfranchised the clergy, but in 1886 political rights were restored to the latter and the Roman Catholic religion was declared to be the faith of the nation. The rulers of the Church have learned by experience, however, that they can succeed best by avoiding partisan conflicts, and the archbishop of Bogota gave effect to this in 1874 by issuing an edict instructing priests not to interfere in politics. The Church influence with all classes is practically supreme and unquestioned, and it still exercises complete control in matters of education. The Colombian hierarchy consists of an archbishop, residing at Bogota, 10 bishops, 8 vicars-general, and 2170 priests. There were also in 1905 about 750 members of 10 monastic and religious orders. There were 270 churches and 312 chapels in the republic. Each diocese has its own seminary for the training of priests.

Finance. — In financial matters Colombia is known abroad chiefly through repeated defaults in meeting her bonded indebtedness, and through the extraordinary depreciation of her paper currency. The public revenues are derived from import duties on foreign merchandise, from export duties on national produce, from internal taxes and royalties on liquors, cigarettes and tobacco, matches, hides and salt, from rentals of state emerald mines and pearl fisheries, from stamped paper, from port dues and from postal and telegraph charges. The receipts and expenditure are estimated for biennial periods, but it has not been customary to publish detailed results. Civil wars have of course been a serious obstacle, but it was an- nounced by President Reyes in 1907 that the revenues were increas- ing. For the two years 1905 and 1906 the revenues were estimated to produce (at $5 to the £1 sterling) £4,203,823, the expenditures being fixed at the same amount. The expenditures, however, did not include a charge of £424,000, chiefly due on account of war claims and requisitions. During the first year of this period the actual receipts, according to the council of the corporation of foreign bondholders, were $9,149,591 gold (£1,829,918) and the payments $7. 33.3I7 gold (£1,406,663). It was expected by the government that the 1906 revenues would largely exceed 1905, but the expecta- tion was not fully realized, chiefly, it may be assumed, because of the inability of an impoverished people to meet an increase in taxation. An instance of this occurred in the promising export of live cattle to Cuba and Panama, which was completely suppressed in 1906 because of a new export tax of $3 gold per head. Of the expenditures about one-fourth is on account of the war department.

The foreign debt, according to the 1896 arrangement with the bondholders which was renewed in 1905, is £2,700,000, together with unpaid interest since 1896 amounting to £351,000 more. Under the 1905 arrangement the government undertook to pay the first coupons at i\ %, and succeeding ones at 3 , pledging 12 to 15 of the customs receipts as security. The first payments were made according to agreement, and it was believed in 1907 that the

succeeding ones, together with one-half of the unpaid interest since 1896, would also be met. It is worthy of note that this debt, principal and accumulated interest, exceeded six and a half millions sterling in 1873, and that the bondholders surrendered about 60% of the claim in the hope of securing the payment of the balance. It is also worthy of note that Panama refused to assume any part of this debt without a formal recognition of her independence by Colombia, and even then only a sum proportionate to her population. The internal debt of Colombia in June 1906 was as follows: —

Consolidated 5,476,887 dollars silver,

Floating 2,345,658 „ gold.

Whether or not this included the unpaid war claims was not stated. Money. — The monetary system, which has been greatly compli cated by the use of two depreciated currencies, silver and paper, has been undergoingaradical reform since 1905, the government proposing to redeem the depreciated paper and establish a new uniform currency on a gold basis. The paper circulation in 1905 exceeded 700,000,000 pesos. The issue began in 1881 through the Banco Nacional de Colombia, its value then being equal to that of the silver coinage. Political troubles in 1884-1885 led to a suspension of cash payments in 1885, and in 1886 Congress made the notes inconvertible and of forced circulation. In 1894 the Banco Nacional ceased to exist as a corporation, and thenceforward the currency was issued for account of the national treasury. On October 16, 1899 — the outstanding circulation then amounting to 46,000,000 pesos, — the government decreed an unlimited issue to meet its expenditures in suppressing the revolution, and later on the departments of Antioquia, Bolivar, Cauca, and Santander were authorized to issue paper money for themselves.

This suicidal policy continued until February 28, 1903, when, according to an official statement, the outstanding paper circulation was: —

Pesos. National government issues. . . . 600,398,581

Department of Antioquia Bolivar Cauca Santander

35.938495-60 18,702,100 44,719,688-70 750,000

700,598,865-30

So great was the depreciation of this currency that before the end of the war 100 American gold dollars were quoted at 22,500 pesos. The declaration of peace brought the exchange rate down to the neighbourhood of 10,000, where it remained, with the exception of a short period during the Panama Canal negotiations, when it fell to 6000. This depreciation (10,000) was equivalent to a loss of 99% of the nominal value of the currency, a paper peso of 100 centavos being worth only one centavo gold. International commercial transactions were based on the American gold dollar, which was usually worth 100 pesos of this depreciated currency. Even at this valuation, the recognized outstanding circulation (for there had been fraudulent issues as well) amounted to more than £1,400,000. In 1903 Congress adopted a gold dollar of 1-672 grammes weight 900 fine (equal to the U.S. gold dollar) as the monetary standard created a redemption bureau for the withdrawal of the paper circulation, prohibited the further issue of such currency, and authorized free contracts in any currency. Previous to that time the law required all contracts to specify payments in paper currency ._ Certain rents and taxes were set aside for the use of the redemption bureau, and a nominally large sum has been withdrawn from circulation through this channel. On the 1st of January 1906, another monetary act came into operation, with additional provisions for currency re demption and improvement of the monetary system. _ A supple- mentary act of 1906 also created a new national banking institution, called the Banco Central, which is made a depository of the public revenues and is charged with a considerable part of their administra- tion, including payments on account of the foreign debt and the conversion of the paper currency into coin. The new law likewise reaffirmed the adoption of a gold dollar of I -672 grammes -900 fine as the unit of the new coinage, which is : — Gold : —

Double condor = 20 dollars.

Condor =10 ,,

Half condor =5 ,,

Dollar (mon. unit) = 100 cents. Silver : —

Half dollar = 50 cents.

Peseta =20 ,,

Real = 10

Nickel: — 5 cents. Bronze: — 2 cents and I cent. The silver coinage (-900 fine) is limited to 10%, and the nickel and bronze coins to 2 % of the gold coinage. The new customs tariff, which came into force at the same time, was an increase of 70 % on the rates of 1904, and provided that the duties should be paid in gold, or in paper at the current rate of exchange. This measure was designed to facilitate the general resumption of specie payments. . Weights and Measures. — The metric system of weights and measures has been the legal standard in Colombia since 1857, but its use is confined almost exclusively to international trade. In the

interior and in all domestic transactions the old Spanish weights and measures are still used — including the Spanish libra of 1 -102 lb avoirdupois, the arroba of 25 libras (12 J kilogrammes), the quintal of 100 libras (50 kilog.), the carga of 250 libras (125 kilogs.), the vara of 80 centimetres, and the fanega. The litre is the standard liquid measure. (A. J. L.)

History

The coast of Colombia was one of the first parts of the American continent visited by the Spanish navigators. Alonso de Ojeda touched at several points in 1499 and 1501; and Columbus himself visited Veragua, Portobello, and other places in his last voyage in 1502. In 1508 Ojeda obtained from the Spanish crown a grant of the district from Cape Vela westward to the Gulf of Darien, while the rest of the country from the Gulf of Darien to Cape Gracias-a-Dios was bestowed on his fellow-adventurer, Nicuessa. The two territories designated respectively Nueva Andalucia and Castella de Oro were united in 15 14 into the province of Tierra-firma, and entrusted to Pedro Arias de Avila. In 1536-153 7 an expedition under Gonzalo Jimenez de Quesada made their way from Santa Marta inland by the river Magdalena, and penetrated to Bogota, the capital of the Muiscas or Chibchas. Quesada gave to the country the name of New Granada.

By the middle of the century the Spanish power was fairly established, and flourishing communities arose along the coasts, and in the table-lands of Cundinamarc'a formerly occupied by the Muiscas. For the better government of the colony the Spanish monarch erected a presidency of New Granada in 1564, which continued till 1718, when it was raised to the rank of a vice- royalty. In the following year, however, the second viceroy, D. Jorge Villalonga, Count de la Cueva, expressing his opinion that the maintenance of this dignity was too great a burden on the settlers, the viceroyalty gave place to a simple presidency. In 1740 it was restored, and it continued as long as the Spanish authority, including within its limits not only the present Colombia, but also Venezuela and Ecuador. An insurrection against the home government was formally commenced in 181 1, and an incessant war against the Spanish forces was waged till

1824.

In 1819 the great national hero, Bolivar (

in the hands of General Jose Hilario Lopez, a member of the democratic party, and under him various changes were effected of a liberal tendency. In January 1852 slavery was entirely abolished. The next president was Jose Maria Obando, but his term of office had to be completed by vice-presidents Obaldia and Mallarino.

In 1853 an important alteration of the constitution took place, by which the right was granted to every province to declare itself independent, and to enter into merely federal connexion with the central republic, which was now known as the Granadine Confederation. In 1856 and 1857 Antioquia and Panama took advantage of the permission. The Conservative party carried their candidate in 1857, Mariano Ospino, a lawyer by profession; but an insurrection broke out in 1859, which was fostered by the ex-president Mosquera, and finally took the form of a regular civil war. Bogota was captured by the democrats in July 1861, and Mosquera assumed the chief power. A congress at Bogota established a republic, with the name of the United States of Colombia, adopted a new federal constitution, and made Mosquera dictator. Meanwhile the opposite party was victorious in the west; and their leader, Julio

Arboleda, formed an alliance with Don Garcia Moreno, the president of Ecuador. He was assassinated, however, in 1862; and his successor, Leonardo Canal, came to terms with Mosquera at Cali. The dictatorship was resigned into the hands of a convention (February 1863) at Rio Negro, in Antioquia; a provisional government was appointed, a constitution was drawn up, and Mosquera elected president till 1864. An unsuccessful attempt was also made to restore the union between the three republics of the former federation. The presidency of Manuel Murillo Toro (1864-1866) was disturbed by various rebellions, and even Mosquera, who next came to the helm, found matters in such a disorganized condition that he offered to retire. On the refusal of his resignation, he entered into a struggle with the majority in the congress, and ultimately resorted to an adjournment and the unconstitutional arrest of 68 of the senators and representatives. To the decree of impeachment published by the congress he replied by a notice of dissolution and a declaration of war; but he soon found that the real power was with his opponents, who effected his arrest, and condemned him first to two years' im- prisonment, but afterwards by commutation to two years' exile. The presidency of Santos Gutierrez (1868-1870) was disturbed by insurrections in different parts of the republic, the most important of which was that in Panama, where the most absolute disorganization prevailed. Under his successor, General E. Salgar, a Liberal candidate elected in opposition to General Herran, a treaty was finally concluded with the United States in connexion with an interoceanic canal, a bank was established at Bogota, and educational reforms instituted. Manuel Murillo Toro (1872-1874) and Santiago Perez (1874-1876) saw the country apparently acquiring constitutional equilibrium, and turning its energies to the development of its matchless resources.

The election for the presidential term 1876-1878 resulted in favour of Aquiles Parra, who was succeeded in April 1878 by General Julian Trujillo. His administration was marked by a strong effort to place the financial position of the government on a more satisfactory footing, and the internal indebtedness was substantially reduced during his rule. In April 1880 Senor Rafael Nunez acceded to the presidency. During his term of office revolutionary disturbances occurred in the provinces of Cauca and Antioquia, but were suppressed with no great diffi- culty. Provision was made in 1880 for a settlement of the boundary dispute with Costa Rica, and in July of that year the federal Congress authorized the formation of a naval squadron. A movement was now set afoot in favour of a confederation of the three republics of Colombia, Ecuador and Venezuela on the basis of the original conditions existing after the expulsion of Spanish authority, and a

resolution was passed by the chamber of deputies to that effect. The opposition shown by Venezuela and Ecuador to this project prevented any definite result from being achieved. In April 1882 Senor Francisco J. Laldua became president, but his death occurring a year later, General Jos6

Eusebio Otalora was nominated to exercise the executive power for the unexpired portion of the term. In 1883 the dispute in connexion with the boundary between Colombia and Venezuela was submitted by the two governments to the arbitration of Alphonso XII., king of Spain, and a commission of five members was appointed to investigate the merits of the respective claims. The decision in this dispute was finally given by the queen regent of Spain on the 16th of March 1891. In April 1884 Senor Rafael Nunez was again proclaimed president of the republic in his absence abroad. Pending his return the administration was left in the hands of General Campo Serrano and General Eliseo Payan. The Liberal party had been instrumental in the re- election of Nunez, and looked for a policy in conformity with their views and political convictions. President Nunez had no sooner returned to Colombia than the Liberals discovered that his political opinions had changed and had become strongly Conservative. Discontent at this condition of affairs soon spread. Nunez from motives of ill-health did not openly assume the presidential office, but from his house near Cartagena he practically directed the government of the republic. The Liberals now began to foment a series of revolutionary movements, and these led in 1885 to a civil war extending over the departments of Boyaca, Cundinamarca, Magdalena and Panama. General Reyes and General Velez were the two principal leaders of the revolt. In order to protect the passage of the traffic across the Isthmus of Panama during these disturbed times detachments of United States marines were landed at Panama and Colon, in accordance with the terms of the concession under which the railway had been constructed. After a number of defeats the leaders of the revolt surrendered in August 1885, and on the 5th of September following peace was officially proclaimed. Nunez, who had meanwhile assumed the presidential duties, now brought about a movement in favour of a fresh Act of Constitution for Colombia, and a new law to that effect was finally approved and promulgated on 4th August 1886. Under the terms of this act the federal system of government for Colombia was abolished, the states becoming departments, the governors of these political divisions being appointed by the president of the republic. Each department has a local legislative assembly elected by the people. The national congress is con- stituted of the Senate and the House of Representatives. The

Senate is composed of twenty-seven members elected for six years, one-third retiring every two years, three of whom are nominated by each of the nine departments. The House of Representatives comprises members elected for four years by universal suffrage, each department forming a constituency and returning one member for every 50,000 inhabitants. Congress convenes every two years. The presidential term of office under the new act was fixed at six years in place of the two years formerly prevailing. The judiciary was irremovable, and trial by jury was allowed for criminal offences. Capital punishment was re-established, and the press was made responsible for matter published. The unlicensed trade in arms and ammunition thitherto existing was prohibited. Previous to 1886 the crime of murder was only punishable by 10 years' imprisonment, a sentence which in practice was reduced to two-thirds of that term; slander and libel were formerly offences which the law had no power to restrain, and no responsibility attached to seditious publications.

After the promulgation of this new Act of Constitution President Nunez was proclaimed as president of the republic for the term ending in 1892. He was unable, however, in con- sequence of ill-health, to reside at Bogota and discharge the presidential duties, and consequently in August 1888 Senor Carlos Holguin was designated to act for him. In 1892 President Nunez was again elected to the presidency for a term of six years, his continued ill-health, however, forcing him to place the active performance of his duties in the hands of the vice-president, Senor Miguel Caro. In 1895 the Liberals made another attempt to seize the government of the country, but the movement was suppressed without any very great difficulty. In this same year Nunez died, and Vice-President Caro became the actual president,

an office he had practically filled during the three previous years. In 1898 Senor M. A. Sanclemente, a strong Conservative, and supported by the Church party, was elected to the presidency for the period ending in 1904. In October 1899 the Liberals organized another revolutionary outbreak for the purpose of trying to wrest the power from Conservatives, but this attempt had no better success than the movements of 1885 and 1895. In January 1900, however, Vice-President Jose Marroquin seized upon the government, imprisoned

President Sanclemente (who died in prison in March 1902), and another period of disturbance began. The rebels were defeated in May in a desperate battle at Cartagena; and continuous fighting went on about Panama, where British marines had to be landed to protect foreign interests. As the year 1900 advanced, the conflict went on with varying success, but the government troops were generally victorious, and in August Vice-President Marroquin was recog- nized as the acting head of the executive, with a cabinet under General Calderon. In 1901 the rebellion continued, and severe fighting took place about Colon. Further complications arose in August, when trouble occurred between Colombia and Vene- zuela. On the one hand, there were grounds for believing that the Clericals and Conservatives in both countries were acting together; and, on the other, it was expected that President Castro of Venezuela would not be sorry to unite his own country- men, and to divert their attention from internal affairs, by a war against Colombia. The Colombian revolutionary leaders had made use of the Venezuelan frontier as a base of operations, and the result was an invasion of Venezuelan territory by Colombian government troops, an incident which at once caused a diplomatic quarrel. The United States government in September offered its good offices, but President Castro refused them, and the state of affairs became gradually more menacing. Meanwhile both Panama and Colon were seriously threatened by the rebel forces, who in November succeeded in capturing Colon by surprise. The situation was complicated by the fact that the railway traffic on the Isthmus was in danger of interruption, and on the capture of Colon it became necessary for the American, British and French naval authorities to land men for the protection of the railway and of foreign interests.

On the 1 8th of September the Venezuelans, who had entered Colombia, were totally routed near La Hacha, and after fierce fighting the insurgents at Colon were compelled to surrender on the 29th of November. But the Civil War was not yet ended. For another eight months it was to continue, causing immense damage to property and trade, and the loss of tens of thousands of lives. In many towns and villages the male population was almost entirely destroyed. Not till June 1903 was internal peace finally restored. In the autumn of that same year Colombia, exhausted and half ruined, was to suffer a further severe loss in the secession of Panama.

The abrogation of the Clayton-Bulwer treaty in 1901, and the failure of the second French company to construct a canal between Colon and Panama (see Panama Canal) had, after many hesitations, induced the United States government to abandon the Nicaragua route and decide

on adopting that of Panama. Negotiations were set on foot with Colombia, and an arrangement —under what was known as the Hay-Herran treaty — was made to the following effect. Colombia agreed (1) to the transfer of the rights, under the concession, of the French company to the United States; (2) to cede, on a hundred years' lease, a right of way for the canal, and a strip of land 5 m. broad on either side of the waterway, and the two ports of Colon and Panama. The United States agreed to pay Colombia (1) £2,000,000 down in cash, and, ten years later, an annual rental of £50,000, and further a share of the price paid to the French company, i.e. £8,000,000, in which Colombia held 50,000 shares. This treaty was signed by the plenipotentiaries and ratified by the United States Senate. The Colombian Congress, however, refused to ratify the treaty on the ground that when the negotiations had taken place the country was in a state of siege, really in the hope of securing a larger money payment. The adjournment took place on the 3 1st of October. On the 3rd of November a revolution broke out at

Panama, and the. state seceded from Colombia and declared itself to be an independent republic. This opportune revolution was no doubt fomented by persons interested in the carrying through of the United States scheme for piercing the isthmus, but their task was one that presented no difficulties, for the isthmian population had been in a state of perennial insurrection against the central government for many years. Whoever may have instigated the rising, this much is certain, that American warships prevented the Colombian troops from landing to suppress the revolt. On the 7th of November the United States government formally recognized the independence of the republic of Panama (q.v.). The other powers in succession likewise recognized the new state; the recognition of Great Britain was given on the 26th of December. Colombia thus sacrificed a great opportunity of obtaining, by the ratification of the Hay-Herran treaty, such a pecuniary recompense for the interest in the territory through which the canal was to be constructed as would have gone far to re-establish her ruined financial credit.

In 1904 the troubled term of President Marroquin came to an end, and by the narrowest of maj orities General Rafael Reyes was ejected in his place. He had been sent as a special envoy to Washington to protest against the recognition of Panama, and to attempt to revive the Hay-Herran treaty, and to secure favourable terms for Colombia in the matter of the canal. He failed to do so, but it was recognized that he had discharged his difficult task with great skill and ability. On his accession to office ■ as president he found the country exhausted and disorganized, more especially in the department of finance, and the

congress was on the whole hostile to him. Finding himself hampered in his efforts to reform abuses, the president dissolved the congress, and summoned a national constituent and legis- lative assembly to meet on the 15th of March 1905, and with its aid proceeded to modify the constitution.

Having personal acquaintance with the success of the rule of President Porfirio Diaz in Mexico, General Reyes determined to set about the regeneration of Colombia by similar methods. His tenure of the presidency was extended to a term of ten years from the 1st of January 1905, and the restriction as to re-election at the end of that term was withdrawn, other alterations being made in the constitution with the effect of placing General Reyes really in the position of a dictator. He soon proved that he had the ability and the integrity of purpose to use his great oppor- tunity for the benefit of his country. His firm and masterful government and wise measures did much to allay the spirit of unrest which had so long been the bane of Colombia, and though an attempt at assassination was made in the spring of 1906, the era of revolution appeared to be over.

The chief foreign treaties entered into by Colombia in the last quarter of the 19th century were: — (1) A treaty with Great Britain, signed on the 27th of October 1888, for the extradition of criminals; (2) a treaty of friendship, commerce and navigation with Italy, signed on the 27th of October 1892; (3) two protocols with Italy, signed respectively on the 24th of May and on the 25th of August 1886, in connexion with the affair of the Italian subject Cerruti; (4) a consular convention with Holland, signed on the 20th of July 1881; (5) a treaty of peace and friendship with Spain, signed on the 30th of January 1881; (6) a convention with Spain for the reciprocal protection of intellectual property; (7) a concordat with the Vatican, signed on the 31st of December 1887; (8) an agreement with the Vatican, signed on the 20th of August 1892, in connexion with ecclesiastical jurisdiction; (9) an agreement with the republic of San Salvador, signed On the 24th of December 1880, in regard to the despatch of a delegate to an international congress; (10) a treaty of peace, friendship and commerce with Germany, signed on the 23rd of July 1892; (n) a treaty with the republic of Costa Rica, signed in 1880, for the delimitation of the boundary; (12) the postal convention, signed at Washington, on the 4th of July 1891 ; (13) a convention with Great Britain, signed on the 31st of July 1896, in connexion with the claim of Messrs Punchard, M'Taggart, Lowther & Co. ; (14) a treaty of friendship, commerce and navigation with Peru, signed on the 6th of August

1898; (15) an extradition treaty with Peru, signed on the 6th of August 1898; (16) a treaty of peace, friendship and defensive alliance with Venezuela, signed on the 21st of November 1896, and on the same date a treaty regulating the frontier commerce. (G. E.)

Authorities. — C. E. Akers, A History of South America, 1854- 1904 (New York, 1905); J. J. Borda, Compendio de historic de Colombia (Bogota, 1890); Salvador Roldan Camacho, Notas de viaje (Bogota, 1890), and Escritos varios (Bogota, 1892) ; Dr Alfred Hettner, Reisen in den colombianischen Anden (Leipzig, 1888); Angel Lemos, Compendio de geografia de la Republica de Colombia (Medellin, 1894); Albert Millican, Travels and Adventures of an Orchid Hunter (London, 1891); J. M. Cordovez Mauro, Reminis- cencias Santafe y Bogota (Bogota, 1899) ; N orris and Laird (Bureau of Navigation), Telegraphic Determination of Longitudes in Mexico, Central America, the West Indies, and on the North Coast of South America (Washington, 1891); R. Nunez and H. Jalhay, La Re- publique de Colombia, geographie, histoire, &c. (Bruxelles, 1893); J. M. Q. Otero, Historia Patria (Bogota, 1891); Lisimaco Patau, La Republica de Colombia (1893); M. Paz and F. Perez, Atlas geogrdfico e historico de la Republica de Colombia (1893); R. S. Pereira, Les jitats Unis de Colombia (Paris, 1883) ; Felipe Perez, Geografia general, fisica y politico de los Estados Unidos de Colombia (Bogota, 1883) ; F. Loraine Petrie, The Republic of Colombia (London, 1906); Elisee Reclus, Geografia de Colombia (Bogota, 1893); W. Reiss and A. Stiibel, Reisen in Siidamerika. Geologische Studien in der Republik Colombia (Berlin, 1893); Ernesto Restrepo, Ensayo etnografico y arqueologico de la provincia de los Quimbayas (Bogota, 1892), and Estudios sobre los aborigines de Colombia (Bogota, 1892) ; Vicente Restrepo, Estudio sobre las minas de oro y plata de Colombia (Bogota, 1888, translated by C. W. Fisher, New York, 1886); W. L. Scruggs, The Colombian and Venezuelan Republics (London, 1899; Boston, 1900); W. Sievers, Reisen in der Sierra Nevada de Santa Maria (Leipzig, 1887) ; F. J. Vergaray Velasco, Nueva geografia de Colombia (Bogota, 1892) ; Frank Vincent, Around and About South America (New York, 1890); R. G. Watson, Spanish and Portuguese South America during the Colonial Period (2 vols., London, 1884). _

See also the diplomatic and consular reports of Great Britain and the United States; publications of the International Bureau of American Republics (Washington, D.C.) ; Bureau of Statistics, Com- mercial

America in 1905 (Washington, 1906).

COLOMBIER, PIERRE BERTRAND DE (1299-1361), French cardinal and diplomatist, was born at Colombier in Ardeche. He was nephew and namesake of Cardinal Pierre Bertrand of Annonay. After a careful juristic education he was successively advocate at the parlement of Paris, intendant of the council of the count of Nevers (1321), and counsellor-clerk to the parle- ment (1329). Having taken holy orders, he became dean of St Quentin in 1330, and was employed to negotiate the marriage of the duke of Normandy, the future king John the Good of France, with the daughter of the king of Bohemia. In 1335 he became bishop of Nevers, in 1339 of Arras, and contributed to bring the county of Flanders into the kingdom of France. Created cardinal priest of St Susanna in 1344, he was employed by the pope on important missions, notably to negotiate peace or an armistice between France and England. Having become bishop of Ostia in 1353, he was sent next year to Charles IV. of Germany, and induced him to come to Italy to be crowned emperor at Rome, 1355. In 1356 he went to France to try to arrange a peace with England, and died in 1361 at the priory of Montaud near Avignon.

See A. Mazon, Essai historique sur Vetat du Vivarais pendant la guerre de cent ans (Paris, 1889), with references there.

COLOMBO, the capital and principal seaport of Ceylon, situ- ated on the west coast of the island. Pop. (1901) 154,691. Colombo stands to the south of the mouth of the river Kelani. The coast-land is here generally low-lying, but broken by slight eminences. The great artificial harbour, enclosed by break- waters, is bounded on the south by a slight promontory. This is occupied by the quarter of the city known as the Fort, from the former existence of a fort founded by the Portuguese and reconstructed by the Dutch. In 1869 the governor, Sir Hercules Robinson (afterwards Lord Rosmead), obtained authority to demolish the fortifications, which were obsolete for purposes of defence, and required 6000 men to man them properly. The levelling of the walls and filling up of the moat made the Fort much more accessible and healthy, and since then it has become the business centre of the city. Here are situated Queen's

House, the governor's residence; the secretariat or government offices, and other government buildings, such as the fine general post office and the customs house. Here also are most of the principal hotels, which have a peculiarly high reputation among European hotels in the East. A lofty tower serves as the prin- cipal lighthouse of the port and also as a clock-tower. On the south side of the Fort are extensive

barracks. The old banqueting-hall of the Dutch governors is used as the garrison church of St Peter.

To the north-east of the Fort, skirting the harbour, are the Pettah, the principal native quarter, the districts of Kotahena and Mutwall, and suburbs beyond. In this direction the prin- cipal buildings are the Wolfendahl church, a massive Doric building of the Dutch (1749); the splendid Roman Catholic cathedral of St Lucia (completed in 1904); and St Thomas's College (1851), which follows the lines of an English public school. Close to this last is the Anglican cathedral of Christ Church. The Kotahena temple is the chief Buddhist temple in Colombo.

To the north-east of the Fort is the Lake, a ramifying sheet of fresh water, which adds greatly to the beauty of the site of Colombo, its banks being clothed with luxuriant foliage and flowers. The narrow isthmus, (between this lake and the sea, south of the Fort, is called Galle Face, and is occupied chiefly by promenades and recreation grounds. The peninsula enclosed by two arms of the Lake is known as Slave Island, having been the site of a slave's prison under the Dutch. South-east of this is the principal residential quarter of Colombo, with the circular Victoria Park as its centre. To the east of the park a series of parallel roads, named after former British governors, are lined with beautiful bungalows embowered in trees. This locality is generally known as the Cinnamon Gardens, as it was formerly a Dutch reserve for the cultivation of the cinnamon bush, many of which are still growing here. In the park is the fine Colombo Museum, founded by Sir William Gregory; and near the neigh- bouring Campbell Park are the handsome buildings of a number of institutions, such as Wesley College, and the General, Victoria Memorial Eye and other hospitals. South of Victoria Park is the Havelock racecourse. Among educational establishments not hitherto mentioned are the Royal College, the principal government institution, the government technical college and St Joseph's Roman Catholic college. Most of the town is lighted by gas, and certain quarters with electric light, and electric tramways have been laid over several miles of the city roads. The water-supply is drawn from a hill region 30 m. distant.

UnderBritishrule Colombo has shared in the prosperity brought to the island by the successive industries of coffee and teaˆ planting. At the height of the coffee-growing enterprise 20,000 men, women and children, chiefly Sinhalese and Tamils, found employment in the large factories and stores of the merchants scattered over the town, where the coffee was cleaned, prepared, sorted and packed for shipment. Tea, on the contrary, is pre- pared and packed on the estates; but

there is a considerable amount of work still done in the Colombo stores in sorting, blending and repacking such teas as are sold at the local public sales; also in dealing with cacao, cardamoms, cinchona bark and the remnant still left of the coffee industry. But it is to its position as one of the great ports of call of the East that Colombo owes its great and increasing importance. A magnificent break- water, 4200 ft. long, the first stone of which was laid by the prince of Wales in 1875, was completed in 1884. This breakwater changed an open roadstead into a harbour completely sheltered on the most exposed or south-west side; but there was still liability in certain months to storms from the north-west and sauth-east. Two additional arms were therefore constructed, consisting of a north-east and north-west breakwater, leaving two openings, one 800 ft. and the other 700 ft. wide, between the various sections. The area enclosed is 660 acres. A first- class graving-dock, of which the Admiralty bore half the cost, has also been added. These improvements caused Galle to be abandoned as a port of call for steamers in favour of Colombo, while Trincomalee has been abandoned as a naval station. The port has assumed first-class importance, mail steamers calling

regularly as well as men-of-war and the mercantile marine of all nations; and it is now one of the finest artificial harbours in the world. The extension of railways also has concentrated the trade of the island upon the capital, and contributed to its rise in prosperity.

Colombo was originally known as the Kalantotta or Kalany ferry. By the Arabs the name was changed to Kolambu, and the town was mentioned by Ibn Batuta in 1346 as the largest and finest in Serendib. In 151 7 the Portuguese effected a settle- ment, and in 1520 they fortified their port and bade defiance to the native besiegers. In 1586 the town was invested by Raja Singh, but without success. On its capture by the Dutch' in 1656 it was a flourishing colony with convents of five religious orders, churches and public offices, inhabited by no fewer than 900 noble families and 1 500 families dependent on mercantile or political occupations. In 1796 it was surrendered to the British.

COLON (formerly known as Aspinwall), a city of the Republic of Panama, on the Atlantic coast, in the Bay of Limon, and 47 m. by rail N.W. of the city of Panama. Pop. (1908) about 3000, consisting largely of Jamaica negroes and natives of mixed Spanish, Indian and

African descent. It is served by the Panama railway, which crosses the Isthmus of Panama from ocean to ocean. Colon has a deep, though poorly sheltered harbour, and is either the terminus or a place of call for seven lines of steamships. It thus serves as an entrep6t for much of the commerce between Atlantic and Pacific ports, and between the interior towns of Central and South America and the cities of Europe and the United States. The city lies on the west side of the low island of Manzanillo, is bordered on the landward sides by swamp, and consists mainly of unimposing frame houses and small shops. The most attractive parts are the American quarter, where the employes of the Panama railway have their homes, and the old French quarter, where dwelt the French officers during their efforts to build the canal. In this last district, near the mouth of the old canal, stands a fine statue of Christopher Columbus, the gift of the empress Eugenie in 1870. Here also stands the mansion erected and occupied by Ferdinand de Lesseps during his residence on the isthmus. With the exception of railway shops, there are no important industrial establishments.

Colon dates its origin from the year 1850, when the island of Manzanillo was selected as the Atlantic terminus of the Panama railway. The settlement was at first called Aspinwall, in honour of William H. Aspinwall (1807-1875), one of the builders of the railway; but some years afterwards its name was changed by legislative enactment to Colon, in honour of Christopher Columbus, who entered Limon Bay in 1 502. The original name, however, survived among the English-speaking inhabitants for many years after this change. With the completion of the railway in 1855, the town supplanted Chagres (q.v.) as the principal Atlantic port of the isthmus. Later it acquired increased importance through its selection by de Lesseps as the site for the Atlantic entrance to his canal. During the revolu- tion of 1885 it was partly burned and was rebuilt on a somewhat larger plan. As the city has always been notoriously unhealth- ful, the United States, on undertaking the construction of the Panama Canal (q.v.), became interested in preventing its becom- ing a centre of infection for the Canal Zone, and by the treaty of November 1903 secured complete jurisdiction in the city and harbour over all matters relating to sanitation and quarantine, and engaged to construct a system of waterworks and sewers in the municipality, which had been practically completed in 1907. The United States government has also opened a port at Cristobal, within the Canal Zone. •

COLON, a town of Matanzas province, Cuba, on the railway between Matanzas and Santa Clara, and the centre of a rich sugar-planting country. Pop. (1907) 7124.

COLON. (1) (Gr. koKov, miswritten and mispronounced as kG\ov, the term being taken from koXos, curtailed), in anatomy, that part of the greater intestine which extends from the caecum to the rectum (see Alimentary Canal). (2.) (Gr. kwXov, a ‘ member or part), originally in Greek rhetoric a short clause

longer than the “comma,” hence a mark (:), in punctuation, used to show a break in construction greater than that marked by the semicolon (;), and less than that marked by the period or full stop. The sign is also used in psalters and the like to mark off periods for chanting. The word is applied in palaeography to a unit of measure in MSS., amounting in length to a hexa- meter line.

COLONEL (derived either from Lat. columna, Fr. colonne, column, or Lat. corona, a crown), the superior officer of a regiment of infantry or cavalry; also an officer of corresponding rank in the general army list. The colonelcy of a regiment formerly implied a proprietary right in it. Whether the colonel com- manded it directly in the field or not, he always superintended its finance and interior economy, and the emoluments of the office, in the 18th century, were often the only form of pay drawn by general officers. The general officers of the 17th and 1 8th centuries were invariably colonels of regiments, and in this case the active command was exercised by the lieutenant- colonels. At the present day, British general officers are often, though not always, given the colonelcy of a regiment, which has become almost purely an honorary office. The sovereign, foreign sovereigns, royal princes and others, hold honorary colonelcies, as colonels-in-chief or honorary colonels of many regiments. In other armies, the regiment being a fighting unit, the colonel is its active commander ; in Great Britain the lieutenant-colonel commands in the field the battalion of infantry and the regiment of cavalry. Colonels are actively employed in the army at large in staff appointments, brigade commands, &c. extra-regimentally. Colonel-general, a rank formerly used in many armies, still survives in the German service, a colonel- general (General-Oberst) ranking between a general of infantry, cavalry or artillery, and a general field marshal (General-Feld- marschall). Colonels-general are usually given the honorary rank of general field marshal.

COLONIAL OFFICE, the department of the administration of the United Kingdom which deals with questions affecting the various colonial possessions of the British crown. The depart- ment as it now exists is of comparatively modern creation, dating only from 1854. The affairs of the English colonies began to assume importance at the Restoration, and were at first entrusted to a committee of the privy council, but afterwards transferred to a commission created by letters

patent. From 1672 to 1675 the council for trade was combined with this commission, but in the latter year the colonies were again placed under the control of the privy council. This arrangement continued until 1695, when a Board of Trade and Plantations was created; its duty, however, was confined to collecting information and giving advice' when required. The actual executive work was performed by the secretary of state for the southern department, who was assisted, from 1768 to 1782, by a secretary of state for the colonies. Both the Board of Trade and Plantations and the additional secretary were abolished in 1782, and the executive business wholly given over to the home office. In 1794 a third secretary of state was reappointed, and in 1801 this secretary was designated as secretary of state for war and the colonies. In 1854 the two offices were separated, and a distinct office of secretary of state for the colonies created.

The secretary of state for the colonies is the official medium of communication with colonial governments; he has certain administrative duties respecting crown colonies, and has a right of advising the veto of an act of a colonial legislature — this veto, however, is never exercised in the case of purely local statutes. He is assisted by a permanent and a parliamentary under- secretary and a considerable clerical staff.

As reorganized in 1907 the colonial office consists of three chief departments: (1) the Dominions Department, dealing with the affairs of the self-governing over-sea dominions of the British crown, and of certain other possessions geographically connected with those dominions; (2) the Colonial Department, dealing with the affairs of crown colonies and protectorates; (3) the General Department, dealing with legal, financial and other general business. In addition to these three departments,

standing committees exist to take a collective view of sugh matters as contracts, concessions, mineral and other leases, and patronage.

COLONNA, a noble Roman family, second only to the Gaetani di Sermoneta in antiquity, and first of all the Roman houses in importance. The popes Marcellinus, Sixtus III., Stephen IV. and Adrian III. are said to have been members of it, but the authentic pedigree of the family begins with Pietro, lord of Columna, Palestrina and Paliano (about noo), probably a brother of Pope Benedict IX. His great

grandson Giovanni had two sons, respectively the founders of the Colonna di Paliano and Colonna di Sciarra lines. The third, or Colonna-Romano line, is descended from Federigo Colonna (1223). In the 12th century we find the Colonna as counts of Tusculum, and the family was then famous as one of the most powerful and turbulent of the great Roman clans; its feuds with the Orsini and the Gaetani are a characteristic feature of medieval Rome and the Campagna; like the other great nobles of the Campagna the Colonna plundered travellers and cities, and did not even spare the pope himself if they felt themselves injured by him. Boniface VIII. attempted to break their power, excommunicated them in 1297, and confiscated their estates. He proclaimed a crusade against them and captured Palestrina, but they after- wards revenged themselves by besieging him at Anagni, and Sciarra Colonna laid violent hands on His Holiness, being with difficulty restrained from actually murdering him (1303). In 1347 the Colonna, at that time almost an independent power, were defeated by Cola di Rienzi, but soon recovered. Pope Martin V. (1417-1431) was a Colonna, and conferred immense estates on his family, including Marino, Frascati, Rocca di Papa, Nettuno, Palinao, &c, in the Campagna, and other fiefs in Romagna and Umbria. Their goods were frequently confiscated and frequently given back, and the house was subject to many changes of fortune; during the reign of Pope Alexander VI. they were again humbled, but they always remained powerful and important, and members of the family rose to eminence as generals, prelates and statesmen in the service of the Church or other powers. In the war of 1522 between France and Spain there were Colonna on both sides, and at the battle of Lepanto (1571) Marc Antonio Colonna, who commanded the papal contingent, greatly distinguished himself. A detailed record of the Colonna family would be a history of Rome. To-day there are three lines of Colonna: (1) Colonna di Paliano, with two branches, the princes and dukes of Paliano, and the princes of Stigliano; (2) Colonna di Sciarra, with two branches, Colonna di Sciarra, princes of Carbagnano, and Barberini-Colonna, princes of Palestrina; and (3) Colonna-Romano. The Colonna palace, one of the finest in Rome, was begun by Martin V. and contains a valuable picture and sculpture gallery.

See A. von Reumont, Geschichte der Stadt Rom (Berlin, 1868), containing an elaborate account of the family; F. Gregorovius, Geschichte der Stadt Rom (Stuttgart, 1872) ; Almanack de Gotha.

(L. V.*)

COLONNA, GIOVANNI PAOLO {circa 1637-1695), Italian musician, was born in Bologna about 1637 and died in the same city on the 28th

of November 1695. He was a pupil of Filippuzzi in Bologna, and of Abbatini and Benevoli in Rome, where for a time he held the post of Organist at S. Apollinare. A dated poem in praise of his music shows that he began to distinguish himself as a composer in 1659. In that year he was chosen organist at S. Petronio in Bologna, where on the 1st of November 1674 he was made chapel-master. He also became president of the Philharmonic Academy of Bologna. Most of Colonna's works are for the church, including settings of the psalms for three, four, five and eight voices, and several masses and motets. He also composed an opera, under the title Amilcare, and an oratorio, La Profezia d' Eliseo. The emperor Leopold I. received a copy of every composition of Colonna, so that the imperial library in Vienna possesses upwards of 83 church compositions by him. Colonna's style is for the most part dignified, but is not free from the inequalities of style and taste almost unavoidable at a period when church music

was in a state of transition, and had hardly learnt to combine the gravity of the old Style with the brilliance of the new.

COLONNA, VITTORIA (1490-1547), marchioness of Pescara, Italian poet, daughter of Fabrizio Colonna, gxand constable of the kingdom of Naples, and of Anna da Montefeltro, was born at Marino, a fief of the Colonna family. Betrothed when four years old at the instance of Ferdinand, king of Naples, to Ferrante de Avalos, son of the marquis of Pescara, she received the highest education and gave early proof of a love of letters. Her hand was sought by many suitors, including the dukes of Savoy and Braganza, but at nineteen, by her own ardent desire, she was married to de Avalos on the island of Ischia. There the couple resided until 1511, when her husband offered his sword to the League against the French. He was taken prisoner at the battle of Ravenna (1512) and conveyed to France. During the months of detention and the long years of campaigning which followed, Vittoria and Ferrante corresponded in the most passionate terms both in prose and verse. They saw each other but seldom, for Ferrante was one of the most active and brilliant captains of Charles V.; but Vittoria's influence was sufficient to keep him from joining the projected league against the emperor after the battle of Pa via (1525), and to make him refuse the crown of Naples offered to him as the price of his treason. In the month of November of the same year he died of his wounds at Milan. Vittoria, who was hastening to tend him, received the news of his death at Viterbo ; she halted and turned off to Rome, and after a brief stay departed for Ischia, where she remained for several years. She refused several suitors, and began to produce those Rime spiriluali which form so distinct a feature in her works. In 1529 she returned to Rome, and spent the next few years between that city, Orvieto, Ischia

and other places. In 1537 we find her at Ferrara, where she made many friends and helped to establish a Capuchin monastery at the instance of the reforming monk Bernardino Ochino, who after- wards became a Protestant. In 1539 she was back in Rome, where, besides winning the esteem of Cardinals Reginald Pole and Contarini, she became the object of a passionate friendship on the part of Michelangelo, then in his sixty-fourth year. The great artist addressed some of his finest sonnets to her, made drawings for her, and spent long hours in her society. Her removal to Orvieto and Viterbo in 1541, on the occasion of her brother Ascanio Colonna's revolt against Paul III., produced no change in their relations, and they continued to visit and correspond as before. She returned to Rome in 1544, staying as usual at the convent of San Silvestro, and died there on the 25th of February 1547.

Cardinal Bembo, Luigi Alamanni and Baldassare Castiglione were among her literary friends. She was also on intimate terms with many of the Italian Protestants, such as Pietro Carne- secchi, Juan de Valdes and Ochino, but she died before the church crisis in Italy became acute, and, although she was an advocate of religious reform, there is no reason to believe that she herself became a Protestant. Her life was a beautiful one, and goes far to counteract the impression of the universal cor- ruption of the Italian Renaissance conveyed by such careers as those of the Borgia. Her amatory and elegiac poems, which are the fruits of a sympathetic and dainty imitative gift rather than of any strong original talent, were printed at Parma in 1538; a third edition, containing sixteen of her Rime Spiriluali, in which religious themes are treated in Italian, was published at Florence soon afterwards; and a fourth, including a still larger proportion of the pious element, was issued at Venice in

1544-

A great deal has been written about Vittoria Colonna, but perhaps the best account of her life is A. Luzio's Vittoria Colonna (Modena, 1885); A. von Reumont's Vita di Vittoria Colonna (Italian corrected edit., Turin, 1883) is also excellent; F. le Fevre's Vittoria Colonna (Paris, 1856) is somewhat inaccurate, but T. Roscoe's Vittoria Colonna (London, 1868) may be recommended to English readers; P. E. Visconti's Le Rime di Vittoria Colonna (Rome, 1846) dea-ls with her poems. (L. V.*)

COLONNADE, in architecture, a range of columns (Ital. colonna) in a row. When extended so as to enclose a temple,

it is called a peristyle, and the same term applies when round an open court, as in the houses at Pompeii. When projecting in front of a building, it is called a portico, as in the Pantheon at Rome and the National Gallery in London. When enclosed between wings, as in Perrault's facade to the Louvre, it is correctly described as a colonnade. Colonnades lined the streets of the towns in Syria and Asia Minor, and they were largely employed in Rome.

COLONSAY, an island of the Inner Hebrides, Argyllshire, Scotland, 10 m. S. of the Ross of Mull. It is 75 m. long by 3 m. broad. The highest point is Carnan Eoin (470 ft.). Towards the middle of the island lies Loch Fada, nearly 2 m. long but very narrow, and there are two other small lakes and a few streams. The coast-line, with frequent beautiful sandy reaches, is much indented, the chief bays being Kiloran, Kilchattan and Staosunaig. On the north-western coast the cliffs are particularly fine. To the south, separated by a strait that is fordable at low water, lies the isle of Oronsay, 2j m. long by 2f m. wide. Both islands contain a number of ecclesiastical remains, standing stones, and some beautiful sculptured crosses. They are named after Columba and Oran, who are said to have stopped here after they left Ireland. There is regular communication between Scalasaig and Glasgow and the Clyde ports. The golf-course at Kilchattan lends a touch of modernity to these remote islandsˆ Near Scalasaig a granite obelisk has been erected to the memdry* of Sir Duncan M'Neill (1704-1874), a distinguished Scottish lawyer, who took the title of Lord Colonsay when he became" a lord of appeal. The soil of both islands is fertile, potatoes and barley being raised and cattle pastured. Population: Colonsay (1901), 301; Oronsay (1901), 12.

COLONY (Lat. colonia, from colonus, a cultivator), a term most commonly used to denote a settlement of the subjects of a sovereign state in lands beyond its boundaries, owning no allegiance to any foreign power, and retaining a greater or less degree of dependence on the mother country. The founding and the growth of such communities furnish matter for an inter- esting chapter in the history as well of ancient as of modern civilization; and the regulation of the relations between the parent state and its dependencies abroad gives rise to important problems alike in national policy and in international economics.

It was mainly the spirit of commercial enterprise that led the

Phoenicians to plant their colonies upon the islands and along the southern coast of the Mediterranean; and even beyond the Pillars of Hercules this earliest great colonizing race left enduring traces of its maritime supremacy. Carthage, indeed, chief of the Phoenician settlements, sent forth colonies to defend her con- quests and strengthen her military power; and these sub- colonies naturally remained in strict subjection to her power, whereas the other young Phoenician states assumed and asserted entire independence.

In this latter respect the Greek colonies resembled those of the Phoenicians. From a very early period the little civic com- munities of Greece had sent forth numerous colonizing streams. At points so far asunder as the Tauric Chersonese, Cyrene and Massilia were found prosperous centres of Greek commercial energy; but the regions most thickly peopled by settlers of Greek descent were the western seaboard of Asia Minor, Sicily and the southern parts of the Italian peninsula. Nor were the least prosperous communities those which were sprung from earlier colonies. The causes that led to the foundation of the Greek colonies were very various. As in Phoenicia, pressure created by the narrow limits of the home country coincided with an adventurous desire to. seek new sources of wealth beyond seas ; but very many Greek emigrations were caused by the expulsion of the inhabitants of conquered cities, or by the intolerable domination of a hated but triumphant faction within the native state. The polity of the new community, often founded in defiance of the home authorities, might either be a copy of that just left behind or be its direct political antithesis. But wherever they went, and whether, as apparently in Asia Minor, Greek blood was kept free from barbaric mixture, or whether, as in Magna Graecia and Sicily, it was mingled with that of the

aboriginal races, the Greek emigrants carried with them the Hellenic spirit and the Hellenic tongue; and the colonies fostered, not infrequently more rapidly and more brilliantly than at home, Greek literature, Greek art and Greek speculation. The relation to be preserved towards the mother states was seldom or never definitely arranged. But filial feeling and established custom secured a measure of kindly sympathy, shown by precedence yielded at public games, and by the almost invariable abstinence of the colony from a hostile share in wars in which the mother city was engaged.

The relation of Rome to her colonies was altogether different. No Roman colony started without the sanction and direction of the public authority; and while the Colonia Romana differed from the Colonia Latina in that the former permitted its members to retain their

political rights intact, the colony, whether planted within the bounds of Italy or in provinces such as Gaul or Britain, remained an integral part of the Roman state. In the earlier colonies, the state allotted to proposing emigrants from amongst the needy or discontented class of citizens portions of such lands as, on the subjection of a hostile people, the state took into its possession as public property. At a later time, especially after the days of Sulla, the distribution of the territories of a vanquished Roman party was employed by the victorious generals as an easy means of satisfying the claims of the soldiery by whose help they had triumphed. The Roman colonies were thus not merely valuable as propugnacula of the state, as permanent supports to Roman garrisons and armies, but they proved a most effective means of extending over wide bounds' the language and the laws of Rome, and of inoculating the inhabitants of the provinces with more than the rudiments of Roman civilization.

The occupation of the fairest provinces of the Roman empire by the northern barbarians had little in common with coloniza- tion. The Germanic invaders came from no settled state; they maintained loosely, and but for a short while, any form of brotherhood with the allied tribes. A nearer parallel to Greek colonization may be found in Iceland, whither the adherents of the old Norse polity fled from the usurpation of Harold Haar- fager; and the early history of the English pale in Ireland shows, though not in orderliness and prosperity, several points of resemblance to the Roman colonial system.

Though both Genoese and Venetians in their day of power planted numerous trading posts on various portions of the Mediterranean shores, of which some almost deserve the name of colonies, the history of modern colonization on a great scale opens with the Spanish conquests in America. The first Spanish adventurers came, not to colonize, but to satisfy as rapidly as possible and by the labour of the enslaved aborigines, their thirst for silver and gold. Their conquests were rapid, but the extension of their permanent settlements was gradual and slow. The terrible cruelty at first exercised on the natives was restrained, not merely by the zeal of the missionaries, but by effective official measures; and ultimately home-born Spaniards and Creoles lived on terms of comparative fairness with the Indians and with the half-breed population. Till the general and success- ful revolt of her American colonies, Spain maintained and em- ployed the latter directly and solely for what she conceived to be her own advantage. Her commercial policy was one of most irrational and intolerable restriction and repression; and till the end of Spanish rule on the American continent, the whole political power was retained by the court at Madrid, and administered in the colonies by an oligarchy of

home-bred Spaniards.

The Portuguese colonization in America, in most respects resembling that of Spain, is remarkable for the development there given to an institution sadly prominent in the history of the European colonies. The nearness of Brazil to the coast of Africa made it easy for the Portuguese to supply the growing lack of native labour by the wholesale importation of purchased or kidnapped Africans.

Of the French it is admitted that in their colonial possessions they displayed an unusual faculty for conciliating the prejudices

of native races, and even for assimilating themselves to the latter. But neither this nor the genius of successive governors and commanders succeeded in preserving for France her once extensive colonies in Canada or her great influence in India. In Algeria and West Africa the French government has not merely found practical training schools for her own soldiers, but by opening a recruiting field amongst the native tribes it has added an available contingent to the French army.

The Dutch took early a leading share in the carrying trade of the various European colonies. They have still extensive colonies in the East Indian Archipelago, as well as possessions in the West Indies. The Danish dependencies in the Antilles are but trifling in extent or importance.

It is the English-speaking race, however, that has shown the most remarkable energy and capacity for colonization. The English settlements in Virginia, New England, New York, New Jersey, Maryland, Pennsylvania, Delaware, South Carolina, North Carolina, and Georgia had, between the first decade of the 17th and the seventh decade of the 18th century, developed into a new nation, the United States of America. It is unnecessary here to deal with the development of what have since been the two great independent branches of the English-speaking people — those of the United States (q.v.) and of the British Empire (

COLOPHON, an ancient city of Ionia, situated inland about 15 m. N. of Ephesus. Its port was at Notium or New Colophon. The site, now called Tracha (only recognized towards the end of the 19th century), lies near Diermendere, 5 m. S. of Develikeui station on the Smyrna-Aidin railway, and about 2 m. from the farms and hamlet of Malkajik.

It is almost entirely under cultivation, and there is little to be seen but remains of the walls and certain tumuli. Rich tombs, however, have been found beside the old roads leading to it, and the site is usually regarded as a particularly promising one for excavation, since Colophon was a very flourishing city in the great period of Ionia and had declined and been largely superseded by Notium before the Roman age. The common belief, however, that it had no existence after the time of Lysimachus is not borne out by the remains on the site. Founded by Andracmon of Pylos, it was at the acme of its prosperity in the 8th and 7th centuries B.C. up to the epoch of its sack by Gyges of Lydia in 665. It claimed to have produced Homer, but its greatest genuine literary name was Mimnermus. It seems to have been ruled by a rich aristo- cracy which provided a famous troop of horse; and, from the Greek saying, usually supposed to refer to the decisive effect of the final charge of this troop in battle, the word colophon has come to be used for the final note appended to old printed books, containing date, &c. In 287 Lysimachus transferred a part of the population to his new city at Ephesus. Though an Ionian colony Colophon did not share in the common festival of the Apaturia and seems to have been isolated for some reason among its neighbours, with one of whom, Ephesus, it was constantly at enmity. The forts by which Ephesus protected itself against Colophonian invasion are still to be seen on the hills north of the Caystrus.

Notium or New Colophon contained the important shrine of the Clarian Apollo, whose site has recently been identified with probability by Th. Makridy Bey during excavations conducted for the Ottoman museum.

See C. Schuchardt in Aiken. Milleil. (1886); W. M. Ramsay, Hist. Geog. of Asia Minor (addenda) (1890). (D. G. H.)

COLOPHON, a final paragraph in some manuscripts and many early printed books (see Book), giving particulars as to authorship, date and place of production, &c. Before the in- vention of printing, a scribe when he had finished copying a book occasionally added a final paragraph at the end of the text in

which he recorded the fact, and (if he were so minded) expressed his thankfulness to God, or asked for the prayers of readers. In the famous Bodleian MS. 264 of the Roman d ‘Alexandre there is an unusually full note of this kind recording the completion of the copy on the 18th of December 1338 and ending — ” Explicit iste liber, scriptor sit crimine liber, Christus scriptorem custodiat ac det honorem.”

Both in manuscripts and also in early printed books authors made use of such a final paragraph for expressing similar feelings. Thus the Guillermus who made a famous collection of sermons on the gospels for Sundays and saints' days records its completion in 1437 and submits it to the correction of charitable readers, and Sir Thomas Malory notes that his Morte d' Arthur " was ended the ix yere of the reygne of Kyng Edward the fourth," and bids his readers " praye for me whyle I am on lyue that God sende me good delyuerance, and whan I am deed I praye you all praye for my soule." So again Jacobus Bergomensis records that his Supplementum Chronicarum was finished " anno salutis nostre 1483. 3 Kalendas Julii in ciuitate Bergomi: mihi vero a natiuitate quadragesimo nono," and in the subsequent editions which he revised brings both the year and his own age up to date. Before printing was invented, however, such paragraphs were exceptional, and many of the early printers, notably Gutenberg himself, were content to allow their books to go out without any mention of their own names. Fust and Schoeffer, on the other hand, printed at the end of their famous psalter of 1457 the following paragraph in red ink: — Presens spalmorum (sic for psalmorum) codex venustate capitalium decoratus Rubricalioni-busque sufficienter distinctus, Adinuentione artificiosa imprimendi ac caracterizandi absque calami vlla exaracione sic effigiatus, Et ad eusebiam dei Industrie est consummatus, Per lohannem fust ciuem maguntinum, Et Petrum Schojfer de Gernszheim Anno domini Millesimo. cccc. Ivii In vigilia Assumpcionis. Similar paragraphs in praise of printing and of Mainz as the city where the art was brought to perfection appear in most of the books issued by the partners and after Fust's death by Schoeffer alone, and were widely imitated by other printers. In their Latin Bible of 1462 Fust and Schoeffer added a device of two shields at the end of the paragraph, and this addition was also widely copied. Many of these final paragraphs give information of great value for the history of printing; many also, especially those to the early editions of the classics printed in Italy, are written in verse. As the practice grew up of devoting a separate leaf or page to the title of a book at its beginning, the importance of these final paragraphs slowly diminished, and the information they gave was gradually transferred to the title-page. Complete title-pages bearing the date and name of the publishers are found in most books printed after 1520, and the final paragraph, if retained at all, was gradually reduced to a bare statement of the name of the printer. From the use of the word in the sense of a " finishing stroke," such a final paragraph as has been de- scribed is called by bibliographers a " colophon " (Gr. Koko4 > &v), but at what period this name for it was first used has not been ascertained. It is quite possibly not earlier than

the 18th century. (For origin see Colophon [city] .) (A. W. Po.)

COLORADO, a state of the American union, situated between 41 and 37 N. lat. and 102 and 109° W. long., bounded N. by Wyoming and Nebraska, E. by Nebraska and Kansas, S. by Oklahoma and New Mexico, and W. by Utah. Its area is 103,948 sq. m. (of which 290 are water surface). It is the seventh largest state of the Union.

Physiography. — Colorado embraces in its area a great variety of plains, mountains and plateaus. It lies at the junction of the Great Plains — which in their upward slant to the westward attain an average elevation of about 4000 ft. along the east boundary of the state — with the Rocky Mountains, to the west of which is a portion of the Colorado Plateau. These are the three physio- graphic provinces of the state (see also United States, section Geology, ad fin., for details of . structure) . The last-named includes a number of lofty plateaus — the Roan or Book, Un- compahgre, &c, which form the eastern continuation of the high plateaus of Utah — and covers the western quarter of the

state. Its eastern third consists of rich, unbroken plains. On their west edge lies an abrupt, massive, and strangely uniform chain of mountains, known in the neighbourhood of Colorado Springs as the Rampart Range, and in the extreme north as the Front Range, and often denominated as a whole by the latter name. The upturning of the rocks of the Great Plains at the foot of the Front Range develops an interesting type of topo- graphy, the harder layers weathering into grotesquely curious forms, as seen in the famous Garden of the Gods at the foot of Pike's Peak. Behind this barrier the whole country is elevated 2000 ft. or so above the level of the plains region. In its lowest portions just behind the front ranges are the natural " parks " — great plateaus basined by superb enclosing ranges; and to the west of these, and between them, and covering the remainder of the state east of the plateau region, is an entanglement of mountains, tier above tier, running fromnorthtosouth,buttressed laterally with splendid spurs, dominated by scores of magnificent peaks, cut by river valleys, and divided by mesas and plateaus. These various chains are known by a multitude of local names. Among the finest of the chains are the Rampart, Sangre de Cristo, San Juan, Sawatch (Saguache) and Elk ranges. The first, like the other ranges abutting from north to south upon the region of the prairie, rises abruptly from the plain and has a

fine, bold outline. It contains a number of fine summits dominated by Pike's Peak (14,108 ft.). Much more beautiful as a whole is the Sangre de Cristo range. At its southern end are Blanca Peak (14,300) and Old Baldy (14,176, Hayden), both in Costilla county; to the northward are Rito Alto Peak (12,989, Wheeler), in Custer county, and many others of almost equal height and equal beauty. The mountains of the south-west are particularly abrupt and jagged. Sultan Mountain (13,366, Hayden) , in San Juan county, and Mt. Eolus (14,079), in La Plata county, dominate the fine masses of the San Juan ranges; and Mt. Sneffels (14,158, Hayden), Ouray county, and Uncompahgre Peak (14,289), Hinsdale county, the San Miguel and Uncom- pahgre ranges, which are actually parts of the San Juan. Most magnificent of all the mountains of Colorado, however, are the Sawatch and adjoining ranges in the centre of the state. The former (the name is used a little loosely) consists of almost a solid mass of granite, has an average elevation of probably 13,000 ft., presents a broad and massive outline, and has a mean breadth of 15 to 20 m. Mt. Ouray (13,956 ft.), in Chaffee county, may be taken as the southern end, and in Eagle county, the splendid Mount of the Holy Cross (14,170) — so named from the figure of its snow-filled ravines — as the northern. Between them lie: in Chaffee county, Mt. Shavano (14,239, Hayden), Mt. Princeton (14,196, Hayden), Mt. Yale (14,187, Hayden), Mt. Harvard (14,375, Hayden), and La Plata Peak (14,342); in Pitkin county, Grizzly Peak (13,956, Hayden); in Lake county, Elbert Peak (14,421), and Massive mountain (14,424), the highest peak in the state; on the boundary between Summit and Park counties, Mt. Lincoln (14,297, Hayden); and, in Summit county, Mt. Fletcher (14,265). The Elk range is geo- logically interesting for the almost unexampled displacement of the strata of which it is composed, and the apparent confusion which has thence arisen. Among the most remarkable of its separate summits, which rise superbly in a crescent about Aspen, are North Italian Peak (13,225), displaying the red, white and green of Italy's national colours, White Rock Mountain (13,532), Mt. Owen (13,102), Teocalli Mountain (13,220), Snow Mass (13,970, Hayden) and Maroon (14,003, Hayden) mountains, Castle Peak (14,259), Capitol Mountain (13,997, Hayden), Pyramid Peak (13,885, Hayden), Taylor Peak (13,419), and about a dozen other summits above 12,000 ft. A few miles to the north and north-east of the Mount of the Holy Cross are Red Mountain (13,333, Wheeler), in Eagle county, Torrey Peak (14,336, Hayden) and Gray's Peak (14,341, Hayden), in Summit county, Mt. Evans (14,330, Hayden), in Clear Creek county, and Rosalie Peak (13,575), m Park county; a little farther north, in Gilpin, Grand and Clear Creek counties, James Peak (13,283, Hayden), and, in Boulder county, Long's Peak (14,271, Hayden). Many fine

mountains are scattered in the lesser ranges of the

state. Altogether there are at least 180 summits exceeding 12,000 ft. in altitude, more than no above 13,000 and about 40 above 14,000.

Cirques, valley troughs, numberless beautiful cascades, shar- pened alpine peaks and ridges, glacial lakes, and valley moraines offer everywhere abundant evidence of glacial action, which has modified profoundly practically all the ranges. The Park Range east of Leadville, and the Sawatch Range, are particularly fine examples. Much of the grandest scenery is due to glaciation.

One of the most remarkable orographical features of the state are the great mountain ” parks “• — North, Estes, Middle, South and San Luis — extending from the northern to the southern border of the state, and lying (with the exception of Middle Park) just east of the continental divide. These ” parks ” are great plateaus, not all of them level, lying below the barriers of sur- rounding mountain chains. North Park, the highest of all, is a lovely country of meadow and forest. Middle Park is not level, but is traversed thickly by low ranges like the Alleghanies; in the bordering mountain rim are several of the grandest moun- tain peaks and some of the most magnificent scenery of the state. Estes Park is small, only 20 m. long and never more than 2 m. broad; it is in fact the valley of Thompson Creek. Its surface is one of charming slopes, and by many it is accounted among the loveliest of Colorado valleys. Seven ranges lie between it and the plains. South Park is similarly quiet and charming in character. Much greater than any of these is San Luis Park. The surface is nearly as flat as a lake, and it was probably at one time the bed of an inland sea. In the centre there is a long narrow lake fed by many streams. It has no visible outlet, but is fresh. The San Luis Park, which runs into New Mexico, is traversed by the Rio Grande del Norte and more than a dozen of its mountain tributaries. These parks are frequented by great quantities of large game, and — especially the North and Middle— are famous hunting-grounds. They are fertile, too, and as their combined area is something like 13,000 sq. m. they are certain to be of great importance in Colorado’s agricultural development.

The drainage system of the state is naturally very complicated. Eleven topographical and climatic divisions are recognized by the United States Weather Bureau within its borders, including the several parks, the continental divide, and various river valleys. Of the rivers, the North Platte has its sources in North Park, the Colorado (the Gunnison and Grand branches) in Middle Park, the Arkansas and South Platte in South Park — where their waters drain in opposite directions from

Palmer's Lake — ■ the Rio Grande in San Luis Park. Three of these flow east and south-east to the Missouri, Mississippi and the Gulf; but the waters of the Colorado system flow to the south-west into the Gulf of California. Among the other streams, almost count- less in number among the mountains, the systems of the Dolores, White and Yampa, all in the west, are of primary importance. The scenery on the head-waters of the White and Bear, the upper tributaries of the Gunnison, and on many of the minor rivers of the south-west is wonderfully beautiful. The South Platte falls 4830 ft. in the 139 m. above Denver; the Grand 3600 ft. in the 224 m. between the mouth of the Gunnison and the Forks; the Gunnison 6477 ft. in 200 m. to its mouth (and save for 16 m. never with a gradient of less than 10 ft.); the Arkansas 7000 ft. in its 338 m. west of the Kansas line. Of the smaller streams the Uncompahgre falls 2700 ft. in 134 m., the Las Animas 7190 ft. in 113 m., the Los Pinos 4920 ft. in 75 m., the Roaring Fork 5923 ft. in 64 m., the Mancos 5000 ft. in 62 m., the La Plata 3103 ft. in 43 m., the Eagle 4293 ft. in 62 m., the San Juan 3785 in 303, the Lake Fork of the Gunnison 6047 in 59. The canyons formed in the mountains by these streams are among the glories of Colorado and of America. The grandest are the Toltec Gorge near the Southern boundary line, traversed by the railway 1500 ft. above the bottom; the Red Gorge and Rouge Canyon of the Upper Grand, and a splendid gorge 16 m. long below the mouth of the Eagle, with walls 2000-2500 ft. in height; the Grand Canyon of the Arkansas (8 m.) above Canyon City, with granite walls towering 2600 ft. above the boiling river at the

Royal Gorge; and the superb Black Canyon (15 m.) of the Gunnison and the Cimarron. But there are scores of others which, though less grand, are hardly less beautiful. The ex- quisite colour contrasts of the Cheyenne canyons near Colorado Springs, Boulder Canyon near the city of the same name, Red Cliff and Eagle River Canyons near Red Cliff, Clear Creek Canyon near Denver — with walls at places 1000 ft. in height — the Granite Canyon (11 m.) of the South Platte west of Florissant, and the fine gorge of the Rio de las Animas (1500 ft.), would be considered wonderful in any state less rich in still more mar- vellous scenery. One peculiar feature of the mountain land- scapes are the mines. In districts like that of Cripple Creek their enormous ore " dumps " dot the mountain flanks like scores of vast ant-hills; and in Eagle River canyon their mouths, like dormer windows into the granite mountain roof, may be seen 2000 ft. above the railway.

Many parts of the railways among the mountains are remark- able for altitude, construction or scenery. More than a dozen mountain passes lie above 10,000 ft. Argentine Pass (13,000 ft.), near Gray's Peak, is one of the highest wagon roads of the world; just east of Silverton is Rio Grande Pass, about 12,400 ft. above sea-level, and in the Elk Mountains between Gunnison and Pitkin counties is Pearl Pass (12,715 ft.). Many passes are traversed by the railways, especially the splendid scenic route of the Denver and Rio Grande. Among the higher passes are Hoosier Pass (10,309 ft.) in the Park Range, and Hayden Divide (10,780) and Veta Pass (9390); both of these across the Sangre de Cristo range; the crossing of the San Miguel chain at Lizard Head Pass (10,250) near Rico; of the Uncompahgre at Dallas Divide (8977) near Ouray; of the Elk and Sa watch ranges at Fremont (11,320), Tennessee (10,229), an d Brecken- ridge (11,470) passes, and the Busk Tunnel, all near Leadville; ' and Marshall Pass (10,846) above Salida. Perhaps finer than these for their wide-horizoned outlooks and grand surroundings are the Alpine Tunnel under the continental divide of the Lower Sawatch chain, the scenery of the tortuous line along the southern boundary in the Conejos and San Juan mountains, which are crossed at Cumbres (10,003 ft.), and the magnificent scenery about Ouray and on the Silverton railway over the shoulder of Red Mountain (attaining 11,235 ft.). Notable, too, is the road in Clear Creek Canyon — where the railway track coils six times upon itself above Georgetown at an altitude of 10,000 ft.

Climate. — The climate of Colorado is exceptional for regularity and salubrity. The mean annual temperature for the state is about 46 . The mean yearly isothermals crossing the state are ordinarily 35 to 50 or 55 F. Their course, owing to the com- plex orography of the state, is necessarily extremely irregular, and few climatic generalizations can be made. It can be said, however, that the south-east is the warmest portion of the state, lying as it does without the mountains; that the north-central region is usually coldest ; that the normal yearly rainfall for the entire state is about 15-5 in., with great local variations (rarely above 27 in.). Winds are constant and rather high (5 to 10 m.), and for many persons are the most trying feature of the climate. Very intense cold prevails of course in winter in the mountains, and intense heat (no° F. or more in the shade) is often ex- perienced in summer, temperatures above 90 being very common. The locality of least annual thermometric range is Lake Moraine (10,268 ft. above the sea) — normally 91 F.; at other localities the range may be as great as 140°, and for the whole state of course even greater (155 or slightly more). The lowest monthly mean in 16 years (1887-1903) was 17-30. Never- theless, the climate of Colorado is not to be judged severe, and

that of the plains region is in many ways ideal. In the lowlands the snow is always slight and it disappears almost immediately, even in the very foothills of the mountains, as at Denver or Colorado Springs. However hot the summer day, its night is always cool and dewless. Between July and October there is little rain, day after day bringing a bright and cloudless sky. Humidity is moderate (annual averages for Grand Junction, Pueblo, Denver and Cheyenne, Wyo., for 6 a.m. about 50 to 66;

for 6 p.m. 33 to 50); it is supposed to be increasing with the increasing settlement of the country. Sunshine is almost continuous, and splendidly intense. The maximum number of ” rainy ” days (with a rainfall of more than o-oi in.) rarely approaches 100 at the most unfortunate locality; for the whole state the average of perfectly ” clear ” days is normally above 50%, of “partly cloudy” above 30, of “cloudy” under 20, of ” rainy ” still less. At Denver, through n years, the actual sunlight was 70% of the possible; many other points are even more favoured; very many enjoy on a third to a half of the days of the year above 90% of possible sunshine. All through the year the atmosphere is so dry and light that meat can be pre- served by the simplest process of desiccation. ” An air more delicious to breathe,” wrote Bayard Taylor, ” cannot anywhere be found; it is neither too sedative nor too exciting, but has that pure, sweet, flexible quality which seems to support all one’s happiest and healthiest moods.” For asthmatic and con- sumptive troubles its restorative influence is indisputable. Along with New Mexico and Arizona, Colorado has become more and more a sanitarium for the other portions of the Union. Among the secondary hygienic advantages are the numerous mineral wells.

Flora and Fauna. — The life zones of Colorado are simple in arrangement. The boreal embraces the highest mountain altitudes; the transition belts it on both sides of the con- tinental divide; the upper Sonoran takes in about the eastern half of the plains region east of the mountains, and is represented further by two small valley penetrations from Utah. Timber is confined almost wholly to the high mountain sides, the mountain valleys and the parks being for the most part bare. Nowhere is the timber large or dense. The timber-line on the mountains is at about 10,000 ft., and the snow line at about 11,000. It is supposed that the forests were much richer before the settlement of the state, which was followed by reckless consumption and waste, and the more terrible ravages of fire. In 1872-1876 the wooded area was estimated at 32% of the state’s area. It is certainly much less now. The principal trees, after the yellow and lodgepole pines, are the red-fir, so-called hemlock and cedar, the Engelmann spruce, the Cottonwood

and the aspen (Populus tremuloides). In 1899 Federal forest reserves had been created, aggregating 4849 sq. m. in extent, and by 1910 this had been increased to 24,528 sq. m. The reserves cover altitudes of 7000 to 14,000 ft. The rainfall is ample for their needs, but no other reserves in the country showed in 1900 such waste by fire and pillage. The minor flora of the country is exceedingly rich. In the plains the abundance of flowers, from spring to autumn, is amazing.

Large game is still very abundant west of the continental divide. The great parks are a favourite range and shelter. Deer and elk frequent especially the mountains of the north- west, in Routt and Rio Blanco counties, adjoining the reserva- tions of the Uncompahgre (White River Ute) and Uintah- Ute Indians — from whose depredations, owing to the negligence of Federal officials, the game of the state has suffered enormous losses. The bison have been exterminated. Considerable bands of antelope live in the parks and even descend to the eastern plains, and the mule-deer, the most common of large game, is abundant all through the mountains of the west. Grizzly or silver-tip, brown and black bears are also abundant in the same region. Rarest of all is the magnificent mountain sheep. Game is protected zealously, if not successfully, by the state, and it was officially estimated in 1898 that there were then probably 7000 elk, as many mountain sheep, 25,000 antelope and 100,000 deer within its borders (by far the greatest part in Routt and Rio Blanco counties). Fish are not naturally very abundant, but the mountain brooks are the finest home for trout, and these as well as bass, cat-fish and some other varieties have been used to stock the streams.

Soil. — The soils of the lowlands are prevailing sandy loams, with a covering of rich mould. The acreage of improved lands in 1900 was returned by the federal census as 2,273,968, three times as much being unimproved; the land improved constituted

3 -4% of the state’s area. The lands available for agriculture are the lowlands and the mountain parks and valleys.

Speaking generally, irrigation is essential to successful culti- vation, but wherever irrigation is practicable the soil proves richly productive. Irrigation ditches having been exempted from taxation in 1872, extensive systems of canals were soon developed, especially after 1880. The Constitution of Colorado declares the waters of its

streams the property of the state, and a great body of irrigation law and practice has grown up about this provision. The riparian doctrine does not obtain in Colorado. In no part of the semi-arid region of the country are the irrigation problems so diverse and difficult. In 1903 there were, according to the governor, 10 canals more than 50 m. in length, 51 longer than 20 m., and hundreds of reservoirs. In 1899 there were 7374 m. of main ditches. The average annual cost of water per acre was then estimated at about 79 cents. The acres under ditch in 1902 were greater (1,754,761) than in any other state; and the construction cost of the system was then $14,769,561 (an increase of 25-6% from 1899 to 1902). There are irrigated lands in every county. Their area increased 8-9% in 1899-1902, and 80-9% from 1890 to 1900; in the latter year they constituted 70-9% of the improved farm-land of the state, as against 48-8 in 1890. The land added to the irrigated area in the decade was in 1890 largely worthless public domain; its value in 1900 was about $29,000,000. As a result of irrigation the Platte is often dry in eastern Colorado in the summer, and the Arkansas shrinks so below Pueblo that little water reaches Kansas. The water is almost wholly taken from the rivers, but underflow is also utilized, especially in San Luis Park. The South Platte is much the most important irrigating stream. Its valley included 660,495 acres of irrigated land in 1902, no other valley having half so great an area. The diversion of the waters of the Arkansas led to the bringing of a suit against Colorado by Kansas in the United States Supreme Court in 1902, on the ground that such diversion seriously and illegally lessened the waters of the Arkansas in Kansas. In 1907 the Supreme Court of the United States declared that Colorado had diverted waters of the Arkansas, but, since it had not been shown that Kansas had suffered, the case was dismissed, without prejudice to Kansas, should it be injured in future by diversion of water from the river. The exhaustion, or alleged exhaustion, by irrigation in Colorado of the waters of the Rio Grande has raised international questions of much interest between Mexico and the United States, which were settled in 1907 by a convention pledging the United States to deliver 60,000 acre-feet of water annually in the bed of the Rio Grande at the Acequia Madre, just above Juarez, in case of drought this supply being diminished proportionately to the diminution in the United States. As a part of the plans of the national government for reclamation of land in the arid states, imposing schemes have been formulated for such work in Colorado, including a great reservoir on the Gunnison. One of the greatest undertakings of the national reclamation service is the construction of 77 m. of canal and of a six-mile tunnel, beneath a mountain, between the canyon of the Gunnison and the valley of the Uncompahgre, designed to make

productive some 140,000 acres in the latter valley.

Apart from mere watering, cultivation is in no way intensive. One of the finest farming regions is the lowland valley of the Arkansas. It is a broad, level plain, almost untimbered, given over to alfalfa, grains, vegetables and fruits. Sugar-beet culture has been found to be exceptionally remunerative in this valley as well as in those of the South Platte and Grand rivers. The growth of this interest has been since 1899 a marked feature in the agricultural development of the state; and in 1905, 1906 and 1907 the state's product of beets and of sugar was far greater than that of any other state; in 1907, 1,523,303 tons of beets were worked — more than two-fifths of the total for the United States. There are various large sugar factories (in 1903, 9, and in 1907, 16), mainly in the north; also at Grand Junction and in the Arkansas valley. The total value of all farm property in- creased between 1880 and 1900 from $42,000,000 to $161,045,101 and 45-9% from 1890 to 1900. In the latter year $49,954,311

of this was in live-stock (increase 1 890-1 900, 121-1%), the remaining value in land with improvements and machinery. The total value of farm products in 1899 was $33,048,576; of this sum 97 % was almost equally divided between crop products and animal products, the forests contributing the remainder. Of the various elements in the value of all farm produce as shown by the federal census of 1900, live-stock, hay and grains, and dairying represented 87-2%. The value of cereals ($4,700,271)- — of which wheat and oats represent four-fifths — is much exceeded by that of hay and forage ($8,159,279 in 1899). Wheat culture increased greatly from 1890 to 1900. Flour made from Colorado wheat ranks very high in the market. As a cereal- producing state Colorado is, however, relatively unimportant; nor in value of product is its hay and forage crop notable, except that of alfalfa, which greatly surpasses that of any other state. In 1906 the state produced 3,157,136 bushels of Indian corn, valued at $1,578,568; 8,266,538 bushels of wheat, valued at $5j373. 2 5°; 5,962,394 bushels of oats, valued at $2,683,077; 759,771 bushels of barley, valued at $410,276; 43,580 bushels of rye, valued at $24,405; and 1,596,542 tons of hay, valued at $15,167,149. The value of vegetable products, of fruits, and of dairy products was, relatively, equally small (only $7,346,415 in 1899). Natural fruits are rare and practically worthless. Apples, peaches, plums, apricots, pears, cherries and melons have been introduced. The best fruit sections are the Arkansas valley, and in the western and south-western parts of the state. Melons are to some extent exported, and peaches also; the musk-melons of the Arkansas valley (Rocky P'ord Canteloups) being in demand all over the United States. The fruit industry dates practically

from 1890. The dairy industry is rapidly increasing. In the holdings of neat cattle (1,453,971) and sheep (2,045,577) it ranked in 1900 respectively seventeenth and tenth among the states of the Union; in 1907, according to the Yearbook of the Department of Agriculture, there were in the state 1,561,712 neat cattle and 1,677,561 sheep. Stock-raising has always been important. The parks and mountain valleys are largely given over to ranges. The native grasses are especially adapted for fodder. The grama, buffalo and bunch varieties cure on the stem, and furnish throughout the winter an excellent ranging food. These native grasses, even the thin bunch varieties of dry hills, are surprisingly nutritious, comparing very favour- ably with cultivated grasses. Large areas temporarily devoted to cultivation with poor success, and later allowed to revert to ranges, have become prosperous and even noted as stock country. This is true of the sandhill region of eastern Colorado. The grass flora of the lowlands is not so rich in variety nor so abundant in quality as that of high altitudes. Before the plains were fenced large herds drifted to the south in the winter, but now sufficient hay and alfalfa are cut to feed the cattle during the storms, which at longest are brief. An account of Colorado agriculture would not be complete without mentioning the depredations of the grasshopper, which are at times extra- ordinarily destructive, as also of the " Colorado Beetle " (Dory- phora decemlineata) , or common potato-bug, which has extended its fatal activities eastward throughout the prairie states.

Minerals. — Colorado is pre-eminently a mineral region, and to this fact it owes its colonization. It possesses unlimited supplies, as yet not greatly exploited, of fine building stones, some oil and asphalt, and related bituminous products, a few precious and semi-precious stones (especially tourmalines, beryls and aquamarines found near Canyon near the Royal Gorge of the Arkansas river), rare opalized and jasperized wood (in the eastern part of the El Paso county), considerable wealth of lead and copper, enormous fields of bituminous coal, and enormous wealth of the precious metals. In the exploitation of the last there have been three periods: that before the dis- covery of the lead-carbonate silver ores of Leadville in 1879, in which period gold-mining was predominant; the succeeding years until 1894, in which silver-mining was predominant; and the period since 1894, in which gold has attained an overwhelming primacy. The two metals are found in more than 50 counties, San Miguel, Gilpin, Boulder, Clear Creek, Lake, El Paso and

Teller being the leading producers. The Cripple Creek field in the last-named county is one of the most wonderful mining districts, past or present, of America. Leadville, in Lake county, is another. The district about Silverton (product 18 70-1 900 about $35,000,000, principally silver and lead, and mostly after 1881) has also had a remarkable development; and Creede, in the years of its brief prosperity, was a phenomenal silver-field. From 1858 up to and including 1904 the state produced, accord- ing to the State Bureau of Mines (whose statistics have since about 1890 been brought into practical agreement with those of the national government) a value of no less than $889,203,323 in gold, silver, lead, copper and zinc at market prices. (If the value of silver be taken at coinage value this total becomes vastly greater.) The yield of gold was $353,913,695 — $229,236,997 from 1895 to 1904; of silver, $386,455,463 — $115,698,366 from 1889 to 1893; of lead, $120,742,674 — its importance beginning in 1879; of copper, $17,879,446 — $8,441,783 from 1898 to 1904; and of zinc, $10,212,045 — a ˆ this from 1902 to 1904. Silver-mining ceased to be highly remunerative beginning with the closing of the India mints and repeal of the Sherman Law in 1893; since 1900 the yield has shown an extraordinary decrease — in 1905 it was $6,945,581, and in 1907 $7,411,652 — and it is said that as a result of the great fall in the market value of the metal the mines can now be operated only under the most favourable conditions and by exercise of extreme economy. In Lake county, for example, very much of the argentiferous ore that is too low for remunera- tive extraction (limit 1903 about $12-00 per ton) is used for fluxes. 1 The copper output was of slight importance until 1889 — $1,457,749 in 1905, and $1,544,918 in 1907; and that of zinc was nil until 1902, when discoveries made it possible to rework for this metal enormous dumps of waste material about the mines, and in 1906 the zinc output was valued at $5,304,884. Lead products declined with silver, but a large output of low ores has continued at Leadville, and in 1905 the product was valued at $5,111,570, and in 1906 at $5,933,829. Up to 1895 the gold output was below ten million dollars yearly; from 1898 to 1904 it ran from 21-6 to 28-7 millions. In 1897 the product first exceeded that of California. In 1907 the value was $20,826,194. Silver values ran, in the years 1880-1902, from 11-3 to 23-1 million dollars; and the quantities in the same years from n-6 to 26-3 million ounces. In 1907 it was 11,229,776 oz., valued at $7,411,652. Regarding again the total combined product of the above five metals, its growth is shown by these figures for its value in the successive periods indicated: 1858-

1879, $77,380,140; 1879-1888, $220,815,709; 1889-1898,

$322,878,362; 1899-1904, $268,229,112. From 1900 to 1903

Colorado produced almost exactly a third of the total gold and silver (market value) product of the entire country.

In addition, iron ores (almost all brown hematite) occur abundantly, and all material for making steel of excellent quality. But very little iron is mined, in 1907 only 11,714 long tons, valued at $21,085. Of much more importance are the manganiferous and the silver manganiferous ores, which are much the richest of the country. Their product trebled from 1889 to 1903; and in 1907 the output of manganiferous ores amounted to 99,711 tons, valued at $251,207. A small amount is used for spiegeleisen, and the rest as a flux.

The stratified rocks of the Great Plains, the Parks, and the Plateaus contain enormous quantities of coal. The coal-bearing rocks are confined to the Upper Cretaceous, and almost wholly to the Laramie formation. The main areas are on the two flanks of the Rockies, with two smaller fields in the Parks. .The east group includes the fields of Canyon City (whose product is the ideal domestic coal of the western states), Raton and the South Platte; the Park group includes the Cones field and the Middle Park; the west group includes the Yampa, La Plata and Grand River fields — the last prospectively (not yet actually) the most valuable of all as to area and quality. About three-

1 The market value of silver varied in the years 1870-1885 from $1-32 to $1-065 an ounce; 1886-1893, $° – 995 to $0-782; 1894- 1904, $0-630 to $0-5722.

fifths of all the coal produced in the state comes from Las Animas and Huerfano counties. In 1901 about a third and in 1907 nearly two-fifths of the state's output came from Las Animas county. The Colorado fields are superior to those of all the other Rocky Mountain states in area, and in quality of product. In 1907 Colorado ranked seventh among the coal-producing states of the Union, yielding 10,790,236 short tons (2-2% of the total for the United States). The total includes every variety from typical lignite to typical anthracite. The aggregate area of beds is estimated by the United States Geological Survey at 18,100 sq. m. (seventh in rank of the states of the Union); and the ac- cessible coal, on other authority, at 33,897,800,000 tons. The industry began in 1864, in which year 500 tons were produced. The product first exceeded one million tons in 1882, two in 1888, three in 1890, four in 1893, five in 1900. From 1897 to 1902 the yield almost doubled, averaging 5,267,783 tons (lignite, semi- bituminous, bituminous, and a steady average production of 60,038 tons of anthracite). About one-fifth of the total product is made into coke, the output of which increased from

245,746 tons in 1890 to 1,421,579 tons (including a slight amount from Utah) in 1907; in 1907 the coke manufactured in Colorado (and Utah) was valued at $4,747,436. Colorado holds the same supremacy for coal and coke west of the Mississippi that Penn- sylvania holds for the country as a whole. The true bituminous coal produced, which in 1897 was only equal to that of the lignitic and semi-bituminous varieties (1-75 million tons), had come by 1902 to constitute three-fourths (5-46 million tons) of the entire coal output. Much of the bituminous coal, especi- ally that of the Canyon City field, is so hard and clean as to be little less desirable than anthracite; it is the favoured coal for domestic uses in all the surrounding states.

Petroleum occurs in Fremont and Boulder counties. There have been very few flowing wells. The product increased from 76,295 barrels in 1887 to above 800,000 in the early 'nineties; it fell thereafter, averaging about 493,269 barrels from 1899 to 1903; in 1905 the yield was 376,238 barrels; and in 1907, 331,851 barrels. In 1905 the state ranked eleventh, in 1907 twelfth, in production of petroleum. It is mostly refined at Florence, the centre of the older field. The Boulder district developed very rapidly after 1902; its product is a high-grade illuminant with paraffin base. Asphalt occurs in the high north rim of Middle Park (c. 10,000 ft.). Tungsten is found in wolf- ramite in Boulder county. In 1903 about 37,000 men were employed in the mines of Colorado. Labour troubles have been notable in state history since 1890.

Mineral springs have already been mentioned. They are numerous and occur in various parts of the state. The most important are- at Buena Vista, Ouray, Wagon Wheel Gap, Poncha or Poncho Springs (90°-i8s° F.), Canyon City, Manitou, Idaho Springs and Glenwood Springs (i2o°-i4o° F., highly mineralized). The last three places, all beautifully situated — the first at the base of Pike's Peak, the second in the Clear Creek Canyon, and the third at the junction of the Roaring Fork with the Grand river — have an especially high repute. In 1904 it was competently estimated that the mineral yield and agricultural yield of the state were almost equal— somewhat above $47,000,000 each. 2

In 1900 only 4-6% of the population were engaged in manu- factures. They are mainly dependent on the mining industry. There are many large smelters and reduction plants in the state, most of them at Denver, Leadville, Durango and Pueblo; at the latter place there are also blast-furnaces, a steel plant and rolling mills. Use is made of the most improved methods of treating the ore. The cyanide process, introduced about 1890, is now one of the most important factors in the utilization of low-grade and refractory gold and silver ores. The

improved dioxide cyanide process was adopted about 1895. The iron and steel product — mainly at Pueblo — is of great importance, though relatively small as compared with that of some other states. Nevertheless, the very high rank in coal and iron

2 The mineral yield for 1907, according to The Mineral Resources of the United States, 1907, amounted to $71,105,128.

interests of the state among the states west of the Mississippi, the presence of excellent manganiferous ores, a central position for distribution, and much the best railway system of any moun- tain state, indicate that Colorado will almost certainly eventu- ally entirely or at least largely control the trans-Mississippi market in iron and steel. The Federal census of iqoo credited the manufacturing establishments of the state with a capital of $62,825,472 and a product of $102,830,137 (increase 1890- 1900, 142-1%); of which output the gold, silver, lead and copper smelted amounted to $44,625,305. Of the other pro- ducts, iron and steel ($6,108,295), flouring and grist-mill products ($4,528,062), foundry and machine-shop products ($3,986,985), steam railway repair and construction work ($3,141,602), printing and publishing, wholesale slaughtering and meat packing, malt liquors, lumber and timber, and coke were the most important. The production of beet sugar is relatively important, as more of it was produced in Colorado in 1905 than in any other state; in 1906 334,386,000 lb (out of a grand total for the United States of 967,224,000 lb) were manufactured here; the value of the product in 1905 was $7,198,982, being 29-2% of the Talue of all the beet sugar produced in the United States in that year. 1

Railways. — On the 1st of January 1909 there were 5403.05 m. of railway in operation. The Denver Pacific, builtfrom Cheyenne, Wyoming, reached Denver in June 1870, and the Kansas Pacific, from Kansas City, in August of the same year. Then followed the building of the Denver & Rio Grande (1871), to which the earlier development of the state is largely due. The great Santa F6 (1873), Burlington (1882), Missouri Pacific (1887) and Rock Island (1888) systems reached Pueblo, Denver and Colorado Springs successively from the east. In 1 888 the Colorado Midland started from Colorado Springs westward, up the Ute Pass, through the South Park to Leadville, and thence over the con- tinental divide to Aspen and Glen wood Springs. The Colorado & Southern, a consolidation of roads connecting Colorado

with the south, has also become an important system.

Population. — The population of the state in 1870 was 39,864; in 1880, 194,327 s ; in 1890, 413,249; in 1900, 539,700; and in 1910, 799,024. Of the 1900 total, males constituted 54-7%, native born 83-1%. The 10,654 persons of coloured race included 1437 Indians and 647 Chinese and Japanese, the rest being negroes. Of 185,708 males twenty-one or more years of age 7689 (4-1%) were illiterate (unable to write), including a fourth of the Asiatics, a sixth of the Indians, one-nineteenth of the negroes, one in twenty-four of the foreign born, and one in 147-4 of the native born. Of 165 incorporated cities, towns and villages, 27 had a population exceeding 2000, and 7 a population of above 5000. The latter were Denver (133,859), Pueblo (28,137), Colorado Springs (21,085), Leadville (12,455), Cripple Creek (10,147), Boulder (6150) and Trinidad (5345). Creede, county-seat of Mineral county, was a phenomenal silver camp from its discovery in 1891 until 1893; in 1892 it numbered already 7000 inhabitants, but the rapid depreciation of silver soon thereafter caused most of its mines to be closed, and in i9ro the population was only 741. Grand Junction (pop. in igio, 7754) derives importance from its railway connexions, and from the distribution of the fruit and other products of the irrigated valley of the Grand river. Roman Catholics are in the majority among church adherents, and Methodists and Presbyterians most

1 The special census of manufactures of 1905 was concerned only with the manufacturing establishments of the state conducted under the so-called factory system. The capital invested in such establishments was $107,663,500, and the product was valued at $100,143,999. The corresponding figures for 1900 reduced to the same standard for purposes of comparison were $58,172,865 and $89,067,879. Thus during the five years the capital invested in factories increased 85-1%, and the factory product 12-4%. The increase in product would undoubtedly have been much greater but for the labour disturbances (described later in the article), which occurred during this interval. Of the total product in 1905 more than four-fifths were represented by the smelting of lead, copper and zinc ores, the manufacture of iron and steel, the production of coke, and the refining of petroleum. The value of the flour and grist-mill product was $5,783,421.

8 Census figures before 1890 do not include Indians on reservations.

numerous of the Protestant denominations. The South Ute Indian Reservation in the south of the state is the home of the Moache, Capote and Wiminuche Utes, of Shoshonean stock.

Administration. — The first and only state constitution was adopted in 1876. It requires a separate popular vote on any amendment — though as many as six may be (since 190c) voted on at one election. Amendments have been rather freely adopted. The General Assemblies are biennial, sessions limited to 90 days (45 before 1884); state and county elections are held at the same time (since 1902). A declared intention to become a United States citizen ceased in 1902 to be sufficient qualifica- tion for voters, full citizenship (with residence qualifications) being made requisite. An act of 1909 provides that election campaign expenses shall be borne ” only by the state and by the candidates,” and authorized appropriations for this purpose. Full woman suffrage was adopted in 1893 (by a majority of about 6000 votes). Women have served in the legislature and in many minor offices; they are not eligible as jurors. The governor may veto any separate item in an appropriation bill. The state treasurer and auditor may not hold office during two consecutive terms. Convicts are deprived of the privilege of citizenship only during imprisonment. County government is of the commissioner type. There is a State Voter’s League similar to that of Illinois.

In 1907 the total bonded debt of the state was $393,500; the General Assembly in 1906 authorized the issue of $900,000 worth of bonds to fund outstanding military certificates of indebtedness incurred in suppressing insurrections at Cripple Creek and elsewhere in 1903-1904. The question of issuing bonds for all outstanding warrants was decided to be voted on by the people in November 1908. Taxation has been very erratic. From 1877 to 1893 the total assessment rose steadily from $3,453,946 to $238,722,417; it then fell at least partly owing to the de- preciation in and uncertain values of mining property, and from 1894 to 1900 fluctuated between 192-2 and 216-8 million dollars; in 1901 it was raised to $465,874,288, and fluctuated in the years following; the estimated total assessment for 1907 was

$365,000,000.

Of charitable and reformatory institutions a soldiers’ and sailors’ home (1889) is maintained at Monte Vista, a school for the deaf and blind (1874) at Colorado Springs, an insane asylum (1879) at Pueblo, a home for dependent and neglected children (1895) at Denver, an industrial school for girls (1887) near Morrison, and for boys (1881)

at Golden, a reformatory (1889) at Buena Vista, and a penitentiary (1868) at Canyon City. Denver was one of the earliest cities in the country to institute special courts for juvenile offenders; a reform that is widening in influence and promise. The parole system is in force in the state reformatory; and in the industrial school at Golden (for youthful offenders) no locks, bars or cells are used, the theory being to treat the inmates as "students." The state has a parole law and an indeterminate-sentence law for convicts.

The public school system of Colorado dates from 1861, when a school law was passed by the Territorial legislation; this law was superseded by that of 1876, which with subsequent amend- ments is still in force. In expenditure for the public schools per capita of total population from 1890 to 1903 Colorado was one of a small group of leading states. In 1906 there were 187,836 persons of school age (from 6 to 21) in the state, and of these 144,007 were enrolled in the schools; the annual cost of education was $4-34 per pupil. In 1902-1903, 92- 5 % of persons from 5 to 18 years of age were enrolled in the schools. The institutions of the state are: the University of Colorado, at Boulder, opened 1877; the School of Mines, at Golden (1873); the Agricultural College, at Fort Collins (1870); the Normal School (1891) at Greeley; and the above-mentioned industrial schools. All are supported by special taxes and appropriations— the Agricultural College receiving also the usual aid from the federal government. Experiment stations in connexion with the college are maintained at different points. Colorado College (1874) at Colorado Springs, Christian but not denominational, and the University of Denver, Methodist, are on independent

COLORADO

foundations. The United States maintains an Indian School at Grand Junction.

History. — According as one regards the Louisiana purchase as including or not including Texas to the Rio Grande (in the territorial meaning of the state of Texas of 1845), one may say that all of Colorado east of the meridian of the head of the Rio Grande, or only that north of the Arkansas and east of the meridian of its head, passed to the United States in 1803. At all events the corner between the Rio Grande and the Arkansas was Spanish from 1819 to 1845, when it

became American territory as a part of the state of Texas; and in 1850, by a boundary arrangement between that state and the federal government, was incorporated in the public domain. The territory west of the divide was included in the Mexican cession of 1848. Within Colorado there are pueblos and cave dwellings commemorative of the Indian period and culture of the south- west. Coronado may have entered Colorado in 1540; there are also meagre records of indisputable Spanish explorations in the south in the latter half of the 18th century (friars Escal- lante and Dominguez in 1776). In 1806 Zebulon M. Pike, mapping the Arkansas and Red rivers of the Louisiana Territory for the government of the United States, followed the Arkansas into Colorado, incidentally discovering the famous peak that bears his name. In 1819 Major S. H. Long explored the valleys of the South Platte and Arkansas, pronouncing them unin- habited and uncultivable (as he also did the valley of the Mis- souri, whence the idea of the ” Great American Desert “)• His work also is commemorated by a famous summit of the Rockies. There is nothing more of importance in Colorado annals until 1858. From 1804 to 1854 the whole or parts of Colorado were included, nominally, under some half-dozen territories carved successively out of the Trans-Mississippi country; but not one of these had any practical significance for an uninhabited land. In 1828 (to 1832) a fortified trading post was established near La Junta in the Arkansas valley on the Santa Fe trail; in 1834-1836 several private forts were erected on the Platte; in 1841 the first overland emigrants to the Pacific coast crossed the state, and in 1846-1847 the Mormons settled temporarily at the old Mexican town of Pueblo. John C. Fremont had explored the region in 1842-1843 (and unofficially in later years for railway routes), and gave juster reports of the country to the world than his predecessors. Commerce was tributary in these years to the (New) Mexican town of Taos.

Colorado was practically an unknown country when in 1858 gold was discovered in the plains, on the tributaries of the South Platte, near Denver. In 1859 various discoveries were made in the mountains. The history of Denver goes back to this time. Julesburg, in the extreme north-east corner, at the intersection of the Platte valley and the overland wagon route, became transiently important during the rush of settlers that followed. Emigration from the East was stimulated by the panic and hard times following 1857. During i860, 1861 and 1862 there was a continuous stream of immigration. Denver (under its present name), Black Hawk, Golden, Central City, Mount Vernon and Nevada City were all founded in 1859; Breckenridge, Empire, Gold Hill, Georgetown and Mill City date from i860 and 1861. The political

development of the next few years was very com- plicated. ” Arapahoe County,” including all Colorado, was organized as a part of Kansas Territory in 1858; but a delegate was also sent to Congress to work for the admission of an inde- pendent territory (called “Jefferson”). At the same time, early in i860, a movement for statehood was inaugurated, a constitution being framed and submitted to the people, who rejected it, adopting later in the year a constitution of terri- torial government. Accordingly the Territory of Jefferson arose, assuming to rule over six degrees of latitude (37°-43°) and eight of longitude (io2°-no°). Then there was the Kansas territorial government also, and under this a full county organization was maintained. Finally, peoples’ court, acting wholly without reference to Kansas, and with no more than suited them (some districts refusing taxes) to the local ” provisional ” legislature, secured justice in the mining country. The provisional legis-

lature of the Territory of Jefferson maintained a wholly illegal but rather creditable existence somewhat precariously and ineffectively until 1861. Its acts, owing to the indifference of the settlers, had slight importance. Some, such as the first charter of Denver, were later re-enacted under the legal territorial government, organized by the United States in February 1861. Colorado City was the first capital, but was soon replaced by Golden, which was the capital from 1862 until 1868, when Denver was made the seat of government (in 1881 permanently, by vote of the people). In 1862 some Texas forces were defeated by Colorado forces in an attempt to occupy the territory for the Confederacy. From 1864 to 1870 there was trouble with the Cheyenne and Arapahoe Indians. A sanguinary attack on an Indian camp in Kiowa county in 1864 is known as the Sand Creek Massacre. In 1867 the Republican party had prepared for the admission of Colorado as a state, but the enabling act was vetoed by President Johnson, and statehood was not gained until 1876. Finally, under a congressional enabling act of the 3rd of March 1875, a constitution was framed by a convention at Denver (20th of December 1875 to 14th of March 1876) and adopted by the people on the 1st of July 1876. The admission of Colorado to the Union was thereupon proclaimed on the 1st of August 1876.

From this time on the history of the state was long largely that of her great mining camps. After 1890 industrial con- ditions were confused and temporarily set greatly backward by strikes and lockouts in the mines, particularly in 1894, 1896- 1897 and 1 903- 1 904, several times threatening civil war and necessitating the establishment of martial law. Questions of railways, of franchises, union scales and the recognition of the union in contracts, questions of sheep and cattle

interests, politics, civic, legal and industrial questions, all entered into the economic troubles of these years. The Colorado ” labour wars ” were among the most important struggles between labour and capital, and afforded probably the most sensational episodes in the story of all labour troubles in the United States in these years. A state board of arbitration was created in 1896, but its usefulness was impaired by an opinion of the state attorney- general (in 1 901) that it could not enforce subpoenas, compel testimony or enforce decisions. A law establishing an eight- hour day for underground miners and smelter employees (1899) was unanimously voided by the state supreme court, but in 1902 the people amended the constitution and ordered the general assembly to re-enact the law for labourers in mines, smelters and dangerous employments. Following the repeal of the Sherman Law and other acts and tendencies unfavourable to silver coinage in 1893 and thereafter, the silver question became the dominant issue in politics, resulting in the success of the Populist-Demo- cratic fusion party in three successive elections, and permanently and greatly altering prior party organizations.

The governors of Colorado have been as follows: — Territorial.

w

Gilpin . . . 1861

E. M. McCook ,

1869

J.

Evans . . . 1862

S. H. Elbert

1873

A.

Cummings . . 1865

E. M. McCook .

1874

A.

C. Hunt. . . 1867

Sta

J. L. Routt te.

1875

J. L. Routt

Republican

1876

F. W. Pitkin

M

1879

J. B. Grant B. H. Eaton

Democrat

1883

Republican

1885

A. Adams .

Democrat

1887

J. A. Cooper

Republican

1890

J. L. Routt D. H. Waite

»»

1891

Populist

1893

A. W. M'Intire .

Republican

1895

A. Adams .

Dem. -Populist

1897

C. S. Thomas

1899

J. B. Orman

M

1901

J. H. Peabody .

Republican

1903

A. Adams .

Democrat

1905 1

Jesse F. M' Donald

Republican

1905 1

Henry A. Buchtel

n

1907

John H. Shafroth

Democrat

1909

1 Adams was inaugurated on the loth of Jannary, having been

Authorities. — For topography and general description : Hayden and assistants, reports on Colorado, U.S. Department of the Interior, Geological and Geographical Survey of the Territories (13 vols., 1867-1878), various reports, especially annual report for 1874; Captain J. C. Fremont, Report of the Exploring Expedition to the Rocky Mountains in 1842ˆ published 1845 as Congressional document 28th Congress, 2nd Session, House Executive Document No. 166, and various other editions. Other early exploring reports are: The Expeditions of Zebulon Montgomery Pike . . . Through Louisiana Territory and in New Spain in the Years 1805-6-7, edited by E. Coues (3 vols., New York, 1895) ; Account of an Expedition from Pittsburgh to the Rocky Mountains, 1819-20, under the Command of Major S. H. Long; compiled . . . by Edwin James (3 vols., London; 2 vols., Philadelphia, 1823); Captain H. Stansbury, Exploration of the Valley of the Great Salt Lake (2 vols., Philadelphia, 1852; also as Senate Executive Document No. 3, 32nd Congress Special Session) ; Francis Parkman, The California and Oregon Trail (New York, 1849; revised ed., Boston, 1892), — a narrative of personal experi- ence, as are the two following books: Bayard Taylor, Colorado; A Summer Trip (New York, 1867) ; Samuel Bowles, The Switzerland of America, A Summer Vacation in Colorado (Springfield, Mass., 1869); F. Fossett, Colorado; A Historical, Descriptive and Statistical Work on the Rocky Mountain Gold and Silver Region (Denver, 1878; New York, 1879, 2nd ed., 1880).

On fauna and flora : United States Biological Survey, Bulletins (especially No. 10), &c. ; the Biennial Report of the State Game and Fish Commissioner; United States Geological Survey, 10th Annual Report, pt. v., and 20th A.R., pt. 5, and various publications of the United States Forestry Division for forest and forest reserves; Porter and Coulter, Synopsis of the Flora of Colorado (1879) ; and scattered papers in scientific periodicals. On climate : United States Department

of Agriculture, Colorado Climate and Crop Service (monthly). On soil and agriculture: Annual Report of the State Board of Agriculture (since 1878), of the State Agricultural College, Agricultural Experiment Station (since 1887), and of the State Board of Horticulture; Biennial Report of the State Board of Land Commissioners (since 1879); publications of the United States Department of Agriculture, various bulletins on agrostology, water supply and irrigation, &c. (See Department bibliographies) ; United States Census, 1900 (States), Bulletin iff, ” Agriculture in Colorado ” (Special), Bulletin 16, ” Irrigation in the United States ” (1902), &c. ; United States Geological Survey, various materials, consult bibliographies in its Bulletins 100, 177, 215, 301, &c. On manufactures : publications of United States Census, 1900, and the special census of manufactures, 1905! On mineral industries: United States Geological Survey, Annual Report, annual volume on ” Mineral Resources “; also the annual Mineral Industry (Roth- well’s New York-London); Colorado State Bureau of Mines, Biennial Report, Inspector of Coal Mines, Biennial Report (since 1883-1884); and an enormous quantity of information in the publications of the United States Geological Survey. For labour troubles see below. On railways, see annual Statistics of Railways of the United States Interstate Commerce Commission, and Poor’s Manual (Annual, New York). Rivers, see Index to Reports of the Chief of Engineers, United States Army (3 vols., 1900, covering 1 866-1 900) ; publications United States Geological Survey. On population: United States Census, 1900. Administration: J. W. Mills’ Annotated Statutes of the State of Colorado … (2 vols., Denver, 1891; vol. iii. 1896); Helen L. Sumner, Equal Suffrage in Colorado (New York, 1909); J. E. Snook, Colorado History and Government (Denver, 1904), is a reliable school epitome.

On history: F. L. Paxson, “A Preliminary Bibliography of Colorado History,” being vol. iii., No. 3, of University of Colorado Studies (June 1906) ; H. H. Bancroft, History of . . . Nevada, Colorado and Wyoming, 1540-1888 (San Francisco, 1890) ; on labour conditions and troubles consult : Reports of the State Bureau of Labour Statistics (since 1892) ; Annual Reports of the State Board of Arbitration (since 1898) ; publications of United States Bureau of Labour (bibliographies) ; also especially Senate Document 122, 58th Congress, 3rd Session, covering the years 1880-1904. See also Cripple Creek and Leadville.

COLORADO RIVER, a stream in the south of the Argentine Republic. It has its sources on the eastern slopes of the Andes in the lat. of the Chilean volcano Tinguiririca (about 34 48′ S.), and pursues a general E.S.E. course to the Atlantic, where it discharges through several

channels of a delta extending from lat. 39° 30′ to 39 30′ S. Its total length is about 620 m., of which about 200 m. from the coast up to Pichemahuida is navigable for vessels of 7 ft. draft. It has been usually described as being formed by the confluence of the Grande and Barrancas,

elected on the return of the vote, which had been notoriously corrupted in Denver and elsewhere. The Republican legislature, after investigating the election and upon receiving from Peabody a written promise that he would resign in twenty-four hours, declared on the 16th of March that Peabody was elected. His resignation on the 17th of March made Lieutenant-Governor M' Donald governor of the state.

but as the latter is only a small stream compared with the Grande it is better described as a tributary, and the Grande as a part of the main river under another name. After leaving the vicinity of the Andes the Colorado flows through a barren, arid territory and receives no tributary of note except the Curaco, which has its sources in the Pampa territory and is considered to be part of the ancient outlet of the now closed lacustrine basin of southern Mendoza. The bottom lands of the Colorado in its course across Patagonia are fertile and wooded, but their area is too limited to support more than a small, scattered population.

COLORADO RIVER, a stream in the south-west of the United States of America, draining a part of the high and arid plateau between the Rocky mountains and the Sierra Nevada in Cali- fornia. The light rainfall scarcely suffices over much of the river's course to make good the loss by evaporation .from the waters drained from mountain snows at its source. Its head- waters are known as the Green river, which rises in north-west Wyoming and after a course of some 700 m. due south unites in south-east Utah with the Grand river, flowing down from Colorado, to form the main trunk of the Colorado proper. The Green cuts its way through the Uinta mountains of Wyoming; then flowing intermittently in the open, it crosses successive uplifts in a series of deep gorges, and flows finally at the foot of canyon walls 1500 ft. high near its junction with the Grand.

The Colorado in its course below the junction has formed a region that is one of the most wonderful of the world, not only for its unique and magnificent scenery, but also because it affords the most remarkable example known of the work of differential weathering and erosion by wind and water and the exposure of geologic strata on an enormous scale. Above the Paria the river flows through scenery comparatively tame until it reaches the plateau of the Marble Canyon, some 60 m. in

length. The walls here are at first only a few score of feet in height, but increase rapidly to almost 5000 ft. At its southern end is the Little Colorado. Above this point eleven rivers with steep mountain gradients have joined either the Green or the Grand or their united system. The Little Colorado has cut a trench 1800 ft. deep into the plateau in the last 27 m. as it approaches the Colorado, and empties into it 2625 ft. above the sea. Here the Colorado turns abruptly west directly athwart the folds and fault line of the plateau, through the Grand Canyon (q.v.) of the Colorado, which is 217 m. long and from 4 to 20 m. wide between the upper cliffs. The walls, 4000 to 6000 ft. high, drop in successive escarpments of 500 to 1600 ft., banded in splendid colours, toward the gloomy narrow gorge of the present river. Below the confluence of the Virgin river of Nevada the Colorado abruptly turns again, this time southward, and flows as the boundary between Arizona and California and in part between Arizona and Nevada, and then through Mexican territory, some 450 m. farther to the Gulf of California. Below the Black Canyon the river lessens in gradient, and in its lower course flows in a broad sedimentary valley — a distinct estuarine plain extend- ing northward beyond Yuma — and the channel through much of this region is bedded in a dyke-like embankment lying above the flood-plain over which the escaping water spills in time of flood. This dyke cuts off the flow of the river to the remarkable low area in southern California known as the Salton Sink, or Coahuila Valley, the descent to which from the river near Yuma is very much greater than the fall in the actual river-bed from Yuma to the gulf. In the autumn of 1904, the diversion flow from the river into a canal heading in Mexican territory a few miles below Yuma, and intended for irrigation of California south of the Sink, escaped control, and the river, taking the canal as a new channel, recreated in California a great inland sea — to the bed of which it had frequently been turned formerly, for example, in 1884 and 1891 — and for a time practically aban- doned its former course through Mexican territory to the Gulf of California. But it was effectively dammed in the early part of 1907 and returned to its normal course, from which, however, there was still much leakage to Salton Sea; in July 1907 the permanent dam was completed. From the Black Canyon to the sea the Colorado normally flows through a desert-like basin,

to the west of which, in Mexico, is Laguna Maquata (or Salada), lying in the so-called Pattie Basin, which was formerly a part of the Gulf of California, and which is frequently partially flooded (like Coahuila

Valley) by the delta waters of the Colorado. Of the total length of the Colorado, about 2200 m., 500 m. or more from the mouth are navigable by light steamers, but channel obstacles make all navigation difficult at low water, and impossible about half the year above Mojave. The whole area drained by the river and its tributaries is about 225,000 sq. m.; and it has been estimated by Major J. W. Powell that in its drainage basin there are fully 200,000 sq. m. that have been degraded on an average 6000 ft. It is still a powerful eroding stream in the canyon portion, and its course below the canyons has a shifting bed much obstructed by bars built of sediment carried from the upper course. The desert country toward the mouth is largely a sandy or gravelly aggradation plain of the river. The regular floods are in May and June. Others, due to rains, are rare. The rise of the water at such times is extraordinarily rapid. Enormous drift is left in the canyons 30 or 40 ft. above the normal level. The valley near Yuma is many miles wide, frequently inundated, and remark- ably fertile; it is often called the ” Nile of America ” from its resemblance in climate, fertility, overflows and crops. These alluvial plains are covered with a dense growth of mesquite, Cottonwood, willow, arrowwood, quelite and wild hemp. Irri- gation is essential to regular agriculture. There is a fine delta in the gulf. The Colorado is remarkable for exceedingly high tides at its mouth and for destructive bores.

In 1540, the second year that Spaniards entered Arizona, they discovered the Colorado. Hernando de Alarcon co-opera- ting with F. V. de Coronado, explored with ships the Gulf of California and sailed up the lower river; Melchior Diaz, march- ing along the shores of the gulf, likewise reached the river; and Captain Garcia L6pez de Cardenas, marching from Zufii, reached the Grand Canyon, but could not descend its walls. In 1604 Juan de Onate crossed Arizona from New Mexico and descended the Santa Maria, Bill Williams and Colorado to the gulf. The name Colorado was first applied to the present Colorado Chiquito, and probably about 1630 to the Colorado of to-day. But up to 1869 great portions of the river were still unknown. James White, a miner, in 1867, told a picturesque story (not generally accepted as true) of making the passage of the Grand Canyon on the river. In 1869, and in later expeditions, the feat was accomplished by Major J. W. Powell. There have been since then repeated explorations and scientific studies.

See C. E. Dutton, ” Tertiary History of the Grand Canyon,” U.S. Geological Survey, Monograph II. (1882); J. W. Powell, Exploration of the Colorado River (Washington, 1875), and Canyons of the Colorado (Meadville, Pa. 1895) ; F. S. Dellenbaugh, Romance of the Colorado River (New York, 1902), and Canyon Voyage (1908); G. W. James,

Wonders of the Colorado Desert (2 vols., Boston, 1906).

COLORADO SPRINGS, a city and the county-seat of El Paso county, Colorado, U.S.A., about 75 m. S. of Denver. Pop. (1890) 11,140; (1900) 21,085, ˚f whom 2300 were foreign-born; (1910) 29,078. The city is served by the Atchison, Topeka & Santa Fe, the Denver & Rio Grande, the Chicago, Rock Island & Pacific (of which the city is a terminus), the Colorado & Southern, the Colorado Springs & Cripple Creek District (con- trolled by the Colorado & Southern), and the Colorado Midland railways, of which the first three are continental systems. Continuous on the west with Colorado Springs is Colorado City (pop. in 1900, 2914), one of the oldest settlements of Colorado, and the first capital (1861). Colorado Springs is superbly situated where the Rocky Mountains rise from the great plains of the prairie states, surrounded on all sides by foothills save in the south-east, where it is open to the prairie. To the south of the mesa (tableland) on which it lies is the valley of Fountain Creek. To the west is the grand background of the canyon-riven Rampart range, with Pike's Peak (q.v.) dominating a. half-dozen other peaks (among them Cameron Cone, Mt. Rosa, Cheyenne Mt.) 9000 to 12,000 ft. in height. Monument Creek traverses the city. The streets are of generous width (100-140 ft.), and are well shaded by trees. There are several fine parks. The city is

the seat of a state asylum for the deaf, dumb and blind, of a printers' home for union men, which was endowed in 1892 by Anthony J. Drexel and George W. Childs, and of Colorado College (1874), one of the leading educational institutions of the Rocky Mountain states, and the oldest institution for higher education in the state. The college is coeducational and non- sectarian. In 1908 it had a permanent endowment of about $425,000, a faculty of 46 and 607 students; the library con- tained 40,000 bound volumes and as many pamphlets. The departments of the institution are a college of arts; schools of engineering (1903), music, and (1906) forestry; and the Cutler Academy, a preparatory school under the control of the college. In 1905 Gen. W. J. Palmer (1836-1909) and W. A. Bell gave to the college Manitou Park, a tract of forest land covering about 13,000 acres and situated about 20 m. from Colorado Springs.

Bright sunshine and a pleasant climate (mean annual tempera- ture about 48 F., rainfall 14 in., falling almost wholly from April to September, relative humidity 59), combined with beautiful scenery, have made the city a favourite health resort and place of residence. Land deeds for city property have always excluded saloons. The municipality owns and operates the water system, water being drawn

from lakes near Pike's Peak. The scenery about the city is remarkable. Manitou (6100-6300 ft.) a popular summer resort, lies about 6 m. (by rail) north-west of Colorado Springs, in a glen at the opening of Ute Pass (so-named because it was formerly used by the Ute Indians), with the mountains rising from its edge. Its springs of soda and iron belong to the class of weak compound carbon- ated soda waters. In the neighbourhood are the Cave of the Winds, the Grand Caverns, charming glens, mountain lakes and picturesque canyons; and the Garden of the Gods (owned by the city) — approached between two tremendous masses of red rock 330 ft. high, and strewn (about 500 acres) with great rocks and ridges of brightly coloured sandstone, whose grotesque shapes and fantastic arrangement have suggested a playground of superhuman beings. At the southern end of the Rampart range is Cheyenne Mt. (9407 ft.), on whose slope was buried Helen Hunt Jackson (" H.H."), who has left many pictures of this country in her stories. The two Cheyenne Canyons, with walls as high as 1000 ft. and beautiful falls, and the road over the mountain side toward Cripple Creek, afford exquisite views. Monument Park (10 m. N.) is a tract of fantastically eroded sandstone rocks, similar to those in the Garden of the Gods.

In 1859 a winter mining party coming upon the sunny valley near the present Manitou, near the old Fontaine-qui-Bouille, settled " El Dorado." Colorado City is practically on the same site. In 1870, as part of the town development work of the Denver & Rio Grande railway, of which General W. J. Palmer was the president, a land company founded Colorado Springs. In 1872 Manitou (first La Fontaine) was founded. Colorado Springs was laid out in 1871, was incorporated in 1872, and was first chartered as a city in 1878. A new charter (May 1909) provided for the recall of elective officials. A road over the Ute Pass to South Park and Leadville was built, and at one time about 12,000 horses and mules were employed in freighting to the Leadville camps. The Chicago, Rock Island & Pacific rail- way reached the city in 1888. The greatest part of the Cripple Creek mining properties is owned in Colorado Springs, where the exchange is one of the greatest in the world.

COLOSSAE, once the great city of south-west Phrygia, was situated on rising ground (1150 ft.) on the left bank of the Lycus (Churuk Su), a tributary of the Maeander, at the upper end of a narrow gorge 2J m. long, where the river runs between cliffs from 50 to 60 ft. high. It stood on the great trade route from Sardis to Celaenae and Iconium, and was a large, prosperous city (Herod, vii.30; Xenophon, Anab. i. 2, §6), until it was ruined by the foundation of Laodicea in a more advantageous position. The town was celebrated for its wool, which

was dyed a purple colour called colossinus. Colossae was the seat of an early Christian church, the result of St Paul's activity at Ephesus, though perhaps actually founded by Epaphras.

The church, to which St Paul wrote a letter, was mainly com- posed of mingled Greek and Phrygian elements deeply imbued with fantastic and fanatical mysticism. Colossae lasted until the 7 th and 8th centuries, when it was gradually deserted under pressure of the Arab invasions. Its place was taken by Khonae (Khonas) — -a strong fortress on a rugged spur of Mt. Kadmus, 3 m. to the south, which became a place of importance during the wars between the Byzantines and Turks, and was the birthplace of the historian, Nicetas Khoniates. The worship of angels alluded to by St Paul (Col. ii. 18), and condemned in the 4th century by a council at Laodicea, reappears in the later worship of St Michael, in whose honour a celebrated church, destroyed by the Seljuks in the 12th century, was built on the right bank of the Lycus.

See Sir W. M. Ramsay, Cities and Bishoprics of Phrygia, vol. i.

COLOSSAL CAVERN, a cave in Kentucky, U.S.A., the main entrance of which is at the foot of a steep hill beyond Eden Valley, and ijm. from Mammoth Cave. It is connected with what has long been known as the Bed Quilt Cave. Several entrances found by local explorers were rough and difficult. They were closed when the property was bought in 1896 by the Louisville & Nashville railway and a new approach made as indicated on the accompanying map. From the surface to the floor is 240 ft.; under Chester Sandstone and in the St Louis Limestone. Fossil corals fix the geological age of the rock. The temperature is uniformly 54° Fahr., and the atmosphere is optically and chemically pure. Lovely incrustations alternate with queer and grotesque figures. There are exquisite gypsum rosettes and intricately involved helictites.

tauuK&ttfi New / v 1 *^ V~ ^ajO) 4 r^S l Rosette Cnuph

<» River.

DonieX

y^^P^S^

, rl Florence ‘ 01 IA venue

l 7 c

1

| N t. Chinese Wall

a. Entrance to New Discovery & Entrance to WitdQoose Chase and River Region 4. Uncle Tom's Pool & lizard Spring & Twin Pits 7. Ruins of Carthage & Reck Island : b q. Sandstone Tumbledown

Entrance taˆV ˆ

PcdQuUiCttTVA

<2&

J

UmLˆ

ˆ 10. Ruins 0/ Martinique ** ?ˆ < 11. Register Avenue > u. Starry Heaven* and i-M-*-**' "* Way 9\ˆ *3*Bearakin Robe P/5? I*. Phosphate Mountain ˆ2F t5.Ww// o/r*e Great Western

%ˆVDtnlng tj. PuloH Rock I 73ˆRoom 18. Cascade Pit Ifjˆˆ J 19. Pearly Pool Njjˆfig«£3Si* eo. Kangaroo Bend

x?

ˆ* Colossal ˆA* Dome vP

COLOSSAL CAVERN sT

KENTUCKY

, ˆafltf** Chalybeate

' Spring

Scale of Feel

O 1OO3O0300 4CXX60O

From survey by Edgar Vaugh

and W.L. Marshall. with additions by John M.Neli

an Dome's Dome)

Copyright 1903 & 1907 by H.(

,. Howey – -

fice^^r- . EmervWalker sc.

Tremendous forces have been at work, suggesting earthquakes and eruptions; but really all is due to the chemical and mechani- cal action of water. The so-called ” Ruins of Carthage ” fill a hall 400 ft. long by 100 ft. wide and 30 ft. high, whose flat roof is a vast homogeneous limestone block. Isolated detached blocks measure from 50 to 100 ft. in length. Edgar Vaughan and W. L. Marshall, civil engineers, surveyed every part of the cave. Vaughan’s Dome is 40 ft. wide, 300 ft. long, and 79 ft. high. Numerous other domes exist, and many deep pits. The grandest place of all is the Colossal Dome, which used to be

entered only from the apex by windlass and a rope reaching 135 ft. to the floor. This is now used only for illumination by raising and lowering a fire-basket. The present entrance is by a gateway buttressed by alabaster shafts, one of which, 75 ft. high, is named Henry Clay’s Monument. The dome walls arise in a series of richly tinted rings, each 8 or 10 ft. thick, and each fringed by stalactites. The symmetry is remarkable, and the reverberations are strangely musical. The Pearly Pool, in a chamber near a pit 86 ft. deep, glistens with countless cave pearls. The route beyond is between rows of stately shafts, and ends in a copious chalybeate spring. Blind flies, spiders, beetles and crickets abound; and now and then a blind crawfish darts through the waters; but as compared with many caverns the fauna and flora are not abundant. It is conjectured, not without some reason, that there is a connexion, as yet undis- covered, between the Colossal and the Mammoth caves. It seems certain that Eden Valley, which now lies between them, is a vast ” tumble-down ” of an immense cavern that formerly united them into one. (H. C. H.)

COLOSSIANS, EPISTLE TO THE, the twelfth book of the New Testament, the authorship of which is ascribed to the Apostle Paul. Colossae, like the other Phrygian cities of Laodicea and Hierapolis, had not been visited by Paul, but owed its belief in Jesus Christ to Epaphras, a Colossian, who had been converted by Paul, perhaps in Ephesus, and had laboured not only in his native city but also in the adjacent portions of the Lycus valley, — a Christian in whom Paul reposed the greatest confidence as one competent to interpret the gospel of whose truth Paul was convinced (i. 7; iv. 12, 13). This Epaphras, like the majority of the Colossians, was a Gentile. It is

probable, however, both from the letter itself and from the fact that Colossae was a trade centre, that Jews were there with their synagogues (cf. also Josephus, Ant. xii. 149). And it is further probable that some of the Gentiles, who afterwards became Christians, were either Jewish proselytes or adherents who paid reverence to the God of the Jews. At all events, the letter indicates a sensitiveness on the part of the Christians not only to oriental mysticism and theosophy (cf. Sir W. M. Ramsay, Cities and Bishoprics of Phrygia, and Church in the Roman Empire), but also to the Judaism of the Diaspora.

Our first definite knowledge of the Colossian Church dates from the presence of Epaphras in Rome in a.d. 62-64 (or a.d. 56-58), when Paul was a prisoner. He arrived with news, perhaps with a letter (J. R. Harris, Expositor, Dec. 1898, pp. 404 ff.), touching the state of religion in Colossae. Paul learns, to his joy, of their faith, hope and love; of the order and stability of their faith; and of their reception of Christ Jesus the Lord (i. 4, 8; ii. 5-7). He sees no sign of an attack upon him or his gospel. On the contrary, loyalty to him and sympathy with him in his sufferings are everywhere manifest (i. 9, 24; ii. 2; iv. 8) ; and the gospel of Christ is advancing here as elsewhere (i. 6). At the same time he detects a lack of cheerfulness and a lack of spiritual understanding in the Church. The joy of the gospel, expressing itself in songs and thanksgivings, is damped (iii. 15, 16), and, above all, the message of Christ does not dwell richly enough in them. Though the believers know the grace of God they are not filled with a knowledge of his will, so that their conduct is lacking in that strength and joy and perfection, that richness of the fulness of knowledge expected of those who had been made full in Christ (i. 6, 9-1 1, 28; ii. 2, 7, 10). The reason for this, Paul sees, is the influence of the claim made by certain teachers in Colossae that the Christians, in order to attain unto and be assured of full salvation, must supplement Paul's message with their own fuller and more perfect wisdom, and must observe certain rites and practices (ii. 16, 21, 23) connected with the worship of angels (ii. 18, 23) and elementary spirits (ii 8, 20).

The origin and the exact nature of this religious movement are alike uncertain. (1) If it represents a type of syncretism as definite as that known to have existed in the developed gnostic systems of the 2nd century, it is inconceivable that Paul should have passed it by as easily as he did. (2) As there is no reference

to celibacy, communism and the worship of the sun, it is im- probable that the movement is identical with that of the Essenes. (3) The phenomena might be explained solely on the basis of Judaism (von Soden, Peake). Certainly the asceticism and ritualism might so be interpreted, for there was among the Jews of the Dispersion an increasing tendency to asceticism, by way of protest against the excesses of the Gentiles. The reference in ii. 23 to severity of the body may have to do with fasting preparatory to seeing visions (cf. Apoc. Baruch, xxi. 1, ix. 2, v. 7). Even the worship of angels, not only as mediators of revelation and visions, but also as cosmical beings, is a well- known fact in late Judaism {Apoc. Bar. Iv. 3; Ethiopic Enoch, Ix. n, lxi. 10; Col. ii. 8, 20; Gal. iv. 3). As for the word ” philosophy ” (ii. 8), it is not necessary to take it in the technical Greek sense when the usage of Philo and Josephus permits a looser meaning. Finally the references to circumcision, para- dosis (ii. 8) and dogmata (ii. 20), directly suggest a Jewish origin. If we resort solely to Judaism for explanation, it must be a Judaism of the Diaspora type. (4) The difficulty with the last- mentioned position is that it under-estimates the speculative tendencies of the errorists and ignores the direct influence of oriental theosophy. It is quite true that Paul does not directly attack the speculative position, but rather indicates the practical dangers inherent therein (the denial of the supremacy of Christ and of full salvation through Him); he does not say that the errorists hold Christ to be a mere angel or an aeon, or that words like pleroma (borrowed perhaps from their own vocabulary) involve a rigorous dualism. Yet his characterization of the movement as an arbitrary religion (ii. 23), a philosophy which is empty deceit (ii. 8), according to elemental spirits and not according to Christ, and a higher knowledge due to a mind controlled by the flesh (ii. 18); his repeated emphasis on Christ, as supreme over all things, over men and angels, agent in creation as well as in redemption, in whom dwelt bodily the fulness of the Godhead; and his constant stress upon knowledge, — all these combine to reveal a speculation real and dangerous, even if naive and regardless of consequences, and to suggest (with Jiilicher and McGiflert) that in addition to Jewish influence there is also the direct influence of Oriental mysticism.

To meet the pressing need in Colossae, Paul writes a letter and entrusts it to Tychichus, who is on his way to Colossae with Onesimus, Philemon’s slave (iv. 7, 9). (On the relation of this letter to Ephesians and to the letter to be sent from Laodicea to Colossae, see Ephesians, Epistle to the.) His attitude is prophylactic, rather than polemic, for the ” philosophy ” has not as yet taken deep root. His purpose is to restore in the hearts of the readers the joy of the Spirit, by making

them see that Christ fulfils every need, and that through faith in Him and love from faith, the advance is made unimpeded unto the perfect man. He will eliminate foreign accretions, that the gospel of Christ may stand forth in its native purity, and that Christ Himself may in all things have the pre-eminence.

The letter begins with a thanksgiving to God for the spiritual growth of the Colossians, and continues with a prayer for their fuller knowledge of the divine will, for a more perfect Christian life, and for a spirit of thanksgiving, seeing that it is God who guarantees their salvation in Christ (i. 1-14). It is Christ who is supreme, not angels, for He is the agent in creation; and it is solely on the basis of faith in Him, a faith expressing itself in love, that redemption is appropriated, and not on the basis of any further requirements such as ascetic practices and the worship of angels (i. 15-23). It is with a full message that Paul has been entrusted, the message of Christ, who alone can lead to all the riches of fulness of knowledge. And for this adequate knowledge the readers should be thankful (i. 23— ii. 7). Again he urges, that since redemption is in Christ alone, and that, too, full redemption and on the basis of faith alone, the demand for asceticism and meaningless ceremonies is folly, and moreover robs Christ, in whom dwells the divine fulness, of His rightful supremacy (ii. 8-23). And he exhorts them as members of the Body of Christ to manifest their faith in Christian love, particu- larly in their domestic relations and in their contact with non-

Christians (iii. i-iv. 6). He closes by saying that Tychichus will give them the news. Greetings from all to all (iv. 7-18).

A letter like this, clear cut in its thought, teeming with ideas emanating from an unique religious experience, and admirably adjusted to known situations, bears on the face of it the marks of genuineness even without recourse to the unusually excellent external attestation. It is not strange that there is a growing consensus of opinion that Paul is the author. With the critical renaissance of the early part of the 19th century, doubts were raised as to the genuineness of the letter (e.g. by E. T. Mayerhoff, 1838). Quite apart from the difficulties created by the Tubingen theory, legitimate difficulties were found in the style of the letter, in the speculation of the errorists, and in the theology of the author. (1) As to style, it is replied that if there are peculiarities in Colossians, so also in the admittedly genuine letters, Romans, Corinthians, Galalians. Moreover, if Pkilippians is Pauline, so also the stylistically similar Colossians (cf. von Soden). (2) As to the speculation of the errorists, it is replied that it is explicable in the lifetime of Paul, that some of the elements of it

may have their source in pre-Christian Jewish theories, and that recourse to the developed gnosticism of the 2nd century is unnecessary. (3) As to the Christology of the author, it is replied that it does not go beyond what we have already in Paul except in emphasis, which itself is occasioned by the circumstances. What is implicit in Corinthians is explicit in Colossians. H. J. Holtzmann (1872) subjected both Colossians and Ephesians to a rigorous examination, and found in Colossians at least a nucleus of Pauline material. H. von Soden (1885), with well-considered principles of criticism, made a similar examination and found a much larger nucleus, and later still, (1893), in his commentary, reduced the non-Pauline material to a negligible minimum. Harnack, Jiilicher and McGiffert, however, agree with Lightfoot, Weiss, Zahn (and early tradition) in holding that the letter is wholly Pauline — a position which is proving more and more acceptable to contemporary scholarship.

Authorities. — In addition to the literature already mentioned, see the articles of Sanday on ” Colossians ” and Robertson on ” Ephesians ” in Smith’s Bible Dictionary (2nd ed., 1893), and the article of A. Jiilicher on ” Colossians and Ephesians ” in. the Encyclopaedia Biblica (1899); the Introductions of H. J. Holtzmann (1892), B. Weiss (1897), Th. Zahn (1900) and Jiilicher (1906); the histories of the apostolic age by C. von Weizsacker (1892), A. C. M’Giffert (1897) and O. Pfleiderer (Urchristentum, 1902); and the commentaries of J. B. Lightfoot (1875), H. von Soden (1893) T. K. Abbott (1897), E. Haupt (1902), Peake (1903) and P. Ewald (1905)- _ . _ (J. E. F.)

COLOSSUS, in antiquity a term applied generally to statues of great size (hence the adjective ” colossal “), and in particular to the bronze statue of the sun-god Helios in Rhodes, one of the wonders of the world, made from the spoils left by Demetrius Poliorcetes when he raised the siege of the city. The sculptor was Chares, a native of Lindus, and of the school of Lysippus, under whose influence the art of sculpture was led to the production of colossal figures by preference. The work occupied him twelve years, it is said, and the finished statue stood 70 cubits high. It stood near the harbour (hrl Xijuew), but at what point is not certain. When, and from what grounds, the belief arose that it had stood across the entrance to the harbour, with a beacon light in its hand and ships passing between its legs, is not known, but the belief was current as early as the 16th century. The statue was thrown down by an earthquake about the year 224 B.C.; then, after lying broken for nearly 1000 years, the pieces were bought by a Jew from the Saracens, and probably reconverted into instruments of war.

Other Greek colossi were the Apollo of Calamis; the Zeus and Heracles of Lysippus; the Zeus at Olympia, the Athena in the Parthenon, and the Athena Promachos on the Acropolis — all the work of Pheidias.

The best-known Reman colossi are: a statue of Jupiter on the Capitol; a bronze statue of Apollo in the Palatine library; and the colossus of Nero in the vestibule of his Golden House, afterwards removed by Hadrian to the north of the Colosseum, where the basement upon which it stood is still visible (Pliny, Nat. Hist, xxxiv. 18).

728′

COLOUR

COLOUR (Lat. color, connected with celare, to hide, the root meaning, therefore, being that of a covering). The visual appar- atus of the eye enables us to distinguish not only differences of form, size and brilliancy in the objects looked upon, but also differences in the character of the light received from them. These latter differences, familiar to us as differences in colour, have their physical origin in the variations in wave-length (or frequency) which may exist in light which is capable of exciting the sensation of vision. From the physical point of view, light of a pure colour, or homogeneous light, means light whose undulations are mathematically of a simple character and which cannot be resolved by a prism into component parts. All the visible pure colours, as thus defined, are to be found in the spectrum, and there is an infinite number of them, correspond- ing to all the possible variations of wave-length within the limits of the visible spectrum (see Spectroscopy). On this view, there is a strict analogy between variations of colour in light and variations of pitch in sound, but the visible spectrum contains a range of frequency extending over about one octave only, whereas the range of audibility embraces about eleven octaves.

Of all the known colours it might naturally be thought that white is the simplest and purest, and, till Sir Isaac Newton’s time, this was the prevailing opinion. Newton, however, showed that white light could be decomposed by a prism into the spectral colours red, orange, yellow, green, blue, indigo and violet; the colours appearing in this order and passing gradually into each other without abrupt transitions. White is therefore not a simple colour, but is merely the colour of sunlight, and probably owes its apparently homogeneous character to the fact that it is the average colour of the light which fills the eye when at rest. The colours of the various objects which we see around us are not due (with the exception of self-luminous and

fluorescent bodies) to any power possessed by these objects of creating the colours which they exhibit, but merely to the exercise of a selective action on the light of the sun, some of the constituent rays of the white light with which they are illuminated being absorbed, while the rest are reflected or scattered in all directions, or, in the case of transparent bodies, transmitted. White light is thus the basis of all other colours, which are derived from it by the suppression of some one or more of its parts. A red flower, for instance, absorbs the blue and green rays and most of the yellow, while the red rays and usually some yellow are scattered. If a red poppy is illuminated successively by red, yellow, green and blue light it will appear a brilliant red in the red light, yellow in the yellow light, but less brilliant if the red colour is pure; and black in the other colours, the blackness being due to the almost complete absorption of the corresponding colour.

Bodies may be classified as regards colour according to the nature of the action they exert on white light. In the case of ordinary opaque bodies a certain proportion of the incident light is irregularly reflected or scattered from their surfaces. A white object is one which reflects nearly all the light of all colours; a black object absorbs nearly all. A body which reflects only a portion of the light, but which exhibits no predominance in any particular hue, is called grey. A white surface looks grey beside a similar surface more brilliantly illuminated.

The next class is that of most transparent bodies, which owe their colour to the light which is transmitted, either directly through, or reflected back again at the farther surface. A body which transmits all the visible rays equally well is said to be colourless; pure water, for example, is nearly quite colourless, though in large masses it appears bluish-green. A translucent substance is one which partially transmits light. Translucency is due to the light being scattered by minute embedded particles or minute irregularities of structure. Some fibrous specimens of tremolite and gypsum are translucent in the direction of the fibres, and practically opaque in a transverse direction. Coloured transparent objects vary in shade and hue according to their size; thus, a conical glass filled with a red liquid commonly appears yellow at the bottom, varying through orange up to red at the upper part. A coloured powder is usually of a much

lighter tint than the substance in bulk, as the light is reflected back after transmission through only a few thin layers. For the same reason the powders of transparent substances are opaque.

Polished bodies, whether opaque or transparent, when illumi- nated with white light and viewed at the proper angle, reflect the incident

light regularly and appear white, without showing much of their distinctive colours.

Some bodies reflect light of one colour and transmit that of another; such bodies nearly always possess the properties of selective or metallic reflection and anomalous dispersion. Most of the coal-tar dyes belong to this category. Solid eosin, for example, reflects a yellowish-green and transmits a red light. Gold appears yellow under ordinary circumstances, but if the light is reflected many times from the surface it appears a ruby colour. On the other hand, a powerful beam of light transmitted through a thin gold-leaf appears green.

Some solutions exhibit the curious phenomenon of dichro- matism (from Si-, double, and xp&V&j colour), that is, they appear of one colour when viewed in strata of moderate thickness, but of a different colour in greater thicknesses (see Absorption op Light).

The blue colour of the sky (q.v.) has been explained by Lord Rayleigh as due to the scattering of light by small suspended particles and air molecules, which is most effective in the case of the shorter waves (blue). J. Tyndall produced similar effects in the laboratory. The green colour of sea-water near the shore is also due to a scattering of light.

The colours of bodies which are gradually heated to white incandescence occur in the order — red, orange, yellow, white. This is because the longer waves of red light are first emitted, then the yellow as well, so that orange results, then so much green that the total effect is yellow, and lastly all the colours, compounding to produce white. Fluorescent bodies have the power of converting light of one colour into that of another (see Fluorescence).

Besides the foregoing kinds of colorization, a body may exhibit, under certain circumstances, a colouring due to some special physical conditions rather than to the specific properties of the material; such as the colour of a white object when illuminated by light of some particular colour; the colours seen in a film of oil on water or in mother-of-pearl, or soap- bubbles, due to interference (q.v.); the colours seen through the eyelashes or through a thin handkerchief held up to the light, due to diffraction (q.v.) ; and the colours caused by ordinary refraction, as in the rainbow, double refraction and polarization (qq.v.).

Composition of Colours. — It has been already pointed out that white light is a combination of all the colours in the spectrum. This was shown by Newton, who recombined the spectral colours and produced

white. Newton also remarks that if a froth be made on the surface of water thickened a little with soap, and examined closely, it will be seen to be coloured with all the' colours of the spectrum, but at a little distance it looks white owing to the combined effect on the eye of all the colours.

The question of the composition of colours is largely a physio- logical one, since it is possible, by mixing colours, say red and yellow, to produce a new colour, orange, which appears identical with the pure orange of the spectrum, but is physically quite different, since it can be resolved by a prism into red and yellow again. There is no doubt that the sensation of colour-vision is threefold, in the sense that any colour can be produced by the combination, in proper proportions, of three standard colours. The question then arises, what are the three primary colours? Sir David Brewster considered that they were red, yellow and blue; and this view has been commonly held by painters and others, since all the known brilliant hues can be derived from the admixture of red, yellow and blue pigments. For instance, vermilion and chrome yellow will give an orange, chrome yellow and ultramarine a green, and vermilion and ultramarine a purple mixture. But if we superpose the pure spectral colours on a screen, the resulting colours are quite

different. This is especially the case with yellow and blue, which on the screen combine to produce white, generally with a pink tint, but cannot be made to give green. The reason of this difference in the two results is that in the former case we do not get a true combination of the colours at all. When the mixed pigments are illuminated by white light, the yellow particles absorb the red and blue rays, but reflect the yellow along with a good deal of the neighbouring green and orange. The blue particles, on the other hand, absorb the red, orange and yellow, but reflect the blue and a good deal of green and violet. As much of the light is affected by several particles, most of the rays are absorbed except green, which is reflected by both pigments. Thus, the colour of the mixture is not a mixture of the colours yellow and blue, but the remainder of white light after the yellow and blue pigments have absorbed all they can. The effect can also be seen in coloured solutions. If two equal beams of white light are transmitted respectively through a yellow solution of potassium bichromate and a blue solution of copper sulphate in proper thicknesses, they can be compounded on a screen to an approximately white colour; but a

single beam transmitted through both solutions appears green. Blue and yellow pigments would produce the effect of white only if very sparsely distributed. This fact is made use of in laundries, where cobalt blue is used to correct the yellow colour of linen after washing.

Thomas Young suggested red, green and violet as the primary colours, but the subsequent experiments of J. Clerk Maxwell appear to show that they should be red, green and blue. Sir William Abney, however, assigns somewhat different places in the spectrum to the primary colours, and, like Young, considers that they should be red, green and violet. All other hues can be obtained by combining the three primaries in proper propor- tions. Yellow is derived from red and green. This can be done by superposition on a screen or by making a solution which will transmit only red and green rays. For this purpose Lord Rayleigh recommends a mixture of solutions of blue litmus and yellow potassium chromate. The litmus stops the yellow and orange light, while the potassium chromate stops the blue and violet. Thus only red and green are transmitted, and the result is a full compound yellow which resembles the simple yellow of the spectrum in appearance, but is resolved into red and green by a prism. The brightest yellow pigments are those which give both the pure and compound yellow. Since red and green produce yellow, and yellow and blue produce white, it follows that red, green and blue can be compounded into white. H. von Helmholtz has shown that the only pair of simple spectral colours capable of compounding to white are a greenish-yellow and blue.

Just as musical sounds differ in pitch, loudness and quality, so may colours differ in three respects, which Maxwell calls hue, shade and tint. All hues can be produced by combining every pair of primaries in every proportion. The addition of white alters the tint without affecting the hue. If the colour be darkened by adding black or by diminishing the illumination, a variation in shade is produced. Thus the hue red includes every variation in tint from red to white, and every variation in shade from red to black, and similarly for other hues. We can represent every hue and tint on a diagram in a manner proposed by Young, following a very similar suggestion B of Newton's. Let RGB (fig. 1) be an equilateral triangle, and let the angular points be coloured red, green and blue of such intensities as to produce white if equally combined; and let the colour of every point of the triangle be determined by combining such proportions of the three primaries, that three weights in the same proportion would have their centre of gravity at the point. Then the centre of the triangle will be a neutral tint, white or grey; and the middle points of the sides Y, S, P will be yellow, greenish-blue and purple. The hue varies all round the

perimeter. The tint varies along any straight line

through W. To vary the shade, the whole triangle must be uniformly darkened.

The simplest way of compounding colours is by means of Maxwell's colour top, which is a broad spinning-top over the spindle of which coloured disks can be slipped (fig. 2) . The disks are slit radially so that they can be slipped partially over each other and the surfaces exposed in any desired ratio. Three disks are used together, and a match is obtained between these and a pair of smaller ones mounted on the same spindle. If any five colours are taken, two of which may be black and white, a match can be got between them by suitable adjustment. This shows that a relation exists between any four colours (the black being ' only needed to obtain the proper intensity) and that consequently the number of independent colours is three. A still better instrument for FlG- 2 – combining colours is Maxwell's colour box, in which the colours of the spectrum are combined by means of prisms. Sir W. Abney has also invented an apparatus for the same purpose, which is much the same in principle as Maxwell's colour box. Several methods of colour photography depend on the fact that all varieties of colour can be compounded from red, green and blue in proper proportions.

Any two colours which together give white are called complementary colours. Greenish-yellow and blue are a pair of complementaries, as already men- tioned. Any number of pairs may be obtained by a simple device due to Helmholtz and represented in fig. 3. A beam of white light, decomposed by the prism P, is recompounded into white light by the lens I and focussed on a screen at /. If the thin prism p is inserted near the lens, any set of colours may be deflected to another point n, thus pro- ducing two coloured and com- plementary images of the source of light.

Nature of White Light. — The question as to whether white light actually consists of trains of waves of regular frequency has been discussed in recent years by A. Schuster, Lord Rayleigh and others, and it has been shown that even if it consisted of a suc- cession of somewhat irregular impulses, it would still be resolved, by the dispersive property of a prism or grating, into trains of regular frequency. We may still, however, speak of white light as compounded of the rays of the spectrum, provided we mean only that the two systems are mathematically equivalent, and not that the homogeneous trains exist as such in the original light.

See also Newton's Opticks, bk. i. pt. ii. ; Maxwell's Scientific Papers; Helmholtz's papers in Poggendorfs Annalen; Sir G. G. Stokes, Burnett Lectures for 1884-5-6; Abney 's Colour Vision

(1895)- a- r. c.)

COLOURS, MILITARY, the flags carried by infantry regiments and battalions, sometimes also by troops of other arms. Cavalry regiments and other units have as a rule standards and guidons (see Flag). Colours are generally embroidered with mottoes, symbols, and above all with the names of battles.

From the earliest time at which men fought in organized bodies of troops, the latter have possessed some sort of insignia visible over all the field of battle, and serving as a rallying-point for the men of the corps and an indication of position for the higher leaders and the men of other formed bodies. In the Roman army the eagle, the vexillum, &c. had all the moral and sentimental importance of the colours of to-day. During the dark and the middle ages, however, the basis of military force being the individual knight or lord, the banner, or other flag bearing his arms, replaced the regimental colour which had signified the corporate body and claimed the devotion of each individual soldier in the ranks, though the original meaning of the

(After Mtiller-Pouillet's Lehrbuch der Physik, 1897.)

Fig. 3.

colour as a corps, not a personal distinction, was sometimes maintained by corporate bodies (such as trade-gilds) which took the field as such. An example is the famous carroccio or standard on wheels, which was frequently brought into the field of battle by the citizen militia of the Italian cities, and was fought for with the same ardour as the royal standard in other medieval battles.

The application of the word " colour " to such insignia, how- ever, dates only from the 16th century. It has been suggested that, as the professional captain gradually ousted the nobleman from the command of the drilled and organized companies of foot — the man of gentle birth, of course, maintained his ascend- ancy in the cavalry far longer — the leaders of such bodies, no longer possessing coat-armour and individual banners, had recourse to small flags of

distinctive colour instead. ” Colour ” is in the 16th century a common name in England and middle Europe for the unit of infantry; in German the Fdhnlein (colour) of landsknechts was a strong company of more than 300 foot. The ceremonial observances and honours paid nowadays to the colours of infantry were in fact founded for the most part by the landsknechts, for whom the flag (carried by their ” ensign “) was symbolical of their intense regimental life and feeling. The now universal customs of constituting the colour guard of picked men and of saluting the colours were in equal honour then; before that indeed, the appearance of the personal banner of a nobleman implied his actual presence with it, and the due honours were paid, but the colour of the 16th century was not the distinction of one man, but the symbol of the corporate life and unity of the regiment, and thus the new colour ceremonial implied the same allegiance to an impersonal regimental spirit, which it has (with the difference that the national spirit has been blended with the regimental) retained ever since. The old soldier rallied to the colours as a matter of habit in the confusion of battle, and the capture or the loss of a colour has always been considered a special event, glorious or the reverse, in the history of a regiment, the importance of this being chiefly sentimental, but having as a very real background the fact that, if its colour was lost, a regiment was to all intents and purposes dissolved and dispersed. Frederick the Great and Napoleon always attached the highest importance to the maintenance at all costs of the regimental colours. Even over young troops the influence of the colour has been extraordinary, and many generals have steadied their men in the heat of battle by taking a regimental colour themselves to lead the advance or to form up the troops. Thus in the first battle of Bull Run (1861) the raw Confederate troops were rallied under a heavy fire by General Joseph John- ston, their commander-in-chief, who stood with a colour in his hand until the men gathered quickly in rank and file. The arch-duke Charles at Aspern (1809) led his young troops to the last assault with a colour in his hand. Marshal Schwerin was killed at the battle of Prague while carrying a regimental colour.

In the British army colours are carried by guards and line (except rifle) battalions, each battalion having two colours, the king’s and the regimental. The size of the colour is 3 ft. 9 in. by 3 ft., and the length of the stave 8 ft. 7 in. The colour has a gold fringe and gold and crimson tassels, and bears various devices and ” battle honours.” Both colours are carried by subaltern officers, and an escort of selected non-commissioned officers forms the rest of the colour party. The ceremony of presenting new colours is most impressive. The old colours are ” trooped ” (see below) before being cased and taken to

the rear. The new colours are then placed against a pile of drums and then uncased by the senior majors and the senior subalterns. The consecration follows, after which the colours are presented to the senior subalterns. The battalion gives a general salute when the colours are unfurled, and 'the ceremony concludes with a march past. " Trooping the colour " is a more elaborate ceremonial peculiar to the British service, and is said to have been invented by the duke of Cumberland. In this, the colour is posted near the left of the line, the right company or guard moves up to it, and an officer receives it, after which the guard with the colour files between the ranks of the remainder from left to right until the right of the line is reached.

In the United States army the infantry regiment has two colours, the national and the regimental. They are carried in action.

In the French army one colour (drapeau) is carried by each infantry regiment. It is carried by an officer, usually a sous- lieutenant, and the guard is composed of a non-commissioned officer and a party of "first class" soldiers. Regiments which have taken an enemy's colour or standard in battle have their own colours " decorated," that is, the cross of the Legion of Honour is affixed to the stave near the point. Battle honours are em- broidered on the white of the tricolour. The eagle was, in the First and Third Empires, the infantry colour, and was so called from the gilt eagle which surmounted the stave. The chasseurs a pied, like the rifles of the British army, carry no colours, but the battalion quartered for the time being at Vincennes carries a colour for the whole arm in memory of the first chasseurs de Vincennes. As in other countries, colours are saluted by all armed bodies and by individual officers and men. When the drapeau is not present with the regiment its place is taken by an ordinary flag.

The colours of > the German infantry, foot artillery and en- gineers vary in design with the states to which the corps belong in the first instance; thus, black and white predominate in Prussian colours, red in those of Wiirttemberg regiments, blue in Bavarian, and so on. The point of the colour stave is decorated in some cases with the iron cross, in memory of the War of Liberation and of the war of 1870. Each battalion of an infantry regiment has its own colour, which is carried by a non-com- missioned officer, and guarded as usual by a colour party. The colour is fastened to the stave by silver nails, and the ceremony of driving the first nail into the stake of a new colour is one of great solemnity. Rings of silver on the stave are engraved with battle honours, the names of those who have fallen in action when carrying the colour, and other commemorative names and dates. The oath taken by each recruit on joining is sworn on the colour

(Fahneneid).

The practice in the British army of leaving the colours behind on taking the field dates from the battle of Isandhlwana (22nd January 1879), in which Lieutenants Melvill and Coghill lost their lives in endeavouring to save the colours of the 24th regiment. In savage warfare, in which the British regular army is more usually engaged, it is true that no particular reason can be adduced for imperilling the colours in the field. It is questionable, however, whether this holds good in civilized warfare. Colours were carried in action by both the Russians and the Japanese in the war of 1904-5, and they were supple- mented on both sides by smaller flags or camp colours. The conception of the colour as the emblem of union, the rallying- point, of the regiment has been mentioned above. Many hold that such a rallying-point is more than ever required in the modern guerre de masses, when a national short-service army is collected in all possible strength on the decisive battle-field, and that scarcely any risks or loss of life would be dispropor- tionate to the advantages gained by the presence of the colours. There is further a most important factor in the problem, which has only arisen in recent years through modern perfection in armament. In the first stages of an attack, the colours could remain, as in the past, with the closed reserves or line of battle, and they would not be uncased and sent into the thick of the fight at all hazards until the decisive assault was being delivered. Then, it is absolutely essential, as a matter of tactics, that the artillery (q.v.), which covers the assault with all the power given it by modern science and training, should be well informed as to the progress of the infantry. This covering fire was main- tained by the Japanese until the infantry was actually in the smoke of their own shrapnel. With uniforms of neutral tint the need of some means whereby the artillery officers can, at 4000 yds. range, distinguish their own infantry from that of the enemy, is more pronounced than ever. The best troops are apt to be unsteadied by being fired into by their own guns (e.g. at Elandslaagte) , and the more powerful the shell, and the more rapid and far-ranging the fire of the guns, the more necessary it

becomes to prevent such accidents. A practicable solution of the difficulty would be to display the colours as of old, and this course would not only have to an enhanced degree the advan- tages it formerly possessed, but would also provide the simplest means for ensuring the vitally necessary co-operation of infantry and artillery in

the decisive assault. The duty of carrying the colours was always one of special danger, and sometimes, in the old short-range battles, every officer who carried a flag was shot. That this fate would necessarily overtake the bearer under modern conditions is far from certain, and in any case the few men on the enemy's side who would be brave enough to shoot accurately under heavy shell fire would, however destructive to the colour party, scarcely inflict as much damage on the battalion as a whole, as a dozen or more accidental shells from the massed artillery of its own side.

COLOUR-SERGEANT, a non-commissioned officer of infantry, ranking, in the British army, as the senior non-commissioned officer of each company. He is charged with many adminis- trative duties, and usually acts as pay sergeant. A special duty of the colour-sergeants of a battalion is that of attending and guard- ing the colours and the officers carrying them. In some foreign armies the colours are actually carried by colour-sergeants. The rank was created in the British army in 1813.

COLOURS OF ANIMALS. Much interest attaches in modern biology to the questions involved in the colours of animals. The subject may best be considered in two divisions: (1) as regards the uses of colour in the struggle for existence and in sexual relationships; (2) as regards the chemical causation.

1. Bionomics

Use of Colour for Concealment. — Cryptic colouring is by far the commonest use of colour in the struggle for existence. It is employed for the purpose of attack (aggressive resemblance or aniicryptic colouring) as well as of defence (protective resemblance or procryptic colouring). The fact that the same method, con- cealment, may be used both for attack and defence has been well explained by T. Belt (The Naturalist in Nicaragua, London,), who suggests as an illustration the rapidity of movement

which is also made use of by both pursuer and pursued, which is similarly raised to a maximum in both by the gradual dying out of the slowest through a series of generations. Cryptic colouring is commonly associated with other aids in the struggle for life. Thus well-concealed mammals and birds, when dis- covered, will generally endeavour to escape by speed, and will often attempt to defend themselves actively. On the other hand, small animals which have no means of active defence, such as large numbers of insects, frequently depend upon concealment alone. Protective resemblance is far commoner among

animals than aggressive resemblance, in correspondence with the fact that predaceous forms are as a rule much larger and much less numerous than their prey. In the case of insectivorous Verte- brata and their prey such differences exist in an exaggerated form. Cryptic colouring, whether used for defence or attack, may be either general or special. In general resemblance the animal, in consequence of its colouring, produces the same effect as its environment, but the conditions do not require any special adaptation of shape and outline. General resemblance is especially common among the animals inhabiting some uni- formly coloured expanse of the earth's surface, such as an ocean or a desert. In the former, animals of all shapes are frequently protected by their transparent blue colour; on the latter, equally diverse forms are defended by their sandy appearance. The effect of a uniform appearance may be produced by a combina- tion of tints in startling contrast. Thus the black and white stripes of the zebra blend together at a little distance, and " their proportion is such as exactly to match the pale tint which arid ground possesses when seen by moonlight " (F. Galton, South Africa, London, 1889). Special resemblance is far commoner than general, and is the form which is usually met with on the diversified surface of the earth, on the shores, and in shallow water, as well as on the floating masses of Algae on the surface of the ocean, such as the Sargasso Sea. In these environments !

the cryptic colouring of animals is usually aided by special modifications of shape, and by the instinct which leads them to assume particular attitudes. Complete stillness and the assump- tion of a certain attitude play an essential part in general resem- blance on land; but in special resemblance the attitude is often highly specialized, and perhaps more important than any other element in the complex method by which concealment is effected. In special resemblance the combination of colouring, shape and attitude is such as to produce a more or less exact resemblance to some one of the objects in the environment, such as a leaf or twig, a patch of lichen, or flake of bark. In all cases the resem- blance is to some object which is of no interest to the enemy or prey respectively. The animal is not hidden from view by becoming indistinguishable from its background, as in the cases of general resemblance, but it is mistaken for some well-known object.

In seeking the interpretation of these most interesting and elaborate adaptations, attempts have been made along two lines. First, it is sought to explain the effect as a result of the direct influence of the environment upon the individual (G. L. L. Buffon), or by the inherited effects of effort and the use and disuse of parts (J. B. P. Lamarck). Second, natural selection is believed to have produced the result, and

afterwards main- tained it by the survival of the best concealed in each generation. The former suggestions break down when the complex nature of numerous special resemblances is appreciated. Thus the arrangement of colours of many kinds into an appropriate pattern requires the co-operation of a suitable shape and the rigidly exact adoption of a certain elaborate attitude. The latter is instinctive, and thus depends on the central nervous system. The cryptic effect is due to the exact co-operation of all these factors; and in the present state of science the only possible hope of an interpretation lies in the theory of natural selection, which can accumulate any and every variation which tends towards survival. A few of the chief types of methods by which concealment is effected may be briefly described. The colours of large numbers of Vertebrate animals are darkest on the back, and become gradually lighter on the sides, passing into white on the belly. Abbott H. Thayer (The Auk, vol. xiii., 1896) has suggested that this gradation obliterates the appearance of solidity, which is due to shadow. The colour-harmony, which is also essential to concealment, is produced because the back is of the same tint as the environment (e.g. earth) bathed in the cold blue-white of the sky, while the belly, being cold blue-white bathed in shadow and yellow earth reflections, produces the same effect. Thayer has made models (in the natural history museums at London, Oxford and Cambridge) which support his interpretation in a very convincing manner. This method of neutralizing shadow for the purpose of concealment by increased lightness of tint was first suggested by E. B. Poulton in the case of a larva (Trans. Ent. Soc. Lond., 1887, p. 294) and a pupa (Trans. Ent. Soc. Lond., 1888, pp. 596, 597), but he did not appreciate the great importance of the principle. In an analogous method an animal in front of a background of dark shadow may have part of its body obliterated by the existence of a dark tint, the remainder resembling, e.g., a part of a leaf (W. Miiller, Zool. Jahr. J. W. Spengel, Jena, 1886). This method of rendering invisible any part which would interfere with the resemblance is well known in mimicry. A common aid to concealment is the adoption by different individuals of two or more different appearances, each of which resembles some special object to which an enemy is indifferent. Thus the leaf-like butterflies (Kallima) present various types of colour and pattern on the under side of the wings, each of which closely resembles some well-known appearance presented by a dead leaf; and the common British yellow under- wing moth (Tryphaena pronuba) is similarly polymorphic on the upper side of its upper wings, which are exposed as it suddenly drops among dead leaves. Caterpillars and pupae are also commonly dimorphic, green and brown. Such differences as these extend the area which an enemy is compelled to search in order to make a living. In

many cases the cryptic colouring changes appropriate

during the course of an individual life, either seasonally, as in the ptarmigan or Alpine hare, or according as the individual enters a new environment in the course of its growth (such as larva, pupa, imago, &c). In insects with more than one brood in the year, seasonal dimorphism is often seen, and the differences are sometimes appropriate to the altered condition of the environ- ment as the seasons change. The causes of change in these and Arctic animals are insufficiently worked out: in both sets there are observations or experiments which indicate changes from within the organism, merely following the seasons and not caused by them, and other observations or experiments which prove that certain species are susceptible to the changing external influences. In certain species concealment is effected by the use of adventitious objects, which are employed as a covering. Examples of this allocryptic defence are found in the tubes of the caddis worms (Phryganea) , or the objects made use of by crabs of the genera Hyas, Stenorhynchus, &c. Such animals are concealed in any environment. If sedentary, like the former example, they are covered up with local materials; if wandering, like the latter, they have the instinct to reclothe. Allocryptic methods may also be used for aggressive purposes, as the ant-lion larva, almost buried in sand, or the large frog Ceratophrys, which covers its back with earth when waiting for its prey. Another form of allocryptic defence is found in the use of the colour of the food in the digestive organs showing through the transparent body, and in certain cases the adven- titious colour may be dissolved in the blood or secreted in super- ficial cells of the body: thus certain insects make use of the chlorophyll of their food (Poulton, Proc. Roy. Soc. liv. 417). The most perfect cryptic powers are possessed by those animals in which the individuals can change their colours into any tint which would be appropriate to a normal environment. This power is widely prevalent in fish, and also occurs in Amphibia and Reptilia (the chameleon affording a well-known example). Analogous powers exist in certain Crustacea and Cephalopoda. AH these rapid changes of colour are due to changes in shape or position of superficial pigment cells controlled by the nervous system. That the latter is itself stimulated by light through the medium of the eye and optic nerve has been proved in many cases. Animals with a short life-history passed in a single environment, which, however, may be very different in the case of different individuals, may have a different form of variable cryptic colouring,

namely, the power of adapting their colour once for all (many pupae), or once or twice (many larvae). In these cases the effect appears to be produced through the nervous system, although the stimulus of light probably acts on the skin and not through the eyes. Particoloured surfaces do not produce particoloured pupae, probably because the antagonistic stimuli neutralize each other in the central nervous system, which then disposes the superficial colours so that a neutral or intermediate effect is produced over the whole surface (Poulton, Trans. Ent. Soc. Lond., 1892, p. 293). Cryptic colouring may incidentally produce superficial resemblances between animals; thus desert forms concealed in the same way may gain a likeness to each other, and in the same way special resemblances, e.g. to lichen, bark, grasses, pine-needles, &c, may sometimes lead to a tolerably close similarity between the animals which are thus concealed. Such likeness may be called syncryptic or common protective (or aggressive) resemblance, and it is to be distinguished from mimicry and common warning colours, in which the likeness is not incidental, but an end in itself. Syn- cryptic resemblances have much in common with those in- cidentally caused by functional adaptation, such as the mole-like forms produced in the burrowing Insectivora, Rodentia and Marsupialia. Such likeness may be called syntechnic resemblance, incidentally produced by dynamic similarity, just as syncryptic resemblance is produced by static similarity.

Use of Colour for Warning and Signalling, or Sematic Coloration. — The use of colour for the purpose of warning is the exact opposite of the one which has been just described, its object being to render the animal conspicuous to its enemies, so that it can be easily seen, well remembered, and avoided in future.

Warning colours are associated with some quality or weapon which renders the possessor unpleasant or dangerous, such as unpalatability, an evil odour, a sting, the poison-fang, &c. The object being to warn an enemy off, these colours are also called aposematic. Recognition markings, on the other hand, are episematic, assisting the individuals of the same species to keep together when their safety depends upon numbers, or easily to follow each other to a place of safety, the young and inexperienced benefiting by the example of the older. Episematic characters are far less common than aposematic, and these than cryptic; although, as regards the latter comparison, the opposite im- pression is generally produced from the very fact that conceal- ment is so successfully attained. Warning or aposematic colours, together with the qualities they indicate, depend, as a rule, for their very existence upon the abundance of palatable food supplied by the animals with cryptic colouring. Unpalata- bility, or even the possession of a sting, is

not sufficient defence unless there is enough food of another kind to be obtained at the same time and place (Poulton, Proc. Zool. Soc, 1887, p. 191). Hence insects with warning colours are not seen in temperate countries except at the time when insect life as a whole is most abundant; and in warmer countries, with well-marked wet and dry seasons, it will probably be found that warning colours are proportionately less developed in the latter. In many species of African butterflies belonging to the genus Junonia (including Precis) the wet-season broods are distinguished by the more or less conspicuous under sides of the wings, those of the dry season being highly cryptic. Warning colours are, like cryptic, assisted by special adaptations of the body-form, and especially by move- ments which assist to render the colour as conspicuous, as possible. On this account animals with warning colours generally move or fly slowly, and it is the rule in butterflies that the warning patterns are similar on both upper and under sides of the wings. Many animals, when attacked or disturbed, ” sham death ” (as it is commonly but wrongly described), falling motionless to the ground. In the case of well-concealed animals this instinct gives them a second chance of escape in the earth or among the leaves, &c, when they have been once detected; animals with warning colours are, on the other hand, enabled to assume a position in which their characters are displayed to the full (J. Portschinsky, Lepidopterorum Rossiae Biologia, St Petersburg, 1890, plate i. figs. 16, 17). In both cases a definite attitude is assumed, which is not that of death. Other warning characters exist in addition to colouring: thus sound is made use of by the disturbed rattle- snake and the Indian Echis, &c. Large birds, when attacked, often adopt a threatening attitude, accompanied by a terrifying sound. The cobra warns an intruder chiefly by attitude and the dilation of the flattened neck, the effect being heightened in some species by the ” spectacles.” In such cases we often see the combination of cryptic and sematic methods, the animal being concealed until disturbed, when it instantly assumes an apo- sematic attitude. The advantage to the animal itself is clear: a poisonous snake gains nothing by killing an animal it cannot eat; while the poison does not cause immediate death, and the enemy would have time to injure or destroy the snake. In the case of small unpalatable animals with warning colours the enemies would only first become aware of the unpleasant quality by tasting and often destroying their prey; but the species would gain by the experience thus conveyed, even though the individual might suffer. An insect-eating animal does not come into the world with knowledge: it has to be educated by experience, and warning colours enable this education as to what to avoid to be gained by a small instead of a large waste of life. Further- more, great tenacity of life is usually possessed by

animals with warning colours. The tissues of aposematic insects generally possess great elasticity and power of resistance, so that large numbers of individuals can recover after very severe treatment. The brilliant warning colours of many caterpillars attracted the attention of Darwin when he was thinking over his hypo- thesis of sexual selection, and he wrote to A. R. Wallace on the subject (C. Darwin, Life and Letters, London, 1887, iii. 93). Wallace, in reply, suggested their interpretation as warning

colours, a suggestion since verified by experiment (Proc. Ent. Soc. Lond., 1867, p. lxxx; Trans. Ent. Soc. Lond., 1869, pp. 21 and 27). Although animals with warning colours are probably but little attacked by the ordinary enemies of their class, they have special enemies which keep the numbers down to the average. Thus the cuckoo appears to be an insectivorous bird which will freely devour conspicuously coloured unpalatable larvae. The effect of the warning colours of caterpillars is often intensified by gregarious habits. Another aposematic use of colours and structures is to divert attention from the vital parts, and thus give the animal attacked an extra chance of escape. The large, conspicuous, easily torn wings of butterflies and moths act in this way, as is found by the abundance of individuals which may be captured with notches bitten symmetrically out of both wings when they were in contact. The eye-spots and ” tails ” so common on the hinder part of the hind wing, and the conspicuous apex so frequently seen on the fore wing, probably have this meaning. Their position corresponds to the parts which are most offen found to be notched. In some cases (e.g. many Lycaenidae) the ” tail ” and eye-spot combine to suggest the appearance of a head with antennae at the posterior end of the butterfly, the deception being aided by movements of the hind wings. The flat-topped ” tussocks ” of hair on many caterpillars look like conspicuous fleshy projections of the body, and they are held prominently when the larva is attacked. If seized, the ” tus- sock ” comes out, and the enemy is greatly inconvenienced by the fine branched hairs. The tails of lizards, which easily break off, are to be similarly explained, the attention of the pursuer being probably still further diverted by the extremely active move- ments of the amputated member. Certain crabs similarly throw off their claws when attacked, and the claws continue to snap most actively. The tail of the dormouse, which easily comes off, and the extremely bushy tail of the squirrel, are probably of use in the same manner. Animals with warning colours often tend to resemble each other superficially. This

fact was first pointed out by H. W. Bates in his paper on the theory of mimicry (Trans, Linn. Soc. vol. xxiii., 1862, p. 495). He showed that the con- spicuous, presumably unpalatable, tropical American butterflies, belonging to very different groups, which are mimicked by others, also tend to resemble each other, the likeness being often remark- ably exact. These resemblances were not explained by his theory of mimicry, and he could only suppose that they had been produced by the direct influence of a common environment. The problem was solved in 1879 by Fritz Muller (see Proc. Ent. Soc. Lond., 1879, p. xx.), who suggested that life is saved by this resemblance between warning colours, inasmuch as the education of young inexperienced enemies is facilitated. Each species which falls into a group with common warning (synaposematic) colours contributes to save the lives of the other members. It is sufficiently obvious that the amount of learning and remember- ing, and consequently of injury and loss of life involved in the process, are reduced when many species in one place possess the same aposematic colouring, instead of each exhibiting a different ” danger-signal.” These resemblances are often described as ” Mullerian mimicry,” as distinguished from true or ” Batesian mimicry ” described in the next section. Similar synapose- matic resemblances between the specially protected groups of butterflies were afterwards shown to exist in tropical Asia, the East Indian Islands and Polynesia by F. Moore (Proc. Zool. Soc, 1883, p. 201), and in Africa by E. B. Poulton (Report Brit. Assoc, 1897, p. 688). R. Meldola (Ann. and Mag. Nat. Hist. x., 1882, p. 417) first pointed out and explained in the same manner the remarkable general uniformity of colour and pattern which runs through so many species of each of the distasteful groups of butterflies; while, still later, Poulton (Proc. Zool. Soc, 1887, p. 191) similarly extended the interpretation to the syn- aposematic resemblances between animals of all kinds in the same country. Thus, for example, longitudinal or circular bands of the same strongly contrasted colours are found in species of many groups with distant affinities.

Certain animals, especially the Crustacea, make use of the special defence and warning colours of other animals. Thus

the English hermit-crab, Pagurus Bernhardus, commonly carries the sea-anemone, Sagartia parasitica, on its shell; while another English species, Pagurus Prideauxii, inhabits a shell which is invariably clothed by the flattened Adamsia palliata.

The white patch near the tail which is frequently seen in the gregarious Ungulates, and is often rendered conspicuous by adjacent black markings, probably assists the individuals in keeping together;

and appearances with probably the same interpretation are found in many birds. The white upturned tail of the rabbit is probably of use in enabling the individuals to follow each other readily. The difference between a typical aposematic character appealing to enemies, and episematic intended for other individuals of the same species, is well seen when we compare such examples as (1) the huge banner-like white tail, conspicuously contrasted with the black or black and white body, by which the slow-moving skunk warns enemies of its power of emitting an intolerably offensive odour; (2) the small upturned white tail of the rabbit, only seen when it is likely to be of use and when the owner is moving, and, if pursued, very rapidly moving, towards safety.

Mimicry (see also Mimicry) or Pseudo-sematic Colours. — The fact that animals with distant affinities may more or less closely resemble each other was observed long before the existing ex- planation was possible. Its recognition is implied in a number of insect names with the termination formis, usually given to species of various orders which more or less closely resemble the stinging Hymenoptera. The usefulness of the resemblance was suggested in Kirby and Spence's Introduction to Entomology, London, 1817, ii. 223. H. W. Bates (Trans. Linn. Soc. vol. xxiii., 1862, p. 495) first proposed an explanation of mimicry based on the theory of natural selection. He supposed that every step in the formation and gradual improvement of the likeness occurred in consequence of its usefulness in the struggle for life. The subject is of additional interest, inasmuch as it was one of the first attempts to apply the theory of natural selection to a large class of phenomena up to that time well known but unexplained. Numerous examples of mimicry among tropical American butterflies were discussed by Bates in his paper; and in 1866 A. R. Wallace extended the hypothesis to the butterflies of the tropical East (Trans. Linn, Soc. vol. xxv., 1866, p. 19); Roland Trimen (Trans. Linn. Soc. vol. xxvi., 1870, p. 497) to those of Africa in 1870. The term mimicry is used in various senses. It is often extended, as indeed it was by Bates, to include all the superficial resemblances between animals and any part of their environment. Wallace, however, separated the cryptic resemblances already described, and the majority of naturalists have followed this convenient arrangement. In cryptic resemblance an animal resembles some object of no interest to its enemy (or prey), and in so doing is concealed; in mimicry an animal resembles some other animal which is specially disliked by its enemy, or some object which is specially attractive to its prey, and in so doing becomes conspicuous. Some naturalists have considered mimicry to include all super ficial likenesses between animals, but such a classification

would group together resemblances which have widely different uses. (1) The resemblance of a mollusc to the coral on which it lives, or an external parasite to the hair or skin of its host, would be procryptic; (2) that between moths which resemble lichen, syncryptic; (3) between distasteful insects, synaposematic; (4) between the Insectivor mole and the Rodent mole-rat, syn- technic; (5) the essential element in mimicry is that it is a false warning (pseud-aposematic) or false recognition (pseud- episematic) character. Some have considered that mimicry indicates resemblance to a moving object; but apart from the non-mimetic likenesses between animals classified above, there are ordinary cryptic resemblances to drifting leaves, swaying bits of twig, &c, while truly mimetic resemblances are often specially adapted for the attitude of rest. Many use the term mimicry to include synaposematic as well as pseudo-sematic resemblances, calling the former " Mullerian," the latter " Batesian," mimicry. The objection to this grouping is that it takes little account of the deceptive element which is essential in mimicry. In

synaposematic colouring the warning is genuine, in pseud- aposematic it is a. sham. The term mimicry has led to much mis- understanding from the fact that in ordinary speech it implies deliberate imitation. The production of mimicry in an individual animal has no more to do with consciousness or "taking thought" than any of the other processes of growth. Protective mimicry is here defined as an advantageous and superficial resemblance of one animal to another, which latter is specially defended so as to be disliked or feared by the majority of enemies of the groups to which both belong — a resemblance which appeals to the sense of sight, sometimes to that of hearing, and rarely to smell, but does not extend to deep-seated characters except when the superficial likeness is affected by them. Mutatis mutandis this definition will apply to aggressive (pseud-episematic) resemblance. The conditions under which mimicry occurs have been stated by Wallace: — " (i) that the imitative species occur in the same area and occupy the same station as the imitated; (2) that the imitators are always the more defence- less; (3) that the imitators are always less numerous in indi- viduals; (4) that the imitators differ from the bulk of their allies; (5) that the imitation, however minute, is external and visible only, never extending to internal characters or to such as do not affect the external appearance." It is obvious that conditions 2 and 3 do not hold in the case of Mullerian mimicry. Mimicry has been explained, independently of natural selection, by

the supposition that it is the common expression of the direct action of common causes, such as climate, food, &c; also by the supposition of independent lines of evolution leading to the same result without any selective action in consequence of advantage in the struggle; also by the operation of sexual selection.

It is proposed, in conclusion, to give an account of the broad aspects of mimicry, and attempt a brief discussion of the theories of origin of each class of facts (see Poulton, Linn. Soc. Journ. Z00L, 1898, p. 558). It will be found that in many cases the argument here made use of applies equally to the origin of cryptic and sematic colours. The relationship between these classes has been explained: mimicry is, as Wallace has stated (Darwinism, London, 1889), merely " an exceptional form of protective resemblance." Now, protective (cryptic) resemblance cannot be explained on any of the lines suggested above, except natural selection; even sexual selection fails, because cryptic resemblance is especially common in the immature stages of insect life. But it would be unreasonable to explain mimetic resemblance by one set of principles and cryptic by another and totally different set. Again, it may be plausible to explain the mimicry of one butterfly for another on one of the suggested lines, but the resemblance of a fly or moth to a wasp is by no means so easy, and here selection would be generally conceded; yet the appeal to antagonistic principles to explain such closely related cases would only be justified by much direct evidence. Furthermore, the mimetic resemblances between butterflies are not haphazard, but the models almost invariably belong only to certain sub-families, the Danainae and Acraeinae in all the warmer parts of the world, and, in tropical America, the Itho- miinae and Heliconinae as well. Theie groups have the char- acteristics of aposematic species, and no theory but natural selection explains their invariable occurrence as models wherever they exist. It is impossible to suggest, except by natural selection, any explanation of the fact that mimetic resemblances are confined to changes which produce or strengthen a super- ficial likeness. Very deep-seated changes are generally involved, inasmuch as the appropriate instincts as to attitude, &c, are as important as colour and marking. The same conclusion is reached when we analyse the nature of mimetic resemblance and realize how complex it really is, being made up of colours, both pigmentary and structural, pattern, form, attitude and movement. A plausible interpretation of colour may be wildly improbable when applied to some other element, and there is no explanation except natural selection which can explain all these elements. The appeal to the direct action of local con- ditions in common often breaks down upon the slightest investi-

gation, the difference in habits between mimic and model in the same locality causing the most complete divergence in their conditions of life. Thus many insects produced from burrowing larvae mimic those whose larvae live in the open. Mimetic resemblance is far commoner in the female than in the male, a fact readily explicable by selection, as suggested by Wallace, for the female is compelled to fly more slowly and to expose itself while laying eggs, and hence a resemblance to the slow-flying freely exposed models is especially advantageous. The facts that mimetic species occur in the same locality, fly at the same time of the year as their models, and are day-flying species even though they may belong to nocturnal groups, are also more or less difficult to explain except on the theory of natural selection, and so also is the fact that mimetic resemblance is produced in the most varied manner. A spider resembles its model, an ant, by a modification of its body-form into a superficial resem- blance, and by holding one pair of legs to represent antennae; certain bugs (Hemiptera) and beetles have also gained a shape unusual in their respective groups, a shape which superficially resembles an ant; a Locus tid (Myrmecophana) has the shape of an ant painted, as it were, on its body, all other parts resem- bling the background and invisible; a Membracid (Homoptera) is entirely unlike an ant, but is concealed by an ant-like shield. When we further realize that in this and other examples of mimicry ” the likeness is almost always detailed and remarkable, however it is attained, while the methods differ absolutely,” we recognize that natural selection is the only possible explanation hitherto suggested. In the cases of aggressive mimicry an animal resembles some object which is attractive to its prey. Examples are found in the flower-like species of M antis, which attract the insects on which they feed. Such cases are generally described as possessing ” alluring colours,” and are regarded as examples of aggressive (anticryptic) resemblance, but their logical position is here.

Colours displayed in Courtship, Secondary Sexual Characters, Epigamic Colours. — Darwin suggested the explanation of these appearances in his theory of sexual selection (The Descent of Man, London, 1874). The rivalry of the males for the possession of the females he believed to be decided by the preference of the latter for those individuals with especially bright colours, highly developed plumes, beautiful song, &c. Wallace does not accept the theory, but believes that natural selection, either directly or indirectly, accounts for all the facts. Probably the majority of naturalists follow Darwin in this respect. The subject is most difficult, and the interpretation of a great proportion of the examples in a high degree uncertain, so that a very brief account is here expedient. That selection of some kind has

been opera- tive is indicated by the diversity of the elements into which the effects can be analysed. The most complete set of observations on epigamic display was made by George W. and Elizabeth G. Peckham upon spiders of the family Attidae (Nat. Hist. Soc. of Wisconsin, vol. i., 1889). These observations afforded the authors ” conclusive evidence that the females pay close atten- tion to the love-dances of the males, and also that they have aot only the power, but the will, to exercise a choice among the suitors for their favour.” Epigamic characters are often con- cealed except during courtship; they are found almost exclu- sively in species which are diurnal or semi-diurnal in their habits, and are excluded from those parts of the body which move too rapidly to be seen. They are very commonly directly associated with the nervous system; and in certain fish, and probably in other animals, an analogous heightening of effect accompanies nervous excitement other than sexual, such as that due to fighting or feeding. Although there is epigamic display in species with sexes alike, it is usually most marked in those with secondary sexual characters specially developed in the male. These are an exception to the rule in heredity, in that their appearance is normally restricted to a single sex, although in many of the higher animals they have been proved to be latent in the other, and may appear after the essential organs of sex have been removed or become functionless. This is also the case in the Aculeate Hymenoptera when the reproductive organs have been

destroyed by the parasite Stylops. J. T. Cunningham has argued (Sexual Dimorphism in the Animal Kingdom, London, 1900) that secondary sexual characters have been produced by direct stimulation due to contests, &c, in the breeding period, and have gradually become hereditary, a hypothesis involving the assump- tion that acquired characters are transmitted. Wallace suggests that they are in part to be explained as ” recognition characters,” in part as an indication of surplus vital activity in the male.

Authorities. — The following works may also be consulted: — T. Eimer, Orthogenesis der Schmetterlinge (Leipzig, 1898); E. B. Poulton, The Colours of Animals (London, 1890); F. E. Beddard, Animal Coloration (London, 1892) ; E. Haase, Researches on Mimicry (translation, London, 1896); A. R. Wallace, Natural Selection and Tropical Nature (London, 1895) ; Darwinism (London, 1897) ; A. H. Thayer and G. H. Thayer, Concealing- Coloration in the Animal

Kingdom (New York, 1910). (E. B. P.)

2. Chemistry The coloration of the surface of animals is caused either by pigments, or by a certain structure of the surface by means of which the light falling on it, or reflected through its superficial transparent layers, undergoes diffraction or other optical change. Or it may be the result of a combination of these two causes. It plays an important part in the relationship of the animal to its environment, in concealment, in mimicry, and so on; the presence of a pigment in the integument may also serve a more direct physiological purpose, such as a respiratory function. The coloration of birds' feathers, of the skin of many fishes, of many insects, is partially at least due to structure and the action of the peculiar pigmented cells known as " chromatophores " (which W. Garstang defines as pigmented cells specialized for the discharge of the chromatic function), and is much better marked when these have for their background a " reflecting layer " such as is provided by guanin, a substance closely related to uric acid. Such a mechanism is seen to greatest advantage in fishes. Among these, guanin may be present in a finely granular form, causing the light falling on it to be scattered, thus producing a white effect; or it may be present in a peculiar crystalline form, the crystals being known as " iridocytes "; or in a layer of closely apposed needles forming a silvery sheet or mirror. In the iris of some fishes the golden red colour is produced by the light reflected from such a layer of guanin needles having to pas's through a thin layer of a reddish pigment, known as a " lipo- chrome." Again, in some lepidopterous insects a white or a yellow appearance is produced by the deposition of uric acid or a nearly allied substance on the surface of the wings. In many animals, but especially among invertebrates, colouring matters or pigments play an important role in surface coloration; in some cases such coloration may be of benefit to the animal, but in others the integument simply serves as an organ for the excretion of waste pigmentary substances. Pigments (1) may be of direct physiological importance; (2) they may be excretory; or (3) they may be introduced into the body of the animal with the food.

Of the many pigments which have been described up to the present time, very few have been subjected to elementary chemical analysis, owing to the great difficulties attending their isolation. An extremely small amount of pigment will give rise to a great amount of coloration, and the pigments are generally accompanied by impurities of various kinds which cling to them with great tenacity, so that when one has been thoroughly cleansed very little of it remains for ultimate analysis. Most of these substances have been detected by means of the spectroscope, their absorption bands serving for their recognition, but

mere identity of spectrum does not necessarily mean chemical identity, and a few chemical tests have also to be applied before a con- clusion can be drawn. The absorption bands are referred to certain definite parts of the spectrum, such as the Fraunhofer lines, or they may be given in wave-lengths. For this purpose the readings of the spectroscope are reduced to wave-lengths by means of interpolation curves; or if Zeiss's microspectroscope be used, the position of bands in wave-lengths (denoted by the Greek letter X) may be read directly. Haemoglobin, the red colouring matter of vertebrate

blood, C76sHi203Ni95S 3 FeO2i8, and its derivatives haematin, C 3 2H3oN4Fe0 3 , and haematoporphyrin, Ci 6 Hi8N 2 0s, are colouring matters about which we possess definite chemical knowledge, as they have been isolated, purified and analysed. Most of the bile pigments of mammals have likewise been isolated and studied chemically, and all of these are fully described in the text-books of physiology and physiological chemistry. Haemo- globin, though physiologically of great importance in the re- spiratory process of vertebrate animals, is yet seldom used for surface pigmentation, except in the face of white races of man or in other parts in monkeys, &c. In some worms the transparent skin allows the haemoglobin of the blood to be seen through the integument, and in certain fishes also the haemoglobin is visible through the integument. It is a curious and noteworthy fact that in some invertebrate animals in which no haemoglobin occurs, we meet with its derivatives. Thus haematin is found in the so-called bile of slugs, snails, the limpet and the crayfish. In sea-anemones there is a pigment which yields some of the decomposition-products of haemoglobin, and associated with this is a green pigment apparently identical with biliverdin (C16H18N2O4), a green bile pigment. Again, haematoporphyrin is found in the integuments of star-fishes and slugs, and occurs in the " dorsal streak " of the earth-worm Lumbricus terrestris, and perhaps in other species. Haematoporphyrin and biliverdin also occur in the egg-shells of certain birds, but in this case they are derived from haemoglobin. Haemoglobin is said to be found as low down in the animal kingdom as the Echinoderms, e.g. in Ophiactis virens and Thyonella gemmata. It also occurs in the blood of Planorbis comeus and in the pharyngeal muscles of other mollusca.

A great number of other pigments have been described; for example, in the muscles and tissues of animals, both vertebrate and invertebrate, are the histohaematins, of which a special muscle pigment, myohaematin, is one. In vertebrates the latter is generally accompanied by haemoglobin, but in invertebrates — with the exception of the pharyngeal muscles of the mollusca — it occurs alone. Although closely related to haemoglobin or its derivative

haemochromogen, the histohaematins are yet totally distinct, and they are found in animals where not a trace of haemoglobin can be detected. Another interesting pigment is turacin, which contains about 7% of nitrogen, found by Pro- fessor A. H. Church in the feathers of the Cape lory and other plantain-eaters, from which it can be extracted by water containing a trace of ammonia. It has been isolated, purified and analysed by Professor Church. From it may be obtained turacoporphyrin, which is identical with haematoporphyrin, and gives the band in the ultra-violet which J. L. Soret and subsequently A. Gamgee have found to be characteristic of haemoglobin and its compounds. Turacin itself gives a peculiar two-banded spectrum, and contains about 7 % of copper in its molecule. Another copper-containing pigment is haemocyanin, which in the oxidized state gives a blue colour to the blood of various Mollusca and Arthropoda. Like haemoglobin, it acts as an oxygen-carrier in respiration, but it takes no part in surface coloration. ”

A class of pigments widely distributed among plants and animals are the lipochromes. As their name denotes, they are allied to fat and generally accompany it, being soluble in fat solvents. They play an important part in surface coloration, and may be greenish, yellow or red in colour. They contain no nitrogen. As an example of a lipochrome which has been isolated, crystallized and purified, we may mention carotin, which has recently been found in green leaves. Chlorophyll, which is so often associated with a lipochrome, has been found in some Infusoria, and in Hydra and Spongilla, &c. In some cases it is probably formed by the animal; in other cases it may be due to symbiotic algae, while in the gastric gland of many Mollusca, Crustacea and Echinodermata it is derived from food-chlorophyll. Here it is known as entero-chlorophyll. The black pigments which occur among both vertebrate and invertebrate animals often have only one attribute in common, viz. blackness, for among the discordant results of analysis one thing is certain, viz. that the melanins from vertebrate animals

are not identical with those from invertebrate animals. The melanosis or blackening of insect blood, for instance, is due to the oxidation of a chromogen, the pigment produced being known as a uranidine. In some sponges a somewhat similar pigment has been noticed. Other pigments have been described, such as actiniochrome, echinochrome, pentacrinin, antedonin, polyperythrin (which appears to be a

baematoporpbyrin), the floridines, spongioporphyrin, &c, which need no mention here; all these pigments can only be distinguished by means of the spectroscope.

Most of the pigments are preceded by colourless substances known as ” chromogens,” which by the action of the oxygen of the air and by other agencies become changed into the corre- sponding pigments. In some cases the pigments are built up in the tissues of an animal, in others they appear to be derived more or less directly from the food. Derivatives of chlorophyll and lipochromes especially, seem to be taken up from the intes- tine, probably by the agency of leucocytes, in which they may occur in combination with, or dissolved by, fatty matters and excreted by the integument. In worms especially, the skin seems to excrete many effete substances, pigments included. No direct connexion has been traced between the chlorophyll eaten with the food and the haemoglobin of blood and muscle. Attention may, however, be drawn to the work of Dr E. Schunck, who has shown that a substance closely resembling haemato- porphyrin can be prepared from chlorophyll; this is known as phylloporphyrin. Not only does the visible spectrum of this substance resemble that of haematoporphyrin, but the invisible ultra-violet also, as shown by C. A. Schunck.

The reader may refer to E. A. Schafer’s Text-Book of Physiology (1898) for A. Gamgee’s article ” On Haemoglobin, and its Com- pounds “; to the writer’s papers in the Phil. Trans, and Proc. Roy. Soc. from 1881 onwards, and also Quart. Journ. Micros. Science and Journ. of Physiol. ; to C. F. W. Krukenberg’s Vergleichende physio- logische Studien from 1879 onwards, and to his Vortrdge. Miss M. I. Newbigin collected in Colour in Nature (1898) most of the recent literature of this subject. Dr E. Schunck’s papers will be found under the heading ” Contribution to the Chemistry of Chlorophyll ” in Proc. Roy. Soc. from 1885 onwards; and Mr C. A. Schunck’s paper in Proc. Roy. Soc. vol. lxiii. (C. A. MacM.)

COLSTON, EDWARD (1636-1721), English philanthropist, the son of William Colston, a Bristol merchant of good position, was born at Bristol on the 2nd of November 1636. He is gener- ally understood to have spent some years of his youth and man- hood as a factor in Spain, with which country his family was long connected commercially, and whence, by means of a trade in wines and oil, great part of his own vast fortune was to come. On his return he seems to have settled in London, and to have bent himself resolutely to the task of making money. In 1681, the date of his father’s decease, he appears as a governor of Christ’s hospital, to which noble foundation he afterwards gave frequently and largely. In the same year he probably

began to take an active interest in the affairs of Bristol, where he is found about this time embarked in a sugar refinery; and during the remainder of his life he seems to have divided his attention pretty equally between the city of his birth and that of his adoption. In 1682 he appears in the records of the great western port as ad- vancing a sum of £1800 to its needy corporation; in 1683 as “a free burgess and meire (St Kitts) merchant” he was made a member of the Merchant’s Hall; and in 1684 he was appointed one of a committee for managing the affairs of Clifton. In 1685 he again appears as the city’s creditor for about £2000, repayment of which he is found insisting on in 1686. In 1689 he was chosen auditor by the vestry at Mortlake, where he was residing in an old house once the abode of Ireton and Cromwell. In 1691, on St Michael’s Hill, Bristol, at a cost of £8000, he founded an alms- house for the reception of 24 poor men and women, and endowed with accommodation for ” Six Saylors,” at a cost of £600, the merchant’s almshouses in King Street. In 1696, at a cost of £8000, he endowed a foundation for clothing and teaching 40 boys (the books employed were to have in them ” no tincture of Whiggism “); and six years afterwards he expended a further sum of £1500 in rebuilding the school-house. In 1708; at a cost of £41,200, he built and endowed his gieat foundation on Saint

Augustine’s Back, for the instruction, clothing, maintaining and apprenticing of 100 boys; and in time of scarcity, during this and next year, he transmitted ” by a private hand ” some £20,000 to the London committee. In 1710, after a poll of four days, he was sent to parliament, to represent, on strictest Tory principles, his native city of Bristol; and in 1713, after three years of silent political life, he resigned this charge. He died at Mortlake in 1721, having nearly completed his eighty-fifth year; and was buried in All Saints’ church, Bristol.

Colston, who was in the habit of bestowing large sums yearly for the release of poor debtors and the relief of indigent age and sickness, and who gave (1711) no less than £6000 to increase Queen Anne’s Bounty Fund for the augmentation of small livings, was always keenly interested in the organization and manage- ment, of his foundations; the rules and regulations were all drawn up by his hand, and the minutest details of their consti- tution and economy were dictated by him. A high churchman and Tory, with a genuine intolerance of dissent and dissenters, his name and example have served as excuses for the formation of two political benevolent societies — the ” Anchor ” (founded 1769) and the “Dolphin” (founded 1749), — and also the “Grateful” (founded 1758), whose rivalry has been perhaps as instrumental in keeping their patron’s memory green as have the

splendid charities with which he enriched his native city (see Bristol).

See Garrard, Edward Colston, the Philanthropist (4to, Bristol, 1852); Pryce, A Popular History of Bristol (1861); Manchee, Bristol Charities.

COLT, SAMUEL (1814-1862), American inventor, was born on the 19th of July 1814 at Hartford, Connecticut, where his father had a manufactory of silks and woollens. At the age of ten he left school for the factory, and at fourteen, then being in a boarding school at Amherst, Massachusetts, he made a runaway voyage to India, during which (in 1829) he constructed a wooden model, still existing, of what was afterwards to be the revolver (see Pistol). On his return he learned chemistry from his father's bleaching and dyeing manager, and under the assumed name " Dr Coult " travelled over the United States and Canada lecturing on that science. The profits of two years of this work enabled him to continue his researches and experi- ments. In 1835, having perfected a six-barrelled rotating breech, he visited Europe, and patented his inventions in London and Paris, securing the American right on his return; and the same year he founded at Paterson, New Jersey, the Patent Arms Company, for the manufacture of his revolvers only. As early as 1837 revolvers were successfully used by United States troops, under Lieut. Colonel William S. Harney, in fighting against the Seminole Indians in Florida. Colt's scheme, however, did not succeed; the arms were not generally appreci ated; and in 1842 the company became insolvent. No revolvers were made for five years, and none were to be had when General Zachary Taylor wrote for a supply from the seat of war in Mexico. In 1847 the United States government ordered 1000 from the inventor; but before these could be produced he had to construct a new model, for a pistol of the company's make could nowhere be found. This commission was the beginning of an immense business. The little armoury at Whitneyville (New Haven, Connecticut), where the order for Mexico was executed, was soon exchanged for larger workshops at Hartford. These in their turn gave place (1852) to the enormous factory of the Colt's Patent Fire- Arms Manufacturing Company, doubled in 1861, on the banks of the Connecticut river, within the city limits of Hartford, where so many millions of revolvers with all their appendages have been manufactured. Thence was sent, for the Russian and English governments, to Tula and Enfield, the whole of the elaborate machinery devised by Colt for the manufacture of his pistols. Colt introduced and patented a number of improvements in his revolver, and also invented a submarine battery for harbour defence. He died at Hartford on the 10th of January 1862.

COLT'S-FOOT, the popular name of a small herb, Tussilago Farfara, a

member of the natural order Compositae, which is

common in Britain in damp, heavy soils. It has a stout branching underground stem, which sends up in March and April scapes about 6 in. high, each bearing a head of bright yellow flowers, the male in the centre surrounded by a much larger number of female. The flowers are succeeded by the fruits, which bear a soft snow-white woolly pappus. The leaves, which appear later, are broadly cordate with an angular or lobed outline, and are covered on the urider-face with a dense white felt. The botanical name, Tussilago, recalls its use as a medicine for cough (tussis). The leaves are smoked in cases of asthma.

COLUGO, or Cobego, either of two species of the zoological genus Galeopithecus. These animals live in the forests of the Malay Peninsula, Sumatra, Borneo and the Philippine Islands, where they feed chiefly on leaves, and probably also on insects. In size they may be compared with cats; the long slender limbs are connected by a broad fold of skin extending outwards from the sides of the neck and body, the fingers and toes are webbed, and the hind-limbs joined by an outer membrane as in bats. Their habits are nocturnal, and during the daytime they cling to the trunks or limbs of trees head downwards in a state of repose. With the approach of night their season of activity commences, when they may be occasionally seen gliding from tree to tree supported on their cutaneous parachute, and they have been noticed as capable of traversing in this way a space of 70 yds. with a descent of only about one in five. Europeans in the East know these animals as ” flying lemurs.” (See Galeopithecus.)

COLUMBA, SAINT (Irish, Colum), Irish saint, was born on the 7th of December 521, in all probability at Gartan in Co. Donegal. His father Feidlimid was a member of the reigning family in Ireland and was closely allied to that of Dalriada (Argyll). His mother Eithne was of Leinster extraction and was descended from an illustrious provincial king. To these powerful connexions as much as to his piety and ability, he owed the immense influence he possessed. Later lives state that the saint was also called Crimthann (fox), and Reeves suggests that he may have had two names, the one baptismal, the other secular. He was afterwards known as Columkille, or Columba of the Church, to distinguish him from others of the same name. During his early years the Irish Church was reformed by Gildas and Finian of Clonard, and numerous monasteries were founded which made

Ireland renowned as a centre of learning. Columba himself studied under two of the most distinguished Irishmen of his day, Finian of Moville (at the head of Strangford Lough) and Finian of Clonard. Almost as a matter of course, under such circumstances, he embraced the monastic life. He was ordained deacon while at Moville, and afterwards, when about thirty years of age, was raised to the priesthood. During his residence in Ireland he founded, in addition to a number of churches, two famous monasteries, one named Daire Calgaich (Derry) on the banks of Lough Foyle, the other Dair-magh (Durrow) in King's county.

In 563 he left his native land, accompanied by twelve disciples, and went on a mission to northern Britain, perhaps on the invitation of his kinsman Conall, king of Dalriada. Irish accounts represent Columba as undertaking this mission in consequence of the censure expressed against him by the clergy after the battle of Cooldrevny; but this is probably a fabrication. The saint's labours in Scotland must be regarded as a manifesta- tion of the same spirit of missionary enterprise with which so many of his countrymen were imbued. Columba established himself on the island of Hy or Iona, where he erected a church and a monastery. About the year 565 he applied himself to the task of converting the heathen kingdom of the northern Picts. Crossing over to the mainland he proceeded to the residence, on the banks of the Ness, of Brude, king of the Picts. By his preaching, his holy life, and, as his earliest biographers assert, by the performance of miracles, he converted the king and many of his subjects. The precise details, except in a few cases, are unknown, or obscured by exaggeration and fiction; but it is certain that the whole of northern Scotland was con- verted by the labours of Columba, and his disciples and the

religious instruction of the people provided for by the erection of numerous monasteries. The monastery of Iona was reverenced as the mother house of all these foundations, and its abbots were obeyed as the chief ecclesiastical rulers of the whole nation of the northern Picts. There were then neither dioceses nor parishes in Ireland and Celtic Scotland; and by the Columbite rule the bishops themselves, although they ordained the clergy, were subject to the jurisdiction of the abbots of Iona, who, like the founder of the order, were only presbyters. In matters of ritual they agreed with the Western Church on the continent, save in a few particulars such as the precise time of keeping Easter and manner of tonsure.

Columba was honoured by his countrymen, the Scots of Britain and Ireland, as much as by his Pictish converts, and in his character of

chief ecclesiastical ruler he gave formal benediction and inauguration to Aidan, the successor of Conall, as king of the Scots. He accompanied that prince to Ireland in 575, and took a leading part in a council held at Drumceat in Ulster, which determined once and for all the position of the ruler of Dalriada with regard to the king of Ireland. The last years of Columba's life appear to have been mainly spent at Iona. There he was already revered as a saint, and whatever credit may be given to some portions of the narratives of his biographers, there can be no doubt as to the wonderful influence which he exercised, as to the holiness of his life, and as to the love which he uniformly manifested to God and to his neighbour.

In the summer of 597 he knew that his end was approaching. On Saturday the 8th of June he was able, with the help of one of his monks, to ascend a little hill above the monastery and to give it his farewell blessing. Returning to his cell he continued a labour in which he had been engaged, the transcription of the Psalter. Having finished the verse of the 34th Psalm where it is written, " They who seek the Lord shall want no manner of thing that is good," he said, " Here I must stop: — what follows let Baithen write "; indicating, as was believed, his wish that his cousin Baithen should succeed him as abbot. He was present at evening in the church, and when the midnight bell sounded for the nocturnal office early on Sunday morning he again went thither unsupported, but sank down before the altar and' passed away as in a gentle sleep.

Several Irish poems are ascribed to Columba, but they are manifestly compositions of a later age. Three Latin hymns may, however, be attributed to the saint with some degree of certainty.

The original materials for a life of St Columba are unusually full. The earliest biography was written by one of his successors, Cuminius, who became abbot of Iona in 657. Much more important is the enlargement of that work by Adamnan. who became abbot of Iona in 679. These narratives are supplemented by the brief but most valuable notices given by the Venerable Bede. See W. Reeves, Life of St Columba, written by Adamnan (Dublin, 1857) ; W. F. Skene, Celtic Scotland, vol. ii. " Church and Culture " (Edinburgh, 1877). (E. C. Q.)

COLUMBAN (543-615), Irish saint and writer, was born in Leinster in 543, and was educated in the monastery of Bangor, Co. Down. About the year 585 he left Ireland together with twelve other monks, and established himself in the Vosges, among the ruins of an ancient fortification called Anagratcs, the present Anegray in the department of Haute-Saone. His enemies accused him before a synod of French

bishops (602) for keeping Easter according to the old British and now unorthodox way, and a more powerful conspiracy was organized against him at the court of Burgundy for boldly rebuking the crimes of King Theuderich II. and the queen-mother Brunhilda. He was banished and forcibly removed from his monastery, and with St Gall and others of the monks he withdrew into Switzerland, where he preached with no great success to the Suebi and Alamanni. Being again compelled to flee, he retired to Italy, and founded the monastery of Bobbio in the Apennines, where he remained till his death, which took place on the 21st of November 615. His writings, which include some Latin poems, prove him a man of learning, and he appears to have been acquainted not only with the Latin classics, but also with Greek, and even Hebrew

The collected edition of St Columban's writings was published by Patrick Fleming in his Collectanea sacra Hiberni (Louvain, 1667),

and reproduced by Migne, p. <., vol. lxxxvi. (Paris, 1844). See further, Wright's Biographia Literaria. Columban's Regula Coenobitalis cum Poenitenliali is to be found in the Codex Regularum (Paris, 1638). A complete bibliography is given in U. Chevallier, Repertoire des sources hist. (Bio. Bibliogr.), vol. i. 990 (Paris, 1905).

COLUMBANI, PLACIDO, Italian architectural designer, who worked chiefly in England in the latter part of the 18th century. He belonged to the school of the Adams and Pergolesi, and like them frequently designed the enrichments of furniture. He was a prolific producer of chimney-pieces, which are often mistaken for Adam work, of moulded friezes, and painted plaques for cabinets and the like. There can be no question that the English furniture designers of the end of the 18th century, and especially the Adams, Hepplewhite and Sheraton, owed much to his graceful, flowing and classical conceptions, although they are often inferior to those of Pergolesi. His books are still a valuable store-house of sketches for internal architectural decoration. His principal works are: — Vases and Tripods (1770); A New Book of Ornaments, containing a variety of elegant designs for Modern Panels, commonly executed in Stucco, Wood or Painting, and used in decorating Principal Rooms (1775); A variety of Capitals, Friezes and Corniches, and how to increase and decrease them, still retaining their proportions (1776). He also assisted John Crunden in the production

of The Chimney- piece Makers' Daily Assistant (1776).

COLUMBARIUM (Lat. columba, a dove), a pigeon-house. The term is applied in architecture to those sepulchral chambers in and near Rome, the walls of which were sunk with small niches {columbaria) to receive the cinerary urns. Vitruvius (iv. 2) employs the term to signify the holes made in a wall to receive the ends of the timbers of a floor or roof.

COLUMBIA, a city and the county-seat of Boone county, Missouri, U.S.A., situated in the central part of the state, about 145 m. (by rail) W.N.W. of St Louis. Pop. (1890) 4000; (1900) 5651 (1916 negroes); (1910) 9662. Columbia is served by the Wabash and the Missouri, Kansas & Texas railways. It is primarily an educational centre, is a market for grain and farm products, and has grain elevators, a packing house, a shoe factory and brick works. Columbia is the seat of the University of Missouri, a coeducational state institution, established in 1839 and opened in 1841; it received no direct financial support from the state until 1867, and its founding was due to the self- sacrifice of the people of the county. It. is now liberally supported by the state; in 1908 its annual income was about $650,000. In 1908 the university had (at Columbia) 200 instructors and 2419 students, including 680 women; included in its library is the collection of the State Historical Society. The School of Mines of the university is at Rolla, Mo. ; all other departments are at Columbia. A normal department was established in 1867 and opened in 1868; and women were admitted to it in 1869. The College of Agriculture and Mechanic Arts became a depart- ment of the university in 1870. The law department was opened in 1872, the medical in 1873, and the engineering in 1877. The graduate department was established in 1896, and in 1908 a department of journalism was organized. On the university campus in the quadrangle is the monument of grey granite erected over the grave of Thomas Jefferson, designed after his own plans, and bearing the famous inscription written by him. It was given to the university by descendants of Jefferson when Congress appropriated money for the monument now standing over his grave. Near the city is the farm of the agricultural college and the experiment station. At Columbia, also, are the Parker Memorial hospital, the Teachers College high school, the University Military Academy, the Columbia Business College, Christian College' (Disciples) for women, established in 1851, its charter being the first granted by Missouri for the collegiate education of Protestant women; the Bible College of the Disciples of Christ in Missouri; and Stephens College (under Baptist control) for women, established in 1856. The municipality owns the water-works and the electric lighting plant. Columbia was first settled about 182 1.

COLUMBIA, a borough of Lancaster county, Pennsylvania, U.S.A., on the W. bank of the Susquehanna river (here crossed

by a long steel bridge), opposite Wrightsville and about 81 m. W. by N. of Philadelphia. Pop. (1890) 10,599; (1900) 12,316, of whom 772 were foreign-born; (1910) 11,454. It is served by the Pennsylvania, the Philadelphia, Baltimore & Washington, the Philadelphia & Reading, and the Northern Central railways, and by interurban electric railways. The river here is about a mile wide, and a considerable portion of the borough is built on the slope of a hill which rises gently from the river-bank and overlooks beautiful scenery. The Pennsylvania railway has repair shops here, and among Columbia's manufactures are silk goods, embroidery and laces, iron and steel pipe, engines, laundry machinery, brushes, stoves, iron toys, umbrellas, flour, lumber and wagons; the city is also a busy shipping and trading centre. Columbia was first settled, by Quakers, in 1726; it was laid out as a town in 1787; and in 1814 it was incorporated. In 1790 it was one of several places considered in Congress for a permanent site of the national capital.

COLUMBIA, the capital city of South Carolina, U.S.A., and the county-seat of Richland county, on the E. bank of the Congaree river, a short distance below the confluence of the Saluda and the Broad rivers, about 130 m. N.W. of Charleston. Pop. (1890) 15,353; (1900) 21,108, of whom 9858 were negroes; and (1910) 26,319. It is served by the Atlantic Coast Line, the Southern, the Seaboard Air Line, and the Columbia, Newberry & Laurens railways. Columbia is picturesquely situated on the level top of a bluff overlooking the Congaree, which falls about 36 ft. in passing by, but is navigable for the remainder of its course. The surrounding country is devoted chiefly to cotton culture. The scate house, United States government building and city hall are fine structures. Some of the new business houses are ten or more storeys in Ijeight. The state penitentiary and the state insane asylum are located here, and Columbia is an important educational centre, being the seat of the university of South Carolina, the Columbia College for women (Methodist Episcopal South, 1854), the College for women (Presbyterian, 1890), and the Presbyterian Theological Seminary (1828); and the Allen University (African Methodist Episcopal; coedu- cational, 1880), and the Benedict College (Baptist) for negroes. The University of South Carolina, organized in 1801 and opened in 1805, was known as South Carolina College in 1805-1863, 1878-1887 and 1891-1906, and as the university of South Carolina in 1866-1877, 1888-1891 and after 1906; in 1907-1908 it had departments of arts, science, pedagogy and law, an enrol- ment of 285 students, and a faculty of 25 instructors. By means of a canal

abundant water power is furnished by the Congaree, and the city has some of the largest cotton mills in the world; it has, besides, foundries and machine shops and manu- factories of fertilizers and hosiery. The manufactures under the factory system were valued at $3,133,903 in 1900 and at $4,676,944 in 1905 — a gain, greater than that of any other city in the state, of 49-2% in five years. In the neighbourhood are several valuable granite quarries. The municipality owns and operates its water-works.

While much of the site was still a forest the legislature, in 1786, chose it for the new capital. It was laid out in the same year, and in 1790 the legislature first met here. Until 1805, when it was incorporated as a village, Columbia was under the direct government of the legislature; in 1854 it was chartered as a city. On the morning of the 17 th of February 1865 General W. T. Sherman, on his march through the Carolinas, entered Columbia, and on the ensuing night a fire broke out which was not extinguished until most of the city was destroyed. The responsibility for this fire was charged by the Confederates upon the Federals and by the Federals upon the Confederates.

COLUMBIA, a city and the county-seat of Maury county, Tennessee, U.S.A., situated on the Duck river, in the central part of the state, 46 m. S. of Nashville. Pop. (1890) 5370; (1900) 6052 (2716 negroes); (1910) 3754. Columbia is served by the Louisville & Nashville, and the Nashville, Chattanooga & St Louis railways. It is the seat of the Columbia Institute for girls (under Protestant Episcopal control), founded in 1836, and of the Columbia Military Academy. Columbia is in a fine farmine;

region; is engaged extensively in the mining and shipping of phosphates; has an important trade in live-stock, especially mules; manufactures cotton, lumber, flour, bricks, pumps and woollen goods; and has marble and stone works. Columbia was settled about 1807 and was incorporated in 1822. During the Civil War it was the base from which General N. B. Forrest operated in 1862-1863, and was alternately occupied by Con- federate and Federal forces during General Hood’s Nashville campaign (November-December 1864).

COLUMBIA RIVER, a stream of the north-west United States and south-west Canada, about 939 m. in length, draining a basin of about 250,000 sq. m., of which 38,395 are in British Columbia; some

105,000 sq. m. belong to the valley of the Snake and 11,700 to that of the Willamette. The source of the river is partly in the Yellowstone country, partly near the Titon peaks, and partly in the pine-clad mountains of British Columbia. Some American geographers regard the head as that of the Clark Fork, but it is most generally taken to be in British Columbia about 80 m. north of the United States line. From this point it runs some 150 m. to the north-west to the ” Big Bend,” and then in a great curve southward, enclosing the superb ranges of the Selkirks, crossing the international line near the boundary of Washington and Idaho, where it is joined by the Pend Oreille river, or Clark Fork, already referred to. This latter river rises in the Rocky Mountains west of Helena, Montana, falls with a heavy slope (1323 ft. in 167 m.) to its confluence with the Flat- head, flows through Lake Pend Oreille (27 m.) in northern Idaho, and runs in deep canyons (falling 900 ft. in 200 m.) to its junction with the Columbia, which from this point continues almost due south for more than 106 m. Here the Columbia is joined by the Spokane, a large river with heavy fall, and enters the ” Great Plain of the Columbia,” an area of some 22,000 sq. m., resemb- ling the ” parks ” of Colorado, shut in on all sides by mountains: the Moses range to the north, the Bitter Root and Cceur d’Alene on the east, the Blue on the south, and the Cascades on the west. The soil is rich, yielding great harvests of grain, and the mountains rich in minerals as yet only slightly prospected. After breaking into this basin the river turns sharply to the west and skirts the northern mountain barrier for about 105 m. Where it strikes the confines of the Cascades, it is joined by the Okanogan, turns due south in the second Big Bend, and flows about 200 m. to its junction with the Snake near Wallula.

After the confluence of the Snake with the Columbia the greater river turns west toward the Pacific. Throughout its course to this point it may be said that the Columbia has no flood plain; everywhere it is cutting its bed; almost every- where it is characterized by canyons, although above the Spokane the valley is much broken down and there is considerable timbered and fertile bench land. Below the Spokane the canyon becomes more steep and rugged. From the mouth of the Okanogan to Priests Rapids extends a superb canyon, with precipitous walls of black columnar basalt 1000 to 3000 ft. in height. The finest portion is below the Rock Island Rapids. In this part of its course, along the Cascade range in the Great Plain and at its passage of the range westward, rapids and cascades particularly obstruct the imperfectly opened bed. In the lower Columbia, navigation is first interrupted 160 m. from the mouth at the Cascades, a narrow gorge across the Cascade range 4-5 m. long, where the river falls 24 ft. in

2500; the rapids are evaded by a canal constructed (1878-1896) by the Federal government, and by a portage railway (1890-1891). Fifty-three miles above this are the Dalles, a series of falls, rapids and rock obstructions extending some 12 m. and ending at Celilo, 115m. below Wallula, with a fall of 20 ft. There are also impediments just below the mouth of the Snake; others in the lower course of this river below Riparia; and almost continuous obstructions in the Columbia above Priests Rapids. The commerce of the Columbia is very important, especially that from Portland, Vancouver, Astoria, and other outlets of the Willamette valley and the lower Columbia. The grain region of the Great Plain, the bottom-land orchards and grain field on the plateaus of the Snake, have not since 1880 been I

dependent upon the water navigation for freighting, but in their interest costly attempts have been made to open the river below the Snake uninterruptedly to commerce.

The Columbia is one of the greatest salmon streams of the world (see Oregon). . The tonnage of deep-sea vessels in and out over the bar at the river's mouth from 1890-1899 was 9,423,637 tons. From 1872-1899 the United States government expended for improvement of the Snake and Columbia $6,925,649. The mouth of the latter is the only deep-water harbour between San Francisco and Cape P'lattery (700 m.), and the only fresh water harbour of the Pacific coast. To facilitate its entrance, which, owing to bars, tides, winds, and the great discharge of the river, has always been difficult, a great jetty has been con- structed (1885-1895, later enlarged) to scour the bars. It was about 4-5 miles long, and in 1903 work was begun to make it 2-5 miles longer. The tides are perceptible 150 m. above the mouth (mean tide at Astoria c. 6-2 ft.), the average tidal flow at the mouth being about 1,000,000 cub. ft. per second; while the fresh water outflow is from 90,000 to 300,000 cub. ft. according to the stage of water, and as high as 1,000,000 cub. ft. in time of flood. Improvements were undertaken by the Federal govern- ment and a state commission in 1902 in order to secure a 25-ft. channel from Portland to the sea.

In 1792, and possibly also in 1788, the river mouth was entered by Captain Robert Gray (1755-1806) of Boston, Mass., who named the river after his own vcsse'. " Columbia," which name has wholly supplanted the earlier name, '' Oregon." In 1804- 1805 the river was explored by Meriwether Lewis and William Clark. Upon these discoveries the United States primarily based its claim to the territory now embraced in the states of Oregon and Washington.

COLUMBIA UNIVERSITY, one of the oldest and most im- portant of

the higher institutions of learning in the United States, located for the most part on Morningside Heights, New York city. It embraces Columbia College, founded as King's College in 1754; a school of medicine (the College of Physicians and Surgeons) founded in 1767, in West 59th Street; a school of law, founded in 1858; schools of applied science, including a school of mines and schools of chemistry and engineer- ing, separately organized in 1896; a school of architecture, organized in 1881 ; graduate schools of political science, organized in 1880, philosophy, organized in 1890, and pure science, organized in 1892; and a school of journalism; closely affiliated with it are the College of Pharmacy, founded in 1829, in West 68th Street; Teachers' College, founded in 1886, as the New York College for the Traiaiug of Teachers, and essentially a part of the university since 1899; and Barnard College (for women) founded in 1889, and essentially a part of the university since 1 900. Reciprocal relations also exist between the university and hoth the General Theological Seminary of the Protestant Episcopal Church and the Union Theological Seminary, thus practically adding to the university a theological department. Columbia also nominates the American professors who lecture at German universities by the reciprocal arrangement made in 1905, the German professors lecturing in America being nominated by the Prussian ministry of education. Women are now admitted to all the university courses except those in law, medicine, techno- logy and architecture. Since 1900 a summer session has been held for six weeks and attended largely by teachers. Teachers and others, under the direction of the Teachers' College, are afforded an opportunity to pursue courses in absentia and so meet some of the requirements for an academic degree or a teacher's diploma. All students of good ability are enabled to complete the requirements for the bachelor's degree together with any one of the professional degrees by six years of study at the university. Several courses of lectures designed especially for the public — notably the Hewitt Lectures, in co-operation with Cooper Union — are delivered at different places in the city and at the university.

In 1908 there were in Columbia University in all departments 609 instructors and 4096 students; of these 420 were in Barnard College, 850 were in the Teachers' College, and 229 were in the College of Pharmacy. The numerous Universitv oublications

include works embodying the results of original research pub- lished

by the University Press; ” Studies ” published in the form of a series by each of several departments, various periodi- cals edited by some members of the faculty, such as the Columbia University Quarterly, the Political Science Quarterly, and the School of Mines Quarterly; and several papers or periodicals published by the students, among which are the Columbia Spectator, a daily paper, the Columbia Law Review, the Columbia Monthly and the Columbia Jester.

With two or three unimportant exceptions the buildings of the university on Morningside Heights have been erected since 1896. They include, besides the several department buildings, a library building, a university hall (with gymnasium), Earl Hall (for social purposes), St Paul’s chapel (dedicated in 1907), two residence halls for men, and one for women. The library contains about 450,000 volumes exclusive of duplicates and unbound pamphlets. The highest authority in the government of the institution is vested in a board of twenty-four trustees, vacancies in which are filled by co-optation; but the immediate educational interests are directed largely by the members of the university council, which is composed of the president of the university, the dean and one other representative from the faculty of each school. The institution is maintained by the proceeds from an endowment fund exceeding $15,000,000, by tuition fees ranging, according to the school, from $150 to $250 for each student, and by occasional gifts for particular objects.

The charter (1754) providing for the establishment of King’s College was so free from narrow sectarianism as to name ministers of five different denominations for ex-officio governors, and the purpose of the institution as set forth by its first president, Dr Samuel Johnson (1696-1772) was about as broad as that now realised. In 1756 the erection of the first building was begun at the lower end of Manhattan Island, near the Hudson, and the institution prospered from the beginning. From 1776 to 1784, during the War of Independence, the exercises of the college were suspended and the library and apparatus were stored in the New York city hall. In 1 784 the name was changed to Columbia College, and an act of the legislature was passed for creating a state university, of which Columbia was to be the basis. But the plan was not a success, and three years later, in 1787, the act was repealed and the administration of Columbia was entrusted to a board of trustees of which the present board is a successor. In 1857 there was an extensive re-organization by which the scope of the institution was much enlarged, and at the same time it was removed to a new site on Madison Avenue between 49th and 50th Streets. From 1890 to 1895 much centralization in its administration was effected, in 1896 the name of Columbia University was adopted, and in the autumn of

1897 the old site and buildings were again abandoned for new, this time on Morningside Heights.

See A History of Columbia University, by members of the faculty (New York, 1904) ; and J. B. Pine, ” King’s College, now Columbia University,” in Historic New York (New York, 1897).

COLUMBINE (Ital. columbina, from columba, a dove), in pantomime (q.v.) the fairy-like dancer who is courted by Harlequin. In the medieval Italian popular comedy she was Harlequin’s daughter.

COLUMBINE, an erect perennial herbaceous plant known botanically as Aquilegia vulgaris (natural order Ranunculaceae). In Med. Latin it was known as Columbina sc. herba, the dove’s plant. The slender stem bears delicate, long-stalked, deeply divided leaves with blunt segments, and a loose panicle of handsome drooping blue or white flowers, which are characterized by having all the five petals spurred. The plant occurs wild in woods and thickets in England and Ireland, and flowers in early summer. It is well known in cultivation as a favourite spring flower, in many varieties, some of which have red flowers.

COLUMBITE, a rare mineral consisting of iron niobate, FeNb 2 6 , in which the iron and niobium are replaced by varying amounts of manganese and tantalum respectively, the general formula being (Fe, Mn) (Nb, Ta)206. It was in this mineral that

/^\

Crystal of Columbite.

Charles Hatchett discovered, in 1801, the element niobium, which he himself called columbium after the country (Columbia or America) whence came the specimen in the British Museum collection which he examined. The species has also been called niobite. It crystallizes in the orthorhombic system, and the black, opaque crystals are often very brilliant with a sub-metallic lustre. Twinned crystals are not uncommon, and there is a dis- tinct cleavage parallel to the face marked b in the figure. Hardness 6; specific gravity 5-3. With increasing amount of tantalum the specific gravity increases up to 7-3, and members at this end of the series are known as tantalite (FeTaˆ). Specimens in which the iron is largely replaced by manganese are known as manganocolumbite or manganotantalite, according as they contain more niobium or more tantalum. Columbite occurs as crystals and compact masses in granite and pegmatite at Rabenstein in Lower

Bavaria, the Ilmen Mountains in the Urals, Had dam in Connecticut, and several other localities in the United States; also in the cryolite of Greenland. Tantalite is from Finland, and it has recently been found in some abundance in the deposits of cassiterite in the tin-field of Greenbushes in the Blackwood district, Western Australia.

Dimorphous with columbite and tantalite are the tetragonal minerals tapiolite (= skogbolite) and mossite, so that the four form an isodimorphous group with the general formula (Fe, Mn) (Nb, Ta) 2 C>6. Mossite is from a pegmatite vein near Moss in Norway, and tapiolite is from Finland. All these minerals contain tin in small amount. (L. J. S.)

COLUMBIUM, or Niobium (symbol Cb or Nb, atomic weight 94), one of the metallic elements of the nitrogen group, first detected in 1801 by C. Hatchett in a specimen of columbite (niobite) from Massachusetts (Phil. Trans. 1802, 49). It is usually found associated with tantalum, the chief minerals containing these two elements being tantalite, columbite, fergusonite and yttro tantalite; it is also a constituent of pyrochlor, euxenite and samarskite. Columbium compounds are usually prepared by fusing columbite with an excess of acid potassium sulphate, boiling out the fused mass with much water, and removing tin and tungsten from the residue by digestion with ammonium sulphide, any iron present being simultaneously converted into ferrous sulphide. The residue is washed, ex- tracted by dilute hydrochloric acid, and again well washed with boiling water. It is then dissolved in hydrofluoric acid and heated in order to expel silicon fluoride; finally the columbium, tantalum and titanium fluorides are separated by the different solubilities of their double fluorides (C. Marignac, Ann. chim. et phys. 1866 [4], 8, p. 63; 1868, 13, p. 28; see also W. Gibbs, Jahresb. 1864, p. 685; R. D. Hall and E. F. Smith, Proc. A mer. Philos. Soc. 1905, 44, p. 177).

The metal was first obtained by C. W. Blomstrand (Journ. prak. Chem. 1866, 97, p. 3 7) by reducing the chloride with hydrogen; it has more recently been prepared by H. Moissan by reducing the oxide with carbon in the electric furnace (the product obtained always contains from 2-3 % of combined carbon), and by H. Goldschmidt and C. Vautin (Journ. Soc. Chem. Industry, 1898, 19, p. 543) by reducing the oxide with aluminium powder. As obtained by the reduction of the chloride, it is a steel grey powder of specific gravity 7-06. It burns on heating in air; and is scarcely attacked by hydrochloric or nitric acids, or by aqua regia; it is soluble in warm concentrated sulphuric acid.

Columbium hydride, CbH, is obtained as a greyish metallic powder,

when the double fluoride, CbF 5 , 2 KF, is reduced with sodium. It burns when heated in air, and is soluble in warm concentrated sulphuric acid. Three oxides of columbium are certainly known, namely the dioxide, Cb 2 2 , the tetroxide, Cb 2 06, whilst a fourth oxide, columbium trioxide, Cb 2 3 , has been described by E. F. Smith and P. Maas (Zeit.f. anorg. Chem. 1894, 7> P- 97)- Columbium dioxide. Cb 2 2 , is formed when dry potassium columbium oxyfluoride is reduced by sodium (H. Rose, Pogg. Ann. 1858, 104, p. 312). It burns readily in air, and is converted into the pentoxide when fused with acid potassium sulphate. Columbium

tetroxide, CbiOt, is obtained as a black powder when the pentoxide is heated to a high temperature in a current of hydrogen. It is un-attacked by acids. Columbium pentoxide (columbic acid), CˆOs, is obtained from columbite, after the removal of tantalum (see above). The mother liquors are concentrated, and the double salt of composition 2KF-CbOF3-H20, which separates, is decomposed by sulphuric acid, or by continued boiling with water (C. Marignac ; see also G. Kriiss and L. F. Nilson, Ber. 1887, 20, p. 1676). It is a white amorphous infusible powder, which when strongly heated in sulphuretted hydrogen, yields an oxysulphide. Several hydrated forms are known, yielding salts known as columbates. A percolumbic acid, HCb0 4 nH 2 0, has been prepared by P. Melikoff and L. Pissar jewsky (Zeit.f. anorg. Chem. 1899, 20, p. 341), as a yellow amorphous powder by the action of dilute sulphuric acid on the potassium salt, which is formed when columbic acid is fused in a silver crucible with eight times its weight of caustic potash [loc. cit.). Salts of the acid HsCbOj have been described by C. W. Balke and E. F. Smith {Jour. Amer. Chem. Soc. 1908, 30, p. 1637).

Columbium trichloride, CbCl 3 , is obtained in needles or crystalline crusts, when the vapour of the pentachloride is slowly passed through a red-hot tube. When heated in a current of carbon dioxide it forms the oxychloride CbOCl 3 , and carbon monoxide. Columbium pentachloride, CbCls, is obtained in yellow needles when a mixture of the pentoxide and sugar charcoal is heated in a current of air-free chlorine. It melts at 194° C. (H. Deville) and boils at 240-5″ C. It is decomposed by water, and dissolves in hydrochloric acid. Columbium oxychloride, CbOCl 3 , is formed when carbon tetrachloride, and columbic acid are heated together at 440° C. : 3CCl4 + Cb205 = 2CbOCl 3 + 3COCl 2 ,and also by distilling the pentachloride,in a

current of carbon dioxide, over ignited columbic acid. It forms a white silky mass which volatilizes at about 400° C. It deliquesces in moist air, and is decomposed violently by water. Columbium pentafluoride, CbFs, is obtained when the pentoxide is dissolved in hydrofluoric acid. It is only known in solution; evaporation of the solution yields the pentoxide. The oxyfluoride, CbOF 3 , results when a mixture of the pentoxide and fluorspar is heated in a current of hydrochloric acid. It forms many double salts with other metallic fluorides.

Columbium oxysulphide, CbOS 3 , is obtained as a dark bronze coloured powder when the pentoxide is heated to a white heat in a current of carbon bisulphide vapour; or by gently heating the oxychloride in a current of sulphuretted hydrogen. It burns when heated in air, forming the. pentoxide and sulphur dioxide.

Columbium nitride, Cb 3 Ns (?), is formed when dry ammonia gas is passed into an ethereal solution of the chloride. A heavy white precipitate, consisting of ammonium chloride and columbium nitride, is thrown down, and the ammonium chloride is removed by washing it out with hot water, when the columbium nitride remains as an amorphous residue (Hall and Smith, loc. cit.).

Potassium fluoxy percolumbate, KjCbOjFs-HnO, is prepared by dissolving potassium columbium oxyfluoride in a 3 % solution of hydrogen peroxide. The solution turns yellow in colour, and, when saturated, deposits a pasty mass of crystals. The salt separates from solutions containing hydrofluoric acid in large plates, which are greenish yellow in colour.

The atomic weight was determined by C. Marignac {Ann. chim. et phys. 1866 (4), 8, p. 16) to be 94 from the analysis of potassium columbium oxyfluoride, and the same value has been obtained by T. W. Richards {Journ. Amer. Chem. Soc. 1898, 20, p. 543).

COLUMBUS, CHRISTOPHER [in Spanish Cristobal Colon] (c. 1446, or perhaps rather 1451, 1506) was the eldest son of Domenico Colombo and Suzanna Fontanarossa, and was born at Genoa either about 1446 or in 145 1, the exact date being un certain. His father was a wool-comber, of some small means, who lived till 1498. According to the life of Columbus by his son Ferdinand (a statement supported by Las Casas), young Christopher was sent to the university of Pavia, where he devoted himself to astronomy, geometry and cosmography. Yet, according to the admiral's own statement, he became a sailor at fourteen. Evidently this statement, however, cannot mean the abandonment of all other employment, for in 1470, 1472, and 1473

we find him engaged in trade at Genoa, following the family business of weaving, and (in 1473) residing at the neighbouring Savona. In 1474-1475 he appears to have visited Chios, where he may have resided some time, returning to Genoa perhaps early in 1476. Thence he seems to have again set out on a voyage in the summer of 1476, perhaps bound for England; on the 13th of August 1476, the four Genoese vessels he accompanied were attacked off Cape St Vincent by a privateer, one Guillaume de Casenove, surnamed Coullon or Colombo (" Columbus ") ; two of the four ships escaped, with Christopher, to Lisbon. In December 1476, the latter resumed their voyage to England, probably carrying with them Columbus, who, after a short stay in England, claims to have made a voyage in the

northern seas, and even to have visited Iceland about February 1477. This last pretension is gravely disputed, but it is perhaps not to be rejected, and we may also trace the Genoese about this time at Bristol, at Galway, and probably among the islands west and north of Scotland. Soon after this he returned to Portugal, where (probably in 1478) he married a lady of some rank, Felipa Moniz de Perestrello, daughter of Bartholomew Perestrello, a captain in the service of Prince Henry the Navigator, and one of the early colonists and first governor of Porto Santo. Felipa was also a cousin of the archbishop of Lisbon at this time (1478).

About 1479 Columbus visited Porto Santo, here as in Portugal probably employing his time in making maps and charts for a livelihood, while he pored over the logs and papers of his deceased father-in-law, and talked with old seamen of their voyages, and of the mystery of tne western seas. About this time, too, if not earlier, he seems to have arrived at the conclusion that much of the world remained undiscovered, and step by step conceived that design of reaching Asia by sailing west which was to result in the discovery of America. In 1474 he is said to ueaot have corresponded with Paolo Toscanelli, the Floren- western tine physician and cosmographer, and to have received passage from him valuable suggestions, both by map and toAsla – letter, for such a Western enterprise. (The whole of this incident has been disputed by some recent critics.) He had perhaps already begun his studies in a number of works, especially the Book of Marco Polo and the Imago Mundi of Pierre d'Ailly, by which his cosmographical and geographical conceptions were largely moulded. His views, as finally developed and presented to the courts of Portugal and Spain, were supported by three principal lines of argument, derived from natural reasons, from the theories of geographers, and from the reports and traditions of mariners. He believed the world to be a sphere; he under- estimated its size; he overestimated the size of

the Asiatic continent. And the farther that continent extended towards the east, the nearer it came towards Spain. Nor were these theories the only supports of his idea. Martin Vicente, a Portu- guese pilot, was said to have found, 400 leagues to the westward of Cape St Vincent, and after a westerly gale of many days' duration, a piece of strange wood, wrought, but not with iron; Pedro Correa, Columbus's own brother-in-law, was said to have seen another such waif at Porto Santo, with great canes capable of holding four quarts of wine between joint and joint, and to have heard of two men being washed up at Flores " very broad- faced, and differing in aspect from Christians." West of Europe, now and then, men fancied there hove in sight the mysterious islands of St Brandan, of Brazil, of Antillia or of the Seven Cities. In his northern journey, too, some vague and formless traditions may have reached the explorer's ear of the voyages of Leif Ericson and Thorfinn Karlsefne, and of the coasts of Markland and Vinland. All were hints and rumours to bid the bold mariner sail towards the setting sun, and this he at length determined to do.

The concurrence of some state or sovereign, however, was necessary for the success of this design. Columbus, on the accession of John II. of Portugal, seems to have entered the service of this country, to have accom- apatnm. panied Diego d'Azambuja to the Gold Coast, and to have taken part in the construction of the famous fort of St George at El Mina (1481-1482). On his return from this ex- pedition, he submitted to King John the scheme he had now matured for reaching Asia by a western route across the ocean. The king was deeply interested in the rival scheme (of an eastern or south-eastern route round Africa to India) which had so long held the field, which had been initiated by the Genoese in 1291, and which had been revived, for Portugal, by Prince Henry the Navigator; but he listened to the Genoese, and referred him to a committee of council for geographical affairs. The council's report was adverse; but the king, who was yet inclined to favour the theory of Columbus, assented to the suggestion of the bishop of Ceuta that the plan should be carried out in secret and without its author's knowledge. A caravel was despatched; but it returned after a brief absence, the sailors

having lost heart, and refused to venture farther. Upon dis- covering this treachery, Columbus left Lisbon for Spain (1484), taking with him his son Diego, the only issue of his marriage with Felipa Moniz, who was by this time dead. He departed secretly; — according to some

writers, to give the slip to King John; according to others, to escape his creditors.

Columbus next betook himself to the south of Spain, and while meditating an appeal to the king of France, opened his plans to the count (from 1491, duke) of Medina Celi. The latter gave him great encouragement, entertained him for two years, and even determined to furnish him with three or four caravels, to carry out his great design. Finally, however, being deterred by the consideration that the enterprise was too vast for a subject, he turned his guest fr^m the determination he had come to of making application at the court of France, by writing on his behalf to Queen Isabella; and Columbus repaired to the court at Cordova at her bidding (i486).

It was an ill moment for the navigator's fortune. Castile and Leon were in the thick of that struggle which resulted in the final conquest of the Granada Moors; and neither Ferdinand nor Isabella had time as yet to give due consideration to Colum- bus' proposals. The adventurer was indeed kindly received; he was handed over to the care of Alonso de Quintanilla, whom he speedily converted into an enthusiastic supporter of his theory. He made many other friends, and among them Beatriz Enriquez, the mother of his second son Fernando. But the committee, presided over by the queen's confessor, Fray Her- nando de Talavera, which had been appointed to consider the new project, reported that it was vain and impracticable.

From Cordova Columbus followed the court to Salamanca, having already been introduced by Quintanilla to the notice of the grand cardinal, Pedro Gonzalez de Mendoza, " the third king of Spain "; the latter had befriended and supported the Genoese, and apparently arranged the first interview between him and Queen Isabella. At Salamanca prolonged discussions took place upon the questions now raised; the Dominicans of San Esteban entertained Columbus during the conferences (1486-1487). In 1487 Columbus, who had been following the court from place to place (billeted in towns as an officer of the sovereigns, and gratified from time to time with sums of money towards his expenses), was present at the siege of Malaga. In 1488 he was invited by the king of Portugal, his " especial friend," to return to that country, and was assured of protection against arrest or proceedings of any kind (March 20): he had probably made fresh overtures to King John shortly before; and in the autumn of 1488 we find him in Lisbon, conferring with his brother Bartholomew and laying plans for the future. We have no record of the final negotiations of Columbus with the Portuguese government, but they clearly did not issue in anything definite, for Christopher now returned to Spain

(though not till he had witnessed the return of Bartholomew Diaz from the discovery of the Cape of Good Hope and his reception by King John), while Bartholomew proceeded to England with a mission to interest King Henry VII. in the Columbian schemes. If the London enterprise was unsuccessful (as indeed it proved) , it was settled that Bartholomew should carry the same invitation to the French court. He did so; and here he remained till summoned to Spain in 1493. Meantime Christopher, unable throughout 1490 to get a hearing at the Spanish court, was in 1 49 1 again referred to & junta, presided over by Cardinal Mendoza ; but this junta, to Colurnbus' dismay, once more rejected his proposals; the Spanish sovereigns merely promised him that when the Granada war was over, they would reconsider what he had laid before them.

Columbus was now in despair. He at once betook himself to Huelva, a little maritime town in Andalusia, north-west of Cadiz, with the intention of taking ship for France. He halted, however, at the monastery of La Rabida, near Huelva, and still nearer Palos, where he seems to have made lasting friend- ships on his first arrival in Spain in January 1485, where he especially enlisted the support of Juan Perez, the guardian, who invited him to take up his quarters in the monastery, and

introduced him to Garcia Fernandez, a physician and student of geography. Juan Perez had been the queen's confessor; he now wrote to her in urgent terms, and was summoned to her presence; and money was sent to Columbus to bring him once more to court. He reached Granada in time to witness the surrender of the city (January 2, 1492), and negotiations were resumed. Columbus believed in his mission, and stood out for high terms; he asked for the rank of admiral at once (" Admiral of the Ocean " in all those islands, seas, and continents that he might discover), the vice-royalty of all he should discover, and a tenth of the precious metals discovered within his admiralty. These conditions were rejected, and the negotiations were again interrupted. An interview with Mendoza appears to have followed; but nothing came of it, and before the close of January 1492, Columbus actually set out for France. At length, however, on the entreaty of the Queen's confidante, the Marquesa de Moya, of Luis de Santangel, receiver of the ecclesiastical revenues of the crown of Aragon, and of other courtiers, Isabella was induced to determine on the expedition. A messenger was sent after Columbus, and overtook him near a bridge called " Pinos," 6 m. from Granada. He returned to the camp at Santa F6, and on the 17th of April 1492, the agreement between him and their Catholic majesties was signed and sealed.

As his aims included not only the discovery of Cipangu or Japan, but also the opening up of intercourse with the grand khan of Cathay, he received a royal letter of introduction to the latter. The town of Palos was ordered to find him two ships, and these were soon placed at his disposal. But no crews could be got together, in spite of the indemnity offered to criminals and ” broken men ” who would serve on the expedition; and had not Juan Perez succeeded in interesting in the cause the Palos ” magnates ” Martin Alonso Pinzon and Vicente Yanez Pinzon, Columbus’ departure had been long delayed. At last, however, men, ships and stores were ready. The expedition consisted of the ” Santa Maria,” a decked ship of 100 tons with a crew of 52 men, commanded by the admiral in person; and of two caravels; the ” Pinta ” of 50 tons, with 18 men, under Martin Pinzon; and the ” Nina,” of 40 tons, with 18 men, under his brother Vicente Yanez, afterwards (1499) the nrst to cross the line in the American Atlantic.

The adventurers numbered 88- souls; and on Friday, the 3rd of August 1492, at eight in the morning, the little fleet weighed anchor, and stood for the Canary Islands. An abstract of the admiral’s diary made by Las Casas is yet extant; and from it many particulars may be gleaned concerning this first voyage. Three days after the ships had set sail the ” Pinta ” lost her rudder; the admiral was in some alarm, but comforted himself with the reflection that Martin Pinzon was energetic and ready-witted; they had, however, to put in at Teneriffe, to refit the caravel. On the 6th of September they weighed anchor once more with all haste, Columbus having been informed that three Portuguese caravels were on the look-out to intercept him. On the 13th of September the westerly variations of the magnetic needle were for the first time observed; on the 15th a meteor fell into the sea at four or five leagues distance; soon after they arrived at those vast plains of seaweed called the Sargasso Sea; while all the time, writes the admiral, they had most temperate breezes, the sweet- ness of the mornings being especially delightful, the weather like an Andalusian April, and only the song of the nightingale wanting. On the 17th the men began to murmur; they were frightened by the strange phenomena of the variation of the compass, but the explanation Columbus gave restored their tranquillity. On the 18th they saw many birds, and a great ridge of low-lying cloud; and they expected to see land. On the 20th they saw boobies and other birds, and were sure the land must be near. In this, however, they were disappointed; and thenceforth Columbus, who was keeping all the while a double reckoning, one for the crew and one for himself, had great difficulty in restraining the evil-disposed from the excesses they meditated. On the 25th Martin Alonso Pinzon raised the cry of land, but it proved false,

as did the rumour to the same

First voyage.

effect on the 7th of October, from the “Nina.” But on the nth the ” Pinta ” fished up a cane, a pole, a stick which appeared to have been wrought with iron, and a board, while the ” Nina ” sighted a branch covered with berries; ” and with these signs all of them breathed and were glad.” At ten o’clock on that night Columbus himself perceived and pointed out discovered. a u S nt anea< i, and at two in the morning of Friday, the 12th of October 1492, Rodrigo de Triana, a sailor aboard the " Nina," announced the appearance of what proved to be the New World. The land sighted was an island, called by the Indians Guanahani, and named by Columbus San Salvador. It is generally identified with Watling Island.

The same morning Columbus landed, richly clad, and bearing the royal banner of Spain. He was accompanied by the brothers Pinzon, bearing banners of the Green Cross (a device of the admiral’s), and by great part of the crew. When they all had ” given thanks to God, kneeling upon the shore, and kissed the ground with tears of joy, for the great mercy received,” the admiral named the island, and took solemn possession of it for their Catholic majesties of Castile and Leon. At the same time such of the crews as had shown themselves doubtful and mutinous sought his pardon weeping, and prostrated themselves at his feet.

Into the remaining detail of this voyage, of highest interest as it is, it is impossible to go further. It will be enough to say that it resulted in the discovery of the islands of Santa Maria de la Concepcion (Rum Cay), Fernandina (Long Island), Isabella (Crooked Island), Cuba or Juana (named by Columbus in honour of the young prince of Spain), and Hispaniola, Haiti, or San Domingo. Off the last of these the ” Santa Maria ” went aground, owing to the carelessness of the steersman. No lives were lost, but the ship had to be unloaded and abandoned; and Columbus, v.‘ho was anxious to return to Europe with the news of his achievement, resolved to plant a colony on the island, to build a fort out of the material of the stranded hulk, and to leave the crew. The fort was called La Navidad; 44 Europeans were placed in charge. On the 4th of January 1493 Columbus, who had lost sight of Martin Pinzon, set sail alone in the ” Nina ” for the east; and two

days afterwards the ” Pinta ” joined her sister-ship. A storm, however, separated the vessels, and it was not until the 18th of February that Columbus reached the island of Santa Maria in the Azores. Here he was threatened with capture by the Portuguese governor, who could not for some time be brought to recognize his commission. On the 24th of February, however, he was allowed to proceed, and on the 4th of March the ” Nina ” dropped anchor off Lisbon. The king of Portugal received the admiral with the highest honours. On the 13th of March the ” Nina ” put out from the Tagus, and two days afterwards, Friday, the 15th of March, she reached Palos.

The court was at Barcelona; and thither, after despatching a letter announcing his arrival, Columbus proceeded in person. He entered the city in a sort of triumphal procession, was received by their majesties in full court, and, seated in their presence, related the story of his wanderings, exhibiting the ” rich and strange ” spoils of the new-found lands, — the gold, the cotton, the parrots, the curious arms, the mysterious plants, the un- known birds and beasts, and the Indians he had brought with him for baptism. All his honours and privileges were confirmed to him; the title of Don was conferred on himself and his brothers; he rode at the king’s bridle; he was served and saluted as a grandee of Spain. A new and magnificent scutcheon was also blazoned for him (4th May 1493), whereon the royal castle and lion of Castile and Leon were combined with the five anchors of his own coat of arms. Nor were their Catholic highnesses less busy on their own account than on that of their servant. On the 3rd and 4th of May Alexander VI. granted bulls confirm- ing to the crowns of Castile and Leon all the lands discovered, or to be discovered, west of a line of demarcation drawn 100 leagues west of the Azores, on the same terms as those on which the Portuguese held their colonies along the African coast. A new expedition was got in readiness with all possible despatch, to secure and extend the discoveries already made.

Second voyage.

After several delays the fleet weighed anchor on the 24th of September 1493 and steered westwards. It consisted of three great carracks (galleons) and fourteen caravels (light frigates), having on board over 1500 men, besides the animals and materials necessary for colonization. Twelve missionaries accompanied the expedition, under the orders of Bernardo Buil or Boil, a Benedictine; Columbus had been already directed (29th May 1493) to endeavour by all means in his power to Christianize the inhabitants of the islands, to make them presents, and to “honour them much”, while all under him were commanded to treat them ” well and lovingly,” under pain of severe

punishment. On the 13th of October the ships, which had put in at the Canaries, left Ferro; and on Sunday, the 3rd of November, after a single storm, ” by the goodness of God and the wise management of the admiral ” an island was sighted to the west, which was named Dominica. Northwards from this the isles of Marigalante and Guadalupe were next discovered and named; while on the north-western course to La Navidad those of Montserrat, Antigua, San Martin, Santa Cruz and the Virgin Islands were sighted, and the island now called Porto Rico was touched at, hurriedly explored, and named San Juan Bautista. On the 22nd of November Columbus came in sight of Hispaniola, and sailing westward to La Navidad, found the fort burned and the colony dispersed. He decided on building a second fort, and coasting on 30 m. east of Monte Cristi, he pitched on a spot where he founded the city of Isabella.

The climate proved unhealthy; the colonists were greedy of gold, impatient of control, proud, ignorant and mutinous; and Columbus, whose inclination drew him westward, was doubtless glad to escape the worry and anxiety of his post, and to avail himself of the instructions of his sovereigns as to further dis- coveries. On the 2nd of February 1494 he sent home, by Antonio de Torres, that despatch to their Catholic highnesses by which he may be said to have founded the West Indian slave trade. He established the mining camp of San Tomaso in the gold country of Central Hispaniola; and on the 24th of April 1494, having nominated a council of regency under his brother Diego, and appointed Pedro Margarit his captain-general, he again put to sea. After following the southern shore of Cuba for some days, he steered southwards, and discovered (May 14th) the island of Jamaica, which he named Santiago. He then resumed his exploration of the Cuban coast, threaded his way through a labyrinth of islets which he named the Garden of the Queen (Jardin de la Reyna), and, after coasting westwards for many days, became convinced that he had discovered continental land. He therefore caused Perez de Luna, the notary, to draw up a document to this effect (12th of June 1494), which was afterwards taken round and signed (the admiral’s steward witnessing) by the officers, men and boys of his three caravels, the ” Nina,” the ” Cordera,” and the ” San Juan.” He then stood to the south-east, and sighted the island of Evangelista (now Isla de los Pinos), revisited Jamaica, coasted the south of Hispaniola, and on the 24th of September touched at and named the island of La Mona, in the channel between Hispaniola and Porto Rico. Thence he had intended to sail eastwards and complete the survey of the Caribbean Archipelago; but he was exhausted by the terrible tear and wear of mind and body he had undergone (he says himself that on this

expedition he was three-and-thirty days almost without sleep), and on the day following his departure from La Mona he fell into a lethargy, that deprived him of sense and memory, and had well-nigh proved fatal to life. At last, on the 29th of September, the little fleet dropped anchor off Isabella, and in his new city the admiral lay sick for five months.

The colony was in a sad plight. Every one was discontented, and many were sick, for the climate was unhealthy and there was nothing to eat. Margarit and Boil had deserted the settle- ment and fled to Spain, but ere his departure the former, in his capacity of captain-general, had done much to outrage and alienate the Indians. The strongest measures were necessary to undo this mischief, and, backed by his brother Bartholomew, Columbus proceeded to reduce the natives under Spanish sway.

Alonso de Ojeda succeeded by a brilliant coup de main in captur- ing the cacique Caonabo, and the rest submitted. Five ship-loads of Indians were sent off to Seville (24th June 1495) to be sold as slaves; and a tribute was imposed upon their fellows, which must be looked upon as the origin of that system of reparti- mientos or encomiendas which was afterwards to work such mischief among the conquered. In October 1495 Juan Aguado arrived at Isabella, with a royal commission to report on the state of the colony; here he took up the position of a judge of Columbus's government; and much recrimination followed. Columbus decided to return home; he appointed his brother Bartholomew adelantado of the island; and on the 10th of March 1496 he quitted Hispaniola in the " Nina." The vessel, after a protracted and perilous voyage, reached Cadiz on the nth of June 1496, where the admiral landed, wearing the habit of a Franciscan. He was cordially received by his sovereigns, and a new fleet of eight vessels was put at his disposal. By royal patent, moreover, a tract cf land in Hispaniola, of 50 leagues by 20, was offered to him, with the title of duke or marquis (which he declined); for three years he was to receive an eighth of the gross and a tenth of the net profits on each voyage; the right of creating a mayorazgo or perpetual entail of titles and estates was granted him; and his two sons were received into Isabella's service as pages.

Meanwhile, however, the preparing of the .fleet proceeded slowly, and it was not till the 30th of May 1498 that he set

sail with his main fleet of six ships — two caravels had voyage. already been sent on ahead. From San Lucar he

steered for Porto Santo, Madeira, and Gomera, despatching three vessels direct from the Canaries to Hispaniola. He next proceeded to the Cape Verde Islands, which he quitted on the 5th of July. On the 31st of the same month, being greatly in need of water, and fearing that no land lay westwards as he had hoped, Columbus had turned his ship's head north, when Alonzo Perez of Huelva saw land about 1 5 leagues to the south-west. It was crowned with three hill-tops, from which circumstance, and in fulfilment of a vow made at starting (to name the first land discovered on this voyage in honour of the Trinity), the admiral named it Trinidad, which, name it yet bears. On Wednesday, the 1st of August, he beheld for the first time the mainland of South America, the continent he had sought so long. It seemed to him but an insignificant island, and he called it Isla Santa.

Sailing westwards, next day he saw the Gulf of Paria (named by him the Golfo de la Ballena), into which he was borne at immense risk on the ridge of waters formed by the meeting of the sea and the Orinoco estuaries. For several days he coasted the continent, esteeming as islands the various projections he saw, and naming them accordingly, nor was it until he had realized the volume poured out by the Orinoco that he began to perceive the truly continental character of his last discovery. He was now anxious to revisit the colony in Hispaniola; and after sighting Tobago, Grenada, and Mar- garita, made for San Domingo, the new capital of the settlement, where he arrived on the 31st of August. He found that affairs had not prospered well in his absence. By the vigour and activity of the adelantado, the whole island had been reduced under Spanish sway; but under the leadership of Francisco Roldan the malcontent settlers had risen in revolt, and Columbus had to compromise matters in order to restore peace. Roldan retained his office of chief justice; and such of his followers as chose to remain in the island were gratified with repartimientos of land and labour.

At home, however, court favour had turned against Columbus. For one thing, the ex-colonists were often bitterly hostile to the admiral and his brothers. They were wont to parade their grievances in the very court-yards of the Alhambra, to surround the king when he came forth with complaints and reclamations, to insult the discoverer's young sons with shouts and jeers. Again, the queen began to criticize severely the shipment of Indians from the new-found lands to Spain. And once more, there was no doubt that the colony itself, whatever the cause, had not prospered so well as might have been desired. Fer-

dinand's support of Columbus had never been very hearty, and his inclination to supersede the Genoese now prevailed over the queen's friendliness. Accordingly, on the 21st of May 1499, Francisco Bobadilla was appointed governor and judge of Hispaniola during royal pleasure, with authority to examine into all complaints. Columbus was ordered to deliver up his charge to Bobadilla, and to accept whatever the latter should deliver him from the sovereigns. Bobadilla left Spain in June 1500, and landed in Hispaniola on the 23rd of August.

Columbus, meanwhile, had restored such tranquillity as was possible in his government. With Roldan's help he had beaten off an attempt on the island of the adventurer Ojeda, his old lieutenant; the Indians were being collected into villages and Christianized. Gold-mining was profitably pursued; in three years, he calculated, the royal revenues might be raised to an average of 60,000,000 reals. The arrival of

Bobadilla, however, speedily changed this state of affairs. On landing, he took possession of the admiral's house and summoned him and his brothers before him. Accusations of severity, of injustice, of venality even, were poured down on their heads, and Columbus anticipated nothing less than a shameful death. Bobadilla put all three in irons, and shipped them off to Spain.

Alonso Vallejo, captain of the caravel in which the illustrious prisoners sailed, still retained a proper sense of the honour and respect due to Columbus, and would have removed the fetters; but to this Columbus would not consent. He would wear them, he said, until their highnesses, by whose order they had been affixed, should order their removal; and he would keep them afterwards " as relics and as memorials of the reward of his service." He did so. His son Fernando " saw them always hanging in his cabinet, and he requested that when he died they might be buried with him." Whether this last wish was complied with is not known.

A heart-broken and indignant letter from Columbus to Dona Juana de Torres, formerly nurse of the infante Don Juan, arrived at court before the despatch of Bobadilla. It was read to the queen, and its tidings were confirmed by communications from Alonso Vallejo and the alcaide of Cadiz. There was a great movement of indignation; the tide of popular and royal feeling turned once more in the admiral's favour. He received a large sum to defray his expenses; and when he appeared at court, on the 17th of December 1500, he was no longer in irons and disgrace, but richly apparelled and surrounded with friends. He was received with all honour and distinction. The queen is said to have been moved to tears by the narration of his story. Their majesties not only repudiated Bobadilla's proceedings, but declined to inquire into the charges that he at the same time brought against his prisoners, and promised Columbus com- pensation for his losses and satisfaction for his wrongs. A new governor, Nicolas de Ovando, was appointed, and left San Lucar on the 13th of February 1502, with a fleet of thirty ships, to supersede Bobadilla. The latter was to be impeached and sent home; the admiral's property was to be restored; and a fresh start was to be made in the conduct of colonial affairs. Thus ended Columbus's history as viceroy and governor of the new Indies which he had presented to the country of his adoption.

His hour of rest, however, was not yet come. Ever anxious to serve their Catholic highnesses, " and particularly the queen," he had determined to find a strait through which he might penetrate westwards into Portuguese Asia. After the usual inevitable delays his prayers were granted, and on the 9th of May 1502, with four caravels

and 1 50 men, he weighed anchor from Cadiz, and sailed on his fourth and last great voyage. He first betook himself to the relief of the Portuguese fort of Arzilla, which had been besieged by the Moors, but the siege had been raised before he arrived. He put to sea westwards once more, and on the 1 5th of June discovered the island of Martinino (probably St Lucia). He had received positive instructions from his sovereigns on no account to touch at Hispaniola; but his largest caravel was greatly in need of repairs, and he had no choice but to abandon her or disobey orders. He preferred the latter alternative, and sent a boat

Fourth voyage.

ashore to Ovando, asking for a new ship and for permission to enter the harbour to weather a hurricane which he saw was coming on. But his requests were refused, and he coasted the island, casting anchor under lee of the land. Here he weathered the storm, which drove the other caravels out to sea, and anni- hilated the homeward-bound fleet, the richest that had till then been sent from Hispaniola. Roldan and Bobadiila perished with others of the admiral's enemies; and Fernando Columbus, who accompanied his father on this voyage, wrote long afterwards, " I am satisfied it was the hand of God, for had they arrived in Spain they had never been punished as theii crimes deserved, but rather been favoured and preferred."

After recruiting his flotilla at Azua, Columbus put in at Jaquimo and refitted his four vessels; and on the 14th of July 1502 he steered for Jamaica. For several days the ships wandered painfully among the keys and shoals he had named the Garden of the Queen, and only an opportune easterly wind prevented the crews from open mutiny. The first land sighted (July 30th) was the islet of Guanaja, about 40 m. east of the coast of Honduras. Here he got news from an old Indian of a rich and vast country lying to the eastward, which he at once concluded must be the long-sought-for empire of the grand khan. Steering along the coast of Honduras, great hardships were endured, but nothing approaching his ideal was discovered. On the 1 2th of September Cape Gracias-a-Dios was rounded. The men had become clamorous and insubordinate; not until the 5th of December, however, would he tack about and retrace his course. It now became his intention to plant a colony on the river Veragua, which was afterwards to give his descendants a title of nobility; but he had

hardly put about when he was caught in a storm, which lasted eight days, wrenched and strained his crazy, worm-eaten ships severely, and finally, on Epiphany Sunday 1503, blew him into an embouchure which he named Belem or Bethlehem. Gold was very plentiful in this place, and here he determined to found his settlement. By the end of March 1503 a number of huts had been run up, and in these the adelantado (Bartholomew Columbus), with 80 men, was to remain, while Christopher returned to Spain for men and supplies. Quarrels, however, arose with the natives; the cacique was made prisoner, but escaped again; and before Columbus could leave the coast he had to abandon a caravel, to take the settlers on board, and to relinquish the enterprise of colonization. Steering eastwards, he left a second caravel at Puerto Bello; he thence bore northwards for Cuba, where he obtained supplies from the natives. From Cuba he bore up for Jamaica, and there, in the harbour of San Gloria, now St Ann's Bay, he ran his ships aground in a small inlet still called Don Christopher's Cove (June 23rd, 1503).

The expedition was received with great kindness by the natives, and here Columbus remained upwards of a year, awaiting the return of his lieutenant Diego Mendez, whom he had despatched to Ovando for assistance. During his critical sojourn here, the admiral suffered much from disease and from the lawlessness of his followers, whose misconduct had alienated the natives, and provoked them to withhold their accustomed supplies, until he dexterously worked upon their superstitions by prognosticating an eclipse. Two vessels having at last arrived for his relief, Columbus left Jamaica on the 28th of June 1504, and, after calling at Hispaniola, set sail for Spain on the 12th of September. After a tempestuous voyage he landed once more at San Lucar on the 7th of November 1504.

As he was too ill to go to court, his son Diego was sent thither in his place, to look after his interests and transact his business. Letter after letter followed the young man from Seville — one by the hands of Amerigo Vespucci. A licence to ride on mule- back was granted him on the 23rd of February 1505; and in the following May he was removed to the court at Segovia, and thence again to Valladolid. On the landing of Philip and Juana at Coruna (25th of April 1506), although " much oppressed with the gout and troubled to see himself put by his rights," he is known to have sent off the adelantado to pay them his duty and to assure them that he was yet able to do them extraordinary

service. The last documentary note of him is contained in a final codicil to the will of 1498, made at Valladolid on the 19th of May

1506. By this the old will is confirmed; the mayorazgo is bequeathed to his son Diego and his heirs male, failing these to Fernando, his second son, and failing these to the heirs male of Bartholomew; only in case of the extinction of the male line, direct or collateral, is it to descend to the females of the family; and those into whose hands it may fall are never to diminish it, but always to increase and ennoble it by all means possible. The head of the house is to sign himself " The Admiral." A tenth of the annual income is to be set aside yearly for distribution among the poor relations of the house. A chapel is founded and endowed for the saying of masses. Beatriz Enriquez is left to the care of the young admiral. Among other legacies is one of " half a mark of silver to a Jew who used to live at the gate of the Jewry, in Lisbon." The codicil was written and signed with the admiral's own hand. Next day (20th oLMay 1506) he died. After the funeral ceremonies at Valladolid, Columbus's remains were transferred to the Carthusian monastery of Santa Maria de las Cuevas, Seville, where the bones of his son Diego, the second admiral, were also laid. Exhumed in 1542, the bodies of both father and son were taken over sea to Hispaniola and interred in the cathedral of San Domingo. In 1 795-1 796, on the cession of that island to the French, the relics were re-exhumed and transferred to the cathedral of Havana, whence, after the Spanish- American War of 1898 and the loss of Cuba, they were finally removed to Seville cathedral, where they remain. The present heir and representative of Columbus belongs to the Larreategui family, descendants of the discoverer through the female line, and retains the titles of admiral and duke of Veragua,

s

Xpof£RENS

Columbus Cipher.

The interpretation of the seven-lettered cipher, accepting the smaller letters of the second line as the final ones of the words, seems to be Salve Christus, Maria, Yosephus. The name Christopher (Christoferens) appears in the last line.

In person Columbus was tall and shapely. The only authentic portrait of him is that which once belonged to Paulus Jovius, and is still in the possession of the de Orchi family (related to Jovius by female descent) at Como. It shows us a venerable man with clean-shaven face, thin grey hair, high forehead, sad thoughtful eyes. It bears the inscription Columbus Lygur. novi orbis reperlor.

Authorities. — Fernando Columbus, Historie del Signor Don Fernando Colombo . . . e vera relatione della vita . . . dell' Am- miraglio D. Chrisloforo Colombo (the Spanish original of this, written before 1539, is lost; only the Italian version remains, first published at Venice in 1571; a good edition appeared in London in 1867); Bartolome' de las Casas, Historia de las Indias, written 1527-1561, but first printed at Madrid in 1875, after remaining in manuscript more than three centuries ; Andres Bernandez, Historia de los Reyes Catolicos (contemporary with Fernando Columbus'sHistorie, but first printed at Granada in 1856; best edition, Seville, 1870); Gonzalo Fernandez Oviedo y Valdes, Historia general de las Indias (Seville, 1535; best edition, Madrid, 1 851-1855); Peter Martyr d'Anghiera, Opus Epistolarum, first published in 1530, and De Orbe Novo (De- cades), printed in 151 1 and 1530; Francisco Lopez de Gomara, Historia general de las Indias (Saragossa, 1552-1553, and Antwerp, !554) ; Antonio de Herrera, Historia general de las Indias occidentales (publication first completed in 1615, but best edition perhaps that of 1730, Madrid); Juan Bautista Mufioz, Historia del Nuevo Mundo (Madrid, 1793); Martin Fernandez Navarrete, Coleccion de los Viages y descubrimientos que hicieron por mar los Espanoles (Madrid, 1825-1837); Washington Irving, History of the Life and Voyages of Christopher Columbus (London, 1827-1828); Alex, von Humboldt, Examen critique (Paris, 1836-1839); R. H. Major, Select Letters of

Columbus (London, Hakluyt Society, 1847) ; Fernandez Duro, Colon y Pinzon (Madrid, 1883) ; Henry Harrisse, Christophe Colomb (Paris, 1884), and Christophe Colomb devant I' histoire (Paris, 1892); Justin Winsor, Christopher Columbus (Cambridge, Mass., 1891); Jose Maria Asensio, Cristoval Colon (Barcelona, 1892); Clements R. Markham, Life of Christopher Columbus (London, 1892); John Fiske, Discovery of America (Boston and New York, 1892); E. J. Payne, History of the New World called America, vol. i. (Oxford, 1892) ; Paul Gaffarel, Histoire de la decouverte de I'Amerique (Paris, 1892); Charles I. Elton, Career of Columbus (London, 1892); Raccolta Colombiana (1892, &c.) ; Sophus Ruge, Columbus (Berlin, 1902) ; John Boyd Thatcher, Christopher Columbus (New York, 1903-1904) ; Henry Vignaud, La Lettre et la carte de Toscanelli (Paris, 1901), and £tudes critiques sur la vie de Colomb avant ses decouverles (Paris, 1905) ; Filson Young, Christopher Columbus and the New World of his discovery (London, 1906). (C. R. B.)

COLUMBUS, a city and the county-seat of Muscogee county, Georgia, U.S.A., on the E. bank and at the head of navigation of the Chattahoochee river, about 100 m. S.S.W. of Atlanta. Pop. (1890) 17,303; (1900) 17,614, of whom 7267 were negroes; (1910, census) 20,554. There is also a considerable suburban population. Columbus is served by the Southern, the Central of Georgia, and the Seaboard Air Line railways, and three steam- boat lines afford communication with Apalachicola, Florida. The city has a public library. A fall in ‘ the river of 115 ft. within a mile of the city furnishes a valuable water-power, which has been utilized for public and private enterprises. The most important industry is the manufacture of cotton goods; there are also cotton compresses, iron works, flour and woollen mills, wood-working establishments, &c. The value of the city’s factory products increased from $5,061,485 in 1900 to $7,079,702 in 1905, or 39-9%; of the total value in 1905, $2,759,081, or 39%; was the value of the cotton goods manufactured. There are many large factories just outside the city limits. Columbus was one of the first cities in the United States to maintain, at public expense, a system of trade schools. It has a large whole- sale and retail trade. The city was founded in 1827 and was incorporated in 1828. In the latter year Mirabeau Buonaparte Lamar (1 798-1 859) established here the Columbus Independent, a State’s-Rights newspaper. For the first twenty years the city’s leading industry was trade in cotton. As this trade was diverted by the railways to Savannah, the water-power was developed and manufactories were established. During the Civil War the city ranked next to Richmond in the manufacture of supplies for the Confederate army. On the 16th of April 1865 it was captured by a Union force under General James Harrison Wilson (b. 1837); 1200 Confederates were taken prisoners; large quantities of arms and stores were seized, and the principal manufactories and much other property were destroyed.

COLUMBUS, a city and the county-seat of Bartholomew county, Indiana, U.S.A., situated on the E. fork of White river, a little S. of the centre of the state. Pop. (1890) 6719; (1900) 8130, of whom 313 were foreign-born and 224 were of negro descent (1910 census) 8813. In 1900 the centre of popula- tion of the United States was 5 m. S.E. of Columbus. The city is served by the Cleveland, Cincinnati, Chicago & St Louis, and the Pittsburg, Cincinnati, Chicago & St Louis railways, and is connected with Indianapolis and with Louisville, Ky., by an electric interurban line. Columbus is situated in a fine farming region, and has extensive tanneries, threshing- machine and traction and automobile engine works, structural iron works, tool and machine shops, canneries and furniture factories. In 1905 the value of the city’s

factory product was $2,983,160, being 28-4% more than in 1900. The water-supply system and electric-lighting plant are owned and operated by the city.

COLUMBUS, a city and the county-seat of Lowndes county, Mississippi, U.S.A., on the E. bank of the Tombigbee river, at the head of steam navigation, 1 50. m. S. E. of Memphis, Tennessee. Pop. (1890) 4559; (1900) 6484 (3366 negroes); (1910) 8988. It is served by the Mobile & Ohio and the Southern railways, and by passenger and freight steamboat lines. It has cotton and knitting mills, cotton-seed oil factories, machine shops, and wagon, stove, plough and fertilizer factories; and is a market

and jobbing centre for a fertile agricultural region. It has a public library, and is the seat of the Mississippi Industrial Institute and College (1885) for women, the first state college for women — the successor of the Columbus Female Institute (1848) — of Franklin Academy (1821), and of the Union Academy (1873) for negroes. The site was first settled about 1818; the city was incorporated in 1821, and in 1830 it became the county-seat of the newly formed Lowndes county. During the Civil War the legislature met here in 1863 and 1865, and in the former year Governor Charles Clark (1810-1877) was inaugurated here.

COLUMBUS, a city, a port of entry, the capital of Ohio, U.S.A., and the county-seat of Franklin county, at the confluence of the Scioto and Olentangy rivers, near the geographical centre of the state, 120 m. N.E. of Cincinnati, and 138 m. S.S.W. of Cleveland. Pop. (1890) 88,150; (1900) 125,560, of whom 12,328 were foreign-born and 8201 were negroes; (1910) 181,511. Colum- bus is an important railway centre and is served by the Cleveland, Cincinnati, Chicago & St. Louis, the Pittsburg, Cincinnati, Chicago & St Louis (Pennsylvania system), the Baltimore & Ohio, the Ohio Central, the Norfolk & Western, the Hocking Valley, and the Cleveland, Akron & Columbus (Penn- sylvania system) railways, and by nine interurban electric lines. It occupies a land area of about 17 sq. m., the principal portion being along the east side of the Scioto in the midst of an extensive plain. High Street, the principal business thoroughfare, is 100 ft. wide, and Broad Street, on which are many of the finest residences, is 1 20 ft. wide, has four rows of trees, a roadway for heavy vehicles in the middle, and a driveway for carriages on either side.

The principal building is the state capitol (completed in 1857) in a square of ten acres at the intersection of High and Broad streets. It is built in the simple Doric style, of grey limestone taken from a quarry

owned by the state, near the city; is 304 ft. long and 184 ft. wide, and has a rotunda 158 ft. high, on the walls of which are the original painting, by William Henry Powell (1823-1879), of O. H. Perry's victory on Lake Erie, and portraits of most of the governors of Ohio. Other prominent structures are the U.S. government and the judiciary buildings, the latter connected with the capitol by a stone terrace, the city hall, the county court house, the union station, the board of trade, the soldiers' memorial hall (with a seating capacity of about 4500), and several office buildings. The city is a favourite meeting-place for conventions. Among the state institutions in Columbus are the university (see below), the penitentiary, a state hospital for the insane, the state school for the blind, and the state institutions for the education of the deaf and dumb and for feeble-minded youth. In the capitol grounds are monu- ments to the memory of Ulysses S. Grant, Rutherford B. Hayes, James A. Garfield, William T. Sherman, Philip H. Sheridan, Salmon P. Chase, and Edwin M. Stanton, and a beautiful memorial arch (with sculpture by H. A. M'Neil) to William McKinley.

The city has several parks, including the Franklin of 90 acres, the Goodale of 44 acres, and the Schiller of 24 acres, besides the Olentangy, a well-equipped amusement resort on the banks of the river from which it is named, the Indianola, another amusement resort, and the United States military post and recruiting station, which occupies 80 acres laid out like a park. The state fair grounds of 115 acres adjoin the city, and there is also a beautiful cemetery of 220 acres.

The Ohio State University (non-sectarian and co-educational), opened as the Ohio Agricultural and Mechanical College in 1873, and reorganized under its present name in 1878, is 3 m. north of the capitol. It includes colleges of arts, philosophy and science, of education (for teachers), of engineering, of law, of pharmacy, of agriculture and domestic science, and of veterinary medicine. It occupies a campus of no acres, has an adjoining farm of 325 acres, and 18 buildings devoted to instruction, 2 dormitories, and a library containing (1906) 67,709 volumes, besides excellent museums of geology, zoology, botany and archaeology ant} history, the last being owned jointly by the university and fan

the state archaeological and historical society. In 1908 the faculty numbered 175, and the students 2277. The institution owed its origin

to federal land grants; it is maintained by the state, the United States, and by small fees paid by the students; tuition is free in all colleges except the college of law. The government of the university is vested in a board of trustees appointed by the governor of the state for a term of seven years. The first president of the institution (from 1873 to 1881) was the distinguished geologist, Edward Orton (1 829-1 899), who was professor of geology from 1873 to 1899.

Other institutions of learning are the Capital University and Evangelical Lutheran Theological Seminary (Theological Semi- nary opened in 1830; college opened as an academy in 1850), with buildings just east of the city limits; Starling Ohio Medical College, a law school, a dental school and an art insti- tute. Besides the university library, there is the Ohio state library occupying a room in the capitol and containing in 1908 126,000 volumes, including a " travelling library " of about 36,000 volumes, from which various organizations in different parts of the state may borrow books; the law library of the supreme court of Ohio, containing complete sets of English, Scottish, Irish, Canadian, United States and state reports, statutes and digests; the public school library of about 68,000 volumes, and the public library (of about 55,000), which is housed in a marble and granite building completed in 1906.

Columbus is near the Ohio coal and iron-fields, and has an extensive trade in coal, but its largest industrial interests are in manufactures, among which the more important are foundry and machine-shop products (1905 value, $6,259,579); boots and shoes (1905 value, $5,425,087, being more than one-sixtieth of the total product value of the boot and shoe industry in the United States, and being an increase from $359,000 in 1890); patent medicines and compounds (1905 value, $3,214,096); carriages and wagons (1905 value, $2,197,960); malt liquors (1905 value, $2,133,955); i ron an d steel; regalia and society emblems; steam-railway cars, construction and repairing; and oleo-margarine. In 1905 the city's factory products were valued at $40,435,531, an increase of 16-4% in five years. Immediately outside the city limits in 1905 were various large and important manufactories, including railway shops, foundries, slaughter- houses, ice factories and brick-yards. In Columbus there is a large market for imported horses. Several large quarries also are adjacent to the city.

The waterworks are owned by the municipality. In 1904- 1905 the city built on the Scioto river a concrete storage dam, having a capacity of 5,000,000,000 gallons, and in 1908 it com- pleted the construction of enormous works for filtering and softening the water-supply, and of works for purifying the flow of sewage — the two costing nearly

$5,000,000. The filtering works include 6 lime saturators, 2 mixing or softening tanks, 6 settling basins, 10 mechanical filters and 2 clear-water reser- voirs. A large municipal electric-lighting plant was completed in 1908.

The first permanent settlement within the present limits of the city was established in 1797 on the west bank of the Scioto, was named Franklinton, and in 1803 was made the county-seat. In 1 810 four citizens of Franklinton formed an association to secure the location of the capital on the higher ground of the east bank; in 181 2 they were successful and the place was laid out while still a forest. Four years later, when the legislature held its first session here, the settlement was incorporated as the Borough of Columbus. In 1824 the county-seat was removed here from Franklinton; in 1831 the Columbus branch of the Ohio Canal was completed; in 1834 the borough was made a city; by the close of the same decade the National Road extend- ing from Wheeling to Indianapolis and passing through Columbus was completed; in 1871 most of Franklinton, which was never incorporated, was annexed, and several other annexations followed.

See J. H. Studer, Columbus, Ohio; its History and Resources (Columbus, 1873); A. E. Lee, History of the City of Columbus, Ohio (New York, 1892).

COLUMELLA, LUCIUS JUNIUS MODERATUS, of Gades, writer on agriculture, contemporary of Seneca the philosopher, flourished about the middle of the 1st century a.d. His extant works treat, with great fulness and in a diffuse but not inelegant style which well represents the silver age, of the cultivation of all kinds of corn and garden vegetables, trees, flowers, the vine, the olive and other fruits, and of the rearing of cattle, birds, fishes and bees. They consist of the twelve books of the De re rustica (the tenth, which treats of gardening, being in dactylic hexameters in imitation of Virgil), and of a book De arboribus, the second book of an earlier and less elaborate work on the same subject.

The best complete edition is by J. G. Schneider (1794). Of a new edition by K. J. Lundstrom, the tenth book appeared in 1902 and De arboribus in 1897. There are English translations by R. Bradley (1725), and anonymous (1745); and treatises, De Columettae vita el scriptis, by V. Barberet (1887), and G. R. Becher (1897), a compact dissertation with notes and references to authorities.

COLUMN (Lat. columna), in architecture, a vertical support consisting

of capital, shaft and base, used to carry a horizontal beam or an arch. The earliest example in wood (2684 B.C.) was that found at Kahun in Egypt by Professor Flinders Petrie, which was fluted and stood on a raised base, and in stone the octagonal shafts of the early temple at Deir-el-Bahri (c. 2850). In the tombs at Beni Hasan (2723 B.C.) are columns of two kinds, the octagonal or polygonal shaft, and the reed or lotus column, the horizontal section of which is a quatrefoil. This became later the favourite type, but it was made circular on plan. In all these examples the column rests on a stone base. (See also Capital and Order.)

The column was employed in Assyria in small structures only, such as pavilions or porticoes. In Persia the column, employed to carry timber superstructures only, was very lofty, being sometimes 12 diameters high; the shaft was fluted, the number of flutes varying from 30 to 52.

The earliest example of the Greek column is that represented in the temple fresco at Cnossus (c. 1600 B.C.), of which portions have been found. The columns were in cypress wood raised on a stone base and tapered downwards. 1 The same, though to a less degree, is found in the stone semi-detached columns which flank the doorway of the Tomb of Agamemnon at Mycenae; the shafts of these columns were carved with the chevron design.

The earliest Greek columns in stone as isolated features are those of the Temple of Apollo at Syracuse (early 7th century B.C.) , the shafts of which were monoliths, but as a rule the Greek columns were all built of drums, sometimes as many as ten or twelve. There was no base to the Doric column, but the shafts were fluted, 20 flutes being the usual number. In the Archaic Temple of Diana at Ephesus there were 52 flutes. In the later examples of the Ionic order the shaft had 24 flutes. In the Roman temples the shafts were very often monoliths.

Columns were occasionally used as supports for figures or other features. The Naxian column at Delphi of the Ionic order carried a sphinx. The Romans employed columns in various ways: the Trajan and the Antonine columns carried figures of the two emperors; the columna rostrata (260 B.C.) in the Forum was decorated with the beaks of ships and was a votive column, the miliaria column marked the centre of Rome from which all distances were measured. In the same way the column in the Place Vend6me in Paris carries a statue of Napoleon I.; the monument of the Fire of London, a finial with flames sculptured on it; the duke of York’s column (London), a statue of the duke of York.

With the exception of the Cretan and Mycenaean, all the shafts of the classic orders tapered from the bottom upwards, and about one-third up the column had an increment,, known as the entasis, to correct an optical illusion which makes tapering shafts look concave; the proportions of diameter to height varied with the order employed. Thus, broadly speaking, a Roman Doric column will be eight, a Roman Ionic nine, a Corinthian

1 The tree-trunk used as a column was inverted to retain the sap ; hence the shape.

ten diameters in height. Except in rare cases, the columns of the Romanesque and Gothic styles were of equal diameter at top and bottom, and had no definite dimensions as regards diameter and height. They were also grouped together round piers which are known as clustered piers. When of exceptional size, as in Gloucester and Durham cathedrals, Waltham Abbey and Tewkesbury, they are generally called ” pillars,” which was apparently the medieval term for column. The word columna, employed by Vitruvius, was introduced into England by the Italian writers of the Revival.

In the Renaissance period columns were frequently banded, the bands being concentric with the column as in France, and occasionally richly carved as in Philibert De L’Orme’s work at the Tuileries. In England Inigo Jones introduced similar features, but with square blocks sometimes rusticated, a custom lately revived in England, but of which there are few examples either in Italy or Spain.

The word ” column ” is used, by analogy with architecture, for any upright body or mass, in chemistry, anatomy, typo- graphy, &c. > (R. P. S.)

COLURE (from Gr. koXos, shortened, and oh pa, tail), in astronomy, either of the two principal meridians of the celestial sphere, one of which passes through the poles and the two solstices, the other through the poles and the two equinoxes; hence designated as solstitial colure and equinoxial colure, respectively.

COLUTHUS, or Coixuthus, of Lycopolis in the Egyptian Thebaid, Greek epic poet, flourished during the reign of Anas- tasius I. (491-518). According to Suidas, he was the author of Calydoniaca (probably an account of the Calydonian boar hunt), Persica (an account, of the

Persian wars), and Encomia (laudatory poems). These are all lost, but his poem in some 400 hexa- meters on The Rape of Helen (‘Aprayr; ‘EXeiˆ/s) is still extant, having been discovered by Cardinal Bessarion in Calabria. The poem is dull and tasteless, devoid of imagination, a poor imitation of Homer, and has little to recommend it except its harmonious versification, based upon the technical rules of Nonnus. It related the history of Paris and Helen from the wedding of Peleus and Thetis down to the elopement and arrival at Troy.

The best editions are by Van Lennep (1747), G. F. Schafer (1825), E. Abel (1880).

COLVILLE, JOHN (c. 1540-1605), Scottish divine and author, was the son of Robert Colville of Cleish, in the county of Kinross. Educated at St Andrews University, he became a Presbyterian minister, but occupied himself chiefly with political intrigue, sending secret information to the English government concerning Scottish affairs. He joined the party of the earl of Gowrie, and took part in the Raid of Ruthven in 1582. In 1587 he for a short time occupied a seat on the judicial bench, and was com- missioner for Stirling in the Scottish parliament. In December 1591 he was implicated in the earl of Bothwell’s attack on Holyrood Palace, and was outlawed with the earl. He retired abroad, and is said to have joined the Roman Church. He died in Paris in 1605. Colville was the author of several works, including an Oratio Funebris on Queen Elizabeth, and some political and religious controversial essays. He is said to be the author also of The Historie and Life of King James the Sext (edited by T. Thompson for the Bannatyne Club, Edinburgh,

1825)-

Colville’s Original Letters, 1582-1603, published by the Bannatyne Club in 1858, contains a biographical memoir by the editor, David Laing.

COLVIN, JOHN RUSSELL (1807-1857), lieutenant-governor of the North- West Provinces of India during the mutiny of 1857, belonged to an Anglo-Indian family of Scottish descent, and was born in Calcutta on the 29th of May 1807. Passing through Haileybury he entered the service of the East India Company in 1826. In 1836 he became private secretary to Lord Auckland, and his influence over the viceroy has been held partly respon- sible for the first Afghan war of 1837; but it has since been shown that Lord Auckland’s policy was dictated by the secret committee of the company at home. In 1853 Mr Colvin was I

appointed lieutenant-governor of the North-West Provinces by Lord Dalhousie. On the outbreak of the mutiny in 1857 he had with him at Agra only a weak British regiment and a native battery, too small a force to make head against the mutineers; and a proclamation which he issued to the natives was censured at the time for its clemency, but it followed the same lines as those adopted by Sir Henry Lawrence and subsequently followed by Lord Canning. Exhausted by anxiety and misrepresentation he died on the 9th of September, his death shortly preceding the fall of Delhi.

His son, Sir Auckland Colvin (1838-1908), followed him in a distinguished career in the same service, from 1858 to 1879. He was comptroller-general in Egypt (1880 to 1882), and financial adviser to the khedive (1883 to 1887), and from 1883 till 1892 was back again in India, first as financial member of council, and then, from 1887, as lieutenant-governor of the North- West Provinces and Oudh. He was created K.C.M.G. in 1881, and K.C.S.I. in 1892, when he retired. He published The Making of Modern Egypt in 1906, and a biography of his father, in the ” Rulers of India ” series, in 1895. He died at Surbiton on the 24th of March 1908.

COLVIN, SIDNEY (1845-), English literary and art critic, was born at Norwood, London, on the 18th of June 1845. A scholar of Trinity College, Cambridge, he became a fellow of his college in 1868. In 1873 he was Slade professor of fine art, and was appointed in the next year to the directorship of the Fitzwilliam Museum. In 1884 he removed to London on his appointment as keeper of prints and drawings in the British Museum. His chief publications are lives of Landor (1881) and Keats (1887), in the English Men of Letters series; the Edinburgh edition of R. L. Stevenson’s works (1894-189 7); editions of the letters of Keats (1887), and of the Vailima Letters (1899), which R. L. Stevenson chiefly addressed to him; A Florentine Picture-Chronicle (1898), and Early History of En- graving in England (1905). But in the field both of art and of literature, Mr Colvin’s fine taste, wide knowledge and high ideals made his authority and influence extend far beyond his published work.

COLWYN BAY, a watering-place of Denbighshire, N. Wales, on the Irish Sea, 405 m. from Chester by the London & North- western railway. Pop. of urban district of Colwyn Bay and Colwyn (1901) 8689. Colwyn Bay has become a favourite bathing-place, being near to, and cheaper than, the fashionable Llandudno, and being a centre for picturesque excursions. Near it is Llaneilian village, famous for its ” cursing well ” (St Eilian’s, perhaps Aelianu.s’). The stream Colwyn joins the Gwynnant. The name Colwyn is that of lords of Ardudwy; a

Lord Colwyn of Ardudwy, in the 10th century, is believed to have repaired Harlech castle, and is considered the founder of one of the fifteen tribes of North Wales. Nant Colwyn is on the road from Carnarvon to Beddgelert, beyond Llyn y gader (gadair), ” chair pool,” and what tourists have fancifully called Pitt’s head, a roadside rock resembling, or thought to resemble, the great statesman’s profile. Near this is Llyn y dywarchen (sod pool), with a floating island.

COLZA OIL, a non-drying oil obtained from the seeds of Brassica campestris, var. oleifera, a variety of the plant which produces Swedish turnips. Colza is extensively cultivated in France, Belgium, Holland and Germany; and, especially in the first-named country, the expression of the oil is an important industry. In commerce colza is classed with rape oil, to which both in source and properties it is very closely allied. It is a comparatively inodorous oil of a yellow colour, having a specific gravity varying from 0-912 to 0-920. The cake left after ex- pression of the oil is a valuable feeding substance for cattle. Colza oil is extensively used as a lubricant for machinery, and for burning in lamps.

COMA (Gr. KUfia, from mifxav, to put to sleep), a deep sleep; the term is, however, used in medicine to imply something more than its Greek origin denotes, namely, a complete and prolonged loss of consciousness from which a patient cannot be roused. There are various degrees of coma: in the slighter

forms the patient can be partially roused only to relapse again into a state of insensibility; in the deeper states, the patient cannot be roused at all, and such are met with in apoplexy, already described. Coma may arise abruptly in a patient who has presented no pre-existent indication of such a state occurring. Such a condition is called primary coma, and may result from the following causes: — (i) concussion, compression or laceration of the brain from head injuries, especially fracture of the skull; (2) from alcoholic and narcotic poisoning; (3) from cerebral haemorrhage, embolism and thrombosis, such being the causes of apoplexy. Secondary coma may arise as a complication in the following diseases: — diabetes, uraemia, general paralysis, meningitis, cerebral tumour and acute yellow atrophy of the liver; in such diseases it is anticipated, for it is a frequent cause of the fatal termination. The depth of insensibility to stimulus is a measure of the gravity of the symptom; thus the con- junctival reflex and even the

spinal reflexes may be abolished, the only sign of life being the respiration and heart-beat, the muscles of the limbs being sometimes perfectly flaccid. A characteristic change in the respiration, known as Cheyne- Stokes breathing occurs prior to death in some cases; it indicates that the respiratory centre in the medulla is becoming exhausted, and is stimulated to action only when the venosity of the blood has increased sufficiently to excite it. The breathing consequently loses its natural rhythm, and each successive breath becomes deeper until a maximum is reached; it then diminishes in depth by successive steps until it dies away completely. The condition of apnoea, or cessation of breathing, follows, and as soon as the venosity of the blood again affords sufficient stimulus, the signs of air-hunger commence; this altered rhythm continues until the respiratory centre becomes exhausted and death ensues.

Coma Vigil is a state of unconsciousness met with in the algide stage of cholera and some other exhausting diseases. The patient's eyes remain open, and he may be in a state of low muttering delirium; he is entirely insensible to his surroundings, and neither knows nor can indicate his wants.

There is a distinct word " coma " (Gr. now, hair), which is used in astronomy for the envelope of a comet, and in botany for a tuft.

COMA BERENICES (" Berenice's Hair "), in astronomy, a constellation of the northern hemisphere; it was first mentioned by Callimachus, and Eratosthenes (3rd century B.C.), but is not included in the 48 asterisms of Ptolemy. It is said to have been named by Conon, in order to console Berenice, queen of Ptolemy Euergetes, for the loss of a lock of her hair, which had been stolen from a temple to Venus. This constellation is sometimes, but wrongly, attributed to Tycho Brahe. The most interesting member of this group is 24 Comae, a fine, wide double star, consisting of an orange star of magnitude 55, and a blue star, magnitude 7.

COMACCHIO, a town of Emilia, Italy, in the province of Ferrara, 30 m. E.S.E. by road from the town of Ferrara, on the level of the sea, in the centre of the lagoon of Valli di Comacchio, just N. of the present mouth of the Reno. Pop. (1001) 7944 (town), 10,745 (commune). It is built on no less than thirteen different islets, joined by bridges, and its industries are the fishery, which belongs to the commune, and the salt-works. The seaport of Magnavacca lies 4 m. to the east. Comacchio appears as a city in the 6th century, and, owing to its position in the centre of the lagoons, was an important fortress. It was included in the "donation of Pippin"; it was taken by the Venetians in

854, but afterwards came under the government of the archbishops of Ravenna; in 1299 it came under the dominion of the house of Este. In 1508 it became Venetian, but in 1597 was claimed by Clement VIII. as a vacant fief.

COMANA, a city of Cappadocia [frequently called Chryse or Aurea, i.e. the golden, to distinguish it from Comana in Pontus; mod. Shahr], celebrated in ancient times as the place where the rites of Ma-Enyo, a variety of the great west Asian Nature- goddess, were celebrated with much solemnity. The service was carried on in a sumptuous temple with great magnificence oy many thousands of hieroduli (temple-servants). To defray

expenses, large estates had been set apart, which yielded a more than royal revenue. The city, a mere apanage of the temple, was governed immediately by the chief priest, who was always a member of the reigning Cappadocian family, and took rank next to the king. The number of persons engaged in the service of the temple, even in Strabo's time, was upwards of 6000, and among these, to judge by the names common on local tomb- stones, were many of Persian race. Under Caracalla, Comana became a Roman colony, and it received honours from later emperors down to the official recognition of Christianity. The – site lies at Shahr, a village in the Anti-Taurus on the upper course of the Sarus (Sihun). mainly Armenian, but surrounded by new settlements of Avshar Turkomans and Circassians. The place has derived importance both in antiquity and now from its position at the eastern end of the main pass of the western Anti-Taurus range, the Kuru Chai, through which passed the road from Caesarea-Mazaca (mod. Kaisarieh) to Melitene (Malatia), converted by Septimius Severus into the chief military road to the eastern frontier of the empire. The extant remains at Shahr include a theatre on the left bank of the river, a fine Roman doorway and many inscriptions; but the exact site of the great temple has not been satisfactorily identified. There are many traces of Severus' road, including a bridge at Kemer, and an immense number of milestones, some in their original positions, others in cemeteries.

See P. H. H. Massy in Geog. Journ. (Sept. 1905) ; E. Chantre, Mission en Cappadocie (1898). (D. G. H.)

COMANA (mod. Gumenek), an ancient city of Pontus, said to have been colonized from Comana in Cappadocia. It stood on the river Iris (Tozanli Su or Yeshil Irmak), and from its central position was a favourite emporium of Armenian and other merchants. The moon-goddess was worshipped in the city with a pomp and ceremony in all

respects analogous to those employed in the Cappadocian city. The slaves attached to the temple alone numbered not less than 6000. St John Chrysostom died there on the way to Constantinople from his exile at Cocysus in the Anti-Taurus. Remains of Comana are still to be seen near a village called Gumenek on the Tozanli Su, 7 m. from Tokat, but they are of the slightest description. There is a mound; and a few inscriptions are built into a bridge, which here spans the river, carrying the road from Niksar to Tokat. (D. G. H.)

COMANCHES, a tribe of North American Indians of Sho- shonean stock, so called by the Spaniards, but known to the French as Padoucas, an adaptation of their Sioux name, and among themselves nsnimenim (people) . They num ber some 1 400, attached to the Kiowa agency, Oklahoma. When first met by Europeans, they occupied the regions between the upper waters of the Brazos and Colorado on the one hand, and the Arkansas and Missouri on the other. Until their final surrender in 1875 the Comanches were the terror of the Mexican arid Texan frontiers, and were always famed for their bravery. They were brought to nominal submission in 1783 by the Spanish general Anza, who killed thirty of their chiefs, During the 19th century they were always raiding and fighting, but in 1867, to the number of 2500, they agreed to go on a reservation. In 1872 a portion of the tribe, the Quanhada or Staked Plain Comanches, had again to be reduced by military measures.

COMAYAGUA, the capital of the department of Comayagua in central Honduras, on the right bank of the river Ulua, and on the interoceanic railway from Puerto Cortes to Fonseca Bay. Pop. (1900) about 8000. Comayagua occupies part of a fertile valley, enclosed by mountain ranges. Under Spanish rule it was a city of considerable size and beauty, and in 1827 its in- habitants numbered more than 18,000. A fine cathedral, dating from 17 15, is the chief monument of its former prosperity, for most of the handsome public buildings erected in the colonial period have fallen into disrepair. The present city chiefly consists of low adobe houses and cane huts, tenanted by Indians. The university founded in 1678 has ceased to exist, but there is a school of jurisprudence. In the neighbourhood are many ancient Indian ruins (see Central America: Archaeology).

Founded in 1540 by Alonzo Caceres, who had been instructed

by the Spanish government to find a site for a city midway between the two oceans, Valladolid la Nueva, as the town was first named, soon became the capital of Honduras.' It received the privileges of a city in 1557, and was made an episcopal see in 1 561. Its decline dates from 1827, when it was burned by revolutionaries; and in 1854 its population had dwindled to 2000. It afterwards suffered through war and rebellion, notably in 1872 and 1873, when it was besieged by the Guatemalans. In 1880 Tegucigalpa (q.v.), a city 37 m. east-south-east, super- seded it as the capital of Honduras.

COMB (a word common in various forms to Teut. languages, cf. Ger. Kamm, the Indo-Europ. origin of which is seen in y6p,s, a peg or pin, and Sanskrit, gambkas, a tooth), a toothed 'article of the toilet used for cleaning and arranging the hair, and also for holding it in place after it has been arranged; the word is also applied, from resemblance in form or in use, to various appliances employed for dressing wool and other fibrous sub- stances, to the indented fleshy crest of a cock, and to the ridged series of cells of wax filled with honey in a beehive. Hair combs are of great antiquity, and specimens made of wood, bone and horn have been found in Swiss lake-dwellings. Among the Greeks and Romans they were made of boxwood, and in Egypt also of ivory. For modern combs the same materials are used, together with others such as tortoise-shell, metal, india-rubber and celluloid. There are two chief methods of manufacture. A plate of the selected material is taken of the size and thickness required for the comb, and on one side of it, occasionally on both sides, a series of fine slits are cut with a circular saw. This method involves the loss of the material cut out between the teeth. The second method, known as " twinning " or " part- ing," avoids this loss and is also more rapid. The plate of material is rather wider than before, and is formed into two combs simultaneously, by the aid of a twinning machine. Two pairs of chisels, the cutting edges of which are as long as the teeth are required to be and are set at an angle converging towards the sides of the plate, are brought down alternately in such a way that the wedges removed from one comb form the teeth of the other, and that when the cutting is complete the plate presents the appearance of two combs with their teeth exactly inosculating or dovetailing into each other. In india- rubber combs the teeth are moulded to shape and the whole hardened by vulcanization.

COMBACQNUM, or Kumbakonam, a city of British India, in the Tanjore district of Madras, in the delta of the Cauvery, on the South Indian railway, 194 m. from Madras. Pop. (1001) 59,623, showing an increase of 10 % in the decade. It is a large town with wide and airy streets, and is adorned with pagodas, gateways and other buildings of considerable pretension. The great gopuram, or gate-pyramid, is one

of the most imposing buildings of the kind, rising in twelve stories to a height of upwards of 100 ft., and ornamented with a profusion of figures of men and animals formed in stucco. One of the water-tanks inthetown is popularlyreputed to be filled with water admitted from the Ganges every twelve years by a subterranean passage 1200 m. long; and it con- sequently forms a centre of attraction for large numbers of devotees. The city is historically interesting as the capital of the Chola race, one of the oldest Hindu dynasties of which any traces remain, and from which the whole coast of Coromandel, or more properly Cholamandal, derives its name. It contains a govern- ment college. Brass and other metal wares, silk and cotton cloth and sugar are among the manufactures.

COMBE, ANDREW (1797-1847), Scottish physiologist' was born in Edinburgh on the 27th of October 1797, and was a younger brother of George Combe. He served an apprenticeship in a surgery, and in 1 8 1 7 passed at Surgeons' Hall. He proceeded to Paris to complete his medical studies, and whilst there he investigated phrenology on anatomical principles. He became convinced of the truth of the new science, and, as he acquired much skill in the dissection of the brain, he subsequently gave additional interest to the lectures of his brother George, by his practical demonstrations of the convolutions. He returned to Edinburgh in 1819 with the intention of beginning practice; but

being attacked by the first symptoms of pulmonary disease, he was obliged to seek health in the south of France and in Italy during the two following winters. He began to practise in 1823, and by careful adherence to the laws of health he was enabled to fulfil the duties of his profession for nine years. During that period he assisted in editing the Phrenological Journal and contributed a number of articles to it, defended phrenology before the Royal Medical Society of Edinburgh, published his Observations on Mental Derangement (183 1), and prepared the greater portion of his Principles of Physiology Applied to Health and Education, which was issued in 1834, and immediately obtained extensive public favour. In 1836 he was appointed physician to Leopold I., king of the Belgians, and removed to Brussels, but he speedily found the climate unsuitable and returned to Edinburgh, where he resumed his practice. In 1836 he published his Physiology of Digestion, and in 1838 he was appointed one of the physicians extraordinary to the queen in Scotland. Two years later he completed his Physiological and Moral Management of Infancy, which he believed to be his best work and it was his last. His latter years were mostly occupied in seeking at various health resorts some alleviation of his disease; he spent two winters in Madeira, and tried a voyage to

the United States, but was compelled to return within a few weeks of the date of his landing at New York. He died at Gorgie, near Edinburgh, on the 9th of August 1847.

His biography, written by George Combe, was published in 1850.

COMBE, GEORGE (1788-1858), Scottish phrenologist, elder brother of the above, was born in Edinburgh on the 21st of October 1788. After attending Edinburgh high school and university he entered a lawyer's office in 1804, and in 181 2 began to practise on his own account. In 181 5 the Edinburgh Review contained an article on the system of " craniology " of F. J. Gall and K. Spurzheim, which was denounced as " a piece of thorough quackery from beginning to end." Combe laughed like others at the absurdities of this so-called new theory of the brain, and thought that it must be finally exploded after such an exposure; and when Spurzheim delivered lectures in Edinburgh, in refuta- tion of the statements of his critic, Combe considered the subject unworthy of serious attention. He was, however, invited to a. friend's house where he saw Spurzheim dissect the brain, and he was so far impressed by the demonstration that he attended the second course of lectures. Investigating the subject for himself, he became satisfied that the fundamental principles of phrenology were true — namely " that the brain is the organ of mind; that the brain is an aggregate of several parts, each subserving a distinct mental faculty; and that the size of the cerebral organ is, caeteris paribus, an index of power or energy of function." In 1817 his first essay on phrenology was pub- lished in the Scots Magazine; and a series of papers on the same subject appeared soon afterwards in the Literary and Statistical Magazine; these were collected and published in 1819 in book form as Essays on Phrenology, which in later editions became A System of Phrenology. In 1820 he helped to found the Phreno- logical Society, which in 1823 began to publish a Phrenological Journal. By his lectures and writings he attracted public attention to the subject on the continent of Europe and in America, as well as at home; and a long discussion with Sir William Hamilton in 1827-1828 excited general interest.

His most popular work, The Constitution of Man, was published in 1828, and in some quarters brought upon him denunciations as a materialist and atheist. From that time he saw everything by the light of phrenology. He gave time, labour and money to help forward the education of the poorer classes; he estab- lished the first infant school in Edinburgh; and he originated a series of evening lectures on chemistry, physiology, history and moral philosophy. He studied the criminal classes, and tried to solve the problem how to reform as well as to punish them; and he strove to introduce into lunatic asylums a

humane system of treatment. In 1836 he offered himself as a candidate for the chair of logic at Edinburgh, but was rejected in favour of Sir William Hamilton. In 1838 he visited America and spent about two years lecturing on phrenology, education and the

treatment of the criminal classes. On his return in 1840 he published his Moral Philosophy, and in the following year his Notes on the United States of North America. In 1842 he delivered, in German, a course of twenty-two lectures on phrenology in the university of Heidelberg, and he travelled much in Europe, inquiring into the management of schools, prisons and asylums. The commercial crisis of 1855 elicited his remarkable pamphlet on The Currency Question (1858). The culmination of the religious thought and experience of his life is contained in his work On the Relation between Science and Religion, first publicly issued in 1857. He was engaged in revising the ninth edition of the Constitution of Man when he died at Moor Park, Farnham, on the 14th of August 1858. He married in 1833 Cecilia Siddons, a daughter of the great actress.

COMBE, WILLIAM (1 741-1823), English writer, the creator of ” Dr Syntax,” was born at Bristol in 1741. The circum- stances of his birth and parentage are somewhat doubtful, and it is questioned whether his father was a rich Bristol merchant, or a certain William Alexander, a London alderman, who died in 1762. He was educated at Eton, where he was contemporary with Charles James Fox, the 2nd Baron Lyttelton and William Beckford. Alexander bequeathed him some £2000 — a little fortune that soon disappeared in a course of splendid extrava- gance, which gained him the nickname of Count Combe; and after a chequered career as private soldier, cook and waiter, he finally settled in London (about 1771), as a law student and bookseller’s hack. In 1776 he made his first success in London with The Diaboliad, a satire full of bitter personalities. Four years afterwards (1780) his debts brought him into the King’s Bench; and much of his subsequent life was spent in prison. His spurious Letters of the Late Lord Lyttelton 1 (1780) imposed on many of his contemporaries, and a writer in the Quarterly Review, so late as 185 1, regarded these letters as authentic, basing upon them a claim that Lyttelton was ” Junius.” An early acquaintance with Lawrence Sterne resulted in his Letters supposed to have been written by Yorick and Eliza (1779). Periodical literature of all sorts — pamphlets, satires, bur- lesques, ” two thousand columns for the papers,” ” two hundred biographies ” — filled up the next

years, and about 1789 Combe was receiving £200 yearly from Pitt, as a pamphleteer. Six volumes of a Devil on Two Sticks in England won for him the title of ” the English le Sage “; in 1794-1796 he wrote the text for Boydell’s History of the River Thames; in 1803 he began to write for The Times. In 1809-181 1 he wrote for Ackermann’s Political Magazine the famous Tour of Dr Syntax in search of the Picturesque (descriptive and moralizing verse of a somewhat doggerel type), which, owing greatly to Thomas Rowlandson’s designs, had an immense success. It was published separately in 1812 and was followed by two similar Tours, ” in search of Consolation,” and ” in search of a Wife,” the first Mrs Syntax having died at the end of the first Tour. Then came Six Poems in illustration of drawings by Princess Elizabeth (1813), The English Dance of Death (1815-1816), The Dance of Life (1816- 1817), The Adventures of Johnny Quae Genus (1822) — all written for Rowlandson’s caricatures; together with Histories of Oxford and Cambridge, and of Westminster Abbey for Ackermann; Picturesque Tours along the Rhine and other rivers, Histories of Madeira, Antiquities of York, texts for Turner’s Southern Coast Views, and contributions innumerable to the Literary Repository. In his later years, notwithstanding a by no means unsullied character, Combe was courted for the sake of his charm- ing conversation and inexhaustible stock of anecdote. He died in London on the 19th of June 1823.

Brief obituary memoirs of Combe appeared in Ackermann’s Literary Repository and in the Gentleman’ s Magazine for August 1823; and in May 1859 a list of his works, drawn up by his own hand, was printed in the latter periodical. See also Diary of H. Crabb Robinson, Notes and Queries for i86g.

1 Thomas, 2nd Baron Lyttelton (1744-1779), commonly known as the ” wicked Lord Lyttelton,” was famous for his abilities and his libertinism, also for the mystery attached to his death, of which it was alleged he was warned in a dream three days before the event.

COMBE, or Coomb, a term particularly in use in south-western England for a short closed-in valley, either on the side of a down or running up from the sea. It appears in place-names as a ter- mination, e.g. Wiveliscombe, Ilfracombe, and as a prefix, e.g. Combemartin. The etymology of the word is obscure, but ” hollow ” seems a common meaning to similar forms in many languages. In English ” combe ” or ” cumb ” is an obsolete word for a ” hollow vessel,” and the like meaning attached to Teutonic forms kumm and kumme. The Welsh cwm, in place- names, means hollow or valley, with which may be compared cum in many Scots place-names. The Greek Kufiˆ Tj also means a hollow vessel, and there is a French dialect word combe

meaning a little valley.

COMBERMERE, STAPLETON COTTON, 1st Viscount (1773- 1865), British field-marshal and colonel of the 1st Life Guards, was the second son of Sir Robert Salusbury Cotton of Comber- mere Abbey, Cheshire, and was born on the 14th of November r773, at Llewenny Hall in Denbighshire. He was educated at Westminster School, and when only sixteen obtained a second lieutenancy in the 23rd regiment (Royal Welsh Fusiliers). A few years afterwards (1793) he became by purchase captain in the 6th Dragoon Guards, and he served in this regiment during the campaigns of the duke of York in Flanders. While yet in his twentieth year, he joined the 25th Light Dragoons (subse- quently 22nd) as lieutenant-colonel, and, while in attendance with his regiment on George III. at Weymouth, he became a great favourite of the king. In 1796 he went with his regiment to India, taking part en route in the operations in Cape Colony (July- August 1796), and in 1799 served in the war with Tippoo Sahib, and at the storming of Seringapatam. Soon after this, having become heir to the family baronetcy, he was, at his father's desire, exchanged into a regiment at home, the 16th Light Dragoons. He was stationed in Ireland during Emmett's insurrection, became colonel in 1800, and major-general five years later. From 1806 to 1814 he was M.P. for Newark. In 1808 he was sent to the seat of war in Portugal, where he shortly rose to the position of commander of Wellington's cavalry, and it was here that he most displayed that courage and judgment which won for him his fame as a cavalry officer. He succeeded to the baronetcy in 1809, but continued his military career. His share in the battle of Salamanca (22nd of July 1812) was especially marked, and he received the personal thanks of Wellington. The day after, he was accidentally wounded. He was now a lieutenant-general in the British army and a K.B., and on the conclusion of peace (1814) was raised to the peerage under the style of Baron Combermere. He was not present at Waterloo, the command, which he expected, and bitterly re- gretted not receiving, having been given to Lord Uxbridge. When the latter was wounded Cotton was sent for to take over his command, and he remained in France until the reduction of the allied army of occupation. In 181 7 he was appointed governor of Barbadoes and commander of the West Indian forces. From 1822 to 1825 he commanded in Ireland. His career of active service was concluded in India (1826), where he besieged and took Bhurtpore — a fort which twenty-two years previously had defied the genius of Lake and was deemed impregnable. For this service he was created Viscount Combermere. A long period of peace and honour still remained to him at home. In 1834 he was sworn a privy councillor, and in 1852 he

succeeded Welling- ton as constable of the Tower and lord lieutenant of the Tower Hamlets. In 1855 he was made a field-marshal and G.C.B. He died at Clifton on the 21st of February 1865. An equestrian statue in bronze, the work of Baron Marochetti, was raised in his honour at Chester by the inhabitants of Cheshire. Comber- mere was succeeded by his only son, Wellington Henry (1818- 1891), and the viscountcy is still held by his descendants.

See Viscountess Combermere and Captain W. W. Knollys, The Combermere Correspondence (London, 1866).

COMBES, [JUSTIN LOUIS] EMILE (1835-), French states- man, was born at Roquecourbe in the department of the Tarn. He studied for the priesthood, but abandoned the idea before ordination, and took the diploma of doctor of kf.ters ˆ1860),

Then he studied medicine, taking his degree in 1867, andsettingup in practice at Pons in Charente-Inferieure. In 1 88 1 he presented himself as a political candidate for Saintes, but was defeated. In 1885 he was elected to the senate by the department of Charente-Inferieure. He sat in the Democratic left, and was elected vice-president in 1893 and 1894. The reports which he drew up upon educational questions drew attention to him, and on the 3rd of November 1895 he entered the Bourgeois cabinet as minister of public instruction, resigning with his colleagues on the 21st of April following. He actively supported the Waldeck-Rousseau ministry, and upon its retirement in 1903 he was himself charged with the formation of a cabinet. In this he took the portfolio of the Interior, and the main energy of the government was devoted to the struggle with clericalism. The parties of the Left in the chamber, united upon this question in the Bloc republicain, supported Combes in his application of the law of 1901 on the religious associations, and voted the new bill on the congregations (1904), and under his guidance France took the first definite steps toward the separation of church and state. He was opposed with extreme violence by all the Con- servative parties, who regarded the secularization of the schools as a persecution of religion. But his stubborn enforcement of the law won him the applause of the people, who called him familiarly le petit pere. Finally the defection of the Radical and Socialist groups induced him to resign on the 17th of January 1905, although he had not met an adverse vote in the Chamber. His policy was still carried on; and when the law of the separation of church and

state was passed, all the leaders of the Radical parties entertained him at a noteworthy banquet in which they openly recognized him as the real originator of the movement.

COMBINATION (Lat. combinare, to combine), a term meaning an association or union of persons for the furtherance of a common object, historically associated with agreements amongst workmen for the purpose of raising their wages. Such a combination was for a long time expressly prohibited by statute. See Trade Unions; also Conspiracy and Strikes and Lock Outs.

COMBINATORIAL ANALYSIS. The Combinatorial Analysis, as it was understood up to the end of the 18th century, was of limited scope and restricted application. P. Nicholson, Historical j n jjj s E ssa y S on the Combinatorial Analysis, published in 1818, states that ” the Combinatorial Analysis is a branch of mathematics which teaches us to ascertain and exhibit all the possible ways in which a given number of things may be associated and mixed together; so that we may be certain that we have not missed any collection or arrangement of these things that has not been enumerated.” Writers on the subject seemed to recognize fully that it was in need of cultiva- tion, that it was of much service in facilitating algebraical operations of all kinds, and that it was the fundamental method of investigation in the theory of Probabilities. Some idea of its scope may be gathered from a statement of the parts of algebra to which it was commonly applied, viz., the expansion of a multinomial, the product of two or more multinomials, the quotient of one multinomial by another, the reversion and conversion of series, the theory of indeterminate equations, &c. Some of the elementary theorems and various particular problems appear in the works of the earliest algebraists, but the true pioneer of modern researches seems to have been Abraham Demoivre, who first published in Phil. Trans. (1697) the law of the general coefficient in the expansion of the series a--bx+cx 1 +dx 3 + . . . raised to any power. (See also Miscel- lanea Analytica, bk. iv. chap. ii. prob. iv.) His work on Proba- bilities would naturally lead him to consider questions of this nature. An important work at the time it was pub- lished was the De Partitione Numerorum of Leonhard Euler, in which the consideration of the reciprocal of the product (i-xz) (i-x 2 z) (i-xH) . . . establishes a fundamental connexion between arithmetic and algebra, arithmetical addition being made to depend upon algebraical multiplication, and a close bond is secured between the theories of discontinuous and continuous quantities. (Cf. Numbers, Partition or.) The

Intro- duction.

multiplication of the two powers X s , xP, viz. x'+x b =x a +*, showed Euler that he could convert arithmetical addition into algebraical multiplication, and in the paper referred to he gives the complete formal solution of the main problems of the partition of numbers. He did not obtain general expressions for the co- efficients which arose in the expansion of his generating functions, but he gave the actual values to a high order of the coefficients which arise from the generating functions corresponding to various conditions of partitionment . Other writers who have contributed to the solution of special problems are James Bernoulli, Ruggiero Guiseppe Boscovich, Karl Friedrich Hindenburg (1741-1808), WilHam Emerson (1701-1782), Robert Woodhouse (1773-1827), Thomas Simpson and Peter Barlow. Problems of combination were generally undertaken as they became necessary for the advancement of some particular part of mathematical science: it was not recognized that the theory of combinations is in reality a science by itself, well worth studying for its own sake irrespective of applications to other parts of analysis. There was a total absence of orderly development, and until the first third of the 19th century had passed, Euler's classical paper remained alike the chief result and the only scientific method of combina- torial analysis.

In 1846 Karl G. J. Jacobi studied the partitions of numbers by means of certain identities involving infinite series that are met with in the theory of elliptic functions. The method employed is essentially that of Euler. Interest in England was aroused, in the first instance, by Augustus De Morgan in 1846, who, in a letter to Henry Warburton, suggested that combinatorial analysis stood in great need of development, and alluded to the theory of partitions. Warburton, to some extent under the guidance of De Morgan, prosecuted researches by the aid of a new instrument, viz. the theory of finite differences. This was a distinct advance, and he was able to obtain expressions for the coefficients in partition series in some of the simplest cases (Trans. Camb. Phil. Soc, 1849). This paper inspired a valuable paper by Sir John Herschel (Phil. Trans. 1850), who, by introducing the idea and notation of the circulating function, was able to present results in advance of those of Warburton. The new idea involved a calculus of the imaginary roots of unity. Shortly afterwards, in 1855, the subject was attacked simultaneously by Arthur Cayley and James Joseph Sylvester, and their combined efforts resulted in the practical solution of the problem that we have to-day. The former added the idea of the prime circulator, and the latter applied Cauchy's theory of residues to the subject, and invented the arithmetical entity termed a denumerant. The next distinct advance was made by Sylvester, Fabian

Franklin, William Pitt Duffee and others, about the year 1882 (Amer. Journ. Math. vol. v.) by the employment of a graphical method. The results obtained were not only valuable in themselves, but also threw considerable light upon the theory of algebraic series. So far it will be seen that researches had for their object the discussion of the partition of numbers. Other branches of combinatorial analysis were, from any general point of view, absolutely neglected. In 1888 P. A. MacMahon investigated the general problem of distribution, of which the partition of a number is a particular case. He introduced the method of symmetric functions and the method of differential operators, applying both methods to the two important subdivisions, the theory of composition and the theory of partition. He introduced the notion of the separation of a partition, and extended all the results so as to include multipartite as well as unipartite numbers. He showed how to introduce zero and negative numbers, uni- partite and multipartite, into the general theory j he extended Sylvester's graphical method to three dimensions; and finally, 1898, he invented the " Partition Analysis " and applied it to the solution of novel questions in arithmetic and algebra. An im- portant paper by G. B. Mathews, which reduces the problem of compound partition to that of simple partition, should also be noticed. This is the problem which was known to Euler and his contemporaries as "The Problem of the Virgins," or "the Rule of Ceres " ; it is only now, nearly 200 years later, that it has been solved.

The most important problem of combinatorial analysis is con- nected with the distribution of objects into classes. A number n may be regarded as enumerating n similar objects; it Panda- j s tnen gajd to be unipartite. On the o ther hand, if the 'problem, ob jectsbe not all similar they cannot be effectively enu- merated by a single integer ; we require a succession of integers. If the objects be p in number of one kind, q of a second kind, r of a third, &c, the enumeration is given by the succession pqr . . . which is termed a multipartite number, and written,

Par . . ., where $p+q+r+ \ldots =n$. If the order of magnitude of the numbers p,q,r, . . . is immaterial, it is usual to write them in descending order of magnitude, and the succession may then be termed a partition of the number n, and is written {pqr . . .)• The succession of integers thus has a twofold signification: (i.) as a multipartite number it may enumerate objects of different kinds; (ii.)

it may be viewed as a partitionment into separate parts of a unipartite number. We may say either that the objects are represented by the multipartite number pqr . . ., or that they are defined by the partition {pqr . . .) of the uni- partite number n. Similarly the classes into which they are distributed may be m in number all similar; or they may be pi of one kind, qi of a second, n of a third, &c, where p\ + ?i --f\ + . • • =m. We may thus d enote the classes either by the multipartite numbers piqin . . ., or by the partition {piqin . . .) of the unipartite number m. The distributions to be considered are such 1 that any number of objects may be in any one class subject to the restriction that no class is empty. Two cases arise. If the order of the objects in a particular class is immaterial, the class is termed a parcel; if the order is material, the class is termed a group. The distribution into parcels is alone considered here, and the main problem is the enumeration of the distributions of objects defined by the partition {pqr . . .) of the number n into parcels denned by the partition {piqin . . .) of the number m. (See “Symmetric Functions and the Theory of Distributions,” Proc. London Mathematical Society, vol. xix.) Three particular cases are of great importance. Case I. is the ” one-to-one distribution,” in which the number of parcels is equal to the number of objects, and one object is distributed in each parcel. Case II. is that in which the parcels are all different, being defined by the partition (nn . . .), conveniently written (i m); this is the theory of the compositions of unipartite arid multipartite numbers. Case III. is that in which the parcels are all similar, being defined by the partition {m) ; this is the theory of the partitions of unipartite and multipartite numbers. Pre- vious to discussing these in detail, it is necessary to describe the method of symmetric functions which will be largely utilized. Let o, j8, 7, . . . be the roots cf the equation

n— 1 n— 2 n

x”-a 1 x +a 2 * — ... = «.

The symmetric function Za p /3*7 r ..., where p+q--r+ . . . =n is, in the partition notation, written {pqr . . .). Let

The dis- \ denote the number of ways of distri-

function, buting the n objects defined by the partition {pqr . . .) into the m parcels defined by the partition {piqin . . .).

The expression

2A (M -0, <*«.„••• > • ˆ r –) ‘ where the numbers pi, qi,n . . . are fixed

and assumed to be in descending order of magnitude, the summation being for every partition {pqr . . .) of the number n, is defined to be the distribu- tion function of the objects defined by {pqr . . .) into the parcels defined by {piqin . . .). It gives a complete enumeration of n objects of whatever species into parcels of the given species. i. One-to-One Distribution. Parcels m in number {i.e. m=n). — Let h, be the homogeneous product-sum of degree s of Case I. the q Uant ities a, 0, y, . . . so that

(1-ax. l-0x. -yx. ...)- 1 = l+h 1 x+k 2 × 2 +h 3 × 3 +... fti = 2a = (l)

fe = So 2 + Sa,8=(2) + (l 2) /! 3 = Sa 3 + Saˆ-|-Sa/3 T = (3) + (21) + (l 3). Form the product h Pl h gi h Tl . . .

Any term in h Pl may be regarded as derived from pi objects dis- tributed into pi similar parcels, one object in each parcel, since the order of occurrence of the letters a, 0, y, . . . in any term is immaterial. Moreover, every selection of p\ letters from the letters in a p /S 3 7 r . . . will occur in some term of h Pv every further selection of qi letters will occur in some term of h gv and so on. Therefore in the product h Pl hg 1 h ri . . . the term a p q y r . . . , and there- fore also the symmetric function {pqr . . .), will occur as many times as it is possible to distribute objects defined by {pqr . . .) into parcels defined by {piqin . . .) one object in each parcel. Hence

SA (M r...), (Piai r r ..)-(Pi r) =*jiˆ • This theorem is of algebraic importance; for consider the simple particular case of the distribution of objects (43) into parcels (52), and represent objects and parcels by small and capital letters respectively. One distribution is shown by the scheme

AAAAABB

a a a a b b b wherein an object denoted by a small letter is placed in a parcel denoted by the capital letter immediately above it. We may interchange small and capital letters and derive from it a distribution of objects (52) into parcels (43) ; viz. : —

AAAABBB

a a a a a b b ‘ The process is clearly of general application, and establishes a one- to-one correspondence between the distribution of objects {pqr . . .) into parcels {piqˆi . . .) and the distribution of objects {piqiri . . .) into parcels (pqr . . .). It is in fact, in Case I., an intuitive observa- tion that we may either consider an object placed in

or attached to a parcel, or a parcel placed in or attached to an object. Analytically we have

Theorem. — ” The coefficient of symmetric function {pqr . . .) in the development of the product h Pl h n h ri … is equal to the coefficient of symmetric function {piqˆi . . .) in the development of the product

The problem of Case I. may be considered when the distributions are subject to various restrictions. If the restriction be to the effect that an aggregate of similar parcels is not to contain more than one object of a kind, we have clearly to deal with the elementary symmetric functions a it a 2 , a s , . . . or (1), (i 2), (i 3), ... in lieu of the quantities hi,hi,hi, . . . The distribution function has then the value a Pl a qi a ri … or (1»,) (1«,) (l’j)..., and by interchange of object and parcel we arrive at the well-known theorem of symmetry in sym- metric functions, which states that the coefficient of symmetric function {pqr . . .) in the development of the product a Pl a qi a ri … in a series of monomial symmetric functions, is equal to the coefficient of the function {piqˆi . . .) in the similar development of the product a p a q a r . . . .

The general result of Case I. may be further analysed with im- portant consequences. Write y.i = {X)xi,

X 2 = (2)x 2 + (1 2)ˆ,

X 3 = (3)x 3 -K21)x 2 xi + (l 3)x 3

and generally X„ = X{\fiv …)x\xˆx v …

the summation being in regard to every partition of s. Consider

the result of the multiplication —

X Pi X qi X n …=2J>xVx?x?...

1 2 3

To determine the nature of the symmetric function P a few definitions are necessary.

Definition I. — Of a number n take any partition (XiX 2 X 3 . . . X 8) and separate it into component partitions thus : —

(X 1 X 2)(X 3 X 1 X 5)(X 6)... in any manner. This may be termed a separation of the partition, the numbers occurring in the separation

being identical with those which occur in the partition. In the theory of symmetric functions the separation denotes the product of symmetric functions —

s a Xi /3 × 2So x 3 ˆ\ 47 × 5Sa x 6 . . .

The portions (Xi\ 2), (XˆXs), (Xe), . . . are termed separates, and if Xi-t-X» = £i, X 3 +X4+X5 = gi, \ = ri. . . be in descending order of magni- tude, the usual arrangement, the separation is said to have a species denoted by the partition {piqiri . . .) of the number n.

Definition II. — If in any distribution of n objects into n parcels (one object in each parcel), we write down a number J, whenever we observe £ similar objects in similar parcels we will obtain a succession of numbers £1, £ 2 , £3, . . . , where (fi, {2, | 3 . . .) is some parti- tion of n. The distribution is then said to have a specification denoted by the partition (!i£>{ 3 . . .).

Now it is clear that P consists of an aggregate of terms, each of which, to a numerical factor pres, is a separation of the partition

\ s i s i S a •••) °ˆ s P ec ‘ es (Piii r i- • ■)• Further, P is the distribution function of objects into parcels denoted by {piqin. . .), subject to the restriction that the distributions have each of them the specification

denoted by the partition (sf 1 ** 2 *”’) Employing a more general notation we may write

XˆXˆX* 3 … =ZPx t V“A;” s . . .

Pl V2 P3 «1 “! «

and then P is the distribution function of objects into parcels {p*ip**p n >...\ the distributions being such as to have the specifica- tion (V’ 1 *ˆ 3 …). Multiplying out P so as to exhibit it as a sum of monomials, we get a result —

X’lXˆX”’ 3 … = Z20*f 1 *°‘V , ‘ 3 ■ . .

Pl Pi P» \ 1 2 3 / «i «2 « 3

indicating that for distributions of specification (sf 1 ˆ 2 ** 3 —) there

are ways of distributing n objects denoted by (xˆ‘XˆX*, 3 …) amongst

n parcels denoted by (pˆPˆP* 3 -), one object in each parcel. Now

observe that as before we may interchange parcel and object, and that this operation leaves the specification of the distribution un- changed. Hence the number of distributions must be the same, and if

then also

This extensive theorem of algebraic reciprocity includes many known theorems of symmetry in the theory of Symmetric Functions.

The whole of the theory has been extended to include symmetric functions symbolized by partitions which contain as well zero and negative parts

2. The Compositions of Multipartite Numbers. Parcels denoted by (i m). — There are here no similarities between the parcels.

Let (71-1 7t 2 ir 3 …) be a partition of m. Case “■ (p?P?Pl z -) a partition of n.

Of the whole number of distributions of the n objects, there will be a certain number such that n\ parcels each contain pi objects, and in general ir, parcels each contain p, objects, where s = l, 2, 3, ...

Consider the product hˆh’V… which can be permuted in

Pl P2 P3

m ˆ—. — ways. For each of these ways &’ ˆ1 J■.’ ˆ Vˆ.. will be a dis-

hItˆIts!... pi P2 vi

tribution function for distributions of the specified type. Hence,

regarding all the permutations, the distribution function is

zii-r-irw*..

1! tt*\ ttA

7Tj! ir 2 ! Wil… Pl Pi

and regarding, as well, all the partitions of n into exactly m parts, the desired distribution function is

2-rrVCCC- [2v = m,2*p = n],

iri!rr 2 ! x 3 !... Pl ft Pl > r j>

that is, it is the coefficient of x” in (hiX+h 2 x i +h3X ! ‘-r. . .)”*. The value of ˆpˆpˆp”’...), (i m) is the coefficient of(/>p#»/>*»...)x” in

the development of the above expression, and is easily shown to have the value

(Pi+m-l\ ”’ (pt+m-l\ “■» (p,+m-l\ ‘» \ pi) \ P* J \ P*) ”’ _ (m\ /pi +m-2\ n /p 2 +m-2\ ** /p 3 +m-2\ “*

+ (m\ /Pi+m-3\ “■’ }pt+m-S\ “» /p,+m-3\ *«_

— ...to m terms. 1 Observe that when pi = p2 = pa — ■ ■ ■ =7ti=7T2=T3. . . =1 this ex- pression reduces to the »nth divided differences of o” . The ex pression

gives the compositions of the multipartite number pˆpˆp** . . . into

m parts. Summing the distribution function from m = \ to « = oo and putting x—i, as we may without detriment, we find that the

totality of the compositions is given by ˆ _’ A Jˆ-h – which

may be given the form I _2’(a 1 — 0,+ai — ...) ‘ Adding £ we bring

this to the still more convenient form

, 1

*l-2(o 1 o, +«,...)•

Let F(/>* 1 £j*/>j’...)denote the total number of compositions of the multipartite pˆpˆK... Then Jfr2ˆ = £+SF(/))o p , and thence

F(p) = 2 P ” 1 . Again * 1 _ 2 < a +g-ajB) = i+SF^^aP'^.andexpand- ing the left-hand side we easily find

Ff *,„**1 gp-m»-lfo+fo) •’ o**>.4.i»-2 (ft+fe-l)l

+Z 2!(fc-2)!(fc-2)! -•

We ha ve found t hat the number of compositions of the multi- partite pip2p3...p, is equal to the coefficient of symmetric function (pip2p3... pa) or of the single term a Pl a P2 a P8 ...a p * in the development

according to ascending powers of the algebraic fraction

1 * ■

? 1 —2(2oi — 2aia2-|-2oia2a3 — ... + (—)* +1 Oi020a… a.

This result can be thrown into another suggestive form, for it can be proved that this portion of the expanded fraction

, 1 , „

2 ‘ jl-(i(2o 1 +a 2 +...+a s)((l-/2(2a 1 +Ja 2 +,..+a,))...(l-(,(2a 1 +2a 2 +...+2a,)}>

which is composed entirely of powers of

tiCLi, 2 2 Cl2, /3A3, .../«a t

has the expression

1 I

2 1— 2(2iia i — 2ii/2«l <*2 + 2/i/2/ 3ˆ a 2 a3-...+(—)s+li 1 / a . ../««! a2…tt g)»

and therefore the coefficient of o Pl o Pl …a Ps in the latter fraction,

1 2 « ‘

when

the same term in the product

i(2a 1 a2...+a s)“i(2ai+2a 2 l...a s) p 2…(2a 1 -l-2a2...+2a.) p ‘-
This result gives a direct connexion between the number of composi- tions and the permutations of the letters in the product oˆa’ 2 ..ˆ”.

Selecting any permutation, suppose that the letter Or occurs q r times in the last p,+p r i...p, places of the permutation; the co- efficient in question may be represented by jS29 1 9 2+ – ■ + 9”, the summation being for every permutation, and since qi = pi this may be written

2Pl- 1 Z2«2+9S+— +9a.

Ex. Gr. — For the bipartite 22 , p\ = p 2 = 2 , and we have the following scheme : —

01 fli oactj §2 = 2

Cll <*2 CLi d2 = = 1

o.\ 02 0.2 ai =1

a 2 0.1 ttj aj =1

Ct2 Ctj a2 a i = = 1

02 a 2 &i <*i = =s

Hence F(22) = 2 (2 2 +2 +2 +2 +2 +2°) =

We may regard the fraction

= 26.

i . (l-/ 1 (2a 1 +a 2 +...+a,) j (l-/,(2ai+2a ! +...+a.)) ... {l-*.(2a 1 +2 OS +...+2a.) j '

as a redundant generating function, the enumeration of the compositions being given by the coefficient of

(Aai) P1 («2

[The transformation of the last section involves The theory a comprehensive theory of Permutations, which it is ofpermu- convenient to discuss shortly here. tations.

If Xi, X 2 , X 3 , ... X„ be linear functions given by the matricular relation

(Xi, X 2 , ... X„ = (on O12 ...

a n i a n 2 ... a nn that portion of the algebraic fraction,

1

(1 – JjXjXI -* 2 X 2) ... (1 -SnXnV

which is a function of the products siˆi, S2X2, s 3 × 3 . . .s„x n only is 1ˆ

|(1— 011*1X0(1— 022*2*2) (l—a33S3*3) ... (1— a„nS„X n)\

where the denominator is in a symbolic form and denotes on expansion

1— 5|anlsia;i+ Sjaiia22[siS2ˆ1*2 — ••• + (—) n \au < '22

where |on|, |ono 22 | ; . . .|ono 2 2,. . .a„ n | denote the several co-axial minors of the determinant

of the matrix. (For the proof of this theorem see MacMahon, ” A certain Class of Generating Functions in the Theory of Numbers,” Phil. Trans. R. S. vol. clxxxv. A, 1894). It follows that the co- efficient of

x il xˆ...x (n

1 I »

in the product

(0]l*l+ai2>:2+'-+

is equal to the coefficient of the same term in the expansion ascending- wise of the fraction

1

1— 2|0nbi-f-Siaiia 2 2U 1 *2 — ... + ( )”|cn0 2 2... I*i*s... *»' If the elements of the determinant be all of them equal to unity, we obtain the functions which enumerate the unrestricted permu tations of the letters in

*i *2 ” ”’

. (xi+x 2 +.,

1

3nd l-(*l+*2 + ...+*»)

Suppose that we wish to find the generating function for the enumeration of those permutations of the letters inx=ixˆ2 . . . x|” which are such

that no letter x H is in a position originally occupied by an x 3 for all values of s. This is a generalization of the ” Probleme des rencontres” or of ” derangements.” We have merely to put

On = 022 = ass — ... — a,.n =

and the remaining elements equal to unity. The generating product is

{x 2 +x s +...+x n)^{x l xs...+x n)K.(x 1 +x i +...+x n – 1) in ,

and to obtain the condensed form we have to evaluate the co-axial minors of the invertebrate determinant —

1 1 ... 1

1 1 ... 1 1 1 ... 1

1 i 1 ... 6

The minors of the ist, 2nd, 3rd. . . »th orders have respectively the values

-1

+2

therefore the generating function is

1

-1),

1 — ZX1X2 — 2~S.XxXi.Xi or writing

(x—Xi)-{x—x 2)...(x this is

... — sXxiXi...x i+ i — ... — (n

Xn) — X -~

l)XiX2...X n ‘

aix^+azX”- 2 — ...,

1 — 02 — 2o 3 — 3o 4 — ... — (» — l)o„ Again, consider the general problem of ” derangements.” We have to find the number of permutations such that exactly m of the letters are in places they originally occupied. We have the particular redundant product

(axi+X2+...+x n) il (x 1 +ax i +...+x„) i2 ...(x l X2...+axJ in ‘ in which the sought number is the coefficient of a m x^x^ 2 ...xi”. The true generating function is derived from the determinant

1 1 1 . .

loll..

1 1 a 1 . . 1 1 1 a . .

and has the form

1

l-o2*i + (o- lHu + l)^^- ..i(-)»(a-l)»- 1 (a + »- l)x iX2 ..Jc n .

It is clear that a large class of problems in permutations can be solved in a similar manner, viz. by giving special values to the elements of the determinant of the matrix. The redundant pro- duct leads uniquely to the real generating function, but the latter has generally more than one representation as a redundant product, in the cases in which it is representable at all. For the existence of a redundant form, the coefficients of x\,x%, . . .x\X 2 . . . in the denominator of the real generating function must satisfy 2”— n 2 + n— 2 conditions, and assuming this to be the case, a redundant form can be constructed which involves n—i un- determined quantities. We are thus able to pass from any par- ticular redundant generating function to one equivalent to it, but involving n— 1 undetermined quantities. Assuming these quantities at pleasure we obtain a number of different algebraic products, each of which may have it) own meaning in arithmetic,

and thus the number of arithmetical correspondences obtainable is subject to no finite limit (cf. MacMahon, loc. cit. pp. 125 et seq.)]

3. The Theory of Partitions. Parcels defined by (m).— When an ordinary unipartite number n is broken up into other numbers, and the order of occurrence of the numbers is immaterial, „ the collection of numbers is termed a partition of the se

number n. It is usual to arrange the numbers comprised in the collection, termed the parts of the partition, in descending order of magnitude, and to indicate repetitions of the same part by the use of exponents. Thus (321 11), a partition of 8, is written (32 1 3). Euler’s pioneering work in the subject rests on the observation that the algebraic multiplication

x a Xx t Xx c X… = x’ ,w -‘ + …

is equivalent to the arithmetical addition of the exponents a, b, c,

He showed that the number of ways of composing n with p integers drawn from the series o, b, c, . . . , repeated or not, is equal to the coefficient of P'x" in the ascending expansion of the fraction

_1

1 — f*°. 1 — fx 6 . 1 — {x c . ...' which he termed the generating function of the partitions in question.

If the partitions are to be composed of p, or fewer parts, it is

merely necessary to multiply this fraction by -~z. Similarly, if

the parts are to be unrepeated, the generatingTunctionis the algebraic product

(i+f**)a+r*)(i+f*9...;

if each part may occur at most twice,

(1 +{■*» +fV) (1 -r-fs'+J- 2 * 26) (1 tx'[image]COMBINATORIAL ANALYSIS

The constant term is

22-^- a..

Let av be a value of x which makes the fraction infinite. The residue of

222-

<-A„i

(

is equal to the residue of

222-

^.M

and when v = n, the residue vanishes, so that we have to consider

22-

"A l>t

<(1-^) A

and the residue of this is, by the first lemma, -Z2ˆ>

which proves the lemma. TakeF(x) ˆ n(1 _ˆ)a l x6) ˆˆ ˆ.sincethesought number

is its constant term.

Let p be a root of unity which makes /(x) infinite when substituted for x. The function of which we have to take the residue is 2p- n e M /(pe _I)

_ T Pˆg”

-2, (“1 – P °e- M)(l pVˆO.-.U p’e‘ 1) We may divide the calculation up into sections by considering separately that portion of the summation which involves the primi- tive gtn roots of untiy, q being a divisor of one of the numbers a, b,. . .1. Thus the gth wave is

(1-p£

*)(i-pjr te)...(i-p’ fl O

which, putting — for p 8 and p = n+i(a+b+...+l), may be written Pi

(p |a g iox _ p -i V-iaz) (pitgite _ p -i V ite) . . . (p\ l e ilx – p-i V 4to)

and the calculation in simple cases is practicable. Thus Sylvester finds for the coefficient of x” in

1

1 — x. 1 — x 2 . 1 — X 3

the expression jˆ — =ˆ— -g(—)”+q(p’ 3 +p~”)’

where ?=»+3.

Sylvester, Franklin, Durfee, G. S. Ely and others have evolved a constructive theory of partitions, the object of

which is the contemplation of the partitions them- Syivestei's se i veS; anc i the evolution of their properties from a meSioA study of their inherent characters. It is concerned

for the most part with the partition of a number into parts drawn from the natural series of numbers i, 2, 3 . . . . Any partition, say (521) of the number 8, is represented by nodes placed in order at the points of a rectangular lattice,

I— — < > •— –

when the partition is given by the enumeration of the nodes by lines. If we enumerate by columns we obtain another partition of 8, viz. (321 3), which is termed the conjugate of the former. The fact or conjugacy was first pointed out by Norman Macleod Ferrers. If the original partition is one of a number n in i parts, of which the largest is j, the conjugate is one into j parts, of which the largest is i, and we obtain the theorem : — " The

number of partitions of any number into • Dart – S or f ewer a

equal to j . ,

having the largest part equalorlessthani > remains the same

when the numbers i andy are interchanged."

The study of this representation on a lattice (termed by

Sylvester the " graph ") yields many theorems similar to that just given, and, moreover, throws considerable light upon the expan- sion of algebraic series.

The theorem of reciprocity just established shows that the number of partitions of n into j parts or fewer, is the same as the number of ways of composing n with the integers 1, 2, 3,. . .j. Hence we can

expand x _ fl j _ ax _ j _ a%%x _ axK _ ad inf _ in ascending powers of a;

for the coefficient of a'x" in the expansion is the number of ways of composing n with j or fewer parts, and this we have seen in the

coefficients of x" in the ascending expansion of t _ , _. — ■. _ r

Therefore

1 — a. 1 — ax. 1 — ax 1 …. ‘

■i + r^ + T

l-* T l-x 1-x* + T ‘

+ …

1-x. l-x 2 ….l-x > * ”” The coefficient of a’x” in the expansion of

1

1 — a. 1 —ax. 1 —ax 2 . …1 —ax’ denotes the number of ways of composing n with j or fewer parts, none of which are greater than i. The expansion is known to be 1 -x > 1 . 1 -«’ 2 . …1 -x > + i . S 1-x. -x…-x i *• It has been established by the constructive method by F. Franklin {Amer. Jour, of Math. v. 254), and shows that the generating function for the partitions in question is

1 -x’ + 1 . 1 -x’ + 2 . …1 -x’ + *’

1— X. 1— x 2 .

.l-x i

which, observe, is unaltered by interchange of i and j.

Franklin has also similarly established the identity of Euler

(1 -x){l -x 2)(l -x^)…ad inf. = E()ixi < -Sfl-i-fl,

known as the ” pentagonal number theorem,” which on interpretation shows that the number of ways of partitioning n into an even number of unrepeated parts is equal to that into an uneven number, except when n has the pentagonal form i (3J 2 + i) , .7 positive or negative, when the difference between the numbers of the’partitions

is (■-)’■

To illustrate an important dissection of the graph we will consider those graphs which read the same by columns as by lines; these are called self- conjugate. Such a graph may be obvi- ously dissected into a square, containing say 2 nodes, and into two graphs, one lateral and on = subjacent, the latter being • • • the conjugate of the former. The former • • graph is limited to contain not more than • 6 parts, but is

subject to no other con- • dition. Hence the number of self -conjugate ■

partitions of n which are associated with a square of 2 nodes is clearly equal to the number of partitions of \{n— 6 2) into 6 or few parts, i.e. it is the coefficient of xJO – *) ; n

1

1

-x. 1 —x 2 .l — x 3 ….l –

or of *» in l-*».l-*M-*«….l-«M’

and the whole generating function is

1 + 2

1-x 2 . 1-x 4 . 1-x 6 ….!-

Now the graph is also composed of 8 angles of nodes, each angle containing an uneven number of nodes; hence the partition is transformable into one containing unequal uneven numbers. In the case depicted this partition is (17, 9, 5, 1). Hence the number of the partitions based upon a square of 8 2 nodes is the coefficient of o s x” in the product (1 + ax)(i + ax 3)(i + ax 6) . . . (1 --ax 2s + 1) . . . , and thence

the coefficient of a 9 in this product is 1 _„ 2 i _ , 1 _ˆ ˆ — vˆ ‘

and we have the expansion

(l + ox)(l + ox 3)(l + ax 5). ..ad inf.

= 1 +

1-

5» +

1 -x 2 . 1 ■

- 4 a* +

1-x 2 . 1-x 4 . 1-

3° 3 +-

Again, if we restrict the part magnitude to i, the largest angle of nodes contains at most 21 — 1 nodes, and based upon a square of 2 nodes we have partitions enumerated by the coefficient of a x r ‘ in the product (1 +ax)(i -f ax s)(l +ax 5) . . . (1 +ox 2, ‘ _1) ; moreover the same number enumerates the partition of \{n—(P) into 8 or fewer parts, of which the largest part is equal to or less than i—8, and. is thus given by the coefficient of x* u ‘ ” in the expansion of

1 -x’-« H .i -z’-s+g.i -xi-e+i. .,,1 .

1-x. 1-x 2 . l-x 3 . ...l-x»

,1-xK 1-x 6 . ...X-xW

1-r nence the expansion

(l+ax)(l+ax 3)(l+axˆ)...(l+ax ii – 1)

■x&;

” 1+ £ 1-* 2 .1-*<.1-*°....1-*** ***

There is no difficulty in extending the graphical method to three _ dimensions, and we have then a theory of a special kind

to three dimen- sions.

of partition of multipartite numbers. Of such kind is the partition

{aiOid.3—, bib 2 b 3 …, C1C2C3…, ...) of the multipartite number

if

(ai+ii+ci+..., a 2 +b 2 +c 2 +..., a 3 +b 3 +Cs +)

asˆi.SiCsˆ...,

for then the graphs of the parts aia 2 a3…, 616263-.., ... are superposable, and we have what we m ay term a regular graph in three dimensio ns. Thus the partition (643, 632, 411) of the multipartite

(16, 8, 6) leads to the graph

d> ® ® <§> ©

©

(D © © •

and every such graph is readable in six ways, the axis of z being perpendicular to the plane of the paper.

Ex. Gr. Plane parallel to xy, direction Ox reads(643,632,411)

xy, yz, yz, zx, zx,

Oy Oy Oz Oz Ox

(333211 , 332111,3111 00) (333,331, 321 , 211 , 110 , 110) (333,322,321 ,310,200,20 0) (333322,3221 00,321 000) (664,431,321)

the par ti tions hav ing reference to the multipartite numbers 16, 8, 6, 976422, 13, 11, 6, which are brought into relation through the medium of the graph. The graph in question is more conveniently represented by a numbered diagram, viz. —

3 3 3 3 2 2 3 2 2 1 3 2 1

and then we may evidently regard it as a unipartite partition on the points of a lattice,

the descending order of magnitude of part being maintained along every line of route which proceeds from the origin in the positive directions of the axes.

This brings in view the modern notion of a partition, which has enormously enlarged the scope of the theory. We consider any number of points in piano or in solido connected (or not) by lines in pairs in any desired manner and fix upon any condition, such as is implied by the symbols i, >, =, <, ˆ, ˆ, as affecting any pair of points so connected. Thus in ordinary unipartite partition we have to solve in integers such a system as

«liOliO)i in,

ai + 02 + 03 + ... +o„ = «, the points being in a straight line. In the

simplest example of the three-dimensional graph we have to solve the system

eiiˆa? 03—

01 + 02 + 03 + 04 = »,

and a system for the general lattice constructed upon the same principle. The system has been discussed by MacMahon, Phil. Trans, vol. clxxxvii. A, 1896, pp. 619-673, with the conclusion that if the numbers of nodes along the axes of x, y, z be limited not to

exceed the numbers m, n, I respectively, then writing for brevity 1—x' = (s), the generating function is given by the product of the factors

(J + l) (1) •

(1 + 2)

(2) •

(1 + 2)

(2) ••

(1 + 3)

(3) ••

(l + m)

(m)

(l + m + 1)

(m + 1)

(l + n) (n) ■

(l + n + 1) (n + 1) •■

(l + m + n-1) (m + n — 1)

one factor appearing at each point of the lattice.

In general, partition problems present themselves which depend upon the solution of a number of simultaneous relations in integers of the form

Xiai + X 2 O2 + X3o 3 4-...^0, the coefficients X being given positive or negative integers, and in some cases the generating function has beer, determined in a form which exhibits the fundamental solutions of the problems from which all other solutions are derivable by addition. (See MacMahon, Phil. Trans, vol. excii. (1899), pp. 351-401; and Trans. Camb. Phil. Soc. vol. xviii. (1899), pp. 12-34.)

The number of distributions of n objects (pip 2 p 3 . . .) into parcels (m) is the coefficient of b m (p 1 p 2 p s . . .)x n in the development of the fraction. Method at

1 symmetric

(l—bax.l-b0x.l-byx… 1 functions.

X(l-b

and if we write the expansion of that portion which involves products of the letters a, 0, 7, . . . of degree r in the form

l + h ri bx r h n b i x^..., we may write the development

'If (l + h r .bx r h r ,b 2 × 2 '-...),

r-1 ' *

and picking out the coefficient of b m x n we find Vh T] h Tl h Tl …,

t\ t 2 t 3

'Zr = m, 2rt = n.

where

The quantities h are symmetric functions of the quantities a, 0, y, . . . which in simple cases can be calculated without difficulty, and then the distribution function can be formed.

Ex. Gr.— Required the enumeration of the partitions of all multi-partite numbers (pip 2 p 3 . . .) into exactly two parts. We find

h 2 i = h i -h 3 hi + h\

h 3 2 = h — hnhi + hth 2

h^hi — hhi + htlh — hihs + h^ and paying attention to the fact that in the expression of fc the term h r is absent when r is uneven, the law is

clear. The generating function is

fhx i +h 2 h 1 × 3 + (h i +hl)x i + (h i h+h s h)x 6 + (h e +2h i h 2)x e + (hh l +hJh+h i h 3)x'+(h+2h}h+h\)x s +... Taking h i +h\ = h i +{(2) + (V)}^

= 2(4) +3(31) +4(2S)+5(21 2)+7(1<), the term 5(2I 2) indicates that objects such as a, a, 6, c can be partitioned in five ways into two parts. These are a\a, b, c\ b\ a, a, c; c\ a, a, b; a, a\ 6, c; a, 6 1 a, c. The function \, has been studied. (See MacMahon, Proc. Land. Math. Soc. vol. xix.) Putting x equal to unity, the function may be written (h +hi+h e + ...) (l+hi+h 2 +h 3 +hi + ...), a convenient formula.

The method of differential operators, of wide application to problems of combinatorial analysis, has for its leading idea the designing of a function and of a differential operator, M th d , so that when the operator is performed upon the func- differ"- tion anumberisreachedwhichenumeratesthesolutions entmi of the given problem. Generally speaking, the prob- °P erators – lems considered are such as are connected with lattices, or as it is possible to connect with lattices.

To take the simplest possible example, consider the problem o(finding the number of permutations of n different letters. The

function is here x", and the operator (J) * = ^ x < yielding S x x n = nl

the number which enumerates the permutations. In fact —

S x x n = h x .x.x.x.x.x

and differentiating we obtain a sum of n terms by striking out an x from the product in ali possible ways. Fixing upon any one of

these terms, say x.^.x.a; , we again operate with 5 X by striking

out an x in all possible ways, and one of the terms so reached is

x.f .x .$ .x Fixing upon this term, and again operating and

continuing the process, we finally arrive at one solution of the problem, which (taking say n =4) may be said to be in

correspondence with the operator diagram—

8.

or say

1

S x

1

8,

1

5*

1

the number in each row of compartments denoting an operation of S x . Hence the permutation problem is equivalent to that of placing n units in the compartments of a square lattice of order n in such manner that each row and each column contains a single unit. Observe that the method not only enumerates, but also gives- a process by which each solution is actually formed. The same problem is that of placing n rooks upon a chess-board of w 2 com- partments, so that no rook can be captured by any other rook.

Regarding these elementary remarks as introductory, we proceed to give some typical examples of the method. Take a lattice of m columns and « rows, and consider the problem of placing units in the compartments in such wise that the 5th column shall contain X s units (s = i, 2, 3, . . . m), and the tth row p t units (t=l, 2, 3, . . .»).

Writing

1 --a i x--(v i x i + ...+... = (l-f ai*)(l +ct2#) (l--a s x).. .

andD r =T-j(8 0l + aAj + a 2 6a 3 +•••)". the multiplication being symbolic, so that Dp is an operator of order p, the function is

C\ 1 d\ 2 0\ 3 …(lx m ,

and the operator T) Pl D P2 Dj, r ..D Pn . The number D Pl D Pr ..D Vn a Xl a Xi a X3 …a Xm enumerates the solutions. For the mode of operation of D p upon a product reference must be made to the

section on ” Differential Operators ” in the article Algebraic Forms. Writing

= ... + A2a, a

or, in partition notation,

(l A i)(l*V.(l x -») = ...A(^ 2 .../> „)..., D, 1 D P2 ...D 1J „(1M)(1^)... (1 > „0 = A,

and the law by which the operation is performed upon the product shows that the solutions of the given problem are enumerated by the number A, and that the process of operation actually represents each solution. Ex. Gr.~ Take Xj = 3, X 2 = 2, Xi = 1,

£1 = 2, pi = 2, p 3 = l, pt = l,

D 2 Dia 3 a 2 Oi = 8, and the process yields the eight diagrams : —

1

1

1

1

1

1

1 1

1

1

1

1

1

1

1

1

1

1

1

1

1 1

1

1

1

1

1

1

1 1

1

1

1

1

1 1

1 1

—

1 1

1 1

—

1

1

1

1

1

1

viz. every solution of the problem. Observe that transposition of the diagrams furnishes a proof of the simplest of the laws of symmetry in the theory of symmetric functions.

For the next example we have a similar problem, but no restriction is placed upon the magnitude of the numbers which may appear in the compartments. The function is now hxjhxˆ ... h\ m , hy, m being

the homogeneous product sum of the quantities a, of order X. operator is as before

DpjDpj, ... Dp w

The

and the solutions are enumerated by

Dp D p

■ Dp h K .

n 1 2

A

Putting as before Xi = 3, X 2 = 2, X 3 = i, £1 = 2, £2 = 2, ps-i, pi = i, the reader will have no difficulty in constructing the diagrams of the eighteen solutions.

The next and last example of a multitude that might be given shows the extraordinary power of the method by solving the famous problem of the ” Latin Square,” which for hundreds of years had proved beyond the powers of mathematicians. The problem consists in placing n letters a, b, c,...n in the compartments of a square lattice of « 2 compartments, no compartment being empty, so that no letter occurs twice either in the same row or in the same column. The function is here

(

Xa?

,»-2

and the operator D ” , the enumeration being given by

2 -1

See Trans. Camb. Phil. Soc. vol. xvi. pt. iv. pp. 262-290.

Authorities. — P. A. MacMahon, ” Combinatory Analysis: A Review of the Present State of Knowledge,” Proc. Land. Math. Soc. vol. xxviii. (London, 1897). Here will be found a bibliography of the Theory of Partitions. Whitworth, Choice and Chance ; Edouard Lucas, ThSorie des nombres (Paris, 1891); Arthur Cayley, Collected Mathematical Papers (Cambridge, 1898), ii. 419; iii. 36, 37; iv. 166- 170; v. 62-65, 617; vii. 575; ix. 480-483; x. 16, 38, 611; xi. 61, 62, 357-364. 589-591; xii. 217-219, 273-274; xiii. 47, 93-113, 269; Sylvester, Amer. Jour, of Math. v. 119 251 ; MacMahon, Proc. Lond. Math. Soc. xix. 228 et seq.; Phil. Trans, clxxxiv. 835-901; clxxxv. 111-160; clxxxvii. 619-673; cxcii. 351-401; Trans. Camb. Phil. Soc. xvi. 262-290. • “\ (P. A. M.)

COMBUSTION (from the Lat. comburere, to burn up), in chemistry, the process of burning or, more scientifically, the oxidation of a substance, generally with the production of flame and the evolution of heat. The term is more customarily given to productions of flame such as we have in the burning of oils, gas, fuel, &c, but it is conveniently extended to ether cases of oxidation, such as are met with when metals are heated for a long time in air or oxygen. The term ” spontaneous com- bustion ” is used when a substance smoulders or inflames apparently without the intervention of any external heat or light; in such cases, as, for example, in heaps of cotton-waste soaked in oil, the oxidation has proceeded slowly, but steadily, for 6ome time, until the heat evolved has raised the mass to the temperature of ignition.

The explanation of the phenomena of combustion was at- tempted at very early times, and the early theories were generally bound up in the explanation of the nature of fire or flame. The idea that some extraneous substance is essential to the process is of ancient date; Clement of Alexandria (c. 3rd century a.d.) held that some ” air ” was necessary, and the same view was accepted during the middle ages, when it had been also found that the products of combustion weighed more than the original combustible, a fact which pointed to the

conclusion that some substance had combined with the combustible during the process. This theory was supported by the French physician Jean Ray, who showed also that in the cases of tin and lead there was a limit to the increase in weight. Robert Boyle, who made many researches on the origin and nature of fire, regarded the increase as due to the fixation of the particles of fire. Ideas identical with the modern ones were expressed by John Mayow in his Tractatus quinqtte medico- physici (1674), but his death in 1679 undoubtedly accounts for the neglect of his suggestions by his contemporaries. Mayow perceived the similarity of the processes of respiration and combustion, and showed that one constituent of the atmosphere, which he termed spiritus nitro-aereus, was essential to combustion and life, and that the second constituent, which he termed spiritus nitri acidi, inhibited combustion and life. At the beginning of the 18th century a new theory of com- bustion was promulgated by Georg Ernst Stahl. This theory regarded combustibility as due to a principle named phlogiston (from the Gr. (fiKoyurroS, burnt), which was present in all combustible bodies in an amount proportional to their degree of combustibility; for instance, coal was regarded as practically

pure phlogiston. On this theory, all substances which could be burnt were composed of phlogiston and some other substance, and the operation of burning was simply equivalent to the liberation of the phlogiston. The Stahlian theory, originally a theory of combustion, came to be a general theory of chemical reactions, since it provided simple explanations of the ordinary chemical processes(when regarded qualitatively) and permitted generaliza- tions which largely stimulated its acceptance. Its inherent defect — that the products of combustion were invariably heavier than the original substance instead of less as the theory de- manded — was ignored, and until late in the 18th century it dominated chemical thought. Its overthrow was effected by Lavoisier, who showed that combustion was simply an oxidation, the oxygen of the atmosphere (which was isolated at about this time by K. W. Scheele and J. Priestley) combining with the substance burnt.

COMEDY, the general term applied to a type of drama the chief object of which, according to modern notions, is to amuse. It is contrasted on the one hand with tragedy and on the other with farce, burlesque, &c. As compared with tragedy it is dis- tinguished by having a happy ending (this being considered for a long time the essential difference), by quaint situations, and by lightness of dialogue and character-

drawing. As compared with farce it abstains from crude and boisterous jesting, and is marked by some subtlety of dialogue and plot. It is, however, difficult to draw a hard and fast line of demarcation, there being a distinct tendency to combine the characteristics of farce with those of true comedy. This is perhaps more especially the case in the so-called ” musical comedy,” which became popular in Great Britain and America in the later 19th century, where true comedy is frequently subservient to broad farce and specta- cular effects.

The word ” comedy ” is derived from the Gr. KUnqSia, which is a compound either of kw/xos (revel) and doi56s (singer; a.ei8eu>, adeiv, to sing), or of Ko>ixr\ (village) and aoidos: it is possible that kw.uos itself is derived from koijutj, and originally meant a village revel. The word comes into modern usage through the Lat. comoedia and Ital. commedia. It has passed through various shades of meaning. In the middle ages it meant simply a story with a happy ending. Thus some of Chaucer’s Tales are called comedies, and in this sense Dante used the term in the title of his poem, La Commedia (cf. his Epistola X., in which he speaks of the comic style as ” loquutio vulgaris, in qua et mulierculae communicant”; again “comoedia vero remisse et humiliter”; “differt a tragoedia per hoc, quod t. in principio est admirabilis et quieta, in fine sive exitu est foetida et horri- bilis “). Subsequently the term is applied to mystery plays with a happy ending. The modern usage combines this sense with that in which Renaissance scholars applied it to the ancient comedies.

The adjective ” comic ” (Gr. kco/ukos), which strictly means that which relates to comedy, is in modern usage generally confined to the sense of “laughter-provoking”: it is distin- guished from ” humorous ” or ” witty ” inasmuch as it is applied to an incident or remark which provokes spontaneous laughter without a special mental effort. The phenomena connected with laughter and that which provokes it, the comic, have been carefully investigated by psychologists, in contrast with other phenomena connected with the emotions. It is very generally agreed that the predominating characteristics are incongruity or contrast in the object, and shock or emotional seizure on the part of the subject. It has also been held that the feeling of superiority is an essential, if not the essential, factor: thus Hobbes speaks of laughter as a ” sudden glory.” Physiological explanations have been given by Kant, Spencer and Darwin. Modern investigators have paid much attention to the origin both of laughter and of smiling, babies being watched from infancy and the date of their first smile being carefully recorded. For an admirable analysis and account of the theories see James Sully, On Laughter (1902), who deals

generally with the develop- ment of the ” play instinct ” and its emotional expression. See Drama ; also Humour ; Caricature ; Play, &c.

COMENIUS (or Komensky), JOHANN AMOS (1592-1671), a famous writer on education, and the last bishop of the old church of the Moravian and Bohemian Brethren, was born at Comna, or, according to another account, at Niwnitz, in Moravia, of poor parents belonging to the sect of the Moravian Brethren. Having studied at Herborn and Heidelberg, and travelled in Holland and England, he became rector of a school at Prerau, and after that pastor and rector of a school at Fulnek. In 16 21 the Spanish invasion and persecution of the Protestants robbed him of all he possessed, and drove him into Poland. Soon after he was made bishop of the church of the Brethren. He supported himself by teaching Latin at Lissa, and it was here that he pub- lished his Pansophiae prodromus (1630), a work on education, and his lanua linguarum reserata (163 1), the latter of which gained for him a widespread reputation, being produced in twelve European languages, and also in Arabic, Persian and Turkish. He subsequently published several other works of a similar kind, as the Eruditionis scholasticae janua and the Janua linguarum trilinguis. His method of teaching languages, which he seems to havebeen the first to adopt, consisted in giving, in parallel columns, sentences conveying useful information, in the vernacular and the languages intended to be taught {i.e. in Comenius’s works, Latin and sometimes Greek). In some of his books, as the Orbis sensuaiium pictus (1658), pictures are added; this work is, indeed, the first children’s picture-book. In 1638 Comenius was requested by the government of Sweden to draw up a scheme for the management of the schools of that country; and a few years after he was invited to join the com- mission that the English parliament then intended to appoint, in order to reform the system of education. He visited England in 1 64 1, but the disturbed state of politics prevented the appoint- ment of the commission, and Comenius passed over to Sweden in August 1642. The great Swedish minister, Oxenstjerna, obtained for him a pension, and a commission to furnish a plan for regulating the Swedish schools according to his own method. Devoting himself to the elaboration of his scheme, Comenius settled first at Elbing, and then at Lissa; but, at the burning of the latter city by the Poles, he lost nearly all his manuscripts, and he finally removed to Amsterdam, where he died in 1671.

As an educationist, Comenius holds a prominent place in history. He was disgusted at the pedantic teaching of his own day, and he insisted that the teaching of words and things must go together. Languages

should be taught, like the mother tongue, by conversation on ordinary topics; pictures, object lessons, should be used; teaching should go hand in hand with a happy life. In his course he included singing, economy, politics, world-history, geography, and the arts and handicrafts. He was one of the first to advocate teaching science in schools.

As a theologian, Comenius was greatly influenced by Boehme. In his Synopsis physicae ad lumen divinum reformatae he gives a physical theory of his own, said to be taken from the book of Genesis. He was also famous for his prophecies and the support he gave to visionaries. In his Lux in tenebris he published the visions of Kotterus, Dabricius and Christina Poniatovia. At- tempting to interpret the book of Revelation, he promised the millennium in 1672, and guaranteed miraculous assistance to those who would undertake the destruction of the Pope and the house of Austria, even venturing to prophesy that Cromwell, Gustavus Adolphus, and Rakoczy, prince of Transylvania, would perform the task. He also wrote to Louis XIV., informing him that the empire of the world should be his reward if he would overthrow the enemies of God.

Comenius also wrote against the Socinians, and published three historical works — Ratio disciplinae ordinisque in imitate fralrum Bohemorum, which was republished with remarks by Buddaeus, Historic, persecutionum ecclesiae Bohemicae (1648), and Martyrologium Bohemicum. See Raumer's Geschichte der Pddogogik, and Carpzov's Religionsuniersuchung der bohmischen und mahrischen Briider.

COMET (Gr. ko/liˆtijs, long-haired), in astronomy, one of a class of seemingly nebulous bodies, moving under the influence of the sun's attraction in very eccentric orbits. A comet is visible only in a small arc of its orbit near perihelion, differing but slightly

from the arc of a parabola. An obvious but not sharp classi- fication of comets is into bright comets visible to the naked eye, and telescopic comets which can be seen only with a telescope. The telescopic class is much the more numerous of the two, only from 20 to 30 bright comets usually appearing in any one century, while several telescopic comets, frequently 6 or 8, are generally observed in the course of a year.

A bright comet consists of (1) a star-like nucleus; (2) a nebu- lous haze, called the coma, surrounding this nucleus, the latter fading into the haze by insensible gradations; (3) a tail or luminous stream flowing from the coma in a direction opposite to that of the sun. The nuclei and comae of different comets exhibit few peculiarities to the unaided vision except in respect to brightness; but the tails of comets differ widely, both in brightness and in extent. They range from a barely visible brush or feather of light to a phenomenon extending over a considerable arc of the heavens, which, comparatively bright near the head of the comet, becomes gradually fainter and more diffuse towards its end, fading out by gradations so insensible that a precise length cannot be assigned to it. When a telescopic comet is first discovered the nucleus is frequently invisible, the object presenting the appearance of a faint nebulous haze, scarcely distinguishable in aspect from a nebula. When the nucleus appears it may at first be only a comparatively faint condensation, and may or may not develop into a point of light as the comet approaches the sun. A tail also is generally not seen at great distances from the sun, but gradually develops as the comet approaches perihelion, to fade away again as the comet recedes from the sun.

A few comets are known to revolve in orbits with a regular period, while, in the case of others, no evidence is afforded by observation that the orbit deviates from a parabola. Were the orbit a parabola or hyperbola the comet would never return (see Orbit). Periodicity may be recognized in two ways: observations during the apparition may show that the motion is in an elliptic and not in a parabolic orbit; or a comet may have been observed at more than one return. In the latter case the comet is recognized as distinctly periodic, and therefore a member of the solar system. The shortest periods range between 3 and 10 years. The majority of comets which have been ob- served are shown by observation to be periodic; the period is usually very long, being sometimes measured by centuries, but generally by thousands of years. It is conceivable that a comet might revolve in a hyperbolic orbit. Although there are several of these bodies observations on which indicate such an orbit, the deviation from the parabolic form has not in any case been so well marked as v to be fully established. Circumstances lead to the classification of newly appearing comets as expected and unexpected. An expected comet is a periodic one of which the return is looked for at a determinate time and in a certain region of the heavens. When this is not the case the comet is an unexpected one.

Physical Constitution of Comets. — The subject of the physical constitution of these bodies is one as to the details of which much

uncertainty still exists. The considerations on which conclusions in this field rest are very various, and can best be set forth by beginning with what we may consider to be the best established facts.

We must regard it as well established that comets are not, like planets and satellites, permanent in mass, but are con- tinuously losing minute portions of the matter which belongs to them, through a progressive dissipation — at least when they are in the neighbourhood of the sun. When near perihelion the matter of a comet is seen to be undergoing a process in the nature of evaporation, successive envelopes of vapour rising from the nucleus to form the coma, and then gradually repelled from the sun to form the tail. If this process went on indefinitely every comet would, in the course of ages, be entirely dissipated. This result has actually happened in the case of some known comets, the best established example of which is that of Biela, in which the process of disintegration was clearly followed. As the amount of matter lost by a comet at any one return cannot

be estimated, and may be very small, it is impossible to set. any limit to the period during which its life may continue. It is still an unsettled question whether, in every case, the eva- poration will ultimately cease, leaving a residuum as permanent as any other mass of matter.

The next question in logical order is one of great difficulty. It is whether the nucleus of a comet is an opaque solid body, a cluster of such bodies, or a mass of particles of extreme tenuity. Some light is thrown on this and other questions by the spectro- scope. This instrument shows in the spectrum of nearly every comet three bright bands, recognized as those of hydrocarbons. The obvious conclusion is that the light forming these bands is not reflected sunlight, but light radiated by the gaseous hydro- carbons. Since a gas at so great a distance from the sun cannot be heated to incandescence, the question arises how incan- descence is excited. The generalizations of recent years growing out of the phenomena of radioactivity make it highly probable that the source is to be found in some form of electrical excitation, produced by electrons or other corpuscles thrown out by the sun. The resemblance of the cometary spectrum to the spectrum of hydrocarbons in the Geissler tube lends great plausibility to this view. It is remarkable that the great comet of 1882 also showed the bright lines of sodium with such intensity that they were observed in daylight by R. Copeland and W. O. Lohse. In addition to these gaseous spectra, all but the fainter comets show a continuous spectrum, crossed by the Fraunhofer lines, which is doubtless due to reflected sunlight. It happens that, since the spectroscope has been perfected, no comet of great brilliancy has been favourably situated for

observation. Until the opportunity is offered, the conclusions to be derived from spectroscopic observation cannot be further extended.

In the telescope the nucleus of a bright comet appears as an opaque mass, one or more seconds in diameter, the absolute dimensions comparing with those of the satellites of the planets, sometimes, indeed, equal to our moon. But the actual results of micrometric measures are found to differ very widely. In the case of Donati's comet of 1858 the nucleus seemed to grow smaller as perihelion was approached. This is evidently due to the fact that the coma immediately around the nucleus was so bright as apparently to form a part of it at considerable distances from the sun. G. P. Bond estimated the diameter of the actual nucleus at 500 m. That the nucleus is a body of appreciable mass seems to be made probable by the fact that, except for the central attraction of such a body, a comet would speedily be dissipated by the different attractions of the sun on different parts of the mass, which would result in each particle pursuing an orbit of its own. It follows that there must be a mass sufficient to hold the parts of the comet, if not absolutely together, at least in each other's immediate neighbourhood. How great a central mass may be required for this is a subject not yet investigated. It might be supposed that the amount of matter must be sufficient to make the nucleus quite opaque. But two considerations based on observations militate against this view. One is that an opaque body, reflecting much sunlight, would show a brighter continuous spectrum than has yet been found in any comet. Another and yet more remarkable observation is on record which goes far to prove not only the tenuity, but the transparency of a cometary nucleus. The great comet of 1882 made a transit over the sun on the 17 th of September, an occurrence unique in the history of astronomy. But the fact of the transit escaped attention except at the observatory of the Cape of Good Hope. Here the comet was watched by W. H. Finlay and by W. L. Elkin as it approached the sun, and was kept in sight until it came almost or quite in contact with the sun's disk, when it disappeared. It should, if opaque, have appeared a few minutes later, projected on the sun's disk; but not a trace of it could be seen. The sun was approaching Table Mountain at the critical moment, and its limb was undulating badly, making the detection of a minute point difficult. The possibility of a very small opaque nucleus is therefore still left open; yet the remarkable conclusion still holds, that, immediately around a possible central nucleus, the matter of the head of the comet was so rare as not to intercept

Plate I.

Fig. i.— COMET 1892, I. (SWIFT), 1892, APRIL 26.

By permission of Lick Observatory (E. E. iarnard)

Fio. 2.— COMET C, 1908, NOV. i5d. 13I1. 10m.

By permission of Yerkes Observatory (E. E. Barnard).

Plate II.

COMET

Fig. 3— HALLEY'S COMET, igio, APRIL 27.

By permission, of Helwan Observatory, Egypt

Fig. 4— HALLEY'S COMET, 1910, MAY 4.

By permission of Verkes Observatory (E. E. Barnard).

any appreciable fraction of the sun's light. This result seems also to show that, with the possible exception of a very small central mass, what seems to telescopic vision as a nucleus is really only the central portion of the coma, which, as the distance from the centre increases, becomes less and less dense by imper- ceptible gradations.

Another fact tending towards this same conclusion is that after this comet passed perihelion it showed several nuclei following each other. Evidently the powerful attraction of the sun had separated the parts of the apparent nucleus, which were following each other in nearly the same orbit. As they could not have been completely brought together again, we may suppose that in such cases the smaller nuclei were permanently separated from the main body. In addition to this, the remarkable similarity of the orbit of this comet to that of several others indicates a group of bodies moving in nearly the same orbit. The other members of the group were the great comets of 1843, 1880 and 1887. The latter, though so bright as to be conspicuous to the naked eye, showed no nucleus whatever. The closely related orbits of the four bodies are also remarkable for approach- ing nearer the sun at perihelion than does the orbit of any other known body. All of these comets pass through the matter of the sun's corona with a velocity of

more than 100 m per second without suffering any retardation. As it is beyond all reasonable probability that several independent bodies should have moved in orbits so nearly the same, the conclusion is that the comets were originally portions of one mass, which gradually separated in the course of ages by the powerful attraction of the sun as the collection successively passed the perihelion. It may be remarked that observations on the comet of 1843 seemed to show a slight ellipticity of the orbit, corresponding to a period of several centuries; but the deviation of all the orbits from a parabola is too slight to be established by observations. The periods of the comets are therefore unknown except that they must be counted by centuries and possibly by thousands of years.

Another fact which increases the complexity of the question is the well-established connexion of comets with meteoric showers. The shower of November 13-15, now known as the Leonids, which recurred for several centuries at intervals of about one- third of a century, are undoubtedly due to a stream of particles left behind by a comet observed in 1866. The same is true of Biela's comet, the disintegrated particles of which give rise to the Andromedids, and probably true also of the Perseids, or August meteors, the orbits of which have a great similarity to a comet seen in 1862. The general and well-established conclu- sion seems to be that, in addition to the visible features of a comet, every such body is followed in its orbit by a swarm of meteoric particles which must have been gradually detached and separated from it. (See Meteor.)

The source of the repulsive force by which the matter forming the tail of a comet is driven away from the sun is another question that has not yet been decisively answered. Two causes have been suggested, of which one has only recently been brought to light. This is the repulsion of the sun's rays, a form of action the probability of which was shown by J. Clerk Maxwell in 1870, and which was experimentally established about thirty years later. The intensity of this action on a particle is proportional to the surface presented by the particle to the rays, and therefore to the square of its diameter, while its mass, and therefore its gravitation to the sun, are proportional to the cube of the diameter. It follows that if the size and mass of a particle in space are below a certain limit, the repulsion of the rays will exceed the attraction of the sun, and the particle will be driven off into space. But, in order that this repulsive force may act, the particles, however minute they may be, must be opaque. Moreover, theory shows that there is a lower as well as an upper limit to their magnitude, and that it is only between certain definable limits of magnitude that the force acts. Conceiving the particle to be of the

density of water, and considering its diameter as a diminishing variable, theory shows that the repul- sion will balance gravity when the diameter has reached 0-0015 of a millimetre. As the diameter is reduced below this limit

the ratio of the repulsive to the attractive force increases, but soon reaches a maximum, after which it diminishes down to a diameter of 0-00007 mm., when the two actions are again balanced. Below this limit the light speedily ceases to act. It follows that a purely gaseous body, such as would emit a characteristic bright line spectrum, would not be subject to the repulsion. We must therefore conclude that both the solid and gaseous forms of matter are here at play, and this view is consonant with the fact that the comet leaves behind it particles of meteoric matter.

Another possible cause is electrical repulsion. The probability of this cause is suggested by recent discoveries in radioactivity and by the fact that the sun undoubtedly sends forth electrical emanations which may ionize the gaseous molecules rising from the nucleus, and lead to their repulsion from the sun, thus resulting in the phenomena of the tail. But well-established laws are not yet sufficiently developed to lead to definite con- clusions on this point, and the question whether both causes are combined, and, if not, to which one the phenomena in question are mainly due, must be left to the future.

A curious circumstance, which may be explained by a duplex character of the matter forming a cometary tail, is the great difference between the visual and photographic aspect of these bodies. The soft, delicate, feathery-like form which the comet with its tail presents to the eye is wanting in a photograph, which shows principally a round head with an irregularly formed tail much like the knotted stalk of a plant. It follows that the light emitted by the central axis of the tail greatly exceeds in actinic power the diffuse light around it. A careful comparison of the form and intensity of the photographic and visual tails may throw much light on the question of the constitution of these bodies, but no good opportunity of making the comparison has been afforded since the art of celestial photography has been brought to its present state of perfection.

The main conclusion to which the preceding facts and con- siderations point is that the matter of a comet is partly solid and partly gaseous. The gaseous form is shown conclusively by the spectroscope, but in view of the extreme delicacy of the indications with this instrument no quantitative estimate of the gas can be made. As there is no central mass sufficient to hold together a continuous atmosphere of elastic gas

of any sort, it seems probable that the gaseous molecules are only those rising from the coma, possibly by ordinary evaporation, but more probably by the action of the ultra-violet and other rays of the sun giving rise to an ionization of disconnected gaseous molecules. The matter cannot be wholly gaseous because in this case there could be no central force sufficient to keep the parts of the comet together.

The facts also point to the conclusion that the solid matter of a comet is formed of a swarm or cloud of small disconnected masses, probably having much resemblance to the meteoric masses which are known to be flying through the solar system and possibly of the same general kind as these. The question whether there is any central solid of considerable mass is still undecided; it can only be said that if so, it is probably small relative to cosmic masses in general — more likely less than greater than 1 00 m. in diameter. The light of the comet therefore proceeds from two sources: one the incandescence of gases, the other the sunlight reflected from the solid parts. No estimate can be formed of the ratio between these two kinds of light until a bright comet shall be spectroscopically observed during an entire apparition.

Origin and Orbits of Comets. — The great difference which we have pointed out between comets and the permanent bodies of the solar system naturally suggested the idea that these bodies do not belong to that system at all, but are nebulous masses, scattered through the stellar spaces, and brought one by one into the sphere of the sun's attraction. The results of this view are easily shown to be incompatible with the observed facts. The sun, carrying the whole solar system with it, is moving through space with a speed of about 10 m. per second. If it approached a comet nearly at rest the result would be a relative motion of this amount which, as the comet came nearer,

would be constantly increased, and would result in the comet describing relative to the sun a markedly hyperbolic orbit, deviating too widely from a parabola to leave any doubt, even in the most extreme cases. Moreover, a large majority of comets would then have their aphelia in the direction of the sun's motion, and therefore their perihelia in the opposite direction. Neither of these results corresponds to the fact. The conclusion is that if we regard a comet as a body not belonging to the solar system, it is at least a body which before its approach to the sun had the same motion through the stellar spaces that the sun has. As this unity of motion must have been

maintained from the beginning, we may regard comets as belonging to the solar system in the sense of not being visitors from distant regions of space.

The acceptance of this seemingly inevitable conclusion leads to another : that no comet yet known moves in a really hyper- bolic orbit, but that the limit of eccentricity must be regarded as 1, or that of the parabola. It is true that seeming evidence of hyperbolic eccentricity is sometimes afforded by observations and regarded by some astronomers as sufficient. The objections to the reality of the hyperbolic orbit are two. (1) A comet moving in a decidedly hyperbolic orbit must have come from so great a distance within a finite time, say a few millions of years ; as to have no relation to the sun, and must after its approach to the sun return into space, never again to visit our system. In this case the motion of the sun through space renders it almost infinitely improbable that the orbit would have been so nearly a parabola as all such orbits are actually found to be. (2) The apparent deviation from a very elongated ellipse has never been in any case greater than might have been the result of errors of observation on bodies of this class.

This being granted, a luminous view of the causes which lead to the observed orbits of comets is readily gained by imagining these bodies to be formed of nebulous masses, which originally accompanied the sun in its journey through space, but at distances, in most cases, vastly greater than that of the farthest planet. Such a mass, when drawn towards the sun, would move round it in a nearly parabolic orbit, similar to the actual orbits of the great majority of comets. The period might be measured by thousands, tens of thousands, or hundreds of thousands of years, according to the distances of the comet in the beginning; but instead of bodies extraneous to the system, we should have bodies properly belonging to the system and making revolutions around the sun.

Were it not for the effect of planetary attraction long periods like these would be the general rule, though not necessarily universal. But at every return to perihelion the motion of a comet will be to some extent either accelerated or retarded by the action of Jupiter or any other planet in the neighbourhood of which it may pass. Commonly the action will be so slight as to have little influence on the orbit and the time of revolution. But should the comet chance to pass the orbit of Jupiter just in front of the planet, its motion would be retarded and the orbit would be changed into one of shorter period. Should it pass behind the planet, its motion would be accelerated and its period lengthened. In such cases the orbit might be changed to a hyperbola,

and then the comet would never return. It follows that there is a tendency towards a gradual but constant diminution in the total number of comets. If we call Ae the amount by which the eccentricity of a cometary orbit is less than unity, Ae will be an extremely minute fraction in the case of the original orbits. If we call =•= S the change which the eccentricity 1 – Ae undergoes by the action of the planets during the passage of the comet through our system, it will leave the system with the eccentricity 1 – Ae ± 8. The possibilities are even whether 5 shall be positive or negative. If negative, the eccentricity will be diminished and the period shortened. If positive, and greater than Ae, the eccentricity 1 – Ae + S will be greater than 1, and then the comet will be thrown into a hyperbolic orbit and become for ever a wanderer through the stellar spaces.

The nearer a comet pa-sses to a planet, especially to Jupiter,

the greatest planet, the greater 5 may be. If S is a considerable negative fraction, the eccentricity will be so reduced that the comet will after the approach be one of short period. It follows that, however long the period of a comet may be, there is a possibility of its becoming one of short period if it approaches Jupiter. There have been several cases of this during the past two centuries, the most recent being that of Brooks's comet, 1889, V. Soon after its discovery this body was found to have a period of only about seven years. The question why it had not been observed at previous returns was settled after the orbit had been determined by computing its motion in the past. It was thus found that in October 1886 the comet had passed in the immediate neighbourhood of Jupiter, the action of which had been such as to change its orbit from one of long period to the short observed period. A similar case was that of Lexel's comet, seen in 1770. Originally moving in an unknown orbit, it encountered the planet Jupiter, made two revolutions round the sun, in the second of which it was observed, then again encoun- tered the planet, to be thrown out of its orbit into one which did not admit of determination. The comet was never again found.

A general conclusion which seems to follow from these con- ditions, and is justified by observations, so far as the latter go, is that comets are not to be regarded as permanent bodies like the planets, but that the conglomerations cf matter which compose them are undergoing a process of gradual dissipation in space. This process is especially rapid in the case of the fainter periodic comets. It was first strikingly brought out in the case of Biela's comet. This object was discovered in 1772, was observed to be periodic after several revolutions had been made, and was observed with a fair degree of regularity at different

returns until 1852. At the previous apparition it was found to have separated into two masses, and in 1852 these masses were so widely separated that they might be considered as forming two comets. Notwithstanding careful search at times and places when the comet was due, no trace of it has since been seen. An examination of the table of periodic comets given at the end of this article will show that the same thing is probably true of several other comets, especially Brorsen's and Tempel's, which have each made several revolutions since last observed, and have been sought for in vain.

In view of the seemingly inevitable dissipation of comets in the course of ages, and of the actually observed changes of their orbits by the attraction of Jupiter, the question arises whether the orbits of all comets of short period may not have been determined by the attraction of the planets, especially of Jupiter. In this case the orbit would, for a period of several centuries, have continued to nearly intersect that of the planet. We find, as a matter of fact, that several periodic comets either pass near Jupiter or have their aphelia in the neighbourhood of the orbit of Jupiter. The approach, however, is not sufficiently close to have led to the change unless in former times the proximity of the orbits was much greater than it is now. As the orbits of all the bodies of the solar system are subject to a slow secular change of their form and position, this may only show that it must have been thousands of years since the comet became one of short period. The two cases of most difficulty are those of Halley's and Encke's comets. The orbit of the former is so elongated and so inclined to the general plane of the planetary orbits that its secular variation must be very slow indeed. But it does not pass near the orbit of any planet except Venus; and even here the proximity is far from being sufficient to have produced an appreciable change in the period. The orbit of Encke's comet is entirely within the orbit of Jupiter, and it also cannot have passed near enough to a planet for thousands of years to' have had its orbit changed by the action in question. It therefore seems difficult to regard these two comets as other than permanent members of the solar system.

Special Periodic Comets. — One of the most remarkable periodic comets with which we are acquainted is that known to astronomers as Halley's. Having perceived that the elements of the comet of 1682 were nearly the same as those of two comets which had respectively appeared in 1531 and 1607, Edmund

Halley concluded that all the three orbits belonged to the same comet, of which the periodic time was about 76 years. After a rough estimate of the perturbations it must sustain from the attraction of the planets, he predicted its return for 1757, — a bold prediction at that time, but justified by the event, for the comet again made its appearance as was expected, though it did not pass through its perihelion till the month of March 1759, the attraction of Jupiter and Saturn having caused, as was computed by Clairault previously to its return, a retardation of 618 days. This comet had been observed in 1066, and the accounts which have been preserved represent it as having then appeared to be four times the size of Venus, and to have shone with a light equal to a fourth of that of the moon. History is silent respecting it from that time till the year 1456, when it passed very near to the earth: its tail then extended over 6o° of the heavens, and had the form of a sabre. It returned to its perihelion in 1835, and was well observed in almost every observatory. But its brightness was far from comparing with the glorious accounts of its former apparitions. That this should have been due to the process of dissipation does not seem possible in so short a period; we must therefore consider either that the earlier accounts are greatly exaggerated, or that the brightness of the comet is subject to changes from some unknown cause. Previous appearances of Halley's comet have been calculated by J. R. Hind, and more recently by P. H. Cowell and A. C. D. Crommelin of Greenwich, the latter having carried the comet back to 87 B.C. with certainty, and to 240 B.C. with fair probability. It was detected by Max Wolf at Heidelberg on plates exposed on Sept. 11, 1909, and subsequently on a Greenwich plate of Sept. 9.

The known comet of shortest period bears the name of J. F. Encke, the astronomer who first investigated its orbit and showed its periodicity. It was originally discovered in 1789, but its periodicity was not recognized until 1818, after it had been observed at several returns. This comet has given rise to a longer series of investigations than any other, owing to Encke's result that the orbit was becoming smaller, and the revolutions therefore accelerated, by some unknown cause, of which the most plausible was a resisting medium surrounding the sun. As this comet is almost the only one that passes within the orbit of Mercury, it is quite possible that it alone would show the effect of such a medium. Recent investigations of this subject have been made at the Pulkova Observatory, first by F. E. von Asten and later by J. O. Backlund who, in 1909, was awarded the Gold Medal of the Royal Astronomical Society for his researches in this field. During some revolutions there was evidence of a slight acceleration of the return, and during others there was not.

The following is a list (compiled in 1909) of comets which are well established as periodic, through having been observed at

List of Periodic Comets observed at more than one Return.

1st Perih.

Last Perih.

Period

Least Dist.

Gr. Dist.

Designation.

Passage.

Passage obs.

Years.

Ast. Units.

Ast. Units.

Halley . . .

1456 June 8-2

1835 Nov. 15-9

75-9

0-58

35-42

Biela . . .

1772 Feb. 16-7

1852 Sept. 23-4

6-67

0-98

6-1-8

Encke .

1786 Jan. 30-9

1905 Jan. 1 1 -4

3-29

o-34

4-08

Tuttle . .

1790 Jan. 30-9

1899 May 4-5

13-78

1 03

10-53

Pons

1812 Sept. 15-3

1884 Jan. 25-7

72-28

0-78

33-70

Olbers . . .

1815 April 26-0

1887 Oct. 8-5

73-32

I-2I

33-99

Winnecke .

1819 July 18-9

1898 Mar. 20-4

5-67

o-77

5-55

Faye .

1843 Oct. 17-1

1896 Mar. 19-3

7-50

1-69

5-93

De Vico

1844 Sept. 2-5

1894 Oct. 12-2

566

119

5-oi

Brorsen

1846 Feb. ii-i

1879 Mar. 30-5

5-52

0-65

5-63

DArrest .

1851 July 8-7

1897 May 21-7

6-56

1-17

5-71

Tempel I. .

1867 May 23-9

1879 May 7-0

5-84

1-56

4-82

Tempel-Swift .

1869 Nov. 18-8

1891 Nov. 15-0

5-51

1-06

5-16

Tempel II.

1873 June 25-2

1904 Nov. 10-5

5-28

1-34

4-66

Wolf . . .

1884 Nov. 17-8

1898 July 4-6

6-8o

1-59

5-57

Frnlay .

1886 Nov. 22-4

1893 July 12-2

6-64

0-99

6-17

Brooks

1889 Sept. 30-3

1903 Dec. 6-5

7-10

1-95

5-44

Holmes

1892 June 13-2

1899 April 28-1

6-89

2-14

one or more returns. In addition to what has already been said of several comets in this list the following remarks may be made. Tuttle's comet was first seen by P. F. A. M6chain in 1790, but was not recognized as periodic until found by Tuttle in 1858,

when the resemblance of the two orbits led to the conclusion of the identity of the bodies, the period of which was soon made evident by continued observations. The comets of Pons and Olbers are remarkable for having an almost equal period. But their orbits are otherwise totally different, so that there does not seem to be any connexion between them. Brorsen's comet seems also to be completely dissipated, not having been seen since 1879. There are also a number of cases in which a comet has been observed through one apparition, and found to be apparently periodic, but which was not seen to return at the end of its supposed period. In some of these cases it seems likely that the comet passed near the planet Jupiter and thus had its orbit entirely changed. It is possible that in other cases the apparent periodicity is due to the unavoidable errors of observation to which, owing to their diffused outline, the nuclei of comets are liable. (S. N.)

COMET-SEEKER, a small telescope (q.v.) adapted especially to searching for comets: commonly of short focal length and large aperture, in order to secure the greatest brilliancy of light. COMILLA, or Kumilla, a town of British India, headquarters of Tippera district in Eastern Bengal and Assam, situated on the river Gumti, with a station on the Assam-Bengal railway, 96 m. from the coast terminus at Chittagong. Pop. (1901) 19,169. The town has many large tanks and an English church, built in 1875.

COMINES, or Commines (Flem. Komen), a town of western Flanders, 13 m. N.N.W. of Lille by rail. It is divided by the river Lys, leaving one part on French (department of Nord), the other on Belgian territory (province of West Flanders). Pop. of the French town 6359 (1906); of the Belgian town, 6453 (1904). The former has a belfry of the 14th century, restored in the 17th and 19th centuries, and remains of a chateau. Comines carries on the spinning of flax, wool and cotton.

COMITIA, the name applied, always in technical and generally in popular phraseology, to the most formal types of gathering of the sovereign people in ancient Rome. It is the plural of comitium, the old " meeting-place " (Lat. cum, together, ire, to go) on the north-west of the Foium. The Romans had three words for describing gatherings of the people. These were concilium, comitia and contio. Of these

concilium had the most general significance. It could be applied to any kind of meeting and is often used to describe assemblies in foreign states. It was, therefore, a word that might be employed to denote an organized gathering of a portion of the Roman people such as the plebs, and in this sense is contrasted with comitia, which when used strictly should signify an assembly of the whole people. Thus the Roman draughtsman who wishes to express the idea ” magistrates of any kind as president of assemblies ” writes ” Magistratus queiquomque comitia con- ciliumve habebit ” {Lex Latino, tabulae Bantinae, 1. 5), and formalism required that a magistrate who summoned only a portion of the people to meet him should, in his summons, use the word concilium. This view is expressed by Laelius Felix, a lawyer probably of the age of Hadrian, when he writes ” Is qui non universum populum, sed partem aliquam adesse jubet, non comitia, sed concilium edicere debet” (Gellius, Nodes Atticae, xv. 27). But popular phraseology did not conform to this canon, and comitia, which gained in current Latin the sense of ” elections ” was sometimes used of the assemblies of the plebs (see the instances in Botsford, dis- tinction between Comitia and Concilium, p. 23). The distinction between comitia and conlio was more clearly marked. Both were formal assemblies convened by a magistrate; but while, in the case of the comitia, the magistrate’s purpose was to ask a question of the people and to elicit their binding response, his object in summoning a contio was merely to bring the people together either

for their instruction or for a declaration of his will as expressed in an edict (” contionem habere est verba facere ad populum sine ulla rogatione,” Gell. op. cit. xiii. 6). The word comitia merely means ” meetings.”

The earliest comitia was one organized on the basis of parishes {curiae) and known in later times as the comitia curiata. The curia voted as a single unit and thus furnished the type for that system of group-voting which runs through all the later organiza- tion of the popular assemblies. This comitia must originally have been composed exclusively of patricians (q.v.); but there is reason to believe that, at an early period of the Republic, it had, in imitation of the centuriate organization, come to include plebeians (see Curia). The organization which gave rise to the comitia centuriata was the result of the earliest steps in the political emancipation of the plebs. Three stages in this process may be conjectured. In the first place the plebeians gained full

rights of ownership and transfer, and could thus become freeholders of the land which they occupied and of the appurtenances of this land (res mancipi) . This legal capacity rendered them liable to military service as heavy-armed fighting men, and as such they were enrolled in the military units called centuriae. When the enrolment was completed the whole host (exercitus) was the best organized and most representative gathering that Rome could show. It therefore either usurped, or became gradually invested with voting powers, and gained a range of power which for two centuries (508-287 B.C.) made it the dominant assembly in the state. But its aristocratic organization, based as this was on property qualifications which gave the greatest voting power to the richest men, prevented it from being a fitting channel for the expression of plebeian claims. Hence the plebs adopted a new political organization of their own. The tribunate called into existence a purely plebeian assembly, firstly, for the election of plebeian magistrates; secondly, for jurisdiction in cases where these magistrates had been injured; thirdly, for presenting petitions on behalf of the plebs through the consuls to the comitia centuriata. This right of petitioning developed into a power of legislation. The stages of the process (marked by the Valerio-Horatian laws of 449 B.C., the Publilian law of 339 B.C., and the Hortensian law of 287 B.C.) are unknown; but it is probable that the two first of the laws progressively weakened the discretionary power of senate and consuls in admitting such petitions; and that the Hortensian law fully recognized the right of resolutions of the plebs (plebiscita) to bind the whole community. The plebeian assembly, which had perhaps originally met by curiae, was organized on the basis of the terri- torial tribes in 471 B.C. This change suggested a renewed organization of the whole people for comitial purposes. The comitia tributa populi was the result. This assembly seems to have been already in existence at the epoch of the Twelve Tables in 451 B.C., its electoral activity is perhaps attested in 447 B.C., and it appears as a legislative body in 357 B.C.

In spite of the formal differences of these four assemblies and the real distinction springing from the fact that patricians were not members of the plebeian bodies, the view which is appropriate to the developed Roman constitution is that the people expressed its will equally through all, although the mode of expression varied with the channel. This will was in theory unlimited. It was re- stricted only by the conservatism of the Roman, by the condition that the initiative must always be taken by a magistrate, by the de facto authority of the senate, and by the magisterial veto which the senate often had at its command (see Senate) . There were no limitations on the legislative

powers of the comitia except such as they chose to respect or which they themselves created and might repeal. They never during the Republican period lost the right of criminal jurisdiction, in spite of the fact that so many spheres of this jurisdiction had been assigned in perpetuity to standing commissions (quaestiones perpetuae). This power of judging exercised by the assemblies had in the main developed from the use of the right of appeal (provocatio) against the judgments of the magistrates. But it is probable that, in the developed procedure, where it was known that the judgment pronounced might legally give rise to the appeal, the magistrate pronounced

no sentence, but brought the case at once before the people. The case was then heard in four separate contiones. After these hearings the comitia gave its verdict. Finally, the people elected to every magistracy with the exception of the occasional offices of Dictator and Interrex. The distribution of these functions amongst the various comitia, and the differences in their organiza- tion, were as follows: —

The comitia curiata had in the later Republic become a merely formal assembly. Its main function was that of passing the lex curiata which was necessary for the ratification both of the imperium of the higher magistracies of the people, and of the potestas of those of lower rank. This assembly also met, under the name of the comitia calata and under the presidency of the pontifex maximus, for certain religious acts. These were the inauguration of the rex sacrorum and the flamens, and that abjuration of hereditary worship (detestatio sacrorum) which was made by a man who passed from his clan (gens) either by an act of adrogation (see Roman Law and Adoption) or by transition from the patrician to the plebeian order. For the purpose of passing the lex curiata, and probably foritsotherpurposesaswell, this comitia was in Cicero's day represented by but thirty lictors (Cic. de Lege Agraria, ii. 12, 31).

The comitia centuriata could be summoned and presided over only by the magistrates with imperium. The consuls were its usual presidents for elections and for legislation, but the praetors summoned it for purposes of jurisdiction. It elected the magis- trates with imperium and the censors, and alone had the power of declaring war. According to the principle laid down in the Twelve Tables (Cicero, de Legibus, iii. 4. 11) capital cases were reserved for this assembly. It was not frequently employed as a legislative body after the two assemblies of the tribes, which were easier to summon and organize, had been recognized as possessing sovereign rights. The internal structure of the comitia centuriata underwent a great change during the Republic • — a change which has been conjecturally attributed to the censorship of

Flaminius in 220 B.C. (Mommsen, Staatsrecht, iii. p. 270). In the early scheme, at a time when a pecuniary valuation had replaced land and its appurtenances (res mancipi) as the basis of qualification, five divisions (classes) were recog- nized whose property was assessed respectively at 100,000, 75,000, 50,000, 25,000 and 11,000 (or 12,500) asses. The first class contained 80 centuries; the second, third and fourth 20 each; the fifth 30. Added to these were the 18 centuries of knights (see Equites). The combined vote of the first class and the knights was thus represented by 98 centuries; that of the whole of the other classes (including 4 or 5 centuries of professional corporations connected with the army, such as the jabri and 1 century of proletarii, i.e. of all persons below the minimum census) was represented by 95 or 96 centuries. Thus the upper classes in the community possessed more than half the votes in the assembly. The newer scheme aimed at a greater equality of voting power; but it has been differently interpreted. The interpretation most usually accepted, which was first suggested by Pantagathus, a 17th-century scholar, is based on the view that the five classes were distributed over the tribes in such a manner that there were 2 centuries of each class in a single tribe. As the number of the tribes was 35, the total number of centuries would be 350. To these we must add 18 centuries of knights, 4 of jabri, &c, and 1 of proletarii. Here the first class and the knights command but 88 votes out of a total of 373. Mommsen's interpretation (Staatsrecht, iii. p. 275) was different. He allowed the 70 votes for the 70 centuries of the first class, but thought that the 280 centuries of the other classes were so combined as to form only 100 votes. The total votes in the comitia would thus be 70 + 100 + 5 (jabri, &c.) + i8 (knights), i.e. 193, as in the earlier arrangement. In 88 B.C. a return was made to the original and more aristocratic system by a law passed by the consuls Sulla and Pompeius. At least this seems to be the meaning of Appian (Bellum Civile, i. 59) when he says taqyovvTO . . . rds x H P °TOvias firj Kara 4 > v\a% dXXd Kara Xoxous . . . -ylyvtaOai. But this change was not permanent as the more liberal system prevails in the Ciceronian period.

The comitia tributa was in the later Republic the usual organ (or laws passed by the whole people. Its presidents were the magistrates of the people, usually the consuls and praetors, and, for purposes of jurisdiction, the curule aediles. It elected these aediles and other lower magistrates of the people. Its jurisdiction was limited to monetary penalties.

The concilium plebis, although voting, like this last assembly, by tribes, could be summoned and presided over only by plebeian magistrates, and never included the patricians. Its utterances {plebiscita) had the full force of law; it elected the tribunes of the plebs and the plebeian aediles, and it pronounced judgment on the penalties which they proposed. The right of this assembly to exercise capital jurisdiction was questioned; but it possessed the undisputed right of pronouncing outlawry {aquae et ignis interdictio) against any one already in exile (Livy xxv. 4, and xxvi. 3).

When the tenure of the religious colleges — formerly filled up by co-optation — was submitted to popular election, a change effected by a lex Domitia of 104 B.C., a new type of comitia was devised for this purpose. The electoral body was composed of 17 tribes selected by lot from the whole body of 35.

There was a body of rules governing the comitia which were concerned with the time and place of meeting, the forms of promulgation and the methods of voting. Valid meetings might be held on any of the 194 ” comitial ” days of the year which were not market or festal days (nundinae, feriae). The comitia curiata and the two assemblies of the tribes met within the walls, the former usually in the Comitium, the latter in the Forum or on the Area Capitolii; but the elections at these assemblies were in the later Republic held in the Campus Martius outside the walls. The comitia cenluriata was by law compelled to meet outside the city and its gathering place was usually the Campus. Promulgation was required for the space of 3 nundinae (i.e. 24 days) before a matter was submitted to the people. The voting was preceded by a contio at which a limited debate was permitted by the magistrate. In the assemblies of the curiae and the tribes the voting of the groups took place simultaneously, in that of the centuries in a fixed order. In elections as well as in legislative acts an absolute majority was required, and hence the candidate who gained a mere relative majority was not returned.

The comitia survived the Republic. The last known act of comitial legislation belongs to the reign of Nerva (a.d. 96-98). After the essential elements in the election of magistrates had passed to the senate in a.d. 14, the formal announcement of the successful candidates (renuntiatio) still continued to be made to the popular assemblies. Early in the 3rd century Dio Cassius still saw the comitia centuriata meeting with all its old solemnities (Dio Cassius lviii. 20).

Bibliography. — Mommsen, Romisckes Staatsrecht, iii. p. 300 foil. (3rd ed., Leipzig, 1887), and Romische Forschungen, Bd. i. (Berlin,

1879); Soltau, Entstehung und Zusammensetzung der altrbmischen Volksversammlungen, and Die Gultigkeit der Plebiscite (Berlin, 1884) ; Huschke, Die Verfassung des Kbnigs Servius Tullius ah Grundlage zu einer romischen Verfassungsgeschichte (Heidelberg, 1 838) ; Bor-geaud, Le Plebiscite dans I'antiquite. Crece et Rome (Geneva, 1838) ; Greenidge, Roman Public Life, p. 65 foil., 102, 238 foil, and App. i. (1901); G. W. Botsford, Roman Assemblies (1909). (A. H. J. G.)

COMITY (from the Lat. comitas, courtesy, from ccmis, friendly, courteous), friendly or courteous behaviour; a term particularly used in international law, in the phrase " comity of nations, " for the courtesy of nations towards each other. This has been held by some authorities to be the basis for the recognition by courts of law of the judgments andrules of law of foreign tribunals (see International Law, Private). " Comity of nations " is sometimes wrongly used, from a confusion with the Latin comes, a companion, for the whole body or company of nations practising such international courtesy.

COMMA (Gr. koiiixo., a thing stamped or cut off, from kotttuv, to strike), originally, in Greek rhetoric, a short clause, something less than the "colon"; hence a mark (,), in punctuation, to show the smallest break in the construction of a sentence. The mark is also used to separate numerals, mathematical symbols and the like. Inverted commas, or " quotation-marks," i.e.

pairs of commas, the first inverted, and the last upright, are placed at the beginning and end of a sentence or word quoted, or of a word used in a technical or conventional sense; single commas are similarly used for quotations within quotations. The word is also applied to comma-shaped objects, such as the " comma-bacillus," the causal agent in cholera.

COMMANDEER (from the South African Dutch kommanderen, to command), properly, to compel the performance of military duty in the field, especially of the military service of the Boer republics (see Commando); also to seize property for military purposes; hence used of any peremptory seizure for other than military purposes.

COMMANDER, in the British navy, the title of the second grade of captains. He commands a small vessel, or is second in command of a large one. A staff commander is entrusted with the navigation of a large ship, and ranks above a navigating lieutenant. Since 1838 the officer next in rank to a captain in the U.S. navy has been called commander.

COMMANDER Y (through the Fr. commanderie, from med. Lat. commendaria, a trust or charge), a division of the landed property in Europe of the Knights Hospitallers (see St John or Jerusalem). The property of the order was divided into ” priorates,” subdivided into ” bailiwicks,” which in turn were divided into ” commanderies “; these were placed in charge of a ” commendator ” or commander. The word is also applied to the emoluments granted to a commander of a military order of knights.

COMMANDO, a Portuguese word meaning ” command,” adopted by the Boers in South Africa through whom it has come into English use, for military and semi-military expeditions against the natives. More particularly a ” commando ” was the administrative and tactical unit of the forces of the former Boer republics, ” commandeered ” under the law of the constitutions which made military service obligatory on all males between the ages of sixteen and sixty. Each ” commando ” was formed from the burghers of military age of an electoral district.

COMMEMORATION, a general term for celebrating some past event. It is also the name for the annual act, or Encaenia, the ceremonial closing of the academic year at Oxford University. It consists of a Latin oration in commemoration of benefactors and founders; of the recitation of prize compositions in prose and verse, and the conferring of honorary degrees upon English or foreign celebrities. The ceremony, which is usually on the third Wednesday after Trinity Sunday, is held in the Sheldonian Theatre, in Broad St., Oxford. ” Commencement ” is the term for the equivalent ceremony at Cambridge, and this is also used in the case of American universities.

COMMENDATION (from the Lat. commendare, to entrust to the charge of, or to procure a favour for), approval, especially when expressed to one person on behalf of another, a recommenda- tion. The word is used in a liturgical sense for an office commend- ing the souls of the dying and dead to the mercies of God. In feudal law the term is applied to the practice of a freeman placing himself under the protection of a lord (see Feudalism), and in ecclesiastical law to the granting of benefices in com- mendam. A benefice was held in commendam when granted either temporarily until a vacancy was filled up, or to a layman, or, in case of a monastery or abbey, to a secular cleric to enjoy the revenues and privileges for life (see Abboi), or to a bishop to hold together with his see. An act of 1836 prohibited the holding of benefices in commendam in England.

COMMENTARII (Lat. =Gr. mojxvi}fxaTO.) , notes to assist the memory, memoranda. This original idea of the word gave rise to a

variety of meanings: notes and abstracts of speeches for the assistance of orators; family memorials, the origin of many of the legends introduced into early Roman history from a desire to glorify a particular family; diaries of events occurring in their own circle kept by private individuals, — the day-book, drawn up for Trimalchio in Petronius {Satyricon, 53) by his actuarius (a slave to whom the duty was specially assigned) is quoted as an example ; memoirs of events in which they had taken part drawn up by public men, — such were the ” Commentaries ” of Caesar on the

Gallic and Civil wars, and of Cicero on his consulship. Different departments of the imperial administration and certain high functionaries kept records, which were under the charge of an official known as a commentariis (cf. a secretis, ab epistulis). Municipal authorities also kept a register of their official acts.

The Commentarii Principis were the register of the official acts of the emperor. They contained the decisions, favourable or unfavourable, in regard to certain citizens; accusations brought before him or ordered by him; lists of persons in receipt of special privileges. These must be distinguished from the commentarii diurni, a daily court-journal. At a later period records called ephemerides were kept by order of the emperor; these were much used by the Scriptores Historiae Augustae (see Augustan History). The Commentarii Senatus, only once mentioned (Tacitus, Annals, xv. 74) are probably identical with the Acta Senatus (q.v.). There were also Commentarii of the priestly colleges: (a) Pontificum, collections of their decrees and responses for future reference, to be distinguished from their Annates, which were historical records, and from their Acta, minutes of their meetings; (b) Augurum, similar collections of augural decrees and responses; (c) Decemvirorum; (d) Fratrum Arvalium. Like the priests, the magistrates also had similar notes, partly written by themselves, and partly records of which they formed the subject. But practically nothing is known of these Commentarii Magistratuum. Mention should also be made of the Commentarii Regum, containing decrees concerning the functions and privileges of the kings, and forming a record of the acts of the king in his capacity of priest. They were drawn up in historical times like the so-called leges regiae (jus Papirianum), supposed to contain the decrees and decisions of the Roman kings.

See the exhaustive article by A. von Premerstein in Pauly- Wissowa,

Realencyclopadie (1901); Teuffel-Schwabe, Hist, of Roman Lit. (Eng. trans.), pp. 72, 77-79; and the concise account by H. The- denat in Daremberg and Saglio, Dictionnaire des antiquites.

COMMENTRY, a town of central France, in the department of Allier, 42 m. S.W. of Moulins by the Orleans railway. Pop. (1906) 7581. Commentry gives its name to a coalfield over 5000 acres in extent, and has important foundries and forges.

COMMERCE (Lat. commercium, fromˆ cum, together, and merx, merchandise), in its general acceptation, the international traffic in goods, or what constitutes the foreign trade of all countries as distinct from their domestic trade.

In tracing the history of such dealings we may go back to the early records found in the Hebrew Scriptures. Such a transac- tion as that of Abraham, for example, weighing down ” four hundred shekels of silver, current with the merchant,” for the field of Ephron, is suggestive of a group of facts and ideas indicating an advanced condition of commercial intercourse, — property in land, sale of land, arts of mining and purifying metals, the use of silver of recognized purity as a common medium of exchange, and merchandise an established profession, or division of labour. That other passage in which we read of Joseph being sold by his brethren for twenty pieces of silver to ” a company of Ishmaelites, coming from Gilead, with their camels bearing spicery and balm and myrrh to Egypt,” extends our vision still farther, and shows us the populous and fertile Egypt in commercial relationship with Chaldaea, and Arabians, foreign to both, as intermediaries in their traffic, generations before the Hebrew commonwealth was founded.

The first foreign merchants of whom we read, carrying goods and bags of silver from one distant region to another, were the southern Arabs, reputed descendants of Ishmael and Esau. The first notable navigators and maritime carriers of goods were the Phoenicians. In the commerce of the ante-Christian ages the Jews do not appear to have performed any conspicuous part. Both the agricultural and the theocratic constitution of their society were unfavourable to a vigorous prosecution of foreign trade. In such traffic as they had with other nations they were served on their eastern borders by Arabian merchants, and on the west and south by the Phoenician shippers. The abundance of gold, silver and other precious commodities gathered from

distant parts, of which we read in the days of greatest Hebrew

prosperity, has more the character of spoils of war and tributes of dependent states than the conquest by free exchange of their domestic produce and manufacture. It was not until the Jews were scattered by foreign invasions, and finally cast into the world by the destruction of Jerusalem, that they began to develop those commercial qualities for which they have since been famous.

There are three conditions as essential to extensive inter- national traffic as diversity of natural resources, division of labour, accumulation of stock, or any other primal Pr j mary element — (1) means of transport,ˆ) freedom of labour conditions and exchange, and (3) security; and in all these of corn- conditions the ancient world was signally deficient.

The great rivers, which became the first seats of population and empire, must have been of much utility as channels of transport, and hence the course of human power of which they are the geographical delineation, and probably the idolatry with which they were sometimes honoured. Nor were the ancient rulers insensible of the importance of opening roads through their dominions, and establishing post and lines of communication, which, though primarily for official and military purposes, must have been useful to traffickers and to the general population. But the free navigable area of great rivers is limited, and when diversion of traffic had to be made to roads and tracks through deserts, there remained the slow and costly carriage of beasts of burden, by which only articles of small bulk and the rarest value could be conveyed with any hope of profit. Corn, though of the first necessity, could only be thus transported in famines, when beyond price to those who were in want, and under this extreme pressure could only be drawn, from within a narrow sphere, and in quantity sufficient to the sustenance of but a small number of people. The routes of ancient commerce were thus interrupted and cut asunder by barriers of transport, and the farther they were extended became the more impassable to any considerable quantity or weight of commodities. As long as navigation was confined to rivers and the shores of inland gulfs and seas, the oceans were a terra incognita, contributing nothing to the facility or security of transport from one part of the world to another, and leaving even one populous part of Asia as unapproachable from another as if they had been in different hemispheres. The various routes of trade from Europe and north-western Asia to India, which have been often referred to, are to be regarded more as speculations of future development than as realities of ancient history. It is not improbable that the ancient traffic of the Red Sea may have been extended along the shores of the Arabian Sea to some parts of Hindustan, but that

vessels braved the Indian Ocean and passed round Cape Comorin into the Bay of Bengal, 2000 or even 1000 years before mariners had learned to double the Cape of Good Hope, is scarcely to be believed. The route by the Euxine and the Caspian Sea has probably never in any age reached India. That by the Euphrates and the Persian Gulf is shorter, and was besides the more likely from passing through tracts of country which in the most remote times were seats of great population. There may have been many merchants who traded on all these various routes, but that commodities were passed in bulk over great distances is inconceivable. It may be doubted whether in the ante-Christian ages there was any heavy transport over even 500 m., save for warlike or other purposes, which engaged the public resources of imperial states, and in which the idea of commerce, as now understood, is in a great measure lost.

The advantage which absolute power gave to ancient nations in their warlike enterprises, and in the execution of public works of more or less utility, or of mere ostentation and monumental magnificence, was dearly purchased by the sacrifice of individual freedom, the right to labour, produce and exchange under the steady operation of natural economic principles, which more than any other cause vitalizes the individual and social energies, and multiplies the commercial resource of communities. Commerce in all periods and countries has obtained a certain freedom and hospitality from the fact that the foreign merchant has something

desirable to offer; but the action of trading is reciprocal, and requires multitudes of producers and merchants, as free agents, on both sides, searching out by patient experiment wants more advantageously supplied by exchange than by direct production, before it can attain either permanence or magnitude, or can become a vital element of national life. The ancient polities offered much resistance to this development, and in their absolute power over the liberty, industry and property of the masses of their subjects raised barriers to the extension of commerce scarcely less formidable” than the want of means of communica- tion itself. The conditions of security under which foreign trade can alone flourish equally exceeded the resources of ancient civilization. Such roads as exist must be protected from robbers, the rivers and seas from pirates ; goods must have safe passage and safe storage, must be held in a manner sacred in the territories through which they pass, be insured against accidents, be

respected even in the madness of hostilities ; the laws of nations must give a guarantee on which traders can proceed in their operations with reasonable confidence; and the governments, while protecting the commerce of their subjects with foreigners as if it were their own enterprise, must in their fiscal policy, and in all their acts, be endued with the highest spirit of commercial honour. Every great breach of this security stops the continuous circulation, which is the life of traffic and of the industries to which it ministers. But in the ancient records we see commerce exposed to great risks, subject to constant pilage, hunted down in peace and utterly extinguished in war. Hence it became necessary that foreign trade should itself be an armed force in the world; and though the states of purely commercial origin soon fell into the same arts and wiles as the powers to which they were opposed, yet their history exhibits clearly enough the necessity out of which they arose. Once organized, it was inevitable that they should meet intrigue with intrigue, and force with force. The political empires, while but imperfectly developing industry and traffic within their own territories, had little sympathy with any means of prosperity from without. Their sole policy was either to absorb under their own spirit and conditions of rule, or to destroy, whatever was rich or great beyond their borders. Nothing is more marked in the past history of the world than this struggle cf commerce to establish conditions of security and means of communication with distant parts. When almost driven from the land, it often found both on the sea; and often, when its success had become brilliant and renowned, it perished under the assault of stronger powers, only to rise again in new centres and to find new channels of intercourse.

While Rome was giving laws and order to the half-civilized tribes of Italy, Carthage, operating on a different base, and by

other methods, was opening trade with less accessible

parts of Europe. The strength of Rome was in her legions, that of Carthage in her ships; and her ships could cover ground where the legions were powerless. Her mariners had passed the mythical straits into the Atlantic, and established the port of Cadiz. Within the Mediterranean itself they founded Carthagena and Barcelona on the same Iberian peninsula, and ahead of the Roman legions had depots and traders on the shores of Gaul. After the destruction of Tyre, Carthage became the greatest power in the Mediterranean, and inherited the trade of her Phoenician ancestors with Egypt, Greece and Asia Minor, as well as her own settlements in Sicily and on the European coasts. An antagonism between the great naval and the great military power, whose interests crossed each other at so many

points, was sure to occur; and in the three Punic wars Carthage measured her strength with that of Rome both on sea and on land with no unequal success. But a commercial state impelled into a series of great wars has departed from its own proper base; and in the year r46 B.C. Carthage was so totally destroyed by the

Romans that of the great city, more than 20 m. in conquests, circumference, and containing at one period near a

million of inhabitants, only a few thousands were found within its ruined walls. In the same year Corinth, one of the greatest of the Greek capitals and seaports, was captured, plundered of vast wealth and given to the flames by a Roman

Carthage.

consul. Athens and her magnificent harbour of the Piraeus fell into the same hands 60 years later. It may be presumed that trade went on under the Roman conquests in some degree as before ; but these were grave events to occur within a brief period, and the spirit of the seat of trade in every case having been broken, and its means and resources more or less plundered and dissipated — in some cases, as in that of Carthage, irreparably — the most necessary commerce could only proceed with feeble and languid interest under the military, consular and proconsular licence of Rome at that period. Tyre, the great seaport of Palestine, having been destroyed by Alexander the _ . Great, Palmyra, the great inland centre of Syrian trade, was visited with a still more complete annihilation by the Roman Emperor Aurelian within little more than half a century after the capture and spoliation of Athens. The walls were razed to their foundations; the population — men, women, children and the rustics round the city — were all either massacred or dispersed; and the queen Zenobia was carried captive to Rome. Palmyra had for centuries, as a centre of commercial intercourse and transit, been of great service to her neighbours, east and west. In the wars of the Romans and Parthians she was respected by both as an asylum of common interests which it would have been simple barbarity to invade or injure; and when the Parthians were subdued, and Palmyra became a Roman annexe, she continued to flourish as before. Her relations with Rome were more than friendly; they became enthusiastic and heroic; and her citizens having inflicted signal chastisement on the king of Persia for the imprisonment of the emperor Valerian, the admira- tion of this conduct at Rome was so great that their spirited leader Odaenathus, the husband of Zenobia, was proclaimed Augustus, and became co-emperor with Gallienus. It is obvious that the destruction of Palmyra

must not only have doomed Palestine, already bereft of her seaports, to greater poverty and commercial isolation than had been known in long preceding ages, but have also rendered it more difficult to Rome herself to hold or turn to any profitable account her conquests in Asia; and, being an example of the policy of Rome to the seats of trade over nearly the whole ancient world, it may be said to contain in graphic characters a presage of what came to be the actual eyent — the collapse and fall of the Roman empire itself.

The repeated invasions of Italy by the Goths and Huns gave rise to a seat of trade in the Adriatic, which was to sustain during more than a thousand years a history of unusual splendour. The Veneti cultivated fertile lands on the Po, and built several towns, of which Padua was the chief. They appear from the' earliest note of them in history to have been both an agricultural and trading people; and they offered a rich prey to the barbarian hordes when these broke through every barrier into the plains of Italy. Thirty years before Attila razed the neighbouring city of Aquileia, the consuls and senate of Padua, oppressed and terrified by the prior ravages of Alaric, passed a decree for erecting Rialto, the largest of the numerous islets at the mouth of the Po, into a chief town and port, not more as a convenience to the islanders than as a security for themselves and their goods. But every fresh incursion, every new act of spoliation by the dreaded enemies, increased the flight of the rich and the industrious to the islands, and thus gradually arose the second Venice, whose glory was so greatly to exceed that of the first. Approachable from the mainland only by boats, through river passes easily defended by practised sailors against barbarians who had never plied an oar, the Venetian refugees could look in peace on the desolation which swept over Italy; their warehouses, their markets, their treasures were safe from plunder; and stretching their hands over the sea, they found in it fish and salt, and in the rich possessions of trade and territory which it opened to them more than compensation for the fat lands and inland towns which had long been their home. The Venetians traded with Constantinople, Greece, Syria and Egypt. They became lords of the Morea, and of Candia, Cyprus and other islands of the Levant. The trade of Venice with India, though spoken of, was probably never great. But the crusades of the 1 2th and 13th centuries against the Saracens in Palestine

Venice.

extended her repute more widely east and west, and increased both her naval and her commercial resources. It is enough, indeed, to account for the grandeur of Venice that in course of centuries, from the security of her position, the growth and energy of her population, and the regularity of her government at a period when these sources of prosperity were rare, she became the great emporium of the Mediterranean — all that Carthage, Corinth and Athens had been in a former age on a scene the most remarkable in the world for its fertility and facilities of traffic, — and that as Italy and other parts of the Western empire became again more settled her commerce found always a wider range. The bridge built from the largest of the islands to the opposite bank became the ” Rialto,” or famous exchange of Venice, whose transactions reached farther, and assumed a more consolidated form, than had been known before. There it was where the first public bank was organized; that bills of exchange were first negotiated, and funded debt became transferable; that finance became a science and book-keeping an art. Nor must the effect of the example of Venice on other cities of Italy be left out of account. Genoa, following her steps, rose into great prosperity and power at the foot of the Maritime Alps, and became her rival, and finally her enemy. Naples, Gaeta, Florence, many other towns of Italy, and Rome herself, long after her fall, were encouraged to struggle for the preservation of their municipal freedom, and to foster trade, arts and navigation, by the brilliant success set before them on the Adriatic; but Venice, from the early start she had made, and her command of the sea, had the commercial pre-eminence.

The state of things which arose on the collapse of the Roman empire presents two concurrent facts, deeply affecting the course of trade — (i) the ancient seats of industry and civiliza- axesT B t i° n were undergoing constant decay, while (2) the energetic races of Europe were rising into more civilized forms and manifold vigour and copiousness of life. The fall of the Eastern division of the empire prolonged the effect of the fall of the Western empire; and the advance of the Saracens over Asia Minor, Syria, Greece, Egypt, over Cyprus and other possessions of Venice in the Mediterranean, over the richest provinces of Spain, and finally across the Hellespont into the Danubian provinces of Europe, was a new irruption of barbarians from another point of the compass, and revived the calamities and disorders inflicted by the successive invasions of Goths, Huns and other Northern tribes. For more than ten centuries the naked power of the sword was vivid and terrible as flashes of lightning over all the seats of commerce, whether of ancient or more modern origin. The feudal system of Europe, in organizing the open country under military

leaders and defenders subordinated in possession and service under a legal system to each other and to the sovereign power, must have been well adapted to the necessity of the times in which it spread so rapidly; but it would be impossible to say that the feudal system was favourable to trade, or the extension of trade. The commercial spirit in the feudal, as in preceding ages, had to find for itself places of security, and it could only find them in towns, armed with powers of self-regulation and defence, and prepared, like the feudal barons themselves, to resist violence from whatever quarter it might come. Rome, in her best days, had founded the municipal system, and when this system was more than ever necessary as the bulwark of arts and manufactures, its extension became an essential element of the whole European civilization. Towns formed themselves into leagues for mutual protection, and out of leagues not infrequently arose commercial republics. The Hanseatic League, founded as early as 1241, gave the first note of an increasing traffic between countries on the Baltic and in northern Germany, which a century or two before were sunk in isolated barbarism. From Lubeck and Hamburg, commanding the navigation of the Elbe, it gradually spread over 85 towns, including Amsterdam, Cologne and Frankfort in the south, and Danzig, Konigsberg and Riga in the north. The last trace of this league, long of much service in protecting trade, and as a means of political mediation, passed away in the erection of the German empire (1870), but only from the same cause that had brought about its gradual

dissolution — the formation of powerful and legal governments— which, while leaving to the free cities their municipal rights, were well capable of protecting their mercantile interests. The towns of Holland found lasting strength and security from other causes. Their foundations were laid as literally in the sea as those of Venice had been. They were not easily attacked whether by sea or land, and if attacked had formidable means of defence. The Zuyder Zee, which had been opened to the German Ocean in 1282, carried into the docks and canals of Amsterdam the traffic of the ports of the Baltic, of the English Channel and of the south of Europe, and what the seas did for Amsterdam from without the Rhine and the Maese did for Dort and Rotterdam from the interior. By the Union of Utrecht in 1579 Holland became an independent republic, and for long after, as it had been for some time before, was the greatest centre of maritime traffic in Europe. The rise of the Dutch power in a low country, exposed to the most destructive inundations, difficult to cultivate or even to inhabit, affords a striking illustration of those conditions which in all times have been found specially favourable to commercial development, and which are not indistinctly reflected in the mercantile history of

England, preserved by its insular position from hostile in- vasions, and capable by its fleets and arms to protect its goods on the seas and the rights of its subjects in foreign lands.

The progress of trade and productive arts in the middle ages, though not rising to much international exchange, was very considerable both in quality and extent. The republics of Italy, which had no claim to rival Venice or Genoa in maritime power or traffic, developed a degree of art, opulence and refinement commanding the admiration of modern times; and if any historian of trans-Alpine Europe, when Venice had already attained some greatness, could have seen it five hundred years afterwards, the many strong towns of France, Germany and the Low Countries, the great number of their artizans, the products of their looms and anvils, and their various canning workmanship, might have added many a brilliant page to his annals. Two centuries before England had discovered any manufacturing quality, or knew even how to utilize her most valuable raw materials, and was importing goods from the continent for the production of which she was soon to be found to have special resources, the Flemings were selling their woollen and linen fabrics, and the French their wines, silks and laces in all the richer parts of the British Islands. The middle ages placed the barbarous populations of Europe under a severe discipline, trained them in the most varied branches of industry, and developed an amount of handicraft and ingenuity which became a solid basis for the future. But trade was too walled in, too much clad in armour, and too incessantly disturbed by wars and tumults, and violations of common right and interest, to exert its full influence over the general society, or even to realize its most direct advantages. It wanted especially the freedom and mobility essential to much international increase, and these it was now to receive from a series of the most pregnant events.

The mariner's compass had become familiar in the European ports about the beginning of the 14th century, and the seamen of Italy, Portugal, France, Holland and England entered upon a more enlightened and adventurous a P ˆgˆf"a. course of navigation. The Canary Islands were sighted by a French vessel in 1330, and colonized in 1418 by the Portuguese, who two years later landed on Madeira. In 1431 the Azores were discovered by a shipmaster of Bruges. The Atlantic was being gradually explored. In i486, Diaz, a Portuguese, steering his course almost unwittingly along the coast of Africa, came upon the land's-end of that continent; and eleven years afterwards Vasco da Gama, of the same nation, not only doubled the Cape of Good Hope, but reached India. About the same period Portuguese travellers penetrated to India by the old time-honoured way of Suez ;

and a land which tradition and imagination had invested with almost fabulous wealth and splendour was becoming more real to the European world at the moment when the expedition of Vasco da Gama had made an oceanic route to its shores distinctly visible. One can hardly now realize the impression made by these discoveries

in an age when the minds of men were awakening out of a long sleep, when the printing press was disseminating the ancient classical and sacred literature, and when geography and astronomy were subjects of eager study in the seats both of traffic and of learning. But their practical effect was seen in swiftly-succeeding events. Before the end of the century Columbus had thrice crossed the Atlantic, touched at San Salvador, discovered Jamaica, Porto Rico and the Isthmus of Darien, and had seen the waters of the Orinoco in South America. Meanwhile Cabot, sent out by England, had discovered Newfoundland, planted the English flag on Labrador, Nova Scotia and Virginia, and made known the existence of an expanse of land now known as Canada. This tide of discovery by navigators flowed on without intermission. But the opening of a maritime route to India and the discovery of America, surprising as these events must have been at the time, were slow in producing the results of which they were a sure prognostic. The Portuguese established in Cochin the first European factory in India a few years after Vasco da Gama's expedition, and other maritime nations of Europe traced a similar course. But it was not till 1600 that the English East India Company was established, and the opening of the first factory of the Company in India must be dated some ten or eleven years later. So also it was one thing to discover the two Americas, and another, in any real sense, to possess or colonize them, or to bring their productions into the general traffic and use of the world. Spain, following the stroke of the valiant oar of Columbus, found in Mexico and Peru remarkable remains of an ancient though feeble civilization, and a wealth of gold and silver mines, which to Europeans of that period was fascinating from the rarity of the precious metals in their own realms, and consequently gave to the Spanish colonizations and conquests in South America an extraordinary but unsolid prosperity. The value of the precious metals in Europe was found to fall as soon as they began to be more widely distributed, a process in itself at that period of no small tediousness; and it was discovered further, after a century or two, that the production of gold and silver is limited like the production of other commodities for which they exchange, and only increased in quantity

at a heavier cost, that is only reduced again by greater art and science in the process of production. Many difficulties, in short, had to be overcome, many wars to be waged, and many deplorable errors to be committed, in turning the new advantages to account. But given a maritime route to India and the discovery of a new world of continent and islands in the richest tropical and sub- tropical latitudes, it could not be difficult to foresee that the course of trade was to be wholly changed as well as vastly extended.

The substantial advantage of the oceanic passage to India by the Cape of Good Hope, as seen at the time, was to enable European trade with the East to escape from the Moors, route to Algerines and Turks who now swarmed round the India. shores of the Mediterranean, and waged a predatory war

on ships and cargoes which would have been a formid- able obstacle even if traffic, after running this danger, had not to be further lost, or filtered into the smallest proportions, in the sands of the Isthmus, and among the Arabs who commanded the navigation of the Red and Arabian Seas. Venice had already begun to decline in her wars with the Turks, and could in- adequately protect her own trade in the Mediterranean. Armed vessels sent out in strength from the Western ports often fared badly at the hands of the pirates. European trade with India can scarcely be said, indeed, to have yet come into existence. The maritime route was round about, and it lay on the hitherto almost untrodden ocean, but the ocean was a safer element than inland seas and deserts infested by the lawlessness and ferocity of hostile tribes of men. In short, the maritime route enabled European traders to see India for themselves, to examine what were its products and its wants, and by what means a profitable exchange on both sides could be established; and on this basis of knowledge, ships could leave the ports of their owners in Europe with a reasonable hope, via the Cape, of reaching the places to which they were destined without transhipment or other intermediary obstacle. This is the explanation to be given of the

joy with which the Cape of Good Hope route was received, as well as the immense influence it exerted on the future course and extension of trade, and of the no less apparent satisfaction with which it was to some extent discarded in favour of the ancient line, via the Mediterranean, Isthmus of Suez and the Red Sea.

The maritime route to India was the discovery to the European nations of a ” new world ” quite as much as the discovery of North and South America and their central isthmus and islands. The one was the far,

populous Eastern world, ^' f scoye, y heard of from time immemorial, but with which there America. had been no patent lines of communication. The other was a vast and comparatively unpeopled solitude, yet full of material resources, and capable in a high degree of European colonization. America offered less resistance to the action of Europe than India, China and Japan; but on the other hand this new populous Eastern world held out much attraction to trade. These two great terrestrial discoveries were contemporaneous; and it would be difficult to name any conjuncture of material events bearing with such importance on the history of the world. The Atlantic Ocean was the medium of both; and the waves of the Atlantic beat into all the bays and tidal rivers of western Europe. The centre of commercial activity was thus physically changed; and the formative power of trade over human affairs' was seen in the subsequent phenomena — the rise of great seaports on the Atlantic seaboard, and the ceaseless activity of geographical exploration, manufactures, shipping and emigration, of which they became the outlets.

The Portuguese are entitled to the first place in utilizing the new sources of wealth and commerce. They obtained Macao as a settlement from the Chinese as early as 1537, and their trading operations followed close on the discoveries of trading their navigators on the coast of Africa, in India and in settie- the Indian Archipelago. Spain spread her dominion ments anrf over Central and South America, and forced the c ° °" es ' labour of the subject natives into the gold and silver mines, which seemed in that age the chief prize of her conquests. France introduced her trade in both the East and West Indies, and was the first to colonize Canada and the Lower Mississippi. The Dutch founded New York in 162 1; and England, which in boldness of naval and commercial enterprize had attained high rank in the reign of Elizabeth, established the thirteen colonies which became the United States, and otherwise had a full share in all the operations which were transforming the state of the world. The original disposition of affairs was destined to be much changed by the fortune of war; and success in foreign trade and colonization, indeed, called into play other qualities besides those of naval and military prowess. The products of so many new countries— tissues, dyes, metals, articles of food, chemical substances — greatly extended the range of European manu- facture. But in addition to the mercantile faculty of discovering how they were to be exchanged and wrought into a profitable trade, their use in arts and manufactures required skill, invention and aptitude for manufacturing labour, and those again, in many cases, were found to depend on abundant possession of natural materials, such as coal and iron. In old and populous

countries, like India and China, modern manufacture had to meet and contend with ancient manufacture, and had at once to learn from and improve economically on the established models, before an opening could be made for its extension. In many parts of the New World there were vast tracts of country, without population or with native races too wild and savage to be reclaimed to habits of industry, whose resources could only be developed by the introduction of colonies of Europeans; and innumerable experiments disclosed great variety of qualification among the European nations for the adventure, hardship and perseverance of colonial life. There were countries which, whatever their fertility of soil or favour of climate, produced nothing for which a market could be found; and products such as the sugar-cane and the seed of the cotton plant had to be carried from regions where they were indigenous to other regions where they might be successfully cultivated, and the art of planting had to pass through an ordeal of risk and speculation. There were

also countries where no European could labour; and the ominous work of transporting African negroes as slaves into the colonies — begun by Spain in the first decade of the 16th century, followed up by Portugal, and introduced by England in 1562 into the West Indies, at a later period into New England and the Southern States, and finally domiciled by royal privilege of trade in the Thames and three or more outports of the kingdom, — after being done on an elaborate scale, and made the basis of an immense superstructure of labour, property and mercantile interest over nearly three centuries, had, under a more just and ennobling view of humanity, to be as elaborately undone at a future time.

These are some of the difficulties that had to be encountered in utilizing the great maritime and geographical conquests of the new epoch. But one cannot leave out of view the obstacles, arising from other sources, to what might be expected to be the regular and easy course of affairs. Commerce, though an un- dying and prevailing interest of civilized countries, is but one of the forces acting on the policy of states, and has often to yield the pace to other elements of national life. It were needless to say what injury the great but vain and purposeless wars of Louis XIV. of France inflicted in that country, or how largely the fruitful and heroic energies of England were

absorbed in the civil wars between Charles and the Parliament, to what poverty Scotland was reduced, or in what distraction and savagery Ireland was kept by the same course of events. The grandeur of Spain in the preceding century was due partly to the claim of her kings to be Holy Roman emperors, in which imperial capacity they entailed intolerable mischief on the Low Countries and on the commercial civilization of Europe, and partly to their com- mand of the gold and silver mines of Mexico and Peru, in an eager lust of whose produce they brought cruel calamities on a newly- discovered continent where there were many traces of antique life, the records of which perished in their hands or under their feet. These ephemeral causes of greatness removed, the hollow- ness of the situation was exposed; and Spain, though rich in her own natural resources, was found to be actually poor — poor in number of people, poor in roads, in industrial art, and in all the primary conditions of interior development. An examination of the foreign trade of Europe two centuries after the opening of the maritime route to India and the discovery of America would probably give more reason to be surprised at the smallness than the magnitude of the use that had been made of these events.

By the beginning of the 19th century the world had been well explored. Colonies had been planted on every coast; great

nations had sprung up in vast solitudes or in countries century. inhabited only by savage or decadent races of men;

the most haughty and exclusive of ancient nations had opened their ports to foreign merchantmen; and all parts of the world been brought into habitual commercial intercourse. The seas, subdued by the progress of navigation to the service of man, had begun to yield their own riches in great abundance and the whale, seal, herring, cod and other fisheries, prosecuted with ample capital and hardy seamanship, had become the source of no small traffic in themselves. The lists of imports and exports and of the places from which they flowed to and from the centres of trade, as they swelled in bulk from time to time, show how busily and steadily the threads of commerce had been weaving together the labour and interests of mankind, and extending a security and bounty of existence unknown in former ages. The 19th century witnessed an extension of the commercial relations of mankind of which there was no parallel in previous history. The heavy debts and taxes, and the currency complications in which the close of the Napoleonic wars left the European nations, as well as the fall of prices which was the necessary effect of the sudden closure of a vast war expenditure and absorption of labour, had a crippling effect for

many years on trading energies. Yet even under such circumstances commerce is usually found, on its well-established modern basis, to make Steady progress from one series of years to another. The powers of production had been greatly increased by a brilliant develop- ment of mechanical arts and inventions. The United States

had grown into a commercial nation of the first rank. The European colonies and settlements were being extended, and assiduously cultivated, and were opening larger and more varied markets for manufactures. In 181 9 the first steamboat crossed the Atlantic from New York to Liverpool, and a similar adventure was accomplished from England to India in 1825 — events in themselves the harbingers of a new era in trade. China, after many efforts, was opened under treaty to an intercourse with foreign nations which was soon to attain surprising dimensions. These various causes supported the activity of commerce in the first four decades ; but the great movement which made the 19th century so remarkable was chiefly disclosed in practical results from about 1840. The outstanding characteristics of the 19th century were the many remarkable inventions which so widened the field of commerce by the discovery of new and improved methods of production, the highly organized division of labour which tended to the same end, and, above all, the powerful forces of steam navigation, railways and telegraphs.

Commerce has thus acquired a security and extension, in all its most essential conditions, of which it was void in any previous age. It can hardly ever again exhibit that wandering course from route to route, and from one solitary centre to another, which is so characteristic of its ancient history, because it is established in every quarter of the globe, and all the seas and ways are open to it on terms fair and equal to every nation. Wherever there is population, industry, resource, art and skill, there will be international trade. Commerce will have many centres, and one may relatively rise or relatively fall; but such decay and ruin as have smitten many once proud seats of wealth into dust cannot again occur without such cataclysms of war, violence and disorder as the growing civilization and reason of mankind, and the power of law, right and common interest forbid us to anticipate. But the present magnitude of commerce devolves serious work on all who are engaged in it. If in the older times it was thought that a foreign merchant required to be not only a good man of business, but even a statesman, it is evident that all the higher faculties of the mercantile profession must still more be called into request when imports and exports are reckoned by hundreds instead of fives or tens of millions, when the markets are so much larger and more numerous, the competition so much more keen and varied, the problems to be solved

in every course of transaction so much more complex, the whole range of affairs to be overseen so immensely widened. It is not a company of merchants, having a monopoly, and doing whatever they please, whether right or wrong, that now hold the commerce of the world in their hands, but large communities of free merchants in all parts of the world, affiliated to manu- facturers and producers equally free, each under strong tempta- tion to do what may be wrong in the pursuit of his own interest, and the only security of doing right being to follow steady lights of information and economic science common to all. Easy transport of goods by land and sea, prompt intelligence from every point of the compass, general prevalence of mercantile law and safety, have all been accomplished; and the world is opened to trade. But intellectual grasp of principles and details, and the moral integrity which is the root of all commercial success, are severely tested in this vaster sphere.

See Trade Organization; Economics; Commercial Treaties, and the sections under the headings of countries.

COMMERCE, the name of a card-game. Any number can play with an ordinary pack. There are several variations of the game , but the following is a common one. Each player receives three cards, and three more are turned up as a ” pool.” The first player may exchange one or two of his cards for one or two of the exposed cards, putting his own, face upwards, in their place. His object is to ” make his hand ” (see below), but if he changes ail three cards at once he cannot change again. The next player can do likewise, and so on. Usually there are as many rounds as there are players, and a fresh card is added to the pool at the beginning of each. If a player passes once he cannot ex- change afterwards. When the rounds are finished the hands are shown, the holder of the best either receiving a stake from

all the others, or, supposing each has started with three ” lives,” taking one life from the lowest. The hands, in order of merit, are: (i.) Tricon — three similar cards, three aces ranking above three kings, and so on. (ii.) Sequence — three cards of the same suit in consecutive order; the highest sequence is the best, (iii.) Flush — three cards of the same suit, the highest ” point ” wins, i.e. the highest number of pips, ace counting eleven and court-cards ten. (iv.) Pair — two similar cards, the highest pair winning, (v.) Point — the largest number of pips winning, as in ” flush,” but there is no restriction as to suit.

Sometimes ” pair ” and ” point ” are not recognized. A popular variation of Commerce is Pounce Commerce. In this, if a player has ahead)’ three similar cards, e.g. three nines, and the fourth nine comes into the pool, he says ” Pounce!” and takes it, thus obtain- ing a hand of four, which is higher than any hand of three: whenever a pounce occurs, a new card is turned up from the pack. COMMERCIAL COURT, in England, a court presided over by a single judge of the king’s bench division, for the trial, as expeditiously as may be, of commercial cases. By the Rules of the Supreme Court, Order xviii. a (made in November 1893), a plaintiff was allowed to dispense with pleadings altogether, provided that the indorsement of his writ of summons contained a statement sufficient to give notice of his claim, or of the relief or remedy required in the action, and stating that the plaintiff intended to proceed to trial without pleadings. The judge might, on the application of the defendant, order a statement of claim to be delivered, or the action to proceed to trial without pleadings, and if necessary particulars of the claim or defence to be delivered.; Out of this order grew the commercial court. It is not a distinct court or division or branch of the High Court, and is not regulated by any special rules of court made by the rule committee. It originated in a notice issued by the judges of the queen’s bench division, in February 1895 (see W.N., 2nd of March 1895), the provisions contained in which represent only ” a practice agreed on by the judges, who have the right to deal by convention among themselves with this mode of disposing of the business in their courts ” (per Lord Esher in Barry v. Peruvian Corpora- tion, 1896, 1 Q. B. p. 209). A separate list of causes of a com- mercial character is made and assigned to a particular judge, charged with commercial business, to whom all applications before the trial are made. The 8th paragraph is as follows: —

Such judge may at any time after appearance and without plead- ings make such order as he thinks fit for the speedy determination, in accordance with existing rules, of the questions really in con- troversy between the parties.

Practitioners before Sir George Jessel, at the rolls, in the years 1873 to 1880, will be reminded of his mode of ascertaining the point in controversy and bringing it to a speedy determination. Obviously the scheme is only applicable to cases in which there is some single issue of law or fact, or the case depends on the construction of some contract or other instrument or section of an act of parliament, and such issue or question is either agreed upon by the parties or at once ascertainable by the judge. The success of the scheme also depends largely on the personal qualities of the judge to whom the list is assigned. Under the able guidance of Mr (afterwards Lord) Justice

Mathew (d. 1908), the commercial court became very successful in bringing cases to a speedy and satisfactory determination without any technicality or unnecessary expense.

COMMERCIAL LAW, a term used rather indefinitely to include those main rules and principles which, with more or less minor differences, characterize the commercial transactions and customs of most European countries. It includes within its compass such titles as principal and agent; carriage by land and sea; merchant shipping; guarantee; marine, fire, life and accident insurance; bills of exchange, partnership, &c.

COMMERCIAL TREATIES. A commercial treaty is a contract between states relative to trade. It is a bilateral act whereby definite arrangements are entered into by each contracting party towards the other — not mere concessions. As regards technical distinctions, an ” agreement,” an ” exchange of notes,” or a ” convention ” properly applies to one specific

subject; whereas a ” treaty ” usually comprises several matters, whether commercial or political.

In ancient times foreign intercourse, trade and navigation were in many instances regulated by international arrangements. The text is extant of treaties of commerce and navigation con- cluded between Carthage and Rome in 509 and 348 b .c. Aristotle mentions that nations were connected by commercial treaties;, and other classical writers advert to these engagements. Under the Roman empire the matters thus dealt with became regulated by law, or by usages sometimes styled laws. When the territories of the empire were contracted, and the imperial authority was weakened, some kind of international agreements again became necessary. At Constantinople in the 10th century treaties cited by Gibbon protected ” the person, effects and privileges of the Russian merchant “; and, in western Europe, intercourse, trade and navigation were carried on, at first tacitly by usage derived from Roman times, or under verbal permission given to merchants by the ruler to whose court they resorted. After- wards, security in these transactions was afforded by means of formal documents, such as royal letters, charters, laws and other instruments possessing the force of government measures. Instances affecting English commercial relations are the letter of Charlemagne in 796, the Brabant Charter of 1305, and the Russian ukase of 1569. Medieval treaties of truce or peace often contained a clause permitting in general terms the renewal of personal and commercial communication as it subsisted before the war. This custom

is still followed. But these medieval arrangements were precarious: they were often of temporary duration, and were usually only effective during the lifetime of the contracting sovereigns.

Passing over trade agreements affecting the Eastern empire, the modern commercial treaty system eame into existence in the 12th century. Genoa, Pisa and Venice were then well-organized communities, and were in keen rivalry. Whenever their position in a foreign country was strong, a trading centre was established, and few or no specific engagements were made on their part. But in serious competition or difficulty another course was adopted: a formal agreement was concluded for the better security of their commerce and navigation. The arrangements of 1140 betweeB Venice and Sicily; the Genoese conventions of 1 149 with Valencia, of 1 161 with Morocco, and of 1181 with the Balearic Islands, the Pisan conventions of 1173 with Sultan Saladin, and of 1184 with the Balearic Islands, were the earliest Western commercial treaties. Such definite arrangements, although still of a personal character, were soon perceived to be preferable to general pro- visions in a treaty of truce or peace. They afforded also greater security than privileges enjoyed under usage ; or under grants of various kinds, whether local or royal. The policy thus in- augurated was adopted gradually throughout Europe. The first treaties relative to the trade of the Netherlands were between Brabant and Holland in 1203, Holland and Utrecht in 1204, and Brabant and Cologne in 1251. Early northern commercial treaties are those between Riga and Smolensk 1229, and between Liibeck and Sweden 1269. The first commercial relations between the Hanse Towns and foreign countries were arrange- ments made by gilds of merchants, not by public authorities as a governing body. For a long period the treaty system did not entirely supersede conditions of intercourse between nations dependent on permission.

The earliest English commercial treaty is that with Norway in 1217. It provides ” ut mercatores et homines qui sunt de potestate vestra libere et sine impedimento terram nostramadire possint, et homines et mercatores nostri similiter vestram.” These stipulations are in due treaty form. The next early English treaties are: — with Flanders, 1274 and 1314; Portugal, 1308, 1352 and 1386; Baltic Cities, 1319 and 1388; Biscay and Castile, 1351; Burgundy, 1417 and 1496; France, 1471, 1497 and 1510; Florence, 1490. The commercial treaty policy in England was carried out systematically under Henry IV. and Henry VII. It was continued under James I. to extend to Scotland English trading privileges. The results attained in the 17th century were— regularity in treaty arrangements; their

durable instead of personal nature; the conversion of permissive into perfect rights; questions as to contraband and neutral trade stated in definite terms. Treaties were at first limited to ex- clusive and distinct engagements between the contracting states; each treaty differing more or less in its terms from other similar compacts. Afterwards by extending to a third nation privileges granted to particular countries, the most favoured nation article began to be framed, as a unilateral engagement by a particular state. The Turkish capitulations afford the earliest instances; and the treaty of 1641 between the Netherlands and Portugal contains the first European formula. Cromwell continued the commercial treaty policy partly in order to obtain a formal recognition of the commonwealth from foreign powers. His treaty of 1654 with Sweden contains the first reciprocal ” most favoured nation clause “: — Article IV. provides that the people, subjects and inhabitants of either confederate ” shall have and possess in the countries, lands, dominions and kingdoms of the other as full and ample privileges, and as many exemptions, immunities and liberties, as any foreigner doth or shall possess in the dominions and kingdoms of the said confederate.” The government of the Restoration replaced and enlarged the Protectorate arrangements by fresh agreements. The general policy of the commonwealth was maintained, with further provisions on behalf of colonial trade. In the new treaty of 1661 with Sweden the privileges secured were those which ” any foreigner whatsoever doth or shall enjoy in the said dominions and kingdoms on both sides.”

In contemporary treaties France obtained from Spain (1659) that French subjects should enjoy the same liberties as had been granted to the English; and England obtained from Denmark (1661) that the English should not pay more or greater customs than the people of the United Provinces and other foreigners, the Swedes only excepted. The colonial and navigation policy of the 17th century, and the proceedings of Louis XIV., provoked animosities and retaliatory tariffs. During the War of the Spanish Succession the Methuen Treaty of 1703 was concluded. Portugal removed prohibitions against the importation of British woollens; Great Britain engaged that Portuguese wines should pay one-third less duty than the rate levied on French wines. At the peace of Utrecht in 17 13 political and commercial treaties were concluded. England agreed to remove prohibitions on the importation of French goods, and to grant most favoured nation treatment in relation to goods and merchandise of the like nature from

any other country in Europe; the French general tariff of the 18th of September 1664, was to be again put in force for English trade. The English provision was at variance with the Methuen Treaty. A violent controversy arose as to the relative importance in 1 7 13 of Anglo-Portuguese or Anglo-French trade. In the end the House of Commons, by a majority of 9, rejected the bill to give effect to the commercial treaty of 1713; and trade with France remained on an unsatisfactory footing until 1786. The other commercial treaties of Utrecht were very complete in their provisions, equal to those of the present time ; and contained most favoured nation articles — England secured in 1 71 5 reduction of duties on woollens imported into the Austrian Netherlands; and trading privileges in Spanish America. Moderate import duties for woollens were obtained in Russia by the commercial treaty of 1766. In the meanwhile the Bourbon family compact of the 15th of August 1761 assured national treatment for the subjects of France, Spain and the Two Sicilies, and for their trade in the European territories of the other two states; and most favoured nation treatment as regards any special terms granted to any foreign country. The first com- mercial treaties concluded by the United States with European countries contained most favoured nation clauses: this policy has been continued by the United States, but the wording of the clause has often varied.

In 1786 France began to effect tariff reform by means of commercial treaties. The first was with Great Britain, and it terminated the long-continued tariff warfare. But the wars of the French Revolution swept away these reforms, and brought about a renewal of hostile tariffs. Prohibitions and differential

duties were renewed, and prevailed on the continent until the sixth decade of the 19th century. In i860 a government existed in France sufficiently strong and liberal to revert to the policy of 1786. The bases of the Anglo-French treaty of i860, beyond its most favoured nation provisions, were in France a general transition from prohibition or high customs duties to a moderate tariff; in the United Kingdom abandonment of all protective imposts, and reduction of duties maintained for fiscal purposes to the lowest rates compatible with these exigencies. Other European countries were obliged to obtain for their trade the benefit of the conventional tariff thus established in France, as an alternative to the high rates inscribed in the general tariff. A series of commercial treaties was accordingly concluded by different European states between 1861 and 1866, which effected further reductions of customs duties in the several countries that came within this treaty system. In 1871 the Republican government sought to terminate the treaties of the empire. The British negotiators

nevertheless obtained the relinquishment of the attempt to levy protective duties under the guise of com- pensation for imposts on raw materials; the duration of the treaty of i860 was prolonged; and stipulations better worded than those before in force were agreed to for shipping and most favoured nation treatment. In 1882, however, France terminated her existing European tariff treaties. Belgium and some other countries concluded fresh treaties, less liberal than those of the system of i860, yet much better than anterior arrangements. Great Britain did not formally accept these higher duties; the treaty of the 28th of February 1882, with France, which secured most favoured nation treatment in other matters, provided that customs duties should be " henceforth regulated by the internal legislation of each of the two states." In 1892 France also fell out of international tariff arrangements; and adopted the system of double columns of customs duties — one, of lower rates, to be applied to the goods of all nations receiving most favoured treatment; and the other, of higher rates, for countries not on this footing. Germany then took up the treaty tariff policy; and between 1 891 and 1894 concluded several commercial treaties.

International trade in Europe in 1909 was regulated by a series of tariffs which came into operation, mainly on the initia- tive of Germany in 1906. Austria-Hungary, Belgium, Bulgaria, Germany, Italy, Rumania, Russia, Servia and Switzerland, were parties to them. Their object and effect was protectionist. The British policy then became one of obtaining modifications to remedy disadvantages to British trade, as was done in the case of Bulgaria and Rumania. An important series of commercial arrangements had been concluded between 1884 and 1900 respecting the territories and spheres of interest of European powers in western, central and eastern Africa. In these regions exclusive privileges were not claimed; most favoured nation treatment was recognized, and there was a disposition to extend national treatment to all Europeans and their trade.

The Turkish Capitulations (q.v.) are grants made by successive sultans to Christian nations, conferring rights and privileges in favour of their subjects resident or trading in the Ottoman dominions, following the policy towards European states of the Eastern empire. In the first instance capitulations were granted separately to each Christian state, beginning with the Genoese in 1453, which entered into pacific relations with Turkey. After- wards new capitulations were obtained which summed up in one document earlier concessions, and added to them in general terms whatever had been conceded to one or more other states; a stipulation which became a most favoured nation article. The English capitulations date from 1569, and then secured

the same treatment as the Venetians, French, Poles and the subjects of the emperor of Germany; they were revised in 1675, and as then settled were confirmed by treaties of subsequent date ” now and for ever.” Capitulations signify that which is arranged under distinct “headings”; the Turkish phrase is ” ahid nameh,” whereas a treaty is ” mouahed6 ” — the latter does, and the former does not, signify a reciprocal engagement. Thus, although the Turkish capitulations are not in themselves treaties, yet by sub- sequent confirmation they have acquired the force of commercial

treaties of perpetual duration as regards substance and prin- ciples, while details, such as rates of customs duties, may, by mutual consent, be varied from time to time.

The most favoured nation article already referred to concedes to the state in the treaty with which it is concluded whatever advantages in the matters comprised within its stipulations have been allowed to any foreign or third state. It does not in itself directly confer any particular rights, but sums up the whole of the rights in the matters therein mentioned which have been or may be granted to foreign countries. The value of the privileges under this article accordingly varies with the conditions as to these rights in each state which concedes this treatment.

The article is drafted in different form :

(i) That contracting states A. and B. agree to extend to each other whatever rights and privileges they concede to countries C. and D., or to C. and D. and any other country. The object in this instance is to ensure specifically to B. and A. whatever advantages C. and D. may possess. A recent instance is Article XI. of the treaty of May 10, 1871, between France and Germany, which binds them respectively to extend to each other whatever advantages they grant to Austria, Belgium, Great Britain, the Netherlands, Russia and Switzerland.

(2) The present general formula : A. and B. agree to extend to each other whatever advantages they concede to any third country ; and engage that no other or higher duties shall be levied on the importation into A. and B. respectively of goods the produce or manufacture of B. and A. than are levied on the like goods the produce or manufacture of any third country the most favoured ui this

respect. There is a similar clause in regard to exportation.

(3) The conditional or reciprocity formula, often used in the 18th and in the early part of the 19th century, namely, that whenever A. and B. make special concessions in return for corresponding concessions, B. and A. respectively are either excluded from par- ticipation therein, or must make some additional equivalent con- cession in order to participate in those advantages.

It may further be observed that the word ” like ‘ relates to the goods themselves, to their material or quality, not to conditions of manufacture, mode of conveyance or anything beyond the fact of their precise description; small local facilities allowed to traffic between conterminous land districts are not at variance with this article

A recent complete and concise English formula is that of Article 2 of the treaty of commerce and navigation of the 31st of October 1905, with Rumania. ” The contracting parties agree that, in all matters relating to commerce, navigation and industry, any privi- lege, favour or immunity which either contracting party has actually granted, or may hereafter grant, to the subjects or citizens of any other foreign state, shall be extended immediately and uncondition- ally to the subjects of the other; it being their intention that the commerce, navigation and industry of each country shall be placed, in all respects, on the footing of the most favoured nation.”

Colonies.— The application of commercial treaties to colonies depends upon the wording of each treaty. The earlier colonial policy of European states was to subordinate colonial interests to those of the mother country, to reserve colonial trade for the mother country, and to abstain from engagements contrary to these general rules. France, Portugal and Spain have adhered in principle to this policy. Germany and Holland have been more liberal. The self-government enjoyed by the larger British colonies has led since 1886 to the insertion of an article in British commercial and other treaties whereby the assent of each of these colonies, and likewise of India, is reserved before they apply to each of these possessions. And further, the fact that certain other British colonies are now within the sphere of commercial inter- course controlled by the United States, has since 1891 induced the British government to enter into special agreements on behalf of colonies for whose products the United States is now the chief market. As regards the most favoured nation article, it is to be remembered that the mother country and colonies are not distinct— not foreign or third — countries with respect to each other. The most favoured nation article, therefore, does not preclude special arrangements

between the mother country and colonies, nor between colonies.

Termination.— Commercial treaties are usually concluded for a term of years, and either lapse at the end of this period, or are terminable then, or subsequently, if either state gives the required notice. When a portion of a country establishes its independence, for example the several American republics, according to present usage foreign trade is placed on a uniform most favoured nation

footing, and fresh treaties are entered into to regulate the com” mercial relations of the new communities. In the case of former Turkish provinces, the capitulations remain in force in principle until they are replaced by new engagements. If one state is absorbed into another, for instance Texas into the United States, or when territory passes by conquest, for instance Alsace to Germany, the commercial treaties of the new supreme govern- ment take effect. In administered territories, as Cyprus and formerly Bosnia, and in protected territories, it depends on the policy of the administering power how far the previous fiscal system shall remain in force. When the separate Italian states were united into the kingdom of Italy in 1861, the commercial engagements of Sardinia superseded those of the other states, but fresh treaties were concluded by the new kingdom to place inter- national relations on a regular footing. When the German empire was established under the king of Prussia in 1871, the commercial engagements of any state which were at variance with a Zollverein treaty were superseded by that treaty.

Scope. — The scope of commercial treaties is well expressed by Calvo in his work on international law. They provide for the importation, exportation, transit, transhipment and bonding of merchandise; customs tariffs; navigation charges; quarantine; the admission of vessels to roadsteads, ports and docks; coasting trade; the admission of consuls and their rights; fisheries; they determine the local position of the subjects of each state in the other country in regard to residence, property, payment of taxes or exemptions, and military service; nationality; and a most favoured nation clause. They usually contain a termination, and sometimes a colonial article. Some of the matters enumerated by Calvo — consular privileges, fisheries and nationality — are now frequently dealt with by separate conventions. Contraband and neutral trade are not included as frequently as they were in the 1 8th century.

The preceding statement shows that commercial treaties afford to foreigners, personally, legal rights, and relief from technical disabilities: they afford security to trade and navigation, and regulate

other matters comprised in their provisions. In Europe the general principles established by the series of treaties 1860- 1866 hold good, namely, the substitution of uniform rates of customs duties for prohibitions or differential rates. The dis- advantages urged are that these treaties involve government interference and bargaining, whereas each state should act independently as its interests require, that they are opposed to free trade, and restrict the fiscal freedom of the legislature. It may be observed that these objections imply some confusion of ideas. All contracts may be designated bargains, and some of the details of commercial treaties in Calvo's enumeration enter directly into the functions of government; moreover, countries cannot remain isolated. If two countries agree by simultaneous action to adopt fixed rates of duty, this agreement is favourable to commerce, and it is not apparent how it is contrary, even to free trade principles. Moreover, security in business transactions, a very important consideration, is provided. Our conclusions are —

(1) that under the varying jurisprudence of nations commercial treaties are adopted by common consent;

(2) that their provisions depend upon the general and fiscal policy of each state;

(3) that tariff arrangements, if judiciously settled, benefit trade;

(4) that commercial treaties are now entered into by all states; and that they are necessary under present conditions of com- mercial intercourse between nations. (C. M. K.*)

See the British parliamentary Return (Cd. 4080) of all commercial treaties between various countries in force on Jan. 1, 1908.

COMMERCY, a town of north-eastern France, capital of an arrondissement in the department of Meuse, on the left bank of the Meuse, 26 m. E. of Bar-le-Duc by rail. Pop. (1906) 5622. Commercy possesses a chateau of the 17th century, now used as cavalry barracks, a Benedictine convent occupied by a training- college for primary teachers, and a communal college for boys. A statue of Dom Calmet, the historian, born in the vicinity, stands

in one of the squares. The industries include iron-working and the manufacture of nails, boots and shoes, embroidery and hosiery. The

town has trade in cattle, grain and wood, and is well known for its cakes (madeleines) . Commercy dates back to the 9th century, and at that time its lords were dependent on the bishop of Metz. In 1 544 it was besieged by Charles V. in person. For some time the lordship was in the hands of Francois Paul de Gondi, cardinal de Retz, who lived in the town for a number of years, and there composed his memoirs. From him it was purchased by Charles IV., duke of Lorraine. In 1744 it became the residence of Stanislas, king of Poland, who spent a great deal of care on the embellishment of the town, castle and neighbourhood.

COMMERS (from Lat. commercium) , the German term for the German students' social gatherings held annually on occasions such as the breaking-up of term and the anniversary of the university's founding. A Commers consists of speeches and songs and the drinking of unlimited quantities of beer. The arrangements are governed by officials {Chargierte) elected by the students from among themselves. Strict rules as to drinking exist, and the chairman after each speech calls for what is called a salamander {ad exerciiium Salamandris bibite, tergite). All rise and having emptied their glasses hammer three times on the table with them. On the death of a student, his memory is honoured with a salamander, the glasses being broken to atoms at the close.

COMMINES, PHILIPPE DE (c. 1445-c. 1511), French historian, called the father of modern history, was born at the castle of Renescure, near Hazebrouck in Flanders, a little earlier than 1447. He lost both father and mother in his earliest years. In 1463 his godfather, Philip V., duke of Burgundy, summoned him to his court, and soon after transferred him to the household of his son, afterwards known as Charles the Bold. He speedily acquired considerable influence over Charles, and in 1468 was appointed chamberlain and councillor; consequently when in the same year Louis XI. was entrapped at Peronne, Commines was able both to soften the passion of Charles and to give useful advice to the king, whose life he did much to save. Three years later he was charged with an embassy to Louis, who gained him over to himself by many brilliant promises, and in 1472 he left Burgundy for the court of France. He was at once made chamberlain and councillor; a pension of 6000 livres was bestowed on him; he received the principality of Talmont, the confiscated property of the Amboise family, over which the family of La Tremoille claimed to have rights. The king arranged his marriage with Helene de Chambes, who brought him the fine lordship of Argenton, and Commines took the name d' Argenton from then (27th of January 1473). He was employed to carry out the intrigues of Louis in Burgundy, and spent several months as envoy in

Italy. On his return he was received with the utmost favour, and in 1479 obtained a decree confirming him in possession of his principality.

On the death of Louis in 1483 a suit was commenced against Commines by the family of La Tremoille, and he was cast in heavy damages. He plotted against the regent, Anne of Beaujeu, and joined the party of the duke of Orleans, afterwards Louis XII. Having attempted to carry off the king, Charles VIII., and so free him from the tutelage of his sister, he was arrested, and put in one of his old master's iron cages at Loches. In 1489 he was banished to one of his own estates for ten years, and made to give bail to the amount of 10,000 crowns of gold for his good behaviour. Recalled to the council in 1492, he strenu- ously opposed the Italian expedition of Charles VIII., in which, however, he took part, notably as representing the king in the negotiations which resulted in the treaty of Vercelli. During the rest of his life, notwithstanding the accession of Louis XII., whom he had served as duke of Orleans, he held no position of importance; and his last days were disturbed by lawsuits. He died at Argenton on the 18th of October, probably in 1511. His wife Helene de Chambes survived him till 1532 ; their tomb is now in the Louvre.

The Memoirs, to which Commines owes his reputation as a

statesman and man of letters, were written during his latter years. The graphic style of his narrative and above all the keenness of his insight into the motives of his contemporaries, an insight undimmed by undue regard for principles of right and wrong, make this work one of the great classics of history. His portrait of Louis XL remains unique, in that to such a writer was given such a subject. Scott in Quentin Durward gives an interesting picture of Commines, from whom he largely draws. Sainte-Beuve, after speaking of Commines as being in date the first truly modern writer, and comparing him with Montaigne, says that his history remains the definitive history of his time, and that from it all political history took its rise. None of this applause is un- deserved, for the pages of Commines abound with excellences. He analyses motives and pictures manners ; he delineates men and describes events; his reflections are pregnant with suggestiveness, his conclusions strong with the logic of facts.

The Memoirs divided themselves into two parts, the first from the reign of Louis XL, 1464-1483, the second on the Italian expedition and the negotiations at Venice leading to the Vercelli treaty, 1494-1495. The first part was written between 1489 and 1491, while Commines was at the chateau of Dreux, the second from 1495 to 1498. Seven

MSS. are known, derived from a single holograph, and as this was undoubtedly badly written, the copies were inaccurate; the best is that which belonged to Anne de Polignac, niece of Commines, and it is the only one containing books vii. and viii.

The best edition of Commines is the one edited by B. de Mandrot and published at Paris in 1901-1903. For this edition the author used a manuscript hitherto unknown and more com- plete than the others, and in his introduction he gives an account of the life of Commines.

Bibliography. — The Memoirs remained in MS. till 1524, when part of them were printed by Galliot du Pre, the remainder first seeing light in 1525. Subsequent editions were put forth by Denys Sauvage in 1552, by Denys Godefroy in 1649, and by Lenglet Du- fresnoy in 1747. Those of Mademoiselle Dupont (1841-1848) and of M. de Chantelauze (188 1) have many merits, but the best was given by Bernard de Mandrot : Memoirs de Philippe de Commynes, from the MS. of Anne de Polignac (1901). Various translations of Commines into English have appeared, from that of T. Danett in 1596 to that, based on the Dupont edition, which was printed in Bonn's series in 1855. (C. B.*)

COMMISSARIAT, the department of an army charged with the provision of supplies, both food and forage, for the troops. The supply of military stores such as ammunition is not included in the duties of a commissariat. In almost every army the duties of transport and supply are performed by the same corps of depart- mental troops.

COMMISSARY (from Med. Lat. commissarius, one to whom a charge or trust is committed), generally, a representative; e.g., the emperor's representative who presided in his absence over the imperial diet; and especially, an ecclesiastical official who exercises in special circumstances the jurisdiction of a bishop iq.ii.) ; in the Church of England this jurisdiction is exercised in a Consistory Court (q.v.), except in Canterbury, where the court of the diocesan as opposed to the metropolitan jurisdiction of the archbishop is called a commissary court, and the judge is the commissary general of the city and diocese of Canterbury. When a see is vacant the jurisdiction is exercised by a " special com- missary " of the metropolitan. Commissary is also a general military term for an official charged with the duties of supply, transport and finance of an army. In the 1 7th and 1 8th centuries the commissaire des guerres, or Kriegskommissiir was an important official in continental armies, by whose agency the troops, in their relation to the civil inhabitants, were placed upon semi- political control. In French military law, commissaires du gouvernement

represent the ministry of war on military tribunals, and more or less correspond to the British judge-advocate (see Court-Martial).

COMMISSION (from Lat. commissio, committer e) , the action of committing or entrusting any charge or duty to a person, and the charge or trust thus committed, and so particularly an authority, or the document embodying such authority, given to some person to act in a particular capacity. The term is thus applied to the

written authority to command troops, which the sovereign or president, as the ultimate commander-in-chief of the nation's armed forces, grants to persons selected as officers, or to the similar authority issued to certain qualified persons to act as justices of the peace. For the various commissions of assize see Assize. The word is also used of the order issued to a naval officer to take the command of a ship of war, and when manned, armed and fully equipped for active service she is said to be " put in commission."

In the law of evidence (g.v.) the presence of witnesses may, for certain necessary causes, be dispensed with by the order of the court, and the evidence be taken by a commissioner. Such evidence in England is said to be " on commission " (see R.S.C. Order XXXVII.). Such causes may be illness, the intention of the witness to leave the country before the trial, residence out of the country or the like. Where the witness is out of the jurisdic- tion of the court, and his place of residence is a foreign country where objection is taken to the execution of a commission, or is a British colony or India, " letters of request " for the examination of the witness are issued, addressed to the head of the tribunal in the foreign country, or to the secretary of state for the colonies or for India.

Where the functions of an office are transferred from an individual to a body of persons, the body exercising these delegated functions is generally known as a commission and the members as commissioners; thus the office of lord high admiral of Great Britain is administered by a permanent board, the lords of the admiralty. Such a delegation may be also temporary, as where the authority under the great seal to give the royal assent to legislation is issued to lords commissioners. Similarly bodies of persons or single individuals may be specially charged with carrying out particular duties; these may be permanent, such as the Charity Commission or the Ecclesiastical and Church

Estates Commission, or may be temporary, such as various international bodies of inquiry, like the commission which met in Paris in 1905 to inquire into the North Sea incident (see Dogger Bank), or such as the various commissions of inquiry, royal, statutory or departmental, of which an account is given below.

A commission may be granted by one person to another to act as his agent, and particularly in business; thus the term is applied to that method of business in which goods are entrusted to an agent for sale, the remuneration being a percentage on the sales. This percentage is known as the " commission," and hence the word is extended to all remuneration which is based on a percentage on the value of the work done. The right of an agent to remuneration in the form of a " commission " is always founded upon an express or implied contract between himself and his principal. Such a contract may be implied from custom or usage, from the conduct of the principal or from the circumstances of the particular case. Such commissions are only payable on transactions directly resulting from agency and may be payable though the principal acquires no benefit. In order to claim remuneration an agent must be legally qualified to act in the capacity in which he claims remuneration. He cannot recover in respect of unlawful or wagering transactions, or in cases of misconduct or breach of duty.

Secret Commissions. — The giving of a commission, in the sense of a bribe or unlawful payment to an agent or employe in order to influence him in relation to his principal's or employer's affairs, has grown to considerable proportions in modern times; it has been rightly regarded as a gross breach of trust upon the part of employes and agents, inasmuch as it leads them to look to their own interests rather than to those of their employers. In order to suppress this bribing of employes the English legislature in 1906 passed the Prevention of Corruption Act, which enacts that if an agent corruptly accepts or obtains for himself or for any other person any gift or consideration as an inducement or reward for doing or forbearing to do any act or business, or for showing or forbearing to show favour or disfavour to any person in relation to his principal's affairs, he shall be guilty of a misdemeanour and shall be liable on conviction or indictment to imprisonment with or without hard labour for a term not exceeding two years, or to a

fine not exceeding £500, or to both, or on summary conviction to imprisonment not exceeding four months with or without hard labour or to a fine not exceeding £50 , or both. The act also applies the same punishment to any person who corruptly gives or offers any gift or

consideration to an agent. Also if a person knowingly gives an agent, or if an agent knowingly uses, any receipt, account or document with intent to mislead the principal, they are guilty of a misdemeanour and liable to the punishment already mentioned. For the purposes of the act ” consideration ” in- cludes valuable consideration of any kind, and ” agent ” includes any person employed by or acting for another. No prosecution can be instituted without the consent of the attorney-general, and every information must be upon oath.

Legislation to the same effect has been adopted in Australia. A federal act was passed in 1905 dealing with secret commissions, and in the same year both Victoria and Western Australia passed drastic measures to prevent the giving or receiving corruptly of commissions. The Victorian act applies to trustees, executors, administrators and liquidators as well as to agents. Both the Victorian and the Western Australian acts enact that gifts to the parent, wife, child, partner or employer of an agent are to be deemed gifts to the agent unless the contrary is proved; also that the custom of any trade or calling is not in itself a defence to a prosecution.

Commissions of Inquiry, i.e. commissions for the purpose of eliciting information as to the operation of laws, or investigating particular matters, social, educational, &c, are distinguished, according to the terms of their appointment, as royal, statutory and departmental. A royal commission in England is appointed by the crown, and the commissions usually issue from the office of the executive government which they specially concern. The objects of the inquiry are carefully defined in the warrant constituting the commission, which is termed the ” reference.” The commissioners give their services gratuitously, but where they involve any great degree of professional skill compensation is allowed for time and labour. The expenses incurred are provided out of money annually voted for the purpose. Unless expressly empowered by act of parliament, a commission cannot compel the production of documents or the giving of evidence, nor can it administer an oath. A commission may hold its sittings in any part of the United Kingdom, or may institute and conduct experiments for the purpose of testing the utility of invention, &c. When the inquiry or any particular portion of it is concluded, a report is presented to the crown through the home department. All the commissioners, if unanimous, sign the report, but those who are unable to agree with the majority can record their dissent, and express their individual opinions, either in paragraphs ap- pended to the report or in separately signed memoranda.

Statutory commissions are created by acts of parliament, and, with the

exception that they are liable to have their proceedings questioned in parliament, have absolute powers within the limits of their prescribed functions and subject to the provisions of the act defining the same. Departmental commissions or committees are appointed either by a treasury minute or by the • authority of a secretary of state, for the purpose of instituting inquiries into matters of official concern or examining into proposed changes in administrative arrangements. They are generally composed of two or more permanent officials of the department concerned in the investigation, along with a sub- ordinate member of the administration. Reports of such com- mittees are usually regarded as confidential documents.

A full account of the procedure in royal commissions will be found in A. Todd's Parliamentary Government in England, vol. ii.

COMMISSIONAIRE, the designation of an attendant, messen- ger or subordinate employe in hotels on the continent of- Europe, whose chief duty is to attend at railway stations, secure customers, take charge of their luggage, carry out the necessary formalities with respect to it and have it sent on to the hotel. They are also employed in Paris as street messengers, light porters, &c. The Corps of Commissionaires, in England, is an associa- tion of pensioned soldiers of trustworthy character, founded in 1859 by Captain Sir Edward Walter, K.C.B. (1823-1904).

It was first started in a very small way, with the intention of providing occupation for none but wounded soldiers. The nucleus of the corps consisted of eight men, each of whom had lost a limb. The demand, however, for neat, uniformed, trusty men, to perform certain light duties, encouraged the founder to extend his idea, and the corps developed into a large self-sup- porting organization. In 1906 there were over 3000 members of the corps, more than 2000 of whom served in London. Out- stations were established in various large towns of the kingdom, and the corps extended its operations also to the colonies.

COMMISSIONER, in general an officer appointed to carry out some particular work, or to discharge the duty of a particular office; one who is a member of a commission (q.v.). In this sense the word is applied to members of a permanently constituted department of the administration, as civil service commissioners, commissioners of

income tax, commissioners in lunacy, &c. It is also the title given to the heads of or important officials in various governmental departments, as commissioner of customs. In some British possessions in Africa and the Pacific the head of the government is styled high commissioner. In India a commissioner is the chief administrative official of a division which includes several districts. The office does not exist in Madras, where the same duties are discharged by a board of revenue, but is found in most of the other provinces. The commissioner comes midway between the local government and the district officer. In the regulation provinces the district officer is called a collector (q.v.), and in the non-regulation provinces a deputy-commissioner. In the former he must always be a member of the covenanted civil service, but in the latter he may be a military officer.

A chief commissioner is a high Indian official, governing a province inferior in status to a lieutenant-governorship, but in direct subordination to the governor-general in council. The provinces which have chief commissioners are the Central Provinces and Berar, the North-West Frontier Province and Coorg. The agent to the governor-general of Baluchistan is also chief commissioner of British Baluchistan, the agent to the governor-general of Rajputana is also chief commissioner of the British district of Ajmere-Merwara, and there is a chief commissioner of the Andaman and Nicobar islands. Several provinces, such as the Punjab, Oudh, Burma and Assam, were administered by chief commissioners before they were raised to the status of lieutenant-governorships (see Lieutenant).

A commissioner for oaths in England is a solicitor appointed by the lord chancellor to administer oaths to persons making affidavits for the purpose of any cause or matter. The Com- missioner for Oaths Act 1889 (with an amending act 1891), amending and consolidating various other acts, regulates the appointment and powers of such commissioners. In most large towns the minimum qualification for appointment is six years' continuous practice, and the application must be supported by two barristers, two solicitors and at least six neighbours of the applicant. The charge made by commissioners for every oath, declaration, affirmation or attestation upon honour is one shilling and sixpence ; for marking each exhibit (a document or other thing sworn to in an affidavit and shown to a deponent when being sworn), one shilling.

COMMITMENT, in English law, a precept or warrant in writing, made and issued by a court or judicial officer (including, in cases of treason, the privy council or a secretary of state), directing the conveyance of a person named or sufficiently described therein to a prison or other

legal place of custody, and his detention therein for a time specified, or until the person to be detained has done a certain act specified in the warrant, e.g. paid a fine imposed upon him on conviction. Its character will be more easily grasped by reference to a form now in use under statutory authority: —

In the county of A, Petty Sessional Division of B.

To each and all of the constables of the county of A and the governor of His Majesty's Prison at C.

E. F. hereinafter called the defendant has this day been convicted before the court of summary jurisdiction sitting at D.

(Here the conviction and adjudication is stated.)

You the said constables are hereby commanded to convey the defendant to the said prison, and there deliver him to the governor thereof together with this warrant: and you the governor of the said prison to receive the defendant into your custody and keep him to hard labour for the space of three calendar months.

Dated Signature and seal of

a justice of the peace.

A commitment as now understood differs from " committal," which is the decision of a court to send a person to prison, and not the document containing the directions to executive and ministerial officers of the law which are consequent on the decision. An interval must necessarily elapse between the decision to commit and the making out of the warrant of com- mitment, during which interval the detention in custody of the person committed is undoubtedly legal. A commitment differs also from a warrant of arrest (mandat d'amener), in that it is not made until after the person to be detained has actually appeared, or has been summoned, before the court which orders committal, to answer to some charge.

If not always, at any rate since 1679, a warrant of commitment has been necessary to justify officers of the law in conveying a prisoner to gaol and a gaoler in receiving and detaining him there. It is ordinarily essential to a valid commitment that it should contain a specific statement of the particular cause of the detention ordered. To this the chief, if not the only exception, is in the case of commitments by order of either House of Parlia- ment (May, Pari. Pr., nth ed., 63, 70, 90). Commitments by justices of the peace must be under their hands and

seals. Com- mitments by a court of record if formally drawn up are under the seal of the court.

Every person in custody is entitled, under the Habeas Corpus Act 1679, to receive within six hours of demand from the officer in whose custody he is, a copy of any warrant of commitment under which he is detained, and may challenge its legality by application for a writ of habeas corpus.

So far as concerns the acts of justices and tribunals of limited jurisdiction, the stringency of the rules as to commitments is an important aid to the liberty of the subject.

In the case of superior courts no statutory forms of commit- ment exist, and the same formalities are not so strictly enforced. Committal of a person present in court for contempt of the court is enforced by his immediate arrest by the tipstaff as soon as committal is ordered, and he may be detained in prison on a memorandum of the clerk or registrar of the court while a formal order is being drawn up. And in the case of persons sentenced at assizes and quarter sessions the only written authority for enforcement is a calendar of the prisoners tried, on which the sentences are entered up, signed by the presiding judge.

Commitments are usually made by courts of criminal juris- diction in respect of offences against the criminal law, but are also occasionally made as a punishment for disobedience to the orders made in a civil court, e.g. where a judgment debtor having means to pay refuses to satisfy the judgment debt, or in cases where the person committed has been guilty of a direct contempt of the court.

The expenses of executing a warrant of commitment, so far as not paid by the prisoner, are defrayed out of the parliamentary grants for the maintenance of prisons.

COMMITTEE (from committi, an Anglo-Fr. past participle of commettre, La.t.commiltere, to entrust; the modern Fr. equivalent comitS is derived from the Eng.), a person or body of persons to whom something is ” committed ” or entrusted. The term is used of a person or persons to whom the charge of the body (“committee of the person”) or of the property and business affairs (” committee of the estate “) of a lunatic is committed by the court (see Insanity) . In this sense the English usage is to pronounce the word commi-ttee. The more common meaning of ” committee ” (pronounced commttt-y) is that of a body of persons elected or appointed to consider and deal with certain matters of business, specially or generally referred to it.

COMMODIANUS, a Christian Latin poet, who flourished about a.d. 250. The only ancient writers who mention him are Gennadius, presbyter of Massilia (end of 5th century), in his De

scriptoribus ecclesiasticis, and Pope Gelasius in De libris recipiendis el non recipiendis, in which his works are classed as Apocryphi, probably on account of certain heterodox statements contained in them. Commodianus is supposed to have been an African. As he himself tells us, he was originally a heathen, but was converted to Christianity when advanced in years, and felt called upon to instruct the ignorant in the truth. He was the author of two extant Latin poems, Instructiones and Carmen apologeticum (first published in 1852 by J. B. Pitra in the Spicilegium Solesmense, from a MS. in the Middlehill collection, now at Cheltenham, supposed to have been brought from the monastery of Bobbio). The Instructiones consist of 80 poems, each of which is an acrostic (with the exception of 60, where the initial letters are in alphabetical order). The initials of 80, read backwards, give Commodianus Mendicus Christi. The Apologeticum, undoubtedly by Commodianus,- although the name of the author (as well as the title) is absent from the MS., is free from the acrostic restriction. The first part of the Instructiones is addressed to the heathens and Jews, and ridicules the divinities of classical mythology; the second contains reflections on Antichrist, the end of the world, the Resurrection, and advice to Christians, penitents and the clergy. In the Apologeticum all mankind are exhorted to repent, in view of the approaching end of the world. The appearance of Antichrist, identified with Nero and the Man from the East, is expected at an early date. Although they display fiery dogmatic zeal, the poems cannot be considered quite orthodox. To the classical scholar the metre alone is of interest. Although they are professedly written in hexameters, the rules of quantity are sacrificed to accent. The first four lines of the Instructiones may be quoted by way of illustration:

” Praefatio nostra viam erranti demonstrat, Respectumque bonum, cum venerit saeculi meta, Aeternum fieri, quod discredunt inscia corda : Ego similiter erravi tempore multo.”

These versus politici (as they are called) show that the change was already passing over Latin which resulted in the formation of the Romance languages. The use of cases and genders, the construc- tion

of verba and prepositions, and the verbal forms exhibit striking irregularities. The author, however, shows an acquaint- ance with Latin poets — Horace, Virgil, Lucretius.

The best edition of the text is by B. Dombart (Vienna, 1887), and a good account of the poems will be found in M. Manitius, Geschichte der christlich-lateinischen Poesie (1891), with bibliography, to which may be added G. Boissier, ” Commodien,” in the Melanges Renter (1887); H. Brewer, Kommodian von Gaza (Paderborn, 1906); L. Vernier, ” La Versification latine populaire en Afrique,” in Revue de philologie, xv. (1891); and C. E. Freppel, Commodien, Arnobe, Lactance (1893). Teuffel-Schwabe, Hist, of Roman Literature (Eng. trans., 384), should also be consulted.

COMMODORE (a form of ” commander”; in the 17th century the term ” commandore ” is used), a temporary rank in the British navy for an officer in command of a squadron. There are two kinds, one with and the other without a captain below him in his ship, the first holding the temporary rank, pay, &c, of a rear- admiral, the other that of captain. It is also given as a courtesy title to the senior officer of a squadron of more than three vessels. In the United States navy ” commodore ” was a courtesy title given to captains who had been in command of a squadron. In 1862 it was made a commissioned rank, but was abolished in 1899. The name is given to the president of a yacht club, as of the Royal Yacht Squadron, and to the senior captain of a fleet of merchant vessels.

COMMODUS, LUCIUS AELIUS AURELIUS (161-192), also called Marcus Antoninus, emperor of Rome, son of Marcus Aurelius and Faustina, was born at Lanuvium on the 31st of August 161. In spite of a careful education he soon showed a fondness for low society and amusement. At the age of fifteen he was associated by his father in the government. Oh the death of Aurelius, whom he had accompanied in the war against the Quadi and Marcomanni, he hastily concluded peace and hurried back to Rome (1 80) . The first years of his reign were uneventful, but in 183 be was attacked by an assassin at the instigation of his sister

Lucilla and many members of the senate, which felt deeply insulted by the contemptuous manner in which Commodus treated it. From this time he became tyrannical. Many distinguished Romans were put to death as implicated in the conspiracy, and others were executed for no reason at all. The treasury was exhausted by lavish expenditure on gladiatorial and wild beast combats and on the soldiery, and the property of the wealthy was confiscated. At the same time Commodus,

proud of his bodily strength and dexterity, exhibited himself in the arena, slew wild animals and fought with gladiators, and commanded that he should be worshipped as the Roman Hercules. Plots against his life naturally began to spring up. That of his favourite Perennis, praefect of the praetorian guard, was dis- covered in time. The next danger was from the people, who were infuriated by the dearth of corn. The mob repelled the praetorian guard, but the execution of the hated minister Cleander quieted the tumult. The attempt also of the daring highwayman Maternus to seize the empire was betrayed; but at last Eclectus the emperor's chamberlain, Laetus the praefect of the praetorians, and his mistress Marcia, finding their names on the list of those doomed to death, united to destroy him. He was poisoned, and then strangled by a wrestler named Narcissus, on the 31st of December 192. During his reign unimportant wars were success- fully carried on by his generals Clodius Albinus, Pescennius Niger and Ulpius Marcellus. The frontier of Dacia was success- fully defended against the Scythians and Sarmatians, and a tract of territory reconquered in north Britain. In 1874 a statue of Commodus was dug up at Rome, in which he is represented as Hercules — a lion's skin on his head, a club in his right and the apples of the Hesperides in his left hand.

See Aelius Lampridius, Herodian, and fragments in Dio Cassius; H. Schiller, Geschichte der romischen Kaiserzeit; J. Zurcher, " Commodus " (1868, in Biidinger's Untersuchungen zur romischen Kaisergeschichte, a criticism of Herodian's account) ; Pauly-Wissowa, Realencyclopddie, ii. 2464 ft. (von Rohden) ; Heer, " Der historische Wert des Vita Commodi " (Philologus, Supplementband ix.).

COMMON LAW, like " civil law," a phrase with many shades of meaning, and probably best defined with reference to the various things to which it is opposed. It is contrasted with statute law, as law not promulgated by the sovereign body; with equity, as the law prevailing between man and man, unless when the court of chancery assumed jurisdiction; and with local or customary law, as the general law for the whole realm, tolerating variations in certain districts and under certain conditions. It is also sometimes contrasted with civil, or canon, or international law, which are foreign systems recognized in certain special courts only and within limits defined by the common law. As against all these contrasted kinds of law, it may be described broadly as the universal law of the realm, which applies wherever they have not been introduced, and which is supposed to have a principle for every possible case. Occasionally, it would appear to be used in a sense which would exclude the law developed by at all events the more modern decisions of the courts.

Blackstone divides the civil law of England into lex scripta or statute law, ,and lex non scripta or common law. The latter, he says, consists of (1) general customs, which are the common law strictly so called, (2) particular customs prevailing in certain districts, and (3) laws used in particular courts. The first is the law by which " proceedings and determinations in the king's ordinary courts of justice are guided and directed." That the eldest son alone is heir to his ancestor, that a deed is of no validity unless sealed and delivered, that wills shall be construed more favourably and deeds more strictly, are examples of common law doctrines, " not set down in any written statute or ordinance, but depending on immemorial usage for their support." The validity of these usages is to be determined by the judges — " the de- positaries of the law, the living oracles who must decide in all cases of doubt, and who are bound by an oath to decide according to the law of the land." Their judgments are preserved as records, and " it is an established rule to abide by former pre- cedents where the same points come again in litigation." The extraordinary deference paid to precedents is the source of the most striking peculiarities of the English common law. There

can be little doubt that it was the rigid adherence of the common law courts to established precedent which caused the rise of an independent tribunal administering justice on more equitable principles — the tribunal of the chancellor, the court of chancery. And the old common law courts — the king's bench, common pleas and exchequer— were always, as compared with the court of chancery, distinguished for a certain narrowness and techni- cality of reasoning. At the same time the common law was never a fixed or rigid system. In the application of old precedents to the changing circumstances of society, and in the development of new principles to meet new cases, the common law courts displayed an immense amount o f subtlety and ingenuity, and a great deal of sound sense. The continuity of the system was not less remarkable than its elasticity. Two great defects of form long disfigured the English law. One was the separation of common law and equity. The Judicature Act of 1873 remedied this by merging the jurisdiction of all the courts in one supreme court, and causing equitable principles to prevail over those of the common law where they differ. The other is the overwhelming mass of precedents in which the law is embedded. This can only be removed by some well-conceived scheme of the nature of a code or digest; to. some extent this difficulty has been overcome by such acts as the Bills of

Exchange Act 1882, the Partnership Act 1890 and the Sale of Goods Act 1893.

The English common law may be described as a pre-eminently national system. Based on Saxon customs, moulded by Norman lawyers, and jealous of foreign systems, it is, as Bacon says, as mixed as the English language and as truly national. And like the language, it has been taken into other English-speaking countries, and is the foundation of the law in the United States.

COMMON LODGING-HOUSE, ” a house, or part of a house, where persons of the poorer classes are received for gain, and in which they use one or more rooms in common with the rest of the inmates, who are nc*. members of one family, whether for eating or sleeping ” {Langdon v. Broadbent, 1877, 37 L.T. 434; Booth v. Ferrett, 1890, 25 Q.B.D. 87). There is no statutory definition of the class of houses in England intended to be in- cluded in the expression ” common lodging-house,” but the above definition is very generally accepted as embracing those houses which, under the Public Health and other Acts, must be registered and inspected. The provisions of the Public Health Act 1875 are that every urban and rural district council must keep registers showing the names and residences of the keepers of all common lodging-houses in their districts, the situation of every such house, and the number of lodgers authorized by them to be received therein. They may require the keeper to affix and keep unde- faced and legible a notice with the words ” registered common lodging-house ” in some conspicuous place on the outside of the house, and may make by-laws fixing the number of lodgers, for the separation of the sexes, for promoting cleanliness and ventilation, for the giving of notices and the taking of precautions in case of any infectious disease, and generally for the well ordering of such houses. The keeper of a common lodging-house is required to limewash the walls and ceilings twice a year — in April and October — and to provide a proper water-supply. The whole of the house must be open at all times to the inspection of any officer of a council. The county of London (except the city) is under the Common Lodging Houses Acts 1851 and 1853, with the Sanitary Act 1866 and the Sanitary Law Amendment Act 1874. The administration of these acts was, from 1851 to 1894, in the hands of the chief commissioner of police, when it was transferred to the London County Council.

COMMON ORDER, BOOK OF, sometimes called The Order of Geneva or Knox’s Liturgy, a directory for public worship in the Reformed Church in Scotland. In 1557 the Scottish Protestant lords in council enjoined the use of the English Common Prayer, i.e. the Second Book

of Edward VI. Mean- while, at Frankfort, among British Protestant refugees, a con- troversy was going on between the upholders of the English liturgy and the French Reformed Order of Worship respectively. By way of compromise John Knox and other ministers drew up a new liturgy based upon earlier Continental Reformed Services,

which was not deemed satisfactory, but which on his removal to Geneva he published in 1556 for the use of the English con- gregations in that city. The Geneva book made its way to Scotland, and was used here and there by Reformed congregations. Knox's return in 1559 strengthened its position, and in 1562 the General Assembly enjoined the uniform use of it as the " Book of Our Common Order " in " the administration of the Sacra- ments and solemnization of marriages and burials of the dead." In 1564 a new and enlarged edition was printed in Edinburgh, and the Assembly ordered that " every Minister, exhorter and reader " should have a copy and use the Order contained therein not only for marriage and the sacraments but also " in Prayer," thus ousting the hitherto permissible use of the Second Book of Edward VI. at ordinary service. " The rubrics as retained from the Book of Geneva made provision for an extempore prayer before the sermon, and allowed the minister some latitude in the other two prayers. The forms for the special services were more strictly imposed, but liberty was also given to vary some of the prayers in them. The rubrics of the Scottish portion of the book are somewhat stricter, and, indeed, one or two of the Geneva rubrics were made more absolute in the Scottish emendations; but no doubt the ' Book of Common Order ' is best described as a discretionary liturgy."

It will be convenient here to give the contents of the edition printed by Andrew Hart at Edinburgh in 161 1, and described (as was usually the case) as The Psalmes of David in Meeter, with the Prose, whereunto is added Prayers commonly used in the Kirke, and private houses; with a perpetuatt Kalendar and all the Changes of the Moone that shall happen for the space of Six Yeeres to come. They are as follows: —

(i.) The Calendar; (ii.) The names of the Faires of Scotland; (iii.) The Confession of Faith used at Geneva and received by the Church of Scotland; (iv.vii.) Concerning the election and duties of Ministers, Elders and Deacons, and Superintendent; (viii.) An order of Ecclesiastical Discipline; (ix.) The Order of Excommunication and of Public Repentance; (x.) The Visita tion of the Sick; (xi.) The Manner of Burial; (xii.) The Order of Public Worship — Forms of Confession and Prayer after Sermon; (xiii.) Other Public Prayers; (xiv.) The

Administration of the Lord's Supper; (xv.) The Form of Marriage; (xvi.) The Order of Baptism; (xvii.) A Treatise on Fasting with the order thereof; (xviii.) The Psalms of David; (xix.) Conclusions or Doxologies; (xx.) Hymns — metrical versions of the Decalogue, Magnificat, Apostles' Creed, &c; (xxi.) Calvin's Catechism; (xxii. and xxiii.) Prayers for Private Houses and Miscellaneous Prayers, e.g. for a man before he begins his work.

The Psalms and Catechism together occupy more than half the book. The chapter on burial is significant. In place of the long office of the Catholic Church we have simply this statement : — " The corpse is reverently brought to the grave, accompanied with the Congregation, without any further ceremonies : which being buried, the Minister (if he be present and required) goeth to the Church, if it be not far off, and maketh some comfortable exhortation to the people, touching death and resurrection." This (with the exception of the bracketed words) was taken over from the Book of Geneva. The Westminster Directory which superseded the Book of Common Order also enjoins interment " without any ceremony," such being stigmatized as " no way beneficial to the dead and many ways hurtful to the living." Civil honours may, however, be rendered.

Revs. G. W. Sprott and Thomas Leishman, in the introduction to their edition of the Book of Common Order, and of the West- minster Directory published in 1868, collected a valuable series of notices as to the actual usage of the former book for the period (1564-1645) during which it was enjoined by ecclesiastical law. Where ministers were not available suitable persons (often old priests, sometimes schoolmasters) were selected as readers. Good contemporary accounts of Scottish worship are those of W. Cowper (1 568-1619), bishop of Galloway, in his Seven Days' Conference between a Catholic. Christian and a Catholic Roman (c. 1 61 5), and Alexander Henderson in The Government and Order of the Church of Scotland (1641). There was doubtless a good

deal of variety at different times and in different localities. Early in the 17th century under the twofold influence of the Dutch Church, with which the Scottish clergy were in close connexion, and of James I.'s endeavours to " justle out " a liturgy which gave the liberty of " conceiving " prayers, ministers began in prayer to read less and extemporize more.

Turning again to the legislative history, in 1567 the prayers were done into Gaelic; in 1579 parliament ordered all gentlemen and yeomen holding property of a certain value to possess copies. The assembly of 1601 declined to alter any of the existing prayers but expressed a willingness to admit new ones. Between 1606 and 1618 various attempts were made under English and Episcopal influence, by assemblies afterwards declared unlawful, to set aside the ” Book of Common Order.” The efforts of James I., Charles I. and Archbishop Laud proved fruitless; in 1637 the reading of Laud’s draft of a new form of service based on the English prayer book led to riots in Edinburgh and to general discontent in the country. The General Assembly of Glasgow in 1638 abjured Laud’s book and took its stand again by the Book of Common Order, an act repeated by the assembly of 1639, which also demurred against innovations proposed by the English separatists, who objected altogether to liturgical forms, and in particular to the Lord’s Prayer, the Gloria Patri and the minister kneeling for private devotion in the pulpit. An Aberdeen printer named Raban was publicly censured for having on his own authority shortened one of the prayers. The following years witnessed a counter attempt to introduce the Scottish liturgy into England, especially for those who in the southern kingdom were inclined to Presbyterianism. This effort culminated in the Westminster Assembly of divines which met in 1643, at which six commissioners from the Church of Scotland were present, and joined in the task of drawing up a Common Confession, Catechism and Directory for the three kingdoms. The commissioners reported to the General Assembly of 1644 that this Common Directory ” is so begun . . . that we could not think upon any particular Directory for our own Kirk.” The General Assembly of 1645 after careful study approved the new order. An act of Assembly on the 3rd of February and an act of parliament on the 6th of February ordered its use in every church, and henceforth, though there was no act setting aside the ” Book of Common Order,” the Westminster Directory was of primary authority. The Directory was meant simply to make known ” the general heads, the sense and scope of the Prayers and other parts of Public Worship,” and if need be, ” to give a help and furniture.” The act of parliament recogniz- ing the Directory was annulled at the Restoration and the book has never since been acknowledged by a civil authority in Scot- land. But General Assemblies have frequently recommended its use, and worship in Presbyterian churches is largely conducted on the lines of the Westminster Assembly’s Directory.

The modern Book of Common Order or Euchologion is a com- pilation drawn from various sources and issued by the Church Service*

Society, an organization which endeavours to promote liturgical usages within the Established Church of Scotland.

COMMONPLACE, a translation of the Gr. koivos totos, i.e. a passage or argument appropriate to several cases; a ” common-place book ” is a collection of such passages or quotations arranged for reference under general heads either alphabetically or on some method of classification. To such a book the name adversaria was given, which is an adaptation of the Latin adversaria scripta, notes written on one side, the side opposite (adversus), of a paper or book. From its original mean- ing the word came to be used as meaning something hackneyed, a platitude or truism, and so, as an adjective, equivalent to trivial or ordinary. It was first spelled as two words, then with a hyphen, and so still in the sense of a ” common-place book.”

COMMON PLEAS, COURT OF, formerly one of the three English common law courts at Westminster — the other two being the king’s bench and exchequer. The court of common pleas was an offshoot of the Curia Regis or king’s council. Previous to Magna Carta, the king’s council, especially that portion of it which was charged with the management of judicial

and revenue business, followed the king’s person. This, as far as private litigation was concerned, caused great inconvenience to the unfortunate suitors whose plaints awaited the attention of the court, for they had, of necessity, also to follow the king from place to place, or lose the opportunity of having their causes tried. Accordingly, Magna Carta enacted that common pleas [communia placita) or causes between subject and subject, should be held in some fixed place and not follow the court. This place was fixed at Westminster. The court was presided over by a chief (capitalis justiciarius de communi banco) and four puisne judges. The jurisdiction of the common pleas was, by the Judicature Act 1873, vested in the king’s bench division of the High Court of Justice.

COMMONS, 1 the term for the lands held in commonalty, a relic of the system on which the lands of England were for the most part cultivated during the middle ages. The country was divided into vills, or townships — often, history. though not necessarily, or always, coterminous with the parish. In each stood a cluster of houses, a village, in which dwelt the men of the township, and around the village lay the arable fields and other lands, which they worked as one common farm. Save for a few small inclosures near the village — for gardens, orchards or paddocks for ycung stock — the whole town- ship was free from permanent fencing. The arable lands lay in large

tracts divided into compartments or fields, usually three in number, to receive in constant rotation the triennial succession of wheat (or rye), spring crops (such as barley, oats, beans or peas), and fallow. Low-lying lands were used as meadows, and there were sometimes pastures fed according to fixed rules. The poorest land of the township was left waste — to supply feed for the cattle of the community, fuel, wood for repairs, and any other commodity of a renewable or practically inexhaustible character. 2 This waste land is the common of our own days.

It would seem likely that at one time there was no division, as between individual inhabitants or householders, of any of the lands of the township, but only of the products. But so far back as accurate information extends the arable land is found to be parcelled out, each householder owning strips in each field. These strips are always long and narrow, and lie in sets parallel with one another. The plough for cultivating the fields was maintained at the common expense of the village, and the draught oxen were furnished by the householders. From the time when the crop was carried till the next sowing, the field lay open to the cattle of the whole vill, which also had the free run of the fallow field throughout the year. But when two of the three fields were under crops, and the meadows laid up for hay, it is obvious that the cattle of the township required some other resort for pastur- age. This was supplied by the waste or common. Upon it the householder turned out the oxen and horses which he contributed to the plough, and the cows and sheep, which were useful in manuring the common fields, — in the words of an old law case: ” horses and oxen to plough the land, and cows and sheep to compester it.” Thus the use of the common by each householder was naturally measured by the stock which he kept for the service of the common fields; and when, at a later period, questions arose as to the extent of the rights on the common, the necessary practice furnished the rule, that the commoner could turn out as many head of cattle as he could keep by means of the lands which were parcelled out to him, — the rule of levancy and cou- chancy, which has come down to the present day.

In the earliest post-conquest times the vill or township is found to be associated with an over-lord. There has been much controversy on the question, whether the vill originally owned its lands free from any control, and was subse- t owns i,ip, quently reduced to a state of subjection and to a large extent deprived of its ownership, or whether its whole history has been one of gradual emancipation, the ownership of the waste,

1 For the commons (communitates) in a socio-political sense see

Representation and Parliament.

2 There is an entry on the court rolls of the manor of Wimbledon of the division amongst the inhabitants of the vill of the crab-apples growing on the common.

or common, now ascribed by the law to the lord being a remnant of his ownership of all the lands of the vill. (See Manor.)

At whatever date the over-lord first appeared, and whatever may have been the personal relations of the villagers to him from time to time after his appearance, there can be hardly any doubt that the village lands, whether arable, meadow or waste, were sub- stantially the property of the villagers for the purposes of use and enjoyment. They resorted freely to the common for such purposes as were incident to their system of agriculture, and regulated its use amongst themselves. The idea that the common was the ” lord’s waste,” and that he had the power to do what he liked with it,subject to specific and limited qualifying rights in others, was, there is little doubt, the creation of the Norman lawyers.

One of the earliest assertions of the lord’s proprietary interest in waste lands is contained in the Statute of Merton, a st tut statute which, it is well to notice, was passed in one at Merton of the first assemblies of the barons of England, before and West- the commons of the realm were summoned to parlia- mtnster m ent. This statute, which became law in the year ‘1235, provided ” that the great men of England (which had enfeoffed knights and their freeholders of small tenements in their great manors)” might ” make their profit of their lands, wastes, woods and pastures,” if they left sufficient pasture for the service of the tenements they had granted. Some fifty years later, another statute, that of Westminster the Second, supplemented the Statute of Merton by enabling the lord of the soil to inclose common lands, not only against his own tenants, but against ” neighbours ” claiming pasture there. These two pieces of legislation undoubtedly mark the growth of the doctrine which converted the over-lord’s territorial sway into property of the modern kind, and a corresponding loosening of the hold of the rural townships on the wastes of their neighbourhood. To what extent the two acts were used, it is very difficult to say. We know, from later controversies, that they made no very great change in the system on which the country was cultivated,

a system to which, as we have seen, commons were essential. In some counties, indeed, inclosures had, by the Tudor period, made greater progress than in others. T. Tusser, in his eulogium on inclosed farming, cites Suffolk and Essex as inclosed counties by way of contrast to Norfolk, Cambridgeshire and Leicestershire, where the open or ” champion ” (champain) system prevailed. The Statutes of Merton and Westminster may have had something to do with the progress of inclosed farming; but it is probable that their chief operation lay in furnishing the lord of the manor with a farm on the new system, side by side with the common fields, or with a deer park.

The first event which really endangered the village system was the coming of the Black Death. This scourge is said to have swept away half the population of the country. The Death. disappearance, by no means uncommon, of a whole family gave the over-lord of the vill the opportunity of appropriating, by way of escheat, the holding of the house- hold in the common fields. The land-holding population of the townships and the persons interested in the commons were thus sensibly diminished.

During the Wars of the Roses the small cultivator is thought to have again made headway. But his diminished numbers, and the larger interest which the lords had acquired in the lands of each vill, no doubt facilitated the determined attack on the common-field system which marked the reigns of Henry VIII. and Edward VI.

This attack, which had for its chief object the conversion of arable land into pasture for the sake of sheep-breeding, was The Tudor tne outcome of many causes. It was no longer of agrarian importance to a territorial magnate to possess a large revolu- body of followers pledged to his interests by their t ‘ oa ‘ connexion with the land. On the other hand, wool

commanded a high price, and the growth of towns and of foreign commerce supplied abundant markets. At the same time the confiscation of the monastic possessions introduced a race of new over-lords — not bound to their territories by any family traditions, and also tended to spread the view that the strong

hand was its own justification. In order to keep large flocks and send many bales of wool to market, each landowner strove to increase his range of pasture, and with this view to convert the arable fields of his vill into grass land. There is abundant evidence both from the complaints of writers such as Latimer and Sir Thomas More, and from the Statutes and royal com- missions of the day, that large inclosures

were made at this time, and that the process was effected with much injustice and accompanied by great hardship. ” Where,” says Bishop Latimer in one of his courageous and vigorous denunciations of ” inclosers and rent-raisers,” ” there have been many householders and inhabitants, there is now but a shepherd and his dog.” In the full tide of this movement, and despite Latimer’s appeals, the Statutes of Merton and Westminster the Second were confirmed and re-enacted. Both common fields and commons no doubt disappeared in many places; and the country saw the first notable instalment of inclosure. But from the evidence of later years it is clear that a very large area of the country was still cultivated on the common-field system for another couple of centuries. When inclosure on any considerable scale again came into favour, it was effected on quite different principles; and before describing what was essentially a modern movement, it will be convenient to give a brief outline of the principles of law applicable to commons at the present day.

Law. — The distinguishing feature in law of common land is, that it is land the soil of which belongs to one person, and from which certain other persons take certain profits — for example, the bite of the grass by the mouth of cattle, coin«i

From the sketch of the common-field system of agriculture which has been given,we shall readily infer that a large proportion of the commons of the country, and of the peculiarities of the law relating to commons, are traceable to that system. Thus, common rights are mostly attached to, or enjoyed with, certain lands or houses. A right of common of pasture usually consists of the right to turn out as many cattle as the farm or other private land of the commoner can support in winter; for, as we have seen, the enjoyment of the common, in the village system, belonged to the householders of the village, and was necessarily measured by their holdings in the common fields. The cattle thus commonable are said to be levant and couchant, i.e. uprising and down-lying on the land. But it has now been decided that they need not in fact be so kept. At the present day a commoner may turn out any cattle belonging to him, wherever they are kept, provided they do not exceed in number the head of cattle which can be supported by the stored summer produce of the land in respect of which the right is claimed, together with any winter herbage it produces. The animals which a commoner may usually turn out are those which were employed in the village system — horses, oxen, cows and sheep. These animals are termed commonable animals. A right may be claimed for other animals, such as donkeys, pigs and geese; but they are termed non-commonable, and the right can only be established on proof of special usage. A right of pasture attached to

land in the way we have described is said to be appendant or appurtenant to such land. Common of pasture appendant to land can only be claimed for commonable cattle; and it is held to have been originally attached only to arable land, though in claiming the right no proof that the land was originally arable is necessary. This species of common right is, in fact, the direct survival of the use by the village householder of the common of the township; while common of pasture appurtenant

represents rights which grew up between neighbouring townships, or, in later times, by direct grant from the owner of the soil of the common to some other landowner, or (in the case of copyholders) by local custom.

The characteristic of connexion with house or land also marks other rights of common. Thus a right of taking gorse or bushes, or of lopping wood for fuel, called fire-bote, is limited to the taking of such fuel as may be necessary for the hearths of a particular house, and no more may be taken than is thus required. The same condition applies to common of turbary, which in its more usual form authorizes the commoner to cut the heather, which grows thickly upon poor soils, with the roots and adhering earth, to a depth of about 9 in. Similarly, wood taken for the repairs of buildings (house-bote) , or of hedges {hedge-bote or hey- bole), must be limited in quantity to the requirements of the house, farm buildings and hedges of the particular property to which the right is attached. And heather taken for litter cannot be taken in larger quantities than is necessary for manuring the lands in respect of which the right is enjoyed. It is illegal to take the wood or heather from the common, and to sell it to any one who has not himself a right to take it. So, also, a right of digging sand, gravel, clay or loam is usually appurtenant to land, and must be exercised with reference to the repair of the roads, or the improvement of the soil, of the particular property to which the right is attached.

We have already alluded to the fact that, in Norman and later days, every vill or township was associated with some over-lord, — some one responsible to the crown, either directly or through other superior lords, for the holding of the land and the per- formance of certain duties of defence and military support. To this lord the law has assigned the ownership of the soil of the common of the vill; and the common has for many centuries been styled the waste of the manor.

The trees and bushes on the common belong to the lord, subject to any rights of lopping or cutting which the commoners may possess. The ground, sand and subsoil are his, and even the grass, though the commoners have the right to take it by the mouths of their cattle. To the over-lord, also, was assigned a seignory over all the other lands of the vill; and the vill came to be termed his manor. At the present day it is the manorial system which must be invoked in most cases as the foundation of the curiously conflicting rights which co-exist on a common. (See Manor.)

Within the bounds of a manor, speaking generally, there are three classes of persons possessing an interest

Manorial commons*

in the land, viz. :-

(a) Persons holding land freely of the manor, or freehold tenants.

(b) Persons holding land of the manor by copy of court roll, or copyhold tenants.

(c) Persons holding from the lord of the manor, by lease or agreement, or from year to year, land which was originally demesne, or which was once freehold or copyhold and has come into the lord's hands by escheat or forfeiture.

Amongst the first two classes we usually find the majority of the commoners on the wastes or commons of the manor To every freehold tenant belongs a right of common of pasture on the commons, such right being " appendant " to the land which he holds freely of the manor. This right differs from most other rights of common in the characteristic that actual exercise of the right need not be proved. When once it is shown that certain land is held freely of the manor, it follows of necessity that a right of common of pasture for commonable cattle attaches to the land, and therefore belongs to its owner, and may be exercised by its occupant. " Common appendant," said the Elizabethan judges, " is of common right, and commences by operation of law and in favour of tillage."

Now this is exactly what we saw to be the case with reference to the use of the common of the vill by the householder cultivating the arable fields. The use was a necessity, not depending upon the habits of this or that householder; it was a use lor common- able cattle only, and was connected with the tillage of the arable lands. It seems almost necessarily to follow that the freehold

tenants of the manor are the representatives of the householders of the vill. However this may be, it is amongst the freehold tenants of the manor that we must first look for commoners on the waste of the manor.

Owing, however, to the light character of the services rendered by the freeholders, the connexion of their lands with the manor is often difficult to prove. Copyhold tenure, on the other hand, cannot be lost sight of; and in many manors copyholders are numerous, or were, till quite recently. Copyholders almost invariably possess a right of common on the waste of the manor; and when (as is usual) they exist side by side with freeholders, their rights are generally of the same character. They do not, however, exist as of common right, without proof of usage, but by the custom of the manor. Custom has been defined by a great judge (Sir George Jessel, M.R., in Hammerton v. Honey) as local law. Thus, while the freehold tenants enjoy their rights by the general law of the land, the copyholders have a similar enjoyment by the local law of the manor. This, again, is what one might expect from the ancient constitution of a village community. The copyholders, being originally serfs, had no rights at law; but as they had a share in the tillage of the land, and gradually became possessed of strips in the common fields, or of other plots on which they were settled by the lord, they were admitted by way of indulgence to the use of the common; and the practice hardened into a custom. As might be expected, there is more variety in the details of the rights they exercise. They may claim common for cattle which are not commonable, if the custom extends to such cattle; and their claim is not necessarily connected with arable land.

In the present day large numbers of copyhold tenements have been enfranchised, i.e. converted into freehold. The effect of this step is to sever all connexion between the land enfranchised and the manor of which it was previously held. Technically, therefore, the common rights previously enjoyed in respect of the land would be gone. When, however, there is no indication of any intention to extinguish such rights, the courts protect the copyholders in their continued enjoyment; and when an enfranchisement is effected under the statutes passed in modern years, the rights are expressly preserved. The commoners on a manorial common then will be, prima facie, the freeholders and copyholders of the manor, and the persons who own lands which were copyhold of the manor but have been enfranchised.

The occupants of lands belonging to the lord of the manor, though they usually turn out their cattle on the common, do so by virtue of the lord's ownership of the soil of the common, and can, as a rule,

make no claim to any right of common as against the lord, even though the practice of turning out may have obtained in respect of particular lands for a long series of years. When, however, lands have been sold by the lord of the manor, although no right of common attached by law to such lands in the lord's hands, their owners may subsequently enjoy such a right, if it appears from the language of the deeds of conveyance, and all the surrounding circumstances, that there was an intention that the use of the common should be enjoyed by the purchaser. The rules on this point are very technical; it is sufficient here to indicate that lands bought from a lord of a manor are not necessarily destitute of common rights.

So far we have considered common rights as they have arisen out of the manorial system, and out of the still older system of village communities. There may, however, be rights of common quite unconnected with the manorial Mz nts ot

„ , . , , , , • 1 1 , • common

system. Such rights may be proved either by producing Bot con . a specific grant from the owner of the manor or by nected long usage. It is seldom that an actual grant is w,tB produced, although it would seem likely that such sy£ tem. grants were not uncommon at one time. But a claim founded on actual user is by no means unusual. Such a claim may be based (a) on immemorial usage, i.e. usage for which no commencement later than the coronation of Richard I. (1189) can be shown, (b) on a presumed modern grant which has been lost, or © (in some cases) on the Prescription Act 1832. There are special rules applicable to each kind of claim.

A right of common not connected with the manorial system may be, and usually is, attached to land; it may be measured, like a manorial right, by levancy and couchancy, or it may be limited to a fixed number of animals. Rights of the latter character seem to have been not uncommon in the middle ages. In one of his sermons against inclosure, Bishop Latimer tells us his father " had walk (i.e. right of common) for ioo sheep." This may have been a right in gross, but was more probably attached to the " farm of £3 or £4 by year at the uttermost " which his father held. A right of common appurtenant may be sold separately, and enjoyed by a purchaser independently of the tenement to which it was originally appurtenant. It then becomes

a right of common in gross.

A right of common in gross is a right enjoyed irrespective of the ownership or occupancy of any lands. It may exist by express grant, or by user implying a modern lost grant, or by immemorial usage. It must be limited to a certain number of cattle, unless the right is claimed by actual grant. Such rights seldom arise in connexion with commons in the ordinary sense, but are a frequent incident of regulated or stinted pastures; the right is then generally known as a cattle-gate or beast-gate.

There may be rights over a common which exclude the owner of the soil from all enjoyment of some particular product of the common. Thus a person, or a class of persons, may be entitled to the whole of the corn, grass, underwood, or sweepage, (i.e. everything which falls to the sweep of the scythe) of a tract of land, without possessing any ownership in the land itself, or in the trees or mines. Such a right is known as a right of sole vesture.

A more limited right of the same character is a right of sole pasturage — the exclusive right to take everything growing on the land in question by the mouths of cattle, but not in any other way. Either of these rights may exist throughout the whole year, or during part only. A right of sole common pasturage and herbage was given to a certain class of commoners in Ash- down Forest on the partition of the forest at the end of the 18th century.

We have seen that the common arable fields and common meadows of a vill were thrown open to the stock of the community between harvest and seed-time. There is still to be Rights in f oun(j ; here and there, a group of arable common fields. fields, and occasionally a piece of grass land with many of the characteristics of a common, which turns out to be a common field or meadow. The Hackney Marshes and the other so-called commons of Hackney are really common fields or common meadows, and along the valley of the Lea a constant succession of such meadows is met with. They are still owned in parcels marked by metes; the owners have the right to grow a crop of hay between Lady day and Lammas day; and from Lammas to March the lands are subject to the depasturage of stock. In the case of some common fields and meadows the right of feed during the open time belongs exclusively to the owners; in others to a larger class, such as the owners and occupiers of all lands within the bounds of the parish. Anciently, as we have seen, the two classes would be identical. In some places newcomers not owning strips in the fields were admitted to the right of turn out; in others, not. Hence the distinction. Similar divergences of practice will be found to exist in Switzerland at the present day; nieder-gelassene, or newcomers, are in some communes admitted to all rights, while, in others, privileges are reserved to the burger, or old inhabitant householders.

Some of the largest tracts of waste land to be found in England are the waste or commonable lands of royal forests or chases. The thickets and pastures of Epping Forest, now rova* ” na PPily preserved for London under the guardianship forests. of the city corporation, and the noble woods and far- stretching heaths of the New Forest, will be called to mind. Cannock Chase, unhappily inclosed according to law, though for the most part still lying waste, Dartmoor, and Ashdown Forest in Sussex, are other instances; and the list might be greatly lengthened. Space will not permit of any

description of the forest system; it is enough, in this connexion, to say that the common rights in a forest were usually enjoyed by the owners and occupiers of land within its bounds (the class may differ in exact

definition, but is substantially equivalent to this) without reference to manorial considerations. Epping Forest was saved by the proof of this right. It is often said that the right was given, or confirmed, to the inhabitants in considera- tion of the burden of supporting the deer for the pleasure of the king or of the owner of the chase. It seems more probable that the forest law prevented the growth of the manorial system, and with it those rules which have tended to restrict the class of persons entitled to enjoy the waste lands of the district.

We have seen that in the case of each kind of common there is a division of interest. The soil belongs to one person; other persons are entitled to take certain products of the soil. This division of interest preserves the common ˆ eren ” as an open space. The commoners cannot inclose, inclosure. because the land does not belong to them. The owner of the soil cannot inclose, because inclosure is inconsistent with the enjoyment of the commoners' rights. At a very early date it was held that the right of a commoner proceeded out of every part of the common, so that the owner of the soil could not set aside part for the commoner and inclose the rest. The Statutes of Merton and Westminster the Second were passed to get over this difficulty. But under these statutes the burden of proving that sufficient pasture was left was thrown upon the owner of the soil; such proof can very seldom be given. Moreover, the statutes have never enabled an inclosure to be made against commoners entitled to estovers or turbary. It seems clear that the statutes had become obsolete in the time of Edward VI., or they would not have been re-enacted. And we know that the zealous advocates of inclosure in the 18th century considered them worthless for their purposes. Practically it may be taken that, save where the owner of the soil of a common acquires all the lands in the township (generally coterminous with the parish) with which the common is connected, an inclosure cannot legally be effected by him. And even in the latter case it may- be that rights of common are enjoyed in respect of lands outside the parish, and that such rights prevent an inclosure.

Modern Inclosure. — When, therefore, the common-field system began to fall out of gear, and the increase of population brought about a demand for an increased production of corn, ihe it was felt to be necessary to resort to parliament modern for power to effect inclosure. The legislation which inclosure ensued was based on two principles. One was that all persons interested in the open land to be dealt with should receive a proportionate equivalent in inclosed land; the other, that inclosure should not be prevented by the opposition, or the inability to act, of a small minority. Assuming that inclosure was desirable, no more equitable course could have been adopted, though

in details particular acts may have been objectionable. The first act was passed in 1709; but the precedent was followed but slowly, and not till the middle of the 18th century did the annual number of acts attain double figures. The high-water mark was reached in the period from 1765 to 1785, when on an average forty-seven acts were passed every year. From some cause, possibly the very considerable expense attending upon the obtaining of an act, the numbers then began slightly to fall off. In the year 1793 a board of agriculture, apparently similar in character to the chambers of commerce of our own day-, was established. Sir John Sinclair was its president, and Arthur Young, the well-known agricultural reformer, was its secretary. Owing to the efforts of this body, and of a select committee appointed by the House of Commons on Sinclair's motion, the first General Inclosure Act was passed in 180 1. This act would at the present day be called an Inclosure Clauses Act. It con- tained a number of provisions applicable to inclosures, which could be incorporated by reference, in a private bill. By this means, it was hoped, the length and complexity, and consequently the expense, of inclosure bills would be greatly diminished. Under the stimulus thus applied inclosure proceeded apace. In the year 1801 no less than 119 acts were passed, and the total

area inclosed probably exceeded 300,000 acres. Three inclosures in the Lincolnshire Fens account for over 53,000 acres. As before, the movement after a time spent its force, the annual average of acts falling to about twelve in the decade 1830-1840. Another parliamentary committee then sat to consider how inclosure might be promoted; and the result was the Inclosure Act 1845, which, though much amended by subsequent legisla- tion, still stands on the statute-book. The chief feature of that act was the appointment of a permanent commission to make in each case all the inquiries previously made (no doubt capriciously and imperfectly) by committees of the two Houses. The commission, on being satisfied of the propriety of an inclosure was to draw up a provisional order prescribing the general conditions on which it was to be carried out, and this order was to be submitted to parliament by the government of the day for confirmation. It is believed that these inclosure orders afford the first example of the provisional order system of legisla- tion, which has attained such large proportions.

Again inclosure moved forward, and between 1845 and 1869 (when it

received a sudden check) 600,000 acres passed through the hands of the inclosure commission. Taking the whole period of about a century and a half, when parliamentary inclosure was in favour, and making an estimate of acreage where the acts do not give it, the result may be thus summarized: —

Acres.

From 1709 to 1797 2,744,926

,, 1801 to 1842 1,307,964

,, 1845 to 1869 618,000

Add for Forests inclosed under Special Acts . 100,000

4,770,890

The total area of England being 37,000,000 acres, we shall probably not be far wrong in concluding that about one acre in every seven was inclosed during the period in question. During the first period, the lands inclosed consisted mainly of common arable fields; during the second, many great tracts of moor and fen were reduced to severalty ownership. In the third period, inclosure probably related chiefly to the ordinary manorial common; and it seems likely that, on the whole, England would have gained, had inclosure stopped in 1845.

As a fact it stopped in 1869. Before the inclosure commission had been in existence twenty years the feeling of the nation towards commons began to change. The rapid growth Open Q £ (- ownS; anc j especially of London, and the awakening

movement . sense of the importance of protecting the public health, brought about an appreciation of the value of commons as open spaces. Naturally, the metropolis saw the birth of this sentiment. An attempted inclosure in 1864 of the commons at Epsom and Wimbledon aroused strong opposition; and a select committee of the House of Commons was appointed to consider how the London commons could best be preserved. The Metro- politan Board of Works, then in the vigour of youth, though eager to become the open-space authority for London, could make no better suggestion than that all persons interested in the commons should be bought out, that the board should defray the expense by selling parts for building, and should make parks of what was left. Had this advice been followed, London would probably have lost two-thirds of the open space which she now enjoys. Fortunately a small knot of men, who afterwards

formed the Commons Preservation Society, took a broader and wiser view. Chief amongst them were the late Philip Lawrence, who acted as solicitor to the Wimbledon opposition, and subse- quently organized the Commons Preservation Society, George Shaw-Lefevre, chairman of that society since its foundation, the late John Locke, and the late Lord Mount Temple (then Mr W. F. Cowper) . They urged that the conflict of legal interests, which is the special characteristic of a common, might be trusted to preserve it as an open space, and that all that parliament could usefully do, was to restrict parliamentary inclosure, and to pass a measure of police for the protection of commons as open spaces. The select committee adopted this view. On their report, was passed the Metropolitan Commons Act 1866, which prohibited any further parliamentary inclosures within the

metropolitan police area, and provided means by which a common could be put under local management. The lords of the manors in which the London commons lay felt that their opportunity of making a rich harvest out of land, valuable for building, though otherwise worthless, was slipping away; and a battle royal ensued. Inclosures were commenced, and the Statute of Merton prayed in aid. The public retorted by legal proceedings taken in the names of commoners. These proceedings — which culminated in the mammoth suit as to Epping Forest, with the corporation of London as plaintiffs and fourteen lords of manors as defendants — were uniformly successful; and London commons were saved. By degrees the manorial lords, seeing that they could not hope to do better, parted with their interest for a small sum to some local authority; and a large area of the common land, not only in the county of London, but in the sub- urbs, is now in the hands of the representatives of the ratepayers, and is definitely appropriated to the recreation of the public.

Moreover, the Commons Preservation Society was able to base, upon the uniform success of the commoners in the law courts, a plea for the amendment of the law. The . Statute of Merton, we have seen, purports to enable meat of the lord of the soil to inclose a common, if he leaves statute 0/ sufficient pasture for the commoners. This statute MeHon ‘ was constantly vouched in the litigation about London commons; but in no single instance was an inclosure justified by virtue of its provisions. It thus remained a trap to lords of manors, and a source of controversy and expense. In the year 1893 Lord Thring, at the instance of the Commons Preservation Society, carried through parliament the Commons Law Amendment Act, which provided that in future no inclosure under the Statute of Merton should be valid, unless made with the consent of the Board of Agriculture, which was to consider the expediency of the inclosure from a public point of

view.

The movement to preserve commons as open spaces soon spread to the rural districts. Under the Inclosure Act of 1845 provision was made for the allotment of a part of the land to be inclosed for field gardens for the labouring ˆ„ m a moas poor, and for recreation. But those who were interested in effecting an inclosure often convinced the inclosure com- missioners that for some reason such allotments would be useless. To such an extent did the reservation of such allotments become discredited that, in 1869, the commission proposed to parliament the inclosure of 13,000 acres, with the reservation of only one acre for recreation, and none at all for field gardens. This proposal attracted the attention of Henry Fawcett, who, after much inquiry and consideration, came to the conclusion that inclosures were, speaking generally, doing more harm than good to the agricultural labourer, and that, under such conditions as the commissioners were prescribing, they constituted a serious evil. With characteristic intrepidity he opposed the annual inclosure bill (which had come to be considered a mere form) and moved for a committee on the whole subject. The ultimate result was the passing, seven years later, of the Commons Act 1876. This measure, introduced by a Conservative government, laid down the principle that an inclosure should not be allowed unless distinctly shown to be for the benefit, not merely of private persons, but of the neighbourhood generally and the public. It imposed many checks upon the process, and following the course already adopted in the case of metropolitan commons, offered an alternative method of making commons more useful to the nation, viz. their management and regulation as open spaces. The effect of this legislation and of the changed attitude of the House of Commons towards inclosure has been almost to stop that process, except in the case of common fields or extensive mountain wastes.

We have alluded to the regulation of commons as open spaces. The primary object of this process is to bring a common under the jurisdiction of some constituted authority, which Regala- may make by-laws, enforceable in a summary way tlon – before the magistrates of the district, for its protection, and may appoint watchers or keepers to preserve order and prevent wanton mischief. There are several means of attaining

this object. Commons within the metropolitan police district— the

Greater London of the registrar-general — are in this respect in a position by themselves. Under the Metropolitan Commons Acts, schemes for their local management may be made by the Board of Agriculture (in which the inclosure commission is now merged) without the consent either of the owner of the soil or the commoners — who, however, are entitled to compensation if they can show that they are injuriously affected. Outside the metropolitan police district a provisional order for regulation may be made under the Commons Act 1876, with the consent of the owner of the soil and of persons representing two-thirds in value of all the interests in the common. And under an act passed in 1899 the council of any urban or rural district may, with the approval of the Board of Agriculture and without recourse to parliament, make a scheme for the management of any common within its district, provided no notice of dissent is served on the board by the lord of the manor or by persons representing one-third in value of such interests in the common as are affected by the scheme. There is yet another way of protecting a common. A parish council may, by agreement, acquire an interest in it, and may make by-laws for its regulation under the Local Government Act 1894. The acts of 1894 and 1899 undoubtedly proceed on right lines. For, with the growth of efficient local government, commons naturally fall to be protected and improved by the authority of the district.

It remains to say a word as to the extent of common land still remaining open in England and Wales. In 1843 it was statistics estimated that there were still 10,000,000 acres of common land and common-field land. In 1 8 74 another return made by the inclosure commission made aguess of 2, 632, 772. These two returns were made from the same materials, viz. the tithe commutation awards. As less than 700,000 acres had been inclosed in the intervening period, it is obvious that the two estimates are mutually destructive. In July 1875 another version was given in the Return of Landowners (generally known as the Modern Domesday Book), compiled from the valuation lists made for the purposes of rating. This return put the commons of the country (not including common fields) at 1,542,648 acres. It is impossible to view any of these returns as accurate. Those compiled from the tithe commutation awards are based largely on estimates, since there are many parishes where the tithes had not been commuted. On the other hand, the valuation lists do not show waste and unoccupied land (which is not rated), and consequently the information as to such lands in the Return of Landowners was based on any materials which might happen to be at the disposal of the clerk of the guardians. All we can say, therefore, is that the acreage of the

remaining common land of the country is probably some- where between 1,500,000 and 2,000,000 acres. It is most capriciously distributed. In the Midlands there is very little to be found, while in a county of poor soil, like Surrey, nearly every parish has its common, and there are large tracts of heath and moor. In 1866, returns were made to parliament by the overseers of the poor of the commons within 15 and within 25 m. of Charing Cross. The acreage within the larger area was put at 38,450 acres, and within the smaller at 13,301; but owing to the difference of opinion which sometimes prevails upon the question, whether land is common or not, and the carelessness of some parish authorities as to the accuracy of their returns, even these figures cannot be taken as more than approximately correct. The metropolitan police district, within which the Metropolitan Commons Acts are in force, approaches in extent to a circle of 15 miles' radius. Within this district nearly 12,000 acres of common land have been put under local manage- ment, either by means of the Commons Acts or under special legislation. London is fortunate in having secured so much recreation ground on its borders. But when the enormous population of the capital and its rapid growth and expansion are considered, the conclusion is inevitable, that not one acre of common land within an easy railway journey of the metropolis can be spared.

Authorities. — Marshall, Elementary and Practical Treatise on Landed Property (London, 1804) ; F. W. Maitland, Domesday Book and Beyond (Cambridge, 1897) ; Borough and Township (Cambridge, 1898); F. Seebohm, The English Village Community (London, 1883); Williams, Joshua, Rights of Common (London, 1880); C. I. Elton, A Treatise on Commons and Waste Lands (1868) ; T. E. Scrutton, On Commons and Common Fields (1887); H. R. Woolrych, Rights of Common (1850); G. Shaw-Lefevre, English Commons and Forests (London, 1894); Sir W. Hunter, The Preservation of Open Spaces (London, 1896) ; " The Movements for the Inclosure and Preservation of Open Lands," Journal of the Royal Statistical Society, vol. lx. part ii. (June 1897); Returns to House of Commons (1843), No. 325; (1870), No. 326; (1874), No. 85; Return of Landowners (1875); Annual Reports of Inclosure Commission and Board of Agriculture; Revised Statutes and Statutes at large. (R. H.*)

COMMONWEALTH, a term generally synonymous with commonweal, i.e. public welfare, but more particularly signifying a form of government in which the general public have a direct voice. " The Commonwealth " is used in a special sense to denote the period in English history between the execution of Charles I. in 1649 and the Restoration in 1660. Commonwealth is also the official designation in America of the states of Massa- chusetts, Pennsylvania, Virginia and

Kentucky. The Common- wealth of Australia is the title of the federation of Australian colonies carried out in 1900.

COMMUNE (Med. Lat. communia, Lat. communis, common), in its most general sense, a group of persons acting together for purposes of self-government, especially in towns. (See B orough, and Commune, Medieval, below.) ” Commune ” (Fr. commune, Ital. comune, Ger. Gemeinde, &c.) is now the term generally applied to the smallest administrative division in many European countries. (See the sections dealing with the administration of these countries under their several headings.) ” The Commune” is the name given to the period of the history of Paris from March 18 to May 28, 1871, during which the commune of Paris attempted to set up its authority against the National Assembly at Versailles. It was a political movement, intended to replace the centralized national organization by one based on a federation of communes. Hence the ” communists ” were also called ” federalists.” It had nothing to do with the social theories of Communism (q.v.). (See France: History.)

COMMUNE, MEDIEVAL. Under this head it is proposed to give a short account of the rise and development of towns in central and western continental Europe since the downfall of the Roman Empire. All these, including also the British towns (for which, however, see Borough), may be said to have formed one unity, inasmuch as all arose under similar conditions, economic, legal and political, irrespective of local peculiarities. Kindred economic conditions prevailed in all the former provinces of the Western empire, while new law concepts were everywhere introduced by the Germanic invaders. It is largely for the latter reason that it seems advisable to begin with an account of the German towns, the term German to correspond to the limits of the old kingdom of Germany, comprising the present empire, German Austria, German Switzerland, Holland and a large portion of Belgium. In their development the problem, as it were, worked out least tainted by foreign interference, showing at the same time a rich variety in detail; and it may also be said that their constitutional and economic history has been more thoroughly investigated than any other.

Like the others, the German towns should be considered from three points of view, viz. as jurisdictional units, as self-adminis- trative units and as economic units. One of the chief distinguish- ing features of early as opposed to modern town-life is that each town formed a jurisdictional district distinct from the country around. Another trait, more in accordance with the conditions of to-day, is that local self-government was more fully developed and strongly marked in the towns than without. And, thirdly^ each town in economic matters

followed a policy as independent as possible of that of any other town or of the country in general. The problem is, how this state of things arose.

From this point of view the German towns may be divided into two main classes: those that gradually resuscitated on the ruins of former Roman cities in the Rhine and Danube countries, and

thoce that were newly founded at a later date in the interior. 1 Foremost in importance among the former stand the episcopal cities. Most of these had never been entirely destroyed during the Germanic invasion. Roman civic institutions perished; but probably parts of the population survived, and small Christian congregations with their bishops in most cases seem to have weathered all storms. Much of the city walls presumably re- mained standing, and within them German communities soon settled.

In the 10th century it became the policy of the German emperors to hand over to the bishops full jurisdictional and administrative powers within their cities. The bishop hence- forward directly or indirectly appointed all officers for the town's government. The chief of these was usually the advocatus or Vogt, some neighbouring noble who served as the proctor of the church in all secular affairs. It was his business to preside three times a year over the chief law-court, the so-called echie or wngebotene Ding, under the cognizance of which fell all cases relating to real property, personal freedom, bloodshed and robbery. For the rest of the legal business and as president of the ordinary court he appointed a Schultheiss, centenarius or causidicus. Other officers were the Burggraf 2 or praefectus for military matters, including the preservation of the town's defences, walls, moat, bridges and streets, to whom also apper- tained some jurisdiction over the craft-gilds in matters relating to their crafts; further the customs-officer or teleonarius and the mint-master or monetae magister. It was not, however, the fact of their being placed under the bishop that constituted these towns as separate jurisdictional units. The chief feature rather is the existence within their walls of a special law, distinct in important points from that of the country at large. The towns enjoyed a special peace, as it was called, i.e. breaches of the peace were more severely punished if committed in a town than elsewhere. Besides, the inhabitants might be sued before the town court only, and to fugitives from the country who had taken refuge in

the town belonged a similar privilege. This special legal status probably arose from the towns being considered in the first place as the king's fortresses 3 or burgs (see Borough), and, therefore, as participating in the special peace enjoyed by the king's palace. Hence the terms " burgh," " borough " in English, baurgs in Gothic, the earliest Germanic designations for a town; " burgher," " burgess " for its inhabitants. What struck the townless early Germans most about the Roman towns was their mighty walls. Hence they applied to all fortified habita- tions the term in use for their own primitive fortifications; the walls remained with them the main feature distinguishing a town from a village; and the fact of the town being a fortified place likewise necessitated the special provisions mentioned for maintaining the peace.

The new towns in the interior of Germany were founded on land belonging to the founder, some ecclesiastical or lay lord, and frequently adjoining the cathedral close of one of the new sees or the lord's castle, and they were laid out according to a regular plan. The most important feature was the market-square, often surrounded by arcades with stalls for the sale of the principal commodities, and with a number of straight streets leading thence to the city gates. 4 As for the fortifications, some time naturally passed before they were completed. Furthermore, the governmental machinery would be less complex than in the older towns. The legal peculiarities distinguishing town and country, on the other hand, may be said to have been conferred

1 As to the former, see S. Rietschel, Die Civitas auf deutschem Boden bis zum Ausgange der Karolingerzeit (Leipzig, 1894); and, for the newly founded towns, the same author, Markt und Stadt in ihrem rechtlichen Verhdltnis (Leipzig, 1897).

2 About the Burggraf, see S. Rietschel, Das Burggrafenamt und die hohe Gerichtsbarkeit in den deutschen Bischofsstadten wahrend des frilheren Mitielalters (Leipzig, 1905).

3 As to the towns as fortresses, see also F. Keutgen, Vntersuchungen iiber den Vr sprung der deutschen Stadtverfassung (Leipzig, 1895) ; and " Der Ursprung der deutschen Stadtverfassung " (Neue Jahrbilcher fur das klassische Altertum, &c, N.F. vol. v.).

- See S. Rietschel, Markt und Stadt, and J. Fritz, Deutsche Stadt-aniagen (Strassburg, 1894).

on the new towns in a more clearly defined form from the beginning.

An important difference lay in the mode of settlement. There is evidence that in the quondam Roman towns the German newcomers settled much as in a village, i.e. each full member of the community had a certain portion of arable land allotted to him and a share in the common. Their pursuits would at first be mainly agricultural. The new towns, on the other hand, general economic conditions having meanwhile begun to undergo a marked change, were founded with the intention of establishing centres of trade. Periodical markets, weekly or annual, had preceded them, which already enjoyed the special protection of the king's ban, acts of violence against traders visiting them or on their way towards them being subject to special punishment. The new towns may be regarded as markets made permanent. The settlers invited were merchants (mercalores personati) and handicraftsmen. The land now allotted to each member of the community was just large enough for a house and yard, stabling and perhaps a small garden (50 by 100 ft. at Freiburg, 60 by 100 ft. at Bern) . These building plots were given as free property or, more frequently, at a merely nominal rent (Wurtzins) with the right of free disposal, the only obligation being that of building a house. All that might be required besides would be a common for the pasture of the burgesses' cattle.

The example thus set was readily followed in the older towns. The necessary land was placed at the disposal of new settlers, either by the members of the older agricultural community, or by the various churches. The immigrants were of widely differing status, many being serfs who came either with or without their lords' permission. The necessity of putting a stop to belated prosecutions on this account in the town court led to the acceptance of the rule that nobody who had lived in a town undisturbed for the term of a year and a day could any longer be claimed by a lord as his serf. But even those who had migrated into a town with their lords' consent could not very well for long continue in serfdom. When, on the other hand, certain bishops attempted to treat all new-comers to their city as serfs, the emperor Henry V. in charters for Spires and Worms proclaimed that in these towns all serf-like conditions should cease. This ruling found expression in the famous saying: Stadtluft macht frei, " town-air renders free." As may be imagined, this led to a rapid increase in population, mainly during the nth to 13th centuries. There would be no difficulty for the immigrants to find a dwelling, or to make a living, since most of them would be versed in one or other of the crafts in practice among villagers.

The most important further step in the history of the towns was the establishment of an organ of self-government, the town- council (Rat,

consilium, its members, Ratmanner, consules, less frequently consiliarii) , with one, two or more burgomasters (Bur germeister, magistri civium, proconsules) at its head. (It was only after the Renaissance that the town-council came to be styled senate, and the burgomasters in Latin documents, consules.) As units of local government the towns must be con- sidered as originally placed on the same legal basis as the villages, viz. as having the right of taking care of all common interests below the cognizance of the public courts or of those of their lord. 5 In the towns, however, this right was strengthened at an early date by the jus negotiate. At least as early as the beginning of the nth century, but probably long before that date, mercantile communities claimed the right, confirmed by the emperors, of settling mercantile disputes according to a law of their own, to the horror of certain conservative-minded clerics. 6 Furthermore, in the rapidly developing towns, opportunities for the exercise of self-administrative functions constantly increased. The new self-governing body soon began to legislate in matters of local government, imposing fines for the breach

5 G. von Below, Die Entstehung der deutschen Stadtgemeinde (Dusseldorf, 1889); and Der Ursprung der deutschen Stadtverfassung (Dfisseldorf, 1892).

6 F. Keutgen, Urkunden zur stddtischen Verfassungsgeschichte, No. 74 and No. 75 (Berlin, 1901).

of its by-laws. Thus it assumed a jurisdiction, partly concurrent with that of the lord, which it further extended to breaches of the peace. And, finally, it raised funds by means of an excise-duty, Ungeld (cf. the English malatolta) or Accise, Zeise. In the older and larger towns it soon went beyond what the bishops thought proper to tolerate; conflicts ensued; and in the 13th century several bishops obtained decrees in the imperial court, either to suppress the Rat altogether, or to make it subject to their nomination, and more particularly to abolish the Ungeld, as detrimental to episcopal finances. In the long run, however, these attempts proved of little avail.

- Meanwhile the tendency towards self-government spread even to the lower ranks of town society, resulting in the establishment of craft-gilds. From a very early period there is reason to believe merchants among themselves formed gilds for social and religious purposes, and

for the furtherance of their economic interests. These gilds would, where they existed, no doubt also influence the management of town affairs; but nowhere has the Rat, as used to be thought, developed out of a gild, nor has the latter anywhere in Germany played a part at all similar in importance to that of the English gild merchant, the only exception being for a time the Richerzeche, or Gild of the Rich of Cologne, from early times by far the largest, the richest, and the most important trading centre among German cities, and therefore provided with an administration more complex, and in some respects more primitive, than any other. On the other hand, the most important commodities offered for sale in the market had been subject to official examination already in Carolingia.n times. Bakers', butchers', shoemakers' stalls were grouped together in the market-place to facilitate control, and with the same object in view a master was appointed for each craft as its responsible representative. By and by these crafts or " offices " claimed the right of electing their master and of assisting him in examin- ing the goods, and even of framing by-laws regulating the quality of the wares and the process of their manufacture. The bishops at first resented these attempts at self-management, as they had done in the case of the town council, and imperial legislation in their interests was obtained. But each craft at the same time formed a society for social, beneficial and religious purposes, and, as these were entirely in accordance with the wishes of the clerical authorities, the other powers could not in the long run be withheld, including that of forcing all followers of any craft to join the gild (Zunftzwang) . Thus the official inspection of markets, community of interests on the part of the craftsmen, and co-operation for social and religious ends, worked together in the formation of craft-gilds. It is not suggested that in each individual town the rise of the gilds was preceded by an organiza- tion of crafts on the part of the lord and his officers; but it is maintained that as a general thing voluntary organization could hardly have proceeded on such orderly lines as on the whole it did, unless the framework had in the first instance been laid down by the authorities: much as in modern times the working together in factories has practically been an indispensable preliminary to the formation of trade unions. Much less would the principle of forced entrance have found such ready acceptance both on the part of the authorities and on that of the men, unless it had previously been in full practice and recognition under the system of official market-control. The different names for the societies, viz. fraternitas, Brilderschajt, officium, Ami, condictum, Zunjt, unio, Innung, do not signify different kinds of societies, but only different aspects of the same thing. The word Gilde alone forms an exception, inasmuch as, generally speaking, it was used by merchant gilds only. 1 •

From an early date the towns, more particularly the older episcopal cities, took a part in imperial politics. Legally the bishops were in their cities mere representatives of the imperial government. This fact found formal expression mainly in two ways. The Vogt, although appointed by the bishop, received the ” ban,” i.e. the power of having justice executed, which he passed on to the lesser officers, from the king or emperor direct. Secondly, whenever the emperor held a curia generalis 1 F. Keutgen, Amter und Ziinfte (Jena, 1903).

(or general assembly, or diet) in one of the episcopal cities, and for a week before and after, all jurisdictional and administrative power reverted to him and his immediate officers. The citizens on their part clung to this connexion and made use of it whenever their independence was threatened by their bishops, who strongly inclined to consider themselves lords of their cathedral cities, much as if these had been built on church-lands. As early as 1073, therefore, we find the citizens of Worms successfully rising against their bishop in order to provide the emperor Henry IV. with a refuge against the rebellious princes. Those of Cologne made a similar attempt in 1074. But a second class of imperial cities (Reichsstadte) , much more numerous than the former, consisted of those founded on demesne-land belonging either to the Empire or to one of the families who rose to imperial rank. This class was largely reinforced, when after the extinction of the royal house of Hohenstaufen in the 13th century, a great number of towns founded by them on their demesne successfully claimed immediate subjection to the crown. About this time, during the interregnum, a federation of more than a hundred towns was formed, beginning on the Rhine, but spreading as far as Bremen in the north, Zurich in the south, and Regensburg in the east, with the object of helping to preserve the peace. After the death of King William in 1256, they resolved to recognize no king unless unanimously elected. This league was joined by a powerful group of princes and nobles and found recognition by the prince-electors of the Empire; but for want of leadership it did not stand the test, when Richard of Cornwall and Alphonso of Castile were elected rival kings in r257. 2 In the following centuries the imperial cities in south Germany, where most of them were situated, repeatedly formed leagues to protect their interests against the power of the princes and the nobles, and destructive wars were waged; but no great political issue found solution, the relative position of the parties after each war remaining much what it had been before. On the part of the towns this was mainly due to lack of leadership and of unity of purpose. At the time of the Reformation the imperial towns, like most of the others, stood forward as champions of the new cause and did valuable service in upholding and defending it.

After that, however, their political part was played out, mainly because they proved unable to keep up with modern conditions of warfare. It should be stated that seven among the episcopal cities, viz. Cologne, Mainz, Worms, Spires, Strassburg, Basel and Regensburg, claimed a privileged position as ” Free Cities,” but neither is the ground for this claim clearly established, nor its nature well defined. The general obligations of the imperial cities towards the Empire were the payment of an annual fixed tax and the furnishing of a number of armed men for imperial wars, and from these the above-named towns claimed some measure of exemption. Some of the imperial cities lost their independence at an early date, as unredeemed pledges to some prince who had advanced money to the emperor. Others seceded as members of the Swiss Confederation. But a considerable number survived until the reorganization of the Empire in 1803. At the peace in 1815, however, only four were spared, namely, Frankfort, Bremen, Hamburg and Lubeck, these being practically the only ones still in a sufficiently flourishing and economically independ- ent position to warrant such preferential treatment. But finally Frankfort, having chosen the wrong side in the war of 1866, was annexed by Prussia, and only the three seaboard towns remain as full members of the new confederate Empire under the style of Freie und Hansestadte. But until modern times most of the larger Landstiidte or mesne-towns for all intents and purposes were as independent under their lords as the im- perial cities were under the emperor. They even followed a foreign policy of their own, concluded treaties with foreign powers or made war upon them. Nearly all the Hanseatic towns belonged to this category. With others like Bremen, Hamburg and Magdeburg, it was long in the balance which class they be- longed to. All towns of any importance, however, were for a considerable time far ahead of the principalities in administration. 2 J. Weizsacker, Der rheinische Bund (Tubingen, 1879).

It was largely this fact that gave them power. When, therefore, from about the 15th century the princely territories came to be better organized, much of the raison d’Ure for the exceptional position held by the towns disappeared. The towns from an early date made it their policy to suppress the exercise of all handicrafts in the open country. On the other hand, they sought an increase of power by extending rights of citizenship to numerous individual inhabitants of the neighbouring villages (Pfalburger, a term not satisfactorily explained). By this and other means, e.g. the purchase of estates by citizens, many

towns gradually acquired a considerable territory. These tendencies both princes and lesser nobles naturally tried to thwart, and the mediate towns or Landstddte were finally brought to stricter subjection, at least in the greater principalities such as Austria and Brandenburg. Besides, the less favourably situated towns suffered through the concentration of trade in the hands of their more fortunate sisters. But the economic decay and consequent loss of political influence among both imperial and territorial towns must be chiefly ascribed to inner causes.

Certain leading political economists, notably K. Bucher [Die Bevolkerung von Frankfurt a. M. im i/flen und i$ten Jahr- hundert, i., Tubingen, 1886; Die Entstehung der Volksivirt- schaft, 5th ed., Tubingen, 1906), and, in a modified form, W. Sombart (Der moderne Kapitalismus, 2 vols., Leipzig, 1902), have propounded the doctrine of one gradual progression from an agricultural state to modern capitalistic conditions. This theory, however, is nothing less than an outrage on history. As a matter of fact, as far as modern Europe is concerned, there has twice been a progression, separated by a period of retrogression, and it is to the latter that Biicher's picture of the agricultural and strictly protectionist town (the geschlossene Stadtmrtschaft) of the 14th and 15th centuries belongs, while Sombart's notion of an entire absence of a spirit of capitalistic enterprise before the middle of the 15 th century in Europe north of the Alps, or the 14th century in Italy, is absolutely fantastic. 1 The period of the rise of cities till well on in the 13th century was naturally a period of expansion and of a considerable amount of freedom of trade. It was only afterwards that a protectionist spirit gained the upper hand, and each town made it its policy to restrict as far as possible the trade of strangers. In this re- volution the rise of the lower strata of the population to power played an important part.

The craft-gilds had remained subordinate to the Rat, but by-and-by they claimed a share in the government of the towns. Originally any inhabitant holding a certain measure of land, freehold or subject to the mere nominal ground-rent above- mentioned, was a full citizen independently of his calling, the clergy and the lord's retainers and servants of whatever rank, who claimed exemption from scot and lot, to use the English formula, alone excepted. The majority of the artisans, however, were not in this happy position. Moreover, the town council, instead of being freely elected, filled up vacancies in its ranks by co-optation, with the result that all power became vested in a limited number of rich families. Against this state of things the crafts rebelled, alleging mismanagement, malversation and the withholding of justice. During the 14th and 15th centuries revolutions and counter-

revolutions, sometimes accompanied by considerable slaughter, were frequent, and a great variety of more democratic constitutions were tried. Zurich, however, is the only German place where a kind of tyrannis, so frequent in Italy, came to be for a while established. On the whole it must be said that in those towns where the democratic party gained the upper hand an unruly policy abroad and a narrow-minded protection at home resulted. An inclination to hasty measures of war and an unwillingness to observe treaties among the democratic towns of Swabia were largely responsible for the

1 G. v. Below, Der Untergang der mittelalterlichen Stadtwirtschaft; Vber Theorien der wirtschaftlichen Entwicklung der Volker; F. Keutgen, " Hansische Handelsgesellschaften, vornehmlich des I4ten Jahrhunderts," in Vierteljahrsschrift fur Sozial- und Wirtschafts-geschichte, vol. iv. (1906).

disasters of the war of the Swabian League in the 14th century. At home, whereas at first markets had been free and open to any comer, a more and more protective policy set in, traders from other towns being subjected more and more to vexatious restrictions. It was also made increasingly difficult to obtain membership in the craft-gilds, high admission fees and so-called masterpieces being made a condition. Finally, the number of members became fixed, and none but members' sons and sons-in- law, or members' widows' husbands were received. The first result was the formation of a numerous proletariate of life-long assistants and of men and women forcibly excluded from follow- ing any honest trade; and the second consequence, the economic ruin of the town to the exclusive advantage of a limited number. From the end of the 15th century population in many towns decreased, and not only most of the smaller ones, but even some once important centres of trade, sank to the level almost of villages. Those cities, on the other hand, where the mercantile community remained in power, like Nuremberg and the seaboard towns, on the whole followed a more enlightened policy, although even they could not quite keep clear of the ever-growing protective tendencies of the time. Many even of the richer towns, notably Nuremberg, ran into debt irretrievably, owing partly to an exorbitant expenditure on magnificent public buildings and extensive fortifications, calculated to resist modern instruments of destruction, partly to a faulty administration of the public debt. From the 13th century the towns had issued (" sold," as it was called) annuities, either for life cr for perpetuity in ever-increasing number, until it was at last found impossible to raise the funds necessary to pay them.

One of the principal achievements of the towns lay in the field of

legislation. Their law was founded originally on the general national (or provincial) law, on custom, and on special privilege. New foundations were regularly provided by their lord with a charter embodying the most important points of the special law of the town in question. This miniature code would thenceforth be developed by means of statutes passed by the town council. The codification of the law of Augsburg in 1276 already fills a moderate volume in print (ed. by Christian Meyer, Augsburg, 1872). Later foundations were frequently referred by their founders to the nearest existing town of importance, though that might belong to a different lord. Afterwards, if a question in law arose which the court of a younger town found itself unable to answer, the court next senior in affiliation was referred to, which in turn would apply to the court above, until at last that of the original mother town was reached, whose decision was final. This system was chiefly developed in the colonial east, where most towns were affiliated directly or indirectly either to Lubeck or to Magdeburg; but it was by no means unknown in the home country. A number of collections of such judgments (Schoffenspriiche) have been published. It is also worth mentioning that it was usual to read the police by-laws of a town at regular intervals to the assembled citizens in a morning-speech (Morgenspraehe) . 2

To turn to Italy, the country for so many centuries in close political connexion with Germany, the foremost thing to be noted is that here the towns grew to even greater independence, many of them in the end acknowledging no overlord whatever after the yoke of the German kings had been shaken off. On the other hand, nearly all of them in the long run fell under the sway of some local tyrant-dynasty.

From Roman times the country had remained thickly studded, with towns, each being the seat of a bishop. From this arose their most important peculiarity. For it was largely due to an identification of dioceses and municipal territories that the nobles of the surrounding country took up their headquarters in the cities, either voluntarily or because forced to do so by the citizens, who made it their policy thus to turn possible opponents into partisans and defenders. In Germany, on the other hand,

2 On this whole subject see Richard Schroder, Lehrbuch der deutschen Rechtsgeschichte (5th ed., Leipzig, 1907), § 56, ” Die Stadt- rechte.” Also Charles Gross, The Gild Merchant (Oxford, 1890), vol. i. Appendix E, ” Affiliation of Medieval Boroughs.”

nobles and knights were carefully shut out so long as the town's independence was at stake, the members of a princely garrison being required to take up their abode in the citadel, separated from the town proper by a wall. Only in the comparatively few cathedral cities this rule does not obtain. It will be seen that, in consequence of this, municipal life in Italy was from the first more complex, the main constituent parts of the population being the capitani, or greater nobles, the valvassori, or lesser nobles (knights) and the people (popolo). Furthermore, the bishops being in most cases the exponents of the imperial power, the struggle for freedom from the latter ended in a radical rid- dance from all temporal episcopal government as well. Foremost in this struggle stood the cities of Lombardy, most of which all through the barbarian invasions had kept their walls in repair and maintained some importance as economic centres, and whose popolo largely consisted of merchants of some standing. As early as the 8th century the laws of the Langobard King Aistulf distinguished three classes of merchants (negotiantes) , among whom the majores et potentes were required to keep themselves provided with horse, lance, shield and a cuirass. The valley of the Po formed the main artery of trade between western Europe and the East, Milan being besides the point of convergence for all Alpine passes west of the Brenner (the St Gotthard, however, was not made accessible until early in the 13th century). Lom- bard merchants soon spread all over western Europe, a chief source of their ever-increasing wealth being their employment as bankers of the papal see.

The struggle against the bishops, in which a clamour for a reform of clerical life and a striving for local self-government were strangely interwoven, had raged for a couple of generations when King Henry V., great patron of municipal freedom as he was, legalized by a series of charters the status quo (Cremona, 1 1 14, Mantua, n 16). But under his weak successors the inde- pendence of the cities reached such a pitch as to be manifestly intolerable to an energetic monarch like Frederick I. Besides, the more powerful among them would subdue or destroy their weaker neighbours, and two parties were formed, one headed by Milan, the other by Cremona. Como and Lodi complained of the violence used to them by the former city. Therefore in 1 1 58 a commission was appointed embracing four Roman legists as representatives of the emperor, as well as those of fourteen towns, to examine into the imperial and municipal rights. The claims of the imperial government, jurisdictional and other, were acknowledged, only such rights of self-government being admitted as could be shown to be grounded on imperial charters. But when it came to carrying

into effect these Roncaglian decrees, a general rising resulted. Milan was besieged by the emperor and destroyed in 1162 in accordance with the verdict of her rivals. Nevertheless, after a defeat at Legnano in n 76, Frederick was forced to renounce all pretensions to interference with the government of the cities, merely retaining an overlordship that was not much more than formal (peace of Constance in 11 83). All through this war the towns had been supported by Pope Alexander III. Similarly under Frederick II. the renewal of the struggle between emperor and pope dovetailed with a fresh out- break of the war with the cities, who feared lest an imperial triumph over the church would likewise threaten their independ- ence. The emperor's death finally decided the issue in their favour.

Constitutionally, municipal freedom was based on the forma- tion of a commune headed by elected consuls, usually to the number of twelve, representing the three orders of capitani, valv assor i and popolo. Frequently, however, the number actually wielding power was much more restricted, and their position altogether may rather be likened to that of their Roman prede- cessors than to that of their German contemporaries. In all important matters they asked the advice and support of " wise men," sapienles, discretiores, prudentes, as a body called the credenza, while the popular assembly (parlamentum, concio, consilium generale) was the true sovereign. The consuls with the assistance of judices also presided in the law-courts; but besides the consuls of the commune there were consults de placitis specially appointed for jurisdictional purposes.

In spite of these multifarious safeguards, however, family factions early destroyed the fabric of liberty, especially as, just as there was an imperial, or Ghibelline, and a papal, or Guelph party among the cities as a whole, thus also within each town each faction would allege adherence to and claim support by one or other of the great world-powers. To get out of the dilemma of party-government, resort was thereupon had to the appoint- ment as chief magistrate of a podesta from among the nobles or knights of a different part of the country not mixed up with the local feuds. But the end was in most cases the establishment of the despotism of some leading family, such as the Visconti at Milan, the Gonzaga at Mantua, the della Scala in Verona and the Carrara in Padua.

In Tuscany, the historic role of the cities, with the exception of Pisa, begins at a later date, largely owing to the overlordship of the powerful margraves of the house of Canossa and their successors, who here represented the emperor. Pisa, however, together with Genoa, all through the nth century distinguished itself by war waged in the

western Mediterranean and its isles against the Saracens. Both cities, along with Venice, but especi- ally the Genoese, also did excellent service in reducing the Syrian coast towns still in the hands of the Turks in the reigns of Kings Baldwin I. and Baldwin II. of Jerusalem, while more particularly Pisa with great constancy placed her fleet at the disposal of the Hohenstaufen emperors for warfare with Sicily.

Meanwhile communes with consuls at their head were formed in Tuscany much as elsewhere. On the other hand the Tuscan cities managed to prolong the reign of liberty to a much later epoch, no podestd ever quite succeeding here in his attempts to establish the rule of his dynasty. Even when in the second half of the 15th century the Medici in Florence attained to power, the form at least of a republic was still maintained, and not till 1531 did one of them, supported by Charles V., assume the ducal title.

Long before the last stage, the rule of signori, was reached, however, the commune as originally constituted had everywhere undergone radical changes. As early as the 13th century the lower orders among the inhabitants formed an organization under officers of their own, side by side with that of the commune, which was controlled by the great and the rich; e.g. at Florence the people in 1250 rose against the turbulent nobles and chose a capitano del popolo with twelve anziani, two from each of the six city- wards (sestieri), as his council. The popolo itself was divided into twenty armed companies, each under a gonfaloniere. But later the arti (craft-gilds), some of whom, however, can be shown to have existed under consuls of their own as early as 1203, attained supreme importance, and in 1282 the government was placed in the hands of their priori, under the name of the signoria. The Guelph nobles were at first admitted to a share in the government, on condition of their entering a gild, but in 1293 even this privilege was withdrawn. The ordinamenti della giustizia of that year robbed the nobility of all political power. The lesser or lower arti, on the other hand, were conceded a full share in it, and a gonfaloniere della giustizia was placed at the head of the militia. In the 14th century twelve buoni uomini representing the wards {sestieri) were superadded, all these dignitaries holding office for two months only. And besides all these, there existed three competing chief justices and com- manders of the forces called in from abroad and holding office for six months, viz. the podestd, the capitano del popolo, and the esecutore della giustizia. In spite of all this complicated machinery of checks and balances, revolution followed upon revolution, nor could an occasional reign of terror be prevented like that of the Signore Gauthier de Brienne, duke of Athens (1342-1343). It was not till after a rising of the lowest order of all, the in- dustrial labourers, had been

suppressed in 1378 {tumulto dei Ciompi, the wool-combers), that quieter times ensued under the wise leadership, first of the Albizzi and finally of the Medici.

The history of the other Tuscan towns was equally tumultuous, all of them save Lucca, after many fitful changes finally passing under the sway of Florence, or the grand-duchy of Tuscany, as the state was now called. Pisa, one time the mightiest, had been

crushed between its inland neighbour and its maritime rival Genoa (battle of Meloria, 1282).

Apart in its constitutional development from all other towns in Italy, and it might be added, in Europe, stands Venice. Almost alone among Italian cities its origin does not go back to Roman times. It was not till the invasions of Hun and Lango- bard that fugitives from the Venetian mainland took refuge among the poor fishermen on the small islands in the lagoons and on the lido — the narrow stretch of coast-line which separates the lagoons from the Adriatic — some at Grado, some at Mala- mocco, others on Rialto. A number of small communities was formed under elected tribunes, acknowledging as their sovereign the emperor at Constantinople. Treaties of commerce were concluded with the Langobard kings, thus assuring a market for the sale of imports from the East and for the purchase of agricultural produce. Just before or after a.d. 700 the young republic seems to have thrown off the rule of the Byzantine dux Histriae et Venetiae and elected a duke {doge) of its own, in whom was vested the executive power, the right to convoke the popular assembly (concio) and appoint tribunes and justices. Political unity was thus established, but it was not till after another century of civil war that Rialto was definitely chosen the seat of government and thus the foundation of the present city laid. After a number of attempts to establish a hereditary dukedom, Duke Domenico Flabianico in 1032 passed a law providing that no duke was to appoint his successor or procure him to be elected during his own lifetime. Besides this two councils were appointed without whose consent nothing of importance was to be done. After the murder by the people of Duke Vitale Michiel in 11 72, who had suffered naval defeat, it was deemed necessary to introduce a stricter constitutional order. According to the orthodox account, some details of which have, however, recently been impugned, 1 the irregular popular meeting was replaced by a great council of from 450 to 480 members elected

annually by special appointed electors in equal proportion from each of the six wards. One of the functions of this body was to appoint most of the state officials or their electors. There was also an executive council of six, one from each ward. Besides these, the duke, who was henceforward elected by a body of eleven electors from among the aristocracy, would invite persons of prominence (the pregadi) in order to secure their assent and co- operation, whenever a measure of importance was to be placed before the great council. Only under extraordinary circum- stances the concio was still to be called. The tenure of the duke's office was for life. The general tendency of constitutional development in Venice henceforward ran in an exactly opposite direction to that of all other Italian cities towards a growing restriction of popular rights, until in 1296 the great council was for all future time closed to all but the descendants of a limited number of noble families, whose names were in that year entered in the Golden Book. It still remained to appoint a board to superintend the executive power. These were the awogadori di commune, and, since Tiepolo's conspiracy in 1310, the Consiglio dei Died, the Council of Ten, which controlled the whole of the state, and out of which there developed in the 16th century the state inquisition.

While in all prominent Italian cities the leading classes of the community were largely made up of merchants, in Venice the nobility was entirely commercial. The marked steadiness in the evolution of the Venetian constitution is no doubt largely due to this fact. Elsewhere the presence of large numbers of turbulent country nobles furnished the first germ for the unending dis- sensions which ruined such promising beginnings. In Venice, on the contrary, its businesslike habits of mind led the ruling class to make what concessions might seem needful, while both the masses and the head of the state were kept in due subjection to the laws. Too much stability, however, finally changed into stagnation, and decay followed. The foreign policy of Venice was likewise mainly dictated by commercial motives, the chief objectives being commercial privilege in the Byzantine empire and in the Frankish states in the East, domination of the Adriatic, 1 H. Kretschmayr, Geschichte von Venedig, vol. i. (Gotha, 1905).

occupation of a sufficient hinterland on the terra firtna, non-sufferance of the rivalry of Genoa, and, finally, maintenance of trade-supremacy in the eastern Mediterranean through a series of alternating wars and treaties with Turkey, the lasting monument of which was the destruction of the Parthenon in 1685 by a Venetian bomb. At last the proud republic surrendered to Napoleon without a stroke.

The cities of southern Italy do not here call for special attention. Several of them developed a certain amount of independence and free institutions, and took an important part in trade with the East, notably so Amain. But after incorporation in the Norman kingdom all individual history for them came to an end.

Rome, finally, derived its importance from being the capital of the popes and from its proud past. From time to time spasmodic attempts were made to revive the forms of the ancient republic, as under Arnold of Brescia in the 12th and by Niccolo di Rienzo in the 14th century; but there was no body of stalwart, self- reliant citizens to support such measures: nothing but turbulent nobles on the one hand and a rabble on the other.

In no country is there such a clear grouping of the towns on geographical lines as in France, these geographical lines, of course, having in the first instance been drawn by historical causes Another feature is the extent to which, in the unruly times preceding the civic movement, serfdom had spread among the inhabitants even of the towns throughout the greater part of the country, and the application of feudal ideas to town government. In some other respects the constitution of the cities in the south of France, as will be seen, has more in common with that of the Italian communes, and that of the northern French towns with those of Germany, than the constitutions of the various groups of French towns have among each other.

In the group of the miles consulages, comprising all important towns in the south, the executive was, as in Italy, in the hands of a body of consules, whose number in most cases rose to twelve. They were elected for the term of one year and re-eligible only after an interval, and they were supported by a municipal council (commune consilium, consilium magnum or secretum or generate, or colloquium) and a general assembly (parlamentum, concio, commune consilium, commune, universitas civium), which, however, as a rule was far from comprising the whole body of citizens. Another feature which these southern towns had in common with their Italian neighbours was the prominent part played by the native nobility. The relations with the clergy were generally of a more friendly character than in the north, and in some cases the bishop or archbishop even retained a considerable influence in the management of the town’s affairs. Dissensions among the citizens, or between the nobles and the bourgeois, frequently ended in the adoption of a podestat. And in several cities of the Languedoc, each of the two classes composing the population retained its separate laws and customs. It is matter of dispute whether vestiges of Roman institutions had survived in these

parts down to the time when the new constitutions sprang into being; but all investigators are pretty well agreed that, in no case did such remnants prove of any practical importance. Roman law, however, was never quite superseded by Germanic law, as appears from the statuts municipaux. In the improvement and expansion of these statutes a remarkable activity was dis- played by means of an annual correctio statutorum carried out by specially appointed statutores. In the north, on the other hand, the carta communiae, forming as it were the basis of the com- mune's existence, seems to have been considered almost as something sacred and unchangeable.

The constitutional history of the communes in northern France in a number of points widely differed from that of these villes consulaires. First of all the movement for their establishment in most cases was to a far greater degree of a revolutionary character. These revolutions were in the first place directed against the bishops; but the position both of the higher clergy and of the nobility was here of a nature distinctly more hostile to the aspirations of the citizens than it was in the south. As a result the clergy and the nobles were excluded from all membership of

the commune, except inasmuch as that those residing in the town might be required to swear not to conspire against it. The commune {communia, communa, communio, communitas, con- juratio, confoederatio) was formed by an oath of mutual help (sacramentum, jut amentum communiae). The members were described asjurati (also burgenses, vicini, amici), although in some communes that term was reserved for the members of the govern ing body. None but men of free and legitimate birth, and free from debt and contagious or incurable disease were received. The members of the governing body were styled juris (jurati) , pairs (pares) or Schevins (scabini). The last was, however, as in Germany, more properly the title of the jurors in the court of justice, which in many cases remained in the hands of the lord. In some cases the town council developed out of this body; but in the larger cities, like Rouen, several councils worked and all these names were employed side by side. The number of the members of the governing body proper varies from twelve to a hundred, and its functions were both judicial and administrative. There was also known an arrangement corresponding to the German alte und sitzende Rat, viz. of retired members who could be called in to lend assistance on important occasions. The most striking distinction, however, as

against the miles consulaires was the elevation of the president of the body to the position of maire or mayeur (sometimes also called prevdt, praepositus). As else- where, at first none but the civic aristocracy were admitted to take part in the management of the town's affairs; but from the end of the 13th century a share had to be conceded to representa- tives of the crafts. Dissatisfaction, however, was not easily allayed; the lower orders applied for the intervention of the king; and that effectively put an end to political freedom. This tendency of calling in state help marks a most striking difference as against the policy followed by the German towns, where all classes appear to have been always far too jealous of local independence. The result for the nation was in the one case despotism, equality and order, in the other individual liberty and an inability to move as a whole. At an earlier stage the king had frequently come to the assistance of the communes in their struggle with their lords. By-and-by the king's confirmation came to be considered necessary for their lawful existence. This proved a powerful lever for the extension of the king's authority. It may seem strange that in France the towns never had recourse to those interurban leagues which played so im- portant a part in Italian and in German history.

These two varieties, the communes and the villes consulaires together form the group of villes litres. As opposed to these stand the villes / ranches, also called villes prevotales after the chief officer, villes de bourgeoisie or villes soumises. They make up by far the majority of French towns, comprising all those situated in the centre of the kingdom, and also a large number in the north and the south. They are called villes /ranches on account of their possessing a franchise, a charter limiting the services due by the citizens to their lord, but political status they had little or none. According to the varying extent of the liberties conceded them, there may be distinguished towns governed by an elective body and more or less fully authorized to exercise jurisdiction; towns possessing some sort of municipal organization, but no rights of jurisdiction, except that of simple police; and, thirdly, those governed entirely by seignorial officers. To this last class belong some of the most important cities in France, wherever the king had power enough to withhold liberties deemed dangerous and unnecessary. On the other hand, towns of the first category often come close to the villes libres. A strict line of demarcation, however, remains in the mutual oath which forms the basis of the civic community in both varieties of the latter, and in the fact that the ville libre stands to its lord in the relation of vassal and not in that of an immediate possession. But however completement assujettie Paris might be, its organization, naturally, was immensely more complex

than that of hundreds of smaller places which, formally, might stand in an identical relationship to their lords. Like other villes /ranches under the king, Paris was governed by a prevdt (provost), but certain functions of self-government for

the city were delegated to the company of the marchands de Veau, mercatores aquae, also called mercatores ansati, that is, the gild of merchants whose business lay down the river Seine, in other words, a body naturally exclusive, not, however, to the citizens as such. At their head stopd a prevdt des marchands and four eschevins de la marchandise. Other prud'hommes were occasionally called in, and from 1296 prevdt and echevins ap- pointed twenty-four councillors to form with themselves a parloir aux bourgeois. . The crafts of Paris were organized in metiers, whose masters were appointed, some by the prevdt de Paris, and some by certain great officers of the court. In the tax rolls of a.d. 1292 to 1300 no fewer than 448 names of crafts occur, while the Livre des metiers written in 1268 by Etienne de Boileau, then prevdt de Paris, enumerates 101 organized bodies of tradesmen or women and artisans. Among the duties of these bodies, as elsewhere, was the guet or night-watch, which neces- sitated a military organization under quartiniers, cinquantainiers and dixainiers. This gave them a certain power. But both their revolutions, under the prevdt des marchands, Etienne Marcel, after the battle of Maupertuis, and again in 1382, were extremely short-lived, and the only tangible result was a stricter subjection to the king and his officers.

An exceptional position among the cities of France is taken up by those of Flanders, more particularly the three " Great Towns," Bruges, Ghent and Ypres, whose population was Flemish, i.e. German. They sprang up at the foot of the count's castles and rose in close conjunction with his power. On the accession of a new house they made their power felt as early as 1 1 28. Afterwards the counts of the house of Dampierre fell into financial dependence on the burghers, and therefore allied themselves with the rising artisans, led by the weavers. These, however, proved far more unruly, bloody conflicts ensued, and for a considerable period the three great cities ruled the whole of Flanders with a high hand. Their influence in the foreign relations of the country was likewise great, it being in their interest to keep up friendly relations with England, on whose wool the flourishing state of the staple industry of Flanders depended. It is a remarkable fact that the historical position taken up by these cities, which politically belonged to France, is much more akin to the part pkyed by the German towns, whereas Cambrai, whose population was French, is the only city politically situated in Germany, where a

commune came to be established.

In the Spanish peninsula, the chief importance of the numerous small towns lay in the part they played as fortresses during the unceasing wars with the Moors. The kings therefore extended special privileges (Jueros) to the inhabitants, and they. were even at an early date admitted to representation in the Cortes (parlia- ment). Of greater individual importance than all the rest was Barcelona. Already in 1068 Count Berengarius gave the city a special law (usatict) based on its ancient usages, and from the 14th century its commercial code (libro del consolat del mar) became influential all over southern Europe.

The constitutions of the Scandinavian towns were largely modelled on those of Germany, but the towns never attained anything like the same independence. Their dependence on the royal government most strongly comes out in the fact of their being uniformly regulated by royal law in each of the three kingdoms. In Sweden particularly, German merchants by law took an equal share in the government of the towns. In Denmark their influence was also great, and only in Norway did they remain in the position of foreigners in spite of their famous settlement at Bergen. The details, as well as those of the German settlement at Wisby and on the east coast of the Baltic, belong rather to the history of the Hanseatic League (q.v.). Denmark appears to be the only one of the three kingdoms where gilds at an early date played a part of importance.

Bibliography. — The only book dealing with the subject in general, viz. K. D. Hiillmann, Stadtewesen des Mittelalters (4 vols., Bonn, 1826-1828), is quite antiquated. For Germany it is best to consult Richard Schroder, Lehrbruch der deutschen Rechtsgeschichte (5th ed., Leipzig,_i907), §§ 51 and 56, where a bibliography as com- plete as need be is given, both of monographs dealing with various

aspects of the question, and of works on the history of individual towns. The latter alone covers two large octavo pages of small print. As a sort of complement to Schroder's chapters may be con- sidered, F. Keutgen, Vrkunden zur stddtischen Verfassungsgeschichte (Berlin, 1 901 — Ausgenvdhlte Urkunden zur deutschen Verfassungs- geschichte, by G. von Below and F. Keutgen, vol. i.), a collection of 437 select charters and other documents, with a very full index. The

great work of G. L. von Maurer, Geschichte der Stddteverfassung von Deutschland (4 thick vols., Erlangen, 1869-1871), contains an enormous mass of information not always treated quite so critically as the present age requires. There is an excellent succinct account for general readers by Georg von Below," Das altere deutsche Stadte-wesen und Biirgertum," Monographien zur Weltgeschichte, vol. vi. (Bielefeld and Leipzig, 1898, illustrated). A number of the most important recent monographs have been mentioned above. As fpr Italy, the most valuable general work for the early times is still Carl HcgeJ, Geschichte der Stddteverfassung von Italien sett der Zeit der romischen Herrschaft bis zum Ausgang des zwblften Jahrhunderts (2 small vols. , Leipzig, 1 847 , price second-hand , M . 40) , in which it was for the first time fully proved that there is no connexion between Roman and modern municipal constitutions. For the period from the 13th century it will perhaps be best to consult W. Assmann, Geschichte des Mittelalters, 3rd ed., by L. Viereck, dritte Abteilung, Die letzten beiden Jahrhunderts des Mittelalters: Deutschland, die Schweiz, und Italien, by R. Fischer, R. Scheppigand L. Viereck (Brunswick, 1906). In this volume, pp. 679-943 contain an excellent account of the various Italian states and cities during that period, with a full bibliography for each. Among recent critical contributions to the history of individual towns, the following works deserve to be specially men- tioned:' Robert Davidsohn, Geschichte von Florenz (Berlin, 1896- 190.8) ; down to the beginning of the 14th century) ; the same, Forschungen zur Geschichte von Florenz (vols, i.iv., Berlin, 1896 1908) ; lleinrich Kretschmayr, Geschichte von Venedig (vol. i., Gotha, 1905, to 1205). For France, there are the works by Achille Luchaire, Les Communes francaises a I'epoque des Capetiens directs (Paris, 1890), and Paul Viollet, "Les Communes francaises au moyen age," Memoires de V Academie des Inscriptions et Belles-lettres, tome xxxvi. (Paris., 1900), There are, of course, also accounts in the great works on French institutions by Flach, Glasson, Viollet, Luchaire, but perhaps the one in Luchaire's Manuel des institutions francaises, periode des Capetiens directs (Paris, 1892) deserves special recom-mendation. Another valuable account for France north of the Loire is that contained in the great work by Karl Hegel, Stadte und Gilden der germanischen Volker im Mittelaller (2 vols., Leipzig, 1891; see English Historical Review, viii. 120-127). Of course, there are also numerous monographs, among which the following may be mentioned: Edouard Bonvalot, Le Tiers Stat d'apres la charte de Beaumont et ses filiates (Paris, 1884) ; and A. Giry, Les iltablissements de Rouen (2 vols., Paris, 1883-1885); also a collection of documents by Gustave Fagniez, Documents relatifs d Vhistoire de I'industrie et du commerce en France (2 vols., Paris, 1898, 1900). Some valuable works on the

commercial history of southern Europe should still be mentioned, such as W. Heyd, Geschichte des Levante- handels im Mittelalter (2 vols., Stuttgart, 1879; French edition by Furcy Raynaud, 2 vols., Paris, 1885 seq., improved by the author), recognized as a standard work; Adolf Schaube, Handelsgeschichte der romanischen Volker des Mittelmeergebietes bis zum Ende der Kreuzziige (Munich and Berlin, 1906) ; Aloys Schulte, Geschichte des mittelalterlichen Handels und Verkehrs zwischen Westdeutschland und Italien mit Ausschluss Venedigs (2 vols., Leipzig, 1900); L. Goldschmidt, Vniversalgeschichte des Handelsrechts (vol. i., Stuttgart, 1891). As for the Scandinavian towns, the best guide is perhaps the book by K. Hegel, Stddte tmd Gilden der germanischen Volker, already mentioned; but see also Dietrich Schafer, ” Der Stand der Geschichtswissenschaft im skandinavischen Norden,” Internationale Wochenschrift, November 16, 1907. (F. K.)

COMMUNISM, the name loosely given to schemes of social organizations depending on the abolition of private property and its absorption into the property of a community as such. It is a form of what is now generally called socialism (q.v.), the terminology of which has varied a good deal according to time and place; but the expression ” communism ” may be con- veniently used, as opposed to ” socialism ” in its wider political sense, or to the political and municipal varieties known as ” collectivism,” ” state socialism,” &c, in order to indicate more particularly the historical schemes propounded or put into practice fcr establishing certain ideally arranged communities composed of individuals living and working on the basis of holding their property in common. It has nothing, of course, to do with the Paris Commune, overthrown in May 1871, which was a political and not an economic movement. Communistic schemes have been advocated in almost every age and country, and have to be distinguished from mere anarchism or from the selfish desire to transfer other people’s property into one’s own pockets. The opinion that a communist is merely a man who

has no property to lose, and therefore advocates a redistribution of wealth, is contrary to the established facts as to those who have historically supported the theory of communism. The Corn-law Rhymer’s lines on this subject are amusing, but only apply to the baser sort:—

” What is a Communist! One that hath yearnings For equal division of unequal earnings. Idler or bungler, or both, he is willing To fork out his penny and pocket your shilling.”

This is the communist of hostile criticism — a criticism, no doubt, ultimately based on certain fundamental facts in human nature, which have usually wrecked communistic schemes of a purely altruistic type in conception. But the great communists, like Plato, More, Saint-Simon, Robert Owen, were the very reverse of selfish or idle in their aims; and communism as a force in the historical evolution of economic and social opinion must be regarded on its ideal side, and not merely in its lapses, however natural the latter may be in operation, owing to the defects of human character. As a theory it has inspired not only some of the finest characters in history, but also much of the gradual evolution of economic organization — especially in the case of co-operation (q.v.); and its opportunities have naturally varied according to the state of social organization in particular countries. The communism of the early Christians, for instance, was rather a voluntary sharing of private property than any abnegation of property as such. The Essenes and the Thera- peutae, however, in Palestine, had a stricter form of communism, and the former required the surrender of individual property; and in the middle ages various religious sects, followed by the monastic orders, were based on the communistic principle.

Communistic schemes have found advocates in almost every age and in many different countries. The one thing that is shared by all communists, whether speculative or practical, is deep dissatisfaction with the economic conditions by which they are surrounded. In Plato's Republic the dissatisfaction is not limited to merely economic conditions. In his examination of the body politic there is hardly any part which he can pronounce to be healthy. He would alter the life of the citizens of his state from the very moment of birth. Children are to be taken away from their parents and nurtured under the supervision of the state. The old nursery tales, " the blasphemous nonsense with which mothers fool the manhood out of their children," are to be suppressed. Dramatic and imitative poetry are not to be allowed. Education, marriage, the number of births, the occupations of the citizens are to be controlled by the guardians or heads of the state. The most perfect equality of conditions and careers is to be preserved; the women are to have similar training with the men, no careers and no ambition are to be forbidden to them; the inequalities and rivalries between rich and poor are to cease, because all will be provided for by the state. Other cities are divided against themselves. " Any ordinary city, however small, is in fact two cities, one the city of the poor, the other of the rich, at war with one another " (Republic, bk. iv. p. 249, Jowett's trans- lation). But this ideal state is to be a perfect unit; although the citizens are divided into classes according to their

capacity and ability, there is none of the exclusiveness of birth, and no in- equality is to break the accord which binds all the citizens, both male and female, together into one harmonious whole. The marvellous comprehensiveness of the scheme for the government of this ideal state makes it belong as much to the modern as to the ancient world. Many of the social problems to which Plato draws attention are yet unsolved, and some are in process of solution in the direction indicated by him. He is not appalled by the immensity of the task which he has sketched out for himself and his followers. He admits that there are difficulties to be over- come, but he says in a sort of parenthesis, ” Nothing great is easy.” He refuses to be satisfied with half measures and patch- work reforms. ” Enough, my friend! but what is enough while anything remains wanting?” These sentences indicate the spirit in which philosophical as distinguished from practical communists from the time of Plato till to-day have undertaken to reconstruct human society.

Sir Thomas More’s Utopia has very many of the characteristics of The Republic. There is in it the same wonderful power of shaking off the prejudices of the place and time in which it was written. The government of Utopia is described as founded on popular election; community of goods prevailed, the magistrates distributed the instruments of production among the inhabitants, and the wealth resulting from their industry was shared by all. The use of money and all outward ostentation of wealth were forbidden. All meals were taken in common, and they were rendered attractive by the accompaniment of sweet strains of music, while the air was filled by the scent of the most delicate perfumes. More’s ideal state differs in one important respect from Plato’s. There was no community of wives in Utopia. The sacredness of the family relation and fidelity to the marriage contract were recognized by More as indispensable to the well- being of modern society. Plato, notwithstanding all the extra-ordinary originality with which he advocated the emancipation of women, was not able to free himself from the theory and practice of regarding the wife as part and parcel of the property of her husband. The fact, therefore, that he advocated community of property led him also to advocate community of wives. He speaks of ” the possession and use of women and children,” and proceeds to show how this possession and use must be regulated in his ideal state. Monogamy was to him mere exclusive posses- sion on the part of one man of a piece of property which ought to be for the benefit of the public. The

circumstance that he could not think of wives otherwise than as the property of their husbands only makes it the more remarkable that he claimed for women absolute equality of training and careers. The circum- stance that communists have so frequently wrecked their pro- jects by attacking marriage and advocating promiscuous inter- course between the sexes may probably be traced to the notion which regards a wife as being a mere item among the goods and chattels of her husband. It is not difficult to find evidence of the survival of this ancient habit of mind. ” I will be master of what is mine own,” says Petruchio. ” She is my goods, my chattels.”

The Perfectionists of Oneida, on the other hand, held that there was ” no intrinsic difference between property in persons and property in things ; and that the same spirit which abolished exclusiveness in regard to money would abolish, if circumstances allowed full scope to it, exclusiveness in regard to women and children ” (Nordhoff ‘s Communistic Societies of the United States) . It is this notion of a wife as property that is responsible for the wild opinions communists have often held in favour of a com- munity of wives and the break-up of family relations. If they could shake off this notion and take hold of the conception of marriage as a contract, there is no reason why their views on the community of property should lead them to think that this contract should not include mutual fidelity and remain in force during the life of the contracting parties. It was probably not this conception of the marriage relation so much as the influence of Christianity which led More to discountenance community of wives in Utopia. It is strange that the same influence did not make him include the absence of slavery as one of the character- istics of his ideal state. On the contrary, however, we find in Utopia the anomaly of slavery existing side by side with institu- tions which otherwise embody the most absolute personal, political and religious freedom. The presence of slaves in Utopia is made use of to get rid of one of the practical difficulties of communism, viz. the performance of disagreeable work. In a society where one man is as good as another, and the means of subsistence are guaranteed to all alike, it is easy to imagine that it would be difficult to ensure the performance of the more laborious, dangerous and offensive kinds of labour. In Utopia, therefore, we are expressly told that ” all the uneasy and sordid services ” are performed by slaves. The institution of slavery was also made supplementary to the criminal system of Utopia, as the slaves were for the most part men who had been convicted of crime; slavery for life was made a substitute for capital punishment.

In many respects, however, More’s views on the labour question

were vastly in advance of his own time. He repeats the indignant protest of the Republic that existing society is a warfare between rich and poor. ” The rich,” he says, ” desire every means by which they may in the first place secure to themselves what they have amassed by wrong, and then take to their own use and profit, at the lowest possible price, the work and labour of the poor. And so soon as the rich decide on adopting these devices in the name of the public, then they become law.” One might imagine these words had been quoted from the programme of The International (g.v.), so completely is their tone in sympathy with the hardships of the poor in all ages. More shared to the full the keen sympathy with the hopeless misery of the poor which has been the strong motive power of nearly all speculative communism. The life of the poor as he saw it was so wretched that he said, ” Even a beast’s life seems enviable ! ” Besides community of goods and equality of conditions, More advocated other means of ameliorating the condition of the people. Although the hours of labour were limited to six a day there was no scarcity, for in Utopia every one worked; there was no idle class, no idle individual even. The importance of this from an economic point of view is insisted on by More in a passage remarkable for the importance which he attaches to the industrial condition of women. ” And this you will easily apprehend,” he says, ” if you consider how great a part of all other nations is quite idle. First, women generally do little, who are the half of mankind.” Translated into modern language his proposals comprise universal compulsory education, a reduction of the hours of labour to six a day, the most modern principles of sanitary reform, a complete revision of criminal legislation, and the most absolute religious toleration. The romantic form which Sir Thomas More gave to his dream of a new social order found many imitators. The Utopia may be regarded as the prototype of Campanella’s City of the Sun, Harrington’s Oceana, Bacon’s Nova Atlantis, Defoe’s Essay on Projects, Fenelon’s Voyage dans I’ lie des Plaisirs, and other works of minor importance.

All communists have made a great point of the importance of universal education. All ideal communes have been provided by their authors with a perfect machinery for securing the education of every child. One of the first things done in every attempt to carry communistic theories into practice has been to establish a good school and guarantee education to every child. The first impulse to national education in the 19th century probably sprang from the very marked success of Robert Owen’s schools in connexion with the cotton mills at New Lanark. Compulsory education, free trade, and law reform, the various movements connected with the improvement of the condition

of women, have found their earliest advocates among theoretical and practical communists. The communists denounce the evils of the present state of society; the hopeless poverty of the poor, side by side with the self-regarding luxury of the rich, seems to them to cry aloud to Heaven for the creation of a new social organization. They proclaim the necessity of sweeping away the institution of private property, and insist that this great revolution, accom- panied by universal education, free trade, a perfect administra- tion of justice, and a due limitation of the numbers of the community, would put an end to half the self-made distress of humanity.

The various communistic experiments in America are the most interesting in modern times, opportunities being naturally greater there for such deviations from the normal forms of regulations as compared with the closely organized states of Europe, and particularly in the means of obtaining land cheaply for social settlements with peculiar views. They have been classi- fied by Morris Hillquit {History of Socialism in the United States, 1903) as (1) sectarian, (2) Owenite, (3) Fourieristic, (4) Icarian.

1. The oldest of the sectarian group was the society of the Shakers (q.v.), whose first settlement at Watervliet was founded in 1776. The Harmony Society or Rappist Community was introduced into Pennsylvania by George Rapp (1770-1847) from Wiirttemberg in 1804, and in 18 r 5 they moved to a settlement (New Harmony) in Indiana, returning to Pennsylvania again in 1824, and founding the village of Economy, from which they were

also known as Economites. Emigrants from Wtirttemberg also founded the community of Zoar in Ohio in 1817, being incorporated in 1832 as the Society of Separatists of Zoar; it was dissolved in 1898. The Amana (q.v.) community, the strongest of all American communistic societies, originated in Germany in the early part of the 18th century as “the True Inspiration Society,” and some 600 members removed to America in 1842-1844. The Bethel (Missouri) and Aurora (Oregon) sister communities were founded by Dr Keil (1812-1877) in 1844 and 1856 respectively, and were dissolved in 1880 and 1881. The Oneida Community (q.v.), created by John Humphrey Noyes (1811-1886), the author of a famous History of A merican Socialisms (1870), was established in 1848 as a settlement for the Society of Perfectionists. All these bodies had a religious basis, and were formed with the object

of enjoying the free exercise of their beliefs, and though communistic in character they had no political or strictly economic doctrine to propagate.

2. The Owenite communities rose under the influence of Robert Owen's work at New Lanark, and his propaganda in America from 1824 onwards, the principal being New Harmony (acquired from the Rappists in 1825); Yellow Springs, near Cincinnati, 1824; Nashoba, Tennessee, 1825; Haverstraw, New York, 1826; its short-lived successors, Coxsackie, New York, and the Kendal Community, Canton, Ohio, 1826. All these had more or less short existences, and were founded on Owen's theories of labour and economics.

3. The Fourierist communities similarly were due to the Utopian teachings of the Frenchman Charles Fourier (q.v.), introduced into America by his disciple Albert Brisbane (1809- 1890), author of The Social Destiny of Man (1840), who was efficiently helped by Horace Greeley, George Ripley and others. The North American Phalanx, in New Jersey, was started in 1843 and lasted till 1855. Brook Farm (q.v.) was started as a Fourierist Phalanx in 1844, after three years' independent career, and became the centre of Fourierist propaganda, lasting till 1847. The Wisconsin Phalanx, or Ceresco, was organized in 1844, and lasted till 1850. In Pennsylvania seven communities were established between 1843 and 1845, the chief of which were the Sylvania Association, the Peace Union Settlement, the Social Reform Unity, and the Leraysville Phalanx. In New York state the chief were the Clarkson Phalanx, the Sodus Bay Phalanx, the Bloomfield Association, and the Ontario Union. In Ohio the principal were the Trumbull Phalanx, the Ohio Phalanx, the Clermont Phalanx, the Integral Phalanx, and the Columbian Phalanx; and of the remainder the Alphadelphia Phalanx, in Michigan, was the best-known. It is pointed out by Morris Hillquit that while only two Fourierist Phalanxes were established in France, over forty were started in the United States.

4. The Icarian communities were due to the communistic teachings of another Frenchman, Etienne Cabet (q.v.) (1788- 1856), the name being derived from his social romance, Voyage en Icarie (1840), sketching the advantages of an imaginary country called Icaria, with a co-operative system, and criticizing the existing social organization. It was his idea, in fact, of a Utopia. Robert Owen advised him to establish his followers, already numerous, in Texas, and thither about 1500 went in 1848. But disappointment resulted, and their numbers dwindled to less than 500 in 1849; some 280 went to Nauvoo, Illinois; after a schism in 1856 some formed a new colony (1858) at

Cheltenham, near St Louis; others went to Iowa, others to California. The last branch was dissolved in 1895.

See also the articles Socialism; Owen; Saint-Simon; Fourier, &c. ; and the bibliography to Socialism. The whole subject is admirably covered in Morris Hillquit's work, referred to above; and see also Noyes's History of American Socialisms (1870) ; Charles Nordhoff's Communistic Societies of the United States (1875) ; and W. A. Hinds's American Communities (1878; 2nd edition, 1902), a very complete account.

COMMUTATION (from Lat. commutare, to change), a process of exchanging one thing for another, particularly of one method of payment for another, such as payment in money for payment in kind or by service, or of payment of a lump sum for periodical payments; for various kinds of such substitution see Annuity;

Copyhold and Tithes. The word is also used similarly of the substitution of a lesser sentence on a criminal for a greater. In electrical engineering, the word is applied to the reversal of the course of an electric current, the contrivance for so doing being known as a "commutator" (see Dynamo). In America, a "commutation ticket" on a railway is one which allows a person to travel at a lower rate over a particular route for a certain time or for a certain number of times; the person holding such a ticket is known as a " commuter."

COMNENUS, the name of a Byzantine family which from 1081 to 1185 occupied the throne of Constantinople. It claimed a Roman origin, but its earliest representatives appear as landed proprietors in the district of Castamon (mod. Kastamuni) in Paphlagonia. Its first member known in Byzantine history is Manuel Eroticus Comnenus, an able general who rendered great services to Basil II. (976-1025) in the East. At his death he left his two sons Isaac and John in the care of Basil, who gave them a careful education and advanced them to high official positions. The increasing unpopularity of the Macedonian dynasty culminated in a revolt of the nobles and the soldiery of Asia against its feeble representative Michael VI. Stratioticus, who abdicated after a brief resistance. Isaac was declared emperor, and crowned in St Sophia on the 2nd of September 1057. For the rulers of this dynasty see Roman Empire, Later, and separate articles.

With Andronicus I. (1183-1185) the rule of the Comneni proper at Constantinople came to an end. A younger line of the original house, after the establishment of the Latins at Constanti- nople in 1204, secured possession of a fragment of the empire in Asia Minor, and

founded the empire of Trebizond (q.v.), which lasted till 1461, when David Comnenus, the last emperor, was deposed by Mahommed II.

For a general account of the family and its alleged survivors see article ” Komnenen,” by G. F. Hertzberg, in Ersch and Gruber’s Allgemeine Encyklopadie, and an anonymous monograph, Precis historique de la maison imperiale des Comnenes (Amsterdam, 1 784) ; and, for the history of the period, the works referred to under Roman Empire, Later.

COMO (anc. Comum), a city and episcopal see of Lombardy, Italy, the capital of the province of Como, situated at the S. end of the W. branch of the Lake of Como, 30 m. by rail N. by W. of Milan. Pop. (1881) 25,560; (1905) 34,272 (town), 41,124 (commune). The city lies in a valley enclosed by mountains, the slopes of which command fine views of the lake. The old town, which preserves its rectangular plan from Roman times, is enclosed by walls, with towers constructed in the 12th century. The cathedral, built entirely of marble, occupies the site of an earlier church, and was begun in 1396, from which period the nave dates: the facade belongs to 1457-1486, while the east of the exterior was altered into the Renaissance style, and richly decorated with sculptures by Tommaso Rodari in 1487-1526. The dome is an unsuitable addition of 1731 by the Sicilian architect Filippo Juvara (1685-1 73 5) , and its baroque decorations spoil the effect of the fine Gothic interior. It contains some good pictures and fine tapestries. In the same line as the facade of the cathedral are the Broletto (in black and white marble), dating from 121 5, the seat of the original rulers of the commune, and the massive clock-tower. The Romanesque church of S.Abondio outside the town was founded in 1013 and consecrated in 1095; it has two fine campanili, placed at the ends of the aisles close to the apse. It occupies the site of the 5th-century church of SS. Peter and Paul. Near it is the Romanesque church of S. Carpoforo. Above it is the ruined castle of Baradello. The churches of S. Giacomo (1095-1117) and S. Fedele (12th century), both in the town, are also Romanesque, and the apses have external galleries. The Palazzo Giovio contains the Museo Civico. Como is a considerable tourist resort, and the steamboat traffic on the lake is largely for travellers. A climate station is established on the hill of Brunate (2350 ft.) above the town to the E., reached by a funicular railway. The Milanese possess many villas here. Como is an industrial town, having large silk factories and other industries (see Lombardy). It is connected with Milan by two lines of railway, one via Monza (the main line,

which goes on to Chiasso — Swiss frontier — and the St Gotthard), the other via Saronno and also with Lecco and Varese.

Of the Roman Comu.ni little remains above ground; a portion of its S.E. wall was discovered and may be seen in the garden of the Liceo Volta, 88 ft. within the later walls: later fortifica- tions (but previous to 1127), largely constructed with Roman inscribed sepulchral urns and other fragments, had been super- imposed on it. Thermae have also been discovered (see V. Barelli in Notizie degli scan, 1880, 333; 1881, 333; 1882, 285). The inscriptions, on the other hand, are numerous, and give an idea of its importance. The statements as to the tribe which originally possessed it are various. It belonged to Gallia Cis- alpina, and first came into contact with Rome in 196 B.C., when M. Claudius Marcellus conquered the Insubres and the Comenses. In 89 B.C., having suffered damage from the Raetians, it was restored by Cn. Pompeius Strabo, and given Latin rights with the rest of Gallia Transpadana. Shortly after this 3000 colonists seem to have been sent there; 5000 were certainly sent by Caesar in 59 B.C., and the place received the name Novum Comum. It appears in the imperial period as a municipium, and is generally spoken of as Comum simply. The place was prosperous; it had an important iron industry; and the banks of the lake were, as now, dotted with villas. It was also im- portant as the starting-point for the journey across the lake in connexion with the Splugen and Septimer passes (see Chia- venna) . It was the birthplace of both the elder and the younger Pliny, the latter of whom founded baths and a library here and gave money for the support of orphan children. There was a praefectus classis Comensis under the late empire, and it was regarded as a strong fortress. See Ch. Hulsen in Pauly-Wissowa, Realencyclopddie, Suppl. Heft i. (Stuttgart, 1903), 326.

Como suffered considerably from the early barbarian invasions, many of the inhabitants taking refuge on the Isola Comacina off Sala, but recovered in Lombard times. It was from that period that the magistri Comacini formed a privileged corporation of architects and sculptors, who were employed in other parts of Italy also, until, at the end of the nth century, individuals began to come more to the front (G. T. Rivoira, Origini del- V architettura Lombarda, Rome, 1901, i. 127 f.). Como then became subject- to the archbishops of Milan, but gained its freedom towards the end of the nth century. At the beginning of the 1 2th century war broke out between Como and Milan, and after a ten years' war Como was taken and its fortifications dismantled in 11 27. In 11 54, however, it took advantage of the arrival of Barbarossa, and

remained faithful to him through- out the whole war of the Lombard League. After frequent struggles with Milan, it fell under the power of the Visconti in 1335. In 1535, like the rest of Lombardy, it fell under Spanish dominion, and in 17 14 under Austrian. Thenceforth it shared the fortunes of Milan, becoming in the Napoleonic period the chief town of the department of the Lario. Its silk industry and its position at the entrance to the Alpine passes gave it some importance even then. It bore a considerable part in the national risings of 1848-1859 against Austrian rule. (T. As.)

COMO, Lake of (the Lacus Larius of the Romans, and so sometimes called Lario to the present day, though in the 4th century it is already termed Lacus Comacinus), one of the most celebrated lakes in Lombardy, Northern Italy. It lies due N. of Milan and is formed by the Adda that flows through the Valtelline to the north end of the lake (here falls in the Maira or Mera, coming from the Val Bregaglia) and flows out of it at its south-eastern extremity, on the way to join the Po. Its area is 555 sq. m., it is about 43 m. from end to end (about 30! m. from the north end of Bellagio) , it is from 1 to 25 m. in breadth, its surface is 653 ft. above the sea, and its greatest depth is 1365 ft. A railway line now runs along its eastern shore from Colico to Lecco (245 m.), while on its western shore Menaggio is reached by a steam tramway from Porlezza on the Lake of Lugano (8 m.). Colico, at the northern extremity, is by rail 17 m. from Chiavenna and 42 m. from Tirano, while at its southern end Como (on the St Gotthard line) is 32 m. from Milan, and Lecco about the same distance. The lake fills a remarkable depression which

has been cut through the limestone ranges that enclose it, and once doubtless extended as far as Chiavenna, the Lake of Mezzola being a surviving witness of its ancient bed. Towards the south the promontory of Bellagio divides the lake into two arms. That to the south-east ends at Lecco and is the true outlet, for the south-western arm, ending at Como, is an enclosed bay. During the morning the Tivano wind blows from the north, while in the afternoon the Breva wind blows from the south. But, like other Alpine lakes, the Lake of Como is exposed to sudden violent storms. Its beauties have been sung by Virgil and Claudian, while the two Plinys are among the celebrities associated with the lake. The shores are bordered by splendid villas, while perhaps the most lovely spot on it is Bellagio, built in an unrivalled position. Among the other villages that line the lake, the best-known are Varenna (E.) and Menaggio (W.), nearly opposite one another, while Cadenabbia (W.) faces Bellagio. – (W. A. B. C.)

COMONFORT, IGNACIO (1812-1,863), a Mexican soldier and

politician, who, after occupying a variety of civil and military posts, was in December 1855 made provisional president by Alvarez, and from December 1857 was for a few weeks consti- tutional president. (See Mexico.)

COMORIN, CAPE, a headland in the state of Travancore, forming the extreme southern point of the peninsula of India. It is situated in 8° 4′ 20″ N., 77 35′ 35″ E., and is the terminating point of the western Ghats. The village of Comorin, with the temple of Kanniyambal, the "virgin goddess," on the coast at the apex of the headland, is a frequented place of pilgrimage.

COMORO ISLANDS, a group of volcanic islands belonging to France, in the Indian Ocean, at the northern entrance of the Mozambique Channel midway between Madagascar and the African continent. The following table of the area and popula- tion of the four largest islands gives one of the sets of figures offered by various authorities: —

Area sq. m.

Population.

Great Comoro . . . Anjuan or Johanna .

Moheli

Total . .

385

145

140

90

50,000

12,000

11,000 9,000

760

82,000

There are besides a large number of islets of coral formation.

Particulars of the four islands named follow.

1. Great Comoro, or Angazia, the largest and most westerly, has a length of about 38 m., with a width of about 12 m. Near its southern extremity it rises into a fine dome-shaped volcanic mountain, Kartola (Karthala), which is over 8500 ft. high, and is visible for more than 100 m. Up to about 6000 ft. it is clothed with dense vegetation. Eruptions are recorded for the years 1830, 1855 and 1858; and another eruption occurred in 1904. In the north the ground rises gradually to a plateau some 2000 ft. above the sea; from this plateau many regularly shaped truncated cones rise another 2000 ft. The centre of the island consists of a desert field of lava streams, about 1600 ft. high. The chief towns are Maroni (pop. about 2000), Itzanda and Mitsamuli; the first, situated at the head of a bay in n° 40′ S., being the seat of the French administrator.

2. Anjuan, or Johanna, next in size, lies E. by S. of Comoro. It is some 30 m. long by 20 at its greatest breadth. The land rises in a succession of richly wooded heights till it culminates in a central peak, upwards of 5000 ft. above the sea, in 12 14′ S., 44 27′ E. The former capital, Mossamondu, on the N.W. coast, is substantially built of stone, surrounded by a wall, and com- manded by a dilapidated citadel; it is the residence of the sultan and of the French administrator. There is a small but safe anchorage at Pomony, on the S. side, formerly used as a coal depot by ships of the British navy.

3. Mayotte, about 21m. long by 6 or 7 m. broad, is surrounded by an extensive and dangerous coral reef. The principal heights on its extremely irregular surface are: Mavegani Mountain, which rises in two peaks to a maximum of 2164 ft., and Uchongin,

2100 ft. The French headquarters are on the islet of Zaudzi, which lies within the reef in 12 46′ S., 45° 20′ E. There are substantial government buildings and store-houses. On the mainland opposite Zaudzi is Msapere, the chief centre of trade. Mayotte was devastated in 1898 by a cyclone of great severity.

4. Moheli or Mohilla lies S. of and between Anjuan and Grand Comoro. It is 1 5 m. long and 7 or 8 m. at its maximum breadth. Unlike the other three it has no peaks, but rises gradually to a central ridge about 1900 ft. in height. Fomboni (pop. about 2000) in the 1ST.

W. and Numa Choa in the S.W. are the chief towns.

All the islands possess a very fertile soil; there are forests of coco-nut palms, and among the products are rice, maize, sweet- potatoes, yams, coffee, cotton, vanilla and various tropical fruits, the papaw tree being abundant. The fauna is allied to that of Madagascar rather than to the mainland of Africa; it includes some land birds and a species of lemur peculiar to the islands. Large numbers of cattle and sheep, the former similar to the small species at Aden, are reared as well as, in Great Comoro, the zebra. Turtles are caught in abundance along the coasts, and form an article of export. The climate is in general warm, but not torrid nor unsuitable for Europeans. The dry season lasts from May to the end of October, the rest of the year being rainy. The natives are of mixed Malagasy, Negro and Arab blood. The majority are Mahommedans. The European inhabitants, mostly French, number about 600. There are some 200 British Indians, traders, in the islands. The external trade of the islands has developed since the annexation of Madagascar to France, and is of the value of about £100,000 a year. Sugar refineries, distilleries of rum, and sawmills are worked in Mayotte by French settlers. Cane sugar and vanilla are the chief exports. The islands are regularly visited by vessels of the Messageries Mari- times fleet, and a coaling station for the French navy has been established.

The islands were first visited by Europeans in the 16th century; they are marked on the map of Diego Ribero made in 1527. At that time, and for long afterwards, the dominant influence in, and the civilization of, the islands was Arab. According to tradition the islands were first peopled by Arab voyagers driven thither by tempests. The petty sultans who exercised authority were notorious slave traders. A Sakalava chief who had been driven from Madagascar by the Hovas took refuge in Mayotte c. 1830, and, with the aid of the sultan of Johanna, conquered the island, which for a century had been given over to civil war. French naval officers having reported on the strategic value of Mayotte, Admiral de Hell, governor of Riunion, sent an officer there in 1841, and a treaty was negotiated ceding the island to France. Possession was taken in 1843, the sultan of Johanna renouncing his claims in the same year. In 1886 the sultans of the other three islands were placed under French protection, France fearing* that otherwise the islands would be taken by Germany. The French experienced some difficulty with the natives, but by 1892 had established their position. The islands, as regulated by the decree of the 9th of April 1908, are under the supreme authority of the governor-general of Madagascar. The local administration is in the hands of an official who himself governs Mayotte but is represented in

the other islands by administrators. On the council which assists the governor are two nominated native notables. In 19 10 the sultan of Great Comoro ceded his sovereign rights to France. In Anjuan the native government is continued under French supervision. The budgets of the four islands in 1904 came to some £30,000, that of Mayotte being about half the total. The chief sources of revenue are poll and house taxes, and, in Mayotte, a land tax.

The lies Glorieuses, three islets 160 m. N.E. of Mayotte, with a population of some 20 souls engaged in the collection of guano and the capture of turtles, were in 1892 annexed to France and placed under the control of the administrator of Mayotte.

See Notice sur Mayotte et les Comores, by Emile Vienne, one of the memoirs on the French colonies prepared for the Paris Exhibition of 1900; Le Sultanat d'Anjouan, by Jules Repiquet (Paris, 1901), a systematic account of the geography, ethnology and history of Johanna; Les colonies frangaises (Paris, 1900), vol. ii. pp. 179-197,

in which the story of the archipelago is set forth by various writers ; an account of the islands by A. Voeltzkow in the Zeitschrift of the Berlin Geog. Soc. (No. 9, 1906), and Carte des lies Comores, by A. Meunier (Paris, 1904).

COMPANION (through the 0. Fr. compaignon or compagnon, from the Late Lat. companio, — cum, with, and pants, bread, — one who shares meals with another; the word has been wrongly derived from the Late Lat. compagnus, one of the same pagus or district), a mess-mate or "comrade" (a term which itself has a similar origin, meaning one who sha res the same camera or room) . " Companion " is particularly used of soldiers, as in the ex- pression " companion in arms," and so is the title of the lowest rank in a military or other order of knighthood; the word is also used of a person who lives with another in a paid position for the sake of company, and is looked on rather as a friend than a servant; and of a pair or match, as of pictures and the like. Similar in ultimate origin but directly adapted from the Fr. chambre de la compagne, and Ital. camera della compagna, the storeroom for provisions on board ship, is the use of " companion ' ' for the framed windows over a hatchway on the deck of a ship, and also for the hooded entrance-stairs to the captain's cabin.

COMPANY, one of a number of words like "partnership," "union," "gild," "society," "corporation," denoting — each with its special shade of meaning — the association of individuals in pursuit of some common object. The taking of meals together was, as the word

signifies (cum, with, panis, bread,) a character- istic of the early company. Gild had a similar meaning: but this characteristic, though it survives in the Livery company (see Livery Companies), has in modern times disappeared. The word “company” is now monopolized — in British usage — by two great classes of companies — (1) the joint stock company, constituted under the Companies (Consolidation) Act 1908, which consolidated the various acts from 1862 to 1007, and (2) the “public company,” constituted under a special act to carry on some work of public utility, such as a railway, docks, gas- works or waterworks, and regulated by the Companies Clauses Aqts 1845 and 1863.

1. Joint Stock Companies.

The joint stock company may be defined as an association of persons incorporated to promote by joint contributions to a common stock the carrying on of some commercial enterprise. Associations formed not for “the acquisition of gain” but to promote art, science, religion, charity or some other useful or philanthropic object, though they may be constituted under the Companies (Consolidation) Act 1908, seldom call themselves companies, but adopt some name more appropriate to express their objects, such as society, club, institute, college or chamber. The joint stock company has had a long history which can only be briefly sketched here. The name of “joint stock company” is — or was — used to distinguish such a company from the “regulated company,” which did not trade on a joint stock but was in the nature of a trade gild, the members of which had a monopoly of foreign trade with particular countries or places (see Adam Smith, Wealth of Nations, bk. v. ch. i. pt. iii.).

The earliest kind of joint stock company is the chartered (see Chartered Companies). The grant of a charter is one of the exclusive privileges of the crown, and the crown has from time to time exercised it in furtherance of trading enterprise. Examples of such grants are the Merchant Adventurers of England, chartered by Richard II. (1390); the East India Co., chartered by Queen Elizabeth (1600); the Bank of England, chartered by William and Mary (1694); the Hudson’s Bay Co.; the Royal African Co.; the notorious South Sea Co.; and in later times the New Zealand Co., the North Borneo Co., and the RoyalNiger Co. Chartered companies had, however, several disadvantages. A charter was not easily obtainable. It was costly. The members could not be made personally liable for the debts of the company: and once created — though only for defined objects — such a company was invested with entire independence and could not be kept to the conditions imposed by the grant,, which was against public policy. A

new form of commercial association was wanted, free from these defects, and it was found in the common law

company— the lineal ancestor of the modern trading company. The common law company was not an incorporated association: it was simply a great partnership with transferable shares. Companies of this kind multiplied rapidly towards the close of the 17 th century and the beginning of the 18th century, but they Were regarded with strong disfavour by the law, for reasons not very intelligible to modern notions; the chief of these reasons being that such companies purported to act as corporate bodies, raised transferable stock, used charters for purposes not warranted by the grant, and were — or were supposed to be — dangerous and mischievous, tending (in the words of the preamble of the Bubble Act) to ” the common grievance, prejudice and inconvenience of His Majesty’s subjects or great numbers of them in trade, commerce or other lawful affairs.” They were too often : — and this no doubt was the real ground of the prejudice against them —utilized by unprincipled persons to promote fantastic and often fraudulent schemes. Matthew Green, in his poem ” The Spleen,” notes how

” Wrecks appear each day, And yet fresh fools are cast away.”

The result was that by the act (6 Geo. I. c. 18) commonly known as the Bubble Act (17 19) such companies were declared to be common nuisances and indictable as such. But the act, though it remained on the statute book for more than one hundred years and was not formally repealed till 1825, proved quite ineffectual to check the growth of joint stock enterprise, and the legislature, finding that such companies had to be tolerated, adopted the wiser course of regulating what it could not repress. One great inconvenience of these common law trading companies arose from their being unincorporated. They were formed of large fluctuating bodies of individuals, and a person dealing with them did not know with whom he was contracting or whom he was to sue. This evil the legislature sought to rectify by empowering the crown to grant to companies by letters patent without incorporation the privilege of suing and being sued by a public officer. Ten years afterwards — in 1844 — a more important line of policy was adopted, and all companies with some ex- ceptions were enabled to obtain a certificate of incorporation without applying for a charter or special act. ‘ The act of 1862 carried this policy one

step farther by prohibiting all associations of more than twenty persons from carrying on business without registering under the act. These were all useful amendments, but they were amendments of form rather than substance. The real vitality of joint stock enterprise lies in the co-operative principle, and the natural growth and expansion of this fruitful principle was checked until the middle of the 19th century by the notorious risks attaching to unlimited liability. In the case of an ordinary partnership, though their liability is unlimited (or was until the Limited Partnerships Act 1907), the partners can generally tell what risks they are incurring. Not so the share- holders of a company. They delegate the management of their business to a board of directors, and they may easily find them- selves committed by the fraud or folly of its members to engage- ments which in the days of unlimited liability meant ruin. Failures like those of Overend and Gurney, and of the Glasgow Bank, caused widespread misery and alarm. It was not until limited liability had been grafted on the stock of the co-operative system that the real potency of the principle of industrial co-operation became apparent. We owe the adoption of the limited liability principle to the clear-sightedness of Lord Sherbrooke — then Mr Robert Lowe — and to the vigorous advocacy of Lord Bramwell. We owe it to Lord Bramwell also that the principle was made a feasible one. The practical difficulty was how to bring home to persons dealing with the company notice that the liability of the shareholders was limited. Lord Bramwell solved the problem by a happy suggestion — ” write it on my tombstone,” he said humorously to a friend. This was that the company should add to its name the word ” Limited ” — paint it up on its premises, and use it on all invoices, bills, promissory notes and other documents. The proposal was adopted by the Legislature and has worked successfully. While limited companies have been

multiplying at the rate of over 4000 a year, the unlimited company has become practically an extinct species. The growth of limited companies is, indeed, one of the most striking phenomena of our day. Their number may be estimated at quite 40,000. Their paid-up capital amounts to the stupendous sum of £1,850,000,000 and, what is even more significant, as the 1st Viscount Goschen remarks in his Essays and Addresses, is that ” the number of shareholders has grown in a much greater ratio than the colossal growth of the aggregate capital. The profits and risks of nearly every kind of business have been spread from year to year over fresh thousands of individuals, and the middle class with moderate incomes are more and more participating in that accumulation of wealth from business of every description which formerly built up the fortunes of individual traders or of bankers or of

single families.”

It is with the limited company then — the company limited by shares — as the normal type and incomparably the most im- portant, that this article mainly deals.

Companies Limited by Shares. — The Companies Act 1862, was intended to constitute a comprehensive code of law applicable to joint stock trading companies for the whole of the United Kingdom. Recognizing the mischief above alluded to — of trading concerns being carried on by large and fluctuating bodies, the act begins by declaring that no company, association or partnership, consisting of more than twenty persons, or ten in the case of banking, shall be formed after the commencement of the act for the purpose of carrying on any business which has for its object the acquisition of gain by the company, association or partnership, or by the individual members thereof, unless it is registered as a company under the act, or is formed in pursuance of some other act of parliament or of letters patent, or is a company engaged in working mines within and subject to the jurisdiction of the Stannaries. Broadly speaking, the meaning of the act is that all commercial undertakings, as distinguished from literaryorcharitable associations, shall be registered. “Business” has a more extensive signification than “trade.” Having thus cleared the ground the act goes on to provide in what manner a company may be formed under the act. The machinery is simple, and is described as follows: —

” Any seven or more persons associated for any lawful purpose may, by subscribing their names to a memorandum of association and otherwise complying with the requisitions of this act in respect of registration, form an incorporated company with or without limited liability” (§ 6). It is not necessary that the subscribers should be traders nor will the fact that six of the subscribers are mere dummies, clerks or nominees of the seventh affect the validity of the company; so the House of Lords decided in Salomon v. Salomon & Co., 1897, A. C. 22.

The document to be subscribed — the Memorandum of Associa- tion — corresponds, in the case of companies formed under the Companies Act 1862, to the charter or deed of settle- Mentor- ment in the case of other companies. The form of it is andam at given in the schedule to the act, and varies slightly Assocla- according as the company is limited by shares or Uo ”’ guarantee, or is unlimited. (See the 3rd schedule to the Consolida- tion Act 1908, forms A, B, C, D.) It is required to state, in the case of a company limited by shares, the five

following matters : —

1. The name of the proposed company, with the addition of the word “limited ” as the last word in such name.

2. The part of the United Kingdom, whether England, Scotland or Ireland, in which the registered office of the company is proposed to be situate.

3. The objects for which the proposed company is to be established.

4. A declaration that the liability of the members is limited.

5. The amount of capital with which the company proposes to be registered, divided into shares of a certain fixed amount.

No subscriber of the memorandum is to take less than one share, and each subscriber is to write opposite his name the number of shares he takes.

These five matters the legislature has deemed of such intrinsic importance that it has required them to be set out in the

company’s Memorandum of Association. They are the essential conditions of incorporation, and as such they must not only be stated, but the policy of the legislature has made them with certain exceptions unalterable.

The most important of these five conditiens is the third, and its importance consists in this, that the objects denned in the memorandum circumscribe the sphere of the company’s activities. This principle, which is one of public policy and convenience, and is known as the ” ultra vires doctrine,” carries wkh it im- portant consequences, because every act done or contract made by a company ultra vires, i.e. in excess of its powers, is absolutely null and void. The policy, too, is a sound one. Shareholders contribute their money on the faith that it is to be employed in prosecuting certain objects, and it would be a violation of good faith if the company, i.e. the majority of shareholders, were to be allowed to divert it to something quite different. So strict is the rule that not even the consent of every individual shareholder can give validity to an ultra vires act.

The articles of association are the regulations for internal management of the company — the terms of the partnership agreed upon by the shareholders among themselves. s'socUt- – model or specimen set of articles known as Table A Hon. was given by the Companies Act 1862, and is appended

in a revised form to the Companies (Consolidation) Act 1908. When a company is to be registered the memorandum of association accompanied by a copy of the articles is taken to the office of the registrar of joint stock companies at Somerset House, together with the following documents: —

1 . A list of persons who have consented to be directors of the company (fee stamp 5s.).

2. A statutory declaration by a solicitor of the High Court engaged in the formation of the company, or by a person named in the articles of association as a director or secretary of the company, that the requisitions of the act in respect of registration and of matters precedent and incidental thereto have been complied with (fee stamp 5s.).

3. A statement as to the nominal share capital (stamped with an ad valorem duty of 5s. per £100).

4. If no prospectus is to be issued, a company must now (Companies Act 1907, s. 1; Consolidation Act 1908, s. 82) in lieu thereof file with the registrar a statement, in the form prescribed by the 1st schedule to the act, of all the material facts relating to the company. Till this has been done the company cannot allot any shares or debentures.

If these documents are in order the registrar registers the company and issues a certificate of incorporation (see Companies (Consolidation) Act 1908, sect. 82); on registration, the memorandum and articles of association become public docu- ments, and any person may inspect them on payment of a fee of one shilling. This has important consequences, because every person dealing with the company is presumed to be acquainted with its constitution, and to have read its memorandum and articles. The articles also, upon registration, bind the company and its members to the same extent as if each member had subscribed his name and affixed his seal to them.

The total cost of registering a company with a capital of £1000 is about £7; £10,000 about £34; £100,000 about £280.

The capital which is required to be stated in the memorandum of

association, and which represents the amount which the company is empowered to issue, is what is known as the nominal capital. This nominal capital must be distinguished from the subscribed capital. Subscribed capital is the aggregate amount agreed to be paid by those who have taken shares in the company. Under the Companies Act 1900, Companies Act 1908, s. 85, a ” minimum subscription ” may be fixed by the articles, and if it is the directors cannot go to allot- ment on less: if it is not, then the whole of the capital offered for subscription must be subscribed. A company may increase its capital, consolidate it, subdivide it into shares of smaller amount and convert paid-up shares into stock. It may also, with the sanction of the court, otherwise reorganize its capital (Companies Act 1907, s. 39; Companies (Consolidation) Act

Capital.

Shares.

1908, s. 45), and for this purpose modify its Memorandum of Association; but a limited company cannot reduce its capital either by direct or indirect means without the sanction of the court. The inviolability of the capital is a condition of incorpora- tion — the price of the privilege of trading with limited liability, and by no subterfuge will a company be allowed to evade this cardinal rule of policy, either by paying dividends out of capital, or buying its own shares, or returning money to shareholders. But the prohibition against reduction means that the capital must not be reduced by the voluntary act of the company, not that a company’s capital must be kept intact. It is embarked in the company’s business, and it must run the risks of such business. If part of it is lost there is no obligation on the company to replace it and to cease paying dividends until such lost capital is repaid. The company may in such a case write off the lost capital and go on trading with the reduced amount. But for this purpose the sanction of the court must be obtained by petition.

A share is an aliquot part of a company’s nominal capital. The amount may be anything from is. to £1000. The tendency of late years has been to keep the denomination low, and so to appeal to a wider public. Shares of £100, or even £10, are now the exception. The most common amount is either £1 or £5. Shares are of various kinds — ordinary, preference, deferred, founders’ and management. Into what classes of shares the original capital of the company shall be divided, what shall be the amount of each class, and their respective rights, privileges and priorities, are matters for the consideration of the promoters of the company, and must depend on its special

circumstances and requirements.

A company may issue preference shares even if there is no mention of them in the Memorandum of Association, and any preference or special privilege so given to a class of shares cannot be. interfered with on any reorganization of capital except by a resolution passed by a majority of shareholders of that class representing three-fourths of the capital of that class (Companies (Consolidation) Act 1908, s. 45). The preference given may be as to dividends only, or as to dividends and capital. The dividend, again, may be payable out of the year's profits only, or it may be cumulative, that is, a deficiency in one year is to be made good out of the profits of subsequent years. Prima facie, a preferential dividend is cumulative. For issuing pre- ference shares the question for the directors is, what must be offered to attract investors. Preference shareholders are given by the Companies Act 1907, s. 23; Companies (Consolidation) Act 1908, s. 114, the right to inspect balance sheets. Founders' shares — which originated with private companies — are shares which usually take the whole or half the profits after payment of a dividend of 7 or 10% to the ordinary shareholders. They are much less in favour than they used to be.

The machinery of company formation is generally set in motion by a person known as a promoter. This is a term of business, not law. It means, to use Chief Justice Cockburn's words, a person " who undertakes to form a °™° ers a company with reference to a given project and to promotion. set it going, and who takes the necessary steps to accomplish that purpose." Whether what a person has done towards this end constitutes him a promoter or not, is a question of fact; but once an affirmative conclusion is reached, equity clothes such promoter with a fiduciary relation towards the company which he has been instrumental in creating. This doctrine is now well established, and its good sense is apparent when once the position of the promoter towards the company is understood. Promoters — to use Lord Cairns's language in Erlanger v. New Sombrero Phosphate Co., 3 A. C. 1236 — "have in their hands the creation and moulding of the company. They have the power of defining how and when and in what shape and under what supervision it shall start into existence and begin to act as a trading corporation." Such a control over the destinies of the company involves correlative obligations towards it, and one of these obligations is that the promoter must not take advantage of the company's helplessness. A promoter

may sell his property to the company, but he must first see that the company is furnished with an independent board of directors to protect its interests and he must make full and fair disclosure of his interest in order that the company may determine whether it will or will not authorize its trustee or agent (for such the pro- moter in equity is) to make a profit out of the sale. It is not a sufficient disclosure in such a case for the promoter merely to refer in the prospectus to a contract which, if read by the share- holders, would inform them of his interest. They are under no obligation to inquire. It is for the promoter to bring home notice, not constructive but actual, to the shareholders.

When a company is promoted for acquiring property — to work a mine or patent, for instance, or carry on a going business — the usual course is for the promoter to frame a draft agreement for the sale of the property to the company or to a trustee on its behalf. The memorandum and articles of the intended company are then prepared, and an article is inserted authorizing or requir- ing the directors to adopt the draft agreement for sale. In pursuance of this authority the directors at the first meeting after incorporation take the draft agreement into consideration; and if they approve, adopt it. Where they do so in the exercise of an honest and independent judgment, no exception can be taken to the transaction; but where the directors happen to be nominees of the promoter, perhaps qualified by him and acting in his interest, the situation is obviously open to grave abuse. It is not too much, indeed, to say that the fastening of an onerous or improvident contract on a company at its start, by interested promoters acting in collusion with the directors, has been the principal cause of the scandals associated with company promotion.

Concurrently with the adoption of the contract for the acquisi- tion of the property which is the company's raison d'Ure, the directors have to consider how they will best get the company's capital subscribed. Down to the passing of the Companies Act 1900 the usual mode of doing this was to issue a prospectus inviting the public to subscribe for shares. After the act of 1900 the prospectus fell into general disuse. In the year 1903, out of a total of 3596 companies which registered, only 358 issued a prospectus, the directors preferring, it would seem, to place the share capital through the medium of brokers, financial agents and other intermediaries rather than run the risk of incurring, personally, liability under the stringent provisions for disclosure contained in the act (s. 10) . Of late the prospectus has, however, returned into favour. Under the act of 1907, incorporated in the Consolidation Act 1908 (s. 82), a company, if it does not issue a prospectus, must file a statement of all the material facts relating to

the company.

A prospectus is an invitation to the public to take shares on the faith of the statements therein contained, and is thus the basis of the agreement to take the shares; there therefore rests on those who are responsible for its issue an obligation to act with the most perfect good faith — uberrima fides — and this obligation has been repeatedly emphasized by judges of the highest eminence. (See the observa- tions of Kindersley, V.C., in New Brunswick Railway Co. v. Muggeridge, i860, 1 Dr. & Sm. 383, and of Lord Herschell in Berry v. Peek, 1889, 14 A. C. 376.) Directors must be perfectly candid with the public; they must not only state what they do state with strict and scrupulous accuracy, but they must not omit any fact which, if disclosed, would falsify the statements made. This is the general obligation of directors when issuing a prospectus; but on this general obligation the legislature has engrafted special requirements. By the Companies Act 1867, it required the dates and names of the parties to any contract entered into by the company or its promoters or directors before the issue of the prospectus, to be disclosed in the pro- spectus; otherwise the prospectus was to be deemed fraudulent. This enactment was repealed by the Companies Act 1900, but only in favour of more stringent provisions incorporated in the Consolidation Act of 1908. Now, not only is every prospectus to be signed and filed with the registrar of Joint Stock Companies before it can be issued, but the prospectus must set forth a long

Pro- spectus.

and elaborate series of particulars about the company — the contents of the Memorandum of Association, with the names of the signatories, the share qualification (if any) of the directors, the minimum subscription on which the directors may proceed to allotment, the shares and debentures issued otherwise than for cash, the names and addresses of the vendors, the amount paid for underwriting the company, the amount of preliminary expenses, of promotion money (if any), and the interest (if any) of every director in the promotion or in property to be acquired by the company. Neglect of this statutory duty of disclosure will expose directors to personal liabili ty . For false or fraudulent statements — as distinguished from non-disclosure — in a pro- spectus directors are liable in an action of deceit or under the Directors' Liability Act 1890, now incorporated in the act of 1908. This act was passed to meet the decision of the House of Lords in Peek v. Deny (12 A. C. 337), that a director could not be made liable in an action of deceit for an untrue statement in a prospectus, unless the plaintiff could prove that the director had made the untrue statement

fraudulently. The Directors' Liability Act enacted in substance that when once a prospectus is proved to contain a material statement of fact which is untrue, the persons responsible for the prospectus are to be liable to pay compensation to any one who has subscribed on the faith of the prospectus, unless they can prove that they had reasonable ground to believe, and did in fact believe, the statement to be true. Actions under this act have been rare, but their rarity may be due to the act having had the effect of making directors more careful in their statements.

Before the passing of the Companies Act 1900, it was a matter for directors' discretion on what subscription they should go to allotment. They often did so on a scandalously inadequate subscription. To remedy this abuse the / s /, a „ s . Companies Act 1900 (Companies (Consolidation) Act 1908, s. 85) provided that no allotment of any share capital offered to the public for subscription is to be made unless the amount fixed by the memorandum and articles of association and named in the prospectus as " the minimum subscription " upon which the directors may proceed to allotment has been subscribed and the application moneys — which must not be less than 5 % of the nominal amount of the share — paid to and received by the company. If no minimum is fixed the whole amount of the share capital offered for subscription must have been subscribed before the directors can go to allotment. The " minimum subscription " is to be reckoned exclusively of any amount payable otherwise than in cash. If these conditions are not complied with within forty days the application moneys must be returned. Any " waiver clause " or contract to waive compliance with the section is to be void.

An allotment of shares made in contravention of these pro- visions is irregular and voidable at the option of the applicant for shares within one month after the first or statutory meeting of the company (Companies (Consolidation) Act, s. 86). Even when a company has got what under the name of the " minimum subscription " the directors deem enough capital for its enter- prise, it cannot now commence business or make any binding contract or exercise any borrowing powers until it has obtained a certificate entitling it to commence business (Companies (Consolidation) Act 1908, s. 87). To obtain this certificate the company must have fulfilled certain statutory conditions, which are briefly these: —

(a) The company must have allotted shares to the amount of not

less than the " minimum subscription." (6) Every director must have paid up his shares in the same pro- portion as the other members of

the company, (c) A statutory declaration, made by the secretary of the company or one of the directors, must have been filed with the registrar of joint stock companies, that these conditions have been complied with. ˆ

These conditions fulfilled, the company gets its certificate and starts on its business career, carrying on its business through the agency of directors, as to whose powers and duties see Directors.

The Companies Act as consolidated in the act of 1908, and

the regulations under them, treat the directors of a company as the persons in whom the management of the com- pany's affairs is vested. But they also comtemplate the ultimate controlling power as residing in the shareholders. A controlling power of this kind can only assert itself through general meetings; and that it may have proper opportunities of doing so, every company is required to hold a general meeting, commonly called the statutory meeting, within — as fixed by the Companies Act 1900 — three months from the date at which it is entitled to commence business. This first statutory meeting acquired new significance under the Companies Act of 1900 and marks an important stage in the early history of a company. Seven days before it takes place the directors are required to send round to the members a certified report informing them of the general state of the company's affairs — the number of shares allotted, cash received for them, and names and addresses of the members, the amount of preliminary expenses, the par- ticulars of any contract to be submitted to the meeting, &c. Furnished with this report the members come to the meeting in a position to discuss and exercise an intelligent judgment upon the state and prospects of the company. Besides the statutory meeting a company must hold one general meeting at leastin every calendar year, and not more than fifteen months after the holding of the last preceding general meeting (Com- panies (Consolidation) Act 1908, s. 64). This annual general meeting is usually called the ordinary general meeting. Other meetings are extraordinary general meetings. Notices convening a general meeting must inform the shareholders of the particular business to be transacted; otherwise any resolutions passed at the meeting will be invalidated. Voting is generally regulated by the articles. Sometimes a vote is given to a shareholder for every share held by him, but more often a scale is adopted; for instance, one vote is given for every share up to ten, with

an additional vote for every five shares beyond the first ten shares up to one hundred, and an additional vote for every ten shares beyond the first hundred. In default of any regulations, every member has one vote only. Sometimes preference shareholders are given no vote at all. A poll may be demanded on any special resolution by three persons unless the articles require five (Companies (Consolidation) Act 1908, s. 69).

A contract to take shares is like any other contract. It is constituted by offer, acceptance and communication of the acceptance to the offerer. The offer in the case of forsAanw. shares is usually in the form of an application in writing to the company, made in response to a pro- spectus, requesting the company to allot the applicant a certain number of shares in the undertaking on the terms of the pro- spectus, and agreeing to accept the shares, or any smaller number, which may be allotted to the applicant. An allottee is under the Companies (Consolidation) Act 1908, s. 86, entitled to rescind his contract where the allotment is irregular, e.g. where the minimum subscription has not been obtained. When an application is accepted the shares are allotted, and a letter of allotment is posted to the applicant. Allotment is the usual, but not the only, evidence of acceptance. As soon as the letter of allotment is posted the contract is complete, even though the letter never reaches the applicant. An application for shares can be withdrawn at any time before acceptance. As soon as the contract is complete, it is the duty of the company to enter the shareholder's name in the register of members, and to issue to him a certificate under the seal of the company, evidencing his title to the shares.

The register of members plays an important part in the scheme of the company system, under the Companies Act 1862. The principle of limited liability having been once members, adopted by the legislature, justice required not only that such limitation of liability should be brought home by every possible means to persons dealing with the company, but also that such persons should know as far as possible what was the limited capital which was the sole fund available to satisfy their claims — what amount had been called up, what remained uncalled, who were the persons to pay,

and in what amounts. These data might materially assist a person dealing with the company in determining, whether he would give it credit or not; in any case they are matters which the public had a right to know. The legislature/recog- nizing this, has exacted as a condition of the privilege of trading with limited liability that the company shall keep a register with those particulars in it, which shall be accessible to the public at all reasonable times. In order that this register may be

accurate, and correspond with the true liability of membership for the time being, the court is empowered under the Companies Act 1862, and the Companies (Consolidation) Act 1908, s. 32, to rectify it in a summary way, on application by motion, by ordering the name of a person to be entered on or removed therefrom. This power can be exercised by the court, whether the dispute as to membership is one between the company and an alleged member, or between one alleged member and another, but the machinery of the section is not meant to be used to try claims to rescind agreements to take shares. The proper proceeding in such cases is by action.

The same policy of guarding against an abuse of limited liability is evinced in the Companies Act 1862, which required that shares in the case of a limited company should be paid for in full. The legislature has allowed fyrsbares. such companies to trade with limited liability, but the price of the privilege is that the limited capital to which alone the creditors can look shall at least be a reality. It is therefore ultra vires for a limited company to issue its shares at a discount; but there was nothing in the Companies Act 1862 which required that the shares of a limited company, though they must be paid up in full, must be paid up in cash. They might be paid ” in meal or in malt,” and it accordingly became common for shares to be allotted in payment for furniture, plate, advertisements or services. The result was that the consideration was often illusory, shares being issued to be paid for in some commodity which had no certain criterion of value. To remedy this evil the legislature enacted in the Companies Act 1867, s. 25, that every share in any company should be held subject to the payment of the whole amount thereof in cash, unless otherwise determined by a contract in writing filed with the registrar, of joint stock companies at or before the issue of the shares. This section not infrequently caused hardship where shares had been honestly paid for in the equivalent of cash, but owing to inadvertence no contract had been filed; and it was repealed by the Companies Act 1900, and the old law restored. In reverting to the earlier law, and allowing shares to be paid for in any adequate consideration, the legislature has, however, exacted a safeguard. It has required the company to file with the registrar of joint stock companies a return stating, in the case of shares allotted in whole or in part for a consideration other than cash, the number of the shares so allotted, and the nature of the consideration — property, services, &c. — for which they have been allotted.

Though every share carries with it the liability to pay up the full amount in cash or its equivalent, the liability is only to pay when and if the directors call for it to be paid up. A call must fix the time and

place for payment, otherwise it is bad.

When a person takes shares from a company on the faith of a prospectus containing any false or fraudulent representations of fact material to the contract, he is entitled to rescind the contract. The company cannot keep a contract & sc,ssloa obtained by the misrepresentation or fraud of its meat agents. This is an elementary principle of law. ■ The misrepresentation, for purposes of rescission, need not be fraudulent; it is sufficient that it is false in fact: fraud or recklessness of assertion will give the shareholder a further remedy by action of deceit, or under the Directors' Liability Act 1890 (see supra); but, to entitle a shareholder to rescind, he must show that he took the shares on the faith or partly on the faith of the false representation: if not, it was innocuous. A shareholder claiming to rescind must do so promptly. It is too late to commence proceedings after a winding-up has begun.

The shares or other interest of any member in a company are personal estate and may be transferred in the manner provided _ by the regulations of the company. As Lord Blackburn

o/sAares. sa ˆ> one °f tne chief objects when joint stock com- panies were established was that the shares should be capableof being easily transferred; but though every share- holder has a prima facie right to transfer his shares, this right is subject to the regulations of the company, and the company may and usually does by its regulations require that a transfer shall receive the approval of the board of directors before being registered, — the object being to secure the company against having an insolvent or undesirable shareholder (the nominee perhaps of a rival company) substituted for a solvent and acceptable one. This power of the directors to refuse a transfer must not, however, be exercised arbitrarily or capriciously. If it were, it would amount to a confiscation of the shares. Directors, for instance, cannot veto a transfer because they disapprove of the purpose for which it is being made (e.g. to multiply votes), if there is no objection to the transferee.

It is a common and convenient practice to deposit share or stock certificates with bankers and others to secure an advance. When this is done the share or stock certificate is usually transfers accompanied by a blank transfer — that is, a transfer executed by the shareholder

borrower, but with a blank left for the name of the transferee. The handing over by the borrower of such blank transfer signed by him is an implied authority to the banker, or other pledgee, if the loan is not paid, to fill in the blank with his name and get himself registered as the owner.

A company can only pay dividends out of profits— -which have been defined as the ” earnings of a concern after deducting the expenses of earning them.” To pay dividends out of capital is not only uljra vires but illegal, as constituting a return of capital to shareholders. Before paying dividends, directors must take reasonable care to secure the preparation of proper balance-sheets and estimates, and must exercise their judgment as business men on the balance-sheets and estimates submitted to them. If they fail to do this, and pay dividends out of capital, they will not be held excused, unless the court should think that they ought to be under the new discretion given to the court by ss. 32-34 of the Companies Act 1907 (Companies (Consolidation) Act 1908, s. 279). The onus is on them to show that the dividends have been paid out of profits. The court as a rule does not interfere with the discretion of directors in the matter of paying dividends, unless they are doing something ultra vires.

By the Companies (Consolidation) Act 1908, ss. 112, 113, in- corporating provisions of the act of 1900 (ss. 21-23), as amended by the act of 1907 (s. 19), the legislature has made strict provisions for the appointment and remuneration of auditors by a company, and has defined their rights and duties. Prior to the act of 1900 audit clauses, except in the case of banking companies, were left to the articles of association and were not matter of statutory obligation.

The ” private company ” may best be described as an incor- porated partnership. The term is statutorily defined — for the first time — by s. 37 of the Companies Act 1907 (s. 121 of Private the Consolidating Act of 1 908). Individual traders and paaies. trading firms have in recent years become much more alive to the advantages offered by incorporation. They have discovered that incorporation gives them the protection of limited liability; that it prevents dislocation of a business by the death, bankruptcy or lunacy of any of its members; that it enables a trader to distribute among the members of his family interests in his business on his decease through the medium of shares; that it facilitates borrowing on debentures or debenture stock, and with a view to secure these advantages thousands of traders have converted their businesses into limited companies. To so large an extent has this been done that private companies now form one- third of the whole number of companies registered. A private company does

not appeal to the public to subscribe its capital, but in the main features of its constitution a private

Auditors.

company differs little from a public one. It is only in one or two particulars that special provisions are requisite. It is generally desired for instance: (1) to keep all the shares among the members — the partners or the family — and not to let them get' into the hands of the public; and (2) to give the principal share- holders, the original partners, a paramount control over the management. For this purpose it is usual to provide specially in the articles that no share shall be transferred to a stranger so long as any member is willing to purchase it at a fair value; that a member desirous of transferring his shares shall give notice to the company; that the company shall offer the shares to the other members; that if within a certain period the company finds a purchaser the shares shall be transferred to him, and that in case of dispute the value shall be settled by arbitration or shall be such a sum as the auditor certifies to be in his opinion the fair value. So in regard to the management it is common to provide that the owner or owners of the business shall be entitled to hold office as directors for a term of years or for life, provided he or they continue to hold a certain number of shares; or an owner is empowered to authorize his executors or trustees whilst hold- ing a certain number of shares to appoint directors. Directors holding office on these special terms are described as " governing " or " permanent " or "life " directors. This union of interest and management in the same persons gives a private company an unquestionable advantage over a public company.

The so-called " one-man company " is merely a variety of the private company. The fact that a company is formed by one man, with the aid of six dummy subscribers, is not in itself (as was at one time supposed) a fraud on the policy of the Companies Act, but it is occasionally used for the purpose of committing a fraud, as where an insolvent trader turns himself into a limited company in order to evade bankruptcy; and it is to an abuse of this kind that the term " one-man company " owes its opprobrious signification.

Companies Limited by Guarantee. — The second class of limited companies are those limited by guarantee, as distinguished from those limited by shares. In the company limited by guarantee each member agrees, in the event of a winding-up, to contribute a certain amount to the assets, — £5, £1 or 10s. — whatever may be the amount of the guarantee. The peculiarity of this form of company is that the interests

of the members of a guarantee company are not expressed in any terms of nominal money value like the shares of other companies, a form of constitu- tion designed, as stated by Lord Thring, the draftsman of the Companies Act 1862, to give a superior elasticity to the company. The property of the company simply belongs to the company in certain fractional amounts. This makes it convenient for clubs, syndicates and other associations which do not require the interest of members to be expressed in terms of cash.

Companies not for Gain. — Associations formed to promote commerce, art, science, religion, charity or any other useful object may, with the sanction of the Board of Trade, register under the Companies Act 1862, with limited liability, but without the addition of the word ” Limited,” upon proving to the board that it is the intention of the association to apply the profits or income of the association in promoting its objects, and not in payment of dividends to members (C. A. 1867, s. 23). This licence was made revocable by s. 42 of the Companies Ace 1907 (Consolidation Act of 1908, ss. 19, 20). In lieu of the word ” Company,” the association may adopt as part of its name some such title as chamber, club, college, guild, institute or society. The power given by this section has proved very useful, and many kinds of associations have availed themselves of it, such as medical institutes, law societies, nursing homes, chambers of commerce, clubs, high schools, archaeological, horticultural and philosophical societies. The guarantee form (see supra) is well adapted for associations of this kind intended as they usually are to be supported by annual subscriptions. No such association can hold more than two acres of land without the licence of the Board of Trade.

Cost-Book Mining Companies. — These are in substance mining partnerships. They derive their name from the fact of

the partnership agreement, the expenses and receipts of the mine, the names of the shareholders, and any transfers of shares being entered in a ” cost-book.” The affairs of the company are managed by an agent known as a ” purser,” who from time to time makes calls on the members for the expenses of working. A cost-book company is not bound to register under the Com- panies Act 1862, but it may do so.

A company once incorporated under the Companies Act 1862 cannot be put an end to except through the machinery of a

winding-up, though the name of a company which is ” ag ~ commercially defunct may be struck off the register of

joint stock companies by the registrar (s. 242 of the Companies (Consolidation) Act 1908, incorporating s. 7 of the act of 1880, as amended by s. 26 of the act of 1000). Winding-up is of two kinds: (1) voluntary winding-up, either purely volun- tary or carried on under the supervision of the court; and (2) winding-up by the court. Of these voluntary winding-up is by far the more common. Of the companies that come to an end Vol atarv 9°% are s0 woun(i U P! an(i this is in accordance

with the policy of the legislature, evinced throughout the Companies Acts, that shareholders should manage their own affairs — winding-up being one of such affairs. A voluntary winding-up is carried out by the shareholders passing a special resolution requiring the company to be wound up voluntarily, or an extraordinary resolution (now defined by s. 182 of the Companies (Consolidation) Act 1908) to the effect that it has been proved to the shareholders’ satisfaction that the company cannot, by reason of its liabilities, continue its business, and that it is advisable to wind it up (C.A. 1862, s. 129). The resolution is generally accompanied by the appointment of a liquidator. In a purely voluntary winding-up’there is a power given by s. 138 for the company or any contributory to apply to the court in any matter arising in the winding-up, but seemingly by an oversight of the legislature the same right was not given to creditors. This was rectified by the Companies Act 1900, s. 25. Section 27of the Companies Act 1907 (s. i88of the Consolidation Act 1908) further provides for the liquidator under a voluntary winding-up summoning a meeting of creditors to determine on the choice of a liquidator. A creditor may also in a proper case obtain an order for continuing the voluntary winding-up under the supervision of the court. Such an order has the advantage of operating as a stay of any actions or executions pending against the company. Except in these respects, the winding-up remains a voluntary one. The court does not actively intervene unless set in motion; but it requires the liquidator to bring his accounts into chambers every quarter, so that it may be in- formed how the liquidation is proceeding. When the affairs of the company are’f ully wound up, the liquidator calls a meeting, lays his accounts before the shareholders, and the company is dissolved by operation of law three months after the date of the meeting (C.A. 1862, ss. 142, 143).

Irrespective of voluntary winding-up, the legislature has defined certain events in which a company formed under the

Companies Act 1862 may be wound up by the court. court These events are: (1) when the company has passed

a resolution requiring the company to be wound up by the court; (2) when the company does not commence its business within a year or suspends it for a year; (3) when the members are reduced to less than seven; (4) when the company is unable to pay its debts, and (5) whenever the court is of opinion that it is just and equitable that the company should be wound up (C.A. 1862, s. 79; s. 129 of the Consolidation Act 1908). A petition for the purpose may be presented either by a creditor, a contributory or the company itself. Where the petition is presented by a creditor who cannot obtain payment of his debt, a winding-up order is ex debito justitiae as against the company or shareholders, but not as against the wishes of a majority of creditors. A winding-up order is not to be refused because the company's assets are over mortgaged (Companies Act 1907, s. 29; s. 141 of Consolidation Act 1908).

The procedure on the making of a winding-up order is now governed by ss. 7, 8, 9 of the Winding-up Act 1890. The official

vi. 26

receiver, as liquidator pro tent., requires a statement of the affairs of the company verified by the directors, and on it reports to the court as to the causes of the company's failure and whether further inquiry is desirable. If he further reports that in his opinion fraud has been committed in the promotion or formation of the company by a particular person, the court may order such person to be publicly examined.

A liquidator's duty is to protect, collect, realize and distribute the company's assets in due course of administration; and for this purpose he advertises for creditors, makes calls on contribu- tories, sues debtors, takes misfeasance proceedings, if necessary, against directors or promoters, and carries on the company's business — supposing the goodwill to be an asset of value — with a view to selling it as a going concern. He may be assisted, like a trustee in bankruptcy, by a committee of inspection, composed of creditors and contributories.

When the affairs of the company have been completely wound up the court is, by s. in of the Companies Act 1862 (s. 127 of the act of 1908), to make an order that the company be dissolved from the date of such order, and the company is dissolved accord- ingly. A company which has been dissolved may, where neces- sary, on petition to the

court be reinstated on the register (Companies Act 1880, s. 1).

A large number of companies now wind up only to reconstruct. The reasons for a reconstruction are generally either to raise fresh capital, or to get rid of onerous preference shares, or to enlarge the scope of the company's objects, which struction. is otherwise impracticable owing to the unalterability of the Memorandum of Association. Reconstructions are carried out in one of three ways: (1) by sale and transfer of the com- pany's undertaking and assets to a new company, under a power to sell contained in the company's memorandum of association, or (2) by sale and transfer under s. 161 of the Companies Act 1862; or (3) by a scheme of arrangement, sanctioned by the court, under the Joint Stock Companies Arrangements Act 1870, as amended by the Companies Act 1907, s. 38 (C.A. 1908, s. 192).

The first of these modes is now the most in favour.

A company, though a mere legal abstraction, without mind or will, may, it is now well settled, be liable in damages for malicious prosecution, for nuisance, for fraud, for negligence, for trespass. The sense of the thing is 1,!^^ that the " company " is a nomen collectivum for the company. members. It is they who have put the directors there to carry on their business and they must be answerable, collectively, for what is done negligently, fraudulently or maliciously by their agents.

2. Public Companies. Besides trading companies there is another large class, exceeding in their number even trading companies, which for shortness may be called public companies, that is to say, com- panies constituted by special act of parliament for the purpose of constructing and carrying on undertakings of public utility, such as railways, canals, harbours, docks, waterworks, gasworks, bridges, ferries, tramways, drainage, fisheries or hospitals. The objects of such companies nearly always involve an inter- ference with the rights of private persons, often necessitate the commission of a public nuisance, and require therefore the sanction of the legislature. For this purpose a special act has to be obtained. A private bill to authorize the undertaking is introduced before one or other of the Houses of Parliament, considered in committee, and either passed or rejected like a public bill. These parliamentary (private bill) committees are tribunals acknowledging certain rules of policy, taking evidence from witnesses and hearing arguments from professional advo- cates. In many of these special acts, dealing as they do with a similar subject matter, similar provisions are required, dnd to avoid repetition and secure uniformity the legislature has passed certain general acts —

codes of law for particular subject matters frequently recurring — which can be incorporated by reference in any special act with the necessary modifications. Thus the

Companies Clauses Acts 1845, 1863 and 1869 supply the general powers and provisions which are commonly inserted in the constitution of such public company, regulating the distribution of capital, the transfer of shares, payment of calls, borrowing and general meetings. The Lands Clauses Consolidation Act 1845 supplies the machinery for the compulsory taking of land incident to most undertakings of a public character. The Railway Clauses Consolidation Act, the Waterworks Clauses Acts 1847 and 1863, the Gasworks Clauses Act 1847, and the Electric Lighting (Clauses) Act 1890 are other codes of law designed for incorporation in special acts creating companies for the construction of railways or the supply of water, gas or electric light. A distinguishing feature of these companies is that, being sanctioned by the legislature for undertakings of public utility, the policy of the law will not allow them to be broken up or destroyed by creditors. It gives creditors only a charge — by a receiver — on the earnings of the undertaking— the ” fruit of the tree.”

3. British Companies Abroad.

The status of British companies trading abroad, so far as Germany, France, Belgium, Greece, Italy and Spain are con- cerned, is expressly recognized in a series of conventions entered into between those countries and Great Britain. The value of the convention with France has been much impaired by the interpretation put upon the words of it by the court of cassation in La Construction Lim. According to this case the nationality of a company depends not on its place of origin but on where it has its centre of affairs, its principal establishment. The result is that a company registered in Britain under the Companies Acts may be transmuted by a French court into a French company in direct violation of the convention. The convention with Germany, which is in similar terms to that with France, has also been narrowed by judicial construction. The “power of exercising all their rights ” given by the convention to. British companies has been construed to mean that a British company will be recognized as a corporate body in Germany, but it does not follow from the terms of

the convention that any British company may as a matter of course establish a branch and carry on business within the German empire. It must still get permission to trade, permission to hold land. It must register itself in the communal register. It must pay stamp duties.

Foreign companies may found an affiliated company or have a branch establishment in Italy, provided they publish their memorandum and articles and the names of their directors. Where no convention exists the status of an immigrant corpora- tion depends upon international comity, which allows foreign corporations, as it does foreign persons, to sue, to make contracts and hold real estate, in the same way as domestic corporations or citizens; provided the stranger corporation does not offend against the policy of the state in which it seeks to trade.

There is, however, a growing practice now for states to impose by express legislation conditions on foreign corporations com- ing to do business within their territory. These conditions are mainly directed to securing that the immigrant corporation shall make known its constitution and shall be amenable to the jurisdiction of the courts of the country where it trades. Thus, by the law of Western Australia — to take a typical instance,— a foreign company is not to commence or carry on business until it empowers some person to act as its attorney to sue and be sued and has an office or place of business within the state, to be approved of by the registrar, where all legal proceedings may be served. New Zealand, Manitoba and many other states have adopted similar precautions; and by the Companies Act 1907, s. 35; C.A. 1908, s. 274 foreign companies having a place of business within the United Kingdom are required to file with the registrar of joint stock companies a copy of the company's charter or memorandum and articles, a list of directors, and the names and addresses of one or more persons authorized to accept service of process. Special conditions of a more stringent nature are often imposed in the case of particular classes of companies of a quasi-public character, such as banking companies, building

societies or insurance companies. Regulations of this kind are perfectly legitimate and necessary. They are in truth only an application of the law of vagrancy to corporations, and have their analogy in the restrictions now generally imposed by states on the immigration of aliens. •

4. Company Law outside the United Kingdom.

Australia.*— Company law in Australia and in New Zealand follows

very closely the lines of company legislation in the United Kingdom.

In New South Wales the law is consolidated by Act No. 40 of 1899, amended 1900 and 1906. In Victoria the law is contained in the Acts Nos. 1074 of 1890 and 355 of 1896; in Queensland in a series of Acts — No. 4 of 1863, No. 18 of 1899, No. 10 of 1891, No. 24 of 1892, No. 3 of 1893, No. 19 of 1894 and No. 21 of 1896; in South Australia in No. 56 of 1892, amended by No. 576 of 1893; in Tasmania by Nos. 22 of 1869, 19 of 1895 and 3 of 1896; in Western Australia by No. 8 of 1893, amended 1897 and 1898.

In New Zealand the law was consolidated in 1903.

Canada. — The act governing joint stock companies in Canada is the Companies Act 1902, amended 1904. It empowers the secretary of state by letters patent to grant a charter to any number of persons not less than five for any objects other than railway or telegraph lines, banking or insurance.

Applicants must file an application— analogous to the British memorandum of association — showing certain particulars — the purposes of incorporation, the place of business, the amount of the capital stock, the number of shares and the amount of each, the names and addresses of the applicants, the amount of Stock taken by each and the amount and mode of payment. Other provisions may also be embodied. A company cannot commence business until 10% of its authorized capital has been subscribed and paid for. The word ” limited ” as part of the company’s name is — as in the case of British companies — to be conspicu- ously exhibited and used in all documents. The directors are not to be less than three or more than fifteen, and must be holders of stock. Directors are jointly and severally liable to the clerks, labourers and servants of the company for six months’ wages. Borrowing powers may be taken by a vote of holders of two- thirds in value of the subscribed stock of the company.

South Africa. — In Cape Colony the law is contained in No. 25 of 1892, amended 1895 and 1906; it follows English law.

In Natal the law is contained in Nos. 10 of 1864, 18 of 1865, 19 of 1893 and 3 of 1896.

In the Orange Free State in Law Ch. 100 and Nos. 2 and 4 of

1892.

For the Transvaal see Nos. 5 of 1874, 6 of 1874, 1 of 1894 and 30 of

1904.

In Rhodesia companies are regulated by the Companies Ordinance 1895 — a combination of the Cape Companies Act 1892, and the British Companies Acts 1862-1890.

France. — There are two kinds of limited liability companies in France — the society en commandite and the societe anonyme. The soci&te en commandite corresponds in some respects to the British private company or limited partnership, but with this difference, that in the soctitt en commandite the managing partner is under unlimited liability of creditors; the sleeping partner's liability is limited to the amount of his capital. The French equivalent of the English ordinary joint stock company is the socie'te anonyme. The minimum number of subscribers necessary to form such a company is (as in the case of a British trading company) seven, but, unlike a British company, the societi anonyme is not legally constituted unless the whole capital is subscribed and one-fourth of each share paid up. Another precaution unknown to British practice is that assets, not in money, brought into a company are subject to verification of value by a general meeting. The minimum nominal value of shares, where the company's capital is less than 200,000 fcs., is 25 fcs.; where the capital is more than 200,000 fcs., 100 fcs. The sociUi is governed by articles which appoint the directors, and there is one general meeting held every year. A societS anonyme may, since 1 902 , issue preference shares. The doctrine

that a corporation never dies has no place in French law. A societt anonyme may come to an end.

Germany. — In Germany the class of companies most nearly corresponding to English companies limited by shares are " share companies " (Aktiengesells haften) and " commandite companies " with a share capital {Kommanditgesellschaften auf Aktien). Since 1892 a new form of association has come into existence known by the name of partnership with limited liability (Gesellschaften mit beschrankter Haftung), which has largely superseded the commandite company. The " share In forming this paid-up company certain preliminary company." steps have to be taken before registration :—

1. The articles must be agreed on;

2. A managing board and a board of supervision must be

appointed ;

3. The whole of the share capital must be allotted and 25 %, at

least, must be paid up in coin or legal tender notes;

4. Reports on the formation of the company must be made by

certain persons; and

5. Certain documents must be filed in the registry.

In all cases where shares are issued for any consideration, not being payment in full in cash, or in which contracts for the purchase of property have been entered into, the promoters must sign a declaration in which they must state on what grounds the prices agreed to be given for such property appear to be justified. In the great majority of cases shares are issued in certificates to bearer. The amount of such a share — to bearer — must as a general rule be not less than £50, but registered shares of £10 may be issued. Balance sheets have to be published periodically.

Partnerships with limited liability may be formed by two or

more members. The articles of partnership must be signed by

all the members, and must contain particulars as to

“L e the amount of the capital and of the individual shares. ships. If t ne liability on any shares is not to be satisfied in

cash this also must be stated. The capital of a limited partnership must amount to £1000. Shares must be registered. Insolvent companies in Germany are subject to the bankruptcy law in the same manner as natural persons.

For further information see a memorandum on German companies printed in the appendix to the Report of Lord Davey’s Committee on the Amendment of Company Law, pp. 13ˆ26.

Italy. — Commercial companies in Italy are of three kinds: — (1) General partnerships, in which the members are liable for all debts incurred; (2) companies in accomodita, in which some members are liable to an unlimited extent and others within certain limits; (3) joint stock companies, in which the liability is limited to the capital of the

company and no member is liable beyond the amount of his holding. None of these companies needs authority from the government for its constitution; all that is needed is a written agreement brought before the public in the ways indicated in the code (Art. 90 et seq.). In joint stock companies the trustees (directors) must give security. They are appointed by a general meeting for a period not exceeding four years (Art. 1 24) . The company is not constituted until the whole of its capital is subscribed, and until three-tenths of the capital at least has been actually paid up. When a company's capital is diminished by one-third, the trustees must call the members together and consult as to what is to be done.

An ordinary meeting is held once at least every year. Shares may not be made payable " to bearer " until fully paid up (Art. 166). A company may issue debentures If this is agreed to by a certain majority (Art. 172). One-twentieth, at least, of the dividends of the company must be added to the reserve fund, until this has become equal to one-fifth of the company's capital (Art. 182). Three or five assessors — members or non-members — keep watch over the way in which the company is carried on.

United Slates. — In the United States the right to create corporations is a sovereign right, and as such is exercisable by the several states of the Union. The law of private corporations must therefore be sought in some fifty collections or groups of statutory and case-made rules. These collections or groups of rules differ in many cases essentially from each other. The acts

regulating business corporations generally provide that the persons proposing to form a corporation shall sign and acknow- ledge an instrument called the articles of association, setting forth the name of the corporation, the object for which it is to be formed, the principal place of business, the amount of its capital stock, and the number of shares into which it is to be divided, and the duration of its corporate existence. These articles are filed in the office of the secretary of state or in designated courts of record, and a certificate is then issued reciting that the provisions of the act have been complied with, and thereupon the incorporators are vested with corporate existence and the general powers incident thereto. This certi- ficate is the charter of the corporation. The power to make bylaws is usually vested in the stockholders, but it may be conferred by the certificate on the directors. Stockholders remain liable until their subscriptions are fully paid. Nothing but money is considered payment of capital stock except where property is purchased. Directors must usually be stockholders.

The right of a state to forfeit a corporation's charter for misuser or non-user of its franchises is an implied term of the grant of incorporation. Corporations are liable for every wrong they commit,' and in such cases cannot set up by way of protection the doctrine of ultra vires.

See for authorities Commentaries on the Law of Private Corporations, by Seymour T). Thompson, LL.D., 6 vols.; Beach on Corporations, and the American Encyclopaedia of Law. (E. Ma.)

COMPARATIVE ANATOMY, a term employed to designate the study of the structure of man as compared with that of lower animals, and sometimes the study of lower animals in contra- distinction to human anatomy; the term is now falling into desuetude, and lingers practically only in the titles of books or in the designation of university chairs. The change in terminology is chiefly the result of modern conceptions of zoology. From the point of view of structure, man is one of the animals; all in- vestigations into anatomical structure must be comparative, and in this work the subject is so treated throughout. See Anatomy and Zoology.

COMPARETTI, DOMENICO (1835-), Italian scholar, was born at Rome on the 27th of June 1835. He studied at the university 6f Rome, took his degree in 1855 in natural science and mathematics, and entered his uncle's pharmacy as assistant. His scanty leisure was, however, given to study. He learned Greek by himself, and gained facility in the modern language by conversing with the Greek students at the university. In spite of all disadvantages, he not only mastered the language, but became one of the chief classical scholars of Italy. In 1857 he published, in the Rheinisches Museum, a translation of some recently discovered fragments of Hypereides, with a dissertation on that orator. This was followed by a notice of the annalist Granius Licinianus, and one on the oration of Hypereides on the Lamian War. In 1859 he was appointed professor of Greek at Pisa on the recommendation of the duke of Sermoneta. A few years later he was called to a similar post at Florence, remaining emeritus professor at Pisa also. He subsequently took up his residence in Rome as lecturer on Greek antiquities and greatly interested himself in the Forum excavations. He was a member of the governing bodies of the academies of Milan, Venice, Naples and Turin. The list of his writings is long and varied. Of his works in classical literature, the best known are an edition of the Euxenippus of Hypereides, and monographs on Pindar and Sappho. He also edited the great inscription which contains a collection of the municipal laws of Gortyn in Crete, discovered on the site of the ancient city. In the Kalewala and the

Traditional Poetry of the Finns (English translation by I. M. Anderton, 1898) he discusses the national epic of Finland and its heroic songs, with a view to solving the problem whether an epic could be composed by the interweaving of such national songs. He comes to a negative conclusion, and applies this reasoning to the Homeric problem. He treats this question again in a treatise on the so-called Peisistratean edition of Homer {La Commission/! omerica di Pisistrato, 1881). His Researches concerning the Book of Sindibdd have been translated

in the Proceedings of the Folk-Lore Society. His Vergil in the Middle Ages (translated into English by E. F. Benecke, 1895) traces the strange vicissitudes by which the great Augustan poet became successively grammatical fetich, Christian prophet and wizard. Together with Professor Alessandro d'Ancona, Comparetti edited a collection of Italian national songs and stories (9 vols., Turin, 1870-1891), many of which had been collected and written down by himself for the first time.

COMPASS (Fr. compas, ultimately from Lat. cum, with, and passus, step), a term of which the evolution of the various meanings is obscure; the general sense is " measure " or " measurement," and the word is used thus in various derived meanings — area, boundary, circuit. It is also more particularly applied to a mathematical instrument ("pair of compasses") for measuring or for describing a circle, and to the mariner's compass.

The mariner's compass, with which this article is concerned, is an instrument by means of which the directive force of that great magnet, the Earth, upon a freely-suspended needle, is utilized for a purpose essential to navigation. The needle is so mounted that it only moves freely in the horizontal plane, and therefore the horizontal component of the earth's force alone directs it. The direction assumed by the needle is not generally towards the geographical north, but diverges towards the east or west of it, making a horizontal angle with the true

Fig. 1. — Compass Card.

meridian, called the magnetic variation or declination; amongst mariners this angle is known as the variation of the compass. In the .usual navigable waters of the world the variation alters from 30 to

the east to 45° to the west of the geographical meridian, being westerly in the Atlantic and Indian oceans, easterly in the Pacific. The vertical plane passing through the longitudinal axis of such a needle is known as the magnetic meridian. Following the first chart of lines of equal variation compiled by Edmund Halley in 1700, charts of similar type have been published from time to time embodying recent observations and corrected for the secular change, thus providing seamen with values of the variation accurate to about 30′ of arc. Possess- ing these data, it is easy to ascertain by observation the effects of the iron in a ship in disturbing the compass, and it will be found for the most part in every vessel that the needle is deflected from the magnetic meridian by a horizontal angle called the deviation of the compass; in some directions of the ship's head adding to the known variation of the place, in other directions subtracting from it. Local magnetic disturbance of the needle due to magnetic rocks is observed on land in all parts of the world, and in certain places extends to the land under the sea, affecting the compasses on board the ships passing over it. The

general direction of these disturbances in the northern hemisphere is an attraction of the north-seeking end of the needle; in the southern hemisphere, its repulsion. The approaches to Cossack, North Australia; Cape St Francis, Labrador; the coasts of Madagascar and Iceland, are remarkable for such disturbance of the compass.

The compass as we know it is the result of the necessities of navigation, which have increased from century to century. It consists of five principal parts — the card, the needles, the bowl, a jewelled cap and the pivot. The card or " fly," formerly made of cardboard, now consists of a disk either of mica covered with paper or of paper alone, but in all cases the card is divided into points and degrees as shown in fig. 1. The outer margin is divided into degrees with 0° at north and south, and 90 at east

Fig. 2. — Admiralty Compass Fig. 3. — Thomson's (Lord Kelvin's) (Frame and Needles). Compass (Frame and Needles).

and west; the 32 points with half and quarter points are seen immediately within the degrees. The north point is marked with afleur de lis, and the principal points, N.E., E., S.E., &c, with their respective names, whilst the intermediate points in the figure have also their names engraved for present information. The arc contained between any two points is n° 15'. The mica card is generally mounted on a brass framework, F F, with a brass cap, C, fitted with a sapphire centre and carrying four magnetized needles, N, N, N, N, as in fig. 2. The

more modern form of card consists of a broad ring of paper marked with degrees and points, as in fig. 1, attached to a frame like that in fig. 3, where an outer aluminium ring, A A, is connected by 32 radial

Fig. 4. — Section of Thomson's Compass Bowl. C, aluminium cap with sapphire centre ; N, N', needles; P, pivot stem with pivot.

silk threads to a central disk of aluminium, in the centre of which is a round hole designed to receive an aluminium cap with a highly polished sapphire centre worked to the form of an open cone. To direct the card eight short light needles, N N, are suspended by sflk threads from the outer ring. The magnetic axis of any system of needles must exactly coincide with the axis passing through the north and south points of the card. Single needles are never used, two being the least number, and these so arranged that the moment of inertia about every diameter of the card shall be the same. The combination of card, needles and cap is generally termed " the card "; on the continent of Europe it is called the " rose." The section of a compass bowl in fig. 4 shows the mounting of a Thomson card on its pivot, which in common with the pivots of most other compasses is made of brass, tipped with osmium-iridium, which although very hard can be sharply pointed and does not corrode.

Fig. 4 shows the general arrangement of mounting all compass cards in the bowl. In fig. 5 another form of compass called a liquid or spirit compass is shown partly in section. The card nearly floats in a bowl filled with distilled water, to which 35% of alcohol is added to prevent freezing; the bowl is hermetically sealed with pure india-rubber, and a corrugated expansion chamber is attached to the bottom to allow for the expansion and contraction of the liquid. The card is a mica disk, either painted as in fig. 1, or covered with linen upon which the degrees and points are printed, the needles being enclosed in brass.

Great steadiness of card under severe shocks and vibrations, combined with a minimum of friction in the cap and pivot, is obtained with this compass. All compasses are fitted with a gimbal ring to keep the bowl and card level under every circum- stance of a ship's motion in a seaway, the ring being connected with the binnacle or pedestal by means of journals or knife edges. On the inside of every compass bowl a vertical black line is drawn, called the " lubber's point," and it is

imperative

Fig. 5. — Liquid Compass.

A, Bowl, partly in section. N,

B, Expansion chamber.

D, The glass. O,

G, Gimbal ring. P, L, Nut to expand chamber when Q,

filling bowl. R,

M, Screw connector. S,

Hole for filling, with screw

O, Magnetic needles. Buoyant chamber. Iridium pivot. Sapphire cap. Mica card.

that when the compass is placed in the binnacle the line joining the pivot and the lubber's point be parallel to the keel of the vessel. Thus, when a degree on the card is observed opposite the lubber's point, the angle between the direction in which the ship is steering and the north point of the compass or course is at once seen; and if the magnetic variation and the disturbing effects of the ship's iron are known, the desired angle between the ships's course and the geographical meridian can be computed. In every ship a position is selected for the navigating or standard compass as free from neighbouring iron as possible, and by this compass all courses are shaped and bearings taken. It is also provided with an azimuth circle or mirror and a shadow pin or style placed in the centre of the glass cover, by either of which the variable angle between the compass north and true north, called the " total error," or variation and deviation combined, can be observed. The binnacles or pedestals for compasses are generally constructed of wood about 45 in. high, and fitted to receive and alter at pleasure the several magnet and soft iron correctors. They are also fitted with different forms of suspen- sion in which the compass is mounted to obviate the mechanical disturbance of the card caused by the vibration of the hull in ships driven by powerful engines.

The effects of the iron and steel used in the construction of ships upon the compass occupied the attention of the ablest physicists of the igth century, with results which enable navi- gators to conduct their ships with perfect safety. The hull of an iron or steel ship is a magnet, and the distribution of its magnetism depends upon the direction of the ship's head when building, this result being produced by induction

from the earth's magnetism, developed and impressed by the hammering of the plates and frames during the process of building. The disturbance of the compass by the magnetism of the hull is generally modified, sometimes favourably, more often un- i

favourably, by the magnetized fittings of the ship, such as masts, conning towers, deck houses, engines and boilers. Thus in every ship the compass needle is more or less subject to deviation differing in amount and direction for every azimuth of the ship's head. This was first demonstrated by Commander Matthew Flinders by experiments made in H.M.S. " Investi- gator " in 1800-1803, and in 1810 led that officer to introduce the practice of placing the ship's head on each point of the compass, and noting the amount of deviation whether to the east or west of the magnetic north, a process which is in full exercise at the present day, and is called " swinging ship." When speaking of the magnetic properties of iron it is usual to adopt the terms " soft " and " hard." Soft iron is iron which becomes instantly magnetized by induction when exposed to any magnetic force, but has no power of retaining its magnetism. Hard iron is less susceptible of being magnetized, but when once magnetized it retains its magnetism permanently. The term " iron " used in these pages includes the " steel " now commonly employed in shipbuilding. If an iron ship be swung when upright for deviation, and the mean horizontal and vertical magnetic forces at the compass positions be also observed in different parts of the world, mathematical analysis shows that the deviations are caused partly by the permanent magnetism of hard iron, partly by the transient induced magnetism of soft iron both horizontal and vertical, and in a lesser degree by iron which is neither magnetically hard nor soft, but which becomes magnetized in the same manner as hard iron, though it gradually loses its magnetism on change of conditions, as, for example, in the case of a ship, repaired and hammered in dock, steaming in an opposite direction at sea. This latter cause of deviation is called sub-permanent magnetism. The horizontal directive force on the needle on board is nearly always less than on land, sometimes much less, whilst in armour-plated ships it ranges from -8 to -2 when the directive force on land = i-o. If the ship be inclined to starboard or to port additional deviation will be observed, reaching a maximum on north and south points, decreasing to zero on the east and west points. Each ship has its own magnetic character, but there are certain conditions which are common to vessels of the same type.

Instead of observing the deviation 6olely for the purposes of correcting the indications of the compass when disturbed by the iron of the ship, the practice is to subject all deviations to mathematical

analysis with a view to their mechanical correction. The whole of the deviations when the ship is upright may be expressed nearly by five co-efficients, A. B, C, D, E. Of these A is a deviation constant in amount for every direction of the ship's head. B has reference to horizontal forces acting in a longi- tudinal direction in the ship, and caused partly by the permanent magnetism of hard iron, partly by vertical induction in vertical soft iron either before or abaft the compass. C has reference to forces acting in a transverse direction, and caused by hard iron. D is due to transient induction in horizontal soft iron, the direc- tion of which passes continuously under or over the compass. E is due to transient induction in horizontal soft iron unsym- metrically placed with regard to the compass. When data of this character have been obtained the compass deviations may be mechanically corrected to within i° — always adhering to the principal that " like cures like." Thus the part of B caused by the permanent magnetism of hard iron must be corrected by permanent magnets horizontally placed in a fore and aft direc- tion; the other part caused by vertical soft iron by means of bars of vertical soft iron, called Flinders bars, before or abaft the compass. C is compensated by permanent magnets athwart- ships and horizontal; D by masses of soft iron on both sides of the compass, and generally in the form of cast-iron spheres, with their centres in the same horizontal plane as the needles; E is usually too small to require correction; A is fortunately rarely of any value, as it cannot be corrected. The deviation observed when the ship inclines to either side is due — (1) to hard iron acting vertically upwards or downwards; (2) to vertical soft iron immediately below the compass; (3) to vertical induc- tion in horizontal soft iron when inclined. To compensate (1)

vertical magnets are used; (3) is partly corrected by the soft iron correctors of D; (2) and the remaining part of (3) cannot be conveniently corrected for more than one geographical position at a time. Although a compass may thus be made practically correct for a given time and place, the magnetism of the ship is liable to changes on changing her geographical position, and especially so when steaming at right angles or nearly so to the magnetic meridian, for then sub-permanent magnetism is developed in the hull. Some vessels are more liable to become sub-permanently magnetized than others, and as no corrector has been found for this source of deviation the navigator must determine its amount by observation. Hence, however carefully a compass may be placed and subsequently compensated, the

mariner has no safety without constantly observing the bearings of the sun, stars or distant terrestrial objects, to ascertain its deviation. The results of these observations are entered in a compass journal for future reference when fog or darkness prevails.

Every compass and corrector supplied to the ships of the British navy is previously examined in detail at the Compass Observatory established by the admiralty at Deptford. A trained observer acting under the superintendent of compasses is charged with this important work. The superintendent, who is a naval officer, has to investigate the magnetic character of the ships, to point out the most suitable positions for the com- passes when a ship is designed, and subsequently to keep himself informed of their behaviour from the time of the ship's first trial. A museum containing compasses of various types invented during the 19th century is attached to the Compass Observatory at Deptford.

The mariner's compass during the early part of the 19th century was still a very imperfect instrument, although numerous inventors had tried to improve it. In 1837 the Admiralty Compass Committee was appointed to make a scientific investigation of the subject, and propose a form of compass suitable alike for azimuth and steering purposes. The committee reported in July 1840, and after minor improvements by the makers the admiralty compass, the card of which is shown in figs. 1 and 2, was adopted by the government. Until 1876, when Sir William Thomson introduced his patent com- pass, this compass was not only the regulation compass of the British navy, but was largely used in other countries in the same or a modified form. The introduction of powerful engines causing serious vibration to compass cards of the admiralty type, coupled with the prevailing desire for larger cards, the deviation of which could also be more conveniently compensated, led to the gradual introduction of the Thomson compass. Several important points were gained in the latter: the quadrantal deviation could be finally corrected for all latitudes; frictional error at the cap and pivot was reduced to a minimum, the average weight of the card being 200 grains; the long free vibrational period of the card was found to be favourable to its steadiness when the vessel was rolling. The first liquid compass used in England was invented by Francis Crow, of Faversham, in 1813. It is said that the idea of a liquid compass was suggested to Crowˆby the experience of the captain of a coasting vessel whose compass card was oscillating wildly until a sea broke on board filling the compass bowl, when the card became steady. Subsequent improvements were made by E. J. Dent, and especially by E. S. Ritchie, of Boston, Massachusetts. In 1888 the form of liquid compass (fig. 5) now solely used in torpedo

boats and torpedo boat destroyers was introduced. It has also proved to be the most trustworthy compass under the shock of heavy gun fire at present available. The deflector is an instrument designed to enable an observer to reduce the deviations of the compass to an amount not exceeding 2° during fogs, or at any time when bearings of distant objects aire not available. It is certain that if the directive forces on the north, east, south and west points of a compass are equal, there can be no deviation. With the deflector any inequality in the directive force can be detected, and hence the power of equalizing the forces by the usual soft iron and magnet correctors. Several kinds of deflector have been invented, that of Lord Kelvin (Sir William Thomson) being the simplest, but Dr Waghorn's is also very effective. The use of the deflector is generally confined to experts.

The Magnetism of Ships. — In 1814 Flinders first showed (see Flinders's Voyage, vol. ii. appx. ii.) that the abnormal values of the variation observed in the wood-built ships of his day was due to deviation of the compass caused by the iron in the ship; that the deviation was zero when the ship's head was near the north and south points; that it attained its maximum on the east and west points, and varied as the sine of the azimuth of the ship's head reckoned from the zero points. He also described a method of correcting deviation by means of a bar of vertical iron so placed as to correct the deviation nearly in all latitudes. This bar, now

known as a " Flinders bar," is still in general use. In 1820 Dr T. Young (see Brande's Quarterly Journal, 1820) investigated mathe- matically the magnetism of ships. In 1824 Professor Peter Barlow* (1776-1862) introduced his correcting plate of soft iron. Trials in certain ships showed that their magnetism consisted partly of hard iron, and the use of the plate was abandoned. In 1835 Captain E. J. Johnson, R.N., showed from experiments in the iron steamship " Garry Owen " that the vessel acted on an external compass as a magnet. In 1838 Sir G. B. Airy magnetically examined the iron steamship " Rainbow " at Deptford, and from his mathematical investigations (see Phil. Trans., 1839) deduced his method of correct- ing the compass by permanent magnets and soft iron, giving practical rules for the same in 1840. Airy's and Flinders's correctors form the basis of all compass correctors to this day. In 1838 S. D. Poisson published his Memoir on the Deviations of the Compass caused by the-. Iron in a Vessel. In this he gave equations resulting from the hypo- thesis that the magnetism of a ship is partly due to the permanent magnetism of hard iron and partly to the transient induced magnet- ism of soft iron ; that the latter is proportional to the intensity of the inducing force, and that the length of the needle is infinitesimally small compared to the distance

of the surrounding iron. From Poisson's equations Archibald Smith deduced the formulae given in the Admiralty Manual for Deviations of the Compass (ist ed., 1862), a work which has formed the basis of numerous other manuals since published in Great Britain and other countries. In view of the serious difficulties connected with the inclining of every ship, Smith's formulae for ascertaining and providing for the correction of the heeling error with the ship upright continue to be of great value to safe navigation. In 1855 the Liverpool Compass Committee began its work of investigating the magnetism of ships of the mercantile marine, resulting in three reports to the Board of Trade, all of great value, the last being presented in 1861.

See also 'Magnetism, and Navigation; articles on Magnetism of Ships and Deviations of the Compass, Phil. Trans., 1839-1883, Journal United Service Inst., 1 859-1 889, Trans. Inst. Nav. Archil., 1860-1861-1862, Report of Brit. Assoc, 1862, London Quarterly Rev., 1865; also Admiralty Manual, edit. 1862-1863-1869-1893- 1900; and Towson's Practical Information on Deviations of the Compass (1886). (E. W. C.)

History of the Mariner's Compass.

The discovery that a lodestone, or a piece of iron which has been touched by a lodestone, will direct itself to point in a north and south position, and the application of that discovery to direct the navigation of ships, have been attributed to various origins. The Chinese, the Arabs, the Greeks, the Etruscans, the Finns and the Italians have all been claimed as originators of the compass. There is now little doubt that the claim formerly advanced in favour of the Chinese is ill-founded. In Chinese history we are told how, in the sixty-fourth year of the reign of Hwang-ti (2634 B.C.), the emperor Hiuan-yuan, or Hwang-ti, attacked one Tchi-yeou, on the plains of Tchou-lou, and finding his army embarrassed by a thick fog raised by the enemy, constructed a chariot (Tchi-nan) for indicating the south, so as to distinguish the four cardinal points, and was thus enabled to pursue Tchi-yeou, and take him prisoner. (Julius Klaproth, Lettre a M. le Baron Humboldt sur I'invention de la boussole, Paris, 1834. See also Mailla, Histoire gSnSrale de la Chine, torn. i. p. 316, Paris, 1777.) But, as other versions of the story show, this account is purely mythical. For the south-pointing chariots are recorded to have been first devised by the emperor Hian-tsoung (a.d. 806-820); and there is no evidence that they contained any magnet. There is no genuine record of a Chinese marine compass before a.d. 1297, as Klaproth admits. No sea-going ships were built in China before 139 B.C. The earliest allusion to the power of the lodestone in Chinese literature occurs in a Chinese

dictionary, finished in a.d. 121, where the lodestone is defined as ” a stone with which an attraction can be given to a needle,” but this knowledge is no more than that existing in Europe at least five hundred years before. Nor is there any nautical significance in a passage which occurs in the Chinese encyclopaedia, Poei-wen-yun-fou, in which it is stated that under the Tsin dynasty, or between a.d. 265 and 419, ” there were ships indicating the south.”

The Chinese, Sir J. F. Davis informs us, once navigated as far as India, but their most distant voyages at present extend not farther than Java and the Malay Islands to the south (The Chinese, vol, iii. p. 14, London, 1844). According to an Arabic manuscript, a translation of which was published by Eusebius Renaudot (Paris, 1718), they traded in ships to the Persian Gulf

and Red Sea in the 9th century. Sir G. L. Staunton, in vol. i. of his Embassy to China (London, 1797), after referring to the early acquaintance of the Chinese with the property of the magnet to point southwards, remarks (p. 445), ” The nature and the cause of the qualities of the magnet have at all times been subjects of contemplation among the Chinese. The Chinese name for the compass is ting-nan-ching, or needle pointing to the south; and a distinguishing mark is fixed on the magnet’s southern pole, as in European compasses upon the northern one.” ” The sphere of Chinese navigation,” he tells us (p. 447), ” is too limited to have afforded experience and observation for forming any system of laws supposed to govern the variation of the needle. . . . The Chinese had soon occasion to perceive how much more essential the perfection of the compass was to the superior navigators of Europe than to themselves, as the com- manders of the ‘ Lion ‘ and ‘ Hindostan,’ trusting to that instru- ment, stood out directly from the land into the sea.” The number of points of the compass, according to the Chinese, is twenty-four, which are reckoned from the south pole; the form also of the instrument they employ is different from that familiar to Europeans. The needle is peculiarly poised, with its point of suspension a little below its centre of gravity, and is exceedingly sensitive; it is seldom more than an inch in length, and is less than a line in thickness. ” It may be urged,” writes Mr T. S. Davies, ” that the different manner of constructing the needle amongst the Chinese and European navigators shows the independence of the Chinese of us, as theirs is the worse method, and had they copied from us, they would have used the

better one ” (Thomson’s British Annual, 1837, p. 291). On the other hand, it has been contended that a knowledge of the mariner’s compass was communicated by them directly or indirectly to the early Arabs, and through the latter was introduced into Europe. Sismondi has remarked (Literature of Europe, vol. i.) that it is peculiarly characteristic of all the pretended discoveries of the middle ages that when the historians mention them for the first time they treat them as things in general use. Gun- powder, the compass, the Arabic numerals and paper, are nowhere spoken of as discoveries, and yet they must have wrought a total change in war, in navigation, in science, and in education. G. Tiraboschi (Storia della. letteratura italiana, torn. iv. lib. ii. p. 204, et seq., ed. 2., 1788), in support of the conjecture that the compass was introduced into Europe by the Arabs, adduces their superiority in scientific learning and their early skill in navigation. He quotes a passage on the polarity of the lodestone from a treatise translated by Albertus Magnus, attributed by the latter to Aristotle, but apparently only an Arabic compilation from the works of various philosophers. As the terms Zoron and Aphron, used there to signify the south and north poles, are neither Latin nor Greek, Tiraboschi suggests that they may be of Arabian origin, and that the whole passage concerning the lodestone may have been added to the original treatise by the Arabian translators.

Dr W. Robertson asserts (Historical Disquisition concerning Ancient India, p. 227) that the Arabs, Turks and Persians have no original name for the compass, it being called by them Bossola, the Italian name, which shows that the thing signified is foreign to them as well as the word. The Rev. G. P. Badger has, how- ever, pointed out (Travels of Ludovico di Varthema, trans. J. W. Jones, ed. G. P. Badger, Hakluyt Sac, 1863, note, pp. 31 and 32) that the name of Bushla or Busba, from the Italian Bussola, though common among Arab sailors in the Mediterranean, is very seldom used in the Eastern seas, — Dairah and Beit el-Ibrah (the Circle, or House of the Needle) being the ordinary appel- latives in the Red Sea, whilst in the Persian Gulf Kiblah-nameh is in more general use. Robertson quotes Sir J. Chardin as boldly asserting ” that the Asiatics are beholden to us for this wonderful instrument, which they had from Europe a long time before the Portuguese conquests. For, first, their compasses are exactly like ours, and they buy them of Europeans as much as they can, scarce daring to meddle with their needles themselves. Secondly, it is certain that the old navigators only coasted it along, which I impute to their want of this instrument to guide and instruct

them in the middle of the ocean. ... I have nothing but argu- ment to offer touching this matter, having never met with any person in Persia

or the Indies to inform me when the compass was first known among them, though I made inquiry of the most learned men in both countries- I have sailed from the Indies to Persia in Indian ships, when no European has been aboard but myself. The pilots were all Indians, and they used the forestaff and quadrant for their observations. These instruments they have from us, and made by our artists, and they do not in the least vary from ours, except that the characters are Arabic. The Arabs are the most skilful navigators of all the Asiatics or Africans; but neither they nor the Indians make use of charts, and they do not much want them; some they have, but they are copied from ours, for they are altogether ignorant of perspective." The observations of Chardin, who flourished between 1643 and 1 7 13, cannot be said to receive support from the testimony of some earlier authorities. That the Arabs must have been ac- quainted with the compass, and with the construction and use of charts, at a period nearly two centuries previous to Chardin's first voyage to the East, may be gathered from the description given by Barros of a map of all the coast of India, shown to Vasco da Gama by a Moor of Guzerat (about the 15th of July 1498), in which the bearings were laid down " after the manner of the Moors," or " with meridians and paraBels very small (or close together), without other bearings of the compass; because, as the squares of these meridians and parallels were very small, the coast was laid down by these two bearings of N. and S., and E. and W., with great certainty, without that multiplication of bearings of the points of the compass usual in our maps, which serves as the root of the others." Further, we learn from Osorio that the Arabs at the time of Gama " were instructed in so many of the arts of navigation, that they did not yield much to the Portuguese mariners in the science and practice of maritime matters." (See The Three Voyages of Vasco da Gama, Hakluyt Soc, 1869; note to chap. xv. by the Hon. H. E. J. Stanley, p. 138.) Also the Arabs that navigated the Red Sea at the same period art shown by Varthema to have used the mariner's chart and compass (Travels, p. 31).

Again, it appears that compasses of a primitive description, which can hardly be supposed to have been brought from Europe, were employed in the East Indies certainly as early as several years previous to the close of the 16th century. In William Barlowe's Navigator's Supply, published in 1597, we read: — " Some fewe yeeres since, it so fell out that I had severall con- ferences with two East Indians which were brought into England by master Candish [Thomas Cavendish], and had learned our language: The one of them was of Mamillia [Manila] in the Isle of Luzon, the other of Miaco in Japan. I questioned with them concerning their shipping and manner of

sayling. They described all things farre different from ours, and shewed, that in steade of our Compas, they use a magneticall needle of sixe ynches long, and longer, upon a pinne in a dish of white China earth filled with water; In the bottome whereof they have two crosse lines, for the foure principall windes; the rest of the divisions being reserved to the skill of their Pilots." Bailak Kibdjaki, also, an Arabian writer, shows in his Merchant's Treasure, a work given to the world in 1282, that the magnetized needle, floated on water by means of a splinter of wood or a reed, was employed on the Syrian seas at the time of his voyage from Tripoli to Alexandria (1242), and adds: — " They say that the captains who navigate the Indian seas use, instead of the needle and splinter, a sort of fish made out of hollow iron, which, when thrown into the water, swims upon the surface, and points out the north and south with its head and tail " (Klaproth, Lettre, p. 57). E. Wiedemann, in Erlangen Sitzungsberichte (1904, p. 330), translates the phrase given above as splinter of wood, by the term wooden cross. Furthermore, although the sailors in the Indian vessels in which Niccola de' Conti traversed the Indian seas in 1420 are stated to have had no compass, still, on board the ship in which Varthema, less than a century later, sailed from Borneo to Java, both the mariner's chart and compass were used; it has been questioned, however, whether in this case the compass was of

Eastern manufacture {Travels of Varthema, Introd. xciv, and p. 249). We have already seen that the Chinese as late as the end of the 18th century made voyages with compasses on which but little reliance could be placed; and it may perhaps be assumed that the compasses early used in the East were mostly too imperfect to be of much assistance to navigators, and ,were therefore often dispensed with on customary routes. The Arab traders in the Levant certainly used a floating compass, as did the Italians before the introduction of the pivoted needle; the magnetized piece of iron being floated upon a small raft of cork or reeds in a bowl of water. The Italian name of calamita, which stiE persists, for the magnet, and which literally signifies a frog, is doubtless derived from this practice.

The simple water-compass is said to have been used by the Coreans so late as the middle of the 18th century; and Dr T. Smith, writing in the Philosophical Transactions for 1683-1684, says of the Turks (p. 439). " They have no genius for Sea- voyages, and consequently are very raw and unexperienced in the art of Navigation, scarce venturing to sail

out of sight of land. I speak of the natural Turks, who trade either into the black Sea or some part of the Morea, or between Constantinople and Alexandria, and not of the Pyrats of Barbary, who are for the most part Renegado's, and learnt their skill in Christendom. . The Turkish compass consists but of 8 points, the four Cardinal and the four Collateral." That the value of the compass was thus, even in the latter part of the 17th century, so imperfectly recognized in the East may serve to explain how in earlier times that instrument, long after the first discovery of its properties, may have been generally neglected by navigators.

The Arabic geographer, Edrisi, who lived about 1100, is said by Boucher to give an account, though in a confused manner, of the polarity of the magnet (Hallam, Mid. Ages, vol. iii. chap. 9, part 2); but the earliest definite mention as yet known of the use of the mariner's compass in the middle ages occurs in a treatise entitled De utensilibus, written by Alexander Neckam in the 12th century. He speaks there of a needle carried on board ship which, being placed on a pivot, and allowed to take its own position of repose, shows mariners their course when the polar star is hidden. In another work, De naturis rerum, lib. ii. c. 89, he writes, — " Mariners at sea, when, through cloudy weather in the day which hides the sun, or through the darkness of the night, they lose the knowledge of the quarter of the world to which they are sailing, touch a needle with the magnet, which will turn round till, on its motion ceasing, its point will be directed towards the north " (W. Chappell, Nature, No. 346, June 15, 1876). The magnetical needle, and its suspen- sion on a stick or straw in water, are clearly described in La Bible Guiot, a poem probably of the 13th century, by Guiot de Provins, wherein we are told that through the magnet {la manette or I'amaniere), an ugly brown stone to which iron turns of its own accord, mariners possess an art that cannot fail them. A needle touched by it, and floated by a stick on water, turns its point towards the pole-star, and a light being placed near the needle on dark nights, the proper course is known (Hist. UtUraire de la France, torn. ix. p. 199 ; Barbazan, Fabliaux, torn. ii. p. 328). Cardinal Jacques de Vitry, bishop of Aeon in Palestine, in his History (cap. 89), written about the year 1218, speaks of the magnetic needle as " most necessary for such as sail the sea "-, 1 and another French crusader, his contemporary, Vincent de Beauvais, states that the adamant (lodestone) is found in Arabia, and mentions a method of using a needle magnetized by it which is similar to that described by Kibdjaki. In 1248 Hugo de Bercy notes a change in the construction of compasses, which are now supported on two floats in a glass cup. From quotations given by Antonio Capmany {Questiones Criticas)

from the De contemplatione of Raimon Lull, of the date 1272, it appears that the latter was well acquainted with the use of

1 Adamas in India reperitur . . . Ferrum occulta quadam natura ad se trahit. Acus ferrea postquam adamantem contigerit, ad stellam septentrionalem . . . semper convertitur, unde valdeneces- sarius est navigantibus in mari.

the magnet at sea; 2 and before the middle of the 13th century Gauthier d'Espinois alludes to its polarity, as if generally known, in the lines: —

" Tous autresi comme l'aimant decoit [detourne] L'aiguillette par force de vertu, A ma dame tor le mont [monde] retenue Qui sa beaute connoit et apercoit." Guido Guinizzelli, a poet of the same period, writes: — "In those parts under the north are the mountains of lodestone, which give the virtue to the air of attracting iron; but because it [the lodestone] is far off, [it] wishes to have the help of a similar stone to make it [the virtue] work, and to direct the needle towards the star." 3 Brunetto Latini also makes reference to the compass in his encyclopaedia Livres dou iresor, composed about 1260 (Livre i. pt. ii. ch. cxx.) : — " Por ce nagent li marinier a l'enseigne des estoiles qui i sont, que il apelent tramontaines, et les gens qui sont en Europe et es parties deca. nagent a. la tramontaine de septentrion, et li autre nagent a, cele de midi. Et qui n'en set la verite, praigne une pierre d'aimant, et troverez que ele a ij faces: l'une qui gist vers l'une tramontaine, et l'autre gist vers l'autre. Et a. chascune des ij faces la pointe d'une aguille vers cele tramontaine a cui cele face gist. Et por ce seroient li marinier deceu se il ne se preissent garde " (p. 147, Paris edition, 1863). Dante (Paradiso, xii. 28-30) mentions the pointing of the magnetic needle toward the pole star. In Scandinavian records there is a reference to the nautical use of the magnet in the Hauksbdk, the last edition of the Landnd- mabdk (Book of the Colonization of Iceland) :— " Floki, son of Vilgerd, instituted a great sacrifice, and consecrated three ravens which should show him the way (to Iceland); for at that time no men sailing the high seas bad lodestones up in northern lands." Haukr Erlendsson, who wrote this paragraph about 1300, died in 1334; his edition was founded on material in two earlier works, that of Styrmir Karason (who died 1245), which is lost, and that of Hurla Thordspn (died 1284) which has no such paragraph. All that is certain is a knowledge of the nautical use of the magnet at the end of the 13th century. From T. Torfaeus we learn that the compass, fitted into a box, was already in use among the Norwegians about the middle of the 13th century {Hist. rer. N orvegicarum, iv. c. 4, p. 345, Hafniae, 1 711); and it is probable that the use of the magnet at sea

was known in Scotland at or shortly subsequent to that time, though King Robert, in crossing from Arran to Carrick in 1306, as Barbour writing in 1375 informs us, ” na nedill had na stane,” but steered by a fire on the shore. Roger’ Bacon (Opus majus and Opus minus, 1 266-1 267) was acquainted with the properties of the lodestone, and wrote that if set so that it can turn freely (swimming on water) it points toward the poles; but he stated that this was not due to the pole-star, but to the influence of the northern region of the heavens.

The earliest unquestionable description of a pivoted compass is that contained in the remarkable Epistola de magnete of Petrus Peregrinus de Maricourt, written at Lucera in 1269 to Sigerus de Foncaucourt. (First printed edition Augsburg, 1558. See also Bertelli in Boncompagni’s Bollettino di bibliografia, t. i., or S. P. Thompson in Proc. British Academy, vol. ii.) Of this work twenty-eight MSS. exist; seven of them being at Oxford. The first part of the epistle deals generally with magnetic attractions and repulsions, with the polarity of the stone, and with the supposed influence of the poles of the heavens upon the poles of the stone. In the second part Peregrinus describes first an improved floating compass with fiducial line, a circle graduated with 90 degrees to each quadrant, and provided with movable sights for taking bearings. He then describes a new compass with a needle thrust through a pivoted axis, placed in a box with transparent cover, cross index of brass or silver, divided circle, and an external ” rule ” or alhidade provided with a pair of sights. In the Leiden MS. of this work, which for long was erroneously ascribed to one Peter Adsiger, is a spurious passage, long believed to mention the variation of the compass.

2 Sicut acus per naturam vertitur ad septentrionem dum sit tacta a magnete. — Sicut acus nautica dirigit marinarios in sua navigatione.

3 Ginguene, Hist. lit. de I’ltalie, t. i. p. 413.

Prior to this clear description of a pivoted compass by Pere- grinus in 1269, the Italian sailors had used the floating magnet, probably introduced into this region of the Mediterranean by traders belonging to the port of Amalfi, as commemorated in the line of the poet Panormita: —

” Prima dedit nautis usum magnetis Amalphis.”

This opinion is supported by the historian Flavius Blondus in his Italia illustrata, written about 1450, who adds that its certain origin is unknown. In 1511 Baptista Pio in his Com- mentary repeats the opinion as to the invention of the use of the magnet at Amalfi as related by Flavius. Gyraldus, writing in 1540 {Libellus de re nautica), misunderstanding this reference, declared that this observation of the direction of the magnet to the poles had been handed down as discovered ” by a certain Flavius.” From this passage arose a legend, which took shape only in the 17 th century, that the compass was invented in the year 1302 by a person to whom was given the fictitious name of Flavio Gioja, of Amalfi.

From the above it will have been evident that, as Barlowe remarks concerning the compass, ” the lame tale of one Flavius at Amelphus, in the kingdome of Naples, for to have devised it, is of very slender probabilitie “; and as regards the assertion of Dr Gilbert, of Colchester {De magnete, p. 4, 1600), that Marco Polo introduced the compass into Italy from the East in 1 260, 1 we need only quote the words of Sir H. Yule {Book of Marco Polo) : — ” Respecting the mariner’s compass and gunpowderˆ I shall say nothing, as no one now, I believe, imagines Marco to have had anything to do with their introduction.”

When, and by whom, the compass card was added is a matter of conjecture. Certainly the Rosa Ventorum, or Wind-rose, is far older than the compass itself; and the naming of the eight principal ” winds ” goes back to the Temple of the Winds in Athens built by Andronicus Cyrrhestes. The earliest known wind-roses on the portulani or sailing charts of the Mediterranean pilots have almost invariably the eight principal points marked with the initials of the principal winds, Tramontano, Greco, Levante, Scirocco, Ostro, Africo (or Libeccio), Ponente and Maestro, or with a cross instead of L, to mark the east point. The north point, indicated in some of the oldest compass cards with a broad arrow-head or a spear, as well as with a T for Tramontano, gradually developed by a combination of these, about 1492, into a fleur de lis, still universal. The cross at the east continued even in British compasses till about 1 700. Wind- roses with these characteristics are found in Venetian and Genoese charts of early 14th century, and are depicted similarly by the Spanish navigators. The naming of the intermediate subdivisions making up the thirty-two points or rhumbs of the compass card is probably due to Flemish navigators ; but they were recognized even in the time of Chaucer, who in 1391 wrote, ” Now is thin Orisonte departed in xxiiii partiez by thi azymutz, in significacion of xxiiii partiez of the world: al be it so that ship men rikne thilke partiez in xxxii ” {Treatise on the Astrolabe, ed. Skeat, Early English Text Soc, London, 1872). The

mounting of the card upon the needle or ” flie,” so as to turn with it, is probably of Amalphian origin. Da Buti, the Dante commentator, in 1380 says the sailors use a compass at the middle of which is pivoted a wheel of light paper to turn on its pivot, on which wheel the needle is fixed and the star (wind-rose) painted. The placing of the card at the bottom of the box, fixed, below the needle, was practised by the compass- makers of Nuremberg in the 16th century, and by Stevinus of Bruges about 1600. The gimbals or rings for suspension hinged at right-angles to one another, have been erroneously attributed to Cardan, the proper term being cardine, that is hinged or pivoted. The earliest description of them is about 1604. The term binnacle, originally bittacle, is a corruption of the Portuguese abitacolo, to denote the housing enclosing the compass, probably originating with the Portuguese navigators. The improvement of the compass has been but a slow process.

1 ” According to all the texts he returned to Venice in 1295 or, as is more probable, in 1296.” — Yule.

The Libel of English Policie, a poem of the first half of the 15th century, says with reference to Iceland (chap, x.) —

” Out of Bristowe, and costes many one, Men haue practised by nedle and by stone Thider wardes within a litle while.”

Hakluyt, Principal Navigations, p. 201 (London, 1599).

From this it would seem that the compasses used at that time by English mariners were of a very primitive description. Barlowe, in his treatise Magnetical Advertisements, printed in 1616 (p. 66), complains that ” the Compasse needle, being the most admirable and usefull instrument of the whole world, is both amongst ours and other nations for the most part, so bungerly and absurdly contrived, as nothing more.” The form he recommends for the needle is that of ” a true circle, having his Axis going out beyond the circle, at each end narrow and narrower, unto a reasonable sharpe point, and being pure Steele as the circle it selfe is, having in the middest a convenient receptacle to place the capitell in.” In 1750 Dr Gowan Knight found that the needles of merchant-ships were made of two pieces of steel bent in the middle and united in the shape of a rhombus, and proposed to substitute straight steel bars of small breadth, suspended edgewise and hardened throughout. He also showed that the Chinese mode of suspending the needle conduces most to sensibility. In 1820 Peter Barlow reported to the Admiralty that half the compasses in the British Navy Were mere lumber and ought to be destroyed. He

introduced a pattern having four or five parallel straight strips of magnetized steel fixed under a card, a form which remained the standard admiralty type until the introduction of the modern Thomson (Kelvin) compass in 1876. (F. H. B.; S. P.T.)

COMPASS PLANT, a native of the North American prairies, which takes its name from the position assumed by the leaves. These turn their edges to north and south, thus avoiding the excessive mid-day heat, while getting the full benefit of the morning and evening rays. The plant is known botanically as Silphiumlaciniatum, and belongs to the natural order Compositae. Another member of the same order, Lactuca Scariola, which has been regarded as the origin of the cultivated lettuce {L. sativa), behaves in the same way when growing in dry exposed places ; it is a native of Europe and northern Asia which has got introduced into North America.

COMPAYRE, JULES GABRIEL (1843-), French educa- tionalist, was born at Albi. He entered the Ecole Normale Superieure in 1862 and became professor of philosophy. In 1876 he was appointed professor in the Faculty of Letters of Toulouse, and upon the creation of the Ecole normale d'institu- trices at Fontenay aux Roses he became teacher of pedagogy (1880). From 1881 to 1889 he was deputy for Lavaur in the chamber, and took an active part in the discussions on public education. Defeated at the elections of 1889, he was appointed rector of the academy of Poitiers in 1890, and five years later to the academy of Lyons. His principal publications are his Histoire critique des doctrines de V Education en France (1879); Elements d'Hucation civique (1881), a work placed on the index at Rome, but very widely read in the primary schools of France; Cours.de pidagogie thiorique et pratique (1885, 13th ed., 1897); The Intellectual and Moral Development of the Child, in English (2 vols., New York, 1896-1902); and a series of monographs on Les Grands £ducateurs.

COMPENSATION (from Lat. compensare, to weigh one thing against another), a term applied in English law to a number of different forms of legal reparation; e.g. under the Forfeiture Act 1870 (s. 4), for loss of property caused by felony, or — under the Riot (Damages) Act 1886 — to persons whose property has been stolen, destroyed or injured by rioters (see Riot). It is due, under the Agricultural Holdings Acts 1883-1906, for agricultural improvements (see Landlord and Tenant; d. also Allot- ments and Small Holdings), and under the Workmen's Compensation Act 1906 to workmen, in respect of accidents in the course of their employment (see Employers' Liability); and under the Licensing Act 1904, to the payments to be made on the extinction of licences to sell intoxicants. The term

” Compensation water ” is used to describe the water given from a reservoir in compensation for water abstracted from a stream, under statutory powers, in connexion with public works (see Water Supply). As to the use of the word ” compensation ” in horology, see Clock; Watch.

Compensation, in its most familiar sense, is however a nomen juris for the reparation or satisfaction made to the owners of property which is taken by the state or by local authorities Or by the promoters of parliamentary undertakings, under statutory authority, for public purposes. There are two main legal theories on which such appropriation of private property is justified. The American may be taken as a representative illustration of the one, and the English of the other. Though not included in the definition of ” eminent domain,” the necessity for compensa- tion is recognized as incidental to that power. (See Eminent Domain, under which the American law of compensation, and the closely allied doctrine of expropriation pour cause d’utilite publique of French law, and the law of other continental countries, are discussed.) The rule of English constitutional law, on the other hand, is that the property of the citizen cannot be seized for purposes which are really ” public ” without a fair pecuniary equivalent being given to him; and, as the money for such compensation must come from parliament, the practical result is that the seizure can only be effected under legislative authority. An action for illegal interference with the property of the subject is not maintainable against officials of the crown or government sued in their official capacity or as an official body. But crown officials may be sued in their individual capacity for such inter- ference, even if they acted with the authority of the government (cp. Raleigh v. Goschen [1898], 1 Ch. 73).

Law of England. — Down to 1845 every act authorizing the purchase of lands had, in addition to a number of common form clauses, a variety of special clauses framed with a view to meeting the particular circumstances with which it dealt. In 1845, however, a statute based on the recommendations of a select committee, appointed in the preceding year, was passed; the object being to diminish the bulk of the special acts, and to introduce uniformity into private bill legislation by classifying the common form clauses, embodying them in general statutes, and facilitating their incorporation into the special statutes by reference. The statute by which this change was initiated

was the Lands Clauses Consolidation Act 1845; and the policy has been continued by a series of later statutes which, together with the act of 1845, are now grouped under the generic title of the Lands Clauses Acts.

The public purposes for which lands are taken are threefold. Certain public departments, such as the war office and the admiralty, may acquire lands for national purposes (see the Defence Acts 1842 to 1873; and the Lands Clauses Consolida- tion Act i860, s. 7). Local authorities are enabled to exercise similar powers for an enormous variety of municipal purposes, e.g. the housing of the working classes, the improvement of towns, and elementary and secondary education. Lastly, the promoters of public undertakings of a commercial character, such as railways and harbours, carry on their operations under statutes in which the provisions of the Lands Clauses Acts are incorporated.

Lands may be taken under the Lands Clauses Acts either by agreement or compulsorily. The first step in the proceedings is a ” notice to treat,” or intimation by the promoters of their readiness to purchase the land, coupled with a demand for particulars as to the estate and the interests in it. The land- owner on whom the notice is served may meet it by agreeing to sell, and the terms may then be settled by consent of the parties themselves, or by arbitration, if they decide to have recourse to that mode of adjusting the difficulty. If the property claimed is a house, or other building or manufactory, the owner has a statutory right to require the promoters by a counternotice to take the whole, even although a part would serve their purpose. This rule, however, is, in modern acts, often modified by special clauses. On receipt of the counter-notice the promoters must either assent to the requirement contained in it, or abandon

their notice to treat. On the other hand, if the landowner fails within twenty-one days after receipt of the notice to treat to give the particulars which it requires, the promoters may proceed to exercise their compulsory powers and to obtain assessment of the compensation to be paid. As a general rule, it is a condi- tion precedent to the exercise of these powers by a company that the capital of the undertaking should be fully subscribed. Compensation, under the Lands Clauses Acts, is assessed in four different modes: — (1) by justices, where the claim does not exceed £50, or a claimant who has no greater interest than that of a tenant for a year, or from year to year, is required to give up possession before the expiration of his tenancy; (2) by arbitra- tion (a) when the claim exceeds £50, and the claimant desires arbitration, and the interest is not a yearly

tenancy, (b) when the amount has been ascertained by a surveyor, and the claimant is dissatisfied, (c) when superfluous lands are to be sold, and the parties entitled to pre-emption and the promoters cannot agree as to the price. (Lands become “superfluous” if taken compulsorily on an erroneous estimate of the area needed, or if part only was needed and the owner compelled the promoters under the power above mentioned to take the whole, or in cases of abandonment) ; (3) by a jury, when the claim exceeds £50, and (a) the claimant does not signify his desire for arbitration, or no award has been made within the prescribed time, or (b) the claimant applies in writing for trial by jury; (4) by surveyors, nominated by justices, where the owner is under disability, or does not appear at the appointed time, or the claim is in respect of commonable rights, and a committee has not been appointed to treat with the promoters.

Promoters are not allowed without the consent of the owner to enter upon lands which are the subject of proceedings under the Lands Clauses Acts, except for the purpose of making a survey, unless they have executed a statutory bond and made a deposit’, at the Law Courts Branch of the Bank of England, as security for the performance of the conditions of the bond.

Measure of Value. — (1) Where land is taken, the basis on which compensation is assessed is the commercial value of the land to the owner at the date of the notice to treat. Potential value may be taken into account, and also good-will of the property in a business. This rule, however, excludes any con- sideration of the principle of ” betterment.” (2) Where land, although not taken, is ” injuriously affected ” by the works of the promoters, compensation is payable for loss or damage resulting from any act, legalized by the promoters’ statutory powers, which would otherwise have been actionable, or caused by the execution (not the use) of the works authorized by the undertaking.

The following examples of how land may be “injuriously affected,” so as to give a right to compensation under the acts, may be given: — narrowing or obstructing a highway which is the nearest access to the lands in question; interference with a right of way; substantial inttnerence with ancient lights; noise of children outside a board school.

Scotland and Ireland. — The Lands Clauses Act 1845 extends to Ireland. There is a Scots enactment similar in character (Lands Clauses [Scotland] Act 1845). The principles and practice of the law of compensation are substantially the same throughout the United

Kingdom.

India and the British Colonies. — Legislation analogous to the Lands Clauses Acts is in force in India (Land Acquisition Act 1894 [Act 1 of 1894]) and in most of the colonies (see western Australia, Lands Resumption Act 1894 [58 Vict. No. 33], Victoria, Lands Compensation Act 1890 [54 Vict. No. 1109]; New Zealand, Public Works Act 1894 [58 Vict. No. 42]; Ontario [Revised Stats. 1897, c. 37]).

Authorities. — English Law: Balfour Browne and Allan, Compensation (2nd ed., London, 1903) ; Cripps, Compensation (5th edition, London, 1905); Hudson, Compensation (London, 1906); Boyle and Waghorn, Compensation (London, 1903) ; Lloyd, Com- pensation (6th ed. by Brooks, London, 1895); Clifford, Private Bill Legislation, London, 1885 (vol. i.), 1887 (vol. ii.) Scots Law: Deas, Law of Railways in Scotland (ed. by Ferguson; Edinburgh, 1897); Rankine, Law of Landowner ship (3rd ed., 1891). (A: W. R.)

COMPIEGNE, a town of northern France, capital of an arrond-

igsement in the department of Oise, 52 m. N.N.E. of Paris on the Northern railway between Paris and St Quentin. Pop. (1906) 14,052. The town, which is a favourite summer resort, stands on the north-west border of the forest of Compiegne and on the left bank of the Oise, less than 1 m. below its confluence with the Aisne. The river is crossed by a bridge built in the reign of Louis XV. The Rue Solferino, a continuation of the bridge ending at the Place de l'Hdtel de Ville, is the busy street of the town; elsewhere, except on market days, the streets are quiet. The hotel de ville, with a graceful facade surmounted by a lofty belfry, is in the late Gothic style of the early 16th century and was completed in modern times. Of the churches, St Antoine (13th and 16th centuries) with some fine Renaissance stained glass, and St Jacques (13th and 15th centuries), need alone be mentioned. The remains of the ancient abbey of St Corneille are used as a military storehouse. Compiegne, from a very early period until 1870, was the occasional residence of the French kings. Its palace, one of the most magnificent structures of its kind, was erected, chiefly by Louis XV. and Louis XVI., on the site of a chateau of King Charles V. of France. It now serves as an art museum. It has two facades, one overlooking the Place du Palais and the town, the other, more imposing, facing towards a fine park and the forest, which is chiefly of oak and beech

and covers over 36,000 acres. Compiegne is the seat of a subprefect, and has tribunals of first instance and of commerce, a communal college, library and hospital. The industries comprise boat- building, rope-making, steam-sawing, distilling and the manu- facture of chocolate, machinery and sacks and coarse coverings, and at Margny, a suburb, there are manufactures of chemicals and felt hats. Asparagus is cultivated in the environs. There is considerable trade in timber and coal, chiefly river-borne.

Compiegne, or as it is called in the Latin chronicles, Com- pendium, seems originally to have been a hunting-lodge of the early Frankish kings. It was enriched by Charles the Bald with two castles, and a Benedictine abbey dedicated to Saint Corneille, the monks of which retained down to the 18th century the privilege of acting for three days as lords of Compiegne, with full power to release prisoners, condemn the guilty, and even inflict sentence of death. It was in Compiegne that King Louis I. the Debonair was deposed in 833; and at the siege of the town in 1430 Joan of Arc was taken prisoner by the English. A monu- ment to her faces the hotel de ville. In 1624 the town gave its name to a treaty of alliance concluded by Richelieu with the Dutch; and it was in the palace that Louis XV. gave welcome to Marie Antoinette, that Napoleon I. received Marie Louise of Austria, that Louis XVIII. entertained the emperor Alexander of Russia, and that Leopold I., king of the Belgians, was married to the princess Louise. In 1814 Compiegne offered a stubborn resistance to the Prussian troops. Under Napoleon III. it was the annual resort of the court during the hunting season. From 1870 to 187 1 it was one of the headquarters of the German army.

COMPLEMENT (Lat. complementum, from complere, to fill up), that which fills up or completes anything, e.g. the number of men necessary to man a ship. In geometry, the complement of an angle is the difference between the angle and a right angle; the complements of a parallelogram are formed by drawing parallel to adjacent sides of a parallelogram two lines intersecting on a diagonal; four parallelograms are thus formed, and the two not about the diagonal of the original parallelogram are the complements of the parallelogram. In analysis, a complementary function is a partial solution to a differential equation iq.v.); complementary operators are reciprocal or inverse operators, i.e. two operations A and B are complementary when both operating on the same figure or function leave it unchanged. A ” complementary colour ” is one which produces white when mixed with another (see Colour). In Spanish the word cum- plimento was used in a particular sense of the fulfilment of the duties of polite behaviour and courtesy, and it came through the French and

Italian forms into use in English, with a change in spelling to ” compliment,” with the sense of an act of politeness, especially of a polite expression of praise, or of social regard and

greetings. The word ” comply,” meaning to act in accordance with wishes, orders or conditions, is also derived from the same origin, but in sense is connected with ” ply ” or ” pliant,” from Lat. plicare, to bend, with the idea of subserviently yielding to the wishes of another.

COMPLUVIUM (from Lat. compluere, to flow together, i.e. in reference to the rain being collected and falling through), in architecture, the Latin term for the open space left in the roof of the atrium of a Roman house for lighting it and the rooms round (see Cavaedium).

COMPOSITAE, the name given to the largest natural order of flowering plants, containing about one-tenth of the whole number and characterized by the crowding of the flowers into heads. The order is cosmopolitan, and the plants show considerable variety in habit. The great majority, including most British representatives, are herbaceous, but in the warmer parts of the world shrubs and arborescent forms also occur; the latter are characteristic of the flora of oceanic islands. In herbaceous plants the leaves are often arranged in a rosette on a much shortened stem, as in dandelion, daisy and others; when the stem is elongated the leaves are generally alternate. The root is generally thickened, sometimes, as in dahlia, tuberous; root and stem contain oil passages, or, as in lettuce and dandelion, a milky white latex. The flowers are crowded in heads (capitula) which are surrounded by an involucre of green bracts, — these

1. Flower head of Marigold

2. Same in vertical section.

Fig. 1.

3. Head of fruits, nat. size.

4. A single fruit.

protect the head of flowers in the bud stage, performing the usual function of a calyx. The enlarged top of the axis, the receptacle, is flat, convex or conical, and the flowers open in centripetal succession. ‘ In many cases, as in the sunflower or daisy, the outer or ray-florets are larger and more conspicuous than the inner, or disk-florets; in other cases, as in dandelion, the florets are all alike. Ray-florets when

present are usually pistillate, but neuter in some genera (as Centaurea) ; the disk-florets are herma- phrodite. The flower is epigynous; the calyx is sometimes absent, or is represented by a rim on the top of the ovary, or takes the form of hairs or bristles which enlarge in the fruiting stage to form the pappus by means of which the seed is dispersed. The corolla, of five united petals, is regular and tubular in shape as in the disk-florets, or irregular when it is either strap-shaped (ligulate), as in the ray-florets of daisy, &c, or all the florets of dandelion, or more rarely two-lipped. The five stamens are attached to the interior of the corolla-tube; the filaments are free ; the anthers are joined (syngenesious) to form a tube round the single style, which ends in a pair of stigmas. The inferior ovary contains one ovule (attached to the base of the chamber), and ripens to form a dry one-seeded fruit; the seed is filled with the straight embryo.

The flower-heads are an admirable example of an adaptation for pollination by aid of insects. The crowding of the flowers in heads ensures the pollination of a large number as the result of a single insect visit. Honey is secreted at the base of the style, and is protected from rain or dew and the visits of short- lipped insects by the corolla-tube, the length of which is

correlated with the length ol proboscis of the visiting insect. When the flower opens, the two stigmas are pressed together below the tube formed by the anthers, the latter split on the inside, and the pollen fills the tube; the style gradually lengthens and carries the pollen out of the anther tube, and finally the stigmas spread and expose their receptive surface which has hitherto been hidden, the two being pressed together. Thus the life history of the flower falls into two stages, an earlier or male and a later or female. This favours cross-pollination as compared with self-pollination. In many cases there is a third stage, as in dandelion, where the stigmas finally curl back so that they touch any pollen grains which have been left on the style, thus ensuring self-pollination if cross-pollination has not been effected.

The devices for distribution of the fruit are very varied. Frequently there is a hairy or silky pappus forming a tuft of hairs, as in thistle or coltsfoot, or a parachute-like structure as in dandelion; these render the fruit sufficiently light to be carried by the wind. In Bidens the pappus consists of two or more stiff-barbed bristles which cause the

fruit to cling to the coats of animals. Occasionally, as in sunflower or daisy, the fruits bear no special appendage and remain-on the head until jerked off.

Compositae are generally considered to represent the most highly developed order of flowering plants. By the massing of the flowers in heads great economy is effected in the material required for one flower, as conspicuousness is ensured by the association; economy of time on the part of the pollinating insect is also effected, as a large number of flowers are visited at one time. The floral mechanism is both simple and effective,

Fig. 2. — Flowering shoot of Cornflower. i. Disk-floret in vertical section.

favouring cross-pollination, but ensuring self-pollination should that fail. The means of seed-distribution are also very effective. A few members of the order are of economic value, e.g. Lactuca (lettuce; q.v.), Cichorium (chicory; q.v.), Cynara (artichoke and cardoon; q.v.), Helianthus (Jerusalem artichoke). Many are cultivated as garden or greenhouse plants, such as Solidago (golden rod), Ageratum, Aster (q.v.) (Michaelmas daisy), Heli- chrysum (everlasting), Zinnia, Rudbeckia, Helianthus (sun- flower), Coreopsis, Dahlia (q.v.), Tagetes (French and African

marigold), Gaillardia, Achillea (yarrow), Chrysanthemum, Pyrethrum (feverfew; now generally included under Chrysan- themum), Tanacelum (tansy), Arnica, Doronicum, Cineraria Calendula (common marigold) (fig. i), Echinops (globe thistle), Centaurea (cornflower) (fig. 2). Some are of medicinal value, such as Anthemis (chamomile), Artemisia (wormwood), Tussilago (coltsfoot), Arnica. Insect powder is prepared from species of Pyrethrum.

The order is divided into two suborders: — Tubuliflorae, characterized by absence of latex, and the florets of the disk

Fig. 3. — Groundsel (Senecio vulgaris).

1. Disk-floret. 3. Ray-floret.

2. Same cut vertically. 4. Fruit with pappus.

being not ligulate, and Liguliflorae, characterized by presence of latex and all the florets being ligulate. The first suborder contains the majority of the genera, and is divided into a number of tribes, characterized by the form of the anthers and styles, the presence or

absence of scales on the receptacle, and the similarity or otherwise of the florets of one and the same head. The order is well represented in Britain, in which forty-two genera are native. These include some of the commonest weeds, such as dandelion (Taraxacum Dens-leonis) , daisy (Bellis perennis) , groundsel (fig. 3) (Senecio vulgaris) and ragwort (S. Jacobaea); coltsfoot (Tussilago Farfara) is one of the earliest plants to flower, and other genera are Chrysanthemum (ox-eye daisy and corn-mari- gold), Arctium (burdock), Centaurea (knapweed and cornflower), Carduus and Cnicus (thistles), Hieracium (hawkweed), Sonchus (sow-thistle), Achillea (yarrow, or milfoil, and sneezewort), Eupatorium (hemp-agrimony), Gnaphalium (cudweed), Erigeron (fleabane), Solidago (golden-rod), Anthemis (may- weed and chamomile), Cichorium (chicory), Lapsana (nipplewort), Crepis (hawk's-beard), Hypochaeris (cat's-ear),and Tragopogon (goat's-beard). – , ,

COMPOSITE ORDER, in architecture, a compound of the Ionic and Corinthian orders (see Order), the chief characteristic of which is found in the capital (q.v.), where a double row of acanthus leaves, similar to those carved round the Corinthian capital, has been added under the Ionic volutes. The richer decoration of the Ionic capital had already been employed in those of the Erechtheum, where the necking was carved with the palmette or honeysuckle. Similar decorated Ionic capitals were found in the forum of Trajan. The earliest example of the Composite capital is found in the arch of Titus at Rome. The entablature was borrowed from that of the Corinthian order.

COMPOSITION (Lat. compositio, from componere, to put together), the action of putting together and combining, and the product of such action. There are many applications of the word. In philology it is used of the putting together of two distinct words to form a single word; and in grammar, of the combination of words into sentences, and sentences into periods, and then applied to the result of such combination, and to the art of producing a work in prose or verse, or to the work itself. In music " composition " is used both of the art of combining musical sounds in accordance with the rules of musical form, and, more generally, of the whole art of creation or invention. The name " composer " is thus particularly applied to the musical creator in general. In the other fine arts the word is

more strictly used of the balanced arrangement of the parts of a

picture, of a piece of sculpture or a building, so that they should form one harmonious whole. The word also means an agreement or an adjustment of differences between two or more parties, and is thus the best general term to describe the agree- ment, often called by the equivalent German word ” Ausgleich,” between Austria and Hungary in 1867. A more particular use is the legal one, for an agreement by which a creditor agrees to take from his debtor a sum less than his debt in satisfaction of the whole (see Bankruptcy). In logic ” composition ” is the name given to a fallacy of equivocation, where what is true distributively of each member of a class is inferred to be true of the whole class collectively. The fallacy of ” division ” is the converse of this, where what is true of a term used collectively is inferred to be true of its several parts. A common source of these errors in reasoning is the confusion between the collective and distributive meanings of the word ” all.” Composition, often shortened to ” compo,” is the name given to many materials compounded of more than one substance, and is used in various trades and manufactures, as in building, for a mixture, such as stucco, cement and plaster, for covering walls, &c, often made to represent stone or marble; a similar moulded compound is employed to represent carved wood.

COMPOUND (from Lat. componere, to combine or put together), a combination of various elements, substances or ingredients, so as to form one composite whole. A ” chemical compound ” is a substance which can be resolved into simple constituents, as opposed to an element which cannot be so resolved (see Chemistry); a word is said to be a ” compound ” when it is made up of different words or parts of different words. The term is also used in an adjectival form with many applications; a ” compound engine ” is one where the expansion of the steam is effected in two or more stages (see Steam-engine) ; in zoology, the ” compound eye ” possessed by insects and Crustacea is one which is made up of several ocelli or simple’ eyes, set together so that the whole has the appearance of being faceted (see Eye); in botany, the ” compound leaf ” has two or more separate blades on a common leaf stalk; in surgery, in a ” compound fracture ” the skin is broken as well as the bone, and there is a communication between the two. There are many mathematical and arithmetical uses of the term, particularly of those forms of addition, multiplication, division and subtraction which deal with quantities of more than one denomination. Compound interest is interest paid upon interest, the accumulation of interest forming, as it were, a secondary principal. The verb ” to com pound ” is used of the arrangement or settlement of differences, and especially of an agreement made to accept or to pay

part of a debt in full discharge of the whole, and thus of the arrangement made by an insolvent debtor with his creditors (see Bankruptcy); similarly of the substitution of one payment for annual or other periodic payments,— thus subscriptions, university or other dues, &c, may be ” compounded “; a particular instance of this is the system of “compounding” for rates, where the occupier of premises pays an increased rent, and the owner makes himself responsible for the payment of the rates. The householder who thus compounds with the owner of the premises he occupies is known as a ” compound householder.” The payment of poor rate forming part of the qualification necessary for the parliamentary franchise in the United Kingdom, various statutes, leading up to the Compound Householders Act 1 85 1, have enabled such occupiers to claim to be placed on the rate. In law, to compound a felony is to agree with the felon not to prosecute him for his crime, in return for valuable con- sideration, or, in the case of a theft, on return of the goods stolen. Such an agreement is a misdemeanour and is punishable with fine and imprisonment.

The name ” compounders ” was given during the reign of William III. of England to the members of a Jacobite faction, who were prepared to restore James II. to the throne, on the condition of an amnesty and an undertaking to preserve the constitution. Until 1853, in the university of Oxford, those possessing private incomes of a certain amount paid special

dues for their degrees, and were known as Grand and Petty Compounders.

The corruption ” compound ” (from the Malay kampung or kampong, a quarter of a village) is the name applied to the en- closed ground, whether garden or waste, which surrounds an Anglo-Indian house. In India the European quarter, as a rule, is separate from the native quarter, and consists of a number of single houses, each standing in a compound, sometimes many acres in extent.

COMPOUND PIER, the architectural term given to a clustered column or pier which consists of a centre mass or newel, to which engaged or semi-detached shafts have been attached, in order to perform, or to suggest the performance of, certain definite structural objects, such as to carry arches of additional orders, or to support the transverse or diagonal ribs of a vault, or the tie- beam of an important roof. In these cases, though performing different functions, the drums of the pier are often cut out of one stone. There are, however, cases where the shafts are detached from the pier and coupled to it by armulets at regular heights, as in the Early English period.

COMPRADOR (a Portuguese word used in the East, derived from the Lat. comparare, to procure), originally a native servant in European households in the East, but now the name given to the native managers in European business houses in China, and also to native contractors supplying ships in the Philippines and elsewhere in the East.

COMPRESSION, in astronomy, the deviation of a heavenly body from the spherical form, called also the ” ellipticity.” It is numerically expressed by the ratio of the differences of the axes to the major axis of the spheroid. The compression or ” flattening ” of the earth is about 1/298, which means that the ratio of the equatorial to the polar axis is 298:297 (see Earth, Figure of the). In engineering the term is applied to the arrangement by which the exhaust valve of a steam-engine is made to close, shutting a portion of the exhaust steam in the cylinder, before the stroke of the piston is quite complete. This steam being compressed as the stroke is completed, a cushion is formed against which the piston does work while its velocity is being rapidly reduced, and thus the stresses in the mechanism due to the inertia of the reciprocating parts are lessened. This compression, moreover, obviates the shock which would otherwise be caused by the admission of the fresh steam for the return stroke. In internal combustion engines it is a necessary condition of economy to compress the explosive mixture before it is ignited: in the Otto cycle, for instance, the second stroke of the piston effects the compression of the charge which has been drawn into the cylinder by the first forward stroke.

COMPROMISE (pronounced comprdmize; through Fr. from Lat. compromittere) , a term, meaning strictly a joint agreement, which has come to signify such a settlement as involves a mutual adjustment, with a surrender of part of each party’s claim. From the element of danger involved has arisen an invidious sense of the word, imputing discredit, so that being ” com- promised ” commonly means injured in reputation.

COMPROMISE MEASURES OF 1850, in American history, a series of measures the object of which was the settlement of five questions in dispute between the pro-slavery and anti-slavery factions in the United States. Three of these questions grew out of the annexation of Texas and the acquisition of western territory as a result of the Mexican War. The settlers who had flocked to California after the discovery of gold in 1848 adopted an anti- slavery state constitution on the 13th of October 1849, and applied for admission into the Union. In the second place it was necessary to form a territorial government for the remainder of the territory acquired from Mexico,

including that now occupied by Nevada and Utah, and parts of Wyoming, Colorado, Arizona and New Mexico. The fundamental issue was in regard to the admission of slavery into, or the exclusion of slavery from, this region. Thirdly, there was a dispute over the western boundary of Texas. Should the Rio Grande be the line of division north of Mexico, or should an arbitrary boundary be established farther to the eastward; in other words, should a considerable part of

the new territory be certainly opened to slavery as a part of Texas, or possibly closed to it as a part of the organized territorial section? Underlying all of these issues was of course the great moral and political problem as to whether slavery was to be confined to the south-eastern section of the country or be per- mitted to spread to the Pacific. The two questions not growing out of the Mexican War were in regard to the abolition of the slave trade in the District of Columbia, and the passage of a new fugitive slave law.

Congress met on the 3rd of December 1849. Neither faction was strong enough in both houses to carry out its own programme, and it seemed for' a time that nothing would be done. On the 29th of January 1 850 Henry Clay presented the famous resolution which constituted the basis of the ultimate compromise. His idea was to combine the more conservative elements of both sections in favour of a settlement which would concede the Southern view on two questions, the Northern view on two, and balance the fifth. Daniel Webster supported the plan in his great speech of the 7th of March, although in doing so he alienated many of his former admirers. Opposed to the conservatives were the extremists of the North, led by William H. Seward and Salmon P. Chase, and those of the South, led by Jefferson Davis. Most of the measures were rejected and the whole plan seemed likely to fail, when the situation was changed by the death of President Taylor and the accession of Millard Fillmore on the 9th of July 1850. The influence of the administration was now thrown in favour of the compromise. Under a tacit understand- ing of the moderates to vote together, five separate bills were passed, and were signed < by the president between 9th and 20th September 1850. California was admitted as a free state, and the slave trade was abolished in the District of Columbia; these were concessions to the North. New Mexico (then including the present Arizona) and Utah were organized without any prohibi- tion of slavery (each being left

free to decide for or against, on admission to statehood), and a rigid fugitive slave law was enacted; these were concessions to the South. Texas (q.v.) was compelled to give up much of the western land to which it had a good claim, and received in return $10,000,000.

This legislation had several important results. It helped to postpone secession and Civil War for a decade, during which time the North-West was growing more wealthy and more populous, and was being brought into closer relations with the North-East. It divided the Whigs into ” Cotton Whigs ” and ” Conscience Whigs,” and in time led to the downfall of the party. In the third place, the rejection of the Wilmot Proviso and the accept- ance (as regards New Mexico and Utah) of ” Squatter Sove- reignty ” meant the adoption of a new principle in dealing with slavery in the territories, which, although it did not apply to the same territory, was antagonistic to the Missouri Compromise of 1820. The sequel was the repeal of the Missouri Compromise in the Kansas-Nebraska Bill of 1854. Fourthly, the enforcement of the fugitive slave law aroused a feeling of bitterness in the North which helped eventually to bring on the war, and helped to make it, when it came, quite as much an anti-slavery crusade as a struggle for the preservation of the Union. Finally, although Clay for his support of the compromises and Seward and Chase for their opposition have gained in reputation, Webster has been selected as the special target for hostile criticism. The Com- promise Measures are sometimes spoken of collectively as the Omnibus Bill, owing to their having been grouped originally — when first reported (May 8) to the Senate — into one bill.

The best account of the above Compromises is to be found in J. F. Rhodes, History of the United States from the Compromise of 1850, vol. i. (New York, 1896). (W. R. S.*)

COMPSA (mod. Conza), an ancient city of the Hirpini, near the sources of the Aufidus, on the boundary of Lucania and not far from that of Apulia, on a ridge 1998 ft. above sea-level. It was betrayed to Hannibal in 216 B.C. after the defeat of Cannae, but recaptured two years later. It was probably occupied by Sulla in 89 B.C., and was the scene of the death of T. Annius Milo in 48 B.C. Most authorities (cf. Hiilsen hv Pauly-Wissowa, Realencyclopadie, Stuttgart, 1901, iv. 797) refer Caes. Bell.

civ. iii. 22, and Plin. Hist. Nat. ii. 147, to this place, supposing the MSS. to be corrupt. The usual identification of the site of Milo’s death with Cassano on the Gulf of Taranto must therefore be rejected. In imperial times, as inscriptions show, it was a municipium, but it lay

far from any of the main high-roads. There are no important ancient remains.

COMPTON, HENRY (1632-1713), English divine, was the sixth and youngest son of the second earl of Northampton. He was educated at Queen's College, Oxford, and then travelled in Europe. After the restoration of Charles II. he became cornet in a regiment of horse, but soon quitted the army for the church. After a further period of study at Cambridge and again at Oxford, he held various livings. He was made bishop of Oxford in 1674, and in the following year was translated to the see of London. He was also appointed a member of the Privy Council, and entrusted with the education of the two princesses — Mary and, Anne. He showed a liberality most unusual at the time to Protestant dissenters, whom he wished to reunite with the established church. He held several conferences on the subject with the clergy of his diocese; and in the hope of influencing candid minds by means of the opinions of unbiassed foreigners, he obtained letters treating of the question (since printed at the end of Stillingfleet's Unreasonableness of Separation) from Le Moyne; professor of divinity at Leiden, and the famous French Protestant divine, Jean Claude. But to Roman Catholicism he was strongly opposed. On the accession of James II. he conse- quently lost his seat in the council and his deanery in the Chapel Royal; and for his firmness in refusing to suspend John Sharp, rector of St Giles's-in-the-Fields, whose anti-papal writings had rendered him obnoxious to the king, he was himself suspended. At the Revolution Compton embraced the cause of William and Mary; he performed the ceremony of their coronation; his old position was restored to him; and among other appointments, he was chosen as one of the commissioners for revising the liturgy. During the reign of Anne he remained a member of the privy council, and was one of the commissioners appointed to arrange the terms of the union of England and Scotland; but, to his bitter disappointment, his claims to the primacy were twice passed over. He died at Fulham on the 7th of July 1713. He had conspicuous defects both in spirit and intellect, but was benevolent and philanthropic. He was a successful botanist. He published, besides several theological works, A Translation from the Italian of the Life of Donna Olympia Maladichini, who governed the Church during the time of Pope Innocent X., which was from the year 1644 to 165s (1667), and A Translation from the French of the Jesuits' Intrigues (1669).

COMPTROLLER, the title of an official whose business primarily was to examine and take charge of accounts, hence to direct or control, e.g. the English comptroller of the household, comptroller and auditor-general (head of the exchequer and audit department),

comptroller-general of patents, &c, comptroller- general (head of the national debt office). On the other hand, the word is frequently spelt controller, as in controller of the navy, controller or head of the stationery office. The word is used in the same sense in the United States, as comptroller of the treasury, an official who examines accounts and signs drafts, and comptroller of the currency, who administers the law relating to the national banks.

COMPURGATION (from Lat. compurgare, to purify com- pletely), a mode of procedure formerly employed in ecclesiastical courts, and derived from the canon law (compurgatio canonica) , by which a clerk who was accused of crime was required to make answers on the oath of himself and a certain number of other clerks (compurgators) who would swear to his character or innocence. The term is more especially applied to a somewhat similar procedure, the old Teutonic or Anglo-Saxon mode of trial by oath-taking or oath-helping (see Jury) .

COMTE, AU6USTE [ISIDORE AU6USTE MARIE FRANCOIS XAVIER] (1798-1857), French Positive philosopher, was born on the 19th of January 1798 at Montpellier, where his father was a receiver-general of taxes for the district. He was sent for his earliest instruction to the school of the town, and in 1814

was admitted to the Ecole Polytechnique. His youth was marked by a constant willingness to rebel against merely official authority; to genuine excellence, whether moral or intellectual, he was always ready to pay unbounded deference. That stren- uous application which was one of his most remarkable gifts in manhood showed itself in his youth, and his application was backed or inspired by superior intelligence and aptness. After he had been two years at the Ecole Polytechnique he took a foremost part in a mutinous demonstration against one of the masters; the school was broken up, and Comte like the other scholars was sent home. To the great dissatisfaction of his parents, he resolved to return to Paris (1816), and to earn his living there by giving lessons in mathematics. Benjamin Franklin was the youth's idol at this moment. " I seek to imitate the modern Socrates," he wrote to a school friend, " not in talents, but in way of living. You know that at five-and-twenty he formed the design of becoming perfectly wise and that he fulfilled his design. I have dared to undertake the same thing, though I am not yet twenty." Though

Comte's character and aims were as far removed as possible from Franklin's type, neither Franklin nor any man that ever lived could surpass him in the heroic tenacity with which, in the face of a thousand obstacles, he pursued his own ideal of a vocation.

For a moment circumstances led him to think of seeking a career in America, but a friend who preceded him thither warned him of the purely practical spirit that prevailed in the new country. " If Lagrange were to come to the United States, he could only earn his livelihood by turning land surveyor." So Comte remained in Paris, living as he best could on something less than £80 a year, and hoping, when he took the trouble to break his meditations upon greater things by hopes about himself, that he might by and by obtain an appointment as mathematical master in a school. A friend procured him a situation as tutor in the house of Casimir Perier. The salary was good, but the duties were too miscellaneous, and what was still worse, there was an end of the delicious liberty of the garret. After a short experience of three weeks Comte returned to neediness and contentment. He was not altogether without the young man's appetite for pleasure; yet when he was only nineteen we find him wondering, amid the gaieties of the carnival of 181 7, how a gavotte or a minuet could make people forget that thirty thousand human beings around them had barely a morsel to eat. >

Towards 1818 Comte became associated as friend and disciple with Saint-Simon, who was destined to exercise a very decisive influence upon the turn of his speculation. In after years he so far forgot himself as to write of Saint-Simon as a depraved quack, and to deplore his connexion with him as purely mischievous. While the connexion lasted he thought very differently. Saint- Simon is described as the most estimable and lovable of men, and the most delightful in his relations; he is the worthiest of philosophers. Even at the very moment when Comte was con- gratulating himself on having thrown off the yoke, he honestly admits that Saint-Simon's influence has been of powerful service in his philosophic education. " I certainly," he writes to his most intimate friend, " am under great personal obligations to Saint- Simon; that is to say, he helped in a powerful degree to launch me in the philosophical direction that I have now definitely marked out for myself, and that I shall follow without looking back for the rest of my life." Even if there were no such un- mistakable expressions as these, the most cursory glance into Saint-Simon's writings is enough to reveal the thread of connexion between the ingenious visionary and the systematic thinker. We see the debt, and we also see that when it is stated at the highest possible, nothing has really been taken either from Comte's claims as a powerful

original thinker, or from his im- measurable pre-eminence over Saint-Simon in intellectual grasp and vigour and coherence. As high a degree of originality may be shown in transformation as in invention, as Moliere and Shakespeare have proved in the region of dramatic art. In philosophy the conditions are not different. // faut prendre son bien oil on le trouve.

It is no detriment to Comte's fame that some of the ideas

which he recombined and incorporated in a great philosophic structure had their origin in ideas that were produced almost at random in the incessant fermentation of Saint-Simon's brain. Comte is in no true sense a follower of Saint-Simon, but it was undoubtedly Saint-Simon who launched him, to take Comte's own word, by suggesting the two starting-points of what grew into the Comtist system — first, that political phenomena are as capable of being grouped under laws as other phenomena; and second, that the true destination of philosophy must be social, and the true object of the thinker must be the reorganization of the moral, religious and political systems. We can readily see what an impulse these far-reaching conceptions would give to Comte's meditations. There were conceptions of less importance than these, in which it is impossible not to feel that it was Saint-Simon's wrong or imperfect idea that put his young admirer on the track to a right and perfected idea. The subject is not worthy i of further discussion. That Comte would have performed some great intellectual achievement, if Saint-Simon had never been born, is certain. It is hardly less certain that the great achieve- ment which he did actually perform was originally set in motion by Saint-Simon's conversation, though it was afterwards directly filiated with the fertile speculations of A. R. J. Turgot and Condorcet. Comte thought almost as meanly of Plato as he did of Saint-Simon, and he considered Aristotle the prince of all true thinkers; yet their vital difference about Ideas did not prevent Aristotle from calling Plato master.

After six years the differences between the old and the young philosopher grew too marked for friendship. Comte began to fret under Saint-Simon's pretensions to be his director. Saint- Simon, on the other hand, perhaps began to fell uncomfortably conscious of the superiority of his disciple. The occasion of the breach between them (1824) was an attempt on Saint-Simon's part to print a production of Comte's as if it wereinsome sort connected with Saint-Simon's schemes of social reorganization. Not only was the breach not repaired, but long afterwards Comte, as we have said, with painful ungraciousness took to calling the encourager of his youth by very hard names.

In 1825 Comte married a Mdlle Caroline Massin. His marriage was one of those of which ” magnanimity owes no account to , prudence,” and it did not turn out prosperously. His family were strongly Catholic and royalist, and “”"”&• they were outraged by his refusal to have the marriage performed other than civilly. They consented, however, to receive his wife, and the pair went on a visit to Montpellier. Madame Comte conceived a dislike to the circle she found there, and this was the too early beginning of disputes which lasted for the remainder of their union. In the year of his marriage we find Comte writing to the most intimate of his correspondents:—” I have nothing left but to concentrate my whole moral existence in my intellectual work, a precious but inadequate compensation; and so I must give up, if not the most dazzling, still the sweetest part of my happiness.” He tried to find pupils to board with him, but only one pupil came, and he was soon sent away for lack of companions. ” I would rather spend an evening,” wrote the needy enthusiast, ” in solving a difficult question, than in running after some empty-headed and consequential millionaire in search of a pupil.” A little money was earned by an occasional article in Le Producteur, in which he began to expound the philosophic ideas that were now maturing in his mind. He announced a course of lectures (1826), which it was hoped would bring money as well as fame, and which were to be the first dogmatic exposition of the Positive Philosophy. A friend had said to him, ” You talk too freely, your ideas are getting abroad, and other people use them without giving you the credit; put your ownership on record.” The lectures attracted hearers so eminent as Humboldt the cosmologist, Poinsot the geometer and Blainville the physiologist.

Unhappily, after the third lecture of the course, Comte had a severe attack of cerebral derangement, brought on by intense and prolonged meditation, acting on a system that was already irritated by the chagrin of domestic discomfort. He did not recover his health for more than a year, and as soon as

convalescence set in he was seized by so profound a melancholy at the disaster which had thus overtaken him, that he threw himself

into the Seine. Fortunately he was rescued, and the iu”ess shock did not stay his return to mental soundness.

One incident of this painful episode is worth mention- ing. Lamennais,

then in the height of his Catholic exaltation, persuaded Comte's mother to insist on her son being married with the religious ceremony, and as the younger Madame Comte apparently did not resist, the rite was duly performed, in spite of the fact that Comte was at the time raving mad. Philosophic assailants of Comtism have not always resisted the temptation to recall the circumstance that its founder was once out of his mind. As has been justly said, if Newton once suffered a cerebral attack without forfeiting our veneration for the Principia, Comte may have suffered in the same way, and still not have forfeited our respect for Positive Philosophy and Positive Polity.

In 1828 the lectures were renewed, and in 1830 was published the first volume of the Course of Positive Philosophy. The

sketch and ground plan of this great undertaking had worit? appeared in 1826. The sixth and last volume was

published in 1842. The twelve years covering the publication of the first of Comte's two elaborate works were years of indefatigable toil, and they were the only portion of his life in which he enjoyed a certain measure, and that a very modest measure, of material prosperity. In 1833 he was ap- pointed examiner of the boys who in the various provincial schools aspired to enter the Ecole Polytechnique at Paris. This and two other engagements as a teacher of mathematics secured him an income of some £400 a year. He made M. Guizot, then Louis Philippe's minister, the important proposal to establish a chair of general history of the sciences. If there are four chairs, he argued, devoted to the history of philosophy, that is to 6ay, the minute study of all sorts of dreams and aberrations through the ages, surely there ought to be at least one to explain the formation and progress of our real knowledge? This wise 6uggestion, still unfulfilled, was at first welcomed, according to Comte's own account, by Guizot's philosophic instinct, and then repulsed by his " metaphysical rancour."

Meanwhile Comte did his official work conscientiously, sorely as he grudged the time which it took from the execution of the great object of his thoughts. " I hardly know if even to you," he writes to his wife, " I dare disclose the sweet and softened feeling that comes over me when I find a young man whose examination is thoroughly satisfactory. Yes, though you may smile, the emotion would easily stir me to tears if I were not carefully on my guard." Such sympathy with youthful hope, in union with industry and intelligence, shows that Comte's dry and austere manner veiled the fires of a generous social emotion. It was this which made him add to his labours the burden of delivering every year from 1831 to 1848 a course of gratuitous

lectures on astronomy for a popular audience. The social feeling that inspired this disinterested act showed itself in other ways. He suffered imprisonment rather than serve in the national guard; his position was that though he would not take arms against the new monarchy of July, yet being a re- publican he would take no oath to defend it. The only amuse- ment that Comte permitted himself was a visit to the opera. In his youth he had been a playgoer, but he shortly came to the conclusion that tragedy is a stilted and bombastic art, and after a time comedy interested him no more than tragedy. For the opera he had a genuine passion, which he gratified as often as he could, until his means became too narrow to afford even that single relaxation.

Of his manner and personal appearance we have the following account from one who was his pupil : — ” Daily as the clock struck eight on the horologe of the Luxembourg, while the ringing hammer on the bell was yet audible, the door of my room opened, and there entered a man, short, rather stout, almost what one might call sleek, freshly shaven, without vestige of whisker or moustache. He was invariably dressed in a suit of the most spotless black, as if going to a dinner party;

Philo- sophy. ”

his white neck-cloth was fresh from the laundress’s hands, and his hat shining like a racer’s coat. He advanced to the arm-chair prepared for him in the centre of the writing-table, laid his hat on the left-hand corner; his snuff-box was deposited on the same side beside the quire of paper placed in readiness for his use, and dipping the pen twice into the ink-bottle, then bringing it to within an inch of his nose to make sure it was properly filled, he broke silence: ‘ We have said that the chord AB,’ &c. For three-quarters of an hour he continued his demonstration, making short notes as he went on, to guide the listener in repeat- ing the problem alone; then, taking up another cahier which lay beside him, he went over the written repetition of the former lesson. He explained, corrected or commented till the clock struck nine; then, with the little finger of the right hand brushing from his coat and waistcoat the shower of superfluous snuff which had fallen on them, he pocketed his snuff-box, and resum- ing his hat, he as silently as when he came in made his exit by the door which I rushed to open for him.”

In 1842, as we have said, the last volume of the Positive Philosophy was given to the public. Instead of that content- ment which we like to picture as the reward of twelve comoie- years of meritorious toil devoted to the erection of a tion of high philosophic edifice, Comte

found himself in the ” Positive midst of a very sea of small troubles, of that uncom- pensated kind that harass without elevating, and waste a man’s spirit without softening or enlarging it. First, the jar of temperament between Comte and his wife had become so unbearable that they separated (1842). We know too little of the facts to allot blame to either of them. In spite of one or two disadvantageous facts in her career, Madame Comte seems to have uniformly comported herself towards her husband with an honourable solicitude for his well-being. Comte made her an annual allowance, and for some years after the separation they corresponded on friendly terms. Next in the list of the vexations was a lawsuit with his publisher. The publisher had inserted in the sixth volume a protest against a certain footnote, in which Comte had used some hard words about Arago. Comte threw himself into the suit with an energy worthy of Voltaire and won it. Third, and worst of all, he had prefixed a preface to the sixth volume, in which he went out of his way to rouse the enmity of the men on whom depended his annual re-election to the post of examiner for the Polytechnic school. The result was that he lost the appointment, and with it one-half of his very modest income. This was the occasion of an episode, which is of more than merely personal interest.

Before 1842 Comte had been in correspondence with J. S. Mill, who had been greatly impressed by Comte’s philosophic ideas ; Mill admits that his own System of Logic owes many valuable j_ s# mltt thoughts to Comte, and that, in the portion of that work which treats of the logic of the moral sciences, a radical improvement in the conceptions of logical method was derived from the Positive Philosophy. Their correspondence, which was full and copious, turned principally upon the two great questions of the equality between men and women, and of the expediency and constitution of a sacerdotal or spiritual order. When Comte found himself straitened, he confided the entire circumstances to Mill. As might be supposed by those who know the affec- tionate anxiety with which Mill regarded the welfare of any one whom he believed to be doing good work in the world, he at once took pains to have Comte’s loss of income made up to him, until Comte should have had time to repair that loss by his own en- deavour. Mill persuaded Grote, Molesworth, and Raikes Currie to advance the sum of £240. At the end of the year (1845) Comte had taken no steps to enable himself to dispense with the aid of the three Englishmen. Mill applied to them again, but with the exception of Grote, who sent a small sum, they gave Comte to understand that they expected him to earn his own living. Mill had suggested to Comte that he should write articles for the English periodicals, and expressed his own willingness to translate any such articles from the French, Comte

at first fell in with the plan, but he speedily surprised and disconcerted Mill by boldly taking up the position of ” high moraJ

com™

817

magistrate,” and accusing the three defaulting contributors of a scandalous falling away from righteousness and a high mind. Mill was chilled by these pretensions; and the correspondence came to an end. There is something to be said for both sides. Comte, regarding himself as the promoter of a great scheme for the benefit of humanity, might reasonably look for the support of his friends in the fulfilment of his designs. But Mill and the others were fully justified in not aiding the propagation of a doctrine in which they might not wholly concur. Comte’s sub- sequent attitude of censorious condemnation put him entirely in the wrong.

From 1845 to ˆ48 Comte lived as best he could, as well as made his wife her allowance, on an income of £200 a year. His little account books of income and outlay, with every item entered down to a few hours before his death, are accurate and neat enough to have satisfied an ancient Roman householder. In 1848, through no fault of his own, his salary was reduced to £80. Littre and others, with Comte’s approval, published an appeal for subscriptions, and on the money thus contributed Comte subsisted for the remaining nine years of his life. By 1852 the subsidy produced as much as £200 a year. It is worth noticing that Mill was one of the subscribers, and that Littre continued his assistance after he had been driven from Comte’s society by his high pontifical airs. We are sorry not to be able to record any similar trait of magnanimity on Comte’s part. His character, admirable as it is for firmness, for intensity, for inexorable will, for iron devotion to what he thought the service of mankind, yet offers few of those softening qualities that make us love good men and pity bad ones.

It is best to think of him only as the intellectual worker, pursuing in uncomforted obscurity the laborious and absorbing task to which he had given up his whole life. His method. singularly conscientious fashion of elaborating his ideas made the mental strain more intense than even so exhausting a work as the abstract exposition of the principles of positive science need have been. He did not write down a word until he had first composed the whole matter in his mind. When he had thoroughly meditated every sentence,he sat down to write, and then, such was the grip of his memory, the exact order of his thoughts came back to him as if without an effort, and he wrote down precisely

what he had intended to write, without the aid of a note or a memorandum, and without check or pause. For example, he began and completed in about six weeks a chapter in the Positive Philosophy (vol. v. ch. 55) which would fill forty pages of this Encyclopaedia. When we reflect that the chapter is not narrative, but an abstract exposi- tion of the guiding principles of the movements of severaL cen- turies, with many threads of complex thought running along side by side all through the speculation, then the circumstances under which it was reduced to literary form are really astonishing. It is hardly possible, however, to share the admiration expressed by some of Comte's disciples for his style. We are not so unreasonable as to blame him for failing to make his pages picturesque or thrilling; we do not want sunsets and stars and roses and ecstasy; but there is a certain standard for the most serious and abstract subjects. When compared with such philosophic writing as Hume's, Diderot's, Berkeley's, then Comte's manner is heavy, laboured, monotonous, without relief and without light. There is now and then an energetic phrase, but as a whole the vocabulary is jejune; the sentences are overloaded ; the pitch is flat. A scrupulous insistence on making his meaning clear led to an iteration of certain adjectives and adverbs, whichat length deadened the effect beyond the endurance of all but the most resolute students. Only the interest of the matter prevents one from thinking of Rivarol's ill-natured remark upon Condorcet, that he wrote with opium on a page of lead. The general effect is impressive, not by any virtues of style, for we do not discern one, but by reason of the magnitude and importance of the undertaking, and the visible conscien- tiousness and the grasp with which it is executed. It is by sheer strength of thought, by the vigorous perspicacity with which he strikes the lines of cleavage of his subject, that he makes his

way into the mind of the reader; in the presence of gifts of this power we need not: quarrel with an ungainly style.

Comte pursued one practice which ought to be mentioned in connexion With his personal history, the practice of what he style hygiene ciribrale. After he had acquired what „

he considered to be a sufficient stock of material, and ^^raie. this happened before he had completed the Positive Philosophy, he abstained from reading newspapers, reviews, scientific transactions and everything else, except two or three poets (notably Dante) and the Imitatio Christi. It is true that his friends kept him informed of what was going on in the scientific world. Still this partial divorce of himself from the record of the social and scientific activity of his time, though it may save a thinker from the deplorable evils of dispersion,

moral and intellectual, accounts in no small measure for the exaggerated egoism, and the absence of all feeling for reality, which marked Comte's later days.

In 1845 Comte made the acquaintance of Madame Clotilde de Vaux, a lady whose husband had been sent to the galleys for life. Very little is known about her qualities. She wrote a little piece which Comte rated so pre- deVa'ux. posterously as to talk about George Sand in the same sentence; it is in truth a flimsy performance, though it contains one or two gracious thoughts. There is true beauty in the saying—"// is- unworthy of a noble nature to diffuse its pain." Madame de Vaux's letters speak well for her good sense and good feeling, and it would have been better for Comte's later work if she had survived to exert a wholesome restraint on his exaltation. Their friendship had only lasted a year when she died (1846), but the period was long enough to give her memory a supreme ascendancy in Comte's mind. Condillac, Joubert, Mill and other eminent men have shown what the intellectual ascendancy of a woman can be. Comte was as inconsolable after Madame de Vaux's. death as D'Alembert after the death of Mademoiselle L'Espinasse. Every Wednesday afternoon he made a reverential pilgrimage to her tomb, and three times every day he invoked her memory in words of passionate expansion. His disciples believe that in time the world will reverence Comte's sentiment about Clotilde de Vaux, as it reveres Dante's adoration of Beatrice — a parallel that Comte himself was the first to hit upon. Yet we cannot help feeling that it is a grotesque and unseemly anachronism to apply in grave prose, addressed to the whole world, those terms. of saint and angel which are touching and in their place amid the trouble and passion of the great mystic poet. What- ever other gifts Comte may have had — and he had many of the rarest kind, — poetic imagination was not among them, any more than poetic or emotional expression was among them. His was one of those natures whose faculty of deep feeling is unhappily doomed to be inarticulate, and to pass away without the magic power of transmitting itself.

Comte lost no time, after the completion of his Course of Positive Philosophy, in proceeding with the System of Positive Polity, for which the earlier work was designed to be a foundation. The first volume was published in fwity." 1851, and the fourth and last in 1854. In 1848, when the political air was charged with stimulating elements, he founded the Positive Society, with the expectation that it might grow into a reunion as powerful over the new revolution as the Jacobin Club had been in the revolution of 1789. The hope was not fulfilled, but a certain number of philosophic disciples gathered round Comte, and eventually formed them- selves, under the guidance of the

new ideas of the latter half of his life, into a kind of church, for whose use was drawn up the Positivist Calendar (1849), in which the names of those who had advanced civilization replaced the titles of the saints. Guten- berg and Shakespeare were among the patrons of the thirteen months in this calendar. In the years 1849, 1850 and 1851 Comte gave three courses of lectures at the Palais Royal. They were gratuitous and popular, and in them he boldly advanced the whole of his doctrine, as well as the direct and immediate pretensions ol himself and his system. The third course ended

in the following uncompromising terms— “In the name of the Past and of the Future, the servants of Humanity — both its philosophical and its practical servants— come forward to claim as their due the general direction of this world. Their object is to constitute at length a real Providence in all departments, — moral, intellectual and material. Consequently they exclude once for all from political supremacy all the different servants of God — Catholic, Protestant or Deist— as being at once behind- hand and a cause of disturbance.” A few weeks after this invitation, a very different person stepped forward to constitute himself a real Providence.

In 1852 Comte published the Catechism of Positivism. In the preface to it he took occasion to express his approval of Louis Napoleon’s coup d’etat of the 2nd of December, — ” a fortunate crisis which has set aside the parliamentary system and insti- tuted a dictatorial republic.” Whatever we may think of the political sagacity of such a judgment, it is due to Comte to say that he did not expect to see his dictatorial republic transformed into a dynastic empire, and, next, that he did expect from the Man of December freedom of the press and of public meeting. His later hero was the emperor Nicholas, “the only statesman in Christendom,” — as unlucky a judgment as that which placed Dr Francia in the Comtist Calendar.

In 1857 he was attacked by cancer, and died peaceably on the 5th of September of that year. The anniversary is celebrated Death. by ceremonial gatherings of his French and English followers, who then commemorate the name and the services of the founder of their religion. By his will he appointed thirteen executors who were to preserve his rooms at 10 rue Monsieur-le-Prince as the headquarters of the new religion of Humanity.

In proceeding to give an outline of Comte's system, we shall consider the Positive Polity as the more or less legitimate _ .', sequel of the Positive Philosophy, notwithstanding phiio- the deep gulf which so eminent a critic as J. S. Mill sophlc insisted upon fixing between the earlier and the later co " m work. There may be, as we think there is, the greatest

slsteacy. difference in their value, and the temper is not the same, nor the method. But the two are quite capable of being regarded, and for the purposes of an account of Comte's career ought to be regarded, as an integral whole. His letters when he was a young man of oneˆand-twenty, and before he had published a word, show how Strongly present the social motive was in his mind, and in what little account he should hold his scientific works, if he did not perpetually think of their utility for the species. " I feel," he wrote, " that such scientific reputation as I might acquire would give more value, more weight, more useful influence to my political sermons." In 1822 he published a Plan of the Scientific Works necessary to reorganize Society. In this he points out that modern society is passing writiax. through a great crisis, due to the conflict of two oppos- ing movements, — the first, a disorganizing movement owing to the break-up of old institutions and beliefs; the second, a movement towards a definite social state, in which all means of human prosperity will receive their most complete develop- ment and most direct application. How is this crisis to be dealt with? What are the undertakings necessary in order to pass successfully through it towards an organic state? The answer to this is that there are two series of works. The first is theoretic or spiritual, aiming at the development of a new principle of co-ordinating social relations, and the formation of the system of general ideas which are destined to guide society. The second work is practical or temporal; it settles the distribution of power, and the institutions that are most conformable to the spirit of the system which has previously been thought out in the course of the theoretic work. As the practical work depends on the conclusions of the theoretical, the latter must obviously come first in order of execution.

In 1826 this was pushed farther in a most remarkable piece called Considerations on the Spiritual Power — the main object of which is to demonstrate the necessity of instituting a spiritual power, distinct from the temporal power and independent of it.

In examining the conditions of a spiritual power proper for modern times, he indicates in so many terms the presence in his mind of a direct analogy between his proposed spiritual power and the functions of the Catholic clergy at the time of its greatest vigour and most

complete independence, — that is to say, from about the middle of the nth century until towards the end of the 13th. He refers to de Maistre's memorable book, Du Pape, as the most profound, accurate and methodical account of the old spiritual organization, and starts from that as the model to be adapted to the changed intellectual and social conditions of the modern time. In the Positive Philosophy, again (vol. v. p, 344), he distinctly says that Catholicism, reconstituted as a system on new intellectual foundations, would finally preside over the spiritual reorganization of modern society. Much else could he quoted to the same effect. If unity of career, then, means that Comte, from the beginning designed the institution of a spiritual power, and the systematic reorganization of life, it is difficult to deny him whatever credit that unity may be worth, and the credit is perhaps not particularly great. Even the readaptation of the Catholic system to a scientific doctrine was plainly in his mind thirty years before the final execu tion of the Positive Polity, though it is difficult to believe that he foresaw the religious mysticism in which the task was to land him. A great analysis Was to precede a great synthesis, but it was the synthesis on which Comte's vision was centred from the first. Let us first sketch the nature of the analysis. Society is to be reorganized on the base of knowledge. What is the sum and significance of knowledge? That is the question which Comte's first master-work professes to answer.

The Positive Philosophy opens with the statement of a certain law of which Comte was the discoverer, and which has always been treated both by disciples and dissidents as the key to his system. This is the Law of the Three States. *z£ r of the It is as follows. Each of our leading conceptions, states. each branch of our knowledge, passes successively through three different phases; there are three different ways in which the human mind explains phenomena, each way following the other in order. These three stages are the Theo- logical, the Metaphysical and the Positive. Knowledge, or a branchjof knowledge, is in the Theological state, when it supposes the phenomena under consideration to be due to immediate volition, either in the object or in some supernatural being. In the Metaphysical state, for volition is substituted abstract force residing in the object, yet existing independently of the object; the phenomena are viewed as if apart from the bodies manifesting them; and the properties of each substance have attributed to them an existence distinct from that substance. In the Positive state, inherent volition or external volition and inherent force or abstraction personified have both disappeared from men's minds, and the explanation of a phenomenon means a reference of it, by way of succession or resemblance, to some other

phenomenon,ˆ-means the establishment of a relation between the given fact and some more general fact. In the Theological and Metaphysical state men seek a cause or an essence; in the Positive they are content with a law. To borrow an illustration from an able English disciple of Comte : — ” Take the phenomenon of the sleep produced by opium. The Arabs are content to attribute it to the ‘ will of God.’ Moliere’s medical student accounts for it by a soporific principle contained in the opium. The modern physiologist knows that he cannot account for it at all. He can simply observe, analyse and experiment upon the phenomena attending the action of the drug, and classify it with other agents analogous in character.” — (Dr Bridges.)

The first and greatest aim of the Positive Philosophy is to advance the study of society into the third of the three stages,- — to remove social phenomena from the sphere of theological and metaphysical conceptions, and to introduce among them the same scientific observation of their laws which has given us physics, chemistry, physiology. Social physics will consist of the conditions and relations of the facts of society, and will have two departments, — one, statical, containing the laws of order; the other dynamical, containing the laws of progress. While

men’s minds were in the theological state, political events, for example, were explained by the will of the gods, and political authority based on divine right. In the metaphysical state of mind, then, to retain our instance, political authority was based on the sovereignty of the people, and social facts were explained by the figment of a falling away from a state of nature. When the positive method has been finally extended to society, as it has been to chemistry and physiology, these social facts will be resolved, as their ultimate analysis, into relations with one another, and instead of seeking causes in the old sense of the word, men will only examine the conditions Of social existence. When that stage has been reached, not merely the greater part, but the whole, of our knowledge will be impressed with one character, the character, namely, of positivity or scientificalness ; and all our conceptions in every part of knowledge will be thoroughly homogeneous. The gains of such a change are enormous. The new philosophical unity will now in its turn regenerate all the elements that went to its own formation. The mind will pursue knowledge without the wasteful jar and friction of conflicting methods and mutually hostile conceptions; educa- tion will be regenerated; and

society will reorganize itself on the only possible solid base— a homogeneous philosophy.

The Positive Philosophy has another object besides the demonstration of the necessity and propriety of a science of society. This object is to show the sciences as branches lassiflca- £ rom a S j n gi e trunk, — is to give to science the ensemble sciences. or spirit or generality hitherto confined to philosophy, and to give to philosophy the rigour and solidity of science. Comte's special object is. a study of social physics, a science that before his advent was still to be formed; his second object is a review of the methods and leading generalities of all the positive sciences already formed, so that we may know both what system of inquiry to follow in our new science, and also where the new science will stand in relation to other knowledge.

The first step in this direction is to arrange scientific method and positive knowledge in order, and this brings us to another cardinal element in the Comtist system, the classification of the sciences. In the front of the inquiry lies one main division, that, namely, between speculative and practical knowledge. With the latter we have no concern. Speculative or theoretic know- ledge is divided into abstract and concrete. The former is concerned with the laws that regulate phenomena in all conceiv- able cases : the latter is concerned with the application of these laws. Concrete science relates to objects or beings; abstract science to events. The former is particular or descriptive; the latter is general. Thus, physiology is an abstract science; but zoology is concrete. Chemistry is abstract; mineralogy is concrete. It is the method and knowledge of the abstract sciences that the Positive Philosophy has to reorganize in a great whole.

Comte's principle of classification is that the dependence and order of scientific study follows the dependence of thephenomeha. Thus, as has been said, it represents both the objective dependence of the phenomena and the subjective dependence of our means of knowing them. The more particular and complex phenomena depend upon the

simpler and more general. The latter are the more easy to study. Therefore science will begin with those attributes of objects which are most general, and pass on gradually to other attributes that are combined in greater complexity. Thus, too, each science rests on the truths of the sciences that precede it, while it adds to them the truths by which it is itself constituted. Comte's" series or hierarchy is arranged as follows:—

(1) Mathematics (that is, number, geometry, and mechanics),

(2) Astronomy, (3) Physics, (4) Chemistry, (5) Biology, (6) Sociology. Each of the members of this series is one degree more special than the member before it, and depends upon the facts of all the members preceding it, and cannot bo fully understood without them. It follows that the crowning science of the hierarchy, dealing with the phenomena of human society, will remain longest under the influence of theological dogmas and ab- stract figments, and will be the last to pass into the positive stage. You cannot discover the relations of the facts of human society

without reference to the conditions of animal life ; you cannot understand' the conditions of animal life without the laws of chemistry; and so with the rest.

This arrangement of the sciences, and the Law of the Three States, are together explanatory of the course of human thought ■ and knowledge. They are thus the double key of The double Comte's systematization of the philosophy of all the k eyo t sciences from mathematics to physiology, and his positive analysis of social evolution, which is the base of ph'l"- sociology. Each science contributes its philosophy. S °P"^' The co-ordination of all these partial philosophies produces the general Positive Philosophy. " Thousands had cultivated science, and with splendid success; not one had conceived the philosophy which the sciences when organized would naturally evolve. A few had seen the necessity of extending the scientific method to all inquiries, but no one had seen how this was to be effected. . . The Positive Philosophy is novel as a philosophy, not as a collection of truths never before suspected. Its novelty is the organization of existing elements. Its very principle implies the absorption of all that great thinkers had achieved; while incorporating their results it extended their methods. ; . . What tradition brought was the results; what Comte brought was the organization of these results . He always claimed to be the founder of the Positive Philosophy. That he had every right to such a title is demonstrable to all who dis tinguish between the positive sciences and the philosophy

which co-ordinated the truths and methods of these sciences into a doctrine." — G. H. Lewes.

Comte's 1 classification of the sciences has been subjected to a vigorous criticism by Herbert Spencer. Spencer's two chief points are these: — (1) He denies that the principle of Criticism the development of the sciences is the principle of on Comte's decreasing generality; he asserts that there are as ciassiHca- many examples of the advfent of a science being tlon ' determined by increasing generality as by increasing speciality. (2) He holds that any grouping of the sciences in a succession gives a radically wrong idea of their genesis and their inter- dependence; no true filiation exists; no science develops itself in isolation; no one is independent, either logically or historically. LittreV by far the most eminent of the scientific followers of Comte, concedes a certain force to Spencer's objections, and makes certain secondary modifications in the hierarchy in consequence, while still cherishing his faith in the Comtist theory of the sciences. J. S. Mill, while admitting the objections as good, if Comte's arrangement pretended to be the only one possible, still holds the arrangement as tenable for the purpose with which it was devised. G. H. Lewes asserts against Spencer that the arrangement in a series is necessary, on grounds similar to those which require that the various truths constituting a science should be systematically co-ordinated although in nature the phenomena are intermingled.

The first three volumes of the Positive Philosophy contain an exposition of the partial philosophies of the five sciences that precede sociology in the hierarchy. Their value has usually been placed very low by the special followers of the sciences concerned; they say that the knowledge is second-hand, is not coherent, and is too confidently taken for final. The Comtist replies that the task is philosophic and is not to be judged by the minute accuracies of science. In these three volumes Comte took the sciences roughly as he found them. His eminence as a man of science must be measured by his only original work in that department, — the construction, namely, of the new science of society. This work is accomplished in the last three volumes of the Positive Philosophy, and the second and third volumes of the Positive Polity. The Comtist maintains that even if these five volumes together fail in laying down correctly and finally the lines of the new science, still they are the first solution of a great problem hitherto unattempted. " Modern biology has got beyond Aristotle's conception; but in the construction of the biological science, not even the most unphilosophical biologist would fail to recognize the value of Aristotle's attempt. So for sociology. Subsequent sociologists may have conceivably to

remodel the whole science, yet not the less will they recognize the merit of the first work which has facilitated their labours."—Congreve.

We shall now briefly describe Comic's principal conceptions in sociology, his position in respect to which is held by himself, and by Socio- others, to raise him to the level of Descartes or Leibnitz. logical Of course the first step was to approach the phenomena coacep- f human character and social existence with the

oas ' expectation of finding them as reducible to general

laws as the other phenomena of the universe, and with the hope of exploring these laws by the same instruments of observation and verification as had done such triumphant work in the case of the latter. Comte separates the collective facts of society and history from the individual phenomena of biology; then he withdraws these collective facts from the region of external , volition, and places them in the region of law. The facts of history must be explained, not by providential interventions, but by referring them to conditions inherent in the successive stages of social existence. This conception makes a science of society possible. Method What is the method? It comprises, besides observa- tion and experiment (which is, in fact, only the observa- tion of abnormal social states) , a certain peculiarity of verification. We begin by deducing every well-known historical situation from the series of its antecedents. Thus we acquire a bodyof empirical generalizations as to social phenomena, and then we connect the generalizations with the positive theory of human nature. .. A sociological demonstration lies in the establishment of an accord- ance between the conclusions of historical analysis and the preparatory conceptions of biological theory; 'As Mill puts it : — "If a sociological theory, collected from historical evidence, contradicts the established general laws of human nature; if (to use M. Comte's instances) it implies, in the mass of mankind; any very decided natural bent, either in a good or in a bad direction; if it supposes that the reason, in- average human beings, pre- dominates over the desires, or the disinterested desires over the personal, — we may know that history has been misinterpreted, and that the theory is false. On the other hand, if laws of social phenomena, empirically generalized from history, can, when once suggested, be affiliated to the known laws of human nature; if the direction actually taken by the developments and

changes of human society, can be seen to be such as the properties of man and of his dwelling-place made antecedently probable, the empirical generalizations are raised into positive laws, and sociology becomes a science." The result of this method. is an exhibition of the events of human experience in co-ordinated series that manifest their own graduated connexion.

Next, as all investigation proceeds from that which is known best to that which is unknown or less well known, and as, in social states, it is the collective phenomenon that is more easy of access to the observer than its parts, therefore we must consider and pursue all the elements of a given social state together and in common. The social organization must be viewed and explored as a whole. There is a nexus between each leading group of social phenomena and other leading groups; if there is a change in one of them, that change is accompanied by a corresponding modification of all the rest. " Not only must political institutions and social manners, on the one hand, and manners and ideas, on the other, be always mutually connected; but further, this consolidated whole must be always connected by its nature with the corresponding state of the integral development of humanity, considered in all its aspects of intellectual, moral and physical activity."— Comte.

Is there any one element which communicates the decisive impulse to all the rest, — any predominating agency in the course of social evolution? The answer is that all the other import- parts of social existence are associated with, and aace of drawn along by, the contemporary condition of lateilec- intellectual development. The Reason is the superior "eiopment an ˆ preponderant element which settles the direction in which all the other faculties shall expand. "It is only through the more and more marked influence of the reason over the general conduct of man and of society, that the gradual

march of our race lias attained that regularity and persevering continuity which distinguish it so radically from the desultory and barren expansion of. even thehighest animal orders, which share, and with enhanced strength, the appetites, the passions, and even the primary sentiments of man." The history of intellectual development, therefore, is the key to social evolution, and the key to the history of intellectual development is the Law of the Three States.

Among other central thoughts in Comte's explanation of history are these:— The displacement of theological by positive conceptions has been accompanied by a gradual rise of an industrial regime ' out of the military regime; — the great permanent contribution of

Catholicism was the separation which it set up between the temporal and the spiritual powers ; — the progress of the race consists in the increasing preponderance of the distinctively human elements over the animal elements ; — the absolute tendency of ordinary social theories will be replaced by an unfailing adherence to the relative point of view, and from this it follows that the social state, regarded as a whole, has been as perfect in each period as the co-existing condition of humanity and its environment would allow.

The elaboration Of these ideas in relation to the history of the civilization of the most advanced portion of the human race occupies two of the Volumes of the Positive Philosophy, and has been accepted by very different schools as a masterpiece of rich, luminous, and far-reaching suggestion. Whatever additions it may receive, and whatever corrections it may require, this analysis of social evolution will continue to be regarded as one of the great achievements of human intellect.

The third volume of the Positive Polity treats of social dynamics, and takes us again over the ground of historic evolu- tion. It abounds with remarks of extraordinary social fertility and comprehensiveness; but it is often dynamics arbitrary; and its views of the past are strained into ‘« the coherence with the statical views of the preceding ˆ,f t lve volume. As it was composed in rather less than six months, and as the author honestly warns us that he has given all his, attention to a more profound co-ordination, instead of working out the special explanations more fully, as he had promised, we need not be surprised if the result is disappointing to those who had mastered the corresponding portion of the Positive Philosophy. Comte explains the difference between his two; works. In the first his “chief object was to discover and demonstrate the laws of progress, and to exhibit in one unbroken sequence the collective destinies of mankind, till then invariably regarded as a series of events wholly beyond the reach of ex- planation, and almost depending on arbitrary will. The present work, on the contrary, is addressed to those who are already sufficiently convinced of the certain existence of social laws, and desire only to have them reduced to a true and conclusive system.”

The main principles of the Comtian system are derived from the Positive Polity and from two other works, — the Positimst Catechism: a Summary Exposition of the Universal Religion, in Twelve Dialogues between a Woman and a p e s m V j si Priest of , Humanity; and, second, The Subjective system. Synthesis (1856) , which is the first and only volume of a workˆ upon mathematics announced at the end of the Positive Philosophy. The system for which the Positive

Philosophy is alleged to have been the scientific preparation contains a Polity and a Religion; a complete arrangement of life in all its aspects, giving a wider sphere to Intellect, Energy and Feeling than could be found in any of the previous organic types, — Greek, Roman or Catholic-feudal. Comte's immense superiority over such prae-Revolutionary Utopians as the Abbe Saint Pierre, no less than over the group of post-revolutionary Utopians, is especially visible in this firm grasp of the cardinal truth that the improve- ment of the social organism can only be effected by a moral development, and never by any changes in mere political mechanism, or any violences in the way of an artificial redistri- bution of wealth. A moral transformation must precede any real advance. The aim, both in public and private life, is to

secure to the utmost possible extent the victory of the social feeling over self-love, or Altruism over Egoism. 1 This is the key to the regeneration of social existence, as it is the key to that unity of individual life which makes all our energies converge freely and without wasteful friction towards a common end. What are the instruments for securing the preponderance of Altruism? Clearly they must work from the strongest element in human nature, and this element is Feeling or the Heart. Under the Catholic system the supremacy of Feeling was abused, and the Intellect was made its slave. Then followed a revolt of Intellect against Sentiment. The business of the new system will be to bring back the Intellect into a condition, not of slavery, but of willing ministry to the Feelings. The subordination never was, and never will be, effected except by means of a religion, and a

religion, to be final, must include a harmonious T h ' " e " synthesis of all our conceptions of the external order of humanity. ˆ e universe. The characteristic basis of a religion

is the existence of a Power without us, so superior to ourselves as to command the complete submission of our whole life. This basis is to be found in the Positive stage, in Humanity, past, present and to come, conceived as the Great Being.

" A deeper study of the great universal order reveals to us at length the ruling power within it of the true Great Being, whose destiny it is to bring that order continually to perfection by con- stantly

conforming to its laws, and which thus best represents to us that system as a whole. This undeniable Providence, the supreme dispenser of our destinies, becomes in the natural course the common centre of our affections, our thoughts, and our actions. Although this Great Being evidently exceeds the utmost strength of any, even of any collective, human force, its necessary constitution and its peculiar function endow it with the truest sympathy towards all its servants. The least amongst us can and ought constantly to aspire to maintain and even to improve this Being. This natural object of all our activity, both public and private, determines the true general character of the rest of our existence, whether in feeling or in thought ; which must be devoted to love, and to know, in order rightly to serve, our Providence, by a wise use of all the means which it furnishes to us. Reciprocally this continued service, whilst strengthening our true unity, renders us at once both happier and better."

The exaltation of Humanity into the throne occupied by the Supreme Being under monotheistic systems made all the rest of Comte's construction easy enough. Utility remains ˆTa t ' le test °* ever y institution, impulse, act; his fabric

religion. becomes substantially an arch of utilitarian proposi- tions, with an artificial Great Being inserted at the top to keep them in their place. The Comtist system is utilitarianism crowned by a fantastic decoration. Translated into the plainest English, the position is as follows: " Society can only be reˆ generated by the greater subordination of politics to morals, by the moralization of capital, by the renovation of the family, by a higher conception of marriage and so on. These ends can only be reached by a heartier development of the sympathetic instincts. The sympathetic instincts can only be developed by the Religion of Humanity." Looking at the problem in this way, even a moralist who does not expect theology to be the instrument of social revival, might still ask whether the sym- pathetic instincts will not necessarily be already developed to their highest point, before people will be persuaded to accept the religion, which is at the bottom hardly more than sympathy under a more imposing name. However that may be, the whole battle — into which we shall not enter — as to the legitimateness of Comtism as a religion turns upon this erection of Humanity into a Being. The various hypotheses, dogmas, proposals, as to the family, to capital, &c, are merely propositions measurable by considerations of utility and a balance of expediencies. Many of these proposals are of the highest interest, and many of them are actually available; but there does not seem to be one of them of an available kind, which could not equally well be approached from other sides, and even incorporated in some radically

antagonistic system. Adoption, for example, as a practice for improving the happiness of families and the welfare of society, is capable of being weighed, and can in truth only be weighed, by utilitarian considerations, and has been commended 1 For Comte's place in the history of ethical theory see Ethics.

by men to whom the Comtist religion is naught. The singularity of Comte's construction, and the test by which it must be tried, is the transfer of the worship and discipline of Catholicism to a system in which " the conception of God is superseded " by the abstract idea of Humanity, conceived as a kind of Personality.

And when all is said, the invention does not help us. We have still to settle what is for the good of Humanity, and we can only do that in the old-fashioned way. There is no guidance in the conception. No effective unity can follow from it, because you can only find out the right and wrong of a given course by summing up the advantages and disadvantages, and striking a balance, and there is nothing in the Religion of Humanity to force two men to find the balance onthesame side. TheComtists are no better off than other utilitarians in judging policy, events, conduct.

The particularities of the worship, its minute and truly ingenious re-adaptations of sacraments, prayers, reverent signs, down even to the invocation of a New Trinity, need not detain us. They are said, though it is not easy to r * e wor " believe, to have been elaborated by way of Utopia. ai£:Mlne. If so, no Utopia has ever yet been presented in a style so little calculated to stir the imagination, to warm the feelings, to soothe the insurgency of the reason. It is a mistake to present a great body of hypotheses — if Comte meant them for hypotheses — in the most dogmatic and peremptory form to which language can lend itself. And there is no more extraordinary thing in the history of opinion than the perversity with which Comte has succeeded in clothing a philosophic doctrine, so intrinsically conciliatory as his, in a shape that excites so little sympathy and gives so much provocation. An enemy defined Comtism as Catholicism minus Christianity, to which an able champion retorted by calling it Catholicism plus Science. Comte's Utopia has pleased the followers of the Catholic, just as little as those of the scientific, spirit.

The elaborate and minute systematization of life, proper to the religion of Humanity, is to be directed by a priesthood. The priests are to possess neither wealth nor material power; they are not to command, but to counsel; their authorityisto b ˆ rest on persuasion, not on force. When religion has be- come positive, and society

industrial, then the influence of the church upon the state becomes really free and independent, which was not the case in the middle ages. The power of the priesthood rests upon special knowledge of man and nature; but to this intellectual eminence must also be added moral power and a certain greatness of character, without which force of intellect and completeness of attainment will not receive the confidence they ought to inspire. The functions of the priesthood are of this kind: — To exercise a systematic direction over education; to hold a consultative influence over all the important acts of actual life, public and private; to arbitrate in cases of practical conflict; to preach sermons recalling those principles of generality and universal harmony which our special activities dispose us to ignore; to order the due classification of society; to perform the various ceremonies appointed by the founder of the religion. The authority of the priesthood is to rest wholly on voluntary adhesion, and there is to be perfect freedom of speech and discussion. This provision hardly consists with Comte's con- gratulations to the tsar Nicholas on the " wise vigilance " with which he kept watch over the importation of Western books.

From his earliest manhood Comte had been powerfully im- pressed by the necessity of elevating the condition of women. (See remarkable passage in his letters to M. Valat, pp. 84-87.) His friendship with Madame de Vaux had omen. deepened the impression, and in the reconstructed society women are to play a highly important part. They are to be carefully excluded from public action, but they are to do many more important things than things political. To fit them for their functions, they are to be raised above material cares, and they are to be thoroughly educated. The family, which is so important an element of the Comtist scheme of things, exists to carry the influence of woman over man to the highest point of cultivation. Through affection she purifies the activity of

Conclu- sion.

man. " Superior in power of affection, more able to keep both the intellectual and the active powers in continual subordination to feeling, women are formed as the natural intermediaries between Humanity and man. The Great Being confides specially to them its moral Providence, maintaining through them the direct and constant cultivation of universal affection, in the midst of all the distractions of

thought or action, which are for ever withdrawing men from its influence. . . . Beside the uniform influence of every woman on every man, to attach him to Humanity, such is the importance and the difficulty of this ministry that each of us should be placed under the special guidance of one of these angels, to answer for him, as it were, to the Great Being. This moral guardianship may assume three types, — the mother, the wife and the daughter; each having several modifications, as shown in the concluding volume. Together they form the three simple modes of .solidarity, or unity with contemporaries, — obedience, union and protection — as well as the three degrees of continuity between ages, by uniting us with the past, the present and the future. In accord- ance with my theory of the brain, each corresponds with one of our three altruistic instincts — veneration, attachment and benevolence."

How the positive method of observation and verification of real facts has landed us in this, and much else of the same kind, is extremely hard to guess. Seriously to examine an encyclopaedic system, that touches life, society and knowledge at every point, is evidently beyond the compass of such an article as this. There is in every chapter a whole group of speculative suggestions, each of which would need a long chapter to itself to elaborate or to discuss. There is at least one biological speculation of astounding audacity, that could be examined in nothing less than a treatise. Perhaps we have said enough to show that after performing a great and real service to thought Comte almost sacrificed his claims to gratitude by the invention of a system that, as such, and in- dependently of detached suggestions, is markedly retrograde. But the world will take what is available in Comte, while for- getting that in his work which is as irrational in one way as Hegel is in another.

See also the article Positivism.

Bibliography.— Works, Editions and Translations: Cours de philosophic positive (6 vols., Paris, 1830-1842; 2nd ed. with preface by E. Littre, Paris, 1864; 5th ed., 1893-1894; Eng. trans. Harriet Martineau, 2 vols., London, 1853; 3 vols. London and New York, 1896); Discours sur V esprit positif (Paris, 1844; Eng. trans, with explanation E. S. Beesley, 1905); Ordre et progres {ib. 1848); Discours sur V ensemble de positivisme (1848, Eng. trans. J. H. Bridges, London, 1852) ; Systeme de politique positive, ou Traite de sociologie (4 vols., Paris, 1852-1834; ed. 1898; Eng. trans, with analysis and explanatory summary by Bridges, F. Harrison, E. S. Beesley and others, 1875-1879); Catechisme positiviste (Paris, 1852; 3rd ed., 1890; Eng. trans. R. Congreve, Lond. 1858, 3rd ed., 1891); Appel aux

Conservateurs (Paris, 1855 and 1898); Synthase subjective (1856 and 1878); Essai de philos. mathematique (Paris, 1878); P. Descours and H. Gordon Jones, Fundamental Principles of Positive Philos. (trans. 1905), with biog. preface by E. S. Beesley. The Letters of Comte have been published as follows: — the letters to M. Valat and J. S. Mill, in La Critique philosophique (1877); correspondence with Mde. de Vaux (ib., 1884) ; Correspondance tnSdite d'Aug. Comte (1903 foil.) ; Lettres inedites de J. S. Mill a Aug. Comte publ. avec les responses de Comte (1899).

Criticism. — J. S. Mill, Auguste Comte and Positivism; J. H. Bridges' reply to Mill, The Unity of Comte' s Life and Doctrines (1866) ; Herbert Spencer's essay on the Genesis of Science and pamphlet on The Classification of the Sciences; Huxley's " Scientific Aspects of Positivism," in his Lay Sermons; R. Congreve, Essays Political, Social and Religious (1874); J. Fiske, Outlines of Cosmic Philosophy (1874); G. H. Lewes, History of Philosophy, vol. ii. ; Edward Caird, The Social Philosophy and Religion of Comte (Glasgow, 1885): Hermann Gruber, Aug. Comte der Begriinder des Positivismus. Sein Leben und seine Lehre (Freiburg, 1889) and Der Positivismus vom Tode Aug. Comtes bis auf unsere Tage, i8s7~i8gi (Freib. 1891); L. Levy-Bruhl, La Philosophie d'Aug. Comte (Paris, 1900) ; H. D. Hutton, Comte 's Theory of Man's Future (1877), Comte, the Man and the Founder (1891), Comte's Life and Work (1892); E. de Roberty, Aug. Comte et Herbert Spencer (Paris, 1894); J. Watson, Comte, Mill and Spencer. An outline of Philos. (1895 and 1899); Millet, La Souverainete d' apres Aug. Comte (1905) ; L. de Montesquieu Fezensac, Le Systeme politique d'Aug. Comte (1907); G. Dumas, Psychologie de deux Messies positivistes (1905). (J. Mo.; X.)

COMUS (from kSjuos, revel, or a company of revellers), in the later mythology of the Greeks, the god of festive mirth. In classic mythology the personification does not exist; but Comus appears in the EUoves, or Descriptions of Pictures, of Philostratus, a writer of the 3rd century a.d. as a winged youth, slumbering in a standing attitude, his legs crossed, his countenance flushed with wine, his head — which is sunk upon his breast — crowned with dewy flowers, his left hand feebly grasping a hunting spear, his right an inverted torch. Ben Jonson introduces Comus, in his masque entitled Pleasure reconciled to Virtue (1619), as the portly jovial patron of good cheer, " First father of sauce and deviser of jelly." In the Comus, sive Phagesiposia Cimmeria; Somnium (1608, and at Oxford, 1634), a moral allegory by a Dutch author, Hendrik van der Putten, or Erycius Puteanus, the conception is more nearly akin to Milton's, and Comus is a being whose enticements are more disguised and delicate than those of

Jonson's deity. But Milton's Comus is a creation of his own. His story is one

" Which never yet was heard in tale or song From old or modern bard, in hall or bower."

Born from the loves of Bacchus and Circe, he is " much like his father, but his mother more " — a sorcerer, like her, who gives to travellers a magic draught that changes their human face into the " brutal form of some wild beast," and, hiding from them their own foul disfigurement, makes them forget all the pure ties of life, " to roll with pleasure in a sensual sty."

COMYN, JOHN (d. c. 1300), Scottish baron, was a son of John Comyn (d. 1274), justiciar of Galloway, who was a nephew of the constable of Scotland, Alexander Comyn, earl of Buchan (d. 1289), and of the powerful and wealthy Walter Comyn, earl of Mentieth (d. 1 2 58) . With his uncle the earl of Buchan, the elder Comyn took a prominent part in the affairs of Scotland during the latter part of the 13th century, and he had interests and estates in England as well as in his native land. He fought for Henry III. at Northampton and at Lewes, and was afterwards imprisoned for a short time in London. The younger Comyn, who had inherited the lordship of Badenoch from his great-uncle the earl of Mentieth, was appointed one of the guardians of Scotland in 1286, and shared in the negotiations between Edward I. and the Scots in 1289 and 1290. When Margaret, the Maid of Norway, died in 1290, Comyn was one of the claimants for the Scottish throne, but he did not press his candidature, and like the other Corny ns urged the claim of John de Baliol. After support- ing Baliol in his rising against Edward I., Comyn submitted to the English king in 1296; he was sent to reside in England, but returned to Scotland shortly before his death.

Comyn's son, John Comyn (d. 1306), called the " red Comyn," is more famous. Like his father he assisted Baliol in his rising against Edward I., and he was for some time a hostage in England. Having been made guardian of Scotland after the battle of Falkirk in 1298 he led the resistance to the English king for about five years, and then early in 1304 made an honour- able surrender. Comyn is chiefly known for his memorable quarrel with Robert the Bruce. The origin of the dispute is uncertain. Doubtless the two regarded each other as rivals; Comyn may have refused to join in the insurrection planned by Bruce. At all events the pair met at Dumfries in January 1306; during a heated altercation charges of treachery were made, and Comyn was stabbed to death either by Bruce or by his followers.

Another member of the Comyn family who took an active part in Scottish affairs during these troubled times is John Comyn, earl of Buchan (d. c. 1313). This earl, a son of Earl Alexander, was constable of Scotland, and was first an ally and then an enemy of Robert the Bruce.

CONACRE (a corruption of corn-acre), in Ireland, a system of letting land, mostly in small patches, and usually for the growth of potatoes as a kind of return instead of wages. It is now practically obsolete.

CONANT, THOMAS JEFFERSON (1802-1891), American Biblical scholar, was born at Brandon, Vermont, on the 13th of December 1802. Graduating at Middlebury College in 1823, he became tutor in the Columbian University (now George

Washington University) from 1825 to 1827, professor of Greek, Latin and German at Waterville College (now Colby College) from 1827 to 1833, professor of biblical literature and criticism in Hamilton (New York) Theological Institute from 1835 to 1851, and professor of Hebrew and of Biblical exegesis in Rochester Theological Seminary from 1851 to 1857. From 1857 to 1875 he was employed by the American Bible Union on the revision of the New Testament (1871). He married in 1830 Hannah O'Brien Chaplin (1800-1865), who was herself the author of The Earnest Man, a biography of Adoniram Judson (1855), and of The History of the English Bible (1859), besides being her husband's able assistant in his Hebrew studies. He died in Brooklyn, New York, on the 30th of April 1891. Conant was the foremost Hebrew scholar of his time in America. His treatise, The Meaning and Use of " Baplizein " Philologically and Historically Investigated (i860), an " appendix to the revised version of the Gospel by Matthew," is a valuable summary of the evidence for Baptist doctrine. He translated and edited Gesenius's Hebrew Grammar (1839; 1877),- and published revised versions with notes of Job (1856), Genesis (1868), Psalms (1871), Proverbs (1872), Isaiah i.-xiii. 22 (1874), and Historical Books of the Old Testament, Joshua to II. Kings (1884).

CONATION (from Lat. conari, to attempt, strive), a psycho- logical term, originally chosen by Sir William Hamilton (Lectures on Metaphysics, pp. 127 foil.), used generally of an attitude of mind involving a tendency to take action, e.g. when one decides to remove

an object which is causing a painful sensation, or to try to interrupt' an unpleasant train of thought. This use of the word tends to lay emphasis on the mind as self-determined in relation to external' objects. Another less common use of the word is to describe the pleasant or painful sensations which accompany muscular activity; the conative phenomena, thus regarded, are psychic changes brought about by external causes. The chief difficulty in connexion with Conation is that of distinguishing it from Feeling, a term of very vague significance both in technical and in common usage. Thus the German psychologist F. Brentano holds that no real distinction can be made. He argues that the mental process from sorrow or dissatisfaction, through hope for a change and courage to act, up to the voluntary determination which issues in action, is a single homogeneous whole (Psychologie, pp. 308-309). The mere fact, however, that the series is continuous is no ground for not distinguishing its parts; if it were so, it would be im- possible to distinguish by separate names the various colours in the solar spectrum, or indeed perception from conception. A more material objection, moreover, is that, in point of fact, the feeling of pleasure or pain roused by a given stimulus is specifically different from, and indeed may not be followed by, the determination to modify or remove it. Pleasure and pain, i.e. hedonic sensation per se, are essentially distinct from appetition and aversion; the pleasures of hearing music or enjoying sun- shine are not in general accompanied by any volitional activity. It is true that painful sensations are generally accompanied by definite aversion or a tendency to take action, but the cases of positive pleasure are amply sufficient to support a distinction. Therefore, though in ordinary language such phrases as " feeling aversion " are quite legitimate, accurate psychology compels us to confine " feeling " to states of consciousness in which no conative activity is present, i.e. to the psychic phenomena of pleasure or pain considered in and by themselves. The study of such phenomena is specifically described as Hedonics (Gr. ridovr], pleasure) or Algedonics (Gr. a\yr]86)v, pain); the latter term was coined by H. R. Marshall (in Pain, Pleasure and Aesthetics, 1894), but has not been generally used.

The problem of conation is closely related to that of Attention (?.».), which indeed, regarded as active consciousness, implies conation (G. T. Ladd, Psychology, 1894, p. 213). Thus, whenever the mind deliberately focusses itself upon a particular object, there is implied a psychic effort (for the relation between Atten- tion and Conation, see G. F. Stout, Analytic Psychology, book i. chap. vi.). All conscious action, and in a less degree even unconscious or reflex action, implies attention; when the mind

” attends ” to any given external object, the organ through the medium of which information regarding that object is conveyed to the mind is set in motion. (See Psychology.)

CONCA, SEBASTIANO (1679-1764), Italian painter of the Florentine school, was born at Gaeta, and studied at Naples under Francesco Solimena. In 1706, along with his brother Giovanni, who acted as his assistant, he settled at Rome, where for several years he worked in chalk only, to improve his drawing. He was patronized by the Cardinal Ottoboni, who introduced him to Clement XL; and a Jeremiah painted in the church of St John Lateran was rewarded by the pope with knighthood and by the cardinal with a diamond cross. His fame grew quickly, and he received the patronage of most of the crowned heads of Europe. He painted till near the day of his death, and left behind him an immense number of pictures, mostly of a brilliant and showy kind, which are distributed among the churches of Italy. Of these the Probatica, or Pool of Siloam, in the hospital of Santa Maria della Scala, at Siena, is considered the finest.

CONCARNEAU, a fishing port of western France in the depart- ment of Finistere, 14 m. by road S.E. of Quimper. Pop. (1906) 7887. The town occupies a picturesque situation on an inlet opening into the Bay of La Foret. The old portion stands on an island, and is surrounded by ramparts, parts of which are believed to date from the 14th century. It is an important centre of the sardine, mackerel and lobster fisheries. Sardine-preserv- ing, boat-building and the manufacture of sardine-boxes are carried on.

C0NCEPCI6N, a province of southern Chile, lying between the provinces of Maule and Nuble on the N. and Bio-Bio on the S., and extending from the Pacific to the Argentine boundary. Its outline is very irregular, the Itata river forming its northern boundary, and the Bio-Bio and one of its tributaries a part of its southern boundary. Area (estimated) 3252 sq. m.; pop. (1895) 188,190. Concepci6n is the most important province of southern Chile because of its advantageous commercial position, fertility and productive industries. Its coast is indented by two large well-sheltered bays, Talcahuano and Arauco, the former having the ports of Talcahuano, Penco and El Tome, and the latter Coronel and Lota. Its railway communications are good, and the Bio-Bio, which crosses its S.W. corner, has 100 m. of navigable channel. The province produces wheat and manufactures flour for export; its wines are reputed the best in Chile, cattle are bred in large numbers, wool is produced, and considerable timber is shipped. Near the coast are extensive deposits of coal, which is shipped from Lota and Coronel, the former being the site of the most productive coal-

mine in South America. The climate is mild and the rainfall is abundant. Large copper-smelting and glass works have been established at Lota because of its coal resources. The valley of the Itata is largely devoted to vine cultivation, and the port of this district, El Tome, is noted for its wine vaults and trade. It also possesses a small woollen factory. The principal towns are on the coast and had in 1895 the following populations: Talcahuano, 10,431; Lota, 9797 (largely operatives in the mines and smelting works); Coronel, 4575; and El Tome, 3977.

CONCEPClдN, a city of southern Chile, capita! of a province and department of the same name, on the right bank of the Bio-Bio river, 7 m. above its mouth, and 355 m. S. S.W. of Santiago by rail. Pop. (1895) 39,837; (1902, estimated) 49,351. It is the commercial centre of a rich agricultural region, but because of obstructions at the mouth of the Bio-Bio its trade passes in great part through the port of Talcahuano, 8 m. distant by rail. The small port of Penco, situated on the same bay and 10 m. distant by rail, also receives a part of the trade because of official restrictions at Talcahuano. Concepci6n is one of the southern termini of the Chilean central railway, by which it is connected with Santiago to the N., with Valdivia and Puerto Montt to the S., and with the port of Talcahuano. Another line extends southward through the Chilean coal-producing districts to Curanilhue, crossing the Bio-Bio by a steel viaduct 6000 ft. long on 62 skeleton piers; and a short line of 10 m, runs

northward to Penco. The Bio-Bio is navigable above the city for loom, and considerable traffic comes through this channel. The districts tributary to Concepci6n produce wheat, wine, wool, cattle, coal and timber, and among the industrial establishments of the city are flour mills, furniture and carriage factories, dis- tilleries and breweries. The city is built on a level plain but little above the sea-level," and is laid out in regular squares with broad streets. It is an episcopal see with a cathedral and several fine churches, and is the seat of a court of appeal. The city was founded by Pedro de Valdivia in 1550, and received the singular title of " La Conception del Nuevo Extreme" It was located on the bay of Talcahuano where the town of Penco now stands, about 9 m. from its present site, but was destroyed by earthquakes in 1570, 1730 and 1751, and was then (1755) re- moved to the margin of the Bio-Bio. In 1835 it was again laid in ruins, a graphic description of which is given by Charles Darwin in The

Voyage of H.M.S. Beagle. The city was twice burned by the Araucanians during their long struggle against the Spanish colonists.

CONCEPC16N, or Villa Concepcion, the principal town and a river port of northern Paraguay, on the Paraguay river, 138 m. (234 m. by river) N. of Asunci6n, and about 345 ft. above sea- level. Pop. (1895, estimate) 10,000, largely Indians and mestizos. It is an important commercial centre, and a port of call for the river steamers trading with the Brazilian town of Corumba, Matto Grosso. It is the principal point for the exportation of Paraguay tea, or ” yerba mate ” {Ilex paraguayensis) . The town has a street railway and telephone service, a national college, a public school, a market, and some important com- mercial establishments. The neighbouring country is sparsely settled and produces little except forest products. Across the river, in the Paraguayan Chaco, is an English missionary station, whose territory extends inland among the Indians for many miles.

CONCEPT 1 (Lat.. conceptus, a thought, from concipere, to take together, combine in thought; Ger. Begriff), in philosophy, a term applied to a general idea derived from and considered apart from the particulars observed by the senses. The mental process by which this idea is obtained is called abstraction (q.v.). By the comparison, for instance, of a number of boats, the mind abstracts a certain common quality or qualities in virtue of which the mind affirms the general idea of ” boat.” Thus the connota- tion of the term ” boat,” being the sum of those qualities in respect of which all boats are regarded as alike, whatever their individual peculiarities may be, is described as a ” concept.” The psychic process by which a concept is affirmed is called ” Conception,” a term which is often loosely used in a concrete sense for ” Concept ” itself. It is also used even more loosejy as synonymous in the widest sense with ” idea,” ” notion.” Strictly, however, it is contrasted with ” perception,” and implies the mental reconstruction and combination of sense- given data. Thus when one carries one’s thoughts back to a series of events, one constructs a psychic whole made up of parts which take definite shape and character by their mutual inter- relations. This process is called conceptual synthesis, the possi- bility of which is a sine qua non for the exchange of information by speech and writing. It should be noticed that this (very common) psychological interpretation of ” conception ” differs from the metaphysical or general philosophical definition given above, in so far as it includes mental presentations in which the universal is not specifically distinguished from the particulars. Some psychologists prefer to restrict the term to the narrower use which excludes all mental states in which particulars are cognized, even though the universal be present also.

In biology conception is the coalescence of the male and female generative elements, producing pregnancy.

1 The word ” conceit ” in its various senses (” idea,” ” plan,” ” fancy,” ” imagination,” and, by modern extension, an over- weening sense of one’s own value) is likewise derived ultimately from the Latin concipere. It appears to have been formed directly from the English derivative ” conceive ” on the analogy of ” deceit ” from ” deceive.” According to the New English Dictionary there is no intermediate form in Old French.

CONCEPTUALISM (from “Concept”), in philosophy, a term applied by modern writers to a scholastic theory of the nature of universals, to distinguish it from the two extremes of Nominalism and Realism. The scholastic philosophers took up the old Greek problem as to the nature of true reality — whether the general idea or the particular object is more truly real. Between Realism which asserts that the genus is more real than the species, and that particulars have no reality, and Nominalism according to which genus and species are merely names (nomina, flatus vocis), Conceptualism takes a mean position. The conceptualist holds that universals have a real existence, but only in the mind, as the concepts which unite the individual things: e.g. there is in the mind a general notion or idea of boats, by reference to which the mind can decide whether a given object is, or is not, a boat. On the one hand ” boat ” is something more than a mere sound with a purely arbitrary conventional significance; on the other it has, apart from particular things to which it applies, no reality; its reality is purely abstract or conceptual. This theory was enunciated by Abelard in opposi- tion to Roscellinus (nominalist) and William of Champeaux (realist). He held that it is only by becoming a predicate that the class-notion or general term acquires reality. Thus similarity (conformitas) is observed to exist between a number of objects in respect of a particular quality or qualities. This quality becomes real as a mental concept when it is predicated of all the objects possessing it (” quod de pluribus natum est praedicari “). Hence Abelard’s theory is alternatively known as Sermonism (sermo, ” predicate “). His statement of this position oscillates markedly, inclining sometimes towards the nominalist, some- times towards the realist statement, using’ the arguments of the one against the other. Hence he is described by some as a realist, by others as a nominalist. When he comes to explain that objective similarity in things which is represented by the class-concept or general term, he adopts the theological Platonic view that the ideas which are the archetypes of the qualities exist in the mind of God. They are, therefore, ante rem, in re and post rem, or, as Avicenna stated it, universalia ante multi-

plicitatem, in multiplicitate, post multiplicitatem. (See Logic, Metaphysics.)

CONCERT (through the French from Lat. con-, with, and certare, to strive), a term meaning, in general, co-operation, agreement or union; the more specific usages being, in music, for a public performance by instrumentalists, vocalists or both combined, and in diplomacy, for an understanding or agreement for common action between two or more states, whether defined by treaty or not. The term ” Concert of Europe ” has been commonly applied, since the congress of Vienna (1814-1815), to the European powers consulting or acting together in questions of common interest. (See Alliance and Europe : History.)

CONCERTINA, or Melodion (Fr. concertina, Ger. Zieh- harmonica or Bandoneon), a wind instrument of the seraphine family with free reeds, forming a link in the evolution of the harmonium from the mouth organ, intermediate links being the cheng and the accordion. The concertina consists of two hexagonal or rectangular keyboards connected by a long ex- pansible bellows of many folds similar to that of the accordion. The keyboards are furnished with rows of knobs, which, on being pressed down by the fingers, open valves admitting the air compressed by the bellows to the free reeds, which are thus set in vibration. These free reeds consist of narrow tongues of brass riveted by one end to the inside surface of the keyboard, and having their free ends slightly bent, some outwards, some inwards, the former actuated by suction when the bellows are expanded, the latter by compression. The pitch of the note depends upon the length and thickness of the reeds, reduction of the length tending to sharpen the pitch of the note, while reduction of the thickness lowers it. The bellows being unpro- vided with a valve can only draw in and emit the air through the reed valves. In order to produce the sound, the concertina is held horizontally between the hands, the bellows being by turns compressed and expanded. The English concertina, invented and patented by Sir Charles Wheatstone in 1829, the year of the

reputed invention of the accordion (q.v.) , is constructed with a double action, the same note being produced on compressing and expanding the bellows, whereas in the German concertina or accordion two different notes are given out. Concertinas are made in complete families — treble, tenor, bass and double bass, having a combined total range of nearly seven octaves. The compass is as

follows: —

Treble concertina, double action

Tenor concertina, single action “, £§:

Bass concertina, single action Double bass concertina, single action

The timbre of the concertina is penetrating but soft, and capable of the most delicate gradations of tone. This quality is due to a law of acoustics governing the vibration of free reeds by means of which fortes and pianos are obtained by varying the pressure of the wind, as is also the case with the double reed or the single or beating reed, while the pressure of the reed with the lips combined with greater pressure of wind produces the harmonic overtones which are not given out by free reeds. The English concertina possesses one peculiarity which renders it unsuitable for playing with instruments tuned according to the law of equal temperament, such as the pianoforte, har- monium or melodion, i.e. it has enharmonic intervals between G# and A# and between Db and Eb. The German concertina is not constructed according to this system; its compass extends down to C or even Bb, but it is not provided with double action. It is possible on the English concertina to play diatonic and chromatic passages or arpeggios in legato or staccato style with rapidity, shakes single and double in thirds; it is also possible to play in parts as on the pianoforte or organ and to produce very rich chords. Concertos were written for concertina with orchestra by Molique and Regondi, a sonata with piano by Molique, while Tschaikowsky scored in his second orchestral suite for four accordions.

The aeola, constructed by the representatives of the original firm of Wheatstone, is a still more artistically developed con- certina, having among other improvements steel reeds instead of brass, which increase the purity and delicacy of the timbre.

See also Accordion; Cheng; Harmonium; Free-Reed Vibrator. (j£. S.)

CONCERTO (Lat. concerlus, from certare, to strive, also con- fused with concentus), in music, a term which appears as early as the beginning of the 17th century, at first as a title of no very definite meaning, but which early acquired a sense justified by its etymology and became applied chiefly to. com- positions in which unequal instrumental or vocal forces are brought into opposition.

Although by Bach’s time the concerto as a polyphonic instru- mental form was thoroughly established, the term frequently appears in the

autograph title-pages of his church cantatas, even when the cantata contains no instrumental prelude. Indeed, so entirely does the actual concerto form, as Bach understands it, depend upon the opposition of masses of tone unequal in volume with a compensating inequality in power of commanding atten- tion, that Bach is able to rewrite an instrumental movement as a chorus without- the least incongruity of style. A splendid example of this is the first chorus of a university festival cantata, Vereinigte Zwietracht der wechselnden Saiten, the very title of which (" united contest of turn-about strings") is a perfect definition of the earlier form of concerto grosso, in which the chief mass of the orchestra was opposed, not to a mere solo instrument, but to a small grouD called the concertino, or else

the whole work was for a large orchestral mass in which tutti passages alternate with passages in which the whole orchestra is dispersed in every possible kind of grouping. But the special significance of this particular chorus is that it is arranged from the second movement of the first Brandenburg concerto; and that while the orchestral material is unaltered except for trans- position of key, enlargement of force and substitution of trumpets and drums for the original horns, the whole chorus part has been evolved from the solo part for a kit violin (violino piccolo) . This admirably illustrates Bach's grasp of the true idea of a concerto, namely, that whatever the relations may be between the forces in respect of volume or sound, the whole treatment of the form must depend upon the healthy relation of function between that force which commands more and that which commands less attention. Ceteris paribus the individual, suitably placed, will command more attention than the crowd, whether in real life, drama or instrumental music. And in music the human voice, with human words, will thrust any orchestral force into the background, the moment it can make itself heard at all. Hence it is not surprising that the earlier concerto forms should show the closest affinity (not only in general aesthetic principle, but in many technical details) with the form of the vocal aria, as matured by Alessandro Scarlatti. And the treatment of the orchestra is, mutatis mutandis, exactly the same in both. The orchestra is entrusted with a highly pregnant and short summary of the main contents of the movement, and the solo, or the groups corresponding thereto, will either take up this material or first introduce new themes to be combined with it, and, in short, enter into relations with the orchestra very like those between the actors and the chorus in Greek drama. If the aria before Mozart may be regarded as a single large melody expanded by the device of the ritornello so as to give full ex- pression to the power of a singer against an instrumental accom- paniment, so the polyphonic concerto form may be regarded

as an expansion of the aria form to a scale worthy of the larger and purely instrumental forces employed, and so rendered capable of absorbing large polyphonic and other types of structure incompatible with the lyric idea of the aria. The da capo form, by which the aria had attained its full dimensions through the addition of a second strain in foreign keys followed by the original strain da capo, was absorbed by the polyphonic concerto on an enormous scale, both in first movements and finales (see Bach's Klavier concerto in E, Violin concerto in E, first movement) , while for slow movements the ground bass (see Variations), diversified by changes of key (Klavier concerto in D minor), the more melodic types of binary form, sometimes with the repeats ornamentally varied or inverted (Concerto for 3 klaviers in D minor, Concerto for klavier, flute and violin in A minor), and in finales the rondo form (Violin concerto in E major, Klavier concerto in F minor) and the binary form (3rd Branden- burg concerto) may be found.

When conceptions of musical form changed and the modern sonata style arose, the peculiar conditions of the concerto gave rise to problems the difficulty of which only the highest classical intellects could appreciate or solve. The number and contrast of the themes necessary to work out a first movement of a sonata are far too great to be contained within the single musical sentence of Bach's and Handel's ritornello, even when it is as long as the thirty bars of Bach's Italian concerto (a work in which every essential of the polyphonic concerto is reproduced on the harpsichord by means of the contrasts between its full register on the lower of its two keyboards and its solo stops on both). Bach's sons had taken shrewd steps in forming the new style; and Mozart, as a boy, modelled himself closely on Johann Christian Bach, and by the time he was twenty was able to write concerto ritornellos that gave the orchestra admir- able opportunity for asserting its character and resource in the statement in charmingly epigrammatic style of some five or six sharply contrasted themes, afterwards to be worked out with additions by the solo with the orchestra's co-operation and intervention. As the scale of the works increases the problem becomes very difficult, because the alternation between solo and

tutti easily produces a sectional type of structure incompatible with the high degree of organization required in first movements; yet frequent alternation is evidently necessary, as the orchestral solo is

audible only above a very subdued orchestral accompani- ment, and it would be highly inartistic to use the orchestra for no other purpose. Hence in the classical concerto the ritornello is never abandoned, in spite of the enormous dimensions to which the sonata style expanded it. And though from the time of Mendelssohn onwards most composers have seemed to regard it as a conventional impediment easily abandoned, it may be doubted whether any modern concerto, except the four magnificent examples of Brahms, and Dr Joachim's Hungarian concerto, possesses first movements in which the orchestra seems to enjoy breathing space. And certainly in the classical concerto the entry of the solo instrument, after the long opening tutti, is always dramatic in direct proportion to its delay. The great danger jn handling so long an orchestral prelude is that the work may for some minutes be indistinguishable "from a symphony and thus the entry of the solo may be unexpected without being inevitable. This is especially the case if the composer has treated his opening tutti like the exposition of a sonata movement, and made a deliberate transition from his first group of themes to a second group in a complementary key, even if the transition is only temporary, as in Beethoven's C minor concerto. Mozart keeps his whole tutti in the tonic, relieved only by his mastery of sudden subsidiary modulation; and so perfect is his marshalling of his resources that in his hands a tutti a hundred bars long passes by with the effect of a splendid pageant, of which the meaning is evidently about to be revealed by the solo. After the C minor concerto, Beethoven grasped the true function of the opening tutti and enlarged it to his new purposes. With an interesting experiment of Mozart's before him, he, in his G major concerto, Op. 53, allowed the solo player to state the opening theme, making the orchestra enter pianissimo in a foreign key, a wonderful incident which has led to the absurd statement that he " abolished the opening tutti," and that Mendelssohn in so doing has " followed his example." In this concerto he also gave considerable variety of key to the opening tutti by the use of an important theme which executes a considerable series of modulations, an entirely different thing from a deliberate modulation from material in one key to material in another. His fifth and last pianoforte concerto, in E flat, commonly called the " Emperor," begins with a rhapsodical introduction of extreme brilliance for the solo player, followed by a tutti of unusual length which is confined to the tonic major and minor with a strictness explained by the gorgeous modula- tions with which the solo subsequently treats the second subject. In this concerto Beethoven also dispenses with the only really conventional feature of the form, namely, the cadenza, a custom elaborated from the operatic aria, in which the singer was allowed to extemporize a flourish on a pause near the end. A similar

pause was made in the final ritornello of a concerto, and the soloist was supposed to extemporize what should be equivalent to a symphonic coda, with results which could not but be deplor- able unless the player (or cadenza writer) were either the com- poser himself, or capable of entering into his intentions, like Joachim, who has written the finest extant cadenza of classical violin concertos.

Brahms's first concerto in D minor, Op. 15, was the result of an immense amount of work, and, though on a mass of material originally intended for a symphony, was nevertheless so perfectly assimilated into the true concerto form that in his next essay, the violin concerto, Op. 77, he had no more to learn, and was free to make true innovations. He succeeds in presenting the con- trasts even of remote keys so immediately that they are service- able in the opening tutti and give the form a wider range in definitely functional key than any other instrumental music. Thus in the opening tutti of the D minor concerto the second subject is announced in B flat minor. In the B flat pianoforte concerto, Op. 83, it appears in D minor, and in the double concerto, Op. 102, for violin and violoncello in A minor it appears in F major. In none of these cases is it in the key in which the

solo develops it, and it is reached with a directness sharply contrasted with the symphonic deliberation with which it is approached in the solo. In the violin concerto, Op. 77, Brahms develops a counterplot in the opposition between solo and orchestra, inasmuch as after the solo has worked out its second subject the orchestra bursts in, not with the opening ritornello, but with its own version of the material with which the solo originally entered. In other words we have now not only the development by the solo of material stated by the orchestra but also a counter-development by the orchestra of material stated by the solo. This concerto is, on the other hand, remark- able as being the last in which a blank space is left for a cadenza, Brahms having in his friend Joachim a kindred spirit worthy of such trust. In the pianoforte concerto in B flat, and in the double concerto, 1 Op. 102, the idea of an introductory statement in which the solo takes part before the opening tutti is carried out on a large scale, and in the double concerto both first and second subjects are thus suggested. It is unnecessary to speak of the other movements of concerto form, as the sectional structure that so easily results from the opposition between solo and orchestra is not of great disadvantage to slow movements and finales, which accordingly do not show important differences from the ordinary types of symphonic and chamber music. The scherzo, on the other hand, is normally of too small a range of contrast for successful adaptation to concerto form, and the solitary great example of its use is the second movement of Brahms's B flat pianoforte concerto.

Nothing is more easy to handle with inartistic or pseudo- classic effectiveness than the opposition between a brilliant solo player and an orchestra; and, as the inevitable tendency of even the most artistic concerto has been to exhaust the resources of the .solo instrument in the increased difficulty of making a proper contrast between solo and orchestra, so the technical difficulty of concertos has steadily increased until even in classical times it was so great that the orthodox definition of a concerto is that it is ” an instrumental composition designed to show the skill of an executant, and one which is almost invariably accompanied by orchestra.” This idea is in flat violation of the whole history and aesthetics of the form, which can never be understood by means of a study of averages. In art the average is always false, and the individual organization of the greatest classical works is the only sound basis for general- izations, historic or aesthetic. (D. F. T.)

CONCH (Lat. concha, Gr. Koyxv), a shell, particularly one of a mollusc; hence the term ” conchology,” the science which deals with such shells, more used formerly when molluscs were studied and classified according to the shell formation; the word is chiefly now used for the collection of shells (see Mollusca, and such articles as Gastropoda, Malacostraca, &c). Large spiral Conchs have been from early times used as a form of trumpet, emitting a very loud sound. They are used in the West Indies and the South Sea Islands. The Tritons of ancient mythology are represented as blowing such ” wreathed horns.” In anatomy, the term concha or ” conch ” is used of the external ear, or of the hollowed central part leading to the meatus; and, in architecture, it is sometimes given to the half dome over the semicircular apse of the basilica. In late Roman work at Baalbek and Palmyra and in Renaissance buildings shells are frequently carved in the heads of circular niches. A low class of the negro or other inhabitants of the Bahamas and the Florida Keys are sometimes called ” Conches ” or ” Conks ” from the shell-fish which form their staple food.

CONCHOID (Gr. Koyxv, shell, and tlSos, form), a plane curve invented by the Greek mathematician Nicomedes, who devised a mechanical construction for it and applied it to the pro- blem of the duplication of the cube, the construction of two mean proportionals between two given quantities, and possibly to the trisection of an angle as in the 8th lemma of Archimedes. Proclus grants Nicomedes the credit of this last application, but it is disputed by Pappus, who claims that his own discovery was

1 Double and triple concertos are concertos with two or three solo

players. A concerto for-several solo players is called a concertante.

original. The conchoid has been employed by later mathe- maticians, notably Sir Isaac Newton, in the construction of various cubic curves.

The conchoid is generated as follows : — Let be a fixed point and BC a fixed straight line; draw any line through O inter- secting BC in P and take on the line PO two points X, X', such

that PX = PX' = a constant quantity. Then the locus of X and X' is the conchoid. The conchoid is also the locus of any point on a rod which is constrained to move so that it always passes through a fixed point, while a fixed point on the rod travels along a straight line. To obtain the equation to the curve, draw AO perpendicular to BC, and let AO = c; let the constant quantity PX = PX' = 6. Then taking O as pole and a line through O parallel to B C as the initial line, the polar equation is r — a cosec 6 +b, the upper sign referring to the branch more distant from O. The cartesian equation with A as origin and BC as axis of x is x 2 y i =(a+y) 2 (b 2 —y 2). Both branches belong to the same curve and are included in this equation. Three forms of the curve have to be distinguished according to the ratio of a to b. If a be less than b, there will be a node at O and a loop below the initial point (curve 1 in the figure) ; if a equals b there will be a cusp at O (curve 2) ; if a be greater than b the curve will not pass through O, but from the cartesian equation it is obvious that is a conjugate point (curve 3). The curve is symmetrical about the axis of y and has the axis of x for its asymptote.

CONCIERGE (a French word of unknown origin; the Latinized form was concergius or concergerius), originally the guardian of a house or castle, in the middle ages a court official who was the custodian of a royal palace. In Paris, when the Palais de la Cite ceased about 1360 to be a royal residence and became the seat of the courts of justice, the Conciergerie was turned into a prison. In modern usage a " concierge " is a hall-porter or janitor.

CONCINI, CONCINO (d. 161 7), 'Count Della Penna, Marshal d'Ancre, Italian adventurer, minister of King Louis XIII. of France, was a native of Florence. He came to France in the train of Marie de' Medici, and married the queen's lady-in- waiting, Leonora Dori, known as Galigai. The credit which his wife enjoyed with the queen, his wit, cleverness

and boldness made his fortune. In 16 10 he had purchased the marquisate of Ancre and the position of first gentleman-in-waiting. Then he obtained successively the governments of Amiens and of Normandy, and in 1614 the baton of marshal. From then first minister of the realm, he abandoned the policy of Henry-IV,, com- promised his wise legislation, allowed the treasury to be pillaged, and drew upon himself the hatred of all classes. The nobles were bitterly hostile to him, particularly Conde, with whom he negotiated the treaty of Loudun in 1616, and whom he had arrested in September 1616. This was done on the advice of Richelieu, whose introduction into politics was favoured by Concini. But Louis XIII., incited by his favourite Charles d'Albert, due de Luynes, was tired of Concini's tutelage. The baron de Vitry received in the king's name the order to imprison him. Apprehended on the bridge of the Louvre, Concini was killed by the guards on the 24th of April 161 7. Leonora was accused of sorcery and sent to the stake in the same year.

In 1767 appeared at Brescia a De Concini vita, by D. Sandellius. On the role of Concini see the Histoire de France, published .under the direction of E. Lavisse, vol. vi. (1905), by Mariejol.

CONCLAVE (Lat. conclave, from cum, together, and clavis, a key), strictly a room, or set of rooms, locked with a key; in this sense the word is now obsolete in English, though the New English Dictionary gives an example of its use so late as 1753. Its present loose application to any private or close assembly, especially ecclesiastical, is derived from its technical application to the assembly of cardinals met for the election of the pope, with which this article is concerned.

Conclave is the name applied to that system of strict seclusion to which the electors of the pope have been and are submitted, formerly as a matter of necessity, and subsequently as the result of a legislative enactment; hence the word has come to be used of the electoral assembly of the cardinals. This system goes back only as far as the 12th century.

Election of the Popes in Antiquity. — The very earliest episcopal nominations, at Rome as elsewhere, seem without doubt to have been made by the direct choice of the founders of the apostolic Christian communities. But this exceptional method was re- placed at an early date by that of election. At Rome the method of election was the same as in other towns: the Roman clergy and people and the neighbouring bishops each took part in it in their several capacities. The people would signify their approbation or disapprobation of the candidates more or less tumultuously, while the clergy were, strictly speaking,

the electoral body, met to elect for themselves a new head, and the bishops acted as presidents of the assembly and judges of the election. The choice had to meet with general consent; but we can well imagine that in an assembly of such size, in which the candidates were acclaimed rather than elected by counting votes, the various functions were not very distinct, and that persons of importance, whether clerical or lay, were bound to influence the elections, and sometimes decisively. Moreover, this form of election lent itself to cabals; and these frequently gave rise to quarrels, sometimes involving bloodshed and schisms, i.e. the election of antipopes, as they were later called. Such , was the case at the elections of Cornelius (251), Damasus (366), Boniface (418), Symmachus (498), Boniface II. (530) and others. The remedy for this abuse was found in having recourse, more or less freely, to the support of the civil power. The emperor Honorius upheld Boniface against his competitor Eulalius, at the same time laying down that cases of contested election should henceforth be decided by a fresh election; but this would have been a dangerous method and was consequently never applied. Theodoric upheld Symmachus against Laurentius because he had been elected first and by a greater majority. The accepted fact soon became law, and John II. recognized (532) the right of the Ostrogothic court of Ravenna to ratify the pontifical elections. Justinian succeeded to this right together with the kingdom which he had destroyed; he demanded, together with the payment of a tribute of 3000 golden solidi, that the candidate elected should not receive the episcopal consecration till he had obtained the confirmation of the emperor. Hence arose long vacancies of the See, indiscreet interference in the elections by the imperial officials, and sometimes cases of simony and venality. This bondage became lighter in the 7th century, owing rather to the weakening of the imperial power than to any resistance on the part of the popes.

Qth to 12th Centuries. — From the emperors of the East the power naturally passed to those of the West, and it was exercised after 824 by the descendants of Charlemagne, who claimed that the election should not proceed until the arrival of their envoys. But this did not last long; at the end of the 9th century, Rome, torn by factions, witnessed the scandal of the posthumous condemnation of Formosus. This deplorable state of affairs lasted almost without interruption till the middle of the nth century. When the emperors were at Rome, they presided over the elections; when they were away, the rival factions of the barons, the Crescentii and the Alberici especially, struggled for the spiritual power as they did for the temporal. During this period were seen cases of popes imposed by a faction rather than elected, and

then, at the mercy of sedition, deposed, poisoned and thrown into prison, sometimes to be restored by force of arms.

The influence of the Ottos (962-1002) was a lesser evil; that of the emperor Otto III. was even beneficial, in that it led to the election of Gerbert (Silvester II., in 999). But this was only a temporary check in the process of decadence, and in 1146 Clement II., the successor of the worthless Benedict IX., admitted that henceforth not only the consecration but even the election of the Roman pontiffs could only take place in presence of the

emperor. In fact, after the death of Clement II. the delegates of the Roman clergy did actually go to Polden to ask Henry III. to give them a pope, and similar steps were taken after the death of Damasus II., who reigned only twenty days. Fortu- nately on this occasion Henry III. appointed, just before his death, a man of high character, his cousin Bruno, bishop of Toul, who presented himself in Rome in company with Hildebrand. From this time began the reform. Hildebrand had the elections of Victor II. (1055), Stephen IX. (1057), and Nicholas II. (1058) carried out according to the canonical form, including the imperial ratification. The celebrated bull In nomine Domini of the 13th of April 1059 determined the electoral procedure; Election ft * s curious to observe how, out of respect for tradition, reserved it preserves all the former factors in the election to the though their scope is modified: “In the first place, cardinals. ˆ carnal bishops shall carefully consider the election together, then they shall consult with the cardinal clergy, and afterwards the rest of the clergy and the people shall by giving their assent confirm the new election.” The election, then, is reserved to the members of the higher clergy, to the cardinals, among whom the cardinal bishops have the preponderating position. The consent of the rest of the clergy and the people is now only a formality. The same was the case of the imperial intervention, in consequence of the phrase: ” Saving the honour and respect due to our dear son Henry (Henry IV.), according to the concession we have made to him, and equally to his successors, who shall receive this right person- ally from the Apostolic See.” Thus the emperor has no rights save those he has received as a concession from the Holy See. Gregory VII., it is true, notified his election to the emperor; but as he set up a series of five antipopes, none of Gregory’s successors asked any more for the imperial sanction. Further, by this bull, the emperors would have to deal with the fait accompli; for it

provided that, in the event of disturbances aroused by mischievous persons at Rome preventing the election from being carried out there freely and without bias, the cardinal bishops, together with a small number of the clergy and of the laity, should be empowered to go and hold the election where they should think fit; that should difficulties of any sort prevent the enthronement of the new pope, the pope elect would be empowered immediately to act as if he were actually pope. This legislation was definitely accepted by the emperor by the concordat of Worms (n 19).

A limited electoral body lends itself to more minute legislation than a larger body; the college for electing the pope, thus reduced so as to consist in practice of the cardinals only, was subjected as time went on to laws of increasing severity. Two points of great importance were established by Alexander III. at the Lateran Council of n 79. The constitution Licet de vitanda discordia makes all the cardinals equally electors, and no longer mentions the lower clergy or the people; it also requires a majority of two-thirds of the votes to decide an election. This latter provision, which still holds good, made imperial antipopes henceforth impossible.

Abuses nevertheless arose. An electoral college too small in numbers, which no higher power has the right of forcing to haste, can prolong disagreements and draw out the conclave course °f tne election for a long time. It is this period during which we actually find the Holy See left vacant most frequently for long spaces of time. The longest of these, however, gave an opportunity for reform and the remedy was found in the conclave, i.e. in the forced and rigid seclusion of the electors. As a matter of fact, this method had previously been used, but in a mitigated form: in 1216, on the death of Innocent III., the people of Perugia had shut up the cardinals; and in 1241 the Roman magistrates had confined them within the ” Septizonium “; they took two months, however, to perform the election. Celestine IV. died after eighteen days, and this time, in spite of the seclusion of the cardinals, there was an interregnum of twenty months. After the death of Clement TV. in 1268, the cardinals, of whom seventeen were gathered together at Viterbo, allowed two years to pass without coming to an

agreement; the magistrates of Viterbo again had recourse to the method of seclusion: they shut up the electors in the episcopal palace, blocking up all outlets; and since the election still delayed, the people removed the roof of the palace and allowed nothing but bread and water to be sent in. Under the pressure of famine and of this strict confinement, the cardinals finally agreed, on the 1st of September 1271, to elect Gregory X., after an interregnum of two years, nine

months and two days.

Taught by experience, the new pope considered what steps could be taken to prevent the recurrence of such abuses; in 1274, at the council of Lyons, he promulgated the constitution Ubi periculum, the substance of which

Laws made by

was as follows: At the death of the pope, the cardinals Gregory x. who were present are to await their absent colleagues for ten days; they are then to meet in one of the papal palaces in a closed conclave; none of them is to have to wait on him more than one servant, or two at most if he were ill; in the conclave they are to lead a life in common, not even having separate cells; they are to have no communication with the outer world, under pain of excommunication for any who should attempt to communicate with them; food is to be supplied to the cardinals through a window which would be under watch; after three days, their meals are to consist of a single dish only; and after five days, of bread and water, with a little wine. During the conclave the cardinals are to receive no ecclesiastical revenue. No account is to be taken of those who are absent or have left the conclave. Finally, the election is to be the sole business of the conclave, and the magistrates of the town where it was held are called upon to see that these provisions be observed. Adrian V. and John XX. were weak enough to suspend the constitution Ubi periculum; but the abuses at once reappeared; the Holy See was again vacant for long periods; this further proof was therefore decisive, and Celestine V., who was elected after a vacancy of more than two years, took care, before abdicating the pontificate, to revive the constitution of Gregory X., which was inserted in the Decretals (lib. i. tit. vi., de election, cap. 3).

Since then the laws relating to the conclave have been observed, even during the great schism; the only exception was the election of Martin V., which was performed by the cardinals of the three obediences, to which the council of Constance added five prelates of each of the six nations represented in that assembly. The same was the case up to the 16th century. At this period the Italian republics, later Spain, and finally the other powers, took an intimate interest in the choice of the holder of what was a considerable political power; and each brought more or less honest means to bear, sometimes that of simony. – It was against simony that Julius II. directed the bull Cum tarn divino (1503), which directed that simoniacal election of the pope should be declared null; that any one could attack it; that men should withdraw themselves from the obedience of a pope thus elected; that simoniacal

agreements should be invalid; that the guilty cardinals should be excom- municate till their death, and that the rest should proceed immediately to a new election. The purpose of this measure was good, but the proposed remedy extremely dangerous; it was fortunately never applied. Similarly, Paul IV. endeavoured by severe punishments to check the intriguing and plotting for the election of a new pope while his predecessor was still living; but the bull Cum secundum (1558) was of no effect.

Pius IV. undertook the task of reforming and completing the legislation of the conclave. The bull In eligendis (of October 1st, 1562), signed by all the cardinals, is a model of precision and wisdom. In addition to the points already stated, we may add the' following: that every day there was to be a scrutiny, i.e. a solemn voting by specially prepared voting papers (concealing the name of the voter, and to be opened only in case of an election being made at that scrutiny), and that this was to be followed by the " accessit," i.e. a second voting, in which the cardinals might transfer their suffrages to those who had obtained the greatest number of votes in the first. Except in case of urgent matters, the election

Julius 11.

Pius IV.

was to form the whole business of the conclave. The cells were to be assigned by lot. The functionaries of the conclave were to be elected by the secret vote of the Sacred College. The most stringent measures were to be taken to ensure seclusion. The bull Aeterni Patris of Gregory XV. (15th of November 1621) is a collection of minute regulations. In it is the rule Gregory compelling each cardinal, before giving his vote, to take the oath that he will elect him whom' he shall judge to be the most worthy; it also makes rules for the forms of voting and of the voting papers, for the counting, the scrutiny, and in fact all the processes of the election. A second bull , Decet Romanum Pontificem, of the 12th of March 1622, fixed the ceremonial of the conclave with such minuteness that it has not been changed since.

All previous legislation concerning the conclave was codified and renewed by Pius X.'s bull, Vacante Sede Apostolico (Dec. 25, 1904), which abrogates the earlier texts, except Leo XIII. 's constitution

Praedecessores Nostri (May 24, 1882), authorizing occasional derogations in circumstances of difficulty, e.g. the death of a pope away from Rome or an attempt to interfere with the liberty of the Sacred College. The bull of Pius X. is rather a codification than a reform, the principal change being the abolition of the scrutiny of accession and the substitution of a second ordinary scrutiny during the same session.

On some occasions exceptional circumstances have given rise to transitory measures. In 1797 and 1798 Pius VI. authorized the cardinals to act contrary to such of the laws concerning the conclave as a majority of them should decide not to observe, as being impossible in practice. Similarly Pius IX., by means of various r-cts which remained secret up till 1892, had taken the most minute precautions in order to secure a free and rapid election, and to avoid all interference on the part of the secular powers. We know that the conclaves in which Leo XIII. and Pius X. were elected enjoyed the most complete liberty, and the hypothetical measures foreseen by Pius IX. were not applied.

Until after the Great Schism the conclaves were held in

various towns outside of Rome; but since then they

The have all been held in Rome, with the single exception

at Rome, of the conclave of Venice (1800), and in most cases

in the Vatican.

There was no place permanently established for the purpose, but removable wooden cells were installed in the various apart- ments of the palace, grouped around the Sistine chapel, in which the scrutinies took place. The arrangements prepared in the Quirinal in 1823 did duty only three times, and for the most recent conclaves it was necessary to arrange an inner enclosure within the vast but irregular palace of the Vatican.- Each cardinal is accompanied by a clerk or secretary, known for this reason as a conclavist, and by one servant only. With the officials of the conclave, this makes about two hundred and fifty persons who enter the conclave and have no further com- munication with the outer world save by means of turning-boxes. Since 1870 the solemn ceremonies of earlier times have naturally not been seen; for instance the procession which used to celebrate the entry into conclave; or the daily arrival in pfo- wocedure. ces sion of tne clergy and the brotherhoods to enquire at the ” rota ” (turning-

box) of the auditors of the Rota: ” Habemusne Pontificem? ” and their return accompanied by the chanting of the ” Veni Creator “; or the ” Marshal of the Holy Roman Church and perpetual guardian of the conclave ” visiting the churches in state. But a crowd still collects morning and evening in the great square of St Peter’s, towards the time of the completion of the vote, to look for the smoke which rises from the burning of the voting-papers after each session; when the election has not been effected, a little straw is burnt with the papers, and the column of smoke then apprises the spectators that they have still no pope. Within the conclave, the cardinals, alone in the common hall, usually the Sistine chapel, proceed morning and evening to their double vote, the direct vote and the ” accessit.” Sometimes these sessions have been very numerous; for example, in 1740, Benedict XIV. was only elected after 255 scrutinies; on other occasions, however, and

notably in the case of the last few popes, a well-defined majority has soon been evident, and there have been but few scrutinies. Each vote is immediately counted by three scrutators, appointed in rotation, the most minute precautions being taken to ensure that the voting shall be secret and sincere. When one cardinal has at last obtained two-thirds of the votes, the dean of the car- dinals formally asks him whether he accepts his election, and what name he wishes to assume. As soon as he has accepted, the first ” obedience ” or ” adoration ” takes place, and immediately after the first cardinal deacon goes to the Loggia of St Peter’s and announces the great news to the assembled people. The conclave is dissolved; on the following day take place the two other ” obediences,” and the election is officially announced to the various governments. If the pope be not a bishop (Gregory XVI. was not), he is then consecrated; and finally, a few days after his election, takes place the coronation, from which the ponti- ficate is officially dated. The pope then receives the tiara with the’triple crown, the sign of his supreme spiritual authority. The ceremony of the coronation goes back to the 9th century, and the tiara, in theformof ahighconicalcap,isequallyancient (seeTiARA) . In conclusion, a few words should be said with regard to the right of veto. In the 16th and 17th centuries the character of the conclaves was determined by the influence of what ,

were then known as the ” factions,” i.e. the forma- O tveto. tion of the cardinals into groups according to their nationality or their relations with one of the Catholic courts of Spain, France or the Empire, or again according as they favoured the political policy of the late pope or his prede- cessor. These groups upheld or opposed certain candidates. The Catholic courts naturally entrusted the cardinals ” of

the crown," i.e. those of their nation, with the mission of removing, as far as lay in their power^ candidates who were distasteful to their party; the various governments could even make public their desire to exclude certain candidates. But they soon claimed an actual right of formal and direct exclusion, which should be notified in the conclave in their name by a cardinal charged with this mission, and should have a decisive effect; this is what has been called the right of veto. We cannot say pre- cisely at what time during the 16th century this transformation of the practice into a right, tacitly accepted by the Sacred College, took place; it was doubtless felt to be less dangerous formally to recognize the right of the three sovereigns each to object to one candidate, than to face the inconvenience of objections, such as were formulated on several occasions by Philip II., which, though less legal in form, might apply to an indefinite number of candidates. The fact remains, however, that it was a right based on custom, and was not supported by airy text or written concession; but the diplomatic right was straightforward and definite, and was better than the intrigues of former days. During the 19th century Austria exercised, or tried to exercise, the right of veto at all the conclaves, except that which elected Leo XIII. (1878); it did so again at the conclave of 1903. On the 2nd of August Cardinal Rampolla had received twenty-nine votes, when Cardinal Kolzielsko Puzina, bishop of Cracow, declared that the Austrian government opposed the election of Cardinal Rampolla; the Sacred College considered that it ought to yield, and on the 4th of August elected Cardinal Sarto, who took the name of Pius X. By the bull Commissum Nobis (January 20, 1904), Pius X. suppressed all right of " veto " or " exclusion " on the part of the secular governments, and forbade, under pain of excommunication reserved to the future pope, any cardinal or conclavist to accept from his government the charge of proposing a " veto," or to exhibit it to the conclave under any form.

Bibliography. — The best and most complete work is Lucius Lector, Le Conclave, origine, histoire, organisation, legislation ancienne et moderne (Paris, 1894). See also Ferraris, Promiita Bibliotheca, s. v. Papa, art. i. ; Moroni, Dizionario di erudizione storico-ecclesi- asiica, s. v. Conclave, Conclavisti, Cetta, Elezione, Esclusiva; Bouix, De Curia Romana, part i. c. x. ; De Papa, part vii. (Paris, 1859, 1870); Barbier de Montault, Le Conclave (Paris, 1878). On the conclave of Leo XIII., R. de Cesare, Conclave d\Leone XIII. (Rome, 1888). On the conclave of Pius X. : an eye-witriess (Card. Mathieu),

Les Derniers Jours de Leon XIII el le conclave (Paris, 1904). See further, for the right of veto: Phillips, Kirchenrecht, t. v. p. 138; Sagmiiller, Die Papstwahlen und die Staale (Tubingen, 1890); Die Papstwahlbullen und das staatliche Recht des Exclusive (Tubingen, 1892); Wahrmund, Ausschliessungsrecht der katholiscken Staaten (Vienna, 1888). (A. Bo.*)

CONCORD, a township of Middlesex county, Massachusetts, U.S.A., about 20 m. N.W. of Boston. Pop. (1900) 5652; (1910, U.S. census) 6421. Area 25 sq. m. It is traversed by the Boston & Maine railway. Where the Sudbury and Assabet unite to form the beautiful little Concord river, celebrated by Thoreau, is the village of Concord, straggling, placid and beautiful, full of associations with the opening of the War of Independence and with American literature. Of particular interest is the ” Old Manse,” built in 1765 for Rev. William Emerson, in which his grandson R. W. Emerson wrote Nature, and Hawthorne his Mosses from an Old Manse, containing a charming descrip- tion of the building and its associations. At Concord there is a state reformatory, whose inmates, about 800 in number, are employed in manufacturing various articles, but otherwise the town has only minor business and industrial interests. The introduction of the ” Concord ” grape, first produced here by Ephraim Bull in 1853, is said to have marked the beginning of the profitable commercial cultivation of table grapes in the United States. Concord was settled and incorporated as a township in 1635, and was (with Dedham) the first settlement in Massachusetts back from the sea-coast. A county convention at Concord village in August 1774 recommended the calling of the first Provincial Congress of Massachusetts — one of the first independent legislatures of America — which assembled here on the nth of October 1774, and again in March and April 1775. The village became thereafter a storehouse of provisions and munitions of war, and hence became the objective of the British expedition that on the 19th of April 1775 opened with the armed conflict at Lexington (q.v.) the American War of Inde- pendence. As the British proceeded to Concord the whole country was rising, and at Concord about 500 minute-men confronted the British regulars who were holding the village and searching for arms and stores. Volleys were exchanged, the British retreated, the minute-men hung on their flanks and from the hillsides shot them down, driving their columns on Lexington. A granite obelisk, erected in 1837, when Emerson wrote his ode on the battle, marks the spot where the first British soldiers fell; while across the stream a fine bionze ” Minute-Man ” (1875) by D. C. French (a native of Concord) marks the spot where once ” the embattled farmers stood and fired the shot heard round the world ” (Emerson). Concord

was long one of the shire-townships of Middlesex county, losing this honour in 1867. The village is famous as the home of R. W. Emerson, Nathaniel Hawthorne, Henry D, Thoreau, Louisa M. Alcott and hei father, A. Bronson Alcott, who maintained here from 1879 to 1888 (in a building still standing) the Concord school of philosophy, which counted Benjamin Peirce, W. T. Harris, Mrs J. W. Howe, T. W. Higginson, Professor William James and Emerson among its lecturers. Emerson, Hawthorne, Thoreau and the Alcotts are buried here in the beautiful Sleepy Hollow Cemetery. Of the various orations (among others one by Edward Everett in 1825) that have been delivered at Concord anniversaries perhaps the finest is that of George William Curtis, delivered in 1875.

See A. S. Hudson, The History of Concord, vol. i. (Concord, 1904) ; G. B. Bartlett, Concord: Historic, Literary and Picturesque (Boston, 1885); and Mrs J. L. Swayne, Story of Concord (Boston, 1907).

CONCORD, a city and the county-seat of Cabarrus county, North Carolina, U.S.A., on the Rocky river, about 150 m. W.S.W. of Raleigh. Pop. (1890) 4339; (1900) 7910 (1789 ne- groes); (1910) 8715. It is served by the Southern railway. Concord is situated in a cotton-growing region, and its chief interest is in the manufacture of cotton goods. The city is the seat of Scotia seminary (for negro girls), founded in 1870 and under the care of the Presbyterian Board of Missions for Freed- men, Pittsburg, Pa. Concord was laid out in 1793 and was first incorporated in 1 8 5 1 .

CONCORD, the capital of New Hampshire, U.S.A., and the county-seat of Merrimack county, on both sides of the Merrimac river, about 75 m. N.W. of Boston, Massachusetts. Pop. (1890) 17,004; (1900) 19,632, of whom 3813 were foreign-born; (1910, census) 21,497. Concord is served by the Boston & Maine railway. The area of the city in 1906 was 45-16 sq. m. Concord has broad streets bordered with shade trees; and has several parks, including Penacook, White, Rollins and the Contoocook river. Among the principal buildings are the state capitol, the state library, the city hall, the county court-house, the post-office, a public library (17,000 vols.), the state hospital, the state prison, the Centennial home for the aged, the Margaret Pillsbury memorial hospital, the Rolfe anri Rumford asylum for orphan girls, founded by Count Rumford’s daughter, and some fine churches, including the Christian Science church built by Mrs Eddy. There are a soldiers’ memorial arch, a statue of Daniel Webster by Thomas Ball, and statues of John P. Hale, John Stark, and Commodore George H; Perkins, the last by Daniel C. French; and at Penacook, 6 m. N.W. of Concord, there is a monument to Hannah Dustin (see Haverhill) . Amon g the

educational institutions are the well-known St Paul's school for boys (Protestant Episcopal, 1853), about 2 m. W. of the city, and St Mary's school for girls (Protestant Episcopal, 1885). From 1847 to *867 Concord was the seat of the Biblical Institute (Methodist Episcopal), founded in Newbury, Vermont, in 1841, removed to Boston as the Boston Theological Seminary in 1867, and after 1871 a part of Boston University. The city has various manufactures, including flour and grist mill products, silver ware, cotton and woollen goods, carriages, harnesses and leather belting, furniture, wooden ware, pianos and clothing; the Boston & Maine Railroad has a large repair shop in the city, and there are valuable granite quarries in the vicinity. In 1905 Concord ranked third among the cities of the state in the value of its factory products, which was $6,387,372, being an increase of 51-7% since 1900. When first visited by the English settlers, the site of Concord was occupied by Penacook Indians; a trading post was built here about 1660. In 1725 Massachusetts granted the land in this vicinity to some of her citizens; but this grant was not recognized by New Hampshire, whose legislature issued (1727) a grant (the Township of Bow) overlapping the Massachusetts grant, which was known as Penacook or Penny Cook. The New Hampshire grantees undertook to establish here a colony of Londonderry Irish; but the Massachusetts settlers were firmly established by the spring of 1727,- Massachusetts definitely assumed jurisdiction in 1 73 1, and in 1734 her general court incorporated the settle- ment under the name of Rumford. The conflicting rights of Rumford and Bow gave rise to one of the most celebrated of colonial land cases, and although the New Hampshire authorities enforced their claims of jurisdiction, the privy council in 1755 confirmed the Rumford settlers in their possession. In 1765 the name was changed to the " parish of Concord," and in 1784 the town of Concord was incorporated. Here, for some years before the War of American Independence, lived Benjamin Thompson, later Count Rumford. In 1778 and again in 1781- 1782 a state constitutional convention met here; the first New Hampshire legislature met at Concord in 1782; the convention which ratified for New Hampshire the Federal Constitution met here in 1788; and in 1808 the state capital was definitely estab- lished here. The New Hampshire Patriot, founded here in 1808 (and for twenty years edited) by Isaac Hill (1788-1851), who was a member of the United States Senate in 1831-1836, and governor of New Hampshire in 1 836-1 839, became one of the leading exponents of Jacksonian Democracy in New England. In 18 14 the Middlesex Canal, connecting Concord with Boston, was completed. A city charter granted by the legislature in 1849 was not accepted by the city until 1853.

See J. O. Lyford, The History of Concord, New Hampshire (City History Commission) (2 vols., Concord, 1903); Concord Town Records, 1732-1830 (Concord, 1894) ; J. B. Moore, Annals of Concord, 1726-1821 (Concord, 1824); and: Nathaniel Bouton, The History 0} Concord (Concord, 1856).

CONCORD, BOOK OF {Liber Concordiae), the collective documents of the Lutheran confession, consisting of the Confessio Augustana, the Apologia Confessionis Augustanae, the Articula Smalcaldici, the Catechismi Major et Minor and the Formula Concordiae. This last was a formula issued on the 25th of June 1580 (the jubilee of the Augsburg Confession) by the Lutheran Church in an attempt to heal the breach which, since the death of Luther, had been widening between the extreme Lutherans and the Crypto-Calvinists. Previous attempts at concord had been made at the request of different rulers, especially by Jacob Andrea with his Swabian Concordia in 1573, and Abel Scher- dinger with the Maulbronn Formula in 1 575. In 1 576 the elector of Saxony called a conference of theologians at Torgau to discuss these two efforts and from them produce a third. The Book of Torgau was evolved, circulated and criticized; a new committee, prominent on which was Martin Chemnitz, sitting at Bergen near Magdeburg, considered the criticisms and finally drew up , the Formula Concordiae. It consists of (a) the “Epitome,” (b) the ” Solid Repetition and Declaration,” each part comprising twelve articles; and was accepted by Saxony, WUrttemberg, Baden among other states, but rejected by Hesse, Nassau and Holstein. Even the free cities were divided, Hamburg and Liibeck for, Bremen and Frankfort against. Hungary and Sweden accepted it, and so finally did Denmark, where at first it was rejected, and its publication made a crime punishable by death. In spite of this very limited reception the Formula Concordiae has always been reckoned with the five other docu- ments as of confessional authority.

See P. Schaff, Creeds of Christendom, i. 258-340, iii. 92-180.

CONCORDANCE (Late Lat. concordantia, harmony, from cum, with, and cor, heart), literally agreement, harmony; hence derivatively a citation of parallel passages, and specifically an alphabetical arrangement, of the words contained in a book with citations of the passages in which they occur. Concordances in this last sense were first made for the Bible. Originally the word was only used in this connexion in the plural concordantiae, each group of parallel passages being properly a concordantia. The Germans distinguish between concordances of things and concordances of words, the former indexing the subject matter of a book (” real ” concordance), the latter the words (” verbal ” concordance).

The original impetus to the making of concordances was due to the conviction that the several parts of the Bible are consistent with each other, as parts of a divine revelation, and may be com- bined as harmonious elements in one system of spiritual truth. To Anthony of Padua (1195-1231) ancient tradition ascribes the first concordance, the anonymous Concordantiae Morales, of which the basis was the Vulgate. The first authentic work of the kind was due to Cardinal Hugh of St Cher, a Dominican monk (d. 1263), who, in preparing for a commentary on the Scriptures, found the need of a concordance, and is reported to have used for the purpose the services of five hundred of his brother monks. This concordance was the basis of two which succeeded in time and importance, one by Conrad of Halberstadt (fl. c. 1290) and the other by John of Segovia in the next century. This book was published in a greatly improved and amplified form in the middle of the 19th century by David Nutt, of London, edited by T. P. Dutripon. The first Hebrew concordance was compiled in 1437-1445 by Rabbi Isaac Nathan b. Kalonymus of Aries. It was printed at Venice in 1523 by Daniel Bomberg, in Basel in 1556, 1569 and 1581. It was published under the title Meir Natib, ” The Light of the Way.” In 1556 it was translated into Latin by Johann Reuchlin, but many errors appeared in both the Hebrew and the Latin edition. These were corrected by Marius de Calasio, a Franciscan friar, who published a four volume folio Concordantiae Sacr. Bibl. Hebr. et Latin, at Rome, 1621, much enlarged, with proper names included. An- other concordance based on Nathan’s was Johann Buxtorf the elder’s Concordantiae Bibl. Ebraicae nova et artificiosa methodo dispositae, Basel, 1632. It marks a stage in both the arrangement and the knowledge of the roots of words, but can only be used by those who know the massoretic system, as the references are

made by Hebrew letters and relate to rabbinical divisions of the Old Testament. Calasio’s concordance was republished in London under the direction of William Romaine in 1747-1749, in four volumes folio, under the patronage of all the monarchs of Europe and also of the pope. In 1754 John Taylor, D.D., a Presbyterian divine in Norwich, published in two volumes the Hebrew Concordance adapted to the English Bible, disposed after the mariner of Buxtorf. This was the most complete and con- venient concordance up to the date of its publication. In the middle of the 19th century Dr Julius Furst issued a thoroughly revised edition of Buxtorf ‘s concordance. The Hebrdischen und chalddischeti Comordanz zu den Heiligen Schriften Alien Testaments (Leipzig, 1840) carried forward the development of the concordance in several directions. It gave (1) a corrected text founded on Harm’s Vanderhoogt’s Bible; (2) the Rabbinical meanings; {3)

explanations in Latin, and illustrations from the three Greek versions, the Aramaic paraphrase, and the Vulgate; (4) the Greek words employed by the Septuagint as renderings of the Hebrew; (5) notes on philology and archae- ology, so that the concordance contained a Hebrew lexicon. An English translation by Dr Samuel Davidson was published in 1867. A revised edition of Buxtorf's work with additions from Furst's was published by B. Bar (Stettin, 1862). A new concordance embodying the matter of all previous works with lists of proper names and particles was published by Solomon Mandelkern in Leipzig (1896); a smaller edition of the same, without quotations, appeared in 1900. There are also concord- ances of Biblical proper names by G. Brecher (Frankfort-on- Main, 1876) and Schusslovicz (Wilna, 1878).

A Concordance to the Septuagint was published at Frankfort in 1602 by Conrad Kircher of Augsburg; in this the Hebrew words are placed in alphabetical order and the Greek words by which they are translated are placed under them. A Septuagint concordance, giving the Greek words in alphabetical order, was published in 17 18 in two volumes by Abraham Tromm, a learned minister at Groningen, then in the eighty-fourth year of his ager It gives the Greek words in alphabetical order; a Latin transla- tion; the Hebrew word or words for which the Greek term is used by the Septuagint; then the places where the words occur in the order of the books and chapters; at the end of the quota- tions from the Septuagint places are given where the word occurs in Aquila, Symmachus and Theodotion, the other Greek translations of the O. T.; and the words of the Apocrypha follow in each case. Besides an index to the Hebrew and Chaldaic words there is another index which contains a lexicon to the Hexapla of Origen. In 1887 (London) appeared the Handy Concordance of the Septuagint giving various readings from Codices Valicanus, Alexandrinus, Sinaiticus and Ephraemi, with an appendix of words from Origen' s Hexapla, not found in the above manuscripts, by G. M., without quotations. A work of the best modern scholarship was brought out in 1897 by the Clarendon Press, Oxford, entitled A Concordance to the Septuagint and the other Greek versions of the Old Testament including the Apocryphal Books, by Edwin Hatch and H. A. Redpath, assisted by other scholars; this was completed in 1900 by a list of proper names.

The first Greek concordance to the New Testament was published at Basel in 1546 by Sixt Birck or Xystus Betuleius (1500-1554), a philologist and minister of the Lutheran Church. This was followed by Stephen's concordance (1594) planned by Robert Stephens and published by Henry, his son. Then in 1638 came Schmied's Tanieiov,

which has been the basis of subsequent concordances to the New Testament. Erasmus Schmied or Schmid was a Lutheran divine who was professor of Greek in Wittenberg, where he died in 1637. Revised editions of the raixulov were published at Gotha in 1717, and at Glasgow in 1819 by the University Press. In the middle of the 19th century Charles Hermann B ruder brought out a beautiful edition (Tauch- nitz) with many improvements. The apparatus criticus was a triumph of New Testament scholarship. It collates the readings of Erasmus, R. Stephens' third edition, the Elzevirs, Mill, Bengel, Webster, Knapp, Tittman, Scholz, Lachmann. It also

gives a selection from the most ancient patristic MSS. and from various interpreters. No various reading of critical value is omitted. An edition of Bruder with readings of Samuel Prideaux Tregelles was published in 1888 under the editorship of Westcott and Hort. The Englishman's Greek Concordance of the New Testament, and the Englishman's Hebrew and Chaldee Concordance, are books intended to put the results of the above- mentioned works at the service- of those who know little Hebrew or Greek. Every word in the Bible is given in Hebrew or Greek, the word is transliterated, and theh every passage in which it occurs is given — the word, however it may be translated, being italicized. They are the work of George V: Wigram assisted by W. Burgh and superintended by S. P. Tregelles, B. Davidson and W. Chalk (1843; 2n d ed. i860). Another book which deserves mention is, A Concordance to the Greek Testament with the English version to each word; the principal Hebrew roots corresponding to the Greek words of the Septuagint, with short critical notes and an index, by John Williams* LL.D., Lond. 1767.

In 1884 Robert Young, author of an analytical concordance mentioned below, brought out a Concordance to the Greek New Testament with a dictionary of Bible Words and Synonyms: this contains a concise concordance to eight thousand changes made in the Revised Testament. Another important work of modern scholarship is the Concordance to the Greek Testament, edited by the Rev. W. F. Moulton and A. E. Geden, according to the texts adopted by Westcott and Hort, Tischendorf, and the English revisers.

The first concordance to the English version of the New Testament was published in London, 1535, by Thomas Gybson. It is a black-letter volume entitled The Concordance of the New Testament most

necessary to be had in the hands of all soche as delyte in the communicacion of any place contayned in ye New Testament.

The first English concordance of the entire Bible was John Marbeck's, A Concordance, that is to sale, a worke wherein by the order of the, letters of the A. B.C. ye mate redely find any worde conteigned in the whole Bible, so often as it is there expressed or mentioned, Lond. 1550. Although Robert Stephens had divided the Bible into verses in 1545, Marbeck does not seem to have known this and refers to the chapters only. In 1550 also ap- peared Walter Lynne's translation of the concordance issued by Bullinger, Jude, Pellican and others of the Reformers, Other English concordances were published by Cotton, Newman, and in abbreviated forms by John Downham or Downame (cd. 1652), Vavasor Powell (161 7-1670), Jackson and Samuel Clarke (1626-1 701). In 1737 Alexander Cruden (

Biblical concordances having familiarized students with the value and use of such books for the systematic study of an author, the practice of making concordances has now become common. There are concordances to the works of Shakespeare, Browning and many other writers. (D. Mm.)

CONCORDAT (Lat. concordatum, agreed upon, from con-, together, and cor, heart), a term originally denoting an agreement between ecclesiastical persons or secular persons, but later applied to a pact concluded between the ecclesiastical authority and the secular authority on ecclesiastical matters which concern both, and, more specially, to a pact concluded between the pope, as head of the Catholic Church, and a temporal sovereign for the regulation of ecclesiastical affairs in the territory of such sove- reign. It is to concordats in this later sense that this article refers.

No one now questions the profound distinction that exists between the two powers, spiritual and temporal, between the church and the state. Yet these two societies are none the less in inevitable relation. The same men go to compose both; and the church, albeit pursuing a spiritual end, cannot dispense with the aid of temporal property, which in its nature depends on the organization of secular society. It follows of necessity that there are some matters which may be called "mixed," and which are the legitimate concern of the two powers, such as church property, places of worship, the appointment and the emoluments of ecclesiastical dignitaries, the temporal rights and privileges of the secular and regular clergy, the regulation of public worship, and the like. The existence of such mixed matters gives rise to inevitable conflicts of jurisdiction, which may lead, and sometimes

have led, to civil war. It is, therefore, to the general interest that all these matters should be settled pacifically, by a common accord; and hence originated those conventions between the two powers which are known by the significant name of concordat, the official name being pactum concordatum or solemnis conventio. In theory these agreements may result from the spontaneous and pacific initiative of the contracting parties, but in reality their object has almost always been to terminate more or less acute conflicts and remedy more or less disturbed situations. It is for this reason that concordats always present a clearly marked character of mutual concession, each of the two powers renouncing certain of its claims in the interests of peace. ,

For the purposes of a concordat the sta te recognizes the official status of the church and Of its ministers and tribunals; guarantees it certain privileges; and sometimes binds itself to secure for it subsidies representing compensation for past spoliations. The pope on his side grants the temporal sovereign certain rights, such as that of making or controlling the appoint- ment of dignitaries; engages to proceed in harmony with the government in the creation of dioceses or parishes; and regular- izes the situation produced by the usurpation of church property &c. The. great advantage of concordats — indeed their principal utility — consists in transforming necessarily unequal unilateral claims into contractual obligations analogous to those which result from an international convention. Whatever the obliga- tions of the state towards the ecclesiastical society may be in pure theory, in practice they become more precise and stable when they assume the nature of a bilateral convention by which the state engages itself with regard to a third party. And reciprocally, whatever may be the absolute rights of the ecclesi- astical society over the appointment of its dignitaries, the administration of its property, and the government of its ad- herents, the exercise of these rights is limited and restricted by the stable engagements and concessions of the concordatory pact, which bind the head of the church with regard to the nations.

A concordat may assume divers forms, — historically, three. The most common in modern times is that of a diplomatic convention debated between the authorized mandatories of the high contracting parties and subsequently ratified by the latter; as, for example, the French concordat of 1801. Or, secondly, the concordat may result from two identical separate

acts, one emanating from the pope and the other from the sovereign ; this was the form of the first true concordat, that of Worms, in 1122. A third form was employed in the case of the concordat of 1516 between Leo X. and Francis I. of France; a papal bull published the concordat in the form of a concession by the pope, and it was afterwards accepted and published by the king as law of the country. The shades which distinguish these three forms are not without significance, but they in no way detract from the contractual character of concordats.

Since concordats are contracts they give rise to that special mutual obligation which results from every agreement freely entered into; for a contract is binding on both parties to it. Concordats are undoubtedly conventions of a particular nature. They may make certain concessions or privileges once given without any corresponding obligation; they constitute for a given country a special ecclesiastical law; and it is thus that writers have sometimes spoken of concordats as privileges. Again, it is quite certain that the spiritual matters upon which concordats bear do not concern the two powers in the same manner and in the same degree; and in this sense concordats are not perfectly equal agreements. Finally, they do not assume the contracting parties to be totally independent, i.e. regard is had to the existence of anterior rights or duties. But with these reservations it must unhesitatingly be said that concordats are bilateral or synallagmatic contracts, from which results an equal mutual obligation for the two parties, who enter into a juridical engagement towards each other. Latterly certain Catholics have questioned this equality of the concor- datory obligation, and have aroused keen discussion. According to Maurice de Bonald {Deux questions sur le concordat de 1801, Geneva, 1871), who exaggerates the view of Cardinal Tarquini (Instil, juris publ. eccl., 1862 and 1868), concordats would be pure privileges granted by the pope; the pope would not be able to enter into agreements on spiritual matters or impose •estraints upon the power of his successors; and consequently he would not bind himself in any juridical sense and would be able freely to revoke concordats, just as the author of a privilege can withdraw it at his pleasure. This exaggerated argument found a certain number of supporters, several of whom neverthe- less sensibly weakened it. But the best canonists, from the Roman professor De Angelis (Prael. juris canon, i. 106) onwards, and all jurists, have victoriously refuted this theory, either by insisting on the principles common to all agreements or by citing the formal text of several concordats and papal acts, which are as explicit as possible. They have thus upheld the true contractual nature of concordats and the mutual juridical obligation

which results from them.

The foregoing statements must not be taken to mean that concordats are in their nature perpetual, and that they cannot be broken or denounced. They have the perpetuity of conven- tions which contain no time limitation; but, like every human convention, they can be denounced, in the form in use for international treaties, and for good reasons, which are summed up in the exigencies of the general good of the country. Never- theless, there is no example of a concordat having been denounced or broken by the popes, whereas several have been denounced or broken by the civil powers, sometimes in the least diplomatic manner, as in the case of the French concordat in 1905. The rupture of the concordat at once terminates the obligations which resulted from it on both sides; but it does not break off all relation between the church and the state, since the two societies continue to coexist on the same territory. To the situation defined by concordat, however, succeeds another situation, more or less uncertain and more or less strained, in which the two powers legislate separately on mixed matters, sometimes not without provoking conflicts.

We cannot describe in detail the objects of concordatory conventions. They bear upon very varied matters, 1 and we must confine ourselves here to a brief resume. In the first place is the official recognition by the state of the Catholic religion

1 These are arranged under thirty-five distinct heads in Nussi's Qwinguaginta conventiones de rebus ecclesiasticis (Rome, 1869).

and its ministers. Sometimes the Catholic religion is declared to be the state religion, and at least the free and public exercise of its worship is guaranteed. Several conventions guarantee the free communication of the bishops, clergy and laity with the Holy See; and this admits of the publication and execution of apostolic letters in matters spiritual. Others define those affairs of major importance which may be or must be referred to the Holy See by appeal, or the decision of which is reserved to the Holy See. On several occasions concordats have established a new division of dioceses, and provided that future erections or divisions should be made by a common accord. Analogous provisions have been made with regard to the territorial divisions within the dioceses; parishes have been recast, and the consent of the two authorities has been required for the establishment of new parishes. As regards candidates for ecclesiastical offices, the concordats concluded with Catholic nations regularly give the

sovereign the right to nominate or present to bishoprics, often also to other inferior benefices, such as canonries, important parishes and abbeys; or at least the choice of the ecclesiastical authority is submitted to the approval of the civil power. In all cases canonical institution (which confers ecclesiastical jurisdiction) is reserved to the pope or the bishops. In countries where the head of the state is not a Catholic, the bishops are regularly elected by the chapters, but the civil power has the right to strike out objectionable names from the list of candidates which is previously submitted to it. Other conventions secure the exercise of the jurisdiction of the bishops in their diocese, and determine precisely their authority over seminaries and other ecclesiastical establishments of instruction and education, as well as over public schools, so far as concerns the teaching of religion. Certain concordats deal with the orders and congregations of monks and nuns with a view to subjecting them to a certain control while securing to them the legal exercise of their activities. Ecclesiastical immunities, such as reservation of the criminal cases of the clergy, exemption from military service and other privileges, are expressly maintained in a cer- tain number of pacts. One of the most important subjects is that of church property. An agreement is come to as to the conditions on which pious foundations are able to be made; the measure in which church property shall contribute to the public expenses is indicated; and, in the 19th century, the position of those who have acquired confiscated church property is regularized. In exchange for this surrender by the church of its ancient property the state engages to contribute to the subsistence of the ministers of public worship, or at least of certain of them.

Scholars agree in associating the earliest concordats with the celebrated contest about investitures (q.v.), which so profoundly agitated Christian Europe in the nth and 12th centuries. The first in date is that which was concluded for England with Henry I. in 1 107 by the efforts of St Anselm. The convention of Sutri of nil between Pope Paschal II. and the emperor Henry V. having been rejected, negotiations were resumed by Pope Calixtus II. and ended in the concordat of Worms (11 22), which was confirmed in 1177 by the convention between Alexander III. and the emperor Frederick I. In this concordat a distinction was made between spiritual investiture, by the ring and pastoral staff, and lay or feudal investiture, by the sceptre. The emperor renounced investiture by ring and staff, and permitted canonical elections; the pope on his part recognized the king’s right to perform lay investiture and to assist at elections. Analogous to this convention was the concordat concluded between Nicholas IV. and the king of Portugal in 1289.

The lengthy discussions on ecclesiastical benefices in Germany ended finally in the concordat of Vienna, promulgated by Nicholas V. in 1448. Already at the council of Constance attempts had been made to reduce the excessive papal reserva- tions and taxes in the matter of benefices, privileges which had been established under the Avignon popes and during the Great Schism; for example, Martin V. had had to make with the different nations special arrangements which were valid for five years only, and by which he renounced the revenues of vacant benefices. The council of Basel went further: it suppressed

annates and all the benefice reservations which did not appear in the Corpus Juris. Eugenius IV. repudiated the Basel decrees, and the negotiations terminated in what was called the ” con- cordat of the princes,” which was accepted by Eugenius IV. on his death-bed (bulls of February 5 and 7, 1447). In February 1448 Nicholas V. concluded the arrangement,which took the name of the concordat of Vienna. This concordat, however, was not received as law of the Empire. In Germany the concessions made to the pope and the reservations maintained by him in the matter of taxes and benefices were deemed excessive, and the prolonged discontent which resulted was one of the causes of the success of the Lutheran Reformation.

In Fiance the opposition to the papal exactions had been still more marked. In 1438 the Pragmatic Sanction of Bourges adopted and put into practice the Basel decrees, and in spite of the incessant protests of the Holy See the Pragmatic was observed throughout the 15th century, even after its nominal abolition by Louis XI. in 1461. The situation was modified by the con- cordat of Bologna, which was personally negotiated by Leo X. and Francis I. of France at Bologna in December 1515, inserted in the bull Primitiva (August 18, 1516), and promulgated as law of the realm in 1517, but not without rousing keen opposition. All bishoprics, abbeys and priories were in the royal nomination, the canonical institution belonging to the pope. The pope pre- served the right to nominate to vacant benefices in curia and to certain benefices of the chapters, but all the others were in the nomination of the bishops or other inferior collators. However, the exercise of the pope’s right of provision still left considerable scope for papal intervention, and the pope retained the annates.

In the 17th century we have only to mention the concordat between Urban VIII. and the emperor Ferdinand II. for Bohemia in 1640. In the

18th century concordats are numerous: there are two for Spain', in 1737 and 1753; two for the duchy of Milan, in 1757 and 1784; one for Poland, in 1736; five for Sardinia and Piedmont, in 1727, 1741, 1742, 1750 and 1770; and one for the kingdom of the Two Sicilies in 1741.

After the political and territorial upheavals which marked the end of the 18th century and the beginning of the 19th, all these concordats either fell to the ground or had to be recast. In the 19th century we find a long series of concordats, of which a good number are still in force. The first in date and importance is that of 1801, concluded for France between Napoleon, First Consul, and Pius VII. after laborious negotiations. Save in the provisions relating to ecclesiastical benefices, all the property of which had been confiscated, it reproduced the concordat of 1316. The pope condoned those who had acquired church property; and by way of compensation the government engaged to give the bishops and cures suitable salaries. The concordat was solemnly promulgated on Easter Day 1802, but the government had added to it uni- lateral provisions of Gallican tendencies, which were known as the Organic Articles. After having been the law of the Church of France for a century, it was denounced by the French govern- ment in 1905. It remains, however, partly in force for Belgium and Alsace-Lorraine, which formed part of French territory in 1801.

We conclude with a brief chronological survey of the concordats during the 19th century, some now abrogated or replaced, others maintained. It must be observed that the denunciation of a concordat by a nation does not necessarily entail the separa- tion of the church and the state in that country or the rupture of diplomatic relations with Rome.

1803. For the Italian republic, between Napoleon and Pius VII., analogous to the French concordat; abrogated.

1813. It is impossible to designate as a concordat the conces- sions which were wrested by violence from Pius VII. when ill and in seclusion at Fontainebleau, and which he at once retracted.

181 7. For Bavaria; still in force.

1817. New French concordat, in which Louis XVIII. en- deavoured to revive the concordat of 1516; but it was not put to the vote in the chambers, and never came into force.

1817. For Piedmont, completed in 1836 and 1841; was

suppressed, like all other Italian concordats, by the formation of the

kingdom of Italy.

1818. For the Two Sicilies, completed in 1834; lasted until the invasion of the kingdom of Naples by Piedmont.

182 1. For Prussia; still in force.

1821. For the Rhine provinces not incorporated in Prussia, with the special object of regulating episcopal elections; con- cerned Wurttemberg, Baden, Hesse, Saxony, Nassau, Frankfort, the Hanseatic towns, Oldenburg and Waldeck. This first concordat was immediately suspended, and was not ratified until 1827; it is partially maintained. It had to be replaced by new concordats concluded with Wurttemberg in 1857 and the grand-duchy ,of Baden in 1859; but these conventions, not having been ratified by those countries, never came into force.

1824. For the kingdom of Hanover; maintained.

1827. For Belgium and Holland; abandoned by a common accord.

1828 and 1845. For Switzerland, for the reorganization of the bishoprics of Basel and Soleure; in force.

1847. For Russia, never applied by Russia. It was followed by several partial conventions.

1851. For Tuscany; lasted until the formation of the kingdom of Italy.

1851. For Spain, completed in 1859 and 1888; in force.

A convention on the religious orders was concluded in 1904, but had not received the assent of the Senate in 1908.

1855. For Austria; denounced in 1870. Several of its provisions are maintained by unilateral Austrian laws. The emperor of Austria continues to nominate to bishoprics by virtue of rights anterior to this concordat.

1857. For Portugal, completed in 1886 for the Portuguese possessions in the Indies; in force.

1886. For Montenegro; in force.

The numerous concordats concluded towards the middle of the 19th century with several of the South American republics either have not come into force or have been denounced and replaced by a more or

less pacific modus vivendi.

For texts see Vincenzio Nussi, Quinquaginta conventiones de rebus ecclesiasticis (Rome, 1869; Mainz, 1870); Branden, Concordata inter S. Sedem et inclytam nationem Germaniae, &c. (undated). On the nature and obligation of concordats see Mgr. Giobbio, I Con- cordati (Monza, 1900) ; idem, Lezioni di diplomazia ecclesiastica (Rome, 1 899-1 903) ; Cardinal Cavagnis, Inshtutiones juris publici ecclesiastici (Rome, 1906). For the French concordats see A. Baudrillard, Quatre cents ans de concordat (Paris, 1905) ; Boulay de la Meurthe, Documents sur la negociation du concordat et sur les autres rapports de la France avec le Saint-Siege (Paris, 1891-1905) ; Cardinal Mathieu, Le Concordat de 1801 (Paris, 1903) ; E. Sevestre, Le Con- cordat de 1801, I'histoire, le texte, la destinee (Paris, 1905). On the relations between the church and the state in various countries see Vering, Kirchenrecht, §§ 30-53. (A. Bo.*)

CONCORDIA, a Roman goddess, the personification of peace and goodwill. Several temples in her honour were erected at Rome, the most ancient being one on the Capitol, dedicated to her by Camillus (367 B.C.), subsequently restored by Livia, the wife of Augustus, and consecrated by Tiberius (a.d. 10). Other temples were frequently built to commemorate the restoration of civil harmony. Offerings were made to Concordia on the birthdays of emperors, and Concordia Augusta was worshipped as the promoter of harmony in the imperial house- hold. Concordia was represented as a matron holding in her right hand a patera or an olive branch, and in her left a cornu copiae or a sceptre. Her symbols were two hands joined together, and two serpents entwined about a herald's staff.

CONCORDIA (mod. Concordia Sagittaria), an ancient town of Venetia, in Italy, 16 ft. above sea-level, 31 m. W. of Aquileia, at the' junction of roads to Altinum and Patavium, to Opitergium (and thence either to Vicetia and Verona, or Feltria and Triden- tum), to Noricum by the valley of the Tilaventus (Tagliamento) , and to Aquileia. It was a mere village until the time of Augustus, who made it a colony. Under the later empire it was one of the most important towns of Italy; it had a strong garrison and a factory of missiles for the army. The cemetery of the garrison has been excavated since 1873, and a large number of important

inscriptions, the majority belonging to the end of the 4th and the beginning of the 5th centuries, have been discovered. It was taken and destroyed by Attila in a.d. 452. Considerable remains of the ancient town have been found — parts of the city walls, the sites of the forum and the theatre, and probably that of the arms factory. The objects found are preserved at Portogruaro, ij m. to the N. The see of Concordia was founded at an early period, and transferred in 1339 to Portogruaro, where it still remains. The baptistery of Concordia was probably erected in 1 100.

See Ch. Hiilsen in Pauly-Wissowa, Realencyclopadie, iv. (Stuttgart, 1 90 1) 830. (T. As,)

CONCRETE (Lat. concretus, participle of concrescere, to grow together), a term used in various technical senses with the general significance of combination, conjunction, solidity. Thus the building material made up of separate substances combined into one is known as concrete (see below). In mathematics and music, the adjective has been used as synonymous with ” con- tinuous ” as opposed to ” discrete, ” i.e. ” separate, ” ” discon- tinuous.” This antithesis is no doubt influenced by the idea that the two words derive from a common origin, whereas ” discrete ” is derived from the Latin discernere. In logic and also in common language concrete terms are those which signify persons or things as opposed to abstract terms which signify qualities, relations, attributes (so J. S. Mill). Thus the term ” man ” is concrete, while ” manhood ” and ” humanity ” are abstract, the names of the qualities implied. Confusions between abstract and concrete terms are frequent; thus the word ” relation,” which is strictly an abstract term implying connexion between two things or persons, is often used instead of the correct term ” relative ” for people related to one another. Concrete terms are further subdivided as Singular, the names of things regarded as individuals, and General or Common, the names which a number of things bear in common in virtue of their possession of common characteristics. These latter terms, though concrete in so far as they denote the persons or things which are known by them (see Denotation), have also an abstract sense when viewed connotatively, i.e. as implying the quality or qualities in isolation from the individuals. The ascription of adjectives to the class of concrete terms, upheld by J. S. Mill, has been disputed on the ground that adjectives are applied both to concrete and to abstract terms. Hence some logicians make a separate class for adjectives, as being the names neither of things nor of qualities, and describe them as Attributive terms.

CONCRETE, the name given to a building material consisting

generally of a mixture of broken stone, sand and some kind of cement. To these is added water, which combining chemically with the cement conglomerates the whole mixture into a solid mass, and forms a rough but strong artificial stone. It has thus the immense advantage over natural stone that it can be easily moulded while wet to any desired shape or size. Moreover, its constituents can be obtained in almost any part of the world, and its manufacture is extremely simple. On account of these properties, builders have come to give it a distinct preference over stone, brick, timber and other building materials. So popular has it become that besides being used for massive constructions like breakwaters, dock walls, culverts, and for foundations of buildings, lighthouses and bridges, it is also proving its usefulness to the architect and engineer in many other ways. A remarkable extension of the use of concrete has been made possible by the introduction of scientific methods of combining it with steel or iron. The floors and even the walls of important buildings are made of this combination, and long span bridges, tall factory chimneys, and large water-tanks are among the many novel uses to which it has been put. Piles made of steel concrete are driven into the ground with blows that would shatter the best of timber. A fuller description of the combination of steel and concrete will be given later.

The constituents of concrete are sometimes spoken of as the matrix and the aggregate, and these terms, though somewhat old- fashioned, are convenient. The matrix is the lime or cement,

whose chemical action with the added water causes the concrete to solidify; and the aggregate is the broken stone or hard material which is embedded in the matrix. The matrix most commonly used is Portland cement, by far the best and ˆtoente strongest of them all. The subject of its manufacture and examination is a most important and interesting one, and the special article dealing with it should be studied (see Cement), Here it will only be said that before using Portland cement very careful tests should be made to ascertain its quality and con- dition. Moreover, it should be kept in a damp-proof store for a few weeks; and when taken out for use it should be mixed and placed in position as quickly as possible, because rain, or even moist air, spoils it by causing it to set prematurely. The oldest of all the matrices is lime, and many splendid examples of its use by the Romans still exist. It has been to a great extent super- seded by Portland cement, on account of the much greater strength of the latter, though lime concrete is still used in many places for dry foundations and small structures. To be of ser- vice the lime should be what is known as ” hydraulic,” that is, not pure or ” fat,” but containing some argillaceous matter, and should be carefully slaked

with water before being mixed with the aggregate. To ensure this being properly done, the lumps of lime should be broken up small, and enough water to slake them should be added, the lime then being allowed to rest for about forty-eight hours, when the water changes the particles of quicklime to hydrate of lime, and breaks up the hard lumps into a powder. The hydrated lime, after being passed through a fine screen to sort out any lumps unaffected by the water, is ready for concrete making, and if not required at once should be stored in a dry place. Other matrices are slag cement, a com- paratively recent invention, and some other natural and artificial cements which find occasional advocates. Materials like tar and pitch are sometimes employed as a matrix; they are used hot and without water, the solidifying action being due to cooling and to evaporation of the mineral oils contained in them. What- ever matrix is used, it is almost invariably " diluted '.' with sand, the grains of which become coated with the finer particles of the matrix. The sand should be coarse-grained and hard. It should be free from dirt — that is to say, free from clay or soft mud, for instance, which prevents the cement adhering to its particles, or again from sewage matter or any substance which will chemically destroy the matrix. The grains should show no signs of decay, and by preference should be of an angular shape. The sand obtained by crushing granite and hard stones is excellent. When lime is used as a matrix, certain natural earths such as pozzuolana or trass, or, failing these, powdered bricks or tiles, may be used instead of sand with great advantage. They have the property of entering into chemical combination with the lime, forming a hard setting compound, and increasing the hardness of the resulting concrete.

The commonest aggregates are broken stone and natural flint gravel. Broken bricks or tiles and broken furnace slag are some- times used, the essential points being that the aggregate should be hard, clean and sound. Generally speaking,broken stones will be rough and angular, whereas the stones in flint gravel will be comparatively smooth and round. It might be supposed, there- fore,that the broken stone will necessarily be the better aggregate, but this does not always follow. Experience shows that, although spherical pebbles are to be avoided, Portland cement adheres tightly to smooth flint surfaces, and that rough stones often give a less compact concrete than smooth ones on account of the difficulty of bedding them into the matrix when laying the con- crete. In mixing concrete there is always a tendency for the stones to separate themselves from the sand and cement, and to form " pockets " of honeycombed concrete which are neither water-tight nor strong. These are much more liable to occur when the stones -are flat

and angular than when they are round. Modern engineers favour the practice of having the stones of various sizes instead of being uniform, because if these sizes are wisely proportioned the whole mixture can be made more solid, and the rough “pockets” avoided. For first-class work, however, and especially in steel concrete, it is customary to reject very large

stones, and to insist that all shall pass through a ring £ of an inch in diameter.

The water, like all the other constituents of concrete, should be clean and free from vegetable matter. At one time sea-water was thought to be injurious, but modern investigation finds no objection to it except on the score of appearance, efflorescence being more likely to occur when it is used.

Sometimes in massive concrete structures large and heavy stones as big as a man can lift are buried in the concrete after it is laid in position but while it is still wet. The stones should be hard and clean, and care must be taken that they are completely surrounded. Such concrete is known as rubble concrete.

In proportioning the quantities of matrix to aggregate the ideal to be aimed at is to get a concrete in which the voids or air-spaces shall be as small as possible; and as the lime or cement tionsf” * s usuau y by f ar the most expensive item, it is desir- able to use as little of it as is consistent with strength. When natural flint gravel containing both stones and sand is used, it is usual to mix so much gravel with so much lime or cement. The proportions in practice generally run from 3 to i for very strong work, down to 12 to 1 for unimportant work. Some engineers have the sand separated from the stones by screens or sieves and then remixed in definite proportions. When stones and sand are obtained from different sources, their relative proportions have to be decided upon. A common way of doing this is first to choose a proportion of sand to cement, which will probably vary from 1 to 1 up to 4 to 1. It then remains to determine what proportion of stones should be added. For this purpose a large can, whose volume is known, is filled loosely with stones, and the volume of the voids between them is determined by measuring how much water the can will hold in addition to the stones. It is then assumed that the quantity of sand and cement should be equal to the voids. Moreover, the

volume of sand and cement together is generally assumed to be equal to that of the sand alone, as the cement to a large extent fills up voids in the sand. For example, suppose it is resolved to use 2 parts of sand to 1 of cement, and suppose that experiment shows that in a pailful of stones two-fifths of the volume consists of voids, then 2 parts of sand (or sand with cement) will fill voids in 5 parts of stones, and the proportion of cement, sand, stones becomes 1:2:5. There are several weak points in this reasoning, and a more accurate way of determining the best proportions is to try different mixtures of cement, stones and sand, filling them into different pails of the same size, and then ascertaining, by weighing the pails, which mixture is the densest.

In determining the amount of water to be added, several things must be considered. The amount required to combine chemically with the cement is about 16% by weight, but in practice much more than this is used, because of loss by evapora- tion, and the difficulty of ensuring that the water shall be uni- formly distributed. If the situation is cool, the stone hard, and the concrete carefully rammed directly it is laid down and kept moist with damp cloths, only just sufficient to moisten the whole mass is required. On the other hand, water should be given generously in hot weather, also when absorbent stone is used or when the concrete is not rammed. In these cases the concrete should be allowed to take all it can, but an excess of water which would flow away, carrying the cement with it, should be avoided.

The thorough mixing of the constituents is a most important item in the production of good concrete. Its object is to distri- Mlxiag, bute all the materials evenly throughout the mass, and it is performed in many different ways, both by hand and by machine. The relative values of hand and machine work are often discussed. Roughly it may be said that where a large mass of concrete is to be mixed at one or two places a good machine will be of great advantage. On the other hand, where the mixing platform has to be constantly shifted, hand mixing is the more convenient way. In hand mixing it is usual to measure out from gauge boxes the sand, stones and cement or lime in a heap on a wooden platform. Then they are turned once or twice in their dry state by men with shovels. Next water is carefully added, and the mixture again turned, when

it is ready for depositing. For important work and especially for thin structures the number of turnings should be increased. Many types of mixing machines are obtainable; the favourite type is one in which the materials are placed in a large iron box which is made to rotate, thus tumbling the matrix and aggregate over each other again and again.

Another simple apparatus is a large vertical pipe or shoot in which sloping baffle plates or shelves are placed at intervals. The materials are fed in at the top of the shoot and fall from shelf to shelf, the mixing being effected by the various shocks thus given. When mixed the concrete is carried at once to the position required, and if the matrix is quick-setting Portland cement this operation must not be delayed.

One of the few drawbacks of concrete is that, unlike brickwork or masonry, it has nearly always to be deposited within moulds or framing which give it the required shape, and Moulds. which are removed after it is set. Indeed, the trouble and expense of these moulds sometimes prohibit its use. It is essential that they shall be strong and stiff, so as not to yield at all from the pressure of the wet concrete. The moulds for the face of a wall consist generally of wooden shutters, leaning against upright timbers which are secured by horizontal or raking struts to firm ground, or to anything that will bear the weight. If a smooth and neat face is wanted other precautions must be taken. The shutters must be planed, and coated with a mixture of soap and oil, so as to come away easily after the concrete is set. Moreover, when depositing the concrete, a shovel or other tool must be worked between the wet concrete and the shutter. This draws sand and water to the face and prevents the rough stones from showing themselves. Sometimes rough concrete is rendered over with a plaster of cement and sand after the shutters have been removed, but this is liable to peel off and should be avoided.

The method of depositing depends on the situation. If for important walls, or for small scantlings such as steel concrete generally involves, the concrete should be deposited in quite small quantities and very carefully rammed ?a£ os,t ‘ into position. If for massive walls, it is usual to tip it out in large quantities from a barrow or wagon, and simply spread it in layers about a foot thick. Depositing concrete under water for breakwaters and bridge foundations requires special skill and special appliances. It is usually done in one of three ways: — (a) By moulding the concrete ashore into large blocks, which, when sufficiently hard, are lowered through the water into position by a crane or similar machine with the aid of divers. The most notable instance of this type of con- struction was at the port of Dublin, where Mr B. B. Stoney made blocks no less than 350 tons in weight. Each block formed a piece of the quay wall 12 ft. long and 27 ft. high, being made on shore and then deposited in position by floating sheers of special design, (b) By moulding the concrete into what are called ” bag-blocks.” In this system the concrete is filled into bags, which are at once lowered through the water like the blocks. But in this case the

concrete being still wet can adapt itself more or less to the shape of the adjoining bags, and strong rough walls can be built in this way. Sometimes the bags are made of enormous size, as at Aberdeen breakwater, where the contents of each bag weighed 50 tons. The canvas was laid in a hopper barge and there filled with the concrete and sewn up. The enormous bag was then dropped through a door in the bottom of the barge upon the breakwater foundation, (c) By depositing the wet concrete through the water between temporary upright timber frames which form the two faces of the wall. In this case very great care has to be taken to prevent the cement from being washed away from the other constituents when passing through the water. Indeed, this is bound to happen more or less, but it is guarded against by lowering the concrete slowly in a special box, the bottom of which is opened as it reaches the ground on which the concrete is to be laid. This method can only be carried out in still water, and where strong and tight framing can be built which will prevent the concrete from escaping. For small work the box can be replaced by a

Strength.

Durability.

canvas bag secured by a special tripping noose which can be loosened when the bag has reached the ground. The concrete escapes from the bag, which is then drawn up and refilled.

Concrete may be compared with other building materials like masonry or timber from various points of view, such as strength, durability, convenience of building, fire- resistance, appearance and cost. Its strength varies within very wide limits according to the quality and proportions of the constituents, and the skill shown in mixing and placing them. To give a rough idea, however, it may be said that its safe crushing load would be about § cwt. per sq. in. for lime concrete, and 1 to 5 cwt. for Portland cement concrete. The safe tensile strength of Portland cement concrete would be some- thing like one-tenth of its compressive strength, and might be far less. On this account it is usual to neglect the tensile strength of concrete in designing structures, and to arrange the material in such a way that tensile stresses are avoided. Hence slabs or beams of long span should not be built of plain concrete, though when reinforced with steel it is admirably adapted for these purposes.

In regard to durability good Portland cement concrete is one of the most durable materials known. Neither hot, cold, nor wet weather has practically any effect whatever upon it. Frost will not injure it after it has once set, though it is essential to guard it from frost during the opera- tions of mixing and depositing. The same praise cannot, how- ever, be given to lime concrete. Even though the best hydraulic lime be used it is wise to confine it to places where it is not exposed to the air, or to running water, and indeed for important structures the use of lime should be avoided. Good Portland cement is so much stronger than any lime that there are few situations where it is not cheaper as well as better to use the former, because, although cement is the more expensive matrix, a smaller proportion of it will suffice for use. Lime should never be used in work exposed to sea-water, or to water containing chemicals of any kind. Portland cement concrete, on the other hand, may be used without fear in sea-water, provided that certain reasonable precautions are taken. Considerable alarm was created about the year 1887 by the failure of two or three large structures of Portland cement concrete exposed to sea- water, both in England and other countries. The matter was carefully investigated, and it was found that the sulphate of magnesia in the sea-water has a decomposing action on Portland cements, especially those which contain a large proportion of lime or even of alumina. Indeed, no Portland cement is free from the liability to be decomposed by sea-water, and on a moderate scale this action is always going on more or less. But to ensure the permanence of structures in sea-water the great object is to choose a cement containing as little lime and alumina as possible, and free from sulphates such as gypsum; and more important still to proportion the sand and stones in the concrete in such a way that the structure is practically non-porous. If this is done there is really nothing to fear. On the other hand, if the concrete is rough and porous the sea-water will gradually eat into the heart of the structure, especially in a case like a dam, where the water, being higher on one side than the other, constantly forces its way through the rough material, and decomposes the Portland cement it contains.

As regards its convenience for building purposes it may be said roughly that in ” mass ” work concrete is vastly more Coavett- convenient than any other material. But concrete is ieaceand hampered by the fact that the surface always has to appear- be formed by means of wooden or other framing, and ance. j n tne cage j tn j n wa jj s or g 00rs t n ; s framing becomes

a serious item, involving expense and delay. In appearance concrete can rarely if ever rival stone or brickwork. It is true that it can be moulded to any desired shape, but mouldings in concrete generally

give the appearance of being unsatisfactory imitations of stone. Moreover, its colour is not pleasing. These defects will no doubt be overcome as concrete grows in popu- larity as a building material and its aesthetic treatment is better understood. Concrete pavings are being used in buildings of

first importance, the aggregate being very carefully selected, and in many cases the whole mixture coloured by the use of pigments. Care must be taken in their selection, however, as certain colouring matters such as red lead are destructive to the cement. One of the great objections to the appearance of concrete is the fact that soon after its erection irregular cracks invariably appear on its surface. These cracks are probably due to shrinkage while setting, aggravated by changes in tempera- ture. They occur no less in structures of masonry and brickwork, but in these cases they generally follow the joints, and are almost imperceptible. In the case of a smooth concrete face there are no joints to follow, and the cracks become an ugly feature. They are sometimes regulated by forming artificial ” joints ” in the structure by embedding strips of wood or sheet iron at regular intervals, thus forming “lines of weakness,” at which the cracks therefore take place. A pleasing ” rough ” appearance can be given to concrete by brushing it over soon after it has set with a stiff brush dipped in water or dilute acid. Or, if hard, its surface can be picked all over with a bush hammer.

At one time Portland cement concrete was considered to be lacking in fireproof qualities, but now it is regarded as one of the best fire-resisting materials known. Although experi-

Resistance

ments on this matter are badly needed, there is little £, nre ” doubt that good steel concrete is very nearly indestruc- tible by fire. The matrix should be Portland cement, and the nature of the aggregate is important. Cinders have been and are still much favoured for this purpose. The reason for this preference lies in the fact that being porous and full of air, they are a good non-conductor. But they are weak, and modern experience goes to show that a strong concrete is the best, and that probably materials like broken clamp bricks or burnt clay, which are porous and yet strong, are far better than cinders as a fireproof aggregate. Limestone should be avoided, as it soon splits under heat. The steel reinforcement is of immense importance in fireproof work, because, if properly designed, it enables the concrete to hold together and do its work even when it has been cracked by fire and water. On the other hand, the concrete, being a

non-conductor, preserves the steel from being softened and twisted by excessive temperature.

Only very general remarks can be made on the subject of cost, as this item varies greatly in different situations and with the market price of the materials used. But in England it may be said that for massive work such as big walls and foundations concrete is nearly always cheaper than brickwork or masonry. On the other hand, for reasons already given, thin walls, such as house walls, will cost more in concrete. Steel concrete is even more difficult to generalize about, as its use is comparatively new, but even in the matter of first cost it is proving a serious rival to timber and to plate steel work, in floors, bridges and tanks, and to brickwork and plain concrete in structures such as culverts and retaining walls, towers and domes.

Artificial Stoties. — There are many varieties of concrete known as ” artificial stones ” which can now be bought ready moulded into the form of paving slabs, wall blocks and pipes: they are both pleasing in appearance and very durable, being carefully made by skilled workmen. Granolithic, globe granite and synthetic stone are examples of these. Some, such as victoria stone, imperial stone and others, are hardened and rendered non-porous after manufacture by immersion in a solution of silicate of soda. Others, like Ford’s silicate of lime- stone, are practically lime mortars of excellent quality, which can be carved and cut like a sandstone of fine quality.

Steel Concrete. — The introduction of steel concrete (also known as ferroconcrete, armoured concrete, or reinforced concrete) is generally attributed to Joseph Monier, a French gardener, who about the year 1868 was anxious to build some concrete water basins. In order to reduce the thickness of the walls and floor he conceived the idea of strengthening them by building in a network of iron rods. As a matter of fact other inventors were at work before Monier, but he deserves much credit for having pushed his invention with vigour, and for

Cost.

having popularized the use of this invaluable combination. The important point of his idea was that it combined steel and concrete in such a way that the best qualities of each material were brought into play. Concrete is readily procured and

Fig. i. — Expanded Steel Concrete Slab.

easily moulded into shape. It has considerable compressive or crushing strength, but is somewhat deficient in shearing strength, and distinctly weak in tensile or pulling strength. Steel, on the other hand, is easily procurable in simple forms such as long bars, and is exceedingly strong. But it is difficult and expensive to work up into various forms. Concrete has been avoided for making beams, slabs and thin walls, just because its deficiency in tensile strength doomed it to failure in such structures. But if a concrete slab be ” reinforced ” with a network of small steel rods on its under surface where the tensile stresses occur (see fig. i) its strength will be enormously increased. Thus the one point of weakness in the concrete slab is overcome by the addition of steel in its simplest form, and both materials are used to their best advantage. The scientific and practical value of this idea was soon seized upon by various inventors and others, and the number of patented systems of combining steel with concrete is constantly increasing. Many of them are but slight modifications of the older systems, and no attempt will be made here to describe them in full. In England it is customary to allow the patentee of one or other

system to furnish his own designs, but this is as much because he has gained the experience needed for success as because of any special virtue in this or that system. The majority of these systems have emanated from France, where steel concrete is largely used. America and Germany adopted them readily, and in England some very large structures have been | erected with this material. The concrete itself 1 should always be the very best quality, and Portland cement should be used on account of its superiority to all others. The aggregate should be the best obtainable and of different sizes, the stones being freshly crushed and screened to pass through a £ in. ring. Very special care should be taken so to proportion – the sand as to make a perfectly impervious mixture. The proportions generally used are 4 to i and 5 to 1 in the case of gravel concrete, or 1:2: 4 or 1:2ˆ: 6 in the case of broken stone concrete. But, generally speaking, in steel concrete the cost of the cement is but a small item of the whole expense, and it is worth while to be generous with it. If It is used in piles or structures where it is likely to be bruised the proportion of cement should be increased. The mixing and

Section through Intersection. Fig. 2.

laying should all be done very thoroughly; the concrete should be rammed in position, and any old surface of concrete which has to be covered should be cleaned and coated with fresh cement. The

reinforcement mostly consists of mild steel and sometimes of wrought iron: steel, however, is stronger and generally cheaper, so that in English practice it holds the field. It should be mild and is usually specified to have a breaking (tensile) strength of 28 to 32 tons per sq. in., with an elongation of at least 20% in 8 in. Any bar should be capable of being bent cold to the shape of the letter U without breaking it. The steel is generally used in the form of long bars of circular section. At first it was feared that such bars would have a tendency to slip through the concrete in which they were em- bedded, but experiments have shown that if the bar is not painted but has a natural rusty surface a very considerable adhesion between the concrete and steel — as much as 2 cwt. per sq. in. of contact surface- may be relied upon. Many devices are used, however, to ensure the adhesion between concrete and bar being perfect. (1) In the Hennebique system of construction the bars are flattened at the end and split to form a ” fish tail.” (2) In the Ransome system round bars are rejected in favour of square bars, which have been twisted in a lathe in “barley

Fig. 3. — Hennebique System.

sugar ” fashion. (3) In the Habrick system a flat bar simi- larly twisted is used. (4) In the Thacher system a flat bar with projections like rivet heads is specially rolled for this purpose.

(5) In the Kahn system a square bar with ” branches ” is used.

(6) In the ” expanded metal ” system no bars are used, but instead a strong steel netting is manufactured in large sheets by special machinery. It is made by cutting a series of long slots at regular intervals in a plain steel plate, which is then forcibly stretched out sideways until the slots become diamond-shaped openings, and a trellis work of steel without any joints is the result (fig. 2).

The structures in which steel concrete is used may be analysed as consisting essentially of (1) walls, (2) columns, (3) piles, (4) beams, (5) slabs, (6) arches. The designs differ considerably according to which of these purposes the structure is to fulfil.

The effect of reinforcing walls with steel is that they can be made much thinner. The steel reinforcement is generally applied in the form of vertical rods built in the wall at intervals, with lighter horizontal rods which cross the vertical ones, and thus form a network of steel which is buried in the concrete. These rods assist in taking the weight, and the whole network binds the concrete together and prevents it

from p

cracking under a heavy load. The vertical „ h* S t rods should not be quite in the middle of the wall but near the inner and outer faces alternately. Care must be taken, however, that all the rods are covered by at least an

2″ Tube for Pitching file Longitudinal Section.

Fig. 5. — Steel and Concrete Pile (Williams System).

ˆ

~.+ ■+***. .M. V

f SteeJ Win Rings

>

inch of concrete to preserve them from damage by rust or fire. In the Cottancin system the concrete is replaced by bricks pierced with holes through which the vertical rods are threaded ; the horizontal tie-rods are also used, but these do not merely cross the vertical ones, but are woven in and out of them.

Columns have generally to bear a heavier weight than walls, and have to be correspondingly stronger. They have usually been made square with a vertical steel rod at each corner. To prevent these rods from spreading apart they must be tied together

at frequent intervals. In some systems this is done by loops of stout wire connecting each rod to its neighbour, and placed one above the other about every 10 in. up the column

Fig. 6.

Fig. 7.

(figs. 3 and 4). In other systems a stout wire is wound continuously in a spiral form round the four rods. Modern investigation goes to prove that the latter is theoretically the more economical way of using the steel, as the spiral binding wire acts like the binding of a wire gun, and prevents the concrete which it encloses from bursting even under

very great loads.

That steel concrete can be used for piles is perhaps the most astonishing feature in this invention. The fact that a compara- tively brittle material like concrete can be subjected not only to

heavy loads but also £%%■’ to the jar and vibra- llp’tion

problem arises how best to arrange the steel so as to assist the concrete in bearing them. To meet tensile stresses the steel is nearly always inserted in the form of bars running along the beam. Figs. 6 to 9 show how they are arranged for different loading. In each case the object is to place the bars as nearly as possible where the tensile stresses occur. In cases where all the stresses are heavy, that portion of the beam which is under compression is similarly reinforced, though with smaller bars (figs. 10 and 11). But as these tension and compression bars are generally placed near the ˆSM under and upper surface n? of the beam they are of little use in helping to resist the shearing stresses which are great- est at its neutral axis. (See Bridges.) These

■WkAAAM(

Fig. 12.

lL

-m ■;■)■’

Fig. 8.

Fig. 9.

from the blows of a heavy pile ram makes it appear as if its nature and pro- perties had been changed by the steel reinforcement. In a this is un-

Bgˆ” doubtedly the case. ˆˆ A. G. Considered ex- periments have shown that concrete when reinforced is capable of being stretched, without fracture, about twenty times as much as plain concrete. Most of the piles driven in Great Britain have been made on the Hennebique system with four or six longitudinal steel rods tied together by stirrups or loops at frequent intervals. Piles made on the Williams system have a steel rolled joist of I section buried in the heart of the pile, and round it a series of steel wire hoops at regular intervals (fig. 5) . Whatever system is used,

. ..u , .i. .. . 1. .1 care must be taken not

•’ > — /del > ‘•’ ■ – • v \.-. &:•?■ – ^ ‘••- jjjj to batter the head of the

jgjj > pile to pieces with the ^ heavy ram. To prevent FlG – I0 – this an iron ” helmet ”

containing a lining of sawdust is fitted over the head of the pile. The sawdust adapts it- self to the rough shape of the concrete, and deadens the blow to some extent.

But it is in the design of steel concrete beams that the greatest ingenuity has been shown, and almost every patentee of a ” system ” has some new device for arranging the steel reinforce- ment to the best advantage. Concrete by itself, though strong in compression, can offer but little resistance to tensile and shear- ing stresses, and as these stresses always occur in beams the

^

W

Fig. 13.

shearing stresses in a heavily loaded beam would cause it to split horizontally at or near the centre. To prevent this many ingenious devices have been introduced. (1) Perhaps one of the most efficient is a diagonal bracing of steel wire passing to and fro between the upper and lower bars and firmly secured to each by lapping or otherwise (fig. 12); this device is used in the Coignet and other French systems. (2) In the Hennebique system (which has found great favour in England) vertical bands or “stirrups,” as they are generally called, of hoop steel are used (fig. 13). They are of U shape, and passing round the tension bars extend to the top of the beam (figs. 14 and 3). They are exceedingly thin, but being buried in concrete no danger of their perishing from rust is to be feared. (3) In the Bous- siron system a

similar stirrup is FlG – H-— Stirrup (Hennebique System), used, but instead of being vertical the two parts are spread so that each is slightly inclined. (4) In the Coularon system, the stirrups are inclined as in fig. ‘i 5, and consist of rods, the ends of which are hooked over the tension and compression bars. (5) In the Kahn system the stirrups are similarly arranged, but instead of being merely secured to the tension bar, they form an integral part of it like branches on a stem, the bar being rolled to a special section to admit of this. (6) In many systems such as the ” expanded

metal ” system, the ., .. ■ .. ^. —

tension and compres- ^•y-’jVVAl-/.Vy’/i’^

sion rods together with ^^1 ‘ ” ■-•••.- t^s.

the stirrups are all ^J

abandoned in favour of Fig. 15.

a single rolled steel

joist of I section, buried in concrete (see fig. 16). Probably the

weight of steel used in this way is excessive, but the joists are

cheap, readily procurable and easy to handle.

Floor slabs may be regarded as wide and shallow beams, and the remarks made about the stresses in the one apply to the other also; accordingly, the various devices which are used for strengthening beams recur in the slabs. But in a thin slab, with its comparatively small span and light load, the concrete is generally strong enough to bear the shearing stresses unaided, and the reinforcement is devoted to assisting it where the tensile stresses occur. For this purpose many designers simply

use the modification of the Monier system, consisting’ of a horizontal network of crossed steel rods buried in the concrete. ” Expanded metal ” too is admirably adapted for the purpose (fig. 1). In the Matrai system thin wires are used instead of rods, and are securely fastened to rolled steel joists, which form the beams on which the slabs rest; moreover, the wires instead of being stretched tight from side to side of the slab are allowed to sag as much as the thickness of the concrete will allow. In

&PA/M£DSr££L

Fig. 16.

the Williams system small flat bars are used, which are not quite horizontal, but pass alternately over and under the rolled joists which support the slabs.

A concrete arch is reinforced in much the same way as a wall, the stresses being somewhat similar. The reinforcing rods are generally laid both longitudinally and circumferentially. In the case of a culvert the circumferential rods are sometimes laid continuously in the form of a spiral as in the Bordenave system.

To those wishing to pursue the subject further, the following books among others may be suggested : — Sabin, Cement and Concrete (New York) ; Taylor and Thompson, Concrete, Plain and Reinforced (London) ; SutclifFe, Concrete, Nature and Uses (London) ; Marsh and Dunn, Reinforced Concrete (London) ; Twelvetrees, Concrete Steel (London) ; Paul Christophe, Le Belon arme (Paris) ; Buel and Hill, Reinforced Concrete Construction (London). (F. E. W.-S.)

CONCRETION, in petrology, a name applied to nodular or irregularly shaped masses of various size occurring in a great variety of sedimentary rocks, differing in composition from the main mass of the rock, and in most cases obviously formed by some chemical process which ensued after the rock was deposited. As these bodies present so many variations in composition and in structure, it will conduce to clearness if some of the commonest be briefly adverted to. In sandstones there are often hard rounded lumps, which separate out when the rock is broken or weathered. They are mostly siliceous, but sometimes calcareous, and may differ very little in general appearance from the bulk of the sandstone. Through them the bedding passes unin- terrupted, thus showing that they are not pebbles; often in their centres shells or fragments of plants are found. Argillaceous sandstones and flagstones very frequently contain ” clay galls ” or concretionary lumps richer in clay than the remainder of the rock. Nodules of pyrites and of marcasite are common in many clays, sandstones and marls. Their outer surfaces are tuber- culate; internally they commonly have a radiate fibrous structure. Usually they are covered with a dark brown crust of limonite produced by weathering; occasionally imperfect crystalline faces may bound them. Not infrequently (e.g. in the Gault) these pyritous nodules contain altered fossils. In clays also siliceous and calcareous concretions are often found. They present an extraordinary variety of shapes, often grotesquely resembling figures of men or animals, fruits, &c, and have in many countries excited popular wonder, being regarded as of supernatural origin (” fairy-stones,” &c), and used as charms.

Another type of concretion, very abundant in many clays and shales, is the ” septarian nodule.” These are usually flattened disk-shaped or ovoid, often lobulate externally like the surface of a kidney. When split open they prove to be traversed by a network of cracks, which

are usually filled with calcite and other minerals. These white infillings of the fissures resemble partitions; hence the name from the Latin septum, a partition.

Sometimes the cracks are partly empty. They vary up to half an inch in breadth, and are best seen when the nodule is cut through with a saw. These concretions may be calcareous or may consist of carbonate of iron. The former are common in some beds of the London Clay, and were formerly used for making cement. The clay-ironstone nodules or sphaerosiderites are very abundant in some Carboniferous shales, and have served in some places as iron ores. Some of the largest specimens are 3 ft. in diameter. In the centre of these nodules fossils are often found, e.g. coprolites, pieces of plants, fish teeth and scales. Yj Phosphatic concretions are often present in certain limestones, clays, shelly sands and marls. They occur, for example, in the Cambridge Greensand,and at the base of certain of the Pliocene beds in the east of England. In many places they have been worked, under the name of " coprolite-beds," as sources of artificial manures. Bones of animals more or less completely mineralized are frequent in these phosphatic concretions, the commonest being fragments of extinct reptilia. Their presence points to a source for the phosphate of lime.

Another very important series of concretionary structures are the flint nodules which occur in chalk, and the patches and bands of chert which are found in limestones. Flints consist of dark-coloured cryptocrystalline silica. They weather grey or white by the removal of their more soluble portions by percolating water. Their shapes are exceedingly varied, and often they are studded with tubercules and nodosities. Sometimes they have internal cavities, and very frequently they contain shells of echinoderms, molluscs, &c, partly or entirely replaced by silica, but preserving their original forms. Chert occurs in bands and tabular masses rather than in nodules; it often replaces consider- able portions of a bed of limestone (as in the Carboniferous Limestones of Ireland). Corals and other fossils frequently occur in chert, and when sliced and microscopically examined both flint and chert often show silicified foraminifera, polyzoa &c, and sponge spicules. Flints in chalk frequently lie along joints which may be vertical or may be nearly horizontal and parallel to the bedding. Hence they increase the stratified appearance of natural exposures of chalk.

It will be seen from the details given above that concretions may be calcareous, siliceous, argillaceous and phosphatic, and they may consist of carbonate or sulphide of iron. In the red clay of the deep sea bottom concretionary masses rich in manganese dioxide are being

formed, and are sometimes brought up by the dredge. In clays large crystals of gypsum, having the shape of an arrow-head, are occasionally found in some numbers. They bear a considerable resemblance to some concretions, e.g. crystal- line marcasite and pyrite nodules. These examples will indicate the great variety of substances which may give rise to con- cretionary structures.

Some concretions are amorphous, e.g. phosphatic nodules; others are cryptocrystalline, e.g. flint and chert; others finely crystalline, e.g.' pyrites, sphaerosiderite ; others consist of large crystals, e.g. gypsum, barytes, pyrites and marcasite. From this it is clear that the formation of concretions is not closely dependent on any single inorganic substance, or on any type of crystalline structure. Concretions seem to arise from the tendency of chemical compounds to be slowly dissolved by interstitial water, either while the deposit is unconsolidated or at a later period. Certain nuclei, present in the rock, then determine reprecipitation of these solutions, and the deposit once begun goes on till either the supply of material for growth is exhausted, or the physical character of the bed is changed by pressure and consolidation till it is no longer favourable to further accretion. The process resembles the growth of a crystal in a solution by slowly attracting to itself molecules of suitable nature from the surrounding medium. But in the majority of cases it is not the crystalline forces, or not these alone, which attract the particles. The structure of a flint, for example, shows that the material had so little tendency to crystallize that it remained permanently in cryptocrystalline or sub- crystalline state. That the concretions grew in the solid sediment is proved by the manner in which lines of bedding pass through

them and not round them. This is beautifully shown by many siliceous and calcareous nodules out of recent clays. That the sediment was in a soft condition may be inferred from the purity and perfect crystalline form of some of these bodies, e.g. gypsum, pyrites, marcasite. The crystals must have pushed aside the yielding matrix as they gradually enlarged. In deep-sea dredg- ings concretions of phosphate of lime and manganese dioxide are frequently brought up; this shows that concretionary action operates on the sea floor in muddy sediments, which have only recently been laid down. The phosphatic nodules seem to originate around the dead bodies of fishes, and manganese incrustations frequently enclose teeth of sharks, ear-bones of whales, &c. This recalls the occurrence of fossils in septarian nodules, flints,

phosphatic concretions, &c, in the older strata. Probably the decomposing organic matter partly supplied sub- stances for the growth of the nodules (phosphates, carbonates, &c), partly acted as reducing agents, or otherwise determined mineral precipitation in those places where organic remains were mingled with the sediment. (J. S. F.)

CONCUBINAGE (Lat. concubina, a concubine; from com-, with, and cubare, to lie), the state of a man and woman cohabiting as married persons without the full sanctions of legal marriage. In early historical times, when marriage laws had scarcely advanced beyond the purely customary stage, the concubine was definitely recognized as a sort of inferior wife, differing from those of the first rank mainly by the absence of permanent guarantees. The history of Abraham's family shows us clearly that the concubine might be dismissed at any time, and her children were liable to be cast off equally summarily with gifts, in order to leave the inheritance free for the wife's sons (Genesis xxi. 9 ff., xxv. s ff.).

The Roman law recognized two classes of legal marriage: (1) with the definite public ceremonies of confarreatio or coemptio, and (2) without any public form whatever and resting merely on the affectio maritalis, i.e. the fixed intention of taking a particular woman as a permanent spouse. 1 Next to these strictly lawful marriages came concubinage as a recognized legal status, so long as the two parties were not married and had no other concubines. It differed from the formless marriage in the absence (1) of affectio maritalis, and therefore (2) of full conjugal rights. For instance, the concubine was not raised^ like the wife, to her husband's rank, nor were her children legitimate, though they enjoyed legal rights forbidden to mere bastards, e.g. the father was bound to maintain them and to leave them (in the absence of legitimate children) one-sixth of his property; moreover, they might be fully legitimated by the subsequent marriage of their parents.

In the East, the emperor Leo the Philosopher (d. 911) insisted on formal marriage as the only legal status; but in the Western Empire concubinage was still recognized even by the Christian emperors. The early Christians had naturally preferred the formless marriage of the Roman law as being free from all taint of pagan idolatry; and the ecclesiastical authorities recognized concubinage also. The first council of Toledo (398) bids the faithful restrict himself " to a single wife or concubine, as it shall please him"; 2 and there is a similar canon of the Roman synod held by Pope Eugenius II. in 826. Even as late as the Roman councils of 1052 and 1063, the suspension from

com- munion of laymen who had a wife and a concubine at the same time implies that mere concubinage was tolerated. It was also recognized by many early civil codes. In Germany ” left-handed ” or ” morganatic ” marriages were allowed by the Salic law between nobles and women of lower rank. In different states of Spain the laws of the later middle ages recognized concubinage

1 The difference between English and Scottish law, which once made ” Gretna Green marriages ” so frequent, is due to the fact that Scotland adopted the Roman law (which on this particular point was followed by the whole medieval church).

2 Gratian, in the 12th century, tried to explain this away by assuming that concubinage here referred to meant a formless marriage; but in 398 a church council can scarcely so have misused the technical terms of the then current civil law (Gratian, Decretum, pars i. dist. xxiv. c. 4).

under the name of barragania, the contract being lifelong, the woman obtaining by it a right to maintenance during life, and sometimes also to part of the succession, and the sons ranking as nobles if their father was a noble. In Iceland, the concubine was recognized in addition to the lawful wife, though it was forbidden that they should dwell in the same house. The Nor- wegian law of the later middle ages provided definitely that in default of legitimate sons, the kingdom should descend to illegitimates. In the Danish code of Valdemar II., which was in force from 1280 to 1683, it was provided that a concubine kept openly for three years shall thereby become a legal wife; this was the custom of hand vesten, the ” handfasting ” of the English and Scottish borders, which appears in Scott’s Monastery. In Scotland, the laws of William the Lion (d. 12 14) speak of concubinage as a recognized institution; and, in the same century, the great English legist Bracton treats the ” concubina legitima ” as entitled to certain rights. 3 There seems to have been at times a pardonable confusion between some quasi- legitimate unions and those marriages by mere word of mouth, without ecclesiastical or other ceremonies, which the church, after some natural hesitation, pronounced to be valid. 4 Another and more serious confusion between concubinage and marriage was caused by the gradual enforcement of clerical celibacy (see Celibacy). During the bitter conflict between laws which forbade sacerdotal marriages and long custom which had per- mitted them, it was natural that the legislators and the ascetic party generally should studiously speak of the priests’ wives as concubines, and do all in their power to reduce them to this position. This very naturally resulted in a too frequent sub- stitution of clerical concubinage for marriage; and the resultant

evils form one of the commonest themes of complaint in church councils of the later middle ages. 6 Concubinage in general was struck at by the concordat between the Pope Leo X. and Francis I. of France in 1516; and the council of Trent, while insisting on far more stringent conditions for lawful marriage than those which had prevailed in the middle ages, imposed at last heavy- ecclesiastical penalties on concubinage and appealed to the secular arm for help against contumacious offenders (Sessio xxiv. cap. 8).

Authorities. — Besides those quoted in the notes, the reader may consult with advantage Du Cange's Glossarium, j.i>. Concubina, the article " Concubinat " in Wetzer and Welte's Kirchenlexikon (2nd ed., Freiburg i/B., 1884), and Dr H. C. Lea's History of Sacer- dotal Celibacy (3rd ed., London, 1907). (G. G. Co.)

CONDE, PRINCES OF. The French title of prince of Cond6, assumed from the ancient town of Conde-sur-1'Escaut, was borne by a branch of the house of Bourbon. The first who assumed it was the famous Huguenot leader, Louis de Bourbon (see below), the fifth son of Charles de Bourbon, duke of Venddme. His son, Henry, prince of Conde (1552-1588), also belonged to the Huguenot party. Fleeing to Germany he raised a small army with which in 1575 he joined Alencon. He became leader of the Huguenots, but after several years' fighting was taken prisoner of war. Not long after he died of poison, administered, according

3 Bracton, De Legibus, lib. iii. tract, ii. c. 28, § I, and lib. iv. tract, vi. c. 8, § 4.

4 F. Pollock and F..W. Maitland, Hist, of English Law, 2nd ed. vol. ii. p. 370. In the case of Richard de Anesty, decided by papal rescript in 1 143, "a marriage solemnly celebrated in church, a marriage of which a child had been born, was set aside as null in favour of an earlier marriage constituted by a mere exchange of consenting words" (ibid. p. 367; cf. the similar decretal of Alex- ander III. on p. 371). The great medieval canon lawyer Lyndwood illustrates the difficulty of distinguishing, even as late as the middle of the 15th century, between concubinage and a clandestine, though legal, marriage. He falls back on the definition of an earlier canonist that if the woman eats out of the same dish with the man, and if he takes her to church, she may be presumed to be his wife ; if, however, he sends her to draw water and dresses her in vile clothing, she is probably a concubine (Provinciate, ed. Oxon. 1679, p. 10, s.v. concubinarios).

5 It may be gathered from the Dominican C. L. Richard's Analysis

Conciliorum (vol. ii., 1778) that there were more than no such complaints in councils and synods between the years 1009 and 1528. Dr Rashdall (Universities of Europe in the Middle Ages, vol. ii. p. 691 , note) points cut that a master of the university of Prague, in 1499, complained openly to the authorities against a bachelor for assaulting his concubine.

to the belief of his contemporaries, by his wife, Catherine de la Tremouille. This event, among others, awoke strong suspicions as to the legitimacy of his heir and namesake, Henry, prince of Conde (1588-1646). King Henry IV., however, did not take advantage of the scandal. In 1609 he caused the prince of Conde to marry Charlotte de Montmorency, whom shortly after Conde 1 was obliged to save from the king's persistent gallantry by a hasty flight, first to Spain and then to Italy. On the death of Henry, Conde returned to France, and intrigued against the regent, Marie de' Medici; but he was seized, and imprisoned for three years (1616-1619). There was at that time before the court a plea for his divorce from his wife, but she now devoted herself to enliven his captivity at the cost of her own liberty. During the rest of his life Conde was a faithful servant of the king. He strove to blot out the memory of the Huguenot connexions of his house by affecting the greatest zeal against Protestants. His old ambition changed into a desire for the safe aggrandizement of his family, which he magnificently achieved, and with that end he bowed before Richelieu, whose niece he forced his son to marry. His son Louis, the great Cond6, is separately noticed below.

The next in succession was Henry Jules, prince of Conde (1643- 1 709) , the son'of the great Conde and of ClemencedeMaille, niece of Richelieu. He fought with distinction under his father in Franche-Comte and the Low Countries; but he was heartless, avaricious and undoubtedly insane. The end of his life was marked by singular hypochondriacal fancies. He believed at one time that he was dead, and refused to eat till some of his attendants dressed in sheets set him the example. His grandson, LouisHenry, duke of Bourbon (1692-1740), Louis XV.'s minister, did not assume the title of prince of Conde which properly belonged to him.

The son of the duke of Bourbon, Louis Joseph, prince of Conde (1 736-1818), afterreceivinga good education, distinguished himself in the Seven Years' War, and most of all by his victory at Johannisberg.

As governor of Burgundy he did much to improve the industries and means of communication of that province. At the Revolution he took up arms in behalf of the king, became commander of the ” army of Conde,” and fought in conjunction with the Austrians till the peace of Campo Fotmio in 1 797, being during the last year in the pay of England. He then served the emperor of Russia in Poland, and after that (1800) returned into the pay of England, and fought in Bavaria. In 1800 Conde arrived in England, where he resided for several years. On the restoration of Louis XVIII. he returned to France. He died in Paris in 1818. He wrote Essai sur la vie du grand Condi (1798).

Louis Henry Joseph, duke of Bourbon (1756-1830), son of the last named, was the last prince of Conde. Several of the earlier events of his life, especially his marriage with the princess Louise of Orleans, and the duel that the comte d’Artois provoked by raising the veil of the princess at a masked ball, caused much scandal. At the Revolution he fought with the army of the emigres in Liege. Between the return of Napoleon from Elba and the battle of Waterloo, he headed with no success a royalist rising in La Vendee. In 1829 he made a will by which he ap- pointed as his heir the due d’Aumale, and made some considerable bequests to his mistress, the baronne de Feucheres (q.v.). On the 27th of August 1830 he was found hanged on the fastening of his window. A crime was generally suspected, and the princes de Rohan, who were relatives of the deceased, disputed the will. Their petition, however, was dismissed by the courts..

Two cadet branches of the house of Conde played an important part: those of Soissons and Conti. The first, sprung from Charles of Bourbon (b. 1566), son of Louis I., prince of Conde, became extinct in the legitimate male line in 1641. The second took its origin from Armand of Bourbon, born in 1629, son of Henry II., prince of Conde, and survived up to i8r4.

See Muret, L’Histoire de I’armee de Conde; Chamballand, Vie de Louis Joseph, prince de Condi; Cretineau-Joly, Histoire des trois dernier s princes de la maison de Conde; and Histoire des princes de Condi, by the due dAumale (translated by R. B. Borthwick, 1872).

CONDE, LOUIS DE BOURBON, Prince of (i 530-1 569), fifth son of Charles de Bourbon, duke of Venddme, younger brother of Antoine, king of Navarre (1518-1562), was the first of the famous house of Conde (see above). After his father’s death in 1537 Louis was educated in the principles of the reformed religion. Brave though deformed, gay but extremely poor for his rank, Conde was led by his ambition to a military career. He fought with distinction in Piedmont under Marshal

de Brissac; in 1552 he forced his way with reinforcements into Metz, then besieged by Charles V.; he led several brilliant sorties from that town; and in 1554 commanded the light cavalry on the Meuse against Charles. In 1557 he was present at the battle of St Quentin, and did further good service at the head of the light horse. But the descendants of the constable de Bourbon were still looked upon with suspicion. in the French court, and Conde's services were ignored. The court designed to reduce his narrow means still further by despatching him upon a costly mission to Philip II. of Spain. His personal griefs thus combined with his religious views to force upon him a r61e of political opposition. He was concerned in the conspiracy of Amboise, which aimed at forcing from the king the recognition of the reformed religion. He was consequently condemned to death, and was only saved by the decease of Francis II. At the accession of the boy-king Charles IX., the policy of the court was changed, and Conde received from Catherine de' Medici the government of Picardy. But the struggle between the Catholics and the Huguenots soon began once more, and henceforward the career of Conde is the story of the wars of religion (see France : History) . He was the military as well as the political chief of the Huguenot party, and displayed the highest generalship on many occasions, and notably at the battle of St Denis. At the battle of Jarnac, with only 400 horsemen, Conde rashly charged the whole Catholic army. Worn out with fighting, he at last gave up his sword, and a Catholic officer named Montesquiou treacherously shot him through the head on the 13th of March 1569.

CONDE, LOUIS II. DE BOURBON, Prince of (1621-1686), called the Great Conde, was the son of Henry, prince of Conde, and Charlotte Marguerite de Montmorency, and was born at Paris on the 8th of September 1621. As a boy, under his father's careful supervision, he studied diligently at the Jesuits' College at Bourges, and at seventeen, in the absence of his father, he governed Burgundy. The due d'Enghien, as he was styled during his father's lifetime, took part with distinction in the campaigns of 1640 and 1641 in northern France while yet under twenty years of age.

During the youth of Enghien all power in France was in the hands of Richelieu; to him even the princes of the blood had to yield; and Henry of Conde sought with the rest to win the cardinal's favour. Enghien was forced to conform. He was already deeply in love with Mile. Marthe du Vigean, who in return was passionately devoted to him, yet, to flatter the cardinal, he was compelled by his father, at the age of twenty, to give his hand to Richelieu's niece, Claire Clemence de Maille- Breze, a child of thirteen. He was present with Richelieu during the dangerous plot of Cinq Mars, and afterwards fought in the

siege of Perpignan (1642).

In 1643 Enghien was appointed to command against the Spaniards in northern France. He was opposed by experienced generals, and the veterans of the Spanish army were accounted the finest soldiers in Europe; on the other hand, the strength of the French army was placed at his command, and under him were the best generals of the service. The great battle of Rocroy (May 18) put an end to the supremacy of the Spanish army and inaugurated the long period of French military predominance. Enghien himself conceived and directed the decisive attack, and at the age of twenty-two won his place amongst the great captains of modern times. After a campaign of uninterrupted success, Enghien returned to Paris in triumph, and in gallantry and intrigues strove to forget his enforced and hateful marriage. In 1644 he was sent with reinforcements into Germany to the assistance of Turenne, who was hard pressed, and took com- mand of the whole army. The battle of Freiburg (Aug.) was

desperately contested, but in the end the French army won a great victory over the Bavarians and Imperialists commanded by Count Mercy. As after Rocroy, numerous fortresses opened their gates to the duke. The next winter Enghien spent, like every other winter during the war, amid the gaieties of Paris. The summer campaign of 1645 opened with the defeat of Turenne by Mercy, but this was retrieved in the brilliant victory of Nordlingen, in which Mercy was killed, and Enghien himself received several serious wounds. The capture of Philipsburg was the most important of his other achievements during this campaign. In 1646 Enghien served under the duke of Orleans in Flanders, and when, after the capture of Mardyck, Orleans returned to Paris, Enghien, left in command, captured Dunkirk (October nth).

It was in this year that the old prince of Conde died. The enormous power that fell into the hands of his successor was naturally looked upon with serious alarm by the regent and her minister. Conde's birth and military renown placed him at the head of the French nobility; but, added to that, the family of which he was chief was both enormously rich and master of no small portion of France. Conde himself held Burgundy, Berry and the marches of Lorraine, as well as other less important territory; his brother Conti held Champagne, his brother-in-law, Longueville, Normandy. The government, therefore, determined to permit no increase of his already overgrown authority,

and Mazarin made an attempt, which for the moment proved successful, at once to find him employment and to tarnish his fame as a general. He was sent to lead the revolted Catalans. Ill- supported, he was unable to achieve anything, and, being forced to raise the siege of Lerida, he returned home in bitter indigna- tion. In 1648, however, he received the command in the important field of the Low Countries; and at Lens (Aug. 19th) a battle took place, which, beginning with a panic in his own regiment, was retrieved by Conde's coolness and bravery, and ended in a victory that fully restored his prestige.

In September of the same year Conde was recalled to court, for the regent Anne of Austria required his support. Influenced by the fact of his royal birth and by his arrogant scorn for the bourgeois, Conde lent himself to the court party, and finally, after much hesitation, he consented to lead the army which was to reduce Paris (Jan. 1645).

On his side, insufficient as were his forces, the war was carried on with vigour, and after several minor combats their substantial losses and a threatening of scarcity of food made the Parisians weary of the war. The political situation inclined both parties to peace, which was made at Rueil on the 20th of March (see Fronde, The). It was not long, however, before Conde became estranged from the court. His pride and ambition earned for him universal distrust and dislike, and the personal resentment of Anne in addition to motives of policy caused the sudden arrest of Conde, Conti and Longueville on the 18th of January 1650. But others, including Turenne and his brother the duke of Bouillon, made their escape. Vigorous attempts for the release of the princes began to be made. The women of the family were now its heroes. The dowager princess claimed from the parlement of Paris the fulfilment of the reformed law of arrest, which forbade imprison- ment without trial. The duchess of Longueville entered into negotiations with Spain; and the young princess of Cond6, having gathered an army around her, obtained entrance into Bordeaux and the support of the parlement of that town. She alone, among the nobles who took part in the folly of the Fronde, gains our respect and sympathy. Faithful to a faithless husband, she came forth from the retirement to which he had condemned her, and gathered an army to fight for him. But the delivery of the princes was brought about in the end by the junction of the old Fronde (the party of the parlement and of Cardinal de Retz) and the new Fronde (the party of the Condes) ; and Anne was at last, in February 165 1, forced to liberate them from their prison at Havre. Soon afterwards, however, another shifting of parties left Conde and the new Fronde isolated. With the court and the old Fronde in alliance against him, Conde found no resource but that of making common cause with the Spaniards, who were at

war with France. The confused civil war which followed this step (Sept. 1651) was memorable chiefly for the battle of the Faubourg St Antoine, in which Conde and Turenne, two of the foremost captains of the age, measured their strength (July 2, 1652), and the army of the prince was only saved by being admitted within the gates of Paris. La Grande Made- moiselle, daughter of the duke of Orleans, persuaded the Parisians to act thus, and turned the cannon of the Bastille on Turenne's army. Thus Conde, who as usual had fought with the most desperate bravery, was saved, and Paris underwent a new investment. This ended in the flight of Conde to the Spanish army (Sept. 1652), and thenceforward, up to the peace, he was in open arms against France, and held high command in the army of Spain. But his now fully developed genius as a con> mander found little scope in the cumbrous and antiquated system of war practised by the Spaniards, and though he gained a few successes, and manoeuvred with the highest possible skill against Turenne, his disastrous defeat at the Dunes near Dunkirk (14th of June 1658), in which an English contingent of Cromwell's veterans took part on the side of Tuienne, led Spain to open negotiations for peace. After the peace of the Pyrenees in 1659, Conde obtained his pardon (January 1660) from Louis, who thought him less dangerous as a subject than as possessor of the independent sovereignty of Luxemburg, which had been offered him by Spain as a reward for his services.

Conde now realized that the period of agitation and party warfare was at an end, and he accepted, and loyally maintained henceforward, the position of a chief subordinate to a masterful sovereign. Even so, some years passed before he was recalled to active employment, and these years he spent on his estate at Chantilly. Here he gathered round him a brilliant company, which included many men of genius — Moliere, Racine, Boileau, La Fontaine, Nicole, Bourdaloue and Bossuet. About this time negotiations between the Poles, Conde and Louis were carried on with a view to the election, at first of Conde's son Enghien, and afterwards of Conde himself, to the throne of Poland. These, after a long series of curious intrigues, were finally closed in 1674 by the veto of Louis XIV. and the election of John Sobieski. The prince's retirement, which was only broken by the Polish question and by his personal intercession on behalf of Fouquet in 1664, ended in 1668. In that year he proposed to Louvois, the minister of war, a plan for seizing Franche-Comte, the execution of which was entrusted to him and successfully carried out. He was now completely re-established in the favour of Louis, and with Turenne was the principal French commander in the cele- brated campaign of 1 6 7 2 against the Dutch. At the forcing of the Rhine passage at Tollhuis (June 12) he received a

severe wound, after which he commanded in Alsace against the Imperialists. In 1673 he was again engaged in the Low Countries, and in 1674 he fought his last great battle at Seneff against the prince of Orange (afterwards William III. of England) . This battle, fought on the nth of August, was one of the hardest of the century, and Cond6, who displayed the reckless bravery of his youth, had three horses killed under him. His last campaign was that of 1675 on the Rhine, where the army had been deprived of its general by the death of Turenne; and where by his careful and methodical strategy he repelled the invasion of the Imperial army of Monte- cucculi. After this campaign, prematurely worn out by the toils and excesses of his life, and tortured by the gout, he returned to Chantilly, where he spent the eleven years that remained to him in quiet retirement. In the end of his life he specially sought the companionship of Bourdaloue, Nicole and Bossuet, and devoted himself to religious exercises. He died on the 1 ith of November 1686 at the age of sixty-five. Bourdaloue attended him at his death-bed, and Bossuet pronounced his Sloge.

The earlier political career of Conde was typical of the great French noble of his day. Success in love and war, predominant influence over his sovereign and universal homage to his own exaggerated pride, were the objects of his ambition. Even as an exile he asserted the precedence of the royal house of France over the princes of Spain and Austria, with whom he was allied for the moment. But the Conde of 1668 was no longer a politician

and a marplot; to be first in war and in gallantry was still his aim, but for the rest he was a submissive, even a subservient, minister of the royal will. It is on his military character, however, that his fame rests. This changed but little. Unlike his great rival Turenne, Conde was equally brilliant in his first battle and in his last. The one failure of his generalship was in the Spanish Fronde, and in this everything united to thwart his genius; only on the battlefield itself was his personal leader- ship as conspicuous as ever. That he was capable of waging a methodical war of positions may be assumed from his campaigns against Turenne and Montecucculi, the greatest generals of the predominant school. But it was in his eagerness for battle, his quick decision in action, and the stern will which sent his regiments to face the heaviest loss, that Conde is distinguished above all the generals of his time. In private life he was harsh and unamiable, seeking only the gratification of his own pleasures and desires. His enforced and

loveless marriage embittered his life, and it was only in his last years, when he had done with ambition, that the more humane side of his character appeared in his devotion to literature.

Conde's unhappy wife had some years before been banished to Chateauroux. An accident brought about her ruin. Her contemporaries, greedy as they were of scandal, refused to believe any evil of her, but the prince declared himself convinced of her unfaithfulness, placed her in confinement, and carried his resentment so far that his last letter to the king was to request him never to allow her to be released.

Authorities. — -See, besides the numerous Memoires of the time, Puget de la Serre, Les Sieges, les batailles, &c, de Mr. le prince de Conde (Paris, 1651) ; J. de la Brune, Histoire de la vie, &c, de Louis de Bourbon, prince de Conde (Cologne, 1694) ; P. Coste, Histoire de Louis de Bourbon, &c. (Hague, 1748); Desormeaux, Histoire de Louis de Bourbon, &c. (Paris, 1768); Turpin, Vie de Louis de Bourbon, &c. (Paris and Amsterdam, 1767) ; Eloge mililaire de Louis de Bourbon (Dijon, 1772); Histoire du grand Conde, by A. Lemercier (Tours, 1862); J. J. E. Roy (Lille, 1859); L. de Voivreuil (Tours, 1846) ; Fitzpatrick, The Great Conde, and Lord Mahon, Life of Louis, prince of Conde (London, 1845). Works on the Conde family by the prince de Conde and de Sevilinges (Paris, 1820), the due dAumale, and Guibout (Rouen, 1856), should also be consulted.

COND£, the name of some twenty villages in France and of two towns of some importance. Of the villages, Conde-en-Brie (Lat. Condetum) is a place of great antiquity and was in the middle ages the seat of a principality, a sub-fief of that of Montmirail; Conde-sur-Aisne (Condatus) was given in 870 by Charles the Bald to the abbey of St Ouen at Rouen, gave its name to a seigniory during the middle ages, and possessed a priory of which the church and a 12th-century chapel remain; Conde-sur-Marne (Condate), once a place of some importance, preserves one of its parish churches, with a fine Romanesque tower. The two towns are: —

1. Conde-sur-l'Escaut, in the department of Nord, at the junction of the canals of the Scheldt and of Conde-Mons. Pop. (1906) town, 2701; commune, 5310. It lies 7 m. N. by E. of Valenciennes and 2 m. from the Belgian frontier. It has a church dating from the middle of the 18th century. Trade is in coal and cattle. The industries include brewing, rope-making and boat- building, and there is a communal college. Conde (Condate) is of considerable antiquity, dating at least from the later Roman period. Taken in 1676 by Louis XIV., it

definitely passed into the possession of France by the treaty of Nijmwegen two years later, and was afterwards fortified by Vauban. During the revolutionary war it was besieged and taken by the Austrians (1793); and in 1815 it again fell to the allies. It was from this place that the princes of Conde (q.v.) took their title. See Perron-Gelineau, Condi ancien et moderne (Nantes, 1887).

2. Conde -sur-Noireau, in the department of Calvados, at the confluence of the Noireau and the Drouance, 33 m. S.S.W. of Caen on the Ouest-Etat railway. Pop. (1906) 5709. The town is the seat of a tribunal of commerce, a board of trade-arbitration and a chamber of arts and manufactures, and has a communal college. It is important for its cotton-spinning and weaving, and carries on dyeing, printing and machine-construction; there are numerous nursery-gardens in the vicinity. Important fairs

are held in the town. The church of St Martin has a choir of the 12th and 15th centuries, and a stained-glass window (15th century) representing the Crucifixion. There is a statue to Dumont d'Urville, the navigator (b. 1790), a native of the town. Throughout the middle ages Conde (Condatum, Condetum) was the seat of an important castellany, which was held by a long succession of powerful nobles and kings, including Robert, count of Mortain, Henry II. and John of England, Philip Augustus of France, Charles II. (the Bad) and Charles III. of Navarre. The place was held by the English from 141 7 to 1449. Of the castle some ruins of the keep survive. See L. Huet, Hist, de Cond&sur-N oireau, ses seigneurs, son Industrie, &c. (Caen, 1883).

CONDE, JOSS ANTONIO (1766-1820), Spanish Orientalist, was born at Peraleja (Cuenca) on the 28th of October 1766, and was educated at the university of Alcali. His translation of Anacreon (1791) obtained him a post in the royal library in 1795, and in 1 796-1 797 he published paraphrases from Theocritus, Bion, Moschus, Sappho and Meleager. These were followed by a mediocre edition of the Arabic text of Edrisi's Description of Spain (1799), with notes and a translation. Conde became a member of the Spanish Academy in 1802 and of the Academy of History in 1804, but his appointment as interpreter to Joseph Bonaparte led to his expulsion from both bodies in 1814. He escaped to France in February 1813, and returned to Spain in 1814, but was not allowed to reside at Madrid till 1816. Two years later he was re-elected by both academies; he died in poverty on the 12th of June 1820. His Historiadela Dominacidn delos Arabes en Espana was published in 1820-1821. Only the first volume was corrected by the author, the other two being compiled from his manuscript by Juan Tineo. This work was translated into German

(1824-1825), French (1825) and English (1854). Conde's pretensions to scholarship have been severely criticized by Dozy, and his history is now discredited. It bad, however, the merit of stimulating abler workers in the same field.

CONDENSATION OF GASES. If the volume of a gas con- tinually decreases at a constant temperature, for which an increasing pressure is required, two cases may occur: — (r) The volume may continue to be homogeneously tempera- filled. (2) If the substance is contained in a certain turn. volume, and if the pressure has a certain value, the substance may divide into two different phases, each of which is again homogeneous. The value of the tempera- ture T decides which case will occur. The temperature which is the limit above which the space will always be homo- geneously filled, and below which the substance divides into two phases, is called the critical temperature of the substance. It differs greatly for different substances, and if we represent it by T c , the condition for the condensation of a gas is that T must be below T c . If the substance is divided into two phases, two different cases may occur. The denser phase may be either a liquid or a solid. The limiting temperature for these two cases, at which the division into three phases may occur, is called the triple point. Let us represent it by T3; if the term " condensation of gases " is taken in the sense of " liquefaction of gases " — which is usually done — the condition for condensationisT„ > T > T3. The opinion sometimes held that for all substances T 3 is the same fraction of T c (the value being about J) has decidedly not been rigorously confirmed. Nor is this to be expected on account of the very different form of crystallization which the solid state presents. Thus for carbon dioxide, CO2, for which T c = 304° on the absolute scale, andfor which we may put T 3 = 2i6°, this fraction is about 0-7; for water it descends down to 0-42, and for other substances it may be still lower.

If we confine ourselves to temperatures between T c and T 3 , the gas will pass into a liquid if the pressure is sufficiently increased. When the formation of liquid sets in we call the gas a saturated vapour. If the decrease of volume is continued, the gas pressure remains constant till all the vapour has passed into liquid. The invariability of the properties of the phases is in close connexion with the invariability of the pressure (called maximum tension). Throughout the course of the process of condensation these properties remain unchanged, provided the temperature remain

Critical pressure.

constant; only the relative quantity of the two phases changes. Until all the gas has passed into liquid a further decrease of volume will not require increase of pressure. But as soon as the liquefaction is complete a slight decrease of volume will require a great increase of pressure, liquids being but slightly compressible.

The pressure required to condense a gas varies with the temperature, becoming higher as the temperature rises. The highest pressure will therefore be found at T c and the lowest at T3. We shall represent the pressure at Tc by p c – It is called the critical pressure. The pressure at T3 we shall represent by pz. It is called the pressure of the triple point. The values of T c and p c for different substances will be found at the end of this article. The values of T3 and p3 are accurately known only for a few substances. As a rule pz U small, though occasionally it is greater than 1 atmosphere. This is the case with CO2, and we may in general expect it if the value of T3/T; is large. In this case there can only be a question of a real boiling-point (under the normal pressure) if the liquid can be supercooled.

We may find the value of the pressure of the saturated vapour for each T in a geometrical way by drawing in the theoretical isothermal a straight line parallel to the »-axis in such a way*

that I v pdv will have the same value whether the straight

line or the theoretical isothermal is followed. This construction, given by James Clerk Maxwell, may be considered as a result of the application of the general rules for coexisting equilibrium, which we owe to J. Willard Gibbs. The construction derived from the rules of Gibbs is as follows: — Construe the free energy at a constant temperature, i.e. the quantity -fpdv as ordinate, if the abscissa represents v, and determine the inclination of the double tangent. Another construction derived from the rules of Gibbs might be expressed as follows: — Construe the value of pv-Jpdv as ordinate, the abscissa representing p, and determine the point oi intersection of two of the three branches of this curve. As an approximate half -empirical formula for the calculation

p It — t\

of the pressure, -logioˆ=/y ™) may be used. It would

follow from the law of corresponding states that in this formula the value of / is the same for all substances, the molecules of which do

not associate to form larger molecule-complexes. In fact, for a great many substances, we find a value for /, which differs but little from 3, e.g. ether, carbon dioxide, benzene, benzene derivatives, ethyl chloride, ethane, &c. As the chemical structure of these substances differs greatly, and association, if it takes place, must largely depend upon the. structure of the molecule, we conclude from this approximate equality that the fact of this value of / being equal to about 3 is characteristic for normal substances in which, consequently, association is ex- cluded. Substances known to associate, such as organic acids and alcohols, have a sensiblyhigher value of/. Thus T. Estreicher (Cracow, 1896) calculates that for fluor-benzene/ varies between 3-07 and 2-94; for ether between 3-0 and 3-1; but for water between 3-2 and 3-33, and for methyl alcohol between 3-65 and 3-84, &c. For isobutyl alcohol / even rises above 4. It is, however, remarkable that for oxygen / has been found almost invariably equal to 2-47 from K. Olszewski's observations, a value which is appreciably smaller than 3. This fact makes us again seriously doubt the correctness of the supposition that/ = 3 is a characteristic for non-association.

It is a general rule that the volume of saturated vapour decreases when the temperature is raised, while that of the coexisting liquid increases. We know only one volume. exception to this rule, and that is the volume of water below 4 C. If we call the liquid volume vj, and the vapour v v , v v – in decreases if the temperature rises, and becomes zero at T e . The limiting value, to which vi and t/„ converge at T c , is called the critical volume, and we shall represent it by v c . According to the law of corresponding states the values both of vifvc and v v (v c must be the same for all substances, if TjT c has been taken equal for them all. According to the investigations of

Sydney Young, this holds good with a high degree of approxima- tion for a long series of substances. Important deviations from this rule for the values of v v jvi are only found for those substances in which the existence of association has already been discovered by other methods. Since the lowest value of T, for which investigations on Vi and v v may be made, is the value of T 3 ; and since T 3 /T e , as has been observed above, is not the same for all substances, we cannot expect the smallest value of vifv c to be the same for all substances. But for low values of T, viz. such as are near Ta, the" influence of the temperature on the volume is but slight, and therefore we are not far from the truth if we assume the minimum value of the ratio xn\v c as being identical 'for all normal substances, and put it at about . Moreover, the influence of the polymerization (association) on the liquid volume appears to be small, so that we may even attribute the

value \ to substances which are not normal. The value of Vv/v e at T=T 3 differs widely for different substances. If we take pi so low that the law of Boyle-Gay Lussac may be applied, we can calculate Vzjv e by means of the formula P Yˆ=k P Y 1 , provided k be known. According to the observa- tions of Sydney Young, this factor has proved to be 3 • 7 7 for normal substances. In consequence ˆ = 3-77^^. A similar formula,

Vc JJZ 1 c

but with another value of k, may be given for associating sub- stances, provided the saturated vapour does not contain any complex molecules. But if it does, as is the case with acetic acid, we must also know the degree of association. It can, however, only be found by measuring the volume itself.

E. Mathias has remarked that the following relation exists between the densities of the saturated vapour and of the coexisting liquid:— Rale ot the

1 / T\ ) rectilinear

pl+p v = 2p c \ l+ail-fj ' diameter.

and that, accordingly, the curve which represents the densities at different temperatures possesses a rectilinear diameter. According to the law of corresponding states, a would be the same for all substances. Many substances, indeed, actually appear to have a rectilinear diameter, and the value of a appears approximatively to be the same. In a Memoirs presents d la sociiti royale d Liege, 15th June 1899, E. Mathias gives a list of some twenty substances for which a has a value lying between 0-95 and 1-05. It had been already observed by Sydney Young that a is not perfectly constant even for normal substances. For associating substances the diameter is not rectilinear. Whether the value of a, near 1, may serve as a characteristic for normal substances is rendered doubtful by the fact that for nitrogen a is found equal to 0-6813 and for oxygen to o-8. At T= T„/2, the formula of E.Mathias,if p„ be neglected with respect to pi, gives the value 2+ffl for Pijp c .

The heat required to convert a molecular quantity of liquid coexisting with vapour into saturated vapour at the same temperature is called molecular latent heat. It decreases with the rise of the temperature, because at a higher heat”* temperature the liquid has already expanded, and because the vapour into which it has to be converted is

denser. At the critical temperature it is equal to zero on account of the identity of the liquid and the gaseous states. If we call the molecular weight m and the latent heat per unit of weight r, then, according to the law of corresponding states, mr/T is the same for all normal substances, provided the temperatures are corresponding. According to F. T. Trouton, the value of mrjT is the same for all substances if we take for T the boiling-point. As the boiling-points under the pressure of one atmosphere are generally not equal fractions of T c , the two theorems are not identical; but as the values of p c for many substances do not differ so much as to make the ratios of the boiling-points under the pressure of one atmosphere differ greatly from the ratios of T c , an approximate confirmation of the law of Trouton may be compatible with an approximate confirmation of the conse- quence of the law of corresponding states. If we take the term boiling-point in a more general sense, and put T in the law of

Trouton to represent the boiling-point under an arbitrary equal pressure, we may take the pressure equal to p c for a certain substance. For this substance mr/T would be equal to zero, and the values of mr/T would no longer show a trace of equality. At present direct trustworthy investigations about the value of r for different substances are wanting; hence the question whether as to the quantity mr/T the substances are to be divided into normal and associating ones cannot be answered. Let us divide the latent heat into heat necessary for internal work and heat necessary for external work. Let / represent the former of these two quantities, then : —

r = r’+p(v v vi) Then the same remark holds good for mr’/T as has been made for mr/T. The ratio between r and that part that is necessary for external work is given in the formula,

r ˆTdp

p(v v -vi) p

By making use of the approximate formula for the vapour

tension :-loge p~ c = f \~T~) • we nn d—

r = j’T c p{vv-vi) T

At T = T e we find for this ratio /”, a value which, for normal

substances is equal to 3/0-4343 = 7. At the critical temperature the quantities r and v v —vi are both equal to o, but they have a finite ratio. As we may equate p(v v ~vi) with pv v — ‘SS£ at very low temperatures, we get, if we take into consideration that R expressed in calories is nearly equal to 2Jm, the value 2/‘T c = i4T c as limiting value for mr for normal substances. This value for mr has, however, merely the character of a rough approxi- mation — especially since the factor/’ is not perfectly constant.

All the phenomena which accompany the condensation of gases into liquids may be explained by the supposition, that the condition of aggregation which we call liquid differs a/tooM?’ on ˆ v * n q uan titv> and not in quality, from that which we call gas. We imagine a gas to consist of separate molecules of a certain mass n, having a’certain velocity depending on the temperature. This velocity is distributed according to the law of probabilities, and furnishes a quantity, of vis viva proportional to the temperatures. We must attribute extension to the molecules, and they will attract one another with a force which quickly decreases with the distance. Even those sup- positions which reduce molecules to centra of forces, like that of Maxwell, lead us to the result that the molecules behave in mutual collisions as if they had extension— an extension which in this case is not constant, but determined by the law of repulsion in the collision, the law of the distribution, and the value of the velocities. In order to explain capillary phenomena it was assumed so early as Laplace, that between the molecules of the same substance an attraction exists which quickly decreases with the distance. That this attraction is found in gases too is proved by the fall which occurs in the temperature of a gas that is expanded without performing ex- ternal work. We are still perfectly in the dark as to the cause of this attraction, and opinion differs greatly as to its dependence on the distance. Nor is this knowledge necessary in order to find the influence of the attraction, for a homogeneous state, on the value of the external pressure which is required to keep the moving molecules at a certain volume (T being given) . We may, viz., assume either in the strict sense, or as a first approximation, that the influence of the attraction is quite equal to a pressure which is proportional to the square of the density. Though this molecular pressure is small for gases, yet it will be con- siderable for the great densities of liquids, and calculation shows that we may estimate it at more than 1000 atmos., possibly increasing up to 10,000. We may now make the same supposi- tion for a liquid as for a gas, and imagine it to consist of molecules, which for non-associating substances are the same as those of the rarefied vapour; these, if T is the same, have the same mean vis

viva as the vapour molecules, but are more closely massed together. Starting from this supposition and all itsconsequences,

van der Waals derived the following lonuuia, which would hold both for the liquid state and for the gaseous state: —

(p + £) («ˆ) = RT.

It follows from this deduction that for the rarefied gaseous state b would be four times the volume of the molecules, but that for greater densities the factor 4 would decrease. If we represent the volume of the molecules by j8, the quantity b will be found to have the following form: —

Only two of the successive coefficients 71, 72, &c, have been worked out, for the determination requires very lengthy calcula- tions, and has not even led to definitive results (L. Boltzmann, Proc. Royal Acad. Amsterdam, March 1899). The latter formula supposes the molecules to be rigid spheres of invariable size. If the molecules are things which are compressible, another formula for b is found, which is different according to the number of atoms in the molecule (Proc. Royal Acad. Amsterdam, 1900- 1901). If we keep the value of a and b constant, the given equation will not completely represent the net of isothermals of a substance. Yet even in this form it is sufficient as to the principal features. From it we may argue to the existence of a critical temperature, to a minimum value of the product pv, to the law of corresponding states, &c. Some of the numerical results to which it leads, however, have not been confirmed by experience. Thus it would follow from the given equation that

~T E ~ 8 T if the value of v is taken so great that the gaseous laws may be applied, whereas Sydney Young has found 1/3-77 for a number of substances instead of the factor 3/8. Again it follows from the given equation, that if a is thought to be inde- pendent of the temperature, r 1 (&) — 4, whereas for a number

of substances a value is found for it which is near 7. If we assume with Clausius that a depends on the temperature, and has

,273 . , T c (dp\ „ a value «Yˆ we find ~pl V3T/ c = 7 –

That the accurate knowledge of the equation of state is of the highest importance is universally acknowledged, because, in connexion with the results of thermodynamics, it will enable us to explain all phenomena relating to ponderable matter. This general conviction is shown by the numerous efforts made to complete or modify the given

equation, or to replace it by another, for instance, by R. Clausius, P. G. Tait, E. H. Amagat, L. Boltzmann, T. G. Jager, C. Dieterici, B. Galitzine. T. Rose Innes and M. Reinganum.

If we hold to the supposition that the molecules in the gaseous and the liquid state are the same — which we may call the supposi- tion of the identity of the two conditions of aggregation — then the heat which is given out by the condensation at constant T is due to the potential energy lost in consequence of the coming closer of the molecules which attract each other, and then it is

equal to a (r — ˆ) . If a should be a function of the temperature, it follows from thermodynamics that it would be equal to la— T jjsj (— — — j . Not only in the case of liquid and gas, but always when the volume is diminished, a quantity of heat is given out equal to a (ˆ-j-J or (“TˆJ Q j-J .

If, however, when the volume is diminished at a given tempera- ture, and also during the transition from the gaseous to the liquidstate, combination into largermolecule-complexes takes place, the total internal heat may be considered i ngsu b.’ as the sum of that which is caused by the combination stances. of the molecules into greater molecule-complexes and by their approach towards each other. We have the simplest case of possible greater complexity when two molecules combine to one. From the course of the changes m the density of the vapour we assume that this occurs, e.g. witn nitrogen peroxide, NO2, and acetic acid, and the somewhat close agreement of the

observed density of the vapour with that which is calculated from the hypothesis of such an association to double-mokcules, makes this supposition almost a certainty. In such cases the molecules in the much denser liquid state must therefore be considered as double-molecules, either completely so or in a variable degree depending on the temperature. The given equation of state cannot hold for such substances. Even though we assume that a and b are not modified by the formation of double-molecules, yet RTis modified, and, since it is proportional to the number of the molecules, is diminished by the combina- tion. The laws found for normal substances will, therefore, not hold for such associating substances. Accordingly for substances for which we have already found an anormal density of the vapour,

we cannot expect the general laws for the liquid state, which have been treated above, to hold good without modification, and in many respects such substances will therefore not follow the law of corresponding states. There are, however, also substances of which the anormal density of vapour has not been stated, and which yet cannot be ranged under this law, e.g. water and alcohols. The most natural thing, of course, is to ascribe the deviation of these substances, as of the others, to the fact that the molecules of the liquid are polymerized. In this case we have to account for the following circumstance, that whereas for NO2 and acetic acid in the state of saturated vapour the degree of association increases if the temperature falls, the reverse must take place for water and alcohols. Such a difference may be accounted for by the difference in the quantity of heat released by the polymerization to double- molecules or larger molecule-complexes. The quantity of heat given out when two molecules fall together may be calculated for NO2 and acetic acid from the formula of Gibbs for the density of vapour, and it proves to be very considerable. With this the following fact is closely connected. If in the pv diagram, starting from a point indicating the state of saturated vapour, a geometrical locus is drawn of the points which have the same degree of association, this curve, which passes towards isor thermals of higher T if the volume diminishes, requires for the same change in T a greater diminution of volume than is indicated by the border-curve. For water and alcohols this geometrical locus will be found on the other side of the border-curve, and the polymerization heat will be small, i.e. smaller than the latent heat. For substances with a small polymerization heat the degree of association will continually decrease if we move along the border-curve on the side of the saturated vapour in the direction towards lower T. With this, it is perfectly com- patible that for such substances the saturated vapour, e.g. under the pressure of one atmosphere, should show an almost normal density. Saturated vapour of water at 100° has a density which seems nearly 4% greater than the theoretical one, an amount which is greater than can be ascribed to the deviation from the gas-laws. For the relation between v, T, and x, if x represents the fraction of the number of double-molecules, the following formula has been found (" Moleculartheorie," Zeits. Phys. Chem., 1890, vol. v):

1 x(v lo S(F =

b) _ E 1 -E !

x)

; = 2

RTF

+C,

from which

v-b\dT)

^ Ei-E2 ” RiT *

which may elucidate what precedes.

By far the majority of substances have a value of T c above

the ordinary temperature, and diminution of volume (increase

_ . of pressure) is sufficient to condense such gaseous

Condense- c ‘, ... ,, „ . . ,. , , ,

tionot substances into liquids, it l c is but little above the

substances ordinary temperature, a great increase of pressure is ■with low j n general required to effect condensation. Substances ”’ for which T c is much higher than the ordinary tempera-

ture To, e.g. T,;>|To, occur as liquids, even without increase of pressure; that is, at the pressure of one atmosphere. The value I is to be considered as only a mean value, because of the inequality of fi . The substances for which T c is smaller than the ordinary temperature are but few in number. Taking the

temperature of melting ice as a limit, these gases are in successive order: CH4, NO, O2, CO, N2 and H2 (the recently discovered gases argon, helium, &c, are left out of account). If these gases are compressed at 0° centigrade they do not show a trace of liquefaction, and therefore they were long known under the name of ” permanent gases.” The discovery, however, of the critical temperature carried the conviction that these substances would not be ” permanent gases ” if they were compressed at much lower T. Hence the problem arose how ” low tempera- tures ” were to be brought about. Considered from a general point of view the means to attain this end may be described as follows: we must make use of the above-mentioned circum- stance that heat disappears when a substance expands, either with or without performing external work. According as this heat is derived from the

substance itself which is to be condensed, or from the substance which is used as a means of cooling, we may divide the methods for condensing the so-called permanent gases into two principal groups.

In order to use a liquid as a cooling bath it must be placed in a vacuum, and it must be possible to keep the pressure of the vapour in that space at a small value. According to the boiling-law, the temperature of the liquid must LI Q” Us a * descend to that at which the maximum tension of the cooling. vapour is equal to the pressure which reigns on the surface of the liquid. If the vapour, either by means of absorp- tion or by an air-pump, is exhausted from the space, the tempera- ture of the liquid and that of the space itself depend upon the value of the pressure which finally prevails in the space. From a practical point of view the value of T 3 may be regarded as the limit to which the temperature falls. It is true that if the air is exhausted to the utmost possible extent, the temperature may fall still lower, but when the substance has become solid, a further diminution of the pressure in the space is of little advantage. At any rate, as a solid body evaporates only on the surface, and solid gases are bad conductors of heat, further cooling will only take place very slowly, and will scarcely neutralize the influx of heat. If the pressure p s is very small, it is perhaps practically impossible to reach T 3 ; if so, T 3 in the following lines will represent the temperature practically attain- able. There is thus for every gas a limit below which it is not to be cooled further, at least not in this way. If, however, we can find another gas for which the critical temperature is sufficiently above T 3 of the first chosen gas, and if it is converted into a liquid by cooling with the first gas, and then treated in the same way as the first gas, it may in its turn be cooled down to (T 3) 2 . Going on in this way, continually lower temperatures may be attained, and it would be possible to condense all gases, provided the difference of the successive critical temperatures of two gases fulfils certain conditions. If the ratio of the absolute critical temperatures for two gases, which succeed one another in the series, should be sensibly greater than 2, the value of T 3 for the first gas is not, or not sufficiently, below the T c of the second gas. This is the case when one of the gases is nitrogen, on which hydrogen would follow as second gas. Generally, however, we shall take atmospheric air instead of nitrogen. Though this mixture of N2 and O2 will show other critical phenomena than a simple substance, yet we shall continue to speak of a T„ for air, which is given at — 140 C, and for which, therefore, T„ amounts to 133 absolute. The lowest T which may be expected for air in a highly rarefied space may be evaluated at 60° absolute— a value which is higher than the T c for hydrogen. Without new contrivances it would,

accordingly, not be possible to reach the critical temperature of H_2. The method by which we try to obtain successively lower temperatures by making use of successive gases is called the " cascade method." It is not self-evident that by sufficiently diminishing the pressure on a liquid it may be cooled to such a degree that the temperature will be lowered to T_3, if the initial temperature was equal to T_c, or but little below it, and we can even predict with certainty that this will not be the case for all substances. It is possible, too, that long before the triple point is reached the whole liquid will have evaporated. The most favourable conditions will, of

course, be attained when the influx of heat is reduced to a minimum. As a limiting case we imagine the process to be isentropic. Now the question has become, Will an isentropic line, which starts from a point of the border-curve on the side of the liquid not far from the critical-point, remain throughout its descending course in the heterogeneous region, or will it leave the region on the side of the vapour? As early as 1878 van der Waals (Verslagen Kon. Akad. Amsterdam) pointed out that the former may be expected to be the case only for sub- stances for which $c_v \backslash c_v$ is large, and the latter for those for which it is small; in other words, the former will take place for sub- stances the molecules of which contain few atoms, and the latter for substances the molecules of which contain many atoms. Ether is an example of the latter class, and if we say that the quantity h (specific heat of the saturated vapour) for ether is found to be positive, we state the same thing in other words. It is not necessary to prove this theorem further here, as the molecules of the gases under consideration contain only two atoms and the total evaporation of the liquid is not to be feared.

In the practical application of this cascade-method some variation is found in the gases chosen for the successive stages. Thus methyl chloride, ethylene and oxygen are used in the cryogenic laboratory of Leiden, while Sir James Dewar has used air as the last term. Carbonic acid is not to be recommended on account of the comparatively high value of T_3. In order to prevent loss of gas a system of " circulation " is employed. This method of obtaining low temperatures is decidedly laborious, and requires very intricate apparatus, but it has the great advantage that very constant low temperatures may be obtained, and can be regulated arbitrarily within pretty wide limits.

In order to lower the temperature of a substance down to T_3, it is not

always necessary to convert it first into the liquid state by means of another substance, as was assumed fvˆl'ff.-no in the last method for obtaining low temperatures. Its own expansion is sufficient, provided the initial condition be properly chosen, and provided we take care, even more than in the former method, that there is no influx of heat. Those conditions being fulfilled, we may, simply by adiabatic expansion, not only lower the temperature of some substances down to T3, but also convert them into the liquid state. This is especially the case with substances the molecules of which contain few atoms.

Let us imagine the whole net of isothermals for homogeneous phases drawn in a pv diagram, and in it the border-curve: Within this border-curve, as in the heterogeneous region, the theoretical part of every isothermal must be replaced by a straight line. The isothermals may therefore be divided into two groups, viz. those which keep outside the heterogeneous region, and those which cross this region. Hence an isothermal, belonging to the latter group, enters the heterogeneous region on the liquid side, and leaves it at the same level on the vapour side. Let us imagine in the same way all the isentropic curves drawn for homogeneous states. Their form resembles that of isothermals in so far as they show a maximum and a minimum, if the entropy- constant is below a certain value, while if it is above this value, both the maximum and the minimum disappear, the isentropic

i , dp d 2 V r.

line in a certain point having at the same time 3- andjˆ=U

for this particular value of the constant. This point, which we might call the critical point of the isentropic lines, lies in the heterogeneous region, and therefore cannot be realized, since as soon as an isentropic curve enters this region its theoretical part will be replaced by an empiric part. If an isentropic curve crosses the heterogeneous region, the point where it enters this region must, just as for the isothermals, be connected with the point where it leaves the region by another curve. When c v jc v — k (the limiting value of c v \c, for infinite rarefaction is meant) approaches unity, the isentropic curves approach the isothermals and vice versa. In the same way the critical point of the isentropic curves comes nearer to that of the isothermals. And if k is not much greater than 1, e.g. k< 1-08, the following property of the isothermals is also preserved, viz. that an

isentropic curve 4 which enters the heterogeneous region on the side of the liquid, leaves it again on the side of the vapour, not of course at the same level; but at a lower point. If, however, k is greater, and

particularly if it is so great as it is with molecules of one or two atoms, an isentropic curve, which enters on the side of the liquid, however far prolonged, always remains within the heterogeneous region. But in this case all isentropic curves, if sufficiently prolonged, will enter the heterogeneous region. Every isentropic curve has one point of intersection with the border-curve, but only a small group intersect the border-curve in three points, two of which are to be found not far from the top of the border-curve and on the side of the vapour. Whether the sign of h (specific heat of the saturated vapour) is negative or positive, is closely connected with the preceding facts. For substances having k great, h will be negative if T is low, positive if T rises, while it will change its sign again before T„ is reached. The values of T, at which change of sign takes place, depend on k. The law of corresponding states holds good for this value of T for all substances which have the same value of k.

Now the gases which were considered as permanent are exactly those for which k has a high value. From this it would follow that every adiabatic expansion, provided it be sufficiently continued, will bring such substances into the heterogeneous region, i.e. they can be condensed by adiabatic expansion. But since the final pressure must not fall below a certain limit, determined by experimental convenience, and since the quantity which passes into the liquid state must remain a fraction as large as possible, and since the expansion never can take place in such a manner that no heat is given out by the walls or the surroundings, it is best to choose the initial condition in such a way that the isentropic curve of this point cuts the border-curve in a point on the side of the liquid, lying as low as possible. The border-curve being rather broad at the top, there are many isentropic curves which penetrate the heterogeneous region under a pressure which differs but little from p c . Availing himself of this property, K. Olszewski has determined p for hydrogen at 15 atmospheres. Isentropic curves, which lie on the right and on the left of this group, will show a point of con- densation at a lower pressure. Olszewski has investigated this for those lying on the right, but not for those on the left.

From the equation cf state (p + ji) (» — 6) = RT, the equation

of the isentropic curve follows as \P + 5§) (v—b) h = C, and

from this we may deduce T(v — b) k ~ i = C. This latter rela- tion shows in how high a degree the cooling depends on the amount by which k surpasses unity, the change in v — b being the same.

What has been said concerning the relative position of the border-curve and the isentropic curve may be easily tested for points of the border-curve which represent rarefied gaseous states, in the following way. Following the border-curve we found

before/’^ for the value of ~Zˆf- Following the isentropic curve

the value of pdr ls equal to jtcj. it JTi

curve rises more steeply than the border-curve. If we take /’ = 7 and choose the value of T c /2 for T — a temperature at which the saturated vapour may be considered to follow the gas-laws — then kl(k-i) = 14, or k= 1-07 would be the limiting value for the two cases. At any rate k= 1-41 is great enough to fulfil the condition, even for other values of T. Cailletet and Pictet have availed themselves of this adiabatic expansion for condensing some permanent gases, and it must also be used when, in the cascade method, T3 of one of the gases lies above T c of the next.

A third method of condensing the permanent gases is applied in C. P. G. Linde’s apparatus for liquefying air. Under a high pressure pi a current of gas is conducted through a narrow spiral, returning through another spiral which appara t us . surrounds the first. Between the end of the first spiral and the beginning of the second the current of gas is reduced to a much lower pressure pi by passing through a tap with a fine

orifice. On account of the expansion resulting from this sudden decrease of pressure, the temperature of the gas, and conse- quently of the two spirals, falls sensibly. If this process is repeated with another current of gas, this current, having been cooled in the inner spiral, will be cooled still further, and the temperature of the two spirals will become still lower. If. the pressures pi and pi remain constant the cooling will increase with the lowering of the temperature. In Linde’s apparatus this cycle is repeated over and over again, and after some time (about two or three hours) it becomes possible to draw off liquid air.

The cooling which is the consequence of such a decrease of pressure was experimentally determined in 1854 by Lord Kelvin (then Professor W. Thomson) and Joule, who represent the result of their experiments in the formula

.pi-pt

Ti — T 2 = –

rjrˆ

In their experiments pi was always 1 atmosphere, and the amount of pi was not large. It would, therefore, be certainly wrong, even though for a small difference in pressure the empiric formula might be approximately correct, without closer investi- gation to make use of it for the differences of pressure used in Linde's apparatus, where £1 = 200 and ˆ 2 =i8 atmospheres. For the existence of a most favourable value of pi is in contra- diction with the formula, since it would follow from it that Ti — T 2 would always increase with the increase of pi. Nor would it be right to regard as the cause for the existence of this most favourable value of pi the fact that the heat produced in the compression of the expanded gas, and therefore pi/ pi, must be kept as small as possible, for the simple reason that the heat is produced in quite another part of the apparatus, and might be neutralized in different ways.

Closer examination of the process shows that if ˆ2 is given, a most favourable value of pi must exist for the cooling itself. If pi is taken still higher, the cooling decreases again; and we might take a value for pi for which the cooling would be zero, or even negative.

If we call the energy per unit of weight e and the specific volume v, the following equation holds : —

ei +/>i»i — pjPt = «2,

or ti+piVi = ti+piVi.

According to the symbols chosen by Gibbs, xi=X2-

As xi is determined by Ti and p lt and xt by T 2 and pi, we obtain,

if we take Ti and pi as being constant,

(&L<*

WTl ” \°L*/ p 2

If T2 is to have a minimum value, we have

dT..

£-‘ =0,or

From this follows

e ha

Ui / Ti _

*©•

Wt, L fci hi’

is positive, we shall have to take for the maximum

cooling such a pressure that the product pv decreases with v, viz. a pressure larger than that at which pv has the minimum value. By means of the equation of state mentioned already, we find for the value of the specific volume that gives the greatest cooling the formula

KTib _2a («i-*) 2 vl’ and for the value of the pressure

If we take the value 2T C for Ti, as we may approximately for air when we begin to work with the apparatus, we find for pi about 8p c , or more than 300 atmospheres. If we take Ti = T c , as we may at the end of the process, we find pi = 2-5p c , or 100 atmospheres. The constant pressure which has been found the most favourable in Linde’s apparatus is a mean of the two calculated pressures. In a theoretically perfect apparatus we ought, therefore, to be able to regulate pi according to the temperature in the inner spiral.

The critical temperatures and pressures of the permanent

gases are

given in the

following table, the former being expressed

on the absolute scale and the latter in atmospheres:

—

‘ T„

Pc

T c

Pc

CH 4

191-2°

55

CO

133-5°

35-5

NO

179-5°

71-2

N 2

127

35

2

I55 o

50

Air

133°

39

Argon

.152°

506

H 2

32°

15

The values of T c and p e for hydrogen are those of Dewar. They are in approximate accordance with those given by K. Olszewski. Liquid hydrogen was first collected by J. Dewar in 1808. Apparatus for obtaining moderate and small quantities have been described by M. W. Travers and K. Olszewski. H. Kamerlingh Onnes at Leiden has brought about a circulation yielding; more than 3 litres per hour, and has made use of it to keep baths of 1-5 litre capacity at all temperatures between 20-2° and 13-7° absolute, the temperatures remaining constant within o-oi°. (See also Liquid Gases.) (J. D. v. d. W.)

CONDENSER, the name given to many forms of apparatus which have for their object the concentration of matter, or bringing it into a smaller volume, or the intensification of energy. In chemistry the word is applied to an apparatus which cools down, or condenses, a vapour to a liquid; reference should be made to the article Distillation for the various types in use, and also to Gas (Gas Manufacture) and Coal Tar; the device for the condensation of the exhaust steam of a steam-engine is treated in the article Steam-Engine. In woollen manufactures, ” condensation ” of the wool is an important operation and is accomplished by means of a ” condenser.” The term is also given — generally as a qualification, e.g. condensing-syringe, condensing-pump, — to apparatus by which air or a vapour may be compressed. In optics a ” condenser ” is a lens, or system of lenses, which serves to concentrate or bring the luminous rays to a focus; it is specially an adjunct to the optical lantern and microscope. In electrostatics a condenser is a device for concentrating an electrostatic charge (see Electrostatics ; Leyden Jar; Electrophorus).

CONDER, CHARLES (1868-1909), English artist, son of a civil engineer, was born in London, and spent his early years in India. After an English education he went into the govern- ment service in Australia, but in 1890 determined to devote himself to art, and studied for several years in Paris, where in 1893 he became an associate of the Societe Nationale des Beaux- Arts. About 1895 his reputation as an original painter, par- ticularly of Watteau-like designs for fans, spread among a limited circle of artists in London, mainly connected first with the New English Art Club, and later the International Society; and his unique and charming decorative style, in dainty pastoral scenes, gradually gave him a peculiar vogue among connoisseurs. Examples of his work were bought for the Luxembourg

and other art galleries. Conder suffered much in later years from ill-health, and died on the 9th of February 1909.

CONDILLAC, ETIENNE BONNOT DE (1715-1780), French philosopher, was born at Grenoble of a legal family on the 30th of September 171 5, and, like his elder brother, the well-known political writer, abbe de Mably, took holy orders and became abbe de Mureau. 1 In both cases the profession was hardly more than nominal, and Condillac's whole life, with the exception of an interval as tutor at the court of Parma, was devoted to speculation. His works are Essai sur Vorigine des connaissances humaines (1746), Traite des systemes (1749), Traite des sensations (1 7S4). TraitS des animaux (1 7 5 5) , a comprehensive Cours d' etudes (1767-1773) in 13 vols., written for the young Duke Ferdinand of Parma, a grandson of Louis XV., Le Commerce et le gouverne- ment, considerSs relativement I'un a I'autre (1776), and two posthumous works, Logique (1781) and the unfinished Langue des calculs (1798). In his earlier days in Paris he came much into contact with the circle of Diderot. A friendship with Rousseau, which lasted in some measure to the end, may have been due in the first instance to the fact that Rousseau had been domestic tutor in the family of Condillac's uncle, M. de Mably,

1 i.e. abbot in commenaam ot the Premonstratensian abbey of Mureau in the Vosges. (Ed.)

at Lyons. Thanks to his natural caution and reserve, Condillac's relations with unorthodox philosophers did not injure his career; and he justified abundantly the ichoice of the French court in sending him to Parma to educate the orphan duke, then a child of seven years. In 1768, on his return from Italy, he was elected to the French Academy, but attended ,no meeting after his recep- tion. He spent his later years in retirement at Flux, a small property which he had purchased near Beaugency, and died there on the 3rd of August 1780.

Though Condillac's genius was not of the highest order, he is important both as a psychologist and as having established systematically in France the principles of Locke, whom Voltaire had lately made fashionable. In setting forth his empirical sensationism, Condillac shows many of the best qualities of his age and nation, lucidity, brevity, moderation and an earnest striving after logical method. Unfortunately it must be said of him as of so many of his

contemporaries, ” er hat die Theile in seiner Hand, fehlt leider nur der geistiger Band “; in the analysis of the human mind on which his fame chiefly rests, he has missed out the active and spiritual side of human experience. His first book, the Essai sur I’origine des connaissances humaines, keeps close to his English master. He accepts with some indecision Locke’s deduction of our knowledge from two sources, sensation and reflection, and uses as his main principle of explanation the association of ideas. His next book, the Traiti des systemes, is a vigorous criticism of those modern systems which are based upon abstract principles or upon unsound hypotheses. His polemic, which is inspired throughout with the spirit of Locke, is directed against the innate ideas of the Cartesians, Male- branche’s faculty — psychology, Leibnitz’s monadism and pre- established harmony, and, above all, against the conception of substance set forth in the first part of the Ethics of Spinoza. By far the most important of his works is the Traiti des sensations, in which he emancipates himself from the tutelage of Locke and treats psychology in his own characteristic way. He had been led, he tells us, partly by the criticism of a talented lady, Made- moiselle Ferrand, to question Locke’s doctrine that the senses give us intuitive knowledge of objects, that the eye, for example, judges naturally of shapes, sizes, positions and distances. His discussions with the lady had convinced him that to clear up such questions it was necessary to study our senses separately, to distinguish precisely what ideas we owe to each sense, to observe how the senses are trained, and how one sense aids another. The result, he was confident, would show that all human faculty and knowledge are transformed sensation only, to the exclusion of any other principle, such as reflection. The plan of the book is that the author imagines a statue organized inwardly like a man, animated by a soul which has never received an idea, into which no sense-impression has ever penetrated. He then unlocks its senses one by one, beginning with smell, as the sense that contributes least to human knowledge. At its first ex- perience of smell, the consciousness of the statue is entirely occupied by it; and this occupancy of consciousness is attention. The statue’s smell-experience will produce pleasure or pain; and pleasure and pain will thenceforward be the master-principle which, determining all the operations of its mind, will raise it by degrees to all the knowledge of which it is capable. The next stage is memory, which is the lingering impression of the smell- experience upon the attention: ” memory is nothing more than a mode of feeling.” From memory springs comparison: the statue experiences the smell, say, of a rose, while remembering that of a Carnation; and ” comparison is nothing more than giving one’s attention to two things simultaneously.” And ” as soon as the statue has comparison it has judgment.” Com- parisons

and judgments become habitual, are stored in the mind and formed into series, and thus arises the powerful principle of the association of ideas. From comparison of past and present experiences fn respect of their pleasure-giving quality arises desire; it is desire that determines the operation of our faculties, stimulates the memory and imagination, and gives rise to the passions. The passions, also, are nothing but sensation trans- formed. These indications will suffice to show the general course

of the argument in the first section of the Traiti des sensations. To show the thoroughness of the treatment it will be enough to quote the headings of the chief remaining chapters: ” Of the Ideas of a Man limited to the Sense of Smell,” ” Of a Man limited to the Sense of Hearing,” ” Of Smell and Hearing combined,” ” Of Taste by itself, and of Taste combined with Smell and Hearing,” ” Of a Man limited to the Sense of Sight.” In the second section of the treatise Condillac invests his statue with the sense of touch, which first informs it of the existence of external objects. In a very careful and elaborate analysis, he distinguishes the various elements in our tactile experiences—* the touching of one’s own body, the touching of objects other than one’s own body, the experience of movement, the explora- tion of surfaces by the hands: he traces the growth of the statue’s perceptions of extension, distance and shape. The third section deals with the combination of touch with the other senses. The fourth section deals with the desires, activities and ideas of an isolated man who enjoys possession of all the senses; and ends with observations on a ” wild boy ” who was found riving among bears in the forests of Lithuania. The conclusion of the whole work is that in the natural order of things everything has its source in sensation, and yet that this source is not equally abundant in all men; men differ greatly in the degree of vividness with which they feel; and, finally, that man is nothing but what he has acquired; all innate faculties and ideas are to be swept away. The last dictum suggests the difference that has been made to this manner of psychologizing by modern theories of evolution and heredity.

Condillac’s work on politics and history, contained, for the most part, in his Cours d’itudes, offers few features of interest, except so far as it illustrates his close affinity to English thought: he had hot the warmth and imagination to make a good historian. In logic, on which he wrote extensively, he is far less successful than in psychology. He enlarges with much iteration, but with few concrete examples, upon the supremacy of fhe analytic method; argues that reasoning consists in the substitution of one proposition for another which is identical with it; and lays it down that science is the same thing as a well-

constructed language, a proposition which in his Langue des calculs he tries to prove by the example of arithmetic. His logic has in fact the good and bad points that we might expect to find in a sensationist who knows no science but mathematics. He rejects the medieval apparatus of the syllogism; but is precluded by his standpoint from understanding the active, spiritual character of thought; nor had he that interest in natural science and appreciation of inductive reasoning which form the chief merit of J. S. Mill. It is obvious enough that Condillac's anti-spiritual psychology, with its explanation of personality as an aggregate of sensations, leads straight to atheism and determinism. There is, however, no reason to question the sincerity with which he repudiates both these consequences. What he says upon religion is always in harmony with his profession; and he vindicated the freedom of the will in a dissertation that has very little in common with the Traiti des sensations to which it is appended. The common reproach of materialism should certainly not be made against him. He always asserts the substantive reality of the soul; and in the opening words of his Essai, " Whether we rise to heaven, or descend to the abyss, we never get outside ourselves — it is always our own thoughts that we perceive," we have the subjectivist principle that forms the starting-point of Berkeley.

As was fitting to a disciple of Locke, Condillac's ideas have had most importance in their effect upon English thought. In matters connected with the association of ideas, the supremacy of pleasure and pain, and the general explanation of all mental contents as sensations or transformed sensations, his influence can be traced upon the Mills and upon Bain and Herbert Spencer. And, apart from any definite propositions, Condillac did a notable work in the direction of making psychology a science; it is a great step from the desultory, genial observation of Locke to the rigorous analysis of Condillac, short-sighted and defective as that analysis may seem to us in the light of fuller knowledge.

His method, however, of imaginative reconstruction was by no means suited to English ways of thinking. In spite of his protests against abstraction, hypothesis and synthesis, his allegory of the statue is in the highest degree abstract, hypo- thetical and synthetic. James Mill, who stood more by the study of concrete realities, put Condillac into the hands of his youthful son with the warning that here was an example of what to avoid in the method of psychology. In France

Condillac's doctrine, so congenial to the tone of 18th century philosophism, reigned in the schools for over fifty years, challenged only by a few who, like Maine de Biran, saw that it gave no sufficient account of volitional experience. Early in the 19th century, the romantic awakening of Germany had spread to France, and sensationism was displaced by the eclectic spiritualism of Victor Cousin.

Condillac's collected works were published in 1798 (23 vols.) and two or three times subsequently; the last edition (1822) has an introductory dissertation by A. F. Thery. The Encyclop&die methodique has a very long article on Condillac (Naigeon). Biographical details and criticism of the Traiti des systkmes in J. P. Damiron's Mimoires pour servir a I'histoire de la philosophic au dix-huitieme siecle, tome iii.; a full criticism in V. Cousin's Cours de I'histoire de la philosophie moderne, ser. i. tome iii. Consult also F. Rethore, Condillac ou V empirisme el le rationalisme (1864); L. Dewaule., Condillac et la psychologie anglaise contemporaine (1 89 1) ; histories of philosophy. (H. St.)

CONDITION (Lat. conditio, from condicere, to agree upon, arrange; not connected with conditio, from condere, conditum, to put together), a stipulation, agreement. The term is applied technically to any circumstance, action or event which is regarded as the indispensable prerequisite of some other circum- stance, action or event. It is also applied generally to the sum of the circumstances in which a person is situated, and more specifically to favourable or prosperous circumstances; thus a person of wealth or birth is described as a person " of condition," or an athlete as being " in condition," i.e. physically fit, having gone through the necessary course of preliminary training. In all these senses there is implicit the idea of limitation or restraint imposed with a view to the attainment of a particular end.

(1) In Logic, the term " condition " is closely related to " cause " in so far as it is applied to prior events, &c, in the absence of which another event would not take place. It is, however, different from " cause " inasmuch as it has a pre- dominantly negative or passive significance. Hence the adjective " conditional " is applied to propositions in which the truth of the main statement is made to depend on the truth of another; these propositions are distinguished from categorical propositions, which simply state a fact, as being " composed of two categorical propositions united by a conjunction," e.g. if A is B, C is D. The second statement (the " consequent ") is restricted or qualified by the first (the " antecedent "). By some logicians these propositions are

classified as (1) Hypothetical, and (2) Disjunctive, and their function in syllogistic reasoning gives rise to the following classification of conditional arguments: — (a) Constructive hypothetical syllogism {modus ponens, ” affirma- tive mood”): If A is B, C is D; but A is B; therefore C is D. (b) Destructive hypothetical syllogism (modus tollens, mood which ” removes,” i.e. the consequent): if A is B, C is D; but C is not D; therefore A is not B. In (a) the antecedent must be affirmed, in (b) the consequent must be denied; other- wise ‘the arguments become fallacious. A second class of con- ditional arguments are disjunctive syllogisms consisting of © the modus ponendo tollens: A is either B or C; but A is B; therefore C is not D; and (d) modus tollendo ponens: A is either B or C; A is not B; therefore A is C. A more complicated conditional argument is the dilemma (q.v.). 1

The limiting or restrictive significance of ” condition ” has led to its use in metaphysical theory in contradistinction to the conception of absolute being, the aseitas of the Schoolmen.

1 The terminology used above has not been adopted by all logicians. ” Conditional ” has been used as equivalent to ” hypo- thetical ” in the widest sense (including “disjunctive”); or narrowed down to be synonymous with ” conjunctive ” (the con- dition being there more explicit) , as a subdivision of ‘ ‘ hypothetical. ‘ ‘

Thus all finite things exist in certain relations not only to all other things but also to thought; in other words, all finite existence is ” conditioned.” Hence Sir Wm. Hamilton speaks of the ” philosophy of the unconditioned,” i.e. of thought in distinction to things which are determined by thought in relation to other things. An analogous distinction is made (cf. H. W. B. Joseph,- Introduction to Logic, pp. 380 foil.) between the so-called universal laws’ of nature and conditional principles, which, though they are regarded as having the force of law, are yet dependent or derivative, i.e. cannot be treated as universal truths. Such principles hold good under present conditions, but other conditions might be imagined under which they would be invalid; they hold good only as corollaries from the laws of nature under existing conditions.

(2) In Law, condition in its general sense is a restraint annexed to a thing, so that by the non-performance the party to it shall receive prejudice and loss, and by the performance commodity or advantage. Conditions may be either: (1) condition in a deed or express condition, i.e. the condition being expressed in actual words; or (2) condition in law or implied condition, i.e. where, although no condition is actually

expressed, the law implies a condition. The word is also used indifferently to mean either the event upon the happening of which some estate or obligation is to begin or end, or the provision or stipulation that the estate or obligation will depend upon the happening of the event. A condition may be of several kinds: (1) a condition precedent, where, for example, an estate is granted to one for life upon condition that, if the grantee pay the grantor a certain sum on such a day, he shall have the fee simple; (2) a condition subsequent, where, for example, an estate is granted in fee upon condition that the grantee shall pay a certain sum on a certain day, or that his estate shall cease. Thus a condition precedent gets or gains, while a condition subsequent keeps and continues. A condition may also be affirmative, that is, the doing of an act; negative, the not doing of an act; restrictive, compulsory, &c. The word is also used adjectivally in the sense set out above, as in the phrases ” conditional legacy,” ” conditional limitation,” ” conditional promise,” &c; that is, the legacy, the limitation, the promise is to take effect only upon the happening of a certain event.

CONDITIONAL FEE, at English common law, a fee or estate restrained in its form of donation to some particular heirs, as, to the heirs of a man’s body, or to the heirs male of his body. It was called a conditional fee by reason of the condition expressed or implied in the donation of it, that if the donee died without such particular heirs, the land should revert to the donor. In other words, it was a fee simple on condition that the donee had issue, and as soon as such issue was born, the estate was supposed to become absolute by the performance of the condition. A conditional fee was converted by the statute De Bonis Condb- tionalibus into an estate tail (see Real Property).

CONDITIONAL LIMITATION, in law, a phrase used in two senses. (1) The qualification annexed to the grant of an estate or interest in land, providing for the determination of that grant or interest upon a particular contingency happening. An estate with such a limitation can endure only until the particular contingency happens; it is a present interest, to be divested on a future contingency. The grant of an estate to a man so long as he is parson of Dale, or while he continues unmarried, are instances of conditional limitations of estates for life. (2) A future use or interest in land limited to take effect upon a given contingency. For instance, a grant to X. and his heirs to the use of A., provided that when C. returns from Rome the land shall go to the use of B. in fee simple. B. is said to take under a conditional limitation, operating by executory devise or springing or shifting use (see Remainder, Reversion).

CONDOM, a town of south-western France, capital of an arrondissement in the department of Gers, on the right bank of the Balse, at its junction with the Gele, 27 m. by road N.N.W. of Auch. Pop. (1906) town, 4046; commune, 6435. Two stone bridges unite Condom with its suburb on the left bank of the river. The streets are small and narrow and several old

houses still remain, but to the east the town is bordered by pleasant promenades. The Gothic church of St Pierre, its chief building, was erected from 1506 to 1521, and was till 1790 a cathedral. The interior, which is without aisles or transept, is surrounded by lateral chapels. On the south is a beautifully sculptured portal. An adjoining cloister of the 16th century is occupied by the h6tel de ville. The former episcopal palace with its graceful Gothic chapel is used as a law-court. The sub-prefecture, a tribunal of first instance, and a communal college, are among the public institutions. Brandy-distilling, wood-sawing, iron-founding and the manufacture of stills are among the industries. The town is a centre for the sale of Armagnac brandy and has commerce in grain and flour, much of which is river-borne.

Condom (Condomus) was founded in the 8th century, but in 840 was sacked and burnt by the Normans. A monastery built here c. 900 by the wife of Sahcho of Gascony was soon destroyed by fire, but in ion was rebuilt, by Hugh, bishop of Agen. Round this abbey the town grew up, and in 13 17 was made into an episcopal see by Pope John XXII. The line of bishops, which included Bossuet (1668-1671), came to an end in 1790 when the see was suppressed. Condom was, during the middle ages, a fortress of considerable strength. During the Hundred Years' War, after several unsuccessful attempts, it was finally captured and held by the English. In 1569 it was sacked by the Huguenots under Gabriel, count of Montgomery.

A list of monographs, &c, on the abbey, see and town of Condom is given s.v. in U. Chevalier, Repertoire des sources. Topobibliogr. (Montbeliard, 1894-1899).

CONDOR (Sarcorhamphus gryphus), an American vulture, and almost the largest of existing birds of flight, although by no means attaining the dimensions attributed to it by early writers. It usually measures about 4 ft. from the point of the beak to the extremity of the tail, and

9 ft. between the tips of its wings, while it is probable that the expanse of wing never exceeds 1 2 ft. The head and neck are destitute of feathers, and the former, which is much flattened above, is in the male crowned with a caruncle or comb, while the skin of the latter in the same sex lies in folds, forming a wattle. The adult plumage is of a uniform black, with the exception of a frill of white feathers nearly surrounding the base of the neck, and certain wing 'leathers which, especially in the male, have large patches of white. The middle toe is greatly elongated, and the hinder one but slightly developed, while the talons of all the toes are comparatively straight and blunt, and are thus of little use as organs of pre- hension. The female, contrary to the usual rule among birds of prey, is smaller than the male.

The condor is a native of South America, where it is confined to the region of the Andes, from the Straits of Magellan to 4 north latitude, — the largest examples, it is said, being found about the volcano of Cayambi, situated on the equator. It is often seen on the shores of the Pacific, especially during 1 the rainy season, but its favourite haunts for roosting and breeding are at elevations of 10,000 to 16,000 ft. There, during the months of February and March, on inaccessible ledges of rock, it deposits two white eggs, from 3 to 4 in. in length, its nest consisting merely of a few sticks placed around the eggs, The period of incubation lasts for seven weeks, and the young are covered with a whitish down until almost as large as their parents. They are unable to fly till nearly two years old, and continue for a considerable time after taking wing to roost and hunt with their parents. The white ruff on the neck, and the similarly coloured feathers of the wing, do not appear until the completion of the first moulting. By preference the condor feeds on carrion, but it does not hesitate to attack sheep, goats and deer, and for this reason it is hunted down by the shepherds, who, it is said, train their dogs to look up and bark at the con- dors as they fly overhead. They are exceedingly voracious, a single condor of moderate size having been known, according to Orton, to devour a calf, a sheep and a dog in a single week. When thus gorged with food, they are exceedingly stupid, and may then be readily caught. For this purpose a horse or mule

is killed, and the carcase surrounded with palisades to which the condors are soon attracted by the prospect of food, for the ; weight of evidence seems to favour the opinion that those vultures owe their knowledge of the presence of carrion more to sight than to scent. Having feasted themselves to excess, they are set upon by the hunters with sticks, and being unable, owing to the want of space within the pen, to take the run without which they are unable to rise on wing, they are readily killed or captured. They sleep during the greater part

of the day, searching for food in the clearer light of morning and evening. They are remarkably heavy sleepers, and are readily captured by the inhabitants ascending the trees on which they roost, and noosing them before they awaken. Great numbers of condors are thus taken alive, and these, in certain districts, are employed in a variety of bull-fighting. They are exceedingly tenacious of life, and can exist, it is said, without food for over forty days. Although the favourite haunts of the condor are at the level of perpetual snow, yet it rises to a much greater height, . Humboldt having observed it flying over Chimborazo at a height of over 23,000 ft. On wing the movements of the condor, as it wheels in majestic circles, are remarkably graceful. The birds flap their wings on rising from the ground, but after attaining a moderate elevation they seem to sail on the air, Charles Darwin having watched them for half an hour without once observing a flap of their wings.

CbNDORCET, MARIE JEAN ANTOINE NICOLAS CARITAT, Marquis de (1743-1794), French mathematician, philosopher and Revolutionist, was born at Ribemont, in Picardy, on the 17th of September 1743. He descended from the ancient family of Caritat, who took their title from Condorcet, near Nyons in Dauphine, where they were long settled. His father dying while he was very young, his mother, a very devout woman, had him educated at the Jesuit College in Reims and at the College of Navarre in Paris, where he displayed the most varied mental activity. His first public distinctions were gained in mathematics. At the age of sixteen his performances in analysis gained the praise of D'Alembert and A. C. Clairaut, and at the age of twenty-two he wrote a treatise on the integral calculus which obtained warm approbation from competent judges. With his many-sided intellect and richly-endowed emotional nature, however, it was impossible for him to be a specialist, and least of all a specialist in mathematics. Philosophy and literature attracted him, and social work was dearer to him than any form of intellectual exercise. In 1769 he became a member of the Academy of Sciences. His contributions to its memoirs are numerous, and many of them are on the most abstruse and difficult mathematical problems.

Being of a very genial, susceptible and enthusiastic disposition, he was the friend of almost all the distinguished men of his time, and a zealous propagator of the religious and political views then current among the literati of France. D'Alembert, Turgot and Voltaire, for whom he had great affection and veneration, and by whom he was highly respected and esteemed, contributed largely to the formation of his opinions. His Lettre d'un laboureur de Picardie & M.N. . . (Necker) was written under the inspira- tion of Turgot, in defence of free internal trade in corn. Condorcet also wrote on the same subject the

Reflexions sur le commerce des bUs (1776). His Lettre d'un theologien, &c, was attributed to Voltaire, being inspired throughout by the Voltairian .anti- clerical spirit. He was induced by D'Alembert to take an active part in the preparation of the EncyclopSdie. His Eloges des Academiciens de I'AcadSmie Roy ale des Sciences morts depuis 1666 jusqu'en i6qq (1773) gained him the reputation of being an eloquent and graceful writer. He was elected to the perpetual secretaryship of the Academy of Sciences in 1777, and to the French Academy in 1782. He was also member of the academies of Turin, St Petersburg, Bologna and Philadelphia. In 1785 he published his Essai sur I' application de I'analyse aux pro- bability des decisions prises a la plurality des voix, — a remarkable work which has a distinguished place in the history of the doctrine of probability; a second edition, greatly enlarged and completely recast, appeared in 1804 under the title of Elements du calcul

des probability et son application aux jeux de hazard, & la lolerie, et aux jugements des hommes, &c. In 1786 he married Sophie de Grouchy, a sister of Marshal Grouchy, said to have been one of the most beautiful women of her time. Her salon at the Hotel des Monnaies, where Condorcet lived in his capacity as inspector-general of the mint, was one of the most famous of the time. In 1786 Condorcet published his Vie de Turgot, and in 1787 his Vie de Voltaire. Both works were widely and eagerly read, and are perhaps, from a merely literary point of view, the best of Condorcet's writings.

The political tempest which had been long gathering over France now began to break and to carry everything before it. Condorcet was, of course, at once hurried along by it into the midst of the conflicts and confusion of the Revolution. He greeted with enthusiasm the advent of democracy, and laboured hard to secure and hasten its triumph. He was indefatigable in writing pamphlets, suggesting reforms, and planning constitu- tions. He was not a member of the States-General of 1780, but he had expressed his ideas in the electoral assembly of the noblesse of Mantes. The first political functions which he exercised were those of a member of the municipality of Paris (17.00). He was next chosen by the Parisians to represent them in the Legislative Assembly, and then appointed by that body one of its secretaries. In this capacity he drew up most of its addresses, but seldom spoke, his pen being more effective than his tongue. He was the chief author of the address to the European powers when they threatened France with

war. He was keenly interested in education, and, as a member of the committee of public instruction, presented to the Assembly (April 21 and 22, 1792) a bold and comprehensive scheme for the organization of a system of state education which, though more urgent questions compelled its postponement, became the basis of that adopted by the Convention, and thus laid the foundations on which the modern system of national education in France is built up. After the attempted flight of the king, in June 1701, Condorcet was one of the first to declare in favour of a republic, and it was he who drew up the memorandum which led the Assembly, on the 4th of September 1792, to decree the suspension of the king and the summoning of the National Convention. He had, meanwhile, resigned his offices and left the Hotel des Monnaies; his declaration in favour of republicanism had alienated him from his former friends of the constitutional party, and he did not join the Jacobin Club, which had not yet declared against the monarchy. Though attached to no powerful political group, however, his reputation gave him great influence. At the elections for the Convention he was chosen for five departments, and took his seat for that of Aisne. He now became the most influential member of the committee on the constitution, and as ” reporter ” he drafted and presented to the Convention (February 15, 1793) a constitution, which was, how- ever, after stormy debates, rejected in favour of that presented by Herault de Sechelles. The work of constitution-making had been interrupted by the trial of Louis XVI. Condorcet objected to the assumption of judicial functions by the Convention, ob- jected also on principle to the infliction of the death penalty; but he voted the king guilty of conspiring against liberty and worthy of any penalty short of death, and against the appeal to the people advocated by the Girondists. In the atmosphere of universal suspicion that inspired the Terror his independent attitude could not, however, be maintained with impunity. His severe and public criticism of the constitution adopted by the Convention, his denunciation of the arrest of the Girondists, and his opposi- tion to the violent conduct of the Mountain, led to his being accused of conspiring against the Republic. He was condemned and declared to be hors la loi. Friends, sought for him an asylum in the house of Madame Vernet, widow of the sculptor and a near connexion of the painters of the same name. Without even asking his name, this heroic woman, as soon as she was assured that he was an honest man, said, ” Let him come, and lose not a moment, for while we talk he may be seized.” When the execution of the Girondists showed him that his presence exposed his protectress to a terrible danger, he resolved

to seek a refuge elsewhere. ” I am outlawed,” he said, ” and if I am

discovered you will meet the same sad end as myself. I must not stay." Madame Vernet's reply deserves to be immortal, and should be given in her own words: " La Convention, Monsieur, a le droit de mettre hors la loi: elle n'a pas le pouvoir de mettre hors de l'humanite; vous resterez." From that time she had his movements strictly watched lest he should attempt to quit her house. It was partly to turn his mind from the idea of attempting this, by occupying it otherwise, that his wife and some of his friends, with the co-operation of Madame Vernet, prevailed on him to engage in the composition of the work by which he is best known — the Esquisse d'un tableau historique des progres de I'esprit humain. In his retirement Condorcet wrote also his justification, and several small works, such as the Moyen d'apprendre a compter surement et avec facilite, which he intended for the schools of the republic. Several of these works were published at the time, thanks to his friends; the rest appeared after his death. Among the latter was the admirable Avis d'un proscrit a sa fille. While in hiding he also continued to take an active interest in public affairs. Thus, he wrote several important memoranda on the conduct of the war against the Coalition, which were laid before the Committee of Public Safety anonymously by a member of the Mountain named Marcoz, who lived in the same house as Condorcet without thinking it his duty to denounce him. In the same way he for- warded to Arbogast, president of the committee for public instruc- tion, the solutions of several problems in higher mathematics.

Certain circumstances having led him to believe that the house of Madame Vernet, 21 rue Servandoni, was suspected and watched by his enemies, Condorcet, by a fatally successful artifice, at last baffled the vigilance of his generous friend and escaped. Disappointed in finding even a night's shelter at the chateau of one whom he had befriended, he had to hide for three days and nights in the thickets and stone-quarries of Clamart. Oh the evening of the 7th of April 1794 — not, as Carlyle says, on a " bleared May morning," — with garments torn, with wounded leg, with famished looks, be entered a tavern in the village named, and called for an omelette. " How many eggs in your omelette?" "A dozen." "What is your trade?" "A carpenter." " Carpenters have* not hands like these, and do not ask for a dozen eggs in an omeletts." When his papers were demanded he had none to show; when his person was searched a Horace was found on him. The villagers seized him, bound him, haled him forthwith on bleeding feet towards Bourg-la- Reine; he fainted by the way, was set on a horse offered in pity by a passing peasant, and, at the journey's end, was cast into a cold damp cell. Next morning he was found dead on the floor. Whether he had died from suffering and exhaustion, from

apoplexy or from poison, is an undetermined question.

Condorcet was undoubtedly a most sincere, generous and noble-minded man. He was eager in the pursuit of truth, ardent in his love of human good, and ever ready to undertake labour or encounter danger on behalf of the philanthropic plans which his fertile mind contrived and his benevolent heart inspired. It was thus that he worked for the suppression of slavery, for the rehabilitation of the chevalier de La Barre, and in defence of Lally-Tollendal. He lived at a time when calumny was rife, and various slanders were circulated regarding him, but fortu- nately the slightest examination proves them to have been inexcusable fabrications. That while openly opposing royalty he was secretly soliciting the office of tutor to the Dauphin; that he was accessory to the murder of the due de la Rochefoucauld; or that he sanctioned the burning of the literary treasures of the learned congregations, are stories which can be shown to be utterly untrue.

His philosophical fame is chiefly associated with the Esquisse . . . des'progres mentioned above. With the vision of the guillo- tine before him, with confusion and violence around him, he com- forted himself by trying to demonstrate that the evils of life had arisen from a conspiracy of priests and rulers against their fellows, and from the bad laws and institutions which they had succeeded in creating, but that the human race would finally conquer its

enemies and free itself of its evils. His fundamental idea is that of a human perfectibility which has manifested itself in con- tinuous progress in the past, and must lead to indefinite progress in the future. He represents man as starting from the lowest stage of barbarism, with no superiority over the other animals save that of bodily organization, and as advancing uninterruptedly, at a more or less rapid rate, in the path of enlightenment, virtue and happiness. The stages which the human race has already gone through, or, in other words, the great epochs of history, are regarded as nine in number. The first three can confessedly be described only conjecturally from general observations as to the development of the human faculties, and the analogies of savage life. In the first epoch, men are united into hordes of hunters and fishers, who acknowledge in some degree public authority and the claims of family relationship, and who make use of an articulate language. In the second epoch — the pastoral state — property is

introduced, and along with it inequality of conditions, and even slavery, but also leisure to cultivate intelligence, to invent some of the simpler arts, and to acquire some of the more elementary truths of science. In the third epoch — the' agricul- tural state — as leisure and wealth are greater, labour better distributed and applied, and the means of communication increased and extended, progress is still more rapid. With the invention of alphabetic writing the conjectural part of history closes, and the more or less authenticated part commences. The fourth and fifth epochs are represented as corresponding to Greece and Rome. The middle ages are divided into two epochs, the former of which terminates with the Crusades, and the latter with the invention of printing. The eighth epoch extends from the invention of printing to the revolution in the method of philo- sophic thinking accomplished by Descartes. And the ninth epoch begins with that great intellectual revolution, and ends with the great political and moral revolution of 1789, and is illustrious, according to Condprcet, through the discovery of the true system of the physical universe by Newton, of human nature by Locke and Condillac, and of society by Turgot, Richard Price and Rousseau. There is an epoch of the future — a tenth epoch, — and the most original part of Condorcet's treatise is that which is devoted to it. After insisting that general laws regulative of the past warrant general inferences as to the future, he argues that the three tendencies which the entire history of the past shows will be characteristic features of the future are: — (1) the destruction of inequality between nations; (2) the destruction of inequality between classes; and (3) the improvement of individuals, the indefinite perfectibility of human nature itself —intellectually, morally and physically. These propositions have been much misunderstood. The equality to which he re- presents nations and individuals as tending is not absolute equality, but equality of freedom and of rights. It is that equality which would make the inequality of the natural advant- ages and faculties of each community and person beneficial to all; Nations and men, he thinks, are equal, if equally free, and are all tending to equality because all tending to freedom. As to indefinite perfectibility, he nowhere denies that progress is conditioned both by the constitution of humanity and the char- acter of its surroundings. But he affirms that these conditions are compatible with endless progress, and that the human mind can assign no fixed limits to its own advancement in knowledge and virtue, or even to the prolongation of bodily life. This theory explains the importance he attached to popular education, to which he looked for all sure progress.

The book is pervaded by a spirit of excessive hopefulness, and

contains numerous errors of detail, which are fully accounted for by the circumstances in which it was written. Its value lies entirely in its general ideas. Its chief defects spring from its author's narrow and fanatical aversion to all philosophy which did not attempt to explain the world exclusively on mechanical and sensational principles, to all religion whatever, and especially to Christianity and Christian institutions, and to monarchy. His ethical position, however, gives emphasis to the sympathetic impulses and social feelings, and had considerable influence upon Auguste Comte.

Madame de Condorcet (b. 1764), who was some twenty years younger than her husband, was rendered penniless by his proscription, and compelled to support not only herself and her four years old daughter but her younger sister, Charlotte de Grouchy. After the end of the Jacobin Terror she published an excellent translation of Adam Smith's Theory of Moral Sentiments; in 1798 a work of her own, Lettres sur la sympathie; and in 1799 her husband's Eloges des academiciens. Later she co-operated with Cabanis, who had married her sister, and with Garat in publishing the complete works of Condorcet (1801-1804). She adhered to the last to the political views of her husband, and under the Consulate and Empire her salon became a meeting-place of those opposed to the autocratic ' r6gime. She died at Paris on the 8th of September 1822. Her daughter was married; in 1807, to General O'Connor.

A Biographie de Condorcet, by M. F. Arago, is prefixed to A. Condorcet-O'Connor's edition of Condorcet's works, in 12 volumes (1847-1849). There is an able ; essay on Condprcet in Lord Morley of Blackburn's Critical Miscellanies. On Condorcet as an historical philosopher see "Comte's Cours de philosophie positive, iv. 252-253, and Systime de politique positive, iv. Appendice General, 109-111; F. Laurent, Etudes, xii. 121-126, 89-110; and R. Flint, Philosophy of History in France and Germany, i. 125-138. The Memoires de Condorcet sur la Revolution francaise, extraits de sa correspondance et de celles de ses amis (2 vols., Paris, Ponthieu, 1824), which were in fact edited by F. G. de la Rochefoucauld-Liancourt, are spurious. See also Dr J. F. E. Robinet, Condorcet, sa vie et son ceuvre, and more especially L. Cahen, Condorcet et la Revolution francaise (Paris, 1904). On Madame de Condprcet see Antoine Guillois, La Marquise de Condorcet, safamille, son salon et ses oeuvres (Paris, 1897).

CONDOTTIERE (plural, condottieri), an Italian term, derived ultimately from Latin conducere, meaning either " to conduct " or " to hire," for the leader of the mercenary military companies, often several thousand strong, which used to be hired out to carry on the

wars of the Italian states. The word is often ex- tended so as to include the soldiers as well as the leader of a company. The condottieri played a very important part in Italian history from the middle of the 13th to the middle of the 15th century. The special political and military circumstances of medieval Italy, and in particular the wars of the Guelphs and Ghibellines, brought it about that the condottieri and their leaders played a more conspicuous and important part in history than the ” Free Companies ” elsewhere. Amongst these circum- stances the absence of a numerous feudal cavalry, the relative luxury of city life, and the incapacity of city militia for wars of aggression were the most prominent. From this it resulted that war was not merely the trade of the condottiere, but also his monopoly, and he was thus able to obtain whatever terms he asked, whether money payments or political concessions. These companies were recruited from wandering mercenary bands and individuals of all nations, and from the ranks of the many armies of middle Europe which from time to time overran Italy.

Montreal d’Albarno, a gentleman of Provence, was the first to give them a definite form. A severe discipline and an elaborate organization were introduced within the company itself, while in their relations to’ the people the most barbaric licence was permitted. ‘Montreal himself was put to death at Rome by Rienzi, and Conrad Land© succeeded to the command. The Grand Company, as it was called, soon numbered about 7000 cavalry and 1 500 select infantry, and was for some years the terror of Italy. They seem to have been Germans chiefly. On the conclusion (1360) of the peace of Bretigny between England and France, Sir John Hawkwood (q.v.) led an army of English mercenaries, called the White Company, into Italy, which took a prominent part in the confused wars of the next thirty years. Towards the end of the century the Italians began to organize armies of the same description. This ended the reign of the purely mercenary company, and began that of the semi-national mercenary army which endured in Europe till replaced by the national standing army system. The first company of importance raised on the new basis was that of St George, originated by Alberigo, count of Barbiano, many of whose subordinates and pupils conquered principalities for themselves. Shortly after,

the organization of these mercenary armies was carried to the highest perfection by Sforza Attendolo, condottiere in the service of Naples,

who had been a peasant of the Romagna, and by his rival Brancaccio di Montone in the service of Florence. The army and the renown of Sforza were inherited by his Son Francesco Sforza, who eventually became duke of Milan (1450). Less fortunate was another great condottiere, Carmagnola, who first served one of the Visconti, and then conducted the wars of Venice against his former masters, but at last awoke the suspicion of the Venetian oligarchy, and was put to death before the palace of St Mark (1432). Towards the end of the 15th century, when the large cities had gradually swallowed up the small states, and Italy itself was drawn into the general current of European politics, and became the battlefield of powerful armies — French, Spanish and German— the condottieri, who in the end proved quite unequal to the gendarmerie of France and the improved troops of the Italian states, disappeared.

The soldiers of the condottieri were almost entirely heavy armoured cavalry (men-at-arms). They had, at any rate before 1400, nothing in common with the people among whom they fought, and their disorderly conduct and rapacity seem often to have exceeded that of other medieval armies. They were always ready to change sides at the prospect of higher pay. They were connected with each other by the interest of a common profession, and by the possibility that the enemy of to-day might be the friend and fellow-soldier of to-morrow. Further, a prisoner was always more valuable than a dead enemy. In consequence of all this their battles were often as bloodless as they were theatrical. Splendidly equipped armies were known to fight for hours with hardly the loss of a man (Zagonara, 1423; Molinella, 1467).

CONDUCTION, ELECTRIC. The electric conductivity of a substance is that property in virtue of which all its parts come spontaneously to the same electric potential if the substance is kept free from the operation of electric force. Accordingly, the reciprocal quality, electric resistivity, may be defined as a quality of a substance in virtue of which a difference of potential can exist between different portions of the body when these are in contact with some constant source of electromotive force, in such a manner as to form part of an electric circuit.

All material substances possess in some degree, large or small, electric conductivity, and may for the sake of convenience be broadly divided into five classes in this respect. Between these, however, there is no sharply-marked dividing line, and the classification must therefore be accepted as a more or less arbitrary one. These divisions are: (1) metallic conductors, (2) non-metallic conductors, (3) dielectric

conductors, (4) electro- lytic conductors, (5) gaseous conductors. The first class com- prises all metallic substances, and those mixtures or combinations of metallic substances known as alloys. The second includes such non-metallic bodies as carbon, silicon, many of the oxides and peroxides of the metals, and probably also some oxides of the non-metals, sulphides and selenides. Many of these sub- stances, for instance carbon and silicon, are well-known to have the property of existing in several allotropic forms, and in some of these conditions, so far from being fairly good conductors, they may be almost perfect non-conductors. An example of this is seen in the case of carbon in its three allotropic conditions — charcoal, graphite and diamond. As charcoal it possesses a fairly well-marked but not very high conductivity in comparison with metals; as graphite, a conductivity about one-four-hun- dredth of that of iron; but as diamond so little conductivity that the substance is included amongst insulators or non-conductors. The third class includes those substances which are generally called insulators or non-conductors, but which are better denominated dielectric conductors; it comprises such solid substances as mica, ebonite, shellac, india-rubber, gutta- percha, paraffin, and a large number of liquids, chiefly hydro- carbons. These substances differ greatly in insulating power, and according as the conductivity is more or less marked, they are spoken of as bad or good insulators. Amongst the latter many of the liquid gases hold a high position. Thus, liquid

oxygen and liquid air have been shown by Sir James Dewar to be almost perfect non-conductors of electricity.

The behaviour of substances which fall into these three classes is discussed below in section I., dealing with metallic conduction.

The fourth class, namely the electrolytic conductors comprises all those substances which undergo chemical decomposition when they form part of an electric circuit traversed by an electric current. They are discussed in section II., dealing with electrolytic conduction.

The fifth and last class of conductors includes the gases. The conditions under which this class of substance becomes possessed of electric conductivity are considered in section III., on con- duction in gases.

In connexion with metallic conductors, it is a fact of great interest and considerable practical importance, that, although the majority of metals when in a finely divided or powdered condition are practically non-conductors, a mass of metallic powder or filings may be made to

pass suddenly into a conductive condition by being exposed to the influence of an electric wave. The same is true of the loose contact of two metallic conductors. Thus if a steel point, such as a needle, presses very lightly against a metallic plate, say of aluminium, it is found that this metallic contact, if carefully adjusted, is non-conductive, but that if an electric wave is created anywhere in the neighbourhood, this non-conducting contact passes into a conductive state. This fact, investigated and discovered independently by D. E. Hughes, C. Onesti, E. Branly, O. J. Lodge and others, is applied in the construction of the ” coherer,” or sensitive tube employed as a detector or receiver in that form of ” wireless telegraphy ” chiefly developed by Marconi. Further references to it are made in the articles Electric Waves and Telegraphy: Wireless.

International Ohm. — The practical unit of electrical resistance was legally defined in Great Britain by the authority of the queen in council in 1894, as the ” resistance offered to an invariable electric current by a column of mercury at the temperature of melting ice, 14-4521 grammes in mass, of a constant cross-sectional area, and a length 106-3 centimetres.” The same unit has been also legalized as a standard in France, Germany and the United States, and is denominated the ” International or Standard Ohm.” It is intended to represent as nearly as possible a resistance equal to io° absolute C.G.S. units of electric resistance. Convenient multiples and sub- divisions of the ohm are the microhm and the megohm, the former being a millionth part of an ohm, and the latter a million ohms. The resistivity of substances is then numerically expressed by stating the resistance of one cubic centimetre of the substance taken between opposed faces, and expressed in ohms, microhms or megohms, as may be most convenient. The reciprocal of the ohm is called the mho, which is the unit of conductivity, and is defined as the con- ductivity of a substance whose resistance is one ohm. The absolute unit of conductivity is the conductivity of a substance whose resis- tivity is one absolute C.G.S. unit, or one-thousandth-millionth part of an ohm. Resistivity is a quality in which material substances differ very widely. The metals and alloys, broadly speaking, are good conductors, and their resistivity is conveniently expressed in microhms per cubic centimetre, or in absolute C.G.S. units. Very small differences in density and in chemical purity make, however, immense differences in electric resistivity; hence the values given by different experimentalists for the resistivity of known metals differ to a considerable extent.

I. Conduction in Solids

It is found convenient to express the resistivity of metals in two

different ways: (1) We may state the resistivity of one cubic centimetre of the material in microhms or absolute units taken between opposed faces. This is called the volume-resistivity ; (2) we may express the resistivity by stating the resistance in ohms offered by a wire of the material in question of uniform cross- section one metre in length, and one gramme in weight. This numerical measure of the resistivity is called the mass-resistivityˆ The mass-resistivity of a body is connected with its volume- resistivity and the density of the material in the following manner : — The mass-resistivity, expressed in microhms per metre- gramme, divided by 10 times the density is numerically equal to the volume-resistivity per centimetre-cube in absolute C.G.S. units. The mass-resistivity per metre-gramme can always be obtained by measuring the resistance and the mass of any wire of

uniform cross-section of which the length is known, and if the density of the substance is then measured, the volume-resistivity can be immediately calculated.

If R is the resistance in ohms of a wire of length /, uniform cross-section s, and density d , then taking p for the volume-resistivity we have lo 3 R = p//j; but lsd = M:. where M is the mass of the wire. Hence icPR = pdP/M. If / = looand M = l, then R = p’= resistivity in ohms per metre-gramme, and icftp’ = i0,0oodp, or p = lo b p’/d, and p’ = io,oooMR// 2 .

The following rules, therefore, are useful in connexion with these measurements. To obtain the mass-resistivity per metre- gramme of a substance in the form of a unifrrm metallic’ wire: — Multiply together 10,000 times the mass in grammes and the total resistance in ohms, and then divide by the square of the length in centimetres. Again, to obtain the volume-resistivity in C.G.S. units per centimetre-cube, the rule is to multiply the mass-resistivity in ohms by 100,000 and divide by the density. These rules, of course, apply only to wires of uniform cross-section. In the following Tables I., II. and III. are given the mass and volume resistivity of ordinary metals and certain alloys expressed in terms of the inter- national ohm or the absolute C.G.S. unit of resistance, the values being calculated from the experiments of A. Matthiessen (1831- 1870) between i860 and 1865, and from later

results obtained by J. A. Fleming and Sir James Dewar in 1893.

Table I. — Electric Mass-Resistivity of Various Metals at o° C, or Resistance per Metre-gramme in International Ohms at 0° C. (Matthiessen.)

Resistance at 0° C.

in International

Approximate Tem-

Ohms of a Wire

perature Co-

Metal.

1 Metre long and

efficient near

Weighing

20° C.

1 Gramme.

Silver (annealed) .

•1523

0-00377

Silver (hard-drawn)

■1657

Copper (annealed) .

•142 1

0-00388

Copper (hard-drawn) .

•1449 (Matthiessen's

Standard)

Gold (annealed)

•4025

0-00365

Gold (hard-drawn)

•4094

Aluminium (annealed)

•0757

Zinc (pressed) .

•4013

Platinum (annealed) .

1-9337

Iron (annealed)

•765

Nickel (annealed) .

I -058 ‘

Tin (pressed) .

•96l8

0-00365

Lead (pressed) . . . <

2-2268

0-00387

Antimony (pressed)

2-3787

0-00389

Bismuth (pressed .

I2-8554 1

0-00354

Mercury (liquid)

12-885*

0-00072

The data commonly used for calculating metallic resistivities were obtained by A. Matthiessen, and his results are set out in the Table II. which is taken from Cantor lectures given by Fleeming Jenkin in 1866 at or about the date when the researches were made. The figures given by Jenkin have, however, been reduced to inter- national ohms and C.G.S. units by multiplying by (ir/4)Xo-g866X io 5 = 77,485.

Subsequently numerous determinations of the resistivityof various pure metals were made by Fleming and Dewar, whose results are set out in Table III.

Resistivity of Mercury. — The volume-resistivity of pure mercury is a very important electric constant, and since 1880 many of the most competent experimentalists have directed their attention to the determination of its value. The experimental process has usually been to fill a glass tube of known dimensions, having large cup-like extensions at the ends, with pure mercury, and determine the absolute resistance of this column of metal. For the practical details of this method the following references may be consulted : — ■ ” The Specific Resistance of Mercury,” Lord Rayleigh and Mrs Sidg- wick, Phil. Trans., 1883, part i. p. 173, and R. T. Glazebrook, Phil. Mag., 1885, p. 20; ” On the Specific Resistance of Mercury,” R. T. Glazebrook and T. C. Fitzpatrick, Phil. Trans., 1888, p. 179, or Proc. Roy. Soc, 1888, p. 44, or Electrician, 1888, 21, p. 538; ” Recent Determinations of the Absolute Resistance of Mercury,” R. T. Glaze- brook, Electrician, 1890, 25, pp. 543 and 588. Also see J. V. Jones, ” On the Determination of the Specific Resistance of Mercury in Absolute Measure,” Phil. Trans., 1891, A, p, 2. Table IV. gives the values of the volume-resistivity of mercury as determined by

_ ‘ The values for nickel and bismuth given in the table are much higher than later values obtained with pure electrolytic nickel and

bismuth.

1 The value here given, namely 12-885, f° r the electric mass-resistivity of liquid mercury as determined by Matthiessen is now known to be too high by nearly I %. The value at present accepted is 12-789 ohms per metre-gramme at 0° C.

Table II.— Electric Volume-Resistivity of Various Metals at 0° or Resistance i > er Centimetre-cube in C.G.S. Units at 0° C.

C,

Metal.

Volume- Resistivity

at 0° C. in C.G.S.

Units.

Silver (afthealed) . Silver (hard-drawn) . Copper (annealed) . Copper (hard-drawn) Gold (annealed) Gold (hard-drawn) . Aluminium (annealed) Zinc (pressed) Platinum (annealed) Iron (annealed) Nickel (annealed) . Tin (pressed) . Lead (pressed) . . ... Antimony (pressed) . Bismuth (pressed) . Mercury (liquid)

1,502 1,629

1,594

1,630 ‘

2,052

2,090

3,006

5,621

9,035 10,568 12,429 2 13,178 19,580

35,4i8

130,872 94,896 3

various observers, the constant being expressed (a) in terms of the

resistance in ohms of a column of mercury one millimetre in cross-section and 100 centimetres in length, taken at 0° C. ; and (b) in terms of the length in centimetres of a column of mercury one square millimetre in cross-section taken at o° C. The result of all the most care- ful determinations has been to show that the resistivity of pure mercury at 0° C. is about 94,070 C.G.S. electromagnetic units of resistance, and that a column of mercury 106-3 centimetres in length having a cross-sectional area of one square millimetre would have a

Table III. — Electric Volume-Resistivity of Various Metals at o" C, or Resistance per Centimetre-cube at 0° C. in C.G.S. Units. (Fleming and Dewar, Phil. Mag., September 1893.)

Resistance at o° C.

per Centimetre-

Mean Temperature

Metal.

cube in C.G.S.

Coefficient between

Units.

o° C. and 100° C.

Silver (electrolytic and

well annealed) 4

1,468

0-00400

Copper (electrolytic and well annealed) 4 . .

1,561

0-00428

Gold (annealed)

2,197

0-00377

Aluminium (annealed)

2,665

0-00435

Magnesium (pressed) .

4,355

0-00381

Zinc . ...

5,751

0-00406

Nickel (electrolytic) 4 .

6,935

0-00618

Iron (annealed)

9,065

0-00625

Cadmium . . . .

10,023

0-00419

Palladium ....

10,219

0-00354

Platinum (annealed) .

10,917

0-003669

Tin (pressed) .

13,048

0-00440

Thallium (pressed)

17,633

6-00398

Lead (pressed) .

20,380

0-00411

Bismuth (electrolytic) 6

1 10,000

0-00433

resistance at 0° C. of one international ohm. These values have accordingly been accepted as the official and recognized" values for the specific resistance of mercury, and the definition of the ohm. The table also states the methods which have been adopted by the different observers for obtaining the absolute value of the resistance of a known column of mercury, or of a resistance coil afterwards

1 The value (1630) here given for hard-drawn copper is about i% higher than the value now adopted, namely, 1626. The differ- ence is due to the fact that either Jenkin or Matthiessen did not employ precisely the value at present employed for the density of hard-drawn and annealed copper in calculating the volume-resis- tivities from the mass-resistivities.

2 Matthiessen's value for nickel is much greater than that obtained in more recent researches. (See Matthiessen and Vogt, Phil. Trans. , 1863* and J. A. Fleming, Proc. Roy. Soc, December 1899.)

3 Matthiessen's value for mercury is nearly I % greater than the value adopted at present as the mean of the best results, namely

94,070.

4 The samples of silver, copper and nickel employed for these tests were prepared electrolytically by Sir J. W. Swan, and were exceedingly pure and soft. The value for volume-resistivity of nickel as given in the above table (from experiments by J. A. Fleming, Proc. Roy. Soc, December 1899) is much less (nearly 40%) than the value given by Matthiessen's researches.

6 The electrolytic bismuth here used was prepared by Hartmann and Braun, and the resistivity taken by J. A. Fleming. The value is nearly 20% less than that given by Matthiessen.

Table IV.-

-Determinations of the Absolute Value of the Volume-Resistivity of Mercury and the Mercury Equivalent of the Ohm.

Value of

Value of

Value of

100 Centi-

Ohm in

Observer.

Date.

Method.

B.A.U. in

metres of

Centi-

Ohms.

Mercury in Ohms.

metres of Mercury.

Lord Rayleigh .

1882

Rotating coil

•98651

•94133

106-31

Lord Rayleigh .

1883

Lorenz method

•98677

106-27

G. Wiedemann .

1884

Rotation through 1 80 °

106-19

E. E. N. Mascart .

1884

Induced current

•9861 1

•94096

106-33

H. A. Rowland . .

1887

Mean of several methods

•98644

■94071

106-32

F. Kohlrausch .

1887

Damping of magnets

•98660

•94061

106-32

R. T. Glazebrook

(1882 (1888

Induced currents

•98665

•94074

106-29

Wuilleumeier

1890

•98686

•94077

106-31

Duncan and Wilkes

1890

Lorenz

■98634

•94067

106-34

J. V. Jones .

1891

Lorenz

Mean value

•94067

106-31

•98653

Streker . ...

1885

An absolute determin-

•94056

106-32

Hutchinson .

1888

ation of resis! anct

•94074

106-30

E. Salvioni .

1890

was not made. The

•94054

106-33

E. Salvioni .

value -98656 has

•94076

106-30

been used

Mean value

■94076

106-31

H. F. Weber . .

1884

Induced current

105-37

H. F. Weber . .

Rotating coil

Absolute

measure-

106-16

A. Roiti ….

1884

Mean effect of in-

ments

compared

105-89

duced current

with German silver

F. Himstedt .

1885

wire coils

issued by

105-98

Siemens and Streker

F. E. Dorn .

1889

Damping of a magnet

106-24

Wild ….

1883

Damping of a magnet

106-03

L. V. Lorenz

1885

Lorenz method

105-93

metre long, weighing one gramme which at 6o° F. is 0-153858 international ohms." Matthiessen also measured the mass-resis- tivity of annealed copper, and found that its conductivity is greater than that of hard- drawn copper by about 2-25% to 2-5% As annealed copper may vary considerably in its state of annealing, and is always somewhat hardened by bending and winding, it is found in practice that the resistivity of commercial annealed copper is about il% less than that of hard-drawn copper. The standard now accepted for such copper, on the recommendation of the 1899 Committee, is a wire of pure annealed copper one metre long, weighing one gramme, whose resistance at 0° C. is -1421 international ohms, or at 6o° F., 0-150822 international ohms. The specific gravity of copper varies from about 8-89 to 8-95, and the standard value accepted for high conductivity commercial copper is 8-912, corresponding to a weight of 555 lb per cubic foot at 60 6 F. Hence the volume- resistivity of pure annealed copper at 0° C. is 1-594 microhms per c.c, or 1594 C.G.S. units, and that of pure hard-drawn copper at o° C. is 1-626 microhms per c.c, or 1626 C.G.S. units. Since Matthiessen's researches, the most care- ful scientific investigation on the conduc- tivity of copper is that of T. C. Fitzpatrick, carried out in 1890. (Brit. Assoc. Report, 1890, Appendix

3, p. 120.) Fitzpatrick confirmed Matthiessen's chief result, and obtained values for the resistivity of hard-drawn copper which, when corrected for temperature variation, are in entire agreement with those of Matthiessen at the same temperature.

The volume resistivity of alloys is, gener- ally speaking, much higher than that of pure metals. Table V. shows the volume resis- tivity at o° C. of a number of well-known alloys, with their chemical composition. Generally speaking, an alloy having high resistivity has poor mechanical qualities, that is to say, its tensile strength and ductility are small. It is possible to form alloys having a resistivity as high as 100 microhms per cubic centimetre ; but, on the other hand, the value of an alloy for electro-technical purposes is judged not merely

Units per Centimetre-cube. (Fleming and Dewar.)

Mean Temperature Coefficients taken at 15 C.

compared with a known column of mercury. A column of figures is added showing the value in fractions of an international ohm of the British Association Unit (B.A.U.), formerly supposed to represent the true ohm. The real value of the B.A.U. is now taken as -9866 of an international ohm.

For a critical discussion of the methods which have been adopted in the absolute determination of the Table V. — Volume-Resistivity of ˆAlloysof known Composition at 0° C. in C.G.S. resistivity of mercury, and the value of the British —•-■.-.. .... ˆ „ „ .

Association unit of resistance, the reader may be re- ferred to the British Association Reports for 1890 and 1892 {Report of Electrical Standards Committee), and to the Electrician, 25 : p. 456, and 29, p. 462. A discussion of the relative value of the results obtained between 1882 and 1890 was given by R. T. Glazebrook in a paper presented to the British Association at Leeds, 1890.

Resistivity of Copper. — In connexion with electro- technical work the determination of the conductivity or resistivity values of annealed and hard-drawn copper wire at standard temperatures is a very important matter. Matthiessen devoted considerable attention to this subject between the years i860 and 1864 (see Phil. Trans., i860, p. 150), and since that time much additional work has been carried out. Matthiessen's value, known as Matthiessen's Standard, for the mass-resistivity of pure hard-drawn copper wire, is the resistance of a wire of pure hard-drawn copper one metre long and weighing one gramme,

and this is equal to 0-14493 international ohms at 0° C. For many purposes it is more convenient to express tem- perature in Fahrenheit degrees, and the recommenda- tion of the 1899 committee on copper conductors l is as follows: — ” Matthiessen’s standard for hard-drawn con- ductivity commercial copper shall be considered to be the resistance of a wire of pure hard-drawn copper one

Alloys.

Resistivity at 0° C.

Tempera- ture Co- efficient at 15° C.

Composition in per cents.

Platinum-silver . Platinum-iridium Platinum-rhodium

Manganese-steel

German silver . Platinoid 2 . . Manganin

Aluminium-silver Aluminiumrcopper . Copper-aluminium . Copper-nickel-alumi

Titanium-aluminium

1 Lg,

lium .

3L582

30,896 21,142 6,280 67,148 29.452

29,982

4I.73I

46,678

4,641

2,904

8,847

14,912

3,887

•000243

•000822

•00143

•00124

•00127

•00201

•000273

■00031

•0000

•00238 •00381 •000897 ■000645

•00290

Pt33% Ag66% Pt8o%, Ir2o% Pt90%, Rd 10% Au 90 %, Ag 10 % Mn 12 % Fe 78 % Ni 4-35 %, remain- ing percentage chiefly iron, but uncertain CusZnaNia

Cu 84%, Mn' 12%,

Ni 4 % Al 94 , Ag6 Al 9 4%,Cu6% Cu97%, Al 3 % Cu8 7 %, Ni6- 5 %,

A16- 5 %

1 In 1899 a committee was formed of representatives from eight of the leading manufacturers of insulated copper cables with delegates from the Post Office and Institution of Electrical Engineers, to consider the question of the values to be assigned to the resistivity of hard-drawn and annealed copper. The sittings of the committee were held in London, the secretary being A. H. Howard. The values given in the above paragraphs are in accordance with the decision of this committee, and its recommendations have been accepted by the General Post Office and the leading manufacturers of insulated copper wire and cables.

by its resistivity, but also by the degree to which its resistivity varies with temperature, and by its capability of being easily drawn into fine

wire of not very small tensile strength. Some pure metals when alloyed with a small proportion of another metal do not suffer much

2 Platinoid is an alloy introduced by Martino, said to be similar in composition to German silver, but with a little tungsten added. It varies a good deal in composition according to manufacture, and the resistivity of different specimens is not identical. Its electric properties were first made known by J. T. Bottomley, in a paper read at the Royal Society, May 5, 1885.

change in resistivity, but in other cases the resultant alloy has a much higher resistivity. Thus an alloy of pure copper with 3 % of aluminium has a resistivity about s| times that of copper; but if pure aluminium is alloyed with 6% of copper, the resistivity of the product is not more than 20% greater than that of pure aluminium. The presence of a very small proportion of a non-metallic element in a metallic mass, such as oxygen, sulphur or phosphorus, has a very great effect in increasing the resistivity. Certain metallic elements also have the same power; thus platinoid has a resistivity 30% greater than German silver, though it differs from it merely in containing a trace of tungsten.

The resistivity of non-metallic conductors is in all cases higher than that of any pure metal. The resistivity of carbon, for instance, in the forms of charcoal or carbonized organic material and graphite, varies from 600 to 6000 microhms per cubic centimetre, as shown in Table VI. : —

Table VI. — Electric Volume-Resistivity in Microhms per Centimetre-cube of Various Forms of Carbon at 15° C.

Substance.	Resistivity.
Arc lamp carbon rod	
Jablochkoff candle carbon	
Carbonized parchmentized thread	

Ordinary carbon filament from glow-lamp

” treated ” or flashed

Deposited or secondary carbon ….

8000 4000 3400 6000

4000 to 5000

2400 to 2500 600 to 900 400 to 500

The resistivity of liquids is, generally speaking, much higher than that of any metals, metallic alloys or non-m«tallic con- ductors. Thus fused lead chloride, one of the best conducting liquids, has a resistivity in its fused condition of 0-376 ohm per centimetre-cube, or 376,000 microhms per centimetre-cube, whereas that of metallic alloys only in few cases exceeds 100 microhms per centimetre-cube. The resistivity of solutions of metallic salts also varies very largely with the proportion of the diluent or solvent, and in some instances, as in the aqueous solutions of mineral acids ; there is a maximum conductivity corresponding to a certain dilution. The resistivity of many liquids, such as alcohol, ether, benzene and pure water, is so high, in other words, their conductivity is so small, that they are practically insulators, and the resistivity can only beappropriately expressed in megohms per centimetre-cube.

In Table VII. are given the names of a few of these badly- conducting liquids, with the values of their volume-resistivity in megohms per centimetre-cube: —

Table VII. — Electric Volume-Resistivity of Various Badly- Conducting Liquids in Megohms per Centimetre-cube.

Substance.

Resistivity

in Megohms

per c.c.

Observer.

Ethyl alcohol ….

Ethyl ether

Benzene

Absolutely pure water ap- proximates probably to

o-5 1 -175 to 3-760

4-700

25-0 at 18° C.

Pfeiffer.

W. Kohlrausch.

Value estimated by F. Kohl- rausch and A. Heydweiler.

From results by F. Kohlrausch and others.

All very dilute aqueous salt solutions having a concen- tration of about o- 0000 1 of an equivalent gramme molecule 1 per litre ap-

1 -oo at 18° C.

proximate to

The resistivity of all those substances which are generally called dielectrics or insulators is also so high that it can only be appropriately expressed in millions of megohms per centimetre- cube, or in megohms per quadrant-cube, the quadrant being a cube the side of which is io 9 cms. (see Table VIII.).

Effects of Heat. — Temperature affects the resistivity of these different classes of conductors in different ways. In all cases, so

1 An equivalent gramme molecule is a weight in grammes equal numerically to the chemical equivalent of the salt. For instance, one equivalent gramme molecule of sodium chloride is a mass of 58-5 grammes. NaCl = 58-5.

far as is yet known, the resistivity of a pure metal is increased if its temperature is raised, and decreased if the temperature is lowered, so that if it could be brought to the absolute zero of temperature (- 273° C.) its resistivity would be reduced to a very small fraction of its resistance at ordinary temperatures. With metallic alloys, however, rise of temperature does not always increase resistivity; it sometimes diminishes it, so that many alloys are known which have amaximumresistivitycorresponding to ascertain temperature, and at of

near this point they vary very little in resistance with temperature. Such alloys have, therefore, a negative temperature-variation of resistance at and above fixed temperatures. Prominent amongst these metallic com- pounds are alloys of iron, manganese, nickel and copper, some of which were discovered b|y Edward Weston, in the United States. One well-known alloy of copper, manganese and nickel, now called manganin, which was brought to the notice of electricians by the careful investigations made at the Berlin Physikalisch – Technische Reichsanstalt, is characterized by having a zero temperature coefficient at or about a certain temperature in the neighbourhood of 15 C. Hence within a certain range of temperature on either side of this critical value the resistivity of manganin is hardly affected at all by tempera- ture. Similar alloys can be produced from copper and ferro-

Table VIII. — Electric Volume-Resistivity of Dielectrics reckoned in Millions of Megohms (Mega-megohms) per Centimetre-cube, and in Megohms per Quadrant-cube, i.e. a, Cube whose Side is io 9 cms.

Substance.

Bohemian glass …

Mica

Gutta-percha .

Flint glass ….

Glover’s vulcanized india- rubber …..

Siemens’ ordinary pure vulcanized indiarubber

Shellac

Indiarubber . . . .

Siemens’ high-insulating fibrous material .

Siemens’ special high- insulating indiarubber .

Flint glass ….

Ebonite .

Paraffin …..

Resistivity.

Mega- megohms per c.c.

61

.84

450

1,020

1,630

2,280

9,000

10,900

1 1 ,900

16,170 20,000 28,000 34,000

Megohms per Quad- rant-cube.

•061 •084 •45

1-02

1-63

2-28 9-0

10-9 ,

ii -9

16-17

20-0

28-

34-

Tempera- ture Cent.

6o° 20°

2 <

6o°

15°

15°

28

24°

15°

15° 20°

4 6 :

46°

manganese. An alloy formed of 80% copper and 20% manganese in an annealed condition has a nearly zero tem- perature-variation of resistance between 20 C. and 100° C. In the case of non-metals the action of temperature is generally to diminish the resistivity as temperature rises, though this is not universally so. The interesting observation has been recorded by J. W. Howell, that “treated” carbon filaments and graphite are substances which have a minimum resistance corresponding to a certain temperature approaching red heat (Electrician, vol. xxxviii. p. 835). At and beyond this temperature increased heating appears to increase their resistivity; this phenomenon may, however, be accompanied by a molecular change and not be a true temperature variation. In the case of dielectric conductors and of electrolytes? the action of rising temperature is to reduce resistivity. Many of the so-called insulators, such as mica, ebonite, indiarubber, and the insulating oils, paraffin, &c, decrease in resistivity with great rapidity as the temperature rises. With guttapercha a rise in temperature from o° C, to 24° C. is sufficient to reduce the resistivity of one-twentieth part of its value at o° C, and the resistivity of flint glass at 140° C. is only one-hundredth of what it is at 6o° C.

A definition may here be given of the meaning of the term Tempera- ture Coefficient. If, in the first place, we suppose that the resistivity (pi) at any temperature (t) is a simple linear function of the resistivity

(Po) at o° C, then we can write p t = p (i--at), or a = (p t —p)lp t.

The quantity a is then called the temperature-coefficient, and its reciprocal is the temperature at which the resistivity would become

zero. By an extension of this notion we can call the quantity dpjpdt the temperature coefficient corresponding to any temperature / at which the resistivity is p. In att cases the relation between the resistivity of a substance and the temperature is best set out in the form of a curve called a temperature-resistance curve. If a series of such curves are drawn for various pure metals, temperature being taken as abscissa and resistance as ordinate, and if the temperature range extends from the absolute zero of temperature upwards, then it is found that these temperature-resistance lines are curved lines having their c&nvexity either upwards or downwards. In other words, the second diiferential coefficient of resistance with respect to temperature is either a positive or negative quantity. An exten- sive series of observations concerning the form of the resistivity curves for various pure metals over a range of temperature extending from — 200 C. to +200° C. was carried out in 1892 and 1893 by Fleming and Dewar {Phil. Mag. Oct. 1892 and Sept. 1893). The resistance observations were taken with resistance coils con- structed with wires of various metals obtained in a state of great chemical purity. The lengths and mean diameters of the wires were carefully measured, and their resistance was then taken at certain known temperatures obtained by immersing the coils in boiling aniline, boiling water, melting ice, melting carbonic acid in ether, and boiling liquid oxygen, the temperatures thus given being + i84°-5. C, +100 C., o° C, -78”-2 C. and 182ˆ5 C. The resistivities of the various metals were then calculated and set out in terms of the temperature. From these data a chart was pre pared showing the temperature-resistance curves of these metals throughout a range of 400 degrees. The exact form of these curves through the region of temperature lying between — 200 ° C. and — 273 C. is not yet known. As shown on the chart, the curves evidently do not converge to precisely the same point. It is, how- ever, much less probable that the resistance of any metal should vanish at a temperature above the absolute zero than at the absolute zero itself, and the precise path of these Curves at their lower ends cannot be delineated until means are found for fixing independently the

temperature of some regions in which the resistance of metallic wires can be measured. Sir J. Dewar subsequently. showed that for certain pure metals it is clear that the resistance would not vanish at the absolute zero but would be reduced to a finite but small value (see " Electric Resistance Thermometry at the Temperature of Boiling Hydrogen," Proc. Roy. Soc. 1904, 73, p. 244).

The resistivity curves of the magnetic metals are also remarkable for the change of curvature they exhibit at the magnetic critical temperature. Thus J. Hopkinson and D. K. Morris {Phil. Mag. September 1897, p. 213) observed the remarkable alteration that takes place in the iron resistance temperature curve in the neighbourhood of 780° G. At that temperature the direction of the curvature of the curve changes so that it becomes convex upwards instead of convex downwards, and in addition the value of the temperature coefficient undergoes a great reduction. The mean temperature coefficient of iron in the neighbourhood of 0° C. is 0-0057; at 765° C. it rises to a maximum value 0-0204; but at 1000° C. it falls again to a lower value, 0-00244. A similar rise to a maximum value and subsequent fall are aiso noted in the case of the specific heat of iron. The changes in the curvature of the resis- tivity curves are undoubtedly connected with the molecular changes that occur in the magnetic metals at their critical temperatures.

A fact of considerable interest in connexion with resistivity is the influence exerted by a strong magnetic field in the case of some metals, notably bismuth. It was discovered by A. Righi and confirmed by S. A. Leduc {Journ. de Phys. 1886, 5, p. 116, and 1887, 6, p. 189) that if a pure bismuth wire is placed in a magnetic field transversely to the direction of the magnetic field, its resistance is considerably increased. This increase is greatly affected by the temperature of the metal (Dewar arid Fleming, Proc. Roy. Soc. 1897, 60, p. 427). The temperature coefficient of pure copper is an important constant, and its value as determined by Messrs Clark, Forde and Taylor in terms of Fahrenheit temperature is

P< = P32[i+o-oo237o8(/-32)+o-ooooo34548(/-32) 2 j.

Time Effects. — In the case of dielectric conductors, commonly called insulators, such as indiarubber, guttapercha, glass and mica, the electric resistivity is not only a function of the tem- perature but also of the time during which the electromotive force employed to measure it is imposed. Thus if an indiarubber- covered cable is immersed in water and the resistance of the dielectric between the copper conductor and the water measured by ascertaining the current which

can be caused to flow through it by an electromotive force, this current is found to vary very rapidly with the time during which the electromotive force is applied. Apart from the small initial effect due to the electro- static capacity of the cable, the application of an electromotive force to the dielectric produces a current through it which rapidly falls in value, as if the electric resistance of the dielectric were increasing. The current, however^ does not fall continuously but tends to a limiting value, and it appears that if the

electromotive force is kept applied to the cable for a prolonged time, a small and nearly constant current will ultimately be found flowing through it. It is customary in electro-technical work to consider the resistivity of the dielectric as the value it has after the electromotive force has been applied for one minute, the standard temperature being 75 F. This, however, is a purely conventional proceeding, and the number so obtained does not necessarily represent the true or ohmic resistance of the dielectric. If the electromotive force is increased, in the case of a large number of ordinary dielectrics the apparent resistance at the end of one minute's electrification decreases as the electromotive force increases.

Practical Standards. — The practical measurement of re- sistivity involves many processes and instruments (see Wheat- stone's Bridge and Ohmmeter). Broadly speaking, the processes are divided into Comparison Methods and Absolute Methods. In the former a comparison is effected between the resistance of a material in a known form and some standard resistance. In the Absolute Methods the resistivity is determined without reference to any other substance, but with reference only to the fundamental standards of length, mass and time. Immense labour has been expended in investigations concerned with the production of a standard of resistance and its evaluation in absolute measure. In some cases the absolute standard is constructed by filling a carefully-calibrated tube of glass with mercury, in order to realize in a material form the official defini- tion of the ohm; in this manner most of the principal national physical laboratories have been provided with standard mercury ohms. (For a full description of the standard mercury ohm of the Berlin Physikalisch-Technische Reichsanstalt, see the Electrician, xxxvii. 569.) For practical purposes it is more con- venient to employ a standard of resistance made of wire.

Opinion is not yet perfectly settled on the question whether a wire made of any alloy can be considered to be a perfectly unalter- able standard of resistance, but experience has shown that a platinum silver alloy (66% silver, 33% platinum), and also the alloy called

manganin, seem to possess the qualities of permanence essential for a wire-resistance standard. A comparison made in 1892 and 1894 of all the manganin wire copies of the ohm made at the Reichsanstalt in Berlin, showed that these standards had remained constant for two years to within one or two parts in 100,000. It appears, however, that in order that manganin may remain constant in resistivity when used in the manufacture of a resistance coil, it is necessary that the alloy should be aged by heating it to a temperature of 140 ° C. for ten hours; and to prevent subsequent changes in resistivity, solders containing zinc must be avoided, and a silver solder containing 75 % of silver employed in soldering the manganin wire to its connexions. ‘ The authorities of the Berlin Reichsanstalt have devoted considerable attention to the question of the best form for a wire standard of electric resistance. In that now adopted the re- sistance wire is carefully insulated and wound on a brass cylinder, being doubled on itself to annul inductance as much as possible. In the coil two wires are wound on in parallel, one being much finer than the other, and the final adjustment of the coil to an exact value is made by shortening the finer of the two. A standard of resistance for use in a laboratory now generally consists of a wire of manganin or platinum-silver carefully insulated and enclosed in a brass case. Thick copper rods are connected to the terminals of the wire in the interior of the case, and brought to the outside, being carefully insulated at the same time from one another and from the case. The coil so constructed can be placed under water or paraffin oil, the temperature of whiˆch can be exactly observed during the process of taking a resistance measurement. Equalization of the temperature of the surrounding medium is effected by the employment of a stirrer, worked by hand or by a small electric motor. The construction of a standard of electrical resistance consisting of mercury in a glass tube is an operation requiring considerable precautions, and only to be undertaken by those experienced in the matter. Opinions are divided on the question whether , greater permanence in resistance can be secured by mercury-in- glass standards of resistance or by wire standards, but the latter are at least more portable and less fragile.

A full description of the construction of a standard wire-resistance coil on the plan adopted by the Berlin Physikalisch-Technische

Reichsanstalt is given in the Report of the British Association Committee on Electrical Standards, presented at the Edinburgh Meeting in 1892. For the design and construction of standards of electric resistances adapted for employment in the comparison and measurement of very low or very high resistances, the reader may be referred to standard treatises on electric measurements.

Bibliography. — See also J. A. Fleming, A Handbook for the Electrical Laboratory and Testing Room, vol. i. (London, 1901); Reports of the British Association Committee on Electrical Standards, edited by Fleeming Jenkin (London, 1873); A. Matthressen and C. Vogt, ” On the Influence of Temperature on the Conducting Power of Alloys,” Phil. Trans., 1864, 154, p. 167, and Phil. Mag., 1865, 29, P- 363; A. Matthiessen and M. Holtzmann, ” On the Effect of the Presence of Metals and Metalloids upon the Electric Conducting Power of Pure Copper,” Phil. Trans., i860, 150, p. 85; T. C. Fitz- pa trick, ” On the Specific Resistance of Copper,” Brit. Assoc. Report, 1890, p. 12O, or Electrician, 1890, 25, p. 608; R. Appleyard, The Conductometer and Electrical Conductivity ; Clark, Forde and Taylor, Temperature Coefficients of Copper (London, 1901). (J. A. F.)

II. Conduction in Liquids

Through liquid metals, such as mercury at ordinary tem- peratures and other metals at temperatures above their melting points, the electric current flows as in solid metals without changing the state of the conductor, except in so far as heat is developed by the electric resistance. But another class of liquid conductors exists, and in them the phenomena are quite different. The conductivity of fused salts, and of solutions of salts and acids, although less than that of metals, is very great compared with the traces of conductivity found in so-called non- conductors. In fused salts and conducting solutions the passage of the current is always accompanied by definite chemical changes; the substance of the conductor or electrolyte is decomposed, and the products of the decomposition appear at the electrodes, i.e. the metallic plates by means of which the current is led into and out of the solution. The chemical phenomena are considered in the article Electrolysis; we are here concerned solely with the mechanism of this electrolytic conduction of the current.

To explain the appearance of the products of decomposition at the electrodes only, while the intervening solution is unaltered, we suppose that, under the action of the electric forces, the opposite parts of the electrolyte move in opposite directions through the liquid. These opposite parts, named ions by Faraday, must therefore be

associated with electric charges, and it is the convective movement of the opposite streams of ions carrying their charges with them that, on this view, constitutes the electric current.

In metallic conduction it is found that the current is pro- portional to the applied electromotive force — a relation known by the name of Ohm's law. If we place in a circuit with a small electromotive force an electrolytic cell consisting of two platinum electrodes and a solution, the initial current soon dies away, and we shall find that a certain minimum electromotive force must be applied to the circuit before any considerable permanent current passes. The chemical changes which are initiated on the surfaces of the electrodes set up a reverse electromotive force of polariza- tion, and, until this is overcome, only a minute current, probably due to the slow but steady removal of the products of decom- position from the electrodes by a process of diffusion, will pass through the cell. Thus it is evident that, considering the electrolytic cell as a whole, the passage of the current through it cannot conform to Ohm's law. But the polarization is due to chemical changes, which are confined to the surfaces of the electrodes; and it is necessary to inquire whether, if the polariza- tion at the electrodes be eliminated, the passage of the current through the bulk of the solution itself is proportional to the electromotive force actually applied to that solution. Rough experiment shows that the current is proportional to the excess of the electromotive force over a constant value, and thus verifies , the law approximately, the constant electromotive force to be overcome being a measure of the polarization. A more satis- factory examination of the question was made by F, Kohlrausch in the years 1873 to 1876. Ohm's law states that the current C is proportional to the electromotive force E, or C = feR, where k is a constant called the conductivity of the circuit. The equation

may also be written as C = E/R, where R is a constant, the reciprocal of k, known as the resistance of the circuit. The essence of the law is the proportionality between C and E, which means that the ratio E/C is a constant. But E/C = R, and thus the law may be tested by examining the constancy of the measured resistance of a conductor when different currents are passing through it. In this way Ohm's law has been confirmed in the case of metallic conduction to a very high degree of accuracy. A similar principle was applied by Kohlrausch to the case of electrolytes, and he was the first to show that an electrolyte possesses a definite resistance which has a constant value when ' measured with different currents and by different experimental methods.

Measurement of the Resistance of Electrolytes. — There are two effects of the passage of an electric current which prevent the possibility of measuring electrolytic resistance by the ordinary methods with the direct currents which are used in the case of metals. The products of the chemical decomposition of the electrolyte appear at the electrodes and set up the opposing electromotive force of polarization, and unequal dilution of the solution may occur in the neighbourhood of the two electrodes. The chemical and electrolytic aspects of these phenomena are treated in the article Electrolysis, but from our present point of view also it is evident that they are again of fundamental importance. The polarization at the surface of the electrodes will set up an opposing electromotive force, and the unequal dilution of the solution will turn the electrolyte into a concentra- tion cell and produce a subsidiary electromotive force either in the same direction as that applied or in the reverse according as the anode or the cathode solution becomes the more dilute. Both effects thus involve internal electromotive forces, and prevent the application of Ohm's law to the electrolytic cell as a whole. But the existence of a definite measurable resistance as a characteristic property of the system depends on the conformity of the system to Ohm's law, and it is therefore necessary to eliminate both these effects before attempting to measure the resistance.

The usual and most satisfactory method of measuring the resistance of electrolytes consists in eliminating the effects of polarization by the use of alternating currents, that is, currents that are reversed in direction many times a second. 1 The chemical action produced by the first current is thus reversed by the second current in the opposite direction, and the polarization caused by the first current on the surface of the electrodes is destroyed before it rises to an appreciable value. The polariza- tion is also diminished in another way. The electromotive force of polarization is due to the deposition of films of the products of chemical decomposition on the surface of the electrodes, and only reaches its full value when a continuous film is formed. If the current be stopped before such a film is completed, the reverse electromotive force is less than its full value. A given current flowing for a given time deposits a definite amount of substance on the electrodes, and therefore the amount per unit area is inversely proportional to the area of the electrodes — to the area of contact, that is, between the electrode and the liquid. Thus, by increasing the area of the electrodes, the polarization due to a given current is decreased. Now the area of free surface of a platinum plate can be increased enormously by coating the plate with platinum black, which is metallic platinum in a spongy state, and with such a plate as

electrode the effects of polarization are diminished to a very marked extent. The coating is effected by passing an electric current first one way and then the other between two platinum plates immersed in a 3% solution of platinum chloride to which a trace of lead acetate is sometimes added. The platinized plates thus obtained are quite satisfactory for the investigation of strong solutions. They have the power, however, of absorbing a certain amount of salt from the solutions and of giving it up again when water or more dilute solution is placed in contact with them. The measurement of very dilute solutions is thus made difficult, but, if the plates be heated to

1 F. Kohlrausch and.L. Holborn, Das Leitvermogen der Elektrolyte (Leipzig, 1898).

Fig. i.

redness after being platinized, a grey surface is obtained which possesses sufficient area for use with dilute solutions and yet does not absorb an appreciable quantity of salt.

Any convenient source of alternating current may be used. The currents from the secondary circuit of a small induction coil are satisfactory, or the currents of an alternating electric light supply may be transformed down to an electromotive force of one or two volts. With such currents it is necessary to consider the effects of self-induction in the circuit and of electrostatic capacity. In balancing the resistance of the electrolyte, resistance coils may be used in which self-induction and the capacity are reduced to a minimum by winding the wire of the coil backwards and forwards in alternate layers.

With these arrangements the usual method of measuring resistance by means of Wheatstone's bridge may be adapted to the case of electrolytes. With alternating currents, however, it is impossible to use a galvanometer in the usual way. The galvanometer was therefore replaced by Kohlrausch by a

telephone, which gives a sound when an alternating current passes through it. The most com- mon plan of the apparatus is i shown diagrammatically in fig. i . j The electrolytic cell and a resist- ance box form two arms of the bridge, and the sliding contact is moved along

the metre wire which | forms the other two arms till no sound is heard in the telephone. The resistance of the electrolyte is to that of the box as that of the right-hand end of the wire is to that of the left-hand end. A more accurate method of using alternating currents, and one more pleasant to use, gets rid of the telephone {Phil. Trans., 1900, 194, p. 321). The current from one or two voltaic cells is led to an ebonite drum turned by a motor or a hand-wheel and cord. On the drum are fixed brass strips with wire brushes touching them in such a manner that the current from the brushes is reversed several times in each revolution of the drum. The wires from the brushes are con- nected with the Wheatstone's bridge. A moving coil galvano- meter is used as indicator, its connexions being reversed in time with those of the battery by a slightly narrower set of brass strips fixed on the other end of the ebonite commutator. Thus any residual current through the galvanometer is direct and not alternating. The high moment of inertia of the coil makes the period of swing slow compared with the period of alternation of the current, and the slight periodic disturbances are thus pre- vented from affecting the galvanometer. When the measured resistance is not altered by increasing the speed of the com- mutator or changing the ratio of the arms of the bridge, the disturbing effects may be considered to be eliminated.

The form of vessel chosen to contain the electrolyte depends on the order of resistance to be measured. For dilute solutions

the shape of cell shown in fig. 2 will be found convenient, while for more concentrated solutions, that indicated in fig. 3 is suitable. The absolute resistances of certain solutions have been determined by Kohlrausch by comparison

Fig. 2.

Fig. 3.

with mercury, and, by using one of these solutions in any cell, the constant of that cell may be found once for all. From the observed resistance of any given solution in the cell the resistance of a centimetre cube — the so-called specific resistance— may be calculated. The reciprocal of this, or the conductivity, is a more generally useful constant; it is conveniently expressed in terms of a unit equal to the reciprocal of an ohm. Thus Kohlrausch found that a solution of potassium chloride, containing one-tenth of a gram equivalent (7-46 grams) per litre, has at 18° C. a specific resistance of 89-37 ohms per centimetre cube, or a conductivity of i-ngXio -4

mhos or i-iiqXioˆ 11 C.G.S. units. As the temperature varia- tion of conductivity is large, usually about 2 % per degree, it is necessary to place the resistance cell in a paraffin or water bath, and to observe its temperature with some accuracy.

Another way of eliminating the effects of polarization and of dilution has been used by W. Stroud and J. B. Henderson {Phil. Mag., 1897 [5], 43, p. 19). Two of the arms of a Wheat- stone's bridge are composed of narrow tubes filled with the solution, the tubes being of equal diameter but of different length. The other two arms are made of coils of wire of equal resistance, and metallic resistance is added to the shorter tube till the bridge is balanced. Direct currents of somewhat high electromotive force are used to work the bridge. Equal currents then flow through the two tubes; the effects of polarization and dilution must be the same in each, and the resistance added to the shorter tube must be equal to the resistance of a column of liquid the length of which is equal to the difference in length of the two tubes.

A somewhat different principle was adopted by E. Bouty in 1884. If a current be passed through two resistances in series by means of an applied electromotive force, the electric potential falls from one end of the resistances to the other, and, if we apply Ohm's law to each resistance in succession, we see that, since for each of them $E = CR$, and C the current is the same through both, E the electromotive force or fall of potential between the ends of each resistance must be proportional to the resistance between them. Thus by measuring the potential difference between the ends of the two resistances successively, we may compare their resistances. If, on the other hand, we can measure the potential difference in some known units, and similarly measure the current flowing, we can determine the resistance of a single electrolyte. The details of the apparatus may vary, but its principle is illustrated in the following description. A narrow glass tube is fixed horizontally into side openings in two glass vessels, and an electric current passed through it by means of platinum electrodes and a battery of considerable electromotive force. In this way a steady fall of electric potential is set up along the length of the tube. To measure the potential difference between the ends of the tube, tapping electrodes are constructed, e.g. by placing zinc rods in vessels with zinc sulphate solution and connecting these vessels (by means of thin siphon tubes also filled with solution) with the vessels at the ends of the long tube which contains the electrolyte to be examined. Whatever be the contact potential difference between zinc and its solution, it is the same at both ends, and thus the potential difference between the zinc rods is equal to that between the liquid at the two ends of the tube. This potential difference may be measured

without passing any appreciable current through the tapping electrodes, and thus the resistance of the liquid deduced.

Equivalent Conductivity of Solutions. — As is the case in the other properties of solutions, the phenomena are much more simple when the concentration is small than when it is great, and a study of dilute solutions is therefore the best way of getting an insight into the essential principles of the subject. The foundation of our knowledge was laid by Kohlrausch when he had developed the method of measuring electrolyte resistance described above. He expressed his results in terms of " equivalent conductivity," that is, the conductivity (k) of the solution divided by the number {m) of gram-equivalents of electrolyte per litre. He finds that, as the concentration diminishes, the value of k/m approaches a limit, and eventually becomes constant, that is to say, at great dilution the conductivity is proportional to the concentration. Kohlrausch first prepared very pure water by repeated distillation and found that its resistance continually increased as the process of purification proceeded. The conductivity of the water, and of the slight impurities which must always remain, was subtracted from that of the solution made with it, and the result, divided by m, gave the equivalent conductivity of the substance dissolved. This procedure appears justifiable, for as long as conductivity is proportional to concentration it is evident that each part of the dissolved matter produces its own independent effect, so that the total conductivity is the sum of the conductivities of the parts;

when this ceases to hold, the concentration of the solution has in general become so great that the conductivity of the solvent may be neglected. The general result of these experiments can be represented graphically by plotting k/m as ordinates and $m as abscissae, $m being a number proportional to the reciprocal of the average distance between the molecules, to which it seems likely that the molecular conductivity may be related. The general types of curve for a simple neutral salt like potassium or sodium chloride and for a caustic alkali or acid are shown in fig. 4. The curve for the neutral salt comes to a limiting value; that for the acid attains a maximum at a certain very small concentration,

and falls again when the dilution is carried farther. It has usually been

considered that this destruc- tion of conductivity is due to chemical action between the acid and the residual impurities in the water. At such great dilution these impurities are present in quantities comparable with the amount of acid which they convert into a less highly conducting neutral salt. In the case of acids, then, the maximum must be taken as the limiting value. The decrease in equivalent conductivity at great dilution is, however, so constant that this explanation seems insufficient. The true cause of the phenomenon may perhaps be connected with the fact that the bodies in which it occurs, acids and alkalis, contain the ions, hydrogen in the one case, hydroxyl in the other, which are present in the solvent, water, and have, perhaps because of this relation, velocities higher than those of any other ions. The values of v the molecular conductivities of all neutral salts are, at great dilution, of the same order of magnitude, while those of acids at their maxima are about three times as large. The influence of increasing concentration is greater in the case of salts containing divalent ions, and greatest of all in such cases as solutions of ammonia and acetic acid, which are sub- stances of very low conductivity.

Theory of Moving Ions.— Kohlrausch, found that, when the polarization at the electrodes was eliminated, the resistance of a solution was constant however determined, and thus established Ohm's Law for electrolytes. The law was confirmed in the case of strong currents by G. F. Fitzgerald and F. T. Trouton (B.A. Report, 1886, p. 312). Now, Ohm's Law implies that no work is done by the current in overcoming reversible electromotive forces such as those of polarization. Thus the molecular inter- change of ions, which must occur in order that the products may be able to work their way through the liquid and appear at the electrodes, continues throughout the solution whether a current is flowing or not. The influence of the current on the ions is merely directive, and, when it flows, streams of electrified ions travel in opposite directions, and, if the applied electromotive force is enough to overcome the local polarization, give up their charges to the electrodes. We may therefore represent the facts by considering the process of electrolysis to be a kind of convection. Faraday's classical experiments proved that when a current flows through an electrolyte the quantity of substance liberated at each electrode is proportional to its chemidl equivalent weight, and to the total amount of electricity passed. Accurate determinations have since shown that the mass of an ion de- posited by one electromagnetic unit of electricity, i.e. its electro- chemical equivalent, is i-o36Xio _4 X its chemical equivalent weight. Thus the amount of electricity associated with one gram-equivalent of any ion

is io 4 /i -036 = 9653 units. Each monovalent ion must therefore be associated with a certain definite charge, which we may take to be a natural unit of electricity; a divalent ion carries two such units, and so on. A cation, i.e. an ion giving up its charge at the cathode, as the electrode at which the current leaves the solution is called, carries a positive charge of electricity; an anion, travelling in the opposite direction, carries a negative charge. It will now be seen that the quantity of electricity flowing per second, i.e. the current

through the solution, depends on (1) the number of the ions concerned, (2) the charge on each ion, and (3) the velocity with which the ions travel past each other. Now, the number of ions is given by the concentration of the solution, for even if all the ions are not actively engaged in carrying the current at the same instant, they must, on any dynamical idea of chemical equi- librium, be all active in turn. The charge on each, as we have seen, can be expressed in absolute units, and therefore the velocity with which they move past each other can be calculated. This was first done by Kohlrausch (Gottingen Nachrichten, 1876, p. 213, and Das Letivermogen der Elektrolyte, Leipzig, 1898) about 1879.

In order to develop Kohlrausch's theory, let us take, as an example, the case of an aqueous solution of potassium chloride, of concen- tration n gram-equivalents per cubic centimetre. There will then be n gram-equivalents of potassium ions and the same number of chlorine ions in this volume. Let us suppose that on each gram- equivalent of potassium there reside --e units of electricity, and on each gram-equivalent of chlorine ions — e units. If u denotes the average velocity of the potassium iono, the positive charge carried per second across unit area normal to the flow is n e v.. Similarly, if v be the average velocity of the chlorine ions, the negative charge carried in the opposite direction is n e v. But positive electricity moving in one direction is equivalent to negative electricity moving in the other, so that, before changes in concentration sensibly super- vene, the total current, C, is ne(u + v). Now let us consider the amounts of potassium and chlorine liberated at the electrodes by this current. At the cathode, if the chlorine ions were at rest, the excess of potassium ions would be simply those arriving in one second, namely, nu. But since the chlorine ions move also, a further separa- tion occurs, and nv potassium ions are left without partners. The total, number of gram-equivalents liberated is therefore «(« + »). By Faraday's law, the number of grams liberated is equal to the product of the current and the electro-chemical equivalent of the ion; the number of gram-equivalents therefore must be equal to rjC, where ij denotes the electro-chemical equivalent of hydrogen in C.G.S. units. Thus we get

n(u--v) =7)C = r]ne(u+v),

and it follows that the charge, e, on 1 gram-equivalent of each kind of ion is equal to 1/7;. We know that Ohm's Law holds good for electrolytes, so that the current C is also given by k.dP/dx, where k denotes the conductivity of the solution, and dP/dx the potential gradient, i.e. the change in potential per unit length along the lines of current flow. Thus

therefore

~(u+v) = kdP/dx;

, kdP

U+V ˆnTx

Now ij is l-036Xio -4 , and the concentration of a solution is usually expressed in terms of the number, m, of gram-equivalents per litre instead of per cubic centimetre. Therefore

kdP

u+v = i- 036X10-

mdx

When the potential gradient is one volt (10 8 C.G.S. units) per centimetre this becomes

u +v = I -036 X io-» Xk/m.

Thus by measuring the value of k/m, which is known as the equivalent conductivity of the solution, we can find u+v, the velocity of the ions relative to each other. For instance, the equiva- lent conductivity of a solution of potassium chloride containing one- tenth of a gram-equivalent per litre is iiiqXio -13 C.G.S. units at l8°C. Therefore

u+v = 1 -036 X 10′ X 1 1 19 X io -13 = i-I59Xio~ 8 = o-ooii59 cm. per sec.

In order to obtain the absolute velocities u and v, we must find some other relation between them. Let us resolve u into i(u-j-v) in one direction, say to the right, and |(«— v) to the left. Similarly v can be resolved into i(v+u) to the left and \{v — u) to the right. On pairing these velocities we have a combined movement of the ions to the

right, with a speed of \{u — v) and a drift right and left, past each other, each ion travelling with a speed of \{u--v), consti- tuting the electrolytic separation. If u is greater than v, the combined movement involves a concentration of salt at the cathode, and a corresponding dilution at the anode, and vice versa. The rate at which salt is electrolysed, and thus removed from the solution at each electrode, is | («+!>)• Thus the total loss of salt at the cathode is i(u--v) — i(w— v)\ or v, and at the anode, \(v--u) — j(u — u), or u. Therefore, as is explained in the article Electrolysis, by measuring the dilution of the liquid round the electrodes when a current passed, W. Hittorf (Pogg. Ann., 1853-1859,89ˆ. 177; 98, p. I; 103, p. 1; 106, PP- 337 an d 513) was able to deduce the ratio of the two velocities, for simple salts when no complex ions are present, and many further

experiments have been made on the subject (see Das Leitvermogen der Elektrelyte).

By combining the results thus obtained with the sum of the velocities, as determined from the conductivities, Kohlrausch cal- culated the absolute velocities of different ions under stated condi- tions. Thus, in the case of the solution of potassium chloride considered above, Hittorf's experiments show us that the ratio of the velocity of the anion to that of the cation in this solution is •51 : -49. The absolute velocity of the potassium ion under unit potential gradient is therefore 0-000567 cm. per sec., and that of the chlorine ion 0-000592 cm. per sec. Similar calculations can be made for solutions of other concentrations, and of different substances.

Table IX. shows Kohlrausch's values for the ionic velocities of three chlorides of alkali metals at 18° C, calculated for a potential gradient of 1 volt per cm.; the numbers are in terms of a unit equal to io~* cm. per sec.:—

Table IX.

KC1

NaCl

LiCl

m

u--v

u

n

u--v

u

V

u＋v

u V

1350

660

690

1 140

450

690

1050

360 690

0-0001

1335

654

681

1 129

448

681

1037

356 681

•001

1313

643

670

1110

440

670

1013

343 670

•01

1263

619

644

1059

415

644

962

318 644

•03

1218

597

621

1013

390

623

917

298 619

•I

1 153

564

589

952

360

592

853

259 594

•3

1088

531

557

876

324

552

774

217 557

1-0

IOII

491

520

765

278

487

651

169 482

30

911

442

469

582

206

376

463

“5 348

5-o

438

153

285

334

80 254

IO-O

25 92

These numbers show clearly that there is an increase in ionic velocity as the dilution proceeds. Moreover, if we compare the values for the chlorine ion obtained from observations on these three different salts, we see that as the concentrations diminish the velocity of the chlorine ion becomes the same in all of them. A similar relation appears in other cases, and, in general, we may say that at great dilution the velocity of an ion is independent of the nature of the other ion present. This introduces the con- ception of specific ionic velocities, for which some values at 18 C. are given by Kohlrausch in Table X. : —

Table X.

K

66Xio~ 6 cms.

per sec.

CI

69Xlo _5 cms. per sec.

Na

45

”

I

69

Li

36

”

NOa .

64

NH 4

66

”

OH

162

H

320

”

C 2 H 3 2

36

>

Ag

57

”

C 3 H 6 2

33

.

Having obtained these numbers we can deduce the conductivity of the dilute solution of any salt, and the comparison of the calculated with the observed values furnished the first confirma- tion of Kohlrausch’s theory. Some exceptions, however, are known. Thus acetic acid and ammonia give solutions of much lower conductivity than is indicated by the sum of the specific ionic velocities of their ions as determined from other compounds. An attempt to find in Kohlrausch’s theory some explanation of this discrepancy shows that it could be due to one of two causes. Either the velocities of the ions must be much less in these solutions than in others, or else only a fractional part of the number of molecules present can be actively concerned in con- veying the current. We shall return to this point later.

Friction on the Ions. — It is interesting to calculate the magnitude of the forces required to drive the ions with a certain velocity. If we have a potential gradient of 1 volt per centimetre the electric force is 10 s in C.G.S. units. The charge of electricity on I gram- equivalent of any ion is I/-OO0IO36 = 9653 units, hence the mechanical force acting on this mass is 9653 X 10 s dynes. This, let us say, produces a velocity u; then the force required to produce unit velocity is P A = lˆVe. = 2ˆ

a velocity of 1 centimetre per second through a very dilute solution must be equal to the weight of 38 million kilograms.

Table XI.

Kilograms-weight.

Kilograms- weight.

Pa Pi

Pa P,

K .

. . 15X10″ 38XIO 8

CI . . . 14X10 8 40X10 6

Na ■.

- – 22 „ 95 „

I … 14 ,, 11 ,,

Li .

• • 27 „ 390 „

NO, . . 15 „ , 25 ,.

NH 4

• • 15 … 83 „

OH . . 5-4 „ 32 „

H .

• • 3-1 .. 3io —

C 2 H,0 2 . . 27 „ 46 „

Ag .

. . 17 „ 16 ,,

C s H 6 2 . 30 ,, 41 ,,

Since the ions move with uniform velocity, the frictional resist- ances brought into play must be equal and opposite to the driving forces, and therefore these numbers also represent the ionic friction coefficients in very dilute solutions at 18° C.

Direct Measurement of Ionic Velocities. — Sir Oliver Lodge was the first to directly measure the velocity of an ion (B.A. Report, 1886, p. 389). In a horizontal glass tube connecting two vessels filled with dilute sulphuric acid he placed a solution of sodium chloride in solid agar-agar jelly. This solid solution was made alkaline with a trace of caustic soda in order to bring out the red colour of a little phenol-phthalein added as indicator. An electric current was then passed from one vessel to the other. The hydrogen ions from the anode vessel of acid were thus carried along the tube, and, as they travelled, decolourized the phenol- phthalein. By this method the velocity of the hydrogen ion through a jelly solution under a known potential gradient was observed to about 0-0026 cm. per sec, a number of the same order as that required by Kohlrausch's theory. Direct determina- tions of the velocities of a few other ions have been made by W. C. D. Whetham (Phil. Trans, vol. 184, A, p. 337; vol. 186, A, p. 507; Phil. Mag., October 1894). Two solutions having one ion in common, of equivalent concentrations, different densities, different colours, and nearly equal specific resistances, were placed one over the other in a vertical glass tube. In one case, for example, decinormal solutions of potassium carbonate and potassium bichromate were used. The colour of the latter is due to the presence of the bichromate group, Cr 2 0r. When a current was passed across the junction, the anions CO3 and Cr 2 07 travelled in the direction opposite to that of the current, and their velocity could be determined by measuring the rate at which the colour boundary moved. Similar experiments were made with alcoholic solutions of cobalt salts, in which the velocities of the ions were found to be much less than in water. The behaviour of agar jelly was then investigated, and the velocity of an ion through a solid jelly was shown to be very little less than in an ordinary liquid solution. The velocities could therefore be measured by tracing the change in colour of an indicator or the formation of a precipitate. Thus decinormal jelly solutions of barium chloride and sodium chloride, the

latter containing a trace of sodium sulphate, were placed in contact. Under the influence of an electromotive force the barium ions moved up the tube, disclosing their presence by the trace of insoluble barium sulphate formed. Again, a measurement of the velocity of the hydrogen ion, when travelling through the solution of an acetate, showed that its velocity was then only about the one-fortieth part of that found during its passage through chlorides. From this, as from the measurements on alcohol solutions, it is clear that where the equivalent conductivities are very low the effective velocities of the ions are reduced in the same proportion.

Another series of direct measurements has been made by Orme Masson (Phil. Trans, vol. 192, A, p. 331). He placed the gelatine solution of a salt, potassium chloride, for example, in a horizontal glass tube, and found the rate of migration of the potassium and chlorine ions by observing the speed at which they were replaced when a coloured anion, say, the Cr 2 7 from a solution of potassium bichromate, entered the tube at one end, and a coloured cation, say, the Cu from copper sulphate, at the other. The coloured ions are specifically slower than the colourless ions which they follow, and in this case it follows that the coloured solution has a

higher resistance than the colourless. For the same current, therefore, the potential gradient is higher in the coloured solution and lower in the colourless one. Thus a coloured ion which gets in front of the advancing boundary finds itself acted on by a smaller force and falls back into line, while a straggling colourless ion is pushed forward again. Hence a sharp boundary is pre- served. B. D. Steele has shown that with these sharp boundaries the use of coloured ions is unnecessary, the junction line being visible owing to the difference in the optical refractive indices of two colourless solutions. Once the boundary is formed, too, no gelatine is necessary, and the motion can be watched through liquid aqueous solutions (see R. B. Denison and B. D. Steele, Phil. Trans., 1906).

AH the direct measurements which have been made on simple binary electrolytes agree with Kohlrausch's results within the limits of experimental error. His theory, therefore, probably holds good in such cases, whatever be the solvent, if the proper values are given to the

ionic velocities, i.e. the values expressing the velocities with which the ions actually move in the solution of the strength taken, and under the conditions of the experiment. If we know the specific velocity of any one ion, we can deduce, from the conductivity of very dilute solutions, the velocity of any other ion with which it may be associated, a proceeding which does not involve the difficult task of determining the migration constant of the compound. Thus, taking the specific ionic velocity of hydrogen as 0-00032 cm. per second, we can find, by determining the conductivity of dilute solutions of any acid, the specific velocity of the acid radicle involved. Or again, since we know the specific velocity of silver, we can find the velocities of a series of acid radicles at great dilution by measuring the conˆ ductivity of their silver salts.

By sach methods W. Ostwald, G. Bredig and other observers have found the specific velocities of many ions both of inorganic and organic compounds, and examined the relation between constitution •id ionic velocity. The velocity of elementary ions is foundto be a periodic function of the atomic weight, similar elements lying on corresponding portions of a curve drawn to express the relation between these two properties. Such a curve much resembles that giving the relation between atomic weight and viscosity in solution. For complex ions the velocity is largely an additive property; to a continuous additive change in the composition of the ion corresponds a continuous but decreasing change in the velocity. The following table gives Ostwald's results for the formic acid series : —

Table XII.

Velocity.

Difference for CHj.

Formic acid . HCO2

Acetic H3C2O2

Propionic ,, . . . H5C3O2 Butyric „ H7C4O2 Valeric ,, . . . H 3 Ct,Oi Caprionic,, . HnC 6 02

51-2 38-3 34-3 30-8 28-8 27-4

- 12-9

- 4-0

- 3-5

- 2-0

- 1.4

Nature of Electrolytes. — We have as yet said nothing about the fundamental cause of electrolytic activity, nor considered why, for example, a solution of potassium chloride is a good conductor, while a solution of sugar allows practically no current to pass.

All the preceding account of the subject is, then, independent of any view we may take of the nature of electrolytes, and stands on the basis of direct experiment. Nevertheless, the facts considered point to a very definite conclusion. The specific velocity of an ion is independent of the nature of the opposite ion present, and this suggests that the ions themselves, while travelling through the liquid, are dissociated from each other. Further evidence, pointing in the same direction, is furnished by the fact that since the conductivity is proportional to the concentration at great dilution, the equivalent-conductivity, and therefore the ionic velocity, is independent of it. The importance of this relation will be seen by considering the alternative to the dissociation hypothesis. If the ions are not permanently free from each other their mobility as parts of the dissolved molecules must be secured by continual interchanges. The velocity with which they work their way through the liquid must then increase as such molecular rearrangements become more frequent, and will therefore depend on the number of solute molecules, i.e. on the

concentration. On this supposition the observed constancy of velocity would be impossible. We shall therefore adopt as a working hypothesis the theory, confirmed by other phenomena (see Electrolysis) , that an electrolyte consists of dissociated ions. It will be noticed that neither the evidence in favour of the dissociation theory which is here considered, nor that described in the article Electrolysis, requires more than the effective dissociation of the ions from each other. They may well be connected in some way with solvent molecules, and there are several indications that an ion consists of an electrified part of the molecule of the dissolved salt with an attendant atmosphere of solvent round it. The conductivity of a salt solution depends on two factors — (1) the fraction of the salt ionized; (2) the velocity with which the ions, when free from each other, move under the electric forces. 1 When a solution is heated, both these factors may change. The coefficient of ionization usually, though not always, decreases; the specific ionic velocities increase. Now the rate of

increase with temperature of these ionic velocities is very nearly identical with the rate of decrease of the viscosity of the liquid. If the curves obtained by observations at ordinary temperatures be carried on they indicate a zero of fluidity and a zero of ionic velocity about the same point, 38-5° C. below the freezing point of water (Kohlrausch, Sitz. preuss. Akad. Wiss., 1901, 42, p. 1026). Such relations suggest that the frictional resistance to the motion of an ion is due to the ordinary viscosity of the liquid, and that the ion is analogous to a body of some size urged through a vis* ous medium rather than to a particle of molecular dimensions finding its way through a crowd of molecules of similar magnitude. From this point of view W. K. Bousfield has calculated the sizes of ions on the assumption that Stokes's theory of the motion of a small sphere through a viscous medium might be applied (Zeits. phys. Chem., 1905, 53, p. 257; Phil. Trans. A, 1906, 206, p. 101). The radius of the potassium or chlorine ion with its envelope of water appears to be about i-2Xio -8 centimetres.

For the bibliography of electrolytic conduction see Electrolysis. The books which ileal more especially with the particular subject of the present article are Das Leilvermogen der Elektrolyte, by F. Kohlrausch and L. Holborn (Leipzig, 1898), and The Theory of Solution and Electrolysis, by W. C. D. Whetham (Cambridge, 1902). (W. C. D. W.)

III. Electric Conduction through Gases A gas such as air when it is under normal conditions conducts electricity to a small but only to a very small extent, however small the electric force acting on the gas may be. The electiical conductivity of gases not exposed to special conditions is so small that it was only definitely established in the early years of the 20th century, although it had engaged the attention of physicists for more than a hundred years. It had been known for a long time that a body charged with electricity slowly lost its charge even when insulated with the greatest care, and though long ago some physicists believed that part of the leak of electricity took place through the air, the general view seems to have been that it was due to almost unavoidable defects in the insulation or to dust in the air, which after striking the charged body was repelled from it and went off with some of the charge. C. A. Coulomb, who made some very careful experiments which were published in 1785 {Mem. de V Acad, des Sciences, 1785, p. 612), came to the conclusion that after allowing for the leakage along the threads which supported the charged body there was a balance over, which he attributed to leakage through the air. His view was that when the molecules of air come into contact wjth a charged body some of the electricity goes on to the mole- cules, which are then repelled from the body carrying their charge with

them. We shall see later that this explanation is not tenable. C. Matteucci (Ann. chim. phys., 1850, 28, p. 390) in 1850 also came to the conclusion that the electricity from a charged body passes through the air; he was the first to prove

1 It should be noticed that the velocities calculated in Kohlrausch's theory and observed experimentally are the average velocities, and involve both the factors mentioned above; they include the time wasted by the ions in combination with each other, and, except at great dilution, are less than the velocity with which the ions move when free from each other.

that the rate at which electricity escapes is less when the pressure of the gas is low than when it is high. He found that the rate was the same whether the charged body was surrounded by air, carbonic acid or hydrogen. Subsequent investigations have shown that the rate in hydrogen is in general much less than in air. Thus in 1872 E. G. Warburg (Pogg. Ann., 1872, 145, p. 578) found that the leak through hydrogen was only about one-half of that through air: he confirmed Matteucci's observations on the effect of pressure oh the rate of leak, and also found that it was the same whether the gas was dry or damp. He was inclined to attribute the leak to dust in the air, a view which was strengthened by an experiment of J. W. Hittorf's (Wied. Ann., 1879, 7, p. 595), in which a small carefully insulated electroscope, placed in a small vessel filled with carefully filtered gas, retained its charge for several days; we know now that this was due to the smallness of the vessel and not to the absence of dust, as it has been proved that the rate of leak in small vessels is less than in large ones.

Great light was thrown on this subject by some experiments on the rates of leak from charged bodies in closed vessels made almost simultaneously by H. Geitel (Phys. Zeit., 1900, 2, p. 116) and C. T. R. Wilson {Proc. Camb. Phil. Soc, 1900, n, p. 32). These observers established that (1) the rate of escape of elec- tricity in a closed vessel is much smaller than in the open, and the larger the vessel the greater is the rate of leak; and (2) the rate of leak does not increase in proportion to the differences of potential between the charged body and the walls of the vessel: the rate soon reaches a limit beyond which it does not increase, however much the potential difference may be

increased, provided, of course, that this is not great enough to cause sparks to pass from the charged body. On the assumption that the maximum leak is proportional to the volume, Wilson's experiments, which were made in vessels less than 1 litre in volume, showed that in dust-free air at atmospheric pressure the maximum quantity of electricity which can escape in one second from a charged body in a closed volume of V cubic centimetres is about io- 8 V electrostatic units. E. Rutherford and S. T. Allan {Phys. Zeit., 1902, 3, p. 225), working in Montreal, obtained results in close agreement with this. Working between pressures of from 43 to 743 millimetres of mercury, Wilson showed that the maximum rate of leak is very approximately proportional to the pressure; it is thus exceedingly small when the pressure is low — a result illustrated in a striking way by an experiment of Sir W. Crookes {Proc. Roy. Soc, 1879, 28, p. 347) in which a pair of gold leaves retained an electric charge for several months in a very high vacuum. Subsequent experiments have shown that it is only in very small vessels that the rate of leak is proportional to the volume and to the pressure; in large vessels the rate of leak per unit volume is considerably smaller than in small ones. In small vessels the maximum rate of leak in different gases, is, with the exception of hydrogen, approximately propor- tional to the density of the gas. Wilson's results on this point are shown in the following table {Proc. Roy. Soc, 1901, 60, p. 277) : —

Gas.

Relative Rate of Leak.

Rate of Leak. Sp. Gr.

Ai- . . . H s ˆ * .

co 2 . » .

S0 8 . y .

CH 3 C1 . .

Ni(CO), . .

I-OO

•184

1-69 2-64 4-7 5-1

1

2-7

IIO I-2I

1-09

•867

The rate of leak of electricity through gas contained in a closed vessel depends to some extent on the material of which the walls of the vessel are made; thus it is greater, other circumstances being the same, when the vessel is made of lead than when it is made of aluminium. It also varies, as Campbell and Wood {Phil. Mag. [6], 13, p. 265) have shown, with the time of the day, having a well-marked minimum at about 3 o'clock in the morning: it also varies from month to month. Rutherford {Phys. Rev., 1903, 16, p. 183), Cooke {Phil. Mag., 1903 [6], 6, p. 403) and M'Clennan and Burton {Phys. Rev., 1903, 16, p. 184) have shown

that the leak in a closed vessel can be reduced by about 30 % by surrounding the vessel with sheets of thick lead, but that the reduction is not increased beyond this amount, however thick the lead sheets may be. This result indicates that part of the leak is due to a very penetrating kind of radiation, which can get through the thin walls of the vessel but is stopped by the thick lead. A large part of the leak we are describing is due to the presence of radioactive substances such as radium and thorium in the earth's crust and in the walls of the vessel, and to the gaseous radioactive emanations which diffuse from them into the atmosphere. This explains the very interesting effect discovered by J. Elster and H. Geitel {Phys. Zeit., 1901, 2, p. 560), that the rate of leak in caves and cellars when the air is stagnant and only renewed slowly is much greater than in the open air. In some cases the difference is very marked; thus they found that in the cave called the Baumannshohle in the Harz mountains the electricity escaped at seven times the rate it did in the air outside. In caves and cellars the radioactive emanations from the walls can accumulate and are not blown away as in the open air.

The electrical conductivity of gases in the normal state is, as we have seen, exceedingly small, so small that the investigation of its properties is a matter of considerable difficulty; there are, however, many ways by which the electrical conductivity of a gas can be increased so greatly that the investigation becomes comparatively

easy. Among such methods are raising the temperature of the gas above a certain point. Gases drawn from the neighbourhood of flames, electric arcs and sparks, or glowing pieces of metal or carbon are conductors, as are also gases through which Rontgen or cathode rays or rays of positive electricity are passing; the rays from the radioactive metals, radium, thorium, polonium and actinium, produce the same effect, as does also ultra-violet light of exceedingly short wave- length. The gas, after being made a conductor of electricity by any of these means, is found to possess certain properties; thus it retains its conductivity for some little time after the agent which made it a conductor has ceased to act, though the con- ductivity diminishes very rapidly and finally gets too small to be appreciable.

This and several other properties of conducting gas may readily be proved by the aid of the apparatus represented in fig. 5.

fi

A

2

Fig. 5.

V is a testing vessel in which an electroscope is placed. Two tubes A and C are fitted into the vessel, A being connected with a water pump, while the far end of C is in the region where the gas is exposed to the agent which makes it a conductor of electricity. Let us suppose that the gas is made conducting by Rontgen rays produced by a vacuum tube which is placed in a box, covered except for a window at B with lead so as to protect the electro- scope from the direct action of the rays. If a slow current of air is drawn by the water pump through the testing vessel, the charge on the electroscope will gradually leak away. The leak, however, ceases when the current of air is stopped. This result shows that the gas retains its conductivity during the time taken by it to pass from one end to the other of the tube C.

The gas loses its conductivity when filtered through a plug of glass-wool, or when it is made to bubble through water. This can readily be proved by inserting in the tube C a plug of glass- wool or a water trap; then if by working the pump a little harder the same current of air is produced as before, it will be found that the electroscope will now retain its charge, showing that the conductivity can, as it were, be filtered out of the gas.

The conductivity can also be removed from the gas by making the gas traverse a strong electric field. We can show this by replacing the tube C by a metal tube with an insulated wire passing down the axis of the tube. If there is no potential difference between the wire and the tube then the electroscope willleak when a current of air is drawn through the vessel, but the leak will stop if a considerable difference of potential is maintained between the wire and the tube: this shows that a strong electric field removes the conductivity from the gas. The fact that the conductivity of the gas is removed by filtering shows that it is due to something mixed with the gas which is removed from it by filtration, and since the conductivity is also removed by an electric field, the cause of the conductivity must be charged with electricity so as to be driven to the sides of the tube by the electric force, Since the gas as a whole is hot electrified either positively or negatively, there must be both negative and positive charges in the gas, the amount of electricity of one sign being equal to that of the other. We are thus led to the conclusion that the conductivity of the gas is due to electrified particles being mixed up with the gas, some of these particles having charges of positive electricity, others of negative. These electrified particles are called ions, and the process by which the gas is made a conductor is called the ionization of the gas. We shall show later that the charges and masses of the ions can be determined, and that the gaseous ions are not identical with those met with in the electrolysis of solutions.

One very characteristic property of conduction of electricity through a gas is the relation between the current through the gas and the electric force which gave rise to it. This relation is not in general that expressed by Ohm's law, which always, as far as our present knowledge extends, expresses the relation for conduction through metals and electrolytes. With gases, on the other hand, it is only when the current is very small that Ohm's law is true. If we represent graphically by means of a curve the relation between the current passing between two parallel metal plates separated by ionized gas and the difference of potential between the plates, the curve is of the character shown in fig. 6 when the ordinates represent the current and the abscissae the difference of potential between the plates. We see that when the potential difference is very small, i.e. close to trie origin, the curve is approximately straight, but that

soon the current increases much less rapidly than the potential

difference, and that a stage is reached when no appreciable increase of current is produced when the potential difference is increased; when this stage is reached the current is constant, and this value of the current is called the ” saturation ” value. When the potential difference approaches the value at which sparks would pass through the gas, the current again increases with the potential difference; thus the curve representing the relation between the current and potential difference over very wide ranges of potential difference has the shape shown in fig. 7 ; curves of this kind have been obtained by von Schweidler (Wien. Ber., 1899, 108, p. 273), and J. E. S. Townsend Phil. Mag., 1901 [6], 1, p. 198). We shall discuss later the causes of the rise in the current with large potential differences, when we consider ionization by collision.

The general features of the earlier part of the curve are readily explained on the ionization hypothesis. On this view the Rontgen rays or other ionizing agent acting on the gas between the plates, produces positive and negative ions at a definite rate. Let us sup- pose that q positive and q negative ions are by this means produced per second between the plates; these under the electric force will tend to move, the positive ones to the negative plate, the negative ones to the positive. Some of these ions will reach the plate, others before reaching the plate will get so near one of the opposite sign that the attraction between them will cause them to unite and form an electrically neutral system; when they do this they end their

1

t.M.F. Fig. 6.

[GASES

existence as ions. The current between the plates is proportional to the number of ions which reach the plates per second. Now it is evident that we cannot go on taking more ions out of the gas than are produced; thus we cannot, when the current is steady, have more than q positive ions driven to the negative plate per second, and the same number of negative ions to the positive. If each of the positive ions carries a chargeof e units of positive electricity, and if there is an equal and opposite charge on each negative ion, then the maximum amount of electricity which can be given to the plates per second is qe, and this is equal to the saturation current. Thus if we measure the saturation current, we get a direct measure of the

1

SO

/

40

/

30

}

/

?0

/

10

^

/

100 200 MO 400 50O £00 700 800 300 1000 1100 1100 1300 O00 1500

Fig. 7.

ionization, and this does not require us to know the value of any quantity except the constant charge on the ion. If we attempted to deduce the amount of ionization by measurements of the current before it was saturated, we should require to know in addition the velocity with which the ions move under a given electric force, the time that elapses between the liberation of an ion and its combination with one of the opposite sign, and the potential difference between the plates. Thus if we wish to measure the amount of ionization in a gas we should be careful to see that the current is saturated.

The difference between conduction through gases and through metals is shown in a striking way when we use potential differences large enough to produce the saturation current. Suppose we have got a potential difference between the plates more than sufficient to produce the saturation current, and let us increase the distance

between the plates. If the gas were to act like a metallic conductor this would diminish the current, because the greater length would involve a greater resistance in the circuit. In the case we are considering the separation of the plates will increase the current, because now there is a larger volume of gas exposed to the rays; there are therefore more ions produced, and as the saturation current is proportional to the number of ions the saturation current is increased. If the potential differ- ence between the plates were much less than that required to saturate the current, then increasing the distance would diminish the current; the gas for such potential differences obeys Ohm's law and the behaviour of the gaseous resistance is therefore similar to that of a metallic one.

In order to produce the saturation current the electric field must be strong enough to drive each ion to the electrode before it has time to enter into combination with one of the opposite sign. Thus when the plates in the preceding example are far apart, it will take a larger potential difference to produce this current than when the plates are close together. The potential difference required to saturate the current will increase as the square of the distance between the plates, for if the ions are to be delivered in a given time to the plates their speed must be proportional to the distance between the plates. But the speed is proportional to the electric force acting on the ion; hence the electric force must be proportional to the distance between the plates, and as in a uniform field the potential difference is equal to the electric force multiplied by the distance between the plates, the potential difference will vary as the square of this distance.

The potential difference required to produce saturation will, other circumstances being the same, increase with the amount of ionization, for when the number of ions is large and they are crowded together, the time which will elapse before a positive one combines with a negative will be smaller than when the number of ions is small. The ions have therefore to be removed more quickly from the gas when the ionization is great than when it is small; thus they must move at – a higher speed and must therefore be acted upon by a larger force.

When the ions are not removed from the gas, they will increase until the number of ions of one sign which combine with ions of the

opposite sign in any time is equal to the number produced by the ionizing agent in that time. We can easily calculate the number of free ions at any time after the ionizing agent has commenced to act.

Let q be the number of ions (positive or negative) produced in one cubic centimetre of the gas per second by the ionizing agent, »i, «2, the number of free positive and negative ions respectively per cubic centimetre of the gas. The number of collisions between positive and negative ions per second in one cubic centimetre of the gas is proportional to »i« 2 . If a certain fraction of the collisions between the positive and negative ions result in the formation of an electrically neutral system, the number of ions which disappear per second on a cubic centimetre will be equal to an v « 2 , where a is a quantity which is independent of ni, n 2 ; hence if / is the time since the ionizing agent was applied to the gas, we have

dtii/dt = q — afiith, dth/dt = q — atli th.

Thus tit—rh is constant, so if the gas is uncharged to begin with, Wi will always equal » 2 . Putting «i = « 2 = » we have

dn/dt = q — an 2 (1),

the solution of which is, since «=o when t = o,

k(e”’”’~i) .

n ~ e £fcai-)-i W>

if & = q/a. Now the number of ions when the gas has reached a steady state is got by putting / equal to infinity in the preceding equation, and is therefore given by the equation

tto=fc = V (

We see from equation (1) that the gas will not approximate to its steady state until 2kat is large, that is until t is large compared with iJ2ka or with 1/2V (qa). We may thus take 1/2 V (qa) as a measure of the time taken by the gas to reach a steady state when exposed to an ionizing agent; as this time varies inversely as V? we see that when the ionization is feeble it may take a very considerable time for the gas to reach a steady state. Thus in the case of our atmosphere where the production of ions is only at the rate of about 30 per cubic centimetre per second, and where, as we shall see, o is about io -6 , it would take some minutes for the ionization in the air to get into a steady state if the ionizing agent were suddenly applied.

We may use equation (1) to determine the rate at which the ions disappear when the ionizing agent is removed. Putting q = o in that equation we get dnjat = — an 2 .

Hence » = «o/(i+«o<ˆ) (3),

where «o is the number of ions when t = o. Thus the number of ions falls to one-half its initial value in the time l/n a. The quantity o is called the coefficient of recombination, and its value for different gases has been determined by Rutherford (Phil. Mag. 1897 [5], 44, p. 422), Townsend {Phil. Trans., 1900, 193, p. 129), McClung (Phil. Mag., 1902 [6], 3, p. 283), Langevin (Ann. chim. phys. [7], 28, p. 289), Retschinsky (Ann. d. Phys., 1905, 17, p. 518), Hendred (Phys. Rev., 1905, 21, p. 314). The values of ale, e being the charge on an ion in electrostatic measure as determined by these observers for different gases, is given in the following table : —

Townsend.

McClung.

Langevin.

Retschinsky.

Hendred.

Air .

2 .

C0 2 . H 2 .

3420

338o

3500 3020

338o

3490 2940

3200 3400

4140

The gases in these experiments were carefully dried and free from dust; the apparent value of o is much increased when dust or small drops of water are present in the g£fs, for then the ions get caught by the dust particles, the mass of a particle is so great compared with that of an ion that they are practically immovable under the action of the electric field, and so the ions clinging to them escape detection when electrical methods are used. Taking e as 3-5 X io~ M , we see that a is about I-2XIO 6 , so that the number of recom binations in unit time between n positive and n negative ions in unit volume is iˆXioˆw 2 . The kinetic theory of gases shows that if we have n molecules of air per cubic centimetre, the number of collisions per second is 1 -2 Xio~ 10 » 2 at a temperature of o°C. Thus we see that the number of recombinations between oppositely charged ions is enormously greater than the number of collisions between the same number of neutral molecules. We shall see that the difference in size between the ion and the molecule is not nearly sufficient to account for the difference between the collisions in the two cases ; the difference is due to the force between the oppositely charged ions, which drags ions into collisions which but for this force would have missed each other.

Several methods have been used to measure a. In one method air, exposed to some ionizing agent at one end of a long tube, is

slowly sucked through the tube and the saturation current measured at different points along the tube. These currents are proportional to the values of n at the place of observation: if we know the distance of this place from the end of the tube when the gas was ionized and the velocity of the stream of gas, we can find t in equation (3), and knowing the value of n we can deduce the value of o from the equation

llni-ilm = a(h-h),

where n u n% are the values of n at the times t u d respectively. In this method the tubes ought to be so wide that the loss of ions by diffusion to the sides of the tube is negligible. There are other methods which involve the knowledge of the speed with which the ions move under the action of known electric forces ; we shall defer the consideration of these methods until we have discussed the question of these speeds.

In measuring the value of o it should be remembered that the theory

of the methods supposes that the ionization is uniform throughout the gas. If the total ionization throughout a gas remains constant, but instead of being uniformly distributed is concentrated in patches, it is evident that the ions will recombine more quickly in the second case than in the first, and that the value of o will be different in the two cases. This probably explains the large values of a obtained by Retschinsky, who ionized the gas by the a rays from radium, a method which produces very patchy ionization.

Variation of a with the Pressure of the Gas. — All observers agree that there is little variation in o with the pressures for pressures of between 5 and 1 atmospheres; at lower pressures, however, the value of o seems to diminish with the pressure: thus Langevin (Ann. chim. phys., 1903, 28, p. 287) found that at a pressure of £ of an atmosphere the value of a was about \ of its value at atmospheric pressure.

Variation of a with the Temperature. — Erikson (Phil. Mag., Aug. 1909) has shown that the value of a for air increases as the tempera- ture diminishes, and that at the temperature of liquid air — 180 ° C, it is more than twice as great as at -f-12 C.

Since, as we have seen, the recombination is due to the coming together of the positive and negative ions under the influence of the electrical attraction between them, it follows that a large electric force sufficient to overcome this attraction would keep the ions apart and hence diminish the coefficient of recombination. Simple con- siderations, however, will show that it would require exceedingly strong electric fields to produce an appreciable effect. The value of a indicatesthat for two oppositely charged ions to unite they must come within a distance of about i-SXio -6 centimetres; at this distance the attraction between them is e 2 X io 12 /2-25, and if X is the external electric force, the force tending to pull them apart cannot be greater than Xe; if this is to be comparable with the attraction, X must be comparable with «Xl0 12 /2-25, or putting e = 4Xlo~ 10 , with I-8XI0 2 ; this is 54,000 volts per centimetre, a force which could not be applied to gas at atmospheric pressure without pro- ducing a spark.

Diffusion of the Ions. — The ionized gas acts like a mixture of gases, the ions corresponding to two different gases, the non-ionized gas to a third. If the concentration of the ions is not uniform, they will diffuse through the non-ionized gas in such a way as to produce a more uniform distribution. A very valuable series of determinations of the coefficient of diffusion of ions through various gases has been made by Townsend (Phil. Trans., 1900, A, 193, p. 129). The method used was to suck the ionized gas through narrow tubes ; by measur- ing the

loss of both the positive and negative ions after the gases had passed through a known length of tube, and allowing for the loss by recombination, the loss by diffusion and hence the coefficient of diffusion could be determined. The following tables give the values of the coefficients of diffusion D on the C.G.S. system of units as determined by Townsend : —

Table I. — Coefficients of Diffusion (D) in Dry Gases.

Gas.

D for + ions.

D for— ions.

Mean Value of D.

• Ratio of D for —to D for + ions.

Air

2

co 2

H 2

•028 •025 •023 ■123

■043 •0396 •026 •190

•0347 •0323 •0245 ■156

1-54 1-58

I-I3

1-54

Table II. — Coefficients of Diffusion in Moist Gases.

Gas.

D for + ions.

D for— ions.

Mean Value of D.

Ratio of D for — to D for + ions.

Air

o 2

C0 2 H 2

•032 •0288 •0245 •128

•037 •0358 •0255 •142

< °335 •0323 ■025

•135

1 ‘09 1-24 1-04

i-il

It is interesting to compare with these coefficients the values of D when various gases diffuse through each other. D for hydrogen through air is -634, for oxygen through air -177, for the vapour of

isobutyl amide through air -042. We thus see that the velocity of diffusion of ions through air is much less than that of the simple gas, but that it is quite comparable with that of the vapours of some complex organic compounds.

The preceding tables show that the negative ions diffuse more rapidly than the positive, especially in dry gases. The superior mobility of the negative ions was observed first by Zeleny (Pfa7. Mag., 1898 [5], 46, p. 120), who showed that the velocity of the negative ions under an electric force is greater than that of the positive. It will be noticed that the difference between the mobility of the negative and the positive ions is much more pronounced in dry gases than in moist. The difference in the rates of diffusion of the positive and negative ions is the reason why ionized gas, in which, to begin with, the positive and negative charges were of equal amounts, sometimes becomes electrified even although the gas is not acted upon by electric forces. Thus, for example, if such gas be blown through narrow tubes, it will

be positively electrified when it comes out, for since the negative ions diffuse more rapidly than the positive, the gas in its passage through the tubes will lose by diffusion more negative than positive ions and hence will emerge positively electrified. Zeleny snowed that this effect does not occur when, as in carbonic acid gas, the positive and negative ions diffuse at the same rates. Townsend {loc. cit.) showed that the coefficient of diffusion of the ions is the same whether the ionization is produced by Rontgen rays, radioactive substances, ultra-violet light, or electric sparks. The ions produced by chemical reactions and in flames are much less mobile; thus, for example, Bloch (Ann. chim. phys., 1905 [8], 4, p. 25) found that for the ions produced by drawing air over phosphorus the value of a/e was between 1 and 6 instead of over 3000, the value when the air was ionized by Rontgen rays.

Velocity of Ions in an Electric Field. — The velocity of ions in an electric field, which is of fundamental importance in conduction, is very closely related to the coefficient of diffusion. Measure- ments of this velocity for ions produced by Rontgen rays have been made by Rutherford (Phil. Mag. [5], 44, p. 422), Zeleny (Phil. Mag. [5], 46, p. 120), Langevin (Ann. Chim. Phys., 1903, 28, p. 289), Phillips (Proc. Roy. Soc. 78, A, p. 167), and Wellisch (Phil. Trans., 1909, 209, p. 249). The ions produced by radio- active substance have been investigated by Rutherford (Phil. Mag. [5], 47 , p. 109) and by Franck and Pohl (Verh. deutsch. phys. Gesell., 1907, 9, p. 69), and the negative ions produced when ultra- violet light falls on a metal plate by Rutherford (Proc. Camb.Phil. Soc. 9, p. 401). H. A. Wilson (Phil. Trans. 192, p.409),Marx (Ann. de Phys. n, p. 765), Moreau (Journ. de Phys. 4, 11, p. 558; Ann. Chim. Phys. 7, 30, p. 5) and Gold (Proc. Roy. Soc. 79, p. 43) have investigated the velocities of ions produced by putting various salts into flames; McClelland (Phil. Mag. 46, p. 29) the velocity of the ions in gases sucked from the neighbourhood of flames and arcs; Townsend (Proc. Camb. Phil. Soc. 9, p. 345) and Bloch (loc. cit.) the velocity of ions produced by chemical reaction; and Chattock (Phil. Mag. [5], 48, p. 401) the velocity of the ions pro- duced when electricity escapes from a sharp needle point into a gas.

Several methods have been employed to determine these velocities. The one most frequently employed is to find the electromotive intensity required to force an ion against the stream of gas moving with a known velocity parallel to the lines of electric force. Thus, of two perforated plane electrodes vertically over each other, suppose the lower to be positively, the upper negatively electrified, and suppose that the gas is streaming vertically downwards with the velocity V; then unless the upward velocity of the positive ion is

greater than V, no positive electricity will reach the upper plate. If we increase the strength of the field between the plates, and hence the upward velocity of the positive ion, untilthe positive ions just begin to reach the upper plate, we know that with this strength of field the velocity of the positive ion is equal to V. By this method, which has been used by Rutherford, Zeleny and H. A. Wilson, the velocity of ions in fields of various strengths has been determined.

The arrangement used by Zeleny is represented in fig. 8. P and Q are square brass plates. They are bored through their centres, and to the openings the tubes R and S are attached, the space between the plates being covered in so as to form a closed box. K is a piece of wire gauze completely covering the opening in Q; T is an insulated piece of wire gauze nearly but not quite filling the opening in the plate P, and connected with one pair of quadrants of an electrometer E. A plug of glass wool G filters out the dust from a stream of gas which enters the vessel by the tube D and leaves it by F; this plug also makes the velocity of the flow of the gas uniform across the section of the tube. The Rontgen rays to ionize the gas

were produced by a bulb at O, the bulb and coil being in a lead-covered box, with an aluminium window through which the ravs passed. Q is connected with one pole of a battery of cells, P and the other pole of the battery are put to earth. The changes in the potential of T are due to ions giving up their charges to it. With a given velocity of air-blast the potential of T was found not to change unless the difference of potential between P and Q exceeded a critical value. The field corresponding to this critical value thus made the ions move with the known velocity of the blast.

‘tAftTV

Fig. 8.

Another method which hag been employed by Rutherford and McClelland is based on the action of an electric field in destroying the conductivity of gas streaming through it. Suppose that BAB, DCD (fig. 9) are a system of parallel plates boxed in so that a stream of gas, after flowing between BB, passes between DD without any loss of gas in the interval. Suppose the plates DD are insulated, and connected with one pair of quadrants of an electrometer, by charg- ing up C to a sufficiently high potential we can drive all the positive ions which enter the system DCD against the plates D; this will cause a deflexion of the electrometer, which in one second will be proportional to the number of positive ions which have entered the system in that time. If

we charge A up to a high potential, B being put to earth, we shall find e D

that the deflexion of the elec — —

trometer connected with * ‘ c

DD is less than it was when 3 ■ ■ ■■ O

A and B were at the same ———————— — •

potential, because some of p-

the positive ions in their ‘ ”’

passage through BAB are driven against the plates B. If u is the velocity along the lines of force in the uniform electric field between A and B, and t the time it takes for the gas to pass through BAB, then all the positive ions within a distance ut of the plates B will be driven up against these plates, and thus if the positive ions are equally distri- buted through the gas, the number of positive ions which emerge from the system when the electric field is on will bear to the number which emerge when the field is off the ratio of 1 —utjl to unity, where I is the distance between A and B. This ratio is equal to the ratio of the deflexions in one second of the electrometer attached to D, hence the observations of this instrument give l—ut/l. If we know the velocity of the gas and the length of the plates A and B, we can determine t, and since / can be easily measured, we can find u, the velocity of the positive ion in a field of given strength. By charg- ing A and C negatively instead of positively we can arrive at the velocity of the negative ion. In practice it is more convenient to use cylindrical tubes with coaxial wires instead of the systems of parallel plates, though in this case the calculation of the velocity of the ions from the observations is a little more complicated, inasmuch as the electric field is not uniform between the tubes.

A method which gives very accurate results, though it is only applicable in certain cases, is the one used by Rutherford to measure the velocity of the negative ions produced close to a metal plate by the incidence on the plate of uftra-violet light. The principle of the method is as follows: — AB (fig. 10) is an insulated horizontal plate of well-polished zinc, which can be moved vertically up and down by means of a screw ; it is connected with one pair of quadrants of an electro- meter, the other pair of quadrants being put to earth. CD is a base-plate with a

hole EF in it; this hole is covered with A *- =3 * fine wire gauze, through which ultra- violet light passes and falls on the plate c – o

AB. The plate CD is connected with £ F

an alternating current dynamo, which Pig. i .

produces a simply-periodic potential

difference between AB and CD, the other pole being put to earth. Suppose that at any instant the plate CD is at a higher potential than AB, then the negative ions from AB will move towards CD, and will continue to do so as long as the potential of CD is higher than that of AB. If, however, the potential difference changes sign before the negative ions reach CD, these ions will go back to AB. Thus AB will not

{ 1

GASES]

CONDUCTION, ELECTRIC

869

lose any negative charge unless the distance betweentheplatesAB and CD is less than the distance traversed by the negative ion during the time the potential of CD is higher than that of AB. By altering the distance between the plates until CD just begins to lose a negative charge, we find the velocity of the negative ion under unit electromotive intensity. For suppose the difference of potential between AB and CD is equal to a sin pt, then if d is the distance between the plates, the electric intensity is equal to a sin pt/d ; if we suppose the velocity of the ion is proportional to the electric intensity, and if « is the velocity for unit electric intensity, the velocity of the negative ion will be ua sin pt/d. Hence if x represent the distance of the ion from AB

dx ua . . ,

x=-~t{i— cos pt), if x = o when t = o.

Thus the greatest distance the ion can get from the plate is equal to 2au/pd, and if the distance between the plates is gradually reduced to this value, the plate AB will begin to lose a negative charge; hence when this happens

d = 2au/pd, oru = pd 2 /2a, an equation by means of which we can find u.

In this form the method is not applicable when ions of both signs are present. Franck and Pohl (Verh. deutsch. physik. Gesell. 1907, 9, p. 69) have by a slight modification removed this restriction. The modification consists in confining the ionization to a layer of gas below the gauze EF. If the velocity of the positive ions is to be determined, these ions are forced through the gauze by applying to the ionized gas a small constant electric force acting upwards; if negative ions are required, the constant force is reversed. After passing through the gauze the ions are acted upon by alternating forces as in Rutherford's method.

Langevin {Ann. chim. phys., 1903, 28, p. 289) devised a method of measuring the velocity of the ions which has been extensively used; it has the advantage of not requiring the rate of ionization to remain uniform. The general idea is as follows. Suppose that we expose the gas between two parallel plates A, B to Rontgen rays or some other ionizing agent, then stop the rays and apply a uniform electric field to the region between the plates. If the force on the positive ion is from A to B, the plate B will receive a positive charge of electricity. After the electric force has acted for a time T reverse it. B will now begin to receive negative electricity and will go on doing so until the supply of negative ions is exhausted. Let us consider how the quantity of positive electricity received by B will vary with T. To fix our ideas, suppose the positive ions move more slowly than the negative; let T 2 and Ti be respectively the times taken by the positive and negative ions to move under the electric field through a distance equal to AB, the distance between the planes. Then if T is greater than T 2 all the ions will have been driven from between the plates before the field is reversed, and there- fore the positive charge received by B will not depend upon T. Next let T be less than T 2 but greater than Ti ; then at the time when the field is reversed all the negative ions will have been driven from between the plates, so that the positive charge received by B will not be neutralized by the arrival of fresh ions coming to it after the reversal of the field. The number of positive ions driven against the plate B will be proportional to T. Thus if we measure the value of the positive charge on B for a series of values of T, each value being less than the preceding, we shall find that until T reaches a certain value the charge remains constant, but as soon as we reduce the time below this value the charge diminishes. The value of T when the diminution in the field begins is T 2 , the time taken for a positive ion to cross from A to B under the electric field; thus from T 2 we can calculate the velocity of the positive ion in this field. If we still

further diminish T, we shall find that we reach a value when the diminution of the positive charge on B with the time suddenly becomes much more rapid ; this change occurs when T falls below T x the time taken for the negative ions to go from one plate to the other, for now when the field is reversed there are still some negative ions left between the plates, and these will be driven against B and rob it of some of the positive charge it had acquired before the field was reversed. By observing the time when the increase in the rate of diminution of the positive charge with the time suddenly sets in we can determine Ti, and hence the velocity of the negative ions.

The velocity of the ions produced by the discharge of electricity from a fine point was determined by Chattock by an entirely different method. In this case the electric field is so strong and the velocity of the ion so great that the preceding methods are not applicable. Suppose P represents a vertical needle discharging electricity into air, consider the force acting on the ions included between two horizontal planes A, B. If P is the density of the electrification, ” and Z the vertical component of the electric intensity, F the resultant force on the ions between A and B is vertical and equal to

jjj Zpdxdydz.

Let us suppose that the velocity of the ion is proportional to the electric intensity, so that if w is the vertical velocity of the ions, which are supposed all to be of one sign, w = RZ.

Substituting this value of Z, the vertical force on the ions between A and B is equal to

kfff

wpdxdydz.

But Jfwpdxdy=i, where 1 is the current streaming from the point. This current, which can be easily measured by putting a galvanometer in series with the discharging point, is independent of 2, the vertical distance of a plane between A and B below the charging point. Hence we have a

IF:

~“kf dz =R7

This force must be counterbalanced by the difference of gaseous pressures over the planes A and B; hence if p B and p A denote

respectively the pressures over B and A, we have

pB-pA = J£Z.

Hence by the measurement of these pressures we can determine R, and hence the velocity with which an ion moves under a given electric intensity.

There are other methods of determining the velocities of the ions, but as these depend on the theory of the conduction of electricity through a gas containing charged ions, we shall consider them in our discussion of that theory.

By the use of these methods it has been shown that the velocities of the ions in a given gas are the same whether the ionization is produced by Rontgen rays, radioactive substances, ultra-violet light, or by the discharge of electricity from points. When the ionization is produced by chemical action the ions are very much less mobile, moving in the same electric field with a velocity less than one-thousandth part of the velocity of the first kind of ions. On the other hand, as we shall see later, the velocity of the negative ions in flames is enormously greater than that of even the first kind of ion under similar electric fields and at the same pressure. But when these negative ions get into the cold part of the flame, they move sluggishly with velocities of the order of those possessed by the second kind. The results of the various determinations of the velocities of the ions are given in the following table. The velocities are in centimetres per second under an electric force of one volt per centimetre, the pressure of the gas being I atmosphere. V+ denotes the velocity of the positive ion, V— that of the negative. V is the mean velocity of the positive and negative ions.”

Velocities of Ions. — Ions produced by Rontgen Rays.

Gas.

v+.

V-.

V.

Observer.

Air

i-6

Rutherford

Air (dry) ....

1-36

1*7

Zeleny

,, .

1-00

1-70

Langevin

,, ...

1-39

178

Phillips

,, ...

i-54

178

Wellisch

Air (moist) .

1-37

i-8i

Zeleny

Oxygen (dry)

i-36

i-8o

,,

Oxygen (moist) .

I ‘29

i-52

Carbonic acid (dry)

076

o-8i

,,

,, ,,

0-86

0-90

Langevin

,, ,,

o-8i

0-85

Wellisch

Carbonic acid (moist)

0-82

075

Zeleny

Hydrogen (dry)

670

7-95

,,

Hydrogen (moist) .

5-30

5-60

Nitrogen

i-

6

Rutherford

Sulphur dioxide

0-44

0-41

lj.

Wellisch

Hydrochloric acid .

i-

27

Rutherford

Chlorine ….

i-

Helium (dry)

5-°9

6-31

Franck and Pohl

Carbon monoxide .

I-IO

1-14

Wellisch

Nitrous oxide

0-82

0-90

Ammonia

074

o-8o

Aldehyde

0-31

0-30

it

Ethyl alcohol

o-34

0-27

»»

Acetone . . .’ .

0-31

0-29

Ethyl chloride .

o-33

0-31

)»

Pentane ….

0-36

o-35

)»

Methyl acetate .

o-33

0-36

if

Ethyl formate .

0-30

0-31

j»

Ethyl ether .

0-29

0-31

»»

Ethyl acetate

0-31

0-28

it

Methyl bromide

0-29

0-28

Methyl iodide .

0-21

0-22

Carbon tetrachloride

0-30

0-31

Ethyl iodide

0-17

0-16

”

Ions p

‘oduced I

＞y Ultra- Violet Light.

Air … .

1-4

Rutherford

Hydrogen …. 3-9 Rutherford

Carbonic acid . . . 078 Rutherford

870

CONDUCTION, ELECTRIC

[GASES

Ions in Gases sucked from Flames. Velocities varying Irom -04 to -23 McClelland

Ions in Flames containing Salts. Negative ions …. 12-9 cm./sec. -J-ions for salts of Li, Na,

K, Rb, Cs … 62

„ ... 200

... 80

Ions liberated by Chemical Action. Velocities of the order of 0-0005 cm./sec. Ions from Point Discharge.

Gold

H. A. Wilson

Marx

Moreau

Bloch

Hydrogen . Carbonic acid Air . . . Oxygen .

5-4 0-83 1-32 1-30

7-43 0-925

i-8o

1-85

6-41 0-88 1-55

1-57

Chattock Chattock Chattock Chattock

It will be seen from this table that the greater mobility of the negative ions is very much more marked in the case of the lighter and simpler gases than in that of the heavier and more complicated ones ; with the vapours of organic substances there seems but little difference between the mobilities of the positive and negative ions, indeed in one or two cases the positive one seems slightly but very slightly the more mobile of the two. In the case of the simple gases the difference is much greater when the gases are dry than when they are moist. It has been shown by direct experiment that the velocities are directly proportional to the electric force.

Variation of Velocities with Pressure. — Until the pressure gets low the velocities of the ions, negative as well as positive, vary inversely as the pressure. Langevin (loc. cit.) was the first to show that at very low pressures the velocity of the negative ions increases more rapidly as the pressure is diminished than this law indicates. If the nature of the ion did not change with the pressure, the kinetic theory of gases indicates that the velocity would vary inversely as the pressure, so that Langevin's results indicate a change in the nature of the negative ion when the pressure is diminished below a certain value. Langevin's results are given in the following table, where p represents the pressure measured in centimetres of mercury, V-f- and V— the

velocities of the positive and negative ions in air under unit electrostatic force, i.e. 300 volts per centimetre : —

Negative Ions.

Positive Ions. .

P-

V-.

pv-ne.

P-

v + .

PV + I76.

7-5

20-0

4i-5

76-0

142-0

6560 2204

994

5io

270

647

580

530 510

505

7-5

2O-0

4i-5

76-0

142-0

4430 1634

7&2 .

480 225

437 430 427 420

425

The increase in the case of pV— indicates that the structure of the negative ion gets simpler as the pressure is reduced. Wallisch in some experiments made at the Cavendish Laboratory found that the diminution in the value of pV — at low pressures is much more marked in some gases than in others, and in some gases he failed to detect it ; but it must be remembered that it is difficult to get measurements at pressures of only a few millimetres, as the amount of ionization is so exceedingly small at such pressures that the quantities to be observed are hardly large enough to admit of accurate measurements by the methods available at higher pressures.

Effect of Temperature on the Velocity of the Ions. — Phillips (Proc. Roy. Soc, 1906, 78, p. 167) investigated, using Langevin's method, the velocities of the /del> and — ions through air at atmospheric pressure at temperatures ranging from that of boiling liquid air to 41 1 ° C. ; Ri and R 2 are the velocities of the and – ions respectively when the force is a volt per centimetre.

Ri.

R 2 .

Temperature Absolute.

2-00

2-495

4ij :

i-95

2-40

399° ‘

1-85

230

383°

i-8i

2-21

373°

1-67

2-125

348°

i-6o

2-0O

333°

1-39

1-785

285°

0-945

1-23

209 °

0-235

0-235

94°

We see that except in the case of the lowest temperature, that of liquid air, where there is a great drop in the velocity, the velocities of the

ions are proportional to the absolute temperature. On the hypothesis of an ion of constant size we should, from the kinetic theory of gases, expect the velocity to be proportional to the square root of the absolute temperature, if the charge on the ion did not affect the number of collisions between the ion and the molecules of

the gas through which it is moving. If the collisions were brought about by the electrical attraction between the ions and the molecules, the velocity would be proportional to the absolute temperature. H. A. Wilson (Phil. Trans. 192, p. 499), in his experiments on the conduction of flames and hot gases into which salts had been put, found that the velocity of the positive ions in flames at a temperature of 2000 ° C. containing the salts of the alkali metals was 62 cm./sec. under an electric force of one volt per centimetre, while the velocity of the positive ions in a stream of hot air at 1000° C. containing the same sal'ts was only 7 cm./sec. under the same force. The great effect of temperature is also shown in some experiments of McClelland (Phil. Mag. [5], 46, p. 29) on the velocities of the ions in gases drawn from Bunsen flames and arcs; he found that these depended upon the distance the gas had travelled from the flame. Thus, the velocity of the ions at a distance of 5-5 cm. from the Bunsen flame when the temperature was 230 ° C. was -23 cm./sec. for a volt per centimetre; at a distance of 10 cm. from the flame when the temperature was 160° C. the velocity was -21 cm./sec; while at a distance of 14-5 cm. from the flame when the temperature was 105° C. the velocity was only -04 cm./sec. If the temperature of the gas at this distance from the flame was raised by external means, the velocity of the ions increased.

We can derive some information as to the constitution of the ions by calculating the velocity with which a molecule of the gas would move in the electric field if it carried the same charge as the ion. From the theory of the diffusion of gases, as developed by Maxwell, we know that if the particles of a gas A are surrounded by a gas B, then, if the partial pressure of A is small, the velocity « with which its particles will move when acted upon by a force Xe is given by the equation

Xe n

where D represents the coefficient of inter-diffusion of A into B, and Ni the number of particles of A per cubic centimetre when the pressure due to A is pi. Let us calculate by this equation the velocity with which a molecule of hydrogen would move through hydrogen if it carried the charge carried by an ion, which we shall prove shortly to be equal to the charge carried by an atom ot hydrogen in the electrolysis of solutions. Since £i/Ni is independent of the pressure, it

is equal to II/N, where II is the atmospheric pressure and N the number of molecules in a cubic centimetre of gas at atmo- spheric pressure. Now Ne = i-22Xlo 10 , if e is measured in electro- static units; II = io° and D in this case is the coefficient of diffusion of hydrogen into itself, and is equal to 1 -7. Substituting these values we find

« = i-97Xio 4 X. If the potential gradient is 1 volt per centimetre, X = 1/300. Sub- stituting this value for X, we find u — 66 cm./sec, for the velocity of a hydrogen molecule. We have seen that the velocity of the ion in hydrogen is only about 5 cm./sec, so that the ion moves more slowly than it, would if it were a single molecule. One way of explaining this is to suppose that the ion is bigger than the molecule, and is in fact an aggregation of molecules, the charged ion acting as a nucleus around which molecules collect like dust round a charged body. This view is supported by the effect produced by moisture in diminishing the velocity of the negative ion, for, as C. T. R. Wilson (Phil. Trans. 193, p. 289) has shown, moisture tends to collect round the ions, and condenses more easily on the negative than on the positive ion. In connexion with the velocities of ions in the gases drawn from flames, we find other instances which suggest that condensation takes place round the ions. An increase in the size of the system is not, however, the only way by which the velocity might fall below that calculated for the hydrogen molecule, for we must *remember* that the hydrogen molecule, whose coefficient of diffusion is 1-7, is not charged, while the ion is. The forces exerted by the ion on the .other molecules of hydrogen are not the same as those which would be exerted by a molecule of hydrogen, and as the coefficient of diffusion depends on the forces between the molecules, the coefficient of diffusion of a charged molecule into hydrogen might be very different from that of an uncharged one.

Wellisch (/oe. cit.) has shown that the effect of the charge on the ion is sufficient in many cases to explain the small velocity of the ions, even if there were no aggregation.

Mixture of Gases. — The ionization of a mixture of gases raises some very interesting questions. If we ionize a mixture of two very different gases, say hydrogen and carbonic acid, and investigate the nature of the ions by measuring their velocities, the question arises, shall we find two kinds of positive and two kinds of negative ions moving with different velocities, as we should do if some of the positive ions were positively charged hydrogen molecules, while others were positively charged molecules of carbonic acid ; or shall we find only one velocity for the positive ions and one for the nega- tive? Many experiments

have been made on the velocity of ions in mixtures of two gases, but as yet no evidence has been found of the existence of two different kinds of either positive or negative ions in such mixtures, although some of the methods for determining the velocities of the ions, especially Langevin's, ought to give evidence of this effect, if it existed. The experiments seem to show

that the positive (and the same is true for the negative) ions in a mixture of gases are all of the same kind. This conclusion is one of considerable importance, as it would not be true if the ions consisted of single molecules of the gas from which they are produced.

Recombination. — Several methods enable us to deduce the co-efficient of recombination of the ions when we know their, velocities. Perhaps the simplest of these consists in determining the relation between the current passing between two parallel plates immersed in ionized gas and the potential difference between the plates. For let q be the amount of ionization, i.e. the number of ions produced per second per unit volume of the gas, A the area of one of the plates, and d the distance between them ; then if the ionization is constant through the volume, the number of ions of one sign produced per second in the gas is qAd. Now if i is the current per unit area of the plate, e the charge on an ion, iA/e ions of each sign are driven out of the gas by the current per second. In addition to this source of loss of ions there is the loss due to the recombination ; if n is the number of positive or negative ions per unit volume, then the number which recombine per second is are 2 per cubic centimetre, and if n is constant through the volume of the gas, as will approxi- mately be the case if the current through the gas is only a small fraction of the saturation current, the number of ions which disappear per second through recombination is an 2 .Ad. Hence, since when the gas is in a steady state the number of ions produced must be equal to the number which disappear, we have

qAd = iA/e + an 2 . Ad, q = iled--a.n 2 .

If «i and «2 are the velocities with which the positive and negative ions move, rewie'and nu 2 e are respectively the quantities of positive electricity passing in one direction through unit area of the gas per

second, and of negative in the opposite direction, hence

i = nuie--nme.

If X is the electric force acting on the gas, h and k 2 the velocities ofj' the positive and negative ions under unit force, «i = &iX, « 2 = k 2 X ; hence

and we have

n = il(ki + ki)Xe,

5 +

edˆ(ki + k 2) 2 e 2 X 2

But qed is the saturation current per unit area of the plate; calling this I, we have

I-i

dai 2 * efa + kiYX*

i 2 .da

X2 e{-i){h + h 2) 2 ' Hence if we determine corresponding values of X and i we can deduce the value of aje if we also know {ki--k 2). The value of I is easily determined, as it is the current when X is very large. The preceding result only applies when i is small compared with I, as it is only in this case that the values of n and X are uniform throughout the volume of the gas. Another method which answers the same purpose is due to Langevin {Ann. Chim. Phys., 1903, 28, p. 289) ; it is as follows. Let A and B be two parallel planes immersed in a gas, and let a slab of the gas bounded by the planes a, b parallel to A and B be ionized by an instantaneous flash of Rontgen rays. If A and B are at different electric potentials, then all the positive ions produced by the rays will be attracted by the negative plate and all the negative ions by the positive, if the electric field were exceedingly large they would reach these plates before they had time to recombine, so that each plate would receive No ions if the flash of Rontgen rays produced No positive and No negative ions. With weaker fields the number of ions received by the plates will be less as some of them will recombine before they can reach the plates. We can find the number of ions which reach the plates in this case in the following way : — In consequence of the movement of the ions the slab of ionized gas will broaden out and will consist of three portions, one in which there are

nothing but positive ions, — this is on the side of the negative plate, — another on the side of the positive plate in which there are nothing but negative ions, and a portion between these in which there are both positive and negative ions; it is in this layer that recombination takes place, and here if n is the number of positive or negative ions at the time / after the flash of Rontgen rays,

re = «o/(l+a»oi). With the same notation as before, the breadth of either of the outer layers will in time dt increase by X{ki--kz)dt, and the number of ions in it by X(ki+k 2)ndt; these ions will reach the plate, the outer layers will receive fresh ions until the middle one disappears, which it will do after a time l/X(ki+k 2), where I is the thickness of the slab ab of ionized gas; hence N, the number of ions reaching either plate, is given by the equation

rllMh+h) noX(ki +k2) X(h +h) . c I ... n«al \

If Q is the charge received by the plate,

Q = Ne= |. log (I+ ^),'

where Qo = nde is the charge received by the plate when the electric force is large enough to prevent recombination, and e = o ^(Ri+Rj). We can from this result deduce the value of « and hence the value of a when Ri + R 2 is known.

Distribution of Electric Force when a Current is passing through an Ionized Gas. — Let the two plates be at right angles to the axis of x ; then we may suppose that between the plates the electric intensity X is everywhere parallel to the axis of x. The velocities of both the positive and negative ions are assumed to be proportional to X. Let kiX,k 2 X represent these velocities respectively ; let »i, re 2 be respectively the number of positive and negative ions per unit volume at a point fixed by the co-ordinate x ; let q be the number of positive or negative ions produced in unit time per unit volume at this point; and let the number of ions which recombine in unit volume in unit time be anin 2 ; then if e is the charge on the ion, the volume density of the electrification is (rai— n 2)e, hence

-^=4ir(» 1 -ra 2)e (1).

If I is the current through unit area of the gas and if we neglect any diffusion except that caused by the electric field, T*S1 n 1 ek 1 X+n 2 ehX = l . . . >. . (2).

From equations (1) and (2) we have

... (3),

me =

n 2 e-

ki + ki

1

/ ±,hdX\ \X + 4irdx) {

\X 4t dx) ‘

h + h\X 4tt dx) (4) ‘

and from these equations we can, if we know the distribution of electric intensity between the plates, calculate the number of positive and negative ions.

In a steady state the number of positive and negative ions in unit volume at a given place remains constant, hence neglecting the loss by diffusion, we have

jˆ(£iWiX) = q — an-jii — ˆ-(£ 2 n 2 X) =5 — o«iw 2

(5). (6).

If h and h are constant, we have from (1), (5) and (6) (PX 2 /i 1 \

-2E?—8x«(s-w«i«i)(£ + £J . . . .(7),

an equatii 1 which is very useful, becaus it enables us, if we know the distri ution of X 2 , to find whether at any point in the gas the ionize on is greater or less than the recombination of the ions. We see t it q-anin 2 , which is the excess of ionization over re- combinat n, is proportional to d’Xˆ/dx 1 . Thus when the ionization exceedsthe recombination, i.e. when q-anm 2 is positive, the curve for X 2 is convex to the axis of x, while when the recombination exceeds the ionization the curve for X 2 will be concave to the axis of x. Thus, for example, fig. 1 1 represents the curve for X 2 observed by

Fig. 11.

Graham {Wied. Ann. 64, p. 49) in a tube through which a steady current is passing. Interpreting it by equation (7), we infer that ionization was much in excess of recombination at A and B, slightly so

along C, while along D the recombination exceeded the ionization. Substituting in equation (7) the values of m, n 2 given in (3), (4), we get

This equation can be solved (see Thomson, Phil. Mag. xlvii. P- 253), when q is constant and h = h. From the solution it appears that if Xi be the value of x close to one of the plates, and X the value midway between them,

where j3»8r«*i/o.

Since e = 4Xio _w , = 2X10-°, and ki for air at atmospheric pressure = 450, /3 is about 2-3 for air at atmospheric pressure and it becomes much greater at lower pressures.

Thus X1/X0 is always greater than unity, and the value of the ratio increases from unity to infinity as /3 increases from zero to infinity. As /3 does not involve either q or I, the ratio of X x to X is independent of the strength of the current and of the intensity of the ionization. .

No general solution of equation (8) has been found when ki is not equal to fe, but we can get an approximation to the solution when g is constant. The equations (1), (2), (3), (4) are satisfied by the values —

1

i L

c(*i + fe).

These solutions cannot, however, hold right up to the surface of the plates, for across each unit of area, at a point P, kilKh + h)e positive ions pass in unit time, and these must all come from the region between P and the positive plate. If X is the distance of P from this plate, this region cannot furnish more than q\ positive ions, and only this number if there are no recombinations. Hence the solution cannot hold when gX is less than fal/(fa + fo)e, or where X is less than £J/(fei + fe)ge.

Similarly the solution cannot hold nearer to the negative plate than the distance & 2 I/(£i + fe)ge.

The force in these layers will be greater than that in the middle of the gas, and so the loss of ions by recombination will be smaller in comparison with the loss due to the removal of the ions by the current. If we assume that in these layers the loss of ion* by recombination can be neglected, we can by the method of the next article find an expression for the value of the electric force at any point in the layer. This, in conjunction with the value

X c = (- H , h \ h -. for the gas outside the layer, will give the value

of X at any point between the plates. It follows from this investigation that if Xi and X 2 are the values of X at the positive and negative plates respectively, and X the value of X outside the layer,

where e = a/4«:(*i + fe). Langevin found that for air at 1 pressure of 152 mm. c = o-oi, at 375 mm. « = o-o6, and at 760 mi 1. £ = 0-27. Thus at fairly low pressures i/e is large, and we have app oximately

Xl = Xo \tj **T**‘ X2-Xo W *Ve

Therefore Xi/X 2 = fei/fa >

or the force at the positive plate is to that at the negative plate as the yelocity of the positive ion is to that of the negative ion. Thus

the force at the negative plate is greater than that at the posi- tive. The falls of potential Vi, V 2 at the two layers when l/e is large can be shown to be given by the equations

Vj =

V 2 = ,hence

k\

> “fe)M!)

Vi/V 2 = ftrW, so that the potential falls at the electrodes are proportional to the squares of the velocities of the ions. The change in potential across the layers is proportional to the square of the current, while the potential change between the layers is proportional to the current, the total potential difference between the plates is the sum of these changes, hence the relation between V and i will be of the form

V = Ai”+Bj 2 . Mie {Ann. der. Phys., 1904, I3> P- 857) has by the method of successive approximations obtained solutions of equation (8) (i.) when the current is only a small fraction of the saturation current, (ii.) when the current is nearly saturated. The results of his investi- gations are represented in fig. 12, which represents the distribution of

CatioSe

Fig. 12.

electric force along the path of the current for various values of the current expressed as fractions of the saturation current. It will be seen that until the current amounts to about one-fifth of the maximum current, the type of solution is the one just indicated, i.e. the electric force is constant except in the neighbourhood of the elec- trodes wheji it increases rapidly.

Though we are unable to obtain a general solution of the equation (8), there are some very important special cases in which that equation can be solved without difficulty. We shall consider two of these, the first being that when the current is saturated. In this case there is no loss of ions by recombination, so that using the same notation as before we have

The solutions of which if q is constant are

n 1 k 1 X = qx,

n a fe a X = I/e – qx = q(l – x), if / is the distance between the plates, and x = o at the positive electrode. Since

dX/dx = 4?r(re 1 — n 2)e,

we get

1 dX* _— (1 ,1 > /

8rd 2 x~ iX ‘\F i + h\ ~ 2 fe’ or

X 2 *»/i ,l\ lx,„

8^=27 U;+fJ -2fe +C –

where C is a quantity to be determined by the condition that (l Xdx = V, where V is the given potential difference between the plates. When the force is a minimum dXjdx = o, hence at this point _ lh j_ _ lk

2 ki-{-ki ki-{-k%

Hence the ratio of the distances of this point from the positive and negative plates respectively is equal to the ratio of the velocities of the positive and negative ions.

The other case we shall consider is the very important one in which the velocity of the negative ion is exceedingly large compared with the positive; this is the case in flames where, as Gold (Proc. Roy. Soc. 97, p. 43) has shown, the velocity of the negative ion is many thousand times the velocity of the positive; it is also very probably the case in all gases when the pressure is low. We may get the solution of this case either by putting &i/fe = o in equation (8), or independently as follows: — Using the same notation as before, we have

i = n 1 hˆXe--n 2 k 2 Xe,

2ˆ(K 2 feX) =q— anifit,

g-4.

n.)e.

In this case practically all the current is carried by the negative ions so that i = « 2 fe 2 Xe, and therefore g = o«i» 2 .

Thus

n 2 = i/k 2 Xe, nˆqkˆXe/ai.

Thus

dX 47re 2 feffX 4_7rt dx~ oi fo>X’

dX 2 _Wfe 2 X 2 _ dx ai

The solution of this equation is

8«

X2 =W+c,

iWktfx j°4

Here x is measured from the positive electrode ; it is more convenient in this case, however, to measure it from the negative electrode. If x be the distance from the negative electrode at which the electric force

is X, we have from equation (7)

To find the value of C 1 we see by equation (7) that

dxni + k 2 f < *x 2 kiks

hence

VOX* hk 2 i”] 3, i = f x i(q- a nn,)dx.

The right hand side of this equation is the excess of ionization over recombination in the region extending from the cathode to X\ it must therefore, when things are in a steady state, equal the excess of the number of negative ions which leave this region over those which enter it. The number which leave is ife and the number which enter is t’o/e, if »o is the current of negative ions coming from unit area

of the cathode, as hot metal cathodes emit large quantities of negative electricity in may in some cases be considerable, thus the right hand side of equation is (i—i Q)/e. When x\ is large dX 2 /dx = o; hence we have from equation

ai(i — id) k--k

o = -

gkikze and since ki is small compared with fe, we have

at 2 I h i — L-S*”* k :

X 2

I + :

f 2 t-

/a.i\

‘qkieˆyˆki i

From the values which have been found for fe and a, we know that

Sweki/a is a large quantity, hence the second term inside the bracket will be very small when eqx is equal to or greater than i; thus this term will be very small outside a layer of gas next the cathode of such thickness that the number of ions produced on it would be sufficient, if they were all utilized for the purpose, to carry the current; in the case of flames this layer is exceedingly thin unless the current is very large. The value of the electric force in the

uniform part of the field is equal to r-z\/ “. while when i “= ,o

the force at the cathode itself bears to the uniform force the ratio of (ˆi +W* to hi. As ki is many thousand times fe the force increases with great rapidity as we approach the cathode; this is a very characteristic feature of the passage of electricity through flames and hot gases. Thus in an experiment made by H. A. Wilson with a flame 18 cm. long, the drop of potential within I centimetre of the cathode was about five times the drop in the other 17 cm. of the tube. The relation between the current and the potential difference when the velocity of the negative ion is much greater than the positive is

very easily obtained. Since the force is uniform and equal to T~ e \J :;> until we get close to the cathode the fall of potential in this part of the discharge will be very approximately equal to T~e\f ~a’ where / is the distance between the electrodes. Close to the cathode, the electric force when i a is not nearly equal to i is approximately given by the equation

X

;(r-

e{kiki)i and the fall of potential at the cathode is equal approximately to Xdx, that is to

Jo

<\i) A

e{kiki)i \qj 4ire 2 &22′ The potential difference between the plates is the sum of the fall of potential in the uniform part of the discharge plus the fall at the cathode, hence

V = (2) *e£ r + 4ˆ2 VTSfe)) ‘ The fall of potential at the cathode is proportional to the square of the current, while the fall in the rest of the circuit is directly pro- portional to the current. In the case of flames or hot gases, the fall of potential at the cathode is much greater

than that in the rest of the circuit, so that in such cases the current through the gas varies nearly as the square root of the potential difference. The equation we have just obtained is of the form

V = Ai + Bi 2 , and H. A. Wilson has shown that a relation of this form represents the results of his experiments on the conduction of electricity through flames.

The expression for the fall of potential at the cathode is inversely proportional to g 3 / 2 , q being the number of ions produced per cubic centimetre per second close to the cathode; thus any increase in the ionization at the cathode will diminish the potential fall at the cathode, and as practically the whole potential difference between the electrodes occurs at the cathode, a diminution in the potential fall there will be much more important than a diminution in the electric force in the uniform part of the discharge, when the force is comparatively insignificant. This consideration explains a very striking phenomenon discovered many years ago by Hittorf, who found that if he put a wire carrying a bead of a volatile salt into the flame, it produced little effect upon the current, unless it were placed close to the cathode where it gave rise to an enormous increase in the current, sometimes increasing the current more than a hundred- fold. The introduction of the salt increases very largely the number of ions produced, so that q is much greater for a salted flame than for a plain one. Thus Hittorf's result coincides with the conclusions we have drawn from the theory of this class of conduction.

The fall of potential at the cathode is proportional to i— %, where in is the stream of negative electricity which comes from the cathode itself, thus as to increases the fall of potential at the cathode diminishes and the current sent by a given potential difference through the gas increases. Now all metals give out negative particles when heated, at a rate which increases very rapidly with the tempera- ture, but at the same temperature some metals give out more than others. If the cathode is made of a metal which emits large quantities of negative particles, C* — to) will for a given value of i be smaller

than if the metal only emitted a small number of particles ; thus the cathode fall will be smaller for the metal with the greater emissitivity, and the relation between the potential difference and the current will be different in the two cases. These considerations are confirmed by experience, for it has been found that the current between electrodes immersed in a flame depends to a great extent upon the metal of which the electrodes are made. Thus Pettinelli (Ace. dei Lincei [5], v. p. 118) found that, ceteris paribus, the current between two carbon

electrodes was about 500 times that between two iron, ones. If one electrode was carbon and the other iron, the current when the carbon was cathode and the iron anode was more than 100 times the current when the electrodes were reversed. The emission of negative particles by some metallic oxides, notably those of calcium and barium, has been shown by Wehnelt (Ann. der Phys. n, p. 425) to be far greater than that of any known metal, and the increase of current produced by coating the cathodes with these oxides is exceedingly large; in some cases investigated by Tufts and Stark (Physik. Zeits., 1908, 5, p. 248) the current was increased many thousand times by coating the cathode with lime. No appreciable effect is produced by putting lime on the anode.

Conduction when all the Ions are of one Sign. — There are many important cases in which the ions producing the current come from one electrode or from a thin layer of gas close to the electrode, no ionization occurring in the body of the gas or at the other electrode. Among such cases may be mentioned those where one of the electrodes is raised to incandescence while the other is cold, or when the negative electrode is exposed to ultra-violet light. In such cases if the electrode at which the ionization occurs is the positive electrode, all the ions will be positively charged, while if it is the negative electrode the ions will all be charged negatively. The theory of this case is exceedingly simple. Suppose the electrodes are parallel planes at right angles to the axis of x ; let X be the electric force at a distance x from the electrode where the ionization occurs, n the number of ions (all of which are of one sign) at this place per cubic centimetre, k the velocity of the ion under unit electric force, e the charge on an ion, and i the current per unit a;rea of the elec- trode. Then we have dX/dx = 4irne, and if u is the velocity of the ion

TV” JV

neu = i. But u = kX, hence we have 7~j~—i, and since the right

hand side of this equation does not depend upon *, we get kX s /8t = ix + C, where C is a constant to be determined. If / is the distance between the plates, and V the potential difference between them,

v = £xdx = l\/^[(u + cyi*-ai*’]-

We shall show that when the current is far below the saturation value, C is very small compared with il, so that the preceding equation becomes

V 2 = 8x«/£ (1).

To show that for small currents C is small compared with il, consider the case when the ionization is confined to a thin layer, thickness d close to the electrode, in that layer let «o be the value of n, then we have q = an 2 +i/ed. If X be the value of X when x — o, kXonoe = i, and J

r – kx ° 2 ˆ r ” * — a ** 1 \

u 8?r M 2 £e.8× 8irke r q+iied ‘ ‘ • { – 2> ‘

Since al&wke is, as we have seen, less than unity, C will be small compared with il, if i/(eq+i/d) is small compared with /. If I is the saturation current, q — I /ed, so that the former expression = id/(l +i),_ if * is small compared with I , this expression is small compared with d, and therefore a fortiori compared with /, so that we are justified in this case in using equation (1).

From equation (2) we see that the current increases as the square of the potential difference. Here an increase in the potential difference produces a much greater percentage increase than in conduction through metals, where the current is proportional to the potential difference. When the ionization is distributed through the gas, we have seen that the current is approximately proportional to the square root of the potential, and so increases more slowly with the potential difference than currents through metals. From equation (1) the current is inversely proportional to the cube of the distance between the electrodes, so that it falls off with great rapidity as this distance is increased. We may note that for a given potential difference the expression for the current does not involve q, the rate of production of the ions at the electrode, in other words, if we vary the ionization the current will not begin to be affected by the strength of the ionization until this falls so low that the current is a considerable fraction of the saturation current. For the same potential difference the current is proportional to k, the velocity under unit electric force of the ion which carries the current. As the velocity of the negative ion is greater than that of the positive, the current when the ionization is confined to the neighbourhood of one of the electrodes will be greater when that electrode is made cathode than when it is anode. Thus the current will appear to pass more easily in one direction than in the opposite.

Since the ions which carry the current have to travel all the way from one electrode to the other, any obstacle which is impervious to these ions will, if placed between the electrodes, stop the current

to the electrode where there is no ionization. A plate of metal will be as effectual as one made of a non-conductor, and thus we get the remarkable result that by interposing a plate of an excellent conductor like copper or silver between the electrode, we can entirely stop the current. This experiment can easily be tried by using a hot plate as the electrode at which the ionization takes place : then if the other electrode is cold the current which passes when the hot plate is cathode can be entirely stopped by interposing a cold metal plate between the electrodes.

Methods of counting the Number of Ions.— The detection of the ions and the estimation of their number in a given volume is much facilitated by the property they possess of promoting the condensation of water-drops in dust-free air supersaturated with water vapour. If such air contains no ions, then it requires about an eightfold supersaturation before any water-drops are formed; if, however, ions are present C. T. R. Wilson {Phil. Trans. 189, p. 265) has shown that a sixfold supersaturation is sufficient to cause the water vapour to condense round the ions and to fall down as raindrops. The absence of the drops when no ions are present is due to the curvature of the drop combined with the surface tension causing, as Lord Kelvin showed, the evaporation from a small drop to be exceeding rapid, so that even if a drop of water were formed the evaporation would be so great in its early stages that it would rapidly evaporate and disappear. It has been shown, however (J. J. Thomson, Application of Dynamics to Physics and Chemistry, p. 164; Conduction of Electricity through Gases, 2nd ed. p. 179), that if a drop of water is charged with electricity the effect of the charge is to diminish the evapora- tion; if the drop is below a certain size the effect the charge has in promoting condensation more than counterbalances the effect of the surface tension in promoting evaporation. Thus the electric charge protects the drop in the most critical period of its growth. The effect is easily shown experimentally by taking a bulb con- nected with a piston arranged so as to move with great rapidity. When the piston moves so as to increase the volume of the air contained in the bulb the air is cooled by expansion, and if it was saturated with water vapour before it is supersaturated after the expansion. By altering the throw of the piston the amount of supersaturation can be adjusted within very wide limits. Let it be adjusted so that the expansion produces about a sixfold

supersaturation; then if the gas is not exposed to any ionizing agents very few drops (and these probably due to the small amount of ionization which we have seen is always present in gases) are formed. If, however, the bulb is exposed to strong Rontgen rays expansion produces a dense cloud which gradually falls down and disappears. If the gas in the bulb at the time of its exposure to the Rontgen rays is subject to a strong electric field hardly any cloud is formed when the gas is suddenly expanded. The electric field removes the charged ions from the gas as soon as they are formed so that the number of ions present is greatly reduced. This experiment furnishes a very direct proof that the drops of water which form the cloud are only formed round the ions.

This method gives us an exceedingly delicate test for the presence of ions, for there is no difficulty in detecting ten or so raindrops per cubic centimetre; we are, thus able to detect the presence of this number of ions. This result illustrates the enor- mous difference between the delicacy of the methods of detecting ions and those for detecting uncharged molecules; we have seen that we can easily detect ten ions per cubic centimetre, but there is no known method, spectroscopic or chemical, which would ennble us to detect a billion (io 12) times this number of uncharged molecules. The formation of the water-drops round the charged ions gives us a means of counting the number of ions present in a cubic centimetre of gas; we cool the gas by sudden expansion until the supersaturation produced by the cooling is sufficient to cause a cloud to be formed round the ions, and the problem of finding the number of ions per cubic centimetre of gas is thus reduced to that of finding the number of drops per cubic centi- metre in the cloud. Unless the drops are very few and far between we cannot do this by direct counting; we can, however, arrive at the result in the following way. From the amount of expan- sion of the gas we can calculate the lowering produced in its

temperature and hence the total quantity of water precipitated. The water is precipitated as drops, and if all the drops are the same size the number per cubic centimetre will be equal to the volume of water deposited per cubic centimetre, divided by the volume of one of the drops. Hence we can calculate the number of drops if we know their size, and this can be determined by measuring the velocity with which they fall under gravity through the air.

The theory of the fall of a heavy drop of water through a viscous fluid shows that v = $ga 2 /ji., where a is the radius of the drop, g the acceleration due to gravity, and it the coefficient of viscosity of the gas through which the drop falls. Hence if we know v we can deduce

the value of a and hence the volume of each drop and the number of drops.

Charge on Ion.— By this method we can determine the number of ions per unit volume of an ionized gas. Knowing this number we can proceed to determine the charge on an ion. To do this let us apply an electric force so as to send a current of electricity through the gas, taking care that the current is only a small fraction of the saturating current. Then if u is the sum of the velocities of the positive and negative ions produced in the electric field applied to the gas, the current through unit area of the gas is neu, where n is the number of positive or negative ions per cubic centimetre, and e the charge on an ion. We can easily measure the current through the gas and thus determine neu ; we can determine n by the method just described, and u, the velocity of the ions under the given electric field, is known from the experiments of Zeleny and others. Thus since the product neu, and two of the factors n, u are known, we can determine the other factor e, the charge on the ion. This method was used by J. J. Thomson, and details of the method will be found in Phil. Mag. [5], 46, p. 528; [5], 48, p. 547; [6], 5, p. 346). The result of these measurements shows that the charge on the ion is the same whether the ionization is by Rontgen rays or by the, influence of ultra-violet light on a metal plate. It is the same whether the gas ionized is hydrogen, air or carbonic acid, and thus is presumably independent of the nature of the gas. The value of e formed by this method was 3-4 Xio -10 electrostatic units.

H. A. Wilson {Phil. Mag. [6], 5, p. 429) used another method. Drops of water, as we have seen, condense more easily on negative than on positive ions. It is possible, therefore, to adjust the ex- pansion so that a cloud is formed on the negative but not on the positive ions. Wilson arranged the experiments so that such a cloud was formed between two horizontal plates which could be maintained at different potentials. The charged drops between the plates were acted upon by a uniform vertical force which affected their rate of fall. Let X be the vertical electric force, e the charge on the drop, Vi the rate of fall of the drop when this force acts, and v the rate of fall due to gravity alone. Then since the rate of fall is proportionate to the force on the drop, if a is the radius of the drop, and p its density, then

Xe + jxpga 3 Vi i-rrpga 3 ~ v’

or But

so that

Xe = f xpgo 3 (i'i —v)/v. v y V gc v

Thus if X, v, i > i are known e can be determined. Wilson by this method found that e was 3-1 Xio" 10 electrostatic units. A few of the ions carried charges 2e or 3*.

Townsend has used the following method to compare the charge carried by a gaseous ion with that carried by an atom of hydrogen in the electrolysis of solution. We have «/D = Ne/II, where D is the coefficient of diffusion of the ions through the gas, « the velocity of the ion in the same gas when acted on by unit electric force, N the number of molecules in a cubic centimetre of the gas when the pressure is II dynes per square centimetre, and e the charge in electrostatic units. This relation is obtained on the hypothesis that N ions in a cubic centimetre produce the same pressure as N uncharged molecules.

We know the value of D from Townsend's experiments and the values of « from those of Zeleny. We get the following values for NeXlo" 10 : —

Gas.

Moist Gas.

Dry Gas.

Positive Ions.

Negative Ions.

Positive Ions.

Negative Ions.

Air

Oxygen .... Carbonic acid . • Hydrogen ....

Mean . . .

1-28 1-34

I-OI

1-24

1-29

1-27

•87

118

1-46

1-63

•99

1-63

I-3I

1-36

•93

1-25

1-22

M5

r-43

I-2I

GASES]

CONDUCTION, ELECTRIC

875

Since 1-22 cubic centimetres of hydrogen at the temperature 15 C. and pressure 760 mm. of mercury are liberated by the passage through acidulated water of one electromagnetic unit of electricity or 3X10 10 electrostatic units, and since in one cubic centimetre of the gas there are 2-46 N atoms of hydrogen, we have, if E is the charge in electrostatic units, on the atom of hydrogen in the electro- lysis of solutions

2-46NE = 3Xio”, or

NE = I-22XI0 10 .

The mean of the values of Ne in the preceding table is I-24XI0 M . Hence we may conclude that the charge of electricity carried by a gaseous ion is equal to the charge carried by the hydrogen atom in the electrolysis of solutions. The values of Ne for the different gases differ more than we should have expected from the probable accuracy of the determination of D and the velocity of the ions : Townsend (Proc. Roy. Soc. 80, p. 207) has shown that when the ionization is produced by Rbntgen rays some of the positive ions carry a double charge and that this accounts for the values of Ne being greater for the positive than for the negative ions. Since we know the value of e, viz. 3-5 Xio -10 , and, also Ne, = 1-24 Xio 10 , we find N the number of molecules in a cubic centimetre of gas at standard temperature and pressure to be equal to 3-5 Xio 19 . This method of obtaining N is the only one which does not involve any assumption as to the shape of the molecules and the forces acting between them.

Another method of determining the charge carried by an ion has been employed by Rutherford (Proc. Roy. Soc. 81, pp. 141, 162), in which the positively electrified particles emitted by radium are made use of. The method consists of: (1) Counting the number of o particles emitted by a given quantity of radium in a known time. (2) Measuring the electric charge emitted by this quantity in the same time. To count the number of the a particles the radium was so arranged that it shot into an ionization chamber a small number of a particles per minute ; the interval between the emission of individual particles v/as several seconds. When an a particle passed into the vessel it ionized the gas inside and so greatly increased its conductivity; thus, if the gas were kept exposed to an electric field, the current through the gas would suddenly increase when an a particle passed into the vessel. Although each a particle produces about thirty thousand ions, this is hardly large enough to produce the conductivity appreciable without the use of very delicate apparatus; to increase the conductivity Rutherford took advantage of the fact that ions, especially negative ones, when exposed to a strong electric field, produce other ions by collision against the molecules of the gas through which they are moving. By suitably choosing the electric field and the pressure in the ionization chamber, the 30,000 ions produced by each a particle can be multiplied to such an extent that an appreciable current passes through the ionization chamber on the arrival of each a particle. An electrometer placed in series with this vessel will show by its deflection when an o particle enters the chamber, and by counting the number of deflec- tions per minute we can determine the number of o particles given out by the radium in that time. Another method of

counting this number is to let the particles fall on a phosphorescent screen, and count the number of scintillations on the screen in a certain time. Rutherford has shown that these two methods give concordant results.

The charge of positive electricity given out by the radium was measured by catching the a particles in a Faraday cylinder placed in a very highly exhausted vessel, and measuring the charge per minute received by this cylinder. In this way Rutherford showed that the charge on the a particle was aˆXlo" 10 electrostatic units. Now e/m for the a particle = 5 Xio 3 , and there is evidence that the a particle is a charged atom of helium ; since the atomic weight of helium is 4 and elm for hydrogen is IO 4 , it follows that the charge on the helium atom is twice that on the hydrogen, so that the charge on the hydrogen atom is 47 Xio -10 electrostatic units.

Calculation of the Mass of the Ions at Low Pressures. — Although at ordinary pressures the ion seems to have a very complex structure and to be the aggregate of many molecules, yet we have evidence that at very low pressures the structure of the ion, and especially of the negative one, becomes very much simpler. This evidence is afforded by determination of the mass of the atom. We can measure the ratio of the mass of an ion to the charge on the ion by observing the deflections produced by mag- netic and electric forces on a moving ion. If an ion carrying a charge e is moving with a velocity v, at a point where the magnetic force is H, a mechanical force acts on the ion, whose direction is at right angles both to the direction of motion of the ion and to the magnetic force, and whose magnitude is eoH sin 0, where 6 is the angle between v and H. Suppose then that we have an ion moving through a gas whose pressure is so low that the free path of the ion is long compared with the distance through which it moves whilst we are experimenting upon it; in this case tiie

motion of the ion will be free, and will not be affected by the presence of the gas.

Since the force is always at right angles to the direction of motion of the ion, the speed of the ion will not be altered by the action of this force ; and if the ion is projected with a velocity v in a direction at right angles to the magnetic force, and if the magnetic force is constant in magnitude and direction, the ion will describe a curve in a plane at right angles to the magnetic force. If p is the radius of curvature of this curve, m the mass of the ion, mtf/p must equal the normal force acting on the ion, i.e. it must be equal to He», or P = mv/ He. Thus the radius of curvature is constant; the path is therefore a

circle, and if we can measure the radius of this circle we know the value of mv/He. In the case of the rapidly moving negative ions projected from the cathode in a highly exhausted tube, which are known as cathode rays, the path of the ions can be readily determined since they make many substances luminous when they impinge against them. Thus by putting a screen of such a substance in the path of the rays the shape of the path will be determined. Let us now suppose that the ion is acted upon by a vertical electric force X and is free from magnetic force, if it be projected with a horizontal velocity v, the vertical deflection y after a time t is 5 X eP/m, or if I is the horizontal distance travelled over by the ion in this time we have since l = vt,

= 1 Xe£_

y n m j,2-

Thus if we measure y and I we can deduce e/mfi. From the effect of the magnetic force we know e/mv. Combining these results we can find both e[m and v.

The method by which this determination is carried out in practice is illustrated in fig. 13. The cathode rays start from the electrode C in a highly exhausted tube, pass through two small holes in the plugs A and B, the holes being in the same horizontal line. Thus a pencil of rays emerging from B is horizontal and produces a bright spot at the far end of the tube. _ In the course of A* (j|

their journey to the end -“4 s ,\

of the tube they pass between the horizontal plates E and D, by connecting these plates with an electric battery a ver- tical electric field is produced between E and D and the phosphores- cent spot is deflected. By measuring this deflection we determine e/mv 2 . The tube is now placed in a uniform magnetic field, the lines of magnetic force being horizontal and at right angles to the plane of the paper. The magnetic force makes the rays describe a circle in the plane of the paper, and by measuring the vertical deflection of the phosphorescent patch at the end of the tube we can determine the radius of this circle, and hence the value of e/mv. From the two observations the value of e/m and v can be calculated.

Another method of finding e/m for the negative ion which is applicable in many cases to which the preceding one is not suitable, is as follows: Let us suppose that the ion starts from rest and moves in a

field where the electric and magnetic forces are both uniform, the electric force X being parallel to the axis of x, and the magnetic force Z parallel to the axis of z ; then if x, y, are the co-ordinates of the ion at the time t, the equations of motion of the ion are —

(L V fL'V

OT W =Xe-He W

fry

He-r,.

The solution of these equations, if x, y, dx/dt, dy/dt all vanish when (= 0, is

x= ipl I – C0S (ˆ m) }

?=Siˆ-sin(»[. _

These equations show that the path of the ion is a cycloid, the generating circle of which has a diameter equal to 2X»j/eH 2 , and rolls on the line x=o.

Suppose now that we have a number of ions starting from the plane x = o, and moving towards the plane x = a. The particles starting from x = o describe cycloids, and the greatest distance they can get from the plane is equal to the diameter of the generating circle of the cycloid, i.e. to 2Xm/eH 2 . (After reaching this distance they begin to approach the plane.) Hence if a is less than the diameter of the generating circle, all the particles starting from x = o will reach the plane x = a, if this is unlimited in extent; while if a is greater than the diameter of the generating circle none of the particles which start from x = o will reach the plane x = a. Thus, if x = is a plane illuminated by ultra-violet light, and consequently the seat of a supply of negative ions, and x — a a plane connected with an electrometer, then if a definite electric intensity is established between the planes, i.e. if X be fixed, so that the rate of emission of negative ions from the illuminated plate is given, and if a is less than 2XV»/eH 2 , all the ions which start from x—o will reach x = a. That

is, the rate at which this plane receives an electric charge will be the same whether there is a magnetic field between the plate or not, but if o is greater than 2Xm/eH 2 , then no particle which starts from the plate x = o will reach the plate x = a, and this plate will receive no charge. Thus the supply of electricity to the plate has been en- tirely stopped by the magnetic field. Thus, cm this theory, if the distance between the plates is less than a certain value, the magnetic force should produce no effect on the rate at which the electrometer plate receives a charge, while if the distance is greater than this value the magnetic force would completely stop the supply of electricity to the plate. The actual phenomena are not so abrupt as this theory indicates. We find that when the plates are very near together the magnetic force produces a very slight effect, and this an increase in the rate of charging of the plate. On increasing the distance we come to a stage where the magnetic force produces a great diminution in the rate of charging. It does not, however, stop it abruptly, there being a considerable range of- distance, in which the magnetic force diminishes but does not destroy the current. At still greater dis- tances the current to the plate under the magnetic force is quite inappreciable compared with that when there is no magnetic force. We should get this gradual instead of abrupt decay of the current if some of the particles, instead of all starting from rest, started with a finite velocity ; in that case the first particles stopped would be those which started from rest. This would be when a = 2Xw/eH 2 . Thus if we measure the value of a when the magnetic force first begins to affect the leak to the electrometer we determine 2Xm/cH ! , and as we can easily measure X and H, we can deduce the value of mje.

By these methods Thomson determined the value of e\m for the negative ions produced when ultra-violet light falls on a metal plate, as well as for the negative ions produced by an incandescent carbon filament in an atmosphere of hydrogen {Phil. Mag. [5], 48, p. 547) as well as for the cathode rays. It was found that the value of ejm for the negative ions was the same in all these cases, and that it was a Constant quantity independent of the nature of the gas from which the ions are produced and the means used to produce them. It was found, too, that this value was more than a thousand times the value of e/M, where e is the charge carried by an atom of hydrogen in the electrolysis of solutions, and M the mass of an atom of hydrogen. We have seen that this charge is the same as that carried by the negative ion in gases; thus since ejm is more than a thousand times e/M, it follows that M must be more than a thousand times m. Thus the mass of the negative ion is exceedingly small compared with the mass of the atom of hydrogen, the smallest mass recognized in chemistry. The

production of negative ions thus involves the splitting up of the atom, as from a collection of atoms something is detached whose mass is less than that of a single atom. It is important to notice in connexion with this subject that an entirely different line of argument, based on the Zeeman effect (see Mag- neto-Optics) , leads to the recognition of negatively electrified particles for which ejm is of the same order as that deduced from the consideration of purely electrical phenomena. These small negatively electrified particles are called corpuscles. The latest determinations of ejm for corpuscles available are the following: — Observer. elm.

Classen (Ber. deut. phys. Ges. 6, p. 700) . . . 1-7728X10′ Bucherer {Ann. der Phys., 28, p. 513) . . . 1763X10 7

It follows from electrical theory that when the corpuscles are moving with a velocity comparable with that of light their masses increase rapidly with their velocity. This effect has been detected by Kauffmann {Gott. Nach., Nov. 8, 1901), who used the corpuscles shot out from radium, some of which move with velocities only a few per cent less than that of light. Other experiments on this point have been made by Bucherer {Ann. der Phys. 28, p. 513).

Conductivity Produced by Ultra- Violet Light. — So much use has been made in recent times of ultra-violet light for producing ions that it is desirable to give some account of the electrical effects produced by light. The discovery by Hertz {Wied. Ann. 31, p. 983) in 1887, that the incidence of ultra-violet light on a spark gap facilitates the passage of a spark, led to a series of investigations by Hallwachs, Hoor, Righi and Stoletow, on the effect of ultra-violet light on electrified bodies. These researches have shown that a freshly cleaned metal surface, charged with negative electricity, rapidly loses its charge, however small, when exposed to ultra-violet light, and that if the surface is insulated and without charge initially, it acquires a positive charge under

the influence of the light. The magnitude of this positive charge may be very much increased by directing a blast of air on the plate. This, as Zeleny {Phil. Mag. [5], 45, p. 272) showed, has the effect of blowing from the neighbourhood of the plate negatively electrified gas, which has similar properties to the charged gas obtained by the separation of ions from a gas exposed to Rontgen rays or uranium radiation. If the metal plate is positively electrified, there is no loss of electrification caused by ultra-violet light. This has been questioned, but a very careful examination of the question by Elstei and Geitel {Wied. Ann. 57, p. 24) has shown that the apparent exceptions are

due to the accidental exposure to reflected ultra-violet light of metal surfaces in the neighbourhood of the plate negatively electrified by induction, so that the apparent loss of charge is due to negative electricity coming up to the plate, and not to positive electricity going away from it. The ultra-violet light may be obtained from an arc-lamp, the effectiveness of which is increased if one of the terminals is made of zinc or aluminium, the light from these substances being very rich in ultra-violet rays; it may also be got very conveniently by sparking with an induction coil between zinc or cadmium terminals. Sunlight is not rich in ultra-violet light, and does not produce anything like so great an effect as the arc light. Elster and Geitel, who have investigated with great success the effects of light on electrified bodies, have shown that the more electro-positive metals lose negative charges when exposed to ordinary light, and do not need the presence of the ultra-violet rays. Thus they found that amalgams of sodium or potassium enclosed in a glass vessel lose a negative charge when exposed to daylight, though the glass stops the small amount of ultra-violet light left in sunlight after its passage through the atmosphere. If sodium or potassium be employed, or, what is more convenient, the mercury-like liquid obtained by mixing sodium and potassium in the proportion of their combining weights, they found that negative electricity was discharged by an ordinary petroleum lamp. If the still more electro-positive metal rubidium is used, the discharge can be produced by the light from a glass rod just heated to redness; but there is no discharge till the glass is lumi- nous. Elster and Geitel arrange the metals in the following order for the facility with which negative electrification is discharged by light: rubidium, potassium, alloy of sodium and potassium, sodium, lithium, magnesium, thallium, zinc. With copper, platinum, lead, iron, cadmium, carbon and mercury the effects with ordinary light are too small to be appreciable. The order is the same as that in Volta's electro-chemical series. With ultra-violet light the different metals show much smaller differ- ences in their power of discharging negative electricity than they do with ordinary light. Elster and Geitel found that the ratio of the photo-electric effects of two metals exposed to approximately monochromatic light depended upon the wave-length of the light, different metals showing a maximum sensitiveness in different parts of the spectrum. This is shown by the following table for the alkaline metals. The numbers in the table are the rates of emission of negative electricity under similar circumstances. The rate of emission under the light from a petroleum lamp was taken as unity: —

Blue. Yellow. Orange. Red.

Rb . . . -i6 -64 -33 -039

Na . . . -37 -36 -14 -009

K … -57 ‘07 -04 -002

The table shows that the absorption of light by the metal has great influence on the photo-electric effect, for while potassium is more sensitive in blue light than sodium, the strong absorption of yellow light by sodium makes it more than five times more sensitive to this light than potassium. Stoletow, at an early period, called attention to the connexion between strong absorp- tion and photo-electric effects. He showed that water, which does not absorb to any great extent either the ultra-violet or visible rays, does not show any photo-electric effect, while strongly coloured solutions, and especially solutions of fluorescent substances such as methyl green or methyl violet, do so to a very considerable extent; indeed, a solution of methyl green is more sensitive than zinc. Hallwachs {Wied. Ann. 37, p. 666) proved

that in liquids showing photo-electric effects there is always strong absorption; we may, however, have absorption without these effects. Phosphorescent substances, such as calcium sulphide show this effect, as also do various specimens of fluor-spar. As phosphorescence and fluorescence are probably accompanied by a very intense absorption by the surface layers, the evidence is strong that to get the photo-electric effects we must have strong absorption of some kind of light, either visible or ultra-violet.

If a conductor A is placed near a conductor B exposed to ultra- violet light, and if B is made the negative electrode and a differ- ence of potential established between A and B, a current of electricity will flow between the conductors. The relation be- tween the magnitude of the current and the difference of potential

when A and B are parallel plates has been investi- gated byStoletow(7o«m«/ de physique, 1890, n, p. 469), von Schweidler (Wien., Ber., 1899, 1Q 8> P- 273) and Varley {Phil. Trans. A., 1904, 202, p. 439) . The results of some of Varley’s experiments are represented in the curves shown in fig. 14, in which the ordinates are the cur- rents and the abscissae the potentials. It will be seen that when the pressure is exceedingly low the cur- rent is independent of the potential difference and . ~ 50 I ‘•**” I I I | «’«n»>y 1 is equal to

the negative

charge carried off in unit time by the corpuscles .«o » 1*0 .so uoemitted from the surface Fig. 14. ~” CM * exposed to the light. At

higher pressures the cur- rent rises far above these values and increases rapidly with the potential difference. This is due to the corpuscles emitted by the illuminated surface acquiring under the electric field such high velocities that when they strike against the molecules of the gas through which they are passing they ionize them, producing fresh ions which can carry on additional current. The relation between the current and the potential difference in this case is in accord- ance with the results of the theory of ionization by collision. The corpuscles emitted from a body under the action of ultra- violet light start from the surface with a finite velocity. The velocity is not the same for all the corpuscles, nor indeed could we expect that it should be: for as Ladenburg has shown (Ann. der Phys., 1903, 12, p. 558) the seat of their emission is not confined to the surface layer of the illuminated metal but extends to a layer of finite, though small, thickness. Thus the particles which start deep down will have to force their way through a layer of metal before they reach the surface, and in doing so will have their velocities retarded by an amount depending on the thickness of this layer. The variation in the velocity of the corpuscles is shown in the following table, due to Lenard (Ann. der Phys., 1902, 8, p. 149).

/

/,

//

”

y

i\

•

6/

11

lyr

//

/

¥■

>

0-04C m

n

.

o*oi» m

■

¥/

o-oosa.i*

n

v*

O’ColHl

it

Carbon.

Platinum. Aluminium.

Corpuscles emitted with velocities between 12 and 8Xio 7 cmsec

with velocities between 8 and 4X10 7 cm sec

with velocities between 4 and

Corpuscles only emitted with the help of an external electric field …..

0-000

0-049 0-67

0-28

0-000

0-155 0-65

0-21

0-004

0-151

0-49

o-35

1-00)

1-00

I-OO

If the illuminated surface is completely surrounded by an envelope of the same metal insulated from and completely shielded from the light, the emission of the negative corpuscles from the illumi- nated surface would go on until the potential difference V between this surface and the envelope became so great that the corpuscles with the greatest velocity lost their energy before reaching the envelope, i.e. if m is the mass, e the charge on a corpuscle, v the greatest velocity of projection, until Ve = ˆmv i . The values found for V by different observers are not very consistent. Lenard found that V for aluminium was about 3 volts and for platinum 2. Millikan and Winchester (Phil. Mag., July 1907) found for aluminium V= -738. The apparatus used by them was so complex that the interpretation of their results is difficult.

An extremely interesting fact discovered by Lenard is that the velocity with which the corpuscles are emitted from the metal is independent of the intensity of the incident light. The quantity of corpuscles increases with the intensity, but the velocity of the individual corpuscles does hot. It is worthy of notice that in other cases when negative corpuscles are emitted from metals, as for example when the metals are exposed to cathode rays, Canal-strahlen, or Rontgen rays, the velocity of the emitted corpuscles is independent of the intensity of the primary radia- tion which excites them. The velocity is not, however, independ- ent of the nature of the primary rays. Thus when light is used to produce the emission of corpuscles the velocity, as Ladenburg has shown, depends on the wave length of the light, increasing as the wave length diminishes. The velocity of corpuscles

emitted under the action of cathode rays is greater than that of those ejected by light, while the incidence of Rontgen rays produces the emission of corpuscles moving much more rapidly than those in the cases already mentioned, and the harder the primary rays the greater is the velocity of the corpuscles.

The importance of the fact that the velocity and therefore the energy of the corpuscles emitted from the metal is independent of the intensity of the incident light can hardly be overestimated. It raises the most fundamental questions as to the nature of light and the constitution of the molecules. What is the source of the energy possessed by these corpuscles ? Is it the light, or in the stores of internal energy possessed by the molecule? Let us follow the consequences of supposing that the energy comes from the light. Then, since the energy is independent of the intensity of the light, the electric forces which liberate the corpuscles must also be independent of that intensity. But this cannot be the case if, as is usually assumed in the electromagnetic theory, the wave front consists of a uniform distribution of electric force without structure, for in this case the magnitude of the electric force is proportional to the square root of the intensity. On the emission theory of light a difficulty of this kind would not arise, for on that theory the energy in a luminiferous particle remains constant as the particle pursues its flight through space. Thus any process which a single particle is able to effect by virtue of its energy will be done just as well a thousand miles away from the source of light as at the source itself, though of course in a given space there will not be nearly so many particles to do this process far from the source as there are close in. Thus, if one of the particles when it struck against a piece of metal caused the ejection of a corpuscle with a given velocity, the velocity of emission would not depend on the intensity of the light. There does not seem any reason for believing that the electromagnetic theory is inconsistent with the idea that on this theory, as on the emission theory, the energy in the light wave may instead of being uniformly distributed through space be concentrated in bundles which occupy only a small fraction of the volume traversed by the light, and that as the wave travels out the bundles get farther apart, the energy in each remaining undiminished. Some such view of the structure of light seems to be required to account for the fact that when a plate of metal is struck by a wave of ultra- violet light, it would take years before the corpuscles emitted from the metal would equal in number the molecules on the surface of the metal plate, and yet on the ordinary theory of light each one of these is without interruption exposed to the action of

the light. The tact discovered by E. Ladenburg (Verh. d. deutsch. physik. Ges. 9, p. 504) that the velocity with which the corpuscles are emitted depends on the wave length of the light suggests that the energy in each bundle depends upon the wave length and increases as the wave length diminishes.

These considerations illustrate the evidence afforded by photo- electric effects on the nature of light; these effects may also have a deep significance with regard to the structure of matter. The fact that the energy of the individual corpuscles is independ- ent of the intensity of the light might be explained by the hypothesis that the energy of the corpuscles does not come from the light but from the energy stored up in the molecules of the metal exposed to the light. We may suppose that under the action of the light some of the molecules are thrown into an unstable state and explode, ejecting corpuscles ; the light in this case acts only as a trigger to liberate the energy in the atom, and it is this energy and not that of the light which goes into the corpuscles. In this way the velocity of the corpuscles would be independent of the intensity of the light. But it may be asked, is this view consistent with the result obtained by Ladenburg that the velocity of the corpuscles depends upon the nature of the light? If light of a definite wave length expelled corpuscles with a definite and uniform velocity, it would be very improbable that the emission of the corpuscles is due to an explosion of the atoms. The experimental facts as far as they are known at present do not allow us to say that the connexion between the velocity of the corpuscles and the wave length of the light is of this definite character, and a connexion such as a gradual increase of average velocity as the wave length of the light diminishes, would be quite consistent with the view that the corpuscles are ejected by the explosion of the atom. For in a complex thing like an atom there may be more than one system which becomes un- stable when exposed to light. Let us suppose that there are two such systems, A and B, of which B ejects the corpuscles with the greater velocity. If B is more sensitive to the short waves, and A to the long ones, then as the wave length of the light diminishes the proportion of the corpuscles which come from B will increase, and as these are the faster, the average velocity of the corpuscles emitted will also increase. And although the potential acquired by a perfectly insulated piece of metal when exposed to ultra-violet light would depend only on the velocity of the fastest corpuscles and not upon their number, in practice perfect insulation is unattainable, and the

potential actually acquired is determined by the condition that the gain of negative electricity by the metal through lack of insulation, is equal to the loss by the emission of negatively electrified corpuscles. The potential acquired will fall below that corresponding to perfect insulation by an amount depending on the number of the faster corpuscles emitted, and the potential will rise if the proportion of the rapidly moving corpuscles is increased, even though there is no increase in their velocity. It is interesting to compare other cases in which corpuscles are emitted with the case of ultra-violet light. When a metal or gas is bombarded by cathode rays it emits corpuscles and the velocity of these is found to be independ- ent of the velocity of the cathode rays which excite them; the velocity is greater than for corpuscles emitted under ultra-violet light. Again, when bodies are exposed to Rontgen rays they emit corpuscles moving with a much greater velocity than those excited by cathode rays, but again the velocity does not depend upon the intensity of the rays although it does to some extent on their hardness. In the case of cathode and Rontgen rays, the velocity with which the corpuscles are emitted seems, as far as we know at present, to vary slightly, but only slightly, with the nature of the substance on which the rays fall. May not this indicate that the first effect of the primary rays is to detach a neutral doublet, consisting of a positive and negative charge, this doublet being the same from whatever system it is detached ? And that the doublet is unstable and explodes, expelling the negative charge with a high velocity, and the positive one, having a much larger charge, with a much smaller velocity, the momentum of the negative charge being equal to that of the positive.

Up to now we have been considering the effects produced when light is incident on metals. Lenard found (and the result has been confirmed by the experiments of J. J. Thomson and Lyman) that certain kinds of ultra-violet light ionize a gas when they pass through. The type of ultra-violet light which produces this effect is so easily absorbed that it is stopped by a layer a few millimetres thick of air at atmos- pheric pressure.

Ionization by Collision. — When the ionization of the gas is produced by external agents such as Rontgen rays or ultraˆ violet light, the electric field produces a current by setting the positive ions moving in one direction, and the negative ones in the opposite; it makes use of ions already made and does not itself give rise to ionization. In many cases, however, such as in electric sparks, there are no external agents to produce ionization and the electric field has to produce the ions as well as set them in motion. When the ionization is produced by external means the smallest electric field is able to produce a current

through the gas; when, however, these external means are absent no current is produced unless the strength of the electric field exceeds a certain critical value, which depends not merely upon the nature of the gas but also upon the pressure and the dimensions of the vessel in which it is contained. The variation of the electric field required to produce discharge can be completely explained if we suppose that the ionization of the gas is produced by the impact with its molecules of corpuscles, and in certain cases of positive ions, which under the influence of the electric field have acquired considerable kinetic energy. We have direct evidence that rapidly moving corpuscles are able to ionize molecules against which they strike, for the cathode rays consist of such corpuscles, and these when they pass through a gas produce large amounts of ionization. Suppose then that we have in a gas exposed to an electric field a few corpuscles. These will be set in motion by the field and will acquire an amount of energy in proportion to the product of the electric force, their charge, and the distance travelled in the direction of the electric field between two collisions with the molecules of the gas. If this energy is sufficient to give them the ionizing property possessed by cathode rays, then when a corpuscle strikes against a molecule it will detach another corpuscle; this under the action of the electric field will acquire enough energy to produce corpuscles on its own account, and so as the corpuscles move through the gas their number will increase in geometrical progression. Thus, though there were but few corpuscles to begin with, there may be great ionization after these have been driven some distance through the gas by the electric field.

The number of ions produced by collisions can be calculated by the following method. Let the electric force be parallel to the axis of x, and let n be the number of corpuscles per unit volume at a place fixed by the co-ordinate x; then in unit time these corpuscles will make- >«tt/X collisions with the molecules, if « is the velocity of a corpuscle and X the mean free path of a corpuscle. When the corpuscles are moving fast enough to produce ions by collision their ■velocities are very much greater than those they would possess at the same temperature if they were not acted on by electrical force, and so we may regard the velocities as being parallel to the axis of x and determined by the electric force and the mean free path of the corpuscles. We have to consider how many of the nuj\ collisions which take place per second will produce ions. We should expect that the ionization of a molecule would require a certain amount of energy, so that if the energy of the corpuscle fell below this amount no ionization would take place, while if the energy of the corpuscle were exceedingly large, every collision would result in ionization. We shall

suppose that a certain fraction of the number of collisions result in ionization and that this fraction is a function of the energy possessed by the corpuscle when it collides against the molecules. This energy is proportional to XeX when X is the electric force, e the charge on the corpuscle, and X the mean free path. If the fraction of collisions which produce ionization is /(XeX), then the number of ions produced per cubic centimetre per second is /(XeX)»«/X. If the collisions follow each other with great rapidity so that a molecule has not had time to recover from one collision before it is struck again, the effect of collisions-might be cumulative, so that a succession of collisions might give rise to ionization, though none of the collisions would produce an ion by itself. In this case / would involve the frequency of the collisions as well as the energy of the corpuscle; in other words, it might depend on the current through the gas as well as upon the intensity of the electric field.

We shall, however, to begin with, assume that the current is so small that this cumulative effect may be neglected.

Let us now consider the rate of increase, dn/dt, in the number of corpuscles per unit volume. In consequence of the collisions, f(Xe \)nu/\ corpuscles are produced per second; in consequence of the motion of the corpuscles, the number which leave unit volume

per second is greater than those which enter it byˆ (nit) ; while in a

certain number of collisions a corpuscle will stick to the molecule and will thus cease to be a free corpuscle. Let the fraction of the number of collisions in which this occurs be /?. Thus the gain in the number

of corpuscles is f(Xe\)nu/\, while the loss is jˆ(nu) +/9y ; hence

When things are in a steady state dn/dt = o, and we have £(«0= £(f(X«\)-/S)w».

If the current is so small that the electrical charges in the gas are not able to produce any appreciable variations in the field, X will be constant and we get nu = Ce**, where o = |/(X«X) – 0! /X. If we take the origin from which we measure x at the cathode, C is the value of nu at the cathode, i.e. it is the number of corpuscles emitted per unit

area of the cathode per unit time; this is equal to ije if i a is the quantity of negative electricity coming from unit area of the cathode per second, and e the electric charge carried by a corpuscle. Hence we have nue = *i e ax . If/ is the distance between the anode and the cathode, the value of nue, when x = l, is the current passing through unit area of the gas, if we neglect the electricity carried by negatively electrified carriers other than corpuscles. Hence j = i e . Thus the current between the plates increases in geometrical progression with the distance between the plates.

By measuring the variation of the current as the distance between the plates is increased, Townsend, to whom we owe much of our knowledge on this subject, determined the values of o for different values of X and for different pressures for air, hydrogen and carbonic acid gas (Phil. Mag. [6], I, p. 198). Since X varies inversely as the pressure, we see that a may be written in the form pcj > (Xlp) or ajX = F(X/p). The following are some of the values of a found by Townsend for air.

X Volts

Pressure

Pressure

Pressure

Pressure

Pressure

per cm.

•17 mm.

•38 mm.

I- 10 mm.

2-1 mm.

4-1 mm.

20

•24

40

•65

•34

80

1-35

1-3

•45

•13

120

1-8

2-0

l-l

•42

•13

160

2-1

2-8

2-0

•9

•28

200

3-4

2-8

1-6

•5

240

2-45

3-8

4-0

2-35

•99

320

27

4‘5

5-5

4-0

2-1

400

5°

6-8

60

3-6

480

3-15

5”4

8-0

7-8

5-3

560

5-8

9-3

9.4

7-i

640

3-25

6-2

io-6

108

8-9

We see from this table that for a given value of X, a for small pressures increases as the pressure increases ; it attains a maximum at a particular pressure, and then diminishes as the pressure increases. The increase in the pressure increases the number of collisions, but diminishes the energy acquired by the corpuscle in the electric field, and thus diminishes the change of any one collision resulting in ionization. If we suppose the field is so strong that at some particular pressure the energy acquired by the corpuscle is well above the value required to ionize at each collision, then it is evident that increasing the number of collisions will increase the amount of ionization, and therefore a, and a cannot begin to diminish until the pressure has increased to such an extent that the mean free path of a corpuscle is so small that the energy acquired by the corpuscle from the electric field falls below the value when each collision results in ionization.

The value of p, when X is given, for which a is a maximum, is proportional to X ; this follows at once from the fact that a is of the form X. F(X/A). The value of Xjp for which F(Xjp) is a maximum is seen from the preceding table to be about 420, when X is expressed in volts per centimetre and p in millimetres of mercury. The maximum value of F(X/p) is about 1/60. Since the current passing between two planes at a distance / apart is to*”” or **oe x,f ˆ x ‘ˆ** and since the force between the plates is supposed to be uniform, XI is equal to V, the potential between the plates ; hence the current between the plates is

it,t V ‘ F< – KIP \ and the greatest value it can have is i e v l6 °. Thus the ratio between the current between the plates when there is ionization and when there is none cannot be greater than e V/6 °, when V is measured in volts. This result is based on Townsend’s experiments with very weak currents; we must remember, however, that when the collisions arc so frequent

that the effects of collisions can accumulate, o may have much larger values than when the current is small. In some experiments made by J. J. Thomson with intense currents from cathodes covered with hot lime, the increase in the current when the potential difference was 60 volts, instead of being e times the current when there was no ionization, as the preceding theory indicates, was several hundred times that value, thus indicating a great increase in a with the strength of the current.

Townsend has shown that we can deduce from the values of a the mean free path of a corpuscle. For if the ionization is due to the collisions with the corpuscles, then unless one collision detaches more than one corpuscle the maximum number of corpuscles pro- duced will be equal to the number of collisions. When each collision results in the production of a corpuscle, a = l/X and is independent of the strength of the electric field. Hence we see that the value of a, when it is independent of the electric field, is equal to the reciprocal of the free path. Thus from the table we infer that at a pressure of 17 mm. the mean free path is 1/325 cm. ; hence at I mm. the mean free path of a corpuscle is 1/19 cm. Townsend has shown that this value of the mean free path agrees well with the value 1/21 cm. deduced from the kinetic theory of gases for a corpuscle moving through air. By measuring the values of a for hydrogen and carbonic acid gas Townsend and Kirby (Phil. Mag. [6], 1, p. 630) showed that the mean free paths for corpuscles in these gases are respectively 1/1 1 -5 and 1/29 cm. at a pressure of 1 mm. These results again agree well with the values given by the kinetic theory of gases,

If the number of positive ions per unit volume is m and v is the velocity, we have nue+mve = i, where i is the current through unit area of the gas. Since nue = i e nx and i = i t nl , when / is the distance between the plates, we see that

nulmv = e nx l(e n ‘—t nz), n *v* t”* m~ u t ne — i™ Since »/« is a very small quantity we see that n will be less than m except when ˆ — e” 1 is small, i.e. except close to the anode. Thus there will be an excess of positive electricity from the cathode almost up to the anode, while close to the anode there will be an excess of negative. This

distribution of electricity will make the electric force diminish from the cathode to the place where there is as much positive as negative electricity, where it will have its minimum value, and then increase up to the anode.

The expression i = i e al applies to the case when there is no source of ionization in the gas other than the collisions; if in addition to this there is a source of uniform ionization producing g ions per cubic centimetre, we can easily show that

,ˆ + 2-V-

1).

With regard to the minimum energy which must be possessed by a corpuscle to enable it to produce ions by collision, Townsend (loc. cit.) came to the conclusion that to ionize air the corpuscle must possess an amount of energy equal to that acquired by the fall of its charge through a potential difference of about 2 volts. This is also the value arrived at by H. A. Wilson by entirely different considera- tions. Stark, however, gives 17 volts as the minimum for ionization. The energy depends upon the nature of the gas ; recent experiments by Dawes and Gill and Pedduck (Phil. Mag., Aug. 1908) have shown that it is smaller for helium than for air, hydrogen, or carbonic acid gas.

If there is no external source of ionization and no emission of corpuscles from the cathode, then it is evident that even if some corpuscles happened to be present in the gas when the electric field were applied, we could not get a permanent current by the aid of collisions made by these corpuscles. For under the electric field, the corpuscles would be driven from the cathode to the anode, and in a short time all the corpuscles originally present in the gas and those produced by them would be driven from the gas against the anode, and if there was no source from which fresh corpuscles could be introduced into the gas the current would cease. The current, however, couid be maintained indefinitely if the positive ions in their journey back to the cathode also produced ions by collisions, for then we should have a kind of regenerative process by which the supply of corpuscles could be continually renewed. To maintain the current it is not neces- sary that the ionization resulting from the positive ions should be anything like as great as that from the negative, as the investiga- tion given below shows a very small amount of ionization by the positive ions will suffice to maintain the current. The existence of ionization by collision with positive ions has been proved by Townsend. Another method by which the current could be and is

maintained is by the anode emitting corpuscles under the impact of the positive ions driven against it by the electric field, j. J. Thomson has shown by direct experiment that positively

electrified particles when they strike against a metal plate cause the metal to emit corpuscles (J. J. Thomson, Proc. Camb. Phil. Soc. 13, p. 212; Austin, Phys. Rev. 22, p. 312). If we assume that the number of corpuscles emitted by .the plate in one second is proportional to the energy in the positive ions which strike the plate in that second, we can readily find an expression for the difference of potential which will maintain without any external ionization a current of electricity through the gas. As this investigation brings into prominence many of the most important features of the electric discharge, we shall consider it in some detail.

Let us suppose that the electrodes are parallel plates of metal at right angles to the axis of x, and that at the cathode x = o and at the anode x — d,d being thus the distance between the plates. Let us also suppose that the current of electricity flowing between the plates is so small that the electrification between the plates due to the accumulation of ions is not sufficient to disturb appreciably the electric field, which we regard as uniform between the plates, the electric force being equal to V/d, where V is the potential difference between the plates. The number of positive ions produced per second in a layer of gas between the planes x and x--dx is anu.dx. Here n is the number of corpuscles per unit volume, a the coefficient of ionization (for strong electric field o=i/X', where X' is the mean free path of a corpuscle), and u the velocity of a corpuscle parallel to x. We have seen that nu = it>€", where U is the number of corpuscles emitted per second by unit area of the cathode. Thus the number of positive ions produced in the layer is aioˆdx. If these went straight to the cathode without a collision, each of them would have received an amount of kinetic energy Vexjd when they struck the cathode, and the energy of the group of ions would be Vexfd.ai a t d ' : dx. The positive ions will, however, collide with the molecules of the gas through which they are passing, and this will diminish the energy they possess when they reach the cathode.

The diminution in the energy will increase in geometrical pro- portion

with the length of path travelled by the ion and will thus be proportional to e – ˆ, /3 will be proportional to the number of collisions and will thus be proportional to the pressure of the gas. Thus the kinetic energy possessed by the ions when they reach the cathode will be

(-ˆ x .W(exld).ai € ax dx,

and E, the total amount of energy in the positive ions which reach the cathode in unit time, will be given by the equation

E = £*** . V(exjd).aiˆ a dx Jo’

&xdx

— c /s<0<* ■

(0-a)« + (0

ˆ\]

(I).

If the number of corpuscles emitted by the cathode in unit time is proportional to this energy we have io = kE, where k is a constant ; hence by equation (1) we have

v ~ kea. r where

I = i- 4 -«»-«W(i+<*(0-o)). Since both /3 and a are proportional to the pressure, I and (f3-a) 2 dla are both functions of pd, the product of the pressure and the spark length, hence we see that V is expressed by an equation of the form

V = Fe/ˆ)

(2),

where f(pd) denotes a function of pd, and neither p nor d enter into the expression for V except in this product. Thus the potential difference required to produce discharge is constant as long as the product of the pressure and spark length remains constant; in other words, the spark potential is constant as long as the mass of the gas between the electrodes is constant. Thus, for example, if we halve the pressure the same potential difference will produce a spark of twice the length. This law, which was discovered by Paschen for fairly long sparks (Annalen, 37, p. 79), and has been shown by Carr (Phil. Trans.,

1903) to hold for short ones, is one of the most important properties of the electric discharge.

We see from the expression for V that when (0-a)d is very large V=(/3-a) 2 d/fcca. Thus V becomes infinite when d is infinite. Again when ({}-a)d is very small we find

V = l/kead; thus V is again infinite when d is nothing. There must therefore be some value of d intermediate between zero and infinity for which Vˆis a minimum. This value is got by finding in the usual way the

v=t

value of d, which makes the expression for V given in equation (1) a minimum. We find that d must satisfy the equation

j = e HP-«)d { x -t_ (0 _ a) J, 4. (0 _ a t rf) S | ,

We find by a process of trial and error that (/3- a)d — 1 8 is approxi mately a solution of this equation ; hence the distance for minimum potential is i-8/(/3-a). Since 0and a are both proportional to the pressure, we see that the critical spark length varies inversely as the pressure._If we substitute this value in the expression for V, we find that V, the minimum spark potential, is given by

2- 2

ke '-

Since /? and a are each proportional to the pressure, the minimum potential is independent of the pressure of the gas. On this view the minimum potential depends upon the metal of which the cathode is made, since k measures the number of corpuscles emitted per unit time by the cathode when struck by positive ions carrying unit energy, and unless /3 bears the same ratio to a for all gases the minimum potential will also vary with the gas. The measurements which have been made of the " cathode fall of potential," which as we shall see is equal to the minimum potential required to produce a spark, show that this quantity varies with the material of which the cathode is made and also with the nature of the gas. Since a metal plate, when bombarded by positive ions, emits corpuscles, the effect we have been considering must play a part in the discharge; it is not, however, the only effect which has to be considered, for as Townsend has shown, positive ions when moving above a certain speed ionize the gas, and cause it to emit corpuscles. It is thus necessary to take into account

the ionization of the positive ions.

Let m be the number of positive ions per unit volume, and to their velocity, the number of collisions which occur in one second in one cubic centimetre of the gas will be proportional to mwp, where p is the pressure of the gas. Let the number of ions which result from these collisions be ymw; 7 will be a function of p and of the strength of the electric field. Let as before n be the number of corpuscles per cubic centimetre, u their velocity, and anu the number of ions which result in one second from the collisions between the corpuscles and the gas. The number of ions produced per second per cubic centimetre is equal to anu + ymw; hence when things are in a steady state

t-(»m) = attu + ymw,

and

e{nu--mw) = i, where e is the charge on the ion and i the current through the gas. The solution of these equations when the field is uniform between the plates, is

‘ enu = Ctˆ-v)* – 71/(0 – 7) , emw = – Ce< a -Y>* + ot’/(o – 7) , where C is a constant of integration. If there is no emission of positive ions from the anode enu = i, when x — d. Determining C from this condition we find

enuˆ-t- \ aeC*-7Xs-<0 I emw ˆ_B±. \ t – ja-yX*-*) I .

— 7 I) — 7 ( )

If the cathode did not emit any corpuscles owing to the bombardment by positive ions, the condition that the charge should be maintained is that there should be enough positive ions at the cathode to carry the current i.e. that emw = i; when x = o, the condition gives

a — 7 (

at-C-YW—y

= 0,

Since a and 7 are both of the form pf(X[p) and X = V/<2, we see that V will be a function of pd, in agreement with Paschen's law. If we take into account both the ionization of the gas and the emission of corpuscles by the metal we can easily show that

0-7 ~ d L(/3+7-a) 2 ((0+7-«) J+ 0+7-

=!]■

where k and j8 have the same meaning as in the previous investigation. When d is large, e (a- ?) '* is also large; hence in order that the left- hand side of this equation should not be negative 7 must be less than a/d*^)*; as this diminishes as d increases we see that when the sparks are very long discharge will take place, practically as soon as 7 has a finite value, i.e. as soon as the positive ions begin to produce fresh ions by their collisions.

In the preceding investigation we have supposed that the electric field between the plates was uniform; if it were not uniform we could get discharges produced by very much smaller differences of potential than are necessary in a uniform field. For to maintain the discharge it is not necessary that the positive ions should act as ionizers all along their path; it is sufficient that they should do so in the neighbourhood of cathode. Thus if we have a strong field close to the cathode we might still get

the discharge though the rest of the field were comparatively weak. Such a distribution of electric force requires, however, a great accumulation of charged ions near the cathode; until these ions accumulate the field will be uniform. If the uniform field existing in the gas before the discharge begins were strong enough to make the corpuscles produce ions by collision, but not strong enough to make the positive ions act as ionizers, there would be some accumulation of ions, and the amount of this accumulation would depend upon the number of free corpuscles originally present in the gas, and upon the strength of the electric field. If the accumulation were sufficient to make the field near the cathode so strong that the positive ions could produce fresh ions either by collision with the cathode or with the gas, the discharge would pass though the gas; if not, there will be no continuous discharge. As the amount of the accumulation depends on the number of corpuscles present in the gas, we can understand how it is that after a spark has passed, leaving for a time a supply of corpuscles behind it, it is easier to get a discharge to pass through the gas than it was before.

The inequality of the electric field in the gas when a continuous discharge is passing through it is very obvious when the pressure of the gas is low. In this case the discharge presents a highly differentiated appearance of which a type is represented in fig. 15. Starting from the cathode we have a thin velvety luminous glow in contact with the sur- face; this glow is often called the ” first AikU/ I H81FI cat hode layer.” Next vjiHiw Yip 1 / tnis we nave a com ” VJIˆ paratively dark space whose thickness in- creases as the pressure diminishes; this is called the ” Crookes’s dark space,” or the ” second cathode layer.” Next this we have a luminous position called the ” negative glow ” or the ” third cathode layer.” The boundary between the second and third layers is often very sharply defined. Next to the third layer we have another dark space called the ” Faraday dark space.” Next to this and reaching up to the anode is another region of luminosity, called the ” positive column,” sometimes (as in fig. 15, a) continuous, sometimes (as in fig. is, b) broken up into light or dark patches called “stria- tums.” The dimensions of the Faraday dark space and the posi- tive column vary greatly with the current passing through the gas and with its pressure; sometimes one or other of them is absent. These differences in appearances are accompanied by great difference in the strength of the electric field. The magnitude of the electric force at different parts of the discharge is repre- sented in fig. 16, where the ordinates repre- sent the electric force at different parts of the tube, the cathode being on the right. We see that the electric force is very large indeed between the negative glow and the cathode, much larger than in any other part of the tube. It is not constant in this region, but increases as we approach the cathode. The force reaches a minimum either in the negative glow itself or in the part of the Faraday dark space just outside, after which it increases towards the positive column. In the case of a uniform positive column the electric force along it is constant until we get quite close to the anode, when a sudden change, called the ” anode fall,” takes place in the potential. The difference of potential between the cathode and the

negative glow is called the ” cathode potential fall ” and is found to be constant for wide variations in the pressure of the gas and the current passing through. It increases, however, considerably when the current through the gas exceeds a certain critical value, depending among other things on the size of the cathode. This cathode fall of potential is shown by experiment to be very approximately equal to the minimum potential difference. The following table contains a comparison of the measurements of the cathode fall of potentials in various gases made by Warburg (Wied. Ann., 1887, 31, p. 545, and 1890, 40,

Valts per Cm ˆ

fi

V

/

bxˆjˆ

crˆ

\

1(?

\j

■..~

. r

/■

/~\

/I

/”}

y t’y ”’

<»Cmt

Discharge in Hydrogen Pressure 2-25 m.m. Current 0-568‘1&- 3 ampere

Fig. i 6.

i), Capstick (Proc. Roy. Society, 1898, 63, p. 356), and Strutt (Phil. Trans., 1900, 193, p. 377), and the measurements by Strutt of the smallest difference of potential which will maintain a spark through these gases.

(a) (i)

Fig. 15.

Gas.

Cathode fall in Volts.

Least potential

difference re- quired to main- tain a Spark.

Platinum Electrodes.

Aluminium Electrodes.

Warburg.

Capstick.

Strutt.

Warburg.

Strutt.

Air … H 2 …

2 . . . .

N 2 . . . .

Hg vapour Helium H 2 . . . NH 3 . . .

340-350

about 300

230 if free

from oxygen

340

298

369 232

469

582

226

168 207

341 302-308

251 261-326

Thus in the cases in which the measurements could be made with the greatest accuracy the agreement between the cathode fall and the minimum potential difference is very close. The cathode fall depends on the material of which the terminals are made, as is shown by the following table due to Mey {Verh. deutsch. physik. Gesell., 1903, 5, p. 72).

Gas.

Electrode.

Pt

Hg

Ag

Cu

Fe

Zn

Al

Mg

Na

Na-K

K

o 2 . .

H 2 . . N 2 . . He . . Argon .

369 300

232 226 167

226

295

280

230

213

190 100

168

207

185

178

80

169

125 78-5

172

170

69

The dependence of the minimum potential required to produce a spark upon the metal of which the cathode is made has not been clearly established, some observers being unable to detect any difference between the potential required to spark between electrodes of aluminium and those of brass, while others thought they had detected such a difference. It is only with sparks not much longer than the critical spark length that we dould hope to detect this difference. When the current through the gas exceeds a certain critical value depending among other things on the size of the cathode, the cathode fall of potential increases rapidly and at the same time the thickness of the dark

spaces diminishes. We may regard the part of the discharge between the cathode and the negative glow as a discharge taking place under minimum potential difference through a distance equal to the critical spark length. An inspection of fig. 16 will show that we cannot regard the electric field as constant even for this small distance; it thus becomes a matter of interest to know what would be the effect on the minimum potential difference required to produce a spark if there were sufficient ions present to produce variations in the electric field analogous to those represented in fig. 16. If the electric force at a distance x from the cathode were proportional to t~ vx we should have a state of things much resembling the distribution of electric force near the cathode. If we apply to this distribution the methods used above for the case when the force was uniform, we shall find that the minimum potential is less and the critical spark length greater than when the electric force is uniform. ‘

Potential Difference required to produce a Spark of given Length. — We may regard the region between the cathode and the negative glow as a place for the production of corpuscles, these corpuscles finding their way from this region through the negative glow. The parts of this glow towards the anode we may regard as a cathode, from which, as from a hot lime cathode, corpuscles are emitted. Let us now consider what will happen to these cor- puscles shot out from the negative glow with a velocity depending on the cathode fall of potential and independent of the pressure. These corpuscles will collide with the molecules of the gas, and unless there is an external electric field to maintain their velocity they will soon come to rest and accumulate in front of the negative glow. The electric force exerted by this cloud of corpuscles will diminish the strength of the electric field in the region between the cathode and the negative glow, and thus tend to stop the discharge. To keep up the discharge we must have a sufficiently strong electric field between the negative glow and the anode to remove the corpuscles from this region as fast as they are sent into it from the cathode. If, however, there is no production of ions in the region between the negative glow and the anode, all the ions in this region will have come from near the cathode and will be negatively charged; this negative electrification will diminish the electric force on the cathode side of it and thus tend to stop the discharge. This back electric field could, however, be prevented by a little ioniza- tion in the region between the anode and glow, for this would afford a supply of positive ions, and thus afford an opportunity for the gas in this region to have in it as many positive as negative ions; in this case it would not give rise to any back electro- motive force. The ionization which produces these positive ions may, if the field is intense, be due

to the collisions of cor- puscles, or it may be due to radiation analogous to ultra-violet, or soft Rontgen rays, which have been shown by experiment to accompany the discharge. Thus in the most simple conditions for discharge we should have sufficient ionization to keep up the supply of positive ions, and an electric field strong enough to keep the velocity of the negative corpuscle equal to the value it has when it emerges from the negative glow. Thus the force must be such as to give a constant velocity to the corpuscle, and since the force required to move an ion with a given velocity is proportional to the pressure, this force will be proportional to the pressure of the gas. Let us call this force ap; then if I is the distance of the anode from the negative glow the potential difference between these points will be alp. The potential difference between the negative glow and the cathode is constant and equals c; hence if V is the potential difference between the anode and cathode, then Y = c-\~alp, a relation which ex- presses the connexion between the potential difference and spark length for spark lengths greater than the critical distance. It is to be remembered that the result we have obtained applies only to such a case as that indicated above, where the electric force is constant along the positive column. Experiments with the discharge through gases at low pressure show the discharge may take other forms. Thus the positive column may be striated when the force along it is no longer uniform, I

or the positive column may be absent; the discharge may be changed from one of these forms to another by altering the current. The relation between the potential and the distance between the electrodes varies greatly, as we might expect, with the current passing through the gas.

The connexion between the potential difference and the spark length has been made the subject of a large number of experiments. The first measurements were made by Lord Kelvin in i860 {Collected Papers on Electrostatics and Magnetism, p. 247); subsequent experiments have been made by Bailie {Ann. de chitnie et de physique, 5, 25, p. 486), Liebig {Phil. Mag. [5], 24, p. 106), Paschen {Wied. Ann. 37, p. 79), Peace {Proc. Roy. Soc, 1892, 52, p. 99), Orgler {Ann. der Phys. 1, p. 159), Strutt {Phil. Trans. 193, p. 377), Bouty {Comptes rendus, 131, pp. 469, 503), Earhart {Phil. Mag. [6], 1, p. 147), Carr {Phil. Trans., 1903), Russell {Phil. Mag. [5], 64, p. 237), Hobbs {Phil. Mag. [6], 10, p. 617), Kinsley {Phil. Mag. [6], 9, 692), Ritter {Ann. der Phys. 14, p. 1 18) . The results of their experiments show that for sparks considerably longer than the critical spark length, the relation between the potential difference V and the spark length I may be expressed when the electrodes are large with great accuracy by the

linear relation $Y = c + blp$, where p is the pressure and c and b are constants depending on the nature of the gas. When the sparks are long the term Up is the most important and the sparking potential is proportional to the spark length. Though there are considerable discrepancies between the results obtained by different observers, these indicate that the production of a long spark between large electrodes in air at atmospheric pressure requires a potential difference of 30,000 volts for each centimetre of spark length. In hydrogen only about half this potential difference is required, in carbonic acid gas the potential difference is about the same as in air, while Ritter's experiments show that in helium only about one-tenth of this potential difference is required.

In the case when the electric field is not uniform, as for example when the discharge takes place between spherical electrodes, Russell's experiments show that the discharge takes place as soon as the maximum electric force in the field between the electrodes reaches a definite value, which he found was for air at atmospheric pressure about 38,000 volts per centimetre.

Very Short Sparks. — Some very interesting experiments on the potential difference required to produce exceedingly short sparks have been made by Earhart, Hobbs and Kinsley; the length of these sparks was comparable with the wave length of sodium light. With sparks of these lengths it was found that it was possible to get a discharge with less than 330 volts, the minimum potential difference in air. The results of these observers show that there is no diminution in the minimum potential difference required to produce discharge until the spark length gets so small that the average electric force between the electrodes amounts to about one million volts per centimetre. When the force rises to this value a discharge takes place even though the potential difference is much less than 330 volts; in some of Earhart's experiments it was only about 2 volts. This kind of discharge is determined not by the condition that the potential difference should have a given value, but that the electric force should have a given value. Another point in which this discharge differs from the ordinary one is that it is influenced entirely by the nature of the electrodes and not by the nature or pressure of the gas between them, whereas the ordinary discharge is in many cases not affected appreciably by changes in the metal of the electrodes, but is always affected by changes in the pressure and character of the gas between them. Kinsley found that when one of these small sparks passed between the electrodes a kind of metallic bridge was formed between them, so that they were in metallic connexion, and that the distance between them had to be considerably increased before the bridge was broken. Almy

{Phil. Mag., Sept. 1908), who used very small electrodes, was unable to get a discharge with less than the minimum spark potential even when the spark length was reduced to one-third of the wave length of sodium light. He suggests that the dis- charges obtained with larger electrodes for smaller voltages are

due to the electrodes being dragged together by the electrostatic attraction between them.

Constitution of the Electric Spark. — Schuster and Hemsalech {Phil. Trans. 193, p. 189), Hemsalech (Comptes Rendus, 130, p. 898; 132, p. giy,Jour. de Phys. 3. 9, p. 43, and Schenck, Astrophy. Jour. 14, p. 116) have by spectroscopic methods obtained very inte/esting results about the constitution of the spark. The method employed by Schuster and Hemsalech was as follows: Suppose we photograph the spectrum of a horizontal spark on a film which is on the rim of a wheel rotating about a horizontal axis with great velocity. If the luminosity travelled with infinite speed from one electrode to the other, the image on the film would be a horizontal line. If, however, the speed with which the luminosity travelled between the electrodes was comparable with the speed of the film, the line would be inclined to the horizontal, and by measuring the inclinations we could find the speed at which the luminosity travelled. In this way Schuster and Hemsalech showed that when an oscillating discharge passed between metallic terminals in air, the first spark passes through the air alone, no lines of the metal appearing in its spectrum. This first spark vaporizes some of the metal and the subsequent sparks passing mainly through the metallic vapour; the appearance of the lines in the film shows that the velocity of the luminous part of the vapour was finite. The velocity of the vapour of metals of low atomic weight was in general greater than that of the vapour of heavier metals. Thus the velocity of aluminium vapour was 1890 metres per second, that of zinc and cadmium only about 545. Perhaps the most interesting point in the investigation was the discovery that the velocities corresponding to different lines in the spectrum of the same metal were in some cases different. Thus with bismuth some of the lines indicated a velocity of 1420 metres per second, others a velocity of only 550, while one (X = 3793) showed a still smaller velocity. These results are in accordance with a view suggested by other phenomena that many of the lines in a spectrum

produced by an electrical discharge originate from systems formed during the discharge and not from the normal atom or molecule. Schuster and Hemsalech found that by inserting a coil with large self induction in the primary circuit they could obliterate the air lines in the discharge.

Schenck, by observing the appearance presented when an alternating current, produced by discharging Leyden jars, was examined in a rapidly rotating mirror, found it showed the following stages: (1) a thin bright line, followed in some cases at intervals of half the period of the discharge by fainter lines; (2) bright curved streamers starting from the negative terminal, and diminishing rapidly in speed as they receded from the cathode; (3) a diffused glow lasting for a much longer period than either of the preceding. These constituents gave out quite different spectra.

The structure of the discharge is much more easily studied when the pressure of the gas is low, as the various parts which make up the discharge are more widely separated from each other. We have already described the general appearance of the dis- charge through gases at low pressures (see p. 657). There is, however, one form of discharge which is so striking and beautiful that it deserves more detailed consideration. In this type of discharge, known as the striated discharge, the positive column is made up of alternate bright and dark patches known as strialions. Some of these are represented in fig. 17, which is taken from a paper by De la Rue and M tiller (Phil. Trans., 1878, Pt. 1). This type of discharge only occurs when the current and the pressure of the gas are between certain limits. It is most beautifully shown when a Wehnelt cathode is used and the current is produced by storage cells, as this allows us to use large currents and to maintain a steady potential difference between the electrodes. The striations are in consequence very bright and steady. The facts which have been established about these striations are as follows: The distance between the bright parts of the striations is greater at low pressures than at high; it depends also upon the diameter of the tube, increasing as the diameter of the tube increases. If the discharge tube is wide at

one place and narrow in another the striations will be closer together in the narrow parts than in the wide. The distance between the striations depends on the current through the tube. The relation is not a very simple one, as an increase of current sometimes increases while under other circumstances it decreases the distance between the striations (see Willows, Proc. Camb. Phil. Soc. 10, p. 302). The electric force is not uniform along the striated discharge, but is greater in the

bright than in the dark parts of the striation. An example is shown in fig. 16, due to H. A. Wilson, which shows the distribution of electric force at every place' in a striated discharge. In experiments made by J. J. Thomson (Phil. Mag., Oct. 1909), using a Wehnelt cathode, the variations in the electric force were more pronounced than those

MIL

OQ0QQQQq(9QQ(i00QQ0Oˆ

c £=

IIIII0JWJII

SaiasE

flflflaaflrtduddgdrtflqdridoqdaddatf*”

=

ij£_

MM

WW

ˆ=SE2

■jˆ car-in. ..i .majjujcSBT

Fig. 17.

shown in fig. 16. The electric force in this case changed so greatly that it actually became negative just on the cathode side of the bright part of the striation. Just inside the striation on the anode side it rose to a very high value, then continually diminished towards the bright side of the next striation when it again increased. This distribution of electric force implies that there is great excess of negative electricity at the bright head of the striation, and a small excess of positive everywhere else. The temperature of the gas is higher in the bright than in the dark parts of the striations. Wood (Wied. Ann. 49, p. 238), who has made a very careful study of the distribution of temperature in a discharge tube, finds that in those tubes the temperature varies in the same way as the electric force, but that this temperature (which it must be remembered is the average temperature of all the molecules and not merely of those which are taking part in the discharge) is by no means high; in no part of the discharge did the temperature in his

experiments exceed ioo° C.

Theory of the Striations. — We may regard the heaping up of the negative charges at intervals along the discharge as the fundamental feature in the striations, and this heaping up may be explained as follows. Imagine a corpuscle projected with considerable velocity from a place where the electric field is strong, such as the neighbourhood of the cathode; as it moves towards the anode through the gas it will collide with the mole- cules, ionize them and lose energy and velocity. Thus unless the corpuscle is acted on by a field strong enough to supply it with the energy it loses by collision, its speed will gradually diminish. Further, when its energy falls below a certain value it will unite with a molecule and become part of a negative ion, instead of a corpuscle; at this stage there will be a sudden and

very large diminution in its velocity. Let us now follow the course of a stream of corpuscles starting from the cathode and approaching the anode. If the speed falls off as the stream proceeds, the corpuscles in the rear will gain on those in front and the density of the stream in the front will be increased. If at a certain place the velocity receives a sudden check by the corpuscles becoming loaded with a molecule, the density of the negative electricity will increase at this place with great rapidity, and here there will be a great accumulation of negative electricity, as at the bright head on the cathode side of a striation. Now this accumulation of negative electricity will produce a large electric force on the anode side; this will drive corpuscles forward with great velocity and ionize the gas. These corpuscles will behave like those shot from the cathode and will accumulate again at some distance from their origin, forming the bright head of the next striation, when the process will be repeated. On this view the bright heads of the striations act like electrodes, and the discharge passes from one bright head to the next as by a number of stepping stones, and not directly from cathode to anode. The luminosity at the head of the striations is due to the recombination of the ions. These ions have acquired considerable energy from the electric field, and this energy will be available for supplying the energy radiated away as light. The recombination of ions which do not possess considerable amounts of energy does not seem to give rise to luminosity. Thus, in an ionized gas not exposed to an electric field, although we have recombination

between the ions, we need not have luminosity. We have at present no exact data as to the amount of energy which must be given to an ion to make it luminous on recombination; it also certainly varies with the nature of the ion; thus even with hot Wehnelt cathodes J. J. Thomson has never been able to make the discharge through air luminous with a potential less than from 16 to 17 volts. The mercury lamps, however, in which the discharge passes through mercury vapour are luminous with a potential difference of about 12 volts. It follows that if the preceding theory be right the potential difference between two bright striations must be great enough to make the corpuscles ionize by collision and also to give enough energy to the ions to make them luminous when they recombine. The difference of potential between the bright parts of successive striations has been measured by Hohn {Phys. Zeit. 9, p. 558) ; it varies with the pressure and with the gas. The smallest value given by Hohn is about 15 volts. In some experiments made by J. J. Thomson, when the pressure of the gas was very low, the difference of potential between two ad- jacent dark spaces was as low as 3 • 7 5 volts.

The Arc Discharge.— The. discharges we have hitherto con- sidered have been characterized by large potential differences and small currents. In the arc discharge we get very large currents with comparatively small potential differences. We may get the arc discharge by taking a battery of cells large enough to give a potential difference of 60 to 80 volts, and connecting the cells with two carbon terminals, which are put in contact, so that a current of electricity flows round the circuit. If the terminals, while the current is on, are drawn apart, a bright discharge, which may carry a current of many amperes, passes from one to the other. This arc discharge, as it is called, is characterized by intense heat and by the brilliant luminosity of the terminals. This makes it a powerful source of light. The temperature of the positive terminal is much higher than that of the negative. According to Violle (Comptes Retidus, 115, p. 1273) the temperature of the tip of the former is about 3500 C, and that of the latter 2700 C. The temperature of the arc itself he found to be higher than that of either of its terminals. As the arc passes, the positive terminal gets hollowed out into a crater-like shape, but the negative terminal remains pointed. Both terminals lose weight.

The appearance of the terminals is shown in fig. 18, given by Mrs Ayrton (Proc. Inst. Elec. Eng. 28, p. 400) ; a, b represent the terminals when the arc is quiet, and c when it is accompanied by ahissing sound. The intrinsic brightness of the positive crater does not increase with an increase in the current ; an increased current produces an increase in the area of the luminous crater, but the amount of light

given

out by each unit of area of luminous surface is unaltered. This indicates that the temperature of the crater is constant; it is probably that at which carbon volatilizes. W. E. Wilson (Proc. Roy. Soc. 58, p. 174; 60, p. 377) has shown that at pressures of several atmospheres the intrinsic brightness of the crater is con- siderably diminished.

Fig. 18.

The connexion between V, the potential difference between the terminals, and /, the length of the arc, is somewhat analogous to that which holds for the spark discharge. Frohlich (Electrotech. Zeit. 4. P- “So) gives for this connexion the relation V = m--nl, where m and n are constants. Mrs Ayrton {The Electric Arc, chap, iv.) finds that both m and n depend upon the current passing between the terminals, and gives as the relation between V and /,

V = a-f- j-f- (7 + j) I, where a, /3, 7, 5 are constants and I the current.

The relation between current and potential difference was made the subject of a series of experiments by Ayrton (Electrician, I, p. 319; xi. p. 418), some of whose results are represented in fig. 19. For a quiet arc an increase in current is accompanied by a fall in potential difference, while for the hissing arc the potential difference is inde- pendent of the current. The quantities m and n which occur in

SO

\j

^

V

s\

i

V

%

\N

»»»

1″

^

£*2

“T\

\

1 *

Cl

\|

CW/7J

«

V

•

«.«5

(mnr

ffi$Sl

QArc

\

\

n –

J3

‘

JO

‘»°

16 /S 20 22 2*

IS 20 JO,

Cumnf in Amptres

Fig. 19.

Frohlich ‘s equation have been determined by several experimenters. For carbon electrodes in air at atmospheric pressure m is about 39 volts, varying somewhat with the size and purity of the carbons; it is diminished by soaking the terminals in salt solution. The value of n given by different observers varies considerably, ranging from -76 to 2 volts when I is measured in millimetres; it depends upon the current, diminishing as the current increases. When metallic terminals are used instead of carbons, the value of m depends upon the nature of the metal, m in general being larger the higher the temperature at which the metal volatilizes. Thus v. Lang (Wied. Ann. 31, p. 384) found the following values for m in air at atmospheric pressure : — C = 35; Pt = 27-4; Fe = 25; Ni = 26-l8; Cu = 23-86; Ag = i5-23; Zn = i9-86; Cd = io-28. Lecher (Wied. Ann. 33, p. 609) gives Pt = 28, Fe = 2o, Ag = 8, while Arons (Wied. Ann. 31, p. 384) found for Hg the value 12-8; in this case the fall of potential along the arc itself was abnormally small. In comparing these values it is important to remember that Lecher (loc. cit.) has shown that with Fe or Pt terminals the arc discharge is intermittent. Arons has shown that this is also the case with Hg terminals, but no intermittence has been detected with terminals of C, Ag or Cu. The preceding measurements refer to mean potentials, and no conclusions as to the actual potential differences at any time can be drawn when the discharge is discontinuous, unless we know the law of discontinuity. The ease with which an arc is sustained depends greatly on the nature of the electrodes; when they are brass, zinc, cadmium, or magnesium it is exceedingly difficult to get the arc.

The potential difference between the terminals is affected by the pressure of the gas. The most extensive series of experiments on this point is that made by Duncan. Rowland, and Tod (Electrician,

31, p. 60), whose results are represented in fig. 20. We see from these curves that for very short arcs the potential difference increases continuously with the pressure, but for longer ones there is a critical

pressure at which the potential difference is a minimum, and that this critical pressure seems to increase with the length of arc.

I

?

j$Ssj

ˆSv

V

s

s

•

wˆ

,”’■

f $

/

f

r

7

‘flfftt of

Inch

■

•x

Cothott

Afiodt

Length of Arc.

Fig. 20.

Fig. 21.

The nature of the gas also affects the potential difference. The magnitude of this effect may be gathered from the following values given by Arons (Ann. der Phys. I, p. 700) for the potential difference required to produce an arc 1-5 mm. long, carrying a current of 4-5 amperes, between terminals of different metals in air and pure nitrogen

Terminal.

Air.

Nitrogen.

1 Terminal.

Air.

Nitrogen.

Ag . .

21

?

I Pt . .

36

30

Zn . .

23

21

Al . .

39

27

Cd . .

25

21

Pb . .

18

Cu . .

27

30

Mg . .

22

Fe . .

29

20

1

Thus, with the discharge for an arc of given length and current, the nature of the terminals is the most important factor in deter- mining the potential difference. The effects produced by the pressure and nature of the surrounding gas, although quite appreciable, are not of so much importance, while in the spark discharge the nature of the terminals is of no importance, everything depending upon the nature and pressure of the gas.

The potential gradient in the arc is very far from being uniform. With carbon terminals Luggin (Wien. Ber. 98, p. 1192) found that, with a current of 15 amperes, there was a fall of potential of 33 ‘7 close to the anode, and one 8-7 close to the cathode, so that the curve representing the distribution of potential between the terminals would be somewhat like that shown in fig. 2 1 . We have seen that a somewhat analogous distribution of potential holds in the case of conduction through flames, though in that case the greatest drop of potential is in general at the cathode and not at the anode. The difference between the changes of potential at the anode and cathode is not so large with Fe and Cu terminals as with carbon ones; with mercury terminals, Arons (Wied. Ann. 58, p. 73) found the anode fall to be 7-4 volts, the cathode fall 5-4 volts.

The case of the arc when the cathode is a pool of mercury and the

anode a metal wire placed in a vessel from which the air has been exhausted is one which has attracted much attention, and important investigations on this point have been made by Hewitt (Electrician, 52, p. 447), Wills (Electrician, 54, p. 26), Stark, Retschinsky and SchnaposnikofE (Ann. der Phys. 18, p. 213) and Pollak (Ann. der Phys. 19, p. 217). In this arrange- ment the mercury is vaporized by the heat, and the discharge which passes through the mercury vapour gives an exceedingly bright light, which has been largely used for lighting factories, &c. The arrangement can also be used as a rectifier, for a current will only pass through it when the mercury pool is the cathode. Thus if such a lamp is connected with an alternating current circuit, it lets through the current in one direction and stops that in the other, thus furnishing a current which is always in one direction.

Theory of the Arc Discharge.— An incandescent body such as a piece of carbon even when at a temperature far below that of the terminals in an arc, emits corpuscles at a rate corresponding to a current of the order of 1 ampere per square centimetre of incandescent surface, and as the rate of increase of emission with the temperature is very rapid, it is probably at the rate of many amperes per square centimetre at the temperature of the negative carbon in the arc. If then a piece of carbon were maintained at this temperature by some external means, and used as a cathode, a current could be sent from it to another electrode whether the second electrode were cold or hot. If,

however, these negatively electrified corpuscles did not produce other ions either by collision with the gas through which they move or with the anode, the spaces between cathode and anode would have a negative charge, which would tend to stop the corpuscles leaving the cathode and would require a large potential difference between anode and cathode to produce any consider- able current. If, however, there is ionization either in the gas or at the anode, the positive ions will diffuse into the region of the discharge until they are sensibly equal in number to the negative ions. When this is the case the back electromotive force is destroyed and the same potential difference will carry a much larger current. The arc discharge may be regarded as analogous to the discharge between incandescent terminals, the only difference being that in the arc the terminals are main- tained in the state of incandescence by the current and not by external means. On this view the cathode is bombarded by positive ions which heat it to such a temperature that negative corpuscles sufficient to carry the current are emitted by it. These corpuscles bombard the anode and keep it incandescent. They ionize also, either directly by collision or indirectly by heating the anode, the gas and vapour of the metal of which the anode is made, and produce in this way the supply of

positive ions which keep the cathode hot.

Discharge from a Point. — A very interesting case of electric discharge is that between a sharply pointed electrode, such as a needle, and a metal surface of considerable area. At atmospheric pressures the luminosity is confined to the immediate neighbour- hood of the point. If the sign of the potential of the point does not change, the discharge is carried by ions of one sign — that of the charge on the pointed electrode. The velocity of these ions under a given potential gradient has been measured by Chattock (Phil. Mag. 32, p. 285), and found to agree with that of the ions produced by Rontgen or uranium radiation, while Townsend (Phil. Trans. 195, p. 259) has shown that the charge on these ions is the same as that On the ions streaming from the point. If the pointed electrode be placed at right angles to a metal plane serving as the other electrode, the discharge takes place when, for a given distance of the point from the plane, the potential difference between the electrodes exceeds a definite value depending upon the pressure and nature of the gas through which the discharge passes; its value also depends upon whether, beginning with a small potential difference, we gradually increase it until discharge commences, or, beginning with a large potential difference, we decrease it until the discharge stops. The value found by the latter method is less than that by the former. According to Chattock's measurements the potential difference V for discharge between the point and the plate is given by the linear relation V =

below that required to produce discharge in a uniform field, so that the discharge from a pointed electrode ought to be compared with a spark whose length is comparable with the radius of curvature of the point. For such short sparks the electric intensity is very high. The electric intensity required to produce the discharge from a gas diminishes as the pressure of the gas diminishes, but not nearly so rapidly as the electric intensity for long sparks. Here again the discharge from a point is comparable with short sparks, which, as we have seen, are much less sensitive to pressure changes than longer ones. The minimum potential at which the electricity streams from the point does not depend upon the material of which the point is made; it varies, however, considerably with the nature of the gas. The following are the results of some experiments on this point. Those in

the first two columns are due to Rontgen, those in the third and fourth to Precht:—

Discharge Potential. Point +.

Pressure 760.

Pressure 205.

Pressure no.

Point +.

Point — .

Volts.

Volts.

Volts.

Volts.

H 2 . .

1296

1 174

2125

1550

2 .

2402

1975

2800

2350

CO

2634

2100

CHt

2777

2317

NO

3188

2543

co 2

3287

2655

3475

2100

N 2

2600

2000

Air

2750

2050

We see from this table that in the case of the discharge from a positively electrified point the greater the molecular weight of the gas the greater the potential required for discharge. Rontgen concluded from his experiments that the discharging potential from a positive point in different gases at the same pressure varies inversely as the mean free path of the molecules of the gas. In the same gas, however, at different pressures the discharging potential does not vary so quickly with the pressure as does the mean free path. In Precht's experiments, in which different gases were used, the variations in the discharging potential are not so great as the variations in the mean free path of the gases.

The current of electrified air flowing from the point when the

electricity is escaping — the well-known ” electrical wind ” — is accompanied by a reaction on the point which tends to drive it backwards. This reaction has been measured by Arrhenius (Wied. Ann. 63, p. 305), who finds that when positive electricity is escaping from a point in air the reaction on the point for a given current varies inversely as the pressure of the gas, and for different gases (air, hydrogen and carbonic acid) inversely as the square root of the molecular weight of the gas. The reaction when negative electricity is escaping is much less. The proportion between the reactions for positive and negative currents depends on the pressure of the gas. Thus for equal positive and negative currents in air at a pressure of 70 cm. the reaction for a positive point was 1-9 times that of a negative one, at 40 cm. pressure 2-6 times, at 20 cm. pressure 3-2 times, at 10-3 cm. pressure 7 times, and at 5-1 cm. pressure 15 times the reaction for the negative point. Investigation shows that the reaction should be proportional to the quotient of the current by the velocity acquired by an ion under unit potential gradient. Now this velocity is inversely proportional to the pressure, so that the reaction should on this view be directly proportional to the pressure. This agrees with Arrhenius’ results when the point is positive. Again, the velocities of an ion in hydrogen”, air and carbonic acid at the same pressure are approximately inversely proportional to the square roots of their molecular weights, so that the reaction should be directly proportional to this quantity. This also agrees with Arrhenius’ results for the discharge from a positive point. The velocity of the negative ion is greater than that of a positive one under the same potential gradient, so that the reaction for the negative point should be less than that for a positive one, but the excess of the positive reaction over the negative is much greater than that of the velocity of the negative

ion over the velocity of the positive. There is, however, reason to believe that a considerable condensation takes place around the negative ion as a nucleus after it is formed, so that the velocity of the negative ion under a given potential gradient will be greater immediately after the ion is formed than when it has existed for some time. The measurements which have been made of the velocities of the ions relate to those which have been some time in existence, but a large part of the reaction will be due to the newly-formed ions moving with a greater velocity, and thus giving a smaller reaction than that calculated from the observed velocity.

With a given potential difference between the point and the neighbouring conductor the current issuing from the point is greater when the point is negative than when it is positive, except in oxygen, when it is less. Warburg (Sitz. Akad. d. Wissensch. zu Berlin, 1899, 50,

p. 770) has shown that the addition of a small quantity of oxygen to nitrogen produces a great diminution in the current from a negative point, but has very little effect on the discharge from a positive point. Thus the removal of a trace of oxygen made a leak from a negative point 50 times what it was before. Experiments with hydrogen and helium showed that impurities in these gases had a great effect on the current when the point was negative, and but little when it was positive. This suggests that the impurities, by condensing round the negative ions as" nuclei, seriously diminish their velocity. If a point is charged up to a high and rapidly alternating potential, such as can be produced by the electric oscillations started when a Leyden jar is discharged, then in hydrogen, nitrogen, ammonia and carbonic acid gas a conductor placed in the neighbourhood of the point gets a negative charge, while in air and oxygen it gets a positive one. There are two considerations which are of im- portance in connexion with this effect. The first is the velocity of the ions in the electric field, and the second the ease with which the ions can give up their charges to the metal point. The greater velocity of the negative ions would, if the potential were rapidly alternating, cause an excess of negative ions to be left in the surrounding gas. This is the case in hydrogen. If, however, the metal had a much greater tendency to unite with negative than with positive ions, such as we should expect to be the case in oxygen, this would act in the opposite direction, and tend to leave an excess of positive ions in the gas.

The Characteristic Curve for Discharge through Gases. — When a current of electricity passes through a metallic conductor the relation between the current and the potential difference is the exceedingly simple one expressed by Ohm's law; the current is proportional to the potential difference. When the current passes through a gas there is no such simple relation. Thus we have already mentioned cases where the current increased as the potential increased although not in the same proportion, while as we have seen in certain stages of the arc discharge the potential difference diminishes as the current increases. Thus the problem of finding the current which a given battery will produce when part of the circuit consists of a gas discharge is much more complicated than when the circuit consists entirely of metallic conductors. If, however, we measure the potential difference between the electrodes in the gas when different currents are sent through it, we can plot a curve, called the " characteristic curve," whose ordinates are the potential differences between the electrodes in the gas and the abscissae the corresponding currents. By the aid of this curve we can calculate the current produced when a given battery is connected up to the gas by leads of known resistance.

For let E be the electromotive force of the battery, R the resist- ance of the leads, i the current, the potential difference between the terms in the gas will be E -Ri. Let ABC (fig. 22) be the ” characteristic curve,” the ordinates being the potential difference between the terms in the gas, and the abscissae the current. Draw the line LM whose equation is E = E C — Ri, then the points where this line cuts the characteristic curves will give possible values of i and E, the current through the discharge tube and the potential difference between the terms. Some of these points may, however, correspond to an unstable position and be impossible to realize. The following method gives us a criterion by which we can distinguish the stable from the unstable positions. If the current

is increased by Si, the electromotive force which has to be overcome

by the battery is RSi + ˆSi. If R + dE/di is positive there will

be an unbalanced electromotive force round the circuit tending to stop the current. Thus the increase in the current will be stopped and the condition will be a stable one. If, however, R + dE/di is

negative there will be an un- balanced electromotive force tending to increase the current still further; thus the current will go on increasing and the condition will be unstable. Thus for stability R + dE/di must be positive, a condition first given by Kaufmann {Ann. der Phys. n, p. 158). The geometrical interpretation of this condition is that the straight line LM must, at the point where it cuts the char- acteristic curve, be steeper than the tangent to character- istic curve. Thus of the points

Fig. 22.

ABC where the line cuts the curve in fig. 22, A and C correspond to stable states and B to an unstable one. The state of things represented by a point P on the characteristic curve when the slope is downward cannot be stable unless there is in the external circuit a resistance greater than that represented by the tangent of the inclination of the tangent to the curve at P to the horizontal axis.

If we keep the external electromotive force the same and gradually

increase the resistance in the leads, the line L M will become steeper and steeper. C will move to the left so that the current will diminish ; when the line gets so steep that it touches the curve at C, any further increase in the resistance will produce an abrupt change in the current ; for now the state of things represented by a point near A' is the only stable state. Thus if the B C part of the curve corre- sponded to a luminous discharge and the A part to a dark discharge, we see that if the electromotive force is kept constant there is a minimum value of the current for the luminous discharge. If the , current is reduced below this value, the discharge ceases to be luminous, and there is an abrupt diminution in the current.

Cathode Rays. — When the gas in the discharge tube is at a very low pressure some remarkable phenomena occur in the neighbourhood of the cathode. These seem to have been first observed by Pliicker {Fogg. Ann. 107, p. 77; 116, p. 45) who noticed on the walls of the glass tube near the cathode a greenish phosphorescence, which he regarded as due to rays proceeding from the cathode, striking against the sides of the tube, and then travelling back to the cathode. He found that the action of a magnet on these rays was not the same as the action on the part of the discharge near the positive electrode. Hittorf {Pogg. Ann. 136, p. 8) showed that the agent producing the phosphor- escence was intercepted by a solid, whether conductor or insulator, placed between the cathode and the sides of the tube. He regarded the phosphorescence as caused by a motion starting from the cathode and travelling in straight lines through the gas. Goldstein {Monat. der Berl. Akad., 1876, p. 24) confirmed this discovery of Hittorf's, and further showed that a distinct, though not very sharp, shadow is cast by a small object placed near a large plane cathode. This is a proof that the rays pro- ducing the phosphorescence must be emitted almost normally from the cathode, and not, like the rays of light from a luminous surface, in all directions, for such rays would not produce a perceptible shadow if a small body were placed near the plane. Goldstein regarded the phosphorescence as due to waves in the ether, for whose propagation the gas was not necessary. Crookes {Phil. Trans., 1870, pt. i. p. 135; pt. ii. pp. 587, 661), who made many remarkable researches in this subject, took a different view. He regarded the rays as streams of negatively electrified particles projected normally from the cathode with great velocity, and, when the pressure is sufficiently low, reaching the sides of the tube, and by their impact producing phosphorescence and heat. The rays on this view are deflected by a magnet, because a magnet exerts a force on a charged moving body.

These rays striking against glass make it phosphorescent. The colour

of the phosphorescence depends on the kind of glass; thus the light from soda glass is a yellowish green, and that from lead glass blue. Many other bodies phosphoresce when exposed to these rays, and in particular the phosphorescence of some

gems, such as rubies and diamonds, is exceedingly vivid. The spectrum of the phosphorescent light is generally continuous, but Crookes showed that the phosphorescence of some of the rare earths, such as yttrium, gives a spectrum of bright bands, and he founded on this fact a spectroscopic method of great importance. Goldstein {Wied. Ann. 54, p. 371) discovered that the haloid salts of the alkali metals change colour under the rays, sodium chloride, for example, becoming violet. The coloration is a surface one, and has been traced by E. Wiedemann and Schmidt {Wied. Ann. 54, p. 618) to the formation of a sub- chloride. Chlorides of tin, mercury and lead also change colour in the same way. E. Wiedemann {Wied. Ann. 56, p. 201) discovered another remarkable effect, which he called thermo-luminescence; he found that many bodies after being exposed to the cathode rays possess for some time the power of becoming luminous when their temperature is raised to a point far below that at which they become luminous in the normal state. Substances belonging to the class called by van'tHoff solid solutions exhibit this property of thermo-luminescence to a remarkable extent. They are formed when two salts, one greatly in excess of the other, are simultaneously precipitated from a solution. A trace of MnSG\| in CaS0 4 shows very brilliant thermo-luminescence. The impact of cathode rays produces after a time perceptible changes in the glass. Crookes {Phil. Trans, pt. ii. 1879, P- 645) found that after glass has been phosphorescing for some time under the cathode rays it seems to get tired, and the phosphor-escence is not so bright as it was initially. Thus, for example, when the shadow of a Mal- tese cross is thrown on the walls of the tube as in fig. 23, if after the dis- charge has been going on for some time [the cross is shaken down or a new cathode used whose line of fire does not cut the cross, the pattern of the cross will still be seen on the glass, but it will now be brighter instead of darker than the surrounding portion. The portions shielded by the cross, not being tired by being made to phosphoresce for a long time, respond more vigorously to the stimulus than those portions which have not been protected. Skinner {Proc. Camb. Phil. Soc. ix. p. 371) and Thomson found on the glass which had been exposed to the rays gelatinous filaments, appar- ently silica, resulting from the reduction of the glass. A reducing action was also noticed by Villard {Journ. de phys. 3, viii. p. 140) and Wehnelt {Wied. Ann. 67, p. 421). It can be well shown by letting the rays fall on a plate of oxidized copperˆ when the part struck by the rays will

become bright. The rays heat bodies on which they fall, and if they are concentrated by using as a cathode a portion of a spherical surface, the heat at the centre becomes so great that a piece of platinum wire can be melted or a diamond charred. Measurements of the heating effects of the rays have been made by Thomson {Phil. Mag. [5], 44, p. 293) and Cady {Ann. der Phys. 1, p. 678). Crookes {Phil. Trans., 1879, pt. i. p. 152) showed that a vane mounted as in a radiometer is set in rotation by the rays, the direction of the rotation being the same as would be produced by a stream of particles proceeding from the cathode. The movement is not due to the momentum imparted to the vanes by the rays, but to the difference in temperature between the sides of the vanes, the rays making the side against which they strike hotter than the other.

Effect of a Magnet. — The rays are deflected by a magnet, so that the distribution of phosphorescence over the glass and the shape and position of the shadows cast by bodies in the tube are altered by the proximity of a magnet. The laws of magnetic deflection of these rays have been investigated by Pliicker {Pogg.

Fig. 23.

Ann. 103, p. 88), Hittorf (Pogg. Ann. 136, p. 213), Crookes {Phil. Trans., 1879, pt. 1, p. 557), and Schuster (Proc. Roy. Soc. 47, p. 526). The deflection is the same as that of negatively electrified particles travelling along the path of the rays. Such particles would in a magnetic field be acted on by a force at right angles te the direction of motion of the particle and also to the magnetic force, the magnitude of the force being proportional to the product of the velocity of the particle, the magnetic force, and the sine of the angle between these vectors. In this case we have seen that if the particle is not acted on by an electrostatic field, the path in a uniform magnetic field is a spiral, which, if the magnetic force is at right angles to the direction of projection of the particle, becomes a circle in the plane at right angles to the magnetic force, the radius being mv/He, where m, v, e are respectively the mass, velocity and charge on the particle, and H is the magnetic force. The smaller the difference of potential between the electrodes of the discharge tube the greater the deflection produced by a magnetic field of given strength, and as the difference of potential

rapidly increases with diminution of pressure, after a certain pressure has been passed, the higher the exhaustion of the tube the less the magnetic deflection of the rays. Birkeland (Comptes rendus, 1896, p. 492) has shown that when the discharge is from an induction coil the cathode rays produced in the tube at any one time are not equally deflected by a magnet, but that a narrow patch of phosphor- escence when deflected by a magnet is split up into several distinct patches, giving rise to what Birkeland calls the ” magnetic spectrum.” Strutt (Phil. Mag. 48, p. 478) has shown that this magnetic spectrum does not occur if the discharge of a large number of cells is employed instead of the coil. Thomson (Proc. Camb. Phil. Soc. 9, p. 243) has shown that if the potential difference between the electrodes is kept the same the magnetic deflection is independent of the nature of the gas filling the discharge tube; this was tested with gases so different as air, hydrogen, carbonic acid and methyl iodide.

Charge of Negative Electricity carried by the Rays. — We have seen that the rays are deflected by a magnet, as if they were particles charged with negative electricity. Perrin (Comptes rendus, 121, p. 1130) showed by direct experiment that a stream of negative electricity is associated with the rays. A modifica- tion made by Thomson of Perrin’s experiment is sketched in fig. 24 (Phil. Mag. 48, p. 478).

The rays start from the cathode A, and pass through a slit in a solid brass rod B fitting tightly into the neck of the tube. This rod is connected with earth and used as the anode. The rays after passing through the slit travel through the vessel C. D and E are

two insulated metal cylinders insulated from each other, and each having a slit cut in its face so as to enable the rays to pass into the inside of the inner cylinder, which is connected with an electro- meter, the outer cylinder being connected with the earth. The two cylinders are placed on the far side of the vessel, but out of the direct line of fire of the rays. When the rays go straight through the slit there is only a very small negative charge com- municated to the inner cylinder, but when they are deflected by a magnet so that the phosphorescent patch falls on the slit in the outer cylinder the inner cylinder Electrometer receives a very large negative

Pig. 24. charge, the increase coinciding

very sharply with the appearance of the phosphorescent patch on the slit. When the patch is so much deflected by the magnet that it falls below the slit, the negative charge in the cylinder again dis- appears.

This experiment shows that the cathode rays are accom- panied by a stream of negative electrification. The same apparatus can be used to show that the passage of cathode rays through a gas makes it a conductor of electricity. For if the induction coil is kept running and a stream of the rays kept steadily going into the

inner cylinder, the potential of the inner cylinder reaches a definite negative value below which it does not fall, however long the rays may be kept going. The cylinder reaches a steady state in which the gain of negative electricity from the cathode rays is equal to the loss by leakage through the conducting gas, the conductivity being produced by the passage of the rays through it. If the inner cylinder is charged up initially with a greater negative charge than corresponds to the steady state, on turning the rays on to the cylinder the negative charge will decrease and not increase until it reaches the steady state. The conductivity produced by the passage of cathode rays through a gas diminishes rapidly with the pressure. When rays pass through a gas at a low pressure, they are deflected by an electric field ; when the pressure of the gas is higher the conductivity it acquires when the cathode rays pass through it is so large that the potential gradient cannot reach a sufficiently high value to produce an appreciable deflection.

Thus the cathode rays carry a charge of negative electricity; the experiment described on page 87s (fig- 13) shows that they are deflected by an electric field as if they were negatively electrified, and are acted on by a magnetic force .in just the way this force would act on a negatively electrified body moving along the path of the rays. There is therefore every reason for believing that they are charges of negative electricity in rapid motion. By measuring the deflection produced by magnetic and electric fields we can determine the velocity with which these particles moved and the ratio of the mass of the particle to the charge carried by it.

We may conclude from the experiments that the value of m/e for the particles constituting the cathode rays is of the order i/i-7Xio 7 , and we have seen that m/e has the same value in all the other cases of negative ions in a gas at low pressure for which it has been measured — viz. for the ions produced when ultra-violet light falls on a metal plate, or when an incandescent carbon filament is surrounded by a gas at a low pressure, and for the |3 particles given out by radio-active bodies. We have also seen that the value of the charge on the gaseous ion, in all cases in which it has been measured — viz. the ions produced by Rbntgen and uranium radiation, by ultra-violet light, and by the discharge of electrification from a point — is the same in

magni- tude as the charge carried by the hydrogen atom in the electro- lysis of solutions. The mass of the hydrogen alone is, however, io~ 4 times this charge, while the mass of the carriers of negative electrification is only 1/1-7 Xio 7 times the charge; hence the mass of the carriers of the negative electrification is only x-,Vt °f the mass of the hydrogen atom. We are thus, by the study of the electric discharge, forced to recognize the existence of masses very much smaller than the smallest mass hitherto recognized.

Direct determinations of the velocity of the cathode rays have been made by J. J. Thomson (Phil. Mag. 38, p. 358), who measured the interval between the appearance of phosphorescence on two pieces of glass placed at a known distance apart, and by Maiorana (Nuovo Cimento, 4, 6, p. 336) and Battelli and Stefanini (Phys. Zeit. 1, p. 51), who measured the interval between the arrival of the negative charge carried by the rays at two places separated by a known distance. The values of the velocity got in this way are much smaller than the values got by the indirect methods previously described: thus J. J. Thomson at a fairly high pressure found the velocity to be 2X10 7 cm./sec. Maiorana found values ranging between io 7 and 6X10 7 cm./sec, and Battelli and Stefanini values ranging from 6X10 6 to 1-2X10'. In these methods it is very difficult to eliminate the effect of the interval which elapses between the arrival of the rays and the attainment by the means of detection, such as the phosphorescence of the glass or the deflection of the electrometer, of sufficient intensity to affect the senses.

Transmission of Cathode Rays through Solids — Lenard Rays. — It was for a long time believed that all solids were absolutely opaque to these rays, as Crookes and Goldstein had proved that very thin glass, and even a film of collodion, cast intensely black shadows. Hertz (Wied. Ann. 45, p. 28), however, showed that behind a piece of gold-leaf or aluminium foil an appreciable amount of phosphorescence occurred on the glass, and that the phosphorescence moved when a magnet was brought near. A most important advance was next made by Lenard (Wied. Ann. 51, p. 225), who got the cathode rays to pass from the inside of a discharge tube to the air outside. For this purpose he used a tube like that shown in fig. 25. The cathode K is an aluminium disc 1-2 cm. in diameter fastened to a stiff wire, which is surrounded by a glass tube. The anode A is a brass strip partly

Fig. 25.

surrounding the cathode. The end of the tube in front of the cathode is closed by a strong metal cap, fastened in with marine glue, in the middle of which a hole 1-7 mm. in diameter is bored, and covered with a piece of very thin aluminium foil about •0026 mm. in thickness. The aluminium window is in metallic contact with the cap, and this and the anode are connected with the earth. The tube is then exhausted until the cathode rays strike against the window. Diffuse light spreads from the window into the air outside the tube, and can be traced in a dark room for a distance of several centimetres. From the window, too, proceed rays which, like the cathode rays, can produce phosphorescence, for certain bodies phosphoresce when placed in the neighbourhood of the window. This effect is conveniently observed by the platino-cryanide screens used to detect Rontgen radiation. The properties of the rays outside the tube resemble in all respects those of cathode rays; they are deflected by a magnet and by an electric field, they ionize the gas through which they pass and make it a conductor of electricity, and they affect a photographic plate and change the colour of the haloid salts of the alkali metals. As, however, it is convenient to distinguish between cathode rays outside and inside the tube, we shall call the former Lenard rays. In air at atmospheric pressure the Lenard rays spread out very diffusely. If the aluminium window, instead of opening into the air, opens into another tube which can be exhausted, it is found that the lower the pressure of the gas in this tube the farther the rays travel and the less diffuse they are. By filling the tube with different gases Lenard showed that the greater the density of the gas the greater is the absorp- tion of these rays. Thus they travel farther in hydrogen than in any other gas at the same pressure. Lenard showed, too, that if he adjusted the pressure so that the density of the gas in this tube was the same — if, for example, the pressure when the tube was filled with oxygen was yV of the pressure when it was filled with hydrogen — the absorption was constant whatever the nature of the gas. Becker (Ann. der Phys. 17, p. 381) has shown that this law is only approximately true, the absorption by hydrogen being abnormally large, and by the inert monatomic gases, such as helium and argon, abnormally small. The distance to which the Lenard rays penetrate into this tube depends upon the pressure in the discharge tube; if the exhaustion in the latter is very high, so that there is a large potential difference between the cathode and the anode, and therefore a high velocity for the cathode rays, the Lenard rays will penetrate farther than when the pressure in the discharge tube is higher and the velocity of the

cathode rays smaller. Lenard showed that the greater the penetrating power of his rays the smaller was their magnetic deflection, and therefore the greater their velocity; thus the greater the velocity of the cathode rays the greater is the velocity of the Lenard rays to which they give rise. For very slow cathode rays the absorption by different gases departs altogether from the density law, so much so that the absorption of these rays by hydrogen is greater than that by air (Lenard, Ann. der Phys. 12, p. 732). Lenard (Wied. Ann. 56, p. 255) studied the passageof his rays through solids as well as through gases, and arrived at the very interesting result that the absorption of a substance depends only upon its density, and not upon its chemical com- position or physical state; in other words, the amount of absorption of the rays when they traverse a given distance depends only on the quantity of matter they cut through in the distance. McClelland (Proc. Roy. Soc. 61, p. 227) showed that the rays carry a charge of negative electricity, and M'Lennan measured the amount of ionization rays of given intensity produced in different gases, finding that if the pressure is adjusted so that the density of the different gases is the same the number of ions per cubic centimetre is also the same. In this case, as Lenard has shown, the absorption is the same, so that with the Lenard rays, as with uranium and probably with Rontgen rays, equal absorption corresponds to equal ionization. A

rays

convenient method for producing Lenard

of great

intensity has been described by Des Coudres (Wied. Ann. 62, p. 134).

Diffuse Reflection of Cathode Rays. — When cathode rays fall upon a surface, whether of an insulator or a conductor, cathode rays start from the surface in all directions. This phenomenon, which was discovered by Goldstein (Wied. Ann. 62, p. 134), has been investigated by Starke (Wied. Ann. 66, p. 49; Ann. der Phys. in, p. 75), Austin and Starke (Ann . der Phys. 9, p. 271), Campbell-Swinton (Proc. Roy. Soc. 64, p. 377), Merritt (Phys. Rev. 7, p. 217) and Gehrcke (Ann. der Phys. 8, p. 81) ; it is often regarded as analogous to the diffuse reflection of light from such a surface as gypsum, and is spoken of as the diffuse reflection of the cathode rays. According to Merritt and Austin and Starke the deviation in a magnetic field of these reflected rays is the same as that of the incident rays . The experiments, however, were confined to rays reflected so that the angle of reflection . was nearly equal to that of incidence. Gehrcke

showed that among the reflected rays there were a large number which had a much smaller velocity than the incident ones. According to Campbell- Swinton the ” diffuse ” reflection is accompanied by a certain amount of ” specular ” reflection. Lenard, who used slower cathode rays than Austin and Starke, could not detect in the scattered rays any with velocities comparable with that of the incident rays; he obtained copious supplies of slow rays whose speed did not depend on the angle of incidence of the primary rays (Ann. der Phys. 15, p. 485). When the angle of incidence is very oblique the surface struck by the rays gets positively charged, showing that the secondary rays are more numerous than the primary.

Repulsion of two Cathode Streams. — Goldstein discovered that if in a tube there are two cathodes connected together, the cathodic rays from one cathode are deflected when they pass near the other. Experiments bearing on this subject have been made by Crookes and Wiedemann and Ebert. The phenomena may be described by saying that the repulsion of the rays from a cathode A by a cathode B is only appreciable when the rays from A pass through the Crookes dark space round B. This is what we should expect if we remember that the electric field in the dark space is far stronger than in the rest of the discharge, and that the gas in the other parts of the tube is rendered a conductor by the passage through it of the cathode rays, and therefore incapable of transmitting electrostatic repulsion.

Scattering of the Negative Electrodes. — In addition to the cathode rays, portions of metal start normally from the cathode and form a metallic deposit on the walls of the tube. The amount of this deposit varies very much with the metal. Crookes (Proc. Roy. Soc. 50, p. 88) found that the quantities of metal torn from electrodes of the same size, in equal times, by the same current, are in the order Pd, Au, Ag, Pb, Sn, Pt, Cu, Cd Ni, In, Fe. ... In air there is very little deposit from an Al cathode, but it is abundant in tubes filled with the monatomic gases, mercury vapour, argon or helium. The scattering increases as the density of the gas diminishes. The particles of metal are at low pressures deflected by a magnet, though not nearly to the same extent as the cathode rays. According to Grandquist, the loss of weight of the cathode in a given time is proportional to the square of the current; it is therefore not, like the loss of the cathode in ordinary electrolysis, proportional to the quantity of current which passes through it.

Positive Rays or ” Canalslrahlen.” — Goldstein (Berl. Sitzungsb. 39, p. 691) found that with a perforated cathode certain rays occurred behind the J

cathode which were not ˆ§ T 1

appreciably deflected by a |

magnet; these he called |

Canal-strahlen, but we shall, |

for reasons which will appear „ 3

later, call them ” positive rays.”

Their appearance is well shown in fig. 26, taken from a paper by Wehnelt (Wied. Ann. 67, p. 421) in which they are represented at B. Goldstein found

m = f.

?Z B

Fig. 26.

ago

that their colour depends on the gas in which they are formed, being gold-colour in air and nitrogen, rose-colour in hydrogen, yellowish rose in oxygen, and greenish gray in carbonic acid.

The colour of the luminosity due to postive rays is not in general the same as that due to anode rays; the difference is exceptionally well marked in helium, where the cathode ray luminosity is blue while that due to the positive rays is red. The luminosity produced when the rays strike against solids is also quite distinct. The cathode rays make the body emit a continuous spectrum, while the spectrum produced by the positive rays often shows bright lines. Thus lithium chloride under cathode rays gives out a steely blue light and the spectrum is continuous, while under the positive rays the salt gives out a brilliant red light and the spectrum shows the red helium line. It is remarkable that the lines on the spectra of the alkali metals are much more easily produced when the positive rays fall on the oxide of the metal than when they fall on the metal itself. Thus when the positive rays fall on a pool of the liquid alloy of sodium and potassium the specks of oxide on the surface shine with a bright yellow light while the untarnished part of the surface is quite dark.

W. Wien (Wied. Ann. 65, p. 445) measured the values of e/m for the particles forming the positive rays. Other measure- ments have been made by Ewers (Wied. Ann. 69, p. 167) and J. J. Thomson (Phil. Mag. 13, p. 561). The differences between the values of e/m for the cathode and positive rays are very remarkable. For cathode rays whose velocity does not approach that of light, e/m is always equal to 1 • 7 X io 8 , while for the positive rays the greatest value of this quantity yet observed is io 4 , which is also the value of elm for the hydrogen ions in the electro- lysis of dilute solutions. In some experiments made by J. J. Thomson (Phil. Mag., 14, p. 359) it was found that when the pressure of the gas was not too low the bright spot produced by the impact of a pencil of these rays on a phosphorescent screen is deflected by electric and magnetic forces into a continuous band extending on both sides of the undeflected position. The portion on one side is in general much fainter than that on the other. The direction of this deflection shows that it is produced by particles charged with negative electricity, while the brighter band is due to particles charged with positive electricity. The negatively electrified particles which produce the band c.c are not corpuscles, for from the electric and magnetic deflections we can find the value of e/m. As this proves to be equal to io 4 , we see that the mass of the carrier of the negative charge is comparable with that of an atom, and so very much greater than that of a corpuscle. At very low pressures part of the phosphorescence disappears, while the upper portion breaks up into two patches (fig. 27). For one of these the maximum value of elm is io 4 and for the other 5X10 3 . At low pressures the appearance of the patches and the values of e/m are the same whether the tube is filled originally with air, hydrogen or helium. In some of the experiments the tube was exhausted until the pressure was too low to allow the discharge to pass. A very small quantity of the gas under investigation was then admitted into the tube, just sufficient to allow the discharge to pass, and the deflection of the phosphorescent patch measured. The following gases were admitted into the tube, air, carbonic oxide, oxygen, hydrogen, helium, argon and neon, but whatever the gas the appearance of the phosphorescence was the same; in every case there w r ere two patches, for one of which e/m= io 4 and for the other e/m=5Xio 3 . In helium at higher pressures another patch was observed, for which e/m=2-5Xio 8 . The continuous band into which the phosphorescent spot is drawn out when the pressure is not exceedingly low, which involves the existence of particles for which the mean value of e/m varies from zero to io 4 , can be explained as follows. The rays on their way to the phosphorescent screen have to pass through gas which is ionized by the passage through it of the positive rays; this gas will therefore contain free corpuscles. The

particles which constitute the rays start with a charge of positive electricity. Some of these particles in their journey through the

gas attract a corpuscle whose negative charge neutralizes the positive charge on the particle. The particles when in this neutral state may be ionized by collision and reacquire a positive charge, or by attracting another particle may become negatively charged, and this process may be repeated several times on their journey to the phosphorescent screen. Thus some of the particles, instead of being positively charged for the whole of the time they are exposed to the electric and magnetic forces, may be for a part of that time without a charge or even have a negative charge. The deflection of a particle is proportional to the average value of its charge whilst under the influence of the deflecting forces. Thus if a particle is without a charge for a part of the time, its deflection will be less than that of a particle which has retained its positive charge for the whole of its journey, while the few particles which have a negative charge for a longer time than they have a positive will be deflected in the opposite direction to the main portion and will produce the tail (fig- 27).

Fig. 27.

A similar explanation will apply to the positive rays discovered by Villard (Comptes rendus, 143, p. 674) and J. J. Thomson (Phil. Mag. 13, p. 359), which travel in the opposite direction to the rays we have been considering, i.e. they travel away from the cathode and in the direction of the cathode's rays; these rays are sometimes called " retrograde " rays. These as far as has been observed have always the same maximum value of e/m, i.e. io 4 , and there are a considerable number of negative ones always mixed with them. The maximum velocity of both the positive and retrograde rays is about. 2X10 8 cm. /sec. and varies very little with the potential difference between the electrodes in the tube in which they are produced (J. J. Thomson, Phil. Mag., Dec. 1909).

The positive rays show, when the pressure is not very low, the line spectrum of the gas through which they pass. An exceed- ingly valuable set of observations on this point have been made by Stark and his .pupils (Physik. Zeit. 6, p. 892; Ann. der Phys. 21, pp. 40, 457). Stark has shown that in many gases, notably hydrogen, the spectrum shows the Doppler effect, and he has been able to calculate in this way the velocity of the positive rays.

Anode Rays. — Gehrcke and Reichenhein (Ann. der Phys. 25, p. 861) have found that when the anode consists of a mixure of sodium and

lithium chloride raised to a high temperature either by the discharge itself or by an independent heating circuit, very conspicuous rays come from the anode when the pressure of the gas in the discharge tube is very low, and a large coil is used to produce the discharge. The determination of e/m for these rays showed that they are positively charged atoms of sodium or lithium, moving with very considerable velocity; in some of Gehrcke's experiments the maximum velocity was as great as i-8Xio 7 cm. /sec. though the average was about io 7 cm. / sec. These velocities are less than those of the positive rays whose maximum velocity is about 2X10 8 cm. /sec. (J. J. T.)

CONDUCTION OF HEAT. The mathematical theory of con- duction of heat was developed early in the 19th century by Fourier and other workers, and was brought to so high a pitch of excellence that little has remained for later writers to add to this department of the. subject. In fact, for a considerable period, the term " theory of heat " was practically synonymous with the mathematical treatment of a conduction. But later experimental researches have shown that the simple assumption of constant coefficients of conductivity and emissivity, on which the mathe- matical theory is based, is in many respects inadequate, and the special mathematical methods developed by J. B. J. Fourier need not be considered in detail here, as they are in many cases of mathematical rather than physical interest. The main object of

the present article is to describe more recent work, and to discuss experimental difficulties and methods of measurement.

1. Mechanism of Conduction. — Conduction of heat implies transmission by contact from one body to another or between contiguous particles of the same body, but does not include transference of heat by the motion of masses or streams of matter from one place to another. This is termed convection, and is most important in the case of liquids and gases owing to their mobility. Conduction, however, is generally understood to include diffusion of heat in fluids due to the agitation of the ultimate molecules, which is really molecular convection. It also includes diffusion of heat by internal radiation, which must occur in transparent substances. In measuring conduction of heat in fluids, it is possible to some extent to eliminate the effects of molar con- vection or mixing, but it would not be possible to distinguish between diffusion, or internal radiation, and

conduction. Some writers have supposed that the ultimate atoms are conductors, and that heat is transferred through them when they are in contact. This, however, is merely transferring the properties of matter in bulk to its molecules. It is much more probable that heat is really the kinetic energy of motion of the molecules, and is passed on from one to another by collisions. Further, if we adopt W. Weber's hypothesis of electric atoms, capable of diffusing through metallic bodies and conductors of electricity, but capable of vibration only in non-conductors, it is possible that the ultimate mechanism of conduction may be reduced in all cases to that of diffusion in metallic bodies or internal radiation in dielectrics. The high conductivity of metals is then explained by the small mass and high velocity of diffusion of these electric atoms. Assuming the kinetic energy of an electric atom at any temperature to be equal to that of a gaseous molecule, its velocity, on Sir J. J. Thomson's estimate of the mass, must be upwards of forty times that of the hydrogen molecule.

2. Law of Conduction. — The experimental law of conduction, which forms the basis of the mathematical theory, was established in a qualitative manner by Fourier and the early experimentalists. Although it is seldom explicitly stated as an experimental law, it should really be regarded in this light, and may be briefly worded as follows: " The rate of transmission of heat by conduction is proportional to the temperature gradient."

The " rate of transmission of heat " is here understood to mean the quantity of heat transferred in unit time through unit area of cross-section of the substance, the unit area being taken perpendicular to the lines of flow. It is clear that the quantity transferred in any case must be jointly proportional to the area and the time. The " gradient of temperature " is the fall of temperature in degrees per unit length along the lines of flow. The thermal conductivity of the substance is the constant ratio of the rate of transmission to the temperature gradient. To take the simple case of the " wall " or flat plate considered by Fourier for the definition of thermal conductivity, suppose that a quantity of heat Q passes in the time T through an area A of a plate of conductivity k and thickness x, the sides of which are constantly maintained at temperatures 6′ and 6". The rate of transmission of heat is Q/AT, and the temperature gradient, supposed uniform, is (d' — d")lx, so that the law of conduction leads at once to the equation

QIAT = k(e'-e"(/x = kdeidx. (1)

This relation applies accurately to the case of the steady flow of heat

in parallel straight lines through a homogeneous and isotropic solid, the isothermal surfaces, or surfaces of equal temperature, being planes perpendicular to the lines of flow. If the flow is steady, and the temperature of each point of the body invariable, the rate of transmission must be everywhere the same. If the gradient is not uniform, its value may be denoted by ddjdx. In the steady state, the product kdd/dx must be constant, or the gradient must vary inversely as the conductivity, if the latter is a function of 6 or x. One of the simplest illustrations of the rectilinear flow of heat is the steady outflow through the upper strata of the earth's crust, which may be considered practically plane in this connexion. This outflow of heat necessitates a rise of temperature with increase of depth. The corresponding

gradient is of the order of i° C. in 100 ft., but varies inversely with the conductivity of the strata at different depths.

3. Variable State. — A different type of problem is presented in those cases in which the temperature at each point varies with the time, as is the case near the surface of the soil with variations in the external conditions between day and night or summer and winter. The flow of heat may still be linear if the horizontal layers of the soil are of uniform composition, but the quantity flowing through each layer is no longer the same. Part of the heat is used up in changing the temperature of the succes- sive layers. In this case it is generally more convenient to consider as unit of heat the thermal capacity c of unit volume, or that quantity which would produce a rise of one degree of temperature in unit volume of the soil or substance considered. If Q is expressed in terms of this unit in equation (1), it is neces- sary to divide by c, or to replace k on the right-hand side by the ratio k/c. This ratio determines the rate of diffusion of tempera- ture, and is called the thermometric conductivity or, more shortly, the diffusivity. The velocity of propagation of temperature waves will be the same under similar conditions in two substances which possess the same diffusivity, although they may differ in conductivity.

4. Emissivity. — Fourier defined another constant expressing the rate of loss of heat at a bounding surface per degree of differ- ence of temperature between the surface of the body and its surroundings. This he called the external conductivity, but the term emissivity is more convenient. Taking Newton's law of cooling that the rate of loss of heat is simply proportional to the excess of temperature, the emissivity would be independent of the temperature. This is generally assumed to be the case in mathematical problems, but the assumption is admissible only in rough work, or if the temperature difference is

small. The emissivity really depends on every variety of condition, such as the size, shape and position of the surface, as well as on its nature; it varies with the rate of cooling, as well as with the temperature excess, and it is generally so difficult to calculate, or to treat in any simple manner, that it forms the greatest source of uncertainty in all experimental investigations in which it occurs.

5. Experimental Methods. — Measurements of thermal con- ductivity present peculiar difficulties on account of the variety of quantities to be observed, the slowness of the process of conduction, the impossibility of isolating a quantity of heat, and the difficulty of exactly realizing the theoretical conditions of the problem. The most important methods may be classified roughly under three heads — (1) Steady Flow, (2) Variable Flow, (3) Electrical. The methods of the first class may be further subdivided according to the form of apparatus employed. The following are some of the special cases which have been utilized experimentally : —

6. The “Wall” or Plate Method. — This method endeavours to realize the conditions of equation (1), namely, uniform rectilinear How. Theoretically this requires an infinite plate, or a perfect heat insulator, so that the lateral flow can be prevented or rendered negligible. This condition can generally be satisfied with sufficient approximation with plates of reasonable dimensions. To find the conductivity, it is necessary to measure all the quantities which occur in equation (1) to a similar order of accuracy. The area A from which the heat is collected need not be the whole surface of the plate, but a measured central area where the flow is most nearly uniform. This variety is known as the ” Guard-Ring ” method, but it is generally rather difficult to determine the effective area of the ring. There is little difficulty in measuring the time of flow, provided that it is not too short. The measurement of the temperature gradient in the plate generally presents the greatest difficulties. If the plate is thin, it is necessary to measure the thickness with great care, and it is necessary to assume that the temperatures of the surfaces are the same as those of the media with which they are in contact, since there is no room to insert thermometers in the plate itself. This assumption does not present serious errors in the case of bad conductors, such as glass or wood, but has given rise to large mistakes in the case of metals. The conductivities of thin slices of crystals have been measured by C. H. Lees {Phil. Trans., 1892) by pressing them between plane amalgamated surfaces of metal. This gives very good contact, and the conductivity of the metal being more than 100 times that of the crystal, the temperature of the surface is determinate.

In applying the plate method to the determination of the conductivity of iron, E. H. Hall proposed to overcome this difficulty by coating the plate thickly with copper on both sides, and deducing the difference of temperature between the two surfaces of junction of the iron and the copper from the thermo-electric force observed by means of a number of fine copper wires attached to the copper coatings at different points of the disk. The advantage of the thermo-junction for this purpose is that the distance between the surfaces of which the temperature-difference is measured, is very exactly defined. The disadvantage is that the thermo-electric force is very small, about ten-millionths of a volt per degree, so that a small accidental disturbance may produce a serious error with a difference of temperature of only 1° between the junctions. The, chief un- certainty in applying this method appears to have arisen from variations of temperature at different parts of the surface, due to inequalities in the heating or cooling effect of the stream of water flowing over the surfaces. Uniformity of temperature could only be secured by using a high velocity of flow, or violent stirring. Neither of these methods could be applied in this experiment. The tempera- tures indicated by the different pairs of wires differed by as much as 10 %, but the mean of the whole would probably give a fair average. The heat transmitted was measured by observing the flow of water (about 20 gm./sec.) and the rise of temperature (about o-5°C.) in one of the streams. The results appear to be entitled to considerable weight on account of the directness of the method and the full consideration of possible errors. They were as follows : —

Cast-iron, k =0-1490 C.G.S. at 30 C, temp, coef.- 0-00075. Pure iron, k = 0-1530 at 30 C, temp, coef- 0-0003.

The disks were 10 cms. in diam., and nearly 2 cms. thick, plated with copper to a thickness of 2 mm. The cast-iron contained about 3-5% of carbon, 1-4% of silicon, and 0-5% of manganese. It should be observed, however, that he obtained a much lower value for cast-iron, namely -105, by J. D. Forbes's method, which agrees better with the results given in § 10 below.

7. Tube Method. — If the inside of a glass tube is exposed to steam, and the outside to a rapid current of water, or vice versa, the temperatures of the surfaces of the glass may be taken to be very approximately equal to those of the water and steam, which may be

easily observed. If the thickness of the glass is small compared with the diameter of the tube, say one-tenth, equation (1) may be applied with sufficient approximation, the area A being taken as the mean between the internal and external surfaces. It is necessary that the thickness x should be approximately uniform. Its mean value may be determined most satisfactorily from the weight and the density. The heat Q transmitted in a given time T may be deduced from an observation of the rise of temperature of the water, and the amount which passes in the interval. This is one of the simplest of all methods in practice, but it involves the measurement of several different quantities, some of which are difficult to observe accurately. The employment of the tube form evades one of the chief difficulties of the plate method, namely, the

uncertainty of the flow at the boundary of the area considered. Unfortunately the method cannot be applied to good conductors, like the metals, because the difference of temperature between the surfaces may be five or ten times less than that between the water and steam in contact with them, even if

Table I.-

*-To Steam Thermometer

-rnr

\7o Separator

Fig. 1.

the water is ener- getically stirred. 8. Cylinder Method. — A variation of the tube method, which can be applied to metals and good con- ductors, depends on the employment of a thick cylinder with a small axial hole in place of a thin tube. The actual tempera- ture of the metal itself can then be observed by inserting thermometers or thermo-couples at measured dis- tances from the centre. This method Water has been applied by H. L. Callendar > ‘”’•* and J. T. Nicolson (Brit. Assoc. Report, 1897) to cylinders of cast-iron and mild steel, 5 in. in diam. and 2 ft. long, with 1 in. axial holes. The surface of the central hole was heated by steam under pressure, and the total flow of

flow in this method are radial. The isothermal surfaces are coaxial cylinders. The areas of successive surfaces vary as their radii, hence the rate of transmission Q/AT varies inversely as the radius r, and is Q/2«-n\ if / is the length of the cylinder, and Q the total heat, calculated from the condensation of steam observed in a time T. The

outward gradient is d$/dr, and is negative if the central hole is heated. We have therefore the simple equation

-kd6/dr = Ql2irrlT. (2)

If k is constant the solution is evidently 6 = a log r+b, where a = -Q/2irklT, and b and k are determined from the known values of the temperatures observed at any two distances from the axis. This gives an average value of the conductivity over the range, but it is better to observe the temperatures at three distances, and to assume k to be a linear function of the temperature, in which case the solution of the equation is still very simple, namely,

6+ieBˆa log r+b, (3)

where e is the temperature-coefficient of the conductivity. The chief difficulty in this method lay in determining the effective distances of the bulbs of the thermometers from the axis of the cylinder, and in ensuring uniformity of flow of heat along different radii. For these reasons the temperature-coefficient of the conduc- tivity could not be determined satisfactorily on this particular form of apparatus, but the mean results were probably trustworthy to I or 2 %. They refer to a temperature of about 60° C, and were —

Cast-iron, 0-109; mild steel, 0-119, C.G.S.

These are much smaller than Hall's results. The cast-iron con- tained nearly 3 % each of silicon and graphite, and 1 % each of phosphorus and manganese. The steel contained less than 1 % of foreign materials. The low value for the cast-iron was confirmed by two entirely different methods given below.

9. Forbes's Bar Method. — Observation of the steady distribution of temperature along a bar heated at one end was very early employed by Fourier, Despretz and others for the comparison of conductivities. It is the most convenient method, in the case of good conductors, on account of the great facilities which it permits for the measurement of the temperature gradient at different points ; but it has the disad- vantage that the results depend almost entirely on a knowledge of the external heat loss or emissivity, or, in comparative experiments, on the assumption that it is the same in different cases. The method of Forbes (in which the conductivity is deduced from the steady distribution of temperature on the assumption that the rate of loss of heat at each point of the bar is the same as that observed in an auxiliary experiment in which a short bar of the same kind is set to

cool under conditions which are supposed to be identical) is well known, but a consideration of its weak points is very instructive, and the results have been most remarkably misunderstood and mis- quoted. The method gives directly, not k, but k/c. P. G. Tait repeated Forbes's experiments, using one of the same iron bars, and endeavoured to correct his results for the variation of the specific heat c. J. C. Mitchell, under Tait's direction, repeated the experi- ments with the same bar nickel-plated, correcting the thermometers for stem-exposure, and also varying the conditions by cooling one end, so as to obtain a steeper gradient. The results of Forbes, Tait and Mitchell, on the same bar, and Mitchell's two results with the end of the bar " free " and " cooled," have been quoted as if they referred to different metals. This is not very surprising, if the values in the following table are compared :—

Thermal Conductivity of Forbes's Iron Bar D (1-25 inches square). C.G.S. Units.

Temp. Cent.

Uncorrected for Variation of c.

Corrected for Variation of c.

Forbes.

Tait.

Mitchell.

Forbes.

Tait.

Mitchell.

Free.

Cooled.

Free.

Cooled.

0° IOO° 200°

•207 •157 ■136

•231 •198 •176

•197

-178

•160

•178 •190 •181

•213 •168 •152

•238 •212 ■196

•203 •190 •178

•184 •197 ■210

heat was determined by observing the amount of steam condensed in a given time. The outside of the cylinder was cooled by water circulating round a spiral screw thread in a narrow space with high velocity driven by a pressure of 120 tt> per sq. in. A very uniform surface temperature was thus obtained. The lines of

The variation of c is uncertain. The values credited to Forbes are those given by J. D. Everett on Balfour Stewart's authority. Tait gives different figures. The values given in the column headed " cooled " are those found by Mitchell with one end of the bar cooled. The discrepancies are chiefly due to the error of the fundamental assumption that the rate of cooling is the same at the same temperature under the very different conditions existing in the two parts of the experiment. They are also partly caused by the large uncertainties of the corrections, especially those of the mercury thermometers under the peculiar conditions of the experiment. The results of Forbes are interesting historically as having been the first approximately correct determinations of conductivity in absolute value. The same method was applied by R. W. Stewart {Phil. Trans., 1892), with the substitution of thermo-couples (following Wiedemann) for mercury thermometers. This avoids the very uncertain correction for stem-exposure, but it is doubtful how far

an insulated couple, inserted in a hole in the bar, may be trusted to

attain the true temperature. The other uncertainties of the method remain. R. W. Stewart found for pure iron, £ = -175 (1 — -0015 t) C.G.S. E. H. Hall using a similar method found for cast-iron at 50 C. the value -105, but considers the method very uncertain as ordinarily practised.

10. Calorimetric Bar Method. — To avoid the uncertainties of surface loss of heat, it is necessary to reduce it to the rank of a small correction by employing a large bar and protecting it from loss of heat. The heat transmitted should be measured calori- metrically, and not in terms of the uncertain emissivity. The apparatus shown in fig. 2 was constructed by Callendar and Nicolson with this object. The bar was a special sample of cast-iron, the conductivity of which was required for some experiments on the condensation of steam {Proc. Inst. C.E., 1898). It had a diameter of 4 in., and a length of 4 ft. between the heater and the calorimeter. The emissivity was reduced to one-quarter by lagging the bar like a steam-pipe to a thickness of I in. The heating vessel could be maintained at a steady temperature by high-pressure steam. The other end was maintained at a temperature near that of the air by a steady stream of water flowing through a well-lagged vessel surrounding the bar. The heat transmitted was measured by observ- ing the difference of temperature between the inflow and the outflow, and the weight of water which passed in a given time. The gradient near the entrance to the calorimeter was deduced from observations with five thermometers at suitable intervals along the bar. The

m \ T ° r*

144 =

T,

%J\

<3

Scale, }i inch = 1 foot

Fig. 2.

Stirrer-

results obtained by this method at a temperature of 40 C. varied from -116 to -118 C.G.S. from observations on different days, and were probably more accurate than those obtained by the cylinder method.

The same apparatus was employed in another series of experiments by A. J. Angstrom's method described below.

1 1 . Guard-Ring Method. — This may be regarded as a variety of the plate method, but is more particularly applicable to good con- ductors, which require the use of a thick plate, so that the tempera- ture of the metal may be observed at different points inside it. A. Berget (Journ. Phys. vii. p. 503, 1888) applied this method directly to mercury, and determined the conductivity of some other metals by comparison with mercury. In the case of mercury he employed a column in a glass tube 13 mm. in diam. surrounded by a guard cylinder of the same height, but 6 to 12 cm. in diam. The mean section of the inner column was carefully determined by weigh- ing, and found to be 1-403 sq. cm. The top of the mercury was heated by steam, the lower end rested on an iron plate cooled by ice. The temperature at different heights was measured by iron wires forming thermo-j unctions with the mercury in the inner tube. The heat-flow through the central column amounted to about 7-5 calories in 54 seconds, and was measured by continuing the tube through the iron plate into the bulb of a Bunsen ice calorimeter, and observ- ing with a chronometer to a fifth of a second the time taken by the mercury to contract through a given number of divisions. The calorimeter tube was calibrated by a thread of mercury weighing 19 milligrams, which occupied eighty-five divisions. The contrac- tion corresponding to the melting of 1 gramme of ice was assumed to be -0906 c.c, and was taken as being equivalent to 79 calories (1 calorie = 15-59 rngrm. mercury). The chief uncertainty of this method is the area from which the heat is collected, which probably exceeds that of the central column, owing to the disturbance of the linear flow by the projecting bulb of the calorimeter. This would tend to make the value too high, as may be inferred from the following results : —

Mercury, k =0-02015 C.G.S. Berget. „ 4 = 0-01479 „ Weber.

,, 4 = 0-0177 „ Angstrom.

12. Variable-Flow Methods. — In these methods the flow of heat is deduced from observations of the rate of change of temperature with time in a body exposed to known external or boundary conditions. No calorimetric observations are required, but the results are obtained in terms of the thermal capacity of unit volume c, and the measurements give the diffusivity

k/c, instead of the calorimetric conductivity k. Since both k and c are generally variable with the temperature, and the mode of variation of

either is often unknown, the results of these methods are generally less certain with regard to the actual

Curves showing the Variation; of Tem/iercUure > witft/ Be/Ufa . al various dales.

■it

zr

£

4

i-

r*

s£

jt

j

&*

,

/

i&^ r

1

**&*

,\

f

I

A

Igt

fttfe.

32′ 3 5 4

0″ \K|| 4S*F*it. SO* SS*

Fig. 3.

flow of heat. As in the case of steady-flow methods, by far the simplest example to consider is that of the linear flow of heat in an infinite solid, which is most nearly realized in nature in the propagation of temperature waves in the surface of the soil. One of the best methods of studying the flow of heat in this case is to draw a series of curves showing the variations of temperature with depth in the soil for a series of consecutive days. The curves given in fig. 3 were obtained from the readings of a number of platinum thermometers buried in undisturbed soil in horizontal positions at M'Gill College, Montreal.

The method of deducing the diffusivity from these curves is as follows: — The total quantity of heat absorbed by the soil per unit area of surface between any two dates, and any two depths, x' and x", is equal to c times the area included between the corresponding curves. This can be measured graphically without any knowledge of the law of variation of the surface temperature, or of the laws of propagation of heat waves. The quantity of heat absorbed by the stratum (x' x") in the interval considered can also be expressed in terms of the calorimetric conductivity k. The heat transmitted through the plane x is equal per unit area of surface to the product of k by the mean temperature gradient (de/dx) and the interval of time, T— T'. The mean temperature gradient is found by plotting the curves for each day from the daily observations. The heat absorbed is the difference of the quantities transmitted through the bounding planes of the stratum. We thus obtain the simple equation —

k'idti'ldx') -k"(d6"/dx") =c (area between curves) /(T-T'). (4) by means of which the average value of the diffusivity k/c can be found for any convenient interval of time, at different seasons of the year, in different states of the soil.

For the particular soil in question it was found that the diffusivity varied enormously with the degree of moisture, falling as low as -ooio C.G.S. in the winter for the surface layers, which became extremely dry under the protection of the frozen ice and snow from December to March, but rising to an average of -0060 to -0070 in the spring and autumn. The greater part of the diffusion of heat was certainly due to the percolation of water. On some occasions, owing to the sudden melting of a surface layer of ice and snow, a large quantity of cold

water, percolating rapidly, gave for a short time values of the diffusivity as high as -0300. Excluding these exceptional cases, however, the variations of the diffusivity appeared to follow the variations of the seasons with considerable regularity in successive years. The presence of water in the soil always increased the value of k/c, and as it necessarily increased c, the increase of k must have been greater than that of kfc.

13. Periodic Flow of Heat. — The above method is perfectly general, and can be applied in any case in which the requisite observations can be taken. A case of special interest and importance is that in which the flow is periodic. The general characteristics of such a flow are illustrated in fig. 4, showing the propagation of temperature waves due to diurnal variations in the temperature of the surface. The daily range of tempera- ture of the air and of the surface of the soil was about 20 F. On a sunny day, the temperature reached a maximum about 2 p.m. and a minimum about 5 A.M. As the waves were propagated downwards through the soil the amplitude rapidly

diminished, so that at a depth of only 4 in. it was already reduced to about 6° F., and to less than 2° at 10 in. At the same time, the epoch of maximum or minimum was retarded, about 4 hours at 4 in., and nearly 12 hours at 10 in., where the maximum temperature was reached between 1 and 2 a.m. The form of the wave was also changed. At 4 in. the rise was steeper than

i/ivttflm yjuua'i wan mag iow

r

CWYC3 0/ ■fUUVl'.JOW

/

,n,

r

1

f

\

t

\

/

\

1

[

r

T

s.

/

^~

1

r

\

^

&

f

v

V-

/

3

-

‘

N

L_

/

\

y

\

‘

\

!

’

S

/

\J

/

\i

‘

6

/

10

Hk

$,

60’

/

/

v >

A

/

“V

_ >

i

/

•

•

r

is

1

1

•fO

id

•

1

^

3

50

Mm.

*Tues.r^*

*fVed-S^*

Thurs.9''*

*m.w 1 **

Fig. 4.

the fall, at 10 in. the reverse was the case. This is due to the fact that the components of shorter period are more rapidly propagated. For instance, the velocity of propagation of a wave having a period of a day is nearly twenty times as great as that of a wave with a period of one year; but on the other hand the penetration of the diurnal wave is nearly twenty times less, and the shorter waves die out more rapidly.

14. A Simple-Harmonic or Sine Wave is the only kind which is propagated without change of form. In treating mathematically the propagation of other kinds of waves, it is necessary to analyse them into their simple-harmonic components, which may be treated as being propagated independently. To illustrate the_ main features of the calculation, we may suppose that the surface is subject to a simple-harmonic cycle of temperature variation, so that the tempera- ture at any time / is given by an equation of the form —

0-0 o = Asin 2T«/ =Asin 271-i/T, (5)

where 0o is the mean temperature of the surface, A the amplitude of the cycle, n the frequency, and T the period. Inthis simple case the temperature cycle at a depth x is a precisely similar curve of the same period, but with the amplitude reduced in the pro- portion e mx , and the phase retarded by the fraction mx/2ir of a cycle. The index-coefficient m is V (irnc/k). The wave at a depth x is represented analytically by the equation

0—80 = Ae-™ sin (2vnt — mx) . (6)*

A strictly periodic oscillation of this kind occurs in the working of a steam engine, in which the walls of the cylinder are exposed to regular fluctuations of temperature with the admission and release of steam. The curves in fig. 5 are drawn for a particular case, but they apply equally to the propagation of a simple-harmonic wave of any period in any substance changing only the scale on which they are drawn. The dotted boundary curves have the equation = =te-" w , and show the rate of diminution of the amplitude of the temperature oscillation with depth in the metal. The wave-length in fig. 4 is o-6o in., at which depth the amplitude of the variation is reduced to less than one five-hundredth part (e~V) of that at the surface, so that for all practical purposes the oscillation may be neglected beyond one wave-length At half a wave-length the amplitude is only ˆrd of that at the surface. The wave-length in any case is 2ir/m.

The diffusivity can be deduced from observations at different depths x' and x , by observing the ratio of the amplitudes.ˆ which is gˆ 1 '-") for a simple-harmonic wave. The values obtained in this way for waves having a period of one second and a wave-length of half an inch agreed very well with those obtained in the same cast-iron by Angstrom's method (see below), with waves having a period of 1 hour and a length of 30 in. This agreement was a very satisfactory test of the accuracy of the fundamental law of con- duction, as the gradients and periods varied so widely in the two cases.*

15. Annual Variation. — A similar method has frequently been

applied to the study of variations of soil-temperatures by. harmonic analysis of the annual waves. But the theory is not strictly applicable, as the phenomena are not accurately periodic, and the state of the soil is continually varying, and differs at different depths, particularly in regard to its' degree of wetness. An additional difficulty arises in the case of observations made with long mercury thermometers buried in vertical holes, that the correction for the expansion of the liquid in the long stems is uncertain, and that the holes may serve as channels for percola- tion, and thus lead to exceptionally high values. The last error

CTMlltKACfc "

U-

t

\

oriNnow

ˆ

~" ■

\ ■*

\ \

v

\

•

MCAN TEMK ft AT SURFACE v

:m *«.

;a

-

—— —

M£> N TE»

P.

s

S^”

“”” ‘

■-C»f WALL

^”*— •■

/

/£’

/ j

-s”

/ /

t

MINIMUM EAT ABSORBED

yft

J-

1

-id”.

0.

DEPTH-

0.20

INCHES.

OJO

040

0.50

60

Spwd, 42 revolutions per minute ; range, 20° at surface.

Fig. 5.

is best avoided by employing platinum thermometers buried horizontally. In any case results deduced from the annual wave must be expected to vary in different years according to the distribution of the rainfall, as the values represent averages depending chiefly on the diffusion of heat by percolating water. For this reason observations at different depths in the same locality often give very concordant results for the same period, as the total percolation and the average rate are necessarily nearly the same for the various strata, although the actual degree of wetness of each may vary considerably. The following are a few typical values for sand or gravel deduced from the annual wave in different localities: —

Table II. — Diffusivity of Sandy Soils. C.G.S. Units.

Observer.

Kelvin, i860 . Neumann, 1863 Everett, i860 . Angstrom, 1 861

Angstrom Rudberg Quetelet Callendar, 1895 Rambaut, 1900

I]

Soil.

Garden sand Sandy loam Gravel Sandy clay

Locality.

Edinburgh

Greenwich Upsala

Thermo- meter.

Mercury

Coarse sand

The same soil, place and instruments

reduced for different years Garden sand I Montreal f Platinum Gravel Oxford

Diffus- ivity.

•0087 •0136 •0125 •0057 •0045 •0094 ■0061

. -0074

•0036 •0074

The low value at Montreal is chiefly due to the absence of percolation during the winter. A. A. Rambaut's results were obtained with similar instruments similarly located, but he did not investigate the seasonal variations of diffusivity, or the effect of percolation. It is probable that the coarser soils, permitting more rapid percolation, would generally give higher results. In any case, it is evident that the transmission of heat by percolation would be much greater in porous soils and in the upper layers of the earth's crust than in the lower strata or in solid rocks. It is probable for this reason that the average conductivity of the earth's crust, as deduced from surface observations, is too large; and that estimates of the age of the earth based on such measure- ments are too low, and require to be raised; they would thereby be brought into better agreement with the conclusions of geologists derived from other lines of argument.

16. Angstrom's Method consists in observing the propagation of heat waves in a bar, and is probably the most accurate method for

measuring the diffusivity of a metal, since the conditions may be widely varied and the correction for external loss of heat can be made comparatively small. Owing, however, to the laborious nature of the observations and reductions, the method does not appear to have been seriously applied since its first invention, except in one solitary instance by the writer to the case of cast-iron (fig. 2). The equation of the method is the same as that for the linear flow with the addition of a small term representing the radiation loss.

The heat per second gained by conduction by an element dx of the bar, of conductivity k and cross section q, at a point where the gradient is d6/dx, may be written qk{

qk(d 2 e/dx 2) =cqde/dt+hp6, which is satisfied by terms of the type

g = e -ax sm (2wnt-bx),

where a 2 -6 2 = hp/qk, and ab = irnc/k.

The rate of diminution of amplitude expressed by the coefficient a in the index of the exponential is here greater than the coefficient b expressing the retardation of phase by a small term depending on the emissivity h. If h — o, a = b = V (irncl k) , as in the case of propagation of waves in the soil.

The apparatus of fig. 2 was designed for this method, and may serve to illustrate it. The steam pressure in the heater may be periodically varied by the gauge in such a manner as to produce an approximately simple harmonic oscillation of temperature at the hot end, while the cool end is kept at a steady temperature. The amplitudes and phases of the temperature waves at different points are observed by taking readings of the thermometers at regular intervals. In using mercury thermometers, it is best, as in the apparatus figured, to work on a large scale (4-in. bar) with waves of slow period, about 1 to 2 hours. Angstrom endeavoured to find the variation of conductivity by this method, but he assumed c to be the same for two different bars, and made no allowance for its variation with temperature. He thus found nearly the same rate of variation for the thermal as for the electric conductivity. His final results for copper and iron were as follows : —

Copper, k =0-982 (1-0-00152 6) assuming c = -84476. Iron, k =0-1988 (1-0-00287 0) ,, c = -88620.

Angatrom's value for iron, when corrected for obvious numerical errors, and for the probable variation of c, becomes —

Iron, ft =0-164 (1-0-0013 0), but this is very doubtful as c was not measured.

The experiments on cast-iron with the apparatus of fig. 2 were varied by taking three different periods, 60, 90 and 120 minutes, and two distances, 6 in. and 12 in., between the thermometers compared. In some experiments the bar was lagged with 1 in. of asbestos, but in others it was bare, the heat-loss being thus increased fourfold. In no case did this correction exceed 7 %. The extreme divergence of the resulting values of the diffusivity, including eight independent series of measurements on different days, was less than 1 %. Observations were taken at mean temperatures of 102° C. and 54°C, with the following results: —

Cast iron at io2°C, £/e = -i296, £ = -858, £ = -1113. ,, „ 54°C., ft/c = -i392, c = -823, £ = -1144. The variation of c was determined by a special series of experiments. No allowance was made for the variation of density with temperature, or for the variation of the distance between the

thermometers, owing to the expansion of the bar. Although this correction should be made if the definition were strictly followed, it is more convenient in practice to include the small effect of linear expansion in the temperature-coefficient in the case of solid bodies.

17. Lorenz's Method. — F. Neumann, H. Weber, L. Lorenz and others have employed similar methods, depending on the observation of the rate of change of temperature at certain points of bars, rings, cylinders, cubes or spheres. Some of these results have been widely quoted, but they are far from consistent, and it may be doubted whether the difficulties of observing rapidly varying temperatures have been duly appreciated in many cases. From an experimental point of view the most ingenious and complete method was that of Lorenz (Wied. Ann. xiii. p. 422, 1881). He deduced the variations of the mean temperature of a section of a bar from the sum S of the E.M.F.'s of a number of couples, inserted at suitable equal intervals / and connected in series. The difference of the temperature gradients D/l at the ends of the section was simultaneously obtained from the difference D of the readings of a pair of couples at either end connected in opposition. The external heat-loss was eliminated by comparing observations taken at the same mean temperatures during heating and during cooling, assuming that the rate of loss of heat/(S) would be the same in the two cases. Lorenz thus obtained the equations :—

Heating, qk Vll = cql dS/dt+f(S). Cooling, qk D'll = cql dS'/dt'+f(S'). Whence k = cP(dS/dt-dS'ldt')l(D-D').

It may be questioned whether this assumption was justifiable, since the rate of change and the distribution of temperature were quite different in the two cases, in addition to the sign of the change itself. The chief difficulty, as usual, Was the determination of the gradient, which depended on a difference of potential of the order of 20 microvolts between two junctions inserted in small holes 2 cms. apart in a bar 1-5 cms. in diameter. It was also tacitly assumed that the thermo-electric power of the couples for the gradient was the same as that of the couples for the mean temperature, although the temperatures were different. This might give rise to constant errors in the results. Owing to the difficulty of measuring the gradient, the order of divergence of individual observations averaged 2 or 3 %, but occasionally reached 5 or 10 %. The thermal con- ductivity was determined; in the neighbourhood of 20° C. with a water jacket, and near 110° C. by the use of a steam jacket. The conductivity of the same bars was independently determined by the method of Forbes, employing an ingenious formula for the heat-loss in place of Newton's law. The results of this method differ 2 or 3 % (in one case nearly 15 %) from the preceding, but it is probably less accurate. The thermal capacity and electrical conductivity were measured at various temperatures on the same specimens

of metal. Owing to the completeness of the recorded data, and the great experimental skill with which the research was conducted, the results are probably among the most valuable hitherto available. One important result, which might be regarded as established by this work, was that the ratio kfk' of the thermal to the electrical con- ductivity, though nearly constant for the good conductors at any one temperature such as o° C, increased with rise of temperature nearly in proportion to the absolute temperature. The value found for this ratio at 0° C. approximated to 1500 C.G.S. for the best conductors, but increased to 1800 or 2000 for bad conductors like German-silver and antimony. It is clear, however, that this relation • cannot be generally true, for the cast-iron mentioned in the last section had a specific resistance of 112,000 C.G.S. at I00°C, which would make the ratio k/k' — 12,500. The increase of resistance with temperature was also very small, so that the ratio varied very little with temperature.

18. Electrical Methods. — There are two electrical methods which have beea recently applied to the measurement of the conductivity of metals, (a) the resistance method, devised by Callendar, and applied by him, and also by R. O. King and J. D. Duncan, (b) the thermo-electric method, devised by Kohlrausch, and applied by W. Jaeger and H. Dieselhorst. Both methods depend on the observation of the steady distribution of tem- perature in a bar or wire heated by an electric current. The advantage is that the quantities of heat are measured directly in absolute measure, in terms of the current, and that the results are independent of a knowledge of the specific heat. Incidentally it is possible to regulate the heat supply more perfectly than in other methods.

(a) In the practice of the resistance method, both ends of a short bar are kept at a steady temperature by means of solid copper blocks provided with a water circulation, and the whole is sur- rounded by a jacket at the same temperature, which is taken as the zero of reference. The bar is heated by a steady electric current, which may be adjusted so that the external loss of heat from the surface of the bar is compensated by the increase of resistance of the bar with rise of temperature. In this case the curve representing the distribution of temperature is a parabola, and the conductivity k is deduced from the mean rise of temperature (R-R°)/aR° by observing the increase of resistance R-R° of the bar, and the current C. It is also necessary to measure the cross-section q, the length /, and the temperature-coefficient a for the range of the experiment.

*In the general case the distribution of temperature is observed by means of a number of potential leads. The differential equation for the distribution of temperature in this case includes the majority of the methods already considered, and may be stated as follows. The heat generated by the current C at a point * where the tempera- ture-excess is is equal per unit*

length and time (t) to that lost by conduction -d(qkd8/dx)fdx, and by radiation hpd (emissivity h, perimeter p), together with that employed in raising the temperature qcdB/dt, and absorbed by the Thomson effect sCd6/dx. We thus obtain the equation—

*C 2 R (l +a8)/l *=-d(qkdO/dx)/dx+hpO+qcdOldt+sCd0ldx. (8) If C=o, this is the equation of Angstrom's method. If h also is zero, it becomes the equation of variable flow in the soil. If d8/dt = o,. the equation represents the corresponding cases of steady flow. In the electrical method, observations of the variable flow are useful for finding the value of c for the specimen, but are not otherwise required. The last term, representing the Thomson effect, is elimi- nated in the case of a bar cooled at both ends, since it is opposite in the two halves, but may be determined by observing the resistance of each half separately. If the current C is chosen so that Cˆoa — hpl, the external heat-loss is compensated by the variation of resistance*

with temperature. In this case the solution of the equation reduces to the form

8 = x(l-x)ORol2lqk. (9)

By a property of the parabola, the mean temperature is frds of the maximum temperature, we have therefore

(R-R)/

which gives the conductivity directly in terms of the quantities actually observed. If the dimensions of the bar are suitably chosen, the distribution of temperature is always very nearly parabolic, so that it is not necessary to determine the value of the critical current C 2 = hpl/aR tl very accurately, as the correction for external loss is a small percentage in any case. The chief difficulty is that of measuring the small change of resistance accurately, and of avoid- ing errors from accidental thermo-electric effects.

_ In addition to the simple measurements of the conductivity (M'Gill College, 1895- 1896), some very elaborate experiments were made by King (Proc. Amer. Acad., June 1898) on the temperature distribution in the case of long bars with a view to measuring the Thomson effect. Duncan (M'Gill College Reports, 1899), using the simple method under King's supervision, found the conductivity of very pure copper to be I -007 for a temperature of 33 ° C.

(b) The method of Kohlrausch, as carried out by Jaeger and Dieselhorst (Berlin Acad., July 1899), consists in observing the differ- ence of temperature between the centre and the ends of the bar by means of insulated thermo-couples. Neglecting the external heat-loss, and the variation of the thermal and electric conductivities k and k', we obtain, as before, for the difference of temperature between the centre and ends, the equation

ft.*- So = C 2 RI/8qk = ECl/8ak = E*k'l&k, (11)*

where E is the difference of electric potential between the ends. Lorenz, assuming that the ratio k/k'=a8, had previously given

tPmo.x-6

which is practically identical with the preceding for small differences of temperature. The last expression in terms of kjk' is very simple, but the first is more useful in practice, as the quantities actually measured are E, C, I, q, and the difference of temperature. The current C was measured in the usual way by the difference of potential on a standard resistance. The external heat-loss was estimated by varying the temperature of the jacket surrounding the bar, and applying a suitable correction to the observed differ- ence of temperature. But the method (a) previously described appears to be preferable in this respect, since it is better to keep the jacket at the same temperature as the oid-blocks. Moreover, the variation of thermal conductivity with temperature is small and uncertain, whereas the variation of electrical conductivity is large and can be accurately determined, and may therefore be legitimately utilized for eliminating the external heat-loss.

From a comparison of this work with that of Lorenz, it is evident that the values of the conductivity vary widely with the purity of the material, and cannot be safely applied to other specimens than those for which they were found.

19. Conduction in Gases and Liquids. — The theory of cpnduc- tion of heat by diffusion in gases has a particular interest, since it is possible to predict the value on certain assumptions, if the viscosity is known. On the kinetic theory the molecules of a gas are relatively far apart and there is nothing analogous to friction between two adjacent layers A and B moving with different velocities. There is, however, a continual interchange of mole- cules between A and B, which produces the same effect as viscosity in a liquid. Faster-moving particles diffusing from A to B carry their momentum with them, and tend to accelerate B; an equal number of slower particles diffusing from B to A act as a drag on A. This action and reaction

between layers in relative motion is equivalent to a frictional stress tending to equalize the velocities of adjacent layers. The magnitude of the stress per unit area parallel to the direction of flow is evidently proportional to the velocity gradient, or the rate of change of velocity per cm. in passing from one layer to the next. It must also depend on the rate of interchange of molecules, that is to say, (1) on the number passing through each square centimetre per second in either direction, (2) on the average distance to which each can travel before collision (i.e. on the " mean free path "), and (3) on the average velocity of translation of the molecules, which varies as the square root of the temperature. Similarly if A is hotter than B, or if there is a gradient of temperature between adjacent layers, the diffusion of molecules from A to B tends to equalize the temperatures, or to conduct heat through the gas at a rate proportional to the temperature gradient, and depending also on the rate of interchange of molecules in the same way as the viscosity effect. Conductivity and viscosity in a gas should vary

in a similar manner since each depends on diffusion in a similar way. The mechanism is the same, but in one case we have diffusion of momentum, in the other case diffusion of heat. Viscosity in a gas was first studied theoretically from this point of view by J. Clerk Maxwell, who predicted that the effect should be independent of the density within wide limits. This, at first sight, paradoxical result is explained by the fact that the mean free path of each molecule increases in the same proportion as the density is diminished, so that as the number of molecules crossing each square centimetre decreases, the distance to which each carries its momentum increases, and the total transfer of momentum is unaffected by variation of density. Maxwell him- self verified this prediction experimentally for viscosity over a wide range of pressure. By similar reasoning the thermal conductivity of a gas should be independent of the density. This was verified by A. Kundt and E. Warburg (Jour. Pkys. v. 118), who found that the rate of cooling of a thermometer in air between 150 mm. and 1 mm. pressure remained constant as the pressure was varied. At higher pressures the effect of conduction was masked by convection currents. The question of the varia- tion of conductivity with temperature is more difficult. If the effects depended merely on the velocity of translation of the molecules, both conductivity and viscosity should increase directly as the square root of the absolute temperature; but the mean free path also varies in a manner which cannot be predicted by theory and which appears to be different for different gases (Rayleigh, Proc. R.S., January 1896). Experiments by the capillary tube method have shown that the viscosity varies more nearly as 8%, but indicate that the rate of increase diminishes at high temperatures. The conductivity probably changes with temperature in the same way, being proportional to the product of the viscosity and the specific heat; but the experimental investigation presents difficulties on account of the

*necessity of eliminating the effects of radiation and convection, and the results of different observers often differ considerably from theory and from each other. The values found for the conductivity of air at o° C. range from -000048 to 000057, aI *d the temperature coefficient from -0015 to 0028. The results are consistent with theory within the limits of experimental error, but the experi mental methods certainly appear to admit of improvement.*

The conductivity of liquids has been investigated by similar methods, generally variations of the thin plate or guard-ring method. A critical account of the subject is contained in a paper by C. Chree (Phil. Mag., July 1887). Many of the experiments were made by comparative methods, taking a standard liquid such as water for reference. A determination of the conductivity of water by S. R. Milner and A. P. Chattock, employing an electrical method, deserves mention on account of the careful elimination of various errors (Phil. Mag., July 1899). Their final result was k = -001433 at 20 ° C., which may be compared with the results of other observers, G. Lundquist (1869), -00155 at 40 C; A. Winkelmann (1874), -00104 at 15 C; H. F. Weber (corrected by H. Lorberg), -00138 at 4 C, and -00152 at 23-6° C; C. H. Lees (Phil. Trans., 1898), -00136 at 25 C, and •001 20 at 47° C; C. Chree, -00124 at 18° C.,and -00136 at 19-5° C. The variations of these results illustrate the experimental difficulties. It appears probable that the conductivity of a liquid increases considerably with rise of temperature, although the contrary would appear from the work of Lees. A large mas: of material has been collected, but the relations are obscured b> experimental errors.

See also Fourier, Theory of Heat; T. Preston, Theory of Heal, cap. vii. ; Kelvin, Collected Papers; O. E. Meyer, Die kinetische Theorie der Gase ; A. Winkelmann, Handbuch der Physik.

(H. L. C.)

CONE (Gr. k&vos), in geometry, a surface generated by a line (the generator) which always passes through a fixed point (the vertex) and through the circumference of a fixed curve (the directrix). The two sheets of the surface, on opposite sides of the vertex, are called the ” nappes ” of the cone. The solid formed between the vertex and a plane cutting the surface is also called a ” cone “; this is contained by a conical surface and the plane of section, Euclid defines a ” right cone ” as the

solid figure formed by the revolution of a right-angled triangle about one of the sides containing the right angle. The axis of the cone is the side about which the triangle revolves ; the circle traced by the other side containing the right angle is the " base"; the hypotenuse in any one of its positions is a gener- ator or generating line ; and the intersection of the axis and a generator is termed the vertex. The Euclidean definition may be modified, so as to avoid the limits thereby placed on the figure, viz. the notion that the solid is between the vertex and the base. A general definition is as follows : — If two intersecting straight lines be given, and one of the lines is made to revolve about the other, which is fixed in such a manner that the angle between the lines is everywhere the same, then the surface (or solid) traced out by the moving line (or generator) is a cone, having the fixed line for axis, the point of intersection of the lines for vertex, and the angle between the lines for the semi- vertical angle of the cone.

An " oblique cone " is the solid or surface traced out by a line which passes through a fixed point and through the circum- ference of a circle, the fixed point not being on the line through the centre of the circle perpendicular to its plane. A " quadric cone " is a cone having any conic for its base. The plane con- taining the vertex, centre of the base, and perpendicular to the base is called the principal section ; and the section of a cone by a plane containing the vertex is a triangle if the solid be considered, and two intersecting lines if the surface be considered. The " subcontrary section " of an oblique cone is made by a plane not parallel to the base, but perpendicular to the principal section, and inclined to the generating lines in that section at the same angles as the base ; this section is a circle. The planes parallel to the base or subcontrary section are called " cyclic planes."

The Greeks distinguished three types of right cones, named " acute," " right-angled " and " obtuse," according to the magnitude of the vertical angle; and Menaechmus showed that the sections of these cones by planes perpendicular to a generator were the ellipse, parabola and hyperbola respectively. Apol- lonius went further when he derived these curves by varying the inclination of the section of any right or oblique cone (see Conic Section). It is to be noted that the Greeks investigated these curves in solido, and consequently the geometry of the cone received much attention. The mensuration of the cone was established by Archimedes. He showed that the volume of the cone was one-third of that of the circumscribing cylinder, and that this was true for any type of cone. Therefore the volume is one-third of the product area of base X vertical height. The surface of a right circular cone is equal to one-half of the circumference of the base multiplied by the slant height of the cone.

Analytically, the equation to a right cone formed by the revolution of the

line y = mx about the axis of x is z = m(x 2 --y 2). Obviously every tangent plane passes through the vertex; this is the characteristic property of conical surfaces. Conical surfaces are also " developable " surfaces, i.e. the surface can be applied to a plane without wrinkling or rending. Connected with quadric cones is the interesting curve termed the " sphero-conic," which is the curve of intersection of any quadric cone and a sphere having its centre at the vertex of the cone.

References should be made to the articles Geometry and Surface for further discussion; and to the bibliographies of these articles for sources where the subject can be further studied. The geo- metrical construction of the curves of intersection of the cone with other solids is given in treatises on descriptive solid geometry, e.g. T. H. Eagles, Constructive Geometry.

CONECTE, THOMAS (d. 1434), French Carmelite monk and preacher, was born at Rennes. He travelled through Flanders and Picardy, denouncing the vices of the clergy and the extra- vagant dress of the women, especially their lofty head-dresses, or hennins. He ventured to teach that he who is a true servant of God need fear no papal curse, that the Roman hierarchy is corrupt, and that marriage is permissible to the clergy, of whom only some have the gift of continence. He was listened to by immense congregations, and in Italy, despite the opposition

of Nicolas Kenton (d. 1468), provincial of the English Carmelites, he introduced several changes into the rules of that order. He was finally apprehended by order of Pope Eugenius IV., con demned and burnt for heresy.

An account of Friar Thomas's preaching and its effect is given by Enguerrand de Monstrelet, provost of Cambrai (d. 1453), in his continuation of Froissart's chronicles.

CONEGLIANO, a town and episcopal see of Venetia, Italy, in the province of Treviso, 17 m. N. by rail from the town of Treviso, 230 ft. above sea-level. Pop. (1901) town, 5880; commune, 10,252.. It is commanded by a large castle. It was the birthplace of the painter Cima da Conegliano, a fine altar- piece by whom is in the cathedral (1492). The place is noted for its wine, chiefly sweet champagne.

CONESTOGA (said to mean " people of the immersed or forked poles "), a tribe of North American Indians of Iroquoian stock. Their country was Pennsylvania and Maryland on the lower Susquehanna river and at the head of Chesapeake bay. They were sometimes known as Susquehannas.

They were formerly a powerful people, able to resist the attacks of the Iroquois. In 1675, however, the latter overwhelmed and scat- tered them. After nearly a century of wandering, the tribe suffered final extinction in the Indian wars of 1763.

CONEY ISLAND, an island about 9 m. S.E. of the S. end of Manhattan Island, U.S.A., on the S. shore of Long Island, from which it is separated by Gravesend Bay, Sheepshead Bay, Coney Island Creek, a tidal inlet, and a broad stretch of low salt marshes. It lies within the limits of the Borough of Brooklyn, New York city. The island is the westernmost of a chain of outlying sandbars that extends along the southern shore of Long Island for almost 100 m. ; it is about 5 m. long and varies from \ m. to 1 m. in width. It is served by the Long Island railway, by several lines of electric railway, and (in summer) by steamboat lines. The island is the most popular seashore resort of the United States. There are four quite distinctly marked districts. At the extreme western extremity, Norton's Point, is the district known as Sea Gate, lying between Gravesend Bay and Lower New York Bay. It is an exclusively residential section, has a fine light-house, a large number of summer homes and the handsome club-house of the Atlantic Yacht Clubr. A broad shore drive connects it on the E. with West Brighton, the most popular amusement centre, to which the name Coney Island has come to be more especially applied. Its great scenic and spectacular features, " side-shows," booths, cafes and dancing halls, have made " Coney Island " a well-known resort. There are bathing beaches, two immense iron piers, observation towers, scenic railways, " Ferris " wheels, and the two amusement reservations known as " Luna Park " and " Dreamland." From West Brighton a broad parkway known as " the Concourse " connects with Brighton Beach, J m. to the E., passing the large bathing establishments maintained by the city of New York. At Brighton Beach there are a large hotel, a theatre and the Brighton Race Track. Still farther to the E., and extending to the eastern extremity of the island, lies Manhattan Beach, with hotels, a theatre and baths, and patronized more largely by a wealthier class of visitors. Adjacent to Manhattan Beach on the mainland, and separated from it by a narrow neck of Sheepshead Bay, lies the village of Sheepshead Bay, in which is the famous race track of the Coney Island Jockey Club.

CONFALONIERI, FEDERICO, Count (1785-1846), Italian revolutionist, was born at Milan, descended from a noble Lom- bard family. In 1806 he married Teresa Casati. During the Napoleonic period Confalonieri was among the opponents of the French regime, and was regarded as one of the leaders of the Italiani puri, or Italian national party. At the time of the Milan riots of 1814, when the minister Prina was assassinated, Confalonieri was unjustly accused of complicity in the deed. After the fall of Napoleon he went to Paris with the other Lombard delegates to plead his

country's cause, advocating the formation of a separate Lombard state under an independent prince. But he received no encouragement, for Lombardy was destined for Austria, and Lord Castlereagh consoled him by

saying that " the Austrian government was the most beneficent in the world." Confalonieri went on to London, in the hope of winning the favour of the British government, but failed in his object. He then joined the freemasons and some of the various other secret societies with which all Europe was swarming, being initiated by Filippo Buonarroti (1761-1837), an old Tuscan Jacobin living in Paris. On returning to Milan, where he found the Austrians in possession, he at first devoted himself to promoting the material progress of his country, but he was ever watching for an opportunity to liberate it from the foreigner.

Early in 1821, when the atmosphere was thick with rumours of revolt, he visited various parts of Italy to sound the liberal leaders, and also corresponded with the Piedmontese officers who, believing that they had the approval of Prince Charles Albert of Carignano, the heir to the throne, were planning a military revolt. There was talk of a rising at Milan combined with a Piedmontese invasion to expel the Austrians, but the plans were very vague and unpractical, for the military con- spirators could count only on a few hundred men, and Con- falonieri warned them that Lombardy was not ready. On the outbreak of the Piedmontese revolt (March-April 1821) the Austrian authorities made some arrests, and, through the treachery of one conspirator and the foolishness of others, discovered the plot, if it could so be called, and arrested Silvio Pellico and Maroncelli and afterwards Confalonieri. A long trial now began, conducted with all the rigour and secrecy of the Austrian procedure, and Confalonieri, outwitted by the astute examining magistrate, A. Salvotti (d. 1866), contradicted himself, made fatal admissions, even compromised others, and together with several companions was condemned to death for high treason, but through the intercession of his wife and father, who went to Vienna to plead his cause in person, the emperor Francis commuted the penalty to perpetual imprisonment in the fortress of Spielberg (January 1824). Confalonieri was taken to Vienna and had a long interview with Prince Metternich, who tried to extract further confessions incriminating other persons, especially Charles Albert, but although Confalonieri seemed at one time inclined to prepare a report on the revolu- tionary movement for the emperor, he did not do so, and once he was in prison he refused to say or write another word, and was treated with exceptional severity in consequence. His wife died in 1830, and in 1836, on the death of the

emperor Francis, he was pardoned and exiled to • America. He came back to Europe after a year's absence, and in 1840 obtained permission to return to Milan to see his dying father. He himself, broken in health and spirits, died on the 10th of December 1846, too soon to see the accomplishment of Italian freedom. He had un- doubtedly played a considerable role in the conspiracy of 1821, being the most influential and richest of the Milanese Liberals; when first arrested his conduct may have been open to criticism, but he more than expiated any temporary weakness due to ill-health and to the barbarous methods of examination by his heroic attitude during his long imprisonment, and his persistent refusal to accept offers of pardon accompanied by dishonouring conditions.

His Memoire e Leltere have been edited by Gabrio Casati (2 vols., Milan, 1890). A. DAncona's Federico Confalonieri (Milan, 1898) is based on the memoirs and on a large number of secret documents from the archives of Vienna and Milan. A. Luzio's Antonio Salvotti e i processi del Ventuno (Rome, 1901) contains many fresh documents which to some extent exonerate Salvotti from the charge of cruelty ; among other papers Metternich's account of his interview with Confalonieri is given in full. See also A. Luzio, Nuovi documenti sul processo Confalonieri (Rome, 1908). (L. V.)*

CONFARREATIO, the ancient patrician form of marriage among the Romans, especially necessary at the nuptials of those whose children were intended to be vestal virgins or flamens of Jupiter. The name originated in the bride and bridegroom sharing a cake of spelt (Jar or panis farreus), in the presence of the pontifex maximus, flamen dialis, and ten witnesses. This form of marriage could only be dissolved by another equally solemn ceremony, which was called diffarreatio. In later re- publican times, confarreatio became obsolete except in the

case of the most sacred priesthoods — the flamines and the rex sacrarum. Confarreatio was the most solemn of the three forms of marriage (q.v.), but in later times the ceremony fell into disuse, and Cicero mentions but two, coemptio and usus. (See Roman Law.)

CONFECTIONERY (from Lat. confectio, conficere, compound), a term of rather vague application, embracing all food prepara- tions of the nature of sweetmeats, pastry, &c, which have sugar (q.v.) for their basis or principal ingredient. In this way the industry may be said to include the preservation of fruits by means of sugar, the manufacture of jams and jellies, the art of preparing fruit-syrups and pastes, ices, and sweetened bever- ages, in addition to the various manufactures in which sugar is the more prominent and principal ingredient. In former days the making of sweetmeats was part of a druggist's business, but in the earlier half of the 19th century it

developed into a separate industry in England, and the International Exhibition of 1851 resulted in its spreading to other countries. At the present day France and Germany are prominent in all sorts of confectionery and bon-bons; and the "candy" industry in America has developed enormously.

The simplest form in which sugar is prepared as a sweet for eating is that of lozenges, which consist of finely ground sugar mixed with dissolved gum to form a stiff dough. This is rolled into sheets of the desired thickness from which the lozenges are stamped out by appropriate cutters and then allowed to dry and harden in a heated apartment. They are coloured and flavoured with a great variety of ingredients, which are added in suitable proportions with the dissolved gum. Many kinds of medicated lozenges are also in extensive use, the medicinal ingredients being similarly incorporated with the gum. Hard sweetmeats, comfits or dragies, constitute another important variety of confectionery. To make these a core or centre of some kind is taken, consisting of a small lozenge, or of some seed or fruit, such as an almond, coriander, caraway, pistachio, &c, and successive layers of sugar are deposited around it till the desired size is attained. The cores are placed in large copper pans or vessels which are heated by a steam coil or jacket, or by hot air, and which are geared to rotate at an inclined angle so that their contents are kept constantly in motion, tumbling over each other. From time to time sugar syrup is added as they appear to get dry, and after receiving a certain coating they are removed to dry and harden. After a sufficient number of alternate coatings in the pan and dryings, the comfits are finished with a coating of thin syrup, which may be coloured if desired. Another extensive class of confectionery is made with sugar boiled at different temperatures, the various degrees of heating being known as thread, blow or feather, ball, crack, caramel, &c. In some cases a little cream of tartar, or glucose to the extent of 30% or even more, is used with the sugar. By treatment of this kind the sugar is obtained in a wide range of consistencies, from soft and creamy, as in fondants, to clear and hard, as in barley sugar. By vigorous and continued drawing out or " pull- ing " of boiled sugar while it is in a plastic condition, the mole- cular structure of the material is changed, and from being glassy and transparent it becomes opaque, porous and granular in appearance. In this way the preparation known as rock is manufactured. For liqueurs, a flavoured syrup is dropped into moulds impressed in dry starch, when a crust of sugar forms on the outside, the interior remaining liquid. The thickness of this crust is then increased by immersing it in syrup from which more sugar-crystals are deposited upon it, and the sweets may be finished in the comfit-pan already mentioned. Sugar- candy is prepared from solutions of either brown or refined sugar, to the latter of which cochineal or other colouring in- gredient is frequently added. The solutions, when boiled to a proper degree,

are poured into moulds across which pieces of string are stretched at sufficient intervals. Kept in a chamber heated from 90 to ioo° F., the sugar gradually crystallizes on the strings and the sides of the mould, and when sufficient has been deposited the remaining liquor is drained off, and the crystals are removed and dried by heat. Machinery, often of

elaborate character, is now extensively employed in almost all branches of the confectionery trade. For chocolate see that article, also Cocoa.

CONFEDERATE STATES OF AMERICA, the title of the independent government, formed by the seceding Southern States at the opening of the American Civil War, in the winter of 1 860-1 86 1. These States contained roughly half the population of the Northern States which remained in the Union. In pro- portion to their population they had played a more important part in the previous political history of the United States than was their share. The formation of the new Confederacy was in the hands of experienced statesmen, well schooled in the politics of their respective states and in the halls of the Federal Congress to undertake such a task. Jefferson Davis of Mississippi was almost naturally chosen president, his rival candidates being Alexander H. Stephens, subsequently chosen to fill the vice- presidency of the Confederacy, an important exponent of states' rights, and during the war a strong antagonist of President Davis's policy, and Robert Toombs of Georgia, a strong seces- sionist. The latter became a prominent member of the Con- federate Congress, and, like Stephens, opposed the despotic powers of the Richmond government. President Davis had been trained in the Federal army, as well as in the Congress and in the National administration. His administration of the Confederate presidency cannot be called brilliant. The diffi- culties he contended with, however, were insurmountable; but his official acts were always the result of an unselfish desire to do what seemed best for the cause he espoused. The presi- dent's cabinet contained, among others, Judah P. Benjamin, secretary of state; C. G. Memminger (1803-1888), and later George A. Trenholm (1806-1876), secretaries of the treasury; G. W. Randolph (1818-1878) and James A. Seddon (1815-1880), secretaries of war; S. R. Mallory (1813-1873), secretary of the navy, and John H. Reagan, postmaster-general. Of these Benjamin was distinctly the most powerful intellectually. Memminger, with little training or aptitude for his difficult position, did not distinguish himself as a financier, and was succeeded in the summer of 1864 by Trenholm, a Charleston banker, of high intelligence and good training, who, however, found it impossible to save the Confederacy from financial ruin. Of other Confederates prominent in

official positions the following may be mentioned: Howell Cobb, a former member of the Federal Congress and of President Buchanan's cabinet, serving as speaker of the provisional Confederate congress and later in the field; Robert W. Barnwell (1801-1882) and William L. Yancey; Benjamin H. Hill (1823-1882) and A. H. Keenan of Georgia; John A. Campbell (1811-1889), before the war a judge of the U.S. Supreme Court; Judge A. G. Magrath (1813- 1893), a prominent judge of the Confederate court in South Carolina; Governors Z. B. Vance of North Carolina, and J. E. Brown of Georgia (1821-1804).

In framing their provisional and permanent constitutions in 1 86 1 the Confederate statesmen emphasized the points of view which had characterized them in the great constitutional discussions of the previous half century. They also aimed to correct certain defects in the United States Constitution by amending that document in various directions. The Southern " States' Rights " view of the sovereign and independent position of the individual states was emphasized in the Con federate constitutions, which even went so far as to allow a state legislature to impeach a Confederate official acting within that state. Moreover, in the provisional Confederate constitu- tion state officials were not bound by oath to support the central government. The powers of the executive were increased as against the prerogatives of the congress. The president was allowed to veto particular appropriations and approve others in the same bill. His term of office was lengthened to seven years, and he was declared ineligible for a second term of office. The cabinet officers were allowed seats in either house of congress, in imitation of the practice in Great Britain, which Alexander H. Stephens especially was anxious to transplant to the American continent. The congress could appropriate money for particular

purposes only by a two-thirds majority, unless the appropriation were asked for by the head of that department. Every bill was to refer to one subject, and that subject was to be expressed in the title, a provision aimed at preventing " omnibus " and confused legislation, in which it signally failed.

The Southern attitude toward a protective tariff Was em- phasized by the constitutional provision that no bounty should be paid and no taxes levied for the benefit of any branches of industry. Similarly the central government could not authorize internal improvements except for aids to navigation. Also the expenses of the post office were not allowed to exceed its receipts. The old Constitution had carefully avoided the use of the word " slave," but the Confederate constitutions had no such scruples, and, moreover, recognized the legitimate existence of slavery, and forbade all legislation which might impair the right of property in negro slaves.

These changes all had reference to times of peace. The war powers of the government were left unchanged from those provided for by the Federal Constitution. Provisions of that document as to suspending the writ of habeas corpus and the provisions regarding conscription were left equally vague in the new Confederate Constitution. These led to acrimonious discussion and much bitter feeling against the centralized war powers of the government at Richmond. As the war progressed, the Richmond authorities became necessarily more and more oppressive and aroused the " Stages' Rights " feeling prevalent in the South. It became evident that a confederated form of government, such as was planned by the Southerners, was unsuited to the stringent requirements of war times and contri- buted doubtless somewhat to the final cataclysm.

The provisions of the new constitution regarding the issue of legal tender paper money remained the same as of old. In the North such legal tender paper began to be issued in the spring of 1862, and later opened the question of the constitution- ality of such a practice. No Confederate legal tender act was ever passed, though the agitation in that direction was often strong. The objections which prevented the passage of such an act were the same as those offered by the minority in later years against the constitutionality of the Federal legal tender act. The Sou therners were too true to their strict constructionist views of the constitution to admit the constitutionality of a legal tender act.

The personnel of the Confederate congress and administration was materially weakened by the military field's drawing off the most brilliant Southern leaders. It was largely owing to the strategical skill of these generals that the Southern armies, smaller and more poorly equipped than their opponents, main- tained the unequal contest for four years. In the naval opera- tions the North had an overwhelming advantage, which was promptly and effectively used. The blockade of the Southern ports, beginning in the spring of 1861, was much less spectacular than the operations of the army, but was quite as effective in breaking down the Confederacy. It cut off the South from obtaining foreign war supplies, and reduced it to dependence upon its own products, which were almost exclusively agricul- tural. Manufacturing industries hardly existed in the South. A few iron works attempted with little success to meet the demand for ordnance. This and small-arms were obtained from the Federal arsenals in 1861, by capture and to some extent by eluding the blockade. Powder factories were estab- lished and vigorously operated. The scarcity and high price of clothing put a large premium on the establishment of textile factories, but their product was far below the demand.

The South was unfortunate in having a poorly developed railway system. As compared with those of the North, its railways were inadequately

equipped and did not form connected systems. During the war, the inroads of the Federal troops, and the natural deterioration of the lines and their rolling stock, greatly reduced the value of the railroads as a military factor. They continued to be active in distributing the relatively small amount of imports through the blockaded ports of Charleston, Savannah and Wilmington. Their usefulness to the army and

the city population in collecting food material from the country- districts was much impaired.

The harvests in the South during the war were fairly abundant, as far as they were not destroyed by the advancing Northern armies. Maize was raised in large quantities, and, in general, the raising of food products instead of tobacco and cotton was encouraged by legislation and otherwise. The scarcity of food in the armies and cities was chiefly due to the breaking down of the means of transportation, and to the paper money policy and its attendant repressive measures.

The specie holdings of the Southern banks largely found their way into the Confederate treasury in payment for the $15,000,000 loan effected early in 1861. In addition, the government secured the specie in the various Federal offices which fell into its power. These sums were soon sent to Europe in payment of foreign war supplies. The gold and silver in general circulation also soon left the country almost entirely, driven out by the rising flood of paper money. Aside from the payment of the above loan the government never secured any specie revenue, and was driven headlong into the wholesale issue of paper money. The first notes were issued in March 1 86 1, and bore interest. They were soon followed by others, bearing no interest and payable in two years, others payable six months after peace. New issues were continually provided, so that from an initial $1,000,000 in circulation in July 1861, the amount rose to 30 millions before December 1861; to 100 millions by March 1862; to 200 millions by August 1862; to perhaps 450 millions by December 1862; to 700 millions by the autumn of 1863; and to a much larger figure before the end of the war.

This policy of issuing irredeemable paper money was copied by the individual states and other political bodies. Alabama began by issuing $1,000,000 in notes in February 1861, and added to this amount during each subsequent session of the state legislature. The other states followed suit. Cities also sought to replenish their treasuries in the same way.

Corporations and other business concerns tried to meet the rising tide of prices with the issue of their individual promissory notes intended to circulate from hand to hand« As a result of this redundancy of the currency the price of gold rose to great heights. It was quoted at a premium in Confederate notes in April 1861. By the end of that year a paper dollar was quoted at 90 cents in gold; during 1862 that figure fell to 40 cents; during 1863, to 6 cents; and still lower during the last two years of the war. The down- ward course of this figure, with occasional recoveries, reflects the popular estimate of the Confederacy's chance of maintaining itself against the Northern invasion. The fluctuations of the gold premium in the North during the same years are a comple- mentary movement, and correspondingly reflect the periods of popular elation and depression as to the final outcome of the war.

The redundant currency drove the price of commodities to exorbitant heights, and deranged all business. It affected different classes of commodities differently. Those the supply of which was entirely from abroad, like coffee, rose to the greatest height owing to their scarcity produced by the blockade. In- genious substitutes were found for such articles, and enormous profits were secured by the merchants who successfully ran the blockade and imported such much-needed articles of foreign origin. These speculators were continually abused for making such importations instead of confining themselves to supplying the government with foreign war supplies. Articles that were produced in the South and marketed abroad or in the North during normal times rose least in value. Tobacco and cotton, for instance, which found no buyers owing to the blocka'de, actually fell in value as quoted in gold. The great divergence of the price of these two commodities in the South and abroad — ■ the Northern price of cotton increased more than tenfold during the war — offered the strongest inducement to evade the blockade and export them. A small amount of cotton reached the world's market by way of the Atlantic ports or Mexico, and netted those concerned in the venture handsome profits.

The same motive operated to encourage trade with the enemy. Tobacco and cotton were smuggled through the military lines in exchange for hospital stores, coffee and similar articles. The military authorities tried to suppress this illicit trade, but at times even they were carried away by the desire to secure the much-desired foreign supplies. The civil government also vacillated between the policy of encouraging exports, especially to Europe in exchange for foreign goods, and the policy of forbidding such trade in view of the supposed advantage accruing to foreigners, who it was hoped would be compelled to acknow- ledge the independence of the Confederacy in order to secure Southern cotton.

The derangement of prices, their local differences and fluctua- tions, produced wild speculation in the South. Normal business was almost impossible, and the gambling element was forced into every transaction. Speculation in gold was especially pronounced. Legislation and popular feeling were aimed at it, but without avail. Even the government itself was compelled to speculate in gold. Speculation in food and other articles was equally inevitable and was much decried. Laws were formed to curb the speculators, but had no effect.

The policy of the Southern banks during the war encouraged speculation. The New Orleans banks had been well managed, and remained solvent until September 1861. The banks of the other states suspended specie payments at the end of i860, and thereafter enlarged their note issue and their loans, thereby adding to the general redundancy of the currency and stimulating the prevalent speculative craze. They did a large business by speculating in cotton, making advances to the planters on the basis of their crops. The state governments also used their note issues for this purpose, the planters urgently demanding relief as their cotton could not reach a market. The Confederate government also made advances on cotton and secured large quantities by purchase, to serve as the basis of cotton bonds. The rise of prices reflecting the redundancy of the currency was no advantage to the producer. Frequent efforts were made by legislation and otherwise to reduce the prices demanded especially by the agriculturists. As a result, the production of food products fell off, at least the agriculturists did not bring their products to market for fear of being forced to sell them at a loss. Supplies for the army were obtained by impressment, the price to be paid for them being arbitrarily fixed at a low figure. As a result, the army administration found it almost impossible to induce producers of food willingly to turn over their products, and the army suffered from want. Under these confused industrial circumstances the sufferings of the debtor class were loudly asserted, and laws were passed to relieve them of their burdens, making the collection of debts difficult or impossible. The debts of Southerners to Northerners contracted before the war were confiscated by the Confederate government, but did not amount to a large figure.

The effectiveness of the Federal blockade and the peculiar industrial development of the South removed the possibility of an ample government revenue. Though import duties were levied, the proceeds amounted to almost nothing. A small export duty on cotton was expected to produce a large revenue sufficient to base a loan upon, but the small amount of cotton exports reduced this source of revenue to an insignificant figure. There being, moreover, no manufactures to tax under an internal revenue system such as the North adopted, the Confederacy was cut off from deriving any considerable revenue from indirect taxation. The first Confederate tax law levied a direct tax of twenty millions of dollars, which was apportioned

among the states. These, with the exception of Texas, contributed their apportioned share to the central government by issuing bonds or notes, so that the tax was in reality but a disguised form of loan. Real taxation was postponed until the spring of 1863, when a stringent measure was adopted taxing property and earnings. It was slowly and with difficulty put into effect, and was re-enacted in February 1864. In the states and cities there was a strong tendency to relax or postpone taxation in view of the other demands upon the people.

With no revenue from taxation, and with the disastrous effects of the wholesale issue of paper money before it, the Confederate government made every effort to borrow money by the issue of bonds. The initial 15-million loan was soon followed by an issue of one hundred millions in bonds, which it was, however, difficult to place. This was followed by even larger loans. The bonds rapidly fell in value, and were quoted during the war at approximately the value of the paper money, in which medium they were paid for by subscribers. To avoid this circumstance a system of produce loans was devised by which the bonds were subscribed for in cotton, tobacco and food products. This policy was subsequently enlarged, and enabled the government to secure at least a part of the armies' food supplies. But the bulk of the subscriptions for these bonds was made in cotton, for which the planters were thus enabled to find a market.

It was hoped to keep the currency within bounds by holders of paper money exchanging it for bonds, which the law allowed and encouraged, but as notes and bonds fell in value simul- taneously, there was no inducement for holders to make that exchange. On the contrary, a note-holder had an advantage over a bond-holder, in that he could use his currency for specula- tion or for purchases in general. In the autumn of 1862 the Confederate law attempted to compel note-holders to fund their notes in bonds, in order thereby to reduce the redundancy of the currency and lower prices. Disappointed in the result of this legislation, the Congress, in February 1864, went much farther in the same direction by passing a law requiring note- holders to fund their notes before a certain date, after which notes would be taxed a third or more of their face value. This drastic measure was accepted as meaning a partial repudiation of the Confederate debt, and though it for the time reduced the currency outstanding and lowered prices, it wrecked the government's credit, and made it impossible for the Treasury to float any more loans. During the last months of the war the Treasury led a most precarious existence, and its actual operations can only be surmised.

During the entire war the notion that the South possessed a most efficient engine of war in its monopoly of cotton buoyed up the hopes of the Southerners. The government strained every effort to secure recognition of the Confederacy as a nation by the great powers of Europe. It also more successfully secured foreigners' financial recognition of the South by effecting a foreign loan based on cotton. This favourite notion was put into practice in the spring of 1863. The French banking house of Erlanger & Company undertook to float a loan of £3,000,000, redeemable after the war in cotton at the rate of sixpence a pound. As cotton at the time was selling at nearly four times that figure and would presumably be quoted far above sixpence long after the establishment of peace, the bonds offered strong attractions to those speculatively inclined and in sympathy with the Southern cause. The placing of the bonds in Europe was mismanaged by the Confederate agents, but notwithstanding a considerable sum was secured from the public and used for the purchase of naval and military stores. At the close of the war these foreign bonds were ignored by the re-established Federal authorities like all the other bonds of the Confederate government. Compared with the partial success of this financial recognition by Europe, the South conspicuously failed in securing the political recognition of the Confederate government. Early in 1 86 1 W. L. Yancey and others went to Europe to enlist the sympathy of foreign governments in the Southern cause. J. M. Mason and John Slidell followed early in 1862, after a short detention by the Federal government, which had removed them from a British vessel en route to Europe. Though these Con- federate commissioners made every effort to induce foreign governments, especially those of Great Britain and France, to recognize the Confederacy, they were foiled in their efforts, largely by the skill and persistence of the Federal minister in London, Charles Francis Adams.

The political history of the Confederate States is the culmina- tion of an inevitable conflict, the beginnings of which are found

in the earlier history of the Union. The financial and industrial history of the South during 1861 to 1865 is the story of a struggle with overwhelming odds. The mistakes of the Confederate government's policy are overshadowed by its desperate efforts to maintain itself against the irresistible attacks of the North. In making that effort the South sacrificed everything, and emerged from the war a financial and industrial wreck.

Bibliography. — Confederate Archives in the War Department (Washington, unpublished documents and letters) ; Journal of the Congress of the C.S.A., 1861-186$ (reprinted by the U.S. Govern- ment, 1904); J. C. Schwab, The Confederate States of America (New York, 1901 ; a financial and industrial history of the South, 1 861-1865; contains a full bibliography); Southern newspaper files; John Bigelow, France and the

Confederate Navy (New York, 1888); J. D. Bulloch, Secrci Service or the Confederate States in Europe (London, 1883: New York, 1S84): h. D, Capers, Life of C. G. Memminger (Richmond, 1893); Jefferson Davis, Rise and Fall of the Confederate Government (New York, 1881); De Bow's Review (New Orleans, 1860-1864) ; J. L. M. Curry, Civil History of the Govern- ment of the Confederate States (Richmond, 1901) ; Herbert Fielder, Life of Joseph E. Brown (Springfield, Mass., 1883) ; J. B. Jones, Rebel War Clerk's Diary (Philadelphia, 1866); E. McPherson, Political History of the United States (4th ed., Washington, 1882; contains many important documents) ; Official Records: Compilation of the War of the Rebellion (Washington, 3rd series, 1880-iqoo; con- tains a great mass of Southern official correspondence) ; E. A. Pollard, various books on the Civil War; J. F. Rhodes, History of the United States, especially volumes iii.-v. (New York, 1898-1904) ; Statutes of the Provisional Government of the C.S.A. (Richmond, 1864); Statutes at Large of the C.S.A. , First Congress (Richmond, 1862); Public Laws of the C.S.A., 1863-1864 (Richmond, 1864); Statutes at Large of the C.S.A., Second Congress (Richmond, 1864); Documents of the various state governments. (J. C. Sc.)

CONFEDERATION (Fr. confederation, Lat. confoederalio, from foedus, a league, foederare, to form a league), primarily any league, or union of people, or bodies of people. The term in modern political use is generally confined to a permanent union of sovereign states, for certain common purposes, e.g. the German Confederation {Bund), established by the congress of Vienna in 1815, and the Confederation of the Rhine {Rheinbund), a league of certain German states under the protection of Napoleon (1806-1813). The alliance of the Great Powers by which Europe was governed after 181 5 was sometimes, especially by the emperor Alexander I., called the " Confederation of Europe "; but this expressed rather a pious aspiration than the actual state of affairs. The distinction between Confederation and Federation (see Federal Government), synonymous in their origin, has been developed in the political terminology of the United States. Up to 1789 these were a Confederation; then the word Federation, or Federal Republic, was introduced as implying closer union. This distinction was emphasized during the Civil War between North and South, the seceding states forming a Confederation (Confederate States of America) in opposition to the Federal Union. Confederation thus copies to mean a union of sovereign states in which the stress if laid on the sovereign independence of each constituent body (cf. the German Staatenbund) ; Federation implies a union of states in which the stress is laid on the supremacy of the common govern- ment (Ger. Bundesstaat) . The distinction is, however, by no means universally observed.

The variant " Confederacy," derived through the Anglo- French

confederacie, and meaning generally a league or union, whether of states or individuals, was applied in America in the sense of Confederation to the seceding southern states (see above). In its political sense, however, confederacy has generally come to mean rather a temporary league of independent states for certain purposes. As applied to individuals, while " confedera- tion " is used of certain open unions of people for political or other purposes (e.g. the Miners' Confederation), " confederacy " — from its obsolete legal sense of conspiracy — has come frequently to imply a secret bond, a combination for illicit purposes, or of persons whose identity is not disclosed.

CONFERENCE, a bringing together (Lat. conferre) for the purpose of discussion, particularly a meeting of members of one or more societies, of representatives of legislative or other bodies, or of different states. Such are the meetings between members of the upper and lower chambers of the British parliament, or

of the United States congress, to adjust matters of difference, and the assemblies of the prime ministers of the various British colonies, held at stated intervals to consult with the imperial government. The title of Colonial Conference was changed to that of Imperial Conference in 1907, but the proposal to change Conference, to Council was dropped; it was felt that the ad- ministrative functions usually connoted by the word " council " made that title less suitable to an assembly with purely delibera- tive and consultative powers, which were more fitly expressed by "conference." In diplomacy the word "conference" is used of a meeting of the representatives of states of greater or less importance for the purpose of settling particular points, as distinguished from a " congress," which is properly a meeting of the great powers for the settlement of questions of general interest. In practice, however, the distinction is not consistently maintained. The meetings preliminary to a congress and the sessions of the congress itself are also styled " conferences " (see Congress). The word is also applied to the annual assemblies for transacting church business in the Wesleyan Methodist Church of Great Britain and to various similar assemblies in the Methodist Episcopal Church of America (see Methodism) .

CONFESSION (Lat. confessio, from confiteor, acknowledge, confess), a term meaning in general the admission and acknow- ledgment that one has done something which otherwise might remain undisclosed, especially the acknowledgment of guilt or wrong-doing, either in public or to somebody specially entitled to such knowledge. The term has a special importance (1)

in religion, (2) in law.

1. Religion. — Among the Jews it was ordered that on the Day of Atonement the high priest should make confession of sins in the name of the whole people, and the day is still kept by the Jews with fasting and confession of sins. The Jews were also enjoined to confess their sins individually to God, and in certain cases to man.

In the Gospels confession is scarcely mentioned. But much is said about forgiveness, and the church is empowered to ad- minister God's pardon (John xx. 23 and Matt, xviii. 18). But it should be noted that the primary reference of " binding and loosing" is, according to rabbinical usage, rather to the laying down of rules than to condoning breaches of them; and nothing is said to confine the words " Whose soever sins ye forgive " to the offences of Christians already baptized, and they should be held to include preaching the Gospel and baptizing converts as well as the administration of internal discipline.

The rest of the New Testament is scarcely more explicit on the subject, which did not become so urgent in the days of early enthusiasm, and when the second coming of the Lord was ex- pected immediately. Baptism conveys the forgiveness of sins, and therefore ought to result in freedom from all wilful sin. But what was to be done with the baptized Christian who fell into grievous sin? On the one hand the Epistle to the Hebrews (vi. 4-6) declared that renewals of the lapsed are impossible. On the other, the confession of sins was ordered in James v. 15, 16 and 1 John i. 9, and the exercise of discipline is referred to in i Cor. v. and 2 Cor. ii. 5-11 (the identification of the two cases is precarious), Gal. vi. 1 and other passages. Though nothing was as yet systematized, the governing principle is laid down that the sin of the member affects the whole body, and therefore the society is bound to deal with it both from pity for the sinner, and for the sake of its own purity.

It soon became necessary to face the various questions involved more systematically. The definite discussion of the problems dates from The Shepherd of Hermas (published at Rome about a.d. 145) . Hermas rejects both the extreme opinions, viz. that to the baptized Christian there is either no such thing as sin, or no such thing as further forgiveness. He represents the church as a woman who offers sinful Christians a unique opportunity for conversion and restoration, which must be seized at once or lost for ever. But while he insists on repentance and mortification, he says nothing about public confession or discipline. Soon bitter controversies arose, especially in the West, where questions

of discipline have always been to the fore (see Montanism; Novatianus;

Donatists). Speaking broadly the development was from rigour to indulgence, and the three schisms referred to voiced the protests of the puritan minority.

At the beginning of the 3rd century something like a definite system had been established at Carthage and elsewhere. Three groups of sins, classified as (1) idolatry, which included apostasy, (2) adultery or fornication, and (3) murder, were held to exclude the guilty person from sharing in the eucharist until death, that is to say, if he had committed the sin after baptism. Not that it was asserted that he, therefore, could not be forgiven by God; indeed he was urged to pray and fast and undergo church discipline; but the church refused to venture on any anticipation of the divine decision. For other grave sins the baptized person was allowed to undergo discipline once, but only once in his life; if he relapsed again, he must remain excommunicate like the adulterer. Baptism was the first plank thrown out to save the drowning man, "confession" the second, and there was no third chance. It was largely due to the rigour of this rule that men so frequently deferred baptism till late in life. Less serious sins, again, were held to be adequately dealt with by ordinary prayers, such as the Lord's Prayer, or by the public prayers of the church. Public but general confession of sins and inter- cession for penitent sinners have from early times formed a normal part of public worship in the Christian church.

The process of public confession or penance (exomologesis, Greek for public confession) was as follows (see Tertullian, De paenitenlia IX. , and other writers) . The sinner was admitted to it as to a privilege by laying on of hands. He wore sackcloth, made his bed in ashes, and fasted or used only the very plainest fare. In secret he gave himself up to ceaseless prayer; in public he threw himself at the brethren's feet to entreat their inter- cessions. This went on for a time proportionate to the gravity of the offence, perhaps for years; then, if his sin allowed it, he was readmitted by the bishop and clergy with further laying on of hands. He must still (at least according to later rules) live in strict abstinence, forgoing, e.g., the use of marriage. And if he fell away, he could never be restored again. One can hardly be surprised that Tertullian says that few faced such an ordeal. In this account nothing is said of confession; but it would appear that in early days the sins were made known to the congregation, and in notorious cases they would take the initiative and expel the offender. It was also common for a penitent to take advice as to the necessity in his case of under- going exomologesis, and this, of course, involved confession. Origen implies that in his days the penitent might choose his own spiritual physician. It is to be noticed that the clergy were never admitted to this public discipline; but a cleric might be deposed and then admitted as a layman. Ordinarily the sinful cleric prayed and fasted at his own discretion, and nothing is said of his confessing his sins. In fact far more importance was attached to the

discipline than to confession.

Church practice was not the same everywhere at the same time; just because Scripture only gave the ruling principles, therefore the different churches worked out their application in different ways. It is, therefore, natural that we should trace the stages of development through the friction they caused. Thus Calixtus, bishop of Rome 219-223, decided to admit adulterers to exomologesis and so to communion; and Tertullian, now become a Montanist, pours out his scorn on him. Thirty years later, first at Carthage, then at Rome, the same step has been taken with regard to penitent apostates, at least the less guilty of them. But the church was thereby involved in a double conflict; for while on the one hand the Novatianist schism represents the puritan outcry against such laxity, on the other the martyrs (hot indeed for the first time) claimed a position above church law, and gave trouble by issuing libelli pads, i.e. requests or even orders that so-and-so, and sometimes the name was not inserted, should be readmitted to communion forthwith without undergoing the discipline of exomologesis. It was out of this practice that later on Indulgences grew up.

A further relaxation appears about the same time. Those

under discipline were allowed to receive the eucharist when in articulo mortis. As this was sometimes effected by means of the reserved sacrament without any formal reconciliation, even without the presence of bishop or priest, it affords further evidence of the emphasis being laid on contrition and submission to discipline rather than on absolution. Cyprian, Epist. xviii., sanctions a dying man's making confession {exomologesis) of his sin before a deacon in case of necessity, and being reconciled by laying on of hands.

At the beginning of the 4th century a system came into use by which penitents undergoing discipline were divided into four grades, the lowest being the mourners, then the hearers, the kneelers and the consistentes (standing). Thus by the nth canon of Nicaea certain who had been guilty of apostasy were to be three years among the hearers, seven among the kneelers, and two among the consistentes. These grades were distinguished by their admission to or exclusion from parts of the church and of divine service; none of them were allowed to communicate until their penance was complete, except in articulo mortis.

In the same century at Rome and at Constantinople we hear of "

penitentiaries," that is priests appointed to act for the bishop in hearing the confession of sins, and deciding whether public discipline was necessary and, if it was, on its duration; in other words they prepared the penitents for solemn recon- ciliation by the bishop. A scandal at Constantinople in 391 led to the suppression in that city not only of the office of peni- tentiary, but practically of public exomologesis also, and that seemingly in Eastern Christendom generally, so that the indi- vidual was left to assess his own penance, and to present himself for communion at his own discretion. This inevitably led on to the reiteration of confession after repeated lapses, and Chrysostom (bishop of Constantinople, 308-407) was attacked for allowing such a departure from ancient rule.

But in the West public discipline continued, though under less and less rigorous conditions. Persecution having ceased, the question of apostasy had lost its chief significance, and as church life became public and influential the evils of scandal were intensified. Penitents, therefore (as a rule), were excused the painful ordeal of public humiliation, but performed their penances in secret; only at the end they were publicly reconciled by the bishop. This was at Rome and Milan appointed to be done on the Thursday before Easter, and gradually became a regular practice, the same penitent year after year doing penance during Lent, and being publicly restored to communion in Holy Week. Towards the end of the 4th century priests began to be allowed to take the bishop's place in the re-admission of penitents and to do it privately. And with this step the evolution of the system was completed. The abandonment of plenary penitence {i.e. the full rigour of exomologesis), the extension of the system in which there was nothing public about the penitence except the solemn reconciliation on Maundy Thursday, the allowing of repeated recourse to this reconciliation, the delegation to priests of the power to reconcile penitents in private; such were the successive stages in the development.

The irruptions of the barbarians revolutionized the whole system of daily life. The various tribes were indeed converted to the faith one after another; but it took centuries to break them in to anything like obedience to Christian principles of morality. In consequence the Christian world tended to be divided into two classes. The first, the religious, including women and laymen as well as clergy, still maintained the old ideals of purity and mutual responsibility. Thus in the chapter- house of a monastery there constantly took place acts of discipline that depended on the theory that the sin of the individual is the concern of the society; open confession was made, open penance exacted. On the other hand, the still half-heathen world outside broke every moral law with indifference; and in the effort to restrain men's, vices church discipline became mechanical instead of sympathetic, penal rather than paternal. The penance was regarded (not without precedent in earlier times) as the discharge of a liability due to

God or the Church; and so much sin was reckoned to involve so much debt. Thus we reach what has been

called la pinitence tarifSe. Penitentials or codes defined (even invented) different degrees of guilt, and assessed the liability involved much as if a sin gave rise to an action to recover damages. The Greek penitentials date from about 600; the Latin are a little later; the most. influential was that of Theodore of Tarsus, who was archbishop of Canterbury from 668 to 690. Two disastrous results not infrequently arose: a money payment was often allowed in lieu of acts of penance, and the prayers and merits of others were held to supply the inadequacy of the sinner's own repentance (see Indulgence). Meanwhile the constant repetition of confession and reconciliation, together with the fact that the most tender consciences .would be the most anxious for the assurance of forgiveness, led to the practice being considered a normal part of the Christian life. It came to be allowed to be used by priests as well as by laymen. Absolu- tion was reckoned one of the sacraments, one of the seven when that mystic number was generally adopted; but there was no agreement as to what constituted the essential parts of the sacrament, whether the confession, the laying on of hands, the penance, or the words of dismissal. It was more and more regarded as the special function of the priest to administer absolution, though as late as the 16th century we hear of laymen confessing to and absolving one another on the battlefield because no priest was at hand. Moreover, the idea of corporate responsibility and discipline was overshadowed by that of medicine for the individual soul, though public penance was still often exacted, especially in cases of notorious crime, as when Henry II. submitted to the scourge after the murder of Becket.

At last in 1215 the council of the Lateran decreed that every one of either sex must make confession at least once a year before his parish priest, or some other priest with the consent of the parish priest. Treating this rule as axiomatic the School- men elaborated their analyses of the sacrament of penance, distinguishing form and matter, attrition and contrition, mortal and venial sins. The Council of Trent in 1551 repudiated the worst corruptions and repelled as slanders certain charges which were made against the medieval system; but it retained the obligation of annual confession, and laid it down that the form of the sacrament consisted in the priest's words of absolution. (See Absolution.)

As confession is now administered in the Roman Church, the disciplinary penance is often little more than nominal, the recitation of a psalm or the like — stress being laid rather on the fulness of the confession and on the words of authoritative absolution. No one is allowed to receive holy communion, if guilty of "mortal" sin, without resorting to confession; only if a priest has to celebrate mass, and there is no other priest to hear his

confession, may he receive " unabsolved " after mortal sin. The faithful are bound to confess all " mortal " sins; they need not confess " venial " sins. It is common to go to confession, even though there are only venial sins to be confessed; and in order to excite contrition people are sometimes advised to confess over again some mortal sin from which they have been previously absolved. No priest may hear confessions without licence from the bishop. Certain special sins are " reserved," that is, the ordinary priest cannot give absolution for them ; the matter must be referred to the bishop, or even the pope. Children begin to go to confession at about the age of seven.

In the Greek Church confession has become obligatory and habitual. Among the Lutherans auricular confession survived the Reformation, but the general confession and absolution before communion were soon allowed by authority to serve as a substitute; in Wurttemberg as early as the 16th century, in Saxony after 1657, and in Brandenburg by decree of the elector in 1698. Private confession and absolution were, however, still permitted; though as may be seen from Goethe's experience, related in his Dichtung und Wahrheit, it tended to become a mere form, a process encouraged by the fact that the fees payable for absolution formed part of the pastor's regular stipend. Since the beginning of the 10th century the practice of auricular confession has been to a certain extent revived

among orthodox Lutherans (see Herzog-Hauck, Realencyklopadie s. " Beichte ")•

To come to England, Wesley provided for spiritual discipline (i) through the class-meeting, whose leader has to advise, comfort or exhort as occasion may arise; and (2) through the ministers, who have to bear the chief responsibility in the reproof, suspension or expulsion from communion of erring brethren. In the Salvation Army people are continually invited to come forward to the " penitent form," and admissions of past evil living are publicly made. Among the Calvinistic bodies in the British Isles and abroad kirk-discipline has been a stern reality; but in none of them is there private confession or priestly absolution.

The Church of England holds in this matter as in others a central position. The method of confession adopted in the public services of the Church of England, with which the Book of Common Prayer is primarily concerned, may be described as one of general confession to God in the face of the church, to be in secret used by each member of the congregation for the confession of his own particular sins, and to be followed by public

absolution. But three other methods of confession for private use are mentioned in the exhortations in the communion service, which constitute the principal directory for private devotions among the authoritative documents of the English Church. First, all men are urged to practise secret confession to God alone, and in it the sins are to be acknowledged in detail. Secondly, where the nature of the offence admits of it, the sinner is to acknowledge his wrongdoing to the neighbour he has aggrieved. And, thirdly, the sinner who cannot satisfy his conscience by these other methods is invited to open his grief to a minister of God's word. Similarly, the sick man is to be moved to make a special confession of his sins if he feels his conscience troubled with any weighty matter. The priest is bound, under the most stringent penalties, never to divulge what he has thus learnt. See the 113th canon of 1604, which, however, excepts crimes " such as by the laws of this realm the priest's own life may be called into question for concealing the same." It is, however, maintained by some that, except in the case of the sick, the only legitimate method of receiving absolution in the Church of England is in the public services of the congregation; and the Church of Ireland has recently made important altera- tions even in the passages that concern the sick, while the Protestant Episcopal Church of the United States has omitted that part of the visitation service altogether.

It is probable that auricular confession never altogether died out in the Church of England, but it is obvious that evidence on the subject must always be hard to find. Certainly there has been a great increase and development of the practice since the Oxford movement in the early part of the 19th century. Two chief difficulties have attended this revival. In the first place, owing to the general disuse of such ministrations, there were none among the English clergy who had experience in delicate questions of conscience; and there had been no treatment of casuistry since Sanderson and Jeremy Taylor (see Casuistry). Those, then, who had to hear penitents unburden their souls were driven to the use of Roman writers on the subject. A book called The Priest in A bsolution was compiled, and at first privately circulated among the clergy; but in 1877 a copy was produced in parliament, and gave rise to much scandal and heated debate, especially in the House of Lords and in the newspapers. In the following year Dr Pusey published a translation of the Abbe J. J. Gaume's Manual for Confessors, abridged and " adapted to the use of the English Church." The other chief difficulty arose from the absence of any authoritative restraint on the hearing of confessions by young and unqualified priests, the Church of England merely directing the penitent who wishes for special help to resort to any " discreet and learned minister." In 1873 a petition signed by four hundred and eighty- three clergy was presented to Convocation asking for the " education, selection and licensing of duly qualified confessors." The bishops declined so to act, but drew up a report on the subject of

confession. The question excites the keenest feeling, and

extreme views are held on either side. On the one hand, it is opposed as the citadel of sacerdotal authority and as a peril to morals. On the other hand, there are those who speak as if auricular confession were a necessary element in every Christian life, and hold that post-baptismal sin of a grave sort can receive forgiveness in no other way. Such a view cannot- be found within the covers of the English Prayer-Book.

Bibliography. — Hooker, Ecclesiastical Polity, book vi. ; Morinus, Commentarius historicus de sacramento paenitenliae; Marshal, Penitential Discipline (1717); F. W. Robertson, Sermons, third series — Absolution (London, 1857); Mead, " Exomologesis " and " Penitence " in Dictionary of Christian Antiquities (London, 1875) ; E. B. Pusey, Advice, &c, being the Abbi Gaume's Manual for Con- fessors, &c. (Oxford, 1878) ; Carter, The Doctrine of Confession in the Church of England (London, 1885); H. C. Lea, A History of Auricular Confession and Indulgences in the Latin Church (Phila- delphia, 1896) ; Boudinhon in Revue d'hisloire et de litterature re- ligieuses (1897 and 1898); H. Wace, Confession and Absolution. Report of Fulham Conference (London, 1902) ; H. B. Swete, in Journal of Theological Studies (April 1903) ; P. Batiffol, Etudes d'histoire et de theologie positive, premiere serie (4th ed., Paris, I9°6)- (W. O. B.)

2. Law. — In criminal procedure confession has always, of course, played an important part, and the attempt to obtain such a confession from the incriminated person, whether by physical torture or by less violent means, was formerly, and in certain countries still remains, a recognized expedient for securing the conviction of the guilty. This method was carried to ruthless extremes by the Inquisition (q.v.), but was by no means unknown in countries in which this institution never gained a foothold; as in England, where torture was practised, though never legalized, for this purpose. In spite of a general tendency to relinquish the inquisitorial method, it is still prevalent in certain countries, notably in France, where the efforts of the prosecution, especially during the preliminary investigations, are directed to extracting a confession from the accused. In English law, on the other hand, the confession of an incriminated person can be received in evidence against him only if it has been free and voluntary. Any threat or inducement held out to a person to make a confession renders the confession inadmissible, even if afterwards made to another person, it having been held that the second confession is likely to be induced by the promise held out by the person to whom the first confession was made. Any inducement to a person to make a confession must refer to some temporal benefit to be gained from it. In conformity with the principle of English law that a person ought not to be made to incriminate himself, it is usual, when a person in custody wishes to make a

statement or confession, to caution him that what he says will be used in evidence against him. Particular facts may have an important bearing on the admissibility or otherwise of a confession — innumerable decisions will be found in Arch- bold's Criminal Pleading (23rd ed.). In divorce law, the con- fession of a wife charged with adultery is always treated with circumspection and caution, for fear of collusion between the parties to a suit. Where, however, such a confession is clear and distinct, the court will usually receive it as evidence against the wife, but not against a co-respondent. In a case where a wife's confession was obtained by falsely stating to her that the sus- pected co-respondent had confessed, such confession was held admissible. (T. A. I.)

CONFESSIONAL (Late Lat. confessionale, neut. adj. from confessionalis, " pertaining to confession," Fr. confessional, Ital. confessionale), a box, cabinet or stall, in which the priest in Roman Catholic churches sits to hear the confessions of penitents. The confessional is usually a wooden structure, with a centre compartment — entered through a door or curtain — in which the priest sits, and on each side a latticed opening for the penitents to speak through, and a step on which they kneel. By this arrangement the priest is hidden, but the penitent is visible to the public. Confessionals sometimes form part of the architectural scheme of the church; many finely decorated specimens, dating from the late 16th and the 17th centuries, are to be found in churches on the continent of Europe. A notable example, in Renaissance style, is in the church of St

Michel at Louvain. But, more usually, confessionals are movable pieces of furniture.

The confessional in its modern form dates no farther back than the 16th century, and Du Cange cites the year 1563 for an early use of the word confessionale for the sacrum poenitentiae tribunal. Originally the term was applied to the place where a martyr or " confessor " (in the sense of one who confesses Christ) had been buried. There are, however, instances (e.g. the confessional of St Trophimus at Aries) where the name was attached to the spot, whether cell or seat, where noted saints were wont to hear confessions. In the popular Protestant view confessional boxes are associated with the scandals, real or supposed, of the practice of auricular confession. They were, however, devised to guard against such scandals by securing at once essential publicity and a reasonable privacy, and by separating priest and penitent. In the middle ages stringent rules were laid down, in this latter respect, by the canon law in the case of confessions by

women and especially nuns.

In England, before the Reformation, publicity was reckoned the best safeguard. Thus Archbishop Walter Reynolds, in 1322, says in his Constitutions: "Let the priest choose for himself a common place for hearing confessions, where he may be seen generally by all in the church; and do not let him hear any one, and especially any woman, in a private place, except in great necessity." It would seem that the priest usually heard confessions at the chancel opening or at a bench end in the nave near the chancel. There is, however, in some churchwardens' accounts mention of a special seat: "the shryving stool," " shriving pew " or " shriving place " (Gasquet, Parish Life in Mediaeval England, p. 199). At Lenham in Kent there is an ancient armchair in stone, with a stone bench and steps on one side, which appears to be a confessional.

With the revival of the practice of auricular confession in the English Church, confessionals were introduced into some of the more " extreme " Anglican churches. Since, however, they certainly formed no part of " the furniture of the church " in the " second year of King Edward VI." they can hardly be considered as covered by the " Ornaments Rubric " in the Prayer-Book. The question of their legality was raised in 1900 in the case of Davey v. Hinde (vicar of the church of the An- nunciation at Brighton) tried before Dr Tristram in the consistory court of Chichester. They were condemned " on the ground that they are not articles of church furniture requisite for or conducive to conformity with the doctrine or practice of the Church of England in relation to the reception of confession" (C. Y. Sturge, Points of Church Law, London, 1907, p. 137).

" Confessional," in the sense of a due payable for the right to hear confession, is now obsolete. As an adjective con- fessional is used in two senses: (1) of the nature of, or belong- ing to confession, e.g. " confessional prayers "; (2) connected with confessions of faith, or creeds, e.g. " confessional differences." (W. A. P.)

CONFESSION AND AVOIDANCE, in pleading, the plea admitting that facts alleged in a declaration are true, but showing new facts by which it is hoped to destroy the effect of the allega- tions admitted. A plea in confession and avoidance neither simply admits nor merely denies; it admits that the facts alleged by the opposite party make out a good prima facie case or defence, but it proceeds to destroy the effect of these allega- tions either by showing some justification or excuse of the matter charged, or some discharge or release from it. All matter in confession and avoidance must be stated clearly and distinctly, and must be specific. If intended to apply .to part only of a statement of claim, it must be so stated.

CONFESSOR, in the Christian Church, a word used in the two senses of (1) a person the holy character of whose life and death entitle him or her, in the judgment of the Church, to a peculiar reputation for sanctity, (2) a priest empowered to hear confessions.

(1) In the first sense the word confessor was in the early Church sometimes applied loosely to all martyrs, but more properly to those who, having suffered persecution and torture

for the faith, were afterwards allowed to die in peace. The present sense of the word, as defined above, developed after the ages of persecution had passed. It came to be applied by custom, as did the predicate " Saint," to the holy men of the past; e.g. Ecgberht, archbishop of York (Excerpt, cap. xxviii), speaks of " the holy fathers whom we have styled confessors, i.e. bishops and priests who have served God in chastity." But, as in the case of " saint," the right of declaring the holy dead to be " confessors " was ultimately reserved to the Holy See. The most celebrated instance of the formal bestowal of the style is that of King Edward of England, who was made a " Confessor " on his canonization by Pope Alexander III. in 1161, and has since been commonly known as Edward the Confessor.

(2) The confessor in the second sense is now termed in ecclesi- astical Latin confessarius (med. Lat. confessare, to confess), to distinguish him from the " confessor " described above. The functions of the confessor are dealt with in the article Con- fession (q.v.). Here it need only be pointed out that though, in the Roman Catholic Church, the potestas ordinis of every priest includes the power of granting absolution, according to the established discipline of the Church, no priest can be a confessor, i.e. hear confessions, without a special faculty from his bishop.

CONFIRMATION (Lat. confirmatio, from confirmare, to establish, make firm), in the Christian sense, the initiatory rite of laying on of hands, supplementary to and completing baptism, and especially connected with the gift of the Holy Ghost to the candidate. The words " confirm " and " confirmation " are not used in the Bible in this technical sense, which has only grown up since the 5th century, and only in the Western churches of Christendom and in their offshoots, but the rite itself has been practised in the Church from the beginning. The history of confirmation has passed through three stages. In the first ages of the Church, when it was recruited chiefly by converts who were admitted in full age, confirmation, or the laying on of hands (Heb. vi. 2), followed close upon baptism, and in the majority of cases the two were combined in a single service. But only the highest order of ministers could confirm (see Acts viii. 14-17); whereas priests and deacons, and in an emergency laymen and even women, could baptize. There was therefore no absolute certainty that a believer who had

been baptized had also received confirmation (Acts xix. 2). But two circumstances tended to prevent the occurrence of such irregularities. In the first place, there were in early days far more bishops in proportion to the number of believers than is the custom now; and, secondly, it was the rule (except in cases of emergency) to baptize only in the season from Easter to Pentecost, and the bishop was always present and laid his hands on the newly baptized. Moreover, in the third and fourth centuries the infants of Christian parents were frequently left unbaptized for years, e.g. Augustine of Hippo. Later, when the Church had come to be tolerated and patronized by the state, her numbers increased, the rule that fixed certain days for baptism broke down, and it was impossible for bishops to attend every baptismal service. Thereupon East and West adopted different methods of meeting the difficulty. In the East greater emphasis was laid on the anointing with oil, which had long been an adjunct of the laying on of hands: the oil was consecrated by the bishop, and the child anointed or " sealed " with it by the parish priest, and this was reckoned as its confirmation. With its baptism thus completed, the infant was held to be capable of receiving holy communion. And to this day in the Eastern Church the infant is baptized, anointed and communicated by the parish priest in the course of a single service; and thus the bishop and the laying on of hands have disappeared from the ordinary service of confirmation. The West, on the other hand, deferred confirmation, not at first till the child had reached years of discretion, though that afterwards became the theory, but from the necessities of the case. The child was baptized at once, that it might be admitted to the Church, while the completion of its baptism was put off till it could be brought to a bishop. Western canons insist on both points at once; baptism is not to be deferred bevond a week,

nor confirmation beyond seven years. And to give an historical example, Henry VIII. had his daughter, afterwards Queen Elizabeth, both baptized and confirmed when she was only a few days old. And still the rubrics of the English Prayer-Book direct that the person who is baptized as an adult is to "be confirmed by the bishop so soon after his baptism "as conveniently may be."

But theologians in the West had elaborated a theory of the grace of confirmation, which made its severance from baptism seem natural; and at the time of the Reformation, while neither side favoured the Eastern practice, the reformers, with their strong sense of the crucial importance of faith, emphasized the action of the individual in the service, and therefore laid it down as a rule that confirmation should be deferred till the child

could learn a catechism on the fundamentals of the Christian faith, which Calvin thought he might do by the time he was ten. Many of the Protestant bodies have abandoned the rite, but it remains among the Lutherans (who, whether episcopal or not, attach great importance to it) and in the group of Churches in com- munion with the Church of England. In the Catholic Apostolic Church (" Irvingites ") confirmation is called " sealing," and is administered by the "angels." Among the Roman Catholics it is reckoned one of the seven sacraments, and administered at about the age of eight: in many cases less emphasis is laid on the confirmation than on the first communion, which follows it.

At the last revision of the Book of Common Prayer an addition was made to the service by prefixing to it a solemn renewal of their baptismal vows by the candidates; and, in the teeth of history and the wording of the service, this has often been taken to be the essential feature of confirmation. Practically, the preparation of candidates for confirmation is the most important and exacting duty of the Anglican parish priest, as the administra- tion of the rite is the most arduous of a bishop's tasks; and after a long period of slovenly neglect these duties are now generally discharged with great care: classes are formed and instruction is given for several weeks before the coming of the bishop to lay on hands " after the example of the Holy Apostles " (prayer in the Confirmation Service) . Of late years there has been a controversy among Anglican theologians as to the exact nature of the gift conveyed through confirmation, or, in other words, whether the Holy Spirit can be said to have come to dwell in those who have been baptized but not confirmed. The view that identifies con- firmation rather than baptism with the Pentecostal outpouring of the Spirit on the Church has had to contend against a long- established tradition, but appeals to Scripture (Acts viii. 16) and to patristic teaching.

Authorities. — Hooker, Ecclesiastical Polity, book v. ch. lxvi; Jeremy Taylor, A Discourse of Confirmation; A. J. Mason, The Relation of Confirmation to Baptism (London, 1891), where see list of other writers; L. Duchesne, Origines du culte chretien, chap. ix. (Paris, 1898). (W. O. B.)

CONFIRMATION OF BISHOPS. In canon law confirmation is the act by which the election of a new bishop receives the assent of the proper ecclesiastical authority. In the early centuries of the history of the Church the election or appointment of a suffragan bishop was confirmed and approved by the metropolitan and his suffragans assembled in synod. By the 4th canon of the first council of Nicaea (a.d. 325), however, it was decreed that the right of confirmation should belong to the metropolitan bishop of each province, a rule confirmed by the

12 th canon of the council of Laodicaea. For the appointment of a

metropolitan no papal confirmation was required either in the West or East; but the practice which grew up, from the 6th century onwards, of the popes presenting the pallium (q.v.), at first honoris causa, to newly appointed metropolitans gradually came to symbolize the licence to exercise metropolitan jurisdic- tion. By the 8th and 9th centuries the papal right of confirma- tion by this means was strenuously asserted; yet as late as the

13 th century there were instances of metropolitans exercising their functions without receiving the pallium, and it was not till after this date that the present rule and practice of the Roman

Catholic Church was definitively established (see Hinschius, Kirchenrecht, ii. p. 28 and notes). The canonical right of the metropolitan to confirm the election of his suffragans was still affirmed by Gratian; but from the time of Pope Alexander III. (1150-1181) the canon lawyers, under the influence of the False Decretals, began to claim this right for the pope (Febronius, De statu ecclesiae, 2nd ed., 1765, cap. iv. § 3, 2). From the 13th century onwards it was effectively exercised, though the all but universal practice of the popes of reserving and providing to vacant bishoprics, initiated by Clement V., obscured the issue, since in the case of papal nominations no confirmation was required. The question, however, was raised, in connexion with that of the papal reservations and provisions, at the councils of Constance and Basel. The former shelved it in the interests of peace; but the latter once more formulated the principle that elections in the churches were to be free and their result confirmed according to the provisions of the common law (Juxta juris communis dis'positionem), i.e. by " the immediate superior " to whom the right of confirmation belonged (Febronius, op. cit. Appendix, p. 784).

In England, where the abuse of provisors had been most acutely felt, the matter was dealt with during the vacancy of the Holy See between the deposition of John XXIII. at Constance (May 1415) and the election of Martin V. (November 1417). During the interval the only possible way of appointing a bishop was by the ancient method of canonical election and confirmation. Shortly after the deposition of John XXIII., Henry V. assented to an ordinance that during the voidance of the Holy See bishops-elect should be confirmed by their metropolitans (Rotuli Parlia- mentorum, iv. p. 71); but the ordinance was not recorded on the Statute Roll. Three bishops only, namely, John Chaundeler of Salisbury, Edmund de Lacey of Hereford and John Wakering of Norwich, were confirmed by the archbishop of Canterbury during the papal vacancy. When Martin V. was elected pope in 1417 he resumed the practice of providing bishops, and from this time until the Reformation the canonical election and confirmation of a bishop in England was a rare exception.

In Roman Catholic countries the complete control of the papacy over the election and appointment of bishops has since the Reformation become firmly established, in spite of the efforts of Gallicans and " Febronians " to reassert what they held to be the more Catholic usage (see Gallicanism; Febronianism; Bishop).

In England at the Reformation the share of the papacy in appointing bishops was abolished, but the confirmation became almost formal in character. By 25 Hen. VIII. c. 20, s. 4, it is provided that after an episcopal election a royal mandate shall issue to the archbishop of the province " requiring him to confirm the said election," or, in case of an archbishop-elect, to one arch- bishop and two bishops, or to four bishops, " requiring and commanding " them " with all speed and celerity to confirm " it. This practice still prevails in the case of dioceses which have chapters to elect. The confirmation has usually been performed by the archbishop's vicar-general, and, in the southern province, at the church of St Mary-le-Bow, London; but since 1901 it has been performed, in part, at the Church House, Westminster, in consequence of the disorder in the proceedings at Bow church on the confirmation there of Dr Winnington Ingram as bishop of London. All objectors are cited toappearon painof contumacy after the old form; but although the knowledge that opposition might be offered has been a safeguard against improper nomina- tions, e.g. in the case of Dr Clarke the Arian, confirmation has never been refused since the Reformation. In 1628 Dr Rives, acting for the vicar-general, declined to receive objections made to Richard Montague's election to the see of Chichester on the ground that they were not made in legal form. An informal protest against the confirmation of Dr Prince Lee of Manchester in 1848 was almost immediately followed by another in due form against that of Dr Hampden, elect of Hereford. The vicar-general refused to receive the objections, and an application to the queen's bench for a mandamus was unsuccess- ful, the judges being divided, two against two. In 1869, at the

confirmation of Dr Temple's election as bishop of Exeter, the vicar-general heard counsel on the question whether he could receive objections, and decided that he could not. When the same prelate was elected to Canterbury, the course here laid down was followed, as also at the confirmation of Dr Mandell Creighton's election to the see pf London. Objections were again raised, in 1902, against Dr Charles Gore, elect of Worcester; and an application was made to the king's bench for a mandamus against the archbishop and his vicar-general when the latter declined to entertain them. By a unanimous judgment (February 10) the

court, consisting of the lord chief justice (Lord Alver- stone) and Justices Wright and Ridley, refused the mandamus. Without deciding that objections (e.g. to the identity of the elect, or the genuineness of documents) could never be investigated by the vicar-general or the archbishop, it held that they could not even entertain objections of the kind alleged. At the con- firmation of Dr Cosmo Gordon Lang's election as archbishop of York, held in the Church House on the 20th of January 1909, objections were raised on behalf of the Protestant Truth Society to the confirmation, on the ground that the archbishop-elect had, while bishop suffragan of Stepney, connived at and en- couraged flagrant breaches of the law as to church ritual, taken part in illegal ceremonies, and the like. The objectors were heard by the archbishop of Canterbury and the other com- missioners in chambers, the decision being that, in accordance with the judgment of the court of king's bench above cited, the objections could not lawfully be received since they did not fall within the province of the commissioners. The archbishop also pointed out that the form of citation (to objectors) had been modified since 1902, but suggested that it was "a matter for consideration whether the terminology of the citation could be altered so as to bring everything into complete accordance with the law of the Church and realm " (see The Times, January 21, 1909). Formerly the archbishop had the right of option, i.e. of choosing any one piece of preferment in the gift of a bishop confirmed by him, and bestowing it upon whom he would; but this has been held to be abolished by a clause in the Cathedral Act of 1840 (3 & 4 Vict. c. 1 13, s. 42). And the election of a dean by a cathedral chapter used to receive the bishop's confirmation (Oughton, Ordo Judiciorum, No. cxxvii.).

Authorities. — L. Thomassin, Vetus et nova disciplina, pars. ii. lib. ii. tit. 1-4 (1705-1706); E. Gibson, Codex juris ecclesiastici anglicani, tit. v. cap. i. (1761); W. H. Bliss, Calendar of Entries in the Papal Registers relating to Great Britain and Ireland, vols, i.-vii. (London, 1893-1906); John Le Neve, Fasti Ecclesiae Anglicanae (Oxford, 1854) ; R. Jebb, Report of the Hampden Case (London, 1849) ; Sir R. J. Phillimore, Ecclesiastical Law, pp. 36-47 (London, 1895) ; art. " The Confirmation of Archbishops and Bishops " in the Guardian for January 20, 1897, pp. 106-107 '< " Judgment in the Gore Case," in the Guardian for February 12, 1902, pp. 234 ff.

CONFISCATION (from Lat. confiscare, to consign to the fiscus, or imperial treasury), in Roman law the seizure and transfer of private property to the fiscus by the emperor; hence the appropriation, under legal authority, of private property to the state; in English law the term embraces forfeiture (q.v.) in the case of goods, and escheat (q.v.) in the case of lands, for crime or in default of heirs (see also Eminent Domain). Goods may also be confiscated by the state for breaches of statutes relating to customs, excise

or explosives. In the United States among the " war measures " during the Civil War, acts were passed in 1861 and 1862 confiscating, respectively, property used for " insurrectionary purposes " and the property generally of those engaged in rebellion. The word is used, popularly, of spoliation under legal forms, or of any seizure of property without adequate compensation.

CONFOLENS, a town of south-western France, capital of an arrondissement in the department of Charente, 44 m. N.E. of Angouleme by rail. Pop. (1906) 2546. Confolens is situated on the banks of the Vienne at its confluence with the Goire. It is an ancient town, with steep narrow streets bordered by old houses. It possesses two bridges of the 15th century, remains of a castle of the 12th century, and two churches, one of the nth, another of the 14th and 15th centuries. The subprefecture,

a tribunal of first instance, and a communal college are among the public institutions. Flour, leather, laces and paper are its industrial products, and there is trade in timber and cattle.

CONFUCIUS [K'ung tsze] (550 or 551-478 B.C.), the famous sage of China. In order to understand the events of his life and the influence of his opinions, we must endeavour to Conation get some impression of the China that existed in his ot China time, in the 5th and 6th centuries B.C. The dynasty ? W 2′ e , o/ of Chow, the third which within historic time had ruled the country, lasting from 1122 to 256 B.C., had passed its zenith, and its kings no longer held the sceptre with a firm grasp. The territory under their sway was not a sixth part of the present empire. For thirteen years of his life Confucius wandered about from state to state, seeking rest and patrons; but his journeyings were confined within the modern provinces of Ho-nan and Shan- tung, and the borders of Chih-li and Hu-peh.

Within the China of the Chow dynasty there might be a population, in Confucius's time, of from 10,000,000 to 15,000,000. We read frequently, in the classical books, of the " ten thousand states " in which the people were distributed, but that is merely a grand exaggeration. In what has been called, though erro- neously, as we shall see, Confucius' s History of his own Times, we find only 13 states of note, and the number of all the states, large and small, which can be brought together from it, and the much more extensive supplement to it by Tso K'iu-ming, not much posterior to the sage, is under 1 50. Chow was a feudal kingdom. The lords of the different territories belonged to five orders of nobility, corresponding closely to the dukes, marquises, earls, counts and barons of feudal Europe. The theory of the constitution required that the princes, on every fresh succession, should receive investiture from the king, and thereafter appear at his court at stated times. They paid to him annually certain specified tributes, and

might be called out with their military levies at any time in his service. A feudal kingdom was sure to be a prey to disorder unless there were energy and ability in the character and administration of the sovereign; and Confucius has sketched, in the work referred to above, the Annals of Lu, his native state, for 242 years, from 722 to 481 B.C., which might almost be summed up in the words: " In those days there was no king in China, and every prince did what was right in his own eyes." In 1770 B.C. a northern horde had plundered the capital, which was then in the present department of Si-gan, Shen-si, and killed the king, whose son withdrew across the Ho and established himself in a new centre, near the present city of Lo-yang in Ho-nan; but from that time the prestige of Chow was gone. Its representatives continued for four centuries and a half with the title of king, but they were less powerful than several of their feudatories. The Annals of Lu, enlarged by Tso K'iu-ming so as to embrace the history of the kingdom generally, are as full of life and interest as the pages of Froissart. Feats of arms, great battles, heroic virtues, devoted friendships and atrocious crimes make the chronicles of China in the 5th, 6th and 7th centuries before the birth of Christ as at- tractive as those of France and England in the 14th and some other centuries after it. There was in China in the former period more of literary culture and of many arts of civilization than there was in Europe in the latter. Not only the royal court, but every feudal court had its historiographers and musicians. Institutions of an educational character abounded. There were ancient histories and poems, and codes of laws, and books of ceremonies. Yet the period was one of . widespread suffering and degeneracy. While the general government was feeble, disorganization was at work in each particular state.

Three things must be kept in mind when we compare feudal China with feudal Europe. First, we must take into account the long duration of the time through which the central authority was devoid of vigour. For about five centuries state was left to contend with state, and clan with clan in the several states. The result was chronic misrule, and misery to the masses of the people, with frequent famines. Secondly, we must take into account the institution of polygamy, with the low status assigned to woman and the many restraints put upon her. In the ancient

poems, indeed, there are a few pieces which are true love songs, and express a high appreciation of the virtue of their subjects; but there are many more which tell a different tale. The intrigues, quarrels, murders and grossnesses that grew out of this social condition it is difficult to conceive, and would be impossible to detail. Thirdly, we must take into account the

absence of strong and definite religious beliefs, properly so called, which has always been a characteristic of the Chinese people. We are little troubled, of course, with heresies, and are not shocked by the outbreaks of theological zeal; but where thought as well as action does not reach beyond the limits of earth and time, we do not find man in his best estate. We miss the graces and consolations of faith; we have human efforts and ambitions, but they are unimpregnated with divine impulses and heavenly aspirings.

Confucius appeared, according to Mencius, one of his most distinguished followers (371-288 B.C.), at a crisis in the nation's history. " The world," he says, " had fallen into 0/ Ate///e. decay, and right principles had disappeared. Perverse discourses and oppressive deeds were waxen rife. Ministers murdered their rulers and sons their fathers. Con- fucius was frightened by what he saw, — and he undertook the work of reformation." The sage was born, according to the historian Sze-ma Ch'ien, in the year 550 B.C.; according to Kung-yang and Kuh-liang, two earlier commentators on his Annals of Lu, in 551; but all three agree in the month and day assigned to his birth, which took place in winter. His clan name was K'ung, and Confucius is merely the latinized form of K'ung Fu-tze, meaning " the philosopher or master K'ung." He was a native of the state of Lu, a part of the modern Shan-tung, embracing the present department of Yen-chow and other portions of the province. Lu had a great name among the other states of Chow, its marquises being descended from the duke of Chow, the legislator and consolidator of the dynasty which had been founded by his father and brother, the famous kings Wan and Wu. Confucius's own ancestry is traced up, through the sovereigns of the previous dynasty of Shang, to Hwang-ti, whose figure looms out through the mists of fable in prehistoric times. A scion of the house of Shang, the surname of which was Tze, was invested by King Wu-Wang with the dukedom of Sung in the present province of Ho-nan. There, in the Tze line, towards the end of the 8th century B.C., we find a K'ung Kia, whose posterity, according to the rules for the dropping of surnames, became the K'ung clan. He was a high officer of loyalty and probity, and unfortunately for himself had a wife of extraordinary beauty. Hwa Tuh, another high officer of the duchy, that he might get this lady into his possession, brought about the death of K'ung Kia, and was carrying his prize in a carriage to his own palace, when she strangled herself on the way. The K'ung family, however, became reduced, and by-and-by its chief representative moved from Sung to Lu, where in the early part of the 6th century we meet with Shuh-liang Heih, the father of Confucius, as commandant of the district of Tsow, and an officer renowned for his feats of strength and daring.

There was thus no grander lineage in China than that of Confucius; and on all his progenitors, since the throne of Shang passed from their line, with perhaps one exception, he could look back with complacency. He was the

son of Heih's old age. That officer, when over seventy years, and having already nine daughters and one son, because that son was a cripple, sought an alliance with a gentleman of the Yen clan, who had three daughters. The father submitted to them Heih's application, saying that, though he was old and austere, he was of most illustrious descent, and they need have no misgivings about him. Ching-tsai, the youngest of the three, observed that it was for their father to decide in the case. " You shall marry him then," said the father, and accordingly she became the bride of the old man, and in the next year the mother of the sage. It is one of the undesigned coincidences' which confirm the credibility of Confucius's history, that his favourite disciple was a scion of the Yen clan.

Heih died in the child's third year, leaving his family in

straitened circumstances. Long afterwards, when Confucius was complimented on his acquaintance with many arts, he accounted for it on the ground of the poverty of his youth, which obliged him to acquire a knowledge of matters belonging to a mean condition. When he was five or six, people took notice of his fondness for playing with his companions at 'setting out sacrifices, and at postures of ceremony. He tells us himself that at fifteen his mind was set on learning; and at nineteen, according to the ancient and modern practice in China in regard to early unions, he was married, — his wife being from his ances- tral state of Sung. A son, the only one, so far as we know, that he ever had, was born in the following year; but he had sub- sequently two daughters. Immediately after his marriage we find him employed under the chief of the Ki clan to whose jurisdiction the district of Tsow belonged, first as keeper of stores, and then as superintendent of parks and herds. Mencius says that he undertook such mean offices because of his poverty, and distinguished himself by the efficiency with which he discharged them, without any attempt to become rich.

In his twenty-second year Confucius commenced his labours as a teacher. He did so at first, probably, in a humble way; but a school, not of boys to be taught the elements of learning, but of young and inquiring spirits who wished to be instructed in the principles of right conduct and government, gradually gathered round him. He accepted the substantial aid of his disciples; but he rejected none who could give him even the smallest fee, and he would retain none who did not show earnest- ness and capacity. " When I have presented," he said, " one corner of a subject, and the pupil cannot of himself make out the other three, I do not repeat my lesson."

Two years after, his mother died, and he buried her in the same grave with his father. Some idea of what his future life was likely to be was already present to his mind. It was not the custom of antiquity to raise any tumulus

over graves, but Confucius resolved to innovate in the matter. He would be travelling, he said, to all quarters of the kingdom, and must therefore have a mound by which to recognize his parents' resting-place. He returned home from the interment alone, having left his disciples to complete this work. They were long in rejoining him, and had then to tell him that they had been detained by a heavy fall of rain, which threw down the first product of their labour. He burst into tears, and exclaimed, "Ah! they did not raise mounds over their graves in anti- quity." His affection for the memory of his mother and dissatis- faction with his own innovation on ancient customs thus blended together; and we can sympathize with his tears. For the regular period of 27 months, commonly spoken of as three years, he observed all the rules of mourning. When they were over he allowed five more days to elapse before he would take his lute, of which he had been devotedly fond, in his hands. He played, but when he tried to sing to the accompaniment of the instru- ment, his feelings overcame him.

For some years after this our information about Confucius is scanty. Hints, indeed, occur of his devotion to the study of music and of ancient history; and we can perceive that his character was more and more appreciated by the principal men of Lu. He had passed his thirtieth year when, as he tells us, " he stood firm " in his convictions on all the subjects to the learning of which he had bent his mind fifteen years before. In 517 B.C. two scions of one of the principal houses in Lu joined the company of his disciples in consequence of the dying com- mand of its chief; and being furnished with the means by the marquis of the state, he made a visit with them to the capital of the kingdom. There he examined the treasures of the royal library, and studied the music which was found in its highest style at the court. There, too, according to Sze-ma Ch'ien, he had several interviews with Lao-tsze, the father of Taoism. It is characteristic of the two men that the latter, a transcendental dreamer, appears to have thought little of his visitor, while Confucius, an inquiring thinker, was profoundly impressed with him.

On his return to Lu, in the same year, that state fell into great

disorder. The marquis was worsted in a struggle with his ministers, and fled to the neighbouring state of Ts'i. Thither also went Confucius, for he would not countenance by his presence the men who had driven their ruler away. He was accompanied by many of his disciples; and as they passed by the T'ai Mountain, an incident occurred which may be narrated as a specimen of the way in which he communicated to them his lessons. The attention of

the travellers was arrested by a woman weeping and wailing at a grave. The sage stopped, and sent one of his followers to ask the reason of her grief. " My husband's father," said she, " was killed here by a tiger, and my husband also, and now my son has met the same fate." Being asked why she did not leave so fatal a spot, she replied that there was there no oppressive government. " Remember this," said Confucius to his disciples, " remember this, my children, oppressive government is fiercer and more feared than a tiger."

He did not find in Ts'i a home to his liking. The marquis of the state was puzzled how to treat him. The teacher was not a man of rank, and yet the prince felt that he ought to give him more honour than rank could claim. Some counsellors of the court spoke of him as " impracticable and conceited, with a thousand peculiarities." It was proposed to assign to him a considerable revenue, but he would not accept it while his counsels were not followed. Dissatisfactions ensued, and he went back to Lu.

There for fifteen more years he continued in private life, prosecuting his studies, and receiving many accessions to his disciples. He had a difficult part to play with the different parties in the state, but he adroitly kept himself aloof from them all; and at last, in his fifty-second year, he was made chief magistrate of the city of Chung-tu. A marvellous reformation, we are told, forthwith ensued in the manners of the people; and the marquis, a younger brother of the one that fled to Ts'i and died there, called him to higher office. He was finally appointed minister of crime, — and there was an end of crime. Two of his disciples at the same time obtained influential positions in the two most powerful clans of the state, and co-operated with him. He signalized his vigour by the punishment of a great officer and in negotiations with the state of Ts'i. He laboured to restore to the marquis his proper authority, and as an important step to that end, to dismantle the fortified cities where the great chiefs of clans maintained themselves like the barons of feudal Europe. For a couple of years he seemed to be master of the situation. "He strengthened the ruler," it is said, "and re- pressed the barons. A transforming government went abroad. Dishonesty and dissoluteness hid their heads. Loyalty and good faith became the characteristics of the men, and chastity and docility those of the women. He was the idol of the people, and flew in songs through their mouths."

The sky of bright promise was soon overcast. The marquis of Ts'i and his advisers saw that if Confucius were allowed to prosecute his course, the influence of Lu would become supreme throughout the kingdom, and Ts'i would be the first to suffer. A large company of beautiful women, trained in music and dancing, and a troop of fine horses, were sent to Lu. The bait took; the women were welcomed, and the sage was neglected. The marquis

forgot the lessons of the master, and yielded supinely to the fascinations of the harem. Confucius felt that he must leave the state. The neglect of the marquis to send round, accord- ing to rule, among the ministers portions of the flesh after a great sacrifice, furnished a plausible reason for leaving the court. He withdrew, though very unwillingly and slowly, hoping that a change would come over the marquis and his counsellors, and a message of recall be sent to him. But no such message came; and he went forth in his fifty-sixth year to a weary period of wandering among various states.

A disciple once asked Confucius what he would consider the first thing to be done, if intrusted with the government of a state. His reply was, " The rectification of names." When told that such a thing was wide of the mark, he held to it, and indeed his whole social and political system was wrapped up in the saying. He had told the marquis of Ts'i that good govern-

ment obtained when the ruler was ruler, and the minister minister; when the father was father, and the son son. Society, he considered, was an ordinance of heaven, and was made up of five relationships — ruler and subject, His ideas husband and wife, father and son, elder brothers and ° m ˆ em ~ younger, and friends. There was rule on the one side of the first four, and submission on the other. The rule should be in righteousness and benevolence; the submission in righteousness and sincerity. Between friends the mutual promotion of virtue should be the guiding principle. It was true that the duties of the several relations were being continually violated by the passions of men, and the social state had become an anarchy. But Confucius had confidence in the preponderating goodness of human nature, and in the power of example in superiors. " Not more surely," he said, " does the grass bend before the wind than the masses yield to the will of those above them." Given the model ruler, and the model people would forthwith appear. And he himself could make the model ruler. He could tell the princes of the states what they ought to be; and he could point them to examples of perfect virtue in former times, — to the sage founders of their own dynasty; to the sage T'ang, who had fflunded the previous dynasty of Shang; to the sage Yu, who first established a hereditary kingdom in China; and to the greater sages still who lived in a more distant golden age. With his own lessons and those patterns, any ruler of his day, who would listen to him, might reform and renovate his own state, and his influence would break forth beyond its limits till the face of the whole kingdom should be filled with a multitu- dinous relation-keeping, well-fed, happy people. " If any ruler," he once said, " would submit to me as his director for twelve months, I should accomplish something considerable; and in three years I should attain the realization of my hopes." Such were the ideas, the dreams of Confucius. But he had not been able to get the ruler of his native state to listen to him. His sage counsels had melted away before the glance of beauty and the pomps of life.

His professed disciples amounted to 3000, and among them were between 70 and 80 whom he described as " scholars of extraordinary ability." The most attached of them were seldom long away from him. They stood or sat reverently by his side, watched the minutest particulars of his conduct, studied under his direction the ancient history, poetry and rites of their country, and treasured up every syllable which dropped from his lips. They have told us how he never shot at a bird perching nor fished with a net, the creatures not having in such a case a fair chance for their lives; how he conducted himself in court and among villagers; how he ate his food, and lay in his bed, and sat in his carriage; how he rose up before the old man and the mourner; how he changed countenance when it thundered, and when he saw a grand display of viands at a feast. He was free and unreserved in his inter- course with them, and was hurt once when they seemed to think that he kept back some of his doctrines from them. Several of them were men of mark among the statesmen of the time, and it is the highest testimony to the character of Confucius that he inspired them with feelings of admiration and reverence. It was they who set the example of speaking of him as the greatest of mortal men; it was they who struck the first notes of that paean which has gone on resounding to the present day.

Confucius was in his fifty-sixth year when he left Lu; and thirteen years elapsed ere he returned to it. In this period were comprised his travels among the different states, when he hoped, and ever hoped in vain, to meet with some prince who would accept him as his counsellor, and initiate a government that should become the centre of a universal reformation. Several of the princes were willing to entertain and support him; but for all that he could say, they would not change their ways.

His first refuge was in Wei, a part of the present Ho-nan, the marquis of which received him kindly; but he was a weak man, ruled by his wife, a woman notorious for her accomplish- ments and wickedness. In attempting to pass from Wei to another state, Confucius was set upon by a mob, which mistook

His disciples.

gio

CONFUCIUS

him for an officer who had made himself hated by his oppressive deeds. He himself was perfectly calm amid the danger, though his followers were filled with alarm. They were H " der- obliged, however, to retrace their way to Wei, and he tags. had there to appear before the marchioness, who

wished to see how a sage looked. There was a screen between them at the interview, such as the present regent- empresses of China use in giving audience to their ministers; but Tze-lu, one of his principal disciples, was indignant that the master should have demeaned himself to be near such a woman, and to pacify him Confucius swore an oath appealing to Heaven to reject him if he had acted improperly. Soon afterwards he left the state.

Twice again, during his protracted wanderings, he was placed in imminent peril, but he manifested the same fearlessness, and expressed his confidence in the protection of Heaven till his course should be run. On one of the occasions he and his company were in danger of perishing from want, and the courage of even Tze-lu gave way. " Has the superior man, indeed, to endure in this way?" he asked. " The superior man may have to endure want," was the reply, " but he is still the superior man. The small man in the same circumstances loses his^self-command."

While travelling about, Confucius repeatedly came across recluses, — a class of men who had retired from the world in disgust. That there was such a class gives us a striking glimpse into the character of the age. Scholarly, and of good principles, they had given up the conflict with the vices and disorder that prevailed. But they did not understand the sage, and felt a contempt for him struggling on against the tide, and always hoping against hope. We get a fine idea of him from his en- counters with them. Once he was looking about for a ford, and sent Tze-lu to ask a man who was at work in a neighbouring field where it was. The man was a recluse, and having found that his questioner was a disciple of Confucius, he said to him: " Disorder in a swelling flood spreads over the kingdom, and no one is able to repress it. Than. follow a master who withdraws from one ruler and another that will not take his advice, had you not better follow those who withdraw from the world altogether?" With these words he resumed his hoe, and would give no information about the ford. Tze-lu went back, and reported what the man had said to the master, who observed: " It is impossible to withdraw from the world, and associate with birds and beasts that have no affinity with us. With whom should I associate but with suffering men? The disorder that prevails is what requires my efforts. If right principles ruled through the kingdom, there would be no necessity for me to change its state." We must recognize in those words a brave heart and a noble sympathy. Confucius would not abandon the cause of the people. He would hold on his way to the end. Defeated he might be, but he would be true to his humane and righteous mission.

It was in his sixty-ninth year, 483 B.C., that Confucius returned to Lu. One of his disciples, who had remained in the state, had been successful in the command of a military expedition, and told the prime minister that he had

learned his skill in war from the master, — urging his recall, and that thereafter mean persons should not be allowed to come between the ruler and him. The state was now in the hands of the son of the marquis whose neglect had driven the sage away; but Confucius would not again take office. Only a few years remained to him, and he devoted them to the completion of his literary tasks, and the delivery of his lessons to his disciples.

The next year was marked by the death of his son, which he bore with equanimity. His wife had died many years before, and it jars upon us to read how he then commanded the young man to hush his lamentations of sorrow. We like him better when he mourned, as has been related, for his own mother. It is not true, however, as has often been said, that he had divorced his wife before her death. The death of his favourite disciple, Yen Hwui, in 481 B.C., was more trying to him. Then he wept and mourned beyond what seemed to his other followers the bounds of propriety, exclaiming that Heaven was destroying

him. His own last year, 478 B.C., dawned on him with the tragic end of his next beloved disciple, Tze-lu. Early one morning, we are told, in the fourth month, he got up, and with Hls ˆeath. his hands behind his back, dragging his staff, he moved about his door, crooning over —

" The great mountain must crumble,

The strong beam must break,

The wise man must wither away like a plant."

Tze-kung heard the words, and hastened to him. The master told him a dream of the previous night, which, he thought, presaged his death. " No intelligent ruler," he said, " arises to take me as his master. My time has come to die." He took to his bed, and after seven days expired. Such is the account we have of the last days of the sage of China. His end was not un-impressive, but it was melancholy. Disappointed hopes made his soul bitter. No wife nor child was by to do the offices of affection, nor was the expectation of another life with him, when he passed away from among men. He uttered no prayer, and he betrayed no apprehension. Years before, when he was very ill, and Tze-lu asked leave to pray for him, he expressed a doubt whether such a thing might be done, and added, " I have prayed for a long time." Deep-treasured now in his heart may have been the thought that he had served his generation by the will of God; but he gave no sign.

When their master thus died, his disciples buried him with great pomp. A

multitude of them built huts near his grave, and remained there, mourning as for a father, for nearly three years; and when all the rest were gone, Tze-kung, the last of his favourite three, continued alone by the grave for another period of the same duration. The news of his death went through the states as with an electric thrill. The man who had been neglected when alive seemed to become all at once an object of unbounded admiration. The tide began to flow which has hardly ever ebbed during three-and-twenty centuries.

The grave of Confucius is in a large rectangle separated from the rest of the K'ung cemetery, outside the city of K'iuh-fow. A magnificent gate gives admission to a fine avenue, lined with cypress trees and conducting to the tomb, a large and lofty mound, with a marble statue in front, bearing the inscription of the title given to Confucius under the Sung dynasty: — " The most sagely ancient Teacher; the all-accomplished, all-informed King." A little in front of the tomb, on the left and right, are smaller mounds over the graves of his son and grandson, from the latter of whom we have the remarkable treatise called The Doctrine of the Mean. All over the place are imperial tablets of different dynasties, with glowing tributes to the one man whom China delights to honour; and on the right of the grandson's mound is a small house said to mark the place of the hut where Tze-kung passed his nearly five years of loving vigil. On the mound grow cypresses, acacias, what is called " the crystal tree," said not to be elsewhere found, and the Achillea, the plant whose stalks were employed in ancient times for purposes of divination.

The adjoining city is still the home of the K'ung family; and there are said to be in it some 40,000 or 50,000 of the descendants of the sage. The chief of the family has large estates by imperial gift, with the title of " Duke by imperial appointment and hereditary right, continuator of the sage."

The dynasty of Chow finally perished two centuries and a quarter after the death of the sage at the hands of the first historic emperor of the nation, — the first of the dynasty of Ts'in, who swept away the foundations of on p fttoa _ the feudal system. State after state went down before his blows, but the name and followers of Confucius were the chief obstacles in his way. He made an effort to destroy the memory of the sage from off the earth, consigning to the flames all the ancient books from which he drew his rules and examples (save one), and burying alive hundreds of scholars who were ready to swear by his name. But Confucius could not be so extinguished. The tyranny of Ts'in was of short duration, and the next dynasty, that of Han, while entering into the new China, found its surest strength in doing honour to his name, and trying to gather up the wreck of the ancient books. It is

difficult to determine what there was about Confucius to secure for him the influence which he has wielded. Reference has been made to his literary tasks; but the study of them only renders the undertaking more difficult. He left no writings in which he detailed the principles of his moral and social system. The Doctrine of the Mean, by his grandson Tze-sze, and The Great Learning, by Tsang Sin, the most profound, perhaps, of his disciples, give us the fullest information on that subject, and contain many of his sayings. The Lun-Yii, or Analects, " Dis- courses and Dialogues," is a compilation in which many of his disciples must have taken part, and has great value as a record of his ways and utterances; but its chapters are mostly disjecta membra, affording faint traces of any guiding method or mind. Mencius, Hsiin K'ing and writers of the Han dynasty, whose works, however, are more or less apocryphal, tell us much about him and his opinions, but all in a loose and unconnected way. No Chinese writer has ever seriously undertaken to compare him with the philosophers and sages of other nations.

*The sage, probably, did not think it necessary to put down many of his own thoughts in writing, for he said of himself that Connexion he was " a transmitter, and not a maker." Nor did with the he lay claim to have any divine revelations. He was '"/Chi"™ no * ; Dorn > ne declared, with knowledge, but was fond of antiquity, and earnest in seeking knowledge there. The rule of life for men in all their relations, he held, was to be found within themselves. The right development of that rule, in the ordering not of the individual only, but of society, was to be found in the words and institutions of the ancient sages.*

China had a literature before Confucius. All the monuments of it, however, were in danger of perishing through the disorder into which the kingdom had fallen. The feudal system that had subsisted for more than 1500 years had become old. Confucius did not see this, and it was impossible that he should.

China was in his eyes drifting from its ancient moorings, drifting on a sea of storms " to hideous ruin and combustion "; and the expedient that occurred to him to arrest the evil was to gather up and preserve the records of antiquity, illustrating and commending them by his own teachings. For this purpose he lectured to his disciples on the histories, poems and constitu- tional works of the nation. What he thus did was of inestimable value to his own countrymen, and all other men are indebted to him for what they know of China before his time, though all the contents of the

ancient works have not come down to us.

He wrote, we are told, a preface to the Shu King, or Book of Historical Documents. The preface is, in fact, only a schedule, without any remark by Confucius himself, giving the names of 100 books, of which it consisted. Of these we now possess 59, the oldest going back to the 23rd century, and the latest dating in the 8th century B.C. The credibility of the earlier portions, and the genuineness of several of the documents, have been questioned, but the collection as a whole is exceedingly valuable.

The Shih king, or Ancient Poems, as existing in his time, or compiled by him (as generally stated, contrary to the evidence in the case), consisted of 311 pieces, of which we possess 305. The latest of them dates 585 years B.C., and the oldest of them ascends perhaps twelve centuries higher. It is the most interest- ing book of ancient poetry in the world, and many of the pieces are really fine ballads. Confucius was wont to say that he who was not acquainted with the Shih was not fit to be conversed with, and that the study of it would produce a mind without a single depraved thought. This is nearly all we have from him about the poems.

The Li ki, or Books of Rites and Ancient Ceremonies and of Institutions, chiefly of the Chow dynasty, have come down to us in a sadly mutilated condition. They are still more than sufficiently voluminous, but they were edited, when recovered under the Han dynasty, with so many additions, that it is hardly worth while to speak of them in connexion with Confucius, though much of what was added to them is occupied with his history and sayings.

Of all the ancient books not one was more prized by him than the Yi-kinˆ, or " The Book of Changes," the rudiments

of which are assigned to Fuh-hi about the 30th century B.C. Those rudiments, however, are merely the 8 trigrams and 64

hexagrams, composed of a whole and a broken line (,),

without any text or explanation of them earlier than the rise of the Chow dynasty. The leather thongs, by which the tablets of Confucius's copy were tied together, were thrice worn out by his constant handling. He said that if his life were lengthened he would give fifty years to the study of the Yi, and might then be without great faults. This has come down to us entire. If not intended from the first for purposes of divination, it was so used both before and after Confucius, and on that account it was exempted, through the superstition of the emperor of the Ts'in dynasty, from the flames. It is supposed to give a theory of the phenomena of the physical universe, and

of moral and political principles «by the trigrams and the different lines and numbers of the hexagrams of Fuh-hi. Almost every sentence in it is enigmatic. As now published, there are always subjoined to it certain appendixes, which are ascribed to Confuciushimself. Pythagoras and he were contemporaries, and in the fragments of the Samian philosopher about the " elements of numbers as the elements of realities " there is a remarkable analogy with much of the Yi. No Chinese critic or foreign student of Chinese litera- ture has yet been able to give a satisfactory account of the book.

But a greater and more serious difficulty is presented by his last literary labour, the work claimed by him as his own, and which has already been referred to more than once as the Annals of Lu. Its title is the Ch'un Ch'iu, or " Spring and Autumn," the events of every year being digested under the heads of the four seasons, two of which are used by synecdoche for the whole. Mencius held that the composition of the Ch'un Ch'iu was as great a work as Yu's regulation of the waters of the deluge with which the Shu King commences, and did for the face of society what the earlier labour did for the face of nature. This work also has been preserved nearly entire, but it is ex- cessively meagre. The events of 242 years barely furnish an hour or two's reading. Confucius's annals do not bear a greater proportion to the events which they indicate than the headings in our Bibles bear to the contents of the chapters to which they are prefixed. Happily Tso K'iu-ming took it in hand to supply those events, incorporating also others with them, and continuing his narratives over some additional years, so that through him the history of China in all its states, from year to year, for more than two centuries and a half, lies bare before us. Tso never challenges the text of the master as being incorrect, yet he does not warp or modify his own narratives to make them square with it; and the astounding fact is, that when we compare the events with the summary of them, we must pronounce the latter misleading in the extreme. Men are charged with murder who were not guilty of it, and base murders are related as if they had been natural deaths. Villains, over whose fate the reader rejoices, are put down as victims of vile treason, and those who dealt with them as he would have been glad to do are subjected to horrible executions without one word of sympathy. Ignoring, concealing and misrepresenting are the characteristics of the Spring and Autumn.

And yet this work is the model for all historical summaries in China. The want of harmony between the facts and the state- ments about them is patent to all scholars, and it is the knowledge of this, unacknowledged to themselves, which has made the literati labour with an astonishing amount of fruitless ingenuity and learning to find in individual words, and the turn of every sentence, some mysterious indication of praise or blame. But the majority of them will admit no flaw in the sage or in his annals. His

example in the book has been very injurious to his country. One almost wishes that critical reasons could be found for denying its authenticity. Confucius said that " by the Spring and A utumn men would know him and men would condemn him . " It certainly obliges us to make a large deduction from our estimate of his character and of the beneficial influence which he has exerted. The examination of his literary labours does not on the whole increase our appreciation of him. We get a higher idea of the man from the accounts which his disciples have given us

of his intercourse and conversations with them, and the attempts which they made to present his teachings in some systematic form. If he could not arrest the progress of disorder in his country, nor throw out principles which should be helpful in guiding it to a better state under some new constitutional system, he gave important lessons for the formation of individual character, and the manner in which the duties in the relations of society should be discharged.

Foremost among these we must rank his distinct enunciation of " the golden rule," deduced by him from his study of man's mental constitution. Several times he gave that rule in express words: — " What you do not like when done to yourself do not do to others." The peculiar nature of the Chinese language enabled him to express this rule by one character, which for want of a better term we may translate in English by " reciprocity." When the ideagram is looked at, it tells its meaning to the eye. It is composed of two other characters, one denoting " heart," and the other — itself com- posite — denoting " as." Tze-kung once asked if there were any one word which would serve as a rule of practice for all one's life, and the master replied, yes, naming this character ($g, shu) , the " as heart," i.e. my heart in sympathy with yours; and then he added his usual explanation of it, which has been given above. It has been said that he only gave the rule in a negative form, but he understood it also in its positive and most comprehensive force, and deplored, on one occasion at least, that he had not himself always attained to taking the initiative in doing to others as he would have them do to him.

Another valuable contribution to ethical and social science was the way in which he inculcated the power of example, and the necessity of benevolence and righteousness in all who were in authority. Many years before he was born, an ancient hero and king had proclaimed in China: " The great God

has conferred on the people a moral sense, compliance with which would show their nature invariably right. To cause them tranquilly to pursue the course which it indicates is the task of the sovereign." Confucius knew the utterance well; and he carried out the prin- ciple of it, and insisted on its application in all the relations of society. He taught emphatically that a bad man was not fit to rule. As a father or a magistrate, he might wield the instruments of authority and punish the transgressors of his laws, but no forthputting of force would countervail the influence of his example. On the other hand, it only needed virtue in the higher position to secure it in the lower. This latter side of his teaching is far from being complete and correct, but the former has, no doubt, been a check on the " powers that be," both in the family and the state, ever since Confucius became the ac- knowledged sage of his country. It has operated both as a restraint upon evil and a stimulus to good.

A few of his more characteristic sayings may here be given, the pith and point of which attest his discrimination sayings. °f character, and show the tendencies of his views: —

" What the superior man seeks is in himself; what the small man seeks is in others."

" The superior man is dignified, but does not wrangle; social, but not a partisan. He does not promote a man simply because of his words, nor does he put good words aside because of the man."

" A poor man who does not flatter, and a rich man who is not proud, are passable characters; but they are not equal to the poor who yet are cheerful, and the rich who yet love the rules of propriety."

" Learning, undigested by thought, is labour lost; thought un- assisted by learning, is perilous."

" In style all that is required is that it convey the meaning."

" Extravagance leads to insubordination, and parsimony to mean- ness. It is better to be mean than insubordinate."

" A man can enlarge his principles; principles do not enlarge the man." That is, man is greater than any system of thought.

" The cautious seldom err."

Sententious sayings like these have gone far to form the ordinary Chinese character. Hundreds of thousands of the literati can repeat every sentence in the classical books; the masses of the people have scores of the

Confucian maxims,

Confucius laid no claim, it has been seen, to divine revelations. Twice or thrice he did vaguely intimate that he had a mission from heaven, and that until it was accomplished he „ ; was safe against all attempts to injure him; but his religion teachings were singularly devoid of reference to any-andphito- thing but what was seen and temporal. Man as he is, s °P b y- and the duties belonging to him in society, were all that he concerned himself about. Man's nature was from God; the harmonious acting out of it was obedience to the will of God; and the violation of it was disobedience. But in affirming this, there was a striking difference between his language and that of his own ancient models. In the King the references to the Supreme Being are abundant; there is an exulting awful recognition of Him as the almighty personal Ruler, who orders the course of nature and providence. With Confucius the vague, impersonal term, Heaven, took the place of the divine name. There is no glow of piety in any of his sentiments. He thought that it was better that men should not occupy themselves with anything but themselves.

There were, we are told in the Analects, four things of which he seldom spoke — extraordinary things, feats of strength, rebellious disorder and spiritual beings. Whatever the institu- tions of Chow prescribed about the services to be paid to the spirits of the departed, and to other spirits, he performed reverently, up to the letter; but at the same time, when one of the ministers of Lu asked him what constituted wisdom, he replied : " To give one's self earnestly to the duties due to men, and while respecting spiritual beings, to keep aloof from them, — that may be called wisdom."

But what belief underlay the practice, as ancient as the first footprints of history in China, of sacrificing to the spirits of the departed, Confucius would not say. There was no need, in his opinion, to trouble the mind about it. " While you cannot serve men," he replied to the inquiry of Tze-lu, " how can you serve spirits?" And what becomes of a man's own self, when he has passed from the stage of life? The oracle of Confucius was equally dumb on this question. " While you do not know life," he said to the same inquirer, " what can you know about death?" Doubts as to the continued existence of the departed were manifested by many leading men in China before the era of Confucius. In the pages of Tso K'iu-ming, when men are swearing in the heat of passion, they sometimes pause and rest the validity of their oaths on the proviso that the dead to whom they appeal really exist. The " expressive silence " of Confucius has gone to confirm this scepticism.

His teaching was thus hardly more than a pure secularism. He had faith in man, man made for society, but he did not care to follow him out of

society, nor to present to him motives of conduct derived from the consideration of a future state. Good and evil would be recompensed by the natural issues of conduct within the sphere of time, — if not in the person of the actor, yet in the persons of his descendants. If there were any joys of heaven to reward virtue, or terrors of future retribution to punish vice, the sage took no heed of the one or the other. Confucius never appeared to give the evils of polygamy a thought. He mourned deeply the death of his mother; but no generous word ever passed his lips about woman as woman. Nor had he the idea of any progress or regeneration of society. The stars all shone to him in the heavens behind; none beckoned brightly before. It was no doubt the moral element of his teaching, springing out of his view of human nature, which attracted many of his disciples, and still holds the best part of the Chinese men of learning bound to him; but the conservative tendency of his lessons — nowhere so apparent as in the Ch'un Ch'iu — is the chief reason why successive dynasties have delighted to do him honour. (J. Le.)

CONGfi D'ELIRE (in Norman French, conge d'eslire, leave to elect), a licence from the crown in England issued under the great seal to the dean and chapter of the cathedral church of the diocese, authorizing them to elect a bishop or archbishop, as the case may be, upon the vacancy of any episcopal or archi- episcopal see in England or in Wales. According to the Chronicle

of Ingulphus, abbot of Crowland, who wrote in the reign of William the Conqueror, the bishoprics in England had been, for many years prior to the Norman Conquest, royal donatives conferred by delivery of the ring and of the pastoral staff. Disputes arose for the first time between the crown of England and the see of Rome in the reign of William Rufus, the pope claiming to dispose of the English bishoprics; and ultimately King John, by his charter Ut liber ae sunt electiones totius Angliae (1214), granted that the bishops should be elected freely by the deans and chapters of the cathedral churches, provided the royal permission was first asked, and the royal assent was required after the election. This arrangement was confirmed by subse quent statutes passed in the reigns of Edward I. and Edward III. respectively, and the practice was ultimately settled in its present form by the statute Payment of Annates, &c, 1534. According to the provisions of this statute, upon the avoidance of any episcopal see, the dean and chapter of the cathedral church are to certify the vacancy of the see to the crown, and to pray that they may be allowed to proceed to a new election. The crown thereupon grants to the dean and chapter its licence

under the great seal to elect a new bishop, accompanied by a letter missive containing the name of the person whom the dean and chapter are to elect. The dean and chapter are thereupon bound to elect the person so named by the crown within twelve days, in default of which the crown is empowered by the statute to nominate by letters patent such person as it may think fit, to the vacant bishopric. Upon the return of the election of the new bishop, the metropolitan is required by the crown to examine and to confirm the election, and the metropolitan's confirmation gives to the election its canonical completeness. In case of a vacancy in a metropolitical see, an episcopal commission is ap- pointed by the guardians of the spiritualities of the vacant see to confirm the election of the new metropolitan. At one time deans of the " old foundation " — in contradistinction to those of the " new foundation," founded by Henry VIII. out of the spoils of the dissolved monasteries — were elected by the chapter on a conge d'elire from the crown, but now all deans are installed by letters-patent from the crown. (See Confirmation or Bishops.)

CONGLETON, HENRY BROOKE PARNELL, ist Baron (1776-1842), was the second son of Sir John Parnell, bart. (1744-1801), chancellor of the Irish exchequer, and was educated at Eton and Cambridge. In 1801 he succeeded to the family estates in Queen's county, and married a daughter of the earl of Portarlington; and in 1802, by his father-in-law's interest, he was returned for Portarlington to parliament, but he speedily resigned the seat. In 1806 he was returned for Queen's county, for which he sat. till 1832, when he withdrew from the repre- sentation. In 1833, however, he was returned for Dundee; and after being twice re-elected for the same city (1835 and 1837), he was raised to the peerage in 1841 with the title of Baron Congleton of Congleton. In 1842, having suffered for some time from ill-health and melancholy, he committed suicide. He was a Liberal Whig, and took a prominent part in the struggle of his party. In 1806 he was a commissioner of the treasury for Ireland; it was on his motion on the civil list that the duke of Wellington was defeated in 1830; in that year and in 1831 he was secretary at war; and from 1835 till 1841 he was paymaster of the forces and treasurer of the ordnance and navy. He was the author of several volumes and pamphlets on matters con- nected with financial and penal questions, the most important being that On Financial Reform, 1830.

He was succeeded as 2nd baron by his eldest son John Vesey (1805-1883), who in 1829 joined the Plymouth Brethren, and spent his life in enthusiastic religious work. He left no son, and his brother Henry William (d. 1896) became 3rd baron, being succeeded by his second son Henry (1839-1906), a soldier who rose to be major-general.

CONGLETON, a market town and municipal borough in the Macclesfield

parliamentary division of Cheshire, England, on the North Staffordshire railway, 157 J m. N.W. by N. of London. Pop. (1901) 10,707. It is finely situated in a deep valley, on

the banks of the Dane, a tributary of the Weaver. To the east Cloud Hill, and to the south Mow Cop, rise sharply to heights exceeding 1000 ft. Congleton has no buildings noteworthy for age or beauty, save a few old timbered houses. The grammar school was in existence as early as 1553. In the 16th and 17 th centuries the leather laces known as " Congleton points " were in high repute; but the principal industry of the town is now the manufacture of silk, which was introduced in 1752 by a Mr Pattison of London. Coal and salt are raised, and the other industries include fustian, towel, couch, chair and nail factories, iron and brass foundries, stone quarries and corn mills. At Biddulph, 3 m. S., in a narrow valley, across the border in Staffordshire, are several coal-mines and iron-foundries. The gardens of the Grange here are celebrated for their beauty. Congleton is served by the Macclesfield canal. The borough is under a mayor, 6 aldermen and 18 councillors. Area, 2572 acres.

Congleton {Congulton) is not mentioned in any historical record before the Domesday Survey, when it was held by Hugh, earl of Chester, and rendered geld for one hide. In the 13th century, as part of the barony of Halton, the manor passed to Henry, earl of Lincoln, who by a charter dated 1282 declared the town a free borough, with a gild merchant and numerous privileges, including power to elect a mayor, a catchpole and an aletaster. This charter was confirmed by successive sovereigns, with some additional privileges. In 1524 the burgesses were exempted from appearing at the shire and hundred courts, and in 1583 the body corporate was reconstructed under the title of mayor and commonalty, and power was granted to make by-laws and to punish offenders. The governing charter, which held force until the Municipal Corporation Act of 18 $5, was granted by James I. in 1624, and instituted a mayor, 8 aldermen, 16 capital burgesses, a high steward, common-clerk and other officers. Charters were also granted by Charles II. and George IV. In 1282 Henry, earl of Lincoln, obtained a Saturday market and an eight days' fair at the feast of St Peter ad Vincula, and the market is still held under this grant. In 131 1 a Tuesday market is mentioned, and a fair at the feast of St Martin. Henry VI. in 1430 granted to the burgesses a fair at the feast of SS. Philip and James. James I. confirmed the three existing fairs and granted an additional fair on the Thursday before Quinquagesima Sunday. Congleton suffered severely from the plagues of 1603 and 1641, and by the latter was almost entirely depopulated. On the whole, however, the town has steadily grown in population and commercial prosperity from the granting of its first charter. See Victoria County History, Cheshire; Robert Head, Congleton Past and Present (Congleton, 1887); Samuel Yates, An History

of the Ancient Town and Borough of Congleton (Congleton, 1820).

CONGLOMERATE (from the Lat. conglomerare, to form into a ball, glomus, glomeris; so also the general term " conglomera- tion " for a miscellaneous collection of things, gathered together in a mass), in petrology, the term used for a coarsely fragmental rock consisting of rounded pebbles set in a finer grained matrix. The pebbles must be rounded, otherwise the rocks are breccias, and these have a distinctly different geological significance. They have attained their present shapes by weathering and by attrition during transport by streams and the waves and currents of the sea. The pebbles consist mainly of hard rocks, such as granite, gneiss, sandstone, greywacke, or sometimes limestone. Quartzites, cherts and flints, and vein-quartz are among the hardest and most durable of all rocks, and hence are specially abundant in conglomerates. Fragments of vein-quartz form a large part of the "banket-rock" of the auriferous Transvaal reefs, one of the most important conglomerates economically. In this case the matrix consists mainly of quartz and chlorite, and gold occurs both in the matrix and in the pebbles. Igneous rocks on account of their toughness are also very abundant in many conglomerates; those at the base of the Old Red Sandstone of Scotland, which are thousands of feet in thickness, consist largely of andesite, porphyrite, granite, diorite and porphyry, along with vein-quartz, quartzite and various kinds of gneiss. Soft and friable rocks, on the other hand, such as shale, mica-schist and coal, are rarely found in any quantity

as pebbles in conglomerate-beds. They are ground to pieces by friction against harder masses and help to form the matrix. The size of the pebbles varies greatly; occasionally they are 10 or 20 ft. in diameter, more frequently they are a foot or less. The cementing matrix in which the pebbles are embedded usually bears some resemblance in composition to the nature of the pebbles, but contains a larger proportion of the softer ingredients, such as clay, mica, weathered felspar, calcite and dolomite. Often it resembles a felspathic or calcareous sandstone; if limestone fragments are common it may be highly calcareous, or may be in large measure dolomitic. Often the matrix is stained red by compounds of iron. The " brockram " of the north of England is a well-known Permian limestone-con- glomerate. The Dolomitic Conglomerate is a similar rock, but of Triassic age. Both of these are often extensively dolomitized and pass into breccias, where their fragments are angular and unworn. The pebble beds of the Bunter (Triassic period) are also familiar to geologists. They cover extensive areas in the mid- lands of England, and are well seen at

Budleigh Salterton on the south coast. The pebbles are mostly quartzite with granite, chert, sandstone and igneous rocks.

Conglomerates are rarely well bedded, showing at most a rude stratification, but they may contain intercalations of finer materials such as sandstone and shale, which indicate the bedding clearly. In these fossils may be found, but they do not often occur in the conglomerates themselves, as the con- ditions are generally unsuitable for the preservation of organic remains. The pebbles, however, may be highly fossiliferdus, and sometimes important evidence is provided by this means as to the age of the Conglomerate. On account of the imperfect stratification it is often very hard to estimate the thickness of conglomerates, and this difficulty is increased by the fact that many of them must have been laid down as sloping banks of pebbles and not as flat layers of deposit. Conglomerates are merely consolidated gravels, and have originated mostly on seashores or in shallow waters near land. They are typical shore formations, and are especially frequent where one series of stratified rocks rest upon an older group unconformably. Other conglomerates occur along with fine-grained red sandstones, salt beds and such rocks as accompany desert deposits. We may compare them with the accumulations of pebbles which cover extensive areas of existing deserts. A quite distinct group of conglomerates characterizes regions where the rocks are much broken and sheared; these may very closely resemble true conglomerates, but have really been produced by the mashing together of rock masses along zones of fracture and movement. They are known as " crush-conglomerates " or " auto-clastic rocks." Conglomerates may undergo metamorphism, and are then converted into " conglomerate-gneiss " or " conglomerate- schist." Their pebbles are flattened and dragged out of shape by interstitial movement, while the matrix becomes highly crystalline. One of the best-known examples of this is the Obermittweida gneiss (Saxony). (J. S. F.)

CONGO, formerly known as Zaire, the largest of the rivers of Africa, exceeded in size among the rivers in the world by the Amazon only. The Congo, though it has a shorter course than the Nile, has a length of fully 3000 m. and a drainage area estimated at 1,425,000 sq. m., with a diameter of some 1400 m. either way. This vast area includes the equatorial basin of Central Africa and much of the surrounding plateaus. West and north the Congo basin is bounded by comparatively narrow bands of higher ground, while east and south the drainage area of the river includes considerable portions of the high plateaus of east and south Central Africa. The main drainage of the Congo system is thus north and west, and these two directions dominate the great bow-like sweep of the main stream before it is deflected south on approaching the western highlands, through which it finally forces a way to the Atlantic Ocean. From the high lands of the south and east in which the head- streams of the

Congo have their origin, the land falls in a succes- sion of steps, generally marked by gorges or rapids in the upper courses of the streams. Besides the main stream most of the

affluents of the river are navigable for considerable distances; in all there are over 6000 m. of navigable water in the Congo basin and 20,000 m. of overhanging wooded banks. On the Congo alone are over 4000 islands, many of considerable length — some fifty of them are over ten miles long. The volume of water poured into the Atlantic is at least 1 , 200,000 cubic ft. per second. 1 Head-Streams. — The most distant head-streams of the Congo are far to the north and east of those most to the south, and it is difficult to determine which stream is the " parent " river. The easterly head-streams are, however, regarded generally as marking the true course of the Congo. The most remote of these rivers is the Chambezi, which, with its tributaries, rises (in British territory) on the southern slope of the plateau between lakes Nyasa and Tanganyika at an elevation of about 6000 ft. The watershed is formed by the crest of the plateau, and is perfectly distinguishable, save at a spot called Ikomba, about half-way between the lakes, where is a swamp which drains to both the Atlantic and the Indian oceans. The Chambezi source is in 9° 6′ S., 31° 20′ E. Its chief tributary, the Karungu, rises in o° 50′ S., 33 2′ E. The Chozi, an affluent of the Karungu, rises in the same latitude as the Chambezi, about half a degree to the east of that stream. After the junction of the Karungu and Chambezi the river flows in a south-westerly direction through a fairly fertile country, and receiving many tributaries becomes a large river with steep wooded banks and many islands. Its width varies greatly, from 30 yds. to 2 m. in a comparatively short distance; its depth is rarely less than 14 ft. In its lower course the Chambezi passes through papyrus marshes, and divid- ing into several channels, enters the vast swamp which forms the southern part of Lake Bangweulu (?.».). The large river, known as the Luapula (Great River), which issues from Bang- weulu in 11° 31′ S. and runs south through this swamp, may be regarded as a continuation of the Chambezi, there being a channel from the one stream to the other. The Luapula on leaving the swamp bends west and then south — reaching 12 25′ S. — and approaches the watershed of the Zambezi, receiving several southern tributaries. The source of its most southern affluent, and therefore the most southern point in the Congo basin, is approximately in 13 30′ S. Turning north the Luapula pre- cipitates itself down the Mumbatuta (or Mambirima) Falls (12° 17′ S., 20 15′ E.), the thunder of which can be heard on a still night for 8 or 9 m. The river, the width of which varies from 250 to 1200 yds., is almost unnavigable until below the Johnston Falls (Mambilima of the natives), a series of rapids extending from 11° 10′ to 10° 30′ S. Below the falls the river is navigable by steamer all the way to Lake Mweru — a distance of 100 m. Before entering Mweru (q.v.) the

Luapula again passes through a swampy region of deltaic character, a great part of the water escaping eastwards by various channels, and after spreading over a wide area finally passing into Mweru by lagoon-like channels east of the main Luapula mouth. From Bangweulu to Mweru the fall of the river in a total distance of 350 m. is about 700 ft. The river (known now as the Luvua) makes its exit at the N.W. corner of the lake, and bending westwards in a winding course, passes, with many rapids, across the zone of the Kebara and Mugila mountains, falling during this interval nearly 1000 ft. In about 6° 45′ S., 26 50′ E. it joins the Kamolondo (otherwise Lualaba), the western main branch of the Congo, which, as it flows in a broad level valley at a lower level than the eastern branch, is held by some to be the true head-stream. The Kamolondo is formed by the junction of several streams having their source on the northern slope of the south-central plateau as it dips towards the equatorial basin. This escarpment contains many heights exceeding 6000 ft. The streams flowing south from it belong to the Zambezi basin, but the watershed is not everywhere clearly defined. Thus the Lumpemba (an affluent of the Lokuleshe, one of the main tributaries of the Lubudi) rises in 11° 24′ S., 24 28′ E., 3 m. S. .

_ ‘ Sir John Murray estimated the mean annual discharge of the Congo at 419-291 cub. m., making it in this respect only second to the Amazon (Scot. Geog. Mag., 1887). The annual rainfall of the basin he put at 1213-344 cub. m.

and 6 m. E. of the source of the Zambezi, both streams running a parallel course northward for some 15 m. There is, however, no connexion between the Zambezi and Congo systems. The Lualaba, also known as Nzilo, which is the main stream of the Kamolondo, rises at an altitude of .4700 ft., in 26°4o’ E., just north of 12 S. — the watershed of the western head-streams of the Congo being everywhere north of that parallel. East of the Lualaba — between it and the Luapula — rises the river Lufira. With many windings the Lualaba and Lufira pursue a generally northerly direction, passing through the Mitumba range in deep gorges, their course being broken by rapids for 40 or- 50 m. Below Konde Rapids in 9° 20′ S. the Lualaba is, however, free from obstructions. (Just above the last of the series of rapids it is joined by the Lubudi, a considerable river and the western- most of the Kamolondo affluents.) Between the rapids named and 7 40′ S. its valley is studded with a chain of small lakes and backwaters. The largest — Upemba — has channels communicat- ing both with the Lualaba and the Lufira. In the rainy season the whole region becomes a

marsh; various grasses, especially papyrus, form floating islands, and the conditions generally recall the sudd region of the Nile. In about 8° 20′ S. the Lualaba and Lufira unite in one of these marshy lakes — Kisale— through which there is a navigable channel. The river issuing from Lake Kisale is called Kamolondo; it has a width varying from 300 to 1000 ft. and an average depth of 10 ft. From Konde Rapids to those of Dia in 5 20′ — a distance of 300 m. — there is no interruption to navigation saving the floating masses of vegetation on Kisale at high water. The region watered by these western head-streams of the Congo includes Katanga and other districts, which are among the most fertile and densely populated in Belgian Congo.

The Upper Congo or Lualaba. — After the junction of the Luapula (Luvua) and the Lualaba (Kamolondo) the united stream, known as the Lualaba or Lualaba-Congo, and here over half a mile wide, pursues a N.N.W. course towards the equator. The Dia Rapids, already mentioned, are the first obstruction to navigation encountered. A mile or two lower down the Lualaba passes through a narrow gorge called the Porte d'Enfer. From this point as far north as 3 ro' S. the course of the river is interrupted by falls and rapids, the chief being the rapids (in 3 55′ S.) below the Arab settlement of Nyangwe and those at Send we in 3° 15′ S. In this part of its course the Congo becomes a majestic river, often over a mile wide, with flat wooded banks, the only real impediments to navigation between the Dia Rapids and Stanley Falls being those named. Between the junction of the two main upper branches, about 1700 ft. above the sea, and the first of the Stanley Falls (1520 ft.), the fall of the river is less than 200 ft., in a distance of 500 m. During the whole of this section the Lualaba receives the most of its tributaries from the east. Of these, the Lukuga connects Lake Tanganyika with the Congo system. The Lukuga (see Tangan- yika) drains the mountainous country through which it passes, and also, intermittently, receives the overflow waters of Tangan- yika. The outlet from the lake is sometimes clear, sometimes silted up. The Lukuga is much broken by rapids, falling 1000 it. during its course oi some 300 m. Farther north are a number of streams which drain the forest region between 4 S. and the equator, the Lubamba, the Elila or Lira, the Luindi and the Lowa being the most important. Their sources lie on an upland region west of the Albertine rift-valley. The Luindi in its middle course has a general width of 60 to 100 yds., but the Lowa is larger, receiving two important affluents, the Luvuto from the north and the Ozo which rises in the mountains at the N.W. end of Lake Kivu. The lower course of the Luindi is very tortuous.

Stanley Falls. — Stanley Falls, which mark the termination of the upper Congo, begin a few miles south of the equator. At this point the river forsakes the northerly course it has been pursuing and sweeps westward through the great equatorial basin. The falls consist of seven cataracts

extending along a curve of the river for nearly 60 m. They are not of great height — the total fall is about 200 ft.— but they effectually prevent

navigation between the waters above and those below except by canoes. The first five cataracts are near together; only

9 m. separate the first from the fifth. The sixth cataract is 22 m. lower down, and the seventh, the most formidable of all the cataracts, is 26 m. below the sixth. The fall, divided into two portions by an islet, is 800 yds. wide. The channel is narrowed at the foot of the fall to some 450 yds. by an island close to the left bank; on the right bank of the river is the island of Wane Rusari (2 m. long by \ m. broad), separated from the mainland by a channel 30 yds. wide. The fall is only about

10 ft.; but the enormous mass of water, and the narrow limits to which it is suddenly contracted, make it much more imposing than many a far loftier cataract. Small rapids mark the course of the river for another 2 m.

The Middle Congo. — Below Stanley Falls the Congo is unbroken by rapids for 980 m., and is navigable throughout this distance all the year round. The river here makes a bold north-westerly

fe£ e English Miles

Ola 4 6

fVE.

31

curve, attaining its most northerly point (2° 13′ 50″ N.) at 22 13′ E., and reaches the equator again after a course of 630 m. from the falls — the distance in a direct line being 472 m. For another 250 m. the river flows south-westerly, until at Stanley Pool the limit of inland navigation is reached. For the greater part of this section the Congo presents a lacustrine character. Immediately below the falls the river, from f to 1 m. broad, flows between low hills, which on the south give place to a swampy region, the river-bank marked by a ridge of clay and gravel. After receiving the waters of the Aruwimi — 130 m. below the falls — the Congo broadens out to 4 or 5 m. ; its banks, densely wooded, are uniformly low, and the surface of the water is studded with alluvial islands and innumerable sandbanks, rendering it impossible save at rare intervals to see from bank to bank. The velocity of the current decreases as the waters spread out, though there is always a channel from 4! to 5 ft. deep. About 100 m. below the Aruwimi confluence theLoika or Itimbiri joins the main stream from the north, the Congo narrowing considerably here owing, it is

supposed, to the matter deposited by the Loika. At two or three other places lower down, the river is contracted to 2§ or 2 m. as 2 result of a slight elevation in the ground, but for a distance of 500 m. no real hill is met with. On the southern curve of the horseshoe bend are

found the largest islands of the Congo — Esumba, 30 m. long, and Nsumba, 50 m. long, and over 5 across at its broadest part. At this point the river from bank to bank is 9 m. wide. Opposite Nsumba, the Mongala, a northern affluent, enters the main stream, whilst lower down (just north of the equator) the Lulanga, Ikelemba and Ruki rivers, southern tributaries, mingle their black waters with the dark current of the Congo. Thirty miles south of the equator the river is joined by the Ubangi (

The velocity of the stream in the middle Congo varies con- siderably. At the Aruwimi confluence the rate is from 300 to 350 ft. a minute; in the broader stretches lower down the current is not more than 200 ft. a minute. Through the Chenal the pace is greatly accelerated, and as it flows out of Stanley Pool the current is not less than 600 ft. a minute.

The Lower Congo. — The cataracts below Stanley Pool are caused by the river forcing its way through the mountains which run parallel to the western coast of the continent. The highlands (known as the Serro do Crystal) consist of two principal mountain zones with an intermediate zone of lower elevation. The passage of this intermediate zone is marked by a fairly navigable stretch of river extending from Manyanga to Isangila, a distance of 70 m., during which the only serious rapids are those of Chumbo and Itunzima, the latter in 13 54′ E.; while above and below, rapids succeed each other at short intervals. Some eighteen main rapids or falls occur during the upper section (87 m.), in the course of which the level drops about 500 ft. ; and about ten in the lower section (56 m.), during which the fall is about 300. The last rapid is a little above the port of Matadi, beyond which the river is navigable for large vessels to the sea, a distance of about 85 m. At Matadi the tall cliffs on either side sink away

and the river widens out into an estuary with many mangrove- bordered creeks and forest-clad islands of a deltaic character. This estuary is traversed by a deep canon, in which soundings of 900 ft. have been obtained. The mouth of the river is in 6° S. and 12 20′ E. The canon or gully is continued into the open sea for over 100 m., with depths as much as 4000 ft. below the general level of the sea floor. Just below Matadi, where the width of the river is about half a mile, depths of 276 and 360 ft.

have been found, the current here running at from 4 to 8 knots, according to the season; while the difference in level between high and low water is 20-25 ft- The difference in level is not due to tidal action but is caused by the rainy or dry seasons, of which there are two each during the year. In the middle Congo May and November are the times of greatest flood; in the lower river the floods are somewhat later. At Stanley Pool the maximum rise of water is about 15 ft. The tides are felt as far as Boma, 49 m. from the mouth of the river, but the rise is there less than a foot; while at the mouth it is 6 ft. The canon above men- tioned is occupied by salt water, which is nearly motionless. Above it the fresh water runs with increasing velocity, but decreasing depth, so that just within the mouth of the river it is only a few feet deep.

The river at its mouth between Banana Point on the north and Sharks Point on the south is over 7 m. across. Banana Point (which grows no bananas) is the end of a long sandy peninsula, its highest spot not more than 6 ft. above high water; Sharks Point is bolder and shaped somewhat like a reaping- hook with the point turned inward, thus enfolding Diegos Bay. The current of the river is perceptible fully 30 m. out to sea, the brown waters of the Congo being distinguishable from the blue of the ocean.

Northern Tributary Rivers. — The various head-streams and affluents of the upper Congo have been already described. Below Stanley Pool numerous streams with courses of 100 or more miles drain the Crystal Mountains and join the Congo. They are unnavigable and comparatively unimportant. There remain to consider the affluents of the middle river. Of these the most important, the Ubangi on the north and the Kasai on the south, with their tributary streams, are noticed separately. In dealing with the other affluents of the Congo those entering the river on the right bank will be considered first.

The Lindi enters the Congo about 15 m. below Stanley Falls in 25 4′ E. It rises in 1° N., 28°3o' E., and flows W. in a tortuous course. Below the Lindi Falls in i° 20′ N., 26 E. it is navigable, a distance of over 100 m. A mile or two above its confluence with the Congo it is joined by the Chopo, a more southerly and less important stream. The basins of these two rivers do not extend to the outer Congo watershed, but the next feeder, the great Aruwimi, rises, as the Ituri, in close proximity to Albert Nyanza, flowing generally from east to west. It is formed of many branches, including the Nepoko from the north, and its upper basin extends over 2J of latitude. The upper river, to about 2 7 E., is much broken by rapids, but apart from those of Yambuya in 24° 47′ the lower river is nearly free from obstruc- tions. To Yambuya, the limit of navigation from the mouth of the Aruwimi, is a distance of over 90 m. The Aruwimi flows almost entirely through the

great equatorial forest, which here seems to reach its maximum density. Its confluence with the Congo is in 1° 12′ N., 23° 38′ E. On its north bank just above the mouth is the station of Basoko. The next tributary, known as the Loika, Itimbiri or Lubi river, rises in about 26 E., and, flowing generally west, joins the Congo by two mouths, 22 35'- 46′ E. The Loika is navigable by steamers as far as the Lubi Falls, a distance of 150 m. The Mongala, the next great tributary to join the Congo, drains the country between the Loika to the east and the Ubangi to the west. It rises in about 3 N., 23 20′ E., and flows in a somewhat similar curve (on a smaller scale) to that of the Ubangi. The Mongala is navigable for over 300 m., and gives access to a fertile rubber-producing region. The Mongala confluence is in i° 53′ N., 19 49′ E. Below the Ubangi confluence the Sanga, in 1° 12′ S., 16° 53′ E., joins the Congo. The Sanga rises in the north-west verge of the Congo

basin and flows in a general north to south direction. Its lower course is tortuous, as it flows across level, often swampy, plains. The main northern branch rises in southern Adamawa in about 7° N., 1 5 E. An almost equally large western branch, the Dscha (or Ngoko), rises in about 3 N., 13J E., and after flowing W. for 100 m. makes a sudden bend S.E., joining the main stream in i° 40′ N., 16 E. In its course it traverses a vast tract of uninhabited forest. The Sanga is navigable by steamers as far as the south-east corner of the German colony of Cameroon, a distance of 350 m. The Likuala and Alima, which join the Congo within 30 m. of the mouth of the Sanga, are much smaller streams. The Lefini (mouth in 2° 57′ S., 16 14′ E.) is the last stream of any size to join the Congo above Stanley Pool.

Southern Tributaries. — The first of the southern tributaries of the middle Congo, the Lomami, enters the main stream in o° 46′ N., 24 16′ E. It has a length of over 700 m., rising in nearly 9 S. It flows S. to N., the greater part of its course being parallel to and from 40 to 150 m. west of the upper Congo. It is comparatively narrow and tortuous, but deep, with a strong current, and is hardly broken by rapids north of 4°° S. About 3 S. it traverses a region of swamps, which may have given rise to the reports once current of a great lake in this locality. For the last 200 m. it is navigable by steamers. Below the mouth of the Lomami there is a long stretch with no southern tributary, as the great plain within the Congo bend is drained by streams flowing in the same direction as the middle Congo — east to west. The Lulanga (or Lulongo), about 400 m. long, enters ino° 40′ N., 18 16′ E. Its northern branch approaches within 20 m. of the Congo in its upper course. The main branch of the Ruki or Juapa, which enters a little north of the equator in 18 21′ E., has its rise between 24 and 25 E. and about 3°

S., in the swampy region traversed by the Lomami. On account of the colour of its water it was named by H. M. Stanley the Black river. It is about 600 m. long and has two large southern tributaries. A few miles above the Ruki confluence the Ikelemba (some 150 m. in length) joins the Congo. The three rivers, Lulanga, Ikelemba and Ruki, and their sub-streams, have between them over 1000 m. of navigable waters. No rapids intercept their course.

Exploration.— Unlike the Nile there are no classic associations with the Congo. A single mention made of the Zaire by Camoens in the Lusiads exhausts its connexion with literature (up to the beginning of the 19th century), other than in little known and semi-fabulous accounts of the ancient kingdom of Congo. The mouth of the river was discovered by the Portuguese naval officer Diogo Cao or Cam either in 1482 or 1483. To mark the discovery and to claim the land for the Portuguese crown he erected a marble pillar on what is now called Sharks Point. Hence the river was first called Rio de Padrao (Pillar river). It soon, however, became known as Zaire (q.v.), a corruption of a native word meaning " river," and subsequently as the Congo. In the three centuries succeeding Diogo Cao's discovery strangely little was done to explore the river. At length the British Admiralty took action, and in 1816 despatched Captain J. K. Tuckey, R.N., at the head of a well-equipped mission. The expedition was prompted by the suggestion that the Congo was identical with the Niger. So slight was the knowledge of the river at that time that .the only chart with any pretension to accuracy did not mark it farther than 130 m. from the mouth, a state of affairs, in the opinion of the admiralty, " little creditable to those Europeans who for nearly three centuries have occupied various parts of the coast " near the river's mouth. Captain Tuckey's expedition reached the mouth of the Congo on the 6th of July 1816, and managed to push up stream as far as Isangila, beyond the lowest series of rapids; but sickness broke out, the commander and sixteen other Europeans died, and the expedition had to return. Captain Tuckey and several of his companions are buried on Prince's Island, just above Boma, the point where the Congo widens into an estuary. A detailed survey of the first 25 m. of the river was effected in 1826 by the " Levin" and the " Barracouta " belonging to Captain (subsequently Vice-Admiral) W. F. W. Owen's expedition; in 1857 Commander J. Hunt, of the " Alecto," made an attempt to ascend the river, but only

reached the cataracts. Captain, afterwards Sir Richard, Burton attained the same limit in 1863, and also proceeded inland as far as Banza Noki (Sao Salvador). In November 1872 an expedition under Lieutenant W. Grandy, R.N., was despatched from England for the purpose of advancing from the west coast to the relief of David Livingstone. So little was the Congo known, however, that Ambriz was chosen as the starting-point, and the

expedition marched overland. After many vicissitudes Lieutenant Grandy had to retrace his steps. He reached, late in 1873, a point on the Congo below the cataracts and intended thence to push his way up stream. The death of Livingstone was soon afterwards reported; and in April 1874, just as Grandy was prepared to ascend the river, letters of recall brought the expedition to a close.

It was by working down from its source that the riddle of the Congo was finally solved. In 1868 David Livingstone traced the course of the Chambezi to Lake Bangweulu. In March 187 1 he reached the town of Nyangwe on the Lualaba, and died (1873) whilst endeavouring to trace the head-streams of that river, which he believed to be the Nile. " I have no fancy," he once said, " to be made into ' black man's pot ' for the sake of the Congo." Livingstone's views were not shared by the scientific world, and as early as 1872 geographers were able to affirm from Livingstone's own reports that the great river system he had explored in the region north of the Zambezi must belong to the Congo and not to the Nile. Actual proof was lacking, and of the course of the main river there was absolute ignorance. But in October 1876, H. M. Stanley arrived at Nyangwe from Zanzibar and from that point navigated the river over 1600 m. to Isangila — "Tuckey's Furthest" — reached in July 1877, thus demon- strating the identity of the Lualaba with the Zaire of the Portu- guese. Stanley's great journey marked an epoch in the history of Africa, politically and commercially as well as geographically. Of the many travellers who followed Stanley in the Congo basin none did more to add to the exact knowledge of the main river and its greatest tributaries — the Ubangi, the Kasai and the Lomami — than the Rev. George Grenfell (1849-1906) of the Baptist Missionary Society. The Aruwimi was partly explored by Stanley in 1887 in his last expedition in Africa, and was further examined by Grenfell in 1894 and 1902. The western head-streams were largely made known by the Belgians, Capt. C. Lemaire and A. Delacommune, the last-named also mapping the upper Lomami and the Lukuga. (See also Ubangi; Kasai; Livingstone and Stanley).

See H. M. Stanley, Through the Dark Continent, &c. (London, 1878); George Grenfell, Map of the River Congo, with Memorandum (London, 1902) ; Sir H. H. Johnston, George Grenfell and the Congo (2 vols., London, 1908) ; C. Lemaire, Mission scientifique du Ka- Tanga (Brussels, 1901-1908) ; 17 memoirs, No. 16 being the Journal de route-, J. K. Tuckey, Narrative of an Expedition to explore the river Zaire, &c. (London, 1818); E. Behm, " Proofs of the Identity of the Lualaba with the Congo " (Proc. Roy. Geo. Soc. vol. xvii., London, 1873) '< L e Mouvement geographique (Brussels, weekly since 1884), and the geographical works mentioned in the bibliography of the Congo Free State. Grenfell's map, scale 1-250,000, is of the river between Stanley Pool and Stanley Falls. For

the lower river see H. Droogmans, Carte du Bas Congo, scale I -100,000, and Notices sur le Bas Congo (Brussels, 1900-1902). (F. R. C.)

CONGO FREE STATE, the name formerly given by British writers to the Etat Independant du Congo, a state of equatorial Africa which occupied the greater part of the basin of the Congo river. In 1908 the state was annexed to Belgium. The present article gives (1) the history of the state, (2) an account of the topography, ethnology, &c, of the country and of its economic condition at the date of its becoming a Belgian colony.

*I. History The Congo Free State owed its existence to the ambition and force of character of a single individual. It dated its formal inclusion among the independent states of the world from 1885, when its founder, Leopold II., king of the *«»p«b» Belgians, became its head. But to understand how formation. it came into existence a brief account is needed of its sovereign's connexion with the African continent. In 1876 King Leopold summoned a conference at Brussels of the leading*

gi8

CONGO FREE STATE

geographical experts in Europe, which resulted in the creation of " The International Association for the Exploration and Civiliza- tion of Africa." To carry out its objects an international com- mission was founded, with committees in the principal countries of Europe. The Belgian committee at Brussels, where also were the headquarters of the International commission, displayed from the first greater activity than did any of the other com- mittees. It turned its attention in the first place to East Africa, and several expeditions were sent out, which resulted in the founding of a Belgian station at Karema on Lake Tanganyika. But the return of Mr (afterwards Sir) H. M. Stanley from his great journey of exploration down the Congo forcibly directed the attention of King Leopold to the possibilities for exploration and civilization offered by the Congo region. On the invitation of the king, Mr Stanley visited Brussels, and on the 25th of November 1878 a separate committee of the International Association was organized at Brussels, under the name " Comite d'etudes du Haut Congo." Shortly afterwards this committee became the " International Association of the Congo," which in its turn was the forerunner of the Congo Free State. The Association was provided with a nominal capital of £40,000, but from the first its funds were largely supplemented from the private purse of King Leopold; and by a gradual process of evolution the work, which was originally, in name at least, international in character, became a purely Belgian enterprise. Mr Stanley, as agent of the Association, spent four years in the country,founding stations and making treaties with

various chiefs. The first station was founded in February 1880 at Vivi, and before returning to Europe in August 1884 Mr Stanley had established 'twenty-two stations on the Congo and its tributaries. Numerous expeditions were organized by King Leopold in the Congo basin, and the activity of the International Association and its agents began seriously to engage the attention of the European powers interested in Africa. On behalf of Portugal, claims were advanced to the Congo, based on the discovery of its mouth by Portuguese navigators centuries before. In the interests of France, M. de Brazza was actively exploring on the northern banks of the Congo, and had established various posts, including one where the important station of Brazzaville is now situated. The fact that the International Association of the Congo had no admitted status as a sovereign power rendered the tenure of its acquisition somewhat precarious, and induced King Leopold to make determined efforts to secure for his enterprise a recognized position. Early in 1884 a series of diplomatic events brought the question to a head. The 2nd Earl Granville, then British foreign secretary, in February of that year concluded a conven- tion with Portugal, recognizing both banks of the mouth of the Congo as Portuguese territory. This convention was never ratified, but it led directly to the summoning of the Berlin Con- gress of 1884-1885, and to the recognition of the International Association as a sovereign state.

The United States of America was the first great power, in a convention signed on the 22nd of April 1884, to recognize the

Association as a properly constituted state. Simultane- ttonˆy'the ous ly> King Leopold had been negotiating with the powers. French government, the Association's most serious

rival, not only to obtain recognition but on various boundary questions, and on the 23rd of April 1884 Colonel M. Strauch, the president of the Association, addressed to the French minister for foreign affairs a note in which he formally declared that the Association would not cede its possessions to any power, " except in virtue of special conventions, which may be concluded between France and the Association, for fixing the limits and conditions of their respective action." The note further declared that, as a fresh proof of its friendly feeling towards France, the Association engaged to give France the right of preference if, through unforeseen circumstances, it were compelled to sell its possessions. Mention may here be made of the fact that in a note dated the 22nd of April 1887, M. van Eetvelde, administrator-general of the foreign affairs of the Congo State, informed the French minister at Brussels that the International Association had not intended in 1884 that the right

of preference accorded to France could be opposed to that of Belgium; and

on the 29th of April the French minister took note, in the name of the French government, of this interpretation of the right of preference, in so far as such interpretation was not contrary to pre-existing international engagements. Germany was the next great power after the United States to recognize the flag of the International Association as that of a friendly state, doing so on the 8th of November 1884, and the same recognition was subsequently accorded by Great Britain on the 16th of December; Italy, 19th of December; Austria-Hungary, 24th of December; Holland, 27th of December; Spain, 7th of January 1885; France and Russia, 5th of February; Sweden and Norway, 10th of February; Portugal, 14th of February; and Denmark and Belgium, 23rd of February. While negotiations with Germany for the recognition of the status of the Congo Free State were in progress, Prince Bismarck issued invitations to the powers to an international conference at Berlin. The conference assembled on the 15th of November 1884, and its deliberations ended on the 26th of February of the following year by the signature of a General Act, which dealt with the relations of the European powers to other regions of Africa as well as the Congo basin. The provisions affecting the Congo may be briefly stated. A conventional basin of the Congo was defined, which comprised all the regions watered by the Congo and its affluents, including Lake Tanganyika, with its eastern tributaries, and in this conventional basin it was declared that " the trade of all nations shall enjoy complete freedom." Freedom of navigation of the Congo and all its affluents was also secured, and differential dues on vessels and merchandise were forbidden. Trade monopolies were prohibited, and provision made for civil- izing the natives, the suppression of the slave trade, and the protection of missionaries, scientists and explorers. Provision was made for the powers owning territory in the conventional basin to proclaim their neutrality. As regards navigation, only such taxes or duties were to be levied as had " the character of an equivalent for services rendered to navigation itself "; and it was further provided that (Article 16) " The roads, railways or lateral canals which may be constructed with the special object of obviating the innavigability or correcting the im- perfection of the river route on certain sections of the course of the Congo, its affluents, and other waterways, placed under a similar system as laid down in Article 15, shall be considered/ in their quality of means of communication, as dependencies of this river and as equally open to the traffic of all nations. And as on the river itself, so there shall be collected on these roads, railways, and canals only tolls calculated on the cost of construc- tion, maintenance, and management, and on the profits due to the promoters " ; while as regards the tariff of these tolls, strangers and natives of the respective territories were to be treated " on a footing of perfect equality." The International Association not having possessed, at the date of the assembling of the Conference, any recognized status, was not formally represented at Berlin, but

the flag of the Association having, before the close of the conference, been recognized as that of a sovereign state by all the powers, with the exception of Turkey, the Association formally adhered to the General Act.

Thus early in 1885 King Leopold had secured the recognition of the Association as an independent state, but its limits were as yet not clearly defined. On the 5th of February, as the result of prolonged negotiations, France conceded Jf^^ as the right of the Association to the course of the lower to limits. Congo below Manyanga, and accepted the Chiloango river and the water-parting of the waters of the Niadi Kwilu and the Congo, as far as beyond the meridian of Manyanga, as the boundary between her possessions and those of the Associa- tion on the lower river. From Manyanga the frontier was to follow the Congo up to Stanley Pool, the median line of Stanley Pool, and the Congo again " up to a point to be settled above the river Licona-Nkundja," from which point a line was to be drawn to the 17th degree of longitude east of Greenwich, following as closely as possible the water-parting of the Licona-Nkundja basin. The identity, of the Licona-Nkundja

subsequently gave rise to considerable discussions with France, and eventually a protocol, signed at Brussels on the 29th of April 1S87, continued the" boundary along the Congo to its confluence with the Dbangi (Mobangi), whence it followed the thalweg of that river to its intersection with the 4th parallel of north latitude, below which parallel it was agreed that the northern boundary of the Congo Free State should in no case descend. In accepting this frontier King Leopold had to sacrifice all claims to the valley of the Niadi Kwilu, in which he had founded fourteen stations, and to the right bank of the Ubangi. With Portugal the Association concluded an agreement on the 14th of February 1885, by which the northern bank of the Congo was recognized as belonging to the Association, while Portugal retained the southern bank of the river as far as Noki. North of the Congo Portugal retained the small enclave of Kabinda, while south of the river the frontier left the Congo at Noki and followed the parallel of that place to the Kwango river.

In April 1885 the Belgian chamber authorized King Leopold " to be the chief of the state founded in Africa by the Inter- national Association of the Congo," and declared that " the union between Belgium and the new State of the Congo shall be exclusively personal." This act of the Belgian legislature regularized the position of King Leopold, who at once began the work of organizing an administration for the new state. 1 In a circular

letter addressed to the powers on the 1st of August 1885 His Majesty declared the neutrality of the " Independent State of the Congo," and set out the boundaries which were then claimed for the new state. At the date of the issue of the circular the agreements with France and Portugal had partially defined the boundaries of the Free State on the lower river, and the 30th degree of longitude east of Greenwich was recognized as the limit of its extension eastwards.

The following is a list of the agreements subsequently made with reference to the boundaries of the state (see also Africa,

§S) = -

1. 22nd of November 1885, with France. — Protocol for delimita-

tion of the Manyanga region.

2. 29th of April 1887, with France. — Protocol for delimitation of

the Ubangi region.

3. 25th of May 1891, with Portugal. — Treaty for delimitation of

the Lunda region, and convention of even date for the settlement of frontiers on lower Congo.

4. 24th of March 1894, with Portugal. — Declaration approving

delimitation of Lunda region.

5. 12th of May 1894, with Great Britain. — Agreement as to Nile

valley and boundaries with British Central Africa.

6. 14th of August 1894, with France. — Agreement as to Mbomu

river, and Congo and Nile basins.

7. 5th of February 1895, with France. — Agreement as to Stanley

Pool.

8. 9th of May 1906, with Great Britain. — Agreement as to terri-

tories leased in 1894 in the Nile valley.

The net result of the above agreements was to leave the Congo Free State with France, Portugal and Great Britain as her neighbours on the north, with Great Britain and Germany as her neighbours on the east, and with Great Britain and Portugal on her southern frontier. The main object of King Leopold's ambition was to obtain an outlet on the Nile, and for the history of the incidents connected with the two important agreements made in 1894 with Great Britain and France, and their sequel in the agreement made with Great Britain in 1906, reference must be made to the article Africa, §5. The expenditure necessitated by the efforts of the king to attain his object in- volved a heavy strain on the finances of the state, reacting on its internal policy. The avowed object of the Free State was to develop the resources of the territory with the aid of the natives, but it early became apparent that the Arab slave-traders, who had established themselves in the country between Lake Tanganyika and Stanley Falls and on the upper river, opposed a serious obstacle to the realization of this programme. The scanty resources at the disposal of the state imposed a policy of restraint on the officers who were brought into relations with

1 The formal proclamation of sovereignty was made at Boma on the 1st of July 1885.

the Arabs on the upper river, of whom Tippoo-Tib was the chief. In 1886 the Arabs had destroyed the state station at Stanley Falls, and it was apparent that a struggle for supremacy was inevitable. But the Free State was at that time ill prepared for a trial of strength, and at Mr Stanley's suggestion the bold course was taken of appointing Tippoo-Tib governor of Stanley Falls, as the representative of King Leopold. This was in 1887, and for five years the modus vivendi thus established continued in operation. During those years fortified camps were established by the Belgians on the Sankuru, the Lcmami, and the Arumiwi, and the Arabs were quick to see that each year's delay increased the strength of the forces against which they would have to contend. In 1891 the imposition of an export duty on ivory excited much ill-will, and when it became known that, in his march towards the Nile, van Kerckhoven The War had defeated an Arab force, the Arabs on the upper the'ltabs. Congo determined to precipitate the conflict. In May 1892 the murder of M. Hodister, the representative of a Belgian trading company, and of ten other Belgians on the upper Lomami, marked the beginning of the Arab war. When the news reached the lower

river a Belgian expedition under the command of Commandant (afterwards Baron) Dhanis was making its way towards Katanga. This expedition was diverted to the east, and, after a campaign extending over several months, during which several battles were fought and the Arab strongholds of Nyangwe and Kasongo were captured, the Arab power was broken and many of the leading Arabs were killed. The political and commercial results of the victory of the Free State troops were thus described by Captain S. L. Hinde, who was Baron Dhanis's second in command: —

" The political geography of the upper Congo basin has been com- pletely changed, as a result of the Belgian campaign against the Arabs. It used to be a common saying in this part of Africa that all roads lead to Nyangwe. This town, visited by Livingstone, Stanley and Cameron, until lately one of the greatest markets in Africa, "has ceased to exist, and its site, when 1 last saw it, was occupied by a single house. Kasongo, a more recent though still larger "centre, with perhaps 60,000 inhabitants, has also been swept away, and is now represented by a station of the Free State 9 m. away on the river-bank. In harmony with this political change the trade routes have been completely altered, and the traffic which used to follow the well-beaten track from Nyangwe and the Lualaba across Tanganyika to Ujiji, or round'the lake to Zanzibar, now goes down the Congo to Stanley Pool and the Atlantic." 2

These results had been attained largely by the aid of native levies and allies, and a number of the men who had taken part in the Arab campaign were enlisted as permanent soldiers by the Belgians. Among these were some Batetelas, who in 1895 revolted in the Lulua and Lomami districts. The mutineers were eventually defeated; but in 1897, while Baron Dhanis was making his way with a large expedition towards the Nile, the Batetelas again revolted, murdered several of their white officers, and took possession of a large area of the eastern portions of the state. Although defeated on several occasions by the Free State forces, the mutineers were not finally dispersed until near the end of 1900, when the last remnants were reported to have crossed into German territory and surrendered their arms. In other parts of the country the state had difficulties with native chiefs, several of whom preserved their autonomy. In the central Kasai region the state had been unable to make its authority good up to the time it ceased to exist.

The international position of the Free State was from the first a somewhat anomalous one. It has already been noted that the right of preference accorded to France in 1884, as interpreted in 1887, was not intended to be opposed later to that of Belgium. By his will dated the 2nd of ™^,,,a. August 1889 King Leopold bequeathed to Belgium " all our sovereign rights over the Independent State of the Congo, as they are recognized by the*

declarations, conventions and treaties concluded since r884 between the foreign powers on the one side, the International Association of the Congo and

2 After 1900 Nyangwe and Kasongo again became towns of some importance, and traffic along the route to Tanganyika revived with the advent of railways, though the main traffic continued down the Congo river.

the Independent State of the Congo on the other, as well as all the benefits, rights and advantages attached to that sovereignty." In July 1890 Belgium acquired, by the terms of a loan to the Congo State which was granted free of interest, the option of annexing the state on the expiry of a period of ten years and six months. Notwithstanding this loan the state became involved in further financial difficulties, 1 and on the 9th of January 1895 the Belgian government entered into a treaty with King Leopold to take over the Free State with all its possessions, claims and obligations, as from the 1 st of January of that year. In anticipa- tion of the consent of the Belgian parliament to this treaty, a Franco-Belgian convention was signed on the 5th of February 1895, by which the Belgian government recognized " the right of preference possessed by France over its Congolese possessions in case of their compulsory alienation, wholly or in part." But after long delays and a violent press compaign the ministry fell, the bill providing for annexation was withdrawn, and the chambers voted a further loan to the Free State to enable it to tide over its immediate difficulties. In 1901, on the expiry of the term of years fixed in the loan convention of 1890, the question of the annexation of the Congo State by Belgium again formed the subject of prolonged discussion. A bill was brought forward in favour of annexation, but this time it was opposed by the Belgian government, which proposed simply to let the loan run on without interest. King Leopold likewise declared himself to be opposed to immediate annexation, and the bill was with- drawn. Under the terms of the government measure, which finally passed through the Belgian parliament in August 1901, Belgium retained her right of option, though not the right to exercise it at a fixed date. Moreover, in anticipation of the time when the Congo State would become a Belgian colony, there was issued under date of 7th of August 1901 the terms of a pro- posed loi organique, regulating the government of any colonial possessions which Belgium might acquire.

The discussions which from time to time took place in the Belgian parliament on the affairs of the Congo State were greatly embittered by the*

charges brought against the state administra- tion. The administration of the state had indeed undergone a complete change since the early years of its existence. A decree of the 1st of July 1885 had, it is true, declared all " vacant lands " the property of the state (Domaine prive" de I'etat), but it was not for some time that this decree was so interpreted as to confine the lands of the natives to those they lived upon or " effectively " cultivated. Their rights in the forest were not at first disputed, and the trade of the natives and of Europeans was not interfered with. But in 1891 — when the wealth in rubber and ivory of vast regions had been demonstrated — a secret decree was issued (Sept. 21) reserving to the state the monopoly of ivory and rubber in the " vacant lands " constituted by the decree of 1885, and circulars were issued making the monopoly effective in the Aruwimi-Welle, Equator and Ubangi districts. The agents of the state were enjoined to supervise their collection, and in future natives were to be obliged to sell their produce to the state. By other decrees and circulars (October 3oand December 5, 1892, and August9, 1893) the rights of the natives and of white traders were further restricted. No definition had been given by the decree of 1885 as to what constituted the " vacant lands " which became the property of the state, but the effect of the later decrees was to assign to the government an absolute proprietary right over nearly the whole country; a native could not even leave his village with- The state out a special permit. 2 The oppressive nature of these becomes a measures drew forth a weighty remonstrance from monopolist the leading officials, and Monsieur C. Janssen, the trading governor, resigned. Vigorous protests by the private concern. trading companies were also made against this violation of the freedom of trade secured by the Berlin Act, and eventually

1 For an account of the loans and liabilities of the state see II. The Belgian Congo, § Finance.

2 The British parliamentary paper Africa No. 1, 1909, contains a memorandum on the land laws in the Congo State, showing the extent to which trade was monopolized throughout its territories by the government.

an arrangement was made by which certain areas were reserved to the state and certain areas to private traders, but the restric- tions imposed on the natives were maintained. Large areas of the state domain were leased to companies invested with very extensive powers, including the exclusive right to exploit the produce of the soil. 3 In other cases, e.g. in the district of Katanga, the state entered into partnership with private companies for the exploitation of the resources of the regions concerned. The " concession " companies were first formed in 1891 under Belgian law; in 1898 some of them were reconstituted under Congo law. In all of them the state had a financial interest either as shareholder or as entitled to part profits. 4

This system of exploitation of the country was fruitful of evil, and was mainly responsible for the bad treatment of the natives. Only in the lower Congo and a narrow strip charges of land on either side of the river above Stanley Pool ofmal- was there any freedom of trade. The situation was adminis- aggravated by the creation in 1896, by a secret decree, atloa – of the Domaine de la couronne, a vast territory between the Kasai and Ruki rivers, covering about 112,000 sq. m. To ad- minister this domain, carved out of the state lands and treated as the private property of Leopold II., a Fondation was organized and given a civil personality. It was not until 1902 that the existence of the Domaine de la couronne was officially acknow- ledged. The Fondation controlled the most valuable rubber region in the Congo, and in that region the natives appeared to be treated with the utmost severity. In the closing years of the 19th century and the early years of the 20th the charges brought against the state assumed a more and more definite character. As indicated, they fell under two main heads. In the first place the native policy of the Congo government was denounced as at variance with the humanitarian spirit which had been regarded by the powers as one of the chief motives inspiring the foundation of the Congo State. In the second place it was contended that the method of exploitation of the state lands and the concessions system nullified the free trade provisions of the Berlin Act. Reports which gave colour to these charges steadily accumulated, and gave rise to a strong agitation against the Congo State system of government. This agitation was particularly vigorous in Great Britain, and the movement entered on a new era when on the 20th of May 1903 the House of Commons agreed without a division to the following motion: —

" That the government of the Congo Free State having, at its inception, guaranteed to the powers that its native subjects should be governed with humanity, and that no trading monopoly or privilege should be permitted within its dominions, this House request His Majesty's Government to confer with the other powers, signatories of the Berlin General Act, by virtue of which the Congo Free State exists, in order that measures may be adopted to abate the evils prevalent in that state."

In accordance with this request the 5th marquess of Lansdowne, then secretary of state for foreign affairs, issued a despatch on the 8th of August 1903 to the British representatives at the courts of the powers which signed the Berlin Act, drawing attention to the alleged cases of ill-treatment of natives and to the existence of trade monopolies in the Congo Free State, and in conclusion stating that His Majesty's government would

3 This concession was asserted by traders who had previously dealt direct with the natives, and by traders who hoped so to do, to contravene the provision of the Act of Berlin prohibiting any commercial monopoly in the

Congo basin. The state maintained, however, that the proprietor who exploits and sells the produce of his land is not engaging in commerce.

4 The best known of these companies are the Abir (Anglo-Belgian India-rubber and Exploration Co.) and the Societe anversoise _ du commerce au Congo. In Katanga the companies holding concessions and the state are jointly represented by the Comite special du Ka- tanga. In 1906 four new companies were formed in which British, American and French capital was largely invested. _ Of these com- panies the Union miniere du Haut Katanga had for object the develop- ment of the mineral wealth of the district named, while the Chemin de fer du Bas Congo undertook to build a railway from Leopoldville to Katanga. The American Congo Company was granted a rubber concession in the Kasai basin. The fourth company, the Societe Internationale forestiere et miniere du Congo, combined mining opera- tions with the exploitation of forest produce.

" be glad to receive any suggestions which the governments of the signatory powers might be disposed to make in reference to this important question, which might perhaps constitute, wholly or in part, the subject of a reference to the tribunal at ihe Hague." This despatch failed to evoke any response from the powers, with the single exception of Turkey, but the public agitation against the Congo State regime continued to grow in force, being greatly strengthened by the publication in February 1904 of a report by Mr Roger Casement, then British consul at Boma, on a journey which he had made through the middle Congo region in 1903 (described as the " Upper " Congo in the report). The action on the part of the British government resulted in considerable correspondence with the Congo govern- ment, which denied the charges of systematic ill-treatment of the natives and controverted the contention that its policy constituted an infringement of the Berlin Act. In July 1904, however, King Leopold issued a decree appointing a commission of inquiry to visit the Congo State, investigate the condition of the natives, and if necessary recommend reforms. The com- mission was composed of M. Edmond Janssens, advocate-general of the Belgian Cour de Cassation, who was appointed president; Baron Giacomo Nisco, president ad interim of the court of appeal at Boma; and Dr E. de Schumacher, a Swiss councillor of state and chief of the department of justice in the canton of Lucerne. Its stay in the Congo State lasted from the 5th of October 1904 to the 21st of February 1905, and during that time the com- Reportot missioners ascended the Congo as far as Stanleyville. the Com- The report of the commission of inquiry was published, mission of m j nus the minutes of the evidence submitted to the

quiry. commissioners, in November 1905. While expressing admiration for the signs which had come under its notice of the advance of civilization in the Congo State, the commission confirmed the reports of the existence of grave abuses in the upper Congo, and recommended a series of measures which would in its opinion suffice to ameliorate the evil. It approved the concessions system in principle and regarded forced labour as the only possible means of turning to account the natural riches of the country, but recognized that though freedom of trade was formally guaranteed there was virtually no trade, properly so called, among the natives in the greater portion of the Congo State, and particularly emphasized the need for a liberal inter- pretation of the land laws, effective application of the law limiting the amount of labour exacted from the natives to forty hours per month, the suppression of the "sentry" system, the with- drawal from the concession companies of the right to employ compulsory measures, the regulation of military expeditions, and the freedom of the courts from administrative tutelage. Simultaneously with the report of the commission of inquiry there was published a decree appointing a commission to study the recommendations contained in the report, and to formulate detailed proposals.

Naturally the development of the charges against the Congo State system of administration was followed with close interest Renewed ' n Belgium. Little or nothing was done, however, movement to advance the bill brought forward in August 1901, for annex- providing for the government of the Congo State in the event of its becoming a Belgian colony. The existence of this measure was recalled in a five days' debate which took place in the Belgian parliament in the spring of 1906, when the report of the commission of inquiry and the question of the position in which Belgium stood in relation to the Congo State formed the subject of an animated and important discussion. In the resolution which was adopted on the 2nd of March the chamber, " imbued with the ideas which presided over the foundation of the Congo State and inspired the Act of Berlin," expressed its confidence in the proposals which the commission of reforms was elaborating, and decided " to proceed without delay to the examination of the projected law of the 7th of August 1901, on the government of Belgium's colonial posses- sions." The report of the reforms commission was not made public, but as the fruit of its deliberations King Leopold signed on the 3rd of June 1906 a number of decrees embodying various

atlonin Belgium,

changes in the administration of the Congo State. By the advocates of radical reforms these measures were regarded as utterly inadequate, and even in Belgium, among those friendly to the Congo State system of administration, some uneasiness was excited by a letter which was

published along with the decrees, wherein King Leopold intimated that certain conditions would attach to the inheritance he had designed for Belgium. Among the obligations which he enumerated as necessarily and justly resting on his legatee was the duty of respecting the arrangements by which he had provided for the establishment of the Domaine de la couronne and the Domaine prive de I' Stat. It was further declared that the territories bequeathed would be inalienable.

The fears excited by this letter that King Leopold desired to restrict Belgium's liberty of action in the Congo State when the latter should become a Belgian colony were not diminished by the announcement in November 1906 of four new concessions, conferring very extensive rights on railway, mining and rubber companies in which foreign capital was largely interested. This was immediately before the opening in the Belgian chamber of a fresh debate in which the history of the Congo question entered on a new stage of critical importance not only from the national but the international point of view. It had become evident, indeed, that things could not continue as they were. In reply to an influential deputation which waited upon him on the 20th of November, Sir Edward Grey, speaking as the representative of the British government in his capacity as sefretary of state for foreign affairs, expressed the desire " that Belgium should feel that her freedom of action is unfettered and unimpaired and her choice unembarrassed by anything which we have done or are likely to do "; but he added that if Belgium should fail to take action " it will be impossible for us to continue to recognize indefinitely the present state of things without a very close examination of our treaty rights and the treaty obligations of the Congo State."

The debate in the Belgian chamber opened on the 28th of November and was not concluded till the 14th of December. It was largely occupied with the consideration of the relations between Belgium and the Congo State from the constitutional point of view. A resolution was finally adopted by 128 votes to 1, thirty Socialist members abstaining from voting. In this resolution the chamber took note of " the replies of the government, according to which the declarations contained in the letter of the 3rd of June do not constitute conditions but ' solemn recommendations,' while ' the convention of cession will have no other object than to effect the transference and define the measures for its accomplishment, and the Belgian legislature will regulate the regime of its colonial possessions in unrestricted liberty.' " In conclusion the chamber, " desiring without prejudice (sans prejuger sur le fond) that the question of the annexation of the Congo should be brought before the chamber in the shortest possible time, in accordance with the intention expressed by the government," recorded its desire that the central committee charged to examine the draft law of the 7 th of August 1901 should " hasten its labours and lay its

report at an early date." (J. S. K.)

For the purpose of considering the proposed colonial law the central committee was changed into a special commission, which from the number of members constituting it became known as the Commission of XVII. The ^^*y a . commission held its first meeting on the 3 1st of January tlons. 1907, and did not complete its labours until the 25th of March 1908. Taking as the basis for discussion the draft loi organique of 1901, it elaborated a measure laying down the principles applicable to the Congo State when it should become a Belgian colony. The draft bill of 1901 had left the autocratic power of the sovereign unchanged; the colonial bill as passed by the commission completely reversed the situation, replacing the absolutism of the king by thorough parliamentary control. This result was only achieved after a severe struggle and after an emphatic declaration by Sir E. Grey that the British govern- ment would regard any other solution as inadmissible (see infra).

While the commission was sitting, further evidence was forth- coming that the system complained of on the Congo remained unaltered, and that the " reforms " of June 1906 were illusory. Various revolts of the natives also occurred, and in some parts of the state complete anarchy prevailed. Not only in Great Britain and America did the agitation against the administration of the Congo State gain ground, but in Belgium and France re- form associations enlightened public opinion. The government of Great Britain let it be known that its patience was not in- exhaustible, while the senate of the United States declared that it would support President Roosevelt in his efforts for the amelioration of the condition of the inhabitants of the Congo. The attitude of the powers was at the same time perfectly friendly towards Belgium. In this manner the movement in favour of ending the baneful regime of Leopold II. was strength- ened. On the 10th of July 1907 the Belgian premier announced that negotiations with the Congo State would be renewed, and on the 28th of November following a treaty was signed for the cession of the Congo State to Belgium. This treaty We new stipulated for the maintenance of the Fondation de la cession. couronne. This " government within a government " was secured in all its privileges, its profits as heretofore being appropriated to allowances to members of the royal family and the maintenance and development of " works of public utility " in Belgium and the Congo, those works including schemes for the embellishment of the royal palaces and estates in Belgium and others for making Ostend " a bathing city unique in the world." The state was to have the right of redemption on terms which, had the rubber

and ivory produce alone been redeemed, would have cost Belgium about £8,500,000.

Even those politicians least disposed to criticize the actions of the king protested vigorously against the provisions concerning the Fondation. It was recognized that the chamber would not vote the treaty of cession unless those provisions were modified. Negotiations between Leopold II. and the Belgian premier followed. While they were in progress the British government again expressed its views, and in very monitory language. They were conveyed in a passage in the king's speech at the opening of parliament on the 29th of January, and in a statement by Sir Edward Grey in the House of Commons on the 26th of February. Sir Edward Grey affirmed that the Congo State had " morally forfeited every right to international recognition," and quoted with approval Lord Cromer's statement that the Congo system was the worst he had ever seen. The foreign secretary declared, in reference to the negotiations for the transfer of the Congo to Belgium, that any semi-transfer which left the control- ling power in the hands of " the present authorities " would not be considered by Great Britain as a guarantee of treaty rights. On the same day that Sir Edward Grey spoke a parliamentary paper was issued (Africa No. 1, 1908) containing consular reports on the state of affairs in the Congo. The most significant of these reports was from Mr W. G. Thesiger, consul at Boma, who in a memorandum on the application of the labour tax, after detailing various abuses, added, " The system which gave rise to these abuses still continues unchanged, and so long as it is unaltered the condition of the natives must remain one of veiled slavery." Eight days later (on the 5th of March) an additional act was signed in Brussels annulling the clauses in the treaty of cession concerning the Fondation, which was to cease to exist on the day Belgium assumed the sovereignty of the Congo and its property to be absorbed in the state domains. Leopold II., however, was able to obtain generous compensation for the surrender of the Fondation. Certain fragments of the domain, including an estate of 155 sq. m. in Africa, a villa at Ostend, and some land at Laeken, were kept by the king, who further retained a life interest in property on the Riviera and elsewhere. Belgium undertook at her own charges and at an estimated cost of £2,000,000 to complete " the works of embellishment " begun in Belgium with funds derived from the Fondation and to create a debt of £2,000,000 chargeable on the funds of the colony, which sum was to be paid to the king in fifteen annual instalments — the money, however, to be expended on objects " connected

with and beneficial to the Congo." The annuities to members of the royal family were to be continued, and other subsidies were promised. But the most important provision was the agreement of Belgium to respect the concessions granted in the lands of the Fondation in November 1906 to the

American Congo Company and the Compagnie forestiere et miniere, companies in which the Congo State had large holdings.

Both the treaty of cession and the additional act were sub- mitted to the Commission of XVII. That body expressed its approval of both measures. Its report on the treaty and the proposed colonial law were presented to the chamber on the 3rd of April. Neither the treaty, the additional act, nor the colonial law expressly modified the land, commercial and concessionary regime established in the Congo, but article II. of the colonial law provided that laws should be passed as soon as possible to settle the natives' rights to real property and the liberty of the individual, while the Belgian government announced its deter- mination to fulfil scrupulously all the obligations imposed on the Congo by international conventions. Public opinion in Belgium was disturbed and anxious at the prospect of assuming responsi- bility for a vast, distant, and badly administered country, likely for years to be a severe financial drain upon the resources of the state. But, though those who opposed annexation formed a numerous body, all political parties were agreed that in case of annexation the excesses which had stained the record of the Free State should cease.

On the isth of April 1908 the chamber began a general debate on the Congo question. The debate made it clear that while the Belgian people did not desire colonial possessions, annexation was the only means of escape from a situa- c f".' tion the country found intolerable. The debate closed Act.' " ° on the 20th of August, when the treaty of annexation, the additional act and the colonial law were all voted by sub- stantial majorities. Amendments had been made in the colonial law giving parliament fuller control over Congo affairs and securing greater independence for the judicature. On the 9th of September following the three measures were also voted by the senate. Thus at length ended the hesitation of the legislature, fourteen years after the first annexation bill had been submitted to it. On the 14th of November the state ceased to exist, the rights of sovereignty being assumed by Belgium the next day without ceremony of any kind. 1 Administrative control in Brussels was transferred to the newly created ministry of the colonies.

II. The Belgian Congo

The colony of which Belgium became possessed in the manner narrated in the historical sketch has an area estimated at 900,000 sq. m. It is bounded W. by the Atlantic, N. by French Congo, N.E. by the Anglo-Egyptian Sudan, E. by the Uganda Protectorate, British and German East Africa, S.E. by northern Rhodesia (British), S.W. by Angola (Portuguese). The coast- line is only 25 m. long. It extends north from the estuary of the Congo, the northern bank of the estuary belonging to Belgium, the southern

to Portugal. The greater part of Belgian Congo lies between the parallels of 4 N. and 10° S. and 18 and 30° E.

Physical Features. — Except for its short coast-line, and for a comparatively small area on its eastern frontier, the colony lies wholly within the geographical basin of the Congo. It may roughly be divided into four zones: — (1) the small coast zone west of the Crystal Mountains, through which the Congo breaks in a succession of rapids to the Atlantic; (2) the great central zone, described below; (3) the smaller zone east of the Mitumba range (including the upper coursesof some of the Congo tributaries which have forced their way through the mountains), and west of Lake Mweru and the upper course of the Luapula; and (4) an area which belongs geographically to the Nile valley. The Crystal Mountains form the western edge of the great Central African plateau and run, roughly, parallel to the coast. The

1 The first power to recognize the transfer of the state to Belgium was Germany, which did so in January 1909

i6°

B

D

E

pPfeiifeP

BELGIAN CONGO

Enplish Miles o 50 100 1 50 200 250

■ ■ ■ *f* ■ , ■ ‘ ■ ‘ ‘

*Capital of C.nlomj ..,,,151 Capitals of Districtˆ**,®*

Railways W

fat •. ..oˆrj,, 1 »Ji_4A« v . oVˆ

r 3 •■ -i

• °i \ ˆ

IfrimbaneS

iwSa n £.- o ‘ ■ -SJ ;) Poppkabaka. VWi’ssn&nni

Muata* Kumbanatt

‘■‘v. •’« »,-

‘■■-/ ,H

hi = ˆ = 3 Armada

LaKe

Longitude East 20 of Greenwich

... pOrV. HˆG—

Twich 24° £) 28 E grmryW&lkt

Mitumba range extends from the south-eastern frontier of the colony, in a north-easterly direction towards Lake Tanganyika, and northwards along the western shore of that lake, past lakes Kivu and Albert Edward to Albert Nyanza, forming the western edge of the western or Albertine rift-valley. This long mountain chain has numerous local names. It varies in altitude from 5000 to 10,000 ft. The eastern escarpment is precipitous, but on its western face it slopes more gently into the Congo basin. North of the Lukuga river the main chain throws out into the central zone, in a north-westerly direction, a secondary range known as the Bambara Mountains, which forms one of the boundaries of the Manyema country. The interior or lake zone is a high plateau with an average elevation of 3000 ft. above sea-level.

The central zone dips with a westerly inclination from the Mitumba Mountains towards the western edge of the plateau. It is described as ” a country of alluvial plains, without any marked mountain features, very well watered, covered with forests and wooded savannahs ” (A. J. Wauters). The forests occupy the river valleys and are densest in the east and north-east

of the state. In these primeval forests the vegetation is exces- sively rank; passage has to be forced through thick underwood and creeping plants, between giant trees, whose foliage shuts out the sun’s rays; and the land teems with animal and insect life of every form and colour. Describing the

forests of the Manyema country, west of Lake Tanganyika, David Livingstone wrote: " Into these [primeval forests] the sun, though vertical, cannot penetrate, excepting by sending down at mid-day thin pencils of rays into the gloom. The rain water stands for months in stagnant pools made by the feet of elephants. The climbing plants, from the size of a whipcord to that of a man-of-war's hawser, are so numerous, that the ancient path is the only passage. When one of the giant trees falls across the road, it forms a wall breast high to be climbed over, and the mass of tangled ropes brought down makes cutting a path round it a work of time which travellers never undertake." This descrip- tion is equally applicable to the forest region extending eastward from the mouth of the Aruwimi almost to Albert Nyanza. This forest covers an area of some 25,000 sq. m.,and into a great part of it the sunshine never enters. It is known variously as the

Pygmy Forest (from the races inhabiting it), the Aruwimi or Ituri Forest (from the rivers traversing it), the Stanley Forest (from its discoverer) , or the Great Congo Forest. It is the largest fragment within the colony of the immense forest which at one time seems to have covered the whole equatorial region. By the banks of the rivers occur the "gallery" formations; i.e. in what appears an impenetrable forest are found avenues of trees " like the colonnades of an Egyptian temple," veiled in leafy shade, and opening " into aisles and corridors musical with many a murmuring fount " (Schweinfurth).

The Congo and its tributary streams are separately noticed. They form, both from the point of view of the physical geography and the commercial development of the colony, its most im- portant feature; but next in importance are the forests. The wooded savannas are mostly situated on the higher lands of the central zone, where the land dips down from the Mitumba Mountains to the Congo.

The part of the colony within the Nile basin is geographically of great interest. It includes some of the volcanic peaks which, north of Lake Kivu, stretch across the rift-valley and attain heights of 13,000 and 14,000 ft.; Albert Edward Nyanza and part of the Semliki river; part of Ruwenzori (q.v.), the so-called " Mountains of the Moon," with snow-clad heights exceeeding 16,500 ft. The colony also includes the western shores of lakes Tanganyika and Kivu (q.v.).

Geology. — The portion of the great basin of the Congo included in the

colony is mainly occupied, so far as it has been explored, by sandstones. These are separable into a lower group (Kundelungu) of red felspathic grits and into an upper group (Lubilasch) of white friable sandstones. Both are considered to represent the Karroo formation of South Africa. The basin in which these sandstones were laid down is limited on the east by ancient gneisses and schists overlain by the highly inclined red felspathic grits. The ancient rocks of Katanga form the southern boundary. The northern periphery lies in French Congo : the western boundary is formed by a zone of Archean and metamorphic rocks and a region composed of several rock groups considered to range between the Silurian and Carboniferous periods; but it is only in the limestones of one group that fossils, indicating a Devonian age, have been found. Rocks of Cretaceous and Tertiary ages are confined to the maritime zone.

Flora. — The most valuable of the forest flora are the lianas, notably Landolphia florida, which yield the india-rubber of commerce. There are also timber trees such as mahogany, ebony, teak, lignum vitae, African cedars and planes, while oil, borassus and bamboo palms are abundant. Other trees are the redwood and camwood. Gum- and resin-yielding trees and plants (such as the acacia) are numerous. Euphorbias attain great size and orchillas are character- istic of the forest weeds. There are innumerable kinds of moss and lichens and ferns with leaves 12 ft. in length. Of the creepers, a crimson-berried variety is known as the pepper climber. Orchids and aloes are common. In the savannas are gigantic baobab trees. In the densest forests the trees, struggling through the tangle of underwood to the light, are often 150 ft. and sometimes 200 ft. in height. The undergrowth itself rises fully 15 ft. above the ground. In many districts the coffee and cotton plants are indigenous and luxuriant. Of fruit trees the banana and plantain are plentiful and of unusual size. Peculiar to the maritime zone are mangoes and the coco-nut palm. Papyrus is found by the river banks.

Fauna. — The forests are the home of several kinds of monkeys, including the chimpanzee in the Aruwimi region; the lion, leopard, wild hog, wolf, hyena, jackal, the python and other snakes, and particularly of the elephant. Among animals peculiar to the forest regions are a tiger-cat about the size of a leopard, the honey badger or black Ituri ratel and the elephant shrew. The zebra, giraffe and the rare okapi are found in the north-eastern borderlands. In the more open districts are troops of antelopes, including a variety armed with tusks, and red buffaloes. Hippopotami and crocodiles abound in the rivers, which are well stocked with many kinds of fish, including varieties resembling perch and bream; and otters make their home in the river banks. The manati is confined to the lower Congo. Bird and insect life is abundant. Among the birds, parrots (especi- ally the grey variety) are common, as are storks and ibises. Herons, hawks, terns,

Egyptian geese, fishing eagles (Gypohierax), the weaver and the whydah bird are found in the lower and middle Congo. Whenever the crocodile is out of the water the spur- winged plover is its invariable companion. The innumerable butterflies and dragon-flies have gorgeous colourings. White and red ants are very prevalent, as are mosquitos, centipedes, spiders and beetles.

Climate. — Situated in the equatorial zone, Belgian Congo shows, over the greater part of its area, only a slight variation of temperature all the year round. The mean annual temperature is about 90° F. From July to August the heat increases slightly, with a more rapid

rise to November. During December the thermometer remains stationary, and in January begins to rise again, reaching its maxi- mum in February. March is also a month of great heat; in April and May the temperature falls, with a more rapid decline in June, the minimum being reached again in July. The mean temperature is lowered on the seaboard by the coast stream from the south, and the thermometer falls sometimes to little over 50 F. Again in the plateau regions in the south the night temperature is sometimes down to freezing point. There is a marked distinction between the wet and dry seasons in the western districts on the lower Congo, where rains fall regularly from October to May, the dry season being from June to September. But nearer the centre of the continent the seasons are less clearly marked by the amount of precipitation, rain falling more or less regularly at all times of the year. The seasons of greatest heat and of the heavy rains are thus coincident on the lower river, where fever, is much more prevalent than on the higher plateau lands nearer the centre of the continent. The amount of the rainfall shows great variations in different years, the records at Banana showing a total fall of 1 6 in. in 1 890-1 89 1 and of 38 in. in 1 893- 1894. Even in the rainy season on the lower river the rain does not fall continuously for a long period, the storms rarely lasting more than a few hours, but frequently attaining great violence. The greatest fall registered as occurring during a single tornado was 6 in. at Bolobo. In July grass fires are of common occurrence, and frequently sweep over a great expanse of country. M. A. Lancaster, the Belgian meteorologist, formulated, as the result of a study of all the available data, the following rule : — That the rainfall increases in the Congo basin (1) in proportion as one nears the equator from the south, (2) as one passes from the coast to the interior. On the lower Congo the prevailing winds are from the west and the south- west, but this prevalence becomes less and less marked towards the interior, until on the upper river they come from the south-east. The wind, however, rarely attains any exceptional velocity. Storms of extreme violence, accompanied by torrential rain, and in rare instances by hailstones, are of not uncommon occurrence. On the coast and along the course of the lower river fogs are very rare, but in the interior

early morning fogs are far from uncommon. Euro- peans are subject to the usual tropical diseases, and the country is not suited for European colonization. This is due more to the humidity than to the heat of the climate.

Inhabitants. — The population is variously estimated at from 14,000,000 to 30,000,000. The vast bulk of the inhabitants of the Congo basin belong to the Bantu-Negro stock, but there are found, in the great forests, sparsely distributed bands of the Pygmy people, who probably represent the aboriginal inhabitants of Central Africa (see Akka; Bambute; Batwa; Wochua). In the north-east of the colony, in the upper basin of the Welle and the Mbomu, the Niam-Niam (q.v.) or Azandeh, a Negroid race of warriors and hunters with a social, political and military organization superior to that of the Bantu tribes of the Congo basin, have intruded from the north. They were forcing their way southwards when the Belgians appeared in the upper Congo about 1895 and arrested their further progress. Neighbours to the Azandeh are the Mangbettu and Ababwa, who are found chiefly in the country between the Welle and the Aruwimi. The Mangbettu, who formerly established a hegemony over the indigenous population, Mundu, Abisanga, Mambare, &c, have practically disappeared as a tribe, though their language and customs still survive. The characteristics of the inhabitants of this region are well summed by Casati, who states that the Mege are considered the most skilful in elephant-hunting, the Azandeh in iron-work, the Mangbettu in wood-carving, the Abarambo in ivory -carving, and the Momfu in agriculture. Arab culture and traces of Arab blood are found in the districts where the slave traders from the east coast had established stations. This Arab influence extends, in varying degrees of intensity, over the whole eastern province, that is the region bounded east by Tanganyika, west by the Lualaba, and north by Stanley Falls and the Mangbettu country. It is mainly evident in the adoption of Arab clothing and the building of houses in Arab fashion. In the valley of the Sankuru the population has been slightly modified by Chinese influences. About 1894 a party of coolies from Macao who had been working on the railway in the cataracts region endeavoured to return home overland. They got as far as the Sankuru district, where the survivors settled and married native women.

Of the Bantu tribes several main groups may be distinguished. The lower Congo and coast regions are occupied by the Ba-Kongo (otherwise Ba-Fiot), a division including the Mushi-Kongo, found chiefly in the Congo division of Angola, and the Basundi,

who live on both banks of the river in the cataracts districts, the Kabinda and the Mayumbe — the two last named dwelling in the coast districts and foot-hills immediately north of the mouth of the Congo. A custom prevails among the coast tribes of placing their marriageable maidens on view in little bowers specially built for the purpose — the skin of the girls being stained red. The Ba-Kongo, as a whole, appear to be a degenerate race, the primitive type having been degraded by several centuries of contact with the worst forms of European civilization (see further Angola: Inhabitants). Extending from the Kwango affluent of the Kasai to Lake Tanganyika are the Luba-Lunda groups. Of these the most widespread tribe is the Ba-Luba (q.v.) . The next in importance, the Ba-Lunda, are mostly confined to the western half of this vast region. They have given their name to the Lunda district of Angola. From the 16th century (and possibly earlier) down to the close of the 19th century the Lunda peoples formed a more or less homogeneous state, the successive sovereigns being known as the Muata Yanvo. The Katanga, one of the Luba tribes, also founded a kingdom of some extent and power. They occupy and have given their name to the south-east part of the colony. In southern Katanga a tribe called Bassanga are cave-dwellers, as are also the Balomoto, who live in the Kundelungu hills west of Lake Mweru. Possibly connected with the Luba-Lunda group are the cannibal Manyema (q.v.), whose home is the district between Tanganyika and the Lualaba at Nyangwe.

Living north of the Luba-Lunda tribes, and occupying the country enclosed by the great bend of the Congo and bounded west by the Kasai, are a large number of tribes, the chief groups being the Bakuba, Basongo Mino, Balolo, Bakete, Bambala, Bayaka, Bahuana, &c. Of these the Basongo Mino are spread over the country between the Kasai and Lomami. Between the last-named river and the Lualaba dwell the savage and cannibal Batetela and Bakussu. Farther north and largely occupying the valley of the Ruki are the Mongo, a large forest tribe. Along the middle Congo from Stanley Pool to Stanley Falls the more important tribes are the Bateke, in the Stanley Pool district, but chiefly on the north side of the river in French territory; the Bayanzi (Babangi), between the mouths of the Kasai and the Ubangi; the Bangala, one of the most gifted of the Congo tribes, whence are recruited many of the soldiery; the Bapoto and the Basoko. These Bangala are not to be confused with the Bangala of the Kwango, also cannibals, who in marauding bands under leaders styled Jaga were devastating the country in the days of the early Portuguese settlements in the Congo regions. The Banza and Mogwandi are large tribes living in the region between the Congo and the Ubangi.

These Bantu races may be further divided into plain, forest and riverine tribes. With the exception of a few riverine tribes, such as the Wagenia who are fishers only, all are agriculturists and the majority keen traders, going

long distances to buy and sell goods, but there are marked differences among them corre- sponding to their environment. The riverine tribes build excel- lent canoes and large " fighting " boats, and are almost uniformly expert boatmen and fishermen and live much on the water; so much so that Hermann von Wissmann and other travellers were struck by the insignificant leg development of several of these tribes. In general the physical development of these people is scarcely so great as that of the average northern European, but the majority are well formed. The most savage and truculent of the tribes are those who live in the forest regions; the most advanced in culture, the dwellers in the plains. Nearly all the tribes have tattoo markings on the face and body; to this rule the Ba-Kongo tribes are an exception. Save where the tribes have come under Arab or European influence, the cloth- ing is extremely scant}', but absolute nudity is not known. The villages of the tribes of the lower Congo are usually surrounded by a palisade; the houses or huts are rectangular and about 7 ft. high, fetishes are usually found over the entry. The Bateke build their houses in circular groups opening on a sort of court- yard; the houses in Bangala villages are built in parallel rows about 200 ft. apart; plantations of manioc usually surround the

villages. Two varieties of culture exist among the tribes in- habiting the state: that extending over the western and central area, and that of the Welle district and eastern fringe. In the former the bow with vegetable string is the chief weapon, and clothing is woven from palm fibre ; in the east spears are found, and in the Welle district swords and throwing-knives also; clothing made from skins also makes its appearance, and more attention is paid to the shades of departed ancestors.

Some tribes, notably the Ba-Luba, possess considerable skill in working in wood, ivory and metals (chiefly iron and copper). The knives, spears and shields of native workmanship frequently show both ingenuity and skill, alike in design and execution. Musical instruments of crude design are common. Over a great part of the country the natives manufacture cloth from vegetable fibre. They employ four different colours, yellow, the natural colour, black, red and brown, which are obtained by dyeing, and these colours they combine into effective designs. In some tribes a rude form of printing designs on cloth is practised, and on the Sankuru and Lukenye a special kind of cloth, with a heavy pile resembling velvet, is made by Bakuba and other tribes. In several districts the action of the state officials and the concession companies in enforcing the collection of large quantities of rubber caused the tribes to abandon their former habits and industries; on the other hand, cannibalism, formerly widely prevalent and practised by tribes with a comparatively high culture (e.g. the Bangala), has been largely stamped out by the rigorous measures adopted by the state. The holding of slaves, and slave-raiding by one tribe upon another, is

also prohibited.

In general, each tribe is autonomous, but, as already stated, considerable kingdoms have been created by the Luba-Lunda groups, as also by the Ba-Kongo, the founders of the " Kingdom of Congo " (see Angola). The Balunda " empire " of Muata Yanvo fell to pieces on the death of the chief Muteba, killed in a war with the Kioke, a Bantu tribe of the upper Kasai, in 1892. At one time this " empire " extended from the Kwango to the Lualaba. 1 The Katanga kingdom, then ruled by an Unyamwezi adventurer named Msiri, was overthrown by the Congo State in 1 89 1. The kingdom of the Cazembe (q.v.), which was to the south and east of Katanga, has also vanished. Among the Bangala, each village has its chief.

Each tribe speaks a different language or dialect of Bantu, the chief groups being described in the article Bantu Languages. Swahili, a Bantu tongue with an admixture of Arabic, &c, is understood by many tribes besides those which have been under the direct influence of the Zanzibar Arabs, and it is the most general means of communication. The religion of the Congo tribes is difficult to define. Belief in a Supreme Being is vague but universal, but as this Being is good, or at least neutral, he is disregarded, and the native applies himself to the 'propitiation and coercion, by magical means, of the countless malignant spirits with which he imagines himself to be surrounded, and which are constantly on the watch to catch him tripping. Elaborate funeral rites, often accompanied by human sacrifice, play a most important part in native life. The idea is that the dead man shall enter the spirit world in a manner befitting his earthly rank, or he would be despised by the other spirits, and also that if proper respect were not shown to his remains, he might bring supernatural punishment on his relations. The point to be recognized is the extremely close connexion in the mind of the native between life in this world and the next, and between the mundane and the supernatural.

The European population, before 1880, consisted of a few traders, Dutch, English, French and Portuguese, having factories in the Congo estuary. By the end of 1886 the Europeans numbered 254, of whom 46 were Belgians. In January 1908 the white population had risen to 2943, 1713 being Belgians.

1 Later on a chief named Kalambo carved out a new " empire " in the central part of the Kasai basin, his authority extending west- ward from the upper Sankuru into the Lunda district of Angola. He was in 1909 and for several years previously independent of the Belgians and Portuguese, and had closed the country to Europeans.

Swedes (200) and Italians (197) came next in numbers. The

British numbered 145.

Towns. — There are no large towns in the European sense, but a number of government stations have been established. At none of these stations is the total population over 5000. Boma {q.v.) is the headquarters of the local administration and the residence of a British consul. It is situated on the right bank of the lower Congo, about 60 m. from its mouth, is one of the principal ports of call for steamers, and the centre of a considerable trade. Banana, close to the mouth of the Congo and Banana Point, possesses one of the best natural harbours on the west coast of Africa, and is capable of sheltering vessels of the largest tonnage. There are a number' of European factories, some of them dating from the 16th century, and the place is the centre of a considerable commerce. Matadi is situated on the left bank of the Congo, at the highest point of the lower river which can be reached by sea-going vessels. It is the point of departure of the Congo railway. The railway company has constructed jetties at which steamers can discharge their cargo. Lukungu, situated on the banks of the river of that name, a southern tributary of the Congo, about half-way between Matadi and Stanley Pool, was formerly the capital of the Falls district, and the chief recruiting station for porters on the lower Congo. Tumba, the present capital of the district, is a station on the Congo railway, the half-way house between Matadi and Stanley Pool. It is about 117 m. from Matadi and 143 from Dolo, the terminus of the railway on Stanley Pool. Dolo is situated a short distance from the pool, and has two channels by which vessels can enter and leave the port. Quays and a slip for launching vessels have been constructed. Leopoldville is the capital of the Stanley Pool district. It is situated about 7 m. from Dolo on the flanks of Mount Leopold. Other places of importance are Luluaburg, on the Lulua river; Lusambo, the capital of the Lualaba-Kasai district, on the Sankuru river; Coquil- hatville, the capital of the equatorial district, at the mouth of the Ruki; Stanleyville, the principal station of Stanley Falls district; New Antwerp, a thriving little town, the capital of the Bangala district, situated on the right bank of the Congo close to 19 E.; Banzyville, the capital of the Ubangi district, on the river of that name; and Basoko, at the junction of the Aruwimi and the Congo. Jabir is the capital of the Welle district, and in the Lado Enclave (q.v.) on the upper Nile the principal places are Rejaf, Lado and Dufile. Nyangwe, on the Lualaba, a little south of 4 S., was a large native town which, about the middle of the 19th century, came under the dominion of the Zanzibar Arabs. It was visited by David Livingstone in 1871, and from it in 1876 H. M. Stanley began his descent of the Congo. In 1892 the town was taken from the Arabs by the Congo State troops and destroyed. It has

since regained considerable importance as a trading centre.

Communications. — There is a regular mail service between Ant- werp and the ports of the lower Congo, which are also served by steamers from Liverpool, Hamburg, Rotterdam and Lisbon. The Congo and its affluents afford over 6000 m. of navigable waters (see Congo). A public transport service on the rivers is maintained by the state. From its mouth to Matadi (85 m.) the Congo is navi- gable by ocean-going vessels. From Matadi a railway, completed in 1898 at a cost of £2,720,000, and 260 m. long, goes past the cataract region and ends at Stanley Pool, whence the Congo is navigable to Stanley Falls, a distance of 980 m. From Stanley Falls a railway runs towards the Nile. An agreement with Great Britain, concluded in May 1906, provided for the continuation of this line from the Congo State frontier through the Lado Enclave to the navigable channel of the Nile near the station of Lado, a steamboat and railway service across Africa from the Congo mouth to the Red' Sea being thus arranged. Another railway (79 m. long), completed in 1906, follows the left bank of the Congo from Stanley Falls, past the rapids to Ponthierville, whence there is a navigable waterway of 300 m. to Nyangwe. From Nyangwe a railway goes towards Lake Tanganyika. Above Nyangwe, on the main stream, another railway is built around the next series of cataracts, thus opening to through communication the upper Lualaba. The total length of steam communication by this route, from Katanga to the mouth of the Congo, is about 2150 m. — 1548 by water and 596 by rail. The Katanga region is also served by lines forming a continuation of the Northern Rhodesia railway system. Besides these main lines a railway (about 90 m. long), having its river terminus at Boma, serves the Mayumbe district. The principal stations are connected by telegraph lines, and, by way of Libreville in French Congo, cable communication with Europe was established in 1905. The colony is included in the Postal Union.

Agriculture. — Until the advent of Europeans the natives, except in the immediate neighbourhood of some of the Arab settlements, did little more than cultivate small patches of land close to their villages. They grew bananas, manioc, the sweet potato, the sugar- cane, maize, sorghum, rice, millet, eleusine and other fruits and vegetables, as well as tobacco, but the constant state of fear in which they lived, either of their neighbours or of the Arabs, offered small inducement to industry. Nor can it be said that under their white masters the natives have become great agriculturists, though planta- tions have been established both by the state and private com- panies, and coffee, cocoa, tobacco, rice and maize are grown for

export. Of domestic animals, sheep and goats are common. Oxen have been introduced from Europe. Horses, asses and mules are comparatively rare.

Minerals.— Gold mines are worked at Kilo in the upper basin of the Ituri fiver, and some 30 m. W. of the Mboga district, Albert Nyanza, where gold has also been found (in British territory). The Ruwe gold mine is in the Katanga district in the south of the colony. It lies west of the Lualaba on the Mitumba range, in about n° S., 25 45′ E. Iron is widely distributed, and worked in a primitive fashion. It has been found in the Manyanga country, the Manyema country on the upper Congo, in the Urua country, in the basins of the Kasai and the Lualaba, and in Katanga. Ironstone hills, estimated to contain millions of tons of ironstone of superior quality, have been reported in the south-eastern region. The wealth of Katanga in copper is great, the richest deposits being in the southern districts, adjacent to the Northern Rhodesia border. In this region, watered by the Lualaba, Lufira and other head-streams of the Congo, immense copper ore deposits are found in hills and spurs of rising ground extending over 150 m. east to west. Tin is found on the western edge of the Katanga copper belt and extends north along the banks of the Lualaba. Copper is also reported in other districts, such as Mpala and Uvira on Lake Tanganyika. Lead ore, tin (Ubangi basin), sulphur and mercury have been discovered.

Industries and Trade. — The principal industry is the collection of caoutchouc (see Rubber) from the rubber vines, which exist in seemingly inexhaustible quantities. The value of the rubber ex- ported, which in 1886 was only £6000, had risen in 1900 to £1,158,000. In 1907 the value was £1,758,000. When the state was founded elephant and hippopotamus ivory formed for some years the most im- portant article of export. When Europeans first entered the Congo basin the natives were found to have large stores of ” dead ivory ” in their possession. Palm oil, palm nuts, white copal, coffee, cocoa, rice, earth-nuts and timber are next in importance among the exports. The trade of the state was of slow growth until after the completion, in 1898, of the railway between the lower and middle Congo, which greatly reduced the cost of the transport of goods. In 1887 the value of goods exported of native origin was £79,000. In 1898 it had risen to £886,000. In the following year (with the railway open) the native produce exported was valued at £1,442,000. In 1905 the total Was £2,120,000. Morethan75 %of the native produce, known as ” special exports, ” go to Belgium. The neighbouring Portuguese possessions are the next best customers of the colony. Holland and Great Britain take most of the remainder of the trade. The principal imports are textiles and clothing, foods and drinks, machinery and metals, steamers and arms and ammunition. Two- thirds of the imports are from Belgium; the remainder came from Germany, Great Britain (chiefly cottons), France and Holland. It should be noted that the importation of alcohol, for the use of the natives, is prohibited. Exports greatly exceed the imports in value. Out of a total trade to the value of £3,000,000 in 1905 only £800,000 represented

imports. This is due in large measure to the system of forced labour instituted by the state.

Shipping. — As with the trade the largest share of the shipping is Belgian, but it is under 50 % of the whole tonnage. The ports of entry are Banana, Boma and Matadi. In 1904 there entered and cleared these ports 205 sea-going vessels of 421,072 tons. Of the tonnage entered 193,202 was Belgian, 85,934 British, 74,536 French, and 67,400 German. In addition about 500 smaller vessels engaged in the coasting trade enter and clear from Boma and Banana every year.

Constitution. — The Free State, under King Leopold of Belgium, was organized as an absolute monarchy. Civil and criminal codes were promulgated by decrees, and in both cases the laws of Belgium were adopted as the basis of legislation, and " modified to suit the special requirements " of the state; e.g. forced labour {prestations) was legalized (law of the 18th of November 1903). 1 This forced labour was to be remunerated and was regarded as in the nature of a tax. Besides the prestations, a system of corvtes, for public works, was enforced. The sovereign was assisted in the task of government by a secretary of state and other high officials, with headquarters at Brussels. The state was represented in Africa by a governor-general, placed at the head both of the civil and military authorities. Under Belgian rule a colonial minister replaced the former secretary of state. The minister has the advice of a colonial council, while the power of legislating for the colony is vested in parliament.

For administrative purposes the colony is divided into thirteen districts and one province, each being governed by a commissary. The districts are Banana, Boma, Matadi, Falls, Stanley Pool, Kwango Oriental, Ubangi, Lualaba-Kasai, Lake Leopold II., Equator, Aruwimi, Bangala and Welle. The region between

1 Forced labour had, however, been authorized in 1891 and exacted in practice since the foundation of the state.

the Lomami river and the great lakes, and south of the Aruwimi and Welle districts forms the Province Orientale. It is divided into zones, of which the chief are Stanley Falls, Ponthierville, and that administered by the Katanga committee. The districts are also subdivided into zones. In 1898 the territory in the valley of the upper Nile leased from Great Britain was

placed for administrative purposes under the same regime as the districts.

Judicial Machinery. — Courts of first instance have been in- stituted in the various districts, and there is a court of appeal at Boma which revises the decisions of the inferior tribunals. There is a further appeal in all cases where the sum in dispute exceeds a thousand pounds, to a superior council at Brussels, composed of a number of jurisconsults who sit as a cour de cassation. 1

Religion and Instruction. — The religion of the native population is that commonly called fetishism (see supra, Inhabitants). The state makes no provision for their religious teaching, but by the Berlin Act missionaries of all denominations are secured perfect freedom of action. The state has established agricultural and technical colonies for lads up to the age of fourteen. These colonies make provision for the training of boys recruited from those rescued from slavery, from orphans, and from children abandoned or neglected by their parents. Practical instruction is given in various subjects, but the main object is to provide recruits for the armed force of the state, and only such lads as are unfitted to be soldiers are drafted into other occupations. Missionaries have displayed great activity on the Congo. In 1907 there were about 500 missionaries in the colony, divided in about equal proportion between Protestants and Roman Catholics. They maintain over 100 stations. The missionaries do not confine themselves to religious instruction, but have schools for ordinary and technical training. There are two Roman Catholic bishops.

Finance. — Revenue is derived from customs, direct taxes (on Europeans), transport charges, &c, and from the exploita- tion of the domain lands. (The prohibition of the import of alcohol deprives the state of a ready source of revenue.) Nearly all the funds required in the work of founding the Free State were provided by Leopold II. out of his privy purse, and for some time after the recognition of the state this system was continued. In the first ten years of his work on the Congo King Leopold is reported to have spent £1,200,000 from his private fortune. The first five years of the existence of the state were greatly hampered by the provision of the Berlin Act prohibiting the imposition of any duties on goods imported into the Congo region, but at the Brussels conference, 1890, a declara- tion was signed by the powers signatory to the Berlin Act, authorizing the imposition of import duties not exceeding 10 % ad valorem, except in the case of spirits, which were to be subject to a higher duty. By agreement with France and Portugal, a common tariff (6 % on most goods imported, 10 % on the export of ivory and india-rubber, 5 % on other exports) was adopted by these powers and the Congo Free State.

Funds for the administration were also obtained by loans. In July 1887

bonds bearing interest (from January 1900) at 2 § % were issued to the amount of £443,000 to represent sums advanced to the founders of the state. The bulk of these bonds (£426,000) were issued to King Leopold, but in January 1895 His Majesty cancelled the bonds in his possession. In 1888 and 1889 bearer bonds to the amount of £2,800,000 were issued out of an authorized issue of £6,000,000. The balance of the loan was issued in 1902. The bonds are redeemable in 99 years by annual drawings, and are entitled to an addition of 5 % per annum when drawn. The redemption fund is administered by a committee representing the bondholders. The Belgian govern- ment in 1890 advanced a sum of £1,000,000, and in 1895 two further sums of £211,000 and £60,000, the former to enable the state to repay a loan and so prevent the forfeiture of an immense territory which had been pledged as security to an Antwerp banker, and the latter to balance the 1895 budget. In October 1896 a loan of £60,000 was raised at 4 %, and in June 1898 a further sum of £500,000 was raised at the same rate

of interest. In October 1900 a 4 % loan of £2,000,000 was issued for the purpose of public works, including railways, and in February 1904 a decree was issued authorizing the creation of bonds to bearer for £1,200,000, at 3 %. From 1890 to 1900 King Leopold is stated to have made a grant of £40,000 per annum from his private purse to the public funds. In 1901 Belgium renounced the repayment of its loans and the payment of interest, reserving the right to annex the state, whose financial obligations to Belgium would revive only if that kingdom should renounce its rights to annex the Congo. In 1886 the total revenue of the country was under £3000, derived from the state domains. The revenue from this source, obtained almost entirely from rubber and ivory, had risen in 1891 to £52,000, in 1896 to £235,000, in 1900 to £448,000, and in 1905 to £660,000. These figures do not, however, disclose the total profits which accrued to the Free State from its trading operations in the Congo. Official returns placed the public expenditure at a higher figure than the revenue. The totals given for 1905 were: revenue, £1,197,466; expenditure, £1,392,026. The monetary system is based on the gold standard, and the coinage is the same as that of the Latin union. On the lower Congo transactions are in cash, but on the middle and upper Congo the use of coins in place of barter or the native brass wire currency makes but slow progress. Moreover, save in the lower Congo state payments (down to 1908) were made in trade goods.

Defence. — The army consists of African troops officered by Europeans. Some of the men are recruited from the neighbouring territories, but the greater part consists of locally raised levies, recruited partly by voluntary enlistment and partly by the enforced enlistment of a certain number of men in each district, who are selected by the commissary in conjunction

with the local chiefs. The effective strength is about 15,000. There are over 200 European officers, and over 300 European sergeants. The term of service for volunteers does not exceed seven years, while the militiamen raised by enforced enlistment serve for five years on active service, and for two years in the reserve. The artillery includes Krupps, Maxims and Nordenfeldts. A fort has been erected at Chinkakassa near Boma, commanding the river below the Falls, and there is another fort at Kinshassa on Stanley Pool to protect Leopoldville and the railway terminus. The governor-general is commander-in-chief of the armed forces of the state, and the commissaries are in com- mand of the military forces in their districts. In the 1 89 1 budget the expenditure on the army was given at £90,000, and by 1900 it had risen to £312,000. In 1905 the charge fell to £221,241.

Bibliography. — (1) Official: Protocols and General Act of the West African Conference (London, 1885). (Annex I to Protocol 9 contains copies of the treaties by which the International Assn. of the Congo obtained the recognition of the European govern- ments.) Documents diplomaliques: Affaires du Congo, 1884-189$ (Paris, 1895) (a French " Yellow Book ")• L'&at indSpendant du Congo d. I' exposition de Bruxelles (Brussels, 1897). Bulletin officiel de I' Stat independant du Congo (Brussels, 1885-1908) (published monthly, and replaced, November 1908, by the Bulletin officiel du Congo beige). Documents concernant le Congo, imprimis par ordre de la chambre des reprSsentants de Belgique (1891-1895). Expose – des motifs du projet de loi approuvant I 'annexion du Congo & la Bel- gique {documents parlementaires, No. 91) (Brussels, 1895). Annates du musSe du Congo (flora, fauna, ethnography, &c.) (Brussels, 1898 et seq.). Despatch . . . in regard to alleged ill-treatment of natives and to the existence of trade monopolies in the . . . Congo (London, 1903). Correspondence and report from His Majesty's consul at Boma respecting the administration of the . . . Congo (London, 1904) contains a lengthy report from Mr Roger Casement, the British consul, condemning in several respects the treatment of natives by the state). Further correspondence respecting the administration of the state is contained in the white papers Africa, No I of 1905, 1906, 1907, Nos. 1 and 2 of 1908 and No. 1 of 1909. Rapport de la commission d'enquUe dans les territoires de Vetat (Brussels, Nos. 9 and 10 of the Bulletin officiel for 1905; a volumin- ous document; the tenor of the report is indicated in the section History). O. Louwers, Lois en vigueur dans Vetat independant du Congo (Brussels, 1905).

(2) Non-official: Le Mouvement geographique, a weekly magazine, founded in 1884 by A. J. Wauters, and devoted chiefly to Congo affairs. A Bibliographic du Congo, 1880-189$ (a list of 3800 books, pamphlets, maps and notices), compiled by A. J. Wauters and A. Buyl, was published

at Brussels in 1895. The most important books in this bibliography are The Congo and Founding of its Free State, by (Sir) H. M. Stanley (London, 1885), and Le Congo, historique, diplomatique, physique, politique, economique, humanitaire et coloniale, b-f A. Chapaux (Brussels, 1894). Stanley's book is of historic im- portance, describing the work he and his helpers accomplished on the Congo between 1879 and 1884; and Chapaux's volume gives the

best general account of the Free State in convenient size. The history section includes a valuable summary of the work of ex- ploration in the Congo basin from the days of David Livingstone up to 1 893. L'itat inaSpendant du Congo, by A. J. Wauters (Brussels, 1899), is a book of similar character to that of Chapaux. Both Chapaux and Wauters deal with ethnology and zoology. Sir H. H. Johnston, George Grenfell and the Congo . . . (2 vols., London, 1908), largely geographical, historical, anthropological and philological studies based on the work of Grenfell. For geology see J. Cornet, " Observations sur la geologie du Congo occidental," Bull. soc. geol. belg. vols. x. and xi. (1896-1897); ibid. " Les Formations post- primaires du bassin du Congo,'M»». soc. geol. belg. vol. xxi. (1893-1894) ; G. F. J. Preumont, " Notes on the Geological Aspect of some of the North-Eastern Territories of the Congo Free State," Quart. Journ. Geol. Soc. vol. lxi. (1905). The economic aspect of the colony is dealt with in Congo, climat, constitution du sol et hygiene … by Bourguignon and five others (Brussels, 1898). The Fall of the Congo Arabs, by S. L. Hinde (London, 1897), is an account of the cam- paigns of 1 892-1 893 by an English surgeon who served as a captain in the state forces. The Congo State, by D. C. Boulger (London, 1898), Droit et administration de I'etat independant du Congo, by F. Cattier (of Brussels University) (Brussels, 1898), and L'Afrique nouvelle, by E. Descamps (professor de droit des gens at Louvain University) (Paris, 1903), are treatises covering all branches of the state's activity, from the standpoint of admirers of the work of Leopold II., in Africa. Professor Cattier in a later work, Ulude sur la situation de I' Stat independant du Congo (Brussels, 1906), severely criticized the Congo administration. Other indictments of Congo State methods are contained in La Question congolaise, by A. Ver- meersch (Brussels, 1906) ; II Congo (Rome, 1908), by Captain Baccari; Civilization in Congoland, by H. R. Fox Bourne (London, 1903); and King Leopold's Rule in Africa (London, 1904); Red Rubber (London, 1906) ; and A Memorial on Native Rights in the Land . . . (London, 1909), by E. D. Morel. Ten Years in Equatoria, by Major G. Casati (London, 1891), contains much information concerning the peoples, zoology, &c, of the north-eastern parts of the state. (F. R. C.)

CONGREGATION (Lat. congregatio, a gathering together, from cum, with, grex, gregis, a flock, herd), an assembly of persons, especially a body of such persons gathered together for religious worship, or the body of persons habitually attending a particular church, hence the basis of that system of religious organization known as Congregationalism (q.v.). Apart from these, the more general meanings of the word, " congregation " is used in the English versions of the Old and New Testaments to translate the Hebrew words 'edah and kahal, the whole community of the Israelites and the assembly of the people. The words " assembly " and " congregation " have been to a certain extent distinguished in the Revised Version, " congrega- tion " being kept for 'edah and " assembly " for kahal. The Septuagint generally translates the first by avmywyri, the second by iiackqo-la (see J. H. Selbie, in Hastings's Diet, of Bible, s.v. " Congregation," cf. " Assembly," ib.). In the Roman Church " congregation " is applied to the committees of cardinals into whose hands the administration of the various departments of the church is given (see Curia Romana). The committees of bishops who regulate the business at a general council of the church are also known as " congregations." In the Roman Church there are several kinds of associations for religious purposes known by the generic name of " congregation "; such are: (1) those branches of a particular order, which, for the stricter practice of the rules of their order, group themselves together under a special form of government and discipline, — thus the Trappists are a congregation of the Cistercians, the monks of Cluny and St Maur are congregations of the Benedictines; (2) communities of religious under a common rule; persons belonging to such communities have either taken no vows, or have not taken " solemn " vows; of the many congregations of this class may be mentioned the Oratorians, the Oblates and the Lazarists; (3) in France religious associations of the laity, male or female, joined together for some religious, charitable or educational purpose (see France : Law and Institutions) . Lastly " congregation " in secular usage is applied to two governing bodies at the university of Oxford, viz. the " Ancient House of Congregation," in whom lies the granting and conferring of degrees, consisting of the vice-chancellor, proctors and " regent masters," and secondly the " Congregation of the University ,of Oxford," created by the University of Oxford Act 1854, and consisting of all members of convocation who are " resident,"

i.e. have passed 141 nights within 2 m. of Carfax during th preceding year. All statutes must be passed by this congregatio) before introduction in convocation, and it alone has the powe of amending statutes (see Oxford). At Cambridge University congregation is the term used of the meeting of the senate. Ii Scottish history, from the fact that the word occurs, in the sensi of " church," frequently in the national covenant of 1537, th< name of "

congregation " was used of the Reformers. Generall} and similarly the title of " lords of the congregation " was giver to the signatories of the covenant.

CONGREGATIONALISM, the name given to that type of churcli organization in which the autonomy of the local church, or body of persons wont to assemble in Christian fellowship, is funda- mental. Varied as are the forms which this idea has assumed under varying conditions of time and place, it remains distinctive enough to constitute one of the three main types of ecclesiastical polity, the others being Episcopacy and Presbyterianism. Episcopacy in the proper sense, i.e. diocesan Episcopacy, repre- sents the principle of official rule in a monarchical form: Presby- terianism stands for the rule of an official aristocracy, exercising collective control through an ascending series of ecclesiastical courts. In contrast to both of these, which in different ways express the principle of clerical or official authority, Congrega- tionalism represents the principle of democracy in religion. It regards church authority as inhering, according to the very genius of the Gospel, in each local body of believers, as a miniature realization of the whole Church, which can itself have only an ideal corporate being on earth. But while in practice it is religious democracy, in theory it claims to be the most immediate form of theocracy, God Himself being regarded as ruling His people directly through Christ as Head of the Church, whether Catholic or local. So viewed, Congregationalism is essentially a " high church " theory, as distinct from a high clerical one. It springs from the religious principle that each body of believers in actual church-fellowship must be free of all external human control, in order the more fully to obey the will of God as con- veyed to conscience by His Spirit. Here responsibility and privilege are correlatives. This, the negative aspect of the congregational idea, has emerged at certain stages of its history as Independency. Its positive side, with its sense of the wider fellowship of "the Brotherhood" (1 Pet. v. 9, cf. ii. 17), has expressed itself in varying degrees at different times, according as conditions were favourable or the reverse. But catholicity of feeling is inherent in the congregational idea of the church, inasmuch as it knows no valid use of the term intermediate between the local unit of habitual Christian fellowship and the church universal. On such a theory confusion between full Catholicity and loyalty to some partial expression of it is mini- mized, and the feeling for Christians as such, everywhere and under whatever name, is kept pure.

The Congregationalism of the Apostolic Church was, to begin with, part of its heritage from Judaism. In the record of Christ's own teaching the term " church " occurs only twice, once in the universal sense, as the true or

Primitive Congrega-

Messianic " Israel of God " (Matt. xvi. 18, cf. Gal. vi. tiouaiism. 16), and once in the local sense corresponding to the Jewish synagogue (Matt, xviii. 17). As Christianity passed to Gentile soil, the sovereign assembly {ecclesia) of privileged citizens in each Greek city furnished an analogy to the latter usage. These, the two senses recognized by Congregationalism, remained the only ones known to primitive Christianity. Writing of the unity of the church as set forth by Paul in Ephesians, Dr Hort (The Christian Ecclesia, p. 168) says: "Not a word in the epistle exhibits the One Ecclesia as made up of many Ecclesiae. To each local Ecclesia St Paul has ascribed a corre- sponding unity of its own ; each is a body of Christ and a sanctuary of God: but there is no grouping of them into partial wholes or into one great whole. The members which make up the One Ecclesia are not communities but individual men. The One Ecclesia includes all members of all partial Ecclesiae; but its relations to them all are direct, not mediate. It is true that . . . St Paul anxiously promoted friendly intercourse and sympathy

between the scattered Ecclesiae; but the unity of the universal Ecclesia as he contemplated it does not belong to this region: it is a bulk of theology and religion, not a fact of what we call ecclesiastical politics."

Organization corresponded to the life distinctive of the new Ecclesia. This was one of essential equality among " the saints " or " the brethren," turning on common possession of and by the one Spirit of Christ. " The whole congregation of the faithful was responsible for the whole life of the church — for its faith, its worship, and its discipline " (Dale). All alike were " priests unto God" in Christ (Apoc. i. 6; 1 Pet. ii. 9) and en- trusted with prerogatives of moral jurisdiction (1 Cor. vi. 1 ff.). " The Ecclesia itself, i.e. apparently the sum of all its male adult members, is the primary body, and, it would seem, even the primary authority." So says Dr Hort (p. 229), adding that " the very origin and fundamental nature of the Ecclesia as a community of disciples renders it impossible that the principle should rightly become obsolete." In the Apostolic age local office was determined, on the one hand, by the divine gifts (charisms) manifesting themselves in certain persons (1 Cor. xii.; Rom. xii. 3 ff.); and on the other by the recognition of such gifts by the inspired common consciousness of each Ecclesia (1 Cor. xvi. 15-18; 1 Thess. v. 12 ff.). In most cases this took formal effect in a setting-apart by prayer, sometimes with laying- on of hands. Such consecration, however, whatever its form, was a function of the local Ecclesia as a whole, acting through those of its members most fitted by gift or standing to be its representatives on the occasion. As to the

specific officers thus called into being, whether for supervision or relief (1 Cor. xii. 28), the New Testament knows none in the local church superior to elders, the ruling order in Judaism also. " Bishop " (overseer) was " mainly, if not always, not a title, but a description of the elder's function " (Hort, p. 232). Each church at first had at its head not a single chief pastor, but a plurality of elders (= bishops) acting as a college.

In course of time there emerged from this presbyterial body a primus inter pares, i.e. a permanent leader, to whom henceforth the description " bishop " tended to be restricted. This is the " monarchical episcopate " which first meets us in the letters of Ignatius, early in the 2nd century (see Church History). But whatever its exact attributes, as he conceived it, it was still strictly a congregational office. Each normal church had its own bishop or pastor, as well as its presbytery and body of deacons. " One city, one church (' parish ' in the ancient sense) with its bishop," was the rule. 1 Hence " if we are to give a name to these primitive communities with their bishops, ' congregational ' will describe them better than ' diocesan ' " (Sanday, Expositor, III. viii. p. 333). Nor did this state of things change so soon as is often supposed. It persisted in the main during the 2nd and 3rd centuries, and only faded before the growing influence of metropolitan or diocesan bishops in the 4th century. These, the bishops in the first instance of provincial capitals, gradually acquired a control oyer their episcopal brethren in lesser cities, analogous to that of the civil governor over other provincial officials. Indeed the development of the whole hierarchy above the congregational bishop was largely influenced by the imperial system, especially after Church and State came into alliance under Constantine.

This sacrifice of local autonomy was in a measure prepared for by an earlier centralizing movement proper to the churches themselves, whereby those in certain areas met in conference or " synod " to formulate a common policy on local problems. Such inter-church meetings cannot be traced back beyond the latter half of the 2nd century, and were purely ad hoc and informal, called to consider specific questions like Montanism and Easter observance. Nor were they at first confined to church officers, much less to bishops, but included " the faithful " of all sorts (Euseb. Hist. Eccl.v. 16, p. 10), and were in fact "councils composed of whole churches " (ex universis ecclesiis), where

1 An ancient city generally included a district around it, dwellers in which would go ecclesiastically, as well as politically, with those living within the city proper.

there was a true " representation of the whole Christian name " (Tert. De Jejun. 13). In a word, they were "councils of churches " {id. De Pud. 10) and not merely of church officers. Naturally, however, as the areas

represented increased, the more indirect and partial became the representation possible. Thus far, however, synods were still compatible with local autonomy and so with Congregationalism. But as the idea that bishops were successors of the apostles came to prevail, presbyters, though sharing in the deliberations, gradually ceased to share in the voting; while synods insensibly acquired more and more coercive control over the churches of the area repre- sented. Yet the momentous change which finally crushed out Congregationalism, by substitution of legal coercion for moral suasion as the final means of securing unity, came relatively late in the history of the ancient Catholic Church.

The seat of authority in Discipline, the means by which the church strives to preserve the Christian standard of living from serious dishonour in its own members, is the touch-stone of church politics. The local Ecclesia in the Apostolic age was itself responsible for the conduct of its members (1 Cor. vi. 1 ff. and the Epistles passim). " If a man will not hear the church," when the local church-meeting utters the mind of Christ on a moral issue, he has rejected the final court of appeal and is ipso facto self-excommunicate (Matt, xviii. 17). This remains the working rule of ante-Nicene Christianity. 2 Indeed Cyprian plainly lays it down that the church members must withdraw from sinful officers, since " the people itself in the main has power either of choosing worthy priests (bishops) or of refusing unworthy ones " (Ep. 67. 3).

On the whole, then, Congregationalism, the self-government of each local church, prevailed for the most part during the first two and a half centuries of Christianity, and with it a church life which, with all its developments of ministry and ritual, remained fundamentally popular in basis (cf. T. M. Lindsay, The Church and the Ministry in the Early Centuries, p. 259 and passim). The central idea was the sanctity of the church-members as such, rather than of the ministry as a clerical order. This is implied in the oldest ordination rules and forms of prayer, such as those underlying the " Canons of Hippolytus " and related collections. It is also implied in the congregational form and spirit of the earliest liturgies; but most of all in the discipline of the church before Constantine. But from the time of Cyprian (a.d. 250) the idea of the ministry as clergy or priesthood gained ground, parallel with the more mixed quality of those admitted by baptism to the status of " the faithful," and with the increas- ingly sacramental conception of the means of grace.

In both respects the reflex action of the Novatianist and Donatist controversies upon Catholicism was disastrous to the earlier idea of church-fellowship. Formal and technical tests of membership, such as the reception of sacraments from a duly authorized clergy, came to replace Christ's own test of character. The church ceased even to be thought of as a society of "

saints," or to be organized on that basis. The gulf between the " laity " and " clergy " went on widening during the 5th and 6th centuries; and the people, stripped of their old prerogatives (save in form here and there), passed into a spiritual pupillage which was one distinctive note of the medieval Church. In such a Catholic atmosphere Congregationalism could have no being, save among little groups of men who protested against the existing order. These, in proportion as they revived a primitive type of piety, tended to recover also some of its forms of organization. " They bore witness to the loss of the true idea of the Christian church," though they did not avail to restore it. Still, a good deal of semi-congregationalism probably did exist in obscure circles which preluded the wider Reformation and were merged in it. So was it among the Waldenses, who reasserted the priesthood of all believers: still more among the Lollards, 3 who produced

2 So not only the Didache (xv. 3, cf. xiv. 1,2), but also Tertullian {Apol. ch. 39), and even Cyprian and the 4th-century Apostolic Constitutions (ii. 47), as well as the Didascalia, its 3rd-century basis.

3 G. M. Trevelyan, England in the Age of Wycliffe (1899) ; W. H. Summers, Our Lollard Ancestors (1906), pp. 51, 92, 109 ff.

a " conventicle " type of Christian fellowship, supplementary to attendance at the parish church. This, while far. short of theoretic Congregationalism, was a prophecy of it.

Congregationalism proper, as a theory of the organized Christian life contemplated in the New Testament, re-emerges

only at the Reformation, with its wide recovery of Coaereea- suc ˆ as P ects °f evangelic experience as acceptance tlonalism. with God and constant access to Him through the sole

mediation of Christ. The practical corollary of this, " the Priesthood of Believers," though grasped by Luther (cf. Lindsay, Hist, of the Reformation, i. 435 ff.) and continental reformers generally, was not fully carried out by them in church organization. This was due partly to a sense that only here and there was there a body of believers ripe for the congregational form of church-fellowship, which Luther himself regarded as the New Testament ideal (Dale, pp. 40-43), partly to fear of, Ana- baptism, the radical wing of the Reformation movement, which first strove to recover primitive Christianity apart altogether from traditional forms. In ' certain Anabaptist circks the primitive idea of a " covenant " between believers and God as

conditioning all their life, especially one with another, was re- vived (Champlin Burrage, The Church-Covenant Idea, Phila- delphia, 1904). Their local church life, as moulded by this idea (found even in the church constitution adopted by Hesse in 1526), was congregational in type. But Anabaptism was not to remain an abiding force on the continent; and though colonies of its exiles settled in England, they did not produce the Congre- gationalism which sprang up there under Elizabeth. This was continuous rather with the Lollard type of secret congregation existing in various places, especially in London and the adjacent counties, at the opening of the 16th century and later (e.g. the " Known Men " at Amersham and elsewhere, Dale, pp. 58 f. 61). Already in 1550 Strype refers to certain " sectaries " in Essex and Kent, as " the first that made separation from the Reformed Church of England, having gathered congregations of their own." Then, during Mary's reign, secret congregations met under the leadership of Protestant clergy, and, when these were lacking, even of laymen. But these " private assemblies of the professors in these hard times," as Strype calls them, were congregational simply by accident. On Elizabeth's accession they ceased to assemble, until it was plain that she did not intend a radical reformation. Then only did some of their members resume secret assembly, with a more definite view to conformity in all things to the New Testament type and that alone.

Still, the development of congregational churches proper was gradual, the result of constant study of " the Word of God " in the light of experience. The process can be traced most clearly in London. 1 There, owing to measures taken in 1565-1566 to enforce clerical subscription to the authorized order of worship, especially touching vestments, certain persons of humble station began to assemble in houses " for preaching and ministering the sacraments " (Grindal's Remains, lxi.). This led in June 1567 to the arrest of some fifteen out of a hundred men and women met in Plumbers' Hall (ostensibly for a wedding), none of whom, to judge from the eight examined, was a minister. Probably they were not long kept in prison, for six of them were among a similar body of 77 persons " found together " in a private house on March 4, 1568, the leaders of whom were imprisoned, and liberated only after " one whole year," early in May 1560 (ibid. pp. 316 ff.). Perhaps it was between 1567 and 1568 that they began to organize themselves more fully in conjunction with four or five of the suspended clergy, with elders and deacons of their own appointing (Grindal, Zurich Letters, lxxxii.; Remains,

'Here in 1561 appeared A Confession of faith, made by common consent of divers reformed Churches beyond the seas; with an Exhor- tation to the Reformation of the Church. It advocated " the polity that our Saviour Jesus Christ hath established," with " pastors, superintendes, deacons"; so that "all true pastors have equal power and authority . . . and for this cause,

that no church ought to pretend any rule or lordship over other "; and none ought "to thrust himself into the government of the Church [as by ordination at large), but that it ought to be done by election." See Burrage, The Church- Covenant Idea, p. 43.

lxi.) . This act of ordaining ministers, probably after the Genevan order — which they certainly used from May 1568 — and their excommunication of certain deserters from their " church " (so Grindal) , clearly mark the fact that this body of some 200 persons had now deliberately taken up a position outside the national church, as being themselves a " church " in a truer sense than any parish church, inasmuch as they conformed to the primitive pattern. Their ideal is embodied in a manifesto set forth about

1570 under the title The True Marks of Christ's Church, &c, and signed by " Richard Fytz, Minister," as being " the order of the Privy Church in London, which by the malice of Satan is falsely slandered. "

" The minds of them that by the strength and working of the Almighty, our Lord Jesus Christ, have set their hands and hearts to the pure, unmingled and sincere worshipping of God, according to his blessed and glorious Word in all things, only abolishing and abhor- ring all traditions and inventions of man whatsoever, in the same Religion and Service of our Lord God, knowing this always, that the true and afflicted Church of our Lord and Saviour Jesus Christ either hath, or else ever more continually under the cross striveth for to have,

" First and foremost, the Glorious word and Evangel preached, not in bondage and subjection [i.e. by episcopal licence], but freely and purely.

" Secondly, to have the Sacraments ministered purely, only and altogether according to the institution and good worde of the Lord Jesus, without any tradition or invention of man.

" And last ot all, to have not the filthy Canon law, but discipline only and altogether agreeable to the same heavenly and almighty worde of our good Lord, Jesus Christ."

Here we have essential Congregationalism, formulated for the first time in England as the original and genuine Christian polity, and as such binding on those loyal to the Head of the Church. All turns, as we see from the petition addressed in

157 1 to the queen by twenty-seven persons (the majority women, possibly wives in some cases of men in prison), upon the duty of separation with a view to purity of Christian fellowship (2 Cor. vi. 17 f.), and upon moral discipline " by the strength and sure warrant of the Lord's good word, as in

Matt, xviii. 15-18 (1 Cor. v.)" were it only in a church of " two or three " gathered in the Name. Whatever may be thought of their application of these principles, there is no mistaking the deeply religious aim of these separatists for conscience' sake, viz. the realizing of the Christian ideal in personal conduct, in a fellow- ship of souls alike devoted to the Highest ; nor can it be doubted that the " mingled " communion of the parish churches made church " fellowship " in the apostolic sense a practical impossi- bility. This was confessed alike by the bishops (e.g. Whitgift) and by the Puritans, who maintained the paramount duty of remaining within the queen's church and there working for the further reformation which they recognized as sadly needed by English religion. But the radical " Puritans " (the above documents in the State Paper Office are endorsed " Bishop of London: Puritans ") felt that this meant treason to the Headship of Christ in His Church; and that until the prince should set aside " the superstition and commandments of men," and " send forth princes and ministers [like another Josiah], and give them the Book of the Lord, that they may bring home the people of God to the purity and truth of the apostolic Church," they could do no other than themselves live after that divine ideal. They were not separated of their own choice, but by the word of God acting on their consciences.

"Reformation without tarrying for Anie " was the burden laid on the heart of the Congregational pioneers in 1567-1571; and it continued to press heavily on many, both " Separatists " and conforming " Puritans " (to use the nicknames used by foes), before it became written theory in Robert Browne's work under that title, published at Middelburg in Holland in 1582 (see Browne, Robert). The story of the many attempts made in the interval by " forward " or advanced Puritans to secure vital religious fellowship within the queen's Church, and of the few cases in which these shaded off into practical Separatism, is still wrapped in some obscurity. 2 But tentative efforts within

2 See, however, The Presbyterian Movement in the reign of Queen Elizabeth, as illustrated by the Minute Book of the Dedham Classis, 1582-1589 (Camden Society, 3rd series, vol. viii., 1905).

parochial limits, by accustoming the more godly sort to feel an inner bond peculiar to themselves, prepared many for the congregational idea of the church, and on the other hand made them feel more than ever dissatisfied with the " mixed " services of the parish church. It seemed to them impossible that vital religion could be inculcated, unless there were other

guarantee for ministerial fitness than episcopal licensing, unless in fact the godly in each parish had a voice in deciding whether a man was called of God to minister the Word of God (see C. Burrage, The True Story of Robert Browne, pp. 7, n f.). But this implied the gathering of the earnest " professors " in each locality into a definite body, committed to the Gospel as their law of life. Such a " gathered church " emerges as the great desideratum with Robert Browne, between 1572, when he graduated at Cambridge, and 1580-1581, when he first defined his Separatist theory. It involved for him a definite " covenant " entered into by all members of the church, with God and with God's people, to abide by Christ's laws as ruling all their conduct, individually and collectively.

It has been debated how far Browne derived this idea from Dutch Anabaptists in Norwich and elsewhere. Doubtless the " covenant " idea was most characteristic of Anabaptists. But they connected it closely with adult baptism, whereas Browne enjoined baptism for the children of those already in covenant, and in no case taught re-baptism. Thus he evidently made " the willing covenant " of conscious faith the essence of the matter, and regarded the sign or seal as secondary. Considering, then, his other differences from Anabaptist theories, and the absence of any hint to the contrary in his own autobiographical references, " it is safe to affirm that he had no conscious indebtedness to the Anabaptists " (Williston Walker, Creeds and Platforms of Congreg., New York, 1893, p. 16). If he adopted ideas then in the air, whether of Anabaptist or other origin (see p. 706, footnote 1), he did so as seeing them in Scripture.

From Browne's idea of a holy people, covenanted to walk after Christ's mind and will, all else flowed, as is set forth in his Book which sheweth the life and manners of all true Christians. \s it may be called the primary classic of congregational theory, its leading principles must here be summarized. Hearing the word of God unto obedience being due to " the gift of His Spirit to His children," every church member is a spiritual person, with a measure of the spirit and office of King, Priest and Prophet, to be exercised directly under the supreme Headship of Christ. Thus mutual oversight and care are among the duties of the members of Christ's body; while their collective inspiration, enabling them to " try the gifts of godliness " of specially endowed fellow-members, is the divine warrant in election to church office. Thus the " authority and office " of " church governors " is not derived from the people, but from God, " by due consent and agreement of the church." Conference between sister churches for counsel is provided for; so that, while autonomous, they do not live as isolated units. Such were the leading features of Browne's Congregationalism, as a polity distinct from both Episcopacy and Prcsbyterianism. Any varieties in the con- gregational genus which emerge later on, keep within his general outlines. To this fact the very nickname "

Brownists," usually given to early " Separatists " by accident, but Congregationalists in essence, is itself witness.

" The kingdom of God was not to be begun by whole parishes, but rather of the worthiest, were they never so few." This sentence from Browne's spiritual autobiography contains the root of the whole matter, and explains the title of his other chief work, also of 1582, A Treatise of Reformation without tarrying for any, and of the wickedness of those Preachers which will not reform till the Magistrate command or compel them. Here he, first of known English writers, sets forth a doctrine which, while falling short of the Anabaptist theory that the civil ruler has no standing in the affairs of the Church, in that religion is a matter of the individual conscience before God, yet marks a certain advance upon current views. Magistrates " have not that authority over the church as to be . . . spiritual Kings . . . but only to rule the commonwealth in all outward justice. . . . And therefore also because the Church is in a commonwealth, it is of their charge; that is, concerning the outward provision and outward justice, they are to look to it.

But to compel religion, to plant churches by power, and to force a submission to ecclesiastical government by laws and penalties, belongeth not to them . . . neither yet to the Church " {Treatise, &c, p. 12). Here Browne distinguishes acceptance of the covenant relation with God (religion) and the forming or " planting " of churches on the basis of God's covenant (with its laws of government), from the enforcing of the covenant voluntarily accepted, whether by church-excommunication or by civil penalties — the latter only in cases of flagrant impiety, such as idolatry, blasphemy or Sabbath-breaking. In virtue of this distinction which implied that the nation was not actually in covenant with God, he taught a relative toleration. In this he was in advance even of most Separatists, who held with Barrow l " that the Prince ought to compel all their subjects to the hearing of God's Word in the public exercises of the church." As, however, the prince might approve a false type of Church, in spite of what they 2 both assumed to be the clear teaching of Scripture, and should so far be resisted, Browne and Barrow found themselves practically in the same attitude towards the prince's religious coercion. It was part of their higher allegiance to the King of kings.

Between 1580 and 1581, when Browne formed in Norwich the first known church of this order on definite scriptural theory, and October 1585, when, being convinced that the times w r ere not yet ripe for the realization of the perfect polity, and taking a more charitable view of the established Church, he yielded to the pressure brought to bear on him by his kinsman Lord Burghley, so far as partially to conform to parochial public worship as defined by law (see Browne, Robert), the history of Congregationalism is

mainly that of Browne and of his writings. Their effect was considerable, to judge from a royal proclamation against them and those of his friend Robert Harrison, issued in June 1583. But the repression of "sectaries" was now, and onwards until the end of the reign, so severe as to prevent much action on these lines. Still Sir Walter Raleigh's rhetorical estimate of " near 20,000 " Brownists existing in England in April 1 593, at least means something. We hear 3 of " Brownists " in London about 1585, while the London petitioners of 1592 refer to their fellows in " other gaols throughout the land "; and the True Confession of 1596 specifies Norwich, Gloucester, Bury St Edmunds, as well as " many other places of the land." But of organized churches we can trace none in England, until we come in 1586 to Greenwood and Barrow, the men whose devotion to a cause in which they felt the imperative call of God seems to have rallied into church-fellowship the Separatists in London, whether those of Fytz's day or those later convinced by the failure of the Puritan efforts at reform and by the writings of Browne. At what exact date this London church — which had a more or less continuous history down to and beyond 1624 — was actually formed, is open to doubt. It was only in September 1592 that it elected officers, viz. a pastor (Francis Johnson), a teacher (Greenwood), two deacons and two elders. Yet as Barrow held that a church could exist prior to its ministry, this settles nothing.

In 1589 Greenwood and Barrow composed " A true Description out of the Word of God of the visible Church," which represents the ideal entertained in their circle. It was practically identical with that set forth by Browne in 1582, though they were at pains to deny personal connexion with him whom they now regarded as an apostate. " The Brownist and the Barrowist go hand in hand together." So was it said in 1602; and there is no good ground (see Powicke, pp. 105 ff., 126 f.) for distin- guishing the theories of the two leaders as to the authority of

1 See F. J. Powicke, Henry Barrow (1900), pp. 128 f., for his views on the topic.

2 I.e. to all honest leaders in State, as well as in Church, as it waa in Israel when a king like Hezekiah restored the Covenant and theh set about enforcing obedience to it. The problem of interpretation of the Divine Will, especially in the case of the " papist " or tradi- tionalist, lay beyond their vision at the time. Hence their doctrine was not really one of freedom of conscience or toleration.

3 S. Bredwell, The Rasing of the Foundations of Brownisme (1588), p. 135. See also F. J. Powicke, " Lists of the Early Separatists," in Cong. Hist. Soc. Transactions, i. 146 ff.

elders. Both equally teach the supremacy of " the whole church " in all discipline, including that upon elders or officers generally, if need arise. Possibly Barrow laid more stress also on the orderly " rules of the Word " to be followed in all church actions, and so conveyed a rather different impression.

After the execution of Greenwood, Barrow and the ex-Puritan Penry (a recent recruit to Separatism), in the spring of 1593, it seemed to some that Separatism was " in effect extinguished." This was largely true for the time as regards England, thanks to the rigour of Archbishop Whitgift, aided by the new act which left deniers of the queen's power in ecclesiastical matters no option but to leave the realm. Even this hard fate the bulk of the London church was ready to endure. Gradually they resumed church-fellowship in ■" Amsterdam, where they chose the learned Henry Ainsworth (q.v.) as teacher, in place of Green- wood, but elected no new pastor, as they expected Francis Johnson (1 562-1618) soon to be released and to rejoin them. This he did at the end of 1597, after a vain attempt to find asylum under his country's flag 1 in Newfoundland. It was here and now that divergent ideals as to the powers of the eldership really emerged. Johnson, a man autocratic by nature, and leaning to his old Presbyterian ideals on the point, held that the church had no power to control its elders, once elected, in their exercise of discipline, much less to depose them; while Ainsworth, true to Barrow and the " old way " as he claimed, sided with those who made the church itself supreme throughout. The church divided on the issue; but neither section has further historical importance. Far otherwise was it with the church which was formed originally at Gainsborough (?i6o2), by " professors " trained under zealous Puritan clergy in the dis- trict where Nottinghamshire, Yorkshire and Lincolnshire meet, but which about 1606 reorganized itself for reasons of con- venience into two distinct churches, meeting at Gainsborough and in Scrooby Manor House. Ere long these were forced to seek refuge, in 1607 and 1608 respectively, at Amsterdam, whence the Scrooby church moved to Leiden in 1609 (Bradford's History of Plymouth Plantation, chs. 1-3). The permanent issues of the Gainsborough-Amsterdam church are connected with the origins of the Baptist wing of Congregationalism, through John Smyth and Thomas Helwys. As for the Scrooby-Leiden church under John Robinson {q.v.), it was in a sense the direct parent of historical " Congregationalism " alike in England and America (see below, section American).

Separatism was now passing into Congregationalism, 2 both in sentiment

and in language. The emphasis changes from protest to calm exposition. In the freer atmosphere of Holland the exiles lose the antithetical attitude, with its narrowing and exaggerative tendency, and gain breadth and balance in the assertion of their distinctive testimony. This comes out in the writings both of Robinson and of Henry Jacob, both of whom passed gradually from Puritanism to Separatism at a time when the silencing of some 300 Puritan clergy by the Canons of 1604, and the exercise of the royal supremacy under Archbishop Bancroft, brought these " brethren of the Second Separation " into closer relations with the earlier Separatists. In a work of 1610, the sequel to his Divine Beginning and Institution of Christ's true Visible and Ministerial Church, Jacob describes " an entire and independent 3 body-politic," "endued with power immediately under and from Christ, as every proper church is and ought to be." But his claim for " independent " churches no longer denies that true Christianity exists within parish assemblies. Similarly Robinson wrote about 1620 a Treatise of the Lawfulness of hearing of the Ministers of the Church of England which shows a larger catholicity of feeling than his

1 So the Amsterdam church petitioned James, on his accession, to allow them to live in their native land on the same terms as French and Dutch churches on English soil (see Walker, op. cit. 75 foil.).

2 The abstract term dates only from the 18th century. But ". congregational " (due to the rendering of ecclesia by " congrega- tion " in early English Bibles) appears about 1642, to judge from the New English Dictionary.

3 " Independent " is not yet used technically, as it came to be about 1640.

earlier Justification of Separation (1 6 1 o) . These semi-separatists still set great store by the church-covenant, in which they bound themselves " to walk together in all God's ways and ordinances, according as He had already revealed, or should further make them known to them." But they realized that " the Lord had more truth and light yet to break forth of his Holy Word "; and this gave them an open-minded and tolerant spirit, which continued to mark the church in Plymouth Colony, as distinct from the Puritans of Massachusetts Bay. Such, then, was the type of church formed in 16 1 6 by Henry Jacob in London. It was founded under the tolerant Archbishop George Abbot (1562- 1633), and would have been content with toleration such as the French and Dutch churches in England enjoyed. But Charles I. and Archbishop Laud would make no terms with deniers of royal supremacy in religion, and in 1632 this church was persecuted.

Besides such regular churches in London and the provinces under the early

Stuarts, there were also numerous "conventicles" composed of very humble folk, such as the eleven about London which Bishop Joseph Hall (1574-1656) reports in 1631, and which he. states in 1640 had grown to some eighty. In these latter the earlier Brownist or even Anabaptist spirit probably prevailed. Further there was arising a new type of " Independent," to use the term now coming into use. Conjoint repression of civil and religious liberty had made thoughtful men ponder matters of church polity. The majority, indeed, even of determined opponents of personal rule in state and church favoured Presbyterianism, particularly before 1641, when Henry Burton's Protestation Protested brought before educated men generally the principles of Congregationalism, as distinct from Puritanism, by applying them to a matter of practical politics. But besides this telling pamphlet and the controversy which ensued, the experience of New England as to the practicability of Congregationalism, at least in that modified form known as the " New England Way," produced a growing impression, especially on parliament. Hence even before the Westminster Assembly met in July 1643, Independ- ency could reckon among its friends men of distinction in the state, like Cromwell, Sir Harry Vane, Lord Saye and Sele; while Milton powerfully pleaded the power of Truth to take care of herself on equal terms. In the Assembly, too, its champions were fit, if few. They included Thomas Goodwin and Philip Nye, who had practised this polity during exile abroad and now strove to avert the substitution of Presbyterian uniformity for the Episcopacy which, as the ally of absolutism, had alienated its own children (see Presbyterianism). Yet the " Five Dissenting Brethren " would have failed to secure toleration even for themselves as Congregationalists — such was the dread felt by the assembly for Anabaptists, Antinomians, and other " sec- taries " — had it not been for the vaguer, but widespread Inde- pendency existing in parliament and in the army. Here, then, we meet with a distinction (cf. Dale, p. 374 ff.) of moment for the Commonwealth era, between " Independency " as a principle and " Congregationalism " as an ideal of church polity. Independency, like Nonconformity, is primarily a negative term, " It simply affirms the right of any society of private persons to meet together for worship . . . without being interfered with 4 by any external authority." Such a right may be asserted on other theories than the congregational or even the Christian. Congregationalism, however, " denotes a positive theory of the organization and powers of Christian churches," having as corollary independency of external control, whether civil or ecclesiastical. " Historically the two terms have been used interchangeably " during the last two hundred years. But under the Commonwealth many professed the one without fully accepting the other.

During the Civil War Congregationalism broadened out into re- ciprocal relations with the national life and history. Thenceforth

4 The opposite of this external Independency, admission of civil oversight even for churches enjoying internal ecclesiastical self- government, was also common, being the outcome of the traditional Puritan attitude to the state. See A. Mackennal, The Evolution of Congregationalism (1901), pp. 43 ff.

it involves not only the story of Nonconformity and the growth of religious liberty, but also the whole development of modern England. To sketch even in outline " The Evolution of Congregationalism " in correspondence with so complex an environment is here impossible. Only salient points can be indicated.

During the Protectorate, with its practical establishment of Presbyterians, Independents and Baptists, the position of Congregationalism was really anomalous, in so far as any of its pastors became parish ministers, 1 and so received " public maintenance " and were expected to administer the sacraments to all and sundry. But the Restoration soon changed matters, and by forcing Presbyterians and Congregationalists alike into Nonconformity, placed the former, instead of the latter, in the anomalous position. In practice they became Independents, after trying in some cases to create voluntary presbyteries, like Baxter's Associations,' adopted partially in 1653-1660, in spite of repressive legislation. But though Presbyterians did not in many instances become Congregationalists also, until a later date, the two types of Puritanism were drawn closer together in the half-century after 1662. The approximation was mutual. Both had given up the strict jure divino theory of their polity as apostolic. The Congregationalism of the Savoy Declaration (Oct. 12, 1658), agreed on by representatives — the majority non-ministerial — from 120 churches, is one tempered by ex- perience gained in Holland and New England, as well as in the Westminster Assembly. Hence when, after the Toleration Act of 1689, a serious attempt was made to draw the two types together on the basis of Heads of Agreement assented to by the United Ministers in and about London, formerly called Presbyterian and Congregational, the basis partook of both (much after the fashion of the New England Way), though on the whole it favoured Congregationalism (see Dale, pp. 474 ff.). In many trust-deeds of this date (which did not contain doctrinal clauses), and for long after, the phrase " Presbyterian or Independent " occurs. Yet the two gradually drifted apart again owing to doctrinal differences, emerging first on the Calvinistic doctrine of grace, such as broke up the joint " Merchants' Lecture " started in 1672 in Pinners' Hall, and next on Christology. In both cases the Congregationalists took the " high," the Presbyterians the " moderate " view. These specific differences revealed

different religious tendencies, 2 the one type being more warmly Evangelical, the other more " rational " and congenial in temper with 18th-century Deism. The theological division was accentu- ated by the Salters' Hall Controversy (171 7-1 719), which, nominally touching religious liberty versus subscription, really involved differences as to Trinitarian doctrine. Ere long Arianism and Socinianism were general among English Presby- terians (see UniTarianism). Congregationalists, on the other hand, whether Independents or Baptists, remained on the whole Trinitarians, largely perhaps in virtue of their very polity, with its intimate relation between the piety of the people and that of the ministry. Yet the relation of Congregational polity to its religious ideal had already become less intimate and conscious than even half a century before: the system was held simply as one traditionally associated with a serious and unworldly piety. " Church privileges " meant to many only the sacred duty of electing their own ministry and a formal right of veto on the proposals of pastor and deacons. The fusion into one office of the functions of " elders " and " deacons " (still distinguished in the Savoy Declaration of 1658) was partly at least a symptom of the decay of the church-idea in its original fulness, a decay itself connected with the general decline in spiritual intensity which marked 18th-century religion, after the overstrain of the preceding age. Yet long before the Evangelical Revival proper,

1 For the distinction between " Gathered " and " Re-formed " churches in this connexion, see Dale, p. 376.

2 A parallel is afforded by the history of Congregationalism in Scotland, which arose early in the 19th century through the evan- gelistic fervour of the Haldanes in an era of " moderatism "; also by the rise of the kindred Evangelical Union, shortly before the Disruption in 1843. These two movements coalesced in a single Congregational Union in 1897.

partial revivals of a warmer piety occurred in certain circles; and among the Independents in particular the new type of hymnody initiated by Isaac Watts (1707) helped not a little.

The Methodist movement touched all existing types of English religion, but none more than Congregationalism. While the " rational " Presbyterians were repelled by it as " enthusiasm," the Independents had sufficient in common with its spirit to assimilate — after some distrust of its special ways and doctrines — its passion of Christlike pity for " those out of the way," and so to take their share in the wider evangelization of the people and the Christian philanthropy which flowed from the new inspira- tion. For underneath obvious differences, like the Arminian theology of the Wesleys and the Presbyterian type of their organization, there was latent affinity between a " methodist society " and the original congregational

idea of a church; and in practice Methodism, outside the actual control of the Wesleys, in various ways worked out into Congregationalism (see Mackennal, op. cit. pp. 156 ff., Dale, pp. 583 ff.). So was it in the long run with the Countess of Huntingdon's Connexion, springing from Whitefield's Calvinistic wing of the Revival, not to mention the congregational strain in some minor Methodist churches.

But whilst Congregationalism grew thereby in numbers and in a sense of mission to all sorts and conditions of men — lack of which was one of the disabilities 3 due in part to its sectarian position before the law (see Mackennal, pp. 142 ff.) — it modified not only its Calvinism but also its old church ideal 4 in the process. During most of the next century it inclined to an individualism untempered by a sense of mystic union with God and in Him with all men (see Dale, pp. 387 ff., for an estimate of these and other changes) . It lost, however, its exclusive spirit. Its pulpit, which had always been the centre of power in the churches, has for a century or more taken a wider range of influence in a succession of notable preachers. Congregationalists generally have been to the fore in attempts to apply Christian principles to matters of social, municipal, national and international importance. They have been steady friends of foreign missions in the most catholic form (supporting the London Missionary Society, founded in 1795 on an inter-denominational basis), of temperance, popular education and international peace. Their weakness as a denomination has lain latterly in their very catholicity of sympathy. Thus it was left to the Oxford Revival, with its emphasis on certain aspects of the Church idea, to help to re-awaken in many Congregationalists a due feeling for specific church-fellowship, which was the main passion with their forefathers. Another influence making in the same direc- tion, but in a different spirit, was the Broad Church ideal represented in various forms by Thomas Erskine of Linlathen, F. W. Robertson of Brighton and F. D. Maurice. In the last of these the conception of Christ's Headship of the human race assumed a specially inspiring form. This conception, in a more definitely Biblical and Christian shape, attained forcible expres- sion in the writings of R. W. Dale of Birmingham, the most influential Congregationalist in the closing decades of the 19th century, in whom lived afresh the high Congregationalism of the early Separatists.

Modern Congregationalism, as highly sensitive to the Zeitgeist and its solvent influence on dogma, shared for a time the critical and negative attitude produced by the first impact of a culture determined by the conception of development as applying to the whole realm of experience. But it has largely outgrown this, and is addressing itself to the progressive re-interpretation of Christianity, in an essentially constructive spirit. Similarly its ecclesiastical statesmen have been developing the full possi- bilities of its polity, to suit the demands of the time for co- ordinated effort.

While its principle of congregational autonomy has been gaining ground in the more centralized systems,

3 Another disability, acutely felt by all Nonconformists, created by the act of 1662, viz. exclusion from the national centres of education, they strove earnestly to remedy by their academies, the story of which is sketched by Dale, pp. 499 ff., 559-561.

4 The modern use of the term ” chapel ” seems to date only from Methodism (Mackennal, p. 165).

whether Episcopal or Presbyterian, its own latent capacity for co-operation has been evoked by actual needs to a degree never before realized in England. Association for mutual help and counsel, contemplated in some degree in the early days, from Browne to the Savoy Declaration of 1658, but thereafter forced into abeyance, began early in the 19th century to find expression in County Unions on a voluntary basis, especially for promoting home missionary work. These in turn led on to the Congregational Union of England and Wales, formed in 1832, and consisting at first of ” County and District Associa- tions, together with any ministers and churches of the Congrega- tional Order recognized by an Association.” Later it was found that an assembly so constituted combined the incompatible functions of a council for the transaction of business and a congress for shaping or expressing common opinion: and its constitution was modified so as to secure the latter object only. But after half a century’s further experience, public opinion, stimulated by growing need for common action in relation to certain practical problems of home and foreign work, proved ripe for the realization of the earlier idea in its double form. In 1904 the Union was again modified so as to embrace (1) a council of 300, representative of the county associations, to direct the business for which the Union as such is responsible, and (2) a more popular assembly, made up of the council and a large number of direct representatives of the associated churches. Association, however, remains as before voluntary, and some churches are outside the Union; nor has a resolution of the assembly more than moral authority for any of the constituent churches. As regards the ” Declaration of Faith, Church Order and Discipline ” adopted in 1833, and still printed in the official Year Book ” for general information ” as to ” what is commonly believed ” by members of the Union, what is characteristic is the attitude taken in the preliminary notes to ” creeds and articles of religion.” These are disallowed as a bond of union or test of communion, much as in the Savoy Declaration of 1658 it is said that constraint ” causeth them to

degenerate from the name and nature of Confessions," " into Exactions and Impositions of Faith."

Among topics which have exercised the collective mind of modern Congregationalism, and still exercise it, are church-aid and home missions, church extension in the colonies, the con- ditions of entry into the ministry and sustentation therein, Sunday school work, the social and economic condition of the people (issuing in social settlements and institutional churches), and, last but not least, foreign missions. Indeed the support of the London Missionary Society has come to devolve almost wholly on Congregationalists, a responsibility recognized by the Union in 1889 and again in 1904. To afford a home for the centralized activities of the Union, the Memorial Hall, Farringdon Street, London, was built on the site of the Fleet prison — soil consecrated by sacrifice for conscience under Elizabeth — and opened in 1875. There the Congregational Library, founded a generation before, is housed, as well as a publication department. A congregational hymn-book (including Watts' collection) was issued by the Union in 1836, and again in fresh forms in 1859, 1873 and 1887.

The theological colleges which train for the Congregational ministry have themselves an interesting history, going back to the private " academies " formed by ejected ministers. They underwent great extension owing to the Evangelical Revival, and became largely centres of evangelistic activity (Dale, p. 593 if.). But they were burdened by the necessity of supplying literary as well as theological training, owing to the disabilities of Non-conformists at Oxford and Cambridge till 1871. Even before that, however, owing partly to the impulse given by the university of London after 1836, the standard of learning in some of the colleges had been rising; and the last generation has seen marked advance in this respect. In 1886 Spring Hill College, Birming- ham, was transplanted to Oxford, where it was refounded under the title of Mansfield College, purely for the post-graduate study of theology (first principal, Dr. A M. Fairbairn) ; in 1905 Cheshunt College, founded by the countess of Huntingdon, was transferred

to Cambridge, to enjoy university teaching; whilst the creation of the university of Wales, the reconstitution of London Uni- versity, and the creation of Manchester University, led, between 1900 and 1905, to the affiliation to them of one or more of the other colleges. Indeed in all cases the students are now in some sort of touch with a university or university college. There are eight colleges in England, viz., besides Mansfield and Cheshunt, New and Hackney Colleges, London; Western College, Bristol; Yorkshire United College, Bradford; Lancashire Independent College, Manchester; the Congregational Institute, Nottingham. In Wales there are three (one partly Presbyterian), in Scotland one, and in the colonies three. The students number over 400.

Congregational statistics are very uncertain before 1832, when the Union began to make such matters its concern. About 1716 Daniel Neal knew of 1107 dissenting congregations,- 860 Presbyterian or Independent (of which perhaps 350 were Inde- pendent), and 247 Baptist. During the 18th century, though the Independents increased at the expense of the Presbyterians, it is doubtful whether they kept pace with the increase of popula- tion, until the Evangelical Revival. In 1832 they reckoned some 800 churches, the Baptists 532. In 1907 the figures were, for Great Britain 1 as a whole: Churches, branch churches and mission stations, 4928; sittings, 1,801,447; church members, 498,953; Sunday school scholars, 729,347, with 69,575 teachers; ministers (with or without pastoral charge), 3197, together with 299 evangelists and lay pastors; lay preachers, 5603. In other parts of the British empire there are some 1045 churches and mission stations (many native), South Africa, 385; Australia, 311, and Tasmania, 49; British North America, 151; British Guiana, 50, and Jamaica, 48; New Zealand, 35; India, 15; Hongkong, 1. There are also congregational churches in Austria, Bulgaria, Holland, Norway, Portugal, Spain, Sweden and in Japan (93). Apart from these, however, and some 150,000 communicants in its foreign missions, British and American " Congregationalism " reckons more than a million and a quarter church members; while, including those known as Baptists (q.v.), the total amounts to several millions more.

The Union of 1832 led indirectly to two further developments. In the first place it fostered the growth of Congregationalism in British colonies. Beginnings had already been made — partly by help of the London Missionary Society — in British North America (from New England), South Africa, Australia and British Guiana. But in 1836 a Colonial Missionary Society was founded in connexion with the Union. Secondly, a medium now existed for drawing closer the bonds between English and American Congregationalists. This gradually led to the idea of " An Ecumenical Council of Congregational Churches," broached in 1874, and first realized in 1891, in the London International Council under the presidency of Dr R. W. Dale (q.v.). The second council met in Boston in 1899, and the third in Edinburgh in 1908. Their proceedings were issued in full, and the institu- tion promised to take a permanent place in Congregationalism.

Bibliography. — The literature bearing on the subject is given with some fulness in the appendix to R. W. Dale's History of English Congregationalism (1907), the most authoritative work at present available. For the ancient church the data are collected in T. M. Lindsay's The Church and the Ministry in the early Centuries (1902), and in papers by the present writer in the Contemp. Review for July 1897 and April 1902. For the modern period in particular see H. M. Dexter's

Congregationalism of the Last Three Hundred Years, as seen in its Literature (New York, 1880), supplemented by biblio- graphies in the first vols, of the Congregational Historical Society's Transactions (1901-), themselves a growing store of fresh materials. Of the older histories Waddington's Congregational History in 5 vols. (1 869-1 880) contains abundant data; while for more detailed study reference may be made to various county histories, such as T. Coleman, Independent Churches of Northampton- shire (1853), T. W. Davids, Annals of Evangelical Nonconformity in Essex (1863), R. Halley, Lancashire, its Puritanism and, Noncon- formity (1869) ; G. H. Pike, Ancient Meeting-Houses in London (1870) ; J. Browne, History of Cong, in Norfolk and Suffolk (1877) ; W. Urwick, Nonconformity in Hertfordshire (1884); W. Densham and

1 In Ireland the oldest existing Congregational church (at Cork) dates from 1760; but most belong to the 19th century. There are now 41 churches, attended by about 10,000 persons. The Channel Islands have 12 churches, the oldest founded in 1803.

J. Ogle, Congr. Churches of Dorset (1899) ; W. H. Summers, History gf the Berks, S. Bucks, and S. Oxon. Cong. Churches (1905) ; and F. J. Powicke, History of the Cheshire Cong. Union, 1806-1906. The Victorian County Histories (Constable) may also be consulted. Im- portant documents for Congregational Faith and Order, with historical introductions, are printed in Williston Walker's Creeds and Platforms of Congregationalism (New York, 1893). A classic exposition of Congregational theory is contained in R. W. Dale's Manual of Cong. Principles (1884). (J. V. B.)

In America. — The history of American Congregationalism during its early years is practically that of the origin of New England. It may be said to begin with the arrival in 1620 of a small company including William Brewster, elder of the refugee church in Leiden, which founded Plymouth in the modern Massachusetts in the winter of that year. Strictly speaking the members of this colony were Separatists, i.e. they belonged to that small body of British Independents who " separated " from the state church under the leadership of Richard Clifton or Clyfton (d. 1616), rector of Babworth, and Brewster, a layman of Scrooby in Nottinghamshire. By the end of ten years the Plymouth colony numbered about 300. About 1628 the religious troubles in England led to the emigration of a large number of Puritans; the colony of Massachusetts Bay was founded in 1628-1630 bysettlers led by John Endecott and John Winthrop, and a church on congregational lines was founded at Salem in 1629, and another soon

afterwards at Boston, which became the centre of the colony. The similarity between the two colonies led to a close relationship, and considerable reinforce- ments continued to arrive until 1640. Certain differences in opinion on franchise questions led to the founding of the colony of Connecticut in 1 634-1 636 by settlers led by Thomas Hooker (d. 1647), John Haynes (d. 1654), and others, and the colony of New Haven was founded in 1638 by a small company under John Davenport (1597-1670) and Theophilus Eaton (d. 1658). In 1643 these four congregational colonies formed a confederacy with a view to their common safety.

It has been calculated that in the period 16 20-1 640 upwards of 22,000 Puritan emigrants (the figures have been placed as high as 50,000) sailed from British and Dutch ports. The reasons that compelled their departure determined their quality; they were all men of rigorous consciences, who loved their fatherland much, but religion more, driven from home not by mercantile necessities or ambitions, but solely by their determination to be free to worship God. They were, as Milton said, " faithful and freeborn Englishmen and good Christians constrained to forsake their dearest home, their friends, and kindred, whom nothing but the wide ocean and the savage deserts of America could hide and shelter from the fury of the bishops." Men so moved so to act could hardly be commonplace; and so among them we find characters strong and marked, with equal ability to rule and to obey, as William Bradford (1590-1657) and Brewster, Edward Winslow (1595-1655) and Miles Standish (1584-1656), John Winthrop (1588-1649) and Dr Samuel P'uller, and men so inflexible in their love of liberty and faith in man as Roger Williams and young Harry Vane. As were the people so were their ministers. Of these it is enough to name John Cotton, able both as a divine and as a statesman, potent in England by his expositions and apologies of the "New England way," potent in America for his organizing and administrative power; Thomas Hooker, famed as an exponent and apologist of the " New England way"; John Eliot, famous as the "apostle of the Indians," first of Protestant missionaries to the heathen; Richard Mather, whose influence and work were carried on by his distinguished son, and his still more distinguished grandson, Cotton Mather. The motives and circumstances of the emigrants determined their polity; they went out as churches and settled as church states. They were all Puritans, but not all Independ- ents — indeed, at first only the men from Leiden were, and they were throughout more enlightened and tolerant than the men of the other settlements. Winthrop's company were noncon- formists but not separatists, esteemed it "an honour to call the Church of England, from whence we rise, our dear mother," emigrated that they might be divided from her corruptions, not from herself. But the new conditions, backed by the special

influence of the Plymouth settlement, were too much for them; they became

Independent, — first, perhaps, of necessity, then of conviction and choice. Only so could they guard their ecclesi- astical and their civil liberties. These, indeed, were at first formally as well as really identical. In 1631 the general court of the Massachusetts colony resolved, " that no man shall be admitted to the freedom of this body politic, but such as are members of some of the churches within the limits of the same."

This lasted till 1 664. In New Haven the same system prevailed from 1639 till 1665. Church and State, citizenship in the one and membership in the other, thus became identical, and the foundation was laid for those troubles and consequent severities that vexed and shamed the early history of Independency in New England, natural enough when all their circumstances are fairly considered, indefensible when we regard their idea of the relation of the civil power to the conscience and religion, but explicable when their church idea alone is regarded. And this latter was their own standpoint; their acts were more acts of church discipline than those of civil penalty.

The years following the settlement of the four colonies were occupied in the solution of problems in church and civil govern- ment and in the preparation for the proper training of ministers. The relation between membership of the church and membership of the civic community has been mentioned. The principal problem which divided the settlers was that known as the " Half Way Covenant," which concerned the status of the children of original church members. The difficulty was that, according to the principles held by the founders of the churches, the admission to membership of a parent involved a similar status in the case of his children; on the other hand, no adult could be admitted unless the church as a whole was convinced that he was a man of proved Christian character. A compromise was arrived at by two assemblies, the first a convention of ministers held at Boston in 1657, the second a general synod of the churches of Massachusetts in 1662. As a result of these assemblies it was decided that those who had become members in childhood simply by virtue of their parents' status could not subsequently join in the celebration of the Lord's Supper nor record votes on ecclesiastical issues, unless they should approve themselves fit; they might, however, in their turn bring their children to baptism and hand on to them the degree of membership which they themselves had received from their own parents. This classification of the members into those who were in full com- munion and those who belonged only to the " Half Way Cove- nant " was vigorously attacked by Jonathan Edwards, but it was not abolished until the early years of the 19th century.

Of far greater importance not only to Congregationalism but also to the future of the American colonies was the care taken by the settlers to

provide adequate training for their ministers. As early as 1636 they founded Harvard College, and in 1701 Yale College was established. The emphasis laid by the Congre- gationalists on this branch of their work has been characteristic of their successors both in America and in Great Britain.

Ten years after the foundation of Harvard, missionary work among the Indians was undertaken by John Eliot and Thomas May hew. Eliot produced his Indian translation of the Scriptures in 1 66 1- 1 663, and by about 1675 there were six Indian churches with some 4000 converts.

The enthusiasm which thus marked the early years of American Congregationalists rapidly cooled from one generation to another. It was not until 1734 that a new outburst of zeal was aroused by the "revivalist" work of Jonathan Edwards, followed in 1740- 1742 by George Whitefield. This wave of enthusiasm spread from Northampton, Mass., till it swept New England. Un- fortunately, however, the solid work achieved was accompanied by much superficial excitement among emotional persons for whom the so-called " Great Awakening " was merely a pass- ing sensation. Moreover there was considerable controversy between the " Old Lights," who regarded the " revival " as positively pernicious, and the "New Lights," who approved it. Partly owing to its own faults and partly owing to the stress ol political excitement which followed it, the Edwardean revival

was followed by nearly half a century of lethargy, during which the chief interest centred in the gradual growth of doctrinal controversy. Two new theological schools began to emerge from the old Calvinistic theology of the early settlers. The first owed its origin to Jonathan Edwards (the elder) and was carried on by Samuel Hopkins (1721-1803), Joseph Bellamy (1710-1790), Nathaniel Emmons (1745-1840), Jonathan Edwards (the younger) and Timothy Dwight (1752-1817). This system of thought, known as the "New England Theology," rapidly became predominant, and by the beginning of the 19th century was generally adopted. An equally important school, though numerically smaller, came into existence in eastern Massachusetts under the leadership of Charles Chauncy (1592-1672) and Jonathan Mayhew (1720-1766). During the events which led up to the Declaration of Independence this school, known as the "Liberal" school, was not prominent though the number of its adherents steadily grew. Subsequently, however, largely owing to the activity of men like William Ellery Channing, it acquired great importance. As early as 1805 it was recognized as predominant in Harvard College, and in 181 5 it had become

a distinct denomination under the new title "Unitarian" (see Unitarianism).

When the excitement caused by the Revolution had subsided, Congregationalism entered upon a new period of energy. From 1 791 onwards revival work again became prominent with results which far surpassed those of the Edwardean period. The number of church members steadily increased, and activities of wider and more lasting importance were undertaken. The loss of Harvard College compelled the provision of new seminaries, and missionary work both home and foreign was vigorously carried on. The following are the seminaries founded since 1800: Andover (1808), Bangor (1816), Hartford (1834), the theological school of Oberlin College (1835), Chicago (1858), Pacific (1869; now at Berkeley, Cal.), and Atlanta (Georgia), 1901. In 1822 a special theological department was organized at Yale. Up to 18 10 missionary work had been carried on at home by several local societies, but in that year the American Board of Commissioners for Foreign Missions was organized. Other societies undertook various departments of work at home : the Congregational Education Society, for assisting candidates for the ministry (1815); the American Missionary Association (1846), founded by the anti-slavery party for the conversion of the negroes, which subsequently devoted its energies to work among the Indians of the west, the negroes of the south, the Chinese of the west coast and the Eskimo in Alaska; to aid in the building of churches and mission rooms the American Congregational Union was formed in 1853 (now called the Con- gregational Church Building Society). To these last societies is largely due the growth of the Congregational body in the west. In the early days of this expansion Congregationalism and Presbyterianism worked hand in hand, but the so-called "Plan of Union" (1801) was successively abandoned by the Conserva- tive Presbyterians in 1837 and by the Congregationalists through the "Albany Convention" in 1852. It was this decision which for the first time gave to Congregationalists a true feeling of denominational unity (see below).

The 19th century was a period of considerable progress for the Congregational body, and on the whole the same may be said for the first seven years of the 20th century. On the other hand, the numerical increase had not kept pace with the increase of population. The English Congregational Year Book for 1908 said, in reference to the United States: "In spite of phenomenal increase of population Congregationalism in the states, as here in London, is only marking time. If other sister churches were reporting progress, or were simply keeping abreast of the popula- tion, these facts would not be so ominous as they undoubtedly are. But we hear no good news of that kind, and gather small comfort from the mere fact that Congregational churches are holding their own as well as any of their neighbours." It must, therefore, be admitted that the great expansion which

marked the first half of the 19th century has not been proportionately maintained. None the less, Congregationalism has through its

leading representatives taken an increasingly important part in theological controversy and scholarship generally. Among the followers of Jonathan Edwards the more prominent have been N. W. Taylor (Yale) and Edwards A. Park (Andover). A new statement of the doctrine of the Atonement, proposed by Horace Bushnell (1802-1876) about 1830, provoked great controversy, but during the later years of the 19th century was widely accepted under the title of the "New Theology." It has not, however, caused a serious division within the denomination. i

Congregationalism in America has thus spread from New ". England, its primitive home, over the West to the Pacific, – but has never had more than a slight foothold in the Southern states. The remarkable junction or fusion of the Independents or "Separatists" who emigrated from Leiden to Plymouth, Massachusetts, with the Puritan Nonconformists of Massachusetts Bay, modified Independency by the introduction of positive fraternal relations among the churches. This gave rise to Congregationalism in the more proper sense of the term. Beyond the limits of New England the progress of the denomination as such was, as we have seen, a good deal hindered for a long period by the willingness of New Englanders going West either to join the Presbyterians, with whom they were substantially agreed in doctrine, or to combine with them in a mixed scheme of policy in which the Presbyterian element was uppermost. It was not until about 1850 that American Congregationalists began to draw more closely together, and to propagate in the Western states and territories their own distinctive policy. Meanwhile, without giving up the main principle of the autonomy of the local church, they have developed in various ways an active disposition to co-operate as a united religious body. This tendency to denominational union is manifest partly in the work of the various educational and missionary societies which have been enumerated, but more strikingly in the institution of the National Council, which is convened at intervals of three years, and is composed of ministers and lay delegates representing the churches. The council, like the minor advisory councils which have been from early times called together for the guidance of particular churches on occasions of special difficulty, is each time dissolved at its adjournment. It is possessed of no authority. Its function is to deliberate on subjects of common concern to the entire denomination, and to publish such opinions and counsels as a majority may see fit to send forth to the churches. The first of the National Councils (held at Boston in 1865) issued a brief statement of doctrine (the " Burial Hill Declara- tion"), descriptive of the religious tenets generally accepted by the denomination. Later (1883) a large committee, previously appointed, framed a more full confession of faith (the " Com- mission Creed "), with the same end in view. Of course

neither of these creeds was in the least binding upon ministers or upon churches, except so far as in each instance they might be volun- tarily adopted. The movement in the direction of union has been still further promoted by the International Councils referred to above (section on British Congregationalism ad fin.), in which the American Congregationalists have met the representatives of their brethren in Great Britain and its colonies having the same faith and polity. In the different states, conferences, composed likewise of representatives of the several churches and their pastors, have sprung up. These meet at stated intervals for the consideration of practical subjects of moment, and for the promotion of a religious spirit. There is a tendency, moreover, to accord to the conferences the function of determining the tests of ministerial standing in the Congregational denomination. In some of the states the licensing of preachers, which was formerly left to the voluntary associations of ministers in the different localities, has been made a function of the state con- ferences. At the very first, in New England, the theory was held that a minister, on ceasing to be the pastor of a particular church, falls into the rank of laymen. But the view was very soon adopted, and since has universally prevailed, that a minister in such cases still retains his clerical character. In later times the measure of authority conceded to a pastor as the shepherd of a flock has been much diminished in consequence of the gradual

development of democratic feeling in both minister and congre- gation. This loss of clerical prestige has been due in no small degree to the increasing habit of dispensing with a form of installation, and of substituting for a permanent pastorate, instituted with the advice and consent of a council, an engage- ment to serve as a minister for a fixed term of one or more years. Under k this custom of " stated supplies " ordination may be granted to those whose ministry in a particular church is made and dissolved by no other process than a mutual agreement. The Congregational churches, as distinct from the churches retaining the same polity, but separated by the adoption of Unitarian opinions, have in times past professed to be Calvinists of stricter or more moderate types. But as [early as 1865, Arminians were welcomed to Congregational fellowship. In the last few decades, with the spread in the community of innova- tions in doctrinal and critical opinions, a wider diversity of belief has come to prevail, so that " Evangelical," in the popular sense of the term, rather than " Calvinistic," is the epithet more suit- able to American Congregational preachers and churches.

The Year-Book for 1907 reported the total number of communi- cants in all the states at 708,913 (in 1857, 224,732) ; Sunday-school scholars, 679,044 (in 1857, 195,572); churches, 5989 (in 1857, 2 35°) I ministers, 5972 (in 1857, 2315); the amount of benevolent contri- butions by the churches as $2,591,693, in addition to a total home expenditure of $8,986,727. In the theological seminaries there were 417 students in 1907-1908, as compared with a maximum of 596 in 1891-1892, and a minimum of 181 in 1864ˆ-1865. The American Board of Commissioners for Foreign Missions reported for the year ending August 31, 1907: 579 missionaries and 4135 native workers; 580 churches with 68,000 communicants and 65,000 scholars.

See Williston Walker, History of the Congregational Churches in the United States (1894); A. Dunning, The National Council Digest (Boston, 1906).

CONGRESS (Lat. congressus, coming together, from congredi; cum, with, and gradus, step), in diplomacy, a solemn assembly of sovereigns or their plenipotentiaries met together for the purpose of definitely settling international questions of common interest. In this political connotation the word first came into use in the 17th century; an isolated instance occurs in 1636, when it was applied to the meeting of delegates summoned by the pope to Cologne, to attempt to put an end to the Thirty Years' War. In 1647 the meetings of delegates for the conclusion of peace, assembled at Osnabriick and Munster, were termed a congress; and in spite of objections to it on the ground that it was "coarse and inappropriate," based on the physiological sense of the word, it continued thenceforward in use.

The adoption of the name Congress for the national legislative body in the United States (and so for other American countries) was simply a development from this usage, for the " Continental Congresses " of 1774 and 1775-1781, and the "Congress of the Confederation" (1781-1788), were, as inter-state representative deliberative bodies, analogous to international congresses, and the Congress of 1789 onwards ultimately consists of representa- tives of the sovereign states composing the Union; this body is, however, dealt with under United States : Political Institutions. The more general analogous use of the term (Church Congress, &c.) is of modern origin.

In its international sense the term " congress " is only applied to gatherings of first-class importance, attended either by the sovereigns themselves or by their secretaries of state for foreign affairs; less important meetings, e.g. either in preparation for a congress or for the settlement of a particular question, are usually termed "conferences." The dividing line between the congress and the conference is, however, historically ill-defined; and though a congress of the first importance, e.g. that of Vienna (1814-1815), is

never otherwise described, the two terms have often been used indifferently in official diplomatic correspondence even of such dignified assemblages as the meetings of sovereigns and statesmen at Aix-la-Chapelle (1818), Troppau (1820) and Laibach (1821). The individual sessions of a congress are also sometimes called conferences.

The results of the work done at various international congresses in developing a sense of the common interests of nations are dealt with under International Law and its allied articles.

The more important congresses, e.g. Munster and Osnabriick (Westphalia) in 1648; Breda, 1667; Aix-la-Chapelle, 1668, 1748, 1818; Nijmwegen, 1678; Regensburg, 1682; Ryswick, 1697; Utrecht, 1713; Tetschen, 1779; Paris, 1782, 1814, 1815, 1856; Rastadt, 1794; Amiens, 1802; Chatillon, 1814; Vienna, 1814-1815; Troppau, 1820; Laibach, 1821; Verona, 1822; Berlin, 1878, are treated under their topographical .headings. The present article is concerned only with the questions of constitution and procedure.

Convocation and constituent Elements of a Congress. — Any sovereign Power has the right to issue invitations to a congress or conference. In principle, moreover, every state directly concerned in the matters to be discussed has the right to be represented. But this principle, though affirmed by the Powers at Aix-la-Chapelle in 1818, has rarely been translated into practice. At the congress of Vienna (1814-1815), the decisions of which affected every state in Europe, a committee of the five great Powers claimed and exercised the right to settle every- thing of importance; and this set the precedent which has been followed ever since. At the congresses of Paris and Berlin, as at that of Vienna, the great Powers regulated the affairs of lesser states without consulting the representatives of the latter. Similarly, at the conference of 1869 on the affairs of Crete no representative of Greece was present; and at the conference of London (1883), on the international regulation of the Danube, the sovereign state of Rumania, though a Danubian Power, was not represented. It was only with great difficulty that Cavour obtained admission to the congress of Paris in 1856, and the proposal of a congress in 1859 broke down on the refusal of Austria to admit the right of Sardinia to be represented. M. Pradier- Fodere deplores the consistent breach of the "fundamental rule" in this respect; but since every sovereign state, great and small, once admitted, has an equal voice, it is difficult to see how a principle, equitable in theory, could be established in practice. The failure of the Hague conferences to arrive at any substantial results was in fact due, more than anything else, to the admission on equal terms of a crowd of very unequal Powers. It may then be laid down that all congresses and conferences that have effected settlements of importance have been summoned and dominated by Powers strong enough to enforce respect for their views.

Preliminaries. — Before a congress meets it is customary, not only to agree on the place of meeting (a question often of first- class importance) and on the Powers to whom invitations are to be sent, but to define very carefully the nature and scope of the business to be transacted. This is done sometimes by an elaborate exchange of diplomatic correspondence issuing in preliminary conventions, sometimes by the summoning of conferences, e.g. those at Vienna in 1855 preliminary to the congress of Paris in 1856.

Procedure. — When the congress assembles the first business- is the verification of powers, which is done by a commission specially appointed to examine the credentials of the pleni- potentiaries. It is usual for the Powers, for obvious practical reasons, to be represented by two or three plenipotentiaries. If the foreign minister himself attend, he needs no credentials; those of his colleagues are countersigned by him. The verification being completed, questions of procedure, of precedence and the like, are settled. In earlier times this was a matter of extreme difficulty and delicacy, since there was no norm by which the respective dignity of the representatives of first-class Powers could be established; an incredible amount of time was wasted in futile questions of precedence, and not seldom negotiations for a peace that every one desired broke down on a point of etiquette. All this has been obviated by the rule observed at the congress of Berlin (1878), according to which the pleni- potentiaries took their seats at a horse-shoe table in lie alpha- betical order of the states they represented, according to the French alphabet.

The presidency of the congress is by courtesy reserved for the minister for foreign affairs of the state in which the meeting is held; if, however, he decline to serve, a president is elected;

or, if there be a mediating Power, the minister representing this presides. At the first session the president takes his seat and delivers a speech welcoming the delegates and sketching the objects of the meeting; the bureau of the congress (secretary, assistant secretaries, and archivist) is then elected on the nomina- tion of the president, and its members are introduced to the assembly. Finally the president impresses on all present the obligation of keeping the proceedings secret, and adjourns the session for a day or two, in order that the ministers may have an opportunity of making each others' acquaintance and talking matters over in private. Serious business begins with the second session.

The discussions are governed by carefully defined rules. Thus every

proposition must be presented in writing, and all decisions to be binding on all must be unanimous. The secretary keeps the minutes (proems-verbal) of each session, which are signed by all present and read at the next meeting. This protocol — as it has been called since the congress of Vienna — takes the form of a bald, but very exact resume of important points discussed, ending with a record of the conclusions and resolutions arrived at. If there be no such results, opinions are recorded. If any plenipotentiary dissent from the general opinion, such dissent must be recorded in the protocol. Sometimes short signed memoranda, known as a vote or opinion, are attached to the protocol, stating the reasons that have governed the Powers in question in agreeing to a given conclusion. Individual Powers may express their dissent in two ways: either by placing such dissent on record, as Lord Stewart did at Laibach, or by with- drawing altogether from the sessions of the congress, as Spain did at Vienna and Great Britain at Verona. Though the Final Act of Vienna was issued as the act of all the Powers, the sub- sequent formal adhesion of Spain was considered necessary to complete the "European" character of that treaty; the action of Great Britain at Verona prevented the intervention in Spain from having the sanction of the concert. At Vienna in 1814, owing to the vast range of the questions to be settled, the work of the congress was distributed among committees; but at Paris (1856) and Berlin (1878) all matters were discussed and settled in full session. The conclusions arrived at after the discussion of the various subjects before the congress are usually embodied in separate conventions, duly signed by the Powers who are a party to them. Finally, these separate conventions are brought together in an inclusive treaty, signed by all the plenipotentiaries present, known as the Final Act.

See P. Pradier-Foderfe, Cours de droit diplomatique (2 vols., 2nd ed., Paris, 1899). (W. A. P.)

CONGREVE, RICHARD (1818-1899), English Positivist, was born at Leamington on the 4th of September 1818, and was educated at Rugby under Dr Arnold, who is said to have expressed a higher opinion of him than of any other pupil. After taking first-class honours at Oxford and gaining a fellowship at Wadham College, he spent some time as a master at Rugby, but returned to Oxford as a tutor. Soon after the revolution of 1 848 he visited Paris, where he made the acquaintance of Barthelemy St Hilaire and Auguste Comte. He was so attracted by the Positive philosophy that he resigned his fellowship in 1855, and devoted the remainder of his life to the propagation of the Positive philosophy. He took a leading part in the work carried on in Chapel Street, Lamb's Conduit Street. In 1878 he declined to admit the authority of Pierre Laffitte, Comte's official successor, and the result was a split in the ranks of English Positivism, Frederic Harrison, Dr J. H. Bridges and Professor E. Beesly forming a separate

society at Newton Hall, Fetter Lane. Con- greve translated several of Comte's works, and in 1874 published a large volume of essays, in which he advocated Comte's view that it was the duty of Great Britain to renounce her foreign possessions. He was a man of high character, courtly manners and great intellectual capacity. He died at Hampstead on the 5th of July 1899.

*Publications. — Roman Empire of the West (1855); annotated edition of Aristotle's Politics (1855; 2 *»d ed., 1874); Catechism of the Positive Religion, translated from the French oi A. Comte (i8s8;*

3rded., 1891); Elizabeth of England (1862); Essays, political, social, and religious (1874; 2nd series, 1892); Historical Lectures (collected in one volume, 1902).

CONGREVE, WILLIAM (1670-1729), English dramatist, the greatest English master of pure comedy, was born at Bardsey near Leeds, where he was baptized on the 10th of February 1670, although the inscription on his monument gives his date of birth as 1672. He was the son of William Congreve, a soldier, who was soon after his son's birth placed in command of the garrison at Youghal. To Ireland, therefore, is due the credit of his education — as a schoolboy at Kilkenny, as an under- graduate at Dublin, where he was a contemporary and friend of Swift. From college he came to London, and was entered as a student of law at the Middle Temple. The first-fruits of his studies appeared under the boyish pseudonym of " Cleophil," in the form of a novel whose existence is now remembered only through the unabashed avowal of so austere a moralist as Dr Johnson, that he "would rather praise it than read it." In 1693 Congreve's real career began, and early enough by the latest computation, with the brilliant appearance and instant success of his first comedy, The Old Bachelor, under the generous auspices of Dryden, then as ever a living and immortal witness to the falsehood of the vulgar charge which taxes the greater among poets with jealousy or envy, the natural badge and brand of the smallest that would claim a place among their kind. The dis- crowned laureate had never, he said, seen such a first play; and indeed the graceless grace of the dialogue was as yet only to be matched by the last and best work of Etherege, standing as till then it had done alone among the barefaced brutalities of Wycherley and Shadwell. The types of Congreve's first work were the common conventional properties of stage tradition; but the fine and clear-cut style in which these types were repro- duced was his own. The gift of one place and the reversion of another were the solid fruits of his splendid success. Next year a better play from the same hand met with worse fortune on the stage, and with yet higher honour from the first living poet of his nation. The noble verses, as faultless in the expression as reckless in the extravagance of their applause, prefixed by Dryden to The

Double Dealer, must naturally have supported the younger poet, if indeed such support can have been required, against the momentary annoyance of assailants whose passing clamour left uninjured and secure the fame of his second comedy; for the following year witnessed the crowning triumph of his art and life, in the appearance of Love for Love (1695). Two years later his ambition rather than his genius adventured on the foreign ground of tragedy, and The Mourning Bride (1697) began such a long career of good fortune as in earlier or later times would have been closed against a far better work. Next year he attempted, without his usual success, a reply to the attack of Jeremy Collier, the nonjuror, "on the immorality and profane- ness of the English stage " — an attack for once not discreditable to the assailant, whose honesty and courage were evident enough to approve him incapable alike of the ignominious precaution which might have suppressed his own name, and of the dastardly mendacity which would have stolen the mask of a stranger's. Against this merit must be set the mistake of confounding in one indiscriminate indictment the levities of a writer like Con- greve with the brutalities of a writer like Wycherley — an error which ever since has more or less perverted the judgment of succeeding critics. The general case of comedy was then, however, as untenable by the argument as indefensible by the sarcasm of its most brilliant and comparatively blameless champion. Art itself, more than anything else, had been out- raged and degraded by the recent school of the Restoration; and the comic work of Congreve, though different rather in kind than in degree from the bestial and blatant licence of his im- mediate precursors, was inevitably for a time involved in the sentence passed upon the comic work of men in all ways alike his inferiors. The true and triumphant answer to all possible attacks of honest men or liars, brave men or cowards, was then as ever to be given by sthe production of work unarraignable alike by fair means or foul, bv frank impeachment or furtive

imputation. In 1 700 Congreve thus replied to Collier with The Way of the World — the unequalled and unapproached master- piece of English comedy, which may fairly claim a place beside or but just beneath the mightiest work of Moliere. On the stage which had recently acclaimed with uncritical applause the author's more questionable appearance in the field of tragedy, this final and flawless evidence of his incomparable powers met with a rejection then and ever since inexplicable on any ground of conjecture. During the twenty-eight years which remained to him, Congreve produced little beyond a volume of fugitive verses, published ten years after the miscarriage of his master- piece. His even course of good fortune under Whig and Tory governments alike was counterweighed by the physical in-

firmities of gout and failing sight. He died, January 19, 1729, in consequence of an injury received on a journey to Bath by the upsetting of his carriage; was buried in Westminster Abbey, after lying in state in the Jerusalem Chamber; and bequeathed the bulk of his fortune to the chief friend of his last years, Henrietta, duchess of Marlborough, daughter of the great duke, rather than to his family, which, according to Johnson, was then in difficulties, or to Mrs Bracegirdle, the actress, with whom he had lived longer on intimate terms than with any other mistress or friend, but who inherited by his will only £200. The one memorable incident of his later life was the visit of Voltaire, whom he astonished and repelled by his rejection of proffered praise and the expression of his wish to be considered merely as any other gentleman of no literary fame. The great master of well-nigh every province in the empire of letters, except the only one in which his host reigned supreme, replied that in that sad case Congreve would not have received his visit.

The fame of the greatest English comic dramatist is founded wholly or mainly on but three of his five plays. His first comedy was little more than a brilliant study after such models as were eclipsed by this earliest effort of their imitator; and tragedy under his hands appears rouged and wrinkled, in the patches and powder of Lady Wishfort. But his three great comedies are more than enough to sustain a reputation as durable as our language. Were it not for these we should have no samples to show of comedy in its purest and highest form. Ben Jonson, who alone attempted to introduce it by way of reform among the mixed work of a time when comedy and tragedy were as inextricably blended on the stage as in actual life, failed to give the requisite ease and the indispensable grace of comic life and movement to the action and passion of his elaborate and magnificent work. Of Congreve's immediate predecessors, whose aim had been to raise on French foundations a new English fabric of simple and unmixed comedy, Wycherley was of too base metal and Etherege was of metal too light to be weighed against him; and besides theirs no other or finer coin was current than the crude British ore of Shadwell's brutal and burly talent. Borrowing a metaphor from Landor, we may say that a limb of Moliere would have sufficed to make a Congreve, a limb of Congreve would have sufficed to make a Sheridan. The broad and robust humour of Vanbrugh's admirable comedies gives him a place on the master's right hand; on the left stands Farquhar, whose bright light genius is to Congreve's as female is to male, or "as moonlight unto sunlight." No English writer, on the whole, has so nearly touched the skirts of Moliere; but his splendid intelligence is wanting in the deepest and subtlest quality which has won for Moliere from the greatest poet of his country and our age the tribute of exact and final definition conveyed in that perfect phrase which salutes at once and denotes him — "ce moqueur pensif comme un ap6tre." Only perhaps in a

single part has Congreve half consciously touched a note of almost tragic depth and suggestion; there is something well- nigh akin to the grotesque and piteous figure of Arnolphe himself in the unvenerable old age of Lady Wishfort, set off and relieved as it is, with grace and art worthy of the supreme French master, against the only figure on any stage which need not shun comparison even with that of Celinrcne.

The Works of William Congreve were published in 1710 (3 vols.). The Dramatic Works of Wycherley, Congreve . . . edited by Leigh

Hunt (1840), contains a biographical and critical notice of Congreve. See also The Comedies of William Congreve (1895), with an intro- duction by W. G. S. Street; and The Best Plays ef William Congreve (1887, 1903), edited for the Mermaid Series by A. C. Ewald. The Life of William Congreve (1887) by Edmund Gosse, in E. S. Robert- son's Great Writers, contains a bibliography by J. P. Anderson.

CA. C. S.)

CONGREVE, SIR WILLIAM, Bart. (1772-1828), British artillerist and inventor, was born on the 20th of May 1772, being the eldest son of Lieutenant-General Sir William Congreve (d. 1814), comptroller of the Royal Laboratory at Woolwich, who was made a baronet in 1812. He was educated at Singlewell school, Kent, and (1788-1793) at Trinity College, Cambridge, taking the degrees of B.A. in 1793 and M.A. in 1795. In the latter year he entered the Middle Temple, and up to 1808 he lived in Garden Court, at first studying law, later editing a political newspaper, and in the end devoting himself to the development of the war rocket, for which he is chiefly remembered. Through his father he enjoyed many opportunities of experiment- ing with artillery material, and finally in 1805 he was able to demonstrate to the prince regent, Pitt and others the uses of the new weapon. In 1805 he accompanied Sir Sidney Smith in a naval attack on the French flotilla at Boulogne, but the weather prevented the use of rockets. In another attack on Boulogne in 1806, however, the Congreve rockets, which were fired in salvos from boats of special construction, were very effectual, and in 1807, 1808 and 1809 they were employed with excellent results on land and afloat at the siege of Copenhagen, in Lord Gambier's fight in the Basque Roads and in the Walcheren expedition. Congreve himself was present in all these affairs. In 1810 or 1811 he became equerry to the prince regent, with whom he was a great favourite, and in 181 1 he was elected a fellow of the Royal Society; in the same year he at last received military rank, being gazetted lieutenant-colonel in the Hanoverian artillery. In 181 2 he became member of parliament for Gatton. In 1813, at the request of the admiralty, he designed a new gun for the armament of frigates, which was adopted and very favourably reported

on. In the same year the newly formed "Rocket Troop" of the Royal Artillery was sent to serve with the Allies in Germany, and this troop rendered excellent service at the battle of Leipzig, where its commander Captain Bogue was killed. In recognition of their services Congreve was shortly afterwards decorated by the sovereigns of Russia and Sweden. Many years later the Congreve rocket was superseded by Hale's, which had no stick.

In 1814, on the death of his father, Colonel Congreve succeeded to the baronetcy and also to the office of comptroller of the Royal Laboratory. He also became inspector of military machines, but his Hanoverian commission did not (it seems) entitle him to command troops of the Royal Artillery, and there was a certain amount of friction and jealousy between Congreve and the Royal Artillery officers. During the visit of the allied sovereigns to London in this year, Congreve arranged the fetes and especially the pyrotechnic displays which the prince regent gave in their honour. In 1817 he became senior equerry to the prince and a K.H., and in 1818 major-general d la suite of the Hanoverian army. In 1820 Sir William Congreve was elected M.P. for Plymouth (for which constituency he sat until his death), and in the following year, at the coronation of George IV. (whose senior equerry he remained), he arranged a great pyrotechnic display in Hyde Park. In his later years Congreve took a prominent part in various industrial ventures, such as gas companies, which, however, were for the most part un- successful. He died at Toulouse on the 16th of May 1828.

Congreve was an ingenious and versatile man of science. Besides the war rocket he invented a gun-recoil mounting, a time-fuze, a parachute attachment to the rocket, a hydro- pneumatic canal lock and sluice (1813), a perpetual motion machine (see Perpetual Motion), a process of colour printing (1821) which was widely used in Germany, a new form of steam- engine, and a method of consuming smoke (which was applied at the Royal Laboratory) ; he also took out patents for a clock in which time was measured by a ball rolling on an inclined

plane; for protecting buildings against fire; inlaying and combining metals; unforgeable bank-note paper; a method of killing whales by means of rockets; improvements in the manufacture of gunpowder; stereotype plates; fireworks; gas meters, &c. The first friction matches made in England (1827) were named after him by their inventor, John Walker. He published a number of works, including three treatises on The Congreve

Rocket System (1807, 1817 and 1821; the last was translated into German, Weimar, 1829); An Elementary Treatise on the Mounting of Naval Ordnance (1812); A Descrip- tion of the Hydropneumatical Lock (1815); A New Principle of Steam-Engine (1819); Resumption of Cash Payments (1819); Systems of Currency (1819), &c.

See Colonel J. R. J. Jocelyn in Journal of the Royal Artillery, vol. 32, No. 11, and sources therein referred to. The account in the Dictionary of National Biography is very inaccurate.

CONGRUOUS (from Lat. congruere, to agree), that which corresponds to or agrees with anything; the derivation appears in " congruence," a condition of such correspondence or agree- ment, a term used particularly in mathematics, e.g. for a doubly infinite system of lines (see Surface), and in the theory of numbers, for the relation of two numbers, which, on being divided by a third number, known as the modulus, leave the same remainder (see Number). The similar word " congruity " is a term of Scholastic theology in the doctrine of merit. God's recompense for good works, if performed in a state of grace, is based on " condignity," meritum de condigno; if before such a state is reached, it should be fit or " congruous " that God should recompense such works by conferring the " first grace," meritum de congruo. The term is also used in theology, in reference to the controversy between the Jesuits and the Dominicans on the subject of grace, at the end of the 16th century (see Molina, Luis, and Suarez, Francisco).

CONIBOS, or Manoas, a tribe of South American Indians inhabiting the Pampa del Sacramento and the banks of the Ucayali, Peru. Spanish missionaries first visited them in 1683, and in 1685 some Franciscans who had founded a mission among them were massacred. Alike fate befell a priest in 1695. They have since been converted and are now a peaceful people.

CONIC SECTION, or briefly Conic, a curve in which a plane intersects a cone. In ancient geometry the name was restricted to the three particular forms now designated the ellipse, parabola and hyperbola, and this sense is still retained in general works. But in modern geometry, especially in the analytical and pro- jective methods, the " principle of continuity " renders advisable the inclusion of the other forms of the section of a cone, viz. the circle, and two lines (and also two points, the reciprocal of two lines) under the general title conic. The definition of conies as sections of a cone was employed by the Greek geometers as the fundamental principle of their researches in this subject; but the subsequent development of geometrical methods has brought to light many other means for defining these curves. One defini- tion, which is of especial value in the geometrical treatment of

the conic sections (ellipse, parabola and hyperbola) in piano, is that a conic is the locus of a point whose distances from a fixed point (termed the focus) and a fixed line (the directrix) are in constant ratio. This ratio, known as the eccentricity, determines the nature of the curve; if it be greater than unity, the conic is a hyperbola; if equal to unity, a parabola; and if less than unity, an ellipse. In the case of the circle, the centre is the focus, and the line at infinity the directrix; we therefore see that a circle is a conic of zero eccentricity.

In projective geometry it is convenient to define a conic section as the projection of a circle. The particular conic into which the circle is projected depends upon the relation of the " vanishing line " to the circle; if it intersects it in real points, then the projection is a hyperbola, if in imaginary points an ellipse, and if it touches the circle, the projection is a parabola. These results may be put in another way, viz. the line at infinity intersects the hyperbola in real points, the ellipse in imaginary points, and the parabola in coincident real points. A conic may also be regarded as the polar reciprocal of a circle for a point;

if the point be without the circle the conic is an ellipse, if on the circle a parabola, and if within the circle a hyperbola. In analytical geometry the conic is represented by an algebraic equation of the second degree, and the species of conic is solely determined by means of certain relations between the coefficients. Confocal conies are conies having the same foci. If one of the foci be at infinity, the conies are confocal parabolas, which may also be regarded as parabolas having a common focus and axis. An important property of confocal systems is that only two confocals can be drawn through a specified point, one being an ellipse, the other a hyperbola, and they intersect orthogonally.

The definitions given above reflect the intimate association of these curves, but it frequently happens that a particular conic is defined by some special property (as the ellipse, which is the locus of a point such that the sum of its distances from two . fixed points is constant) ; such definitions and other special properties are treated in the articles Ellipse, Hyperbola and Parabola. In this article we shall consider the historical development of the geometry of conies, and refer the reader to the article Geometry: Analytical and Projective, for the special methods of investigation.

History. — The invention of the conic sections is to be assigned to the school of geometers founded by Plato at Athens about the 4th century B.C. Under the guidance and inspiration of this philosopher much attention was given to the geometry of solids, and it is probable that while investigating the cone, Menaechmus, an associate of Plato, pupil of Eudoxus, and brother of Dino- stratus (the inventor of the quadratrix), discovered and

investi- gated the various curves made by truncating a cone. Menaechmus discussed three species of cones (distinguished by the magnitude of the vertical angle as obtuse-angled, right-angled and acute- angled), and the only section he treated was that made by a plane perpendicular to a generator of the cone; according to the species of the cone, he obtained the curves now known as the hyperbola, parabola and ellipse. That he made considerable progress in the study of these curves is evidenced by Eutocius, who flourished about the 6th century a.d., and who assigns to Menaechmus two solutions of the problem of duplicating the cube by means of intersecting conies. On the authority of the two great commentators Pappus and Proclus, Euclid wrote four books on conies, but the originals are now lost, and all we have is chiefly to be found in the works of Apollonius of Perga. Archimedes contributed to the knowledge of these curves by determining the area of the parabola, giving both a geometrical and a mechanical solution, and also by evaluating the ratio of elliptic to circular spaces. He probably wrote a book on conies, but it is now lost. In his extant Conoids and Spheroids he defines a conoid to be the solid formed by the revolution of the parabola and hyperbola about its axis, and a spheroid to be formed similarly from the ellipse; these solids he discussed with great acumen, and effected their cubature by his famous " method of exhaustions."

But the greatest Greek writer on the conic sections was Apollonius of Perga, and it is to his Conic Sections that we are indebted for a review of the early history of this subject. Of the eight books which made up his original treatise, only seven are certainly known, the first four in the original Greek, the next three are found in Arabic translations, and the eighth was restored by Edmund Halley in 17 10 from certain introductory lemmas of Pappus. The first four books, of which the first three are dedicated to Eudemus, a pupil of Aristotle and author of the original Eudemian Summary, contain little that is original, and are principally based on the earlier works of Menaechmus, Aristaeus (probably a senior contemporary of Euclid, flourishing about a century later than Menaechmus) , Euclid and Archimedes. The remaining books are strikingly original and are to[be regarded as embracing Apollonius's own researches.

The first book, which is almost entirely concerned with the con- struction of the three conic sections, contains one of the most brilliant of all the discoveries of Apollonius. Prior to his time, a right cone of a definite vertical angle was required for the generation of any particular conic; Apollonius showed that the sections could all be produced from one and the same cone, which may be

*either right or oblique, by simply varying the inclination of the cutting plane. The importance of this generalization cannot be overestimated; it is of more than historical interest, for it remains the basis upon which certain authorities introduce the study of these curves. To comprehend more exactly the discovery of Apollonius, imagine an oblique cone on a circular base, of which the line joining the vertex to the centre of the base is the axis. The section made by a plane containing the axis and perpendicular to the base is a triangle contained by two generating lines of the cone and a diameter of the basal circle. Apollonius considered sections of the cone made by planes at any inclination to the plane of the circular base and perpendicular to the triangle containing the axis. The points in which the cutting plane intersects the sides of the triangle are the vertices of the curve; and the line joining these points is a diameter which Apollonius named the latus transversum. He discriminated the three species of conies as follows : — At one of the two vertices erect a perpendicular {latus rectum) of a certain length (which is determined below), and join the extremity of this line to the other vertex. At any point on the latus transversum erect an ordinate. Then the square of the ordinate intercepted between the diameter and the curve is equal to the rectangle con- tained by the portion of the diameter between the first vertex and the foot of the ordinate, and the segment of the ordinate intercepted between the diameter and the line joining the extremity of the latus rectum to the second vertex. This property is true for all conies, and it served as the basis of most of the constructions and propositions given by Apollonius. The conies are distinguished by the ratio between the latus rectum (which was originally called the latus erectum, and now often referred to as the parameter) and the segment of the ordinate intercepted between the diameter and the line joining the second vertex with the extremity of the latus rectum. When the cutting plane is inclined to the base of the cone at an angle less than that made by the sides of the cone, the latus rectum is greater than the intercept on the ordinate, and we obtain the ellipse; if the plane is inclined at an equal angle as the side, the latus rectum equals the intercept, and we obtain the parabola; if the inclination of the plane be greater than that of the side, we obtain the hyper- bola. In modern notation, if we denote the ordinate by y, the distance of the foot of the ordinate from the vertex (the abscissa) by x, and the latus rectum by p, these relations may be expressed as y*px for the hyperbola. Pappus in his commentary on Apollonius states that these names were given in virtue of the above relations ; but accord- ing to Eutocius the curves were named the parabola, ellipse or hyperbola, according as the angle of the cone was equal to, less than, or greater than a right angle. The word parabola was used by Archimedes, who was prior to Apollonius; but this may be an interpolation.*

We may now summarize the contents of the Conies of Apol- lonius. The first book deals with the generation of the three conies; the second with the asymptotes, axes and diameters; the third with various metrical relations between transversals, chords, tangents, asymptotes, &c; the fourth with the theory of the pole and polar, including the harmonic division of a straight line, and with systems of two conies, which he shows to intersect in not more than four points; he also investigates conies having single and double contact. The fifth book contains properties of normals and their envelopes, thus embracing the germs of the theory of evolutes, and also maxima and minima problems, such as to draw the longest and shortest lines from a given point to a conic; the sixth book is concerned with the similarity of conies; the seventh with complementary chords and conjugate diameters; the eighth book, according to the restoration of Edmund Halley, continues the subject of the preceding book. His proofs are generally long and clumsy; this is accounted for in some measure by the absence of symbols and technical terms. Apollonius was ignorant of the directrix of a conic, and although he incidentally discovered the focus of an ellipse and hyperbola, he does not mention the focus of a parabola. He also considered the two branches of a hyperbola, calling the second branch the " opposite " hyperbola, &nd shows the relation which existed between many metrical properties of the ellipse and hyperbola. The focus of the parabola was discovered by Pappus, who also introduced the notion of the directrix.

The Conies of Apollonius was translated into Arabic by Tobit ben Korra in the gth century, and this edition was followed by Halley in 1710. Although the Arabs were in full possession of the store of knowledge of the geometry of conies which the Greeks had accumulated, they did little to increase it; the only advance made consisted in the application of describing inter- secting conies so as to solve algebraic equations. The great

pioneer in this field was Omar Khayyam, who flourished in the nth century. These discoveries were unknown in western Europe for many centuries, and were re-invented and developed by many European mathematicians. In 1522 there was pub- lished an original work on conies by Johann Werner of Nurem- burg. This work, the earliest published in Christian Europe, treats the conic sections in relation to the original cone, the procedure differing from that of the Greek geometers. Werner was followed by Franciscus Maurolycus of Messina, who adopted the same method, and added considerably to the discoveries of Apollonius. Claude Mydorge (1585-1647), a French geometer and friend of Descartes, published a work De sectionibus conicis in which he greatly simplified the cumbrous proofs of Apollonius, whose method of treatment he followed.

Johann Kepler (1571-1630) made many important discoveries in the geometry of conies. Of supreme importance is the fertile conception of the

planets revolving about the sun in elliptic orbits. On this is based the great structure of celestial mechanics and the theory of universal gravitation; and in the elucidation of problems more directly concerned with astronomy, Kepler, Sir Isaac Newton and others discovered many properties of the conic sections (see Mechanics). Kepler's greatest contri- bution to geometry lies in his formulation of the " principle of continuity " which enabled him to show that a parabola has a " caecus (or blind) focus " at infinity, and that all lines through this focus are parallel (see Geometrical Continuity). This assumption (which differentiates ancient from modern geometry) has been developed into one of the most potent methods of geometrical investigation (see Geometry: Projective). We may also notice Kepler's approximate value for the circumference of an ellipse (if the semi-axes be a and 6, the approximate circumference is ir(a+i)).

An important generalization of the conic sections was developed about the beginning of the 17th century by Girard Desargues and Blaise Pascal. Since all conies derived from a circular cone appear circular when viewed from the apex, they conceived the treatment of the conic sections as projections of a circle. From this conception all the properties of conies can be deduced. Desargues has a special claim to fame on account of his beautiful theorem on the involution of a quadrangle inscribed in a conic. Pascal discovered a striking property of a hexagon inscribed in a conic (the hexagrammum mysticum) ; from this theorem Pascal is said to have deduced over 400 corollaries, including most of the results obtained by earlier geometers. This subject is mathematically discussed in the article Geometry : Projective.

While Desargues and Pascal were founding modern synthetic geometry, Rene Descartes was developing the algebraic repre- sentation of geometric relations. The subject of analytical geometry which he virtually created enabled him to view the conic sections as algebraic equations of the second degree, the form of the section depending solely on the coefficients. This method rivals in elegance all other methods; problems are investigated by purely algebraic means, and generalizations discovered which elevate the method to a position of paramount importance. John Wallis, in addition to translating the Conies of Apollonius, published in 1655 an original work entitled De sectionibus conicis nova methodo expositis, in which he treated the curves by the Cartesian method, and derived their properties from the definition in piano, completely ignoring the connexion between the conic sections and a cone. The analytical method was also followed by G. F. A. de 1'Hopital in his Traite analytique des sections coniques (1707). A mathematical investigation of the conies by this method is given in the article Geometry: Analytical. Philippe de la Hire, a pupil of Desargues, wrote several works on the conic sections, of which the most important is his Sectiones Conicae (1685). His treatment is synthetic, and he follows his

tutor and Pascal in deducing the properties of conies by projection from a circle.

A method of generating conies essentially the same as our modern method of homographic pencils was discussed by Jan de Witt in his Elementa linearum curvarum (1650); but he treated the curves by the Cartesian method, and not synthetically.

Similar methods were devised by Sir Isaac Newton and Colin Maclaurin. In Newton's method, two angles of constant magnitude are caused to revolve about their vertices which are fixed in position, in such a manner that the intersection of two limbs moves along a fixed straight line; then the two remaining limbs envelop a conic. Maclaurin's method, published in his Geometria organica (1710), is based on the proposition that the locus of the vertex of a triangle, the sides of which pass through three fixed points, and the base angles move along two fixed lines, is a conic section. Both Newton's and Maclaurin's methods have been developed by Michel Chasles. In modern times the study of the conic sections has proceeded along the lines which we have indicated; for further details reference should be made to the article Geometry.

Authorities. — For the ancient geometry of conic sections, especially of Apollonius, reference should be made to T. L. Heath's Apollonius of Perga (1886); more general accounts are given in James Gow, A Short History of Greek Mathematics (1884), and in H. G. Zeuthen, Die Lehre von dem Kegelschnitten in Alterthum (1886). Michel Chasles in his Apercu historique sur Vorigine et le developpe- ment des methodes en geometrie (1837, a third edition was published in 1889), gives a valuable account of both the ancient and modern geometry of conies; a German translation with the title Geschichte der Geometrie was published in 1839 by L. A. Sohncke. A copious list of early works on conic sections is given in Fred. W. A. Murhard, Bibliotheca mathematica (Leipzig, 1798). The history is also treated in general historical treatises (see Mathematics).

Geometrical constructions are treated in T. H. Eagles, Constructive Geometry of Plane Curves (1886); geometric investigations primarily based on the relation of the conic sections to a cone are given in Hugo Hamilton's De Sectionibus Conicis (1758); this method of treatment has been largely replaced by considering the curves from their definition in piano, and then passing to their derivation from the cone and cylinder. This method is followed in most modern works. Of such text-books there is an ever-

increasing number; here we may notice W. H. Besant, Geometrical Conic Sections; C. Smith, Geometrical Conies; W. H. Drew, Geometrical Treatise on Conic Sections. Reference may also be made to C. Taylor, An Introduction to Ancient and Modern Geometry of Conies (1881).

See also list of works under Geometry : Analytical and Projective.

CONINE, or Coniine (a-propyl piperidine), CsHi 7 N, an alka- loid occurring, associated with y-coniceine, conhydrine, pseudo- conhydrine and methyl conine, in hemlock (Conium macu- latum). It is a colourless oily liquid of specific gravity 0-845 (20° C), boiling at 166 C, almost insoluble in water, soluble in ether and in alcohol. It has a sharp burning taste and a pene- trating smell, and acts as a violent poison. It is dextro-rotatory. The alkaloid is a strong base and is very readily oxidized; chromic acid converts it into normal butyric acid and ammonia; hydrogen peroxide gives aminopropylvalerylalde- hyde, NH 2 CH(C 3 H 7)(CH 2)3-CHO, whilst the benzoyl derivative is oxidized by potassium permanganate to benzoyl-a-amino- valericacid, C 6 H 6 CO-NH-CH(C 3 H 7)-(CH 2) 3 -COOH. It combines directly with methyl iodide to form dimethyl coninium iodide, C10H22NI, which by the destructive methylation process of A. W. Hofmann (Berichte, 1881, 14, pp. 494, 659) is converted into the hydrocarbon conylene C 8 Hi4, a compound that can also be obtained by heating nitrosoconine with phosphoric anhydride to 80-90 C. On heating conine with concentrated hydriodic acid and phosphorus it is decomposed into ammonia and normal octane CsHis. Conine is a secondary base, forming a nitroso deri- vative with nitrous acid, a urethane with chlorcarbonic ester and a tertiary base (methyl conine) with methyl iodide; reactions which point to the presence of the = NH group in the molecule.

It was the first alkaloid to be synthesized, a result due to A. Ladenburg (see various papers in the Berichte for the years 1881, 1884, 1885, 1886, 1889, 1893, 1894, 1895, and Liebig's Annalen for 1888, 1894). A. W. Hofmann had shown that conine on distillation with zinc dust gave a-propyl pyridine (conyrine). This substance when heated with hydriodic acid to 300° C. is converted into a-propyl piperidine, which can also be obtained by the reduction of a-allyl pyridine (formed from a-methyl pyridine and paraldehyde). The a-propyl piperidine so obtained is the inactive (racemic) form of conine, and it can be resolved into the dextro- and laevo-varieties by means of dextro-tartaric acid, the i-conine rf-tartrate with caustic soda giving rf-conine closely resembling the naturally occurring alkaloid. A. Laden-

burg (Ber. 1906, 39, p. 2486) showed that the difference in the rotations of the natural and synthetic d-conine is not due to another substance, iso-

conine, as was originally supposed, but that the artificial product is a stereo-isomer, which yields natural conine on heating for some time to 29o °-3oo°, and then distilling.

7-Coniceine, CsHi 5 N, is a tetrahydro conyrine, i.e. a tetra- hydro propyl pyridine. It may be obtained by brominating conine, and then removing the elements of hydrobromic acid with alkalis. Other coniceines have been prepared. Con- hydrine, CsHitNO, and pseudoconhydrine are probably stereo- isomers, the latter being converted into the former when boiled with ligroin. Since conhydrine is dehydrated by phosphorus pentoxide into a mixture of a and /3 coniceines, it may be con- sidered an oxyconine. Methyl conine, C0H19N or C 3 Hi 4 -N(CH 3), is synthesized from conine and an aqueous solution of potassium methyl sulphate at ioo°.

CONINGTON, JOHN (1825-1869), English classical scholar, was born on the 10th of August 1825 at Boston in Lincolnshire. He knew his letters when fourteen months old, and could read well at three and a half. He was educated at Beverley Grammar school, at Rugby and at Oxford, where, after matriculating at University College, he came into residence at Magdalen, where he had been nominated to a demyship. He was Ireland and Hertford scholar in 1844; in March 1846 he was elected to a scholarship at University College, and in December of the same year he obtained a first class in classics; in February 1848 he became a fellow of University. He also obtained the Chancellor's prize for Latin verse (1847), English essay (1848) and Latin essay (1849). He successfully applied for the Eldon law scholar- ship in 1849, and proceeded to London to keep his terms at Lincoln's Inn. The legal profession, however, proved distasteful, and after six months he resigned the scholarship and returned to Oxford. During his brief residence in London he formed a connexion with the Morning Chronicle, which was maintained for some time. He showed no special aptitude for journalism, but a series of articles on university reform (1849-1850) is noteworthy as the first public expression of his views on a subject that always interested him. In 1854 his appointment, as first occupant, to the chair of Latin literature, founded by Corpus Christi College, gave him a congenial position. From this time he confined himself with characteristic conscientiousness almost exclusively to Latin literature. The only important exception was the translation of the last twelve books of the Iliad in the Spenserian stanza in completion of the work of P. S. Worsley, and this was undertaken in fulfilment of a promise made to his dying friend. In 1852 he began, in conjunction with Prof. Goldwin Smith, a complete edition of Virgil with a commentary, of which the first volume appeared in 1858, the second in 1864, and the third soon after his death. Prof. Goldwin Smith was compelled to withdraw from the work at an early stage, and in the last volume his place was taken by H. Nettleship. In 1866 Conington published his most famous work, the translation of the Aeneid of

Virgil into the octosyllabic metre of Scott. The version of Dryden is the work of a stronger artist; but for fidelity of rendering, for happy use of the principle of compensa- tion so as to preserve the general effect of the original, and for beauty as an independent poem, Conington's version is superior. That the measure chosen does not reproduce the majestic sweep of the Virgilian verse is a fault in the conception and not in the execution of the task. Conington died at Boston on the 23rd of October 1869.

His edition of Persius with a commentary and a spirited prose translation was published posthumously in 1872. In the same year appeared his Miscellaneous Writings, edited by J. A. Symonds, with a memoir by Professor H. J. S. Smith (see also H. A. J. Munro in Journal of Philology, ii., 1869). Among his other editions are Aeschylus, Agamemnon (1848), Choephori (1857); English verse translations of Horace, Odes and Carmen Saeculare (1863), Satires, Epistles and Ars Poetica (1869).

CONISTERIUM (from Gr. kovis, dust), the name of the room in the ancient palaestra or thermae (baths) where wrestlers, after being anointed with oil, were sprinkled with sand, so as to give them a grip when wrestling.

CONJEEVERAM, Kanchipuram, a town of British India, in the Chingleput district of Madras, 45 m. W.S.W. of Madras by rail. Pop. (1901) 46,164. It is esteemed by the Hindus as one of the holiest places in southern India, ranking among the seven sacred cities of India, and is remarkable for the number of its temples and shrines. Of these the old Jain temple, situated in a hamlet some 2 m. south of the Weavers' quarter of the city (Pillapalaiyam), dates from the time when the Chola power was at its height (12th or 13th century), and is of great importance to the historian by reason of the inscriptions, which contain an almost perfect record of the dynasties who held the country. Older than this temple are the Vaikuntha Perumal temple of Vishnu and the Siva temple of KailasanSth, which date from the time of the Pallava kings. The great temple of Siva, dedicated to Ekambara Swami (the god with the single garment) is remark- able for its lofty towers (gopuram) and the extreme irregularity of its design, through which it gains in picturesqueness what it loses in dignity. Besides the towers, it has several fine porches, great tanks approached by flights of stone steps, and the " hall of the thousand columns." This latter contains actually 540 columns, most of them elaborately carved, arranged in twenty rows. About 2 m. distant, in Little Conjeeveram, is the Vara- daraja-swami Vaishnava temple, also containing a hall of pillars, beautifully carved, and possessing a wonderfully rich treasury of votive jewels. A mark on the wall

of the inner enclosure, something like a horseshoe, is held to be the first letter of the name of Vishnu. For a century or more the Tangalai and Vadagalai sects, connected with the worship of the temple, have been quarrelling fiercely as to the form of this symbol; the questions arising out of this led to much litigation, and though final judgment was given by the privy council, the matter still constitutes a danger to the peace. The general aspect of the city is pleasing, with low houses and broad streets lined with fine trees. Its only noteworthy industry is the weaving of the superior silk and cotton saris worn by native women.

Conjeeveram, a British corruption of Kanchipuram (the golden city), is very ancient, having been in the early centuries of the Christian era the capital of the Pallava dynasty. The Chinese traveller Hsiian Tsang, who visited it in the 7 th century, says that it was then 6 m. in circumference and inhabited by a people superior to any he had met in piety.and courage, love of justice and reverence for learning. In the nth century the city was conquered by the Cholas, who held it until their overthrow by the Mussulmans in 13 10, after which it fell under the sway of the kings of Vijayanagar. In 1646 it was taken from them by the Mussulmans, who in their turn were ousted by the Mahrattas in 1677. Shortly afterwards the emperor Aurungzeb's forces retook the place, which remained in Mussulman hands until 1752, when it was captured by Clive.

CONJUGAL RIGHTS, those rights which a husband and wife (Lat. conjux) have to each other's society. When either party continues to refuse to render these rights to the other, they may be enforced by a suit for the restitution of conjugal rights. In England the jurisdiction which the old ecclesiastical courts exercised to enforce this right was transferred to the divorce court by the Matrimonial Causes Act 1857. The procedure is by cita- tion and petition, but, before a petition can be filed, a written demand must be made to the refusing party for cohabitation. Previous to the Matrimonial Causes Act 1884, disobedience to a decree for the restitution of conjugal rights rendered the refusing party liable to attachment and imprisonment. The act of 1884 substituted for attachment, if the wife be the petitioner, an order for periodical payments by the husband to the wife. Failure to comply with a decree for restitution is deemed to be desertion, and a sentence of judicial separation may be pronounced, although the period of two years prescribed by the act of 1857 may not have expired. Conjugal rights cannot be enforced by the act of either party (R. v. Jackson, 1801, 1 Q.B. 671), the proper procedure being to apply to the court for relief.

CONJUNCTION (from Lat. conjungere, to join together) , a general term signifying the act or state of being joined together. It is used technically in astronomy and grammar. In astronomy,

” conjunction” is the nearest apparent approach of two heavenly bodies which seem to pass each other in their courses — said to be in longitude, right ascension, &c, when they have the same longitude, &c. A superior conjunction is one in which the lesser body is beyond the greater, especially when a planet is beyond the sun. An inferior conjunction is one in which a planet is on our side of the sun. In grammar the term ” conjunction ” is applied to one of the so-called ” parts of speech, ” viz. those words which are used to “join together ” words, clauses or sentences. Con- junctions are variously classified according to their specific function, e.g. adversative (” but,” ” though “) which contrast, ‘ illative (” therefore “) where the second sentence or clause is an inference from the first, temporal where a time-relation is expressed, and so forth.

CONJURING, the art, sometimes called White or Natural Magic, and long associated with the profession of ” magician,” consisting of the performance of tricks and illusions, with or without apparatus. Historically this art has taken many forms, and has been mixed up with the use of what now are regarded as natural though obscure physical phenomena. The employ- ment of purely manual dexterity without mechanical apparatus may be distinguished as legerdemain, prestidigitation or sleight of hand.

Whether or not the book of Exodus makes the earliest historical reference to this form of natural ” magic ” when it records how the magicians of Egypt imitated certain miracles of Moses “by their enchantments,” it is known that the Egyptian hierophants, as well as the magicians of ancient Greece and Rome, were accustomed to astonish their dupes with optical illusions, visible representations of the divinities and subdivinities passing before the spectators in dark subterranean chambers. The principal optical illusion employed in these effects was the throwing of spectral images upon the smoke of burning incense by means of concave metal mirrors. But according to Hippolytus (Ref. Om. Haer. iv. 35), the desired effect was often produced in a simpler way, by causing the dupe to look into a cellar through a basin of water with a glass bottom standing under a sky-blue ceiling, or by figures on a dark wall drawn in inflammable material and suddenly ignited. The flashes of lightning and the rolling thunders which sometimes accompanied these manifesta- tions were easy tricks, now familiar to everybody as the ignition of lycopodium and the shaking of a sheet of metal. The ancient methods described by Hippolytus (iv. 32) were very similar.

Judging from the accounts which history has handed down to us, the marvels performed by the thaumaturgists of antiquity were very skilfully produced, and must have required a con- siderable practical knowledge of the art. The Romans were in the habit of giving conjuring exhibitions, the most favourite feat being that of the ” cups and balls,” the performers of

which were called acetabularii, and the cups themselves acetabula. The balls used, however, instead of being the convenient light cork ones employed by modern conjurors, were simply round white pebbles which must have added greatly to the difficulty of performing the trick. The art survived the barbarism and ignorance of the middle ages; and the earliest professors of the modern school were Italians such as Jonas, Androletti and Antonio Carlotti. But towards the close of Elizabeth's reign conjurors were classed with "ruffians, blasphemers, thieves, vagabonds, Jews, Turks, heretics, pagans and sorcerers."

The history of conjuring by mechanical effects and inventions is full of curious detail. Spectral pictures or reflections of moving objects, similar to those of the camera or magic lantern, were described in the 14th and 16th centuries. Thus, in the House of Fame, bk. iii., Chaucer speaks of " appearances such as the subtil tregetours perform at feasts" — pictorial representations of hunting, falconry and knights jousting, with the persons and objects instantaneously disappearing; exhibitions of the same kind are mentioned by Sir John Mandeville, as seen by him at the court of " the Great Chan " in Asia; and in the middle of the 16th century Benvenuto Cellini saw phantasmagoric spectres projected upon smoke at a nocturnal exhibition in the Colosseum at Rome. The existence of a camera obscura at this latter date

is a fact; for the instrument is described by Baptista Porta, the Neapolitan philosopher, in his Magia Naturalis (1558). And the doubt how magic lantern effects could have been produced in the 14th century, when the lantern itself is alleged to have been invented by Athanasius Kircher in the middle of the 17 th century, is set at rest by the fact that glass lenses were constructed at the earlier of these dates, — Roger Bacon, in his Discovery of the Miracles of Art, Nature and Magic (about 1260), writing of glass lenses and perspectives so well made as to give good telescopic and microscopic effects, and to be useful to old men and those who have weak eyes. Towards the end of the 18th century Comus, a French conjuror, included in his entertainment a figure which suddenly appeared and disappeared about three ft. above a table, — a trick explained by the circumstance that a concave mirror was among his properties; and a contemporary performer, Robert, exhibited the raising of the dead by the same agency. Early in the 19th century Philipstal gave a sensation to his magic lantern entertainment by lowering unperceived between the audience and the stage a sheet of gauze upon which fell the vivid moving shadows of phantasmagoria.

A new era in optical tricks began in 1863 when John Nevil Maskelyne (b. 1839), of Cheltenham, invented a wood cabinet in which persons vanished and were made to reappear, although it was placed upon high feet, with no passage through which a person could pass from the cabinet to the stage floor, the scenes, or the ceiling; and this cabinet was examined and measured for concealed space, and watched round by persons from the audience during the whole of the transformations. The general principle was this: if a looking-glass be set upright in the corner of a room, bisecting the right angle formed by the walls, the side wall reflected will appear as if it were the back, and hence an object may be hidden behind the glass, yet the space seem to remain unoccupied. This principle, however, was so carried out that no sign of the existence of any mirror was discernible under the closest inspection. Two years later the same simple principle appeared in " The Cabinet of Proteus," patented by Tobin and Pepper of the Polytechnic Institution, in which two mirrors were employed, meeting in the middle, where an upright pillar concealed their edges. In the same year Stodare exhibited the illusion in an extended form, by placing the pair of mirrors in the centre of the stage, supported between the legs of a three-legged table having the apex towards the audience; and as the side walls of his stage were draped exactly like the back, reflection showed an apparently clear space below the table top, where in reality a man in a sitting position was hidden behind the glasses and exhibited his head (" The Sphinx ") above the table. The plane mirror illusion is so effective that it has been reproduced with modifications by various performers. In one case a living bust was shown through an aperture in a looking-glass sloping upward from the front towards the back of a curtained cabinet; in another a person stood half-hidden by a vertical mirror, and imitation limbs placed in front of it were sundered and removed; and in another case a large vertical mirror was pushed forward from a back corner of the stage at an angle of 45 degrees, to cover the entrance of a living " phantom," and then withdrawn. Maskelyne improved upon his original cabinet by taking out a shelf which, in conjunction with a mirror, could enclose a space, and thus left no apparent place in which a person could possibly be hidden. He introduced a further mystification by secretly conveying a person behind a curtain screen, notwithstanding that, during the whole time, the existence of a clear space under the stool upon which the screen is placed is proved by performers continually walking round. The principle of reflecting by means of transparent plate-glass the images of highly-illuminated objects placed in front, so that they appear as if among less brilliantly lighted objects behind the glass, was employed in the " ghost " illusions of Sylvester, of Dircks and Pepper, of Robin, and of some other inventors, — the transparent plate-glass being, in some cases, inclined forwards so as to reflect a lime- lighted object placed below the front of the stage, and in other arrangements set vertically at an angle so as to reflect the object from

a lateral position.

Among the acoustic wonders of antiquity were the speaking head of Orpheus, the golden virgins, whose voices resounded through the temple of Delphi, and the like. Hippolytus (iv. 4) explains the trick of the speaking head as practised in his day, the voice being really that of a concealed assistant who spoke through the flexible gullet of a crane. Towards the close of the 10th century Gerbert (Pope Silvester II.) constructed (says William of Malmesbury) a brazen head which answered ques- tions; and similar inventions are ascribed to Roger Bacon, Albertus Magnus, and others. In the first half of the 1 7th century the philosopher Descartes made a speaking figure which he called his daughter Franchina; but the superstitious captain of a vessel had it thrown overboard. In the latter part of the same century Thomas Irson, an Englishman, exhibited at the court of Charles II. a wooden figure with a speaking-trumpet in its mouth; and questions whispered in its ear were answered through a pipe secretly communicating with an apartment wherein was a learned priest able to converse in various languages. Johann Beckmann, in his History of Inventions (about 1770, Eng. transl. by W. Johnston, 4th ed., 1846), relates his inspection of a speaking figure, in which the words really came through a tube from a confederate who held a card of signs by which he received intelligence from the exhibitor. Somewhat later was shown in England the figure of an infant suspended by a ribbon, having a speaking-trumpet in its mouth, — an illusion in which two concave mirrors were employed, one of them concentrating the rays of sound into a focus within the head of the figure; and the mirror nearest the figure was hidden by a portion of the wall-paper which was perforated with pin-holes. In 1783 Giuseppe Pinetti de Wildalle, an Italian conjuror of great originality, exhibited among his many wonders a toy bird perched upon a bottle, which fluttered, blew out a candle, and warbled any melody proposed or improvised by the audience, — doing this also when removed from the bottle to a table, or when held in the performer's hand upon any part of the stage. The sounds were produced by a confederate who imitated song-birds after Rossignol's method by aid of the inner skin of an onion in the mouth; and speaking-trumpets directed the sounds to whatever position was occupied by the bird. About the year 1825 Charles, a Frenchman, exhibited a copper globe, carrying four speaking- trumpets, which was. suspended in a light frame in the centre of a room. Whispers uttered near to this apparatus were heard by a confederate in an adjoining room by means of a tube passing through the frame and the floor, and answers issued from the trumpets in a loud tone. Subsequently appeared more than one illusion of a similar order, in which the talking and singing of a distant person issued from an isolated head or figure by aid of ear-trumpets secretly contained within parts in which, from their outside form, the presence of such*

instruments would not be suspected. It is probable that the automaton trumpeters of Friedrich Kaufmann and of Johann Nepomuk Malzel were clever deceptions of the same kind. As described in the Journal deMode, 1809, Malzel's life-size figure had the musical instrument fixed in its mouth; the mechanism was wound up, and a set series of marches, army calls, and other compositions was performed, accompaniments being played by a real band. Mechanical counterparts of the human lips, tongue and breath, both in speech and in playing certain musical instruments, have, however, been constructed, as in Jacques de Vaucanson's celebrated automaton flute-player, which was completed in 1736; the same mechanician's tambourine and flageolet player, which was still more ingenious, as, the flageolet having only three holes, some of the notes were produced by half -stopping; Abbe Mical's heads which articulated syllables, and his automata playing upon instruments; Kempelen's and Kratzenstein's speaking-machines, in the latter part of the 18th century; the speaking-machine made by Fabermann of Vienna, closely imitating the human voice, with a fairly good pronunciation of various words; the automaton clarionet-player constructed by Van Oeckelen, a Dutchman, and exhibited in New York in i860, which played airs from a barrel like that of a crank-organ, and could take the clarionet; from its mouth and replace it, and

Maskelyne's two automata, " Fanfare " (1878) playing a cornet, and " Labial " (1879) playing a euphonium, both operated by mechanism inside the figures and supplied with wind from a bellows placed separately upon the stage.

Lucian tells of the magician Alexander in the 2nd century that he received written questions enclosed in sealed envelopes, and a few days afterwards delivered written responses in the same envelopes, with the seals apparently unbroken; and both he and Hippolytus explain several methods by which this could be effected. In this deception we have the germ of " spirit-reading " and "spirit-writing," which, introduced in 1840 by John Henry Anderson, " The Wizard of the North," became common in the repertoire of modern conjurors, — embracing a variety of effects from an instantaneous substitution which allows the performer or his confederate to see what has been secretly written by the audience. The so-called " second-sight " trick depends upon a system of signalling between the exhibitor, who moves amongtheaudience collecting questions to be answered and articles to be described, and the performer, who is blind- folded on the stage. As already stated, the speaking figure which Stock showed to Professor Beckmann, at Gottingen, about 1770, was instructed by a code of signals. In 1783 Pinetti had an automaton figure about 18 in. in height, named the Grand Sultan or Wise Little Turk, which answered questions as to chosen

cards and many other things by striking upon a bell, intelligence being communicated to a confederate by an ingenious ordering of the words, syllables or vowels in the questions put. The teaching of Mesmer and the feats of clairvoyance suggested to Pinetti a more remarkable performance in 1785, when Signora Pinetti, sitting blindfold in a front box of a theatre, replied to questions and displayed her knowledge of articles in the possession of the audience. Half a century later this was developed with greater elaboration, and the system of telegraphing cloaked by intermixing signals on other methods, first by Robert-Houdin in 1846, then by Hermann in 1848, and by Anderson at a later period. Details of the system of indicating a very large number of answers by slight and unperceived variations in the form of question are given by F. A. Gandon, La seconde vue dlvoilee (Paris, 1849).

Fire tricks, such as walking on burning coals, breathing flame and smoke from a gall-nut filled with an inflammable composition and wrapped in tow, or dipping the hands in boiling pitch, were known in early times, and are explained by Hippolytus (iv. 33). At the close of the 17th century Richard- son astonished the English public by chewing ignited coals, pouring melted lead (really quicksilver) upon his tongue and swallowing melted glass. Strutt, in Sports and Pastimes of the People of England, relates how he saw Powel the fire-eater, in 1762, broil a piece of beefsteak laid upon his tongue, — a piece of lighted charcoal being placed under his tongue which a spectator blew upon with a bellows till the meat was sufficiently done. This man also drank a melted mixture of pitch, brimstone and lead out of an iron spoon, the stuff blazing furiously. These performers anointed their mouths and tongues with a protective composition.

Galen speaks of a person in the 2nd century who relighted a blown-out candle by holding it against a wall or a stone which had been rubbed with sulphur and naphtha; and the instan- taneous lighting of candles became a famous feat of later times. Baptista Porta gave directions for performing a trick entitled " many candles shall be lighted presently." Thread is boiled in oil with brimstone and orpiment, and when dry bound to the wicks of candles; and, one being lighted, the flame runs to them all. He says that on festival days they are wont to do this among the Turks. " Some call it Hermes his ointment." In 1783 Pinetti showed two figures sketched upon a wall, one of which put out a candle, and the other relighted the hot wick, when the candle was held to their mouths. By wafers he had applied a few grains of gunpowder to the mouth of the first, and a bit of phosphorus to that of the other. A striking trick of this conjuror was to extinguish two wax candles and simul- taneously light two others at a distance of 3 ft., by firing a pistol.

The candles were placed in a row, and the pistol fired from the end where the lighted candles were placed; the sudden blast of hot gas from the pistol blew out the flames and lighted the more distant candles, because in the wick of each was placed a millet-grain of phosphorus. A more recent conjuror showed a pretty illusion by appearing to carry a flame invisibly between his hands from a lighted to an unlighted candle. What he did was to hold a piece of wire for a second or two in the flame of the first candle, and then touch with the heated wire a bit of phos- phorus which had been inserted in the turpentine-wetted wick of the other. But in 1842 Ludwig Dobler, a German conjuror of much originality, surprised his audience by lighting two hundred candles instantaneously upon the firing of a pistol. This was the earliest application of electricity to stage illusions. The candles were so arranged that each wick, black from previous burning, stood a few inches in front of a fine nozzle gas-burner projecting horizontally from a pipe of hydrogen gas, and the two hundred jets of gas passed through the same number of gaps in a conducting- wire. An electric current leaping in a spark through each jet of gas ignited all simultaneously, and the gas flames fired the candle wicks.

J. E. Robert-Houdin (1805-1871), who opened his " Temple of Magic " at Paris in 1845, originated the application of electro- magnetism for secretly working or controlling mechanical apparatus in stage illusions. His Soirees fantastiques at Paris gave him such a reputation that the French government actually sent him to Algiers in order to show his superiority to the local marabouts; and he ranks as the founder of modern conjuring. He first exhibited in 1845 his light and heavy chest, which, when placed upon the broad plank or " rake " among the spectators, and exactly over a powerful electromagnet hidden under the cloth covering of the plank, was held fast at pleasure. In order to divert suspicion, Houdin showed a second experiment with the same box, suspending it by a rope which passed over a single small pulley attached to the ceiling; but any person in the audience who took hold of the rope to feel the sudden increase in the weight of the box was unaware that the rope, while appearing to pass simply over the pulley, really passed upward over a winding-barrel worked as required by an assistant. Remarkable ingenuity was displayed in concealing a small electromagnet in the handle of his glass bell, as well as in his drum, the electric current passing through wires hidden within the cord by which these articles were suspended. In one of Houdin's illusions — throwing eight half-crowns into a crystal cash-box previously set swinging — electricity was employed in a different manner. Top, bottom, sides and ends of an oblong casket were of transparent glass, held together at all the edges by a light metal frame. The coins were concealed under an opaque design on the lid, and supported by a false lid of glass, which was tied by cotton thread to a piece of platinum wire. Upon connecting the electric circuit, the

platinum, becoming red- hot, severed the thread, letting fall the glass flap, and dropping the coins into the box.

Down to the latter part of the 18th century no means of secretly communicating ad libitum motions to apparently isolated pieces of mechanism had superseded the clumsy device of packing a confederate into a box on legs draped to look like an unsophisticated table. Pinetti placed three horizontal levers close beside each other in the top of a thin table, covered by a cloth, these levers being actuated by wires passing through the legs and feet of the table and to the confederate behind a scene or partition. In the pedestal of each piece of apparatus which was to be operated upon when set loosely upon the table were three corresponding levers hidden by cloth; and, after being examined by the audience, the piece of mechanism was placed upon a table in such a position that the two sets of levers exactly coincided, one being superimposed upon the other. In one " effect " the confederate worked a small bellows in the base of a lamp, to blow out the flame; in another he let go a trigger, causing an arrow to fly by a spring from the bow of a doll sports- man; he actuated a double-bellows inside a bottle, which caused flowers and fruit to protrude from among the foliage of an

artificial shrub, by distending with air a number of small bladders shaped and painted to represent them; he opened or shut valves which allowed balls to issue out of various doors in a model house as directed by the audience; and he moved the tiny bellows in the body of a toy bird by which it blew out a candle. Other conjurors added more complicated pieces of apparatus, — one being a clock with small hand moving upon a glass disk as required by the audience. The glass disk carrying the numbers or letters was in reality two, the back one being isolated by ratchet teeth on its periphery hidden by the ring frame which supported it, and, though the pillar-pedestal was separated into three pieces and shown to the spectators, movable rods, worked by the table levers, were in each section duly covered by cloth faces. Another mechanical trick, popular with Torrini, Houdin, Philippe and Robin, and worked in a similar way, was a little harlequin figure which rose out of a box set upon the table, put his legs over the front of the box and sat on the edge, nodded his head, smoked a pipe, blew out a candle, and whistled a one-note obbligato to an orchestra. Robert-Houdin employed, instead of the table levers, vertical rods each arranged to rise and fall in a tube, according as it was drawn down by a spiral spring or pulled up by whip-cord which passed over a pulley at the top of the tube and so down the table leg to the hiding-place of the confederate. In his

centre table he had ten of these " pistons," and the ten cords passing under the floor of the stage terminated at a keyboard. Various ingenious automata were actuated by this means of transmitting motion; but the most elaborate piece of mechanical apparatus constructed by Houdin was his orange tree. The oranges, with one exception, were real, stuck upon small spikes, and concealed by hemispherical screens which were covered with foliage; and the screens, when released by the upward pressure of a piston, made half a turn, and disclosed the fruit. The flowers were hidden behind foliage until raised above the leaves by the action of another piston. Near the top of the tree an artificial orange opened into four portions; while two butterflies attached to two light arms of brass rose up behind the tree, appeared on each side by the spreading of the arms, and drew out of the opened orange a handkerchief which had been borrowed and vanished away.

Many of the illusions regarded as the original inventions of eminent conjurors have been really improvements of older tricks. Hocus Pocus Junior, The Anatomy of Legerdemain (4th ed., 1654) gives an explanatory cut of a method of drawing different liquors out of a single tap in a barrel, the barrel being divided into compartments, each having an air-hole at the top, by means of which the liquid in any of the compartments was withheld or permitted to flow. Robert-Houdin applied the principle to a wine-bottle held in his hand from which he could pour four different liquids regulated by the unstopping of any of the four tiny air-holes which were covered by his fingers. A large number of very small liqueur glasses being provided on trays, and containing drops of certain flavouring essences, enabled him to supply imitations of various wines and liquors, according to the glasses into which he poured syrup from the bottle; while by a skilful substitution- of a full bottle for an emptied one, or by secretly refilling in the act of wiping the bottle with a cloth, he produced the impression that the bottle was " inexhaustible." In 1835 was first exhibited in England a trick which a Brahman had been seen to perform at Madras several years before. Ching Lau Lauro sat cross-legged upon nothing, — one of his hands only just touching some beads hung upon a genuine hollow bamboo which was set upright in a hole on the top of a Wooden stool. The placing of the performer in position was done behind a screen; and the explanation of the mysterious suspension is that he passed through the bamboo a strong iron bar, to which he connected a support which, concealed by the beads, his hand and his dress, upheld his body. In 1849 Robert-Houdin reproduced the idea under the title of ethereal suspension, — professedly rendering his son's body devoid of weight by administering vapour of ether to his nose, and then, in sight of the audience, laying him in a horizontal position in the air with one elbow resting upon a staff resembling

a long walking-stick. The support was a jointed iron frame under the boy's

dress, with cushions and belts passing round and under ;he body. Subsequently the trick was improved upon by Sylvester — the suspended person being shown in several changes of position, while the sole supporting upright was finally removed. For the latter deception the steel upright was made with polished angular faces, apex towards the spectators, and acted in a dim light on the same principle as the mirrors , of a Sphinx table. Before lowering the light, the reflector bar is covered by the wood staff set up before it.

The mysterious vanishing or appearing of a person under a large extinguisher upon the top of a table, and without the use of mirrors, was first performed by Comus, a French conjuror very expert in the cups-and-balls sleight-of-hand, who, appearing in London in 1789, announced that he would convey his wife under a cup in the same manner as he would balls. The feat was accomplished by means of a trap in a box table. Early in the 19th century Chalons, a Swiss conjuror, transformed a bird into a young lady, on the same principle. In 1836 Sutton varied the feat by causing the vanished body to reappear under the crust of a great pie. Houdin " vanished " a person standing upon a table top which was shown to be only a few inches thick; but there was a false top which was let down like the side of a bellows, this distension being hidden by a table-cloth hanging sufficiently low for the purpose, and the person, when covered by the extinguisher, entered the table through a trap-door opening upwards. Robin, in 1851, added to the wonder of the trick by vanishing two persons in succession, without any possibility of either escaping from the table, — the two persons really packing themselves into a space which, without clever arrangement and practice, could not hold more than one. The sword-and-basket trick was common in India many years ago. In one form it consisted in inverting an empty basket over a child upon the ground; after the child had secreted himself between the basket-bottom and a belt concealed by a curtain painted to look like the actual wicker bottom, a sword was thrust through both sides of the basket, the child screaming, and squeezing upon the sword and upon the ground a blood- coloured liquid from a sponge. When the performer upset the basket, the child could not be seen; but another child similarly costumed suddenly appeared among the spectators, having been up to that time supported by a pair of stirrups under the cloak of a confederate among the bystanders. In another form an oblong basket is used large at the bottom and tapering to the top, with the lid occupying only the central portion of the top, and the child is so disposed round the basket that the sword plunged downward avoids him, and the performer can step inside and stamp upon the bottom to prove that the basket is empty. In 1865 Stodare introduced the trick into England, but in a new manner. Upon light trestles he placed a large oblong basket; and after a lady attired in a profuse muslin dress had composed herself and her

abundance of skirt within, and the lid had been shut and the sword plunged through the sides, the basket was tilted towards the audience to show that it was empty, and the lady reappeared in a gallery of the hall. The basket was formed with an outer shell to turn down, leaving the lady with her dress packed together lying upon the basket bottom and behind what had formed a false front side,~— the principle being the same as in the clown's box, which, when containing a man, is rolled over to display the inside empty. The reappearing lady was a double, or twin sister.

Among the most meritorious and celebrated mechanical illusions have been automaton figures secretly influenced in their movements by concealed operators. In the 17th century M. Raisin, organist of Troyes, took to the French court a harpsi- chord which played airs as directed by the audience; but, upon opening the instrument, Louis XIV. discovered a youthful performer inside. In 1769 Baron Kempelen, of Pressburg, in Hungary, completed his chess-player, which for a long time remained the puzzle of Europe. It was an illusion, — the merit consisting in the devices by which the confederate player was hidden in the cabinet and body of the figure, while the interior

was opened in successive instalments to the scrutiny of the spectators. The first player was a Polish patriot, Worousky, who had lost both legs in a campaign; as he was furnished with artificial limbs when in public, his appearance, together with the fact that no dwarf or child travelled in Kempelen's company, dispelled the suspicion that any person could be employed inside the machine. This automaton, which made more than one tour to the capitals and courts of Europe, and was owned for a short time by Napoleon I., was exhibited by Malzel after the death of Kempelen in 1819, and ultimately perished in a fire at Phila- delphia in 1854. A revival of the trick appeared soon afterwards in Hooper's " Ajeeb," shown at the Sydenham Crystal Palace and elsewhere. A chess-playing figure, " Mephisto," designed by Gumpel, was also exhibited. No space existed for the accommodation of a living player within; but, as there was no attempt at isolating the apparatus from mechanical communica- tion through the carpet or the floor, there was nothing to preclude the moving arm and gripping finger and thumb of the figure from being worked by any convenient connexion of threads, wires, rods and levers. In 1875 Maskelyne and Cooke produced at the Egyptian Hall, in London, an automaton whist-player, " Psycho," which, from the manner in which it was placed upon the stage, appeared to be perfectly isolated from any mechanical communication from without; there was no room within for the concealment of a living player by aid of any optical or other illusion, and yet the free motions of both arms, especially of the right arm and hand in finding any Card, taking hold of it, and raising it or lowering it to any position and at any speed as demanded by the audience, indicated that the actions were directed from without. The arm had all the complicated movements necessary for chess or draught playing; and " Psycho " calculated any sum up to a total of 99,000,000. A still more original automaton was Maskelyne's figure " Zoe," constructed in 1877, which wrote and drew pictures at dictation of the audience. " Zoe," a nearly life-size but very light doll, sat loose upon a cushioned skeleton-stand, of which the solid feet of the plinth rested upon a thick plate of clear glass laid upon the floorcloth or carpet of the stage. " Psycho," a smaller oriental figure, sitting cross-legged on a box, was supported by a single glass cylinder of clear glass, which, as originally exhibited, stood upon the carpet of the stage, but was afterwards set loose upon a small stool, having solid wood feet.

That a mysterious and apparently elaborate mechanical movement may, after all, possess the utmost simplicity is illustrated by the familiar conjuring trick known as " rising cards." Four cards having been chosen by the audience and returned to the pack, this is placed end upwards in a

glass goblet, or in a thin case not deep enough to hide the pack, upon the top of a decanter or upon a stick. At command, the cards rise, one at a time, out of the pack; one rises part of the way and sinks back again; one rises quickly or slowly as directed; one comes out feet first, and, on being put back, rises head upwards like the others; and one dances in timer to music, and finally jumps out of the pack. At the conclusion there remain only the goblet or the case and the cards, subject to the minutest examination of any one from the audience, without a trace of moving mechanism visible. This was one of the chief jeux of Louis Christian Comte, the French conjuror and ventriloquist, at the end of the 18th century, and in varied forms has been popular to the preseiit day. Probably it was suggested by the earlier device of the golden head dancing in a glass tumbler, which is described in The Conjuror Unmasked (1790). Several crown pieces were put in the glass, a small gilded head above them, and a plate or other flat cover laid upon the mouth of the glass; yet the head thus isolated jumped inside the glass so as to count numbers and answer questions. The secret communicator of motion was a fine silk thread attached to the head and passing through a tiny notch cut in the lip of the glass, and so to a confederate who pulls it. In the case of the rising cards the whole of the movements are effected by arranging a single silk thread in the previously prepared pack, passing over some cards and under others, and led behind the decanter or other

support to the stage and thence to the confederate. As this in- finitely simple mechanical agent is drawn altogether out of the pack after the last card has risen, literally no trace remains of any means of communicating motion to the cards.

Oriental ingenuity, which furnished the original idea of the ethereal suspension trick, contributed the Chinese rings intro- duced into England in 1834; also the Chinese feat of producing a bowl of water with gold-fish out of a shawl, first seen in England in 1845, an d the Indian rope-tying and sack feats upon which the American brothers Davenport founded a distinct order of performances in 1859. Their quick escape from rope bonds in which they were tied by representatives of the audience, the instantaneous removal of their coats in a dark seance, leaving themselves still bound, and their various other so-called ” pheno- mena ” were exposed and imitated by Maskelyne, who, in i860, greatly surpassed any feats which they had accomplished. He proceeded to exhibit himself floating in the air, to show “material- ized spirit forms,” and to present a succession of wonders of the spirit mediums in novel performances. One of Maskelyne’s cleverest inventions was the box which he constructed in i860; it closely fitted when he packed himself in a cramped position within; it was enclosed in a canvas

wrapper, corded with any length and complicated meshing of rope, and the knot sealed, yet his escape was effected in seven seconds. Taking more time, he performed the converse of these operations except the sealing. Provided with the wrapper and the open box, himself standing outside,he drew a curtain before him to concealthe modus operandi, and in a few minutes was found in the box, which, though so small as to permit no limb to be moved more than a few inches, he nevertheless wrapped and corded as exactly as if he had operated from the outside.

Modern conjuring has given rise to many interesting develop- ments, but none perhaps attracted a larger share of public attention than the legal battle in the last years of the century over this box-trick. The case had a special interest in England, from the fact that it was the only one in which a trick had ever occupied the attention of the House of Lords. The litigation arose in this way. Mr Maskelyne had been in the habit of offering a considerable reward to any one who could produce a correct imitation of his box-trick. The offer was a direct challenge to imitators, and was intended to show — as nothing else could have done^-that the tricks sold and exhibited as " correct imitations " were not what they professed to be. Two amateur mechanicians, having made or procured a box externally resembling Mr Maske- lyne's, gave a private performance before a few friends, and then claimed the reward. Mr Maskelyne refused to pay, his contention being that hundreds of people had already escaped from locked and corded boxes resembling his in appearance. Indeed, it was for that very reason that he had been compelled to make the offer. The claimants then brought an action to recover £500 — the amount offered. Mr Maskelyne produced his box in court, and challenged the plaintiffs to expose the secret, contending that they could riot possibly imitate correctly a trick of which they did not know the secret. Their point, however, was that they had nothing to do with the secret, and that a box-trick was not a trick-box. The jury, being unable to decide whether a mechanical trick is a piece of mechanism or the effect it produces, could not agree, and were discharged. In a second trial, the jury, after much deliberation, found for the plaintiffs. Mr Maskelyne appealed against the verdict. His appeal occupied the court for three days, and was dismissed. Finally he carried the case to the House of Lords, and lost it. The majority of the law lords, while fully admitting that the secret had never been discovered, Were of opinion that the trick had been correctly " imitated." To people dealing with mechanical devices this decision is bound to appear not a little curious. A mechanical trick is a mechanical invention, and when we have two absolutely different inventions, although they may produce more or less similar results, one is by no means an imitation of the other — to say nothing of a " correct imitation." Applied to inventions generally, such a ruling Would produce disastrous results.

To those interested in magic, however, one effect of the

litigation was to intensify the mystery surrounding the original box-trick. The whole matter has been publicly thrashed out. It has been learned that the trick, generally, consists of a movable panel fastened by a secret catch. Provided that the rope be not too severely knotted over that panel, the performer can escape; but otherwise failure is inevitable. Further, it is known that the original trick has never failed, even under the most severe tests, whereas the imitations have failed repeatedly. There can only be one reason for this — a great difference in the mechanical principles employed.

Like most forms of refined entertainment the conjuror's magic appears to have kept well abreast of the times. Certainly, at no period of the world's history has it ever been so popular as at present. As a natural consequence, so many skilled exponents of the art have never before existed. . Yet there is one respect in which at the present day conjuring shows no advance upon the records of earlier times. The one great peculiarity in connexion with magic, at every period, has been the limited number of those who prove themselves capable of originating magical effects. This peculiarity has never been more thoroughly emphasized than at present. Since the days of Robert-Houdin, only two men have attained any remarkable degree of prominence — Mr Maskelyne and M. Buatier de Kolta. There are many who, as entertainers, are entitled to rank with the highest, but to those two only can prominence be justly given as originators. The only logical conclusion to be drawn is that to invent original illusions is a matter of no ordinary difficulty, and, indeed, all who have attempted work of that kind will admit that such is the case. When, however, an original principle has been invented, it may be utilized in producing many and apparently quite distinct effects. As an example of this, Maskelyne's " Cleopatra's Needle," invented in 1879, may be mentioned. The trick con- sisted of a piece of mechanism representing an exceedingly light model of the famous obelisk. So light was it, in fact, that it could easily be lifted with one hand. Upon an isolated stand, previously examined by the audience, a sheet of ordinary brown paper was laid, and on this the " needle " was placed. Thus during the performance communication with the obelisk was obviously impossible. Yet from within it human beings emerged in a most startling manner. The secret consisted in the fact that the " needle " was capable of being lifted by invisible means, and from the outset contained two or three persons concealed within it. Notwithstanding the fact that this illusion was one of Mr Maskelyne's simplest devices, it puzzled even experts for a considerable time. When at last the secret leaked out, the principle was seized upon with

avidity and utilized in a variety of ways — for example, by M. Buatier de Kolta in his beautiful illusion, " The Cocoon," first produced at the Egyptian Hall, London, in 1887. In this case de Kolta had the advantage of Mr Maskelyne's assistance in perfecting the mechanical details. De Kolta's smaller tricks have for years supplied the whole army of ordinary conjurors with novelties. In 1886, at the Eden Theatre, Paris, he introduced his famous illusion known as " The Vanishing Lady." This mystery, performed as he alone could perform it, was one of the most effective tricks ever exhibited. Hundreds of " imitations " were, of course, produced ; but, like the imitations of Mr Maskelyne's box, they sink into insignificance when compared with the original; and in this case, unfortunately for the originator, the reputation of the original was speedily ruined by clumsy exponents, who only succeeded in exposing the principle. The effect produced by de Kolta was as follows: — Taking from his pocket what appeared to be an ordinary newspaper, folded, he opened it out and laid it upon the stage. Then a chair was shown, front and back, to. the audience, and placed upon the paper. Madame de Kolta, in ordinary evening dress, then took her seat upon the chair, and a large piece of black silk was thrown over her, enveloping her from head to foot. Then de Kolta would shout, " I'll throw you in the air! " — or words to that effect — and to all appearance he grasped her round the waist, lifted her above his head, and she vanished, covering and all, at his finger-tips.

Among the illusions depending for their effect upon sudden

disappearance, perhaps the most inexplicable was that produced by Mr Maskelyne in 1891 under the appropriate titleof " Oh!":— that being an expression frequently used by spectators upon witnessing the startling effect. In the illusion the performer whose disappearance was to be effected seated himself upon a raised couch, above which a kind of canopy was supported upon, brass rods. From the canopy depended curtains capable of being raised or lowered. The right hand of the performer was strapped to one end of this couch, and the left hand was secured by means of a strap attached to one end of a stout cord. The other end of the cord, having been passed through a hole in the framework of the canopy, was securely held by a member of the audience. The curtains were then lowered to within 18 in. of the ground, and through an aperture in the front curtain the performer's right hand was passed. This hand, again, was held by a second member of the audience. Finally, a sheet of iron was placed beneath the couch, to prevent any possibility of the performer's escape being effected through a trap in the stage. Thus, with the performer's right hand in full view, his left drawn upwards by the cord attached to it, and a clear space below the couch, escape seemed impossible; yet, upon the word " Go!" the right hand disappeared, the cord became slack in the hands of the holder, the curtains were instantly raised, and the performer had vanished.

In 1886 M. Buatier de Kolta, in conjunction with Mr Maskelyne, presented at the Egyptian Hall, London, a series of illusioftary effects upon an entirely novel principle, to which they gave the name of " Black Magic." The main idea was based upon the fact — obvious when Once it is pointed out — that visible form cannot exist in the absence of shadow or varying tint. In other words, we can only distinguish forms when they exhibit either variations in colour or shade. Absolute uniformity must, necessarily, mean invisibility. To bring about this uniformity, the entire stage was draped in black velvet, giving it the ap- pearance of a dark and immensely deep cavern. There were no lights within it, though from the front it was brilliantly illumin- ated. Upon the stage, thus prepared, the most startling appearances and disappearances took place, within a few feet of the footlights. The illusions were produced by the simple method of covering anything to be concealed by screens of black velvet. These could be brought almost to the front of the stage, and yet would remain invisible; thus, in an instant", persons or articles would appear, apparently from space, or would disappear into it. The principle involved in the pro- duction of these illusions was adopted subsequently by many conjurors, and has served to produce an almost endless variety of effects.

The production of innumerable blossoms from a sheet of paper was undoubtedly the prettiest of M. Buatier de Kolta's smaller tricks. A small sheet of cartridge-paper is twisted into a cone, which is shown to be empty, but immediately artificial blossoms begin to pour out of it, until quite a bushel of them are piled up. Unfortunately for the inventor, the first time he introduced the trick at the Eden Theatre, Paris, one or two of the " blosspms " were carried by a draught of air into the auditorium. These were at once sold to a manufacturer of conjuring appliances, and within a few days de Kolta's " Spring Blossoms " were upon the market. !

Another startling trick, by the same inventor, is " The Flying Cage." A live bird is imprisoned within a small cage, held between the performer's hands, when suddenly, by a quick movement of the arms, both bird and cage vanish. The cage simply collapses, and is drawn by a string up the coat-sleeve, the unfortunate bird being sometimes maimed, if not killed outright. The Society for the Prevention of Cruelty to Animals once took action in the matter, and sought to prevent the performance of the trick at one of the London music-halls; but the conjuror in this case invited the officials to witness a private demonstration, and was clever enough to convince them that there was no cruelty. Conjuring with animals has a great charm for young folk, and happily it is very seldom that a trick involves any cruelty whatever. The animals, as a rule, quickly

become accustomed to the business, and appear thoroughly to understand what is required of them.

In recent years the mystery known as " Second Sight " has been vastly improved. The old system, invented by Pinetti in 1785, and brought to great perfection by Robert-Houdin, has almost disappeared. It consisted of an elaborate code of signals, given by means of subtle variations in the questions put to the supposed clairvoyant; the form in which the question was put conveying the appropriate answer. Now it is customary to avoid speech altogether. The information is conveyed by means of gesture or slight sounds at varying intervals. This business requires an enormous amount of practice, and an abnormal memory on the part of those who become expert.

But there are certain tricks of this class which require little or no skill and a very small amount of practice. These are generally introduced by impostors who claim or tacitly suggest the possession of supernatural powers. The following is a very familiar example of the kind of trick employed by such persons. The performers are usually a man and a woman. The man first appears, and informs the audience that he will shortly introduce a lady possessing extraordinary powers. Not only can she read the thoughts of any person whose mind is en rapport with hers, but also she can foretell the future, trace missing friends, discover lost property, &c. In order to display the lady's capa- bilities, he requests that any members of the audience who have questions they would like answered will write them secretly. For convenience in writing, slips of paper, pencils and squares of thick millboard are passed round, the millboard squares being for use as writing-desks. The writers are particularly cautioned to allow no one to see what is written, but to fold up the papers and retain them in their own possession. Further, the writers are instructed that, when the clairvoyant appears, the thoughts of each must be kept intently fixed upon what he has written. The pencils and millboards are then collected, and the prepara- tions being so far complete, other portions of the entertainment are proceeded with. Finally, as the last item in the programme, the clairvoyant is introduced. A handkerchief, upon which some liquid has been poured, is held over the lady's nose and mouth, and apparently she falls into a trance. Then she proceeds to describe the appearance of certain of the writers, the position they occupy in the room, and the nature of the questions they have written, giving to those questions more or less plausible answers. The trick never fails to produce the most profound astonishment, and by its means several persons have made rapid strides to fortune. But the whole business is an impudent imposture. Therefore it cannot be too often or too thoroughly exposed. It is accomplished as follows. Some of the

millboards passed round for convenience in writing are built up of a number of thicknesses, fastened together at the edges only. Beneath the outer layer a sheet of carbon paper is concealed, so that the pressure of the pencil causes a reproduction in duplicate to be impressed upon an inner layer of cardboard. These pre- pared pads are handed round by attendants, who note the dress and appearance of the persons by whom the questions are written. That information, together with the prepared pads, is subse- quently conveyed to the clairvoyant. She requires a certain amount of time in order to memorize the questions and the description of the writers; consequently she is not introduced to the audience until, say, an hour has elapsed. Of course, it would not be discreet to have all the millboards prepared. Many of them, perhaps the majority, are really what they appear to be; but, needless to say, the questions written upon these are never answered. It is carefully pointed out beforehand that the clairvoyant can only read the questions of those whose minds are in sympathy with hers. That statement, naturally, serves to account for her inability to read or answer questions written by those who have used the plain millboards.

In connexion with this trick a further imposture is carried out by inviting strangers to send, by post, any questions they wish to have answered. Such an invitation appears to be quite Straightforward and genuine, but those who are sufficiently credulous or sufficiently curious to respond to it lend themselves

to the perpetration of an ingenious fraud. In reply to any such communication, the writer is informed that it is necessary for him to attend one of the public performances, and endeavour to bring his mind into harmony with that of the clairvoyant. Enclosed is a complimentary ticket entitling him to attend any performance he pleases. The procedure, then, is simply this. Each ticket bears a private mark, and a corresponding mark is put upon the letter written by the person to whom it is sent. When any marked ticket is presented, the attendant notes the dress and appearance of the visitor and the seat he occupies. That information is given to the clairvoyant, together with the ticket. She refers to the letter bearing the mark corresponding to the ticket, and ascertains what that particular visitor wishes to know. Thus to the public she appears to read and answer a question which has not been written down, but merely thought of by a total stranger. There are numerous methods of obtaining information by means similar to those already described. Suffi- cient, however, has been said to show that such devices are of the simplest, and require nothing more than a callous effrontery to carry them into effect. Of course, all kinds of mischances are bound to occur. But, when one is supposed to be dealing with undiscovered laws of nature, it does not require much in- genuity to wriggle out of any situation, however difficult.

Modern magic calls to its aid all the appliances of modern science — electricity, magnetism, optics and mechanics; but the most successful adepts in the art look down upon all such aids and rely upon address and sleight of hand alone. The presti- digitator's motto is " The quickness of the hand deceives the eye "; but this very phrase, which is always in a performer's mouth, is in itself one of the innocent frauds which the conjuror employs as part and parcel of his exhibition. The truth is that it is not so much upon the quickness with which a feat is performed as upon the adroitness with which the time and means of perform- ing it are concealed that its success depends. The right oppor- tunity for executing the required movement is technically called a temps. This is defined to be any act or movement which dis- tracts the attention of the audience while something is being " vanished " or " produced." Experiment will readily convince any one that it is absolutely impossible to move the hand so quickly as to abstract or replace any object without being perceived, so long as the eyes of the audience are upon the performer. But it is very easy to do so unnoticed, provided the audience are looking another way at the time; and the faculty of thus diverting their attention is at once the most difficult and the most necessary accomplishment for a conjuror to acquire. It does not suffice to point, or ask them to look in another direction, because they will obviously suspect the truth and look with all the more persistence. The great requisite is to " have a good eye " — in French conjuring parlance avoir de I'odl; an earnest, convinced look of the performer in a particular direction will carry every one's glances with it, while a furtive glance at the hand which is performing some function that should be kept secret will ruin all.

The motto prefixed by Robert-Houdin to his chapter on the " Art of Conjuring " is — " to succeed as a conjuror, three things are essential: first, dexterity; second, dexterity; and third, dexterity "; and this is not a mere trick of language, for triple dexterity is required, not only to train the hand to the needful adroitness, but to acquire the requisite command of eye and tongue. Unfortunately this dexterity may be applied not only to conjuring but to cheating, particularly in the case of card- sharpers. It takes various forms: (1) marking the cards; (2) abstracting certain cards during the game for clandestine use; (3) previously concealing cards about the person; (4) packing the cards; (5) substituting marked or prepared packs; (6) confederacy; (7) false shuffles. All these methods are thoroughly exposed in Robert-Houdin's work Les Trickeries des Grecs. The successful card-sharper must have qualities which, if applied in a legitimate direction, would ensure distinction in almost any profession.

In the case of purely dexterical tricks, little advance has been made. Recently some new sleights were introduced from

America. These consist in an amplification of the method of concealing coins and cards at the back of the fingers. The principle has received the incongruous title of " back-palming." By means of this method both back and front of the hand alternately can be shown empty, while, notwithstanding its apparent emptiness, the hand nevertheless conceals a coin or card. The first and fourth fingers are caused to act as pivots, upon which the concealed articles are turned from front to back, and vice versa, the turning being performed by the second and third fingers. The movement is very rapid, and is accomplished in the act of turning over the hand to show the two sides alter- nately. The sleight requires an enormous amount of practice. It has been brought to the highest state of perfection by Herr Valadon.

In all ages a very popular magical effect has been the apparent floating of a person in empty space. An endless variety of in- genious apparatus has been invented for the purpose of pro- ducing such effects, and the present article would be incomplete without some reference to one or two of the more modern examples. A very pretty illusion of this kind is that originally produced under the title of " Astarte." A lady is brought forward, and after making her bow to the audience she retires to the back of the stage, the whole of which is draped with black velvet and kept in deep shadow. There she is caused to rise in the air, to move from side to side, to advance and retire, and to revolve in all directions. The secret consists in an iron lever, covered with velvet to match the background, and therefore invisible to the audience. This lever is passed through an opening in the back curtain and attached to a socket upon the metal girdle worn by the performer. The girdle consists of two rings, one inside the other, the inner one being capable of turning about its axis. By means of this main lever and a spindle passing through it and gearing into the inner ring of the girdle, the various movements are produced. A hoop is passed over the performer with a view to demonstrate her complete isolation, but the audience is not allowed to examine it. It has a spring joint which allows it to pass the supporting lever. Among illusions of this class there is probably none that will bear com- parison with the " levitation " mystery produced by Mr Maske- lyne. A performer, in a recumbent position, is caused to rise several feet from the stage, and to remain suspended in space while an intensely brilliant light is thrown upon him, illuminating the entire surroundings. Persons walk completely round him, and a solid steel hoop, examined by the audience, is passed over him, backwards and forwards, to prove the absence of any tangible connexion.

The secrets of conjuring were for a long time jealously guarded by its professors, but in 1793 a work appeared in Paris, by M. Decremps, entitled

Testament de Jerome Sharpe, professeur de physique amusante, which gives a very fair account of the methods then in vogue. In 1858 a still more important and accurate book was published — Sorcellerie ancienne el moderne expliquee, by J. N. Pousin; and in 1868 J. E. Robert-Houdin issued his Secrets de la prestidigation et de la magie, which is a masterly exposition of the entire art and mystery of conjuring. The last-mentioned book was translated into English by Professor Louis Hoffman, the author of Modern Magic. See also Hoffman, More Magic, and Later Magic; Edwin Sachs, Sleight of Hand; and J. N. Maskelyne, Sharps and Flats. (J. A. Cl.; G. Fa.; J. N. M.)

CONKLING, ROSCOE (1829-1888), American lawyer and political leader, was born in Albany, New York, on the 30th of October 1829. He was the son of Alfred Conkling (1789-1874), who was a representative in Congress from New York in 182 1- 1823, a Federal district judge in 1825-1852, and U.S. minister to Mexico in 1852-1853. Roscoe Conkling was admitted to the bar at Utica, New York, in 1850, was appointed district-attorney of Oneida county in the same year, and soon attained success in the practice of his profession. At first a Whig, he joined the Republican party at its formation, and was a Republican repre- sentative in Congress from 1859 to 1863. He refused to follow the financial policy of his party in 1862, and delivered a notable speech against the passage of the Legal Tender Act, which made a certain class of treasury notes receivable for all public and private debts. In this opposition he was joined by his brother,

Frederick Augustus Conkling (1816-1891); at that time also a Republican member of Congress. In 1863 he resumed the practice of law, and in April 1865 was appointed a special judge advocate by the secretary of war to investigate alleged frauds in the recruiting service in western New York. He was again a representative in Congress from December 1865 until 1867, when he entered the Senate. After the war he allied himself with the radical wing of his party, was a member of the joint committee that outlined the congressional plan of reconstructing the late Confederate States, and laboured for the impeachment of President Johnson. During President Grant's administration he was a member of the senatorial coterie that influenced most of the president's policies, and in 1873 Grant urged him to accept an appointment as chief justice of the Supreme Court, but he declined. In the Republican national convention of 1876 Conkling sought nomination for the presidency, and after the disputed election of this year he took a prominent part in devising and securing the passage of a bill creating an electoral commission. In 1880 he was one of the leaders of the unsuccess- ful movement to nominate Grant for a third presidential term. With Grant's successors, Hayes and Garfield, his relations were not cordial; an opponent of civil service reform, he came into conflict with President Hayes over the removal of Chester A. Arthur and other federal office-

holders in New York; and when in 1 88 1 President Garfield, without consulting him, appointed William H. Robertson, a political opponent of Conkling, as collector of the port of New York, and when this appointment was confirmed by the Senate in spite of Conkling's opposition, Conkling and his associate senator from New York, Thomas C. Piatt, resigned their seats in the Senate and sought re-election as a personal vindication. Being unsuccessful, Conkling took up the practice of law in New York city, again declining, in 1882, a place on the bench of the Supreme Court, and appeared in a number of important cases. While in public life Conkling always attracted attention by his abilities, his keenness and eloquence in debate, his aggressive leadership and his striking personality. Though always a strenuous worker in Congress, he was not the originator of any great legislative measures, and his efficiency as a law-maker is thought to have been much impaired by his personal animosities. His hostility to James G. Blaine, a fellow Republican senator, was especially marked. He died in New York city on the 18th of April 1888.

See A. R. Conkling (ed.), The Life and Letters of Roscoe Conkling (New York, 1889).

CONN, LOUGH, a lake of western Ireland, in Co. Mayo. Its length (N.N.W. to S.S.E.) is 9 m. and its extreme breadth rather over 4 m., but two promontories projecting from opposite shores about the centre narrow it to less than 1 m. On the south a passage so narrow as to be bridged communicates with Lough Cullin; the current through this channel, normally from Conn to Cullin, is sometimes reversed. The total length of the two loughs is nearly 12 m. They drain eastward by a short channel tributary to the Moy, and the principal affluents are the Deel and the Manulla. Lough Conn lies 42 ft. above sea-level. It contains a few islands, and its shores are generally low, but the isolated mass of Nephin (2646 ft.) rises finely on the west. The lake is in favour with anglers.

CONNAUGHT, ARTHUR WILLIAM PATRICK ALBERT, Duke of (1850-), third son and seventh child of Queen Victoria, was born at Buckingham Palace on the 1st of May 1850. Being destined for the army, the young prince was entered at the Royal Militafy Academy, Woolwich, in 1866, and gazetted to the Royal Engineers on the 19th of June 1868. In the follow- ing November he was transferred to the Royal Artillery, and on the 3rd of August 1869 to the Rifle Brigade. He became captain in 1871, and, transferred to the 7th Hussars in 1874, was promoted major in 1875, and returned to the Rifle Brigade as lieutenant- colonel in September 1876. He was promoted colonel and major- general in 1880, lieutenant-general in 1889, and general in 1893. He accompanied the expeditionary force to Egypt in 1882, and commanded the Guards brigade at the battle of Tel-el-Kebir. He was mentioned three times in despatches, received the C.B.

and was thanked by parliament. In 1886 the duke went to India and commanded the Bombay army until 1890, when he returned home. He commanded the southern district from 1890 to 1893, and that of Aldershot from 1893 to 1898. On the departure of Lord Roberts for South Africa the duke succeeded him as commander-in-chief of the forces in Ireland, 9th of January 1900. On attaining his majority in 1 871 an annuity of £15,000 was granted to Prince Arthur by parliament, and in 1874 he was created duke of Connaught and Strathearn and earl of Sussex. On the 13th of March 1879 he married Princess Louise Marguerite of Prussia, third daughter of Prince Frederick Charles, and received an additional annuity of £10,000. The duke and duchess represented Queen Victoria at the coronation of the tsar Nicholas II. at Moscow in 1896. On the reorganization of the war office and the higher commands in 1904, the duke was appointed to the new office of inspector-general to the forces, from which he retired in 1907, being then given the new post of commander-in-chief in the Mediterranean, stationed at Malta, which he held until 1909.

CONNAUGHT, a province of Ireland occupying the mid- western portion of the island, and having as the greater part of its eastern boundary the river Shannon, over its middle course. It includes the counties Mayo, Sligo, Leitrim, Galway and Roscommon (qg.v. for topography, &c). According to the legendary chronicles of Ireland, Connaught(Connacht) was given by the Milesian conquerors of the country to the Damnonians, and the Book of Leinster gives Tinne mac Conrath (20 B.C.) as the first of the list of the kings of all Connaught, whose realm at its greatest extent included also the district of Brenny or Breffny, corresponding to the modern county of Cavan. The Damnonian dynasty held its own till the 4th century a.d., when it was ousted by the Milesian Muireadhach Tireach, king paramount (airdrigh) of Ireland from 331 to 357. Henceforth the annals of Connaught are of little interest until the end of the 12th century, when William de Burgh received a grant of lands in Connaught from King John as lord paramount of Ireland. In the quarrel between Cathal Carrach and Cathal Crovderg for the throne he supported either side in turn, with the result that he lost his Connaught estates in 1203. In 1207, however, his son Richard received a grant from King Henry III. of the forfeited lands of the king of Connaught, and thenceforth the history of the province is closely bound up with that of the great family of Burgh (q.v.). In 146 1 Connaught, with Ulster, fell nominally to the crown, in the person of Edward IV., as heir of Lionel, duke of Clarence, and his wife, daughter and heiress of William de Burgh, 3rd earl of Ulster (d. 1333). In the wild

districts of the west of Ireland, however, legal titles were easier to claim than to enforce, and from 1333 onward Connaught was in fact divided between the de Burghs, Bourcks or Burkes (MacWilliam " Oughters " and MacWilliam " Eighters "), assimilated now to the Irish in dress and manners, and the native kings of the ancient Milesian dynasty, which survived till 1464. It was not till the 16th century that Con- naught began to be effectively brought under English rule. A stage in this direction was marked by the conversion in 1543 of the MacWilliam Eighter, Ulick Bourck, into a noble on the English model as earl of Clanricarde; though it was not till 1603 that the MacWilliam Oughter became Viscount Mayo. Meanwhile, about 1580, Connaught was for the most part divided into shires by Sir Henry Sidney, who also brought into existence the administration of Connaught and Munster by presidents, which continued for seventy years. The county Clare (hitherto Thomond or North Munster) was now annexed to Connaught, and continued to belong to it down to the Restoration.

CONNEAUT, a city of Ashtabula county, Ohio, U.S.A., on Lake Erie at the mouth of Conneaut Creek, and about 68 m. N.E. of Cleveland. Pop. (1890) 3241; (1900) 7133 (1227 foreign- born); (19 10) 8319. It is served by the New York, Chicago & St Louis (which has railway repair shops here), the Lake Shore & Michigan Southern, and the Bessemer & Lake Erie railways, and by car ferries which ply between Conneaut and Rondeau and Port Stanley on the Canadian side of Lake Erie. There is a beautiful public park of 20 acres on the lake shore. Conneaut

is situated in a grain-growing and dairying region; it has an excellent harbour to and from which coal and ore are shipped, and is a sub-port of entry. The city has planing mills, flour mills, brick works, tanneries, canneries and manufactories of electric and gas fixtures, electric lamps and tungsten gas lamps. The municipality owns and operates its electric-lighting plant. In 1796 surveyors for the Connecticut Land Co. built a log store-house here, but the permanent settlement dates from 1798; in 1832 Conneaut was incorporated, and it became a city in 1898.

CONNECTICUT, one of the thirteen original states of the United States of America, and one of the New England group of states. It is bounded N. by Massachusetts, E. by Rhode Island, S. by Long Island Sound, and W. by New York; the S.W. corner projects along the Sound S. of New York for about 13 m. Situated between 40° 54′ and 42 3′ N. lat., and 71 47′ and 73° 43′ W. long., its total area is 4965 sq. m., of which 145 are water surface: only two states of the Union, Rhode Island and Delaware, are smaller in area.

Physiography. — Connecticut lies in the S. portion of the peneplain region

of New England. Its surface is in general that of a gently undulating upland divided near the middle by the lowland of the Connecticut valley, the most striking physio- graphic feature of the state. The upland rises from the low S. shore at an average rate of about 20 ft. in a mile until it has a mean elevation along the N. border of the state of 1000 ft. or more, and a few points in the N.W. rise to a height of about 2000 ft. above the sea. The lowland dips under the waters of Long Island Sound at the S. and rises slowly to a height of only 100 ft. above them where it crosses the N. border. At the N. this lowland is about 15 m. wide; at the S. it narrows to only S m. and its total area is about 600 sq. m. Its formation was caused by the removal of a band of weak rocks by erosion after the general upland surface had been first formed near sea-level and then elevated and tilted gently S. or S.E.; in this band of weak rocks were several sheets of hard igneous rock (trap) inclined from the horizontal several degrees, and so resistant that they were not removed but remained to form the " trap ridges " such as West Rock Ridge near New Haven and the Hanging Hills of Meriden. These are identical in origin and structure with Mt. Tom Range and Holyoke Range of Massa- chusetts, being the S. continuation of those structures. The ridges are generally deeply notched, but their highest points rise to the upland heights, directly to the E. or W. The W. section of the upland is more broken than the E. section, for in the W. are several isolated peaks lying in line with the S. con- tinuation of the Green and the Housatonic mountain ranges of Vermont and Massachusetts, the highest among them being: Bear Mountain (Salisbury) 2355 ft.; Gridley Mountain (Salisbury), 2200 ft.; Mt. Riga (Salisbury), 2000 ft.; Mt. Ball (Norfolk) and Lion's Head (Salisbury), each 1760 ft.; Canaan Mountain (North Canaan), 1680 ft.; and Ivy Mountain (Goshen), 1640 ft. Just as the surface of the lowland is broken by the notched trap-ridges, so that of the upland is often interrupted by rather narrow deep valleys, or gorges, extending usually from N. to S. or to the S.E. The lowland is drained by the Connecticut river as far S. as Middletown, but here this river turns to the S.E. into one of the narrow valleys in the E. section of the upland, the turn being due to the fact that the river acquired its present course when the land was at a lower level and before the lowland on the soft rocks was excavated. The principal rivers in the W. section of the upland are the Housatonic and its affluent, the Naugatuck; in the E. section is the Thames which is really an outlet for three other rivers (the Yantic, the Shetucket and the Quinebaug). In the central and N. regions of the state the course of the rivers is rapid, owing to a relatively recent tilting of the surface. The Connecticut river is navigable as far as Hartford, and the Thames as far as Norwich. The Housatonic river, which in its picturesque course traverses the whole breadth of the state, has a short stretch of tide-water navigation. The lakes which are found in all parts of the state and the rapids and waterfalls along the rivers are largely due to disturbances of the drainage

lines by the ice invasion of the glacial period.

To the glacial action is also due the extensive removal of the original soil from the uplands, and the accumulation of morainic hills in many localities. The sea-coast, about ioo m. in length, has a number of bays which have been created by a depression of small valleys making several good harbours.

The climate of Connecticut, though temperate, is subject to sudden changes, yet the extremes of cold and heat are less than in the other New England states. The mean annual temperature is 49° F., the average temperature of winter being 27 , and that of summer 72°. Since the general direction of the winter winds is from the N.W. the extreme of cold (- io° or – 1 5) is felt in the north-western part of the state, while the prevailing summer winds, which are from the S.W., temper the heat of summer in the coast region, the extreme heat (ioo°) being found in the central part of the state. The annual rainfall varies from 45 to 50 in.

Agriculture. — Connecticut is not an agricultural state. Al- though three-fourths of the land surface is included in farms, only 7% of this three-fourths is cultivated; but agriculture is of considerable economic and historic interest. The accounts of the fertility of the Connecticut valley were among the causes leading to the English colonization, and until the middle of the nineteenth century agriculture was the principal occupation. The soils, which are composed largely of sands, except in the upland valleys where alluvial loams with the sub-soils of clay are found, were not suitable for tillage. However, a thrifty, industrious, self-reliant agricultural life developed, labour was native-born, the women of the household worked in the fields with the men, some employment was found for every season, and a system of neighbourly barter of food products took the place of other modes of exchange. But the development of manufactures in the first half of the 19th century, the competi- tion of the new western states in farm products, and the change in the character of the population incident to the growth of cities, caused a great change in agriculture after i860. Indeed, during every decade from i860 to 1890 the total value of farm property and products declined; and the increase of products from 1890 to 1900 was due to the growth of dairy farms, which yielded almost one-third of the total farm product of the state. In the same decade Indian corn, potatoes and tobacco were the only staples whose acreage increased and the production of all cereals except Indian corn and buckwheat declined. Tobacco, which was first grown here between 1640 and 1660, because of

a law restricting the use of tobacco to that grown in the colony, was in the decade 1890-1900 the only crop raised for consumption outside the state; its average yield per acre (1673 lb) was exceeded in the continental United States only in Vermont (1844 lb) and Massachusetts (1674 lb) in 1899, and in 1907 (1510 lb) by New Hampshire (1650 lb), Vermont (1625 lb) and Massachusetts (1525 ft)). The total value of Connecticut tobacco in 1907 was $2,501,000 (1906, $4,415,922; 1905, $3,911,933), and the average farm price was 11-5 cents per lb (in 1906, 18 cents; 1905, 17 cents). But the cultivation of tobacco is confined almost exclusively to the valleys of the Connecticut and Housatonic rivers, and these lands are constantly and ex- pensively treated with nitrogenous fertilizers; the grades raised are the broad-leaf and the Habana seed-leaf wrappers, which, excepting the Florida growth from Sumatra seed, are the nearest domestic approach to the imported Sumatra. The manufacture of cigars was begun in South Windsor, Connecticut, in 1801. Dairying was responsible for the increased production between 1889 and 1899 of Indian corn and the large acreage in hay, which surpassed that of any other crop, but many hay and grain farms were afterwards abandoned. The production of orchard fruits and market vegetables, however, increased during the decade 1890-1900. Other evidences of the transition in agricultural life are that in Tolland and Windham counties the value of farm buildings exceeded that of farm land, that in Middlesex and Fairfield counties the acreage as well as the value of the farms declined, that native farm labour and ownership were being replaced by foreign labour and ownership; while dependent land tenure is insignificant, 87 % of the farms being worked by

their owners. The state board of agriculture holds annual conventions for the discussion of agricultural problems.

Minerals. — The mineral industries of Connecticut have had a fortune very similar to that of agriculture. The early settlers soon discovered metals in the soil and began to work them. About 1730 the production of iron became an important industry in the vicinity of Salisbury, and from Connecticut iron many of the American military supplies in the War of Independence were manufactured. Copper was mined in East Granby as early as 1 705 and furnished material for early colonial and United States coins. Gold, silver and lead have also been produced, but the discovery of larger deposits of these metals in other states has caused the abandonment of all metal mines in Connecticut, except those of iron and tungsten. The quarries of granite near Long Island Sound, those of sandstone at Portland, and of feldspar at Branchville and South Glastonbury, however, have furnished building and paving materials for other states; the stone product of the state was valued at $1,386,540 in 1906. Limestone, for the reduction of lime, is also mined; and beryl, clays and mineral springs yield products of minor importance.

On account of the importations from Canada, Chesapeake Bay and the Great Lakes, the mackerel, cod and menhaden fisheries declined, especially after i860, and the oyster and lobster fisheries are not as important as formerly. In 1905, according to the U.S. Bureau of Fisheries, the fisheries' products of the state were valued at $3,173,948, market oysters being valued at $1,206,217 and seed oysters at $1,603,615.

Manufactures. — Manufacturing, however, has encountered none of the vicissitudes of other industries. Manufactures form the principal source cf Connecticut's wealth, — manufac- turing gave occupation in 1900 to about one-fifth of the total population, and the products in that year ranked the state eleventh among the states of the American Union. Indeed, manufacturing in Connecticut is notable for its early beginning and its development of certain branches beyond that of the other states. Iron products were manufactured throughout the 18th century, nails were made before 1716 and were exported from the colony, and it was in Connecticut that cannon were cast for the Continental troops and the chains were made to block the channel of the Hudson river to British ships. Tinware was manufactured in Berlin, Hartford county, as early as 1770, and tin, steel and iron goods were peddled from Connecticut through the colonies. The Connecticut clock maker and clock peddler was the 18th-century embodiment of Yankee ingenuity; the most famous of the next generation of clock makers were Eli Terry (1772-1852), who made a great success of his wooden clocks; Chauncey Jerome, who first used brass wheels in 1837 and founded in 1844 the works of the New Haven Clock Co.; Gideon Roberts; and Terry's pupil and successor, Seth Thomas (1786-1859), who built the factory at Thomaston carried on by his son Seth Thomas (1816-1888). In 1732 the London hatters complained of the competition of Connecticut hats in their trade. Before 1749 brass works were in operation at Waterbury — the great brass manufacturing business there growing out of the making of metal buttons. In 1768 paper mills were erected at Norwich, and in 1776 at East Hartford. In 1788 the first woollen mills in New England were established at Hartford, and about 1803 one hundred merino sheep were imported by David Humphreys, who in 1806 built a mill in that part of Derby which is now Seymour and which was practically the first New England factory town; in 181 2 steam was first used by the Middle town Woollen Manufacturing Company. In 1804 the manufacture of cotton was begun at Vernon, Hartford county; mills at Pomfret and Jewett City were established in 1806 and 1810 respectively. Silk culture was successfully introduced about 1732; and there was a silk factory at Mansfield, Tolland county, in 1758. The period of greatest development of manufactures began after the war of 181 2. The decade of greatest relative development was that of 1 860-1 870, during which the value of the products increased 96-6 . During the period 1850-1900, when the popula- tion

increased 145, the average number of wage-earners

employed in manufacturing establishments increased 248-3%, the number so employed constituting 13-7% of the state's total population in 1850 and 19-5% of that in 1900. The average number of wage-earners employed in establishments conducted under the factory system alone was 13-7% greater in 1905 than in 1900. In 1900 Connecticut led the United States in the manufacture of ammunition, bells, brass and copper (rolled), brass castings and finishings, brass ware and needles and pins. In the automobile industry the state in 1905 ranked second (to Michigan) in capital invested; and was sixth in value of product, but first in the average value per car, which was $2354 ($2917 for gasoline; $2343 for electric; $673 for steam cars). Connecticut has long ranked high in textile manufactures, but the product of cotton goods in 1900 ($15,489,442) and in 1905 ($18,239,155) had not materially advanced beyond that of 1890 ($15,409,476), this being due to the increase in cotton manu- facturing in the South. Between 1890 and 1900 Connecticut's products in dyeing and finishing of textiles, industries which have as yet not developed in the South, increased 217-3% from $7 I S>388 in 1890 to $2,269,967 in 1900; in 1905 their value was $2,215,314. The manufacture of woollen goods and silk also increased respectively 33% and 26-5% between 1890 and 1900; the returns for 1900, however, include the fur hat product ($7,546,882), which was not included in the returns for 1890. In 1905 the value of the woollen goods manufactured in the state was $11,166,965; of the silk goods, $15,623,693. The value of the products of all the textile industries combined increased from $46,819,399 in 1900 to $56,933,113 in 1905, when the com- bined textile product value was greater than that of any other manufactured product in the state. The most important single industry in 1905 was the manufacture of rolled brass and copper with a product value of $41,911,903 (in 1900, $36,325,178) — 80-7% of the total for the United States; the value of the product of the other brass industries was brass ware (1905) $9,022,427,— 51-6% of the total for the United States,— (1900) $8,947,451; and brass castings and brass finishing (1905) $2,982,115, (1900) $3,254,239. Hardware ranks next in im- portance, the output of 1905 being valued at $21,480,652, — which was 46-9% of the total product value of hardware for the entire United States, — as against $16,301,198 in 1900. Then come in rank of product value for 1905: foundry and machine shop products (1905) $20,189,384, (1900) $18,991,079; cotton goods; silk and silk goods;

ammunition (1905) $ I S.394,485, — being 77-2% of the value of all ammunition made in the United States, — (1900) $9,823,712; and rubber boots and shoes (1905) $12,829,346, (1900) $11,999,038. In 1905 the state ranked first in the United States in the value of clocks manufactured, — $6,158,034, or 69-4% of the total product value of the industry for that year in the United States, — and also in the value of plated ware — $8,125,881, being 66-9% of the product value of the United States.

The decade of greatest absolute increase in the value of manufactures was that ending in 1900, the value of manufactured products in that year being $352,284,116, an increase of $104,487,742 over that of 1890. 1 The general tendency was towards the centralization of industry, the number of establish- ments in the leading industries increasing less than 5%, while the capital and the value of the products increased respectively 33-5% and 42%. Among the new manufactories were a ship- building establishment at Groton near New London, which undertook contracts for the United States government, and a compressed-air plant near Norwich. Of the 359 manufactured products classified by the United States census, 249, or almost seven-tenths, were produced in Connecticut.

This prominence in manufactures is due to excellent transporta- tion facilities, to good water powers, to the ease with which labour is got from large cities, to plentiful capital (furnished by the large

*1 The figure given above as the gross value of all manufactured products in 1900 includes that of all manufacturing and mechanical establishments. The value of the products of factories alone was $315ˆ106,150. By 1905 this had increased to $369,082,091 or 17*1 Co-*

insurance and banking concerns of the state), and to Connecticut's liberal Joint Stock Act of 1837 (copied in Great Britain and else- where), permitting small sums to be capitalized in manufactures; and even to a larger extent, possibly it is the result of the in- genuity of the Connecticut people. In the two decades 1880- 1900 more patents were secured in Connecticut in proportion to its population than in any other state. It was in Connecticut that Elias Howe and Allen B. Wilson developed the sewing machine; that Charles Goodyear discovered the process of vulcanising rubber; that Samuel Colt began the manufacture of the Colt fire-arms; arid it was from near New Haven that Eli Whitney went to Georgia where he invented the cotton gin. The earliest form of manufacturing was that of household industries, nails, clocks, tin ware and other useful articles being made by hand, and then peddled from town to town. Hence Connecticut became known as the " Land of Yankee Notions "; and small wares are still manufactured, the patents granted to inventors in one city ranging from bottle-top handles, bread toasters and lamp holders, to head-rests for

church pews and scissors-sharpeners. Then, after a long schooling in ingenuity by the system of household industries, came the division of labour, the introduction of machinery and the modern factory. Transportation of products is facilitated by water routes (chiefly coasting), for which there are ports of entry at New Haven, Hartford, Stonington, New London and Bridgeport, and by 1013 m. (on the 1st of January 1908) of steam railways. One company, the New York, New Haven & Hartford, controlled 87% of this railway mileage in 1904, and practically all the steamboat lines on Long Island Sound. Since 1895 electric railways operated by the trolley system have steadily developed, their mileage in 1909 approximating 895 m. By their influence the rural districts have been brought into close touch with the cities, and many centres of population have been so connected as to make them practically one community.

Population. — The population of Connecticut in 1880 was 622,700; in 1890, 746,258 — an increase of 19-8$; in 1900, 908,420 — an increase of 21-7$ over that of 1890; and in 1910, 1,114,756. Of the 1900 population 98-2$ were white, 26-2$ were foreign born, and 31-1 % of the native whites were of foreign parentage. Of the foreign-born element, 29-8% were Irish; there were also many Germans and Austrians, English, and French- and English-Canadians. In 1900 there were 24 incor- porated cities or boroughs with a population of more than 5000, and on this basis almost three-fifths of the total population of the state was urban. The principal cities, having a population of more than 20,000, were New Haven (108,027), Hartford (79,850), Bridgeport (70,966), Waterbury (45,859), New Britain (25,998), and Meriden (24,296). The industrial development has affected religious conditions. In the early part of the 19th century the Congregational church. had the largest number of communicants; in 1906 more than three-fifths of the church population was Roman Catholic; the Congregationalists com- posed about one-third of the remainder, and next ranked the Episcopalians, Methodists and Baptists.

Government. — The present constitution of Connecticut is that framed and adopted in 1818 with subsequent amendments (33 U P to 1909). Amendments are adopted after approval by a majority vote of the lower house of the general assembly, a two-thirds majority of both houses of the next general assembly, and ratification by the townships. The executive and legislative officials are chosen by the electors for a term of two years; the attorney general for four years; the judges of the supreme court of errors and the superior court, appointed by the general assembly on nomination by the governor, serve for eight, and the judges of the courts of common pleas (in Hartford, New London, New Haven, Litchfield and Fairfield counties) and of the district courts, chosen in like manner, serve for four years. In providing for the judicial system, the constitution says: " the powers and jurisdiction of which courts shall be defined by law." The

general assembly has interpreted this as a justifica- tion for interference in legal matters. It has at various times granted divorces, confirmed faulty titles, annulled decisions

*of the justices of the peace, and validated contracts against which judgment by default had been secured. Qualifications for suffrage are: the age of twenty-one years, citizenship in the United States, residence in the state for one year and in the township for six months preceding the election, a good moral character, and ability " to read in the English language any article of the Constitution or any section of the Statutes of this State." * Women may vote foT school officials. The right to decide upon a citizen's qualifications for suffrage is vested in the selectmen and clerk of each township. A property qualifica- tion, found in the original constitution, was removed in 1845. The Fifteenth Amendment of the Federal Constitution was ratified (1869) by Connecticut, but negroes were excluded from the suffrage by the state constitution until 1876.*

The jurisprudence of Connecticut, since the 17th century, has been notable for its divergence from the common law of England. In 1639 inheritance by primogeniture was abolished, and this resulted in conflict with the British courts in the 1 8th century. 2 At an early date, also, the office of public prose-' cutor was created to conduct prosecutions, which until then had been left to the aggrieved party. The right of bastards to inherit the mother's property is recognized, and the age of consent has been placed at sixteen years. Neither husband nor wife acquires by marriage any interest in the property of the other; the earnings of the wife are her sole property and she has the right to make contracts as if unmarried. After residence in the state for three years divorce may be obtained on grounds of fraudulent contract, desertion, neglect for three years, adultery, cruelty, intemperance, imprisonment for life and certain crimes. The Joint Stock Act of 1837 furnished the precedent and the principle for similar legislation in other American states and (it is said) for the English Joint Stock Companies Act of 1856. The relations between capital and labour are the subject of a series of statutes, which prohibit the employment of children under fourteen years of age in any mechanical, mercantile or manufacturing establishment, punish with fine or imprisonment any attempt by an employer to influence his employee's vote or to prevent him from joining a labour union, and in cases of insolvency give preference over general liabilities to debts of $100 or less for labour. A homestead entered upon record and occupied by the owner is exempt to the extent of $1000 in value from liability for debts.

The government of Connecticut is also notable for the variety of its administrative boards. Among these are a board of pardons, a state library committee, a board of mediation and arbitration for adjustment of labour disputes, a board of educa- tion and a railway commission. The bureau of labour statistics has among its duties the giving of information to immigrant labourers regarding their legal rights: it has free employment agencies at Bridgeport, Norwich, Hartford, New Haven and Waterbury. A state board of charities has supervision over all philanthropic and penal institutions in the state, including hospitals, which numbered 103 in 1907; and the board visits the almshouses supported by seventy-eight (of the 168) towns of the state, and investigates and supervises the provision made for the town poor in the other ninety towns of the state; some, as late as 1906, were, with the few paupers maintained by the state, cared for in a private almshouse at Tariffville, which was commonly known as the " state almshouse. ' ; The institutions supported by the state are: a state prison at Wethersfield, the Connecticut industrial school for girls (reformatory) at Middle- town and a similar institution for boys at Meriden,the Connecticut hospital for the insane at Middletown, and the Norwich hospital for the insane at Norwich. The state almost entirely supports the Connecticut school for imbeciles, at Lakeville; the American school for the deaf, in Hartford; the oral school for the deaf,

1 The constitution prescribes that " the privileges of an elector shall be forfeited by a conviction of bribery, forgery, perjury, duelling, fraudulent bankruptcy, theft or other offense for which an infamous punishment is inflicted," but this disability may in any case be removed by a two-thirds vote of each house of the general assembly.

2 See an article, " The Connecticut Intestacy Law," by Charles M. Andrew in the Yale Review, vol. iii.*

at Mystic; the Connecticut institute and industrial home for the blind, at Hartford; Fitch's home for soldiers, at Noroton; ten county jails in the eight counties; and eight county temporary homes for dependent and neglected children.

Education. — Education has always been a matter of public interest in Connecticut. Soon after the foundation of the colonies of Connecticut and New Haven, schools similar to the English Latin schools were established. The Connecticut Code of 1650 required all parents to educate their children, and every township of 50 householders (later 30) to have a teacher supported by the men of family, while the New Haven Code of 1656 also encouraged education. In 1672 the general court granted 600 acres of land to each county for educational purposes; in 1794 the general assembly appropriated the proceeds from the sale of western lands to

education, and in 1837 made a similar disposition of funds received from the Federal treasury. The existing organization and methods in school work began in 1838, when the state board of commissioners of common schools (later replaced by a board of education) was organized, with Henry Barnard at its head. In 1900, 5-9% of the population at least 10 years of age was illiterate. All children between 7 and 16 are required to attend school, but those over 14 are excused if they labour; every township of more than 10,000 inhabitants must support an evening school for those over 14; and text- books are provided by the townships for those unable to purchase them. In 1907-1908 the total school revenue was $5,027,877 or $22-35 f° r eacn child enrolled, the enrolment being 78-51% of the total number of children enumerated of school age. Of the school revenue about 2-81% was derived from a per- manent school fund, 10-96% from state taxation, 80-43% from local taxation and 5-8% from other sources. The average school term was 186-73 days (in 1899-1900 it was 189-01 days), and the average monthly salary of male teachers $115-07, that of female teachers, $50-5. Supplementing the educative influence of the schools are the public libraries (161 in number in 1907); the state appropriates $200 to establish, and $100 per annum to maintain, a public library (provided the town in which the library is to be established contributes an equal amount), and the Public Library Committee has for its duty the study of library problems. Higher education is provided by Yale University (q.v.) ; by Trinity College, at Hartford (non- sectarian), founded ˆ,1823; by Wesleyan University, at Middle- town, the oldest college of the Methodist Church in the United States, founded in 1831; by the Hartford Theological Seminary (1834); by the Connecticut Agricultural College, at Storrs (founded 1881), which has a two years' course of preparation for rural teachers and has an experiment station ; by the Connecti- cut Experiment Station at New Haven, which was established in 1875 at Middletown and was the first in the United States; and by normal schools at New Britain (established 1881), Willimantic (1890), New Haven (1894) and Danbury (1903).

Finance. — In the year ending on the 30th of September 1908 the receipts of the state treasury were $3,925,492, the ex- penditure $4,741,549, and the funded debt, deducting a Civil List Fund of $325,513 in the treasury, was $548,586. The debt was increased in April 1909 by the issue of bonds for $1,000,000 (out of $7,000,000 authorized in 1907). The principal source of revenue was an indirect tax on corporations, the tax on railways, savings banks and life insurance companies, yielding 70% of the state's income. A tax on inheritances ranked next. There is a military commutation tax of $2, and all persons neglecting to pay it or to pay the poll tax are liable to imprison- ment. A state board of equalization has been established to insure equitable taxation. More than 130 underwriting

institu- tions have been chartered in the state since 1 794. The insurance business centres at Hartford. The legal rate of interest is 6 %, and days of grace are not allowed.

History. — The first settlement by Europeans in Connecticut was made on the site of the present Hartford in 1633, by a party of Dutch from New Netherland. In the same year a trading post was established on the Connecticut river, near Windsor, by members of the Plymouth Colony, and John Oldhara

(1600-1636) of Massachusetts explored the valley and made a good report of its resources. : Encouraged by Oldham's account of the country, the inhabitants of three Massachusetts towns, Dorchester, Watertown and New Town (now Cambridge), left that colony for the Connecticut valley. The emigrants from Watertown founded Wethersfield in the winter of 1634-1635; those from New Town (now Cambridge) settled at Windsor in the summer of 1635; and in the autumn of the same year people from Dorchester settled at Hartford. These early colonists had come to Massachusetts in the Puritan migration of 1630; their removal to Connecticut, in which they were led principally by Thomas Hooker (g.v.), Roger Ludlow (c. 1590- 1665) and John Haynes (d. 1654), was caused by their discontent with the autocratic character of the go vernmentin Massachusetts; but the instrument of government which they framed in 1639; known as the Fundamental Orders of Connecticut, reveals no radical departure from the institutions of Massachusetts. The general court — the supreme civil authority — was composed of deputies from the towns, and a governor and magistrates who were chosen at a session of the court attended by all freemen of the towns. It powers were not clearly defined; there was also no separation of the executive, legislative and judicial functions, and the authority of the governor was limited to that of a presiding officer.

The government thus established was not the product of a federation of townships, as has often been stated; indeed, the townships had been governed during the first year by com- missioners deriving authority from Massachusetts, and the first general court was probably convened by them. In 1638 the celebrated Fundamental Orders were drawn up, and in 1639 they were adopted. Their most original feature was the omission of a religious test for citizenship, though a precedent for this is to be found in the Plymouth Colony; on the other hand, the union of church and state was presumed in the preamble, and in 1659 a property qualification (the

possession of an estate of £30) for suffrage was imposed by the general court.

In the meantime another migration to the Connecticut country had begun in 1638, when a party of Puritans who had arrived in Massachusetts the preceding year sailed from Boston for the Connecticut coast and there founded New Haven. The leaders in this movement were John Davenport ˆ597-1670) and Theophilus Eaton, and their followers were drawn from the English middle class. Soon after their arrival these colonists drew up a " plantation covenant " which made the Scriptures the supreme guide in civil as well as religious affairs; but no copy of this is now extant. In June 1639, however, a more definite statement of political principles was framed, in which it was clearly stated that the rules of Scripture should determine the ordering of the church, the choice of magistrates, the making and repeal of laws, the dividing of inheritances, and all other matters of public import; that only church members could become free burgesses and officials of the colony; that the free burgesses should choose twelve men who should choose seven others, and that these should organize the church and the civil government. In 1643 the jurisdiction of the New Haven colony was extended by the admission of the townships of Milford, Guilford and Stamford to equal rights with New Haven, the recognition of their local governments, and the formation of two courts for the whole jurisdiction, a court of magistrates to try important cases and hear appeals from " plantation " courts, and a general court with legislative powers, the highest court of appeals, which was similar in composition to the general court of the Connecticut Colony. Two other townships were after- wards added to the colony, Southold, on Long Island, and Branford, Conn.

The religious test for citizenship was continued (except in the case of six citizens of Milford), and in 1644 the general court decided that the "judicial laws of God as they were declared by Moses " should constitute a rule for all courts " till they be branched out into particulars hereafter.'" The theocratic char- acter of the government thus established is clearly revealed in the series of strict enactments and decisions which constituted the

famous " Blue Laws." Of the laws (45 in number) given by Peters, more than one-half really existed in New Haven, and more than four-fifths existed in some form in the New England colonies. Among those of New Haven are the prohibition of trial by jury, the infliction of the death penalty for adultery, and of the same penalty for conspiracy against the jurisdiction, the strict observance of the Sabbath enjoined, and heavy fines for " concealing or entertaining Quaker or other blasphemous hereticks." 1

A third Puritan settlement was established in 1635 at the mouth of the

Connecticut river, under the auspices of an English company whose leading members were William Fiennes, Lord Say and Sele (1582-1662) and Robert Greville, Lord Brooke (1608-1643). In their honour the colony was named Saybrook. In 1639 George Fenwick (d. 1657), a member of the company, arrived, and as immigration from England soon afterwards greatly declined on account of the Puritan Revolution, he sold the colony to Connecticut in 1644. This early experiment in colonization at Saybrook and the sale by Fenwick are important on account of their relation to a fictitious land title. The Say and Sele Company secured in 163 1 from Robert Rich, earl of Warwick (1587-1658), a quit claim to his interest in the terri- tory lying between the Narragansett river and the Pacific Ocean. The nature of Warwick's right to the land is not stated in any extant document, and no title of his to it was ever shown. But the Connecticut authorities in their effort to establish a legal claim to the country and to thwart the efforts of the Hamilton family to assert its claims to the territory between the Connecticut river and Narragansett Bay — claims derived from a grant of the Plymouth Company to James, marquess of Hamilton (1606- i649)in 1635 — elaborated the theory that the Plymouth Company had made a grant to Warwick, and that consequently his quit claim conferred jurisdiction upon the Say and Sele Company; but even in this event, Fenwick had no right to make his sale, for which he never secured confirmation.

The next step in the formation of modern Connecticut was the union of the New Haven colony with the older colony. This was accomplished by the royal charter of 1662, which defined the boundaries of Connecticut as extending from Massachusetts south to the sea, and from Narragansett bay west to the South Sea (Pacific Ocean). This charter had been secured without the knowledge or consent of the New Haven colonists and they naturally protested against the union with Connecticut. But on account of the threatened absorption of a part of the Con- necticut territory by the Colony of New York granted to the duke of York in 1664, and the news that a commission had been appointed in England to settle intercolonial disputes, they finally assented to the union in 1665. Hartford then became the capital of the united colonies, but shared that honour with New Haven from 1701 until 1873.

The charter was liberal in its provisions. It created a corpora- tion under the name of the Governor and Company of the English Colony of Connecticut in New England in America, sanctioned the system of government already existing, provided that all acts of the general court should be valid upon being issued under the seal of the colony, and made no reservation of royal or parlia- mentary control over legislation or the administration of justice. Consequently there developed in Connecticut an independent, self-reliant colonial government, which looked to its chartered

privileges as the supreme source of authority.

Although the governmental and religious influences which moulded Connecticut were similar to those which moulded New England at large, the colony developed certain distinctive characteristics. Its policy "was to avoid notoriety and public- attitudes; to secure privileges without attracting needless

1 A collection of these laws was published in his General History of Connecticut (London, 1781), by the Rev. Samuel Peters (1735- 1826), a Loyalist clergyman of the Church of England, who in 1774 was forced by the patriots or whigs to flee from Connecticut. The most extreme (and most quoted) of these laws were never in force in Connecticut, but the substantial genuineness of others was con 1 – clusively shown by Walter F. Prince, in The Report of the American I Historical A ssociation for i8q8.

notice; to act as intensely and vigorously as possible when action seemed necessary and promising; but to say as little as possible, and evade as much as possible when open resistance was evident folly." 1

The relations of Connecticut with neighbouring colonies were notable for numerous and continuous quarrels in the 1 7 th century. Soon after the first settlements were made, a dispute arose with Massachusetts regarding the boundary between the two colonies; after the brief war with the Pequot Indians in 1637 a similar quarrel followed regarding Connecticut's right to the Pequot lands, and in the New England Confederation (established in 1643) friction between Massachusetts and Connecticut continued. Difficulty with Rhode Island was caused by the conflict between that colony's charter and the Connecticut charter regarding the western boundary of Rhode Island; and the encroachment of outlying Connecticut settlements on Dutch territory, and the attempt to extend the boundaries of New York to the Connecticut river, gave rise to other disputes. These questions of boundary were a source of continuous discord, the last of them not being settled until 1881. The attempts of Governors Joseph Dudley (1647-1720), of Massachusetts, and Thomas Dongan (1634-1715) of New York, to unite Connecticut with their colonies also caused difficulty.

The relations of Connecticut and New Haven with the mother country were similar to those of the other New England colonies. The period of most serious friction was that during the administra- tion of the New England colonies by Sir Edmund Andros (q.v.), who in pursuance of the later Stuart

policy both in England and in her American colonies visited Hartford on the 31st of October 1687 to execute quo warranto proceedings against the charter of 1662. It is said that during a discussion at night over the surrender of the charter the candles were extinguished, and the document itself (which had been brought to the meeting) was removed from the table where it had been placed. Accord- ing to tradition it was hidden in a large oak tree, afterwards known as the "Charter Oak." 2 But though Andros thus failed to secure the charter, he dissolved the existing govern- ment. After the Revolution of 1688, however, government under the charter was resumed, and the crown lawyers decided that the charter had not been invalidated by the quo warranto proceedings.

Religious affairs formed one of the most important problems in the. life of the colony,-. The established ecclesiastical system was the Congregational. The Code of 1650 (Connecticut) taxed all persons for its support, provided for the collection of church taxes, if necessary, by civil distraint, and forbade the formation of new churches without the consent of the general court. The New England Half Way Covenant of 1657, which extended church membership so as to include all baptized persons, was sanctioned by the general court in 1664. The custom by which neighbouring churches sought mutual aid and advice, prepared the way for the Presbyterian system of church government, which was established by an ecclesiastical assembly held at Saybrook in 1708, the church constitution there framed being known as the " Saybrook Platform." At that time, however, a liberal policy towards dissent was adopted, the general court granting permission for churches " soberly to differ or dissent " from the establishment. Hence a large number of new churches soon sprang into being. In 1727 the Church of England was permitted to organize in the colony, and in 1729 a similar privilege was granted to the Baptists and Quakers. A religious revival swept the colony in 1741. The very existence of the establishment seemed threatened; consequently in 1742 the general court forbade any ordained minister to enter another parish than his own without an invitation, and decided that only those were legal ministers who were recognized as such by the general court. Throughout the remaining years of the 18th

1 Johnston, Connecticut, p. 130.

2 For a good version of the tradition see Wadsworth or the Charter Oak (Hartford, 1904), by W. H. Gocher. The tree was blown down in August 1856; in June 1907 a marble shaft was unveiled on its site by the Society of Colonial Wars, of Connecticut.

century there was constant friction between the establishment and the nonconforming churches; but in 1791 the right of free incorporation was granted to all sects.

In the War of American Independence Connecticut took a prominent part. During the controversy over the Stamp Act the general court instructed the colony's agent in London to insist on " the exclusive right of the colonists to tax themselves, and on the privilege of trial by jury," as rights that could not be surrendered. The patriot sentiment was so strong that Loyalists from other colonies were sent to Connecticut, where it was believed they would have no influence; and the copper mines at Simsbury were converted into a military prison; but among the nonconforming sects, on the other hand, there was considerable sympathy for the British cause. Preparations for war were made in 1774; on the 28th of April 1775 the expedition against Ticonderoga and Crown Point was resolved upon by some of the leading members of the Connecticut assembly, and although they had acted in their private capacity funds were obtained from the colonial treasury to raise the force which on the 8th of May was put under the command of Ethan Allen. Connecticut volunteers were among the first to go to Boston after the battle of Lexington and more than one-half of Washington's army at New York in 1776 was composed of Connecticut soldiers. Yet with the exception of isolated British movements against Stonington in 1775, Danbury in 1777, New Haven in 1779 and New London in 1781 no battles were fought in Connecticut territory.

In 1776 the government of Connecticut was reorganized as a state, the charter of 1662 being adopted by the general court as " the Civil Constitution of this State, under the sole authority of the people thereof, independent of any King or Prince what- ever." In the formation of the general government the policy of the state was national. It acquiesced in the loss of western lands through a decision (1782) of a court appointed by the Confederation (see Wyoming Valley) ; favoured the levy of taxes on imports by federal authority; relinquished (1786) its claims to all western lands, except the Western Reserve (see Ohio); and in the constitutional convention of 1787 the present system of national representation in Congress was proposed by the Connecticut delegates as a compromise between the plans presented by Virginia and New Jersey.

For many years the Federalist party controlled the affairs of the state. The opposition to the growth of American nationality which characterized the later years of that party found expres- sion in a resolution of the general assembly that a bill for in- corporating state troops in the Federal army would be " utterly subversive of the rights and liberties of the people of the state, and the freedom, sovereignty and independence of the same," and in the prominent part taken by Connecticut in the Hartford Convention (see Hartford) and in the advocacy of the radical amendments proposed by it. But the development of manu~ factures, the discontent of nonconforming religious sects with the establishment, and the confusion of the executive, legislative and judicial branches of the government in the existing constitu-

tion opened the way for a political revolution. All the dis- contented elements united with the Democratic party in 181 7 and defeated the Federalists in the state election; and in 1818 the existing constitution was adopted. From 1830 until 1855 there was close rivalry between the Democratic and Whig parties for control of the state administration.

In the Civil War Connecticut was one of the most ardent supporters of the Union cause. When President Lincoln issued his first call, for 75,000 volunteers, there was not a single militia company in the state ready for service. Governor William A. Buckingham (1804-1875), one of the ablest and most zealous of the " war-governors," and afterwards, from 1861; until his death, a member of the United States Senate, issued a call for volunteers in April 1861; and soon 54 companies, more than five times the state's quota, were organized. Corporations, individuals and towns made liberal contributions of money. The general assembly made an appropriation of $2,000,000, and the state furnished approximately 48,000 men to the army.

Equally important was the moral support given to the Federal government by the people.

After the war the Republicans were more frequently successful at the polls than the Democrats. Representation in the lower house of the general assembly, by the constitution of 1818, was based on the townships, each township having two representa- tives, except townships created after 1818, which had only one each; this method constituted a serious evil when, in the transition from, agriculture to manufacturing as the leading industry, the population became Concentrated to a considerable degree in a few large cities, and the relative importance of the various townships was greatly changed. The township of Marlborough, with a population in 1900 of 322, then had one representative, while the city of Hartford, with a population of 79,850, had only two; and the township of Union, with 428 inhabitants, and the city of New Haven, with 108,027, each had two representatives. The apportionment of representation in the state senate had become almost as objectionable. By a constitutional amendment of 1828 it had been provided that senators should be chosen by districts, and that in the apportion- ment regard should be had to population, no county or township to be divided and no part of one county to be joined to the whole or part of another county, and each county to have at least two senators; but by 1900 any relation that the districts might once have had to population had disappeared. The system of representation had sometimes put in power a

*political party representing a minority of the voters: in 1878, 1884, 1886, 1888 and 1890 the Democratic candidates for state executive offices received a plurality vote; but, as a majority was not obtained, these elections were referred to the general assembly, and the Republican party in control of the lower house secured the election of its candidates; in 1901 constitutional amendments were adopted making a plurality vote sufficient for election, increasing the number of senatorial districts, and stipulating that " in forming them regard shall be had " to population. But the greater inequalities in township representation sub- sisted, although in 1874 an amendment had given all town- ships of 5000 inhabitants two seats in the lower house, every other one " to be entitled to its present representation," and in 1876 another amendment had provided that no township incorporated thereafter should be entitled to a . representative " unless it has at least 2500 inhabitants, and unless the town from which the major portion of its territory is taken has also at least 2500 inhabitants." These provisions did not remedy the grosser defects, and as proposals for an amendment of the constitution could be submitted to the people only after receiving a majority vote of the lower house, all further attempts at effective reform seemed to be blocked, owing to the unwillingness of the repre- sentatives of the smaller townships to surrender their unusual degree of power. Therefore, the question of calling a constitu- tional convention, for which the present constitution makes no provision, was submitted to the people in 1901, and was carried. But the act providing for the convention had stipulated that the delegates thereto should be chosen on the basis of township representation instead of population. The small townships thus secured practical control of the convention, and no radical changes were made. A compromise amendment submitted by the convention, providing for two representatives for each township of 2000 inhabitants, and one more for each 5000 above 50,000, satisfied neither side, and when submitted to a popular vote, on the 16th of June 1902, was overwhelmingly defeated. Governors of Connecticut * The Colony of Connecticut.*

JohnHaynes 1 639-1 640

Edward Hopkins 1640-1641

John Haynes 1641-1642

George Wyllys 1 642-1 643

John Haynes 1643-1644

Edward Hopkins 1644-1645

John Haynes 1645-1646

Edward Hopkins 1 646-1 647

John Haynes . . . – - ■ J647- 1648

1 Term of service, one year until 1876; thereafter, two years.

Edward Hopkins 1648-1649

John Haynes 1 649-1 650

Edward Hopkins 1650-1651

John Haynes 1651-1652

Edward Hopkins . 1652-1633

John Haynes 1 653-1 654

Edward Hopkins 1654-1655

Thomas Welles 1655-1656

John Webster 1656-1657

John Winthrop 1657-1658

Thomas Welles 1658-1659

John Winthrop 1659-1676 .

William Leete 1 676-1 683

Robert Treat 1683-1687

Edmund Andros 1 687-1 689

Robert Treat 1689-1698

Fitz John Winthrop 1698-1708

Gurdon Saltonstall 1708-1725

Joseph Talcott 1725-1742

Jonathan Law 1742-175 1

Roger Wolcott 1 751-1754

Thomas Fitch . 1 754-1 766

William Pitkin 1 766-1 769

Jonathan Trumbull 1 769-1 776

The New Haven Colony.

Theophilus Eaton 1639-1657

Francis Newman 1658-166G

William Leete 1661-1665

State Governors

Jonathan Trumbull Matthew Griswold Samuel Huntington Oliver Wolcott . Jonathan Trumbull John Treadwell . Roger Griswold . John Cotton Smith Oliver Wolcott . Gideon Tomlinson John S. Peters . Henry W. Edwards Samuel A. Foote Henry W. Edwards William W. Ellsworth Chauncey F. Cleveland Roger S. Baldwin Isaac Toucey Clark Bissell Joseph Trumbull Thomas H. Seymour. Charles H. Pond CActing) Henry Dutton . William T. Minor . Alexander H. Holley William A. Buckingham Joseph R. Hawley James E. English Marshall Jewell . James E. English Marshall Jewell . Charles R. Ingersoll Richard D. Hubbard Charles B. Andrews Hobart B. Bigelow . Thomas M. Waller . Henry B. Harrison . Phineas C. Lounsbury Morgan G. Bulkeley Luzon B. Morris O. Vincent Coffin Lorrin A. Cooke George E. Lounsbury George P. McLean . Abiram Chamberlain Henry Roberts . Rollin S. Woodruff . George L. Lilley Frank W. Weeks Simeon E. Baldwin

1776-1784 Federalist

1 784-1 786

1 786-1 796

1 796-1 797

1 797-1 809

1809-1811 „

1811-1812 ,,

1812-1817 „

1 8 17-1827 Democrat

1 827-1 83 1 Federalist

1 831-1833 Whig

1 833-1 834 Democrat

1 834-1 835 Whig

1 835-1 838 Democrat

1 838-1 842 Whig

1 842-1 844 Democrat

1 844-1 846 Whig

1 846-1 847 Democrat

1 847-1 849 Whig

I 849-1 850 „

1 850-1 853 Democrat

1 853-1 854

1 854-1 855 Whig

1855-1857 Know-Nothing

1 857-1 858 Republican

1858-1866

1866-1867

1 867-1 869 Democrat

1 869-1 870 Republican

1 870-1 87 1 Democrat

1871-1873 Republican

1 873-1 877 Democrat

1877-1879 Democrat

1879-1881 Republican

1 881-1883 Republican

1 883-1885 Democrat

1 885-1 887 Republican

1 887-1 889

1 889-1 893

1 893-1 895 Democrat

1 895-1 897 Republican

1 897-1 899

1 899-1 90 1

1901-1903

1903-1905

1905-1907

1 907- 1 909

1909

1909-1911

19 n Democrat

Bibliography. — The " Acorn Club " has recently published a list of books printed in Connecticut between 1709 and 1800 (Hartford, 1904), and Alexander Johnston's Connecticut (Boston, 1887) contains a bibliography of Connecticut's history up to 1 886. Information con- cerning the physical features of the state may be obtained in William M. Davis's Physical Geography of Southern New England (National Geographical Society Publications, 1895). For information concern- ing industries, &c, see the Twelfth Census of the United States, and the Census of Manufactures of 1905, and a chapter in Johnston's Connecti- cut. For law and

administration, consult the 2ast two chapters on

" The Constitution and Laws of Connecticut " in New England States (vol. i., Boston, 1897) ; " Town Rule in Connecticut " in Political Science Quarterly, vol. iv. ; Bernard Steiner's History of Education in Connecticut (Washington, 1893), and the reports of the administra- tive boards and officials, especially those, of .ˆhe Bureau of Labor Statistics, the Board of Education, the Board of Charities and the Treasurer. There is no completely satisfactory history of the state. Johnston's Connecticut is well written, but his theories regarding the relationship between the townships and the state are not gener- ally accepted by historical scholars. There is< a good chapter in Herbert L. Osgood's History of the American Colonies in the Seven- teenth Century (New York, 1904). Connecticut as a Colony and as a State (Hartford, 1904; 4 vols.) is written from secondary sources, as also is G. H. Hollister's History of Connecticut (to 1818) (2 vols. Hartford, 1857). Perhaps the most satisfactory historical work is that of Benjamin Trumbull, A Complete History of Connecticut from 1630 to 1764 (New Haven, 1804-1818). E. E. Atwater's History of the Colony of New Haven (New Haven, 1 881) is also valuable, and the monograph of C. H. Levermore, " The Republic of New Haven," and that of C. M. Andrews " The River Towns of Connecticut " in The Johns Hopkins University Studies (Baltimore, 1886 and 1889) should be consulted for the institutions of the colonial period. For the sources, see Colonial Records of Connecticut (15 Vols., Hartford, 1 850-1 890); The Records of the Colony and the Plantation of New Haven (2 vols., Hartford, 1857-1858) and Records of the State of Connecticut (2 vols., Hartford, 1 894-1895). The Collections (Hartford i860 et seq.) of the Connecticut Historical Society contain valuable material, especially the papers of Governor Joseph Talcott; and the Papers (New Haven, 1865 et seq.) of the New Haven Colony Historical Society are extremely valuable for local history; but a vast number of documents relating to the colonial and state periods, now in the state library at Hartford, have never been published.

CONNECTICUT RIVER, a stream of the New England states, U.S.A. It rises in Connecticut Lake in N. New Hampshire — several branches join in N.E. Vermont, near the Canadian line, about 2000 ft. above the sea — flows S., forming the boundary between Vermont and New Hampshire, crosses Massachusetts and Connecticut, and empties into Long Island Sound. Its course is about 345 m. and its drainage basin 1 1 ,08 5 sq. m. The principal tributary is the Farmington, which rises in the Green Mountains in Massachusetts, and joins the Connecticut above Hartford. From its head to

the Massachusetts line the banks are wooded, the bed narrow, the valley slopes cut sharply in crystalline rocks, and the tributaries small and torrential. In the 273 m. of this upper portion of its course the average descent is is to 34 ft. a mile. In Massachusetts and Connecticut the river flows through a basin of weaker Triassic shales and sandstones, and the valley consequently broadens out, making the finest agricul- tural region of large extent in New England. Near Holyoke and at other points rugged hills of harder trap rock rise so high above the valley lowland that they are locally called mountains. From their crests there are beautiful views of the fertile Connecticut valley lowland and of the more distant enclosing hills of crystal- line rocks. The river winds over this lowland, for the most part flowing over alluvial bottoms. The valley sides rise from the river channels by a series of steps or terraces. These terraces are noted for their perfection of form, being among the most perfect in the country. They have been cut by the river in its work of removing the heavy deposits of gravel, sand and clay that were laid down in this lowland during the closing stages of the Glacial Period, when great volumes of water, heavily laden with sediment, were poured into this valley from streams issuing from the receding ice front. In the course of this excavation of glacial deposits the river has here and there discovered buried spurs of rock over which the water now tumbles in rapids and falls. For example, 11 m. above Hartford are the Enfield Falls, where a descent of 31-8 ft. in low water (17-6 in highest water) is made in 5-25 m. At Middletown, Conn., the river turns abruptly S.E., leaving the belt of Triassic rocks and again entering the area of crystalline rocks which border the lowland. Therefore, from near Middletown to the sea the valley again narrows. The river valley is a great manufacturing region, especially where there is a good water-power derived from the stream, as at Wilder and Bellows Falls, Vt., at Turners Falls and Holyoke, Mass., and at Windsor Locks, Conn. Five miles below Brattleboro, Vt., a huge power dam was under construction in 1909. Efforts have been made by the. United States govern-

ment to open the river to Holyoke, and elaborate surveys were made in 1896-1907. At Enfield Rapids is a privately built canal with locks 80 ft. long and 18 ft. wide, handling boats with a draft of 3 ft. From Hartford seaward the Connecticut is a tidal and navigable stream. Bars form at the mouth and have had to be removed annually by dredging. From 1829-1899 the Federal government expended $585,640 on the improvement of the river. During the colonial period the Connecticut river played an important part in the settlement of New England. The rival English and' Dutch' fur traders found it a convenient highway, and English homeseekers were soon attracted to its valley by the fertility of the meadow lands. From the middle of the 17th century until the advent of the railway the stream was a great thoroughfare between the seaboard and the region

to, the north. Its valley was consequently settled with unusual rapidity, and is now a thickly populated region, with many flourishing towns and cities.

See Annual Reports of the Chief of Engineers, U.S. Army, passim (index, 1900) ; E. M. Bacon's Connecticut River and the Valley of the Connecticut (New York, 1906); G. S. Roberts's Historic Towns of the Connecticut River Valley (Schenectady, New York, 1906) ; and Martha K. Genth, " Valley Towns of Connecticut," in the Bulletin of the American Geographical Society, vol. xxxix. No. 9 (New York

1907)-

CONNECTIVE TISSUES, in anatomy. Very widely distributed throughout the tissues and organs of the animal body, there occur tissues characterized by the presence of a high proportion of intercellular substance. This intercellular substance may be homogeneous in structure, or, as is more commonly the case, it may consist, in whole or in part, of a number of fibrous elements. AH these tissues are grouped together under the name Connective Tissues. They comprise the following types :— areolar tissue, adipose tissue, reticular or lymphoid tissue, white fibrous tissue, elastic tissue, cartilage and bone. They are all developed from the same layer of embryonic cells and all perform a.somewhat similar function, viz. to connect and support the other tissues and organs. According to the nature of their work the ground substance varies in its texture, being fibrous in some, calcareous and rigid in others. As forming the most typical of these tissues, we will first consider the structure of areolar con- nective tissue.

Areolar Tissue— This tissue is found in its most typical form uniting the skin to the deeper lying parts. It varies greatly in its density according to the animal and the position of the body from which it is taken. A piece of the looser variety may be spread out as a thin sheet and then examined microscopically. It is then seen to consist chiefly of bundles of extremely fine fibres running in all directions and interlacing with one another to form a meshwork. The spaces, or areolae thus formed give the name to this tissue (see fig. 1). The constituent fibres of each bundle are termed White Fibres. The bundles vary very much in size, but the fibres of which they are composed are of wonderfully constant size. A bundle may branch by sending off its fibres to unite; with similar branches from neighbouring bundles, but the individual fibres do not branch nor do they at any time fuse with one another. They form bundles of greater or less size by being arranged parallel to one another, and in these bundles are bound together by some kind of cement substance. The meshwork formed by these fibres is filled up by a ground substance in the composition of which mucin takes some part. In this ground substance lie the cells of the tissue. In addition to the white fibres a second variety of fibres is also present in this tissue. They

can be readily distinguished from the white fibres by their larger and variable size, by their more distinct ou tline, and by the fact that they, for the most part, run as straight lines through the preparation. Moreover they frequently branch, and the branches unite with those of neighbouring fibres. They are known as Yellow Elastic Fibres. Several of these will be found torn across in any preparation especially at the edges, and the torn ends will be found to be curled up in a very character- istic manner. The two types of fibre further differ from one another both chemically and physically. Thus the white fibre swells up and dissolves in boiling water, yielding a solution of

gelatin, whereas the yellow elastic fibre is quite insoluble under these conditions. The white fibres swell when treated with weak acetic acid, and are readily dissolved by peptic digestion but not by pancreatic. The yellow elastic fibres, on the other hand, are unaffected by acetic acid and resist the action of gastric juice for a long time, but are dissolved by pancreatic juice. In

Fig. I. — Connective tissue, showing cells, fibres and ground- substance. . (Szymnowicz.) c, Cell; e, elastic fibril, /, white fibril.

physical properties the white fibres are inextensible and extra- ordinarily strong, even being able, weight for weight, to carry a greater strain than steel wire. The yellow elastic fibres, on the other hand, are easily extensible and very elastic, but are far less, strong than the white fibres. Their elasticity is exhibited by their straight course when viewed in a stretched preparation of areolar tissue, and this contrasts markedly with the wavy course of the bundles of white fibres seen in the same preparation.

The Cells of Areolar Tissue. — Several types of cells are found in the spaces of this tissue and are usually classified as follows, (i) Lamellar cells. These are flattened branching cells which usually lie attached to the bundles of white fibres or at the junction of two or more bundles. The branches commonly unite with similar branches of neighbouring cells. (2) Plasma cells. These are composed of a highly vacuolated plasma, are not flattened but otherwise vary greatly in shape. (3) Granular cells. These are spherical cells densely packed with granules which stain deeply with basic dyes. (4) Leucocytes. These are typical blood corpuscles which have left the blood capillaries and gained the tissue spaces. They vary much in amount and in variety.

Adipose or Fatty Tissue. — This consists of rounded vesicles closely packed together to form a dense tissue, found for instance around an organ, along the course of the smaller blood vessels, or in the areolar tissue beneath the skin. This tissue is formed from areolar tissue by an accumulation of fat within certain of the cells of the tissue. These are especially the granular cells, though some regard the fat cells as specific in character, and to be found in large numbers only in certain parts of the body. The fat is either taken in as such by the cell, or, as is more commonly the case, manufactured by the cell from other chemical material (carbohydrate chiefly) and deposited within it in the form of small granules. As these accumulate they run together to form larger granules and this process continuing, the cell at last becomes converted into a thin layer of living material surrounding a single large fat globule. The use of fatty tissue is to serve as a storehouse of food material for future use. In conformity with this it is packed away in parts of the

body where it will not interfere with the working of the different tissues and organs, and in several positions is made use of as packing to fill up irregular spaces, e.g. between the eyeball and the bony socket of the eye.

■ *Reticular Tissue— This is a variety of connective tissue in which the reticulum of white fibres is built up of very fine strands leaving large interspaces in which the cells typical of the tissue are enclosed. The ground substance of the tissue is reduced to a minimum. Many connective tissue cells lie on the fibres which may in places be completely covered by them. This tissue therefore forms a groundwork holding together the main parts of an organ to form a compact whole. It may thus be demonstrated in lymphatic glands, the spleen, the liver, in mucous membranes and many other cellular organs.*

White Fibrous Tissue. — This is the form of tissue in which the white fibres largely preponderate. The fibrous bundles may

;W-.'?'. 1 .'W l » .' , tt '>.. ˆ VT' 1 WBF-" w» i ._*

Fig, 2. — Tendon of rat's tail, stained with gold chloride and showing cells arranged in rows between the bundles of fibres.

*be all arranged parallel to one another to form a dense compact structure as in a tendon. It is found wherever great strength combined with flexibility is required and the fibres are arranged in the direction in which the stress has to be transmitted. In other instances the bundles may be united to form mem- branes, and in such cases the main number of bundles run in one direction only, which < * s is again that in which the main stress has to be con- ducted. Such are the ligaments around the joints or the fasciae*

covering the muscles of the limbs, &c. In other positions, e.g. the dura mater, the fibrous bundles course in all directions, thus forming a very tough membrane. The cells of such tissues lie in the spaces between the bundles and are found flattened out in two or three directions where they are compressed by the oval fibrous bundles surrounding them (see figs. 2 and 3). The cells thus lie in linear groups running parallel tc the bundles, presenting a very characteristic appearance.

Yellow Elastic Tissue. — This is the form of connective tissue mainly composed of elastic fibres. It is found in those positions where a continuous but varying stress has to be supported. In some positions the elastic tissue is in the form of branching

Fig. 3. — Transverse section of portion of a tendon showing arrangement of white fibres in large bundles bounded by con- nective tissue, with tendon cells between the fibres, a, tendon cells; b, tendon bundles.

Fig. 4. — Isolated elastic fibres of ligamentum nuchae. Branching fibres of very definite outline with irregularly placed transverse markings.

fibres arranged parallel to one another and bound together by white fibres, e.g. ligamentum nuchae (fig. 4). In other cases it may be in the form of thin plates perforated in many directions to form a fenestrated membrane. In this type a series of such plates are arranged round the larger arteries forming a lar&e proportion of the artery wall.

All the connective tissues are vascular structures though as the number of cells present is not great, and further as those cells are not as a rule the seat of a very active metabolism, the number

The tissues are also supplied

of blood vessels is quite small, with lymphatics and nerves.

Cartilage. — Cartilage or gristle is a tough and dense tissue possessing a certain degree of flexibility and high elasticity. It is found where a certain amount of flexibility is required but where a fixed shape must be retained, e.g. in the trachea which must always be kept open or in the external ear or pinna which owes its typical and permanent shape to the presence of cartilage. It is largely associated with the bones in the formation of the skeleton. The tissue consists of a number of cells embedded in a solid matrix or ground substance. Three varieties are distin- guished according to

the nature of the matrix. Thus if the matrix is homogeneous in structure the cartilage is termed hyaline. Two other forms occur in which fibrous tissue is em- bedded in the cartilage matrix. They are therefore .termed fibro-cartilages and if the fibres are of the white variety the cartilage is called white fibro-cartilage, if of the yellow elastic form, elastic cartilage.

Hyaline Cartilage (fig. 5). — This consists of a number of rounded cells enclosed within a homogeneous matrix. The cells

possess an oval nucleus and a granular, often vacuolated cell- body. The number of cells present varies considerably in different specimens. In freshly formed cartilage the cells are numerous, the amount of matrix separating them being small. Cartilage grows by a deposition of new matrix by the cartilage cells which thus become more and more separated from one Fig. 5.— Hyaline Cartilage, another. After a time the cells Homogeneous matrix inter- divide and subsequently become spersed with groups of cells par ted from one another by de-

mother cell. them. The cells are often to be

seen in groups of two, three or four cells, indicating the common origin of each group from a parent cell. Towards the surface of the cartilage the cells are often modified in shape tenaing to become flattened in a direction parallel to the surface. Some of the cells near the surface of a piece of cartilage may be branched, appearing as a transition form between connective tissue corpuscles and typical cartilage cells. This is particularly the case at points where tendon or ligaments are attached. There may often be a deposit of lime salts in the matrix of hyaline cartilage especially in old animals or in the deeper layers of articular cartilage where it is attached to bone. A similar deposit of lime salts is well marked in the superficial parts of the skeleton of the cartilaginous fishes. In the development of animals possessing a bony skeleton, the skeleton is first laid down as hyaline cartilage which subsequently becomes gradually removed, bone being deposited in its place. In the adult, hyaline cartilage is found at the ends of the long bones (articular cartilage), uniting the bony ribs to the sternum (costal cartilage), and forming the cartilages of the nose, trachea and bronchi, &c. This as well as the other forms of cartilage are non-vascular so that the cells must gain their food-stuffs and get rid of their waste products by a process of diffusion through the matrix, a process which must of necessity be slow.

White Fibro-Cartilage. — This is a variety of cartilage in which numerous white fibres ramify in all directions through the matrix (fig. 6). The cells he separate and not in groups, and the amount of matrix between is commonly small. The white fibres may run in all directions or may chiefly

run in one direction only. Under the microscope the tissue closely resembles a dense white fibrous tissue, only the cells enclosed in it are cartilage cells and not connective tissue cells. Owing to the presence of so much fibrous tissue this variety of cartilage is very much tougher than hyaline cartilage and less flexible. It is found in places which have to withstand a considerable amount of compression but where a less rigid structure than bone is demanded. Thus it is

found forming the intervertebral disks, the interarticular cartil- ages, or at the edges of joint surfaces to deepen the surface.

Fig. 7. — Elastic fibro-cartilage of Epiglottis. Abundant cartilage cells in a matrix containing many branching elastic fibres.

Fig. 6.ˆWhite fibro-carti'age of intervertebral disk, with typical cartilage cells, matrix characterized by presence of many white fibres.

Elastic Fibro-Cartilage.— In this variety the matrix is per meated by a complex arid well-defined meshwork of elastic fibres (fig. 7). The size Of the fibres varies considerably in different specimens. It is found in parts which have to retain a permanent shape but where a considerable amount of flexi- bility is requisite, .as in the pinna of the ear, the epiglottis, the cartilage of the Eustachian tube, &c.

Bone. — Bone is a con nective tissue in which a considerable amount of mineral matter is deposited in the intercellular matrix where- by it acquires a dense and rigid consistency. If bone be incinerated so that the organic matter is burnt away, a residue of mineral matter is left. This consists chiefly of calcium phosphate, and amounts to as much as two-thirds of 'the weight of the original bone. If, on the other hand, bone be macerated in hydrochloric or nitric acid for a time the calcium phosphate is dissolved, leaving the organic matter practically unaffected and still showing the microscopic structure 6f bone. Hence it follows that the organic matrix is uniformly impregnated with the calcium salts.

According to its naked-eye appearance bone is distinguished as being either compact or cancellated. The former is dense like ivory and forms the outer surface of all bones. The whole of the shaft of a long bone is composed of this compact form. Cancellated bone has a spongy structure and contains large interspaces filled with a fatty tissue rich in blood vessels. This form of bone tissue is found forming the interior of most bones, especially the heads of the long bones, the interior of the ribs, &c. The cavity of the shaft of a long bone is filled, just as in the case of the smaller cavities in cancellated bone, with a fatty tissue, the Bone Marrow (see below).

The histological structure of bone may be made out from a piece of dried bone which has been ground down between grinding stones until it is sufficiently thin' for microscopic purposes. If such a section be prepared from a thin transverse slice of a long bone the appearance pictured in fig. 8 will be seen. The section comprises a number of circular units bound into a compact whole by intervening material showing in the main the same structural details. Each of these circular structures is termed an Haversian system. In the centre of each is seen a dark area, the Haversian canal, around which the bone matrix is deposited in the form of a number of concentric laminae. Enclosed between the laminae are a number of small spaces also appearing black in this prepara- tion. These are the bone lacunae and spreading away from thiim in directions generally trarisverse to the laminae are seen a large number of fine branching lines — the canaliculi. All parts of a preparation such as this which appear dark in reality represent spaces in the bone matrix. In the course of the preparation of the

specimen all these cavities have been filled up with finely divided debris and hence appear opaque. In the living bone these spaces are filled with a tissue or a cell or with fine protoplasmic processes. Thus the Haversian canal contains an artery and vein, some capillaries, a flattened lymph space, fine medullated nerve fibres — the whole being supported in a fine fatty tissue. Each lacuna is filled with a cell — the bone corpuscle — and the canaliculi contain fine branching processes of these cells. On comparing such a section with one taken parallel to the long axis of the shaft of a bone it is seen that the Haversian canals run some distance along the length of the bone, and that they frequently unite with one another or communicate by obliquely coursing channels. The spaces between the Haversian systems are filled in with further bony tissues which may or may not be arranged in laminae. Finally, the systems are as it were bound together by other laminae running parallel to the surface of the bone. If a piece of fresh bone be decalcified so that a thin section can be cut from it, the bone corpuscles can be seen filling up the lacunae but the section does not give so typical a picture as that already examined because it is not possible to make the protoplasmic structures filling the lacunae and canaliculi stand out in marked contrast with the surrounding matrix.

Fig. 8. — Section of Bone. Showing four Haversian systems and interlying bone material. This is a dry preparation, hence all the cavities (such as the Haversian Canals, the lacunae and canaliculi), being filled with debris from the grinding, appear dark.

Cancellous bone only differs from compact bone in the arrange- ment of the bone tissue. This encloses a number of irregular spaces which communicate with one another to form a kind of spongework. Commonly the framework is so constructed that a number of trabeculae running parallel to one another are produced. This is for the purpose of especially strengthening the bone in that direction. This direction is in all cases found to be that in which the bone has to support its maximum strain while in position within the body. Usually the bone trabeculae are so narrow that there is no need for Haversian systems within them, and they therefore usually consist of a few laminae arranged parallel to the surface. These laminae include bone corpuscles as in the rest of the bone tissue.

Bone Marrow. — Filling the central cavity of the tubular bones and the cavities of the spongy bone tissue is a tissue largely composed of fat cells. This is the bone marrow. Two varieties are distinguished, the one being red in colour, the other yellow. Red marrow is composed of a number of fat cells lying in a tissue made up of large and small marrow cells and typical giant cells or myeloplaxes (fig. 9). The whole of these elements are sup- ported in a delicate connective tissue. The marrow cells exhibit manifold forms. Some are typical leucocytes and lymphocytes as found in circulating blood. Others named myelocytes are slightly larger than leucocytes, with round or oval nuclei, and a protoplasm containing neutrophile granules. Yet another variety contains large eosinophile granules in the protoplasm. These different types of cell probably develop into leucocytes. The giant cells are large spherical cells with several nuclei.

In addition to fully ‘ developed red blood corpuscles there MP ais” Dresent numerous nucleated red blood cells (erythro-

blasts or haematoblasts). These are red blood corpuscles in an early stage of formation. They reach the blood after they have lost their nuclei.

Fig. q.~

/, Fat vacuole. my, Myeloplaxes. m, Marrow cells.

-Section of Bone Marrow.

e, Eosinophile cells.

r, Red corpuscles.

h, Haematoblasts or erythro-blasts.

Development of Bone. — The formation of new bone always takes place from connective tissue, but we may distinguish two different modes. In the

first the bone is preceded by cartilage (development from cartilage), in the second the bone is laid down directly from a vascular fibrous membrane (development from membrane). The development of bone from cartilage is the more complicated of the two because in it bone formation is taking place in two positions at the same time and in two rather different manners. Thus bone is being laid down from the outside (perichondral formation) from the fibrous membrane surrounding the cartilage, the perichondrium and also within the substance of the cartilage (endochondral formation). Peri- chondral formation takes place somewhat earlier than endo- chondral and in the case of a long bone is first observed around the centre of the shaft, i.e. in that portion of the bone which forms the diaphysis. Here the perichondrium is vascular and carries on the surface next to the cartilage an almost Con- tinuous layer of typical cells cuboid in shape, the osteoblasts or bone-formers. Calcium salts are deposited in the matrix of the immediately subjacent cartilage and the cell spaces of the cartilage increase in size while the cartilage cells shrink. Further growth of cartilage ceases in this region so that at one time the shaft of the cartilage may appear constricted in the middle. The formation of bone endochondrally is ushered in by the in- growth of blood vessels from the perichondrium. A way through the calcified matrix of the cartilage is made for them by a process of erosion. This is effected by a number of polynucleated giant cells, the osteoclasts, which apply themselves to the matrix 'and gradually dissolve it away. The enlarged cartilage spaces are thus opened to one another, and soon the only remnants of the matrix consist of a number of irregular trabeculae of calcified matrix. In this way the primary marrow spaces are produced, the whole structure representing the future spongy portion of the bone. The next step in both perichondral and endochondral bone formation consists in the deposition of bone matrix. This is effected by the osteoblasts. In the spongy portion they deposit a layer upon the surfaces of the calcified cartilage matrix, and thus in newly formed bone we find a central framework of cartilage matrix enclosed in a layer of bone matrix (see fig. 10). In the perichondral formation the deposition is effected in the same manner but is not uniformly spread over the whole surface, but trabeculae are formed. These become confluent at places, thus leaving spaces through which blood vessels and osteogenetic tissue pass to reach the interior of the bone. As the deposition of bone matrix proceeds, some of the osteoblasts become included within the matrix. These cease to form fresh matrix and in

fact become bone corpuscles. Increase in thickness of the new bone is effected by the deposition of fresh matrix followed again by the inclusion of

further osteoblasts. The spaces within the trabeculae become in this way gradually narrowed by the deposition of matrix until at last only a narrow centre is left large enough to contain the blood vessels and their accompanying nerves, lymphatics and a small number of osteoblasts. Bone formation then ceases. In this manner the Haversian systems are produced.

Growth of the bone proceeds by the deposition of more matrix on the exterior, but simultaneously a process of absorp- tion is also taking place. This is most typically seen within the spongy portion of the bone. The absorption of the trabeculae is effected by the osteoclasts. These become applied to the trabeculae and gradually eat their way into the matrix thus coming to lie within lacunae. They possess the power of dissolving both bone and cartil- age matrix. Side by side with this solution process we may often see new formation taking place by the activity of the osteoblasts (fig. 10). In this manner the whole framework of the bone may be gradually re- placed. The process is most active in embryos and very young animals, but also continues during the whole life of an animal,thuseffecting altera- tions in shape and structure of the whole bone. Growth in the length of a bone is effected by formation of new bone at either end of the shaft. After the ossification centre has been formed in the shaft (diaphysis) of the borie subsidiary centres make their appearance in Fig. 10.— A part of bone the heads of the bones. These developing from cartilage f b a simikr process of bone

snowing enlarged cartilage . .,11 1 • 1

spaces. formation, fresh bone masses which,

0, Osteoblasts lining a however, are not continuous with cavity and depositing the bone tissue of the shaft. They bone matrix on the form the epiphyses. They are

m n^ul^T^^ attached to the diaphysis by an (J. I, Osteoblasts which have . ..., ,

become included in the intermediate piece of cartilage, and deposited bone to form it is by a process of growth, of this bone corpuscles. cartilage and its subsequent replace-

F nSmx lald d ° Wn b ° ne ment by bone that S rowth in len S th Giant cells or osteoclasts, of the whole bone is effected (fig. 10). Cartilage cells arranged This piece of intervening cartilage

in rows. can be easily seen in a young bone

Unaltered matrix of an(j pers i sts as i ong as the bone can

hyaline cartilage. . ˆ . , ˆ, „,

increase in length. Thus m man

the last junction of epiphysis to diaphysis may not take place

until the 28th year.

Development of bone in membrane shows a. course in all respects very similar to perichondral bone formation. A layer of osteogerietic tissue makes its appearance in the membrane from which the bone is to be formed. In this tissue a number of stiff fibres are deposited which soon become covered and impregnated with calcium salts. Around these bundles of fibres numbers of osteoblasts are deposited and by them bone matrix is deposited in irregular trabeculae. The bone increases by the deposition of fresh matrix just as in perichondral bone formation and Haversian systems are formed after precisely the same manner as in that position. The factor determining the position af one of these systems is of course the presence of a blood vessel penetrating towards the deeper part of the bone.

Muscle. — Muscle is the contractile tissue of the body, that tissue by which the various parts of the body are moved. Thus

b,

d, c,

a,

it forms the main bulk of the limbs, back, neck and body wall. Most of- the viscera too possess well-developed muscular coats. When Separated into its constituent parts it is seen that muscle in all instances is built up of a number of long fibres. These are of three well-defined types. Those forming the skeletal muscles are of large size, even in some instances up to 12 cms. in length, their diameter varying from 0,01 to 0,1 mm. When these are examined under the microscope they are found, to be character- ized by possessing a decided transverse marking, and they are therefore known as striated muscle fibres. From the fact that they comprise those muscles which are under the control of the will they are also called voluntary muscle fibres. The second variety of muscle is made up of much smaller fibres varying in different parts from 0,05 to 0,15 mm. in length and about 0,005 mm – m diameter. These fibres show no transverse stria tions nor are they directly under the control of the will. They are therefore termed smooth or involuntary muscle. Lastly, there is a third type of muscle found in the heart which lies intermediate in structure between these two varieties. In this the fibres are small and show distinct transverse striations.

Longitudinal striations are also present though somewhat less marked. In most respects this form of muscle fibre resembles smooth muscle more closely than striated muscle.

Voluntary or Striated Muscle. — Each muscle fibre of which this is composed is what is known as a syncytium or Plasmodium, i.e. a structure containing a number of nuclei, which has been formed from a single cell by proliferation of its nucleus without subdivision of the protoplasm. It is thus an assemblage of cells possessing a common protoplasm. Each fibre generally runs parallel to the length of the muscle and if that muscle is short extends the whole length. Thus the one end of the fibre may be attached to tendon when the end is rounded off. The other end may also terminate in tendon or in the fibrous covering of bone in which case it is again rounded. In long muscles, however, the fibre may only extend a certain distance along the muscle, and it is then found to terminate in a tapering or bevelled end. In some of the long muscles some of the fibres may both arise and terminate in the substance of the muscles. In such a case both ends are bevelled. All the fibres in a muscle are arranged parallel to one another.

The outer surface of each muscle fibre consists of a tough homogeneous membrane, the sarcolemma. The main muscle substance (see fig. n) is composed of several parts, viz. the fibrillae, the sarcoplasm and the nuclei. Under the action of reagents the muscle fibre may be ____ˆ___

split into a number of longitudinal 'pTSflX'5-1ˆˆfW3ˆˆ®6 elements. These are the fibrillae. ltPffi|JHj'|||ˆ : !{|ˆPmi

and dark substance which give them Slitrˆiiffff HˆjHw™

They possess alternate bands of light i'i-£mˆˆsˆˆ; fcirir!; ji s-ff

a striated appearance. When viewed f 1 1 jj oijax-''-:: y. Hi tik-r? v under polarized light the dark sub- iMˆˆ§ˆm stance is found to be doubly refract- iff fˆLSSji J jffiir If-Hl-ii I fci ing or anisotropic, the light band ||#lpl||!||Ii? f|fiSt is singly refracting or isotropic. iˆMi$ˆMˆMiisiˆMM!ii*

mm

Fig. 11. — Striated or Voluntary muscle fibre, with alternate light and dark bands and many nuclei immediately beneath the sarcolemma.

gly refracting or isotrop: According to many observers, in the centre of each isotropic segment there is a thin transverse disk of aniso- tropic material and in the centre of each anisoptropiC segment a thin disk of isotropic substance. The fibrillae are arranged in the muscle fibre parallel to one

another and with the alternate light and dark bands at approxi- mately the same level across the fibre, thus giving to the whole muscle fibre its typical transverse striation. The fibrillae are united to one another by interfibrillar substance to form bundles, of which there may be a considerable number in each muscle fibre. The bundles lie in a surrounding layer of sarcoplasm which apparently represents the remaining portion of unaltered protoplasm of the syncytium. This structure of muscle is best seen in the transverse sections of the fibres. A number of areas separated by a clear protoplasm are then to be seen. The areas are formed by the bundles of fibrillae seen in transverse section,

the intermediate substance is the sarcoplasm. In some muscles, apparently, each fibrilla is surrounded by a considerable amount of sarcoplasm, in which case the fibrillae are easily isolated from one another and can be readily examined. This is the case in the wing muscles of insects. The nuclei of the fibre are arranged close

Fig. 12. — -Transverse section of Fig. 13.— Isolated

a striated muscle fibre. smooth muscle fibres,

n, Nucleus. Very much contracted.

- *s, Sarcoplasm. Fibres tapering at each*

m, Bundle of fibrillae forming end, with nucleus in

a muscle column. centre of cell.

under the sarcolemma. Each is surrounded by a small quantity of sarcoplasm and in shape is an elongated ellipse. In most cases the muscle fibres do not branch, though in a few instances, such as the superficial muscles of the tongue, branching is found.

Involuntary or Smooth Muscle (figs. 13 arid 14).' — This form of muscle tissue when separated into its single constituents is seen to consist of fibres possessing a typical long spindle shape. The central part is somewhat swollen and contains an elongated nucleus centrally placed. The ends of the fibres are drawn out and pointed sharply. There is no definite surrounding membrane to each cell. In most of the cells, especially the larger, a distinct longitudinal marking can be seen. This is due to the presence of the fibrils which run the length of the fibre and in all proba-

bility are the essential contractile elements.

In most instances the cells are arranged with one another in a tissue to form bundles or sheets of contractile substance. In each bundle or sheet the cells are cemented to one another so that they may all act in unison. The cementing material is apparently of a membranous character and is so arranged that contiguous fibres are only separated by a single layer of mem- brane. According to some, neighbouring fibres are connected to one another by minute offshoots, and these communications

serve to explain the manner in which the contractionisobserved to pass from fibre to fibre along a sheet composed of the muscles.

Involuntary muscle is the variety of muscle tissue found in the walls of the hollow viscera, such as stomach, intestines, ureter,bladder,uterus, &c, and of the respir- atory passages, in the middle coats of arteries, in the skin

,, . . _ , ~, , , and the muscular tra-

Preparation of Frog s Bladder hprlll „_ nf thp <. n i PPn >oth muscle in situ forming a beculae ot the spleen.

The arrangement is very typical, for in- stance, in the small intestine. Here the muscular coat consists of two layers of muscle. Each is in the form of a sheet which varies greatly in thickness in different animals. In the inner sheet the fibres, which are all parallel to one another, are disposed with their long axis transverse to the direction of the gut. In the outer layer, the direction of the fibres is at right angles to this. In a viscus with thick muscle walls the fibres are bound into bundles and the bundles may run in all directions. In some

Fig. 14 showing smooth muscle in situ forming a network.

15. — Cardiac Muscle, Isolated cells.

instances the bundles may form branching systems, thus constitut- ing a network, as in the bladder (fig. 14)., In other instances, e g. the villi of the small intestine, the muscle fibres are separate, forming a felt-work with wide meshes.

Heart Muscle. — The fibres of which the muscular walls of the heart are composed though cross striated are not voluntary, for they are not under the control of the will. Each fibre is an oblong cell possessing distinct trans- verse and less distinct longitudinal striations (fig. 15). There is no sarcolemma, and the nucleus of each fibre is placed in the centre. The longitudinal striation is due to the presence of fibrillae, each of which is

cross striated. These lie parallel to one another in the cell, the sarco- plasm surrounding them being much more abundant in these fibres than is striated muscle. The fibrillae are arranged in rows, and when a trans- Fig. verse section of one of these fibres is examined it is seen that the rows

radiate away from the centre of the cell. A further distinctive character of cardiac muscle fibres is that they frequently branch, the branches uniting with others from neighbouring cells. Moreover, the ends of the fibres are attached to corre- sponding faces of other cells, and through these attached faces the fibrillae pass, so that there is an approximation to the formation of a syncytium. (T.G.Br.)

CONNELLITE, a rare mineral species, a hydrous copper chloro-sulphate, Cu 15 (Cl,OH) 4 S0 16 15H20, crystallizing in the hexagonal system. It occurs as tufts of very delicate acicular crystals of a fine blue colour, and is associated with other copper minerals of secondary origin, such as cuprite and mala chite. Its occurrence in Cornwall was noted by Philip Rashleigh in 1802, and it was first examined chemically by Arthur Connell in 1847. Outside Cornwall it has been found only in Namaqua- land in South Africa.

CONNELLSVILLE, a borough of Fayette county, Pennsylvania, U.S.A., on the Youghiogheny river, about 60 m. S.S.E. of Pitts- burg. Pop. (1890) 5629; (1900)7160, including 800 foreign-born; (1910) 12,845. It is served by the Pennsylvania, the Pittsbuig and Lake Erie, and the Baltimore & Ohio railways, and by the interurban electric system of the West Penn Railway Co., which has a large power plant near Connellsville. Connellsville is the centre of the Connellsville coke district (in Fayette and Westmoreland counties), which has the largest production in the United States, the output in 1907 (13,089,427 tons) being 32-1% of that of the whole country. Connellsville coke is the standard grade. What is called the Lower Connellsville coke region lies in Fayette county S.W. of the Connellsville district. It is richest near Uniontown, and in 1907 produced 6,310,900 tons of coke, making it second only to Connellsville. The so-called Upper Connellsville (or Latrobe) district, near Latrobe, produced in 1907, 1,030,260 tons of coke. The combined output of these three districts in 1907 was 50-1% of the total of the entire country. The borough of Connellsville has various manufactures including iron, tin plate, automobiles and various kinds of machinery; and a state hospital for the treatment of persons injured in mines is located here. Connellsville was first settled in 1770, was laid out as a town by Zachariah Connell, in whose honour it was named, in 1793, and was incorpor- ated in 1806. The borough of New Haven (pop. in 1900, 1532) was annexed to Connellsville after the census enumeration of

1900.

CONNEMARA, a wild and picturesque district in the west of Co. Galway, Ireland. (See Galway.)

CONNERSVILLE, a city and the county-seat of Fayette county, Indiana, U.S.A., situated on White Water river, in the east central part of the state, about 50 m. E. by S. of Indianapolis. Pop. (1900) 6836; (1910) 7738. It is served by the Cincinnati, Hamilton & Dayton, the Cleveland, Cincinnati, Chicago & St

Louis, the Fort Wayne, Cincinnati & Louisville railways, and by the Indianapolis & Cincinnati Traction line (electric). It has a good water-power, and among its manufactures are wagons and carriages, axles, furniture, flour and electric signs. The water-works are owned and operated by the city. Connersville was first settled about the close of the war of 1812; was laid out in 1 817 by John Conner, in whose honour it was named; and received a city charter in 1869.

CONNOR (or O'Connor), BERNARD (1666-1698), English physician, was born in Kerry, Ireland, and after studying at Montpellier and Paris, graduated at Reims in 1691. Having travelled through Italy with the two sons of the high chancellor of Poland, he was introduced at the court of Warsaw, and appointed physician to John Sobieski, king of Poland. In 1695 he went to England, where he lectured at Oxford, London and Cambridge, and became a member of the Royal Society and of the College of Physicians. He was the. author of a treatise entitled Evangelium Medici (1697), in which he endeavoured to explain the Christian miracles as due to natural causes, and of a History of Poland (1698). He died in London in 1698.

CONNOTATION, in logic, a term (largely due to J. S. Mill) equivalent to Intension, which is used to describe the sum of the qualities regarded as belonging to any given thing and involved in the name by which it is known; thus the term " elephant " connotes the having a trunk, a certain shape of body, texture of skin, and so on. It is clear that as scientific knowledge advances the Connotation or Intension of terms increases, and, therefore, that the Connotation of the same term may vary considerably according to the knowledge of the person who uses it. Again, if a limiting adjective is added to a noun (e.g. African elephant), the Connotation obviously increases. In all argument it is essential that the speakers should

be in agreement as to the Intension of the words they use. General terms such as " Socialism," " Slavery," " Liberty," and technical terms in philosophy and theology are frequently the cause of controversies which would not arise if the disputants were agreed as to the Intension or Connotation of the terms. In addition Connotative terms, as those which imply attributes, are opposed to Non- Connotative, which merely denote things without implying attributes. See also Denotation; and any .text-books on elementary logic, e.g. T. Fowler or W. S. Jevons.

CONOID (Gr. kuvos, cone, and elbos, form), in geometry, the solids (or surfaces) formed by the revolution of a conic section about one of its principal axes. If the conic be a circle the conoid is a sphere (q.v.); if an ellipse a spheroid (q.v.); if a parabola a paraboloid; if a hyperbola the surface is a hyper- boloid of either one or two sheets according as the revolution takes place about the conjugate or transverse axis, and the surface generated by the asymptotes is called the " asymptotic cone." If two intersecting straight lines be regarded as a conic, then the principal axes are the bisectors of the angles between the lines; consequently the corresponding conoid is a right circular cone. It is to be noted that all these surfaces are surfaces of revolution; and they, therefore, differ from the surfaces discussed under the same names in the article Geo- metry: Analytical.

*The spheroid has for its cartesian equation(» 2 -r-y 2)/a 2 -|-3 2 /& 2 = * > the hyperboloid of one sheet(of revolution)is(a?-j-y 2)/a s -^/i 2 =i; the hyperboloid of two sheets is z 2 /c L /a 2 = i; and the paraboloid of ' revolution is 3?-y 2 =$az.*

CONOLLY, JOHN (1794-1866), English physician, was born at Market Rasen, Lincolnshire, of an Irish family, on the 27th of May 1794. He graduated M.D. at Edinburgh in 1821. After practising at Lewes, Chichester and Stratford-on-Avon succes- sively, he was appointed professor of the practice of medicine at University College, London, in 1828. In 1830 he published a work on the Indications of Insanity, and soon afterwards settled at Warwick. In 1832 in co-operation with Sir Charles Hastings and Sir John Forbes, he founded a small medical association with a view to raising the standard of provincial practice. In later years this grew in importance and membership, and finally became the British Medical Association. In 1839 he was elected

resident physician to the Middlesex County Asylum at Hanwelit In this capacity he made his name famous by carrying out in its entirety and on a large scale the principle of non-restraint in the treatment of the insane. This principle had been acted on in two small asylums — William Tuke's Retreat near York,, and the Lincoln Asylum; but it was due to the energy of

Conolly in sweeping away all mechanical restraint in the great metro- politan lunatic hospital, in the face of strong opposition, that the principle became diffused over the whole kingdom, and accepted as fundamental. In 1844 he ceased to be resident physician at Hanwell, but remained visiting physician until 1852. He died on the 5th of March 1866 at Hanwell, where in the later part of his life he had a private asylum. His works include Construction and Government of Lunatic Asylums (1847); The Treatment of the Insane without Mechanical Restraints (1856) ; and an Essay on Hamlet (1863).

CONON, son of Timotheus, Athenian general. After having held several commands during the Peloponnesian War, he wa chosen as one of the ten generals who superseded Alcibiades in 406 B.C. He was defeated by the Spartan Callicratidas and shut up in Mytilene. The Athenian victory at Arginusae rescued him from his dangerous situation, and as he had not been present at the battle, he was not tried with the other generals, and was allowed to retain his command. .In 405, however, the Athenian fleet was surprised by Lysander, at Aegospotami, and Conon with difficulty managed to escape with eight ships to his friend Evagoras, king of Cyprus. On the outbreak of the war between Sparta and the Persians (400) he obtained from King Artaxerxes joint command with Pharnabazus of a Persian fleet. In 394 he defeated the Lacedaemonians near Cnidus, and thus deprived them of the empire of the sea, which they had held since the taking of Athens. Sailing down the Aegean to Athens, he exr pelled the Lacedaemonian harmosts from most of the maritime towns, and finally completed his services to his country by restor- ing the long walls and the fortifications of the Peiraeus. Accord- ing to one account, he was put to death by Tiribazus, when on an embassy from Athens to the Persian court to counteract the intrigues of Sparta; but it seems more probable that he escaped to Cyprus and died there about 390.*

See Xenophon, Hellenica, iv. 3. 8 ; Justin vi. 3 ; Cornelius Nepos, Conon ; Lysias, De bonis Aristophanis, 41-44; Isocrates, Paner gyricus, 41 ; M. Schmidt, Das Leben Konons (1873), with notes and references to authorities.

CONON, Greek astronomer and geometrician, flourished at Samos in the 3rd century B.C. He was the friend of Archimedes, who survived him. Conon is best known in connexion with the Coma Berenices (Hair of Berenice). Berenice, the wife of Ptolemy Euergetes, had dedicated her hair in the temple of Arsinoe of Zephyrium (Aphrodite Zephyritis) as an offering to secure the safe return of her husband from his Syrian expedition. It disappeared from the temple, and was declared by Conon to have been placed among the stars. The incident formed the subject of a poem by Ca.llimachus, of which only a few lines are preserved, but we still possess

the imitation of it by Catullus. Conon is also considered the inventor of the curve known as the " Spiral of Archimedes." He wrote a work on astronomy, which contained a collection of the observations of solar eclipses made by the Chaldaeans, and drew up a parapegma, or meteorological calendar, from his own observations. He also investigated the question of the number of points of intersection of two conies, and his researches probably formed the basis of the 4th book of the Conies of Apollonius of Perga.

CONON, grammarian and mythographer, flourished at Rome in the time of Caesar and Augustus. He was the author of a collection of myths and legends, relating chiefly to the founda- tion of colonies. The work, dedicated to Archelaus Philopator, king of Cappadocia, contained 50 Narratives (AvriyrniaTa, Narra- tiones); an epitome, accompanied by brief criticisms, has been preserved in Photius {cod. 186). The style is good, being founded on the best Attic models, and the whole is agreeable to read. Nicolaus of Damascus is said to have made considerable use of the work (edition by U. Hofer, 1890).

CONQUEST, in international law, the subjugation of an enemy in war. International law recognizes a " right of con- quest"; 1 that is to say, neutral powers accept the de facto result of a war of conquest, or of a war which has led to conquest, without reference to any questions of justice or morality the war may involve. Neutral states, however, have often intervened to prevent the exercise of the right, on the ground that some interest of theirs was implicated. Two comparatively recent cases of this were the intervention of : neutral European powers after the signing of the Russo-Turkish treaty of San Stefano in 1878, and that which took place after the Chino-Japanese War (1899). The theory of the balance of power, which long swayed the diplomacy of Europe, was also a restriction placed upon the right of conquest (see Balance of Power). Where, however, no neutral interest is involved, as in the case of the South African War (1899-1902), or where any neutral interest involved is not backed by sufficient physical or moral support among the powers to ensure success to any joint action among them, the conquering state deals with the conquered state in such vray as it has the power to enforce, subject only to the possible moral reproval of public opinion in case of any ruthless abuse of the latter's impotency.

Conquest may or may not be followed by annexation (q.v.) in part, as in the case of the Franco-German War when Germany exercised her overwhelming strength to force France into trans- ferring to her a portion of her territory, or as in the case of the South African War, in which Great Britain annexed to her dominions the whole territory of the subjugated republics.

Among European states any attempt to disturb the balance of the political distribution of Europe might still be held to involve the common interests of the other powers. The sup- pression of an independent European state and its incorporation into another state, as a termination to a war, in fact has only occurred in recent times in Italy and Germany, and these were cases in which that balance has rather been promoted than disturbed.

It is sometimes difficult to say when a conquest is complete, and the consequences of annexation may be rightfully enforced. A time necessarily comes, in the course of a war of conquest, when the conqueror may rightfully declare that the laws of peace shall be applicable from a certain moment, and that further resistance will not entitle the combatants to the treatment pre- scribed for regular combatants by the laws of war. To carry on warfare after the entire territory is in the hands of the enemy, after all means of government by the dispossessed authority are at an end, after all

hope of recovery of its territorial sovereignty is absolutely gone, is obviously mere wanton bloodshed. A war is practically at an end when the position of the one belligerent renders the contest manifestly hopeless for the other belligerent. 2

'"The rights of conquest," says Halleck (Int. Law, 3rd ed., ch. 33), explaining the nature of the right, " are derived from force alone. They begin with possession and end in the loss of possession. The possession is acquired by force, either from its actual exercise or from the intimidation it produces. There can be no antecedent claim or title from which any right of possession is derived, for if so it would not be a conquest. The assertion and enforcement of a right to possess a particular territory do not constitute a conquest of that territory. By the term conquest we understand the forcible ac- quisition of territory admitted to belong to the enemy. It expresses, not a right, but a fact, from which rights are derived. Until the fact of conquest occurs, there can be no rights of conquest. A title acquired by a conquest cannot, therefore, relate back to a period anterior to the conquest. That would involve a contradiction of terms. The title of the original owner prior to the conquest is, by the very nature of the case, admitted to be valid. His rights are therefore suspended by force alone. If that force be overcome, and the original owner resumes his possession, his rights revive and are deemed to have been uninterrupted. It, therefore, cannot be said that the original owner loses any of his rights of sovereignty, or that the conqueror acquires any rights whatever in the conquered territory anterior to actual conquest."

s " There is subjugation," says Rivier (Droit des gens, vol. ii. p. 436), " when a war is terminated by the complete defeat of one of the belligerents, so that all his territory is taken, the authority of his government suppressed, and he ceases in consequence to exist as a state."

" Tr j extinction of a state by conquest," says Westlake (Int.

From that moment it is the duty of the conqueror to organize the regular government of the conquered territory on a footing of peace. As soon as this regular government has been estab- lished, to take human life, destroy property or otherwise disturb public order entails the penalties of the criminal law. A govern- ment which is strong enough to maintain its authority, which is in possession of and is de facto administering a country, is the govern- ment of that country, and, however just or interesting may be the cause of those who have been dispossessed, they are not entitled to treatment as belligerents. Thus in the South African War of 1890-1902 the British authorities, when the whole territory was occupied, manifestly beyond hope of recovery, might have ceased to treat the roving bands of armed men, who were still carrying on war, as belligerents. This, however,

would probably have entailed reprisals; and when the Dutch govern- ment offered its good offices in January 1902, with a view to bringing the war to an end, the offer, though not accepted in the form of mediation, nevertheless led to negotiations which resulted in " terms of surrender " between delegates of the burghers "acting as the government " of the two republics (31st of May 1902), which gave finality to the conquest and made individual resistance thereafter unquestionably an act of rebellion. The position of the remains of a regular force roving over a conquered country, in fact, is one which it is difficult to deal with under principles of law, men who have been fighting for the retention of their national independence differing essenti- ally from insurgents. (T. Ba.)

CONRAD, or Konrad (M. H. Ger. Kuonrdt, i.e. " keen in counsel," Lat. Conradus, It. Corrado, cf. the A.S. Ccenred), a German masculine proper name, borne by four German kings and emperors. The last of the Hohenstaufen, Conrad the younger, duke of Swabia, is known in history by the diminutive form Conradin (q.v.).

CONRAD I. (d. 918), German king, son of Conrad, count of Lahngau, was a member of an influential Franconian family, and was probably related to the German king Arnulf . He took part in the feud between his family and that of the Babenbergs, and after his father's death in 906 passed much of his time at the court of Louis the Child, and assumed the title of " duke in Franconia." When Louis died in 911, Conrad was chosen German king at Forchheim on the 8th of November 911 owing to the efforts of Hatto I., archbishop of Mainz, and to the reputation he appears to have won in war and peace alike. Coming to the throne he found the unity of Germany threatened by the Magyars and the Normans from without, and by the growing power of the stem-duchies from within. He failed, however, to bring Lorraine into subjection, and was equally unsuccessful in his struggle with Henry, duke of Saxony, after- wards King Henry the Fowler. His subsequent years were mainly spent in warfare in Swabia and Bavaria, but owing to ill-health and the feebleness of his forces he was only partially successful in his attempts to restore peace. He died on the 23rd of September 918, and was buried at Fulda. About 914 Conrad married Kunigunde, a sister of Erchanger, count palatine in Swabia, and widow of Liutpold, margrave of Carinthia. He had no sons, and named his former enemy, Henry of Saxony, as his successor.

See E. Dummler, Geschichte des ostfrankischen Reichs (Leipzig, 1887-1888) ; F. Stein, Geschichte des Konigs Konrad I. von Franken und seines Hauses (Nordlingen, 1872). F. Loher, Konig Konrad I. und Herzog Heinrich von Sachsen (Munich, 1857); Die Urkunde des deutschen Konigs Konrad I., edited by Th. von Sickel in the Monumenla Germaniae historica. Diplomata (Hanover, 1879).

CONRAD II. (c. 990ˆ1039), Roman emperor, founder of the Franconian or Salian dynasty, was a son of Henry, count of Spires, grandson of Otto I., duke of Carinthia, and through his great-grandmother Liutgarde, wife of Conrad the Red, duke of Lorraine, a descendant of the emperor Otto the Great. He was Law, 1904, pt. i. p. 64), " will take place when the conquering power has declared its will to annex it, and has established its authority throughout the territory, any opposition still made being on the scale of brigandage rather than of war, and no corner remains in which the ordinary functions of government are carried on in the name of the old state."

966

CONRAD III.

a: member of the family of the Conradines, counts in Franconia, but the family estates had passed to another branch, and were held at this time by another Conrad, called the " younger " to distinguish him from his elder relative. He appears to have been a. man of strong character, and owing to his skill in warfare, and especially to his marriage in 1016 with Gisela, widow of Ernest I., duke of Swabia, won position and influence in Germany. When the emperor Henry IL died in 1024, the two Conrads were the most prominent candidates for the throne, and are said to have mutually agreed to abide by the decision of the electors. After some delay the elder Conrad was elected German king early in September 1024. He owed his election to the support of the German bishops, especially that of Aribo, arch bishop of Mainz, who crowned him in his cathedral on the 8th of September 1024; and the king's biographer, Wipo, remarks that Charlemagne himself could 1 ot have been welcomed more gladly by the people. Aribo, however, refused to perform this ceremony for Gisela, as she was within the prohibited degrees of affinity, and she was crowned some days later at Aix-la- Chapelle by Pilgrim, archbishop of Cologne. Conrad then travelled through his dominions, received tribute from tribes dwelling east of Saxony, and by his journey " bound the kingdom most firmly in the bond of peace, and the kingly protection." His position, however, was full of difficulty, and the various elements of discontent tended to unite. Boleslaus, duke of the Poles, took the title of king, and assumed a threatening attitude; Rudolph III., king of Burgundy or Aries, who had arranged that the emperor Henry II. should succeed him, refused to make a similar arrangement with Conrad; many of the Italians were hoping to obtain a king from France; and some German princes, including Conrad the younger, and the king's step-son Ernest II., duke of Swabia, showed signs of revolt.

The death of Boleslaus in 1025, and a cession of some lands north of the

Eider to Canute, king of Denmark and England, secured the northern and eastern frontiers of Germany from attack, and the king's domestic enemies were soon crushed. In 1026 Conrad set out for Italy, and supported by Heribert, archbishop of Milan, assumed the Lombard crown in that city, and afterwards overcame the resistance which was offered by Pavia and Ravenna. Travelling to Rome, he was crowned emperor in the presence of the kings of Burgundy and Denmark by Pope John XIX., on the 26th of March 1027. The emperor then visited southern Italy, where by mingling justice with severity he secured respect for the imperial authority; and returned to Germany to find Ernest of Swabia, the younger Conrad, and their associates again in arms. One cause o'f this rising was the claim put forward by Ernest to the Burgundian succession, as King Rudolph was his great-uncle. But his efforts were unsuccessful, and in 1028 the revolt was suppressed; while in the meantime the emperor had met Rudolph of Burgundy at Basel, and had secured for himself a promise of the»succession. The emperor's presence was soon needed in the east, where Mesislaus, duke of the Poles, and Stephen I., king of Hungary, were ravaging the borders of Germany. An expedition against Stephen in 1029 was only partially successful, but he submitted in 103 1, and in 1032 Mesislaus was compelled to cede Lusatia to Conrad. In 1030 Ernest of Swabia was killed in battle; and in September 1032 the king of Burgundy died, and his kingdom was at once seized by his nephew Odo, count of Champagne. Collecting an army, Conrad marched into Burgundy in 1033, was chosen and crowned king of Peterlingen, and after driving his rival from the land was again crowned at Geneva in 1034. Having asserted his authority over the Bohemians and other Slavonic tribes, Conrad went a second time to Italy in 1036 in response to an appeal from Heribert of Milan, whose oppressions had led to a general rising of the smaller vassals against their lords. An assembly was held at Pavia, and when Heribert refused to obey the commands of the emperor he was seized and imprisoned; but he escaped to Milan, where the citizens took up arms in his favour. Unable to take Milan, Conrad issued in May 1037 an edictum de beneficiis, by which he decreed that the principle of heredity should apply in Italy to lands held by sub-

vassals, and that this class of tenants should not be deprived of their lands except by the sentence of their peers, and should retain the right of appeal to the emperor. Having crushed a rising at Parma and left the city in flames, Conrad restored Pope Benedict IX. to Rome, and marched into southern Italy, where he invested the Norman Rainulf with the county of Aversa, and gave the principality of Capua to Waimar IV., prince of Salerno. Returning to Germany, the emperor handed over the kingdom of Burgundy to his son Henry, afterwards the emperor Henry III., and proceeded to Utrecht, where he died on the 4th of June 1039. He was

buried in the cathedral which he had begun to build at Spires.

Conrad did much for the strengthening of the German kingdom. Its boundaries were extended by the acquisition of Burgundy and the reconquest of Lusatia; disturbances of the peace became fewer and were more easily suppressed than heretofore ; and three of the duchies, Bavaria, Franconia and Swabia, were made apanages of the royal house. Although he did not decree that German fiefs should be hereditary, he favoured the tendency in this direction, and so attempted to make the smaller vassals a check on the power of the nobles. He endeavoured to unite Italy and Germany by inter-marriages between the families of the two countries, governed Italy to a large extent by German officials, and ordered that the law of Justinian should supersede Lombard law in the Roman territories. He ruled the church with a firm hand; appointed his own supporters, regardless of their individual fitness, to bishoprics and abbeys; and sought by inquiry to restore to the royal domain the estates granted to the church by his predecessors.

See Wipo, Gesta Chuonradi II. imperatoris, Herimann of Reichenau, Chronicon, Annates Sangallenses majores, Annates Hildisheimenses, all in the Monumenta Germaniae historica. Scriptores (Hanover and Berlin, 1826-1892). An edition of Wipo, together with parts of the Chronicon and the Annates Sangallenses, edited by H. Bresslau, was published at Hanover in 1878.

H. Bresslau, Jahrbiicher des deutschen Reichs unter Konrad II. (Leipzig, 1879-1884); H. Bresslau, Die Kanzlei Kaiser Konrads II. (Berlin, 1869); W. Arndt, Die Wahl Conrad II. (Gottingen, 1861); J. von Pflugk-Harttung, Unter suchungen zur Geschichte Kaiser Konrads II. (Stuttgart, 1890), G. A. H. Stenzel, Geschichte Deutsch- lands unter den frdnkischen Kaisem (Leipzig, 1827-1828); M. Pfenninger, Die ktrchliche Politik Kaiser Konrads II. (Halle, 1880); M. Pfenninger, Kaiser Konrads II. Beziehungen zu Aribo von Mainz Pilgrim von Koln, und Aribert von Mailand (Breslau, 1891); O. Bliimcke, Burgund unter Rudolf III. und der Heimfall der burgun- dischen Krone an Kaiser Konrad II. (Greifswald, 1869); W. von Giesebrecht, Geschichte der deutschen Kaiserzeit (Leipzig, 1881- 1890); H. Pabst, " Frankreich und Konrad II. in den Jahren 1024 und 1025," in the Forschungen zur deutschen Geschichte, Band v. (Gottingen, 1862-1886).

CONRAD HI. (1093-1152), German king, second son of Frederick I., duke of Swabia, and Agnes, daughter of the emperor Henry IV., was the first king of the Hohenstaufen family. His father died in 1 105, and his mother married secondly Leopold III., margrave of Austria; but little is known of his early life until 1 1 1 5 when his uncle the emperor Henry V. appointed him duke of Franconia. In 1 1 16, together with his elder brother Frederick

IL, duke of Swabia, he was left by Henry as regent of Germany, and when the emperor died in 1125 he became titular king of Burgundy, or Aries. Returning from the Holy Land in n 26, he took part in the war which during his absence had broken out between his brother Frederick and the new king, Lothair the Saxon; and was chosen king in opposition to Lothair on the 18th of December n 27. His election in preference to Frederick was possibly due to the fact that owing to his absence from Germany he had not taken the oath of fealty to the new king. Hastening across the Alps he was crowned king of Italy at Monza in June n 28, and in spite of the papal ban was generally acknowledged in northern Italy. His position, however, rapidly weakened. The rival popes, Innocent II. and Anacletus IL, both declared against him; the Romans repudiated him; and after failing to seize the extensive possessions left by Matilda, marchioness of Tuscany, he returned to Germany in 113 2. He continued the struggle against Lothair till October 1135, when he submitted, was pardoned, and recovered his estates; owing this generous treatment, it is said, to the good offices of

St Bernard, abbot of Clairvaux. In 1136 he accompanied the imperial forces to Italy in the capacity of standard-bearer, dis- tinguished himself by his soldierly skill, and in view of the in- creasing age and infirmity of Lothair, sought to win the favour of Pope Innocent II.

In December 1137 Lothair died, and some of the princes met at Coblenz, and chose Conrad for a second time as German king on the 7th of March 1138, in presence of the papal legate. Crowned at Aix-la-Chapelle six days later, he was acknowledged at Bamberg by several of the South German princes; but his position could not be strong while Henry the Proud, the powerful duke of Bavaria and Saxony, refused his allegiance. Attempts at a peaceful settlement of this rivalry failed, and Henry was placed under the ban in July 1 138, when war broke out in Bavaria and Saxony. The king was unable to make much headway, in spite of the death of Duke Henry, which occurred in October 1 139; and his half-brother Leopold IV., margrave of Austria, to whom Bavaria had been entrusted, was defeated by Henry's brother Welf, afterwards duke of Spoleto and margrave of Tuscany. Conrad, however, captured the fortress of Weinsberg from Welf in December 1140, and is said to have allowed the women to leave the town, each with as much of her property as she could carry on her back. To his surprise, so the story runs, each woman came out bearing on her back a husband, a father or a brother, who thus escaped the vengeance of the conquerors. This tale is now regarded as legendary, and the same remark also applies to the tradition that the cries Hi Welfen, hi Wibelinen,

were first raised at this siege. Peace was made at Frankfort in May 1142, when Henry the Lion, son of Henry the Proud, was confirmed in the duchy of Saxony, while Bavaria was given to Conrad's step-brother Henry Jasomirgott, margrave of Austria, who married Gertrude, the widow of Henry the Proud.

Affairs in Italy demanded the attention of the king, as Roger L, king of Sicily, had won considerable authority on the mainland, and refused to recognize the German king, whose help Pope Lucius II. implored against the rebellious Romans. This state of affairs drove Conrad into alliance with the East Roman emperor, Manuel Comnenus, who in 1146 married his step-sister; but the condition of Germany prevented the contemplated campaign against Roger. The solitary success amid the general disorder in the Empire was the expedition undertaken in 1 142 by Conrad into Bohemia, where he restored his brother-in-law Ladislaus to this throne. An attempt, however, to perform the same service for another brother-in-law, also called Ladislaus, who had been driven from his Polish dukedom, ended in failure. Mean- while Germany was ravaged and devastated by civil war, which Conrad was unable to repress. Disorder was rampant in Saxony, Bavaria and Burgundy; and in 1146 war broke out between the Bavarians and the Hungarians. A term was placed to this con- dition of affairs by the preaching of Bernard of Clairvaux, and the consequent departure of many turbulent nobles on crusade. In December 1146 the king himself took the cross, secured the election and coronation of his young son Henry as his successor, appointed Henry I., archbishop of Mainz, as his guardian, and set out for Palestine in the autumn of 1147. Marching with a large and splendid army through Hungary, he reached Asia Minor, where his forces were decimated by disease and by the sword. Stricken by illness, Conrad returned to Constantinople at Christmas 1147, but in March 1148 set out to rejoin his troops. Having shared in the fruitless attack on Damascus, he left Palestine in September 1148, and passed the ensuing winter at Constantinople, where he made fresh plans for an attack on Roger of Sicily. He reached Italy by sea; but the news that Roger had allied himself with Louis VII., king of France, and his old opponent Welf of Bavaria, compelled him to return hastily to Germany, which was again in disorder. He was obliged to neglect repeated invitations from the Romans, who sent him a specially urgent letter in 1149, and consequently never received the imperial crown.

Conrad died on the 15th of February 11 52 at Bamberg, where he was buried. By his wife, Gertrude, daughter of Berenger,

count of Sulzbach, he had two sons, the elder of whom, Henry, died in 1 1 50. Passing over his younger son Frederick on account of his youth, he appointed as his successor his nephew Frederick III., duke of Swabia,

afterwards the emperor Frederick I. Conrad possessed military talents, and had many estimable qualities, but he lacked perseverance and foresight, and was hampered by his obligations to the church.

The chief authority for Conrad's life and reign is Otto of Freising. " Chronicon," in the Monumenta Germaniae historica. Scriptores, Band xx. (Hanover and Berlin, 1 826-1 892). The best modern authorities are L. von Ranke, Weltgeschichte, achter Teil (Leipzig, 1887-1888), W. von Giesebrecht, Geschichte der deutschen Kaiserzeit, Band iv. (Brunswick, 1877), J- Jastrow, Deutsche Geschichte im Zeitalter der Hohensiaufen (Berlin, 1893); Ph. Jaffe, Geschichte des deutschen Reiches unter Lothar dem Sachsen (Berlin, 1843); W. Bernhardi, Konrad III. (Leipzig, 1883); O. von Heinemann, Lothar der Sachse und Konrad III. (Halle, 1869).

CONRAD IV. (1228-1254), German king, son of the emperor Frederick II. and Isabella of Brienne, was born at Andria in Apulia on the 26th of April 1228. In 1235 he was made duke of Swabia and in 1237 was chosen king of the Romans, or German king, at Vienna, in place of his half-brother Henry, an election which was subsequently confirmed by the diet at Spires. After spending some time in Italy he returned to Germany and began to take part in the quarrel which had arisen between the emperor and the pope. In 1 240 he called an assembly to Eger, where many of the princes declared openly against the pope, and was soon in arms against Siegfried, archbishop of Mainz, the leader of the papal party in Germany. Although defeated near Frank- fort in August 1246 by the anti-king, Henry Raspe, landgrave of Thuringia, he obtained help from the towns and from his father-in-law Otto II., duke of Bavaria, and drove Henry Raspe to Thuringia. He was carrying on the struggle against Henry Raspe's successor, William II., count of Holland, when the emperor died in December 1250, and a few days later Conrad narrowly escaped assassination at Regensburg. Assuming the title of king of Jerusalem and Sicily, he raised an army by pledging his Swabian estates and marched to Italy in 1251, where with the help of his illegitimate half-brother, Manfred, he over- ran Apulia and took Capua and Naples. He was preparing to return to Germany at the head of a large army when he died at Lavello on the 21st of May 1254. In September 1246 he married Elizabeth (d. 1273), daughter of Otto of Bavaria, by whom he left a son, Conradin, whom he had never seen.

See F. W. Schirrmacher, Die letzten Hohenstaufen (Gottingen, 1871); C. Rodenberg, Innocenz IV. und das Konigtum Sicilien, 1245-1254 (Halle, 1892); J. Kempf, Geschichte des deutschen Reiches wdhrend des grossen Interregnums (Wiirzburg, 1893); and. E. Winkelmann, Kaiser Friedrich //. (Leipzig, 1889).

CONRAD (d. 955), surnamed the "Red," duke of Lorraine, was a son of a Franconian count named Werner, who had possessions on both banks of the Rhine. He rendered valuable assistance to the German king Otto, afterwards the emperor Otto the Great, and in 944 was made duke of Lorraine. In 947 he married Otto's daughter Liutgarde (d. 953), and afterwards took a prominent part in the struggle between Louis IV., king of France, and Hugh the Great, duke of Paris. He accompanied his father-in-law to Italy in 951, and when Otto returned to Germany in 952, Conrad remained behind as his representative, and signed a treaty with Berengar II., king of Italy, which brought about an estrangement between the German king and himself. He entered into alliance with his brother-in-law Ludolf, and taking up arms against Otto, seized the person of the king, afterwards resisting successfully an attack on Mainz. He then ravaged the lands of his enemies in Lorraine ; treated with the Magyars for support, but submitted to Otto in June 954, when he was deprived of his duchy, though permitted to retain his hereditary possessions. He was killed on the Lechfeld on the 10th of August 955, while fighting loyally for Otto against the Magyars, and was buried at Worms. He left a son Otto, who was the grandfather of the emperor Conrad II. Conrad is greatly lauded for his valour by contemporary writers, and the historian Widukind speaks very highly of his qualities both of mind and of body.-

See Widukind, " Res gestae Saxonicae," in the Monumenta Germaniae hislorica. Scriptores, Band iii. (Hanover and Berlin, 1 826-1892); W. von Giesebrecht, Ge'schichle der deutschen KaiSer- zeit (Leipzig, 1881); R. Kopke and E. Dummler, Jahrbilcher des deutschen Reichs unter Kaiser Otto I. (Leipzig, 1876); K. Kostler, Die Ungarnschlacht auf dem Lechfelde (Augsburg, 1884).

CONRAD OF MARBURG (c. 1 180-1233), German inquisitor, was born probably at Marburg, and received a good education, ' possibly at the university of Bologna. It is not certain that he belonged to any of the religious orders, although he has been claimed both by the Franciscans and the Dominicans. Early in the 13 th century he appears to have won some celebrity as a preacher, and in 12 14 was commissioned by Pope Innocent III. to arouse interest in the proposed crusade. After continuing this work for two or three years Conrad vanishes from history until 1226, when he' is found occupying a position of influence at the court of Louis IV., landgrave of Thuringia. He became confessor to the landgrave's wife St Elizabeth of Hungary (q.v.) , and exercised the landgrave's rights of clerical patronage during his absence on crusade. In 1227 he was employed

by Pope Gregory IX. to extirpate heresy in Germany, to denounce the marriage of the clergy, and to visit the monasteries. He carried on the crusade against heretics with great ze?,l in Hesse and Thuringia, but especially in the district around the mouth of the Weser inhabited by a people called the Stedinger. In 1233 he accused Henry II., count of Sayn, of heresy, a charge which was indignantly repudiated. An assembly at Mainz of bishops and princes declared Henry innocent, but Conrad demanded that this sentence should be reversed. This was his last work, for as he rode from Mainz he was murdered near' Marburg on the 30th of July 1233. He left an Epistola ad papam de miraeulis Sanctae Elisabethae, which was first published at Cologne in 1653. Conrad is chiefly known to English readers through Charles Kingsley's Saint's Tragedy, in which he is a prominent character.

See E. L. T. Henke, Konrad von Marburg (Marburg, 1861), B. Kaltner, Konrad von Marburg und die Inquisition in Deutschland (Prague, 1882); A. Hausrath, Der Ketzermeister Konrad von Mar- burg (Leipzig, 1883); J. Beck, Konrad von Marburg (Breslau, 1871).

CONRAD OF WURZBURG (d. 1287), the chief German poet of the second half of the 13th century. As little is known of his life as that of any other epic poet of the age. By birth probably a native of Wurzburg, he seems to have spent part of his life in Strassburg and his later years in Basel, where he died on the 31st of August 1287. Like his master, Gottfried of Strassburg, Conrad did not belong to the nobility, from which most of the poets of the time sprang. His varied and voluminous literary, work is comparatively free from the degeneration which set in so rapidly in Middle High German poetry during the 13th century. His style, although occasionally diffuse, is dignified in tone; his metre is clearly influenced by Gottfried's tendency to reKeve the monotony of the epic-metre with ingenious variations, but it is always correct; his narratives — if we except Die halbe Birn, of which the authorship is doubtful — are free from coarseness, to which the popular poets at this time were prone, and, although mysticism and allegory bulk largely in his works, they were not allowed, as in so many of his contemporaries, to usurp the place of poetry. Conrad has written a number of legends {Alexius, Silvester, Pantaleon) illustrating Christian virtues and dogmas; Der Welt Lohn, a didactic allegory on the familiar theme of " Frau, Welt," the woman beautiful in front, unsightly and loathsome behind. Die goldene Schmiede is a panegyric of the Virgin; the Klage der Kunst, an allegorical defence of poetry. His most ambitious works are two enormously long epics, Der trojanische Krieg (of more than 40,000 verses and unfinished at that !) and Partenopier und Meliur, both of which are based on French originals. Conrad's powers are tb be seen to best advantage in his shorter verse romances, such as Engelhart Und Engellrut, Kaiser Otto and Das Herzemaere; the last

mentioned, the theme of which has been made familiar to modern readers by Uhland in his Kastellan von Coucy, is one of the best poems of its kind in Middle High German literature.

There is no uniform edition of Conrad's works. Der trojanische Krieg was edited by A. von Keller for the Stuttgart Literarische Verein (1858); Partenopier und Meliur, by K. Bartsch (1871);

Die goldene Schmiede and Silvester, by W. Grimm (1840 and 1841); Alexius, by H. F. Massmann (1843) and R. Henczynski (1898); Der Welt Lohn, by F. Roth (1843); Engelhart und Engeltrut, by M. Haupt (1844, 2nd ed., 1890) ; Klage der Kunst, by E. Joseph (1885). The shorter poems, Otto and Herzemaere, will be found most conveniently in Erzdhlungen und Schwanke des Mittelalters, edited by H. Lambel (2nd ed., 1883). Modern German translations of Conrad's most popular poems have been published by K. Pannier and H. Kriiger in Reclam's Universalbibliothek (1879-1891). On Conrad see F. Pfeiffer in Germania, iii. (1867), and W. Golther in the Allgemeine deutsche Biographie, vol. 44 (1898), s.v. " Wurzburg, Konrad von."

CONRAD, JOSEPH (1856-), English novelist, was born in Poland, his full name having been Joseph Conrad Korzeniowski. He learnt French in infancy, but did not learn English until he was nearly twenty. At Constantinople, where he had gone with the intention of joining the Russians against the Turks, he joined the French merchant navy. Later on he found his way to Lowestoft in England, and, after obtaining his mate's certificate, he sailed for the East in an English ship. The story of this voyage is told in Youth, and other Tales (1902). His chief other volumes are Almayer's Folly (1895), An Outcast of the Islands (1896), The Nigger of the Narcissus (1897), Tales of Unrest (1898), Lord Jim (1900), Typhoon (1903), The Mirror of the Sea (1906), and, with F. M. Hueffer, Romance (1903). All these are remarkable for their vigorous English style, and the vivid description of exotic scenes; the author being especially successful in tracing the effects of tropical surroundings and the contact with Asiatics on European sailors and traders; His play One Day More was produced by the Stage Society in June

1905.

CONRADIN, or Conrad the Younger (1252-1268), king of Jerusalem and Sicily, son of the German king Conrad IV., and Elizabeth, daughter of Otto II. duke of Bavaria, was born at Wolfstein in Bavaria on the 25th of March 1252. Having lost his father in 1254 he grew up at the court of his uncle and guardian, Louis II. duke of Bavaria; but little is known of his appearance and character except that he was " beautiful as Absalom, and

spoke good Latin." Although he had been entrusted by his father to the guardianship of the church, he was pursued with relentless hatred by pope Innocent IV., who sought to bestow the kingdom of Sicily on a foreign prince. Innocent's successor, Alexander IV., continued this policy, offered the Hohenstaufen lands in Germany to Alphonso X. king of Castile, and forbade Conradin's election as king of the Romans. Having assumed the title of king of Jerusalem and Sicily, Conradin took possession of the duchy of Swabia in 1262, and remained for some time in his dukedom. Conradin's first invitation to Italy came from the Guelphs of Florence, by whom he was asked to take arms against Manfred, who had been crowned king of Sicily in 1258. This invitation was refused by Louis on his nephew's behalf, but after Manfred's fall in 1266 envoys from the Ghibelline cities came to Bavaria and urged him to come and free Italy. Pledging his lands, he crossed the Alps and issued a manifesto at Verona setting forth his claim on Sicily. Notwithstanding the defection of his uncle Louis and other companions who returned to Germany, the threatenings of Pope Clement IV., and lack of funds, his cause seemed to prosper. Proclaimed king of Sicily, his partisans both in the north and south of Italy took up arms; his envoy was received with enthusiasm in Rome; and the young king himself was welcomed at Pavia and Pisa. In November 1267 he was ex-communicated; but his fleet was victorious over that of Charles duke of Anjou, who had taken possession of Sicily on Manfred's death; and in July 1268 he was himself greeted with immense enthusiasm at Rome. Having strengthened his forces, he marched towards Lucera to join the Saracens. On the 23rd of August 1268 he encountered the troops of Charles at Tagliacozzo, but the eagerness of his soldiers to obtain plunder gave the victory to the French. Escaping from the field of battle Conradin reached Rome, but acting on advice to leave the city he reached Astura, where he was seized and handed over to Charles of Anjou. At Naples he was tried as a traitor, and on the 29th of October was beheaded with his friend and companion Frederick

of Baden, titular duke of Austria. With his death the Hohen- stauf en race became extinct. His remains, with those of Frederick of Baden, still rest in the church of the monastery of Santa Maria del Carmine at Naples, founded by his mother for the good of his soul; and here in 1847 a marble statue, by Thorwaldsen, was erected to his memory by Maximilian, crown prince of Bavaria. In the great 14th century " Manesse " MS: (c) collection of medieval German lyrics, preserved at Heidelberg, there are two songs written by Conradin, and his fate has formed the subject of several dramas.

See F. W. Schirrmacher, Die letzten Hohenstaufen (Gottingen, 187 1); K. Hampe, Geschichte Konradins von Hohenstaufen (Berlin, 1893); del Giudice, II Giudizio e la condanna di Corradino (Naples, 1876); E. Miller, Konradin von Hohenstaufen (Berlin, 1897).

CONRART (or Conrard), VALENTIN (1603-1675), one of the founders of the French Academy, was born in Paris of Calvinist parents. He was educated for a commercial life; but after his father's death in 1620 he began to come into contact with men of letters, and soon acquired a literary reputation, though he wrote nothing for many years. He was made councillor and secretary to the king; and in 1629 his house became the resort of men of letters, who met to talk over literary subjects, and to read and mutually criticize their works. Cardinal Richelieu offered the society his protection, and in this way (1635) the French Academy was created. Its first meetings were held in the house of Conrart, who was unanimously elected secretary, and discharged the duties of his post for forty-three years, till his death on the 23rd of September 1675. The most important of Conrart's works is his Memoires sur I'histoire de son temps published by L. J. N. de Monmerque in 1825.

See also R. Kerviler and Edouard de Barthelemy, Conrart, sa vie et sa correspondance (1881); C. B. Petitot, Memoires relatifs a I'histoire de France, tome xlviii. ; and Sainte-Beuve, Causeries du lundi (19 juillet 1858). •

CONSALVI, ERCOLE (1757-1824), Italian cardinal and states- man, was born at Rome on the 8th of June 1757. His grandfather, Gregorio Brunacci, of an ancient family of Pisa, had changed his name in order to become heir to a certain march'ese di Consalvi. Ercole, who was the eldest of five children early left orphans, began his education at the Piarist college at Urbino. Removed thence on account of the cruel treatment he and his brother received, he went to the college opened at that time by Cardinal Henry of York at Frascati. Here Consalvi soon became one of the cardinal's favourite proteges. In 1776 he entered the Academia Ecclesiastica at Rome, in which Pope Pius VI. took a strong personal interest. This led to his being appointed in 1783 camariere segreto to the pope, an office which involved the duty of receiving those who desired an audience. Next year he was made a domestic prelate and shortly afterwards a member of the Congregation del buon governo. His further promotion was rapid; at the instance of Pope Pius, who thought his talents would be best employed at the bar, he became votante di segnatura, and, on the first vacancy, auditor of the Rota for Rome. This last post left him plenty of leisure, which he used for travelling and cultivating the society of interesting people, a taste which earned him the title of Monsignore Ubique. When the outbreak of the French Revolution made a reorganization of the

papal army necessary, this was carried out by Consalvi as assessor to the new military Congregation.

In 1798, when the French occupied Rome, Consalvi was imprisoned in the castle of St Angelo, together with other papal officials, in retaliation for the murder of General Duphot; a proposal to whip him through the streets was defeated by the French general in command, but, after three months' confine- ment, he was deported with a crowd of galley slaves to Naples, and his property was confiscated as that of "an enemy of the Roman republic." He managed with difficulty to reach Pius VI., who had sought refuge in the Certosa of t-.e Val d' Ema, and was present at his death-bed.*

As secretary to the conclave which assembled in the monastery of San Giorgio Maggiore at Venice, Consalvi had the difficult task of corresponding with the various governments and organizing the assembly at a time when the Revolution had confused all

issues and reduced the individual cardinals' to beggary. In this his diplomatic ability was conspicuously evident, and it was also largely 1 owing to his influence that Cardinal Chiaramonte was elected as Pius VII. (March 14, 1800). On the 3rd of June the new pope re-entered Rome; on the nth of August Consalvi was appointed cardinal-deacon and secretary of state, or prime minister. The appointment was an admirable one'; for Consalvi possessed just the qualities necessary to supplement those' of Pius. The pope was above all a religious man, of a gentle and con- templative character; the cardinal was pre-eminently a man of affairs. Their personal sympathy for each other continued to the end, though at the outset at least their political views differed. Pius, who had openly expressed sympathy with the new liberties of France, was accused of "Jacobinism"; Consalvi, brought up in the legitimist atmosphere of the entourage of Cardinal York, was a convinced supporter of the divine right of kings generally and of Louis XVIII. in particular. But, though opposed to the principles of the Revolution, Consalvi was far from being a blind obscurantist, and he recognized the urgent need for reform in the system of papal government. In this, despite bitter opposition, he made many significant changes. He permitted laymen to hold certain public offices, under surveillance of the prelates, organized a guard from among the Roman nobility, decreed a plan for redeeming the base coinage, permitted the communes a certain degree of municipal liberty, and promised the liquidation of the public debt. In the long debates between Rome and France about the Concordat Consalvi took the leading part. In June 1 801 he arrived in Paris, where his handsome presence, urbane manners, and conspicuous ability made him a general favourite. Even Napoleon, though enraged at the firmness with which he maintained the papal claims, could not resist his personal fascination. It was largely' owing to Consalvi's combined firmness and tact*

that the Concordat, as ultimately signed, was free from the objectionable clauses on which the First Consul had at first insisted. During the pope's absence in Paris, at the coronation of Napoleon, Consalvi remained as virtual sovereign in Rome; and his regency was rendered remarkable by a great inundation, caused by the overflow of the Tiber, during which he exposed himself with heroic humanity for the preservation of the sufferers. Not long after the return of the pope the amity between the Vatican and the Tuileries was again broken. Rome was full of anti-revolutionary and anti-Napoleonic strangers from all parts of Europe. The emperor was irritated; and his ambassador, Cardinal Fesch, kept up the irritation by perpetual complaints directed more especially against Consalvi himself. " Tell Consalvi," wrote the conqueror, still flushed with Austerlitz, " that if he loves his country he must either resign or do what I demand." Consalvi did accordingly resign on the 17th of June 1807, and when in 1808 General Miollis entered Rome, and the temporal power of the pope was formally abolished, he broke off all relations with the French, though several of them were his intimate friends. In 1809 he was at Paris, and, in a remarkable interview, received from Napoleon's own lips an apology for the treatment he had received. With unbending dignity, however, he retained his antagonism; and shortly afterwards' he was one of the thirteen cardinals who refused to attend the ceremony of the emperor's marriage with Marie Louise. For this display of independence he was imprisoned at Reims, and not released till some three years later; when Napoleon had extorted terms from the captive pope at Fontainebleau. On his release Consalvi hastened to his master's assistance; and he was soon after allowed to resume his functions under the restored pontificate at Rome.

In 1814 Consalvi went, as the pope's representative, to England to meet and confer with the allied sovereigns, and later in the year was sent as papal plenipotentiary to the congress of Vienna. Here he was successful in obtaining the restitution to the pope of the Marches (Ancona, Treviso and Fermo) and Legations (Bologna, Ferrara and Ravenna), but he failed to prevent Austria from annexing the ancient papal possessions on the left bank of the Po and obtaining the right to garrison Ferrara and Comacchio. This led to his presenting at the close of the congress

a formal protestatio, in which he not only denounced the failure of the Powers to do justice to the church, but also their refusal to re-establish that " centre of political unity," the Holy Roman Empire.

The rest of Consalyi's life was devoted to the work of re- organizing the

States of the Church, and bringing back the allegiance of Europe to the papal throne. He was practically governor of Rome; and Pius was so much under his control that " Pasquin " said the pope would have to wait at the gates of paradise till the cardinal came from purgatory with the keys. Nor was the affectionate confidence of the pope misplaced. Consalvi's rule, in times of singular difficulty and unrest, was characterized by wisdom and moderation. He had to steer a middle course between the extremes represented by the Carbonari on the one hand and the Sanfedisti on the other, and he con- sistently refused to employ the cruel and inquisitorial methods in vogue under his successors. His foreign policy was guided by the traditional antagonism of the papacy to German domination in Italy, and generally by a desire to free the Holy See as far as possible from the political entanglements of the age. Thus he resisted all Metternich's efforts to draw him into his " system "; stoutly maintained the doctrine of non-intervention against the majority of the Powers of the continental alliance; protested at the congress of Troppau against the suggested application of the principle of intervention to the States of the Church; and at Verona joined with Tuscany in procuring the rejection of Metternich's proposal for a central committee, on the model of the Mainz Commission, to discover and punish political offences in Italy.

On the death of Pius VII. (August 21, 1823), Consalvi retired to his villa of Porto d' Anzio; and, though he accepted from the new pope the honorary office of prefect of the college De Pro- paganda Fide, his political career was closed. He died on the 24th of January 1824. By his will he directed that all the pres- ents he had received should be sold, and the proceeds applied to the completion of Thorwaldsen's monument of Pius VII. in St Peter's.

Consalvi, besides being a statesman, was a man of wide and varied interests. As a young abate he had followed the fashion of writing verses, and to the end he remained a notable patron of the arts and sciences, music being his main passion. For the city of Rome he did much; ancient buildings were excavated and preserved by his direction; chairs of natural science and archaeology were founded in the university; and extensive pur- chases were made for the Vatican museum, which was augmented by the addition of the beautiful Braccio Nuovo, or new wing.

Cardinal Consalvi's Memoires were published in two vols, by S. Cretineau-Joly (Paris, 1864). Other collections of documents are: — C. von Duerm, Correspondance du Cardinal Consalvi avec le Prince C. de Metternich, 181 5 (Louvain and Brussels, 1899); S. Rinieri, Correspondenza inedita dei Cardinali Consalvi e Pacca, 1814-1815 (Turin, 1903). See J. L. Bartholdy, Zuge aus dem Leben des Cardinal Hercule Consalvi (Stuttgart, 1824) ; Cardinal Wiseman, Recollections of the Last Four Popes (London,

1858); Cretineau- Joly, L'Ltglise romaine en face de la Revolution (1859) ; Ernest Daudet, Le Cardinal Consalvi (Paris, 1 866) ; E. L. Fischer, Cardinal Consalvi (Mainz, 1899); Dr predrik Nielsen, bishop of Aarhus, Hist, of the Papacy in the 19th Century (2 vols., Eng. trans, by A. J. Mason, D.D., London, 1906), which treats of Consalvi's work in great detail. For other general authorities see Cambridge Modern History, bibliographies to vol. ix. chap, vii., by L. G. Wickham-Legg, and vol. x. chap, v., by Lady Blennerhassett.

CONSANGUINITY, or Kindred, in law, the connexion or relation of persons descended from the same stock or common ancestor {vinculum personarum ab eodem stipite descendentium) . This consanguinity is either lineal or collateral. Lineal con- sanguinity is that which subsists between persons of whom one is descended in a direct line from the other, while collateral relations descend from the same stock or ancestor, but do not descend the one from the other. Colla'-ral kinsmen, then, are such as lineally spring from one and the same ancestor, who is the stirps, or root, as well as the stipes, trunk or common stock, whence these relations branch out. It will be seen that the modern idea of consanguinity is larger than that of agnatio in the civil law, which was limited to connexion through males,

and was modified by the ceremonies of adoption and emancipa- tion, and also than that of cognatio, which did not go beyond the sixth generation, and was made the basis of Justinian's law of succession. The more limited meaning of consanguinei was brothers or sisters by the same father, as opposed to uterini, brothers or sisters by the same mother. The degrees of collateral consanguinity were differently reckoned in the civil and in the canon law, " The civil law reckons the number of descents between the persons on both sides from the common ancestor. The canon law counts the number of descents between the common ancestor and the two persons on one side only," and always on the side of the person who is more distant from the common ancestor. English law follows the canon law in beginning at the common ancestor and reckoning downwards. The question of consanguinity owes its great importance to the relationship it bears to the laws of marriage and inheritance. For instance, the law forbids marriage between persons within certain degrees of consanguinity and affinity, a prohibition which applies with equal force to a bastard as well as to those born in wedlock. The laws of inheritance and descent are regulated in a great measure according to consanguinity, however much they may vary in different jurisdictions.

Apart from those countries which have made either the civil or the canon law the basis of reckoning degrees of consanguinity (and practically all civilized countries adopt one or other), it is im- possible to describe any method or system, for they are as various as the countries and tribes. See,

however, the article Indian Law; and consult Lewis H. Morgan, Systems of Consanguinity and Affinity of the Human Family (Washington, 1870); J. F. McLennan, On Primitive Marriage (Edinburgh, 1865) : E. A. Westermarck, History of Human Marriage (2nd ed., London, 1894); E. Crawley, The Mystic. Rose (1902); A. Lang and J. J. Atkinson, Social Origins and Primal Law (1903) ; E. B. Tylor, Primitive Culture (4th ed., 1903). See also Affinity; Marriage; Inheritance.

CONSCIENCE, HENDRIK (181 2-1883), Flemish writer, was born at Antwerp on the 3rd of December 1812. Although he invariably signed his name Hendrik, his baptismal name was Henri. He was the son of a Frenchman, Pierre Conscience, from Besancon, who had been chef de litnonerie in the navy of Napoleon, and who was appointed under-harbourmaster at Antwerp in 181 1, when that city formed part of France. Hen- drik's mother was a Fleming, Cornelia Balieu. When, in 1815, the French abandoned Antwerp after the Congress of Vienna, they left Pierre Conscience behind them. He was a very eccentric person, and he took up the business of buying and breaking-up worn-out vessels, of which the port of Antwerp was full after the peace. The child grew up in an old shop stocked with marine stores, to which the father afterwards added a collection of unsaleable books; among them were old romances which inflamed the fancy of the child. His mother died in 1820, and the boy and his younger brother had no other companion than their grim and somewhat sinister father. In 1826 Pierre Conscience married again, this time a widow much younger than himself, Anna Catherina Bogaerts. Hendrik had long before this developed an insatiable passion for reading, and revelled all day long among the ancient, torn and dusty tomes which passed through the garret of " The Green Corner " on their way to destruction. Soon after his second marriage Pierre took a violent dislike to the town, sold the shop, and retired to that Kempen or Campine which Hendrik Conscience so often describes in his books — the desolate flat land that stretches between Antwerp and Venloo. Here Pierre bought a little farm, with a great garden round it, and here, while their father was buying ships in distant havens, the boys would spend weeks, and even months, with no companion but their stepmother.

At the age of seventeen Hendrik left the paternal house in Kempen to become a tutor in Antwerp, and to prosecute his studies, which were soon broken in upon by the revolution of 1830. He volunteered as a private in the new Belgian army, and served in barracks at Venloo, and afterwards at Dender- monde, until 1837, when he retired with, the grade of sergeant-major. Thrown in this way with Flemings of every class, and made a close observer of their mental habits, the young man formed the idea of writing in the despised idiom of the country,

an idiom which was then considered too vulgar to be spoken, and much less written in, by educated Belgians. Although, close by, across the Scheldt, the Dutch possessed a rich and honoured literature, many centuries old, written in a language scarcely to be distinguished from Flemish, a foolish prejudice denied recognition to the language of the Flemish provinces of Belgium. As a matter of fact, nothing had been written in it for many years, when the separation in 1831 served to make the chasm between the nations and the languages one which could never be bridged over. It was therefore with the foresight of a prophet that Conscience wrote, in 1830 itself, "I do not know how it is, but I confess I find in the real Flemish something indescribably romantic, mysterious, profound, energetic, even savage. If I ever gain the power to write, I shall throw myself head over ears into Flemish composition." His poems, however, written while he was a soldier, were all in French. He received no pension when he was discharged, and going back idle to his father's house, he determined to do the impossible, and write a Flemish book for sale. A passage in Guicciardini fired his fancy, and straightway he wrote off that series of scenes in the War of Dutch Independence which lives in Belgian literature under the title of In't Wonderjaar 1566; this was published in Ghent in 1837. His father thought it so vulgar of his son to write a book in Flemish that he turned him out of doors, and the celebrated novelist of the future started for Antwerp, with a fortune which was strictly confined to two francs and a bundle of clothes. An old schoolfellow found him in the street and took him to his home ; and soon various people of position, amongst them the eminent painter, Wappers, interested themselves in the brilliant and unfortunate young man. Wappers even gave him a suit of clothes, and presented him to the king, who expressed a wish, which was not immediately carried out in consequence of some red tape, that the Wonderjaar should be added to the library of every Belgian school. But it was under the patronage of Leopold I. that Conscience published his second work, Fantasy, in the same year, 1837. A small appointment in the provincial archives relieved him from the actual pressure of want, and in 1838 he made his first great success with the historical romance called The Lion of Flanders, which still holds its place as one of his masterpieces. To this followed How to become a Painter (1843), What a Mother can Suffer (1843), Siska van Roosemaei (1844), Lambrecht Hensmans (1847), Jacob van Artevelde (1849), and The Conscript (1850). During these years he lived a varie- gated existence, for some thirteen months actually as an under- gardener in a country house, but finally as secretary to the Academy of Fine Arts in Antwerp. It was long before the sale of his books-, greatly praised but seldom bought, made him in any degree independent.

His ideas, however, began to be generally accepted. At a Flemish congress which met at Ghent so early as 1841, the writings of Conscience were mentioned as the seed which was most likely to yield a crop of national literature. Accordingly the patriotic party undertook to encourage their circulation, and each fresh contribution from the pen of Conscience was welcomed as an honour to Belgium. In 1845 Conscience was made a knight of the Order of Leopold. To write in Flemish had now ceased to be regarded as a proof of vulgarity; on the contrary, the tongue of the common people became almost fashionable, and Flemish literature began to live. In 1845 Conscience published a History of Belgium, but he was well advised to return to those exquisite pictures of Flemish home-life which must always form the most valuable portion of his repertory. He was now at the height of his genius, and Blind Rosa (1850), Rikketikketak (1851), The Decayed Gentle- man (1851), and The Miser (1853) rank among the most important of the long list of his novels. These had an instant effect upon contemporary fiction, and Conscience had many imitators. Nevertheless, not one of the latter has approached Conscience in popularity, or has deserved to approach him. In 1855 the earliest translations of his tales began to appear in English, French, German and Italian, and his fame became universal. In 1867 the post of keeper of the Royal Belgian museums was created, and this important sinecure was given

to Conscience. He continued to produce novels with great regularity, and his separate publications amounted at last to nearly eighty in number. He was now the most eminent of the citizens of Antwerp, and his seventieth birthday was celebrated by public festivities. After a long illness he died, in his house in Antwerp, on the 10th of September 1883; he was awarded a public funeral.

The portraits of Conscience present to us a countenance rather French than Flemish in type, with long smooth hair, contem- plative dark eyes under heavy brows, a pointed nose, and a humorous broad mouth; in late life he wore the ornament of a long white beard. Whether the historical romances of Conscience will retain the enormous popularity which they have enjoyed is much less than certain, but far more likely to live are the novels in which he undertook to be the genre-painter of the life of his own day. In spite of too rhetorical a use of soliloquizing, and of a key of sentiment often pitched too high for modern taste, the stories of Conscience are animated by a real spirit of genius, mildly lustrous, perhaps; rather than startlingly brilliant. Whatever glories may be in store for the literature of Flanders, Conscience is always sure of a distinguished place as its forerunner and its earliest classic. (E. G.)

CONSCIENCE (Lat. con-scientia, literally " knowledge of a thing shared with another person " or " complete knowledge," and derivatively "

consciousness " in general), a philosophical term used both popularly and technically in many different senses for that mental faculty which decides between right and wrong. In popular usage " conscience " is generally understood to give intuitively authoritative decisions as regards the moral quality of single actions; this usage implicitly assumes that every action has an objective or intrinsic goodness or badness, which " con- science " may be said to discern much in the same way as the eye sees or the ear hears. Moralists generally, however, are agreed that in all moral judgments of this character there is an implied reference to moral laws, the validity of which is in some ethical systems the true subject matter of conscience. The part played by conscience in relation to general moral laws and particular cases will vary according to the view taken of the character of the general laws. If, on what is called the " jural " theory, these laws are regarded as deriving their authority from an external source, the operation of conscience is so far limited. It may be held to recognize the validity of divine laws, for example; or it may be confined to the deductive process of applying those laws to particular cases, known as " cases of conscience " (see Casuistry). If, on the other hand, the general laws are regarded as intuitive, then the discernment of them may be taken as the true function of conscience. In either theory, conscience may be understood as the active principle in the soul which, in face of two alternatives, tells a man that he ought to select the one which is in conformity with the moral law. Apart from the two functions of discerning between right and wrong, and actively predisposing the agent to moral action, conscience has further a retrospective action whereby remorse falls upon the man who recognizes that he has broken a moral law. See Ethics; also Butler, Joseph; and compare the "moral sense " doctrine of Shaftesbury.

There are certain special uses of the word " conscience." A Conscience clause is the term given to a special provision often inserted in an English act of parliament to enable persons having religious scruples to absent themselves from certain services, or to abstain from certain duties, otherwise prescribed by the act. Conscience money is the name given to a payment voluntarily made by a person who has evaded his obligations, especially in respect of taxes and the like. This usage derives from thelastf unction of conscience mentioned above. Conscience Courts were local courts, established by acts of parliament in London and various provincial towns, for the recovery of small debts, usually sums under £5. They were superseded by county courts (q.v.).

CONSCRIPTION (from Lat. con-, together, and scribere, to write), the selection, by lot or otherwise, of a proportion of the men : of military age for compulsory . service in the naval and

military forces of their country; or, more mdely, compulsory military service in any form. For a discussion of the military features of conscription and of other forms of recruiting see Army, §§ 40 ff. The present article deals with the economic and social aspects of compulsory military service, for which, generally and non- technically, the word " conscription " is used more commonly than any other. The word occurs for the first time in France in the law of the 19th Fructidor (1798), which pre- scribes the liability of les difenseurs conscriis to serve if required from their twentieth to twenty-fifth year of age.

There is perhaps no law on the statute-books of any nation which has exercised and is destined in the future to exercise a more far-reaching influence on the future of humanity than this little-known French act of i7o8Jfcntroduced by General Jourdan to the Council of the Five Hundred, for it was the power thus conferred upon the French government which alone rendered the Napoleonic policy of conquest possible. " I can afford to expend thirty thousand men a month " ; this boast of Napoleon's, made to Metternich at Schonbrunn in 1805, has determined the trend of events from that day forward, not only on the battle- field, but also in the workshops, and forms even at the present day the chief guarantee for peace, stability and economic development upon the continent of Europe.

The idea in itself was not new. The principle that every able-bodied male is liable to be called on for the defence of the state dates from the earliest times. The essential im- portance of the event lies in this, that at a critical moment this law passed by an obscure body of men — absolutely in defiance of the opinion of the greatest reformer that France at that moment had discovered, Camot, and of the feelings of a very large proportion of the whole community — became permanent by the action of causes set in motion by Napoleon, which ulti- mately compelled all Europe to adopt similar legislation.

To understand its full significance we must trace the line of evolution of the then existing armies of Europe.

In almost any state, in proportion as the central executive power prevailed over internal disturbance, the able-bodied males of each country ceased to have opportunities and incentives for training themselves to arms. Trade became more profitable than plunder, and men began to specialize in various directions. Wealth began to accumulate and fortresses sprang into existence for its protection, but the new fortifications required specialists for their reduction, and above all things an abundance of time. Militia forces (corresponding to the former feudal levies) neither could find the

specialized labour nor would afford the time — hence the necessity arose of enlisting men who had made the use of arms their special study and were content to abide by the rules of conduct their maintenance as organized bodies imposed. But wherever Europe happened to enjoy a few years of peace, the supply of men who had trained themselves to arms naturally decreased, and the state itself was compelled to assume the task of training its recruits. This, with the exceedingly complicated nature of the weapons in use, was a very long process, and though even in the 16th century the idea of universal service was put forward by such statesmen as Machiavelli and Maurice of Nassau, practically it could not be put into force, because in the time the male population could economically give to their training, satisfactory results could not be obtained.

As Motley has pointed out in his Rise of the Butch Republic, in the time of Alva 5000 disciplined Spaniards were a match for 20,000 and more burghers, though the latter were fighting with the courage of desperation, and were of necessity more or less inured to the horrors of warfare. But with every improve- ment in the nature of hand firearms this ratio of superiority of the trained soldiers tended to disappear, whilst as campaigns became fewer and shorter the difficulty of obtaining war-trained soldiers, accustomed to fighting as the Spaniards had been, always increased.

Moreover, after the peace of Westphalia — the close of the great era of religious wars — wars were made for dynastic reasons and primarily for the acquisition of territory; and since the territory was of no use without inhabitants to pay revenue, the " principle

of moderation was introduced into the conduct of hostilities, altogether foreign to their nature " (Clausewitz). Men were no longer allowed to live at free quarters or to pillage towns. On the contrary, even in an enemy's country, they had to submit to the severest restraints, and thus soldiering, being no longer remunerative, ceased to attract the more daring spirits.

Thus in the decade preceding the French Revolution soldiering had reached the very nadir of degradation all over Europe, and, though the Prussians, for instance, still retained a great relative superiority when fighting in closed bodies under the eyes of their leaders, the spirit which had led them to victory when fighting in and for their own country had entirely disappeared from their ranks when they had to face the French in their great struggle for existence.

Amongst the earliest problems of the French Revolution was the question of army reform, and compulsory service was at once proposed, and though for the time the opposition of most of the principal soldiers prevailed, ultimately a proposal was accepted by which voluntary enlistment was

retained for the line, all unmarried citizens between eighteen and forty years of age constituted the militia, and the rest of the men the national guards for home defence.

The latter proved so popular that over 2,571,000 names were obtained. At once the militia was given up, and reliance was placed upon the national guard, which was called upon to furnish 160 battalions of volunteers. The result was disappointing. Only 60 incomplete battalions were furnished, and these (except for the few hundreds of enthusiasts amongst them from whom came many of the marshals, generals and colonels of the empire) were recruited from the least trustworthy sections of the com- munity. These were the celebrated Volontaires and proved a positive scourge wherever they were quartered. It was clear that they could not meet the invaders, and the assembly decreed on the nth of July 1792 " La patrie en danger," and ordered every able-bodied man to consider himself liable for active service, but left it to the communes and districts to select representatives to proceed to the front. These men were called Fidlres, and seem to have been principally those whom the communes desired to get rid of.

But, though the idea of compulsion was present, the means of enforcing the law at the time were so imperfect that the result of this effort was only 60,000 men, of whom not more than half ever reached the field armies. Further, the law had announced that the liability extended only for the duration of the particular campaign, which in accordance with the prevalent idea of war was considered to terminate when winter quarters were taken up. In December, therefore, most of the men raised during the year took their discharge, and with the new year the work had to begin all over again. To fill the gaps caused by this sudden defection, and in view of the addition of Great Britain to the list of their enemies, the Convention decreed on the 20th of February 1793 a fresh compulsory levy of 500,000 men. Quotas were assigned to each department and commune, and three days' grace was allowed to each to find their contingents by volunteering; failing this recourse was had to compulsion, all unmarried national guards between the ages of eighteen and forty being held liable. Thereupon thousands fled from their homes, and Vendee (q.v.) rose in open revolt.

Then on the 18th of March came the disaster of Neerwinden, and again the danger of invasion loomed near. In this emergency the Committee of Public Safety replaced the existing recruiting agents by special commissioners with unlimited power, and these ruthlessly hunted down those who attempted to evade their liability. Still the result was. inadequate to meet the danger arising from the fall of Valenciennes and Conde. The Jacobins appeared before the Convention on the 12th of August and demanded the Levte en masse, and, using the popular outcry as a fulcrum, Carnot at length

*succeeded in introducing a work- able scheme of compulsion, which limited the liability to service to all able-bodied men between eighteen and twenty-five, but within these limits allowed no exemptions. This became law on the 23rd of August, and it at once began to operate sati**

factorily, because it was limited to a class who were neither sufficiently numerous, nor sufficiently important politically, to resist coercion. Meanwhile other factors had intervened to render military service more popular. Famine was spreading, political persecution was at its highest, and the ranks of the army became almost the only refuge where men could escape the terrors of secret denunciation. Moreover, experience in the Netherlands and the Palatinate had shown that men could live very comfortably at their enemy's expense. All these causes combined made an immense increase in the yield of the new law, and, according to the careful estimate of the due d'Aumale (1867) , by the 1st of January 1794 there were no less than 770,000 men under arms and available for active service. The tide of success in the north of France now definitely turned against the Allies, for they were powerless against the mobility and numbers produced by hunger and political terrorism. Bonaparte's successes of 1 796 were the highest expression of the " new French " method thus developed.

But with the respite which his victories in Italy immediately secured, a reaction against the severity of the conscription soon made itself felt, and the obvious need for internal development gave the discontented a lever for extorting concessions from the government.

To the political economists of the period it seemed a de- liberate waste of productive energy to take the young merchant or clerk from his work and force a musket into his hands, whilst other men already trained were willing to renew their contract to defend the state. To regulate this question and also to define more clearly the obligations of the citizen, Jourdan introduced before the Five Hundred a report calling for a reorganization of the army. This ultimately, in the autumn of 1798, became the law of the country and remained practically unaltered as the basis of the French military organization down to 1870. The law definitely laid down the liability of every able-bodied French citizen to serve from his twentieth to his twenty-fifth year, leaving it to circumstances to determine how many classes or what proportion of each should be called up for service. Finally, after much discussion the right of exemption by pay- ment of a substitute was conceded, and therein lay the germ of the disaster of 1870.

Meanwhile, with the assumption of the imperial title by Napoleon, the era of conquest recommenced, and as each fresh slice of territory was absorbed the French law of conscrip- tion was immediately enforced. This still further swelled the numerical preponderance against which the other nations had to contend, and each in turn was compelled to follow the French example. Prussia, however, alone pursued the idea to its logical conclusion, and in the law of 1808 definitely affirmed the principle of universal service without distinction of class or right of exemption by purchase.

Under the restrictions as to numbers imposed on Prussia by Napoleon after Tilsit, and also as a consequence of exceeding poverty, this law found only partial fulfilment, and voluntary organization had to be called into existence to meet the demand for numbers during the Wars of Liberation; but when after 1815 peace was at length assured, the system came into full operation, and it is to this that Prussia owed her phenomenal recovery from the depths of exhaustion into which the catastrophe of Jena had plunged her.

Army expenditure became the fly-wheel which steadied her disorganized finance. The troops had to be fed, clothed, equipped and housed; and the several occupations and trades involved in these processes gave profitable employment both to intellect, which was required to invent, devise and control, and to capital, which would have shirked the risks attending any but government contracts, and remained in private hoards, to the detriment of the reproductive power of the nation.

The compulsory intercourse of all ranks compelled the classes to educate the masses — using the term " education " in its broadest sense. Free book-education itself had been forced on the nation as a military necessity of the moment, for without a certain degree of intellectual development in the recruits it was

impossible to make soldiers of them within the short time available. But the practical value and application of the book teaching had, in sheer self-defence, to be imparted by the better- class recruits to their social inferiors, and, in the unconscious exercise of these functions as teachers of one another, all found themselves strengthened in character and universal sympathies.

The intelligence of the men reacted on the officers, who could no longer exercise authority by mere word of command, but were compelled, if they wished to survive, to teach by intelligent methods; and they were compelled to struggle for survival because outside of the army absolute ruin and destitution awaited them.

■ *The duration of service being limited to three years, it followed that each year brought with it an influx of recruits to each battalion beyond the power of a few specialists to cope with. Hence the work had to be delegated to the captains and sub- alterns, who thus were compelled to become the teachers as well as the leaders of their men. The results from a military point of view were incalculable.*

Perhaps the greatest benefit Prussia derived from her system during the first two generations — i.e. from 1810 to i860— of its continuance was the insensible fusion which took place between the aristocracy and the people as a consequence of their enforced co-operation in a common task. Freed from the fear of French oppression, the court and the older men of the nobility would have swung back to the full exercise of their old feudal privileges; for as they still retained the bulk of the executive power, all the legal reforms and restrictions initiated by von Stein would have proved but paper safeguards; but the army compelled the opposing classes to understand and appreciate one another better, and the younger generation, living always with the threat of invasion impending over them, learnt by emulation from their seniors, who had led their men in battle, the true secret of command, the art of awakening the higher instincts of the men entrusted to them. If it seems to British readers that their progress was slow and that much remains to be accom- plished, their starting-point at the outbreak of the French Revolution must be recalled and contrasted with that of the British army; indeed, we must go back to the time of Henry VII. to find a fair parallel.

It must be remembered too that we are speaking of Prussia only. In the other states of Germany which retained conscrip- tion with paid substitutes progress was far slower. The whole of Bavaria, Wurttemberg, and the districts along the Rhine had been saturated with French socialistic theories, and here the task of regeneration fell into other hands, and freedom, of a relative kind, had to be extorted by revolutionary means. To these reformers — many of them both devoted and enlightened thinkers — the armies of their own little states necessarily appeared as merely authorized oppressors of the people; and they may well be pardoned for failing to appreciate the essential differences involved in the two systems.

As the years went by, the Prussian military machine was turning out year by year an ever-increasing number of men, who by reason of the physical and moral training they had undergone were head and shoulders above the class whence they had sprung. These men soon asserted their superiority in the labour market and drove their weaker comrades to the wall. The men thus displaced, being obviously less fitted to maintain wives and families, found themselves supplanted by their stronger rivals in the affections of the women, and jealousy being thus evoked, they became as it were a nidus for

revolutionary bacilli. This partly explains the temporary recrudescence of revolutionary tendencies during the 'forties and 'fifties. But the growing wealth-producing power of the nation, due to the higher average physique and power of concentration (the consequence of the military training), began to attract the attention of capitalists, and an era of railway construction set in, distributing wealth and employment about the country. This for a time relieved the congestion of the labour market, and, long before the victories of 1866 and 1870 had definitely removed the

last fears of invasion, industries were beginning to spring up around the great trading centres of Germany.

With the treaty of Frankfurt the last fears of the investors vanished, and capital, hitherto dammed back by the uncertainty, of land tenure, particularly in the Rhine districts, literally poured into the country, inducing an era of expansion and prosperity for which one can hardly find a parallel, even in America.

That such a period of evolution should have been attended by fluctuations lies in the nature of things. Men accustomed to deal only in hundreds find it difficult to adapt themselves to the business methods requisite to deal securely with millions, and there have been many severe crises due to over-production and speculation, which displaced large masses of workmen and. brought misery to thousands of homes.

The remarkable increase of population, the direct consequence of the broader understanding of elementary hygienic principles instilled into the men during their service with the colours, brought a fresh complication into the problem. The strength of the army being definitely fixed by financial considerations, the proportion of men taken for service to the total number annually becoming liable fell off, during the 'eighties, to a very marked degree, and the men who escaped service, being as a consequence of their want of training less fitted for employment in the organized industries which were in process of evolution, swelled the ranks of the unemployed and thus afforded fresh material for the socialist propagandists to work upon. If the proportion of men escaping service rose materially above one-half of the total yearly contingent of men becoming available for service, the danger lay very near that the socialist vote might soon exceed all other interests put together, thus threatening the stability of all existing institutions. To meet this danger it was determined in 1893 to increase the annual contingent whilst diminishing the duration of colour service, so that

approximately two-thirds of the men available should pass through the ranks, it being held that the habit of obedience to constituted authority acquired in the army, together with the silent influence which could be exercised on the ex-soldiers and reservists by the sympathy and example of their former commanders of all ranks, formed the best possible guarantee against the undue spread of socialistic doctrine. It was never anticipated that all men who had served their two years would become partisans of constituted authority, but only that, whilst all would learn the hopelessness of armed resistance against the force which held control of the solid-drawn cartridges and artillery material, the bulk at least would recognize the substantial advantages that accrued to them personally from their previous connexion with the services, and would form a solid bulwark against the spread of subversive doctrines.

To realize the whole situation, the attitude of the leading thinkers amongst the statesmen and soldiers of Germany must be borne in mind. Socialism is to them a necessary lever to extort from capital fairer conditions for labour, capital must be fairly dealt with if the labourers' reasonable demands are to be satisfied, and the army is the compensating lever which secures the necessary adjustments. Capital is attracted by the security of tenure ensured by a strong army, and the working classes are encouraged to put forward reasonable demands by the habits of self-respect and the sense of individuality they acquire in the army, whilst the possible danger of any abuse of the offensive power the army embodies is curbed by the fact, well known and realized by all continental soldiers, that though one may order men on to the battlefield, one cannot guarantee that they will fight when they get there unless the cause they are called on to defend appeals to the hereditary instincts of self-preservation in the race itself. It is unfortunate that sufficient attention has not yet been paid to the statistical side of this question, and concrete figures are not forthcoming to demonstrate the material benefits which have flowed from compulsory service.

Briefly, however, it may be pointed out that under modern conditions of industry the greatest national wealth-producing power resides, not as formerly in the technical skill of the in- dividual, which machinery is gradually superseding, but in the

power of continuous collective effort of organized bodies, and that physical health and the power of mental concentration are the principal qualities required by the units of such bodies. Now these are the two essential factors which modern methods of military training aim at developing, and these methods in turn evolved naturally from, the conditions of service which compulsion introduced. The men who have undergone this training leave the ranks with bodies steeled to resist disease, and minds capable of

prolonged concentrated effort. Hence they not only remain capable of work for a considerably longer period of time, but they also do better work throughout the whole time. It has been estimated that on the average the trained German soldier's expectation of life is about five years better than the normal of his own class. Hence altogether about one million men are still alive and doing good work who without such training would be dead and buried; similarly there are in all some seven millions more, all doing better work day for day than they otherwise would have done.

On the whole the armies of the German states absorbed in taxation some 1500 million sterling from Waterloo (1815) up to 1906; hence if we assume the increment of wealth-producing power due to training as only two shillings a week per man, the net return on the capital invested must be regarded as enormous, and that some such economic process has been in action is sufficiently indicated by the almost incredible growth in national credit during the same period.

At the close of the Napoleonic wars, German (including Prussian) credit was actually nil, and there was hardly a town or hamlet throughout the area swept over by the French armies that was not paying heavy interest on loans raised to satisfy the rapacity of its conquerors. Many of these loans still remained unliquidated at the close of the 1870 campaign. Yet since then the credit, both of the individual states and of the empire as a whole, has risen to a point rivalling that of Great Britain, in spite of the fact that in geographical position and in material resources the country is by no means favourably situated.

These advantages have followed on the introduction of compulsory service in Germany — not because there is any in- herent virtue in the principle of compulsion in itself, but because it happened that, at the moment compulsion became necessary, the idea was exactly adapted to its environment, and the driving forces necessary to ensure its permanency remained in full activity. Primarily there existed an aristocracy numerically sufficient to fill the offices of instructorship to the masses, and poverty compelled this aristocracy to accept the new responsi- bility. In the second place there was the knowledge of what" war really means, sufficiently vivid and fresh in the minds of the masses to induce them to submit to the necessary restraints of military discipline. When these causes were no longer in full activity, there remained, as sufficient incentive to those still in the active phase of their training, the knowledge that the nation at large, and more particularly the women, fully appreciated the sacrifices that all ranks were compelled to make.

In other nations these driving forces have been absent. Thus' in Russia the aristocracy was both numerically and intellectually inadequate to the tasks

compulsion entailed upon it. But gener- ally it can be seen that the success or failure of the system has been in exact proportion to the degree in which these drivingf orces have been available. The failure of compulsion if applied in the British Isles would be due to the fact that the principal factor of its success — the knowledge of what war must mean and the risk of immediate invasion — cannot be brought home to the people as long as the British navy retains its predominance. If the navy is adequate to prevent invasion, then compulsion is unnecessary; if it is inadequate, then the only way to make good its inade- quacy is to bring home to the electors by a course of partial training the consequences which must ensue if they continue to neglect it. ' (F. N. M.)

CONSECRATION (Lat. consecratio, from con and sacrare, " to make sacred "), the separating or setting apart of certain persons, animals, things, places and seasons as sacred, so as to hallow and _sanctify them in themselves or adapt them to a

religious r61e and purpose. Thus we consecrate a king, a priest, a deacon; a temple or a church and any part of church furniture; we also consecrate water for use in lustrations, bread and wine in the sacrament; a season or day is consecrated, as a feast or fast. We consecrate ourselves either in a ritual act, as of baptism or ordination, vows or monkish initiation; or, without any implication of particular ceremonies, a man is said to consecrate himself to good works or learning.

The above are good senses of the word, but it is also used in th.e sense of devoting things and persons to destruction; and in this sense it is tantamount to cursing. Holiness is dangerous and may even involve degradation, as in the case of the Burmese para-gyoon or servitor of the pagoda who is by heredity for ever a slave and outcast, unclean of the unclean, with whom none may eat or intermarry, yet ever tending and keeping clean the shrine. Particular sites, rivers, springs, hills, meadows, caves, rocks, trees or groves, are holy and from time immemorial have been so, as the natural homes or haunts of gods or spirits. Here God has appeared to men, and will again. Such sites in the Old Testament were Hebron with its tree, Sinai with its burning bush, Bethel, Shechem, Beersheba, Mount Gerizim. As a rule their initial consecration goes back beyond memory and tradition; we can rarely seize it in the making, as in the case of a Roman puteal, or spot struck by lightning, which was walled round like a well (puteus) against profanation, being thenceforth a shrine of Semo Sancus, the god of lightning. In ancient society certain animals,

plants, kins, families, were also holy and bound up with the god by blood-ties or otherwise. A priestly kin owned perhaps the spot haunted by the god, and so became holy. Plants and animals were often hallowed as totems (q.v.) . Among the Australian natives we catch the consecrating agency at work. Their babies are incarnations of spirits which quitted a bush or rock passed by the mothers at the moment of conception. Each spirit, as it quits its nanja or natural haunt to enter the mother, drops a churinga, a slab of stone or wood marked with the child's totem and containing its spirit attributes. These are collected and treasured up for ever.

We also catch the god himself at the work of consecration in tales of voices heard from heaven or of birds alighting on favoured heads. In the Talmud the voice from heaven, called Bath Kol, attested Rabbi Hillel, as he walked in Jericho, to be worthy of the holy spirit's descent and in-dwelling. At his baptism a dove descended upon Jesus, and one quitted Polycarp's body at the moment of his death. In Philo the wild pigeon symbolizes the holy spirit. A dove also descended out of a pillar of light on the occasion of the baptism in Jordan of the saintly Basil, bishop of Caesarea; and an eagle lit down upon King Tarquin. Most birds for the primitive man are souls, and the Polynesians hold that birds convey from and into their idols the spirits which live therein. A natural consecration also hallows objects fallen from heaven, like the holy shield of the Sabii, or the holy ikons or pictures " not made with hands " which abound in Russia.

In such cases the holiness or taboo (q.v.) is traditional, or any- how not imparted at a given moment by human intervention. The god has not been constrained or invited to enter in. The Fetish religions afford examples of such constraint or invitation. Spirits capable of being confined in matter and made useful are in various ways sung or coaxed into the tenements prepared for them. Thus a West African native who wants a suhman takes a rudely-cut wooden image or a stone, a root of a plant, or some red earth placed in a pan, and then he calls on a spirit of Sasa- bonsum (" a genus of deities, every member of which possesses identical characteristics ") to enter the object prepared, promis- ing it offerings and worship. If a spirit consents to take up its residence in the object, a low hissing sound is heard, and the suhman is complete. It receives a small portion of the daily food of its owner, and is treated with reverence, and mainly used to bring evil on some one else. 1 This is a typical case of a human consecration. Invocation of a name, with sacrifice and anointing, consecrated the Semitic massebas or nosbs,— erect pillars of stone

1 From A. B. Ellis, The Tshi-speaking Peoples of the Gold Coast (1887), cited in A. C. Haddon's Fetichism and Magic.

in which the godireally lived, and which were no mere images or symbols

of him. 1 Two such still remain hard by the ruins of the royal sanctuary of Edom, overlooking Petra, and are obelisks in form, 18 ft. high. They were usually set up under a holy tree to commemorate a divine epiphany and were mostly unwrought (Exod. xx. 25), lest the hand of human craftsman should intro- duce another numen or divine power than what the votaries wished to tenant them. The consecration consisted of a smearing with fat of victims or with oil of vegetable offering (Gen. xxviii. 18), and the life or soul inherent in these passed into the stone. Such stones were familiar objects in the streets of an old Greek city, where Theophrastus (Characters, ch. 16) saw the " super- stitious " man, as he passed by, take out his phial of oil, pour it over them, and kneel down before them to say his prayers. In a street of Benares similar devotions meet the eye, as dainty maidens pour out phials of holy water over erect stones of the same obscene pattern that was common also in Greece and Italy. The Semitic word for a stone tenanted by the numen was Beth-el, house of god, in Greek fiaLrvhos. It was often small and port- able, and known as a " stone ensouled." Such stone pillars were usually two in number, as in Solomon's temple (1 Kings vii. 1 5, 2 1) or in Melkarth's shrine at Tyre, described by Herodotus (ii. 44). Sometimes twelve stood together, e.g. in Jos. iv. 20 and Exod. xxiv. 4, which passages may have suggested that Armenian rite of founding a church, in which we witness the transition from a stonehenge to a church building. The bishop and clergy choose a suitable spot, and erect twelve large stones unwrought and unpolished around the central rock of the altar, and on these the walls of the church are laid. In Armenia and the Caucasus the cult of such sacred trees and pillars passed without break into that of the cross, which was hallowed as follows. By popular preference made of the wood of a sacred tree, it was brought into church, and washed first with water and then with wine, or anciently perhaps with blood of a victim. The people pray " for the sending of the grace of the Holy Spirit into this image of the holy cross"; the priest that God will "send the grace of His all-powerful and uplifted arm " into the holy oil, with which he then makes the sign of the cross first on the eye and afterwards on the four wings of the cross, saying: " May this cross be blessed, anointed and hallowed in the name of Father and Son and Holy Spirit." He then lays his right hand on it and ordains it, with the prayer: " Lay, O Lord, Thy holy hand upon this emblem of the cross and bless it." The people kiss the cross and bow down to it; and ever after Christ's spirit is enshrined in it; it cures disease, drives off demons, and wards off wind and hail. Animal victims are sacrificed before it, as in old days before the sacred pole or pillar, and it is worshipped and adored. He that dies in defence of it is a holy martyr. Thus Christ ousted in the stocks and stones the old evil spirits that tenanted them, and took their place. Among the Greeks cruciform shape sufficed of itself to hallow wood or stone.

In Hinduism the various implements of sacrifice are similarly personified and worshipped, especially the sacrificial post to which the victim is bound, and which, under the name of vanaspati and svaru, is deified and invoked. It is a survival of tree-worship and comparable to the Semitic ashera. The Rigveda (3, 8) describes it as a tree well lopped with axe, anointed and adorned by the priest. Such a post set up by the priests is a god, is thrice anointed with ghee (or holy butter), and being set up beside the fire is invoked to let the offering go up to the gods. 2

It is not always easy to mark off consecration from inspiration. Thus in New Zealand " a priest by repeating charms can cause the spirit to enter into the idol … it is the same atua or spirit which will at times enter not the image but the priest himself, throw him into convulsions and deliver oracles through him." 3 It is, however, best to restrict the term " consecration " to cases where the spirit falls on a person, not automatically or unex-pectedly, but by invitation, in response to prayer, through laying- on of hands and greasing, after a formal fast, continence, ritual

2 " Vedic Mythology," by A. A. Macdonnell, in Grundris der indo-arischen Philologie (Strassburg, 1897).

3 Tylor, Primitive Culture, ii. 174.

washing, and so forth. Thus in i Sam. x., Samuel ordaining Saul " took the vial of oil and poured it upon his head and kissed him," and soon afterwards "XJod gave Saul another heart "; so that when he met the band of prophets the contagion &ew from them to him, "and the spirit of God came mightily upon him, and he prophesied among them."

The- recognized modes of communicating the afflatus, power or numen to a person or thing to be consecrated are many, and onlyaiew can be enumerated, (i) Blowing. The risen Jesus (John xx\ 22) breathed on his disciples and said, " Receive ye the Holy Ghost." The Roman priest, in consecrating the water of the font for baptism, blows over it and signs it twice with the cross. He also begins the rite of baptism by blowing in the catechumen's face. In the rite of laying hands on an elect the bishop of the Armenian Paulicians blows three times in the face of the newly ordained. The impure spirit is blown out and the pure blown in. (2) Laying-on of hands. The particular persons whose virtue is to be transmitted lay their hands on the head or shoulders of the consecrand, e.g. three bishops in episcopal consecration. (3) Branding or signing the person, especially on

the forehead, with the sacred emblem. So a Hindu paints his caste emblem on his forehead, and a fugitive slave in ancient Egypt, once marked with sacred stigmata in a temple, could not be reclaimed by the master. He belonged to the god, Roman recruits when they took the sacr amentum, or oath of fealty, were tattooed with the " sign " or " seal." So in Christian initiations the sign of the cross is made on the brow, and in Revelation the redeemed are so marked. Mexican peasants regularly paint or tattoo a cross on their foreheads, and the old Armenian equivalent for destiny or fate is cakatagir or forehead-writing. An inanimate object is similarly consecrated. The " soldiers " of Mithras, says Tertullian, were signed or sealed on their foreheads. (4) Use of a name. The invocation of a powerful name over a thing or person brings him or it within its sphere of influence, and actually communicates thereto the demoniac or supernatural power wielded by the owner of the name.

Amulets, seals, talismans, relics, ear or nose rings stamped with divine emblems or otherwise hallowed, communicate their holiness to the wearers and protect from the Adversary. Personal ornaments and decorations of dwellings, furniture, vehicles and pottery had once a consecrating, or — what often comes to the same thing — a prophylactic value and significance. Mutilations, such as circumcision, violation of chastity in the case of maidens hallowed to certain gods, ritual cutting of hair and nails, and their deposition in a sanctuary, rather belong to the category of sacrifice, as also the burial of a living victim under the founda- tions of a new building or bridge (see Sacrifice). Cursing is, equally with consecration, a taboo imposed on a thing or person. It may be noted in consecration how nicely the taboo or con- tagion, whether of holiness or unholiness, can be localized. An Arab's curse is escaped by falling flat on the face, for it then shoots over the head; and recently the following case was referred from French Canada before the judicial committee of the privy council. A man buried his wife in a plot he had bought in a Catholic cemetery. Presently he died also, but without the sacraments, for he had changed his religion. His executors ignored the protests of the Catholic clergy and buried him in the same grave. Ultimately the bishop of Quebec, unable to get a mandamus from the English privy council to dig him up, solemnly deconsecrated the ground down to the estimated depth of the lid of the wife's coffin. The use of specially consecrating cemeteries among Christians is first mentioned by Gregory of Tours (c. 570) ; but under the Roman law they had, like those of the Pagans, been held inviolable by pagan emperors like Gordian and Julian and denned as "res religioni destinatae quin immo (iam) religionis effectae " (Cod. Justin, lib. ix. tit. 19).

Lastly, a classical mode of consecrating persons, or winning or reinforcing their holiness or kinship with the god, is the sacrificial meal at which

sacred animals or the god himself are eaten. (See Sacrament and Sacrifice.) Consecration is so frequently the counterpart of Purification that the article thereon should be read in connexion with this. For the con-

secration of bishops, see Bishop; for that of churches, see Dedication.

Authorities.— E. B. Tylor, Primitive Culture (London, 1903); Robertson Smith, Religion of the Semites (London, 1901); Mary H. Kingsley, West African Studies (London, 1901), and Notes on t}ie Folklore of the Fjort (London, 1898) ; W. Warde Fowler, The Romap Festivals (London, 1905) ; L. R. Farnell, The Evolution of Religion (London, 1905); J. G. Prazer, The Golden Bough (London, 1900); A. C. Haddon, Fetichism and Magic, containing a good bibliography (London, 1906). For Christian rites of consecration, see J. Goar's Euchologion (1647) ; H. A. Wilson, The Gelasian Sacramentary (Oxford, 1894); F. C. Conybeare's Rituale Armenorum' (Oxford, 1905); L. Duchesne, Origines du culte Chretien (1889); M. Magis- tretti, Monumenta veteris Liturgiae Ambrosianae, Pontificate (Milan, 1897)- (F. C. C.)

CONSEIL DE FAMILLE ("family council"), in France, an institution for the protection of the interests of minors. By the Code Civil (art. 407-410) it is composed of seven members. The local justice of the peace (juge de paix) is the presiding officer. The other six members must be relations of the minor, chosen from the mother's and father's side of the family respectively (three on each side) . The Code gives in minute detail rules for choosing these relations. Meetings of the family council are held in private, five of the members constituting a quorum. The council has power to appoint a guardian to the minor; to authorize marriage or oppose it; to audit the accounts and decide questions concerning the minor's estate. The French family council is founded on the Roman law of tutelage, and has a long and useful history.

CONSERVATIVE PARTY, in Great Britain, the name of the successors of the Tories (see Whig and Tory) as one of the great political parties, representing the opposition to the Liberal party (?•!'.), championing stability rather than innovation, or the advantages of preserving inherited conditions so far as possible rather than adopting changes which are founded on theoretical ideals. J. W. Croker suggested the term (Quarterly Rev., Jan. 1830) as more appropriate than " Tory," but for some time it was only used sporadically, and many of the old Tory regime disliked it. The term " Tory " has in fact never quite fallen out of use, and has been commonly retained by many modern Conservatives who wish to emphasize that theirs is a constructive and positive policy of constitutional as opposed to radical reform, and not merely one of letting things remain simply "as they are." Similarly attempts were made in the 'eighties to substitute "

Constitutionalist," but without its becoming current coin; and Lord Randolph Churchill called himself a " Tory democrat."

Sir Robert Peel, in a speech in the House of Commons, protested against the " un-English name of Conservative." Yet Peel himself shattered the old Tory and Protectionist party in 1846, and soon after called himself a Conservative, and the Peelites were commonly spoken of as " Liberal Conservatives." And when " Liberal " came into regular use for one party, " Con- servative " became the recognized term for its opposite, Toryism being popularly regarded as the reactionary creed of the sup- porters of " vested interests " and opponents of reform of any kind. The character of any British Conservative party, in the widest sense of the term, has naturally changed, and was bound continually to change, with the progress of events. The successive Reform Acts, which put political power into the hands of new classes of the electorate, made it necessary to make a new sort of appeal to them, in order to support the causes of the church establishment, the House of Lords, and the main features of the constitution. The history of this movement cannot be sum- marized here, but the salient details may be found in the biographical articles on such leading Conservative statesmen as Lord Beaconsfield, Lord Salisbury and Mr A. J. Balfour (qq.v.). In organization the party followed much on the lines of the Liberal party. After 1832 associations known as " Constitutional " or " Conservative " multiplied throughout the country; and a " National Union of Conservative and Con- stitutional Associations " formed a confederation in 1867, in alliance with the work of the Central Conservative Office under the party whips. It was, however, unlike the similar Liberal

" National Liberal Federation," under the control of influential people who were loyal to the Central Office. In this respect the Conservative party, as an internally loyal party, had some advantage in organization; and such independent outbreaks as that of the " Fourth Party " (in the parliament of 1880), while stimulating to the Central Office, may be said to have applied a useful massage rather than to have led to any breaking of bones; while the Primrose League and similar new bodies acted as co-operating agencies. Mr Gladstone's proposal of Home Rule for Ireland in 1886 resulted in a great accession of strength to the party, owing to the splitting off of the Liberal Unionists from the Liberal party. From this time the term "Unionists" began to come into use, to signify both the Conservative and the Liberal Unionist parties; the distinction between the two wings gradually grew smaller; and by degrees the name of " Con- servative

party," though officially maintained, became more and more vague, as politics centred round Ireland, Imperialism or Tariff Reform.

See also M. Ostrogorski, Democracy and the Organization of Political Parties (Eng. trans., 1902) ; T. E. Kebbel, History of Toryism (1886).

CONSERVATOIRE (the Fr. equivalent of Ital. Conservatorio, Ger. Conservatorium, from Med. Lat. conservatorium, a place where anything is preserved, Lat. conservare, to preserve), a public institution for instruction in music and declamation. The name Conservatoire is generally used not only of the French institutions to which it properly applies, but also of the Italian Conservatorio and the German Conservatorium, and even sometimes of English schools of music. In the United States, however, the anglicized form " Conservatory " is used, a form far more satisfactory from the point of view of linguistic purity, but difficult to establish in England owing to its common applica- tion to a particular kind of green house (see Horticulture). The Italian conservatorios were the earliest, and originated in hospitals for the rearing of foundlings and orphans (whence the name) in which a musical education was given. When fully equipped, each conservatorio had two maestri or principals, one for composition and one for singing, besides professors for the various instruments. Though St Ambrose and Pope Leo I., in the 4th and 5th centuries respectively, are sometimes named in connexion with the subject, the historic continuity of the conservatoire in its modern sense cannot be traced farther back than the 16th century. The first to which a definite date can be assigned is the Conservatorio di Santa Maria di Loretto, at Naples, founded by Giovanni di Tappia in 1537. Three other similar schools were afterwards established in the city, of which the Conservatorio di Sant' Onofrio deserves special mention on account of the fame of its teachers, such as Alessandro Scarlatti, Leo, Durante and Porpora. There were thus for a considerable time four flourishing conservatorios in Naples. Two of them, however, ceased to exist in the course of the 18th century, and on the French occupation of the city the other two were united by Murat in a new institution under the title Real Collegio di Musica, which admitted pupils of both sexes, the earlier con servatorios having been exclusively for boys. In Venice, on the other hand, there were from an early date four conservatorios conducted on a similar plan to those in Naples, but exclusively for girls. These died out with the decay of the Venetian republic, and the centre of musical instruction for northern Italy was transferred to Milan, where a conservatorio on a large scale was established by Prince Eugene Beauharnais in 1808. The cele- brated conservatoire of Paris owes its origin to the Ecole Royale de Chant et de Declamation, founded by Baron de Breteuil in 1 784, for the purpose of training singers for the opera. Suspended during the stormy period of the Revolution, its place was taken by the Conservatoire de Musique, established in 1795 on the basis of

a school for gratuitous instruction in military music, founded by the mayor of Paris in 1792. The plan and scale on which it was founded had to be modified more than once in succeeding years, but it continued to flourish, and in the interval between 1820 and 1840, under the direction of Cherubini, may be said to have led the van of musical progress in Europe. In more recent years that place of honour belongs decidedly to the

Conservatorium at Leipzig, founded by Mendelssohn in 1843, which, for composition and instrumental music, became the chief resort of those who wished to rise to eminence in the art. Of other European conservatoires of the first rank may be named those of Prague, founded in 1810; of Brussels, founded in 1833 and long presided over by the celebrated Fetis; of Cologne, founded in 1849; an d those instituted more recently at Munich and Berlin, the instrumental school in the latter long enjoying the direction of Joachim. In England the functions of a con- servatoire have been discharged by the Royal Academy of Music of London, founded in 1822, which received a charter of incor- poration in 1830, the Royal College of Music (1882), the Guildhall school, and similar institutions. The chief public institution for teaching music in the United States is the National Con- servatory of Music of America, founded in New York in 1885. The famous Dvofak was for a time its director. Other well- known American establishments are the Peabody Conservatory in Baltimore (1868), the Cincinnati College of Music (1878), and the New England Conservatory of Music in Boston

(1867).

CONSERVATOR (Lat. conservare, to preserve), one who preserves from injury, a guardian or custodian. In the middle ages the title of conservator was given to various officers, such as those appointed by the council of Wiirzburg in 1287 to protect the privileges of certain religious persons, the guardians of academic rights in the university of Paris, certain Roman magistrates as late as the 16th century; or the conservator Judaeorum who was enjoined to look after the Jews of the county of Provence in 1424. By the 2 Henry V. there was appointed a' conservator of truce and safe conducts in each English seaport " to enquire of all offences done against the king's truce and safe conducts, upon the main sea, out of the liberties of the cinque ports." In Scotland the conservator of the realm (c. 1503) had jurisdiction to settle the disputes and protect the rights of Scottish merchants in foreign ports or places of trade. In England the conservators of the peace {custodes pads) were the precursors of the modern justices of the peace. Stubbs traces their origin to the assignment of knights, in 1195, to enforce the oath to preserve the peace which Richard I. ordered to be taken by all persons above the age of 15. By the 1 Edward III. conservators of the peace were appointed for each county to guard the peace and to hear

and determine felonies. The office was reconstituted by the parliament of 1327, and its powers were extended in 1360. From the sovereign and the lord chancellor down to the justice and the village constable, all who have to do with the repression of crime are included within the general term of conservators of the peace. As commonly used nowadays in England, the term conservator is applied only to the guardian of a museum or of a river (see Thames).

CONSETT, an urban district in the north-western parlia- mentary division of Durham, England, 20 m. S.E. of Newcastle- upon-Tyne by a branch of the North Eastern railway. Pop. (1901) 9694. It is the centre of a populous industrial district. At Shotley Bridge (where there is a small spa) a colony of German metal-workers, making swords and knives, was established in the 17th century; but this industry has now been replaced by paper mills. There are extensive collieries and ironworks in the district.

CONSHOHOCKEN, a borough of Montgomery county, Penn- sylvania, U.S.A., on the Schuylkill river, 12 m. N.W. of Phil- adelphia. Pop.(i89o) 5470; (1900) 5762(932beingforeign-born); (1910) 7480. It is served by the Pennsylvania and the Phil- adelphia & Reading railways. The borough is built on land which rises gradually from the river-bank for about j m. and then becomes quite level, but the surrounding country is for the most part occupied by hills, several of which rise to considerable height. It has a variety of manufacturing establishments, among which are cotton and woollen mills, rolling mills, steel mills, foundries, boiler shops, tube works, and works for making surgical instru- ments and artificial stone. The place was first settled about 1820, and was, for several years known as Matson's Ford; in 1830 it was laid out as a town and received its present name, an

Indian word meaning " pleasant valley." It was incorporated in 1850. Immediately across the Schuylkill is West Consho- hocken (pop. in 1900, 1958), where carpets and woollen goods are manufactured.

CONSIDERANT, VICTOR PROSPER (1808-1893), French socialist, was born at Salins (Jura) on the 12th of October 1808. Educated at the Ecole Polytechnique in Paris, he entered the French army as an engineer, rising to the rank of captain. Becoming imbued, however, with the phalansterian ideas of Francois Fourier, he resigned his commission in 1831, in order to devote himself to advancing the doctrines of his master. On the death of Fourier in 1837 he became the acknowledged head of the movement, and took charge of La Phalange, the organ of Fourierism. He also established

phalanges at Cond6-sur- Vesgres and elsewhere, but they had little success and soon died of inanition. During this period he published his Destinie sociale (1834-1838), undoubtedly the most able and most im- portant work of the Fourierist school. After the revolution of

1848 he was elected to the Constituent Assembly for the depart- ment of Loiret, and in 1849 to the Legislative Assembly for the department of the Seine. Considerant's share in the " demonstra- tion " under the leadership of Ledru-Rollin on the 13th of June

1849 caused his compulsory flight to Belgium. Thence he went (1852) to Texas, but soon returned to Brussels, where he suffered a short imprisonment for alleged conspiracy against the peace of a, neighbouring state. On his release he again set out for Texas, and founded at San Antonio the communistic colony of La Reunion. This experiment met with little more success than his 'former attempts, and in 1869 he returned to Paris, where he lived in retirement, needy and forgotten, till his death in 1893. The most important of Considerant's other writings were Exposition du systeme de Fourier (1845), Principes du socialisme (1847), TMoriedu droit de propriUe et du droit au travail (1848).

CONSIDERATION (from Lat. considerare, to look at closely, examine, generally taken to be from con-, and the base seen in sidus, sideris, a star, the word being supposed to be originally an astrological or astronomical term), observation, attention, regard or taking into account, hence the fact taken into account, and especially something given as an equivalent or reward or in payment; in the law of contract, an act or forbearance, or the promise thereof, offered by one party to an agreement, and accepted by the other as an inducement to that other's act or promise (Pollock on Contract). Consideration in the legal sense is essential to the validity of every contract unless it is made in writing under seal. The meaning of the word is quite accurately expressed by a phrase used in one of the earliest cases on the subject — it is strictly a quid pro quo. Something, whether it be in the nature of an act or a forbearance, must move from one of the parties in order to support a promise made by the other. A mere promise by A to give something to B cannot be enforced unless there is some consideration " moving from B." While every contract requires a consideration, it is held that the court will not inquire into the adequacy thereof, but it must be of some value in the eye of the law. It must also be legal, and it must be either present or future, not past. See further Contract.

CONSIGNMENT (from consign, Fr. consigner, Lat. con- signare, to affix a signum, seal; whence, in Late Lat., to hand over, transmit), generally, the delivery or transmission of any person or thing for safe custody, e.g. of a malefactor to prison, or of a horse to the care of a groom. In law,

consignment is used of the sending or transmitting of goods to a merchant or factor for sale. The person who consigns the goods is called the consignor, and the person residing at the port of delivery or elsewhere to whom the goods are to be delivered when they arrive there is called the consignee. See further Affreightment.

CONSISTORY (Lat. consistorium, literally, a standing place, hence meeting place, waiting or audience chamber) , a term which, like many other expressions, has undergone a regular evolution in the course of centuries. It was first applied to the audience- chamber in which the emperors received petitions and gave judgment; it soon came to mean also the persons who took part in the deliberation, and, by an extension of meaning, a tribunal

I or jurisdiction (see Du Cange, Glossarium, s.v.). But the ex- pression has now long been exclusively applied to gatherings of ecclesiastical persons for the purpose of administering justice or transacting business.

In the Western Church the episcopal consistory was simply the bishops' tribunal, the proceedings of which took a more or less strictly judicial form. But the name has disappeared almost everywhere; the only episcopal consistories outside England (see Consistory Courts) which survive are in Austria and in certain dioceses of Bavaria and Germany (see Vering, Kirchenrecht, § 149). Thus the name consistory has come to be applied almost exclusively to meetings of the college of cardinals with the pope as president, formerly for deliberative purposes, but nowadays purelyformal. These meetings used to be frequent, but are now held very seldom, taking place only three or four times a year.

The cardinals (q.v.) form the pope's council and senate; before it became the custom to entrust the management of various kinds of business, grouped according to their nature, to commis- sions composed of cardinals, the pope used to consider and dis- cuss with the whole sacred college matters of general interest or those which were specially referred to him, notably the questions submitted to him by bishops from all parts of Christendom. To this are due a good number of the decretals which have found a place in the Corpus juris canonici. In the middle ages, when the cardinals were few in number, consistories were held very often. Thus the Gesta of Innocent III. tell us that this great pope " held publicly, three times a week, according to the usage then established, a solemn consistory; in it he heard complaints from all men, and examined in person even affairs of the least importance with a prudence and perspicacity which were the admiration of all." Later we have recorded only one con- sistory a week; in the 16th century, according to Cardinal De Luca, it usually took place only twice in a month; and soon the consistories were held at still greater intervals; they were held more or less regularly during the Ember weeks, but now they have no

longer a fixed date.

Whatever be their form, they are nowadays merely ceremonial, the business upon which they are supposed to meet being dis- cussed and decided previously; consequently, they are merely a kind of solemn promulgation. The preparation of the business is entrusted to the commission of cardinals known as the Consistorial Congregation.

There are three kinds of consistory: the secret consistory, in which only the cardinals take part; the public consistory, to which are admitted persons from outside and a fairly large audience; and finally, the semi-public consistory, in which the bishops present in Rome take part wich the cardinals, and are allowed to state their opinion. The last form is only used in the case of the consistory preceding a canonization. The public con- sistory is now only held for the ceremony of conferring the hat on newly created cardinals; formerly the popes used to receive in public consistory sovereigns and certain other great persons, but in this case the consistory was not deliberative in form.

Finally, in secret consistories were discussed matters of general interest, such as the creation of cardinals, the provision of cathedral churches and other higher benefices, — hence called consistorial, — the creation, union or division of dioceses, the con- ferring of the pallium (q.v.) , and other matters of importance. In these consistories takes place the " preconization " of bishops appointed since the last consistory. The custom is for the pope to open the meeting by a discourse, or " consistorial allocution," in which he deals with the position of the Church, either in general or in some particular country; or again, he may denounce some danger which is threatening at the time either the faith or discipline, or protest against attacks upon the rights of the Church. Such, for example, were the allocutions of Pius IX. against the successive invasions of his temporal domain, or that of Pius X. against the breaking of the Concordat by the French government.

In the consistory, the cardinals are seated in a circle around the pope; on his right sits the chief cardinal bishop, after whom

are placed in order all the others; on the left of the pope stands the chief cardinal deacon ; the chief cardinal priest comes next to the last cardinal bishop, and the last cardinal priest next to the last cardinal deacon. As in the old imperial consistorium, the cardinals assemble in the hall of the

consistory, and there await the pope, who takes his place upon his throne; in former days he used first to give audience to those cardinals who had to submit certain matters to him, after which the doors were shut and the consistory became secret.

Authorities. — Bouix, De Curia romana, pt. ii. c. I (Paris, 1859); Plattenberg, Notitia congregationum, cap. 3 (Hildesheim, 1693) ; Cardinal de Luca, Thealrum veritatis, lib. xv. p. 2 (Rome, 1671).

(A. Bo.)*

CONSISTORY COURTS, those ecclesiastical courts wherein the ordinary jurisdiction of the bishop is exercised (see Con- sistory). They exist in every diocese of England. Consistory courts were established by a charter of William I., which ap- pointed the cognizance of ecclesiastical causes in a distinct place or court from the temporal. The officer who exercises jurisdiction in a consistory court is known as the chancellor (q.v.), and he is appointed by patent from the bishop or archbishop. All jurisdiction, both contentious and voluntary, is committed to him under two separate offices, those of official principal and vicar-general; the distinction between the two offices is that the official principal usually exercises contentious jurisdiction and the vicar-general voluntary jurisdiction. (In the province of York there is an official principal of the chancery court and a vicar-general of the diocese.) Since about the middle of the 19th century consistory courts have been shorn of much of their importance. Before the year 1858 consistory courts exercised concurrently with the courts of their respective provinces jurisdiction over matrimonial and testamentary matters. This jurisdiction was taken away by the Court of Probate Act 1857 and the Matrimonial Causes Act 1857. They had also corrective jurisdiction over criminous clerks, but this was abrogated by the Church Discipline Act 1840. The principal business of con- sistory courts is now the dispensing of faculties. The procedure in such is strictly forensic, for all applications for faculties, though they may be unopposed, are commenced by citation, calling on all who may have an interest to oppose. From the consistory courts an appeal lies to the provincial courts, i.e. the arches court of Canterbury and the chancery court of York. Also, by the Clergy Discipline Act 1892, a clergyman may be prosecuted and tried in a consistory court for immoral acts or conduct. Under this act, either party may appeal either to ■ the provincial court or to the king in council against any judgment of a consistory court.

CONSOLATION (Fr. consolation, Lat. consolatio, from con- solari, to assuage, comfort, console), in general, the soothing of disappointment or grief. The word is applied equally to the action of consoling, to the state of being consoled, and to the instruments by which comfort is brought. Thus

we speak of a person making attempts at consolation, of receiving consolation, and e.g. of the consolations of religion. In the sense of compensation for loss, the word " consolation " has had a variety of adaptations. Of its use in ecclesiastical Latin, in this sense, Du Cange gives various instances. Thus the synod of Angers (453) decreed that those clerics " qui sunt caelibes, nonnisi a sororibus aut amatis aut matribus consolentur " ; consolatio was also the name given, e.g., to the evening meal given to monks after the regular collation " by way of consolation " and to certain payments made to members of chapters over and above the revenues of their benefices. In an analogous sense we use the word in such combinations as " consolation prize," " con- solation race," " consolation stakes," meaning such as are open only to competitors who have not won in any preceding " event." Consolation is also the name of a French gambling game, so called because it is usually played on and about race-courses after the races have been run and the players have presumably lost. The necessary implements are a board divided into sections numbered from 1 to 6, upon which the players place their stakes, and a die which is shaken in a box and thrown on

the board. The banker, usually a professional gambler, pays five times the money on the winning number and pockets the rest. His chances of winning are overwhelming, as the die is never thrown until a stake has been placed upon all six compartments.

CONSOLE (a French form, supposed to be an abbreviation of consolidS, from Lat. consolidare, to strengthen), the architectural term given to a corbel (q.v.) placed on end, i.e. in which the height is greater than the projection. The console brackets which carry the cornice of a Roman doorway, and are described by Vitruvius as an cones (see Ancon), are among the best examples. The word is, however, more familiar in its connexion with furniture. The console-table was originally so called because the slab was supported upon a scroll-shaped bracket, or upon legs which in form and contour answered roughly to the idea of a bracket. A console-table has a front and two sides; the back, which remains unornamented, always stands against the wall. Since this piece of furniture was first introduced in the 17th century it has undergone many mutations of form. It has been flat and oblong, oval and bombe; but, save during the Empire period, it has rarely been severe. The console-table — the slab of which is often of marble — lends itself with peculiar adaptability to ornament, and, especially during the first half of the 18th century which was its most distinguished and, artistically, its most satisfactory period, it was often of extreme grace and elegance. France was always its natural home, and the Mobilier National and the great French palaces still contain many extremely ornate examples, in which fruits and flowers, wreaths and scrolls, gildings and inlayings produce gorgeous yet homogeneous effects.

Until the reign of Louis XVI. console- tables were almost invariably gilded, but they then began to be painted usually in gris-perle, and by degrees they came to be manufactured in rose-wood and mahogany. Although much used in England the console has never been thoroughly acclima- tized there; that it has always retained a foreign flavour is indicated by the fact that, unlike most other pieces of furniture, it has failed to commend itself to any but the richer classes.

CONSOLIDATION ACTS. To " consolidate " (Lat. consolidare, from con-, together, and solidus, firm) is to press compactly together, put on a firm basis, and especially bring together into one strong whole. The practice of legislating for small portions of a subject only at a time, which is characteristic of the English parliament, produces as a necessary consequence great confusion in the statute law. The acts relating to any subject of importance or difficulty will be found to be scattered over many years, and through the operation of clauses partially repealing or amending former acts, the final sense of the legislature becomes enveloped in unintelligible or contradictory expressions. Where oppor- tunity offers, the law thus expressed in many statutes is sometimes recast in a single statute, called a Consolidation Act. Among such are acts dealing with the customs, stamps and stamp duties, public health, weights and measures, sheriffs, coroners, county courts, housing, municipal corporations, libraries, trustees, copyhold, diseases of animals, merchant shipping, friendly societies, &c. These observations apply to the public general acts of the legislature. On the other hand, in settling private acts, such as those relating to railway and canal enterprise, the legislature always inserted certain clauses founded on reasons of public policy applicable to the business in question. To avoid the necessity of constantly re-enacting the same principles in private acts, their common clauses were embodied in separate statutes, and their provisions are ordered to be incorporated in any private act of the description mentioned therein. Such are the Lands Clauses Acts, the Companies Clauses Acts and the Railways Clauses Acts.

CONSOLS, an abbreviation of consolidated annuities, a form of British government stock which originated in 1751. Consols now form the larger portion of the funded debt of the United Kingdom. In the progress of the national debt it was deemed expedient, on grounds which have been much questioned, instead of borrowing at various rates of interest, according to the state of the market or the need and credit of the government, to offer

a fixed rate of interest, usually 3 or 35%, and as the market re- quired to

give the lenders an advantage in the principal funded. Thus subscribers of £100 would sometimes receive £150 of 3% stock. In 1815, at the close of the French wars, a large loan was raised at as much as £174 3% stock for £100. The low rate of interest was thus purely nominal, while the principal of the debt was increased beyond all due proportion. This practice began in the reign of George II., when some portions of the debt on which the interest had been successfully reduced were con- solidated into 3 % annuities, and consols, as the annuities were called, and other stocksof nominallylowinterest,rapidlyincreased under the same practice during the great wars. In times of peace, when the rate of money, has enabled portions of the debt at a higher interest to be commuted into stock of lower interest, it has usually been into consols that the conversion has been effected. Temporary deficits of the revenue have been covered by an issue of consols; exchequer bills when funded have taken the same form, though not constantly or exclusively; and some government loans for special purposes, such as the relief of the Irish famine and the expenditure in the Crimean and Boer Wars have been wholly or partly raised in consols. The consequence has been to give this stock a pre-eminence in the amount- of the funded debt. See further under National Debt: United Kingdom.

CONSORT (Lat. consors, a companion), in general, a partner or associate, but more particularly a husband or wife. The word is also used in conjunction with some titles, as " queen consort," " prince consort." Under the law of the United Kingdom, the queen consort is a subject, but has certain privileges. By the Treason Act 1351, the compassing and imagining her death is high treason, as is also the commission of adultery with her. With regard to the acquisition and disposal of property, the incurring of rights and liabilities under contract, suing and being sued, a queen consort is regarded as a. feme sole (32 Henry VIII. c. 51, 1540; Private Property of the Sovereign Act 1800). The queen consort has her own ceremonial officers and appears in the courts by her attorney- and solicitor-general. At one time she had a revenue out of the demesne lands of the crown and a portion of any sum paid by a subject to the king in return for a grant of any office or franchise; this was termed aurum reginae or queen-gold. Provision is now made for the queen consort by statute. When the husband of a queen consort dies she becomes a queen dowager. A queen dowager is not under the protection of the law of treason. It is said (Blackstone, Commentaries) that she cannot marry without the king's licence, but this is doubtful. A queen regnant, holding the crown in her own right, has all the prerogatives of a sovereign. In the four cases of queens regnant in English history, the husbands' positions have each been different. When Queen Mary I. married Philip of Spain it was provided by every safeguard that words could suggest that the queen alone should exercise all the powers of the crown; official documents, however, were to issue in their joint names.

William III. occupied the throne jointly with his wife, Mary II. The husband of Queen Anne, George of Denmark, who was naturalized by act of parliament in 1689, occupied no definite position, and differed only from other subjects of the queen in the conditions of his naturalization. The position of Prince Albert of Saxe-Coburg-Gotha, the husband of Queen Victoria, was somewhat like that of Prince George of Denmark. A few days before his marriage he had been natural- ized as a British subject, and immediately after his marriage letters patent were issued, giving him precedence next to the queen. He had, however, no distinctive title, and the privileges and precedence he received were only by courtesy. As the patent which gave him precedence was inoperative outside the United Kingdom, certain difficulties occurred at foreign courts, and in order to settle these, the formal title of " Prince Consort " was conferred upon him by letters patent in 1857.

CONSPIRACY (from Lat. conspirare, literally to breathe together, to agree, combine, and especially to form a secret plot), in English law, an agreement between two or more persons to do certain wrongful acts, which may ncvt, however, be punishable

when committed by a single person, not acting in concert with others. The following are enumerated in text-books as the things, an agreement to do which, made between several persons, con- stitutes the offence of conspiracy: — (1) Falsely to charge another with a crime punishable by law, either from a malicious or vindictive motive or feeling towards the party, or for the purpose of extorting money from him; (2) wrongfully to injure or pre- judice a third person or any body of men in any other manner; (3) to commit any offence punishable by law; (4) to do any act with intent to pervert the course of justice; (5) to effect a legal purpose, with a corrupt intent or by improper means; to which are added (6) conspiracies or combinations among workmen to raise wages.

The division is not a perfect one, but a few examples under each of the heads will indicate the nature of the offence in English law. First, a conspiracy to charge a man falsely with any felony or misdemeanour is criminal; but an agreement to pro- secute a man who is guilty, or against whom there are reasonable grounds for suspicion, is not. Under the second head the text- books give a great variety of examples, — e.g. mock auctions, where sham bidders cause the goods to go off at prices grossly above their worth; a conspiracy to raise the price of goods by spreading false rumours; a conspiracy by persons to cause themselves to be reputed men of property, in order to deceive tradesmen. These examples show how wide the law stretches its conception of criminal agreement. The third head requires no explanation. A conspiracy to murder is expressly made punishable by penal servitude and imprisonment (The Offences against the

Person Act 1861). A curious example of conspiracy under the fourth head is the case in which several persons were convicted of conspiracy to procure another to rob one of them, so that by convicting the robber they might obtain the reward given in such cases. The combination to effect a lawful purpose with corrupt intent or by improper means is exemplified by agreements to procure seduction, &c.

The most important question in the law of conspiracy, apart from the statute law affecting labourers, is how far things which may be lawfully done by individuals can become criminal when done by individuals acting in concert, and some light may be thrown on it by a short statement of the history of the law. In the early period of the law down to the 17 th century, conspiracy was defined by the Ordinance of Conspirators of 1305: — " Con- spirators be they that do confedr or bind themselves by oath, covenant, or other alliance, that every of them shall aid the other falsely and maliciously to indite, or cause to indite, or falsely to move or maintain pleas, and also such as cause children within age to appeal men of felony, whereby they are imprisoned and sore grieved, and such as retain men in the country with liveries or fees to maintain their malicious enterprizes, and this extendeth as well to the takers as to the givers." The offence aimed at here is conspiracy to indict or to maintain suits falsely; and it was held that a conspiracy under the act was not complete, unless some suit had been maintained or some person had been falsely indicted and acquitted. A doctrine, however, grew up that the agreement was in itself criminal, although the conspiracy was not actually completed (Poulterer's case, 161 1). This developed into the rule that any agreement to commit a crime might be prosecuted as a conspiracy. A still further development of this doctrine is that a combination might be criminal, although the object apart from combination would not be criminal. The cases bearing on this question will be found arranged under the following heads, and in chronological order, in the Law of Criminal Conspiracies and Agreements, by R. S. Wright (London, 1873): — Combinations against government; combinations to defeat or pervert justice; combinations against public morals or decency; combination to defraud; combination to injure otherwise than by fraud; trade combinations. " It is conceived," says the author, " that on a review of all the decisions, there is a great preponderance of authority in favour of the proposition that, as a rule, an agreement or combination is not criminal unless it be for acts or omissions (whether as ends or means) which would be criminal apart from agreement." A dictum of

Lord Denman's is often quoted as supplying a definition of conspiracy. It is, he says, either a combination to procure an unlawful object, or to procure a lawful object by unlawful means; but the exact meaning to be given to the word " lawful " in this antithesis has nowhere been precisely stated. A thing may be unlawful in the sense that the law will not aid it, although it may not expressly punish it. The extreme limit of the doctrine is reached in the suggestion that a combination to hiss an actor at a theatre is a punishable conspiracy.

The application of the wide conception of conspiracy to trade disputes and to civil questions arising out of contracts for service is dealt with under the headings Labour Legislation, Strikes and Lock-outs and Trade Unions. The criminal side is regulated by the Conspiracy and Protection to Property Act 1875, which enacted that "an agreement or combination by two or more persons to do, or procure to be done, any act in contemplation or furtherance of a trade dispute between employers and workmen shall not be indictable as a conspiracy, if such act committed by one person would not be punishable as a crime. When a person is convicted of any such agreement or com- bination to do an act which is punishable only on summary con- viction, and is sentenced to imprisonment, the imprisonment shall not exceed three months, or such longer period, if any, as may have been prescribed by the statute for the punishment of the said act when committed by one person." The effect of the act of 1875 in conjunction with the Employers and Workmen Act of the same year is that breach of contract between master and workmen is to be dealt with as a civil and not as a criminal case, with two exceptions. A person employed on the supply of gas and water, breaking his contract with his employer, and knowing, or having reasonable cause to believe, that the consequence of his doing so, either alone or in combination with others, will be to deprive the inhabitants of the place wholly or to a great extent of their supply of gas or water, shall be liable on conviction to a penalty not exceeding £20, or a term of imprisonment not ex- ceeding three months. And generally any person wilfully and maliciously breaking a contract of service or hiring, knowing or having reasonable cause to believe that the probable consequences of his so doing either alone or in combination with others will be to endanger human life or cause serious bodily injury, or to expose valuable property whether real or personal to destruction or serious injury, shall be liable to the same penalty. By section 7 every person who, with a view to compel any other person to abstain from doing or to do any act which such other person has a legal right to do or abstain from doing, wrongfully and without legal authority, (1) uses violence to or intimidates such other person, or his wife and children, or injures his property; or (2) persistently follows such other person about from place to place; or (3) hides any tools, clothes or other property owned or used by such other

person, or deprives him of or hinders him in the use thereof; or (4) watches or besets the house or other place where such other person resides, or works, or carries on business, or happens to be, or the approach to such house or place; or (5) follows such other person with two or more other persons, in a disorderly manner, in or through any street or road, shall be liable to the before-mentioned penalties. Of course a combination to do any of these acts would be punishable as a conspiracy, as mentioned in section 3 above.

Seamen are expressly exempted from the operation of this act. The exceptions as to contracts of service for the supply of gas and water, &c, were supported by the circumstances of the London gas stokers' case in 1872.

Conspiracy at common law is a misdemeanour, and the punishment is fine or imprisonment, or both, to which may be added hard labour in the case of any conspiracy to cheat and defraud, or to extort money or goods, or falsely to accuse of any crime, and to obstruct, pervert, prevent or defeat the cause of justice. Conspiracy to murder, whether the victim be a subject of the king or resident in his dominions or not, is, by the Offences against the Person Act 1861, punishable by penal servitude.

United States.— The most generally accepted definition of conspiracy in the United States is " a combination of two or

more persons by some concerted action to accomplish some criminal or unlawful purpose, or to accomplish some purpose not in itself criminal or unlawful by criminal or unlawful means"; though in some states, e.g. Colorado, it is not conspiracy under the statute to do a lawful act in an unlawful way (Lipschitz v. People [1898] 25 Col. 261). In some states an overt act must be shown (N.Y. Pen. Code, § 171). This is so in the Federal Courts, United States v. McCord (72 Fed. R. 159). Conspiracy out of the state to do any act which if done within the state would be treason is punishable by im- prisonment not exceeding ten years {ibid. § 169). The United States Revised Statutes, § 5440, make any conspiracy to commit an act, declared by any law of the United States to be a crime, an offence against the United States, e.g. a conspiracy to plunder a wrecked vessel within the admiralty and maritime jurisdiction of the United States (U.S. v. Sanche, 7 Fed. R. 715), conspiracy to violate the postal laws (Re Renkle [1903] 125 Fed. R. 996), to violate the revenue laws (U.S. v. Cohn [1904] 128 Fed. R. 615). It is not essential that the object be accomplished (Radford v. U. S. [1 904] 129 Fed. R. 49) . A conspiracy to depress the market price of stock by circulating false reports that the company was going into the hands of a receiver is indictable under N.Y. Pen. Code, § 168 (People v. Goslin [1901] 67 N.Y. App. D: 16, affirmed

171 N.Y. 627).

CONSTABLE, ARCHIBALD (1774-1827), Scottish publisher, was born on the 24th of February 1774 at Carnbee, Fife. His father was land steward to the earl of Kellie. In 1788 Archibald was apprenticed to Peter Hill, bookseller, of Edinburgh, but in 1795 he started in business for himself as a dealer in rare and curious books. He bought the Scots Magazine in 1801, and John Leyden, the orientalist, became its editor. In 1800 Constable began the Farmer's Magazine, and in November 1802 he issued the first number of the Edinburgh Review, under the nominal editorship of Sydney Smith; Lord Jeffrey, was, how- ever, the guiding spirit of the review, having as his associates Lord Brougham, Sir Walter Scott, Henry Hallam, John Playfair and afterwards Macaulay. Constable made a new departure in publishing by the generosity of his terms to authors. The writers for the Edinburgh Review were paid at an unprecedented rate, and Constable offered Scott 1000 guineas in advance for Marmion. In 1804 A. G. Hunter joined Constable as partner, bringing considerable capital into the firm, styled from that time Archibald Constable & Co. In 1805, jointly with Long- man & Co., Constable published Scott's Lay of the Last Minstrel, and in 1807 Marmion. In 1808 a split took place between Constable and Sir Walter Scott, who transferred his business to the publishing firm of John Ballantyne & Co., for which he supplied the greater part of the capital. In 1813, however, a reconciliation took place. The publishing firm of Ballantyne was in difficulties, and Constable again became Scott's publisher, a condition being that the firm of John Ballantyne & Co. should be wound up at an early date, though Scott retained his interest in the printing business of James Ballantyne & Co. In 1812 Constable, who had admitted Robert Cathcart and Robert Cadell as partners on the retirement of A. G. Hunter, purchased the copyright of the Encyclopaedia Britannica, adding the supplement (6 vols., 1816-1824) to the 4th, 5th and 6th editions (see Encyclopaedia). In 1814 he bought the copyright of Waverley. This was issued anonymously; but in a short time 1 2, poo copies were disposed of, Scott's other novels following in quick succession. The firm also published the Annual Register. Through over-speculation, complications in Constable's business arose, and in 1826 a crash came. Constable's London agents stopped payment, and he failed for over £250,000, while James Ballantyne & Co. also went bankrupt for nearly £90,000. Sir Walter Scott was involved in the failure of both firms. Constable started business afresh, and began in 1827 Constable's Miscellany of original and selected works . . . consisting of a series of original works, and of standard books republished in a cheap form, thus making one of the earliest and most famous attempts to popu- larize wholesome literature. He died on the 21st of July 1827. After Constable's bankruptcy, Robert Cadell (1788-1849), who

had been his partner, in conjunction with Sir Walter Scott, bought from the various publishers in whose hands they were, all Scott's novels which had been issued up to that time, and began the issue of the forty-eight volume edition (1829-1833). The result of its publication was that the debt on Abbotsford was redeemed, and that Cadell bought the estate of Ratho near Edinburgh, which he owned till his death on the 21st of January

1849.

Archibald Constable's son,Thomas (181 2-1881), was appointed in 1839 printer and publisher in Edinburgh to Queen Victoria, and issued, among other notable series, Constable's Educational Series, and Constable's Foreign Miscellany. In 1865 his son Archibald became a partner, and when he retired in 1893 the firm continued under the name of T. & A. Constable.

See also Archibald Constable and Ms Literary Correspondents, by his son Thomas Constable (3 vols., 1873). This book contains numerous contemporary notices of Archibald Constable, and vindi- cates him from the exaggeration of J. G. Lockhart and others.

CONSTABLE, HENRY (1562-1613), English poet, was born in 1562. His father, Sir Robert Constable, was knighted by the earl of Essex in Scotland in 1570, and was the author of a work On the Ordering of a Camp. The poet went to St John's College, Cambridge, where he took his degree of B.A. in 1580. He was (or now became) a Roman Catholic, and we hear of him' next in Paris, whence in 1584 and 1585 he wrote to Walsingham letters which still exist, and which prove Constable to have been in the secret service of the English government. A later correspondence with Essex contains protestations of his loyalty. He was probably still abroad, when, in the autumn of 1592, a London publisher issued Diana, the praises of his Mistress in certain sweet sonnets, by H. C, containing 23 poems. A reissue of this pamphlet in 1594 (misprinted 1584) was greatly enlarged, not merely by more sonnets which may or may not be Constable's, but by eight poems which were certainly the work of Sir Philip Sidney. Published a few weeks after the Delia of Daniel, the original Diana of 1592 claims a very early place in the evolution of the Elizabethan sonnet. In 1598 Constable was sent on a mission from the Pope to Scotland, the idea being that James VI. was to be supported in his claim to the English succession on condition of his setting English Romanists free from the exist- ing disabilities. Constable's mission came to nothing, and he entered the service of the king of France. Later he asked for permission to return to England, but it was

refused. In con- sequence of a surreptitious excursion to London, he was captured and imprisoned in the Tower in 1604. After a manhood spent in almost continuous exile, Henry Constable died at Liege on the 9th of October 1613. The Diana was the only work printed in the poet's life-time; it was augmented from MS. sources by H. J. Todd, in 1813. His Spiritual Sonnets first appeared in 1815, edited by Thomas Park. Almost the only known pieces by Constable which are not sonnets are the song of " Diaphenia," and the beautiful pastoral canzone, on " Venus and Adonis," contained in the England's Helicon of 1600. In 1594 he prefixed four sonnets, addressed to the soul of Sir Philip Sidney, to that writer's Apology of Poetry. A prose work of devotion, The Catholic Moderator (1623), has been attributed to Constable. Who Diana was has never been determined, but it has been conjectured that she may have been Mary, countess of Shrews- bury, who was a distant cousin of the poet. The body of Constable's writing is so small, and its authenticity so little supported by evidence, that it is rash to give a very definite opinion as to its character. But it is evident, from his undoubted productions, that he was much under the influence of the French poets of his time, particularly of Desportes, as well as of Petrarch and Sidney. That Shakespeare was acquainted with Constable's poetry and admired it seems to be certain, and that he borrowed from it, " gives it," as Mr Sidney Lee has said, " its most lasting interest." In the arrangement of his rhymes, Constable usually keeps closer to the Petrarchan model than Daniel and the other contemporary sonneteers are accustomed to do. (E. G.)

CONSTABLE, JOHN (1776-1837), English landscape painter,. was born at East Bergholt in Suffolk on the nth of June 1776.

His father was a man of some property, including water-mills at Dedham and Flatford, and two windmills, in which John, the second son, was set to work at the age of seventeen, after leaving Dedham grammar school. From boyhood he was devoted to painting, which he studied in his spare time in company with John /Dunthorne, a local plumber and glazier. While working thus he made the acquaintance of Sir George Beaumont, a medi- ocre painter but a keen patron of the arts, and was inspired by the sight of Claude's " Hagar and Ishmael " and by some drawings of Girtin which Sir George possessed. His passion for art increasing, he was allowed by his father to visit London in 1795 to consult the landscape-painter Joseph Farington, R. A. (1 747-1821), who recognized his originality and gave him some technical hints. He also made the acquaintance of the engraver J. T. Smith, who taught him etching, and corresponded with him during the next few years, which were spent partly in London and partly in Suffolk. In 1797 he was recalled to work in his father's counting-house at Bergholt, and it was not till February 1799 that he definitely adopted the profession of painting, and became a student at the Royal Academy. The few existing

works of this period are heavy, clumsy and amateurish. Recognizing their faults, Constable worked hard at copying old masters " to acquire execution." The remedy was effective, for his sketches on a tour in Derbyshire in 1801 show considerable freshness and accomplishment. In 1802 he exhibited at the Royal Academy, and was much helped and encouraged by the president, Benjamin West, who did him a further service by preventing him from accepting a drawing-mastership (offered by Archdeacon Fisher, of Salisbury), and thereby greatly stimulating his efforts. The manner of West appears strongly in the altarpiece painted by Constable for Brantham church in 1804, but Gainsborough, the Dutch masters and Girtin are the predominant influences upon his landscape, especially Girtin in the year 1805, and in 1806, when he visited the Lake District. From 1806 to 1809 Constable was frequently engaged in painting portraits or in copying portraits by Reynolds and Hoppner. The effect on his landscape was great. He learned how to con- struct an oil painting, and the efforts of the next few years were devoted to combining this knowledge with his innate love of the fresh colour of nature.

With the year 18 11 began a critical period. He exhibited a large view of Dedham Vale, in which the characteristic features of his art appear for the first time almost fully developed, and he became attached to Miss Maria Bicknell. His suit was opposed by the lady's relatives, and Constable's apparently hopeless prospects drove him again to portrait-painting, in which he acquired considerable skill. It was not till the death of his father in 18 16 that he was able to marry and settle in No. r Keppel Street, Russell Square, where a succession of works now well known were painted: "Flatford Mill" (1817), "A Cottage in a Cornfield," and in 1819 " The White Horse," which was bought by his great friend Archdeacon Fisher for £105, as was the "Stratford Mill" of 1820. In 1819 two legacies each of £4000 diminished his domestic anxieties, and his talent was recognized by his election in November to the associateship of the Royal Academy. The series of important works was continued by " The Haywain " (1821), " A View on the Stour " (1822), "Salisbury Cathedral from the Bishop's Garden" (1823), and " The Lock " (1824). This last year was a memorable one. " The Haywain " was sold to a Frenchman, was exhibited at the Louvre, and, after creating a profound sensation among French artists, was awarded a gold medal. In the following year " The White Horse " won a similar distinction at Lille. In 1825 he exhibited " The Leaping Horse " (perhaps his master- piece), in 1826 "The Cornfield," in 1827 "The Marine Parade and Chain Pier, Brighton," and in 1828 " Dedham Vale."

In 1822 Constable had taken Farington's house, 35 Charlotte Street, Fitzroy Square, but his wife's failing health made him turn his attention to Hampstead, and after temporary occupa- tion first of 2 Lower Terrace and

then of a house on Downshire Hill, he took No. 6 Well Walk, in 1827, letting the greater part of his London house. In 1828 his financial position was made

secure by a legacy of £20,000 from Mr Bicknell, but the death of his wife towards the end of the year was a shock from which he never wholly recovered. His election to membership of the Academy in the following year did not lessen his distress: he felt that the honour had been delayed too long. His chief exhibit in 1829 was " Hadleigh Castle," and this was succeeded by the great " Salisbury Cathedral from the Meadows " (1831), " The Opening of Waterloo Bridge " (1832), which had been begun in 1817, " Englefield House " (1833), " The Valley Farm " (183s), " The Cenotaph " (1836), and " Arundel Mill and Castle" (1837). Constable had long suffered from rheumatism and nervous depression, but his sudden death on the 31st of March 1837 could be traced to no definite disease. He was buried in Hampstead churchyard, where his tomb may still be seen.

In May 1838 his remaining works were sold at auction, but fetched very small prices. Many were bought in by his children, and through their generosity have passed to the English nation, as the national collections at Trafalgar Square, Millbank and South Kensington testify. Nowhere else can Constable's art be studied completely or safely, since forgeries and imitations are common and have crept into the Louvre and other famous galleries. Much of the power of his work survives in the noble series of mezzotints made after his sketches by David Lucas, and first issued in 1833. Though a commercial failure at the time of publication, this English Landscape series is now deservedly prized, as are the other plates which Lucas engraved after Con- stable. Constable himself made a few desultory experiments in etching, but they are of no importance.

As already indicated, the mature art of Constable did not develop till after the year 181 1, when he began to combine the fresh colour of nature, which he had learned to depict by working in the open air, with the art of making a picture, which he had learned from painting portraits and copying those of other masters. His development was unusually slow, and his finest work, with but few exceptions, was done between his fortieth and fiftieth years (1816-1826). During the last twelve years of his life his manner became more free, and the palette knife was constantly used to apply spots and splashes of pure colour, so that his technique often suggests that afterwards employed by the Impressionists. Yet his direct influence upon French landscape has sometimes been overrated. When Constable first

exhibited at the Salon in 1825 Theodore Rousseau, the pioneer of French naturalism, was only twelve years old, and the movement of 1830 was really originated in France by Gros and Gericault, while in England the water-colour painters led the way. Constable's death in 1837 removed the man and most of his work from the public eye for another generation, and he became a famous shadow rather than a living force. So Monet and the Impressionists, when they sought after the secret of painting air and sunshine, looked to Turner rather than to Con- stable, and in England the eloquence of Ruskin pointed in the same direction.

Since the British nation came into the possession of a large portion of Constable's pictures and sketches, his work has been better understood. Though limited in range of subject to the scenery of Suffolk, Hampstead, Salisbury and Brighton, his sketches express the tone, colour, movement and atmosphere of the scenes represented with unrivalled force and truthfulness, and modern criticism tends to rate their spontaneity above the deliberate accomplishment of his large finished works. His treatment of skies is specially notable. Here his early experience as a miller told in his favour. No one has painted English cloud effects so truthfully, or used them as a compositional quantity with so much skill. Though in looking at nature he was determined to see with his own eyes and not with those of any former master, he found that the science of his predecessors was necessary to him before his sketches could be translated into large pictures. In these pictures his vivid tones and fresh colour are grafted upon the formulae of Claude and Rubens, and it is a common error to regard Constable as an opponent of the great old masters. His pictures, like his writings and lectures, prove just the reverse. His dislike was reserved for the painters

who took their ideas from other painters instead of getting' them directly from nature.

Authorities. — Among older books see C. R. Leslie, Memoirs of the Life of John Constable, R. A. (London, 2nd ed. 1845, 3rd ed. 1896) (the classical work on the subject) ; and English Landscape Scenery, a Series of Forty Mezzotint Engravings on Steel, by David Lucas, from pictures painted by John Constable, R.A. (London, folio, JˆS)- The large work on Constable and his Influence on Landscape Painting, by C. J. Holmes (1902), contains the only chronological catalogue of Constable's paintings and sketches. Leslie's biography has been admirably rendered into French by M. Leon Bazalgette (Paris, H. Floury, 1905). (C. J. H.)

CONSTABLE, SIR MARMADUKE (c. 1455-1518), English soldier, was descended from a certain Robert (d. 1216), lord of Flamborough, who was related to the Lacys, hereditary constables of Chester, hence the surname of the family. A son of Sir Robert Constable (d. 1488), Marmaduke was in

France with Edward IV. in 1475 and with Henry VII. in 1492. He was sheriff of Staffordshire and Yorkshire, was in high favour with Henry VII. and Henry VIII. , and led his kinsmen and retainers to the battle of Flodden in 15 13. He was twice married, and left several sons when he died on the 20th of November 1518. In Flamborough church one may still read a rhyming epitaph describing Constable's life and prowess.

Sir Marmaduke's eldest son, Sir Robert Constable (c 1478- 1537), helped Henry VII. to defeat the Cornish rebels at Black- heath in 1497. In 1 536, when the rising known as the Pilgrimage of Grace broke out in the north of England, Constable was one of the insurgent leaders, but towards the close of the year he submitted at Doncaster and was pardoned. He did not share in the renewal of the rising which took place in January 1537; but he refused the king's invitation to proceed to London, and was arrested. Tried for treason, he was hanged at Hull in the following June.

Sir Marmaduke's second son, Sir Marmaduke Constable (c. 1480-1545), was knighted after the battle of Flodden, and was at the Field of the Cloth of Gold in 1520. He was a knight of the shire for Yorkshire and then for Warwickshire, and was a member of the Council of the North from 1 537 until his death.

Another noteworthy member of this family was the regicide, Sir William Constable (d. 1655), who was created a baronet in 161 1. A member of the Long Parliament, he fought with distinction among the parliamentarians at Edgehill; in 1644 his military enterprises in north Yorkshire were very successful, and later he guarded the king at Carisbrooke, and was governor of Gloucester. He was one of the king's judges, was a member of the council of state under Cromwell, and died in London on the 15th of June 1655.

CONSTABLE (O. Fr. connestalle, Fr. connUable, Med. Lat. comestabilis, conestabilis, constabularius , from the Lat. comes stabuli, count of the stable), a title now confined to the lord high constable of England, the lord constable of Scotland, the constables of some royal castles in England, and to certain executive legal officials of inferior rank in Great Britain and the United States.

The history of the constable is closely analogous to that of the marshal (

The Byzantine comes stabuli (koixtis tov

this time onward the office of constable tended, in France, continually to increase in importance. On the abolition of the seneschalship by King Philip Augustus in iiqi, the constable succeeded to many of his powers and privileges. Thus in the 13th century he claimed as of right the privilege of leading the vanguard of the army. Under Philip the Fair (1268-1314) he begins to be invested with the military government of certain provinces as lieutenant of the king (locum lenens regis); and, finally, in the 14th century, owing to the confusion of his high prerogatives as the royal lieutenant with his functions as con- stable, he is, as constable, recognized as commander-in-chief of the army. The French kings never allowed the office of constable to become hereditary, and in January 1627, after the death of Francois de Bonne, due de Lesdiguieres, the office was suppressed by royal edict. Napoleon created the office of grand constable for his brother Louis, and that of vice-constable for Marshal Berthier, but these were suppressed at the Restoration.

The jurisdiction of the constable, known as the connUablie et marechaussee de France, was held in fee until the abolition of the office of constable, when it became a royal court, without, however, changing its name. Henceforth it was nominally under the senior marshal of France, and all marshals had the right of sitting as judges; but actually it was presided over by the lieutenant giniral with the lieutenant particulier and the procureur du roi as assessors. At first peripatetic, its seat was ultimately fixed at Paris, as part of the organization of the parlement. Its jurisdiction, which included all military persons and causes, was somewhat vaguely extended to embrace all crimes of violence, &c, committed outside the jurisdiction of the towns; it thus came often into conflict with that of the other royal courts.

The office of constable was not confined on the continent to France. The Gothic kings of Spain had their comites stabuli; so did, later on, the kings of Naples, where the functions of this officer were much the same as in France. The great vassals of the French crown, moreover, arranging their households on the model of that of the king, had their constables, whose office tended for the most part to become hereditary. Thus the constableship of the county of Toulouse was hereditary in the family of Sabran, that of Normandy in the house of Crespin.

In England the title of constable was unknown before the Conquest, though the functions of the office were practically those of the English staller. In the laws of Edward the Confessor the title constable is mentioned as the French equivalent for the English heretoga, or military commander (ductor exercitus). But among the great officers of the Norman-English court the constable duly makes his appearance as " quartermaster-general of the court and of the army." In England, however, where the office soon became

hereditary, the constable never attained the same commanding position as in France, though the military duties attached to his office prevented its sinking into a mere grand serjeanty. He was not the superior of the marshal, the functions of the two offices being in fact hardly distinguishable. From the first, moreover, the title of constable was not confined to the constable proper, whose office in the reign of Stephen was made hereditary under the style of high constable (see Lord High Constable) ; for every command held under the supreme constabularia was designated by this name, and there were constables of troops, of castles, of garrisons and even of ships (constabularia navigii regis). Under the Norman and Angevin kings, then, the title had come to be loosely applied to any high military command. Its extension to officials exercising civil jurisdiction is not difficult to account for. In feudal society, based as this was on a military organization, it is easy to see how the military jurisdiction of the constables would tend to encroach on that of the civil magistrates. The origin of the modern chief and petty constables, however, is to be traced to the Statute of Winchester of 1285, by which the national militia was organized by a blending of the militaiy system with the constitution of the shires. Under this act a chief or high constable was appointed in every hundred; while in the old ti things and villatae the village bailiff was generally appointed a petty constable, receiving in addition to his old magisterial functions a new military office.

From the time of Edward III. the old title of reeve or tithing-man is lost in that of constable, which represents his character as an officer of the peace as well as of the militia. The high and petty constables continued to be the executive legal officers in the counties until the County Police Acts of 1839 and 1840 re- organized the county police. In 1842 an important statute was passed enacting that for the future no appointment of a petty constable, headborough, borsholder, tithing-man, or peace Officer of the like description should be made for any parish at any court leet, except for purposes unconnected with the pre- servation of the peace, and providing, as a means of increasing the security of persons and property, for the appointment by justices of the peace in divisional petty sessions of fit persons or their substitutes to act as constables in the several parishes of England, and giving vestries an optional power of providing paid constables. Under the acts of 1839 and 1840 the establish- ment of a paid county police force was optional with the justices. With the Police Act of 1856 this optional power became com- pulsory, and thenceforth the history of the petty constable in England is that of the police. In 1869 provision was made for the abolition of the old office of high constable (the High Con- stables Act 1869) and, as the establishment of an efficient police force rendered the general appointment of parish constables unnecessary, the appointment ceased, subject to the appointment by vestries of paid

constables under the chief constable of the county (Parish Constables Act 1872). See further Police.

" Special constables " are peace officers appointed to act on occasional emergencies when the ordinary police force is thought to be deficient. The appointment of special constables is for the most part regulated by an act of 183 1. In the absence of volunteers the office is compulsory, on the appointment of two justices. The lord-lieutenant may also appoint special constables and the statutory exemptions may be disregarded, but voters cannot be made to serve during a parliamentary election. While in office special constables have all the powers of a common law constable, and in London those of a 'metropolitan police officer.

In the United States, outside the larger towns, the petty constable retains much the same status as in England before the act of 1842. Hs still has a limited judicial power as con- servator of the peace, and often exercises various additional functions, such as that of tax-collector or overseer of the roads or other duties, as may be decided for him by the community which appoints him. In the old colonial days the office, borrowed from England, was of much importance. The office of high constable existed also in Philadelphia and New York, in the latter town until 1830, and in some towns the title has been retained for the chief of the police force.

See Du Cange, Glossarium (ed. Niort, 1883), s. " Comes Stabuli "; R. Gneist, Hist, of the Ting. Constitution (trs. London, 1891) ; W. L. Melville Lee, Hist, of Police in England (London, 1001); Encycl. of the Laws of England, s. " Constable " (London, 1907) ; W. Stubbs, Constitutional Hist, of England (Oxford, 1 875-1 878); A. Luchaire, Manuel des institutions frangaises (Paris, 1892). (\V. A. P.)

CONSTANCE (Ger. Konstanz or Costnitz), a town in the grand- duchy of Baden. It is built, at a height of 1303 ft. above the sea, on the S. or left bank of the Rhine, just as it issues from the Lake of Constance to form the Untersee. The town com- municates by steamer with all the places situated on the shores of the Lake of Constance, while by rail it is 30 or 31 m. by one or other bank of the Rhine from Schaffhausen (on the W.) and 225 m. along the S.W. shore of the lake from Rorschach (S.E.). In 1905 it numbered 24,818 inhabitants, mostly German- speaking and Romanists. A fine bridge leads north over the Rhine to one suburb, Petershausen, while to the south the town gradually merges into the Swiss suburb of Kreuzlingen. It is a picturesque little town, with several noteworthy medieval buildings. The former cathedral church was mainly built 1069-1089, but was later gothicized; near the west end of the nave a plate in the floor marks the spot where Huss stood when condemned to death, while in the midst of the choir is the brass which covered the grave of Robert Hallam, bishop of Salisbury,

who died herein 1417, during the council. The old Dominican

convent, on an island east of the town, is now turned into a hotel, but the buildings (especially the cloisters) are well pre- served. The 14th century Kaufkaus (warehouse for goods) was the scene of the conclave that elected Martin V., but the council really sat in the cathedral church. The town - hall dates from 1592, and has many points of interest. In the market-place, side by side, are two houses wherein two important historical events are said to have taken place — in the " Gasthaus zum Barbarossa " Frederick Barbarossa signed the peace of Constance (1183), while in the house named "zum Hohen Hafen " the emperor Sigismund invested Frederick of Hohenzollern with the mark of Brandenburg (1417). On the outskirts of the town, to the west, in the Briihl suburb, a stone marks the spot where Hus and Jerome of Prague were burnt to death. The Rosgarten museum contains various interesting collections. Constance is the centre of a brisk transit trade, while it has various factories and other industrial establishments.

Constance owes its fame, not to the Roman station that existed here, but to the fact that it was a bishop's see from the 6th century (when it was transferred hither from Vindonissa, near Brugg, in the Aargau) till its suppression in 1821, after having been secularized in 1803 and having lost, in 1814-1815, its Swiss portions. The bishop was a prince of the Holy Roman Empire, while his diocese was one of the largest in Germany, including (shortly before the Reformation) most of Baden and Wurttemberg, and 12 out of the 22 Swiss cantons (all the region on the right bank of the Aar, save the portions included in the diocese of Coire) — in it were comprised 350 monasteries, 1760 benefices and 17,000 priests. It was owing to this im- portant position that the see city of the diocese was selected as the scene of the great reforming council, 1414-1418 (see below), which deposed all three rival popes, elected a new one, Martin V., and condemned to death by fire John Huss (6th of July 1415) and Jerome of Prague (23rd of May 1416). In 1192 (some writers say in 1255) the city became an imperial free city, but the bishop and his chapter practically ruled it till the time of the Reforma- tion. Constance is the natural capital of the Thurgau, so that when in 1460 the Swiss wrested that region from the Austrians, the town and the Swiss Confederation should have been naturally drawn together. But Constance refused to give up to the Swiss the right of exercising criminal jurisdiction in the Thurgau, which it had obtained from the emperor in 141 7, while the Austrians, having bought Bregenz (in two parts, 1451 and 1523), were very desirous of securing the

well-placed city for themselves. In 1530 Constance (whose bishop had been forced to flee in 1527 to Meersburg, on the other side of the lake, and from that time the episcopal residence) joined, with Strassburg, Memmingen and Lindau, the Schmalkalden League. But after the great defeat of the Protestants in 1547, in the battle of Miihlberg, the city found itself quite isolated in southern Germany. The Austrians had long tried to obtain influence in the town, especi- ally when its support of the Protestant cause attracted the sympathy of the Swiss. Hence Charles V. lost no time, and in 1 548 forced it, after a bloody, though unsuccessful, fight on the bridge over the Rhine, not merely to surrender to the imperial authority and to receive the bishop again, but also to consent to annexation to the Austrian family dominions. Protestantism was then vigorously stamped out. In 1633 Constance resisted successfully an attempt of the Swedes to take it, and, in 1805, by the treaty of Pressburg, was handed over by Austria to Baden.

See S. J. Capper, The Shores and Cities of the Bodensee (London, 1881); G. Gsell-Fels, Der Bodensee (Munich, 1893); Bruckmann's illustrierte Reisefiihrer; E. Issel, Die Reformation in Konstanz (Freiburg i/B., 1898) ; F. X. Kraus, Die Kunstdenkmaler des Kreises Konstanz (Freiburg i/B., 1887) ; J. Laible, Geschichte der Stadt Konstanz (Konstanz, 1896) ; A. Maurer, Der Ubergang der Stadt Konstanz an das Haus Osterreich (Frauenfeld, 1904). (W. A. B. C.)

CONSTANCE, COUNCIL OF. This council, convoked at the instance of the emperor Sigismund by Pope John XXIII. — one of the three popes between whom Christendom was at the time divided — with the object of putting an end to the Great Schism of the West and reforming the church, was opened on

the 5th of November 1414 and did not close until the 22nd of April 1418. In spite of his reluctance to go to Constance, John XXIII. , who succeeded Alexander V. (the pope elected by the council of Pisa), hoped that the new council, while confirm- ing the work of the council of Pisa, would proclaim him sole legitimate pope and definitely condemn his two rivals, Gregory XII. and Benedict XIII. But he was soon forced to renounce this hope. So urgent was the need of restoring union at any cost that even prelates who had taken an active part in the work of the council of Pisa, such as Pierre d'Ailly, cardinal bishop of Cambrai, were forced to admit, in view of the fact that the decisions of that council had been and were still contested, that the only possible course was to reconsider the question of the union de novo, entirely disregarding all previous deliberations on the subject, and treating the claims of John and his two competitors with the strictest impartiality. Feebly supported by the Italians, by the majority of the cardinals, and by the representatives of the king of France, John soon found himself in danger of being driven to abdicate. With the connivance of

the duke of Austria he fled, first to Schaffhausen, then to Lauf en- burg, Freiburg, and finally to Breisach, in the hope of escaping in Burgundian territory the pressure exerted upon him by the emperor and the fathers of the council. His flight, however, only precipitated events. Sigismund declared war on the duke of Austria, and the fathers, determined to have their will carried out, drew up in their 4th and 5th sessions (30th of March and 6th of April 1415) a set of decrees with the intention of justifying their attitude and putting the fugitive pope at their mercy. Interpreted in the most general sense, these decrees, which enacted that the council of Constance derived its power immedi- ately from Jesus Christ, and that every one, even the pope, was bound to obey it and every legitimately assembled general council in all that concerned faith, reform, union, &c, were tantamount to the overturning of the constitution of the church by establishing the superiority of the council over the pope. Their terms, however,could not fail to give rise to some ambiguity, and their validity was especially contested on the ground that the council was not ecumenical, since it represented at that date the obedience of only one of three rival popes. Neverthe- less, John, who had been abandoned by the duke of Austria and imprisoned in the castle of Radolfzell, near Constance, was arraigned, suspended and deposed (May 29th), and himself ratified the sentence of the council.

Pope Gregory XII. was next required to renounce his rights, and this he did, with as much independence as dignity, through a legate, who previously convoked the council in the name of his master, and thus in some sort gave it the necessary confirmed authority. This was the regular extinction of the line of pontiffs who, if the validity of the election of Urban VI. on the 8th of April 1378 be admitted, had held the legitimate papacy for thirty- seven years.

All that remained was to obtain the abdication of Benedict XIIL, the successor of the Avignon pope Clement VII., but the combined efforts of the council and the emperor were power- less to overcome the obstinacy of the Aragonese pope. It was in vain that Sigismund journeyed to Perpignan, and that the kings of Aragon, Castile and Navarre ceased to obey the aged pontiff. Abandoned by almost all his adherents Benedict found refuge in the castle of Peniscola on an impregnable rock overlook- ing the Mediterranean, and remained intractable. At the council proceedings were instituted against him, which ended at last on the 26th of July 141 7 in his deposition. In this sentence it is to be noted that the council of Constance was careful not to base itself upon the former decision of the council of Pisa. The action of the council of Constance in renewing the condemnation of the doctrines of Wycliffe pronounced at Rome in 1413, and in condemning and executing John Huss and Jerome of Prague, is dealt with elsewhere (see Wycliffe; Huss; Jerome of Prague). Nor is it possible to mention here all the intrigues and quarrels that arose during three and a

half years among the crowd of prelates, monks, doctors, simple clerks, princes and ambassadors composing this tumultuous assembly— perhaps

the greatest congress of; people the world has ever seen. From the outset, voting by count of heads had been superseded by voting according to nations, i.e. all questions were deliberated and settled in four distinct assemblies — the Italian, the French, the German and the English, 1 — the decisions of the nations being merely ratified afterwards pro forma by the council in general congregation, and also, if occasion arose, in public session. These four groups, however, were of unequal importance, and thanks to this arrangement the English, although weakest in point of numbers, were able to exercise the same influence in the council as if they had formed a fourth of the voters — the same influence, for instance, as the Italians, who had an imposing numerical force. This anomaly aroused lively protests, especi- ally in the French group, after the battle of Agincourt. had rekindled national animosity on both sides. The arrival of the Spaniards at Constance necessitating the formation of a fifth nation, Pierre d'Ailly availed himself of the opportunity to ask either that the English nation might be merged in the German, or that each great nation might be allowed to divide itself into little groups each equivalent to the English nation. It is not difficult to imagine the storms aroused by this indiscreet proposal; and had not the majority of the Frenchmen assembled at Con- stance had the sagacity to refuse to uphold the cardinal of Cambrai on this point, the upshot would have been a premature dissolution of the council.

Another source of trouble was the attitude of the emperor Sigismund, who, not content with protecting by his presence and as far as possible directing the deliberations of the " Uni- versal Church," followed on more than one occasion a policy of violence and threats, a policy all the more irritating since, weary of his previously assumed role of peacemaker between the Christian powers, he had abruptly allied himself with the king of England, and adopted an extremely hostile attitude towards the king of France.

The reform which the council had set itself to effect was a subject the fathers could not broach without stirring up dis- sension: some stood out obstinately for preserving the status quo, while others contemplated nothing less than the transformation of the monarchical administration of the church into a parlia- mentary democracy, the subordination of the sovereign pontiff, and the annihilation of the Sacred College. In view of these difficulties, the opinion which tended to assure the success of one at

least of the great tasks before the council, viz. the re-establish- ment of unity by the election of a single pope, finally prevailed in despite of Sigismund. The general reform on which the council had failed to come to an understanding had to be adjourned, and the council contented itself with promulgating, on the 9th of October 141 7, the only reforming decrees on which an agreement could be reached. The principle of the periodicity of the councils was admitted; the first was to assemble after the lapse of five years, the second within the next seven years, and subsequent councils were to meet decennially. In the event of a fresh schism, the council, which bound itself to assemble immediately, even without formal convocation, was to remain sole judge of the conflict. After his election the pope had to make a pro- fession of the Catholic faith, and give guarantees against arbitrary translations. Finally, the council pronounced in favour of the pope's renunciation Of the right to the movable property of deceased prelates (spolium) as well as of the right of procurations. The execution of the surplus of the general reform of the church in its head and members was left in the hands of the future pope, who had to proceed conjointly with the council, or rather with a commission appointed by the nations — in other words, once the new pope was elected, the fathers, conscious of their impotence, were disinclined to postpone their dispersion until the laborious achievement of the reform. They were weary of the business, and wished to be done with it.

In order to rebuild the see of St Peter on a basis now cleared of obstacles, an attempt was made to surround the election of

1 The English, who had hitherto been considered to form part of the German " nation," were recognized as a separate nation at this council for the first time.

the future pope with all the necessary guarantees. The authority of the cardinals, who were the only persons judicially invested with the right of electing the pope, emerged from the crisis through which the church had just passed in far too feeble and contested a condition to carry by its own weight the general assent. It was therefore decided that with the cardinals each nation should associate six delegates, and that the successful candidate should be required to poll two- thirds of the suffrages, not only in the Sacred College, but also in each of these five groups. The advantage of this arrangement was that the choice of the future pope would depend, not only on the vote of the cardinals, thus safeguarding tradition, but at the same time on the unanimous consent of the various nations, by which the adhesion of the whole Catholic world to the election would be guaranteed. There was, indeed, a danger lest the rivalries in the assembly might render it exceedingly difficult, not to say im- possible, to obtain such unanimity. But at the end of three days the conclave resulted in the election of

Cardinal Otto Colonna, who took the name of Martin V. (nth of November 1417), and the Great Schism of the West was at an end.

To conform to the decrees of the council, the new pope drew up a project of reform with the concurrence of the fathers still re- maining at Constance, and subsequently made various reforming treaties or concordats with the nations of the council, which finally broke up after the 45th session, held on the 22nd of April 1418. To all seeming the pope had admitted the canonicity of several of the decrees of Constance — forinstance, he had submitted to the necessity of the periodical convocation of other councils; but from his reticence on some points, as well as from his general attitude and some of his constitutions, it appeared that the whole of the decrees of Constance did not receive his unqualified approval, and without any definite pronouncement he made some reservations in the case of decrees which were detrimental to the rights and pre-eminence of the Holy See.

See H, von der Hardt, Magnum oecumenicum Constantiense concilium (Frankfort, 1700) ; Ulrich von Richental, Das Concilium- buch zu Conslanz, ed. by Buck in the Bibliothek des liter. Vereins (Stuttgart, 1882); H. Finke, Forschungen und Quellen zur Gesch. des Konstanzer Konzils (Paderborn, 1889), and Acta concilii Constan- tiensis, vol. i. (Munster, 1896); N. Valois, La France et le grand schisme d'Occident, vol. iv. (Paris, 1902). (N. V.)

CONSTANCE, LAKE OF (called by the Romans Locus Brigan- tinus or lake of Bregenz, and now usually named in German Bodensee, as well as the " Swabian Sea "), the most extensive sheet of water in the Alpine region, after the Lake of Geneva. It is situated on the north-east frontier of Switzerland, and is formed by the Rhine. Its shape is oblong, while at its north- western extremity it divides into two arms, the Untersee (from Con- stance to Stein-am-Rhein) and the Uberlingersee (funning up to Ludwigshafen). The length of the lake from Bregenz to Stein- am-Rhein is 465 m., while that from Bregenz to Ludwigshafen is but 40 m. Its surface is 1309 ft. above sea-level, the greatest width is io| m., and the greatest depth 827 ft. The area of the lake is 204! sq. m., of which 8if sq. m. have belonged to Switzer- land since 1803, the canton of Thurgau holding 59! sq. m. and that of St Gall 2i§ sq. m. Austria has held Bregenz, at the south- eastern angle of the lake, since 1451, while the north end of the lake belongs to Baden (Constance held since 1805), and bits of its eastern shore form part of Wiirttemberg (Friedrichs- hafen, formerly called Buchhorn, since 1810) and of Bavaria (Lindau since 1 805) . The first steamer was placed on its waters in 1824. Numerous remains of lake-dwellings have been found on the shores of this lake (see E. von Troltsch, Die Pfaklbauten des Bodenseegebietes, Stuttgart, 1902). (W. A. B. C.)

CONSTANS, JEAN ANTOINE ERNEST (1833-), French statesman, was born at Beziers. He began his career as professor of law, and in 1876 was elected deputy for Toulouse. He sat in the Left Centre and was one of the 363 of the 16th of May 1877. Re-elected in October 1877, he joined Freycinet as minister of the interior in May 1880, holding this portfolio until the 14th of November 1881. On the 22nd of February 1889 he again assumed the same office in the Tirard cabinet. He became prominent as a stalwart opponent of the Boulangist party,

constituting the senate a high court of justice, and taking police measures against the Ligue des patriotes. He resigned on the 1 st of March 1890, but his resignation involved the fall of the cabinet, and he resumed his portfolio in the Freycinet cabinet on the 17th of March. On the 29th of December 1889 he had been elected senator by the department of the Haute-Garonne. He was violently attacked by the press and the Boulangist deputies, but did not resign until the whole cabinet withdrew, on the 26th of February 1892. In December 1898 he was appointed ambassador at Constantinople.

CONSTANT, BENJAMIN (1845-1902), French painter, was born in Paris, and studied under Cabanel. His first Salon picture, " Hamlet et le Roi," was hung in 1869, and he became at once one of the recognized modern masters in France. In addition to a number of subject-pictures, such as " Trop Tard " (1870), " Samson et Delilah " (1871), and others taken from Moroccan studies, he was an eminent painter of portraits of some of the most prominent men and women of the day, one of his last being that of Queen Victoria (1900). He was a member of the Institut de France and received several French and foreign decorations.

CONSTANT DE REBECQUE, HENRI BENJAMIN (1767-1830), French writer and politician, was born at Lausanne on the 25th of October 1767. His mother, Henriette de Chandieu, died at his birth; and his father, Juste Arnold de Constant, com- manded a regiment in the Dutch service. After a good private education at Brussels, he was sent to Oxford, and thence to Erlangen ; a subsequent residence at Edinburgh and the relations there formed with prominent Whigs profoundly influenced his political views. He returned to Switzerland in 1786, and in the next year visited Paris, where he met Madame de Charriere, a Dutchwoman who had married into a Swiss family with which his own was connected. Madame de Charriere, although twenty- seven years older than Constant, became his mistress, and the liaison, an affair possibly more of the intellect than of the heart, lasted until 1796, when Constant became intimate with Madame de Stael. After

an escapade in England in 1787, he spent two months with her at Colombier before becoming, in deference to his father's wishes, chamberlain at the court of Charles William, duke of Brunswick, where in 1789 he married one of the ladies- in-waiting, Wilhelmina, Baroness Chramm. The duke's share in the coalition against France made his service incompatible with Constant's political opinions, which were already definitely republican, and, on the dissolution of his marriage in 1794, he resigned his post. Meanwhile his father had been accused of malversation of the funds of his regiment; Benjamin helped him with his defence, with the result that he was finally ex- onerated and restored to the service with the rank of general.

Constant, who had met Madame de Stael at Lausanne in 1794, followed her in the next year to Paris, where he rapidly became a personage in the moderate republican circle which met in her salon; and by 1796 he had established with her intimate relations, which, in spite of many storms, endured for ten years. In 1796 he published two pamphlets in defence of the Directory and against the counter-revolution, " De la force du gouverne- ment actuel et de la necessity de se rattier " and " Des reactions politiques." He was one of the promoters of the constitutional club of Salm, formed to counterbalance the royalist club of Clichy, and he supported Barras in 1797 and 1799 in the coups d'etat of 18 Fructidor, and of 18 Brumaire. In December 1799, he was nominated a member of the Tribunate, where he showed from the outset an independence quite unacceptable to Napoleon, by whom he was removed in the " creaming " of that assembly in 1802. His incessant opposition was attributed partly to his association with Madame de Stael, whose salon was a centre for those disaffected from the Napoleonic regime, and in 1803 he followed her into exile. After M. de Stael's death in 1802, there was no longer any obstacle to their marriage, but Madame de Stael was apparently unwilling to change her name. Much of Constant's time was spent with her at Coppet; but he also made long sojourns at Weimar, where he mixed in the Goethe- Schiller circle, and accumulated material for the great work on religion which he had begun, so far back as 1787, at Colom-

bier. His relations with Madame de Stael became more and more difficult, and in 1808 he secretly married Charlotte von Hardenberg, whom he had known at Brunswick, and whose divorce from her second husband, General Dutertre, he had secured. Even his marriage, which did not prove a happy one, was insufficient to cause an entire breach with Corinne, who insisted on his return to Coppet for a short time. In 181 1, while residing with his wife's relations at Hardenberg, near Gottingen, he was brought into contact with German mysticism, which considerably modified his earlier sceptical views on religion.

The Napoleonic reverses of 1813 brought him back to politics, and in November he published at Hanover his De V esprit de conquite et de I'usurpation dans lews rapports avec la civilisation europeenne, directed against Napoleon. He also entered into relations with the crown prince of Sweden (Bernadotte), who conferred on him the order of the Polar Star. On his return to Paris, during its occupation by the allied sovereigns, he was well received by the emperor Alexander I. of Russia, and resumed his old place in the Liberal salon of Madame de Stael. In a series of pamphlets he advocated the principles of a Liberal monarchy and the freedom of the press. At this point began the second great attachment of his life, his unfortunate infatuation for Madame Recamier, under whose influence he committed the worst blunder of his political career. At the beginning of the Hundred Days he had violently asserted in the Journal des debats his resolution not to be a political turncoat, and had left Paris. Attracted by Madame Recamier, he soon returned, and after an interview with Napoleon on the 10th of April, he became a supporter of his government and drew up the Acte constitu- tionnel. The return of Louis XVIII. drove him into exile. In London in 181 5 he published Adolphe, one of the earliest examples of the psychological novel. It had been written in 1807, and is intrinsically autobiographical; that Adolphe represents Constant himself there is no dispute, but Ellenore probably owes something both to Madame de Charriere and Madame de Stael. In 1816 he was again in Paris, advocating Liberal constitutional principles. He founded in 181 8 with other Liberal journalists the Minerve franc.aise and in 1820 La Renommee. In 1819 he was returned to the Chamber of Deputies, and proved so formidable an opponent that the government made a vain attempt to exclude him from the Chamber on the ground of his Swiss birth. Perhaps the greatest service he rendered to his party was his consistent advocacy of the freedom of the press. At the outbreak of the revolution of 1830 he was absent from Paris, having undergone an operation, but he re- turned at the request of Lafayette to take his share in the elevation of Louis Philippe to the throne. On the 27 th of August he was made president of the council of state, but he died on the 8th of December of the same year. During his later years he ha'd been a cripple in consequence of a fall in the Chamber of Deputies, and he fought the last of his many duels sitting in a chair. After the death, in 1817, of Madame de Stael, whom he continued to visit daily until the end, he had ceased to go into society, giving himself up to his passion for play. To pay his gambling debts he accepted a gift of 200,000 francs from Louis Philippe, thus affording a ready handle to his enemies. The failure of his candidature for the Academy in 1830 is said to have been a shock to his enfeebled health.

Constant's political career was spoiled by his liaison with Madame de Stael, and at the Restoration was further disturbed by his unreturned

passion for Madame Recamier. His defects as a debater were not compensated entirely by the excellence of his set speeches; but his wide culture and powerful intellect were bound to leave their mark on affairs. His political in- consistencies were more apparent than real, for there was no break in his advocacy of Liberal principles. His best writing is to be found in his journalism and correspondence (only a small part of which has been published), rather than in his more pretentious political pamphlets.

In the most important of his writings, De la religion considiree dans sa source, ses formes, et ses developpements (5 vols., 1825- 1831), he traces the successive transformations of the religious

sentiment imperishable under its varying forms. Besides Adolphe, in its way as important as Chateaubriand's Rent, he left two other sketches of novels in MS., which are apparently lost. His political tracts were collected by himself as, Collection complete des ouwages publies sur . . . la France, formant une espece de cows de politique constitutionnelle (4 vols., 1818-1820), as were his Discours a la Chambre des Deputes (2 vols., 1827). _

Authorities.— See Constant's Cahier rouge, published first in 1907, containing his autobiography from 1767 to 1787; Journal intime (1804-1816), re-edited with the Lettres a sa famille by D. Melegari in 1895; the semi-autobiographical Adolphe; his letters to Madame de Charriere ; to Madame Recamier, edited by Madame Lenormant in 1882. His ordinary diary has disappeared, with his letters to his wife and to Madame de Stael. See further an article by Loeve-Veimars in the Revue des deux mondes (ist January 1833) ; H. Castille, B. Constant (1859) ; the Reminiscences of J. J. Coulmann (3 vols., 1862-1869); fid. Herriot, Madame dejiecamier et ses amis (1904) ; Sainte-Beuve in Derniers portraits litteraires (B. Constant and Madame de Charriere), Causeries du lundi (vol. xi.), Nouveaux lundis (vol. i.) ; fi. Faguet, Politiques et moralistes du XIX e siecle (jjra serie, 1891); P. Godet, Madame de Charriere et ses amis (Geneva, 1905); L. Michon, Le Gouvernement parlementaire sous la Restauralion (1905), containing an analysis of the more important of Constant's political writings; V. Glachant, Benjamin Constant sous I'cetl ud guet (1906), containing an account of his relations with the police, also his correspondence with Fauriel; G. Rudter, La Jeunesse de B. Constant, and Bibliographie critique (1909).

CONSTANTIA, a district of Cape Colony, in the Cape peninsula, noted for the excellent quality of its wines, the best produced in South Africa. The government wine farm, Groot Constantia, 10 m. S. of Cape Town, contains over 150,000 vines. This and the adjacent farm of High Constantia are the only farms on which the vines yielding the finest wines flourish. The district is also celebrated for the excellence of the fruit it yields. Groot Constantia House is a good example of the Dutch colonial dwelling-houses of the 17 th century. It was built (c. 1684) by the governor Simon van der Stell, and named in honour of his wife Constance. Van der Stell also laid out the vineyard, which soon attained a wide reputation. Old Cape Colony, by Mrs A. F. Trotter (London, 1903), contains a plan and sketches of Groot Constantia.

CONSTANTINE, the name of several Roman and Later Roman emperors.

Constantine I., known as " The Great " (288 ?~337), Roman emperor — Flavius Valerius Constantinus,'— was born on the 27th of February, probably in a. d. 288, 2 at Naissus (the modern Nish) in Upper Moesia (Servia). He was the illegitimate son of Con- stantius I. and Flavia Helena (described by St Ambrose as an innkeeper). His father, already a distinguished officer, soon afterwards became praefectus praetorio, and in 293 was raised to the rank of Caesar and placed in command of the western provinces. While still a boy, Constantine was sent — practically as a hostage — to the Eastern court. He accompanied Diocletian to the East in 302, was invested with the rank of tribunus primi ordinis and served under Galerius on the Danube. In 305 Diocletian and Maximianus abdicated, and Constantius and Galerius became Augusti, while Severus and Maximinus Daia attained the rank of Caesares. Constantius now demanded from Galerius the restoration of his son, which was unwillingly granted; indeed, we are told that Constantine only escaped from the court of Galerius by flight, and evaded pursuit by carrying off all the post-horses ! He traversed Europe with the greatest possible speed and found his father at Bononia (Boulogne), on the point of crossing to Britain to repel an invasion of Picts and Scots. After gaining a victory, Constantius died at Eboracum (York), and on the 25th of July 306, the army acclaimed his son as Augustus. Constantine, however, displayed that union of deter- mination and prudence which the occasion required. He accepted the nomination of the army with feigned reluctance and wrote a carefully-worded letter to Galerius, disclaiming responsi-

1 The praenomina Lucius, Marcus and Gaius are found in various inscriptions. In reality Constantine, like his father and successors, bore no praenomen.

2 His age at death is variously stated at 62 (Aur. Vict.), 63 (Epit. de

Caes), 64 (Euseb.), 65 (Zonaras and Socrates) and 66 (Eutrop.) years. Seeck has shown that these statements are false, and that Constantine was born in or about the year 288 a.d.

bility for the action of the troops, but requesting recognition as Caesar — a position to which he might naturally aspire on the elevation of Severus to the rank of Augustus. Galerius was not in a position to refuse the request, in view of the temper of the western army, and for a year Constantine bore the title of Caesar not only in his own provinces, but in those of the East as well. He fought with success against the Franks and Alamanni, and reorganized the defences of the Rhine, building a bridge at Colonia Agrippina (Cologne). The rising of Maxentius (q.v.) at Rome (Oct. 28), supported by his father Maximianus (q.v.), led to the defeat and capture of the western Augustus, Severus (q.v.) . Maximianus thereupon recognized Constantine as Augustus (a.d. 307); their alliance was confirmed by the marriage of Constantine with Fausta, the daughter of Maximianus, and the father and son-in-law held the consulship, which, however, was not recognized in the East. Galerius now invaded Italy, but was forced by a mutiny of his troops to retire from the gates of Rome. Maximianus urged Constantine to fall upon the flank of his retreating army, but he once more showed his determina- tion to tread the strict path of legitimacy. Maximianus, after the failure of his attempt to depose his son Maxentius, was forced to seek refuge with Constantine, and became a quantite nggligeable. In 308 Diocletian and Galerius held a conference at Carnuntum and determined to annul the actions of the Western rulers. Maximianus was set aside, Licinius invested with the purple as Augustus of the West (Nov. 11), while the title filius Augus- torum was conferred upon Constantine and Maximinus Daia, and the former was destined for a first consulship (that of 307 being passed over) for 309. Constantine, with his customary union of prudence and decision, tacitly ignored this arrangement; he continued to bear the title of Augustus, and in 309, when he himself was proclaimed consul (with Licinius) in the East, no consuls were recognized in his dominions. In 310, while Con- stantine was engaged in repelling an inroad of the Franks, Maximianus endeavoured to resume the purple at Arelate (Aries) . Constantine returned in haste from the Rhine, and pursued Maximianus to Massilia, where he was captured and put to death. Since Constantine's legal title to the Empire of the West rested on his recognition by Maximianus, he had now to seek for a new ground of legitimacy, and found it in the assertion of his descent from Claudius Gothicus (q.v.), who was represented as the father of Constantius Chlorus. 4*

Constantine's patience was soon rewarded. In 311 Galerius died, and Maximinus Daia (who had assumed the style of Augustus in 310) at once marched to the shores of the Bosporus and at the same time entered into

negotiations with Maxentius. This threw Licinius into the arms of Constantine, who entered into alliance with him and betrothed his half-sister Constantia to him. In the spring of 312 Constantine crossed the Alps, before Maxentius, who had been obliged to suppress the rebellion of Domitius Alexander in Africa, had completed his preparations. The force he commanded was of uncertain strength; according to his Panegyrist (who may have underrated it) it consisted of about 25,000, according to Zonaras of nearly 100,000 men. He stormed Susa, defeated Maxentius's generals at Turin and Verona, and marched straight for Rome. This bold and almost desperate move, which contrasted strongly with Constantine's usual caution, and seemed to court the failure which had befallen Severus and Galerius, was, it would seem, the result of an event which, as told in Eusebius's Life of Constantine, takes the form of a conspicuous miracle — the Vision of the Flaming Cross which appeared in the sky at noonday with the legend 'Ep roirrq vino. (" By this conquer "), and led to Constantine's conversion to Christianity. Eusebius professes to have heard the story from the lips of Constantine; but he wrote after the emperor's

3 The story told in the De mortibus persecutorum (cap. 30) of a later conspiracy of Maximianus, which failed owing to the fidelity of Fausta, is most probably a fiction.

- *Such is the primary version of the story, implied in the Seventh Panegyric of Eunenius, delivered at Trier in a.d. 310. It would seem that when Christian sentiment was offended by the illegitimate origin ascribed to Constantius, the story was modified and Claudius became his uncle.*

*death, and it was evidently unicnown to him in the shape given above when he wrote the Ecclesiastical History. The author of the De morlibus persecutorum, whether Lactantius or another, was a well-informed contemporary, and he tells us that the sign was seen by Constantine in a dream; and even Eusebius supplements the vision by day with a dream in the following night. In any case, Constantine, who may have been impressed by the misfortunes which had befallen the more strenuous opponents of Christianity, adopted the monogram J^ as his device 1 and staked his all on the issue. **

Maxentius, trusting in superiority of numbers, — he is said to have had 170,000 infantry and 18,000 cavalry at his disposal, but this total probably includes the forces defeated by Con- stantine in Northern Italy —

marched out of Rome and prepared to dispute the passage of the Tiber at the Pons Mulvius (Ponte Molle), beside which a bridge of boats was constructed. Our authorities give no satisfactory account of the battle which followed, and Aurelius Victor places it at Saxa Rubra, a state- ment accepted by Moltke and other modern authorities. It is more probable, as Seeck has shown, that while the head of Maxentius's column may have reached Saxa Rubra (which is some miles to the north of the Mulvian Bridge on the Via Flaminia), Constantine, by a rapid turning movement, reached the Via Cassia and attacked Maxentius's rearguard at the bridge, 2 forcing him to fight in the narrow space between the hills and the Tiber. The army which Constantine had been training for six years at once proved its superiority. The Gallic cavalry swept the left wing of the enemy into the Tiber, swollen with autumn rains, and with it perished Maxentius, owing, as was said, to the collapse of the bridge of boats (Oct. 28). The remainder of his troops surrendered at discretion and were incorporated by Constantine in the ranks of his army, with the exception of the praetorian guard, which was finally disbanded.

Thus Constantine became undisputed master of Rome and the West, and Christianity, although not as yet adopted as the official religion, secured by the edict of Milan toleration through- out the Empire. This edict was the result of a conference between Constantine and Licinius in 313 at Milan, where the marriage of the latter with Cons tan tia took place. Constantine was forced to recognize Licinius's natural son as his heir. In the course of the same year Licinius defeated Maximinus Daia, who perished at Tarsus by his own hand. In 314 war broke out between the two Augusti, owing, as we are told, to the treachery of Bassianus, the husband of Constantine's sister Anastasia, for whom he had claimed the rank of Caesar. After two hard- won victories Constantine made peace, Illyricum and Greece being added to his dominions. Constantine and Licinius held the consulship in 315, in which year the former celebrated his decennalia, and on the 1st of March 317 Constantine's two sons and Licinius's bastard were proclaimed Caesars.

Peace was preserved for nearly nine years, during which the wise government of Constantine strengthened his position, while Licinius (who resumed the persecution of the Christians in 321) steadily lost ground through his indolence and cruelty. Great armaments, both military and naval, were called into being by both emperors, and in the spring of 324 s Licinius (whose forces are said to have been superior in numbers) declared war. He was twice defeated, first at Adrianople (July 1) and afterwards at Chrysopolis (Sept. 18), when endeavouring to raise the siege of Byzantium, and was finally captured at Nico- media. His life was spared on the intercession of Constantia and he was interned at Thessalonica, where he was executed in the following year on the charge of treasonable

correspondence with the barbarians.

1 The name labarum, given to the military standards bearing the monogram, is of unexplained origin. Lactantius says that the symbol was used on the shields of Constantine's troops.

2 That the battle was called after the Milvian bridge is indicated by a relief and inscription from Cherchel (C.I.L. viii. 9356).

8 It has been disputed whether the final struggle between Con- stantine and Licinius took place in a.d. 323 or 324; but the formulae employed in the dating of Egyptian papyri seem to point to the latter year (see Comptes-rendus de Vacademie des inscriptions, 1906, p. 231 ff-)-

Constantine now reigned as sole emperor in East and West. He presided at the council of Nicaea (see under Nicaea and Council) in 325; in the same year he celebrated his Vicennalia in the East, and in 326 repeated the celebration in Rome. Whilst he was in Rome his eldest son, Crispus, was banished to Pola and there put to death on a charge brought against him by Fausta. Shortly afterwards, as it would seem, Constantine became convinced of his innocence, and ordered Fausta to be executed. The precise nature of the circumstances remains a mystery.

In 326 Constantine determined to remove the seat of empire from Rome to the East, and before the close of the year the foundation-stone of Constantinople was laid. At least two other sites — Sardica and Troy — were considered before the emperor's choice fell on Byzantium. It is very probable that this step was connected with Constantine's decision to majie Christianity the official religion of the empire. Rome was naturally the stronghold of paganism, to which the great majority of the senate clung with fervent devotion. Constantine did not wish to do open violence to this sentiment, and therefore resolved to found a new capital for the new empire of his creation. He announced that the site had been revealed to him in a dream; the ceremony of inauguration was performed by Christian ecclesiastics on the nth of May 330, when the city was dedicated to the Blessed Virgin.

In 332 Constantine was called in to aid the Sarmatians against the Goths over whom his son gained a great victory on the 20th of April. Two years later there was again fighting on the Danube, when 300,000 Sarmatians were settled in Roman territory. In 335 a rebellion in Cyprus gave Constantine an excuse for executing the younger Licinius. In the same year he carried out a partition of the empire between his three sons and his two nephews, Delmatius and Hannibalianus. The last named received the vassal-kingdom of Pontus with the title of rex regum, while the others ruled

as Caesars in their several provinces. Constantine, however, retained the supreme govern- ment, and in 335 celebrated his tricennalia. Finally, in 337, Shapur (Sapor) II. of Persia asserted his claim to the provinces conquered by Diocletian, and war broke out. Constantine was preparing to lead his army in person, when he was taken ill, and after a vain trial of the baths at Helenopolis, died at Ancy- rona, a suburb of Nicomedia, on the 22nd of May, having received Christian baptism shortly before at the hands of Eusebius. He was buried in the church of the Apostles at Constantinople.

It has been said by Stanley that Constantine was entitled to be called " Great " in virtue rather of what he did than of what he was ; and it is true that neither his intellectual nor his moral qualities were such as to earn the title. His claim to greatness rests mainly on the fact that he divined the future which lay before Christianity, and determined to enlist it in the service of his empire, and also on his achievement in completing the work begun by Aurelian and Diocletian, by which the quasi- constitutional monarchy or " Principate " of Augustus was transformed into the naked absolutism sometimes called the " Dominate." There is no reason to doubt the sincerity of Constantine's conversion to Christianity, although we may not attribute to him the fervent piety which Eusebius ascribes to him, nor accept as genuine the discourses which pass. under his name. The moral precepts of the new religion were not without influence upon his life, and he caused his sons to receive a Christian education. Motives of political expediency, however, caused him to delay the full recognition of Christianity as the religion of the state until he became sole ruler of the empire, although he not merely secured toleration for it immediately after his victory over Maxentius, but intervened in the Donatist controversy as early as 313, and presided at the council of Aries in the following year. By a series of enactments immunities and privileges of various kinds were conferred on the Catholic Church and clergy — heretics being specifically excluded — • and the emperor's attitude towards paganism gradually revealed itself as one of contemptuous toleration. From being the established religion of the state it sank into a mere superstitio.

At the same time its rites were allowed to subsist except where they were held to be subversive of morality, and even in the closing years of Constantine's reign we find legislation in favour of the municipal flamines and collegia. In 333, or later, a cult of the Gens Flavia, as the Imperial family was called, was established at Hispellum (Spello); the offering of sacrifices in the new temple was, however, strictly prohibited. Nor was it until after Constantine's final triumph over Licinius that pagan symbols

disappeared from the coinage and the Christian mono- gram (which had already been used as a mint mark) became a prominent device. From this time forward the Arian con- troversy demanded the emperor's constant attention, and by his action in presiding at the council of Nicaea and afterwards pronouncing sentence of banishment against Athanasius he not only identified himself more openly than ever with Christianity, but showed a determination to assert his supremacy in eccle- siastical affairs, holding no doubt that, as the office of ponlifex maximus gave him the supreme control of religious matters throughout the empire, the regulation of Christianity fell within his province. In this matter his discernment failed him. It had been comparatively easy to apply coercion to the Donatists, whose resistance to the temporal power was not wholly due to spiritual considerations, 1 but was largely the result of less pure motives; but the Arian controversy raised fundamental issues, which to the mind of Constantine appeared capable of com- promise, but in reality, as Athanasius rightly discerned, disclosed vital differences of doctrine. The result foreshadowed the process by which the church which Constantine hoped to mould into an instrument of absolutism became its most determined opponent. It is unnecessary to give more than a passing mention to the legend according to which Constantine, smitten with leprosy after the execution of Crispus and Fausta, received absolution and baptism from Silvester I. and by his Donation to the bishop of Rome laid the foundation of the temporal power of the papacy (see Donation of Constantine).

The political system of Constantine was the final result of a process which, though it had lasted as long as the empire, had assumed a marked form under Aurelian. It was Aurelian who surrounded the imperial person with oriental pomp, wearing the diadem and the jewelled robe, and assuming the style of dominus and even deus, who assimilated Italy to the condition of the provinces and gave official furtherance to the economic process by which a regime of status replaced a regime of contract. Diocletian endeavoured to secure the new despotism against military usurpation by an elaborate system of co-regency with two lines of succession, bearing the names of Jovii and Herculii, but maintained by adoption and not by hereditary succession. This artificial system was destroyed by Constantine, who established dynastic absolutism in favour of his own family, the gens Flavia, evidence of whose cult is found both in Italy and in Africa. To form a court he created a new official aristo- cracy to replace the senatorial order, which the military emperors of the 3rd century a.d. had reduced to practical insignificance. Upon this aristocracy he showered titles and distinctions, such as the revised patriciate, which carried with them the coveted immunity from fiscal burdens. 2 As the senate was now a quantiU negligeable, Constantine could afford to readmit its members freely to the career of provincial administration, which had been almost closed to them

since the reign of Gallienus, and to accord to it certain empty privileges such as the free election of quaestors and praetors, while on the other hand the right of the senator to be tried by his peers was taken away and he was placed under the jurisdiction of the provincial governor.

In the administration of the empire Constantine completed the work of Diocletian by effecting the separation of civil from military functions. Under him the praefecti praetorio cease entirely to perform military duties and become the heads of the

1 The watchword Quid est imperatori cum ecclesia ? belongs to a later period.

! These titles were so freely bestowed that in a.d. 326 Constantine found it necessary in the interest of the treasury to enact that the fiscal immunity which they carried should no longer be hereditary.

civil administration, more especially in the matter of jurisdiction: in 331 their decisions were made final and no appeal to the emperor was permitted. The civil governors of the provinces (vicarii and praesides) had no control of the military forces, which were commanded by duces; and not content with the security against usurpation which was afforded by this division of power, Constantine employed the comites who formed a large element in the official aristocracy to supervise and report upon their conduct of affairs (see Count), as well as an army of so- called agentes. in rebus who, under colour of inspecting the Im- perial posting service, carried on a wholesale system of espionage. In the organization of the army the creation of a field force (comitatenses) beside the permanent frontier-garrisons (limitanei) was probably the work of Diocletian; to Constantine is due the creation of the great commands under the magistri peditum and equitum. He also introduced the practice, afterwards increasingly common, of placing barbarians, especially Germans, in posts of high responsibility.

The organization of society in strictly hereditary corporations or professions was no doubt partly completed before the accession of Constantine; but his legislation contributed to rivet the fetters which bound each individual to the caste from which he sprang. Such originales are mentioned in Constantine's earliest laws, and in 33 2 the hereditary status of the agricultural colonus was recognized andenf orced. Above all, the municipal decuriones on whom the responsibility for raising taxation rested saw every avenue of escape closed against them. In 326 they were for-bidden to acquire immunity by joining the ranks of the Christian clergy. It was the interest of the government by such means to secure the regular payment of the heavy fiscal burdens both in money and in kind which had been laid on the subjects of the empire by Diocletian and were certainly not

diminished by Constantine. One of our ancient authorities speaks of him as having been for ten years an excellent ruler, for twelve a robber and for ten a spendthrift, and he was constantly forced to have recourse to fresh exactions in order to enrich his favourites and to carry out such extravagant projects as the building of a new capital. To him are due the taxes known as collatio glebalis, levied on the estates of senators, and collatio lustralis, levied on the profits of trade.

In general legislation the reign of Constantine was a time of feverish activity. Nearly three hundred of his enactments are preserved to us in the Codes, especially that of Theodosius. They display a genuine desire for reform and distinct traces of Christian influence, e.g. in their humane provisions as to the treatment of prisoners and slaves and the penalties imposed on offences against morality. Nevertheless they are in many instances singularly crude in conception as well as turgid in style, and were manifestly drafted by official rhetoricians rather than by trained legists. Like Diocletian, Constantine believed that the time had come for society to be remodelled by the fiat of despotic authority, and it is significant that from henceforth we meet with the undisguised assertion that the will of the emperor, in whatever form expressed, is the sole fountain of law. Constantine, in fact, embodies the spirit of absolute authority which, both in church and state, was to prevail for many centuries.

Authorities. — The principal ancient sources for the life of Con- stantine are the biography of Eusebius, which is, however, partial and untrustworthy owing to the ecclesiastical bias of its author (whose Ecclesiastical History is also of importance), the tract de mortibus persecutorum ascribed to Lactantius, the orations of the Panegyrici, Nos. vi.-x., the second book of the history of Zosimus (which is written from the pagan standpoint), the so-called Excerpta Valesiana and the writings of Aurelius Victor and Eutropius. The laws of Constantine contained in the Codex Theodosianus have been treated chronologically by Otto K. Seeck, Zeitschrift der Savigny- Stiftung (Romanische Abteilung), x. p. i. ff. and 177 ff. Amongst modern books may be named J. C. F. Manso, Das Leben Constantins des Grossen (1817), Jacob Burckhardt, Die Zeit Constantins des Grossen (2nd ed., 1880), H. Schiller, Geschichte der romischen Kaiser-zeit, ii. 2, 164 ff. (1887), and above all Seeck, Geschichte des Unter-gangs der antiken Welt, vol. i.(2nd ed., 1897). For a short account in English C. H. Firth's Constantine the Great (1905) may be consulted. (H. S. J.)

CONST ANTINE II.— CONST ANTINE- VII.

Constantine II. (317-340), son of Constantine the Great, Roman emperor (337-340), was born at Arelate (Aries) in February 317. On the 1st of March in the same year he was created Caesar, and was consul in 320, 321, 324 and 329. The fifth anniversary of his Caesarship was celebrated by the pane- gyrist Nazarius (g.v.). He gained the credit of the victories of his generals over the Alamanni (331, for which he received the title Alamannicus), and over the Goths (332). From 335 he administered the Gallic portion of the empire as Caesar till his father's death (22nd of May 337). On the 9th of September in the same year he assumed the title of Augustus, together with his brothers Constans and Constantius, and in 338 a meeting was held at Viminiacum, on the borders of Pannonia, to arrange the distribution of the empire. In accordance with the arrange- ments made by his father, Constantine received Britain, Spain and the Gauls; Pontus, Asia, the East, and Egypt fell to Constantius; Africa, Pannonia and the Italies to the youngest brother Constans, whose dominions were further increased by the addition of Macedonia, Dalmatia and Thrace, originally intended for Delmatius, a nephew of Constantine I. and one of the victims of the general massacre of that emperor's kinsmen. By virtue of his seniority, Constantine claimed a kind of control over his brothers. Constans, an ambitious youth encouraged by intriguing advisers, declined to submit; and Constantine, jealous of his prerogatives and dissatisfied with his share in the empire, demanded from Constans the cession of Africa and equal authority in Italy. After protracted but unavailing negotiations, Constantine in 340 invaded Italy. He had advanced as far as Aquileia, when he fell into an ambuscade and lost his life. His body was thrown into the little river Alsa, but subsequently recovered and buried with royal honours.

See Zosimus ii. xii. ; Aurelius Victor, Epit. 41 ; Eusebius, Vita Constantini, iv. ; O. Seeck in Pauly-YVissowa's Realencyclopadie, iv. pt. 1 (1900) ; Gibbon, Decline and Fall, ch. 18.

Constantine III., son of the emperor Heraclius (d. 641) by his first wife Eudocia, succeeded his father as joint-emperor with Heracleonas, the son of Heraclius by his second wife Martina. Court intrigues nearly led to a civil war, which was prevented by the death of Constantine (May 641), after a brief reign of 103 days. He was supposed to have been poisoned by order of his step-mother Martina.

Constantine IV. Pogonatus (the " bearded "), son of Constans II., was emperor from 668 to 685. After his father's death he set out for Sicily, where an Armenian named Mizizius had been declared emperor. Having defeated and put the usurper to death, he returned to the capital. For six years (672-677) the Arabs under the caliph Moawiya (see Caliphate) besieged Constantinople, but the ravages caused amongst them by the so-

called " Greek fire," heavy losses by land and sea, and the inroads of the Christian Mardaites (or Maronites, g.v.) of Mount Lebanon, obliged Moawiya to make peace and agree to pay tribute for thirty years. The attacks of the Slavs and Avars upon Thessalonica were heroically repulsed by the inhabitants. But Constantine, exhausted by the war with the Arabs, was unable to prevent the Bulgars, a tribe of Finno-Ugrian race, from crossing the Danube and settling in the district where their name still survives. The Bulgarian kingdom was established under its first king Isperich in 679. The tribute paid by the Arabs was used to purchase the good will of the new settlers. In order to restore peace in the church, Constantine summoned an ecumenical council (the sixth) at Constantinople, which held its sittings from the 7th of November 680 to the 16th of September 681. The result was the condemnation of the Monothelites and a recognition of the doctrine that two wills, neither opposed nor intermingled, were united in the person of Christ, in accordance with his twofold nature (see under Constantinople, Councils or).

Constantine V. Copronymus (Gr. ubirpos), son of Leo III. the iconoclast, was emperor 740-775. Immediately after his accession, while he was engaged in a campaign against the Arabs, his brother-in-law, an Armenian named Artavasdus, a supporter of the image-worshippers, had been proclaimed emperor, and

it was not till the end of 743 that Constantine re-entered Con- stantinople. When he felt his position secure, he determined to settle the religious controversy once for all. In 754 he assembled at the palace of Hiereion 338 bishops, by whom the worship of images was forbidden as opposed to all Christian doctrine and a curse pronounced upon all those who upheld it. But in spite of the severity with which the resolution was en- forced, the resistance to iconoclasm continued, chiefly owing to the attitude of the monks, who exercised great influence over the common people. A vigorous campaign against monasticism took place; the monasteries were closed, and many of them pulled down or converted into barracks; monks and nuns were compelled to marry, and exiled in large numbers to Cyprus; the literary and artistic treasures were sold for the benefit of the imperial treasury. One of the most important results of the struggle was the defection of the pope, who sought and obtained protection from Pippin, king of the Franks. All attempts to induce Pippin to throw over his new protege failed, and from this time onward the nominal dependence of Rome and the papacy on emperors at Constantinople ceased. Constantine has been described by the orthodox historians of his time as a monster of iniquity; but, in spite of the harshness and occasional cruelty with which he treated his religious opponents, for which an excuse may be found in the obstinate fanaticism of the monks, 'it is now generally admitted that he was one of

the most capable rulers who ever occupied the Byzantine throne. He restored the aqueduct built by Valens and destroyed by the barbarians in the reign of Heraclius, re-peopled Constantinople (after it had been devastated by a great plague) and some of the cities of Thrace, revived commercial prosperity, and carried on a number of wars, in which, on the whole, he was successful, against the Arabs, Slavs and Bulgarians. In the year of his death he set out on an expedition against the last-named, but a violent attack of fever obliged him to discontinue his journey. He died on board his fleet on his way home.

Constantine VI., grandson of Constantine V., was emperor- 780-797. At ten years of age he succeeded his father, Leo IV., under the guardianship of his mother Irene (g.v.), who held the reins of government for ten years. In 782 the Arabs under Harun al-Rashid penetrated as far as the Bosporus, and exacted an annual tribute as the price of an inglorious peace (see Caliphate, § C, 3 ad fin.) . Even when Constantine came of age, Irene practically retained the supreme power. At length Constantine had her arrested, but foolishly pardoned her shortly afterwards. Disastrous campaigns against the Bulgarians and' Arabs afforded her an opportunity of rousing the contempt and hatred of the people against their ruler. On his return to Constantinople, Constantine managed to escape to the Asiatic ccast, but being brought back practically by force he was seized and blinded. According to some, he died on the same day; according to others, he survived for several years. With Constantine VI. the Syrian (Isaurian) dynasty became extinct.

See Theophanes, and the biographies of the patriarch Tarasius and Theodore of Studium; also F. C. Schlosser, Geschiihte der bilderstiirmenden Kaiser des ostromischen Reichs (Frankfurt ■ am Main, 1812) ; other works s.v. Irene.

Constantine VII. Porphyrogenitus (Gr. Porphyrogennetos, " born in the purple ") (905-959), East Roman emperor, author and patron of literature, was the son of Leo VI. the Wise! Though nominally emperor from 912-959, it was not until 945 that Constantine could really be called sole ruler. During this period he had been practically excluded from all real share in the government by ambitious relatives. Though wanting in strength of will, Constantine possessed intelligence and many other good qualities, and his reign on the whole was not unsatisfactory. He was poisoned by his son Romanus in 959. Constantine was a painter and a patron of art, a literary man and a patron of literature; and herein consists his real importance, since it is to works written by or directly inspired by him that we are indebted for our chief knowledge of his times. He was the author or inspirer of several works of considerable length. (1) De Thematibus, an account of the military districts (Themata)

of the empire during the time of Justinian, chiefly borrowed from Hierocles and Stephanus of Byzantium. (2) De admini- strando imperio, an account of the condition of the empire, and an exposition of the author's view of government, written for the use of his son Romanus; it also contains most valuable information as to the condition and history of various foreign nations with which the Byzantine empire had been brought into contact on the east, west and north. (3) De cerimoniis aulae Byzantinae, which describes the customs of the Eastern Church and court. (4) A life of Basilius I., his grandfather, based on the work of Genesius. (5) Two treatises on military subjects are attributed to him; one on tactics, which, as the title shows, was really written by his grandson Constantine VIII., the other a description of the different methods of fighting in fashion amongst different peoples. (6) A speech on the despatch of an image of Christ to Abgar, king of Edessa. Of works under- taken by his instructions the most important were the Encyclo- paedic Excerpts from all available treatises on various branches of learning. (1) Historica, in 53 sections, each devoted to a special subject; of these the sections De legationibus, De virtutibus et vitiis, De sententiis, De insidiis, have been wholly or partly preserved. (2) Basilica, a compilation from the different parts of the Justinian Corpus Juris, subsequently the text-book for the study of law. (3) Geoponica, agricultural treatises, for which see Geoponici and Bassus, Cassianus. (4) Iairica, a medical' handbook compiled by one Theophanes Nonnus, chiefly from Oribasius. (5) Hippiatrica, on veterinary surgery, the connexion of which with Constantine is, however, disputed. (6) Hisloria animalium, a compilation from the epitome of Aristotle's work on the subject by Aristophanes of Byzantium, with additions from other writers such as Aelian and Timotheus of Gaza.

On Constantine VII. generally the most important work is A. Rambaud, L' Empire grec au dixieme siecle (1870); see also Gibbon, Decline and Fall, ch. 53, and G. Finlay, Hist, of Greece, ii. 294 (1877). Many of his works will be found in Migne, Patrologia Graeca, cix., cxii., cxiii. ; for editions of the rest, C. Kfumbacher, Geschichte der byzantinischen Liter atur (1897), and the article by Cohn in Pauly-Wissowa's Realencyclopadie der classischen Altertumswissenschaft (1900) should be consulted. The former contains a valuable note on the " Gothic Christmas " described in detail in the De cerimoniis ; see also Bury in Eng. Hist. Rev. xxii.

(1907).

Constantine VIII. This title is given by Gibbon to the son of Romanus I.

Lecapenus, one of the colleagues of Constantine VII. Porphyrogenitus, but it is now generally bestowed upon Constantine, the brother and colleague of Basil II. from 976-1025, sole ruler 1025-1028. An absolute contrast to his brother, he gave himself up to a life of pleasure and allowed the administra- tion to fall into the hands of six eunuchs.

Constantine IX. Monomachus, emperor 1042-1054, owed his elevation to an old admirer, Zoe, the widow of Romanus III. Argyrus (1028-1034) and of Michael IV. the Paphlagonian (1034- 1041), who, after the brief reign of Michael V. Calaphates (December 1041-April 1042), was proclaimed empress with her sister, Theodora. Quarrels broke out between the sisters, and, in order to secure her position, Zoe married Constantine, with whom she shared the throne till her death in 1050. In his old age Constantine, who had once been a famous warrior, utterly neglected the defences of the empire and reduced his army by disbanding 50,000 of his best troops; on the other hand, he spent extravagant sums on luxuries and the erection of magnificent buildings. Rebellions broke out at home and abroad; the Normans conquered Lombardy, which subsequently (1055) became the duchy of Apulia, and thus Italy was lost to the empire; the Petchenegs (Patzinaks) crossed the Danube and

attacked Thrace and Macedonia; and the Seljuk Turks made their appearance on the Armenian frontier.

Constantine X. Ducas, emperor 1059-1067, succeeded Isaac I. Comnenus (q.v.). But the choice was not justified, for Con- stantine, who as the friend and minister of Isaac had shown himself a capable statesman and financier, proved incompetent as an emperor. He devoted himself to philosophical trifling, petty administrative and judicial details, while his craze for economy developed into avarice. He reduced the army, cut down the soldiers' pay, failed to keep up the supply of war material, and neglected the frontier fortresses at a time when the Seljuk Turks were pressing hard upon the eastern portion of the empire. Alp Arslan, the successor of Toghrul Beg, overran Armenia in 1064, and destroyed its capital Ani. The Magyars occupied Belgrade, the Petchenegs (Patzinaks) continued their inroads, and in 1065 the Uzes (called by the Greeks Comani), a Turkish tribe from the shores of the Euxine, crossed the Danube in vast numbers, ravaged Thrace and Macedonia, and penetrated as far as Thessalonica. The empire was only saved by an outbreak of plague amongst the invaders and the bravery of the Bulgarian peasants. In the year before Constantine's death the remnant of the Byzantine possessions in Italy was finally lost to the empire, and the chief town, Bari, taken by the Normans.

For the later Constantines references to general authorities will be found

under Roman Empire, Later; see also Caliphate and Seljuks for the wars of the period.

CONSTANTINE [Flavius Claudius Constantinus], usurper in Britain, Gaul and Spain (a.d. 407-410) during the reign of Honorius, was a common soldier, invested with the purple by his comrades in Britain by reason of his alleged descent from Constantine the Great. He at once crossed over to Bononia (Boulogne), and with the support of the Gallic troops soon made himself master of the country as far as the Alps and Pyrenees, and established his capital at Arelate (Aries) . In Spain two kinsmen of Honorius, who offered considerable resistance, were finally defeated by Constans, the son of Constantine. The downfall of Stilicho caused an alteration in the policy of Honorius, who, hard pressed by the barbarians, pardoned Constantine, recognized him as joint ruler, and permitted him to confer the title of Caesar upon Constans. This gave Constantine his opportunity. With a large army he marched into Italy, avowedly to assist Honorius, in reality with the intention of making himself ruler of the West. But his plans were upset by the revolt of Gerontius. This capable general, who had been appointed commander in Spain during the absence of Constans on a visit to his father, indignant at being superseded, set up one of his own adherents as emperor, invaded Gaul, and put Constans to death at Vienna (Vienne). He then besieged Constantine himself in Arelate, but the advance of an Italian army under Constantius and Ulfilas forced him to retire. The generals of Honorius themselves continued the siege and completely defeated a body of German troops on their way to assist Constantine. The latter, seeing that further resistance was useless, took refuge in a church, laid down the imperial insignia, took orders as a priest, and surrendered the city on condition that his life should be spared. He and his younger son Julian were sent to Honorius, by whose orders they were put to death on the way to Ravenna. The revolt of Constantine materially influenced the subsequent history of Britain, since the virtual abandonment by Honorius of any claim to sovereignty over it cleared the way for the Saxon conquest of the island.

See Zosimus v. ad fin. and vi. ; Sozomen, Ecclesiastical History, ix. 11 foil.; Gibbon's Decline and Fall, ed. J. B. Bury, pp. 272, 340, 502; E. A. Freeman, "Tyrants of Britain, Gaul and Spain" in English Historical Review, i. (1886); O. Seeck in Pauly-Wissowa's Realencyclopadie, iv. pt. 1 (1900).

PRINTED IN U.S.A.

VOL07_CONSTANTINE-_P-DEMIDOV

Britannica

THE

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

FIRST edit

ion, published in three volumes, 1768 — 1771.

SECOND ,

, „ ten ,

, 1777— 1784.

THIRD ,

, „ eighteen ,

, 1788— 1797.

FOURTH ,

, „ twenty ,

, 1801 — 1810.

FIFTH ,

, „ twenty ,

, 1815 — 1817.

SIXTH ,

, „ twenty ,

, 1823 — 1824.

SEVENTH ,

, „ twenty-one ,

, 1830 — 1842.

EIGHTH ,

, „ twenty-two ,

1853—1860.

NINTH , TENTH ,

, ,, twenty-five , , ninth edition and eleven

, 1875—1889.

supplementary volumes,

1902 — 1903.

ELEVENTH ,

, published in twenty-nine volume

s, 1910 — 1911.

COPYRIGHT

in all countries subscribing to the

Bern Convention

by THE CHANCELLOR, MASTERS AND SCHOLARS

of the

UNIVERSITY OF CAMBRIDGE

Allrtgnts rtstwtd

THE

ENCYCLOPEDIA BRITANNICA

A

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME VII

CONSTANTINE PAVLOVICH to DEMIDOV

New York

Encyclopaedia Britannica, Inc. 342 Madison Avenue

Copyright, in the United States of America, 1910,

by

The Encyclopaedia Britannica Company.

INITIALS USED IN VOLUME VII. TO IDENTIFY INDIVIDUAL CONTRIBUTORS, 1 WITH THE HEADINGS OF THE ARTICLES IN THIS VOLUME SO SIGNED.

A.

B. F.

Y.

A.

Bo.*

A.

Ca.

A.

E.B.

A.

E.J.

A.

F. P.

A. 6.

A. Go* A. H. J. G.

A- H. P.

A. J. B. A. J. B.*

A* J« £•

A.L. A. Mw.

Dance (in part).

Honorary Canon of \ Curia Romana; L Decretals.

j Curve (in part).

Creeds.

i Craig, John; Cranmer;

1 Cromwell, Thomas; Crowley,

Alexander Bell Filson Young.

Formerly Editor of the Outlook. Author of Christopher Columbus; Master-singers; The Complete Motorist; Wagner Stories; &c.

Auguste Boudinhon, D.D., D.C.L.

Professor of Canon Law in the Catholic University of Paris. Paris. Editor of the Co-noniste contemporain.

Arthur Cayley, LL.D., F.R.S.

See the biographical article : Cayley, Arthur.

Rev. Andrew Ewbank Burn, M.A., D.D.

Vicar of Halifax and Prebendary of Lichfield. Author of An Introduction to the – Creeds and the Te Deum ; Niceta of Remesiana ; &c.

Arthur Ernest Jolliffe, M.A.

Fellow of, and Tutor and Mathematical Lecturer at, Corpus Christi College, Oxford. -{ Continued Fractions. Senior Mathematical Scholar,

1892.

Albert Frederick Pollard, M.A., F.R.Hist.Soc. [Coverdale* Cox Richard*

Fellow of All Souls' College, Oxford. Professor of English History in the University ‘ ‘ ‘

of London. Assistant Editor of the Dictionary of National Biography, 1893-1901. Author of England under the Protector Somerset ; Life of Thomas Cranmer ; &c.

Major Arthur George Frederick Griffiths (d. 1908). f Crime*

H.M. Inspector of Prisons, 1878-1896. Author of The Chronicles of Newgate;\ ri„i_i,!„i««.» Secrets of the Prison House ; &c. |_ Wiminoiogy

Rev. Alexander Gordon, M.A.

Lecturer on Church History in the University of Manchester.

Abel Hendy Jones Greenidge, M.A., D.Litt. (Oxon.) (d. 1905).

Formerly Fellow and Lecturer of Hertford College, Oxford, and of St John's College, Oxford. Author of Infamia in Roman Law; Handbook of Greek Constitutional History; Roman Public Life; History of Rome. Joint-author of Sources of Roman History, 133-70 B.C.

Rev. Arnold Hill Payne, M.A.

Chaplain, Oxford Diocesan Mission to the Deaf and Dumb. Late Normal Fellow, National Deaf Mute College, Washington, U.S.A. Author of The Mental Develop- ment of the Orally and Manually taught Deaf; The Pure Oral Method of necessity a Comparative Failure; &c.

Alfred Joshua Butler, M.A., D.Litt. C

Fellow and Bursar of Brasenose College, Oxford. Fellow of Eton College. Author -I Copts* of The Ancient Coptic Churches of Egypt; The Arab Conquest of Egypt; &c. I.

Arthur John Butler, M.A. (1844-1910). f

Formerly Fellow of Trinity College, Cambridge, and Professor of Italian Language J J} an tg and Literature, University College, London. Author of a prose translation of 1

{

Coornhert.

Consul: Roman.

Deaf and Dumb.

The Coptic Church.

Dante’s Divine Comedy; Dante and his Times; &c.

Arthur John Evans, M.A., D.Litt., LL.D., F.R.S., F.S.A.

Fellow of Brasenose College, Oxford. Keeper of Ashmolean Museum, Oxford, 1884- 1908. Hon. Keeper since 1908. Made archaeological discoveries in Crete, 1893;- excavated the Palace of Knossos. Author of Through Bosnia on Foot; Cretan Pictographs and Prae-Phoenician Script ; and other works on archaeology.

Andrew Lang.

See the biographical article: Lang, Andrew.

Allen Mawer, M.A.

Professor of English Language and Literature, Armstrong College, Newcastle-on- Tyne. Fellow of Gonville and Caius College, Cambridge. Formerly Lecturer in English at the University of Sheffield.

Crete: Archaeology and Ancient History.

Crystal-Gazing.

Danelagh.

1 A complete list, showing all individual contributors, appears in the final volume.

A. M. C.

A. M. CI.

A.N. A. N.*

A.

N. M.

A.

van M.

A.

W. H.*

A.

Wi.

A. W. R.

A. W. W. C. E* C. E. N. C. F. A.

C. F. B.

C. K.

C. K. S. C. L. C. PL

C. R. B.

D. C. T. D. F. T.

D. 6. H.

Agnes Mary Clerke.

See the biographical article: Clerke, A. M.

Agnes Muriel Clay (Mrs Wilde).

Formerly Resident Tutor of Lady Margaret Hall, Oxford. Joint-author of Sources ‘ of Roman History, 133-70 B.C.

Alfred Newton, F.R.S.

See the biographical article: Newton, Alfred.

Rev. Alexander Nairne, M.A.

Professor of Hebrew and Old Testament Exegesis in King’s College,

London. Examining Chaplain to the Bishop of St Albans. Fellow of King's College, London. Formerly Fellow of Jesus College, Cambridge. Crosse Scholar, 1886. Author of The Bible Doctrine of Atonement; &c.

A. N. Monkhouse. J

Member of Editorial Staff of Manchester Guardian. I

Alexander van Millingen, M.A., D.D. f

Professor of History, Robert College, Constantinople. Author of Byzantine Con- -j stantinople; Constantinople; &c. L

Arthur William Holland. J

Formerly Scholar of St John's College, Oxford. Bacon Scholar of Gray's Inn, 1900. [

Aneurin Williams, M.A., M.P. f

Barrister-at-Law of the Inner Temple. Chairman of Executive, International Co- J operative Alliance. M.P. for Plymouth, 1910. Author of Twenty-eight Years of Co-partnership at Guise; &c. "-

Alexander Wood Renton, M.A., L.L.B.

Puisne Judge of the Supreme Court of Ceylon. Editor of Encyclopaedia of the Laws of England.

Adolphus William Ward, Litt.D., LL.D. See the biographical article: Ward, A. W.

Charles Everitt, A.M., F.C.S., F.G.S., F.R.A.S.

Sometime Scholar of Magdalen College, Oxford.

Charles Eliot Norton, LL.D.

See the biographical article: Norton, Charles E.

Charles Francis Atkinson. ,,,,,,,

Formerly Scholar of Queen's College, Oxford. Captain, 1st City of London (Royal

TJ* "1* _ \ A..J.1 „f T 1 /.-. ~\f7Zl A ***** n it nit*A f^nlA TTn trnniiv

“Copernicus; Delambre; . Delisle, J. N.

Curia; Decemviri; Decurio.

Coot; Cormorant; Crane; Crossbill; Crow; Cuckoo; Curlew.

Author of The Wilderness and Cold Harbour.

Author of Lord \ Coolle –

Dagobert.

Charles Francis Bastable, M.A., LL.D. f

Regius Professor of Law and Professor of Political Economy in the University of _j Dublin. Author of Public Finance; Commerce of Nations; Theory of International 1 Trade; &c. L

William Charles Mark Kent. f

Barrister-at-Law, Middle Temple. Edited the London Sun for twenty-five years; J the Weekly Register, 1874-1881. Author of The Humour and Pathos of Charles | Dickens; &c. >-

Clement King Shorter.

Editor of the Sphere. Author of Sixty Years of Victorian Literature; Immortal- Memories ; The Brontes: Life and Letters ; &c.

H. Caldwell Lipsett.

Formerly Editor of the Civil and Military Gazette, Lahore, India. Curzon in India.

Christian Peister, D. es L. .

Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour. Author ot Etude sur le regne de Robert le Pieux; Le Duche merovingien d’ Alsace et la legende de Sainte-Odile.

Charles Raymond Beazley, M.A., D.Litt., F.R.G.S., F.R.Hist.S.

Professor of Modern History in the University of Birmingham. Formerly Fellow of Merton College, Oxford, and University Lecturer in the History of Geography. Lothian Prizeman, Oxford, 1889. Lowell Lecturer, Boston, 1908. Author of

Henry the Navigator ; The Dawn of Modern Geography; &c.

David Croal Thomson. .

Formerly Editor of the Art Journal. Author of The Brothers Mans; The Barbizon – School of Painters ; Life of ‘ ‘ Phiz ‘ ‘ ; Life of Bewick ; &c.

Donald Francis Tovey. . .

Balliol College, Oxford. Author of Essays in Musical Analysis, comprising The Classical Concerto, The Goldberg Variations; and analyses of many other classical” works.

David George Hogarth, M.A.

Keeper of the Ashmolean Museum, Oxford. Fellow of Magdalen College, Oxford. Fellow of the British Academy. Excavated at Paphos, 1888; Naukratis, 1899- and 1903; Ephesus, 1904-1905; Assiut, 1906-1907. Director, British School at Athe.ns, 1897-1900; Director, Cretan Exploration Fund, 1899.

Creatianism and Traducianism,

Cotton (in part).

Constantinople.

Curia Regis.

Co-operation.

Corporal Punishment; Covenant.

Cumberland, Richard:

Dramatist.

Constellation.

Curtis, George William.

Crimean War; Cromwell, Oliver (in part)

Decimal Coinage. Dalling, Lord.

Cowper, William; Crabbe, George.

Conti, Nicolo de’; Cook, Captain; Dampier; Daniel of Kiev; Davis,

John.

Corot; Daubigny.

Contrapuntal Forms; Counterpoint.

Cyrenaica; Cyrene.

INITIALS AND HEADINGS OF ARTICLES

Vll

D.H.

D. Mn. E.Br. £. B. El.

E. B. P.

E. C. Q. E. F. S.

E. G. E. Gr.

David Hannay.

E.

Ma.

Ed

1. M.

E.

M. W

E.

Pr.

E. R. B.

E. Tn. E.V.

F, E. W.

F. G. M. B.

FLu.

F. LI. G.

F. Po. F. S. P.

(Convoy .(in part) ; Cordoba, Gonzalo Fernandez do; Dahlgren, John Adolf.

Rev. Dugald Macfadyen, M.A.

Minister of South Grove Congregational Church, Highgate. Missionary Society.

Director of the London 1 Cruden, Alexander.

Ernest Barker, M.A. f

Fellow of, and Lecturer in Modern History at, St John's College, Oxford. Formerly 1 Crusades. Fellow and Tutor of Merton College. Craven Scholar, 1895. I

Edwin Bailey Elliott, M.A., F.R.S., F.R.A.S. f

Waynflete Professor of Pure Mathematics and Fellow of Magdalen College, Oxford. . Formerly Fellow of Queen's College, Oxford. President of London Mathematical Society, 1896-1898. Author of Algebra of Quantics; &c.

Edward Bagnall Potjlton, M.A., D.Sc, F.R.S., LL.D.

Hope Professor of Zoology in the University of Oxford. Fellow of Jesus College, . Oxford. Author of The Colours of Animals; Essays on Evolution; Darwin and the Original Species; &c.

Edmund Crosby Quiggin, M.A.

Fellow of Gonville and Caius College, Cambridge; Lecturer in Modern Languages, * and Monro Lecturer in Celtic.

Edward Fairbrother Strange.

Assistant Keeper, Victoria and Albert Museum, South Kensington. Member of. Council, Japan Society. Author of numerous works on art subjects. Joint-editor of Bell's " Cathedral " Series.

Curve (in part).

Darwin.

Cuchulinn.

Edmund Gosse, LL.D.

See the biographical article : Gosse, Edmund.

Delia Quercia.

Conte; Couplet; Cowley; Crashaw; Criticism; Daniel, Samuel; Davenant, Sir William; Dekker, Edward Douwes. Corfu (in part) ; Corinth : Isthmus of; Cos(in part) ; Crisa ; Daphne; Delos; Delphi.

Debentures and Debenture Stock.

Ctesiphon; Cyaxares; Cyrus; Darius; Deioces; Demetrius of Bactria.

Constitution of Athens.

Ernest Arthur Gardner, M.A.

See the biographical article: Gardner, Percy.

Edward Manson.

Barrister-at-Law. Joint-editor of Journal of Comparative Legislation. Author of ■ Debentures and Debenture Stock; &c.

Eduard Meyer, D.Litt. (Oxon.), LL.D., Ph.D.

Professor of Ancient History in the University of Berlin. Author of Geschichte des Alterthums; Forschungen zur alien Geschichte; Geschichte des alien Agyptens; Die Israeliten und ihreNachbarstamme; &c.

Rev. Edward Mewburn Walker, M.A.

Fellow, Senior Tutor and Librarian of Queen’s College, Oxford.

Edgar Prestage. C

Special Lecturer in Portuguese Literature in the University of Manchester. Com- J Corte-Real, Jeronymo; mendador, Portuguese Order of S. Thiago. Corresponding Member of Lisbon Royal 1 Cruz e Silva. Academy of Sciences and Lisbon Geographical Society, &c. I

Edwyn Robert Bevan, M.A. [”

Formerly Scholar of New College, Oxford. Author of House of Seleucus; Jerusalem -j Demetrius of Macedonia. under the High Priests. L

Rev. Ethelred Leonard Taunton (d.1907).

Author of The English Black Monks of St Benedict ; History of the Jesuits in England.

Rev. Edmund Venables, M.A., D.D. (1819-1895).

Canon and Precentor of Lincoln. Author of Episcopal Palaces of England.

Rev. Frederick Edward Warren, M.A., B.D., F.S.A.

Rector of Bardwell, Bury St Edmunds. Fellow of St John’s College, Oxford, 1865- 1882. Author of The Old Catholic Ritual done into English and compared with the- Corresponding Offices in the Roman and Old German Manuals; The Liturgy and Ritual of the Celtic Church ; &c.

Frederick George Meeson Beck, M.A.

Fellow and Lecturer in Classics, Clare College, Cambridge.

Friedrich Luckwaldt, Ph.D.

Professor of History at the Royal Technical High School, Danzig. Osterreich und die Anfdnge des Befreiungskriege von 18 13; &c.

Francis Llewellyn Griffith, M.A., Ph.D., F.S.A.

Reader in Egyptology, Oxford University. Formerly Scholar of Queen’s College, Oxford. Editor of the Archaeological Survey and Archaeological Reports of the Egypt Exploration Fund. Fellow of Imperial German Archaeological Institute.

Sir Frederick Pollock, Bart., LL.D., D.C.L.

See the biographical article: Pollock: Family.

Francis Samuel Philbrick, A.M., B.Sc. C

Formerly Scholar and Resident Fellow of Harvard University. Member

of American -j Cuba. Historical Association. 1

Cullen, Paul; Curci. Crypt.

Dedication.

Deira.

Author of -I Dahlmann.

Copts (in part).

Contract.

viii INITIALS AND HEADINGS OF ARTICLES

F. T. M. Sir Frank Thomas Marzials, K.C.B. -fl)audet.

Formerly Accountant-General of the Army. Editor of ” Great Writers ” Series. |_

F. W. Ha. Frederick William Hasluck, M.A. J .

Assistant Director, British School of Archaeology, Athens. Fellow of King’s “l CyziCUS. College, Cambridge. Browne’s Medallist, 1901. L

F. W. R.* Frederick William Rudler, I.S.O., F.G.S. f Corundum; Cryolite _

Curator and Librarian at the Museum of Practical Geology, London, 1879-1902. i 7v> m , n („ij’ ‘

President of the Geologists’ Association, 1 887-1 889. I ˆ«ram°K».

G. A. B. George A. Boulenger, F.R.S. f

In charge of the Collections of Reptiles and Fishes, Department of Zoology, British < CyprinodontS. Museum. Vice-President of the Zoological Society of London. L

G. C. B. Gilbert Charles Bourne, M.A., D.Sc., F.R.S. r

Linacre Professor of Comparative Anatomy, Oxford. Fellow of Merton College, J Cnral-reefs Oxford. Author of An Introduction to the Study of Comparative Anatomy of\ ” ‘

Animals; &c.

G. C. C. G. C. Chubb.

i Cytology.

G. C. W. George Charles Williamson, Litt.D. r Cooper Alexander*

Chevalier of the Legion of Honour. Author of Portrait Miniatures ; Life of Richard J _ c 1 . ‘

Cosway, R.A.; George Engleheart; Portrait Drawings; &c. Editor of new edition 1 l>°oper, Samuel; of Bryan’s Dictionary of Painters and Engravers. (_ Cosway, Richard.

G. F. Z. G. F. Zimmer, A.M.Inst.CE., F.Z.S. J”

Author of Mechanical Handling of Material. \ Conveyors.

G. H. Fo. George Herbert Fowler, F.Z.S., F.L.S., Ph.D. f

Formerly Berkeley Fellow of Owens College, Manchester, and Assistant Professor < Ctenophora. of Zoology at University College, London. [

G. J. T. George James Turner. f

Barrister-at-Law, Lincoln’s Inn. Editor of Select Pleas of the Forest for the Selden -j County. Society. (.

G. P. R. Gerald Philip Robinson. I*

President of the Society of Mezzotint Engravers. Mezzotint Engraver to Queen ~\ Cousins, Samuel. Victoria and to King Edward VII. I

G. Sa. George Saintsbury, L.L.D., Litt.D. j Corneille, Pierre;

See the biographical article: Saintsbury, G. E. B. I Corneille, Thomas.

G. Sn. Grant Showerman, A.M., Ph.D. [Corybantes;

Professor of Latin at the University of Wisconsin. Member of the Archaeological J Criobolium* Institute of America. Member of American Philological Association. Author of 1 r llr »*„.. p.tu.1. With the Professor; The Great Mother of the Gods; &c. I ˆ ureles > ˆYDeie.

G. W. T. Rev. Griffithes Wheeler Thatcher, M.A., B.D. f

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew

and Old”) Damiri. Testament History at Mansfield College, Oxford, I

H. Br. Henry Bradley, M.A., Ph.D. f

Joint -editor of the New English Dictionary (Oxford). Fellow of the British Academy. -I Cynewulf. Author of The Story of the Goths; The Making of English; &c. L

H. B. W. Horace Bolingbroke Woodward, F.R.S., F.G.S. f

Late Assistant Director, Geological Survey of England and Wales. Wollaston J nonhon

Medallist G — 1 ~~* — ‘ c — •’”<-" A...-U — f rz. tt:* ~r n.- /^„-;„„.-„-t a-..—*.. ~c 1 j^cuiiou.

London; &c.

Medallist, Geological Society. Author of The History of the Geological Society of I

H. F. G. Hans Friedrich Gadow, M.A., F.R.S., Ph.D. C

Strickland Curator and Lecturer on Zoology in the University of Cambridge. -I Crocodile. Author of Amphibia and Reptiles (Cambridge Natural History). I

H. Fr. Henri Frantz. f r . lirh . t

Art Critic, Gazette des Beaux Arts, Paris. \ uouroei.

H. M. W. H. Marshall Ward, M.A., F.R.S., D.Sc. (d. 1905). r

Formerly Professor of Botany in the University of Cambridge. President of the J jj Barv British Mycological Society. Author of Timber and some of its Diseases ; The Oak ; 1 »ary.

Disease in Plants; &c. I

H. St. Henry Sturt, M.A. J Crusius;

Author of Idola Theatri ; The Idea of a Free Church ; and Personal Idealism. \ Cudworth, R.

H. S. J. Henry Stuart Jones, M.A. r

Formerly Fellow and Tutor of Trinity College, Oxford, and Director of

the British J Costume: Aegean, Greek, School at Rome. Member of the German Imperial Archaeological Institute. 1 Etruscan and Roman Author of The Roman Empire ; &c. L

H. Th. Sir Henry Thompson, Bart. f cremation

See the biographical article: Thompson, Sir Henry. \

H. Tr. Sir Henry Trotter, K.C.M.G., C.B. r

Lieutenant-Colonel, Royal Engineers. H.B.M. Consul-General for Roumania, J — , 1894-1906, and British Delegate on the European Commission of the Danube. 1 0* nUDe – Victoria Medallist, Royal Geographical Society, 1878. [_

H. W. C. D. Henry William Carless Davis, M.A. f

Fellow and Tutor of Balliol College, Oxford. Fellow of. All Souls' College, 1895-ˆ Coutances, Walter Of, 1902. Author of England under the Normans and Angevins; Charlemagne. (.

INITIALS AND HEADINGS OF ARTICLES

IX

LA.

J. An.

J.

A.

C.

J.

A.

H.

J.

C.

S.-H

J.

D.

B.

J.

D.

Pr.

J.

E.

B.

J.

Go

.*

J.G.K.

J. H. P. J. H. M.

J. H. R. J. HI. R.

J. H. Rs.

J. L. M.

J. Mo. J. McP.

J.M.M.

J, P. Pe.

J. S. P.

J. T. Be. J. T. C.

Israel Abrahams, M.A.

Reader in Talmudic and Rabbinic Literature, University of Cambridge. President, Jewish Historical Society of England. Author of A Short History of Jewish Litera- ture; Jewish Life in the Middle Ages.

Joseph Anderson, LL.D.

Keeper of the National Museum of Antiquities, Edinburgh. Assistant Secretary to the Society of Antiquaries of Scotland, and Rhind Lecturer, 1879-1882 and 1892. Editor of Drummond's Ancient Scottish Weapons; &c.

Crescas; Delmedigo.

Crannog.

Sir Joseph Archer Crowe, K.C.M.G.

See the biographical article: Crowe, Sir J. A.

John Allen Howe, B.Sc.

Curator and Librarian of the Museum of Practical Geology, London.

John Castleman Swinburne-Kanham, J.P.

Barrister-at-Law, Middle Temple. Hon. Secretary of Cremation Society of England.

James David Bourchier, M.A., F.R.G.S.

King's College, Cambridge. Correspondent of The Times in South-Eastern Europe. Commander of the Orders of Prince Danilo of Montenegro and of the Saviour of Greece, and Officer of the Order of St Alexander of Bulgaria. t

John Dyneley Prince, Ph.D.

Professor of Semitic Languages at Columbia University, New York.

John Eglinton Bailey.

Author of John Dee and the Steganographia of Trithemius ; Life of Thomas Fuller.

Joseph Grego.

Art Critic. Author of A History of Parliamentary Elections ; A History of Dancing ; Thomas Rowlandson ; James Gillray ; &c.

John Graham Kerr, M.A., F.R.S.

Regius Professor of Zoology in the University of Glasgow. Formerly Demonstrator in Animal Morphology in the University of Cambridge. Fellow of Christ's College, Cambridge, 1898-1904. Walsingham Medallist, 1898. Neill Prizeman, Royal Society of Edinburgh, 1904.

John Henry Freese, M.A.

Formerly Fellow of St John's College, Cambridge.

John Henry Middleton, M.A., F.S.A., Litt.D., D.C.L. (1846-1896). 1

Formerly Slade Professor of Fine Art in the University of Cambridge, and Art j Director of the South Kensington Museum. Author of The Engraved Gems of Classical Times ; Illuminated Manuscripts in Classical and Medieval Times.

John Horace Round, M.A., LL.D. (Edin.).

Author of Feudal England; Studies in Peerage and Family History; Peerage and* Pedigree; &c.

John Holland Rose, M.A., Litt.D. _ 1

Lecturer on Modern History to the Cambridge University Local Lectures Syndicate. J Author of Life of Napoleon I. ; Napoleonic Studies ; The Development of the European 1 Nations; The Life of Pitt; &c. I

Rev. James Hardy Ropes, D.D. i

Bussey Professor of New Testament Criticism and Interpretation, and Dexter J Lecturer on Bible Literature, Harvard University. Author of The Apostolic Age | in the Light of Modern Criticism ; &c. |

John Linton Myres, M.A., F.S.A. 1

Wykeham Professor of Ancient History in the University of Oxford. Formerly J Gladstone Professor of Greek, and Lecturer in Ancient Geography, University of 1 Liverpool ; and Lecturer on Classical Archaeology in University of Oxford. |

Viscount Morley of Blackburn. j

See the biographical article: Morley, Viscount. 1

John Macfarlane. i

Formerly Librarian of the Imperial Library, Calcutta. Author of Library Ad- J

ministration; &c.]

John Malcolm Mitchell. (

Sometime Scholar of Queen's College, Oxford. Lecturer in Classics, East London -j College (University of London). Joint-editor of Grote's History of Greece. {

Rev. John Punnett Peters, Ph.D., D.D. r

Canon Residentiary, Cathedral of New York. Formerly Professor of Hebrew in the J University of Pennsylvania. Director of the University Expedition to Babylonia, 1 1888-1895. Author of Nippur, or Explorations and Adventures on the Euphrates. {

John Smith Flett, D.Sc, F.G.S. r

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in J Edinburgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby 1 Medallist of the Geological Society of London. [

John T. Bealby. r

Joint-author of Stanford's Europe. Formerly Editor of the Scottish Geographical -1 Magazine. Translator of Sven Hedin's Through Asia, Central Asia and Tibet; &c. I

Joseph Thomas Cunningham, M.A., F.Z.S. r

Lecturer on Zoology at the South- Western Polytechnic, London. Formerly Fellow J of University College, Oxford. Assistant Professor of Natural History in the"! University of Edinburgh. Naturalist to the Marine Biological Association. [

f Cranach; I Cuyp. f Corallian; ICornbrash; Culm.

•j Cremation: Statistics.

{Crete: Geography and Statis- tics; and Modern History.

{

Daniel (in part). Cryptography.

Cruikshank. Cyclostomata.

■< Demeter.

Delia Robbia (in part).

Court Baron.

Daru, Count; Decaen.

Corinthians: Epistles to the.

Cyprus (in part). Danton.

Damien, Father. Delian League.

Deir.

Crystallite; Dacite.

Crimea (in part) ; Daghestan (in part).

Cuttle-fish.

X

J.V. IL G. J.

K.S.

INITIALS AND HEADINGS OF ARTICLES

L.D.* L« J* S«

L.V.* M. A. C.

M

Ha.

M

N.T.

M

O.B.C

N.

D.M

N.

W. T.

0.

Ba.

0.

J. R. H.

P. A. K.

P. C. Y.

P.G. P.Gi.

P. G. K. R. A.*

John Veitch, LL.D.

See the biographical article: Veitch, John.

Kingsley Garland Jayne.

I Cousin, V. (in part).

IGSLEY VjAKLAJNU JAYME. f

Sometime Scholar of Wadham College, Oxford. Matthew Arnold Prizeman, 1903. J Croatia-SIavonia; Author of Vasco da Carta and his Successors. 1 Dalmatia.

Kathleen Schlesinger.

Author of The Instruments of the Orchestra ; &c.

Count Lutzow, Litt.D. (Oxon.), D.Ph. (Prague), F.R.G.S.

Chamberlain of H.M. the Emperor of Austria, King of Bohemia. Hon. MemDer of the Royal Society of Literature. Member of the Bohemian Academy, &c. Author of Bohemia, a Historical Sketch ; The Historians of Bohemia (Ilchester Lecture, Oxford, 1904); The Life and Times of

John Hus; &c.

Louis Duchesne.

See the biographical article: Duchesne, L.M.O.

»

Leonard James Spencer, M.A.

Assistant in Department of Mineralogy, British Museum. Formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar. Editor of the Minera- logical Magazine.

Luigi Villari.

Italian Foreign Office (Emigration Department). Formerly Newspaper Corre- spondent in East of Europe. Italian Vice-Consul in New Orleans, 1906; Phil- – adelphia, 1907; and Boston, U.S.A., 1907-1910. Author of Italian Life in Town and Country; Fire and Sword in the Caucasus; &C.

Maurice A. Canney, M.A.

Assistant Lecturer in Semitic Languages in the University of Manchester. Formerly Exhibitioner of St John's College, Oxford. Pusey and Ellerton Hebrew Scholar, ' Oxford, 1892; Kennicott Hebrew Scholar, 1895; Houghton Syriac Prize, 1896.

Marcus Hartog, M.A., D.Sc, F.L.S.

Professor of Zoology, University College, Cork. Author of " Protozoa ' bridge Natural History, and papers for various scientific journals.

Marcus Niebuhr Tod, M.A.

Fellow and Tutor of Oriel College, Oxford. University Lecturer in Epigraphy. Joint-author of Catalogue of the Sparta Museum.

Maximilian Otto Bismarck Caspari, M.A.

Reader in Ancient History at London University. University, 1 905-1 908.

Newton Dennison Mereness, A.M., Ph.D. Author of Maryland as a Proprietary Province.

Northcote Whitbridge Thomas, M.A.

Government Anthropologist to Southern Nigeria. Corresponding Member of the Societe d' Anthropologic de Paris. Author of Thought Transference; Kinship and Marriage in Australia; &c.

Oswald Barron, F.S.A.

Editor of the Ancestor, 1902-1905. Hon. Genealogist to Standing Council of the Honourable Society of the Baronetage.

Osbert John Radcliefe Howarth, M.A.

Christ Church, Oxford. Geographical Scholar, 1901. British Association.

Contrafagotto; Cor Anglais; Cornet {in part); Cromorne {in part); Crowd; Cymbals.

Czech.

Damasus.

Copper-glance; Copper Pyrites; Covellite; Crocoite; Crystallography; Cuprite; Cyanite; Datolite.

Contarini; Cornaro;

Correnti; Corsini;

Dandolo; Delia Gherardesca.

Daub, Karl.

in Cam—! Cystoflagellata.

-j Demaratus.

r Corfu {in part); Lecturer in Greek at Birmingham < Corinth {in part) ;

I Cos {in part).

-j Davis, Jefferson {in part).

J Death-warning.

r Costume: Medieval and -j Modern European; Icourtenay: Family.

Prince Peter Alexeivitch Kropotkin.

See the biographical article : Kropotkin, P. A.

Philip Chesney Yorke, M.A. Magdalen College, Oxford.

Percy Gardner, Litt.D., D.C.L., F.S.A.

See the biographical article: Gardner, Percy.

Peter Giles, M.A., LL.D., Litt.D.

Fellow and Classical Lecturer of Emmanuel College, Cambridge, and University

Reader in Comparative Philology. Late Secretary of the Cambridge Philological

Society. Author of Manual of Comparative Philology; &c. Paul G. Konody.

Art Critic of the Observer and the Daily Mail. Formerly Editor of The Artist.

Author of The Art of Walter Crane; Velasquez, Life and Work; &c. Robert Anchel.

Archivist to the Departement de 1'Eure.

Assistant Secretary of the -i Copenhagen.

r Cossacks; J Crimea {in part); IDaghestan {in part).

"Cottington, F. C. Baron; Coventry, Sir William; Craven, Earl of; Cromwell, Oliver {in part); Cromwell, Richard.

f Daedalus;

1 Demetrius (Sculptor).

D.

David, Gerard.

J Convention, The National; I Cordeliers, Club of the.

INITIALS AND HEADINGS OF ARTICLES

R. A. S. M.

R. B. McK. R. B. R.

R. H. C.

R. H. L. R. J. M. R. L.*

R. N. B. R. P. S.

R.So. R. S. C. R. W. R.

S. A. C.

S. E. B.

S. J. C.

S.Wa. T.As.

T. A. I. T. A. J. T. Ba.

JDekker, Thomas (in part).

Robert Alexander Stewart Macalister, M.A., F.S.A. J Damascus;

St John's College, Cambridge. Director of Excavations for the Palestine Ex- t Dead Sea; ploration Fund. I Decapolis,

Ronald BruNlees McKerrow. Trinity College, Cambridge.

Rueus Byam Richardson, Ph.D., B.D.

Formerly Director of American School of Classical Studies, Athens. Member of American Geological Society, British Society of Promotion of Hellenic Studies, Greek Archaeological Society, &c. Author of History of Greek Sculpture; Vacation Days in Greece; Greece through the Stereoscope; &c.

Rev. Robert Henry Charles, M.A., D.D., D.Litt. f

Grinfield Lecturer and Lecturer in Biblical Studies, Oxford. Fellow of the British J Daniel (in Part) Academy. Formerly Professor of Biblical Greek, Trinity College, Dublin. Author . of Critical History of the Doctrine of a Future Life ; Book of Jubilees ; &c. I

Robin Humphrey Legge. f

Principal Musical Critic for Daily Telegraph. Author of Annals of the Norwich -s Debussy.

Corinth (in part).

Festivals; &c.

Ronald John McNeill, M.A.

Christ Church, Oxford. Barrister-at-Law. Gazette, London.

Formerly Editor of the St James's-

Richard Lydekker, F.R.S., F.G.S., F.Z.S.

Member of the Staff of the Geological Survey of India, 1874-1882. Author of ■ Catalogues of Fossil Mammals, Reptiles and Birds in British Museum; The Deer of all Lands, &c.

Robert Nisbet Bain (d. 1909).

Formerly Assistant Librarian, British Museum. Author of Scandinavia: the Political History of Denmark, Norway and Sweden, 1 5 13-1900; The First Romanovs, – 1613 to 172$; Slavonic Europe: the Political History of Poland and Russia from 1469 to 1796; &c.

R. Phene Spiers, F.S.A., F.R.I.B.A.

Formerly Master of the Architectural School, Royal Academy, London. Past President of Architectural Association. Associate and Fellow of King's College, . London. Corresponding Member of the Institute of France. Editor of Fergusson's History of Architecture. Author of Architecture: East and West; &c.

Robert Somers (1822-1891).

Editor of North British Daily Mail, 1849-1859. lands ; The Southern States since the War.

Conway, Henry Seymour; Cowper, William C, 1st Earl; Cromwell, Oliver (in part).

Coyote; Creodonta; Deer.

Corvinus; Czartoryski; Damjanich; Deak; De Geer; De la Gardie;

Demetrius Donskoi; Demetrius, Fseudo.

Decorated Period.

Author of Letters from the High- -j Corn Laws (in part).

Robert Seymour Conway, M.A., D.Litt. (Cantab.).

Professor of Latin in the University of Manchester. Formerly Professor of Latin – of University College, Cardiff, and Fellow of Gonville and Caius College, Cambridge.

Robert William Rogers, D.D., Litt.D., LL.D., Ph.D.

Professor of Hebrew and Old Testament Exegesis, Drew Theological Seminary, Madison, New Jersey. Author of Inscriptions of Sennacherib; History of Babylonia ‘ and Assyria; The Religion of Babylonia and Assyria; &c.

Stanley Arthur Cook, M.A.

Editor for Palestine Exploration Fund. Lecturer in Hebrew and Syriac, and formerly Fellow Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904-1908. Author of Glossary of Aramaic Inscrip- ‘ tions ; The Laws of Moses and the Code of Hammurabi ; Critical Notes on Old Testament History; Religion of Ancient Palestine; &c.

Hon. Simeon Eben Baldwin, M.A., LL.D.

Professor of Constitutional and Private International Law in Yale University. Director of the Bureau of Comparative Law of the American Bar Association. • Formerly Chief Justice of Connecticut. Author of Modern Political Institutions; American Railroad Law; &c.

Sydney John Chapman, M.A.

Professor of Political Economy and Dean of the Faculty of Commerce in the Uni- versity of Manchester. Author of The Lancashire Cotton Industry; The Cotton Industry and Trade; &c.

Samuel Wadsworth, M.A.

Barrister-at-Law of the Inner Temple and of Lincoln’s Inn. Joint-editor of the 17th – edition of Davidson’s Concise Precedents in Conveyancing.

Thomas Ashby, M.A., DXitt. (Oxon.).

Director of British School of Archaeology at Rome. Formerly Scholar of Christ Church, Oxford. Craven Fellow, 1897. Conington Prizeman, 1906. Member of the” Imperial German Archaeological Institute.

Cumae (in part).

Cuneiform.

Costume: Ancient, Oriental; Cush; Dan; David (in part); Deborah; Decalogue (in part).

Conveyancing (United States).

Cotton: Marketing and Supply. Cotton Manufacture.

Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.

Thomas Athol Joyce, M.A.

Assistant in Department of Ethnography, British Museum. Anthropological Institute.

Conveyancing (in part).

Corflnium; Cori; Cortona; Cosa; Cosenza; Cremona; Crotona; Cumae (in part); Cures.

(Convocation (in part); Corn Laws (in part) ; Coroner; Cruelty; Day.

Hon. Sec, Royal J Costume (in part).

. Sir Thomas Barclay, M.P. r Contraband;

Member of the Institute of International Law. Member of the Supreme Council I ronwnw CV*, v>/i»A- of the Congo Free State. Officer of the Legion of Honour. Author of Problems of] „..,..* J™ “;„.’.

International Practice and Diplomacy: &c. M.P. for Blackburn, 1910.

1 Declaration of Paris.

T.

T.

T.

W.

P.

V.

M.

W

.A.

B.

C.

T.F.C. Theodore Frevlinghuysen Collier, PhJ) _ {Constantinople, Councils of.

Assistant Professor of History, Williams College, Williamstown, Mass., U.S.A. {_■ r

T. K. C. Thomas Kelly Cheyne, D.D. j Cosmogony;

See the biographical article: Cheyne, T. K. \ Deluge, The. ‘

T. M. F. Thomas Macall Fallow, M.A., F.S.A. . (-Coronation;

Editor of the Antiquary, 1895-1899. Author of Memorials of Old Yorkshire; The< Cross and Crucifixion; Cathedral Churches of Ireland. L Crown and Coronet.

T. Se. Thomas Seccombe. [” . ■

Lecturer in History, East London and Birkbeck Colleges, University of London. J rnnefuntinn Pavlmriph Stanhope Prizeman, Oxford, 1887. Assistant Editor of Dictionary of National] ˆ on! “» uuue raviovicn. Biography, 1891-1901. Author of The Age of Johnson: &c. I

Sir Travers Twiss, K.C., D.CL., F.R.S. /Consulate of the Sea;

See the biographical article: TwisSj Sir Travers. \ Convocation (in part).

Thomas Willjam Fox, M.Sc.Tech. / Cotton-sDinnine Machinerv

Professor of Textiles, Manchester University. Author of Mechanism of Weaving. \ ™ uon spinning macmnery.

Victor Charles Mahillon. f cornet (in part);

Principal of the Conservatoire Royal de Musique at Brussels. Chevalier of thei Cromorne (in ■hart)

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D. (Bern.), r . Fellow of Magdalen College, Oxford. Professor of English History, St David's Crousaz, Jean Pierre de;

College* Lampeter, 1880-1881. Author of Guide du Hdut Dauphini; The Range of 1 Dauphine; the Todi; Guide to Grindelwald; Guide to Switzerland; The Alps in Nature and in Davos. . History ;&c. Editor of the Alpine Journal, 1880-1889; &c. . t

™ . » ..7 "Y",, „, . f Cope; Crete (in part) ;

W. A. P. ,,■ Walter Alison Phillips MˆA _ J cntaaa: . National, Class and

..,■ Former/y-Exhibitioner of Merton College and Senior Scholar of St John s College, i n ~ . , Oxford. Author of Modern Europe ; &c. Official ;

L Dalmatic.

W. B.* William Burton, M.A., F.C.S. f .' s

Chairman, Joint Committee of Pottery Manufacturers of Great Britain. Author of A Delia Robbia (in part). : "English StoHeware and Earthenware; &c. [_

William Bell Scott. f Cox, David;

See the biographical article: Scott, William Bell. \ Delaroche.

WiLLiXsT'CifARLES Smith, K.C., M.A., LL.D., F.R.S. (Edin.). f

Formerly Sheriff of Ross, Cromarty and Sutherland. Editor of Judicial Review, 1 Dance (in part). 1889-1900. . ' I

W. Cave Thomas. ("

Author of Symmetrical Education; Mural or Monumental Decoration; Revised Theory ■< Cornelius, Peter von.

of Light. ‘ I

Rt. Rev. William Edward Collins, D.D, r

Bishop of Gibraltar. Formerly Professor of Ecclesiastical History, King’s College, J _ , r , , .

London. Jˆecturer at Selwyn and St John’s Colleges, Cambridge. Author of The] Cyprus: C#WfC# of. ‘ . Study of. Ecclesiastical History; Beginnings of English Christianity; &c. (_

WilliaU <■ Ernest Henley. J*rw»«,. i„ m ˆ t-„„„-ˆ,„-„

See the biographical article: Henley, W.E. j Cooper, James Femmore.

w.

B.

Sc.

w.

C.

S.

w.

c.

T.

w.

E.

Co.

w.

E.

H.

w.

Fr

William Fream, LL.D. (d. 1907). f

Formerly Lecturer on Agricultural Entomology, University of Edinburgh, and! Dairy and Dairy-farming. Agricultural Correspondent of The Times. I

(-Contempt of Court; W. F. C. William Feilden Craies, M.A. _ Conversion:

Barrister-at- Law, Inner Temple. Lecturer on Criminal Law, King's College, London. 1 rnctc- rrimmoi i,„. Editor of Archbold'sCnwirea/P/ eadwg (23rd edition). wrara, wimraai LAW,

(_ Damages.

W. G. F. William George Freeman, B.Sc. (London), A.R.C.S. C

Joint-author of Nature Teaching; The World's Commercial Products. Joint-editorˆ Cotton (in part), oi Science Progress, in the Twentieth Century. '■■'[_

W. L. H. D. Wynfrid Lawrence Henry Duckworth, M.A., M.D., D.Sc. ["

, Lecturer in Physical Anthropology, and Senior Demonstrator of Human Anatomy J rT0 _ 5A *, i,*

in the University of Cambridge. Fellow of Jesus. College. Author of Morphology 1 wanlomelr y.

' and Anthropology; &c. {,

W. L.-W. Sir William : Lee-Warner, M.A., K.C.S.I. r

Member of Council of India. Formerly Secretary in the Political and Secret J Dalhousie 1st MarQUiS Department of the India Office. Author of Life of the Marquis of Dalhousie; \ '

Memoirs 'of field-Marshal Sir Henry Wylie Norman; &c. I

W. M. William Minto, M.A. Jrˆt-i™, ti.->ˆ«> /• * a

See the biographical article : Minto, William. \ Dekker ' ^^^ (»* P art) –

W. M. R. William Michael Rossetti. J Correggio;

See the biographical article: Rossetti, Dante G. \ Crivelli, Carlo.

W. P.* Walter Pitt, M.Inst.CE., M.I.M.E. fr

Member of the Committee of International Maritime Conference, I .ondon, &c. “^Cranes.

INITIALS AND HEADINGS OF ARTICLES

X1U

w.

R. E. H

w.

R. S,

w.

T. Ca.

w.

Wr.

w.

W. H.*

w.

W. R.*

William Richard Eaton Hodgkinson, Ph.D., F.R S.

Professor of Chemistry and Physics, Ordnance College, Woolwich. Formerly Pro- fessor of Chemistry and Physics, R.M.A., Woolwich. Part-author of Valentin- Hodgkinson’s Practiced Chemistry; &c.

William Robertson Smith, LL.D.

See the biographical article: Smith, W. R.

William Thomas Calman, D.Sc, F.Z.S. f S rab J fc

Assistant in charge of Crustacea, Natural History Museum, South Kensington.-; Crayfish; Author of ” Crustacea ” in A Treatise on Zoology, edited by Sir E. Ray Lankester. |_ Crustacea.

Cordite.

‘ David (in part) ; Decalogue (in part).

Williston Walker, Ph.D., D.D. .

Professor of Church History, Yale University. Author of History of the Congre- gational Churches in the United States; The Reformation; John Calvin; &c.

Cotton, John.

Hon. William Wirt Henry, M.A. (d. 1900). .,,-•• u . f

Formerly President of the American Historical Association and of the Virginia His- J Davis, Jefferson (in part). 4. :„„i c„„:„*., a,itlini- anrl FHitnr nf the life. Correspondence and Speeches of

torical Society Patrick Henry

;nr OI Hie siuieuiau nuiuiˆi jra,ui.iu,.iuu ˆ..u „. w.~ . ..„....- ,

Author and Editor of the Life, Correspondence and Speeches of

William Walker Rockwell, Lie. Theol.

Assistant Professor of Church History, Union Theological Seminary, New York.

J Council.

PRINCIPAL UNSIGNED ARTICLES

Constitution and Con-

Corporation.

Cricket. 1

Cyrenaics.

stitutional Law.

Corrupt Practices.

Crocus.

Dacia.

Consul.

Corsica.

Croquet.

Dahomey.

Cookery.

Corvee.

Cruciferae.

Damask.

Coorg.

Costa Rica.

Culdees.

Darfur.

Copper.

Count.

Cumberland.

Deacon.

Coprolites.

Court.

Curling.

Dean.

Copyhold.

Couvade.

Currant.

Death.

Copyright.

Covenanters.

Cursor Mundi.

Debt.

Coral.

Crawford, Earls of.

Cutlery.

Deccan.

Cork.

Creey.

Cycling.

Deism.

Cornell University.

Cretaceous System.

Cycloid.

Delaware.

Cornwall.

Cribbage.

Cynics.

Delirium.

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

VOLUME VII

CONSTANTINE PAVLOVICH (1779-1831), grand-duke and cesarevich of Russia, was born at Tsarskoye Selo on the 27 th of April 1779. Of

the sons born to the unfortunate tsar Paul, Petrovich and his wife Maria Feodorovna, nie princess of Wtirt- temberg, none more closely resembled his father in bodily and mental characteristics than did the second, Constantine Pavlovich. The direction of the boy's upbringing was entirely in the hands of his grandmother, the empress Catherine II. As in the case of her eldest grandson (afterwards the emperor Alexander I.), she regulated every detail of his physical and mental education; but in accordance with her usual custom she left the carrying out of her views to the men who were in her confidence. Count Nicolai Ivanovich Soltikov was supposed to be the actual tutor, but he too in his turn transferred the burden to another, only interfering personally on quite excep- tional occasions, and exercised neither a positive nor a negative influence upon the character of the exceedingly passionate, restless and headstrong boy. The only person who really took him in hand was Cesar La Harpe, who was tutor-in-chief from 1783 to May 1795 and educated both the empress's grandsons.

Like Alexander, Constantine was married by Catherine when not yet seventeen years of age, a raw and immature boy, and he made his wife, Juliana of Coburg, intensely miserable. After a first separation in the year 1799, she went back permanently to her German home in 1801, the victim of a frivolous intrigue, in the guilt of which she was herself involved. An attempt made by Constantine in 1814 to win her back to his hearth and home broke down on her firm opposition. During the time of this tragic marriage Constantine's first campaign took place under the leadership of the great Savorov. The battle of Bassignano was lost by Constantine's fault, but at Novi he distinguished himself by such personal bravery that the emperor Paul be- stowed on him the title of cesarevich, which according to the fundamental law of the constitution belonged only to the heir to the throne. Though it cannot be proved that this action of the tsar denoted any far-reaching plan, it yet shows that Paul already distrusted the grand-duke Alexander. However that may be, it is certain that Constantine never tried to secure the throne. After his father's death he led a wild and disorderly bachelor life. He abstained from politics, but remained faithful to his military inclinations, though, indeed, without manifesting anything more than a preference for the externalities of the service.

In command of the Guards during the campaign of 1805

VII. 1

Constantine had a share of the responsibility for the unfortunate turn

which events took at the battle of Austerlitz; while in 1807 neither his skill nor his fortune in war showed any improve- ment. However, after the peace of Tilsit he became an ardent admirer of the great Corsican and an upholder of the Russo- French alliance. It was on this account that in political questions he did not enjoy the confidence of his imperial brother. To the latter the French alliance had always been merely a means to an end, and after he had satisfied himself at Erfurt, and later during the Franco- Austrian War of 1809, that Napoleon like- wise regarded his relation to Russia only from the point of view of political advantage, he became convinced that the alliance must transform itself into a battle of life and death. Such insight was never attained by Constantine; even in 181 2, after the fall of Moscow, he pressed for a speedy conclusion of peace with Napoleon, and, like field-marshal Kutusov, he too opposed the policy which carried the war across the Russian frontier to a victorious conclusion upon French soil. During the campaign he was a boon companion of every commanding-officer. Barclay de Tolly was twice obliged to send him away from the army. His share in the battles in Germany and France was insignificant. At Dresden, on the 26th of August, his military knowledge failed him at the decisive moment, but at La Fere-Champenoise he distinguished himself by personal bravery. On the whole he cut no great figure. In Paris the grand-duke excited public ridicule by the manifestation of his petty military fads. His first visit was to the stables, and it was said that he had marching and drilling even in his private rooms.

In the great political decisions of those days.Constantine took not the smallest part. His importance in political history dates only from the moment when the emperor Alexander entrusted him in Poland with a task which enabled him to concentrate all the one-sidedness of his talents and all the doggedness of his nature on a definite object: that of the militarization and outward discipline of Poland. With this begins the part played by the grand-duke in history. In the Congress-Poland created by Alexander he received the post of commander-in-chief of the forces of the kingdom; to which was added later (1819) the command of the Lithuanian troops and of those of the Russian provinces that had formerly belonged to the kingdom of Poland. In effect he was the actual ruler of the country, and soon became the most zealous advocate of the separate position of Poland created by the constitution granted by Alexander. He organized their army for the Poles, and felt himself more a Pole than a

Russian, especially after his marriage, on the 27th of May 1820, with

a Polish lady, Johanna Grudzinska. Connected with this was his renunciation of any claim to the Russian succession, which was formally completed in 1822. It is well known how, in spite of this, when Alexander I. died on the 1st of December 1825 the grand-duke Nicholas had him proclaimed emperor in St Petersburg, in connexion with which occurred the famous revolt of the Russian Liberals, known as the rising of the Dekabrists. In this crisis Constantine's attitude had been very correct, far more so than that of his brother, which was vacillating and uncertain. Under the emperor Nicholas also Constantine maintained his position in Poland. But differences soon arose between him and his brother in consequence of the share taken by the Poles in the Dekabrist conspiracy. Con- stantine hindered the unveiling of the organized plotting for independence which had been going on in Poland for many years, and held obstinately to the belief that the army and the bureaucracy were loyally devoted to the Russian empire. The eastern policy of the tsar and the Turkish War of 1828 and 1829 caused a fresh breach between them. It was owing to the opposi- tion of Constantine that the Polish army took no part in this war, so that there was in consequence no Russo-Polish comrade-ship in arms, such as might perhaps have led to a reconciliation between the two nations.

The insurrection at Warsaw in November 1830 took Con- stantine completely by surprise. It was owing to his utter failure to grasp the situation that the Polish regiments passed over to the revolutionaries; and during the continuance of the revolution he showed himself as incompetent as he was lacking in judgment. Every defeat of the Russians appeared to him almost in the light of a personal gratification: his soldiers were victorious. The suppression of the revolution he did not live to see. He died of cholera at Vitebsk on the 27th of June 1831. He was an impossible man in an impossible situation. On the Russian imperial throne he would in all probability have been a tyrant like his father.

See also Karrnovich's The Cesarevich Constantine Pavlovich (2 vols., St Petersburg, 1899), (Russian); T. Schiemann's Geschichte Russ- lands unter Kaiser Nicolaus I. vol. i. (Berlin, 1904); Pusyrevski's The Russo-Polish War of 1831 (2nd ed., St Petersburg, 1890) (Russian). (T. Se.)

CONSTANTINE, a city of Algeria, capital of the department of the same name, 54 m. by railway S. by W. of the port of Philippeville, in 36°22′ N., 6° 36′ E. Constantine is the residence of a general commanding a division, of a prefect and other high officials, is the seat of a bishop, and had a population in 1906 of 46,806, of whom 25,312 were Europeans. The population of the commune, which

includes the suburbs of Constantine, was 58,435. The city occupies a romantic position on a rocky plateau, cut off on all sides save the west from the surrounding country by a beautiful ravine, through which the river Rummel flows. The plateau is 2130 ft. above sea-level, and from 500 to nearly 1000 ft. above the river bed. The ravine, formed by the Rummel, through erosion of the limestone, varies greatly in width — at its narrowest part the cliffs are only 15 ft. apart, at its broadest the valley is 400 yds. wide. At the N.E. angle of the city the gorge is spanned by an iron bridge (El-Kantara) built in 1863, giving access to the railway station, situated on Mansura hill. A stone bridge built by the Romans, and restored at various times, suddenly gave way in 1857 and is now in ruins; it was built on a natural arch, which, 184 ft. above the level of the river, spans the valley. Along the north-eastern side of the city the Rummel is spanned in all four times by these natural stone arches or tunnels. To the north the city is commanded by the Jebel Mecid, a hill which the French (following the example of the Romans) have fortified.

Constantine is walled, the extant medieval wall having been largely constructed out of Roman material. Through the centre from north to south runs a street (the rue de France) roughly dividing Constantine into two parts. The place du Palais, in which are the palace of the governor and the cathedral, and the kasbah (citadel) are west of the rue de France, as is likewise

the place Negrier, containing the law courts. The native town lies chiefly in the south-east part of the city. A striking contrast exists between the Moorish quarter, with its tortuous lanes and Oriental architecture, and the modern quarter, with its rectangular streets and wide open squares, frequently bordered with trees and adorned with fountains. Of the squares the place de Nemours is the centre of the commercial and social life of the city. Of the public buildings those dating from before the French occupation possess chief interest. The palace, built by Ahmed Pasha, the last bey of Constantine, between 1830 and 1836, is one of the finest specimens of Moorish architecture of the 19th century. The kasbah, which occupies the northern corner of the city, dates from Roman times, and preserves in its more modern portions numerous remains of other Roman edifices. It is now turned into barracks and a hospital. ‘. The fine mosque of Sidi-el-Kattani (or Salah Bey) dates from the close of the 18th century; that of Suk-er-Rezel, now transformed into a cathedral,, and called Notre-Dame des Sept Douleurs, was built about a century earlier. The Great Mosque, or Jamaa-el-Kebir, occupies the site of what was probably an ancient pantheon. The mosque Sidi-el-Akhdar has a beautiful minaret nearly 80 ft. high. The museum, housed in the hotel de ville, contains a fine

collection of antiquities, including a famous bronze statuette of the winged figure of Victory, 23 in. high, discovered in the kasbah in 1858.

A religious seminary, or medressa, is maintained in connexion with the Sidi-el-Kattani; and the French support a college and various minor educational establishments for both Arabic and European culture. The native industry of Constantine is chiefly confined to leather goods and woollen fabrics. Some 100,000 burnouses are made annually, the finest partly of wool and partly of silk. There is also an active trade in embossing or engraving copper and brass utensils. A considerable trade is carried on over a large area by means of railway connexion with Algiers, Bona, Tunis and Biskra, as well as with Philippeville. The railways, however, have taken away from the city , its monopoly of the traffic in wheat, though its share in that trade still amounts to from £400,000 to £480,000 a year.

Constantine, or, as it was orginally called, Cirta or Kirtha, from the Phoenician word for a city, was in ancient times one of the most important towns of Numidia, and the residence of the kings of the Massyli. Under Micipsa (2nd century B.C.) it reached the height of its prosperity, and was able to furnish an army of 10,000 cavalry and 20,000 infantry, Though it afterwards declined, it still continued an important military post, and is frequently mentioned during successive wars- Caesar having bestowed a part of its territory on his supporter Sittius, the latter introduced a Roman settlement, and the town for a time was known as Colonia Sittianorum. In the war of Maxentius against Alexander, the Numidian usurper, it was laid in ruins; and on its restoration in a.d. 313 by Constantine it received the name which it still retains. It was not captured during the Vandal invasion of Africa, but on the conquest by the Arabians (7th century) it shared the same fate as the surrounding country. Successive Arab dynasties looted it, and many monuments of antiquity suffered (to be finally swept away by ” municipal improvements ” under the French regime). During the 12th century it was still a place of considerable prosperity; and its commerce was extensive enough to attract the merchants of Pisa, Genoa and Venice. Frequently taken and retaken by the Turks, Constantine finally became under their dominion the seat of a bey, subordinate to the dey of Algiers. To Salah Bey, who ruled from 1770 to 1792, we owe most of the existing Moslem buildings. In 1826 Constantine asserted its independence of the dey of Algiers, and was governed by Haji Ahmed, the choice of the Kabyles. In 1836 the French under Marshal Clausel made an unsuccessful attempt to storm the city, which they attacked by night by way of El-Kantara. The French suffered heavy loss. In 1837 Marshal Valee approached the

town by the connecting western isthmus, and succeeded in taking it by assault, though again the French lost heavily. Ahmed, however, escaped and maintained his

independence in the Aures mountains. He submitted to the French in 1848 and died in 1850.

CONSTANTINOPLE, the capital of the Turkish empire, situated in 41 o' 16″ N. and 28 58′ 14″ E. The city stands at the southern extremity of the Bosporus, upon a hilly promontory that runs out from the European or western side of the straits towards the opposite Asiatic bank, as though to stem the rush of waters from the Black Sea into the Sea of Marmora. Thus the promontory has the latter sea on the south, and the bay of the Bosporus, forming the magnificent harbour known as the Golden Horn, some 4 m. long, on the north. Two streams, the Cydaris and Barbysus of ancient days, the Ali-Bey-Su and Kiahat-Hane-Su of modern times, enter the bay at its north- western end. A small winter stream, named the Lycus, that flows through the promontory from west to south-east into the Sea of Marmora, breaks the hilly ground into two great masses, — a long ridge, divided by cross-valleys into six eminences, over- hanging the Golden Horn, and a large isolated hill constituting the south-western portion of the territory. Hence the claim of Constantinople to be enthroned, like Rome, upon seven hills. The 1st hill is distinguished by the Seraglio, St Sophia and the Hippodrome; the 2nd by the column of Constantine and the mosque Nuri-Osmanieh; the 3rd by the war office, the Seraskereate Tower and the mosque of Sultan Suleiman; the 4th by the mosque of Sultan Mahommed II., the Conqueror; the 5th by the mosque of Sultan Selim; the 6th by Tekfour Serai and the quarter of Egri Kapu; the 7 th by Avret Tash and the quarter of Psamatia. In Byzantine times the two last hills were named respectively the hill of Blachernae and the Xerolophos or dry hill.

History, Architecture and Antiquities. — Constantinople is famous in history, first as the capital of the Roman empire in the East for more than eleven centuries (330-1453), and secondly as the capital of the Ottoman empire since 1453. In respect of influence over the course of human affairs, its only rivals are Athens, Rome and Jerusalem. Yet even the gifts of these rivals to the cause of civilization often bear the image and superscription of Constantinople upon them. Roman law, Greek literature, the theology of the Christian church, for example, are intimately associated with the history of the city beside the Bosporus.

The city was founded by Constantine the Great, through the enlargement of the old town of Byzantium, in a.d. 328, and was inaugurated as a new seat of government on the nth of May, a.d. 330. To indicate its political dignity, it was named New Rome, while to perpetuate the fame -of its founder it was styled Constantinople. The chief patriarch of the Greek church still signs himself ” archbishop of Constantinople, New Rome.” The old name of the place, Byzantium, however, continued in use. ‘

The creation of a new capital by Constantine was not an act of personal caprice or individual judgment. It was the result of causes long in operation, and had been foreshadowed, forty years before, in the policy of Diocletian. After the senate and people of Rome had ceased to be the sovereigns of the Roman world, and their authority had been vested in the sole person of the emperor, the eternal city could no longer claim to be the rightful throne of the state. That honour could henceforth be conferred upon any place in the Roman world which might suit the convenience of the emperor, or serve more efficiently the interests he had to guard. Furthermore, the empire was now upon its defence. Dreams of conquests and extension had long been abandoned, and the pressing question of the time was how to repel the persistent assaults of Persia and the barbarians upon the frontiers of the realm, and so retain the dominion inherited from the valour of the past. The size of the empire made it difficult, if not impossible, to attend to these assaults, or to control the ambition of successful generals, from one centre. Then the East had grown in political importance, both as the scene of the most active life in the state and as the portion of the empire most exposed to attack. Hence the famous scheme of Diocletian to divide the burden of government between four colleagues, in

order to secure a better administration of civil and of military affairs. It Was a scheme, however, that lowered the prestige of Rome, for it involved four distinct seats of government, among which, as the event proved, no place was found for the ancient capital of the Roman world. It also declared the high position of the East, by the selection of Nicomedia in Asia Minor as the residence of Diocletian himself. When Constantine, therefore, established a new seat of government at Byzantium, he adopted a policy inaugurated before his day as essential to the preserva- tion of the Roman dominion. He can claim originality only in his choice of the particular point at which that seat was placed, and in his recognition of the fact that his alliance with the Christian church could be best maintained in a new atmosphere.

But whatever view may be taken of the policy which divided the

government of the empire, there can be no dispute as to the widsom displayed in the selection of the site for a new imperial throne, ” Of all the events of Constantine’s life,” says Dean Stanley, ” this choice is the most convincing and enduring proof of his real genius.” Situated where Europe and Asia are parted by a channel never more than 5 m. across, and sometimes less than half a mile wide, placed at a point commanding the great waterway between the Mediterranean and the Black Sea, the position affords immense scope for commercial enterprise and political action in rich and varied regions of the world. The least a city in that situation can claim as its appropriate sphere of influence is the vast domain extending from the Adriatic to the Persian Gulf, and from the Danube to the eastern Mediter- ranean. Moreover, the site constituted a natural citadel, difficult to approach or to invest, and an almost impregnable refuge in the hour of defeat, within which broken forces might rally to retrieve disaster. To surround it, an enemy required to be strong upon both land and sea. Foes advancing through Asia Minor would have their march arrested, and their blows kept beyond striking distance, by the moat which the waters of the Bosporus, the Sea of Marmora and the Dardanelles combine to form. The narrow straits in which the waterway connecting the Mediterranean with the Black Sea contracts, both to the north and to the south of the city, could be rendered impassable to hostile fleets approaching from either direction, while on the landward side the line of defence was so short that it could be strongly fortified, and held against large numbers by a comparatively small force. Nature, indeed, cannot relieve men of their duty to be wise and brave, but, in the marvellous configuration of land and sea about Constantinople, nature has done her utmost to enable human skill and courage to establish there the splendid and stable throne of a great empire.

Byzantium, out of which Constantinople sprang, was a small, well-fortified town, occupying most of the territory comprised in the two hills nearest the head of the promontory, and in the level ground at their base. The landward wall started from a point near the present Stamboul custom-house, and reached the ridge of the 2nd hill, a little to the east of the point marked by Chemberli Tash (the column of Constantine). There the principal gate of the town opened upon the Egnatian road. From that gate the wall descended towards the Sea of Marmora, touching the water in the neighbourhood of the Seraglio lighthouse. The Acropolis, enclosing venerated temples, crowned the summit of the first hill, where the Seraglio stands. Immediately to the south of the fortress was the principal market-place of the town, surrounded by porticoes on its four sides, and hence named the

Tetrastoon. On the southern side of thte square stood the baths of Zeuxippus, and beyond them, still farther south, lay the Hippodrome, which Septimius Severus had undertaken to build but failed to complete. Two theatres, on the eastern slope of the Acropolis, faced the bright waters of the Marmora, and a stadium was found on the level tract on the other side of the hill, close to the Golden Horn. The Strategion, devoted to the military exercises of the brave little town, stood close to Sirkedji Iskelessi, and two artificial harbours, the Portus Prosforianus and the Neorion, indented the shore of the Golden Horn, re- spectively in front of the ground now occupied by the station of the Chemins de Fer Orientaux and the Stamboul custom-house.

CONSTANTINOPLE

CONSTANTINOPLE

One Statute Mile

Ancient sites are shown by thick lines

and fettered thus:- Hippodrome Edirn ˆ.

Wail of Byzantium.., – - ~- -. Ka/wsfc

Watt of Constantine „ *****

Byzantine Walls

wˆxiMˆzmˆmB’i

Professor

A graceful granite column, still erect on the slope above the head of the promontory, commemorated the victory of Claudius Gothicua over the Goths at Nissa, a.d. 269. All this furniture of Byzantium was appropriated for the use of the new capital.

According to Zosimus, the line of the landward walls erected by Constantine to defend New Rome was drawn at a distance of nearly 2 m. (15 stadia) to the west of the limits of the old town. It therefore ran across the promontory from the vicinity of Un Kapan Kapusi (Porta Platea), at the Stamboul head of the Inner Bridge, to the neighbourhood of Daud Pasha Kapusi (Porta S. Aemiliani), on the Marmora, and thus added the 3rd and 4th hills and portions of the 5th and 7th hills to the territory of Byzantium. We have two indications of the course of these walls on the 7th hill. One is found in the name Isa

Kapusi (the Gate of Jesus) attached to a mosque, formerly a Christian church, situated above the quarter of Psamatia. It perpetuates the memory of the beautiful gateway which formed the triumphal entrance into the city of Constantine, and which survived the original bounds of the new capital as late as 1 508, when it was overthrown by an earthquake. The other indication is the name Alti Mermer (the six columns) given to a quarter in the same neighbourhood. The name is an ignorant translation of Exa- kionion, the corrupt form of the designation Exokionion, which belonged in Byzantine days to that quarter because marked by a column outside the city limits. Hence the Arians, upon their expulsion from the city by Theodosius I., were allowed to hold

their religious services in the Exokionion, seeing that it was an extra-mural district. This explains the fact that Arians are sometimes styled Exokionitae by ecclesiastical historians. The Constantinian line of fortifications, therefore, ran a little to the east of the quarter of Alti Mermer. In addition to the territory enclosed within the limits just described, the suburb of Sycae or Galata, on the opposite side of the Golden Horn, and the suburb of Blachernae, on the 6th hill, were regarded as parts of the city, but stood within their own fortifications. It was to the ramparts of Constantine that the city owed its deliverance when attacked by the Goths, after the terrible defeat of Valens at Adrianople, a.d. 378.

In the opinion of his courtiers, the bounds assigned to New Rome by Constantine seemed, it is said, too wide, but after some eighty years they proved too narrow for the population that had gathered within the city. The barbarians had meantime also grown more formidable, and this made it necessary to have stronger fortifications for the capital. Accordingly, in 413, in the reign of Theodosius II., Anthemius, then praetorian prefect of the East and regent, enlarged and refortified the cit> by the erection of the wall which forms the innermost line of defence in the bulwarks whose picturesque ruins now stretch from the Sea of Marmora, on the south of Yedi Kuleh (the seven towers), northwards to the old Byzantine palace of the Porphyrogenitus (Tekfour Serai) , above the quarter of Egri Kapu. There the new works joined the walls of the suburb of Blachernae, and thus

protected the city on the west down to the Golden Horn. Some- what later, in 439, the walls along the Marmora and the Golden Horn were brought, by the prefect Cyrus, up to the extremities of the new landward walls, and thus invested the capital in complete armour.

Then also Constantinople attained its final size. For any subsequent extension of the city limits was insignificant, and was due to strategic considerations. In 447 the wall of Anthemius was seriously injured by one of those earthquakes to which the city is liable. The disaster was all the more grave, as the Huns under Attila were carrying everything before them in the Balkan lands. The desperateness of the situation, however, roused the government of Theodosius II., who was still upon the throne, to put forth the most energetic efforts to meet the emergency. If we may trust two contem- porary inscriptions, one Latin, the other Greek, still found on the gate Yeni Mevlevi Khaneh Kapusi (Porta Rhegium), the capital was again fully armed, and rendered more secure than ever, by the prefect Constantine, in less than two months. Not only was the wall of Anthemius restored, but, at the distance of 20 yds., another wall was built in front of it, and at the same distance from this second wall a broad moat was con- structed with a breastwork along its inner edge. Each wall was flanked by ninety-six towers. According to some authorities, the moat was flooded during a siege by opening the aqueducts, which crossed the moat at intervals and conveyed water into the city in time of peace. This opinion is extremely doubtful. But in any case, here was a barricade 190-207 ft. thick, and 100 ft. high, with its several parts rising tier above tier to permit concerted action, and alive with large bodies of troops ready to pour, from every coign of vantage, missiles of death — arrows, stones, Greek fire — upon a foe. It is not strange that these fortifications defied the assaults of barbarism upon the civilized life of the world for more than a thousand years. As might be expected, the walls demanded frequent restoration from time to time in the course of their long history. Inscriptions upon them record repairs, for example, under Justin II., Leo the Isaurian, Basil II., John Palaeologus, and others. Still, the ramparts extending now from the Marmora to Tekfour Serai are to all intents and purposes the ruins of the Theodosian walls of the 5th century.

This is not the case in regard to the other parts of the fortifica- tions of the city. The walls along the Marmora and the Golden Horn represent the great restoration of the seaward defences of the capital carried out by the emperor Theophilus in the 9th century; while the walls between Tekfour Serai and the Golden Horn were built long after the reign of Theodosius II., super- seding the defences of .that quarter of the city in his day, and relegating them, as traces of their course to the rear of the later works indicate, to the secondary office of protecting the palace of Blachernae. In 627 Heraclius built the wall along the west of the quarter of Aivan Serai, in order to bring the level tract at the foot of the 6th hill within the city bounds, and shield the church of

Blachernae, which had been exposed to great danger during the siege of the city by the Avars in that year. In 813 Leo V. the Armenian built the wall which stands in front of the wall of Heraclius to strengthen that point in view of an expected attack by the Bulgarians.

The splendid wall, flanked by nine towers, that descends from the court of Tekfour Serai to the level tract below Egri Kapu, was built by Manuel Comnenus (1143-1180) for the greater security of the part of the city in which stood the palace of Blachernae, then the favourite imperial residence. Lastly, the portion of the fortifications between the wall of Manuel and the wall of Heraclius presents too many problems to be discussed here. Enough to say, that in it we find work belonging to the times of the Comneni, Isaac Angelus and the Palaeologi.

If we leave out of account the attacks upon the city in the course of the civil wars between rival parties in the empire, the fortifications of Constantinople were assailed by the Avars in 627; by the Saracens in 673-677, and again in 718; by the Bulgarians in 813 and 913; by the forces of the Fourth Crusade in 1203-1204; by the Turks in 1422 and 1453. The city was

taken in 1204, and became the seat of a Latin empire until 1261, when it was recovered by the Greeks. On the 29th of May 1453 Constantinople ceased to be the capital of the Roman empire in the East, and became the capital of the Ottoman dominion.

The most noteworthy points in the circuit of the walls of the city are the following. (1) The Golden gate, now included in the Turkish fortress of Yedi Kuleh. It is a triumphal archway, consisting of three arches, erected in honour of the victory of Theodosius I. over Maximus in 388, and subsequently incorpor- ated in the walls of Theodosius II., as the state entrance of the capital. (2) The gate of Selivria, or of the Pege, through which Alexius Strategopoulos made his way into the city in 1261, and brought the Latin empire of Constantinople to an end. (3) The gate of St Romanus (Top Kapusi), by which, in 1453, Sultan Mahommed entered Constantinople after the fall of the city into Turkish hands. (4) The great breach made in the ramparts crossing the valley of the Lycus, the scene of the severest fighting in the siege of 1453, where the Turks stormed the city, and the last Byzantine emperor met his heroic death. (5) The palace of the Porphyrogenitus,long erroneously identified with the palace of the Hebdomon, which really stood at Makrikeui. It is the finest specimen of Byzantine civil architecture left in the city. (6) The tower of Isaac Angelus and the tower of Anemas, with the chambers in the body of the wall to the north of them. (7) The wall of Leo, against which the

troops of the Fourth Crusade came, in 1203, from their camp on the hill opposite the wall, and delivered their chief attack. (8) The walls protecting the quarter of Phanar, which the army and fleet of the Fourth Crusade under the Venetian doge Henrico Dandolo carried in 1204. (9) Yali Kiosk Kapusi, beside which the southern end of the chain drawn across the mouth of the harbour during a siege was attached. (10) The ruins of the palace of Hormisdas, near Chatladi Kapu, once the residence of Justinian the Great and Theodora. It was known in later times as the palace of the Bucoleon, and was the scene of the assassination of Nicephorus Phocas. (n) The sites of the old harbours between Chatladi Kapu and Daud Pasha Kapusi. (12) The fine marble tower near the junction of the walls along the Marmora with the landward walls.

The interior arrangements of the city were largely determined by the configuration of its site, which falls into three great divi- sions, — the level ground and slopes looking towards the Sea of Marmora, the range of hills forming the midland portion of the promontory, and the slopes and level ground facing the Golden Horn. In each division a great street ran through the city from east to west, generally fined with arcades on one side, but with arcades on both sides when traversing the finer and busier quarters. The street along the ridge formed the principal thoroughfare, and was named the Mese (Me

Of the edifices and monuments which adorned the fora, only a slight sketch can be given here. On the north side of the Augustaion rose the church of St Sophia, the most glorious cathedral of Eastern Christendom; opposite, on the southern side of the square, was the Chalce, the great gate of the imperial palace; on the east was the senate house, with a porch of six noble columns; to the west, across the Mes6, were the law courts. In the area of the square stood the Milion, whence dis- tances from Constantinople were measured, and a lofty column which bore the equestrian statue of Justinian the Great. There also was the statue of the empress Eudoxia, famous in the history of Chrysostom, the pedestal of which is preserved near the church

of St Irene. The Augustaion was the heart of the city's ecclesi- astical and political life. The forum of Constantine was a great business centre . Its most remarkable monument was the column of Constantine, built of twelve drums of porphyry and bearing aloft his

statue. Shorn of much of its beauty, the column still stands to proclaim the enduring influence of the foundation of the city.

In the forum of Theodosius I. rose a column in his honour, constructed on the model of the hollow columns of Trajan and Marcus Aurelius at Rome. There also was the Anemodoulion, a beautiful pyramidal structure, surmounted by a vane to indicate the direction of the wind. Close to the forum, if not in it, was the capitol, in which the university of Constantinople was estab- lished. The most conspicuous object in the forum of the Bous was the figure of an ox, in bronze, beside which the bodies of criminals were sometimes burnt. Another hollow column, the pedestal of which is now known as Avret Tash, adorned the forum of Arcadius. A column in honour of the emperor Martian still stands in the valley of the Lycus, below the mosque of Sultan Mahommed the Conqueror. Many beautiful statues, belonging to good periods of Greek and Roman art, decorated the fora, streets and public buildings of the city, but conflagra- tions and the vandalism of the Latin and Ottoman conquerors of Constantinople have robbed the world of those treasures.

The imperial palace, founded by Constantine and extended by his successors, occupied the territory which lies to the east of St Sophia and the Hippodrome down to the water's edge. It consisted of a large number of detached buildings, in grounds made beautiful with gardens and trees, and commanding magnifi- cent views over the Sea of Marmora, across to the hills and moun- tains of the Asiatic coast. The buildings were mainly grouped in three divisions—the Chalce, the Daphne and the " sacred palace." Labarte and Paspates have attempted to reconstruct the palace, taking as their guide the descriptions given of it by Byzantine writers. The work of Labarte is specially valuable, but without proper excavations of the site all attempts to restore the plan of the palace with much accuracy lack a solid foundation. With the accession of Alexius Comnenus, the palace of Blachernae, at the north-western corner of the city, became, the principal residence of the Byzantine court, and was in con- sequence extended and embellished. It stood in a more retired position, and was conveniently situated for excursions into the country and hunting expeditions. Of the palaces outside the walls, the most frequented were the palace at the Hebdomon, now Makrikeui, in the early days of the Empire, and the palace of the Pege, now Balukli, a short distance beyond the gate of Selivria, in later times. For municipal purposes, the city was divided, like Rome, into fourteen Regions.

As the seat of the chief prelate of Eastern Chris teRdom, Constantinople was characterized by a strong theological and:

ecclesiastical temperament. It was full of churches and mona- steries, enriched with the reputed relics of saints, prophets and martyrs, which consecrated it a holy city and attracted pilgrims from every quarter to its shrines. It was the meeting-place of numerous ecclesiastical councils, some of them ecumenical (see below, Constantinople, Councils of). It was likewise dis- tinguished for its numerous charitable institutions. Only some twenty of the old churches of the city are left. Most of them have been converted into mosques, but they are valuable monuments of the art which flourished in New Rome. Among the most interesting are the following. St John of the Studium (Emir- Achor Jamissi) is a basilica of the middle of the 5th century, and the oldest ecclesiastical fabric in the city; it is now, un- fortunately, almost a complete ruin. SS. Sergius and Bacchus (Kutchuk Aya Sofia) and St Sophia are erections of Justinian the Great. The former is an example of a dome placed on an octagonal structure, and in its general plan is similar to the con- temporary church of S. Vitale at Ravenna. St Sophia (i.e. ‘kyia 2o$i

Constantine, and repaired by Justinian, is in its present form mainly a restoration by Leo the Isaurian, in the middle of the 8th century. St Mary Panachrantos (Fenari Isa Mesjidi) belongs to the reign of Leo the Wise (886-91 2) . The Myrelaion (Bodrum Jami) dates from the 10th century. The Pantepoptes (Eski Imaret Jamissi), the Pantocrator (Zeirek Kilisse Jamissi), and the body of the church of the Chora (Kahriyeh Jamissi) represent the age of the Comneni. The Pammacaristos (Fetiyeh Jamissi) , St Andrew in Krisei (Khoja Mustapha Jamissi) , the narthexes and side chapel of the Chora were, at least in their present form, erected in the times of the Palaeologi. It is difficult to assign precise dates to SS. Peter and Mark (Khoda Mustapha Jamissi at Aivan Serai), St Theodosia (Gul Jamissi), St Theodore Tyrone (Kilisse Jamissi). The beautiful facade of the last is later than the other portions of the church, which have been assigned to the 9th or 10th century.

For the thorough study of the church of St Sophia, the reader must consult the works of Fossati, Salzenburg, Lethaby and Swainson, and Antoniadi. The present edifice was built by Justinian the Great, under the direction of Anthemius of Tralles and his nephew Isidorus of Miletus. It was founded in 532 and dedicated on Christmas Day 538. It replaced two earlier churches of that name, the first of which was built by Constantius and burnt down in 404, on the occasion of the exile of Chrysostom, while the second was erected by Theodosius II. in 415, and destroyed by fire in the Nika riot of 532. Naturally the church has undergone repair from time to time. The original dome fell in 558, as the result of an earthquake, and among the im- provements

introduced in the course of restoration, the dome was raised 25 ft. higher than before. Repairs are recorded under Basil I., Basil II., Andronicus III. and Cantacuzene. Since the Turkish conquest a minaret has been erected at each of the four exterior angles of the building, and the interior has been adapted to the requirements of Moslem worship, mainly by the destruction or concealment of most of the mosaics which adorned the walls. In 1847-1848, during the reign of Abd-ul-Mejid, the building was put into a state of thorough repair by the Italian architect Fossati. Happily the sultan allowed the mosaic figures, then exposed to view, to be covered with matting before being plastered over. They may reappear in the changes which the future will bring.

The exterior appearance of the church is certainly disappoint- ing, but within it is, beyond all question, one of the most beautiful creations of human art. On a large scale, and in magnificent style, it combines the attractive features of a basilica, with all the glory of an edifice crowned by a dome. We have here a stately hall, 235 ft. N. and S., by 250 ft. E. and W., divided by two piers and eight columns on either hand into nave and aisles, with an apse at the eastern end and galleries on the three other sides. Over the central portion of the nave, a square area at the angles of which stand the four piers, and at a height of 179 ft. above the floor, spreads a dome, 107 ft. in diameter, and 46 ft. deep, its base pierced by forty arched windows. From the cornice of the dome stretches eastwards and westwards a semi dome, which in its turn rests upon three small semi-domes. The nave is thus covered completely by a domical canopy, which, in its ascent, swells larger and larger, mounts higher and higher, as though a miniature heaven rose overhead. For light- ness, for grace, for proportion, the effect is unrivalled. The walls of the building are reveted with marbles of various hues and patterns, arranged to form beautiful designs, and traces of the mosaics which joined the marbles in the rich and soft coloration of the whole interior surface of the building appear at many points. There are forty columns on the ground floor and sixty in the galleries, often crowned with beautiful capitals, in which the monograms of the emperor Justinian and the empress Theo- dora are inscribed. The eight porphyry columns, placed in pairs in the four bays at the corners of the nave, belonged originally to the temple of the sun at Baalbek. They were subsequently carried to Rome by Aurelian, and at length presented to Justinian by a lady named Marcia, to be erected in this church ” for the salvation of her soul.” The columns of verde antique on either

side of the nave are commonly said to have come from the temple of Diana at Ephesus, but recent authorities regard them as specially cut for use in the church. The inner narthex of the church formed a magnificent vestibule 205 ft. long by 26 ft. wide, reveted with marble slabs and glowing with mosaics.

The citizens of Constantinople found their principal recreation in the chariot-races held in the Hippodrome, now the At Meidan, to the west of the mosque of Sultan Ahmed. So much did the race-course (begun by Severus but completed by Constantine) enter into the life of the people that it has been styled ” the axis of the Byzantine world.” It was not only the scene of amuse- ment, but on account of its ample accommodation it was also the arena of much of the political life of the city. The .factions, which usually contended there in sport, often gathered there in party strife. There emperors were acclaimed or insulted; there military triumphs were celebrated; there criminals were executed, and there martyrs were burned at the stake. Three monuments remain to mark the line of the Spina, around which the chariots whirled; an Egyptian obelisk of Thothmes III., on a pedestal covered with bas-reliefs representing Theodosius I., the empress Galla, and his sons Arcadius and Honorius, pre- siding at scenes in the Hippodrome; the triple serpent column, which stood originally at Delphi, to commemorate the victory of Plataea 479 B.C.; a lofty pile of masonry, built in the form of an obelisk, and once covered with plates of gilded bronze. Under the Turkish buildings along the western side of the arena, some arches against which seats for the spectators were built are still visible.

The city was supplied with water mainly from two sources; from the streams immediately to the west, and from the springs and rain impounded in reservoirs in the forest of Belgrade, to the north-west, very much on the system followed by the Turks. The water was conveyed by aqueducts, concealed below the surface, except when crossing a valley. Within the city the water was stored in covered cisterns, or in large open reservoirs. The aqueduct of Justinian, the Crooked aqueduct, in the open country, and the aqueduct of Valens that spans the Valley between the 4th and 3rd hills of the city, still carry on their beneficent work, and afford evidence of the attention given to the water-supply of the capital during the Byzantine period. The cistern of Arcadius, to the rear of the mosque of Sultan Selim (having, it has been estimated, a capacity of 6,571,720 cubic ft. of water), the cistern of Aspar, a short distance to the east of the gate of Adrianople, and the cistern of Mokius, on the 7th hill, are speci- mens

of the open reservoirs within the city walls. The cistern of Bin Bir Derek (cistern of Illus) with its 224 columns, each built up with three shafts, and the cistern Yeri Batan Serai (Cisterna Basilica) with its 420 columns show what covered cisterns were, on a grand scale. The latter is still in use. 1

Byzantine Constantinople was a great commercial centre. To equip it more fully for that purpose, several artificial harbours were constructed along the southern shore of the city, where no natural haven existed to accommodate ships coming up the Sea of Marmora. For the convenience of the imperial court, there was a small harbour in the bend of the shore to the east of Chatladi Kapu, known as the harbour of the Bucoleon. To the west of that gate, on the site of Kadriga Limani (the Port of the Galley), was the harbour of Julian, or, as it was named later, the harbour of Sophia (the empress of Justin II.). Traces of the harbour styled the Kontoscalion are found at Kum Kapu. To the east of Yeni Kapu stood the harbour of Kaisarius or the Heptascalon, while to the west of that gate was the harbour which bore the names of Eleutherius and of Theodosiur I. A harbour named after the Golden gate stood on the shore to the south-west of the triumphal gate of the city.

The Modern City. — As the capital of the Ottoman empire, the aspect of the city changed in many ways. The works of

1 For full information on the subject of the ancient water-supply see Count A. F. Andreossy, Constantinople et le Bosphore ; Tchikat- chev, Le Bosphore et Constantinople (2nd ed., Paris, 1865); Forch- heimer and Strzygowski, Die byzantinischen Wasserbehdlter ; also article Aqueduct.

art which adorned New Rome gradually disappeared. The streets, never very wide, became narrower, and the porticoes along their sides were almost everywhere removed. A multitude of churches were destroyed, and most of those which survived were converted into mosques. In race and garb and speech the population grew largely oriental. One striking alteration in the appearance of the city was the conversion of the territory extending from the head of the promontory to within a short distance of St Sophia into a great park, within which the buildings constituting the seraglio of the sultans, like those forming the palace of the Byzantine emperors, were ranged around three courts, distinguished by their respective gates — Bab-i-Humayum, leading into the court of the Janissaries; Orta Kapu, the middle gate, giving access to the court in which the sultan held state receptions; and Bah-i-Saadet, the gate of Felicity, leading to the more

private apartments of the palace. From the reign of Abd-ul-Mejid, the seraglio has been practically abandoned, first for the palace of Dolmabagche on the shore near Beshiktash, and now for Yildiz Kiosk, on the heights above that suburb. It is, however, visited annually by the sultan, to do homage to the relics of the prophet which are kept there. The older apartments- of the palace, such as the throne-room, the Bagdad Kiosk, and many of the objects in the imperial treasury are of extreme interest to all lovers of oriental art. To visit the seraglio, an imperial irade is necessary. Another great change in the general aspect of the city has been produced by the erection of stately mosques in the most commanding situations, where dome and, minarets, and huge rectangular buildings present a combination of mass and slenderness, of rounded lines and soaring pinnacles, which gives to Constantinople an air of unique dignity and grace, and at the same time invests it with the glamour of the oriental world- The most remarkable mosques are the following: — The mosque of Sultan Mahommed the Conqueror, built on the site of the church of the Holy Apostles, in 1459, but rebuilt in 1768 owing to injuries due to an earthquake;., the mosques of Sultan Selim, of the Shah Zadeh, of Sultan Suleiman and of Rustem: Pasha — all works of the 16th century, the best period of Turkish architecture; the mosque of Sultan Bayezid II. (1497-1505);- the mosque of Sultan Ahmed I. (1 610); Yeni- Valide-Jamissi (1615-1665); Nuri-Osmanieh (1748-1755); Laleli-Jamissi (1765). The Turbehs containing the tombs of the sultans and, members of their families are often beautiful specimens of Turkish art. ,

In their architecture, the mosques present a striking instance of the influence of the Byzantine style, especially as it appears in St Sophia. The architects of the mosques have made a skilful use of the semi-dome in the support of the main dome of the building, and in the Consequent extension of the arched canopy that spreads over the worshipper. In some cases the main dome rests upon four semi-domes. At the same time, when viewed from the exterior, the main dome rises large, bold and commanding, with nothing of the squat appearance that mars the dome of St Sophia, with nothing of the petty prettiness of the little domes perched on the drums of the later Byzantine churches. The great mosques express the spirit of the days when the Ottoman empire was still mighty and ambitious. Occasionally, as in the case of Laleli Jamissi, where the dome rests upon an octagon inscribed in a square, the influence of SS. Sergius and Bacchus is perceptible.

For all intents and purposes, Constantinople is now the collection of towns and villages situated on both sides of the Golden Horn and along the shores of the Bosporus, including Scutari and Kadikeui. But

the principal parts of this great agglomeration are Stamboul (from Gr. ds tt\v ttoKlv, ” into the city “), the name specially applied to the portion of the city upon the promontory, Galata and Pera. Galata has a long history, which becomes of general interest after 1265, when it was assigned to the Genoese merchants in the city by Michael Palaeologus, in return for the friendly services of Genoa in the overthrow of the Latin empire of Constantinople. In the course of time, notwithstanding stipulations to the contrary, the town was strongly fortified and proved a troublesome neighbour

During the siege of 1453 the inhabitants maintained on the whole a neutral attitude, but on the fall of the capital they surrendered to the Turkish conqueror, who granted them liberal terms. The walls have for the most part been removed. The noble tower, however, which formed the citadel of the colony, still remains, and is a striking feature in the scenery of Constantinople. There are also churches and houses dating from Genoese days. Galata is the chief business centre of the city, the seat of banks, post- offices, steamship offices, &c. Pera is the principal residential quarter of the European communities settled in Constantinople, where the foreign embassies congregate, and the fashionable shops and hotels are found.

Since the middle of the 19th century the city has yielded more and more to western influences, and is fast losing its oriental character. The sultan’s palaces, and the residences of all classes of the community, adopt with more or less success a European style of building. The streets have been widened and named. They are in many instances better paved, and are lighted at night. The houses are numbered. Cabs and tramways have been introduced. Public gardens have been opened. For some distance outside the Galata bridge, both shores of the Golden Horn have been provided with a quay at which large steamers can moor to discharge or embark their passengers and cargo. The Galata quay, completed in 1889, is 756 metres long and 20 metres wide; the Stamboul quay, completed in 1900, is 378 metres in length. The harbour, quays and facilities for handling merchandise, which have been established at the head of the Anatolian railway, at Haidar Pasha, under German auspices, would be a credit to any city. It is true that most of these improvements are due to foreign enterprise and serve largely foreign interests; still they have also benefited the city, and added much to the convenience and comfort of local life. There has been likewise progress in other than material respects. The

growth of the imperial museum of antiquities, under the direction of Hamdy Bey, within the grounds of the Seraglio, has been remarkable; and while the collection of the sarcophagi discovered at Sidon constitutes the chief treasure of the museum, the institution has become a rich storehouse of many other valuable relics of the past. The existence of a school of art, where painting and architecture are taught, is also a sign of new times. A school of handicrafts flourishes on the Sphendone of the Hippodrome. The fine medical school between Scutari and Haidar Pasha, the Hamidieh hospital for children, and the asylum for the poor, tell of the advance of science and humanity in the place.

Considerable attention is now given to the subject of education throughout the empire, a result due in great measure to the influence of the American and French schools and colleges established in the provinces and at the capital. More than thirty foreign educational institutions flourish in Constantinople itself, and they are largely attended by the youth belonging to the native communities of the country. The Greek population is provided with excellent schools and gymnasia, and the Armenians also maintain schools of a high grade. The Turkish government itself became, moreover, impressed with the import- ance of education, and as a consequence the whole system of public instruction for the Moslem portion of the population was, during the reign of Sultan Abd-ul-Hamid II., more widely extended and improved. Beside the schools of the old type attached to the mosques, schools of a better class were estab- lished under the direct control of the minister of education, which, although open to improvement, certainly aimed at a higher standard than that reached in former days. The progress of education became noticeable even among Moslem girls. The social and political influence of this intellectual improvement among the various communities of the empire soon made itself felt, and had much to do with the startling success of the con- stitutional revolution carried out, under the direction of the Committee of Union and Progress, in the autumn of 1908.

Climate. — The climate of the city is healthy, but relaxing. It is damp and liable to sudden and great changes of temperature. The winds from the north and those from the south are at

constant feud, and blow cold or hot in the most capricious manner, often in the course of the same day. ” There are two climates at Constantinople, that of the north and that of the south wind.” The winters may be severe, but when mild they are wet and not invigorating. In summer the heat is tempered by the prevalence of a

north-east wind that blows down the channel of the Bosporus. Observations at Constantinople and at Scutari give the following results, for a period of twenty years.

Constantinople.

Scutari.

Mean temperature Maximum ….

Rain

Number of rainy days .

57:7′ 99 1′

17° 2′

28-3 in.

112

58° 1′ 105° 6′

13*0′

29-29 in.

128-6

The sanitation of the city has been improved, although much remains to be done in that respect. No great epidemic has visited the city since the outbreak of cholera in 1866. Typhoid and pulmonary diseases are common.

Population. — The number of the population of the city is an uncertain figure, as no accurate statistics can be obtained. It is generally estimated between 800,000 and 1,000,000. The inhabitants present a remarkable conglomeration of different races, various nationalities, divers languages, distinctive costumes and conflicting faiths, giving, it is true, a singular interest to what may be termed the human scenery of the city, but rendering impossible any close social cohesion, or the de- velopment of a common civic life. Constantinople has well been described as ” a city not of one nation but of many, and hardly more of one than of another.” The following figures are given as an approximate estimate of the size of the communities which compose the population.

Moslems 384,910

Greeks 152,741

Greek Latins 1,082

Armenians 149,590

Roman Catholics (native) . . 6,442

Protestants (native) 819

Bulgarians 4.377

Jews . . 44-3 61

Foreigners 129,243

873.565

Water-Supply. — Under the rule of the sultans, the water- supply of the city has been greatly extended. The reservoirs in the forest of Belgrade have been enlarged and increased in number, and new aqueducts have been added to those erected by the Byzantine emperors. The use of the old cisterns within the walls has been almost entirely abandoned, and the water is led to basins in vaulted chambers (Taxim), from which it is distributed by underground conduits to the fountains situated in the different quarters of the city. From these fountains the water is taken to a house by water-carriers, or, in the case of the humbler classes, by members of the household itself.

For the supply of Pera, Galata and Beshiktash, Sultan Mahmud I. constructed, in 1732, four bends in the forest of Belgrade, N.N.W. and N.E. of the village of Bagchekeui, and the fine aqueduct which spans the head of the valley of Buyuk- der6. Since 1885, a French company, La Compagnie des Eaux, has rendered a great service by bringing water to Stamboul, Pera, and the villages on the European side of the Bosporus, from Lake Dercos, which lies close to the shore of the Black Sea some 29 m. distant from the city. The Dercos water is laid on in many houses. Since 1893 a German company has supplied Scutari and Kadikeui with water from the valley of the Sweet Waters of Asia.

Trade. — The trade of the city has been unfavourably affected by the political events which have converted former provinces of the Turkish empire into autonomous states, by the develop- ment of business at other ports of the empire, owing to the opening up of the interior

country through the construction of railroads, and by the difficulties which the government, with the view of preventing political agitation, has put in the way of

easy intercourse by natives between the capital and the provinces. Most of the commerce of the city is in hands of foreigners and of Armenian and Greek merchants. Turks have little if anything to do with trade on a large scale. ” The capital, ” says a writer in the Konstantinopler Handelsblatt of November 1904, ” pro- duces very little for export, and its hinterland is small, extending on the European side only a few kilometres — the outlet for the fertile Eastern Rumelia is Dedeagach — and on the Asiatic side embracing the Sea of Marmora and the Anatolian railway district. Even part of this will be lost to Constantinople when the Anatolian railway is connected with the port of Mersina and with the Kassaba-Smyrna railway. Some 750 tons of the sweetmeat known as ‘ Turkish delight ‘ are annually exported to the United Kingdom, America and Rumelia; embroideries, &c, are sold in fair quantities to tourists. Otherwise the chief articles of Constantinople’s export trade consist of refuse and waste materials, sheep’s wool (called Kassab bashi) and skins from the slaughter-houses (in 1903 about 3,000,000 skins were exported, mostly to America), horns, hoofs, goat and horse hair, guts, bones, rags, bran, old iron, &c, and finally dogs’ excre- ments, called in trade ‘ pure,’ a Constantinople speciality, which is used in preparing leather for ladies’ gloves. From the hinter- land comes mostly raw produce such as grain, drugs, wool, silk, ores and also carpets. The chief article is grain.”

The average value of the goods passing through the port of Constantinople at the opening of the 20th century was estimated at about £ T 1 1,000,000. From the imperfect statistics available, the following tables of the class of goods imported and exported, and their respective values, were drawn up in 1901 by the late Mr Whittaker, The Times correspondent.

Imports. Manufactured goods (cotton, woollen,

silk, &c.)

Haberdashery, ironmongery

Sugar

Petroleum

Flour

Coffee

Rice

Cattle

Various

fT 1 3,500,000

90,000 500,000 400,000 400,000 300,000 250,000 100,000 850,000

Total . £T 7,000,000

Cereals .

Mohair

Carpets .

Silk and cocoons

Opium

Gum tragacanth

Wool

Hides

Various .

Exports.

£T 1,000,000

800,000 700,000 500,000 400,000 150,000 100,000 100,000 250,000

Total . £T 4,100,000

About 40% of the import trade of Constantinople is British. According to the trade report of the British consulate, the share of the United Kingdom in the value of £7,142,000 on the total imports to Constantinople during the year 1900-1901 was £1,811,000; while the share of the United Kingdom in the value of £2,669,000 on the total exports during the same year was £998,000. But it is worthy of note

that while British commerce still led the way in Turkey, the trade of some other countries with Turkey, especially that of Germany, was increas- ing more rapidly. Comparing the average of the period 1896-1900 with the total for 1904, British trade showed an increase of 33%, Austro-Hungarian of nearly 60%, Germany of 130%, Italian of 98%, French of 8%, and Belgian of nearly 33%. The shipping visiting the port of Constantinople during the year 1905, excluding sailing and small coasting vessels, was 9796, representing a total of 14,785,080 tons. The percentage of steamers under the British flag was 37-1; of tonnage, 45-9.

Administration. — For the preservation of order and security, the city is divided into four divisions (Belad-i-Selassi), viz. 1 A Turkish lira = 18 shillings (English).

Stamboul, Pera-Galata, Beshiktash and Scutari. The minister of police is at the head of the administration of the affairs of these divisions, and is ex-officio governor of Stamboul. The governors of the other divisions are subordinate to him, but are appointed by the sultan. Each governor has a special staff of police and gendarmery and his own police-court. In each division is a military commander, having a part of the garrison of the city under his orders, but subordinate to the commander-in-chief of the troops guarding the capital.

The municipal government of the four divisions of the city is in the hands of a prefect, appointed by the sultan, and sub- ordinate to the minister of the interior. He is officially styled the prefect of Stamboul, and is assisted by a council of twenty-four members, appointed by the sultan or the minister of the interior. All matters concerning the streets, the markets, the bazaars, the street-porters (hamals), public weighers, baths and hospitals come under his jurisdiction. He is charged also with the collec- tion of the city dues, and the taxes on property. The city is furthermore divided into ten municipal circles as follows. In Stamboul: (1) Sultan Bayezid, (2) Sultan Mehemet, (3) Djerah Pasha (Psamatia); on the European side of the Bosporus and the northern side of the Golden Horn: (4) Beshiktash, (5) Yenikeui, (6) Pera, (7) Buyukdere ; on the Asiatic side of the Bos- porus: (8) Anadol Hissar, (9) Scutari, (10) Kadikeui. Each circle is subdivided into several wards (mahalleh). ” The out- lying parts of the city are divided into six districts (Cazas), namely, Princes’ Islands, Guebzeh, Beicos, Kartal, Kuchuk- Chekmedje and Shile, each having its governor (kaimakam), who is usually chosen by the palace. These districts are depend- encies of the ministry of the interior, and their municipal affairs are directed by agents of the prefecture.”

In virtue of old treaties, known as the Capitulations (q.v.), foreigners enjoy to a large extent the rights of exterritoriality. In disputes with one another, they are judged before their own courts of justice. In litigation between a foreigner and a native, the case is taken to a native court, but a representative of the foreigner's consulate attends the proceedings. Foreigners have a right to establish their own schools and hospitals, to hold their special religious services, and even to maintain their respective national post-offices. No Turkish policeman may enter the premises of a foreigner without the sanction of the consular authorities to whose jurisdiction the latter belongs. A certain measure of self-government is likewise granted to the native Christian communities under their ecclesiastical chiefs.

Bibliography. — On Constantinople generally, besides the regular guide-books and works already mentioned, see P. Gyllius, De topographic, Constantinopoleos, De Bosporo Thracio (1632) ; Du Cange, Constantinopolis Christiana (1680); J. von Hammer, Constantinopolis und der Bosporos (1822) ; Mordtmann, Esquisse topographique de Constantinople (1892) ; E. A. Grosvenor, Constantinople (1895); van Millingen, Byzantine Constantinople (1899); Paspates, Bvfaimval MeXkrai (1877) ; Scarlatos Byzantios, 'H Koivaravrlvov t6Xk (1851) ; E. Pears, Fall of Constantinople (1885), The Destruction of the Greek Empire (1903) ; Gibbon, The Decline and Fall of the Roman Empire; Salzenberg, Altchristliche Baudenkmale von Konstantinopel; Lethaby and Swainson, The Church of Sancta Sophia; Pulgher, Les Anciennes £,glises byzantines de Constantinople; Labarte, Le Palais imperial de Constantinople et ses abords. (A. van M.)

CONSTANTINOPLE, COUNCILS OF. Of the numerous eccle- siastical councils held at Constantinople the most important are the following:

1. The second ecumenical council, 381, which was in reality only a synod of bishops from Thrace, Asia and Syria, convened by Theodosius with a view to uniting the church upon the basis of the Orthodox faith. No Western bishop was present, nor any Roman legate; from Egypt came only a few bishops, and these tardily. The first president was Meletius of Antioch, whom Rome regarded as schismatic. Yet, despite its sectional char- acter, the council came in time to be regarded as ecumenical alike in the West and in the East.

The council reaffirmed the Nicene faith and denounced all opposing doctrines. The so-called " Niceno-Constantinopolitan Creed," which has almost universally been ascribed to this council, is certainly not the Nicene creed nor even a recension

of it, but most likely a Jerusalem baptismal formula revised by the interpolation of a few Nicene test-words. More recently its claim to be called ” Constantinopolitan ” has been challenged. It is not found in the earliest records of the acts of the council, nor was it referred to by the council of Ephesus (431), nor by the ” Robber Synod ” (449), although these both confirmed the Nicene faith. It also lacks the definiteness one would expect in a creed composed by an anti-Arian, anti-Pneumatomachian council. Harnack (Herzog-Hauck, Realencyklopadie, 3rd ed., s.v. ” Konstantinopolit. Symbol.”) conjectures that it was ascribed to the council of Constantinople just before the council of Chalcedon in order to prove the orthodoxy of the Fathers of the second ecumenical council. At all events, it became the creed of the universal church, and has been retained without change, save for the addition of filioque.

Of the seven reputed canons of the council only the first four are unquestionably genuine. The fifth and the sixth probably belong to a synod of 382, and the seventh is properly not a canon. The most important enactments of the council were the granting of metropolitan rights to the bishops of Alexandria, Antioch, Thrace, Pontus and Ephesus; and according to Constantinople the place of honour after Rome, against which Rome protested. Not until 1 50 years later, and then only under compulsion of the emperor Justinian, did Rome acknowledge the ecumenicity of the council, and that merely as regarded its doctrinal decrees.

See Mansi iii. pp. 521-599; Hardouin i. pp. 807-826; Hefele, 2nd ed., ii. pp. I sqq. (English translation, ii. pp. 340 sqq.) ; Hort, Two Dissertations (Cambridge, 1876) ; and the article Creeds.

2. The council of 553, the fifth ecumenical, grew out of the controversy of the ” Three Chapters,” an adequate account of which, up to the time of the council, may be found in the articles Justinian and Vigilids. The council convened, in response to the imperial summons, on the 4th of May 553. Of the 165 bishops who subscribed the acts all but the five or six from Egypt were Oriental; the pope, Vigilius, refused to attend (he had made his escape from Constantinople, and from his retreat in Chalcedon sent forth a vain protest against the council) . The synod was utterly subservient to the emperor. The ” Three Chapters ” were condemned, and their authors, long dead, anathematized, without, however, derogating from the

authority of the council of Chalcedon, which had given them a clean bill of orthodoxy. Vigilius was excommunicated, and his name erased from the diptychs. The Orthodox faith was set forth in fourteen anathemas. Opinion is divided as to whether Origen was condemned. His name occurs in the eleventh anathema, but some consider it an interpolation; Hefele defends the genuineness of the text, but finds no evidence for a special session against Origen, as some have conjectured.

. The council was confirmed by the emperor, and was generally received in the East. Vigilius was soon coerced into submission, but the West repudiated his pusillanimous surrender, and rejected the council. A schism ensued which lasted half a century and was not fully healed until the synod of Aquileia, about 700. But the ecumenicity of the council was generally acknowledged

by 680.

See Mansi ix. pp. 24-106, 149-658, 712-730; Hardouin iii. pp. 1-328, 331, 414, 524; Hefele, 2nd ed., ii. pp. 798-924 (English translation, iv. pp. 229-365).

3. The sixth ecumenical council, 680-681, which was convened by the emperor Constantine Pogonatus to terminate the Mono- thelitic controversy (see Monothelites). All the patriarchates were represented, Constantinople and Antioch by their bishops in person, the others by legates. The number of bishops present varied from 150 to 300. The council approved the first five ecumenical councils and reaffirmed the Nicene and ” Niceno-. Constantinopolitan ” creeds. Monothelitism was unequivocally condemned; Christ was declared to have had “two natural wills and two natural operations, without division, conversion, separation or confusion.” Prominent Monothelites, living or dead, were anathematized, in particular Sergius and his suc- cessors in the see of Constantinople, the former pope, Honorius,, and Macarius, the patriarch of Antioch. An imperial decree

-confirmed the council, and commanded the acceptance of its

doctrines under pain of severe punishment. The Monothelites took fright and fled to Syria, where they gradually formed the sect of the Maronites (q.v.).

The anathematizing of Honorius as heterodox has occasioned no slight embarrassment to the supporters of the doctrine of papal infallibility.

It is not within the scope of this article to pass judgment upon the various proposed solutions of the difficulty, e.g. that Honorius was not really a Monothelite; that in acknowledging one will he was not speaking ex cathedra; that, at the time of condemning him, the council was no longer ecumenical; &c. One thing is certain, however, he was anathe- matized; and the notion of interpolation in the acts of the council (Baronius) may be dismissed as groundless.

See Mansi xi. pp. 190-922; Hardouin iii. pp. 1043-1644; Hefele, 2nd ed. iii. pp. 12 1-3 13.

4. The ” Quinisext Synod ” (692), so-called because it was regarded by the Greeks as supplementing the fifth and sixth ecumenical councils, was held in the dome of the Imperial Palace (” In Trullo,” whence the synod is called also ” Trullan “). Its work was purely legislative and its decisions were set forth in 102 canons. The sole authoritative standards of discipline were declared to be the ” eighty-five apostolic canons,” the canons of the first four ecumenical councils and of the synods of Ancyra, Neo-Caesarea, Antioch, Changra, Laodicea, Sardica and Carthage, and the canonical writings of some twelve Fathers, — all canons, synods and Fathers, Eastern with one exception, viz. Cyprian and the synod of Carthage; the bishops of Rome and the occidental synods were utterly ignored.

The canons of the second and fourth ecumenical councils respecting the rank of Constantinople were confirmed; the rank of a see was declared to follow the civil rank of its city; un- enthroned bishops were guaranteed against diminution of their rights; metropolitans were forbidden to alienate the property of vacant suffragan sees.

The provisions respecting clerical marriage were avowedly more lenient than the Roman practice. Ordination was denied to any one who after baptism had contracted a second marriage, kept a concubine, or married a widow or- a woman of ill-repute. Lectors and cantors might marry after ordination; presbyters, deacons and sub-deacons, if already married, should retain their wives; a bishop, however, while not dissolving his marriage, should keep his wife at a distance, making suitable provision for her. An illegally married cleric could not perform sacerdotal functions. Monks and nuns were to be carefully separated, and were not to leave their houses without permission.

It was forbidden to celebrate baptism or the eucharist in private oratories; neither might laymen give the elements to themselves, nor approach the altar, nor teach. Offerings for the dead were authorized,

and the mixed chalice made obligatory. Contrary to the occidental custom, fasting on Saturday was forbidden. The mutilation of the Scriptures and the desecration of sacred places were severely condemned; likewise the use of the Iamb as the symbol for Christ (a favourite symbol in the West).

The synod legislated also concerning marriage, bigamy, adultery, rape, abortion, seductive arts and obscenity. The theatre, the circus and gambling were unsparingly denounced, and soothsayers and jugglers, pagan festivals and customs, and pagan oaths were placed under the ban.

The council was confirmed by the emperor and accepted in the East; but the pope protested against various canons, chiefly those respecting the rank of Constantinople, clerical marriage, the Saturday fast, and the use of the symbol of lamb; and refused, despite express imperial command and threat, to accept the ” Pseudo-Sexta.” So that while the synod adopted a body of legislation that has continued to be authoritative for the Eastern Church, it did so at the cost of aggravating the irritation of the West, and by so much hastening the inevitable rupture of the church.

See Mansi xi. pp. 921-1024; Hardouin iii. pp. 1645-1716; Hefele, 2nd ed., iii. pp. 328-348.

5. The iconoclastic synods of 754 and 815, both of which

promulgated harsh decrees against images and neither of which is recognized by the Latin Church, and the synod of 842, which repudiated the synod of 815, approved the second council of Nicaea, and restored the images, are all adequately treated in the article Iconoclasts.

See Mansi xii. pp. 575 sqq,, xiii. pp. 210 sqq., xiv. pp. in sqq., 787 sqq.; Hardouin iv. pp. 330 sqq., 1045 sqq., 1457 sqq.; Hefele, 2nd ed. iv. pp. 1 sqq., 104 sqq.

6. The synods of 869 and 870, of which the former, regarded by the Latin Church as the eighth ecumenical council, condemned Photius as an usurper and restored Ignatius to the see of Constanti- nople; the latter, which the Greeks consider to have been the true eighth ecumenical council, held after the death of Ignatius and the

reconciliation of Photius with the emperor, repudiated the synod of 869, restored Photius, and condemned all who would not recognize him. (For further details of these two synods see Photius.)

See Mansi xv. pp. 143-476 et passim, xvi. pp. I-550, xvii. pp. 66- 186, 365-530; Hardouin v. pp. 119-390, 749-1210, et passim, vi. pp. 19-87, 209-334 ; Hefele, 2nd ed., iv. pp. 228 sqq., 333 sqq., 435 sqq. ; Hergenrother, Photius (Regensburg, 1867-1869). (T. F. C.)

CONSTANTINUS, pope from 708 to 715, was a Syrian by birth and was consecrated pope in March 708. He was eager to assert the supremacy of the papal see; at the command of the emperor Justinian II. he visited Constantinople; and he died on the 9th of April 715.

CONSTANTIUS, FLAVIUS VALERIUS, commonly called Chlorus (the Pale), an epithet due to the Byzantine historians, Roman emperor and father of Constantine the Great, was born about a.d. 250. He was of Illyrian origin; a fictitious connexion with the family of Claudius Gothicus was attributed to him by Constantine. Having distinguished himself by his military ability and his able and gentle rule of Dalmatia, he was, on the 1st of March 293, adopted arid appointed Caesar by Maximian, whose step-daughter, Flavia Maximiana Theodora, he had married in 289 after renouncing his wife Helena (the mother of Constantine). In the distribution of the provinces Gaul and Britain were allotted to Constantius. In Britain Carausius and subsequently Allectus had declared themselves independent, and it was not till 296 that, by the defeat of Allectus, it. was re-united with the empire. In 298 Constantius overthrew the Alamanni in the territory of the Lingones (Langres) and strengthened the Rhine frontier. During the persecution of the Christians in 303 he behaved with great humanity. He ob- tained the title of Augustus on the 1st of May 305, and died the following year shortly before the 2 5th of July at Eboracum (York) during an expedition against the Picts and Scots.

See Aurelius Victor, De Caesaribus, 39 ; Eutropius ix. 14-23 ; Zosimus ii. 7.

CONST ANTZA (Constanta), formerly known as Kustendji or Kustendjs, a seaport on the Black Sea, and capital of the department of Constantza, Rumania; 140 m. E. by S. from Bucharest by rail. Pop. (1900) 12,725. When the Dobrudja was ceded to Rumania in 1878, Constantza was partly rebuilt. In its clean and broad streets there are many synagogues, mosques and churches, for half the inhabitants are Roman Catholics, Moslems, Armenians or Jews; the remainder being Orthodox Rumans and Greeks. In the vicinity there are mineral

springs, and the sea-bathing also attracts many visitors in summer. The chief local industries are tanning and the manufacture of petroleum drums. The opening, in 1895, of the railway to Bucharest, which crosses the Danube by a bridge at Cerna Voda, brought Constantza a considerable transit trade in grain and petroleum, which are largely exported; coal and coke head the list of imports, followed by machinery, iron goods, and cotton and woollen fabrics. The harbour, protected by breakwaters, with a light- house at the entrance, is well defended from the north winds, but those from the south, south-east, and south-west prove sometimes highly dangerous. In 1902 it afforded 10 alongside berths for shipping. It had a depth of 22 ft. in the old or inner basin, and of 26 ft. in the new or outer basin, beside the quays. The railway runs along the quays. A weekly service between Constantza and Constantinople is conducted by state-owned

steamers, including the fast mail and passenger boats in connexion with the Ostend and Orient expresses. In 1902, 576 vessels entered at Constantza, with a net registered tonnage of 641,737. The Black Sea squadron of the Rumanian fleet is stationed here. Constantza is the Constantiana which was founded in honour of Constantia, sister of Constantine the Great (a.d. 274-337). It lies at the seaward end of the Great Wall of Trajan, and has evidently been surrounded by fortifications of its own. In spite of damage done by railway contractors (see Henry C. Barkley, Between the Danube and the Black Sea, 1876) there are considerable remains of ancient masonry — walls, pillars, &c. A number of inscriptions found in the town and its vicinity show that close by was Tomi, where the Roman poet Ovid (43 b.c.-a.d. 17) spent his last eight years in exile. A statue of Ovid stands in the main square of Constantza.

In regard to the Constantza inscriptions in general, see Allard, La Bulgarie orientate (Paris, 1866) ; Desjardins in Ann. dell' istit. di corr. arch. (1868) ; and a paper on Weickum's collection in Sitzungsbericht of the Munich Academy (1875).

CONSTELLATION (from the Lat. constellatus, studded with stars; co'n, with, and stella, a star), in astronomy, the name giyen to certain groupings of stars. The partition of the stellar expanse into areas characterized by specified stars can be traced back to a very remote antiquity. It is believed that the ultimate origin of the constellation figures and names is to be found in the corresponding systems in vogue among the primitive civiliza- tions of the Euphrates valley — the Sumerians, Accadians and Babylonians; that these were carried westward into ancient Greece by the Phoenicians, and to the lands of Asia Minor by the Hittites, and that Hellenic culture in its turn

introduced them into Arabia, Persia and India. From the earliest times the star-groups known as constellations, the smaller groups (parts of constellations) known as asterisms, and also individual stars, have received names connoting some meteorological phenomena, or symbolizing religious or mythological beliefs. At one time it was held that the constellation names and myths were of Greek origin; this view has now been disproved, and an examination of the Hellenic myths associated with the stars ■ and star-groups in the light of the records revealed by the decipherment of Euphratean cuneiforms leads to the conclusion that in many, if not all, cases the Greek myth has a Euphratean. parallel, and so renders it probable that the Greek constellation system and the cognate legends are primarily of Semitic of even pre-Semitic origin.

The origin and development of the grouping of the stars into constellations is more a matter of archaeological than of astronomical interest. It demands a careful study of the myths and religious thought of primitive peoples; and the tracing of the names from one language to another belongs to comparative philology.

The Sumerians and Accadians, the non-Semitic inhabitants of the Euphrates valley prior to the Babylonians, described the stars collectively as a ” heavenly flock “; the sun was the “old sheep”; the seven planets were the “old-sheep stars”; the whole of the stars had certain ” shepherds, ” and Sibzianna (which, according to Sayce and Bosanquet, is the modern Arcturus, the brightest star in the northern sky) was the ” star of the shepherds of the heavenly herds.*/’ The Accadians bequeathed their system to the Babylonians, and cuneiform tablets and cylinders, boundary stones, and Euphratean art generally, point to the existence of a well-defined system of star names in their early history. From a detailed study of such records, in their nature of rather speculative value, R. Brown, junr. (Primitive Constellations, 1899) has compiled a Euphratean planisphere, which he regards as the mother of all others. The tablets examined range in date from 3000-500 B.C., and hence the system must be anterior to the earlier date. Of great im- portance is the Creation Legend, a cuneiform compiled from older records during the reign of Assur-bani-pal, c. 650 B.C., in which there occurs a passage interpretable as pointing to the acceptance of 36 constellations: 12 northern, 12 zodiacal sind 12 southern. These constellations were arranged in three

concentric annuli, the northern ones in an inner annulus sub- divided into 60 degrees, the zodiacal ones into a medial annulus of 120 degrees, and the southern ones into an outer annulus of 240 degrees. Brown has suggested a correlation of the Euphratean names with those of the Greeks and moderns. His results may be exhibited in the following form: — the central line gives the modern equivalents of the names in the Euphratean zodiac; the upper line the modern equivalents of the northern paranatellons; and the lower line those of the southern paranatellons. The zodiacal constellations have an interest peculiarly their own; placed in or about the plane of the ecliptic, their rising and setting with the sun was observed with relation to weather changes and the more general subject of chronology, the twelve subdivisions of the year being correlated with the twelve divisions of the ecliptic (see Zodiac).

lation to weather changes. The earliest Greek work which purported to treat the constellations qua constellations, of which we have certain knowledge, is the Qcuvofieva of Eudoxus of Cnidus (c. 403-350 B.C.). The original is lost, but a versification by Aratus (c. 270 B.C.), a poet at the court of Antigonus Gonatas, king of Macedonia, and an ‘Efi77?7

Northern . .

Cassiopeia

Auriga

Cepheus

Ursa minor

Ursa major

Bootes

Serpentarius

Hercules

Lyra

Aquila

Pegasus

Andromeda

Zodiacal . .

Aries

Taurus

Gemini

Cancer

Leo

Virgo

Libra

Scorpio

Sagittarius

Capricornus

Aquarius

Pisces

Southern

Eridanus

Orion

Canis major

Argo

Hydra Crater

Corvus

Centaurus

Lupus

Ara

?

Piscis australis

Cetus

The Phoenicians — a race dominated by the spirit of com- mercial enterprise — appear to have studied the stars more especially with respect to their service to navigators; according to Homer ” the stars were sent by Zeus as portents for mariners.” But all their truly astronomical writings are lost, and only by a somewhat speculative piecing together of scattered evidences can an estimate of their knowledge be formed. The inter-relations of the Phoenicians with the early Hellenes were frequent and far- reaching, and in the Greek presentation of the legends concerning constellations a distinct Phoenician, and in turn Euphratean, element appears. One of the earliest examples of Greek literature extant, the Theogonia of Hesiod (c. 800 B.C.), appears to be a curious blending of Hellenic and Phoenician thought. Although not an astronomical work, several constellation subjects are introduced. In the same author’s Works and Days, a treatise which is a sort of shepherd’s calendar, there are distinct references to the Pleiades, Hyades, Orion, Sirius and Arcturus. It cannot be argued, however, that these were the only stars and con- stellations named in his time; the omission proves nothing. The same is true of the Homeric epics wherein the Pleiades, Hyades, Ursa major, Orion and Bootes are mentioned, and also of the stars and constellations mentioned in Job. Further support is given to the view that, in the main, the constellations were trans- mitted to the Greeks by the Phoenicians from Euphratean sources in the fact that Thales, the earliest Greek astronomer of any note, was of Phoenician descent. According to Calli- machus he taught the Greeks to steer by Ursa minor instead of Ursa major; and other astronomical observations are assigned to him. But his writings are lost, as is also the case with those of Phocus the Samian, and the history of astronomy by Eudemus, the pupil of Aristotle; hence the paucity of our knowledge of Thales’ s astronomical learning.

From the 6th century B.C. onwards, legends concerning the constellation subjects were frequently treated by the historians and poets. Aglaosthenes or Agaosthenes, an early writer, knew Ursa minor as Kwocrovpa, Cynosura, and recorded the transla- tion of Aquila; Epimenides the Cretan [c. 600 B.C.) recorded the translation of Capricornus and the star Capella; Pherecydes of Athens (c. 500-450 B.C.) recorded the legend of Orion, and stated the astronomical fact that when Orion sets Scorpio rises; Aeschylus (525-456 B.C.) and Hellanicus of Mytilene (c. 496-411 B.C.) narrate the legend of the seven Pleiades — the daughters of Atlas; and the latter states that the

Hyades are named either from their orientation, which resembles v (upsilon), ” or because at their rising or setting Zeus rains “; and Hecataeus of Miletus (c. 470 B.C.) treated the legend of the Hydra.

In the 5th century B.C. the Athenian astronomer Euctemon, according to Geminus of Rhodes, compiled a weather calendar in which Aquarius, Aquila, Canis major, Corona, Cygnus, Delphinus, Lyra, Orion, Pegasus, Sagitta and the asterisms Hyades and Pleiades are mentioned, always, however, in re-

Corvus. In this enumeration Serpens is included in Serpentarius and Lupus in Centaurus; these two constellations were separated by Hipparchus and, later, by Ptolemy. On the other hand, Aratus kept the Pleiades distinct from Taurus, but Hipparchus reduced these stars to an asterism. Aratus was no astronomer, while Hipparchus was ; and from the fact that the latter adopted, with but trifling exceptions, the constellation system portrayed by Aratus, it may be concluded that the system was already familiar in Greek thought. And three hundred years after Hipparchus, the Alexandrian astronomer Ptolemy adopted a very similar scheme in his uranometria, which appears in the seventh and eighth books of his Almagest, the catalogue being styled the “Eicdecns /caiwuaj or ” accepted version.”

The Almagest has a dual interest: first, being the work of one primarily a commentator, it presents a crystallized epitome of all earlier knowledge; and secondly, it has served as a basis of subsequent star-catalogues. 1 The Ptolemaic catalogue em- braces only those stars which were visible at Rhodes in the time of Hipparchus (c. 150 B.C.), the results being corrected for precession ” by increasing the longitudes by 2° 40’, and leaving the latitudes undisturbed ” (Francis Baily, Mem. R.A.S., 1843). The names and orientation of the constellations therein adopted are, with but few exceptions, identical with those used at the present day; and as it cannot be doubted that Ptolemy made only very few modifications in the system of Hipparchus, the names were adopted at least three centuries before the Almagest was compiled. The names in which Ptolemy differs from modern usage are: — Hercules (tv yovanv), Cygnus (“Opm), Eridanus (noraˆos), Lupus (QtjpLov), Pegasus (“Lt7tos), Equuleus (“Lt7tou TTporonri) , Canis minor (HpoKvuv), and Libra (XtjXoi, although f vyos is used for the same constellation in other parts of the Almagest). The following table gives the names of the constellations as they occur in (1) modern catalogues; (2) Ptolemy (a.d. 150); (3) Ulugh Beg (1437); (4) Tycho Brahe (1628); the last column gives the English equivalent of the modern name.

The reverence and authority which was accorded the famous compilation of the Alexandrian astronomer is well evidenced by the catalogue of the Tatar Ulugh Beg, the Arabian names there adopted being equivalent to the Ptolemaic names in nearly every case; this is also shown in the Latin translations given below. Tycho Brahe, when compiling his catalogue of stars, was unable to observe Lupus, Ara, Corona australis and Piscis australis, on account of the latitude of Uranienburg ; and hence these constellations are omitted from his catalogue. He diverged from Ptolemy when he placed the asterisms Coma Berenices and Antinous upon the level of formal constellations, Ptolemy having

1 The historical development of star-catalogues in general, re- garded as statistics of the co-ordinates, &c, of stars, is given in the historical section of the article Astronomy. See also E. B. Knobel, ” Chronology of Star Catalogues,” Mem. R.A.S.{i&tj).

CONSTELLATION

Plate I.

CONSTELLATIONS OF THE NORTHERN HEMISPHERE.

PlATF. II.

CONSTELLATION

CONSTELLATIONS OF THE SOUTHERN HEMISPHERE.

CONSTELLATION

i3

j

Modern.

Ptolemy.

Ulugh Beg.

Tycho Brahe.

Meaning.

Ursa minor

“ApKTou jut/cpas der7-epio-jit6s| Stellae Ursi minoris

Ursa minor, Cynosura

Little Bear

Ursa major

“ApKTou p.eya\rjs ,,

„ Ursi majons

Ursa major, Helice

■Great Bear

Draco

ApaKovros ,,

,, Draconis

Draco

Dragon

Cepheus

Krjkws ,,

„ Cephei

Cepheus

Cepheus

cr

Bootes

Howtov ,,

„ Vociferatoris

Bootes, Arctophylax

Ploughman

w-

Corona borealis

Xretfrkvov (3opetov ,,

,, Coronae or Phecca

Corona borea

Northern Crown

w

Hercules

Tov kv ybvaaiv ,,

„ Incumbentis genubus

Engonasi, Hercules

Man kneeling

O

Lyra

Aipas ,,

„ roOShelyak or Testudo

Lyra, Vultur cadens

T 6 Lyre

Bird, Swan

Cygnus

“Opvi6os „

„ Gallinae

Olor, Cygnus

Cassiopeia

KacTtTl€7T€taS „

„ Inthronatae

Cassiopeia

Cassiopeia

* >

Perseus

Hepire&s ,,

„ Bershaush or Portans

Perseus

Perseus

G “*

Caput Larvae

J

Auriga

‘Jividx»v ,,

„ Tenentis habenas

Auriga, Heniochus, Erichthonius

Charioteer

G

Serpentarius

‘0io{ > xov ,,

„ Serpentarii

Ophiuchus, Serpentarius

Serpent-holder

j3

Serpens

“Opecos otfrioiixov „

„ Serpentis

Serpens ophiuchi

Serpent

4->

j Sagitta

‘OkttoO „

„ Sagittae

Sagitta or Telum

Arrow

O

2

Aquila

‘AeroD ,,

„ Aquilae

Aquila or Vultur volans

Eagle

Delphinus

AeXˆtvos ,,

„ Delphini

Delphinus

Dolphin

/

Equuelus

“Ititov irpoTOfxijs ,,

„ Sectionis eqˆui

Equuleus, Equi sectio

Colt

r?

Pegasus

“lirirov ,,

,, Equi majons

Pegasus, Equus alatus

Pegasus, Horse

Andromeda

‘AvdponiSas „

„ Mulieris catenatae

Andromeda

Andromeda

Triangulum

Tpiy&vov ,,

„ Trianguli

Triangulus, Deltoton

Triangle

Aries

Kpiov ,,

„ *Arietis

Aries

Ram

Taurus

Taiipov „

„ Tauri

Taurus

Bull

c

Gemini

AiSviicov „

„ Gemellorum

Gemini

Twins

1.

Cancer

KapKtrou ,,

„ Cancri

Cancer

Crab

is

Leo

Aiovros ,,

„ Leonis

Leo

Lion

“2 –

Virgo

HapOivov „

„ Virginis, Sumbela

Virgo

Virgin

en

Libra

XijXwv ,,

„ Librae

Libra

Balance

O

Scorpio

SKOpTTtOU ; ,

„ Scorpionis

Scorpius

Scorpion

Sagittarius

Toˆotov M

„ Sagittarii, Arcum

Sagittarius

Archer

Capricornus

AiyoKepuTos ,,

„ Capricorni

Capricornus

Goat

rt

Aquarius

“TSpoxbov ,,

„ Effusoris aquae, Situla

Aquarius

Water-pourer

Pisces

‘lxBvbyv t>

„ Piscis

Pisces

Fishes

Cetus

ICˆtous „

„ Ceti

Cete

Sea-monster,

1/5

Whale

Orion

‘ilpiovos t1

„ Gigantis

Orion

Orion

CO

Eridanus

TloTCLflQV ,,

„ Fluminis

Eridanus fluvius

River

C O

Lepus

Aa7tf>o0 ,,

„ Leporis

Lepus

Hare

‘£

Canis major

Kvvos ,,

„ Canis majoris

Canis major

Great Dog

rt

Canis minor

HpoKvvds ,,

„ Canis minoris

Canis minor, Procyon

Little Dog

“qj

Argo

‘Apyovs 1t

„ Navis

Argo navis

Ship

to ”

c

Hydra

“T5pou „

„ Hydri

Hydra

Sea-serpent Bowl

Crater

Kparˆpoj ,,

„ Craterae

Crater

e

Corvus

KdpaKos ,,

„ Corvi

Corvus

Crow

1-1

Centaurus

KePTavpov ,,

„ Centauri

Centaurus, Chiron

Centaur

4 >

Lupus

Qrjplov ,,

„ Ferae

Wild beast

3

O

Ara

QvfiiarTjplov ,,

,, Thuribuli

Censer, Altar

Cfi

Corona australis

XT&t > avov vortov ,,

„ Coronae australis

Southern Crown

ˆ

Piscis australis

‘IxQvos votIov ,,

,, Piscis australis

„ Fish

regarded these asterisms as unformed stars (d/wp<ˆ>a)TOi) . The next innovator of moment was Johann Bayer, a German astro- nomer, who published a Uranometria in 1603, in which twelve constellations, all in the southern hemisphere, were added to Ptolemy’s forty-eight, viz. Apis (or Musca) (Bee), Avis Indica (Bird of Paradise), Chameleon, Dorado (Sword-fish), Grus (Crane), Hydrus (Water-snake), Indus (Indian), Pavo (Peacock), Phoenix, Piscis volans (Flying fish), Toucan, Triangulum australe. According to W. Lynn {Observatory, 1886, p. 255), Bayer adapted this part of his catalogue from the observations of the Dutch navigator Petrus Theodori (or Pieter Dirchsz Keyser), who died in 1596 off Java. The Coelum stellatum Christianum of Julius Schiller (1627) is noteworthy for the attempt made to replace the names connoting mythological and pagan ideas by the names of apostles, saints, popes, bishops, and other dignitaries of the church, &c. Aries became St Peter; Taurus, St Andrew; Andromeda, the Holy Sepulchre; Lyra, the Manger; Canis major, David; and so on. This innovation (with which the introduction of the twelve apostles into the solar zodiac by the Venerable Bede may be compared) was short-lived. According to Charles Hutton [Math. Diet. i. 328(1795)] the editions published in 1654 and 1661 had reverted to the Greek names; on the other hand, Camille Flammarion (Popular Astronomy, p. 375) quotes an illuminated folio of 1661, which represents ” the sky delivered from pagans and peopled with Christians.” A similar confusion was attempted by E. Weigelius, who sought to introduce a Coelum heraldicum, in which the

constellations were figured as the arms or insignia of European dynasties, and by symbols of commerce.

In Edmund Halley’s southern catalogue (Catalogus stellarum australium), published in 1679 and incorporated in Flamsteed’s Historia coeleslis (1725), the following constellations are named: —

Piscis australis, Columba Noachi, Argo navis, Robur Caroli, Ara, Corona australis, Grus, Phoenix, Pavo, Apt: 3 or Avis Indica, Musca apis, Chameleon, Triangulum australe, Piscis voians, Dorado or Xiphias, Toucan or Anser Americanus, and Hydrus. Flamsteed's maps also contained Mons Menelai. This list contains nothing new except Robur Caroli, since Columba Noachi (Noah's dove) had been raised to the skies by Bartschius in 1624. The constellation Robur Caroli and also the star Cor Caroli (a Canum Venaticorum) were named by Halley in honour of Charles II. of England.

In 1690 two posthumous works of Johann Hevelius (1611- 1687), the Firmamentum sobiescianum and Prodromus astrono- miae, added several new constellations to the list, viz. Canes venatici (the Greyhounds), Lacerta (the Lizard), Leo minor (Little Lion), Lynx, Sextans Uraniae, Scutum or Clypeus Sobieskii (the shield of Sobieski), Vulpecula et Anser (Fox and Goose), Cerberus, Camelopardus (Giraffe), and Monoceros (Unicorn); the last two were originally due to Jacobus Bart- schius. In 1679 Augustine Royer introduced the most interesting of the constellations of the southern hemisphere, the Crux australis or Southern Cross, He also suggested Nubes major, Nubes minor, and Lilium, and re-named Canes venatici the river

Jordan, and Vulpecula et Anser the river Tigris, but these innovations met with no approval. The Magellanic clouds, a collection of nebulae, stars and star-clusters in the neighbourhood of the south pole, were so named by Hevelius in honour of the navigator Ferdinand Magellan.

Many other star-groupings have been proposed from time to time; in some cases a separate name has been given to a part of an authoritatively accepted constellation, e.g. Ensis Orionis, the sword of Orion, or an ancient constellation may be subdivided, e.g. Argo (ship) into Argo, Malus (mast), Vela (sails), Puppis (stern) , Carina (keel) ; and whereas some of the rearrangements, which have been mostly confined to the southern hemisphere, have been accepted, many, reflecting nothing but idiosyncrasies of the proposers, have deservedly dropped into oblivion. Nicolas Louis de Lacaille, who made extended observations of the southern stars in 1751 and in the following years, and whose results were embodied in his posthumous Coelum australe stelliferum (1763), introduced the following new constellations: — Apparatus sculptoris (Sculptor's workshop), Fornax chemica (Chemical furnace), Horologium (Clock), Reticulus rhomboidalis (Rhomboidal

net), Caela sculptoris (Sculptor's chisels), Equuleus pictoris (Painter's easel), Pyxis nautica (Mariner's compass), Antlia pneumatica (Air pump), Octans (Octant), Circinus (Com- passes), Norma alias Quadra Euclidis (Square), Telescopium (Telescope), Microscopium (Microscope) and Mons Mensae (Table Mountain). Pierre Charles Lemonnier in 1776 intro- duced Tarandus (Reindeer), and Solitarius; J. J. L. de Lalande introduced Le Messier (after the astronomer Charles Messier) (1776), Quadrans muralis (Mural quadrant) (1795), Globus aerostaticus (Air balloon) (1798), and Felis (the Cat) (1799). Martin Poczobut introduced in 1777 Taurus Poniatovskii; Bode introduced the Honores Frederici (Honours of Frederick) (1786), Telescopium Herschelii (Telescope of Herschel) (1787), Machina electrica (Electrical machine) (1790), Officina typo- graphica (Printing press) (1799), an d Lochium funis (Log line); and M. Hell formed the Psalterium Georgianum (George's lute).

The following list gives the names of the constellations now usually employed: they are divided into three groups: — north of the zodiac, in the zodiac, south of the zodiac. Those marked with an asterisk have separate articles.

Northern (28).

"Andromeda

*Cepheus

"Hercules

Pegasus

*Aquila

*Coma Berenices

Lacerta

*Perseus

•Auriga

*Corona borealis

*Leo minor

*Sagitta

*Bo6tes

*Cygnus

Lynx

Serpens

Camelopardus

*Delphinus

*Lyra

Triangulum

“Canes venatici

Draco

(Ophiuchus } *Serpentarius

*Ursa major

‘Cassiopeia

Equuleus

*Ursa minor

*Vulpecula et Anser

Zodiacal (12).

- Aquarius

*Capricornus

*Libra

“Scorpio

*Aries

*Gemini

- Pisces

*Taurus

*Cancer

*Leo

“Sagittarius Southern (49).

*Virgo.

Antlia (pneumatica)

Corona australis

Lepus

Pictor (Equuleus pictoris)

Apus

Corvus

Lupus

Piscis australis

*Ara

Crater

Malus

Puppis

Argo

Crux

Mons Mensae

Recticulum

Caela sculptoris

(Caelum)

*Canis major

Dorado

Microscopium

Sculptor (Apparatus sculptoris) Scutum Sobieskii

Canis minor

*Eridanus

Monoceros

Sextans

Carina

Fornax chemica

Musca australis

Telescopium

*Centaurus

Grus

Norma

Toucan

*Cetus

Horologium

Octans

Triangulum australe

Chameleon

*Hydra

*Orion

Vela

Circinus

Hydrus

Pavo

Volans (Piscis volans)

Columba Noachi

Indus

Phoenix

(C. E.*)

CONSTIPATION (from Lat. constipare, to press closely to- gether, whence also the adjective ” costive “), the condition of body when the faeces are unduly retained, or there is difficulty in evacuation, tightness of the bowels (see Digestive Organs; and Therapeutics). It may be due to constitutional peculiarities, 3edentary or irregular habits, improper diet, &c. The treatment

varies with individual cases, according to the cause at work, laxatives, dieting, massage, &c, being prescribed.

CONSTITUENCY (from ” constituent,” that which forms a necessary part of a thing; Lat. constituere, to create), a political term for the body of electors who choose a representative for parliament or for any other public assembly, for the place or district possessing the right to elect a representative, and for the residents generally, apart from their voting powers, in such a locality. The term is also applied, in a transferred sense, to the readers of a particular newspaper, the customers of a business and the like.

CONSTITUTION AND CONSTITUTIONAL LAW. The word constitution (comtitutio) in the time of the Roman empire signified a collection of laws or ordinances made by the emperor. We find the word used in the same sense in the early history of English law, e.g. the Constitutions of Clarendon. In its modern use constitution has been restricted to those rules which concern the political structure of society. If we take the accepted definition of a law as a command imposed by a sovereign on the subject, the constitution would consist of the rules which point out where* the sovereign is to be found, the form in which his powers are exercised, and the relations of the different members of the sovereign body to each other where it consists of more persons than one, In every independent political society, it is assumed by these definitions, there will be found somewhere or other a sovereign, whether that sovereign be a single person, or a body of persons, or several bodies of persons. The com- mands imposed by the sovereign person or body on the rest of the society are positive laws, properly so called. The sovereign body not only makes laws, but has two other leading functions, viz. those of judicature and administration. Legisiation is for the most part performed directly by the sovereign body itself; judicature and . administration, for the most part, by delegates. The constitution of a

society, accordingly, would show how the sovereign body is composed, and what are the relations of its members inter se, and how the sovereign functions of legislation, judicature and administration are exercised. Constitutional law consists of the rules relating to these subjects, and these rules may either be laws properly so called, or they may not — i.e. they may or may not be commands imposed by

the sovereign body itself. The English constitutional rule, for example, that the king and parliament are the sovereign, cannot be called a law; for a law presupposes the factwhieh it asserts. And other rules, which are constantly observed in prac- tice, but haveneverbeenenacted by the sovereign power, are in the same way constitutional laws which are not laws. It is an undoubted rule of the English constitution that the king' shall not refuse his assent to a bill which has passed both Houses of Parliament,but it is certainly not a law. Should the king veto such a bill his action would be unconstitutional,but not illegal. : On the other hand the rules re- latingto the electionof members to the House of Commons are nearly all positive laws strictly – so called. Constitutional law, as the phrase is commonly used, would include all the laws dealing with the sovereign body in the exercise of its various functions, and all the rules, not being laws properly so called, relating to the same subject.

The above is an attempt to indicate the meaning of the phrases in their stricter or more technical uses. Some wider meanings may be noticed. In the phrase constitutional

government, a form of government based on certain principles which may roughly be called popular is the leading idea. Great Britain, Switzerland, the United States, are all constitutional governments in this sense of the word. A country where a large portion of the people has some considerable share in the supreme power would be a constitutional country. On the other hand, constitutional, as applied to governments, may mean stable as opposed to unstable and anarchic societies. Again, as a term of party politics, constitutional has come to mean, in England, not obedience to constitutional rules as above described, but adherence to the existing type of the constitution or to some conspicuous portions thereof, — in other words, conservative.

The ideas associated with constitution and constitutionalism are thus, it will be seen, mainly of modern and European origin. They are

wholly inapplicable to the primitive and simple societies of the present or of the former times. The discussion of forms of government occupies a large space in the writings of the Greek philosophers,— a fact which is to be explained by the existence among the Greeks of many independent political communities, variously organized, and more or less democratic in character. Between the political problems of the smaller societies and those of the great European nations there is no useful parallel to be drawn, although the predominance of classical learning made it the fashion for a long time to apply Greek speculations on the nature of monarchy, aristocracy, and democracy to public questions in modern Europe. Representation (q.v.), the characteristic principle of European constitutions, has, of course, no place in societies which were not too large to admit of every free citizen participating personally in the business of govern- ment. Nor is there much in the politics or the political literature of the Romans to compare with the constitutions of modern states. Their political system, almost from the beginning of empire, was ruled absolutely by a small assembly or by one man.

The impetus to constitutional government in modern times has to a large extent come from England, and it is from English politics that the phrase and its associations have been borrowed. England has offered to the world the one conspicuous example of a long, continuous, and orderly development of political institutions. The early date at which the principle of self- government was established in England, the steady growth of the principle, the absence of civil dissension, and the preservation in the midst of change of so much of the old organization, have given its constitution a great influence over the ideas of politicians in other countries. This fact is expressed in the proverbial phrase — •" England is the mother of parliaments." It would not be difficult to show that the leading features of the constitu- tions now established in Other nations have been based on, or defended by, considerations arising from the political history of England.

In one important respect England differs conspicuously from most other countries. Her constitution is to a large extent unwritten, using the word in much the same sense as when we speak of unwritten law. Its rules can be found in no written document, but depend, as so much of English law does, on precedent modified by a constant process of interpretation. Many rules of the constitution have in fact a purely legal history, that is to say, they have been developed by the law courts, as part of the general body of the common law. Others have in a similar way been developed by the practice of parliament. Both Houses, in fact, have exhibited the same spirit of adherence to

precedent, coupled with a power of modifying precedent to suit circumstances, which distinguishes the judicial tribunals. In a constitutional crisis the House of Commons appoints a committee to " search its journals for precedents," just as the court of king's bench would examine the records of its own decisions. And just as the law, while professing to remain the same, is in process of constant change, so, too, the unwritten constitution is, without any acknowledgment of the fact, con stantly taking up new ground.

In contrast with the mobility of an unwritten constitution is the fixity of a constitution written out, like that of the United States or Switzerland, in one authoritative code. The constitu-

tion of the United States, drawn up at Philadelphia in 1787, is contained in a code of articles. It was ratified separately by each state, and thenceforward became the positive and exclusive statement of the constitution. The legislative powers of the legislature are not to extend to certain kinds of bills, e.g. ex post facto bills; the president has a veto which can only be overcome by a majority of two- thirds in both Houses; the con- stitution itself can only be changed in any particular by the con- sent of the legislatures or conventions of three-fourths of the several states; and finally the judges of the Supreme Court are to decide in all disputed cases whether an act of the legislature is permitted by the constitution or not.

The constitution of the United States is the supreme law of the land as to the matters which it embraces. The constitution of each state is the supreme law of the state, except so far as it may be controlled by the constitution of the United States. Every statute in conflict with the constitution to which it is subordinate is void so far as this conflict extends. If it concerns only a distinct and separable part of the statute, that part only is' void. Every court before which a statutory right or defence is asserted has the power to inquire whether the statute in question is or is not in conflict with the paramount constitution. This power belongs even to a justice of the peace in trying a cause. He sits to administer the law, and it is for him to deter- mine what is the law. Inferior courts commonly decline to hold a statute unconstitutional, even if there may appear to be substantial grounds for such a decision. The presumption is always in favour of the validity of the law, and they generally prefer to leave the responsibility of declaring it void to the higher courts.

The judges of the state courts are bound by their oath of office to support the constitution of the United States. They have an equal right with those of the United States to determine whether or how far it

affects any matter brought in question in any action. So, vice versa, the judges of the United States courts, if the point comes up on a trial before them, have the right to determine whether or how far the constitution of a state in- validates a statute of the state. They, however, are ordinarily bound to follow the views of the state courts on such a question. They are not bound by any decision of a state court as to the effect of the constitution of the United States on a state statute or any other matter. This judicial power of declaring a statute void because unconstitutional has been not infrequently exercised, from the time when the first state constitutions were adopted.

Juries in criminal causes are sometimes made by American statutes or recognized by American practice as judges of the law as well as the fact. The better opinion is that this does not make them judges of whether a law on which the prosecution rests violates the paramount constitution and is therefore void (United States v. Cattender, Wharton's State Trials, 688; State v. Main, 69 Connecticut Reports, 123, 128).

If a state court decides a point of constitutional law, set up under the constitution of the United States, against the party relying upon it, and this decision is affirmed by the state court of last resort, he may sue out a writ of error, and so bring his case before the Supreme Court of the United States. If the state decision be in his favour, the other side cannot resort to like proceedings.

A decree of the Supreme Court of the United States on a point of construction arising under the constitution of the United States settles it for all courts, state and national.

The salient characteristic of the United States constitution is, perhaps, its formidable apparatus of provisions against change; and, in fact, only 1 5 constitutional amendments had been adopted from 1789 up to 1909, the last being in 1870. In the same period the unwritten constitution of England has made a most marked ' advance, chiefly in the direction of democratizing the monarchy, and diminishing the powers of the House of Lords. The House of Commons has continuously asserted its legislative predomin- ance, and has reduced the other House to the position of a revising chamber, which in the last resort, however, can produce a legislative deadlock, subject to the results of a new genera]

election (see Parliament). And the cabinet, which depends on the support of the House of Commons, has become more and more the executive council of the realm. One conspicuous feature of the English constitution, by which it is broadly dis- tinguished from written or artificial constitutions, is the presence throughout its entire extent of legal fictions. The influence of the lawyers on the progress of the constitution has already been noticed, and is nowhere more clearly shown than in this peculiarity of its structure. As in the common law, so in the constitution, change has been effected in substance without any corresponding change in terminology. There is hardly one of the phrases used to describe the position of the crown which can be understood in its literal sense, and many of them are currently accepted in more senses than one. The American constitution of 1789 reproduced, however, in essentials, and with necessary modifications, the contemporary British model, and, where it did so, has preserved the old conception of what was then the British system of government. The position and powers of the president were a fair counterpart of the royal prerogative of that day; the two houses of Congress corresponded sufficiently well to the House of Lords and the House of Commons, allowing for the absence of the elements of hereditary rank and territorial in- fluence. While the English constitution has changed much, the American constitution has changed very little in these respects. Allowing for the more democratic character of the constituencies, the organization of the supreme power in the United States is nearer the English type of the 18th century — is, in fact, less elastic than in the United Kingdom.

On the other hand, it is not uncommon to misinterpret the rigidity of the United States constitution, from a regard rather to the theory which its text suggests than to the practical working of the machine. For the letter of the constitution has to some extent been modified, if not technically amended, in various respects by judicial interpretation, and by use and wont (e.g. as regards the election of the president). This side of the matter may be studied in C. G. Tiedeman's work cited below. Moreover, even in respect of the 18th-century British character attaching to the constitution, as drawn up in 1787, it has to be remembered that this was not taken direct from England. As several American constitutional historians have elaborately shown (e.g. A. C. McLaughlin, in The Confederation and the Constitution, 1905), the English idea had already been developed in various directions during the preceding colonial period, and the constitution really represented the English constitutional usage as known in America, into which the Philadelphia con- vention introduced new features corresponding to the prevailing civil conditions or suggested by English analogy. It is

important to emphasize this point, since the resemblance of the American constitution of 1789 to the contemporary English constitution has sometimes been exaggerated; but the fact remains that the written constitution has been less susceptible of development than the unwritten.

Between England and some other constitutional countries a difference of much constitutional importance is to be found in the terms on which the component parts of the country were brought together. All great societies have been produced by the aggregation of small societies into larger and larger groups. In England the process of consolidation was completed before the constitution settled down into its present form. In the United States, on the other hand, in Switzerland, and in Germany the constitution is in form an alliance among a number of separate states, each of which may have a constitution and laws of its own for local purposes. In federal governments it remains a question how far the independence of individual states has been sacrificed by submission to a constitution. In the United States constitutional progress is hampered by the necessity thus created of having every amendment ratified by the separate vote of three-fourths of the states.

See also Government; Sovereignty; Cabinet; Prerogative, &c, and the section on Government or Constitution in the articles on the various countries. The standard work on the English con- stitution is Sir William Anson's Law and Custom of the Constitution (1st ed. 1886; 3rd ed. 1909)- see also A. L. Lowell, The Government

of England (1908); W. Bagehot, The English Constitution; S. Low, The Governance of England (1904) ; A. V. Dicey, The Law of the Constitution (7th ed. 1909) ; W. Stubbs, Constitutional History of England (1878) ; R. Gneist, History of the English Constitution (Engl, trans. 1886); J. Macy, The English Constitution (New York, 1897); E. W. Ridges, Constitutional Law of England (1905); F. W. Maitland, Constitutional History of England (1908) ; G. B. Adams and H. M. Stephens, Select Documents of English Constitutional History (New York, 1901). For America, see C. E. Stevens, Sources of the Constitution of the United States (London and New York, 1 894) ; G. T. Curtis, Constitutional History of the United States (2 vols., New York, 1 889-1896) ; T. Mel. Cooley, General Principles of Constitutional Law in the United States (Boston, 1880; 3rd ed. 1898); S. G. Fisher, Evolution of the Constitution of the United States (Philadelphia, 1897); J. I. C. Hare, American Constitutional Law (2 vols., Boston, 1889) ; J. F. Jameson (ed.), Essays on the Constitutional History of the United States in the Formative Period, 177S-178Q

(Boston, 1889); W. M. Meigs, Growth of the Constitution in the Federal Convention of 1787 (Philadelphia, 1900) ; and C. G. Tiedeman, Unwritten Con- stitution of the United States (New York, 1890). Also A. L. Lowell, Government and Parties in Continental Europe (2 vols., 1896) ; W. F. Dodd, Modern Constitutions (2 vols., Chicago, 1909), a collec- tion of the fundamental laws of twenty-two of the most important countries.

" CONSTITUTION OF ATHENS " ('kfrnvaiuv iroXireia), a work attributed to the philosopher Aristotle (384-322 B.C.), forming one of a series of Constitutions (iroXu-eicu), 158 in number, which treated of the institutions of the various states in the Greek world. It was extant until the 7th century of our era, or to an even later date, but was subsequently lost. A copy of this treatise, written in four different hands upon four rolls of papyrus, and dating from the end of the 1st century a.d., was discovered in Egypt, and acquired by the trustees of the British Museum, for whom it was edited by F. G. Kenyon, assistant in the manu- script department, and published in January 1891. Some very imperfect fragments of another copy had been acquired by the Egyptian Museum at Berlin, and were published in 1880.

Authorship. — It may be regarded as now established that the treatise discovered in Egypt is identical with the work upon the constitution of Athens that passed in antiquity under the name of Aristotle. The evidence derived from a comparison of the British Museum papyrus with the quotations from the lost work of Aristotle's which are found in scholiasts and grammarians is conclusive. Of fifty-eight quotations from Aristotle's work, fifty- five occur in the papyrus. Of thirty-three quotations from Aristotle, which relate to matters connected with the con- stitution, or the constitutional history of Athens, although they are not expressly referred to the 'AOnivaiuv iroXireia, twenty-three are found in the papyrus. Of those not found in the papyrus, the majority appear to have come either from the beginning of the treatise, which is wanting in the papyrus, or from the latter portion of it, which is mutilated. The coincidence, therefore, is as nearly as possible complete. It may also be regarded as established by internal evidence that the treatise was composed during the interval between Aristotle's return to Athens in 335 B.C. and his death in 322. There are two passages which give us the latter year as the terminus ad quern, viz. c. 42. 1 and c. 62. 2. In the former passage the democracy which is about to be described is spoken of as the " present constitution " (17 vvv KarkaTaxrvs rrjs irdXiTeias). The democratic constitution was abolished, and a timocracy established, on the surrender of Athens to Antipater, at the end of the Lamian War, in the autumn of 322. At the same time Samos was lost; it is still reckoned, however, among the

Athenian possessions in the latter passage. On the other hand, the foreign possessions of Athens are limited to Lemnos, Imbros, Scyros, Delos and Samos. This could only apply to the period after Chaeronea (338 B.C.). In c. 61. 1, again, mention is made of a special Strategus kirl ras o-u/jjuopias; but it can be proved from inscrip- tions that down to the year 334 the generals were collectively con- cerned with the symmories. Finally, in c. 54. 7 an event is dated by the archonship of Cephisophon (329). We thus get the years 329 and 322 as fixing the limits of the period to which the composition of the work must be assigned. It follows that, whether it is by Aristotle or not, its date is later than that of the Politics, in which there is no reference to any event subsequent to the death of Philip in 336

The only question as to authorship that can fairly be raised is the question whether it is by Aristotle or by a pupil; i.e. as to the sense in which it is " Aristotelian." The argument on the two sides may be summarized as follows: —

Against. — (i.) The occurrence of non- Aristotelian words and phrases and the absence of turns of expression characteristic of the undisputed writings of Aristotle, (ii.) The occurrence of statements contradictory of views found in the Politics; e.g. c. 4 (Constitution of Draco) compared with Pol. 1274 b 15 (ApaicoPTOS vofwi fitv An, irdXirdq. 8′ VTapxovay tovs vonovs Wr\Kev) ; c. 8. 1 (the archons appointed by lot out of selected candidates) compared with Pol. 1274 a 17, and 1281 b 31 (the archons elected by the demos); c. 17. 1 (total length of Peisistratus' reign, 19 years) compared with Pol. 13 15 b 32 (total length, 17 years); c. 21. 6 (Cleisthenes left the clan and phratries unaltered) compared with Pol. 1319 b 20 (Cleisthenes increased the number of the phratries); c. 21. 2 and 4 compared with Pol. 1275 b 37 (different views as to the class admitted to citizenship by Cleisthenes). It will be observed that the instances quoted relate to the most famous names in the early history of Athens, viz. Draco, Solon, Peisistratus and Cleisthenes. (iii.) Arguments drawn from the style, composition and general character of the work, which are alleged to be unworthy of the author of the undoubtedly genuine writings. There is no sense of proportion (contrast the space devoted to Peisistratus and his sons, or to the Four Hundred and the Thirty, with the inadequate treatment of the period between the Persian and Peloponnesian Wars); there is a lack of historical insight and an uncritical acceptance of erroneous views; and the anecdotic element is unduly prominent. These

considerations led several of the earlier critics to deny the Aristotelian authorship, e.g. the editors of the Dutch edition of the text, van Herwerden and van Leeuwen; Rtihl, Cauer and Schvarcz in Germany; H. Richards and others in England.

For. — (i.) The consensus of antiquity. Every ancient writer who mentions the Constitution attributes it to Aristotle, while no writer is known to have questioned its genuineness, (ii.) The coincidence of the date assigned to its composition on internal grounds with the date of Aristotle's second residence in Athens, (iii.) Parallelisms of thought or expression with passages in the Politics; e.g. c. 16. 2 and 3 compared with Pol. 1318 b 14 and 13 19 a 30; the general view of Solon's legislation compared with Pol. 1296 b 1; c. 27. 3 compared with Pol. 1274 a 9. To argument (i.) against the authorship, it is replied that the Constitution is an historical work, intended for popular use; differences in style and terminology from those of a philosophical treatise, such as the Politics, are to be expected. To argument (ii.) it is replied that, as the Constitution is a later work than the Politics, a change of view upon particular points is not surprising. These considerations have led the great majority of writers upon the subject to attribute the work to Aristotle himself. On this side are found Kenyon and Sandys among English scholars, and in Germany, Wilamowitz, Blass, Gilbert, Bauer, Bruno Keil, Busolt, E. Meyer, and many others. On the whole, it can hardly be doubted that the view which is supported by so great a weight of authority is the correct one. The arguments advanced on the other side are not to be lightly set aside, but they can scarcely outweigh the combination of external and internal evidence in favour of the attribution to Aristotle. An attentive study of the parallel passages in the Politics will go a long way towards carrying conviction. It is true that a series such as the Constitu- tions might well be entrusted to pupils working under the direc- tion of their master. It is also true, however, that the Constitution of Athens must have been incomparably the most important of the series and the one that would be most naturally reserved for the master's hand. There are no traces in the treatise either of variety of authorship or of incompleteness, though there are evidences of interpolation.

Contents. — The treatise consists of two parts, one historical, and the other descriptive. The first forty-one chapters compose the former part, the remainder of the work the latter. The first part comprised an account of the original constitution of Athens,

and of the eleven changes through which it successively passed (see c. 41). The papyrus, however, is imperfect at the beginning (the

manuscript from which it was copied appears to have been similarly defective), the text commencing in the middle of a sentence which relates to the trial and banishment of the Alcmeonidae for their part in the affair of Cylon. The missing chapters must have contained a sketch of the original constitu- tion, and of the changes introduced in the time of Ion and Theseus.

The following is an abstract of Part I. in its present form. Chapters 2,3, description of the constitution before the time of Draco. 4, Draco's constitution. 5-12, reforms of Solon. 13, party feuds after the legislation of Solon. 14-19, the rule of Peisistratus and his sons. 20, 21, the reforms of Cleisthenes. 22, changes introduced between Cleisthenes and the invasion of Xerxes. 23, 24, the supre- macy of the Areopagus, 479-461 B.C. 25, its overthrow by Ephialtes. 26, 27, changes introduced in the time of Pericles. 28, the rise of the demagogues. 29-33, the revolution of the Four Hundred. 34-40, the government of the Thirty. 41, list of the successive changes in the constitution. It may be noted that the reforms of Solon, the tyranny of Peisistratus and his sons, and the revolutions of the Four Hundred and the Thirty, together occupy considerably more than two-thirds of Part I.

Part II. describes the constitution as it existed at the period of the composition of the treatise (329-322 B.C.). It begins with an account of the conditions of citizenship and of the training of the ephebi (citizens between the ages of 18 and 20). In chapters 43-49 the functions of the Council (£011X17) and of the officials who act in concert with it are described. 50-60 deal with the officials who are appointed by lot, of whom the most important are the nine Archons, to whose functions five chapters (55-59) are devoted. The military officers, who come under the head of elective officials, form the subject of c. 61. With c. 63 begins the section on the Law-courts, which occupied the remainder of the Constitution. This portion, with the exception of c. 63, is fragmentary in character, owing to the mutilated condition of the fourth roll of the papyrus on which it was written. ' It will thus be seen that the subjects which receive fullest treatment in Part II. are the Council, the Archons and the Law- courts. The Ecclesia, on the other hand, is dealt with very briefly, in connexion with the prytaneis and proedri (cc. 43, 44).

Sources. — The labours of several workers in this field, notably Bruno Keil and Wilamowitz, have rendered it comparatively easy to form a general estimate of Aristotle's indebtedness to previous writers, although problems of great difficulty are encountered as soon as it is attempted to determine the precise sources from which the historical

part of the work is derived. Among these sources are unquestionably Herodotus (for the tyranny of Peisistratus, and for the struggle between Cleisthenes and Isagoras), Thucydides (for the episode of Harmodius and Aristogeiton, and for the Four Hundred) , Xenophon (for the Thirty), and the poems of Solon. There is now among critics a general consensus in favour of the view that the most important of his sources was the Atthis of Androtion, a work published in all probability only a few years earlier than the Constitution; in any case, after the year 346. From it are derived not only the passages which are annalistic in character and read like excerpts from a chronicle {e.g. c. 13. 1, 2; c. 22; c. 26. 2* 3), but also most of the matter common to the Constitution and to Plutarch's Solon. The coincidences with Plutarch, which are often verbal, and extend to about 50 lines out of 170 in cc. 5-1 1 of the Constitution, can best be explained on the hypothesis that Hermippus, the writer followed by Plutarch, used the same source as Aristotle, viz. the Atthis of Androtion. Androtion is probably closely followed in the account of the pre-Draconian constitution, and to him appear to be due the explanation of local names {e.g. xˆPˆv dreXes), or proverbial expressions {e.g. rd jut)

I«

27. 4 (Pericles' motive for the introduction of the dicasts' pay). But while the object (01 PovKontvoi (SkoLtrfaintiv, c. 6) and the date of this oligarchical pamphlet (for the date cf. Plutarch's Solon, c. 15 oi 7repi Kovoova koI TZXuvlav /cat 'linrovucov, which points to a time when Conon, Alcibiades and Callias were pro- minent in public life) are fairly certain, the authorship is quite uncertain, as is also its relationship to another source of import- ance, viz. thai? from which are derived the accounts of the Four Hundred and the Thirty. The view taken of the character and course of these revolutions betrays a strong bias in favour of Theramenes, whose ideal is alleged to have been the iraTptos iroXtreta. It has been maintained, on the one hand, that this last source (the authority followed in the accounts of the Four Hundred and the Thirty) is identical with the oligarchical pamphlet, and, on the other, that it is none other than the Atthis of Androtion. The former hypothesis is improbable. In favour of the latter two arguments may be adduced. In the first place, Androtion's father, Andron, was one of the Four Hundred, and took Theramenes' side. Secondly, the precise marks of time, which are characteristic of the Atthis, are conspicuous in these chapters. In view, however, of the fact that Androtion in his political career showed himself not only a democrat, but a democrat of the extreme school, the hypothesis must

be pronounced untenable.

Value. — It is by no means easy to convey a just impression of the value of Aristotle's work as an authority for the constitu- tional history of Athens. In all that relates to the practice of his own day Aristotle's authority is final. There can be no question, therefore, as to the importance, or the trustworthy character, of the Second Part. But even here a caution is necessary. It must be remembered that its authority is final for the 4th century only, and that we are not justified in arguing from the practice of the 4th century to that of the 5th, unless corroborative evidence is available. In the First Part, however, where he is treating of the institutions and practice of a past age, Aristotle's authority is very far from being final. An analysis of this part of the work discloses his dependence, in a remarkable degree, upon his sources. Occasionally he compares, criticizes or combines; as a rule he adheres closely to the writer whom he is using. There is no evidence, either of inde- pendent inquiry, or of the utilization of other sources than literary ones. Where " original documents " are quoted, or referred to, as e.g. in the history of the Four Hundred, or of the Thirty, it is probable that he derived them from a previous writer. For the authority of Aristotle we must substitute, therefore, the authority of his sources; i.e. the value of any particular statement will vary with the character of the source from which it comes. For the history of the 5th century the passages which come from Androtion's Atthis carry with them a high degree of authority. It by no means follows, however, that a statement relating to earlier times is to be accepted simply because it is derived from the same source. And in passages which are derived from other sources than the Atthis a much lower degree of authority can be claimed, even for state- ments relating to the 5th century. The supremacy of the Areopagus after the Persian Wars, the policy attributed to Aristides (c. 24), and the association of Themistocles with Ephialtes, are cases in point. Nor must the reader expect to find in the Constitution a great work, in any sense of the term. The style, it is true, is simple and clear, and the writer's criticisms are sensible. But the reader will look in vain for evidence of the philosophic insight which makes the Politics, even at the present day, the best text-book of political philosophy. It is perhaps hardly too much to say that there is not a single great idea in the whole work. He will look in vain, too, for any consistent view of the history of the constitution as a whole, or for any adequate account of its development. He will find occasional misunderstandings of measures, and confusions of thought. There are appreciations which it is difficult to accept, and inaccuracies which it is difficult to pardon. There are contradictions which the author has overlooked, and there are

omissions which are unaccountable. Yet, in spite of such defects,

the importance of the Constitution can hardly be exaggerated. Its recovery has rendered obsolete any history of the Athenian constitution that was written before the year 1801. Before this date our knowledge was largely derived from the statements of scholiasts and lexicographers which had not seldom been misunderstood. The recovery of the Constitution puts us for the first time in possession of the evidence. To appreciate the difference that has been made by its recovery, it is only necessary to Compare what we now know of the reforms of Cleisthenes with what we formerly knew. It is much of it evidence that needs a careful process of weighing and sifting before it can be safely used; but it is, as a rule, the best, or the only evidence. The First Part may be less trustworthy than the Second; it is notjess indispensable to the student of constitutional history.

Bibliography. — A conspectus of the literature of the Constitution complete down. to the end of 1 892 is given in Sandys p. Ixvii., and, though less complete, down to the beginning of 1895 in Busolt, Griechische Geschichte, 2nd ed. vol. ii. p. 15. In the present article only the most important editions, works or articles are mentioned.

Editions of the text : Editio princeps, ed. by F. G. Kenyon, 30th January 1891, with commentary. Autotype facsimile of the papyrus (1891). Aristotelis voXirda ‘Adr)vaio > v, ed. G. Kaibel et U. von Wilamowitz-Moellendorff (Berlin, Weidmann, 1891). Aristotelis qui fertur ‘ KS-qvaiuv woXueia recensuerunt H. van Herwerden et J. van Leeuwen (Leiden, 1891). Teubner text, ed. by F. Blass (Leipzig, 1892). Edition of the text without commentary by Kenyon.

Most of these have passed through several editions. The fullest commentary is that contained in the edition of the text by J. E. Sandys (London, 1893). The best translations are those of Kenyon, in English, and of Kaibel and Kiessling, in German.

Works dealing with the subject: Bruno Keil, Die Solonische Verfassung nach Aristoteles (Berlin, 1892) ; G. Gilbert, Constitutional Antiquities of Sparta and Athens (Eng. trans., 1895); U. von Wila- mowitz-Moellendorff, Aristoteles und Athen (2 vols., Berlin, 1893), a work of great importance, in spite of many unsound conclusions; E. Meyer, Forschungen, vol. ii. pp. 406 ff. (the section dealing with the Four Hundred is especially valuable). Articles: R. W. Macan, Journal of Hellenic Studies (April 1891); R. Nissen, Rheinisches Museum (1892), p. 161; G. Busolt, Hermes (1898), pp. 71 ff . ; O. Seeck, ” Quellenstudien zu des Aristoteles’ Verfassungsgeschichte Athens,” in

Lehmann's Beitrage zwalten Geschichte, vol. iv. pp. 164 and 270. (E. M. W.)

CONSUETUDINARY (Med. Lat. consuetudinarius, from con- suetudo, custom), customary, a term used especially of law based on custom as opposed to statutory or written law. As a noun " consuetudinary " (Lat. consuetudinarius, sc. liber) is the 'name given to a ritual book containing the forms and ceremonies used in the services of a particular monastery, cathedral or religious order.

CONSUL (in Gr. generally wroros, a shortened form of crparqybs viraros, i.e. praetor maximus), the title borne by the two highest of the ordinary magistrates of the whole Roman community during the republic. In the imperial period these magistrates had ceased practically to be the heads of the state, but their technical position remained unaltered. (For the modern commercial office of consul see the separate article below.)

The consulship arose with the fall of the ancient monarchy (see further Rome: History, II. " The Republic "). The Roman reverence for the abstract conception of the magistracy, as expressed in the imperium and the auspicia, led to the pre- servation of the regal power weakened only by external limitations. The two new officials who replaced the king bore the titles of leaders (praetores) and of judges (judices; cf. Cicero, De legibus, iii. 3. 8, " regio imperio duo sunto iique a praeeundo judicando . . . praetores judices . . . appellamino"). But the new fact of colleagueship caused a third title to prevail, that of consules or " partners," a word probably derived from con- salio on the analogy of praesul and exul (Mommsen, Staatsrecht, ii. p. 77, n. 3). This first example of the collegiate principle assumed the form that soon became familiar in the Roman commonwealth. Each of the pair of magistrates could act up to the full powers of the imperium; but the dissent of his colleague rendered his decision or his action null and void. At the same time the principle of a merely annual tenure of office was insisted on. The two magistrate's at the close of their year of office were bound to transmit their power to successors; and these successors whom they nominated were obliged to seek the suffrages of the

people. The only body known to us as electing the consuls during the republican period was the comitia centuriata (see Comitia). The

consulate was originally confined to patricians. During the struggle for higher office that was waged between, the orders the office was suspended on fifty-one occasions between the years 444 and 367 B.C. and replaced by the military tribunate with consular power, to which plebeians were eligible. The struggle was brought to an end by the Licinio Sextian laws of 367 B.C., which enacted that one consul must be a plebeian (see Patricians).

Most of the internal history of Rome down to the beginning of the third century B.C. consists in a series of attacks, whether intentional or accidental, on the power of the executive. As the consuls are the sole representatives of higher executive authority in early times, this history is one of a progressive decline in the originally wide and arbitrary powers of the office. Their right of summary criminal jurisdiction was weakened by the successive laws of appeal (provocatio) ; their capacity for interpreting the civil law at their pleasure by the publication of the Twelve Tables and the Forms of Action. The growth of the tribunate of the plebs hampered their activity both as legislators and as judges. They surrendered the duties of registration to the censors in 443 B.C., and the rights of civil jurisdiction and control over the market and police to the praetor and the curule aediles in 367 B.C.

The result of these limitations and of this specialization of functions in the community was to leave the consuls with less specific duties at home than any magistrates in the state. But the absence of specific functions may be of itself a sign of a general duty of supervision. The consuls were in a very real sense the heads of the state. Polybius describes them as controlling the whole administration (Polyb. vi. 1 2 Tracrcov eun nvpioi t&v Sri/jo- alwv irpaˆtoiv). This control they exercised in concert with the senate, whose chief servants they were. It was they who were the most regular consultants of this council, who formulated its decrees as edicts, and who brought before the people legislative measures which the senate had approved. It was they also who represented the state to the outer world and introduced foreign envoys to the senate. The symbols of their presidency were manifold. It was marked by the twelve lictors (q.v.), a number permitted to no other ordinary magistrate, by the fact that the first act of newly-admitted consuls was to take the auspices, their second to summon the senate, and by the use of their names for dating the year. The consulate was, indeed, as Cicero expresses it, the culminating point in an official career (” Honorum populi finis est consulatus,” Cic. Pro Planco, 25. 60).

In the domestic sphere the consuls retained certain powers of

jurisdiction. This jurisdiction was either (i.) administrative or (ii.) criminal, (i.) Their administrative jurisdiction was some- times concerned with financial matters such as pecuniary claims made by the state and individuals against one another. They acted in these matters in the periods during which the censors were not in office. We also find them adjudicating in disputes about property between the cities of Italy, (ii.) Their criminal jurisdiction was of three kinds. In the first place it was their duty, before the development of the standing commissions which originated in the middle of the 2nd century B.C., to set in motion the criminal law against offenders for the cognizance of ordinary, as opposed to political, crimes. The reference of such cases to the assembly of the people was effected through their quaestors (see Quaestor). Secondly, when the people and senate, or the senate alone, appointed a special commission (see Senate), the commissioner named was often a consul. Thirdly, we find the consul conducting a criminal inquiry raised by a point of international law. It is possible that in this case his advising body {consilium) was composed of the fetiales (see Herald, ad fin.). (Cicero, De republica, iii. 18. 28; Mommsen, Staatsrecht, ii. p. 112, n. 3).

During the greater part of the republic the consuls were recognized as the heads of the administration abroad as well as at home. It thus became necessary that departments of adminis- tration (provinciae) should be determined and assigned. The

method of assignment varied. The least usual device was for one consul to take the field at the head of an army, while the other remained at home to transact the civil business of state. More often foreign wars demanded the attention of both consuls. In this case the regular army of four legions was usually divided; between them. When it was necessary that both armies should co-operate, the principle of rotation was adopted, each consul having the command for a single day — a practice which may be illustrated by the events preceding the battle of Cannae (Polybius iii. no; Livy xxii. 41). During the great period of conquest from 264 to 146 B.C. Italy was generally one of the consular “provinces,” some foreign country the other; and when at the close of this period Italy was at peace, this distinction approxi- mated to one between civil and military command. The consuls . settled their departments amongst themselves by agreement! or by lot (comparatio, sortitio), the power of declaring what should be the consular provinciae was usurped by the senate, (see Senate), and a lex Sempronia passed by C. Gracchus,: probably in 122 B.C., ordained that the two consular provinces should be declared before the election of the consuls. At this time the consuls entered office on the 1st of January (a practice which commenced in 1 53 b. a), and their military

command began on the 1 st of March, They could hold this military command until they were superseded in the following March, and thus their tenure of power was practically raised to fourteen months. But meanwhile the home officials invested with the imperium had proved insufficient for the military needs of the empire, and the system of prolonging the command {prorogatio imperii) had been growing up (see Province). The consul whose command had been prolonged now served abroad as proconsul. It is probable, that Sulla in his legislation of 81 B.C. did something to stereotypeˆ this system. Certainly the government by pro-magistrates be- comes the rule after this period (cf. Cicero, De natura deorum,' ii. 3. 9; De divinatione, ii. 36. 76, 77), although there are several instances of consuls assuming the active command of provinces between the years 74 and 55 B.C. (Mommsen, Rechtsfrage, p. 30), and Cicero declares that the consul has a right to approach every province (" consules, quibus more majorum concessum est vel omnes adire proviricias," Cicero, Ad Atticum, viii. 15. 3).' Certainly in theory the provinces were still regarded as "con- sular," not " proconsular," and were technically, although not practically, held from the 1st of March' of the consul's tenure' of office at Rome (cf. Cicero, De provinciis consularibus, 15. 37; Mommsen, Rechtsfrage, passim). It was not until the lex Pompeia of 52 B.C. (Dio Cassius xl. 56) had established a five years' interval between home and foreign command that the theory of the prorogatio imperii vanished and the proconsulate became a separate office.

Since the theory of the persistence of the republican constitu- tion was of the essence of the Principate, the consuls necessarily lost little of their outward position and dignity under the rule of the Caesars. The consulship was the only office in which a citizen, other than a member of the imperial house, might have the princeps as a colleague, and in the interval between the death or deposition of one princeps and the appointment of another the consuls resumed their normal position as the heads of the state (cf. Herodian ii. 12). As the presidents of the senate, who after a.d. 14 elected them to their office, they were the chief personal representatives of those elements of sovereignty that were supposed to attach to that body, and they directed that high criminal jurisdiction which the senate of this period assumed (see Senate). A restored power of jurisdiction is indeed one of the features of their position during this time, and it is probable that the civil appeals which came to the senate were delegated to the consuls. They also acted for a time as delegates to the princeps in matters of Chancery jurisdiction such as trusts and guardianship (Mommsen, Staatsrecht, ii. p. 103). The consulship was also a preparation for certain high commands, such as the government of certain public and

imperial provinces (see Pro- vince) and the praefecture of the city. It was probably due to the fact that the consulship was such a prize, and perhaps also to the expense imposed on the office by its association with the

celebration of games (Dio Cassius lvi. 46, lix. 20) that the tenure was progressively shortened. In the early principate the consuls hold office for six months, later for four to two months (Mommsen, Staatsrecht, ii. pp. 84-87). The consuls appointed for the 1st of January were called ordinarii, the others suffecti; and the whole year was dated by the names of the former.

This distinction continued in the Empire that was founded by Diocletian and Constantine. The ordinarii were nominated by the emperor, the suffecti were nominated by the senate, and their appointment was ratified by the emperor. The consulship was still the greatest dignity which the Empire had to bestow; and the pomp and ceremony of the office increased in proportion to the decline in its actual power. The entry of the consuls on office was celebrated by a great procession, by games given to the people, by a distribution of gifts, such as the ivory diptychs, a long series of which has been preserved. But the senate, over which they presided until the time of Justinian, was little more than the municipal council of the city of Rome; and the justice which they meted out had dwindled down to the formal and uncontested acts of manumission and the granting of guardians. Sometimes there was a consul of the West at Rome and a consul of the East at Constantinople; at other times both consuls might be found in either capital. The last consul born in a private station was Basilius in the East in a.d. 541. But the emperors continued to bear the title for some time longer.

Authorities. — Mommsen, Romisches Staatsrecht, ii. pp. 74-140 (3rd ed., Leipzig, 1887) ; Herzog, Geschichle und System der romischen Staatsverfassung, i. p. 688 foil., 827 foil. (Leipzig, 1884, &c); Lange, Romische Alterthumer, i. p. 524 foil. (Berlin, 1856, &c); Schiller, Staats- und Rechtsaltertiimer, p. 53 foil. (Munich, 1893, Handbuch der klassischen Altertums-Wissenschaft, von Dr Iwan von Muller) ; Daremberg-Saglio, Dictionnaire des antiouites grecques et romaines, i. 1455 foil. (1875, &c.) ; De Ruggiero, Dizionario eptgrafico di antichitd Romane, ii. 679 foil., 868 foil. (Rome, 1886, &c); Pauly-Wissowa, Realencyclopadie, iv. 11 12 foil, (new edition, Stuttgart, 1893, &c).

For the consular diptychs, cf. besides Daremberg-Saglio, I.e., Gori, Thesaurus veterum diptychorum (Florence, 1759), and Labarte, Histoire des arts induslriels au moyen age, i. p. 10 foil., 190 foil. (1st ed., Paris, 1864). (A. H. J. G.)

CONSUL, a public officer authorized by the state whose com- mission he bears to manage the commercial affairs of its subjects in a foreign country, and formally permitted by the government of the country wherein he resides to perform the duties which are specified in his commission, or lettre de provision. (For the ancient magisterial office of consul see separate article above.)

A consul, as such, is not invested with any diplomatic character, and he cannot enter on his official duties until a rescript, termed an exequatur (sometimes a mere countersign endorsed on the commission), has been delivered to him by the authorities of the state to which his nomination has been communicated by his own government. This exequatur, called in Turkey a barai, may be revoked at any time at the discretion of the government where he resides. The status of consuls commissioned by the Christian powers to reside in Mahommedan countries, China, Korea, Siam, and, until 1899, in Japan, and to exercise judicial functions in civil and criminal matters between their own countrymen and strangers, is exceptional to the common law, and is founded on special conventions or capitulations (q.v.).

The title of consul, in the sense in which it is used in inter- national law, is derived from that of certain magistrates, in the cities of medieval Italy, Provence and Languedoc, charged with the settlement of trade disputes whether by sea or land (consules mercatorum, consules artis maris, &c.) – 1 With the growth of trade it early became convenient to appoint agents with similar powers in foreign parts, and these often, though not invariably, were styled consuls {consules in partibus ultramarinis). 2 The

1 The title of consul was borne by the chief municipal officers of several cities of the south of France during the middle ages and up to the Revolution. The name was not due to their being the suc- cessors of the chiefs of the Roman municipia. They were members of the governing body known as the consulat, and in Latin documents are sometimes styled consiliarii, i.e. councillors. The consulat itself is not traceable beyond the 12th century.

2 Particular quarters of mercantile cities were assigned to foreign traders and were placed under the jurisdiction of their own magis-

trates, variously styled syndics, provosts (praepositi), echevins

earliest foreign consuls were those established by Genoa, Pisa, Venice and Florence, between 1098 and 1196, in the Levant, at Constantinople, in Palestine, Syria and Egypt. Of these the Pisan agent at Constantinople bore the title of consul, the Venetian that of baylo (q.v.). In 1251 Louis IX. of France arranged a treaty with the sultan of Egypt under which French consuls were established at Tripoli and Alexandria, and Du Cange cites a charter of James of Aragon, dated 1268, granting to the city of Barcelona the right to elect consuls in partibus ultramarinis, &c. The free growth of the system was, however, hampered by commercial and dynastic rivalries. The system of French foreign consulships, for instance, all but died out after the crushing of the independent life of the south and the incor- poration of Provence and Languedoc under the French crown; while, with the establishment of Venetian supremacy in the Levant, the baylo developed into a diplomatic agent of the first class at the expense of the consuls of rival states. The modern system of consulships actually dates only from the 16th century. Early in this century both England and Scotland had their " conservators " with " jurisdiction to do justice between merchant and merchant beyond the seas " ; but France led the way. The alliance between Francis I. and Suleiman the Magnifi- cent gave her special advantages in the Levant, of which she was not slow to take advantage. Her success culminated in the capitulations signed in 1604, under the terms of which her consuls were given precedence over all others and were endowed with diplomatic immunities (e.g. freedom from arrest and from domiciliary visits) , while the traders of all other nations were put under the protection of the French flag. It was not till 1675 that, under the first capitulations signed with Turkey, English consuls were established in the Ottoman empire. Ten years earlier, under the commercial treaty between England and Spain, they had been established in Spain.

The frequent wars of the succeeding century hindered the development of the consular system. Thus, though the system of consuls was regularly established in France by the ordinance of 1661, in 1760 France had consuls only in the Levant, Barbary, Italy, Spain and Portugal, while she discouraged the establish- ment of foreign consuls in her own ports as tending to infringe her own jurisdiction. It was not till the 19th century that the system developed universally. Hitherto consuls had, for the most part, been business men with no special qualification as regards training; but the French system, under which the consular service had been long established as part of the general civil service of the country, a system that had survived the Revolution unchanged, was gradually adopted by other nations;

though, as in France, consuls not belonging to the regular service, and having an inferior status, continued to be appointed. In Great Britain the consular service was organized in 1825 (see below) ; in France the series of ordinances and laws by which its modern constitution was fixed began in 1833. In Germany progress was hindered by the political conditions of the country under the old Confederation; for the Hanse cities, which practi- cally monopolized the oversea trade, lacked the means to estab- lish a consular system on the French model. The present magnificently organized consular system of Germany is, then, one of the most remarkable outcomes of the establishment of the united empire. It was initiated by an act of the parliament of the North German Confederation (Nov. 8, 1867), subsequently incorporated in the statutes of the Empire, which laid down the principle that the German consulates were to be under the immediate jurisdiction of the president of the Confederation (later the emperor). The functions, duties and privileges of French and German consuls do not differ materially from those of British consuls; but there is a great difference in the organiza- tion and personnel of the consular service. In France, apart from the consuls elus or consuls marchands, who are mere consular agents, selected by the government from among the traders of a

(scabini), &c, who had power to fine or to expel from the quarter. The Hanseatic League (q.v.), particularly, had numerous settlements of this kind, the earliest being the Steelyard at London, established in the 13th century.

town where it desires to be represented, and unsalaried, the consular body proper was, by the decrees of July 10, 1880, and April 27, 1883, practically constituted a branch of the diplomatic service. It is recruited from the same sources, and its members are free to exchange into the corps diplomatique, or vice versa. Candidates for the diplomatic and consular services have to undergo the same training and pass the same examinations, i.e. in the constitutional, administrative and judicial organiza- tion of the various powers, in international law, commercial law and maritime law, in the history of treaties and in com- mercial and political geography, in political economy, and in the German and English languages. They have to serve three years abroad or attached to some ministerial department before they can enter for the examination which entitles them to an appointment as attache or as consul suppliant. This assimilation of the

consular to the diplomatic service remains peculiar to France. 1

In Germany it was enacted by the law of February 28, 1873, that German consuls must be either trained jurists, or must have passed special examinations. The result of this system has been the establishment throughout the world of an elaborate network of trained commercial experts, directly responsible to the central government, and charged as one of their principal duties with the task of keeping the government informed of all that may be of interest to German traders. These annual consular reports were from the first regularly and promptly published in the Deutsche Handelsarchiv, and have contributed much to the wonderful expansion of German trade. The right to establish consuls is now universally recognized by Christian civilized states. Jurists at one time contended that according to international law a right of " ex-territoriality " attached to consuls, their persons and dwellings being sacred, and themselves amenable to local authority only in cases of strong suspicion on political grounds. It is now admitted that, apart from treaty, custom has established very few consular privileges; that perhaps consuls may be arrested and incarcerated, not merely on criminal charges, but for civil debt; and that, if they engage in trade or become the owners of immovable property, their persons certainly lose protection. This question of arrest has been frequently raised in Europe: — in the case of Barbuit, a tallow-chandler, who from 1717 to 1735 acted as Prussian consul in London, and to whom the exemption conferred by statute on ambassadors was held not to apply; in the case of Cretico, the Turkish consul in London in 1808; in the case of Begley, the United States consul at Genoa, arrested in Paris in 1840; and in the case of De la Fuente Hermosa, Uruguayan consul, whom the Cour Roy ale of Paris in 1842 held liable to arrest for debt. In the same way consuls are often exempt from all kinds of rates and taxes, and always from personal taxes. They are exempt from billeting and military service, but are not entitled (except in the Levant, where also freedom from arrest and trial is the rule) to have private chapels in their houses. The right of consuls to exhibit their national arms and flag over the door of the bureau is not disputed.

Until the year 1825 British consuls were usually merchants engaged in trade in the foreign countries in which they acted as consuls, and their remuneration consisted entirely of fees. An act of that year, however, organized the consular service as a branch of the civil service, with payment by a fixed salary instead of by fees; consuls were forbidden also to engage in trade, and the management of the service was put under the control of a separate department of the foreign office, created for the purpose. In 1832 the restriction as to engaging in trade

was withdrawn, except as regards salaried members of the British consular service.

1 i.e. as regards the organization of the system. Consuls, or consuls-general, of other countries have sometimes a diplomatic or quasi-diplomatic status. Consuls-general charges d'affaires, e.g., rank as diplomatic agents. Of these the most notable is the British agent and consul-general in Egypt, whose position is unique. The diplomatic agent of Belgium at Buenos Aires, e.g., is minister-resident and consul-general, and the minister of Ecuador in London is consul- general charge d'affaires.

The duty of consuls, under the " General Instructions to British Consuls," is to advise His Majesty's trading subjects, to quiet their differences, and to conciliate as much as possible the subjects of the two countries. Treaty rights he is to support in a mild and moderate spirit; and he is to check as far as possible evasions by British traders of the local revenue laws. Besides assisting British subjects who are tried for offences in the local courts, and ascertaining the humanity of their treat- ment after sentence, he has to consider whether home or foreign law is more appropriate to the case, having regard to the convenience of witnesses and the time required for decision; and, where local courts have wrongfully interfered, he puts the home government in motion through the consul-general or ambassador. He sends in reports on the labour, manufacture, trade, commercial legislation and finance, technical education, exhibitions and conferences of the country or district in which he resides, and, generally, furnishes information on any subject which may be desired of him. He acts as a notary public; he draws up marine and commercial protests, attests documents brought to him, and, if necessary, draws up wills, powers of attorney, or conveyances. He celebrates marriages in accordance with the provisions of the Foreign Marriage Act 1892, and, where the ministrations of a clergyman cannot be obtained, reads the burial service. At a seaport he has certain duties to perform in connexion with the navy. In the absence of any of His Majesty's ships he is senior naval officer; he looks after men left behind as stragglers, or in hospital or prison, and sends them on in due course to the nearest ship. He is also em- powered by statute to advance for the erection or maintenance of Anglican churches, hospitals, and places of interment sums equal to the amount subscribed for the purpose by the resident British subjects.

As the powers and duties of consuls vary with the particular commercial interests they have to protect, and the civilization of the state in whose territory they reside, instead of abstract definition, we

summarize the provisions on this subject of the British Merchant Shipping Acts. 2 Consuls are bound to send to the Board of Trade such reports or returns on any matter relating to British merchant shipping or seamen as they may think necessary. Where a consul suspects that the shipping or navigation laws are being evaded, he may require the owner or master to produce the log-book or other ship documents (such as the agreement with the seamen, the account of the crew, the certificate of registration); he may muster the crew, and order explanations with regard to the documents. Where an offence has been committed on the high seas, or aboard ashore, by British seamen or apprentices, the consul makes inquiry on oath, and may send home the offender and witnesses by a British ship, particulars for the Board of Trade being endorsed on the agree- ment for conveyance. He is also empowered to detain a foreign ship the master or seamen of which appear to him through their misconduct or want of skill to have caused injury to a British vessel, until the necessary application for satisfaction or security be made to the local authorities. Every British mercantile ship, not carrying passengers, on entering a port gives into the custody of the consul to be endorsed by him the seamen's agree- ment, the certificate of registry, and the official log-book; a failure to do this is reported to the registrar-general of seamen. The following five provisions are also made for the protection of seamen. If a British master engage seamen at a foreign port, the engagement is sanctioned by the consul, acting as a super- intendent of Mercantile Marine Offices. The consul collects the property (including arrears of wages) of British seamen or apprentices dying abroad, and remits to H.M. paymaster-general. He also provides for the subsistence of seamen who are ship- wrecked, discharged, or left behind, even if their service was with foreign merchants; they are generally sent home in the first British ship that happens to be in want of a complement, and the expenses thus incurred form a charge on the parliamentary fund for the relief of distressed seamen, the consul receiving a

2 See also instructions to consuls prepared by the Board of Trade and approved by the secretary of state for foreign affairs.

commission of i\ % on the amount disbursed. Complaints by crews as to the quality and quantity of the provisions on board are investigated by the consul, who enters a statement in the log-book and reports to the Board of Trade. Money disbursed by consuls on account of the illness or injury of seamen is generally recoverable from the owner.

With regard to passenger vessels, the master is bound to give the consul facilities for inspection and for communication with passengers, and to exhibit his ” master’s list,” or list of passengers, so that the consul may transmit to the registrar-general, for insertion in the Marine Register Book, a report of the passengers dying and children born during the voyage. The consul may even defray the expenses of maintaining, and forwarding to their destination, passengers taken off or picked up from wrecked or injured vessels, if the master does not undertake to proceed in six weeks; these expenses becoming, in terms of the Passenger Acts 1855 and 1863, a debt due to His Majesty from the owner or charterer, where a salvor is justified in detaining a British vessel, the master may obtain leave to depart by going with the salvor before the consul, who, after hearing evidence as to the service rendered and the proportion of ship’s value and freight claimed, fixes the amount for which the master is to give bond and security. In the case of a foreign wreck the consul is held to be the agent of the foreign owner. Much of the notarial business which is imposed on consuls, partly by statute and partly by the request of private parties, consists in taking the declarations as to registry, transfers, &c, under the Mercantile Shipping Acts. Consuls in the Ottoman empire, China, Siam and Korea have extensive judicial and executive powers.

Since the incorporation of the British consular service in the civil service there have been several proposals to ” reform ” the system with the view of increasing its usefulness, more particularly from the point of view of providing assistance to British trade abroad (see Reports of Special Committees of the House of Commons on the Consular Service, 1858, 1872, 1903). It has been frequently urged that British consuls in their commercial know- ledge and intercourse with foreign merchants compare unfavour- ably, for example, with the consuls of the United States. It must be remembered, however, that there are points of striking dissimilarity between the duties of the consuls of these two countries. The American consul is necessarily brought much into touch with the trade and commerce of the country to which he is assigned through the system of consular invoices (see Ad Valorem) ; in his ordinary reports he is not confined to one stereotyped form, and when preparing special reports (a valuable feature of the United States consular service) he is liberally treated as regards any expense to which he has been put in obtaining information. He is practically free from the multifarious duties which the English consul has to discharge in connexion with the mercantile marine, nor has he to perform marriage ceremonies; and financially he is much better off, being allowed to retain as personal all fees

obtained from his notarial duties. The Committee of 1903 was appointed to in- quire, inter alia, whether the limits of age — 25 to 50 — for candi- dates should be altered, and whether service as a vice-consul for a certain period should be required to qualify for promotion to the rank of consul; whether means could not be adopted to give consular officers opportunities of increasing their practical knowledge of commercial matters and to bring them more into personal contact with the commercial community. The sugges- tions of the committee as the result of its inquiries were adopted in principle by the Foreign Office. The consular service is now grouped into three main divisions: (1) the general service; (2) Levant and Persia; and (3) China, Japan, Korea and Siam. The general consular service is graded into three divisions: first grade, consuls-general, salary £1000 with local allowances; second grade, consuls-general and consuls, salary £800 and local allowances; third grade, consuls, salary £600, with local allowances. Vice-consuls have an annual salary of £350, rising by annual increments of £15 to £450. In the general consular service appointments are sometimes made to the higher offices

from the ranks, but more usually from a select list of nominees, who must pass a qualifying examination. A proportion of the vacancies are reserved for competition amongst candidates who have had actual commercial experience. Divisions 2 and 3 are recruited by open competition. There were at one time a small number of commercial agents ■(/hose business consisted in watch- ing and reporting on the commerce, industries and products of special districts, and in answering inquiries on commercial sub- jects. Their duties were subsequently transferred to the consular staff, and a new class of officers, consular attaches, created. The consular attaches divide their time between special in- vestigations abroad, and visits to manufacturing districts in the United Kingdom. The headquarters of the commercial attaches in Europe, except those at Paris and Constant ; nople, were transferred to London, without defined districts, in 1907 (see Report on the System of British Commercial Attaches and Agents, 1908, Cd. 3610). ” Pro-consuls “are frequently appointed for the purpose of administering oaths, taking affidavits or affirmations, and performing notarial acts under the Com- missioners for Oaths Acts 1889.

The position of the United States consuls is minutely described hr the Regulations, Washington, 1896. Under various treaties and conventions, they enjoy large privileges and jurisdiction. By the treaty of 18 16 with Sweden the United States government agreed that the consuls of the two states respectively should be sole judges in disputes between captains and crews of vessels. (Up to 1906 there were

eighteen treaties containing this clause.) By convention with France in 1853 they likewise agreed that the consuls of both countries should be permitted to hold real estate, and to have the ” police interne des navires a commerce.” In Borneo,China, Korea, Morocco, Persia, Siam, Tripoli and Turkey an extensive jurisdiction, civil and criminal, is exercised by treaty stipulation iri cases where United States subjects are interested. Exemption from liability to appear as a witness is often stipulated. The question was raised in France in 1843 by the case of the Spanish consul Soller at Aix, and in America in 1854 by the case of Dillon, the French consul at San Francisco, who, on being arrested by Judge Hoffmann for declining to give evidence in a criminal suit, pulled down his consular flag. So, also, inviolability of national archives is often stipulated. To the consuls of other nations the United States government have always accorded the privileges of arresting deserters, and of being themselves amenable only to the Federal and not to the States courts. They also recognize foreign consuls as representative suitors for absent foreigners.

The United States commercial agents are appointed by the president, and usually receive an exequatur. They form a class by themselves, and are distinct from the consular agents, who are simply deputy consuls in districts where there is no principal consul.

By a law of April 1906 the U.S. consular service was re- organized and graded, the office of consul-general being divided into seven classes, and that of consul into nine classes; and on June 27 an executive order was issued by President Roosevelt governing appointments and promotions.

See A. de Miltitz, Manuel des consuls (London and Berlin, 1837-1843); Baron Ferdinand de Cussy, Dictionnaire du diplomate et du consul (Leipzig, 1846), and Reglements consulaires des principaux hats maritimesde V Europe et de I’Amerique {ib., 1851) ; Tuson, British Consul’s Manual (London, 1856) ; De Clercq, Guide pratique des consulats (1st ed., 1858, 5th ed. by de Vallat, Paris, 1898); C. T. Tarring, British Consular Jurisdiction in the East (London, 1887);. Lippmann, Die Konsularjurisdiktion im Orient (Berlin, 1898) ; Zorn, Die Konsulargesetzgebung des deutschen Reichs (2nd ed., Berlin, 1901) ; v. Konig, Handbuch des deutschen Konsularwesens (6th ed., Berlin, 1902) ; : Martens, Das deutsche Konsular- und Kolonialrecht (Leipzig, 1904); Malfatti di Monte Tretto, Handbuch des osterreichisch- ungarischen Konsularwesens (2 vols., 2nd ed., Vienna, 1904). See also the Parliamentary Reports referred to in the text. For British consuls much detailed information, including, e.g., minute directions for the uniforms of the various grades, will be found in the

official Foreign Office List published annually. As regards American consuls, see C. L. Jones, The Consular Service of the U. S. A. (Philadelphia, 1906) ; Publications of Univ. of Pennsylvania, ‘■ Series in Pol. Econ. and Public Law,” No. 18; and Fred. Van Dyne, Our Foreign Service (Rochester, N.Y., 1909).

“CONSULATE OF THE SEA,” a celebrated collection of maritime customs and ordinances (see also Sea La\Vs) in the Catalan language, published at Barcelona in the latter part of the 15th century. Its proper title is The Book of the Consulate, or in Catalan, Lo Libre de Consolat, the name being derived from the fact that it embodied the rules of law followed in the mari- time cities of the Mediterranean coast by the commercial judges known generally as consuls (q.v.). The earliest extant edition of the work, which was printed at Barcelona in 1494, is without a title-page or frontispiece, but it is described by the above-mentioned title in the epistle dedicatory prefixed to the table of contents. The only known copy of this edition is preserved in the National Library in Paris. The epistle dedicatory states that the work is an amended version of the Book of the Consulate, compiled by Francis Celelles with the assistance of numerous shipmasters and merchants well versed in maritime affairs. According to a statement made by Capmany in his Codigo de los costumbras maritimas de Barcelona, published at Madrid in 1791, there was extant to his knowledge in the last century a more ancient edition of the Book of the Consulate, printed in semi- Gothic characters, which he believed to be of a date prior to 1484. This is the earliest period to which any historical record of the Book of the Consulate being in print can be traced back. There are, however, two Catalan MSS. preserved in the National Library in Paris, the earliest of which, being MS. Espagnol 1 24, contains the two first treatises which are printed in the Book of the Con- sulate of 1494, and which are the most ancient portion of its contents, written in a hand of the 14th century, on paper of that century. The subsequent parts of this MS. are on paper of the 15 th century, but there is no document of a date more recent than 1436. The later of the two MSS., being MS. Espagnol 56, is written throughout on paper of the 15th century, and in a hand of that century, and it purports, from a certificate on the face of the last leaf, to have been executed under the superintendence of Peter Thomas, a notary public, and the scribe of the Consulate of the Sea at Barcelona. ■

The edition of 1494, which is justly regarded as the editio princeps of

the Book of the Consulate, contains, in the first place, a code of procedure issued by the kings of Aragon for the guidance of the courts of the consuls of the sea, in the second place, a collection of ancient customs of the sea, and thirdly, a body of ordinances for the government of cruisers of war. A colophon at the end of these ordinances informs the readers that ” the book commonly called the Book of the Consulate ends here”; after which there follows a document known by the title of The Acceptations, which purports to record that the previous chapters and ordinances had been approved by the Roman people in the nth century, and by various princes and peoples in the 12th and 13th centuries. Capmany was the first person to question the authenticity of this document in his Memorias historicas sobre la marina, &°c, de Barcelona, published at Madrid in 1779-1792. Pardessus and other writers on maritime law followed up the inquiry in the 19th century, and have conclusively shown that the document, whatever may have been its origin, has no proper reference to the Book of the Consulate, and is, in fact, of no histori- cal value whatsoever. The paging of the edition of 1494 ceases with this document, at the end of which is the printer’s colophon, reciting that ” the work was completed on the 14th of July 1494, at Barcelona, by Pere Posa, priest and printer.” The remainder of the volume consists of what may be regarded as an appendix to the original Book of the Consulate. This appendix contains various maritime ordinances of the kings of Aragon and of the councillors of the city of Barcelona, ranging over a period from 1340 to 1484. It is printed apparently in the same type with the preceding part of the volume. The original Book of the Consulate, coupled with this appendix, constitutes the work which has obtained general circulation in Europe under the title of The Con- sulate of the Sea, and which in the course of the 16th century was translated into the Castilian, the Italian, and the French languages. The Italian translation, printed at Venice in 1 549 by Jean Baptista Pedrezano, was the version which obtained the largest circulation in the north of Europe, and led many

jurists to suppose the work to have been of Italian origin. In the next following century the work was translated into Dutch by Westerven, and into German by Engelbrecht, and it is also said to have been translated into Latin.

An excellent translation into French of ” The Customs of the Sea,” which are the most valuable portion of the Book of the Consulate, was published by Pardessus in the second volume of his Collection des lois maritim.es (Paris, 1834), under the title of ” La Compilation connue sous le nom de consulat de la mer.” See introduction, by Sir Travers Twiss, to the Black Book of the Admiralty (London, 1874), which in

the appendix to vol. iii. contains his translation of ” The Customs of the Sea,” with the Catalan text. (T. T.)

CONSUMPTION (Lat. consumere), literally, the act of consum- ing or destroying. Thus the word is popularly applied to phthisis, a ” wasting away ” of the lungs due to tuberculosis

(q.v.). In economics the word has a special significance as a

technical term. It has been defined as the destruction of utilities, and thus opposed to ” production,” which is the creation of utilities, a utility in this connexion being anything which satisfies a desire or serves a purpose. Consumption may be either pro- ductive or unproductive; productive where it is a means directly or indirectly to the satisfaction of any economic want, unpro- ductive when it is devoted to pleasures or luxuries. Its place in the science of economics, and its close relation with production, are treated of in every text-book, but special reference may be made to W. Roscher, Nationalokonomie, 1883, and G. Schonberg, Handbuck d. polit. Okonomie, 1890-1891.

CONSUS, an ancient Italian deity, originally a god of agricul- ture. The time at which his festival was held (after harvest and seed-sowing), the nature of its ceremonies and amusements, his altar at the end of the Circus Maximus always covered with earth except on such occasions, all point to his connexion with the earth. In accordance with this, the name has been derived from condere (= Condius, as the “keeper” of grain or the ” hidden ” god, whose life-producing influence works in the depths of the earth). Another etymology is from conserere (” sow,” cf. Ops Consiva and her festival Opiconsivia). Amongst the ancients (Livy i. 9; Dion. Halic. ii. 31) Consus was most commonly identified with Uoo-eiSSiv “Lnrios (Neptunus Equester), and in later Latin poets Consus is used for Neptunus, but this idea was due to the horse and chariot races which took place at his festival; otherwise, the two deities have nothing in common. According to another view, he was the god of good counsel, who was said to have ” advised ” Romulus to carry off the Sabine women (Ovid, Fasti, iii. 199) when they visited Rome for the first celebration of his festival (Consualia). In later times, with the introduction of Greek gods into the Roman theological system, Consus, who had never been the object of special reverence, sank to the level of a secondary deity, whose character was rather abstract and intellectual.

His festival was celebrated on the 21st of August and the 15th of December. On the former date, the flamen Quirinalis, assisted by the

vestals, offered Sacrifice, and the pontifices presided at horse and chariot races in the circus. It was a day of public rejoicing; all kinds of rustic amusements took place, amongst them running on ox-hides rubbed with oil (like the Gr. acTKoAiao-jUos). Horses and mules, crowned with garlands, were given rest from work. A special feature of the games in the circus was chariot racing, in which mules, as the oldest draught beasts, took the place of horses. The origin of these games was generally attributed to Romulus; but by some they were considered an imitation of the Arcadian i7nroKpareia introduced by Evander. There was a sanctuary of Consus on the Aventine, dedicated by L. Papirius Cursor in 272, in early times wrongly identified with the altar in the circus.

See W. W. Fowler, The Roman Festivals (1899); G. Wissowa, Religion und Kultus der Romer (1902) ; Preller-Jordan, Romische Mythologie (1881).

CONTANGO, a Stock Exchange term for the rate of interest paid by a " bull " who has bought stock for the rise and does not intend to pay for it when the Settlement arrives. He arranges to carry over or continue his bargain, and does so by entering into a fresh bargain with his seller, or some other party,

by which he sells the stock for the Settlement and buys it again for the next, the price at which the bargain is entered being called the making-up price. The rate that he pays for this accommodation, which amounts to borrowing the money involved until the next Settlement, is called the contango.

CONTARINI, the name of a distinguished Venetian family, who gave to the republic eight doges and many other eminent citizens. The story of their descent from the Roman family of Cotta, appointed prefects of the Reno valley (whence Cotta Reni or Conti del Reno), is probably a legend. One Mario Con- tarini was among the twelve electors of the doge Paulo Lucio Anafesto in 697. Domenico Contarini, elected doge in 1043, subjugated rebellious Dalmatia and recaptured Grado from the patriarch of Aquileia. He died in 1070. Jacopo was doge from 1275 to 1280. Andrea was elected doge in 1367, and during his reign the war of Chioggia took place (1380); he was the first to melt down his plate and mortgage his property for the benefit of the state. Other Contarini doges were: Francesco (1623-1624), Niccolo (1630-1631),

who built the church of the Salute, Carlo (1655-1656), during whose reign the Venetians gained the naval victory of the Dardanelles, Domenico (1659- 1675) and Alvise (1676-1684). There were at one time no less than eighteen branches of the family; one of the most important was that of Contarini dallo Zaffo or di Giaffa, who had been invested with the countship of Jaffa in Syria for their services to Caterina Cornaro, queen of Cyprus; another was that of Con- tarini degli Scrigni (of the coffers) , so called on account of their great wealth. Many members of the family distinguished themselves in the service of the republic, in the wars against the Turks, and no less than seven Contarini fought at Lepanto. One Andrea Contarini was beheaded in 1430 for having wounded the doge Francesco Foscari (q.v.) on the nose. Other members of the house were famous as merchants, prelates and men of letters; among these we may mention Cardinal Gasparo Con- tarini (1483-1542), and Marco Contarini (1631-1689), who was celebrated as a patron of music and collected at his villa of Piazzola a large number of valuable musical MSS., now in the Marciana library at Venice. The family owned many palaces in various parts of Venice, and several streets still bear its name.

See J. Fontana, ” Sulla patrizia famiglia Contarini,” in II Gondoliere (1843). (L. V.*)

CONTAT, LOUISE FRANCHISE (1760-1813), French actress, made her dSbut at the Comedie Francaise in 1766 as Atalide in Bajazet. It was in comedy, however, that she made her first success, as Suzanne in Beaumarchais’s Mariage de Figaro; and in several minor character parts, which she raised to the first importance, and as the soubrette in the plays of Moliere and Marivaux, she found opportunities exactly fitted to her talents. She retired in 1809 and married de Parny, nephew of the poet. Her sister Marie fimilie Contat (1 769-1 846), an admirable soubrette, especially as the pert servant drawn by Moliere and de Regnard, made her debut in 1784, and retired in 1815.

CONTE, literally a ” story,” derived from the Fr. conter, to narrate, through low Lat. and Provencal forms contare and comtar. This word, although not recognized by the New English Dictionary as an English term, is yet so frequently used in English literary criticisms that some definition of it seems to be demanded. A conte, in French, differs from a ricit or a rapport in the element of style; it may be described as an anecdote told with deliberate art, and in this introduction of art lies its peculiar literary value. According to Littre, there is no fundamental difference between a conte and a roman, and all that can be said is that the conte is the generic term, covering long stories and short alike, whereas the roman (or novel) must extend to a certain length.

But if this is the primitive and correct significa- tion of the word, it is certain that modern criticism thinks of a conte essentially as a short story, and as a short story exclusively occupied in illustrating one set of ideas or one disposition of character. As early as the 13th century, the word is used in French literature to describe an anecdote thus briefly and artistically told, in prose or verse. The fairy-tales of Perrault and the apologues of La Fontaine were alike spoken of as contes,

and stories of peculiar extravagance were known as contes bieus, because they were issued to the common public in coarse blue paper covers. The most famous contes in the 18th century were those of Voltaire, who has been described as having invented the conte philosophique. But those brilliant stories, Candide, Zadig, L'Ingenu, La Princesse de Babylone and Le Taureau blanc, are not, in the modern sense, contes at all. The longer of these are romans, the shorter nouvelles; not one has the anecdotical unity required by a conte. The same may be said of those of Marmontel, and of the insipid imitations of Oriental fancy which were so popular at the close of the 18th century. The most per- fect recent writer of contes is certainly Guy de Maupassant, and his celebrated anecdote called " Boule de suif " may be taken as an absolutely perfect example of this class of literature, the precise limitations of which it is difficult to define. (E. G.)

CONTfi,, NICOLAS JACQUES (1755-1805), French mechanical genius, chemist and painter, was born at Aunou-sur-Orne, near Sees, on the 4th of August 1 755, of a family of poor farm labourers. At the age of fourteen he displayed precocious artistic talent in a series of religious panels, remarkably fine in colour and composition, for the principal hospital of Sees, where he was employed to help the gardener. With the advice of Greuze he took up portrait painting, quickly became the fashion, and laid by in a few years a fair competency. From that time he gave free rein to his passion for the mechanical arts and scientific studies. He attended the lectures of J. A. C. Charles, L. N. Vaquelin and J. B. Leroy, and exhibited before the Academy of Science an hydraulic machine of his own invention of which the model was the subject of a flattering report, and was placed in Charles's collection. The events of the Revolution soon gave him an opportunity for a further display of his inventive faculty. The war with England deprived France of plumbago ; he substituted for it an artificial substance obtained from a mixture of graphite and clay, and took out a patent in 1795 for the form of pencil which still bears his name. At this time he was associated with Monge and Berthollet in experiments in connexion with the inflation of military balloons, was conducting the school for that department of the engineer corps at Meudon, was

perfecting the methods of producing hydrogen in quantity, and was appointed (1796) by the Directory to the command of all the aerostatic establishments. He was at the head of the newly created Conservatoire des arts et metiers, and occupied himself with experiments in new compositions of permanent colours, and in 1798 constructed a metal-covered barometer for measuring comparative heights, by observing the weight of mercury issuing from the tube. Summoned by Bonaparte to take part as chief of the aerostatic corps in the expedition to Egypt, he considerably extended his field of activity, and for three years and a half was, to quote Berthollet, ” the soul of the colony.” The disaster of Aboukir and the revolt of Cairo had caused the loss of the greater part of the instruments and munitions taken out by the French. Conte, who, as Monge says, ” had every science in his head and every art in his hands,” and whom the First Consul described as ” good at everything,” seemed to be everywhere at once and triumphed over apparently insur- mountable difficulties. He made, – in an almost uncivilized country, utensils, tools and machinery of every sort from simple windmills to stamps for minting coin. Thanks to his activity and genius, the expedition was provided with bread, cloth, arms and munitions of war; the engineers with the exact tools of their trade; the surgeons with operating instruments. He made the designs, built the models, organized and supervised the manufacture, and seemed to be able to invent immediately anything required. On his return to France in 1802 he was commissioned by the minister of the interior, Chaptal, to super- intend the publication of the great work of the commission on Egypt, and an engraving machine of his construction materially shortened this task, which, however, he did not live to see finished. He died at Paris on the 6th of December 1805. Napoleon had included him in his first promotions to the Legion of Honour. A bronze statue was erected to his memory in 1852 at Sees, by public subscription.

CONTEMPT OF COURT

25

CONTEMPT OF COURT, in English law, any disobedience or disrespect to the authority or privileges of a legislative body, or interference with the administration of a court of justice.

1. The High Court of Parliament. Each of the two houses of Parliament has by the law and custom of parliament power to protect its freedom, dignity and authority against insult, disregard or violence by resort to its own process and not to ordinary courts of law and without having its process interfered with by those courts. The nature and limits of

this authority to punish for contempt have been the subject of not infrequent conflict with the courts of law, from the time when Lord Chief Justice Holt threatened to commit the speaker for attempting to stop the trial of Ashby v. White (1701), as a breach of privilege, to the cases of Burdett v. Abbott (1810), Stockdale v. Hansard and Howard v. Cosset (1842, 1843), and Bradlaugh v. Gosset (1884). It is now the accepted view that the power of either House to punish contempt is exceptional and derived from ancient usage, and does not flow from their being courts of record. Orders for committal by the Commons are effectual only while the House sits; orders by the Lords may be for a time specified, in which event prorogation does not operate as a discharge of" the offender. It was at one time considered that the privilege of committing for contempt was inherent in every deliberative body invested with authority by the constitution, and consequently that colonial legislative bodies had by the nature of their functions the power to commit for contempt. But in Kielley v. Carson (1843; 4 Moore, P.C. 63) it was held that the power belonged to parliament by ancient usage only and not on the theory above stated, and in each colony it is necessary to inquire how far the colonial legislature has acquired, by order in council or charter or from the imperial legislature, power to punish breach of privilege by imprisonment or com- mittal for contempt. This power has in some cases been given directly, in others by authority to make laws and regulations under sanctions like those enforced by the Houses of the imperial parliament. In the case of Nova Scotia the provincial assem- bly has power to give itself by statute authority to commit for contempt (Fielding v. Thomas, 1896; L.R.A.C. 600). In Barton v. Taylor (1886; n A.C. 197) the competence of the legislative assembly of New South Wales to make standing orders punishing contempt was recognized to exist under the colonial constitution, but the particular standing orders under consideration are held not to cover the acts which had been punished. (See May, Pari. Pr., 10th ed., 1896; Anson, Law and Custom of the Constitution, 3rd ed., 1897.)

2. Courts of Justice. The term contempt of court, when used with reference to the courts or persons to whom the exercise Qf the judicial functions of the crown has been delegated, means insult offered to such court or person by deliberate defiance of its authority, disobedience to its orders, interruption of its proceedings or interference with the due course of justice, or any conduct calculated or tending to bring the authority or administration of the law into disrespect or disregard, or to interfere with or prejudice parties or witnesses during the litigation. The ingenuity of the judges and of those who are concerned to defeat or defy justice have rendered

contempt almost Protean in its character. But for practical purposes most, if not all, contempts fall within the classification which follows: —

(a) Disobedience to the judgment or order of a court com- manding the doing or abstaining from a particular act, e.g. an order to execute a conveyance of property or an order on a person in a fiduciary capacity to pay into court trust moneys as to which he is an accounting party. This includes disobedience by the members of a local authority to a mandamus to do some act which they are by law bound to do; and proceedings for contempt have been taken in the case of guardians of the poor who have refused to enforce the Vaccination Acts, e.g. at Keighley and Leicester, and of town councillors who have refused to comply with an order to take specified measures to drain their borough (e.g. Worcester) . This process for compelling obedience is in substance a process of civil execution for the

benefit of the injured party rather than a criminal process for punishing the disobedience; and for purposes of appeal orders dealing with these forms of contempt have hitherto been treated as civil proceedings.

(b) Disobedience by inferior judges or magistrates to the lawful order of a superior court. Such disobedience, if amounting to wilful misconduct, would usually give ground for amotion or removal from office, or for prosecution or indictment or information for misconduct (Archbold, Criminal Pleading, 147, 23rd ed.).

(c) Disobedience or misconduct by executive officers of the law, e.g. sheriffs and their bailiffs or gaolers. The contempt consists in not complying with the terms of writs or warrants sent for execution. For instance, a judge of assize having ordered the court to be cleared on account of some disturbance, the high sheriff issued a placard protesting against ” this un- lawful proceeding,” and ” prohibiting his officer from aiding and abetting any attempt to bar out the public from free access to the court.” The lord chief justice of England, sitting in the other court, summoned the sheriff before him and fined him £500 f° r the contempt, and £500 more for persisting in addressing the grand jury in court, after he had been ordered to desist. A sheriff who fails to attend the assizes is liable to severe fine as being in contempt (Oswald, 51). And in Harvey’s case (1884, 26 Ch. D. 644) steps were taken to attach a sheriff who had failed to execute a writ of attachment for contempt of court in the mistaken belief that he was not entitled to break open doors to take the person in contempt. The

Sheriffs Act 1887 enumerates many instances in which misconduct is punishable under that act, but reserves to superior courts of record power to deal with such misconduct as a contempt (s. 29).

(d) Misconduct or neglect of duty by subordinate officials of courts of justice, including solicitors. In these cases it is more usual for the superior authorities to remove the offender from office, or for disciplinary proceedings to be instituted by the Law Society. But in the case of an unqualified person assuming to act as a solicitor or in the case of breach of an undertaking given by a solicitor to the court, proceedings for contempt are still taken.

(e) Misconduct by parties, jurors or witnesses. Jurors who fail to attend in obedience to a jury summons and witnesses who fail to attend on subpoena are liable to punishment for contempt, and parties, counsel or solicitors who practise a fraud on the court are similarly liable.

(/) Contempt in facie curiae. ” Some contempts.” says Blackstone, ” may arise in the face of the court, as by rude and contumelious behaviour, by obstinacy, perverseness or prevarication, by breach of the peace, or any wilful disturbance whatever “; in other words, direct insult to or interference with a sitting court is treated as contempt of the court. It is immaterial whether the offender is juror, party, witness, counsel, solicitor or a stranger to the case at hearing, and occasionally it is found necessary to punish for contempt persons under trial for felony or misdemeanour if by violent language or conduct they interrupt the proceedings at their trial. Judges have even treated as contempt the continuance outside the court-house after warning of a noise sufficient to disturb the proceedings of the court; and in Victoria Chief Justice Higginbotham committed for contempt a builder who persisted after warning in building operations close to the central criminal court in Melbourne, which interfered with the due conduct of the business of the sittings.

(g) Attempts to prevent or interfere with the due course of justice, whether made by a person interested in a particular case or by an outsider. This branch of contempt takes many forms, such as frauds on the court by justices, solicitors cr counsel (e.g. by fraudulently circularizing shareholders of a company against which a winding-up petition had been filed), tampering with witnesses by inducing them through threats or persuasion not to attend or to withhold evidence or to commit perjury, threatening judge or jury or attempting to bribe them and the like; and also by ” scandalizing the court itself ” by abusing

the parties concerned in a pending case, or by creating prejudice against such persons before their cause is heard.

The locus classicus on the subject of contempt by , attacks on judges is a judgment prepared by Sir Eardley-Wilmot in the

case of an application for an attachment against Invectives j Almon in 1765, for publishing a pamphlet libelling ˆagel. the court of king's bench. The judgment was not

actually delivered as the case was settled, but has long been accepted as correctly stating the law. Sir Eardley-Wilmot said that the offence of libelling judges in their judicial capacity is the most proper case for an attachment, for the " arraignment of the justice of the judges is arraigning the king's justice; it is an impeachment of his wisdom and goodness in the choice of his judges; and excites in the minds of the people a general dissatisfaction with all judicial determinations, and indisposes their minds to obey them. To be impartial, and to be .universally thought so, are both absolutely necessary for the giving justice that free, open and uninterrupted current which it has for many ages found all over this kingdom, and which so eminently distinguishes and exalts it above all nations upon the earth." Again, " the constitution has provided very apt and proper remedies for correcting and rectifying the involuntary mistakes of judges, and for punishing and removing them for any perver- sion of justice. But if their authority is to be trampled on by pamphleteers and news-writers, and the people are to be told that the power given to the judges for their protection is prosti- tuted to their destruction, the court may retain its power some little time, but I am sure it will eventually lose all its authority." The object of the discipline enforced by the court by proceed- ings for contempt of court is not now, if it ever was, to vindicate the personal dignity of the judges or to protect them from insult as individuals, but to vindicate the dignity and authority of the court itself and to prevent acts tending to obstruct the due course of justice. The question whether a personal invective against judges should be dealt with brevi manu by the court attacked, or by proceedings a,t the instance of the attorney- general by information or indictment for a libel on the adminis- tration of justice or on the judge attacked, or should be dealt with by a civil action for damages, depends on the nature and occasion of the attack on the judge.

There has at times been a disposition by judges in colonial courts to use the process of the court to punish criticisms on their acts by counsel or parties or even outsiders, which the privy council has been prone to discourage. For instance in a Nova Scotia case a barrister was suspended from practice for writing to the chief justice of the province a letter relating to a case in which the barrister was suitor. The privy council while considering the letter technically a contempt, held the punishment inappropriate. In Macleod v. St Aubyn (1899, A.C. 549) it was said that proceedings for scandalizing the court itself were obsolete in England. But in 1900 the king's bench division, following the Almon case, summarily punished a scurrilous personal attack on a judge of assize with reference to his remarks in a concluded case, published immediately after the conclusion of the case (R. v. Gray, igoo, 2 Q.B. 36). The same measure may be meted out to those who publish invectives against judges or juries with the object of creating suspicion or contempt as to the administration of justice. But the existence of this power does not militate against the right of the press to publish full reports of trials and judgments or to make with fairness, good faith, candour and decency, comments and criticisms on what passed at the trial and on the correctness of the verdict or the judgment. To impute corruption is said to go beyond the limits of fair criticism. Shortt (Law relating to Works of Literature) states the law to be that the temperate and respectful discussion of judicial determination is not prohibited, but mere invective and abuse, and still more the imputation of false, corrupt and dishonest motives is punishable. In an information granted in 1788 against the corporation of Yarmouth for having entered upon their books an order " stating that the assembly were sensible that Mr W. (against whom an action had been brought for malicious prosecution, and a verdict for £3000

returned, which the court refused to disturb) was actuated by motives of public justice, of preserving the rights of the corpora- tion to their admiralty jurisdiction, and of supporting the honour and credit of the chief magistrate, " Mr Justice Buller said, " The judge and jury who tried the case, confirmed by the court of common pleas, have said that instead of his having been actuated by motives of public justice, or by any motives which should influence the actions of an honest man, he had been actuated by malice. These opinions are not reconcilable; if the one be right the other must be wrong. It is therefore a direct insinua- tion that the court had judged wrong in all they have done in this case, and is therefore clearly a libel on the administration of justice."

The exact limits of the power to punish for contempt of court in respect of statements or comments on the action of judges and juries,

or with reference to pending proceedings, have been the subject of some controversy, owing to the difficulty of reconciling the claims of the press to liberty and of the public to free dis- cussion of the proceedings of courts of justice with the claims of the judges to due respect and of the parties to litigation that their causes should not be prejudiced before trial by outside inter- ference. As the law now stands it is permissible to publish con- temporaneous reports of the proceedings in cases pending in any court (Law of Libel Amendment Act 1888, s. 3), unless the proceedings have taken place in private (in camera), or the court has in the interests of justice prohibited any report until the case is concluded, a course now rarely, if ever, adopted. But it is not permissible to make any comments on a pending case calculated to interfere with the due course of justice in the case, nor to publish statements abouti the cause or the parties calculated to have that effect. This rule applies even when the case has been tried and the jury has disagreed if a second trial is in prospect. Applications are frequently made to commit pro- prietors and editors who comment too freely or who undertake the task of trying in their newspapers a pending Case. The courts are now slow to move unless satisfied that the statements or comments may seriously affect the course of justice, e.g. by reaching the jurors who have to try the case.

The difference between pending and decided cases has been frequently recognized by the courts. What would be a fair comment in a decided case may tend to influence the mind of the judge or the jury in a case waiting to be heard, and will accordingly be punished as a contempt. In Tichborne v. Moslyn the publisher of a newspaper was held to have committed a contempt by printing in his paper extracts from affidavits in a pending suit, with comments upon them. In the case of R. v. Castro it was held that after a true bill has been found, and the indictment removed into the court of queen's bench, and a day fixed for trial, the case was pending; and: it was a contempt of court to address public meetings, alleging that the defendant was not guilty, that there was a conspiracy against the defendant, and that he could not have a fair trial; and the court ordered the parties to answer for their contempt. In the case of the Moat Farm murder (1903) the high court punished as contempt a series of articles. published in a newspaper while the preliminary inquiry . was proceeding and before the case went to a jury (R. v. Parker, 1903, 2 K.B. 432). The like course was followed in 1905 in the case of statements made in a Welsh newspaper about a woman awaiting trial for attempted murder (R. v. Davigs, 1906, 1 K.B. 32); and in the case of the Weekly Dis- patch in 1902 (R. v. Tibbits and Windust, 1 K.B. 77), two journal- ists were tried on indictment, and held to have been rightly convicted, for

conspiring to prevent the course of justice by publishing matter calculated to interfere with the fair trial of persons who were under accusation.

” In the superior courts the power of committing for con- tempt is inherent in their constitution, has been coeval with their original institution and has been always exercised ” courts (Oswald, On Contempt, 3). The high court in which . having these courts are merged is the only court which has jurisMc- a general jurisdiction to deal summarily with all forms ””

of contempt- Each division of that court deals with

Punish- ment.

the particular contempts arising with reference to proceedings before the division; but the king’s bench division, in the exercise of the supervisory authority inherited from the old court of king’s bench as custos morum, also from time to time deals with acts constituting interference with justice in other inferior courts whether of record or not. The nature and limits of this jurisdic- tion after much discussion have been defined by decisions ki 1903 and 1905 in attempts to try by newspapers cases under inquiry by justices or awaiting trial at assizes or quarter sessions. The exercise of this authority in the king’s bench division, being in a criminal cause or matter, is not the subject of appeal to any higher court.

Inferior courts of record have, as a general rule, power to punish only those contempts which are committed in facie curiae or consist in disobedience to the lawful orders or judgments of the court. For instance, a county court may summarily punish persons who insult the judge or any officer of the court of any juror or witness, or wilfully interrupt the proceedings, or mis- behave in the court-house (County Court Act 1888, s. 162), and may also attack persons who having means refuse to comply with an order to pay money, or refuse to comply with an order to deliver up a specific chattel or disobey an injunction. A court of quarter sessions has at common law a like power as to con- tempts in facie curiae and is said to have power to punish its officials for contempt in nonrattendance or neglect of duty:

Contempt of court is a misdemeanour and is punishable by fine and imprisonment or either at discretion. The offence may be tried

summarily, or may be prosecuted on informa- tion or on indictment as was done in the case of the Weekly Dispatch already mentioned. The prerogative of pardon extends to all contempts of court which are dealt with by a sentence of clearly punitive character; but it is doubtful whether it extends to committals for disobedience to orders made in aid of the execution of a civil judgment.

Contempt is usually dealt with summarily by the court con- temned in the case of contempt in facie curiae. The offender may be instantly apprehended and without further proof or examination fined or sent to prison. In the case of other con- tempts the High Court not only can deal with contempts affecting itself, but can also intervene summarily to protect inferior courts from contempts. This jurisdiction was asserted and exercised in the Moat Farm case (1903) and the South Wales Past case (1905) already mentioned. v

Except in cases of contempt in facie curiae evidence on oath as to the alleged contempt must be laid before the court, and application made for the ” committal ” or ” attachment ” of the offender. The differences between the two modes are technical rather than substantial.

The procedure for dealing with contempt of court varies somewhat according as the contempt consists in disobeying an order of the High Court made in a civil cause, or consists in interference with the course of justice by persons not present in court nor parties to the cause. In the first class of cases the court proceeds by order of committal or giving leave to issue writ of attachment. In either case the person said to be in contempt must have full notice of the proposed motion and of the grounds on which he is said to be in contempt; and the rules regulating such proceedings must be strictly complied with (R. v. Tuck, 1906, 2 Ch. 692). In proceedings on the crown side of the king’s bench division it is still usual to apply in the first place for a rule nisi for leave to attach the alleged offender who is given an opportunity of explaining, excusing or justifying the incriminated acts. It is essential that before punishment the alleged offender should have had full notice as to the specific offence charged and opportunity of answering to it. The king’s bench procedure is that generally used for interference with the due course of criminal justice or disobedience to prerogative writs such as mandamus.

An order of committal is an order in execution specifying the nature of the detention to be suffered, or the penalty to be paid. The process of attachment merely brings the accused into court; he is then required to answer on oath interrogatories administered

to him, so that the court may be better informed of the circumstances of the contempt. If he can clear himself on oath he is discharged; if he confesses the court will punish him by fine or imprisonment, or both, at its discretion. But in Very many cases on proper apology and submission, and undertaking not to repeat the contempt, and payment of costs, the court allows the proceedings to drop without proceeding to fine or imprison.

From time to time proposals have been made to deprive the superior courts of the power to deal summarily with contempts not committed in facie curiae, and to require proceedings on other charges for contempt to go before a jury. This distinction has already been made in some British colonies, e.g. British Guiana, by an ordinance of 1900 (No. 31). Recent decisions in England have so fully defined the limits of the offence and declared the practice of the courts that it would probably only result in undue licence of the press if the power now carefully and judicially exercised of dealing summarily with journalistic interference with the ordinary course of justice were taken away and the delay involved in submitting the case to a jury were made inevitable. The courts now only act in clear cases, and in cases of doubt can always send the question to a jury. The experience of other countries makes it undesirable to part with the summary remedy so long as it is in the hands of a trusted judicature.

Scotland. — In Scotland, the courts of session and justiciary have, at common law, and exercise the power of punishing contempt committed during a judicial proceeding by censure, fine or imprisonment proprio motu without formal proceedings or a summary complaint. The nature of the offence is there in substance the same as in England (see Petrie, 1889: 7 Rettie Justiciary 3; Smith, 1892: 20 Rettie Justiciary 52).

Ireland. — In Ireland the law of contempt is on the same lines as in England, but conflicts have arisen between the bench and popular opinion, due to political and religious differences, which have led to proposals for making juries and not judges arbiters in cases of contempt.

British Dominions beyond Seas. — The courts of most British possessions have acquired and freely exercise the power of the court of king's bench to deal summarily with contempt of court; and, as already stated, it is not infrequently the duty of the privy council to restrain too exuberant a vindication of the offended dignity of a colonial court. (W. F. C.)

CONTI, PRINCES OF. The title of prince of Conti, assumed by a younger branch of the house of Conde, was taken from Conti-sur-Selles, a small town about 20 m. S.W. of Amiens, which came into the Conde family by the marriage of Louis of Bourbon, first prince of Conde, with Eleanor de Roye in 1551.

Francois (1 558-1614), the third son of this marriage, was given the. title of marquis de Conti, and between 1581 and 1597 was elevated to the rank of a prince. Conti, who belonged to the older faith, appears to have taken no part in the wars of religion until 1587, when his distrust of Henry, third duke of Guise, caused him to declare against the League, and to support Henry of Navarre, afterwards King Henry IV. of France. In 1589 after the murder of Henry III., king of France, he was one of the two princes of the blood who signed the declaration recognizing Henry IV. as king, and he continued to support Henry, although on the death of Charles cardinal de Bourbon in 1590 he himself was mentioned as a candidate for the throne. In 1605 Conti, whose first wife Jeanne de Coeme, heiress of Bonnetable, had died in 1601, married the beautiful and witty Louise Marguerite (1 574-1631), daughter of Henry duke of Guise and Catherine of Cleves, whom, but for the influence of his mistress Gabrielle d'Estrees, Henry IV. would have made his queen. Conti died in 1614. His only child Marie having predeceased him in 1610, the title lapsed. His widow followed the fortunes of Marie de' Medici, from whom she received many marks of favour, and was secretly married to Francois de Bassompierre (q.v.), who joined her in conspiring against Cardinal Richelieu. Upon the exposure of the plot the cardinal exiled her to her estate at Eu, near Amiens, where she died. The princess wrote Aventures de la cour de Perse, in which, under the veil of fictitious scenes and names, she tells the history of her own time.

In 1629 the title of prince de Conti was revived in favour of Akmand de Bourbon (16,29-1666), second son of Henry II. of

Bourbon, prince of Cond6, and brother of Louis, the great Conde. He was destined for the church and studied theology at the university of Bourges, but although he received several benefices he did not take orders. He played a conspicuous part in the intrigues and fighting of the Fronde, became in 1648 commander-in-chief of the rebel army, and in 1650 was with his brother Conde imprisoned at Vincennes. Released when Mazarin went into exile, he wished to marry

Mademoiselle de Chevreuse (1627-1652), daughter of the famous confidante of Anne of Austria, but was prevented by his brother, who was now supreme in the state. He was concerned in the Fronde of 1651, but soon afterwards became reconciled with Mazarin, and in 1654 married the cardinal's niece, Anne Marie Martinozzi (1639-1672), and secured the government of Guienne. He took command of the army which in 1654 invaded Catalonia, where he captured three towns from the Spaniards. He afterwards led the French forces in Italy, but after his defeat before Ales- sandria in 1657 retired to Languedoc, where he devoted himself to study and mysticism until his death. At Clermont Conti had been a fellow student of Moliere's for whom he secured an introduction to the court of Louis XIV., but afterwards, when writing a treatise against the stage entitled Traiti de la comidie el des spectacles selon les traditions de I'Eglise (Paris, 1667), he charged the dramatist with keeping a school of atheism. Conti also wrote Lettres sur la grdce, and Du devoir des grands et des devoirs des gouverneurs de province.

Louis Aemand de Bourbon, prince de Conti (1661-1685), eldest son of the preceding, succeeded his father in 1666, and in 1680 married Marie Anne, a daughter of Louis XIV. and Louise de la Valliere. He served with distinction in Flanders in 1683, and against the wish of the king went to Hungary, where he assisted the Imperialists to defeat the Turks at Gran in 1683. After a dissolute life he died at Fontainebleau from smallpox.

Francois Louis de Bourbon, prince de Conti (1664-1709), younger brother of the preceding, was known until 1685 as prince de la Roche-sur-Yon. Naturally of great ability, he received an excellent education and was distinguished both for the independence of his mind and the popularity of his manners. On this account he was not received with favour by Louis XIV. ; so in 1683 he assisted the Imperialists in Hungary, and while there he wrote some letters in which he referred to Louis as le rot du Mdtre, for which on his return to France he was temporarily banished to Chantilly. Conti was a favourite of his uncle the great Conde, whose grand-daughter Marie Therese de Bourbon (1666-1732) he married in 1688. In 1689 he accompanied his intimate friend Marshal Luxembourg to the Netherlands, and shared in the French victories at Fleurus, Steinkirk and Neer- winden. On the death of his cousin, Jean Louis Charles, due de Longueville (1646-1694), Conti in accordance with his cousin's will, claimed the principality of Neuchatel against Marie, duchesse de Nemours (1625-1707), a sister of the duke. He failed to obtain military assistance from the Swiss, and by the king's command yielded the disputed territory to Marie, although the courts of law had decided in

his favour. In 1697 Louis XIV. offered him the Polish crown, and by means of bribes the abbe de Polignac secured his election. Conti started rather unwillingly for his new kingdom, probably, as St Simon remarks, owing to his affection for Francoise, wife of Philip II., duke of Orleans, and daughter of Louis XIV. and Madame de Montespan. When he reached Danzig and found his rival Augustus II., elector of Saxony, already in possession of the Polish crown, he returned to France, where he was graciously received by Louis, although St Simon says the king was vexed to see him again. But the misfortunes of the French armies during the earlier years of the war of the Spanish Succession compelled Louis to appoint Conti, whose military renown stood very high, to command the troops in Italy. He fell ill before he could take the field, and died on the 9th of February 1709, his death calling forth exceptional signs of mourning from all classes.

Louis Armand de Bourbon, prince de Conti (1696-1727), eldest son of the preceding, was treated with great liberality

by Louis XIV., and also by the regent, Philip duke of Orleans. He served under Marshal Villars in the War of the Spanish Succession, but he lacked the soldierly qualities of his father. In 1713 he married Louise Elisabeth (1693-1775), daughter of Louis Henri de Bourbon, prince de Conde, and grand-daughter of Louis XIV. He was a prominent supporter of the financial schemes of John Law, by which he made large sums of money.

Louis Franqois de Bourbon, prince de Conti (1717-1776), only son of the preceding, adopted a military career, and when the war of the Austrian Succession broke out in 1741 accompanied Charles Louis, due de Belle-Isle, to Bohemia. His services there led to his appointment to command the army in Italy, where he distinguished himself by forcing the pass of Villafranca and winning the battle of Coni in 1 744. In 1 745 he was sent to check the Imperialists in Germany, and in 1746 was transferred to the Netherlands, where some jealousy between Marshal Saxe and himself led to his retirement in 1747. In this year a faction among the Polish nobles offered Conti the crown of that country, where owing to the feeble health of King Augustus III. a vacancy was expected. He won the personal support of Louis XV. for his candidature, although the policy of the French ministers was to establish the house of Saxony in Poland, as the dauphiness was a daughter of Augustus. Louis therefore began secret personal relations with his ambassadors in eastern Europe, who were thus receiving contradictory instructions; a policy known later as the secret du roi. Although Conti did not secure the Polish throne he remained in the confidence of Louis until 1755, when his influence

was destroyed by the intrigues of Madame de Pompadour; so that when the Seven Years' War broke out in 1756 he was refused the command of the army of the Rhine, and began the opposition to the administration which caused Louis to refer to him as " my cousin the advocate." In 1771 he was prominent in opposition to the chancellor Maupeou. He supported the parlements against the ministry, was especially active in his hostility to Turgot, and was suspected of aiding a rising which took place at Dijon in 1775. Conti, who died on the 2nd of August 1776, inherited literary tastes from his father, was a brave and skilful general, and a diligent student of military history. His house, over which the comtesse de Boufflers presided, was the resort of many men of letters, and he was a patron of Jean Jacques Rousseau.

Louis Francois Joseph, prince de Conti (1734-1814), son of the preceding, possessed considerable talent as a soldier, and distinguished himself during the Seven Years' War. He took the side of Maupeou in the struggle between the chancellor and the parlements, and in 1788 declared that the integrity of the constitution must be maintained. He emigrated owing to the weakness of Louis XVI., but refused to share in the plans for the invasion of France, and returned to his native country in 1790. Arrested by order of the National Convention in 1793, he was acquitted, but was reduced to poverty by the confiscation of his possessions. He afterwards received a pension, but the Directory banished him from France, and as he refused to share in the plots of the royalists he lived at Barcelona till his death in 1 8 14, when the house of Conti became extinct.

See F. de Bassompierre, Memoires (Paris, 1877); G. Tallemant des Reaux, Historiettes (Paris, 1 854-1 860); L. de R. due de Saint Simon, Memoires (Paris, 1873) ; C. E. duchesse d'Orleans, Memoires (Paris, 1880); R. L. Marquis d'Argenson, Journal et memoires (Paris, 1859-1865); F. J. de P. cardinal de Bernis, Memoires et lettres (Paris, 1878) ; J. V. A. due de Broglie, Le Secret du roi (Paris, 1878); P. A. Cheruel, Histoire de la minorite de Louis XIV et du ministire de Mazarin (Paris, 1879); E. Boutaric, Correspondance secrete de Louis XV sur la politique etrangere (Paris, 1866); P. Foncin, Essai sur le ministire de Turgot (Paris, 1877) ; E. Bourgeois Neuchdtel et la politique prussienne en Franche-Comte (Paris, 1877).

CONTI, NICOLO DE* (fl. 1419-1444), Venetian explorer and writer, was a merchant of noble family, who left Venice about 141 9, on what proved an absence of 25 years. We next find him in Damascus, whence he made his way over the north Arabian desert, the Euphrates, and southern Mesopotamia, to Bagdad. Here he took ship

and sailed down the Tigris to Basra and the head of the Persian Gulf; he next descended the gulf to Ormuz, coasted along the Indian Ocean shore of

Persia (at one port of which he remained some time, and entered into a business partnership with some Persian merchants), and so reached the gulf and city of Cambay, where he began his Indian life and observations. He next dropped down the west coast of India to Ely, and struck inland to Vijayanagar, the capital of the principal Hindu state of the Deccan, destroyed in 155s- Of this city Conti gives an elaborate description, one of the most interesting portions of his narrative. From Vijay- anagar and the Tungabudhra he travelled to Maliapur near Madras, the traditional resting-place of the body of St Thomas, and the holiest shrine of the native Nestorian Christians, then ” scattered over all India,” the Venetian declares, ” as the Jews are among us.” The narrative next refers to Ceylon, and gives a very accurate account of the Cingalese cinnamon tree; but, if Conti visited the island at all, it was probably on the return journey. His outward route now took him to Sumatra, where he stayed a year, and of whose cruel, brutal, cannibal natives he gained a pretty full knowledge, as of the camphor, pepper and gold of this ” Taprobana.” From Sumatra a stormy voyage of sixteen days brought him to Tenasserim, near the head of the Malay Peninsula. We then find him at the mouth of the Ganges, and trace him ascending and descending that river (a journey of several months), visiting Burdwan and Aracan, penetrating into Burma, and navigating the Irawadi to Ava. He appears to have spent some time in Pegu, from which he again plunged into the Malay Archipelago, and visited Java, his farthest point. Here he remained nine months, and then began his return by way of Ciampa (usually Cochin-China in later medieval European literature, but here perhaps some more westerly portion of Indo-China); a month’s voyage from Ciampa brought him to Coloen, doubtless Kulam or Quilon, in the extreme south-west of India. Thence he continued his homeward route, touching at Cochin, Calicut and Cambay, to Sokotra, which he describes as still mainly inhabited by Nestorian Christians; to the ” rich city ” of Aden, ” remarkable for its buildings “; to Gidda or Jidda, the port of Mecca; over the desert to Carras or Cairo; and so to Venice, where he arrived in 1444.

As a penance for his (compulsory) renunciation of the Christian faith during his wanderings, Eugenius IV. ordered him to relate his history

to Poggio Bracciolini, the papal secretary. The narrative closes with Conti's elaborate replies to Poggio's question on Indian life, social classes, religion, fashions, manners, customs and peculiarities of various kinds. Following a prevalent fashion, the Venetian divides his Indies into three parts, the first extending from Persia to the Indus; the second from the Indus to the Ganges; the third including all beyond the Ganges; this last he considered to excel the others in wealth, culture and magnificence, and to be abreast of Italy in civilization. We may note, moreover, Conti's account of the bamboo in the Ganges valley; of the catching, taming and rearing of elephants in Burma and other regions; of Indian tattooing and the use of leaves for writing; of various Indian fruits, especially the jack and mango; of the polyandry of Malabar; of the cock- fighting of Java; of what is apparently the bird of Paradise; of Indian funeral ceremonies, and especially suttee; of the self- mutilation and immolation of Indian fanatics; and of Indian magic, navigation (" they are not acquainted with the compass "), justice, &c. Several venerable legends are reproduced; and Conti's name-forms, partly through Poggio's vicious classicism, are often absolutely unrecognizable; but on the whole this is the best account of southern Asia by any European of the 15th century; while the traveller's visit to Sokotra is an almost though not quite unique performance for a Latin Christian of the middle ages.

The original Latin is in Poggio's De varietate Fortunae, book iv. ; see the edition of the Abbe Oliva (Paris, 1723). The Italian version, printed in Ramusio's Navigationi et viaggi, vol. i., is only from a Portuguese translation made in Lisbon. An English translation with short notes was made by J. Winter Jones for the Hakluyt Society in the vol. entitled India in the Fifteenth Century (London, 1857) ; an introductory account of the traveller and his work by R. H. Major precedes. (C. R. B.)

CONTINENT (from Lat. continere, "to hold together"; hence " connected," " continuous "), a word used in physical geography of the larger continuous masses of land in contrast to the great oceans, and as distinct from the submerged tracts where only the higher parts appear above the sea, and from islands generally.

On looking at a map of the world, continents appear generally as wedge-shaped tracts pointing southward, while the oceans have a polygonal shape. Eurasia is in some sense an exception, but all the southern terminations of the continents advance into the sea in the form of a wedge — South America, South Africa, Arabia, India, Malaysia and Australia connected by a submarine platform with Tasmania. It is difficult not to believe that these remarkable characters

have some relation to the structure of the great globe-mass, and according to T. C. Chamberlin and R. D. Salisbury, in their Geology (1906), ” the true conception is perhaps that the ocean basins and continental platforms are but the surface forms of great segments of the lithosphere, all of which crowd towards the centre, the stronger and heavier — the ocean basins — taking precedence and squeezing the weaker and lighter ones — the continents — between them.” ” The area of the most depressed, or master segments, is almost exactly twice that of the protruding or squeezed ones. This estimate includes in the latter about 10,000,000 sq. m. now covered with shallow water. The volume of the hydrosphere is a little too great for the true basins, and it runs over, covering the borders of the continents ” (see Continental Shelf) . Several theories have been advanced to account for the roughly triangular shape of the continents, but that, presenting the least difficulty is the one expressed above, ” since in a spherical surface divided into larger and smaller segments the major part should be polygonal,while the minor residual segments are more likely to be triangular.”

As bearing on this geological idea, it is interesting to notice in this connexion that the areas of volcanic activity are mostly where continent and ocean meet; and that around the continents there is an almost continuous ” deep” from 100 to 300 m. broad, of which the Challenger Deep (11,400 ft.) and the great Tuscarora Deep are fragments. If on a map of the world a broad inked brush be swept seawards round Africa, passing into the Mediterranean, round North and South America, round India, then continuously south of Java and round Australia south of Tasmania and northward to the tropic, this broad band will represent the encircling ribbon-like ” deep,” which gives strength to the suggestion that the continents in their main features are permanent forms and that their structural connexion with the oceans is not temporary and accidental. The great protruding or ” squeezed ” segments are the Eurasian (with an area roughly of twenty-four, reckoning in millions of square miles), strongly ridged on the south and east, and relatively flat on the north-west; the African (twelve), rather strongly ridged on the east, less abruptly on the west and north; the North American (ten), strongly ridged on the west, more gently on the east, and relatively flat on the north and in the interior; the South American (nine), strongly ridged on the west and somewhat on the north-east and south-east, leaving ten for the smaller blocks. The sum of these will represent one-third of the earth’s surface, while the remaining two-thirds is covered by the ocean.

The foundation structure of the continents is everywhere similar. Their resulting rocks and soils are due to differential minor

movements in the past, by which deposits of varying character were produced. These movements, taking place periodically and followed by long periods of rest, produce continued stability for the development and migration of forms of life, the grading of rivers, the development of varied char- acteristic land forms, the migration and settlement of human beings, the facility or difficulty of intelligent intercourse between races and communities, with finally the commercial interchange of those commodities produced by varying climatic conditions upon different parts of the continental surface; in short, for those geographical factors which form the chief product of past and present human history. (See Geography.)

CONTINENTAL SHELF, the term in physical geography for the submerged platform upon which a continent or island stands in relief. If a coin or medal be partly sunk under water the image and superscription will stand above water and represent a continent with adjacent islands; the sunken part just sub- merged will represent the continental shelf and the edge of the coin the boundary between it and the surrounding deep, called by Professor H. K. H. Wagner the continental slope. If the lithosphere surface be divided into three parts, namely, the continent heights, the ocean depths, and the transitional area separating them, it will be found that this transitional area is almost bisected by the coast-line, that nearly one-half of it (,10,000,000 sq. m.) lies under water less than ioo fathoms deep, and the remainder 12,000,000 sq. m. is under 600 ft. in elevation. •There are thus two continuous plain systems, one above water and one under water, and the second of these is called the continental shelf. It represents the area which would be added to the land surface if the sea fell 600 ft. This shelf varies in width. Round Africa — except to the south— and off the western coasts of America it scarcely exists. It is wide under the British Islands and extends as a continuous platform under the North Sea, down the English Channel to the south of France; it unites Australia to New Guinea on the north and to Tasmania on the south, connects the Malay Archipelago along the broad shelf east of China with Japan, unites north-western America with Asia, sweeps in a symmetrical curve outwards from north-eastern America towards Greenland, curving downwards outside New- foundland and holding Hudson Bay in the centre of a shallow dish. In many places it represents the land planed down by wave action to a plain of marine denudation, where the waves have battered down the cliffs and dragged the material under water. If there were no compensating

action in the differential movement of land and sea in the transitional area, the whole of the land would be gradually planed down to a submarine platform , and all the globe would be covered with water. There are, however, periodical warpings of this transitional area by which fresh areas of land are raised above sea-level, and fresh continental coast-lines produced, while the sea tends to sink more deeply into the great ocean basins, so that the continents ‘ slowly increase in size. ‘ In many cases it is possible that the continental shelf is the end of a low plain submerged by subsidence; in others a low plain may be an upheaved con- tinental shelf, and probably wave action is only one of the factors at work ” (H. R. Mill, Realm of ‘Nature, 1897).

CONTINUED FRACTIONS. In mathematics, an expression

ˆ h ai* T.

of the form

o 2 =

04 = * = -

where ai,a 2 ,(J3, . . . and 6 2 ,6 3 , 64, . . . are any quantities whatever, positive or negative, is called a ” continued fraction.” The quantities ai . . . ,b 2 . . . may follow any law whatsoever. If the continued fraction terminates, it is said to be a terminating continued fraction; if the number of the quantities Oi . . ., 6 2 • • • is infinite it is said to be a non-terminating or infinite continued fraction. If &2/02, 63/03…, the component fractions, as they are called, recur, either from the commencement or from some fixed term, the continued fraction is said to be recurring or periodic. It is obvious that every terminating continued fraction reduces to a commensurable number.

The notation employed by English writers for the general con- tinued fraction is

Oi ± -

3 64

a 2 = fc o s = fca4 = t ‘ ‘■■■’ Continental writers frequently use the notation

61, „„ „ , H.bibt]

- — ˆ . . ., or ai =*=, — ‘ˆi— ‘±1 —

O4 |0 2 |03 |04

The terminating continued fractions

ai

6 2 63

= — – =t — = o 2 CE3

a u 01 +

a 2

ai +

O2 + O3

.62 63 bt

02+03+04′

reduced to the forms

01 01O2+62 01O2O3+62O3 + 62O1

l’ 02 O2O3 + 63 ‘

01020304 + &203Q4 + 63O1O4 + &4O102 + b 2 bj

020304+0463+0264 ‘ ■ ”

are called the successive convergents to the general continued fraction.

Their numerators are denoted by p u p 2 , p 3 , p 4 . . .; their denominators by Ci, 52, ?3, ?4. • •

We have the relations

Pn=a„p n l+bnPn

In the case of the fraction 01 — relations p„ = a n pn~i – b„p n – 2 , Taking the quantities a t . . . , 6 :

we have the

fraction of the form Oi-l — – . — ,

2 +0 S +

gn = o„g„_i+6„g„_

62 63 64

— 03—04— ‘ ‘ Qn = o„g„_i — 6„g„_ 2 .

. . to be all positive, a continued

. . . is called a continued fraction of

a continued fraction of the form — — — .

02-03 — 04 —

the first class ;

called a continued fraction of the second flass.

A continued fraction of the form 01-I — . — . — . .... where

02+03+04 +

Oi, o 2 , 03, 04. . . are all positive integers, is called a simple continued fraction. In the case of this fraction a u a 2 , o 3 , a 4 . . . are called the successive partial quotients. It is evident that, in this case,

Pi, P2, ps- ■ ., gi, 22, gs. • ., are two series of positive integers increasing without limit if the fraction does not terminate.

The general continued fraction Oi-| — – , -^ , — , . is evidently

OSTO3+04+ J

equal, convergent by convergent, to the continued fraction 1 A262 X2X363 X3X464 ai ~’~X2a2+ X 3 o 3 + X4O4 +” ■ • ‘ where X 2 , X 3 , X 4 , . . . are any quantities whatever, so that by choos- ing A 2 6 2 = i, X2A303 = i, &c, it can be reduced to any equivalent con- tinued fraction of the form Oi+t- , 7 . -y , ...

O2+O3+.04 +

Simple Continued Fractions.

I. The simple continued fraction is both the most interesting and important kind of continued fraction.

Any quantity, commensurable or incommensurable, can be expressed uniquely as a simple continued fraction, terminating in the case of a commensurable quantity, non-terminating in the case of an incommensurable quantity. A non-terminating simple con- tinued fraction must be incommensurable.

In the case of a terminating simple continued fraction the number of partial quotients may be odd or even as we please by writing the

last partial quotient, o„ as o n — 1 +-.

‘ The numerators and denominators of the successive convergents obey the law p„q n -i — £„_iG„ = (— i) n , from which it follows at once that every convergent is in its lowest terms. The other principal properties of the convergents are : —

The odd convergents form an increasing series of rational fractions continually approaching to the value of the whole continued frac- tion ; the even convergents form a decreasing series having the same property.

Every even convergent is greater than every odd convergent ; every odd convergent is less than, and every even convergent greater than, any following convergent.

Every convergent is nearer to the value of the whole fraction than any preceding convergent.

Every convergent is a nearer approximation to the value of the whole fraction than any fraction whose denominator is less than that of the convergent.

The difference between the continued fraction and the n’ h con-

vergent is less than

and greater than

On + 2

These limits

o»2» + i ° g„g„ + 2

may be replaced by the following, which, though not so close, are

simpler, viz. = and „ , _, — ;. ˆ g» g»(g» + gn + i)

Every simple continued fraction must converge to a definite limit ; for its value lies between that of the first and second convergents and, since

pn In

F”-i

g«-i ”

Lt.£ = = Lt.

g»

Pn-

q n qn-\ so that its value cannot oscillate.

The chief practical use of the simple continued fraction is that by means of it we can obtain rational fractions which approxi- mate to any quantity, and we can also estimate the error of our

approximation. Thus a continued fraction equivalent to x (the ratio of the circumference to the diameter of a circle) is i j_ i *i* II 3 + 7 + i5 + i + 292 + 1 + i + ... of which the successive convergents are

3. 21 233 355 IQ3993 & i’ 7″ 106′ 113′ 33102′ *’

the fourth of which is accurate to the sixth decimal place, since the error lies between i/gˆs or -0000002673 and fle/ˆSs or -0000002665. Similarly the continued fraction given by Euler as equivalent to i(« — 1) (e being the base of Napierian logarithms), viz.

i 1 2 I i

I + 6 + IO + I4 + I8 + .-;,

may be used to approximate very rapidly to the value of e.

For the application of continued fractions to the problem " To find the fraction, whose denominator does not exceed a given integer D, which shall most closely approximate (by excess or defect, as may be assigned) to a given number commensurable or incommen- surable," the reader is referred to G. Chrystal's Algebra, where also may be found details of the application of continued fractions to such interesting and important problems as the recurrence of eclipses and the rectification of the calendar (q.v.).

Lagrange used simple continued fractions to approximate to the solutions of numerical equations; thus, if an equation has a root between two integers a and a+i, put x = a + i/y and form the equation in y; if the equation in y has a root between b and 6+1, put y = b + i/z, and so on. Such a method is, however, too tedious, compared with such a method as Horner's, to be of any practical value.

The solution in integers of the indeterminate equation ax+by = c may be effected by means of continued fractions. If we suppose a/b to be converted into a continued fraction and p/q to be the pen- ultimate convergent, we have dq — bp = +1 or —I, according as the number of convergents is even or odd, which we can take them to be as we please. If we take aq — bp = +l we have a general solution in integers of ax+by = c, viz. x = cq — bt, y = at—cp; if we take aq — bp = — I, we have x — bt — cq, y = cp— at.^

An interesting application of continued fractions to establish a unique correspondence between the elements of an aggregate of m dimensions and an aggregate of n dimensions is given by G. Gantor in vol. 2 of the Acta Mathematical . •

Applications of simple continued fractions to the theory of numbers, as, for example, to prove the theorem that a divisor of the sum of two squares is itself the sum of two squares, may be found in J. A. Serret's Cours d'Algebre SupSrieure.

2. Recurring Simple Continued Fractions. — The infinite continued fraction

1 t_ L L L 2.LL J. L

ai+ a2+a 3 + . . . +a„+6 1 + 6 2 + . . . +b„+h+b 2 + . . . + b„+ k + . . .,

where, after the « tb partial quotient, the cycle of partial quotients b\, 6 2 , ... , b n recur in the same order, is the type of a recurring simple

continued fraction.

The value of such a fraction is the positive root of a quadratic equation whose coefficients are real and of which one root is negative. Since the fraction is infinite it cannot be commensurable and therefore its value is a quadratic surd number. Conversely every positive quadratic surd number, when expressed as a simple continued fraction, will give rise to a recurring fraction. Thus

. _l I I I 1

2_V3_ 3 + i+2+l+2+ ...,

, 1 1 1 1 _i 1 1 _i V28-5+ 3+2+3 + io+3+2+~3 + io+ ■■•

The second case illustrates a feature of the recurring continued fraction which represents a complete quadratic surd. There is only one non-recurring partial quotient Oi. If 61, fo, . . ., b„ is the cycle of recurring quotients, then &„=2

In the case of a recurring continued fraction which represents V N, where N is an integer, if n is the number of partial quotients in the recurring cycle, and f»,/j„ the nr ih convergent, then p\ T — Nq 2 m — (— i)" r , whence, if n is odd, integral solutions of the indeterminate equation x 2 — Ny 2 = ± I (the so-called Pellian equation) can be found. If n is even, solutions of the equation x 2 ~^- Ny 2 = + 1 can be found.

The theory and development of the simple recurring continued fraction is due to Lagrange. For proofs of the theorems here stated and for applications to the more general indeterminate equation x 2 — Ny 2 = H the reader may consult Chrystal's Algebra or Serret's Cours d'Algebre Superieure; he may also profitably consult a tract by T. Muir, The Expression of a Quadratic Surd as a Continued Fraction (Glasgow, 1874).

The General Continued Fraction.

I. The Evaluation of Continued Fractions. — The numerators and denominators of the convergents to the general continued fraction both satisfy the difference equation «„ = a„K„_i+&„«„_2. When we

can solve this equation we have an expression for the n th convergent to the fraction, generally in the form of the quotient of two series, each of n terms. As an example, take the fraction (known as Brouncker's fraction, after Lord Brouncker)

1 i 2 3j 5? 2

1 + 2 + 2+2 +2 + . – .

«„ +l = 2«„ + (2re-i) 2 «„_ 1 ,

Here we have whence

M»+l — (2» + l)w„=— (2» — l)j«„ — (2»— l)«„_i),

and we readily find that

g» 3 5 7 ’” 2»+i’

whence the value of the fraction taken to infinity is |x.

It is always possible to find the value of the w th convergent to a recurring continued fraction. If r be the number of quotients in the recurring cycle, we can by writing down the relations connecting the successive p’s and q’s obtain a linear relation connecting

Pnr+mt P(n~l)r+m, P(n-2)r+m,

in which the coefficients are all constants. Or we may proceed as follows. (We need not consider a fraction with a non-recurring part) . Let the fraction be

£l 2?. b-i +b 2 +..

+X+K+ . . .

Let M„=;

then

ai 02

leading to an

gnr+m ‘ ”’” b L +6 2 + . . • +&r +U„i

equation of the form A« n «n-i+B : K„+C«„_i + D = o, where A,B,C,D are independent of n, which is readily solved.

2. The Convergence of Infinite Continued Fractions. — We have seen that the simple infinite continued fraction converges. The infinite general continued fraction of the first class cannot diverge for its value

lies between that of its first two convergents. It may, how ever, oscillate. We have the relation p„q n ˆi —p„-iq„ = (— l)“J 2 &3 ■ ■ -b n ,

from which — — £ˆ = (— i)* 2 ‘•• ■ ” ” ■, and the limit of the right-

hand side is not necessarily zero.

The tests for convergency are as follows :

Let the continued fraction of the first class be reduced to the form

then it is convergent .if at least one of the series

dl + d 2 + d 3 + d i +

d 3 + df, + d 7 + . . ., ˆ2 + ˆ4 + ˆ6 + ■ • • diverges, and oscillates if both

these series converge.

For the convergence of the continued fraction of the second class there is no complete criterion. The following theorem covers a large number of important cases.

” If in the infinite continued fraction of the second classa„&J„ + I for all values of n, it converges to a finite limit not greater than’ unity.”

3. The Incommensurability of Infinite Continued Fractionsˆ— There is no general test for the incommensurability of the general infinite continued fraction.

Two cases have been given by Legendre as follows; —

If

I. The infinite continued fraction — . . , — , con-

a 2 + a z + . . . z„, . . .

verges to an incommensurable limit if after some finite value of n

the condition a„ < £&„ is always satisfied.

” ” b n

T n – ... con –

verges to an incommensurable limit if after some finite value of H

the condition a„&6„ + i is always satisfied, where the sign > need

not always occur but must occur infinitely often.

Continuants. The functions p„ and q n , regarded as functions of oi, . . ., c„, bt, . . ., b n determined by the relations

pn = a n p n ˆi+b H p n _ 1 , qn = a„qˆi + b n q„ˆ 2 ,

with the conditions pi=ai, po = l; qi = a 2 , qi = l, ?o = 0, have been studied under the name of continuants. The notation adopted is

h h\

,01, a 2 , ...

and it is evident that we have

II. The infinite continued fraction — — ‘

a 2 –

Pn~K(a

■bn.

aj ‘

_W K . . ., b n \

The theory of continuants is due in the first place to Euler. The reader will find the theory completely treated in Chrystal’s Algebra, where will be found the exhibition of a prime number of the form \p-- 1 as the actual sum of two squares by means, of continuants, a result given by H. J. S. Smith.

The continuant K(„ *’ 3 ” ‘ ” “J is also equal to the

determinant

Ol

— I

o o

Ch

o

O3

-I

o o

*4 4

u —I a„_i 6 r o o — — 00 — la,

from which point of view continuants have been treated by W. Spottiswoode, J. J. Sylvester and T. Muir. Most of the theorems concerning continued fractions can be thus proved simply from the properties of determinants (see T. Muir's Theory of Determinants, chap, iii.).

Perhaps the earliest appearance in analysis of a continuant in its determinant form occurs in Lagrange's investigation of the vibra- tions of a stretched string (see Lord Rayleigh, Theory of Sound, vol. i. chap. iv.).

The Conversion of Series and Products into Continued Fractions.

I . A continued fraction may always be found whose n ih convergent shall be equal to the sum to n terms of a given series or the product to n factors of a given continued product. In fact, a continued

.. + a„ +

numerators of its successive convergents any assigned quantities Pi, Pz, ps, ■ ■ ■ , pn, and for their denominators any assigned quantities gi, q 2 , 53, . . . , g„ . . .

The partial fraction b n /a n corresponding to the n th convergent can be found from the relations

pn = anpn-i + bnpn-2, g. n = a n q n -i + b n q n ~i ; and the first two partial quotients are given by

bi = pi, Oi = gi, biOt — p2, ai02-{-b2 = q2. If we form then the continued fraction inwhich pi, p 2 , pz, . . ., p„ are »i, «i + «2, M1 + M2 + M3, • • • > M1 + M2 + . . .' m„, and gi, g2, g3, . . ., g n are all unity, we find the series Mi M2 continued fraction

«2 «3

Ml Mi U%

fraction – 1 ,— ,

can be constructed having for the

. -j-« B equivalent to the

Ml

which we can transform into

«2 «lM 3

«2

, -I + ;

Mn-1

M»-i

Mi I –

M2M4

M„- 2 M„

■ . . . — Mn-l + Mn

-M1 + M2 — M2 + M3 — M3 + M4

a result given by Euler.

2. In this case the sum to n terms of the series is equal to the n th convergent of the fraction. There is, however, a different way in which a series may be represented by a continued fraction. We may require to represent the infinite convergent power series a OiX 02ˆ + ... by an infinite continued fraction of the form fo fox fox fox 1 — 1— 1— 1 —... Here the fraction converges to the sum to infinity of the series. Its

n tb convergent is not equal to the sum to n terms of the series. Expressions for fo, fo, fo, . . . by means of determinants have been given by T. Muir (Edinburgh Transactions, vol. xxvii.).

A method was given by J. H. Lambert for expressing as a con- tinued fraction of the preceding type the quotient of two convergent power series. It is practically identical with that of finding the greatest common measure of two polynomials. As an instance leading to results of some importance consider the series

F(»,x) = i + (T+ff)l , + (T+f|>(T+f| + l)2 , + ... We have

F(n + i,x)-F(n,x) = –

F(i,x) 1 */y(t+i) */(t+i)(7+2) Wtpˆx) 1+ I + I +...,

which may also be written

7 x x

T+7 + I+T+2 + ... By putting = fc x 2 /4 for x in F(o,x) and F(i,x), and putting at the same time 7 = 1/2, we obtain

tan x =

tanh x-

X X 1 X 2 X 1

*i~ 3- 5-7- • ■ • Val ’” *°i + 3+“5+ 7 + These results were given by Lambert, and used by him to [prove

that ir and it 2 are incommensurable, and also any commensurable

power of e.

Gauss in his famous memoir on the hypergeometric series

F (,, ft7 ,x)=r+ˆ+ˆ+;y 7 % i ˆ+...

gave the expression for F(a,/3+l, 7+1, x)+F(a, fo 7, x) as a con- tinued fraction, from which if we put £ = and write 7 — I for 7, we get the transformation

a a(a + l) a(a + l)(a+2) , _I fox fox ,

I+ y x+ y{y + if + y{y+i){y+ 2 f +----I- 1 _ x _.. where

„ _ a _ (a + l)7 (a+w-l)(7+w-2)

Pl ~y' P * ~(7 + l)(7+2) P 2 "- 1 "(7+2»-3)(7+2»-2)'

ft = ;

2(7 + 1 -a)

_, (7+2)(7+3)"-

Ft n(y + n — I — a)

" P2n- (7+2ra-2)(7+2»-l)-

7(7 + 1)'

From this we may express several of the elementary series as continued fractions; thus taking 0=1, 7 = 2, and putting x for — x,

, , , , . X iH I 2 X 2 2 X 2*X 1?X 1?X

we have log (1 +x) =- + – + – + – + ~ _fy + ˆ + _

Taking 7 = 1, writing xfa for x and increasing a indefinitely, we

haVe6= I-l+i-3>i-5+...

For some recent developments in this direction the reader may consult a paper by L- J- Rogers in the Proceedings of the London Mathematical Society (series 2, vol. 4).

Ascending Continued Fractions.

There is another type of continued fraction called the ascending continued fraction, the type so far discussed being called tjie descending continued fraction. It is of no interest or importance, though both Lambert and Lagrange devoted some attention to it. The notation for this type of fraction is

bi+——-—

63+-—ˆ

b2+ ?i_

03

ci+-

It is obviously equal to the series

„ ,62 , 63 , 64 1

O2 O2O3 O2O304 02030405

Historical Note.

+ .

The invention of continued fractions is ascribed generally to Pietro Antonia Cataldi, an Italian mathematician who died in 1626. He used them to represent square roots, but only for particular numerical examples, and appears to have had no theory on the subject. A previous writer, Rafaello Bombelli, had used them in his treatise on Algebra (about 1579), and it is quite possible that Cataldi may have got his ideas from him. His chief advance on Bombelli was in his notation. They next appear to have been used by Daniel Schwenter (1585-1636) in a Geometrica Practica published in 1618. He uses them for approximations. The theory, however, starts with the publica- tion in 1655 by Lord Brouncker of the continued fraction

j j2 ˆ2 K-2

1 , ˆ ,— 1 as an equivalent of ir/4. This he is supposed

to have deduced, no one knows how, from Wallis' formula for

John Wallis, discussing this fraction in his Arithmetica In- finitorum (1656), gives many of the elementary properties of the convergents to the general continued fraction, including the rule for their formation. Huygens (Descriptio automali planetarii, 1703) uses the simple continued fraction for the purpose of approximation when designing the toothed wheels of his Planet- arium. Nicol Saunderson (1682-1730), Euler and Lambert helped in developing the theory, and much was done by Lagrange in his additions to the French edition of Euler's Algebra (1795). Moritz A. Stern wrote at length on the subject in Crelle's Journal (x., 1833; xi., 1834; xviii., 1838). The theory of the con- vergence of continued fractions is due to Oscar Schlomilch, P. F. Arndt, P. L. Seidel and Stern. O. Stolz, A. Pringsheim and E. B. van Vleck have written on the convergence of infinite continued fractions with complex elements.

References. — For the further history of continued fractions we may refer the reader to two papers by Gunther and A. N. Favaro, Bulletins di bibliographia e di storia delle scienze mathematische e fisiche, t.

vii., and to M. Cantor, Geschichte der Mathematik, 2nd Bd. For text-books treating the subject in great detail there are those of G. Chrystal in English; Serret's Cours d'algebre superieure in French; and in German those of Stern, Schlomilch, Hatterdorff and Stolz. For the application of continued fractions to the theory of

trrational numbers there is P. Bachmann's Vorlesungen ilber die Natur der Irrationalzahnen (1892). For the application of continued fractions to the theory of lenses, see R. S. Heath's Geometrical Optics, chaps, iv. and v. For an exhaustive summary of all that has been written on the subject the reader may consult Bd. 1 of the Ency- klopddie der mathematischen Wissenschaften (Leipzig). (A. E. J.)

CONTOUR, CONTOUR-LINE (a French word meaning generally " outline," from the Med. Lat. contomare, to round off), in physical geography a line drawn upon a map through all the points upon the surface represented that are of equal height above sea-level. These points lie, therefore, upon a horizontal plane at a given elevation passing through the land shown on the map, and the contour-line is the intersection of that horizontal plane with the surface of the ground. The contour-line of o, or datum level, is the coastal boundary of any land form. If the sea be imagined as rising 100 ft., a new coast-line, with bays and estuaries indented in the valleys, would appear at the new sea-level. If the sea sank once more to its former level, the 100-ft. contour-line with all its irregularities would be represented by the beach mark made by the sea when 100 ft. higher. If instead of receding the sea rose continuously at the rate of 100 ft. per day, a series of levels 100 ft. above one another would be marked daily upon the land until at last the highest mountain peaks appeared as islands less than 100 ft. high. A record of this series of advances marked upon a flat map of the original country would give a series of concentric contour-lines narrowing towards the mountain- tops, which they would at last completely surround. Contour- lines of this character are marked upon most modern maps of small areas and upon all government survey and military maps at varying intervals according to the scale of the map.

CONTRABAND (Fr. contrebande, from contra, against, and bannum, Low Lat. for " proclamation "), a term given generally to illegal traffic; and particularly, as " contraband of war," to goods, &c, which subjects of neutral states are forbidden by international law to supply to a

belligerent.

According to current practice contraband of war is of two kinds: (1) absolute or unconditional contraband, i.e. materials of direct application in naval or military armaments; and (2) conditional contraband, consisting of articles which are fit for, but not necessarily of direct application to, hostile uses. There is much difference of opinion among international jurists and states, however, as to the specific materials and articles which may rightfully be declared by belligerents to belong to either class. There is also disagreement as to the belligerent right where the immediate destination is a neutral but the ultimate an enemy port.

An attempt was made at the Second Hague Conference to come to an agreement on the chief points of difference. The British delegates were instructed even to abandon the principle of contraband of war altogether, subject only to the exclusion by blockade of neutral trade from enemy ports. In the alterna- tive they were to do their utmost to restrict the definition of contraband within the narrowest possible limits, and to obtain exemption of food-stuffs destined for places other than be- leaguered fortresses and of raw materials required for peaceful industry. Though the discussions at the conference did not result in any convention, except on the subject of mails, it was agreed among the leading maritime states that an early attempt should be made to codify the law of naval war generally, in connexion with the establishment of an international prize court (see Prize).

Meanwhile, on the subject of mails, important articles were adopted which figure in the ” Convention on restric- tions in the right of capture ” (No. n of the series as set out in the General Act, see Peace Conference). They are as follows:—

Art. 1. — The postal correspondence of neutrals or belligerents, whatever its official or private character may be, found on the high seas on board a neutral or enemy ship is inviolable. If the ship is detained, the correspondence is forwarded by the captor with the least possible delay.

The provisions of the preceding paragraph do not apply, in case of violation of blockade, to correspondence destined for, or proceeding from, a blockaded port.

viz. 3

Malls.

Art. 1 1. —The inviolability of postal correspondencedoesnotexempt a neutral mail ship from the laws and customs of maritime war as to neutral merchant ships in general. The ship, however, may not be searched except when absolutely necessary, and then only with as much consideration and expedition as possible.

As regards food-stuffs Great Britain has long and consistently held that provisions and liquors fit for the consumption of the enemy's naval or military forces are contraband, pood- Her Prize Act, however, provides a palliative, in the stuffs and case of " naval or victualling stores," for the penalty Dre ' attaching to absolute contraband, the lords of the emp °"' admiralty being entitled to exercise a right of pre-emption over such stores, i.e. to purchase them without condemnation in a prize court. In practice, purchases are made at the market Value of the goods, with an additional 10% for loss of profit.

On the continent of Europe no such palliative has yet been adopted; but moved by the same desire to distinguish unmistak- able from, so to speak, constructive contraband, and to protect trade against the vexation of uncertainty, many continental jurists have come to argue conditional contraband away al- together. This change of opinion has especially manifested itself in the discussions on the subject in the Institute of Inter- national Law, a body composed exclusively of recognized international jurists. The rules this body adopted in 1896, though they do not represent the unanimous feeling of its members, may be taken as the view of a large proportion of them. The majority comprised German, Danish, Italian, Dutch and French specialists. The rules adopted contain a clause, which, after declaring conditional contraband abolished, states that: " Nevertheless the belligerent has, at his option and on condition of paying an equitable indemnity, a right of sequestration or pre-emption as to articles (objets) which, on their way to a port of the enemy, may serve equally in war or in peace." This rule, it is seen, is of wider application than the above-mentioned provision of the British Prize Act. To become binding in its existing form, either an alteration of the text of the Declaration of Paris or a modification in the wording of the clause would be necessary, seeing that under the Declaration of Paris " the neutral flag covers enemy goods, except contra- band of war." It may be said that, in so far as the continent is concerned, expert opinion is, on the whole, favourable to the recognition of conditional contraband in the form of a right of sequestration or pre-emption and within the limits Great Britain has shown a disposition to set to it as against herself.

As regards coal there is no essential difference between the position of coal to feed ships and that of provisions to feed men. Neither is per se

contraband. At the West African CoaA

Conference in 1884 the Russian representative pro- tested against its inclusion among contraband articles, but the Russian government included it in their declaration as to contra- band on the outbreak of the Russo-Japanese War. In 1898 the British foreign office replied to an inquiry of the Newport Chamber of Commerce on the position of coal that: ” Whether in any particular case coal is or is not contraband of war, is a matter prima facie for the determination of the Prize Court of the captor’s nationality, and so long as such decision, when given, does not conflict with well-established principles of inter- national law, H.M.‘s government will not be prepared to take exception thereto.” The practical applications of the law and usage of contraband in the Russo-Japanese War of 1904-5, however, brought out vividly the need of reform in these ” well- established principles.”

The Japanese regulations gave rise to no serious difficulties. Those issued by Russia, 6”n the other hand, led to „ . much controversy between the British government versywtth and that of Russia, in connexion with the latter’s Russia In pretension to class coal, rice, provisions, forage, horses ˆ usso ” and cotton with arms, ammunition, explosives, &c, as War- e absolute contraband. On June i,i904,LordLansdowne expressed the surprise with which the British government learnt that rice and provisions were to be treated as unconditionally contraband—” a step which they regarded as inconsistent with

the law and practice of nations.” They furthermore ” felt themselves bound to reserve their rights by also protesting against the doctrine that it is for the belligerent to decide what articles are as a matter of course, and without reference to other considerations, to be dealt with as contraband of war, regard- less of the well-established rights of neutrals”; nor would the British government consider itself bound to recognize as valid the decision of any prize court which violated those rights. It did not dispute the right of a belligerent to take adequate precautions for the purpose of preventing contraband of war, in the hitherto accepted sense of the words, from reaching the enemy; but it objected to the introduction of a new doctrine under which ‘ ‘ the well-understood distinction between conditional and unconditional

contraband was altogether ignored, and under which, moreover, on the discovery of articles alleged to be contraband, the ship carrying them was, without trial and in spite of her neutrality, subjected to penalties which are reluct- antly enforced even against an enemy's ship." (See section' 40 of Russian Instructions on Procedure in Stopping, Examining and Seizing Merchant Vessels, published in London Gazette of March 18, 1904.) In particular circumstances provisions might acquire a contraband character, as, for instance, if they should be consigned direct to the army or fleet of a belligerent, or to a port where such fleet might be lying, and if facts should exist raising the presumption that they were about to be employed in victualling the fleet of the enemy. In such cases it was not denied that the other belligerent would be entitled to seize the provisions as contraband of war, on the ground that they would afford material assistance towards the carrying on of warlike operations. But it could not be admitted that if such provisions were consigned to the port of a belligerent (even though it should be a port of naval equipment) they should therefore be necessarily regarded as contraband of war. The test was whether there were circumstances relating to any particular cargo to show that it was destined for military or naval use. 1

The Russian government replied that they could not admit that articles of dual use when addressed to private individuals in the enemy's country should be necessarily free from seizure and condemnation, since provisions and such articles of dual use, though intended for the military or naval forces of the enemy, would obviously, under such circumstances, be addressed to private individuals, possibly agents or contractors for the naval or military authorities.

Lord Lansdowne in answer stated that while H.M. government did not contend that the mere fact that the consignee was a private person should necessarily give immunity from capture, they held that to take vessels for adjudication merely because their destination was the enemy's country would be vexatious, and constitute an unwarrantable interference with neutral commerce. To render a vessel liable to such treatment there should be circumstances giving 'rise to a reasonable suspicion that the provisions were destined for the enemy's forces, and it was in such a case for the captor " to establish the fact of destination for the enemy's forces before attempting to procure their condemnation " (September 30, 1904).

The protests of Great Britain led to the reference of the subject by the Russian government to a departmental committee, with the result that on October 22, 1904, a rectifying notice was issued declaring that

articles capable of serving for a warlike object, in- cluding rice and food-stuffs, should be considered as contraband of war, if they are destined for the government of the belligerent power or its administration or its army or its navy or its fortresses or its naval ports; or for the purveyors thereof; and that in cases where they were addressed to private individuals these articles should not be considered as contraband of war; but that in all cases horses and beasts of burden were to be considered as contraband. As regards cotton, •explanations were given by the Russian government (May n, 1904) that the prohibition of cotton applied only to raw cotton suitable for the manufacture of explosives, and not to yarn or tissues: The carriage of belligerent despatches connected with the con-

duct of a war or of persons in the service of a belligerent state falls within the , prohibition of contraband traffic, but to distinguish such traffic from that of contraband, Analogues properly so called, the term applied to it in international %££ tra ~ law is ” analogues of contraband.” The penalty attaching to such carriage necessarily varies according to the degree of the analogy. ■

Trade between neutrals has a prima facie right to go on, in spite of war, without molestation. But if the ultimate destina- tion of goods, though shipped first to a neutral port, is enemy’s territory, then, according to the doctrine yo”age&” S of ” continuous voyages,” the goods may be treated as if they had been shipped to the enemy’s territory direct. The doctrine is entirely Anglo-Saxon in its origin 1 and’develop- ment. Only in one case does it seem ever to have been actually put in force by a foreign prize court, namely, in the case of the ” Doelwijk,” a Dutch vessel which was adjudged good prize by an Italian court on the ground that, although bound for Djibouti, a French port, it was laden with a provision of arms of a model which had gone out of use in Europe, and could only be destined for the Abyssinians, with whom Italy was at war.

The Institute of International Law in 1896 adopted the following rule on the subject: —

” Destination to the enemy is presumed, where the shipment is to one of the enemy ports, or to a neutral port, if it is unquestion- ably proved by the facts that the neutral port was only a state {(.tape) towards the enemy as the final destination of a single com- mercial operation.”

During the South African War (1899-1902) Great Britain was involved in controversy with Germany, who at first declined to recognize the

existence of any rule which could interfere with trade between neutrals, the German vessels in question having been stopped on their way to a neutral port.

As stated above, the Second Hague Conference failed to come to any understanding on contraband, but the subject was exhaust- ively dealt with by the Conference of London (1908-1909) on the laws and customs of naval war, in the following articles: —

ART. 22. — The following articles may, without notice, be treated as contraband of war, under the name of absolute contraband: (1) Arms of all kinds, including arms for sporting purposes, and their distinctive component parts; (2) projectiles, charges and cartridges of all kinds, and their distinctive component parts ; (3) powder and explosives specially prepared for use in war; (4) gun-mountings, limber boxes, limbers, military wagons, field forges and their dis- tinctive component parts; (5) clothing and equipment of a distinct- ively military character; (6) all kinds of harness of a distinctively military character; (7) saddle, draught and pack animals suitable for use in war ; (8) articles of camp equipment and their distinctive component parts; (9) armour plates; (10) warships, including boats, and their distinctive component parts of such a nature that they can only be used on a vessel of war; (11) implements and apparatus designed exclusively for the manufacture of munitions of war, for the manufacture or repair of arms, or war material for use on land or sea.

Art. 23. — Articles exclusively used for war may be added to the list of absolute contraband by a declaration, which must be notified. Such notification must be addressed to the governments of other powers, or to their representatives accredited to the power making the declaration. A notification made after the outbreak of hostilities is addressed only to neutral powers.

Art. 24. — The following articles, susceptible of use in war as well .as for purposes of peace, may, without notice, be treated as contra- band of war, under the name of conditional contraband: (1) Food- stuffs; (2) forage and grain, suitable for feeding animals; (3) clothing, fabrics for clothing, and boots and shoes, suitable for use in war; (4) gold and silver in coin or bullion; paper money; (5) vehicles of all kinds available for use in war, and their component parts; (6) vessels, craft and boats of all kinds; floating docks, parts of docks and their component parts ; (7) railway material, both fixed and rolling-stock, and material for telegraphs, wireless telegraphs and telephones; (8) balloons and flying machines and their dis- tinctive component parts, together with accessories and articles recognizable as intended for use

in connexion with balloons and flying machines; (9) fuel; lubricants; (10) powder and explosives not specially prepared for use in war; (11) barbed wire and imple- ments for fixing and cutting the same; (12) horseshoes and shoeing materials; (13) harness and saddlery; (14) field glasses, telescopes, chronometers and all kinds of nautical instruments.

‘See Springbok case, 1866, 5 Wallace I.; on Doelwijk case see Brusa, Rev. gen. de droit international public (1897); Fauchille id. (1897), p. 291, also The Times, April 15, May 25, June I, 1897.

Art. 25. — Articles susceptible of use in war as well as for purposes of peace, other than those enumerated in Articles 22 and 24, may be added to the list of conditional contraband by a declaration, which must be notified in the manner provided for in the second paragraph of Article 23.

Art. 26.— If a power waives, so far as it is concerned, the right to treat as contraband of war an article comprised in any of the classes enumerated in Articles 22 and 24, such intention shall be announced by a declaration, which must be notified in the manner provided for in the second paragraph of Article 23.

Art. 27. — Articles which are not susceptible of use in war may not be declared contraband of war.

Art. 28. — The following may not be declared contraband of war : (1) Raw cotton, wool, silk, jute, flax, hemp and other raw materials of the textile industries, and yarns of the same; (2) oil seeds and nuts; copra; (3) rubber, resins, gums and lacs; hops; (4) raw hides and horns, bones and ivory; (5) natural and artificial manures, including nitrates and phosphates for agricultural purposes; (6) metallic ores ; (7) earths, clays, lime, chalk, stone, including marble, bricks, slates and tiles; (8) Chinaware and glass; (9) paper and paner-making materials; (10) soap, paint and colours, including articles exclusively used in their manufacture, and varnish; (11) bleaching powder, soda ash, caustic soda, salt cake, ammonia, sulphate of ammonia and sulphate of copper; (12) agricultural, mining, textile and printing machinery; (13) precious and semi- precious stones, pearls, mother-of-pearl and coral; (14) clocks and watches, other than chronometers; (15) fashion and fancy goods; (16) feathers of all kinds, hairs and bristles; (17) articles

of house- hold furniture and decoration ; office furniture and requisites.

Art. 29. — Likewise the following may not be treated as contraband of war: (1) Articles serving exclusively to aid the sick and wounded. They can, however, in case of urgent military necessity and subject to the payment of compensation, be requisitioned, if their destination is that specified in Article 30 ; (2) articles intended for the use of the vessel in which they are found, as well as those intended for the use of her crew and passengers during the voyage.

Art. 30. — Absolute contraband is liable to capture if it is shown to be destined to territory belonging to or occupied by the enemy, or to the armed forces of the enemy. It is immaterial whether the carriage of the goods is direct or entails transhipment or a subsequent transport by land.

Art. 31. — Proof of the destination specified in Article 30 is com- plete in the following cases: (1) When the goods are documented for discharge in an enemy port, or for delivery to the armed forces of the enemy; (2) when the vessel is to call at enemy ports only, or when she is to touch at an enemy port or meet the armed forces of the enemy before reaching the neutral port for which the goods in question are documented.

Art. 32. — Where a vessel is carrying absolute contraband, her papers are conclusive proof as to the voyage on which she is engaged, unless she is found clearly out of the course indicated by her papers and unable to give adequate reasons to justify such deviation.

Art. 33. — Conditional contraband is liable to capture if it is shown to be destined for the use of the armed forces or of a government department of the enemy state, unless in this latter case the circum- stances show that the goods cannot in fact be used for the purposes of the war in progress. This latter exception does not apply to a consignment coming under Article 24 (4).

Art. 34. — The destination referred to in Article 33 is presumed to exist if the goods are consigned to enemy authorities, or to a con tractor established in the enemy country who, as a matter of common knowledge, supplies articles of this kind to the enemy. A similar

E resumption arises if the goods are consigned to a fortified place elonging to the enemy, or other place serving as a base for the armed forces of the enemy. No such presumption, however, arises in the case

of a merchant vessel bound for one of these places if it is sought to prove that she herself is contraband. In cases where the above presumptions do not arise, the destination is presumed to be innocent. The presumptions set up by this article may be rebutted.

Art. 35. — Conditional contraband is not liable to capture, except when found on board a vessel bound for territory belonging to or occupied by the enemy, or for the armed forces of the enemy, and when it is not to be discharged in an intervening neutral port. The ship's papers are conclusive proof both as to the voyage on which the vessel is engaged and as to the port of discharge of the goods, unless she is found clearly out of the course indicated by her papers, and unable to give adequate reasons to justify such deviation.

Art- 36. — Notwithstanding the provisions of Article 35, con- ditional contraband, if shown to have the destination referred to in Article 33, is liable to capture in cases where the enemy country has no seaboard.

Art. 37. — A vessel carrying goods liable to capture as absolute or conditional contraband may be captured on the high seas or in the territorial waters of the belligerents throughout the whole _ of her voyage, even if she is to touch at a port of call before reaching the hostile destination.

Art. 38. — A vessel may not be captured on the ground that she has carried contraband on a previous occasion if such carriage is in point of fact at an end.

Art. 39. — Contraband goods are liable to condemnation.

Art. 40. — A vessel carrying contraband may be condemned if the contraband, reckoned either by value, weight, volume or freight, forms more than half the cargo.

Art. 41. — If a vessel carrying contraband is released, she may be" condemned to pay the costs and expenses incurred by the captor in respect of the proceedings in the national prize court and the custody of the ship and cargo during the proceedings.

Art. 42. — Goods which belong to the owner of the contraband and are on board the same vessel are liable to condemnation.

Art. 43.— If a vessel is encountered at sea while unaware of the outbreak of hostilities or of the declaration of contraband which applies to her cargo, the contraband cannot be condemned except on payment of compensation; the vessel herself and the remainder of the

cargo are not liable to condemnation or to the costs and expenses referred to in Article 41. The same rule applies if the master, after becoming aware of the outbreak of hostilities, or of the declaration of contraband, has had no opportunity of discharging the contraband. A vessel is deemed to be aware of the existence of a state of war, or of a declaration of contraband, if she left a neutral port subsequently to the notification to the power to which such port belongs of the outbreak of hostilities or of the declaration of contra- band respectively, provided that such notification was made in sufficient time. A vessel is also deemed to be aware of the existence of a state of war if she left an enemy port after the outbreak of hostilities.

Art. 44.' — A vessel which has been stopped on the ground that she is carrying contraband, and which is not liable to condemnation on account of the proportion of contraband on board, may, when the circumstances permit, be allowed to continue her voyage if the master is Willing to hand over the contraband to the belligerent warship. The delivery of the contraband must be entered by the captor on the logbook of the vessel stopped, and the master must give the captor duly certified copies of all relevant papers. The captor is at liberty to destroy the contraband that has been handed over to him under these conditions.

See Hautefeuille, Des droits et devoirs des nations neutres (2nd ed., 1858); Perels, Droit maritime international, traduit par Arendt (Paris, 1884) ; Moore, Digest of International Law (1906) ; L. Oppen- heim, International Law (1907); Barclay, Problems of International', Practice and Diplomacy (1907). See also Hall, International Law on Analogues of Contraband; Smith and Sibley, International Law as interpreted during the Russo-Japanese War, 1905, on " Malacca ", and " Prinz Heinrich " cases (mails). (T. Ba.)

CONTRACT (Lat. contractus, from contrahere, to draw together, to bind), the legal term for a bargain or agreement; some writers, following the Indian Contract Act, confine the term to agree- ments enforceable by law: this, though not yet universally adopted, seems an improvement. Enforcement of good faith in matters of bargain and promise is among the most important functions of legal justice. It might not be too much to say. that, next after keeping the peace and securing property against violence and fraud so that business may be possible, it is the most important. Yet we shall find that the importance of contract is developed comparatively late in the history of law. The common- wealth needs elaborate rules about contracts only when it is advanced enough in civilization and trade to have an elaborate system of credit. The Roman law of the empire dealt with

contract, indeed, in a fairly adequate manner, though it never- had a complete or uniform theory; and the Roman law, as settled by Justinian, appears to have satisfied the Eastern empire long after the Western nations had begun to recast their institutions, and the traders of the Mediterranean had struck out a cosmo- politan body of rules and custom known as the Law Merchant, which claimed acceptance in the name neither of Justinian nor of the Church, but of universal reason. It was amply proved afterwards that the foundations of the Roman system were strong enough to carry the fabric of modern legislation. But the collapse of the Roman power in western Christendom threw society back into chaos, and reduced men's ideas of ordered justice and law to a condition compared with which the earliest Roman law known to us is modern.

In this condition of legal ideas, which it would be absurd to call jurisprudence, the general duty of keeping faith is not recognized except as a matter of religious or social observance.' Those who desire to be assured of anything that lies in promise must exact an oath, or a pledge, or personal sureties; and even then the court of their people — in England the Hundred Court in the first instance — will do nothing for them in the first case, and not much in the two latter. Probably the settlement of a blood-feud, with provisions for the payment of the fine

by instalments, was the nearest approach to a continuing con- tract, as we now understand the term, which the experience of Germanic antiquity could furnish. It is also probable that the performance of such undertakings, as it concerned the general peace, was at an early time regarded as material to the common- weal; and that these covenants of peace, rather than the rudimentary selling and bartering of their day, first caused our Germanic ancestors to realize the importance of putting some promises at any rate under public sanction. We have not now to attempt any reconstruction of archaic judgment and justice, or the lack of either, at any period of the darkness and twilight which precede the history of the middle ages. But the history of the law, and even the present form of much law still common to almost all the English-speaking world, can be understood only when we bear in mind that our forefathers did not start from any general conception of the state's duty to enforce private agreements, but, on the contrary, the state's powers and functions in this regard were extended gradually, unsystematic- ally, and by shifts and devices of ingenious suitors and counsel, aided by judges, rather than by any

direct provisions of princes and rulers. Money debts, it is true, were recoverable from an early time. But this was not because the debtor had promised to repay the loan; it was because the money was deemed still to belong to the creditor, as if the identical coins were merely in the debtor's custody. The creditor sued to recover money, for centuries after the Norman Conquest, in exactly the same form which he would have used to demand possession of land; the action of debt closely resembled the " real actions," and, like them, might be finally determined by a judicial combat; and down to Blackstone's time the creditor was said to have a property in the debt — property which the debtor had " granted " him. Giving credit, in this way of thinking, is not reliance on the right to call hereafter for an act, the payment of so much current money or its equivalent, to be performed by the debtor, but merely suspension of the immediate right to possess one's own particular money, as the owner of a house let for a term suspends his right to occupy it. This was no road to the modern doctrine of contract, and the passage had to be made another way. In fact the old action of debt covered part of the ground of contract only by accident. It was really an action to recover

any property that was not land; for the remedy of debt." ° r a dispossessed owner of chattels, afterwards known

as detinue, was only a slightly varying form of it. If the property claimed was a certain sum of money, it might be due because the defendant had received money on loan, or because he had received goods of which the agreed price remained unpaid; or, in later times at any rate, because he had become liable in some way by judgment, statute or other authority of law, to pay a fine or fixed penalty to the plaintiff. Here the person recovering might be as considerable as the lord of a manor, or as mean as a " common informer "; the principle was the same. In every case outside this last class, that is to say, whenever there was a debt in the popular sense of the word, it had to be shown that the defendant had actually received the money or goods; this value received came to be called quid pro quo — a term unknown, to all appearance, out of England. Neverthe- less the foundation of the plaintiff's right was not bargain or promise, but the unjust detention by the defendant of the plaintiff's money or goods.

We are not concerned here to trace the change from the ancient method of proof — oath backed by " good suit," i.e.

the oaths of an adequate number of friends and pnot ° neighbours — through the earlier form of jury trial, in

which the jury were supposed to know the truth of their own knowledge, to the modern establishment of facts by testimony brought before a jury who are bound to give their verdict according to the evidence. But there was one mode of proof which, after the Norman Conquest, made a material addition to the substantive law. This was the proof by writing, which means writing authenticated by seal. Proof by writing was admitted under Roman influence, but, once admitted, it acquired the character of being conclusive which belonged to all

proof in early Germanic procedure. Oath, ordeal and battle were all final in their results. When the process was started there was no room for discussion. So the sealed writing was final too, and a man could not deny his own deed. We still say that he cannot, but with modern refinements. Thus the deed, being allowed as a solemn and probative document, furnished a means by which a man could bind himself, or rather effectually declare himself bound, to anything not positively forbidden by law. Whoever could afford parchment and the services of a clerk might have the benefit of a ” formal contract ” in the Roman sense of the term. At this day the form of deed called a bond or ” obligation ” is, as it stands settled after various experiments, extremely artificial; but it is essentially a solemn admission of liability, though its conclusive stringency has been relaxed by modern legislation and practice in the interest of sub- stantial justice. By this means the performance of all sorts of undertakings, pecuniary and otherwise, could be and was legally secured. Bonds were well known in the 13th century, and from the 14th century onwards were freely used for commercial and other purposes; as for certain limited purposes they still are. The ” covenant ” of modern draftsmen is a direct promise made by deed; it occurs mainly as incident to conveyances of land. The medieval ” covenant,” conventio, was, when we first hear of it, practically equivalent to a lease, and never became a common instrument of miscellaneous contracting, though the old books recognize the possibility of turning it to various uses of which there are examples; nor had it any sensible influence on the later development of the law. On the whole, in the old common law one could do a great deal by deed, but very little without deed. The minor bargains of daily life, so far as they involved mutual credit, were left to the jurisdiction of inferior courts, of the Law Merchant, and — last, not least — of the Church.

Popular custom, in all European countries, recognized simpler ways of pledging faith than parchment and seal. A handshake was enough to bind a bargain. Whatever secular law might say, the Church said it was an open sin to break plighted faith; a matter, therefore, for

spiritual correction, in other words, for compulsion exercised on the defaulter by the bishop's or the archdeacon's court, armed with the power of excommunication. In this way the ecclesiasti- cal courts acquired much business which was, in fact, as secular as that of a modern county court, with the incident profits. Medieval courts lived by the suitors' fees. What were the king's judges to do? However high they put their claims in the course of the rivalry between Church and Crown, they could not effectually prohibit the bishop or his official from dealing with matters for which the king's court provided no remedy. Con- tinental jurists had seen their way, starting from the Roman system as it was left by Justinian, to reduce its formalities to a vanishing quantity, and expand their jurisdiction to the full breadth of current usage. English judges could not do this in the 15th century, if they could ever have done so. Nor would simplification of the requisites of a deed, such as has now been introduced in many jurisdictions, have been of much use at a time when only a minority even of well-to-do laymen could write with any facility.

There was no principle and no form of action in English law which recognized any general duty of keeping promises. But could not breach of faith by which a party had suffered be treated as some kind of legal wrong ? There was a known action of trespass and a known action of deceit, this last of a special kind, mostly for what would now be called abuse of the process of the court; but in the later middle ages it was an admitted remedy for giving a false warranty on a sale of goods. Also . there was room for actions " on the case," on facts analogous to those covered by the old writs, though not precisely within their terms. If the king's judges were to capture this important branch of business from the clerical hands which threatened to engross it, the only way was to devise some new form of action on the case. There were signs, moreover, that the court ol chancery would not neglect so promising a field if the common law judges left it open.

The mere fact of unfulfilled promise was not enough, in the eyes of medieval English lawyers, to give a handle to the law. A o it ˆ ut m J ur y caused by reliance on another man's under- ' taking was different. .The special undertaking or " assumption " creates a duty which is broken by fraudulent or incompetent miscarriage in the performance. I profess to be a skilled farrier, and lame your horse. It is no trespass,

because you trusted the horse to me; but it is something like a trespass, and very like a deceit. I profess to be a competent builder; you employ me to build a house, and I scamp the work so that the house is not fit to live in. An action on the case was allowed without much difficulty for such defaults. The next step, and a long one, was to provide for total failure to perform. The builder, instead of doing bad work, does nothing at all within the time agreed upon for completing the house. Can it be said that he has done a wrong? At first the judges felt bound to hold that this was going too far; but suitors anxious to have the benefit of the king's justice persevered, and in the course of the 15th century the new form of action, called assumpsit from the statement of the defendant's undertaking on which it was founded, was allowed as a remedy for non-performance as well as for faulty performance. Being an action for damages, and not for a certain amount, it escaped the strict rules of proof which applied to the old action of debt; being in form for a kind of trespass, and thus a privileged appeal to the king to do right for a breach of his peace, it escaped likewise the risk of the defendant clearing himself by oath according to the ancient popular procedure. Hence, as time went on, suitors were em- boldened to use " assumpsit " as an alternative for debt, though it had been introduced only for cases where there was no other remedy. By the end of the 16th century they got their way ; and it became a settled doctrine that the existence of a debt was enough for the court to presume an undertaking to pay it. The new form of action was made to cover the whole ground of informal contracts, and, by extremely ingenious devices of pleading, developed from the presumption or fiction that a man had promised to pay what he ought, it was extended in time to a great variety of cases where there was in fact no contract at all.

The new system gave no new force to gratuitous promises. For it was assumed, as the foundation of the jurisdiction, that

the plaintiff had been induced by the defendant's Hon. erS " undertaking, and with the defendant's consent, to

alter his position for the worse in some way. He had paid or bound himself to pay money, he had parted with goods, he had spent time in labour, or he had foregone some profit or legal right. If he had not committed himself to anything on the strength of the defendant's promise, he had suffered no damage and had no cause of action. Disappointment of expectations is unpleasant, but it is not of itself damnum in a legal sense. To sum up the effect of this in modern language, the plaintiff must have given value of some kind, more or less, for the defendant's undertaking. This something given by the

promisee and accepted by the promisor in return for his undertaking is what we now call the consideration for the promise. In cases where debt would also lie, it coincides with the old requirement of value received {quid pro quo) as a condition of the action of debt being available. But the conception is far wider, for the consideration for a promise need not be anything capable of delivery or possession. It may be money or goods; but it may also be an act or series of acts ; further (and this is of the first importance for our modern law) , it may itself be a promise to pay money or deliver goods, or to do work, or otherwise to act or not to act in some specified way. Again, it need not be anything which is obviously for the promisor's benefit. His acceptance shows that he set some value on it; but in truth the promisee's burden, and not the promisor's benefit, is material. The last refinement of holding that, when mutual promises are exchanged between parties, each promise is a consideration for the other and makes it binding, was conclusively accepted only in the 17th century. The result was that promises of mere bounty could no more be enforced than before, but any kind of lawful bargain could;

and there is no reason to doubt that this was in substance what most men wanted. Ancient popular usage and feeling show little more encouragement than ancient law itself to merely gratuitous alienation or obligations. Also (subject, till quite modern times, to the general rule of common-law procedure that parties could not be their own witnesses, and subject to various modern statutory requirements in various classes of cases) no particular kind of proof was necessary. The necessity of consideration for the validity of simple contracts was un-fortunately confused by commentators, almost from the beginning of its history, with the perfectly different rules of the Roman law about nudum pactum, which very few English lawyers took the pains to understand. Hasty comparison of misunderstood Roman law, sometimes in its civil and sometimes in its ecclesi- astical form, is answerable for a large proportion of the worst faults in old-fashioned text-books. Doubtless many canonists, probably some common lawyers, and possibly some of the judges of the Renaissance time, supposed that ex nudo pacto non oritur actio was in some way a proposition of universal reason; but it is a long way from this to concluding that the Roman law had any substantial influence on the English.

The doctrine of consideration is in fact peculiar to those jurisdictions where the common law of England is in force, or is the foundation of the received law, or, as in South Africa, has made large encroachments upon it in practice. Substantially similar results are obtained in other modern systems by professing to enforce all

deliberate promises, but imposing stricter conditions of proof where the promise is gratuitous.

As obligations embodied in the solemn form of a deed were thereby made enforceable before the doctrine of consideration was known, so they still remain. When a man has Deeds. by deed declared himself bound, there is no need to look for any bargain, or even to ask whether the other party has assented. This rugged fragment of ancient law remains embedded in our elaborate modern structure. Nevertheless gratuitous promises, even by deed, get only their strict and bare rights. There may be an action upon them, but the powerful remedy of specific performance — often the only one worth having — is denied them. For this is derived from the extra- ordinary jurisdiction of the chancellor, and the equity ad- ministered by the chancellor was not for plaintiffs who could not show substantial merit as well as legal claims. The singular position of promises made by deed is best left out of account in considering the general doctrine of the formation of contracts; and as to interpretation there is no difference. In what follows, therefore, it will be needless, as a rule, to distinguish between ” parol ” or ” simple ” contracts, that is, contracts not made by deed, and obligations undertaken by deed.

From the conception of a promise being valid only when given in return for something accepted in consideration of the promise, it follows that the giving of the promise and of the consideration must be simultaneous. Words

Promise and otter.

of promise uttered before there is a consideration for them can be no more than an offer; and, on the other hand, the obligation declared in words, or inferred from acts and conduct, on the acceptance of a consideration, is fixed at that time, and cannot be varied by subsequent declaration, though such declarations may be material as admissions. It was a long while, however, before this consequence was clearly perceived. In the 18th century it was attempted, and for a time with considerable success, to extend the range of enforceable promises without regard to what the principles of the law would bear, in order to satisfy a sense of natural justice. This movement was checked only within living memory, and traces of it remain in certain apparently anomalous rules which are indeed of little practical importance, but which private writers, at any rate, cannot safely treat as obsolete. However, the question of ” past consideration ” is too minute and technical to be pursued here. The general result is that a binding contract is regularly consti- tuted by the acceptance of an offer, and at

the moment when it is accepted; and, however complicated the transaction may be, there must always, in the theory of English law, be such a

moment in every case where a contract is formed. It also follows that an offer before acceptance creates. no duty of any kind (" A revocable promise is unknown to our law "ˆApson); which' is by no means necessarily the case in systems where the English rule of consideration is unknown. The question what amounts to final acceptance of an offer is, on the other hand, a question ultimately depending on common sense, and must be treated on similar lines in all civilized countries where the business of life is carried on in a generally similar way. The rules that an offer is understood to be made only for a reasonable time, according to the nature of the case, and lapses if not accepted in due time; that an expressed revocation of an offer can take effect only if communicated to the other party before he has accepted; that acceptance of an offer must be accprding to its terms, and a conditional or qualified acceptance is only a new proposal, and the like, may be regarded as standing on general convenience as much as on any technical ground.

Great difficulties have arisen, and in other systems as well

as in the English, as to the .completion of contracts between

persons at a distance. : There must be some rule, and

spoadence. vet an y ru ˆ e t ˆ at can he framed must seem arbitrary

in some cases. On the whole the modern doctrine

is to some such effect as the following : — j

The proposer of a contract can prescribe or authorize any mode, or at least any reasonable mode, of acceptance, and if he specifies none he is deemed to authorize the use of any reasonable mode in common use, and especially the post. Acceptance in words is not always required; an offer may be well accepted by an act clearly referable to the proposed agreement, and constituting the whole or part of the performance asked for— say the despatch of goods in answer to an order by post, or the doing of work bespoken; and it seems that in such cases further communication — unless expressly requested — is

not necessary as matter of law, however prudent and desirable it may be. Where a promise and not an act is sought (as where a tradesman writes a letter offering goods for sale on credit) , it must be communicated; in the absence of special direction letter post or telegraph may be used; and, further, the acceptor having done his part when his answer is committed to the post, English courts now hold (after much discussion and doubt) that any delay or miscarriage in course of post is at the proposer's risk, so that a man may be bound by an acceptance he never received. It is generally thought — though there is no English decision- that, in conformity with this last rule, a revocation by telegraph of an acceptance already posted would be inoperative. Much more elaborate rules are laid down in some continental codes. It seems doubtful whether their complication achieves any gain of substantial justice worth the price. At first sight it looks easy to solve some of the difficulties by admitting an interval during which one party is bound and the other not. But, apart from the risk of starting fresh problems as hard as the old ones, English principles, as above said, require a contract to be con- cluded between the parties at one point of time, and any excep- tion to this would have to be justified by very strong grounds of expediency. We have already assumed, but it should be specific- ally stated, that neither offers nor acceptances are confined to communications made in spoken or written words. Acts or signs may and constantly do signify proposal and assent. One does not in terms request a ferryman to put one across the river. Stepping into the boat is an offer to pay the usual fare for being ferried over, and the ferryman accepts it by putting off. This is a very simple case, but the principle is the same in all cases. Acts fitted to convey to a reasonable man the proposal of an agreement, or the acceptance of a proposal he has made, are as good in law as equivalent express words. The term " implied contract " is current in this connexion, but it is unfortunately ambiguous. It sometimes means a contract concluded by acts, not words, of one or both parties, but still a real agreement; sometimes an obligation imposed by law where there is not any agreement in fact, for which the name " quasi-contract " is more appropriate and now usual. :

The obligation of contract is an obligation created and deter-

mined by the will of the parties. Herein is the characteristic difference of contract from all other branches of law. The business of the law, therefore, is to give effect so tLthm far as possible to the intention of the parties, and all the rules for interpreting contracts go back to this fundamental principle and are controlled by it. Every one knows that its application is not always obvious. Parties often express them- selves obscurely; still oftener they leave large parts of their intention

unexpressed, or (which for the law is the same thing) have not formed any intention at all as to what is to be done in certain events. But even where the law has to fill up gaps by judicial conjecture, the guiding principle still is, or ought to be, the consideration of what either party has given the other reasonable cause to expect of him. The court aims not at imposing terms on the parties, but at fixing the terms left blank as the parties would or reasonably might have fixed them if all the possibilities had been clearly before their minds. For this purpose resprt must be had to various tests: the court may look to the analogy of what the parties have expressly provided in case of other specified events, to the constant or general usage, of persons engaged in like business, and, at need, ultimately to. the court's own sense of what is just and expedient. All auxiliary rules of this kind are subject to the actual will of the parties, and are applied only for want of sufficient declaration of it. by the parties themselves. A rule which can take effect against the judicially known will of the parties is not a rule of construction or interpretation, but a positive rule of law. How- ever artificial some rules of construction may seem, this test will always hold. In modern times the courts have avoided laying down new rules of construction, preferring to keep a free hand and deal with each case on its merits as a whole. It should be observed that the fulfilment of a contract may create a relation between the parties which, once established, is governed by fixed rules of law not variable by the preceding agreement. Marriage is the most conspicuous example of this, and perhaps the only complete one in our modern law.

There are certain rules of evidence which to some extent guide or restrain interpretation. In particular, oral testimony is not allowed to vary the terms of an agreement reduced to writing. This is really in aid of the parties' deliberate intention, for the object of reducing terms to writing is to make them certain. There are apparent exceptions to the rule, of which the most conspicuous is the admission of evidence to show that words were used in a special meaning current in the place or trade in question., But they are reducible, it will be found, to applications (perhaps over-subtle in some cases) of the still more general- principles that, before giving legal force to a document, we must know that, it is really what it purports to be, and that when we do give effect to it according to its terms we must be sure of what its terms really say. The rules of evidence here spoken of are modern, and have nothing to do with the archaic rule already mentioned as to the effect of a.deed.

Every contracting party is bound to perform his promise according to its terms, and in case of any doubt in the sense in which the other party would reasonably understand the promise. Where the

performance on one or both formance. sides extends over an appreciable time, continuously or by instalments, questions may arise as to the right of either party to refuse or suspend further performance on the ground of some default on the other side. Attempts to lay down hard and fast rules on such questions are now discouraged, the aim of the courts being to give effect to the true substance and intent of the contract in every case. Nor will the court hold one part of the terms deliberately agreed to more or less material than another in modern business dealings. ” In the contracts of merchants time is of the essence,” as the Supreme Court of the United States has said in our own day. Certain ancient rules restraining the apparent literal effect of common provisions in mortgages and other instruments were in truth controlling rules of policy. New rules of this kind can be made only by legislation. Whether the parties did or did not in fact intend the obligation of a contract to be subject to unexpressed

conditions is, however, a possible and not uncommon question of interpretation. One class of eases giving rise to such questions is that in which performance becomes impossible by some external cause not due to the promisor’s own fault; a similar but not identical one is that in which the agreement cduld be literally performed, and yet the performance would not give the promisor the substance of what he bargained for; as happened in the “coronation cases” arising out of the post- ponement of the king’s coronation in 1902. As to promises obviously absurd or impossible from the first, they are un- enforceable only on the ground that the parties cannot have seriously meant to create a liability. For precisely the same reason, supported by the general usage and understanding of mankind, common social engagements, though they often fulfil all other requisites of a contract, have never been treated as binding in law.

In all matters of contract, as we have said, the ascertained will of the parties prevails. But this means a will both lawful illegality. anc ˆ ˆ ree ” Hence there are limits to the force of. the general rule, fixed partly by the law of the land, which is above individual will and interests, partly by the need of securing good faith and justice between the parties themselves against fraud or misadventure. Agreements cannot be enforced when their performance would involve an offence against the law. There may be legal offence, it must be remembered, not only

in acts commonly recognized as criminal, disloyal or immoral, but in the breach or non-observance of positive regula- tions made by the legislature, or persons having statutory authority, for a great variety of purposes. It would be useless to give details on the subject here. Again, there are cases where an agreement may be made and performed without offending the law, but on grounds of “public policy” it is not thought right that the performance should be a matter of legal obligation, even if the ordinary conditions of an enforceable contract are satisfied. A man may bet, in private at any rate, if he likes, and pay or receive as the event may be; but for many years the winner has had no right of action against the loser. Un- fortunate timidity on the part of the judges, who attempted to draw distinctions instead of saying boldly that they would not entertain actions on wagers of any kind, threw this topic into the domain of legislation; and the laudable desire of parliament to discourage gambling, so far as might be, without attempting impossible prohibitions, has brought the law to a state of ludicrous complexity in both civil and criminal jurisdic- tion. But what is really important under this doctrine of public policy is the confinement of ” contracts in restraint of trade ” within special limits. In the middle ages and down to modern times there was a strong feeling — not merely an artificial legal doctrine— against monopolies and everything tending to mono- poly. Agreements to keep up prices or not to compete were regarded as criminal. Gradually it was found that some kind of limited security against competition must be allowed if such transactions as the sale of a going concern with its goodwill, or the retirement of partners from a continuing firm, or the employment of confidential servants in matters involving trade secrets, were to be carried on to the satisfaction of the parties. Attempts to lay down fixed rules in these matters were made from time to time, but they were finally discredited by the decision of the House of Lords in the Maxim-Nordenfelt Com- pany’s case in 1894. Contracts ” in restraint of trade ” will now be held valid, provided that they are made for valuable considera- tion (this even if they are made by deed), and do not go beyond what can be thought reasonable for the protection of the interests concerned, and are not injurious to the public. (The Indian Contract Act, passed in 1872, has unfortunately embodied views now obsolete, and remains unamended.) All that remains of the old rules in England is the necessity of valuable considera- tion, whatever be the form of the contract, and a strong pre- sumption — but riot an absolute rule of law— that an unqualified agreement not to carry on a particular business is not reasonable.

Where there is no reason in the nature of the contract for not

enforcing it, the consent of a contracting party may still not be binding on him because not given with due knowledge, or, if he is in a relation of dependence to the other party, with inde- pendent judgment. Inducing a man by deceit to enter into a contract may always be treated by the deceived party p ˆ as a ground for avoiding his obligation, . if he does so within a reasonable time after discovering the truth, and, in particular, before any innocent third person has acquired rights for value on the faith of the contract (see Fraud). Coercion would be treated on principle' in the same way as fraud, but such cases hardly occur in modern times. There is a kind of moral domination, however, which our courts watch with the utmost jealousy, and repress under the name of "undue influence" when it is used to obtain pecuniary advantage. Persons in a position of legal or practical authority — guardians, confidential advisers, spiritual directors, and the like— must not ab ise their authority for selfish ends. They are not forbidden to take benefits from those who depend on them or put their trust in them; but if they do, and the givers repent of their bounty, the whole burden of proof is on the takers to show that the gift was in the first instance made freely and with understanding. Large voluntary gifts or beneficial contracts, outside the limits within which natural affection and common practice justify them, are indeed not encouraged in any system of civilized law. Professional money-lenders were formerly checked by the usury law: since those laws were repealed in 1854, courts and juries have shown a certain astuteness in applying the rules of law as to fraud and undue influence — the latter with certain special features— to transactions with needy " expectant heirs " and other improvident persons which seem on the whole unconscionable. The Money Lenders Act of 1900 has fixed and (as finally interpreted by the House of Lords) also sharpened these developments. In the case of both fraud and undue influence, the person entitled to avoid a contract may, if so advised, ratify it afterwards; and ratification, if made with full knowledge and free judgment, is irrevocable. A contract made with a person deprived by unsound mind or intoxication of the capacity to form a rational judgment is on the same footing as a contract obtained by fraud, if the want of capacity is apparent to the other party.

There are many cases in which a statement made by one party to the other about a material fact will enable the other to avoid the contract if he has relied on it, and it was in fact untrue, though it may have been made at the time with honest ˆJˆtion. belief in its truth. This is so wherever, according to the common course of business, it is one party's business to know the facts, and the other practically must, or reasonably may, take the facts from 'him. In some classes of cases

even inadver- tent omission to disclose any material fact is treated as a mis- representation. Contracts of insurance are the most important; here the insurer very seldom has the means of making any effective inquiry of his own. Misdescription of real property on a sale; without fraud, may according to its importance be a matter for compensation or for setting aside the contract. Promoters of companies are under special duties as to good faith and disclosure which have been worked out at great length in the modern decisions. But company law has become so complex within the present generation that, so far from throwing much light on larger principles, it is hardly intelligible without some previous grasp of them. Sometimes it is said that misrepre- sentation (apart from fraud) of any material fact will serve to avoid any and every kind of contract. It is submitted that this is certainly not the law as to the sale of goods or as to the contract to marry, and therefore the alleged rule cannot be laid down as universal. But it must be remembered that parties can, if they please, and not necessarily by the express terms of the contract itself, make the validity of their contract conditional on the existence of any matter of fact whatever, including the correctness of any particular statement. If they have done this, and the fact is not so, the contract has no force; not because there has been a misrepresentation, but because the parties agreed to be bound if the fact was so and not otherwise. It is

a question of interpretation whether in a given case there was any such condition.

Mistake is said to be a ground for avoiding contracts, and there are cases which it is practically convenient to group under this head. On principle they seem to be mostly reducible to Mistake. failure of the accep tance to correspond with the offer, or absence of any real consideration for the promise. In such cases, whether there be fraud or not, no contract is ever formed, and therefore there is nothing which can be ratified — a distinction which may have important effects. Relief against mistake is given where parties who have really agreed, or rather their advisers, fail to express their intention correctly. Here, if the original true intention is fully proved— as to which the court is rightly cautious— the faulty document can be judicially rectified.

By thf common law an infant (i.e. a person Jess than twenty-one

years olc) was bound by contracts made for ” necessaries,” i.e.

such commodities as a jury holds, and the court thinks

Disability. they may reasonably holdj su itable and required for

the person’s condition; also by contracts otherwise clearly for his benefit; all other contracts he might confirm or avoid after coming of age. An extremely ill-drawn act of 1874 absolutely deprived infants of the power of contracting loans, contracting for the supply of goods other than necessaries, and stating an account so as to bind themselves; it also disabled them from binding themselves by ratification. The liability for necessaries is now declared by legislative authority in the Sale of Goods Act 1893; the modern doctrine is that it is in no case a true liability on contract. There is an obligation imposed by law to pay, not the agreed price, but a reasonable price. Practically, people who give credit to an infant do so at their peril, except in cases of obvious urgency.

Married women were incapable by the common law of con- tracting in their own names. At this day they can hold separate property and bind themselves to the extent of that property— not personally— by contract. The law before the Married Women’s Property Acts (1882 and 1893, and earlier acts now superseded and repealed) was a very peculiar creature of the court of chancery; the number of cases in which it is necessary to go back to it is of course decreasing year by year. But a married woman can still be restrained from anticipating the income of her separate property, and the restriction is still commonly inserted in marriage settlements.

There is a great deal of philosophical interest about the nature and capacities of corporations, but for modern practical purposes it may be said that the legal powers of British corporations are directly or indirectly determined by acts of parliament. For companies under the Companies Acts the controlling instrument or written constitution is the memorandum of association. Company draftsmen, taught by experience, nowadays frame this in the most comprehensive terms. Questions of either personal or corporate disability are less frequent than they were. In any case they stand apart from the general principles which characterize our law of contract.

The rights created by contract are personal rights against the promisors and their legal representatives, and therefore different in kind from the rights of ownership and the like Contract w hich are available against all the world. Nevertheless Inperty. they may be and

very commonly are capable of pecuniary estimation and estimated as part of a man's assets. Book debts are the most obvious example. Such rights are property in the larger sense: they are in modern law transmissible and alienable, unless the contract is of a kind implying personal confidence, or a contrary intention is otherwise shown. The rights created by negotiable instruments are an important and unique species of property, being not only exchangeable but the very staple of commercial currency. Contract and conveyance, again, are distinct in their nature, and sharply distinguished in the classical Roman law. But in the common law property in goods is transferred by a complete contract of sale without any further act, and under the French civil code and systems which have followed it a like rule applies not only

to movables but to immovables. In English law procuring a man to break his contract is a civil wrong against the other contracting party, subject to exceptions which are still not

clearly defined.

Authorities. — History: Ames, "The History of Assumpsit, Harvard Law Rev. ii. 1, 53 (Cambridge, Mass. 1889); Pollock and Maitland, History of English Law, 2nd ed., ii. 184-239 (Cambridge, 1898). Modern: Pollock, article " Contract " in Encyclopaedia of the Laws of England (2nd ed., London, 1907), a technical summary of the modern law; the same writer's edition of the Indian Contract Act (assisted by D. F. Mulla, London and Bombay, 1905) restates and discusses the principles of the common law besides commenting on the provisions of the Act in detail. Of the text-books, Anson, English Law of Contract, reached an eleventh edition in 1906; Harriman, Law of Contracts (second edition, 1901) ; Leake, Principles of the Law of Contract (fifth edition by Randall, 1906) ; Pollock, Principles of Contract (eighth edition, 1910, third American edition, Wald's completed by Wifiiston, New York, 1906). O. W. Holmes's (justice of the Supreme Court of the United States) The Common Law (Boston, Mass. 1881) is illuminating on contract as on other legal topics, though the persent writer cannot accept all the learned judge's historical conjectures. (F. Po.)

CONTRACTILE VACUOLE, in biology, a spherical space filled with liquid, which at intervals discharges into the medium; it is found in all fresh-water groups of Protozoa, and some marine forms, also in the naked aquatic reproductive cells of Algae and Fungi. It is absent in states with a distinct cell-wall to resist excessive turgescence, such as would lead to the rupture of a naked cell, and we conclude that its chief function is to prevent such turgescence in unprotected naked cells. It fulfils also respiratory and renal functions, and is comparable,

physiologi- cally, to the contractile vesicle or bladder of Rotifers and Turbellarians. In many species it is part of a complex of canals or spaces in the protoplasm.

See M. Hartog, British Association Reports, and Degen, Botanische Zeitung, vol. lxiii. Abt. 1 (1905) (see also Protozoa; Protoplasm).
CONTRADICTION, PRINCIPLE OF (principium contradic- tions), in logic, the term applied to the second of the three primary ” laws of thought.” The oldest statement of the law is that contradictory statements cannot both at the same time be true, e.g. the two propositions ” A is B ” and ” A is not B” are mutually exclusive. A may be B at one time, and not at another; A may be partly B and partly not B at the same time; but it is impossible to predicate of the same thing, at the same time, and in the same sense, the absence and the presence of the same quality. This is the statement of the law given by Aristotle (to yap avrd vvkpxˆv re koX jui) imapxuv hhiivarov tc? o.vt

Modern logicians, following Leibnitz and Kant, have generally adopted a different statement, by which the law assumes an essentially different meaning. Their formula is ” A is not not- A “; in other words it is impossible to predicate of a thing a quality which is its contradictory. Unlike Aristotle’s law this law deals with the necessary relation between subject and predicate in a single judgment. Whereas Aristotle states that one or other of two contradictory propositions must be false, the Kantian law states that a particular kind of proposition is in itself necessarily false. On the other hand there is a real connexion between the two laws. The denial of the statement ” A is not-A ” presupposes some knowledge of what A is, i.e. the statement A is A. In other words a judgment about A is implied. Kant’s analytical propositions depend on presupposed concepts which are the same for all people. His statement, regarded as a logical principle purely and apart from material facts, does not therefore amount to more than that of Aristotle, which deals simply with the significance of negation.

See text-books of Logic, e.g. C. Sigwart’s Logic (trans. Helen Dendy, London, 1895), vol. i. pp. 142 foil. ; for the various expressions of the law see Ueberweg’s Logik, § 77; also J. S. Mill, Examination of Hamilton, 471 ; Venn, Empirical Logic.

CONTRAFAGOTTO, Double Bassoon or Contrabassoon (Fr. contrebasson; Ger. Kontrafagolt), a wood-wind instrument of the double reed family, which it completes as grand bass, the other members being the oboe, cor angkis, and bassoon.

The contrafagotto corresponds to the double bass in strings, to the contrabass tuba in the brass wind, and to the pedal clarinet in the single reed wood wind.

There are at the present day three distinct makes of contra- fagotto. (1) The modern German (fig. 1) is founded on the

older models, resembling the bassoon, the best- known being Heckel's of Biebrich-am-Rhein, used at Bayreuth and in many German orchestras. In this model the character- istics of the bassoon are preserved, and the tone is of true fagotto quality extended in its lower register. The Heckel con- trafagotto consists of a wooden tube 16 ft. 4 in. long with a conical bore, and doubled back four times upon itself to make it less unwieldy. It is thus about the same length as the bassoon and terminates in a bell 4 in. in diameter pointing downwards. The crook consists of a small brass tube about 2 ft. long, having avery narrow bore, to which is bound the double-reed mouthpiece. (2) The modern English double bassoon is one designed by Dr W. H. Stone, and made under his superintendence by Haseneier of Coblenz. It

Fig. i.— Contra- From Capt. c. R. Day's is stat . ed that instruments

fagotto, German Cat – .'". Mus -, Insi – b g of this pattern are less

model (Wilhelm iˆoTtiswoode. y " fatiguing to blow than

Heckel). F IG . 2.— Contra- those resembling the bas-

fagotto, Haseneier- soon . The bore is truly

Morton model. ˆˆ starting with a

diameter of \ in. at the reed and ending in a diameter of 4 in. at the open end of the tube which points upwards and has no denned bell, being merely finished with a rim. Alfred Morton, in England, has constructed double bassoons on Dr Stone's design (fig. 2). (3) The third model is of brass and consists of a conical tube of wide calibre some 15 or 16 ft. long, curved round four times upon itself and having a brass tuba or euphonium bell which points upwards. This brass model, usually known as the Belgian or French (fig. 3), was really of Austrian origin, having been first introduced by Schollnast of Presburg about 1839. B. F. Czerveny of Koniggratz and Victor Mahillon of Brussels both appear to have followed up this idea independently; the

former producing a metal contrafagotto in Eb in 1856 and one in Bb which he called sub-contrafagotto in 1867, while Mahillon's was ready in 1868. In the brass contrafagotto the lateral holes are pierced at theoretically correct intervals along the bore, and have a diameter almost equal to the section of the bore at the point where the hole is pierced. The octave harmonic only is obtainable on this instrument owing to the great length of the bore and its large calibre. There are therefore two octave keys

which give a chromatic compass Eh

register are obtained by skilful manipulation of the reed with the lips and increased pressure of the breath. The notes of both extremes are difficult to produce.

Although the double bassoon is not a transposing instrument the music for it is written an octave higher than the real sounds

"»f 8va. bassa.

The modern wooden contrafagotto has a pitch one octave below that of the bassoon and three below that of the oboe; its compass extending from 16 ft. C. to middle C. The harmonics of the octave in the middle register and of the 12th in the upper

Back. Front.

Fig. 3. — -The French or Belgian Contrafagotto.

in order to avoid the ledger lines. The quality of tone is some- what rough and rattling in the lowest register, the volume of sound not being quite adequate considering the depth of the pitch. In the middle and upper registers the tone of the wooden contra- fagotto possesses all the characteristics of the bassoon. The contrafagotto has a complete chromatic compass, and it may therefore be played in any key. Quick passages are avoided since they would be neither easy nor effective, the instrument being essentially a slow-speaking one. The lowest notes are only possible to a good player, and cannot be obtained piano; never- theless, the instrument forms a fine bass to the reed family, and supplies in the orchestra the notes missing in the double bass in order to reach 16 ft. C.

The origin of the contrafagotto, like that of the oboe (q.v.) must be sought in the highest antiquity (seeAuLOs). Its immediate forerunner was the double bombard or bombardino or the great double quint-

(a— –

pommer whose compass extended downwards to E —

It is not known precisely when the change took place, though it was probably soon after the transformation of the bassoon, but Handel scored for the instrument and it was used in military bands before being adopted in the orchestra. The original instrument made for Handel by T. Stanesby, junior, and played by J. F. Lampe at the Marylebone Gardens in 1739, was exhibited at the Royal Military Exhibition, London, in 1890. Owing to its faulty construction and weak rattling tone the double bassoon fell into disuse, in spite of the fact that the great composers Haydn, Mozart and Beethoven scored for it abundantly ; the last used it in the C minor and choral sym- phonies and wrote an obbligato for it in Fidelio. It was restored to favour in England by Dr W. H. Stone. (K. S.)

CONTRALTO (from Ital. contra-alto, i.e. next above the alto), the term for the lowest variety of the female voice, as dis- tinguished from the soprano and mezzo-soprano. Originally it signified, in choral music, the part next higher than the alto, given to the falsetto counter-tenor.

CONTRAPUNTAL FORMS, in Music. The forms of music may be considered in two aspects, the texture of the music from moment to moment, and the shape of the musical design as a whole. Historically the texture of music became definitely

organized long before the shape coold be determined by any but external or mechanical conceptions. The laws of musical texture were known as the laws of ” counterpoint ” (see Counter- point and Harmony). The “contrapuntal” forms, then, are historically the earliest and aesthetically the simplest in music; the simplest, that is to say, in principle, but not neces- sarily the easiest to appreciate or to execute. Their simplicity is like that of mathematics, the simplicity of the elements involved; but the intricacy of their details and the subtlety of their expression may easily pass the limits of popularity, while art of a much more complex nature may masquerade in popular guise; just as mathematical science is seldom popular- ized, while biology masquerades in infant ‘schools as “natural history.” . Here, however, the resemblance between counterpoint and mathematics ends, for the simplicity of genuine contrapuntal style is a simplicity of emotion as

well as of principle; and if the style has a popular reputation of being severe and abstruse, this is largely because the popular conception of emotion is conventional and dependent upon an excessive amount of external nervous stimulus.

i. Canonic Forms and Devices.

In the canonic forms, the earliest known in music as an inde- pendent art, the laws of texture also determine the shape of the whole, so that it is impossible, except in the light of historical knowledge, to say which is prior to the other. The principle of canon being that one voice shall reproduce the material of another note for note, it follows that in a composition where all parts are canonic and where the material of the leading part consists of a pre-determined melody, such as a Gregorian chant or a popular song, there remains no room for further considera- tion of the shape of the work. Hence, quite apart from their expressive power and their value in teaching composers to attain harmonic- fluency under difficulties, the canonic forms played the leading part in the music of the 15th and 1 6th centuries; nor indeed have they since fallen into neglect without grave injury to the art. But strict canon soon proved inadequate, and even dangerous, as the sole regulating principle in music; and its rival and cognate principle, the basing of polyphonic designs upon a given melody to which one part (generally the tenor) was confined, proved scarcely less so.- Nor were these two principles, the canon and the canto fermo, likely, by com- bination in their strictest forms, to produce better artistic results than separately. Both were rigid and mechanical principles; and their development into real artistic devices was due, not to a mere increase in the facility of their use, but to the fact that, just as the researches of alchemists led to the foundations of chemistry, so did the early musical puzzles lead to the discovery of innumerable harmonic and melodic resources which have that variety and freedom of interaction which can be organized into true works of art and can give the ancient mechanical devices themselves a genuine artistic character attainable by no other means.

The earliest canonic form is the rondel or rota as practised in the 1 2th century. It is, however, canonic by accident rather than in its original intention. It consists of a combination of short melodies in several voices, each melody being sung by each voice in turn. Now it is obvious that if one voice began alone, instead of all together, and if when it went on to the second melody the second voice entered with the first, and so on, the result would be a canon in the unison. Thus the difference between the crude counterpoint of the rondel and a strict canon in the unison is a mere questipn of the point at which the

com- position begins, and a 12th century rondel is simply a canon at the unison begun at the point where all the voices have already entered. There is some reason to believe that one kind of rondeau practised by Adam de la Hale was intended to be sung in the true canonic manner of the modern round; and the wonderful English rota, ” Sumer is icumen in,” shows in the upper four parts the true canonic method, and in its two-part pes the method in which the parts began together. In these archaic works the canonic form gives the whole a consistency and stability

contrasting oddly with the dismal warfare between nascent harmonic principles and ancient anti-harmonic criteria which hopelessly wrecks them as regards euphony. As soon as harmony became established on a true artistic basis, the unaccompanied round took the position of a trivial but refined art-form, with hardly more expressive possibilities than the triolet in poetry, a form to which its brevity and lightness renders it fairly compar- able. Orlando di Lasso’s QSlibrom sans cesse is a beautiful example of the 16th century round, which was at that time little cultivated by serious musicians. In more modern times the possibilities of the round in its purest form have ̂enormously increased; and with the aid of elaborate instrumental accom- paniments it plays an important feature in such portions of classical operatic ensemble as can with dramatic propriety be devoted to expressions of feeling uninterrupted by dramatic action. In the modern round the first voice can execute a long and complete melody before the second voice joins in. Even if this melody be not instrumentally accompanied, it will imply a certain harmony, or at all events arouse curiosity as to what the harmony is to be. And the sequel may shed a new light upon the harmony, and thus by degrees the whole character of the melody may be transformed. The power of the modern round for humorous and subtle, or even profound, expression was first fully revealed by Mozart, whose astounding unaccom- panied canons would be better known if he had not unfortunately set many of them to extemporized texts unfit for publication. The round or the catch (which is simply a specially jocose round) is a favourite English art-form, and the English specimens of it are probably more numerous and uniformly’ successful than those of any other nation. Still they cannot honestly be said to realize the full possibilities of the form. It is so easy to write a good piece of free and fairly contrapuntal harmony in three or more parts, and so arrange it that it remains correct when the parts are brought in one by one, that very few composers seem to have realized that any further artistic device was possible within such limits. Even Cherubini gives hardly more than a valuable hint that the round may be more than a jeu d’ esprit; and, unless he be an adequate

exception, the unaccompanied rounds of Mozart and Brahms stand alone as works that raise the round to the dignity of a serious art-form. With the addition of an orchestral accompaniment the round obviously becomes a larger thing; and when we consider such specimens as that in the finale of Mozart's Cosi fan tutte, the quartet in the last act of Gherubini's Faniska, the wonderfully subtle quartet " Mir ist so wunderbar " in Beethoven's Fidelio, and the very beautiful numbers in Schubert's masses where Schubert finds expression for his genuine contrapuntal feeling without incurring the risks resulting from his lack of training in fugue-form, we find that the length of the initial melody, the growing variety of the orchestral accompaniment and the finality and climax of the free coda, combine to give the whole a character closely analogous to that of a set of contrapuntal variations, such as the slow movement of Haydn's " Emperor " string quartet, or the opening of the finale of Beethoven's 9th Symphony. Berlioz is fond; of beginning his largest movements like a kind of round; e.g. his Dies Irae, and Scene aux Champs.

A moment's reflection will show that three conditions are necessary to make a canon into a round. First, the voices must imitate each other in the unison; secondly, they must enter at equal intervals of time; and thirdly, the whole melodic material must be as many times longer than the interval of time as the number of voices; otherwise, when the last voice has finished the first phrase, the first voice will not be ready to return to the beginning. Strict canon is, however, possible under innumerable other conditions, and even a round is possible with some of the voices at the interval of an octave, as is of course inevitable in writing for unequal voices. And in a round for unequal voices there is obviously a new means of effect in the fact that, as the melody rotates, its different parts change their pitch in relation to each other. The art by which this is possible without incorrectness is that of double, triple and multiple counterpoint (see Counterpoint). Its difficulty is

variable, and with an instrumental accompaniment there is none. In fugues, multiple counterpoint is one of the normal resources of music; and few devices are more self-explanatory to the ear than the process by which the subject and counter- subjects of a fugue change their positions, revealing fresh melodic and acoustic aspects of identical harmonic structure at every turn. This, however, is rendered possible and interesting by the fact that the passages in such counterpoint are separated by episodes and are free to appear in different keys: Many

fugues of Bach are written throughout in multiple counterpoint; but the possibility of this, even to composers such as Bach and Mozart, to whom difficulties seem unknown, depends upon the freedom of the musical design which allows the composer to select the most effective permutations and combinations of his counterpoint, and also to put them into whatever key he chooses. An unaccompanied round for unequal voices would bring about the permutations and combinations in a mechanical order; and unless the melody were restricted to a compass common to soprano and alto each alternate revolution would carry it beyond the bounds of one or the other group of voices. The technical difficulties of such a problem are destructive to artistic invention. But they do not appear in the above-mentioned operatic rounds, though these are for unequal voices, because here the length of the initial melody is so great that the composition is quite long enough before the last voice has got farther than the first or second phrase, and, moreover, the free instrumental accompani- ment is capable of furnishing a bass to a mass of harmony Otherwise incomplete.

The resources of canon, when emancipated from the principles of the round, are considerable when the canonic form is strictly maintained, and are inexhaustible when it is treated freely. A canon need not be in the unison; and when it is in some other interval the imitating voice alters the expression of the melody by transferring it to another part of the scale. Again, the imitating voice may follow the leader at any distance of time; and thus we have obviously a definite means of expression in the difference of closeness with which various canonic parts may enter, as, for instance, in the stretto of a fugue. Again, if the ‘ answering part enters on an unaccented beat where the leader began on the accent, there will be artistic value in the resulting difference of rhythmic expression. This is the device known as per arsin et thesin. All these devices are, in skilful hands, quite definite in their effect upon the ear, and their expressive power is undoubtedly due to their special canonic nature. The beauty of the pleading, rising sequences in crossing parts that we find in the canon in the 2nd at the opening of the Recordare in Mozart’s Requiem is attainable by no other technical means. The close canon in the 6th at the distance of one minim in re- versed accent in Bach’s eighteenth Goldberg variation owes all its smooth harmonic expression to the fact that the two canonic parts move in sixths which would be simultaneous but for the pause of the minim which reverses the accents of the upper part while it creates that chain of suspended discords which give harmonic variety to the whole.

Two other canonic devices have important artistic value, namely,

augmentation and diminution (two different aspects of the same thing) and inversion. In augmentation the imitating part sings twice as slow as the leader, or sometimes still slower. This obviously should impart a new dignity to the melody, and in diminution the expression is generally that of an accession of liveliness. 1 Neither of these devices, however, continues to appeal to the ear if carried on for long. In augmentation the answering part lags so far behind the leader that the ear cannot long follow the connexion, while a diminished answer will obviously soon overtake the leader, and can proceed on the same plan only by itself becoming the leader of a canon in augmentation. Beethoven, in the fugues in his sonatas op. 106 and no, adapted augmentation and diminution to modern varieties of thematic expression, by employing them in triple

1 But see the E. major fugue in the second book of the Wohl-temperirtes Klavier, where the entry of the diminished subject (in a new position of the scale) is very tender and solemn.

time, so that, hy' doubling the length of the original notes across this triple rhythm, they produce an entirely hew rhythmic expression. This does not seem to have been applied by any earlier composer with the same consistency or intention.

The device of inversion consists in the imitating part reversing every interval of the leader, ascending where the leader descends and vice versa. Its expressive power depends upon such subtle matters of the harmonic expression of melody that its artistic use is one of the surest signs of the difference between classical and merely academic music. There are "many melodies of which the inversion is as natural as the original form, and does not strikingly alter its character. Such are, for instance, the theme of Bach's Kunst der Fuge, most of PurcelTs contrapuntal themes, the theme in the fugue of Beethoven's sonata, op. no, and the eighth of Brahms's variations on a theme by Haydn. In such cases inversion sometimes produces harmonic variety as well as a sense of melodic identity in difference. But where a melody has marked features of rise and fall, such as long scale passages or bold skips, the inversion, if productive' of good harmonic structure and expression, may be a powerful method of trans- formation. This is admirably shown in the twelfth of Bach's Goldberg Variations, in the fifteenth fugue of the first book of his Forty-eight Preludes and Fugues, in the finale of Beethoven's sonata, op. 106, and in the second subjects of the first and last movements of Brahms's clarinet trio;

The only remaining canonic device which figures in classical music is that known as cancrizans, in which the imitating part reproduces the

leader backwards. It is of extreme rarity in serious music; and, though it sometimes happens by accident that a melody or figure of uniform rhythm will produce something equally natural when read backwards, there is only one example of its use that appeals to the ear as well as the eye. This is to be found in the finale of Beethoven's sonata, op. 106, where it is applied to a theme with such sharply contrasted rhythmic and melodic features that with long familiarity a listener would probably feel not only the wayward humour of the passage in itself, but also its connexion with the main theme. Nevertheless, the prominence given to the device in technical treatises, and the fact that this is the one illustration which hardly any of them cite, show too clearly the way in which music is treated not only as a' dead language but as if it had never been alive.

All these devices are also independent of the canonic idea, since they are so many methods of transforming themes in themselves and need not always be used in contrapuntal combination.

■ a 2. Fugue.

As the composers of the 16th century made progress in har- monic and contrapuntal expression through the discipline of strict Canonic forms, it became increasingly evident that there was no necessity for the maintenance of strict canon throughout a composition. Oh the contrary, the very variety of canonic possibilities, apart from i:he artistic necessity of breaking up the unif drm fulness of harmony, suggested the desirability of changing one kind of canon for another, and even of contrasting canonic texture with that of plain masses of non-polyphonic harmony. The result is best known in the polyphonic 16th-century motets. Iri these the essentials of canonic effect are embodied in the entry of one voice after another with a definite theme stated by each voice in that part of the scale which best suits its compass, thus producing a free canon for as many parts as there are voices, in alternate intervals of the 4th, 5th and octave, and at such distances of time as are conducive to clearness and variety of proportion. It is not necessary for the later voices to imitate more than the opening phrase of the earlier, or, if they do imitate its continuation, to keep to the same interval.

Such a texture differs in no way from that of the fugue of more modern times. But the form is not what is now understood as fugue, inasmuch as .16th-century composers did hot normally think of writing long movements on one theme or of making a point of the return of a theme after episodes. With the appear- ance of new words in the text, the 16th-century composer

naturally took up a new theme without troubling to design it for contrapuntal combination with the opening; and the form resulting from this treatment of words was faithfully reproduced in the instrumental ricercari of the time. Occasionally, however, breadth of treatment and terseness of design combined to produce a short movement on one idea indistinguishable in form from a fughetta of Bach; as in the Kyrie of Palestrina's Ma,ss, Salve Regina.

But in Bach's art the preservation of a main theme is more necessary the longer the composition; and Bach has an incalcul- able number of methods of giving his fugues a symmetry of form and balance of climax so subtle and perfect that we are apt to forget that the only technical rules of a fugue are those which refer to its texture. In the Kunst der Fuge Bach has shown with the utmost clearness how in his opinion the various types of fugue may be classified. That extraordinary work is a series of fugues, all on the same subject. The earlier fugues show how an artistic design may be made by simply passing the subject from one voice to another in orderly succession (in the first ex- ample without any change of key except from tonic to dominant). The next stage of organization is that in which the subject is combined with inversions, augmentations and diminutions of itself. Fugues of this kind can be conveniently called stretto- fugues. 1 The third and highest stage is that in which the fugue combines its subject with contrasted counter-subjects, and thus depends upon the resources of double, triple and quadruple counterpoint. But of the art by which the episodes are con- trasted, connected climaxes attained, and keys and subtle rhythmic proportions so balanced as to give the true fugue-forms a beauty and stability second only to those of the true sonata forms, Bach's classification gives us no direct hint. A comparison of the fugues in the Kunst der Fuge with those else- where in his works reveals a necessary relation between the nature of the fugue-subject and the type of fugue. In th.e Kunst der Fuge Bach has obvious didactic reasons for taking the same subject throughout; and, as he wishes to show the extremes of technical possibility, that subject must necessarily be plastic rather than characteristic. Elsewhere Bach prefers very lively or highly characteristic themes as subjects for the simplest kind of instru- mental fugue. On the other hand, there comes a point when the mechanical strictness of treatment crowds out the proper develop- ment of musical ideas; and the 7th fugue (which is one solid mass of stretto in augmentation, diminution and inversion) and the 1 2 th and 13 th (which are invertible bodily) are academic

exercises outside the range of free artistic work. On the other hand, the less complicated stretto-fugues and the fugues in double and triple counterpoint are perfect works of art and as beautiful as any that Bach wrote without didactic purpose.

Fugue is still, as in the 16th century, a texture rather than a form; and the rules given in most technical treatises for its general shape are based, not on the practice of the great composers, but on the necessities of beginners, whom it would be as absurd to ask to write a fugue without giving them a form as to ask a schoolboy to write so many pages of Latin verses without a subject. But this standard form, what- ever its merits may be in combining progressive technique with musical sense, has no connexion with the true classical types of fugue, though it played an interesting part in the renaissance of polyphony during the growth of the sonata style, and even gave rise to valuable works of art (e.g. the fugues in Haydn's quartets, op. 20). One of its rules was that every fugue should have a stretto. This rule, like most of the others, is absolutely without classical warrant; for in Bach the ideas of stretto and of counter- subject almost exclude one another except in the very largest fugues, such as the 22nd in the second book of the Forty-eight; while Handel's fugue-writing is a masterly method, adopted as occasion requires, and with a lordly disdain for recognized devices. But the pedagogic rule proved to be not without artistic point in more modern music; for fugue became, since the rise of the sonata-form, for some generations a contrast with the normal means of expression instead of being itself normal.

1 For technical terms see articles Counterpoint and Fugue.

And while this was so, there was considerable point in using every possible means to enhance the rhetorical force of its peculiar devices, as is shown by the astonishing modern fugues in Beethoven's last works. Nowadays, however, polyphony is universally recognized as a permanent type of musical texture, and there is no longer any reason why if it crystallizes into the fugue-form at all it should not adopt the classical rather than the pedagogic type.

It is still an unsatisfied wish of accurate musicians that the term fugue should be used to imply rather a certain type of polyphonic texture than the whole form of a composition. At present one runs the risk of grotesque misconceptions when one quite rightly describes as " written in fugue " such passages as the first subjects in Mozart's Zauberflbte overture, the andantes of Beethoven's first symphony and C minor quartet, or the first and second subjects of the finale of Mozart's G major quartet, the second subject of the finale of his D

major quintet, and the exposition of quintuple counterpoint in the coda of the finale of the Jupiter Symphony, and countless other passages in the developments and main subjects of classical and modern works in sonata form. The ordinary use of the term implies an adherence to a definite set of rules quite incompatible with the sonata style, and therefore inapplicable to these passages, and at the same time equally devoid of real connexion with the idea of fugue as understood by the great masters of the 16th century who matured it. In the musical articles in this Encyclopaedia we shall therefore speak of writing “in fugue” as we would speak of a poet writing in verse, rather than weaken our descriptions by the orthodox epithet of ” loose fugato.”

3. Counterpoint on a Canto Fermo.

The early practice of building polyphonic designs on a voice- part confined to a given plain-song or popular melody furnishes the origin for every contrapuntal principle that is not canonic, and soon develops into a canonic principle in itself. When the canto fermo is in notes of equal length and is sung without inter- mission, it is of course as rigid a mechanical device as an acrostic. Yet it may have artistic value in furnishing a steady rhythm in contrast to suitable free motion in. the other parts. When it is in the bass, as in Orlando di Lasso’s six-part Regina Coeli, it is apt to cramp the harmony; but when it is in the tenor (its normal place in 16th-century music), or any other part, it determines little but the length of the composition. It may or may not appeal to the ear; if not, it at least does no harm, for its restricting influence on the harmony is small if its pace is slower than that of its surroundings. If, on the other hand, its melody is characteristic, or can be enforced by repetition, it may become a powerful means of effect, as in the splendid close of Fayrfax’s Mass Albanus quoted by Professor Wooldridge on page 320 in the second volume of the Oxford History of Music. Here the tenor part ought to be sung by a body of voices that can be distinctly heard through the glowing superincumbent harmony; and then the effect of its five steps of sequence in a melodious figure of nine semibreves will reveal itself as the principle which gives the passage consistency of drift and finality of climax.

When the rhythm of the canto fermo is not uniform, or when pauses intervene between its phrases, whether these are different figures or repetitions of one figure in different parts of the scale, the device passes into the region of free art, and an early example of its simplest use is described in the article Music as it appears in Josquin’s wonderful Miserere. Orlando di Lasso’s work is full of instances of it, one of the most dramatic of which is the motet Fremuit spiritu Jesus

(Magnum Opus No. 553 [378]), in which, while the other voices sing the scripture narrative of the death and raising of Lazarus, the tenor is heard singing to an admirably appropriate theme the words, Lazare, veni foras. When the end of the narrative is reached, these words fall into their place and are of course taken up in a magnificent climax by the whole chorus.

The free use of phrases of canto fermo in contrapuntal texture, whether confined to one part or taken up in fugue by all,

constitutes the whole fabric of 16th-century music; except where polyphonic device is dispensed with altogether, as in Palestrina's two settings of the Stabat Mater, his Litanies, and all of his later Lamentations except the initials. A 16th-century mass, when it is not derived in this way from those secular melodies to which the council of Trent objected, is so closely connected with Gregorian tones, or at least with the themes of some motet appropriate to the holy day for which it was written, that in a Roman Catholic cathedral service the polyphonic music of the best period co-operates with the Gregorian intonations to produce a consistent musical whole with a thematic coherence almost suggestive of Wagnerian Leitmotif. In later times the Protestant music of Germany attained a similar consistency, under more complicated musical conditions, by the use of chorale-tunes; and in Bach's hands the fugal and other treatment of chorale-melody is one of the most varied and expressive of artistic resources. It seems to be less generally known that the chorale plays a considerable though not systematic part in Handel's English works. The passage "the kingdoms of the world" in the "Hallelujah Chorus" (down to "and He shall live for ever and ever ") is a magnificent development of the second part of the chorale Wachet auf (" Christians wake, a voice is calling"); and it would be easy to trace a German or Roman origin for many of the solemn phrases in long notes which in Handel's choruses so often accompany quicker themes.

From the use of an old canto fermo to the invention of an original one is obviously a small step; and as there is no limit to the possibilities of varying the canto fermo, both in the part which most emphatically propounds it and in the imitating or contrasted parts, so there is no line of demarcation between the free develop- ment of counterpoint on a canto fermo and the general art of combining melodies which gives harmony its deepest expression and musical texture its liveliest

action. Nor is there any such line to separate polyphonic from non-polyphonic methods of accompanying melody; and Bach's Orgelbiichlein and Brahms's posthumous organ-chorales show every conceivable gradation between plain harmony or arpeggio and the most complex canon.

In Wagnerian polyphony canonic devices are rare except in such simple moments of anticipation or of communion with nature as we have before the rise of the curtain in the Rheingold and at the daybreak in the second act of the Gdtterddmmerung. On the other hand, the art of combining contrasted themes crowds almost every other kind of musical texture (except tremolos and similar simple means of emotional expression) into the background, and is itself so transformed by new harmonic resources, many of which are Wagner's own discovery, that it may almost be said to constitute a new form of art. The influence of this upon instrumental music is as yet helpful only in those new forms which are breaking away from the limits of the sonata style; and it is impossible at present to sift the essential from the unessential in that marvellous compound of canonic device, Wagnerian harmony, original technique and total disregard of every known principle of musical grammar, which renders the work of Richard Strauss the most remarkable musical pheno- menon of recent years. All that is certain is that the two elements in which the music of the future will finally place its main organizing principles are not those of instrumentation and external expression, on which popular interest and controversy are at present centred, but rhythmic flow and counterpoint. These have always been the elements which suffered from neglect or anarchy in earlier transition-periods, and they have always been the elements that gave rationality to the new art to which the transitions led. (D. F. T.)

CONTREXEVILLE, a watering-place of north-eastern France, in the department of Yosges, on the Vair, 39 m. W. of fipinal by rail. Pop. (1906) 940. The mineral springs of Contrexeville have been in local repute since a remote period, but became generally known only towards the end of the 18th century; and the modern reputation of the place as a health resort dates from 1864, when it began to be developed by a company, the Societe des Eaux de Contrex6ville, and more particularly from about 1895. In the ten years after this latter date many improvements

were made for the accommodation of visitors, for whom the season is from May to September. The waters of the Source Pavilion, which are used chiefly for drinking, have a temperature of 53° F. and are characterized chiefly by the presence of calcium sulphate. They are

particularly efficacious in the treatment of gravel and kindred disorders, by the elimination of uric acid.

See Thirty-five years at Contrexeville (1903), by Dr Debout d'Estrees.

CONTROL (Fr. controle, older form contre rolle, from Med. Lat. contra-rotulus, a counter roll or copy of a document used to check the original; there is no instance in English of the use of " con- trol " in this, its literal, meaning) , a substantive (whence the verb) for that which checks or regulates anything, and so especially command of body or mind by the will, and generally the power of regulation. In England the "Board of Control," abolished in 1858, was the body which supervised the East India Company in the administration of India. In the case of " controller," a general term for a public official who checks expenditure, the more usual form " comptroller " is a "wrong spelling due to a false connexion with " accompt " or " account." A " control " or " control-experiment," in science, is an experiment used, by an application of the method of difference, to check the inferences drawn from another experiment.

CONTUMACY (Lat. contumacia, obstinacy; derived from the root tern-, as in temnere,*te-Aespise, or possibly from the root turn-, as in turner e, to swell, with anger, &c), a stubborn refusal to obey authority, obstinate resistance; particularly, in law, the wilful contempt of the order or summons of a court (see Contempt of Court). In ecclesiastical law, the contempt of the authority of an ecclesiastical court is dealt with by the issue of a writ de contumace capiendo from the court of chancery at the instance of the judge of the ecclesiastical court; this writ took the place of that de excommunicato capiendo in 18 13, by an act of George III. c. 127 (see Excommunication).

CONUNDRUM (a word of unknown origin, probably coined in burlesque imitation of scholastic Latin, as "hocus-pocus" or "panjandrum"), originally a term meaning whim, fancy or ridiculous idea; later applied to a pun or play upon words, and thus, in its usual sense, to a particular form of riddle in which the answer depends on a pun. In a transferred sense the word is also used of any puzzling question or difficulty.

CONVENT (Lat. conventus, from convenire, to come together), a term applied to an association of persons secluded from the world and devoted to a religious life, and hence to the building in which they live, a monastery or (more particularly) nunnery. The diminution <" conventicle " (conventiculum) , generally used in a contemptuous sense as implying sectarianism, secrecy or illegality, is applied to the

meetings or meeting-places of religious' or other dissenting bodies.

CONVENTION (Lat. conventio, an assembly or agreement; from convenire, to come together), a meeting or assembly; an agreement between parties; a general agreement on which i? based some custom, institution, rule of behaviour or taste, or canon of art; hence extended to the abuse of such an agreement, whereby the rules based upon it become lifeless and artificial. The word is of some interest historically and politically. It is used of an assembly of the representatives of a nation, state or party, and is particularly contrasted with the formal meetings of a legislature. It is thus applied to those parliaments in English history which, owing to the abeyance of the crown, have assembled without the formal summons of the sovereign; in 1660 a convention parliament restored Charles II. to the throne, and in 1689 the Houses of Commons and Lords were summoned informally to a convention by William, prince of Orange, as were the Estates of Scotland, and declared the throne abdicated by James II. and settled the disposition of the realm. Similarly, the assembly which ruled France from September 1792 to October 1795 was known as the National Convention (see below) ; the statutory assembly of delegates which framed the constitution of the United States of America in 1787 was called the Constitu- tional Convention; and the various American state constitutions have been drafted and sometimes revised by constitutional

conventions. In the party system of the United States the nomination of party candidates for office or election is in the hands of delegates, chosen by the primaries, meeting in the convention of the party; the convention system is universal, from the national conventions of the Republican and Democratic parties, which nominate the candidates for the presidency and vice-presidency, down to a ward convention, which nomi- nates the candidate for a town-councillorship. In diplomacy, “convention” is a general name given to international agree- ments other than treaties, but not necessarily differing either in form or subject-matter from a treaty, and sometimes used quite widely of all forms of such agreements. Many con- ventions have been made for the formation of international “unions” to regulate and protect various economic, industrial and other non-political interests, such as postal and telegraphic services, trade-marks, patents, copyright, quarantine, &c. Thus the Latin Monetary Union was created in 1865 by the Convention of Paris, and the abolition of bounties on the pro-

duction and exportation of sugar by the Convention of Brusseis in igo2 (see Treaties).

. CONVENTION, THE NATIONAL, in France, the constitutional and legislative assembly which sat from the 20th of September 1792 to the 26th of October 1795 (the 4th of Brumaire of the year IV.). On the 10th of August 1792, when the populace of Paris stormed the Tuileries and demanded the abolition of the monarchy, the Legislative Assembly decreed the provisional suspension of the king and the convocation of a national conven- tion which should draw up a constitution. At the same time it was decided that the deputies to that convention should be elected by all Frenchmen 25 years old, domiciled for a year and living by the product of their labour. The National Convention was therefore the first French assembly elected by universal suffrage, without distinctions of class. The age limit of the electors was further lowered to 21, and that of eligibility was fixed at 25 years.

The first session was held on the 20th of September 1792. The next day royalty was abolished, and on the 22nd it was decided that all documents should be henceforth dated from the year I. of the French Republic. The Convention was destined to last for three years. The country was' at war, and it seemed best to postpone the new constitution until peace should be concluded. At the same time as the Convention prolonged its powers it extended them considerably in order to meet the pressing dangers which menaced the Republic. Though a legislative assembly, it took over the executive power, entrusting it to its own members. This "confusion of powers," which was contrary to the philosophical theories — those of Montesquieu especially— which had inspired the Revolution at first, was one of the essential characteristics of the Convention. The series of exceptional measures by which that confusion of powers was created constitutes the "Revolutionary government" in the strict sense of the word, a government which was princi- pally in vigour during the period called "the Terror." It is thus necessary to distinguish, in the work of the Convention, the temporary expedients from measures intended to be permanent.

The Convention held its first session in a hall of the Tuileries, then it sat in the hall of Manege*, and finally from the 10th of May 1793 in that of the Spectacles (or Machines), an immense hall in which the deputies were but loosely scattered. This last hall had tribunes for the public, which often influenced the debate by interruptions or applause. The full number of deputies was 749, not counting 33 from the colonies, of whom only a section arrived in Paris. Besides these,

however, the depart- ments annexed from 1792 to 1795 were allowed to send deputa- tions. Many of the original deputies died or were exiled during the Convention, but not all their places were filled by suppliants. Some of those proscribed during the Terror returned after the 9th of Thermidor. Finally, many members were sent away either to the departments or to the armies, on missions which lasted sometimes for a considerable length of time. For all these reasons it is difficult to find out the number of deputies present at any given date, for votes by roll-call were rare. In

the Terror the number of those voting averaged only 250. The members of the Convention were drawn from all classes of society, but the most numerous were lawyers. Seventy-five members had sat in the Constituent Assembly, 183 in the Legislative.

According to its own ruling, the Convention elected its presi- dent every fortnight. He was eligible for re-election after the lapse of a fortnight. Ordinarily the sessions were held in the morning, but evening sessions were also frequent, often extending late into the night. Sometimes in exceptional circumstances the Convention declared itself in permanent session and sat for several days without interruption. For both legislative and administrative purposes the Convention used committees, with powers more or less widely extended and regulated by successive laws. The most famous of these committees are those of Public Safety, of General Security, of Education {ComiU de salut public, ComiU de surelS gSnerale, Comite de I' instruction).

The work of the Convention was immense in all branches of public affairs. To appreciate it without prejudice , one should recall that this assembly saved France from a civil war and invasion, that it founded the system of public education {Museum, Ecole Poly technique, Ecole Normale Supirieure, Ecole des Langues orientales, Conservatoire), created institutions of capital im- portance, like that of the Grand Litre de la Dette publique, and definitely established the social and political gains of the Revolution.

See French Revolution; Girondists; Mountain; Danton; Robespierre; Marat, &c.

Bibliography.— -The Convention published a Proces-verbal of its sessions, which, although lacking the value of those published by assemblies_ to-day, is an official document of capital importance. Copies of it are rare, however, and it has been too much neglected by historians. See F. A. Aulard, Recueil des actes du comite de Salut

Public avec la correspondance officielle des representants en mission, et le registre du conseil executif provisoire (Paris, 1889 et seq.) ; M. J. Guillaume, Proces-verbaux du comite d' Instruction Publique de la Convention Nationale (Paris, 1 891-1904, 5 vols. 4to) ; F. A. Aulard, Histoire politique de la Revolution francaise (Paris, 1903); Mortimer-Ternaux, Histoire de la Terreur (1862-1881), a work based on and comprising documents, but written with strong royalist bias; Eugene Despois, Le Vandalisme revolutionnaire (1868), for the scientific work of the Convention. A detailed bibliography of the documents relating to the Convention is given in the Repertoire gSneral des sources manuscrites de I'histoire de Paris pendant la Revolution francaise, vol. viii. &c (1908), edited by A. Tueley under the auspices of the municipality of Paris. For a more summary bibliography see M. Tourneux, Bibliog. de I'histoire de Paris pendant la Revolution francaise, i. 89-95 (Paris, 1890). (R. A.*)

CONVERSANO, a town and episcopal see of Apulia, Italy, in the province of Bari, 17 m. S.E. by rail from the town of Bari. Pop. (1901) 13,685. It has a fine southern Romanesque cathedral of the end of the nth century, with a modernized interior, and a castle which from 1456 belonged to the Acquaviva family, dukes of Atri and counts of Conversano. The convent of S. Benedetto is one of the earliest offshoots of Montecassino. (See S. Simone, II Duomo di Conversano, Trani, 1896). Here, or in the vicinity, is the site of the unimportant ancient town of Norba.

CONVERSION (Lat. conversio, from convertere, to turn or change), a general term for the operation of converting, changing, or transposing; used technically in special senses in logic, theology and law.

1. In logic, conversion is one of three chief methods of im- mediate inference by which a conclusion is obtained directly from a single premise without the intervention of another premise or middle term. A proposition is said to be "converted" when the subject and the predicate change places; the original proposition is the "convertend," the new one the "converse." The chief rule governing conversion is that no term which was not distributed 1 in the convertend may be distributed in the con- verse; nor may the quality of the proposition (affirmative or negative) be changed. It follows that of the four possible forms

1 A term is said to be " distributed " when it is taken universally: in the proposition "men are mortal " (meaning. " all men ") the term " men " is "distributed " while " mortal " is undistributed, because there are mortal beings which are not men.

of propositions A, E, I and O (see article A), E and I can be converted simply. If no A is B (E), it follows that no B is A; if some A is B, it follows that some B is A. This form of con- version is called Simple Conversion; E propositions convert into E, and I into I. On the other hand, A cannot be converted simply. If all men are mortal, the most that can follow by conversion is that some mortals are men. This is called Con- version by Limitation or Per Accidens. Only if it be known from external or non-logical sources that the predicate also is distributed can there be simple conversion of a universal affirma- tive. Neither of these: forms of conversion can be applied to the particular negative proposition O, which has to be dealt with under a secondary system of conversion, as follows. The terminology by which these secondary processes are described is not altogether satisfactory, and logicians are not agreed as to the application of the terms. The following system is perhaps the most commonly used. We have seen that the converse of “all A is B” is “some B is A”; we can, in addition, derive from it another, though purely formal, proposition “no A is not-B”; i.e. an E proposition. This process is called Obversion, Permuta- tion or Immediate Inference by Privative Conception; it is applicable to every proposition including O. A further process, known as Contraposition or Conversion by Negation, consists of conversion following on obversion. Thus from “all A is B,” we get ” no not-B is A.” In the case of the O proposition we get (by obversion) ” some A is not-B ” and then (by conversion) “some not-B is A” {i.e. an I proposition). In the case of the I proposition the contrapositive is impossible, as infringing the main rule of conversion. Another term, Inversion, has been used by some logicians for a still more complicated process by the alternative use of conversion and obversion, which is applic- able to A and E, and results in obtaining a proposition concerning the contradictory of the original subject; thus “all A is B” becomes “some not- A is not B.”

Considerable discussion has centred on the problem as to whether the process of conversion can properly be regarded as inference. The essence of inference is that the conclusion should embody knowledge which is not in the premise or premises, and many logicians have contended that no fact is stated in the converse which was not in the convertend, or, in other words, that conversion is merely a transformation or verbal change of the same statement. Hence the term Eductions and Equiva- lent Propositional Forms have been given to converse proposi- tions. It is clear, for instance, that if the universal

affirmative is taken connotatively as a scientific law, and not historically, no real inference is achieved by stating as another scientific fact its converse, the particular affirmative. Moreover, even if the convertend is stated as an historic fact, though there is acquired a certain new significance, it may well be argued that the inference is not immediate but syllogistic.

For this controversy see J. S. Mill, Logic, II. i. 2 ; Bradley, Logic, III. pt. i. chap. ii. 30-37; H. W. B. Joseph, Introduction to Logic (1906), pp. 209 foil.; J. N. Keynes, Formal Logic (3rd ed., 1894).

2. In theology, conversion (the equivalent of the Gr. crrpefaiv, briav) is originally the acceptation of Christianity by heathens. It is also used generally for a change from one re- ligion to another, or in a narrower sense for a complete change of attitude towards God, involving a deeper conviction of the ultimate religious and moral truths. Considerable difference of opinion has always existed, and still exists, within the Christian Church as to the true nature • and the causes of conversion, especially in the sense last described. Some have held that man is merely the passive recipient of the Divine Grace, a view based largely on the rendering of the Authorized Version of Isaiah vi. 10 as quoted in Matt. xiii. 15, Mark iv. 12, and John xii. 40. Others again hold that baptism, as involving a second birth of the baptized person, makes subsequent conversion unnecessary or even meaningless, or conversely that conversion is this very second birth and renders baptism unnecessary. The reply generally made to such arguments is that baptism implies regeneration only, which is a change wrought from the outside by the Divine Spirit in general disposition or spiritual status.

while conversion is a positive or concrete demonstration of that change, not merely the negative beginning of a new life but the positive “returning” to God in faith and repentance. The precise connexion between conversion and repentance is again a vexed question. How far and in what sense does man take an active part in his own conversion? To this it is .frequently answered that while the initial stage of conversion is and can be the work of the Holy Spirit alone, it lies with man to make it complete by accepting the proffered grace in repentance and faith (cf. Acts vii. 51, “Ye stiffnecked and uncircumcised in heart and ears, ye do always resist the Holy Ghost”). A man may of his own free will avoid those surroundings which predispose him to such “resistance.” The view that man cannot convert himself is clearly stated in Article X. by the Church of England. ” The condition of man after the fall of Adam is such that he cannot turn (sese converter ■«) and prepare himself by his > own

natural strength and good works, to faith, and calling upon God: where- fore we have no power to do good works pleasant and acceptable to God, without the grace of God by Christ preventing us that we may have a good will, and working with us, when we have that good will.” Further problems are connected with the possibility of repeated conversions of the same man, the necessity of a single strongly marked conversion completed in. a single process, the significance of sudden conversion of persons in a highly emotional state, such as has been common in revivalist meetings, especially in Wales and the United States of America. Conversions of the last kind have followed frequently on striking physical phenomena, perceived in many cases only by the con- vert himself, such as a sudden bright light or a noise like a clap of thunder. 1 In all cases of conversion, however, the criterion of its, validity is generally taken to be the resultant change of a man’s character as manifested in his mode of life and thought, in the abstention from sin, and in devotion to good works. (X.)

3. In English law, conversion is the unauthorized exercise of dominion by one person over the property (other than money or chattels real) of another, in a manner inconsistent with his rights of possession, or the unauthorized assumption by another of the powers of the true owner of goods. The history and exact definition of this form of actionable wrong have occupied the attention of many learned writers, and the incidents of actions to assert the rights of the true owner form a considerable part of treatises on the rules and forms of civil pleading. There are many ways in which the wrong may be committed. : In some cases the exercise of the dominion may amount to an act of trespass or to a crime, e.g. where the taking amounts , to larceny, or fraudulent appropriation by a bailee or agent en- trusted with the property of another (Larceny Acts of 1861 and 1001). But in such cases, except where money is taken, the civil remedy of the owner is by action for conversion or detention of the property, subject in the case of larceny to the rule that criminal prosecution should precede restitution by the taker. The remedy in use in these cases used to be by what was called an action on the case for trover and conversion, the plaintiff putting aside all suggestions of trespass and of crime, and resting his case on the fiction that the defendant had found and used goods not his own. The fictitious averment of loss was abolished in 1852, and under the present procedure, in which the old forms of action are not in use, the remedy is by a claim (still usually called conversion) for wrongfully depriving the true owner of personal property of its use by some specified act inconsistent with his dominion over it, usually by dealing with the property in a manner

inconsistent with the owner's rights. Originally, the action of trover and conversion was limited to goods and chattels, but it is now accepted as applying to valuable securities, such as cheques and bills of exchange.

The gist of the action is in the unauthorized dealing, for however short a time and for however limited a purpose, with the personal property of another. Even refusal to deliver up to the owner is sufficient to prove conversion, though it is often

1 Numerous instances, drawn from other religions besides Christianity, are given in Professor William James's The Varieties of Religious Experience (1902).

made the ground of an action for detinue, if the plaintiff desires to have the property returned in specie. The knowledge, motive or good faith of the person wrongfully dealing with the property of another is for civil purposes immaterial, and the action is often brought to try the title of two claimants to the same goods; e.g. where a person who has innocently bought or taken in pledge goods stolen or illegally procured resists the claim of the original owner for the return of the goods. A warehouseman may render himself liable to the owner of goods deposited with him, through delivering the goods to a third person on a forged authority or without authority, or by issuing a warehouse receipt representing the goods to be in his possession or control when they have ceased to be so.

The exact measure of compensation due to a plaintiff whose goods have been wrongfully converted may be merely nominal if the wrong is technical and the defendant can return the goods; it may be limited to the actual damage where the goods can be returned, but the wrong is substantial; but in ordinary cases it is the full value to the owner of the goods of which he has been deprived.

Fraudulent conversion by any person to his own use (or that of persons other than the owner) of property entrusted to him is a crime in the case of custodians of property, factors, trustees under express trusts in writing (Larceny Act, 1861, ss. 77-85; Larceny Act, 1901).

The law of Ireland, of most British possessions, and of the United States, follows that of England as to the civil or criminal remedies for conversion.

The term ” conversion ” is also used in English law with reference to the rule of courts of equity which, in certain cases (following the maxim of treating as done what ought to have been done), treats as converted into personalty land which has been directed so to be converted by a will, contract or settlement, or as converted into land personalty which has been by such instru- ment directed to be applied for purchase of realty. The “rule is also applied where a vendor of land dies between the making of the contract of sale and its completion by conveyance of the land. The importance of the rule lies in the different destination of realty and personalty under the laws relating to inheritance

and succession.

See Bullen and Leake, Precedents of Pleading (3rd ed., 1868, 6th ed. by Dodd and Chitty, 1905); F. Pollock, on Torts (7th ed., 1904); Clerk and Lindsell, on Torts (3rd ed., 1904); Lewin, on Trusts (nth ed-, 1904); Jarman, on Wills (5th ed., 1893); Dart, Vendors and Purchasers (nth ed., p. 301). (W. F. C.)

CONVEX (Lat. convexus, carried round, rounded, from con-, with, and vehere, to carry), a term for the exterior side of a curved or rounded surface, as opposed to ” concave ” (Lat. con-, and cavus, hollow), the inner surface.

CONVEYANCE, primarily the act or process of conveying anything. The verb ” to convey,” now used in the senses of carrying, transporting, transmitting, communicating or handing over, originally had the same meaning as “convoy” (q.v.), i.e. to accompany, a meaning which still survived in the 18th century. Like ” convoy ” it is ultimately derived from the Late Lat. conviare (not from convehere), but through the old Norman French form conveier, which in central France passed into the form convoier, mod. Fr. convoyer, whence ” convoy.” Apart from the general sense given above the word conveyance is now used in three special senses: (1) a carriage or other means of transport, (2) in law, the transference of property by deed or writing between living persons, and (3) the written instrument by which such transference is effected. (See Conveyancing.)

CONVEYANCING, in English law, the art or science of convey- ing or effecting the transfer of property, or modifying interests in relation to property, by means of written documents.

In early legal systems the main element in the transfer of

property was the change, generally accompanied by some public

ceremony, in the actual physical possession: the

story. f unct j on { documents, where used, being merely the preservation of evidence. Thus, in Great Britain in the feudal period, the common mode of conveying an immediate freehold was by feoffment with livery of seisin — a proceeding in which the

transferee was publicly invested with the feudal possession or seisin, usually through the medium of some symbolic act per- formed in the presence of witnesses upon the land itself. A deed or charter of feoffment was commonly executed at the same time by way of record, but formed no essential part of the conveyance. In the language of the old rule of the common law, the immediate freehold in corporeal hereditaments lay in livery, whereas reversions and remainders and all incorporeal heredita- ments lay in grant, i.e. passed by the delivery of the deed of conveyance or grant without any further ceremony. The process by which this distinction was broken down and the present uniform system of private conveyancing by simple deed was established, constitutes a long chapter in English legal history.

The land of a feudal owner was subject to the risk of forfeiture for treason, and to military and other burdens. The common law did not allow him to dispose of it by will. By the law of mort- main religious houses were prohibited from acquiring it. The desire to escape from these burdens and limitations gave rise to the practice of making feoffments to the use of, or upon trust for, persons other than those to whom the seisin or legal possession was delivered. The common law recognized only the legal tenant ; but the cestui que use or beneficial owner gradually secured for his wishes and directions concerning the profits of the land the strong protection of the chancellors as exercising the equitable jurisdiction of the king. The resulting loss to the crown and the great lords of the feudal dues and privileges, coupled with the public disadvantages arising from ownership of land which, in an increasing degree, was merely nominal, brought about the passing in the year 1535 of the famous Statute of Uses, the object of which was to destroy alto- gether the system of uses and equitable estates. It enacted, in substance, that whoever should have a use or trust in any heredita- ments should be deemed to have the legal seisin, estate and possession for the same interest that he had in the use; in other words, that he should become in effect the feudal tenant without actual delivery of possession to him by the actual feoffee to uses or trustee: In its result the statute was a fiasco. It was solemnly decided that the act transferred the legal possession to the use once only, and

that in the case of a conveyance to A to the use of B to the use of or upon trust for C, it gave the legal estate to B, and left C with an interest in the position of the use before the statute. Thus was completed the foundation of the modern system of trusts fastened upon legal estates and protected by the equitable doctrines and practice of the j udicature.

But the statute not only failed to abolish uses: it also opened the way to the evasion of the public ceremony of livery of seisin, and the avoidance of all notoriety in conveyances. Other ways, besides an actual feoffment to uses, of creating a use had been in vogue before the statute. If A bargained with B, in writing or not, for the sale of land, and B paid the price, but A remained in legal possession, the court of chancery enforced the use or equitable interest in favour of B. The effect of a bargain and sale (as such a transaction was called) after the statute was to give B the legal interest without any livery of seisin. This fresh danger was met in the very year of the statute itself by an enactment that a bargain and sale of an estate of inheritance or freehold should be made by deed publicly enrolled. But the Statute of Enrolments was in terms limited to estates of freehold. It was allowed that a bargain and sale for a term, say, of one year, must transfer the seisin to the bargainee without enrol- ment. And since what remained in the bargainor was merely a reversion which ” lay in grant,” it was an easy matter to release this by deed the day after. By this ingenious device was the publicity of feoffment or enrolment avoided, and the lease and release, as the process was called, remained the usual mode of conveying a freehold, in posession down to the 19th century.

It was not until 1845 that the modern system of transfer by a single deed was finally established. By the Real Property Act of that year it was enacted that all corporeal hereditaments should, as regards the immediate freehold, be deemed to lie in grant as well as in livery. Since this act the ancient modes of conveyance, though not abolished by it, have in practice become obsolete. Traces of the old learning connected with them remain, however, embedded in the modern conveyance. Many a purchase-deed recites that the vendor is seised in fee-simple of the property. It is the practice, moreover, to convey not only ” to ” but also ” to the use of ” a purchaser. For before the Statute of Uses, a conveyance made without any consideration or declaration of uses was deemed to be made to the use of the party conveying. In view of the operation of the statute upon the legal estate in such circumstances, it is usual in all convey- ances, whether for value or not, to declare a use in favour of the party to whom the grant is made.

CONVEYANCING

In its popular usage the word ” conveyance ” signifies the document employed to carry out a purchase of land. But the term ” conveyancing ” is of much wider import, and comprises the preparation and completion of all kinds of legal instruments. A well-known branch of the conveyancer’s business is the investi- gation of title — an important function in the case of purchases or mortgages of real estate. With personal estate (other than leasehold) he has perhaps not so much concern. Chattels are usually transferred by delivery, and stocks or shares by means of printed instruments which can be bought at a law-stationer’s. The common settlements and wills, however, deal wholly or mainly with personal property; and an interest in settled personalty is frequently the subject of a mortgage. Of late years, also, there has been an enormous increase in the volume of conveyancing business in connexion with limited joint-stock companies.

In the preparation of legal documents the practitioner is much assisted by the use of precedents. These are outlines or models of instruments of all kinds, exhibiting in accepted legal phraseology their usual form and contents with additions and variations adapted to particular circumstances. Collections of them have been in use from early times, certainly since printing became common. The modern precedent is, upon the whole, concise and businesslike. The prolixity which formerly character- ized most legal documents has largely disappeared, mainly through the operation of statutes which enable many clauses previously inserted at great length to be, in some cases, e.g. covenants for title, incorporated by the use of a few prescribed words, and in others safely omitted altogether. The Solicitors’ Remuneration Act 1881, has also assisted the process of curtail- ment, for there is now little or no connexion between the length of a deed and the cost of its preparation. So long as the drafts- man adheres to recognized legal phraseology and to the well- settled methods of carrying out legal operations, there is no reason why modern instruments should not be made as terse and businesslike as possible.

It is not usual for land to be sold without a formal agreement in writing being entered into. This precaution is due, partly

to the Statute of Frauds (§4), which renders a contract tor sale* ˆ or tne sa ˆ e °ˆ ‘ anc * unenforceable by action “unless

the agreement upon which such action shall be brought, or some memorandum or note thereof, shall be in writing and signed by the party to be charged therewith or some other person thereunto by him

lawfully authorized," and partly to the fact that there are few titles which can with prudence be exposed to all the requisitions that a purchaser under an " open contract " is entitled by law to make. Such a purchaser may, for example, require a forty years' title (Vendor and Purchaser Act 1874). Under an open contract a vendor is presumed to be selling the fee-simple in possession, free from any incumbrance, or liability, or restriction as to user or otherwise; and if he cannot deduce a title of the statutory length, or procure an incumbrance or restriction to be removed, the purchaser may repudiate the contract. The preparation of an agreement for sale involves accordingly an examination of the vendor's title, and the exercise of skill and judgment in deciding how the vendor may be pro- tected against trouble and expense without prejudice to the sale. Upon a sale by auction the agreement is made up of (1) the particulars, which describe the property; (2) the conditions of sale, which state the terms upon which it is offered; and (3) the memorandum or formal contract at the foot of the condi- tions, which incorporates by reference the particulars and conditions, names or sufficiently refers to the vendor, and is signed by the purchaser after the sale. The object of the agree- ment, whether the sale is by private contract or by auction, is to define accurately what is sold, to provide for the length of title and the evidence in support of or in connexion with the title which is to be required except so far as it is intended that the general law shall regulate the rights of the parties, and to fix the times at which the principal steps in the transaction are to be taken. It is also usual to provide for the payment of interest at a prescribed rate upon the purchase money if the completion

shall be delayed beyond the day fixed for any cause other than the vendor's wilful default, and also that the vendor shall be at liberty to rescind the contract without paying costs or compensa- tion if the purchaser insists upon any requisition or objection which the vendor is unable or, upon the ground of expense or other reasonable ground, is unwilling to comply with or remove. Upon a sale by auction it is the rule to require a deposit to be paid by way of security to the vendor against default on the part of the purchaser.

The signature of the agreement is followed by the delivery to the purchaser or his solicitor of the abstract of title, which is an epitome of the various instruments and events under and in consequence of which the vendor derives f title. his title. A purchaser is entitled to an abstract at the vendor's expense unless otherwise stipulated. It begins with the instrument fixed by the contract for the commencement of the title, or, if there has been no agreement upon the subject, with an instrument of such character and date as is prescribed by the law in

the absence of stipulation between the parties. From its commencement as so determined the abstract, if properly prepared, shows the history of the title down to the sale; every instrument, marriage, birth, death, or other fact or event con- stituting a link in the chain of title, being sufficiently set forth in its proper order. The next step is the verification of the abstract on the purchaser's behalf by a comparison of it with the originals of the deeds, the probates of the wills, and office copies of the instruments of record through which the title is traced. The vendor is bound to produce the original documents, except such as are of record or have been lost or destroyed, but, unless otherwise stipulated, the expense of producing those which are not in his possession falls upon the purchaser (Con- veyancing Act 1 881). After being thus verified, the abstract is perused by the purchaser's advisers with the object of seeing whether a title to the property sold is deduced according to the contract, and what evidence, information or objection, in respect of matters appearing or arising upon the abstract, ought to be called for or taken. For this purpose it is necessary to consider the legal effect of the abstracted instruments, whether they have been properly completed, whether incumbrances, adverse interests, defects, liabilities in respect of duties, or any other burdens or restrictions disclosed by the abstract, have been already got rid of or satisfied, or remain to be dealt with before the completion of the sale. The result of the consideration of these matters is embodied in " requisitions upon title," which are delivered to the vendor's solicitors within a time tion"sf ' usuallyfixed for the purpose by the contract. In making or insisting upon requisitions regard is had, among other things, to any special conditions in the contract dealing with points as to which evidence or objection might otherwise have been required or taken, and to a variety of provisions contained in the Vendor and Purchaser Act 1874, and the Conveyancing Act 1881, which apply, except so far as otherwise agreed, and of which the follow- ing are the most important: (1) Recitals, statements and descriptions of facts, matters and parties contained in instruments twenty years old at the date of the contract are, unless proved inaccurate, to be taken as sufficient evidence of the truth of such facts, matters and descriptions; (2) a purchaser cannot require the production of, or make any requisition or objection in respect of, any document dated before the commencement of the title; (3) the cost of obtaining evidence and information not in the vendor's possession must be borne by the purchaser. The possibility of the rescission clause now commonly found in con- tracts for the sale of real estate being exercised in order to avoid compliance with an onerous requisition, is also an important factor in the situation. The requisitions are in due course replied to, and further requisitions may

arise out of the answers. A summary method of obtaining a judicial determination of questions connected with the contract, but not affecting its validity, is provided by the Vendor and Purchaser Act 1874. Before completion it is usual for the purchaser to cause searches to be made in various official registers for matters required to be entered therein, such as judgments, land charges, and pending

actions, which may affect the vendor's title to sell, or amount to an incumbrance upon the property.

When the title has been approved, or so soon as it appears reasonably certain that it will be accepted, the draft conveyance is prepared and submitted to the vendor. This is aneesT" commonly done by and at the expense of the purchaser, who is entitled to determine the form of the con- veyance, provided that the vendor is not thereby prejudiced, or put to additional expense. The common mode of conveying a freehold is now, as already mentioned, by ordinary deed, called in this case an indenture, from the old practice, where a deed was made between two or more parties, of writing copies upon the same parchment and then dividing it by an indented or toothed line. Indenting is, however, not necessary, and in modern practice is disused. A deed derives its efficacy from its being sealed and delivered. It is still a matter of doubt whether signing is essential. It is not necessary that its execu- tion should be attested except in special circumstances, as, e.g. where made under a power requiring the instrument exercising it to be attested. But in practice conveyances are not only sealed, but also signed, and attested by one or two witnesses. The details of a conveyance in any particular case depend upon the subject-matter and terms of the sale, and the state of the title as appearing by the abstract. The framework, however, of an ordinary purchase-deed consists of (i) the date and parties, (2) the recitals, (3) the testatum or witnessing-part, containing the statement of the consideration for the sale, the words incorporating covenants for title and the operative words, (4) the parcels or description of the property, (5) the habendum, showing the estate or interest to be taken by the purchaser, and (6) any provisos or covenants that may be required. A few words will illustrate the object and effect of these component parts.

(1) The parties are the persons from whom the property, or some estate or interest in or in relation to it, is to pass to the purchaser, or

whose concurrence is rendered necessary by the state of the title in order to give the purchaser the full benefit of his contract and to complete it according to law. It is often necessary that other persons besides the actual vendor should join in the conveyance, e.g. a mortgagee who is to be paid off and convey his estate, a trustee of an outstanding legal estate, a person entitled to some charge or restriction who is to release it, or trustees who are to receive the purchase-money where a limited owner is selling under a power (e.g. a tenant for life under the power given by the Settled Land Act 1882). Parties are described by their names, addresses and occupations or titles, each person with a separate interest, or filling a distinct character, being of a separate part. (2) The recitals explain the circumstances of the title, the interests of the parties in relation to the property, and the agreement or object intended to be carried into effect by the conveyance. Where the sale is by an absolute owner there is no need for recitals, and they are frequently dispensed with; but where there are several parties occupying different positions, recitals in chronological order of the instruments and facts giving rise to their connexion with the property are generally necessary in order to make the deed intelligible. (3) It is usual to mention the consideration. Where it consists of money the statement of its payment is followed by an acknowledgment, in a parenthesis, of its receipt, which, in deeds executed since the Conveyancing Act 1881, dispenses with any endorsed or further receipt. A vendor, who is the absolute beneficial owner, now conveys expressly ” as beneficial owner,” which words, by virtue of the Conveyancing Act 1881, imply covenants by him with the purchaser that he has a right to convey, for quiet enjoyment, freedom from incumbrances, and for further assurance — limited, however, to the acts and defaults of the covenantor and those through whom he derives his title otherwise than by purchase for value. A trustee or an incumbrancer joining in the deed conveys ” as trustee ” or “as mortgagee,” by which words covenants are implied that the covenantor individually has not done or suffered anything to incumber the property, or prevent him from conveying as

expressed. As to the operative words, any expression showing an intention to pass the estate is effectual. Since the Conveyan- cing Act 1881, “convey” has become as common as “grant,” which was formerly used. (4) The property may be described either in the body of the deed or in a schedule, or compendiously in the one and in detail in the other. In any case it is usual to annex a plan. Different kinds of property have their appro- priate technical words of description. Hereditaments is the most comprehensive term, and is generally used

either alone or in conjunction with other words more specifically descriptive of the property conveyed. (5) The habendum begins with the words ” to hold,” and the estate, on a sale in fee-simple, is limited, as already mentioned, not only to, but also to the use of, the purchaser. Before the Conveyancing Act 1881, it was necessary to add, after the name of the purchaser, the words ” and his heirs,” or ” his heir and assigns,” though the word ” assigns ” never had any conveyancing force. But since that Act it is sufficient to add ” in fee-simple ” without using the word ” heirs.” Unless, however, one or other of these additions is made, the purchaser will even now get only an estate for his life. If the property is to be held subject to a lease or incum- brance, or is released by the deed from an incumbrance previously existing, this is expressed after the words of limitation. (6) Where any special covenants or provisions have been stipulated for, or are required in the circumstances of the title, they are, as a rule, inserted at the end of the conveyance. In simple cases none are needed. Where, however, a vendor retains documents of title, which he is entitled to do where he sells a part only of the estate to which they relate, it is the practice for him by the conveyance to acknowledge the right of the purchaser to production and delivery of copies of such of them as are not instruments of record like wills or orders of court, and to undertake for their safe custody. This acknowledgment and undertaking supply the place of the lengthy covenants to the like effect which were usual before the Conveyancing Act 1881. A trustee or mortgagee joining gives an acknowledgment as to documents retained by him, but not an undertaking. The fore-going outline of a conveyance will be illustrated by the following specimen of a simple purchase-deed of part of an estate belonging to an absolute owner in fee : —

This Indenture made the day of

between A. B. of, &c., of the one part and C. D. of, &c., of the other part Whereas the said A. B. is seised (among other hereditaments) of the messuage hereinafter described and hereby conveyed for an estate in fee simple in possession free from incumbrances and has agreed to sell the same to the said C. D. for £100 Now this In- denture witnesseth that in pursuance of the said agreement and in consideration of the sum of £100 paid to the said A. B. by the said C. D. (the receipt whereof the said A. B. doth hereby acknow- ledge) the said A. B. as beneficial owner doth hereby convey unto the said C. D. All that messuage or tenement situate &c, and known as, &c. To Hold the premises unto and to the use of the said C. D. his heirs and assigns [or in fee simple] And the said A. B. doth hereby acknowledge the right of the said C. D. to production and delivery of copies of the

following documents of title [mentioning them] and doth undertake for the safe custody thereof In witness, &c.

It will be observed that throughout the deed there are no stops, the commencement of the several parts being indicated by capital letters. The draft conveyance having been approved on behalf of the vendor, it is engrossed upon stout paper or parchment, and there remains only the completion of the sale, which usually takes place at the office of the vendor's solicitor. A purchaser is not entitled to require the vendor to attend personally and execute the conveyance in his presence or that of his solicitor. The practice is for the deed to be previously executed by the vendor and delivered to his solicitor, and for the solicitor to receive the purchase-money on his client's behalf, since a purchaser is , under the Conveyancing Act 1 8 8 1 , saf e in pay ing the purchase-money to a solicitor producing a deed so executed, when it contains the usual acknowledgment by the vendor of the receipt of the money. Upon the completion, the documents of title are handed over except in the case above referred to, and any claims between the parties in respect of interest upon the purchase-money, apportioned outgoings, or otherwise, are

settled. The conveyance is, of course, delivered to the purchaser, upon whom rests the obligation of affixing the proper stamp — which he may do without penalty within thirty days after execution (Stamp Act 1891). It may be added that, subject to any special bargain, which is rarely made, the costs of the execution by the vendor and other parties whose concurrence is necessary, and of any act required to be done by the vendor to carry out his contract, are borne by the vendor.

Ordinary leases at rack-rents are not generally preceded by a formal agreement, such as is common on a sale of land, or by an teases. investigation into the lessor's title. As a rule, the principal terms are arranged between the parties, and embodied with various ancillary provisions in a draft lease, which is prepared by the lessor's advisers and submitted to the lessee, the ultimate form and contents of the instrument being adjusted by negotiation. If an intending lessee desires to examine the title he must make an express bargain to that effect, for under a contract to grant a lease the intended lessee is not entitled, in the absence of such express stipulation, to call for the title to the freehold (Vendor and Purchaser Act 1874). By the Statute of Frauds all leases, except leases for a term not exceeding three years, and at not less than two-thirds of the rack-rent, were required to be in writing. And now by the Real Property Act 1845, leases required by law to be in writing are void at law unless made by deed. An instrument, void as a lease under the act, may, however, be valid as an agreement to take a lease; and since the Judicature Act 1873, under which equitable doctrines prevail in the High Court, a person holding under an agreement for a lease, of which specific performance would be granted, is treated in all branches of that court as if such a lease were already executed. Unless otherwise agreed, a lease is always prepared by a lessor's solicitor at the expense of the lessee; but the cost of the counterpart (i.e. the duplicate executed by the lessee) is usually borne by the lessor.

Upon the sale and conveyance of a leasehold property sub- stantially the same procedure is observed as above indicated in the case of a freehold. A few additional points, meatof ‘ h° wever > ma y De specially mentioned. Under an open leaseholds, contract the vendor cannot be called upon to show the title to the freehold reversion (Vendor and Purchaser Act 1874; Conveyancing Act 1881). Accordingly, the abstract of title begins with the lease, however old;

but the subsequent title need not be carried back for more than forty years before the sale. The purchaser, apart from stipulation, must assume, unless the contrary appears, that the lease was duly granted, and upon production of the receipt for the last payment due for rent before completion, that all the covenants and provisions of the lease have been duly performed and observed up to the date of actual completion. The appropriate word of conveyance is ” assign,” and a conveyance of leaseholds is generally called an assignment. The vendor’s covenants for title implied by his assigning ” as beneficial owner ” include, in addition to the covenants implied by those words in a conveyance of freehold, a covenant limited in manner above mentioned, that the lease is valid, and that the rent and the provisions of the lease have been paid and observed up to the time of conveyance (Conveyancing Act 188 1). Where the vendor, as is the common case, remains liable after the assignment for the rent and the performance of the covenants, the purchaser must covenant to pay the rent, and perform and observe the covenants and provisions of the lease, and keep the vendor indemnified in those respects.

A mortgage is prepared by the solicitor of the mortgagee, and the mortgagor bears the whole expenses of the transaction. It is Mortgages. seldom that there is any preliminary agreement, because (1) a contract to lend money is not specifically enforceable; and (2) inasmuch as the primary object of a mortgagee is to have his money well secured, he is not, generally, willing to submit to restrictions as to title or evidence of title which might give rise to difficulty or expense in the event of a sale of the mortgaged property. An intending mortgagor is accordingly required to show a title easily marketable, and to verify it at his own cost. A mortgage follows the same general

form as a conveyance on sale, the principal points of difference being that the conveyance of the property is preceded by a covenant for the payment of the mortgage money and interest, and followed by a proviso for reconveyance upon such payment, and by any special provisions necessary or proper in the circum- stances, such as a covenant for insurance and repairs where the security comprises buildings. The covenants for title implied by a mortgagor conveying ” as beneficial owner ” are the same as in the case of a vendor, but they are absolute and nonqualified in the manner above pointed out.

The beneficial operation of the Conveyancing Act 188 1 in shortening conveyances is well illustrated by a modern mortgage. For, by virtue of the act, a mortgagee by deed executed after its commencement has, subject to any contrary provisions contained in the deed, the following powers to the like extent as if they had been conferred

in terms : (I) a power of sale exercisable after the mortgage money has become due (a) if notice requiring payment has been served ‘ and not complied with for three months, (b) if any interest is in arrear for. two months, or © there has been a breach of some obligation under the deed or the act other than the covenant for payment of the mortgage money or interest; (2) a power to insure subject to certain restrictions; (3) a power, when entitled to sell, to appoint a receiver; and (4) a power while in possession to cut and sell timber. The act contains ancillary provisions enabling a mortgagee upon a sale to convey the property for such estate or interest as is the subject of the mortgage, and to give a valid receipt for the purchase-money, and the purchaser is amply protected against any irregularities of which he had no notice. There are also large powers of leasing conferred by the act upon mortgagor and mortgagee while respectively in possession, and a power for the mortgagor, whilst entitled to redeem, to inspect and take copies of title-deeds in the mortgagee’s possession. The elaborate provisions for all these purposes which were formerly inserted in mortgage deeds are now omitted; but sometimes the operation of the act is modified in certain respects. The procedure upon a sale by a mort- gagee is the same as in the case of any other vendor. He conveys, however, ” as mortgagee,” these words implying only a covenant by him against incumbrances arising from his own acts.

The frame of a strict settlement of real estate, which is usually made either on marriage or by way of resettlement on a tenant in tail under an existing settlement attaining twenty-one, has been much simplified; but such settlements still meats. remain the most technical and most complicated of legal instruments. By virtue of the Settled Land Acts 1882 to 1800, tenants for life and many other limited owners have extensive powers of sale, of leasing, and of doing numerous other acts required in a due course of management. These powers cannot be excluded or fettered by settlors. They are, as a rule, considered in practice to be sufficient, and the corresponding elaborate provisions formerly inserted in settlements are now omitted, the operation of the acts being merely supplemented, where desirable, by some extension of the statutory powers, in relation, e.g., to the investment and application of capital money. To complete the statutory machinery it is desirable that persons should be nominated by the settlement trustees for the purposes of the acts. Since the Conveyancing Act 1881, provisions for the protection of jointresses or persons entitled under settlements to rent charges or annual sums issuing out of the land are no longer required, as all such persons have now powers of distress and entry, and of limiting terms to secure their respective

interests. Terms for raising portions must still, however, be expressly created. The Conveyancing Act 1881 also confers large powers of management during the minorities of infants beneficially entitled upon persons either appointed for the purpose by the instrument or being such trustees such as are mentioned in § 42. An estate in tail may now be limited by the use of the words ” in tail ” without the words ” heirs of the body ” formerly necessary. And a settlor generally conveys ” as settlor,” by which only a covenant for further assurance is implied under the Conveyancing Act 1 88 1. Personal settlements are most often made upon marriage. The settled property is vested in trustees, either by the settlement itself, or in the case of cash, mortgage debts, stocks or shares, by previous delivery or transfer, upon trusts declared by the instrument.

The norma! trusts after the marriage are (1) for investment; (2) for payment of the income of the husband’s property to him for life, and of the wife’s property to her for life for her separate use without power of anticipation whilst under coverture; (3) for

payment to the survivor for his or her life of the income of both properties; (4) after the death of the survivor, both as to capital and income, for the issue of the marriage as the husband and wife shall jointly by deed appoint, and in default of joint appointment as the survivor shall by deed or will appoint, and in default of such appointment for the children of the marriage who attain twenty- one, or being daughters marry, in equal shares, with the addition of a clause (called the hotchpot clause) precluding a child who or whose issue takes a part of the fund by appointment from sharing in the unappointed part without bringing the appointed share into account. Then follows a power for the trustees with the consent of the parents whilst respectively living to raise a part (usually a half) of the share of a child and apply it for his or her advancement or benefit. Power to apply income, after the death of the life tenants, for the maintenance and education of infants entitled in expectancy, is conferred upon trustees by the Conveyancing Act 1 88 1. The ultimate trusts in the event of there being no children who attain vested interests are (1) of the husband’s property for him absolutely; and (2) of the wife’s property for such persons as she shall when discovert by deed, or whether covert or discovert by will, appoint, and in default of

appointment, for her absolutely if she survive the husband, but if ,not, then for her next of kin under the'Statute of Distributions, excluding the husband. For all ordinary purposes the trustees have now under various statutes sufficient powers and indemnities. They may, however, in some cases need special pro- tection against liability. A power of appointing new trustees is supplied by the Trustee Act 1893. It is usually made exercisable by the husband and wife during their joint lives, and by the survivor during his or her life.

The form and contents of wills are extremely diverse. A will of, perhaps, the commonest type (a) appoints executors and trustees; (6) makes a specific disposition of a freehold or leasehold residence; (c) gives a few legacies or annuities; and (d) devises and bequeaths to the executors and trustees the residue of the real and personal estate upon trust to sell and convert, to invest the proceeds (after payment of debts and funeral and testamentary expenses) in a specified manner, to pay the income of the investments to the testator's widow for life or until another marriage, and subject to her interest, to hold the capital and income in trust for his children who attain twenty-one, or being daughters marry, in equal shares, with a power of advancement. Daughters' shares are frequently settled by testators upon them and their issue on the same lines and with the same statutory incidents as above mentioned in the observations upon settlements; and- some- times a will contains in like manner a strict settlement of real estate. It is a point often overlooked by testators desirous of benefiting remote descendants that future interests in property must, under what is known as the rule against perpetuities, be restricted within a life or lives in being and twenty-one years afterwards. In disposing of real estate " devise " is the ap- propriate word of conveyance, and of personal estate "bequeath." But neither word is at all necessary. " I leave all I have to A. B. and appoint him my executor " would make an effectual will for a testator who wished to give all his property, whether real or personal, after payment of his debts, to a single person. By virtue of the Land Transfer Act 1897, Part I., real estate of an owner dying after 1897 now vests for administrative purposes in his executors or administrators, notwithstanding any testa- mentary disposition.

It remains to mention that by the Land Transfer Act 1897 a system of compulsory registration of title, limited to the county of London, was established. (See Land Registration.)

Conveyancing counsel to the court (i.e. to the chancery division of the High Court) are certain counsel, in actual practice as con- veyancers, of not less than ten years' standing, who are appointed by the lord

chancellor, to the number of six, under s. 40 of the Master in Chancery Abolition Act 1852. They are appointed for the purpose of assisting the court in the investigation of the title to any estate, and upon their opinion the court or any judge thereof may act. Any party who objects to the opinion given by any con- veyancing counsel may have the point in dispute disposed of by the judge at chambers or in court. Business to be referred to conveyancing counsel is distributed among them in rotation, and their fees are regulated by the taxing officers.

United States. — American legislation favours the general policy of registering all documents in the contents of which the public have an interest, and its tendency has been steadily towards more and more full registration both of documents and statistics. From the early days of the colonial era it has been

customary to record wills and conveyances of real estate in full in public books, suitably indexed, to which free access was given. During the last decade of the 19th century, three states — Illinois, Massachusetts, and Ohio — adopted the main features of the Torrens or Prussian system for registering title to land rather than conveyances under which title may be claimed. These are the ascertainment by public officers of the state of the title to some or all of the parcels of real estate which are the subject of individual property within the state; the description of each parcel (giving its proper boundaries and characteristics) on a separate page of a public register, and of the manner in which the title is vested; the issue of a certificate to the owner that he is the owner; the official notation on this register of each change of title thereafter; and a warranty by the govern- ment of the title to which it may have certified. To make the system complete it is further requisite that every landowner should be compelled to make use of it, and that it should be impossible to transfer a title effectually without the issue of such a government certificate in favour of the purchaser.

Constitutional provisions have been found to prevent or embarrass legislation in these directions in some of the states, but it is believed that they are nowhere such as cannot be obeyed without any serious encroachment on the principles of the new system (People v. Chase, 165 Illinois Reports, 527; State v. Guilbert, 56 Ohio State Reports, 575; People v. Simon, 176 Illinois Reports, 165; Tyler v. Judges, 173 Massachusetts Reports; 55 North-Eastem Reporter, 812; Hamilton v. Brown, 161 United States Reports, 256).

Conveyances which have been duly recorded become of com- paratively little importance in the United States. The party claiming

immediately under them, if forced to sue to vindicate his title, must produce them or account for their loss; but any one deriving title from him can procure a certified copy of the original conveyance from the recording officer and rely on that. Equitable mortgages by a deposit of title-deeds are unknown.

The general prevalence of public registry systems has had an influence in the development of American jurisprudence in the direction of supporting provisions in wills and conveyances, which, unless generally known, might tend to mislead and deceive, such as spendthrift trusts (Nichols v. Eaton, 9 1 United States Reports ,716). Conveyances of real estate are simple in form, and are often prepared by those who have had no professional training for the purpose. Printed blanks, sold at the law-stationers, are commonly employed. The lawyers in each state have devised forms for such blanks, sometimes peculiar in some points to the particular state, and sometimes copied verbatim from those in use elsewhere. Deeds intended to convey an absolute estate are generally either of the form known as warranty deed or of that known as release deed. The release deed is often used as a primary conveyance without warranty to one who has no prior interest in the land. Uniformity in deeds is rendered particularly desirable from the general prevalence of the system of recording all conveyances at length in a public office. Record books are printed for this purpose, containing printed pages corresponding to the printed blanks in use in the particular state, and the recording officer simply has to fill up each page as the deed of similar form was filled up. One set of books may thus be kept for recording warranty deeds, another for recording release deeds, another for recording mortgage deeds, another for leases, &c.

Authorities. — Davidson, Precedents and Forms in Conveyancing (London, 1877 and 1885); Key and Elphinstone, Compendium of Precedents in Conveyancing (London, 1904) ; Elphinstone, Introduction to Conveyancing (London, 1900) ; Prideaux, Precedents in Conveyancing (1904); Pollock, The Land Laws (London, 1896).

(S. Wa.;S. E. B.) CONVEYORS. ” Conveyor ” (for derivation see Conveyance) is a term generally applied to mechanical devices designed for the purpose of moving material in a horizontal or slightly in- clined direction; in this article, however, are included a variety of appliances for moving materials in horizontal, vertical and combined horizontal and vertical directions. The material so handled may be conveyed in a practically uninterrupted stream,

as in the case of worms, bands and pushplate conveyors, or elevators carrying grain or coal, &c; or it may be conveyed from one point to another, intermittently, that is to say in a succession of separate loads, as happens with single bucket elevators, furnace hoists, rope and chain haulage, and also in the case of ropeways and aerial cableways. Some of these devices are of great antiquity, others are of quite modern origin. The principles of their construction are simple and easy of understanding, but by variations in the details of their construc- tion the engineer has adapted these few appliances to the most varied work. At one end of the scale they may be used for such light duties as conveying the goods purchased by a customer to the packers and bringing them back made up into a parcel or for taking his money to the cashier and returning the change. At the other they are adopted for handling large quantities of heavy material at a minimum expenditure of human labour. Coal, for instance, a more or less friable substance, the value of which is seriously diminished by fracture, may be mechanically handled with a minimum risk of breakage. The difficult problem of handling the contents of gas retorts and coke ovens, and of simultaneously quenching and conveying the glowing material, has been solved. Perhaps an even more astonishing piece of work is the manipulation of the iron from the blast furnace; for instance, liquid metal is drawn from a furnace into pouring pots which in their turn discharge it to and distribute it over a pig-iron casting machine, which is practically a conveyor for liquid metal, consisting of a strand of moving moulds from which the solidified pigs, after cooling in water, are automatically removed after reaching the loading terminal over the railway trucks. Certain types of conveyors may be made to combine efficiently, with their primary work of transport, complex sorting, sifting, drying and weighing operations.

Worm Conveyors. — The worm conveyor, also known as the Archimedean screw, is doubtless the most ancient form of conveyor. It consists of a continuous or broken blade screw set on a spindle. This spindle is made to revolve in a suitable trough, and as it revolves any material put in is propelled by the screw from one end of the trough to the other. Such conveyors have been used in flour-mills for centuries. The writer has seen in an East Anglian mill which was over 250 years old disused screw conveyors, probably as old as the mill, consisting of spindles of octagonal shape, made of not too hard wood, around which a broken blade screw was formed by the insertion at regular intervals of small blades of hard wood (fig. 1). Modern worm conveyors usually consist of a spindle formed of a length of

Fig. 1. — Early Flour Mill Conveyor. 1

wrought iron piping, to which is fitted either a broken or con- tinuous worm. In the former case (fig. 2) the worm is composed of a series of blades or paddles arranged like a spiral round the

Fig. 2. — Paddle Worm Conveyor.

spindle; each blade is fixed, by means of its shank, in a transverse hole in the spindle, and the shank is held in position by being tapped and fitted with a nut. In this way is formed, out of separate blades, a practically complete screw, technically known

1 The illustrations in this article are taken, by kind permission, from the Proceedings of the Institution of Civil Engineers.

as a ” paddle worm.” The lengths or sections of the worm run to about 8 ft., the various lengths being coupled by turned gudgeons, which also serve as journals for the bearings. In the so-called continuous worm conveyors the screw is formed of a continuous sheet-iron spiral (fig. 3) . Sometimes a narrow groove

Fig. 3. — Continuous Worm Conveyor.

is cut in spiral form on the spindle, and in this groove the sheet- iron spiral is secured.

The spiral or anti-friction conveyor (fig. 4) was introduced about 1887. In this case a narrow spiral, which passes con- centrically round the spindle, with a space between both, is fixed to it at set intervals by small blades, each of which is itself fixed by its shank and a nut to the spindle. The spiral may be made of

Fig. 4. — Spiral or Anti-Friction Conveyor.

almost any section, from a round bar about 3? in. in diameter to L or T section, but is preferably a flat bar. Worms are fitted into wooden or iron troughs leaving a clearance of J to J in. The spindle must be supported at suitable intervals by bearings, preferably of the bush type. A continuous worm, being more rigid than a paddle worm, needs fewer supports. The lid of the worm trough should be loose, not screwed on, because in case of an accumulation of feed through a choke in a delivery spout the paddles of a paddle worm would be broken, or a continuous worm stripped, unless the material could throw off the lid and relieve the worm. The ratios of the pitch of the worm to the diameter must be regulated by the nature of the material

to be conveyed, and will vary from one- third to a pitch equal to, or even exceeding, the diameter. The greater the pitch the larger the capacity, but also the greater the driving power required, at the same speed. For handling materials of greater specific gravity, such as cement, &c, it is advisable to use a smaller pitch than for substances of lower specific gravity, such as grain. The capacity of a continuous worm exceeds that of either a paddle or spiral conveyor of the same diameter, pitch and speed. As regards the relative efficiency of paddle and spiral conveyors a series of careful tests made by the writer indicated that, run at a slow speed the paddle worm, but at a high speed the spiral worm, has the greater efficiency. There is of course a speed at which the efficiency of both types is about equal, and that is at 150 revolu- tions per minute for conveyors 4 to 6 in. in diameter.

The power necessary to drive worm conveyors under normal conditions is very considerable; a continuous worm of 18 to 20 in. diameter running at 60 revolutions per minute will convey 50 tons of grain per hour over a distance of a hundred feet at an expenditure of 185 to 19 H.P. A material like cement would require rather more power because of the greater friction of the cement against the blades and the trough. Delivery from a worm conveyor can be effected at any desired point, all that is necessary being to cut an outlet, which should preferably be as wide as the diameter of the worm, because the worm delivers only on its leading side, and is practically empty on the other side, so that a smaller outlet might only give exit to a portion of the feed, unless it was on the leading side.

A special form of worm conveyor is the tubular (fig. 5), which consists of an iron tube with a continuous spiral fitted to its inner

periphery, or of iron or wooden tubes of square sections fitted with fixed baffle plates inside. In working it revolves bodily on suitable rollers. This type is more costly than the ordinary worm conveyors, and also requires more power. Its efficiency is,

Fig. 5. — Tubular Worm Conveyor.

moreover, easily impaired if run at too high a speed, because the centrifugal force asserts itself and counteracts the propulsion, which in this case is effected by gravity. Some experiments made in 1868 by George Fosbery Lyster, engineer of the Liverpool docks, gave

convincing results (see Proc. Inst. Mech. Eng., August 1869). The tubular worm conveyor is suitable where a granular material has to be moved over a comparatively short distance, say from one building to another on the same level, and where no bridge is available for the installation of any other kind of conveyor. Conveyofs of this type have, however, come into use for conveying hard and cutting substances over consider- able lengths. Ordinary worm conveyors are practically debarred from use for such substances on account of the short life of the intermediate bearings, which are not necessary with externally supported tubular worms.

To sum up, worm conveyors are of the simplest construction and of small prime cost. The terminals again are much less expensive than those of most other kinds of conveyors. When the distance to be traversed by the material is short, the worm conveyor has this advantage, that it is cheaper than other kinds of conveyors. If it be desired not only to con- vey but also to mix two or more materials, such as cement and sand in a dry state, or poultry food, this appliance is thoroughly well adapted for the work. On the other hand, there is a grinding action exer- cised on any material conveyed, and when hard or cutting sub- stances are handled the wear and tear on the conveyor blades, trough and bearings is very great, and the power sensible item.

Band Conveyors— -The inventor of band conveyors for the handling of grain and minerals was G. F. Lyster, who, as already mentioned, in 1868 carried out exhaustive experiments at the Liverpool docks, where he established the band conveyor as a grain-handler. For granaries the band conveyor is an ideal appliance. Its capacity is great, and it can be run at relatively high speeds with a moderate expenditure of power. The band conveyor of to-day is an endless belt of canvas or more often india-rubber with insertion, and when fitted with the usual receiving and delivery appliances can be used to handle grain from or into granaries and also to feed bins or sections of a ware- ‘ house. The endless bands run over terminal pulleys, and are also supported on their way by a series of guide rollers, which are in greater number on the loaded than on the empty strand. The band is usually run quite fiat, except that at the point or points where the grain is fed on it is slightly hollowed for a few feet, by means of two curving rolls which are set obliquely so as

to make it trough-shaped. The supporting or guide rollers are 4 in. to 6 in. in diameter, and are sometimes made of wood, but more often consist of steel tubes to which spindles with conical end gudgeons are secured. The gudgeons generally run in suitable bush-bearings, which should be well lubricated. Band conveyors should be driven on the

delivery and not the receiving terminal, as the tight side of the band is the flattest. The guide rollers, for ordinary grain conveyors, are fitted to the upper or working side of the. band at intervals of about 6 ft., and at distances of 12 ft. on the lower or return strand. In cases where both strands of the band are used for carrying grain, the lower strand must be supported by as many rollers as the upper. Under such conditions, terminal pulleys must be of larger diameter than usual, the object being to throw the two strands farther apart, so as to give sufficient space between the two strands to spout the feed in and out again at the other end. The two strands can be run any distance apart by the use of two additional pulleys for the terminals. This arrangement would be in place where it was desired, as it might be, to run one strand of the band along the top floor of the granary to distribute, while the other strand travelled along the ground- floor or basement to withdraw, the grain.

Band conveyors are kept tight, when the band is not very long, by a tightening gear, similar to that used on elevators, and consisting of two screws which push or better pull the two pedestals of one terminal pulley farther away from the other terminal. If the band is of such length that an adjustment of ˆ to 5 ft. on the tightening gear is not sufficient, it is advisable to use in place of screws a tighten- ing pulley, over which the belt passes, but which is itself held in tension by weights. The choice of the exact tightening gear will depend on various considerations, the length of the belt, the type of throw-off carriage used, and the quality of the belt all being factors to be considered. The throw-off carriage (fig. 6), which serves to withdraw material from the band at any desired point, is a simple but ingenious appliance consisting essentially of guide pulleys which by raising one part of the band and lowering the other have the effect of causing the grain to quit the surface of the band at the point where it is deflected upwards. The grain is thus cast

ELEVATION

Fig. 6. — Throw-off Carriage for Band Conveyor.

CROSS SECTION

absorbed by a worm conveyor is a

clear of the band, and into the air, being caught as it falls in a hopper and spouted in any desired direction. Throw-off carriages differ in certain details, but the principle is the same. For feeding a band conveyor it is important to give the material a horizontal velocity,

approaching that of the band. The grain should therefore be fed through a spout rather less in breadth than half of the width of the band, and set at an incline of 42J to the horizontal. Band con- veyors run at a speed of 400 to 600 ft. per minute, according to the nature of the material; oats, for instance, would be liable to be blown off the band at a speed in excess of 500, which would be suitable for wheat. Nuts, maize and the heavier seeds could be carried at 600. The power consumption by a grain-laden band compares favourably with any other form of conveyor. An 18-in. band 100 ft. in length running 500 ft. per minute would carry 50 tons per hour at an expenditure of only 4-5 H.P.

While the band conveyor is an ideal conveyor in warehouses and mills, it is also capable of rendering good service in handling such heavy materials as coal and minerals. Of course for such purposes the band and its fittings must be of much more sub- stantial construction. The central portions of the band carrying the load, being subjected to great wear and tear, are often made

Fig. 7.

of solid india-rubber extending to nearly half the thickness of the band in the middle, and tapering off towards the edges, while the surface facing the guide rollers is of insertion coated with india-rubber. Bands properly prepared and stretched will bear a strain of 3 tons to the square inch. Balata bands may be used in place of india-rubber, but though less expensive are not so lasting. Bands that have to carry coal or minerals are usually .-,. curved along the entire

length of the upper or loaded strand into a trough shape by guide rollers (fig. 7). Bands of woven wire are sometimes used with coal – washing plants, but ^^ have the disadvantage of sˆ lack of durability. They are more liable to stretch and are high in price. They may be run as high as about 600 ft. per minute, but to ensure proper grip-driving terminals must either be faced with leather or made of wood.

The speed of band conveyors loaded with coal or minerals greatly depends on the size of the fragments; the proper speed for large pieces would be 150-200 ft. per minute, while smaller material could be carried at a maximum velocity of 700-750 ft. Band conveyors will carry in an upward direction, up to 24 degrees, without any loss of

capacity. They can be used not only to carry light and heavy bodies, such as grain and coal, in a continuous stream, but also to convey relatively large bodies such as sacks of flour, or cement, &c, intermittently. Thus a band 26 in. wide and 350 ft. long is used at a flour-mill in York to load sacks of flour into railway trucks; by this means 12 wagons can be loaded by two men in 1 hour. Band conveyors are not necessarily fixed in one place. A portable model has rendered good service in tunnel-cutting, mining and quarrying. This band is mounted in a light steel frame, itself fitted with small wheels, so as to be readily put in any required position, and is entirely self-contained, being provided with tightening gear, a small motor, &c. If required, several lengths can be joined together, or one band can deliver upon another at a lower level. The same advantages that attend the use of the band-conveyor for handling grain may be claimed for this appliance when carrying coal and heavy bodies, namely the demand for relatively small power, smooth and noiseless work, and gentle handling of material. On the other hand the feed cannot be withdrawn at intermediate points except by means of a throw-off carriage. The numerous bearings of the guide rollers require careful lubrication, and the rubber bands should be protected as much as possible from changes of temperature.

The metal band or belt conveyor, a modification of the rubber or canvas band conveyors, is an endless belt composed of iron plates connected to endless chains, usually of malleable cast iron, running under the plates. Such appliances, being obviously more cumbrous than band conveyors, are only used in handling material of a hard and cutting nature. They usually deliver only at the end, but if intermediate delivery be desired a scraper may be so fixed across the band at a given point, at an angle of 45 , as to scrape the whole or part of the feed into a shoot, or a scraper may be mounted obliquely on a suitable carriage which can be moved to any points at which delivery may be required. In some bands of this type supporting rollers are attached to the links and travel with them, or are fixed to the framing so that the band runs over them, an arrangement which has the advan- tage of economizing driving power and of promoting smooth running. Metal band conveyors are tightened in the same way as textile or rubber bands, and may run at a speed of 60 to 1 20 ft. per minute. The driving gear must always be placed at the delivery terminal, so that the loaded strand is in tension. Such appliances are often used as sorting tables or picking bands, for instance, for coal, cement, minerals, &c.

In another modification ‘ of the metal band conveyor, the travelling trough conveyor, the sides of each plate are turned up

so as to form the conveying surface of the band into a continuous trough. With this arrangement intermediate delivery is im- possible, as the sides of the trough will not allow the use of a scraper. As compared with push-plate conveyors (which consist of scrapers mounted on endless travelling chains that run usually in troughs), travelling trough conveyors are gentle handlers of material.

A conveyor which is capable of dealing with many different kinds of material is known as the vibrating trough conveyor. It is so far like the band and travelling trough conveyor that the material it conveys from one point to another is conveyed without the use of any stirring or pushing agent, such as belong to worm, push-plate and cable trough conveyors. For materials requiring gentle treatment, this type of conveyor is eminently suitable. There are different kinds of vibrating trough conveyors . In one type the trough is caused to make a reciprocating motion by means of a crank and connecting rod, the trough itself being supported on rollers. In another type the trough is actuated by a cam, or by cranks with some kind of quick return motion. In the appliance known as the- Zimmer or swinging conveyor the trough is supported in its reciprocating motion by means of laminated spring legs set obliquely to the trough. These legs are securely bolted at one end to the floor or any other solid support, and at the other end to the trough itself; hence no lubrication is required, as would be the case with supporting rollers. Moreover the combined action of the reciprocating motion of the crank and the rocking of the spring legs has the effect of causing the material to travel faster in the trough with a given stroke of the crank than would be the case with any other support. The material to be conveyed is not carried along with its support as in the case of a band or travelling trough conveyor, but is caused to move in a series of hops, to use popular language.

The action will be sufficiently explained by the appended diagram (fig. 8), which, however, is exaggerated to give a clearer idea of the actual movements, which are on quite a small scale. The line AB represents the bottom of the trough, while C C are two of the spring legs; the full lines indicate the spring legs at the extreme backward position of the crank, while the dotted lines show the spring legs E … B, ... E 2 … E 3 .fV.:. ..':-Q.:. . . S:,py:'... .'.p.. –

Fig. 8. — Swinging or Zimmer Conveyor.

and bottom of the trough at the extreme forward position of the crank D. The material to be conveyed, represented by E, is thrown forward by the forward movement of the crank, and describes a short parabolic curve; it is thrown at about a right angle to the inclined legs

C C, but before it has time to complete its parabolic course, the trough has been moved by the crank into its original position. As soon as tne material has dropped down, the trough makes another forward movement, whereupon the material is thrown forward another stage, and this process, which is continually repeated, as indicated by the letters Ei, E2, E3, has the effect of carrying or conveying the material in the direction desired. It is important to note that the actual movement both of trough and material is within narrow bounds; the horizontal movement of the trough is only about I in., while the vertical or upward movement is about | in. The material is conveyed by this vibrating trough with a minimum of friction, as it is evident that the material is carried forward without any contact with the trough, while the very nature of the motion precludes injurious friction between the particles themselves. When the trough is full the material will move as it were in a solid mass.

An important improvement in this type of vibrating trough conveyor is the balanced conveyor, in which the trough is made in two sections, one being placed at a slightly lower level than the other, so that one-half may deliver into the other half. The two sections are driven by triple or quadruple cranks set at an angle of about 180 to one another. In this case one-half of the conveyor will move forward while the other moves backward, thus balancing each other (fig. 9). At the same time the material keeps moving in the same direction because all the spring legs are of the same inclination. It is usual to drive balanced conveyors at or near the centre of their length, but they -may also be driven from one end,

in which case Vrte balancing of the conveyor would be effected by a powerful volute spring which is compressed and released by a crank and connecting rod, in place of being connected to one-half of the conveyor. Two sections of a Zimmer conveyor can be made to run in opposite directions by merely reversing the inclination of the spring legs; in, such a case the sections of a trough would be con- nected by a flexible coupling. Conveyors of this type have been used in lengths up to 500 ft., and in widths of over 6 ft. The feed can be received or discharged at any desired point in the length; for drawing off material at intermediate points it is only necessary to open a slide in the bottom of the trough. If a great increase be desired in the capacity of this conveyor the connecting rod may be attached, not to the trough at all, but to the spring legs at a point of about a third or half-way

from the base, so that the free ends of the legs can swing the trough backward and forward ; by this means the stroke is amplified and consequently the capacity is increased, while the driving power required is practically the same,

The power absorbed by the Zimmer conveyor is comparatively small ; a length of 100 ft. conveying a load of 50 tons per hour takes 8-75 h.p. With a speed of 300-370 revolutions per minute of the

chain of buckets. But these buckets, unlike elevator buckets, which are bolted on to a band or chain, are free to move on the axis on which they are suspended above their centre of gravity. When the conveyor is at work the buckets will always be in an upright position, whether the motion be vertical or horizontal. Each bucket carries its load to the point at which delivery is required, where an adjustable tippling device is ready to catch and tilt the bucket, thus emptying it. This type of conveyor is chiefly used in connexion with coal stores and boiler houses, where it has undeniable advantages. For instance, in feeding overhead bunkers a well-designed gravity bucket conveyor may do the work of (1) a horizontal conveyor in bringing coal from the railway siding, (2) a vertical elevator in raising it to the bunkers, and (3) a horizontal conveyor in distributing it to the respective bunkers. In some cases the returning empty strand of buckets is used to clear the ashes from under the boilers.

conveyor, the material will traverse 40-70 ft. per minute. The gentle action of this appliance has caused it to be largely used in dealing with friable materials, such as coal. The simplicity of the mechan- ism leaves little to get out of order, and the entire absence of travel- ling gear, such as supporting rollers, is a valuable feature. The capacity of the conveyor may be sensibly increased by running it on a downward gradient, while the capacity will be correspondingly diminished by working in an upward direction. Among many purposes for which this type of conveyor has been found suitable is that of a. drainer in connexion with coal-washing plants. A per- forated plate at the head will allow the water to escape, while the coal is carried to the other end. A slight upward slant permits the water left with the coal to run back and escape. In colliery work this conveyor makes a suitable picking table. The motion of the trough, while not so fast as to baffle the pickers, has the advantage of uniformly spreading the lumps of coal. This apparatus also lends itself to the grading of coal. All that is necessary is to fit the trough with a sieve which divides it into an upper and lower deck. The coarser material passes along the top of the sieve, while the finer coal, sifted out by the perforations, travels along the bottom of the trough till discharged. In spite of the gentle

propelling action of this conveyor, it has a thorough sifting action ; a perforated plate from 10 to 12 ft. long is usually sufficient to separate any desired grade, and at a certain Belgian colliery a conveyor of this type fitted with grading sieves feeds seven trucks standing in a row, but each on a different siding, and each taking coal of a different size. This conveyor has been found useful both as a drying and cooling appli- ance. Several substances of a sticky nature, such as moist sugar, which are difficult to deal with mechanically, can be efficiently handled by the swinging conveyor.

The gravity or tilting bucket conveyor can be used as a combined elevator and conveyor. It consists essentially of two endless chains or ropes held at fixed distances apart by suitable bars which are fitted with small rollers at each end. Every link, or second link, carries a bucket, and the whole forms an endless

Conveyors of this type run at a mean rate of 40 ft. per minute, and if it be desired to attain a given capacity the size of the buckets must be adapted to the increased load as an increase of speed for a higher capacity is impracticable. The power absorbed is not great, the heaviest demand on the motive force being made by the elevating operation. Such conveyors have the merit of handling the material gently, while feeding and discharging can take place at any point. There are many journals to be looked after, but in the most approved systems thei- lubrication is effected automatically. Whilst such a plant has the advantage of requiring only one driving gear, a breakdown at one point of the installation means the stoppage of the whole.

Among typical conveyors on this system is the Hunt conveyor (fig. 10), which consists of a double link carrying a series of pivoted buckets which are free to revolve on their axes at all points, except at that point at which they discharge. This operation is effected by a cam action, the buckets on their release righting themselves and becoming ready for refilling. The driving gear propels the chain by means of pawls which engage with the cross studs of the chain and have a central thrusting action. Another well-known appliance of this type is the pan bucket conveyor. This consists of a continuous trough built in sections and supported on axles and guide wheels running on suitable rails. There is one axle to each section, and in each section of the trough a bucket is pivoted to the sides. There are several other conveyors of this type, amongst which the ” Tipit ” should be mentioned. For the Bousse gravity conveyor it is claimed that it will go round any curve backwards or forwards in both planes, and is therefore adaptable for installations when the typical gravity bucket would be useless. The buckets^ of this conveyor are coupled together

by a link in the middle, which obviously allows more latitude in negotiating curves than the double chain of most of the other types.

CONVEYORS

57

Pneumatic Grain Elevators have been employed with good effect in loading and unloading grain from ships. This method of conveying grain falls under three systems: (i) the blast system; (2) the suction system; and (3) the combined blast and suction system.

In the first system a barge, known as a machinery barge, is fitted with a steam boiler, a set of air compressing engines, and a length of flexible piping long enough to reach from any part of the barge to the farthest corner of the ship to be loaded. A small pipe, known as the nozzle, is inserted at the inlet end of the piping, where the grain is taken in, and communicates with the air compressor at the other end. Compressed air can be ad- mitted to the nozzle or shut off by a valve. The inlet end of the flexible pipe is pushed into the grain in the barge, while the other end is led over the hatches of the vessel to be loaded. As the compressor is set to work and the valve of the compressed air supply pipe opened, the air naturally rushes up the pipe and

this through valves into a second receptacle, whence it is con- veyed to any desired point by flexible pipes. This second tank is divided into two sections and provided with valves so that the two sections will alternately be under the influence of blast or suction. Alternatively the grain is discharged by an automatic valve from the vacuum tank into the second air-tight chamber which communicates with the compressed air chamber. From this section the grain is discharged by an outlet pipe by the agency of compressed air. A similar system was introduced by Messrs Haviland & Farmer, who have, however, since abandoned it on account of difficulties connected with the application of the blast, which was found to abrade the grain rather severely, especially at the bends in the pipes. An even greater objection was the delivery of dust with the grain, which made it impossible for trimmers to remain in the hold while the elevator was at work. Messrs Haviland and Farmer now work on the suction system, in which they claim to have introduced several improve-

escapes at the other end which is lying over the ship’s hatchway. If the inlet nozzle be immersed in the grain to the depth of 12 to 18 in. the induced atmospheric air will follow the lead of the compressed air, and drawing the grain around into the inlet nozzle will carry it up the

pipe and deliver it into the hold of the vessel loading.

In the suction system, which is identified with the name of F. E. Duckham, the process is somewhat different. An air-tight •tank or receiver, 8 to 10 ft. in diameter and 10 to 20 ft. high, is fitted with a hopper bottom, and is erected, if floating, on a barge, at a sufficient height to allow grain falling from the hopper bottom, and passing through an air lock, to be delivered by gravity through a shoot into the vessel being loaded. A pipe connects the vacuum tank with the exha,ust pumps. Several flexible pipes of sufficient length to reach any corner of the ship to be unloaded, may be connected with the vacuum tank. As the air pumps are set working a partial vacuum is formed within the tank, and as the nozzle end of the pipe is immersed into the grain to the depth of a few inches, the air and grain are drawn in at the mouth of the nozzle and carried along the pipe to the vacuum tank. The natural expansion of the air then lets the grain drop to the hopper bottom, whence it issues from an air-lock valve, while the air is drawn away by a pipe communicating with the pumps and is thence discharged into the open.

In the third system, or blast and suction combined, the grain is sucked into a vacuum tank, as just described, and drops from

ments, notably in regard to the purification of the air between the vacuum chamber and the exhaustors, and in devising a new automatic air trap.

The first pneumatic suction elevator in Great Britain was erected at the Millwall docks (London) under the Duckham patents. At Sulina, on the Lower Danube, a pneumatic elevator erected on the Haviland-Farmer system, which has undergone one or two reconstructions, has been proved capable of elevating 160 tons of grain per hour with 375 i.h.p.

The only objection to pneumatic elevators appears to be that of expense. The cost of installation is relatively heavy, and the power required for working is large. But in dealing with vessels carrying heavy cargoes of grain the saving of labour and demur- rage is sufficient to justify the large outlay of capital required in ports where there is sufficient grain traffic.

Hot Coke Conveyors. — Hot coke is admittedly one of the most difficult materials to handle by mechanical means, and though it might be too much to say that all difficulties have' been sur- mounted by the engineer, it has, since the end of the 19th century, been more

or less satisfactorily handled by machinery. Even in a dry state coke is a troublesome material to handle by machinery. It is of a gritty and rasping nature, and is at the same time very friable. Unless it is gently handled, breakage is bound to occur and to result in the making of a certain proportion of fine dust known as ” breeze.” Apart from the depreciation in the value of the coke, this .breeze is a sharp, cutting material, calculated to do

considerable injury to the working parts of the conveyor, such as chains, and to the bearings, if it can get inside. Of course the conveying of the coke in an incandescent condition is another serious difficulty, as this glowing material .must be quenched by water, a sufficiently delicate operation in itself. The chief use for hot coke conveyors has been found in connexion with gas works, but attempts have also been made to provide efficient machinery for the service of coke ovens of great capacity.

The justification of any kind of machinery must rest on its relative efficiency and economy. As compared with some other materials the mechanical handling of hot coke does not realize such a striking economy; a hot coke conveyor is expensive to build — on account of the great wear and tear it must be very solidly constructed — and it is costly in upkeep. Still in large gas works the use of machinery for treating glowing coke is economic-

uptake to carry awey the fumes and vapours. These trucks have been hauled, in lieu of human arms, by endless ropes or even small locomotives.

The earlier hot coke conveyors were of the pushplale type. The trough, some 27 in. wide, consisted of cast iron sections, while the pushplates, formed of malleable castings, were attached at a pitch of 24 in. to a central chain and were pulled along on a wrought iron bar, which could be renewed when necessary. These conveyors with a speed of 48 ft. per minute, had a capacity of some 20 tons per hour. A conveyor constructed on these lines was installed at the Gathorn works in 1903. The wear and tear was very great; moreover the chain, being central, suffered severely from the hot coke, to the action of which it was directly exposed.

The New Conveyor Company’s conveyor consists of a water-tight

trough through which pass closely-fitting tray plates, attached to a single chain. These plates are joggled down at one end to receive the flat front part of the succeeding plate, with the aim of excluding

Flue seated

Cross Section

“Water Trough

Longitudinal Section

Plan

Fig. 11.— Bronder Hot Coke Conveyor.

ally advisable. Exact calculations are not very easy to make, because while the cost of hand labour in this department of a gas works is accurately known, the efficiency of different hot coke conveyors varies. G. E. Stephenson, of the Gathorn gas works, estimated that a saving of 4! d. per ton had been realized on each ton of coke conveyed to the yard from the retort house, as against the same material wheeled in barrows. This saving represented the difference between the cost of twelve men, who formerly handled the hot coke with shovels and barrows, and the cost of one conveyor with the wages of one man to look after it. In an ordinary way one man would rake out the coke from the retort mouthpiece into a barrow placed underneath, while a second man quenched the glowing coke with buckets of water, or better still with a hose. Then the barrow would be wheeled out into the yard. Obviously this is a slow and relatively expensive method, apart from the deleterious fumes arising from the quenching of the coke. Some improvement was effected by the substitution for the old hand-barrows of cage-like tipping trucks; these are run on narrow gauge rails out of the retort house and the red-hot coke they contain is quenched by a copious spray, the truck being placed the while over a grating through which the surplus water is drained away, under an inverted funnel with an

the breeze from the under part of the carrying plate. The chain is made entirely of steel with side rollers attached to every third plate, the plates, \ in. thick, are dished in the shape of a tray, which is less hable’to distortion (from heat) than a flat plate. The speed of travel is about 45 ft. per minute, while the capacity when handling coke from 20 ft. retorts is some 30 tons per hour.

A conveyor made by Messrs Graham, Morton & Co., consists of a

travelling tray, the sections of which are joined together by steel spindles provided with a roller at each end, the latter running on suitable rails. These sections consist of steel castings with a number of lateral slots; thus the tray has the appearance of a travelling grating. To receive the quenching water that escapes through the grating a trough is placed beneath, and a scraper is used to free the trough of the dust escaping through the grating.

An interesting conveyor is that of G. A. Bronder, of New York (fig. 1 1)_, which has some affinity with the gravity bucket conveyor. It runs in a water-tight trough which is filled up to a certain height, the water being slowly circulated by mechanism which resembles a water wheel. The chain of buckets runs in the trough, the sides forming the rails for the supporting rollers. The conveyor is covered in along its whole length, and forms a sort of flue which is connected at each bench with a number of shoots through which the coke drops into the conveyor buckets. A pipe of large diameter is con- nected with an exhaust fan, which draws away the fumes created by the quenching process, and sends them into a chimney discharg- ing into the open. The chain and buckets, being carried on rollers which run on the outer edge of the trough, cannot come in contact

either with the hot coke or with gritty particles. The chain of buckets is connected by horseshoe-shaped brackets extending upwards beyond the sides of the buckets and connected with the links of the driving chains. When the conveyor is at work the covers of the mouth-pieces are opened and the coke is fed into the buckets ; simultaneously the water valves are opened and the glowing coke is quenched. Any breeze which may have fallen between the buckets is collected by a scraper and delivered into a tank at one end, while the propeller wheel draws the water from this tank and drives it back to the other end of the trough. The top strand is the working strand and delivers its load at the terminal. One important differ-

Fig. 12. — Wild Coke Conveyor.

ence between an ordinary gravity bucket conveyorand this apparatus is that the buckets are here rigidly connected to the supporting wheels.

The West hot coke conveyor consists of a strongly-built trough in

which a single wide chain partly carries and partly drags the coke. In the trough is a false bottom, the plates of which are loosely fixed and kept in position by angle irons on which the chain drags. By two arm-like extensions the links of the chain are widened right across the trough. The pitch of the chain is 12 in., so that all the large pieces of coke are more carried than dragged. The speed of travel is about 40 ft. per minute.

The Wild conveyor (fig. 12) consists of a cast iron or steel trough 24 to 30 in. wide by 9 in. deep, supported by cast iron brackets to which the rails that support the strands of the chain are secured. Both chains run outside the trough, and are secured on either side to the pushplates, so that only the scraper comes in contact with the hot coke. Every second link of the 12 in. pitch chain carries a push or scraper-plate, as shown in illustration.

The De Brouwer hot coke conveyor, which is much used in gas works both in Great Britain and on the continent of Europe, was invented by a Belgian engineer. Its construction has undergone many modifications which experience has shown to be desirable. It consists of a trough of cast or wrought iron, or mild steel, 20 to 36 in. wide and 3 to 6 in. deep. Double endless chains run in the corners of the trough, the two chains being connected together by round cross bars set 30 in. apart, so as to form a sort of ladder. The hot coke is carried or dragged along by these bars. One end of the trough is closed and the other is bent upwards with a view to retaining the quenching water. As the hot coke is dragged along it is subjected to the action of jets of water. The conveyor bars, which act as scrapers, sweep the water and the coke along the trough till the point is reached where the latter curves upwards. Then the water flows back like a small cascade on the half-quenched coke, which is thus thoroughly extinguished. Considerable inclines can be negotiated with this conveyor; in some installations on the continent of Europe angles of 30° to the horizontal have been surmounted. In a modification of the De Brouwer conveyor, in- stalled at the Cassel gas works, the bars which form the rungs of the conveyor were replaced by cast iron rakes. In another modified form, the work of F. A. Marshall, to be found in the Copenhagen gas works, sluices are provided for withdrawing an excess of water at any point in the trough.

In Great Britain a hot coke conveyor has been designed on similar lines by Messrs R. Dempster & Sons, Ltd. (fig. 13). The chains are parallel from end to end, and are composed of identical and interchangeable malleable cast links. Instead of the chains carrying the rollers, as is often the case, the chains are themselves carried and

guided by flanged rollers supported from the framework. This arrangement has the advantage of decreasing the weight of the chain, as neither the rollers nor the lubricators have to be conveyed, being stationary. The scrapers are of cast steel and have a rake-like shape with a view to minimize the breakage of coke.

The essential features in a hot coke conveyor are strength and simplicity, a minimum of wearing parts, interchangeability of wearing surfaces and of worn and broken parts, protection of wearing and working parts from contact with the hot coke, and facilities for keeping the temperature of the conveyor .ts even as possible, so as to avoid distortion of parts through sudden changes. To attain these latter conditions, it appears essential to construct conveyors of the pushplate type. In these the hot coke is kept continually moving, and thus the good effect is secured of heating the conveyor from end to end uniformly and gradually. This applies particularly to gas works conveyors.

Cross Section, with Water Jacket.

Fig. 13. — Dempster Coke Conveyor.

For the service of coke ovens the plate or tray conveyor might be suitable because more gentle. It must be remembered that coke oven conveyors must be of large capacity, and moreover in this case there is more scope for cooling the coke in front of the oven before it is removed to the conveyor, the work being all effected in the open.

Elevators. — This term is here confined to its proper meaning (in English engineering treatises) of a device for raising material in a vertical or slanting direction by means of buckets attached to endless belts or chains. Lifts for passengers are also some- times termed elevators (?.».), and in America the term is also currently applied to the granary or warehouse in which grain is stored (see Granaries).

In the bucket elevator, an endless belt or chain runs over terminal pulleys which are fixed at different levels, the distance from centre to centre of these pulleys beings known as the length of the elevator. The design and construction of the elevator will be varied to suit its purpose. Grain elevators are invariably cased in wooden or iron trunks, and the head and foot are also of wood or iron, iron trunks being particularly used in so-called fire-proof buildings. The trunk of

the grain elevator (fig. 14) is almost always vertical whilst the band to which the buckets are attached may consist of leather, cotton, hemp, webbing or other suit- able substances. When an elevator is intended for lifting heavy materials, such as coal, coke or cement, it is usually set at a slant (figs. 15 and 16), and the endless belt is replaced by one or two strands of endless chain which support the buckets and run over the terminal sprocket wheels. The buckets are attached to the links of the chains, and to prevent these heavy buckets and chains from sagging in their inclined position, rollers or more often short skidder bars are fixed to each bucket, sliding on well-oiled angle bars on each side of the elevator frame.

Both grain and mineral elevators are usually fitted with tightening gears to keep the belt or chain taut; these are generally placed at the lower or well end so as not to interfere with the position of the upper terminal, which is almost invariably the driven one. The tightening of the band at the bottom terminal in the elevator well necessarily alters the space between the terminal pulley and the bottom of the well. This is of little consequence in grain elevators, but for elevators intended to handle coal or any material of varying size the ordinary tightening gear is unsuitable. In such a case the best plan is to attach the elevator-well to the terminal in such a way as to go up or down with the sprocket wheel when the chain is loosened or tightened, while the foot bracket which supports the well and terminal spindle remains a fixture. In order to tighten elevator chains without interfering with either of the terminals, adjustable jockey pulleys at some suitable point may be used, and the desired effect can thus be attained by pressing against the chains and thereby taking up the slack without any interference with either the feed or delivery end.

Elevator buckets must be proportioned to the size and nature of the material they are intended to carry, and care must be taken to maintain a uniform feed. This may readily be effected by adjustable outlets and spouts for grain and the like, and by certain feeding devices for handling minerals of uneven size. For instance, an oscil- lating feed shoot making from 30 to 60 oscillations per minute can be installed in such a case, and adjusted to deposit at each backward and forward stroke the exact amount of material adapted to the capacity of the elevator. The speed of the shoot will naturally vary with the size of material to be fed. For small coal 60 oscillations would be about the correct speed; for large coal the speed might be reduced to 30 or less. Speaking generally, care should always be taken to prevent an undue rush of feed, that is, more than the elevator can take up, and if tenacious materials are handled, feeding devices should be employed provided with stirrers or agitators that will effectually keep

the material moving and prevent any larger lumps from arching over the feed spout, and thus producing chokes. Elevators should always be fed from that side on which the buckets ascend, that the stream of material may meet the elevator buckets on their upward journey. This will prevent the material from filling up the elevator well and spare the buckets from dredging through an accumulation of feed. Elevators erected at an incline

are best fed at a point several feet above the well into the chain of ascending buckets, as under such conditions little will miss the buckets and drop into the well.

The reason why grain elevators are set vertically, whereas ele- vators intended to carry heavy bodies such as coal and ore are generally inclined at an angle, is that the former can be run at a much greater velocity than the latter. Grain, for instance, would be uninjured by a velocity at the delivery end which would fracture coal and seriously reduce its value, to say nothing of the dust pro- duction and the damage which would be done to the receiving spouts and shoots. Elevators carrying a light material can be run at a circumferential velocity of 250 to 350 ft. per minute, and if

side elevation

Fig. 14.-

CHO ELEVATION.

-Grain Elevator.

vertically set, will throw the grain, &c, clear of the elevator into the shoot for its reception. On the other hand, elevators handling heavy material must be set at an angle in order to give a clear de- livery at a much lower speed of 50 to 60 ft. per minute; in other words, the elevator is so inclined that the shoot for the reception of the material can be put underneath the delivering buckets which slowly disgorge their load. To obtain good results, without taking up too much space, an elevator carrying heavy material should be set at 40° to 6o c to the horizontal. The same results can be obtained if the main portion of the elevator is vertical and only the upper portion inclined, or so curved as to bring the delivery over the shoot. The speed at which vertical elevators should be run will depend on the diameter of the terminal pulley, that is, the pulley over which the buckets and bands pass. The centrifugal force of pulleys revolv- ing at the same speed is in direct proportion to their diameters, and this is twice as much in a 2 ft.- as in

a 1 ft. pulley. It may be taken that the centrifugal force of a pulley will increase in proportion to the square of its velocity; hence the centrifugal force of a pulley 2 ft. in diameter running at 50 revolutions per minute will be four times the centrifugal force of a pulley of the same diameter making only 25 revolutions per minute. It must not be forgotten that to effect a clean discharge of the buckets of a vertical elevator, the

centrifugal fqrce must be sufficient- to overcome the gravity of the material, because the material thrown off the delivery pulley in a horizontal direction will be more rapidly deflected into a parabolic curve the higher its specific gravity. It follows that for a specifically heavy material a greater centrifugal force will be required; that is to say, the elevator will . have to be higher speeded than in dealing with a lighter material.

Elevator buckets must be varied according to the nature of the material; for instance, shallow buckets will be found best for a soft and clinging material such as flour, moist sugar, sand, small coal, &c, while for a hard or semi-hard body such as wheat, coal,

Fig. 15. — Mineral Elevator, upper terminal.

&c, deeper buckets are prefer- able. On account of their lower speed, elevators for specifically heavy material require much larger buckets and chains than grain elevators of the same bulk capacity. The most economical form of elevator is fitted with a continuous chain of buckets. Such elevators may be con- structed to carry either grain or minerals. The advantages are greatercapacity than an ordinary elevator of the same dimensions and a more uniform delivery; moreover, smoother running is secured, since the buckets being close together need not plunge intermittently through the con- tents of the elevator-well.

Intermittent Conveyors. — The elevators we have been considering, whether used for carrying and distributing coal or grain, have this in common, that they raise material from a lower to a higher level, so to speak, in a continuous stream, the continuity being broken only by the short spaces between the buckets. In the continuous bucket type indeed the stream of material is practically, if not absolutely, continuous. In all these cases the elevator is fed with the material in a

continuous stream, and by some mechanical means; whether by band, worm or shoot, is immaterial. Elevators of a somewhat different and more substantial construction may be and are often used for handling filled sacks, barrels, carcases of animals and other bulky objects, which cannot be delivered in a uniform stream, but may have to be conveyed by the elevator intermittently. The ordinary buckets used for grain or coal are replaced by other appliances for gripping and holding the object to be raised from a lower to a higher level, but in principle these appliances are essentially elevators.

Another kind of elevator, known as a lift or hoist, is used in mines and quarries and in serving blast furnaces. This is an elevator with one or two buckets. Essentially a heavy load lifter, it is intended for material of too large a bulk to be handled economically by ordinary elevators, and is employed for lifting in either a vertical or, more often, an inclined direction.

For elevating materials, such as large coal, iron ore, limestone, &c, which are too large to be fed into ordinary elevators, and

must therefore be handled intermittently, the single bucket elevator or hoist may be used with advantage. But as the essential use of mechanical appliances for handling material is to save human labour as far as possible, that hoist will prove the most economical the operation of which is as automatic as possible. The Americans seem to have been pioneers in the construction of furnace hoists, which form the principal elevators of this class, but some excellent examples of the modern furnace hoist are now to be found in Great Britain and elsewhere in Europe. Generally speaking, a furnace hoist consists of an inclined iron bridge girder set at an angle to the upright shaft of the furnace. On this incline are laid rails for the ascent and descent of the bucket, which in this case is known as a skip and is provided with suitable wheels, while the hoisting gear manipu- lating the skips by a steel rope is erected on or near the ground level. The rails when they approach the upper terminus are usually bent in a more or less horizontal position so as auto- matically to tilt and thereby unload the skip. To attain the same end, the rails supporting the back wheels of the skips may be bent at the terminus, or the back wheels may have additional wheels of a larger diameter on the other side of their flanges, so that during the ascent and descent the skip runs on its four normal wheels, while at the upper terminus the outer and larger back wheels engage with short lengths of extra rails and thus tilt and effect the automatic clearance of the skip. The dead weight of the skip may be balanced by a counter weight, or double tracks may be laid, so that the empty skip descends on one track whilst the loaded_skip is being

raised on the other. In this case the distributing hopper at the top of the furnace has an elongated shape so as to take the charges alternately from buckets on either track. Again, the two tracks may be laid one above the other, so that one skip runs on the upper

rails and the other on the lower. The two buckets will pass each other at about the centre of the framing, where there will be plenty of room for clearance.

The capacity of the skip will of course de- pend to some extent on the capacity of the furnace, but an average charge may be put down at 2 tons of ore and lime, or 1 ton of coke. To raise such a charge to a furnace 80 ft. high would require, assuming no counter weight were used, a motor of about 100 h.p. On account of the great speed at which

Fig. 16. — Mineral Elevator, lower terminal.

the hoist works, the time taken in raising the charged skip, discharging it, and returning it empty would be only 30 to 40 seconds. The hoist cable runs over guide pulleys placed at the top of the furnace, and the cable is often manipulated by an electrically driven winch in a cabin below. The descent of the empty skip in more modern installations is utilized to effect an even distribution of the feed from the hopper to the furnace by causing the hopper to revolve. To this end the latter is provided with an ingenious mechanism which only comes into operation as the car descends. After every charge shot into the hopper the latter is revolved a few degrees, and this has the effect of giving the delivery of the next load in another direction, so that the charges of the skip are in turn distributed over the whole area of the surface. This is deemed a most essential point in furnace-charging, and it is not one of the least recommendations of this mechanical system of furnace-charging that it can give an even feed without any hand labour whatever. A double hoist has been designed which has the advantage that if one elevator breaks down the work of the furnace is not interrupted. In this system two furnaces are connected at the top by a gantry or bridge, against which, between the furnaces, two inclined elevators are set, so that each can serve either furnace. The skips are on wheels and detachable from the elevator, and are loaded from the ore pockets at the lower terminal and drawn up on a cradle; as this reaches the top where the rails on

the gantry correspond with the gauge of the skip or car, the latter is carried by its own weight down a slight incline to either furnace, discharging its contents as it passes over the conical mouth. Another advantage claimed for this system is that the rails of the cradle, when in its lowest position, correspond with the rails which lie parallel to the furnaces and run right under the store bins from which the skip is loaded. The economy to be realized from a furnace hoist will be in direct proportion to the use made of mechanical means of feed conveyance. For instance, the store bins in connexion with such elevators might be economically fed by suitable conveyors, or the material might be brought in self- unloading hoppered trucks into conveniently placed bins, ready to be drawn into the skips.

Ropeways. — A ropeway has been defined as that method of handling material which consists of drawing buckets on ropes, and by means of ropes, such buckets being filled with the material to be handled and being automatically or otherwise discharged. At what period of history ropeways were first used it is impossible to say, but the fact that pulley blocks, and even wire ropes, were known to the ancients, renders a pedigree of 2000 years at least possible. In more modern days, an old engraving shows a single ropeway in working order in 1 644 in the city of Danzig. This, the work of Adam Wybe, a Dutch engineer, was a single ropeway in its simplest form, consisting of an endless rope passing over pulleys suspended on posts; to the rope were attached a number of small buckets, which evidently carried earth from a hill out- side the city to the rampart inside the moat. The rope was probably of hemp. Modern ropeways worked with wire ropes date from about i860, when a ropeway was erected in the Harz Mountains. Since then several systems have been evolved, but in the main ropeways may be divided into the single and double rope class.

The ropeway is essentially an intermittent conveyor, the material being carried in buckets or skips, and practice has proved it an economical means of handling heavy material. The prime cost of a ropeway is usually moderate, though of course it varies with the ground and other local conditions. Working expenses should be low, because under the supervision of one competent engineer unskilled labour is quite sufficient. A ropeway may be carried over ground over which rails could only be laid at enormous cost. To a certain extent ropeways are independent of weather conditions, because their working need not be interrupted even by heavy snowfalls. Their construction is very simple, and there is little gear to get out of order. Sound workmanship and good material will ensure a relatively long life. As an instance, a certain rope in a Spanish ropeway tested new to a breaking

strain of 29} tons was shown after carrying 160,000 tons (in two years' incessant work) still to possess a breaking strain of 27 \ tons. The power absorbed by a ropeway is relatively moderate, and under special conditions may be nil. The only demand it makes on the superficial area of the ground traversed is the small emplacements of the standards, which in modern ropeways are few and far between. Wayleaves, or the permission to erect standards and run the line over private land, may of course mean an item in the capital outlay. This circumstance may have checked ropeway construction in Great Britain, but it must also be borne in mind that a large portion of that country is comparatively level and well provided with railways. In building a ropeway it is essential to take as straight a line as possible, because curves generally necessitate angle stations, which mean extra capital and working, cost. On the other hand, ground that would be difficult for the railway engineer, such as steep hills, deep valleys and turbulent streams, has no terror for the ropeway erector. There is a case of a ropeway of a total length of 5400 ft. with a total difference in altitude of 2000 ft. ; it is claimed this ground could not be covered by a railway with less than 1 5 m. of line graded at 1 in 40.

Perhaps the simplest type of a single rope system is an endless running rope from which the carriers are suspended, and with which they move by frictional contact. Or the carriers may be fixed to this rope and move with it. The ropeway itself would consist of an endless rope running between two drums, one, known as the driving drum, being provided with power receiving and transmitting gear, while the drum at the opposite terminal would be fitted with tightening gear. The endless rope is carried on suitable pulleys which themselves are supported on standards or trestles spaced at intervals varying with the nature of the ground. The rope runs at an average speed of 4 m. per hour, a speed at which the bucket or skip can automatically unload itself. In the double ropeway the carrier runs on a fixed rope, which takes the place of the rails of a railway. The carrier is fitted with running heads fur- nished with grooved steel wheels. The load is borne by a hanger pivoted from the carrier, and is conveyed along the rail rope by an endless hauling rope at an average speed of 4 to 6 m. per hour. The hauling is operated by driving gear at one end, and controlled by tightening gear at the other end just as in the single rope system. Double ropeways have been carried in one section over 18 to 20 m., and will transport single loads of 6 cwt. to a ton or more.

Broadly speaking, the single ropeway is not so suitable for heavy loads and long distances as the double, but in this connexion the work of Ropeways Limited should be noted, which favours a single rope system. Their engineer, J. Pearce Roe, introduced multiple sheaves for

supporting the rope at each standard. Thus the rope may pass over one, two or four sheaves, which are provided with balance beams that have the advantage of adjusting themselves to the angle caused by the rope passing over the sheaves, thus equalizing the pressure over a number of sheaves. A ropeway erected on this system in Japan spans 4000 yds. of very broken ground; yet only 17 trestles are used, and as each support is placed as high as possible, no one is of great height. An altitude of 1 130 ft. is reached in a distance of 1200 yds. The ropeway has a daily carrying capacity of 60 tons in one direction and of 30 tons in the other. Another installation on this system, which serves an iron mine in Spain, spans 6500 yds. of very rough country, so steep that in many places the sure-footed mule cannot keep on the track. This ropeway can deal with 85 tons per hour. The greatest distance covered by this system, on one section, is 7100 yds., or about 4 m., and the carrying capacity is 45 tons per hour.

The motive power required for a ropeway will vary with the conditions. In cases of descending loads the power generated is sometimes so considerable as to render it available for driving other machinery, or it may have to be absorbed by some special brake device. In a ropeway in Japan of 1800 yds., which runs mostly at an incline of 1 in l|, the force generated is absorbed by a hydraulic brake the revolving fan of which drives the water against fixed vanes which repel and heat it. In this way, 50 h.p. is absorbed and the speed brought under the control of a hand brake.

Aerial Cableways. — The aerial cableway is a development of the ropeway, and is a conveyor capable of hoisting and dumping at any desired point. The load is carried along a trackway consisting of a single span of suspended cable, which covers a comparatively short distance. The trackway may either run in a more or less horizontal direction, i.e. the terminals may be on the same level, or it may be inclined at such an angle that the load will descend by gravity. The trackway or rail rope rests upon saddles of iron or hard wood on the tops of terminal supports, usually known as towers. These towers may be constructed

either of wood or iron, and if the exigencies of the work render it desirable, they may be mounted on trolleys and rails, in which case the cableway is rendered portable, and can be moved about, sometimes a great advantage in excavating work. The motive power

may be either steam, gas, or electricity. The motor is situated in what is termed the head tower, which is sometimes a little higher than the other or tail tower. Sometimes, but not frequently, the latter is also fitted with a motor. The span between the two towers sometimes extends to 2000 ft., but this is exceptional. Very heavy loads are dealt with, sometimes as much as 8 tons in a single load. The load, which may be carried in a skip or a tray, is borne by an apparatus called the carrier, which is a modification of a running head, consisting of pulleys and blocks and running along the main cable or trackway. The carrier is also fitted with pulleys or guides for the dump line. The carrier is drawn along the main cable by an endless or hauling rope which passes from the carrier over the head tower and is wound several times round the drum of the winding engine to secure frictional hold, then back over the head tower, to the tail tower, returning to the rear end of the carrier. The hoisting rope passes from the engine to the fall block for raising the load. The dump line comes from the other side of the winding engine drum and passes to a smaller block attached to the rear end of the skip or tray. The whole weight of the skip is borne by the hoisting rope, while the dump line comes in slack, but at the same rate of speed. Whenever it is desired to dump the load, the dump line is shifted to a section of the drum having a slightly larger diameter, and being thus drawn in at a higher rate of speed the load is discharged. The engine is then reversed, and the carriage brought back for the next load.

This is in outline the mode of operating all cableways. This appliance has rendered great service as a labour saver in navvy- ing, quarrying and mining work; in placer-mining, for instance, cableways have been found very useful when fitted with a self- filling drag bucket, which will take the place of a great number of hands. Cableways can be worked at a great speed, but a good mean speed would be 500 to 750 ft. for conveying and 200 to 300 ft. for hoisting. A cableway used in excavating work in Chicago was credited with a capacity of 400 to 600 cub. yds. per day at a total cost of 2d. per yard, including labour, coal, oil, waste, &c.

Coaling Ships at Sea. — In the coaling of ships at sea the cable- way has rendered great service. The conditions under which this operation has to be carried out present many difficulties, especially in rough water. One of the chief obstacles is the maintenance of the necessary tension on the cable used in conveying the coal from the collier to the ship. The first test in coaling ships at sea, made by the British admiralty, took place in 1890 in the Atlantic at a point 500 m. south of the Azores in water 2000 fathoms deep. Ten ships of war were coaled, each vessel taking enough coal to enable it to steam back to

Torbay, 1800 m. away. In this case the collier was lashed alongside the battleship it was feeding, thick fenders being interposed to prevent damage, but nevertheless as the colliers got light they pitched considerably, and one or two sustained dents in their sides. The ships did not roll, being kept bows-on to the swell, which became heavy before the coaling was completed. The coal was taken in by derricks at the main deck ports. It is clear that had the sea been really rough coaling in this fashion would have been impossible.

The most practicable method of coaling at sea yet devised is the marine cableway of Spencer Miller, which has been tried with some success in the American navy. It is intended for use between vessels 350 to 500 ft. apart. The ship being coaled takes the collier in tow, steaming at the rate of 4 to 8 knots; it has been found that a speed of five knots in moderately rough water will keep the cableway taut and maintain a sufficient distance between the crafts. The collier is fitted with an engine having double cylinders and double friction drums, which is placed just abaft the foremast. A steel rope j in. in diameter is led from one drum over a pulley at the mast head and thence to a pulley at the head of shear-poles on the vessel being coaled, and brought back to the other drum. The engine moves in the

same direction all the time and keeps on winding in both the strands of the conveying rope. Should the two vessels increase the distance between them during the operation of conveying the coal bags, of which two, weighing 420 lb each, may be fastened to the carrier, the extra rope called for is obtained by slipping the upper strand from the drum; this increases the speed of the upper cable. On the other hand should the distance between the vessels be reduced, this operation is reversed, the speed of the upper strand being reduced. To keep the carriage steady on its return empty, a rope, known as the sea-anchor line, is stretched above the two strands of the conveyor line, and under a pulley on the carriage. This cable is attached to the vessel, resting on a saddle on the shear head, whence it leads through the carriage over pulleys at the head of the foremast and mainmast of the collier, running on astern several hundred feet into the sea. A drag or sea-anchor, usually made of canvas and cone-shaped, is attached to the end of this rope. This anchor is used to support the empty carriage on its return to the collier. The diameter of the cone's base is graduated to the speed of the vessels. Thus in a smooth-water test, with a ship steaming at 6 knots, one 7 ft. in diameter was used, while the same anchor answered its purpose very well with a ship doing 5 knots in rough water.

The results given by this system of coaling at sea are relatively

satisfactory. Tests made in the United States navy showed that 20 to 25 tons of coal per hour could be delivered by a collier to a war-vessel during a moderate gale. As the ship was under steam all the time and consumed 3 to 4 tons of coal per hour, the balance of the coal bunkered amounted to between 16 and 20 tons per hour, or say 384 tons in 24 hours. It has been sug- gested that under service conditions the speed of the towing vessel might be increased to 8 or 10 knots an hour; this would of course increase the coal consumption unless the collier pro- ceeded under her own steam. But in such a case the space between the two crafts might be diminished, which would have the effect of causing the cable to sag and of stopping the work, since the conveyor cable to act properly must be kept taut. In Great Britain the Temperley Transporter Company have taken up this method of coaling at sea, working in collaboration with Spencer Miller, and have introduced several improvements in detail. Their system has been tried by the British admiralty.

The coaling of a large vessel by this appliance has the advantage of economizing hand labour. One man is required to work the hoist on the collier, while 20 men will be in the hold filling the bags and delivering them to the deck, where 1 5 or so will transfer the bags to the lift. One or two men suffice for the overhead work ; their station is in the trestle trees. On board the receiving ship a few men will be stationed at the shear head to empty the bags into a canvas shoot, and then return them, while there will be the usual force of bunker trimmers. A ton of coal per minute has' been transferred from the collier to the vessel, but for this capacity the ships must not be too far apart, else the rope would not remain taut under such loads. During the Russo-Japanese War, many of the Russian battleships were coaled by means of aerial cableways. The coaling of vessels in this manner seems a success, but it would be desirable to increase the carrying capacity of the cableway or to duplicate the installations.

Telpherage. — A telpher ropeway or cableway may be defined as a ropeway or cableway worked and controlled electrically, only a rail rope being required besides the live rail or wire from which the electric current is taken. Telpherage was devised by Professor Fleeming Jenkin in 1881, and developed by him in conjunction with Professors W. E. Ayrton and J. Perry. The telpher itself consists of a light two-wheeled truck, carrying the driving motors, which, to avoid gearing or other complicated mechanism, are usually coupled directly to the axles of the telpher. Thus the telpher is a self-propelled electric carrier running on a mono-rail, which, according to the conditions, may be a steel rail or a steel cable. From the telpher are suspended carriers which can be adapted to any kind of material. In many cases

the whole load may be suspended from the telpher, or the load, especially if of some length, may be supported at one end

by a telpher, and at the other end by what is known as a trailer, or again, two telphers may be installed, one at each end of the load. The telpher carries a small trolley sheave or bow which serves to collect the current from a trolley wire stretched a little above the rail. Frequently the telpher is accompanied by an attendant who manipulates it, but by dividing the trolley wire into sections any system of telpherage may be constructed to work automatically, and by switching off the current from the section in which the telpher is required to stop it can be brought to a standstill at any required point. The speed of the telpher may be readily regulated by the introduction of a resistance between any section of the line and the supply of electricity. The speed may be high, as much as 1 500 ft. per minute over the straight portions of the line, but slackened at curves and loading stations, or when approaching a terminus. The required power may be obtained from the mains of an ordinary electric supply with either direct or alternating current, but the former is preferable. The mean expenditure of power in a working day is said to average (including electrical hoisting) 1 H.P. per ton of average load.

The uses of telpherage are many and various. In factories and warehouses, where the buildings are scattered, it has been installed with excellent results. Being essentially an overhead system, there is a saving of floor space, the ground not being obstructed by trucks or trolleys. The same reasons which render ropeways an economical means of handling such material as coal, ore, stone, slate, &c, between the mine or quarry and the rail or barge, may be adduced in favour of telpherage. For the unloading of railway trucks in a crowded goods-yard it is undoubtedly applicable. Any kind of tipping or hoisting operations can be automatically effected by its aid, and any sort of grab may be used in dealing with such materials as sand, clay or gravel. Telpherage is clearly a labour-saving method of handling materials, but of course the exact conditions under which any system is to be used need careful study, while the economy to be effected by the installation of a telpher line must to a great extent depend upon the available supply of electrical energy. (G. F. Z.)

CONVOCATION (Lat. convocatio, a calling together), an assembly of persons met together in answer to a summons. The term is more

usually applied in a restricted sense to assemblies of the clergy or of the graduates of certain universities.

In the American Protestant Episcopal Church a convocation is a voluntary deliberative conference of the clergy; it has no legislative function, and like the convocation of a university, assembles primarily to discuss matters of common interest.

In England the name ” convocation ” is specifically given to an assembly of the spirituality of the realm of England, which is summoned by the metropolitan archbishops of Canterbury and of York respectively, within their ecclesiastical provinces, pursu- ant to a royal writ, whenever the parliament of the realm is summoned, and which is also continued or discharged, as the case may be, whenever the parliament is prorogued or dissolved. These assemblies consist of two Houses, an upper and lower. In the upper house sit the archbishops and bishops, and in the lower the deans and archdeacons of every cathedral, the provost of Eton College, with one proctor elected by each cathedral chapter and two by the beneficed clergy in each diocese in the province of Canterbury (in the province of York two proctors are elected by each archdeacon), with a prolocutor at their head. When and how this convocation originated is not historically clear. This much is known from authentic records, that the present constitution of the convocation of the prelates and clergy of the province of Canterbury was recognized as early as in the eleventh year of the reign of Edward I. (1283) as its normal constitution; and that in extorting that recognition from the crown, which the clergy accomplished by refusing to attend unless summoned in lawful manner (debito modo) through their metropolitan, the clergy of the province of Canterbury taught the laity the possibility of maintaining the freedom of the nation against the encroachments of the royal power. It had been a provision of the Anglo-Saxon period, the origin of which is

generally referred to the council of Clovesho (747), that the possessions of the church should be exempt from taxation by the secular power, and that it should be left to the benevolence of the clergy to grant such subsidies to the crown from the endowments of their churches as they should agree to in their own assemblies. It may be inferred, however, from the language of the various writs issued by the crown for the collection of the ” aids ” voted by the Co mmune Concilium of the realm in the reign of Henry III., that the clergy were unable to maintain the exemption of church property from being taxed to those ” aids ” during that king’s reig’n; and it was not until some years had elapsed of the reign of Edward I. that the spirituality

succeeded in vindicating their constitutional privilege of voting in their own assemblies their free gifts or ” benevolences,” and in insisting on the crown observing the lawful form of convoking those assemblies through the metropolitan of each province.

The form of the royal writ, which it is customary to issue in the present day to the metropolitan of each province, is identical in its purport with the writ issued by the crown in 1283 to the metropolitan of the province of Canterbury, after the clergy of that province had refused to meet at Northampton in the previous year, because they had not been summoned in lawful manner; whilst the mandates issued by the metropolitans in pursuance of the royal writs, and the citations issued by the bishops in pursuance of the mandates of their respective metro- politans, are identical in their purport and form with those used in summoning the convocation of 1283, which met at the New Temple in the city of London, and voted a ” benevolence ” to the crown, as having been convoked in lawful manner. The existing constitution of the convocation of the province of Canterbury — and the same observation will apply to that of the province of York — in respect of its comprising representatives of the chapters and of the beneficed clergy, in addition to the bishops and other dignitaries of the church, would thus appear to be of even more ancient date than the existing constitution of the parliament of the realm.

From this period down to the eleventh year of the reign of Edward III. there were continual contests between the spiritu- ality of the realm and the crown, — the spirituality contest contending for their constitutional right to vote their between subsidies in their provincial convocations; the crown, spMtu- on the other hand, insisting on the immediate attend- am wnd ance of the clergy in parliament. The resistance of the clergy to the innovation of the ” praemunientes ” clause had so far prevailed in the reign of Edward II. that the crown consented to summon the clergy to parliament through their metropolitans, and a special form of provincial writ was for that purpose framed; but the clergy protested against this writ, and the struggle was maintained between the spirituality and the crown until 1337 (n Edward III.), when the crown reverted to the ancient practice of commanding the metropolitans to call together their clergy in their provincial assemblies, where their subsidies were voted in the manner as accustomed before the ” praemunientes ” clause was introduced. The ” praemunientes ” clause, however, was continued in the parliamentary writs issued to the several bishops of both provinces, whilst the bishops were permitted to neglect at their pleasure the execution of the writs.

The history of the convocation of the province of Canterbury, as at present constituted, is full of stirring incidents, and it resolves itself readily into five periods. The first period, by which is meant the first period which dates ad eris«iT from an epoch of authentic history, is the period of its periods. greatest freedom, but not of its greatest activity. It extends from the reign of Edwardl. (1283) to that of Henry VIII. The second period is the period of its greatest activity and of its greatest usefulness, and it extends from the twenty-fifth year of the reign of Henry VIII. to the reign of Charles II. The third period extends from the fifteenth year of the reign of Charles II. (1664) to the reign of George I. This was a period of turbulent activity and little usefulness, and the anarchy of the lower house of convocation during this period created a strong prejudice against the revival of convocation in the mind of the laity. The

fourth period extends from the third year of the reign of George I. (1716) to the fifteenth year of the reign of Queen Victoria. This was a period of torpid inactivity, during which it was customary for convocation to be summoned and to meet pro forma, and to be continued and prorogued indefinitely. The fifth period may be considered to have commenced in the fifteenth year of the reign of Queen Victoria (1852).

During the first of the five periods above mentioned, it would appear from the records preserved at Lambeth and at York that the metropolitans frequently convened congregations period (s0 ca ll e d) °f their clergy without the authority of a royal writ, which were constituted precisely as the convocations were constituted, when the metropolitans were commanded to call their clergy together pursuant to a writ from the crown. As soon, however, as King Henry VIII. had obtained from the clergy their acknowledgment of the supremacy of the crown in all ecclesiastical causes, he constrained the spirituality to declare, by what has been termed the Act of Submission on behalf of the clergy, that the convocation ” is, always has been, and ought to be summoned by authority of a royal writ “; and this declaration was embodied in a statute of the realm (25 Henry VIII. c. 19), which further enacted that the convocation ” should thenceforth make no provincial canons, constitutions or ordin- ances without the royal assent and licence.” The spirituality was thus more closely incorporated than heretofore in the body politic of the realm, seeing that no deliberations on its part can take place unless the crown has

previously granted its licence for such deliberations. It had been already provided during this period by 8 Henry VI. c. 1, that the prelates and other clergy, with their servants and attendants, when called to the convoca- tion pursuant to the king's writ, should enjoy the same liberty and defence in coming, tarrying and returning as the magnates and the commons of the realm enjoy when summoned to the king's parliament.

The second period, which dates from 1533 to 1664, has been distinguished by four important assemblies of the spirituality of the realm in pursuance of a royal writ — the two first of which occurred in the reign of Edward VI., the third in the reign of Queen Elizabeth, and the fourth in the reign of Charles II. The two earliest of these convocations were summoned to complete the work of the reformation of the Church of England, which had been begun by Henry VIII.; the third was called together to reconstruct that work, which had been marred on the accession of Mary (the consort of Philip II. of Spain), whilst the fourth was summoned to re-establish the Church of England, the framework of which had been demolished during the great rebellion. On all of these occasions the convocations worked hand in hand with the parliament of the realm under a licence and with the assent of the crown. Meanwhile the convocation of 1603 had framed a body of canons for the governance of the clergy. Another convocation requires a passing notice, in which certain canons were drawn up in 1640, but by reason of an irregularity in the proceedings of this convocation (chiefly, on the ground that its sessions were continued for some time after the parliament of the realm had been dissolved), its canons are not held to have any binding obligation on the clergy. The convocations had up to this time maintained their liberty of voting the subsidies of the clergy in the form of " benevolences " separate and apart from the " aids " granted by the laity in parliament, and one of the objections taken to the proceedings of the convocation of 1640 was that it had continued to sit and to vote its subsidies to the crown after the parliament itself had been dissolved. It is not, therefore, surprising on the restoration of the monarchy in 1 66 1 that the spirituality was not anxious to retain the liberty of taxing itself apart from the laity, seeing that its ancient liberty was likely to prove of questionable advantage to it. It voted, however, a benevolence to the crown on the occasion of its first assembling in 1661 after the restoration of King Charles II., and it continued so to do until 1664, when an arrangement was made between Archbishop Sheldon and Lord Chancellor Hyde, under which the spirituality silently waived its long-asserted

right of voting its own subsidies to the crown, and submitted itself thenceforth to be assessed to the ” aids ” directly granted to the crown by parliament. An act was accordingly passed by the parliament in the following year 1665, entitled aoniaa An act to grant a Royal Aid unto the King’s Majesty, compact to which aid the clergy were assessed by the com- missioners named in the statute without any objection being raised on their part or behalf, 1 there being a proviso that in so contributing the clergy should be relieved of the liability to pay two subsidies out of four, which had been voted by them in the convocation of a previous year. In consequence of this practical renunciation of their separate status, as regards their liability to taxation, the clergy have assumed and enjoyed in common with the laity the right of voting at the election of members of the House of Commons, in virtue of their ecclesiastical freeholds.

The most important and the last work of the convocation during this second period of its activity was the revision of the Book of Common Prayer which was completed in the latter part of 1 66 1.

The Revolution in 1688 is the most important epoch in the third period of the history of the synodical proceedings of the spirituality, when the convocation of Canterbury, having met in 1689 in pursuance of a royal writ, period. obtained a licence under the great seal, to prepare certain alterations in the liturgy and in the canons, and to deliberate on the reformation of the ecclesiastical courts. A feeling, however, of panic seems*to have come over the Lower House, which took up a position of violent antagonism to the Upper House. This circumstance led to the prorogation of the convocation and to its subsequent discharge without any practical fruit resulting from the king’s licence. Ten years elapsed during which the convocation was prorogued from time to time without any meeting of its members for business being allowed. The next convocation which was permitted to meet for business, in 1700, was marked by great turbulence and in- subordination on the part of the members of the Lower House, who refused to recognize the authority of the archbishop to prorogue their sessions. This controversy was kept up until the discharge of the convocation took place concurrently with the dissolution of the parliament in the autumn of that year. The proceedings of the Lower House in this convocation were disfigured by excesses which were clearly violations of the constitutional order of the convocation. The Lower House refused to take notice of the archbishop’s schedule of prorogation, and adjourned itself by its own authority, and upon the demise of the crown it disputed the fact of its sessions having expired,

and as parliament was to continue for a short time, prayed that its sessions might be continued as a part of the parliament under the ” praemunientes ” clause. The next convocation was summoned in the first year of Queen Anne, when the Lower House, under the leadership of Dean Aldrich, its prolocutor, challenged the right of the archbishop to prorogue it, a . lm * and presented a petition to the queen, praying her Lower majesty to call the question into her own presence. House to The question was thereupon examined by the queen’s slt / f < ' e ". council, when the right of the president to prorogue pe " enuy ' both houses of convocation by a schedule of prorogation was held to be proved, and further, that it could not be altered except by an act of parliament. During the remaining years of the reign of Queen Anne the two Houses of convocation were engaged either in internecine strife, or in censuring sermons or books, as teaching latitudinarian or heretical doctrines; and, when it had been assembled concurrently with parliament on the accession of King George I., a great breach was before long created between the two houses by the Bangorian controversy. Dr Hoadly, bishop of Bangor, having preached a sermon before the king, in the Royal Chapel at St James's Palace in 171 7, against the principles and practice of the nonjurors, which had been printed

1 It had always been the practice, when the clergy voted their subsidies in their convocation, for parliament to authorize the collection of each subsidy by the same commissioners who collected the parliamentary aid.

by the king’s command, the Lower House, which was offended by the sermon and had also been offended by a treatise on the same subject published by Dr Hoadly in the previous Baagoriaa vearj i os t n0 time in representing the sermon to the troversy. Upper House, and in calling for its condemnation. A controversy thereupon arose between the two houses which was kept up with untiring energy by the Lower House, until the convocation was prorogued in 1717 in pursuance of a royal writ; from which time until 1861 no licence from the crown was granted to convocation to proceed to business. During this period, which may be regarded as the fourth distinguishing period in the history of the convocations of the Church of England, it was usual for a few members of the convocation to period. meet when first

summoned with every new parliament, in pursuance of the royal writ, for the Lower House to elect a prolocutor, and for both houses to vote an address to the crown, after which the convocation was prorogued from time to time, pursuant to royal writs, and ultimately discharged when the parliament was dissolved. There were, however, several occasions between 171 7 and 1741 when the convocation of the province of Canterbury transacted certain matters, by way of consultation, which did not require any licence from the crown, and there was a short period in its session of 1741 when there was a probability of its being allowed to resume its de- liberative functions, as the Lower House had consented to obey the president's schedule of prorogation; but the Lower House having declined to receive a communication from the Upper House, the convocation was forthwith prorogued, from which time until the middle of the 19th century the convocation was not permitted by the crown to enjoy any opportunity even for consultation. The spirituality at last aroused itself from its long repose in 1852, and on this occasion the Upper House took the lead. The active spirit of the movement was Samuel Wilber- force, bishop of Oxford, but the master mind was Henry Phillpotts, bishop of Exeter. On the convoca- tion assembling several petitions were presented to both houses, praying them to take steps to procure from the crown the necessary licence for their meeting for the despatch of business, and an address to the Upper House was brought up from the Lower House, calling the attention of the Upper House to the reasonableness of the prayer of the various petitions. After some discussion the Upper House, influenced mainly by the argument of Henry, bishop of Exeter, consented to receive the address of the Lower House, and the convocation was there- upon prorogued, shortly after which it was discharged concur- rently with the dissolution of parliament. On the assembling of the next convocation of the province of Canterbury, no royal writ of exoneration having been sent by the crown to the metro- politan, the sessions of the convocation were continued for several days; and from this time forth convocation may be considered to have resumed its action as a consultative body, whilst it has also been permitted on more than one occasion to exercise its functions as a deliberative body. In 1865, under licence from the crown, the Convocations of Canterbury and York framed new canons in place of the 36th, 37th, 38th and 40th canons of 1603, and amended the 62nd and 102nd canons in 1888. In 1872 convocation was empowered by letters of business from the crown to frame resolutions on the subject of public worship, which resolutions were afterwards incorporated in the Act of Uniformity Amendment Act 1872.

As a deliberative body, convocation has done much useful work, but it suffers considerably from its unrepresentative nature. The non-beneficed clergy still remain without the franchise, but the establishment of Houses of Laymen (see Laymen, Houses of) for both provinces has, to a certain extent, secured the co-operation of the lay element. Several attempts have been made to promote legislation to enable the convocations to reform their constitutions and to enable them to unite for special purposes; in 1905 a bill was introduced into the House of Lords. It did not, however, get beyond a first reading. In 1896 a departure was made in holding joint sessions of both convocations, in conjunction with the two Houses of Laymen, for con-

sultative purposes. This body is now termed the Representative Church Council, and it adopted a Constitution in November 1905. All formal business is transacted in the separate convocations. It is usual for convocation to meet three times a year.

The order of convening the convocation of the province of Canterbury is as follows. A writ issues from the crown, addressed to the metropolitan archbishop of Canterbury, commanding him " by reason of certain difficult and urgent affairs concerning us, the security and defence of our Church of England, and the peace and tranquillity, public good and defence of our kingdom, and our subjects of the same, to call together with all convenient speed, and in lawful manner, the several bishops of the province of Canterbury, and deans of the cathedral churches, and also the archdeacons, chapters and colleges, and the whole clergy of every diocese of the said province, to appear before the said metropolitan in the cathedral church of St Paul, London, on a certain day, or elsewhere, as shall seem most expedient, to treat of, agree to and conclude upon the premises and other things, which to them shall then at the same place be more clearly explained on our behalf." In case the metropolitical see of Canterbury should be vacant, the writ of the crown is ad- dressed to the dean and chapter of the metropolitical church of Canterbury in similar terms, as being the guardians of the spiritu- alities of the see during a vacancy. Thereupon the metropolitan, or, as the case may be, the dean and chapter of the metropolitical church, issue a mandate to the bishop of London, as dean of the province, and if the bishopric of London should be vacant, then to the bishop of Winchester as subdean, which embodies the royal writ, and directs the bishop to cause all the bishops of the province to be cited, and through them the deans of the cathedral and collegiate churches, and the archdeacons and other dignitaries of churches, and each chapter by one, and the clergy of each diocese by two sufficient proctors, to appear before the metropolitan or his commissary, or, as the case may be, before the dean and chapter of

the metropolitical church or their commissary, in the chapter-house of the cathedral church of St Paul, London, if that place be named in the mandate, or elsewhere, with continuation and prorogation of days next following, if that should be necessary, to treat upon arduous and weighty affairs, which shall concern the state and welfare, public good and defence of this kingdom and the subjects thereof, to be then and there seriously laid before them, and to give their good counsel and assistance on the said affairs, and to consent to such things as shall happen to be wholesomely ordered and appointed by their common advisement, for the honour of God and the good of the church.

The provincial dean, or the subdean, as the case may be, there- upon issues a citation to the several bishops of the province, which embodies the mandate of the metropolitan or of the dean and chapter of the metropolitical church, as the case may be, and admonishes them to appear, and to cite and admonish their clergy, as specified in the metropolitical mandate, to appear at the time and place mentioned in the mandate. The bishops thereupon either summon directly the clergy of their respective dioceses to appear before them or their commissaries to elect two proctors, or they send a citation to their archdeacons, according to the custom of the diocese, direct- ing them to summon the clergy of their respective archdeaconries to elect a proctor. The practice of each diocese in this matter is the law of the convocation, and the practice varies indefinitely as regards the election of proctors to represent the beneficed clergy. As regards the deans, the bishops send special writs to them to appear in person, and to cause their chapters to appear severally by one proctor. Writs also go to every archdeacon, and on the day named in the royal writ, which is always the day next following that named in the writ to summon the parliament, the convocation assembles in the place named in the archbishop's mandate. There- upon, after the Litany has been sung or said, and a Latin sermon preached by a preacher appointed by the metropolitan, the clergy are praeconized or summoned by name to appear before the metro- politan or his commissary; after which the clergy of the Lower House are directed to withdraw and elect a prolocutor to be presented to the metropolitan for his approbation. The convocation thus constituted resolves itself at its next meeting into two houses, and it is in a fit state to proceed to business.

The constitution of the convocation of the province of York differs slightly from that of the convocation of the province of Canterbury, as each archdeaconry is represented by two proctors, precisely as in parliament formerly under the Praemunientes clause.

There are some anomalies in the diocesan returns of the two convocations, but in all such matters the consuetudo of the diocese is the governing rule.

Bibliography. — Wilkins, Concilia Magnae Britannia etHiberniae (4 vols, folio, 1737); Gibson, Codex Juris Ecclesiastici Anglicani (2 vols, folio, 1713) ; Johnson, A Collection of all the Ecclesiastical Laws, Canons and Constitutions of the English Church (2 vols. 8vo, 1720); Gibson, Synodus Anglicana (8vo, 1702, re-edited by Dr Edward Cardwell, 8vo, 1854); Shower, A Letter to a Convocation Man concerning the Rights, Powers and Privileges of that Body (4to, 1697); Wake, The Authority of Christian Princes over their Ecclesi- astical Synods asserted, occasioned by a late Pamphlet intituled A Letter

to a Convocation Man (8vo, 1697); Atterbury, The Rights, Powers and Privileges of an English Convocation stated and vindicated in answer to a late book of Dr Wake's (8vo, 1700); Burnet, Reflections on a Book intituled The Rights, Powers and Privileges of an English Convocation stated and vindicated (4to, 1700); Kennet, Ecclesiastical Synods and Parliamentary Convocations of the Church of England historically stated and justly vindicated from the Misrepresentation of Mr Atterbury (8vo, 1701); Atterbury, The Power of the Lower House of Convocation to adjourn itself (4to, 1701) ; Gibson, The Right of the Archbishop to continue or prorogue the whole Convocation (4*0, 1701); Kennet, The Case of the Praemunientes (4to, 1701); Hooper, The Narrative of the Lower House vindicated from the Exceptions of a Letter, intituled The Right of the Archbishop to continue or prorogue the Convocation (4to, 1702); Atterbury, The Case of the Schedule stated (4 to > 1702); Gibson, The Schedule- Reviewed, or the Right of the Archbishop to continue or prorogue the whole Convocation, cleared from the Exception of a late Vindication of the Narrative of the Lower House, and of a Book intituled The Case of the Schedule stated (4to, 1702); Hody, A History of the English Councils and Convocation, and of the Clergy's sitting in Parliament (8vo, 1702); Wake, The State of the Church and Clergy of England in their Councils, Synods, Convocations, Conventions, and other Public Assemblies, occasioned by a book intituled The Rights, Powers and Privileges of an English Convocation (fol., 1703); Burnet, History of His Own Time (2 vols, folio, 1734), re-edited by Dr Martin J. Routh (6 vols. 8vo, 1833); Hallam, Constitutional History of England (3 vols. 8vo, 1832) ; Card- well, Documentary Annals of the Reformed Church

of England (2 vols., 1839); Card well, A History of Conferences and other Proceedings connected with the revision of the Common Prayer (8vo, 1841); Card- well, Synodalia, a Collection of Articles of Religion, Canon and Pro- ceedings of Convocation in the Province of Canterbury (2 vols. 8vo, 1842) ; Lathbury, A History of the Convocation of the Church of Eng- land (2nd ed., 8vo, 1853); Trevor, The Convocation of the two Pro- vinces (8vo, 1852); Pearce, The Law relating to Convocations of the Clergy (8vo, 1848) ; Synodalia, a Journal of Convocation, commenced in 1852 (8vo); The Chronicle of Convocation, being a record of the proceedings of the Convocation of Canterbury, commenced in 1863 (8vo). (T. T.; T. A. I.)

CONVOLVULACEAE, a botanical natural order belonging to the series Tubiflorae of the sympetalous group of Dicotyledons. It contains about 40 genera with more than 1000 species, and is found in all parts of the world except the coldest, but is especially well developed in tropical Asia and tropical America. The most characteristic members of the order are twining plants with generally smooth heart-shaped leaves and large showy white or purple flowers, as, for instance, the greater bindweed of English hedges, Calystegia septum, and many species of the genus Ipomaea, the largest of the order, including the ” convolvulus major ” of gardens, and morning glory. The creeping or trailing type is a common one, as in the English bindweed {Convolvulus arvensis), which has also a tendency to climb, and Calystegia Soldanella, the sea-bindweed, the long creeping stem of which forms a sand- binder on English seashores; a widespread and efficient tropical sand-binder is Ipomaea Pes-Caprae. One of the commonest tropical weeds, Evolvulus alsinoides, has slender, long-trailing stems with small leaves and flowers. In hot dry districts such as Arabia and north-east tropical Africa, genera have been developed with a low, much-branched, dense, shrubby habit, with small hairy leaves and very small flowers. An exceptional type in the order is represented by Humbertia, a native of Madagascar, which forms a large tree. The dodder (q.v.) is a genus (Cuscuta) of leafless parasites with slender thread-like twining stems. The flowers stand singly in the leaf-axils or form few or many flowered cymose inflorescences; the flowers are sometimes crowded into small heads. The bracts are usually scale-like, but sometimes foliaceous, as for instance in Calystegia, where they are large and envelop the calyx.

The parts of the flower are in fives in calyx, corolla and stamens, followed by two carpels which unite to form a superior ovary. The sepals, which are generally free, show much variation in size, shape and covering, and afford valuable characters for the distinc- tion of genera or sub-genera. The corolla is generally funnel- shaped, more

rarely bell-shaped or tubular; the outer face is often marked out in longitudinal areas, five well-defined areas tapering from base to apex, and marked with longitudinal striae corresponding to the middle of the petals, and alternating with five non-striated weaker triangular areas; in the bud the latter are folded inwards, the stronger areas being exposed and showing a twist to the right. The slender filaments of the stamens vary

widely, often in the same flower; the anthers are linear to ovate in shape, attached at the back to the filament, and open lengthwise. Some importance attaches to the form of the pollen grains; the two principal forms are ellipsoidal with longitudinal bands forming the Convolvulus-type, and a spherical form with a spiny surface known as the Ipomaea-typt. The ovary is generally two-chambered, with two inverted ovules standing side by side at the inner angle of each chamber. The style is simple or branched, and the stigma is linear, capitate or globose in form; these variations afford means for distinguishing the different genera. The fruit is usually a capsule opening by valves; the seeds, where four are developed, are each shaped like the quadrant of a sphere; the seed-coat is smooth, or sometimes warty or hairy; the embryo is large with generally broad, folded, notched or bilobed cotyledons surrounded by a horny endosperm. Cuscuta has a thread-like, spirally twisted embryo with no trace of cotyledons.

The large showy flowers are visited by insects for the honey which is secreted by a ring-like disk below the ovary; large-

Convolvulus sepium, slightly reduced.

1. Flower cut vertically. 4. Embryo taken out of seed.

2. Fruit, slightly reduced. 5. Horizontal plan of arrange-

3. Seed cut lengthwise showing ment of flower.

embryo.

flowered species of Ipomaea with narrow tubes are adapted for the visits of honey-seeking birds.

The largest genus, Ipomaea, has about 400 species distributed throughout the warmer parts of the earth. Convolvulus has about 150 to 200 species, mainly in temperate climates; the genus is principally developed in the Mediterranean area and western Asia. Cuscuta contains nearly 100 species in the warmer and temperate regions; two

are native in Britain.

The tubers of Ipomaea Batatas are rich in starch and sugar, and, as the ” sweet potato,” form one of the most widely distributed foods in the warmer parts of the earth. Several members of the order are used medicinally for the strong purging properties of the milky juice (latex) which they contain; scammony is the dried latex from the underground stem of Convolvulus Scammonia, a native of the Levant, while jalap is the product of the tubercles of Exogonium Purga, a native of Mexico. Species of Ipomaea (morning glory), Convolvulus and Calystegia are cultivated as ornamental plants. Convolvulus arvensis (bindweed) is a pest in fields and gardens on account of its wide-spreading underground stem, and many of the dodders (Cuscuta) cause damage to crops.

CONVOY (through the Fr. from late Lat. conviare, to go along with, from Lat. cum, with, and via, way; ” convey ” has the same ultimate origin [see Conveyance], neither word being

connected, as has sometimes been supposed, with Lat. con- vehere, to carry together), a verb and noun now almost exclusively- used in military and naval parlance. As a verb it signifies in the first instance to accompany or to escort; and in the 17th century we even hear of cavalry ” convoying ” infantry, but its meaning was soon complicated by the growing use of the word ” convey ” in the sense of ” to carry,” and as the usual task of an escort was that of accompanying and protecting vehicles containing supplies, the noun ” convoy ” (Fr. convoi) was introduced and has thence- forward in land warfare meant a train of vehicles containing stores for the use of troops and its guard or escort. Sometimes even the word is found in the meaning of the train of vehicles without implying that there is an escort, so far has the original meaning become obscured; but the idea of military protection is always present, whether this protection is given by a separate escort or provided by the weapons of the drivers themselves.

In naval warfare the term is used to describe a method adopted for defending merchant ships against capture. It was usually applied to the vessels to be protected — as for example ” the Baltic convoy,” or ” Captain Montray’s convoy.” Until the 17th century the English term was ” to waft ” and the warship employed to guard the traders on their way was called ” a wafter.” The practice of sailing in convoy for

mutual protection was common in the middle ages, when all ships were more or less armed and the war vessel was not entirely differentiated from the trader. Thus the ships of the great German confederation of cities known as the Hanseatic League were required to sail in convoy. So were the six trading squadrons which sailed yearly from Venice. The masters of all the vessels were required to obey the authority of an officer who had the general command. In the 16th century the Spanish trade with America was compelled by law to sail in convoys (Jlotas) , in order to avoid the danger of capture by pirates to which single ships were exposed. In the 17th and 18th centuries the use of convoy was universal. Dutch, French or British ships were collected at a rendezvous, and were accompanied by warships till they reached the point at which they were compelled to separate in order to go to their various destinations. The main danger was near the enemy's ports. An example of the way the duty was discharged may be found in the Newfoundland convoy. They sailed from England under the direction of a naval officer and the protection of his ships, commonly a forty- or fifty-gun ship with a smaller vessel in attendance. The convoy sailed to the banks of Newfoundland. When they had filled up with stock fish, they were escorted across the Atlantic by the same officer. He accompanied those of them bound to the Mediterranean to the port of Leghorn, and, when they had unloaded and reloaded, saw them home. All cases were not so simple. The ships engaged in the East and West India trade, for instance, sailed together. In the Channel they were protected by the main strength of the fleet. When beyond the Stilly Islands they were left to the care of a smaller force, and continued together till in the neighbour- hood of Madeira, when they separated. Convoys were subject to attack in two forms, by strong squadrons which overpowered the guard, and by privateers, corsairs and isolated cruisers. Thb latter peril was much increased in the case of British commerce by the reluctance of the merchant captains to obey the naval officers. They were very much inclined to separate from the convoy as they approached their destination in the hope of forestalling rivals. As a natural consequence they were frequently captured by hostile privateers. French naval officers had authority and large powers of punishment over merchant skippers. The British naval officers had not. In 1803-34, on the renewal of the war with France, the British government saw the necessity for regulating convoy more strictly than had hitherto been the case. It therefore passed " an act for the better protection of the trade of the United Kingdom during the present hostilities with France." By this act (the 43rd Geo. III. Cap. 57) all vessels not exempted by special licence were required to sail in convoy and to conform to strict regulations, under penalties of £1000

(or, when the goods included government stores, of £1500) and the loss of all claim to insurance in case of capture. (D. H.)

The object of convoying is to attach an official public character to the convoyed ships, i.e. a sort of assimilation of them to the escorting ship or ships of war. Thus European states and jurists hold that the declaration of the commander of the convoy, that there is no contraband of war on board the convoyed ships, pledges the national good faith, and must be assumed to be correct in the same way as it is assumed that the convoy itself is carrying no contraband of war. Great Britain has never taken this view. Down to 1907 she had maintained that it is materially impossible for any neutral state to exercise the necessary super- vision to secure absolute accuracy of the ship's papers. Number 29, however, of the instructions given by the government to the British plenipotentiaries at the Hague Conference of 1907 stated that " H.M. government would … be glad to see the right of search limited in every practicable way, e.g. by the adop- tion of a system of consular certificates declaring the absence of contraband from the cargo. . . ." As the greater includes the smaller, we may assume that, if a consular certificate might suffice to exempt from the exercise of search, the state guarantee of a convoy would certainly suffice. The London Convention on the Laws and Customs of Naval War has laid down the rules as to convoys in the following terms:

Neutral vessels under national convoy are exempt from search. The commander of a convoy gives, in writing, at the request of the commander of a belligerent warship, all information as to the character of the vessels and their cargoes, which could be obtained by search. — Art. 61.

If the commander of the belligerent warship has reason to suspect that the confidence of the commander of the convoy has been abused, he communicates his suspicions to him. In such a case it is for the commander of the convoy alone to investigate the matter. He must record the result of such investigation in a report, of which a copy is handed to the officer of the warship. If, in the opinion of the com- mander of the convoy, the facts shown in the report justify the cap- ture of one or more vessels, the protection of the convoy must be withdrawn from such vessels. — Art. 62. (T. Ba.)

CONVULSIONS, the pathological condition of body associated with abnormal, violent and spasmodic contractions and relaxa- tions of the muscles, taking the form of a fit. Convulsions may be a symptom resulting from various diseases, but the term is commonly restricted to

the infantile variety, occurring in association with teething, or other causes which upset the child's nervous system. The treatment (plunging into a hot bath, or administration of chloroform) must be prompt, as convulsions are responsible for a large part of infant mortality.

The name " Convulsionaries " (Fr. Convulsionnaires) was given to certain Jansenist fanatics in France in the 18th century, owing to the convulsions, regarded by them as proofs of divine inspiration, which were the result of their religious ecstasies (see Jansenism). The term " Convulsionists " is sometimes applied to them, as also, more loosely, to other religious enthusiasts who exhibit the same symptoms.

CONWAY, HENRY SEYMOUR (1721-1795), English field marshal and statesman, was the second son of Francis Seymour, of Ragley, Warwickshire, who took the name of Conway on succeeding to the estates of the earl of Conway in 1699 and was created Baron Conway in 1703 (see Seymour or St Maur). Henry Seymour Conway's elder brother, Francis, 2nd Baron Conway, was created marquess of Hertford in 1793; his mother was a sister of Sir Robert Walpole's wife, and he was therefore first cousin to Horace Walpole, with whom he was on terms of in- timate friendship throughout his life. Having entered the army at an early age, Conway was elected to the Irish parliament in 1 741 as member for Antrim, which he continued to represent for twenty years; in the same year he became a member of the English House of Commons, sitting for Higham Ferrers in Northamptonshire, and he remained in parliament, representing successively a number of different constituencies, almost without interruption for more than forty years. Meantime he saw much service in the army abroad, where he served with conspicuous bravery and not without distinction. In 1745 he became aide-de-camp to the duke of Cumberland in Germany, and was present at Fontenoy; in the following year he had command of a regiment at Culloden. In 1755 he went to Ireland as secretary

to the lord-lieutenant, a position which he held for one year only; and on his return to England he received a court appointment, having already been promoted major-general. In 1757 he was associated with Sir John Mordaunt in command of an abortive expedition against Rochfort, the complete failure of which brought Conway into discredit and involved him in a pamphlet controversy. In 1759 he became

lieutenant-general, and served under Prince Ferdinand of Brunswick in the campaigns of 1761- 1763. Returning to England he took part in the debates in parliament on the Wilkes case, in which he opposed the views of the court, speaking strongly against the legality of general warrants. His conduct in this matter highly incensed the king, who insisted on Conway being deprived of his military command as well as of his appointment in the royal household. His dismissal along with other officers was the occasion of another paper controversy in which Conway was defended by Horace Walpole, and gave rise to much constitutional dispute as to the right of the king to remove military officers for their conduct in parliament — a right that was tacitly abandoned by the Crown when the Rockingham ministry of 1765 reinstated the officers who had been removed.

In this ministry Conway took office as secretary of state, with the leadership of the House of Commons. In the dispute with the American colonies his sympathies were with the latter, and in 1766 he carried the repeal of the Stamp Act. When in July of that year Rockingham gave place to Chatham, Conway retained his office; and when Chatham became incapacitated by illness he tamely acquiesced in Townshend's reversal of the American policy which he himself had so actively furthered in the previous administration. In January 1768, offended by the growing influence of the Bedford faction which joined the govern- ment, Conway resigned the seals of office, though he was per- suaded by the king to remain a member of the cabinet and " Minister of the House of Commons." When, however, Lord North became premier in 1770, Conway resigned from the cabinet and was appointed to the command of the royal regiment of horse guards; and in 1772 he became governor of Jersey, the island being twice invaded by the French during his tenure of command. In 1780 and 1781 he took an active part in opposi- tion to Lord North's American policy, and it was largely as the result of his motion on the 22 nd of February in the latter year, demanding the cessation of the war against the colonies, when the ministerial majority was reduced to one, that Lord North resigned office. In the Rockingham government that followed General Conway became commander-in-chief with a seat in the cabinet; and he retained office under Shelburne when Rocking- ham died a few months later. On Pitt's elevation to the premier- ship, Conway supported Fox in opposition; but after the dissolution of parliament in 1784 he retired from political life. He was made field marshal in 1 793,and died at Henley-on-Thames on the 9th of July 1795. Conway married in 1747 Caroline, daughter of General Campbell (afterwards duke of Argyll), and widow of the earl of Aylesbury. He had one daughter, Anne, who married John Darner, son

of Lord Milton, and who inherited a life interest in Strawberry Hill under the will of Horace Walpole.

Conway was personally one of the most popular men of his day. He was handsome, conciliatory and agreeable, and a man of refined taste and untarnished honour. As a soldier he was a dashing officer, but a poor general. He was weak, vacillat- ing and ineffective as a politician, lacking in judgment and decision, and without any great parliamentary talent. In his later years he dabbled in literature and the drama, and interested himself in arboriculture in his retirement at Henley-on-Thames.

See Horace Walpole, Letters, edited by P. Cunningham (9 vols., London, 1857), many of the letters being addressed to Conway; Memoirs of the Last Ten Years of the Reign of George II. (2 vols., London, 1822); Memoirs of the Reign of George III., edited by Sir D. le Marchant (4 vols., London, 1845); Journal of the Reign of George III., 1771-1783 (2 vols., London, 1859). See also the duke of Buckingham and Chandos, Memoirs of the Court and Cabinets of George III. (4 vols., London, 1853). Much information about Conway will also be found in the biographies of his leading con- temporaries, Rockingham, Shelburne, Chatham, Pitt and Fox.

(R.J.M.)

CONWAY, HUGH, the nom-de-plume of Frederick John Fargus (1847-1885), English novelist, who was born at Bristol on the 26th of December 1847, the son of an auctioneer. He was intended for his father's business, but at the age of thirteen joined the training-ship "Conway" in the Mersey. In deference to his father's wishes, however, he gave up the idea of becoming a sailor, and returned to Bristol, where he was articled to a firm of accountants till on his father's death in 1868 he took over the family business.' While a clerk he had written the words for various songs, adopting the nom-de-plume Hugh Conway in memory of his days on the training-ship. Mr Arrowsmith, the Bristol printer and publisher, took an interest in his work, and Fargus's first short story appeared in Arrow- smith's Miscellany. In 1883 Fargus published through Arrow- smith his first long story, Called Back, of which over 350,000 copies were sold within four years. A dramatic version of this book was produced in London in 1884, and in this year Fargus published another story, Dark Days. Ordered to the Riviera for his health, he caught typhoid fever, and died at Monte Carlo on the 15th of May r88s. Several other books from his pen appeared posthumously, notably A Family Affair.

CONWAY, MONCURE DANIEL (1832-1907), American clergyman and author, was born of an old Virginia family in Stafford county, Virginia, on the 17 th of March 1832. He graduated at Dickinson College in 1849, studied law for a year, and then became a Methodist minister in his native state. In 1852, owing largely to the influence of Ralph Waldo Emerson, his religious and political views underwent a radical change, and he entered the Harvard Divinity School, where he graduated in 1854. Here he fell under the influence of "transcendentalism," and became an outspoken abolitionist. On his return to Virginia this fact and his rumoured connexion with the attempt to rescue the fugitive slave, Anthony Burns, in Boston aroused the bitter hostility of his old neighbours and friends, and in consequence he left the state. In 1854-1856 he was pastor of a Unitarian church at Washington, D.C., but his anti-slavery views brought about his dismissal. From 1856 to 1861 he was a Unitarian minister in Cincinnati, Ohio, where, also, he edited a short-lived liberal periodical called The Dial. Subsequently he was an editor of the Commonwealth in Boston, Mass., and wrote The Rejected Stone (1861) and The Golden Hour (1862), both powerful pleas for emancipation. In 1862-1863, during the Civil War, he lectured in England in behalf of the North. From 1863 to 1884 he was the minister of the South Place chapel, Finsbury, London; and during this time wrote frequently for the London press. In 1884 he returned to the United States to devote himself to literary work. In addition to those above mentioned, his publications include Tracts for To-day (1858), The Natural History of the Devil (1859), Testimonies Concerning Slavery (1864), The Earthward Pilgrimage (1870), Republican Superstitions (1872), Idols and Ideals (1871), Demonology and Devil Lore (2 vols., 1878), A Necklace of Stories (1879), Thomas Carlyle (1881), The Wandering Jew (1881), Emerson at Home and Abroad (1882), Pine and Palm (2 vols., 1887), Life and Papers of Edmund Randolph (1888), The Life of Thomas Paine with an unpublished sketch of Paine by William Cobbett (2 vols., 1892), Solomon and Solomonic Literature (1899), his Autobiography (2 vols., 1900), and My Pilgrimage to the Wise Men of the East (r9o6). Conway died on the 15th of November 1907.

CONWAY, SIR WILLIAM MARTIN (1856-), English art critic and mountaineer, son of the Rev. William Conway, after- wards canon of Westminster, was born at Rochester, and was educated at Repton and at Trinity College, Cambridge. He became interested in early printing and engraving, and in r88o made a tour of the principal libraries of Europe in pursuit of his studies, the result appearing in 1884 as a History of the Wood- cutters of the Netherlands in the Fifteenth

Century. His later works on art included Early Flemish Artists (1887); The Literary Remains of Albrecht Diirer (1889); The Dawn of Art in the Ancient World (1891), dealing with Chaldaean, Assyrian and Egyptian art; Early Tuscan Artists (1902). From 1884 to 1887 he was professor of art at University College, Liverpool; and in

i 901-1904 he was Slade professor of the fine arts at Cambridge. He was knighted in 1895. Sir Martin Conway early became a member of the Alpine Club, of which he was president from 1902 to 1904. In 1892 he beat the climbing record by ascending to a height of 23,000 ft. in the Himalayas in the course of an exploring and mountaineering expedition undertaken under the auspices of the Royal Society, the Royal Geographical Society and the British Association. In 1896 1897 he explored the interior of Spitsbergen, and in the next year he explored and surveyed the Bolivian Andes, climbing Sorata (21,500 ft.) and Illimani (21,200 ft.). He also ascended Aconcagua (23,080 ft.) and explored Tierra del Fuego. At the Paris exhibition of 1900 he received the gold medal for mountain surveys, and the founder's medal of the Royal Geographical Society in 1905. His expedi tions are described in his Climbing and Exploration in the Kara- Koram Himalayas {t.?><)\) ,The Alps from End to End (1895), The First Crossing of Spitsbergen (1897), The Bolivian Andes (1901), &c; No Man's Land, a History of Spitsbergen from . . . J$g6 . . . was published in 1906.

CONWAY {Conwy, or Aberconwy) , a municipal borough in the Arfon parliamentary division of Carnarvonshire, N. Wales, 14 m. by the London & North- Western railway from Bangor, and 225 m.N.W. from London. Pop. (1901) 4681. The town is enclosed by a high wall, roughly triangular, about 1 m. round, with twenty-one dilapidated round towers, pierced by three principal gateways with two strong towers. The castle in the south-east angle, built in 1284 by Edward I., was inhabited, in 1389, by Richard II. , who here agreed to abdicate. Held for Charles I. by

Archbishop Williams, it was taken by General Mytton in 1646. Dismantled by the new proprietor, Earl Conway, it remains a ruin. It is oblong, with eight massive towers, and has, within, a hall 130 ft. in length, known as Llewelyn's. The parliamentary borough of Conway,returning, with five other towns,one member, extends over to the right bank of the stream Conwy (Conway). In 1885 the mayor of Conway was made a constable. Llandudno with Great and Little Orme's Heads are at some 4 m. distance. Two bridges, a tubular for the railway (40 ft. shorter than that of the Menai) and a suspension, designed by Stephenson (1846-1848) and Telford (1822-1826) respectively, cross the stream. St Mary's church is Gothic; the Elizabethan Plas Mawr is the locale of the Royal Cambrian Academy of Art. There are still some fragments of the 1185 Cistercian Abbey. There are golf links here and at Llandudno. The Conwy stream, on which a steamboat runs from Deganwy (2 m. below Conway town) to Trefriw, opposite Llanrwst, in summer, has some coasting trade in sulphur and slates. It is about 30 m. long, its valley (a haunt of artists) containing the towns last mentioned and Bettws y coed. Its pearls are mentioned in Drayton's Polyolbion and Spenser's Faerie Queene. Pearl fisheries existed at Conway for many centuries, dating back to the Roman occupation. Tacitus, Agricola, 12, says of Britain " gignit et Oceanus margarita, sed subfusca ac liventia," as are those found to-day.

Diganhwy (Dyganwy, Deganwy) is mentioned in the Mabinogion {Geraint and Enid), if the reading is sound; it is certainly mentioned in the Annates Cambriae (years 812-822) and in the Black Book of Caerfyrddin (Carmarthen), xxiii. 1. Caer-hyn, 45 m. from Conway, is on the highroad from London to Holyhead, and is the Conovium of the Romans. The site of the camp can still be traced, consisting of a square, strengthened by four parallel walls, extending to a distance from the main work. The camp is on a height, with the Conwy in front and a wood on each flank. At the foot of the hill, near the stream, was a Roman bath, with walls, pavement and pillars. Camden's Britannia mentions tiles, with marks of the 10th or Antoninus's legion, as being found here, perhaps mistakenly. Gleini nadroedd (possibly amulets) and vitrum have been found here. In Bwlch y ddwy faen (" two rock ravine "), on the way to Aber, are the remains of a Roman road and antiquities.

CONYBEARE, WILLIAM DANIEL (1787-1857), dean of Llandaff , one of the most distinguished of English geologists, who was born in London on the 7th of June 1787, was a grandson of John Conybeare, bishopof Bristol (1692-1755)ˆ notable preacher

and divine, and son of Dr William Conybeare, rector of Bishops- gate. Educated first at Westminster school, he went in 1805 to Christ Church, Oxford, where in 1808 he took his degree of B.A., with a first in classics and second in mathematics, and proceeded to M.A. three years later. Having entered holy orders he became in 1814 curate of Wardington, near Banbury, and he accepted also a lectureship at Brislington near Bristol. During this period he was one of the founders of the Bristol Philosophi- cal Institution (1822). He was rector of Sully in Glamorganshire from 1823 to 1836, and vicar of Axminster from 1836 to 1844. He was appointed Bampton lecturer in 1839, an d was

instituted to the deanery of Llandaff in 1845. Attracted to the study of geology by the lectures of Dr John Kidd {q.v.) he pursued the subject with ardour. As soon as he had left college he made extended journeys in Britain and on the continent, and he became one of the early members of the Geological Society. Both Buckland and Sedgwick acknowledged their indebtedness to him for instruction received when they first began to devote attention to geology. To the Transactions of the Geological Society as well as to the Annals of Philosophy and Philosophical Magazine he contributed many geological memoirs. In 18 21 he distinguished himself by the description of a skeleton of the Plesiosaurus, discovered by Mary Anning, and his account has been confirmed in all main points by subsequent researches. Among his most important memoirs is that on the south-western coal district of England,written in conjunction with Dr Buckland, and published in 1824. He wrote also on the valley of the Thames, on Elie de Beaumont's theory of mountain-chains, and on the great landslip which occurred near Lyme Regis in 1839 when he was vicar of Axminster. His principal work, however, is the Outlines of the Geology of England and Wales (1822) ,being a second edition of the small work issued by William Phillips {q.v.) and written in co-operation with that author. The original contribu- tions of Conybeare formed the principal portion of this edition, of which only Part I., dealing with the Carboniferous and newer strata, was published. It affords evidence throughout of the extensive and accurate knowledge possessed by Conybeare; and it exercised a marked influence on the progress of geology in this country. He was a fellow of the Royal Society and a corresponding member of the Institute of France. In 1844 he was awarded the Wollaston medal by the Geological Society of London. The loss of his eldest son, W. J. Conybeare, preyed on his mind and hastened his end. He died at Itchenstoke, near Portsmouth, a few months after his son, on the 12th of August 1857. (Obituary in Gent. Mag. Sept. 1857, p. 335.)

His elder brother John Josias Conybeare (1779-1824), also educated at Christ Church, Oxford, and an accomplished scholar, became vicar of Batheaston, and was professor of Anglo-Saxon and afterwards of poetry at Oxford. He likewise was an ardent student of geology and communicated several important papers to the Annals of Philosophy and the Transactions of the Geological Society of London. (Obituary in Ann. Phil. vol. viii., Sept. 1824, p. 162.)

CONYBEARE, WILLIAM JOHN (1815-1857), English divine, son of Dean W. D. Conybeare, was born on the 1st of August 1815, and was educated at Westminster and at Trinity College, Cambridge, where he was elected fellow in 1837. From 1842 to 1848 he was principal of

the Liverpool Collegiate Institution, which he left for the vicarage of Axminster. He published Essays, Ecclesiastical and Social, in 1856, and a novel, Perversion, or the Causes and Consequences of Infidelity, but is best known as the joint author (with J. S. Howson) of The Life and Epistles of St Paul (1851). He died at Weybridge in 1857.

COODE, SIR JOHN (1816-1892), English engineer, was born at Bodmin, Cornwall, on the nth of November 18 16, the son of a solicitor. After considerable experience as an engineer in the west of England he came to London, and from 1844-1847 had a consulting practice in Westminster. In the latter year he was appointed resident engineer in charge of the extensive national harbour works at Portland then in progress. In 1856 he was appointed engineer-in-chief of this undertaking, and this post he retained till the completion of the works in 1872. His

services at Portland were rewarded with a knighthood. He was now recognized as the leading authority on harbour construction, and his advice was sought by many of the colonial governments, especially by those of South Africa and Australia, and by the Indian government. After the Portland harbour his best-known work is the harbour of Colombo, Ceylon. He was made a K.C.M.G. in 1886. From 1884 till his death he was a member of the Suez Canal Commission, and' from 1889-1891 president of the Institution of Civil Engineers. He died at Brighton on the 2nd of March 1892.

COOK, ALBERT STANBURROUGH (1853-), American scholar, was bom on the 6th of March 1853 in Montville, Morris county, New Jersey. He graduated at Rutgers College in 1872, and also studied at Gottingen and Leipzig (1877-1878), and, after spending the years 1879-1881 as associate in English at Johns Hopkins University, in London, and under Sievers at Jena, he became in 1882 professor of English in the University of California, and in 1889 professor of English language and literature in Yale University. He re-organized the teaching of English in the state of California, and edited many texts for reading in secondary schools; but he is best known for his work in Old English and in poetics. He translated, edited, and revised Sievers' Old English Grammar (1885), edited Judith (1888), The Christ of Cynewulf (1900), Asser's Life of King Alfred (1905), and The Dream of the Rood (1905), and prepared A First Book in Old English Grammar (1894). He also edited, with annotations, Sidney's Defense

of Poesie (1890); Shelley's Defense of Poetry (1891); Newman's Poetry (1891); Addison's Criticisms on Paradise Lost (1892); The Art of Poetry (1892), being the essays of Horace, Vida and Boileau; and Leigh Hunt's What is Poetry (1893); and published Higher Study of English (1906).

COOK, EDWARD DUTTON (1829-1883), English dramatic critic and author, was born in London on the 30th of January 1829, the son of a solicitor. He was educated at King's College school, London, and, after four years in his father's office, obtained a situation in the London office of a railway company, at first utilizing only his spare time in literary work, but eventually devoting himself entirely to literature. He was dramatic critic of the Pall Mall Gazette from 1867 to 1875, and of the World from 1875 till his death. He also wrote freely on art topics, and was the author of several novels. He died in London on the nth of September 1883.

COOK, ELIZA (1818-1889), English author, was born on the 24th of December 1818, in Southwark, being the daughter of a local tradesman. She was self-taught, and began when a girl to write poetry for the Weekly Dispatch and New Monthly. In 1838 she published Melaia and other Poems, and from 1849 to 1854 conducted a paper for family reading called Eliza Cook's Journal. She also published Jottings from my Journal (i860), and New Echoes (1864); and in 1863 she was given a civil list pension of £100 a year. As the author of a single poem, " The Old Armchair," Eliza Cook's name was for a generation after 1838 a household word both in England and in America, her kindly domestic sentiment making her a great favourite with the working-class and middle-class public. She died at Wimbledon on the 23rd of September 1889.

COOK, JAMES (1728-1779), English naval captain and explorer, was born on the 28th of October 1728, at Marton village, Cleveland, Yorkshire, where his father was first an agricultural labourer and then a farm bailiff. At twelve years of age he was apprenticed to a haberdasher at Staithes, near Whitby, and afterwards to Messrs Walker, shipowners, of Whitby, whom he served for years in the Norway, Baltic and Newcastle trades.

In 175s, having risen to be a mate, Cook joined the royal navy, and after four years' service was, on the recommendation of Sir Hugh Palliser, his commander, appointed master suc- cessively of the sloop " Grampus," of the " Garland " and of the " Solebay," in the last of which he served in the St Lawrence. He was employed also in sounding and surveying the river, and he published a chart of the

channel from Quebec to the sea. In 1762 he was present at the recapture of Newfoundland, and was

employed in surveying portions of this coast (especially Placentia Harbour); in 1763, on Palliser becoming governor of Newfound- land, Cook was appointed ” marine surveyor of the coast of Newfoundland and Labrador”; this office he held till 1767; and the volumes of sailing directions he now brought out (1766- 1768) showed remarkable abilities. At the same time he began to make his reputation as a mathematician and astronomer by his observation of the solar eclipse of the 5th of August 1766, at one of the Burgeo Islands, near Cape Ray, and by his account of the same in the Philosophical Transactions (vol. lvii. pp.

215-216).

In 1768 Cook was appointed to conduct an expedition, suggested by the revival of geographical interest now noticeable, and resolved on by the English admiralty at the instance of the Royal Society, for observing the impending transit of Venus, and prosecuting geographical researches in the South Pacific Ocean. For these purposes he received a commission as lieutenant (May 25th), and set sail in the ” Endeavour,” of 370 tons, accompanied by several men of science, including Sir Joseph Banks (August 25th). On the 13th of April 1769, he reached Tahiti, where he observed the transit on the 3rd of June. From Tahiti he sailed in quest of the great continent then supposed to exist in the South Pacific, explored the Society Islands, and thence struck to New Zealand, whose coasts he circumnavigated and examined with great care for six months, charting them for the first time with fair accuracy, and especially observing the channel (” Cook Strait “) which divided the North and South Islands. His attempts to penetrate to the interior, however, were thwarted by native hostility. From New Zealand he proceeded to ” New Holland ” or Australia, and surveyed with the same minuteness and accuracy the whole east coast. New South Wales he named after a supposed resemblance to Glamorganshire; Botany Bay, sighted on the 28th of April 1770, was so called by the naturalists of the expedition. On account of the hostility of the natives his discoveries here also were confined to the coast, of which he took possession for Great Britain. From Australia Cook sailed to Batavia, satisfying himself upon the way that (as Torres had first shown in 1607) New Guinea was in no way an outlying part of the greater land mass to the south.

Arriving in England, by way of the Cape of Good Hope, on the 1 2th of June, Cook was made a commander, and soon after was appointed

to command another expedition for examining and determining once for all the question of the supposed great southern continent. With the ” Resolution ” of 462 tons, the “Adventure” (Captain Furneaux) of 330 tons, and 193 men, he sailed from Plymouth on the 13th of July 1772; he touched at the Capeof Good Hope, and striking thence south-east (November 22nd) passed the Antarctic Circle (January 16th, 1773), repassed the same, and made his way to New Zealand (March 26th) without discovering land. From New Zealand he resumed his ” search for a continent,” working up and down across the South Pacific, and penetrating to 67 31′ and again to 71 10′ S., with imminent risk of destruction from floating ice, but with the satisfaction of disproving the possibility of the disputed con- tinent in the seas south-eastward of New Zealand. He then made for Easter Island, whose exact position he determined, for the first time, with accuracy; noticing and describing the gigantic statues which Roggewein, the first discoverer of the island, had made known. In the same manner he accomplished a better determination and examination of the Marquesas, as well as of the Tonga or Friendly Islands, than had yet been made; and after a stay at Tahiti to rest and refit, crossed the central Pacific to the ” New Hebrides,” as he renamed Quiros’s ” Southern Land of the Holy Spirit ” (a name preserved in the modern island of Espiritu Santo), called by Bougainville the ” Great Cyclades ” (Grandes Cyclades), whose position, extent, divisions and character were now verified as never before. Next followed the wholly new discoveries of New Caledonia, Norfolk Island, and the Isle of Pines. Another visit to New Zealand, and yet another examination of the far southern Pacific, which was crossed from west to east through the whole of its extent, from south Australia to Tierra del Fuego, were now undertaken by

Cook before he finally closed his work in refutation of the Ant- arctic continent, as previously understood, on this side of the world. The voyage closed with a rapid survey of the ” Land of Fire,” the rounding of Cape Horn, the rediscovery of the island now named Southern Georgia, the discovery of Sandwich Land, the crossing of the South Atlantic (here also exploding the great Terra Australis delusion), and visits to the Cape of Good Hope, St Helena, Ascension, Fernando Noronha and the Azores. The voyage (reckoning only from the Cape of Good Hope and back to the same) had covered considerably more than 20,000 leagues, nearly three times the equatorial circumference of the earth; it left the main outlines of the southern portions of the globe substantially as they are known to-day; and it showed a

possibility of keeping a number of men for years at sea without a heavy toll of lives. Cook only lost one man out of 118 in more than 1000 days; he had conquered scurvy.

The discoverer reached Plymouth on the 25th of July 1775, and his achievements were promptly, if meanly, rewarded. He was immediately raised to the rank of post-captain, appointed a captain in Greenwich hospital, and soon afterwards unanimously elected a member of the Royal Society, from which he received the Copley gold medal for the best experimental paper which had appeared during the year.

Cook's third and last voyage was primarily to settle the question of the north-west passage, practically abandoned since before the middle of the 17th century, but now taken up again, as a matter of scientific interest, by the British government. The explorer, who had volunteered for this service, was instructed to sail first into the Pacific through the chain of the newly dis- covered islands which he had recently visited, and on reaching New Albion to proceed northward as far as latitude 65° and endeavour to find a passage to the Atlantic. Several ships were at the same time fitted out to attempt a passage on the other side from the Atlantic to the Pacific. Sailing from the Nore on the 25th of June 1776 (Plymouth, July 12), with the " Resolution " and " Discovery," and touching at the Cape of Good Hope, which he left on the 30th of November, Cook next made Tasmania and thence passed on to New Zealand and the Tonga and Society Islands, discovering on his way several of the larger members of the Hervey or Cook Archipelago, especially Mangaia and Aitutaki (March 30th- April 4th, 1777) ; some smaller isles of this group he had already sighted on his second voyage, September 23rd, 1773. From Tahiti, as he moved north towards the main object of his expedition, he made a far more important discovery, or rather rediscovery, that of the Hawaiian or Sandwich Islands, the greatest and most remarkable of the Polynesian archipelagos (early February 1778). These had perhaps first been seen by the Spanish navigator Gaetano in 1555; but their existence had been kept a close secret by Spain at the time, and had long been forgotten. Striking the west American coast in 44° 55′ N. on the 7th of March following, he made an almost continuous survey of the same up to Bering Straits and beyond, as far as 70 41', where he found the passage barred by a wall, or rather continent, of ice, rising 12 ft. above water, and stretching as far as the eye could reach. The farthest point visible on the American shore (in the extreme north-west of Alaska) he called Icy Cape. On his way towards Bering Straits he discovered and named King George's (" Nootka ") and Prince William's Sound, as well as Cape Prince of Wales, the westernmost

extremity of North America, never yet seen by English navigators, but well known to Russian explorers, who probably first sighted it in 1648; he also penetrated into the bay afterwards known as Cook's Inlet or River, which at first seemed to promise a passage to the Arctic Seas, to the south-east of the Alaska peninsula. Cook next visited the Asiatic shores of Bering Straits (the extreme north-east of Siberia); returning to America, he explored Norton Sound, north of the Yukon; touched at (Aleutian) Unalaska, where he met with some Russian-American settlers; and thence made his way back to the Hawaiian group, which he had christened after his friend and patron Lord Sandwich, then head of the British admiralty (January 17th, 1779). Here he visited Maui and Hawaii itself, whose size and importance he now

first realized, and in one of whose bays (Kealakekua) he met his death earlyin the morning of the 14th of February 1779. During the night of the 13th, one of the " Discovery's " boats was stolen by the natives; and Cook, in order to recover it, made trial of his favourite expedient of seizing the king's person until repara- tion should be made. Having landed on the following day with some marines, a scuffle ensued which compelled the party to retreat to their boats. Cook was the last to retire; and as he was nearing the shore he received a blow from behind which felled him to the ground. He rose immediately, and vigorously resisted the crowds that pressed upon him, but was soon overpowered.

Had Cook returned from his third voyage, there is ground for believing King George would have made him a baronet. Dis- tinguished honours were paid to his memory, both at home and by foreign courts, and a pension was settled upon his widow. But in his life a very inadequate share of official reward was dealt out to the man who not only may be placed first among British maritime discoverers, but also gave his country her title, and so her colonies, in Australasia. As a commander, an observer and a practical physician, his merits were equally great. Re- ference has been made to his survey work and to his victory over scurvy; it must not be forgotten that along with a commanding personal presence, and with sagacity, decision and perseverance quite extraordinary, went other qualities not less useful to his work. He won the affection of those who served under him by sympathy, kindness and unselfish care of others as noteworthy as his gifts of intellect.

See the Account of a Voyage round the World in 176 0-177 1, by Lieut. James Cook, in vols. ii. and iii. of Hawkesworth's Voyages (1773); the Voyage towards the South Pole and round the World . . .

in . . . 1772-1775, written by James Cook . . . (1777); a Voyage to the Pacific Ocean . . . in 1776-1780, vols. i. and ii. written by Cook (1784); also the Narrative of the Voyages round the World performed by Captain James Cook, by A. Kippis, D.D., F.R.S. (1788), long the standard life of the navigator, but now superseded by Arthur Kitson's Captain James Cook, the Circumnavigator (1907). (C. R. B.)

COOK, THOMAS (1808-1892), English travelling agent, was born at Melbourne in Derbyshire on the 22nd of November 1808. Beginning work at the age of ten, he was successively a gardener's help and a wood-turner at Melbourne, and a printer at Lough- borough. At the age of twenty he became a Bible-reader and village missionary for the county of Rutland; but in 1832, on his marriage, combined his wood-turning business with that occupation. In 1836 he became a total abstainer, and sub- sequently became actively associated with the temperance movement, and printed at his own expense various publications in its interest, notably the Children's Temperance Magazine (1840), the first of its kind to appear in England. In June 1841 a large meeting was to be held at Loughborough in connexion with this movement, and Cook was struck with the idea of getting the Midland CountiesRailwayCompany to run a special train from Leicester to the meeting. The company consented, and on the 5 th of July there were carried 570 passengers from Leicester to Lough-borough and back at a shilling a head. This is believed to be the first publicly-advertised excursion train ever run in England — private " specials," reserved for members of institutes and similar bodies, were already in use. The event caused great excitement, and Cook received so many applications to organize similar parties that he henceforward deserted wood-turning, while continuing his printing and publishing. The summers of the next three years were occupied with excursions like the first; but in 1845 Cook advertised a pleasure-trip on a more extensive scale, from Leicester to Liverpool and back, with opportunities for visiting the Isle of Man, Dublin and Welsh coast. A Hand- book of the Trip to Liverpool was supplied for the use of travellers. In the previous year Cook had entered into a permanent arrange- ment with the Midland Railway Company to place trains at his disposal, for which he should provide the passengers. A trip to Scotland followed, and the excursionists were received in Glasgow with music and salute of guns.

The next great impetus to popular travel was given by the Great Exhibition of 185 1, which Cook helped 163,000 visitors to attend. On the occasion of the Paris exhibition of 1855 there

was a Cook's excursion from Leicester to Calais and back for £i:ios. The following year saw the first grand circular tour in Europe. This part of Cook's activity largely increased after

1863, when the Scottish railway managers broke off their engagements with him, and left him free for more distant enterprise. Switzerland was opened up in 1863, and Italy in

1864. Up to this time " Cook's tourists " had been personally conducted, but now he began to be an agent for the sale of English and foreign tickets, the holders of which travelled in- dependently. Switzerland was the first foreign country accessible under these conditions, and in 1865 nearly the whole of Europe was included in the scheme. Its extension to the United States followed in 1866. For the benefit of visitors to the Paris ex- hibition, Cook made a fresh departure and leased a hotel there. In the same year began his system of " hotel-coupons," providing accommodation at a fixed charge. The year 1869 was marked by an extension of Cook's tours to Palestine, followed by further developments of travel in the East, his son, John Mason Cook, (1834-1899), being appointed in 1870 agent of the khedivial government for passenger traffic on the Nile. The Franco-German War of 1870-187 1 was expected to damage the tourist system, but, as a matter of fact, encouraged it, through the de- mand for combination, international tickets enabling travellers to reach the south of Europe without crossing the belligerent countries. At the termination of the war a party of American freemasons visited Paris under J. M. Cook's guidance, and became the precursors of the present vast American tourist traffic. At the beginning of 1872 J. M. Cook entered into formal partnership with his father, and the firm first took the name of Thomas Cook & Son. In 1882, on the outbreak of Arabi Pasha's rebellion, Thomas Cook & Son were commissioned to convey Sir Garnet Wolseley and his suite to Egypt, and to transport the wounded and sick up the Nile by water, for which they received the thanks of the war office. The firm was again employed in 1 884 to convey General Gordon to the Sudan, and the whole of the men (18,000) and stores necessary for the expedition afterwards sent to relieve him. In 1889 Thomas Cook & Son acquired the exclusive right of carrying the mails, specie, soldiers and officials of the Egyptian government along the Nile. In 1891 the firm celebrated its jubilee, and on the 19th of July of the following year Thomas Cook died. He had been afflicted with blindness in his declining

- years. His son, J. M. Cook, died in 1899, leaving three sons, all

actively engaged in the business.

COOK or Hervey ISLANDS, an archipelago in the Pacific Ocean, lying mainly between 155 and 160° E., and about 20 S.; a dependency of the British colony of New Zealand. It com- prises nine partly volcanic, partly coralline, islands, the more important of which are Rarotonga, hilly, fertile and well watered, with several cones 300 to 400 ft. high, above which towers the majestic Rarotonga volcano (2920 ft.), the culminating point of the archipelago; Mangaia (Mangia); Aitutaki, with luxuriant cocoa-nut palm groves; Atui (Vatui); Mitiero; Mauki; Fenuaiti; and the two Hervey Islets, which give an alternative name to the group. The total land area is 1 1 1 sq. m. Owing to its healthy, equable climate, the archipelago is well suited for European settlement; but the dangerous fringing coral reefs render it difficult of access, and it suffers also from the absence of good harbours. The natives, who are of Polynesian stock and speech, have legends of their emigration from Samoa. They say their ancestors found black people on the islands, and the strongly Melanesian type which is found, especially on Mangaia, supports the statement. The Cook Islanders were formerly man-hunters and cannibals, but they now are nearly all Protestants, wear European dress and live in stone houses. The total population is about 6200. Since 1890 the islands have enjoyed a general legislature and an executive council of which the Arikis (" kings " and " queens ") are members. But all enactments are subject to the approval of the British resident at Rarotonga, and a British protectorate, proclaimed in 1888, was followed by the annexation of the whole archipelago by the governor of New Zealand, by proclamation of June 10th, 1901. The archipelago was discovered by Captain Cook in 1777, and

in 1823 became the scene of the remarkable missionary labours of John Williams, of the London Missionary Society. The chief products of the group are cocoanuts, fruits, coffee and copra. Lime-juice and hats are made.

COOKE, GEORGE FREDERICK (1756-1811), English actor, was born in London, and made his first appearance on the stage in Brentford at the age of twenty as Dumont in Jane Shore. His first London appearance was at the Haymarket in 1778, but it was not until 1794 in Dublin, as Othello, that he attained high rank in his profession. In 1801 he appeared in London as Richard III., Iago, Shylock and Sir Giles Overreach, and became the rival of Kemble, with whom, however, and with Mrs Siddons, he acted from 1803. His intemperate habits unfortunately grew more and more notorious, and on at least one occasion the curtain had to be rung down owing to the audience

hissing his drunken condition. He visited the United States in 18 10, and died in New York on the 26th of September 181 1. A monument to his memory was erected in St Paul's churchyard there by Edmund Kean.

COOKE, JAY (1821-1905), American financier, was born at Sandusky, Ohio, on the 10th of August 182 1, the son of Eleu- theros Cooke (1787-1864), a pioneer Ohio lawyer, and Whig member of Congress from that state in 1831-1833. Being destined for a commercial career, Jay Cooke received a pre- liminary training in a trading house in St Louis, and in the booking office of a transportation company in Philadelphia, and at the age of eighteen entered the Philadelphia house of E.W. Clark & Company, one of the largest private banking firms in the country. He showed such aptitude for business that three years later he was admitted to membership in the firm, and before he was thirty he was also a partner in the New York and St Louis branches of the Clarks. In r8s8 he retired from the firm, and for the next three yearshe devoted himself to reorganiz- ing some of the abandoned Pennsylvania railways and canals and placing them again in operation. On the 1st of January 1861 he opened in Philadelphia the private banking house of Jay Cooke & Company, and soon achieved signal success in floating at par a war loan of $3,000,000 for the state of Pennsylvania, whose credit had become notoriously bad. In the early months of the Civil War Cooke co-operated with the secretary of the treasury, Salmon P. Chase, in securing loans from the leading bankers in the Northern cities, and his own firm was so successful in dis- tributing treasury notes that Chase engaged him as special agent for the sale of the $500,000,000 of so-called " five-twenty " bonds authorized by the act of the 25th of February 1862. To dispose of these bonds the treasury department had already tried every regular means at its command and had failed. Cooke secured the influence of the American press, appointed 2500 sub-agents, and before the machinery he set in motion could be stopped he had sold $11,000,000 more of bonds than had been authorized, an excess which Congress immediately sanctioned. At the same time he used all his influence in favour of the estab- lishment of national banks, and organized a national bank at Washington and another at Philadelphia almost as soon as such institutions were authorized by Congress. In the early months of 1865, when the needs of the government were pressing, and the sale of the new " seven-thirty " notes by the national banks had been very disappointing, Cooke's services were again secured. He sent agents into the remotest villages and hamlets, and even into the isolated mining camps of the West, and caused the rural newspapers to praise the loan. As a result, between February and July

1865 he had disposed of three series of the notes, reaching a total of $830,000,000. Through these efforts the Union soldiers were well supplied and well paid while dealing the final blows of the war; and, later, with money in their pockets, they were disbanded without difficulty.

After the war Cooke became interested in the development of the North-west, and in 1870 his firm undertook to finance the construction of the Northern Pacific railway. In advancing the money for the work, the firm over-estimated the possibilities of its capital, and at the approach of the financial crisis of 1873 it was forced to suspend. By 1880 Cooke had discharged all his

obligations, and through an investment in a silver mine in Utah had again become wealthy. He died at Ogontz, Pennsylvania, on the 18th of February 1905. Cooke was noted for his piety, and gave regularly a tenth of his income for religious and charit- able purposes. His handsome estate at Ogontz, which he had been compelled to give up during his bankruptcy, he later repurchased and converted into a school for girls.

See E. P. Oberholtzer, Jay Cooke, Financier of the Civil War (Philadelphia, 1907).

COOKE, ROSE TERRY (1827-1892), American writer, nie Terry, was born at West Hartford, Connecticut, on the 17th of February 1827. She published in i860 a volume of Poems, but after her marriage in 1873 to Rollin H. Cooke she was best known for her fresh and humorous stories, though in 1888 she published more verse in her Complete Poems. The chief volumes of fiction dealing mainly with New England country life, produced by Rose Terry Cooke, were Happy Dodd (1878), Somebody's Neighbors (1881), Root-bound (1885), The Sphinx's Children (1886), Steadfast (1889) and Huckleberries (189 1). She died at Pittsfield, Massachusetts, on the 18th of July 1892.

COOKERY (Lat. coquus, a cook), the art of preparing and dressing food of all sorts for human consumption, of converting the raw materials, by the application of heat or otherwise, into a digestible and pleasing condition, and generally ministering to the satisfaction of the appetite and the delight of the palate. We may take it that some form of cookery has existed from the earliest times, and its progress

has been from the simple to the elaborate, dominated partly by the foods accessible to man, partly by the stage of civilization he has attained, and partly by the appliances at his command for the purpose either of treating the food, or of consuming it when served.

The developed art of cookery is necessarily a late addition — if it may be considered to be included at all — to the list of ” fine arts.” Originally it is a purely industrial and useful art. Man, says a French writer, was born a roaster, and ” pour ttre cuisinier, il a besoin de le devenir.” The ancients were great eaters, but strangers to the subtler refinements of the palate. The gods were supposed to love the smell of fried meat', while their nectar and ambrosia represented an ideal, which, though preserved as a phrase, would hardly satisfy a modern epicure. The ancients were poorly provided with pots and pans, except of a simple order, or with the appurtenances of a kitchen, and they were sadly to seek in the requisites v of a modern table. So long as men ate with their hands no dainty confection was suitable; the viands were set forth in a straightforward style fit for their requirements. ” Plain cooking,” which, after all, can never become obsolete, was the only sort. Oddities, no doubt, were the luxuries; and we can see to-day in the ethnological accounts of contemporary savages and backward civilizations, a fair representation of the cookeries of the ancients. The luxuries of the Chinese are, in their way, a survival of long ages of a cookery which to western civilization is grotesque. Even if it is an historic impertinence, it is impossible for the countries of western civilization to regard the fine flower of their own evolu- tion as other than the highest pitch of progress. Autres temps, autres mceurs. To the Chinaman French cooking may possibly be as grotesque as to an Englishman the Chinaman's hundred- year-old buried egg, black and tasteless. The history of com- parative cookery is bound up with the physical possibilities of each country and its products; and if we attempt to mark out stages in the evolution of cookery as a fine art, it is necessarily as understood by the so-called civilized peoples of the West in their culmination at the present day.

It is obvious that opportunity has dominated its history, for the art of cookery is to some extent the product of an increased refinement of taste, consequent on culture and increase of wealth. To this extent it is a decadent art, ministering to the luxury of man, and to his progressive inclination to be pampered and have his appetite tickled. It is thus only remotely connected with the mere necessities of nutrition (q.v.), or the science of dietetics (?.».). Mere hunger, though the best sauce, will not produce cookery, which is the art of sauces. For centuries its

elaboration consisted mainly of a progressive variety of foods, the richest and rarest being sought out; and their nature depended on what was most difficult to obtain. The Greeks learnt by contact with Asia to increase the sumptuous character of their banquets, but we know little enough of their ideas of gastronomy. Athens was the centre of luxury. According to our chief authority Athenaeus, Archestratus of Gela, the friend of the son of Pericles, the guide of Epicurus, and author of the Heduphagetica, was a great traveller, and took pains to get information as to how the delicacies of the table were prepared in different parts. His lost work was versified by Ennius. Other connoisseurs seem to have been Numenius of Heraclea, Hegemon of Thasos, Philogenes of Leucas, Simonaclides of Chios, and Tyndarides of Sicyon. The Romans, emerging from their pristine simplicity, borrowed from the Greeks their achievements in'gastronomic pleasure. We read of this or that Roman gourmet, such as Lucullus, his extravagances and his luxury. The name of the connoisseur Apicius, after whom a work of the time of Heliogabalus is called, comes down to us in association with a manual of cookery. And from Macrobius and Petronius we can gather very interesting glimpses of the Roman idea of a menu. In the later empire, tradition still centred round the Roman cookery favoured by the geographical position of Italy; while the customs and natural products of the remoter parts of Europe gradually begin to assert themselves as the middle ages progress.

It is, however, not till the Renaissance, and then too with Italy as the starting-point, that the history of modern cookery really begins. Meanwhile cookery may be studied rather in the architecture of kitchens, and the development of their appurtenances and personnel, than in any increase in the subtleties of the art; the ideal was inevitably gross; the end was feeding — inextricably associated in all ages with cooking, but as distinct from its fine fleur as gluttony from gastronomy.

Montaigne's references to the revival of cookery in France by Catherine de' Medici indicate that the new attention paid to the art was really novel. She brought Italian cooks to Paris and introduced there a cultured simplicity which was unknown in France before. It is to the Italians apparently that later developments are originally due. It is clearly established, for instance (says Abraham Hay ward in his Art of Dining), that the Italians introduced ices into France. Fricandeaus were invented by the chef of Leo X. And Coryate in his Crudities, writing in the time of James I., says that he was called " furcifer " (evidently in contemptuous jest) by his friends, from his using those " Italian neatnesses called forks." The use of the fork and spoon marked an epoch in the progress of dining, and con- sequently of cookery.

Under Louis XIV. further advances were made. His mattre d'hdtel, Bechamel, is famous for his sauce; and Vatel, the great Conde's cook, was a celebrated artist, of whose suicide in despair at the tardy arrival of the fish which he had ordered, Madame de Sevigne relates a moving story. The prince de Soubise, immortalized by his onion sauce, also had a famous chef.

In England the names of certain cookery-books may be noted, such as Sir J. Elliott's (1539), Abraham Veale's (1575), and the Widdowe's Treasure (1625). The Accomplisht Cook, by Robert May, appeared in 1665, and from its preface we learn that the author (who speaks disparagingly of French cookery, but more gratefully of Italian and Spanish) was the son of a cook, and had studied abroad and under his father (c. 1610) at Lady Dormer's, and he speaks of that time as " the days wherein were produced the triumphs and trophies of cookery." From his description they consisted of most fantastic and elaborately built up dishes, intended to amuse and startle, no less than to satisfy the appetite and palate.

Louis XV. was a great gourmet; and his reign saw many developments in the culinary art. The mayonnaise (originally mahonnaise) is ascribed to the due de Richelieu. Such dishes as " potage a la Xavier," " cailles a la Mirepoix," " chartreuses a la Mauconseil," " poulets d, la Villeroy," " potage a la Condi," " gigot a la Mailly," owe their titles to celebrities of the day, and the Pompadour gave her name to various others. The

Jesuits Brunoy and Bougeant, who wrote a preface to a contemporary treatise on cookery (1739). described the modern art as " more simple, more appropriate, and more cunning, than that of old days," giving the ingredients the same union as painters give to colours, and harmonizing all the tastes. The very phrase " cordon bleu " (strictly applied only to a woman cook) arose from an enthusiastic recognition of female merit by the king himself. Madame du Barry, piqued at his opinion that only a man could cook to perfection, had a dinner prepared for him by a cuisiniere with such success that the delighted monarch demanded that the artist should be named, in order that so precious a cuisinier might be engaged for the royal household. " Allons done, la France! " retorted the ex-grisette, " have I caught you at last ? It is no cuisinier at all, but a cuisiniere, and I demand a recompense for her worthy both of her and of your majesty.

Your royal bounty has made my negro, Zamore, governor of Luciennes, and I cannot accept less than a cordon bleu ” (the Royal Order of the Saint Esprit) ” for my cuisiniere.”

The French Revolution was temporarily a blow to Parisian cookery, as to everything else of the ancien regime. ” Not a single turbot in the market,” was the lament of Grimod de la Reyniere, the great gourmet, and author of the Manuel des amphitryons (1808). But while it fell heavily on the class of noble amphitryons it had one remarkable effect on the art which was epoch-making. It is from that time that we notice the rise of the Parisian restaurants. To 1770 is ascribed the first of these, the Champ d’oiseau in the rue des Poulies. In 1789 there were a hundred. In 1804 (when the Almanack des gour- mands, the first sustained effort at investing gastronomy with the dignity of an art, was started) there were between 500 and 600. And in 1814, to such an extent had the restaurants at’tracted the culinary talent of Paris, that the allied monarchs, on arriving there, had to contract with the two brothers Very for the supply of their table. Among the great gastronomic names of Napoleon’s day was that of his chancellor Cambaceres, of whose dinners many stories are told. Robert (the eponym of the sauce Robert), Rechaud and Merillion were at this period esteemed the Raphael, Michelangelo and Rubens of cookery; while A. Beauvilliers (author of Art des cuisines) and Careme (author of the Maitre d’hotel fran(ais, and chef at different times to the Tsar Alexander I., Talleyrand, George IV. and Baron Rothschild) were no less celebrated. 1 Perhaps the greatest name of all in the history of the literature of cookery is that of Anthelme Brillat-Savarin (1755-1826), the French judge and authorof the Physiologic dugout (1825), the classic of gastronomy.

In England Louis Eustache Ude, Charles Elme Francatelli, and Alexis Soyer carried on the tradition, all being not only cooks but authors of treatises on the art. The Original (1835) of Thomas Walker, the Lambeth police magistrate, is another work which has inspired later pens. Like the Physiologie du gout, it is no mere cookery-book, but a compound of observation and philosophy. Among simple hand-books, Mrs Glasse’s, Dr Kitchener’s and Mrs Rundell’s were standard English works in the 1 8th and early 19th centuries; and in France the Cuisiniere de la campagne (1818) went through edition after edition. An interesting old English work is Dr Pegge’s Forme ofCury (1780), which includes some historical reflections on the subject. ” We have some good families in England,” he says, ” of the name of Cook or Coke. . . . Depend upon it, they all originally sprang from real professional cooks, and they need not be ashamed of their extraction any more than Porters, Butlers, &c.” He points out that cooks in early

days were of some importance; William the Conqueror bestowed land on his coquorum praepositus and coquus regius; and Domesday Book records the bestowal of a manor on Robert Argyllon, by the service of a dish called ” de la Groute” on the king’s coronation day.

At the present time, whatever the local varieties of cooking, and the difference of national custom, French cooking is ad- mittedly the ideal of the culinary art, directly we leave the plain

1 See Lady S. O. Morgan’s France, 1829-1830, ii. 414, for an account of a dinner by Cargme.

roast and boiled. And the spread of cosmopolitan hotels and restaurants over England, America and the European continent, has largely accustomed the whole civilized world to the Parisian type. The improvements in the appliances and appurtenances of the kitchen have made the whole world kin in the arts of dining, but the French chef remains the typical master of his craft. Schools of cookery have been added to the educational machine. The literature of the subject has passed beyond enumeration.

It is unnecessary here to pursue so vast a practical subject into detail; but the following notes on broiling, roasting, baking, boiling, stewing and frying may be useful.

Broiling. — The earliest method of cooking was probably burying seeds and flesh in hot ashes, a kind of broiling on all the surfaces at the same time, which when properly done is the most delicate kind of cooking. Broiling is now done over a clear fire extending at least 2 in. beyond the edges of the gridiron, which should slightly incline towards the cook. It is usual to rub the bars with a piece of suet for meat, and chalk for fish, to prevent the thing broiled from being marked with the bars of the gridiron. In this kind of cookery the object is to coagulate as quickly as possible all the albumen on the surface, and seal up the pores of the meat so as to keep in all the juices and flavour. It is, therefore, necessary thoroughly to warm the gridiron before putting on the meat, or the heat of the fire is conducted away while the juices and flavour of the meat run into the fire. Broiling is a simple kind of cookery, and one well suited to invalids and persons of delicate appetites. There is no other way in which small quantities of meat can be so well and so quickly cooked. Broiling cannot be well done in front of an open fire, because one side of the meat is exposed to a current of cold air. A pair of tongs should be used instead of a fork for turning all broiled meat and fish.

Roasting.' — Two conditions are necessary for good roasting — a clear bright fire and frequent basting. Next to boiling or stewing it is the most economical method of cooking. The meat at first should be placed close to a brisk fire for five minutes to coagulate the albumen. It should then be drawn back a short distance and roasted slowly. If a meat screen be used, it should be placed before the fire to be moderately heated before the meat is put to roast. The centre of gravity of the fire should be a little above the centre of gravity of the joint. No kitchen can be complete without an open range, for it is almost impossible to have a properly roasted joint in closed kitcheners. The heat radiated from a good open fire quickly coagulates the albumen on the surface, and thus to a large extent prevents that which is fluid in the interior from solidifying. The connective tissue which unites the fibres is gradually converted into gelatin, and rendered easily soluble. The fibrin and albumen appear to undergo a higher oxidation and are more readily dissolved. The fat cells are gradually broken, and the liquid fat unites to a small extent with the chloride of sodium and the tribasic phosphate of sodium contained in the serum of the blood. It is easily seen that roasting by coagulating the external albumen keeps together the most valuable parts of the meat, till they have gradually and slowly undergone the desired change. This surface coagulation is not sufficient to prevent the free access of the oxygen of the surrounding air. The empyreumatic oils generated on the surface are neither wholesome nor agreeable, and

these are perhaps better removed by roasting than any other method except broiling. The chief object is to retain as much as possible all the sapid juicy properties of the meat, so that at the first cut the gravy flows out of a rich reddish colour, and this can only be accomplished by a quick coagulation of the surface albumen. The time for roasting varies slightly with the kind of meat and the size of the joint. As a rule beef and mutton require a quarter of an hour to the pound; veal and pork about 17 minutes to the pound. To tell whether the joint is done, press the fleshy part with a spoon ; if the meat yield easily it is done.

Baking meat is in many respects objectionable, and should never be done if any other method is available. The gradual disuse of open grates for roasting has led to a practice of first baking and then browning before the fire. This method completely reverses the true order of cooking by beginning with the lowest temperature and finishing with the highest. Baked meat has never the delicate flavour of roast meat, nor is it so digestible. The vapours given off by the charring of the surface cannot freely escape, and the meat is cooked in an atmosphere charged with empyreumatic oil. A brick or earthenware oven is preferable to iron, because the porous nature of the bricks absorbs a good deal of the vapour. When potatoes are baked with meat, they should always be first parboiled, because they take a longer time to bake, and the moisture rising from the potatoes retards the process of baking, and makes the meat sodden. A baked meat pie, though not always very digestible, is far less objectionable than plain baked meat. In the case of a meat pie the surfaces of the meat are protected by a bad conductor of heat from that charring of the surface which generates empyreumatic vapours, and the fat and gravy, gradually rising in temperature, assist the cooking, and such cooking more nearly resembles stewing than baking. The process may go on for a long time after the re- moval of the meat from the oven, if surrounded with flannel, or some

bad conductor of heat. The Cornish pasty is the best example of this kind of cooking. Meat, fish, game, parboiled vegetables, apples or anything that fancy suggests, are surrounded with a thick flour and water crust and slowly baked. When removed from the oven, and packed in layers of flannel, the pasty will keep hot for hours. When baked dishes contain eggs, it should be remembered that the albumen becomes harder and more insoluble, according to the_ time occupied in cooking. About the same time is required for baking as roasting.

Boiling is one of the easiest methods of cooking, but a suc- cessful result depends on a number of conditions which, though they appear trifling, are nevertheless necessary. The fire must be watched so as properly to regulate the heat. The saucepan should be scrupulously clean and have a closely-fitting lid, and be large enough to hold sufficient water to well cover and surround the meat, and all scum should be removed as it comes to the surface; the addition of small quantities of cold water will assist the rising of the scum. For all cooking purposes clean rain water is to be preferred. Among cooks a great difference of opinion exists as to whether meat should be put into cold water and gradually brought to the boiling point, or should be put into boiling water. This, like many other unsettled questions in cookery, is best decided by careful scientific experiment and observation. If a piece of meat be put into water at a temperature of 60°, and gradually raised to 212°, the meat is undergoing a gradual loss of its soluble and nutritious properties, which are dissolved in the water. From the surface to the interior the albumen is partially dissolved out of the meat, the fibres become hard and stringy, and the thinner the piece of meat the greater the loss of all those sapid constituents which make boiled meat savoury, juicy and palatable. To put meat into cold water is clearly the best method for making soups and broth ; it is the French method of preparing the pot au feu; but the meat at the end of the operation has lost much of that juicy sapid property which makes boiled meat so acceptable. The practice of soaking fresh meat in cold water before cooking is for the same reasons highly objectionable; if necessary, wipe it with a clean cloth. But in the case of salted, smoked and dried meats soaking for several hours is indispensable, and the water should be occasionally changed. The other method of boiling meat has the authority of Baron Liebig, who recommends putting the meat into water when in a ‘state of ebullition, and after five minutes the saucepan is to be drawn aside, and the contents kept at a temperature of 162 (50° below boiling). The effect of boiling water is to coagulate the albumen on the surface of the meat, which prevents.but not entirely, the juices from passingintothe water, and meat thus boiled has more flavour and has lost much less in weight. To obtain well-flavoured boiled meat the idea of soups or broth must be a secondary consideration. It is, however, impossible to cook a piece of meat in water without extracting some of its juices and nutriment, and the liquor should in both cases be made into a soup.

Stewing. — When meat is slowly cooked in a close vessel it is said to be stewed; this method is generally adopted in the preparation of made dishes. Different kinds of meat may be used, or only one kind

according to taste. The better the meat the better the stew; but by carefully stewing the coarsest and roughest parts will become soft, tender and digestible, which would not be possible by any other kind of cooking. Odd pieces of meat and trimmings and bones can often be purchased cheaply, and may be turned into good food by stewing. Bones, although containing little meat, contain from 39 to 49 % of gelatin. The large bones should be broken into small pieces, and allowed to simmer till every piece is white and dry. Gelatin is largely used both in the form of jellies and soups. Lean meat, free from blood, is best for stewing, and, when cut into con- venient pieces, it should be slightly browned in a little butter or dripping. Constant attention is necessary during this process, to prevent burning. The meat should be covered with soft water or, better, a little stock, and set aside to simmer for four or five hours, according to the nature of the material. When vegetables are used, these should also be slightly browned and added at intervals, so as not materially to lower the temperature. Stews may be thickened by the addition of pearl barley, sago, rice, potatoes, oatmeal, flour, &c, and flavoured with herbs and condiments according to taste. Although stewing is usually done in a stewpan or saucepan with a close-fitting cover, a good stone jar, with a well-fitting lid, is prefer- able in the homes of working people. This is better than a metal saucepan, and can be more easily kept clean; it retains the heat longer, and can be placed in the oven or covered with hot ashes. The common red jar is not suitable; it does not stand the heat so well as a grey jar; and the red glaze inside often gives way in the presence of salt. The lid of a vessel used for stewing should be re-moved as little as possible. An occasional shake will prevent the meat from sticking. At the end of the operation all the fat should be carefully removed.

Frying. — Lard, oil, butter, or dripping may be used for frying. There are two methods of frying — the dry method, as in frying a pancake, and the wet method, as when the thing fried is immersed in a bath of hot fat. In the former case a frying pan is used, in the other a frying kettle or stewpan. It is usual for most things to have a wire frying basket ; the things to be fried are placed in the basket and immersed at the proper temperature in the hot fat. The fat should gradually rise in temperature over a slow fire till it attains

nearly 400° Fahr. Great care is required to fry properly. If the tem-perature is too low the things immersed in the fat are not fried, but soddened; if, on the other hand, the temperature is too high, they are charred. The temperature of the fat varies slightly with the nature of things to be fried. Fish, cutlets, croquets, rissoles and fritters are well fried at a temperature of 380 Fahr. Potatoes, chops and white bait are

better fried at a temperature of 400 ° Fahr. Care must be taken not to lower the temperature too much by introducing too many things. The most successful frying is when the fat rises two or three degrees during the frying. Fried things should be of a golden brown colour, crisp and free from fat. When fat or oil has been used for fish it must be kept for fish. It is customary first to use fat for croquets, rissoles, fritters and other delicate things, and then to take it for fish. Everything fried in fat should be placed on bibulous paper to absorb any fat on the surfaces.

COOKSTOWN, a market town of Co. Tyrone, Ireland, in the east parliamentary division, 54 m. W. by N. of Belfast, on branches of the Great Northern and the Northern Counties (Midland) railways. Pop. of urban district (1901) 3531. It consists principally of a single street of great length, and lies in a pleasant, well-wooded district, near the Ballinderry river. It has important manufactures of linen, and some agricultural trade. It was founded in 1609, the landlord, Allan Cook, giving name to it. The mansion of Killymoon Castle, in the vicinity, is a notable example of the work of a celebrated architect, John Nash (c. 1800).

COOKTOWN, a seaport of Banks county, Queensland, Australia, at the mouth of the Endeavour river, about 1050 m. direct N.N.W. of Brisbane. It is visited by the ocean steamers of several lines, and is the centre of a very extensive beche-de-mer and pearl fishery. Tin and gold are worked in the district, in which also good coffee and rice are grown. Cooktown is the port of the Palmer gold-fields, and a railway runs to Laura on the gold-fields, 67 m. W. by S. of Cooktown. It is the chief port of Queensland for the New Guinea trade; and is also the seat of a Roman Catholic vicariate apostolic whose bishop has jurisdiction over the whole of Queensland north of lat. 1 8° 50’. In 1770 Captain Cook here beached his ship the ” Endeavour,” to repair the damage caused by her striking a reef in the neighbourhood of the estuary, which he could only clear by throwing his guns overboard. Cooktown became a municipality in 1876. The population of the town and district in 1901 was 1936.

COOKWORTHY, WILLIAM (1705-1780), English potter, famous for his discovery of the existence of china-clay and china- stone in Cornwall, and as the first manufacturer of a porcelain similar in nature to the Chinese, from English materials, was born at Kingsbridge, Devon, of Quaker parents who were in humble circumstances. At the age of fourteen he was apprenˆ ticed to a London apothecary named Bevans, and he afterwards returned to the neighbourhood of his birthplace, and carried on business at Plymouth with the co-operation of his

master, under the title of Bevans & Cook worthy. The manufacture of porcelain was at the time attracting great attention in England, and while the factories at Bow, Chelsea, Worcester and Derby were introducing the artificial glassy porcelain, Cookworthy, following the accounts of Pere d'Entrecolles, spent many years In searching for English materials similar to those used by the Chinese. From 1745 onwards he seems to have travelled over the greater portion of Cornwall and Devon in search of these minerals, and he finally located them in the parish of St Stephen's near to St Austell. With a certain amount of financial assistance from Mr Thomas Pitt of Boconnoc (afterwards Lord Camelford) he established the Plymouth China Factory at least as early as 1768. The factory was removed to Bristol about 1770, and the business was afterwards sold to Richard Champion and others and became the well-known Bristol Porcelain Manufactory. Apart from its historic interest there is little to be said for the Plymouth porcelain. Technically it was often imperfect, and its artistic treatment was never of a high order. But Cookworthy deserves to be remembered for his discovery of those abundant supplies of English clay and rocks which form the foundation of English porcelain and fine earthenware (see Ceramics).

COOLGARDIE, a municipal town in Western Australia, 310 m. by rail E. by N. of Perth, and 528 m. by rail N.E. of

Albany. Pop. (1901) 4249. Its gold-fields were discovered in 1891 and are among the richest in the colony. Lignite, copper, graphite and silver are also found. Toorak and Montana are small residential suburbs. A remarkable engineering work by which a full supply of water was brought to the town from Fremantle (a distance exceeding 330 m. direct) was completed in 1903.

COOLIE, or Cooly (from Koli or Kuli, an aboriginal race of western India; or perhaps from Tamil kuli, hire, i.e. one hired), a term generally applied to Asiatic labourers belonging to the unskilled class as opposed to the artisan, and employed in a special sense to designate those natives of India and China who leave their country under contracts of service to work as labourers abroad. After the abolition of slavery much difficulty was found in obtaining cheap labour for tropical plantations. The emancipated black was unwilling to engage in field labour, while the white man was physically incapable of so doing. Recourse was had to the overpeopled empires of China and

India, as the most likely sources from which to obtain that supply of workers upon which the very existence of some colonies, notably in the West Indies, depended.

The first public recognition of the coolie traffic was in 1844, when the British colony of Guiana made provision for the encouragement of Chinese immigration. About the cooties" same time both Peru and Cuba began to look to China as likely to furnish an efficient substitute for the negro bondsman. Agents armed with consular commissions from Peru appeared in Chinese ports, where they collected and sent away shiploads of coolies. Each one was bound to serve the Peruvian planter to whom he might be assigned for seven or eight years, at fixed wages, generally about 17s. a month, food, clothes and lodging being provided. From 1847 to 1854 coolie emigration went on briskly without attracting much notice, but it gradually came to light that circumstances of great cruelty attended the trade. The transport ships were badly equipped and overcrowded, and many coolies died before the end of the voyage. On arrival in Cuba or Peru the survivors were sold by auction in the open market to the highest bidders, who held them virtually as slaves for seven years instead of for life. Particularly terrible was the lot of those who, contrary to their agreements, had been sent to labour in the foul guano pits of the Chincha islands, where they were forced to toil in gangs, each under the charge of an overseer armed with a cowhide lash. In i860 it was calculated that of the four thousand coolies who had been fraudulently consigned to the guano pits of Peru not one had survived. The greater number of them had committed suicide. In i8s< > the British governor of Hong-Kong issued a proclamation forbidding British subjects or vessels to engage in the transport of coolies to the Chinchas. Technically this was ultra vires on his part, but his policy was confirmed by the Chinese Passengers' Act 1855, which put an end to the more abominable nhase of the traffic. After that no British ship was allowed to sail on more than a week's voyage with more than twenty coolies on board, unless her master had complied with certain very stringent regulations.

The consequence of this was that the business of shipping coolies for Peru was transferred to the Portuguese settlement of Macao. There the Peruvian and Cuban "labour-agents" established depots, which they unblushingly called "barracoons," the very term used in the West African slave trade. In these places coolies were " received," or in plain words, imprisoned and kept under close guard until a sufficient number were collected for export. Some of these were decoyed by fraudulent promises of profitable employment. Others were kidnapped by piratical junks hired to scour the neighbouring coasts. Many were bought from leaders of turbulent native factions, only too glad to sell

the prisoners they captured whilst waging their internecine wars. The procurador or registrar-general of Macao went through the form of certifying the contracts; but his inspection was practically useless. After the war of 1856-1857 this masked slave trade pushed its agencies into Whampoa and Canton. In April 1859, however, the whole mercantile

community of the latter port rose up in indignation against it, and transmitted such strong representations to the British embassy in China, that steps were taken to mitigate the evil. New regulations were from time to time passed by the Portuguese authorities for the purpose of minimizing the horrors of the Macao trade. They seem, however, to have been systematically evaded, and to have been practicallyinoperative. At Canton and Hong-Kong the coolie trade was put under various regulations, which in the latter port worked well only when the profits of ” head-money ” were ruined. In March 1866 the representatives of the governments of France, England and China drew up a convention for the regulation of the Canton trade, which had an unfortunate effect. It left head-money, the source of most of the abuses, comparatively untouched. It enacted that every coolie must at the end of a five years’ engagement have his return passage-money paid to him. The West Indian colonies at once objected to this. They wanted permanent not temporary settlers. They could not afford to burden the coolie’s expensive contract with return passage-money, so they declined to accept emigrants on these terms. Thus a legalized coolie trade between the West Indies and China was extinguished. Thereafter the coolie supply for British colonies was drawn exclusively from India, until 1904, when an exception was made in the case of the Transvaal. Under a convention drawn up in that year between the United Kingdom and China over fifty thousand indentured Chinese labourers were engaged on three years’ contracts to work in the Witwatersrand gold mines (see Transvaal). To the Malay states and other parts of eastern Asia there is an extensive yearly migration of Chinese coolies. This migration, however, is not under contract. From Amoy alone some seventy-five thousand coolies yearly migrate to Singapore and the Straits Settlements, whence they are drafted for labour purposes in every direction.

It is scarcely possible to say when the Indian coolie trade began. Before the end of the 18th century Tamil labourers from southern India were wont to emigrate to the Straits Settlements, and they also flocked to Tenasserim from the other “ooUls side of the Bay of Bengal after the conquest had produced a demand for labour. The first regularly recorded attempt at organizing coolie emigration from India took place in 1834, when forty coolies were exported to Mauritius; but

it was not until 1836 that the Indian government decided to put the trade under official regulations. In 1837 an emigration law was passed for all the territories of the East India Company, providing that a permit must be obtained from government for every shipment of coolies, that all contracts should terminate in five years, that a return passage should be guaranteed, that the terms of his contract should be carefully explained to each coolie, and that the emigrant ship should only carry one coolie for every ton and a half of burden. Then as now the Indian government watched the deportation of labour from their dominions with jealous and anxious care, and when in 1838 it was found that upwards of twenty-five thousand natives had, up to that year, gone from all parts of India to Mauritius, the government became somewhat alarmed at the dimensions which the traffic was assuming. Brougham and the anti-slavery party denounced the trade as a revival of slavery, and the Bengal government suspended it in order to investigate its alleged abuses. The nature of these may be guessed when it is said that the inquiry condemned the fraudulent methods of recruiting then in vogue, and the brutal treatment which coolies often received from ship captains and masters. In 1842 steps were taken formally to reopen the coolie trade with Mauritius, and in 1844 emigration to the West Indies was sanctioned by the Indian government. In 1847 Ceylon was separated from India, and her labour supply was cut off; but this accident was soon remedied, the Ceylon government adopting protective regulations for the coolies.

Emigration of coolies under contract to labour outside India is now regulated by the Emigration Act of 1883 and the rules issued under its provisions, the only exceptions being in re- spect of emigrants to Ceylon and the Straits Settlements and

adjoining states, or those engaged by the British government for employment in east and central Africa. By section 8 of this act natives of India are permitted to emigrate under Modern labour contracts only to such countries as have TionsV satisfied the government of India that sufficient pro- vision is made for the protection of the emigrants. A country which is duly empowered under the act to receive emigrants may appoint an agent, residing in India, who is responsible for the due observance of the provisions of the law. These agents are under the general supervision of the protector of emigrants. As emigrants have to be recruited at great distances from the port of embarkation, recruiters are appointed by the agents and licensed by

the protector. The conduct of these subordinates is minutely regulated. Every precaution is taken to let the emigrant know the exact terms on which he is hired, and to ensure good treatment in the interval between registration and embarkation. Coolies are shipped for the most part from Calcutta and Madras, but of recent years large numbers bound for Mombasa and the Seychelles left from Bombay and Karachi. Both the coolies themselves and the depot are medically inspected. Only those physically fit are allowed to embark. The vessels for their conveyance are licensed and inspected by the local government. The terms on which emigrants are recruited are settled beforehand by convention with the colonies concerned, and are embodied in ordinances passed by the local legislatures. They vary in detail, but their main provisions relate to the rights and obligations of the emigrants, including the grant of a return passage on the expiry of a specified period, usually ten years. The British colonies to which coolies were exported in the decade 1891-1901 were British Guiana, Trinidad, St Lucia, Jamaica, Mauritius, the Seychelles Islands, Fiji, East Africa and Natal; the only non-British country was Dutch Guiana. Emigration to the French colonies, including Reunion has been forbidden by the government of India since 1886, but there still remain in those colonies some of the former emigrants, and the questions of their treatment and repatriation have frequently formed the subject of representations to the French authorities.

The number of Indian coolies resident in the various British colonies in 1900 was 625,000, of which the largest numbers were 265,000 in Mauritius and 125,000 in British Guiana. British There were still 13,800 in Reunion. The regulations colonies, governing coolie labour in British Guiana may be taken as typical for the British colonies generally. They are contained in the Labour Ordinance of 1873, which was amended by the ordinances of 1875, 1876, 1886 and 1887. Under these ordinances an immigration agent-general is appointed, to whom medical officers and recruiting agents are responsible, and the emigrants are allotted by him to the separate estates. They regulate the hours of work, the rate of wages, and the general treatment of the coolies, the nature of house and hospital accommodation, the terms of re-enlistment and the conditions of marriage amongst the coolies themselves. The coolies returning from the British colonies to India in 1901 possessed average savings of £19.

During the construction of the Uganda railway large numbers of coolies were recruited in the Punjab and exported from British Karachi to Mombasa. During the decade 1891-1901 East and the number of these emigrants was 33,000; but on the South completion of the line the emigration practically AMca. stopped, while in 1901-1902 there

were over 6000 emigrants who returned to India. Some, however, settled in East Africa. Coolies are also exported for government employment in Nyasaland. In Natal the Indian population had by 1904 reached over 100,000 and slightly outnumbered the whites. Many of the coolies had become permanent residents in the colony (see Natal).

According to the census of 1901 there were 775,844 foreigners in Assam, of whom no fewer than 645,000 or 83% were brought into the province as garden coolies. The recruiting of these coolies is regulated by Act VI. of 1901, which provides that a labour agreement may be entered into for four years, and includes

a penal clause, under which a coolie deserting or refusing to work may be punished with imprisonment. The coolies can also give an agreement under Act XIII. of 1859, by which they Assam are only liable to civil action for breach of contract. Ceylon The latter are called non-act coolies. This system of ’”* immigration has made tea-planting the most important Burma. industry in Assam, and has greatly increased the prosperity of the province. Migration to Ceylon and Burma takes place chiefly from the Madras ports, and is of a seasonal and temporary character. The tea estates and pearl fisheries of Ceylon, and the town work and harvesting in Burma attract large numbers of Tamil labourers. The respective numbers embarking in 1901 were 117,000 for Ceylon, 84,000 for Burma and 27,000 for the Straits Settlements. In Ceylon there is no system of recruitment like that for the Assam tea-gardens. The coolies come in gangs, each under its own headman, with whom the planter deals exclusively, leaving him to make his own arrangements with the individual coolies. The coolies are mostly carried in small sailing vessels from the ports of Madura and Tanjore, and the number who permanently settle in Ceylon is not very great.

See E. Jenkins, The Coolie; his Rights and Wrongs (1871); J. L. A. Hope, In Quest of Coolies (1872); and C. B. Grose, The Labour Ordinances (Georgetown, 1890). (C. L.)

COOMA, a town of Beresford county, New South Wales, Australia, 264 m. by rail S.S.W. of Sydney. Pop. (1901) 1938. The town is the centre of a pastoral district and has a large trade in furs, while at Bushy Hill, a mile from the town, is a small gold-field. Cooma, which is pleasantly situated at an elevation of 2657 ft-, is the tourist centre for visitors to the Yarrangobilly Caves and Mount Kosciusko and its observatory. The caves are distant 65 m. from the town, situated in the side of a hill, over- looking the Yarrangobilly river; they are seven in number and of remarkable beauty and extent.

COOPER, ABRAHAM (1787-1868), English animal and battle painter, the son of a tobacconist, was born in London. At the age of thirteen he became an employe at Astley's amphitheatre, and was afterwards groom in the service of Sir Henry Meux. When he was twenty-two, wishing to possess a portrait of a favourite horse under his care, he bought a manual of painting, learned something of the use of oil-colours, and painted the picture on a canvas hung against the stable wall. His master bought it and encouraged him to continue in his efforts. He accordingly began to copy prints of horses, and was introduced to Benjamin Marshall, the animal painter, who took him into his studio, and seems to have introduced him to the Sporting Magazine, an illustrated periodical to which he was him- self a contributor. In 1814 he exhibited his " Tam O'Shanter," and in 1816 he won a prize of £100 for his " Battle of Ligny." In 1817 he exhibited his " Battle of Marston Moor " and was made associate of the Academy, and in 1820 he was elected Academician. Cooper, although ill educated, was a clever and conscientious artist; his colouring was somewhat flat and dead, but he was a master of equine portraiture and anatomy, and had some antiquarian knowledge. He had a special fondness for Cavalier and Roundhead pictures.

COOPER, ALEXANDER (d. 1660), English miniature painter. His works are of great rarity, and the chief are a series represent- ing the king and queen of Bohemia and their children, in the possession of the German emperor; some very remarkable portraits belonging to the queen of Holland, and others in the possession of the king of Sweden and in various Swedish galleries. He was the brother of Samuel Cooper, but whether senior or junior to him is not known, although, according to certain Swedish authorities, he is stated, upon very slight evidence, to have been born in 1605, four years before his more famous brother. He came to Sweden in 1646, and the Swedish docu- ments declare that he was a Jew, and that his full name was Abraham Alexander Cooper. He had previously been residing in Holland, but on reaching Sweden entered the service of Queen Christina, and continued to be her miniature painter until 1654, when she resigned the crown. Two years later, Cooper was in Denmark, carrying out some commissions for Christian IV., but

in 1657 was back again in Stockholm, where he died in the early part of 1660. The date of his birth is not known, but he is believed to have been born in London.

For full information regarding his career, and for various docu- ments

bearing his signature, see The History of Portrait Miniatures, by G. C. Williamson, chap. vi. page 78, and an article in the Nine- teenth Century for October 1905. ‘ (G. C. W.)

COOPER, SIR ASTLEY PASTON (1768-1841), English surgeon, was born at the village of Brooke in Norfolk on the 23rd of August 1 768. His father, Dr Samuel Cooper, was a clergyman of the Church of England; his mother was the author of several novels. At the age of sixteen he was sent to London and placed under Henry Cline (1750-1827), surgeon to St Thomas’s hospital. From the first he devoted himself to the study of anatomy, and had the privilege of attending the lectures of John Hunter. In 1789 he was appointed demonstrator of anatomy at St Thomas’s hospital, where in 1791 he became joint lecturer with Cline in anatomy and surgery, and in 1800 he was appointed surgeon to Guy’s hospital, on the death of his uncle, William Cooper. In 1802 he received the Copley medal for two papers read before the Royal Society of London on the destruction of the membrana tympani; and in 1805 he was elected a fellow of that society. In the same year he took an active part in the formation of the Medico-Chirurgical Society, and published in the first volume of its Transactions an account of an attempt to tie the common carotid artery for aneurism. In 1804 he brought out the first, and in 1807 the second, part of his great work on hernia, which added” so largely to his reputation that in 1813 his annual pro- fessional income rose to £21,000 sterling. In the same year he was appointed professor of comparative anatomy to the Royal College of Surgeons and was very pppular as a lecturer. In 1817 he performed his famous operation of tying the abdominal aorta for aneurism; and in 1820 he removed a wen from the head of George IV., and about six months afterwards received a baronetcy, which, as he had no son, was to descend to his nephew and adopted son, Astley Cooper. He served as president of the Royal College of Surgeons in 1827 and again in 1836, and he was elected a vice-president of the Royal Society in 1830. He died on the 12th of February 1841 in London, and was interred, by his own desire, beneath the chapel of Guy’s hospital. A statue by E. H. Baily was erected in St Paul’s.

His chief works are Anatomy and Surgical Treatment of Hernia (1804-1807); Dislocations and Fractures (1822); Lectures on Surgery (1824-1827); Illustrations of Diseases of the Breast (1829) ; Anatomy of the Thymus Gland (1832) ; Anatomy of the Breast (1840).

See Life of Sir A. Cooper, by B. B. Cooper (1843).

COOPER, CHARLES HENRY (1808-1866), English antiquary, was born

at Great Marlow, on the 20th of March 1808, being descended from a family formerly settled at Bray, Berkshire. He received his education at a private school in Reading. In 1826 he fixed his residence at Cambridge, and in 1836 was elected coroner of the borough. Four years later he was admitted a solicitor, and in course of time he acquired an extensive practice, but his taste and inclination ultimately led him to devote almost the whole of his time to literary research, and especially the elucidation of the history of the university of Cambridge. In 1849 he resigned the office of borough coroner on being elected to the town-clerkship, which he retained till his death on the 21st of March 1866. His earliest production, A New Guide to the University and Town of Cambridge, was published anonymously in 1831. The Annals of Cambridge followed (1842-1853) con- taining a chronological history of the university and town from the earliest period to 1853. His most important work, the Athenae Cantabrigienses (1858, 1861), a companion work to the famous Athenae Oxonienses of Anthony a Wood, contains biographical memoirs of the authors and other men of eminence who were educated at the university of Cambridge from 1500 to 1609. Cooper's other works are The Memorials of Cambridge, (1858-1866) and a Memoir of Margaret, Countess of Richmond and Derby (1874). He was a constant contributor to Notes and Queries, the Gentleman's Magazine and other antiquarian publica- tions, and left an immense collection of MS. materials for a biographical history of Great Britain and Ireland.

COOPER, JAMES FENIMORE (1789-1851), American novelist, was born at Burlington, New Jersey, on the 15th of September 1789. Reared in the wild country round Otsego Lake, N.Y., on the yet unsettled estates of his father, a judge and member of Congress, he was sent to school at Albany and at New Haven, and entered Yale College in his fourteenth year, remaining for some time the youngest student on the rolls. Three years after- wards he joined the United States navy; but after making a voyage or two in a merchant vessel, to perfect himself in seaman- ship, and obtaining his lieutenancy, he married and resigned his commission (1811). He settled in Westchester county, N.Y., the "Neutral Ground" of his earliest American romance, and produced anonymously (1820) his first book, Precaution, a novel of the fashionable school. This was followed (1821) by The Spy, which was very successful at the date of issue; The Pioneers (1823), the first of the " Leatherstocking " series; and The Pilot (1824), a bold and dashing sea-story. The next was Lionel Lincoln (1825), a feeble and unattractive work; and this was succeeded in 1826 by the famous Last of the Mohicans, a book that is

often quoted as its author's masterpiece. Quitting America for Europe he published at Paris The Prairie (1826), the best of his books in nearly all respects, and The Red Rover, (1828), by no means his worst.

At this period the unequal and uncertain talent of Cooper would seem to have been at its best. These excellent novels were, however, succeeded by one very inferior, The Wept of Wish-ton-Wish (1829); by The Notions of a Travelling Bachelor (1828), an uninteresting book; and by The Waterwitch (1830), one of the poorest of his many sea-stories. In 1830 he entered the lists as a party writer, defending in a series of letters to the National, a Parisian journal, the United States against a string of charges brought against them by the Revue Britannique; and for the rest of his life he continued skirmishing in print, sometimes for the national interest, sometimes for that of the individual, and not infrequently for both at once. This opportunity of making a political confession of faith appears not only to have fortified him in his own convictions, but to have inspired him with the idea of imposing them on the public through the medium of his art. His next three novels, The Bravo (1831), The Heidenmauer (1832) and The Headsman: or the Abbaye of Vigneron (1833), were designed to exalt the people at the expense of the aristocracy. Of these the first is by no means a bad story, but the others are among the dullest ever written ; all were widely read on both sides of the Atlantic.

In 1833 Cooper returned to America, and immediately pub- lished A Letter to my Countrymen, in which he gave his own version of the controversy he had been engaged in, and passed some sharp censure on his compatriots for their share in it. This attack he followed up with The Monikins (1835) and The American Democrat (1835); with several sets of notes on his travels and experiences in Europe, among which may be remarked his England (1837), in three volumes, a burst of vanity and ill- temper; and with Homeward Bound, and Home as Found (1838), noticeable as containing a highly idealized portrait of himself. All these books tended to increase the ill-feeling between author and public; the Whig press was virulent and scandalous in its comments, and Cooper plunged into a series of actions for libel. Victorious in all of them, he returned to his old occupation with something of his old vigour and success. A History of the Navy of the United States (1839), supplemented (1846) by a set of Lives of Distinguished American Naval Officers, was succeeded by The Pathfinder (1840), a good "Leatherstocking" novel; by Mercedes of Castile (1840); The Deer slayer (1841); by The Two Admirals and by Wing and Wing (1842); by Wyandotte, The History of a Pocket Handkerchief, and Ned Myers (1843); and by Afloat and Ashore, or the Adventures of Miles Wallingford (1844). From pure fiction,

however, he turned again to the combination of art and controversy in which he had achieved distinction, and in the two Littlepage Manuscripts (1845- 1846) he fought with a great deal of vigour. His next novel was The Crater, or Vulcan's Peak (1847), in which he attempted to intro- duce supernatural machinery with indifferent success; and this

was succeeded by Oak Openings and Jack Tier (1848), the latter a curious rifacimento of The Red Rover; by The Sea Lions (1849) ; and finally by The Ways of the Hour (1850), another novel with a purpose, and his last book. He died of dropsy on the 14th of September 1851 at Cooperstown, New York. His daughter, Susan Fenimore Cooper (1813-1894), was known as an author and philanthropist.

Cooper was certainly one of the most popular authors that have ever written. His stories have been translated into nearly all the languages of Europe and into some of those of Asia. Balzac admired him greatly, but with discrimination; Victor Hugo pronounced him greater than the great master of modern romance, and this verdict was echoed by a multitude of inferior readers, who were satisfied with no title for their favourite less than that of "the American Scott." As a satirist and observer he is simply the "Cooper who 's written six volumes to prove he's as good as a Lord" of Lowell's clever portrait; his enormous vanity and his irritability find vent in a sort of dull violence, which is exceedingly tiresome. It is only as a novelist that he deserves consideration. His qualities are not those of the great masters of fiction; but he had an inexhaustible imagination, some faculty for simple combination of incident, a homely tragic force which is very genuine and effective, and up to a certain point a fine narrative power. His literary training was in- adequate; his vocabulary is limited and his style awkward and pretentious; and he had a fondness for moralizing tritely and obviously, which mars his best passages. In point of con- ception, each of his three-and-thirty novels is either absolutely good or is possessed of a certain amount of merit; but hitches occur in all, so that every one of them is remarkable rather in its episodes than as a whole. Nothing can be more vividly told than the escape of the Yankee man-of-war through the shoals and from the English cruisers in The Pilot, but there are few things flatter in the range of fiction than the other incidents of the novel. It is therefore with some show of reason that The Last of the Mohicans, which as a chain of brilliantly narrated episodes is certainly the least faulty in

this matter of sustained excellence of execution, should be held to be the best of his works.

The personages of his drama are rather to be accounted as so much painted cloth and cardboard, than as anything approach- ing the nature of men and women. As a creator of aught but romantic incident, indeed, Cooper's claims to renown must rest on the fine figure of the Leatherstocking, and, in a less degree, on that of his friend and companion, the Big Serpent. The latter has many and obvious merits, not the least of which is the pathos shed about him in his last incarnation as the Indian John of The Pioneers. Natty Bumpo, however, is a creation of no common unity and consistency. There are lapses and flaws, and Natty is made to say things which only Cooper, in his most verbosely didactic vein, could have uttered. But on the whole the impression left is good and true. In the dignity and simplicity of the old backwoodsman there is something almost Hebraic. With his na'ive vanity and strong reverent piety, his valiant wariness, his discriminating cruelty, his fine natural sense of right and wrong, his rough limpid honesty, his kindly humour, his picturesque dialect, and his rare skill in woodcraft, he has all the breadth and roundness of a type and all the eccentricities and peculiarities of a portrait.

See James Fenimore Cooper (Boston, 1883), by Thomas R. Lounsbury in the " American Men of Letters " series; Griswold, Prose Writers of America (Philadelphia, 1847); J. R. Lowell, Fable for Critics; M. A. de Wolfe Howe, American Bookmen (New York, 1898); and the introduction by Mowbray Morris to Macmillan's uniform edition of Cooper's novels (London, 1900). (W. E. H.)

COOPER, PETER (1791-1883), American manufacturer, inventor and philanthropist, was born in New York city on the 1 2 th of February 1791. His grandfathers and his father served in the War of American Independence. He received practically no schooling, but worked with his father at hat-making in New York city, at brewing in Peekskill, at brick-making in Catskill, and again at brewing in Newburgh. At seventeen he was apprenticed to a coach-builder in New York city. On coming of age he got employment at Hempstead, Long Island, making

machines for shearing cloth; three years afterwards he set up in this business for himself, having bought the sole right to manufacture such machinery in the state of New York. Business prospered during the War of 1812, but fell off after the peace. He turned his shop into a furniture factory; soon sold this and for a short time was. engaged in the grocery business on the site of the present Bible House, opposite

Cooper Union; and then invested in a glue and isinglass factory, situated for twenty-one years in Manhattan (where the Park Avenue Hotel was built later) and then in Brooklyn. About i828he built the Canton Iron Works in Baltimore, Maryland, the foundation of his great fortune. The Baltimore & Ohio railway was to cross his property, and, after various inventions aiming to do away with the loco- motive crank and thus save two-fifths of the steam, in 1830 he designed and constructed (largely after plans made two years before) the first steam locomotive built in America; though only a small model it proved the practicability of using steam power for working that line. The "Tom Thumb," as Cooper called the locomotive, was about the size of a modern hand-car; as the natural draft was far from sufficient, Cooper devised a blowing apparatus. Selling his Baltimore works, he built, in 1836, in partnership with his brother Thomas, a rolling mill in New York; in 1845 he removed it to Trenton, New Jersey, where iron structural beams were first made in 1854 and the Bessemer process first tried in America in 1856; and at Philippsburg, New Jersey, he built the largest blast furnace in the country at that time. He built other foundries at Ringwood, New Jersey, and at Durham, Pennsylvania; bought iron mines in northern New Jersey, and carried the ore thence by railways to his mills. Actively interested with Cyrus Field in the laying of the first Atlantic cable, he was president of the New York, Newfound- land & London Telegraph Company, and his frequent cash advances made the success of the company possible; he was president of the North American Telegraph Company also, which controlled more than one-half of the telegraph lines of the United States. For his work in advancing the iron trade he received the Bessemer gold medal from the Iron and Steel Institute of Great Britain in 1879. He took a prominent part in educational affairs, strongly opposed the Roman Catholic claims for public funds for parochial schools, and conducted the campaign of the Free School Society to its successful issue in 1842, when a state law was passed forbidding the support from public funds of any "religious sectarian doctrine." He is probably best known, however, as the founder of the Cooper Union (q.v.). Cooper was an early advocate of the emancipation and the enlistment in the Union army of Southern negroes, and he upheld the administration of Lincoln. Though he had been a hard-money Democrat, he joined the Greenback party after the Civil War, and in 1876 was its candidate for the presidency, but received only 81,740 out of the 8,412,833 votes cast. He died in New York city on the 4th of April 1883. He published The Political and Financial Opinions of Peter Cooper, with an Auto- biography of his Early Life (1877), and Ideas for a Science of Good Government, in Addresses, Letters and Articles on a Strictly National Currency, Tariff and Civil Service

(1883).

There is a brief biography by R. W. Raymond, Peter Cooper (Boston, 1900).

COOPER, SAMUEL (1609-1672), English miniature painter. This artist was undoubtedly the greatest painter of miniatures who ever lived. He is believed to have been born in London, and was a nephew of John Hoskins, the miniature painter, by whom he was educated. He lived in Henrietta St. , Covent Garden, and frequented the Covent Garden Coffee-House. Pepys, who makes many references to him, tells us he was an excellent musician, playing well upon the lute, and also a good linguist, speaking French with ease. According to other contemporary writers, he was a short, stout man, of a ruddy countenance. He married one Christiana, whose portrait is at Welbeck Abbey, and he had one daughter. In 1668 he was instructed by Pepys to paint a portrait of Mrs Pepys, for which he charged £30. He is known to have painted also the portrait of John Aubrey, which was presented in 1691 to the Ashmolean Museum, as we

learn from his correspondence with John Ray, the naturalist. Evelyn refers to him in 1662, when, on the. occasion of the visit that the diarist paid to the king, Cooper was drawing the royal face and head for the new coinage.

Magnificent examples of his work are to be found at Windsor Castle, Belvoir Castle, Montague House, Welbeck Abbey, Ham House, the Rijks Museum at Amsterdam and in the collection of Mr J. Pierpont Morgan. His largest miniature is in the posses- sion of the duke of Richmond and Gordon at Goodwood. A piece of the artist's handwriting is to be seen at the back of one of his miniatures in the Welbeck Abbey collection, and one of his drawings in black chalk is in the University Gallery at Oxford. His own portrait of himself is in the collection of Mr J. Pierpont Morgan.

The date of his death has been handed down by a record in the diary of Mary Beale, the miniature painter; and in some letters from Mr Charles Manners, addressed to Lord Roos, dated 1672, now amongst the duke of Rutland's papers at Belvoir, the writer refers to Cooper's serious illness on the 4th of May, and to his doubt as to whether the artist would ever recover. Mary Beale's reference to his decease is in

the following words: ” Sunday, May 5, 1672 — Mr Samuel Cooper, the most famous limner of the world for a face, dyed.”

For a fuller account see the History of Portrait Miniatures, by G. C. Williamson, vol. i. p. 64. (G. C. W.)

COOPER (or Couper), THOMAS (c. 1517-1594), English bishop and writer, was born in Oxford, where he was educated at Magdalen College. He became master of Magdalen College school, and afterwards practised as a physician in Oxford. His literary career began in 1548, when he compiled, or rather edited, a Latin dictionary Bibliotheca Eliotae, and in 1549 he published a continuation of Thomas Lanquet’s Chronicle of the World. This work, known as Cooper’s Chronicle, covers the period from a.d. 17 to the time of writing, and was reprinted in 1560 and 1565. In 1565 appeared the first edition of his greatest work, Thesaurus Linguae Romanae et Britannicae, and this was followed by three other editions. Queen Elizabeth was greatly pleased with the Thesaurus, generally known as Cooper’s Dictionary ; and its author, who had been ordained about 1559, was made dean of Christ Church, Oxford, in 1567. Two years later he became dean of Gloucester, in 1571 bishop of Lincoln and in 1584 bishop of Winchester. Cooper was a stout controversialist; he defended the practice and precept of the Church of England against the Roman Catholics on the one hand and against the Martin Marprelate writings and the Puritans on the other. He took some part, the exact extent of which is disputed, in the persecution of religious recusants in his diocese, and died at Winchester on the 29th of April 1594.

Cooper’s Admonition against Martin Marprelate was reprinted in 1847, and his Answer in Defence of the Truth against the Apology of Private Mass in 1850.

COOPER, THOMAS (1759-1840), American educationalist and political philosopher, was born in London, England, on the 22nd of October 1759, and educated at Oxford. Threatened with prosecution at home because of his active sympathy with the French Revolution, he emigrated to America about 1793, and began the practice of law in Northumberland county, Pennsylvania. He was president-judge of the Fourth District of Pennsylvania in 1 806-181 1. Like his friend Joseph Priestley, who was then living in Northumberland, he sympathized with the Anti-Federalists, and took part in the agitation against the Sedition Act, and for a newspaper attack in 1799 on President John Adams, Cooper was convicted, fined and imprisoned for libel. Like Priestley, Cooper was very highly esteemed by Thomas Jefferson, who

secured for him the appointment as first professor of natural science and law in the University of Virginia— a position which Cooper was forced to resign under the fierce attack made on him by the Virginia clergy. After filling the chair of chemistry in Dickinson College, Carlisle, Pa. (1811-1814), and in the University of Pennsylvania (1818-1819), he became professor of chemistry in South Carolina College, at Columbia, in 1819, and afterwards gave instruction in political

economy also. In 1 8 20 he became acting president of this institution, and was president from 1821 until 1833, when he resigned owing to the opposition within the state to his liberal religious views. In December 1834, owing to continued opposition, he resigned his professorship. He had been formally tried for infidelity in 1832. He was a born agitator: John Adams described him as ” a learned, ingenious, scientific and talented madcap.” Before his college classes, in public lectures, and in numerous pamphlets, he constantly preached the doctrine of free trade, and tried to show that the protective system was especially burdensome to the South. His remedy was state action. Each state, he con- tended, was a sovereign power and was in duty bound to protest against the tyrannical acts of the Federal government. He exercised considerable influence in preparing the people of South Carolina for nullification and secession; in fact he pre- ceded Calhoun in advocating a practical application of the state sovereignty principle. The last years of his life were spent in preparing an edition of the Statutes at Large of the state, which was completed by David James McCord (1797-1855) and pub- lished in ten volumes (1836-1841). Dr Cooper died in Columbia on the nth of May 1840. As a philosopher he was a follower of Hartley, Erasmus Darwin, Priestley and Broussais; he was a physiological materialist, and a severe critic of Scotch meta- physics. Among his publications are Political Essays (1800); An English Version of the Institutes of Justinian (1812); Lectures on the Elements of Political Economy (1826); A Treatise on the Law of Libel and the Liberty of the Press (1830); and a translation of Broussais’ On Irritation and Insanity (183 1), with which were printed his own essays, “The Scripture Doctrine of Material- ism,” ” View of the Metaphysical and Physiological Arguments in favour of Materialism,” and ” Outline of the Doctrine of the Association of Ideas.”

See I. Woodbridge Riley, American Philosophy: the Early Schools (New York, 1907).

COOPER, THOMAS (1805-1892), English Chartist and writer, the son of a working dyer, was born at Leicester on the 20th of March 1805.

After his father's death his mother began business as a dyer and fancy box-maker at Gainsborough. Young Cooper was apprenticed to a shoemaker. He had a passion for knowledge; studied Greek, Latin and Hebrew in his spare time; and in 1827 gave up cobbling to become a schoolmaster, and, later, a Methodist preacher. His affairs did not prosper, and after going to Lincoln, where he obtained work on a local news- paper, he came to London in 1839. Here he became assistant to a second-hand bookseller, but in 1840 he joined the staff of the Leicestershire Mercury. His support of the Chartist move- ment obliged him to resign his position, but he undertook to edit The Midland Counties Illuminator, a Chartist journal, in 1 84 1. He became a leader of the extreme Chartist party, and for his action in urging on the strike of 1842 he was imprisoned in Stafford gaol for two years. Here he produced The Purgatory of Suicides, a political epic in ten books, embodying the radical ideas of the time. In his efforts to publish this work after his liberation he came under the notice of Benjamin Disraeli and Douglas Jerrold. Through Jerrold's help it appeared in 1845, and Cooper then turned his attention to lecturing upon historical and educational subjects. In 1856 he suddenly renounced the free-thinking doctrines which he had held for many years, and became a lecturer on Christian evidences. He died at Lincoln on the 15th of July 1892. Among his other works may be mentioned the Bridge of History over the Gulf of Time (1871) and the Life of Thomas Cooper, written by Himself (1872).

COOPER, THOMAS SIDNEY (1803-1902), English painter, was born at Canterbury on the 26th of September 1803. In very early childhood he showed in many ways the strength of his artistic inclinations, but as the circumstances of his family did not admit of his receiving any systematic training, he began be- fore he was twelve years old to work in the shop of a coach painter. A little later he obtained employment as a scene painter; and he alternated between these two occupations for about eight years. But the desire to become an artist continued to influence him, and all his spare moments were given up to drawing and

painting from nature. At the age of twenty he went to London, drew for a while in the British Museum, and was admitted as a student of the Royal Academy. He then returned to Canterbury, where he was able to earn a living as a drawing-master and by the sale of sketches and drawings. In 1827 he settled in Brussels; but four years later he

returned to London to live, and by showing his first picture at the Royal Academy (1833) began an unprecedentedly prolonged career as an exhibitor. Cooper's name is mainly associated with pictures of cattle or sheep, and the most notable of the many hundred he produced are: " A Summer's Noon" (1836), "A Drover's Halt on the Fells" (1838), " A Group in the Meadows " (1845), " The Half-past One o'Clock Charge at Waterloo " (1847), " The Shepherd's Sabbath" (1866), "The Monarch of the Meadows" (1873), "Separated but not Divorced" (1874), "Isaac's Substitute" (1880), " Pushing off for Tilbury Fort " (1884), " On a Farm in East Kent " (1889), " Return to the Farm, Milking Time " (1897). He was elected A.R.A. in 1845 and R.A. in 1867. He presented to his native place, in 1882, the Sidney Cooper Art Gallery, built on the site of the house in which he was born. He wrote his reminiscences, under the title of My Life, in 1890; and died on the 7th of February 1002.

COOPERAGE, or Coperage (Flemish and Dutch hooper, a trader, dealer), a system of traffic in spirituous liquors, tobacco and other articles amongst the fishermen in the North Sea. The practice began in the middle of the 19th century, when Flemish and Dutch koopers frequented the fishing fleets for the purpose of barter. Trading first in tobacco, they extended their operations, and soon became practically floating grog-shops.

The demoralizing nature of the traffic was brought to the public notice in 1881, and a convention was held at the Hague in 1882 to consider means of remedying the abuses. In 1887 Great Britain, Germany, Belgium, Denmark, France and the Nether- lands signed an agreement to prevent the sale or purchase of spirituous liquors among fishermen at sea. In Great Britain an act (the North Sea Fisheries Act 1888) was passed to carry into effect the terms of the convention. The act (now repealed and replaced by the North Sea Fisheries Act 1893, with which it is identical but for some slight verbal modifications) imposes a fine not exceeding £50 or a term of imprisonment not exceeding three months for supplying, exchanging or otherwise selling spirits. It imposes a like penalty for purchasing spirits by exchange or otherwise, and requires every British vessel dealing in provisions or other articles to have a licence and to carry a special mark. In 1882 Mr E. J. Mather started a mission to deep sea fishermen, which sends out mission ships and supplies the fishermen with good clothing, literature, tobacco, &c, at a fair price. This mission, now the Royal National Mission to Deep Sea Fishermen, is registered by the Board of Trade.

See E. J. Mather, Nor'ard of the Dogger (1888), and publications of

the Mission to Deep Sea Fishermen.

COOPERAGE (from ” cooper,” a maker of casks, derived from such forms as Mid. Dutch cuper, Ger. Kiifer, Lat. cuparius; the same root is seen in various Teut. words for a basket, such as Dutch kuip and Eng. ” kipe ” and ” coop, ” but cooper is appar- ently not formed directly from ” coop,” which never means a ” cask ” but always a basket-cage for poultry, &c), the art of making casks, barrels and other rounded vessels, the sides of which are composed of separate staves, held together by hoops surrounding them. The art is one of great antiquity; Pliny ascribes its invention to the inhabitants of the Alpine valleys. The trade is one in which there are numerous subdivisions, the chief of which are tight or wet and dry or slack cask manufacture. To these may be added white cooperage, a department which embraces the construction of wooden tubs, pails, churns and other even-staved vessels. Of all departments, the manufacture of tight casks or barrels for holding liquids is that which demands the greatest care and skill since, in addition to being perfectly tight when filled with liquid, the vessels must bear the strain of transportation to great distances, and in many cases have to resist considerable internal pressure when they contain ferment- ing liquors, The staves are best made of well-seasoned oak.

Since a cask is a double conoid, usually having its greatest diameter (technically the bulge or belly) at the centre, each stave must be properly curved to form a segment of the whole, and must be so cut as to have a suitable bilge or increase of width from the ends to the middle; it must also have its edges bevelled to such an angle that it will form tight joints with its neighbours. The staves being prepared, the next operation is to set up or raise the barrel. For this purpose as many staves as are necessary are arranged upright in a circular frame, and round their lower halves are fitted truss hoops which serve to keep them together for the permanent hooping. The upper ends are then drawn together by means of a rope which is passed round them and tightened by a windlass, and other truss hoops are dropped over them, the wood being steamed or heated to enable it to bend freely to shape. The two ends of the cask are next finished to receive the heads by forming the chime, or bevel on the extremity of the staves, and the croze or groove into which the heads fit. Finally the heads and permanent hoops are put in place. The heads, when made of two or more pieces, are jointed by wooden dowel pins, and after being cut to size are chamfered or bevelled round the edge to fit into the croze grooves. The hoops are generally of iron. The manufacture of slack casks proceeds on the same general lines, but is simpler in various respects, both because less accurate workmanship is required, and

because softer woods, largely fir, may be employed. Machinery of the most elaborate and specialized character has been devised to perform most of the operations in making both slack and tight casks, and though it involves considerable capital outlay it effects so great an economy of time that it has largely superseded hand labour. (For an account of such machinery see L. H. Ran- some, ” Cask-making Machinery,” Proc. Inst. Civ. Eng. vol. 115; also an article in Engineering, 1908, 85, p. 845.) Barrels without separate staves are made by bending a sheet of wood, sawn from a log in a continuous strip, into the required circular shape, the bulge at the centre being obtained by cutting out V gores from the ends. Barrels are also sometimes made of steel, either of the ordinary bulging form or consisting of straight-sided drums provided near the middle with rings on which they may be rolled.. Immense numbers of casks of different shapes and sizes are employed in various industries. Tight barrels are a necessity to the wine and cider maker, brewer and distiller, and are largely used for the transport of oils and liquid chemicals, while slack barrels are utilized by the million for packing cement, alkali, china, fruit, fish and numerous other products.

CO-OPERATION, a term used particularly both for a theory of life, and for a system of business, with the general sense of “working together” {con, with, and opus, work). In its narrowest usage it means a combination of individuals to econo- mize by buying in common, or increase their profits by selling in common. In its widest usage it means the creed that life may best be ordered not by the competition of individuals, where each seeks the interest of himself and his family, but by mutual help; by each individual consciously striving for the good of the social body of which he forms part, and the social body in return caring for each individual: ” each for all, and all for each ” is its accepted motto. Thus it proposes to replace among rational and moral beings the struggle for existence by voluntary combination for life. More or less imperfectly embodying this theory, we have co-operation in the concrete, or ” the co-operative movement,” meaning those forms of voluntary association where individuals unite for mutual aid in the production of wealth, which they will devote to common purposes, or share among themuponprinciples of equity, reason and the common good, agreed upon beforehand. Not that a co-operative society can begin by saying absolutely what those principles in their purity would dictate. It begins with current prices, current rates of wages and interest, current hours of labour, and modifies them as soon as it can wherever they seem least conformable to equity, reason and the common good.

In the industrial world there is everywhere much working together for

the production of wealth, but this is not included in co-operation if the shares of those concerned are determined by

competition, i.e. by a struggle and the relative ability of each to secure a large share. Nor do co-operators regard the association as truly voluntary, though it may depend on contract, if that contract be one of service only, without an opportunity for all concerned to share in the ultimate control. Co-operation in fact is essentially a democratic association. On the other hand, there is some working together for the production of wealth which without being competitive, or based on service, is not strictly voluntary: thus in primitive societies there is much customary help, combined with customary division of the produce; and in advanced societies we have state and municipal socialism. These are indeed sometimes included in co-operation, but at least they are not voluntary co-operation, since the individual has no choice but to take part in them; they depend on the power of the ruler to coerce the ruled, or of the majority to coerce the minority. In co-operation, meaning voluntary co- operation, there may also, it is true, be frequent overruling of the minority by the majority, but only so far as the minority have, when joining the association, voluntarily agreed to permit, and subject always to an effective ultimate right of secession.

Thus co-operation occupies the middle ground between competition and state or municipal socialism. In its technical sense, however, it does not cover the whole of this ground: it does not cover associations which are primarily for social, provident, or religious purposes, but only those closely connected with the production of wealth. We speak of co-operative societies for agriculture, for manufacturing, for retail, or whole- sale distribution, for building or house-owning, for raising capital and so forth; while the great Friendly Societies (q.v.), though a part of co-operation as a theory of life, are not part of the co-operative movement. The line is somewhat hard to draw, and consequently is drawn somewhat arbitrarily. Thus while a society for building, or for the collective ownership of houses, is counted a co-operative society, a Building Society (as we ordinarily understand the term), though it be purely mutual in its basis, is not.so counted in Great Britain, but is in the United States (see Building Societies).

For the early history of the co-operative movement we have to look chiefly to Great Britain, and British co-operation acknow- ledges as its

founder Robert Owen (q.v.). In every age and every country the origins of co-operation may no doubt be traced, wherefcnen have helped one another in the creation of wealth and agreed as brothers as to its division. In England long before the days of Owen there was much co- operation of miners and fishermen which, though scarcely obligatory on the individuals taking part in it, was largely regulated by custom. Coming to more purely voluntary associa- tions, co-operative workshops are recorded, retail co-operation was practised in Scotland from the middle of the 18th century, while in England shops not unlike co-operative stores, but without the democratic element, were in one or two instances set up by benevolent individuals. It does not seem, however, that there was any theory of co-operation until Owen in England, and almost simultaneously Fourier {q.v.) in France, formulated their gospels, not identical, yet having much in common. Of these two Owen and his teaching are by far the more important.

The end of the 18th and the beginning of the 19th centuries were the culminating days of the industrial revolution, when the old organization of domestic industry had given way before the factory system, and the population of the factory districts was suffering a martyrdom, with ruin of body and degradation of character, from unbridled competition, long hours, women's and children's labour, pauper apprenticeship, great fluctuations of trade and employment, dearness and adulteration of pro- visions, the truck system and insanitary homes. Owen, having himself become a great employer of labour, after starting as a draper's assistant, saw that this was in every sense waste, and that as it paid the manufacturer to have the best machinery and not to overdrive it, but to tend it well and keep it in the best repair, so it would pay him, and abundantly pay the nation, to have the human machines well cared for, not overworked, and kept in the best condition. The popular individualistic

Robert Owen.

philosophy of that day taught that the good of society would be achieved by each individual seeking in his business relations the interest of himself and his family; but Owen maintained that the well-being of the social body could only be served if each individual made that his conscious aim. For this reason he and his disciples were called Socialists. He taught further that a man's character depended mainly upon the circumstances which influenced his life; he emphasized environment, and all but denied heredity. At New Lanark, from 1799, he carried out these ideas among the workers in the cotton mills of which he was managing partner. 1 " For twenty-nine years," he wrote, " we did without the necessity for magistrates or lawyers; without a

single legal punishment; without any known poors' rate; without intemperance or religious animosities. We re- duced the hours of labour, well educated all the children from infancy, greatly improved the condition of the adults, diminished their daily labour, paid interest on capital, and cleared upwards of £300,000 of profit." So wonderful were the results upon the population, that New Lanark became a show-place of world-wide renown, and was visited by many of the greatest and most exalted people of the period.

While thus using his own power Owen not only advocated legislation to limit the hours of factory labour, but appealed to the public authorities to establish industrial communities, where the poor might be set to work, and be managed paternally on the principles of New Lanark. So great was his repute, and so influential the royal and other personages who gave him their support, that this appeal might probably have been successful had not Owen, in reply to complaints as to his religious views — which were deistic — and that his system was not founded on religion, made a public attack upon all accepted religions.

Failing to get the required support from the Government and magistrates, he still sought it from wealthy believers in his teaching, and a number of "communities" (see Communism) were founded in England and Scotland, and in the United States. These were intended to be self-supporting, the land and other means of producing wealth being owned in common, and work and education being regulated on Owen's principles. Owen well knew that most of them lacked the large amount of capital necessary, but his hand was forced by enthusiastic followers, and even the most hopeful of the experiments, that of Queenwood in Hampshire (1 839-1 844), was made prematurely and failed.

His connexion with New Lanark also came to an end, not from any want of success, but through differences with some of his partners who objected to such matters as dancing, military drill for the children, and the wearing of kilts, but above all feared lest Owen's " infidelity " should undermine the people's faith.

Thus it might have seemed that Owen's life and fortune had been spent in vain, and resulted only in unsuccessful experiments; but this was far from being so. His teaching, and in particular his doctrines of circumstance, and of the conscious seeking after the social good, his belief in self-supporting communities, and his vision of a new moral and industrial world, had powerfully affected the working classes, indeed, all classes. Workmen in many parts of the country had formed

groups with the ultimate object of founding self-supporting communities. If the govern- ment and the rich would not provide capital enough to start communities, the workers would start them themselves. Thus was the democratic basis given to co-operation. As a means they had been founding co-operative societies, which are sometimes called ” union shops ” to distinguish them from the later growth of societies of the Rochdale type. The members began by buying provisions wholesale and retailing them to themselves at current prices; the difference became capital, and as soon as possible one member was set to work to make boots and another clothes, and so forth, until ultimately the society should have capital enough to take land and form a community. Education also was prominent among their objects. These co-operative societies reached some 400 or 500 between 1828 and 1834, but the movement then collapsed. As the original enthusiasm died out, or members left the neighbourhood, or capital accumulated in 1 Holyoake, History of Co-operation (1906 edition), i. 34.

the hands of the original shareholders, they almost all either failed or became private property. In those early days, moreover, the law gave no protection to the property of co-operative societies. This remained so until 1852, when the Christian Socialists (see Socialism) among their many great services to the working classes secured such protection. In 1862 they secured also limited liability for the members.

Before 1844 a co-operative society had already been formed and failed at Rochdale in Lancashire, yet some ardent spirits planned B hd 1 to f° rm another. Twenty-eight poor men, flannel pioneers, weavers and such like, got together a capital of £28 by twopenny and threepenny subscriptions, and in December 1844 opened in Toad Lane, Rochdale, a little shop from which, speaking broadly, the whole of British co-operation, and very much of that of other lands, has grown. Their objects were those of other co-operative societies of the time, including the ultimate aim of a self-supporting community. In this last they never succeeded, nor indeed did they attempt it; but they did succeed in vastly improving the position of millions of the working classes by enabling them to” obtain their provisions cheap and pure, to avoid the millstone of debt, to save money, to pass from retail to wholesale trade, and from distribution to manufacturing, building and house-owning, ship-owning and banking; above all to educate

themselves, and to live with an ideal.

The Rochdale Equitable Pioneers began their trading in the smallest way, the members taking turns to serve in the shop; yet where so many other Union shops had failed Rochdale succeeded, and it has steadily grown to an institution with some 14,000 members, doing a trade of £300,000, owning shops and workshops, a library and reading-rooms, making large profits, and devoting a substantial part of them to education and to charitable purposes. What was the reason of this difference? Chiefly it would seem a different method of dealing with the profits. Earlier ” Stores ” had divided these according to the capital contributed by each member, or else equally among the members: the Rochdale Pioneers determined that, after paying 5 % interest on the share capital, all profit should be allotted to the purchasing members in proportion to their purchases, and be capitalized in the name of the member entitled, until his shares amounted to £5. Thus each member found it his interest to purchase at the store and to introduce new purchasers. The ownership of the store remained always with the purchasers, and each came under the magic influence of a little capital saved.

Not only did Rochdale store grow amazingly, but its example spread far and near. New stores were founded on the ” Rochdale Growth pl an ” an d old stores adopted it; soon they were of co- numbered by hundreds. In spite of many failures operative there were in 1906 more than fourteen hundred such s ores. s t ores i n the United Kingdom, with nearly two and a quarter million members, over £33,000,000 capital, and sales exceeding £63,000,000 in the year. The number of societies does not increase of late years, the tendency being rather for estab- lished societies to open branches, but all the other figures increase rapidly from year to year.

These workmen’s Co-operative Stores, or Distributive Societies, flourish chiefly in the north and midlands of England and in Scotland, but are found more or less all over the country. They, and practically all other British co-operative societies, are registered under the Industrial and Provident Societies Act, which constitutes them corporate bodies, with limited liability, and fixes £200 as the maximum that any member may hold in the share capital. Their government is democratic, based on one vote each, for man or woman; and their members or share- holders, and their committee-men or directors, are almost exclusively the more provident of the working classes, or belong to the class just above. Store societies are of various sizes, from the small village shop to the greatest of them all, the Leeds Society, with nearly 30,000 members, sales exceeding a

million and a half sterling, and an elaborate organization of branches and manufacturing departments. Their method, the ” Rochdale system,” is as follows, subject to occasional variations. Member- ship is open to all who pay a shilling entrance fee and sign for a

£1 share, which can be paid up out of profit. For the most part members may at any time withdraw their shares in cash at par. A record of each member’s purchases is kept by means of metal tokens or otherwise, and at the end of each quarter, after paying a limited interest (never more than 5 %, and in very many societies less) on shares, and, in some societies, paying a proportion of profit to the employees, the surplus is divided to the members in proportion to their purchases : non-members also usually receiving half dividends on theirs. Thus the members in effect obtain their necessaries at cost price. The dividend on members’ purchases averages about 2s. 6d. in the £. In many successful societies even more is paid, but the average is falling. Where dividend is high, prices are often fixed above those current in the neighbourhood, so that the members, in addition to saving the retailer’s profit, use their Society as a sort of savings bank, where they put away a halfpenny or so for every shilling they spend. In addition to retailing, a store often manufactures bread, clothes, boots and millinery, sometimes farms land, or grinds corn; usually for its own members only’, but occasionally for sale to other societies also. Their productions in this way exceed £5,000,000 a year. They also invest large and increasing sums in building cottages, to let or sell to their members; and they lend still more largely to their members, to enable them to buy cottages.

Outwardly these stores may look like mere shops, but they are really much more. First, they are managed with a view not to a proprietor’s profit, but to cheap and good commodities. Secondly they have done an immense work for thrift and the material prosperity of the working classes, and as teachers of business and self-government. But further, they have a distinct social and economic aim, namely, to correct the present inequalities of wealth, and substitute for the competitive system an industry controlled by all in the common interest, and distributing on principles of equity and reason, mutually agreed on, the wealth produced. With this view they acknowledge the duties of fair pay and good conditions for their own employees, and of not buying goods made under bad conditions. The best societies further set aside a small proportion of their profits for educational purposes, including concerts, social gatherings, classes, lectures, reading-rooms and libraries, and often make grants to causes with which they sympathize. Their members are prominent in local government affairs; co-operative candidates are occasionally run for town councils, and

often talked of for parliament. Though the societies are non-political, and have refused to join the labour representation movement, they are usually centres of ” pro- gressive ” ideas. There are of course many defects, and of their two million members a large, and many fear an increasing, proportion, attracted by the prosperity of the societies, think chiefly of what they themselves gain; but the government of the movement has, hitherto at least, been largely in the hands of men of ideas, who believe that stores are but a step to co-operative production, and on to the ” co-operative commonwealth.”

It is indeed only when we come to federations of co-operative societies, and above all to production, with its large number of employees, that the educational side of the movement and its power to promote industrial reform are most seen. The Co- operative Union, Limited, for instance, is a propagandist federation of all the chief co-operative societies in Great Britain, and some in Ireland. Its income of £10,000 a year is contributed by the Co-operative Societies. It looks after their legal and parliamentary interests, carries on much educational work by means of literature, lectures, classes, scholarships, summer meetings at the universities, and so on; organizes numerous local conferences for discussion, and once a year a great national co-operative congress, and exhibition of productions, in some chief centre of population. The Co-operative Wholesale Society, Limited, is a trading federation of the great majority of the English stores. Founded in 1863 on a small scale, it now counts its employees by thousands, its capital by millions, and its yearly sales by tens of millions. Besides its merchant trade, it manu- factures to the value of £4,500,000, owning factories, warehouses and land in many districts. It imports largely, and runs its own steamships. It is also the bank of the co-operative societies,

and the chief outlet for the always redundant capital of the well-established stores. The Scottish stores also have their Wholesale Society, not less important relatively. For many purposes these two are in partnership. In each of them the net profits are returned to the stores as a dividend on purchases, and thence to the whole body of members; but in the Scottish Wholesale a part is also paid to its employees as a dividend upon their wages. There are also a few local federations of stores, mostly for corn- milling and baking.

Strongly contrasting with this production by associations of

consumers, or ” consumers’ production,” is the co-partnership, or

labour co-partnership, branch of co-operation. Its ne’rship’ simplest form is an association of producers formed to

carry on their own industry. Originally such societies were intended to consist solely of the workers employed; the ideal was the ” self-governing workshop,” introduced from France by the Christian Socialists of 1850; but membership is now open to the distributive societies, which are the chief customers, and usually, to all sympathizers. Shares are transferable, not withdrawable. Profits first pay the agreed ” wages of capital,” usually 5%, and of what remains the main part goes to the employees as a dividend on their wages, and to the customers as a dividend on their purchases. In well-established societies the dividend on wages averages about is. on the £. This is not usually paid in cash, but credited to the employees as share capital, whereby all may become members. Besides other producers’ associations, more or less co-operative, there are over a hundred co-partnership societies at work in England, against a dozen or fifteen in 1883. They are engaged in boot-making, printing, building, weaving, clothing, wood-working, metal- working, and so on. Some of them are very small, while others have businesses of £50,000 a year or more, the average being about £10,000. The majority show fair, sometimes large profits. Each is governed by a committee, which is elected by the members and appoints the manager. A minority of them sell in the open, i.e. the non-co-operative, market, and a few sell largely for export.

We constantly hear that co-operative production is a failure. There have no doubt been failures, especially of big experiments

attempted among men totally unprepared. But many theories °^ ^ e f a il ures counted were not truly co-operative.

At the present day consumers’ production is successful beyond all question, while the net growth of producers’ associa- tions in the last twenty years has been marked both in number and importance. These two forms of production best illustrate the two rival theories which divide British co-operation, and between whose partisans the conflict has at times been sharp. The consumers’ theory maintains that all profit on price is abstracted from the consumer, and must be returned to him; while to him should also belong all capital and control, subject to such regulations as the state and the trade unions enforce. This theory is fully exemplified in the English Wholesale Society, and in some of the smaller federations for production, which employ

workmen, whether co-operators or not, for wages only, and admit no individual, but only co-operative societies, to membership. It is also exemplified by the great majority of the jtores, though in their case the employee may become a member in his capacity as a consumer. The co-partnership theory, on the other hand, maintains that the workers actually employed in (my industry, whether distributive or productive, should be partners with those who find the capital, and those who buy the produce, and should share with them the profit, responsibilities and control. The consumers' party contend that societies of producers make a profit out of the consumers, and thus are never truly co-operative, while as they multiply they must compete against each other. The co-partnership party answer that labour at least helps to make the profit, and that competition, as yet almost insignificant between their societies, can be avoided by federating them (a process long ago begun) for buying and selling in common, and for other common purposes, while leaving each the control and responsibility of its own internal affairs. They further advocate the eventual federation of the productive wing

of co-operation with the distributive, for settling prices and all matters in which their interests might conflict. In this way they say the co-operative system may extend indefinitely without sacrificing either individual responsibility and freedom, or a general unity and control, so far as these are necessary to secure the common interest. On the other hand they hold that the opposing system tends more and more to centralization and bureaucracy, and divorces the individual workman from all personal interest in his work, and from any control over its conditions. They contend, moreover, and it is indeed admitted that, in spite of the great advantages which consumers' produc- tion has in its command of a market and of abundant capital, only a small part of industry can ever be carried on by associa- tions of the persons who actually consume the produce. Outside this small part, therefore, voluntary co-operation is impossible except as some form of co-partnership.

On the working-out of these two principles depends the future of co-operation. The example of Scotland probably throws light on the problem. There co-operative production, amounting to some millions sterling, is nearly all carried on by federations of consumers' societies, including the Scottish Wholesale, which apply more or less successfully the co-partnership principle — i.e. their employees are admitted to share in profits, and may become members, whereby they are further admitted to share in capital and control. The type of organization hence resulting is very much the same as where a society of producers admits consumers' societies to membership, and sets

aside a proportion of the profits to be returned to them as dividend upon their purchases. To this combined type, we have seen, English productive societies, started by producers, have come; and it would appear that those started by consumers must ultimately tend to it. However, in spite of honoured leaders of the early days, the consumers' party is at present greatly in the ascendant in English co-operation, and even in the Scottish federations it is almost strong enough to abolish co-partnership, and allow no one to share in capital, profit or control except in his capacity as a consumer.

An association of co-operative societies and individuals, called the Labour Co-partnership Association, exists to maintain the principle of co-partnership in co-operation, and also to promote its gradual adoption in ordinary businesses. Some progress in this latter direction is being made, there being a tendency to improve upon simple profit-sharing by capitalizing the workman's " bonus," whereby he becomes a shareholder, and the business is gradually modified in a co-operative direction. There are remarkable instances of such modification abroad, notably that of the great iron foundry and Familistere at Guise in France. The most noteworthy, among several, in England is that of the South Metropolitan Gas Company, where after eighteen years of the system 5000 odd employees had in 1907 more than £320,000 invested in the company; they also elect three of themselves directors of the company, this being one-third of the board. Unfortunately this example is, or at least was, marred by a feud with the trade unions, whereas there is friendship between trade unionism and co-partnership, as indeed between trade unionism and co-operation generally.

One of the most recent arid promising developments of English co-operation is the tenants' co-partnership movement for the common ownership of groups of houses, which the Tenants' society owning them lets out to its members. These co-part- societies are but few as yet, but they have sprung up aers Mp rapidly and promise great usefulness and extension. socletles – Somewhat similar societies have long been a recognized branch of co-operation on the continent of Europe.

Such, then, are the history and present extent of co-operation in Great Britain. Turning abroad we find in almost all civilized countries, besides other forms of co-operation, im- Themove- portant and growing movements roughly similar to ment those above described, but on the whole less identified "Jf^J?," with the working classes and less coloured by their social and economic ideals. In France, Germany, Switzerland, Italy and elsewhere, there are very important co-

distributive movements looking to Rochdale as their prototype ; and in the United States of America there are at least continual attempts to spread Rochdale co-operation. Of these foreign stores, however, many exhibit important modifications, such as unlimited liability, and selling at cost price, or between that and market prices. On the whole we may say that Rochdale Co- operation is the most extended and the most typical. It, and the workshop movement springing from Fourier, and the socialist co- operation of Belgium and elsewhere, are certainly the forms which have most of the ideal of democratic equality and social recon- struction. Other forms look more to the money benefits accruing to the members, seeking to supplement the present order of society, rather than to bring in a new order. Among these other forms — separate in origin, in methods, and largely in spirit — the most important are credit co-operation, or people's banking, and agricultural co-operation, two forms until recently unknown in the British Islands.

Confusion has sometimes arisen from the fact that while Rochdale Co-operation sets itself against " credit," continental Germany co-operation is more concerned with obtaining credit and credit for its members than with anything else. But credit is co-opera- used in two senses. The English workman employed tloa ' for wages is against the credit which means spending

them before they are earned: continental co-operation seeks by collective credit to put into the hands of working peasants, craftsmen and traders, the stock and the tools without which their labour is vain. Credit for consumption is the road to poverty; credit for production the road to well-being.

Just asjwith co-operation in labour and in purchase, so mutual help in obtaining credit may doubtless be traced in primitive forms far back into history. It was certainly more or less " in the air " in Germany and France about 1848 and even earlier; but the beginning of systematic organized credit co-operation may be definitely fixed in the year 1849, when Raiffeisen began his Darlehnscasse, or loan bank, in Rhenish Prussia. Curiously enough it had also a second and entirely independent origin. For in the following year Schulze-Delitzsch, in a distant part of the same kingdom, established his Credit Society based

on an entirely different system. As this second system spread much more rapidly than the other and attained, as indeed it retains, much greater commercial magnitude, it came to be regarded as the beginning of credit co-operation, of which for a long time it was the only important form. These two remain the two distinct types in every land. Thus Germany, which has innumerable co-operative societies of every form and of great importance, is in particular the mother of credit co-operation.

In the famine years of 1846 and 1847 and for some years after, Friedrich Wilhelm Raiffeisen was a burgomaster in the barren Westerwald. The people were hopelessly ground down Raiffeisen ˆy ˆˆj. to money-lenders for small doles of capital, banks. advanced to purchase stock, or meet times of special difficulty. It occurred to Raiffeisen that by combining to borrow a moderate sum of money on their joint responsibility, and afterwards to lend it out among themselves in small sums at a slightly greater rate of interest, the peasants might obtain relief from their burden of usury, and at the same time get the capital necessary to make their labour productive. Accordingly in 1849 at the little town of Flammersfeld, he set up a ” Loan Bank.” Despite its success, it remained the only one of its kind for five years, when Raiffeisen founded a second. There was no third for eight years more: it was only in 1880 that they began really to spread, but now they are found in many lands and are counted by thousands.

Such a bank is essentially an association of neighbours. Besides borrowing, it also receives savings deposits, which often produce a large part of, or even all, the capital it needs. Usually a few of the members are comparatively well to do people, who join to help their neighbours by increasing the society’s credit. This Raiffeisen considered essential. They have no actual privi- lege, but by common consent they take a leading part. In the true Raiffeisen bank the liability of each member is unlimited, but limited liability has been introduced in some of its modifica-

tions. The Society confines its operations strictly to a small area, say a parish, where everyone knows everyone. Each borrower must specify the purpose for which he wants a loan, say to buy a cow or drain a field, or pay off a money-lender, and this is rigorously inquired into. Only members can borrow. Any member, however poor, can borrow for a profitable approved purpose, and no one, however rich, for any other. Practically all the members see that the money is applied as agreed; and, while the loan is often made for a long period, a year or two —even for ten or more — so as to repay itself out of the profit,

power is reserved to call it in at short notice if misapplied. Loans are repayable by periodical instalments, but repayments must be made with absolute punctuality. No bills, mortgages or other securities are taken, except a note of hand either alone or with one or two sureties. There are two committees, one to lend and do the work of the society, and the other to supervise the first; and on both of these it is understood that the richer members are to be in a majority. No committeeman or officer receives any remuneration for his services, except that the accountant gets a small salary. Originally there were no shares, and when in 1889 the legislature ordained that there must be shares, the Raiffeisen banks made theirs as small as possible, generally ten or twelve shillings. Nothing is paid on the shares as interest or dividend, all profit being voted once for all to the ordinary reserve and the indivisible reserve, the latter the backbone of the system. In every large district the Raiffeisen banks are federated in a Union, and these Unions culminate in a General Agency. As an intermediary among themselves, and between them and the money market, the banks have also a central bank with a capital of £500,000, and with ten provincial branches. A great deal of agricultural co-operation has arisen from these banks as centres, and with the money they have supplied.

Raiffeisen banks boast that neither member nor creditor has ever lost a penny by them, and while this is denied it seems at least near the truth. Their credit is so good that they can obtain money at very low rates, and as their expenses are trifling they can re-lend to their members at rates but little higher. In Germany they usually lend at about 5%. Only men of good character can obtain membership: thus, besides spreading prosperity, they have everywhere been great promoters of sobriety and good conduct. They were only intended to meet the needs of the peasants, especially of the very poorest, and for this purpose they have proved admirably suited.

Very different were the people among whom Schulze-Delitzsch established his form of co-operative credit; and very different the organization he adopted and the results which have flowed from it. In 1850 Franz Hermann Schulze was a ˆ? b ,Z ,ze . judge in his native town of Delitzscn, almost at the banks. middle point of the southern edge of Prussia, and established there his first Vorschussverein, or Advance-Union. He had been in England and knew something of our co-operative movement, but he scarcely seems to have derived any part of his inspiration from it. The people he desired to help were towns- men, especially the small craftsmen working on their own account, the joiners, shoemakers and so forth; and his ideal was to do this merely by stimulating their thrift.

In a Schulze-Delitzsch bank, a number of such men combine together to raise a capital of guarantee: to do this every member takes up one share and one only, which is of large value, say £30 or £50 or even much more, but can be paid up by small instalments. Thus every member is committed to a long course of saving. On the strength of this capital in course of formation, and the unlimited liability of the members, the bank is able to borrow, or to receive as savings and deposits from members and others, a much larger capital. The funds so constituted it lends out at the highest rates it can command, originally 12% or 14%, but now very much less, and varying, of course, with the market. It lends to members only, but to any amount, for any purpose and on any good and sufficient security, whether acceptance, pro- missory note, overdraft, discount, mortgage, pledge, surety or what not. The loans, however, are always for a short period,

usually three months, renewable for another three months, and sometimes further than that. The committee of management are elected by the general meetings; they decide on all loans, and receive a salary, plus a commission on the business done. The council of supervision are also paid, or at least entitled to pay. The great objects which a bank keeps in view are security and a good return on capital. It is not confined to a small area, but works for as large and as varied a constituency as possible. With such a constitution the Schulze-Delitzsch banks grow big and accumulate a large capital of their own. On an average each bank has nearly 600 members and lends about £150,000 per annum, including loans renewed. Losses are sometimes made, but they are not heavy on the whole. All the profits are divided upon capital, or put to reserve, except some, usually small, sums given to charitable or educational purposes. Dividends average about 5%, but have been known to reach and even exceed 30%.

It may therefore justly be said that for co-operative institu- tions these banks smack too much of joint-stockism : they are in fact co-operative not much more than in the same sense that the Oldham cotton mills, and other ” working-class limiteds,” have sometimes been loosely called co-operative. They seem consti- tuted to make the lender’s interest supreme, but they have, nevertheless, conferred enormous benefits on the handicraftsmen, small traders, small cultivators and others who borrow from them. They have put capital within their reach at reasonable rates.

These banks also have their central point. In 1864 the German Co-operative Societies' Bank was founded to centralize the work of the local Schulze-Delitzsch banks and to bring the money market within their reach. It was not itself co-operative, and never confined its business to the co-operative banks. Beginning in a very small way, by 1903 it had attained a capital of a million and a half sterling and a yearly business of £154,000,000, of which £28,000,000 was specifically with co-operative credit societies. It was then amalgamated with another banking business, the Dresdner Bank, esteemed one of the most important and successful in Germany.

Thus these two types of credit co-operation agree in being founded on unlimited liability, but speaking broadly they are contrasted in that the Schulze-Delitzsch banks work primarily, though by no means solely, among townsmen, are based on share capital, work for profit, which they divide on shares, are con- ducted by paid directors, and confer their benefits not on the very poorest but rather, as their own friends say, on the middle classes: the Raiffeisen banks are designed for the peasantry, are not based upon share capital, neither divide, nor work for, profit, are conducted by unpaid directors, and confer their benefits especially on the very poor. The Schulze-Delitzsch type is strong in self-help, but tends to commercialism as it grows; the other needs the help of the well-to-do to back up the self- help of the poor, but it tends to altruism and the union of classes.

The world has 30,000 co-operative credit societies, not counting building societies; and though they are organized in many groups, especially in their native Germany, for local reasons, or because of some modification, or some compromise between the two systems, the two types really include them all. There is, however, a strong tendency to introduce limited liability into various offshoots of the one type and the other; even into the orthodox Schulze-Delitzsch banks themselves, when they grow big. From Germany co-operative banks have spread into almost all European countries — even at last to Ireland and England — and to America and Asia. In Germany there are some fifteen thousand local, and no less than sixty central, co-operative credit associations, which lend out £180,000,000 a year including renewals. In Italy, Austria and Hungary they are also strong. In 1896 it was estimated that £150,000,000 a year must be very well within the total amount lent by money co-operation on the continent of Europe; eight years later it could not well fall short of £250,000,000, and the amount keeps constantly increasing. Of this total only a small percentage represents loans by banks of

the Raiffeisen type, which, though very numerous, often lend only a

few hundred pounds each in the year.

Great controversy has prevailed as to the state subsidies given to co-operative credit. While governments are sometimes rather inclined to hinder co-operative distribution, they have shown a marked tendency to foster, whether for political or economic reasons, co-operative credit. The Prussian government in response to popular demand, vigorously supported by the agricultural interest, has founded and endowed with £2,500,000 of public money, the Central Co-operative Bank, whose object is to bring capital within the reach of the various groups of co- operative banks. The Schulze-Delitzsch Union was the only one to dispute the need of this, and though the bank has given a stimulus to the formation of co-operative societies, it still denies that this is a healthy propagation. Nevertheless, some even of the Schulze-Delitzsch societies resort to this state bank for money. It is under government administration and lends immense sums each year. In France the Bank of France has been compelled to lend £1,600,000 free of interest, and to give about £120,000 per annum out of its profits to assist agriculture; this money is being lent free to ” regional ” banks, and by them at about 3% to local societies. State help has also been given to the co-operative bank of the French workmen’s productive societies. In Austria and in many other countries a great deal of similar help has been given.

Closely connected with certain developments of credit, and deserving to rank as the third, if not the second, great sub- division of co-operation, is agricultural co-operation, Denmark a movement in the main of the last twenty years, but and agri. amounting now to a great force, almost everywhere cultural except in Great Britain, and in some countries almost co-opera- to a revolution. It is important to say agricultural ”’ co-operation and not co-operative agriculture, for in spite of some customary mutual help in farm work, in spite of several attempts, and some small successes, in co-operative farming, the actual cultivation is almost everywhere individualistic. The farmer or peasant cultivates alone, or with his family, or servants; when he co-operates with his fellows, it is to manu- facture, or to market, the products of his farm, or more often to obtain the things he needs for his farming, to raise stock, to own expensive machinery in common, or insure against risks. By these means the small farmer, without sacrificing his own peculiar advantages, obtains most of the advantages of the big farmer, to the immense improvement of his position.

At almost every point agricultural and credit co-operation touch; yet the most perfect example of agricultural co-operation is not concerned

with credit co-operation in any form. The farmers of Denmark practise co-operation in almost every variety, except for raising capital. The commercial banks have provided money to start dairies and other co-operative societies; so that, it would appear, the need of credit co-operation has not been felt.

The Danish farmer is almost always a freeholder: it is little more than a century since his ancestors were serfs. It is little more than a generation since a few men, turning to account the strong national feeling aroused by the defeat of 1864, started a great educational movement which has left its mark on all strata of Danish society. After the People's High School, technical schools arose in various places; and to these, and to the excellent continuation schools in the country districts, tht Danes are beholden for the regeneration of their agriculture. From 1867 co-operative distributive societies on the Rochdale plan had been spreading in Denmark; but it was not till 1882 that co-operation in agriculture began, and the first co-operative dairy was formed; ten years later there were about a thousand such, a number which has slightly increased since. These dairies are productive societies in which the cow-owners are the shareholders, and all shareholders have equal rights and equal voting power, whether they own one cow or one hundred. Almost every village hasj its co-operative dairy, fitted to deal with the milk of from 400 to 1400, or even 2000 cows. They far exceed all the other dairies of Denmark. More than four-fifths of all the milk of Denmark

is used in them, and they produce butter worth more than nine millions sterling. The profits are divided among those who supply the cream, in proportion to the value of their supplies — a method of dividing profits characteristic of agricultural co-operation. The village dairies are united in federations to export their produce.

Side by side with the dairies are other co-operative societies, quite independent but largely composed of the same members, for buying collectively fodder, manures and other agricultural or household requisites, for collecting and exporting eggs, slaughtering hogs and curing bacon, improving the breed of stock, for bee-keeping, fruit-growing and so forth. By means of these societies the country has been greatly enriched. The farmer not uncommonly belongs to ten co-operative societies, besides probably a farmers' club. The work of starting and administrating the societies is seldom paid, and many

farmers give much time to it gratuitously. They are in the main organized on the same principles as the dairies, but with varia- tions; the largest egg export society, for instance, has over 30,000 members. It is not a federation of village societies, but a centralized body with many branches.

The growth of the bacon-curing societies has been remarkable. The first of them was not founded until 1887, but they spread rapidly, and in seven years there were twenty, killing more than half the country's then produce of hogs. The movement has greatly increased since then, and multiplied its output about fourfold. Co-operation in collecting, grading and exporting eggs only began in 1895, and in eight years 65,000 members had joined the various egg societies, and the value of eggs exported had reached £436,000. Taken as a whole, the effect of agricultural co-operation in Denmark has amounted to little less than a revolution. It has brought the results of science within the peasant's reach, and he has been quick to avail himself of them: it has transformed a great part of farm work into a factory industry, increased the yield of the soil, improved the material position of the peasants, and drawn rich and poor together. Denmark, once so poor, is now, except England, probably the richest country in Europe in proportion to its population. Besides Denmark, Germany, France, Italy, Belgium, Holland, Finland, Australia, New Zealand, the United States, Canada, Ireland and many other countries have important developments of agricultural co-operation. In Germany, where it is closely connected with credit co-operation, it seems to date from 1866 only, yet in forty years agricultural co-operative societies have come to number six thousand, without counting the agricultural banks, which exceed twice that number. There are dairies, societies to purchase farm requisites, societies of grape-growers, hop-growers and beetroot-growers, distilleries, labour societies, insurance societies, societies to own warehouses and granaries and to sell produce, to purchase land and resell it in small holdings, and even several societies which purchase land to cultivate it in common. The close connexion between credit- societies and other agricultural co-operation is exemplified in the Central Union of orthodox Raiffeisen credit societies at Neuwied. Through a central bank and a trading department allied to it, it has negotiated the joint purchase of coal, feeding- stuffs, manures, machinery and so forth to large amounts, as well as the difficult business of the combined sale of agricultural produce. Moreover, several local centres connected with this union have granaries and warehouses for the storage of agri- cultural produce, and negotiate joint sales, while within the union facilities have been found for selling the products of one district to members in

another.

In Ireland stores have not hitherto flourished, though a few exist. Irish co-operation is agricultural, and dates from the foundation of one co-operative dairy in 1889. Thence has grown a movement already of great importance, still advancing and comprising from eighty to ninety thousand members, belonging to some hundreds of societies — dairies, agricultural supply societies, banks and so forth, formed on the Danish model. To form a dairy the small working farmers of a district register a society and take up

Irish agri- culture,

shares of £1 each, in proportion to the number of their cows. Each brings his milk to be separated, is paid for the butter- making material it contains, and receives back skim milk. If any profit is divided, it belongs nine-tenths to the suppliers of milk in proportion to the value of their supplies, and one-tenth to the dairy employees as dividend on wages in pursuance of the co-partnership principle. These dairies produce butter worth more than £1,000,000. Their rapid spread is due to their great influence in improving the quality of butter, and hence increasing the farmer's gains. The co-operative banks are of the Raiffeisen type, though a few have limited liability. They aim at providing the peasants with necessary capital (" the lucky money " they have christened it) and expelling the usurer. They are increasing rapidly. Among other objects of Irish co-operation are selling eggs, poultry, barley and pigs, joint- grazing, potato-spraying, scutching flax, bacon curing, home industries, and of course supplying farm requisites. The move- ment promises much further growth in magnitude and variety. The dairy societies have federated into an agency for reaching the English market, and the supply societies into an Irish Wholesale for purchasing to the best advantage. Besides the direct profits and economies of these societies, they have greatly benefited Ireland by teaching men of all classes, parties and religions to act together for peaceful progress; they have led to a wide diffusion of better agricultural knowledge, and to the establishment by government of the Agricultural Department. (See Ireland.)

In France, which Englishmen are apt to speak of as pre- eminently the country of co-operative production, the agri- cultural is the most important branch of co-operation; and the source and mainstay of agricultural co-opera- tive˚azr7′ tion are the Syndicats Agricoles. These are not culture technically co-operative societies; they are rather '» France trade unions, not indeed of wage-earners only, or and * l } er mainly, but of cultivators. They cannot legally trade, " r * es '

being constituted for the study and protection of the general interests of the members, the spread of information, and so forth. Their principal object however, seems in many cases to be to combine their members for the purchase of all farm requisites and especially of chemical manures. This they do by collecting, sorting and passing on orders. They cannot usually manage selling in common without the intervention of a society specially registered for that object. Beginning only in 1893, .their number long ago ran into thousands and their membership into hundreds of thousands, drawn from all classes of cultivators and landowners, great and little. Among much other good work they have led to the formation of a large number of strictly co-operative societies for all the purposes of agriculture, except cultivation in common. Thus there are two thousand agricultural banks, besides butter factories, distilleries, associations for threshing, for sale of fruit and vegetables, for wine-making, oil-pressing, and so on, amounting altogether to some hundreds. There are also societies, mostly of ancient date, engaged in making Gruyere cheese: a few years ago these numbered 2000, but they are dwindling. Lastly, there are some eight thousand mutual insurance societies organized as agricultural syndicates.

Everywhere the main features of this agricultural movement are similar to those we have seen in Denmark and Ireland; it is supplementary to individual cultivation; hardly ever does it appear as associations for cultivating in common, and, speaking with certain important exceptions, it has no very ideal aims, but seeks chiefly to give the farmer a better profit. In England there are a number of farms worked ‘ by stores, and several large associations for the supply of farm requisites; but the typical agricultural co-operation, based on small village societies and federations of such societies, has only recently been made known and begun to take root.

It is notable that while the Syndicats agricoles are almost exactly what Fourier, the Robert Owen of France, foresaw as the next stage of social development, the other great branch of French co-operation, the workshop movement of the Associations

ouvrieres de production, is directly due to his teaching, which led in 1848 to the starting of a large number of co-operative p workshops. The suppression of association after the

and co- advent of Napoleon III. killed most of them, but operative with the return of liberty they revived and they have produc- steadily increased ever since. They vary somewhat among themselves, but are in the main combinations of workmen to carry on their industries with their own capital or that of their trade unions. Their chief difference from English co-partnership societies is that they very rarely admit to member- ship any persons not belonging to the trade. They are engaged in a great variety of industries, selling comparatively little to co-operative distributive societies, as English co-partnership societies do, but taking contracts from government depart- ments and the municipalities, and supplying the general public. Complete statistics of their total trade are not available, but it exceeds £2,000,000, and the separate societies seem to vary, like the majority of English co-partnership societies, from about £40,000 a year downwards, a few being larger but the great majority small. From about 140 societies in 1896 they have grown to between two and three times that number, and the increase continues with rapidity. More than two hundred of them are federated in the Chambre consultative des associations ouvrihres de production, which looks after certain business inr terests of the societies, and also assists the formation of new ones by propaganda and advice. In Paris alone about a third of these societies are found.

It has been objected that their growth is artificial inasmuch as the government gives them certain advantages, such as pre- ference over the private contractor at an equal price, exemption from the deposit of security, and special concessions as to payments on account. It also grants a subvention (recently about £7000 per annum), which was formerly all given to the societies in grants, but is now largely lent to them at not more than 2% interest through their own special bank. This bank was founded in 1893 to help the societies with loans and discounts, and was soon after endowed by a disciple of Fourier with £20,000. The societies have also benefited by other private beneficence and public help. As to the Government aid, it must be remem- bered that in France the state helps all forms of industry in ways unknown to us, and the French co-operative producers always declare that what is done for them is a trifle compared to what is done for other manufacturers. Moreover, they get many large contracts in open and unaided competition. In these societies the auxiliaires, or workers who are not members, are often numerous; but no society is now admitted to their federation which does not' share profits with the auxiliaires and facilitate their admission to membership.

Consumers' co-operation, credit co-operation, agricultural co-operation, and workshop co-operation, as exemplified in Great Britain,

Germany, Denmark and France, are found in most advanced countries, some in one and some in another, in forms roughly similar to those above described. Of co- operation for production it might have been said, a few years ago, that outside Great Britain it everywhere meant associations of producers. Except bakeries, there was but little consumers' production; that, however, seems now to be spreading in foreign countries also. The most important developments of co-operation not yet described are the socialist co-operation of Belgium, the co-operative building societies of the United States, the labour societies of Italy and Russia, the co-operation of German craftsmen to provide themselves with raw material, and the letting out of railway construction to temporary co-operative groups of workmen by the New Zealand and Victorian governments.

In Belgium co-operation is mostly socialist in the towns and Catholic in the country. In all the principal industrial centres are very important co-operative bakeries and distributive societies, owned by co-operative groups, numbering thousands of workmen of every calling. These Maisons du peuple are admitted to be well managed, even by those who dislike their politics. The socialist party look upon them chiefly as a means

of organizing and educating the working classes for political and economic emancipation, and of providing funds for political warfare. Like the English stores, and allied societies, they are based on the consumer, but unlike them they pay no interest on share capital, though they do on deposits. A much larger part of the profit than in England is devoted to propaganda and common purposes, though a part is also paid to the consumers individually in the form of checks exchangeable for bread or other goods. The workers employed also receive a share of profit as a dividend on their wages, and elect their repre- sentatives on the committee of management. By means of these societies the party has a press, buildings, and the funds to fight elections and support members in parliament. In France, where the store movement has been of an individualistic, and often middle class, tendency, the socialists have lately imitated the example of Belgium, and seem to be winning more success than the older French stores.

In the United States there has long been much important agricultural co-operation, and there have been many much-ad- vertised attempts to establish Rochdale co-operation, but there have so often been failures and even dishonesties that co-opera- tion has had a bad odour in the country, and the developments come and go with such rapidity that it is difficult to speak with confidence of its stability. The branch of co-operation which has been a great success in the United States

consists of the great co-operative building societies, but building societies are not considered part of the co-operative movement in Great Britain.

Co-operation of all kinds is greatly developed in Italy, but one form is specially notable. The Societa di lavoro are co- operative labour gangs of great importance. They are counted by hundreds, and are found among navvies, builders, masons, carriers, stevedores, agricultural labourers and other workmen, and have carried out very great works in Italy and in foreign countries. They have, for instance, drained' lands in the Cam- pagna and made a railway in Greece. They differ from pro- ductive societies markedly in that they have comparatively little to do with capital or material, but contract mainly for labour.

The Slavonic races seem to have a special aptitude for grouping together co-operatively: it is said that men meeting casually on a journey will do so for the brief time they are together. In countries like Servia we see this ancient, and more or less cus- tomary, loose and unstable co-operation meeting the modern contractual, permanent co-operation of banks and other registered societies. So in Russia, where so large a part in the national organization is played by the Artel (see Russia), which may be a transitory co-operative group of workmen undertaking a particular piece of work, e.g. to build a house, or a permanent association like that of the bank porters combined together to guarantee one another's honesty.

While English and some other forms of co-operation have always repudiated state help, and probably rightly, so far as their own work is concerned, the state in almost all g tate j, e j B countries, and conspicuously in England, has in fact helped to the extent of providing special legislation, and waiving fees, so as to encourage the formation of co-operative societies. A second form of state help is very noticeable in the modern development of agriculture, as in Denmark, Canada, New Zealand, Ireland and very many countries, where the state has played a great part in performing or assisting functions which neither voluntary association nor individual enterprise could well perform alone; in providing technical education, expert advisers, exhibitions and prizes; in distributing information in all forms; in finding out markets, controlling railway rates, subsidizing steamboats, and even grading, branding, warehousing and freezing produce, and maintaining trade agents abroad. These things have not been done for co-operative societies alone, but for agriculture in general; but co-operation has chiefly benefited, and much has been done expressly to encourage the formation of associations of cultivators, and provincial and national federations of such associations; and government

departments of agriculture are found acting through such bodies, and with their advice and assistance. The third and most Questionable

Con- clusion.

form of state help is by direct subventions, and we have seen how much has been done in this way for credit co-operation and particularly agricultural credit. Harm has undoubtedly been done in certain cases by forcing co-operative societies, whether from political motives or merely mistaken policy. Yet even as to money subventions, good authorities, while admitting the great dangers, remain convinced that the advantages overbalance them, self-help being evoked, and helped over initial difficulties which would otherwise be insuperable. Experience in fact shows that governments can do a very great deal, at least for agricultural co-operation, but only on condition that they encourage, and do not undermine, self-help and private initiative. Thus while voluntary association is sometimes advocated as a step towards, and sometimes on the other hand as a substitute for, and bulwark against, state socialism, we find in practice these two forces working each in its own sphere, and in ways com- plementary one to the other, while underlying and essential to both is the force of individual action and self-help.

We have now surveyed co-operation in its chief forms and in some of the countries where it is chiefly found. Some years ago it was roughly estimated that the members of one or other of its branches numbered six millions, represent- ing with their families a population of 25,000,000 people. This must be much within the truth to-day. In no other country so much as in Great Britain do we find the tendency for all branches of co-operation to federate in one union and to help one another by mutual trade. Yet everywhere the instinct of co-operative societies is to federate with others — at least with others of their own particular shade; so that Wholesales and other federations are found more and more in many countries. Since 1895 the co-operators and co-operative societies of many far-distant lands — almost of the whole world — have been drawn together by the International Co-operative Alliance, a body which, without attempting to interfere in their differences, collects information from all, and distributes it to all, keeps them all in touch, and every few years calls their delegates to- gether in congress, to discuss their problems, and to remember their common ideals.

Bibliography. — International Co-operative Alliance, Interna- tional Co-operative Bibliography (London, 1906) ; G. J. Holyoake, History of Co-operation (London, 1875-1879, new ed., 1906), History of the Rochdale Pioneers (London, 1893, new ed., 1900), Self-Help a Hundred Years Ago (London; 3rd ed., 1891), Co-operative Movement of To-day (London, 1891, new ed., 1896); Lloyd Jones, Life and Times and Labours of Robert Owen (London, 1890, new ed., 1895); F. Podmore, Robert Owen (London, 1906) ; E. T. Craig, History of Ralahine (London, 1882, new ed., 1893); Thomas Hughes and E. V. Neale, A Manual for Co-operators (Manchester, 1881, 1888); Catherine Webb (editor), Industrial Co-operation (Manchester, 1904) ; Beatrice Potter (Mrs Sidney Webb), Co-operative Movement in Great Britain (London, 1891, 1893, 1904); A. H. D. Acland and B. Jones, Working Men Co-operators (1898); Benjamin Jones, Co-operative Production (London, 1894); C. R. Fay, Co-operation at Home and Abroad (London, 1908); H. D. Lloyd, Labour Co-partnership (London and New York, 1898) ; D. F. Schloss, Methods of Industrial Remuneration (London, 2nd ed., 1894) ; N. P. Gilman, Profit Sharing (London, 1892); C. Robert, Guide pratique de la participation (Paris, 1892); Aneurin Williams, Twenty-eight Years of Co-partnership at Guise (Letchworth, 1908), Relations of Co-operative Movement to National and International Commerce (Manchester, 1896) ; Dallet-Fabre-Prudhommeaux, Le Familistere illustre (Paris, 1901); Bernadot, Le Familistere de Guise (Guise, 1892); E. O. Greening, The Co-operative Traveller Abroad (London, 1888); H. W. Wolff, People's Banks (London, 1893, 1896), Co-operative Banking, its Principles and Practice, with a chapter on Co-operative Mortgage Credit (London, 1907) ; de Rocquigny, La Co-operation de pro- duction dans l' agriculture (Paris, 1896); Merlin, Les Associations ouvrieres et patronales, &c. (Paris, 1900) ; Mabilleau and others, La Prevoyance sociale en Italie (Paris, 1898); Fr. Miiller, Wesen, Grundsatze und Nutzen der Consumvereine (Basel, 1900). See also the annual Reports of the Government Labour Departments, and the Monthly Bulletin of the Internat. Co-op. Alliance. (A. Wl.*)

COOPERSTOWN, a village and the county-seat of Otsego county, New York, U.S.A., where the Susquehanna river emerges from Otsego Lake; about 92 m. (by rail) W. of Albany. Pop. (1890) 2657; (1900) 2368; (1905) 2446; (1910) 2484. It is served by the Cooperstown & Charlotte Valley railway (owned and controlled by the Delaware & Hudson), and is on the line of

the Oneonta & Mohawk Valley electric railway. The village lies in the midst of a hop-growing and dairying region, and has cheese factories and creameries. It has a public library, Thanks- giving hospital, a

Y.M.C.A. hall, and the Diocesan orphanage (Protestant Episcopal). Cooperstown is a summer resort, Otsego Lake (9 m. long and with an average width of about 1 m.), the ” Glimmerglass ” of Cooper’s novels, being one of the most picturesque of the New York lakes. Cooperstown occupies the site of an old Indian town. In 1 785 the site became the property of Judge William Cooper, who in the following year founded there a village which took his name and was incorporated in 1807. Judge Cooper himself settled here with his family in 1790. His son, James Fenimore Cooper, who lived here for many years and is buried in the Episcopal cemetery here, made the region famous in his novels.

See J. Fenimore Cooper, The Chronicles of Cooperstown (Coopers-town, 1838).

COOPER UNION, a unique educational and charitable institu- tion ” for the advancement of science and art ” in New York city. It is housed in a brownstone building in Astor Place, between 3rd and 4th Avenues immediately N. of the Bowery, and was founded in 1857-1859 by Peter Cooper, and chartered in 1859. In a letter to the trustees accompanying the trust-deed to the property, Cooper said that he wished the endowment to be ” for ever devoted to the advancement of science and art, in their application to the varied and useful purposes of life “; provided for a reading-room, a school of art for women, and an office in the Union, ” where persons may apply … for the services of young men and women of known character and qualifications to fill the various situations “; expressed the desire that students have monthly meetings held in due form, ” as I believe it to be a very important part of the education of an American citizen to know how to preside with propriety over a deliberative assembly”; urged lectures and debates exclusive of theological and party questions; and required that no religious test should ever be made for admission to the Union. Cooper’s most efficient assistant in the Union was Abram S. Hewitt. In 1900 Andrew Carnegie put the finances of the Union on a sure footing by gifts aggregating $600,000. For the year 1907 its revenue was $161,228 (including extraordinary receipts of $25,565, from bequests, &c), its expenditures $161,390; at the same time its assets were $3,870,520, of which $1,070,877 was general endowment, building and equipment, and $2,797,728 was special endowments ($205,000 being various endowments by Peter Cooper; $340,000, the William Cooper Foundation; $600,000, the Cooper-Hewitt Foundation; $391,656, the John Halstead Bequest; $217,820, the Hewitt Memorial Endowment). The work has been very successful, the instruction is excellent, and the interest of the pupils is eager. All courses are free. The reading-room and library contain full files of current journals and magazines; the library has the rare complete old and new series of

patent office reports, and in 1907 had 45,760 volumes; in the same year there were 578,582 readers. There is an excellent museum for the arts of decoration. Apart from valuable lecture courses, the principal departments of the Union, with their attendance in 1907, were: a night school of science— a five-year course in general science (667) and in chemistry (154), a three-year course in electricity (114), and a night school of art (!333); a day school of technical science — four years in civil, mechanical or electrical engineering — (237); a woman's art school (282); a school of stenography and typewriting for women (55); a school of telegraphy for women (31); a class in elocution (96); and classes in oratory and debate (146). During the year 2505 was the highest number in attendance at any time, and then 3000 were on the waiting list.

In the great hall of the Union free lectures for the people are given throughout the winter; one course, the Hewitt lectures, in co-operation with Columbia University, "of a very high grade, corresponding more nearly to those given by the Lowell Institute in Boston "; six (in 1907) courses in co-operation with the Board of Education of New York city, which, upon Mayor Hewitt's suggestion, made an appropriation for this work in

1887-1888, and extended such lecture courses to different parts of the city, all under the direction (after 1890) of Henry M. Leipziger (b. 1854), and several courses dealing especially with social and political subjects, and including, besides lectures and recitals, public meetings for the discussion of current problems.

CO-OPTATION (from Lat. co-optare; less correctly " co- option ") , the election to vacancies on a legislative, administrative or other body by the votes of the existing members of the body, instead of by an outside constituency. Such bodies may be purely co-optative, as the Royal Academy, or may be elective with power to add to the numbers by co-optation, as municipal corporations in England.

COORG (an anglicized corruption of Kodagu, said to be derived from the Kanarese Kudu, " steep," " hilly "), a province of India, administered by a commissioner, subordinate to the governor- general through the resident of Mysore, who is officially also chief commissioner of Coorg. It lies in the south of the peninsula, on the plateau of the Western Ghats, sloping inland towards Mysore. It is an

attractive field of coffee cultivation, though the greater part is still under forest, but the prosperity of the industry has declined since 1891. The administrative head- quarters are at Mercara (pop. 6732). Coorg is the smallest province in India, its area being only 1582 sq. m. Of this amount about 1000 sq. m. consist of ghat, reserved and other forests. Coorg was constituted a province not on account of its size, but on account of its isolation. It lies at the top of the Western Ghats, and is cut off by them from easy communication with the British districts of South Kanara and Malabar, which form its western and southern boundaries, while on its other sides it is surrounded by the native state of Mysore. It is a mountainous district, presenting throughout a series of wooded hills and deep valleys; the lowest elevations are 3000 ft. above sea-level. The loftiest peak, Tadiandamol, has an altitude of 5729 ft.; Pushpagiri, another peak, is 5626 ft. high. The prin- cipal river is the Cauvery, which rises on the eastern side of the Western Ghats, and with its tributaries drains the greater part of Coorg. Besides these there are several large streams that take their rise in Coorg. In the rainy season, which lasts during the continuance of the southwest monsoon, or from June to the end of September, the rivers flow with violence and great rapidity. In July and August the rainfall is excessive, and the month of November is often showery. The yearly rainfall may exceed 160 in.; in the dense jungle tract it reaches from 120 to 150; in the bamboo district in the west from 60 to 100 in. The climate, though humid, is on the whole healthy; it is believed to have been rendered hotter and drier by the clearing of forest land. Coorg has an average temperature of about 60° F., the extremes being 52° and 82 . The hottest season is in April and May. In the direction of Mysore the whole country is thickly wooded; but to the westward the forests are more open. The flora of the jungle includes Michelia (Chumpak), Mesua (Iron- wood), Diospyros (Ebony and other species), Cedrela toona (White cedar), Chickrassia tubularis (Red cedar), Calophyllum angustifolium (Poon spar), Canarium slrictum (Black Dammar tree), Artocarpus, Dipterocarpus, Garcinia, Euonymus, Cinna- momum iners, Myristica, Vaccinium, Myrtaceae, Melastomaceae, Rubus (three species) , and a rose. In the undergrowth are found cardamom, areca, plantain, canes, wild pepper, tree and other ferns, and arums. In the forest of the less thickly-wooded bamboo country in the west of Coorg the trees most common are the Dalbergia latifolia (Black wood) , Pterocarpus marsupium (Kino tree), Terminalia coriacea (Mutti), Lager stromia parviflora (Benteak), Conocarpus lalifolius (Dindul), Bassia latifolia, Butea frondosa, Nauclea parviflora, and several acacias, with which, in the eastern part of the district, teak and sandalwood occur. Among the fauna may be mentioned the elephant, tiger, tiger- cat, cheetah or hunting

leopard, wild dog, elk, bison, wild boar, several species of deer, hares, monkeys, the buceros and various other birds, the cobra di capello, and a few alligators. The most interesting antiquities of Coorg are the earth redoubts or war- trenches {kadangas) , which are from 15 to 25 ft. high, and provided with a ditch 10 ft. deep by 8 or 10 ft. wide. Their linear extent is

reckoned at between 500 and 600 m. They are mentioned in inscriptions of the 9th and 10th centuries. The exports of Coorg are mainly rice, coffee and cardamoms; and the only important manufacture is a kind of coarse blanket. Fruits of many descriptions, especially oranges, are produced in abund- ance, and are of excellent quality.

In 1901 the population was 180,607, showing an increase of 4-4 % in the decade. Of the various tribes inhabiting Coorg, the Coorgs proper, or Kodagas, and the Yeravas, or Eravas, both special to the country, are the most numerous. The Kodagas (36,091) are a light-coloured race of unknown origin. They constitute a highland clan, free from the trammels of caste, and they have the manly bearing and independent spirit natural in men who have been from time immemorial the lords of the soil. Their religion consists of ancestor- and demon-worship, with a certain admixture of Brahman cults. The men are by tradition warriors and hunters, and while they will plough the fields and reap the rice,they leave all menial work to the women and servants . They speak Kodagu, a dialect of Hala Kannada or old Kanarese, midway between that and Malayalam. It has been asserted that the institution of polyandry was prevalent among them, according to which the brothers of a family had their wives in common. But if this institution ever existed it no longer does so. The Yeravas (14,586) are a race of an altogether inferior type, dark-skinned and thick-lipped, resembling the Australian aborigines who possibly, according to one theory, may have sprung from the same Dra vidian stock (see Australia: Abor- igines). Though now nominally free, they were, before the establishment of British rule, the hereditary praedial slaves of the Kodagas. Some of them live a primitive life in the jungle, but the majority earn a livelihood as coolies. They are demon- worshippers, their favourite deity being Karingali (black Kali). Their language, a dialect of Malayalam, is peculiar to them. Among the other tribes or castes special to Coorg are the Heggades (1503 in 1901), cultivators from Malabar; the Ayiri (898), who constitute the artisan caste; the Medas (584), who are basket- and mat-makers, and act as drummers at feasts; the Binepatta (98), originally wandering musicians from Malabar, now agri- culturists; the Kavadi (49), cultivators from Yedenalknad; all these speak the Coorg language, wear the Coorg

dress, and conform, more or less, to Coorg customs. Other tribes are not special to Coorg. Of these the Holeyas (27,000) are the most numerous. They are divided into four sections: Badagas from Mysore, Kembattis and Maringis from Malabar, Kukkas from S. Kanara. They were formerly the slaves of the Kodagas and now act as their menials. The Lingayats (8700) are rather a religious sect than a tribe. Of the Tulu (farmer) class the Gaudas (1 1 ,900) , who live principally along the western boundary, are the most important; they speak Tulu and wear the Coorg dress. Other castes and tribes are the Tiyas (1500) and Nayars (1400), immigrants from Malayalam; the Vellala (1300), who are Tamils; the Mahrattas (2400) and Brahmans (1100). Of the Mussulmans the most numerous are the Moplahs (6700) and the Shaikhs (4400), both chiefly traders. Of native Christians there are upwards of 3000. The official language of Coorg, which is that spoken by 45 % of the population, is Kanarese (Kannada), the Coorg language (Kodagu) coming next. The Coorg dress is very picturesque, its characteristics being a long coat (Kupasa), of dark-coloured cloth, reaching below the knees, folded across and confined at the waist by a red or blue girdle. The sleeves are cut off below the elbow, showing the arms of a white shirt. The head-dress is a red kerchief, or a peculiar large, flat turban, covering the back of the neck. The Coorg also carries a short knife, with an ivory or silver hilt, fastened with silver chains and stuck into the girdle. A large, broad- bladed waist knife, akin, to the kukri of the Gurkhas, worn at the back, point upwards, was formerly a formidable weapon in hand-to-hand fighting, but is now used only for exhibitions of strength and skill on festive occasions.

The chief crops are rice and coffee. Some abandoned coffee land has been planted with tea as an experiment. The cultiva- tion of cinchona has proved unprofitable. There is no railway.

There are no colleges, but twenty-four scholarships are given to maintain Coorg students at colleges in Madras and Mysore. There are secondary schools at Mercara and Virarajendrapet.

The early accounts of Coorg are purely legendary, and it was not till the 9th and 10th centuries that its history became the subject of authentic record. At this period, according to in- scriptions, the country was ruled by the Gangas of Talakad, under whom the Changalvas, kings of Changa-nad, styled later kings of Nanjarayapatna

or Nanjarajapatna, held the east and part of the north of Coorg, together with the Hunsur taluk in Mysore. After the overthrow, in the nth century, of the Ganga power by the Cholas, the Changalvas became tributary to the latter. When the Cholas in their turn were driven from the Mysore country by the Hoysalas, in the 12th century, the Changalvas held out for independence; but after a severe struggle they were subdued and became vassals of the Hoysala kingr. In the 14th century, after the fall of the Hoysala rule, they passed under the supremacy of the Vijayanagar empire. During this period, at the beginning of the 16th century, Nanja Raja founded the new Changalva capital Nanjarajapatna. In 1589 Piriya Raja or Rudragana rebuilt Singapatna and renamed it Piriyapatna (Periapatam). The power of the Vijayanagar empire had, however, been broken in 1565 by the Mahommedans; in 1 6 10 the Vijayanagar viceroy of Seringapatam was ousted by the raja of Mysore, who in 1644 captured Piriyapatna. Vira Raja, the last of the Changalva kings, fell in the defence of his capital, after putting to death his wives and children.

Coorg, however, was not absorbed in Mysore, which was hard pressed by other enemies, and a prince of the Ikkeri or Bednur family (perhaps related to the Changalvas) succeeded in bringing the whole country under his sway, his descendants continuing to be rajas of Coorg till 1834. The capital was removed in 1681 by Muddu Raja to Madikeri or Mercara. In 1770 a disputed succession led to the intervention of Hyder Ali of Mysore in favour of Linga Raja, who had fled to him for help, and whom he placed on the throne on his consenting to cede certain terri- tories and to pay tribute. On Linga Raja's death in 1780 Hyder Ali interned his sons, who were minors, in a fort in Mysore, and, under pretence of acting as their guardian, installed a Brahman governor at Mercara with a Mussulman garrison. In 1782, however, the Coorgs rose in rebellion and drove out the Mahom- medans. Two years later Tippoo Sultan reduced the country; but the Coorgs having again rebelled in 1785 he vowed their destruction. Having secured some 70,000 of them by treachery, he drove them to Seringapatam, where he had them circum- cised by force. Coorg was partitioned among Mussulman proprietors, and held down by garrisons in four forts. In 1788, however, Vira Raja (or Vira Rajendra Wodeyar), with his wife and his brothers Linga Raja and Appaji, succeeded in escaping from his captivity, at Periapatam and, placing himself at the head of a Coorg rebellion,- succeeded in driving the forces of Tippoo out of the country. The British, who were about to enter on the struggle with Tippoo, now made a treaty with Vira Raja; and during the war that followed the Coorgs proved invaluable allies. By the treaty of peace Coorg, though not adjacent to the East India Company's territories,

was included in the cessions forced upon Tippoo. On the spot where he had first met the British commander, General Abercromby, the raja founded the city of Virarajendrapet.

Vira Raja, who, in'consequence of his mind becoming unhinged, was guilty towards the end of his reign of hideous atrocities, died in 1809 without male heirs, leaving his favourite daughter Devammaji as rani. His brother Linga Raja, however, after acting as regent for his niece, announced in 181 1 his own assump- tion of the government. He died in 1820, and was succeeded by his son Vira Raja, a youth of twenty, and a monster of sensuality and cruelty. Among his victims were all the members of the families of his predecessors, including Devammaji. At last, in 1832, evidence of treasonable designs on the raja's part led to inquiries on the spot by the British resident at Mysore, as the result of which, and of the raja's refusal to amend his ways, a British force marched into Coorg in 1834. On the nth of April

the raja was deposed by Colonel Fraser, the political agent with the force, and on the 7th of May the state was formally annexed to the East India Company's territory. In 1852 the raja, who had been deported to Vellore, obtained leave to visit England with his favourite daughter Gauramma, to whom he wished to give a European education. On the 30th of June she was baptized, Queen Victoria being one of her sponsors; she after- wards married a British officer who, after her death in 1864, mysteriously disappeared together with their child. Vira Raja himself died in 1 863 , and was buried in Kensal Green cemetery.

The so-called Coorg rebellion of 1837 was really a rising of the Gaudas, due to the grievance felt in having to pay taxes in money instead of in kind. A man named Virappa, who pre- tended to have escaped from the massacre of 1820, tried to take advantage of this to assert his claim to be raja, but the Coorgs remained loyal to the British and the attempt failed. In 186 1, after the Mutiny, the loyalty of the Coorgs was rewarded by their being exempted from the Disarmament Act.

See " The Coorgs and Yeravas," by T. H. Holland in the Journal of the Asiatic Society of Bengal, vol. Ixx. part iii. No. 2 (1901); Rev. G. Richter, Castes and Tribes found in the Province of Coorg (Bangalore, 1887) ; Imperial Gazetteer of India (Oxford, 1908), vol. xi. s.v., where, besides an admirable account of the country and its inhabitants, the history of Coorg is dealt with in some detail.

COORNHERT, DIRCK VOLCKERTSZOON (1522-1590), Dutch

politician and theologian, youngest son of Volckert Coornhert, cloth merchant, was born at Amsterdam in 1522. As a child he spent some years in Spain and Portugal. Returning home, he was disinherited by his father's will, for his marriage with Cornelia (Neeltje) Simons, a portionless gentlewoman. He took for a time the post of major-domo to Reginald (Reinoud), count of Brederode. Soon he settled in Haarlem, as engraver on copper, and produced works which retain high values. Learning Latin, he published Dutch translations from Cicero, Seneca and Boetius. He was appointed secretary to the city (1562) and secretary to the burgomasters (1564). Throwing himself into the struggle with Spanish rule, he drew up the manifesto of William of Orange (1566). Imprisoned at the Hague (1568), he escaped to Cleves, where he maintained himself by his art. Recalled in 1572, he was secretary of state for a short time; his aversion to military violence led him to return to Cleves, where William continued to employ his services and his pen. As a religious man, he wrote and strove in favour of tolerance, being decidedly against capital punishment for heretics. He had no party views; the Heidelberg catechism, authoritative in Holland, he criticized. The great Arminius, employed to refute him, was won over by his arguments. He died at Gouda on the 29th of October 1590. His Dutch version of the New Testament, following the Latin of Erasmus, was never completed. His works, in prose and verse, were published in 1630, 3 vols.

See F. D. J. Moorrees, Dirck Volckertszoon Coornhert (1887); N. Delvenne, Biog. des Pays-Bas (1829); A. J. van der Aa, Biog. Woordenboek der Nederlanden (1855). (A. Go.*)

COOT, a well-known water-fowl, the Fulica atra of Linnaeus, belonging to the family Rallidae or rails. The word coot, in some parts of England pronounced cute, or scute, is of uncertain origin, but perhaps cognate with scout and scoter — both names of aquatic birds — a possibility which seems to be more likely since the name " macreuse," by which the coot is known in the south of France, being in the north of that country applied to the scoter (Oedemia nigra) shows that, though belonging to very different families, there is in popular estimation some connexion between the two birds. 1 The Latin Fulica (in polite French, Fouique) is probably allied to fuligo, and has reference to the bird's dark colour. 2 The coot breeds abundantly in many of the larger inland waters of the northern parts of the Old World, in winter commonly resorting, and often in great numbers, to the mouth of rivers or shallow bays of the sea, where it becomes a general object of pursuit by gunners whether for sport or gain.

1 It is owing to this interchange of their names that Yarrell in his British Birds refers Victor Hugo's description of the " chasse aux macreuses " to the scoter instead of the coot.

2 Hence also we have Fulix or Fuligula applied to a duck of dingy appearance, and thus forming another parallel case.

At other times of the year it is comparatively unmolested, and being very prolific its abundance is easily understood. The nest is a large mass of flags, reeds or sedge, piled together among rushes in the water or on the margin, and not unfrequently contains as many as ten eggs. The young, when first hatched, are beautiful little creatures, clothed in jet-black down, with their heads of a bright orange-scarlet, varied with purplish-blue. This brilliant colouring is soon lost, and they begin to assume the almost uniform sooty-black plumage which is worn for the rest of their life; but a characteristic of the adult is a bare patch or callosity on the forehead, which being nearly white gives rise to the epithet " bald " often prefixed to the bird's name. The coot is about 18 in. in length, and will sometimes weigh over 2 lb. Though its wings appear to be short in proportion to its size, and it seems to rise with difficulty from the water, it is capable of long-sustained and rather rapid flight, which is performed with the legs stretched out behind the stumpy tail. It swims buoyantly, and looks a much larger bird in the water than it really is. It dives with ease, and when wounded is said frequently to clutch the weeds at the bottom with a grasp so firm as not even to be loosened by death. It does not often come on dry land, but when there, marches leisurely and not without a certain degree of grace. The feet of the coot are very remarkable, the toes being fringed by a lobed membrane, which must be of considerable assistance in swimming as well as in walking over the ooze — acting as they do like mud-boards.

In England the sport of coot-shooting is pursued to some extent on the broads and back-waters of the eastern counties — in Southampton Water and Christchurch Bay — and is often conducted battue-fashion by a number of guns. But even in these cases the numbers killed in a day seldom reach more than a few hundreds, and come very short of those that fall in the officially-organized chasses of the lakes near the coast of Langue- doc and Provence, of which an excellent description is given by the. Vicomte Louis de Dax (Nouveaux Souvenirs de chasse, &c, pp. 53-65; Paris, i860). The flesh of the coot is very variously

regarded as food. To prepare the bird for the table, the feathers should be stripped, and the down, which is very close, thick and hard to pluck, be rubbed with powdered resin; the body is then to be dipped in boiling water, which dissolving the resin causes it to mix with the down, and then both can be removed together with tolerable ease. After this the bird should be left to soak for the night in cold spring-water, which will make it look as white and delicate as a chicken. Without this process the skin after roasting is found to be very oily, with a fishy flavour, and if the skin be taken off the flesh becomes dry and good for nothing (Hawker's Instructions to Young Sportsmen; Hele's Notes about Aldeburgh).

The coot is found throughout the Palaearctic region from Iceland to Japan, and in most other parts of the world is repre- sented by nearly allied species, having almost the same habits. An African species {F. cristata), easily distinguished by two red knobs on its forehead, is of rare appearance in the south of Europe. The Australian and North American species (F. australis and F. americana) have very great resemblance to the English bird; but in South America half-a-dozen or more additional species are found which range to Patagonia, and vary much in size, one (F. gigantea) being of considerable magni- tude. The remains of a very large species (F. newtoni) were dis- covered in Mauritius, where it must have been a contemporary of the dodo, but like that bird is now extinct. (A. N.)

COOTE, SIR EYRE (1726-1783), British soldier, the son of a clergyman, was born near Limerick, and entered the 27th regiment. He saw active service in the Jacobite rising of 1745, and some years later obtained a captaincy in the 39th regiment, which was the first British regiment sent to India. In 1756 a part of the regiment, then quartered at Madras, was sent forward to join Clive in his operations against Calcutta, which was re- occupied without difficulty, and Coote was soon given the local rank of major for his good conduct in the surprise of the Nawab's camp. Soon afterwards came the battle of Plassey, which would in all probability not have taken place but for Coote's soldierly

advice at the council of war; and after the defeat of the Nawab he led a detachment in pursuit of the French for 400 m. under extraordinary difficulties. His conduct won him the rank of lieutenant-colonel and the command of the 84th regiment, newly-raised for Indian service, but his exertions seriously injured his health. In October 1759 Coote's regiment arrived to take part in the decisive struggle between French and English in the Carnatic. He took command of the forces at Madras, and in 1760 led them in the decisive victory of Wandiwash

(January 22). After a time the remnants of Lally's forces were shut up in Pondicherry. For some reason Coote was not entrusted with the siege operations, but he cheerfully and loyally supported Monson, who brought the siege to a successful end on the 15th of January 1761. Soon afterwards Coote was given the command of the East India Company's forces in Bengal, and conducted the settlement of a serious dispute between the Nawab Mir Cassim and a powerful subordinate, and in 1762 he returned to England, receiving a jewelled sword of honour from the Company and other rewards for his great services. In 1771 he was made a K.B. In 1779 he returned to India as lieutenant-general commanding in chief. Following generally the policy of Warren Hastings, he nevertheless refused to take sides in the quarrels of the council, and made a firm stand in all matters affecting the forces. Hyder Ali's progress in southern India called him again into the field, but his difficulties were very great and it was not until the 1st of June 1781 that the crushing and decisive defeat of Porto Novo struck the first heavy blow at Hyder's schemes. The battle was won by Coote under most unfavourable conditions against odds of five to one, and is justly ranked as one of the greatest feats of the British in India. It was followed up by another hard-fought battle at Pollilur (the scene of an earlier triumph of Hyder over a British force) on the 27th of August, in which the British won another success, and by the rout of the Mysore troops at Sholingarh a month later. His last service was the arduous campaign of 1782, which finally shattered a constitution already gravely impaired by hardship and exertions. Sir Eyre Coote died at Madras on the 28th of April 1783. A monument was erected to him in Westminster Abbey.

For a short biography of Coote see Twelve British Soldiers (ed. Wilkinson, London, 1899), and for the battles of Wandewash and Porto Novo, consult Malleson, Decisive Battles of India (London, 1883). An account of Coote may be found in Wilk's Historical Sketches of Mysore (18 10).

COPAIBA, or Copaiva (from Brazilian cupauba), an oleo-resin — sometimes termed a balsam — obtained from the trunk of the Copaifera Lansdorfii (natural order Leguminosae) and from other species of Copaifera found in the West Indies and in the valley of the Amazon. It is a somewhat viscous transparent liquid, occasionally fluorescent and of a light yellow to pale golden colour. The odour is aromatic and very characteristic, the taste acrid and bitter. It is insoluble in water, but soluble in absolute alcohol, ether and the fixed and volatile oils. Its approximate composition is more than 50% of a volatile oil and less than 50% of a resin. The pharmacopoeias contain the oleo-resin itself, which is given in doses of from a half to one

drachm, and the oleum copaibae, which is given in doses of from five to twenty minims, but which is inferior, as a medicinal agent, to the oleo-resin. Copaiba shares the pharmacological characters of volatile oils generally. Its distinctive features are its disagree- able taste and the unpleasant eructations to which it may give rise, its irritant action on the intestine in any but small doses, its irritant action on the skin, often giving rise to an erythematous eruption which may be mistaken for that of scarlet fever, and its exceptionally marked stimulant action on the kidneys. In large doses this last action may lead to renal inflammation. The resin is excreted in the urine and is continually mistaken for albumin since it is precipitated by nitric acid, but the precipitate is re-dissolved, unlike albumin, on heating. Its nasty taste, its irritant action on the bowel, and its characteristic odour in the breath, prohibit its use — despite its other advantages — in all diseases but gonorrhoea. For this disease it is a valuable

remedy, but it must not be administered until the acute symptoms have subsided, else it will often increase them. It is best given in cachets or in three times its own bulk of mucilage of acacia. Various devices are adopted to disguise its odour in the breath. The clinical evidence clearly shows that none of the numerous vegetable rivals to copaiba is equal to it in therapeutic value.

COPAL (Mexican copalli, incense), a hard lustrous resin, varying in hue from an almost colourless transparent mass to a bright yellowish-brown, having a conchoidal fracture, and, when dissolved in alcohol, spirit of turpentine, or any other suitable menstruum, forming one of the most valuable varnishes. Copal is obtained from a variety of sources; the term is not uniformly applied or restricted to the products of any particular region or series of plants, but is vaguely used for resins which, though very similar in their physical properties, differ somewhat in their constitution, and are altogether distinct as to their source. Thus the resin obtained from Trachylobium Hornemannianum is known in commerce as Zanzibar copal, or gum anime. Mada- gascar copal is the produce of T. verrucosum. From Guibourtia copallifera is obtained Sierra Leone copal, and another variety of the same resin is found in a fossil state on the west coast of Africa, probably the produce of a tree now extinct. From Brazil and other South American countries, again, copal is obtained which is yielded by TrachylobiumMartianum, Hymenaea Courbaril, and various other species, while the dammar resins and the piney varnish of India are

occasionally classed and spoken of as copal. Of the varieties above enumerated by far the most important from a commercial point of view is the Zanzibar or East African copal, yielded by Trachylobium Horne- mannianum. The resin is found in two distinct conditions: (i) raw or recent, called by the inhabitants of the coast sanda- rusiza miti or chakazi, the latter name being corrupted by Zanzibar traders into ” jackass ” copal; and (2) ripe or true copal, the sandarusi inti of the natives. The raw copal, which is obtained direct from the trees, or found at their roots or near the surface of the ground, is not regarded by the natives as of much value, and does not enter into European commerce. It is sent to India and China, where it is manufactured into a coarse kind of varnish. The true or fossil copal is found embedded in the earth over a wide belt of the mainland coast of Zanzibar, on tracts where not a single tree is now visible. The copal is not found at a greater depth in the ground than 4 ft., and it is seldom the diggers go deeper than about 3 ft. It occurs in pieces varying from the size of small pebbles up to masses of several ounces in weight, and occasionally lumps weighing 4 or 5 lb have been obtained. After being freed from foreign matter, the resin is submitted to various chemical operations for the purpose of clearing the ” goose-skin,” the name given to the peculiar pitted-like surface possessed by fossil copal. The goose-skin was formerly supposed to be caused by the impression of the small stones and sand of the soil into which the soft resin fell in its raw condition; but it appears that the copal when first dug up presents no trace of the goose-skin, the subsequent appearance of which is due to oxidation or inter- molecular change.

COPALITE, or Copaline, also termed ” fossil resin ” and ” Highgate resin,” a naturally occurring organic substance found as irregular pieces of pale-yellow colour in the London clay at Highgate Hill. It has a resinous aromatic odour when freshly broken, volatilizes at a moderate temperature, and burns readily with a yellow, smoky flame, leaving scarcely any ash.

COP AN, an ancient ruined city of western Honduras, near the Guatemalan frontier, and on the right bank of the Rio Copan, a tributary of the Motagua. For an account of its elaborately sculptured stone buildings, which rank among the most cele- brated monuments of Mayan civilization, see Central America: Archaeology. The city is sometimes regarded as identical with the Indian stronghold which, after a heroic resistance, was stormed by the Spaniards, under Hernando de Chaves, in 1530. It has given its name to the department in which it is situated.

COPARCENARY (co-, with, and parcener, i.e. sharer; from O. Fr.

parcpnier, Lat. parlitio, division), in law, the descent of

lands of inheritance from an ancestor to two or more persons possessing an equal title to them. It arises either by common law, as where an ancestor dies intestate, leaving two or more females as his co-heiresses, who then take as coparceners or parceners; or, by particular custom, as in the case of gavelkind lands, which descend to all males in equal degrees, or in de- fault of males, to all the daughters equally. These co-heirs, or parceners, have been so called, says Littleton (§ 241), “because by writ the law will constrain them, that partition shall be made among them.” Coparcenary so far resembles joint tenancy in that there is unity of title, interest and possession, but whereas joint tenants always claim by purchase, parceners claim by descent, and although there is unity of interest there is no entirety, for there is no jus accrescendi or survivorship. Co- parcenary may be dissolved (a) by partition; (b) by alienation by one coparcener; (c) by all the estate at last descending to one coparcener, who thenceforth holds in severalty; (d) by a com- pulsory partition or sale under the Partition Acts.

The term ” coparcenary ” is not in use in the United States, joint heirship being considered as tenancy in common.

COPE, EDWARD DRINKER (1840-1807), American palaeon- tologist, descended from a Wiltshire family who emigrated about 1687, was born in Philadelphia on the 28th of July 1840. At an early age he became interested in natural history, and in 1859 communicated a paper on the Salamandridae to the Academy of Natural Sciences at Philadelphia. He was educated partly in the University of Pennsylvania, and after further study and travel in Europe was in 1865 appointed curator to the Academy of Natural Sciences, a post which he held till 1873. In 1864-67 he was professor of natural science in Haverford College, and in 1889 he was appointed professor of geology and palaeon- tology in the University of Pennsylvania. To the study of the American fossil vertebra ta he gave his special attention. From 1871 to 1877 he carried on explorations in the Cretaceous strata of Kansas, the Tertiary of Wyoming and Colorado; and in course of time he made known at least 600 species and many genera of extinct vertebrata new to science. Among these were some of the oldest known mammalia, obtained in New Mexico. He served on the U.S. Geological Survey in 1874 in New Mexico, in 1875 in Montana, and in 1877 in Oregon and Texas. He was also one of the editors of the American Naturalist. He died in Philadelphia on the 12th of April 1897.

Publications. — Reports for U.S. Geological Survey on Eocene Vertebrata of Wyoming (1872); on Vertebrata of Cretaceous Formations of the West (1875); Vertebrata of the Tertiary Formations of the West (1884) ; The Origin of the Fittest: Essays on Evolution (New York, 1887) ; The Primary Factors of Organic Evolution (Chicago, 1896). Memoir by Miss Helen D. King, American Geologist, Jan. 1899 (with portrait and bibliography); also memoir by P. Frazer, American Geologist, Aug. 1900 (with portrait).

COPE, EDWARD MEREDITH (1818-1873), English classical scholar, was born in Birmingham on the 28th of July 1818. He was educated at Ludlow and Shrewsbury schools and Trinity College, Cambridge, of which society he was elected fellow in 1842, having taken his degree in 1841 as senior classic. He was for many years lecturer at Trinity, his favourite subjects being the Greek tragedians, Plato and Aristotle. When the professor- ship of Greek became vacant, the votes were equally divided between Cope and B. H. Kennedy, and the latter was appointed by the chancellor. It is said that the keenness of Cope's disappointment was partly responsible for the mental affliction by which he was attacked in 1869, and from which he never recovered. He died on the 5th of August 1873. As his published works show, Cope was a thoroughly sound scholar, with perhaps a tendency to over-minuteness. He was the author of An Introduction to Aristotle's Rhetoric (1867), a standard work; The Rhetoric of Aristotle, with a commentary, revised and edited by J. E. Sandys (1877); translations of Plato's Gorgias (2nd ed., 1884) and Phaedo (revised by H. Jackson, 1875). Mention may also be made .of his criticism of Grote's account of the Sophists, in the Cambridge Journal of Classical Philology, vols, i., ii., iii. (1854-1857).

The chief authority for the facts of Cope's life is the memoir pre- fixed to vol. i. of his edition of The Rhetoric of Aristotle.

COPE (M.E. cape, cope, from Med. Lat. capa, cappa), a liturgical vestment of the Western Church. The word " cope," now confined to this sense, was in its origin identical with " cape " and " cap," and was used until comparatively modern times also for an out-door cloak, whether worn by clergy or laity. This, indeed, was its original meaning, the cappa having been an outer garment common to men and women whether clerical or lay (see Du Cange, Glossarium, s.v.). The word pluviale (rain-cloak), which the cope bears in the Roman

Church, is exactly parallel so far as change of meaning is concerned. In both words the etymology reveals the origin of the vestment, which is no more than a glorified survival of an article of clothing worn by all and sundry in ordinary life, the type of which survives, e.g. in the ample hooded cloak of Italian military officers. This origin is clearly traceable in the shape and details of the cope. When spread out this forms an almost complete semicircle. Along the straight edge there is usually a broad band, and at the neck is attached the ” hood ” (in Latin, the clypeus or shield), i.e. a shield-shaped piece of stuff which hangs down over the back. The vestment is secured in frqnt by a broad tab sewn on to one side and fastening to the other with hooks, sometimes also by a brooch (called the morse, Lat. morsus). Sometimes the morse is attached as a mere ornament to the cross-piece. The cope thus preserves the essential shape of its secular original, and even the hood, though now a mere ornamental appendage, is a survival of an actual hood. The evolution of this latter into its present form was gradual; first the hood became too small for use, then it was transformed into a small triangular piece of stuff (13th century), which in its turn grew (14th and 15th centuries) into the shape of a shield (see Plate II., fig. 4), and this again, losing its pointed tip in the 17th century, expanded in the 18th into a flap which was sometimes enlarged so as to cover the whole back down to the waist. In its general effect, however, a cope now no longer suggests a ” waterproof.” It is sometimes elaborately embroidered all over; more usually it is of some rich material, with the borders in front and the hood embroidered, while the morse has given occasion for some of the most beautiful examples of the goldsmith’s and jeweller’s craft (see Plate II., figs, s, 6).

The use of the cope as a liturgical vestment can be traced to the end of the 8th century: a pluviale is mentioned in the foundation charter of the monastery of Obona in Spain. Before this the so-called cappa choralis, a black, bell-shaped, hooded vestment with no liturgical significance, had been worn by the secular and regular clergy at choir services, processions, &c. This was in its origin identical with the chasuble (q.v.), and if, as Father Braun seems to prove, the cope developed out of this, cope ‘and chasuble have a common source. 1 Father Braun cites numerous inventories and the like to show that the cope (pluviale) was originally no more than a more elaborate cappa worn on high festivals or other ceremonial occasions, sometimes by the whole religious community, sometimes — if the stock were limited — by those, e.g. the cantors, &c, who were most con- spicuous in the ceremony. In the 10th century, partly under the influence of the wealthy and splendour-loving community of Cluny, the use of the

cope became very widespread; in the nth century it was universally worn, though the rules for its ritual use had not yet been fixed. It was at this time, however, par excellence the vestment proper to the cantors, choirmaster and singers, whose duty it was to sing the invitatorium, responses, &c, at office, and the introitus, graduale, &c, at Mass. This use survived in the ritual of the pre-Reformation Church in England, and has been introduced in certain Anglican churches, e.g. St Mary Magdalen's, Munster Square, in London.

'This derivation, suggested also by Dr Legg (Archaeol. Journal, 51, p. 39, 1894), is rejected by the five bishops in their report to Convocation (1908). Their statement, however, that it is " pretty clear " that the cope is derived from the Roman lacerna or birrus is very much open to criticism. We do not even know what the appearance and form of the birrus were; and the question of the origin of the cope is not whether it was derived from any garment of the time of the Roman Empire, and if so from which, but what garment in use in the 8th and 9th centuries it represents.

By the beginning of the 13th century the liturgical use of the cope had become finally fixed, and the rules for this use included by Pope Pius V. in the Roman Missal and by Clement VIII. in the Pontificate and Caeremoniale were consequently not new, but in accordance with ancient and universal custom. The substitution of the cope for the chasuble in many of the functions for which the latter had been formerly used was primarily due to the comparative convenience of a vestment opened at the front, and so leaving the arms free. A natural conservatism preserved the chasuble, which by the 9th century had acquired a symbolical significance, as the vestment proper to the celebration of Mass; but the cope took its place in lesser functions, i.e. the censing of the altar during the Magnificat and at Mattins (whence the German name Rauchmantel, smoke-mantel), processions, solemn consecrations, and as the dress of bishops attending synods.

It is clear from this that the cope, though a liturgical, was never a sacerdotal vestment. If it was worn by priests, it could also be worn by laymen, and it was never worn by priests in their sacerdotal, i.e. their sacrificial, capacity. For this reason it was not rejected with the "Mass vestments " by the English Church at the Reformation, in spite of the fact that it was in no ecclesiastical sense " primi- tive." By the First Prayer-book of Edward VI., which repre- sented a compromise, it was directed to be worn as an alter- native to the " vestment " (i.e. chasuble) at the celebration of the Communion; this at least seems the plain meaning of the words " vestment or cope," though they have been otherwise interpreted. In the Second Prayer -book vestment

and cope alike disappear; but TTr .

a cope was worn by the prelate Abbey!” ” *’ Westrmnster

who consecrated Archbishop

Parker, and by the ” gentlemen ” as well as the priests of Queen Elizabeth’s chapel; and, finally, by the 24th canon (of 1603) a ” decent cope ” was prescribed for the ” principal minister ” at the celebration of Holy Communion in cathedral churches as well as for the “gospeller and epistler.” Except at royal coronations, however, the use of the cope, even in cathedrals, had practically ceased in England before the ritual revival of the 19th century restored its popularity. The disuse implied no doctrinal change; the main motive was that the stiff vestment, high in the neck, was incompatible with a full-bottomed wig. Scarlet copes with white fur hoods have been in continuous use on ceremonial occasions in the universities, and are worn by bishops at the opening of parliament.

With the liturgical cope may be classed the red mantle (man- turn), which from the nth century to the close of the middle ages formed, with the tiara, the special symbol of the papal dignity. The immantatio was the solemn investiture of the new pope immediately after his election, by means of the cappa rubea, with the papal powers. This ceremony was of great importance. In the contested election of 1159, for instance, though a majority of the cardinals had elected Cardinal Roland (Alexander III.), the defeated candidate Cardinal Octavian (Victor IV.), while his rival was modestly hesitating to accept the honour, seized the pluviale and put it on his own shoulders hastily, upside down; and it was on this ground that the council of Pavia in 11 60 based their declaration in favour of Victor, and anathematized Alexander. The immantatio fell out of use during the papal exile at Avignon and was never restored.

It will be convenient here to note other vestments that have developed out of the cappa. The cappa choralis has already

Fig. 1. — Seventeenth Century

The Papal man turn.

The cappa

been mentioned; it survived as a choir vestment that in winter took the place of the surplice, rochet or almuce. In the 12th century it was provided with arms {cappa manicata), but the use of this form was forbidden at choir services magna. and other liturgical functions. From the hood of the cappa was developed the almuce (q.v.). At what date the cappa choralis developed into the cappa magna, a non-liturgical vestment peculiar to the pope, cardinals, bishops and certain privileged prelates, is not known; but mention of it is found as early as the 15th century. This vestment is a loose robe, with a large hood (lined with fur in winter and red silk in summer) and a long train, which is carried by a cleric called the caudatarius. Its colour varies with the hierarchical rank of the wearer: — red for cardinals, purple for bishops, &c; or, if the dignitary belong to a religious order, it follows the colour of the habit of the order. The right to wear a violet cappa magna is conceded by the popes to the chapters of certain important cathedrals, but the train in this case is worn folded over the left arm or tied under it. It may only be worn by them, more- over, in their own church, or when the chapter appears elsewhere in its corporate capacity.

Lastly, from the cappa is probably derived the mozzetla, a short cape with a miniature hood, fastened down the front with

buttons. The name is derived from the Italian The

mozzeita. mozzare, to cut off, and points to its being an abbrevi- ated cappa, as the episcopal ” apron ” is a shortened cassock. It is worn over the rochet by the pope, cardinals, bishops and prelateˆ, the colours varying as in the case of the cappa magna. Its use as confined to bishops can be traced to the 16th century.

See Joseph Braun, S. J., Die liturgische Gewandung (Freiburg im Breisgau, 1907) ; also the bibliography to the article Vestments.

(W. A. P.)

COPELAND, HENRY, an 18th century English cabinet-maker and furniture designer. He appears to have been the first manufacturing cabinet-maker who published designs for furni- ture. A New Book of Ornaments appeared in 1746, but it is not clear whether the engravings with this title formed part of a book, or were issued only in separate plates; a few of the latter are all that are known to exist. Between 1752 and 1769 several collections of designs were produced by Copeland in conjunction with Matthias Lock; in one of them Copeland is described as of Cheapside. Some of the original drawings

are in the National Art library at the Victoria and Albert Museum. Copeland was probably the originator of a peculiar type of chair-back, popular for a few years in the middle of the 18th century, consisting of a series of interlaced circles. Much of his work has been attributed to Thomas Chippendale, and it is certain that one derived many ideas from the other, but which was the originator and which the copyist is by no means clear. The dates of Copeland's birth and death are unknown, but he was still living in 1768.

COPENHAGEN (Danish Kjobenhavn), the capital of the kingdom of Denmark, on the east coast of the island of Zealand (Sjaelland) at the southern end of the Sound. Pop. (1901) 400,575. The latitude is approximately that of Moscow, Berwick- on-Tweed and Hopedale in Labrador. The nucleus of the city is built on low-lying ground on the east coast of the island of Zealand, between the sea and a series of small freshwater lakes, known respectively as St Jorgens So, Peblings So and Sortedams So, a southern portion occupying the northern part of the island of Amager. An excellent harbour is furnished by the natural channel between the two islands; and communication from one division to the other is afforded by two bridges — the Langebro and the Knippelsbro, which replaced the wooden drawbridge built by Christian IV. in 1620. The older city, including both the Zealand and Amager portions, was formerly surrounded by a complete line of ramparts and moats; but pleasant boule- vards and gardens now occupy the westward or landward site of fortifications. Outside the lines of the original city (about 5 m. in circuit), there are extensive suburbs, especially on the Zealand side (Osterbro, Norrebro and Vesterbro or Osterf oiled,

&c, and Frederiksberg), and Amagerbro to the south of Christianshavn.

The area occupied by the inner city is known as Gammelsholm (old island). The main artery is the Gothersgade, running from Kongens Nytorv to the western boulevards, and separating a district of regular thoroughfares and rectangular blocks to the north from one of irregular, narrow and picturesque streets to the south. The Kongens Nytorv, the focus of the life of the city and the centre of road communications, is an irregular open space at the head of a narrow arm of the harbour (Nyhavn) inland from the steamer quays, with an equestrian statue of Christian V. (d. 1699) in the centre. The statue is familiarly known as Hesten (the horse) and is surrounded by noteworthy buildings. The Palace of Charlottenborg, on the east side, which takes its name from Charlotte, the wife of Christian V., is a huge sombre building, built in 1672. Frederick V. made a grant of it to

the Academy of Arts, which holds its annual exhibition of paintings and sculpture in April and May, in the adjacent Kunstudstilling (1883). On the south is the principal theatre, the Royal, a beautiful modern Renaissance building (1874), on the site of a former theatre of the same name, which dated from 1 748. Statues of the poets Ludvig Holberg (d. 1 7 54) , and Adam Ohlenschlager (d. 1850), the former by Stein and the latter by H. V. Bissen, stand on either side of the entrance, and the front is crowned by a group by King, representing Apollo and Pegasus, and the Fountain of Hippocrene. Within, among other sculptures, is a relief figure of Ophelia, executed by Sarah Bernhardt. Other buildings in Kongens Nytorv are the foreign office, several great commercial houses, the commercial bank, and the Thotts Palais of c. 1685. The quays of the Nyhavn are lined with old gabled houses.

From the south end of Kongens Nytorv, a street called Holmens Kanal winds past the National Bank to the Holmens Kirke, or church for the royal navy, originally erected as an anchor-smithy by Frederick II., but consecrated by Christian IV., with a chapel containing the tombs of the great admirals Niels Juel and Peder Tordenskjold, and wood-carving of the 17th century. The. street then crosses a bridge on to the Slottsholm, an island divided from the mainland by a narrow arm of the harbour, occupied mainly by the Christiansborg and adjacent buildings. The royal palace of Christiansborg, originally built (1731-1745) by Christian VI., destroyed by fire in 1794, and rebuilt, again fell in flames in 1884. Fortunately most of the art treasures which the palace contained Were saved. A decision was arrived at in 1903, in commemoration of the jubilee of the reign of Christian IX., to rebuild the palace for use on occasions of state, and to house the parliament. On the Slottsplads (Palace Square) which faces east, is an equestrian statue of Frederick VII. There are also preserved the bronze statues which stood over the portal of the palace before the fire — figures of Strength, Wisdom, Health and Justice, designed by Thorvaldsen. The palace chapel, adorned with works by Thorvaldsen and Bissen, was preserved from the fire, as was the royal library of about 540,000 volumes and 20,000 manu- scripts, for which a new building in Christiansgade was designed about 1900.

The exchange (Borsen), on the quay to the east, is an ornate gabled building erected in 1619-1640, surmounted by a remark- able spire, formed of four dragons, with their heads directed to the four points of the compass, and their bodies entwining each other till their tails come to a point at the top. To the south is the arsenal (Tojkus) with a collection of ancient armour.

The Thorvaldsen museum (1839-1848), a sombre building in a combination of the Egyptian and Etruscan styles, consists of two storeys. In the centre is an open court, containing the artist's tomb. The exterior walls are decorated with groups of figures of coloured stucco, illustrative of events connected with Thorvaldsen's life. Over the principal entrance is the chariot of Victory drawn by four horses, executed in bronze from a model by Bissen. The front hall, corridors and apart- ments are painted in the Pompeian style, with brilliant colours and with great artistic skill. The museum contains about 300

COPE

Plate 1.

r

,™

■

ip

- ˆM

H

IP|

iˆˆˆˆK;ˆH

Er‘5 Py

IQfˆMˆI

ˆˆEL? ;’ *9

HHH

BH

j|S

It 1ˆ4

BS3ˆ

Iplli

<•

6

‘.’ IN

HHH

M ‘ “*

I I

rSJˆJSali

iˆi5s*»

• - e *’ 7

Fig. 2.— THE SYON COPE. (English, 13™ Century.)

The medallions with which it is embroidered contain representations of Christ on the Cross, Christ and St Mary Magdalene, Christ and Thomas, the death of the Virgin, the burial and coronation of the Virgin, St Michael and the twelve Apostles. Of the latter, four survive only in tiny fragments. The spaces between the four rows of medallions are filled with six-winged cherubim. The ground-work of the vestment is green silk embroidery, that of the medallions red. The figures are worked in silver and gold thread and coloured silks. The lower border and the orphrey with coats of arms do not belong to the original cope and arc of somewhat later date. The cope belonged to the convent of Syon near Isleworth, was taken to Portugal at the Reformation, brought back early in the 19th century to England by exiled nuns and given by them to the Earl of Shrewsbury. In 1864 it was bought by the South Kensington Museum.

G. 3.— COPE OF BLUE SILK VELVET, WITH AITLIQUE WORK AND EMBROIDERY.

In the middle of the orphrey is a figure of Our Lord holding the orb in His left hand, and with His right hand raised in benediction. To the right are figures of St Peter, St Bartholomew and St Ursula; and to the left, St Paul, St John the Evangelist and St Andrew On the hood is a seated figure of the Virgin Mary holding the Infant Saviour. GERMAN: early 16th century. (In the Victoria and Albert Museum, No. 91. 1904.)

Plate II.

COPE

Fig. 4.— COPE OF EMBROIDERED PURPLE SILK VELVET.

In the middle is represented the Assumption of the Virgin; on the hood is a seated figure of the Almighty bearing

three souls in a napkin. English, about 1500. (In the Victoria and Albert Museum.)

fit •’ ‘ X

{ ■

Fig. 5.— COPE MORSE (German, 14TH Century) IN THE CATHEDRAL AT AIX-LA-CHAPELLE.

(From a photograph by Father Joseph Braun, S. J.)

Fig. 6.

-COPE MORSE (German, Early 14TH Century), IN THE PARISH CHURCH AT ELTEN.

(From a photograph by Father Joseph Braun, S. J.)

of Thorvaldsen’s works; and in one apartment is his sitting-room furniture arranged as it was found at the time of his death in

1844.

On the mainland, immediately west of the Slottsholm, is the Prinsens Palais, once the residence of Christian V. and Frederick VI. when crown princes, containing the national museum. This consists of four sections, the Danish, ethnographical, antique and numismatic. It was founded in 1807 by Professor Nyerup, and extended between 1815 and 1885 by C. J. Thomsen and J. J. A. Worsaae, and the ethnographical Collection is among the finest in the world. From this point the Raadhusgade leads north-west to the combined Nytorv-og-

Gammeltorv, where is the old townhall (Raadhus, 1815), and continues as the Norregade to the Vor Frue Kirke (Church of our Lady), the cathedral church of Copenhagen. This church, the site of which has been similarly occupied since the 12th century, was almost entirely destroyed in the bombardment of 1807, but was completely restored in 1811-1829. The works of Thorvaldsen which it contains constitute its chief attraction. In the pediment is a group of sixteen figures by Thorvaldsen, representing John the Baptist preaching in the wilderness; over the entrance within the portico is a bas-relief of Christ's entry into Jerusalem; on one side of the entrance is a statue of Moses by Bissen, and on the other a statue of David by Jerichau. In a niche behind the altar stands a colossal marble statue of Christ, and marble statues of the twelve apostles adorn both sides of the church.

Immediately north of Vor Frue Kirke is the university, founded by Christian I. in 1479; though its existing constitution dates from 1788. The building dates from 1836. There are five faculties — theological, juridical, medical, philosophical and mathematical. In 1851 an English and in 1852 an Anglo-Saxon lectureship were established. All the professors are bound to give a series of lectures open to the public free of charge. The university possesses considerable endowments and has several foundations for the assistance of poor students; the " regent's charity," for instance, founded by Christian, affords free residence and a small allowance to one hundred bursars. There are about 2000 students. In connexion with the university are the obser- vatory, the chemical laboratory in Ny Vester Gade, the surgical academy in Bredgade, founded in 1786, and the botanic garden. The university library, incorporated with the former Classen library, collected by the famous merchants of that name, contains about,20o,ooo volumes, besides about 4000 manuscripts, which include Rask's valuable Oriental collection and the Arne-Magnean series of Scandinavian documents. It shares with the royal library the right of receiving a copy of every book published in Denmark. There is also a zoological museum. Adjacent is St Peter's church, built in a quasi-Gothic style, with a spire 256 ft. high, and appropriated since 1585 as a parish church for the German residents in Copenhagen. A short distance along the Krystalgade is Trinity church. Its round tower is in ft. high, and is considered to be unique in Europe. It was con- structed from a plan of Tycho Brahe's favourite disciple Longo- mOntanus, and was formerly used as an observatory. It is ascended by a broad inclined spiral way, up which Peter the Great is said to have driven in a carriage and four. From this church the Kjobermayergade runs south, a populous street of shops, giving upon the Hoibro-plads, with its fine equestrian statue of Bishop Absalon, the city's founder. This square is

connected by a bridge with the Slottsholm.

The quarter north-east of Kongens Nytorv and Gothersgaden is the richest in the city, including the palaces of Amalienborg, the castle and gardens of Rosenborg and several mansions of the nobility. The quarter extends to the strong moated citadel, which guards the harbour on the north-east. It is a regular polygon with five bastions, founded by Frederick III. about 1662-1663. One of the mansions, the Moltkes Palais, has a collection of Dutch paintings formed in the 18th century. This is in the principal thoroughfare of the quarter, Bredgaden, and close at hand the palace of King George of Greece faces the Frederikskirke or Marble church. This church, intended to have vii. 4

been an edifice of great extent and magnificence, was begun in the reign of Frederick V. (1749), but after twenty years was left unfinished. It remained a ruin until 1874, when it was purchased by a wealthy banker, M. Tietgen, at whose expense the work was resumed. The edifice was not carried up to the height originally intended, but the magnificent dome, which recalls the finest examples in Italy, is conspicuous far and wide. The diameter is only a few feet less than that of St Peter's in Rome. As the church stands it is one of the principal works of the architect, F. Meldahl. Behind King George's palace from the Bredgade lies the Amalienborg-plads, having in the centre an equestrian statue of Frederick V., erected in 1768 at the cost of the former Asiatic Company. The four palaces, of uniform design, encircling this plads, were built for the residence of four noble families; but on the destruction of Chris tians- borg in 1794 they became the residence of the king and court, and so continued till the death of Christian VIII. in 1848. One of the four is inhabited by the king, the second and third by the crown prince and other members of the royal family, while the fourth is occupied by the coronation and state rooms. The Ameliegade crosses the plads and, with the Bredgade, terminates at the esplanade outside the citadel, prolonged in the pleasant promenade of Lange Linie skirting the Sound.

To the west of the citadel is the Ostbanegaard, or eastern rail- way station, from which start the local trains on the coast line to Klampenborg and Helsingor. South-west from this point extends the line of gardens which occupy the site of former land- ward fortifications, pleasantly diversified by water and planta- tions, skirted on the inner side by three wide boulevards, Ostervold, Norrevold and Vestervold Gade, and containing noteworthy public buildings, mostly modern. In the Ostre Anlaeg is the art museum (1895) containing pictures, sculptures and engravings. Infrontof it is the Denmark

monument (1896), commemorating the golden wedding (1892) of Christian IX. and Queen Louisa. Among various scenes in relief, the marriage of King Edward VII. of England and Queen Alexandra is depicted. The botanical garden (1874) contains an observatory with a statue of Tycho Brahe, and the chemical laboratory, mineralogical museum, polytechnic academy (1829) and com- munal hospital adjoin it. On the inner side of Ostevold Gade is Rosenborg Park, with the palace of Rosenborg erected in 1610-1617. It is an irregular building in Gothic style, with a high pointed roof, and flanked by four towers of unequal dimen- sions. It contains the chronological collection of Danish monarchs, including a coin and medal cabinet, a fine collection of Venetian glass, the famous silver drinking-horn of Oldenburg (1474), the regalia and other objects of interest as illustrating the history of Denmark. The Riddersal, a spacious room, is covered with tapestry representing the various battles of Christian V., and has at one end a massive silver throne. The Norrevold Gade leads through the Norretorv past the Folke- teatre and the technical school to the Orsteds park, and from its southern end the Vestervold Gade continues through the Raadhus Plads, a centre of tramways, flanked by the modern Renaissance town hall (1901), ornamented with bronze figures, with a tower at the eastern angle. Here is also the museum of industrial art, and the Ny-Carlsberg Glyptotek, with its collection of sculpture, is on this boulevard, which skirts the pleasure garden called Tivoli. From the Raadhus-plads the Vesterbro Gade runs towards the western quarter of the city, skirting the Tivoli. Here is the Dansk Folke museum, a collec- tion illustrating the domestic life of the nation, particularly that of the peasantry since 1600. A column of Liberty (Friheds- Stotte) rises in an open space, erected in 1798 to commemorate the abolition of serfdom. Immediately north is the main railway station (Banegaard), and the North and Klampenborg stations near at hand. The western (residential) quarter contains the park of Frederiksberg, with its palace erected under Frederick IV. (d. 1730), used as a military school. The park contains a zoological garden, and is continued south in the pleasant Sonder- marken, near which lies the old Glyptotek, which contained the splendid collection of sculptures, &c, made by H. C. Jacobsen

since 1887, uutil their removal to the new Glyptotek founded by him in the Vestre Boulevard.

The quarter of Christianshavn is that portion of the city which skirts

the harbour to the south, and lies within the fortifications. It contains the Vor Frelsers Kirke (Church of Our Saviour), dedicated in 1696, with a curious steeple 282 ft. high, ascended by an external spiral staircase. The lower part of the altar is composed of Italian marble, with a representation of Christ's sufferings in the garden of Gethsemane; and the organ is con- sidered the finest in Copenhagen. The city does not extend much farther south, though the Amagerbro quarter lies without the walls. The island of Amager is fertile, producing vegetables for the markets of the capital. It was peopled by a Dutch colony planted by Christian II. in 1516, and many old peculiarities of dress, manners and languages are retained.

The environs of Copenhagen to the north and west are interest- ing, and the country, both along the coast northward and inland westward is pleasant, though in no way remarkable. The rail- way along the coast northward passes the seaside resorts of Klampenborg (6 m.) and Skodsborg (10 m.) . Near Klampenborg is the Dyrehave (Deer park) or Skoven (the forest), a beautiful forest of beeches. The Zealand Northern railway passes Lyngby, on the lake of the same name, a favourite summer residence, and Hillerod (21 m.), a considerable town, capital of the amt (county) of Frederiksberg, and close to the palace of Frederiksberg. This was erected in 1602-1620 by Christian IV., embodying two towers of an earlier budding, and partly occupying islands in a small lake. It suffered seriously from fire in 1859, but was care- fully restored under the direction of F. Meldahl. It contains a national historical museum, including furniture and pictures. The palace church is an interesting medley of Gothic and Re- naissance detail. The villa of Hvidore was acquired by Queen Alexandra in 1907.

Among the literary and scientific associations of Copenhagen may be mentioned the Danish Royal Society, founded in 1742, for the advancement of the sciences of mathematics, astronomy, natural philosophy, &c, by the publication of papers and essays; the Royal Antiquarian Society, founded in 1825, for diffusing a knowledge of Northern and Icelandic archaeology; the Society for the Promotion of Danish Literature, for the publication of works chiefly connected with the history of Danish literature; the Natural Philosophy Society; the Royal Agricultural Society; the Danish Church History Society; the Industrial Association, founded in 1838; the Royal Geographical Society, established in 1876; and several musical and other societies. The Academy of Arts was founded by Frederick V. in 1754 for the instruction of artists, and for disseminating a taste for the fine arts among manufacturers and operatives. Attached to it are schools for the study of architecture, ornamental drawing and modelling. An Art

Union was founded in 1826, and a musical conservatorium in 1870 under the direction of the composers N. W. Gade and J. P. E. Hartmann.

Among educational institutions, other than the university, may be mentioned the veterinary and agricultural college, established in 1773 and adopted by the state in 1776, the military academy and the school of navigation. Technical instruction is provided by the polytechnic school (1829), which is a state institution, and the school of the Technical Society, which, though a private foundation, enjoys public subvention. The schools which prepare for the university, &c, are nearly all private, but are all under the control of the state. Elementary instruction is mostly provided by the communal schools.

The churches already mentioned belong to the national Lutheran Church; the most important of those belonging to other denominations are the Reformed church, founded in 1688, and rebuilt in 1731, the Catholic church of St Ansgarius, con- secrated in 1842, and the Jewish synagogue in Krystalgade, which dates from 1853. Of the monastic buildings of medieval Copenhagen various traces are preserved in the present nomen- clature of the streets. The Franciscan establishment gives its name to the Graabrodretorv or Grey Friars' market; and St Clara's Monastery, the largest of all, which was founded by

Queen Christina, is still commemorated by the Klareboder or Clara buildings, near the present post-office. The Duebrodre Kloster occupied the site of the hospital of the Holy Ghost.

Among the hospitals of Copenhagen, besides many modern institutions, there may be mentioned Frederick's hospital, erected in 1752-1757 by Frederick V., the Communal Hospital, erected in 1859-1863, on the eastern side of the Sortedamsso, the general hospital in Ameliegade, founded in 1769, and the garrison hospital, in Rigensgade, established in 1816 by Frederick VI. After the cholera epidemic of 1853, which carried off more than 4000 of the inhabitants, the medical association built several ranges of workmen's houses, and their example was followed by various private capitalists, among whom may be mentioned the Classen trustees, whose buildings occupy an open site on the western outskirts of the city.

Copenhagen is by far the most important commercial town in Denmark, and exemplifies the steady increase in the trade of the country. The harbour is mainly comprised in the narrow strait between the outer Sound and its inlet the Kalvebod or Kallebo Strand. The trading capabilities were aided by the construction in 1894 of the

Frihavn (free port) at the northern extremity of the town, well supplied with warehouses and other conveniences. It is connected with the main railway station by means of a circular railway, while a short branch connects it with the ordinary custom-house quay. The commercial harbour is separated from the harbour for warships (Orlogshavn) by a barrier. The sea approaches are guarded by ten coast batteries besides the old citadel. The Middelgrund is a powerful defensive work completed in 1896 and most of the rest are modern. The landward defences of Copenhagen, it may be added, were left unprovided for after the Napoleonic wars until the patriotism of Danish women, who subscribed sufficient funds for the first fort, shamed parliament into granting the necessary money for others (1886-1895). Copenhagen is not an industrial town. The manufactures carried on are mostly only such as exist in every large town, and the export of manufactured goods is inconsider- able. The royal china factory is celebrated for models of Thorvaldsen's works in biscuit china. The only very large establishment is one for the construction of iron steamers, engines, &c, but some factories have been erected within the area of the free port for the purpose of working up imported raw materials duty free.

History. — Copenhagen (i.e. Merchant's Harbour, originally simply Havn, latinized as Hafnia) is first mentioned in history in 1043. It was then only a fishing village, and remained so until about the middle of the 12th century, when Valdemar I. presented that part of the island to Axel Hvide, renowned in Danish history as Absalon (q.v.), bishop of Roskilde, and after- wards archbishop of Lund. In 1167 this prelate erected a castle on the spot where the Christiansborg palace now stands, and the building was called after him Axel-huus. The settlement gradually became a great resort for merchants, and thus acquired the name which, in a corrupted form, it still bears, of Kaup- mannahofn, Kjobmannshavn, or Portus Mercatorum as it is translated by Sax© Grammaticus. In n 86, Bishop Absalon bestowed the castle and village, with the lands of Amager, on the see of Roskilde; but, as the place grew in importance, the Danish kings became anxious to regain it, and in 1245 King Eric IV. drove out Bishop Niels Stigson. On the king's death (1250), however, Bishop Jacob Erlandsen obtained the town, and, in 1254, gave to the burghers their first municipal privileges, which were confirmed by Pope Urban III. in 1286. In the charter of 1254, while there is mention of a communitas capable of making a compact with the bishop, there is nothing said of any trade or craft gilds. These are, indeed, expressly pro- hibited in the later charter of Bishop Johann Kvag (1294); and the distinctive character of the constitution of Copenhagen during the middle ages consisted in

the absence of the free gild system, and the right of any burgher to pursue a craft under license from the Vogt (advocatus) of the overlord and the city authorities. Later on, gilds were established, in spite of the pro- hibition of the old charters; but they were strictly subordinate

to the town authorities, who appointed their aldermen and sup- pressed them when they considered them useless or dangerous. The prosperity of Copenhagen was checked by an attack by the people of Liibeck in 1248, and by another on the part of Prince Jaromir of Riigen in 1259. In 1306 it managed to repel the Norwegians, but in 1362, and again in 1368, it was captured by the opponents of Valdemar Atterdag. In the following century a new enemy appeared in the Hanseatic league, which was jealous of its rivalry, but their invasion was frustrated by Queen Philippa. Various attempts were made by successive kings to obtain the town from the see of Roskilde, as the most suitable for the royal residence; but it was not till 1443 that the transference was finally effected and Copenhagen became the capital of the kingdom. From 1523 to 1524 it held out for Christian II. against Frederick I., who captured it at length and strengthened its defensive works; and it was only after a year's siege that it yielded in 1536 to Christian III. From 1658 to 1660 it was unsuccessfully beleaguered by Charles Gustavus of Sweden ; and in the following year it was rewarded by various privileges for its gallant defence. In 1660 it gave its name to the treaty which concluded the Swedish war of Frederick III. In 1700 it was bombarded by the united fleets of England, Holland and Sweden; in 1728 a conflagration destroyed 1640 houses and five churches; another in 1795 laid waste 943 houses, the church of St Nicolas, and the Raadhus. In 1801 the Danish fleet was destroyed in the roadstead by the English (see below, § Battle of Copenhagen); and in 1807 the city was bombarded by the British under Lord Cathcart, and saw the destruction of the university buildings, its principal church and numerous other edifices.

See O. Nielsen, Kobenhavns Historie oz Beskrivelse (Copenhagen, 1877-1892) ; C. Bruun and P. Munch, Kobenhavn, Skrilding aj dets Historie, &c. (ibid. 1887-1901); Bering-Liisberg, Kobenhavn i gamle Dage (ibid. 1898 et seq.). (0. J. R. H.)

Battle of Copenhagen

The formation of a league between the northern powers', Russia,

Prussia, Denmark and Sweden, on the 16th of December

1800, nominally to protect neutral trade at sea from the enforce- ment by Great Britain of her belligerent claims, led to the despatch of a British fleet to the Baltic on the 12th of March

1801. It consisted of fifty-three sail in all, of which eighteen were of the line. Prussia possessed no fleet. The nominal strength of the Russian fleet was eighty-three sail of the line, of the Danish twenty-three, and of the Swedish eighteen. But this force was for the most part only on paper. Some of the Russian ships were at Archangel, others in the Mediterranean. Of those actually in the Baltic and fit to go to sea, twelve were at Reval shut in by the ice, and the others were at Kronstadt. The Swedes could equip only eleven of the line for sea, and Denmark only seven or eight. It is highly doubtful whether the three powers could have collected more than forty ships of the line — and they would have been hastily manned, destitute of experience, and without confidence. A rapid British attack would in any case forestall the concentration of these hetero geneous squadrons. The superior quality of the veteran British crews was more than enough to counterbalance a mere superiority in numbers. The command of the British fleet was given to Sir Hyde Parker, an amiable man of no energy and little ability. He had Nelson with him as second in command — then a junior admiral but without rival in capacity and in his hold on the confidence of the fleet. Parker's orders were to give Denmark twenty-four hours in which to withdraw from the coalition, and on her refusal to destroy or neutralize her strength and then proceed against the Russians before the breaking up of the ice allowed the ships at Reval to join the squadron at Kronstadt.

On the 21st of March the British fleet, after a somewhat stormy passage, was at the entrance to the Sound. Nicholas Vansittart, afterwards Lord Bexley, the British diplomatic agent entrusted with the message to the Danish government, was landed, and left for Copenhagen. On the 23rd he returned with the refusal of the Danes. The British fleet then passed

the Danish fort at Cronenburg, unhurt by its distant fire, and without being molested by the forts on the Swedish shore. Nelson urged immediate attack, and recommended, as an alternative, that part of the British fleet should watch the Danes while the remainder advanced up the Baltic to prevent the junction of the Russian Reval squadron with the ships in Kronstadt. Sir Hyde Parker was, however, unwilling to go up the Baltic with the Danes unsubdued behind him, or to divide his force. It was therefore resolved that an attack should

be made on the Danish capital with the whole fleet in two divisions. Copenhagen lies on the east side of the island of Zealand; opposite it is the shoal known as the Middle Ground. To the east of the Middle Ground is another shoal known as Saltholm Flat, and there is a passage available for large ships between them. The main fortification of Copenhagen was the powerful Tfekroner (Three Crown) battery at the northern end of the sea-front. Here the Danes had placed their strongest ships. The southern part of the city front was covered by hulks and gun-vessels or bomb-vessels. There were in all eighteen hulks or ships of the line in the Danish defence. To have made the attack from the northern end would in Nelson's words have been " to take the bull by the horns." He therefore proposed that he should be detached with ten sail of the line, and the frigates and small craft, to pass between the Middle Ground and Saltholm Flat, and assail the Danish line at the southern end while the remainder of the fleet engaged the Trekroner battery from the north. Sir Hyde Parker accepted his offer, and added two ships of the line to the ten asked for by Nelson.

During the nights of the 30th and 31st of March the channel between the Middle Ground and Saltholm Flat was sounded by the boats of the British fleet, the Danes making no attempt to interfere with them. On the 1st of April Nelson brought his ships through. He had transferred his flag from his own ship the " St George " (98) to the " Elephant " (74), commanded by Captain Foley, because the water was too shallow for a three- decker. On the morning of the 2nd of April the wind was fair from the south-east, and at 9.30 a.m. the British squadron weighed anchor, led by the " Amazon " frigate, commanded by Captain Riou, and began to pass along the front of the Danish line. The Danes could bring into action 375 guns in all. Their hulks and bomb-vessels were supported by batteries on Zealand; but, as the water is shallow for a long distance from the shore, these defences were too far off to render them effectual aid on the south end of their line. Nelson disposed of a greater number of guns, 1058 in all, but some did not come into action. The " Agamemnon " (64), commanded by Captain Fancourt, was unable to round the south point of the Middle Ground. The " Bellona " (74), commanded by Captain Thompson, and the " Russel " (74), commanded by Captain Cuming, ran ashore on the Middle Ground, but within range though at too great a distance for fully effective fire. Captain Thompson lost his leg in the battle. The other ships passed between the " Bellona " and " Russel " and the Danes. The leading British ship, the " Defiance " (74), carrying the flag of Rear-Admiral Graves, anchored just south of the Trekroner. As the wind was from the south-east Sir Hyde Parker was

unable to make the proposed attack from the north. The place opposite the Danish fort which was to have been taken by him was occupied by Captain Riou and the frigates. The ” Elephant ” anchored almost in the middle of the line. Fire was opened about 10 a.m., and at 11.30 the action was at its height.

Until 1 o’clock there was no diminution of the Danish fire. Sir Hyde Parker, who saw the danger of Nelson’s position, became anxious, and sent his second, Captain Robert Waller Ottway, to him with a message authorizing him to retire if he thought fit. Before Ottway, who had to go in a row-boat, reached the ” Elephant,” Sir Hyde Parker had reflected that it would be more magnanimous in him to take the responsibility of ordering the retreat. He therefore hoisted the signal of recall. It was a well-meant but ill-judged order-. Nelson could only have retreated before the south-easterly wind by going past the Trekroner fort, where the passage is narrow, and the navigation

difficult. He therefore disregarded the signal, and amused himself and the few officers about him by putting his glass to his blind eye and saying that he could not see it. The frigates opposite the Trekroner did retreat, Captain Riou being slain as they drew off.

At about 2.30 the fire from the Danish hulks had been much beaten down, but as their crews fell, fresh men were sent from the shore and the fire was resumed. Nelson astutely and legitimately seized the opportunity to open negotiations with the Danes. He sent a flag of truce carried by Sir F. Thesiger ashore to the crown prince of Denmark (then regent of the kingdom), to say that unless he was allowed to take possession of the hulks which had surrendered he would be compelled to burn them, a course which he deprecated on the ground of humanity and his tenderness of ” the brothers of the English the Danes.” The crown prince, who was shaken by the spectacle of the battle, allowed himself to be drawn into a reply, and to be referred to Sir Hyde Parker. Fire was suspended by the Danes to allow of time to receive Sir Hyde Parker’s answer. Nelson with intelligent promptitude availed himself of the interval to with- draw his squadron past the Trekroner. The difficulty found in getting the ships out — one of them grounded — showed how disastrous an attempt to draw off under fire of the forts must have been.

The Danish government, which had entered the coalition largely from

fear of Russia, was not prepared to make very great sacrifices, and now entered into negotiations for an armistice. It was the more ready to do so because it received news of the assassination of the tsar Paul, which had happened on the 24th of March. An armistice was made for fourteen weeks, which left the British fleet free to proceed up the Baltic. On the 12th of April, after lightening the three-deckers of their guns, the fleet passed over the shallows. But its presence had now lost all military significance. Sir Hyde Parker was assured by the Russian minister at Copenhagen that the new tsar Alexander I. would not continue the policy of hostility with England and alliance with France which had proved fatal to his father. The Swedes, who like the Danes had entered the coalition under pressure from Russia, did not send their ships to sea. The government of the new tsar was prepared for an arrangement with England. The date of the final settlement was in all probability delayed by the activity of Nelson, and his belief that a British fleet was the best negotiator in Europe. The British government learnt of the tsar's death on the 15th of April. On the 17 th it instructed Sir Hyde Parker to agree to a suspension of hostilities, and not to take active measures against Russia so long as the Reval squadron did not put to sea. On the 21st of April, having now received a full account of the battle at Copenhagen, it recalled Sir Hyde Parker, whose vacillating conduct and want of enterprise had become manifest. He received the news of his recall on the 5th of May. Nelson, to whom the command passed, at once put to sea, and hastened with a part of his fleet to Reval, which he reached on the 12th of May. The Russian squadron had, however, cut a passage through the ice in the harbour on the 3rd, and had sailed for Kronstadt. Nelson was received with formal civility by the Russian officers, with whom he exchanged visits. He wrote a letter to Mr Garlike, secretary of the British embassy at St Petersburg, saying that he had come with a small squadron as the best way of paying " the very highest compliment " to the tsar.

The Russian government, which not unnaturally wished to avoid any appearance of acting under dictation, and was now in no anxiety for the Reval squadron, treated his presence as a menace. On the 13th of May Count Pahlen answered in a most peremptory letter informing Nelson that negotiations would be suspended while he remained at Reval. This retort caused Nelson annoyance which he did not attempt to conceal, but he justly concluded that he had nothing further to do at Reval, and therefore returned down the Baltic. Nelson remained with the fleet till he was relieved at his own request, and was able to sail for England on the 18th of June. He gave a proof of his regard for the service of the country by taking his passage home

in a small brig rather than withdraw a line of battle ship from the

squadron, which his rank entitled him to dq, and as other admirals of the time generally did. The British sailors and ships embargoed in Russia were released on the 17 th of May. Great Britain released her prisoners on the 4th of June, and on the 17 th of June was signed the convention which terminated the Baltic campaign.

See Dispatches and Letters of Vice-Admiral Nelson, by Sir N. Harris Nicolas (1845); Life of Nelson, by Capt. A. T. Mahan (London, 1899). (D. H.)

COPERNICUS (orKoppERNiGK),NICOLAUS, Polish astronomer, was born on the 19th of February 1473, at Thorn in Prussian Poland, where his father, a native of Cracow, had settled as a wholesale trader. His mother, Barbara Watzelrode, belonged to a family of high mercantile and civic standing. After the death of his father in 1483, Nicolaus was virtually adopted by his uncle Lucas Watzelrode, later (in 1489) bishop of Ermeland. Placed at the university of Cracow in 1491, he devoted himself, during three years, to mathematical science under Albert Brudzewski (1445-1497), and incidentally acquired some skill in painting. At the age of twenty-three he repaired to Bologna, and there varied his studies of canon law by attending the astronomical lectures of Domenico Maria Novara (1454- 1504). At Rome, in the Jubilee year 1500, he himself lectured with applause; but having been nominated in 1497 canon of the cathedral of Frauenburg, he recrossed the Alps in 1501 with the purpose of obtaining further leave of absence for the com- pletion of his academic career. Late in the same year, accord- ingly, he entered the medical school of Padua, where he remained until 1505, having taken meanwhile a doctor's degree in canon law at Ferrara on the 31st of May 1503. After his return to his native country he resided at the episcopal palace of Heilsberg as his uncle's physician until the latter's death on the 29th of March 1512. He then retired to Frauenburg, and vigorously attended to his capitular duties. He never took orders, but acted continually as the representative of the chapter under harassing conditions, administrative and political; he was besides commissary of the diocese of Ermeland; his medical skill, always at the service of the poor, was frequently in demand by the rich; and he laid a scheme for the reform of the currency before the Diet of Graudenz in 1522. Yet he found time, amid these multifarious occupations, to elaborate an entirely new system of astronomy, by the adoption of which man's outlook on the universe was fundamentally changed.

The main lines of his great work were laid down at Heilsberg; at Frauenburg, from 1513, he sought, with scanty instrumental means, to test by observation the truth of the views it embodied (see Astronomy:

History). His dissatisfaction with Ptolemaic doctrines was of early date; and he returned from Italy, where so-called Pythagorean opinions were then freely discussed, in strong and irrevocable possession of the heliocentric theory. The epoch-making treatise in which it was set forth, virtually finished in 1530, began to be known through the circulation in manuscript of a Commentariolus, or brief popular account of its purport written by Copernicus in that year. Johann Albrecht Widmanstadt lectured upon it in Rome; Clement VII. approved, and Cardinal Schonberg transmitted to the author a formal demand for full publication. But his assent to this was only extracted from him in 1540 by the importunities of his friends, especially of his enthusiastic disciple George Joachim Rheticus (1514-1576), who printed, in the Narratio prima (Danzig, 1540), a preliminary account of the Copernican theory, and simul- taneously sent to the press at Nuremberg his master's complete exposition of it in the treatise entitled De revolutionibus orbium coelestium (1543). But the first printed copy reached Frauen- burg barely in time to be laid on the writer's death-bed. Coper- nicus was seized with apoplexy and paralysis towards the close of 1542, and died on the 24th of May 1543, happily unconscious that the fine Epistle, in which he had dedicated his life's work to Paul III., was marred of its effect by an anonymous preface, slipt in by Andreas Osiander (1498-1552), with a view to dis- arming prejudice by insisting upon the purely hypothetical

character of the reasonings it introduced. The trigonometrical section of the book had been issued as a separate treatise (Witten- berg, 1542) under the care of Rheticus. The only work published by Copernicus on his own initiative was a Latin version of the Greek Epistles of Theophylact (Cracow, 1509). His treatise De monetae cudendae ralione, 1526 (first printed in 1816), written by order of King Sigismund L, is an exposition of the principles on which it was proposed to reform the currency of the Prussian provinces of Poland. It advocates unity of the monetary system throughout the entire state, with strict integrity in the quality of the coin, and the charge of a seigniorage sufficient to cover the expenses of mintage.

Authorities. — Rheticus was the only contemporary biographer of Copernicus, and his narrative perished irretrievably. Gassendi's jejune Life (Paris, 1654) is thus the earliest extant of any note. It was supplemented, during the 19th century, by the various publications of

J. Sniadecki (Warsaw, 1803-1818); of J. H. W. Westphal, J. Czynski, M. Curtze, H. A. Wolynski, F. Hipler, and others, but their efforts were overshadowed by Dr Leopold Prowe's exhaustive Nicolaus Coppernicus (Berlin, 1883ˆ1884), embodying the outcome of researches indefatigably prosecuted for over thirty years. The first volume (in two parts) is a detailed biography of the great astronomer; the second includes some of his minor writings and correspondence, family records, and historical documents of local interest. The effects of his Italian sojourn upon the nascent ideas of Copernicus may be profitably studied in Domenico Berti's Copernico e le vicende del sistema Copernicano in Italia (Roma, 1876), and in G. V. Schiaparelli's I Precursori del Copernico nell' antichila (Milano, 1873). A centenary edition of De revolutionibus orbium coelestium was issued at Thorn in 1873, and a German translation by C. L. Menzzer in 1879. (A. M. C.)

C0PIAP6, a city of northern Chile, capital of the province of Atacama, about 35 m. from the coast on the Copiapo river, in lat. 27 36′ S., long. 70 23′ W. Pop. (1895) 93°i. The Caldera & Copiapo railway (built 1848-1851 and one of the first in South America) extends beyond Copiap6 to the Chafiarcillo mines (50 m.) and other mining districts. Copiapo stands 1300 ft. above sea-level and has a mean temperature of about 67° in summer and 51 in winter. Its port, Caldera, 50 m. distant by rail, is situated on a well-sheltered bay with good shipping facilities about 6 m. N. of the mouth of the Copiapo river. Copiap6 is perhaps the best built and most attractive of the desert region cities. The river brings down from the mountains enough water to supply the town and irrigate a considerable area in its vicinity. Beyond the small fertile valley in which it stands is the barren desert, on which rain rarely falls and which has no economic value apart from its minerals (especially saline compounds). Copiapo was founded in 1742 by Jose de Manso (afterwards Conde.de Superunda, viceroy of Peru) and took its name from the Copayapu Indians who occupied that region. It was primarily a military station and transport post on the road to Peru, but after the discovery of the rich silver deposits near Chafiarcillo by Juan Godoy in 1832 it became an important mining centre. It has a good mining school and reduction works, and is the supply station for an extensive mining district. For many years the Famatina mines of Argentina received supplies from this point by way of the Come- Caballo pass.

COPING (from " cope," Lat. capa), in architecture, the capping or covering of a wall. This may be made of stone, brick, tile, slate, metal, wood or thatch. In all cases it should be weathered to throw off the wet. In Romanesque work it was plain and flat, and projected over the wall with a throating to form a drip. In later work a steep slope was

given to the weathering (mainly on the outer side), and began at the top with an astragal; in the Decorated style there were two or three sets off; and in the later Perpendicular period these assumed a wavy section, and the coping mouldings were continued round the sides, as well as at top and bottom, mitreing at the angles, as in many of the colleges at Oxford. The cheapest type of coping is that which caps the ordinary 9 in. brick wall, and consists of brick on edge above a double tile creasing, all in cement; the creasing con- sisting of one or two rows of tiles laid horizontally on the wall and projecting on each side about 2 in. to throw off the water (see also Masonry).

COPLAND, ROBERT (fl. 1515), English printer and author, is said to have been a servant of William Caxton, and certainly worked for Wynkyn de Worde. The first book to which his name is affixed as a printer is The Boke of Justices of Peace (1515), at the sign of the Rose Garland, in Fleet Street, London. Anthony a. Wood supposed, on the ground that he was more educated than was usual in his trade, that he had been a poor scholar of Oxford. His best known works are The hye way to the S.pyttell hous, a dialogue in verse between Copland and the porter of St Bartholomew's hospital, containing much information about the vagabonds who found their way there; and Jyl of Breynt- fords Testament, dismissed in Athenae Oxonienses (ed. Bliss) as " a poem devoid of wit or decency, and totally unworthy of further notice." He translated from the French the romances of Kynge Appolyne of Thyre (W. de Worde, 1510), The History of Helyas Knyght of the Swanne (W. de Worde, 1513), and The Life of Ipomydon (Hue of Rotelande), not dated. Among his other works is The Complaynte of them that ben too late maryed, an undated tract printed by W. de Worde.

William Copland, the printer, supposed to have been his brother, published three editions of Howleglas, perhaps by Robert, which in any case represent the earliest English version of Till Eulenspiegel.

The Knyght of the Swanne was reprinted in Thorn's Early Prose Romances, vol. iii., and by the Grolier Club (1901); the Hye Way in W. C. Hazlitt's Remains of the Early Popular Poetry of England, vol. iv. (1866). See further the " Forewords " to Dr F. J. Furnivall's reprint of Jyl of Breyntford (for private circulation, 1871) and J. P. Collier, Bibliographical and Critical Account of the Rarest Books in the English Language, vol. i. p. 153 (1865). For the books issued from his press see Hand-Lists of English Printers (1501-1556), printed for the Bibliographical Society in 1896.

COPLESTON, EDWARD (1776-1849), English bishop, was born at

Offwell in Devonshire, and educated at Oxford. He was elected to a tutorship at Oriel College in 1797, and in 1800 was appointed vicar of St Mary's, Oxford. As university professor of poetry (1802-1812) he gained a considerable reputation by his clever literary criticism and sound latinityi After holding the office of dean at Oriel for some years, he succeeded to the provostship in 1814, and owing largely to his influence the college reached a remarkable degree of prosperity during the first quarter of the 19th century. In 1826 he was appointed dean of Chester, and in the next year he was consecrated bishop of Llandaff. Here he gave his support to the new movement for church restoration in Wales, and during his occupation of the see more than twenty new churches were built in the diocese. The political problems of the time interested him greatly, and his writings include two able letters to Sir Robert Peel, one dealing with the Variable Standard of Value, the other with the Increase of Pauperism (Oxford, 1819).

COPLEY, JOHN SINGLETON (1737-1815), English historical painter, was born of Irish parents at Boston, Massachusetts. He was self-educated, and commenced his career as a portrait- painter in his native city. The germ of his reputation in England was a little picture of a boy and squirrel, exhibited at the Society of Arts in 1760. In 1774 he went to Rome, and thence in 1775 came to England. In 1777 he was admitted associate of the Royal Academy; in 1783 he was made Academician on the exhibition of his most famous picture, the " Death of Chatham," popularized immediately by Bartolozzi's elaborate engraving; and in 1790 he was commissioned to paint a portrait picture of the defence of Gibraltar. The " Death of Major Pierson," in the National Gallery, also deserves mention. Copley's powers appear to greatest advantage in his portraits. He was the father of Lord Chancellor Lyndhurst.

COPPEE, FRANCOIS EDOUARD JOACHIM (1842-1908), French poet and novelist, was born in Paris on the 12 th of January 1842. His father held a small post in the civil service, and he owed much to the care of an admirable mother. After passing through the Lycee Saint-Louis he became a clerk in the ministry of war, and soon sprang into public favour as a poet of the young " Parnassian " school. His first printed verses date from 1864. They were republished with others in 1866 in

a collected form (Le Religuaire), followed (1867) by Les Intimitis and Poemes modernes (1867-1869). In 1869 his first play, Le Passant, was received with marked approval at the Odeon theatre, and later Fais ce que dots (187 1) and Les Bijoux de la delivrance (1872), short metrical dramas inspired by the war, were warmly applauded. ‘

After filling a post in the library of the senate, Coppee was chosen in 1878 as archivist of the Com6die-Francaise, an office which he held till 1884. In that year his election to the Academy caused him to retire altogether from his public appointments. He continued to publish volumes of poetry at frequent intervals, including Les Humbles (1872), Le Cahier rouge (1874), Olivier (1875), L’Exilee (1876), Contes en vers, &c. (1881), Poemes et recits (1886), Arriere-saison (1887), Paroles sinceres (1890). In his later years his output of verse declined, but he published two more volumes, Dans la priere et la lutle and Vers franqais. He had established his fame as ” le poete des humbles.” Besides the plays mentioned above, two others written in collaboration with Armand d’Artois, and some light pieces of little importance, Coppee produced Madame de Maintenon (1881), Sever Torelli (1883), Les Jacobites (1885), and other serious dramas in verse, including Pour la couronne (1895), which was translated into English (For the Crown) by John Davidson, and produced at the Lyceum Theatre in 1896. The performance of a short episode of the Commune, Le Pater, was prohibited by the government (1889) . Coppee’s first story in prose, Une Idylle pendant le siege, appeared in 1875. It was followed by various volumes of short tales, by Toute une jeunesse (1890) — an attempt to reproduce the feelings, if not the actual wants, of the writer’s youth, — Les Vrais Riches (1892), LeCoupable (1896), &c. He was made an officer of the Legion of Honour in 1888. A series of reprinted short articles on miscellaneous subjects, styled Mon Franc Parler, appeared from 1893 to 1896; and in 1898 was published La Bonne Souffrance, the outcome of Coppee’s reconversion to the Roman Catholic Church, which gained very wide popularity. The immediate cause of his return to the faith was a severe illness which twice brought him to the verge of the grave. Hitherto he had taken little open interest in public affairs, but he now joined the most violent section of Nationalist politicians, while retaining contempt for the whole apparatus of democracy. He took a leading part against the prisoner in the Dreyfus case, and was one of the originators of the notorious Ligue de la Patrie Francaise. He died on

the 23rd of May 1908.

Alike in verse and prose Coppee concerned himself with the plainest expressions of human emotion, with elemental patriot- ism, and the joy of young love, and the pitifulness of the poor, bringing to bear on each a singular gift of sympathy and insight. The lyric and idyllic poetry, by which he will chiefly be re- membered, is animated by musical charm, and in some instances, such as La Benediction and La Grive des forgerons, displays a vivid, though not a sustained, power of expression. There is force, too, in the gloomy tale, Le Coupable. But he exhibits all the defects of his qualities. In prose especially, his sentiment often degenerates into sentimentality, and he continually approaches, and sometimes oversteps, the verge of the trivial. Nevertheless, by neglecting that canon of contemporary art which would reduce the deepest tragedies of life to mere subjects for dissection, he won those common suffrages which are the prize of exquisite literature.

See M. de Lescure's Francois Coppee, I'homme, la vie, I'auvre (1889), an d G. Druilhet, Vn Poke francais (1902).

COPPEE, HENRY (1821-1895), American educationalist and author, was born in Savannah, Georgia, on the 13th of October 182 1, of a French family formerly settled in Haiti. He studied at Yale for two years, worked as a civil engineer, graduated at West Point in 1845, served in the Mexican War as a lieutenant and was breveted captain for gallantry at Contreras and Churubusco, was professor of English at West Point from 1850 to 1855 (when he resigned from the army), was professor of English literature and history in the University of Pennsyl- vania 1855-1866, and on the 1st of April 1866 was chosen first president of Lehigh University. In 1875 he was succeeded by

John McD. Leavitt and became professor of history and English literature, but was president pro tern, from the death of Robert A. Lamberton (b. 1824) in September 1893 to his own death in Bethlehem on the 22nd of March 1895. He published ele- mentary text-books of logic (1857), of rhetoric (1859), and of English literature (1872); various manuals of drill; Grant, a Military Biography (1866); General Thomas (1893), in the " Great Commanders " Series; History of the Conquest of Spain by the Arab-Moors (1881) ; and in 1862 a translation of Marmont's Esprit des institutions militaires, besides editing the Comte de Paris's Civil War in America.

COPPER (symbol Cu, atomic weight 63-1, H = i, or 63-6, O = 16), a metal which has been known to and used by the human race from the

most remote periods. Its alloy with tin (bronze) was the first metallic compound in common use by mankind, and so extensive and characteristic was its employment in pre- historic times that the epoch is known as the Bronze Age. By the Greeks and Romans both the metal and its alloys were indifferently known as xˆA/cos and aes. As, according to Pliny, the Roman supply was chiefly drawn from Cyprus, it came to be termed aes cyprium, which was gradually shortened to cyprium, and corrupted into cuprum, whence comes the English word copper, the French cuivre, and the German Kupfer.

Copper is a brilliant metal of a peculiar red colour which assumes a pinkish or yellowish tinge on a freshly fractured surface of the pure metal, and is purplish when the metal contains cuprous oxide. Its specific gravity varies between 8-91 and 8 -95, according to the treatment to which it may have been subjected; J. F. W. Hampe gives 8-945 (f°) for perfectly pure and compact copper. Ordinary commercial copper is somewhat porous and has a specific gravity ranging from 8 • 2 to 8 • 5 . It takes a brilliant polish, is in a high degree malleable and ductile, and in tenacity it only falls short of iron, exceeding in that quality both silver and gold. By different authorities its melting-point is stated at from 1000 to 1200 C; C. T. Heycock and F. H. Neville give io8o°-5; P. Dejean gives 1085° as the freezing- point. The molten metal is sea-green in colour, and at higher temperatures (in the electric arc) it vaporizes and burns with a green flame. G. W. A. Kahlbaum succeeded in subliming the metal in a vacuum, and H. Moissan (Compt. rend., 1905, 141, p. 853) distilled it in the electric furnace. Molten copper absorbs carbon monoxide, hydrogen and sulphur dioxide; it also appears to decompose hydrocarbons (methane, ethane), absorbing the hydrogen and the carbon separating out. These occluded gases are all liberated when the copper cools, and so give rise to porous castings, unless special precautions are taken. The gases are also expelled from the molten metal by lead, carbon dioxide, or water vapour. Its specific heat is 0-0899 a t o° C. and 0-0942 at 100°; the coefficient of linear expansion per i° C. is 0-001869. In electric conductivity it stands next to silver; the conducting power of silver being equal to 100, that of perfectly pure copper is given by A. Matthiessen as 96-4 at 13 C.

Copper is not affected by exposure in dry air, but in a moist atmosphere, containing carbonic acid, it becomes coated with a green basic carbonate. When heated or rubbed it emits a peculiar disagreeable odour. Sulphuric and hydrochloric acids have little or no action upon it at ordinary temperatures, even when in a fine state of division; but on heating, copper sulphate and sulphur dioxide are formed in the first case, and cuprous chloride and hydrogen in the

second. Concentrated nitric acid has also very little action, but with the dilute acid a vigorous action ensues. The first products of this reaction are copper nitrate and nitric oxide, but, as the concentration of the copper nitrate increases, nitrous oxide and, eventually, free nitrogen are liberated.

Many colloidal solutions of copper have been obtained. A reddish-brown solution is obtained from solutions of copper chloride, stannous chloride and an alkaline tartrate (Lotter- moser, Anorganische Collolde, 1901).

Occurrence. — Copper is widely distributed in nature, occurring in most soils, ferruginous mineral waters, and ores. It has been discovered in seaweed; in the blood of certain Cephalopoda and Ascidia as haemocyanin, a substance resembling the ferruginous

haemoglobin, and of a species of Limulus; in straw, hay, eggs, cheese, meat, and other food-stuffs; in the liver and kidneys, and, in traces, in the blood of man and other animals (as an en- tirely adventitious constituent, however); it has also been shown by A. H. Church to exist to the extent of 5-9% in turacin, the colouring-matter of the wing-feathers of the Turaco.

Native copper, sometimes termed by miners malleable or virgin copper, occurs as a mineral having all the properties of the smelted metal. It crystallizes in the cubic system, but the crystals are often flattened, elongated, rounded or otherwise distorted. Twins are common. Usually the metal is arborescent, dendritic, filiform, moss-like or laminar. Native copper is found in most copper-mines, usually in the upper workings, where the deposit has been exposed to atmospheric influences. The metal seems to have been reduced from solutions of its salts, and deposits may be formed around mine-timber Or on iron objects. It of ten fills cracks and fissures in the rock. It is not infrequently found in serpentine, and in basic eruptive rocks, where it occurs as veins and in amygdales. The largest known deposits are those in the Lake Superior region, near Keweenaw Point, Michigan, where masses upwards of 400 tons in weight have been dis-covered. The metal was formerly worked by the Indians for implements and ornaments. It occurs in a series of amygdaloidal dolerites or diabases, and in the associated sandstones and con-glomerates. Native silver occurs with the copper, in some cases

embedded in it, like crystals in a porphyry. The copper is also accompanied by epidote, calcite, prehnite, analcite and other zeolitic minerals. Pseudomorphs after calcite are known; and it is notable that native copper occurs pseudomorphous after aragonite at Corocoro, in Bolivia, where the copper is disseminated through sandstone.

Ores. — The principal ores of copper are the oxides cuprite and melaconite, the carbonates malachite and chessylite, the basic chloride atacamite, the silicate chrysocolla, the sulphides chalcocite, chalcopyrite, erubescite and tetrahedrite. Cuprite (q.v.) occurs in most cupriferous mines, but never by itself in large quantities. Melaconite (q.v.) was formerly largely worked in the Lake Superior region, and is abundant in some of the mines of Tennessee and the Mississippi valley. Malachite is a valuable ore containing about 56% of the metal; it is obtained in very large quantities from South Australia, Siberia and other localities. Frequently intermixed with the green malachite is the blue carbonate chessylite or azurite (q.v.), an ore containing when pure 55-16% of the metal. Atacamite (q.v.) occurs chiefly in Chile and Peru. Chrysocolla (q.v.) contains in the pure state 30% of the metal; it is an abundant ore in Chile, Wisconsin and Missouri. The sulphur compounds of copper are, however, the most valuable from the economic point of view. Chalcocite, redruthite, copper-glance (q.v.) or vitreous copper (Cu 2 S) contains about 80% of copper. Copper pyrites, or chalcopyrite, contains 34-6% of copper when pure; but many of the ores, such as those worked specially by wet processes on account of the presence of a large proportion of iron sulphide, contain less than 5 % of copper. Cornish ores are almost entirely pyritic; and indeed it is from such ores that by far the largest proportion of copper is extracted throughout the world. In Cornwall copper lodes usually run east and west. They occur both in the ” killas ” or clay-slate, and in the ” growan ” or granite. Erubescite (q.v.), bornite, or horseflesh ore is much richer in copper than the ordinary pyrites, and contains 56 or 57% of copper. Tetra- hedrite (q.v.), fahlerz, or grey copper, contains from 30 to 48% of copper, with arsenic, antimony, iron and sometimes zinc, silver or mercury. Other copper minerals are percylite (PbCuCl 2 (OH) 2), boleite (3PbCuCl 2 (OH) 2 , AgCl), stromeyerite {(Cu, Ag) 2 Sj, cubanite (CuS, Fe 2 S 3), stannite (Cu 2 S, FeSnS 3), tennantite (3Cu 2 S, As 2 S 3), emplectite (Cu 2 S, Bi 2 S 3), wolfsbergite (Cu 2 S, Sb 2 S 3), famatinite (3Cu 2 S, Sb 2 S 5) and enargite (3Cu 2 S, As 2 S5). For other minerals, see Compounds of Copper below.

Metallurgy. — Copper is obtained from its ores by three principal methods, which may be denominated — (1) the pyro-metallurgical or dry method, (2) the hydro-metallurgical or wet method, and (3) the

electro-metallurgical method.

The methods of working vary according to the nature of the ores treated and local circumstances. The dry method, or ordinary smelting, cannot be profitably practised with ores containing less than 4% of copper, for which and for still poorer ores the wet process is preferred.

Copper Smelting. — We shall first give the general principles which underlie the methods for the dry extraction of copper, and then proceed to a more detailed discussion of the plant used. Since all sulphuretted copper ores (and these are of the most economic importance) are invariably contaminated with arsenic and antimony, it is necessary to eliminate these impurities, as far as possible, at a very early stage. This is effected by calcina- tion or roasting. The roasted ore is then smelted to a mixture of copper and iron sulphides, known as copper ” matte ” or ” coarse-metal,” which contains little or no arsenic, antimony or silica. The coarse-metal is now smelted, with coke and siliceous fluxes (in order to slag off the iron), and the product, consisting of an impure copper sulphide, is variously known as ” blue-metal,” when more or less iron is still present, ” pimple-metal,” when free copper and more or less copper oxide is present, or ” fine ” or ” white-metal,” which is a fairly pure copper sulphide, containing about 75% of the metal. This product is re-smelted to form ” coarse-copper,” containing about 95% of the metal, which is then refined. Roasted ores may be smelted in reverberatory furnaces (English process), or in blast-furnaces (German or Swedish process). The matte is treated either in reverberatory furnaces (English process), in blast furnaces (German process), or in converters (Bessemer process). The ” American process ” or ” Pyritic smelting ” consists in the direct smelting of raw ores to matte in blast furnaces. The plant in which the operations are conducted varies in different countries. But though this or that process takes its name from the country in which it has been mainly developed, this does not mean that only that process is there followed.

The ” English process ” is made up of the following operations : (1) calcination; (2) smelting in reverberatory furnaces to form the matte; (3) roasting the matte; and (4) subsequent smelting in reverberatory furnaces to fine- or white-metal; (5) treating the fine-metal in reverberatory furnaces to coarse- or blister- copper, either with or without previous calcination; (6) refining of the coarse-copper. A shorter process (the so-called ” direct process “) converts the fine-metal into refined copper directly. The ” Welsh process ” closely resembles the English method; the main difference consists in the

enrichment of the matte by smelting with the rich copper-bearing slags obtained in sub- sequent operations. The ” German or Swedish process ” is characterized by the introduction of blast-furnaces. It is made up of the following operations: (1) calcination, (2) smelting in blast-furnaces to form the matte, (3) roasting the matte, (4) smelting in blast-furnaces with coke and fluxes to ” black- ” or ” coarse-metal,” (5) refining the coarse-metal. The ” Anglo- German Process ” is a combination of the two preceding, and consists in smelting the calcined ores in shaft furnaces, con- centrating the matte in reverberatory furnaces, and smelting to coarse-metal in either.

The impurities contained in coarse-copper are mainly iron, lead, zinc, cobalt, nickel, bismuth, arsenic, antimony, sulphur, selenium and tellurium. These can be eliminated by an oxidizing fusion, and slagging or volatilizing the products resulting from this operation, or by electrolysis (see below). In the process of oxidation, a certain amount of cuprous oxide is always formed, which melts in with the copper and diminishes its softness and tenacity. It is, therefore, necessary to reconvert the oxide into the metal. This is effected by stirring the molten metal with a pole of green wood (” poling “); the products which arise from the combustion and distillation of the wood reduce the oxide to metal, and if the operation be properly conducted “tough-pitch ” copper, soft, malleable and exhibiting a lustrous silky fracture, is obtained. The surface of the molten metal is protected from oxidation by a layer of anthracite or charcoal. “Bean-shot ” eopper is obtained by throwing the molten metal into hot water; if cold water be used, ” feathered-shot ” copper is formed.

” Rosette ” copper is obtained as thin plates of a characteristic dark-red colour, by pouring water upon the surface of the molten metal, and removing the crust formed. ” Japan ” copper is purple-red in colour, and is formed by casting into ingots, weighing from six ounces to a pound, and rapidly cooling by immersion in water. The colour of these two varieties is due to a layer of oxide. ” Tile ” copper is an impure copper, and is obtained by refining the first tappings. ” Best-selected ” copper is a purer variety.

Calcination or Roasting and Calcining Furnaces. — The roasting should be conducted so as to eliminate as much of the arsenic and antimony as possible, and to leave just enough sulphur as is necessary to combine with all the copper present when the calcined ore is

smelted. The process is effected either in heaps, stalls, shaft furnaces, reverberatory furnaces or muffle furnaces. Stall and heap roasting require considerable time, and can only be economically employed when the loss of the sulphur is of no consequence; they also occupy much space, but they have the advantage of requiring little fuel and handling. Shaft furnaces are in use for ores rich in sulphur, and where it is desirable to convert the waste gases into sulphuric acid. Reverberatory roasting does not admit of the utilization of the waste gases, and requires fine ores and much labour and fuel; it has, however, the advantage of being rapid. Muffle furnaces are suitable for fine ores which are liable to decrepitate or sinter. They involve high cost in fuel and labour, but permit the utilization of the waste gases.

Reverberatory furnaces of three types are employed in calcining copper ores: (i) fixed furnaces, with either hand or mechanical rabbling; (2) furnaces with movable beds; (3) furnaces with rotating working chambers. Hand rabbling in fixed furnaces has been largely superseded by mechanical rabbling. Of mechanically rabbling furnaces we may mention the O'Harra modified by Allen-Brown, the Hixon, the Keller- Gaylord-Cole, the Ropp, the Spence, the Wethey, the Parkes, Pearce's " Turret " and Brown's " Horseshoe " furnaces. Blake's and Brunton's furnaces are reverberatory furnaces with a movable bed. Furnaces with rotating working chambers admit of continuous working; the fuel and labour costs are both low.

In the White-Howell revolving furnace with lifters — a modifica- tion of the Oxland — the ore is fed and discharged in a continuous stream. The Bruckner cylinder resembles the Elliot and Russell black ash furnace; its cylinder tapers slightly towards each end, and is generally 18 ft. long by 8 ft. 6 in. in its greatest diameter. Its charge of from 8 to 12 tons of ore or concentrates is slowly agitated at a rate of three revolutions a minute, and in from 24 to 36 hours it is reduced from say 40 or 35 % to 7 % of sulphur. The ore is under better control than is possible with the continu- ous feed and discharge, and when sufficiently roasted can be passed red-hot to the reverberatory furnace. These advantages compensate for the wear and tear and the cost of moving the heavy dead-weight.

Shaft calcining furnaces are available for fine ores and permit the recovery of the sulphur. They are square, oblong or circular in section, and the interior is fitted with horizontal or inclined plates or prisms, which regulate the fall of the ore. In the Gerstenhoffer and Hasenclever-Helbig furnaces the fall is retarded by prisms and inclined plates. In other furnaces the ore rests on a series of horizontal plates,

and either remains on the same plate throughout the operation (Ollivier and Perret furnace), or is passed from plate to plate by hand (Maletra), or by mechanical means (Spence and M'Dougall).

The M'Dougall furnace is turret-shaped, and consists of a series of circular hearths, on which the ore is agitated by rakes attached to revolving arms and made to fall from hearth to hearth. It has been modified by Herreshoff , who uses a large hollow revolv- ing central shaft cooled by a current of air. The shaft is provided with sockets, into which movable arms with their rakes are readily dropped. The Peter Spence type of calcining furnace has been followed in a large number of inventions. In some the rakes are attached to rigid frames, with a reciprocating motion-, in others to cross-bars moved by revolving chains. Some of

these furnaces are straight, others circular. Some have only One hearth, others three. This and the previous type of furnace, owing to their large capacity, are at present in greatest favour. The M'Dougall-Herreshoff, working on ores of over 30% of sulphur, requires no fuel; but in furnaces of the reverberatory type fuel must be used, as an excess of air enters through the slotted sides and the hinged doors which open and shut frequently to permit of the passage of the rakes. The consumption of fuel, however, does not exceed 1 of coal to 10 of ore. The quantity of ore which these large furnaces, with a hearth area as great as 2000 ft. and over, will roast varies from 40 to 60 tons a day. Shaft calcining furnaces like the Gerstenhoffer, Hasenclever, and others designed for burning pyrites fines have not found favour in modern copper works.

The Fusion of Ores in Reverberatory and Cupola Furnaces. — After the ore has been partially calcined, it is smelted to extract its earthy matter and to concentrate the copper with part of its iron and sulphur into a matte. In reverberatory furnaces it is smelted by fuel in a fireplace, separate from the ore, and in cupolas the fuel, generally coke, is in direct contact with the ore. When Swansea was the centre of the copper-smelting industry in Europe, many varieties of ores from different mines were smelted in the same furnaces, and the Welsh reverberatory furnaces were used. To-day more than eight-tenths of the copper ores of the world are reduced to impure copper bars or to fine copper at the mines; and where the character of the ore permits, the cupola furnace is found more economical in both fuel and labour than the reverberatory.

The Welsh method finds adherents only in Wales and Chile. In America the usual method is to roast ores or concentrates so that the

matte yielded by either the reverberatory or cupola furnace will run from 45 to 50% in copper, and then to transfer to the Bessemer converter, which blows it up to 99 %. In Butte, Montana, reverberatories have in the past been preferred to cupola furnaces, as the charge has consisted mainly of fine roasted concentrates; but the cupola is gaining ground there. At the Boston and Great Falls (Montana) works tilting reverbera- tories, modelled after open hearth steel furnaces, were first erected; but they were found to possess objectionable features. Now both these and the egg-shaped reverberatories are being abandoned for furnaces as long as 43 ft. 6 in. from bridge to bridge and of a width of 15 ft. 9 in. heated by gas, with re- generative checker work at each end, and fed with ore or con. centrates, red-hot from the calciners, through a line of hoppers suspended above the roof. Furnaces of this size smelt 200 tons of charge a day. But even when the old type of reverberatory is preferred, as at the Argo works, at Denver, where rich gold, and silver-bearing copper matte is made, the growth of tha furnace in size has been steady. Richard Pearce's reverberatories in 1878 had an area of hearth of 15 ft. by 9 ft. 8 in., and smelted 12 tons of cold charge daily, with a consumption of 1 ton of coal to 2-4 tons of ore. In 1900 the furnaces -were 35 ft. by 16 ft., and smelt 50 tons daily of hot ore, with the consumption of 1 ton of coal to 3-7 tons of ore.

The home of cupola smelting was Germany, where it has never ceased to make steady progress. In Mansfeld brick cupola furnaces are without a rival in size, equipment and performance. They are round stacks, designed on the model of iron blast furnaces, 29 ft. high, fed mechanically, and provided with stoves to heat the blast by the furnace gases. The low percentage of sulphur in the roasted ore is little more than enough to produce a matte of 40 to 45 %, and therefore the escaping gases are better fitted than those of most copper cupola furnaces for burning in a stove. But as the slag carries on an average 46 % of silica, it is only through the utmost skill that it can be made to run as low on an average as 0-3% in copper oxide. As the matte contains on an average 0-2% of silver, it is still treated by the Ziervogel wet method of extraction, the management dreading the loss which might occur in the Bessemer process of concentration, applied as preliminary to electrolytic separation. Blast furnaces of large size, built of brick, have been constructed for treating the richest ai > d more silicious ores of Rio Tinto, and

the Rio Tinto Company has introduced converters at the mine. This method of extraction contrasts favourably in time with the leaching process, which is so slow that over 10,000,000 tons of ore are always under treatment on the immense leaching floors of the company's works in Spain. In the United States the cupola has undergone a radical modification in being built of water-jacketed sections. The first water-jacketed cupola which came into general use was a circular inverted cone, with a slight taper, of 36 inches diameter at the tuyeres, and com- posed of an outer and an inner metal shell, between which water circulated. As greater size has been demanded, oval and rectangular furnaces — as large as 180 in. by 56 in. at the tuyeres — have been built in sections of cast or sheet iron or steel. A single section can be removed and replaced without entirely emptying the stack, as a shell of congealed slag always coats the inner surface of the jacket. The largest furnaces are those of the Boston & Montana Company at Great Falls, Montana, which have put through 500 tons of charge daily, pouring their melted slag and matte into large wells of 10 ft. in diameter. A combined brick- and water-cooled furnace has been adopted by the Iron Mountain Company at Keswick, Cal., for matte concentration. In it the cooling is effected by water pipes, interposed horizontally between the layers of bricks. The Mt. Lyell smelting works in Tasmania, which are of special interest, will be referred to later. (See Pyritic Smelting below.)

Concentrating Matte to Copper in the Bessemer Converter. — As soon as the pneumatic method of decarburizing pig iron was accepted as practicable, experiments were made with a view to Bessemerizing copper ores and mattes. One of the earliest and most exhaustive series of experiments was made on Rio Tinto ores at the John Brown works by John Hollway, with the aim of both smelting the ore and concentrating the matte in the same furnace, by the heat evolved through the oxidation of their sulphur and iron. Experiments along the same lines were made by Francis Bawden at Rio Tinto and Claude Vautin in Australia. The difficulty of effecting this double object in one operation was so great that in subsequent experiments the aim was merely to concentrate the matte to metallic copper in con- verters of the Bessemer type. The concentration was effected without any embarrassment till metallic copper commenced to separate and chill in the bottom tuyeres. To meet this obstacle P. Manhes proposed elevated side tuyeres, which could be kept clear by punching through gates in a wind box. His invention was adopted by the Vivians, at the Eguilles works near Sargues, Vaucluse, France, and at Leghorn in Italy. But the greatest expansion of this method has been in the United States, where more than 400,000,000 lb. of copper are annually made

in Bessemer converters. Vessels of several designs are used — some modelled exactly after steel converters, other barrel- shaped, but all with side tuyeres elevated about 10 in. above the level of the bottom lining. Practice, however, in treating copper matte differs essentially from the treatment of pig iron, inasmuch as from 20 to 30% of iron must be eliminated as slag and an equivalent quantity of silica must be supplied. The only practical mode of doing this, as yet devised, is by lining the con- verter with a silicious mixture. This is so rapidly consumed that the converters must be cooled and partially relined after 3 to 6 charges, dependent on the iron contents of the matte. When available, a silicious rock containing copper or the precious metals is of course preferred to barren lining. The material for lining, and the frequent replacement thereof, constitute the principal expense of the method. The other items of cost are labour, the quantity of which depends on themechanicalappliances provided for handling the converter shells and inserting the lining; and the blast, which in barrel-shaped converters is low and in vertical converters is high, and which varies therefore from 3 to 1 5 lb to the square inch. The quantity of air consumed in a converter which will blow up about 35 tons of matte per day is about 3000 cub. ft. per minute. The operation of raising a charge of 50% matte to copper usually consists of two blows. The first blow occupies about 25 minutes, and oxidizes all but a small quantity of the iron and some of the sulphur, raising

the product to white metal. The slag is then poured and skimmed, the blast turned on and converter retilted. During the second blow the sulphur is rapidly oxidized, and the charge reduced to metal of 09% in from 30 to 40 minutes. Little or no slag results from the second blow. That from the first blow contains between 1 % and 2 % of copper, and is usually poured from ladles operated by an electric crane into a reverberatory, or into the settling well of the cupola. The matte also, in all economically planned works, is conveyed, still molten, by electric cranes from the furnace to the converters. When lead or zinc is not present in notable quantity, the loss of the precious metals by volatilization is slight, but more than 5% of these metals in the matte is prohibitive. Under favourable conditions in the larger works of the United States the cost of converting a 50% matte to metallic copper is generally understood to be only about -fo to ˆ of a cent per lb. of refined copper.

Pyritic Smelting. — The heat generated by the oxidation of iron and sulphur has always been used to maintain combustion in the kilns or stalls for roasting pyrites. Pyritic smelting is a development of the Russian engineer Semenikov's treatment (proposed in 1866) of copper matte in a Bessemer converter. Since John Hollway's and other early

experiments of Lawrence Austin and Robert Sticht, no serious attempts have been made to utilize the heat escaping from a converting vessel in smelting ore and matte either in the same apparatus or in a separate furnace. But considerable progress has been made in smelting highly sulphuretted ores by the heat of their own oxidizable constituents. At Tilt Cove, Newfoundland, the Cape Copper Company smelted copper ore, with just the proper proportion of sulphur, iron and silica, successfully without any fuel, when once the initial charge had been fused with coke. The furnaces used were of ordinary design and built of brick. Lump ore alone was fed, and the resulting matte showed a concentration of only 3 into 1. When, however, a hot blast is used on highly sulphuretted copper ores, a concentration of 8 of ore into 1 of matte is obtained, with a consumption of less than one-third the fuel which would be consumed in smelting the charge had the ore been previously calcined. A great impetus to pyritic smelting was given by the investigations of W. L. Austin, of Denver, Colorado, and both at Leadville and Silverton raw ores are successfully smelted with as low a fuel consumption as 3 of coke to 100 of charge.

Two types of pyritic smelting may be distinguished: one, in which the operation is solely sustained by the combustion of the sulphur in the ores, without the assistance of fuel or a hot blast; the other in which the operation is accelerated by fuel, or a hot blast, or both. The largest establishment in which advantage is taken of the self-contained fuel is at the smelting works of the Mt. Lyell Company, Tasmania. There the blast is raised from 6oo° to 700 F. in stoves heated by extraneous fuel, and the raw ore smelted with only 3 % of coke. The ore is a compact iron pyrites containing copper 2-5%, silver 3-83 oz., gold 0-139 oz. It is smelted raw with hot blast in cupola furnaces, the largest being 2 10 in. by 40 in. The resulting matte runs 25%. This is reconcentrated raw in hot blast cupolas to 55%, and blown directly into copper in converters. Thus these ores, as heavily charged with sulphur as those of the Rio Tinto, are speedily reduced by three operations and without roasting, with a saving of 97-6% of the copper, 93-2% of the silver and 93-6% of the gold.

Pyritic smelting has met with a varying economic success. According to Herbert Lang, its most prominent chance of success is in localities where fuel is dear, and the ores contain precious metals and sufficient sulphides and arsenides to render profitable dressing unnecessary.

The Nicholls and James Process. — Nicholls and James have applied, very ingeniously, well-known reactions to the refining of copper, raised to the grade of white metal. This process is practised by the Cape Copper and Elliot Metal Company. A portion of the white metal

is calcined to such a degree of oxidation that when fused with the unroasted portion, the reaction between the oxygen in the roasted matte and the sulphur in the raw

material liberates the metallic copper. The metal is so pure that it can be refined by a continuous operation in the same furnace.

Wet Methods for Copper Extraction. — Wet methods are only employed for low grade ores (under favourable circumstances ore containing from J to i % of copper has admitted of economic treatment), and for gold and silver bearing metallurgical products.

The fundamental principle consists in getting the ore into a solution, from which the metal can be precipitated. The ores of any economic importance contain the copper either as oxide, carbonate, sulphate or sulphide. These compounds are got into solution either as chlorides or sulphates, and from either of these salts the metal can be readily obtained. Ores in which the copper is present as oxide or carbonate are soluble in sulphuric or hydrochloricacids,ferrouschloride,ferric sulphate, ammoniacal compounds and sodium thiosulphate. Of these solvents, only the first three are of economic importance. The choice of sul- phuric or hydrochloric acid depends mainly upon the cost, both acting with about the same rapidity; thus if a Leblanc soda factory is near at hand, then hydrochloric acid would most certainly be employed. Ferrous chloride is not much used; the Douglas-Hunt process uses a mixture of salt and ferrous sulphate which involves the formation of ferrous chloride, and the new Douglas-Hunt process employs sulphuric acid in which ferrous chloride is added after leaching.

Sulphuric acid may be applied as such on the ores placed in lead, brick, or stone chambers; or as a mixture of sulphur dioxide, nitrous fumes (generated from Chile saltpetre and sulphuric acid), and steam, which permeates the ore resting on the false bottom of a brick chamber. When most of the copper has been converted into the sulphate, the ore is lixiviated. Hydrochloric acid is applied in the same way as sulphuric acid; it has certain advantages of which the most important is that it does not admit the formation of basic salts; its chief dis- advantage is that it dissolves the oxides of iron, and accordingly must not be used for highly ferriferous ores. The solubility of copper carbonate in ferrous chloride solution was pointed out by

Max Schaffner in 1862, and the subsequent recognition of the solubility of the oxide in the same solvent by James Douglas and Sterry Hunt resulted in the ” Douglas-Hunt ” process for the wet extraction of copper. Ferrous chloride decomposes the copper oxide and carbonate with the formation of cuprous and cupric chlorides (which remain in solution), and the precipitation of ferrous oxide, carbon dioxide being simultaneously liberated from the carbonate. In the original form of the Douglas-Hunt process, ferrous chloride was formed by the interaction of sodium chloride (common salt) with ferrous sulphate (green vitriol), the sodium sulphate formed at the same time being removed by crystallization. The ground ore was stirred with this solution at 70 C. in wooden tubs until all the copper was dissolved. The liquor was then filtered from the iron oxides, and the filtrate treated with scrap iron, which precipitated the copper and reformed ferrous chloride, which could be used in the first stage of the process. The advantage of this method rests chiefly on the small amount of iron required; but its disadvantages are that any silver present in the ores goes into solution, the forma- tion of basic salts, and the difficulty of filtering from the iron oxides. A modification of the method was designed to remedy these defects. The ore is first treated with dilute sulphuric acid, and then ferrous or calcium chloride added, thus forming copper chlorides. If calcium chloride be used the precipitated calcium sulphate must be removed by filtration. Sulphur dioxide is then blown in, and the precipitate is treated with iron, which produces metallic copper, or milk of lime, which produces cuprous oxide. Hot air is blown into the filtrate, which contains ferrous or calcium chlorides, to expel the excess of sulphur dioxide, and the liquid can then be used again. In this process (” new Douglas-Hunt “) there are no iron oxides formed, the silver is not dissolved, and the quantity of iron necessary is relatively small, since all the copper is in the cuprous condition. It is not used in the treat- ment of ores, but finds application in the case of calcined argenti- ferous lead and copper mattes.

The precipitation of the copper from the solution, in which it is present as sulphate, or as cuprous and cupric chlorides, is generally effected by metallic iron. Either wrought, pig, iron sponge or iron bars are employed, and it is important to notice that the form in which the copper is precipitated, and also the time taken for the separation, largely depend upon the condition in which the iron is applied. Spongy iron acts most rapidly, and after this follow iron turnings and then sheet clippings. Other precipitants such as sulphuretted hydrogen and solutions of sulphides, which precipitate the copper as sulphides, and mirk of lime, which gives copper oxides, have not met with

commercial success. When using iron as the precipitant, it is desirable that the solution should be as neutral as possible, and the quantity of ferric salts present should be reduced to a minimum; otherwise, a certain amount of iron would be used up by the free acid and in reducing the ferric salts. Ores in which the copper is present as sulphate are directly lixiviated and treated with iron. Mine waters generally contain the copper in this form, and it is extracted by conducting the waters along troughs fitted with iron gratings.

The wet extraction of metallic copper from ores in which it occurs as the sulphide, may be considered to involve the following operations: (1) conversion of the copper into a soluble form, (2) dissolving out the soluble copper salt, (3) the precipitation of the copper. Copper sulphide may be converted either into the sulphate, which is soluble in water; the oxide, soluble in sulphuric or hydrochloric acid; cupric chloride, soluble in water; or cuprous chloride, which is soluble in solutions of metallic chlorides.

The conversion into sulphate is generally effected by the oxidizing processes of weathering, calcination, heating with iron nitrate or ferric sulphate. It may also be accomplished by calcination with ferrous sulphate, or other easily decomposable sulphates, such as aluminium sulphate. Weathering is a very slow, and, therefore, an expensive process; moreover, the entire conversion is only accomplished after a number of years. Cal- cination is only advisable for ores which contain relatively much iron pyrites and little copper pyrites. Also, however slowly the calcination may be conducted, there is always more or less copper sulphide left unchanged, and some copper- oxide formed. Calcination with ferrous sulphate converts all the copper sulphide into sulphate. Heap roasting has been successfully employed at Agordo, in the Venetian Alps, and at Majdanpek in Servia. Josef Perino's process, which consists in heating the ore with iron nitrate to 50 — 150° C, is said to possess several advantages, but it has not been applied commercially. Ferric sulphate is only used as an auxiliary to the weathering process and in an electrolytic process.

The conversion of the sulphide into oxide is adopted where the Douglas-Hunt process is employed, or where hydrochloric or sulphuric acids are cheap. The calcination is effected in rever- beratory furnaces, or in muffle furnaces, if the sulphur is to be recovered. Heap, stall or shaft furnace roasting is not very satisfactory, as it is very difficult to transform all the sulphide into oxide.

The conversion of copper sulphide into the chlorides may be accomplished by calcining with common salt, or by treating the ores

with ferrous chloride and hydrochloric acid or with ferric chloride. The dry way is best; the wet way is only employed when fuel is very dear, or when it is absolutely necessary that no noxious vapours should escape into the atmosphere. The dry method consists in an oxidizing roasting of the ores, and a subsequent chloridizing roasting with either common salt or Abraumsalz in reverberatory or muffle furnaces. The bulk of the copper is thus transformed into cupric chloride, little cuprous chloride being obtained. This method had been long proposed by William Longmaid, Max Schaffner, Becchi and Haupt, but was only introduced into England by the labours of William Henderson, J. A. Phillips and others. The wet method is employed at Rio Tinto, the particular variant being known as the " Dotsch " process. This consists in stacking the broken ore in heaps and adding a mixture of sodium sulphate and ferric

chloride in the proportions necessary for the entire conversion of the iron into ferric sulphate. The heaps are moistened with ferric chloride solution, and the reaction is niaintained by the liquid percolating through the heap. The liquid is run off at the base of the heaps into the precipitating tanks, where the copper is thrown down by means of metallic iron. The ferrous chloride formed at the same time is converted into ferric chloride which can be used to moisten the heaps. This conversion is effected by allowing the ferrous chloride liquors slowly to descend a tower, filled with pieces of wood, coke or quartz, where it meets an ascending current of chlorine.

The sulphate, oxide or chlorides, which are obtained from the sulphuretted ores, are lixiviated and the metal precipitated in the same manner as we have previously described.

The metal so obtained is known as " cement " copper. If it contains more than 55% of copper it is directly refined, while if it contains a lower percentage it is smelted with matte or calcined copper pyrites. The chief impurities are basic salts of iron, free iron, graphite, and sometimes silica, antimony and iron arsenates. Washing removes some of these impurities, but some copper always passes into the slimes. If much carbonaceous matter be present (and this is generally so when iron sponge is used as the precipitant) the crude product is heated to redness in the air; this burns out the carbon, and, at the same time, oxidizes a little of the copper, which must be subsequently reduced. A similar operation is conducted when arsenic is present; basic-lined

reverberatory furnaces have been used for the same purpose.

Electrolytic Refining. — The principles have long been known on which is based the electrolytic separation of copper from the certain elements which generally accompany it, whether these, like silver and gold, are valuable, or, like arsenic, antimony, bismuth, selenium and tellurium, are merely impurities. But it was not until the dynamo was improved as a machine for generat- ing large quantities of electricity at a very low cost that the electrolysis of copper could be practised on a commercial scale. To-day, by reason of other uses to which electricity is applied, electrically deposited copper of high conductivity is in ever- increasing demand, and commands a higher price than copper refined by fusion. This increase in value permits of copper with not over £2 or $10 worth of the precious metals being profitably subjected to electrolytic treatment. Thus many million ounces of silver and a great deal of gold are recovered which formerly were lost.

The earliest serious attempt to refine copper industrially was made by G. R. Elkington, whose first patent is dated 1865. He cast crude copper, as obtained from the ore, into plates which were used as anodes, sheets of electro-deposited copper forming the cathodes. Six anodes were suspended, alternately with four cathodes, in a saturated solution of copper sulphate in a cylindrical fire-clay trough, all the anodes being connected in one parallel group, and all the cathodes in another. A hundred or more jars were coupled in series, the cathodes of one to the anodes of the next, and were so arranged that with the aid of side-pipes with leaden connexions and india-rubber joints the electrolyte could, once daily, be made to circulate through them all from the top of one jar to the bottom of the next. The current from a Wilde's dynamo was passed, apparently with a current density of 5 or 6 amperes per sq. ft., until the anodes were too crippled for further use. The cathodes, when thick enough, were either cast and rolled or sent into the market direct. Silver and other insoluble impurities collected at the bottom of the trough up to the level of the lower side-tube, and were then run off through a plug in the bottom into settling tanks, from which they were removed for metallurgical treatment. The electrolyte was used until the accumulation of iron in it was too great, but was mixed from time to time with a little water acidulated by sulphuric acid. This process is of historic interest, and in principle it is identical with that now used. The modifications introduced have been chiefly in details, in order to economize materials and labour, to ensure purity of product, and to increase the rate of deposition.

The chemistry of the process has been studied by Martin Kiliani {Berg-

und Hiittenmannische Zeitung, 1885, p. 249), who found that, using the (low) current-density of 1-8 ampere per sq. ft. of cathode, and an electrolyte containing 1 J lb of copper sulphate and § lb of sulphuric acid per gallon, all the gold, platinum and silver present in the crude copper anode remain as metals, undis- solved, in the anode slime or mud, and all the lead remains there as sulphate, formed by the action of the sulphuric acid (or SO4 ions) ; he found also that arsenic forms arsenious oxide, which dissolves until the solution is saturated, and then remains in the slime, from which on long standing it gradually dissolves, after conversion by secondary reactions into arsenic oxide; antimony forms a basic sulphate which in part dissolves; bismuth partly dissolves and partly remains, but the dissolved portion tends slowly to separate out as a basic salt which becomes added to the slime ; cuprous oxide, sulphide and selenides remain in the slime, and very slowly pass into solution by simple chemical action; tin partly dissolves (but in part separates again as basic salt) and partly remains as basic sulphate and stannic oxide; zinc, iron, nickel and cobalt pass into solution — more readily indeed than does the copper. Of the metals which dissolve, none (except bismuth, which is rarely present in any quantity) deposits at the anode so long as the solution retains its proper proportion of copper and acid, and the current-density is not too great. Neutral solutions are to be avoided because in them silver dissolves from the anode and, being more electro-negative than copper, is deposited at the cathode, while antimony and arsenic are also deposited, imparting a dark colour to the copper. Electrolytic copper should contain at least 99-92 % of metallic copper, the balance consisting mainly of oxygen with not more than o-oi % in all of lead, arsenic, antimony, bismuth and silver. Such a degree of purity is, however, unattainable unless the conditions of electrolysis are rigidly adhered to. It should be observed that the free acid is gradually neutralized, partly by chemical action on certain con- stituents of the slime, partly by local action between different metals of the anode, both of which effect solution independently of the current, and partly by the peroxidation (or aeration) of ferrous sulphate formed from the iron in the anode. At the same time there is a gradual substitution of other metals for copper in the solution, because although copper plus other (more electro-positive) metals are constantly dissolving at the anode, only copper is deposited at the cathode. Hence the composition and acidity of the solution, on which so much depends, must be constantly watched.

The dependence of the mechanical qualities of the copper upon the current-density employed is well known. A very weak current gives a pale and brittle deposit, but as the current-density is in- creased up to

a certain point, the properties of the metal improve ; beyond this point they deteriorate, the colour becoming darker and the deposit less coherent, until at last it is dark brown and spongy or pulverulent. The presence of even a small proportion of hydro- chloric acid imparts a brown tint to the deposit. Baron H. v. Hiibl {Mittheil. des k. k. militar-geograph. Inst., 1886, vol. vi. p. 51) has found that with neutral solutions a 5 % solution of copper sulphate gave no good result, while with a 20% solution the best deposit was obtained with a current-density of 28 amperes per sq. ft.; with solutions containing 2 % of sulphuric acid, the 5 % solution gave good deposits with current-densities of 4 to 7-5 amperes, and the 20% solution with 11-5 to 37 amperes, per sq. ft. The maximum current-densities for a pure acid solution at rest were : for 15% pure copper sulphate solutions 14 to 21 amperes, and for 20% solutions 18-5 to 28 amperes, per sq. ft.; but when the solutions were kept in gentle motion these maxima could be increased to 21-28 and 28-37 amperes per sq. ft. respectively. The necessity for adjusting the current-density to the composition and treatment of the electro- lyte is thus apparent. The advantage of keeping the solution in motion is due partly to the renewal of solution thus effected in the neighbourhood of the electrodes, and partly to the neutralization of the tendency of liquids undergoing electrolysis to separate into layers, due to the different specific gravities of the solutions flowing from the opposing electrodes. Such an irregular distribution of the bath, with strong copper sulphate solution from the anode at the bottom and acid solution from the cathode at the top, not only alters the conductivity in different strata and so causes irregular current-distribution, but may lead to the current-density in the upper layers being too great for the proportion of copper there present. Irregular and defective deposits are therefore obtained. Provision for circulation of solution is made in the systems of copper-refining now in use. Henry Wilde, in 1875, in depositing copper on iron printing-rollers, recognized this principle and rotated the rollers during electrolysis, thereby renewing the surfaces of metal and liquid in mutual contact, and imparting sufficient motion to the solution to prevent stratification; as an alternative he imparted motion to the electrolyte by means of propeller blades. Other workers have followed more or less on the same lines; reference may be made to the patents of F. E. and A. S. Elmore, who sought to improve the character of the deposit by burnishing during electro- lysis, of E. Dumoulin, and Sherard Cowper-Coles {Engineering Review, 1ˆ05, vol. xiii. p. 392), who prefers to rotate the cathodf at a speed that maintains a peripheral velocity of at least 1000 ft. per minute. Certain other inventors have applied the same principle in a different way. H. Thofehrn in America and J. C. Graham va

England have patented processes by which jets of the electrolyte are caused to impinge with considerable force upon the surface of the cathode, so that the renewal of the liquid at this point takes place very rapidly, and current-densities per sq. ft. of 50 to 100 amperes are recommended by the former, and of 300 amperes by the latter. Graham has described experiments in this direction, using a jet of electrolyte forced (beneath the surface of the bath) through a hole in the anode upon the surface of the cathode. Whilst the jet was playing, a good deposit was formed with so high a current-density as 280 amperes per sq. ft., but if the jet was checked, the deposit (now in a still liquid) was instantaneously ruined. When two or more jets were used side by side the deposit was good opposite the centre of each, but bad at the point where two currents met, because the rate of flow was reduced. By introducing perforated shields of ebonite between the electrodes, so that the full current-density was only attained at the centres of the jets, these ill effects could be prevented. One of the chief troubles met with was the formation of arborescent growths around the edges of the cathode, due to the greater current-density in this region; this, however, was also obviated by the use of screens. By means of a very brisk rotation of cathode, combined with a rapid current of electrolyte, J. W. Swan has succeeded in depositing excellent copper at current- densities exceeding 1000 amperes per sq. ft. The methods by which such results are to be obtained cannot, however, as yet be practised economically on a working scale; one great difficulty in applying them to the refining of metals is that the jets of liquid would be liable to carry with them articles of anode mud, and Swan has shown that the presence of solid particles in the electrolyte is one of the most fruitful causes of the well-known nodular growths on electro- deposited copper. Experiments on a working scale with one of the jet processes in America have, it is reported, been given up after a full trial.

In copper-refining practice, the current-density commonly ranges from 7-5 to 12 or 15, and occasionally to 18, amperes per sq. ft. The electrical pressure required to force a current of this intensity through the solution, and to overcome a certain opposing electro- motive force arising from the more electro-negative impurities of the anode, depends upon the composition of the bath and of the anodes, the distance between the electrodes, and the temperature, but under the usual working conditions averages 0-3 volt for every pair of electrodes in series. In nearly all the processes now used, the solution contains

about l| to 2 lb of copper sulphate and from 5 to 10 oz. of sulphuric acid per gallon of water, and the space between the electrodes is from 1ˆ to 2 in., whilst the total area of cathode surface in each tank may be 200 sq. ft., more or less. The anodes are usually cast copper plates about (say) 3 ft. by 2 ft. by f or I in. The cathodes are frequently of electro-deposited copper, deposited to a thickness of about fa in. on black-leaded copper plates, from which they are stripped before use. The tanks are commonly constructed of wood lined with lead, or tarred inside, and are placed in terrace fashion each a little higher than the next in series, to facilitate the flow of solution through them all from a cisternat one end to a well at the other. Gangways are left between adjoining rows of tanks, and an overhead travelling-crane facilitates the removal of the electrodes. The arrangement of the tanks depends largely upon the voltage available from the electric generator selected; commonly they are divided into groups, all the baths in each group being in series. In the huge Anaconda plant, for example, in which 150 tons of refined copper can be produced daily by the Thofehrn multiple system (not the jet system alluded to above), there are 600 tanks about 8| ft. by 4J ft. by 31 ft. deep, arranged in three groups of 200 tanks in series. The connexions are made by copper rods, each of which, in length, is twice the width of the tank, with a bayonet-bend in the middle, and serves to support the cathodes in the one and the anodes in the next tank. Self- registering voltmeters indicate at any moment the potential differ- ence in every tank, and therefore give notice of short circuits occur- ring at any part of the installation. The chief differences between the commercial systems of refining lie in the arrangement of the baths, in the disposition and manner of supporting the electrodes in each, in the method of circulating the solution, and in the current-density employed. The various systems are often classed in two groups, known respectively as the Multiple and Series systems, depending upon the arrangement of the electrodes in each tank. Under the multiple system anodes and cathodes are placed alternately, all the anodes in one tank being connected to one rod, and all the cathodes to another, and the potential difference between the terminals of each tank is that between a single pair of plates. Under the series system only the first anode and the last cathode are connected to the conductors; between these are suspended, isolated from one another, a number of intermediate bi-polar electrode plates of raw copper, each of these plates acting on one side as a cathode, receiving a deposit of copper, and on the other as an anode, passing into solution; the voltage between the terminals of the tank will be as many times as great as that between a single pair of plates as there are spaces between electrodes in the tank. In time the original impure copper of the plates

becomes replaced by refined copper, but if the plates are initially very impure and dissolve irregularly, it may happen that much residual scrap may have to be remelted, or that some of the metal may be twice refined, thus involving a

waste of energy. Moreover, the high potential difference between the terminals of the series tank introduces a greater danger of short-circuiting through scraps of metal at the bottom of the bath; for this reason, also, lead-lined vats are inadmissible, and tarred slate tanks are often used instead. A valuable comparison of the multiple and series systems has been published by E. Keller (see The Mineral Industry, New York, 1899, vol. vii. p. 229). G. Kroupa has calcu- lated that the cost of refining is 8s. per ton of copper higher under the series than it is under the multiple system; but against this, it must be remembered that the new works of the Baltimore Copper Smelting and Rolling Company, which are as large as those of the Anaconda Copper Mining Company, are using the Hayden process, which is the chief representative of the several series systems. In this system rolled copper anodes are used; these, being purer than many cast anodes, having flat surfaces, and being held in place by guides, dissolve with great regularity and require a space of only f in. between the electrodes, so that the potential difference between each pair of plates may be reduced to 0-15-0-2 volt.

J. A. W. Borchers, in Germany, and A. E. Schneider and O. Szontagh, in America, have introduced a method of circulating the solution in each vat by forcing air into a vertical pipe communi- cating between the bottom and top of a tank, with the result that the bubbling of the air upward aspirates solution through the vertical pipe from below, at the same time aerating it, and causing it to overflow into the top of the tank. Obviously this slow circulation has but little effect on the rate at which the copper may be de- posited. The electrolyte, when too impure for further use, is commonly recrystallized, or electrolysed with insoluble anodes to recover the copper.

The yield of copper per ampere (in round numbers, 1 oz. of copper per ampere per diem) by Faraday's law is never attained in practice ; and although 98 % may with care be obtained, from 94 to 96 % represents the more usual current-efficiency. With 100% current- efficiency and a potential difference of 0-3 volt between the electrodes, I lb of copper should require about 0-154 electrical horse-power hours as the amount of energy to be expended in the tank for its production. In practice the expenditure is somewhat greater than this; in large works the gross horse-power required for the refining itself and for power and lighting in the factory may not exceed 0-19 to 0-2 (or in smaller

works 0-25) horse-power hours per pound of copper refined.

Many attempts have been made to use crude sulphide of copper or matte as an anode, and recover the copper at the cathode, the sulphur and other insoluble constitutents being left at the anode. The best known of these is the Marchese process, which was tested on a working scale at Genoa and Stolberg in Rhenish Prussia. As the operation proceeded, it was found that the voltage had to be raised until it became prohibitive, while the anodes rapidly became honeycombed through and, crumbling away, filled up the space at the bottom of the vat. The process was abandoned, but in a modified form appears to be now in use in Nijni-Novgorod in Russia. Siemens and Halske introduced a combined process in which the ore, after being part-roasted, is leached by solutions from a previous electro- lytic operation, and the resulting copper solution electrolysed. In this process the anode solution had to be kept separate from the cathode solution, and the membrane which had in consequence to be used, was liable to become torn, and so to cause trouble by permitting the two solutions to mix. Modifications of the process have therefore been tried.

Modern methods in copper smelting and refining have effected enormous economy in time, space, and labour, and have conse- quently increased the world's output. With pyritic smelting a sulphuretted copper ore, fed into a cupola in the morning, can be passed directly to the converter, blown up to metal, and shipped as 99% bars by evening — an operation which formerly, with heap roasting of the ore and repeated roasting of the mattes in stalls, would have occupied not less than four months. A large furnace and a Bessemer converter, the pair capable of making a million pounds of copper a month from a low-grade sulphuretted ore, will not occupy a space of more than 25 ft. by 100 ft.; and whereas, in making metallic copper out of a low-grade sulphuretted ore, one day's labour used to be expended on every ton of ore treated, to-day one day's labour will carry at least four tons of ore through the different mechanical and metallurgical processes necessary to reduce them to metal. About 70% of the world's annual copper output is refined electrolytically, and from the 461,583 tons refined in the United States in 1907, there were recovered 13,995,436 oz;. of silver and 272,150 oz. of gold. The recovery of these valuable metals has contributed in no small degree to the expansion of electrolytic refining.

Production.- — The sources of copper, its applications and its metallurgy, have undergone great changes. Chile was the largest producer in 1869 with 54,867 tons; but in 1899 her

production had fallen off to 25,000 tons. Great Britain, though she had made half the world's copper in 1830, held second place in i860, making from native ores 15,968 tons; in 1900 her pro- duction was 777 tons, and in 1907, 711 tons. The United States made only 572 tons in 1850, and 12,600 tons in 1870; but she to- day makes more than 60% of the world's total. In 1879, Spain was the largest producer, but now ranks third.

The estimated total production for each decade of the 19th century in metric tons is here shown: —

1801-1810 1811-1820 1 821-1830 1 831-1840 1841-1850 1851-1860 1861-1870

91,000

96,000

135,000

218,400

291,000

506,999 900,000

1871-1880 1,189,000

1881-1890 2,373,398

1891-1900 3,708,901

The following table gives the output of various countries and the world's production for the years 1895, 1900, 1905, 1907:—

Country.

1895-

1900.

1905-

1907.

United States . Spain and Portugal

Chile …. Germany . Australasia

Russia .

175,294 55,755 18,725 22,428

16,799

10,160

12,806

5,364

274,933 53,718 28,285 26,016 20,635 23,368 22,473 8,128

397 > oo3

45-527 36,485 29,632 22,492

34,483 70,010

8,839

398,736 50,470 49,718 27,112 20,818 41,910 61,127 15,240

World’s production

339,994

496,819

699,5H

723,807

As the stock on hand rarely exceeds three months’ demand, and is often little more than a month’s supply, it is evident that consumption’ has kept close pace with production.

The large demand for copper to be used in sheathing ships ceased on the introduction of iron in shipbuilding because of the difficulty of coating-iron with an impervious layer of copper; but the consumption in the manufacture of electric apparatus and for electric conductors

has far more than compensated.

Alloys of Copper. — Copper unites with almost all other metals, and a large number of its alloys are of importance in the arts. The principal alloys in which it forms a leading ingredient are brass, bronze, and German or nickel silver; under these several heads their respective applications and qualities will be found.

Compounds of Copper. — Copper probably forms six oxides, viz. CU4O, CU3O, CU2O, CuO, CU2O3 and Cu0 2 . The most important are cuprous oxide, Cu 2 0, and cupric oxide, CuO, both of Oxides which give rise to well-defined series of salts. The other andhy oxides do not possess this property, as is also the case droxUes. of th g hydrate d ox ; des Cu 3 2 2H 2 and Cu 4 3 5H 2 0, de- scribed by M. Siewert.

Cuprous oxide, Cu 2 0, occurs in nature as the mineral cuprite (q.v.). It may be prepared artificially by heating copper wire to a white heat, and afterwards at a red heat, by the atmospheric oxidation of copper reduced in hydrogen, or by the slow oxidation of the metal under water. It is obtained as a fine red crystalline precipitate by reducing an alkaline copper solution with sugar. When finely divided it is of a fine red colour. It fuses at red heat, and colours glass a ruby-red. The property was known to the ancients and during the middle ages; it was then lost for several centuries, to be rediscovered in about 1827. Cuprous oxide is reduced by hydro- gen, carbon monoxide, charcoal, or iron, to the metal ; it dissolves in hydrochloric acid forming cuprous chloride, and in other mineral acids to form cupric salts, with the separation of copper. It dissolves in ammonia, forming a colourless solution which rapidly oxidizes and turns blue. A hydrated cuprous oxide, (4Cu 2 0, H 2 0), is obtained as a bright yellow powder, when cuprous chloride is treated with potash or soda. It rapidly absorbs oxygen, assuming a blue colour. Cuprous oxide corresponds to the series of cuprous salts, which are mostly white in colour, insoluble in water, and readily oxidized to cupric salts.

Cupric oxide, CuO, occurs in nature as the mineral melaconite (q.v.), and can be obtained as a hygroscopic black powder by the gentle ignition of copper nitrate, carbonate or hydroxide; also by heating the hydroxide. It oxidizes carbon compounds to carbon dioxide and water, and therefore finds extensive application in analytical organic chemistry. It is also employed to colour glass, to which it imparts a light green colour. Cupric hydroxide, Cu(OH) 2 , is obtained as a greenish-blue flocculent precipitate by

mixing cold solutions of potash and a cupric salt. This precipitate always contains more or less potash, which cannot be entirely removed by washing. A purer product is obtained by adding ammonium chloride, filtering, and washing with hot water. Several hydrated oxides, e.g. Cu(OH) 2 ,3CuO,Cu(OH) 2 -6H 2 0,6CuO-H 2 0,have been described. Both the oxide and hydroxide dissolve in ammonia to form a beautiful azure-blue solution (Schweizer's reagent), which dissolves cellulose, or perhaps, holds it in suspension as water does starch ; accordingly, the solution rapidly perforates paper or calico. The salts derived from cupric oxide are generally white when anhydrous, but blue or green when hydrated.

Copper quadrantoxide, CU4O, is an olive-green powder formed by mixing well-cooled solutions of copper sulphate and alkaline stannous chloride. The trientoxide, Cu 3 0, is obtained when cupric oxide is heated to l500°-200o° C. It forms yellowish-red crystals, which scratch glass, and are unaffected by all acids except hydrofluoric; it also dissolves in molten potash. Copper dioxide, Cu0 2 H 2 0, is obtained as a yellowish-brown powder, by treating cupric hydrate with hydrogen peroxide. When moist, it decomposes at about 6°C, but the dry substance must be heated to about 180°, before decomposition sets in (see L. Moser, Abst. J.C.S., 1907, ii. p. 549).

Cuprous hydride, (CuH)„, was first obtained by Wurtz in 1844, who treated a solution of copper sulphate with hypophosphorous acid, at a temperature not exceeding 70 C. According to E. J. Bartlett and W. H. Merrill, it decomposes when heated, and gives cupric hydride, CuH 2 , as a reddish-brown spongy mass, which turns to a chocolate colour on exposure. It is a strong reducing agent.

Cuprous fluoride, CuF, is a ruby-red crystalline mass, formed by heating cuprous chloride in an atmosphere of hydrofluoric acid at iioo °-I200° C. It is soluble in boiling hydrochloric acid, but it is not reprecipitated by water, as is the case with cuprous chloride. Cupric fluoride, CuF 2 , is obtained by dissolving cupric oxide in hydrofluoric acid. The hydrated form, (CuF 2 , 2H 2 0, 5HF) ,is obtained as blue crystals, sparingly soluble in cold water; when heated to loo C. it gives the compound CuF(OH), which, when heated with ammonium fluoride in a current of carbon dioxide, gives anhydrous copper fluoride as a white powder.

Cuprous chloride, CuCl or Cu 2 Cl 2 , was obtained by Robert Boyle by heating copper with mercuric chloride. It is also obtained by burning the metal in chlorine, by heating copper and cupric oxide with hydrochloric acid, or copper and cupric chloride with hydro- chloric

acid. It dissolves in the excess of acid, and is precipitated as a white crystalline powder on the addition of water. It melts at below red heat to a brown mass, and its vapour density at both red and white heat corresponds to the formula Cu 2 Cl 2 . It turns dirty violet on exposure to air and light; in moist air it absorbs oxygen and forms an oxychloride. Its solution in hydrochloric acid readily absorbs carbcn monoxide and acetylene; hence it finds application in gas analysis. Its solution in ammonia is at first colourless, but rapidly turns blue, owing to oxidation. This solution absorbs acetylene with the precipitation of red cuprous acetylide, Cu 2 C 2 , a very explosive compound. Cupric chloride, CuCl 2 , is ob- tained by burning copper in an excess of chlorine, or by heating the hydrated chloride, obtained by dissolving the metal or cupric oxide in an excess of hydrochloric acid. It is a brown deliquescent powder, which rapidly forms the green hydrated salt CuCl 2 , 2H 2 on exposure. The oxychloride Cu 3 2 Cl 2 4H 2 is obtained as a pale blue precipi tate when potash is added to an excess of cupric chloride. The oxychloride Cu40 3 Cl 2 ,4H 2 occurs in nature as the mineral atacamite. It may be artificially prepared by heating salt with ammonium copper sulphate to 100°. Other naturally occurring oxychlorides are botallackite and tallingite. ” Brunswick green,” a light green pigment, is obtained from copper sulphate and bleaching powder.

The bromides closely resemble the chlorides and fluorides.

Cuprous iodide, Cu 2 I 2 , is obtained as a white powder, which suffers little alteration on exposure, by the direct union of its components or by mixing solutions of cuprous chloride in hydrochloric acid and potassium iodide ; or, with liberation of iodine, by adding potassium iodide to a cupric salt. It absorbs ammonia, forming the compound Cu 2 I 2 , 4NH3. Cupric iodide is only known in combination, as in Cul 2 , 4NH 3 , H 2 0, which is obtained by exposing Cu 2 I 2 ,4NH 3 to moist air.

Cuprous sulphide, Cu 2 S, occurs in nature as the mineral chalcocite or copper-glance (q.v.), and may be obtained as a biack brittle mass by the direct combination of its constituents. (See above, Metallurgy.) Cupric sulphide, CuS, occurs in nature as the mineral covellite. It may be prepared by heating cuprous sulphide with sulphur, or triturating cuprous sulphide with cold strong nitric acid, or as a dark brown precipitate by treating a copper solution with sul- phuretted hydrogen. Several polysulphides, e.g. Cu 2 S 6 , Cu 2 S 6 , Cu 4 S 6 , Cu 2 S 3 , have been described; they are all unstable, decomposing- into cupric sulphide and sulphur. Cuprous sulphite, CuS0 3 -H 2 0, is obtained as a brownish-red crystalline powder by treating cuprous hydrate with

sulphurous acid. A cuproso-cupric sulphite, Cu 2 S0 3 , CuS0s,2H 2 0, is obtained by mixing solutions of cupric sulphate and acid sodium sulphite.

Cupric sulphate or ” Blue Vitriol,” CUSO4, is one of the most im- portant salts of copper. It occurs in cupriferous mine waters and as the minerals chalcanthite or cyanosite, CuS04-5H 2 0, and boothite, CuS0 4 -7H 2 0. Cupric sulphate is obtained commercially by the

no

oxidation of sulphuretted copper ores (see above, Metallurgy; wet methods), or by dissolving cupric oxide in sulphuric acid. It was obtained in 1644 by Van Helmont, who heated copper with sulphur and moistened the residue, and in 1648 by Glauber, who dissolved copper in strong sulphuric acid. (For the mechanism of this reaction see C. H. Sluiter, Chem. Weekblad, 1906, 3, p. 63, and C. M. van Deventer, ibid., 1906, 3, p. 515.) It crystallizes with five molecules of water as large blue triclinic prisms. When heated to ioo°, it loses four molecules of water and forms the bluish-white monohydrate, which, on further heating to 250°-26o°, is converted into the white CUSO4. The anhydrous salt is very hygroscopic, and hence finds application as a desiccating agent. It also absorbs gaseous hydro- chloric acid. Copper sulphate is readily soluble in water, but in- soluble in alcohol ; it dissolves in hydrochloric acid with a consider- able fall in temperature, cupric chloride being formed. The copper is readily replaced by iron, a knife-blade placed in an aqueous solution being covered immediately with a bright red deposit of copper. At one time this was regarded as a transmutation of iron into copper. Several basic salts are known, some of which occur as minerals; of these, we may mention brochantite (q.v.), CuSCh, 3Cu(OH 2), langite, CuS0 4 , 3Cu(OH) 2 , H 2 0, lyellite (or devilline), warringtonite ; woodwardite and enysite are hydrated copper- aluminium sulphates, connellite is a basic copper chlorosulphate, and spangolite is a basic copper aluminium chlorosulphate. Copper sulphate finds application in calico printing and in the preparation of the pigment Scheele’s green.

A copper nitride, Cu 3 N, is obtained by heating precipitated cuprous oxide in ammonia gas (A. Guntz and H. Bassett, Bull. Soc. Chim., I9°*. 35. P- 201). Amaroon-colouredpowder,ofcompositionCuN0 2 , is formed when pure dry nitrogen dioxide is passed over finely- divided copper at 25°-30°. It decomposes when heated to 90°; with water it gives nitric oxide and cupric nitrate and nitrite. Cupric nitrate, Cu(N0

3) 2 , is obtained by dissolving the metal or oxide in nitric acid. It forms dark blue prismatic crystals containing 3, 4, or 6 molecules of water according to the temperature of crystal- lization. The trihydrate melts at 114-5°, and boils at 170°, giving off nitric acid, and leaving the basic salt Cu(N0 3) 2 -3Cu(OH) 2 . The mineral gerhardtite is the basic nitrate Cu 2 (OH) 3 N0 3 .

Copper combines directly with phosphorus to form several compounds. The phosphide obtained by heating cupric phosphate, Cu 2 H 2 P 2 0g, in hydrogen, when mixed with potassium and cuprous sulphides or levigated coke, constitutes ” Abel’s fuse,” which is used as a primer. A phosphide, Cu 3 P 2 , is formed by passing phosphor- etted hydrogen over heated cuprous chloride. (For other phosphides see E. Heyn and O. Bauer, Rep. Chem. Soc, 1906, 3, p. 39.) Cupric phosphate, Cu 3 (P04) 2 , may be obtained by precipitating a copper solution with sodium phosphate. Basic copper phosphates are of frequent occurrence in the mineral kingdom. Of these we may notice libethenite, Cu 2 (OH)PO*4; chalcosiderite, a basic copper iron phosphate; torbernite, a copper uranyl phosphate; andrewsite, a hydrated copper iron phosphate ; and henwoodite, a hydrated copper aluminium phosphate.

Copper combines directly with arsenic td*form several arsenides, some of which occur in the mineral kingdom. Of these we may mention whitneyite, Cu 9 As, algodonite, CuoAs, and domey kite, Cu 3 As. Copper arsenate is similar to cupric phosphate, and the resemblance is to be observed in the naturally occurring copper arsenates, which are generally isomorphous with the corresponding phosphates. Olivenite corresponds to libethenite; clinoclase, euchroite, corn- wallite and tyrolite are basic arsenates; zeunerite corresponds to torbernite; chalcophyllite (tamarite or ” copper-mica “) is a basic copper aluminium sulphato-arsenate, and bayldonite is a similar compound containing lead instead of aluminium. Copper arsenite forms the basis of a number of once valuable, but very poisonous, pigments. Scheele’s green is a basic copper arsenite; Schweinfurt green, an aceto-arsenite ; and Casselmann’s green a compound of cupric sulphate with potassium or sodium acetate.

Normal cupric carbonate, CuC0 3 , has not been definitely obtained, basic hydrated forms being formed when an alkaline carbonate is added to a cupric salt. Copper carbonates are of wide occurrence in the mineral kingdom, and constitute the valuable ores malachite and azurite. Copper rust has the same composition as malachite; it results from the action of carbon dioxide and water on the metal. Copper carbonate is also the basis of the valuable blue to green pigments

verditer, Bremen blue and Bremen green. Mountain or mineral green is a naturally occurring carbonate.

By the direct union of copper and silicon, cuprosilicon, consisting mainly of Cu 4 Si, is obtained (Lebeau, C.R., 1906; Vigouroux, ibid.).

Copper_ silicates occur in the mineral kingdom, many minerals owing their colour to the presence of a cupriferous element. Dioptase (q.v.) and chrysocolla (q.v.) are the most important forms.

Detection. — Compounds of copper impart a bright green coloration to the flame of a Bunsen burner. Ammonia gives a characteristic blue coloration when added to a solution of a copper salt ; potassium ferrocyanide gives a brown precipitate, and, if the solution be very dilute, a brown colour is produced. This latter reaction will detect one part of copper in 500,000 of water. For the borax beads and the qualitative separation of copper from other metals, see Chemistry: Analytical. For the quantitative estimation, see Assaying: Copper.

Medicine. — In medicine copper sulphate was employed as an emetic, but its employment for this purpose is now very rare, as it is exceedingly depressant, and if it fails to act, may seriously damage the gastric mucous membrane. It is, however, a useful superficial caustic and antiseptic. All copper compounds are poisonous, but not so harmful as the copper arsenical pigments.

References. — See generally H. J. Steven's Copper Handbook (annual), W. H. Weld, The Copper Mines of the World (1907), The Mineral Industry (annual), and Mineral Resources of the United States (annual). Forthedry metallurgy, see E.D.Peters,Principles of Copper Smelting (New York, 1907) ; for pyritic smelting, see T. A. Rickard, Pyrite Smelting (1905) ; for wet methods, see Eissler, Hydrometallurgy of Copper (London, 1902) ; and for electrolytic methods, see T. Ulke, Die electrolytische Raffination des Kupfers (Halle, 1904). Reference should also be made to the articles Metallurgy and Electro-Metallurgy. For the chemistry of copper and its compounds see the references in the article Chemistry: Inorganic. Toxicologic and hygienic aspects are treated in Tschirsch's Das Kupfer vom Standpunkt der gerichtlichen Chemie, Toxikologie und Hygiene (Stuttgart, 1893).

COPPERAS (Fr. couperose; Lat. cupri rosa. the flower of copper), green vitriol, or ferrous sulphate, FeS0 4 -7H 2 0, having a bluish-green colour and an astringent, inky and somewhat sweetish taste. It is used in dyeing and tanning, and in the manufacture of ink and of Nordhausen sulphuric acid or fuming oil of vitriol (see Iron).

COPPER-GLANCE, a mineral consisting of cuprous sulphide, Cu 2 S, and crystallizing in the orthorhombic system. It is known also as chalcocite, redruthite and vitreous copper (German, Kupfer glaserz of G. Agricola, 1546). The crystals have the form of six-sided tables or prisms; the angle between the prism faces (lettered in the figure) being 6o° 25'. When twinned on the prism planes 0, as is frequently the case, the crystals simulate hexagonal symmetry still more closely, as in the minerals arag-

onite and chrysoberyl. Twinning also takes place according to two other laws, giving rise to interpenetrating crystals with the basal planes (s) of the two individuals inclined at angles of 69 or 87 56′ respectively. The mineral also occurs as compact masses of considerable extent. The colour is dark lead-grey with a metallic lustre, but this is never very bright, since the material is readily altered, becoming black and dull on exposure to light. The mineral is soft (H. = 2|) and sectile, and can be readily cut with a knife, like argentite; sp. gr. 5-7. Analyses agree closely with the formula Cu 2 S, which corresponds to 79-8% of copper; small quantities of iron and silver are some- times present.

Next to chalcopyrite, copper-glance is the most important ore of copper. It usually occurs in the upper part of the copper- bearing lodes, and is a secondary sulphide derived from the chalcopyrite met with at greater depths; sometimes, however, the two minerals are found together in the same part of the lodes. The best crystals are from St Just, St Ives, and Redruth in Cornwall, and from Bristol in Connecticut. Small crystals of recent formation are found on Roman bronze coins in the thermal springs at Bourbonne-les-Bains.

Copper-glance readily alters to other minerals, such as malachite, covellite, melaconite and chalcopyrite. On the other hand, it is found as pseudomorphs after chalcopyrite, galena, and organic structures such as wood; copper-glance pseudomorphous after galena preserves the cleavage of the original mineral and is known as harrisite.

Isomorphous with copper-glance is the orthorhombic mineral stromeyerite, a double copper and silver sulphide, CuAgS, which occurs in abundance in the Altai Mountains. (L. J. S.)

COPPERHEADS, an American political epithet, applied by Union men during the Civil War to those men in the North who, deeming it impossible to conquer the Confederacy, were earnestly in favour of peace and therefore opposed to the war policy of the president and of Congress. Such men were not necessarily friends of the Confederate

cause. The term originated in the autumn of 1862, and its use quickly spread throughout the North. In the Western states early in 1863 the terms ” Copperhead ”

in

and ” Democrat ” had become practically synonymous. . The name was adopted because of the fancied resemblance of the peace party to the venomous copperhead snake, and, though applied as a term of opprobrium, it was willingly assumed by those upon whom it was bestowed.

COPPERMINE, a river of Mackenzie district, Canada, about 475 m. long, rising in a small lake in approximately no° 20′ W. and 65° 50′ N., and flowing south to Lake Gras and then north- westward to Coronation Gulf in the Arctic Ocean. Like Back’s river, the only other large river of this part of Canada, it is unnavigable, being a succession of lakes and violent rapids. The country through which it flows is a mass of low hills arid morasses. The river was discovered by Samuel Hearne in 177 1, and was explored from Point Lake to the sea by Captain (after- wards Sir John) Franklin in 182 1.

COPPER-PYRITES, or Chalcopyrite, a copper iron sulphide (CuFeS 2) , an important ore of copper. The name copper-pyrites is from the Ger. Kupferkies, which was used as f«tr back as 1546 by G. Agricola; chalcopyrite (from xaX«6s, ” copper,” and pyrites) was proposed by J. F. Henckel in his Pyritologia, oder Kiess-Historie (1725). By the ancients copper-pyrites was included with other minerals under the term pyrites, though the copper-ore from Cyprus referred to by Aristotle as chalcites may possibly have been identical with this mineral.

Chalcopyrite crystallizes in the tetragonal system with inclined hemihedrism, but the form is so nearly cubic that it was not recognized as tetragonal until accurate measurements were made in 1822. Crystals are usually tetrahedral in aspect, owing to the large development of the sphenoid P jui}. The faces of this form are dull and striated, whilst the smaller faces of the complementary sphenoid P’ {in} (fig. 1) are bright and smooth. The combination of these two forms produces a figure resembling

an octahedron, the ˆ angle between P and

P’ being 70 7 J’, corresponding to the angle 70 32′ of the regular

octahedron. The other faces shown in fig. 1 are the basal pinacoid, a {001}, and two square pyramids, {201}. Crystals are usually twinned, and are and difficult to decipher. There are three twin-planes being (in), (101) and (no) respectively. Twinning according to the first law is effected by rotation about an axis normal to the sphenoidal face (in), the resulting form resembling the twins of blende and spinel. Twinning according to the second law can only be explained by reflection across the plane (101), not by rotation about an axis; chalcopyrite affords an excellent example of this com- paratively rare type of symmetric twinning. Interpenetra- tion twins (fig. 2) with (no) as twin-plane are of very rare occurrence.

Crystals have imperfect cleavages parallel to the eight faces of the pyramid c {201}. The fracture is conchoidal, and the material is brittle. Hardness 4; specific gravity 4-2. The colour is brass-yellow, and the lustre metallic; the streak, or colour of the powder, is greenish-black. The mineral is especially liable to surface alteration, tarnishing with beautiful iridescent colours; a blue colour usually predominates, owing probably to the alteration of the chalcopyrite to covellite (CuS). The massive and compact mineral frequently exhibits this iridescent tarnish, and is consequently known to miners as ” peacock ore ” or ” peacock copper.” The massive mineral sometimes occurs in mammillary and botryoidal forms with a smooth brassy surface, and is then known to Cornish miners as ” blister- copper-ore.”

Chalcopyrite or copper-pyrites may be readily distinguished from iron-pyrites (or pyrites), which it somewhat resembles

Fig

6 {101} and c often complex twin-laws, the

Fig. 2.

in appearance, by its deeper colour and lower degree of hardness: the former is easily scratched by a knife, whilst the latter can only be scratched with difficulty or not at all. Chalcopyrite is decomposed by nitric acid with separation of sulphur and formation of a green solution; ammonia added in excess to this solution changes the green colour to deep blue and precipitates red ferric hydroxide.

The chemical formula CuFeS2 corresponds with the percentage composition Cu = 34‘5, Fe = 30‘5, S = 35’o. Analyses usually, however, show the presence of more iron, owing to the intimate admixture of iron-pyrites. Traces of gold, silver, selenium or thallium

are sometimes present, and the mineral is sometimes worked as an ore of gold or silver.

Chalcopyrite is of wide distribution and is the commonest of the ores of copper. It occurs in metalliferous veins, often in association with iron-pyrites, chalybite, blende, &c, and in Cornwall and Devon, where it is abundant, with cassiterite. The large deposits at Falun in Sweden occur with serpentine in gneiss, and those at Montecatini, near Volterra in the province of Pisa, serpentine and gabbro. At Rammelsberg in the Harz it forms a bed in argillaceous schist, and at Mansfield in Thuringia it occurs in the Kupferschiefer with ores of nickel and cobalt. Extensive deposits are mined in the United States, particularly at Butte in Montana, and in Namaqualand, South Africa. Well-crystallized specimens are met with at many localities; for example, formerly at Wheal Towan (hence the name towanite, which has been applied to the species) in the St Agnes district of Cornwall, at Freiberg in Saxony, and Joplin, Missouri. (L. J. S.)

COPPICE, or Copse (from an O. Fr. copeis or coupeis, from Late Lat. colpare, to cut with a blow; colpas, the Late Lat. for “blow,” is a shortened form of colapus or colaphus, adapted from the Gr. k6Xo.< £os)> a small plantation or thicket of planted or self : sown trees, which are cut periodically for use or sale, before the trees grow into large timber. Whether naturally or artificially grown the produce is looked on by the English law as jructus industrialis. The tenant for life or years may appropriate this produce (see Dashwood v. Magniac, 1801, 3 Ch. 306).

COPRA (a Spanish and Portuguese adaptation of the Malay hopper ah, and Hindustani khopra, the coco-nut), the dried broken kernel of the coco-nut from which coco-nut oil is extracted by boiling and pressing. Copra is the form in which the product of the coco-nut is exported for commercial purposes (see Coco- nut Palm).

COPROLITES (from Gr. K&irpos, dung, and \L60s, stone), the fossilized excrements of extinct animals. The discovery of their true nature was made by Dr William Buckland, who observed that certain convoluted bodies occurring in the Lias of Gloucestershire had the form which would have been produced by their passage in the soft state through the intestines of reptiles or fishes. These bodies had long been known as “fossil fir cones” and “bezoar stones.” Buckland’s conjecture that they were of faecal origin, and similar to the album grecum or ex- crement of hyaenas, was confirmed by Dr W. Prout, who on analysis found they consisted essentially of calcium phosphate and carbonate, and not infrequently contained fragments of unaltered

bone. The name “coprolites” was accordingly given to them by Buckland, who subsequently expressed his belief that they might be found useful in agriculture on account of the calcium phosphate they contained. The Liassic coprolites are described by Buckland as resembling oblong pebbles, or kidney-potatoes; they are mostly 2 to 4 in. long, and from 1 to 2 in. in diameter, but those of the larger ichthyosauri are of much greater dimensions. In colour they vary from ash-grey to black, and their fracture is conchoidal. Internally they are found to consist of a lamina twisted upon itself, and externally they generally exhibit a tortuous structure, produced, before the cloaca was reached, by the spiral valve of a compressed small intestine (as in skates, sharks and dog-fishes); the surface shows also vascular impressions and corrugations due to the same cause. Often the bones, teeth and scales of fishes are to

be found dispersed through the coprolites, and sometimes the bones of small ichthyosauri, which were apparently a prey to the larger marine saurians. Coprolites have been found at Lyme Regis, enclosed by the ribs of ichthyosauri, and in the remains of several species of fish ; also in the abdominal cavities of a species of fossil fish, Macropoma Mantelli, from the chalk of Lewes. Professor T. Jager has described coprolites from the alum-slate of Gaildorf in Wurttemberg; the fish-coprolites of Burdiehouse and of Newcastle-under-Lyme are of Carboniferous age. The so-called ” beetle-stones ” of the coal-formation of Newhaven, near Leith, which have mostly a coprofite nucleus, have been applied to various ornamental purposes by lapidaries. The name ” cololites ” (from the Greek kcoKov, the large intestine, XWor, stone) was given by Agassiz to fossil wormlike bodies, found in the lithographic slate of Solenhofen, which he determined to be either the petrified intestines or contents of the intestines of fishes. The bone-bed of Axmouth in Devonshire and West- bury and Aust in Gloucestershire, in the Penarth or Rhaetic series of strata, contains the scales, teeth and bones of saurians and fishes, together with abundance of coprolites; but neither there nor at Lyme Regis is there a sufficient quantity of phos- phatic material to render the working of it for agricultural purposes remunerative.

The term coprolites has been made to include all kinds of phosphatic nodules employed as manures, such, for example, as those obtained from the Coralline and the Red Crag of Suffolk. At the base of the Red Crag in that county is a bed, 3 to 18 in. thick, containing rolled fossil

bones, cetacean and fish teeth, and shells of the Crag period, with nodules or pebbles of phosphatic matter derived from the London Clay, and often investing fossils from that formation. These are distinguishable from the grey Chalk coprolites by their brownish ferruginous colour •and smooth appearance. When ground they give a yellowish-red powder. These nodules were at first taken by Professor J. S. Henslow for coprolites; they were afterwards termed by Buckland ” pseudo-coprolites.” ” The nodules, having been imbued with phosphatic matter from their matrix in the London Clay, were dislodged,” says Buckland, ” by the waters of the seas of the first period, and accumulated by myriads at the bottom of those shallow seas where is now the coast of Suffolk. Here they were long rolled together with the bones of large mammalia, fishes, and with the shells of molluscous creatures that lived in shells. From the bottom of this sea they have been raised to form the dry lands along the shores of Suffolk, whence they are now extracted as articles of commercial value, being ground to powder in the mills of Mr [afterwards Sir John] Lawes, at Deptford, to supply our farms with a valuable substitute for guano, under the accepted name of coprolite manure.” The phosphatic nodules occurring throughout the Red Crag of Suffolk are regarded as derived from the Coralline Crag. The Suffolk beds have been worked since 1846; and. immense quantities of coprolite have also been obtained from Essex, Norfolk and Cambridgeshire. The Cambridgeshire coprolites are believed to be derived from deposits of Gault age; they are obtained by washing from a stratum about a foot thick, resting on the Gault, at the base of the Chalk Marl, and probably homotaxeous with the Chloritic Marl. An acre used to yield on an average 300 tons of phosphatic nodules, value £750. About £140 per acre was paid for the lease of the land, which after two years was restored to its owners re-soiled and levelled. Plicatulae have been found attached to these coprolites, showing that they were already hard bodies when lying at the bottom of the Chalk ocean. The Cambridgeshire coprolites are either amorphous or finger-shaped; the coprolites from the Greensand are of a black or dark-brown colour; while those from the Gault are greenish- white on the surface, brownish-black internally. Samples of Cambridgeshire and Suffolk coprolite have been found by A. Voelcker to give on analysis phosphoric acid equivalent to about 55 and 52-5% of tribasic calcium phosphate respectively {J own. R. Agric. Soc. Eng., i860, xxi. 358). The following analysis of a saurio- coprolite from Lyme Regis is given by T. J. Herapath xii. 91) : —

Water . . . . . f . . . 3-976

Organic matter …... 2-001

Calcium sulphate ….. 2-026

Calcium carbonate 28-121

Calcium fluoride . . . . . .not determined

Calcium and magnesium phosphate . 53-996

Magnesium carbonate 0-423

Aluminic phosphate 1-276

Ferric phosphate 6-182

Silica 0-733

98-734

An ichthyo-coprolite from Tenby was found to contain 15.4% of phosphoric anhydride. The pseudo-coprolites of the Suffolk Crag have been estimated by Herapath to be as rich in phosphates as the true ichthyo-coprolites and saurio-coprolites of other formations, the proportion of P 2 5 contained varying between 12-5 and 37-25%, the average proportion, however, being 32 or 33%-

Coprolit# is reduced to powder by powerful mills of peculiar construction, furnished with granite and buhrstones, before being treated with concentrated sulphuric acid. The acid renders it available as a manure by converting the calcium phosphate, Ca 3 P 2 08, that it contains into the soluble monocalcium salt, CaHiPjOs, or ” superphosphate.” The phosphate thus produced forms an efficacious turnip manure, and is quite equal in value to that produced from any other source. The Chloritic Marl in the Wealden district furnishes much phosphatic material, which has been extensively worked at Froyle. In the vicinity of Farnham it contains a bed of ” coprolites ” of considerable extent and 2 to 15 ft. in thickness. Specimens of these from the Dippen Hall pits, analysed by Messrs J. M. Paine and J. T. Way, showed the presence of phosphates equivalent to 55-96 of bone-earth {J own. R. Agric. Soc. Eng. ix. : 56). Phosphatic nodules occur also in the Chloritic Marl of the Isle of Wight and Dorset- shire, and at Wroughton, near Swindon. They are found in the Lower Greensand, or Upper Neocomian series, in the Atherfield Clay at Stopham, near Pulborough; occasionally at the junction of the Hythe and Sandgate beds; and in the Folkeston beds, at Farnham. At Woburn, Leighton, Ampthill, Sandy, Upware, Wicken and Potton, near the base of Upper Neocomian iron- sands, there is a band between 6 in. and 2 ft. in

thickness con- taining ” coprolites “; these consist of phosphatized wood, bones, casts of shells, and shapeless lumps. The coprolitic stratum of the Speeton Clay, on the coast to the north of Flam- borough Head, is included by Professor Judd with the Portland beds of that formation. In 1864 two phosphatic deposits, a limestone 3 ft. thick, with beds of calcium phosphate, and a shale of half that thickness, were discovered by Hope Jones in the neighbourhood of Cwmgynen, about 16 m. from Oswestry. They are at a depth of about 12 ft., in slaty shale containing Llandeilo fossils and contemporaneous f elspathic ash and scoriae. A specimen of the phosphatic limestone analysed by A. Voelcker yielded 34-92% tricalcium phosphate, a specimen of the shale 52-15% (Report of Brit. Assoc, 1865). Phosphatic beds, sup- posed to have had a coprolitic origin, are found in the Lower Silurian rocks of Canada.

See T. J. Herapath, Chem. Gaz., 1849, p. 449; W. Buckland, Geology and Mineralogy (4th ed., 1869); O. Fisher, Quart. Journ. Geo!. Soc, 1873, p. 52; J. J. H. Teall, On the Potton and Wicken Phosphatic Deposits (Sedgwick Prize Essay for 1873) (1875) and ” The Natural History of Phosphatic Deposits,” Proc. Geol. Assoc. xvi. (1900); L. W. Collet, Proc Roy. Soc. Edin. xxv. pt. 10, p. 862: T. G. Bonney, Cambridgeshire Geology (1875); L. Gruner, Bull, soc geol. franc, xxviii. (2nd series), p. 62; J. Martin, ibid. iii. (3rd series), p. 273.

COPTOS (Egyptian Keft, Kebto), the modern]£tjft (a village with railway station a short distance from the west bank of the Nile about 25 m. north-east of Thebes), an ancient city, capital of the fifth nome of Upper Egypt, and the starting-point of several roads to the Red Sea, of which that which passes along the valley running due east to Kosseir past the ancient quarries of Hamma- mat was the most frequented, until the foundation of Berenice (q.v.) by Ptolemy Philadelphus made an even more important line of traffic to the south- west. The growth of trade with Arabia

and India thereafter raised Coptos to great commercial prosperity; but in a.d. 292 its share in the rebellion against Diocletian led to an almost total devastation. It again appears, however, as a place of importance, and as the seat of a consider- able Christian community, though the stream of traffic turned aside to the neighbouring Kus. During part of the 7th century it was called Justinianopolis in honour of the emperor Justinian.

The local god of Coptos, as of Khemmis (Akhmlm, q.v.), was the ithyphallic Min; but in late times Isis was of equal import- ance in the city. Min was especially the god of the desert routes. Petrie's excavations on the site of the temple brought to light remains of all periods, the most remarkable objects being three very primitive limestone statues of the god with figures of an elephant, swords of sword-fish, sea-shells, &c, engraved upon them: there were also found some very peculiar terra-cottas of the Old Kingdom, and the decree of an Antef belonging to the latter part of the Middle Kingdom, deposing the monarch for siding with the king's enemy.

COPTS, the early native Christians of Egypt and their suc- cessors of the Monophysite sect, now racially the purest repre- sentatives of the ancient Egyptians. The name is a Europeanized form, dating perhaps from the 14th century, of the Arabic Kibt (or Kubt), which, in turn, is derived from the Greek AiyinrTioi., " Egyptians " (the Copts in the Coptic language likewise style themselves powXiuu, "people of Egypt," "Egyptians").

The limited application of the name is explained by the circumstances of the time when Mahomet sent forth his challenge to the world and 'Amr conquered Egypt (a.d. 627-641). At that time the population of Egypt was wholly Christian (except for a sprinkling of Jews, &c), divided into two fiercely hostile sects, the Monophysites and the Melkites. The division was in great measure racial. The Melkites, adherents of the orthodox or court religion sanctioned by the council of Chalcedon, were mainly of foreign extraction, from the various Hellenistic races which peopled the Eastern Roman empire, while the bulk of the population, the true Egyptians, were Monophysite. Amongst the latter political aspirations, apart from religion, may be said not to have existed. It has generally been held that the Copts invited and aided the Moslems to seize the country in order that at all costs they might be freed from the yoke of the state religion imposed by the Eastern Roman Empire; but Dr A. J. Butler has shown this view to be untenable, while admitting that the religious feuds of the Christians made the task of the Arabs easy. The mysterious Mukaukis, who treacherously handed over Alexandria, impregnable as it was for Arab warriors, and then capitulated, was none other than Cyrus, the Melkite patriarch and governor of Egypt; the native Monophysite party, however, smarting under the persecution of the Emperor Heraclius, seemed to have most to gain by a change of masters. The prophet Mahomet himself had prescribed indulgence to the Copts before his death, and 'Amr was mercifully disposed.to them. Although they offered resistance in some places, after the Roman forces had been destroyed or had abandoned Egypt they generally acquiesced in

the inevitable; and when in 646 a Roman fleet and army recaptured Alexandria and harried the Delta, the Copts helped the Moslems to cast out the Christian invaders. Some of the Copts embraced Islam at once, but as yet they formed practically a solid Christian nation under ihz protection of the conquering Arabs, and the religious and political distinction between the ” true believers ” and the Christians was so sharp that a native Christian turning Moslem was no longer a Copt, i.e. Egyptian; he practically changed his nationality.

The beginnings of Christianity in Egypt are obscure; the Existence of it among the natives (as opposed to the mixed ” Greek ” population of Egypt and Alexandria which produced so many leading figures and originated leading doctrines in the early church) can be traced back as far as the Decian persecution (a.d. 249-251) in the purely Egyptian names of several martyrs. St Anthony (c. a.d. 270) was a Copt; so also was Pachomius, the founder of Egyptian monasticism at the beginning of the 4th century. The scriptures were translated into Coptic not later than the 4th century. A religion founded on morality and with

a clear doctrine of life after death was especially congenial to the Egyptians; thus the lower orders in the country embraced Christianity fervently, while the Alexandrian pagans were lost in philosophical speculation and Neoplatonism was spread amongst the rich “Greek” landowners; these last, partly out of religious enthusiasm, partly from greed, annoyed and oppressed their Christian peasantry. Egypt was then terribly im- poverished; the upper country was constantly overrun by raiders from Nubia and the desert; and the authority of the imperial government was too weak to interfere actively on behalf of the Christians. The monasteries, however, were refuges that could bid defiance to the most powerful of the pagan aristocracy as well as to barbarian hordes, and became centres of united action that, at the summons of Shenoute, the organizer of the national church, swept away the idols of the oppressors in riot and bloodshed. In the course of the 5th century the Christians reached a position in which they were able to treat the pagans mercifully as a feeble remnant.

The Copts had little interest in theology; they were content to take their doctrine as prepared for them by the subtler minds of their Greek leaders at Alexandria, choosing the simplest form when disputes arose. In 325 their elected patriarch, Athanasius, and his following of Greeks and Copts, triumphed at the council of Nicaea against Arius; but in 451 the banishment of Dioscorus, patriarch of Alexandria, by the council of Chalcedon created a great schism, the Egyptian church holding to his Monophysite tenets (see Coptic Church, below), while the Catholic and imperial party at Constantinople ever sought to

further the ” Melkite” cause in Egypt at the expense of the native church. Thenceforward there were generally two patriarchs, belonging to the rival communities, and the Copts were oppressed by the Melkites; Heraclius, in 638 after the repulse of the Persians, endeavoured to unite the churches, but, failing in that, he persecuted the Monophysites more severely than ever before, until “Amr brought Egypt under the Moslem rule of ‘Omar, as has been related above. Under the persecution many Copts had gone over to the Melkites, but now it was the turn of the Melkites, as supporters of the emperor of Constantinople, to suffer, and they almost entirely disappeared from Egypt, though a remnant headed by a patriarch of Alexandria of the Orthodox Christians has survived to this day.

But after a few years of the mild rule of ‘Amr the Egyptians began to be squeezed for the benefit of the Moslem exchequer and persecuted for their religion. Many of the more thoughtful and sober Christians must long have been disgusted with religious strife, and had already embraced the simple and congenial doctrines of Islam; others went over for the sake of material gain. Conflicts arose from time to time between the Mahommedan minority and the Christians. The Copts were excellent scribes and accountants and were continued in their posts under the Arab rule; the government offices were full of them; sometimes even the wazirate (vizierate) was held by a Copt, and that too in a time of persecution of the Christians. The pride of the Copts, still seen in the objection which the poorest among them have to engaging in any mean work or trade, was a serious danger, perhaps even a chief source of their troubles, in earlier days; devout Moslems on more than one occasion stirred the mob to fury when they saw Christians lording it over ” true believers. ” The lower orders of the Copts were continually oppressed. Thus there was every inducement amongst the Christians to turn Mahommedan. Arab tribes, too, were encouraged to settle in Egypt until the Mahommedans exceeded the Copts in numbers.

The history of the Copts consists on the one hand of the record of religious strife, of growing scandals in the church, such as simony, and attempted reforms; and on the other hand of persecutions at the hands of the Moslems. As examples of the severity of the persecutions, it may be noted that, in the 8th century, the monks not only were compelled to pay a capitation tax, but were branded with name and number, civilians were oppressed with heavy taxation, churches demolished, pictures and crosses destroyed (722-723). Degrading dresses were imposed upon the Christians (849-850) ; later, under Hakim (997), they

were compelled to wear heavy crosses and black turbans as an ignominious distinction. Salaheddin (Saladin) in 1171 re- enforced these statutes and defiled the churches. In 1301, the blue turban was introduced, but many Copts preferred a change of religion to the adoption of this head-dress. In 1348 a religious war, attended by the destruction of churches and mosques and great loss of life, raged at Cairo between the Copts and Mahom- medans, and large numbers of the former embraced Islam. Their oppression practically ceased under Mehemet Ali (181 1).

There have been very few cases of conversion from Mahom-medanisro to Christianity; and, as intermarriage of Christians with Mahcmmedans implied conversion to Islam, the Copts have undoubtedly preserved the race of the Egyptians as it existed at the time of the Arab conquest in remarkable purity. The Coptic agricultural population (fellahm) in the villages of Upper Egypt and elsewhere are not markedly different from the Mahommedan fellahin, who, of course, are of the same stock, but mixed with Arab blood. The Copts in the towns, who have always been engaged in sedentary occupations, as scribes and handicraftsmen, have a more delicate frame and complexion, and may have mingled with Syrian and Armenian Christians.

According to the 1907 census, there were 667,036 orthodox Copts in Egypt, or less than -ˆth of the total population, this being the same proportion as in 1830, when, according to Lane, they numbered about 150,000. The number of churches and monasteries at the same time had risen from 146 to 450, not including Protestant chapels nor Coptic Catholic churches. At the 1907 census the total number of Christians in Egyot described as Copts was 706,322; among them there were 24,710 Protestants and 14,576 Roman Catholics.

Monogamy is strict among the Copts, and divorce is granted only for adultery. Circumcision of both sexes is common before baptism. In regard to dress, at present only the clergy retain the old distinctive costume and black turban. The rest of the Copts dress exactly like their Moslem brethren, from whom they can be distinguished only by the cross which many of them still have tattooed just below the palm of the right hand. Since the British occupation of the country there has been a tendency amongst the Coptic women to give up the veil, which they had borrowed from the Mahommedans; this is especially

noticeable at places like Assiut, where, thanks to the efforts of American missionaries, female education has made much progress.

In trades and professions, so long as the Copts had no foreign competition to contend against, they maintained their supremacy over the rest of the population. They filled government offices; in towns and villages they monopolized trades and professions requiring care and skill. They were the accountants, the architects, the goldsmiths, the carpenters, the land-surveyors, the bonesetters, &c. But, with the extension of railways and agricultural roads and the increased facilities of communication and prosperity, there has been a great influx of Italian, Greek, Armenian and other Levantine workmen, who, with their better tools, are undoubtedly superior to the Copts, and have proved most formidable rivals. Furthermore, the importation of cheap European wares of every description is slowly killing all native industry. Lastly, since the British, as the dominant race, have filled most posts of responsibility in the government, the Moslems, in general, are obliged to content themselves with the sub- ordinate posts which in the past they left to the Copts. Some Copts have attained high office, and in 1908 a Copt became prime minister. Moreover, the Copts have to a certain extent made up for the ground they lose elsewhere by engaging in agriculture and banking, and there are now to be found many rich Coptic landowners and farmers, especially in Upper Egypt.

Language. — The language spoken by the Copts was of various dialects, named Sahidic, Akhmimic, Fayumic, &c, descended from the ancient Egyptian with more or less admixture of Greek (for the Coptic dialects see Egypt: Language). Coptic, however, has been entirely extinct as a spoken language for over 200 years, having been supplanted by Arabic; in the 13th century it was already so much decayed that Arabic translations of the liturgies were necessary. The Gospels, however, are still read in the

churches in the Bohairic dialect. This dialect appears in litera- ture later than the others, having become of importance only with the extinction of Greek in Lower Egypt; for a time it shared the field with Sahidic, after the disappearance of Akhmimic and Fayumic, but eventually displaced it in the churches, where it now survives alone.

Coptic literature is almost entirely religious, and consists mainly of translations from the Greek. Such was the enthusiasm for Christianity amongst the lower classes in Egypt that' transla- tions of the Bible were made into three of the dialects of Coptic before the council of Chalcedon; they probably date back at least as early as the middle of

the 4th century. For the dwellers in the Delta the Greek version was probably sufficient, until the break with the Greek (Melkite) Church in the 5th century induced them to make a separate translation in their own native northern or Bohairic dialect. The Gnostic heresy, otherwise known only through the works of its opponents, is illustrated in some Coptic MSS. of the 4th century, the so-called Pistis Sophia or Askew Codex, and the Bruce Codex, respectively in the British Museum and Bodleian Libraries. According to Schmidt and Harnack, they are translations dating from the 3rd century and belong to an ascetic or encratitic sect of the Gnostics which arose in Egypt itself. There is abundance of apocryphal works, of apocalypses, of patristic writings from Athanasius to the council of Chalcedon, homilies, lives of saints and anecdotes of holy men, acts of martyrs extending from the persecution of Diocletian to that of the Persians in the 7th century, and lives of later ascetics and martyrs reaching down to the 14th century. Unless some of the Egyptian acta sanctorum el martyrum ■ should prove to have been originally written in Coptic, almost the only original works in that language of any importance are the numerous sermons and letters of Shenoute, a monk of Atrepe near Akhmlm, written in the Sahidic dialect in the 4th century. After the Arab conquest, as a defence to the threatened church, language and nationality, versifications of the Proverbs, of Solomon's Song and of various legends were composed, with other religious songs. They are mostly anti- phonal, a number of stresses in a line marking the rhythm. There is no musical notation in the MSS., but traditional church tunes are generally referred to or prescribed for the songs. Of secular literature strangely little existed or at least has survived: only a few magical texts, fragments of a medical treatise, of the story of Alexander, and of a story of the conquest of Egypt by Cambyses, are' known, apari from numerous legal and business documents.

Coptic was occasionally employed for literary purposes as late as the 14th century, but from the 10th century onward the Copts wrote mostly in Arabic. Severus of Eshmunain (c. 950), who wrote a history of the patriarchs of Alexandria, was one of the first to employ Arabic; Cyril ibn Laklak and others in the 13th and 14th centuries translated much of the older literature from Coptic into Arabic and Ethiopic for the use of the Egyptian and Abyssinian churches. From this period also date the native Coptic grammars and lexicons of Ibn 'Assal and others. At the present time literature among the Copts is represented by Claudius Labib, an enthusiast for the revival of the Coptic tongue, Marcus Simaika, a leader of the progressive movement, and others. (F. Ll. G.)

The Coptic Church.- — Up to the 5th century the church of Alexandria

played a part in the Christian world scarcely second to that of Rome: the names of Origen, Athanasius and Cyril bear witness to her greatness. But in the time of the patriarch Dioscorus the church, always fond of speculation, was rent asunder by the controversy concerning the single or twofold nature of our Lord, as stated by Eutyches. The Eutychian doctrine, approved by the council of Ephesus, was condemned by that of Chalcedon in 451. But to this decision, though given by 636 bishops, the Copts refused assent — a refusal which profoundly affected both the religious and the political history of their country. From that moment they were treated as heretics. The emperor appointed a new bishop of Alexandria, whose adherents the Copts styled Melkites or Imperialists, while the

Copts are distinguished as Monophysites and Jacobites. The court party and the native party each maintained its own line of patriarchs, and each treated the other with bitter hostility. For nearly two centuries strife and persecution continued. The well-meant ecthesis of Heraclius was a failure and was followed by repression, till in 640 the Copts were released from the Roman dominion by the Saracen invasion. But it was only after prolonged resistance to the Arabs that the Copts accepted a change of masters, which gave them for a while religious freedom. The orthodox or Melkite party, consisting mostly of Byzantine Greeks, was swept away, and the double succession of patriarchs practically ceased. True, even now there is an orthodox patriarch of Alexandria living in Cairo, but he has only a few Greeks for followers, and scarcely a nominal succession has been maintained. But the Coptic succession has been continuous and real.

The distinctive Monophysite doctrine of the Copts is not easy to state intelligibly, and yet they cling to it with something of Doctrine. *-he tenacity which has marked their whole history. They repudiate the heresy of Eutyches as strongly as that of Nestorius, and claim to stand between the two doctrines teaching that Christ was one person with one nature which was made up by the indissoluble union of a divine and a human nature,, but that notwithstanding this absolute union the two natures remained after union distinct, unconfounded and uncommingled, separate though inseparable. The creed thus savours of paradox, not to say contradiction. It is set forth in the Liturgy and recited at every Coptic mass in the following words: — ” I believe that this is the life-giving flesh which thine only Son took from the . . . Holy Mary. He united it with His Divinity without mingling and

without confusion and without alteration. ... I believe that His Divinity was not separated from His Manhood for one moment or for the twinkling of an eye." On all other points of dogma, including the single pro- cession of the Holy Ghost, the Copts agree with the Greek Church.

" The most holy pope and patriarch of the great city of Alexandria and of all the land of Egypt, of Jerusalem the holy Hierarchy. c y > ° Nubia, Abyssinia and Pentapolis, and all the preaching of St Mark," as he is still called,had originally jurisdiction over all the places named. Jurisdiction over Abyssinia remains, but from Nubia and Pentapolis Christianity has disappeared. The ancient rule is that no bishop is eligible for the patriarchate. The requirement of a period of desert life has so far prevailed that no one but a monk from one of the desert monasteries is now qualified. This rule, harmless perhaps when the monasteries were the great schools of learning and devotion, now puts a premium oh ignorance, and is disastrous to the 1 church; more particularly as even bishops must be chosen from the monks. The patriarch is elected by an assembly of bishops and elders. The candidate is brought in chains from the desert, and, if only in monk's orders, is passed through the higher grades except that of bishop. The patriarch's seat was transferred some time after the Arab conquest from Alex- andria to the fortress town of Babylon (Old Cairo) , and in modern times it was shifted to Cairo proper. The other orders and offices in the church are metropolitan, bishop, chief priest, priest, archdeacon, deacon, reader and monk. The number of bishoprics in ancient times was very large — Athanasius says nearly 100. At present there remain ten in Egypt, one at Khartum and three in Abyssinia.

The numerous remaining churches in Egypt but faintly represent the vast number standing in ancient times. Rufinus says that he found 10,000 monks in the one region Bulldinzs of Arsinoe. Later, in 616, the Persians are described as destroying 600 monasteries near Alexandria. Abu Salih (12th century) gives a list of churches surviving in his day, and their number is astonishing. The earliest were cut out of rocks and caverns. In the days of Constantine and Justinian basilicas of great splendour were built, such as the church of St Mark at Alexandria and the Red Monastery in Upper Egypt. This type of architecture permanently influenced Coptic builders,

but there prevailed also a type, probably native in origin, though possessing Byzantine features, such as the domed roofing. There is no church now standing which bears any trace of the fine glass mosaics which once adorned the basilicas, nor is there any example of a well-defined cruciform ground-plan. But the use of the dome by Coptic

architects is almost universal, and nearly every church has at least three domes overshadowing the three altars. The domes are sometimes lighted by small windows; but the walls are windowless, and the churches con- sequently gloomy. Among the most interesting churches are those of Old Cairo, those in the Wadi Natron, and the Red and White Monasteries (Der el-Abiad and Der el-Ahmar) near Suhag in Upper Egypt.

Every church has three altars at the eastern end in three contiguous chapels. The central division is called the haikal or sanctuary, which is always divided from the choir by a fixed partition or screen with a small arched nitinga. doorway closed by double doors. This resembles the Greek iconostasis, the screen on which the ” icons ” or sacred pictures are placed. Haikal screen and choir screen are often sumptuously carved and inlaid. A marble basin for the mandatum in the nave, and an epiphany tank at the west are common features. The altar is usually built of brick or stone, hollow within, and having an opening to the interior. A wooden altar-slab covered with crosses, &c, lies in a rectangular depression on the surface, and it is used in case of need as a portable altar. Chalice and paten, ewer and basin, crewet and chrismatory, are found as in the Western churches. The aster consists of two crossed half-hoops of silver and is used to place over the wafer. The fiabellum is used, though now rarely made of precious metal. Some examples of silver-cased textus now remaining are very fine. Every church possesses thuribles— the use of incense being universal and frequent — and diadems for the marriage service. The use of church bells is forbidden by the Moslems, except in the desert, and church music consists merely of cymbals and triangles which accompany the chanting.

The sacramental wine is usually made from raisins, but the juice must be fermented. Churches even in Cairo have a press for crushing the raisins. The eucharistic bread is baked in an oven built near the sanctuary. The wafer is a ndcere~ a small loaf about 3 inches in diameter and 1 inch monies. thick, stamped with the trisagion and with crosses. Communion must be received fasting. Confession is required, but has somewhat fallen into disuse. Laymen receive in both kinds. The waier being broken into the chalice, crumbs or ” pearls ” are taken out in a spoon and so administered, as in the Greek rite. Reservation is uncanonical. Renaudot states that it was permitted in cases of great extremity, when the host remained upon the altar with lamps burning and a priest watching, but it is not now practised, and there is no evidence of any such vessel as a pyx in Coptic ritual. Small benedictional crosses belong to each altar, and processional crosses are common. The crucifix is unknown, for while paintings and frescoes

abound, , graven images are absolutely forbidden. The liturgy was read exclusively in the extinct Coptic language till the end of the 19th century, but parts are now read in Arabic, while the lessons have long been read in Arabic as well as in Coptic. The services are still excessively long, that of Good Friday lasting eleven hours ; but benches are now provided in the newer churches. Seven sacraments are recognized — baptism, confirmation, eucharist, penance, orders, matrimony, and unction of the sick. The chief fasts are those of Advent, of Nineveh, of Heraclius, Lent and Pentecost. Pilgrimage to Jerusalem is a duty and sometimes a penance.

The Coptic ritual deserves much fuller study than it ha§ received. Since the 7th century the church has been so isolated as to be little influenced by changes affecting other communions. Consequently it remains in many respects the most ancient rnonument of primitive rites" and ceremonies in Christendom. But centuries of subjection to Moslem rule have much weakened it. For the liturgical dress see Vestments; Chasuble, &c.

The British occupation of Egypt profoundly modified Coptic

religious life. Before it the Copts lived in their own semi- fortified quarters in Cairo or Old Cairo or in country or desert Present Dairs (Ders). Walls and gates were now thrown state down or disused: the Copts began to mix and live

of the f r eely among the Moslems, their children to frequent church. t j ie game scnoo ls, an(j the people to abandon their distinctively Christian dress, names, customs and even religion. Freedom and prosperity threatened to injure the Church more than centuries of persecution. Many of the younger generation of Copts began openly to boast their indifference and even scepticism: in the large towns churches came to be too often frequented only by the old or the uneducated, confession and fasts fell into neglect and the number of communicants diminished; while the facility of divorce granted by Islam occasioned many perversions from among the Copts to that religion. On the other hand the necessity of resistance to these tendencies and of reform from within was strongly realized. Unfortunately, the institution of a lay council of eminent churchmen, which has been formed for the patriarch and for every bishop in his own diocese, has led to prolonged struggles and on one occasion to a

serious crisis, in which the patriarch and the metropolitan of Alexandria were for a while banished to the desert. A principal object of these lay councils is to control the financial and legal powers vested in patriarch and bishops — powers which have often been greatly abused. Other objects are (i) to provide Christian religious education in all Coptic schools and to raise these schools to a high standard in secular matters; (2) to promote the education of women; (3) to apply church revenues to the maintenance of churches and schools and to the better payment of the clergy, who are now often compelled to live on charity; (4) to ensure prompt ad- ministration of justice in ecclesiastical causes such as divorce, inheritance, &c; and (5) to establish colleges for the efficient training of the clergy. Educated Copts remember the time when the church of Alexandria was as famous for learning as for zeal. They desire also to resist the serious encroachments of Roman Catholic, American Presbyterian, and other foreign missions upon their ancient faith. (A. J. B.)

Authorities. — (1) History and Religion: Johann Michael Wansleben (Vansleb), a Dominican and learned orientalist (1635- 1679), Hist, de Veglise d'Alexandrie (Paris, 1677), written at Cairo in 1672 and 1673 mainly from original native sources, and Nouvelle Relation . . . d'un voyage fait en E~gypte, fife. (Paris, 1677 and 1698, Eng. trans., London, 1678) ; Eusebe Renaudot the younger (1646- 1720), Historia Patriarcharum Alexandrinorum (Paris, 1713); Abu Dakn (Josephus Abudacnus), Historia Jacobitarum (Oxford, 1675, Eng. trans, by Sir E. Sadleir, London, 1693) ; S. C. Malan, Original Documents of the Coptic Church (London, 1874); Denzmger, Ritus Orientalium (Wiirzburg, 1863); Hon. Robert Curzon, Vtstts to Monasteries in the Levant (London, 1849) ; J. M. Neale, Hist, of the Patriarchate of Alexandria (2 vols., ib., 1847), in the Hist, of the Holy Eastern Church, coloured by the writer's Anglo-Catholic point of view; A. J. Butler, Ancient Coptic Churches of Egypt (Oxford, 1884); B. T. A. Evetts and Butler, Churches and Monasteries of Egypt, by Abu Saleh (Oxford, 1895); E. Amelineau, Monuments pour servir d I'histoire de VfLgypte chretienne aux IV" et V' siicles, Coptic and Arabic documents published and translated for the first time, in Mem. de la mission archeolog. franc, au Caire, t. iv. (Paris, 1888), and Monuments . . . au IV" siecle in the Annates du musee Guimet, t. xvii. (Paris, 1889) ; P. Rohrbach, Die alexandrinischen Patriarchen (Berlin, 1891); Jullien, VfLgypte: souvenirs bibliques et Chretiens (Lille, 1 891) ; Macaire, Histoire de Veglise d'Alexandrie (Cairo, 1 894) ; Porphyrius, The Christian East: Alexandrian Patriarchate (St Petersburg, 1898; in Russian); Strzygowski, Orient oder Rom? (Leipzig 1901); De Bock, Materiaux pour servir a Varcheologie de V&gypte chretienne (St

Petersburg, 1901); Kilab al Hulap al Mukaddas (Cairo, 1902) ; A. Gayet, ” Les Monuments coptes du musee de Boulaq,” in the Mem. miss, archeolog. franc, au Caire, 1. 111. (Paris, 1889); id., V Art copte (Paris, 1902); Horner, The Statutes of the Apostles (London, 1904); Egypt Exploration Fund Reports, section “Christian Egypt”; W. E. Crum, article Koptische Kirche ” in RealencyHopadie filr protestantische Theologie und Kirche, 3 Aufl -J. M. Fuller’s article “Coptic Church “in Smith’s Dictionary of Biography; A. J. Butler, The Arab Conquest of Egypt (Oxford, 1902); J. Leipoldt, Schenute von Atripe und die Entstehung des national-agyptischen Christentums (Leipzig, 1903), Die Entstehung der koptischen Kirche (a valuable essay printed as the introduction to R. Haupt’s Katalog 5, Halle, 1905) ; B. T. A. Evetts, The Patriarchal History of Severus ” in Graffin’s Patrologia orientahs (Paris); J. Milne, A History of Egypt under Rtxnan Rule (1898).

Literature. — See Crum’s article above referred to, his Catalogue of Coptic MSS. in the British Museum, and his annual reviews in the Archaeological Report of the Egypt Exploration Fund; J. Leipoldt in Geschichte der chrisllichen Literaluren des Orients (Leipzig, 1907); H. Junker, Koptische Poesie des zehnten Jahrhunderts, 1. Teil (Berlin, 1908) ; Archdeacon Dowling, The Egyptian Church (London,

1909)-

Modern People. — E. W. Lane’s description of the Copts in his Modern Egyptians is interesting, but founded on imperfect infor- mation, and, moreover, coloured by prejudices in favour of the Moslems whom he studied with so much sympathy. See Klunzinger, Upper Egypt, pp. 61 et sqq. ; also the last chapter of The Story of the Church of Egypt, by Mrs E. L. Butcher (1897), on the social life and customs.

COPYHOLD, in English law, an ancient form of land tenure, legally defined as a ” holding at the will of the lord according to the custom of the manor.” Though nowadays of diminishing practical importance, its incidents are historically interesting. Its origin is to be found in the occupation by villani, or non- freemen, of portions of land belonging to the manor of a feudal lord. In the time of the Domesday survey the manor was in part granted to free tenants, in part reserved by the lord himself for his own uses. The estate of the free tenants is the freehold estate of English law; as tenants of the same manor they assembled together in manorial court or court baron, of which they were the judges. The portion of the manor reserved for the lord (the demesne, or domain) was cultivated by labourers who were bound to the land {adscripti glebae). They could not leave the manor, and their service

was obligatory. These villani, however, were allowed by the lord to cultivate portions of land for their own use. It was a mere occupation at the pleasure of the lord, but in course of time it grew into an occupation by right, recognized first of all by custom and afterwards by law. This kind of tenure is called by the lawyers villenagium, and it probably marks a great advance in the general recognition of the right when the name is applied to lands held on the same con- ditions not by villeins but by free men. The tenants in villenage were not, like the freeholders, members of the court baron, but they appear to have attended in a humbler capacity, and to have solicited the succession to the land occupied by a deceased father, or the admission of a new tenant who had purchased the good- will, as it might be called, of the holding, paying for such favours certain customary fines or dues. In relation to the tenants in villenage, the court baron was called the customary court. The records of the court constituted the title of the villein tenant, held by copy of the court roll (whence the term ” copyhold “) ; and the customs of the manor therein recorded formed the real property law applicable to his case.

Copyhold had long been established in practice before it was formally recognized by the law. At first it was in fact, as it is now in the fictitious theory of the law, a tenancy at will, for which none of the legal remedies of a freeholder were available. In the reign of Edward IV., however, it was held that a tenant in villenage had an action of trespass against the lord. In this way a species of tenant-right, depending on and strongly supported by popular opinion, was changed into a legal right. But it retained many incidents characteristic of its historical origin. The life of copyhold assurance, it is said, is custom. Copyhold is necessarily parcel of a manor, and the freehold is said to be in the lord of the manor. The court roll of the manor is the evidence of title and the record of the special laws as to fines, quit rents, heriots, &c, prevailing in the manor. When copyhold land is conveyed from one person to another, it is surrendered by the owner to the lord, who by his payment of the customary fine makes a new grant of it to the purchaser. The lord must admit the vendor’s nominee, but the form of the conveyance is still that of surrender and re-grant. The lord, as legal owner of the fee-simple of the lands, has a right to all the mines and minerals and to all the growing timber, although the tenant may have planted it himself. Hence it appears that the existence of copyhold tenures may sometimes be traced by the total absence of timber from such lands, while on freehold lands it grows in abundance. Hence also the popular saying that the ” oak grows not except on free land.” The copyholder must not commit waste either by cutting

down timber, &c, or by neglecting to repair buildings. In such respects the law treats him as a mere lessee, — the real owner being supposed to be the lord. On the other hand, the lord may not enter the land to cut his own timber or open his mines. The limitations of estates usual in respect of other lands, as found in copyhold, become subject of course to the operations of its peculiar conditions as to the relation of lord and tenant. An estate for life, or pour autre vie {i.e. for another's life), an estate entail, cr in fee-simple, may be carved out of copyhold.

A species of tenure resembling copyhold is what is known as customary freehold. The land is held by copy of court-roll, but not by will of the lord. The question has been raised whether the freehold of such lands is in the lord of the manor or in the tenant, and the courts of law have decided in favour of the former. In some instances copyhold for lives alone is recognized, and in such cases the lord of the manor may ultimately, when all the lives have dropped, get back the land into his own hands.

The feudal obligations attaching to copyhold tenure have been found to cause much inconvenience to the tenants, while they are of no great value to the lord. One of the most vexatious of these is the heriot, under which name the lord is entitled to seize the tenant's best beast or other chattel in the event of the tenant's death. The custom dates from the time when all the copyholder's property, including the copyholder himself, belonged to the lord, and is supposed to have been fixed by way of analogy to the custom which gave a military tenant's habiliments to his lord in order to equip his successor. Instances have occurred of articles of great value being seized as heriots for the copyhold tenements of their owners. A race horse worth £2000 or £3000 was thus seized. The fine payable on the admission of a new tenant, whether by alienation or succession, is to a certain extent arbitrary, but the courts long ago laid down the rule that it must be reasonable, and anything beyond two years' improved value of the lands they disallowed.

The inconvenience caused by these feudal incidents of the tenure led to a series of statutes, having for their object the conversion of copyhold into, freehold. The first Copyhold Act, that of 1 84 1, was consolidated by the Copyhold Act 1894. Owing to the incidents attaching to land " holden by copy of court roll according to the custom of the manor " in the shape of fines and heriots, the inability

to grant a lease for a term exceed- ing a year, and to the peculiar rules as to descent, waste, dower, curtesy, alienation, and other matters, varying often from manor to manor and widely differing from the uniform law applicable tc land in general, enfranchisement, or the conversion of land held by copyhold tenure into freehold, is often desired. This could and may still be effected at common law, but only by agreement on the part of both the lord and the tenant. Moreover, it was subject to other disadvantages. The cost fell on the tenant, and the land when enfranchised was subject to the encumbrances attaching to the manor, and so an investigation into the lord's title was necessary. In 1841 an act was passed to provide a statutory method of enfranchisement, removing some of the barriers existing at common law; but the machinery created was only available where both lord and tenant were in agreement. The Copyhold Act 1852 went further, and for the first time introduced the principle of compulsory enfranchisement on the part of either party. By the Copyhold Act 1894, which now governs statutory enfranchisement, the former Copyhold Acts 1841-1887, were repealed, and the law was consolidated and improved. Enfranchisement is now effected under this act, though in certain cases it is also to be obtained under special acts, such as the Land Clauses Consolidation Act 1848; and the old common law method with all its disadvantages is still open. The Copyhold Act 1894 deals both with compulsory and with voluntary enfranchisement. In either case the sanction of the Board of Agriculture must be obtained; and powers are bestowed on it to decide questions arising on enfranchisement, with an appeal to the High Court. The actual enfranchisement, where it is compelled by one of the parties, is effected by an award made by the board; in the case of a voluntary enfranchisement it is completed by deed. Under the act it is open to both lord

and tenant to compel enfranchisement, though the expenses are to be borne by the party requiring it. The compensation to the lord, in the absence of an agreement, is ascertained under the direction of the board on a valuation made by a valuer or valuers appointed by the lord and tenant; and may be paid either in a gross sum or by way of an annual rent charge issuing out of the land enfranchised, and equivalent to interest at the rate of 4% on the amount fixed upon as compensation. This rent charge is redeemable on six months' notice at twenty-five times its annual amount. The tenant, even if he is the compelling party, may elect either method; but the lord has not the same option, and where the enfranchisement is at his instance, unless there is either an agreement to the contrary or a notice on the part of the tenant to exercise his option, the compensation is a rent charge.

Power is conferred on the lord to purchase the tenant's interest where a change in the condition of the land by enfranchisement would prejudice his mansion house, park or gardens; while on the other hand, in the interest of the public or the other tenants, the board is authorized to continue con- ditions of user for their benefit.

So far the provisions relating to compulsory enfranchisement have been dealt with; but even in the case of a voluntary agree- ment the lord and tenant are only entitled to accept enfranchise- ment with the consent of the Board of Agriculture. The consideration in addition to a gross sum or a rent charge may consist of a conveyance of land, or of a right to mines or minerals, or of a right to waste in lands, belonging to the manor, or partly in one way and partly in another. The effect of enfranchisement, whether it be voluntary or compulsory, is that the land becomes of freehold tenure subject to the same laws relating to descent, dower and curtesy as are applicable to freeholds, and so freed from Borough English, Gavelkind (save in Kent), and other cus- tomary modes of descent, and from any custom relating to dower or free-bench or tenancy by curtesy. Nevertheless, the lord is entitled to escheat in the event of failure of heirs, just as if the land had not been enfranchised. The land is held under the same title as that under which it was held at the date at which the enfran- chisement takes effect; but it is not subject to any estate right, charge, or interest affecting the manor. Every mortgage of copyhold estate in the land enfranchised becomes a mortgage of the freehold, though subject to the priority of the rent charge paid in compensation under the act. All rights and interests of any person in the land and all leases remain binding in the same manner. On the other hand the tenant's rights of common still continue attached to the freehold; and, without express consent in writing of the lord or tenant respectively, the right of either in mines or minerals shall not be affected by the change. No creation of new copyholds by granting land out of the waste is permissible, save with the consent of the Board of Agriculture; and the act enacts that a valid admittance of a new copy- holder may be made without holding a court.

Under the earlier acts, machinery to free the land from the burden of the old rents, fines and heriots was set up, commuting them into a rent charge or a fine. Commutation, however, is never compulsory, and differs from enfranchisement in that, whereas by enfranchisement the land in question is converted into freehold, by commutation it still continued parcel of the manor, though subject to a rent charge or a fine, as might have been agreed. The ordinary laws of descent, dower, and curtesy were, however, substituted for the customs in relation to these matters incidental to the land in question before commutation,

and the timber became the tenant's.

Authorities. — C. I. Elton, Law of Copyholds (1898) ; C. Watkins, On Copyholds (1825); Scriven on Copyholds, ed. A. Brown (1896); A. Brown, Copyhold Enfranchisement Acts (1895).

COPYING MACHINES. Appliances of various kinds have been devised for producing copies of writings made by the pen or pencil. A simple method commonly adopted when only a single copy is required is to write the original with specially prepared copying ink (formed by adding some thickening substance like sugar or gum to ordinary ink), to place upon it a damped sheet of thin absorbent paper, and to press the two

together in some way, as in a copying press. The resulting impression, being reversed, must be read from the back of the absorbent paper, which is thin enough to be transparent. Another process, by which a considerable number of copies can be made simultaneously, consists in interleaving a number of sheets of thin white paper with sheets of paper prepared with lampblack (" carbon paper ") and writing on the top sheet with a " style " or other sharp-pointed instrument. The hectograph may be taken as typical of manifolding processes analogous to lithography. In it the writing is in first instance done with aniline ink, and then a transfer is made to a plate of a gelatinous composition, from which a series of duplicates can be taken off. Another class of methods involves the preparation of what are essentially stencils. In the cyclostyle, paper of a special kind is stretched over a smooth metal plate, and the writing instrument consists of a holder having at the end a small wheel provided with a serrated edge on its periphery, which perforates the paper with lines of minute cuts and thus forms a stencil. When ink is passed over this stencil with a roller it goes through the perforations and leaves an impression on a piece of paper placed underneath. In the trypograph a similar result is attained by using a simple style for writing, but stretch- ing the paper over a metal plate having its surface covered with fine sharp corrugations which pierce the paper as the style is moved over them. In the Edison electric pen the stencil is formed by the aid of a style containing a fine needle, which is rapidly moved up and down by a small electric motor mounted at the top of the pen, and thus a series of minute holes is punctured in the paper by the act of writing. For copying plans and drawings, engineers, architects, &c,

use a “blue print” process which depends on the action of light on certain salts of iron (see Sun-Copying and Photography).

COPYRIGHT, in law, the right, belonging exclusively to the author or his assignees, of multiplying for sale copies of an original work or composition, in literature or art. As a recognized form of property it is, compared with others, of recent origin, being in fact, in the use of literary works, mainly the result of the facility for multiplying copies created by the discovery of print- ing. It is with copyright in literary compositions that we are here primarily concerned, as it was established first, the analogous right as regards works of plastic art, &c, following in its train.

i. Whether copyright was recognized at all by the common law of England was long a much debated legal question. Black- stone thinks that ” this species of property, being grounded on labour and invention, is more properly reducible to the head of occupancy than any other, since the right of occupancy itself is supposed by Mr Locke and many others to be founded on the personal labour of the occupant.” But he speaks doubtfully of its existence — merely mentioning the opposing views, ” that on the one hand it hath been thought no other man can have a right to exhibit the author’s work without his consent, and that it is urged on the other hand that the right is of too subtle and unsubstantial a nature to become the subject of property at the common law, and only capable of being guarded by positive statutes and special provisions of the magistrate.” He notices that the Roman law adjudged that if one man wrote anything on the paper or parchment of another, the writing should belong to the owner of the blank materials, but as to any other property in the works of the understanding the law is silent, and he adds that ” neither with us in England hath there been (till very lately) any final determination upon the rights of authors at the common law.” The common law undoubtedly gives a right to restrain the publication of unpublished compositions; but when a work is once published, its protection depends on the statutes regulat- ing copyright. The leading case on the subject of unpublished works is Prince Albert v. Strange (1849), 2 De G. & Sm. 652. Copies of etchings by Queen Victoria and Prince Albert, which had been lithographed for private circulation, fell into the hands of the defendant, a London publisher, who proposed to exhibit them, and issued a catalogue entitled A Descriptive Catalogue of the Royal Victoria and Albert Gallery of Etchings. The court of chancery restrained the publication of the catalogue, holding

that property in mechanical works, or works of art, does certainly subsist, and is invaded, before publication, not only by copying but by

description or catalogue. This protection includes news {Exchange Telegraph Co. v. Central News, 1807).

As a matter of principle, the nature of copyright itself, and the reasons why it should be recognized in law, have, as already stated, been the subject of bitter dispute. It was attacked as constituting a monopoly, and it has been r /ˆ A ”’ e ° argued that copyright should be looked upon as a doubtful exception to the general law regulating trade, and should be strictly limited in point of duration. On the other hand, it is claimed that copyright, being in the nature of personal property, should be perpetual. A man’s own work, in this view, is as much his as his house or his money, and should be protected by the state. Historically, and in legal definition, there would appear to be no doubt that copyright, as regulated by statute, is strictly a monopoly. The parliamentary protection of works of art for the period of fourteen years by an act of 1 709 and later statutes appears, as Blackstone points out, to have been suggested by the exception in the Statute of Monopolies 1623. The object of that statute was to suppress the royal grants of exclusive right to trade in certain articles, and to reassert in relation to all such monopolies the common law of the land. Certain exceptions were made on grounds of public policy, and among others it was allowed that a royal patent of privilege might be granted for fourteen years ” to any inventor of a new manufacture for the sole working or making of the same.” Copyright, like patent right, would be covered by the legal definition of a monopoly. It is a mere right to prevent other people from manufacturing certain articles. But objections to monopolies in general do not apply to this particular class of cases, in which the author of a new work in literature or art has the right of preventing others from manufacturing copies thereof and selling them to the public. The rights of persons licensed to sell spirits, to hold theatrical exhibitions, &c, are also of the nature of monopolies, and may be defended on special grounds of public policy. The monopoly of authors and inventors rests on the general sentiment underlying all civilized law, that a man should be protected in the enjoyment of the fruits of his own labour.

Literary Copyright

2. United Kingdom. — On the invention of printing (see Press Laws) the crown, or other sovereign powers, granted patents or licences with the object of restricting the right of account, multiplying copies of literary works, and this super- vision of publication still has certain historical results. A special kind of what amounts to perpetual copyright in various publications has for various reasons been recognized by the laws (1) in the crown, and (2) in the universities

and colleges. The various copyright acts, referred to below, except from their provisions the copyrights vested in the two English and the four Scottish universities, Trinity College, Dublin, and the colleges of Eton, Westminster and Winchester. Crown copyrights are saved by the general principle which exempts crown rights from the operation of statutes unless they are expressly mentioned. Among the books in which the crown has claimed copyright are the English translation of the Bible, the Book of Common Prayer, statutes, orders of privy council,proclamations, almanacs, Lilly's Latin Grammar, year books and law reports. The copy- right in the Bible is rested by some on the king's position as head of the church; Lord Lyndhurst rested it on his duties as the chief executive officer of the state charged with the publica- tion of authorized manuals of religion. The right of printing the Bible and the Book of Common Prayer is vested in the king's printer and the universities of Oxford and Cambridge. These copyrights do not extend to prohibit independent translations from the original. The obsolete copyright of the crown in Lilly's Latin Grammar was founded on the fact of its having been drawn up at the king's expense. The universities have a joint right (with the crown's patentees) of printing acts of parliment. Law reports were decided to be the property of the crown in the reign of Charles II.; by act of parliament they were forbidden

to be published without licence from the chancellor and the chiefs of the three courts, and this form of licence remained in use after the act had expired. University and college copyrights were made perpetual by an act of George III., but only on condition of the books being printed at, their printing presses and for their own benefit.

3. The first definite statute, or Copyright Act, in England was passed in 1709. The preamble states that printers, booksellers and other persons were frequently in the habit of printing, reprinting, and publishing " books and other writings without the consent of the authors or proprietors of such books and writings, to their very great detriment, and too often to the ruin of them and their families." " For preventing, therefore, such practices for the future, and for the encouragement of learned men to compose and write useful books, it is enacted that the author of any book or books already printed, who hath not transferred to any other the copy or copies of such book or books in order to print or reprint the same, shall have the sole right and liberty of printing such book or books for the term of one-and-

twenty years, and that the author of any book or books already composed, and not printed and published, or that shall hereafter be composed, and his assignee, or assignees, shall have the sole liberty of printing and reprinting such book or books for the term of fourteen years, to commence from the day of first publishing the same, and no longer." The penalty for offences against the act was declared to be the forfeiture of the illicit copies to the true proprietor, and the fine of one penny per sheet, half to the crown, and half to any person suing for the same. " After the expiration of the said term of fourteen years the sole right of printing or disposing of copies shall return to the authors thereof, if they are then living, or their representatives, for another term of fourteen years." To secure the benefit of the act registration at Stationers' Hall was necessary. In section 4 was contained the provision that if any person thought the price of a book " too high and unreasonable," he might complain to the arch- bishop of Canterbury, the lord chancellor, the bishop of London, the chiefs of the three courts at Westminster, and the vice- chancellors of the two universities in England, and to the lord president, lord justice general, lord chief baron of the exchequer, and the~ rector of the college of Edinburgh in Scotland, who might fix a reasonable price. Nine copies of each book were to be pro- vided for the royal library, the libraries of the universities of Oxford and Cambridge, the four Scottish universites, Sion College, and the faculty of advocates at Edinburgh.

It was believed for a long time that this statute had not interfered with the rights of authors at common law. Ownership of literary property at common law appears indeed to have been recognized in some earlier statutes. The Licensing Act 1662 prohibited the printing of any work without the consent of the owner on pain of forfeiture, &c. This act expired in 1679, and attempts to renew it were unsuccessful. The records of the Stationers' Company show that the purchase and sale of copy- rights had become an established usage, and the loss of the protec- tion, incidentally afforded by the Licensing Act, was felt as a serious grievance, which ultimately led to the statute of 1709. That statute, as the judges in Millar v. Taylor (1769, 4 Burr. 2303) pointed out, speaks of the ownership of literary property as a known thing. Many cases are recorded in which the courts protected copyrights not falling within the periods laid down by the act. Thus in 1735 the master of the rolls restrained the printing of an edition of the Whole Duty of Man, published in 1657. In 1739 an injunction was granted by Lord Hardwicke against the publication of Paradise Lost, at the instance of persons claiming under an assignment from Milton in 1667. In the case of Millar v. Taylor the plaintiff, who had purchased the copy- right of Thomson's Seasons in 1729, claimed damages for an

unlicensed publication thereof by the defendant in 1763. The jury found that before the statute it was usual to purchase from authors the perpetual copyright of their works. Three judges, among whom was Lord Mansfield, decided in favour of the common law right; one was of the contrary opinion. The majority thought that the act of 1 709 was not intended to destroy

copyright at common law, but merely to protect it more efficiently during the limited periods. Millar v. Taylor, however, was speedily overruled by the case of Donaldson v. Beckett in the House of Lords in 1774. The judges were called upon to state their opinions. A majority (seven to four) were of opinion that the author and his assigns had at common law the sole right of publication in perpetuity. A majority (six to five) were of opinion that this right had been taken away by the statute of 1709, and a term of years substituted for the perpetuity. The decision appears to have taken the trade by surprise. Many booksellers had purchased copyrights not protected by the statute, and they now petitioned parliament to be relieved from the consequences of the decision in Donaldson v. Beckett. A bill for this purpose actually passed the House of Commons, but Lord Camden's influence succeeded in defeating it in the House of Lords. The result is that from that time on ordinary copyright has been recognized except in so far as it is sanctioned by statute. The university copyrights were, however, protected in perpetuity by an act passed in 1775.

By an act of 1801 the penalty for infringement of copyright was increased to threepence per sheet, in addition to the forfeiture of the book. The proprietor was to have an action on the case against any person in the United Kingdom, or British dominions in Europe, who should print, reprint, or import without the consent of the proprietor, first had in writing, signed in the presence of two or more credible witnesses, any book or books, or who knowing them to be printed, &c, without the proprietor's consent should sell, publish, or expose them for sale; the proprietor to have his damages as assessed by the jury, and double costs of suit. A second period of fourteen years was confirmed to the author, should he still be alive at the end of the first. Further, it was forbidden to import into the United Kingdom for sale books first composed, written, or printed and published within the United Kingdom, and reprinted elsewhere. Another change was made by the act of 1814, which in substitu- tion for the two periods of fourteen years gave to the author and his assignees copyright for the full term of twenty-eight years from the date of the first publication, " and also, if the author be living at the end of that period, for the residue of his natural life."

4. The Copyright Act of 1842 repealed the previous acts on the same subject, and is the basis of the existing law. Its preamble stated its object to be to encourage the production of ” literary matter of lasting benefit to the world.” The principal clause is the following (§ 3) : “■ That the copy- right in every book which shall after the passing of this act be published in the lifetime of its author shall endure for the natural life of such author, and for the further term of seven years, commencing at the time of his death, and shall be the property of such author and his assignees; provided always that if the said term of seven years shall expire before the end of forty-two years from the first publication of such book the copyright shall in that case endure for such period of forty-two years; and that the copyright of every book which shall be published after the death of its author shall endure for the term of forty-two years from the first publication thereof, and shall be the property of the pro- prietor of the author’s manuscript from which such book shall be first published and his assigns.” The benefit of the enlarged period was extended to subsisting copyrights, unless they were the property of an assignee who had acquired them by purchase, in which case the period of copyright would be extended only if the author or his personal representative agreed with the proprietor to accept the benefit of the act. By section 5 the judicial committee of the privy council may license the republication of books which the proprietor of the copyright thereof refuses to publish after the death of the author. The sixth section provides for the delivery within certain times of copies of all books published after the passing of the act, and of all subsequent editions thereof, at the British Museum. And a copy of every book and its subsequent editions must be sent on demand to the following libraries: the Bodleian at Oxford, the public library at Cambridge, the library of the faculty of advocates in Edinburgh, and that of Trinitv College, Dublin. Other libraries (the .libraries

Act of

1842.

of the four Scottish Universities, King’s Inns, Dublin, and Sion College) entitled to this privilege under the earlier acts had been deprived thereof by an act passed in 1836, and grants from the treasury, calculated on the annual average value of the books they had received, were ordered to be paid to them as compensa- tion. A book

of registry is ordered to be kept at Stationers' Hall for the registration of copyrights, to be open to inspection on payment of one shilling for every entry which shall be searched for or inspected. And the officer of Stationers' Hall shall give a certified copy of any entry when required, on payment of five shillings; and such certified copies shall be received in evidence in the courts as prima facie proof of proprietorship or assignment of copyright or licence as therein expressed, and, in the case of dramatic or musical pieces, of the right of representation or performance. False entries shall be punished as misdemeanours. The entry is to record the title of the book, the time of its publica- tion, and the name and place of abode of the publisher and proprietor of copyright. Without making such entry no pro- prietor can bring an action for infringement of his copyright, but the entry is not otherwise to affect the copyright itself. Any person deeming himself aggrieved by an entry in the registry may complain to one of the superior courts, which will order it to be expunged or varied if necessary. A proprietor may bring an action on the case for infringement of his copyright, and the defendant in such an action must give notice of the objections to the plaintiff's title on which he means to rely. No person except the proprietor of the copyright is allowed to import into the British dominions for sale or hire any book first composed or written or printed and published in the United Kingdom, and reprinted elsewhere, under penalty of forfeiture and a fine of £10. The proprietor of any encyclopaedia, review, magazine, periodical work, or work published in a series of books or parts, who shall have employed any person to compose the same, or any volumes, parts, essays, articles, or portions thereof, for publication on the terms that the copyright therein shall belong to such proprietor, shall enjoy the term of copyright granted by the act. 1 But the proprietor may not publish separately any article or review without the author's consent, nor may the author unless he has reserved the right of separate publication. Where neither party has reserved the right they may publish by agreement, but the author at the end of twenty-eight years may publish separately. Proprietors of periodical works shall be entitled to all the benefits of registration under the act, on entering in the registry the title, the date of first publication of the first volume or part, and the names of proprietor and publisher.

The interpretation clause of the act defines a book to be every volume, part, or division of a volume, pamphlet, sheet of letter- press, sheet of music, map, chart, or plan separately published.

5. During the last quarter of the 19th century the question of copyright became continually more prominent, and a considerable

extension was given by judicial interpretation to the exua- scope of the act of 1842. ” Literary matter of lasting shas. benefit to the world ” came to include every publica- tion (not being illegal) which could be described as “literary ” or ” original,” the criterion as to the latter qualifica- tion being, in the last resort, whether (see Trade Auxiliary Co. v. Middksborough Association, 1889, 40 Ch.D. 425) the author or compiler has really put his own brain-work into it.

6. The most marked and certain progress has been in the application of the law of copyright to the periodical press, in

order to protect within reasonable limits the labour and expenditure of newspapers that obtain for the public the earliest news and arrange it for publication. It is settled law since 1881 (Walter v. Howe, 17 Ch.D. 708, over- ruling Cox v. Land b° Water Journal Co., 1869), that a newspaper is a book within the meaning of the act, and can claim all rights that a Look has under the Copyright Act. Thus, leading articles, special articles, and even news items are protected (Walter v. Steinkcpff, 1892, 3 Ch. 489; Exchange Telegraph Co. v. Gregory

1 Such articles must be paid for, in order to vest copyright in the proprietor. The leading case about encyclopaedias is that of Lawrence and Bullen v. Aftalo, decided by the House of Lords in 1904.

News- papers.

and Co., 1896, 1 Q.B. 147). Current prices of stocks and shares, translations, the compilation of a directory, summaries of legal proceedings, and other similar literary work, so far as the literary form, the labour and money are concerned, are equally protected. In short, the test may now be broadly stated to be, whether labour of the brain and expenditure of money have been given for the production; whilst the old requirement of original matter is very broadly interpreted. The leading case on the subject is Walter v. Lane (decided in the House of Lords, 6th August 1900). The question there raised was, whether or not copyright applied under the act of 1842 in respect of verbatim reports of speeches. Four law lords, viz. Lord Chancellor Halsbury, Lord Davey, Lord James of Hereford and Lord Brampton upheld the claim to copyright in such cases, whilst Lord Robertson was the sole dissentient.

. Apart from newspapers, protection has been extended to publications having no literary character; Messrs Maple’s furniture catalogue, and the Stock Exchange prices on the ” tape ” have been awarded the same protection as directories. The courts have declined to protect works

which are mere copies of railway time-tables, or the ” tips ” of a sporting prophet, or mechanical devices with no independent literary matter, such as patterns for cutting ladies’ sleeves.

7. The publication of lectures without consent of the authors or their assignees is prohibited by the Lecture Copyright Act 183 5, which reinforces the common law against publica- L eciures tion of ” unpublished ” matter, and gives a copyright

for 28 years. This act, however, excepts from its provisions: (1) lectures of which notice has not been given two days before their delivery to two justices of the peace living within 5 m. to the place of delivery (an impracticable condition), and (2) lectures delivered in universities and other public institutions. Sermons by clergy of the established Church are believed to fall within this exception. The leading cases are Nicols v. Pitman, 1884, 26 Ch.D. 374, and Caird v. Sime, 1887, 12 A.C. 326.

8. The writer of private letters sent to another person may in general restrain their publication. It was urged in some of the cases that the sender had abandoned his property

in the letter by the act of sending; but this was denied tetters” by Lord Hard wick e (Pope v. Curl in 1741), who held that at most the receiver only might take some kind of joint property in the letter along with the author. Judge Story, in the American case of Folsom v. Marsh, 2 Story (Amer.) 100, states the law as follows: ” The author of any letter or letters, and his representatives, whether they are literary letters or letters of business, possess the sole and exclusive copyright therein; and no person, neither those to whom they are addressed, nor other persons, have any right or authority to publish the same upon their own account or for their own benefit.” But there may be special occasions justifying such publication. See also the English case of Macmillan v. Dent (1905).

9. The question of what is an infringement of copyright has been the subject of much discussion. It was decided under the statute of 1709 that a repetition from memory was

not a publication so as to be an infringement of lairinste- copyright. In the case of Reade v. Conquest, 1861, meat. 9 C.B., the same view was taken. The defendant had dramatized the plaintiff’s novel It’s Never too Late to Mend, and the piece was performed at his theatre. This was held to be no breach of copyright; but the circulation of copies of a drama, so taken from a copyright novel, whether gratuitously or for

sale, is not allowed. Then again it is often a difficult question to decide whether the alleged piratical copyright does more than make that fair use of the original author's materials which the law permits. It is not every act of borrowing literary matter from another which is piracy, and the difficulty is to draw the line between what is fair and what is unfair. Lord Eldon put the question thus, — whether the second publication is a legitimate use of the other in the fair exercise of a mental operation deserving the character of an original work. Another test proposed is " whether you find on the part of the defendant an animus furandi—a.n intention to take for the purpose of saving himself

labour." No one, it has been said, has a right to take, whether with or without acknowledgment, a material and substantial portion of another's work, his arguments, his illustrations, his authorities, for the purpose of makinng or improving a rival publication. When the materials are open to all, an author may acquire copyright in his selection or arrangement of them. Several cases have arisen on this point between the publishers of rival directories. Here it has been held that the subsequent compiler is bound to do for himself what the original compiler had done. When the materials are thus in medio, as the phrase is, it is considered a fair test of piracy to examine whether the mistakes of both works are the same. If they are, piracy will be inferred. Translations stand to each other in the same relation as books constructed of materials in common. The animus furandi, mentioned above as a test of piracy, does not imply deliberate intention to steal; it may be quite compatible with ignorance even of .the copyright work. Abridgments, moreover, of original works appear to be favoured by the courts — when the act of abridgment is itself an act of the understanding, " employed in carrying a large work into a smaller compass, and rendering it less expensive." Lord Hatherley, however, in Tinsley v. Lacy, 1863, 1 H. & M. 747, incidentally expressed his disapproval of this feeling — holding that the courts had gone far enough in this direction, and that it was difficult to acquiesce in the reason sometimes given that the compiler of an abridg- ment is a benefactor to mankind by assisting in the diffusion of knowledge. A mere selection or compilation, so as to bring the materials into smaller space, will not be a bona fide abridg- ment; " there must be real substantial condensation, and intellectual labour, and judgment bestowed thereon " (Justice Story). A publication professing to be A Christmas Ghost Story, Reoriginated from the Original by Charles

Dickens, Esq., and Analytically Condensed expressly for this Work, was found (Dickens v. Lee, 1844, 8 Jur. 183) to be an invasion of Charles Dickens's copyright in the original.

10. There can be no copyright in any but innocent publica- tions. Books of an immoral or irreligious tendency have been

repeatedly decided to be incapable of being made the works"* SUD J ect °f copyright. In a case (Lawrence v. Smith,

1 Jac. 471) before Lord Eldon in 1822, an injunction had been obtained against a pirated publication of the plaintiff's Lectures on Physiology, Zoology, and the Natural History of Man, which the judge refused to continue, " recollecting that the immortality of the soul is one of the doctrines of the Scriptures, and considering that the law does not give protection to those who contradict the Scriptures." The same judge refused in 1822 to restrain a piracy of Lord Byron's Cain, and Don Juan was refused protection in 1823. Compare also Cowan v. Milbourn, 1867, L.R. 2 Ex. 230, in which a contract to let a room for lectures of an irreligious character was held not to be binding.

11. The quasi-copyright in titles of books, periodicals, &c. is founded on the desirability of preventing one person from

putting off on the public his own productions as those of another. This is, however, not copyright, but a question of ordinary fraud. The name of a journal (if sufficiently established) is a species of trade-mark in which the law recognizes" what it calls a " species of property," provided any misleading of the public is involved. Thus, the Wonderful Magazine was invaded (1803) by a publication calling itself the Wonderful Magazine, New Series Improved. Bell's Life in London was pirated (1850) by a paper calling itself the Penny Bell's Life. The proprietors of the London Journal got an injunction (1859) against the Daily London Journal, which was projected by the person from whom they had bought their own paper, and who had covenanted with them not to publish any weekly journal of a similar nature. A song published under the title of Minnie, sung by Madame Anna Thillon and Miss Dolby at Monsieur Jullien's concerts, was invaded (1855) by a song to the same air published as Minnie Dale, Sung at Jullien + t Concerts by Madame Anna Thillon. On the other hand, the Sphere and Spear, titles of misleading similarity, assumed by two weekly periodicals that appeared almost simultaneously in London in

Titles of works.

1900, could not successfully attack each other, because neither had an established reputation when first adopted.

12. Dramatic and musical compositions stand on this peculiar footing, that they may be the subject of two entirely distinct rights. As writings they come within the general Copyright Act, and the unauthorized multiplication of Jn™* copies is a piracy of the usual sort. This was decided to music. be so even in the case of musical compositions under the act of 1709. The Copyright Act of 1842 includes a ” sheet of music” in its definition of a book. Separate from the copy- right thus existing in dramatic or musical compositions is the stage-right or right of representing them on the stage; this was the right created by the Dramatic Copyright Act of 1833, in the case of dramatic pieces. This act gave the owner of the stage- right (right of representation) a period of twenty-eight years, or the duration of the author’s life if longer. The Copyright Act 1842 extended this right to musical compositions, and made the period in both cases the same as that fixed for copyright. And the act expressly provides (meeting a contrary decision in the courts) that the assignment of copyright of dramatic and musical pieces shall not include the right of representation unless that is expressly mentioned. The act of 1833 prohibited representa- tion ” at any place of public entertainment,” a phrase which was omitted in the act of 1842, and it may perhaps be inferred that the restriction is now more general and would extend to any unauthorized representation anywhere. A question has also been raised whether, to obtain the benefit of the act, a musical piece must be of a dramatic character. The dramatization of a novel, i.e.’ the acting of a drama constructed out of .materials derived from a novel, is not necessarily an infringement of the copyright in the novel (supposing it to be possible to do it without making any sort of colourable copy of the literary form) , but to publish a drama so constructed has been held to be a breach of copyright (Tinsley v. Lacy, 1863, 1 H. & M. 747, where defendant had published two plays founded on two of Miss Braddon’s novels, and reproducing the incidents and in many cases the language of the original) . Where two persons dramatize the same novel, what, it may be asked, are their respective rights? In Toole v. Young, 1874, 9 Q.B. 523, this point actually arose. A, the author of a published novel, dramatized, it and assigned the drama to the plaintiff, but it was never printed, published or represented upon the stage. B, ignorant of A’s drama, also dramatized the novel and assigned his drama to the defendant, who represented it on the stage. It was held that any one might dramatize A’s published novel, and that the representation of B ‘s drama was not a representation of A’s drama. This case may be compared with Reade v. Lacy (1861).

In the ” Little Lord Fauntleroy ” case (1888) the person who dramatized the novel of another without his consent, an operation up to that time believed to be unassailable in law, was attacked successfully, by preventing him from using printed or written copies of the play, either to deposit with the lord chamberlain or as prompt-books. In every case where much of the original dialogue of the novel is taken, this stops the production of the dramatization.

In music, statutes of 1882 and 1888 have prevented the use of the provisions inflicting penalties for the performance of copy- right songs for purposes of extortion, by allowing the court to inflict a penalty of one farthing and make the plaintiff pay the costs, if justice requires it. Authors reserving the right of public performance are required to print a notice to that effect on all copies of the music.

An important decision (which appears to be a grave injustice) on musical copyright is the case of Boosey v. Whight (1899; followed in other cases — see Mabe v. Conner, 1909), in which it was held that the reproduction of copyright tunes on the per- forated slips for an Aeolian or other mechanical instrument is not an infringement of copyright. In Germany it has been decided (Lincke v. Gramophone Co.) that the reproduction of copyright music on a gramophone is an infringement, and an injunction was granted. It has also been held in France that the production of copyright words (but not music) was an

infringement, while in the United States the Copyright Act of 1909 extended copyright control to mechanical reproductions, and gave the copyright proprietor power to exact royalties.

The copyright in music was subject to serious injury in England from the selling of pirated copies in the streets by hawkers; and in 1902 an act was passed enabling summary proceedings to be taken for having such copies seized and destroyed. But this act had various practical defects, which still left publishers largely at. the mercy of the pirates. In 1905 the evil had become so serious that the chief music publishers announced their intention of not producing any further works till the law was altered; but the new Musical Copyright Bill of that year was obstructed and talked out in the House of Commons. In November 1905 an important prosecution, instituted by Messrs Chappell on behalf of the associated music-publishers and composers, was brought against a coterie of pirates. In the session of 1906 another attempt,

this time successful, was made to pass a Musical Copyright Bill. This act (the Musical Copy- right Act 1906) made it a criminal offence, punishable with fine and imprisonment, to reproduce or sell, or to possess plates for the production of, pirated copies of musical works. The act also gave power to a constable to arrest without warrant any person who in any public place exposes for sale or has in his possession for sale, or canvasses or personally advertises pirated copies, provided that the apparent owner of the copyright signs an authority requesting such arrest at his own risk. Also a court of summary jurisdiction may grant a search warrant, if there is reasonable ground for believing that an offence against the act is being cqmmitted on any premises.

13. The right of foreigners under the English copyright acts produced at one time an extraordinary conflict of judicial opinion. A foreigner who during residence in the fofe%a˚rs. British dominions should publish a work was admitted to have a copyright therein. The question was whether residence at the time of publication was necessary. In Cocks v. Purday, the court of common pleas held that it was not. In Boosey v. Davidson, the court of queen's bench, following the decision of the court of common pleas in Cocks v. Purday, held that a foreign author might have copyright in works first pub- lished in England, although he was abroad at the time of publica- tion. But the court of exchequer, in Boosey v. Purday, refused to follow these decisions, holding that the legislature intended only to protect its own subjects, — whether subjects by birth or by residence. The question came before the House of Lords on appeal in the case of Boosey v. Jeffreys (1854), in which the court of exchequer had taken the same line. The judges having been consulted were found to be divided in opinion. Six of them held that a foreigner resident abroad might acquire copyright by publishing first in England. Four maintained the contrary. The views of the minority were affirmed by the House of Lords (Lord Chancellor Cranworth and Lords Brougham and St Leonards). The lord chancellor's opinion was founded upon " the general doctrine that a British senate would legislate for British subjects properly so called, or for such persons who might obtain that character for a time by being resident in this country, and therefore under allegiance to the crown, and under the protection of the laws of England." Lord Brougham said

that

" The statute of Anne had been passed for the purpose of encourag- ing learned men, and with that view that act had given them the exclusive right in their publications for twenty-one years. This,

however, was clear, they had no copyright at common law, for if they had there would have been no necessity for the passing of that statute. It could scarcely be said that the legislature had decided a century and a half since that act was to be passed to create a monopoly in literary works solely for the benefit of foreigners.. In the present case he was clearly of opinion that the copyright did not exist, and therefore that foreign law should not prevail over British law where there was such diversity between the two."

Against the authority of this case, however, must be set the opinion of two great lord chancellors— Lord Cairns and Lord Westbury. In the case of Routledge v. Low, L.R. 3 H. L. 100, 1868, Lord Cairns said,

" The aim of the legislature is to increase the common stock of

the literature of the country; and if that stock can be increased by the publication for the first time here of a new and valuable work composed by an alien who has never been in the country, I see nothing in the wording of the act which prevents, nothing in the policy of the act which should prevent, and everything in the pro- fessed object of the act and in its wide and general provisions which should entitle such a person to the protection of the act, in return and compensation for the addition he has made to the literature of the country."

And Lord Westbury said, in the same case,

" The case of Jeffreys v. Boosey is a decision which is attached to and depends on the particular statute of which it was the exponent, and as that statute had been repealed and is now replaced by another act, with different enactments expressed in different language, the case of Jeffreys v. Boosey is not a binding authority in the exposition of this later statute. The act appears to have been dictated by a wise and liberal spirit, and in the same spirit it should be interpreted, adhering of course to the settled rules of legal con- struction. The preamble is, in my opinion, quite inconsistent with the conclusion that the protection given by the statute was intended to be confined to the works of British authors. The real condition of obtaining its advantages is the first publication by the author of his work in the United Kingdom. Nothing renders necessary his bodily presence here at the time, and I find it impossible to discover any reason why it should be required, or what it can add to the merit of the first publication. If the intrinsic merits of the reasonˆ ing. on which Jeffreys v. Boosey was decided be considered, I must frankly admit that it by no means commands my assent."

These conclusions might follow also from the Naturalization Act of 1870, which enacts that real and personal property of every description may be taken, acquired, held, and disposed: of by an alien in the same manner in all respects as by a natural born British subject. At the present time the International Copyright Act has largely removed the question from, the area of conflict.

14. International Copyright. — Books published in one country and circulated in another depend for their protection in the latter upon international copyright. Until 1886 international copyright in Great Britain rested on a series of orders Tbe Bera in council, made under the authority of the Inter- v ™~ tJon , national Copyright Act 1844 (superseding acts of 1820 and 1826), conferring on the authors of a particular foreign country the same rights in Great Britain as British authors, on condition of their registering their work, in Great Britain within a year of first publication abroad. A condition of the granting of each order was that the , sovereign should be satisfied that reciprocal protection was given in the country in question to British authors. As the result of conferences at Bern in 1885 and 1887, this system was simplified and made more general by the treaty known as ” The Bern Convention,” signed at Bern on the 5th of September 1887. The contracting parties were the British Empire, Belgium, France, Germany, Italy, Spain, Switzerland, Tunis and Hayti. Luxemburg, Monaco, Norway and Japan afterwards joined. Austria and Hungary have a separate convention with Great Britain, concluded on the 24th of April 1893. The notable absentees among European powers are Holland and Russia. So far as the United States is concerned, the matter is regulated by the American copyright acts, which are dealt with separately below.

The basis of the Bern convention was that authors of any of the countries of the Union, or the publishers of works first published in one of them, should enjoy in each of the other countries of the Union the same rights as the law of that country granted to native authors. The only conditions were that the work should comply with the necessary formalities, such as registration, in tJˆ country where it was first published, in which case it was exempt from all such formalities elsewhere; and that the protection required from any country should not exceed that given in the country of origin. The rights conferred included the ; sole right of making a translation of the work for ten years from its first publication. The convention was retrospective; that is to say, it applied to copyright works published before its coming into existence, each country being allowed to protect vested interests, or copies already made by others, as it should think best.

The rights of foreign authors in Great Britain rest on legislation

giving effect to the Bern convention, namely, the International Copyright Act of 1886, and an order in council made under that act, dated 28th November 1887. These confer on the author or publisher of a work of literature or art first published in one of the countries which are parties to the convention, after compliance with the formalities necessary there, the same rights as if the work had been first published in the United Kingdom, provided that those rights are not greater than those enjoyed in the foreign country.

The rights of British authors in foreign countries rest in each country on the domestic legislation by which the particular country has given effect to its promise contained in the Bern convention, and are enforced by the courts of that country. The Bern convention was revised in minor details not affecting its broad principles by a conference meeting in 1896 in Paris, and Great Britain adopted the results of their labours by an order in council dated 7th March 1898. A further simplification in the international law of copyright was expected to result from the efforts of the international conference at Berlin in r9o8, July 1910 being the latest date at which ratification by the states concerned might take place, but it cannot here be stated to what extent legislation may give effect to the decisions arrived at. So far as these decisions affect Great Britain, the greatest alterations of existing law would be in establishing throughout the Union protection of musical copyright, especially with regard to singing and talking machines, and also in the matter of newspaper copyright. The conference adopted a threefold division of newspaper matter : (1) serial stories, tales and all other work, literary, scientific and artistic, which is to have absolute protection; (2) all newspaper matter, except the foregoing and mere items of general news (faits divers), of which reproduction is to be permitted on acknowledgment of the source, unless such reproduction is expressly forbidden; (3) news of the day and simple facts, to which no protection is given. An endeavour was also made to have a uniform period throughout the Union for copyright of the author's life and 50 years.

15. Colonial Copyright. — Under English copyright, books of the United Kingdom were formerly protected in the colonies by the Colonial Copyright Act of 1847, and copies of them printed or reprinted elsewhere could not be imported into the colonies. In 1876 a

royal commission was appointed to consider the whole question of home, colonial and international copyright; and various recommendations were made. But the matter now rests on the English International Copyright Act 1886, which con- tains provisions designed to extend the benefit of the British copyright acts to works first produced in the colonies, while allowing each colony to legislate separately for works first produced within its own limits. The colonies at present are all included in the system of international copyright established by the Bern convention.

In 1875 an act was passed (re-enacted in 1886 in the revised Canadian statutes) to give effect to an act of the parliament of the Dominion of Canada respecting copyright. An order in council in 1868 had suspended the prohibition against the importation of foreign reprints of English books into Canada, and the parliament had passed a bill on the subject of copyright as to which doubts had arisen whether it was not repugnant to the Order in Council. It was also enacted that, after the bill came into operation, if an English copyright book became entitled to Canadian copyright, no Canadian reprints thereof should be imported into the United Kingdom, unless by the owner of the copyright. The following points in the Canadian act are worth noting: — Any person print- ing or publishing an unprinted manuscript without the consent of the author or legal proprietor shall be liable in damages (§ 3). Any person domiciled in Canada, or in any part of the British possessions, or being a citizen of any country having an inter- national copyright treaty with the United Kingdom, who is the author of any book, map, &c, &c, shall have the sole right and liberty of printing, reprinting, publishing, &c, for the term of twenty-eight years. The work must be printed and published, or reprinted or republished in Canada, whether before or after its publication elsewhere : and the Canadian privilege is not to be con-

tinued after the copyright has ceased elsewhere. And”no immoral or licentious, or irreligious, or treasonable, or seditious literary, scientific or artistic work ” shall be the subject of Copyright (§ 4). A further period of fourteen years will be continued to the author or his widow and children. An ” interim copyright ” pending publication may be obtained by depositing in the office of the minister of agriculture (who keeps the register of copyrights) a copy of the title of the work; and works printed first in a series of articles in a periodical, but intended to be published as books, may have the benefit of this interim copyright. If a copyright work becomes out of print, the owner may be notified of the act through the minister of agriculture, who, if he does not apply a remedy, may license a new edition, subject to a royalty to the owner. Anonymous books may be entered in the name of the first

publisher. In 1889 an amending Canadian act was passed, which led to a long controversy with the Mother Country, — the imperial government refusing to sanction it, — till in 1900 a compromise was effected, and a further act amending that of 1886 became law. It applies only to books copyright in Canada, and, subject to certain reservations, allows the minister of agriculture to prohibit the importation, without consent of the licensees, of any copies printed elsewhere of books published in the British dominions licensed by the owners to be reproduced in Canada.

The Australian states all have copyright laws modelled on the English. New Zealand provides for a term of 28 years, or the author's life. In Cape Colony the term for books is the author's life and 5 years, or a minimum of 30 years. The Indian act of 1847 is modelled on the English.

16. Other Countries. — The following notes give the general terms of the copyright law in other countries of importance. For details reference must be made to text-books. We only deal specifically with the history and par- hm ticulars of American copyright.

Austria, by a law of 1895, gives copyright for thirty years after author's death.

Belgium.— Copyright formerly perpetual, now limited to the life of the author, and 50 years thereafter.

France. — Copyright in France is recognized in the most ample manner. Two distinct rights are secured by law — • 1st, the right of reproduction of literary works, musical com- positions, and works of art; and 2nd, the right of representation of dramatic works and musical compositions. The period is for the life of the author and fifty years after his death. After the author's death the surviving consort .has the usuf- ructuary enjoyment of the rights which the author has not disposed of in his lifetime or by will, subject to reduction for the benefit of the author's protected heirs if any. The author may dispose of his rights in the most absolute manner in the forms and within the limits of the Code Napoleon. Piracy is a crime punishable by fine of not less than 100 nor more than 2000 francs; in the case of a seller from 25 to 500 francs. The pirated edition will be confiscated. Piracy also forms the ground for a civil action of damages to the amount of the injury sustained — the produce of the confiscation, if any, to go towards payment of the indemnity (Penal Code, Art. 425-429).

Germany. — Period fixed in 1837 at ten years; but copyright for

longer periods was granted for voluminous and costly works, and for the works of German poets. Among Others the works of Schiller, Goethe, Wieland, &c, were protected for a period of twenty years from the date of the decree in each case. In 1845 the period was extended in all cases to the author's life and thirty years after. The present law rests on a Codifying Act of 1901, the term being the author's life and 30 years, or not less than 10 years in any case.

Greece.— Copyright is for fifteen years from publication.

Holland. — Fifty years, or author's life, whichever is longer.

Hungary. — by a law of 1884, gives a copyright for the author's life and 50 years after.

Italy. — Life of author, or 40 years from date of publication; and afterwards a further period of 40 years, subject to a right in others to reproduce on payment of 5 % on each copy.

Japan. — Author's life and 30 years after.

American law.

Norway, by a law of 1893, gives protection for author's life and 50 years after.

Portugal. — Author's life and 50 years after.

Russia. — Author's life and 50 years.

Spain. — -Author's life and 80 years thereafter.

Sweden and Denmark provide for a term of the author's lifetime and 50 years after.

Switzerland.— Author's life and 30 years after.

Turkey. — Author's life, or 40 years, whichever is the longer.

17. United States. — American copyright is provided for by an act of March 1909, which replaced acts of July 1870 and March 1891, both of which had introduced important modifications in the original act of 1790. Under all acts preceding that of 1891, copyright had been

granted to ” citizens or residents of the United States,” the term ” resident ” having been, in decisions prior to 1891, construed to mean a person domiciled in the United States with the intention of making there his per/nanent abode. The works of foreigners could thus be reproduced without authorization, and they were so reproduced in so far as there was prospect of financial gain. The leading publishers, however, had from the earliest times made terms with British authors, or with their representatives, the British publishers, for producing authorized American editions. But at most they were only able to secure by this means an advantage of a few weeks' priority over the unauthorized editions, and the good-will of the conscientious buyer; so that if they paid the author any considerable sum, the price of the authorized editions had to be made so high that it was not easy to secure a remunerative sale. The unauthorized editions had the further advantage in competition, that for the purpose of being manufactured more promptly and more economically, they could be and often were issued in an ab- breviated and garbled form, an injury which to not a few writers seemed more grievous than the lack of pecuniary profit. In Great Britain, during the first half of the 19th century, the copy- right law had been so interpreted as to secure recognition of the rights of American authors for such works as were produced there not later than in any other country, so that authors like Washington Irving and Fenimore Cooper secured for a time satisfactory returns; but after 1850 the conditions became the same as in the United States. Unauthorized editions were published, and were often incomplete and garbled.

As from decade to decade the books produced on either side of the Atlantic, which possessed interest for readers of the other side, increased in quantity and in importance, the evil of these unrestricted piracies increased. The injury to British authors was greater only in proportion as the English books were more numerous. The pressure from Great Britain during the last half of the 19th century for international copyright was con- tinuous; and in America it was recognized by authors, by representative publishers, and by the more intelligent people everywhere, that the existing conditions were of material disadvantage. The loss to American authors was direct; and the loss to legitimate American publishers was also clear, in that better returns could be secured by adequate payments for rights that could be protected by law than by ” courtesy ” payments for authorizations that carried no legal rights. An injury was being done to American literature; for, when authorized editions of American works had to compete against unauthorized and more cheaply produced editions of English works, the business incentive for literary

production was seriously lessened. In fiction particularly, authors had to contend against a flood of cheaply produced editions of ” appropriated ” English books. Equally to be condemned were the ethics of a relation under which one class of property could be appropriated while other classes secured legal protection. On these several grounds efforts had long been made to secure international copyright. Between 1843 and 1886 no less than eleven international copy- right bills were drafted, for the most part at the instance of the copyright associations or copyright leagues. They were one after the other killed in committee. In 1886 the twelfth inter- national copyright bill was brought before the Senate by Senator

Jonathan Chace of Rhode Island, and was referred to the committee on patents. In 1887 the American Publishers' Copyright League (succeeding the earlier American Publishers' Association) was organized, with William H. Appleton as president and G. H. Putnam as secretary. The executive committee of this league formed, with a similar committee of the Author's Copyright League, a conference committee, under the direction of which the campaign for copyright was continued until the passage of the act of March 1891. Of the Authors' Copyright League James Russell Lowell was the first president, being succeeded by Edmund Clarence Stedman. The secretary during the active work of the league was Robert U. Johnson. Under the initiative of the conference committee copyright leagues were organized in Boston, Chicago, St Louis, Cincinnati, Minneapolis, Denver, Colorado City and other places. The Chace Bill was introduced in the House in March 1888. In May 1890 this bill, with certain modifications, came before the House, and was there defeated. In March 1891 the same measure, with certain further modifications, secured a favourable vote in the House during the last hour of the last day of the session, was passed by the Senate, and was promptly signed by President Harrison. Thus, after a struggle extending over fifty-three years, the United States accepted the principle at all events of international copyright.

18. The act of 1891 was criticized in several respects': (1) A condition was that books or works of art must be ” manu- factured ” in America; consideration not being given to books originally produced in some language other than English. (2) It required publication in the United States simultaneously with that in the country of origin. (3) The term of copyright (28 years, with an extension of 14 years to the author if alive, or to widow or children) was shorter than that accorded under the law of any other literature-producing country, excepting Greece. Minor amending acts were passed in 1893, 1895 and 1897, that of Feb. 19, 1897, establishing as the copyright department of the library

of Congress a Bureau of Copyrights, the head of which bears the title of Register of Copyrights. Eventually, after hard work by the American Authors' Copyright League and the Publishers' Copyright League, and after Provls l° a * sittings extending to a period of three years, a new bill ° 1909 ° submitted to Congress by the two Committees on Patents of the House of Representatives and the Senate was successfully passed. It came into force on the 1st of July 1909. Its provisions may be briefly summarized as follows : —

Copyright is granted to authors for twenty-eight years from the date of first publication, whether the copyrighted work bears the author's true name or is published anonymously or under _ an assumed name. A further term of twenty-eight years "L"^

is granted to the author if at the expiration of the first "W*^ term he be still living, or to his widow and children if he be dead. If the author's widow and children be dead an extension is granted to the author's executors, or in the absence of a will, to his next of kin. Applications for renewal and extension must be made to the copyright office and duly registered therein within one year prior to the expiration of the existing term. To any work in which copyright subsists at the time the act went into force the act extends renewal for a period of twenty-eight years at the expiration of the time provided for under the previously existing law (first period 28 years, renewal period 14 years). The works for which copyright may be secured under the act " shall include all the writings of an author." For purposes of registration the act classifies (1) books, including composite and cyclopaedic works, directories, DefinHloa gazetteers and other compilations; (2) periodicals, includ- . _„. ing newspapers; (3) lectures, sermons, addresses, pre right pared for oral delivery; (4) dramatic or dramatico- '

musical compositions; (5) musical compositions; (6) maps; (7) works of art; models or designs for works of art; (8) reproductions of a work of art; (9) drawings or plastic works of a scientific or technical character; (10) photographs and (11) prints and pictorial illustrations. But compilations or abridgments, adaptations, arrangements, dramatizations, translations or other versions of copyrighted works, when produced with the consent of the proprietors of the copyrighted work are, under the 1909 act, new works subject to copyright. A citizen or subject of a foreign state can secure copyright only when he is domiciled within the United States at the time of the first publication of his work, or when the foreign state or nation of which he is a subject grants, either by treaty, convention, agreement or law, to citizens of the United States the benefit of

copyright on substantially the same basis as to its own citizens, or copyright protection equal to that secured by the foreign author under the United States act, or when the foreign state is a party to an international agreement providing for reciprocity in the grant- ing of copyright, and the United States may, by the terms of that agreement, become a party thereto. After copyright has been secured by publication of a work, two complete copies of the best edition published must be ” promptly ” deposited in the copyright office, or mailed to the register of copyrights, the postmaster, on request, giving a receipt and mailing the books without cost. If the work be a contribution to a periodical, one copy of the issue contain- ing it must be sent, or if it be a work not reproduced in copies for sale, a copy, print, photograph or other identifying reproduction must accompany the claim. Prior to 1891 the works of authors could be put into print on either side of the Atlantic. The act of 1891 laid down that, in order to secure copyright, all editions of the works of all authors, resident or non-resident, must be entirely „ „ manufactured within the United States, the term ” manu-

. . ,”, factured ” including the setting of type as well as printing clause anc * binding. This manufacturing condition was insisted

on by the typographical unions. There is no logical connexion, however, between the right of an author or artist to the control of his production and the interests of American workmen; the attempt to legislate for them jointly must bring about no little confusion and inequity. If American working-men cannot secure a living in competition with labourers on the other side of the Atlantic, their needs should be cared for under the provisions of the protective tariff. It is, however, the belief of a large number of those who are engaged in the manufacturing of books that, with his advanced methods of work, the skilled American labourer has no reason to dread the competition of European craftsmen. With this manu- facturing condition out of the way, there would be nothing to prevent the United States from becoming a party to the Bern Convention. This would place intellectual property on both sides of the Atlantic on the same footing. The power of the unions was sufficiently strong to prevent this condition being eliminated from the act of 1909, but the just claims were met of authors whose books are originally produced in some language other than English, the E motion ” OI “ig ma ‘ text °f a book of foreign origin in a language or of text ot ‘ an g ua g es other

than English ” being exempted from the lorelna requirements as to type-setting in the United States. On book * ne otner hand the manufacturing condition is extended by

the act of 1909 to illustrations within a book, and also to separate lithographs or photo-engravings, ” except where in either case the subjects represented are located in a foreign country and illustrate a scientific work or reproduce a work of art.” The notice of copyrights required by the act consists either of the word ” copy- right or by the abbreviation ” Copr.,” accompanied by the name of the copyright proprietor, and in the case of printed literary, musical or dramatic works, the notice must include also the year in which the copyright was secured by publication. In the case of works specified in 6 to 1 1 inclusive, of the classification given above, the copyright notice may consist of the letter C enclosed within a

circle, thus: (£), accompanied by the initials, monogram, mark or symbol of the copyright proprietor, provided that on some accessible portion of the copy or of the margin, or on the back or pedestal his name appears.

The act of 1909 gives an interim protection to a book published abroad in the English language before publication in the United States, the deposit in the copyright office, not later than Interim thirty days after its publication abroad, of one complete tton”” copy °f tne foreign edition, with a request for the reserva- tion of the copyright and a statement of the name and nationality of the author and copyright proprietor, securing copy- right for thirty days from the date of deposit. Any person infringing

Infringe- menu

a copyright work is liable to an injunction, and to pay such damages as the copyright proprietor may have suffered

by the infringement ; in lieu of actual damages and profits the courts may award such damages as appear to be just, and in assessing them may, at its discretion, allow the amounts mentioned below, except that in the case of a newspaper reproduction of a copyrighted photograph such damages must not exceed the sum of two hundred and fifty dollars nor be less than fifty dollars, and in no other case must the damages be more than five thousand dollars or less than two hundred and fifty dollars: (1) In the case of a painting, statue or sculpture, ten dollars for any infringing copy made or sold or found in the possession of the infringer or his agents or employees; (2) in the case of any work enumerated in the classifi- cation given before, except a painting, statue or sculpture, one dollar for every infringing copy; (3) in the case of a lecture, sermon or address, fifty dollars for every infringing delivery ; (4) in the case of dramatic or dramatico-musical or a choral or orchestral composition, one hundred dollars for the first and fifty dollars for every subsequent infringing performance; in the case of other musical compositions, Musical * en dollars f° r ev ery infringing performance; all infring- comoosl- ln % co pi es an d devices must also be delivered up for de- tlons. struction. The act gives full control over his compositions

to a musical composer, and thfi right to make any arrangement or setting of it, or of the melody of it. in any system of

notation or form of record from which it may be read or reproduced. His right to control the reproduction of his music by mechanical instruments is restricted (1) to cover only music published and copyrighted after the act went into effect ; (2) to include a musical composition by a foreign composer only in the case of a citizen of a foreign state that grants to citizens of the United States similar rights;

(3) where the owner of a musical copyright has permitted the use of his work upon parts of instruments serving to reproduce the composition mechanically, permission for a similar use of such work must be accorded to any other person on the payment of a fixed royalty of two cents on each part manufactured. The act makes a clear distinction between the property in the copyright _ . and that in the material object representing the copyright, . * _

and enacts that the sale or conveyance of the material S i snm l B t object shall not of itself constitute a transfer of the copy- f C0Dy . right. Transfer of copyright in the United States is to be right. effected by an instrument in writing signed by the pro- prietor of the copyright, or the copyright may be bequeathed by will. Assignment of copyright executed in a foreign country must be acknowledged by the assignor before a consular officer of the United States. Every assignment of copyright must be recorded in the copyright office within three calendar months after its execu- tion in the United States or within six months without the limits of the United States. The importation into the United States is for- bidden of any piratical copies of a copyrighted book or of any copies not produced in accordance with the manufacturing . . provisions of the act (although authorized by the author fionot' or proprietor), but importation is allowed to any society cogytleht or institution incorporated for educational, literary, wor i [/ philosophical, scientific or religious purposes, or for the encouragement of the fine arts, or to any State school, college, &c, or to free public libraries, when importation is for use and not for sale. The act of 1891 allowed " two copies in any one invoice " to be imported, but by, the act of 1909 not more than one copy is to be imported in one invoice.

The provisions having to do with international copyright become operative in the case of a foreign state only when the president proclaims that the state has fulfilled the condition of reciprocity. The act of 1891 was put into force with foreign states as follows: — 1st of July 1891, Great Britain, Belgium, France, Switzerland; 8th of March 1892, Germany (by separate treaty); 31st of October 1892, Italy; 8th of May 1893, Denmark; 15th of July 1895, Spain; 20th of July 1895, Portugal; 27th of February 1896, Mexico; 13th of April 1896, Sweden and Norway; 25th of May 1896, Chile; 19th of October 1899, Costa Rica; 20th of November 1899, the kingdom of the Netherlands. In the case of each state the territory covered by the provisions of the law included the possessions, dependencies, &c. The copyright agree- ment with Great Britain therefore covered the crown colonies of the empire, including India and the self-governing dominions and states, such as Canada, Australia, &c. An American work duly entered for copyright

in Great Britain secures, as a British publication secures, the protection of copyright under the provisions of the Bern convention throughout the territory of the several states that are parties to that convention.

Artistic Copyright

19. Literary authors had protection for their literary work much earlier than artists for their artistic productions. Pictures and illustrations, when included in books or newspapers, are protected by the law which applies to the latter, but that is a separate question. It was not until the reign of George II. that the legislature in England afforded any protection for the work of artists. The English law on artistic copyright is alone con- sidered in this account, the American having been included in the section United States above (18), while for other countries the details are so various that it is only possible to refer the reader to the leading text-books.

The first Artists' Copyright Bill was passed in the interest of William Hogarth, one of the greatest of English painters, who was engraver as well as painter, and who devoted a considerable portion of his time to engraving his 1"%™*' own works. No sooner, however, were these published than his market was seriously damaged by the issue of inferior copies of his engravings by other publishers. To protect Hogarth from such piracy the Engraving Copyright Act 1734 was passed, which provided that " every person who should invent and design, engrave, etch, or work in mezzotinto or chiaroscuro, any historical or other print or prints, should have the sole right and

liberty of printing and representing the same for the term of fourteen years, to commence from the day of the first publishing thereof, which shall be truly engraved with the name of the pro- prietor on each plate, and printed on every such print or prints." The penalty for piracy was the forfeiture of the plate and all prints, with a fine of 5s. for every pirated print.

In 1766, in the reign of George III., a second Engraving Copyright Act was passed " to amend and render more effectual" the first act, and " for vesting and securing to Jane Hogarth, widow, the property in certain prints," which extended the protection beyond the designer, who was also engraver, to any person who, not being himself a

designer, made, or caused to be made, an engraving from any picture or other work of art. Jane Hogarth, the widow of the painter, found herself nearing the termination of the fourteen years' term of copyright grant by the first act, with the probability that immediately on its expiry the engravings of her husband then on sale, and on' which her livelihood depended, would be immediately pirated. It was mainly to save her from the loss of her livelihood that this second Copyright Bill extended the term of the copyright to twenty-eight years.

The engravers and publishers of the day were not over- scrupulous, and they sought to' evade the penalties of the copy- right acts by taking the designs, and adding to them or taking from them, or both, and producing fresh engravings, seeking to make it appear that they were producing new works. These prac- tices assumed such proportions that it became necessary, in 1777; to call upon parliament to put through another short measure still further to protect the engraver, by prohibiting the copying " in whole or in part " (a clause not contained in the previous acts), by varying, adding to, or diminishing from, the main design of an engraving without the express consent of the proprietor or proprietors. These three acts remain in force to the present day. In 1852, in an international copyright act, it was declared that the Engraving Copyright Acts collectively were intended to include prints taken by lithography or any other mechanical process.

20. In May 1814 the Sculpture Copyright Act was passed to give protection to sculptors. The term of copyright for sculptors Sculpture. was a peculiar one. It was to last for fourteen years,

with the proviso that, should the author be still alive, he should enjoy a further period of fourteen years, the copyright returning to him for the second fourteen should he have disposed of it for the first period. It is a condition of copyright with the sculptor that the author must put his name with the date upon every work before putting it forth or publishing it. A curious and interesting point in the interpretation of this act is, that according to the opinion of eminent jurists it is necessary to an infringement of the copyright of a piece of sculpture that the copy of it must take the form of another piece of sculpture; that a photograph, drawing, or engraving of a piece of sculpture is not to be considered a reproduction of it, and is therefore not an infringement of the sculptor's copyright.

21. Strange as it may seem, painting was the last branch of the arts to receive copyright protection. The cause of the Palatine Pinters was

taken up by the Society of Arts, who

endeavoured, in the first instance, to pass an amend- ment and consolidation bill dealing with engraving, sculpture and painting; but, failing in their first effort, they limited their second to an attempt to pass a bill in favour of painting, drawing and photography. It was in the year 1862 that this act, having passed through parliament, came into force. The absence of any antecedent protection for the painter is clearly stated in its preamble, which reads as follows: “Whereas by law as now established, the authors of paintings, drawings, and photographs have no copyright in such their works, and it is expectant that the law should in that respect be amended. Be it, therefore, enacted,” &c. This preamble makes it clear that there is no copyright in any paintings, drawings, or photographs executed and dealt with before the year 1862 — to be exact, 29th July of that year. The duration of the term of copyright in this act of 1862 differs from its predecessors, by being made dependent on the life of the author, to which life seven years were added. In

the Literary Copyright Act there are two terms — the life of the author and seven years, or forty-two years, whichever may prove the longer. In taking a fixed term like forty-two years it is necessary to have something to start from, and with a literary work it was easy to start from the date of publication. But pictures are not published. They may pass from the studio to the wall of the purchaser without being made public in any way. The difficulty was evidently before the author of this act, and the artist’s term was made his life and seven years after his death without any alternative. This term applies equally to photographers. Perhaps no bill which ever passed through parliament ostensibly fox the purpose of benefiting a certain set of people has failed so completely as has this bill to accomplish its end. It started by proposing to give copyright to authors of paintings, drawings and photographs, and it would seem that no difficulty ought to have arisen as to whom such copyright should rightly belong; but the following clause of the act has introduced confusion into the question of ownership: —

Provided that when any painting, or drawing, or the negative of, any photograph, shall for the first time after the passing of this act be sold or disposed of, or shall be made or executed for op on behalf of any other person for a good or valuable considera- tion, the person so selling or disposing of, or making or executing the same, shall not retain the copyright thereof unless it be expressly reserved to him by agreement in writing, signed at or before the time of such sale or disposition, by the vendee or assignee of such painting or drawing, or

such negative of a photograph, or by the person on whose behalf the same shall be so made or executed; but the copyright shall belong to the vendee or assignee of such painting or drawing, or such negative of a photograph, or to the person for or on whose behalf the same shall have been made or executed ; nor shall the vendee or assignee thereof be entitled to such copyright unless at or before the time of such sale or disposition an agreement in writing, signed by the person so selling or disposing of the same, or by his agent duly authorized, shall have been made to that effect.

That is to say, after promising the author copyright in his work for life and seven years, the act stipulates that in order to get it the author must, at the time of the first sale or disposition of his picture, obtain a document in writing from the purchaser of the picture, reserving the copyright to the author, and the act goes on to say that if he does not take this step the copyright becomes the property of the purchaser of the picture, but with the proviso, in order to secure it to him, he must have a document signed by the artist assigning the copyright to him; but if neither of these things is done, and no document is signed, the copyright does not belong to either the artist who sells or the client who buys, and the act is silent as to whom it does belong to. It has disappeared and belongs tojio one. There is no copyright existing in the work for any one. It has passed into the public domain, and any one who can get access to the work may reproduce it. Now, as most purchases are made from the walls of exhibitions, in ninety-nine cases out of a hundred the copyright is absolutely lost. And where the sale is arranged directly between the artist and his client, the difficulty experienced by the artist in raising the question as to whom the copyright shall belong to is so great, owing to the dread lest the mere mention of the signing of a document should cause the selling of the picture to fall through, that in numerous such cases the copyright lapses and becomes public property. Photographers are not affected by this clause, because they do not as a rule sell the negatives they produce, and with them the copyright lies in the negative. They carry on their trade in prints without the question of the negative arising. The picture-dealer, also, who buys a picture and copyright is not subjected to the same disability as the painter. The picture- dealer can sell a picture without saying a word to his client as to the copyright, which he, nevertheless, retains intact; the provision is applicable only to the first sale of the work, which, therefore, throws the whole of the disability upon the painter.

The act gives the copyright of every work executed on com- mission to the person by whom it is commissioned. It makes it compulsory upon every owner of a copyright that he should register it at Stationers' Hall

before he can take any action at law to protect it. The copyright does not lapse if unregistered, but so long as it remains unregistered no action at law can be

taken on account of any infringement. A copyright can be registered at any time, even after an infringement, but the owner of the copyright cannot recover for any infringement before registration. The act provides for both penalties and damages in the following cases:— (1) For infringing copyright in the ordinary way by issuing unlawful copies. (2) For fraudulently signing or affixing a fraudulent signature to a work of art. • (3) For fraudulently dealing with a work so signed. (4) For fraudu- lently putting forth a copy of a work of art, whether there be copyright in it or no, as the original work of the artist. (5) For altering, adding to, or taking away from a work during the lifetime of the author if it is signed, and putting it forth as the unaltered work of the author. (6) For importing pirated works. The incongruities of this act were so apparent that its promoters desired to stop it, feeling that it would be-‘ better to have no bill at all than one which conferred so little upon the people it, was intended to benefit; but Lord Westbury, the lord chancellor, who had charge of the bill in the House of Lords, advised them to let it go through with all its imperfections, that they might get the right of the painter to protection recognized. This advice was followed, and the bill had no sooner become law than a fresh effort was started to have it amended. Year by year the agitation went on, with the exception only of a period when Irish affairs took up all the attention of parliament, and domestic legislation was rendered impossible. But in 1898 the Copyright Association of Great Britain promoted a bill, which was introduced into the House of Lords by Lord Herschell. It was a measure designed to deal with all forms of copyright — literary, musical, dramatic and artistic — and was remitted by the House of Lords for consideration to a committee, which, having sat for three sessions, decided not to proceed with Lord Herschell’s measure, but to treat literature and art in separate bills. It had under its consideration an artistic bill, drafted for and presented by the Royal Academy, and a literary bill and an artistic bill drafted by the committee itself. The main proposals in the latter were to give copyright to the author of any artistic work or photograph for a period of life and thirty years, unless; the work be commissioned, in which case the copyright was to be the property of the employer, ■except in the case of sculpture intended to be placed in a street or public place. The bill provided summary remedies for dealing with pirated works. It

omitted altogether any reference to registration, and it provided for international copyright.

22. To sum up the position of artistic copyright in 1909, we find five British acts, three dealing with engraving, one with sculpture, and one with painting, drawing and photography, and between them very little relation. We have three terms of duration of copyright — 28 years for engraving, 14 for sculpture, with a second 14 if the artist be alive at the end of the first, life and 7 years for painting, drawing or photography. There are two different relations of the artist to his copyright. The sculptor's right to sell his work and retain his copyright has never been questioned so long as he signs and dates it. The painter's copyright is made to depend upon the signing of a document by the purchaser of his work. The engraver and the sculptor are. not required to register; but the author's name, and the date of putting forth or publishing, must appear on his work. The painter cannot protect his copyright without registration, but this registration as it is now required is merely a pitfall for the unwary. Designed to give the public information as to the ownership and duration of copyrights, the uncertainty of its operation results in the prevention of information on these very points.

The Berlin Convention of 1908 led to the appointment of a British committee to deal with its recommendations, and their report in 1909 foreshadowed important changes in the law both of literary and of artistic copyright, whenever Parliament should give its attention seriously to the subject.

Difficult and complicated as is the whole subject of artistic copyright, it is perhaps not to be wondered at that ignorance of the law on the subject is very widespread, even Practical amon g S t those who are most interested in its action. cutties. O ne 0I tne commonest beliefs amongst artists is, that all they have to do to secure copyright is to register a picture at Stationers' Hall; but the authorities at Stationers' Hall ask no questions, and simply enter any particulars submitted to them on their printed form. Some artists make a practice, when they send a picture away to exhibition, to fill up one of these forrhsj reserving the copyright by their entry to themselves, in

the belief that, if accompanied by the fee required by the Hall, its entry will reserve the copyright to them, oblivious of the fact that the only thing which can reserve the copyright to them is the possession of a document assigning the copyright to them by the purchaser of the picture. Another useless method of attempting to reserve artists' copyrights is that adopted by the promoters of public exhibitions, with

whom it is an almost constant practice to print on some portion of the catalbgue of the exhibition a statement that ” copyrights of all pictures are reserved,” the impression apparently prevailing that a notice of this kind effectively reserves the copyright for the artist while selling his picture from the walls. It, of course, does no such thing, and the copyright of any picture sold in these circum- stances, without the necessary document from the purchaser, must be lost to the artist, and pass irrevocably into the public domain.

In a work.of art the work itself and the copyright are two totally distinct properties, and may be held by different persons. The conditions differ materially from those of a work of literature, in which as a rule there is no value apart from publication. There is a value in a work of art for its private enjoyment quite apart from its commercial value in the form of reproductions; but when the two properties exist in different hands, the person holding the copyright has no power to force the owner of the work of art to give him .access to it for purposes of reproduction; this can only be effected by private arrangement. It has been argued that, as the two properties are so distinct, the owner of the copyright ought to have the right of access to the picture for the 1 purpose of exercising his right to reproduce it. But it is easy to see that it would destroy the value of art property if proprietors knew that at any moment they might be forced to surrender their work for the purpose of reproduction, though for a time only.

There is often a strong sympathy between the artist and the person who buys his picture, and it is not at all unusual, when application is made to the owner of the picture for access to it, for him to submit the question of reproduction to the artist. Although the latter may really have no right in it, it is felt, as a practical matter, that he is largely interested in the character of the reproduction it is proposed to make. Hence the courtesy which is usually extended to him.

Owing also to the increased facilities of reproduction, the practice has become very common of splitting up copyrights and granting licences in what may be described as very minute forms. It would, of course, be impossible for a publisher to pay an artist ‘ the sum at which he values his entire copyright, simply that he might reproduce his picture in the form of a black-and-white block in a magazine, and it has consequently become quite common for the artist to grant a licence for any and every particular form of reproduction as it may be required, so that he may grant the right of reproduction in one particular form in one particular publication, and even for a particular period of time, reserving to himself thus the right to grant similar

licences to other publishers. This is apparently not to the injury of the artist; it is probably to his advantageˆ and it certainly promotes business.

23. The great obstacle in the way of securing a really good Artistic Bill has been the introduction into it of photography. It was by a sort of accident that the photographer was given the same privileges as the painter in the bill of graphs. 1862. The promoters of the bill thought that the photographer would be protected by the Engraving Acts which covered prints; but since the photographers feared that, as their prints were of a different character from the prints from a plate, the Engraving Acts might not protect them, it was at the last moment decided to put photography into the Art Bill. The result of this was that the painter lost his chance of copyright on all works executed on commission. Legislators feared that if photographers held copyright in all their works the public would have no protection from the annoyance of seeing the photographs of their wives and daughters exhibited and sold in shop windows' by the side of "professional beauties " and other people, and

made articles of commerce. So in the case of commissioned works the copyright was denied to both painters and photographers.

The royal commission which reported on the subject in 1878 proposed two distinct terms of copyright for painting and photography. The term for the painter was dependent on his life; that for the photographer was a definitely fixed term of years from the date of publication of his photographs; and there can be little doubt that this is the right way to deal with the two branches of copyright. The artist who paints a picture signs it, and there is no difficulty in knowing who is the author of a painting and in whom the term of copyright is vested. In a very large number of cases a photograph is taken by an employee, who is here to-day and gone to-morrow, and even his employer knows nothing of his existence. Of course, it may suit an employer to be able to maintain secrecy as to the authorship of his negative, inasmuch as it enables him to go on claiming copyright fees indefinitely; but it is not to the public interest. In most countries on the continent of Europe a photographer has the fixed term of five years' copyright in an original photograph dating from its publication, which date, together with the name and address of the photographer, has to be stamped on every copy issued. In the public interest this is a

good method of dealing with photographs.

24. The ” authorship ” of a photograph has been much debated in the law courts; and “author” was defined in Nottage v. Jackson (1883) as ” the man who really represents or creates, or gives to ideas, or fancy, or imagination, true local habitation — the man in fact who is most nearly the effective cause of the representation ‘ ‘ {per Lord Justice Bowen) . He is not necessarily the owner of the camera, or the proprietor of the busi- ness; it depends on the circumstances. He is essentially the person who groups and effectively superintends the picture. When a photographer takes a portrait without fee, the copyright vests in him and not in the sitter, who cannot prevent its publication; but if the photograph is commissioned and paid for by the sitter the copyright — in the absence of contrary stipulations — vests in him, and he can restrain exhibition or multiplication of copies; ” the bargain includes, by implication, an agreement that the prints taken from the negative are to be appropriated to the use of the customer only” (Mr Justice North in Pollard v. Photo- graphic Co., 1888). And this applies even when the sitter is not the actual purchaser of the negative (Boucas v. Cooke, 1903). But in several cases the ” celebrity ” who has sat to a photo- grapher at his request and without payment has not been allowed to distribute his photograph to newspapers for reproduction with- out the photographer’s consent. The fact that a sitter pays the photographer for prints, though he has not commissioned the sitting, would not vest the copyright in him.

25. The ” Living Pictures ” case in 1894 {Hanfstangel v. Empire Palace) was a curious one. The Empire music-hall in London produced some tableaux vivants, representing certain pictures, of which Messrs Hanfstangel owned the copyright, and an action was brought by them for an injunction. The courts of chancery and of appeal decided against the plaintiffs, on the ground that a reproduction of a painting must be by a painting or something cognate; but in an action for infringement, though the view already given was confirmed, the plaintiffs succeeded so far as the backgrounds to the grouping were concerned. Meanwhile two newspapers had published sketches of the same tableaux vivants, and Messrs Hanfstangel brought actions for infringement {Hanfstangel v. Newnes, and v. Baines, 1 804) . Mr Justice Stirling found for the plaintiffs, but on appeal, and finally in the House of Lords, this decision was reversed.

26. Copyright in Designs. — An act of 1787 first gave protection to printed designs on linen and cotton fabrics; and in 1839

a further act included designs on animal fabrics, or mixed animal and vegetable fabrics ; while in the same year another act protected designs for manufactured articles. These acts had been preceded in France by laws of 1737 and 1 744 creating a property by law in manufacturers' designs. The British law, which in various acts established a copyright (a) in ornamental and {b) useful designs, was in 1 883 consolidated in the

Designs.

Patents, Designs and Trade Marks Act, with amending acts up to 1888; and these acts were further consolidated and amended by an act of 1905. See Trade-marks and Patents.

British Imperial Copyright Bill of 1910

The consolidation of the British copyright law, not only in the United Kingdom but in the Dominions, and its amendment so as to include the recommendations of the Berlin International Convention of 1908, were the objects of a government bill introduced into parliament by the president of the Board of Trade on the 26th of July 1910, discussion on which was reserved for a later period in the year. The passing of this bill, though the date of it was uncertain owing to the peculiar circumstances of English politics at the moment, was practically assured by the facts that, apart altogether from the crying need for a re- vision of the English law, the draft had previously been considered and accepted, not only by a Board of Trade Committee which reported unanimously in favour of the recommendations of the Berlin Convention, but also by an Imperial Conference. The bill for the first time brought British copyright entirely under statutory law and consolidated and amended all previous enactments; it adopted the suggestions of the Imperial Con- ference (attended by representatives of Canada, Australia, South Africa, New Zealand and Newfoundland, other interests being covered by home representatives of the Foreign Office, India Office, Colonial Office and Board of Trade) as to providing for its extension by their declaration to the Dominions; and with its enactment a great simplification of the British law of copy- right came in sight, though for historical reasons the details given above of the law as unamended must still remain of value.

Briefly, the new points of importance, apart from the placing of all copyright on a purely statutory basis and the inclusion of literary and artistic copyright within one arrangement, were as follows. All compulsory formalities of registration were abolished. The length of the period for which copyright lasted was extended to the life of the

author and 50 years after. This reform was qualified, however, by a clause intended to protect the public from its abuse, and providing that after the author's death, if the work was withheld from the public or published at too high a price, or if the reasonable requirements of the public were not satisfied, a licence might be granted to publish or perform it. These changes applied to all the subject-matters of copyright, which were now put on the same level and treated uniformly. In certain cases, already discussed above, protection was extended: e.g. translations and lectures, original adapta- tions and arrangements, works of artistic novelty, including architectural designs; and the right to dramatize a novel or " novelize " a drama was conferred in each case on the author. Musical works were protected against unauthorized reproduction by mechanical means without payment; but protection was also extended to the mechanical record when authorized.

In including all sorts of intellectual product the bill followed the recommendation (resolution 6) of the Imperial Conference as to the definition of copyright (Pari. Paper Cd. 5272): " the Conference is of opinion that, subject to proper qualifications, copyright should include the sole right to produce or reproduce a work, or any substantial part thereof, in any material form whatsoever and in any language, to perform, or in the case of a lecture, to deliver, the work or any substantial part thereof in public, and, if the work is unpublished, to publish the work, and should include the sole right to dramatize novels and vice versa, and to make records, &c, by means of which a work may be mechanically performed." As to architecture and artistic crafts the Conference recommended (resolution 9) that " an original work of art should not lose the protection of artistic copyright solely because it consists of, or is embodied in, a work of archi • tecture or craftsmanship; but it should be clearly understood that such protection is confined to its artistic form and does not extend to the processes or methods of reproduction, or to an industrial design capable of registration under the law relating to designs and destined to be multiplied by way of manufacture or trade."

As to the application of the new period of copyright to existing

works, the Conference recommended (resolution 10) " that existing works in which copyright actually subsists at the commencement of the new act (but no others) should enjoy, subject to existing rights, the

same protection as future works, but the benefit of any extension of terms should belong to the author of the work, subject, in the case where he has assigned his existing rights, to a power on the part of the assignee at his option either to purchase the full benefit of the copyright during the extended term, or, without acquiring the full copyright, to continue to publish the work on payment of royalties, the payment in either case to be fixed by arbitration if necessary."

The Conference was also of opinion (resolution 4a) that, under the new Imperial Act, copyright should subsist only in works of which the author was a British subject or bona fide resident in one of the parts of the British Empire to which it extended; and that copyright should cease if the work were first published elsewhere than in such parts of the Empire.

The sensible basis on which the new bill was framed, and the authority it represented, commended it, in spite of many controversial points, to the acceptance both of the public and of the various parties concerned. But nobody who had ever wrestled with all the difficulties of international copyright, as complicated by the law in the United States, would suppose that it was the last word on the subject. What the bill did was to bring British legislation into better shape, and to amend it on certain points which had worked unjustly. The great distinction between the requirements for British and for American copyright still re- mained, namely, the American manufacturing clause. Perhaps the most notable innovation was the clause enabling a licence to be granted for the publication of a copyright work where the owners of the copyright had not exercised it for the " reasonable requirements " of the public. Some such clause was clearly called for when the period of monopoly was being extended ; but the interpretation to be put upon the occasions which would justify such interference might well be difficult. It may perhaps be suggested that this innovation pointed to a reconsideration of the true relations of " publishers " and " authors " (in the widest sense) in respect of copyright, which sooner or later might be approached from a different point of view. The new clause was intended for the protection of the public from the mis- handling of an author's work after his death, while greater protection was given him during his life. From a purely business point of view, the question might well be whether a publisher or other party not the author should have a copyright at all, and whether equity would not be satisfied if copyright vested solely in the author and his family, with liberty to any one to " publish " on fair terms, consideration being had to an original publisher's reasonable claims and existing contracts. The advisability of any such advance on the principle now asserted must

depend rather on experience of actual business and the working of the clause; but even under the procedure provided by the bill of 1910 it would equally be imperative for a publisher who owned a deceased author's copyright to show that he had given or was giving the public valuable consideration for his monopoly, in order to uphold it against any one willing, on payment of a reasonable royalty, to serve the public better.

Authorities. — For special points see W. A. Copinger's The Law of Copyright in Works of Literature and Art, 4th ed., by J. M. Easton (1904); or T. E. Scrutton's Law of Copyright (3rd ed., 1896). See also E. J. MacGillivray, A Treatise on the Law of Copyright (1902) ; Richard Winslow, M.A..LL.B., The Law of Artistic Copyright(hondon, 1889); A. Birrell, Copyright in Books (London, 1899); B. A. Cohen, Law of Copyright (London, 1896) ; L. Edmunds, Copyright in Designs (London, 1908) ; Knoxand Hind, Copyright in Designs(London, 1899) ; W. Briggs, Law of International Copyright (1906); W. M. Colles and H. Hardy, Playright and Copyright in all Countries (1906).

COQUELIN, BENOIT CONSTANT (1841-1909), French actor, known as Coquelin aini, was born at Boulogne on the 23rd of January 1841. He was originally intended to follow his father's trade of baker (he was once called un boulanger manque by a hostile critic) , but his love of acting led him to the Conservatoire, where he entered Regnier's class in 1859. He won the first prize for comedy within a year, and made his debut on the 7th of December i860 at the Comedie Francaise as the comic valet,

vii. 5

Gros-Ren6, in Moliere : s Dipit amoureux, but his first great success was as Figaro, in the following year. He was made societaire in 1864, and during the next twenty-two years he created at the Francais the leading parts in forty-four new plays, including Theodore de Banville's Gringoire (1867), Paul Ferrier's Tabarin (1871), Emile Augier's Paul Foreslier (1871), V tltrangere (1876) by the younger Dumas, Charles Lomon's Jean Dacier (1877), Edward Pailleron's Le Monde ou Von s'ennuie (1881), Erckmann and Chatrian's Les Rantzau (1884). In consequence of a dispute with the authorities over the question of his right to make provincial tours in France he resigned in 1886. Three years later, however, the breach was healed; and after a successful series of tours in Europe and the United States he rejoined the Comedie Francaise as pensionnaire in 1890. It was during this period that he took the part of Labussiere, in the production of Sardou's' Thermidor, which was interdicted by the government after three

performances. In 1892 he broke definitely with the Comedifr Francaise, and toured for some time through the capitals of Europe with a company of his own. In 1895 he joined the Renaissance theatre in Paris, and played there until he became director of the Porte Saint Martin in 1897. Here he won successes in Edmond Rostand's Cyrano de Bergerac (1897), Emile Bergerats Plus que reine (1899),' Catulle Mendes' Scarron (1905), and Alfred Capus and Lucien Descaves' L' Attentat (1906). In 1900 he toured in America with Sarah Bernhardt, and on their return continued with his old colleague to appear in L'Aiglon, at the Theatre Sarah Bernhardt. He was rehearsing for the creation of the leading part in Rostand's Chantecler, which he was to produce, when he died suddenly in Paris, on the 27th of January 1909. Coquelin was an Officier de l'lnstruction Publique and of the Legion of Honour. He published L'Art et le comidien (1880), Moliere et le misanthrope (1881), essays on Eugene Manuel (1881) and Sully-Prudhomme (1882), L' Arnolphe de Moliere (1882), Les Comidiens (1882), L'Art de dire le monologue (with his brother, 1884), Tartuffe (1884), L'Art du comedien (1894).

His brother, Ernest Alexandre Honore Coquelin (1848- 1909), called Coquelin cadet, was born on the 16th of May 1848 at Boulogne, and entered the Conservatoire in 1864. He graduated with the first prize in comedy and made his debut in 1867 at the Odeon. The next year he appeared with his brother at the Theatre Francais and became a sociStaire in 1879. He played a great many parts, in both the classic and the modern repertoire, and also had much success in reciting monologues of his own composition. He wrote Le Livre des convalescents (1880), Le Monologue moderne (1881), Fairiboles (1882), Le Rire (1887), Pirouettes (1888). He died on the 8th of February 1 909.

Jean Coquelin (1865-), son of Coquelin aing, was also an actor, first at the Theatre Francais (debut, 1890), later at the Renaissance, and then at the Porte Saint Martin, where he created the part of Raigone in Cyrano de Bergerac.

COQUEREL, ATHANASE JOSUE (I 8 2 o-i87s), French Protestant divine, son of A. L. C. Coquerel (q.v.), was born at Amsterdam on the 16th of June 1820. He studied theology at Geneva and at Strassburg, and at an early age succeeded his uncle, C. A. Coquerel, as editor of Le Lien, a post which he held till 1870. In 1852 he took part in establishing the Nouvelle Revue de tkSologie, the first periodical of scientific theology published in France, and in the same year helped to found the " Historical Society of French Protestantism." Meanwhile he had gained a high reputation as a preacher, and especially as the

advocate of religious freedom; but his teaching became more and more offensive to the orthodox party, and on the appearance (1864) of his article on Renan's Vie de Jisus in the Nouvelle Revue de thiologie he was forbidden by the Paris con- sistory to continue his ministerial functions. He received an address of sympathy from the consistory of Anduze, and a provision was voted for him by the Union Protestante Liberale, to enable him to continue his preaching. He received the cross of the Legion of Honour in 1862. He died at Fismes (Marne), on the 24th of July 1875. His chief works were Jean Colas et sa famille (1858); Des Beaux- Arts en Italie (Eng. trans. 1859); La Saint Barthilemy (i860); Pricis de I'Sglise reformee (1862):

Le Catholicisme et le proteslantisme consideres dans leur origine et leur diveloppement (1864); Libres itudes, and La Conscience et lajoi (1867).

COQUEREL, ATHANASE LAURENT CHARLES (1795-1868), French Protestant divine, was born in Paris on the 17th of August 1795. He received his early education from his aunt, Helen Maria Williams, an Englishwoman, who at the dose of the 1 8th century gained a reputation by various translations and by her Letters from France. He completed his theological studies at the Protestant seminary of Montauban, and in 18 16 was ordained minister. In 1817 he was invited to become pastor of the chapel of St Paul at Jersey, but he declined, being unwilling to subscribe to the Thirty-nine Articles of the Church of England. During the following twelve years he resided in Holland, and preached before Calvinistic congregations at Amsterdam, Leiden and Utrecht. In 1830, at the suggestion of Baron Georges de Cuvier, then minister of Protestant worship, Coquerel was called to Paris as pastor of the Reformed Church. In the course of 1833 he was chosen a member of the consistory, and rapidly acquired the reputation of a great pulpit orator, but his liberal views brought him into antagonism with the rigid Calvinists. He took a warm interest in all matters of education, and dis- tinguished himself so much by his defence of the university of Paris against a sharp attack, that in 1835 he was chosen a member of the consistory of the Legion of Honour. In 1841 appeared his Reponse to the Leben Jesu of Strauss. After the revolution of February 1848, Coquerel was elected a member of the National Assembly, where he sat as a moderate republican,

subsequently becoming a member of the Legislative Assembly. He supported the first ministry of Louis Napoleon, and gave his vote in favour of the expedition to Rome and the restoration of the temporal power of the pope. After the coup d'etat of the 2nd of December 1851, he confined himself to the duties of his pastorate. He was a prolific writer, as well as a popular and eloquent speaker. He died at Paris on the 10th of January 1868. A large collection of his sermons was published in 8 vols, between i8i9and 1852. Other works were Biographie sacree (1825-1826); Histoire sainte et analyse de la Bible (1839); Orthodoxie moderne (1842); Christologie (1858), &c.

His brother, Charles Augustin Coquerel (1797-1851), was the author of a work on English literature (1828), an Essai sur I'ltistoire gSnirale du christianisme (1828) and a Histoire des iglises du disert, depuis la revocation de Fedit de Nantes (1841). A liberal in his views, he was the founder and editor of the Annates protestantes, Le Lien, and the Revue protestante.

COQUES (or Cocx), GONZALEZ (1614-1684), Flemish painter, son of Pieter Willemsen Cocx, a respectable Flemish citizen, and not, as his name might imply, a Spaniard, was born at Antwerp. At the age of twelve he entered the house of Pieter, the son of " Hell " Breughel, an obscure portrait painter, and at the expiration of his time as an apprentice became a journeyman in the workshop of David Ryckaert the second, under whom he made accurate studies of still life. At twenty-six he matri- culated in the gild of St Luke; he then married Ryckaert's daughter, and in 1653 joined the literary and dramatic club known as the " Retorijkerkamer." After having been made president of his gild in 1665, and in 167 1 painter in ordinary to Count Monterey, governor-general of the Low Countries, he married again in 1674, and died full of honours in his native place. One of his canvases in the gallery at the Hague represents a suite of rooms hung with pictures, in which the artist himself may be seen at a table with his wife and two children, surrounded by masterpieces composed and signed by several contemporaries. Partnership in painting was common amongst the small masters of the Antwerp school; and it has been truly said of Coques that he employed Jacob von Arthois for landscapes, Ghering and van Ehrenberg for architectural backgrounds, Steenwijck the younger for rooms, and Pieter Gysels for still life and flowers; but the model upon which Coques formed himself was Van Dyck, whose sparkling touch and refined manner he imitated with great success. He never ventured beyond the "cabinet," but in this limited field the family groups of his middle time are full of life,

brilliant from the sheen ef costly dress and sparkling play of light and

shade, combined with finished execution and enamelled surface.

COQUET (pronounced Cocket), a river of Northumberland, draining a beautiful valley about 40 m. in length. It rises in the Cheviot Hills. Following a course generally easterly, but greatly winding, it passes Harbottle, near which relics of the Stone Age are seen, and Holystone, where it is recorded that Bishop Paulinus baptized a great body of Northumbrians in the year 627. Several earthworks crown hills above this part of the valley, and at Cartington, Fosson and Whitton are relics of medieval border fortifications. The small town of Rothbury is beautifully situated beneath the ragged Simonside Hills. The river dashes through a narrow gully called the Thrum, and then passes Brink- burn priory, of which the fine Transitional Norman church was restored to use in 18*58, while there are fragments of the monastic buildings. This was an Augustinian foundation of the time of Henry I. The dale continues well wooded and very beautiful until Warkworth is reached, with its fine castle and remarkable hermitage. A short distance below this the Coquet has its mouth in Alnwick Bay (North Sea), with the small port of Amble on the south bank, and Coquet Island a mile out to sea. The river is frequented by sportsmen for salmon and trout fishing. No important tributary is received, and the drainage area does not exceed 240 sq. m.

COQUET (pronounced co-kette), to simulate the arts of love- making, generally from motives of personal vanity, to flirt; in a figurative sense, to. trifle or dilly-dally with anything. The word is derived from the French coqueter, which originally means, ” to strut about like a cock-bird,” i.e. when it desires to attract the hens. The French substantive coquet, in the sense of ” beau ” or “lady-killer,” was formerly commonly used in English; but the feminine form, coquette, now practically alone survives, in the sense of a woman who gratifies, her vanity by using her powers of attraction in a frivolous or inconstant fashion* Hence ” to coquet,” the original and more correct form, has com« fre- quently to be written ” to coquette.” Coquetry (Fr. coquetterie), primarily the art of the coquette, is used figuratively of any dilly-dallying or “coquetting” and, by transference of idea, of any superficial qualities of attraction in persons or things. ” Coquet ” is still also occasionally used adjectivally, but the more usual form is “coquettish”; e.g. we speak of a ” coquettish manner,-” or a • ” coquettish hat.” The crested humming-birds of the genus Lophornis are known as coquettes (Fr. coquets).

COQUIMBO, an important city and port of the province and department of Coquimbo, Chile, in 29 57′ 4″ S., 7i°2i’ 12″ W. Pop. (1895) 7322. The railway connexions are with Ovalle to the S., and

Vicuna (or Elqui) to the E., but the proposed exten* sion northward of Chile's longitudinal system would bring Coquimbo into direct communication with Santiago. The city has a good well-sheltered harbour, reputed the best in northern Chile, and is the port of La Serena, the provincial capital, 9 m. distant, with which it is connected by rail. There are large copper-smelting establishments in the city, which exports a very large amount of copper, some gold and silver, and cattle and hay to the more northern provinces.

The province of Coquimbo, which lies between those of Aconcagua and Atacama and extends from the Pacific inland to the Argentine frontier, has an area of 13,461 sq. m. (official estimate) and a population (1895) of 160,898. It is less arid than the province of Atacama, the surface near the coast being broken by well-watered river valleys, which produce alfalfa, and pasture cattle for export. Near the mountains grapes are grown, from which wine of a good quality is mad%. The mineral resources include extensive deposits of copper, and some less important mines of gold and silver. The climate is dry and healthy, and there are occasional rains. Several rivers, the largest of which is the Coquimbo (or Elqui) with a length of 125 m., cross the province from the mountains. The capital is La Serena, and the principal cities are Coquimbo, Ovalle (pop. 5565), and Illapel (3170).

CORACLE (Welsh corwg-l, from corwg, cf . Irish and mod. Gaelic curaeh, boat), a species of ancient British fishing-boat which is still extensively used on the Severn and other rivers of Wales, notably on the Towy and Teifi. It is a light boat, oval in shape, and formed of canvas stretched on a framework of split and interwoven rods, and well-coated with tar and pitch to render it water-tight. According to early writers the framework was covered with horse or bullock hide (corium). So light and portable are these boats that they can easily be carried on the fisherman's shoulders when proceeding to and from his work. Coracle-fishing is performed by two men, each seated in his coracle and with one hand holding the net while with the other he plies his paddle. When' a fish is caught, each hauls up his end of the net until the two coracles are brought to touch and the fish is then secured. The coracle forms a unique link between the modern life of Wales and its remote past; for this primitive type of boat was in existence amongst the Britons at the time of the invasion of Julius Caesar, who has left a description of it, and even employed it in his

Spanish campaign.

CORAfiS (Korais), ADAMANTIOS [in French, Diamant Coray] (1748-1833), Greek scholar and patriot, was born at Smyrna, the son of a merchant. As a schoolboy he distinguished himself in the study of ancient Greek, but from 1772 to 1779 he was occupied with the management of his father's business affairs in Amsterdam. In 1782, on the collapse of his father's business, he went to Montpellier, where for six years he studied medicine, supporting himself by translating German and English medical works into French. He then settled in Paris, where he lived until his death on the 10th of April 1833. Inspired by the ideals of the French Revolution, he devoted himself to furthering the cause of Greek independence both among the Greeks themselves and by awakening the interest of the chief European Powers against the Turkish rule. His great object was to rouse the enthusiasm of the Greeks for the idea that they were the true descendants of the ancient Hellenes by teaching them to regard as their own inheritance the great works of antiquity. He sought to purify the ordinary written language by eliminating the more obvious barbarisms, and by enriching it with classical words and others invented in strict accordance with classical tradition (see further Greek. Language: modern). Under his influence, though the common patois was practically untouched, the language of literature and intellectual inter- course was made to approximate to the pure Attic of the 5 th and 4th centuries B.C. His chief works are his editions of Greek authors contained in his -'EAXijwkˆ B[/3\to0ijKi7 and his Hapepya; his editions of the Characters of Theophrastus, of the De aere, aquis, et locis of Hippocrates, and of the Aethiopica of Heliodorus, elaborately annotated.

His literary remains have been edited by Mamoukas and Damalas (1881-1887) ; collections of letters written from Paris at the time of the French Revolution have been published (in English, by P. Ralli, 1898; in French, by the Marquis de Queux de Saint-Hilaire, 1880). His autobiography appeared at Paris (1829; Athens, i89i),and his life has been written by D. Thereianos (1889-1890); see also A. R. Rhangabe, Histoire lilteraire de la Gr'ece moderne (1877).

CORAL, the hard skeletons of various marine organisms. It is chiefly carbonate of lime, and is secreted from sea-water and deposited in the tissues of Anthozoan polyps, the principal source of the coral-reefs of the world (see Anthozoa) , of Hydroids (see Hydromedusae), less important in modern reef -building, but extremely abundant in Palaeozoic times, and of certain Algae. The skeletons of many other organisms, such as Polyzoa and Mollusca, contribute to coral masses

but cannot be included in the term ” coral.” The structure of coral animals (sometimes erroneously termed “coral insects”) is dealt within the articles cited above; for the distribution and formation of reefs see Coral-reefs.

Beyond their general utility and value as sources of lime, few of the corals present any special feature of industrial im- portance, excepting the red or precious coral {Cor allium rubrum) of the Mediterranean Sea. It, however, is and has been from remote times very highly prized for jewelry, personal orna- mentation and decorative purposes generally. About the

beginning of the Christian era a great trade was carried on in coral between the Mediterranean and India, where it was highly esteemed as a substance endowed with mysterious sacred properties. It is remarked by Pliny that, previous to the existence of the Indian demand, the Gauls were in the habit of using it for the ornamentation of their weapons of war and helmets; but in his day, 30 great was the Eastern demand, that it was rvery rarely seen even in the regions which produced it. Among the Romans branches of coral were hung around children’s necks to preserve them from danger, and the substance had many medicinal virtues attributed to it. A belief in its potency as a charm continued to be entertained throughout medieval times; and even to the present day in Italy it is worn as a preservative from the evil eye, and by females as a cure for sterility.

The precious coral is found widespread on the borders and around the islands of the Mediterranean Sea. It ranges in depth from shallow water (25 to 50 ft.) to water over 1000 ft., but the most abundant beds are in the shallower areas. The most important fisheries extend along the coasts of Tunisia, Algeria and Morocco; but red coral is also obtained in the vicinity of Naples, near Leghorn and Genoa, and on the coasts of Sardinia, Corsica, Catalonia and Provence. It occurs also in the Atlantic off the north-west of Africa, and recently it has been dredged in deep water off the west of Ireland. Allied species of small commercial value have been obtained off Mauritius and near Japan. The black coral {Antipathes abies), formerly abundant in the Persian Gulf, and for which India is the chief market, has a wide distribution and grows to a con- siderable height and thickness in the tropical waters of the Great Barrier Reef of Australia.

From the middle ages downwards the securing of the right to the coral fisheries on the African coasts was an object of considerable rivalry among the Mediterranean communities of Europe. Previous to the 16th century they were controlled by the Italian republics. For a short

period the Tunisian fisheries were secured by Charles V. to Spain; but the monopoly soon fell into the hands of the French, who held the right till the Revolutionary government in 1793 threw the trade open. For a short period (about 1806) the British government controlled the fisheries, and now they are again in the hands of the French authorities. Previous to the French Revolution much of the coral trade centred in Marseilles; but since that period, both the procuring of the raw material and the working of it up into the various forms in which it is used have become peculiarly Italian industries, centring largely in Naples, Rome and Genoa. On the Algerian coast, however, boats not flying the French flag have to pay heavy dues for the right to fish, and in the early years of the 20th century the once flourishing fisheries at La Calle were almost entirely neglected. Two classes of boats engage fn the pursuit — a large size of from 12 to 14 tons, manned by ten or twelve hands, and a small size of 3 or 4 tons, with a crew of five or six. The large boats, dredging from March to October, collect from 650 to 850 lb of coral, and the small, working throughout the year, collect from 390 to 500 lb. The Algerian reefs are divided into ten portions, of which only one is fished annually — ten years being considered sufficient for the proper growth of the coral.

The range of value of the various qualities of coral, according to colour and size, is exceedingly wide, and notwithstanding the steady Oriental demand its price is considerably affected by tb- fluctuations of fashion. While the price of the finest tints of ro; pink may range from £80 to £120 per oz., ordinary red-colourea small pieces sell for about £2 per oz., and the small fragments called collette, used for children's necklaces, cost about 5s. per oz. In China large spheres of good coloured coral command high prices, being in great requisition for the button of office worn by the mandarins. It also finds a ready market throughout India and in Central Asia; and with the negroes of Central Africa and of America it is a favourite ornamental substance.

CORALLIAN (Fr. Corallien), in geology, the name of one of the divisions of the Jurassic rocks. The rocks forming this division

are mainly calcareous grits with oolites, and rubbly coral rock — often called "Coral Rag"; ferruginous beds are fairly common, and occasionally there are beds of clay. In England the Corallian strata are usually divided into an upper series, characterized by the ammonite Perisphinctes plicatilis, and a lower series with Aspidoceras

perarmatus as the zonal fossil. When well developed these beds are seen to lie above the Oxford Clay and below the Kimeridge Clay; but it will save a good deal of confusion if it is recognized that the Corallian rocks of England are nothing more than a variable, local lithological phase of the two clays which come respectively a.bove and below them. This caution is particularly necessary when any attempt is being made to co-ordinate the English with the continental Corallian.

The Corallian rocks are nowhere better displayed than in the cliffs at Weymouth. Here Messrs Blake and Huddleston recog- nized the following beds: —

Upper Coral Rag and Abbotsbury Iron Ore. Sandsfoot Grits.

Upper CoraUian |ˆ? a 0t B ˆ-

Osmington Oolite (quarried at Marnhull and – Todbere). f Bencliff Grits. Lower Corallian-/ Nothe Clay. [Nothe Grit.

In Dorsetshire the Corallian rocks are 200 ft. thick, in Wiltshire 100 ft., but N.E. of Oxford they are represented mainly by clays, and the series is much thinner. (At Up ware, the ” Up ware limestone ” is the only known occurrence of beds that correspond in character with the Coralline oolite between Wiltshire and Yorkshire). In Yorkshire, however, the hard rocky beds come on again in full force. They appear once more at Brora in Sutherlandshire. Corallian strata have been proved by boring in Sussex (241 ft.). In Huntingdon, Bedfordshire, parts of Buckinghamshire, Cambridgeshire and Lincolnshire the Corallian series is represented by the “AmpthiH Clay,” which has also been called ” Bluntesham ” or ” Tetworth” Clay. Here and there in this district hard calcareous inconstant beds appear, such as the Elsworth rock, St Ives rock and Boxworth rock.

In Yorkshire the Corallian rocks differ in many respects from their southern equivalents. They are subdivided as follows: —

_ Upper Calcareous Grit “1

Kimeridge g « f Coral Rag and Upper Lime- Clay r2 .S- stone

Middle Calcareous Grit

Oxford Clay

o”§

-A. plicatilis.

Lower Limestone ˆ Passage Beds Lower Calcareous Grit

>A. perarmatus.

These rocks play an important part in the formation of the Vale of Pickering, and the Hambleton and Howardian Hills; they are well exposed in Gristhorpe Bay.

The passage beds, highly siliceous, flaggy limestones, are known locally as “Greystone” or “Wall stones”; some portions of these beds have resisted the weathering agencies and stand up prominently on the moors — such are the ” Bridestones.” Cement stone beds occur in the upper calcareous grit at North Grimstone; and in the middle and lower calcareous grits good building stones are found.

Among the fossils in the English Corallian rocks corals play an important part, frequently forming large calcareous masses or “doggers”; Thamnastrea, Thecosmilia and Isastrea are prominent genera. Ammonites and belemnites are abundant and gasteropods are very common (Nerinea,Chemnitzia, Bourgetia, &c.) . Trigonias are very numerous in certain beds (T. perlata and T. mariani). Astarte ovata, Lucina aliena and other pelecypods are also abundant. The echinoderms Echinobrissus scutatus and Cidaris florigemma are characteristic of these beds.

Rocks of the same age as the English Corallian are widely spread over Europe, but owing to the absence of clearly-marked itratigraphical and palaeontological boundaries, the nomen- clature has become greatly involved, and there is now a tendency amongst continental geologists to omit the term Corallian iltogether. According to A. de Lapparent’s classification the

English Corallian rocks are represented by the Siquanien stage, with two substages, an upper Astartien and lower Rauracien; but this does not include the whole Corallian stage as defined above, the lower part being placed by the French author in his Oxfordien stage. For the table showing the relative position of these stages see the article Jurassic.

See also ” The Jurassic Rocks of Great Britain,” vol. i. (1892) and vol. v. (1895) {Memoirs of the Geological Survey); Blake and Huddleston, ” On the Corallian Rocks of England, Q.J.G.S. vol. xxxiii. (1877)- Q. A. H.)

CORAL-REEFS. Many species of coral (q.v.) are widely distributed, and are found at all depths both in warmer and colder seas. Lophohelia prolifera and Dendrophyllia ramea form dense beds at a depth of from 100 to 200 fathoms off the coasts of Norway, Scotland and Portugal, and the " Challenger/' and other deep-sea dredging expeditions have brought up corals from great depths in the Pacific and Atlantic oceans. But the larger number of species, particularly the more massive kinds, occur only in tropical seas in shallow waters, whose mean temperature does not fall below 68° Fahr., and they do not flourish unless the temperature is considerably higher. These conditions of temperature are found in a belt of ocean which may roughly be indicated as lying between the 28th N. and S. parallels. Within these limits there are numerous reefs and islands formed of coral intermixed with the calcareous skeletons of other animals, and their formation has long been a matter of dispute among naturalists and geologists.

Coral formations may be classed as fringing or shore reefs, barrier reefs and atolls. Fringing reefs are platforms of coral rock extending no great distance from the shores of a continent or island. The seaward edge of the platform is usually somewhat higher than the inner part, and is often awash at low water. It is intersected by numerous creeks and channels, especially opposite those places where streams of fresh water flow down from the land, and there is usually a channel deep enough to be navigable by small boats between the edge of the reef and the land. The outer wall of the reef is rather steep, but descends into a comparatively shallow sea. Since corals are killed by fresh water or by deposition of mud or sand, it is obvious that the outer edge of the reef is the region of most active coral growth, and the boat channel and the passages leading into it from the open sea have been formed by the suppression of coral growth by one of the above-mentioned causes, assisted by the scour of the tides and the solvent action of sea-water. Barrier reefs may be regarded as fringing reefs on a large scale. The great Australian barrier reef extends for no less a distance than 1250 m. from Torres Strait in 9-5° S. lat. to Lady Elliot island in 24 S. lat. The outer edge of a barrier reef is much farther from the shore than that of a fringing reef, and the channel between it and the land is much deeper. Opposite Cape York the seaward edge of the great Australian barrier reef is nearly 90 m. distant from the coast, and the maximum depth of the channel at this point is nearly 20 fathoms. As is the case in a fringing reef, the outer edge of a barrier reef is in many places awash at low tides, and masses of dead coral and sand may be piled up on it by the action of the waves, so that islets are formed which in time are covered with

vegetation. These islets may coalesce and form a strip of dry land lying some hundred yards or less from the extreme outer edge of the reef, and separated by a wide channel from the mainland. Where the barrier reef is not far from the land there are always gaps in it opposite the mouths of rivers or considerable streams. The outer wall of a barrier reef is steep, and frequently, though not always, descends abruptly into great depths. In many cases in the Pacific Ocean a barrier reef surrounds one or more island peaks, and the strips of land on the edge of the reef may encircle the peaks with a nearly complete ring. An atoll is a ring-shaped reef, either awash at low tide or surmounted by several islets, or more rarely by a complete strip of dry land surrounding a central lagoon. The outer wall of an atoll generally descends with a very steep but irregular slope to a depth of 500 fathoms or more, but the lagoon is seldom more than 20 fathoms deep, and may be much less. Frequently, especially to the

leeward side of an atoll, there may be one or more navigable passages leading from the lagoon to the open sea.

Though corals flourish everywhere under suitable conditions in tropical seas, coral reefs and atolls are by no means universal in the torrid zone. The Atlantic Ocean is remarkably free from coral formations, though there are numerous reefs in the West Indian islands, off the south coast of Florida, and on the coast of Brazil. The Bermudas also are coral formations, their high land being formed by sand accumulated by the wind and cemented into rock, and are remarkable for being the farthest removed from the equator of any recent reefs, being situated in 32° N. lat. In the Pacific Ocean there is a vast area thickly dotted with coral formations, extending from 5 N. lat. to 2 5 S. lat., and from 130 E. long, to 145° W. long. There are also extensive reefs in the westernmost islands of the Hawaiian group in about 25 N. lat. In the Indian Ocean, the Laccadive and Maldive islands are large groups of atolls off the west and south-west of India. Still farther south is the Chagos group of atolls, and there are numerous reefs off the north coast of Madagascar, at Mauritius, Bourbon and the Seychelles. The Cocos-Keeling Islands, in 1 2° S. lat. and 96°E. long., are typical atolls in the eastern part of the Indian Ocean.

The remarkable charactersof barrier reefs and atolls, their isolat- ed position in the midst of the great oceans the seemingly unfath- omable

depths from which they rise their peaceful and shallow lagoons and inner channels, their narrow strips of land covered with coco-nut palms and other vegetation, and rising but a few feet above the level of the ocean, naturally attracted the attention of the earlier navigators, who formed sundry speculations as to their origin. The poet-naturalist, A. von Chamisso, was the first to propound a definite theory of the origin of atolls and encircling reefs, attributing their peculiar features to the natural growth of corals and the action of the waves. He pointed out that the larger and more massive species of corals flourish best on the outer sides of a reef, whilst the more interior corals are killed or stunted in growth by the accumulation of coral and other debris. Thus the outer edge of a submerged reef is the first to reach the surface, and a ring of land being formed by materials piled up by the waves, an atoll with a central lagoon is produced. Chamisso's theory necessarily assumed the existence of a great number of submerged banks reaching nearly, but not quite, to the surface of the sea in the Pacific and Indian oceans, and the difficulty of accounting for the existence of so many of these led C. Darwin to reject his views and bring forward an explanation which may be called the theory of subsidence. Starting from the well-known premise that reef-building species of corals do not flourish in a greater depth of water than 20 fathoms, Darwin argued that all

™ £.«L V. „.WA

Diagram showing the formation of an atoll during subsidence. (After C. Darwin.) The lower part of the figure represents a barrier reef surrounding a central peak.

A,A, outer edges of the barrier reef at the sea-level; the coco- nut trees indicate dry land formed on the edges of the reef.

L L, lagoon channel.

A',A', outer edges of the atoll formed by upgrowth of the coral during the subsidence of the peak.

L', lagoon of the atoll.

The vertical scale is considerably exaggerated as compared with the horizontal scale.

coral islands must have a rocky base, and that it was inconceivable that, in such large tracts of sea as occur in the Pacific and Indian oceans, there should be a vast number of submarine peaks or banks all rising to within 20 or 30 fathoms of the surface and none emerging

above it. But on the supposition that the atolls and

encircling reefs were formed round land which was- undergoing a slow movement of subsidence, their structure could easily be explained. Take the case of an island consisting of a single high peak. At first the coral growth would form a fringing reef clinging to its shores. As the island slowly subsided into the ocean the upward growth of coral would keep the outer rim of the reef level with or within a few fathoms of the surface, so that, as subsidence proceeded, the distance between the outer rim of the reef and the sinking land would continually increase, with the result that a barrier-reef would be formed separated by a wide channel from the central peak. As corals and other organisms with calcareous skeletons live in the channel, their remains, as well as the accumulation of coral and other debris thrown over the outer edge of the reef, would maintain the channel at a shallower depth than that of the ocean outside. Finally, if the subsidence continued, the central peak would disappear beneath the surface, and an atoll would be left consisting of a raised margin of reef surrounding a central lagoon, and any pause during the movement of subsidence would result in the formation of raised islets or a strip of dry land along the margin of the reef. Darwin's theory was published in 1842, and found almost universal acceptance, both because of its simplicity and its applicability to every known type of coral-reef formation, including such difficult cases as the Great Chagos Bank, a huge submerged atoll in the Indian Ocean.

Darwin's theory was adopted and strengthened by J. D. Dana, who had made extensive observations among the Pacific coral reefs between 1838 and 1842, but it was not long before it was attacked by other observers. In 1851 Louis Agassiz produced evidence to show that the reefs off the south coast of Florida were not formed during subsidence, and in 1863 Karl Semper showed that in the Pelew islands there is abundant evidence of recent upheaval in a region where both atolls and barrier-reefs exist. Latterly, many instances of recently upraised coral formations have been described by H. B. Guppy, J. S. Gardiner and others, and Alexander Agassiz and Sir J. Murray have brought forward a mass of evidence tending to shake the subsidence theory to its foundations. Murray has pointed out that the deep-sea sound- ings of the " Tuscarora " and " Challenger " have proved the existence of a large number of submarine elevations rising out of a depth of 2000 fathoms or more to within a few hundred fathoms of the surface. The existence of such banks was unknown to Darwin, and removes his objections to Chamisso's theory. For although they may at first be too far below the surface for reef- building corals, they afford a habitat for numerous echinoderms, molluscs, Crustacea and deep-sea

corals, whose skeletons accumulate on their summits, and they further receive a constant rain of the calcareous and silicious skeletons of minute organisms which teem in the waters above. By these agencies the banks are gradually raised to the lowest depth at which reef-building corals can flourish, and once these establish themselves they will grow more rapidly on the periphery of the bank, because they are more favourably situated as regards food-supply. Thus the reef will rise to the surface as an atoll, and the nearer it approaches the surface the more will the corals on the exterior faces be favoured, and the more will those in the centre of the reef decrease, for experiment has shown that the minute pelagic organisms on which corals feed are far less abundant in a lagoon than in the sea outside. Eventually, as the margin of the reef rises to the surface and material is accumulated upon it to form islets or continuous land, the coral growth in the lagoon will be feeble, and the solvent action of sea- water and the scour of the tide will tend to deepen the lagoon. Thus the considerable depth of some lagoons, amounting to 40 or 50 fathoms, may be accounted for. The observations of Guppy in the Solomon islands have gone far to confirm Murray's conclusions, since he found in the islands of Ugi, Santa Anna and Treasury and Stirling islands unmistakable evidences of a nucleus of volcanic rock, covered with soft earthy bedded deposits several hundred feet thick. These deposits are highly fossili- ferous in parts, and contain the remains of pteropods, lamelli-branchs and echinoderms, embedded in a foraminiferous deposit mixed with volcanic debris, like the deep-sea muds brought up by

the "Challenger." The flanks of these elevated beds are covered with coralline limestone rocks varying from 100 to 16 ft. in thickness. One of the islands, Santa Anna, has the form of an upraised atoll, with a mass of coral limestone 80 ft. in vertical thickness, resting on a friable and sparingly argillaceous rock resembling a deep-sea deposit. A. Agassiz, in a number of important researches on the Florida reefs, the Bahamas, the Bermudas, the Fiji islands and the Great Barrier Reef of Australia, has further shown that many of the peculiar features of these coral formations cannot be explained on the theory of subsidence, but are rather attributable to the natural growth of corals on banks formed by prevailing currents, or on extensive shore platforms or submarine flats formed by the erosion of pre-existing land surfaces.

In face of this accumulated evidence, it must be admitted that the

subsidence theory of Darwin is inapplicable to a large number of coral reefs and islands, but it is hardly possible to assert, as Murray does, that no atolls or barrier reefs have ever been developed after the manner indicated by Darwin. The most recent research on the structure of coral reefs has also been the most thorough and most convincing. It is obvious that, if Murray's theory were correct, a bore hole sunk deep into an atoll would pass through some 100 ft. of coral rock, then through a greater or less thickness of argillaceous rock, and finally would penetrate the volcanic rock on which the other materials were deposited. If Darwin's theory is correct, the boring would pass through a great thickness of coral rock, and finally, if it went deep enough, would pass into the original rock which subsided below the waters. An expedition sent out by the Royal Society of London started in 1896 for the island of Funafuti, a typical atoll of the Ellice group in the Pacific Ocean, with the purpose of making a deep boring to test this question. The first attempt was not successful, for at a depth of 105 ft. the refractory nature of the rock stopped further progress. But a second attempt, under the management of Professor Edgeworth David of Sydney, proved a complete success. With improved apparatus, the boring was carried down to a depth of 697 ft. (116 fathoms), and a third attempt carried it down to n 14 ft. (185 fathoms). The boring proves the existence of a mass of pure limestone of organic origin to the depth of n 14 ft., and there is no trace of any other rock. The organic remains found in the core brought up by the drill consist of corals, foraminifera, calcareous algae and other organisms. A boring was also made from the deck of a ship into the floor of the lagoon, which shows that Under 100 ft. of water there exists at the bottom of the lagoon a deposit more than 100 ft. thick, consisting of the remains of a calcareous alga, Halimeda opuntia, mixed with abundant foraminifera. At greater depths, down to 245 ft., the same materials, mixed with the re- mains of branching madrepores, were met with, and further progress was stopped by the existence of solid masses of coral, fragments of porites, madrepora and heliopora having been brought up in the core. These are shallow-water corals, and their existence at a depth of nearly 46 fathoms, buried beneath a ma,ss of Halimeda and foraminifera, is clear evidence of recent sub- sidence. Halimeda grows abundantly over the floor of the lagoon of Funafuti, and has been observed in many other lagoons. The writer collected a quantity of it in the lagoon of Diego Garcia in the Ghagos group. The boring demonstrates that the lagoon of Funafuti has been filled up to an extent of at least 245 ft. (nearly 41 fathoms), and this fact accords well with Darwin's theory, but is incompatible with that of Murray. In the present state of our knowledge it seems reasonable to conclude that coral reefs are formed

wherever the conditions suitable for growth exist, whether in areas of subsidence, elevation or rest. A con- siderable number of reefs, at all events, have not been formed in areas of subsidence, and of these the Florida reefs, the Bermudas, the Solomon islands, and possibly the Great Barrier Reef of Australia are examples. Funafuti would appear to have been formed in an area of subsidence, and it is quite probable that the large groups of low-lying islands in the Pacific and Indian oceans have been formed under the same conditions. At the same time, it must be remembered that the atoll or barrier

reef shape is not necessarily evidence of formation during sub- sidence, for the observations of Karl Semper, A. Agassiz, and Guppy are sufficient to prove that these forms of reefs may be produced by the natural growth of coral, modified by the action of waves and currents in regions in which subsidence has certainly not taken place.

See A. Agassiz, many publications in the Mem. Amer. Acad- (1883) and Bull. Mus. Comp. Zool. (Harvard, 1889-1899); J. D. Dana, Corals and Coral Islands (1853; 2nd ed., 1872; 3rd ed., 1890); C. Darwin, The Structure and Distribution of Coral Reefs (3rd ed., 1889); H. B. Guppy, “The Recent Calcareous Formations of the Solomon Group,” Trans. Roy. Soc. Edinb. xxxii. (1885); R. Langenbeck, ” Die neueren Forschungen iiber die Korallenriffe, ” Hettner geogr. Zeitsch. iii. (1897) ; J. Murray, ” On the Structure and Origin of Coral Reefs and Islands,” Proc. Roy. Soc. Edinb. x. (1879-1880); J. Murray and Irvine, ”’ On Coral Reefs and other Carbonate of Lime Formations in Modern Seas,” Proc. Roy. Soc. Edinb. (1889) ; W. Savile Kent, The Great Barrier Reef of Australia (London, W. H. Allen & Co., 1893); Karl Semper, Animal Life, ” Internat. Sci. Series,” vol. xxxi. (1881); J. S. Gardiner, Nature, lxix. 371. (G. C. B.)

CORAM, THOMAS (1668-1751), English philanthropist, was born at Lyme Regis, Dorset. He began life as a seaman, and rose to the position of merchant captain. He settled at Taunton, Massachusetts, for several years engaging there in farming and boat-building, and in 1703 returned to England. His acquaintance with the destitute East End of London, and the miserable condition of the children there, inspired him with the idea of providing a refuge for such of them as had no legal protector; and after seventeen years of unwearied exertion, he obtained in 1739 a royal charter authorizing the establishment of his hospital for foundling infants (see Foundling Hospitals) . It was opened in Hatton Garden, on the 17th of October 1740, with twenty inmates. For fifteen years it was supported by voluntary contributions; but in 1756 it was endowed with a parliamentary grant of £1 0,000 for the support of all that might be

sent to it. Children were brought, however, in such numbers, and so few (not one-third, it is said) survived infancy, that the grant was stopped, and the charity, which had been removed to Guilford Street, was from that time only administered under careful restrictions. Coram's later years were spent in watching over the interests of the hospital; he was also one of the pro- moters of the settlement of Georgia and Nova Scotia; and his name is honourably connected with various other charities. In carrying out his philanthropic schemes he spent nearly all his private means; and an annuity of £170 was raised for him by public subscription. He died on the 29th of March 1751.

COR ANGLAIS, or English Horn (Ger. englisches Horn or alt Hoboe; Ital. corno inglese), a wood- wind double-reed instru- ment of the oboe family, of which it is the tenor. It is not a horn, but bears the same relation to the oboe as the basset horn does to the clarinet. The cor anglais differs slightly in construction from the oboe; the conical bore of the wooden tube is wider and slightly longer, and there is a larger globular bell and a bent metal crook to which the double reed mouthpiece is attached. The fingering and method of producing the sound are so similar in both instruments that the player of the one can in a short time master the other, but as the cor anglais is pitched a fifth lower, the music must be transposed for it into a key a fifth higher than the real sounds produced. The compass of the cor anglais extends over two octaves and a fifth:

Notation

JEL.

h*

i?

Real sounds <

5

The true quality of the cor anglais is penetrating like that of the oboe, but mellower and more melancholy.

The cor anglais is the alto Pommer (q.v.) or haute-contre de hautbois (see Oboe), gradually developed, improved and provided with key-work. It is not known exactly when the change took place, but it was probably during the 17th century, after the Schalmey or Shawm had been transformed into the oboe. In a 17th century MS. (Add. 30,342, f. 145) in the British Museum, written in French, giving pen and ink

sketches of many instru- ments, is an ” accord de hautbois ” which comprises a pMalle

(bass oboe or Pommer), a sacquebute (sackbut) as basse-contre, a taille (tenor) with a note that the haute-contre (the cor anglais) est de tnestne sinon plus petite. The tubes of all the members of the hautbois family are straight in this drawing. Before 1688 the French hoboy, made in four parts and having two keys, was known in England. 1 It is probable that in France, where the hautbois played such an important part in court music, the cor anglais, under the name of haute-contre de hautbois, was also provided with keys. At the end of the 17th century there were two players of the haute-contre de hautbois among the musicians of the Grande Ecurie du Roi. 2

The origin of the name of the instrument is also a matter of conjecture. Two theories exist — one that cor anglais is a corruption of cor angle, a name given on account of the angular bend of the early specimens.

In that case the name,

but not necessarily the

instrument, probably

originated in France

early in the 1 8th century,

for Gluck scored for two

cors anglais in his Italian

version of Alceste played

in Vienna in 1767. When

a French version of this

opera was given in Paris

two years later, the cor

anglais, not being known
or available there, was
replaced by oboes. It
was not until 1808 that
the cor anglais was
heard at the Paris Opera,
when it was played by
the oboist Vogt in Catel's
Alexandre chez Apelle.
This, however, proves
only that the name was
not familiar in France,
where the oboe of the
same pitch was called
haute-contre de hautbois.
The bending of the tube
and the development of
the cor anglais as solo
instrument originated in
Germany, unless the
oboe da caccia was identi- cal with the cor anglais,
in which case Italy
would be the country of
origin. Thomas

Stanesby, junior, made

an oboe da caccia in

1740 of straight pattern

in four pieces, having a

bent metal crook for the

insertion of the reed and

two saddle keys> but

the bell was like the bell

of the oboe, not globular

like that of the cor

anglais, a form to which

the veiled quality of its

timbre is due. It is in- teresting in this con- nexion to recall some

experiments in bending

the cor anglais, which

do not appear to have led to any practical result. A French broadside (c. 1650), ” La Musique,” preserved in the British Museum, contains drawings of many musical instruments in use in the 17th century; among them are an oboe with keys in a perforated case, and two other wood 1 wind instruments of the same family, which may be taken to represent attempts to dispose of the inconvenient length of the haute-contre (1) by bending the tube at right angles for about one quarter of its length from the mouthpiece, which contains a large

1 See Harleian MS. 2034, f. 207b, British Museum, in the third part of Randle Holme’s Academy of Armoury, written before 1688, where an outline sketch in ink is also given.

2 See J. Ecorcheville, ” Quelques documents sur la musique de la Grande ficurie du Roi,” Sammelband intern. Musikges. ii. 4, pp. 609 and 625. Deeds exist creating charges for four hautbois and musettes de Poitou in the hand of King John, middle of 14th century, see p.

Fig. 1. — Modern

Cor anglais. (Besson&Co.)

From Richard' Hofmann's Katechismus der Musik- instmtnenle.

Fig. 2. — Cor angle\ 1 8th century.

double reed, (2) by bending the tube in the elongated " S " shape of the corno torto or bass Zinke, for which the drawing in question might be mistaken but for the bent crook inserted in the end for the reception of the reed, which, however, is missing. The other hypothesis is that when the cor anglais was given a bend in order to facilitate the handling, the name was adopted to mark its resemblance to a kind of hunting-horn said to be in use in England at the time. This suggestion does not seem to be a happy one ; for if the reference be to the crescent-shaped horn, that instrument was in use in all countries at various periods before the 17th century, while if it be to the angular form, then a reproduction of such a horn should be forthcoming to support the statement.

The idea of bending the instrument is attributed to Giovanni or Giuseppe Ferlendis of Bergamo, 3 brothers and virtuosi on the oboe. One of these had settled in Salzburg, and both were equally renowned as performers on the English horn. They visited Venice, Brescia, Trieste, Vienna, London (in 1795) and Lisbon, where Giuseppe died. In this case we might expect the name to have been given in Italian, corno inglese; yet Gluck in his Italian edition used the French name already in 1767, when Giuseppe was but twelve years old. We must await some more conclusive explanation, but we may suppose that the new name was bestowed when the instrument assumed a form entirely new to the family of hautbois or oboes. The cor anglais was well known in England before 1774, for in a quaint book of travels through England, published in that year, we read that Signor Sougelder, 4 " an eminent surgeon of Bristol," was a performer " on the English horn."

The experiment of bending the cor anglais did not prove satis- factory, for the tube instead of being bored had to be cut out of two pieces of wood which were then glued together and covered with leather. Even the most skilful craftsman did not succeed in making the inside of the tube quite smooth ; the roughness of the wood was detrimental to the tone and gave the cor anglais a veiled, somewhat hoarse quality, and

makers before long reverted to the direct or vertical form. (K. S.).

CORATO, a city of Apulia, Italy, in the province of Bari, 26 m. W. of Bari by steam tramway. Pop. (1901) 4 J >S73- It is situated in the centre of an agricultural district. It contains no buildings of great interest, but is a clean and well-kept town.

CORBAN (W.ii), an Aramaic word meaning ” a conse- crated gift.” Josephus uses the word of Nazirites and of the temple treasure of Jerusalem. Such a votive offering lay under a curse if it were diverted to ordinary purposes, like the spoil of Jericho which Achan appropriated (Josh, vii.), or the temple treasure of Delphi which was seized by the Phocians, 356 B.C. The word is found in Mark vii. n, the usual interpretation of which is that Jesus refers to an abuse — a man might declare that any part of his property which came into his parents' hands was corban, consecrated, i.e. that a curse rested on any benefit they might get from it. The Jewish scribes thus fenced the law of vows with a traditional interpretation which made men break the most binding injunctions of the Mosaic Law, in this case the fifth commandment. A totally different explanation of the passage is put forward by J. H. A. Hart in The Jewish Quarterly Review for July 1907, the gist of which is that Jesus commends the Pharisees for insisting that when a man has vowed a vow to God he should pay it even though his parents should suffer.

CORBEIL, WILLIAM OF (d. 1136), archbishop of Canterbury, was born probably at Corbeil on the Seine, and was educated at Laon. He was soon in the service of Ranulf Flambard, bishop of Durham; then, having entered the order of St Augustine, he became prior of the Augustinian foundation at St Osyth in Essex. At the beginning of 11 23 he was chosen from among several candidates to be archbishop of Canterbury, and as he refused to admit that Thurstan, archbishop of York, was independent of the see of Canterbury, this prelate refused to consecrate him, and the ceremony was performed by his own suffragan bishops. Proceeding to Rome the new archbishop found that Thurstan had anticipated his arrival in that city and had made out a strong case against him to Pope Calixtus II.; however, the exertions of the English king Henry I. and of the emperor Henry V. prevailed, and the pope gave William the pallium. The archbishop's next dispute was with the papal

3 See Henri Lavoix, Histoire de V instrumentation, p. 1 1 1 ; Gerber, Lexikon, ” Giuseppe Ferlendis “; Robert Eitner, Quellen-Lexikon der Tonkunstler, ” Gioseffo Ferlendis.” Fetis and Pohl also* refer to him.

4 See Musical Travels thro' England (London, 1 774), p. 56.

legate, Cardinal John of Crema, who had arrived in England and was acting in an autocratic manner. Again travelling to Rome, William gained another victory, and was himself appointed papal legate (legatus natus) in England and Scotland, a precedent of considerable importance in the history of the English Church. The archbishop had sworn to Henry I. that he would support the claim of his daughter Matilda to the English crown, but nevertheless he crowned Stephen in December 1135. He died at Canterbury on the 21st of November 1136. William built the keep of Rochester Castle, and finished the building of the cathedral at Canterbury, which was dedicated with great pomp in May 1130.

See W. F. Hook, Lives of the A rchbishops of Canterbury (1 860-1 884) ; and W. R. W. Stephens, History of the English Church (1901).

CORBEIL, a town of northern France, capital of an arrondisse- ment in the department of Seine-et-Oise, at the confluence of the Essonne with the Seine, 21 m. S. by E. of Paris on the Orleans railway to Nevers. Pop. (1906) 9756. A bridge across the Seine unites the main part of the town on the left bank with a suburb on the other side; handsome boulevards lead to the village of Essonnes (pop. 7255), about a mile to the south-west. St Spire, the only survivor of the formerly numerous churches of Corbeil, dates from the 12th to the 15th centuries. Behind the church there is a Gothic gateway. A monument has been erected to the brothers Galignani, publishers of Paris, who gave a hospital and orphanage to the town. Corbeil is the seat of a sub-prefect, and has tribunals of first instance and commerce and a chamber of commerce. It has important flour-mills, tallow-works, printing-works, large paper-works at Essonnes, and carries on boat and carriage-building, and the manufacture of plaster. The Decauville engineering works are in the vicinity. There is trade in grain and flour.

From the 10th to the 12th century Corbeil was the chief town of a powerful countship, but it was united to the crown by Louis VI.; it continued for a long time to be an important military post in connexion with the commissariat of Paris. In 1258 St Louis concluded a treaty here with James I. of Aragon. Of the numerous sieges to which it has been exposed the most important were those by the Huguenots in 1 562, and by Alexander Farnese, prince of Parma, in 1

CORBEL (Lat. corbellus, a diminutive of corvus, a raven, on account of the beak-like appearance; Ital. mensola, Fr. corbeau, cul-de-lampe, Ger. Kragstein) , the name in medieval architecture for a piece of stone jutting out of a wall to carry any super- incumbent weight. A piece of timber projecting in the same way was called a tassel or a bragger. Thus the carved ornaments from which the vaulting shafts spring at Lincoln are corbels. Norman corbels are generally plain. In the Early English period they are sometimes elaborately carved, as at Lincoln above cited, and sometimes more simply so, as at Stone. They some- times end with a point apparently growing into the wall, or forming a knot, as at Winchester, and often are supported by angels and other figures. In the later periods the foliage or ornaments resemble those in the capitals. The corbels carrying the arches of the corbel tables in Italy and France were often elaborately moulded, and sometimes in two or three courses projecting over one another; those carrying the machicolations oi English and French castles had four courses. The corbels carrying balconies in Italy and France were sometimes of great size and richly carved, and some of the finest examples of the Italian CinquecentO style are found in them. Throughout England, in half-timber work, wood corbels abound, carrying window-sills or oriels in wood, which also are often carved. A ” corbel table ” is a projecting moulded string course supported by a range of corbels. Sometimes these corbels carry a small arcade under the string course, the arches of which are pointed and trefoiled. As a rule the corbel table carries the gutter, but in Lombard work the arcaded corbel table was utilized as a decoration to subdivide the storeys and break up the wall surface. In Italy sometimes over the ccr.bels will be a moulding, and above a plain piece of projecting wall forming a parapet (see also Masonry).

CORBET, RICHARD (1582-1635), English bishop and poet, was born in 1582, the son of a nurseryman at Ewell, Surrey. At Oxford, to which he proceeded from Westminster school in 1597, he was noted as a wit. On taking orders he continued to display this talent from the pulpit, and James I., in consideration of his ” fine fancy and preaching,” made him one of the royal chaplains. In 1620 he became vicar of Stewkley, Berkshire, and in the same year was made dean of Christchurch, Oxford. In 1628 he was made bishop of Oxford, and in 1632 translated thence to the see of Norwich. Corbet was the author of many poems, for the most part of a lively, satirical order, his most serious production being the Fairies’ Farewell. His verses were first collected and published in 1647. His conviviality was famous, and many stories are told of his youthful merry- making in London taverns

in company with Ben Jonson, who always remained his close friend, and other dramatists. He died at Norwich on the 28th of July 1635.

CORBIE (Lat. corvus), a crow or raven. In architecture, ” corbie steps ” is a Scottish term (cf. Corbel) for the steps formed up the sides of the gable by breaking the coping into short horizontal beds.

CORBRIDGE.. a small market town in the Hexham parlia- mentary division of Northumberland, England; 35 m. E. of Hexham, on the north bank of the river Tyne, which is here crossed by a fine seven-arched bridge dating from 1674. Pop. (1901) 1647. Corbridge was formerly of greater importance than at present. Its name, derived from the small river Cor, a tributary of the Tyne, is said to be associated with the Brigantian tribe of Corionototai. About 760 it became the capital of Northum- bria; later it was a borough and was long represented in parlia- ment. . In 1138 David of Scotland made it a centre of military operations, and it was ravaged by Wallace in 1296, by Bruce in 13 1 2, and by David II. in 1346. Its chief remains of antiquity are a square peel-tower and the cruciform church of St Andrew, of which part of the fabric is of pre-Conquest date, though the building is mainly Early English. Extensive use is made of building materials from the Roman station of Corstopitum (also called Corchester), which lay half a mile west of Corbridge at the junction of the Cor with the Tyne. This site has from time to time yielded many valuable relics, notably a silver dish, discovered in 1734, 148 oz. in weight and ornamented with figures of deities; but the first-rate importance of the station was only revealed by careful excavations undertaken in 1907 seq. There were then unearthed remains of several buildings fronting a broad thoroughfare, one of which is the largest Roman building, except the baths at Bath, yet discovered in England. Two of these buildings were granaries, and indicate the importance of Corstopitum as a base of the northward operations of Antoninus Pius. After his conquests had been lost, and Corstopitum ceased to be a military centre, its military buildings passed into civilian occupation, of which many evidences have been found. A fine hoard of gold coins, wrapped in lead-foil and hidden in a wall, was discovered in 1908. Corstopitum ceased to exist early in the 5th century, and the site was never again occupied.

CORBULO, GNAEUS DOMITIUS (1st century a.d.), Roman general, was the half-brother of Caesonia, one of the wives of the emperor Caligula. In the reign of Tiberius he held the office of praetor, and was appointed to the superintendence of the roads and bridges. Under Claudius he was governor of lower Germany (a.d. 47). He punished the Frisii who refused to pay the tribute, and was on the point of

advancing against the Chauci, but was recalled by the emperor and ordered to withdraw behind the Rhine. In order to provide employment for his soldiers, Corbulo made them cut a canal from the Mosa (Meuse) to the northern branch of the Rhine, which still forms one of the chief drains between Leiden and Sluys, and before the introduction of railways was the ordinary traffic road between Leiden and Rotterdam. Soon after the accession of Nero, Vologaeses (Vologasus), king of Parthia, overran Armenia, drove out Rhadamistus, who was under the protection of the Romans, and set his own brother Tiridates on the throne. Corbulo was thereupon sent out to the East with full military powers. After some delay, he took

the offensive in 58, and, reinforced by troops from Germany, attacked Tiridates. Artaxata and Tigranocerta were captured, and Tigranes, who had been brought up in Rome and was the obedient servant of the government, was installed king of Armenia. In 61 Tigranes invaded Adiabene, an integral portion of the Parthian kingdom, and a conflict between Rome and Parthia seemed unavoidable. Vologaeses, how- ever, thought it better to come to terms. It was agreed that both the Roman and Parthian troops should evacuate Armenia, that Tigranes should be dethroned, and the position of Tiridates recognized. The Roman government declined to accede to these arrangements, and L. Caesennius Paetus, governor of Cappadocia, was ordered to settle the question by bringing Armenia under direct Roman administration. The protection of Syria in the meantime claimed all Corbulo's attention. Paetus, a weak and incapable man, suffered a severe defeat at Rhande.a (62), where he was surrounded and forced to capitulate and to evacuate Armenia. The command of the troops was again entrusted to Corbulo. In 63, with a strong army, he crossed the Euphrates, but Tiridates declined to give battle and concluded peace. At Rhandea he laid down his diadem at the foot of the emperor's statue, promising not to resume it until he received it from the hand of Nero himself in Rome. In 67 disturbances broke out in Judaea, but Nero, jealous of Corbulo's success and popularity, ordered Vespasian to take command of the forces and summoned Corbulo to Greece. On his arrival at Cenchreae, the port of Corinth, messengers from Nero met Corbulo, and ordered him to commit suicide. Without hesitation he obeyed, ex- claiming, " I have deserved it." Whether he had really given any grounds for suspicion is unknown; but there is no doubt, so great was his popularity with the soldiers and such the hatred felt for Nero, that he could easily have

seized the throne. Corbulo wrote an account of his Asiatic experiences, which is lost.

See Tacitus, Annals, xii.-xv. ; Dio Cassius lix. 15, lx. 30, Ixii. 19-23, lxiii. 6, 17, lxvi. 3; H. Schiller, Ceschichte des romischen Kaiserreichs unter der Regierung des Nero (1872) ; E. Egli, ” Feldzuge in Armenien von 41-63,” in M. Biidinger’s Untersuchungen zur romischen Kaisergeschichte, i. (1868); Mommsen, Hist, of the Roman Provinces, ii. (1886); for the Armenian campaigns see B. W. Henderson in Classical Review (April, May, June, 1901); in general D. T. Schoonover, A Study of Cn. Domitius Corbulo (Chicago, 1909).

CORD (derived through the Fr. corde, from the Lat. chorda, Gr. xopˆV, the string of a musical instrument) , a length of twisted or woven strands, in thickness coming between a rope and a string, a smaller kind of rope (q.v.). From the use of such a cord for measuring, the word is applied to a quantity of cut wood, differing according to locality. The variant ” chord,” which, in spelling, reverts to the original Latin, is used in particular senses, as, in physiology, for such cord-like structures as the vocal chords; in the case of the ” umbilical cord,” the other spelling is usually retained. In mathematics a ” chord ” is a straight line joining any two points’ on the same curve, and, in music, the word is used of several musical notes sounded simultaneously and in harmony (q.v.). In this last sense, ” chord ” is properly a shortened form of ” accord,” agreement, from Late Lat. accordare, and the spelling with h is due to a confusion.

CORDAY D’ARMONT, MARIE ANNE CHARLOTTE (1768- !793)i French revolutionary heroine, the murderess of Marat, born at St Saturnin des Lignerets, near Seez in Normandy, was descended from a noble but poor family, and numbered among her ancestors the dramatist Corneille. Charlotte Corday was educated in the convent of the Holy Trinity at Caen, and then sent to live with an aunt. Here she saw hardly any one but her relative, and passed her lonely hours in reading the works of the philosophes, especially Voltaire and the Abbe Raynal. Another of her favourite authors was Plutarch, from whose pages she doubtless imbibed the idea of classic heroism and civic virtue which prompted the act that has made her name famous. On the outbreak of the Revolution she began to study current politics, chiefly in the papers issued by the party afterwards known as the Girondins. On the downfall of this party, on May 31, 1793, many of the leaders took refuge in Nor-

mandy, and proposed to make Caen the headquarters of an army of volunteers, at the head of whom Felix de Wimpffen, wQo com-

manded the army assembled for the defence of the coasts at Cherbourg, was to have marched upon Paris. Charlotte attended their meetings, and heard them speak; but we have no reason to believe that she saw any of them privately, till the day when she went to ask for introductions to friends of theirs in Paris. She saw that their efforts in Normandy were doomed to fail. She had heard of Marat as a tyrant and the chief agent in their over- throw, and she had conceived the idea of going alone to Paris and assassinating him, — doubtless thinking that this would break up the party of the Terrorists and be the signal of a counter-revolution, and ignorant of the fact that Marat was ill almost to the point of death, and that others were more in- fluential than he.

Apparently she had thought of going to Paris in April, before the fall of the Girondins, for she had then procured a passport which she used in July. It contained the usual description of the bearer, and ran thus: Laissez passer la citoyenne Marie, &c, Corday, dgSe de 24 ans, taille de 5 pieds 1 pouce, cheveux et sourcils chdtains, yeux gris, front tteve', nez long, louche moyenne, menton rond fourchu, visage ovale. Arrived in Paris she first attended to some business for a friend at Caen, and then she wrote to Marat: " Citizen, I have just arrived from Caen. Your love for your native place doubtless makes you desirous of learning the events which have occurred in that part of the republic. I shall call at your residence in about an hour; have the goodness to receive me and to give me a brief interview. I will put you in a condition to render great service to France." On calling she was refused admittance, and wrote again, promising to reveal important secrets, and appealing to Marat's sympathy on the ground that she herself was persecuted by the enemies of the republic. She was again refused an audience, and it was only when she called a third time (July 13) that Marat, hearing her voice in the ante- chamber, consented to see her. He lay in a bathing tub, wrapped in towels, for he was suffering from a horrible disease which had almost reduced him to a state of putrefaction. Our only source of information as to what followed is Charlotte's own confession. She spoke to Marat of what was passing at Caen, and his only comment on her narrative was that all the men she had mentioned should be guillotined in a few days. As he spoke she drew from her bosom a dinner-knife (which she had bought the day before for two francs) and plunged it into his left side. It pierced the lung and the aorta. He cried out, "A moi, ma ch'ere amiel" and expired. Two women rushed in, and prevented Charlotte from escaping. A crowd collected round the house, and it was with difficulty that she was escorted to the prison of the Abbaye. On being brought before the Revolutionary Tribunal she gloried in her act, and

when the indictment against her was read, and the president asked her what she had to say in reply, her answer was, ” Nothing, except that I have succeeded.” Her advocate, Claude Frangois Chauveau Lagarde, put forward in vain the plea of insanity. She was sentenced to death, and calmly thanked her counsel for his efforts on her behalf, adding that the only defence worthy of her was an avowal of the act. She was then conducted to the Conciergerie, where at her own desire her portrait (now in the museum of Versailles) was painted by the artist Jean Jacques Hauer. She preserved her perfect calmness to the last. When she saw the guillotine, she placed herself in position under the fatal blade without assistance from any one. The knife fell, and one of the executioners held up her head by the hair, and had the brutality to strike it with his fist. Many believed they saw the dead face blush, — probably an effect of the red stormy sunset. It was the 17th of July 1793. It is difficult to analyse the character of Charlotte Corday; but there was in it much that was noble and exalted. Her mind had been formed by her studies on a pagan type. To C. J. M. Barbaroux and the Girondins of Caen she wrote from her prison, anticipating happiness ” with Brutus in the Elysian Fields ” after her death, and with this letter she sent a simple loving farewell to her father, revealing a tender side to her character that otherwise we would hardly have looked for in such a woman. Lamartine called her

I’ange de I’assassinat, and Vergniaud said, ” Elle nous perd, mais elle nous apprend a mourir.”

See (Euvr.es politiques de Charlotte Corday (Caen, 1863; some letters and an Adresse aux Francois amis des his et de la paix), with a supplement printed in the same year; Louvet de Couvrai, Memoires (ed. Aulard, Paris, 1889); Alphonse Esquiros, Charlotte Corday (2nd ed., 2 vols., Paris, 1841); Cheron de Villiers, Marie Anne Charlotte Corday (Paris, 1865); Casiinir Perier, “La Jeunesse de Charlotte Corday ” {Revue des deux mondes, 1862) ; G. Vatel, Dossiers du proces criminel de Charlotte de Corday . . . extraits des archives impericles (Paris, 1861), and Dossier historique de Charlotte Corday (Paris, 1872); Austin Dobson, Four Frenchwomen (London, 1890); A. Ducos, Les Trois Girondines, Mme Roland, Charlotte Corday . . . (Paris, 1896); Dr Cabanes, “La vraie Charlotte Corday,” in Le Cabinet secret de Vhistoire (4 vols., 1897-1900). Her tragic history was the subject of two anonymous tragedies, Charlotte Corday (1795), said to be by the Conventional F. J. Gamon, and Charlotte Corday (Caen,

1797), neither of which have any merit; another by J. B: Salles is published by C. Vatel in Charlotte de Corday et les Girondins (1864-1872). See further bibliographical articles in M. Tourneux, Bibl. de Vhist. de Paris . . . (vol. iv., 1906), and in the Bibliographie des femmes celebres (3 vols., Turin and Rome, 1892-1905); and also E. Defrance, Charlotte Corday et la mort de Marat (1909).

CORDELIERS, CLUB OF THE, or Society of the Friends of the Rights of Man and of the Citizen, a popular society of the French Revolution. It was formed by the members of the district of the Cordeliers, when the Constituent Assembly suppressed the 60 districts of Paris to replace them with 48 sections (21st of May 1 790) . It held its meetings at first in the church of the monastery of the Cordeliers, — the name given in France to the Franciscan Observantists, — now the Dupuytren museum of anatomy in connexion with the school of medicine. From 1 791 , however, the Cordeliers met in a hall in the rue Dauphine. The aim of the society was to keep an eye on the government; its emblem on its papers was simply an open eye. It sought as well to encourage revolutionary measures against the monarchy and the old regime, and it was it especially which popularized the motto ” Liberty, Equality, Fraternity.” It took an active part in the movement against the monarchy of the 20th of June and the 10th of August 1792; but after that date the more moderate leaders of the club, Danton, Fabre d’Eglantine, Camille Desmoulins, seem to have ceased attending, and the ” enrages ” obtained control, such as J. R. Hebert, F. N. Vincent, C. P. H. Ronsin and A. F. Momoro. Its influence was especially seen in the creation of the revolu- tionary army destined to assure provisions for Paris, and in the establishment of the worship of Reason. The Cordeliers were combated by those revolutionists who wished to end the Terror, especially by Danton, and by Camille Desmoulins in his journal Le Vieux Cordelier. The club disowned Danton and Desmoulins and attacked Robespierre for his ” moderation,” but the new insurrection which it attempted failed, and its leaders were guillotined on the 24th of March 1 794, from which date nothing is known of the club. We know little of its composition.

The papers emanating from the Cordeliers are enumerated in M. Tourneux, Bibliographie de Vhistoire de Paris pendant la Revolution (1894), i. (on the trial of the Hebertists) Nos. 4204-4210, ii. Nos. 9795-9834 and 11,813. See also A. BoUgeart,’ Les Cordeliers, documents pour servir a V histoire de la Revolution (Caen, 1891) ; G. Lenotre, Paris revolutionnaire (Paris, 1895) ; G. Tridon, Les Hebertists, plainte contre une calomnie de Vhistoire (Paris, 1864). The last-named author was condemned to four months’ prison; his work vvasreprinted in 187 1. The inventory of the pictures found in 1790 in

the monastery of the Cordeliers was published by J. Guiffrey in Nouvelles archives de Vart francais, viii., 2nd series, iii. (1880). (R. A.*)

CORDERIUS, the Latinized form of name used by Mathurin Cordier (c. 1480-1564), French schoolmaster, a native of Normandy or Perche. He possessed special tact and liking for teaching children, and taught first at Paris, where Calvin was among his pupils, and, after a number of changes, finally at Geneva, where he died on the 8th of September 1564. He wrote several books for children; the most famous is his Colloquia {Colloquiorum scholasticorum libri quatuor), which has passed through innumerable editions, and was used in schools for three centuries after his time. He also wrote: Principia Latine loquendi scribendique, sive selecta quaedam ex Epislolis Ciceronis; De corrupti sermonis apud Gallos emendatione et Latine loquendi Ratione; De syllabarum quantitate; Condones sacrae viginti sex Galliae; Calonis disticha de moribus (with Latin and French

translation) ; Remontrances et exhortations au roi et aux grands de sonroyaume.

See monograph by E. A. Berthault, De M. Corderio et creatis apud Protestantes litterarum studiis (1875).

CORDES, a town of southern France, in the department of Tarn, 15 m. N.W. of Albi by road. Pop. (1906) 1619. Cordes, which covers the summit and slopes of an isolated hill, was a bastide founded by Raymond VII., count of Toulouse, in the first half of the 13th century. It preserves its medieval aspect to a remarkable degree, a large number of houses of the 13th and 14th centuries, with decorated fronts, forming its chief attraction. A church of the same periods and remains of the original ramparts are also to be seen.

CORDILLERA, a Spanish term for a range or chain of mountains, derived from the Old Spanish cordilla, the diminutive of cuerda, a cord or rope. The name was first given to the Andes ranges of South America, Las Cordilleras de los Andes, and applied to the extension of the system into Mexico. In North America the parallel ranges of mountains running between and including the Rocky Mountains and the Sierra Nevada are known as the ” Cordilleras,” and that part of the western continent crossed by them has been termed the ” Cordilleran region.” Although the name has been applied to the eastern mountain system of Australia, the word is not, outside America, used as a generic term for parallel ranges of mountains.

CORDITE, the name given to the smokeless propellant in use in the British army and navy. The material is produced in the form of cylindrical rods or strings of varying thicknesses by pressing the material, whilst in a soft and pasty state, through dies or perforations in a steel plate by hydraulic or screw pressure, hence the name cordite. The thickness or size of the rods varies from about 1 mm. diameter to 5 or more mm. according, to the nature of the charge for which it is intended. The smallest diameter is used for revolver cartridge and the largest for heavy guns. When first devised by the Ordnance Committee, presided over by Sir Frederick Abel, in 1891, this explosive consisted of 58% of nitro-glycerin, 37% of gun-cotton, and 5% of mineral jelly. This variety is now known as Cordite Mark 1. At the present time a modification is made which contains gun-cotton 65 %, nitro-glycerin 30 %, and mineral jelly 5 %. This is known as Cordite M.D. The advantages of Cordite M.D. over Mark 1 are slightly reduced rate of burning, higher velocities and more regular pressure in the gun, and lower temperature.

Cordite of either mark is a perfectly waterproof substance, containing only traces of water remaining from the manufactur- ing processes. It has a density of about 1-56 at the ordinary temperature (15° C), and, as its coefficient of expansion is small, this density does not change to any serious extent under climatic temperature variations. A rod may be bent to a moderate extent without breaking, and Cordite M.D. especially shows considerable elasticity. It can be impressed by the nail and cut with a knife, but is not in the least sticky, nor does the nitro- glycerin exude to any appreciable extent. It can be obtained in a finely-divided state by scraping with a sharp knife, or on a new file, or by grinding in a mill, such as a coffee-mill, but can scarcely be pounded in a mortar. Cordite is of a brownish colour in mass, but is much paler when finely ground or scraped. The rods easily become electrified by gentle friction with a dry substance. Like all colloidal substances it is an exceedingly bad conductor of heat. A piece ignited in air burns with a yellowish flame. With the smaller sizes, about 2 mm. diameter or less, this flame may be blown out, and the rod will continue to burn in a suppressed manner without actual flame, fumes containing oxides of nitrogen being emitted. Temperature appears to have an effect on the rate of burning. When much cooled it certainly burns more slowly than when at the ordinary air temperature, and is also more difficult to ignite. Rods of moderate thickness, say from 5 mm. diameter, will continue to burn under water if first ignited in air and the burning portion slowly immersed. The end of a rod of cordite may be struck a moderately heavy blow on an anvil without exploding or igniting. The rod will first flatten out. A sharp blow will then

or explode the portion immediately under the hammer, the remainder of the rod remaining quite intact. Bullets may be fired through a bundle or package of cordite without detonating or inflaming it. This is of course a valuable quality. The exact temperature at which substances ignite or take fire is in all cases difficult to determine with any exactness. Gordite is not instantly ignited on contact with a flame such as that of a candle, because, perhaps, of the condensation of some moisture from the products of burning of the candle upon it. A blow-pipe flame or a red-hot wire is more rapid in action. The ignition temperature may be somewhere in the region of 180° C.

All the members of this class of explosive when kept for some time at (for them) moderately high temperatures, such as the boiling-point of water (ioo° C.), show signs of decomposition; oxides of nitrogen are liberated, and some complex oxidation processes are started. Carefully prepared gun-cotton and nitro- glycerin will, however, withstand this temperature for a long time without serious detriment, excepting that nitro-glycerin is slightly volatilized. When incorporated in cordite, however, the nitro-glycerin appears to be much less volatile than when free at this temperature. Under reduced pressure (3 or 4 in. only of mercury instead of 30) it is possible to distil away a considerable amount of nitro-glycerin from cordite at 100° C. It is very doubtful whether at ordinary temperatures and pressures any nitro-glycerin whatever evaporates.

Cordite may be kept in contact with clean, dry metals, wood, paper, and a number of ordinary substances without deteriora- tion. In contact with damp and easily oxidizable metals all the substances of the gun-cotton class are liable to a slight local action, but the colloid nature, and probably also the contained mineral jelly, protect cordite considerably in these circumstances. Ammonia has a deleterious action, but even this proceeds but slowly. Cordite does not appear to change when kept under water.

The manufacturing processes comprise: drying the gun- cotton and nitro-glycerin; melting and filtering the mineral jelly ; weighing and mixing the nitro-glycerin with the gun-cotton; moistening this mixture with acetone until it becomes a jelly; and then incorporating in a special mixing mill for about three hours, after which the weighed

amount of mineral jelly is added and the incorporation continued for about one hour or until judged complete. The incorporating or mixing machine is covered as closely as possible to prevent too great evaporation of the very volatile acetone. Before complete incorporation the mixture is termed, in the works, ” paste,” and, when finally mixed, ” dough.”

The right consistency having been produced, the material is placed in a steel cylinder provided with an arrangement of dies or holes of regulated size at one end, and a piston or plunger at the other. The plunger is worked either by hydraulic power or by a screw (driven from ordinary shafting). Before reaching and passing through the holes in the die, the material is filtered through a disk of fine wire gauze to retain any foreign substances, such as sand, bits of wood or metal, or unchanged fibres of cellulose, &c, which might choke the dies or be otherwise dangerous. The material issues from the cylinders in the form of cord or string of the diameter of the holes of the die. The thicker sizes are cut off, as they issue, into lengths (of about 3 ft.), it being generally arranged that a certain number of these— say ten — should have, within narrow limits, a definite weight. The small sizes, such as those employed for rifle cartridges, are wound on reels or drums, as the material issues from the press cylinders, in lengths of many yards.

Some of the solvent or gelatinizing material (acetone) is lost during the incorporating, and more during the pressing process and the necessary handling, but much still remains in the cordite at this stage. It is now dried in heated rooms, where it is generally spread out on shelves, a current of air passing through carrying the acetone vapour with it. In the more modern works this air current is drawn, finally, through a solution of a substance such as sodium bisulphite; a fixed compound is thus formed with the acetone, which by suitable treatment

may be recovered. The time taken in the drying, varies with the thickness of the cordite from a few days to several: weeks. For several reasons it is desirable that this process should go on gradually and slowly.

After drying, all the various batches of cordite cf the sanle size are carefully ” blended, ” so that any slight differences in the manufacture of one batch or one day’s output may be equal- ized as much as possible. Slight differences may arise from the raw materials, cotton waste or glycerin, or in the making of these into gun-cotton or nitro-glycerin respectively. To help in con- trolling the blending, each ”

make ” of gun-cotton and nitro- glycerin is ” marked ” or numbered, and carries its mark to the cordite batch of which it is an ingredient. The history of each box of large-sized or reel of small-sized cordite is therefore known up to the operation of blending and packing. The final testing, is by firing proofs, as in the case of the old gunpowders.

The gun-cotton employed for cordite is made in the usual way (see Gun-Cotton), with the exception of treating with alkali. It is also after complete washing with water gently pressed into small cylinders (about 3 in. diameter and 4 in. high) whilst wet, and these are carefully dried before the nitro-glycerin is added. The pressure applied is only sufficient to make the gun-cotton just hold together so that it is easily mixed with the nitro-glycerin. The mineral jelly or vaseline is obtained at a certain stage of distillation of petroleum, and is a mixture of hydrocarbons, paraffins, olefines and some other unsaturated hydrocarbons, possibly aromatic, which no doubt play a very important. part as preservatives in cordite.

The stability of cordite, that is, its capability of keeping without chemical or ballistic changes, is judged of by certain ” heat tests.” The Abel heat test consists in subjecting a weighed quantity, 2 grams, of the finely divided cordite contained in a test tube, to a temperature of 70 C. maintained constant by a water bath. The test tube is about 6Xf in., and dips into the water sufficiently to immerse about 2 in., viz. the part containing the cordite. In the upper free portion a piece of filter-paper impregnated with a mixture of potassium iodide and starch paste is suspended by a platinum wire from the stopper of the tube. A portion of the test paper is moistened with a solution of glycerin to render it more sensitive than the dry part. A faint brown colour appearing on the moistened portion indicates that some oxides of nitrogen have been evolved from the cordite. This brown tint is compared with a standard, and the time taken before the standard tint appears is noted. The time fixed upon as a test of relative stability is an arbitrary one determined by examination of well-known specimens. Should the cordite or other explosive contain traces of mercury salts, such as mercuric chloride, which is sometimes added as a preservative, this test is rendered nugatory, and no coloration may appear (or only after a long exposure) , although the sample may be of indifferent stability. It is now customary to examine specially for mercury, either by heating the explosive in contact with gold leaf or silver foil, or by’ burning the substance and examining the flame in the spectroscope.

The method of examination known as the vacuum silvered vessel process is probably not interfered with by the presence of very small

quantities of mercury. It consists in heating 50 grams of the finely divided explosive in a Dewar's silvered vacuum glass bulb to a rigidly constant temperature of 8b° C. for many hours. A sensitive thermometer having its bulb immersed in the centre of the cordite shows when the temperature rises above 80°. Such a rise indicates internal oxidation or decomposition of the explosive; it is accompanied by an evolu- tion of nitrogen dioxide, NO2, the depth of colour of which is noted through a side tube attached to the bulb. As all explosives of this class would in time decompose sufficiently to give these indications, time periods or limits have been fixed at which an appreciable and definite rise in temperature and production of red fumes indicate relative stability or instability. (W. R. E. H.)

C6RD0BA, GONZALO FERNANDEZ DE (1453-1515), Spanish general and statesman, usually spoken of by the Italianized form of his Christian name as Gonsalvo de Cordoba, or as " the

Great Captain," was the second son of Don Pedro Fernandez de Cordoba, count of Aguilar, and of his wife Elvira de Herrera, who belonged to the family of Enriquez, the hereditary admirals of Castile, a branch of the royal house. Gonzalo was born at Montilla near the city of Cordova (Cordoba) on the 16th of March 1453. The father died when he and his elder brother, Don Alonso, were mere boys. The counts of Aguilar carried on an hereditary feud with the rival house of Cabra, and the children were carried by their vassals into the faction fights of the two families. As a younger son Gonzalo had his fortune to make, but he was generously aided by the affection of his elder brother, who was very wealthy. War and service in the king's court offered the one acceptable career outside the church to a gentle- man of his birth.

He was first attached to the household of Don Alphonso, the king's brother, and upon his death devoted himself to Isabella, afterwards the queen. During the civil war, and the conflict with Portugal which disturbed the first years of her reign, he fought under the grand master of Santiago, Alonso de Cardenas. After the battle of Albuera, the grand master gave him especial praise, saying that he could always see Gonzalo to the front because he was conspicuous by the splendour of his armour. Indeed the future Great Captain, who, as a general, was above all things astute and patient, could, and habitually did, display the most reckless personal daring, going into a fight as if

he loved it, and having a shrewd sense that a reputation for intrepidity, a free-handed profusion, and the personal magnificence which strikes the eye, would secure him the devotion of his soldiers. During the ten years' war for the conquest of Granada he com- pleted his apprenticeship under his brother, the count of Aguilar, the grand master of Santiago, and the count of Tendilla, of whom he always spoke as his masters. It was a war of surprises and defences of castles or towns, of skirmishes, and of ambuscades in the defiles of the mountains. The military engineer and the " guerrillero " were about equally employed. Gonzalo's most distinguished single feat was the defence of the advanced post of Illora, but he commanded the queen's escort when she wished to take a closer view of Granada, and he beat back a sortie of the Moors under her eyes. When Granada surrendered, he was one of the officers chosen to arrange the capitulation, and on the peace he was rewarded by a grant of land.

So far he was only known as an able subordinate, but his capacity could not be hidden from such an excellent judge of character as Isabella, to whom as a woman he appealed by a chivalrous union of devotion and respect. When, therefore, the Catholic sovereigns decided to support the Aragonese house of Naples against Charles VIII. of France, Gonzalo was chosen by the influence of the queen, and in preference to older men, to command the Spanish expedition. It was in Italy that he won the title of the Great Captain; Guicciardini says that it was given him by the customary arrogance of the Spaniards, but it was certainly accepted as just by all the soldiers of the time of whatever nationality. A detailed account of his campaigns cannot be given here. He held the command in Italy twice. In 1495 he was sent with a small force of little more than five thousand men to aid Ferdinand of Naples to recover his kingdom, and he returned home after achieving success, in 1498. After a brief interval of service against the conquered Moors who had risen in revolt, he returned to Italy in 1501. Ferdinand of Spain had entered into his iniquitous compact with Louis XII. of France for the spoliation and division of the kingdom of Naples. The Great Captain was chosen to command the Spanish part of this robber coalition. As general and as viceroy of Naples he re- mained in Italy till 1507. During his first command he was mostly employed in Calabria in mountain warfare which bore much resemblance to his former experience in Granada. There was, however, a material difference in the enemy. The French forces, commanded by the Scotsman Stuart d'Aubigny, con- sisted largely of Swiss pikemen, and of their own men-at-arms. With his veterans of the Granadine war, foot soldiers armed with sword and buckler, or arquebuses and crossbows, and light cavalry, trained to unsleeping

vigilance, capable of long marches,

and of an endurance unparalleled among the soldiers of the time, he could carry on a guerrillero warfare which wore down his opponents, who suffered far more than the Spaniards from the heat. But he saw clearly that this was not enough. His ex- perience in Seminara showed him that something more was wanted on the battlefield. The action was lost mainly because King Ferdinand, disregarding the advice of Gonzalo, persisted in fighting a pitched battle with inferior numbers, some of whom were untrustworthy Neapolitans. The Spanish foot behaved excellently, but the result showed that in the open field their loose formation and their swords put them at a disadvantage as against a charge of heavy cavalry or pikemen. Gonzalo therefore introduced a much more strict formation, and adopted the pike as the weapon of a part of his foot. The division of the Spanish infantry into the ” battle ” or main central body of pikemen, and the wings (alas) of ” shot ” to be employed in outflanking the enemy, was primarily due to the Great Captain.

The French were expelled by 1498 without another battle. When the Great Captain reappeared in Italy he had first to perform the congenial task of driving the Turk from Cephalonia, then to aid in robbing the king of Naples, Frederick, brother of his old ally Ferdinand. When the king of Naples had [been despoiled, the French and Spaniards quarrelled over the booty. The Great Captain now found himself with a much outnumbered army in the presence of the French. The war was divided into two phases very similar to one another. During the end of 1502 and the early part of 1303 the Spaniards stood at bay in the entrenched camp at Barletta near the Ofaiito on the shores of the Adriatic. He resolutely refused to be tempted into battle either by the taunts of the French or the discontent of his own soldiers. Meanwhile he employed the Aragonese partisans in the country, and flying expeditions of his own men, to harass the enemy’s communications. When he was reinforced, and the French committed the mistake of scattering their forces too much to secure supplies, he took the offensive, pounced on the enemy’s depot of provisions at Cerignola, took a strong position, threw up hasty field works, and strengthened them with a species of wire entanglements. The French made a headlong front attack, were repulsed, assailed in flank, and routed. The later operations on the Garigliano were very similar, and led to the total expulsion of the French from Naples. Gonzalo remained as governor of Naples till 1507. But he had become too great not to arouse the jealousy of such a typical king of the Renais- sance as Ferdinand the Catholic. The death of the queen in 1504 had deprived him of a friend, and it must be allowed that he was

profuse in rewarding his captains and his soldiers out of the public treasury. Ferdinand loaded him with titles and fine words, but recalled him so soon as he could, and left him un- employed till his death on the 2nd of December 1515.

The Great Captain is sometimes spoken of as the first of modern generals. The expression is uncritical, for modern generalship arose from many sides, but he was emphatically a general. There is much in his methods which bears a curious likeness to those of the duke of Wellington; Barletta, for instance, has a distinct resemblance to the Torres Vedras campaign, and the battle on the Garigliano to Assaye. As an organizer he founded the Spanish infantry of the 16th and 17th centuries, and he gave the best proof of his influence by forming a school of officers. The best generals of Charles V. were either the pupils of the Great Captain or were trained by them.

There is no life of Gonzalo de Cordoba written by a scholar who was also a good judge of war. The dull Cronica del Gran Capitan gives the bare events of his campaigns rather wearisomely but fully. Paulus Govius, Vitae illustrium virorum, translated by Domenichi (Florence, 1550), is elegant and very readable, Don Jose Quintana includes bim in his Espanoles celebres (Rivadeneyra Biblioteca de aulores espanoles, vol. xix., Madrid, 1846-1880); and Prescott collected the authorities, and made good use of them in his Ferdinand and Isabella. See also P. du Poncet, Histoire de Gonsahe de Cordoue (Paris, 1714). The Gonsalve de Cordoue, ou Grenade reconquise of Florian (Paris, 1791) is a romance. (D. H.)

C6RD0BA, a large central province of the Argentine Republic, bounded N. by Santiago del Estero, E. by Santa F6, S. by Buenos Aires and La Pampa, W. by San Luis and Rioja, and N.W. by

Catamarca. Pop. (1895) 35 I , 22 35 (r 9 4, estimate) 465,464; jirea, 62,160 sq. m. The greater part of the province belongs to the pampas, though less fertile and grassy than the plains farther E. and S. It likewise includes large saline and swampy areas. The N.W. part of the province is traversed by an isolated mountain system made up of the C6rdoba, Pocho and Ischilin sierras, which extend for a distance of some 200 m. in a N. and S. direction. These ranges intercept the moist winds from the Atlantic, and receive on their eastern slopes an abundant rainfall, which gives them a strikingly verdant appearance

in comparison with the surrounding plains.' West and N.W. of the sierras are extensive saline basins called Las Salinas Grandes, which extend into the neighbouring provinces and are absolutely barren. In the N.E. the land is low and swampy; here are the large saline lagoons of Mar Chiquita and Los Porongos. The principal rivers, which have their sources in the sierras and flow eastward, are the Primero and Segundo, which flow north- easterly into the lacustrine basin of Mar Chiquita; the Tercero and Quarto, which unite near the Santa Fe frontier to form the Carcarafia, a tributary of the Parana; and the Quinto, which flows south-easterly into the swamps of the Laguna Amarga in the S. part of the province. Countless small streams also descend the eastern slopes of the sierras and are lost in the great plains. The eastern districts are moderately fertile, and are chiefly devoted to cattle-breeding, though cereals are also produced. In the valleys and well-watered foothills of the sierras, however, cereals, alfalfa and fruit are the principal products. The rainfall is limited throughout the province, and irrigation is employed in but few localities. The mineral resources include gold, silver, copper, lead and iron, but mining is carried on only to a very limited extent. Salt and marble are also produced. Cordoba is traversed by several railway lines — those running westward from Buenos Aires and Rosario to Mendoza and the Chilean frontier, those connecting the city of Cordoba with the same cities, and with Tucuman on the N. and Catamarca and Rioja on the N.W. The chief towns are Cordoba, the capital, Rio Quarto, Villa Maria, an important railway centre 82 m. S.E. of C6rdoba, and Cruz del Eje on the W. slopes of the sierras, no m. N.W. of C6rdoba.

C6RD0BA, a city in the central part of the Argentine Re- public, capital of the above province, on the Rio Primero, 435 m. by rail N.W. of Buenos Aires by way of Rosario, 246 m. from the latter. Pop. (1895) 42,783 — the suburbs having 11,679 more — (1905, estimate) 60,000. The city is connected by railway with Buenos Aires and Rosario, and with the capitals of all the surrounding provinces. C6rdoba stands on a high eastward-sloping plain called the "Altos," 1240 ft. above sea- level, and is built in a broad river bottom washed out by periodical inundations and the action of the rains on the alluvial banks. The inundations have been brought under control by the construction of barriers and dams, but the banks are con- stantly broken down. The city is regularly laid out, and contains many fine edifices and dwellings. Several suburban settlements surround the city, the more important of which are served by the urban tramway lines. The streets are lighted by gas and electricity, and an excellent telephone service is maintained. The noteworthy public buildings

include the cathedral, a hand- some edifice curiously oriental in appearance, a massive old Jesuit church with a ceiling of richly carved and gilded cedar, the old university, founded in 1613, which still occupies the halls built by the Jesuits around a large quadrangle, the fine old cabildo, or government house, of Moorish appearance, and the national observatory on the barranca overlooking the city. There are, also, two national normal schools, a national college, an episcopal seminary, an endowed Carmelite orphanage, a national meteorological station, a national academy of sciences, and a good public library. Among the attractive features of the city is an alameda of about six acres, within which is a square artificial lake of 4 acres, surrounded by shrubbery and shaded walks; the alameda dates from the time when the Jesuits ruled the city, and to them also are due the tiled baths, supplied with running water. A short avenue connects the alameda with the

principal plaza, a pretty garden and promenade. The water supply of Cordoba is derived from the Rio Primero, 12 m. above the city, where an immense dam (Dique San Roque), one of the largest of its kind in South America, has been built across the river valley. This dam also serves to irrigate the valley below, and to furnish power for the electric plant which provides Cordoba with light and electric power. In and about the city there are several industrial establishments which have sprung into existence since the opening of the first railway in 1870. The surrounding country is irrigated and well cultivated, and pro- duces an abundance of fruit and vegetables.

The city was founded in 1573 by Luis Geronimo de Cabrera and was for a long time distinguished for its learning and piety. It was the headquarters of the Jesuits in this part of South America for two centuries, and for a time the capital of the Spanish intendencia of Tucuman. The expulsion of the Jesuits in 1767 proved to be a serious blow to the academic reputation of the city, from which it did not recover until 1870, when President Sarmiento engaged some eminent scientific men from Europe to teach modern science in the university.

C6RD0BA, a town of the state of Vera Cruz, Mexico, 55 m. W.S.W. of the port of Vera Cruz, in a highly fertile valley, near the volcano of Orizaba, and 2880 ft. above sea-level. Pop. (1895) 7974. The surrounding district produces sugar, tobacco and coffee, C6rdoba being one of the principal coffee-producing centres of Mexico. It also manufactures cotton and woollen fabrics. The town is regularly laid out and built of stone, and contains several handsome edifices, chief of which is the old cathedral. C6rdoba was a town of considerable importance in colonial times, but fell into decay after the revolution.

The rail- way from Vera Cruz to Mexico, which passes through it, and the development of coffee production, have helped the city to recover a part of its lost trade.

CORDON (a French derivative of corde, cord) , a wordusedin many applications of its meaning of ” line ” or ” cord,” and particularly of a cord of gold or silver lace worn in military and other uniforms. The word is especially used of the sash or ribbon worn by members of an order of knighthood, crossing from one shoulder to the opposite hip. The cordon bleu, the sky-blue ribbon of the knight’s grand cross of the order of the Holy Spirit, the highest order of the Bourbon kings of France, was, like the ” blue ribbon ” of the English Garter, taken as a type of the highest reward or prize to which any one can attain (see also Cookery). In heraldry, ” cordons ” are the ornamental cords which, with the hats to which they are attached, ensign the shields of arms of certain ecclesiastical dignitaries; they are interlaced to form a mesh or network and terminate in rows of tassels. A cardinal’s cordon is gules with five rows of fifteen tassels, an archbishop’s vert with four rows of ten, and a bishop’s also vert, with three rows of six. In architecture a ” cordon ” is a projecting band of stone along the outside of a building, a string-course. The word is frequently used in a transferred sense of a line of posts or stations to guard an enclosed area from unauthorized passage, e.g. a military or police cordon, and especially a sanitary cordon, a line of posts to prevent communication from or with an area infected with disease.

CORDOVA (Span. Cordoba), an inland province of southern Spain, bounded on the N.E. by Ciudad Real, E. by Jaen, S.E. by Granada, S. by Malaga, S.W. and W. by Seville, and N.W. by Badajoz. Pop. (1900) 455,859; area, 5299 sq. m. The river Guadalquivir divides the province into two very dissimilar portions. On the right bank is the mountainous region of the Sierra Morena, less peopled and fertile than the left bank, with its great plains (La Campina) and slightly undulating country towards the south and south-east, where the surface again becomes mountainous with the outlying ridges of the Sierra Nevada. The Guadalquivir, flowing from E.N.E. to W.S.W., waters the richest districts of Cordova, and has many tributaries, notably the Bembezar, Guadiato and Guadamellato, on the right, and the Genii and Guadajoz on the left. The northern districts (Los Pedroches) are drained by several small tributaries of the Guadiana. The climate is much varied. Snow is to be found

for months en the highest peaks of the mountains; mild tempera- ture in the plains, except in the few torrid summer months, when rain seldom falls. The peasantry are chiefly occupied in various branches of husbandry; sheep-farming and the culture of the olive employ large numbers. The agricultural wealth of Cordova is, however, not fully exploited, owing to the conservatism and backward education of the peasantry. There are no great manuˆ facturing towns, but mining is an industry of some importance. In 1903 coal was obtained in considerable quantities in the Belmez district; argentiferous lead and zinc near Pozoblanco and elsewhere; iron ore at Luque, near Baena. A small amount of bismuth is also obtained. Mining is facilitated by a fairly complete and well-kept system of communication by road and railway. The main line Madrid-Linares-Seville follows the Guadalquivir valley throughout the province, passing through the capital, Cordova. Here it meets the line from Almorchon, on the north, to Malaga, on the south, which has three important branches — Belmez-Fuente del Arco, Cordova-Utrera, and Puente Genii- Jaen. After the capital, the principal towns are Aguilar de la Frontera (13,236), Baena (14,539), Cabra (13,127), Fuente Ovejuna (11,777), Lucena (21,179), Montilla (13,603), Montoro (14,581), Pozoblanco (12,792), Priego de Cordoba (16,904) and Puente Genii (12,956). These are described under separate headings. Other towns of less importance are Adamuz (6974), Belalcazar (7682), Belmez (8978), Bujalance (10,756), Castro del Rio (11,821), Hinojosa del Duque (10,673), Palma del Rio (7914), Rute (10,740) and Villafranca de Cordoba (9771).

CORDOVA (Span. Cdrdoba; Lat. Corduba), the capital of the Spanish province of Cordova, on the southern slopes of the Sierra de Cordova, and the right bank of the river Guadalquivir. Pop. (1900) 58,275. At Cordova the Madrid-Seville railway meets the branch line from Almorchon to Malaga. The city is an episcopal see. Few fragments remain of its Moorish walls, which were erected on Roman foundations and enclosed a very wide area, now largely occupied by garden-ground cleared from the ruins of ancient buildings. On the outskirts are many modern factories in striking contrast with the surrounding orange, lemon and olive plantations, and with the pastures which belong to. the celebrated Cordovan school of bull-fighting. Nearer the centre the streets are for the most part narrow and crooked. Almost every building, however, is profusely covered with whitewash, and thus there is little difference on the surface between the oldest and the most modern houses. The southern suburb communicates with the town by means of a bridge of sixteen arches across the river, exhibiting the usual combination of Roman and

Moorish masonry and dominated at the one end by an elevated statue of the patron saint, St Raphael, whose effigy is to be seen in various other quarters of the city. The most important of the public buildings are the cathedral, the old monastic establishments, the churches, the bishop's palace, the city hall, the hospitals and the schools and colleges, including the academy for girls founded in 1590 by Bishop Pacheco of Cordova, which is empowered to grant degrees. The Alcazar, or royal palace, stands on the south-west amid the gardens laid out by its builder, the caliph Abd-ar-Rahman III. (912-961). Its older parts are in ruins, and even the so-called New Alcazar, erected by Alphonso XI. of Castile in 1328, and long used as the offices of the Holy Inquisition, has only one wing in good repair, which serves as a prison.

But the glory of Cordova, surpassing all its other Moorish or Christian buildings, is the mezquita, or mosque, now a cathedral, but originally founded on the site of a Roman temple and a Visigothic church by Abd-ar-Rahman I. (756-788); who wished to confirm the power of his caliphate by making its capital a great religious centre. Immigration from all the lands of Islam soon rendered a larger mosque necessary, owing to the greatly increased multitude of worshippers, and, by orders of Abd-ar- Rahman II. (822-852) and Al-Hakim II. (961-976), the original size was doubled. After various minor additions, Al-Mansur, the vizier of the caliph Hisham II. (976-1009), again enlarged the Zeca, or House of Purification, as the mosque was named, to twice its former size, rendering it the largest sacred building cf Islam, after the Kaaba at Mecca. The ground plan of the

completed mosque forms a rectangle, measuring 5.70 ft. in length and 425 in breadth, or little less than St Peter's in Rome. About one-third of this area is occupied by the courtyard, and the cloisters which surround it on the north, west and east. The exterior, with the straight lines of its square buttress towers, has a heavy and somewhat ungainly appearance; but the interior is one of the most beautiful specimens of Moorish architecture. Passing through a grand courtyard about 500 ft. in length, shady with palm and cypress and orange trees and watered by five fountains, the visitor enters on the south a magnificent and bewildering labyrinth of pillars in which por- phyry, jasper and many-coloured marbles are boldly combined. Part came from the spoils of Nimes or JNarbonne, part from Seville or Tarragona, some from the older ruins of Carthage, and others as a present to Abd-ar-Rahman I. from the East Roman emperor Leo IV., who sent also from Constantinople his own skilled workmen, with 16 tons of tesserae for the mosaics. Originally of different heights, the pillars have been adjusted to their present standard of 12 ft. either by being sunk into

the soil or by the addition of Corinthian capitals. Twelve hundred was the number of the columns in the original building, but many have been destroyed. The pillars divide the area of the building from north to south, longitudinally into nineteen and transversely into twenty-nine aisles — each row supporting a tier of open Moorish arches of the same height (12 ft.) with a third and similar tier superimposed upon the second. The full height of the ceiling is thus about 35 ft. The Moorish character of the building was unfortunately impaired in the 16th century by the formation in the interior of a crucero, or high altar and cruciform choir, by the addition of numerous chapels along the sides of the vast quadrangle, and by the erection of a belfry 300 ft. high in room of the old minaret. The crucero in itself is no disgrace to the architect Hernan Ruiz, but every lover of art must sympathize with the rebuke administered by the emperor Charles V. (1500-1558) to the cathedral authorities: ” You have built here what could have been built as well any- where else; and you have destroyed what was unique in the world.” Magnificent, indeed, as the cathedral still is, it is almost impossible to realize what the mosque must have been when the worshippers thronged through its nineteen gateways of bronze, and its 4700 lamps, fed with perfumed oil, illuminated its brilliant aisles. Of the exquisite elaboration bestowed on the more sacred portions abundant proof is afforded by the third Mihrab, or prayer-recess, a small 10th-century chapel, heptagonal in shape, roofed with a single shell-like block of snow-white marble, and inlaid with Byzantine mosaics of glass and gold.

Cordova was celebrated in the time of the Moors for its silver- smiths, who are said to have come originally from Damascus; and it exported a peculiar kind of leather which took its name from the city, whence is derived the word cordwainer. Fine silver filigree ornaments are still produced; and Moorish work in leather is often skilfully imitated, although this handicraft almost disappeared in the 15th century. The chief modern industries of Cordova are distillation of spirits and the manu- facture of woollen, linen and silken goods.

Corduba, probably of ‘ Carthaginian origin, was occupied by the Romans under Marcus Marcellus in 152 B.C.. and shortly afterwards became the first Roman colonia in Spain. From the large number of men of noble rank among the colonists, the city obtained the title of Patricia; and to this day the Cordovese pride themselves on the purity and antiquity of their descent. In the rst century B.C. Cordova aided the sonsof Pompey against Caesar; but after the battle of Munda, in 45 B.C., it fell into the hands of Caesar, who avenged the obstinacy of its resistance by massacring 20,000 of the inhabitants. Under Augustus, if not before, it became a municipality, and was the capital of the

thoroughly Romanized province of Baetica. In the lifetime of Strabo, however (c. 63 b.c.a.d. 21), it still ranked as the largest city of Spain. Its prosperity was due partly to its position on the Baetis, and on the Via Augusta, the great com mercial road “from northern Spain built by Augustus, and partly

to its proximity to mines and rich grazing and grain-producing districts. Hosius, its bishop, presided over the first council of Nieaea in 345; and its importance was maintained by the Visigothic kings, whose rule lasted from the 5th to the beginning of the 8th century. Under the Moors, Cordova was at first an appanage of the caliphate of Damascus; but after 756 Abd-ar- Rahman I. made it the capital of Moorish Spain, and the centre of an independent caliphate (see Abd-ar-Rahman) . It reached its zenith of prosperity in the middle of the 10th century, under Abd-ar-Rahman III. At his death, it is recorded by native chroniclers, probably with Arabic exaggeration, that Cordova contained within its walls 200,000 houses, 600 mosques, 900 baths, a university ,_ and numerous public libraries; whilst on the bank of the Guadalquivir, under the power of its monarch, there were eight cities, 300 towns and 12,000 populous villages. A period of decadence began in 1016, owing to the claims of the rival dynasties which aimed at succeeding to the line of Abd-ar-Rahman; the caliphate never won back its position, and in 1236 Cordova was easily captured by Ferdinand III. of Castile. The substitution of Spanish for Moorish supremacy rather accelerated than arrested the decline of art, industry and popula- tion; and in the 19th century Cordova never recovered from the disaster of 1808, when it was stormed and sacked by the French. Few cities of Spain, however, can boast of so long a list of illustrious natives in the Moorish and Roman periods, and even, to a less extent, in modern times. It was the birthplace of the rhetorician Marcus Annaeus Seneca, and his more famous son Lucius (c. 3 b.c.-a.d. 65); of the poet Lucan (a.d. 39-65); of the philosophers Averroes (1126-1198) and Maimonides (1135- 1204); of the Spanish men of letters Juan de Mena (c. 1411- 1456), Lorenzo de Sepulveda (d. 1574) and Luis de Gongora y Argote (1561-1627); and the painters Pablo de Cespedes (1538-1608) and Juan de Valdes Leal (1630-1691). The celebrated captain Gonzalo Fernandez de C6rdoba (q.v.), the con- queror of Naples (1495-1498), was born in the neighbouring town of Montilla.

, See Estudio descriptivo de los monumentos drabes de Granada y

Cordoba, by R. Contreras (Madrid, 1885) ; Cordoba, a large illustrated volume of the series Espana, by P. de Madrazo (Barcelona, 1884); Inscripciones drabes de Cordoba, by R. Amador de los Rios y Villalta (Madrid, 1886).

CORDUROY, a cotton cloth of the fustian kind, made like a ribbed velvet. It is generally a coarse heavy material and is used largely for workmen's clothes, but some finer kinds are used for ladies' dresses, &c. According to the New English Dictionary the word is understood to be of English invention, " either originally intended, or soon after assumed, to represent a supposed French corde du roi." It is said that a coarse woollen fabric called duroy, made in Somerset durjng the 18th century, has no apparent connexion with it. From the ribbed appearance of the cloth the name corduroy is applied, particularly in Amercia, to a rough road of logs laid transversely side by side, usually across swampy ground.

CORDUS, AULUS CREMUTIUS, Roman historian of the later Augustan age. He was the author of a history (perhaps called Annates) of the events of the civil wars and the reign of Augustus, embracing the period from at least 43-18 B.C. In aˆd. 25 he was brought to trial for having eulogized Brutus and spoken of Cassius as the last of the Romans. His real offence was a witti- cism at the expense of Sejanus, who put up two of his creatures to accuse him in the senate. Seeing that nothing could save him, Cordus starved himself to death. A decree of the senate ordered that his works should be confiscated and burned by the aediles. Some copies, however, were saved by the efforts of Cordus's daughter Marcia, and after the death of Tiberius the work was published at the express wish of Caligula. It is impossible to form an opinion of it from the scanty fragments (H. Peter, Historicorum Romanorum Fragmenta,.i&&3) . According to ancient authorities, the writer was very outspoken in his denunciations, and his relatives considered it necessary to strike out the most offensive passages of the work before it was widely circulated (Quintilian, Instil, x. 1, 104). Two passages in Pliny (Nat. Hist. x. 74 [37], xvi. 108 L45]) seem to refer to a work of a different nature from

the history — perhaps a treatise on Admiranda or remarkable things.

See Tacitus, Annals, iv. 34, 35; Suetonius, Tiberius, 61, Caligula, 16; Seneca, Suasoriae, vii., esp. the Consolatio to Cordus's daughter Marcia; Dio Cassius lvii. 24. There are monographs by J. Held (1841) and C. Rathlcf (i860). Also H. Peter, Die geschichtliche Literatur ilber die rbmische Kaiserzeit (1897); Teuffel-Schwabe, Hist, of Roman Lit., Eng. trans., 277, I.

CORELLI, ARCANGELO (1653-1713), Italian violin-player and composer, was born on tlie 12th or 13th of February 1653, at Fusignano near Imola, and died in 17 13. Of his life little is known. His master on the violin was Bassani. Matteo Simonelli, the well-known singer of the pope's chapel, taught him composition. His first decided success was gained in Paris at the age of nineteen. To this he owed his European reputation. From Paris Corelli went to Germany. In 1681 he was in the service of the electoral prince of Bavaria; between 1680 and 1685 he spent a considerable time in the house of his friend Farinelli. In 1685 he was certainly in Rome, where he led the festival performances of music for Queen Christine of Sweden and was also a favourite of Cardinal Ottoboni. From 1689 to 1690 he was in Modena, the duke of which city made him handsome presents. In 1708 he went once more to Rome, living in the palace of Cardinal Ottoboni. His visit to Naples, at the invita- tion of the king, took place in the same year. The style of execu- tion introduced by Corelli and preserved by his pupils, such as Geminiani, Locatelli, and many others, has been of vital import- ance for the development of violin-playing, but he employed only a limited portion of his instrument's compass, as may be seen by his writings, wherein the parts for the violin never proceed above D on the first string, the highest note in the third position; it is even said that he refused to play, as impossible, a passage which extended to A in altissimo in the overture to Handel's Trionfo del Tempo, and took serious offence when the composer played the note in evidence of its practicability. His compositions for the instrument mark an epoch in the history of chamber music; for his influence was not confined to his own country. r Even Sebastian Bach submitted to it. Musical society iri Rome owed much to Corelli. He was received in the highest circles of the aristocracy, and arranged and for a long time presided at the celebrated Monday concerts in the palace of Cardinal Ottoboni. Corelli died possessed of a sum of 1 20,000 marks and a valuable collection of pictures, the only luxury in which he had indulged. He left both to his benefactor and friend, who, however, generously made over the money to'Corelli's relations. Corelli's compositions are distinguished by a beautiful flow of melody and by a masterly treatment of the accompanying parts, which he is justly said to have liberated from the strict rules of counterpoint. Six collections of concerti, sonatas and minor pieces for violin, with accompaniment of other instruments, besides several concerted pieces for strings, are authentically ascribed to this composer. The most important of these is the XII. Suonati a violino eviolone dimbalo (Rome, 1700).

CORELLI, MARIE (1864-), English novelist, was the daughter of an Italian father and a Scottish mother, but in infancy was adopted by

Charles Mackay (q.v.), the” song- writer and journalist, whose son Eric, at his death, became her guardian. She was sent to be educated in a French convent with the object of training her for the musical profession, and while still a girl composed various pieces of music. But her journalistic con- nexion proved a stronger stimulus to expression, and editors who were friends of her adopted father printed some of her early poetry. Then she produced what was at least a clever, if not a remarkably well written, romantic story, on the theme of a self revelation connecting the Christian Deity with a world force in the form of electricity, which was published in 1886 under the title of A Romance of Two Worlds. It had an im mediate and large sale, which resulted, naturally, in her devoting her inventive faculty to satisfy the public demand for similar work. Thus she wrote in succession a series of melodramatic romantic novels, original in some aspects of their treatment, daring in others, but all combining a readable plot with enough au fond of what the majority demanded in ethical and religious

correctness to suit a widespread contemporary taste; these were Vendetta (1886), Thelma (1887), Ardath (1889), The Soul of Lilith (1892), Barabbas (1893), The Sorrows of Satan (1895), — the very titles were catching, — The Mighty Atom (1896), — which appealed to all who knew enough of modern science to wish to think it wicked, — and others, down to The Master Christian (1900), again satisfying the socio-ethico-religious demand, and Temporal Power (1902), with its contemporary suggestion from the acces- sion of Edward VII. Miss Corelli had the advantage of writing quite sincerely and with conviction, amid what superior critics sneered at as bad style and sensationalism, on themes which conventional readers nevertheless enjoyed, and round plots which were dramatic and vigorous. Her popular success was great and advertised itself. It was helped by a well-spread belief that Queen Victoria preferred her novels to any other. Reviewers wrote sarcastically, and justly, of her obvious literary lapses and failings; she retorted by pitying the poor reviewers and letting it be understood that no books of hers were sent to the Press for criticism. When she went to live at Stratford-on-Avon, her personality, and her importance in the literary world, became further allied with the historic associations of the place; and in the public life of women writers her utterances had the reclame which is emphasized by journalistic publicity. Such success is not to be gauged by purely literary standards ; the popularity of Miss Corelli’s novels is a

phenomenon not so much of literature as of literary energy — entirely creditable to the journalistic resource of the writer, and characteristic of contemporary pleasure in readable .fiction.

CORENZIO, BELISARIO (c. 1558-1643), Italian painter, a Greek by birth, studied at Venice under Tintoretto, and then settled at Naples, where he became famous for unscrupulous conduct as a man and rapid execution as an artist. Though careless in composition and a mannerist in style, he possessed an acknowledged fertility of invention and readiness of hand; and these qualities, allied to a certain breadth of conception, seem in the eyes of his contemporaries to have atoned for many defects. When Guido Reni came in 162 1 to Naples to paint in the chapel of St Januarius, Corenzio suborned an assassin to take his life. The hired bravo killed Guido's assistant, and effectually frightened Reni, who prudently withdrew to Rome. Corenzio, however, only suffered temporary imprisonment, and lived long enough to supplant Ribera in the good graces of Don Pedro di Toledo, viceroy of Naples, who made him his court painter. Corenzio vainly endeavoured to fill Guido's place in the chapel of St Januarius. His work was adjudged to have been under the mark, and yet the numerous frescoes which he left in Nea- politan churches and palaces, and the large wall paintings which still cover the cupola of the church of Monte Casino are evidence of uncommon facility, and show that Corenzio was not greatly inferior to the fa prestos of his time. His florid style, indeed, seems well in keeping with the overladen architecture and full- blown decorative ornament peculiar to the Jesuit builders of the 17th century. Corenzio died, it is said, at the age of eighty- five by a fall from a scaffolding.

CO-RESPONDENT, in law, generally, a person made respondent to, or called upon to answer, along with another or others, a petition or other proceeding. More particularly, since the Matrimonial Causes Act 1857, the term is applied to the person charged by a husband, when presenting a petition praying for the dissolution of his marriage on the ground of adultery, with misconduct with his wife, and made, jointly with her, a respondent to the suit. (See also Divorce.)

CORFE CASTLE, a town in the eastern parliamentary division of Dorsetshire, England, in the district called the Isle of Purbeck, 1 291 m. S.W. by W. from London by the London & South- western railway. Pop. (1901) 1440. The castle, through which the town is famous, guarded a gap in the line of considerable hills which rise in the centre of Purbeck. It is strongly placed on an eminence falling almost sheer on three sides. Its ruins are extensive, and date for the most part from the Norman period to the reign of Edward I. There is, however, a trace

of early masonry which may have belonged to the Saxon house where,

in 978, King Edward the Martyr was murdered. Corfe Castle was held for the empress Maud against King Stephen in 1139, was frequently the residence-of King John, and was a stronghold of the barons against Henry III. Edward II. was imprisoned here for a short period. The castle withstood a protracted siege by the Parliamentarians in 1643, and fell to them by treachery in 1646, after which it was dismantled and wrecked. The church in the town, almost wholly rebuilt, is dedicated to St Edward the Martyr. The quarrying of Purbeck stone and the raising of potters' clay are the chief industries.

Probably Corfe Castle (Corfes geat, Corf geat, Corve, Corph) was an early Anglo-Saxon settlement. According to William of Malmesbury the church was founded by St Aldhelm in the 7 th century. In 1086 the abbey of Shaftesbury held the manor, which afterwards passed to the Norman kings, who raised the castle. Its date is disputed, but the town dependent on it seems to have grown up during the 13th century, being first mentioned in 1290, when an inquisition states that the mayor has pesag« of wool and cheese. The rights of the burgesses seem to have been undefined, for frequent commissions attest to encroach- ments on the rights of warren, forest and wreckage belonging to the royal manor. In 1380-1381 at an inquisition into the liberties of Corfe Castle, the jurors declared that from time immemorial the constable and his steward had held all pleas and amerciaments except those of the mayor's court of Pie Powder, but that the town had judgment by fire, water and combat. The tenants, or " barons," elected themselves a mayor and coroners, but the constable received the assize of ale. Elizabeth in 1577 gave exclusive admiralty jurisdiction within the island of Purbeck to Sir Christopher Hatton, and granted the mayor and " barons " of Corfe the rights they enjoyed by prescription and charter and that of not being placed on juries or assizes in matters beyond the island. Charles II. incorporated Corfe Castle in 1663, the mayor being elected at a court leet from three nominees of the lord of the manor. Corfe Castle first returned two representatives to parliament in 1572, but was disfranchised in 1832. A market for each Saturday was granted to Corfe in 1 214, and in 1248 the town obtained a fair and a market on each Thursday, while Elizabeth granted fairs on the feasts of St Philip and St James and of St Luke; both of these still survive. As early as the 14th century the quarrying and export of marble gave employment to the men of Corfe, and during the 18th century the knitting of stockings was a flourishing industry.

See T. Bond, History and Description of Corfe Castle (London and

Bournemouth, 1883).

CORFINIUM, in ancient Italy, the chief city of the Paeligni, 7 m. N. of Sulmona in the valley of the Aternus. The site of the original town is occupied by the village of Pentima. It probably became subject to Rome in the 4th century B.C., though it does not appear in Roman history before the Social War (90 B.C.), in which it was at first adopted by the allies as the capital and seat of government of their newly founded state under the name Italia (this form, not Italica, is vouched for by the coins). It appears also as a fortress of importance in the Civil War, though it only resisted Caesar's attack for a week (49 B.C.). Whether the Via Valeria ran as far as Corfinium before the time of Claudius is uncertain: he, however, certainly extended it to the Adriatic, and at the same time constructed a cross road, the Via Claudia Nova, which diverged from the Via Claudia Valeria at a point 6 m. farther north, and led past Peltuinum and Aveia to Foruli on the Via Salaria. Another road ran S.S.E. past Sulmo to Aesernia. It was thus an im- portant road centre, and must have been, in the imperial period, a town of some size, as may be gathered from the inscriptions that have been discovered there, and from the extent rather than the importance of the buildings visible on the site (among them may be noted the remains of two aqueducts), which has, however, never been systematically excavated. Short accounts of discoveries will be found in Notizie degli Scavi, passim, and a museum, consisting chiefly of the contents of tombs, has been formed at Pentima. In one corner of a large enclosed space (possibly a palaestra) was constructed the church of S. Pelino,

The present building dates from the 13th century, though its origin may be traced to the end of the 5th when it was the cathedral of the see of Valva, which appears to have been the name of Corfinium at the close of the Roman period. (T. As.)

CORFU (anc. and mod. Gr. Kep/cupa. or KopKvpa, Lat. Corcyra), an island of Greece, in the Ionian Sea, off the coast of Albania or Epirus, from which it is separated by a strait varying in breadth from less than 2 to about 15 m. The name Corfu is an Italian corruption of the Byzantine Kopv<£<&, which is derived from the Greek Kopvai (crests). In shape it is not unlike the sickle (drepane), to which it was compared by the ancients, — the hollow side, with the town and harbour of Corfu in the centre, being turned towards the Albanian

coast. Its extreme length is about 40 m. and its greatest breadth about 20. The area is estimated at 227 sq. m., and the population in 1907 was 99,571, of whom 28,254 were in the town and suburbs of Corfu. Two high and well-defined ranges divide the island into three districts, of which the northern is mountainous, the central undulating and the southern low-lying. The most important of the two ranges is that of San Salvador, probably the ancient Istone, which stretches east and west from Cape St Angelo to Cape St Stefano, and attains its greatest elevation of 3300 ft. in the summit from which it takes its name. The second culminates in the mountain of Santi Deca, or Santa Decca, as it is called by misinterpretation of the Greek designation oi "Ayioi Ako, or the Ten Saints. The whole island, composed as it is of various limestone formations, presents great diversity of surface, and the prospects from the more elevated spots are magnificent.

Corfu is generally considered the most beautiful of all the Greek isles, but the prevalence of the olive gives some monotony to its colouring. It is worthy of remark that Homer names, as adorning the garden of Alcinous, seven plants only — wild olive, oil olive, pear, pomegranate, apple, fig and vine. Of these the apple and the pear are now very inferior in Corfu; the others thrive well and are accompanied by all the fruit trees known in southern Europe, with addition of the Japanese medlar(or loquat), and, in some spots, of the banana. When undisturbed by cultivation, the myrtle, arbutus, bay and ilex form a rich brushwood and the minor flora of the island is extensive.

The common form of land tenure is the colonia perpelua, by which the landlord grants a lease to the tenant and his heirs for ever, in return for a rent, payable in kind, and fixed at a certain proportion of the produce. Of old, a tenant thus obtaining half the produce to himself was held to be co-owner of the soil to the extent of one-fourth; and if he had three-fourths of the crop, his ownership came to one-half. Such a tenant could not be expelled except for non-payment, bad culture or the transfer of his lease without the landlord's consent. Attempts have been made to prohibit so embarrassing a system; but as it is preferred by the agriculturists, the existing laws permit it. The portion of the olive crop due to the landlord, whether by colonia or ordinary lease, is paid, not according to the actual harvest, but in keeping with the estimates of valuators mutually appointed, who, just before the fruit is ripe, calculate how much each tree will probably yield. The large old fiefs (baronie) in Corfu, as in the other islands, have left their traces in the form of quit-rents (known in Scotland by the name of feu-duties), generally equal to one-tenth of the produce. But they have been much subdivided, and the vassals may by law redeem them. Single olive trees of first quality yield sometimes as much as 2 gallons of oil, and

this with little trouble or expense beyond the collecting and pressing of the fallen fruit. The trees grow unrestrained, and some are not less than three hundred years old. The vineyards are laboured by the broad heart-shaped hoe. The vintage begins on the festival of Santa Croce, or the 26th of September (O.S.). None of the Corfu wines is much exported. The capital is the only city or town of much extent in the island; but there are a number of villages, such as Benizze, Gasturi, Ipso, dypho, with populations varying from 300 to 1000. Near Gasturi stands the Achilleion, the palace built for the Empress Elizabeth of Austria, and purchased in 1907 by the German emperor, William II.

The town of Corfu stands on the broad part of a peninsula, whose termination in the citadel is cut from it by an artificial fosse formed in a natural gully, with a salt-water ditch at the bottom. Having grown up within fortifications, where every foot of ground was precious, it is mostly, in spite of recent im- provements, a labyrinth of narrow, tortuous, up-and-down streets, accommodating themselves to the irregularities of the ground, few of them fit for wheel carriages. There is, however, a handsome esplanade between the town and the citadel, and a promenade by the seashore towards Castrades. The palace, built by Sir Thomas Maitland (?i 759-1824; lord high com- missioner cf the Ionian Islands, 181 5), is a large structure of white Maltese stone. In several parts of the town may be found houses of the Venetian time, with some traces of past splendour, but they are few, and are giving place to structures in the modern and more convenient French style. Of the thirty-seven Greek churches the most important are the cathedral, dedicated to Our Lady of the Cave (17 Uavayla S7njXt

History. — According to the local tradition Corcyra was the Homeric island of Scheria, and its earliest inhabitants the Phaeacians. At a date no doubt previous to the foundation of Syracuse it was peopled by settlers from Corinth, but it appears to have previously received a stream of emigrants from Eretria. The splendid commercial position of Corcyra on the highway between Greece and the West favoured its rapid growth, and, influenced oerhaps by the presence of non-Corinthian settlers, its people, quite contrary to the usual practice of Corinthian colonies, maintained an independent and even hostile attitude towards the mother city. This opposition came to a head in the early part of the 7th century, when their fleets fought the first naval battle recorded in Greek history (about 664 B.C.). These hostilities ended in the conquest of Corcyra by the Corinthian tyrant Periander (c. 600), who induced his new subjects to join in the colonization of Apollonia and Anactorium. The island soon regained its independence and henceforth devoted itself to a purely mercantile

policy. During the Persian invasion of 480 it manned the second largest Greek fleet (60 ships), but took no active part in the war. In 435 it was again involved in a quarrel with Corinth and sought assistance from Athens. This new alliance was one of the chief immediate causes of the Peloponnesian War (q.v.), in which Corcyra wa9 of considerable use to the Athenians as a naval station, but did not render much assistance with its fleet. The island was nearly lost to Athens by two attempts of the oligarchic faction to effect a revolution; on each occasion the popular party ultimately won the day and took a most bloody revenge on its opponents (427 and 425). During the Sicilian campaigns of Athens Corcyra served as a base for supplies; after a third abortive rising of the oligarchs in 410 it practically withdrew from the war. In 375 it again joined the Athenian alliance; two years later it was besieged by a Lacedaemonian armament, but in spite of the devastation of its flourishing countryside held out successfully until relief was at hand. In the Hellenistic period Corcyra was exposed to attack from several sides; after a vain siege by Cassander it was occupied in turn by Agathocles and Pyrrhus. It subsequently fell into the hands of Illyrian corsairs, until in 229 it was delivered by the Romans, who retained it as a naval

station and gave it the rank of a free state. In 31 B.C. it served Octavian (Augustus) as a base against Antony.

Eclipsed by the foundation of Nicopolis, Corcyra for a long time passed out of notice. With the rise of the Norman kingdom in Sicily and the Italian naval powers, it again became a frequent object of attack. In 1081-1085 it was held by Robert Guiscard, in 1147-1154 by Roger II. of Sicily. During the break-up of the Later Roman Empire it was occupied by Genoese privateers (1197-1207) who in turn were expelled by the Venetians. In 1 2 14-12 59 it passed to the Greek despots of Epirus, and in 1267 became a possession of the Neapolitan house of Anjou. Under the latter’s weak rule the island suffered considerably from the inroads of various adventurers ; hence in 1386 it placed itself under the protection of Venice, which in 1401 acquired formal sovereignty over it. Corcyra remained in Venetian hands till 1797, though several times assailed by Turkish armaments and subjected to two notable sieges in 1536 and 1716-1718, in which the great natural strength of the city again asserted itself. The Venetian feudal families pursued a mild but somewhat enervating policy towards the natives, who began to merge their nationality in that of

the Latins and adopted for the island the new name of Corfu. The Corfiotes were encouraged to enrich themselves by the cultivation of the olive, but were debarred from entering into commercial competition with Venice. The island served as a refuge for Greek scholars, and in 1732 became the home of the first academy of modern Greece, but no serious impulse to Greek thought came from this quarter.

By the treaty of Campo Formio Corfu was ceded to the French, who occupied it for two years, until they were expelled by a Russo-Turkish armament (1799). For a short time it became the capital of a self-governing federation of the Hephtanesos ("Seven Islands"); in 1807 its faction-ridden government was again replaced by a French administration, and in 1809 it was vainly besieged by a British fleet. When, by the treaty of Paris of November 5, 181 5, the Ionian Islands were placed under the protectorate of Great Britain, Corfu became the seat of the British high commissioner. The British commissioners, who were practically autocrats in spite of the retention of the native senate and assembly, introduced a strict method of government which brought about a decided improvement in the material prosperity of the island, but by its very strictness displeased the natives. In 1864 it was, with the other Ionian Islands, ceded to the kingdom of Greece, in accordance with the wishes of the inhabitants. The island has again become an important point of call and has a considerable trade in olive oil; under a more careful system of tillage the value of its agricultural products might be largely increased.

Corf u contains very few and unimportant remains of antiquity. The site of the ancient city of Corcyra(K£p/ci;pa) is wellascertained, about i| m. to the south-east of Corfu, upon the narrow piece of ground between the sea-lake of Calichiopulo and the Bay of Castrades, in each of which it had a port. The circular tomb of Menecrates, with its well-known inscription, is on the Bay of Castrades. Under the hill of Ascension are the remains of a temple, popularly called of Neptune, a very simple Doric struc- ture, which still in its mutilated state presents some peculiarities of architecture. Of Cassiope, the only other city of ancient im- portance, the name is still preserved by the village of Cassopo, and there are some rude remains of building on the site; but the temple of Zeus Cassius for which it was celebrated has totally disappeared. Throughout the island there are numerous monasteries and other buildings of Venetian erection, of which the best known are Paleocastrizza, San Salvador and Pelleka.

Authorities. — Strabo vi. p. 269; vii. p. 329; Herodotus viii. 168; Thucydides i.-iii. ; Xenophon, Hellenica, vi. 2; Polybius ii. 9-1 1 ;

Plutarch, Quaestiones Graecae, ch. xi. ; H. Jervis, The Ionian- Islands during the Present Century (London, 1863); D. F. Ansted, The Ionian Islands in the Year 1863 (London, 1863) ; Riemann, Recherches archeologiques sur les lies ioniennes (Paris, 1 879-1 880); J. Partsch, Die Insel Korfu (Gotha, 1887) ; B. Schmidt, Korkyraische Studien (Leipzig, 1890); B. V. Head, Historia Numorum (Oxford, 1887), pp. 275-277; H. Lutz in Philologus, 56 (1897), pp. 71-77; also art. Numismatics: Greek, § " Epirus." (E. Gr. ; M. O. B. C.)

CORI (anc. Cora), a town and episcopal see of the province of Rome, Italy, 36 m, S.E. by rail from the town of Rome, on the lower slopes of the Volscian mountains, 1300 ft. above sea-level. Pop. (1901) 6463. It occupies the site of the ancient Volscian town of Cora, the foundation of which is by classical authors variously ascribed to Trojan settlers, to the Volscians (with a later admixture of Latins), and to the Latins themselves. The last is more probable (though in that case it was the only town of the Prisci Latini in the Volscian hills), as it appears among the members of the Latin league. Coins of Cora exist, belonging at latest to 350-250 B.C. It was devastated by the partisans of Marius during the struggle between him and Sulla. Before the end of the Republic it had become a municipium. It lay just above the older road from Velitrae to Terracina, which followed the foot of the Volscian hills, but was 6 m. from the Via Appia, and it is therefore little mentioned by classical writers. It is comparatively often spoken of in the 4th century, but from that time to the 13th we hear hardly anything of it, as though it had almost ceased to exist. The remains of the city walls are considerable : three different enceintes, one within the other, enclose the upper and lower town and the acropolis. They are built in Cyclopean work, and different parts vary con- siderably in the roughness or fineness of the jointing and hewing of the blocks; but explorations at Norba (q.v.) have proved that inferences as to their relative antiquity based upon such con- siderations are not to be trusted. There is a fine single-arched bridge, now called the Ponte della Catena, just outside the town on the way to Norba, to which an excessively early date is often assigned.

At the summit of the town is a beautiful little Doric tetrastyle temple, belonging probably to the 1st century B.C., built of limestone with an inscription recording its erection by the duumviri. It is not known to what deity it was dedicated; and there is no foundation for the assertion that the porphyry statue of Minerva (or Roma) now in front of the Palazzo del Senatore, at Rome, was found here in the 16th century. Lower down are two columns of a Corinthian temple dedicated to Castor and Pollux, as the inscription records. The church of Santa Oliva stands upon the site of a Roman building. The cloister,

constructed in 1466-1480, is in two storeys; the capitals of the columns are finely sculptured by a Lombard artist (G. Giovan- noni in L" 'Arte, 1906, p. 108). There are remains of several other ancient buildings in the modern town, especially of a series of large cisterns probably belonging to the imperial period. Some interesting frescoes of the Roman school of the 15 th century are to be found in the chapel of the Annunziata outside the town (F. Hermanin in L' Arte, 1906, p. 45).

See G. B. Piranesi, Antichitd, di Cora (Rome, n.d., c. 1770); A. Nibby, Analisi della Carta dei Dintorni di Roma (Rome, 1848), i. 487 seq. (T. As.).

CORIANDER, the fruit, improperly called seed, of an umbelli- ferous plant (Coriandrum sativum), a native of the south of Europe and Asia Minor, but cultivated in the south of England, where it is also found as an escape, growing apparently wild. The name is derived from the Gr. /copts (a bug), and was given on account of its foetid, bug-like smell. The plant produces a slender, erect, hollow stem rising 1 to 2 ft. in height, with bipinnate leaves and small flowers in pink or whitish umbels. The fruit is globular and externally smooth, having five indistinct ridges, and the mericarps, or half-fruits, do not readily separate from each other. It is used in medicine as an aromatic and carminative, the active principle being a volatile oil, obtained by distillation, which is isomeric with Borneo camphor, and may be given in doses of J to 3 minims. On account of its pleasant and pungent flavour it is a favourite ingredient in hot curries and sauces. The fruit is also used in confectionery, and as a flavouring ingredient in various liqueurs. The essential oil on which its aroma depends is obtained from it by distillation. The tender leaves and shoots of the young plant are used in soups and salads.

CORINGA, a seaport of British India, in the district of Godavari and presidency of Madras, on the estuary of a branch of the

Godavari river. The harbour is protected from the swell of the sea by the southward projection of Point Godavari, and affords a shelter to vessels during the south-west monsoon; but though formerly the most important on this coast it has been silted up and lost its trade. The repairing and building of small coasting ships is an industry at Tallarevu in the vicinity. In 1787 a gale from the north-east

occasioned an inundation which swept away he greater part of Coringa with its inhabitants; and in 1832 another storm desolated the place, carrying vessels into the fields and leaving them aground. Of Europeans the Dutch were the first to establish themselves at Coringa. In 1759 the English took possession of the town, and erected a factory 5 m. to the south of it.

CORINNA, surnamed “the Fly,” a Greek poetess, born at Tanagra in Boeotia, flourished about 500 B.C. She is chiefly known as the instructress and rival of Pindar, over whom she gained the. victory in five poetical contests. According to Pausanias (ix. 22. 3), her success was chiefly due to her beauty and her use of the local Boeotian dialect. The extant fragments of her poems, dealing chiefly with mythological subjects, such as the expedition of the Seven against Thebes, will be found in Bergk’s Poetae Lyrici Graeci.

Some considerable remains of two poems on a 2nd-century papyrus (Berliner Klassikertexte, v., 1907) have also been attributed to Corinna (W. H. D. Rouse’s Year’s Work in Classical Studies, 1907; J. M. Edmonds, New Frags, of . . . and Corinna, 1910).

CORINTH, a city of Greece, situated near the isthmus (see Corinth, Isthmus of) which connects Peloponnesus and central Greece, and separates the Saronic and the Corinthian gulfs on E. and W. The ancient town stood 15 m. from the latter, in a plain extending westward to Sicyon. The citadel, or Acro- corinthus, rising precipitously on the S. to a height of 1886 ft. was separated by a ravine from Oneium, a range of hills which runs E. to the isthmus entrance. Between this ridge and the offshoots of Geraneia opposite a narrow depression allowed of easy transit across the Isthmus neck. The territory of Corinth was mostly rocky and unfertile; but its position at the head of two navigable gulfs clearly marked it out as a commercial centre. Its natural advantages were enhanced by the ” Diolcus ” or tram-road, by which ships could be hauled across the Isthmus. It was connected in historic times with its western port of Lechaeum by two continuous walls, with Cenchreae and Schoenus on the east by chains of fortifications. The city walls attained a circuit of 10 m.

I. History. — In mythology, Corinth {originally named Ephyre) appears as the home of Medea, Sisyphus and Bellerophon, and already has over-sea connexions which illustrate its primitive commercial activity. Similarly the early presence of Phoenician traders is attested by the survival of Sidonian cults (Aphrodite Urania, Athena Phoenicice, Melicertes, i.e. Melkarth). In the Homeric poems Corinth

is a mere dependency of Mycenae; nor does it figure prominently in the tradition of the Dorian migrations. Though ultimately conquered by the invaders it probably retained much of its former ” Ionian ” population, whose god Poseidon continued to be worshipped at the national Isthmian games throughout historic times; of the eight communal tribes perhaps only three were Dorian. Under the new dynasty of Aletes, which reigned according to tradition from 1074 to 747, Corinthian history continues obscure. The govern- ment subsequently passed into the hands of a small corporation of nobles descended from a former king Bacchis, and known as the Bacchidae, who nominated annually a Prytanis (president) from among their number. The maritime expansion of Corinth at this time is proved by the foundation of colonies at Syracuse and Corcyra, and the equipment of a fleet of triremes (the newly invented Greek men-of-war) to quell a revolt of the latter city.

But Corinth’s real prosperity dates from the time of the tyranny (657-581), established by a disqualified noble Cypselus {q.v.). and continued under his son Periander (q.v.). Under these remarkable men, whose government was apparently mild, the city rapidly developed. She extended her sphere of influence throughout the coastlands of the western gulf; by the settle-

ment of numerous colonies in N.W. Greece she controlled the Italian and Adriatic trade-routes and secured a large share of the commerce with the western Greeks. In Levantine waters connexions grew up with the great marts of Chalcis and Miletus, with the rulers of Lydia, Phrygia, Cyprus and Egypt. As an industrial centre Corinth achieved pre-eminence in pottery, metal-work and decorative handicraft, and was the reputed ” inventor ” of painting and tiling; her bronze and her pottery, moulded from the soft white clay of Oneium, were widely exported over the Mediterranean. The chief example of her early art was the celebrated ” chest of Cypselus ” at Olympia, of carved cedar and ivory inlaid with gold. The city was enriched with notable temples and public works (see § Archaeology) , and became the home of several Cyclic poets and of Arion, the perfecter of the dithyramb.

The tyranny was succeeded by an oligarchy based upon a graduated money qualification, which ruled with a consistency equalling that of the Venetian Council, but pursued a policy too purely commercial to the neglect of military efficiency. Late in the 6th century Corinth joined the Peloponnesian league under Sparta, in which her financial resources and strategic position secured her an unusual degree of independence. Thus the city successfully befriended the Athenians against Cleomenes I. (q.v.), and supported them against Aegina, their

common commercial rival in eastern waters. In the great Persian war of 480 Corinth served as the Greek headquarters: her army took part at Thermopylae and Plataea and her navy distinguished itself at Salamis and Mycale. Later in the century the rapid development of Athenian trade and naval power became a serious menace. In 459 the Corinthians, in common with their former rivals the Aeginetans, made war upon Athens, but lost both by sea and land. Henceforward their Levantine commerce dwindled, and in the west the Athenians extended their rivalry even into the Corinthian Gulf. Though Syracuse remained friendly, and the colonies in the N.W. maintained a close commercial alliance with the mother-city, the disaffection of Corcyra hampered the Italian trade. The alliance of this latter power with Athens accentuated the rising jealousy of the Corinthians, who, after deprecating a federal war in 440, virtually forced Sparta's hand against Athens in 432. In the subsequent war Corinth displayed great activity in the face of heavy losses, and the support she gave to Syracuse had no little influence on the ultimate issue of the war (see Peloponnesian War). In 395 the domineering attitude of Sparta impelled the Corinthians to conclude an alliance with Argos which they had previously contemplated on occasions of friction with the former city, as well as with Thebes and with Athens, whose commercial rivalry they no longer dreaded. In the ensuing " Corinthian War " the city suffered severely, and the war-party only main- tained itself by the help of an Argive garrison and a formal annexation to Argos. Since 387 the Spartan party was again supreme, and after Leuctra Corinth took the field against the Theban invaders of Peloponnesus (371-366). In 344 party struggles between oligarchs and democrats led to a usurpation by the tyrant Timophanes, whose speedy assassination was compassed by his brother Timoleon (q.v.).

After the campaign of Chaeronea, Philip II. of Macedon summoned a Greek congress at Corinth and left a garrison on the citadel. This citadel, one of the "fetters of Greece," was eagerly contended for by the Macedonian pretenders after Alexander's death; ultimately it fell to Antigonus Gonatas, who controlled it through a tyrant. In 243 Corinth was freed by Aratus and incorporated into the Achaean league. After a short Spartan occupation in 224 it was again surrendered to Macedonia. T. Quinctius Flamininus, after proclaiming the liberty of Greece at the Isthmus, restored Corinth to the league (196). With the revival of its political and commercial import- ance the city became the centre of resistance against Rome. In return for the foolish provocation of war in 146 B.C. the Roman conquerors despoiled Corinth of its art treasures and destroyed the entire settlement: the land was partly made over to Sicyon and partly

became public domain.

14-8

CORINTH

In 46 Julius Caesar repeopled Corinth with Italian freedmen and dispossessed Greeks. Under its new name Laus Julii and an Italian constitution it rapidly recovered its commercial prosperity. Augustus made it the capital of Achaea; Hadrian enriched it with public works. Its prosperity, as also its pro- fligacy, is attested by the New Testament, by Strabo and Pausanias. After the Gothic raids of 267 and 395 Corinth was secured by new fortifications at the Isthmus. Though restricted to the citadel, the medieval town became the administrative and ecclesiastical capital of Peloponnesus, and enjoyed a thriving trade and silk industry until in 1147 it was sacked by the Normans. In 1210 it was joined to the Latin duchy of the Morea, and subsequently was contended for by various Italian pretenders. Since the Turkish conquest (1459) the history of Corinth has been uneventful, save for a raid by the Maltese in 161 1 and a Venetian occupation from 1687 to 1715.

Authorities. — Strabo, pp. 378-382; Pausanias ii. 1-4; Curtius, Peloponnesos (Gotha, 1851), ii. 514-556; E. Wilisch, Die Altkorin- thische Thonindustrie (Leipzig, 1892) and Geschickte Korinth's (1887, 1896, 1901); G. Gilbert, Griechische Staatsaltertilmer (Leipzig, 1885), li. pp. 87-91. (M. O. B. C.)

II. Archaeology and Modern Town. — The modern town of New Corinth, the head of a district in the province of Corinth (pop. 71,229), is situated on the Isthmus of Corinth near the south- eastern recess of the Gulf of Corinth, 35 m. N.E. from the site of the ancient city. It was founded in 1858, when Old Corinth was destroyed by an earthquake. It is connected by railway with Athens (57 m.), with Patras (80 m.), and with Nauplia (40 m.), the capital of Argolis. Communication by sea with Athens, Patras, the Ionian Islands and the shores of the Ambracian Gulf, is constant since the opening of the Corinthian ship canal, in 1893. It has not, however, attained great pros perity. It has broad streets and low houses, but is architec- turally unattractive, like most of the creations of the time of King Otto. Its chief exports are seedless grapes (" currants "), olive-oil, silk and cereals. Pop. (1905) about 4300.

Old Corinth passed through its various stages, Greek, Roman, Byzantine, Turkish. After the War of Liberation it was again Greek,

and, being a considerable town, was suggested as the capital of the new kingdom of Greece. The earthquake of 1858 levelled it to the ground with the exception of about a dozen houses. A mere handful of the old inhabitants remained on the site. But fertile fields and running water made it attractive; and outsiders gradually came in. At present it is an untidy, poverty-stricken village of about 1000 inhabitants, mostly of Albanian blood. Like the ancient city, it spreads out over two terraces, one about 100 ft. above the other. These were formed in different geological ages by the gulf, which had in historical times receded to a distance of 1 \ m. from the city. At the nearest point to the city was laid out the harbour, Lechaeum, a basin dug far into the shore and joined with the city by long walls. At about the middle of the two terraces, 15 m. long, the edge of the upper one was worn back into a deep indentation, probably by running water, possibly by quarrying. Here was the heart of the ancient city. At the lower end of the indentation is the modern public square, shaded by a gigantic and picturesque plane tree, nourished by the surplus water of Pirene. As the visitor looks from the square up the indentation he sees on a height to the right a venerable temple ruin, and, directly in front, Aero-Corinth, rising over 1 500 ft. above the village. Even from the village, the view over the gulf , including Parnassus with its giant neighbours on the N., Cyllene and its neighbours on the W., and Geraneia on the N.E., is very fine. But from Acro- Corinth the view is still finer, and is perhaps unsurpassed in Greece.

The excavations begun in 1896 by the American school of Classical Studies at Athens, under the direction of Rufus B. Richardson, have brought to light important monuments of the ancient city, both Greek and Roman.

The first object was the locating of the agora, or public square, first because Pausanias says that most of the important monu- ments of the city were either on or near the agora; and secondly because, beginning with the agora, he mentions, sometimes with

a brief description, the principal monuments in order along three of the principal thoroughfares radiating from it. In the first year's work twenty-one trial trenches were dug in the hope of finding a clue to its position. Somewhat less than a quarter of a mile to the N.W. of the temple, set back into the edge of the upper terrace, there was found, under 20 ft. of soil, a ruined Roman theatre built upon the ruins of a Greek theatre. This theatre was, according to Pausanias, on the street leading from the agora towards Sicyon, and so to the west of the agora. Another trench dug across the deep indentation to the E. of the temple revealed a broad limestone pavement leading from the very

northern edge of the city up through the indentation, in the direction of Aero-Corinth. It required little sagacity to

CORINTH

showing sites of excavations

Theatre

Yards

100

Metres

Clauce

Baths of Eurycles

Greek Temple

ˆRoman Building .ferine Pr ˚pylae*- }

I

identify it with the street mentioned by Pausanias as leading from the agora towards Lechaeum. It was practically certain that by following up this pavement to its point of intersection with the road from Sicyon the agora would be discovered.

The limestone pavement, with long porches on either side, was found to stop at the foot of a marble staircase of thirty-four steps of Byzantine construction, underneath which appeared a Roman arrangement of the two flights with a platform halfway up. The top flight led up to the propylaea. The remains of the propylaea above ground are few; but the foundations are massive and well laid, at the end of the upper terrace where it is farthest worn back. These foundations are clearly those of a Roman triumphal arch, which perhaps took the name ” pro- pylaea ” from an ancient Greek structure on the same spot. This arch appears on Roman coins from Augustus to Commodus; according to Pausanias it bore two four-horse chariots, one driven by Helios and the other by Phaethon, his son, all in gilded bronze.

Although a considerable part of the agora has been excavated, none of the statues which Pausanias saw in it have been dis- covered. On the upper (S.) side are excellent foundations of a long porch. On the N. side, stretching westward from the

propylaea, are two porches of different periods. The older one, which still existed in Roman times, was backed up against the temple hill, which was cut away to make room for it. An ancient staircase, 15 ft.

broad, led down from the temple hill into the lower area of the broad pavement, from which access to the agora and the Pirene was easy.

To the E. of the paved road and close up against the agora itself, only at a much lower level, was found, buried under 35 ft. of earth, the famous fountain Pirene, tallying exactly with the description of Pausanias, as ” a series of chambers that are like caves, and bearing a facade of white marble.” This Pirene originally had a two-storey facade of Roman fashion made of limestone, but, before the time of Pausanias, it had received a covering of marble which has now fallen off, but has left traces of itself in the holes drilled into the limestone, in the rough hacking away of the half columns, and in the numerous marble fragments which lay in front of the f acade. This was not, however, the earliest form of Pirene. It was built up in front of a more simple Greek fountain-structure which consisted of seven cross-walls placed under the edge of the stratum forming the upper terrace. Six chambers were thus formed which showed the chaste beauty of Greek workmanship-, while the stratum of native rock which covered them gave a touch of nature and made them caves. The walls ended at the front in the form of an anta delicately carved. On a parapet at the rear of each chamber a single slender Ionic column between two antae supported an Ionic entablature. The stuccoed walls were striped horizontally and vertically with red on a blue field, on which appear fishes swimming. The chambers were really reservoirs, filled by the water which flowed along their backs.

We know nothing further about the Greek system, but in the Roman adjustment the water was led from this series of cisterns into a large rectangular basin which formed the centre of a quadrangle 50 ft. square. In the N.E. corner is a hole through which it was drained, and at the N. end a flight of five steps led down into it. Besides the four orifices through which water ‘flowed into it there were two other holes about 4 in. lower down to keep the basin from overflowing. Two uses of water are mentioned by Pausanias. ” The water,” he says, ” was sweet to drink,” and also good for tempering bronze. It seems clear then, that the basin was at stated times used for the latter purpose, and was converted into a tank. The bronze was plunged into the water in a red hot condition, and thus acquired its peculiar excellence.

In Byzantine times five columns, of various diameters, with no two bases of the same size, bearing Corinthian capitals, were set up about 6 ft. in front of the facade. Blocks of marble which had seen use elsewhere ran from them back into the facade, which was hacked away in rough fashion to receive them. Probably these blocks formed

the floor of a balcony, a tawdry marble addition.

Pirene was at all times the heart of the city. Here it was that Athena helped Bellerophon to bridle Pegasus; and hence she received the epithet of ” the Bridler,” Chalinitis. The importance of the fountain is attested by the fact that the Greek poets and the Delphic oracle instead of saying Corinth said, ” the city of Pirene.” That it was a place of common resort is shown by Euripides {Medea, 68 f.), where it is said that the elders were to be found ” near the august waters of Pirene, playing draughts (ire

Of the surviving monuments of the Greek city the most important is the temple of Apollo. While it was probably badly wrecked by the Romans at the sack of the city, its massive columns with the entablature survived. That it was restored and was in use in Roman time is shown by the fact that both the seven columns still standing and two fallen columns dis- covered in the excavations, to say nothing of several fragments of others, have a thick coating of Roman stucco laid over the finer Greek. The style of the temple points to 600 B.C., when Periander was at the height of his power. According to Herodotus he made his doubtful adherents deposit pledges of faithfulness in the temple of Apollo. Quite near the W. end of the temple is the fountain Glauce cut out of a cube of rock, apparently left standing when the material for the temple was quarried around it. In it were carved out four chambers or reservoirs all connected and a porch consisting of three pillars between two antae in which the side walls ended. The water coming down from Aero-Corinth was introduced from behind. Approached by a flight of steps partly rock-cut, it had at the rear of the porch a balustrade with marble lions’ heads through which the water overflowed. Two of these heads were found. The top of the system of reservoirs was too heavy for the slender cross walls and pillars, only the stumps of which remain; a collapse took place, by which the porch and the W. compartment were carried away. From its location only about 50 yds. from the temple it seems to have been the temple fountain. It was named after the second wife of Jason, Glauce, who plunged into it to quench the fire of the poisoned bridal garments given her by Medea.

It is not surprising that monuments were found of which there is no record in ancient writings. Such was a very ancient fountain W. of the propylaea, 25 ft. below the surface. Under remains of the Roman city appeared a triglyphon of porous stone with an extent from N. to S. of about 30 ft. At the N. end it turned westward at an obtuse angle and extended about 10 ft. in that direction. The system is about 4 ft. high. While the colours on the metopes and triglyphs had faded somewhat,

the border above them, topped with a cornice projecting 6 in., retained a most brilliant maeander pattern of red, blue and yellow, while below these were two bands of godroons of blue and red. On the top of this system as a foundation were set several statue bases, one bearing the signature of Lysippus, which shows that the system stood there at least as early as the 4th century B.C. Some parts of it may have been taken from older buildings, but not the cornice nor the corner metope block which formed an obtuse angle. Near the middle of the long side is an opening; and from it a flight of seven steps led down to a trapezoidal chamber, on the back wall of which are two lions' heads of bronze, through which water, conducted in long semi-cylindrical channels of bronze, from behind the wall, poured out into pitchers for which holes are cut in the floor. Channels for the overflow were cut along the back and sides of the chamber. All this was once approached from the front at the level of the floor, long before the triglyphon was set up, 7 ft. above it. Considering its depth this fountain must be dated back to the 5th century, probably near the beginning. The style of the lions' heads would hardly admit a later date. This is the only case of an ancient Greek fountain of such an early date, unaltered and intact. The pains taken to preserve it suggest that it was invested with a sacred character.

Sculptures in large numbers, both of the Greek city and the Roman, are collected in the new museum erected by the Greek government near the plane tree. The finest of the Greek sculptures is the head of a youth found in the orchestra of the theatre at a depth of 23 ft. It lacks only the lower part of the bridge of the nose, and has style and character, resembling Myron's heads in shape and in the hair. A large fragment of a relief also of early" date, represents two dancing maenads half life-size. Most impressive is a colossal female figure of grand style and excellent drapery. If not an original of the 5th century it is one of the finest of copies. Of the great amount of Roman sculpture the best single piece is a head of Dionysus under, the

influence of wine, crowned with a wreath of ivy, his right hand thrown carelessly over his head. The fine execution is all that differentiates it from the numerous copies in various museums. The most important sculptures of the Roman period, however, are a group of colossal figures supporting an entablature, a large part of which has been recovered. One of the figures, a barbarian captive, effeminate like those which appear on Roman triumphal arches, is practically

intact. Another, its counterpart, is preserved down to the hips. These differ from Caryatids, which bear the architrave on their heads. Here a pilaster forming the back of the figure receives a Corinthian capital, upon which the architrave rests; and the figures merely brace up the pilaster. Two of these figures stood at the end of a re-entrant curve, several pieces of which are preserved. Two female heads of like proportions belong to the system, since the backs of their heads are cut away in the same manner as the male heads. The building to which the figures' belonged, a porch, extended westward from the propylaea; and may be traced for 45 ft. All that is left of it is the core of opus incertum.

The excavations brought to light vases and fragments of vases, of nearly every period except the Mycenaean. On the N. side of the hill on which stands the village schoolhouse, from which one looks across the indentation to the Apollo temple, several vertical shafts in the limestone stratum were found, and under- neath it in horizontal passages were bodies surrounded with vases. These are pre-Mycenaean, and their only ornament is scratches, into which white matter has been pressed. There are over fifty of these vases, of multiform shapes. By the side of the Lechaeum road, near the steps leading to the propylaea, were found in deep diggings thirteen early Geometric vases. Proto-Corinthian vases also were everywherestronglyrepresented. The best find of pottery, however, was an Old Corinthian celebe (KeXej3ij, drinking vessel) , about a foot high, in forty-six fragments, found in a well, 30 ft. below the surface. On one side are a boar and a leopard confronting each other, and on the other sidetwo cocks in the same heraldic arrangement. On the projecting plates supported by the handles are palmettes.

Two inscriptions in the Old Corinthian alphabet came to light. But, on the whole, inscriptions before the Roman times were almost entirely lacking. One inscription, though of late date, deserves mention. On a marble block broken away at both ends, which in a second use was a lintel, we read ATOrHEBP, which can only be avvayuyfi 'Eppaiwv (synagogue of the Hebrews).

The excavations were confined to a small part of the city, but there is little doubt that it was the most important part. By good fortune the earth here was very deep. On the higher level of the agora and the Apollo temple, where the depth of earth is comparatively slight, there is little hope of important finds. There is no hope of finding the great bronze Athena, which stood in the middle of the agora. To the west, beyond the theatre, one might find the temple of Athena Chalinitis and the fountain Lerna, and somewhere near Glauce, the Odeum and

the tomb of Medea's children; but it is more likely that they have disappeared. On the Lechaeum road, on which a bewildering wealth of fountains and statues is enumerated, only the Baths of Eurycles below the plane tree were found; deep diggings were made into them, and the foundations of the facade laid bare. This great complex was apparently supplied with water from Hadrian's aqueduct from Lake Stymphalus. On the street going eastward from the agora nothing is mentioned between it and the city wall. This level eastern part was probably given up to fine houses, all traces of which have perished. Outside the gate, apparently, was the famous Craneion, shaded by cypress trees, and near it the tombs of Lais and Diogenes, a precinct of Bellerophon and of Athena Melaenis. The number of temples and shrines enumerated by Pausanias along the road leading up to Aero-Corinth is bewildering. Here were represented Isis and Serapis, Helios, the Mother of the Gods, the Fates, Demeter and Persephone; but no trace of these temples remains. At the highest point of the road, according to Pausanias, there stood the famous temple of Aphrodite, but the remains excavated at this point seem to be

those of a late tower, and the few foundations below it do not resemble those of a temple. We are equally unfortunate in regard to Strabo's splendid marble Sisyphaeum just below the summit. The fountain Pirene, " behind the temple," still exists, hut so much earth has accumulated about' it that one now approaches it by going down a ladder. The water is so crystal clear that one inadvertently steps into it. The identity of name with that of Pirene in the city is justified by the fact that the upper spring is the source of the Pirene below.

See, for details, the American Journal of Archaeology (from 1896).

(R. B. R.)

CORINTH, a city and the county-seat of Alcorn county, Mississippi, U.S.A., situated in the N.E. part of the state, about 90 m. E. by S. of Memphis, Tennessee. Pop. (1890) 21 n; (1900) 3661 (1174 negroes); (1910) 5020. It is served by the Mobile & Ohio and the Southern railways; and by a branch of the Illinois Central connecting Jackson, Miss., and Birmingham, Ala. It has woollen mills, cotton compresses, clothing, furniture, and spoke and stave factories and machine shops, and is a cotton market. Because of its situation and its import- ance as a railway junction, Corinth played an important part in the western campaigns of the Civil War. After the first Con- federate line of defence had been broken by the capture of Fort Henry and Fort Donelson (February 1862), Corinth was fortified by General P. G. T. Beauregard, and was made the centre of the new line along the

Memphis & Charleston railway, ” the great East and West artery of the Confederacy.” Grant’s advance on this centre, then defended by General A. S. Johnston, led to the battle of Shiloh, fought on April 6/7 about 20 m. N.E. of Corinth; after this engagement Beauregard withdrew to Corinth. General H. W. Halleck, with a greatly superior force, cautiously and slowly advanced upon the Confederate position, consuming more than a month in the operation. During the night of the 29th of May Beauregard evacuated the place (which was occupied by the Federals on the following day) , and re-established his line at Tupelo. Corinth then became the headquarters of the Union forces under General W. S. Rosecrans, who on the 3/4 of October 1862 was fiercely attacked here by General Earl von Dorn, whom he repulsed, both sides suffering considerable losses in killed and wounded, and the Confederates leaving many prisoners behind.

CORINTH, ISTHMUS OF, an isthmus of Greece, dividing the Gulf of Corinth from the Saronic Gulf. Ships were sometimes dragged across it in ancient times at a place called the Diolcus {faehKuv, to pull or cut through). Nero, in a.d. 67, began cutting a canal through it; but the project was abandoned. In 1893 a ship canal was opened, with its western entrance about i\ m. N.E. of the little town of New Corinth. It was begun in 1881 by a French company, which ceased operations in 1889, a Greek company completing the undertaking. The canal is about 70 ft. broad, nearly 4 m. long, and 26 ft. deep. It shortens the journey from the Adriatic to the Peiraeus by 202 m., but foreign steamships seldom use it, as the narrowness of the canal and the strength of the current at times render the passage dangerous. About 1 m. from its western end it is crossed by the iron bridge of the Athens and Corinth railway. Traces of the Isthmian wall may still be seen parallel to the canal; it was constructed, at an unknown date, for the fortification of the Isthmus. Just to the S. of it, and about 5 m. from the sea are the remains of the Isthmian precinct of Poseidon and its stadium, where the Isthmian games were celebrated. This precinct served also as a fortress. Within it have been found traces of the temple of Poseidon and other buildings. (E. Gr.)

CORINTHIANS, EPISTLES TO THE, two books of the Bible (New Testament). The two letters addressed to the Christian church at Corinth are, with Romans, the longest of the Pauline epistles. They possess a singular interest and value, due to the apostle’s close acquaintance with the members of the church addressed and their circumstances. In consequence of this intimate character the First Epistle to the. Corinthians presents a picture, unrivalled in fulness and colour, of the life of a Pauline church, while the Second Epistle, written out of strong feeling gives a revelation of the innermost

feelings and characteristic

temperament of Paul himself, such as is not elsewhere to be found. Dealing, as both epistles do, with concrete problems of morals and with such tendencies of thought and life as find their parallel in all times, they are full of instruction to the modern Church ; and this instruction increases in effectiveness the better we come to understand ancient modes of thought in their diversity from our own.

Lofty and vivid expression of the apostle's thought on the highest themes is also to be found here — witness the "Hymn to Love " (1 Cor. xiii.), the declaration of the resurrection (1 Cor. xv. ' 51-57), or the list of signatures of the true servant of God (2 Cor. vi. 3-10). In important historical statements, also, these epistles stand second to none, not even to Galatiansˆ- as may be indicated by a reference to the words about the institu- tion of the Lord's supper (1 Cor. xi. 23-26) and the death and resurrection of Jesus Christ (1 Cor. xv. 1-8); or to the auto- biographical utterances in which Paul explains that he was once a persecutor of Christians (1 Cor. xv. 9), mentions his escape from Damascus (2 Cor. xi. 32 f.), describes his coming to Corinth (1 Cor. ii. 1 ff.), enumerates his sufferings for the Gospel (2 Cor. xi. 16-31), tells of his visions (2 Cor. xii. 1-9). In the Corinthian epistles we come in contact, as nowhere else, with the man Paul and his daily life.

The history of Paul's relations with Corinth can be made out from the Acts and the Epistles with considerable clearness. The chronology of Paul's life is not at any point surely determin- able within a range of less than five years, but it must have been in the autumn of one of the years a.d. 49-53 (the usual chronology has fixed on a.d. 52) that the arrival of Paul in Corinth took place as described in Acts xviii. 1. In his so-called second missionary journey Paul had been driven by irresistible inner impulses to push on into Greece the missionary work already begun in Asia Minor. First he preached in the province of Macedonia, where the work opened auspiciously at Philippi, Thessalonica and Beroea; then, apparently driven out by the violent opposition of the Jews, he moved on to Achaea, and after rather unsuccessful attempts to secure converts among the philosophers of Athens came to Corinth.

This ancient city, taken and destroyed by the Romans in 146 B.C., had

been refounded by Julius Caesar as a Roman colony in 46 B.C., settled with Italian colonists, and made a residence of the Roman governor. Its situation on the isthmus of Corinth made it a stage on the greatest of the trade routes between Rome and the East, and it was at this time the com- mercial capital of Greece. The traditions of licentiousness and sensuality associated with the worship of Aphrodite, which had given rise to the sinister word corinthianize, increased the natural tendencies of a great city to wickedness and wanton luxury. Here, as in all great centres of trade and industry, there was a body of Jews, with a synagogue. The conditions of life in Corinth — the heathen surroundings, the temptations to vice, the competition and disputes of trading life, the controversial arguments of Jews, the alertness of mind of a lively city people, the haughty temper of the inhabitants of the capital — all these are to be seen reflected in the earnest paragraphs of Paul's two epistles.

The founding of the church in Corinth (cf. 1 Cor. iv. 15) and nearly everything important that we know of Paul's first visit there will be found, well told, in Acts xviii. 1-18, a passage for which, evidently, the writer of the history had excellent sources of information. Of the somewhat chastened spirit with which Paul came he himself tells in 1 Cor. ii. 1-5. His success was prompt and large, and in the year and six months of his stay a vigorous church was gathered, including Aquila and Priscilla, as well as Crispus, the ruler of the synagogue, of whom we hear again in 1 Cor. i. 14; whether Sosthenes, who seems to have succeeded Crispus in his office (Acts xviii. 17), was afterwards converted and became the Christian brother mentioned in 1 Cor. i. 1 cannot be known. The church evidently consisted mainly of Gentile converts, but with some Jews (1 Cor. x. 14, " flee from idolatry "; xii. 2, " when ye were Gentiles "; vii. .18, " was any man called being circumcised ?") .

The apostle's next long stay was at Ephesus, whither he seems to have gone in the course of the same year- in which he left Corinth (a.d. 51-55) and where he stayed three years. Before he arrived at Ephesus Aquila and Priscilla, who had settled there, made the acquaintance of Apollos, a Jew from Alexandria, well-educated and zealous, who with imperfect Christian know- ledge was preaching the gospel of Jesus to his fellow-countrymen in the synagogue. He presently went to Corinth and carried on Christian work there with success (Acts xviii. 24-28). " I planted," says Paul (1 Cor. iii. 6), " Apollos watered." From this point on our information comes from the epistles, of which the first was written from Ephesus before Pentecost of the year in which Paul left that city, i.e. a.d. 54-58 (1 Cor. xvi. 8).

It appears that the church grew in numbers, for Paul refers in 2 Cor. i. 1 to ” saints who are in all Achaea.” Its membership was mostly of humble people (1 Cor. i. 26-29), but probably not exclusively so, for Crispus and Stephanas (who with his household was able to render services that may well have been costly, 1 Cor. xvi. 15), Gaius and Erastus (Rom. xvi. 23), would appear to have been persons of substance. The references to law-suits perhaps imply fairly prosperous traders, the tone of the letters suggests considerable education and a reasonable degree of property on the part of many (though not all) of the readers.

The first need of the church for help from Paul seems to have grown out of the dangers from surrounding heathenism. In 1 Cor. v. 9 we read of a letter in which Paul had directed the Christians ” not to have company with fornicators.” This letter, so far as we know, opened the correspondence which was maintained during the three years of Paul’s stay in Ephesus, whence there was easy and frequent communication with Corinth. He refers to it in order to explain the injunction which had been (perhaps wilfully) misunderstood and exaggerated. 1

While at Ephesus Paul was visited by persons of the household of Chloe (1 Cor. i. n), and by Stephanas with Fortunatus and Achaicus (probably his slaves, xvi. 17). From them and from a letter (vii. 1), which was brought perhaps by Stephanas, he was able to gain the intimate knowledge which the epistles everywhere reveal. The letter from Corinth must have contained inquiries as to practical conduct with regard to marriage (vii. t), meat offered to idols (viii. 1), and the ” spiritual gifts ” (xii. 1), and may well have related to other matters, such as the collection of money for Jerusalem (xvi. 1), the visit of Apollos (xvi. 12), the position of women (xi. 2). Paul’s reply includes many other topics. When it was sent, his trusted helper Timothy had also started on his way (probably through Macedonia) to Corinth, to contribute there to the edification of the Christians (iv. 17, xvi. 10). The letter itself was doubtless sent by the hand of returning Corinthians, possibly by the unnamed brethren referred to in xvi. 1 1 , and was expected to arrive before Timothy.

First Epistle. — The first epistle (in many respects the most systematic of all Paul’s letters) is a pastoral letter, dealing both with positive evils that need correction, and with difficult questions of practice and of thought upon which advice may be valued. Through it all there is a genial undercurrent of con- fidence in the personal loyalty of the Corinthian church to Paul, its founder and father. We shall be aided to understand its contents by a brief summary of the tendencies and conditions at Corinth which it reflects.

First of all there was a lack of supreme devotion to the Cause itself, which led the Corinthians to forget that they were first, last and always Christians, and so to form factions and parties. Of these there were distinguished at least three, attached to the names respectively of the founder Paul, of the learned Apollos, and of the great pillar-apostle at Jerusalem, Peter, besides, as many hold, a fourth, which arrogantly claimed to be the party of Christ (i. 12). What were the precise motives and principles of these parties cannot be determined. They do not in any case seem to represent recognizable definite points of view

1 Hilgenfeld, Bacon and others hold that this letter is partly preserved in 2 Cor. vi. 14-vii. 1, bat the evidence for removing those verses from their present position is insufficient.

with regard to the controverted matters that are taken up in the epistle. Yet some conjectures are possible. Paul and Apollos were personally on friendly terms (xvi. 12, cf. iii. 5-9, iv. 6), and were understood to be in fundamental agreement. But doubtless the more elaborate discourses of Apollos were admired, and Paul's teaching seemed in contrast bare, plain and crude (cf. 2 Cor. x. 10). The contrast between the Hellenic and Jewish types of thought may well have played a part also. Paul seems to be replying to such criticisms brought against him when he declares that he deliberately chose to bring to Corinth not the " wisdom of men " but the " power of God " (i. 17, ii. 1-5), and informs them that he has a store of wisdom for those who are ready for it (ii. 6). On the other hand the party of Cephas must have had Jewish-Christian leanings. A little later, in the second epistle, such a tendency is seen breaking out into violent opposi- tion to Paul. The " Christ-party," if, as is probable, it existed, must also have been a party with a Judaizing turn (cf . 2 Cor. x. 7, xi. 22 f.), perhaps of a more extreme character. The danger of shattering the solid front of the Christian church against surrounding heathenism was keenly felt by Paul, as nearly every one of his epistles testifies. How serious it was at. Corinth is shown by the long passage (chaps, i.-iv.) in which he points out that sectarianism is a mark not of superior but of inferior maturity and devotion.

Other difficulties arose from various causes. The influences of the heathen world, from which most of the Corinthian Christians had come and to which their friends and neighbours belonged, were

always with them, and the problems created by these re- lations were very numerous. Christianity had brought over and had even intensified the moral code of Judaism, and, especi- ally in the relations of the sexes, this brought a strain upon the naturalistic impulses and lower standards of converts trained in a different system.

Again, there were law-suits in the ordinary courts, a natural result of the frictions and strains of an oriental trading com- munity. To Paul this was abhorrent, and here too he urges a complete break with their past. With regard to the social customs of meals at which meat that had been offered in heathen sacrifices was a part, and of feasts actually at heathen temples, doubtful questions arose. Was it a denial of the faith to eat such food or not? Mixed marriages, too, had their problems; ought the believing wife to separate herself? Ought the believing husband to insist that his heathen wife stay with him against her will? And, further, in the case of slaves, does the consciousness of Christian manhood give a new motive for trying to gain worldly freedom? In all these matters Paul gives sensible advice. There were clearly two groups of Christians, the ” weak,” or scrupulous, whose principle was to abstain, and the ” strong,” or free, who maintained that the morally insignificant must not usurp a place to which it has no right. Paul sides with neither, but follows two principles, one that the church and its members must be kept pure, the other that the moral welfare not only of the individual but of his neighbour must be the controlling motive.

Not due so much to heathen influences as to the natural tendencies of imperfect and passionate human nature were other conditions. The most striking incident here, and one which gave Paul much concern, was the case of a man who after his father’s death had married his own stepmother (” the case of incest “). That this was rare in the ancient world and generally abominated both by Jews and Greeks made it seem to Paul the more impera- tive that this stain on the Christian church should be removed. His language shows his indignation and grief that the Corinthians themselves have not already taken the matter in hand.

Besides these troubles from heathenism there were questions of asceticism; the Greek reaction against naturalism held that nature was vile and marriage wrong. Paul had a qualified tendency to asceticism, but he shows excellent good sense in his discussion of these delicate matters.

A different set of difficulties arose from the freedom into which Christianity had introduced persons from all classes of life. What

degree of freedom was permissible to a Christian woman?

How far must a woman of the lower classes who became a Christian subject herself to the restrictions of a higher class of society? Might a woman, as a free child of God, take part in the Christian public meeting?

Also in matters pertaining to the common religious life of the new society the new situation raised new problems. How should reasonable order be maintained in the wholly democratic forms of the church devotional meeting? What value should be assigned to the different religious functions or ” spiritual gifts “? Did any of them confer the right to a conscious- ness of God’s special favour? Again, the celebration of the Lord’s supper, which was associated with a proper meal, was marred by exhibitions of selfishness and irreverence that needed correction.

The great variety of practical problems present to the anxious minds of the Corinthians themselves and of germinant abuses revealed to the paternal scrutiny of the apostle, opens to us some notion of the exciting times in which the Corinthian Christians stood, and explains the intensity and detailed concern of the apostle. From every side and at every moment new and often difficult questions were arising; to every one of them belonged remoter relations that made it profoundly important. It is by no accident that Paul is in the habit of treating the simplest moral issues by reference to the highest principles of his theology. From the situation at Corinth we gain an idea of what was taking place in many cities, but in the seething life of so great a capital with more rapid and varied development.

Of strictly intellectual and theological problems or errors only one is treated systematically, although at many other points in the practical discussions we can detect the theoretical basis cf the errors combated and the theological foundations of Paul’s own judgments. Questions about the resurrection, however, had appeared, of a rationalistic nature and evincing an Hellenic failure to understand the Jewish view. In his reply Paul shows that he too recognizes the significance of the Greek’s difficulties and he presents a conception which, fortunately for the later Church, does some measure of justice to the superior scientific insight of their attitude.

Second Epistle. — After the despatch of First Corinthians there took place, it would appear, the riot in the theatre at Ephesus (Acts xix. 23 ff.), to which 2 Cor. i. 8 seems to refer. On leaving Ephesus Paul went to Troas (2 Cor. ii. 12), then to Macedonia, and from Macedonia (2

Cor. vii. 5, viii. 1, ix. 2) he wrote Second Corinthians. This must have been in the autumn of one of the years a.d. 54-58, nearly or quite a year after First Corinthians was written (cf. ” a year ago,” 2 Cor. viii. 10, ix. 2 and 1 Cor. xvi. 1-4). In the meantime there had been exciting developments in Paul’s relations with Corinth, the course of which we can partly trace by the aid of the second epistle. These events explain the great difference in tone between the second epistle and the first.

Several allusions in Second Corinthians show that Paul had already twice visited Corinth (2 Cor. ii. 1, xii. 14, xii. 21, xiii. 2). The second of these visits is not mentioned in Acts; it is referred to by Paul as having a painful character. The most natural hypothesis is that, in consequence of a growing spirit of insubordination on the part of the Corinthians, Paul found it necessary to go to Corinth from Ephesus (probably by sea direct) at some time after First Corinthians was written. Of what happened on this visit, which the writer of Acts has naturally enough thought it unnecessary to mention, we seem to learn further from certain passages in the letter (2 Cor. ii. 5-1 1, vii. o) which refer to some sort of an insult to Paul for which there has now been repentance and which the apostle heartily forgives. For the offender he entreats also the pardon of the church. It may well be that the sad affair had to do with the gross offender of the ” case of incest ” (1 Cor. v. 1-8), who with the support of his fellow Christians may have refused to conform to Paul’s imperative commands. We may suppose an angry scene, possibly an attack of Paul’s bodily ailment (especially if the ” thorn in the flesh ” be understood to be epilepsy) , the immediate triumph of the adversaries, Paul’s speedy departure in grief.

If, as other scholars hold, the offender was not the same as in the first epistle, the general picture of the visit will not have to be much changed.

Besides making this visit it is probable that Paul also wrote to Corinth a letter, now lost, intended to secure the result of which the unfortunate visit had failed (ii. 3, 4, 9, vii. 8, 12). It, is, however, possible that the allusions merely refer to 1 Cor. v., in which case it is not necessary to assume this intermediate letter. The letter, if there was one, may have been sent by Titus, whom Paul in any case commissioned to go to Corinth and try to mend matters. Paul describes his anxiety over this last resource in touching language (ii.

12, 13). Disappointed that Titus did not meet him at Troas, he moved on to Macedonia, and there (vii. 5-9) was rejoiced by the coming of the envoy with good news of the complete return of the Corinthians to integrity and loyalty.

Second Corinthians was Paul's response to this friendly attitude reported by Titus. It went by the hand of Titus, who was promptly sent back to complete the work he had so well begun (viii. 6, 16-24). In company with him (viii. 18) was sent a brother (unnamed) who had already been appointed as the representative of the churches to accompany Paul in carrying to Jerusalem the great collection of money now nearly completed. The greater part of the epistle consists of the outpouring of Paul's thankful and loving heart (chaps, i.-vii.), together with directions and exhortations relating to the collection.

But the epistle contains evidence of another and a disagreeable side to the affairs of the Corinthian church. Especially the last four chapters, but also references in the earlier chapters, show that virulent personal opponents of Paul and his "work had been exercising an evil activity. It is not easy to discover the precise relation of these persons to the parties at Corinth or to the series of events which have just been sketched, but we can well under- stand that their presence and efforts played a large part in the history. We learn that Jewish Christians (xi. 22) had come to Corinth, doubtless from Jerusalem, with letters of recommenda- tion (iii. 1). They urged their own claims as apostles (though not of the twelve), and set themselves up as superior to Paul (xi. s, xii. n, v. 12, xi. 18). Paul calls them " false apostles" (xi. 13-15), and declares that they preach "another Jesus, another Spirit, another Gospel " (xi. 4). That in Paul's judg- ment his influence with the Corinthian church depended on overthrowing the power of these disturbers of the peace is plain, and this accounts for the strenuous, and occasionally violent, tone of his polemic in chapters x.-xiii. As we compare them with the Judaizers of Galatia it seems that their polemic was less on the ground of principles and doctrines, and more a personal attack. Paul does not much argue, as he does in Galatians, against the inclination of Gentile Christians to subject themselves to the Law (yet note the contrast of the old veiled covenant and the new open revelation, iii. 4-18, esp. iii. 6); he is engaged in personal defence against charges of carnal motives (x. 2), perhaps even of embezzlement (xii. 16-18), and also of fickleness (i. 12-ii. 4). When he ironically calls himself a " fool " (xi. 1, 16, 17, 19, 21, xii. 6-11), he is doubtless taking up their term of abuse, and in many of the hard passages of this most difficult of all Paul's epistles we may suspect that half-quoted flings of the enemy glimmer through his retort. From 2 Cor. x. 7, xi. 22 it may be inferred that these Jewish Christians had

something to do with the ” Christ-party ” of which we seem to hear in the first epistle.

To the tact and firmness of Titus must be ascribed much of the successful issue of these dealings with the Corinthians. Paul spent the following winter at Corinth (Acts xx. 2, 3) ; while there he wrote the Epistle to the Romans, which in its milder tone gives clear indication that the day of violent controversy with Judaizing emissaries like those who came to Galatia had passed. There was indeed, as might have been expected, trouble from enemies among the Jews, but Paul escaped the danger, and with the money for the mother church, the collection of which had so long lain near his heart, he was able to start for Jerusalem in the spring of one of the years 55-59 (See Paul).

In later time (circ. a.d. 95) we hear from the epistle of Clement of Rome that the Corinthian church paid full honour to Paul’s memory; and circ. a.d. 139, the excellent Catholic (though Hebrew) Christian Hegesippus found himself deeply refreshed by the honest life and the fidelity to Christian truth of the de- scendants and successors of the Christians over whom Paul had laboured with such faithful oversight and so many anxious tears.

Critical Questions. — The manuscript evidence for the Corinthian epistles is the same as for the other epistles of Paul (see Bible: New Testament). Of early attestation the amount is rather greater for First Corinthians than for other epistles. Not only were both epistles included without question in the Pauline canon of Marcion (circ. a.d. i 50) and in the Muratorian list (end of 2nd century), and known to various Gnostic sects of the 2nd century, but Clement of Rome (circ. a.d. 95) makes a specific reference (xlvii. 1) to the fact that the Corinthians ” received the Epistle of the blessed Apostle Paul,” and pro- ceeds with an unmistakable quotation from 1 Cor. i. 11-13. Other quotations from First Corinthians are found in Clement, Ignatius, Polycarp, Athenagoras, Theophilus, Irenaeus, Clement of Alexandria, Tertullian, while use of the epistle can probably be detected in Hermas. Second Corinthians was, and still remains, less quotable, but it is probably used by Polycarp, perhaps by Ignatius, and by the presbyters known to Irenaeus, and it was freely used by Theophilus, Irenaeus, Clement of Alexandria and Tertullian.

The only serious doubt of the genuineness of First and Second Corinthians has been that of the so-called Dutch school of critics, in the latter part of the 19th century, and forms a part of their attempt (the first since that of Baur) entirely to reconstruct the history of early Christianity. Their view that the Corinthian epistles are the product of

a body of progressive Christians in the 2nd century, who ascribed to a legendary Paul the advanced views they had themselves developed, has not commended itself to critics, and seems to be burdened by nearly all possible difficulties. The genuineness of both epistles is, in fact, amply attested not only by early writers, but by the surer proof of complicated and consistent concreteness, with perfect adaptation to all we know of Paul and of the passing circumstances of the earliest days of Christianity in Greece. For a writer a century later to have composed the Corinthian epistles and then success- fully passed them off as the work of Paul could be explained only by an hypothesis of inspiration! It would have been as difficult as to forge a daily newspaper. It is to be observed that the two epistles are so intimately connected by their contents with Romans and Galatians that the four together support one another's genuineness.

In Second Corinthians two important questions of integrity have been much discussed. (1) 2 Cor. vi. 14-vii. 1 is a passage somewhat distinct from its context, and introduced by a seem- ingly abrupt break in the sequence of thought. It is, therefore, held by some (including G. Heinrici) to be an interpolation by another writer, by others (as A. Hilgenfeld) to be a part of the letter referred to in 1 Cor. v.' 9. But the arguments against Pauline authorship are not convincing; there is after all a certain real connexion to be traced between the section and vi. 1 ; and the resemblance to the substance of 1 Cor. v. 9 is natural in any case. (2) More important is the question as to 2 Cor. x.-xiii. Since J. S. Semler (1776) it has been held by careful scholars that these chapters are written in a tone of excited irritation which is out of accord with the genial tone of gratified affection and confidence that pervades chaps, i.ix. Hence such scholars as A. Hausrath, R. A. Lipsius, O. Pfleiderer, P. W. Schmiedel, A. C. M'Giffert have adopted the view that these four chapters were not written as part of Second Corinthians, but, while unquestion ably from Paul's hand, were from a separate letter (the " Vier- kapitel-Brief ") , probably the same as that supposed to be referred to in 2 Cor. ii. 3-9, vii. 8-12. This theory is, however, probably not correct, for while, on the one hand, it is based on an exaggera- tion of the differences and a neglect of certain lines of connexion between the chaps, x.-xiii. and chaps, i.-ix., on the other hand the identification supposed is made difficult by several facts.

Thus these chapters contain no mention whatever of the offender of 2 Cor. ii, 5-1 1 > of whose case the intervening letter must have mainly

treated; again, x. 1, 9, 10, n imply a previous sharp rebuke already administered, such as is hardly accounted for merely by First Corinthians; and finally, xii. 18 implies that these four chapters were not written until after Titus's visit, that is, that they were written at just the same time as Second Corinthians.

An apocryphal correspondence of Paul and the church at Corinth, consisting of the church's letter and Paul's reply, had canonical authority in the Syrian church in the 4th century (Aphraates, Ephraem). It is preserved in Armenian and Latin manuscripts, and is now known to have been a part of the Acts of Paul, written in the 2nd century. The letters relate to the con- demnation of certain Gnostic views. For a translation see Stanley's Epistles of St Paul to the Corinthians (4th ed., 1876), pp. 593-598. See Harnack, Geschichte der altchristlichen Litera- tur, i. pp. 37-39, ii. 1, pp. 506-508; Bardenhewer, Geschichte der altkirchlichen Literatur, i. pp. 463-467; Hennecke, Neutesta- mentliche Apokryphen, pp. 362-364, 378-380.

Bibliography. — On the Corinthian Epistles consult the Introduc- tions to the New Testament of H. Holtzmann (1885, 3rd ed. 1892);

B. Weiss (1886, 3rd ed. 1897, Eng. trans. 1887); G. Salmon (1887); A. Julicher (1894, 5th and 6th ed. 1906, Eng. trans. 1964); T. Zahn (1897-1899, 2nd ed. 1900); and the articles in the Bible dictionaries, especially those by A. Robertson in Hastings's Dic- tionary. See also Lives of Paid ; and the general works on the Apostolic Age of C. von Weizsacker (1886, 2nd ed. 1892); O. Pfleiderer, Das Urchristentum (1887, 2nd ed. 1902, Eng. trans. 1906) ; and A. C. M'Giffert (1897). Especially valuable for I and 2 Corinthians is E. von Dobschiitz, Christian Life in the Primitive Church (1902, Eng. trans. 1904).

In English, Dean Stanley's work (1855, 4th ed. 1876) is now out of date. On First Corinthians reference may be made to the works of T. Evans in Speaker's Commentary (1881) ; T. C. Edwards (1885) ;

C. J. Ellicott (1887); Fr. Godet (1886-1887, Eng. trans. 1887); on both epistles to those of H. A. W. Meyer (sth.ed. 1870, Eng. trans. 1877-1879) and J. J. Lias, in Cambridge Greek Testament (1886-1892). F. W. Robertson's classic Sermons on St Paul's Epistles to the Corinthians (1859) should not be neglected. In German there are commentaries of much value by G. Heinrici (1880-1887) and in Heinrici's revision of Meyer's Kommentar (8th ed., 1896-1900), and by P. W. Schmiedel in Hand-Commentar (1891, 2nd ed. 1892). For further literature see Robertson's art. " Corinthians, First Epistle to the," in Hastings's Dictionary of the Bible. On early attestation see A.

H. Charteris, Canonicity (1880), and the Oxford Committee's New Testament in the Apostolic Fathers (1905). (J. H. Rs.)

CORINTO, a seaport on the Pacific coast of Nicaragua,. in the department of Chinandega, built on the small island of Asserra- dores or Corinto, at the entrance to Realejo Bay, 65 m. by rail N.W. of Managua. Pop. (1900) about 3000. The town, which was founded in 1849, and first came into prominence as a port in 1863, has a spacious and sheltered harbour, the best in Nicaragua. It possesses no docks or wharves, and vessels anchor some 500 yds. off-shore to load or discharge cargo by means of lighters. On the mainland is the terminus of a railway to Leon, Managua and other commercial centres. Coffee, gold, mahogany, rubber and cattle are largely exported; and more than half the foreign trade of Nicaragua passes through this port, which has completely superseded the roadstead of Realejo, now partly filled with sandbanks, but from 1550 to 1850 the principal seaport of the country. About 450 ocean-going ships, of some 450,000 tons, annually enter the port. Most of the foreign vessels are owned in Germany or the United States. The coasting trade is restricted to Nicaraguan boats. •

CORIOLANUS, GAIUS (or Gnaeus) MARCIUS, Roman legend- ary hero of patrician descent. According to tradition, his surname was due to the bravery displayed by him at the siege of Corioli (493 B.C.) during the war against the Volscians (but see below). In 492, when there was a famine in Rome, he advised that the people should not be relieved out of the supplies obtained from Sicily, unless they would consent to the abolition of their tribunes. For this he was accused by the tribunes, and, being condemned to exile, took refuge with his friend Attius Tullius, king of the Volscians. A pretext for a quarrel with Rome was found, and Coriolanus, in command of the Volscian army, advanced against his native city. In vain the first men of Rome prayed for

moderate terms. He would agree to nothing less than the restoration to the Volscians of all their land, and their admission among the Roman citizens. A mission of the chief priests also failed. At last, persuaded by his mother Veturia and his wife Volumnia, he led back the Volscian army, and restored the conquered towns. He died at an advanced age in exile amongst the Volscians; according to others, he was put to death by them as a traitor; a third tradition (mentioned, but ridiculed, by Cicero) represents him as having taken his own life.

The whole legend is open to serious criticism. At the tradi- tional date (493 B.C.) Corioli was not a Volscian possession, but one of the Latin cities which had concluded a treaty of alliance with Rome; further,

Livy himself states that the chroniclers knew nothing of a campaign carried on by the consul Postumus Cominius Auruncus (under whom Coriolanus is said to have served) against the Volscians. Only one of the consuls was mentioned as having concluded the treaty;- the absence of the other was consequently assumed, and a reason- for it found in a Volscian war. The bestowal of a cognomen from a captured city was unknown at the time, the first instance being that of Scipio; in. any case, it would have been conferred upon the commander-in-chief, Postumus Cominius Auruncus, not upon a subordinate. The conquest of Corioli by Coriolanus is invented to explain the surname. The details of the famine are borrowed from those of later years, especially 433 and 411. The incident of Coriolanus taking refuge with the Volscian king, who, according to Plutarch, was his bitter enemy, curiously resembles the appeal of Themistocles to the Molossian king Admetus. Further, the tradition that Coriolanus, like Themistocles, committed suicide, renders it a probable conjecture that these incidents are derived from a Greek source. The contradictions in the accounts of the campaign against Rome and its inherent improbability give further ground fqr suspicion. Twelve important towns are taken in a single summer apparently without resistance on the part of the Romans, and after the retirement of Coriolanus they are immediately abandoned by the conquerors. It is' strange that the Volscians should have entrusted a stranger with the command of their army, and it is possible that the attribution of their successes to a Roman general was intended to gratify the national pride and obliterate the memory of a disastrous war. It is sug- gested that: Coriolanus never commanded the Volscian army at all, but that, like Appius Herdonius — the Sabine chieftain who in 460, with a band of fugitives and slaves, obtained possession of the capitol — he appeared at the gates of Rome at the head of a body of exiles (but at a much later date, c. 443), at a time when the city was in great distress, perhaps as the result of a pestilence, and only desisted from making himself master of Rome at the earnest entreaty of his mother. This seems to be the historical nucleus of the tradition, which accentuates' the great influence exercised by and the respect shown to the Roman matrons in early times.

Ancient Authorities. — Plutarch's Life; Livyii. 34-40; Dion. Halic. vj. 92-94, vii. 21-27, 4i-47 > viii. 1-60; Cicero, Brutus, x. 42. The story is the subject of Shakespeare's Coriolanus. For a critical examination of the story see Schwegler, Rbmische Geschichte, bk. xxiv. ; Sir G. Cornewall Lewis, Credibility of Early Roman History, ch. xii. 19-23; W. Ihne, History of Rome, i. ; T. Mommsen, " Die Erzahlung von Cn. Marcius Coriolanus," in Hermes, iv. (1869); E. Pais, Storia di Roma, i.

ch. 4 (1898).

CORIOLI, an ancient Volscian city in Latium adiectum, taken, according to the Roman annals in 493 B.C., with Longula and Pollusca, and retaken (but see above) for the Volsci by Gaius Marcius Coriolanus, its original conqueror, who, in disgust at his treatment by his countrymen, had deserted to the enemy, After this it does not appear in history, and we hear soon after- wards (443 B.C.) of a dispute between Ardea and Aricia about some land which had been part of the territory of Corioli, but had at an unknown date passed to Rome with Corioli. The site is ap- parently to be sought in the N.W. portion of the district between the sea, the river Astura and the Alban Hills; but it cannot be more accurately fixed (the identification with Monte Giove, S. of the Valle-Aricciana, rests on no sufficient evidence), and even in the time of Pliny it ranked among the lost cities of Latium.

CORIPPUS, FLAVIUS CRESCONIUS, Roman epic poet of the 6th century a.d. He was a native of Africa, and in one of the MSS. is called grammaticus (teacher). He has been identified, but on insufficient grounds, with Cresconius, an African bishop (7th century), author of a Concordia Canonum, or collection of the laws of the church. Nothing is known of Corippus beyond what is contained in his own poems. He appears to have held the office of tribune or notary {scriniarius) under Anastasius, imperial treasurer and chamberlain of Justinian, at the end of whose reign he left Africa for Constantinople, in consequence of having lost his property during the Moorish and Vandal wars. He was the author of two poems, of considerable importance for the history of the times, one of which was not discovered till the beginning of the 10th century. The latter poem, dedicated to the nobles of Carthage, which comes first in point of time, is called Johannis or De bellis Libycis, and relates the overthrow of the Moors by a certain Johannes, magister militum in 546; it is in eight books (the last is unfinished) and contains about 5000 hexameters. The narrative commences with the despatch of Johannes to the theatre of war by Justinian, and ends with the decisive victory near Carthage (548). The other poem {In laudem Justini minoris), in four books, contains the death of Justinian, the coronation of his successor Justin II, (14th of November 565), and the early events of his reign. It is preceded by a preface, and a short and fulsome panegyric on Anastasius, the poet's patron. The Laus was published at Antwerp in

1581 by Michael Ruyz Azagra, secretary to the emperor Rudolf II., from a 9th or 10th century MS. The preface contains a reference to a previous work by the author on the wars in Africa,- and although Johannes Cuspinianus (1473-1529) in his De Caesaribus ei Imperatoribus professed to have seen a MS. of it in the library at Buda (destroyed by Suleiman II. in 1527), it was not till 1814 that it was discovered at Milan by Cardinal Mazzucchelli, librarian of the Ambrosian library, from the codex Trivultianus (in the library of the marquis Trivulzi), the only MS. of the Johannis still extant.

The Johannis is of great value, not only from a purely historical point of view, but also as giving a description of the land and people of Africa, which conscientiously records the impressions of an intelligent native observer; many of his statements as to manners and customs are confirmed both by independent ancient authorities (such as Procopius) and by our knowledge of the modern Berbers. Virgil, Lucan, and Claudian were the poet's chief models. The Laus, which was written when he was advanced in years, although marred by Byzantine servility and gross flattery of a by no means worthy object, throws much light upon Byzantine court ceremony, as in the account of the accession of Justin and the reception of the embassy of the Avars. On the whole the language and metre of Corippus, considering the age in which he lived and the fact that he was not a native Italian, is remarkably pure. That he was a Christian is rendered probable by negative indications, such as the absence of all the usual mythological accessories of an epic poem, positive allusions to texts of Scripture, and the highly orthodox passage Laus iv. 294 ff.

The editions of the Johannis by P. Mazzucchelli (1820) and of the Laus by P. F. Foggini (1777) are still valuable for their commentaries. They are both included in the 28th volume of the Bonn Corpus scriptorum historiae Byzantinae. The best modern editions, are by J. Partsch (in Monumenta Germaniae historica, 1879), with very valuable prolegomena, and M. Petschenig {Berliner Studien fiir klassische Philologie, iv., 1886); see also Gibbon, Decline and Fall, ch. xlv.

CORISCO, the name of a bay and an island on the Guinea Coast, West Africa. The bay is bounded N. by Cape San Juan (i° 10′ N:) and S. by Cape Esterias (o° 36′ N.), and is about 31m. across, while it extends inland some 15 m. The bay is much encumbered with sandbanks, which impair its value as a harbour. Whereas the Muni river or estuary, which enters the bay on its northern side, has a maximum depth of over 100 ft., vessels entering it have to come by a channel with an average depth of six fathoms. The entrance to the southern

part of the bay is obstructed by the Bana Bank, which extends for 9 m., rendering

navigation dangerous. The bay encloses many small islands and islets, some hardly distinguishable from sandbanks and submerged at high water, giving rise to a native saying that ” half the islands live under water.” The principal islands are four, Bana, Great and Little Elobey, and Corisco, the last- named lying farthest to seaward and giving its name to the bay.

Corisco Island, the largest of the group, is some 3 m. long by if m. in breadth and has an area of about si sq. m. The surface of the island is very diversified. On a miniature scale it possesses mountains and valleys, rivers, lakes, forests and swamps, grass- land and bushland, moorland and parkland. The forests supply ebony and logwood for export. The natives are a Bantu-Negro tribe called Benga. There are among them many converts to Roman Catholicism and a few Protestants. Corisco and the other islands named are Spanish possessions and are governed as dependencies of Fernando Po.

See Mary H. Kingsley, Travels in West Africa, ch. xvii. (London, 1897); E. L. Perea, ” Guinea espanola: La isla de Corisco,” in Revista de geog. colon, y mercantil (Madrid, 1906).

CORK, RICHARD BOYLE, ist Earl or (1 566-1643), Irish statesman, second son of Roger Boyle of Faversham in Kent, a descendant of an ancient Herefordshire family, and of Joan, daughter of Robert Naylor of Canterbury, was born at Canterbury on the 3rd of October 1566, and was educated at the King’s school and at Bennet (Corpus Christi) College, Cambridge, where he was admitted in 1 583 . He afterwards studied law at the Middle Temple and became clerk to Sir Richard Manwood, chief baron of the exchequer; but finding his position offered little opportunity for advancement he determined to make a new start in Ireland: He landed in Dublin on the 23rd of June 1588, as he relates himself, with £27, 3s. in money, a gold bracelet worth £10, and a diamond ring, besides some fine wearing apparel. He began to make his fortune almost immediately. In 1590 he obtained the appointment of deputy escheator to John Crofton, the escheator-general, and in 1595 he married Joan, daughter and co-heiress of William Appsley of Limerick, who died in 1599, having brought him an estate of £500 a year.

Meanwhile he had been the object of the attacks of Sir Henry Wallop and others, incited, according to his own account, by envy at his success and increasing prosperity, and was appre- hended on various

charges of fraud in his office, being more than once thrown into prison. He was on the point of leaving for England to justify himself to the queen, when the rebellion in Munster in October 1598 again reduced him to poverty and obliged him to return to London to his chambers at the Temple. He was, however, almost immediately taken by Essex into his service, when Sir Henry Wallop again renewed his prosecution, with the result that Boyle was summoned before the star chamber. His enemies appear to have failed in substantiating their accusations, and in the course of the inquiry, at which he had secured the presence of the queen herself, he was able to expose several instances of malversation on the part of his opponent, who was dismissed in consequence from his office of treasurer, while Boyle himself, who had favourably impressed the queen, was declared by her as ” a man fit to be employed by ourselves ” and was at once made clerk of the council of Munster. He brought to Elizabeth the news of the victory near Kingsale in December 1601, and in October 1602 was again sent over by Sir George Carew, the president of Munster, on Irish affairs; and on this occasion, at the instance of Carew, he bought for £1000 the whole of Sir Walter Raleigh’s lands in Cork, Waterford and Tipperary, consisting of 12,000 acres with immense capa- bilities of development. This offered a splendid opportunity for the exercise of his genius for business and administration. Manufactures were established, the breeding of cattle and fish introduced, mines opened, colonists from England encouraged to come over, the natural resources of the land developed, bridges, harbours and roads constructed, and towns settled, order being maintained by 13 castles garrisoned by retainers.

While himself quickly accumulating vast riches, the services

which Boyle rendered to the government and to the nation at such a time of disorder and transition were incalculable. He soon became the most powerful subject in Ireland. On the 25th of July 1603 he married, as his second wife, Catherine, daughter of Sir Geoffrey Fenton, secretary of state, and was knighted. In 1606 he became a privy councillor for Munster and in 1613 for Ireland. On the 6th of September 1616 he was raised to the peerage as Lord Boyle, baron of Youghal, and on the 26th of October 1620 was created earl of Cork and Viscount Dungarvan. He was appointed on the 26th of October 1629 a lord justice, and on the 9th of November 163 1 lord high treasurer. Though no peer of England, he was ” by writ called into the

Upper House by His Majesty's great grace," and took his place as an " assistant sitting on the inside of the Woolsack." 1 The appointment of Wentworth (Lord Strafford), however, as lord deputy in 1633 put an end to the predominant power and influence of Cork in Ireland. " A most cursed man," he writes in his diary on Wentworth's arrival, " to all Ireland and to me in particular." In reality these two great men had much in common, held similar views of administration, and had the same talents for practical statesmanship. Cork had already carried out in Munster the policy which Strafford desired to see extended to the whole of Ireland. But Cork belonged to the " spacious days of great Elizabeth," and for such a man there was no room within the narrow despotism and intolerance of the government of Charles. The subjection of the great was part of Strafford's settled policy, and consequently, instead of seeking his collabora- tion in developing the country and in maintaining order, he studied merely to diminish his influence. He subjected him to various humiliations. He forced him to remove his wife's tomb from the choir in St Patrick's at Dublin, and deprived him arbitrarily of the greater part of the revenues of Youghal, a portion of the Raleigh estates. " No physic," wrote Laud, delighted, " better than a vomit if it be given in time, and there- fore you have taken a very judicious course to administer one so early to my Lord of Cork. I hope it will do him good. . . ." 2 Cork, however, refrained from any systematic or retaliatory resistance, and even simulated an admiration for Strafford's rule. At the latter's trial he was an important witness, but took no active part in the prosecution, though he thoroughly approved of his condemnation and execution. Scarcely had he returned to Ireland from witnessing his rival's destruction when the rebellion broke out, but his influence and preparations, supported by the military prowess of his sons, were sufficient to offer a successful resistance to the rebels in Munster and to save the province from ruin. This was his last great service to the state. He died about the 15th of September 1643, leaving a large and illustrious family by his second wife.

Four of his seven sons received independent peerages, — Richard, created Baron Clifford and earl of Burlington; Lewis, Viscount Kinalmeaky, killed in 1642 at the battle of Liscarrol; Roger, baron of Broghill and earl of Orrery; and Francis, Viscount Shannon. Another son was Robert Boyle (q.v.), the famous natural philosopher and chemist.

The title passed to the eldest surviving son, Richard Boyle, 1st earl of Burlington and 2nd earl of Cork (1612-1698), who matriculated at Christ Church, Oxford, and was knighted in 1624. Returning home after travelling abroad he married in 1635 Elizabeth, daughter and

heir of Henry, Lord Clifford, later earl of Cumberland. On the outbreak of the rebellion he sup- ported his father in Munster, fought at the battle of Liscarrol, and raised forces for the first war with the Scots. In 1640 he represented Appleby in the Long Parliament, and in the civil war he supported zealously the royal cause, being created in 1643 Baron Clifford of Lanesborough in the peerage of England, in addition to the earldom of Cork which he inherited from his father the same year. At the Restoration he obtained also the earldom of Burlington (or Bridlington), and was appointed lord-lieutenant of the West Riding of Yorkshire, resigning this office through opposition to the government of James II. He held the office of lord treasurer of Ireland from 1680 till 1695. 1 Lords Journals. 2 Strafford Letters, i. 156.

He died on th" 5th of January 1698. His two sons having predeceased him, he was succeeded in his titles by- his grandson Charles, issue of his eldest son Charles, as 2nd earl of Burlington and 3rd earl of Cork; and on the extinction of the direct male line in the person of Richard, the 4th earl, in 1753 the earldom of Cork fell to the younger branch of the Boyle family, in the person of John, 5th earl of Orrery, he and later earls being " of Cork and Orrery."

John Boyle, 5th earl of Cork and Orrery (1707-1762), only son of the 4th earl of Orrery, »was born on the 2nd of January 1707. He was educated at Christ Church, Oxford, and was led by indifferent health and many untoward accidents to cultivate in retirement his talents for literature and poetry. His trans- lation of the Letters of Pliny the Younger, with various notes, for the use of his eldest son, was published in 1751. He also published Remarks on the Life and Writings of Jonathan Swift (1 751), in several letters addressed to his second son, and Memoirs of Robert Carey, earl of Monmouth, from the original manuscript, with preface and notes. He died on the 16th of November 1762, His Letters from Italy appeared in 1774, edited, with memoir, by the Rev. J. Duncombe. The earldom continued in later > years in the Boyle family, being held in 1909 by the 10th earl (b. 1861). The wife of the 7th earl (see Cork and Orrery, Mary, Countess as) was a famous figure in society in the, early 19th century.

Bibliography for ist Earl. — True Remembrances, written by himself and printed by Birch in his edition of the works of Robert Boyle; Lismore Papers, ed. by A. B. Grosart (10 vols., 1886-1887), Ist series consisting of the diary from 161 1 to his death and of autobiographical notes, and 2nd series of correspondence; Life of Lord Cork, by Dorothea Townshend (1904) ; article in the Diet, of Nat. Biog., with authorities there given; Egerton MSS. 80 (copies of

correspondence) ; Add. MSS., Brit. Mus., 19831-19832 (rebellion in Munster, examination before the Star Chamber, correspondence) and 18023; Strafford's Letters ; Calendars of State Papers, Domestic and Irish, and Carew Papers; E. Lodge's Irish, Peerage, i. 144; E. Budgell's Memoirs of the Boyles (1737); Ed. Edwards's Life of Raleigh; Gardiner's Hist, of England; Charles Smith's History of Cork (1893); R. Caulfield's Council Book of Youghal; also the biography in Biographia Britannica, Kippis, vol. ii.

CORK, a county of Ireland in the province of Munster, bounded S. by the Atlantic Ocean, E. by the counties Waterford and Tipperary, N. by Limerick, and W. by Kerry. It is the largest county in Ireland, having an area of 1,849,686 acres, or about 2890 sq. m. The outline is irregular; the coast is for the most part bold and rocky, and is intersected by the bays of Bantry, Dunmanus, and Roaring Water. The southern part of the coast projects several headlands into the Atlantic, and its south- eastern side is indented by Cork Harbour, and Ballycotton and Youghal Bays. The surface is undulating. It consists of low rounded ridges, with corresponding valleys, running east and west, except in the western portion of the county, which is more mountainous. The principal rivers are the Blackwater, the Lee, and the Bandon, flowing generally eastward from their sources in the high ground of the west. The most elevated part of the county is in the Boggeragh Mountains, in the north-west, which reach an extreme height of 2 118 ft. To the south are the Shehy Mountains, at the root of the two promontories flanking Bantry Bay, the Caha Mountains forming the backbone of the northern of these promontories, and the hills of the district of Corbery to the south of the Shehy range. North of the Blackwater the country is comparatively level, being a branch of the great plain which occupies a large part of the centre of Ireland. Of the principal rivers the Blackwater has its source in the county Limerick. The Lee originates in the wild and picturesque Gouganebarra Lough, and the Bandon river rises in the Cullinagh Lough. There are also some smaller streams which flow directly into the sea, the more important of these being in the south-west portion of the county. No lakes of any magnitude occur, the largest being Lough Allua, or Inchigeelagh, an expansion of the river Lee. The scenery of the western parts of the county is bold and rugged. In the central and eastern parts, especially, in the valleys, it is green and quiet, and in some spots well wooded.

Geology. — The county presents a remarkable simplicity of geological structure. Its surface is controlled throughout by the ” Hercynian ” folds, running from the Kerry border eastward to the sea at Youghal. The Old Red Sandstone comes out in the north, forming the heather-clad Ballyhoura Hills, which are repeated across the limestone hollow of Mitchelstown.by the western spur of the Knockmealdown Mountains. On the west, beds as high as the Millstone Grit and Coal Measures remain above the limestone, extending from Mallow and Kanturk to the Limerick and Kerry borders. Another synclinal of Carboniferous Limestone runs from Millstreet through Lismore, and the Blackwater has worn out an easy course along it. Then the Old Red Sandstone again rises as an undulating upland through the centre of the county, with a few synclinal patches of Carboniferous Shale and Limestone caught in on its back. Cork city lies on the north slope and in the floor of a larger synclinal, and the Yellow Sandstone, which forms the passage- beds from the Old Red Sandstone to the Carboniferous, appears near the city. This hollow continues across the Lee through Middleton. The limestone in it has become crystalline, veined and brecciated, while a fine red staining, especially at Little Island, adds to its value as a marble. After another anticlinal of Old Red Sandstone, the Carboniferous Slate occupies most of the country southward, with occasional appearances of the basal Coomhola Grits and of the underlying Old Red Sandstone along anticlinals. The soils thus vary from sandy loams, usually on the higher ground, to stiff clays along the limestone hollows. ‘

This country admirably illustrates the system of river-develop- ment originally traced out by Prof. J. B. Jukes in 1862, and further explained by Prof. W. M. Davis and others. The folded series, culminating originally in Upper Carboniferous strata, was worn down, perhaps as far back as Permian times, until it possessed a fairly uniform surface. This surface, or ” peneplain,” was probably the result of denudation working away the beds almost to sea-level. A subsequent elevation enabled the streams, as in so many cases now recognized, to cut into the surface along the direction of greatest inclination, which here happened to be southward. When the higher strata had been worn away, the rivers and their tributaries worked upon rocks of very various hardness, but with a common strike from east to west. The tributaries, running along the strike, speedily confined themselves to the synclinals of limestone, along which they could erode and dissolve long valleys. The present surface of anticlinal sandstone ridges and synclinal limestone hollows thus began to arise ; but the main streams still held on their courses across the

strike, that is, from north to south. Here and there a more active tributary worked its way back at its head into the basin of one of the cross-streams, and drew off into its own system the head-waters of this other stream. With this new flood of water the strengthened system still further deepened its original ravine across the strike, while the beheaded' cross-stream or streams rapidly dwindled in importance. Ultimately, the tributaries of the surviving river- systems appeared as the most important feature, stretching far west — in the case of county Cork— along the synclinal hollows; while the original cross-ravine remained in the course of each river, a right- angled bend occurring thus in the lower portion of the valleys. Jukes urged that the upper part of the original cross-ravine can be traced above the bend in each case, though the stream now descend- ing along it seems merely a tributary entering parallel with the north-and-south portion of the main stream. Moreover, the tribu- taries on the north side of the great synclinal valleys may in many cases be the relics of original cross-streams that once flowed directly to the sea until captured by the growth along the synclinal of the tributary of another stream. The Blackwater, rising on Upper Carboniferous beds on the Kerry border, thus falls steeply southward to Rathmore, and then turns eastward along the synclinal valley of limestone from Millstreet to Cappoquin. Here it abruptly turns south, keeping, in fact, to that part of its valley which was first developed. The Lee, rising in the Old Red Sandstone moors of Gouganebarra, runs east, encountering one or two patches of lime- stone in the floor of the synclinal on its way, mere residues of the rock that once occupied the hollow. Near Cork, the limestone and accompanying shale are better preserved; but the river, instead of continuing along the synclinal through Middleton to Youghal, turns south, and forms the now submerged valley of Cork Harbour. Observations have shown that the coast lay much at its present level in pre-Glacial times, and that Cork Harbour was thus a marine inlet before the ice descended into it. The synclinal valleys of Bantry Bay and Dunmanus Bay were also, in all probability, submerged at this same early epoch.

The county has been famous for its copper-mines, notably at Allihies in the extreme west. The region south-west of B antr y has been mined in several places. Both gold and silver have been found in the copper-ores of this latter area. Barytes has been mined near Bantry, Schull and Clonakilty, and manganese-ore at Glandore. Anthracite has been raised from time to time in the band of Coal Measures south-west of Kanturk. The marble of Little Island near Cork is quarried under the name of " Cork Red," and the veined pink and grey marble of Middleton is also much esteemed.

Climate and Watering-places. — The climate is moist and warm, the prevailing winds being from the west and south-west. The

annual rainfall in the city of Cork is about 40 in., that of the whole county being somewhat higher. The mean annual temperature is about 52° F. The snow-fall during the winter is usually slight, and snow rarely remains long on the ground except in sheltered places. The thermal spring of Mallow was formerly in considerable repute; it is situated in a basin on the banks of the Blackwater, rising from the base of a limestone hill. The chief places for sea-bathing are Blackrock, Passage, Monkstown, Queenstown, and other waterside villages in the vicinity of Cork; Bantry, Baltimore, Kinsale, Glengarrif and Youghal are also much frequented during the summer months.

Industries. — The soils of the county exhibit no great variety. They may be reduced in number to four: the calcareous in the limestone districts; the deep mellow loams found in districts remote from limestone, and generally occurring in the less elevated parts of the grey and red sandstone districts; the light shallow soils, and the moorland or peat soils, the usual substratum of which is coarse retentive clay. About one-sixth of the total area is quite barren. In a district of such extent and variety of surface, the state of agriculture must be liable to much variation. The more populous parts near the sea, and in the vicinity of the great lines of communication, exhibit favourable instances of agricultural improvement. Oats, potatoes and turnips are the principal crops, but the extent of land under tillage shows a general decrease. Pasture land, however, extends, and the number of cattle, sheep and poultry rises; for dairies are numerous and the character of the Cork butter and farmyard produce stands high in English and foreign markets.

Youghal, Kinsale, Queenstown, Castletown and Bearhaven are the deep-sea and coast fishing district centres of the county; while the salmon fishing is distributed among the districts of Cork, Bandon, Skibbereen and Bantry. The mackerel fishery is especially productive from mid-March to mid-June. The Blackwater, Lee and Bandon, apart from the netting industry, afford good rod-fishing for salmon, especially the first, on which Lismore, Fermoy and Mallow are the principal centres. The loughs, the upper waters of these rivers and their tributaries, frequently abound in trout. Macroom, Inchigeelagh, Bandon, Dunmanway and Glandore, with Bantry and Skibbereen, are all good stations.

Communications. — The main line of the Great Southern & Western railway, entering the county from the north at Charle- ville, serves

Cork and Queenstown. The Cork, Bandon & South Coast line runs west to Skibbereen, Baltimore, Bantry, Clonakilty and Kinsale; and there are also the Cork & Macroom line to Macroom; the Cork, Blackrock & Passage to the western waterside villages of Cork Harbour, and the Great Southern & Western branch eastward from Cork to Youghal; while from Mallow a branch of the same system continues towards Killarney and the south-western coast of Ireland. There is also connexion from this junction with Fermoy, Mitchelstown and county Waterford eastward. The Timoleague and Courtmacsherry line connects these villages with the Clona- kilty branch of the Cork, Bandon & South Coast Railway.

Population. — The population (438,432 in 1891; 404,611 in 1 901) exhibits a decrease among the most serious of the Irish counties, and emigration is correspondingly heavy. Of the total about 90% are Roman Catholics, and about 70% constitute the rural population. The principal towns are Cork (pop. 76,122, a county of a city); Queenstown (7909), Fermoy (6126); Kinsale (4250), Bandon (2830), Youghal (5393), Mallow (4542), Skibbereen (3208), Macroom (3016), Bantry (3109), Middleton (3361), Clonakilty (3098), and among smaller towns Charleville, Mitchelstown, Passage West, Doneraile and Kanturk. Crook- haven in the extreme S.W. is of importance as a harbour of refuge, but the chief ports are Cork and Queenstown. The county is divided into east and west ridings, and contains twenty-three baronies and 249 parishes. Assizes are held at Cork, and quarter-sessions at Cork, Fermoy, Kanturk, Kinsale, Mallow, Middleton, and Youghal in the east riding; and Bandon, Bantry, Clonakilty, Macroom and Skibbereen in the west riding. The county is in the Protestant diocese of Cork, and the Roman Catholic diocese

of Cork, Cloyne, Kerry and Ross. There are seven parliamentary divisions, east, mid, north, north-east, south, south-east and west, each returning one member.

History. — Cork is one of the counties which is generally considered to have been instituted by King John. It had not always its present extent, for its existing boundaries include part of the ancient territory of Desmond (q.v.), which, in the later half of the 16th century, ranked as a separate county. In 1598, however, there were two sheriffs in the county Cork, one especially for Desmond, which was then included in Cork, but was afterwards amalgamated with the county Kerry. In the

same period wide lands in the county were given to settlers under the crown, and among these were Sir Walter Raleigh and Edmund Spenser the poet, who received 40,000 acres and 3028 acres respectively. In 1602 a large portion of the estates of Sir Walter Raleigh and Fane Beecher were purchased by Richard Boyle, 1st earl of Cork, who had them colonized with English settlers; and by founding or rebuilding the towns of Bandon, Clonakilty, Baltimore, Youghal, and afterwards those of Middleton, Castlemartyr, Charleville and Doneraile, which were incorporated and made parliamentary boroughs, the family of Boyle became possessed of nearly the entire political power of the county.

Antiquities. — The earlier antiquities of the county are rude monuments of the Pagan era. There are two so-called druids' altars, the most perfect near Cloyne, and certain pillar stones scattered through the county, with straight marks cut on the edges called Ogham inscriptions, the interpretation of which is a subject of much controversy. The remains of the old ecclesi- astical buildings are in a very ruinous condition, being used as burial-places by the country people. The principal is Kilcrea, founded by Cormac M'Carthy about 1485, some of the tombs of whose descendants are still in the chancel ; the steeple is still nearly perfect, and chapter-house, cloister, dormitory and kitchen can be seen. Timoleague church, situated on a romantic spot on rising ground at the extreme end of Courtmacsherry Bay, contains some tombs of interest, and is still in fair condition. Buttevant Abbey (13th century) contains some tombs of the Barrys and other distinguished families. There is a good crypt here. All these were the property of the Franciscans. There are two round towers in the county, one in a fine state of preservation opposite Cloyne Cathedral, the other at Kinneigh. On the chapter seal at Ross, which is dated 1661, and seems to have been a copy of a much earlier one, there is a good example of a round tower and stone-roofed church, with St Fachnan, to whom the church is dedicated, standing by, with a book in one hand and a cross in the other. The present church dates from 1837, but is on the site of a former cathedral united to Cork in 1 583. Of Mourne Abbey, near Mallow, once a preceptory of the Knights Templars, and Tracton Abbey, which once sent a prior to parliament, the very ruins have perished. On an island of Lough Gouganebarra are remains of an oratory of St Finbar.

Of the castles, Lohort, built in the reign of King John, is by far the oldest, and in its architectural features the most interesting ; it is still quite perfect and kept in excellent repair by the owner, the Earl of Egmont. Blarney Castle, built by Cormac M'Carthy about 1449, has a wide reputation (see Blarney). Castles Mahon and Macroom have been

incorporated into the residences of the earls of Bandon and Bantry. The walls of Mallow Castle attest its former strength and extent, as also the castle of Kilbolane. The castles of Buttevant, Kilcrea and Dripsy are still in good condition. At Kanturk is a huge Elizabethan castle still known as " M'D'onagh's Folly," left unfinished owing to objections raised by a jealous government. At Kilcolman castle near Doneraile the " Faerie Queene " was written by Spenser.

CORK, a city, county of a city, parliamentary and municipal borough and seaport of Co. Cork, Ireland, at the head of the magnificent inlet of Cork Harbour, on the river Lee, 1655 m. S.W. of Dublin by the Great Southern & Western railway. Pop. (1901) 76,122. Until the middle of the 19th century it ranked second only to Dublin, but is now surpassed by Belfast in commercial importance. It is the centre of a considerable

railway system, including the Great Southern & Western, the Cork, Bandon & South Coast, the Cork & Macroom Direct,, the Cork,Blackrock & Passage railways, and the Cork&Muskerry light railway; each of which companies possesses a separate station in the city. The passenger steamers to Great Britain, mainly under the control of the City of Cork Steam Packet Company, serve Fishguard, Glasgow, Liverpool, Plymouth and Southampton, London and other ports, starting from Penrose Quay on the North Channel.

The nucleus of the city occupies an island formed by the North and South Channels, two arms of the river. Lee, and in former times no doubt merited its name, which signifies a swamp. In the beginning of the 18th century, indeed, this island' was broken up into many parts connected by drawbridges, by numerous small channels navigable at high tide. It now includes most of the principal thoroughfares, which form a notable contrast to many of the smaller streets and alleys, in which good building and cleanliness are lacking. Three bridges cross the North Channel, a footbridge, North Gate bridge and St Patrick's bridge, the last a handsome three-arch structure leading to St Patrick's Street, a wide and pleasant thoroughfare, containing a statue of Father Mathew, the celebrated Capuchin advocate of temperance, born in 1790. It communicates with the Grand Parade and this in turn with Great George's Street, to the west, and the South Mall to the east, the last containing the principal banks, the County Club house, and good commercial buildings. The Clarks, South Gate, Parliament and Parnell bridges cross the South Channel to the southern parts of the city. Public grounds are few, but on the outskirts of the city are a park and race-course, with the fashionable Marina promenade; while the Mardyke walk, on the west of the island, is pleasantly shaded by a fine

avenue, and was the site of the International exhibition held in 1902. Electric tramways connect the city and suburbs and traverse the principal streets and the St Patrick's and Parnell bridges. Both branches of the Lee are lined with fine quays of cut limestone, extending in total length over 4 m.

The principal church is the Protestant cathedral, founded in 1865, and consecrated on St Andrew's Day 1870; while the central tower was completed in 1879. It is dedicated to St Fin Barre or Finbar, who founded the original cathedral in the 7 th century. The present building is in the south-west part of the city, and replaces a somewhat mean structure erected in 1735 on the site. of the ancient cathedral, which suffered during the siege of Cork in September 1689. Money for the erection of the building of 1735 was raised by the curious method of a tax on imported coal. The new cathedral is in the Early French (pointed) style, with an eastern apse and a striking west front. Its design was by William Burges (d. 1881), and its erection was due to the indefatigable exertions and munificence of Dr John Gregg, bishop of Cork, Cloyne and Ross; while the tower and spires were the gift of two merchants of Cork. The other principal Protestant churches are St Luke's, St Nicholas and St Anne Shandon, with its striking tower of parti-coloured stones; and its peal of bells extolled in Father Prout's lyric " The Bells of Shandon." The Roman Catholic cathedral, also dedicated to St Finbar, is conspicuous on the north side of the city; it dates from 1808, but has been since restored. Other fine churches of this faith are St Mary, St Peter and Paul, St Patrick, Holy Trinity and St Vincent de Paul. St Finbar's cemetery has handsome monuments, and St Joseph's, founded by Father Mathew in 1830 on the site of the old botanic gardens of the Cork Institution, is beautifully planted. The court house in Great George's Street has a good Corinthian portico, happily undamaged in a fire which destroyed the rest of the building in 1 891 . The custom-house commands the river in a fine position at the lower junction of the branches. The usual commercial and public buildings are mainly on the island. The most notable educational establishment is the University College, founded as Queen's College (1849), with those of the same name at Belfast and Gal way, under an Act of 1845. A new charter was granted to it under letters patent pursuant to the Irish Universities Act 1908, when it was given its present name. The building,

and

QUEENSTOWN

English RTiles o y ti y ; J

Contours at intervals of 100 feet

Based on information embodied from the Ordnance Survey, by permission of the Controller of H. M. Stationery Office.

designed by Sir Thomas Deane, occupies a beautiful site on the river in the west of the city, where Gill Abbey, of the 7 th century, formerly stood. It is a fine building in Tudor Style, ” worthy,” said Macaulay, “to stand in the High Street of Oxford.” A large library, museum and well-furnished laboratory are here. The Crawford School of Science (1885); and the Munster Dairy and Agricultural School, 1 m. west of the city, also claim notice; while besides parochial and industrial schools several of the religious orders located here devote themselves to education. The Cork library (founded 1790) contains a valuable collection of books. The Royal Cork Institution (1807), in addition to an extensive library and a rare collection of Oriental MSS., possesses a valuable collection of minerals, and the collections of casts from the antique presented by the pope to George IV. There are numerous literary and scientific societies, including the Cork Cuvierian and Archaeological Society. The principal clubs are the County and the Southern in South Mall, and the City in Grand Parade; while for sport there are the Cork Golf Club, Little Island, three rowing clubs, and the Royal Munster and Royal Cork Yacht clubs, the latter located at Queenstown. The theatres are the opera-house in Nelson’s Place, and the Theatre Royal.

The country neighbouring to Cork is highly attractive. The harbour, with the ceaseless activity of shipping, its calm waters, sheltered by many islands, and its well-wooded shores studded with pleasant watering-places, affords a series of charming views, apart from its claim to be considered one of the finest natural harbours in the kingdom. Military depots occupy several of the smaller islets, and three batteries guard the entry. This is about 1 m. wide, but within the width increases to 3 m. while the length is about 10 m. The Atlantic port of Queenstown {q.v.) is on Great Island at the head of the outer harbour. Tivoli (the residence of Sir Walter Raleigh) , Fort William, Lota Park, and Blackrock Castle are notable features on the shore; and Passage, Blackrock, Glenbrook and Monkstown are waterside

resorts. Inland from Cork runs the picturesque valley of the Lee, and low hills surround the commanding situation of the port.

The harbour is by far the most important on the south coast of Ireland, and dredging operations render the quays approach- able for vessels drawing 20 ft. at all states of the tide. Its trade is mainly with Bristol and the ports of South Wales. The imports, exceeding £1,000,000 in annual value, include large quantities of wheat and maize, while the exports (about £9000 annually) are chiefly of cattle, provisions, butter and fish. The Cork Butter Exchange, where classification of the various qualities is carried out by branding under the inspection of experts, was important in the early part of the 17th century, and an unbroken series of accounts dates from 1769 when the present market was founded. There are distilleries, breweries, tanneries and iron foundries in the city; and manufactures of woollen and leather goods, tweeds, friezes, gloves and chemical manure. Nearly six-sevenths of the population are Roman Catholics. The city does not share with the county the rapid decrease of population. It is governed by a lord mayor, 14 aldermen and 42 councillors. The parliamentary borough returns two members.

The original site of Cork seems to have been in the vicinity of the Protestant cathedral; St Finbar's ecclesiastical foundation attracting many students and votaries. In the 9th century the town was frequently pillaged by the Northmen. According to the Annals of the Four Masters a fleet burned Cork in 821; in 846 the Danes appear to have been in possession of the town, for a force was collected to demolish their fortress; and in 1012 Cork again fell in flames. The Danes then appear to have founded the new city on the banks of the Lee as a trading centre. It was anciently surrounded with a wall, an order for the reparation of which is found so late as 1 748 in the city council books (which date from 1610). Submission and homage were made to Henry II. on his arrival in 1172, and subsequently the English held the town for a long period against the Irish, by constant and

careful watch. Cork showed favour to Perkin Warbeck in 1492, and its mayor was hanged in consequence. In 1649 it surrendered to Cromwell, and in 1689 to the earl of Marlborough after five days' siege, when Henry, duke of Grafton, wasmortally wounded. Cork was a borough by prescription, and successive charters were granted to it from the reign of Henry II. onward. By a charter of Edward IV. the

lord mayor of Cork was created admiral of the port, and this office is manifested in a triennial ceremony in which the mayor throws a dart over the harbour.

See C. Smith, Ancient and Present State of the County and City of Cork (1750), edited by R. Day and W. A. Copinger (Cork, 1893); C. B. Gibson, History of the City and County of Cork (London, 1861) ; M. F. Cusack, History of the City and County of Cork, 1875. ‘ CORK (perhaps through Sp. corcha from Lat. cortex, bark, but possibly connected with quercus, oak), the outer layer of the bark of an evergreen species of oak (Quercus Suber). The tree reaches the height of about 30 ft., growing in the south of Europe and on the North African coasts generally; but it is principally cultivated in Spain and. Portugal. The outer layer of bark in the cork oak by annual additions from within gradually becomes a thick soft homogeneous mass, possessing those com- pressible and elastic properties upon which the economic value of the material chiefly depends. The first stripping of cork from young trees takes place when they are from fifteen to twenty years of age. The yield, which is rough, unequal and woody in texture, is called virgin cork, and is useful only as a tanning substance, or for forming rustic work in ferneries, conservatories, &c. Subsequently the bark is removed every eight or ten years, the quality of the cork improving with each successive stripping; and the trees continue to live and thrive under the operation for 150 years and upwards. The produce of the second barking is still so coarse in texture that it is only fit for making floats for nets and for similar applications. The operation of stripping the trees takes place during the months of July and August. Two cuts are made round the stem — one a little above the ground, and the other immediately under the spring of the main branches. Between these three or four longitudinal incisions are then made, the utmost care being taken not to injure the inner bark. The cork is thereafter removed in the sections into which it has been cut, by inserting under it the wedge-shaped handle of the implement used in making the incisions. After the outer surface has been scraped and cleaned, the pieces are flattened by heating them over a fire and submitting them to pressure on a flat surface. In the heating operation the surface is charred, and thereby the pores are closed up, and what is termed ” nerve ” is given to the material. In this state the cork is ready for manufacture or exportation.

Though specially developed in the cork-oak, the substance cork is an almost universal product in the stems (and roots) of woody plants which increase in diameter year by year. Generally towards the end of the first year the original thin protective layer of a stem or branch is replaced by a thin layer of ” cork,” that is a layer of cells the living

contents of which have dis- appeared while the walls have become thickened and toughened as the result of the formation in them of a substance known as suberin. Fresh cork is formed each season by an active form- ative layer below the layer developed last season, which generally peels off. Where the formation is extensive and persistent as in the cork-oak, a thick covering of cork is formed. In some cases, as on young shoots of the cork-elm, the development is irregular and wing-like outgrowths of cork are formed. In northern Russia a similar method to that used for obtaining cork from the cork-oak is employed with the birch.

Cork possesses a combination of properties which peculiarly fits it for many and diverse uses, for some of which it alone is found applicable. The leading purpose for which it is used is for forming bungs and stoppers for bottles and other vessels containing liquids. Its compressibility, elasticity and practical imperviousness to both air and water so fit it for this purpose that the term cork is even more applied to the function than to the substance. Its specific lightness, combined with strength and durability, recommend it above all other substances for forming life-buoys, belts and jackets, and in the construction

of life-boats and other apparatus for saving from drowning. On account of its lightness, softness and non-conducting pro- perties it is used for hat-linings and the soles of shoes, the latter being a very ancient application of cork. It is also used in making artificial limbs, for lining entomological cases, for pommels in leather-dressing, and as a medium for making architectural models. Chips and cuttings are ground up and mixed with india-rubber to form kamptulicon floor-cloth, or ” cork-carpet.” The inner bark of the cork-tree is a valuable tanning material.

Certain of the properties and uses of cork were known to the ancient Greeks and Romans, and the latter, we find by Horace (Odes iii. 8), used it as a stopper for wine-vessels: — ” corticem adstrictum pice dimovebit amphorae ” —

It appears, however, that cork was not generally used for stopping bottles till so recent a period as near the end of the 17th century, and bottles themselves were not employed for storing liquids till the 15th century. Many substitutes have been proposed for cork as a stoppering agent; but except in the case of aerated liquids none of these has recommended itself in practice. For aerated water bottles several successful devices have been introduced. The most simple of these is an india- rubber ball pressed upwards into the narrow of the bottle neck by the force of the gas contained in the water; and in another

system a glass ball is similarly pressed against an india-rubber collar inserted in the neck of the bottle. By analogy the term ” to cork ” is used of any such devices for sealing up a bottle or aperture.

CORK AND ORRERY, MARY, Countess of (Mary Monckton) (1746ˆ1840), was born on the 21st of May 1746, the daughter of the first Viscount Galway. From her early years she took a keen interest in literature, and through her influence her mother’s house in London became a favourite meeting-place of literary celebrities. Dr Johnson was a frequent guest. According to Boswell, Miss Monckton’s “vivacity enchanted the sage, and they used to talk together with all imaginable ease.” Sheridan, Reynolds, Burke and Horace Walpole were among her constant visitors, and Mrs Siddons was her closest friend. In 1786 she married the seventh earl of Cork and Orrery, who died in 1798. As Lady Cork, her love of social ” lions ” became more pro- nounced than ever. Among her regular guests were Canning and Castlereagh, Byron, Sir Walter Scott, Lord John Russell, Sir Robert Peel, Theodore Hook and Sydney Smith. She is supposed to have been the original of Lady Bellair in Disraeli’s Henrietta Temple, and Dickens is believed to have drawn on her for some of the peculiarities of Mrs Leo Hunter in Pickwick. Lady Cork had a remarkable memory, and was a brilliant con- versationalist. She died in London on the 30th of May 1840. She was then ninety-four, but within a few days of her death had been either dining out or entertaining every night. There is a fine portrait of her by Reynolds.

CORLEONE (Saracen, Korliun), a town of Sicily, in the province of Palermo, 42 m. S. of Palermo by rail and 21 m. direct, 1949 ft. above sea-level. Pop. (1901) 14,803. The town was a Saracen settlement, but a Lombard colony was introduced by Frederick II. Two medieval castles rise above the town, and there are some churches of interest.

CORMENIN, LOUIS MARIE DE LA HA YE, Vicomte de (1788-1868), French jurist and political pamphleteer, was bom at Paris on the 6th of January 1788. His father and his grand- father both held the rank of lieutenant-general of the admiralty. At the age of twenty he was received advocate, and about the same time he gained some reputation as a writer of piquant and delicate poems. In 1810 he received from Napoleon I. the appointment of auditor to the council of state; and after the restoration of the Bourbons he became master of requests. During the period of his connexion with the council he devoted himself zealously to the study of administrative law. He was selected to prepare some of the most important reports of the council. Among his separate publications at this time are noted, — Du conseil d’etat envisage comme conseil et comme juridiction

dans notre monarchic constitutionnelle (1818), and De la responsa- btiitt des agents du gouvernement. In the former he claimed, for the protection of the rights of private persons in the administra- tion of justice, the institution of a special court whose members should be irremovable, the right of oral defence, and publicity of trial. In 1822 appeared his Questions de droit administratis , in which he for the first time brought together and gave scientific shape to the scattered elements of administrative law. These he arranged and stated clearly in the form of aphorisms, with logical deductions, establishing them by proofs drawn from the archives of the council of state. This is recognized as his most important work as a jurist. The fifth edition (1840) was thoroughly revised.

In 1828 Cormenin entered the Chamber of Deputies as member for Orleans, took his seat in the Left Centre, and began a vigorous opposition to the government of Charles X. As he was not gifted with the qualifications of the orator, he seldom appeared at the tribune; but in the various committees he defended all forms of popular liberties, and at the same time delivered, in a series of powerful pamphlets, under the pseudonym of ” Timon,” the most formidable blows against tyranny and all political and administrative abuses. After the revolution of July 1830, Cormenin was one of the 221 who signed the protest against the elevation of the Orleans dynasty to the throne; and he resigned both his office in the council of state and his seat in the chamber. He was, however, soon re-elected deputy, and now voted with the extreme Left. The discussions on the budget in 1831 gave rise to the publication of his famous series of Lettres sur la liste civile, which in ten years ran through twenty-five editions. In the following year he was elected deputy for Belley. In 1834 he was elected by two arrondissements, and sat for Joigny, which he represented till 1846. In this year he lost his seat in con- sequence of the popular prejudice aroused against him by his trenchant pamphlet Oui etnon (1845) against attacks on religious liberty, and a second entitled Feu! Feu! (1845), written in reply to those who demanded a retractation of the former. Sixty thousand copies were rapidly sold.

Cormenin was an earnest advocate of universal suffrage before the revolution of February 1848, and had remorselessly exposed the corrupt practices at elections in his pamphlet — Ordre dujour sur la corruption ilectorale. After the revolution he was elected by four departments to the Constituent Assembly, and became one of its vice-

presidents. He was also member and president of the constitutional commission, and for some time took a leading part in drawing up the republican constitution. But the disputes which broke out among the members led him to resign the presidency. He was soon after named member of the council of state and president of the comite du contentieux. It was at this period that he published two pamphlets — Sur V ind&pendance de I Italic After the coup d'Uat of December 2, 1851, Cormenin, who had undertaken the defence of Prince Louis Napoleon after his attempt at Strassburg, accepted a place in the new council of state of the empire. Four years later, by imperial ordinance, he was made a member of the Institute. One of the most characteristic works of Cormenin is the Livre des orateurs, a series of brilliant studies of the principal parliamentary orators of the restoration and the monarchy of July, the first edition of which appeared in 1838, and the eighteenth in i860. In 1846 he published his Entretiens de village, which procured him the Montyon prize, and of which six editions were called for the same year. His last work was Le Droit de tonnage en AlgSrie (i860). He died at Paris, on the 6th of May 1868. Two volumes jf his Reliquiae were printed in Paris in the same year.

CORMON, FERN AND (1845-), French painter, was born in Paris. He became a pupil of Cabanel, Fromentin and Portaels, and one of the leading historical painters of modern France. At an early age he attracted attention by the better class of sensationalism in his art, although for a time his powerful brush dwelled with particular delight on scenes of bloodshed, such as the" Murder in the Seraglio " (1868) and the " Death of Ra vara, Queen of Lanka " at the Toulouse Museum. The Luxembourg has his " Cain flying before Jehovah's Curse " ; and for the vii. 6

Mairie of the fourth arrondissement of Paris he executed in grisaille a series of Panels: " Birth," " Death," " Marriage," " War," &c. " A Chief's Funeral," and pictures having the Stone Age for their subject, occupied him for several years. He was appointed to the Legion of Honour in 1880. Subse- quently he also devoted himself to portraiture.

CORMONTAINGNE, LOUIS DE (c. 1697-1752), French military engineer, was born at Strassburg. He was present as a volun teer at the sieges of Freiburg and Landau in the later years of the War of the Spanish Succession, and in 1715 he entered the engineers. After being stationed for some years at Strassburg he became captain, and was put in charge (at first in a sub- ordinate capacity, and subsequently as chief engineer) of the new works, Forts Moselle and Bellecroix, at Metz, which he built according to his own system of fortification. He was present at the siege of Philipsburg in 1733, and as a lieutenant-

colonel took part in most of the sieges in the Low Countries during the War of the Austrian Succession. He attained the rank of brigadier and finally that of martchal de camp, and was employed in fortification work until his death. His Architecture militaire, written in 17 14, was long kept secret by order of the authorities, but, an unauthorized edition having appeared at the Hague in 1 741, he himself prepared another version called Premier mimoire sur la fortification, which from 1 741 onwards was followed by others. His ideas are closely modelled on those of Vauban iq.v.), and in his lifetime he was not considered the equal of such engineers as d'Asfeld and Filley. It was not until twenty years after his death that his system became widely known. Fourcroy de Rainecourt, then chief of engineers, searching the archives for valuable matter, chose the numerous memoirs of Cormontaingne for publication amongst engineer officers in 1776. Even then they only circulated privately, and it was not until the engineer Bousmard published Cormontaingne's Memorial de Vattaque des places (Berlin, 1803) that Fourcroy, and after him General La Fitte de Clave, actually gave to the general public the CEuvres posthumes de Cormontaingne (Paris, 1 806-1 809).

His system of fortification was not marked by any great originality of thought, which indeed could not be expected of a member of the corps du ginie, the characteristics of which were a close caste spirit and an unquestioning reverence for the authority of Vauban. Forts Moselle and Bellecroix are still in existence.

See Von Brese-Winiari, t)ber Entstehen etc. der neueren Befestigungsmethode (Berlin, 1844); Prevost du Vernois, De la fortification depuis Vauban (Paris, 1861) ; Cosseron de Villenoisy, Essai historique sur la fortification (Paris, 1869).

CORMORANT (from the Lat. corvus marinus, 1 through the Fr., in some patois of which it is still " cor marin "; in certain Ital. dialects are the forms " corvo marin " or " corvo marino "), a large sea-fowl belonging to the genus Phalacrocorax 2 (Carbo, Halieus and Graculus of some ornithologists) , and that group of the Linnaean order Anseres, now partly generally recognized by Illiger's term Steganopodes, of which it with its allies forms a family Phalacrocoracidae.

The cormorant (P. carbo) frequents almost all the sea-coast of Europe, and breeds in societies at various stations, most generally on steep cliffs, but occasionally on rocky islands as well as on trees. The nest consists of a large mass of sea-weed, and, with the ground immediately surrounding it, generally looks as though bespattered

with whitewash, from the excrement of the bird, which lives entirely on fish. The eggs, from four to six in number, are small, and have a thick, soft, calcareous shell, bluish- white when first laid, but soon becoming discoloured. The young are hatched blind, and covered with an inky-black skin. They remain for some time in the squab-condition, and are then highly esteemed for food by the northern islanders, their flesh being said to taste as well as a roasted hare's. Their first plumage is of a sombre brownish-black above, and more or less white beneath. They take two or three years to assume the fully adult

1 Some authors, following Caius, derive the word from corvtn vorans and spell it corvorant, but doubtless wrongly.

2 So spelt since the days of Gesner; but possibly Phalarocorax would be more correct.

dress, which is deep black, glossed above with bronze, and varied in the. breeding-season with white on the cheeks and flanks, besides being adorned by filamentary feathers on the head, arid further set off by a bright yellow gape. The old cormorant looks nearly as big as a goose, but is really much smaller; its flesh is quite uneatable.

Taken when young from the nest, this bird is'easily tamed and can be trained to fish for its keeper, as was of old time commonly done in England, where the: master of the cormorants was one of the officers of the royal household. Nowadays the practice is nearly obsolete. When taken out to furnish sport, a strap is fastened round the bird's neck so as, without impeding its breath, to hinder it from swallowing its captures. 1 Arrived at the waterside, it is cast off. It at once dives and darts along the bottom as swiftly as an arrow in quest of its prey, rapidly scanning every hole or pool. A fish is generally seized within a few seconds of its being sighted, and as each is taken the bird rises to the surface with its capture in its bill. It does not take much longer to dispose of the prize in the dilatable skin of its throat so far as the strap will allow, and the pursuit is recommenced until the bird's gular pouch, capacious as it is,, will hold no more. It then returns to its keeper, who has been anxiously watching and- encouraging its movements, and a little manipulation of its neck effects the delivery of the booty. It may then be let loose again, or, if considered to have

done its work, it is fed and restored to its perch. The activity the bird displays under water is almost incredible to those who. have not seen its performances, and in a shallow river scarcely a fish escapes its keen eyes, and sudden turns, except by taking refuge under a stone or root, or in the mud that may be stirred up during the operation, and so avoiding observation (see Salvin and Freeman, Falconry, 1859). Nearly allied to the cormorant, and having much the same habits, is the shag, or green cormorant of some writers (P.. graculus): The shag (which name in many parts of the world is used in a generic sense) is, however, about one-fourth smaller in linear dimensions, is much more glossy in plumage, and its nuptial embellishment is a nodding plume instead of the white patches of the cormorant. The easiest diagnostic on examination will be found to be the number of tail-feathers, which in the former are fourteen and in the shag twelve. The latter, too, is more marine in the localities it frequents, scarcely ever entering fresh or indeed inland waters.

In the south of Europe a much smaller species (P.pygmaeus) is found. ” This is almost entirely a fresh- water bird, and is not uncommon on the lower Danube. Other species, to the number perhaps of thirty or more, have been discriminated from other parts of the world, but all have a great general similarity to one another. New Zealand and the west coast of northern America are particularly rich in birds of this genus, and the species found there are the most beautifully decorated of any. All, however, are remarkable for their curiously-formed feet, the four toes of each being connected by a web, for their long stiff tails, and for the absence, in the adult, of any exterior nostrils. When gorged, or when the state of the tide precludes fishing, they are fond of sitting on an elevated perch, often with extended wings, and in this attitude they will remain motionless for a considerable time, as though hanging themselves out to dry. It was perhaps this peculiarity that struck the observation of Milton, and prompted his well-known similitude of Satan to a cormorant {Par ad. Lost, iv. 194); but when not thus behaving they them- selves provoke the more homely comparison of a row of black bottles. Their voracity is proverbial. (A. N.)

CORN (a common Teutonic word; cf. Lat. granum, seed, grain), originally meaning a small hard particle or grain, as of sand, salt, gunpowder, &c. It thus came to be applied to the small hard seed of a plant, as still used in the words barley-corn and pepper-corn. In agriculture it is generally applied to the seed of the cereal plants. It is often locally understood to mean that kind of cereal which is the leading crop of the district;

1 According to Willoughby it was formerly the custom to carry the cormorant hooded till it was required ; in modern practice the.bearer wears a face-mask to protect himself from its beak.

thus in England it refers to wheat, in Scotland and Ireland to oats, and in the United States to maize (Indian corn). See Grain Trade; Corn Laws; Agriculture; Wheat; Maize; &c.

The term ” corned ” is given to a preparation of meat (especi- ally beef) on account of the original manner of preserving it by the use of salt in grains or ” corns.”

CORN (from Lat. cornu, horn), in pathology (technically clavus), a localized outgrowth of the epidermic layer of the skin, most commonly of the toe, with a central ingrowth of a hard horny plug. The underlying papillae are atrophied, causing a cup-shaped hollow, whilst the surrounding papillae are hyper- trophied. The condition is mainly caused by badly fitting boots, though any undue pressure, of insufficient power to give rise to ulceration, may be the cause of a corn. Corns may be hard or soft. The hard corn usually occurs on one of the toes, is a more or less conical swelling and may be extremely painful at times. If suppuration occurs around the corn, it is apt to burrow, and if unattended to may give rise to arthritis or even necrosis. The best treatment is to soften the corn with hot water, pare it very carefully with a sharp knife, and then paint it with a solution of- salicylic acid in collodion. The painting must be repeated three times a day for a week or ten days. The soft corn occurs between the toes and is usually a more painful condition. Owing to the absorption of sweat its surface may become white and sodden in appearance. The treatment is much the same, but spirits of camphor should be painted on each night, and a layer of cotton wool placed between the toes during the daytime.

CORNARO, CATERINA (1454-151°), queen of Cyprus, was the daughter of Marco Cornaro, a Venetian noble, whose brother Andrea was an intimate friend of James de Lusignan, natural son of King John II. of Cyprus. In the king’s death in 1458 the succession was disputed, and James , with the help of the sultan of Egypt, seized the island. But several powers were arrayed against him— the duke of Savoy, who claimed the island on the strength of the marriage of his son Louis to Charlotte, the only legitimate daughter of John II.,* the Genoese, and the pope. It was important that he should make a marriage such as would secure him powerful support. Andrea Cornaro suggested his niece Caterina, famed for her beauty, as that union would bring him Venetian help. The proposal was agreed to, and approved of by

Caterina herself and the senate, and the contract was signed in 1468, But further intrigues caused delay, arid it was not until 147 1 that James's hesitations were overcome. Caterina was solemnly adopted by the doge as a " daughter of the Republic " and sailed for Cyprus in 1472 with the title of queen of Cyprus, Jerusalem and Armenia. But she only enjoyed one year of happiness, for in 1473 her husband died of fever, leaving his kingdom to his queen and their child as yet unborn. Enemies and rival claimants arose on all sides, for Cyprus was a tempting bait. In August the child James III. was born, but as soon as the Venetian fleet sailed away a plot to depose him in favour of Zarla, James's illegitimate daughter, broke out, and Caterina was kept a prisoner. The Venetians returned, and order was soon restored, but the republic was meditating the seizure of Cyprus, although it had no valid title whatever^ and after the death of Caterina's child in 1474 it was Venice which really governed the island. The poor queen was surrounded by intrigues and plots, and although the people of the coast towns loved her, the Cypriot nobles were her bitter enemies and hostile to Venetian influence. In 1488 the republic, fearing that Sultan Bayezid II. intended to attack Cyprus, and having also discovered a plot to marry Caterina to King Alphonso II. of Naples, a proposal to which she seemed not averse, decided to recall the queen to Venice and formally annex the island. Caterina at first refused, for she clung to her royalty, but Venice was a severe parent to its adopted daughter and would not be gainsaid; she was forced to abdicate in favour of the republic, and returned to Venice in 1489. The government conferred on 2 Whence the kings of Italy derive their title of kings of Cyprus and Jerusalem.

her the castle and town of Asolo for life, and there in the midst of a learned and brilliant little court, of which Cardinal Bembo (q.v.) was a shining light, she spent the rest of her days in idyllic peace. She died in July 1510. Titian's famous portrait of her is in the Uffizi gallery in Florence.

Bibliography. — A. Centelli, Caterina Cornaro e il suo regno (Venice, 1892); S. Romanin, Storia documentata di Venezia, vol. iv. (Venice, 1855), and his Lezioni di storia Veneta (Florence, 1875); L. de Mas Latrie, Histoire de Vile de Chypre (Paris, 1852-1861); and Horatio Brown's essay in his Studies in Venetian History (London, 1907), which gives the best sketch of the queen's career and a list of authorities. (L. V.*)

CORNARO, tUIGI (1467-1566), a Venetian nobleman, famous for his treatises on a temperate life. In his youth he lived freely, but after a severe illness at the age of forty, he began under medical advice gradually to reduce his diet. For some time he restricted himself to a daily allowance of 1 2 oz. of solid food and 14 oz. of wine; later in life he reduced still further his bill of fare, and found he could support his life and strength with no more solid meat than an egg a day. At the age of eighty-three he wrote his treatise on The Sure and Certain Method of Attaining a Long and Healthful Life, the English translation of which went through numerous editions; and this was followed by three others on the same subject, composed at the ages of eighty-six, ninety-one and ninety-five respectively. The first three were published at Padua in 1558. They are written, says Addison {Spectator, No. 195), ” with such a spirit of cheerfulness, religion and good sense, as are the natural concomitants of temperance and sobriety.” He died at Padua at the age of ninety-eight.

CORNBRASH, in geology, the name applied to the uppermost member of the Bathcnian stage of the Jurassic formation in England. It is an old English agricultural name applied in Wiltshire to a variety of loose rubble or ” brash ” which, in that part of the country, forms a good soil for growing corn. The name was adopted by William Smith for a thin band of shelly limestone which, in the south of England, breaks up in the manner indicated. Although only a thin group of rocks (10-25 f t.) , it is remarkably persistent ; it may be traced from Weymouth to the Yorkshire coast, but in north Lincolnshire it is very thin, and probably dies out in the neighbourhood of the Humber. It appears again, however, as a thin bed in Gristhorpe Bay, Cayton Bay, Wheatcroft, Newton Dale and Langdale. In , the inland exposures in Yorkshire it is difficult to follow on account of its thinness, and the fact that it passes up into dark shales in many places — the so-called ” clays of the Cornbrash,” with Avicula echinata.

The Cornbrash is a very fossiliferous formation; the fauna indicates a transition from the Lower to the Middle Oolites, though it is probably more nearly related to that of the beds above than to those below. Good localities for fossils are Radipole near Weymouth, Closworth, Wincanton, Trowbridge, Cirencester, Witney, Peterborough and Sudbrook Park near Lincoln. A few of the important fossils are: Waldheimia lagenalis, Pecten levis, Avicula echinata, Ostrea flabelloides, Myacites decurtatus, Echinobrissus clunicularis ; Macrocephalites macrocephalus is abundant in the midland counties but rarer in the south; belemnites are not known. The remains of saurians (Steneosaurus) are occasionally found. The Cornbrash is of little value for building or road-making, although it is used locally; in

the south of England it is not oolitic, but in York- shire it is a rubbly, marly, frequently ironshot oolitic limestone. In Bedfordshire it has been termed the Bedford limestone.

See Jurassic; also H. B. Woodward, “The Jurassic Rocks of Britain,” vol. iv. (1894) ; and C. Fox Strangways, vol. i. ; both Memoirs of the Geological Survey. (J. A. H.)

CORNEILLE, PIERRE (1606-1684), French dramatist and poet, was born at Rouen, in the rue de la Pie, on the 6th of June 1606. The house, which was long preserved, was destroyed not many years ago. His father, whose Christian name was the same,, was avocat du roi a la Table de Marbre du Palais, and also held the position of maitre des eaux et forets in the vicomtt (or bailliage, as some say) of Rouen. In this latter office he is said to have shown himself a vigorous magistrate, suppressing

brigandage and plunder without regard to his personal safety. He was ennobled in 1637 (it is said not without regard to his son’s distinction), and the honour was renewed in favour of his sons Pierre and Thomas in 1669, when a general repeal of the letters of nobility recently granted had taken place. There appears, however, to be no instance on record of the poet himself assuming the ” de ” of nobility. His mother’s name was Marthe le Pesant.

After being educated by the Jesuits of Rouen, Corneille at the age of eighteen was entered as avocat, and in 1624 took the oaths, as we are told, four years before the regular time, a dis- pensation having been procured. He was afterwards appointed advocate to the admiralty, and to the “waters and forests,” but both these posts must have been of small value, as we find him parting with them in 1650 for the insignificant sum of 6000 livres. In that year and the next he was procureur-syndic des Etats de Normandie. His first play, MSlite, was acted in 1629. It is said by B. le B. de Fontenelle (his nephew) to have been inspired by personal experiences, and was extremely popular, either because or in spite of its remarkable difference from the popular plays of the day, those of A. Hardy. In 1632 Clitandre, a tragedy, was printed (it may have been acted in 163 1); in 1633 La Veuve and the Galerie du palais, in 1634 La Suivante and La Place Royale, all the: last-named plays being comedies, saw the stage. In 1634 also, having been selected as the composer of a Latin elegy to Richelieu on the occasion of the cardinal visiting Rouen, he was introduced to the subject of his verses, and was soon after enrolled among the “five poets.” These officers (the others being G. Colletet, Boisrobert and C. de l’Etoile, who in no way merited the title, and J.

de Rotrou, who was no unworthy yokefellow even of Corneille) had for task the more profitable than dignified occupation: of working up Richelieu's ideas into dramatic form.' No one could be less suited for such work than Corneille, and he soon (it is said) incurred his employer's displeasure by altering the plan of the third act of Les Thuileries, which had been entrusted to him.

Meanwhile the year 1635 saw the production of MSdSe, a grand but unequal tragedy. In the next year the singular extravaganza entitled L'lllusion comique followed, and was succeeded about the end of November by the Cid, based on the Mocedades del Cid of Guillem de Castro. The triumphant success of this, perhaps the most " epoch-making " play in all literature, the jealousy of Richelieu and the Academy, the open attacks of Georges de Scudery and J. de Mairet and others, and the pamphlet- war which followed, are among the best-known incidents in the history of letters. The trimming verdict of the Academy, which we have in J. Chapelain's Sentiments de I'AcadSmie francaise sur la tragi-comSdie du Cid (1638), when its arbitration was demanded by Richelieu, and not openly repudiated by Corneille, was virtually unimportant; but it is worth remember- ing that no less a writer than Georges de Scudery, in his Observa- tions sur le Cid (1637), gravely and apparently sincerely asserted and maintained of this great play that the subject was utterly bad, that all the rules of dramatic composition were violated, that the action was badly conducted, the versification constantly faulty, and the beauties as a rule stelen! Corneille himself was awkwardly situated in this dispute. The esprit bourru by which he was at all times distinguished, and which he now displayed in his rather arrogant Excuse a Ariste, unfitted him for contro- versy, and it was of vital importance to him that he should not lose the outward marks of favour which Richelieu continued to show him. Perhaps the pleasantest feature in the whole matter is the unshaken and generous admiration with which Rotrou, the only contemporary whose genius entiled him to criticise Corneille, continued to regard his friend, rival, and in some sense (though Rotrou was the younger of the two) pupil. Finding it impossible to make himself fairly heard in the matter, Corneille (who had retired from his position among the " five poets ") withdrew to Rouen and passed nearly three years in quiet there, perhaps revolving the opinions afterwards expressed in his three Discours and in the Examens of his plays, where he bows, somewhat as in the house of Rimmon, to " the rules." In 1639,

or at the beginning of 1640, appeared Horace with a dedication to Richelieu. The good offices of Madame de Combalet, to whom the Cid had been dedicated, and perhaps the satisfaction of the cardinal's literary jealousy, had healed what breach there may have been, and indeed the poet was in no position to quarrel with his patron. Richelieu not only allowed him 500 crowns a year, but soon afterwards, it is said, though on no certain authority, employed his omnipotence in reconciling the father of the poet's mistress, Marie de Lamperiere, to the marriage of the lovers (1640). In this year also Cinna appeared. A brief but very serious illness attacked him, and the death of his father the year before had increased his family anxieties by leaving his mother in very indifferent circumstances. It has, however, been recently denied that he himself was at any time poor, as older traditions asserted.

In the following year Corneille figured as a contributor to the Guirlande de Julie, a famous album which the marquis de Montausier, assisted by all the literary men of the day, offered to his lady-love, Julie d'Angennes. 1643 was, according to the latest authorities (for Cornelian dates have often been altered), a very great year in the dramatist's life. Therein appeared Polyeucte, the memorable comedy of Le Menteur, which though adapted from the Spanish stood in relation to French comedy very much as Le Cid, which owed less to Spain, stood to French tragedy; its less popular and far less good Suite, — and perhaps La Mart de Pompie. Rodogune (1644) was a brilliant success; Thiodore (1645), a tragedy on a somewhat perilous subject, was the first of Corneille's plays which was definitely damned. Some amends may have been made to him by the commission which he received next year to write verses for the Triomphes poitiques de Louis XIII. Soon after (22nd of January 1647) the Academy at last (it had twice rejected him on frivolous pleas) admitted the greatest of living French writers. HSraclius (1646) , Andromede (1650), a spectacle-opera rather than a play, Dow Sanche d'Aragon (1650) and Nicomede (1651) were the products of the next few years' work; but in 1632 Pertharite was received with decided disfavour, and the poet in disgust resolved, like Ben Jonson, to quit the loathed stage. In this resolution he persevered for six years, during which he worked at a verse translation of the Imitation of Christ (finished in 1656), at his three Discourses on Dramatic Poetry, and at the Examens which are usually printed at the end of his plays. In 1659 Fouquet, the Maecenas of the time, persuaded him to alter his resolve, and CEdipe, a play which became a great favourite with Louis XIV., was the result. It was followed by La Toison d'or (1660), Sertorius (1662) and Sophonisbe (1663). In this latter year Corneille (who had at last removed his

residence from Rouen to Paris in 1662) was included among the list of men of letters pensioned at the proposal of Colbert. He received 2opo livres. Othon (1664), Agisilas (1666), Attila (1667), and Tite el Berenice (1670), were generally considered as proofs of failing powers, — the cruel quatrain of Boileau —

” Apres YAgSsilas Helas! Mais apres V Attila • Hola!”

in the case of these two plays, and the unlucky comparison with Racine in the BSrinice, telling heavily against them. In 1665 and 1670 some versifications of devotional works addressed to the Virgin had appeared. The part which Corneille took in Psychi (1671), Moliere and P. Quinault being his coadjutors, showed signs of renewed vigour; but PulchSrie (1672) and SurSna (1674) were allowed even by his faithful followers to be failures. He lived for ten years after the appearance of Surina, but was almost silent save for the publication, in 1676, of some beautiful verses thanking Louis XIV. for ordering the revival of his plays. He died at his house in the rue d’Argenteuil on the 30th of September 1684. For nine years (1674-1681), and again in 1683, his pension had, for what reason is unknown, been suspended. It used to be said that he was in great straits, and the story went (though, as far as Boileau is concerned, it has been invalidated), that at last Boileau, hearing of this,

went to the king and offered to resign his own pension if there were not money enough for Corneille, and that Louis sent the aged poet two hundred pistoles. He might, had it actually been so, have said, with a great English poet in like case, ” I have no time to spend them.” Two days afterwards he was dead.

Corneille was buried in the church of St Roch, where no monument marked his grave until 1821. He had six children, of whom four survived him. Pierre, the eldest son, a cavalry officer who died before his father, left posterity in whom the name has continued; Marie, the eldest daughter, was twice married, and by her second husband, M. de Farcy, became the ancestress of Charlotte Corday. Repeated efforts have been made for the benefit of the poet’s descendants, Voltaire, Charles X. and the ComSdie franQaise having all borne part therein.

The portraits of Corneille (the best and most trustworthy of which is from the burin of M. Lasne, an engraver of Caen), represent him as a man of serious, almost of stern countenance, and this agrees well enough with such descriptions as we have of his appearance, and with the idea of him which we should form from his writings and conduct. His nephew Fontenelle admits that his general address and manner

were by no means pre- possessing. Others use stronger language, and it seems to be confessed that either from shyness, from pride, or from physical defects of utterance, probably from all three combined, he did not attract strangers. Racine is said to have assured his son that Corneille made verses “cent fois plus beaux” than his own, but that his own greater popularity was owing to the fact that he took some trouble to make himself personally agreeable. Almost all the anecdotes which have been recorded concerning him testify to a rugged and somewhat unamiable self-content- ment. ” Je n’ai pas le merite de ce pays-ci,” he said of the court. ” Je n’en suis pas moins Pierre Corneille,” he is said to have replied to his friends as often as they dared to suggest certain shortcomings in his behaviour, manner or speech. ” Je suis saoul de gloire et aflame d’argent ” was his reply to the compliments of Boileau. Yet tradition is unanimous as to his affection for his family, and as to the harmony in which he lived with his brother Thomas who had married Marguerite de Lam- periere, younger sister of Marie, and whose household both at Rouen and at Paris was practically one with that of his brother. No story about Corneille is better known than that which tells of the trap between the two houses, and how Pierre, whose facility of versification was much inferior to his brother’s, would lift it when hard bestead, and call out ” Sans-souci, une rime!” Notwithstanding this domestic felicity, an impression is left on the reader of Corneille’s biographies that he was by no means a happy man. Melancholy of temperament will partially explain this, but there were other reasons. He appears to have been quite free from envy properly so called, and to have been always ready to acknowledge the excellences of his contemporaries. But, as was the case with a very different man — Goldsmith — praise bestowed on others always made him uncomfortable unless it were accompanied by praise bestowed on himself. As Guizot has excellently said, ” Sa jalousie fut celle d’un enfant qui veut qu’un sourire le rassure contre les caresses que recoit son frere.”

Although his actual poverty has been recently denied, he cannot have been affluent. His pensions covered but a small part of his long life and were most irregularly paid. He was no “dedicator,” and the occasional presents of rich men, such as Montauron (who gave him a thousand, others say two hundred, pistoles for the dedication of Cinna), and Fouquet (who com- missioned CFdipe), were few and far between, though they have exposed him to reflections which show great ignorance of the manners of the age. Of his professional earnings, the small sum for which, as we have seen, he gave up his offices, and the expres- sion of Fontenelle that he practised ” sans gofit et sans succes,” are sufficient proof. His patrimony and his wife’s

dowry must both have been trifling. On the other hand, it was during the early and middle part of his career impossible, and during the later part very difficult, for a dramatist to live decently by his pieces. It was not till the middle of the century that the custom

of allowing the' author two shares in the profits during the first run of the piece was observed, and even then revivals profited him nothing. Thomas Corneille himself, who to his undoubted talents united wonderful facility, untiring industry, and (gift valuable above all others to the playwright) an extraordinary knack of hitting the public fancy, died, notwithstanding his simple tastes, " as poor as Job." We know that Pierre received for two of his later pieces two thousand livres each, and we do not know that he ever received more.

But his reward in fame was not stinted. Corneille, unlike many of the great writers of the world, was not driven to wait for " the next age " to do him justice. The cabal or clique which attacked the Cid had no effect whatever on the judgment of the public. All his subsequent masterpieces were received with the same ungrudging applause, and the rising star of Racine, even in conjunction with the manifest inferiority of Corneille's last five or six plays, with difficulty prevailed against the older poet's towering reputation. The great men of his time — Conde, Turenne, the marechal de Grammont, the knight-errant due de Guise— were his fervent admirers. Nor had he less justice done him by a class from whom less justice might have been expected, the brother men of letters whose criticisms he treated with such scant courtesy. The respectable mediocrity of Chapelain might misapprehend him; the lesser geniuses of Scudery and Mairet might feel alarm at his advent; the envious Claverets and D'Aubignacs might snarl and scribble. But Balzac did him justice; Rotrou, as we have seen, never failed in generous appreciation; Moliere in conversation and in print recognized him as his own master and the foremost of dramatists. We have quoted the informal tribute of Racine; but it should not be forgotten that Racine, in discharge of his duty as respondent at the Academical reception of Thomas Corneille, pronounced upon the memory of Pierre perhaps the noblest and most just tribute of eulogy that ever issued from the lips of a rival. Boileau's testimony is of a' more chequered character; yet he seems never to have failed in admiring Corneille whenever his principles would allow him to do so. Questioned as to the great men of Louis XIV.'s reign, he is said to have replied: " I only know three, — Corneille, Moliere and

myself.” “And how about Racine?” his auditor ventured to remark. ” He was an extremely clever fellow to whom I taught the art of elaborate rhyming ” (rimer difficilement). It was reserved for the 18th century to exalt Racine above Corneille. Voltaire, who was prompted by his natural benevolence to comment on the latter (the profits went to a relation of the poet), was not altogether fitted by nature to appreciate Corneille, and moreover, as has been ingeniously pointed out, was not a little wearied by the length of his task. His partially unfavourable verdict was endorsed earlier by Vauvenargues, who knew little of poetry, and later by La Harpe, whose critical standpoint has now been universally abandoned. Napoleon I. was a great admirer of Corneille (” s’il vivait, je le ferais prince,” he said) , and under the Empire and the Restoration an approach to a sounder appreciation was made. But it was the glory of the romantic school, or rather of the more catholic study of letters which that school brought about, to restore Corneille to his true rank. So long, indeed, as a certain kind of criticism was pursued, due appreciation was impossible. When it was thought sufficient to say with Boileau that Corneille excited, not pity or terror, but admiration which was not a tragic passion; or that

” D’un seul nom quelquefois le son dur ou bizarre Rend un poeme entier ou burlesque ou barbare ;”

when Voltaire could think it crushing to add to his exposure of the ” infamies ” of Theodore — ” apres cela comment osons-nous condamner les pieces de Lope de Vega et de Shakespeare? ” — it is obvious that the Cid and Polyeucte, much more Don Sanche d’Aragon and Rodogune, were sealed books to the critic.

Almost the first thing which strikes a reader is the singular inequality of this poet, and the attempts to explain this in- equality, in reference to his own and other theories, leave the fact untouched. Producing, as he certainly has produced, work which classes him with the greatest names in literature, he has

also signed an extraordinary quantity of verse which has not merely the defects of genius, irregularity, extravagance, bizarrete, but the faults which we are apt to regard as exclusively belonging to those who lack genius, to wit, the dulness and tediousness of mediocrity. Moliere’s manner of accounting for this is famous in literary history or legend. ” My friend Corneille,” he said, ” has a familiar who inspires him with the finest verses in the world. But sometimes the familiar leaves him to shift for himself, and then he fares very badly.” That Corneille was by no means destitute of the critical faculty his Discourses and the Examens of his plays (often admirably acute, and,

with Dryden's subsequent prefaces, the originals to a great extent of specially modern criticism) show well enough. But an enemy might certainly contend that a poet's critical faculty should be of the Promethean, not be Epimethean order. The fact seems to be that the form in which Corneille's work was cast, and which by an odd irony of fate he did so much to originate and make popular, was very partially suited to his talents. He cou'd imagine admirable situations, and he could write verses of incomparable grandeur — verses that reverberate again and again in the memory, but he could not, with the patient docility of Racine, labour at proportioning the action of a tragedy strictly, at maintaining a uniform rate of interest in the course of the plot and of excellence in the fashion of the verse. Especially in his later plays a verse and a couplet will crash out with fulgurous brilliancy, and then be succeeded by pages of very second-rate declamation or argument. It was urged against him also by the party of the Doucereux, as he called them, that he could not manage, or did not attempt, the great passion of love, and that except in the case of Chimene his principle seemed to be that of one of his own heroines:—

" Laissons, seigneur, laissons pour les petites ames Ce commerce rampant de soupirs et de flammes."

(Aristie in Sertorius.)

There is perhaps some truth in this accusation, however much some of us may be disposed to think that the line just quoted is a fair enough description of the admired ecstasies of Achille and Bajazet. But these are all the defects which can be fairly urged against him; and in a dramatist bound to a less strict service they would hardly have been even remarked. They certainly neither require, nor are palliated by, theories of his " megalomania," of his excessive attention to conflicts of will and the like. On the English stage the liberty of unrestricted incident and complicated action, the power of multiplying characters and introducing prose scenes, would have exactly suited his somewhat intermittent genius, both by covering defects and by giving greater scope for the exhibition of power.

How great that power is can escape no one. The splendid soliloquies of Medea which, as Voltaire happily says, " annoncent Corneille," the entire parts of Rodogune and Chimene, the final speech of Camille in Horace, the discovery scene of Cinna, the dialogues of Pauline and Severe in Polyeucte, the magnificently- contrasted conception and exhibition of the best and worst forms of feminine dignity in the Cornelie of PompSe and the Cleopatre of Rodogune, the singularly fine contrast in Don Sanche d'Aragon, between the haughtiness of the

Spanish nobles and the unshaken dignity of the supposed adventurer Carlos, and the characters of Aristie, Viriate and Sertorius himself, in the play named after the latter, are not. to be surpassed in grandeur of thought, felicity of design or appropriateness of language. “Admiration ” may or may not properly be excited by tragedy, and until this important question is settled the name of tragedian may be at pleasure given to or withheld from the author of Rodogune. But his rank among the greatest of dramatic poets is not a matter of question. For a poet is to be judged by his best things, and the best things of Corneille are second to none.

The Plays. — It was, however, some time before his genius came to perfection. It is undeniable that the first six or seven of his plays are of no very striking intrinsic merit. On the other hand, it requires only a very slight acquaintance with the state of the drama in France at the time to see that these works, poor as they may now seem, must have struck the spectators as something

new and surprising. The language and dialogue of Milite are on the whole simple and natural, and though the construction is not very artful (the fifth act being, as is not unusual in Corneille, superfluous and clumsy), it is still passable. The fact that one of the characters jumps on another’s back, and the rather promiscuous kissing which takes place, are nothing to the liberties usually taken in contemporary plays. A worse fault is the (TTixofivdia, or, to borrow Butter’s expression, the Cat-and- Puss dialogue, which abounds. But the common objection to the play at the time was that it was too natural and too devoid of striking incidents. Corneille accordingly, as he tells us, set to work to cure these faults, and produced a truly wonderful work, Clitandre. Murders, combats, escapes and outrages of all kinds are provided; and the language makes The Rehearsal no burlesque. One of the heroines rescues herself from a ravisher by blinding him with a hair-pin, and as she escapes the seducer apostrophizes the blood which trickles from his eye, and the weapon which has wounded it, in a speech forty verses long. This, however, was his only attempt of the kind. For his next four pieces, which were comedies, there is claimed the introduction of some important improvements, such as the choosing for scenes places well known in actual life (as in the Galerie dupalais), and the substitution of the soubrette inplace of the old inconvenient and grotesque nurse. It is certain, however, that there is more interval between these six plays and Medie than

between the latter and Corneille's greatest drama. Here first do we find those sudden and magnificent lines : which characterize the poet. The title-role is, however, the only good one, and as a whole the play is heavy'. Much the same may be saidof its curious successor V Illusion comique. This is not only a play within a play, but in part of it there is actually a third involution, one set of characters beholding another set discharging the parts of yet another. It contains, however, some very fine lines, in particular, a defence of the stage and some heroics put into the mouth of a braggadocio. We have seen it said of the Cid that it is difficult to understand the enthusiasm ■ it excited. But the difficulty Can only exist for persons who are insensible to dramatic ex- cellence, or who so strongly object to the forms of the French drama that they cannot relish anything so presented. Rodrigue, Chimene, Don Diegue are not of any age, but of all time. The conflicting passions of love, honour, duty, are here represented as they never had been on a French stage, and in the " strong style" which was Corneille's own. Of the many objections urged against the play, perhaps the weightiest is that which condemns the frigid and superfluous part of the Infanta. Horace, though more skilfully constructed, is perhaps less satisfactory. There is a hardness about the younger Horace which might have been, but is not made, imposing, and Sabine's effect on the action is quite out of proportion to the space she occupies. The splendid declamation of Camille, and the excellent part of the elder Horace, do not altogether atone for these defects. Cihna is perhaps generally considered the poet's masterpiece, and it undoubtedly contains the finest single scene in all French tragedy. The blot on it is certainly the character > of Emilie, who is spiteful and thankless, not heroic. Polyeucte has some- times been elevated to the same position. There is, however, a certain coolness about the hero's affection for his wife which somewhat detracts from the merit of his sacrifice; while the Christian part of the matter is scarcely so well treated as in the Saint Genest Of Rotrou or the Virgin Martyr of Massinger. On the other hand, the entire parts of Pauline and Severe are beyond praise, and the manner in which the former reconciles her duty as a wife with her affection for her lover is an astonishing success. In Pompee (for La Mort de Pomp&e, though the more appropriate, was not the original title) the splendid declamation of Cornelie is the chief thing to be remarked. Le Menteur fully deserves the honour which Moliere paid to it. Its continuation, notwithstand- ing the judgment of some French critics, we cannot think so happy. But TModore is perhaps the most surprising of literary anomalies. The central situation, which so greatly shocked Voltaire and indeed all French critics from the date of the piece, does not seem to blame. A virgin martyr who is threatened

with loss of honour as a bitterer punishment than loss of life offers points as powerful as they are perilous. But the treatment is thoroughly bad. From the heroine who is, in a phrase of Dryden's, " one of the coolest and most insignificant' " heroines ever drawn, to the undignified Valens, the termagant Marcelle, and the peevish Placide, there is hardly a good character. Im- mediately upon this in most printed editions, though older in representation, follows the play which (therein agreeing rather with the author than with his critics) we should rank as his greatest triumph, Rodogune. Here there is hardly a weak point. The magnificent and terrible character of Cleop&tre, and the contrasted dispositions of the two princes, of course attract most attention. But the character of Rodogune herself, which has not escaped criticism, comes hardly short of these. Heraclius, despite great art and much fine poetry, is injured by the extreme complication of its argument and by the blustering part of Pulcherie. Andromide, with the later spectacle piece, the Toison d'or, do not call for comment, and we ■ have already alluded to the chief merit of Don Sanche. Nicomede, often considered one of Corneille's best plays, is chiefly remarkable for the curious and unusual character of its hero; Of Pertharite it need only be said that no single critic has to our knowledge disputed the justice of its damnation. (Edipe is certainly unworthy of its subject and its author, but in Sertorius we have one of Corneille's finest plays. It is remarkable not only for its many splendid verses and for the nobility of its sentiment, but from the fact that not one of its characters lacks interest, a commendation not generally to be bestowed on its author's work. Of the last six plays we may say that perhaps only one of them; AgSsilas, is almost wholly worthless. Not a few speeches of Surena and of Othon are of a very high order. As to the poet's non-dramatic works, we have already spoken of his extremely interesting critical dissertations. His minor poems and poetical devotions are not likely to be read save from motives of duty or curiosity. The verse translation of a. Kempis, indeed, which was in its day immensel^xspopular (it passed through many editions), condemns itself.

Bibliography. — The subject of the bibliography of Corneille was treated in the most exhaustive manner by M. E. Picot in his Bibliographic Cornelienne (Paris, 1875-^1876)., Less elaborate, but still ample information may. be found in J. A. Taschereau's Vie and in Jyl. Marty-Laveaux's edition of the Works. The individual plays were usually printed a year or two after their first appearance: but these dates have been subjected to confusion and to controversy, and it seems better to refer for them to the works quoted and to be quoted. The chief collected editions in the poet's lifetime were those of 1644,

1648, 1652, 1660 (with important corrections), 1664 and 1682, which gives the definitive text. In 1692 T. Corneille pub- lished a complete Thedtre in 5 vols. l2mo. Numerous editions appeared in the early part of the 18th century, that of 1740 (6 vols. l2rno, Amsterdam) containing the (Euvres diverses as well as the plays. Several editions are recorded between this and that of Voltaire (12 vols. 8vo; Geneva, 1764, 1776, 8 vols. 4to), whose Commentaires have often been reprinted separately. In the year IX. (1801) appeared an edition of the Works with Voltaire's commentary and criticisms thereon by Palissot (12 vols. 8vo, Paris). Since this the editions have been extremely numerous. Those chiefly to be remarked are the following. Lefevre's (12 vols. 8vo, Paris, 1854), well printed and with a useful variorum commentary, lacks biblio- graphical- information and is disfigured by hideous engravings. Of: Taschereau's, in the Bibliotheque elzevirienne, only two volumes were published. Lahure's appeared in 5 vols. (1857-1862) and 7 vols. (1864-1866). The edition of Ch. Marty-Laveaux in Regnier's Grands Hcrivains de la France (1862-1868), in 12 vols. 8vo, is still the standard. In appearance and careful editing it leaves nothing to desire, containing the entire works, a lexicon, full bibliographical information, and an album of illustrations of the poet's places of residence, his arms, some title-pages of his plays, facsimiles of his writings, &c. Nothing is wanting but variorum comments, which Lefevre's edition supplies. Fontenelle's life of his uncle is the chief original authority on that subject, but Taschereau's Hisioire de la vie et des ouvrages de P. Corneille (1st ed. 1829; 2nd in the Bibl- elzevirienne, 1 855) is the standard work. Its information has been corrected and augmented in various later publications, but not materially. Of the exceedingly numerous writings relative to Corneille we may mention the Recueil de dissertations sur plusieurs tragSdies de Corneille et de Racine of the abbe Granet (Paris, 1740), the criticisms already alluded to of Voltaire, La Harpe and Palissot, the well-known woric of Guizot, first published as Vie de Corneille in 1 813 and revised as Corneille etson temps in 1852, and the essays, repeated in his Portraits

litteraires, in Port-Royal, and in the Nouveaux Lundis of Sainte-Beuve. More recently, besides essays by MM. Brunetiere, Faguet and Lemaitre and the part appurtenant of M. E. Rigal's work on 1 6th century drama in France, see Gustave Lanson's " Corneille " in the Grands Ecrivains frangais (1898); F. Bouquet's Points obscurs el nouveaux de la vie de Pierre Corneille (1888); Corneille inconnu, by J. Levallois (1876); J.

Lemaitre, Corneille et la poetique d'Aristote (1888); J. B. Segall, Corneille and the Spanish Drama (1902); and the recently discovered and printed Fragments sur Pierre et Thomas Corneille of Alfred de Vigny (1905). On the Cid quarrel E. H. Chardon's Vie de Rotrou (1884) bears mainly on a whole series of documents which appeared at Rouen in the proceedings of the Societe des bibliophiles normands during the years 1 891-1894. The best-known English criticism, that of Hallam in his Literature of Europe, is inadequate. The translations of separate plays are very numerous, but of the complete Theatre only one version (into Italian) is recorded by tfte French editors. Fontenelle tells us that his uncle had translations of the Cid in every European tongue but Turkish and Slavonic, and M. Picot's book apprises us that the latter want, at any rate, is now supplied. Corneille has suffered less than some other writers from the attribution of spurious works. Besides a tragedy, Sylla, the chief piece thus assigned is L'Occasion perdue recouverte, a rather loose tale in verse. Internal evidence by no means fathers it on Corneille, and all external testimony is against it. It has never been included in Corneille's works. It is curious that a translation" of Statius {Thebaid, bk. hi.), an author of whom Corneille was extremely fond, though known to have been written, printed and published, has entirely dropped out of sight. Three verses quoted by Menage are all we possess. (G. Sa.)

CORNEILLE/ THOMAS (1625-1709), French dramatist, was born at Rouen on the 20th of August 1625, being nearly twenty years younger than his brother, the great Corneille. His skill in verse-making seems to have shown itself early, as at the age of fifteen he composed a piece in Latin which was represented by his fellow-pupils at the Jesuits' college of Rouen. His first French play, Les Engagements du hasard, was acted in 1647. Le Feint Astrologue, imitated from the Spanish, and imitated by Dryden, came next year. At his brother's death he succeeded to his vacant chair in the Academy. He then turned his attention to' philology, producing a new edition of the Remarques of C. F. Vaugelas iiˆi687, and in 1694 a dictionary of technical terms, intended to supplement that of the Academy. A complete translation of Ovid's Metamorphoses (he had published six books with the Heroic Epistles some years previously) followed in 1697. In 1704 he lost his sight and was constituted a "veteran," a dignity which preserved to him the privileges, while it exempted him from the duties, of an academician. But he did not allow his misfortune td put a stop to his work, and in 1708 produced a large Dictionnaire universel geographique et historique in three volumes folio. This was his last labour. He died at Les Andelys on the 8th of December 1709, aged eighty-four. It has been the custom to speak of Thomas Corneille as of

one who, but for the name he bore, would merit no notice. This is by no means the case; on the contrary, he is rather to be commiserated for, his connexion with a brother who outshone him as he would have outshone almost any one. But the two were strongly attached to one another, and practically lived in common. Of his forty- two plays (this is the utmost number assigned to him) the last edition of his complete works contains only thirty-two, but he wrote several in conjunction with other authors. Two are usually reprinted as his masterpieces at the end of his brother's selected works. These are Ariane (1672) and the Comte d' Essex, in the former of which Rachel attained success. But of Laodice, Camma, Stilico and some other pieces, Pierre Corneille himself said that " he wished he had written them," and he was not wont to speak lightly. Camma (1661, on the same story as Tennyson's Cup) especially deserves notice. Thomas Corneille is in many ways remarkable in the literary gossip-history of his time. His Timocrate boasted of the longest run (80 nights) recorded of any play in the century. For La Devineresse'he and his coadjutor de Vise (1638-1710, founder of the Mercure galant, to which Thomas contributed) received above 6000 liVres, , the largest sum known to have been thus paid. Lastly, one of his pieces (Le Baron des Fondrieres) contests the honour of being the first which was hissed off the stage.

There is a monograph, Thomas Corneille, sa vie et ses ouvrages (1892), by G. Reynier. See also the Fragments inedits de critique sur Pierre et Thomas Corneille of Alfred de Vigny, published in 1905. (G. Sa.)

CORNELIA (2nd cent, k.c), daughter of Scipio Africanus the Elder,mdther of the Gracchiand of Sempronia, the wifeof Scipio Africanus the Younger. On the death of her husband, refusing numerous offers of marriage,: she devoted herself to the education of her twelve children. She was so devoted to her sons Tiberius and Gaius that it was even asserted that she was concerned in the death of her son-in-law Scipio, who by his achievements had eclipsed the fame of the Gracchi, and was said to have approved of the murder of Tiberius. When asked to show her jewels she presented her sons, and on her death a statue was erected to her memory inscribed, " Cornelia, the mother of the Gracchi." After the murder of her second son Gaius she retired 'to Misenum, where she devoted herself to Greek and Latin literature, and to the society of men of letters. She was a highly educated woman, and her letters were celebrated for their beauty of style. The genuineness of the two fragments of a letter from her to her son Gaius, printed in some editions of Cornelius Nepos, is disputed. ' :

See L. Mercklin, De Corneliae vita (1844), of no great value; J. Sorgel,

Cornelia, die Mutter der Gracchen. (1868), a short popular sketch. . . V . ■

CORNELIUS, pope, was elected, in 251 during the lull in the persecution of the emperor Decius. Two years afterwards, under the emperor Gallus, he was exiled to Centumcellae (Civita Vecchia) , where he, died.. He was very intimate with St Cyprian, and is commemorated with him on the 16th of September, which is not, however, the anniversary of his death. He died in June

253—

CORNELIUS, CARL AUGUST PETER (1824-1874), German musician and poet, son, of an actor at Wiesbaden, grandson of the engraver Ignaz Cornelius, and nephew of Cornelius the: painter, was born at Mainz on the 24th of December 1824. In his childhood his bent was towards languages, but his musical gifts were carefully, cultivated and he learned to sing and to play the violin. Cornelius the elder, anxious for his son to become an actor, himself taught the boy the elements of the art.. These: theatrical studies, however, were interrupted early by a visit paid by Peter Cornelius to England as second violin in the Mainz orchestra. On returning home young Cornelius made his stage debut as John Cook in Kean. But after two more appear- ances, as the lover in the comedy Das war Ich and as Perin in Moreto's Donna Diana, he practically abandoned the stage for > music, his idea being to become a comic opera composer. In 1843 his father died. Hitherto Cornelius's musical studies had been unsystematic. Now opportunity served to remedy this, for his relative, Cornelius the painter, summoned him in 1844 to Berlin, and enabled him a year later to become a pupil of Siegfried Wilhelm Dehn (1799-1858), counterpoint and theory generally being worked at laboriously. After leaving Dehn, Cornelius proved his independence by writing a trio in A minor, a quartet in C, ;as well as two comic opera texts. In 1847 he returned to Dehn and immediately composed an enormous mass of music, including a second trio, 30 vocal canons, several sonatas, a Mass, a Stabat Mater; he also wrote a number of translations of old French poems, which are classics of their kind. In 1852 he first came in touch with Liszt, through his uncle's instrumen- tality. At Weimar, whither he went in 1852, he heard Berlioz's delightful Benvenuto Cellini, a work which ultimately exercised great influence over him.: For the time, however, he devoted himself, on Liszt's advice, to further . Church compositions, the influence of the Church, on him at that time being so great that he applied, but vainly, for a place in a Jesuit college. Still his mind was bent on the production of a comic opera, but the composition was long delayed by the work of translating the

prefaces for Liszt's symphonic poems and the texts of works by Berlioz and Rubinstein. Between October 1855 and September in the following year, Cornelius wrote the book of the Barbier von Bagdad, and on December 15, 1858, the opera was produced at Weimar under Liszt, and hissed off the stage. Thereupon Liszt resigned his post, and shortly afterwards Cornelius went to Vienna and Munich, and still later came very much under Wagner's influence. Cornelius's Cid was completed and produced at Weimar in 1865. For the last nine years of his life (1865-1874)

Cornelius was occupied with his opera Gunlod and other compositions, besides writing ably and abundantly on Wagner's music-dramas. In 1867 he became teacher of rhetoric and harmony at the Musikschule, Munich, and married Berthe Jung. He died on the 26th of October 1874. Not the least of Cornelius's many claims to fame was his remarkable versatility. Many of his original poems, as well as his translations from the French, rank high. Among his songs, special mention may be made of the lovely " Weihnachtslieder," and of the " Vatergruft," an unaccompanied vocal work for baritone solo and choir.

CORNELIUS, PETER VON (1784-1867), German painter, was born in Diisseldorf in 1784. ■ His father, who was inspector of the Diisseldorf gallery, died in 1709, and the young Cornelius was stimulated to extraordinary exertions. In a letter *to the Count Raczynski he says, " It fell to the lot of an elder brother and myself to watch over the interests of a numerous family. It was at this time that it was attempted to persuade my mother that it would be better for me to devote myself to the trade of a goldsmith than to continue to pursue painting — in the first place, in consequence of the time necessary to qualify me for the art, and in the next, because there were already so many painters. My dear mother, however, rejected all this advice, and I felt myself impelled onward by an uncontrollable enthusiasm, to which the confidence of my mother gave new strength, which was supported by the continual fear that I should be removed from the study of that art I loved so much." His earliest work of importance was the decoration of the choir of the church of St Quirinus at Neuss. At the age of twenty-six he produced his designs from Faust. On October 14, 1811, he arrived in Rome, where he soon became one of the most promising of that brotherhood of young German painters which included Overbeck, Schadow, Veit, Schnorr and Ludwig Vogel

(1788-1879), — a fraternity (some of whom selected a ruinous convent for their home) who were banded together for resolute study and mutual criticism. Out of this association came the men who, though they were ridiculed at the time, were destined to found a new German school of art.

At Rome Cornelius participated, with other members of his fraternity, in the decoration of the Casa Bartoldi and the Villa Massimi, and whˆle thus employed he was also engaged upon designs for the illustration of the Nibelungenlied. From Rome he was called to Diisseldorf to remodel the Academy, and to Munich by the then crown-prince of Bavaria, afterwards Louis I., to direct the decorations for the Glyptothek. Cornelius, however, soon found that attention to such widely separated duties was incompatible with the just performance of either, and most inconvenient to himself; eventually, therefore, he resigned his post at Diisseldorf to throw himself completely and thoroughly into those works for which he had been commissioned by the crown-prince. He therefore left Diisseldorf for Munich, where he was joined by those of his pupils who elected to follow and to assist him. At the death of Director Langer, 1824-182 5, he became director of the Munich Academy.

The fresco decorations of the Ludwigskirche, which were for the most part designed and executed by Cornelius, are perhaps the most important mural works of modern times. The large fresco of the Last Judgment, over the high altar in that church, measures 62 ft. in height by 38 ft. in width. The frescoes of the Creator, the Nativity, and the Crucifixion in the same building are also upon a. large scale. Amongst his other great works in Munich may be included his decorations in the Pinakothek and in the Glyptothek; those in the latter building, in the hall of the gods and the hall of the hero-myths, are perhaps the best known. About the year 1839-1840 he left Munich for Berlin to proceed with that series of cartoons, from the Apocalypse, for the frescoes for which he had been commissioned by Frederick William IV., and which were intended to decorate the Campo Santo or royal mausoleum. These were his final works.

Cornelius, as an oil painter, possessed but little technical skill, nor do his works exhibit any instinctive appreciation of colour. Even as a fresco painter his manipulative power was not great. And in critically examining the execution in colour of some of

his magnificent designs, one cannot help feeling that he was, in this respect, unable to do them full justice. Cornelius and his associates endeavoured to follow in their works the spirit of the Italian painters.

But the Italian strain is to a considerable extent modified by the Diirer heritage. This Diirer influence is manifest in a tendency to overcrowding v\ composition, in a degree of attenuation in the proportions of, and a poverty of contour in, the nude figure, and also in a leaning to the selection of Gothic forms for draperies. These peculiarities are even noticeable in Cornelius's principal work of the " Last Judgment," in the Ludwigskirche in Munich. The attenuation and want of flexibility of contour in the nude are perhaps most conspicuous in his frescoes of classical subjects in the Glyptothek, especially in that representing the contention for the body of Patroclus. But notwithstanding these peculiarities there is always in his works a grandeur and nobleness of conception, as all must acknowledge who have inspected his designs for the Ludwigs- kirche, for the Campo Santo, &c. If he were not dexterous in the handling of the brush, he could conceive and design a subject with masterly purpose. If he had an imperfect eye for colour, in the Venetian, the Flemish, or the English sense, he had vast mental foresight in directing the German school of painting; and his favourite motto of Deutschland uber alles indicates the direction and the strength of his patriotism. Karl Hermann was one of Cornelius's earliest and most esteemed scholars, a man of simple and fervent nature, painstaking to the utmost, a very type of the finest German student nature; Kaulbach and Adam Eberle were also amongst his scholars. Every public edifice in Munich and other German cities which were embellished with frescoes, became, as in Italy, a school of art of the very best kind; for the decoration of a public building begets a practical knowledge of design. The development of this institution of scholarship in Munich was a work of time. The cartoons for the Glyptothek were all by Cornelius's own hand. In the Pinakothek his sketches and small drawings sufficed; but in the Ludwigskirche the invention even of some of the subjects was entrusted to his scholar Hermann.

To comprehend and appreciate thoroughly the magnitude of the work which Cornelius accomplished for Germany, we must remember that at the beginning of the 19th century Germany had no national school of art. Germany was in painting and sculpture behind all the rest of Europe. Yet in less than half a century Cornelius founded a great school, revived mural painting, and turned the gaze of the art world towards Munich. The German revival of mural painting haditseffectupon England, as well as upon other European nations, and led to the famous cartoon competitions held in Westminster Hall, and ultimately to the partial decoration of the Houses of Parliament. When the latter work was in contemplation, Cornelius, in response to invitations, visited England (November 1841). His opinion was in

every way favourable to the carrying out of the project, and even in respect of the durability of fresco in the climate of England. Cornelius, in his teaching, always inculcated a close and rigorous study of nature, but he understood by the study of nature something more than what is ordinarily implied by that expression, something more than constantly making studies from life; he meant the study of nature with an inquiring and scientific spirit. ” Study naflire,” was the advice he once gave, ” in order that you may become acquainted with its essential forms.”

The personal appearance of Cornelius could not but convey to those who were fortunate enough to come into contact with him the impression that he was a man of an energetic, firm and resolute nature. He was below the middle height and squarely built. There was evidence of power about his broad and over- hanging brow, in his eagle eyes and firmly gripped attenuated lips, which no one with the least discernment could misinterpret. Yet there was a sense of humour and a geniality which drew men towards him; and towards those young artists who sought his teaching and his criticism he always exhibited a calm patience.

See Forster, Peter von Cornelius (Berlin, 1874). (W. C. T.)

CORNELL UNIVERSITY

CORNELL UNIVERSITY, one of the largest of American institutions of higher education, situated at Ithaca, New York. Its campus is finely situated on a hill above the main part of the city; it lies between Fall Creek and Cascadilla Creek (each of which has cut a deep gorge), and commands a beautiful view of the valley and of Lake Cayuga. The university is co-educa- tional (since 1872), and comprises the graduate school, with 306 students in 1909; the college of arts and sciences (902 students); the college of law (225 students), established in 1887; the medical college (217 students, of whom 29 were taking freshman or sophomore work in Ithaca, where all women entering the college must pursue the first two years of work) — this college was established in 1898 by the gift of Oliver Hazard Payne, and has buildings opposite Bellevue hospital on First Avenue and 28th Street, New York city; the New York state veterinary college (94 students), established by the state legislature in 1894; the New York state college of agriculture (413 students), estab- lished as such by the state legislature in 1904, — the teaching of agriculture had from the beginning been an important part of the university’s work, — with an

agricultural experiment station, established in 1887 by the Federal government; the college of architecture (133 students) ; the college of civil engineer- ing (569 students) ; and the Sibley College of mechanical engineer- ing and mechanic arts (1 1 63 students) , named in honour of Hiram Sibley (1807-1888), a banker of Rochester, N.Y., who gave $180,000 for its endowment and equipment and whose son Hiram W. Sibley gave $130,000 to the college. A state college of forestry was established in connexion with the university in 1898, but was discontinued after several years. The total enrolment of regular students in 1909 was 3980; in addition, 841 students were enrolled in the 1908 summer session (which is especially for teachers) and 364 in the " short winter course in agriculture " in 1909. Nearly all the states and territories of the United States and thirty-two foreign countries were represented — eˆ. there were 33 students from China, 12 from the Argentine Republic, 6 from India, 10 from Japan, 10 from Mexico, s from Peru, &c.

In the W. central part of the campus is the university library building, which, with an endowment (1891) of $300,000 for the purchase of books and periodicals, was the gift of Henry Williams Sage (1814-1897), second president of the board of trustees; in 1906 it received an additional endowment fund of about $500,000 by the bequest of Prof. Willard Fiske. The building, of light grey Ohio sandstone, houses the general library (300,050 volumes in 1909), the seminary and department libraries (7284 volumes), and the forestry library (1007 volumes). Among the special collections of the general library are the classical library of Charles Anthon, the philological library of Franz Bopp, the Gold win Smith library (1869), the White architectural and historical libraries, the Spinoza collection presented by Andrew D. White (1894), the library of Jared Sparks, the Samuel J. May collection of works on the history of slavery, the Zarncke library, especially rich in Germanic philology and literature, the Eugene Schuyler collection of Slavic folk-lore, literature and history, the Willard Fiske Rhaeto-Romanic, Icelandic, Dante and Petrarch collections, and the Herbert H. Smith collection of works on Latin America (in addition there are college and department libraries — that of the college of law numbers 38,735 volumes — bringing the total to 353,638 bound volumes in 1909). Among the other buildings are: Morse Hall, Franklin Hall, Sibley College, Lincoln Hall (housing the college of civil engineering), Goldwin Smith Hall (for language and history), Stimson Hall (given by Dean Sage to the medical college), Boardman Hall (housing the college of law) , Morrill Hall (containing the psycho- logical laboratory), McGraw Hall and White Hall — these, with the library, forming the quadrangle; S. of the

quadrangle, Sage chapel (with beautiful interior decorations), Barnes Hall (the home of the Cornell University Christian Association), Sage College (a dormitory for women), and the armoury and gymnasium; E. of the quadrangle, the Rockefeller Hall of Physics (1906) and the New York State College of Agriculture (completed in 1907); and S.E. of the quadrangle the New York State

Veterinary College and the Fuertes Observatory. The university is well-equipped with laboratories, the psychological laboratory, the laboratories of Sibley college and the hydraulic laboratory of the college of civil engineering being especially noteworthy; the last is on Fall Creek, where a curved concrete masonry dam has been built, forming Beebe Lake. East of the campus is the university playground and athletic field (55 acres), built with funds raised from the alumni. Cayuga Lake furnishes opportunity for rowing, and the Cornell crews are famous. During their first two years all undergraduates, unless properly excused, must take a prescribed amount of physical exercise. Normally the first year's exercise for male students is military drill under the direction of a U.S. army officer detailed as com- mandant.

The reputation of the university is particularly high in mechanical engineering; Sibley college was built up primarily under Prof. Robert Henry Thurston (1839-1903), a well-known engineer, its director in 1885-1903. The college includes the following departments: machine design and construction, experimental engineering, power engineering, and electrical engineering. The " Susan Linn Sage School of Philosophy," so called since the gift (1891) of $200,000 from Henry W. Sage in memory of his wife, issues The Philosophical Review and Cornell Studies in Philosophy, and is well known for the psychological laboratory investigations under Prof. E. B. Titchener (b. 1867). Equally well known are the college of agriculture under Prof. Liberty Hyde Bailey (b. 1858); the " Cornell School " of Latin grammarians, led first by Prof. W. G. Hale and then by Prof. C. E. Bennett; the department of entomology under Prof. J. H. Comstock (b. 1849), the department of physics under Prof. E. L. Nichols (b. 1854), and other departments. The uni- versity publishes Cornell Studies in Classical Philology, the Journal of Physical Chemistry, the Physical Review, Publications of Cornell University Medical College, various publications of the college of agriculture, and Studies in History and Political Science (of " The President White School of History and Political Science "). Among the student publications are The Cornell Era (1868, weekly), The Cornell Daily Sun (1880), The Sibley Journal of Engineering (1882), The Cornell Magazine, a literary monthly, and The Cornell Widow (1892), a comic tri- weekly. The regular annual tuition fee is $100, but in medicine, in architecture, and in civil and

mechanical engineering it is $150. In the veterinary and agricultural colleges there are no tuition fees for residents of New York state. There are 150 free- tuition state scholarships (one for each of the state assembly districts), and, in addition, there are 36 undergraduate university scholarships (annual value, $200) tenable for two years, and 23 fellowships and 17 graduate scholarships (annual value, $300-600 each). In the college of arts and sciences the elective system, with certain restrictions, obtains.

The university has always been absolutely non-sectarian; its charter prescribes that ” persons of every religious denomina- tion, or of no religious denomination, shall be equally eligible to all offices and appointments ” and that ” at no time shall a majority of the board (of trustees) be of one religious sect or of no religious sect.” There is, however, an active Christian Association andreligious services — provided for bytheDean Sage Preachership Endowment — are conducted in Sage chapel by eminent clergy- men representing various sects and denominations.

The affairs of Cornell university are under the administration of a board which must consist of forty trustees, of whom ten are elected by the alumni. The following are ex officio members of the board: the president of the university, the librarian of the Cornell Library (in Ithaca), the governor and the lieutenant- governor of the state, the speaker of the state assembly, the state commissioners of education and of agriculture, and the president of the state agricultural society. The internal government is in the hands of the university faculty (which consists of the president, the professors and the assistant professors, and has jurisdiction over matters concerning the university as a whole), and of the special faculties, which consist of the president, the professors, the assistant professors, and the instructors ol

the several colleges, and which have jurisdiction over distinctively collegiate matters.

In 1909 the invested funds of the university amounted taabout $8, 594,300, yielding an annual income. of about $428,800; the income from state and nation was about: $232,050, and from tuition fees about $336,100; the campus and buildings were valued at about $4,263,400, and the Library; collections, apparatus, &c> at about

$1,826,100.

The university was incorporated by the legislature of New York state on the 27 th of April 1865, andwajs named in honour of Ezra Cornell, 1 its principal benefactor. In 1864 Cornell, at the suggestion of Andrew D. White, his fellow member of the state senate, decided to found a university of a new : typeˆ-which should be broad and liberal in its scope, should be absolutely non- sectarian, and which should recognize and meet the growing need for practical training and adequate instruction in the sciences as well as in the humanitiesv He offered to the state as an endowment $500,000 (with 200 acres of land) on condition that the state add to this fund the proceeds of the sales of public lands granted to it by the Morrill Act of 1862 for “the endow- ment, support and maintenance of at least one college, where the leading object shall be . . . to teach such branches of learn- ing as are related to agriculture and the mechanic arts . . . ” 2 The charter provided that “such other branches of science and knowledge may be embraced in the plan of instruction and investigation pertaining to the university as the trustees may deem useful and proper,” and Ezra Cornell expressed his own ideal in the oft-quoted words; “I would found an in- stitution where any person can find, instruction in any study.” The opposition to Cornell’s plan was bitter, especially on the part of : denominational schools and press, but incorporation was secured, and the trustees first met on the 5th of September 1865. Andrew D. White was elected president and the entire educational scheme was left to him. Dr White’s ideals in part were: a closer union between the advanced and the general educational system of the state; liberal instruction of the industrial classes; increased stress on technical instruction; unsectarian control; ” a course in history and political and social science adapted to the practical needs of men worthily ambitious in public affairs “; a more thorough study of modern languages and literatures, especially English; the “steady effort to abolish monastic government and pedantic instruction ” ; the elective system of studies; and the stimulus of non-resident lecturers. On the 7 th of October 1868 the Cornell University opened with some confusion due to the condition of the campus, and to the presence of 412 would-be pupils, many of whom expected to ” work their way through.” The brilliance of the faculty and especially of its non-resident members (including J. R. Lowell, Louis Agassiz, G. W. Curtis, Bayard Taylor, Theodore D. Dwight, and Goldwin Smith, who was a resident professor in 1866-18.69), was to a degree over-shadowed during the fifteen years 1868-1882 by financial difficulties. But Ezra Cornell himself , paid many salaries during early years, and provided much valuable equip- ment solely at his own expense; and because the

state's land scrip was selling too low to secure an adequate endowment for the University, in 1866 he bought the land scrip yet unsold

1 Ezra Cornell (1807-1874) was born in Westchester county, New York, on the nth of January 18O7'.' His parents were Quakers from Massachusetts. He received a scanty education ; worked as a carpenter in Syracuse and as a machinist in Ithaca ; became interested (about 1842) in the development of the electric telegraph; and after unsuccessful or over-expensive attempts to ground the telegraph wires in 1844 solved the difficulty by stringing them on poles. He organized many telegraph construction companiesˆ was one of the founders of the Western Union TelegraphCompany, and accumulated a large fortune. He was a delegate to the first national convention of the Republican party (1856) and was a member of the New York assembly in 1862-1863 and of the state senate in 1864-1867. He founded a public library (dedicated in 1866) in Ithaca, and died there on the 9th of December 1874. Consult Alonzo B. Cornell, True and Firm: A Biography of Ezra Cornell (New York, 1884).

2 New York's share amounted to 990,000 acres. The Morrill Act prescribed that the proceeds from the sale of this land should not be used for the purchase, erection or maintenance of any building or buildings.

(819,920 acres) 3 by the state at the fate:o£ sixty; cents an acre on the understanding that all profits, in excess of the purchase money, should constitute a separate endowment, fund to which the restrictions in the Morrill Act should not apply; and in i866-i867.he " located " 512,000 acres in Wisconsin, Minnesota, and Kansas. In November 1.874 he . transferred these lands, which had cost him $576,953 more than he had received from them, to the university. This actual deficit on the lands owned by the university steadily increased up to 1881, when, after the trustees had refused (in t88q) an offer of $1,250,000 for 275,000 acres of pine lands, they sold about 140,600 acres for $2,319,296; ultimately 401,296 acres of the land turned over to the university by Cornell were sold, bringing a net return of about $4,800,000. The university, was put on a sound financial footing; the number of students, less in 1881- 1882 than in 1868 at the opening of the university, again increased, so that it was 585 in 1884-1885, and 2120 in 1897- 1898. The presidents of the university have been: Andrew Dickson White, 1865-1885; Charles Kendall Adams, 1885-1892; and Jacob Gould Schurman.

CORNET, , a word having two distinct, significations and two

etymological histories, both, however, ultimately referable to the same Latin origin: — –

1. (Fr. comette, dim. of come, from Lat. cornu, a horn), a small standard, formerly carried by a troop of cavalry, and similar to, the pennon in form, narrowing gradually to a point. The term was then applied to the body. of cavalry which carried a, cornet. In this sense it is used in the military literature of the 16th century and, less frequently, in that of the 17th. Before the close of the 16th century, however, the world had also come to mean a junior officer of a troop of cavalry who, like the ” ensign ” of foot, carried the colour. The spelling ” coronet ” occurs in the 16th century, and has perhaps contributed to obscure the derivation of ” colonel ” or ” coronel.” The rank of ” cornet ” remained in the British cavalry until the general adoption of the term “second lieutenant.” In the Boer republics ” field-cornets ” were local subordinate officers of the commando (q.v.), the unit of , the military forces. Elected for three years by the wards into which the electoral districts wˆere divided, they had administrative as well as military duties, and acted as magistrates, inspectors of natives and registration officers for their respective wards. In 1907, the , ” field-cornet ” system was re-established in the Transvaal; the new duties of the “field-cornets” are those performed by assistant magistrates, viz. petty jurisdiction, registration of voters, births and deaths* the carrying out of regulations as to animal diseases, and main- tenance of roads. : The ” field-cornets ” are appointed by govern- ment for three years.

2.. (Fr. cornet, Ital. cornetto, Med. Lat. cornelum, a bugle, from Lat. cornu, a horn), in music, the name of two varieties of wind instruments (see below), and also of certain stops of the organ. The great organ ” solo cornet ” was a mixture or compound stop, having either 5, 4, or 3 ranges of pipes; occasionally it was placed on a separate soundboard, when it was known as a ” mounted cornet.” The ” echo cornet ” was a similar stop, but softer and enclosed in a box. In German and Dutch organs the term cornet is sometimes applied to a pedal reed stop.

(a). Cornet or Cornett (Fr. cornet, cornet d bouquin; Ger. Zinck; Zincken; Ital. cornetto) is the name given to a family of wopd wind instruments, now obsolete, having a cup-shaped mouthpiece and a conical bore without a bell, and differing entirely from the modern cornet a pistons. The old cornets were pf two kinds, the straight and the curved, characterized by radical differences in construction. There’ were two very different kinds of straight cornets (Ger. gerader Zinck, Ital. cornetto diretto or recto), the one most commonly used having a

detachable cup-,shaped mouthpiece similar to that of the trumpet, while the other was made to all apoearance without mouthpiece, there being not even a moulded rim at the end of the tube to

‘He had previously — in 1865 — bought scrip for 100,000 acres for $50,000, on the understanding that all profits which might accrue from the sale of the land should be paid to the university.

break the rigid straight line. Examination of the tube, however, reveals the secret of the characteristic sweet tone of this latter kind of cornet; unsuspected inside the top of the tube is cut out of the thickness of the wood a mouthpiece, not cup-shaped, but like a funnel similar to that of the French horn, which merges gradually into the bore of the instrument. This mode of conˆ struction, together with the narrower bore adopted, greatly influenced the timbre of the instrument, whose softer tone was thus due mainly to the substitution of the funnel for the sharp angle of incidence at the bottom of the cup mouthpiece known as the throat (see Mouthpiece), where it communicates with the tube. It is this sharp angle, which in the other cornets with detachable mouthpiece; causes the column of air to break, producing a shrill quality of tone, while the wider bore and slightly rough walls of the tube account for the harshness. In Germany the sweet-toned cornet was known as stiller or sanfter Zinck, and in Italy as cornetto muto (fig. 1), while in France the instruments with detachable mouthpiece were distinguished by the adition of a bouquin (= with mouth- piece). The curved cornet (Ger. krummer Zinck or Stadtkalb ; Ital. cornetto curvo) could riot for obvious reasons have the bore” pierced through a single piece of wood; the channel for the vibrating column’of air was, therefore, hollowed out of two pieces of wood/ the diameter increasing from the mouthpiece to the lower end. The two pieces of wood thus pre- pared were joined together with glue and covered with leather, the outer surface of the tube being finished off in octagonal shape. The separate mouthpiece, made in- differently of wood, horn, ivory or metal, 1 analogous to that of the trumpet, was distinctly cup-shaped and fixed by a tenon to the upper extremity of the pipe. The primitive instrument was an animal’s horn.

Pipes of such short length give only, besides the first or fundamental, the second and sometimes the third note of the harmonic series. Thus a pipe that has forits funda- mental A will, if the pressure of breath and tension of the lips be steadily increased, give the octave A and the

twelfth E. In order to connect the first and second harmonics diatonically, the length of the pipe was progressively shortened by boring lateral holes through the tube for the fingers to cover. The successive opening of these holes furnished the instrumentalist with the different intervals of the scale, six holes sufficing for this purpose:

The fundamental was thus connected with its octave by all the : degrees of a diatonic scale, which became chromatic by the help of cross-fingering and the greater or less tension of the lips stretched as vibrating reeds across the opening of the mouth- piece. This increased compass of twenty-seven notes obtained . '.See Marin Mersenne, L'Harmonie universelle (Paris, 1636-1637), bk. v., pp. 273-274.

: From Capt. C. R. Day's Descriptive Catalogue oj Musical Instruments, by permission of Messrs. Eyre & Spottiswoode. :

Fig. 1.— Cornetto Fig. 2. — Cornetto Muto. Curvo.

by cross-fingering. is very' clearly shown in a table by Eisel.? The fingering was completed by a seventh hole, which had for its object the production of the octave without the necessity of closing all the holes in order to produce the second note of the harmonic series. The first complete octave, thus obtained by a succession of fundamental notes, was easily octaved by a stronger pressure of breath and tension of the lips across the mouthpiece, and thus the ordinary limits of the compass of a Zinck or cornet could be extended to a fifteenth. Whether straight or curved' it was pierced laterally with seven holes, six through the front,' and the seventh, that nearest the mouthpiece, through the back. The first three holes wereusually covered with the third, second: and first fingers of the right hand, the next four with the third; second and first fingers and the thumb of the left hand. But some instrumentalists inverted the position of the hands. Virdung 3 shows, besides: the cornetto recto, a kind of Zinck made of an animal's horn with only four holes, three in the front of the pipe and one at the back. Such an instrument as this had naturally a very limited compass, since these four holes only sufficed to produce the intermediate notes between the second and third proper tones of the harmonic scale, the lower octave comprised between the first and second remaining' incomplete;' by overblowing, however, the next octave would be obtained in addition, : – ,

At the beginning of the 17th century Praetorius 4 represents the Zincken as a complete family comprising: (1) the little Zinck with

the lowest note

note

r, (2) the ordinary Zinck with the lowest

(3) the great Zinck, cornon or corno torto, a great

cornet in the shape of an 3 with the lowest, note Efc: pr:orz_» ” : rrl. In France 5 the family was composed of the following instruments :

(1) The [dessus or treble cornet with the lowest note

(2) the haute-contre . or alto cornet with the lowest note

3 =

(3) the tattle or tenor cornet with the lowest note

e 6 cornet with the lowest note

and the

basse or bass or

The cornets of the lowest pitch were sometimes furnished with an’ open key which, when closed, lengthened the . tube, and extended the compass downwards by a note. Mersenne figures a cornon with’ a key. –

During the middle ages these instruments were in ; such favour that an important part was given to them in all instrumental combinations. At Dresden, 7 between 1647 and 165 1, the Kapelle of the electoral prince of Saxony- included two cornets, the bass beirig supplied by the trombone. Monteverde introduced two cornets in the 3rd and 4th acts of his Orfeo (1607). In France the charges for the Chapelle-Musique of the kings of France for the year 1.619 contain two entries of the sum of 450 livres lournois, salary paid to one Marcel Cayty, joueur de cornet, a post held by htm from 1604 until at least 163-1, when another cornet player, Jean Daneau, is also mentioned. 8

In Germany in the 17th and 18th centuries, Zincken were used with trombones in the churches to accompany the chorales. There are examples of this use of the instrument in the sacred cantatas of J. S. Bach, where the cornet is added to the upper voice parts to strengthen them, Johann Mattheson, conductor of the opera at

. 2 See Eisel’s (Anon.) Musicus AiiTodlS&KTds, oder der sfch selbst

informirende Musicus (Erfurt, 1738), p. 93 and table vi.

3 Sebastian Virdung, Musica getutscht und auszgezogen (Basel,

1511).

4 Michael Praetorius, Syntag. Music, vol. ii. De Organograpkia (Wolfenbtittel, 1618), pp. 25 and 41, pis. 8 and 13.

6 See Mersenne, he. cit. .

6 See Ad. MS. 30342, Brit. Museum, fol. 145. A tract in French containing pen and ink sketches of musical instruments, which dates from the 17th or perhaps the 1 8th century, and was formerly in the possession of the Jesuit college in Paris. Here the pedalle is the bass pommer, or kautbois, and the sackbut is indicated as second bass or basse-contre. As also in Mersenne, the cornets are curved.

7 See MoritziFiirstenau, Geschichte der Musik und des Theaters am Hofe zu Dresden (Dresden, 1861-1862), p. 28.

8 See Michel Brenet, ” Deux comptes de la Chapelle MusiqUe des rois de France,” Sammelband der Intern. Mus. Ges., vi. I (Leipzig, 1904), pp. 20, 21, 29; and Archives nationales (Paris), Z. la. 486;

Hamburg, writing on the orchestra in 17 13 ‘ gives a description of the Zinck as a member of the orchestra, but in 1739, 2 in his work on the perfect conductor, he deplores the decrease of its popularity in church music, from which it seems to be banished as useless. Gluck was the last composer of importance who scored for the cornet, as for instance in Orfeo, in Paride ed Elena, in Alceste and in Armide, &c. The great vogue of the curved cornet is not to be accounted for by its musical qualities, for it had a hard, hoarse, piercing sound, and it failed utterly in truth of intonation; these natural defects, moreover, could only be modified with great difficulty. Mersenne’s eulogium of the dessus, then more employed than the other cornets, can only be appreciated at its full value if we look upon the art of cornet playing as a lost art. ” The dessus,” he says, ” was used in the vocal concerts and to make the treble with the organ, which is ravishing when one knows how to play it to perfection like the Sieur Guiclet;” and again further on, “the character of its tone resembles the brilliance of a sunbeam piercing the darkness, when it is heard among the voices in churches,

cathedrals or chapels.” 3 Mersenne further observes that the serpent is the true bass of the •cornet, that one without the other is like body without soul. A drawing in pen and ink of a curved cornet is given by Randle Holme in his Academy of Armoury (1688) ; * and at the end of the description of the instrument he adds, ” It is a delicate pleasant wind musick, if well played and humoured.” Giovanni Maria Artusi 6 of Bologna, writing at the end of the 16th century, devotes much space to the cornet, explaining in detail the three kinds of tonguing used with the instrument. By tonguing is understood a method of articulation into the mouthpiece of flute, cornet a pistons or trumpet, of certain syllables which add brilliance to the tone. Artusi advocates (1) for the guttural effect, ler, ler, ler, der, ler, der, ler; ter, ler, ter; ler, ter, ler; (2) for the tongue effect, tere, tere, tere; (3) for the dental effect, teche, teche, teche, used by those who wish to strike terror into the hearts of the hearers — an effect, however, which offends the ear. A clue to the popularity of the instrument during the middle ages may perhaps be found in Artusi’s remark that this instrument is the most apt in imitating the human voice, but that it is very difficult and fatiguing to play; the musician, he adds elsewhere, should adopt an instrument to imitate the voice as much as possible, such as the cornetto and the trombone. He mentions two players in Venice, II Cavaliero del Cornetto and M. Girolamo da Udine, who excelled in the art of playing the cornet.

Being derived from the horn of an animal through which lateral holes had been pierced, the curved cornet was probably the earlier, and when the instrument came to be copied in metal and in wood the straight cornet was the result of an attempt to simplify the construction. The evolution probably took place in Asia Minor, where tubes with conical bore were the rule, and the instrument .was thence introduced into Europe. A straight Zinck, having a grotesque animal’s head at the bell-end, and six holes visible, is pictured in a miniature of the nth century. 6 What appears to be precisely the same kind of instrument, although differing widely in reality, the chaunter being reed-blown, is to be found in illuminated MSS. as the chaunter of the bagpipe, as for example in a royal roll of Henry III. at the British Museum, 7 where it occurs twice played by a man on stilts. The grotesque was probably added to the chaunter in imita- tion of that on the straight Zinck. Two stille Zincken or cornetti muti are among the musical instruments represented in the triumphal procession of the emperor Maximilian I. 8 (d. 1519), designed at his command by H. Burgmair under the superintendence of Albrecht Diirer.

(b) Cornet A Pistons, Cornet, Cornopaean (Fr. cornet a pistons; Ger. Cornett; Ital. cornetto), are the names of a modern brass wind

instrument of the same pitch as the trumpet. Being a transformation of the old post-horn, the cornet should have a conical bore of wide diameter in proportion to the length of tube, but in practice usually only a small portion of the tube is conical, i.e. from the mouthpiece to the slide of the first valve and from the slide of the third valve to the bell. The tube of the cornet is doubled roujwl upon itself. The cup-shaped mouth- piece is larger than that of the trumpet; the shape of the cup in conjunction with the length of the tube and the proportions

1 Das neu-eroffnete Orchester (Hamburg, 1713), p. 253.

2 Der vollkommene Kapellmeister (Hamburg, 1739).

3 See Mersenne, op. cit., bk. v., p. 274.

4 Part of book iii. in MS. Harleian, 2034, fol. 207b. Brit. Museum.

6 Delle imperfettioni delta moderna musica (Venice, 1600), pp. 4, 5, 6 and 12b.

• Grafl. Schonborn Bibl. Pommersfelden, Cod. 2776, reproduced in E. Buhle's Die musikalischen Inslrumente in den Miniatur-Hand-schriften des Mittelalters, part i. (Leipzig, 1903) pi. 6 and p. 24, where other references will be found.

7 Royal Roll, 14 B. v. 13th century. See also Augustus Hughes-Hughes, Catalogue of MS. Music in the British Museum, part iii.

8 See " Triumphzug des Kaisers Maximilians I.," Beilage zum isten Bd. d. Jahrbuch der Samml. des Allerhochsten Kaiserhauses (Vienna, 1883), part i. p. 26, and letterpress, Bd. i. pp. 154- 181.

of the bore determines the timbre of the instrument. The outline of the bottom of the cup, where it communicates with the bore, is of the greatest importance. 9 If, as in the trumpet, it piesents angles against which the column of air breaks, it produces a brilliant tone quality. In the cornet mouthpiece there are no angles at the bottom of the cup, which curves into the bore; hence the cornet's loose, coarse quality of tone. The sound is produced by stretching the lips across the mouthpiece, and making them act as double reeds, set in vibration by the breath. There are no fixed notes on the cornet as in instruments with lateral holes, or with keys; the musical scale is obtained by means of the power the performer possesses — once he has learned how to use it — of producing the notes of the harmonic series by over-blowing, i.e. by varying the tension of the lips and the pressure of breath. In the cornet this series is short, comprising only the

harmonics from the 2nd to the 8th :

{Harmonic series of the B b cornet — the 7th is slightly flat, a defect which the performer corrects, if he uses the note at all.

»» =

B*” 3 4

£

:Aˆt =

The intermediate notes completing the chromatic scale are obtained by means of three pistons which, on being depressed, open valves leading into supplementary wind-ways, which lengthen the original tube. The pitch of the instrument is thus lowered respectively one tone, half a tone, and one tone and a half. The action of the piston temporarily changes the key of the instrument and with it the notes of the harmonic series. Before a performer, therefore, can play a note he must know in which harmonic series it is best obtained and use the proper piston in conjunction with the requisite lip tension. By means of the pistons the compass of the cornet is thus extended from

Real sounds for the cornet in C.

ˆEE3i

SˆZ- -\z~

C (Theminimsindicatethe practical J compass but the extension shown 1 by the crotchets is possible to all $*”- L good players.)

The treble clef is used in notation, and in England the music for the cornet is usually written as sounded, but most French and German composers score for it as for a transposing instru- ment; for example, the music for the Bt > cornet is written in a key one tone higher than that of the composition.

The timbre of the cornet lies somewhere between that of the horn and the trumpet, having the blaring, penetrating quality of the latter without its brilliant noble sonorousness. The great favour with which the cornet meets is due to the facility with which it speaks, to the little fatigue it causes, and to the simpli- city of its mechanism. We must, however, regret from the point of view of art that its success has been so great, and that it has ended in usurping in brass bands the place of

the bugles, the tone colour of which is infinitely preferable as a foundation for an ensemble composed entirely of brass instruments. Even the symphonic orchestra has not been secure from its intrusion, and the growing tendency in some orchestras, notably in France, to allow the cornet to supersede the trumpet, to the great de- triment of tone colour, is to be deplored. The cornet used in a rich orchestral harmony is of value for completing the chords of trumpets, or to undertake diatonic and chromatic passages which on account of their rapidity cannot easily be fingered by trombones or horns. The technical possibilities of the instru- ment are very great, almost unrivalled in the brass wind: — notes sustained, crescendo or diminuendo; diatonic and chromatic scale and arpeggio passages; leaps, shakes, and in fact all kinds of musical figures in any key, can be played with great facility on the three-valved cornet. Double tonguing is also practic- able, the articulation with the tongue of the syllables ti-ke for double, and of ti-ke-ti for triple time producing a striking staccato effect.

The cornet was evolved in Germany, at the beginning of the 19th century, from the post-horn, by the application of the

9 See Victor Mahillon, Elements d'acoustique musicale et instru- mental (Brussels, 1874), pp. 96, 97, &c, with diagrams, and Friedrich Zamminer, Die Musik und die musikalischen Instrument, &c. (Giessen, 1855), p. 310, &c, with diagrams.

newly invented pistons of Stoelzel and Bluemel patented in 1815. It was introduced into Great Britain and France about 1830. There were at first only two pistons — for a whole tone and for a half tone — from which there naturally resulted gaps in the chromatic scale of the instrument. The use of a combination of pistons (see Bombardon and Valves) fails to give acoustically correct intervals, because the length of tubing thus thrown open is not of the theoretical length required to produce the interval. A tube about 4 ft. long, such as that of the Bb cornet, needs an additional length of about 3 in. to lower the pitch a semitone ; but, if this cornet has already been lowered one tone to the key of Ab, the length of tube has increased some 6 in., and the 3-in. semitone piston no longer adds sufficient tubing to

produce a semitone of correct intona- tion. To the per- former falls the task of concealing the shortcomings of his instrument, and he

therefore corrects the intonation by varying the lip ten- sion. At first the cornet was supplied with a great many crooks for A, At>, G, F, E, Eb and D, but from the explanation but now given, it will be readily understood that they were found unpractical for valve instruments, and all but the first two mentioned have been abandoned. The history of the cornet is a record of the endeavours of successive musical instrument makers to overcome this inherent defect in construction. The most ingenious and successful of these improvements are the following: — (1) The six-valve-independent system 1 of Adolphe Sax, designed about 1850, by which a separate valve was used for each position, thus obviating the necessity of using combina- tions of pistons. This theoretically perfect system unfortunately introduced great difficulties in practice, the valves being made ascending instead of descending, and each piston cutting off a definite length of wind- way from the open tube, instead of adding to it. The system was eventually abandoned. (2) The Besson

FlG. 3. — Bt> Cornet with enharmonic valves (Besson & Co.).

Fig. 4. — B\> Cornet with strictly conical bore throughout, Klussmann's patent (Rudall, Carte & Co.).

Registre giving eight independent positions, afterwards modified as the (3) Besson compensating system transpositeur, patented in England in 1859, which was considered so successful that the idea was extensively used by other makers. (4) The Boosey automatic compensating piston, invented by D. J. Blaikley, and patented in 1878, a very ingenious device whereby when two or more pistons are used simultaneously the length of the air column is automatically adjusted to the theoretical length required to ensure correct intonation. (5) Victor Mahillon's automatic regulating pistons {pistons regulateur automatiqut) produced about 1886, the result of independent efforts in the same direction as Blaikley, and equally ingenious and effectual. 2 Finally we have (6) more recently the Besson enharmonic valve system (fig. 3) with three pistons and six independent tuning

1 For a fuller description of this system see Capt. C. R. Day, Descriptive Catalogue of Musical Instruments (London, 1891), p. 207, No. 406.

2 Id., pp. 192-193.

slides which give the seven positions independently, thus realiz- ing in a simple effectual manner all that Sax strove to accomplish with his

six pistons. The enharmonic valves give all notes theoretically true; there are in addition separate means for adjusting each of the first six lengths, for although these lengths are theoretically correct there are always certain modifying conditions connected with brass instruments which render it essential to provide means for adjustment. All notes being true on this Besson cornet, they can be fingered to the greatest advantagefor smoothness and rapidity. (7) Rudall, Carte & Co.‘s cornet (fig. 4), with strictly conical bore (Klussmann’s patent) throughout the open tube and additional lengths from the mouth- piece to the bell, gives a perfect intonation and is at the same time easy to blow. There are no crooks to this cornet when constructed in Bb, but it may be instantaneously transposed into the key of A major by means of an undetachable slide guided by a piston rod. (V. M.; K. S.)

CORNETO TARQUINIA (anc. Tarquinii), a town of Italy, in the province of Rome, 62 m. N.W. by rail from the town of Rome, 490 ft. above sea-level. Pop. (1901) 5273. Corneto probably arose after the ancient town had been destroyed by the Saracens. In the 10th century it began to acquire import- ance, and for some time was an independent commune. It is picturesquely situated, and commands a fine view. It possesses medieval fortifications, and no less than twenty-five towers are still standing in various parts of the town, which thus has a remarkably medieval appearance. The castle on the N. contains the Romanesque church of S. Maria in Castello, begun in 11 21, with a fine portal of 1143, a cibonum of 1168 and a pulpit of 1209, both in ” cosmatesque ” work: the” pavement in marble mosaic also is fine. There are several other Romanesque and Gothic churches in the town more or less restored. The oldest parts of the Palazzo Comunale date from about 1000. The Gothic Palazzo Vitelleschi (1439) contains remarkably rich windows. The municipal museum (which is to be transferred to this palace) and the Palazzo Bruschi, contain fine collections of Etruscan antiquities from the tombs of Tarquinii. Four miles to the S.W. is the Porto Clementino (perhaps the ancient Graviscae, the port of Tarquinii), with government saltworks, in which convicts are employed.

See L. Dasti, Notizie sloriche archeologiche di Tarquinia e Corneto (Rome, 1878); for the cemeteries, Notizie degli Scavi, 1906, 1907.

CORNICE (Fr. corniche, Ital. cornice), in architecture, the projection at the top of a wall, which is provided to throw off the rain water from the roof, beyond the face of the building. As employed in classic architecture it forms the upper part of the entablature of an order, and is there subdivided into bed mould, corona and cymatium. The term is also generally applied to any moulding projection which crowns the

feature to which it is attached; thus doors and windows, internally as well as externally, have each their cornice, and the same applies to pieces of furniture (see also Masonry).

CORNIFICIUS, the author of a work on rhetorical figures, and perhaps of a general treatise (ars, Ttx vr l) on the art of rhetoric (Quintilian, Instit., iii. 1. 21, ix. 3. 89). He has been identified with the author of the four books of Rhetorica dedicated to a certain Q. Herennius and generally known under the title of Auctor ad Herennium. The chief argument in favour of this identity is the fact that many passages quoted by Quintilian from Cornificius are reproduced in the Rhetorica. Jerome, Priscian and others attributed the work to Cicero (whose De inventione was called Rhetorica prima, the Auctor ad Herennium, Rhetorica secunda), while the claims of L. Aelius Stilo, M. Antonius Gnipho, and Ateius Praetextatus to the authorship have been supported by modern scholars. But it seems improbable that the question of authorship will ever be satisfactorily settled. Internal indications point to the date of compositions as 86-82 B.C., the period of Marian domination in Rome. The unknown author, as may be inferred from the treatise itself, did not write to make money, but to oblige his relative and friend Herennius, . for whose instruction he promises to supply other works on I grammar, military matters and political administration. He

expresses his -contempt for the ordinary school rhetorician, the hair-splitting dialecticians and their ” sense of inability to speak, since they dare not even pronounce their own name for fear of expressing themselves ambiguously.” Finally, he admits that rhetoric is not the highest accomplishment, and that philosophy is far more deserving of attention. Politically, it is evident that he was a staunch supporter of the popular party.

The first and second books of the Rhetorica treat of inventio and forensic rhetoric; the third, of dispositio, pronuntiatio, memoria, deliberative and demonstrative rhetoric; the fourth, of docutio. The chief aims of the author are conciseness and clearness (breviter et dilucide scribere). In accordance with this, he ignores all rhetorical subtleties, the useless and irrelevant matter introduced by the Greeks to make the art appear more difficult of acquisition; where possible, he uses Roman ter- minology for technical terms, and supplies his own examples of the various rhetorical figures. • The work as a whole is

con- sidered very valuable. The question of the relation of Cicero's De inventione to the Rhetorica has been much discussed. Three views were held: that the Auctor copied from Cicero; that they were independent of each other, parallelisms being due to their having been taught by the same rhetorician at Rome; that Cicero made extracts from the Rhetorica, as well as from other authorities, in his usual eclectic fashion. The latest editor, F. Marx, puts forward the theory that Cicero and the Auctor have not produced original works, but have merely given the substance of two Ttxvaj. (both emanating from the Rhodian school); that neither used the rexvai directly, but reproduced the revised version of the rhetoricians whose school they attended, the introductions alone being their own work; that the lectures on which the Ciceronian treatise was based were delivered before the lectures attended by the Auctor.

The best modern editions are by C. L. Kayser (i860), in the Tauchnitz, and W. Friedrich (1889), in the Teubner edition of Cicero's works, and separately by F. Marx (1894); see also De scholiis Rhetorices ad Herennium, by M. Wisen (1905). Full references to authorities will be found in the articles by Brzoska in Pauly-Wissowa, Realencyclopddie (1901); M. Schanz, Geschichte der romischen Litt., i. (2nd ed., pp. 387-394) ; and Teuffel-Schwabe, Hist, of Roman Lit. (Eng. trans., p. 162) ; see also Mommsen, Hist, of Rome, bk. iv. ch. 13.

CORNING, ERASTUS (1794-187 2), American capitalist, was born in Norwich, Connecticut, on the 14th of December 1794. In 1807 he became a clerk in a hardware store at Troy, New York, but in 1814 he removed to Albany, where he eventually became the owner of extensive ironworks, obtained a controlling interest in various banking institutions, and accumulated a large fortune. He was prominently connected with the early history of railway development in New York, became president of the Utica & Schenectady line, and was the principal factor in the extension and consolidation of the various independent lines that formed the New York Central system, of which he was president from 1853 to 1865. He was also interested in the building of the Michigan Central and the Chicago, Burlington & Quincy railways, and was president of the company which constructed the Sault Sainte Marie ship canal, providing a navig- able waterway between Lakes Huron and Superior. He was prominent in politics as a Democrat, and, after serving as mayor of Albany from 1834 to 1837, and as state senator from 1842 to 1845, ne was a representative in Congress in 1857-1859 and in 1861-1863, being re-elected for a third term in 1862, but resigning before the opening of the session. In 1861 he was a delegate to the Peace Congress, but when the Civil War actually began he loyally supported the Lincoln administration. He

was a delegate to the New York constitutional convention of 1867, and was for many years vice-chancellor of the board of regents of the University of the State of New York. He died at Albany, New York, on the 9th of April 1872.

CORNING, a city of Steuben county, New York, U.S.A., in the S. part of the state, on the Chemung river, 10 m. W.N.W. of Elmira. Pop. (1890) 8550; (1900) 11,061, of whom 1410 were foreign-born; (1910) 13,730. Corning is served by the Erie, the Delaware, Lackawanna & Western, and the New

York Central & Hudson River railways. Among the principal buildings and institutions are a fine city hall, a Federal building; a county court house, the Corning hospital, a free public library and St Mary's orphan asylum (Roman Catholic) . Corning is one of the principal markets in New York state for tobacco, which is extensively produced in the surrounding country. The principal industry is the making of cut and flint glass, and, of the several extensive plants devoted to this industry, that of the Corning Glass Works is one of the largest in the world. The city also has railway car shops and foundries, and among its manufactures are pressed brick, tile and terra-cotta, papier- mache and lumber. The total value of the factory products in 1905 was $3,083,515, 35-7% more than in 1900. There were settlers on the site of Corning as early as 1789, but it was not until 1848 that it was incorporated as a village under its present name, given in honour of Erastus Corning, the railway builder. Corning was chartered as a city in 1890.

See C. H. M'Master, History of the Settlement of Steuben County (Bath, N.Y., 1853)-

CORN LAWS. In England, legislation on corn was early applied both to home and foreign trade in this essential produce. Roads were so bad, and the chain of home trade so feeble, that there was often scarcity of grain in one part, and plenty in another part of the same kingdom. Export by sea or river to some foreign market was in many cases more easy than the carriage of corn from one market to another within the country. The frequency of local dearths, and the diversity and fluctuation of prices, were thus extreme. It was out of this general situation that the first corn laws arose, and they appear to have been wholly directed towards lowering the price of corn. Exportation was prohibited, and home merchandise in grain was in no repute or toleration. As long as the rent of land, including the extensive domains of the crown, was paid in kind, the sovereign, the barons and other landholders had little interest in the price of corn different from that

of other classes of people, the only demand for corn being for consumption and not for resale or export. But as rents of land came to be paid in money, the interest of the farmer to be distinguished by a remove from that of the landowner, the difference between town and country to be developed, and the business of society to be more complex, the ruling powers of the state were likely to be actuated by other views; and hence the force which corn legislation afterward assumed in favour of what was deemed the agricultural interest. But during four centuries after the Conquest the corn law of England simply was that export of corn was prohibited, save in years of extreme plenty under forms of state licence, and that producers carried their surplus grain into the nearest market town, and sold it there for what it would bring among those who wanted it to consume; and the same rule prevailed in the principal countries of the continent of Europe. This policy, though, as one may argue from its long continuance, probably not felt to be acutely oppressive, was of no avail in removing the evils against which it was directed. On the contrary it prolonged and aggravated them. The prohibition of export discouraged agricultural im- provement, and in so much diminished the security and liberality even of domestic supply; while the intolerance of any home dealing or merchandise in corn prevented the growth of a com- mercial and financial interest strong enough to improve the means of transport by which the plenty of one part of the same country could have come to the aid of the scarcity in another.

Apart from this general feudal germ of legislation on corn, the history of the British corn laws may be said to have begun with the statute in the reign of Henry VI. (1436), by Eag n sb which exportation was permitted without state licence, corn laws, when the price of wheat or other corn fell below certain 1436- prices. The reason given in the preamble of the statute was that the previous state of the law had compelled farmers to sell their corn at low prices, which was no doubt true, but which also showed the important turn of the tide that had set in. J. R. M'Culloch, in an elaborate article in the Commercial Dictionary, says that the fluctuation of the prices of corn in that age was so great, and beyond all present conception, that " it is

not easy to determine whether the exportation price of 6s. < 8d. for wheat " [12s. iod. in present money per quarter] " was above or below the medium price." But while the medium price of the kingdom must be held to be unascertainable in a remote time, when the

medium price in any principal market town of England did not agree with that of another for any year or series of years, one may readily perceive that the cultivators of the wheat lands in the south-eastern counties of England, for example, who could frequently have sold their produce in that age to Dutch merchants to better advantage than in their own market towns, or even in London, but were prohibited to export abroad, and yet had no means of distributing their supplies at home so as to realize the highest medium price in England, must have felt aggrieved, and that their barons and knights of the shire would have a common interest in making a strong effort to rectify the injustice in parliament. This object appears to have been in some measure accomplished by this statute, and twenty- seven years afterwards (1463) a decided step was taken towards securing to agriculturists a monopoly of the home market by a statute prohibitory of importation from abroad. Foreign import was to be permitted only at and above the point of prices where the export of domestic produce was prohibited. The landed interest had now adopted the idea of sustaining and equalizing the value of corn, and promoting their own. industry and gains, which for four centuries, under various modifications of plan, and great changes of social and political condition, were to maintain a firm place in the legislation and policy of England. But there were many reasons why this idea, when carried into practice, should not have the results anticipated from it.

The import of grain from abroad, even in times of dearth and high prices at home, could not be considerable as long as the policy of neighbouring countries was to prohibit export; nor could the export of native corn, even with the Dutch and other European ports open to such supplies, be effective save in limited maritime districts, as long as the internal corn trade was sup- pressed, not only by want of roads, but by legal interdict. The regulation of liberty of export and import by rates of price, moreover, had the same practical objection as the various sliding- scales, bounties, and other legislative expedients down to 1846, viz. that they failed, probably more in that age than in later times, to create a permanent market, and aimed only at a casual trade. When foreign supplies were needed, they were often not to be found; and when there was an excess of corn in the country ■a profitable outlet was both difficult and uncertain. It would appear, indeed, that during the Wars of the Roses the statutes of Henry VI. and Edward IV. had become obsolete; for a law regulating export prices in identical terms of the law of 1436 was re-enacted in the reign of Philip and Mary (1554). In the

, preceding reign of Edward VI., as well as in the succeeding long reign of Elizabeth, there were unceasing complaints of the decay of tillage, the dearth of corn, and the privations of the labouring classes; and these complaints were met by the same kind of measures — by statutes encouraging tillage, forbidding the enlargement of farms, imposing severer restrictions on storing ■ and buying and selling of grain, and by renewed attempts to regulate export and import according to prices. In 1562 the price at which export might take place was raised to 10s. per quarter for wheat, and 6s. 8d. for barley and malt. This only

, lasted a few years, and in 1570 the export of wheat and barley was permitted from particular districts on payment of a duty of is. 8d. per quarter, although still liable to prohibition by the government or local authority, while it was entirely prohibited under the old regulations from other districts. Only at the close of Elizabeth's reign (1603) did a spark of new light appear in a further statute, which removed the futile provisions in favour of tillage and against enlargement of pastoral farms, and rested

, the whole policy for promoting an equable supply of corn, while encouraging agriculture, on an allowed export of wheat and other grain at a duty of 2s. and is. 4d. when the price of wheat was not more than 20s., and of barley and malt 12s. per quarter. The import of corn appears to have been much lost sight of from the period of the statute of 1463. The internal state of England,

as well as the policy of other countries of Europe,' was unfavour- able to any regular import of grain, though 'many parts of the kingdom were often suffering from dearth bf corn. It is obvious that this legislation, carried over more than a century and a half, failed of its purpose, and that it neither. promoted agriculture nor increased the supply of bread. : So great a variance and conflict between the intention of statutes and the actual course of affairs might be deemed inexplicable, but for an explanation which a close economic study of the circumstances of the times affords.

Besides the general reasons of the failure already indicated, there were three special causes in active operation, which, though not seen at the period, have become distinct enough' since. (1) A comparatively free, export of wool had been permitted in England from time immemorial. It was subject neither to conditions of price nor to duties in the times under consideration, was easier of transport and much less liable to damage than corn, and, under the extending manufactures of France

and; the Low Countries, was sure of a foreign as well as a domestic market. Here was one description of rural produce on- which there was the least embargo, and on which some reliance could be placed that it would in all circumstances bring a fair value; while corn, the prime rural produce, was subject as a commodity of mer- chandise to every difficulty, internally and externally,; which meddling legislation and popular prejudice could impose. The numerous statutes enjoining tillage and discouraging pastoral farms — or in other words requiring that agriculturists should turn from what was profitable . to what was unprofitable — had consequently no substantial effect, save in the many individual instances in which the effect may have been injurious. (2) The value of the standard money of the kingdom had been under- going great depreciation from two opposite quarters at once. The pound sterling of England was reduced in weight of pure metal from £1 : 18 : 9 in 1436, the date of the first of the corn statutes, to 4s. 7fd. in 1551, as far as can be estimated in present money, and to £1 : q : 6f under the restoration of the coinage in the following year. At the same time the greater abundance of silver, which now began to be experienced in Europe from the discovery of the South American mines, was steadily reducing the intrinsic value of the metal. Hence a general rise of prices remarked by Hume and other historians; and hence also it followed that a price of corn fixed for export or import at one period became always at another period more or less restrictive of export than had been designed. (3) The wages of labour would have followed the advance in the prices of commodities had wages been left free, but they were kept down by statute to the three or four pence per day at which they stood when the pound sterling contained one-fourth more silver, and silver itself was much more valuable. This was a. refinement of cruelty. The feudal system was breaking up; a wage-earning population was rapidly increasing both in the farms and in the towns; but the spirit of feudalism remained, and the iron collar of serfdom was riveted round the necks of the labourers by these statutes many generations after they had become nominally freemen. 1 The result was chronic privation and discontent among the common people, by which all, the conditions of agriculture and trade in corn were further straitened and barbarized; and an age, in some high respects among the most brilliant in the annals of England, “was marked by an enormous increase of pauperism, and by the introduction of the merciful but wasteful remedy of the Poor Laws.

The corn legislation of Elizabeth remained without change during the reign of James, the civil wars and the Commonwealth. But on the restoration of Charles II. in 1660, the question was resumed, and an

act was passed of a more prohibitory char- acter. Export and import of corn, while nominally permitted

1 M'Culloch found from, a comparison of the prices of corn and wages of labour in the reign of Henry VII. and the latter part of the reign of Elizabeth, that in the former period a labourer could earn a quarter of wheat in 20, a quarter of rye in 12, and a quarter of barley in 9 days; whereas, in the latter period, to earn a quarter of wheat required 48, a quarter of rye 32, and a quarter of barley 29 days' labour.

were alike subjected to heavy duties — the need of the exchequer being the paramount consideration, while the agriculturists were no doubt pleased with the complete command secured to them in the home market. This act was followed by such high prices of corn, and so little advantage to the revenue, that parliament in 1663 reduced the duties on import to 9% ad valorem, while at the same time raising the price at which export ceased to 48s., and reducing the duty on export from 20s. to 5s. 4d. per quarter. In a few years this was found to be too much free- trade for the agricultural liking, and in 1670 prohibitory duties were re-imposed on import when the home price was under 53s. 4d., and a duty of 8s. between that price and 80s., with the usual make-weight in favour of home supply, that export should be prohibited when the price was 53s. 4d. and upwards. But complaints of the decline of agriculture continued to be as rife under this act as under the others, till on the accession of William and Mary, the landed interest, taking advantage of the Revolution as they had taken advantage of the Restoration to promote their own interests, took the new and surprising step of enacting a bounty on the export of grain. This evil continued to affect the corn laws of the kingdom, varied, on one occasion at least, with the further complication of bounties on import, until the 1 9th century. The duties on export being abolished, while the heavy duties on import were maintained, this is probably the most one-sided form which the British corn laws ever assumed, but it was attended with none of the advantages anticipated. The prices of corn fell, instead of rising. There had occurred at the period of the Revolution a depreciation of the money of the realm, analogous in one respect to that which marked the first era of the corn statutes (1436-1551), and forming one of the greatest difficulties which the government of William had to encounter. The

coin of the realm was greatly debased, and as rapidly as the mint sent out money of standard weight and purity, it was melted down, and disappeared from the circulation. The influx of silver from South America to Europe had spent its action on prices before the middle of the century; the precious metals had again hardened in value; and for forty years before the Revolution the price of corn had been steadily falling in money price. The liberty of exporting wool had also now been cut down before the English manufactures were able to take up the home supply, and agriculturists were consequently forced to extend their tillage. When the current coin of the kingdom became wholly debased by clipping and other knaveries, there ensued both irregularity and inflation of nominal prices, and the producers and consumers of corn found themselves equally ill at ease. The farmers complained that the home-market for their produce was unremunerative and unsatisfactory; the masses of the people complained with no less reason that the money wages of labour could not purchase them the ustial necessaries of life. Macaulay, in his History of England, says of this period, with little exaggeration, that " the price of the necessaries of life, of shoes, of ale, of oatmeal, rose fast. The labourer found that the bit of metal which, when he received it, was called a shilling, would hardly, when he purchased a pot of beer or a loaf of rye bread, go as far as sixpence." The state of agriculture could not be prosperous under these conditions. But when the government of William surmounted this difficulty of the coinage, as they did surmount it, under the guidance of Sir Isaac Newton, with remarkable statesmanship, it necessarily followed that prices, so far from rising, declined, because, for one reason, they were now denominated in a solid metallic value. The rise of prices of corn attending the first years of the export bounty was consequently of very brief duration. The average price of wheat in the Winchester market, which in the ten years 1690-1699 was £2: ios., fell in the ten years 1716-1725 to £1: 5:4, and in the ten years 1746-1755 to £1:1:2$. The system of corn law established in the reign of William and Mary was probably the most perfect to be conceived for advancing the agricultural interest of any country. Every stroke of the legislature seemed complete to this end. Yet it wholly failed of its purpose. The price of wheat again rose in 17 50-1 760 and

1760-1770 to £1:19 :3i and £2:11:3!, but many causes had meanwhile been at work, as invariably happens in such economic developments, the operation of which no statutes could embrace, either to control or to prevent. Between the reign of William and Mary and that of George III., the question of bounty on export of grain had, in the general progress of the country, fallen into the background, while that of the

heavy embargoes on import had come to the front. Therefore it is that Burke's Act of 1773, as a deliberate attempt to bring the corn laws into some degree of reason and order, is worthy of special mention. This statute permitted the import of foreign wheat at a nominal duty of 6d. when the home price was 48s. per quarter, and it stopped both the liberty to export and the bounty on export together when the home price was 44s. per quarter. The one blemish of this statute was the stopping export and cutting off bounty on export at the same point of price.

Few questions have been more discussed or more differently interpreted than the elaborate system of corn laws dating from the reign of William and Mary. So careful an observer as Malthus was of opinion that the bounty on export had enlarged the area of subsistence. That it had large operation is sufficiently attested by the fact that, in the years from 1 740 to 175 r, bounties were paid out of the exchequer to the amount of £1,515,000, and in 1749 alone they amounted to £324,000. But the trade thus forced was of no permanence, and the British exports of corn, which reached a maximum of 1,667,778 quarters in 1749- 1750, had fallen to 600,000 quarters in 1760 and continued to decrease.

Burke's Act lasted long enough to introduce a regular import of foreign grain, varying with the abundance or scarcity of the home harvest, yet establishing in the end a systematic preponderance of imports over exports. The period, t £^

moreover, was marked by great agricultural improve- ments, by extensive reclamation of waste lands, and by an increased home produce of wheat, in the twenty years from 1773 to 1793, of nearly 2,000,000 quarters. Nor had the course of prices been unsatisfactory. The average price of British wheat in the twenty years was £2:6:3, an d in only three years of the twenty was the price a fraction under £2. But the ideas in favour of greater freedom of trade, of which the act of 1773 was an indication, and of which another memorable example was given in Pitt's commercial treaty with France, were over- whelmed in the extraordinary excitement caused by the French Revolution, and all the old corn law policy was destined to have a sudden revival. The landowners and farmers complained that an import of foreign grain at a nominal duty of 6d., when the price of wheat was only 48s., deprived them of the ascending scale of prices when it seemed due; and on this instigation an act was passed in 1791, whereby the price at which importation could proceed at the nominal duty of 6d. was raised to 54s., with a duty of 2s. 6d. from 54s. to 50s., and at 50s. and under 50s. a prohibitory duty of 24s. 3d.

The bounty on export was main- tained by this act, but exportation was allowed without bounty till the price reached 46s.; and the permission accorded by the statue of 1773 to import foreign corn at any price, to be re- exported duty free, was modified by a warehouse duty of 2s. 6d. in addition to the duties on import payable at the time of sale, when the corn, instead of being re-exported, happened to be sold for home consumption. The legislative vigilance in this statue to prevent foreign bread from reaching the home consumer is remarkable. There were deficient home harvests for some years after 1791, particularly in 1795 and 1797, and parliament was forced to the new expedient of granting high bounties on im- portation. At this period the country was involved in a great war; all the customary commercial relations were violently disturbed; freight, insurance and other charges on import and export were multiplied fivefold; heavier and heavier taxes were imposed; and the capital resources of the kingdom were poured with a prodigality without precedent into the war channels. The consequence was that the price or corn, as of all other commodities, rose greatly: and the Bank of England having

stopped paying in specie in 1797, this raised nominal prices still more under the liberal use of bank paper in loans and discounts, and the difference that began to be established in the actual value of Bank of England notes and their legal par in bullion'.

The average price of British wheat rose to £5 : 19 : 6 in 1801. So unusual a value must have led to a large extension of the area under wheat, and to much corn-growing on land that after great outlay was ill prepared for it. .In the following years there were agricultural complaints; and in 1804, though in 1803 the average price of wheat had been as high as £2 : 18 : 10, an act was passed, so much more severe than any previous statute, that its object would appear to have been to keep the price of corn somewhere approaching the high range of 180 1. A prohibitory duty of 24s. 3d. was imposed on the import of foreign wheat when the home price was 63s. or less; and the price at which the bounty was paid on export was lowered to 40s., while the price at which export might proceed without bounty was raised to 54s. Judging from the prices that ruled during the remaining period of the French wars, this statute would appear to have been effective for its end, though, under all the varied action of the times on a rise of prices, it would be difficult to assign its proper place in the general effect. The average price of wheat rose to £4 : 9 : 9 in 1805, and the

bank paper price in 1812 was as high even as £6 : 6 : 6. The bullion prices from 1809 to 1813 ranged from 86s. 6d. to 100s. 3d. But it was foreseen that when the wars ended a serious reaction would ensue, and that the rents of land, and the general condition of agriculture, under the warlike, protective and monetary stimulation they had received, would be imperilled. In the brief peace of 1814 the average bullion price of British wheat fell to 55s. 8d. All the means of select committees of inquiry on agricultural distress, and new modifications of the corn laws, were again brought into requisition. The first idea broached in parliament was to raise the duties on foreign imports, as well as the prices at which they were to be leviable, and to abolish the bounty on export, while permitting freedom of export whatever the home price might be. The latter part of the scheme was passed into law in the session of 1814; but the irritation of the manufacturing districts against the new scale of import duties was too great to be resisted. In the subsequent session an act was passed, after much opposition, fixing 80s. (14s. more than during the wars) as the price at which import of wheat was to become free of duty.

This act of 181 5 was intended to keep the price of wheat in the British markets at about 80s. per quarter; but the era of war and great expenditure of money raised by public loans had ended, the ports of the continent were again open to some measure of trade and to the equalizing effect of trade upon prices, the Bank of England and other banks of issue had to begin the uphill course of a resumption of specie payments, the nation had to begin to feel the whole naked weight of the war debt, and the idea of the protectors of a high price of corn was proved by the event to be an utter hallucination. The corn statutes of the next twenty years, though occupying an enormous amount of time and attention in the Houses of Parliament, may be briefly treated, for they are simply a record of the impotence of legislation to maintain the price of a commodity at a high point when all the natural economic causes in operation are opposed to it. In 182 2 a statute was passed reducing the limit of prices at which importation could proceed to 70s. for wheat, 35s. for barley, 25s. for oats; but behind the apparent relaxation was a new scale of import duties, by which foreign grain was subjected to heavy three-month duties up to a price of 85s., — 17s. when wheat was 70s., 12s. when between 70s. and 80s., and 10s. when 85s., showing the grasping spirit of the would-be monopolizers of the home supply of corn, and their reluctance to believe in a lower range of value for corn as for all other commodities. This act never operated, for the reason that, with the exception in some few instances of barley, prices never were so high as its projectors had contemplated. The corn trade had passed rapidly

beyond reach of the statutes by which it was to be so painfully controlled; and as there were occasional seasons of scarcity, particularly in oats, the king in

council was authorized for several years to override the statutes, and do whatever the public interests might require.

In 1827 Canning introduced a new system of duties, under which there would have been a fixed duty of is. per quarter when the price of wheat was at or above 70s., and an increased duty of 2s. for every shilling the price fell below 69s. ; but though Canning's resolutions were adopted by a large majority in the House of Commons, his death and the consequent change of ministers involved the failure of his scheme of corn duties. In the following year Charles Grant introduced another scale of import duties on corn, by which the duty was to be 23s. when the price was 64s., 16s. 8d. when the price was 69s., and only is. when the price was 73s. or above 73s. per quarter; and this became law the same year. This sliding scale was more objection- able, as a basis of foreign corn trade, than that of Canning, though not following so closely shilling by shilling the variation of prices, because of the abrupt leaps it made in the amount of duties leviable. For example, a merchant who ordered a ship- ment of foreign wheat when the home price was 70s. and rising to 73s., instead of having a duty of is. to pay, should on a backward drop of the home price to 69s. have 16s. 8d. of duty to pay. The result was to introduce wide and incalculable elements of specula- tion into all transactions in foreign corn. The prices during most part of this period were under the range at which import was practically prohibited. The average price of British, wheat was 96s. nd. in 1817, but from that point there was in succeeding years a rapid and progressive decline, varied only by the results of the domestic harvests, till in 1835 the average price of wheat was 39s. 4d., of barley 29s. nd. and oats 22s. The import of foreign grain in these years consisted principally of a speculative trade, under a privilege of warehousing accorded in the statute of 1773, and extended in subsequent acts, by which the grain might be sold for home consumption on payment of the duties, or re-exported free, as suited the interest of the holders.

The act of 1822 admitted corn of the British possessions in North America under a favoured scale of duties, and in 1825 a temporary act was passed, allowing the import of wheat from these provinces at a fixed duty of 5s. per quarter, irrespective of the home price, which, if maintained, would have given some stability to the trade with Canada. The idea of a fixed duty on all foreign grain, however, appears to have grown in favour from about this period. It was

included in the programme of import duty reforms of the Whig government in 1841, and fell with its propounders in the general election of that year. Sir Robert Peel, on succeeding to office, and commencing his remarkable career as a free-trade statesman, introduced and carried in 1842 a new sliding scale of duties somewhat better adjusted to the current values. But public opinion by this time was changing, and the prime minister, convinced, as he confessed, by the arguments of Cobden and the Anti-Corn-Law League, and stimulated into action by the failure of the potato crop in Ireland, put an effectual end to the history of the corn laws by the famous act of 1846. It was provided under this measure that the maximum duty on foreign wheat was to be immediately reduced to 10s. per quarter when the price was under 48s., to 5s. on barley when the price was under 26s., and to 4s. on oats when the price was under 18s., with lower duties as prices rose above these figures; but the conclusive part of the enactment was that in three years — on the 1st of February 1849 — these duties were to cease, and all foreign corn to be admitted at a duty of is. per quarter, and all foreign meal and flour at a duty of 4! d. per cwt. — the same nominal imposts which were conceded to grain and flour of British possessions abroad from the date of the act. Ih 1869 even these nominal duties were abolished by Robert Lowe in a Customs Duties Act. In 1902 a registration duty of 3d. per cwt. was imposed on imported corn, and $d. per cwt. on imported flour, in the expectation that such a duty would broaden the basis of taxation. The duty was, however, repealed the following year. But a low duty on imported foreign corn was made an essential part of the tariff reform scheme advocated by Mr. J. Chamberlain (q.v.) from 1903 onwards.

Foreign Corn Laws. — Freedom of export of corn from customs

Portugal.

France.

duties has become the general rule of nearly all foreign countries. It is somewhat curious that Spain saw the advantage to her wheat-producing provinces of freedom of export of wheat as early as 1820, and three years afterwards extended this freedom to all ” fruits of the soil ” in Spain. The import duty on wheat, as on other grain, has varied from time to time. The tariff of 1882 fixed the duty at 2s. 3fd. per cwt.; a law of February 1895 raised the duty to 4s. $jd. per cwt.,

at which rate it remained till 1898, when it was reduced to 2s. sid., though in this same year, that of the war with the United States, it was for some three months suspended, owing to distress in the country. In 1899 it was raised to 3s. 3d., and by a law of March 1904 fixed at 6-oo pesetas per 100 kilos (2s. 5jd. per cwt.) as long as the average price of wheat in the markets of Castile does not fall below 27-00 pesetas per 100 kilos (us. per cwt.). The duty on rye, oats, barley and maize is is. 9§d. per cwt. The duty on flour varied from 3s. 4§d. per cwt. in 1882 to 7s. ojd. in 1895; by the law of March 1904 it was fixed at 4s. of d. per cwt. The duty on rice is 2s. if d. per cwt. in the husk and 4s. 3jd. not in the husk. In Portugal the import duty on wheat was fixed by a law of May 1888 at 20 reis per kilo (4s. 7d. per cwt.). By a law of July 1889, as amended by laws of August 1891 and July 1899, importation is prohibited except in the event of the home-grown crop being insufficient, and even then permission is confined to millers. The duty, in the event of permission to import being accorded, is to be charged on a sliding scale intended to keep the cost of wheat to the millers, including the duty, at 60 reis (3id.) per kilo (2-2 lbs.). Maize is subject to a duty of 4s. ijd. per cwt., and rye, oats and barley to one of 3s. 8d. per cwt. By laws of July 1889 and August 1891 the importation of flour was prohibited except in the event of a strike of the mill-hands, and the duty was fixed at 6s. 2d. per cwt. Export and import of grain in France were prohibited down to the period of the repeal of the British corn laws, save when prices were below certain limits in the one case and above certain other limits in the other. But export of grain and flour from France has long been free of duty. On the other hand, import duties have varied considerably. By a law of 1881, the duty on wheat was fixed at 3d. per cwt.; this duty was raised in 1885 to is. 2jd. per cwt. and again in 1887 to 2s. ofd. By a law of 1894 the duty was fixed at 2s. iofd. per cwt. In 1898, owing to the sudden rise in the price of corn occasioned by the war between Spain and the United States, the duty was temporarily (the 4th of May to the 30th of June) suspended. By a law of 1873 free importation of rye, barley, maize and oats was permitted, but by a law of 1885 a duty was fixed at 7jd. per cwt., and this was subsequently (1887) increased to is. 2|d. In 1881 the duty on imported flour was as low as 5! d. per cwt., but this was increased successively by laws of 1885, 1887, 1891 and 1892, and in 1894 was fixed at 4s. 5fd. per cwt. at the rate of extraction of 70% and over; 5s. 5fd. at 70 to 60%; and 6s. 6d. at 60% and under. In Belgium both the export and import of wheat, rye, barley and maize are free of duty; so also were oats and flour. Since 1895, however, there has been a duty of is. 2§d. on oats, and of gf d. on flour. The policy of the Netherlands was, owing to the advantages possessed by its ports, long favourable to the import

lands?” an d export of grain. But for some years prior to 1845 there was a moderate sliding scale of import duties, and this gave place, on the ravages of the potato disease, to a low fixed duty; since 1877, however, the importation of cereals and flour has been free. In Italy there are no duties on the export of grain. The import duties show a progressive increase. In 1878 the import duty on wheat was 6fd. per cwt.; this was increased to is. 2|d. in 1888, and in 1894 to 3s. oJd. As in Spain and France, there was a temporary reduction and suspension during 1898, on the Spanish- American war. The duty on rye, barley, oats and maize was fixed by the tariff of 1878 at 5ˆd. per cwt. By a decree of 1894 the duty on rye was raised to is. jod.; that on barley, by a decree of 1896, to is. 7|d.; that on oats, by a decree of 1888, to is. 7|d.; and that on maize, by a decree of 1896, to 3s. ofd. The duty on flour, fixed at is. i|d., by the tariff of 1878, was raised to 2s. sid. in 1888, to 3s. 6ˆd. in

Italy.

1888, and to 5s. in 1894. In Germany, the duty on wheat and rye, as fixed by the tariff of 1879, was 6d. per cwt. In 1885 this was raised to is. 6jd., and in 1888 to 2s. 6|d. By treaty in 1892 this was decreased to is. 9jd. On oats the duty in 1879 was 6d. per cwt., increased to 9jd. in 1885, and again, in 1888, to 2s. o-jd., but reduced to is. 5d. in 1892. On barley the duty in 1879 was 3d., in 1885 g\d., in 1888 is. if d., and in 1892 is. oJd. On maize, 3d. in 1879, 6d. in 1885, is. oJd. in 1888, and 9fd. in 1892. On flour, is. oJd. in 1879, 3s. 9fd. in 1885, 5s. 4d. in 1888, and 3s. 8|d. in 1892. The new German tariff of 1906 which formed the basis for the new German com- mercial treaties with Russia, Italy, Austria-Hungary, &c, and which was passed when the influence of the agrarian party was predominant, increased still more the import duties on cereals. Under this tariff there are two rates of duties: (1). Those of the new ” general ” tariff as applied to imports from all countries entitled to most favoured-nation treatment. (2). ” Conven- tional ” tariff rates, conceded to other states as the result of treaties. Under this tariff the ” general ” and ” conventional ” duties, respectively, on wheat are 3s. 9§d. and 2s. 9d.; on oats and rye, 3s. 6jd. and 2s. 6Jd.; on ” common baker’s produce,” 8s. 3d. and 5s. 2d. In Austria-Hungary the Hungary. import duty on wheat and rye is, under the tariff of 1887, is. 6jd. per cwt.; on barley and oats, 9|d.; on maize, 6d., and on flour, 3s. 9fd.

The great countries, famous for a production of raw materials much beyond their own means of consumption, are favourable, of course, to the utmost freedom of export. The empire of China itself was never unwilling to sell to foreigners states tea for which there was no

domestic use. The United States promotes transit and export of grain, internally and externally, with all the intelligence and resources of a civilized people. Although the import duty on ” breads tuffs ” imposed by the United States tariff is very high, and is, possibly, a useful protection against the importation of ” baker’s products,” yet it is to a certain extent unnecessary for a country which must dispose of its surplus by exportation. The same remark applies to Russia, whose exportation and importation are alike free, though there is an import duty on wheat flour of 2s. nfd. per cwt. In the British colonies probably the only example of an export duty is that on rice in British India; it amounts to 3 annas per maund (4d. per cwt.). The import of grain into India is free. In Australia, New Zealand, Canada, and all mainly agricultural countries, there is no export duty. In each of these countries, however, there is an import duty; in the cases of Australia and New Australia Zealand, designed, to a certain extent, as a precaution New against possible rivalry on the part of the other. The Zealand, Australian import duty is is. 6d. per cental (100 lb av.), ana a ‘ and the New Zealand 9d. per cental. The Canadian import duties on grain are important only in the light of being a species of retaliation against similar duties imposed by the United States with the design of restricting inter-frontier exchange. The Canadian import duty is, on barley, 30% ad valorem; on buckwheat, rye and oats, 4-93d. per bushel, and on wheat, S-92d. per bushel. The South African production of cereal is still insufficient to meet the demand for home consumption, and there is a considerable grain importa- tion. The import duty, which undoubtedly acts as an encourage- ment to home agriculture, is is. per cental. (See also Grain Trade.) (R. So.; T. A. I.)

CORN-SALAD, or Lamb’s Lettuce, Valerianella olitoria (natural order Valerianaceae) , a weedy annual, native of southern Europe, but naturalized in cornfields in central Europe, and not infrequent in Britain. In France it is used in salads during winter and spring as a substitute for lettuces, but it is less esteemed in England. The plant is raised from seed sown on a ‘ bed or border of light rich earth, and should be weeded and watered, as occasion requires,, till winter, when it should be protected with long litter during severe frost. The largest plants should be drawn for use in succession. Sowing may be made every two or three weeks from the beginning of August till

Russia.

India.

South Africa.

October, and again in March, if required in the latter part of the spring. The sorts principally grown are the Round-leaved and the Italian ; the last is a distinct species, Valerianella eriocarpa.

CORNU, MARIE ALFRED (1841-1902), French physicist, was born at Orleans on the 6th of March 1841, and after being educated at the Ecole Polytechnique and the Ecole des Mines, became in 1867 professor of experimental physics in the former institution, where he remained throughout his life. Although he made various excursions into other branches of physical science, undertaking, for example, with J. B. A. Bailie about 1870 a repetition of Cavendish's experiment for determining the mean density of the earth, his original work was mainly concerned with optics and spectroscopy. In particular he carried out a classical redetermination of the velocity of light by A. H. L. Fizeau's method, introducing various improvements in the apparatus, which added greatly to the accuracy of the results. This achieve- ment won for him, in 1878, the prix Lacaze and membership of the Academy of Sciences in France, and the Rumford medal of the Royal Society in England. In 1899, at the jubilee commemora- tion of Sir George Stokes, he was Rede lecturer at Cambridge, his subject being the undulatory theory of light and its influence on modern physics; and on that occasion the honorary degree of D.Sc. was conferred on him by the university. He died at Paris on the nth of April 1902.

CORNU COPIAE, later Cornucopia (" horn of plenty "), a horn; generally twisted, filled with fruit and flowers, or an ornament representing it. It was used as a symbol of prosperity and abundance, and hence in works of art it is placed in the hands of Plutus, Fortuna and similar divinities (for the mythological account see Amaltheia). The symbol probably originated in the practice of using the horns of oxen and goats as drinking-cups; hence the rhyton (drinking-horn) is often confounded with the cornu copiae. For its representation in works of art, in which it is very common, especially in those belonging to the Roman period, see article in Daremberg and Saglio's Dictionnaire des Anliquites.

CORNUS, an ancient town of Sardinia, of Phoenician origin, on the west coast, 18 m. from Tharros, and the same from Bosa. At the time of the Second Punic War it is spoken of as the principal city of the district, and its capture by the Romans was the last act in the

suppression of the rebellion of 215 B.C., it having served as a place of refuge for the fugitives after the defeat of the combined forces of the rebels and the Carthaginians. The site of the ancient acropolis, covered with debris, may still be made out. Here were found three inscriptions in 1831, with dedications by the ordo, or town council, of Cornus to various patrons, from one of which it seems that it was a colony, though when it became so is unknown (Th. Mommsen, Corp. Inscr. Lat. x. 7915 sqq.). Unimportant remains of an aqueduct and (perhaps) of a church exist. ■ Excavations in the necropolis of the Roman period are recorded by F. Nissardi, Notizie degli Scavi, 1887, p. 47. Phoenician rock-cut tombs may also be seen.

CORNUTUS, LUCIUS ANNAEUS, Stoic philosopher, flourished in the reign of Nero. He was a native of Leptis in Libya, but resided for the most part in Rome. He is best known as the teacher and friend of Persius, whose satires he revised for publica- tion after the poet's death, but handed them over to Caesius Bassus to edit, at the special request of the latter. He was banished by Nero (in 66 or 68) for having indirectly disparaged the emperor's projected history of the Romans in heroic verse (Dio Cassius lxii. 29), after which time nothing more is heard of him. He was the author of various rhetorical works in both Greek and Latin ('Pˆropocai Texrai, De figuris sententiarum). Another rhetorician, also named Cornutus, who flourished a.d. 200-250 (or in the second half of the 2nd century) was the author of a treatise Tex>ˆ7 tov ttoXitlkov \6yov (ed. J. Graeven, 1890). A philosophical treatise, Theologiae Graecae compendium (of which the Greek title is uncertain; perhaps, 'EXXijwi) OedKoyla, or Hepl tt)s tuv de&v vo~eo} S, though the latter may be the title of an abridgment of the former) is still extant. It is a manual of " popular mythology as expounded in the etymological and symbolical interpretations of the Stoics " (Sandys), and although marred by many absurd etymologies, abounds in beautiful

thoughts (ed. C. Lang, 1881). Simplicius and Porphyry refer to his commentary on the Categories of Aristotle, whose philosophy he is said to have defended against an opponent Athenodorus in a treatise 'Avnypa(f>V irpos 'AdrjvoSwpov. His Aristotelian studies were probably his most important work. A commentary on Virgil (frequently quoted by Servius) and Scholia to Persius arc also attributed to him; the latter, however, are of much later date, and are assigned by Jahn to the Carolingian period. Excerpts from his treatise De enuntiatione vel orthographia are preserved in Cassiodorus. The so-called Disticha Cornuti (ed. Liebl, Straubing, 1888) belong to the late middle ages.

See G. Martini, De L. Annaeo Cornuto (1825); O. Jahn, Prolego- mena to his edition of Persius; H. von Arnim in Pauly-Wissowa's Realencyclopadie, i. pt. ii. (1894) ; M. Schanz, Geschichte der romischen Litteratur, i. 2 (1901), p. 285; W. Christ, Geschichte der griechischen Litteratur (1898), pp. 702, 755; Teuffel-Schwabe, Hist, of Roman Literature (Eng. trans.), § 299, 2.

CORNWALL, the capital of the united counties of Stormont, Dundas and Glengarry, Ontario, Canada, 67 m. S. W. of Montreal, on the left bank of the St Lawrence river. Pop. (1901) 6704. It is an important station on the Grand Trunk and the Ottawa & New York railways, and is a port of call for all steamers between Montreal and Lake Ontario ports. The surplus from the Cornwall canal furnishes excellent water privileges for its factories, which include cotton and woollen mills and grist and saw mills. The town has long been celebrated for its lacrosse club. On the opposite bank of the river is St Regis, inhabited chiefly by Indians of the Iroquois tribe.

CORNWALL, the south-westernmost county of England, bounded N. and N.W. by the Atlantic Ocean, E. by Devonshire, and S. and S.W. by the English Channel. The area is 1356-6 sq. m. The most southerly extension is Lizard Point, and the most westerly point of the mainland Land's End, but the county also includes the Scilly Isles (q.v.), lying 25 m. W. by S. of Land's End. No county in England has a stronger individuality than Cornwall, whether in economic or social conditions, in history, nomenclature, tradition, or even in the physical characteristics of the land. Such individuality is hardly to be compassed within political boundaries, and in some respects it is shared by the neighbouring county of Devon, yet the traveller hardly feels its influence before passing west of the Tamar.

Physically, Cornwall is a great promontory with a direct length of 75 m. from N.N.E. to S.S.W., and an extreme breadth, at the junction with Devonshire, of 45 m. The river Tamar here forms the greater part of the boundary, and its valley divides the high moors of Devonshire and the succession of similar broad-topped hills which form the backbone of the Cornish promontory. The scenery is full of contrast. To the west of Launceston the principal mass of high land rises to 1375 ft. in Brown Willy, the highest point in the county. This district is broken and picturesque, with rough tors or hills and boulders. A remarkable pile of rocks called the Cheese-wring, somewhat resembling an inverted pyramid in form, is seen on the moor north of Liskeard. This district is for the most part a region of furze and heather; but after passing Bodmin, the true Cornish moorland asserts itself, bare, desolate and impracticable, broken and dug into hillocks,

which are sometimes due to early mining works, sometimes to more modern search for metals. The seventy miles from Launceston to Mount's Bay have been called not untruly " the dreariest strip of earth traversed by any English high road." There is hardly more cultivation on the higher ground west of Mount's Bay, or in the Meneage or " rocky country," the old Cornish name for the promontory which ends in the Lizard. Long combes and valleys, however, descend from this upper moorland towards the coast on both sides. These are in general well wooded, and, in the luxuriance of their vegeta- tion, strongly characteristic. The small rivers traversing them in several cases enter fine estuaries, which ramify deeply into the land. Such are, on the south coast, the great estuary of the Tamar, and other streams, on which the port of Plymouth is situated (but only the western shore is Cornish), the Looe and Fowey rivers, F'almouth Harbour, the most important of the purely Cornish inlets and accessible for the largest vessels, and

the Helford river. On the north are the estuaries of the Camel and the Hayle, debouching into Padstow Bay and St Ives Bay respectively. The Fowey and Camel valleys almost completely break the continuation of the central high ground, and the up- lands west of Mount's Bay are similarly parted from the main mass by the low tract between Hayle and Marazion. Except at the mouth of a stream or estuary the coast is almost wholly rock-bound, and the cliff scenery is unsurpassed in England. Three different types are found. On the north coast, from Tintagel Head and Boscastle northward to Hartland Point in Devonshire, the dark slate cliffs, with their narrow and distorted strata, are remarkably rugged of outline, owing to the ease with which the waves fret the loosely-bound rock. On the south, in the beautiful little bays in the neighbourhood of the Lizard Point, the serpentine rock is noted for its exquisite colouring. Between Treryn and Land's End, at the south-west, a majestic barrier of granite is presented to the sea. The beautiful Scilly Isles continue the line of the granite, and the intervening sea is said to have submerged a tract of land named Lyonesse, containing, according to tradition, 140 parish churches, and intimately connected with the Arthurian romances.

Geology. — One of the most striking features of Cornwall is the presence of the four great masses of granite which rise up and form as many elevated areas out of a lower-lying region occupied by rocks almost entirely slaty in character, generally known as " Killas." The

granite is not the oldest of the Cornish rocks ; these are found in the Lizard peninsula and are represented by serpentine, gabbro and metamorphic schists. With the exception of a small tract about Veryan and Gorran, of Ordovician age, all the sedimentary rocks, as far as a line joining Boscastle and South Petherwin, were formerly classed as Devonian; to the north of the line are the Culm measures — slates, grits and limestones — of Carboniferous age. The extensive spread of Killas is not, however, entirely Devonian, as it is shown on most maps. In the northern portion, Lower, Middle and Upper Devonian can be distinguished; the lower beds at Polperro, Looe and Watergate, the higher beds along the line indicated above. Farther south it has been shown that an older set of Palaeozoic rocks constitutes at least a part of the Killas; the Veryan series, with Caradoc fossils, is succeeded in descending order by the Portscatho series, the Falmouth series and the Mylor series ; the lowest Devonian beds represented here by the Menaccan series, rest unconformably upon these Ordovician beds. Upper Silurian fossils have been found near Veryan. All these rocks have been subjected to severe thrusting from the south, consequently they are much contorted and folded. After this thrusting and folding had taken place, intrusions of diabase, &c, penetrated the sedimentary strata in numerous places, but it was not until post-Carboniferous times that the granite masses were intruded. The principal granite masses are those of St Just and Land's End, Penryn, St Austell and Bodmin Moor. To the granite Cornwall owes much of its prosperity; it has altered the Killas for some distance around each mass, and the veins of tin and copper ore, though richest in the Killas, are evidently genetically related to the granite. The principal metalliferous districts, Camborne, Redruth, St Just, &c, all lie near the granite margins. The china clay and china stone industry is dependent on the fact that the granite was itself altered in patches during the later phases of eruptive activity by the agency of boric and fluoric vapours which kaolinized the felspar of the granite. Later eruptions produced dykes of quartz-porphyry and other varieties, all locally called " elvans," which penetrate both the granite and the Killas. Small patches of Pliocene strata are found at St Erth and St Agnes Beacon. Blown sand is an important feature at St Pirran, Lelant, Gwythian and elsewhere, and raised beaches are frequent round the coast. A characteristic Cornish deposit is the " Head," an old consolidated scree or talus. Many rare minerals have been obtained from the mines and much tin ore has been taken from the river gravels. The river gravel at Carnon has yielded native gold.

Climate. — The climate of Cornwall is peculiar. Snow seldom lies for more than a few days, and the winters are less severe than in any

other part of England, the average temperature for January being 34° F. at Bude and 43-7° at Falmouth. The sea- winds, except in a few sheltered places, prevent timber trees from attaining to any great size, but the air is mild, and the lower vegetation, especially in the Penzance district, is almost southern in its luxuriance. Geraniums, fuchsias, myrtles, hydrangeas and camellias grow to a considerable size, and flourish through the winter at Penzance and round Falmouth; and in the Scilly Isles a great variety of exotics may be seen flourishing in the open air. Stone fruit, and even apples and pears, do not attain the same full flavour as in the neighbouring county, owing to the want of dry heat. The pinaster, the Pinus

austriaca, Pinus insignis and other firs succeed well in the western part of the county. All native plants display a per- fection of beauty hardly to be seen elsewhere, and the furze, including the double-blossomed variety, an4 the heaths, among which Erica vagans and ciliaris are characteristic, cover the moorland and the cliff summits with a blaze of the richest colour. On the whole the climate is healthy, though the prevalent westerly and south-westerly winds, bringing with them great bodies of cloud from the Atlantic, render it damp; the mean annual rainfall, though only 32-85 in. at Bude, reaches 44-41 atFalmouth, and 50-57 at Bodmin.

Agriculture. — About seven-tenths of the total area is under cultivation, but oats form the only important grain-crop. Turnips, swedes and mangolds make up the bulk of the green crops. The number of cattle (chiefly of the Devonshire breed) is large, and many sheep are kept; nearly 60,000 acres of hill pasture being recorded. As regards agricultural produce, however, Cornwall is chiefly famous for the market-gardening carried on in the neighbourhood of Penzance, where the climate is specially suitable for the growth of early potatoes, broccoli and asparagus. These are despatched in large quantities to the London market; the Scilly Isles sharing in the industry. Fruit and flowers are also grown for the market. In the valleys the soil is frequently rich and deep; there are good arable and pasture farms, and the natural oak-wood of these coombes has been preserved and increased by plantation.

Mining. — The wealth of Cornwall, however, lies not so much in the soil, as underground and in the surrounding seas. Hence the favourite Cornish toast, ” fish, tin and copper.” The tin of Cornwall has been known and worked from a period anterior to certain history. There is no direct proof that the Phoenician traders came to Cornwall for tin; though it has been sought to identify the Cassiterides {q.v.) or Tin Islands with the county or the Scilly Isles. By ancient charters the ”

tinners ” were exempt from all jurisdiction (save in cases affecting land, life and limb) other than that of the Stannary Courts, and peculiar laws were enacted in the Stannary parliaments (see Stannaries). For many centuries a tax on the tin, after smelting, was paid to the earls and dukes of Cornwall. The smelted blocks were carried to certain towns to be coined, that is, stamped with the duchy seal before they could be sold. By an act of 1838 the dues payable on the coinage of tin were abolished, and a compensation was awarded to the duchy instead of them. The Cornish miners are an intelligent and independent body, and the assistance of a Cornishman has been found necessary to the successful develop- ment of mining in many parts of the world, while many miners have emigratedfrom Cornwall to more remunerative fields abroad. The industry has suffered from periods of depression, as before the accession of Queen Elizabeth, who introduced miners from Germany to resuscitate it; and in modern times the shallow workings, from which tin could be easily ” streamed,” have become practically exhausted. The deeper workings to which the miners must needs have recourse naturally render production more costly, and the competition of foreign mines has been detrimental. The result is that the industry is comparatively less prosperous than formerly, and employs far fewer of the inhabitants. However, in the district of Camborne, Cam Brea, Ulogan and Redruth, and near St Just in the extreme west, the mines are still active, while there are others of less importance elsewhere, as near Callington in the south-east. And when, as in 1906, circumstances affecting the production of foreign mines cause a rise in the price of tin, the Cornish mines enjoy a period of greater prosperity; the result being the recent reopening of many of the mines which had been closed for twenty years. The largest tin-mine is that of Dolcoath near Camborne. Copper is extracted at St Just and at Cam Brea; but the output has decreased much further than that of tin. As it lies deeper in the earth, and consequently could not be ” streamed ” for, it was almost unnoticed in the county until the end of the 15th century, and little attention was paid to it until the last years of the 17th. No mine seems to have been worked exclusively for copper before the year 1770; and up to that time the casual produce had been

bought by Bristol merchants, to their great gain, at rates from £2 : 1 os. to £4 per ton. In 1718 John Coster gave a great impulse to the trade by draining some of the deeper mines, and instructing the men in an improved method of dressing the ore. The trade thereafter

progressively increased, and in 185 1 the mines of Devon and Cornwall together were estimated to furnish one-third of the copper raised throughout Europe, including the British Isles. Antimony ores and manganese are found, and some lead occurs, being worked without great result. Iron in lodes, as brown haematite, has been worked near Lost- withiel and elsewhere. In the St Austell district the place of tin and copper mining has been taken by that of the raising and preparation of china clay. Granite is largely quarried in various districts, as at Luxulian (between St Austell and Lostwithiel), and in the neighbourhood of Penryn. This is the material of London and Waterloo Bridges, the Chatham docks, and many other great works. It is for the most part coarse-grained, though differing greatly in different places in this respect. Fine slate is quarried and largely exported, as from the Delabole quarries near Tintagel. These slates were in great repute in the 16th century and earlier. Serpentine is quarried in the Lizard district, and is worked there into small ornamental objects for sale to visitors; it is in favour as a decorative stone. Pitchblende also occurs, and is mined for the extraction of radium.

Fisheries. — The fisheries of Cornwall and Devon are the most important on the south-west coasts. The pilchard is in great measure confined to Cornwall, living habitually in deep water not far west of the Scilly Isles, and visiting the coast in great shoals, — one of which is described as having extended from Mevagissey to the Land's End, a distance, including the windings of the coast, of nearly 100 m. In summer and autumn pilchards are caught by drift nets; later in the year they are taken off the northern coast by seine nets. Forty thousand hogsheads, or 120 million fish, have been taken in the course of a single season, requiring 20,000 tons of salt to cure them. Twelve millions have been taken in a single day; and the sight of this great army of fish passing the Land's End, and pursued by hordes of dog-fish, hake, and cod, besides vast flocks of sea-birds, is most striking. The principal fishing stations are on Mount's Bay and at St Ives, but boats are employed all along the coast. When brought to shore the pilchards are carried to the cellars to be cured. They are then packed in hogsheads, each containing about 2400 fish. These casks are largely exported to Naples and other Italian ports — whence the fisherman's toast, "Long life to the pope, and death to thousands." Besides pilchards, mackerel and herring are taken in great numbers, and conger eels of great size; mullet and John Dory may be mentioned. There is also a trade in " sardines," young pilchards taking the place of the real Mediterranean fish.

Communications. — The principal ports are Falmouth and Penzance,

but that of Hayle is of some importance, and there are large engineering works here. It lies on the estuary of the Hayle river, which opens into St Ives Bay, the township of Phillack adjoining on the north-east. A brisk coasting trade is maintained at many small ports along the coast. Communications are provided chiefly by the Great Western railway, the main line of which passes through the county and terminates at Penzance. Fowey, Penryn and Falmouth, and Helston on the south, and Bodmin and Wadebridge, Newquay and St Ives, are served by branch lines. A light railway runs from Liskeard to Looe. The north-eastern parts of the county (Launceston, Bude, Wadebridge) are served by the London & South- Western railway. Coaches are run in several districts during the summer, and in some parts, as in the neighbourhood of Penzance, and between Helston and the Lizard, the Great Western company provides a motor-car service to places beyond the reach of the railway. Many of the small seaside towns have become favourite holiday resorts, such as Bude, Newquay and St Ives, and the south-coast ports.

Population and Administration. — The area of the ancient county is 868,220 acres, with a population in 1891 of 322,571, and in 1001 of 322,334. In 1861 the population was 369,390, and had shown an increase up to that census. The area of the adminis-

trative county is 886,384 acres. The county contains 9 hundreds. The municipal boroughs are Bodmin (pop. 5353), the county town; Falmouth (11,789), Helston (3088), Launceston (4053), Liskeard (4010), Lostwithiel (1331), Penryn (3190), Penzance (13,136), St Ives (6699), Saltash (3357), Truro (11,562), an episcopal city. The other urban districts are Callington (17 14), Camborne (14,726), Hayle (1084), Looe (2548), Ludgvan (2274), Madron (3486), Newquay (3 n 5), Padstow (1566), Paul (6332), Phillack (3881), Redruth (10,451), St Austell (3340), St Just (5646), Stratton and Bude (2308), Torpoint (4200), Wadebridge (2186). Small market and other towns, beyond those in the above lists, are numerous. Such are Calstock in the east, St Germans in the south-east near Saltash, St Blazey near St Austell, Camelford, St Columb Major, and Perranzabuloe in the north, with the mining towns of Gwennap and Illogan in the Redruth district and Wendron near Helston, all inland towns; while on the south coast may be mentioned Fowey and Meva- gissey, on either side of St Austell Bay, and Marazion on Mount's Bay, close by St Michael's Mount. Cornwall is in the western circuit, and assizes are held at Bodmin. It has one court of quarter sessions, and is divided into 1 7 petty sessional divisions. The boroughs of Bodmin, Falmouth, Helston, Launceston, Liskeard, Penryn, Penzance, St Ives and Truro have separate commissions of the peace, and Penzance has a separate court

of quarter sessions. The Scilly Isles are administered by a separate council, and form one of the petty sessional divisions. There are 239 civil parishes, of which 5 are in the Scilly Isles. Cornwall is in the diocese of Truro, and there are 227 ecclesiastical parishes or districts wholly or in part within the county. The parliamentary divisions are the North-Eastern or Launceston, South-Eastern or Bodmin, Mid or St Austell, Truro, North- Western or Camborne, and Western or St Ives, each returning one member; while the parliamentary borough of Penryn and Falmouth returns one member.

Language. — The old Cornish language survives in a few words still in use in the fishing and mining communities, as well as in the names of persons and places, but the last persons who spoke it died towards the end of the 18th century. It belonged to the Cymric division of Celtic, in which Welsh and Armorican are also included. The most important relics of the language known to exist are three dramas or miracle plays, edited and translated by Edwin Norris, Oxford, 1859. A sketch of Cornish grammar is added, and a Cornish vocabulary from a MS. of the 13th century (Cotton MSS. Vespasian A. 14, p. 70). (See Celt: Language and Literature.) It may be mentioned that the great numbers of saints whose names survive in the topography of the county are largely accounted for by the fact that here, as in Wales, it was the practice to canonize the founder of a church. The natives have many traits in common with the Welsh, such as their love of oratory and their strong tribal attachment to the county.

History. — Cornwall was the last portion of British territory in the south to submit to the Saxon invader. Viewed from its eastern boundary it doubtless appeared less attractive than the rich, well-wooded lands of Wessex, while it unquestionably afforded greater obstacles in the way of conquest. In 815 Ecgbert directed his efforts towards the subjugation of the West- Welsh of Cornwall, and after eight years' fighting compelled the whole of Dyvnaint to acknowledge his supremacy. Assisted by the Danes the Cornish revolted but were again defeated, probably in 836, at the battle of Hengestesdun, Hingston Down in Stoke-Climsland. Ninety years later Aethelstan banished the West- Welsh from Exeter and made the Tamar the boundary of their territory. The thoroughness of the Saxon conquest is evident from the fact that in the days of the Confessor nearly the whole of the land in Cornwall was held by men bearing English names. As the result of the Norman conquest less than one-twelfth of the land (exclusive of that held by the Church) remained in English hands. Six-sevenths of the manors were assigned to Robert, count of Mortain, and became the foundation of the territorial possessions and revenues of the earldom which was held until 1337, usually by special

grant, by the sons or

near relatives of the kings of England. On the death of John of Eltham the last earl, in 1337, Edward the Black Prince was created duke of Cornwall. By the terms of the statute under which the dukedom was created the succession was restricted to the eldest son of the king, but in 16 13, on the death of Prince Henry, an extended interpretation, given by the king's advisers, enabled his brother Charles (afterwards Charles I.) to succeed as son of the king and next heir to the realm of England.

Traces of jurisdictional differentiation anterior to Domesday survive in the names of at least five of the hundreds, although these names do not appear in the Survey itself. The hundreds into which the ccuuty was divided at the time of the Inquisitio Geldi were as follows: — Straton, which embraced the present hundreds of Stratton, Lesnewth and Trigg; Fawiton, approxi- mately conterminous with West; Panton, now included in Pydasr, Tibeste, Wineton, Conarditon and Rileston, very nearly identical with Powder, Kerrier, Penwith and East. The shire court was held at Launceston except from about 1260 to 1386, when it was held at Lostwithiel. In 1716 the summer assize was transferred to Bodmin. Since 1836 both assizes have been held at Bodmin. The jurisdiction of the hundred courts became early attached to various manors, and their bailiwicks and bedellaries descended with the real estate of their owners. There is much obscurity concerning theearly ecclesiastical organization. It is certain, however, that Cornwall had its own bishops from the middle of the 9th century until the year 1018, when the see was removed to Crediton. During the interval the see had been placed sometimes at Bodmin and sometimes at St Germans. In 1049 the see of the united dioceses of Devon and Cornwall was fixed at Exeter. Cornwall was formed into an archdeaconry soon after, and, as such, continued until 1876, when it was re- constituted a diocese with its see at Truro. The parishes of St Giles-on-the-Heath, North Petherwin and Werrington, wholly in Devon, and Boyton, partly in Devon and partly in Cornwall, which were portions of the ancient archdeaconry, and also the parishes of Broadwoodwidger and Virginstowe, both in Devon, which had been added to it in 1875, thus came to be included in the Truro diocese. The present archdeaconries of Bodmin embracing the eastern, and of Cornwall embracing the western portion of the newly constituted diocese were formed, by order in council, in 1878. Aethelstan's

enactment had doubtless roughly determined the civil boundary of the Celtic-speaking county. In 1386 disputes having arisen, a commission was appointed to determine the Cornish border between North Tamerton and Hornacot.

For the first four centuries after the Norman conquest the part played by Cornwall in England's political history was com- paratively unimportant. In her final attempt in 1471 to restore the fortunes of the house of Lancaster, Queen Margaret received the active support of the Cornish, who, under Sir Hugh Courtenay and Sir John Arundell, accompanied her to the fatal field of Tewkesbury, and in 1473 John de Vere, earl of Oxford, held St Michael's Mount in her behalf until the following February, when he surrendered to John Fortescue. A rising of considerable magnitude in 1497 a t the instigation of Thomas Flamank, occasioned by the levy of a tax for the Scottish war, was only repelled after the arrival of the insurgents at Blackheath in Kent. Perkin Warbeck, who landed at Whitsand Bay in the parish of Sennen, obtained general support in the same year. The im- position of the Book of Common Prayer and the abrogation of various religious ceremonies led to a rebellion in 1549 under Sir Humphry Arundell of Lanherne, the rebels, who knew little English, demanding the restoration of the Latin service, but a fatal delay under the walls of Exeter led to their early defeat and the execution of their leaders. During the Civil War of the 17th century Cornwall won much glory in the royal cause. In 1643 Sir Ralph Hopton, who commanded the king's Cornish troops, defeated General Ruthen on Bradoc Down, while General Chudleigh, another parliamentary general, was repulsed near Launceston, and the earl of Stamford at Stratton. The whole county was thereby secured to the king. Led by Sir Beville Grenville of Stow the Cornish troops now marched into Somerset-

shire, where in the indecisive battle of Lansdowne they greatly distinguished themselves, but lost their brave leader. In July 1644 the earl of Essex marched intc- Cornwall and was followed soon afterwards by the king's troops in pursuit. Numerous engagements were fought, in which the latter were uniformly successful. The troops of Essex were surrounded and their leader escaped in a boat from Fowey to Plymouth. In 1646, owing to dissensions amongst the king's officers, and in particular to the refusal of Sir Richard Grenville to serve under Lord Hopton, and to the defection of Colonel Edgcumbe, the royal cause declined and became desperate. On the 16th of August 1646 articles of capitulation were signed by the defenders of Pendennis Castle.

Two members for the county were summoned by Edward I. to the

parliament of 1295, an d two continued to be the number of county members until 1832. Six boroughs — Launceston, Liskeard, Lostwithiel, Bodmin, Truro and Helston — were granted the like privilege by the same sovereign. To strengthen and augment the power of the crown as against the House of Commons, between 1547 and 1584, fifteen additional towns and villages received the franchise, with the result that, between the latter date and 1821, Cornwall sent no less than forty-four members to parliament. In 182 1 Grampound lost both its members, and by the Reform Act in 1832 fourteen other Cornish boroughs shared the same fate. Cornwall was, in fact, notorious for the number of its rotten boroughs. In the vicinity of Liskeard ” within an area, which since 1885 … is represented by only one member, there were until 1832 nine parliamentary boroughs returning eighteen members. In this area, on the eve of the Reform Act, there was a population of only 14,224 ” (Porrit, Unreformed House of Commons, vol. i. p. 92) . Bossiney, a village near Camelford, Camelford itself, Lostwithiel, East Looe, West Looe, Fowey and several others were disfranchised in 1832, but even until the act of 1885 Bodmin, Helston, Launceston, Liskeard and St Ives were separately represented, whereas Penzance was not. Until this act was passed Truro, and Penryn with Falmouth, returned two members each.

Antiquities. — No part of England is so rich as Cornwall in prehistoric antiquities. These chiefly abound in the district between Penzance and the Land’s End, but they occur in all the wilder parts of the county. They may be classed as follows. (1) Cromlechs. These in the west of Cornwall are called ” quoits,” with reference to their broad and flat covering stones. The largest and most important are those known as Lanyon, Mulfra, Chun and Zennor quoits, all in the Land’s End district. Of these Chun is the only one which has not been thrown down. Zennor is said to be the largest in Europe, while Lanyon, when perfect, was of sufficient height for a man on horseback to ride under. Of those in the eastern part of Cornwall, Trevethy near Liskeard and Pawton in the parish of St Breock are the finest. (2) Rude uninscribed monoliths are common to all parts of Cornwall. Those at Boleigh or Boleit, in the parish of St Buryan, S.W. of Penzance, called the Pipers, are the most important. (3) Circles, none of which is of great dimensions. The principal are the Hurlers, near Liskeard; the Boskednan, Boscawen-un, and Tregeseal circles; and that called the Dawns-un, or Merry Maidens, at Boleigh. All of these, except the Hurlers, are in the Land’s End district. Other circles that may be mentioned are the Trippet Stones, in the parish of Blisland, near Bodmin, and one at Duloe, near Liskeard. (4) Long alignments or avenues of stones, resembling those on Dartmoor, but not so perfect, are to be found on the moors near

Rough Tor and Brown Willy. A very remarkable monument of this kind exists in the neighbourhood of St Columb Major, called the Nine Maidens. It consists of nine rude pillars placed in a line, but now imperfect, while near them is a single stone known as the Old Man. (5) Hut dwellings. Of these there are at least two kinds, those in the eastern part of the county resembling the beehive structures and enclosures of Dartmoor, and those in the west comprising ” hut-clusters,” having a central court, and a surrounding wall sometimes of considerable height and thickness. The beehive masonry is also found in connexion with these, as are also (6) Caves, or

subterraneous structures, resembling those of Scotland and Ireland. (7) Cliff castles are a characteristic feature of the Cornish coast, especially in the west, such as Treryn, Men, Kenedjack, Bosigran and others. These are all fortified on the landward side. At Treryn Castle is the Logan Stone, a mass of granite so balanced as to rock upon its support. (8) Hill castles, or camps, are very numerous. Castelan-Dinas, near St Columb, is the best example of the earthwork camp, and Chun Castle, near Penzance, of the stone.

Early Christian remains in Cornwall include crosses, which occur all over the country and are of various dates from the 6th century onward; inscribed sepulchral stones, generally of the 7th and 8th centuries; and oratories. These last have their parallels in Ireland, which is natural, since from that country and Wales Cornwall was christianized. The buildings (also called baptisteries) are very small and rude, a simple parallelogram in form, always placed near a spring. The best example is St Piran’s near Perranzabuloe, which long lay buried in sand dunes. St Piran was one of the missionaries sent from Ireland by St Patrick in the 5th century, and became the patron saint of the tin-miners.

The individuality of Cornwall is reflected in its ecclesiastical architecture. The churches are generally massive, plain struc- tures of granite, built as it were to resist the storms which sweep up from the sea, low in the body, but with high unadorned towers. Within, a common feature is the absence of a chancel arch. In a few cases, of which Gwennap church is an illustration, where the body of the church lies low in a valley, there is a detached campanile at a higher level. The prevalent style is Perpendicular, much rebuilding having taken place in this period, but there are fine examples of the earlier

styles. The west front and part of the towers of the church of St Germanus of Auxerre at St Germans form the best survival of Norman work in the county; there are good Norman doorways at Manaccan and Kilkhampton churches, and the church of Morwenstow, near the coast north of Bude, is a remarkable illustration of the same style. This church has the further interest of having had as its rector the Cornish poet Robert Stephen Hawker (1803-1875). The Early English style is not commonly seen, but the small church of St Anthony in Roseland, near the east shore of Falmouth harbour (with an ornate Norman door), and portions of the churches of Camelford and Manaccan, are instances of this period. Decoratad work is similarly scanty, but the churches of Sheviock, in the south-east, and St Columb Major have much that is good, and that of St Bartholomew, Lostwithiel, has a beautiful and rich lantern and spire in this style surmounting an Early English tower, while the body of the church is also largely Decorated. Perpendicular churches are so numerous that it is only needful to mention those possessing some peculiar characteristic. Thus, the high ornamentation of Launceston and St Austell churches is unusual in Cornwall, as is the rich and graceful tower of Probus church. St Neot's church, near Liskeard, has magnificent stained glass of the 15th and 16th centuries.

The ruined castles of Launceston, Trematon near Saltash, Restormel near Lostwithiel, and Tintagel, date, at least in part, from Norman times. St Michael's Mount was at once a fortress and an ecclesiastical foundation. Pendennis Castle, Falmouth, is of the time of Henry VIII. The mansions of Cornwall are generally remarkable rather for their position than for archi- tectural interest, but Trelawne, partly of the 15th century, near Looe, and Place House, a Tudor building, at Fowey, may be noted.

Authorities. — See Richard Carew, Survey of Cornwall (London, 1602) ; W. Borlase, Antiquities of Cornwall (Oxford, 1754 and 1769) ; D. Gilbert, Parochial History of Cornwall (London, 1837-1838), incorporating collections of W. Hals and Tonkin; J. T. Blfght, Ancient Crosses in the East of Cornwall (London, 1858), and Churches of West Cornwall (London, 1865) ; G. C. Boase and W. P. Courtney, Bibliotheca Cornubiensis, a catalogue of the writings, both MS. and printed, of Cornishmen, and of works relating to Cornwall (Truro and London, 1864-1881); R. Hunt, Popular Romances and Drolls of the West of England (London, 1865); W. Bottrell, Traditions and Hearthside Stories of West Cornwall (Penzance, 1870-1873); J. H. Collins, .Handbook to the Mineralogy of Cornwall and Devon (Truro,

1871); W. C. Borlase, Naenia Cornubiae (1872); Early Christianity in

Cornwall (London, 1893) ; J. Bannister, Glossary of Cornish Names (London, 1878); W. P. Courtney, Parliamentary Representation of Cornwall to 1832 (London, 1889) ; G. C. Boase, Collectanea Cornubiensia (Truro, 1890); J. R. Allen, Old Cornish Crosses (Truro, 1896); A. H. Norway, Highways and Byways in Cornwall (1904); Lewis Hind, Days in Cornwall (1907) ; Victoria County History, Cornwall.

CORNWALLIS, CHARLES CORNWALLIS, 1st Marquess (1738-1805), eldest son of Cnarles, 1st earl of Cornwallis (1700- 1762), was born on the 31st of December 1738. Having been educated. at Eton and Clare College, Cambridge, he entered the army. For some time he was member of parliament for Eye; in 1 761 he served a campaign in Germany, and was gazetted to a lieutenant-colonelcy in the 12th Foot. In 1762 he succeeded to the earldom and estates of his father; in 1765 he was made aide- de-camp to the king and gentleman of the bedchamber; in 1766 he obtained a colonelcy in the 33rd Foot; and in 1770 he was appointed governor of the Tower. In public life he was dis- tinguished by independence of character and inflexible integrity; he voted without regard to party, and opposed the ministerial action against Wilkes and in the case of the American colonies. But when the American War of Independence broke out, he accompanied his regiment across the Atlantic, and served not without success as major-general. In 1780 he was appointed to command the British forces in South Carolina, and in the same year he routed Gates at Camden. In 178 1 he defeated Greene at Guilford Court House, and made a destructive raid into Virginia; but he was besieged at Yorktown by French and American armies and a French fleet, and was forced to capitulate on the 19th of October 1781. With him fell the English cause in the United States. He not only escaped censure, however, but in 1786 received a vacant Garter, and was appointed governor-general of India and commander-in-chief in Bengal. As an administrator he projected many reforms, but he was interrupted in his work by the quarrel with Tippoo Sahib. In 1 791 he assumed in person the conduct of the war and captured Bangalore; and in 1792 he laid siege to Seringapatam, and concluded a treaty with Tippoo Sahib, which stripped the latter of half his realm, and placed his two sons as hostages in the hands of the English. For the permanent settlement of the land revenue under his administra- tion, see Bengal. He returned to England in 1793, received a marquessate and a seat in the privy council, and was made master-general of the ordnance with a place in the Cabinet. In June 1 798 he was appointed to the viceroyalty of Ireland, and the zeal with which he strove to pacify the country gained him the respect and good-will of both Roman Catholics and Orangemen. On the 17 th of July a general amnesty was proclaimed,

and a few weeks afterwards the French army under Humbert was surrounded and forced to surrender. In 1801 Cornwallis was replaced by Lord Hardwicke, and soon after he was appointed plenipotentiary to negotiate the treaty of Amiens (1802). In 1805 he was again sent to India as governor-general, to replace Lord Wellesley, whose policy was too advanced for the directors of the East India Company. He was in ill-health when he arrived at Calcutta, and while hastening up the country to assume command of the troops, he died at Ghazipur, in the district of Benares, on the 5th of October 1805. He was succeeded as 2nd marquess by his only son, Charles (1774-1823). On his death the marquessate became extinct, but the title of Earl Cornwallis passed to his uncle, James (1 743-1824), who was bishop of Lichfield from 1781 until his death. His son and successor, James, the 5th earl, whose son predeceased him in 1835, died in May 1852, when the Cornwallis titles became extinct.

See W. S. Seton-Karr, The Marquess Cornwallis, ” Rulers of India ” series (1890).

CORNWALLIS, SIR WILLIAM (1744-1819), British admiral, was the brother of the 1st Marquess Cornwallis, governor-general of India. He was born on the 20th of February 1 744, and entered the navy in 1755. His promotion was naturally rapid, and in 1766 he had reached post-rank. Until 1779 he held various commands doing the regular work of the navy in convoy. In that year he commanded the ” Lion ” (64) in the fleet of Admiral Byron. The “Lion” was very roughly handled in the battle

off Grenada on the 6th of July 1779, and had to make her way- alone to Jamaica. In March 1 780 he fought an action in company with two other vessels against a much superior French force off Monti Cristi, and had another encounter with them near Bermuda in June. The force he engaged was the fleet carrying the troops of Rochambeau to North America, and was too strong for his squadron of two small liners, two fifty-gun ships and a frigate. After taking part in the second relief of Gibraltar, he returned to North America, and served with Hood in the actions at the Basse Terre of St Kitts, and with Rodney in the battle of Dominica on the 12th of April 1782. Some very rough verses which he wrote on the action have been printed in Leyland’s ” Brest-Papers,” published for the Navy Record Society, which show that he thought very ill of Rodney’s conduct of the battle. In 1788 he went

to the East Indies as commodore, where he remained till

1794. He had some share in the war with Tippoo Sahib, and helped to reduce Pondicherry. His promotion to rear-admiral dates from the 1st of February 1793, and on the 4th of July 1 794 he became vice-admiral.

In the Revolutionary War his services were in the Channel. The most signal of them was performed on the 16th of June

1795, when he carried out what was always spoken of with respect as ” the retreat of Cornwallis.” He was cruising near Brest with four sail of the line and two frigates, when he was sighted by a French fleet of twelve sail of the line, and many large frigates commanded by Villarst Joyeuse. The odds being very great he was compelled to make off. But two of his ships were heavy sailers and fell behind. He was consequently overtaken, and attacked on both sides. The rearmost ship, the ” Mars ” (74), suffered severely in her rigging and was in danger of being surrounded by the French. Cornwallis turned to support her, and the enemy, impressed by a conviction that he must be relying on help within easy reach, gave up the pursuit. The action affords a remarkable proof of the moral superiority which the victory of the 1st of June, and the known efficiency of tfie crews, had given to the British navy. The reputation of Corn- wallis was immensely raised, and the praise given him was no doubt the greater because he was personally very popular with officers and men. In 1796 he incurred a court-martial in conse- quence of a misunderstanding and apparently some temper on both sides, on the charge of refusing to obey an order from the Admiralty. He was practically acquitted. The substance of the case was that he demurred on the ground of health at being called upon to go to the West Indies, in a small frigate, and without ” comfort.” He became full admiral in 1799, and held the Channel command for a short interval in 1801 and from 1803 to 1806, but saw no further service. He was made a G.C.B. in 181 s, and died on the 5th of July 1819. His various nicknames among the sailors, ” Billy go tight,” given on account of his rubicund complexion, ” Billy Blue,” ” Coachee,” and ” Mr Whip,” seem to show that he was regarded with more of affection than reverence.

See also Ralfe, Nav. Biog. i. 387 ; Naval Chronicle, vii. I ; Char- nock, Biogr. Nav. vi. 523.

CORO, a small city and the capital of the state of Falcon, Venezuela, 7 m. W. of La Vela de Coro (its port on the Caribbean coast), with which it is connected by rail, and 199 m. W.N.W. of Caracas. Pop. (1904,

estimate) 9500. Coro stands on a sandy plain between the Caribbean and the Gulf of Venezuela, and near the isthmus connecting the peninsula of Paraguana, with the mainland. Its elevation above sea-level is only 105 ft., and its climate is hot but not unhealthy. The city is badly built, its streets are unpaved, and it has no public buildings of note except two old churches. Its water-supply is derived from springs some distance away. Coro is the commercial centre for an extensive district on the E. side of Lake Maracaibo and the Gulf of Venezuela, which exports large quantities of goat-skins, an excellent quality of tobacco, and some coffee, cacao, castor beans, timber and dyewoods. It was founded in 1527 by Juan de Ampues, who gave to it the name of Santa Ana de Coriana (afterwards corrupted to Santa Ana de Coro) in honour of the day and of the tribe of Indians inhabiting this locality It was

also called Venezuela (little Venice) because of an Indian village on the gulf coast built on piles over the shallow water; this name was afterwards bestowed upon the province of which Coro was the capital. Coro was also made the chief factory of the Welsers, the German banking house to which Charles V. mortgaged this part of his colonial possessions, and it was the starting-point for many exploring and colonizing expeditions into the interior. It was made a bishopric in 1536, and for a time Coro was one of the three most important towns on the northern coast. The seat of government was removed to Caracas in 1578 and the bishopric five years later. Coro is celebrated in Venezuelan history as the scene of Miranda's first attempt to free his country from Spanish rule. It suffered greatly in the war which followed.

COROMANDEL COAST, a name formerly applied officially to the eastern seaboard of India approximately between Cape Calimere, in 10° 17′ N., 79° 56′ E., and the mouths of the Kistna river. The shore, which is low, is without a single good natural harbour, and is at all times beaten by a heavy sea. Communica- tion with ships can be effected only by catamarans and flat- bottomed surf-boats. The north-east monsoon, which lasts from October till April, is exceedingly violent for three months after its commencement. From April till October hot southerly winds blow by day ; at night the heat is tempered by sea- breezes. The principal places frequented by shipping are Pulicat, Madras, Sadras, Pondicherry, Cuddalore, Tranquebar, Nagore, and Negapatam. The name Coromandel is said to be derived from Cholamandal, the mandal or region of the ancient dynasty of the Chola. Its official use has lapsed.

CORONA (Lat. for " crown "), in astronomy, the exterior envelope of

the sun, being beyond the photosphere and chromo- sphere, invisible in the telescope and unrecognized by the spectroscope, except during a total eclipse (see Sun; Eclipse).

Corona Borealis, also known as the Corona septentrionalis, and the Northern Crown or Garland, is a constellation of the Northern hemisphere, mentioned by Eudoxus (4th cent. B.C.) and Aratus (3rd cent. B.C.). In the catalogues of Ptolemy, Tycho Brahe, and Hevelius, eight stars are mentioned; but recent uranographic surveys have greatly increased this number. The mftst interesting members are: a Coronae, a binary consisting of a yellow star of the 6th magnitude, and a bluish star of the 7 th magnitude ; R Coronae, an irregular variable star ; and T Coronae or Nova Coronae, a temporary or new star, first observed in 1866. Corona Australis, also known as Corona meridionalis, or the Southern Crown, is a constellation of the Southern hemisphere, mentioned by Eudoxus and Aratus. In Ptolemy's catalogue thirteen stars are described.

In physical science, coronae (or " glories ") are the coloured rings frequently seen closely encircling the sun or moon. Formerly classified by the ancient Greeks with halos, rainbows, &c, under the general group of " meteors," they came to receive considerable attention at the hands of Descartes, Christiaan Huygens, and Sir Isaac Newton ; but the correct explanation of coronae was reserved until the beginning of the 19th century, when Thomas Young applied the theories of the diffraction and interference of light to this phenomenon. Prior to Young, halos and coronae had not been clearly differentiated ; they were both regarded as caused by the refraction of light by atmospheric moisture and ice, although observation had shown that important distinctions existed between these phenomena. Thus, while halos have certain definite radii, viz. 22 and 46 , the radii of coronae vary very considerably ; also, halos are coloured red on the inside, whereas coronae are coloured red on the outside (see Halo).

It has now been firmly established, both experimentally and mathematically, that coronae are due to diffraction by the minute particles of moisture and dust suspended in the atmo- sphere, and the radii of the rings depend on the size of the diffracting particles. (See Diffraction of Light.)

Other meteorological phenomena caused by the diffraction of light include the anthelia, and the chromatic rings seen encircling shadows thrown on a bank of clouds, mist or fog. These appear-

ances differ from halos and coronae inasmuch as their centres are at the anti-solar point; they thus resemble the rainbow. The anthelia (from the Greek avri, opposite, and tjXios, the sun) are coloured red on the inside, the outside being generally colour- less owing to the continued overlapping of many spectra. The diameter increases with the size of the globules making up the mist. The chromatic rings seen encircling the ” spectre of the Brocken ” are similarly explained.

The blue colour of the sky (q.v.), supernumerary rainbows, and the gorgeous sunsets observed after intense volcanic disturbances, when the atmosphere is charged with large quantities of extremely minute dust particles (e.g. Krakatoa), are also explicable by the diffraction of light. (See Dust.)

See E. Mascart, Traite d’ optique (1899-1903); J. Pernter, Meteorologische Optik (1902-1905).

In architecture, the term ” corona ” is used of that part of a cornice which projects over the bed mould and constitutes the chief protection to the wall from rain; it is always throated, and its soffit rises towards the wall. The term is also given to the apse or semicircular termination of the choir; as at Canterbury in the part called ” Becket’s crown.” The large circular chandelier suspended in churches, of which the finest example is that given by Barbarossa to Aix-la-Chapelle, is often called a corona. The term is also used in botany of the crown-like appendage at the top of compound flowers, the diminutive being coronule.

CORONACH (a Gaelic word, from comh, with, and ranach, wailing), the lamentation or dirge for the dead which accom- panied funerals in the Highlands of Scotland and in Ireland. The more usual term in Ireland is ” keen ” or ” keening.”

C0RONAD0, FRANCISCO VASQUEZ DE (c. 1500-e. 1545), Spanish explorer of the south-western part of the United States of America. He accompanied Antonio de Mendoza to New Spain in 1535; by a brilliant marriage, became a leading grandee, and in 1539 was appointed governor of the province of New Galicia. The report presented by Fray Marcos de Niza concerning the ” Seven cities of Cibola ” (now identified almost certainly with the Zuni pueblos of New Mexico) aroused great interest in Mexico; Melchior Diaz was sent late in 1539 to retrace Fray Marcos ‘s route and report on his story; and an expedition under Coronado left Compostela for the ” Seven

Cities ” in February 1 540. This expedition consisted of a provision train and droves of live-stock; several hundred friendly Indians, Spanish footmen, and more than 250 horsemen. Coronado, with a part of this force, captured the ” Seven Cities.” The fabled wealth, however, was not there. In the autumn (1 540) Coronado was joined by the rest of his army. Meanwhile exploring parties were sent out: Tusayan, the Hopi or Moki (Moqui) country of north-eastern Arizona, was visited; Garcia Lopez de Cardenas discovered and described the Grand Canyon of the Colorado; and expeditions were sent along the Rio Grande (Tuguez), where the army wintered. The Indians revolted but were put down. The army, reinspirited by the tales of a plains-Indian slave 1 about vast herds of cows (bison) on the plains, and about an Eldorado called ” Quivira ” far to the N.E., started thither in April 1541, and, with a few horsemen, penetrated at least to what is now central Kansas. Here Coronado found a few permanent settlements of Indians; in October he was again on the Rio Grande; and in the spring of 1542 he led his followers home. Thereafter he practi- cally disappears from history. The first description of the bison and the prairie plains, the first trustworthy account of the Zuni pueblos, the discovery of the Grand Canyon, a vast increase of the nominal dominion of Spain and Christianity (the priests did not return from Cibola), and a notable addition to geographical knowledge, which, however, was long forgotten, were the results of this expedition; which is, besides, for its duration and the vast. distance covered, over mountains, desert and plains, one of the most remarkable expeditions in the history of American dis- covery. In connexion with it, in 1540, Hernando de Alarcon ascended the Gulf of California to its head and the Colorado river for a long distance above its mouth.

1 He was later killed for deception, and confessed that the Pecos Indians induced him to lure Coronado to destruction.

All the essential sources with a critical narrative are available in G. P. Winship’s The Coronado Expedition (in the 14th Report of the United States Bureau of Ethnology, for 1892-1893, Washington. 1896), except the Tratado del descubrimiento de las Yndias y sti conquesta of Juan Suarez de Peralta (written in the last third of the 1 6th century, republished at Madrid, 1878). See also especialh Justo Zaragoza, Noticias historicas de la Nueva Espana (Madrid, 1878), the various writings of A. F. A. Bandelier (q.v.) ; General J. H. Simpson in Smithsonian Institution Report (Washington, 1869), with an excellent map; and Winship for a full bibliography. H. H. Bancroft’s account in his Pacific States (vols. 5, 10, 12) i« less authoritative.

CORONATION (Lat. corona, crown), a solemnity whereby sovereigns are inaugurated in office. In pre-Christian times in Europe the king or ruler, upon his election, was raised on a shield, and, standing upon it, was borne on the shoulders of certain of the chief men of the tribe, or nation, round the assembled people. This was called the gyratio, and it was usually performed three times. At its conclusion a spear was placed in the king's hand, and the diadem, a richly wrought band of silk or linen, which must not be confused with the crown (see Crown and Coronet), was bound round his forehead, as a token of regal authority. When Europe became Christian, a religious service of benediction was added to the older form, which, however, was not abandoned. Derived from the Teutons, the Franks continued the gyratio, and Clovis, Sigebert, Pippin and others were thus elevated to the royal estate. From a combination of the old custom with the religious service, the later coronation ceremonies were gradually developed. In the ceremonial procession of the English king from the Tower to Westminster (first abandoned at the coronation of James II.), in the subsequent elevation of the king into what was known as the marble chair in Westminster Hall, and in the showing of the king of France to the people, as also in the universal practice of delivering a sceptre to the new ruler, traces, it is thought, may be detected of the influence of the original function.

The added religious service was naturally derived from the Bible, where mention is frequently made, in the Old Testa- ment, of the anointing and crowning of kings. The anointing of the king soon came to be regarded as the most important, if not essential, feature of the service. By virtue of the unction which he received, the sovereign was regarded, in the middle ages, as a mixta persona, in part a priest, and in part a layman. It was a strange theory, "and Lyndwode, the great English canonist, is cautious as to it, and was content to say that it was the opinion of some people. It gained very wide acceptance, and the anointed sovereign was generally regarded as, in some degree, possessed of the priestly character. By virtue of the unction he had received, the emperor was made a canon of St John Lateran and of St Peter at Rome, and also of the collegiate church of Aachen, while the king of France was premier chanoine of the primatial church of Lyons, and held canonries at Embrun, Le Mans, Montpellier, St Pol-de-Leon, Lodeve, and other cathedral churches in France. There are, moreover, trustworthy records that, on more than one occasion, a king of France, habited in a surplice and choir robes, .took part with the clergy in the services of some of those churches. Martene quotes an order, which directs that at the imperial coronation at Rome, the pope ought to sing the mass, the emperor read the gospel, and the king of Sicily, or if

present the king of France, the epistle. Nothing like this was known in England, and a theory, which has prevailed of late, that the English sovereign is, in a personal sense, canon of St David's, is based on a misconception. The canonry in question was attached to St Mary's College at St David's before the Reformation, and, at the dissolution of the college, became crown property, which it has remained ever since; but the king of England is not, and never was personally, a canon of St David's, nor did he ever perform any quasi-clerical function.

At first a single anointing on the head was the practice, but afterwards other parts of the body, as the breast, arms, shoulders and hands received the unction. From a very early period in the West three kinds of oil have been blessed each year on Maundy Thursday, the oil of the catechumens, the oil of the sick, and the chrism. The last, a compound of olive oil and

balsam, is only used for the most sacred purposes, and the oil of the catechumens was that used for the unction of kings. In France, however, a legend gained credence that, as a special sign of divine favour, the Holy Dove had miraculously descended from heaven, bearing a vessel (afterwards called the Sainte Ampoule), containing holy oil, and had placed it on the altar for the coronation of Clovis. A drop of oil from the Sainte Ampoule mixed with chrism was afterwards used for anointing the kings of France. Similarly the chrism was introduced into English coronations, for the first time probably at the coronation of Edward II. To rival the French story another miracle was related that the Virgin Mary had appeared to Thomas Becket, and had given him a vessel with holy oil, which at some future period was to be used for the sacring of the English king. A full account of this miracle, and the subsequent finding of the vessel, is contained in a letter written in 1318 by Pope John XXII. to Edward II. The chrism was used in addition to the holy oil. The king was first anointed with the oil, and then signed on the head with the chrism. In all other countries the oil of the catechumens was alone used. In consequence of the use of chrism the kings of England and France were thought to be able to cure scrofula by the imposition of their hands, and hence arose the practice in those countries of touching for the king's evil, as it was called. In England the chrism disappeared at the Reformation, but touching for the evil was continued till the accession of the house of Hanover in 1714.

The oldest of all existing rituals for the coronation of a king is contained in what is known as the Pontifical of Egbert, who was archbishop of York in the middle of the 8th century. The coronation service in it is entitled Missa pro rege in die bene- dictionis ejus, and the coronation ceremony is interpolated in the middle of the mass. After the Gospel the officiant recites some prayers of benediction, and then pours oil from a horn on the king's head, while the anthem " Zadok the priest," &c, is sung. After this the assembled bishops and nobles place a sceptre in the king's hands, while a form of intercessory bene- diction is recited. Then the staff (baculus) is delivered to him, and finally a helmet (galea) is set upon his head, the whole assembly repeating thrice " May King N. live for ever. Amen. Amen. Amen." The enthronement follows, with the kisses of homage and of fealty, and the mass, with special prayers, is concluded. ' '. ■

Another coronation service of Anglo-Saxon~'date bearing, but with no good reason, the name of ˆEthelred II., has also been preserved, and is of importance as it spread from England to the continent, and was used for the coronations of the kings of France. It differs from the Egbert form as the coronation precedes the mass, while the use of a ring, and the definite allusion to a crown (corona not galea) occur in it. Joined to it is the form for the coronation of a queen consort. It may have been used for the crowning of Harold and of William the Conqueror.

A third English coronation form, of the 12th century, bears the name of Henry I., but also without good reason. The ceremonial is more fully developed, and the king is anointed on the head, breast, shoulders and elbows. The royal mantle appears for the first time, as does the sceptre. The queen consort is to be crowned secundum ordinem Romanum, and the whole function precedes the mass.

The fourth and most important of all English coronation services is that of the Liber Regalis, a manuscript still in the keeping of the dean of Westminster. It was introduced in 1307, and continued in use till the Reformation, and, in an English translation and with the Communion service substituted for the Latin mass, it was used for the coronation of James I. In it the English coronation ceremonies reached their fullest develop- ment. The following is a bare outline of its main features: —

The ceremonies began the day before the coronation, the king being ceremonially conducted in a procession from the Tower of London to Westminster. There he reposed for the night, and was instructed by the abbot as to the solemn obligations of the kingly office. Early next

morning he went to Westminster

Hall-, and there, among other ceremonies, as rex regnaturus was elevated into a richly adorned seat on the king's bench, called the Marble Chair. Then a procession with the regalia was marshalled, and led into the abbey church, the king wearing a cap of estate on his head, and supported by the bishops of Bath and Durham. A platform with thrones, &c, having been previously prepared under the crossing, the king ascended it, and all being in order, the archbishop of Canterbury called for the Recognition, after which the king, approaching the high altar, offered a pall to cover it, and a pound of gold. Then a sermon appropriate to the occasion was preached by one of the bishops, the oath was administered by the archbishop, and the Veni Creator and a litany were sung. Then the king was anointed with oil on his hands, breast, between the shoulders, on the shoulders, on the elbows, and on the head; finally he was anointed with the chrism on his head. Thus blessed and anointed, the king was vested, first with a silk dalmatic, called the colobium sindonis, then a long tunic, reaching to the ankles and woven with great golden images before and behind, was put upon him. He then received the buskins (caligae), the sandals (sandalia), and spurs (calcaria), then the sword and its girdle; after this the stole, and finally the royal mantle, four-square in shape and woven throughout with golden eagles. Thus vested, the crown of St Edward was set on his head, the ring placed on his wedding finger, the gloves drawn over his hands, and the golden sceptre, in form of an orb and cross, delivered to him. Lastly, the golden rod with the dove at the top was placed in the king's left hand. Thus consecrated, vested and crowned, the king kissed the bishops who, assisted by the nobles, enthroned him, while the Te Deum was sung. When a queen consort was also crowned, that ceremony immediately followed, and the mass with special collect, epistle, gospel and preface was said, and during it both king and queen received the sacrament in one kind. At the conclusion the king retired to a convenient place, surrounded with curtains, where the great chamberlain took off certain of the robes, and substituted others for them, and the archbishop, still wearing his mass vestments, set other crowns on the heads of the king and queen, and with these they left the church.

This service, in English, was used at the coronation of James I., Elizabeth having been crowned with the Latin service. Little change was made till 1685, when it was considerably altered for the coronation of James II. The Communion was necessarily omitted in the case of a Roman Catholic, but other changes were introduced quite needlessly by Archbishop Sancrof t, and four years later the 'old order was still more seriously changed, with the result that the

revisions of 1685 and 1689 have grievously mutilated the service, by confusing the order of its different sections, while the meaning of the prayers has been completely changed for no apparent reason. Alterations since then have been verbal rather than essential, but at each subsequent coronation some feature has disappeared, the proper preface having been abandoned at the coronation of Edward VII.

In connexion with the English coronation a number of claims to do certain services have sprung up, and before each coronation a court of claims in constituted, which investigates and adjudi- cates on the claims that are made. The most striking of all these services is that of the challenge made by the king's champion, an office which has been hereditary in the Dymoke family for many centuries. Immediately following the service in the church a banquet was held in Westminster Hall, during the first course of which the champion entered the hall on horseback, armed cap-a- pie, with red, white and blue feathers in his helmet. He was supported by the high constable on his right, and the earl marshal on his left, both of whom were also mounted. On his appearance in the hall a herald in front of him read the challenge, the words of which have not materially varied at any period, as follows: " If any person, of what degree soever, high or low, shall deny or gainsay our sovereign lord . . ., king of the United Kingdom of Great Britain and Ireland, defender of the faith (son and), next heir unto our sovereign lord the last king deceased, to be the right heir to the imperial crown of this realm of Great Britain and Ireland, or that he ought not to enjoy the same; here is his

champion, who saith that he lieth, and is a false traitor, being ready in person to combat with him; and in this quarrel will adventure his life against him, on what day soever he shall be appointed." The champion then threw down the gauntlet. The challenge was again made in the centre of the hall, and a third time before the high table, at which the king was seated. The king then drank to the champion out of a silver-gilt cup, with a cover, which he handed to him as his fee. The banquet was last held, and the challenge made, at the coronation of George IV. in 1821. The champion's claim was admitted in 1902, but as there was no banquet the duty of bearing the standard of England was assigned to him. There is no record of the challenge having been ever accepted.

The revival of the western empire under Charlemagne was marked by

his coronation by the pope at Rome in the year 800. His successors, for several centuries, went to Rome, where they received the imperial crown in St Peter's from the pope, the crown of Lombardy being conferred in the church of St Ambrose (Sant' Ambrogio) at Milan, that of Burgundy at Aries, and the German crown, which came to be the most important of all, most commonly at Aix-la-Chapelle. It must suffice to speak of the coronations at Rome and Aix-la-Chapelle. From Martene we learn the early form of the ceremony at Rome. The emperor was met at the silver door of St Peter's, where the first coronation prayer was recited over him by the bishop of Albano. He was then conducted within the church, where in medio rotae majoris, the bishop of Porto said the second prayer. Thence the emperor went to the confessio of St Peter, where the litany was said, and there, or before the altar of St Maurice, the bishop of Ostia anointed him on the right arm and between the shoulders. Then he ascended to the high altar, where the pope delivered the naked sword to him. This he flourished, and then sheathed in its scabbard. The pope then delivered the sceptre to the emperor, and placed the crown on his head. The ceremony was concluded by the coronation mass said by the pope. The custom of the emperors going to Rome to be crowned was last observed by Frederick III. in 1440, and after that the German coronation was alone cele- brated. The form followed was mainly thus: the electors first met at Frankfort, under the presidency of the elector-archbishop of Mainz, and, the election having been made, the emperor was led to the high altar of the cathedral and seated at it. He was then conducted to a gallery over the entrance to the choir, where, seating himself with the electors, proclamation was made of the election, and on a subsequent day the coronation took place. If the coronation was performed, as it most commonly was, at Aix-la-Chapelle, then the archbishop of Cologne, as diocesan, was the chief officiant, and the emperor was presented to him by the two other clerical electors, the archbishops of Mainz and Trier. The emperor was anointed on the head, the nape of the neck, the breast, the right arm between the wrist and the elbow, and on the palms of both hands. After this, he was vested in what were called the imperial and pontifical robes, which included the buskins, a long alb, the stole crossed priest wise over the breast, and the mantle. The regalia were then delivered to him, and the crown was set on his head conjointly by the three archbishop electors. Mass was then said, during which the emperor com- municated in one kind. When the coronation was performed at Aix-la-Chapelle, the emperor was at once made, at its conclusion, a canon of the church.

The coronation form in France bore much resemblance, in its general

features, to the English coronation, and was, it is believed originally based on the English form. The unction was given, first on the top of the head in the form of a cross, on the breast, between the shoulders, and at the bending and joints of both arms. Then, standing up, the king was vested in the dalmatic, tunic and royal robe, all of purple velvet sprinkled with fleurs-de-lys of gold, and representing, it was said, the three orders of subdeacon, deacon and priest. Then, kneeling again, he was anointed in the palms of the hands, after which the gloves, ring and sceptre were delivered. Then the peers were summoned by name to come near and assist, and the archbishop of Reims, taking the crown of Charlemagne from the altar, set it on the king's head. After

which the enthronement, and showing of the king to the people, took place. All the unctions were made with the chrism, mixed with a drop of oil from the Sainte Ampoule. After the enthrone- ment, mass was said, and at its conclusion the king communicated in both kinds. The third day after the coronation, the king touched for the evil.

On the "n Frimaire an 13″ Napoleon and Josephine were jointly crowned at Paris, by the pope. Napoleon entered Notre- Dame wearing a crown, and before him were carried the imperial ornaments, to wit: " la couronne de Vempereur, Vtpee, la main de justice, le sceptre, le manteau de I'empereur, son anneau, son collier, le globe imperial, la couronne de I'imperalrice, son manteau, son anneau." Each of these was blessed, and delivered with a benediction to the emperor and empress, kneeling, side by side, to receive them, both having previously received the unction on the head and on each hand. Napoleon placed the crown on his head himself. Mass with special prayers followed.

In Spain the coronation ceremony never assumed the fullness, or magnificence, that might have been expected. It was usually performed at Toledo, or in the church of St Jerome at Madrid, the king being anointed by the archbishop of Toledo. The royal ornaments were the sword, sceptre, crown of gold and the apple of gold, which the king himself assumed after the unction. In recent years the unction and coronation have been disused.

In Sweden the king was anointed and crowned at Upsala by the archbishop. The ceremony is now performed in the Storkyrka, at Stockholm, where the archbishop of Upsala anoints the king on the breast, temples, forehead and palms of both hands. The crown is placed on the king's head by the archbishop and the minister of justice jointly, whereupon the state marshal pro- claims: " Now is crowned

king of the Swedes, Goths and Wends, he and no other." When there is a queen consort, she is then anointed, crowned and proclaimed, in the same manner.

In Norway, according to the law of 18 14, the coronation is performed in the cathedral at Trondhjem, when the Lutheran superintendent, or bishop, anoints the king. The crown is placed on the king's head jointly by the bishop and the prime minister.

In Russia the coronation is celebrated at Moscow, and is full of religious significance. The tsar is anointed by the metropolitan, but places the crown on his head himself. He receives the sacrament among the clergy, the priestly theory of his office being recognized. In some other European countries the coronation ceremony, as in Austria and Hungary, is also performed with much significant ritual. In other countries, as Prussia, it is retained in a modified form; but in the remaining states such as Denmark, Belgium, Italy, &c, it has been abandoned, or never introduced.

Authorities. — L. G. Wickham Legg, English Coronation Records; Roxburgh Club — Liber Regalis; Anon., A Complete Account of the Ceremonies observed in the Coronations of the Kings and Queens of England (London, 1727); F. Sandford, Description of the Coronation of James II. (1687); Menin, The Form, Order and Ceremonies of Coronations, trans, from the French (1727); Martene, De Antiquis Ecclesiae Ritibus, lib. ii. (T. M. F.)

CORONER, an ancient officer of the English common law, so called, according to Coke, because he was a keeper of the pleas of the crown (custos placitorum coronae). At what period the office of coroner was instituted is a matter of considerable doubt; some modern authorities (Stubbs, Select Charters, 260; Pollock and Maitland, Hist. Eng. Law, i. 519) date its origin from 1194, but C. Gross (Political Science Quarterly, vol. vii.) has shown that it must have existed before that date. The office was always elective, the appointment being made by the freeholders of the county assembled in county court. By the Statute of West- minster the First it was ordered that none but lawful and discreet knights should be chosen as coroners, and in one instance a person was actually removed from office for insufficiency of estate. Lands to the value of £20 per annum (the qualification for knighthood) were afterwards deemed sufficient to satisfy the requirements as to estate which ought to be insisted on in the case of a coroner. The complaint of Blackstone shows the transition of the office from its original dignified and honorary

character to a paid appointment in the public service. ” Now, indeed, through the culpable neglect of gentlemen of property, this office has been suffered to fall into disrepute, and get into low and indigent hands; so that, although formerly no coroners would condescend to be paid for serving their country, and they were by the aforesaid Statute of Westminster expressly forbidden to take a reward, under pain of a great forfeiture to the king; yet for many years past they have only desired to be chosen for their perquisites; being allowed fees for their attendance by the statute 3 Henry VII. c. 1 , which Sir Edward Coke com- plains of heavily; though since his time those fees have been much enlarged.” The mercenary character of the office, thus deprecated by Coke and Blackstone, is now firmly established, without, however (it need hardly be said), affording the slightest ground for such reflections as the above. The coroner is in fact a public officer, and like other public officers receives payment for his services. The person appointed is almost invariably a qualified legal or medical practitioner; how far one is a more ” fit person ” than another has frequently been a matter of dispute — a Bill of 1879, which, however, failed to pass, decided in favour of the legal profession. The property qualification for a county coroner (” having land in fee sufficient in the same county whereof he may answer to all manner of people,” 14 Ed. III. st. 1, c. 8), although re-enacted in the Coroners Act 1887, is now virtually dispensed with. The appointment is for life, but is vacated by the holder being made sheriff. A coroner may be removed by the writ de coronatore exonerando, for sufficient cause assigned, or the lord chancellor may, if he thinks fit, remove any coroner from his office for inability or misbehaviour in the discharge of his duty.

Coroners are of three kinds: (1) coroners by virtue of their office, e.g. the lord chief justice of the king’s bench is the principal coroner of England; the puisne judges of the king’s bench are sovereign coroners — they may exercise their jurisdiction within any part of the realm, even in the verge * or other exempt liberties or franchises; (2) coroners by charter or commission, e.g. in certain liberties and franchises coroners are appointed by the crown or by lords holding a charter from the crown; (3) coroners by virtue of election, e.g. county and borough coroners. County coroners in England were, until 1888, elected by the freeholders, but by the Local Government Act r888 the appointment was given to the county council, who may appoint any fit person, not being a county alderman or county councillor, to fill

the office. By an act of i860 the system of payment by fees, established by an act of 1843, was abolished and payment made by salary calculated on the average amount of the fees, mileage, and allowances usually received by the coroner for a period of five years, and the calculation revised every five years. In boroughs having a separate court of quarter sessions, and whose population exceeds 10,000, the coroner is appointed by the town council and is paid by fees. A county coroner must reside within his district or not more than two miles out of it. Deputy coroners are also appointed in both counties andboroughs, and the law relating to their appointment is contained in the Coroners Act 1892. The duties of a coroner were ascertained by 4 Edward I. st. 2: — ” A coroner of our Lord the king ought to inquire of these things, first, when coroners are commanded by the king’s bailiffs or by the honest men of the county, they shall go to the places where any be slain, or suddenly dead or wounded, or where houses are broken, or where treasure is said to be found, and shall forthwith command four of the next towns, or five, or six, to appear before him in such a place; and when they are come thither, the coroner upon the oath of them shall inquire in this manner, that is, to wit, if it concerns a man slain, if they know when the person was slain, whether it were in any house, field, bed, tavern, or company, and if any, and

1 Coroner of the Verge. — The verge comprised a circuit of 12 m. round the king’s court, and the coroner of the king’s house, called the coroner of the verge, has jurisdiction within this radius. By the Coroners Act 1887 the jurisdiction of the verge was abolished and became absorbed in that of the county, but the appointment of the king’s coroner was left with the lord steward, while his jurisdiction was limited to the precincts of the palace.

who, were there, &c. It shall also be inquired if the dead person were known, or else a stranger, and where he lay the night before. And if any person is said to be guilty of the murder, the coroner shall go to their house and inquire what goods they have, &c.” Similar directions were given for cases of persons found drowned or suddenly dead, for attachment of criminals in cases of violence, &c. His functions are now, by the Coroners Act 1887, limited to an inquiry upon ” the dead body of a person lying within his jurisdiction, where there is reasonable cause to suspect that such person has died either a violent or an unnatural death, or has died a sudden death of which the cause is unknown, or that such person has died in prison, or in such place or under such circum- stances as to require an inquest in pursuance of any act ” (s. 3), and upon treasure-trove (s. 36). The inquisition must be super visum corporis (that is, after ” viewing the body “) ; the evidence is taken on oath; and any party suspected may tender

evidence. The Coroners Act 1887, s. 21, gives power to the coroner to summon medical witnesses and to direct the per- formance' of a post-mortem examination. The verdict must be that of twelve at least of the jury. If any person is found guilty of murder or other homicide, the coroner shall commit him to prison for trial; he shall also certify the material evidence to the court, and bind over the proper persons to prosecute or to give evidence at the trial. He may in his discretion accept bail for a person found guilty of manslaughter. Since the abolition of public executions, the coroner is required to hold an inquest on the body of any criminal on whom sentence t>f death has been carried into effect. The duty of coroners to inquire into treasure-trove {q.v.) is still preserved by the Coroners Act 1887, which, however, repealed certain other jurisdictions, as, — inquests of royal fish (whale, sturgeon) thrown ashore or caught near the coast; inquest of wrecks, and of felonies, except felonies on inquisitions of death. By the City of London Fire Inquests Act 1888 the duty is imposed upon the coroner for the city to hold inquests in cases of loss or injury by fire in the city of London and the liberties thereof situated in the county of Middlesex. This is a practice which exists in several European countries.

In Scotland the duties of a coroner are performed by an officer called a procurator-fiscal.

In the United States and in most of the colonies of Great Britain the duties of a coroner are substantially the same. In some cases his duties are more enlarged, his inquisition embracing the origin of fires; in others they are confined to holding inquests in cases of suspicious deaths. Unlike a coroner in England, he is elected generally only for a specified period.

Authorities. — Jervis, Office and Duties of Coroners (6th ed., 1898); R. H. Wellington, The King's Coroner (2 vols., 1905-1906). In 1908 a committee was appointed to inquire into the law relating to coroners and coroners' inquests and into the practice in coroners' courts. • (T. A. I.)

CORONIUM, that constituent (otherwise unknown) of the sun's corona, which emits the characteristic green coronal ray, of which the wave-length is 5303.

COROT, JEAN-BAPTISTE CAMILLE (1796-1875), French landscape painter, was born in Paris, in a house on the Quai by the rue du Bac, now demolished, on the 26th of July 1796. His family were well-to-do bourgeois people, and whatever may have been the experience of

some of his artistic colleagues, he never, throughout his life, felt the want of money. He was educated at Rouen and was afterwards apprenticed to a draper, but hated commercial life and despised what he called its ” business tricks,” yet he faithfully remained in it until he was twenty-six, wher his father at last consented to his adopting the profession of art. Corot learned little from his masters. He visited Italy on three occasions: two of his Roman studies are now in the Louvre. He was a regular contributor to the Salon during his lifetime, and in 1846 was ” decorated ” with the cross of the Legion of Honour. He was promoted to be officer in 1867. His many friends considered nevertheless that he was officially neglected, and in 1874, only a short time before his death, they presented him with a gold medal. He died in Paris, on the 22nd of February 1875, and was buried at Pere Lachaise.

Of the painters classed in the Barbizon school it is probable

that Corot will live the longest, and will continue to occupy the highest position. His art is more individual than Rousseau’s, whose works are more strictly traditional; more poetic than that of Daubigny, who is, however, Corot’s greatest contemporary rival; and in every sense more beautiful than J. F. Millet, who thought more of stern truth than of aesthetic feeling.

Corot’s works are somewhat arbitrarily divided into periods, but the point of division is never certain, as he often completed a picture years after it had been begun. In his first style he painted traditionally and ” tight ” — that is to say, with minute exactness, clear outlines, and with absolute definition of objects throughout. After his fiftieth year his methods changed to breadth of tone and an approach to poetic power, and about twenty years later, say from 1865 onwards, his manner of painting became full of ” mystery ” and poetry. In the last ten vears of his work he became the Pere Corot of the artistic circles of Paris, in which he was regarded with personal affection, and he was acknowledged as one of the five or six greatest landscape painters the world has ever seen, along with Hobbema, Claude, Turner and Constable. During the last few years of his life he earned large sums by his pictures, which became greatly sought after. In 1871 he gave £2000 for the poor of Paris (where he remaine’d during the siege), and his continued charity was long the subject of remark. Besides landscapes, of which he painted several hundred, Corot

produced a number of figure pictures which are much prized. These were mostly studio pieces, executed probably with a view to keep his hand in with severe drawing, rather than with the intention of producing pictures. Yet many of them are fine in composition, and in all cases the colour is remarkable for its strength and purity. Corot also executed a few etchings and pencil sketches. In his landscape pictures Corot was more traditional in his method of work than is usually believed. If even his latest tree-painting and arrange- ment are compared with such a Claude as that which hangs in the Bridgewater gallery, it will be observed how similar is Corot's method and also how masterly are his results.

The works of Corot are scattered over France and the Nether- lands, Great Britain and America. The following may be considered as the first half-dozen : " Une Matinee " (1850), now in the Louvre; " Macbeth " (1859), in the Wallace collection; " Le Lac " (1861); " L'Arbre brise " (1865); "Pastorale — Souvenir d'ltalie " (1873), in the Glasgow Corporation Art Gallery; " Biblis " (1875). Corot had a number of followers who called themselves his pupils. The best known are Boudin, Lepine, Chintreuil, Francais and Le Roux.

Authorities. — H. Dumesnil, Souvenirs intimes (Paris, 1875) ; Roger-Miles, Les Artistes celebres: Corot (Paris, 1891); Roger- Miles, Album classique des chefs-d'eeuvres de Corot (Paris, 1895) '• J. Rousseau, Bibliotheque d'art moderne : Camille Corot (Paris, 1884) ; J. Claretie, Peintres et sculpteurs contemporains : Corot (Paris, 1884) ; Ch. Bigot, Peintres francais contemporains: Corot (Paris, 1888); Geo. Moore, Ingres and Corot in Modern Painting (London, 1893); David Croal Thomson, Corot (4to, London, 1892); Mrs Schuyler van Rensselaer, " Corot," Century Magazine (June 1889); Corot, The Portfolio (1870), p. 60, (l875)_p. 146; R. A. M. Stevenson, " Corot as an Example of Style in Painting," Scottish Art Review (Aug. 1888); Ethel Birnstigl and Alice Pollard, Corot (London, 1904) ; Alfred Robaut, VCEuvre de Corot, catalogue raisonne et illustre, precede de I'histoire de Corot et de ses ceuvres par Etienne Morceau-Nelaton (Paris, 1905). (D. C. T.)

CORPORAL. 1. (From Lat. corporalis, belonging to the corpus or body), an adjective appearing in several expressions, such as "corporal punishment" (see below), or in "corporal works of mercy," for those acts confined to the succouring of the bodily needs, such as feeding the hungry, visiting the sick, rescuing captives. A " corporal oath " was sworn with the body in contact with a sacred object (see Oath).

2. (From Lat. corporalis, sc. palla, or corporale, sc. pallium), in the Roman Catholic Church, a small square linen cloth, which at the

service of the Mass is placed on the altar under the chalice and paten. It was originally large enough to cover the whole surface of the altar, and was folded over so as to cover the chalice — a custom still observed by the Carthusians. The chalice is now, however, covered by another small square of linen, stiffened with

cardboard, &c, known as the pall {palla). When not in use both corporal and pall are carried in a square silken pocket called the burse. The corporal must be blessed by the bishop, or by a priest with special faculties, the ritual prayers invoking the divine blessing that the linen may be worthy to cover and enwrap the body and blood of the Lord. It represents the winding-sheet in which Joseph of Arimathea wrapped the body of the dead Christ.

3. (Of uncertain derivation; the French form caporal, and Ital. caporale, point to an origin from capo, Italian for head; the New English Dictionary, however, favours the derivation from Lat. corpus, Ital. corpo, body), a non-commissioned officer of infantry, cavalry and artillery, ranking below a sergeant. This rank is almost universal in armies. In the i6thand 17th centuries there were corporals but no sergeants in the cavalry, and this custom is preserved in the three regiments of British household cavalry, the rank of sergeant being replaced by that of ” corporal of horse,” and that of sergeant-major by ” corporal-major.” In the 16th and early 17th centuries the title ” corporal of the field ” was often given to a superior officer who acted as a staff -officer to the sergeant-major-general. In the navy the ” ship’s corporal,” formerly a semi-military instructor to the crew, is now a petty officer charged with assisting the master-at-arms in police duties on board ship.

CORPORAL PUNISHMENT, chastisement inflicted by one person on the body {corpus) of another. By the common law of England, Scotland and Ireland, the infliction of corporal punish- ment is illegal unless it is done in self-defence or in defence of others, or is done either by some person having punitive authority over the person chastised or under the authority of a competent court of justice. Corporal punishment in defence of self or others needs no comment, except that, like all other acts done in defence, its justification depends on whether or not it was reasonably necessary for the protection of the person attacked. Among persons invested with punitive authority, mention must first be made of parents and guardians, and of teachers, who have, by implied delegation from the parents, and as incidental to the relation of master and pupil, powers of reasonable corporal punishment. Such powers are not limited to offences committed by the pupil upon the premises of the school, but

extend to acts done on the way to and from school and during what may be properly regarded as school hours {Cleary v. Booth, 1893, 1 Q.B. 465). The rights of parents, guardians and teachers, in regard to the chastisement of children, were expressly recognized in English law by the Prevention of Cruelty to Children Act 1904 (§ 28). Poor law authorities and managers of reformatories are in the same position in this respect as teachers. The punitive authority of elementary school teachers is subject to the regula- tions of the education authority: that of poor law authorities to the regulation of the Home Office and the Local Government Board. A master has a right to inflict moderate chastisement upon his apprentice for neglect or other misbehaviour, provided that he does so himself, and that the apprentice is under age (Archbold, Cr . PI., 23rd ed., 795). Where a legal right of chastisement is exercised immoderately, the person so exercising it incurs both civil and criminal liability.

In some of the older English legal authorities {e.g. Bacon, Abridg. tit. ” Baron and Feme,” B), it was stated that a husband might inflict moderate corporal punishment on his wife in order to keep her ” within the bounds of duty.” But these authorities were definitely discredited in 1891 in the case of R. v. Jackson (1 Q.B. 671). By the unmodified Mahommedan law, a husband may administer moderate corporal punishment to his wife; but it is doubtful whether this right could be legally exercised in British India (Wilson, Digest of Anglo-M ahommedan Law, 2nded., PP- J53, IS4)- In Hawkins’s Pleas of the Crown (Bk. 1, c. 63, § 29) it is laid down that ” churchwardens, and perhaps private persons, may whip boys playing in church” during divine service. But while the right to remove such offenders is undoubted, the right of castigation could not now safely be exercised. At common law the master of a ship is entitled to inflict reasonable chastisement on a seaman for gross breach of

duty. But such offences are now specially provided for by the Merchant Shipping Act 1894 (§§ 220-238); and where the provisions of that statute are available, corporal punishment would probably be illegal.

As to corporal punishment in the army and navy, see articles Military Law; Navy. In civil prisons, whether they are convict prisons or local prisons, corporal punishment may not be inflicted except under sentence of a competent court, or except in the case of prisoners under

sentence of penal servitude, or convicted of felony, or sentenced to hard labour, who have been guilty of mutiny or incitement to mutiny, or of gross personal violence to an officer or servant of the prison (Act of 1898, § 5). Flogging for these offences in prison may not be inflicted except by order of the board of visitors or visiting committee of the prison, made at a meeting specially constituted, and confirmed by a secretary of state (Prison Act of 1898, § 5; Convict Prison Rules 1899; Stat. R. and O. 1899, No.

321, rr. 77-79; Local Prison Rules 1899; Stat. R. and 0. 1899, No.

322, rr. 84, 85). The mode of inflicting the punishment is prescribed by the Convict Prison Rules (rr. 82-85) an d the Local Prison Rules (rr. 88-91), which limit the number of strokes and prescribe the instrument to be used for inflicting them, the cat or birch for prisoners over 18, and the birch for prisoners under 18.

Corporal punishment for breaches of prison discipline in Scottish prisons is not authorized by any statute nor under the Scottish Prison Rules (see Stat. R. and 0. Revised, ed. 1904, vol. x. tit. ” Prison, Scotland,” p. 60). In Irish convict prisons corporal punishment may be inflicted by order of justices specially appointed by the lord-lieutenant under § 3 of the Penal Servitude Act 1864, but the Irish PrisonRulesof i902(Stat.R.and 0. 1902, No. 59o)contain no reference to this power.

At common law, courts of justice had jurisdiction to impose a sentence of whipping on persons convicted on indictment for petty larceny or misdemeanours of the meaner kind (see 1 Bishop, Amer. Cr. Law, 8th ed., § 942). But they do not now impose such sentence except under statutory authority. The whipping of women was absolutely prohibited in 1820 by the Whipping of Female Offenders Abolition Act of that year. But there are numerous statutes authorizing the imposition of a sentence of whipping on male offenders. The following cases may be noted. 1. Adults: ‘(a) who are incorrigible rogues (Vagrancy Act 1824, § 10); (6) who discharge fire-arms, &c, with intent to injure or alarm the sovereign (Treason Act 1842, § 2, and see 8 St. Tr. N.S. 1, and O’Connor’s Case, 1872, ib. p. 3 n.); (c) who are guilty of robbery with violence (Larceny Act 1861, § 43), or offences against § 21 of the Offences against the Person Act of 1 861; there has been much controversy as to whether the Garrotters Act of 1861, which authorized the ordering of more than one whipping in the case of an offender over 16 years of age, was the effective cause of the diminution of the offences against which it was directed, but the best judicial opinion is in the affirmative. 2. Males under sixteen: (a) in any

of the cases above noted ; (b) for many statutory offences, e.g. larceny (Larceny Act 1861), malicious damage (Malicious Damage Act 1861, § 75; Criminal Law Amendment Act 1885, § 4); (c) by courts of summary jurisdiction (Summary Jurisdiction Act 1879, §§ 10, 11, and 1899; First Offenders Act 1887); if a boy is over 7 and under 1 2, not more than 6 strokes, if he is over 12, but under 14, not more than 12 strokes may be inflicted ; the birch-rod is to be used, and the punishment is to be given by a police constable in the presence of a superior officer, and of the parent or guardian if he desire it.

In Scotland the whipping of male offenders under 14 is regulated by the Prisons (Scotland) Act i860, § 74ˆ, the Whipping Act 1862, and § 514 of the Burgh Police (Scotland) Act 1892; and offenders over 16 may not be whipped for offences against person or property (Whipping Act 1862, § 2).

In Ireland the law is in substance the same as in England; for special statutes see official Index to Statutes (ed. 1905), p. 985, art. Punishment, 6.

The flogging of women is prohibited throughout British India (Code of Criminal Procedure, Act v. of 1898, § 393) and the British colonies, where the infliction of corporal punishment by judicial order is in the main regulated on the lines of modern English legisla- tion. In some British colonies the list of offences punishable by whipping is larger than in England (see Queensland Criminal Code 1899, arts. 212, 2'i3, 216).

In the United States whipping is not a legal punishment under the Federal Law (Revised Stats. U.S. § 5327). But in some of the states of the Union whipping is inflicted under statute, and is not held cruel or unusual within the Federal Constitution (1 Bishop,

A mer. Crim. Law, 8th ed., § 947) . In Delaware wife-beating and certain offences against property by males are punishable with flogging ; and in Maryland the same punishment is applicable for wife-beating. Flogging is in force as a disciplinary measure in some penal institutions.

It has been suggested by Laurent (Principes de droit civil francais (1870), vol. iv. § 275) that the express definition in the French Code Civil (arts. 371 et seq.) of parental rights over children excludes the power of corporal punishment. But this view is not generally accepted. The parental right of moderate chastisement is expressly reserved in the Civil Code of Spain (art. 155, 2). Flogging is not recognized as a

legal punish- ment by the French Code Penal, nor by the Penal Codes of Germany, Italy, Spain or Portugal. (See also Whipping or Flogging.) (A. W. R.)

CORPORATION (from Lat. corporare, to form into a body, corpus, corporis), in English law, an association of persons which is treated in many respects as if it were itself a person. It has rights and duties of its own which are not the rights and duties of the individual members thereof. Thus a corporation may own land, but the individual members of the corporation have no rights therein. A corporation may owe money, but the corporators as individuals are under no obligation to pay the debt. The rights and duties descend to the successive members of the corporation. This capacity of perpetual succession is regarded as the distinguishing feature of corporations as com- pared with other societies. One of the phrases most commonly met with in law-books describes a corporation as a society with perpetual succession and a common seal. The latter point, however, is not conclusive of the corporate character.

The legal attributes of a corporation have been worked out with great fulness and ingenuity in English law, but the con- ception has been taken full-grown from the law of Rome. The term in Roman law corresponding to the modern corporation is collegium; a more general term is universitas. A collegium or corpus must have consisted of at least three persons, who were said to be corporati — habere corpus. They could hold property in common and had a common chest. They might sue and be sued by their agent {syndicus or actor). There was a complete separa- tion in law between the rights of the collegium as a body and those of its individual members. The collegium remained in existence although all its original members were changed. It was governed by its own by-laws, provided these were not contrary to the common law. The power of forming collegia was restrained, and societies pretending to act as corporations were often suppressed. In all these points the collegia of Roman closely resemble the corporations of English law. There is a similar parallel between the purposes for which the formation of such societies is authorized in English and in Roman law. Thus among the Roman collegia the following classes are distin- guished : — (1) Public governing bodies, or municipalities, civitales; (2) religious societies, such as the collegia of priests and Vestal Virgins ; (3) official societies, e.g. the scribae, employed in the administration of the state ; (4) trade societies, e.g. fabri, pictores, navicularii, &c. This class shades down into the societates not incorporated, just as our own trading corporations partake largely of the character of ordinary partnerships. In the later Roman law the distinction of corporations into civil and ecclesi- astical, into lay and eleemosynary, is recognized. The latter could not alienate without just cause, nor take land without a licence — a restriction which may be compared with modern statutes of

mortmain. All these privileged societies are what we should call corporations aggregate. The corporation sole (i.e. con- sisting of only a single person) is a later refinement, for although Roman law held that the corporation subsisted in full force, notwithstanding that only one member survived, it did not impute to the successive holders of a public office the character of a corporation. When a public officer in English law is said to be a corporation sole, the meaning is that the rights acquired by him in that capacity descend to his successor in office, and not (as the case is where a public officer is not a corporation) to his ordinary legal representative. The best known instances of

corporation sole are the king and the parson of a parish. The Conception of the king as a corporation is the key to many of his paradoxical attributes in constitutional theory — his invisibility, immortality, &c.

The term quasi-corporation is applied to holders for the time being of certain official positions, though not incorporated, as the churchwardens of a parish, guardians of the poor, &c.

The Roman conception of a corporation was kept alive by ecclesiastical and municipal bodies. When English lawyers came to deal with such societies, the corporation law of Rome admitted of easy application. Accordingly, in no department has English law borrowed so copiously and so directly from the civil law. The corporations known to the earlier English law were mainly the municipal, the ecclesiastical, and the educational and eleemosynary. To all of these the same principles, borrowed from Roman jurisprudence, were applied. The different purposes of these institutions brought about in course of time differences in the rules of the law applicable to each. In particular, the great development of trading companies under special statutes has produced a new class of corporations, differing widely from those formerly known to the law. The reform of municipal corporations has also restricted the operation of the principles of the older corporation law. These principles, however, still apply when special statutes have not intervened.

The legal origin of corporation is ascribed by J. Grant (Treatise on the Law of Corporations, 1850) to five sources, viz. common law, prescription, act of parliament, charter and implication. Prescription

in legal theory implies a grant, so that corporations by prescription would be reducible to the class of chartered or statutory corporations. A corporation is said to exist by implica- tion when the purposes of a legally constituted society cannot be carried out without corporate powers. Corporations are thus ultimately traceable to the authority of charters and acts of parliament. The power of creating corporations by charter is an important prerogative of the crown, but in the present state of the constitution, when all the powers of the crown are practically exercised by parliament, there is no room for any jealousy as to the manner in which it may be exercised. The power of charter- ing corporations belonged also to subjects who had jura regalia, e.g. the bishops of Durham granted a charter of incorporation to the city of Durham in 1565, 1602 and 1780. The charter of a corporation is regarded as being of the nature of a contract between the king and the corporation. It will be construed more favourably for the crown, and more strictly as against the grantee. It cannot alter the law of the land, and it may be surrendered, so that, if the surrender is accepted by the crown and enrolled in chancery, the corporation is thereby dissolved. Great use was made of this power of the crown in the reigns of Charles II. and James II.

Every corporation, it is said, must have a name, and it may have more names than one, but two corporations cannot have the same name. And corporations cannot change their name save by charter or some equivalent authority.

The possession of a common seal, though, as already stated, not conclusive of the corporate character, is an incident of every corporation aggregate. The inns of courts have common seals, but they are only voluntary societies, not corporations. Generally speaking, all corporate acts affecting strangers must be performed under the common seal; acts of internal administra- tion affecting only the corporators, need not be under seal. The rule has been defended as following necessarily from the im- personal character of a corporation; either a seal or something equivalent must be fixed upon so that the act of the corporation may be recognized by all.

A corporation may be abolished by statute, but not by the mere authority of the crown. It may also become extinct by the disappearance of all its members or of any integral part, by surrender of charter if it is a chartered society, by process of law, or by forfeiture of privileges.

The power of the majority to bind the society is one of the first principles of corporation law, even in cases where the corporation has

a head. It is even said that only by an

act of parliament can this rule be avoided. The binding majority is that of the number present at a corporate meeting duly summoned. p

In corporations which have a head (as colleges), although the head cannot veto the resolution of the majority, he is still considered an integral part of the society, and his death suspends its existence, so that a head cannot devise or bequeath to the corporation, nor can a grant be made to a corporation during vacancy of the headship.

A corporation, has power to make such regulations (by-laws) as are necessary for carrying out its purposes, and these are binding on its members and on persons within its local jurisdic- tion if it has any.

The power to acquire and hold land was incident to a corpora- tion at common law, but its restriction by the statutes of mort- main dates from a very early period. The English law against mortmain was dictated by the jealousy of the feudal lords, who lost the services they would otherwise have been entitled to, when their land passed into the hands of a perpetual corporation. The vast increase in the estates of ecclesiastical corporations constituted by itself a danger which might well justify the operation of the restricting statutes.

The Mortmain Acts applied only to cases of alienation inter vivos. There was no power to devise lands by will until 3 2 Henry VIII. c. 1 (1540), and when the power was granted corporations were expressly excluded from its benefits. No devise to a corporation, whether for its own use or in trust, was allowed to be good; land so devised went to the heir, either absolutely or charged with the trusts imposed upon it in the abortive devise. A modification, however, was gradually wrought by the judicial interpretations of the Charitable Trusts Act 1601, and it was held that a devise to a corporation for a charitable purpose might be a good devise, and would stand unless voided by the Mortmain Acts; so that no corporation could take land, without a licence, for any purpose or in any way; and no localised corporation could take lands by devise, save for charitable purposes. Then came the act of 1 736, commonly but improperly called the Mortmain Act. Its effect was generally to make it impossible for land to be left by will for charitable uses, whether through a corporation or a natural person. 1 The Wills Act 1837 did not renew the old provision against devises to corporations, which therefore fell under the general law of mortmain. The law was consolidated by the Mortmain and Charitable Uses Act 1888, and the result is simply that corporations cannot take land for any purpose without a licence, and no licence in mortmain is

granted by the crown, except in certain statutory cases in the interests of religion, charity or other definite public object.

The power of corporations at common law to alienate their property is usually restricted, as is their power to lease it for more than a certain number of years, except by sanction of a public authority. The more important classes of corporations, how- ever, are now governed by special statutes which exclude or modify the operation of the common law principles. The most considerable class of societies still unaffected by such special legislation are the Livery Companies (q.v.). Under Company will be found an account of the important enactments regulating joint-stock companies.

The question to what extent the common law incidents of a corporation have been interfered with by special legislation has become one of much importance, especially under the acts relating to joint-stock companies. The most important case on this subject is that of Riche v. The Ashbury Railway Carriage Company, 1875 (L.R. 9 Ex. 224; L.R. 7 H.L. 653), in. which, the judges of the exchequer chamber being equally divided, the decision of the court below was affirmed. The view taken by the affirming judges, viz. that the common law incidents of a corpora- tion adhere unless expressly removed by the legislature, may be

1 Devises to colleges are excepted from the operation of the act, but such devises must be for purposes identical with or closely resembling the original purposes of the college; and the exception from this act does not supersede the necessity for a licence in mortmain.

illustrated by a short extract from the judgment of Mr Justice Blackburn : —

” If I thought it was at common law an incident to a corporation that its capacity should be limited by the instrument creating it, I should agree that the capacity of a company incorporated under the act of 1862 was limited to the object in the memorandum of association. But if I am right in the opinion which I have already expressed, that the general power of contracting is an incident to a corporation which it requires an indication of intention in the legislature to take away, I see no such indication here. If the question was whether the legislature had conferred on a corporation, created under this act,

capacity to enter into contracts beyond the provisions of the deed, there could be only one answer. The legislature did not confer such capacity. But if the question be, as I apprehend it is, whether the legislature have indicated an intention to take away the power of contracting which at common law would be incident to a body corporate, and not merely to limit the authority of the managing body and the majority of the share- holders to bind the minority, but also to prohibit and make illegal contracts made by the body corporate, in such a manner that they would be binding on the body if incorporated at common law, I think the answer should be the other way.”

On the other hand, the House of Lords, agreeing with the three dissentient judges in the exchequer chamber, pronounced the effect of the Companies Act to be the opposite of that indi- cated by Mr Justice Blackburn. ” It was the intention of the legislature, not implied, but actually expressed, that the corpora- tions, should not enter, having regard to this memorandum of association, into a contract of this description. The contract in my judgment could not have been ratified by the unanimous assent of the whole corporation.” In such companies, therefore, objects beyond the scope of the memorandum of association are ultra vires of the corporation. The doctrine of ultra vires, as it is called, is almost wholly of modern and judicial creation. The first emphatic recognition of it appears to have been in the case of companies created for special purposes with extraordinary powers, by act of parliament, and, more particularly, railway companies. The funds of such companies, it was held, must be applied to the purposes for which they were created, and to no other. Whether this doctrine is applicable to the older or, as they are sometimes called, ordinary corporations, appears to be doubtful. S. Brice {Ultra Vires) writes: —

” Take, as a strong instance, a university or a London guild. Either can undoubtedly manage, invest, transform and expend the corporate property in almost any way it pleases, but if they proposed to exhaust the same on the private pleasures of existing members, or to abandon the promotion, the one of education, the other of their art and mystery, it is very probable, if not absolutely certain, that the court of chancery would restrain the same, as being ultra vires.”

CORPS (pronounced as in French, from which it is taken, being a late spelling of cors, from Lat. corpus, a body; cf. ” corpse “), a word in very general use since the 1 7 th century to denote a body of troops, varying from a few hundred to the greater part of an army. In a special sense ” corps ” is used as synonymous with ” army corps ” (corps d’armie). The word is applied to any organized body, as in corps diplomatique, the general body of foreign diplomatic agents

accredited to any government (see Diplomacy), or corps de ballet, the members of a troop of dancers at a theatre; so in esprit de corps, the common spirit of loyalty which animates any body of associated persons.

CORPSE (Lat. corpus, the body), a dead human body. By the common law of England a corpse is not the subject of property nor capable of holding property. It is not therefore larceny to steal a corpse, but any removal of the coffin or grave-cloths is otherwise, such remaining the property of the persons who buried the body. It is a misdemeanour to expose a naked corpse to public view, to prevent the burial of a dead body, or to disinter it without authority; also to bury or otherwise dispose of a dead body on which an inquest ought to be held, without giving notice to a coroner. Anyone who, having the means, neglects to bury a dead body which he is legally bound to bury, is guilty of a misdemeanour, but no one is bound to incur a debt for such a purpose. It is incumbent on the relatives and friends of a deceased person to provide Christian burial for him ; failing relatives and friends, the duty devolves upon the parish. No corpse can be attached, taken in execution, arrested or detained

for debt. See further Body-snatching, and Burial and Burial Acts.

CORPULENCE (Lat. corpus, body), or Obesity (Lat. ob, against, and edere, to eat), a condition of the animal body characterized by the over-accumulation of fat under the skin and around certain of the internal organs. In all healthy persons a greater or less amount of fat is present in these parts, and serves important physiological ends, besides contributing to the proper configuration of the body (see Nutrition) . Even a considerable measure of fatness, however inconvenient, is not inconsistent with a high degree of health and activity, and it is only when in great excess or rapidly increasing that it can be regarded as a pathological state (see Metabolic Diseases). The extent to which excess of fat may proceed is illustrated by numerous well- authenticated examples recorded in medical works, of which only a few can be here mentioned. Thus Bright, a grocer of Maldon, in Essex, who died in 1750, in his twenty-ninth year, weighed 616 lb. Dr F. Dancel (Traile de I'obesite, Paris, 1863) records the case of a young man of twenty-two, who died from excessive obesity, weighing 643 lb. In the Philosophical Transactions for 181 3 a case is recorded of a girl of four years of age who weighed 256 lb. But the most celebrated case is that of Daniel Lambert (q.v.) of Leicester, who died in 1809 in his fortieth year. He is said to have been the heaviest man that ever lived, his weight being 739 lb (52 st. 11 lb). Health cannot be long maintained under excessive obesity, for the increase in

bulk of the body, rendering exercise more difficult, leads to relaxation and defective nutrition of muscle, while the accumulations of fat in the chest and abdomen occasion serious embarrassment to the functions of the various organs in those cavities. In general the mental activity of the highly corpulent becomes impaired, although there have always been many notable exceptions to this rule.

Various causes are assigned for the production of corpulence (see Metabolic Diseases). In some families there exists an hereditary predisposition to an obese habit of body, the mani- festation of which no precautions as to living appear capable of averting. But it is unquestionable that certain habits favour the occurrence of corpulence. A luxurious, inactive, or sedentary life, with over-indulgence in sleep and absence of mental occu- pation, are well recognized predisposing causes. The more immediate exciting causes are over-feeding and the large use of fluids of any kind, but especially alcoholic liquors. Fat persons are not always great eaters, though many of them are, while leanness and inordinate appetite are not infrequently associated. Still, it may be stated generally that indulgence in food, beyond what is requisite to repair daily waste, goes towards the increase of flesh, particularly of fat. This is more especially the case when the non-nitrogenous (the fatty, saccharine and starchy) elements of the food are in excess. The want of adequate bodily exercise will in a similar manner produce a like effect, and it is probable that many cases of corpulence are to be ascribed to this cause alone, from the well-known facts that many persons of sedentary occupation become stout, although of most abstemious habits, and that obesity frequently comes on in the middle-aged and old, who take relatively less exercise than the young, in whom it is comparatively rare. Women are more prone to become corpulent than men, and appear to take on this condition more readily after the cessation of the function of menstruation.

For the prevention of corpulence and the reduction of super- fluous fat many expedients have been resorted to, and numerous remedies recommended. These have included bleeding, blister- ing, purging, starving (see Fasting), the use of different kinds of baths, and of drugs innumerable. The drinking of vinegar was long popularly, but erroneously, supposed to be a remedy for obesity. It is related of the marquis of Cortona, a noted general of the duke of Alva, that by drinking vinegar he so reduced his body from a condition of enormous obesity that he could fold his skin about him like a garment.

In 1863 a pamphlet entitled ” Letter on Corpulence, Addressed to the Public by William Banting,” in which was narrated the remarkable

experience of the writer in accomplishing the reduc- tion of his own weight in a short space of time by the adoption of a

particular kind of diet, started the modern dietetic treatment, at first called ” Banting ” after the author. After trying almost every known remedy without effect, Banting was induced, on the suggestion of Mr Harvey, a London aurist, to place himself upon an entirely new form of diet, which consisted chiefly in the removal, as far as possible, of all saccharine, starchy and fat food, the reduction of liquids, and the substitution of meat or fish and fruit in moderate quantity at each meal, together with the daily use of an antacid draught. Under this regimen his weight was reduced 46 lb in the course of a few weeks, while his health underwent a marked improvement. His experience, as might have been expected, induced many to follow his example; and since then various regimens have been propounded, all aiming at treating corpulence on modern physiological principles (see also Dietetics, Metabolic Diseases and Nutrition). It is important, however, to bear in mind that the treatment should be followed under medical advice and observation; for, however desirable it be to get rid of superabundant fat, it would be manifestly no gain were this to be achieved by the sacrifice of the general health.

CORPUS CHRISTI, a city and the county-seat of Nueces county, Texas, U.S.A., situated on Corpus Christi Bay opposite the mouth of the Nueces river, 192 m. W.S.W. of Galveston and about 150 m. S.S.E. of San Antonio. Pop. (1890) 4387; (1900) 4703, including 963 foreign-born and 460 negroes; (1910) 8299. Itis served by the National of Mexico, the St Louis, Brownsville & Mexico, and the San Antonio & Aransas Pass railways. In 1908 the Federal government began work on a project to connect Corpus Christi harbour with Aransas Pass by a channel 85 ft. deep at low water and 75 ft. wide at the bottom, following a natural depression between the two bays. Corpus Christi is a summer and winter resort, with a very dry equable climate (average annual mean, 70- 2° F.) and good bathing on the horse- shoe beach of Corpus Christi Bay. The city has an extensive coasting trade, and exports fruit, early vegetables, fish and oysters. There was a small Spanish settlement here at an early date, but no American settlement was made until after the Mexican War. Corpus Christi was the base from which General Zachary Taylor made his forward movement to the Rio Grande in 1846. It was chartered as a city in 1876,

CORPUS CHRISTI, FEAST OF (Lat. festum corporis Christi, i.e. festival of the Body of Christ, Fr. fite-Dieu orjUe du sacrement, Ger. Frohnleichnamsfest), a festival of the Roman Catholic Church in honour of the Real Presence of Christ in the sacrament of the altar, observed on the first Thursday after Trinity Sunday. The doctrine of transubstantiation was defined by the Lateran Council in 12 15, and shortly afterwards the elevation and adora- tion of the Host were formally enjoined. This naturally stimu- lated the popular devotion to the Blessed Sacrament, which had been already widespread before the definition of the dogma. The movement was especially strong in the diocese of Liege, and when Julienne, prioress of Mont-Cornillon near Liege (1222- 1258), had a vision in which the need for the establishment of a festival in honour of the Sacrament was revealed to her, the matter was taken up with enthusiasm by the clergy, and in 1 246 Robert de Torote, bishop of Liege, instituted such a festival for his diocese. The idea, however, did not spread until, in 1261, Jacob Pantaleon, archdeacon of Liege, ascended the papal throne as Urban IV. By a bull of 1 264 Urban made the festival, hitherto practically confined to the diocese of Liege, obligatory on the whole Church, 1 and a new office for the festival was written by Thomas Aquinas himself. As yet the stress was laid on reverence for the Holy Sacrament as a whole ; there is no mention in Urban's bull of the solemn procession and exposition of the Host for the adoration of the faithful, which are the main features of the festival as at present celebrated. Urban's bull was once more promulgated, at the council of Vienne in 131 1, by

1 The pope's decision, so the story goes, was hastened by a miracle. A priest, saying mass at the church of Santa Christina at Bolsena, was troubled, after the consecration, with grave doubts as to the truth of the doctrine of transubstantiation. His temptation was removed by the Host beginning to bleed, the blood soaking through the corporal into the marble of the altar.

Pope Clement V.; and the procession of the Host in connexion with the festival was instituted, if the accounts we possess are trustworthy, by Pope John XXII.

From this time onwards the festival increased in popularity and in splendour. It became in effect the principal feast of the Church, the procession of the Sacrament a gorgeous pageant, in which not only the members of the trade and craft gilds, with the magistrates of the cities, took part, but princes and sovereigns. It thus became in a high

degree symbolical of the exaltation of the sacerdotal power. 2 In the 15th century the custom became almost universal of following the procession with the performance of miracle-plays and mysteries, generally arranged and acted by members of the gilds who had formed part of the pageant.

The rejection of the doctrine of transubstantiation at the Reformation naturally involved the suppression of the festival of Corpus Christi in the reformed Churches. Luther, in spite of his belief in the Real Presence, regarded it as the most harmful of all the medieval festivals and, though he fully realized its popularity, it was the first that he abolished. This attitude of the reformers towards the festival, however, intensified by their abhorrence of the traffic in indulgences with which it had become closely associated, only tended to establish it more firmly among the adherents of the ” old religion.” The procession of the Host on Corpus Christi day became, as it were, a public demonstration of Catholic orthodoxy against Protestantism and later against religious Liberalism. In most countries where religious opinion is sharply divided the procession of Corpus Christi is therefore now forbidden, even when Catholicism is the dominant religion. In England occasional breaches of the law in this respect have been for some time tolerated, as in the case of the Corpus Christi procession annually held by the Italian community in London. An attempt to hold a public procession of the Host in connexion with the Eucharistic Congress at Westminster in 1908, however, was the signal for the outburst of a considerable amount of opposition, and was eventually abandoned owing to the personal intervention of the prime minister.

CORRAL (Span, from corro, a circle), a word used chiefly in Spanish America and the United States for an enclosure for cattle and horses, and also for a defensive circle formed of wagons against attacks from Indians. It is also used as a verb, meaning to drive into a corral, and so figuratively to enclose, hem in. The word is probably connected with the South African Dutch word kraal (q.v.). In Ceylon it is especially used for an enclosure meant for the capture of wild elephants. In this last sense of the word the corresponding term in India is keddah (q.v.).

CORREA, a genus of Australian plants belonging to the natural order Rutaceae, named after the Portuguese botanist Jose Francisco Correa da Serra. The plants are evergreen shrubs and extremely useful for winter flowering. They are increased by cuttings, and grown in a cool greenhouse in rough peaty soil, with a slight addition of loam and sand. After the plants have done flowering, they should all get a little artificial warmth, plenty of moisture, and a slight shade, while they

are making their growth, during which period the tips of the young shoots should be nipped out when 6 or 8 in. long. When the growth is complete, a half-shady place outdoors during August and September will be suitable, with protection from parching winds and hot sunshine.

CORREA DA SERRA, JOSfc FRANCISCO (1750-1823), Portuguese politician and man of science, was born at Serpa, in Alemtejo, in 1750. Educated at Rome, he took orders under the protection of the duke of Alafoes, uncle of Mary I. of Portugal. In 1777 he returned to Lisbon, where he resided with his patron, with whose assistance he founded the Portuguese Academy of Sciences. Of this institution he was named perpetual secre- tary, and he received the privilege of publishing its trans- actions without reference to any censor whatever. His use of this right brought him into conflict with the Holy Office; and

2 Nothing caused more offence to Liberal sentiment in France after the Restoration than the spectacle of King Louis XVIII. walking and carrying a candle in the procession through the streets of Paris.

consequently in 1786 he fled to France, and remained there till the death of Pedro III., when he again took up his residence with Alafoes. But having given a lodging in the palace to a French Girondist, he was forced to flee to England, where he found a protector in Sir Joseph Banks, and became a member of the Royal Society. In 1797 he was appointed secretary to the Portuguese embassy, but a quarrel with the ambassador drove him once more to Paris (1802), and in that city he resided till 1813, when he crossed over to New York. In 1816 he was made Portuguese minister-plenipotentiary at Washington, and in 1820 he was recalled home, appointed a member of the financial council, and elected to a seat in the a Cortes. Three years after, and in the same year with the fall of the constitutional govern- ment, he died. Correa da Serra ranks high as a botanist, though he published no great special work. His principal claim to renown is the Colecqao de livros ineditos da historia Portugueza, (4 vols., 1790-1816), an invaluable selection of documents, exceedingly well edited.

CORREGGIO, or Coreggio, the name ordinarily given to Antonio Allegri (1494-1534), the celebrated Italian painter, one of the most vivid and impulsive inventors in expression and pose and the most

consummate executants. The external circum- stances of his life have been very diversely stated by different writers, and the whole of what has been narrated regarding him, even waiving the question of its authenticity, is but meagre.

The first controversy is as to his origin. Some say that he was born of poor and lowly parents; others, that his family was noble and rich. Neither account is accurate. His father was Pelle- grino Allegri, a tradesman in comfortable circumstances, living at Correggio, a small city in the territory of Modena; his mother Bernardina Piazzoli degli Aromani, also of a creditable family of moderate means. Antonio was born at Correggio, and was carefully educated. He was not (as has been often alleged) strictly self-taught in his art — a supposition which the internal evidence of his pictures must of itself refute. They show a knowledge of optics, perspective, architecture, sculpture and anatomy. The last-named science he studied under Dr Giovanni Battista Lombardi, whom he is believed to have represented in the portrait currently named ” II Medico del Correggio ” (Correggio’s physician). It is concluded that he learned the first elements of design from his uncle, Lorenzo Allegri, a painter of moderate ability at Correggio, and from Antonio Bartolotti, named Tognino, and that he afterwards went to the school of Francesco Ferrari Bianchi (named Frare), and perhaps to that of the successors of Andrea Mantegna in Mantua. He is said to have learned modelling along with the celebrated Begarelli at Parma; and it has even been suggested that, in the ” Pieta. ” executed by Begarelli for the church of Santa Margherita, the three finest figures are the work of Correggio, but, as the group appears to have been completed three years after the painter’s death, there is very little plausibility in this story. Another statement connecting Begarelli with Correggio is probably true, namely, that the sculptor executed models in relief for the figures which the painter had to design on the cupolas of the churches in Parma. This was necessarily an expensive item, and it has been cited as showing that Correggio must have been at least tolerably well off, — an inference further supported by the fact that he used the most precious and costly colours, and generally painted on fine canvases or sometimes on sheets of copper.

The few certain early works of, Correggio show a rapid pro- gression towards the attainment of his own original style. Though he never achieved any large measure of reputation during his brief lifetime, and was perhaps totally unknown beyond his own district of country, he found a sufficiency of employers, and this from a very youthful age. One of his early pictures, painted in 1514 when he was nineteen or twenty years old, is a large altar-pit ce commissioned for the

Franciscan convent at Carpi, representing the Virgin enthroned, with Saints; it indicates a predilection for the style of Leonardo da Vinci, and has certainly even greater freedom than similarly early works of Raphael. This picture is now in the Dresden gallery. Another painting of Correggio's youth is the " Arrest of

Christ." A third 'is an Ancona (or triple altar-piece — the " Repose in Egypt, with Sts Bartholomew and John ") in the church of the Conventuali at Correggio, showing the transition from the painter's first to his second style. Between 15 14 and 1 5 20 Correggio worked much, both in oil and in fresco, for churches and convents. In 1521 he began his famous fresco of the " Ascension of Christ," on the cupola of the Benedictine church of San Giovanni in Parma; here the Redeemer is surrounded by the twelve apostles and the four doctors of the church, supported by a host of wingless cherub boys amid the clouds. This he finished in 1524, and soon afterwards undertook his still vaster work on another cupola, that of the cathedral of the same city, presenting the " Assumption of the Virgin," amid an un- numbered host of saints and angels rapt in celestial joy. It occupied him up to 1 530. The astounding boldness of scheme in these works, especially as regards their incessant and audacious f oreshortenings — the whole mass of figures being portrayed as in the clouds, and as seen from below — becomes all the more startling when we recall to mind the three facts — that Correggio had apparently never seen any of the masterpieces of Raphael or his other great predecessors and contemporaries, in Rome, Florence, or other chief centres of art; that he was the first artist who* ever undertook the painting of a large cupola; and that he not only went at once to the extreme of what can be adventured in foreshortening, but even forestalled in this attempt the mightiest geniuses of an elder generation — the " Last Judgment " of Michelangelo, for instance, not having been begun earlier than 1533 (although the ceiling of the Sixtine chapel, in which foreshortening plays a comparatively small part, dates from 1508 to 1512). The cupola of the cathedral has neither skylight nor windows, but only light reflected from below; the frescoes, some portions of which were ultimately supplied by Giorgio Gandini, are now dusky with the smoke of tapers, and parts of them, in the cathedral and in the church of St John, have during many past years been peeling off. The violent foreshortenings were not, in the painter's own time, the object of unmixed admiration; some satirist termed the groups a " guaz- zetto di rane," or " hash of frogs." This was not exactly the opinion of Titian, who is reported to have said, on seeing the pictures, and finding them lightly esteemed by local dignitaries, " Reverse the cupola, and fill it with gold, and even that will not be its money's

worth.” Annibale Caracci and the Eclectics generally evinced their zealous admiration quite as ardently. Parma is the only city which contains frescoes by Correggio. For the paintings “of the cupola of San Giovanni he received the moderate sum of 472 sequins; for those of the cathedral, much less proportionately, 350. On these amounts he had to subsist, himself and his family, and to provide the colours, for about ten years, having little time for further work meanwhile. Parma was in an exceedingly unsettled and turbulent condition during some of the years covered by Correggio’s labours there, veering between the governmental ascendancy of the French and of the Pope, with wars and rumours of wars, alarms, tumults and pestilence.

Other leading works by Correggio . are the following : — The frescoes in the Camera di San Paolo (the abbess’s saloon) in the monastery of S. Lodovico at Parma, painted towards 1319 in fresco, — ” Diana returning from the Chase,” with auxiliary groups of lovely and vivacious boys of more than life size, in sixteen oval compartments. In the National Gallery, London, the ” Ecce Homo,” painted probably towards 1520 (authenticity not unquestioned); and “Cupid, Mercury and Venus,” the latter more especially a fine example. The oil-painting of the Nativity named ” Night ” (“La Notte “), for which 40 ducats and 208 livres of old Reggio coin were paid, the nocturnal scene partially lit up by the splendour proceeding from the divine Infant. This work was undertaken at Reggio in 1 5 2 2 for Alberto Pratoneris, and is now in the Dresden gallery. The oil-painting of St Jerome, termed also ” Day ” (” II Giorno “), as contrasting with the above-named ” Night.” Jerome is here with the Madonna and Child, the Magdalene, and two Angels, of whom one points out to the Infant a passage in the book held by the

Saint. This was painted for Briseida Bergonzi from 1527 on- wards, and was remunerated by 400 gold imperials, some cartloads of faggots and measures of wheat, and a fat pig. It is now in the gallery at Parma. The ” Magdalene lying at the entrance of her Cavern ” : this small picture (only 18 in. wide) was bought by Augustus III. of Saxony for 6000 louis d’or, and is in Dresden. In the same gallery, the two works designated ” St George ” (painted towards 1532) and ” St Sebastian.” In the Parma gallery, the Madonna named ” della Scala,” a fresco which was originally in a recess of the Porta Romana, Parma; also. the Madonna ” della Scodella ” (of the bowl, which is held by the Virgin — the subject being the Repose in Egypt) : it was executed for

the church of San Sepolcro. Both these works date towards 1526. In the church of the Annunciation, ” Parma,” a fresco of the Annunciation, now all but perished. Five celebrated pictures painted or begun in 1532, — “Venus,” “Leda,” “Danae,” ” Vice,” and ” Virtue ” : the ” Leda,” with figures of charming girls bathing, is now in the Berlin gallery, and is a singularly delightful specimen of the master. In Vienna, “Jupiter and Io.” In the Louvre, ” Jupiter and Antiope,” and the ” Mystic Marriage of St Catharine.” In the Naples Museum, the ” Madonna Reposing,” commonly named ” La Zingarella,” or the ” Madonna del Coniglio ” (Gipsy-girl, or Madonna of the Rabbit). On some of his pictures Correggio signed ” Lieto,” as a synonym of ” Allegri.” About forty works can be con- fidently assigned to him, apart from a multitude of others probably or manifestly spurious.

The famous story that this great but isolated artist was once, after long expectancy, gratified by seeing a picture of Raphael’s, and closed an intense scrutiny of it by exclaiming ” Anch’ io son pittore ” (I too am a painter), cannot be traced to any certain source. It has nevertheless a great internal air of probability; and the most enthusiastic devotee of the Umbrian will admit that in technical bravura, in enterprizing, gifted, and consummated execution, not Raphael himself could have assumed to lord it over Correggio.

In 1520 Correggio married Girolama Merlino, a young lady of Mantua, who brought him a good dowry. She was but sixteen years of age, very lovely, and is said by tradition to have been the model of his Zingarella. They lived in great harmony together, and had a family of four children. She died in 1529. Correggio himself expired at his native place on the 5th of March 1534. His illness was a short one, and has by some authors been termed pleurisy. Others, following Vasari, allege that it was brought on by his having had to carry home a sum of money, 50 scudi, which had been paid to him for one of his pictures, and paid in copper coin to humiliate and annoy him; he carried the money himself, to save expense, from Parma to Correggio on a hot day, and his fatigue and exhaustion led to the mortal illness. In this curious tale there is no symptom of authenticity, unless its very singularity, and the unlikelihood of its being invented without any foundation at all, may be allowed to count for something. He is said to have died with Christian piety; and his eulogists (speaking apparently from intuition rather than record) affirm that he was a good citizen, an affectionate son and father, fond and observant of children, a sincere and obliging friend, pacific, beneficent, grateful, unassuming, without mean- ness, free from envy and tolerant of criticism. He was buried with some pomp in the Arrivabene chapel, in the cloister of the Franciscan church at Correggio.

Regarding the art of Correggio from an intellectual or emotional point of view, his supreme gift may be defined as suavity, — a vivid, spontaneous, lambent play of the affections, a heartfelt inner grace which fashions the forms and features, and beams like soft and glancing sunshine in the expressions. We see lovely or lovable souls clothed in bodies or corresponding loveli- ness, which are not only physically charming, but are so informed with the spirit within as to become one with that in movement and gesture. In these qualities of graceful naturalness, not heightened into the sacred or severe, and of joyous animation, in momentary smiles and casual living turns of head or limb, Correggio undoubtedly carried the art some steps beyond any-

thing it had previously attained, and he remains to this day the unsurpassed or unequalled model of pre-eminence. From a technical point of view, his supreme gift — even exceeding his prodigious faculty in foreshortening and the like — is chiaroscuro, the power of modifying every tone, from bright light to depth of darkness, with the sweetest and most subtle gradations, all being combined into harmonious unity. In this again he far distanced all predecessors, and defied subsequent competition. His colour also is luminous and precious, perfectly understood and blended; it does not rival the superb richness or deep intense glow of the Venetians, but on its own showing is a perfect achieve- ment, in exact keeping with his powers in chiaroscuro and in vital expression. When we come, however, to estimate painters according to their dramatic faculty, their power of telling a story or impressing a majestic truth, their range and strength of mind, we find the merits of Correggio very feeble in comparison with those of the highest masters, and even of many who without, being altogether great have excelled in these particular qualities. Correggio never means much, and often, in subjects where fulness of significance is demanded, he means provokingly little. He expressed his own miraculous facility by saying that he always had his thoughts at the end of his pencil; in truth, they were often thoughts rather of the pencil and its controlling hand than of the teeming brain. He has the faults of his excellences — sweetness lapsing into mawkishness and affectation, empty in elevated themes and lasciviously voluptuous in those of a sensuous type, rapid and forceful action lapsing into posturing and self-display, fineness and sinuosity of contour lapsing into exaggeration and mannerism, daring design lapsing into incorrect- ness. No great master is more dangerous than Correggio to his enthusiasts; round him the misdeeds of conventionalists and the follies of connoisseurs cluster with peculiar virulence, and almost tend to blind to his real and astonishing excellences those practitioners or

lovers of painting who, while they can acknowledge the value of technique, are still more devoted to greatness of soul, and grave or elevated invention, as expressed in the form of art.

Correggio was the head of the school of painting of Parma, which forms one main division of the Lombardic school. He had more imitators than pupils. Of the latter one can name with certainty only his son Pomponio, who was born in 1521 and died at an advanced age; Francesco Capelli; Giovanni Giarola; Antonio Bernieri (who, being also a native of the town of Correggio, has sometimes been confounded with Allegri); and Bernardo Gatti, who ranks as the best of all. The Par- migiani (Mazzuoli) were his most highly distinguished imitators.

A large number of books have been written concerning Correggio. The principal modern authority is Conrado Ricci, Life and Times of Correggio (1896); see also Pungileoni, Memorie storiche di Antonio Allegri (1817); Julius Meyer, Antonio Allegri (1870, English trans- lation, 1876); H. Thode, Correggio (1898); Bigi, Vita ed opere (1881); Colnaghi, Correggio Frescoes at Parma (1845); Fagan, Works of Correggio (1873); and T. Sturge Moore, Correggio (1906) (a work which includes some adverse criticism on the views of Bernhard Berenson, in his Study of Italian Art, 1901, and else- where). • (W. M. R.)

■■ CORRENTI, CESARE (1815-1888), Italian revolutionist and politician, was born on the 3rd of January 1815, at Milan, of a poor but noble family. While employed in the public debt administration, he flooded Lombardy with revolutionary pamphlets designed to excite hatred against the Austrians, and in 1848 proposed the general abstention of the Milanese from smoking, which gave rise to the insurrection known as the Five Days. During the revolt he was one of the leading spirits of the operations of the insurgents. Until the reoccupation of Milan by the Austrians he was secretary-general of the provisional govern- ment, but afterwards he fled to Piedmont, whence he again distributed his revolutionary pamphlets throughout Lombardy, earning a precarious livelihood by journalism. Elected deputy in 1849, he worked strenuously for the national cause, supporting Cavour in his Crimean policy, although he belonged to the Left. After the annexation of Lombardy he was made commissioner for the liquidation of the Lombardo- Venetian debt, in i860 was

appointed councillor of state, and received various other public positions, especially in connexion with the railway and financial administration. He veered round to the Right, and in 1867 and again in 1869 he held the portfolio of education; he played an important part in the events consequent upon the occupation of Rome, and helped to draft the Law of Guarantees. As minister of education he suppressed the theological faculties in the Italian universities, but eventually resigned office and allied himself with the Left again on account of conservative opposition to his reforms. His defection from the Right ultimately assured the advent of the Left to power in 1876; and while declining office, he remained chief adviser of Agostino Depretis until the latter's death. On several occasions — notably in connexion with the redemption of the Italian railways, and with the Paris exhibition of 1878 — he acted as representative of the government. In 1877 he was given the lucrative appointment of secretary of the order of Saints Maurice and Lazarus by Depretis, and in 1886 was created senator. He died at Rome on the 4th of October 1888. He left a considerable body of writings on a variety of subjects, none of which is of exceptional merit.

See E. Massarani, Cesare Correnli nella vita e nelle opere (1890); and L. Carpi, 77 Risorgimento italiano, vol. iv. (Milan, 1888). (L. V.*)

CORRESPONDENCE (from med. scholastic Lat. correspondenlia, corrcspondere, compounded of Lat. cum, with, and respondere, to answer; cf. Fr. correspondence), strictly a mutual agreement or fitness of parts or character, that which fits or answers to a requirement in another, or more generally a similarity or parallel- ism. In the 17th and 18th centuries the word was frequently applied to relations and communications between states. It is now, outside special applications, chiefly applied to the inter- change of communications by letter, or to the letters themselves, between private individuals, states, business houses, or from individuals to the press. The " doctrine of correspondence or correspondences," one of the leading tenets of Swedenborgianism, is that every natural object corresponds to and typifies some spiritual principle or truth, this being the only key to the true interpretation of Scripture. In mathematics, the term " corre- spondence " implies the existence of some relation between the members of two groups of objects. If each object of one group corresponds to one and only one object of the second, and vice versa, then a one-to-one correspondence exists between the groups. If each object of the first group corresponds to /3 objects of the second group, and each object of the second group corre- sponds to a objects of the first group, then an a to (3 corre- spondence exists between the two groups. For examples of the application of this notion see Curve.

CORREZE, a department of south-central France, formed from the southern portion of the old province of Limousin, bounded N. by the departments of Haute- Vienne and Creuse, E. by Puy-de-D6me, S.E. by Cantal, S. by Lot, and W. by Dordogne. Area, 2273 sq. m. Pop. (1906) 317,430. Correze is situated on the western fringe of the central plateau of France. It forms a hilly tableland elevated in the east and north, and intersected by numerous fertile river valleys, trending for the most part to the south and south-west. The highest points, many of which exceed 3000 ft., are found in the north, where the Plateau de Millevaches separates the basins of the Loire and the Garonne. Except for a small district in the extreme north, which is watered by the Vienne, Correze belongs to the basin of the Garonne. The Dordogne waters its south-eastern region. The Correze, from which the department takes its name, and the Vezere, of which the Correze is the chief tributary, rise in the Plateau de Mille- vaches, flow south-west, and unite to the west of Brive. The climate of Correze is, in general, cold, damp and variable, except in the south-west, where it is mild and agreeable. The majority of the inhabitants live by agriculture. About one-third of the department is arable land, most of which is found in the south- west. Rye, buckwheat and wheat (in the order named) are the most abundant cereals. Hemp, flax and tobacco are also grown. The mor „ elevated regions of the north and east are given over to pasture, sheep being specially numerous on the Plateau de

Millevaches. Pigs and goats are reared to a considerable extent; and poultry-farming and cheese-making are much practised. The vineyards of the neighbourhood of Brive produce wine of medium quality. Chestnuts, largely used as an article of food, walnuts and cider-apples are the chief fruits. Coal in small quantities, slate, building-stone and other stone are the mineral products, and clay, used in potteries and tile-works, is also worked. The most important industrial establishment is the government manufactory of fire-arms at Tulle. There are flour-mills, breweries, oil- works, saw-mills and dye-works; and hats (Bort), coarse woollens, silk, preserved foods, wooden shoes, chairs, paper and leather are manufactured. Coal and raw materials for textile industries are leading imports; live stock and agricultural products are the chief exports. The department is served by the Orleans railway, and the Dordogne is navigable. The department is divided into the arrondissements of Tulle, Brive and Ussel, containing 29 cantons and 289 communes. It belongs to the archdiocese of Bourges, the region of the XII. army corps, and the Acadimie (educational division) of Clermont- Ferrand. Its court of appeal is at Limoges. Tulle, the capital, and Brive are the principal towns of the department. Uzerche is a picturesque old town on the Vezere, with a

Romanesque church, old houses, a gate and other remains of medieval fortifications. At Aubazine (or Obazine) there is a Romanesque church of the 12th century, formerly belonging to the celebrated Cistercian abbey, of which Etienne ” of Obazine ” (d. 1 1 59 and subsequently beatified) was the founder and first abbot. It contains the fine sculptured tomb of the founder. To the same style belong the abbey church of Beaulieu, the south portal of which is elaborately carved, the abbey church of Meymac, and the abbey church of Vigeois. Treignac, with its church, bridge and ramparts of the 15th century, and Turenne, dominated by the ruins of the castle of the famous family of that name, are ancient and interesting towns. The dolmen at Espartignac and the cromlech of Aubazine are the chief megalithic remains in the department. A Roman eagle and other antiquities have been found close to Ussel, which at the end of the 16th century became the centre of the duchy of Ventadour.

C0RRI8, LOUGH, a lake of western Ireland, in the counties Galway and Mayo. It lies N.W. and S.E., and is 27 m. long, including a long projecting arm at the north-west. The extreme breadth is 7 m., but the outline is extremely irregular, and the lough narrows near the centre to a few hundred yards. Lough Corrib is very shallow, hardly exceeding 30 ft. in depth at any point, and it is covered with islands, of which there are some 300. It lies 29 ft. above sea-level, and drains by the short river Corrib to Galway Bay. The large Lough Mask lies to its north and is connected with it by a partly subterranean channel. The scenery is pleasant, but the shores are low, except at the north-west, where the wild foothills of Joyce’s Country rise.

CORRIDOR (Fr. corridor, from Ital. corridore, Med. Lat. corri- dorium, a ” running-place,” from currere, to run), a main passage in a large building, on which various apartments open. In public offices, prisons, workhouses, hospitals, &c, the corridors are usually of severe simplicity; but in mansions and palaces large corridors (galleries) are often adorned with works of art, whence comes the term ” picture gallery ” applied to many collections. The term ” corridor carriage ” is applied to the modern style of railway carriage in which a narrow passage connects the separate compartments, the object being to combine a certain degree of privacy for the traveller with access from one compartment to another whilst the train is in motion.

CORRIE (Gaelic coire, cauldron; hence whirlpool, or circular hollow), a term used in the Highlands of Scotland for a steep- sided, rounded hollow in a mountain-side, from the lower part of which a stream usually issues as the outlet of a small lake ponded by glacial debris. Corrie-lakes are common in all glaciated mountain regions. (See

Cirque.)

CORRIENTES, a north-eastern province of the Argentine Republic, and part of a region known as the Argentine Mesopo- tamia, bounded N. by Paraguay, N.E. by Misiones (territory), E. by Brazil, S. by Entre Rios, and W. by Santa Fe and the

Chaco. Pop. (1895) 239,618; (1904 estimate) 299,479; area, 32,580 sq. m. Nearly one-third of the province is covered by swamps and lagoons, or is so little above their level as to be practically unfit for permanent settlement unless drained. The Ibera lagoon (c. 8500 sq. m., according to the Argentine Year Book for 1905-1906) includes a large part of the central and north-eastern departments, and the Maloya lagoon covers a large part of the north-western departments. Several streams flowing into the Parana and Uruguay have their sources in these lagoons, the Ibera. sending its waters in both directions. The southern districts of the province, however, are high and rolling, similar to the neighbouring departments of Entre Rios, and are admirably adapted to grazing and agriculture. The north-eastern corner is also high, but it is broken by ranges of hills and is heavily forested, like the adjacent territory of Misiones. The climate on the higher plains is sub-tropical, but in the northern swamps it is essentially tropical. Corrientes is the hottest province of Argentina, notwithstanding its large area of water and forest. The exports include cattle and horses, jerked beef, hides, timber and firewood, cereals and fruit. The principal towns are Corrientes, the capital; Goya, a flourishing agri- cultural town (1906 estimate, 7000) on a side channel of the Parana, 150 m. S. of Corrientes, the seat of a modern normal school and the market-town of a prosperous district; Bella Vista (pop. 1906 estimate, 3000), prettily situated on the Parana, 80 m. S. of Corrientes, the commercial centre of a large district; Esquina (pop. 1906 estimate, 3000) on the Parana at the mouth of the Corrientes river, 86 m. S. of Goya, which exports timber and firewood from the neighbouring forest of Payubre; Monte Caseros (pop. 1906 estimate, 4000) on the Uruguay river, from which cattle are shipped to Brazil, the eastern terminus of the Argentine North-Eastern railway (which crosses the province in a N.W. direction to Corrientes), and a station on the East Argentine railway (which runs northward to Paso de Los Libres, opposite Uruguayana, Brazil and to San Tome, and southward to a junction with the Entre Rios railways). A considerable district on the upper Uruguay was once occupied by prosperous Jesuit

missions, all of which fell into decay and ruins after the expulsion of that order from the Spanish possessions in 1767. The population of the province is composed very largely of Indian and mixed races, and Guarani is still the language of the country people.

CORRIENTES (San Juan de Corrientes), a city and river port, and the capital of the above province, in the north of the Argentine Republic, on the left bank of the Parana river, 20 m. below the junction of the Upper Parana and Paraguay, and 832 m. N. of Buenos Aires. The name is derived from the siete corrientes (seven currents) caused by rocks in the bed of the river just above the town. Pop. (1895) 16,129; (1907 local estimate) 30,172, largely Indian and of mixed descent. The appearance of Corrientes is not equal to its commercial and political importance, the buildings both public and private being generally poor and antiquated. There are four churches, the more conspicuous of which are the Matriz and San Francisco. The government house, originally a Jesuit college, is an anti- quated structure surrounding an open court (patio). There is a national college. The commercial importance of Corrientes results from its unusually favourable situation near the con- fluence of the Upper Parana and Paraguay, and a short distance below the mouth of the Bermejo. The navigation of the Upper Parana and Bermejo rivers begins here, and freight for the Upper Parana and Chaco rivers is transhipped at Corrientes, which practically controls the trade of the extensive regions tributary to them. Corrientes is the western terminus of the Argentine North-Eastern railway, which crosses the province S.E. to Monte Caseros, where it connects with the East Argentine line running S. to Concordia and N. to San Tome. The principal exports are timber, cereals, mate, sugar, tobacco, hides, jerked beef, jEru.it and quebracho.

CORRIGAN, MICHAEL AUGUSTINE (1839-1902), third archbishop of the Roman Catholic archdiocese of New York, in the United States, was born in Newark, New Jersey, on the

13th of August 1839. In 1859 he graduated at Mount St Mary's College, Emmittsburg, Maryland, and began his studies for the priesthood as the first of the twelve students with whom the American College at Rome was opened. On the 19th of September 1863 he was ordained priest, and in 1864 obtained the degree of D.D. Returning to America, he was appointed professor of Dogmatic Theology and Sacred Scripture, and director of the ecclesiastical seminary of Seton Hall College at South Orange, New Jersey; soon afterwards he was made vice-president of the institution; and in 186S became president, succeeding Rev. Bernard J. M'Quaid (b. 1823), the first Roman Catholic bishop of Rochester. In October 1868 Corrigan became vicar-

general of Newark, a diocese then including all the state of New Jersey. When Archbishop Bayley was transferred to the see of Baltimore in 1873, Pius IX. appointed Corrigan bishop of Newark. In 1876 he resigned the presidency of Seton Hall College. In 1880 Bishop Corrigan was made coadjutor, with the right of succession, to Cardinal McCloskey, archbishop of New York, under the title of archbishop of Petra; and thereafter nearly all the practical work of the archdiocese fell to his hands. He was at the time the youngest archbishop in the Catholic Church in America. On the death of Cardinal McCloskey in 1885 Archbishop Corrigan became metropolitan of the diocese of New York. He died on the 5th of May 1902. He was a scholar of much erudition, with great power of administrative organization, simple, generous and kindly in character. The earlier years of his archiepiscopate were disturbed by his controversy with Edward McGlynn (1839-1900), a New York priest (and a fellow-student with Corrigan at Rome), who disapproved of parochial schools, refused to go to Rome for examination, and was excom- municated in July 1887, but returned to the church five years later.

See Michael Augustine Corrigan: A Memorial, with biographical sketch by John A. Mooney (New York, 1902).

CORROSIVE SUBLIMATE, Mercuric Chloride, Per- chloride or Mercury ($HgCl_2$), a white solid obtained by the action of chlorine on mercury or calomel, by the addition of hydrochloric acid to a hot, strong solution of mercurous nitrate, $Hg_2(NO_3)_2 + 4HCl = 2HgCl_2 + 2H_2O + 2NO_2$, and, commercially, by heating a mixture of mercuric sulphate and common salt, the mercuric chloride subliming and being condensed in the form of small rhombic crystals. It melts at 288 , and boils at 303 ; it is sparingly soluble in cold water, more so in hot; it is very soluble in alcohol and ether. It is soluble in hydrochloric acid forming com- pounds such as $HgCl_2 \cdot 2HCl$, $3HgCl_2 \cdot 4HCl$, $2HgCl_2 HCl$; accord ing to the temperature and concentration; it also forms double salts with many chlorides; sal alembroth, $2NH_4Cl \cdot HgCl_2 \cdot H_2O$, is the compound with ammonium chloride. It absorbs ammonia to form $HgCl_2 NH_3$, which may be distilled without decomposi tion. Various oxychlorides are formed by digesting corrosive sublimate with mercuric oxide. Corrosive sublimate has im- portant applications in medicine — as an astringent, stimulant, caustic and antiseptic (see Mercury).

CORRUPT PRACTICES, a term used in English election law, as defined by the Corrupt and Illegal Practices Prevention Act 1883, to include bribery, treating, undue influence, personation, and aiding, abetting, counselling and procuring personation. Bribery” and corruption at

elections have been the subject of much legislation, statutes for their prevention have been passed in 1729, 1809, 1827, 1842, 1854, 1868 and 1883.

By the Corrupt and Illegal Practices Prevention Act 1883 (which incorporated the Corrupt Practices Prevention Act 1854, an act that repealed all former legislation) the following persons are to be deemed guilty of bribery: —

1. Every person who shall directly or indirectly, by himself or by any other person on his behalf, give, lend, &c, or offer, promise, or promise to procure, &c, any money or valuable con- sideration to or for any voter or any other person in order to .induce any voter to vote or refrain from voting, or shall corruptly

do any such act on account of such voter having voted or refrained from voting at any election.

2. Every person who shall similarly give or procure or promise,

&c, any office, place or employment to or for any voter or other person in order to induce him to vote, &c.

3. Every person who shall make any gift, loan, promise, &c, as aforesaid to any person to induce such person to procure the return of any person to serve in parliament or the vote of any voter.

4. Every person who shall, in consequence of such gift, procure or engage, promise or endeavour to procure the return of any person or the vote of any voter.

5. Every person who shall pay any money with the intent that it should be spent in bribery, or who shall pay money in repay- ment of any money wholly or in part expended in bribery.

6. Every person who before or during an election shall receive or contract for any money, &c, for voting, or refraining, or agreeing to vote or to refrain from voting.

7. Every person who, after the election, receives money, &c, on account of any person having voted or refrained, &c.

Treating. — Any person who corruptly by himself or by any other person either before, during or after an election, directly or indirectly gives or provides, or pays wholly or in part the expense of giving or providing any meat, drink or entertainment, or provision to or for any person in order to be elected, or for being elected, or for the purpose of corruptly influencing such person to give or refrain from giving his vote at an election, &c, shall be deemed guilty of treating, and every elector corruptly accepting such meat, drink, &c, shall also be guilty of treating.

Undue Influence. — Every person who shall directly or in- directly make use of or threaten to make use of any force, violence, &c, or inflict or threaten to inflict any temporal or spiritual injury, &c, upon any person to induce or compel such person to vote or refrain from voting, or who shall by abduction, duress, or any fraudulent device or contrivance impede or prevent the exercise of the franchise of any elector, or shall thereby compel, induce, &c, any elector to give or refrain from giving his vote, shall be guilty of undue influence.

Illegal, as distinguished from ” corrupt,” practices are certain acts and omissions in regard to an election which are now prohibited, whether done or omitted, honestly or dishonestly. They may be classified under the following heads: — (1) Acts which are illegal practices by whomsoever committed. These are as follows: Payment or receipt or contracts to pay or receive money for conveyance of voters to or from the poll, on account of any committee room beyond the number allowed by the act, or to an elector for use of house or land to exhibit addresses, &c, or for exhibition by him (otherwise than in the ordinary course of his business of advertising agent) of such addresses, &c; pay- ment of election expenses otherwise than by or through the election agent, and payment otherwise than to a candidate or election agent of money provided by any other person for election expenses; voting or procuring to vote of any person prohibited from voting, if the person offending knows of the prohibition; knowingly publishing a false statement that a candidate has withdrawn, or publishing with a view to affect the return of a candidate a false statement as to his character or conduct. (2) Acts and omissions which are illegal practices in the case of candidates and agents only, being breaches of duties specially imposed on them. These are the payment or incurring expenses in excess of the maximum authorized by the legislature, the omitting without lawful excuse to make a return and declaration of expenses in due time, and the payment by an election agent of any election expense amounting to 46s. not vouched by bill of particulars and receipt, of any claim for expenses not sent in in due time, or of any such claim after the time allowed for payment thereof. (3) Acts which

are illegal practices when done by a candidate or agent, and are a minor offence when done by any one else. These are illegal payments, employment and hiring, and printing, publishing or posting a bill, placard or poster not bearing on its face the name of the printer or publisher. Illegal payments are knowingly providing money for prohibited pay-* ments or expenses in excess of the maximum, corruptly inducing a candidate to withdraw by payment or promise of payment (the candidate so induced being guilty of the like offence), paying or

agreeing to pay for torches, flags, banners, cockades, ribbons and other marks of distinction (the receiver being guilty of the like offence if he is aware of the illegality). Illegal employment is the employment for payment or promise of payment of persons beyond the number allowed by the legislature or for purposes not authorized. The employe is guilty of the like offence if he knows of the illegality. Illegal hiring is the letting or lending, or the employing, hiring, borrowing or using to carry voters to the poll of stage, or hackney carriages, or horses, or of carriages or horses ordinarily let for hire, and the hiring of committee rooms in premises licensed for the sale of intoxicants, in a club (not being a permanent political club) where intoxicants are sold, in premises where refreshments are ordinarily sold, or in a public elementary school in receipt of a parliamentary grant. Personation and aiding, abetting, &c, of personation are felonies punishable with two years' imprisonment with hard labour. All other corrupt practices are indictable misdemeanours (in Scotland, crimes and offences) punishable with one year's imprisonment, with or without hard labour, or a fine not exceeding £200. Conviction of any corrupt practice also renders the offender incapable for seven years of being registered as an elector, or voting at any election, parliamentary or other, in the United Kingdom, or of holding any public or judicial office, or of being elected to or sitting in the House of Commons; and any such office or seat held by him at the time is vacated. In the case of a parliamentary candidate, if an election court finds that there has been treating or undue influence by him, or any other corrupt practice with his know- ledge or consent, he becomes incapable of ever being elected for the same constituency, and incurs the like incapacities as if he had been convicted on indictment; if it is found by the election court that he has been guilty by his agents of a corrupt practice, he becomes incapable for seven years of being elected for the same constituency. Illegal practices are offences punishable on summary conviction with a fine not exceeding £100, and with five years' incapacity for being registered or voting as a parlia- mentary elector, or an elector to public office within the county or borough where the

offence was committed. Illegal payments, employment and hiring, and printing and publishing of bills, &c, not bearing the printer's or publisher's name, are, when com- mitted by any one who is not a candidate or agent, offences punishable on summary conviction with a fine not exceeding £100, but carry with them no incapacities. Where an election court finds that any illegal practice has been committed with the knowledge or consent of a parliamentary candidate, he becomes incapable for seven years of being elected to or sitting in the House of Commons for the same constituency. He incurs the like incapacity, limited to the duration of the parliament for which the election was held, if the election court finds that he was guilty by his agents of an illegal practice. A prosecution for any of the above offences cannot be instituted more than a year after the offence was committed, unless an inquiry by election com- missioners takes place, in which case it may be instituted at any time within two years from the commission of the offence, not being more than three months after the date of the commissioners' report.

The law as to corrupt and illegal practices, as above stated, applies equally to parliamentary, municipal, county and parish council elections. Incapacities corresponding to those incurred by parliamentary candidates found guilty by an election court are incurred by municipal and other candidates in the like case, e.g. a municipal candidate found personally guilty of a corrupt practice is incapacitated forever, and a candidate found guilty by his agents is incapacitated for three years from holding corporate office in the borough.

See Rogers, On Elections, 3 vols. ; Fraser, Law of Parliamentary Elections.

CORRY, a city of Erie county, Pennsylvania, U.S.A., 37 m. S.E. of Erie, in the N.W. part of the state, at an elevation of about 1430 ft. Pop. (1890) 5677; (1900) 5369 (671 foreign- born); (1910) 5991. It is served by the Erie and the Penn- sylvania railways. Corry is situated in the midst of a fine farming region, which is rich in petroleum and natural gas, and

is widely known for its mineral springs. One mile W. of the city is a state fish hatchery, and there are fine trout streams in the neighbourhood. Among the city's manufactures are steel, engines,

locomotives, radiators, shovels, bricks, flour, furniture and leather. Corry was settled in i860, and was incorporated as a borough in 1863 and as a city in 1866.

CORSAIR (through the Fr. from the Med. Lat. cursarius, a pirate; cursus, or cursa, from currere, to run, being Late Latin for a plundering foray), the name given by the Mediterranean peoples to the privateers of the Barbary coast who plundered the shipping of Christian nations; they were not strictly pirates, as they were commissioned by their respective govern- ments, but the word came to be synonymous, in English, with ” pirate.” The French word corsaire is still used for ” privateer,” and guerre de course is applied to the use in naval warfare of ” commerce-destroyers.” (See Pirate, Barbary Pirates and Privateer.)

CORSICA (Fr. Corse), a large island of the Mediterranean, forming a department of France. It is situated immediately to the north of Sardinia (from which it is separated by the narrow strait of Bonifacio), between 41 21′ and 43 N. and 8° 30′ and 9° 30′ E. Area, 3367 sq.m. Pop. (1906) 291,160. Corsica lies within 54 m. W. of the coast of Tuscany, 98 m. S. of Genoa and 106 m. S.E. of the French coast at Nice. The extreme length of the island is 114 m. and its breadth 52 m. The greater part of the surface of Corsica is occupied by forest-clad mountains, whose central ridge describes a curve from N.W. to S.W., pre- senting its convexity towards the E. Secondary chains diverge in all directions from this main range, enclosing small basins both geographically and socially isolated; on the west and. south of the island they either terminate abruptly on the shore or run out to a great distance into the sea, forming picturesque bays and gulfs, some of which afford excellent harbours. The highest peaks are the Monts Cinto (8881 ft.), Rotondo (8612), Paglia Orba (8284), Padro (7851) and d’Oro (784s). On the eastern side of the island, between Bastia and Porto Vecchio, there intervenes between the mountains and the sea a considerable tract of low and unhealthy, but fertile country, and the coast is fringed in places by lagoons.

Geology. — Corsica may be divided into two parts, which are geo- logically distinct, by a line drawn from Belgodere through Corte to the east coast near Favone. West of this line the island is com- posed chiefly of granite, with a large mass of granophyres, quartz porphyries and similar rocks forming the high mountains around Mt. Cinto; but between the Gulfs of Porto and Galeria, schists, limestones and anthracite, containing fossils of Upper Carboniferous age, occur. The famous orbicular diorite of Corsica is found near Sta. Lucia-di-Tallano in the arrondissement of Sartene. In the eastern part of the island the

predominant rocks are schists of unknown age, with intrusive masses of serpentine and euphotide. Folded amongst the schists are strips of Upper Carboniferous beds similar to those of the west coast. Overlying these more ancient rocks are limestones with Rhaetic and Liassic fossils, occurring in small patches at Oletta, Morosaglia, &c. Nummulitic limestone of Eocene age is found near St Florent, and occupies several large basins near the boundary between the granite and the schist. Mio- cene molasse with Clypeaster, &c, forms the plain of Aleria on the east coast, and occurs also at St Florent in the north and Bonifacio in the south. A small patch of Pliocene has been found near Aleria. The caves of Corsica, especially in the neighbourhood of Bastia, contain numerous mammalian remains, the commonest of which belong to Lagomys corsicanus, Cuv.

See Hollande, ” Geologie de la Corse,” Ann. set. gSol., vol. ix. (1877) ; Nentien, ” fitudes sur les gites mineraux de la Corse,” Ann. Mines Paris, ser. 9, vol. xii. pp. 231-296, pi. v. (1897).

Corsica is well watered by rivers and torrents, which, though short in their course, bring down large volumes of water from the mountains. The longest is the Golo, which rises in the pastoral region of Niolo, isolated among the mountains to the west of Corte and inhabited by a distinct population of obscure origin. It enters the sea on the east coast to the south of the salt-water lake of Biguglia; farther south, on the same side of the island, is the Tavignano, while on the west there are the Liamone, the Gravone and the Taravo. The other streams are all comparatively small. Owing to the rugged and indented outline of the western coast there are an unusual number of bays and harbours. Of the bays the most important are

Porto, Sagone, Ajaccio and Valinco; of the ports, St Florent (San Fiorenzo), He Rousse (Isola Rossa), Calvi, Ajaccio and Propriano. On the eastern side, which is much less rugged and broken, the only harbours worth mentioning are those of Bastia and Porto Vecchio (the Portus Syracusanus of the ancients), and the only gulfs those of Porto Vecchio and Santa Manza. At the extreme south are the harbour and town -of Bonifacio, giving name to the strait which separates Corsica from Sardinia.

The climate of the island ranges from warmth in the low- lands to extreme rigour in the mountains. The intermediate region is the most temperate and healthy. The mean annual temperature at Ajaccio is 63 F. The dominant winds are those from the south-west and south-east.

There are mines of anthracite, antimony and copper; the island

produces granite, building stone, marble, and amianthus, and there are salt marshes. Among other places Guagno, Pardina Guitera, and Orezza have miijeral springs.

The agriculture of Corsica suffers from scarcity of labour, due partly to the apathy of the inhabitants, and from scarcity of capital. The cultivation of cereals, despite the fertility of the soil, is neglected; wheat is grown to some extent, but in this respect, the population is dependent to a large degree on outside supplies. The culture of fruit, especially of the vine, cedrates, citrons and olives (for which the Balagne region, in the north- west, is noted), of vegetables and of tobacco, and sheep and goat rearing are the main rural industries, to which may be added the rearing of silk-worms. The exploitation of the fine forests, which contain the well-known Corsican pine, beeches, oaks and chestnuts, is also an important resource, but tends to proceed too rapidly. Chestnuts are exported, and, ground into flour, are used as food by the mountaineers. Most of the inhabitants are proprietors of land, but often the properties are so split up that many hours, or even a whole day, are spent in going from the vineyard or olive plantation to the arable land in the plain or the chestnut-wood in the mountain. A great part of the agricultural labour is performed by labourers from Tuscany and Lucca, who periodically visit the island for that purpose. Sheep of a peculiar breed, resembling chamois and known as mouflons, inhabit the more inaccessible parts of the mountains. The uncultivated districts are generally overgrown with a thick tangled underwood, consisting of arbutus, myrtle, thorn, laurel broom and other fragrant shrubs, and known as the maquis, the fragrance of which can be distinguished even from the sea.

Fishing and shooting are allowed almost everywhere to the possessor of a government licence; special permission, where it is necessary, is easily obtained. Wild boars, stags, in the eastern districts, and hares as well as the mouflon are found, while partridges, quail, woodcock, wild duck and water-fowl are abundant. Trout and eels are the chief fish. The flesh of the Corsican blackbird is considered a delicacy. The fisheries of tunny, pilchard and anchovy are extensively prosecuted for the supply of the Italian markets; but comparatively few of the natives are engaged in this industry.

The Corsican is simple and sober but unenterprising; dignified and proud, he is possessed of a native courtesy, manifested in his hospitality to strangers, the refusal of which is much resented. He is, however, implacable towards his own countrymen when his enmity is once aroused, and the practice of the blood-feud or vendetta has not died out. Each individual is attached to some powerful family, and the

influence of this usage is specially marked in politics, the individual voting with his clan on pain of arousing the vindictiveness of his fellow-members. Another dominant factor in social life in Corsica is the almost universal ambition on the part of the natives towards an official career, a tendency from which commerce and agriculture inevitably suffer.

The manufactures of the island are of small importance. They include the extraction of gallic acid from chestnut-bark, the preparation of preserved citrons and other delicacies, and of macaroni and similar foods and the manufacture of fancy goods and cigars.

The chief ports are Bastia, Ajaccio and He Rousse. A railway

runs from Bastia to Ajaccio with branches to Calvi and Ghiso- naccia, but, in general, lack of means of communication as well as of capital are a barrier to commercial activity. In 1905 imports reached a value of £113,000. The chief were tobacco, furniture and wooden goods, wine, cereals, coal, cheese and bran. Exports were valued at £336,000, and included chestnut-extract, charcoal, timber, citrons and other fruits, seeds, casks, skins, chestnuts and tanning bark.

Corsica is divided into five arrondissements (chief towns — Ajaccio, Bastia, Calvi, Corte and Sartene), with 62 cantons and 364 communes. It forms part of the academic, (educational circumscription) and archiepiscopal province of Aix (Bouches-du- Rhone) and of the region of the XV. army corps. The principal towns are Ajaccio, the capital and the seat of the bishop of the island and of the prefect ; Bastia, the seat of the court of appeal and of the military commander; Calvi, Corte and Bonifacio. Other places of interest are St Jlorent, near which stand the ruins of the cathedral (12th century) of the vanished town of Nebbio; Murato, which has a church (12th or 13th century) of Pisan architecture, which is exemplified in other Corsican churches; and Cargese, where there is a Greek colony, dating from the 17th century. Near Lucciana are the ruins of a fine Romanesque church called La Canonica. Megalithic monuments are numerous, chief among them being the dolmen of Fontanaccia in the arrondisse- ment of Sartene.

History. — The earliest inhabitants of Corsica were probably Ligurian. The Phocaeans of Ionia were the first civilized people to establish settlements there. About 560 B.C. they landed in the island and

founded the town of Alalia. By the end of the 6th century, however, their power had dwindled before that of the Etruscans, who were in their turn driven out by the Carthaginians. The latter were followed by the Romans, who gained a footing in the island at the time of the First Punic War, but did not estab- lish themselves there till the middle of the 2nd century B.C. Both Marius and Sulla founded colonies — the one 1 at Mariana (near Lucciana) in 104, the second at Aleria in 88. In the early centuries of the Christian era Corsica formed one of the senatorial provinces of the Empire, but though it was in continuous commercial communication with Italy, it was better known as a place of banishment for political offenders. One of the most distinguished of those was the younger Seneca, who spent in exile there the eight years ending a.d. 49.

During the break-up of the Roman empire in the West the possession of Corsica was for a while disputed between the Vandals and the Gothic allies of the Roman emperors, until in 469 Genseric finally made himself master of the island. For 65 years the Vandals maintained their domination, the Corsican forests supplying the wood for the fleets with which they terror- ized the Mediterranean. After the destruction of the Vandal power in Africa by Belisarius, his lieutenant Cyril conquered Corsica (534) which now, under the exarchate of Africa, became part of the East Roman empire. The succeeding period was one of great misery. Goths and Lombards in turn ravaged the island, which in spite of the prayers of Pope Gregory the Great the exarch of Africa did nothing to defend; the rule of the Byzantines was effective only in grinding excessive taxes out of the wretched population; and, to crown all, in 713 the Mussul- mans from the northern coast of Africa made their first descent upon the island. Corsica remained nominally attached to the East Roman empire until Charlemagne, having overthrown the Lombard power in Italy (774), proceeded to the conquest of the island, which now passed into the hands of the Franks. In 806, however, occurred the first of a series of Moorish incursions from Spain. Several times defeated by the emperor’s lieutenants, the Moors continually returned, and in 810 gained temporary possession of the island. They were crushed and exterminated by an expedition under the emperor’s son Charles, but none the less returned again and again. In 828 the defence of Corsica was entrusted to Boniface II., count of the Tuscan march, who conducted a successful expedition against the African Mussul- mans, and returning to Corsica built a fortress in the south of the island which formed the nucleus of the town (Bonifacio) that

bears his name. Boniface’s war against the Saracens was continued by his son Adalbert, after he had been restored to his father’s dignities in

846; but, in spite of all efforts, the Mussul- mans seem to have remained in possession of part of the island until about ‘930. Corsica, of which Berengar II., king of Italy, had made himself master, became in 962, after his dethronement by Otto the Great, a place of refuge for his son Adalbert, who succeeded in holding the island and in passing it on to his son, another Adalbert. This latter was, however, defeated by the forces of Otto II., and Corsica was once more attached to the marquisate of Tuscany, of which Adalbert was allowed to hold part of the island in fee.

The period of feudal anarchy now began, a general mellay of petty lords each eager to expand his domain. The counts of Cinarca, especially, said to be descended from Adalbert, aimed at establishing their supremacy over a/ J a the whole island. To counteract this and similar muae. ambitions, in the nth century, a sort of national diet was held, and Sambucuccio, lord of Alando, put himself at the head of a movement which resulted in confining the feudal lords to less than half of the island to the south, and in establishing in the rest, henceforth known as the Terra di Comune, a sort of republic composed of autonomous parishes. This system, which survived till the Revolution, is thus described by Jacobi (torn. i. p. 137). ” Each parish or commune nominated a certain number of councillors who, under the name of ‘ fathers of the commune,’ were charged with the administration of justice under the direction of a podesta, who was as it were their president. The podestas of each of the states or enfranchised districts chose a member of the supreme council charged with the making of laws and regulations for the Terra di Comune. This council or magistracy was called the Twelve, from the number of districts taking a share in its nomination. Finally, in each district the fathers of the commune elected a magistrate who, under the name of caporale, was entrusted with the defence of the interests of the poor and weak, with seeing that justice was done to them, and that they were not made the victims of the powerful and rich.”

Meanwhile the south remained under the sway of the counts of Cinarca, while in the north feudal barons maintained their independence in the promontory of Cape Corso. In- ternal feuds continued; William, marquis of Massa, of S over- the family known later as the Malaspina, was called in eigaty. by the communes (1020), drove out the count of Cinarca, reduced the barons to order, and in harmony with the communes established a dominion which he was able to hand on to his son. Towards the end of the nth century, however, the popes laid claim to the island in virtue of the donation of Charle- magne, though the Frankish conqueror had promised at most the reversion of the lands of the Church. The Corsican clergy sup-

ported the claim, and in 1077 the Corsicans declared themselves subjects of the Holy See in the presence of the apostolic legate Landolfo, bishop of Pisa. Pope Gregory VII. thereupon invested the bishop and his successors with the island, an investiture confirmed by Urban II. in 1 190 and extended into a concession of the full sovereignty. The Pisans now took solemn possession of the island and their ” grand judges ” (judices) took the place of the papal legates. Corsica, valued by the Pisans as by the Vandals as an inexhaustible storehouse of materials for their fleet, flourished exceedingly under the en- lightened rule of the great commercial republic. Causes of dissension remained, however, abundant. The Corsican bishops repented their subjection to the Pisan archbishop; the Genoese intrigued at Rome to obtain a reversal of the papal gift to the rivals with whom they were disputing the supremacy of the seas. Successive popes followed conflicting policies in this respect; until in 1138 Innocent II., by way of compromise, divided the ecclesiastical jurisdiction of the island between the archbishops of Pisa and Genoa. This gave the Genoese great influence in Corsica, and the contest between the Pisans and Genoese began to distract the island. It was not, however, till n 95 that the Genoese, by capturing Bonifacio — a nest of pirates preying on the

Rule oi Pisa.

commerce of both republics — actually gained a footing in the country. For twenty years the Pisans fought to recover the fortress for themselves, until in 12 17 the pope settled the matter by taking it into his own hands.

Throughout the 13th century the struggle between Pisans and Genoese continued, reproducing in the island the feud of Ghibellines and Guelphs that was desolating Italy. In order to put a stop to the ruinous anarchy the chiefs of the Terra di Comune called in the marquis Isnard Malaspina; the Pisans set up the count of Cinarca once more; and the war between the marquis, the Pisans and Genoese dragged on with varying fortunes, neither succeeding in gaining the mastery. Then, in 1 298, Pope Boniface VIII. added to the complication by investing King James of Aragon with the sovereignty of Corsica and of Sardinia. In 1325, after long delay, the Aragonese attacked and reduced Sardinia, with the result that the Pisans, their sea-power shattered, were unable to hold their own in Corsica. A fresh period of anarchy

followed until, in 1347, a great assembly of caporali and barons decided to offer the sovereignty of the island to Genoa. A regular tribute was to be paid to the re- public; the Corsicans were to preserve their laws and customs, under the council of Twelve in the north and a council of Six in the south; Corsican interests were to be represented at Genoa by an orator.

The Genoese domination, which began under evil auspices — for the Black Death killed off some two-thirds of the population — ■ was not destined to bring peace to the island. The Genoese fgudgj barons of the south and the hereditary caporali tion. ‘ 0I the north alike resisted the authority of the Genoese governors ; and King Peter of Aragon took advantage of their feuds to reassert his claims. In 1372 Arrigo, count of La Rocca, with the assistance of Aragonese troops, made himself master of the island; but his very success stirred up against him the barons of Cape Corso, who once more appealed to Genoa. The republic, busied with other affairs, hit upon the luckless expedient of investing with the governorship of the island a’ sort of chartered company, consisting of five persons, known as the Maona. They attempted to restore order by taking Arrigo della Rocca into partnership, with disastrous results. In 1380 four of the ” governors of the Maona ” resigned their rights to the Genoese republic, and Leonello Lomellino was left as sole governor. It was he who, in 1383, built Bastia on the north coast, which became the bulwark of the Genoese power in the island. It was not till 1401, after the death of Count Arrigo, that the Genoese domination was temporarily re-established.

Meanwhile Genoa itself had fallen into the hands of the French, and in 1407 Leonello Lomellino returned as governor with the title of count of Corsica bestowed on him by Charles VI. of France. But Vincentello d’ Istria, who had gained distinction in the service of the king of Aragon, had captured Cinarca, rallied round him all the communes of the Terra di Comune, proclaimed him- self count of Corsica at Biguglia and even seized Bastia. Lomel- lino was unable to make headway against him, and by 1410 all Corsica, with the exception of Bonifacio and Calvi, was lost to Genoa, now once more independent of France. A feud of Vincentello with the bishop of Mariana, however, led to the loss of his authority in the Terra di Comune ; he was compelled to go to Spain in search of assistance, and in his absence the Genoese reconquered the island. Not, however, for long. The Great Schism was too obvious an opportunity for quarrelling for the Corsicans to neglect; and the Corsican bishops and clergy were more ready with the carnal than with spiritual weapons. The suffragans of Genoa fought for Benedict XIII., those of Pisa for John XXIII.; and when

Vincentello returned with an Aragonese force he was able to fish profitably in troubled waters. He easily captured Cinarca and Ajaccio, came to terms with the Pisan bishops, mastered the Terra di Comune and built a strong castle at Corte; by 1419 the Genoese possessions in Corsica were again reduced to Calvi and Bonifacio.

At this juncture Alphonso of Aragon arrived, with a large fleet, to take possession of the island. Calvi fell to him; but Bonifacio held out, and its resistance gave time for the

The bank of San

Corsicans, aroused by the tyranny and exactions of the Aragonese, to organize revolt. In the end the siege of Bonifacio was raised, and the town, confirmed in its privileges, became practically an independent republic ; a ™^” ese under Genoese protection. As for Vincentello he vention. managed to hold his own for a while; but ultimately the country rose against him, and in 1435 he was executed as a rebel by the Genoese, who had captured him by surprise in the port of Bastia.

The anarchy continued, while rival factions, nominal adherents of the Aragonese and Genoese, contended for the mastery. Profiting by the disturbed situation, the Genoese doge, Janus da Fregoso, succeeded in reducing the island, his artillery secur- ing him an easy victory over the forces of Count Paolo della Rocca (1441). To secure his authority he built and fortified the new city of San Fiorenzo, near the ruins of Nebbio. But again the Aragonese intervened, and the anarchy reached its height. An appeal to Pope Eugenius IV. resulted in the despatch of a pontifical army of 14,000 men (1444), which was destroyed in detail by a league of some of the caporali and most of the barons under the bold leadership of Rinuccio da Leca. A second expedition was more fortunate, and Rinuccio was killed before Biguglia. In 1447 Eugenius was succeeded on the papal throne by Nicholas V., a Genoese, who promptly made over his rights in Corsica, with all the strong places held by his troops, to Genoa. The island was now, in effect, divided between the Genoese republic; the lords of Cinarca, who held their lands in the south under the nominal suzerainty of Aragon; and Galeazzo da Campo Fregoso, who was supreme in the Terra di Comune.

An assembly of the chiefs of the Terra di Comune now decided to offer the government of the island to the Company or Bank of San Giorgio, a powerful commercial corporation established at Genoa in the 14th century. 1 The bank accepted; the Spaniards were driven from the country; o/wyto. and . a government was organized. But the bank

soon fell foul of the barons, and began a war of extermination against them. Their resistance was finally broken in 1460, when the survivors took refuge in Tuscany. But order had scarcely been established when the Genoese Tommasinoda Campo Fregoso, whose mother was a Corsican, revived the claims of his family and succeeded in mastering the interior of the island (1462). Two years later the duke of Milan, Francesco Sforza, overthrew the power of the Fregoso family at Genoa, and promptly proceeded to lay claim to Corsica. His lieutenant had no difficulty in making the island accept the overlordship of the duke of Milan; but when, in 1466, Francesco Sforza died, a quarrel broke out, and Milanese suzerainty became purely nominal save in the coast towns. Finally, in 1484, Tommasino da Campo Fregoso persuaded the duke to Milanese grant him the government of the island. The strong vention. places were handed over to him; he entered into marriage relations with Gian Paolo da Leca, the most powerful of the barons, and was soon supreme in the island.

Within three years the Corsicans were up in arms again. A descendant of the Malaspinas who had once ruled in Corsica, Jacopo IV. (d'Appiano), was now prince of Piombino, and to him the malcontents applied. His brother Gherardo, count of Montagnano, accepted the call, proclaimed himself count of Corsica, and, landing in the island, captured Biguglia and San Fiorenzo; whereupon Tommasino da Campo Fregoso discreetly sold his rights to the bank of San Giorgio. No sooner, however, had the bank — with the assistance of the count of Leca — beaten Count Gherardo than the Fregoso family tried to repudiate their bargain. Their claims were supported by the count of Leca, and it cost the agents of the bank some hard fighting before the turbulent baron was beaten and exiled to Sardinia. Twice he returned, and he was not finally expelled from the country till 1501; it was not till 1511 that the other barons were crushed and

1 See " Conventions entre quelques seigneurs Corses et l'ofnce de St Georges (1453)," in Bulletin soc. scientif. Corse (1881-1882), pp. 286, 305, 413, 501, 549 and (1883) 147; also the report of the deputies sent by the bank to Pope Nicholas V. in 1453, ib. p. 141.

that the bank could consider itself in secure possession of the island.

If the character of the Corsicans has been distinguished in modern times for a certain wild intractableness and ferocity, the cause lies in

their unhappy past, and not least in the character of the rule established by the bank of San Giorgio. The power which the bank had won by ruthless cruelty, it exercised in the spirit of the narrowest and most short-sighted selfishness. Only a shadow of the native institutions was suffered to survive, and no adequate system of administration was set up in the place of that which had been suppressed. In the absence of justice the blood-feud or vendetta grew and took root in Corsica just at the time when, elsewhere in Europe, the progress of civilization was making an end of private war. The agents of the bank, so far from discouraging these internecine quarrels, looked on them as the surest means for preventing a general rising. Concerned, moreover, only with squeezing taxes out of a recalcitrant population, they neglected the defence of the coast, along which the Barbary pirates harried and looted at will; and to all these woes were added, in the 16th century, pestilences and disastrous floods, which tended scill further to impoverish and barbarize the country.

In these circumstances King Henry II. of France conceived the project of conquering the island. From Corsican mercenaries in First French service, men embittered by wrongs suffered at

French the hands of the Genoese, he obtained all the necessary interven- information; by a treaty of alliance concluded at Con-Uon,l553. s tantinople (February i, 1553) with Sultan Suleiman the Magnificent he secured the co-operation of the Turkish fleet. The combined forces attacked the island the same year; the citadel of Bastia fell almost without a blow, and siege was at once laid simultaneously to all the other fortresses. The capitulation of Bonifacio to the Turks, after an obstinate resist- ance, was followed by the treacherous massacre of the garrison; soon, of all the strong places, the Genoese held Calvi alone. At this juncture the emperor Charles V. intervened; a strong force of imperial troops and Genoese was poured into the island, and the tide of war turned. The details of the struggle that followed, in which the Corsican national hero Sampiero da Bastelica gained his first laurels, are of little general importance. Fortresses were captured and recaptured; and for three years French, Germans, Spaniards, Genoese and Corsicans indulged in a carnival of mutual slaughter and outrage. The outcome of all this was a futile reversion to the status quo. In 1 5 36, indeed, the conclusion of a truce left Corsica — with the exception of Bastia — in the hands of the French, who proceeded to set up a tolerable govern- ment; but in 1559, by the treaty of Cateau-Cambresis, the island was restored to the bank of San Giorgio, from which it was at once taken over by the Genoese republic.

Trouble at once began again. The Genoese attempted to levy a tax which the Corsicans refused to pay; in violation of the

terms of the treaty, which had stipulated for a uni- Sampiero versa i amnesty, they confiscated the property of Bastelica. Sampiero da Bastelica. Hereupon Sampiero again put

himself at the head of the national movement. The suzerainty of the Turk seemed preferable to that of Genoa, and, armed with letters from the king of France, he went to Constanti- nople to ask the aid of a fleet for the purpose of reducing Corsica to the status of an Ottoman province. 1 All his efforts to secure foreign help were, however, vain; he determined to act alone, and in June 1564 landed at Valinco with only fifty followers. His success was at first extraordinary, and he was soon at the head of 8000 men; but ultimate victory was rendered impossible by the indiscipline among the Corsicans and by the internecine feuds of which the Genoese well knew how to take advantage. For over two years a war was waged in which quarter was given on neither side; but after the assassination of Sampiero in 1567 the spirit of the insurgents was broken. In 1568 an honourable peace, including a general amnesty, was arranged with the Genoese commander Giorgio Doria by Sampiero's son Alphonso

1 Haramer-Purgstall, Gesch. des Osmanischen Reichs (Pest, 1840), ii. 288.

d'Ornano, who with 300 of his friends emigrated to Fiance, where he rose to be a marshal under Henry IV.

From this time until 1729 Corsica remained at peace under the government of Genoa. It was, however, a peace due to lassitude and despair rather than contentment. The settlement of 1568 had reserved a large measure of autonomy to the Corsicans; during the years that followed this was withdrawn piecemeal, until, disarmed and powerless, they were excluded from every office in the administration. Nor did the Genoese substitute any efficient system for that which they had destroyed. In the absence of an effective judiciary the vendetta increased; in the absence of effective protection the sea-board was exposed to the ravages of the Barbary pirates, so that the coast villages and towns were abandoned and the inhabitants withdrew into the interior, leaving the most fertile part of the country to fall into the condition of a malarious waste. To add to all this, in 1576 the population had been decimated by a pestilence. Emigration en masse continued, and an attempt to remedy this by introducing a colony of Greeks in 1688 only added one more element of discord to

the luckless island. To the Genoese Corsica continued to be merely an area to be exploited for their profit; they monopolized its trade; they taxed it up to and beyond its capacity; they made the issue of licences to carry firearms a source of revenue, and studiously avoided interfering with the custom of the vendetta which made their fiscal expedient so profitable. 2

In 1729 the Corsicans, irritated by a new hearth-tax known as the due seini, rose in revolt, their leaders being Andrea Colonna Ceccaldrand Luigi Giafferi. As usual, the Genoese were soon confined to a few coast towns; but the ti729 intervention of the emperor Charles VI. and the despatch of a large force of German mercenaries turned the tide of war, and in 1732 the authority of Genoa was re-estab- lished. Two years later, however, Giacinto Paoli once more raised the standard of revolt; and in 1735 an assembly at Corte proclaimed the independence of Corsica, set up a constitution, and entrusted the supreme leadership to Giafferi, Paoli and Ceccaldi. Though the Genoese were again driven into the fortresses, lack of arms and provisions made any decisive success of the insurgents impossible, and when, on the 12th of March 1736, the German adventurer Baron Theodor von Neuhof arrived with a shipload of muskets and stores and the assurance of further help jˆiag to come, leaders and people were glad to accept his aid Theodore on his own conditions, namely that he should be ot acknowledged as king of Corsica. On the 15th of Corsica. April, at Alesani, an assembly of clergy and of representatives of the communes, solemnly proclaimed Corsica an independent kingdom under the sovereignty of Theodore “I.” and his heirs. The new king’s reign was not fated to last long. The Optra bouffe nature of his entry on the stage — he was clad in a scarlet caftan, Turkish trousers and a Spanish hat and feather, and girt with a scimitar — did not, indeed, offend the unsophisticated islanders; they were even ready to take seriously his lavish bestowal of titles and his knightly order “della Liberazione”; they appreciated his personal bravery; and the fact that the Genoese government denounced him as an impostor and set a price on his head could only confirm him in their affection. But it was otherwise when the European help that he had promised failed to arrive, and, still worse, the governments with which he had boasted his influence disclaimed him. In November he thought it expedient to proceed to the continent, ostensibly in search of aid, leaving Giafferi, Paoli and Luca d’Ornano as regents. In spite of several attempts, he never succeeded in returning to the island. The Corsicans, weary of the war, opened negotiations with the Genoese; but the refusal of the latter to regard the islanders as other than rebels made a mutual agreement impossible. Finally the republic decided to seek the aid of France, and

in July 1737 a treaty was signed by which the French king bound himself to reduce the Corsicans to order, t

2 Father Cancellotti, who visited every part of the island, estimated the number of murders committed in 20 years at 28,000 (quoted in the article on Corsica in La Grande Encyclopedic).

Sardinian and British Intervene tlon, 1746.

The object of the French in assisting the Genoese was not the acquisition of the island for themselves so much as to obviate inter- the danger, of which they had long been aware, of its vention of falling into the hands of another power, notably Great France, Britain. The Corsicans, on the other hand, though lT38 ‘ ready enough to come to terms with the French king,

refused to acknowledge the sovereignty of Genoa even when backed by the power of France. A powerful French force, under the comte de Boissieux, arrived in the spring of 1738, and for some months negotiations proceeded. But the effect of the French guarantee of Corsican liberties was nullified by the demand that the islanders should surrender their arms, and the attempt of Boissieux to enforce the order for disarmament was followed, in the winter of 1738-39, by his defeat at the hands of the Cor- sicans and by the cutting up of several isolated French detach- ments. In February 1739 Boissieux died. His successor, the marquis de Maillebois, arrived in March with strong reinforce- ments, and by a combination of severity and conciliation soon reduced the island to order. Its maintenance, however, depended on the presence of the French troops, and in October 1740 the death of the emperor Charles VI. and the outbreak of the War of the Austrian Succession necessitated their withdrawal. Genoese and Corsicans were once more left face to face, and the perennial struggle began anew.

In 1743 ” King Theodore,” supported by a British squadron, made a descent on the island, but finding that he no longer possessed a following, departed never to return. The Corsicans, assembled in diet at Casinca, now elected Giampietro Gaffori and Alerio Matra as generals and ” protectors of the fatherland ” (protettori della p atria) , and began a vigorous onslaught on the Genoese strong- holds. They were helped now by the sympathy and active aid of European powers,

and in 1746 Count Domenico Rivarola, a Corsican in Sardinian service, succeeded in capturing Bastia and San Fiorenzo with the aid of a British squadron and Sardinian troops. The factious spirit of the Corsicans themselves was, however, their worst enemy. The British commander judged it inexpedient to intervene in the affairs of a country of which the leaders were at loggerheads; Rivarola, left to himself, was unable to hold Bastia — a place of Genoese sympathies — and in spite of the collapse of Genoa itself, now in Austrian hands, the Genoese governor succeeded in maintaining himself in the island. By the time of the signature of the peace of Aix-la-Chapelle, in 1748, the situation of the island had again changed. Rivarola and Matra had departed, and Gaffori was left nominally supreme over a people torn by intestine feuds. Genoa, too, had expelled the Austrians with French aid, and, owing to a report that the king of Sardinia was meditating a fresh attempt to conquer the island, a strong French expedition under the marquis de Cursay had, at the request of the republic, occupied Calvi, Bonifacio, Ajaccio and Bastia. By the terms of the treaty of Aix-la-Chapelle, Renewed Corsica was once more assigned to Genoa, but the French French garrison remained, pending a settlement inter- between the republic and the islanders. In view of the vea on. intractable temper of the two parties no agreement could be readied; but Cursay ‘s persona] popularity served to preserve the peace for a while. His withdrawal in 1752, however, was the signal for a general rising, and once more, at a diet held at Orezza, Gaffori was elected general and protector. In October of the following year, however, he fell victim to a vendetta and the nation was once more leaderless. His place was taken for a while *by Clemente Paoli, son of Giacinto, who for a year or two suc- ceeded, with the aid of other lieutenants of Gaffori, in holding the Genoese at bay. He was, however, by temperament unfitted to lead a turbulent and undisciplined people in time of stress, and in 1755, at his suggestion, his brother Pasquale was invited to come from Naples and assume the command.

The first task of Pasquale Paoli, elected general in April at an assembly at San Antonio della Casabianca, was to suppress the rival faction led by Emanuele Matra, son of Gaffori’s former colleague. By the spring of 1756 this was done, and the Cor- sicans were able to turn a united front against the Genoese. At

this juncture the French, alarmed by a supposed understanding between Paoli and the British, once more intervened, and occupied Calvi, Ajaccio and San Fiorenzo until 1757, when their forces were once more called away by the wars on the pˆl” continent. In 1758 Paoli renewed the attack on the Genoese, founding the new port of Isola Rossa as a centre whence the Corsican ships could attack the

trading vessels of Genoa. The republic, indeed, was now too weak to attempt seriously to re- assert its sway over the island, which, with the exception of the coast towns, Paoli ruled with absolute authority and with con- spicuous wisdom. In the intervals of fighting he was occupied in reducing Corsican anarchy into some sort of civilized order. The vendetta was put down, partly by religious influence, partly with a stern hand; the surviving oppressive rights of the feudal signori were abolished; and the traditional institutions of the Terra di Comune were made the basis of a democratic constitution for the whole island.

As regarded the relations of Corsica all now depended on the attitude of France to which both Paoli and the republic made overtures. In 1764 a French expedition under the comte de Marbeuf arrived, and, by agreement with C °,ˆ ca Genoa, garrisoned three of the Genoese fortresses. France. Though Genoese sovereignty had been expressly recognized in the agreement authorizing this, it was in effect non-existent. French and Corsicans remained on amicable terms, and the inhabitants of the nominally Genoese towns actually sent representatives to the national consulta or parliament. The climax came early in 1767 when the Corsicans captured the Genoese island of Capraja, and occupied Ajaccio and other places, evacuated by the French as a protest against the asylum given to the Jesuits exiled from France. Genoa now recognized that she had been worsted in the long contest, and on the 1 5th of May 1768 signed a treaty selling the sovereignty of the island to France.

The Corsicans, intent on independence, were now faced with a more formidable enemy than the decrepit republic of Genoa. A section of the people indeed, were in favour of submission; but Paoli himself declared for resistance; and among those who supported him at the consulta summoned to discuss the question was his secretary Carlo Buonaparte, father of Napoleon Bona- parte, the future emperor of the French. Into the details of the war that followed, it is impossible to e”hter here; in the absence of the hoped-for help from Great Britain its issue could not be doubtful; and, though the task of the French was a hard one, by the summer of 1769 they were masters of the island. On the 1 6th of June Pasquale and Clemente Paoli, with some 400 of their followers, embarked on a British ship for Vaguest Leghorn. On the 15th of September 1770, a general assembly of the Corsicans was summoned and the deputies swore allegiance to King Louis XV.

For twenty years Corsica, while preserving many of its old institutions, remained a dependency of the French crown. Then came the Revolution, and the island, conformed Corsica to the new model, was

incorporated in France as a and the separate department (see Renucci, ii. p. 271 seq.). revolution Paoli, recalled from exile by the National Assembly otl7S9, on the motion of Mirabeau, after a visit to Paris, where he was acclaimed as “the hero and martyr of liberty ” by the National Assembly and the Jacobin Club, returned in 1790 to Corsica, where he was received with immense enthusiasm and acclaimed as ” father of the country.” With the new order in the island, however, he was little in sympathy. In the towns branches of the Jacobin Club had been established, and these tended, as elsewhere, to usurp the functions of the regular organs of government and to introduce a new element of discord into a country which it had been Paoli’s life’s work to unify. Suspicions of his loyalty to revolutionary principles had already been spread at Paris by Bartolomeo Arena, a Corsican deputy and ardent Jacobin, so early as 1791; yet in 1792, after the fall of the monarchy, the French government, in its anxiety to secure Corsica, was rash enough to appoint him lieutenant-general of the forces and governor (capo comandante) of the island. Paoli accepted an office which he had refused two years before at the

hands of Louis XVI. With the men and methods of the Terror, however, he was wholly out of sympathy. Suspected of throwing obstacles in the way of the expedition despatched in 1793 against Sardinia, he was summoned, with the procurator-general Pozzo di Borgo, to the bar of the Convention. Paoli now openly defied the Convention by summoning the representatives of the com- . munes to meet in diet at Corte on the 27th of May. under ^° t ‘ le remonstrances of Saliceti, who attended the Paoli. meeting, he replied that he was rebelling, not

against France, but against the dominant faction of whose actions the majority of Frenchmen disapproved. Saliceti thereupon hurried to Paris, and on his motion Paoli and his sympathizers were declared by the Convention hors la loi (June 26) .

Paoli had already made up his mind to raise the standard of revolt against France. But though the consulta at Corte British elected him president, Corsican opinion was by no occupa- ‘means united. Napoleon Bonaparte, whom Paoli had Hon, 1794- expected to win over to his views, indignantly rejected the idea of a breach with France, and the Bonapartes were henceforth ranked with his enemies. Paoli now appealed for assistance to the British government, which

despatched a considerable force. By the summer of 1 794, after hard fighting, the island was reduced, and in June the Corsican assembly formally offered the sovereignty to King George III. The British occupation lasted two years, the island being administered by Sir Gilbert Elliot. Paoli, whose presence was considered inexpedient, was invited to return to England, where he remained till his death. In 1796 Bonaparte, after his victorious Italian campaign, sent an expedition against Corsica. The British, weary of a somewhat thankless task, made no great resistance, and in October the island was once more in French hands. It was again occupied by Great Britain for a short time in 1814, but in the settlement of 1815 was restored to the French crown. Its history henceforth is part of that of France.

See F. Girolami-Cortona, Geographic generate de la Corse (Ajaccio, 1893); A. Andrei, A travers la Corse (Paris, 1893); Forcioli-Conti, Notre Corse (Ajaccio, 1897); R. Le Joindre, La Corse et les Corses (Paris, 1904) ; F. O. Renucci, Storia di Corsica (2 vols., Bastia, 1833), fervidly Corsican, but useful; Antonio Pietro Filippini, Istoria di Corsica (1st ed., 1594; 2nd ed., corrected and illustrated with unpublished documents by G. C. Gregori, 5 vols., Pisa, 1827-1832); J. M. Jacobi, Hist. gen. de la Corse, 2 vols., Paris, 1833-1835), with many unpublished documents; L. H. Caird, History of Corsica (London, 1899). Further works and references to articles in reviews, &c, are given in Ulysse Chevalier's Repertoire des sources, &c, Topo-bibliographie, t. ii. s.v.

CORSICANA, a city and the county-seat of Navarro county, Texas, U.S.A., situated in the N.E. part of the state, about 55 m-. S. of Dallas. Pop. (1890) 6285; (1900) 9313, of whom 2399 were of negro descent; (1910 census) 9749. It is served by the Houston & Texas Central, the St Louis South Western, and the Trinity & Brazos Valley railways. It is the centre of a large and productive wheat- and cotton-growing region, which has also numerous oil wells (with a total produc- tion in 1907 of 226,311 barrels). The city has two oil refineries, a large cotton j gin and a cotton compress, and among its manufactures are cotton-seed oil, cotton-cloth, flour and ice. The total value of the factory product in 1905 was $1,796,805, being an increase of 50-3% since 1900. Natural gas is ex- tensively used for fuel and for lighting. Corsicana is the seat of the Texas state orphan home and of an Odd Fellows widows' and orphans' home, and has a Carnegie library. Corsicana was named in honour of the wife of a Mexican, Navarro, who owned a large tract of land in the county and from whom the county was named. The first permanent settlement here was made in 1848, and Corsicana was incorporated as a village in 1850 and chartered as a city in 1871.

CORSINI, the name of a Florentine princely family, of which the founder is said to be Neri Corsini, who flourished about the year n 70. Like other Florentine nobles the Corsini had at first no titles, but in more recent times they received many from foreign potentates and from the later grand dukes of Tuscany. The emperor Charles IV. created the head of the house a count palatine in 137 1; the marquisate of Sismano was conferred on

them in 1620, those of Casigliano and Civitella in 1629, of Lajatico and Orciatico in 1644, of Giovagallo and Tresana in 1652; in 1730 Lorenzo Corsini was elected pope as Clement XII., and conferred the rank of Roman princes and the duchy of Casigliano on his family, and in 1732 they were created grandees of Spain. They own two palaces in Florence, one of which on the Lung' Arno Corsini contains the finest private picture gallery in the city, and many villas and estates in various parts of Italy.

See L. Passerini, Genealogia e storia delta famiglia Corsini (Florence, 1858); A. von Reumont, Geschichte der Stadt Rom (Berlin, 1868); Almanack de Goiha. (L. V.*)

CORSON, HIRAM (1828-), American scholar, was born on the 6th of November 1828, in Philadelphia, Pennsylvania. He held a position in the library'of the Smithsonian Institution, Washington D. ˆ1849-1856),

was a lecturer on English literature in Philadelphia (1859-1865), and was professor of English at Girard College, Philadelphia (1865-1866), and in St John's Col- lege, Annapolis, Maryland (1866-1870). In 1870-1871 he was professor of rhetoric and oratory at Cornell University, where he was professor of Anglo-Saxon and English literature (1 87 2-1 886) , of English literature and rhetoric (1886-1890), and from 1890 to 1903 (when he became professor emeritus) of English literature, a chair formed for him. He edited Chaucer's Legende of Goode Women (1863) and Selections from Chaucer's Canterbury Tales (1896), and wrote a Hand- Book of Anglo-Saxon and Early English (1871), and, among other text-books, An Elocutionary Manual (1864), A Primer of English Verse (1892), and Introductions to the study of Browning (1886, 1889), of Shakespeare (1889) and of Milton (1899). The volume on Shakespeare and the Jottings on the Text of Macbeth (1874) contain some excellent Shake- spearian criticism. He also published The University of the Future (1875), The Aims of Literary Study (1895), and The Voice and Spiritual Education (1896). He translated the Satires of Juvenal (1868) and edited a translation by his wife, Caroline Rollin (d. 1901), of Pierre Janet's Mental State of Hystericals (1901).

CORSSEN, WILHELM PAUL (1820-1875), German philologist, was born at Bremen on the 20th of January 1820, and received his school education in the Prussian town of Schwedt, to which his father, a merchant, had removed. After spending some time at the Joachimsthal Gymnasium in Berlin, where his interest in philological pursuits was awakened by the rector, Meinike, he proceeded to the university, and there came especi- ally under the influence of Bockh and Lachmann. His first important appearance in literature was as the author of Origines poesis romanae, by which he had obtained the prize offered by the " philosophical " or " arts " faculty of the university. In 1846 he was called from Stettin, where he had for nearly two years held a post in the gymnasium, to occupy the position of lecturer in the royal academy at Pforta (commonly called Schulpforta), and there he continued to labour for the next twenty years. In 1854 he won a prize offered by the Royal Prussian Academy of Sciences for the best work on the pronuncia-* tion and accent of Latin, a treatise which at once took rank, on its publication under the title of Uber Aussprache, Vocalismus, und Betonung der lateinischen Sprache (1858-1859), as one of the most erudite and masterly works in its department. This was followed in 1863 by his Kritische Beitrdge zur lat. Formen- lehre, which were supplemented in 1866 by Kritische Nachtrage zur lat. Formenlehre. In the discussion of the pronunciation of Latin he was naturally led to consider the various old Italian' dialects, and the

results of his investigations appeared in miscel- laneous communications to Kuhn's Zeitschrift fiir vergleichende Schriftforschung. Ill-health obliged him to give up his professor- ship at Pforta, and return to Berlin, in 1866; but it produced almost no diminution of his literary activity. In 1867 he pub- lished an elaborate archaeological study entitled the Alterthiimer und Kunstdenkmale des Cistercienserklosters St Marien und der Landesschule Pforta, in which he gathers together all that can be discovered about the history of the Pforta academy, the German " Eton," and in 1868-1869 he brought out a new edition of his

work on Latin pronunciation. From a very early period he had been attracted to the special study of Etruscan remains, and had at various times given occasional expression to his opinions on individual points; but it was not till 1870 that he had the opportunity of visiting Italy and completing his equipment for a formal treatment of the whole subject by personal inspection of the monuments. In 1874 appeared the first volume of Uber die Sprache der Etrusker, in which with great ingenuity and erudition he endeavoured to prove that the Etruscan language was cognate with that of the Romans. Before the second volume (published posthumously under the editorship of Kuhn) had received the last touches of his hand, he was cut off in 187s by a compara- tively early death.

CORT, CORNELIS (1536-1578), Dutch engraver, was born at Horn in Holland, and studied engraving under Hieronymus Cockx of Antwerp. About 1565 he went to Venice, where Titian employed him to execute the well-known copperplates of St Jerome in the Desert, the Magdalen, Prometheus, Diana and Actaeon, and Diana and Calisto. From Italy he wandered back to the Netherlands, but he returned to Venice soon after 1567, proceeding thence to Bologna and Rome, where he produced engravings from all the great masters of the time. At Rome he founded the well-known school in which, as Bartsch tells us, the simple line of Marcantonio was modified by a brilliant touch of the burin, afterwards imitated and perfected by Agostino Caracci in Italy and Nicolas de Bruyn in the Netherlands. Before visiting Italy, Cort had been content to copy Michael Coxcie, F. Floris, Heemskerk, G. Mostaert, Bartholomaus Spranger and Stradan. In Italy he gave circulation to the works of Raphael, Titian, Polidoro da Caravaggio, Baroccio, Giulio Clovio, Muziano and the Zuccari. His connexion with Cockx and Titian is pleasantly illustrated in a letter addressed to the

latter by Dominick Lampson of Liege in 1567. Cort is said to have engraved upwards of one hundred and fifty-one plates. In Italy he was known as Cornelio Fiammingo.

CORTE, a town of central Corsica, 52 m. N.E. of Ajaccio by the railway between that town and Bastia. Pop. (1906) 4839. The upper town is situated on a precipitous rock overhanging the confluence of the Tavignano and Restonica, the rest of the town lying below it on both banks of the rivers. On the summit of the rock stands a citadel built by Vincentello d'Istria (see Corsica). Other interesting buildings are the house in which Pasquale Paoli lived while Corte was the seat of his government (1755 to 1769), and the house of another patriot, Giampietro Gaffori, whose wife defended it from the Genoese in 1750. There are statues of Paoli, of General Gaffori, and of General Arrighi di Casanova, duke of Padua (d. 1853). Corte is capital of an arrondissement of the island, has a subprefecture, a tribunal of first instance and a communal college, and manufactures alimentary paste. There are marble quarries in the vicinity, and the town has trade in wine and timber. In the 18th century Corte was the centre of the resistance to the Genoese, and it was the seat of a university erected by Paoli.

CORTE-REAL, JERONYMO (1533-1588), Portuguese epic poet, came of a noble Portuguese stock. Of the same family were Gaspar Corte-Real, who in 1500 and 1501 sailed to Labrador and the Arctic seas; and his brothers Miguel and Vasco. Their voyages opened the way for important Portuguese fisheries on the Newfoundland coast (see Henry Hamsse, Les Corte-Real et leurs voyages au Nouveau-Monde, and Gasper Corte-Real: la dale exacte de sa derniere expedition au Nouveau- Monde, Paris, 1883). In his youth Jeronymo fought in Africa and Asia according to the custom of noblemen in that age. There is a tradition that he was present at the affair of Tangier on the 18th of May 1 5 53 , when D . Pedro de Menezes met his death. Return- ing home, it is supposed about 1570, he spent the rest of his days in retirement. In 1578 he placed his sword at the disposal of King Sebastian for the fatal expedition to Africa, but the monarch dispensed him from the journey (it is said) on account of his age, and in 1586 we find him acting as provedor of the Miseri- cordia of Evora. He married D. Luiza da Silva, but left no legitimate issue. Corte-Real was painter as well as soldier and

poet, and one of his pictures is still preserved in the church of S. Antao at Evora. His poetical works are believed to have been, composed in his old age at the mansion on his estate near Evora, known as " Valle de Palma." O Segundo cerco de Diu, an epic in 21

cantos, deals with the historic siege of that Indian island- fortress of the Portuguese. First printed in 1 5 74, it had a second edition in 1783, while a Spanish version appeared at Alcala in 1597. Austriada, an epic in 15 cantos celebrating the victory of Don John of Austria over the Turks at Lepanto, was written in Spanish and published in 1578. King Philip 1L accepted the dedication in flattering terms and visited the poet when he came to Portugal. Naufragio de Sepulveda, an epic in 17 cantos, describes the tragic shipwreck on the South African coast and the death of D. Manoel de Sepulveda with his beautiful wife and young children, a disaster which drew some feeling stanzas from Camoens (Lusiads, v. 46) . The poem was published four years after the death of Corte-Real by his heirs, and had two later editions, while a Spanish version appeared in Madrid in 1624 and a French in Paris in 1844. Auto dos quatro novissimos do homem is a short poem printed in 1768. Except the Naufragio de Sepulveda, which is highly considered in Portugal, Corte-ReaPs poetry has hardly stood the test of time, and critics of later generations have refused to ratify the estimate formed by contemporaries, who considered him the equal, if not the superior, of Camoens. His lengthy epics suffer from a want of sustained inspiration, and are marred by an abuse of epithet, though they contain episodes of considerable merit, vigorous and well- coloured descriptive passages, and exhibit a pure diction.

See Subsidios para a biographia do poeta Jeronymo Corte-Real (Evora, 1899); also Ernesto do Canto's Memoir on the family in Nos. 23 and 24 of the Archivo dos Azores, and Dr Sousa Viterbo's Trabalhos nauticos dos Portuguezes, ii. 153 et seq. (E. Pr.)

CORTES, HERNAN or HERNANDO (1485-1547), Spanish soldier, the conqueror of Mexico, was born at Medellin, a small town,of Estremadura, in 1485. He belonged to a noble family of decayed fortune, and, being destined for the law, was sent, at fourteen years of age, to the university of Salamanca; but study was distasteful to him, and he returned home in 1501, resolved to enter upon a life of adventure. He arranged to accompany Ovando, who had been appointed to the command of San Domingo, but was prevented from joining the expedition by an accident that happened to him in a love adventure. He next sought military service under the celebrated Gonsalvo de Cordoba, but a serious illness frustrated his purpose. At last, in 1504, he set out, according to his first plan, for San Domingo, where he was kindly received by Ovando. He was then only nineteen, and remarkable for a graceful physiognomy and amiable manners, as well as for skill and address in all military exercises. He remained in San Domingo, where Ovando had successively con- ferred upon him several lucrative and honourable employments, until 151 1, when he

accompanied Diego Velazquez in his ex- pedition to the island, of Cuba. Here he became alcalde of Santiago, and displayed great ability on several trying occasions.

An opportunity was soon afforded him of showing his powers as a military leader. Juan Grijalva, lieutenant of Velazquez, had just discovered Mexico, but had not attempted to effect a settlement. This displeased the governor of Cuba, who super- seded Grijalva, and entrusted the conquestof the newly discovered country to Cortes. The latter hastened his preparations, and, on the 18th of November 1518, he set out from Santiago, with 10 vessels, 600 or 700 Spaniards, 18 horsemen and some pieces of cannon. Scarcely had he set sail, however, when Velazquez re- called the commission which he had granted to Cortes, and even ordered him to be put under arrest; but the attachment of the troops, by whom he was greatly beloved, enabled him to persevere in spite of the governor; and on the 4th of March 15 19 he landed on the coast of Mexico. Advancing along the gulf, sometimes taking measures to conciliate the natives, and sometimes spread- ing terror by his arms, he took possession of the town of Tobasco. The noise of the artillery, the appearance of the floating for- tresses which had transported the Spaniards over the ocean, and the horses on which they fought, all new objects to the

natives, inspired them with astonishment mingled with terror and admiration; they regarded the Spaniards as gods, and sent them ambassadors with presents. Cortes here learned that the native sovereign was called Montezuma; that he reigned over an extensive empire, which had lasted for three centuries; that thirty vassals, called caciques, obeyed him; and that his riches were immense and his power absolute. No more was necessary to inflame the ambition of the invader, who did not hesitate to undertake the conquest of this great empire, which could only be effected by combining stratagem and address with force and courage. He laid the foundation of the town of Vera Cruz, caused himself to be elected captain-general of the new colony, and burned his vessels to cut off the possibility of retreat and show his soldiers that they must either conquer or perish. He then penetrated into the interior of the country, drew to his camp several caciques hostile to Montezuma, and induced these native princes to facilitate his progress. The republic of Tlaxcala, which was hostile to Montezuma, opposed him; but he routed its army, which had resisted all the forces of the Mexican empire, dictated peace on moderate

terms and converted the people into powerful auxiliaries. His farther advance was in vain attempted to be checked by an ambuscade laid by the inhabitants of Cholula, on whom he took signal vengeance.

Surmounting all other obstacles he arrived, with 6000 natives and a handful of Spaniards, in sight of the immense lake on which was built the city of Mexico, the capital of the empire. Monte- zuma received him with great pomp, and his subjects, believing Cortes to be a descendant of the sun, prostrated themselves before him. The first care of Cortes was to fortify himself in one of the beautiful palaces of the prince, and he was planning how to possess himself of the riches of so opulent an empire, when intelligence reached him that a general of the emperor, who had received secret orders, had just attacked the garrison of Vera Cruz and killed several of his soldiers. The head of one of the Spaniards was sent to the capital. This event undeceived the Mexicans, who had hitherto believed the Spaniardstobeimmortal, and necessarily altered the whole policy of Cortes. Struck with the greatness of the danger, surrounded by enemies, and having only a handful of soldiers, he conceived and instantly executed a most daring project. Having repaired with his officers to the palace of the emperor, he announced to Montezuma that he must either accompany him or perish. Being thus master of the per- son of the monarch, he next demanded that the Mexican general and his officers who had attacked the Spaniards should be de- livered into his hands; and when this had been done he caused these unfortunate men, who had only obeyed the orders of their sovereign, to be burned alive before the gates of the imperial palace. During this cruel execution Cortes entered the apartment of Montezuma, and caused him to be loaded with irons, in order to force him to acknowledge himself a vassal of Charles V. The unhappy prince yielded, and was restored to a semblance of liberty on presenting the fierce conqueror with 600,000 marks of pure gold, and a prodigious quantity of precious stones. Scarcely had he reaped the fruits of his audacity, however, when he was in- formed of the landing of a Spanish army, under Narvaez, which had been sent by Velazquez to compel him to renounce his command. In this emergency Cortes acted with his usual decision and courage. Leaving 200 men at Mexico, under the orders of his lieutenant (Alvarado), he marched against Narvaez, whom he defeated and made prisoner, and he then enlisted under his standard the Spanish soldiers who had been sent to attack him! On his return to the capital, however, he found that the Mexicans had revolted against the emperor and the Spaniards, and that dangers thickened around him. Montezuma perished in attempting to address his revolted subjects; the latter, hav- ing chosen a new emperor, attacked the headquarters of Cortes with the utmost

fury, and, in spite of the advantage of firearms, forced the Spaniards to retire, as the only means of escaping destruction. Their rear-guard, however, was cut in pieces, and they suffered severely during the retreat, which was continued during six days. Elated with their success, the Mexicans offered battle in the plain of Otumba. This was what Cortes desired, and

it proved their destruction. Cortes gave the signal for battle, and, on the 7th of July 1520, gained a victory which decided the fate of Mexico. Immediately afterwards he proceeded to Tlaxcala, assembled an auxiliary army of natives, subjected the neighbouring provinces, and then marched a second time against Mexico, which, after a gallant defence of several months, was retaken on the 13th of August 1521.

These successes were entirely owing to the genius, valour and profound but unscrupulous policy of Cortes; and the account of them which he transmitted to Spain excited the admiration of his countrymen. The extent of his conquests, and the ability he had displayed, effaced the censure which he had incurred by the irregularity of his operations; and public opinion having declared in his favour, Charles V., disregarding the pretensions of Velaz- quez, appointed him governor and captain-general of Mexico, at the same time conferring on him the valley of Oaxaca, which was erected (1529) into a marquisate, with a considerable revenue. But although his power was thus confirmed by royal authority, and although he exerted himelf to consolidate Spanish domina- tion throughout all Mexico, the means he employed were such that the natives, reduced to despair, took arms against the Spaniards. This revolt, however, was speedily subdued, and the Mexicans were everywhere forced to yield to the ascendancy of European discipline and valour. Guatemotzin, who had been recognized as emperor, and a great number of caciques, accused of having conspired against the conquerors, were publicly executed, with circumstances of great cruelty, by order of Cortes. Meanwhile the court of Madrid, dreading the ambition and popularity of the victorious chief, sent commissioners to watch his conduct and thwart his proceedings; and whilst he was completing the conquest of New Spain his goods were seized by the fiscal of the Council of the Indies, and his retainers imprisoned and put into irons'. Indignant at the ingratitude of his sovereign, Cortes returned in person to Spain to appeal to the justice of the emperor, and appeared there with great splendour. The emperor received him with every mark of distinction, and decorated him with the order of St Iagb. Cortes returned to Mexico with new titles but diminished authority, a viceroy having been entrusted with the administration of civil affairs, whilst the military department, with permission to push his conquests, was all

that remained to Cortes. This division of powers became a source of continual dissension, and caused the failure of the last enterprises in which he engaged. Nevertheless, in 1536, he discovered the peninsula of Lower California, and surveyed a part of the gulf which separates it from Mexico.

At length, tired of struggling with adversaries unworthy of him, whom the court took care to multiply, he returned to Europe, 'hoping to confound his enemies. But Charles V. received him coldly. Cortes dissembled, redoubled the assiduity of his attendˆ ance on the emperor, accompanied him in the disastrous expedi- tion to Algiers in 1541, served as a volunteer, and had a horse killed under him. This was his last appearance in the field, and if his advice had been followed the Spanish arms would have been saved from disgrace, and Europe delivered nearly three centuries earlier from the scourge of organized piracy. Soon afterwards he fell into neglect, and could scarcely obtain an audience. The story goes that, having forced his way through the crowd which surrounded the emperor's carriage, and mounted on the door- step, Charles, astonished at an act of such audacity, demanded to know who he was. " I am a man," replied the conqueror of Mexico proudly, " who has given you more provinces than your ancestors left you cities." So haughty a declaration of important services ill-requited could scarcely fail to offend a monarch on whom fortune had lavished her choicest favours. Cortes, overwhelmed with disgust, withdrew from court, passed the remainder of his days in solitude, and died, near Seville, on the 2nd of December 1547.

The only writings of Cortes are five letters on the subject of his conquests, which he addressed to Charles V. The best edition of them is that of Don Francisco Antonio Lorenzana, archbishop of Mexico, entitled Historic, de Nueva-Espana escrita por su esclarecido conquistador, Hernan Cortes, aumentada con otros documientos y notas (Mexico, 1770, 4to), a work the noble simplicity of which attests

the truth of the recital it contains. An English translation of the letters, edited by Francis A. MacNutt, was published in 1908. The conquests of Cortes have been described with pompous elegance by Antonio de Solis in his Historia de la conquista de Mejico (1684), and with more truth and simplicity by Bernardo Diaz del Castillo in his work under the same title (1632). See also Sir Arthur Helps's Life of Hernando

Cortes (2 vols., London, 1871), F. A. MacNutt's Fernando Cortes (" Heroes of the Nations " Series, 1909), and the bibliography to Mexico.

CORTES, a Spanish term literally signifying the " courts," and applied to the states, or assembly of the states, of the kingdom. (See Spain and Portugal.)

CORTI, LODOVICO, Count (1823-1888), Italian diplomatist, was born at Gambarano on the 28th of October 1823. Early involved with Benedetto Cairoli in anti-Austrian conspiracies, he was exiled to Turin, where he entered the Piedmontese foreign office. After serving as artillery officer through the campaign of 1848, he was in 1850 appointed secretary of legation in London, whence he was promoted minister to various capitals, and in 1875 ambassador to Constantinople. Called by Cairoli to the direction of foreign affairs in 1878, he took part in the congress of Berlin, but unwisely declined Lord Derby's offer for an Anglo- Italian agreement in defence of common interests. At Berlin he sustained the cause of Greek independence, but in all other respects remained isolated, and excited the wrath of his country- men by returning to Italy with " clean hands." For a time he withdrew from public life, but in 1881 was again sent to Con- stantinople by Cairoli, where he presided over the futile conference of ambassadors upon the Egyptian question. In 1886 he was transferred to the London embassy, but was recalled by Crispi in the following year through a misunderstanding. He died in Rome on the 9th of April 1888.

CORTLAND, a city and the county-seat of Cortland county, New York, U.S.A., in the central part of the state, on Tiough- nioga river, at the junction of its E. and W. branches. Pop. (1890) 8590; (1900) 9014, of whom 682 were foreign born; (1905) 11,2725(1910) 11,504. It is served by the Delaware, Lacka- wanna & Western and the Lehigh Valley railways. The Franklin Hatch library and a state normal and training school (opened in 1869) are in Cortland. The city has important manufactories of wire, and wire-cloth and netting (one of the largest in' America), cabs, carriages and waggons, iron and steel, wall-paper, dairy supplies, corundum wheels, and clothing. The value of the city's factory products increased from $3,063,828 in 1900 to $4,574,191 in 1905 or 49-3%. The town of Cortlandville, which formed a part of the Phelps and Gorham Purchase, was first settled in 1792, and until 1829 was a part of the town of Homer; from which in the latter year it was separated, and made the county- seat. In 1 900 the village of Cortland in the town of Cortlandville was chartered as a city.

See H. C. Goodwin, Cortland County and the Border Wars of New York (New York, 1859).

CORTONA, a town and episcopal see of Italy, in the province of Arezzo, 18 m. S. by E. from the town of Arezzo by rail. The ancient and modern names are identical. Pop. (1901) of town, 3579; commune, 29,296. The highest point of Cortona, a medieval castle (Fortezza), is situated 2130 ft. above sea-level on a hill commanding a splendid view, and is approached by a winding road. It is surrounded by its ancient Etruscan walls, which for the greater part of the circuit are fairly well preserved. They are constructed of parallelepipedal blocks of limestone, finely jointed (though the jointing has often been spoilt by weathering), and arranged in regular courses which vary in size in different parts of the enceinte. Near the N.W. angle some of the blocks are 7 to 8| ft. long and 25 ft. high, while on the W. side they are a good deal smaller — sometimes only 1 ft. high (see F. Noackin Romische Mitleilungen, 1897, 184). Within the town are two subterranean vaulted buildings in good masonry, of uncertain nature, some other remains under modern buildings, and a concrete ruin known as the “Bagni di Bacco.” The museum of the Accademia Etrusca, a learned body founded by Ridolfino Venuti in 1726, is situated in the Palazzo Pretorio; it contains some Etruscan objects, among which may be specially noted a magnificent bronze lamp with 16 lights, of remarkably

fine workmanship, found in 1740, at the foot of the hill, two votive hands and a few other bronzes, and a little gold jewellery. The library has a good MS. of Dante. The cathedral, originally a Tuscan Romanesque building of the nth-i2th centuries, is now a fine Renaissance basilica restored in the 18th century, containing some paintings by Luca Signorelli, a native of the place. Opposite is the baptistery, with three fine pictures by Fra Angelico. S. Margherita, just below the Fortezza, is an ugly modern building occupying the site of a Gothic church of 1294, and containing a fine original rose window and reliefs from the tomb of the saint by Angelo e Francesco di maestro Pietro d’Assisi. Other works by Signorelli are to be seen elsewhere in the town, especially in S. Domenico; Pietro Berettini (Pietro da Cortona, 1 596-1669) is hardly represented here at all. Below the town is the massive tomb chamber (originally sub- terranean, but now lacking the mound of the earth which covered it) known as the Grotta di Pitagora (grotto of Pythagoras). To the E. is the church of S. Maria del Calcinaio, a fine early Re- naissance building by Francesco di Giorgio Martini of Siena, with fine stained glass windows.

The foundation of Cortona belongs to the legendary period of Italy. It

appears in history as one of the strongholds of the Etruscan power; but in Roman times it is hardly mentioned. Dionysius's statement that it was a colony (i. 26) is probably due to confusion.

See G. Dennis, Cities and Cemeteries of Etruria (London, 1883), ii. 394 seq. ; A. Delia Cella, Cortona Antica (Cortona, 1900). (T. As.)

CORUMBA, a town and river port of Brazil on the W. bank of the Paraguay river, 1986 m. above Buenos Aires and 486 m. above the Paraguayan frontier. Pop. (1890) 8414. Corumba is a fortified military post, has the large Ladario naval arsenal, where small river boats are built and repaired, and is the com- mercial entrepot of the state of Matto Grosso. It is near the Bolivian frontier and is strongly garrisoned. Although the climate is extremely hot, the neighbouring country has many large cattle farms. Corumba is one of the most important places in the interior of Brazil.

CORUNDUM, a mineral composed of native alumina (AI2O3), remarkable for its hardness, and forming in its finer varieties a valuable gem-stone. Specimens were sent from India to England in the 18th century, and were described in 1798 by the Hon. C. Greville under the name of corundum — a word which he believed to be the native name of the stone (Hindi, kurund; Tamil,, kurundam; Sanskrit, kuruvinda, "ruby"). The finely coloured, transparent varieties include such gem-stones as the ruby and sapphire, whilst the impure granular and massive forms are known as emery. The term corundum is often restricted to the remaining kinds, i.e. those crystallized and crystalline varieties which are not sufficiently transparent and brilliant for ornamental purposes, and which were known to the older mineralogists as " imperfect corundum." Such varieties were termed by J. Black, in con- sequence of their hardness, adamantine spar, but this name is now usually re- stricted to a hair-brown corundum, remarkable for a pearly sheen on the basal plane.

Corundum crystallizes in the hexagonal system. In fig. 1, which is a form of ruby, the prism a is com- bined with a hexagonal pyra- mid n, a rhombohedron R, and the basal pinacoid C. In fig. 2, which represents a typical crystal of sapphire, the prism i is associated with the acute pyramids b, r, and a rhombohedron a. Other crystals show a tabular habit, consisting usually of the basal pinacoid with a rhombohedron, and it is notable that this habit is said to be characteristic of corundum which has consolidated from a fused magma. Corundum has no true

Fig. 1.

Fig. 2.

cleavage, but presents parting planes due to the structure of the crystal, which have been studied by Prof. J. W. Judd.

Next to diamond, corundum is the hardest known mineral. Its hardness is generally given as 9, but there are slight variations in. different stones, sapphire being rather harder than ruby, and ruby than common corundum. The colours are very varied, and it is probable that iron is responsible for many of the tints, though chromium is a possible agent in certain cases. The transparent varieties are often distinguished as ” Oriental ” stones. (See Ruby and Sapphire.) Corundum is used largely for watch-jewels, and for bearings in electrical apparatus.

The coloured corundums fit for gem-stones come chiefly from Ceylon, Burma, Siam and Montana. Coarse dull corundum is found in many localities, and usually has higher commercial value as an abrasive agent than emery, which is less pure. The coarse corundum, however, is often partially hydrated or other- wise altered, whereby its hardness is diminished. In India, where the native lapidaries use corundum-sticks and rubbers formed of the powdered mineral cemented with lac, it occurs in the Salem district, Madras, in Mysore and in Rewa. Large deposits of corundum exist in the United States, especially in N. Carolina and Georgia, where they are associated with peridotites, often near contact with gneiss. The mineral has been extensively worked, as at Corundum Hill, Macon county, N.C., near which, in 1871, were discovered numerous rubies, sapphires and pebbles of coarse corundum in the bed of a river. Corundum occurs also at many localities in Montana, where the crystals are often of gem quality. They are found mostly as loose crystals in gravel, but are known also in igenous rocks like andesite and lamprophyre. Prof. J. H. Pratt, who has studied the occurrence both in Montana and in N. Carolina, considers that the alumina was dissolved in a molten magma, from which it separated at an early period of consolidation, as illustrated by the experiments of J. Morcze- wicz. Corundum occurs also in Canada in an igneous rock, a nepheline-syenite, associated with Laurentian gneiss. Important deposits were discovered by the Geological Survey in 1896, in Hastings county, Ontario; and corundum is now worked there and in Renfrew county. New South Wales, Queensland and Victoria are other localities for corundum. The mineral is found also in

the Urals and the Ilmen Mountains, in the Alps (in dolomite), in the basalts of the Rhine, and indeed as a subordinate rock-constituent corundum seems to enjoy a wide distribution, being found even in the British Isles.

See Joseph Hyde Pratt, “Corundum and its Occurrence and Distribution in the United States,” Bulletin U.S. Geol. Surv., No. 269 (1906) ; T. H. Holland, Economic Geology of India (2nd ed.), part i. (1898). (F. W. R.*)

CORUNNA, a maritime province in the extreme north-west of Spain; forming part of Galicia, and bounded on the E. by Lugo, S. by Pontevedra, W. and N. by the Atlantic Ocean. Pop. (1900) 653,556; area, 3051 sq. m. The coast of Corunna is exposed to the full force of the Atlantic; it forms one succession of fantastic- ally shaped promontories, divided by bays and estuaries which often extend for many miles inland, with reefs and small islands in their midst. Though well lighted, this coast is very dangerous to navigation, gales and fogs being frequent in winter and spring. The most conspicuous headlands are Cape Ortegal and Cape de Vares, the most northerly points of the Spanish seaboard, and Capes Finisterre and Torinana in the extreme west. The principal bays are those of Santa Marta, Ferrol and Corunna, on the north ; Corcubion, Muros y Noya and Arosa, on the west. Wild and rugged though this region appears to travellers at sea, the mountains which overspread the interior are covered with forests and pastures, and watered by an abundance of small rivers and streams. The climate is mild and singularly equable, but the rainfall is very heavy. All the fruits and vegetables of northern Europe thrive in the sheltered valleys, and the cultivation of cherries, strawberries, peas and onions, for export, ranks among the most profitable local industries. Heavy crops of wheat, rye, maize and sugar-beet are raised. The wines of Corunna are heady and of inferior flavour. Cattle-breeding, once a flourishing industry, had greatly decUsed by the beginning

of the 20th century, owing to foreign competition. All along the coast there are valuable fisheries of sardines, lobsters, cod, hake and other fish. Copper, tin and gold ace procured in small quantities, and other minerals undoubtedly exist. The exports consist chiefly of farm produce and fish; the imports, of coal and textiles from England, petroleum from the United States, marble from Italy, salt fish from Norway and Newfoundland, and hides. The principal towns are Corunna, the capital and chief port (pop. 1900, 43,97i); Ferrol (25,281), another seaport; Santiago de Compostela (24,120), famous as a place of pilgrimage; Carballo (13,032); Ortigueira (18,426) and

Ribeira (12,218). These are described under separate headings. Along the coast there are numerous trading and fishing stations of minor importance. Railway communication is very defective. From Corunna a line passes south-eastward to Lugo and Madrid, and from Santiago another line goes southward to Vigo and Oporto; but the centre and the north-west of the province are, to a great extent, in- accessible except by road; and many, even of the main highways, are ill-constructed and ill-kept. Very few Spanish provinces have so high a birthrate, but the population increases very slowly owing to emigration. For a description of the peasantry, who are distinguished in may respects from those inhabiting other parts of Spain, see Galicia.

CORUNNA (Span. La Corutia; Fr. La Corogne; Eng. formerly often The Groyne), the capital of the province described above; in 43° 22′ N., and 8° 22′ W.; on the bay of Corunna, an inlet of the Atlantic Ocean. Pop. (1900) 43,97i- The principal railways of north-westem Spain converge on Corunna, and afford direct communication with Madrid and Oporto. Corunna consists of an upper and a lower town, built respectively on the eastern side of a small peninsula, and on the isthmus connecting the peninsula with the mainland. The upper town is the more ancient, and is still surrounded by walls and bastions, and defended by a citadel; but it has been gradually outgrown by the lower, which, though at first a mere fishing village, as its name of Pescaderia implies, is now comparatively well built, and has many broad and hand- some streets. There is little remarkable in the public buildings, although the churches of Santiago and the Colegiata date respec- tively from the 12th and 13th centuries, and there are several convents, two hospitals, a palace for the captain-general of Galicia, a theatre, a school of navigation, an arsenal and barracks. The harbour is on the east. Though difficult to approach in stormy weather, it is completely sheltered, and accommodates vessels drawing 22 ft. It is defended by several forts, of which the most important are San Diego, on the east, and San Antonio, on the west. These fortifications are of little practical value on the landward side, as they are commanded by a hill which over- looks the town. The so-called Tower of Hercules, on the north, has been increased by modern additions to a height of nearly 400 ft., and is surmounted by a fine revolving light. Many foreign steamers call here, for emigrants or mails, on their way to South America. Upwards of 1200 merchant ships, mostly British, entered the port in 1905. The exports are chiefly agricultural produce, wine and fish; the imports are coal, colonial products, and manufactured goods. Chief among the industrial establishments is a state tobacco factory; the sardine and herring fisheries also employ alarge number of the inhabitants.

Corunna, possibly at first a Phoenician settlement, is usually identified with the ancient Ardobrica, a seaport mentioned by the ist-century historian, Pomponius Mela, as in the country of the Artabri, from whom the name of Partus Artabrorum was given to the bay on which the city is situated. In the middle ages, and probably at an earlier period, it was called Caronium; and this name is much more probably the origin of the present designation than the Latin Columna which is sometimes put forward. The harbour has always been of considerable import- ance, but it is only in comparatively modem times that it has made a figure in history. In 1 588 it gave shelter to the Invincible Armada; in 1598 the town was captured and burned by the British under Drake and Norris. In 1747, and again in 1805, the bay was the scene of a naval victory of the British over the French; and on the 16th of January 1809 a battle took place

in the neighbourhood, which is celebrated in British military- annals (see Peninsular War). The French under Marshal Soult attempted to prevent the embarcation of the English under Sir John Moore, but were successfully repulsed in spite of their superior numbers. Moore was mortally wounded and died shortly afterwards. He was hastily buried in the ramparts near the sea; a monument in the Jardin de San Carlos raised by the British government commemorates his death. The town joined the revolutionary movement of 1820, but in 1823 it was forced to capitulate by French troops. In 1836 it was captured by the Carlists. Corunna suffered heavily when Spain was de- prived of Cuba and Porto Rico by the Spanish-American War of 1898, for it had hitherto had a thriving trade with these colonies.

CORVlJE, in feudal law, the term used to designate the unpaid labour due from tenants, whether free or unfree, to their lord; hence any forced labour, especially that exacted by the state, the word being applied both to each particular service and to the system generally. Though the corvee formed a characteristic feature of the feudal system, it was, as an institution, much older than feudalism, and was already developed in its main features under the Roman Empire. Thus, under the Roman system, personal services (operae) were due from certain classes of the population not only to the state but to private proprietors. Apart from the obligations (operae officiates) imposed on freed- raen as a condition of their enfranchisement, which in the country usually took the form of unpaid work on the landlord’s domain, the semi-servile coloni were bound, besides paying rent in

money or kind, to do a certain number of days' unremunerated labour on that part of the estate reserved by the landed proprietor. The state also exacted personal labour (operae publicae), in lieu of taxes, from certain classes for such purposes as the upkeep of roads, bridges and dykes; while the inhabitants of the various regions were responsible for the maintenance of the posting system (cursus publicus), for which horses, carts or labour would be requisitioned.

Under the Frankish kings, who in their administration followed the Roman tradition, this system was preserved. Thus for the repair of roads, or other public works, within their jurisdiction the counts were empowered to requisition the labour of the inhabitants of the pagus, while the missi and other public functionaries on their travels were entitled to demand from the population en route entertainment and the means of transport for themselves and their belongings. It was, however, the economic revolution which between the 6th and 10th centuries converted the Gallo-Roman estates into the feudal model, and the political conditions under which the officials of the Frankish empire developed into hereditary feudal nobles, that evolved the system of the corvee as it existed throughout the middle ages and, in some countries, survived far into the 19th century. The Roman estate had been cultivated by free farmers, by coloni, and by slave labour. Under Frankish rule the farmers became coloni or hospites, the slaves, serfs. The estate was now habitually divided into the lord's domain (terra indominicata, dominicum) and a series of allotments (mansi), parcels of land distributed by lot to the cultivators of the domain, who held them, partly by payment of rent in money or kind, partly by personal service and labour on the domain, these obligations both as to their nature and amount being very rigorously defined and permanently fixed in the case of each mansus and passing with the land to each new tenant. They varied, of course, very greatly according to the size of the holding and the needs of the particular estate, but they possessed certain common character- istics which are everywhere found. Luchaire (Manuel, p. 346) divides all corvees into two broad categories, (1) corvees properly so called, (2) military services. The second of these, so far as the obligation to serve in the host (Hostis et equitatus) is concerned, was common to all classes of feudal society; though the obliga- tion of villeins to keep watch and ward (gueta, warda) and to labour at the building or strengthening of fortifications (muragium, munitio castri) are special corvees. We are, however, mainly concerned with the first category, which may again be subdivided

into two main groups, (1) personal service of men and women (manoperae, manuum operae, Fr. manoeuvres, manual labour), (2)

carriage (carroperae, carragia, carrala, &c, Fr. charrois), i.e. service rendered by means of carts, barrows or draught animals. These again were divided into fixed services (operae rigae) and exceptional services, demanded when the others proved in- sufficient. To these latter was given in the 8th century the name of operae corrogatae (i.e. requisitioned works, from rogare, to request. From this term (corrupted into corvatae, curvadae, corveiae, &c.) is derived the word corvee, which was gradually applied as a general term for all the various services.

As to the nature of these corvees it must be noted that in the middle ages the feudal lords had replaced the centralized state for all administrative purposes, and the services due to them by their tenants and serfs, were partly in the nature of rent in the form of labour, partly those which under the Roman and Frankish monarchs had been exacted in lieu of taxes, and which the feudal lords continued to impose as sovereigns of their domains. To the former class belonged the service of personal labour in the fields, of repairing buildings, felling trees, threshing corn, and the like, as well as the hauling of corn, wine or wood; to the latter belonged that of labouring on the roads, of building and repairing bridges, castles and churches, and of carrying letters and despatches. Corvees were further distinguished as real, i.e. attached to certain parcels of land, and personal, i.e. due from certain persons.

In spite of the fact that the corvees were usually strictly defined by local custom and by the contracts of tenancy, and that, in an age when currency was rare, payment in personal labour was a convenience to the poor, the system was open to obvious abuses. With the growth of communal life in the towns the townsmen early managed to rid themselves of these burdensome obligations either by purchase, or by exchanging the obligation of personal work for that of supplying carts, draught animals and the like. In the country, however, the system survived all but intact; and, so far as it was modified, was modified for the worse. Whatever safeguards the free cultivators may have possessed, the serfs were almost everywhere — especially in the 10th and nth centuries — actually as well as nominally in this respect at the mercy of their lords (corviables a merci) , there being no limit to the amount of money or work that could be demanded of them. The system was oppressive even when the nobles to whom these services were paid gave something in return, namely, protection to the cultivator, his family and his land; they became intolerable when the development of the modern state deprived the land-owners of their duties, but not of their rights. In the case of France, in the 17th century the so-called corvee royale was added to the burden of the

peasants, i.e. the obligation to do unpaid labour on the public roads, an obligation made general in 1738; and this, together with the natural resentment of men at the fact that the land which their ancestors had bought was still subject to burdensome personal obligations in favour of people whom they rarely saw and from whom they derived no benefit, was one of the most potent causes of the Revolution. By the Constituent Assembly personal corvees were abolished altogether, while owners of land were allowed the choice of continuing real corvees or commuting them for money. The corvee as an incident of land tenure has thus disappeared in France. The corvee royale of repairing the roads, however, abolished in 1789, was revived, under the name of prestation, under the Consulate, by the law of 4 Thermidor an X., modified by subsequent legislation in 1824, 1836 and 1871. Under these laws the duty of keeping the roads in repair is still vested in the local communities, and all able-bodied men are called upon either to give three days' work or its equivalent in money to this purpose. It is precisely the same system as that in force under the Roman Empire, and if it differ from the corvee it is mainly in the fact that the burden is equitably distributed, and that the work done is of actual value to those who do it.

As regards other countries, the corvee was everywhere, sooner or later, abolished with the serfdom of which it was the principal

incident (see Serfdom) . Though so early asiy72Maria Theresa had endeavoured to mitigate its hardships in her dominions (in Hungary unpaid labour was only to be demanded of the serfs on 52 days in the year!) it survived longest in the Austrian empire, being finally abolished by the revolution of 1848. The duty of personal labour on the public roads is, however, still maintained in other countries besides France. This was formerly the case in England also, where the occupiers of each parish who, by the common law, had access to the roads were responsible also for their upkeep. An act of 1555 imposed four days of forced labour for the repair of roads, and an act of Elizabeth (5 Eliz. c. 13) raised the number of days to six, or the payment of a composition instead. Ths system of turnpikes, dating from 1663, which gradually extended over the whole of England, lessened the burden of this system of taxation, so far as main roads were concerned, but the greater number of the local roads were subject to repair by statutory labour until the Highways Act 1835, by which highways were put under the direction of aparish surveyor, and

the necessary expenses met by a rate levied on the occupiers of land. In Scotland, statutory labour on highways was created by an act of 1719, and abolished in 1883.

In Egypt, the corvee has been employed from time immemorial, more especially for the purpose of cleaning out the irrigation canals. In the days when only one harvest a year was reaped, this forced labour was not a very great burden, but the intro- duction of cotton and the sugar-cane under Mehemet Ali changed the conditions. These latter are crops which require watering at various seasons of the year, and very often the fellah was called away for work in the canals at times when his own crops required the utmost attention. Moreover, the inequality of the corvee added to the evil. In some districts it was possible to purchase exemption, and the more wealthy paid no more for the privilege than the humblest fellah, consequently the corvee fell with undue hardship on the poorer classes. Under the premiership -of Riaz Pasha the corvee was gradually abolished in Egypt between the years 1888 and 1891, and a small rate on the land substituted to provide the labour necessary for cleaning the canals. The corvee is now employed only to a limited extent to guard the banks of the Nile during flood.

See Du Cange, Glossarium inf. et med. Lat. s.v. ” Corvatae ” ; A Luchaire, Manuel des institutions francaiscs (Paris, 1892), pp. 346-349; La Grande Encyclopedic, s.v., with bibliography. For further works see the bibliography to the article Serfdom.

CORVEY, a place in the Prussian province of Westphalia, on the Weser, a mile north of the town of Hoxter, with which it communicates by an avenue of lime trees. During the middle ages it was famous for its great Benedictine abbey, which was founded and endowed by the emperor Louis the Pious about 820, and received its name from having been first occupied by a body of monks coming from Corbie in Picardy. The bones of St Vitus, the patron saint of Saxony, were removed thither . according to legend in 836, but apart from this attraction, Corvey became the centre of Christianity in Saxony and a nursery of classical studies. The abbot was a prince of the Empire, and Corvey was made a bishopric in 1783. In 1803 the abbey was secularized, in 1815 its lands were given to Prussia, and in 1822 they were bestowed on Victor Amadeus, landgrave of Hesse-Rotenburg, by whom they were bequeathed, in 1834,10 Prince Victor of Hohenlohe-Schillingsfiirst, duke of Ratibor. The abbey, which is now used as a residence, possesses a magnificent library of 150,000 volumes especially rich in old illustrated works, though the ancient collection due to theliterary enthusiasm of the Benedictines is no

longer extant. Here in 1517 the manuscript of the five first books of the Annals of Tacitus was discovered. Here Widukind wrote his Res gestae Saxonicae. Here, also, the librarian and poet Hoffmann von Fallersleben lived and worked. The Annales Corbejenses 648-1148 of the monks can be read in the Monumenta Gertnaniae historica, Band iii. The Chronicon Corbejense, published by A. C. Wedekind in 1823, has been declared by S. Hirsch and Waitz (Kritische Priifung, Berlin, 1839) to be a forgery.

See P. Wigand, Geschichte der Abtci Korvey (Hoxter, 1819) ; and M. Meyer, Zur altern Geschichte Corveys und Hoxters (Paderborn, 1893).

CORVINUS, JANOS [John] (1473-1 504), illegitimate son of Matthias Hunyadi, king of Hungary, and one Barbara, supposed to be the daughter of a burgess of Breslau. He took his name from the raven {corvus) in his father's escutcheon. Matthias originally intended him for the Church, but on losing all hope of offspring from his consort Queen Beatrice, determined, towards the end of his life, to make the youth his successor on the throne. He loaded him with honours and riches, till he was by far the wealthiest magnate in the land. He publicly declared him his successor, created him a prince with vast apanages in Silesia, made the commandants of all the fortresses in ,the kingdom take an oath of allegiance to him, and tried to arrange a marriage for him with Bianca Maria Sforza of Milan, a project which was frustrated by the intrigues of Queen Beatrice. Matthias also intended to make the recognition of Janos as prince royal of Hungary by the emperor Frederick a condition precedent of relinquishing all or part of the conquered hereditary domains of the house of Habsburg; but his sudden death left the matter still pending, and the young prince suddenly found himself alone in the midst of enemies. The inexperienced and irresolute youth speedily became the victim of the most shameful chicanery. He was first induced formally to resign his claims to the throne, on the understanding that he was to be compensated with the crown of Bosnia. He was then persuaded to retire southwards with the royal treasures which Matthias had confided to him, whereupon an army immediately started in pursuit, scattered his forces, and robbed him of everything. Meanwhile the diet had elected Vladislav of Bohemia king (July 15, r49o), to whom Janos hastened to do homage, in order to save something from the wreck of his fortunes. He was also recognized as prince of Slavonia and duke of Troppau, but compelled to relinquish both titles five years later. On the invasion of Hungary by Maxi- milian, he shewed his loyalty to the crown by relinquishing into the hands of Vladislav the three importantfortressesof Pressburg, Komarom and Tata, which had been entrusted to him by his father. But now, encouraged by his

complacency, the chief dignitaries, headed by the palatine Stephen Zapolya, laid claim to nearly all his remaining estates and involved him in a whole series of costly processes. This they could do with perfect impunity, as they had poisoned the mind of the indolent and suspicious king against their victim. In 1496 Corvinus married Beatrice, the daughter of Bernard Frangepan. His prospects now improved, and in 1498 he was created perpetual ban of Croatia and Slavonia. From 1499 to 1502 he successfully defended Bosnia against the Turks, and in the following year aspired to the dignity of palatine, but was defeated by a com- bination of Queen Beatrice and his other enemies. He died on the 1 2th of October 1504, leaving one son, Prince Christopher, who died on the 17th of March 1505.

See Gyula Schonherr, Janos Corvinus Hunyadi (Hung.) (Budapest, 1894). (R. N. B.)

CORVUS, MARCUS VALERIUS (c. 370-270 B.C.), Roman general of the early republican period. According to the legend a raven settled on his helmet during his combat with a gigantic Gaul, and distracted the enemy's attention by flying in his face. He was twice dictator and six times consul, and occupied the curule chair twenty-one times. In his various campaigns he defeated successively the Gauls, the Volscians, the Samnites, the Etruscans and the Marsians. His most important victory (343) was over the Samnites at Mount Gaurus.

See Livy vii. 26-42, x. 2-1 1.

CORWEN (" the white choir "), a market town of Merioneth- shire, Wales, on branches of the London & North Western and the Great Western railways; 10 m. from Llangollen, through the Glyn Dyfrdwy (Dee Vale). Pop. (1901) 2680. Telford's road, raised on the lower Berwyn range side and overlooking the Dee, opens up the picturesqueness of Corwen, historically interesting from the reminiscences of Wales's last struggle for independence under Owen Glendower. In the old parish church was traditionally Owen's pew; his knife, fork and dagger, are at the neighbouring Rug (Rhug); his palace, 3 m. distant at Sychnant (dry stream). Here is the church dedicated to St

Julian, archbishop of St David's (d. 1009), with " the college," an almshouse endowed by William Eyton of Plas Warren, Shropshire. The

old British fort, Caer Drewyn, one of a chain of forts from Dyserth to Canwyd, is the supposed scene of Glen- dower's retreat under Henry IV., and herej Owen Cwynedd is said to have prepared to repulse Henry II. To the N.E. are the Clwyd hills; to the S. the Berwyn range, to the S.W. Arran Mawddy and Cadair (Cader) Idris; to the W. the two Arenigs; to the N.W. Snowdon. Corwen is a favourite station for artists and anglers. Besides the Dee, there are several streamlets, such as the Trystion, which forms the Rhaiadr Cynwyd (waterfall), the Ceudiog, and the Alwen.

CORWIN, THOMAS (1794-1865), American statesman and orator, was born in Bourbon county, Kentucky, on the 29th of July 1794. In 1798 his father, Matthias Corwin (1761-1829), removed to what later became Lebanon, Ohio, where the son worked on a farm, read much, and in 1817 was admitted to the bar. As an advocate he was at once successful, but after 183 1 he devoted his attention chiefly to politics, identifying himself first with the Whig and after 1858 with the Republican party. He was a member of the lower house of the Ohio legis- lature in 1821, 1822 and 1829, and of the national House of Representatives from 183 1 to 1840; was governor of Ohio in 1840-1842; served in the United States Senate from 1845 to 1850; was secretary of the treasury in the cabinet of President Fillmore in 1850-1853; was again a member of the national House of Representatives from 1859 to 1861; and from 1861 to 1864 was minister of the United States to Mexico — a position of peculiar difficulty at that time. As a legislator he spoke seldom, but always with great ability, his most famous speech being that of the nth of February 1847 opposing the Mexican War. In i860 he was chairman of the House " Committee of Thirty-three," consisting of one member from each state, and appointed to consider the condition of the nation and, if possible, to devise some scheme for reconciling the North and the South. He is remembered chiefly as an orator. Many anecdotes have been told to illustrate his kindliness, his inimitable humour, and his remarkable eloquence. He died at Washington, D.C., on the 18th of December 1865.

Seethe Life and Speeches of Thomas Corwin (Cincinnati, 1896), edited by Josiah Morrow; and an excellent character sketch, Thomas Corwin (Cincinnati, 1 881), by A. P. Russell.

CORY, WILLIAM JOHNSON (1823-1892), English school- master and author, son of Charles Johnson of Torrington, Devon- shire, was born on the 9th of January 1823. He was educated at Eton and King's College, Cambridge. At Cambridge he gained the chancellor's medal for an English poem on Plato in 1843, and the Craven Scholarship in

1844. In 1845, after graduating at the university, he was made an assistant master at Eton, where he remained for some twenty-six years. He has been called ” the most brilliant Eton tutor of his day.” He had a great influence on his pupils, and he defended the Etonian system against the criticism of Matthew James Higgins. In 1872, having inherited an estate at Halsdon and assumed the name of Cory, he left Eton. He married late in life, and after four years spent in Madeira he settled in 1882 at Hampstead. He died on the nth of June 1892. He proved his genuine lyrical power in Ionica (1858), which was republished with some additional poems in 1891. He also produced Lucretilis (1871), a work on the writing of Latin verses; Iophon {1873), on Greek Iambics; and Guide to Modern History from 1815 to 1835 (1882). Extracts from the Letters and Journals of William Cory, which contains much paradoxical and suggestive criticism, were edited by F.W. Cornish and published by private subscription in 1897.

His elder brother, Charles Wellington Johnson Furse (1821- 1900), who, on the death of his father in 1854, took the name of Furse, was canon and archdeacon of Westminster from 1894 till his death. The artist Charles Wellington Furse, A.R.A. (1868-1904), was a son of Archdeacon Furse.

CORYATE, THOMAS (1577 ?-i6i7), English traveller arid writer, was born at Odcombe, Somersetshire, where his father, the Rev. George Coryate, prebendary of York Cathedral, was

rector. Educated at Westminster school and at Oxford, he became a kind of court fool, eventually entering the household of Prince Henry, the eldest son of James I. In 161 1 he published a curious account of a prolonged walking tour undertaken in 1608, under the title of Coryate’s Crudities hastily gobbled up in Five Months Travels in France, Italy, &c. At the command of Prince Henry, verses in mock praise of the author, and in- tended originally to persuade some bookseller to undertake the publication of the Crudities, were added to the volume. These commendatory verses, written in a number of languages, and some in a mixture of languages, by Ben Jonson, Donne, Chapman, Drayton and others, were afterwards published (161 1) by them- selves as the Odcombian Banquet. The book contains a clear and interesting account of Coryate’s travels, and, being the first of its kind, was extremely popular. It is now very rare, and the copy in the Chetham library is said to be the only perfect one. In the same year was published a second volume of a similar kind, Coryats Crambe, or his Coleworte twice Sodden. In 16 12 he set out on another journey, which also was mostly performed on foot. He visited

Greece, the Holy Land, Persia and India; from Agra and Ajmere he sent home an account of his adventures. Some of his letters were published in 1 6 1 6 under the title of Letters from Asmere, the Court of the Great Mogul, to several Persons of Quality in England, and some fragments of his writings were included in Purchas his Pilgrimes in 1625. Coryate was a curious and observant traveller; he gives accounts of inscrip- tions he had copied, of the antiquities of the towns he passed through, and of manners and customs, from the Italian pronuncia- tion of Latin to the new-fangled use of forks. He acquired a knowledge of Turkish, Persian and Hindustani in the course of his travels, and on being presented by the English ambassador, Sir Thomas Roe, to the Great Mogul, he delivered a speech in Persian. His journeys were performed at small expense, for he says that he spent only three pounds between Aleppo and Agra, and often lived ” competently ” for a penny a day. Coryate died at Surat in 1617.

Coryate’s Crudities, with his letters from India, was reprinted from the edition of 161 1 in 1776, and at the Glasgow University Press (2 vols., 1905). The Odcombian Banquet was ridiculed by John Taylor, the Water Poet, in his Laugh and be Fat, or a Commentary on the Odcombian Banket (1613) and two other satires.

CORYBANTES (Gr. KopvPavres) , in Greek mythology, half divine, half demonic beings, bearing the same relation to the Asiatic Great Mother of the Gods that the Curetes bear to Rhea. From their first appearance in literature, they are already often identified or confused with them, and are distinguished only by their Asiatic origin and by the more pronouncedly orgiastic nature of their rites. Various accounts of their origin are given: they were earth-born, sons of Cronus, sons of Zeus and Calliope, sons of Rhea, of Ops, of the Great Mother and a mystic father, of Apollo and Thalia, of Athena and Helios. Their names and number were as indistinct even to the ancients as those of the Curetes and Idaean Dactyli. Like the Curetes, Dactyli, Telchines and Cabeiri (q.v.), however, they represent primitive gods of procreative significance, who survived in the historic period as subordinate deities associated with a form of the Great Mother goddess, their relation to the Great Mother of the Gods, Cybele, being comparable with that of Attis (q.v.). They may have been represented or impersonated by priests in her rites as Attis was, but they were also, like him, not actual priests in the first instance, but objects of worship in which a frenzied dance, with accompaniment of flute music, the beating of tambourines, the clashing of cymbals and castanets, wild cries and self-infliction of wounds — the whole culminating in a state of ecstasy and exhaustion

— were the most prominent features. The dance of the Corybantic priests, like that of the priests who represented the'ˆCuretes, may have originated in a primitive faith in the power of noise to avert evil. Its psychic effect, both upon the dancer and upon the mystic about whom he danced during the initiation of the Cybele- Attis mysteries, made it a widely known and popular feature of the cult.

In art the Corybantes appear, usually not more than two or three in number, fully armed and executing their orgiastic

dance in the presence of the Great Mother, her lions and Attis. They sometimes appear with the child Dionysus, between whose cult and that of the Mother there was a close affinity. (G. Sn.)

CORYDON, a town and the county-seat of Harrison county, Indiana, U.S.A., on Indian Creek, about 21 m. W. by S. of Louisville, Kentucky. Pop. (1900) 1610; (1010) 1703. Corydon is served by the Louisville, New Albany & Corydon railway, which connects at Corydon Junction, 8 m. N., with the Southern railway. There are sulphur springs here, and the town is a summer and health resort. Wyandotte Cave is several miles W. of Corydon. Corydon is in an agricultural region, and there are valuable quarries in the neighbourhood; among the town's manufactures are waggons, and building and lithographic stone. Corydon was settled about 1805, and was the capital of Indiana Territory from 1813 to 1816, and of the state until 1824. The convention which framed the first state constitution met here in June 18 16. The original state house, an unpretentious two- storey stone building, is still standing. Corydon was captured by the Confederates during Gen. Morgan's raid on the 9th of July 1863.

CORYPHAEUS (from Gr. Kopvri, the top of the head), in Attic drama, the leader of the chorus. Hence the term (some- times in an Anglicized form " coryphe ") is used for the chief or leader of any company or movement. In 1856 in the university of Oxford there was founded the office of Coryphaeus or Prae- centor, whose duty it was to lead the musical performances directed by the Choragus (q.v.) . The office ceased to exist in 1899.

COS, or Stanko (Ital. Stanchio, Turk. Istan-keui, by corruption from Eis rav Kw) , an island in that part of the Turkish archi- pelago which was anciently known as the Myrtoan Sea, not far from the south-western

corner of Asia Minor, at the mouth of the Gulf of Halicarnassus, or Bay of Budrum. Its total length is about 25 m. and its circumference about 74. Its population is estimated at about 10,000, of whom nearly all are Greeks.

A considerable chain of mountains, known to the ancients as Oromedon, or Prion, extends along the southern coast with hardly a break except near the island of Nisyros; so that the greatest versant and most important streams turn towards the north. The whole island is little more than a mass of limestone, and consequently unites great aridity in the drier mountain regions with the richest fertility in the alluvial districts. As the attention of the islanders is mainly directed to 'the culture of their vineyards, which yield the famous sultana raisins, a considerable proportion of the arable land is left untouched, though wheat, barley and maize are sown in some quarters, and melons and sesamum seed appear among the exports. The Cos lettuce is well known. Fruit, especially grapes, is exported in large quantities to Egypt, mostly in local sailing boats. The wild olive is abundant enough, but neglected; and cotton, though it thrives well, is grown only in small quantities. As the principal harbour, in spite of dredging operations, is fit only for smaller vessels, the island is not of so much commercial import- ance as it would otherwise be; but since 1868 it has been regularly visited by steamers. The only town in the island is Cos, or Stanko, at the eastern extremity, remarkable for its fortress, founded by the knights of Rhodes, and for the gigantic plane- tree in the public square. The fortress preserves in its walls a number of interesting architectural fragments. The plane-tree has a circumference of about 30 ft., and its huge and heavy branches have to be supported by pillars ; of its age there is no certain knowledge, but the popular tradition connects it with Hippocrates. The town is supplied by an aqueduct, about 4 m. in length, with water from a hot chalybeate spring, which is likewise named after the great physician of the island. The villages of Pyli and Kephalas are interesting, the former for the Greek tomb of a certain Charmylos, and the latter for a castle of the knights of St John and the numerous inscriptions that prove that it occupies the site of the chief town of the ancient deme of Isthmos. The most interesting site on the island is the precinct of Asclepius, which was excavated in 1900-1904 on the slope of Mount Prion, about 2 m. from the town of Cos. It consists of three terraces, the uppermost containing a temple, a cypress

grove and porticoes; the middle, which is the earliest portion, two or three temples, an altar, and other buildings; and the lower a kind of sacred agora enclosed by porticoes. The precinct had been enlarged and reconstructed at various times. The earliest buildings on the

middle terrace probably date from the 6th century B.C. The temple on the upper terrace, with the imposing flight of steps by which it is approached, seems to belong to the 2nd century B.C. when the whole precinct was enlarged and reconstructed. After a destructive earthquake, the whole appears to have been rebuilt by Xenophon, the physician and poisoner of the emperor Claudius. The final destruction was brought about by the earthquake of a.d. 554. Among other things the precinct contains a fountain of water with medicinal properties. It is doubtful whether this water is brought from Burinna, the famous fountain of Hippocrates in the mountain above.

History. — Cos was a Dorian colony with a large contingent of settlers from Epidaurus who took with them their Asclepius cult and made their new home famous for its sanatoria. The other chief sources of the island's wealth lay in its wines, and in later days, in its silk manufacture. Its early history is obscure. During the Persian wars it was ruled by tyrants, but as a rule it seems to have been under an oligarchic government. In the 5th century it joined the Delian League, and after the revolt of Rhodes served as the chief Athenian station in the south-eastern Aegean (411-407). In 366 a democracy was instituted. After helping, in the Social War (357—355), to weaken Athenian power it fell for a few years to the Carian prince Maussollus. In the Hellenistic age Cos attained the zenith of its prosperity. Its alliance was valued by the kings of Egypt, who used it as an outpost for their navy to watch the Aegean. As a seat of learning it rose to be a kind of provincial branch of the museum of Alexandria, and became a favourite resort for the education of the princes of the Ptolemaic dynasty; among its most famous sons were the physician Hippocrates, the painter Apelles, the poets Philetas and, perhaps, Theocritus (q.v.). Following the lead of its great neighbour, Rhodes, Cos generally displayed a friendly attitude towards the Romans; in a.d. 53 it was made a free city. In a.d. 13 15 it was occupied by the Knights of St John; in 1523 it passed under Ottoman sway. Except for occasional incursions by corsairs and some severe earthquakes the island has rarely had its peace disturbed.

Authorities. — L. Ross, Reisen nach Kos, &c. (Halle, 1852), pp. 11-29, an d Reisen auf den griechischen Inseln (Stuttgart, 1 840-1845), ii. 86 ff. ; O. Rayet, Memoire sur Vile de Cos (Paris, 1876); M. Dubois, De Co Insula (Paris and Nancy, 1884); W. Paton and E. Hicks, The Inscriptions of Cos (Oxford, 1891); B. V. Head, Historia Numorum (Oxford, 1887), pp. 535-537; Archaol. Anzeiger, 1905, i. ; for coins see also Numismatics: Greek, § ” Calymna and Cos.”

(E.Gr.;M.O. B.C.)

COSA, an ancient city of Etruria, on the S.W. coast of Italy, close to the Via Aurelia, 45 m. E.S.E. of the modern town of Orbetello. Apparently it was not an independent Etruscan town, but was founded as a colony by the Romans in the territory of the Volceientes, whom they had recently conquered, in 273 B.C. The town was strongly fortified, and the walls, about a mile in circuit, with three gates, and seventeen projecting rectangular towers at intervals, are in places preserved to a height of over 30 ft. on the outside, and 15 on the inside. The lower part is built of polygonal, the upper of rectangular, blocks, and the masonry is of equal fineness all through, so that a difference of date cannot be assumed; such a change of technique is not without parallel in Greece (F. Noack in Romische Mitteilungen, 1897, 194). Within the city no remains are visible. The place was of importance as a fortress; it was approached by a branch road which diverged from the Via Aurelia at the post station of Succosa, at the foot of the hill on which the town stood. The harbour, too, was of some importance. In the 5th century we hear of it as deserted, and in the 9th a town called Ansedonia took its place for a short time, but itself soon perished, though it has left its name to the ruins.

See G. Dennis, Cities and Cemeteries of Etritria (London, 1883), ii. 245- (T. As.)

COSEL, or Kosel, a town of Germany, in the Prussian province of Silesia, at the junction of the Klodnitz'and the Oder, 29 m. S.E. of Oppeln by rail. Pop. (1905) 7085. It has an Evangelical and a Roman Catholic church, an old chateau and a grammar- school (Progymnasium). Its industries are of some importance, including a manufactory of cellulose (employing 1200 hands), steam saw- and flour-mills and a petroleum refinery. There is a lively trade by river.

The first record of Cosel dates from 1286. From 1306 to 1359 it was the seat of an independent duchy held by a cadet line of the dukes of Teschen. In 1 53 2 it fell to the emperor, was several times besieged during the Thirty Years' War, and came into Prussian possession by the treaty of Breslau in 1742. Frederick II, converted it into a fortress, which was besieged in vain by the Austrians in 1758, 1759, 1760 and 1762. In 1807 it withstood another siege, by the Bavarian allies of Napoleon. The fortifica- tions were razed and their site converted into promenades in 1874.

COSENZ, ENRICO (1812-1898), Italian soldier, was born at Gaeta, on the 12th of January 1812. As captain of artillery in the Neapolitan army he took part in the expedition sent by Ferdinand II. against the Austrians in 1848; but after the coup d'&tat at Naples he followed General Guglielmo Pepe in disobeying Ferdinand's order for the withdrawal of the troops, and proceeded to Venice to aid in defending that city. As commandant of the fort of Marghera, Cosenz displayed dis- tinguished valour, and after the fall of the fort assumed the defence of the Piazzale, where he was twice wounded. Upon the fall of Venice he fled to Piedmont, where he remained until, in 1859, he assumed the command of a Garibaldian regiment. In i860 he conducted the third Garibaldian expedition to Sicily, defeated two Neapolitan brigades at Piale (August 23), and marched victoriously upon Naples, where he was appointed minister of war, and took part in organizing the plebiscite. During the war of 1866 his division saw but little active service. After the war he repeatedly declined the portfolio of war. In 1 88 1, however, he became chief of the general staff, and held that position until a short time before his death at Rome on the 7th of August 1898.

COSENZA (anc. Consentia), a town and archiepiscopal see of Calabria, Italy, the capital of the province of Cosenza, 755 ft. above sea-level, 43 m. by rail S. by W. of Sibari, which is a station on the E. coast railway between Metaponto and Reggio. Pop. (1901) town, 13,841; commune, 20,857. It is situated on the slope of a hill between the Crati and Busento, just above the junction, and is commanded by a castle (1250 ft.). The Gothic cathedral, consecrated in 1 2 2 2 , on the site of another ruined by an earthquake in n 84, goes back to French models in Champagne, and is indeed unique in Italy. It contains the Gothic tomb of Isabella of Aragon, wife of Philip III. of France, and also the tomb of Louis III., duke of Anjou; but it has been spoilt by restoration both inside and out. S. Domenico has a fine rose window. The Palazzo del Tribunale (law courts) is a fine building, and the upper town contains several good houses of rich proprietors of the province; while the lower portion is unhealthy. Earthquakes, and a fire in 1901, have done con- siderable damage to the town.

The ancient Consentia is first named as the burial place of Alexander of Epirus in about 330 B.C. In 204 it became Roman, though it was more under the influence of Greek culture. It is mentioned by Strabo as the chief town of the Bruttii, and frequently spoken of in classical authors as an important place. It lay on the Via Popillia. Varro speaks of its apple trees which gave fruit twice in the year and Pliny praises its wine also. It is the more surprising that in the whole of its territory no in- scriptions, either Greek or Latin, have ever been found, those

that are recorded by some writers being fabrications. In a.d. 410 Alaric fell in battle here and was buried, it is said, in the bed of the Busento, which was temporarily diverted and then allowed to resume its natural course. Cosenza became an archbishopric in the nth century. In 1461 it was taken by Roberto Orsini, and suffered severely. It was the home of a scientific academy founded by the philosopher Bernardino Telesio (1509-1588).

In 1 5 5 5-1 56 1 it was the centre of the persecution by the Inquisition of the Waldenses who had settled there towards the end of the 14th century. (T. As.)

COSHOCTON, a city and the county-seat of Coshocton county, Ohio, U.S.A., at the confluence of the Tuscarawas and the Wal- honding rivers, with the Muskingum river, and about 70 m. E.N.E. of Columbus. Pop. (1890) 3672; (1900) 6473 (364 foreign- born) ; (1910) 9603. It is served by the Pennsylvania, the Pitts- burg, Cincinnati, Chicago & St Louis (controlled by the Penn- sylvania), and the Wheeling & Lake Erie railways. The city is built on a series of four broad terraces, the upper one of which has an elevation of 824 ft. above sea-level, and commands pleasant views of the river and the valley. It has a public library. Coshocton is the commercial centre of an extensive agricultural district and has manufactories of paper, glass, flour, china-ware, cast-iron pipes and especially of advertising specialities. The municipality owns and operates its water- works. Coshocton occupies the site of a former Indian village of the same name — the chief village of the Turtle tribe of the Delawares. This village w as destroyed by the whites in 1 7 8 1 . The first settlement by whites was begun in 1801; and in 1802 the place was laid out as a town and named Tuscarawas. In 181 1, when it was made the county-seat, the present name was adopted. Coshocton was first incorporated in 1833.

COSIN, JOHN (1594-1672), English divine, was born at Nor- wich on the 30th of November 1594. He was educated at Norwich grammar school and at Caius College, Cambridge, where he was scholar and afterwards fellow. On taking orders he was appointed secretary to Bishop Overall of Lichfield, and then domestic chaplain to Bishop Neile of Durham. In December 1624 he was made a prebendary of Durham, and in the following year archdeacon of the East Riding of Yorkshire. In 1628 he took his degree of D.D. He first became known as an author in 1627, when he published his Collection of Private Devotions, a manual stated to have been prepared by command of Charles I., for the use of the queen's maids of honour. 1 This book, together with his insistence on points of ritual in his cathedral church

and his friendship with Laud, exposed him to the suspicions and hostility of the Puritans; and the book was rudely handled by William Prynne and Henry Burton. In 1628 Cosin took part in the prosecution of a brother prebendary, Peter Smart, for a sermon against high church practices: and the prebendary was deprived. In 1634 Cosin was appointed master of Peterhouse, Cambridge; and in 1640 he became vice-chancellor of the univer- sity. In October of this year he was promoted to the deanery of Peterborough. A few days before his installation the Long Parliament had met; and among the complainants who hastened to appeal to it for redress was the ex-prebendary, Smart. His petition against the new dean was considered; and early in 164 1 Cosin was sequestered from his benefices. Articles of impeach- ment, were, two months later, presented against him, but he was dismissed on bail, and was not again called for. For sending the university plate to the king, he was deprived of the mastership of Peterhouse (1642). He thereupon withdrew to France, preached at Paris, and served as chaplain to some members of the house- hold of the exiled royal family. At the Restoration he returned to England, was reinstated in the mastership, restored to all his benefices, and in a few months raised to the see of Durham (December 1660). At the convocation in 1661 he played a prominent part in the revision of the prayer-book, and endeavoured with some success to bring both prayers and rubrics into com- pleter agreement with ancient liturgies. He administered his diocese with conspicuous ability and success for about eleven years; and applied a large share of his revenues to the promotion of the interests of the Church, of schools and of charitable institutions. He died in London on the 15th of January 1672.

Cosin occupies an interesting and peculiar position among the churchmen of his time. Though a ritualist and a rigorous enforcer of outward conformity, he was uncompromisingly hostile to Roman Catholicism, and most of his writings illustrate this antagonism. In France he was on friendly terms with 1 See John Evelyn's Diary (Oct. 12, 1651).

Huguenots, justifying himself on the ground that their non- episcopal ordination had not been of their own seeking, and at the Savoy conference in 1661 he tried hard to effect a reconcilia- tion with the Presbyterians. He differed from the majority of his colleagues in his strict attitude towards Sunday observance and in favouring, in the case of adultery, both divorce and the re-marriage of the innocent

party. He was a genial companion, frank and outspoken, and a good man of business.

Among his writings (most of which were published posthumously) are a Historia Transubstantiationis Papalis (1675), Notes and Collec- tions on the Book of Common Prayer (1710) and A Scholastical History of the Canon of Holy Scripture (1657). A collected edition of his works, forming 5 vols, of the Oxford Library of Anglo- Catholic Theology, was published between 1 843 and 1855; and his Correspond- ence (2 vols.) was edited by Canon Ornsby for the Surtees Society

(1868-1870).

COSMAS, of Alexandria, surnamed from his maritime ex- periences Indicopleustes, merchant and traveller, flourished during the 6th century a.d. The surname is inaccurate, since he never reached India proper; further, it is doubtful whether Cosmas is a family name, or merely refers to his reputation as a cosmographer. In his earlier days he had sailed on the Red Sea and the Indian Ocean, visiting Abyssinia and Socotra and apparently also the Persian Gulf, western India and Ceylon. He subsequently became a monk, and about 548, in the retire- ment of a Sinai cloister, wrote a work called Topographia Christiana. Its chief object is to denounce the false and heathen doctrine of the rotundity of the earth, and to vindicate the scriptural account of the world. Photius, who had read it, calls it a ” commentary on the Octateuch ” (meaning the eight books of Ptolemy’s great geographical work; according to some, the first eight books of the Old Testament). According to Cosmas the earth is a rectangular plane, covered by the vaulted roof of the firmament, above which lies heaven. In the centre of the plane is the inhabited earth, surrounded by ocean, beyond which lies the paradise of Adam. The sun revolves round a conical mountain to the north — round the summit in summer, round the base in winter, which accounts for the difference in the length of the day. Cosmas is supposed by some to have been a Nestorian. Although not to be commended from a theological standpoint, the Topographia contains some curious information. Especially to be noticed is the description of a marble seat discovered by him at Adulis (Zula) in Abyssinia, with two inscriptions recounting the heroic deeds and military successes of Ptolemy Euergetes and an Axumitic king. It also contains in all probability the oldest Christian maps. From allusions in the Topographia Cosmas seems to have been the author of a larger cosmography, a treatise on the motions of the stars, and commentaries on the Psalms and Canticles. Photius {Cod. 36) speaks contemptuously of the style and language of Cosmas, and throws doubt upon his truthfulness. But the author himself expressly disclaims any claims to

literary elegance, which in fact he considers unsuited to a Christian circle of readers, and the accuracy of his statements has been confirmed by later travellers.

The Topographia will be found in Migne, Patrologia Graeca, lxxxviii. ; an edition by G. Siefert is promised in the Teubner series. See H. Gelzer, ” Kosmas der Indienfahrer,” in Jahrbiicher fur protestantische Theologie, ix. (1883) and C. R. Beazley, The Dawn of Modern Geography, i. (1897). There is an English translation, with introduction and notes, by J. W. M c Crindle (1897), published by the Hakluyt society.

COSMAS, of Prague (1045-1125), dean of the cathedral and the earliest Bohemian historian. His Chronicae Bohemorum libri Hi., which contains the history and traditions of Bohemia up to nearly the time of his death, has earned him the title of the Herodotus of his country. This work, which his continuators brought down to the year 1 283, is of the highest value to historians in spite of the fact that its reputation for disingenuousness and credibility has been greatly affected by the critical attacks of J. Loserth (Studien zu Cosmas von Prag, Vienna, 1880, &c).

The work was first published at Hanover in 1602, from the im- perfect Strassburg codex. A perfected edition was brought out at the same place in 1607; this was reprinted, with notes by C, G. Schwarz in I. B.. Menckenius, Scriptores rer. Germ. (3 vols., Lips.,

1728-1730). It is included in Pelzel and Dobrowsky, Script, rer. Bohem. i. pp. 1-282, after collation with Dresden MS., edited very fully by R. Kopke in Mon. Germ. Hist. Scrip, ix. 1-132, and repeated in Migne, Patrol, lat. clxvi. pp. 55-388, and in Fontes rer. Bohem. ii. (1874), I “37° (Latin and Czech), by W. Wl. Tomek. See A. Potthast, Bibliotheca Hist. Med. Aevi.

COSMATI, the name of a Roman family, seven members of which, for four generations, were skilful architects, sculptors and workers in mosaic. The following are the names and dates known from existing inscriptions: —

Lorenzo (born in the second half of the 12th century).

Jacopo (dated works 1205 and 1210).

Cosimo (” ” 1210-1235).

I

Luca Jacopo Adeodato Giovanni

(1231 and 1235). (1231-1293). (1294). (1296 and 1303).

Their principal works in Rome are: ambones of S. Maria in Ara Coeli (Lorenzo); door of S. Saba, 1205, and door with mosaics of S. Tommaso in Formis (Jacopo); chapel of the Sancta Sanctorum, by the Lateran (Cosimo); pavement of S. Jacopo alia Lungara, and (probably) the magnificent episcopal throne and choir-screen in S. Lorenzo fuori le Mura, of 1254 (Jacopo the younger); baldacchino of the Lateran and of S. Maria in Cosmedin, c. 1294 (Adeodato); tombs in S. Maria sopra Minerva (c. 1296), in S. Maria Maggiore, and in S. Balbina (Giovanni). The chief signed works by Jacopo the younger and his brother Luca are at Anagni and Subiaco. A large number of other works by members and pupils of the same family, but unsigned, exist in Rome. These are mainly altars and baldacchini, choir-screens, paschal candlesticks, ambones, tombs and the like, all enriched with sculpture and glass mosaic of great brilliance and decorative effect.

Besides the more mechanical sort of work, such as mosaic patterns and architectural decoration, they also produced mosaic pictures and sculpture of very high merit, especially the recumbent effigies, with angels standing at the head and foot, in the tombs of Ara Coeli, S. Maria Maggiore and elsewhere. One of their finest works is in S. Cesareo; this is a marble altar richly decorated with mosaic in sculptured panels, and (below) two angels drawing back a curtain (all in marble) so as to expose the open grating of the confessio. The magnificent cloisters of S. Paolo fuori le Mura, built about 1285 by Giovanni, the youngest of the Cosmati, are one of the most beautiful works of this school. The baldacchino of the same basilica is a signed work of the Florentine Arnolfo del Cambio, 1285, “cum suo socio Petro,” probably a pupil of the Cosmati. Other works of Arnolfo, such as the Braye tomb at Orvieto (q.v.), show an intimate artistic alliance between him and the Cosmati. The equally magnificent cloisters of the Lateran, of about the same date, are very similar in design; both these triumphs of the sculptor-architect’s and mosaicist’s work have slender marble columns, twisted or straight, richly inlaid with bands of glass mosaic in delicate and brilliant patterns. The shrine of the Confessor at Westminster is a work of this school, executed about 1268. The general style of works of the Cosmati school is Gothic in its main lines, especially in the elaborate altar-canopies, with their pierced geometrical tracery. In detail, however, they differ widely from the purer Gothic of northern countries. The richness of effect which the

English or French architect obtained by elaborate and carefully worked mouldings was produced in Italy by the beauty of polished marbles and jewel-like mosaics — the details being mostly rather coarse and often carelessly executed.

An excellent account of the Cosmati is given by Boito, Archi- tettura del medio evo (Milan, 1880), pp. 117-182.

COSMIC (from Gr. koo-jms, order or universe), pertaining to the universe, universal or orderly. In ancient astronomy, the word " cosmical " means occurring at sunrise, and designates especially the rising or setting of the stars at that time. " Cosmical physics " is a term broadly applied to the totality of those branches of science which treat of cosmical phenomena

and their explanation by the laws of physics. It includes terrestrial magnetism, the tides, meteorology as related to cosmical causes, the aurora, meteoric phenomena, and the physical constitution of the heavenly bodies generally. It differs from astrophysics only in dealing principally with phenomena in their wider aspects, and as the products of physical causes, while astrophysics is more concerned with minute details of observation.

COSMOGONY (from Gr. koc/jxis, world and ylyvecrdai, to be born), a theory, however incomplete, of the origin of heaven and earth, such as is produced by primitive races in the myth-making age, and is afterwards expanded and systematized by priests, poets or philosophers. Such a theory must be mythical in form, and, after gods have arisen, is likely to be a theogony (0e6s, god) as well as a cosmogony (Babylonia, Egypt, Phoenicia, Polynesia) .

i. To many the interest of such stories will depend on their parallelism to the Biblical account in Genesis i. ; the anthropo- logist, however, will be attracted by them in proportion as they illustrate the more primitive phases of human culture. In spite of the frequent overgrowth of a luxuriant imagination, the leading ideas of really primitive cosmogonies are extremely simple. Creation out of nothing is nowhere thought of, for this is not at all a simple idea. The pre-existence of world-matter is assumed; sometimes too that of heaven, as the seat of the earth-maker, and that of preternatural animals, his coadjutors. The earth- making process may, among the less advanced races, be begun

by a bird, or some other animal (whence the term ” therio- morphism “), for the high idea of a god is impossible, till man has fully realized his own humanity. Of course, the earth- forming animal is a preternaturally gifted one, and is on the line of development towards that magnified man who, in a later stage, becomes the demiurge. 1 Between the two comes the animal — man, i.e. a being who has not yet shed the slough of an animal shape, but combines the powers — natural and preter- natural — of some animal with those of a man. Let us now collect specimens of the evidence for different varieties of cos- mogony, ranging from those of the Red Indian tribes to that of the people ,of Israel.

2. North American Stories. — Theriomorphic creators are most fully attested for the Red Indian tribes, whose very backwardness renders them so valuable to an anthropologist. There is a painted image from Alaska, now in the museum of the university of Pennsylvania, which represents such an one. We see a black crow tightly holding a human mask which he is in the act of incubating. Let us pass on to the Thlinkit Indians of the N.W. coast. A cycle of tales is devoted to a strange humorous being called Yehl or Yelch, i.e. the Raven, miraculously born, not to be wounded, and at once a semi-developed creator and a culture hero. 2 His bitter foe is his uncle; the germs of dualism appear early. Like some other culture-heroes, he steals sun, moon and stars out of a box, so enlightening the dark earth. These people are at any rate above the Greenlanders, but are surpassed by the Algonkins described by Nicholas Perrot in 1700, and by the Iroquois, whom the heroic Father Brebeuf (1593-1649) learned to know so well. 3 The earth-maker of the former was called Michabo, i.e. the Great Hare. 4 He is the leader of some animals on a raft on a shoreless sea. Three of these in succession are sent to dive for a little earth. A grain of sand is brought; out of it he makes an island (America?). Of the carcases of the dead animals he makes the present men (N. Americans?). There is also a Flood-story, an episode in which has a bearing on the

1 Cf. Miss Harrison, Prolegomena to the Study of Greek Religion, chaps, vi., vii., ” The Making of a Goddess and of a God.”

2 See Ratzel, Hist, of Mankind, ii. .147-148; Breysig, Die Ent- stehung des Gottesgedankens (1905), pp. 10-12.

3 See Chamberlain, Journ. of American Folklore, iv. 208-209 (analysis of Perrot’s account) ; Brinton, Myths of the New World, pp. 176-179; Breysig, op. cit., pp. 15-20.

4 On Michabo see Brinton, op. cit. (1876), pp. 176 ff., Essays of an Americanist (1890), p. 132. This scholar holds that “Michabo” has properly nothing to do with ” Great Hare,” but should be translated ” the Great White One,” i.e. the light of the dawn. The Algonkins, however, thought otherwise, and the myth itself suggests a theriomorphic earth-maker.

great dragon-myth B (see Deluge). ˆThe Iroquois are in advance of the Algonkins; their creator-hero has no touch of the animal in him. Above the waters there existed a heaven, or a heavenly earth (cf. Mexico, Babylonia, Egypt), through a hole in which Aataentsic fell to the water. The broad back of a tortoise (cf. § 6) on which a diving animal had placed some mud, received her. Here, being already pregnant, she gave birth to a daughter, who in turn bore the twins Joskeha and Tawiscara (myth of hostile brothers). By his violence (cf. Gen. xxv. 22) the latter killed his mother, out of whose corpse grew plants. Tawiscara fled to the west, where he rules over the dead. Joskeha made the beasts and also men. After acting as culture-giver he disappeared to the east, where he is said to dwell with his grandmother as her husband. 6

3. Mexican.— The most interesting feature in the Mexican cosmology is the theory of the ages of the world. Greece, Persia and probably Babylon, knew of four such ages. 7 The Priestly Writer in the Pentateuch also appears to be acquainted with this doctrine; it is the first of four ages which begins with the Creation and ends with the Deluge. The Mexicans, however, are said to have assumed five ages called ” suns.” The first was the sun of earth; the second, of fire; the third, of air; the fourth, of water; the fifth (which is the present) was unnamed. Each of these closed with a physical catastrophe. 8 The speculations which underlie the Mexican theory have not come down to us. For the Iranian parallel, see § 8, and on the Hebrew Priestly Writer, Gunkel, Genesis’ 1 -, pp. 233 ff.

4. Peruvian. — In Peru, as in Egypt, the sun-god obtained universal homage. But there were creator-gods in the back” ground. A theoretical supremacy was accorded by the Incas to Pachacamac, whose worship, like that of Viracocha, they appear to have already found when they conquered the land. Pachacamac means, in Quichua, “world-animator.” 9 The ” philosophers” of Peru declared that he desired no temples or sacrifices, no worship but that of the heart. This is conceivable; Maui, too, in New Zealand had no temple or priests. But most probably this deity had another less abstract name, and the horrible worship offered in the one temple which he really had under the Incas, accorded with his true cosmic significance as the god of the

subterranean fire. Viracocha too had a cosmic position; an old Peruvian hymn calls him ” world-former, world-animator.” 10 He was connected with water. A third creator was Manco Capac (” the mighty man “) , whose sister and wife is called Mama Oello, ” the mother-egg.” Afterwards, the creator and the mother-egg became respectively the sun and the moon, represented by the Inca priest-king and his wife, the supposed descendants of Manco Capac. 11 Dualistic tendencies were also developed. Las Casas 12 reports a story that before creation the creator-god had a bad son who sought, after creation, to undo all that his father had done. Angered at this, his father hurled him into the sea. We need not suspect Christian influences, but the parallelism of Rev. xx. 3, Isa. xiv. 12, 15, Ezek. xxviii. 16 is obvious.

5. Polynesian. — Polynesia, that classic land of mythology, is specially rich in myths of creation. The Maori story, told by Grey and others, of the rending apart of Rangi (— Langi, heaven)

5 See Schoolcraft, Myth of Hiawatha (1856), pp. 35-39; and cf. the myth of Manabush, analysed in Journ. of Amer. Folklore, iv.

210-213.

6 The latest explanation of Joskeha is ” dear little sprout,” and of Tawiscara, ” the ice-one,” while Aataentsic becomes ” she of the swarthy body.” Hewitt, Journ. of Amer. Folklore, x. 68. Brebeuf (1635) says that Iouskeha gives growth and fair weather (Tylor, Prim. Cult. i. 294).

7 See Jeremias, Das Alle Testament im Lichte des Alten Orients, p. 121, 1; Winckler, Die Keilinschriften und das Alte Testament 3 ,

P- 333; .,’•..

8 Reville, Religions of Mexico and Peru, p. 129.

9 Garcilasso el Inca, Comment, de los Incas, lib. ii. c. 2; cf. Lang, The Making of Religion, pp. 262-270.

(V° Reville, p. 187.

11 Reville, p. 158. Garcilasso (lib. i. c. 18) says that Manco Capac ” taught the subject nations to be men,” and also founded the imperial city of Cuzco (= navel).

12 De las antiquas gentes del Peru (ed. 1892), pp. 55, 56.

and Papa (earth)' can be paralleled in China, India and Greece, and more remotely in Egypt and Babylonia. The son of Rangi and Papa was Tangaloa (also called Tangaroa and Taaroa), the sea-god and the father of fishes and reptiles. 1 In other parts of Polynesia he is the Heaven God, to whom there is no like, no second. In Samoa he is even called Tangaloa-Langi (Tangaloa = heaven) . And if he is the sea -god, we must remember that there is a heavenly as well as an earthly ocean; hence the clouds are sometimes called Tangaloa's ships. It is true, the popular imagery is unworthy of such a god. Sometimes he is said to live in a shell, by throwing off which from time to time he increases the world; or in an egg, which at last he breaks in pieces; the pieces are the islands. We also hear that long ago he hovered as an enormous bird over the waters, and there deposited an egg. The egg may be either the earth with the overarching vault of heaven or (as in Egypt — but this is a later view) the sun. The latter received mythical representation in that most interesting god (but originally rather culture-hero) Maui, who,inNewZealand practically supplants Tangaloa, and becomes the god of the air and of the heaven, the creator and the causer of the flood. 2 Speculation opened the usual deep problem ; whence came the gods? It was answered that Po, i.e. darkness, was the begetter of all things, even of Tangaloa.

6. Indian. — India, however, is the natural home of a mythology recast by speculation. The classical specimen of an advanced cosmogony is to be found in the Rig Veda (x. 129) ; it is the hymn which begins, " There then was neither Aught nor Naught!" 3 Another such cosmogony is given in Manu. It is " the self- existent Lord," who, " with a thought, created the waters, and deposited in them a seed which became a golden egg, in which egg he himself is born as Brahma, the progenitor of the worlds." 4 The doctrine of creation by a thought is characteristically Indian. In the satapatha Brahmana (cf. Deluge), we meet again with the primeval waters and the world-egg, and with the famous mythological tortoise-theory, 5 also found among the Algonkins (§ 2) — antique beliefs gathered up by the framers of philosophic systems, who felt the importance of maintaining such links with the distant past.

7. Egyptian. — In Egypt too the systematizers were busily engaged in the co-ordination of myths. They retained the belief that the germs of all things slept for ages within the dark flood, personified as Nun or Nu. How they were drawn forth was variously told. 6 In some districts

the demiurge was called Khnumu; it was he who modelled the egg (of the world?) and also man. 7 Elsewhere he was the artizan-god Ptah, who with his hammer broke the egg; sometimes Thoth, the moon-god and principle of intelligence, who spoke the world into existence. 8 A strange episode in the legend of the destruction of man by the gods tells how Ra (or Re) , the first king of the world, finding in his old age that mankind ceased to respect him, first tried the remedy of massacre, and then ascended the heavenly cow, and organized a new world — that of heaven. 9

8. Iranian. — The Iranian account of creation 10 is specially interesting because its religious spirit is akin to that of Genesis i. From a literary point of view, indeed, it cannot compare with the dignified Hebrew narrative, but considering the misfortunes which have befallen the collection of Zoroastrian traditions now represented by the Bundahish (the Parsee Genesis) we cannot reasonably be surprised. The work referred to begins by

1 See especially Waitz-Gerland, Anthropologic der Naturvolker, vi. 229-302; Gill, Myths and Songs of the South Pacific; Schirren, Wander sagen der Neuseelander; also an older work (Sir George) Grey's Polynesian Mythology.

2 See Schirren, op. cit., pp. 64-89.

8 J. Muir, Metrical Translations, pp. 188-189.

4 J. Muir, Sanscrit Texts, iv. 26.

5 See Tylor, Early History of Mankind, p. 340; Primitive Culture, i. 329 ; Oldenberg, Religion des Veda, pp. 85 f .

6 See Maspero, Dawn of Civilization, p. 127; also Brugoch, Religion und Mythologie der alten Agypter.

7 See illustration in Maspero, p. 157.

8 See Maspero, pp. 146-147.

9 Maspero, pp. 160-169.

10 See Zoroaster, and cf. Ency. Bib., " Creation," §9; " Zoro-astrianism," §§ 20, 21.

describing the state of things in the beginning; the good spirit in endless light and omniscient, and the evil spirit in endless darkness

and with limited knowledge. Both produced their own creatures, which remained apart, in a spiritual or ideal state, for 3000 years, after which the evil spirit began his opposition to the good creation under an agreement that his power was not to last more than 9000 years, of which only the middle 3000 were to see him successful. By uttering a sacred formula the good spirit throws the evil one into a state of confusion for a second 3000 years, while he produces the archangels and the material creation, including the sun, moon and stars. At the end of that period the evil spirit, encouraged by the demons he had produced, once more rushes upon the good creation to destroy it. The demons carry on conflicts with each of the six classes of creation, namely, the sky, water, earth, plants, animals represented by the primeval ox, and mankind represented by Gayomard or Kayumarth (the " first man " of the Avesta). 11 Four points to be noticed here: (1) the belief in the four periods of the world, each of 3000 years (cf. § 3); (2) the comparative success for a time of Angra Mainyu (the evil principle personified) ; (3) the absence of any recognition of pre-existent matter; (4) the mention of six classes of good creatures. Each of these deserves a comment which we cannot, however, here give, and the third may seem to suggest direct influence of the Iranian upon the Jewish cosmogony. But though there are in Gen. i. six days of creative activity, and the creative works are not six, but eight, if not ten in number, and indirect Babylonian influence is more strongly indicated. Jewish thinkers would have been attracted by the emphatic assertion of the creatorship of the One God in the royal Persian inscriptions more than by the traditional cosmogony. See further Ency. Bib., " Creation," § 9.

9. Phoenician and Greek. — Phoenician cosmogonies would appear, from the notices which have come down to us, 12 to have been composite. The traditions are pale and obscure. It is clear, however, that the primeval flood and the world-egg (out of which came heaven and earth) are referred to. See Ency. Bib., " Creation " § 7; " Phoenicia " § 15; Lagrange, Religions semitiques, pp. 351 ff. Greek cosmogonies (the orientalism of which is clear) will be found in Hesiod, Theog. 116 ff. ; Aristophanes, Birds, 692 ff.; cf. Clem. Rom., Homil. vi. 4. See Miss Harrison, Prolegomena to the Study of Greek Religion, chap. xii. " Orphic Cosmogony."

10. Babylonian and Israelilish. — Of the Babylonian and Israelitish cosmogonies we have several more or less complete records. For details as to the former, see Babylonian and Assyrian Religion. With regard to thelatter, wemaynoticethat in Gen. ii. 46-25 we have an account of creation which, though in its present form very incomplete, is highly attractive, because it is pervaded by a breath from primitive

times. It has, however, been interwoven with an account of the Garden of Eden from some other source (see Eden; Paradise), and perhaps in order to concentrate the attention of the reader, the description of the origin of ” earth and heaven ” as well as of the plants and of the rain, appears to have been omitted. In fact, both the creation- stories at the opening of Genesis must have undergone much editorial manipulation. Originally, for instance, Gen. i. 26 must have said that man was made out of earth; this point of contact between the two cosmogonic traditions has, however, been effaced.

The other narrative, Gen. i. i-ii. 4a, is a much more complete cosmogony, and since the theory of P. A. Lagarde (1887), which ascribes it to Iranian influence (see § 8), has no very solid ground, whereas the theory which explains it as largely Babylonian is in a high degree plausible, we must now consider the relations between the Israelitish and Babylonian cosmogonies. The short account of creation first translated in 1890 by T. G. Pinches is distinguished by its non-mythical character; in particular, the

11 West, Pahlavi Texts (S.B.E.), vol. i., introd. p. xxiii. We need not deny that, late as the Bundahish may be as a whole, the tradi- tions which it contains are often old.

12 Fragments of older works are cited by Philo of Byblus (in Eusebius, Praep. Evang. i. 10) and Mochus and Endemus (in Damascius, De primis principiis, c. 125).

dragon of chaos and darkness is conspicuous by her absence. This may illustrate the fact that the dragon is also unmentioned in the Hebrew cosmogony; to some writers the dragon-element may have seemed grotesque and inappropriate. We must, however, study this element in the most important Babylonian tradition, even if only for its relation to non-Semitic myths and especially to some striking passages in the Bible (Isa. xxvii. 1, li. 96; Ps. lxxiv. 14, Ixxxix. 10, n; Job iii. 8, ix. 13, xxvi. 12, 13; Rev. xii. 3, 4, xx. 1-3). One may also be permitted to hold that the mythic figure of the dragon, if used poetically, is a highly serviceable one, and consider that ” in the beginning God fought with the dragon, and slew him ” would have formed an admirable illustration of the passages just now referred to, especially to those in the Apocalypse.

The student should, however, notice that the dragon-element is not entirely unrepresented even in the priestly Hebrew cos- mogony. It is said in Gen. i. 9, 10, 14, 15, that God divided the primeval waters into two parts by an intervening ” firmament ” or ” platform,” on which the sun, moon and stars (planets) were placed to mark times and to give light. This division (cp. Ps. lxxiv. 13) is really a pale version of the old mythic statement respecting the cleaving of the carcase of Tiamat (the Dragon) into two parts, one of which kept the upper waters from coming down. 1 And we must affirm that the technical term U horn (rendered in the English Bible ” the deep “), which evidently signifies the enveloping primeval flood, and which closely resembles Tiamat, the name given to the dragon or serpent in the epic (cf. tiamtu and tamtu, Babylonian words for ” the ocean “), can only be due to the influence — probably the very early influence — of Babylonia.

But we are far from having exhausted the evidence of Baby- lonian influence on the Hebrew cosmogony. The description of chaos in v. 2 not only mentions the great water {tShom) , but the earth, i.e. the earth-matter, out of which the earth and (potenti- ally) its varied products (w. 9-1 1), and (as we know from the Babylonian epic) the ” firmament ” or ” platform ” of the heaven were to appear. This earth-matter is called ” tohu and bohu “; there is nothing like this phrase in the epic, but we may infer from Jer. iv. 23, where the same phrase occurs, that it means ” devoid of living things.” For a commentary on this see the opening of the Babylonian account referred to above, which refers to the period of chaos as one in which there were neither reeds nor trees, and where ” the lands altogether were sea.” As to the creative acts, we may admit that the creation of light does not form one of them in the epic (cf. Gen. i. 3), but the existence of light apart from the sun is presupposed; Marduk the creator is in fact a god of light. Nor ought we to find a discrepancy between the Babylonian and the Hebrew accounts in the creation of the heavenly bodies after the plants, related in Gen. i. 14-18. For the position of this creative act is due to the necessity of bringing all the divine acts into the framework of six working days. On the whole, the Hebrew statement of the successive stages of creation corresponds so nearly to that in the Babylonian epic that we are bound to assume that one has been influenced by the other. And if we are asked, ” Which is the more original ? ” we answer by appealing to the well-established fact of the profound influence of Babylonian culture upon Canaan in remote times (see Canaan). An important elenrent in this culture would be mythic representations of the origin of things, such as the Babylonian Creation and Deluge-stories in various forms. Indeed, not only Canaan

but all the neighbouring regions must have been pervaded by Babylonian views of the universe and its origin. Myths of origins there must indeed have been in those countries before Babylonian influence became so overpowering, but, if so, these myths must have become recast when the great Teacher of the Nations half-attracted and half-compelled attention. More than this we need not assert. Zimmern's somewhat different treatment of the subject in Ency. Biblica, " Creation," § 4, may be compared.

Popular writers are in some danger of misrepresenting this important result. It is tempting, but incorrect, to suppose that

•See Jastrow, Religion of Babylonia and Assyria, p. 428.

a docile Israelitish writer accepted one of the chief forms of the Babylonian cosmogony, merely omitting its polytheism and substituting " Yahweh " for " Marduk." As we have seen, various myths of Creation may have been current both in N. Arabia (whence the Israelites may have come) and in Canaan prior to the great extension of Babylonian influence. These myths doubtless had peculiarities of their own. From one of them may have come that remarkable statement in Gen. i. 26, " and the spirit of God (Elohim) was hovering over the face of the waters," which, until we find some similar myth nearer home, is best illustrated and explained by a Polynesian myth (see Cheyne, Traditions and Beliefs of Ancient Israel, ad loc). It is also probably to a non-Babylonian source that we owe the prescription of vegetarian or herb diet in Gen. i. 29, 30, which has a Zoroastrian parallel 2 and is evidently based on a myth of the Golden Age, independent of the Babylonian cosmogony. Gen. i., therefore, has not, as it stands, been directly borrowed from Babylonia, and yet the infused Babylonian element is so considerable that the story is, in a purely formal aspect, much more Babylonian than either Israelitish or Canaanitish or N. Arabian. We say " in a purely formal aspect," because the strictness with which Babylonian mythic elements have been adapted in Gen. i. to the wants of a virtually monotheistic community is in the highest degree remarkable.

On the literary scheme of the Creation-story in Gen. i. see the commentaries {e.g. Dillman's and Driver's). On the other Old Testament references to creation, and on the prophetic doctrine of creation, see Ency. Bib., " Creation," §§ 27-29. On the traces of dragon and serpent myths in the Old Testament and their signifi- cance, see Gunkel, Schopfung und Chaos (1895) — a pioneering work of the highest merit — and Ency. Bib., " Behemoth," " Dragon," " Rahab," " Serpent." On the connexion of the Creation and the Deluge-stories, see

Deluge. Cf. also the article on Babylonian and Assyrian Religion; and Cheyne, Traditions and Beliefs of Ancient Israel (1907). _ (T. K. C.)

COSMOPOLITAN (Gr. k6<7/jos, world, and ToKlrqs, citizen), of or belonging to a " citizen of the world," i.e. one whose sympathies, interests, whether commercial, political or social, and culture are not confined to the nation or race ta which he may belong, opposed therefore to " national " or * insular." As an attribute the word may be applied to a cultured man of the world, who has travelled widely and is at home in many forms of civilization, to such races as the Jewish, scattered through the civilized world, yet keeping beneath their cosmopolitanism the racial type pure, and also to mark a profound line of cleavage in economic and political thought.

COSNE, a town of central France, capital of an arrondissement in the department of Nievre, on the right bank of the Loire at its junction with the Nohain, 37 m. N.N.W. of Nevers by the Paris-Lyon railway. Pop. (1906) town, 5750; commune, 8437. Two suspension bridges unite it to the left bank of the Loire. The church of St Aignan is a building of the 12th century, restored in the 16th and 18th centuries; the only portions in the Romanesque style are the apse and the north-west portal. It formerly belonged to a Benedictine priory depending on the abbey of La Charite (Nievre). The manufacture of files, flour-milling and tanning are carried on in the town which has a subprefecture, a tribunal of first instance and a communal college. Cosne is mentioned in the Antonine Itinerary under the name of Condate, but it was not till the middle ages that it rose into importance as a military post. In the 12 th century the bishop of Auxerre and the count of Nevers agreed to a division of the supremacy over the town and its territory.

COSSA, LUIGI (1831-1896), Italian economist, was born at Milan on the 27th of May 1831. Educated at the universities of Pavia, Vienna and Leipzig, he was appointed professor of political economy at Pavia in 1858. He died at Pavia on the 10th of May 1896. Cossa was the author of several works which established for him a high reputation; including Scienza delle finanze (1875, English translation 1888 under title Taxation, its Principles and Methods); Guida alio studio dell' economia politica (1876, English translation 1880), an admirable com- pendium of the theoretical preliminaries of economics, with a 2 See Bundahish, xv. 2 (S.B.E., v. 53).

brief critical -history of the science and an excellent bibliography; Introduzione alio studio dell' economia politico, (1876, English translation by L. Dyer, 1893); and Saggi di economia politica,

1878.

COSSA, PIETRO (1830-1880), Italian dramatist, was born at Rome in 1830, and claimed descent from the family of Pope John XXIII., deposed by the council of Constance. He mani- fested an independent spirit from his youth, and was expelled from a Jesuit school on the double charge of indocility and patriotism. After fighting for the Roman republic in 1849, he emigrated to South America, but failing to establish himself returned to Italy, and lived precariously as a literary man until 1870, when his reputation was established by the unexpected success of his first acted tragedy, Nero. From this time to his death in 1880 Cossa continued to produce a play a year, usually upon some classical subject. Cleopatra, Messalina, Julian, enjoyed great popularity, and his dramas on subjects derived from Italian history, Rienzi and The Borgias, were also successful. Plautus, a comedy, was preferred by the author himself, and is more original. Cossa had neither the divination which would have enabled him to reconstruct the ancient world, nor the imagination which would have enabled him to idealize it. But he was an energetic writer, never tame or languid, and at the same time able to command the attention of an audience without recourse to melodramatic artifice; while his sonorous verse, if scarcely able to support the ordeal of the closet, is sufficiently near to poetry for the purposes of the stage.

His collected Teatro poetico was published in 1887.

COSSACKS (Russ. Kazak; plural, Kazaki, from the Turki quzzaq, " adventurer, free-booter "), the name given to consider- able portions of the population of the Russian empire, endowed with certain special privileges, and bound in return to give military service, all at a certain age, under special conditions. They constitute ten separate voiskos, settled along the frontiers: Don, Kuban, Terek, Astrakhan, Ural, Orenburg, Siberian, Semiryechensk, Amur and Usuri. The primary unit of this organization is the stanitsa, or village, which holds its land as a commune, and may allow persons who are not Cossacks (excepting Jews) to settle on this land for payment of a certain rent. The assembly of all householders in villages of less than 30 households, and of 30 elected men in villages having from 30 to 300 households (one from each 10 households in the more populous ones), constitutes the village assembly, similar to the mir, but having wider attributes, which assesses the taxes, divides the land, takes measures for the

opening and support of schools, village grain-stores, communal cultivation, and so on, and elects its ataman (elder) and its judges, who settle all disputes up to £10 (or above that sum with the consent of both sides). Military service is obligatory for all men, for 20 years, beginning with the age of 18. The first 3 years are passed in the preliminary division, the next 12 in active service, and the last s years in the reserve. Every Cossack is bound to procure his own uniform, equipment and horse (if mounted) — the government supplying only the arms. Those on active service are divided into three equal parts according to age, and the first third only is in real service, while the two others stay at home, but are bound to march out as soon as an order is given. The officers are supplied in the usual way by the military schools, in which all Cossack voiskos have their own vacancies, or are non-commissioned Cossack officers, with officers' grades. In return for this service the Cossacks have received from the state considerable grants of land for each voisko separately.

The total Cossack population in 1893 was 2,648,049 (1,331,470 women), and they owned nearly 146,500,000 acres of land, of which 105,000,000 acres were arable and 9,400,000 under forests. This land was divided between the staniisas, at the rate of 81 acres per each soul, with special grants to officers (personal to some of them, in lieu of pensions), and leaving about one-third of the land as a reserve for the future. The income which the Cossack voiskos receive from the lands which they rent to different persons, also from various sources (trade patents, rents of shops, fisheries, permits of gold-digging, &c), as also from the subsidies

they receive from the government (about £712,500 in' 1893), is used to cover all the expenses of state and local administration. They have besides a special reserve capital of about £2,600,000. The expenditure of the village administration is covered by village taxes. The general administration is kept separately for each voisko, and differs with the different voiskos. The central administration, at the Ministry of War, is composed of repre- sentatives of each voisko, who discuss the proposals of all new laws affecting the Cossacks. In time of war the ten Cossack voiskos are bound to supply 890 mounted sotnias or squadrons (of 125 men each), 108 infantry sotnias or companies (same number), and 236 guns, representing 4267 officers and 177,100 men, with 170,695 horses. In time of peace they keep 314 squadrons, 54 infantry sotnias, and 20 batteries containing 108 guns (2574 officers, 60,532 men, 50,054 horses). Altogether, the Cossacks have 328,705 men ready to take arms in case of need. As a rule, popular education amongst the Cossacks stands at a higher level than in the remainder of Russia. They have more schools and a greater proportion

of their children go to school. In addition to agriculture, which (with the exception of the Usuri Cossacks) is sufficient to supply their' needs and usually to leave a certain surplus, they'carry on extensive cattle and horse breeding, vine culture in Caucasia, fishing on the Don, the Ural, and the Caspian, hunting, bee-culture, &c. The extraction of coal, gold and other minerals which are found on their territories is mostly rented to strangers, who also own most factories.

A military organization similar to that of the Cossacks has been introduced into certain districts, which supply a number of mounted infantry sotnias. Their peace-footing is as follows: — Daghestan, 6 regular 'squadrons and 3 of militia; Kuban Circassians, 1 sotnia; Terek, 8 sotnias; Kars, 3 sotnias; Batum, 2 infantry and 1 mounted sotnia; Turkomans, 3 sotnias; total, 25 squadrons and 2 companies.

For the origin and history of the Cossacks see Poland: History, and the biographies of Razin, Chmielnicki and Mazepa. (P. A. K.)

COSSIMBAZAR, or Kasimbazar, a decayed town on the river Bhagirathi in the Murshidabad district of Bengal, India, now included in the Berhampur municipality. Pop. (1901) 1262. Though the history of the place cannot be traced back earlier than the 17th century, it was of great importance long before the foundation of Murshidabad. From the first European traders set up factories here, and after the ruin of Satgaon by the silting up of the mouth of the Saraswati it gained a position, as the great trading centre of Bengal, which was not challenged until after the foundation of Calcutta. In 1658 the first English agent was established at Cossimbazar, and in 1667 the chief of the factory there became an ex-officio member of council. In English docu- ments of this period, and till the early 19th century, the Bhagi-rathi was described as the Cossimbazar river, and the triangular piece of land between the Bhagirathi, Padma and Jalangi, on which the city stands, as the island of Cossimbazar. The proximity of the factory to Murshidabad, the Mahommedan capital, while it was the main source of its wealth and of its political importance, exposed it to constant danger. Thus in 1757 it was the first to be taken by Suraj-ud-dowlah, the nawab; and the resident with his assistant (Warren Hastings) were taken as prisoners to Murshidabad.

At the beginning of the 19th century the city still flourished; so late as 1811 it was described as famous for its silks, hosiery, koras and beautiful ivory work. But an insidious change in its once healthy climate had begun to work its decay; the area of cultivated land round it had shrunk to vanishing point, jungle haunted by wild beasts taking its place; and in 1813 its ruin was completed by a sudden change in

the course of the Bhagi- rathi, which formed a new channel 3 m. from the old town, leaving an evil-smelling swamp around the ancient wharves. Of its splendid buildings the fine palace of the maharaja of Cossimbazar alone remains, the rest being in ruins or represented only by great mounds of earth. The first wife of Warren Hastings was buried at Cossimbazar, where her tomb with its inscription still remains.

See Imp. Gaz. of India (Oxford, 1908), s.v.

COSTA, GIOVANNI (1826-1903), Italian painter, was born in Rome. He fought under Garibaldi in 1848, and seWed as a volunteer in the war of 1859; and his enthusiasm for Italian unity was actively shown again in 1870, when he was the first to mount the breach in the assault of Rome near the Porta Pia. He had settled meanwhile at Florence, where his fight for the independence of art from worn-out traditions was no less strenuous, and he became known as a landscape-painter of remarkable originality, and of great influence in the return to minute observation of nature. He had many English friends and followers, notably Matthew Ridley Corbet (1850-1902), and Lord Carlisle, and was closely associated with Corot and the Barbizon school. In later years he lived and worked mainly in Rome, where his studio was an important centre. An exhibition of his pictures was held in London in 1904, and he is represented in the Tate Gallery. He died at Rome in 1903.

See also Madame Agresti's Giovanni Costa (1904).

COSTA, LORENZO (1460-1535), Italian painter, was born at Ferrara, but went in early life to Bologna and ranks with the Bolognese school. In 1438 he painted his famous " Madonna and Child with the Bentivoglio family," and other frescoes, on the walls of the Bentivoglio chapel in San Giacomo Maggiore, and he followed this with many other works. He was a great friend of Francia, who was much influenced by him. In 1 509 he went to Mantua, where his patron was the Marquis Francesco Gonzaga, and he eventually died there. His " Madonna and Child en- throned " is in the National Gallery, London, but his chief works are at Bologna. His sons, Ippolito (1506-1561) and Girolamo, were also painters, and so was Girolamo's son Lorenzo the younger (1 537-1 5 8 3)-

COSTA, SIR MICHAEL ANDREW AGNUS (1808-1884), British musical conductor and composer, the son of Cavaliere Pasquale Costa, a Spaniard, was born at Naples on the 14th of February 1808. Here he became at an early age a scholar at the Royal College of Music. His cantata L'Immagine was composed when he was fifteen. In 1826 he wrote his first opera II Delitto Punito; in 1827 another opera II sospetto funesto. To this period belong also his oratorio La Passione, a grand Mass for four voices, a Dixit Dominus, and three symphonies. The opera // Carcere d'lldegonda was composed in 1828 for the Teatro Nuovo, and in 1829 Costa wrote his Malvina for Barbaja, the impresario of San Carlo. In this latter year he visited Birming- ham to conduct Zingarelli's Cantata Sacra, a setting of some verses from Isaiah ch. xii. Instead, however, of conducting, he sang the tenor part. In 1830 he settled in London, having a connexion with the King's theatre. His ballet Kenilworth [was written in 1831, the ballet line Heure a Naples in 1832, and the ballet Sir Huon (composed for Taglioni) in 1833. In this latter year he wrote his famous quartet Ecco quel fiero istante. Malek Adhel, an opera, was produced in Paris in 1837. In 1842 he wrote the ballet music of Alma for Cerito, and in 1844 his opera Don Carlos was produced in London. Costa became a naturalized Englishman and received the honour of knighthood in 1869. He conducted the opera at Her Majesty's from 1832 till 1846, when he seceded to the Italian Opera at Co vent Garden; he was conductor of the Philharmonic Society from 1846 to 1854, of the Sacred Harmonic Society from 1848, and of the Birmingham festival from 1849. In 1855 Costa wrote Eli, and in 1864 Naaman, both for Birmingham. Meanwhile he had conducted the Bradford (1853) and Handel festivals (1857-1880), and the Leeds festivals from 1874 to 1880. On the 29th of April 1884 he died at Brighton. Costa was the great conductor of his day, but both his musical and his human sympathies were somewhat limited; his compositions have passed into oblivion, with the exception of the least admirable of them — his arrangement of the national anthem.

COSTAKI, ANTHOPOULOS (1835-1902), Turkish pasha, was born in 1835. He became a professor at the Turkish naval college; then entered the legal branch of the Turkish service, rising to the post of procureur imperial at the court of cassation. He was governor-general of Crete; and in 1895 was appointed Ottoman ambassador in London, a post which he continued to

hold until his death at Constantinople in rgo2. He bore through- out his career the reputation of an intelligent and upright public servant.

COSTANZO, ANGELO DI (c 1507-1591), Italian historian and poet,

was born at Naples about 1507. He lived in a literary circle, and fell in love with the beautiful Vittoria Colonna. His great work, Le Istorie del regno di Napoli dal 1250 fino al 14Q8, first appeared at Naples in 1572, and was the fruit of thirty or forty years' labour; but nine more years were devoted to the task before it was issued in its final form at Aquila (1581). It is still one of the best histories of Naples, and the style is dis- tinguished by clearness, simplicity and elegance. The Rime of di Costanzo are remarkable for finical taste, for polish and frequent beauty of expression, and for strict obedience to the poetical canons of his time.

See G. Tiraboschi, Storia delta letteralura italiana, vol. vii. (Flor- ence, 1812).

COSTA RICA, a republic of Central America, bounded on the N. by Nicaragua, E. by the Caribbean Sea, S.E. and S.by Panama, S.W., W. and N.W. by the Pacific Ocean. (For map, see Central America.) The territory thus enclosed has an area of about 18,500 sq. m., and may be roughly described as an elevated tableland, intersected by lofty mountain ranges, with their main axis trending from N.W. to S.E. It is fringed, along the coasts, by low-lying marshes and lagoons, alternating with tracts of rich soil and wastes of sand.

Physical Description. — The northern frontier, drawn 2 m. S. of the southern shores of the river San Juan and of Lake Nicaragua., terminates at Salinas Bay on the Pacific; its southern frontier skirts the valley of the Sixola or Tiliri, strikes south-east along the crests of the Talamanca Mountains as far as 9 N., and then turns sharply south, ending in Burica Point. The monotonous Atlantic littoral is unbroken by any large inlet or estuary, and thus contrasts in a striking manner with the varied outlines of the Pacific coast, which includes the three bold promontories of Nicoya, Golfo Dulce and Burica, besides the broad sweep of Coronada Bay and several small harbours. The Gulf of Nicoya, a shallow landlocked inlet, containing a whole archipelago of richly-wooded islets, derives its name from Nicoya, an Indian chief who, with his tribe, was here converted to Christianity in the 1 6th century. It is famous for its purple-yielding murex, pearls and mother-of-pearl. The Golfo Dulce has an average depth of 100 fathoms and contains no islands. Two volcanic Cordilleras or mountain chains, separated from one another by the central plateau of San Jose and Cartago, traverse the interior of Costa Rica, and form a single watershed, often precipitous on its Pacific slope, but descending more gradually towards the Atlantic, where there is a broad expanse of plain in the north-east. The more northerly range, in which volcanic disturbances on a great scale have been comparatively recent, extends

transversely across the country, from a point a little south of Salinas Bay, to the headland of Carreta, the southern extremity of the Atlantic seaboard, also known as Monkey Point. Its direction changes from south-east to east-south-east opposite to the entrance into the Gulf of Nicoya, where it is cut into two sections by a depres- sion some 20 m. wide. At first it is rather a succession of isolated volcanic cones than a continuous ridge, the most conspicuous peaks being Orosi (5185 ft.), the four-crested Rincon de la Vieja (4500), Miravalles (4698) and Tenorio (6800). In this region it is known as the Sierra de Tilaran. Then succeed the Cerros de los Guatusos, a highland stretching for more than 50 m. without a single volcano. Poas (8895), the scene of a violent eruption in 1834, begins a fresh series of igneous peaks, some with flooded craters, some with a constant escape of smoke and vapour. From Irazti (11,200), the culminating point of the range, both oceans and the whole of Costa Rica are visible; its altitude exceeds that of Aneto, the highest point in the Pyrenees, but so gradual is its acclivity that the summit can easily be reached by a man on horseback. Turialba (10,910), adjoining Irazu on the east, was in eruption in 1866. Its name, though probably of Indian origin, is sometimes written Turrialba, and connected with the Latin Tunis Alba, ” White Tower.” The more southerly of

the two Costa Rican ranges, known as the Cordillera de Tala- manca, rises south of the Gulf of Nicoya, and extends midway between the two oceans towards the south-east. It follows exactly the curve of the mainland, and is continued into Panama, under the name of the Cordillera de Chiriqui. Its chief summits are Chirripo Grande (11,485), the loftiest in the whole country, Buena Vista (10,820), Ujum (8695), Pico Blanco (9645) and Rovalo (7050), on the borders of Panama. Throughout the volcanic area earthquakes and landslides are of frequent occurrence. ‘

The narrowness of the level ground between the mountains and the sea renders almost impossible the formation of any navigable river. The most important streams are those of the Atlantic seaboard, notably the San Juan, which drains Lake Nicaragua. Issuing from the lake within Nicaraguan territory, the San Juan has a course of 95 m., mostly along the frontier, to the Colorado Mouth, which is its main outfall, and belongs wholly to Costa Rica. Its chief right-hand tributaries are the San Carlos and Sarapiqui. The Reventazon, or Parismina, flows from the central plateau to the Caribbean Sea;

despite the shortness of its valley, its volume is considerable, owing to the prevalence of moist trade-winds near its sources. Six small streams and one large river, the Rio Frio, flow across the northern frontier into Lake Nicaragua. On the Pacific coast all the rivers are rapid and .liable to sudden floods. None is large, although three bear the prefix Rio Grande, “great river.” The Tempisque enters the Pacific at the head of the Gulf of Nicoya, and tends to silt up that already shallow inlet (5-10 fathoms) with its alluvial deposits. The Rio Grande de Tarcoles also enters the gulf, and the Rio Grande de Pirris and Rio Grande de Terrabis or Diquis flow into Coronada Bay. The Rio Grande de Tarcoles rises close to the Ochomogo Pass and the sources of the Reventazon, at the base of Irazu; and the headwaters of these two streams indicate precisely the depression in the central plateau which severs the northern from the southern mountains.

Costa Rica is not differentiated from the neighbouring lands by any very marked peculiarities of geological formation, or of plant and animal life. Its geology, flora and fauna are therefore described under Central America (q.v.).

Climate. — Owing to the proximity of two oceans, and the varied configuration of the surface of Costa Rica, an area of a few square miles may exhibit the most striking extremes of climate; but, over the entire country, it is possible to distinguish three climatic zones — tropical, temperate and cold. These generally succeed one another as the altitude increases, although the heat is greater at the same elevation on the Pacific than on the Atlantic coast. It is, however, less oppressive, as cool breezes prevail and damp is comparatively rare. The tropical zone comprises the coast and the foothills, and ranges, in its mean annual temperature, from 72 F. to 82 . In the San Jose plateau (3000-5000 ft.), which is the most densely populated portion of the temperate zone, the average is 68°, with an average variation for all seasons of only 5 . Above 7500 ft. frosts are frequent, but snow rarely falls. The wet season, lasting during the prevalence of the south-west monsoon, from April to December, is clearly defined on the Pacific slope. It is curiously interrupted by a fortnight of dry weather, known as the Veranillo de San Juan, in June. Towards the Atlantic the trade-winds may bring rain in any month. Winter lasts from December to February. The normal rainfall is about 80 in., but as cloud-bursts are common, it may rise to 150 in. or even more. Rheumatism on the Atlantic seaboard, and malaria on both coasts, are the commonest forms of disease; but, as a whole, Costa Rica is one of the healthiest of tropical lands.

Population. — In 1904, according to the official returns, the total

population numbered 331,340; having increased by more than one-fourth in a decade. Spanish, with various modifications of dialect, and the introduction of many Indian words, is the principal language; and the majority of the inhabitants claim descent from the Spanish colonists — chiefly Galicians — who came hither during the 16th and subsequent centuries. The percentage of Spanish blood is greater than in the other Central

American republics; but there is also a large population of half-castes (ladinos or mestizos) due to intermarriage with native Indians. The resident foreigners, who are mostly Spaniards, Italians, Germans and British subjects, numbered less than 8000 in 1904; immigration is, however, encouraged by the easy terms on which land can be purchased from the state. The native Indians, though exterminated in many districts, and civilized in others, remain in a condition of complete savagery along parts of the Nicaraguan border, where they are known as Prazos or Guatusos, in the Talamanca country and elsewhere. Their numbers may be estimated at 4000. They are a quiet and in- offensive folk, who dwell in stockaded encampments, and preserve their ancestral language and customs. For an account of early Indian civilization in Costa Rica, see Central America: Archaeology. The Mosquito Indians come every summer to fish for turtle off the Atlantic coast. As only 200 negroes were settled in Costa Rica when slavery was abolished in 1824, and no important increase ever took place through immigration, the black population is remarkably small, amounting only to some 1200.

Chief Towns and Communications. — The whites are congre- gated in or near the chief towns, which include the capital, San Jose (pop. 1904 about 24,500), the four provincial capitals of Alajuela (4860), Cartago (4536), Heredia (7151) and Liberia or Guanacaste (2831), with the seaportsof Puntarenas (3569), on the Pacific, and Limon (3171) on the Atlantic. These, with the exception of Heredia and Liberia, are described in separate articles. The transcontinental railway from Limon to Puntarenas. was begun in 18 71, and forms the nucleus of a system intended ultimately to connect all the fertile parts of the country, and to join the railways of Nicaragua and Panama. It skirts the Atlantic coast as far as the small port of Matina; thence it passes inland to Reventazon, and bifurcates to cross the northern mountains; one branch going north of Irazu, while the other traverses the Ochomogo Pass. At San Jose these lines reunite, and the railway is continued to Alajuela, the small Pacific port of Tivives, and Puntarenas. The railways are owned partly by the state, partly by the Costa Rica railway company, which, in 1904, arranged to build several branch lines through the banana districts of the Atlantic

littoral. Apart from the main lines of communication the roads are very rough, often mere tracks; and the principal means of transport are ox-carts or pack-m.ules. The postal and telegraphic services are also somewhat inadequate.

Agriculture and Industries. — The name ” Costa Rica,” meaning ” rich coast,” is well deserved; for, owing to the combination of ample sunshine and moisture with a wonderfully fertile soil, almost any kind of fruit or flower can be successfully cultivated; while the vast tracts of virgin forest, which remain along the Atlantic slopes, contain an abundance of cedar, mahogany, rosewood, rubber and ebony, with fustic and other precious dye-woods. The country is essentially agricultural, and owes its political stability to the presence of a large class of peasant pro- prietors, who number more than two-thirds of the population. Coffee, first planted in 1838, is grown chiefly on the plateau of San Jose. The special adaptability of this region to its growth is attributed to the nature of the soil, which consists of layers of black or dark-brown volcanic ash, varying in depth from 1 to 6 yds. Bananas are grown over a large and increasing area; rice, maize, barley, potatoes and beans are cultivated to some extent in the interior; cocoa, vanilla, sugar-cane, cotton and indigo are products of the warm coast-lands, but are hardly raised in sufficient quantities to meet the local demand. Stock- farming, a relatively undeveloped industry, tends to become more important, owing to the assistance which the state renders by the importation of horses, cattle, sheep and swine, from Europe and the United States, in order to improve the native breeds. In the south-east farmers are often compelled to retire with their flocks and herds before the thousands of huge, migratory vampires, which descend suddenly on the pastures and are able in one night to bleed the strongest animal to death. The manufactures are insignificant; and although silver, copper, iron, zinc, lead and marble are said to exist in considerable

quantities, the only ores that have been worked are gold, silver and copper. At the beginning of the 20th century the silver and copper mines had been abandoned. The goldfields are exploited with American capital, and yield a fair return.

Commerce.— The exports, which comprise coffee, bananas, cocoa, cabinet-woods and dye-woods, with hides and skins, mother-of-pearl, tortoiseshell and gold, were officially valued at £1,398,000 in 1904;

and in the same year the imports, including foodstuffs, dry goods and hardware, were valued at £1,229,000. Over £1,250,000 worth of the exports consisted of coffee and bananas, and these commodities were of almost equal value. Nearly 85 % of the coffee, or more than 20,000,000 ft), were sent to Great Britain. The development of the banana trade dates from 1881, when 3500 bunches of fruit were exported to New Orleans. This total increased very rapidly, and in 1902 a monthly service of steamers was established from Limon to Bristol and Manchester. The service to England soon became a weekly one, while there are at least three weekly sailings to the United States. In 1904 the number of bunches sent abroad exceeded 6,000,000. So important is this crop that the rate of wages to labourers in the banana districts is nearly 3s. daily, as compared with an average of is. 8d. in the coffee plantations. The bulk of the imports comes from the United States (52% in 1904), Great Britain (19%) and Germany (13%). Almost the whole foreign trade passes through Limon and Puntarenas. In 1904, exclusive of banana steamers, there were regular steamship services weekly from Limon to the United States and Germany, fortnightly to Great Britain, and monthly to France, Italy and Spain; while at Puntarenas four American liners called monthly on the voyage between San Francisco and Panama.

Finance. — The valuable resources of the republic, and its comparative immunity from revolution, formerly attracted the attention of European and American investors, who supplied the capital for internal development. In 187 1 the government contracted aloanof £1,000,000 in London, and in 1872 it borrowed an additional £2,400,000 for railway construction. The outstand- ing foreign debt amounted in 1887 to £2,691,300, while the arrearsof interest were no less than £2,119,500. An arrangement with the creditors was concluded in 1888; but in 1895 the republic again became bankrupt, and a fresh arrangement was sanctioned in March 1897, by which the interest on £1,475,000 was reduced to 2§% and that on £525,000 to 3%. It was pro- vided that amortization, at £10,000 yearly, should begin in 191 7. In 1904 the service of the external debt, which then amounted to £2,500,000, including £500,000 arrears of interest, was again suspended; the total of the internal debt was £815,000. About one-half of the national revenue is derived from customs, the remainder being principally furnished by railways, stamps, and the salt and tobacco monopolies. In the financial year 1904- 1905 the revenue was £503,000, the expenditure £390,000. Education, internal development and the service of the internal debt were the chief sources of expenditure.

Money and Credit. — There are three important banks, the Anglo-

Costa Rican Bank, with a capital of £120,000, the Bank of Costa Rica (£200,000), and the Commercial Bank of Costa Rica (£100,000), founded in 1905. On the 25th of April 1900 a law was enacted for the regulation of the constitution, capital, note emission and metallic reserves of banks. On the 24th of October 1896 an act was passed for the adoption of a gold coinage, and the execution of this act was decreed on the 17 th of April 1900. The monetary unit is the gold colon weighing -778 gramme, •900 fine, and thus worth about 23d. It is legally equivalent to the silver peso, which continues in circulation. The gold coins of the United States, Great Britain, France and Germany are legally current. The metric system of weights and measures was introduced by law in 1884, but the old Spanish system is still in use.

Constitution and Government. — Costa Rica is governed under a constitution of 1870, which, however, only came into force in 1882, and has often been modified. The legislative power resides in a House of Representatives, consisting of about 30 to 40 deputies, or one for every 8000 inhabitants. The deputies are chosen for a

term of four years by local electoral colleges, whose members are returned by the votes of all self-supporting citizens. One-half of the chamber retires automatically every two years. The president and three vice-presidents constitute the executive. They are assisted by a cabinet of four ministers, representing the departments of the interior, police and public works; foreign affairs, justice, religion and education; finance and commerce; war and marine. For purposes of local administration the state is divided into five provinces, Alajuela, Cartago, Guanacaste, Heredia and San Jose, and two maritime districts (comarcas), Limon and Puntarenas. All these divisions except Guanacaste — which takes its name from a variety of mimosa very common in the province — are synonymous with their chief towns; and each is controlled by a governor or prefect appointed by the president. Justice is administered by a supreme court, two courts of appeal, and the court of cassation, which sit in San Jose, and are supple- mented by various inferior tribunals.

Religion and Education. — The Roman Catholic Church is supported by the state, and the vast majority of the people accept its doctrines; but complete religious liberty is guaranteed by the constitution. The Jesuits, who formerly exercised wide- spread influence, were expelled in 1884. Of the other religious communities, the most important are the Protestants, numbering 3000, and the Buddhists, about 250. Primary education is free and compulsory; the standard of attendance is high and the instruction fair, but a large proportion of the older

inhabitants were illiterate at the beginning of the 20th century. In the matter of secondary education considerable neglect has been shown. In 1904 there were only six secondary schools, including the institute of law and medicine and the training-school for teachers at San Jose. The state grants scholarships tenable at European universities to promising pupils, and there are three important public libraries.

Defence. — Military service in time of war is compulsory for all able-bodied citizens aged 18-50. There are a permanent army, of about 600; a militia, comprising an active service branch to which all under 40 belong, with a reserve for those between 40 and 50; and a national guard, including all males under 18 and over 50 who are capable of bearing arms. On a war footing these forces would number about 36,000. A gunboat and a torpedo boat constitute the navy, which, however, requires the services of an admiral, subordinate to the ministry of marine.

History. — The origin of the name Costa Rica (Spanish for ” Rich Coast “) has been much disputed. It is often stated that the territories to which the name is now applied were first known as Nueva Cartago, while Costa Rica was used in a wider sense to designate the whole south-western coast of the Caribbean Sea, from the supposed mineral wealth of this region. Then, in 1540, the name was restricted to an area approximately equal to that of modern Costa Rica. In such a case it must have been bestowed ironically, for the country proved very unprofitable to the gold-seekers, who were its earliest European settlers. Col. Church, in the paper cited below, derives it from Costa de Oreja, ” Earring,Coast,” in allusion to the earrings worn by the Indians and remarked by their conquerors. He quotes evidence to show that this name was known to 16th-century cartographers.

With the rest of Central America, Costa Rica remained a province of the Spanish captaincy-general of Guatemala until 1821. Its conquest was completed by 1530, and ten years later it was made a separate province, the limits of which were fixed, by order of Philip II., between 1560 and 1573. This task was principally executed by Juan Vazquez de Coronado (or Vasquez de Coronada), an able and humane governor appointed in 1562, whose civilizing work was undone by the almost uninterrupted maladministration of his fifty-eight successors. The Indians were enslaved, and their welfare was wholly subordinated to the quest for gold. From 1666 onwards both coasts were ravaged by pirates, who completed the ruin of the country. Diego de. la Haya y Fernandez, governor in 1718, reported to the crown that no province of Spanish America was in so wretched a condi- tion. Cocoa-beans were the current coinage. Tomas de Acosta, governor from 1797 to

1809, confirmed this report, and stated

that the Indians were clothed in bark, and compelled in many cases to borrow even this primitive attire when the law required their attendance at church.

On the 15th of September 1821 Costa Rica, with the other Central American provinces, revolted and joined the Mexican empire under the dynasty of Iturbide; but this subjection never became popular, and, on the establishment of a Mexican republic in 1823, hostilities broke out between the Conservatives, who desired to maintain the union, and the Liberals, who wished to set up an independent republic. The opposing factions met near the Ochomogo Pass; the republicans were victorious, and the seat of government was transferred from Cartago, the old capital, to San Jose, the Liberal headquarters. From 1824 to 1839 Costa Rica joined the newly formed Republic of the United States of Central America; but the authority of the central government proved little more than nominal, and the Costa Ricans busied themselves with trade and abstained from politics. The exact political status of the country was not, however, definitely assured until 1848, when an independent republic was again proclaimed. In 1856-60 the state was involved in war with the adventurer William Walker (see Central America); but its subsequent history has been one of immunity from political disturbances, other than boundary disputes, and occasional threats of revolution, due chiefly to unsatisfactory economic conditions. The attempt of J. R. Barrios, president of Guatemala, to restore federal unity to Central America failed in 1885, and had little influence on Costa Rican affairs. In 1897 the state joined the Greater Republic of Central America, estab- lished in 1895 by Honduras, Nicaragua and Salvador, but dissolved in 1898. The boundary question between Costa Rica and Nicaragua was referred to the arbitration of the president of the United States, who gave his award in 1888, confirming a treaty of 1858; further difficulties arising from the work of demarcation were settled by treaty in 1896. The boundary between Costa Rica and Panama (then a province of Colombia) was fixed by the arbitration of the French president, who gave his award on the 15th of September 1900. The frontiers de- limited in accordance with these awards have already been described.

Bibliography. — In addition to the works on Central America cited

under that heading, the following give much general infor- mation: G. Niederlein, The Republic of Costa Rica (Philadelphia, R. Villafranca, Costa Rica (New York, 1895); L. Z. Baron

Compendio geographico y_ estadistico de la Republica de Costa Rica (San Jose, 1894) ; H. Pittier, Apuntaciones sobre el chma y geographia de la Republica de Costa Rica (San Jose, 1890); P. Biolley, Costa Rica and her Future (Washington, 1889); M. M. de Peralta, Costa Rica (London, 1873). For an account of immigration, commerce and other mainly statistical matters, see J. Schroeder, Costa Rica State Immigration (San Jose, 1894); Bulletins of the Bureau of American Republics (Washington) ; British Diplomatic and Consular Reports (London) ; U.S.A. Consular Reports (Washington) ; Reports of the Ministries (San Jose). For the history of Costa Rica, see L. Z. Baron, Compendio de la historia de Costa Rica (San Jose, 1894) ; F. M. Barrantes, Elementos de historia de Costa Rica (San Jose, 1892); J. B. Calvo, The Republic of Costa Rica (Chicago, 1890), gives a partisan account of local politics, trade and finance, author- ized by the government. Frontier questions are discussed fully in Col. G. E. Church's " Costa Rica," a very valuable paper in vol. x. of the Journal of the Royal Geographical Society (London, 1897) ; and, by Dr E. Seler, in " Der Grenzstreit zwischen den Repubhken Costa Rica und Colombia," in Petermann's Mittheilungen, vol. xlvi. (1900). For a detailed bibliography see D. J. Maluquer, Republica de Costa Rica (Madrid, 1890). The best maps are that of the Bureau of American Republics (1903), and, for physical features, that of Col. Church, published by the R.G.S. (London, 1897).

COSTELLO, DUDLEY (1803-1865), English journalist and novelist, son of Colonel J. F. Costello, was born in Ireland in 1803. He was educated for the army at Sandhurst, and served for a short time in India, Canada and the West Indies. His literary and artistic tastes led him to quit the army in 1828, and he then passed some years in Paris. He was introduced to Baron Cuvier, who employed him as draughtsman in the pre- paration of his Regne animal. He next occupied himself in copying illuminated manuscripts in the Bibliotheque Royale; and to him and his sister belongs the merit of being the first to draw general attention to this beautiful forgotten art, and of

thus leading to its revival. About 1838 Costello became foreign correspondent to the Morning Herald; in 1846 he became foreign correspondent of the Daily News; and during the last twenty years of his life he held the post of sub-editor of the Examiner. He wrote A Tour through the Valley of the Meuse (1845) and Piedmont and Italy,

from the Alps to the Tiber (1859-1861). Among his novels are Stories from a Screen (1855), The Millionaire (1858), Faint Heart never won Fair Lady (1859) and Holidays with Hobgoblins (i860). He died on the 30th of September 1865. His elder sister, Louisa Stuart Costello (1799-1870), author and miniature painter, was born in Ireland in 1799. Her father died while she was young, and Louisa, who removed to Paris with her mother in 1814, helped to support her mother and brother by her skill as an artist. At the age of sixteen she published a volume of verse entitled The Maid of the Cyprus Isle, and other poems. This was followed in 1 8 2 5 by Songs of a Stranger, dedicated to W. L. Bowles. Ten years later appeared her Specimens of the Early Poetry of France, illustrated by beautifully executed illuminations, the work of her brother and herself. It was dedicated to Moore, and procured her his friendship as well as that of Sir Walter Scott. Her principal works are — A Summer among the Bocages and Vines (1840); The Queen's Poisoner (or The Queen -M other) , a historical romance (1841); Biarn and the Pyrenees (1844); Memoirs of Eminent Englishwomen (1844); The Rose Garden of Persia (1845), a series of translations from Persian poets, with illuminations by herself and her brother; The Falls, Lakes and Mountains of North Wales (1845); Clara Fane (1848), a novel; Memoirs of Mary of Burgundy (1853); and Memoirs of Anne of Brittany (1855). She died at Boulogne on the 24th of April 1870.

COSTER-MONGER (originally Costard-monger, a seller of costards, a species of large ribbed apple). The word " monger " is common, in various forms, in Teutonic languages in the sense of trader or dealer, and appears in " iron-monger " and " fish- monger," and with a derogatory significance of petty or under- hand dealing in such words as "scandal-monger." A "coster- monger," or " coster," originally, therefore, one who sold apples and fruit in the street, is now an itinerant dealer in fruit, vegetables or fish, but more particularly, as distinguished from a "hawker" on the one hand, and " general dealer " on the other, is a street trader in the above commodities who uses a barrow. The coster-monger's trade in London, so far as it falls under clause 6 of the Metropolitan Streets Act 1867, which deals with obstruction by goods to footways and streets is subject to regula- tions of the commissioner of police. So long as these are carried out, coster-mongers, street hawkers and itinerant traders are exempted, by an amending act, from the liabilities imposed by clause 6 of the above act.

COSTS, a term used in English law to denote the expenses incurred (1) in employing a lawyer in his professional capacity for purposes other than litigation; (2) in instituting and carrying on litigation whether

with or without the aid of a lawyer.

Solicitor and Client. — The retainer of a solicitor implies a contract to pay to him his proper charges and disbursements with respect to the work done by him as a solicitor. In cases of conveyancing his remuneratien is now for the most part regulated by scales ad valorem on the value of the property dealt with (Solicitors' Remuneration Order 1882), and clients are free to make written agreements for the conduct of any class of non- litigious business, fixing the costs by a percentage on the value of the amount involved. So far as litigious business is concerned, the arrangement known as "no cure no pay " is objected to by the courts and the profession as leading to speculative actions, and stipulations as to a share of the proceeds of a successful action are champertous and illegal. An English solicitor's bill drawn in the old form is a voluminous itemized narrative of every act done by him in the cause or matter with a charge set against each entry and often against each letter written. Before the solicitor can recover from his client the amount of his charges, he must deliver a signed bill of costs and wait a month before suing.

The High Court has a threefold jurisdiction to deal with solicitors' costs: — (1) by virtue of its jurisdiction over them

as its officers; (2) statutory, under the Solicitors Act 1843 and other legislation; (3) ordinary, to ascertain the reasonable- ness of charges made the subject of a claim.

The client can, as a matter of course, get an order.for taxation within a month of the delivery of the solicitor's bill, and either client or solicitor can get such an order as of course within twelve months of delivery. After expiry of that time the court may order taxation if the special circumstances call for it, and even so late as twelve months after actual payment.

Costs as between solicitor and client are taxed in the same office as litigious costs, and objections to the decisions of the taxing officer, if properly made, can be taken for review to a judge of the High Court and to the Court of Appeal.

Litigious Costs. — The expenses of litigation fall in the first instance on the person who undertakes the proceedings or retains and employs the lawyer. It is in accordance with the ordinary ideas of justice that

the expenses of the successful party to litiga- tion should be defrayed by the unsuccessful party, a notion ex- pressed in the phrase that " costs follow the event." But there are many special circumstances which interfere to modify the application of this rule. The action, though successful, may be in its nature frivolous or vexatious, or it may have been brought in a higher court where a lower court would have been competent to deal with it. On the other hand the defendant, although he has escaped a judgment against him, may by his conduct have rendered the action necessary or otherwise justifiable. In such cases the rule that costs should follow the event would be felt to work an injustice, and exceptions to its operation have therefore been devised. In the law of England the provisions as to litigious costs, though now simpler than of old, are still elaborate and complicated, and the costs themselves are on a higher scale than is known in most other countries.

Except as regards appeals to the House of Lords and suits in equity, the right to recover costs from the opposite party in litigation has always depended on statute law or on rules made under statutory authority. " Costs are the creature of statute." The House of Lords has declared its competence to grant costs on appeals independently of statute.

In the judicial committee of the privy council the power to award, in its discretion, costs on appeals from the colonies or other matters referred to it, is given by § 15 of the Judicial Committee Act 1833; and the costs are taxed by the registrar of the council.

Courts of equity have always claimed a discretion independently of statute to give or refuse costs, but as a general rule the maxim of the civil law, victus victori in expensis condemnatus est, was followed. The successful party was recognized to have a prima facie claim to costs, but the court might, on sufficient cause shown, not only deprive him of his costs, but even in some rare cases order him to pay the costs of his unsuccessful opponent. There was a class of cases in which the court generally gave costs to parties sustaining a certain character, whatever might be the result of the suit (e.g. trustees, executors and mortgagees).

In the courts of common law, costs were not given either to plaintiff or defendant, although the damages given to a successful plaintiff might suffice to cover not only the loss sustained by the wrong done, but also the expense he had been put to in taking proceedings. The defendant in a baseless or vexatious action could not even recover his costs thus indirectly, and the indirect costs given to a plaintiff under

the name of damages were often inadequate and uncertain. Costs were first given under the Statute of Gloucester (1277, 6 Edward I. c. 1), which enacted that " the demandant shall recover damages in an assize of novel disseisin and in writs of mort d'ancestor, cosinage, aiel and beziel, and further that the demandant may recover against the tenant the costs of his writ purchased together with the damages above said. And this act shall hold in all cases when the party is to recover damages." The words " costs of his writ " were extended to mean all the legal costs in the suit. The statute gave costs, wherever damages were recovered, and no matter what the amount of the damages may be. Costs were first given to a defendant by the Statute of Marlbridge (1267) in a case relating

to wardship in chivalry (52 Henry III. c. 6) ; but costs were not given generally to successful defendants until 1 53 1 (23 Henry VIII. c. 15), when it was enacted that " if in the actions therein men- tioned the plaintiff after appearance of the defendant be non- suited, or any verdict happen to pass by lawful trial against the plaintiff, the defendant shall have judgment to recover his costs against the plaintiff, to be assessed and taxed at the discretion of the court, and shall have such process and execution for the recovery and paying his costs against the plaintiff, as the plaintiff should or might have had against the defendant, in case the judg- ment had been given for the plaintiff." In 1606 by 4 James I. c. 3, this " good and profitable law " was extended to other actions not originally specified, although within the mischief of the act, so that in any action wherein the plaintiff might have costs if judgment were given for him, the defendant if successful should have costs against the plaintiff. The policy of these enactments is expressed to be the discouragement of frivolous and unjust suits. This policy was carried out by other and later acts. The Limitations Act 1623, § 6, ordered that if the plaintiff in an action of slander recovered less than 40s. damages, the plaintiff should be allowed no more as costs than he got as damages. By 43 Elizabeth c. 6 it was enacted that in any personal action not being for any title or interest in land, nor concerning the freehold or inheritance of lands nor for battery, where the damages did not amount to 40s. no more costs than damages could be allowed. By 3 & 4 Vict. c. 24 (Lord Denman's Act 1840), where the plaintiff in an action of tort recovered less than 40s., he was not allowed costs unless the judge certified that the action was really brought to try a right besides the right to recover damages, or that the injury was wilful or malicious.

All these enactments have been superseded by the Judicature Acts, but in the case of slander on women the provisions of the act of 1623 were re-enacted in the Slander of Women Act 1891.

Supreme Court. — The general rule now in force in the Supreme Court of Judicature is as follows: — ” Subject to the provisions of the Judicature Acts and the rules of the court made thereunder, and to the express provision of any statute whether passed before or after the 14th of August 1890, the costs of and incident to all proceedings in the Supreme Court, including the administration of estates and trusts, shall be in the discretion of the court or judge, and the court or judge shall have full power to determine by whom and to what extent such costs are to be paid. Provided (1) that nothing herein contained shall deprive an executor, administrator, trustee or mortgagee who has not unreasonably carried on or resisted any proceedings of any right to costs out of a particular estate or fund to which he would be entitled under the rules hitherto (i.e. before 1883) acted upon in the chancery division as successor of the court of chancery; (2) that where an action, cause, matter or issue is tried with a jury, the costs shall follow the event unless the judge who tried the case or the court shall for good cause otherwise order.” (R.S.C.,0. 65, r. 1.)

The rule above stated applies to civil proceedings on the crown side of the king’s bench division, including mandamus, prohibition quo warranto, and certiorari (R. v. Woodhouse, 1906, 2 K.B. 502, 540); and to proceedings on the revenue side of that division (O. 68, r. 1) ; but it does not apply to criminal proceedings in the High Court, which are regulated by the crown office rules of 1906, or by statutes dealing with particular breaches of the law, and as to procedure in taxing costs by 0. 65, r. 27, of the Rules of the Supreme Court.

The rule is also subject to specific provision empowering the courts to limit the costs to be adjudged against the unsuccessful party in proceedings in the High Court, which could and should have been instituted in a county court, e.g. actions of contract under £100, or actions of tort in which less than £10 is recovered (County Courts Act 1888, §§ 65, 66, 116; County Courts Act

1903, § 3)-

For instance, in actions falling within the Public Authorities Protection Act 1893 against public bodies or officials, the defendant, if successful, is entitled to recover costs as between solicitor and client unless a special order to the contrary is made

by the court; and under some statutes still unrepealed, double or treble costs are to be allowed. Besides the rules above stated, there is also a provision, adopted from the practice of courts of equity, that if tender was made before action of a sum sufficient to satisfy the plaintiff's just demand and is followed by payment into court in the action of the sum tendered, the court will make the plaintiff pay the costs of action as having been unnecessarily brought.

Costs of interlocutory proceedings in the course of a litigation are sometimes said to be " costs in the cause," that is, they abide the result of the principal issue. A party succeeding in inter- locutory proceedings, and paying the costs therein made " costs in the cause," would recover the amount of such costs if he had a judgment for costs on the result of the whole trial, but not otherwise. But it is usual now not to tax the costs of inter- locutory proceedings till after final judgment.

Taxation. — When an order to pay the costs of litigation is made the costs are taxed in the central office of the High Court, unless the court when making the order fixes the amount to be paid (R.S.C.,0. 65, r.23). Recent changes in the organization for taxing have tended to create a uniformity of system and method which had long been needed.

The taxation is effected, under an elaborate set of regulations, by reference to the prescribed scales, and on what is known as the lower scale, unless the court has specially ordered taxation on the higher scale (R.S.C., O. 65, rr. 8, 9, appendix N).

In the taxation of litigious costs two methods are still adopted, known as " between party and party " and " between solicitor and client." Unless a special order is made the first of the two methods is adopted. Until very recently " party and party " costs were found to be a very imperfect indemnity to the success- ful litigant; because many items which his solicitor would be entitled to charge against him for the purposes of the litigation were not recoverable from his unsuccessful opponent. The High Court can now, in exercise of the equitable jurisdiction derived from the court of chancery, make orders on the losing party to pay the costs of the winner as between solicitor and client. These orders are not often made except in the chancery division. But even where party and party costs only are ordered to be paid under the present practice (dating from 1902), the taxing office allows against the unsuccessful party all costs, charges and expenses necessary or proper for the attainment of justice or defending the rights of the successful party, but not costs incurred through over-

caution, negligence, or by paying special fees to counsel or special fees to witnesses or other persons, or by any other unusual expenses (R.S.C.,0. 65, rr. 27, 29). This practice tends to give an approximate indemnity, while preventing oppression of the losing party by making him pay for lavish expenditure by his opponent. The taxation is subject to review by a judge on formal objections carried on, and an appeal lies to the Court of Appeal.

County Courts. — The costs of all proceedings in county courts follow the event, unless the judge in his discretion otherwise orders. The amount allowed is regulated by scales included in the county court rules, and is ascertained by the registrar of the court subject to any special direction by the judge, and to review by him. The costs are allowed as between party and party, but the registrar on the application of solicitor or party, and subject to the like review, taxes costs as between solicitor and client. Nothing is allowed which is not sanctioned by the scales, unless it is proved that the client has agreed in writing to pay (County Courts Act 1888, § 118).

Costs in Criminal Cases. — In criminal cases the right to recover the expenses of prosecution or defence from public funds or the opposite party depends wholly on statute. According to the common law rule the crown neither pays nor receives costs, but the rule is in some cases altered by statute {Thomas v. Pritchard, 1903, 1 K.B. 209).

Courts of summary jurisdiction may order costs to be paid by the unsuccessful to the successful party (Summary Jurisdiction Act 1848, § 18).

On prosecutions for treason or felony the court may order the

accused person, if convicted, to pay the costs of his prosecution (Forfeiture Act 1870); and the like power exists as to persons convicted of offences indictable under the Criminal Law Amend- ment Act 1885 (see § 18), and as to persons convicted on indict- ment of assault, corrupt practices at elections, offences against the Merchandise Marks Acts, or of defamatory libel, if they have unsuccessfully pleaded jurisdiction.

Provision is also made for the payment out of the local rate of the district of the costs of prosecuting all felonies (except treason- felony) and a number of misdemeanours. A list of these offences will be found in Archbold, Criminal Pleading, 23rd ed., 246. The legislation on this subject authorizes the payment of the expenses of witnesses and of the prosecutor, both at a pre- liminary inquiry before justices and at the

trial, and in the case of summary conviction for any of the indictable offences in question. It has been extended so as to include the expenses of witnesses for the defence in any indictable case if they have given evidence at the preliminary inquiry, and the costs of the defence of poor prisoners in every indictable case in which the committing justices or the court of trial certify for legal aid (Poor Prisoners' Defence Act 1903). The costs are taxed by the proper officer of the court of assize or the clerk of the peace in accordance with scales issued by the Home Office in 1903 and 1904. These scales do not fix the fees to be allowed to counsel or solicitor for the prosecution. The costs, when taxed, are paid by the treasurer of the county or borough on whom the order for payment is made.

Where a prosecution or indictment fails, the prosecutor cannot as a rule be made to pay the costs of the defence: except in cases within the Vexatious Indictments Act 1859 and its amendments {i.e. where he has, after a refusal by justices to commit for trial, insisted on continuing the prosecution) ; or where a defamatory libel is successfully justified, or where prosecutions in respect of merchandise marks or corrupt practices at elections have failed. (W. F. C.)

COSTUME (through the Fr. costume, from Ital. costume, Late Lat. costuma, a contracted form of Lat. consuetudinem, ace. of consuetudo, custom, habit, manner, &c), dress or clothing, .especially the distinctive clothing worn at different periods by different peoples or different classes of people. The word appears in English in the 18th century, and was first applied to the correct representation, in literature and art, of the manners, dress, furniture and general surroundings of the scene repre- sented. By the early part of the 19th century it became restricted to the fashion or style of personal apparel, including the head- dresses, jewelry and the like.

The subject of clothing is far wider than appears at first sight. To the average man there is a distinction between clothing and ornament, the first being regarded as that covering which satisfies the claims of modesty, the second as those appendages which satisfy the aesthetic sense. This distinction, however, does not exist for science, and indeed the first definition involves a fallacy of which it will be as well to dispose forthwith.

Modesty is not innate in man, and its conventional nature is easily seen from a consideration of the different ideas held by different races on this subject. With Mahommedan peoples it is sufficient for a woman to cover her face; the Chinese women would think it extremely indecent to show their artificially compressed feet, and it is

even improper to mention them to a woman; in Sumatra and Celebes the wild tribes consider the exposure of the knee immodest; in central Asia the finger-tips, and in Samoa the navel are similarly regarded. In Tahiti and Tonga clothing might be discarded without offence, provided the individual were tattooed; and among the Caribs a, woman might leave the hut without her girdle but not unpainted. Similarly, in Alaska, women felt great shame when seen without the plugs they carried in their lips. Europeans are considered indelicate in many ways by other races, and a remark of Peschel 1 is to the point: " Were a pious Mussulman of Ferghana to be present at our balls and see the bare shoulders of our wives and daughters, and the semi-embraces of our round dances, he would silently wonder at the long-suffering of Allah who had not long 1 The Races of Man.

ago poured fire and brimstone on this sinful and shameless generation." Another point of interest lies in the difference of outlook with which nudity is regarded by the English and Japanese. Among the latter it has been common for the sexes to take baths together without clothing, while in England mixed bathing, even in full costume, is even now by no means universal. Yet in England the representation of the nude in art meets with no reproach, though considered improper by the Japanese. Even more striking is the fact that in civilized countries what is permitted at certain times is forbidden at others; a woman will expose far more of her person at night, in the ballroom or theatre, than would be considered seemly by day in the street; and a bathing costume which would be thought modest on the beach would meet with reprobation in a town.

Modesty therefore is highly conventional, and to discover its origin the most primitive tribes must be observed. Among these, in Africa, South America, Australia and so forth, where clothing is at a minimum, the men are always more elaborately orna- mented than the women. At the same time it is noticeable that no cases of spinsterhood are found; celibacy, rare as it is, is confined to the male sex. It is reasonable, therefore, to conclude that ornament is a stimulus to sexual selection, and this con- clusion is enforced by the fact that among many comparatively nude peoples clothing is assumed at certain dances which have as their confessed object the excitation of the passions of the opposite sex. Many forms of clothing, moreover, seem to call attention to those parts of the body of which, under the conditions of Western civilization at the present day, it aims at the

conceal- ment; certain articles of dress worn by the New Hebrideans, the Zulu-Xosa tribes, certain tribes of Brazil and others, are cases in point. Clothing, moreover — and this is true also of the present day — almost always tends to accentuate rather than to conceal the difference between the sexes. Looking at the question then from the point of view of sexual selection it would seem that a stage in the progress of human society is marked by the discovery that concealment affords a greater stimulus than revelation; that the fact is true is obvious, — even to modern eyes a figure partially clad appears far more indecent than a nude. That the stimulus is real is seen in the fact that among nude races flagrant immorality is far less common than among the more clothed; the contrast between the Polynesians and Melanesians, living as neighbours under similar conditions, is striking evidence on this point. Later, when the novelty of clothing has spent its force, the stimulus is supplied by nudity complete or partial.

One more point must be considered: there is the evidence of competent observers to show that members of a tribe accus- tomed to nudity, when made to assume clothing for the first time, exhibit as much confusion as would a European compelled to strip in public. This fact, considered together with what has been said above, compels the conclusion that modesty is a feeling merely of acute self-consciousness due to appearing unusual, and is the result of clothing rather than the cause. In the words of Westermarck: ” The facts appear to prove that the feeling of shame, far from being the cause of man’s covering his body, is, on the contrary, a result of this custom; and that the covering, if not used as a protection from the climate, owes its origin, at least in a great many cases, to the desire of men and women to make themselves mutually attractive.”

Primitive adornment in its earliest stages may be divided into three classes; first the moulding of the body itself to certain local standards of beauty. In this category may be placed head-deformation, which reached its extreme development among the Indians of North-West America and the ancient Peruvians; foot-constriction as practised by the Chinese; tooth-chipping among many African tribes; and waist-com- pression common in Europe at the present day. Many forms of deformation, it may be remarked in passing, emphasize some natural physical characteristic of the people who practise them. Secondly, the application of extraneous matter to the body, as painting and tattooing, and the raising of ornamental scars often by the introduction of foreign matter into flesh-wounds

(this practice belongs partly to the first category also) . Thirdly, the suspension of foreign bodies from, or their attachment to, convenient portions of the body. This category, by far the largest, includes ear-, nose- and lip-ornaments, head-dresses, necklets, armlets, wristlets, leglets, anklets, finger- and toe-rings and girdles. The last are important, as it is from the waist- ornaments chiefly that what is commonly considered clothing at the present day has been developed.

Setting aside for the moment the less important, historically, of these, nearly all of which exist in Western civilization of the present day, it will be as well to consider that form of dress which is marked by the greatest evolution. It is generally supposed that man originated in tropical or subtropical latitudes, and spread gradually towards the poles. Naturally, as the temperaˆ ture became lower, a new function was gradually acquired by his clothing, that of protecting the body of the wearer. Climate then is one of the forces which play an important part in the evolution of dress; at the same time care must be taken not to attribute too much influence to it. It must be remembered that the Arabs, who inhabit an extremely hot country, are very fully clothed, while the Fuegians at the extremity of Cape Horn, exposed to all the rigours of an antarctic climate, have, as sole protection, a skin attached to the body by cords, so that it can be shifted to either side according to the direction of the wind.

Dr. C. H. Stratz divides clothing climatically into two classes: tropical, which is based on the girdle (or, when the attachment is fastened round the neck, the cloak), and the arctic, based on the trouser. This classification is ingenious and convenient as far as it goes, but it seems probable that the trouser, which also has the waist as its point of attachment, may itself be a further development of the girdle. Certainly, however, in historical times the division holds good, and it is worthy of remark that one of the points about the northern barbarians which struck the ancient Greeks and Romans most forcibly was the fact that they wore trousers. Amongst the most northerly races the latter garb is worn by both sexes alike; farther south by the men, the women retaining the tropical form; farther south still the latter reigns supreme. No distinct latitude can be assigned as a boundary between the two forms, from the simple fact that where migration in comparatively recent times has taken place a natural conservatism has prevented the more familiar garb from being discarded; at the same time the two forms can often be seen within the limits of the same country; as, for instance, in China, where the women of Shanghai commonly wear trousers, those of Hong-Kong skirts. The retention by women in Europe of the tropical garb can be explained by the fact that her sphere has been mainly confined to the

house, and her life has been less active than that of man; consequently the adoption of the arctic dress has been in her case less necessary. But it is notice- able that where women engage in occupations of a more than usually strenuous nature, they frequently don male costume while at their work; as, for instance, women who work in mines (Belgium) and who tend cattle (Switzerland, Tirol). The retention of the tropical pattern by the Highlanders is due directly to environment, since the kilt is better suited than trousers for walking over wet heather.

Another factor besides climate which has exerted a powerful influence on dress — more perhaps on what is commonly regarded as " jewelry " as distinct from " clothing " — is superstition. Doubtless many of the smaller objects with which primitive man adorned himself, especially trophies from the animal world, were supposed to exert some beneficial or protective influence on the wearer, or to produce in him the distinguishing character- istics attributed to the object, or to the whole of which the object was a part. Such objects might be imitated in other materials and by successive copying lose their identity, or their first mean- ing might be otherwise forgotten, and they would ultimately exercise a purely decorative function. Though this factor may be responsible for much, or even the greater part, of primitive " jewelry," yet it does not seem likely that it is the cause of all forms of ornament; much must be attributed to the desire to satisfy an innate aesthetic sense, which is seen in children

and of which some glimmerings appear among the lower animals also.

See Ed. Westermarck, The History of Human Marriage (London, 1901); Racinet, Le Costume historique (Paris, 1888); C. H. Stratz, FrauenUeidung (Stuttgart). (T. A. J.)

I. Ancient Costume

i. Ancient Oriental. — Although the numerous discoveries of monuments, sculptures, wall-paintings, seals, gems, &c, combine with the evidence from inscriptions and from biblical and classical writers to furnish a considerable accumulation of material, the methodical study of costume (in its widest sense) in the ancient oriental world (western Asia and Egypt) has several difficulties of its own. It is often difficult to obtain quite accurate or even adequate reproductions of

scenes and subjects, and, when this is done, it is obviously necessary to refrain from treating the work of the old artists and sculptors as equivalent to photo- graphic representations. Art tended to become schematic, artists were bound by certain limitations and conventions (Egypt under Amenophis IV. is a notable exception), and their work was apt to be stilted. In Egypt, too, the spirit of caricature occasionally shows itself. But when every allowance is made for the imperfections or the cunning of the workman, one need only examine any collection of antiquities to see that there was a dis- tinct appreciation of foreign physical types (not so much for personal portraiture), costumes, toilet, armour and decoration, often markedly different from native forms, and that a single scene {e.g. war, tribute-bearers, captives) will represent varieties of dress which are consistently observed in other scenes or which can be substantiated from native sources. 1 Important evidence can thus be obtained on ethnological relations, foreign influences and the like. Speaking generally, it has been found that the East as opposed to the West has undergone relatively little alteration in the principal constituents of dress among the bulk of the population, and, although it is often difficult to interpret or explain some of the details as represented (one may contrast, for example, worn sculptures or seals with the vivid Egyptian paintings), comparison with later descriptions and even with modern usage is frequently suggestive. The vocabulary of old oriental costume is surprisingly large, and some perplexity is caused by the independent evolution both of the technical terms (where they are intelligible) and of the articles of dress themselves. In reality there were numerous minor variations in the cut and colour of ancient dress even as there are in the present day in or around Palestine. These differences have depended upon climate, occupation, occasion {e.g. marriage, worship, feasts), and especially upon individual status and taste. Rank has accounted for much, and ceremonial dress- — the apparel

Romans' naturally left its mark, and there have been ages of increasing luxury followed by periods of reaction, with a general levelling and nationalization on religious grounds (Judaism, Islam) . All in all the study of oriental costume down to the days of Hellenism proves to be something more than that of mere apparel, and any close survey of the evidence speedily raises questions which concern old oriental history and thought.

The simplest of all coverings -is the loin-cloth characteristic of warm climates, and a necessary protection where there are trying extremes of temperature. Clothing did not originateinideasofdecency(Gen.ii.2S,iii.7). Children covering. ran and still run about naked, the industrious work- man upon the Egyptian

monuments is often nude, and the worshipper would even appear before his deity in a state of absolute innocence. 2 The Hebrews held that the leaves of the fig-tree (the largest available tree in Palestine) served primitive man and that the Deity gave them skins for a covering — evidently after he had slain the animals (Gen. iii. 21). With this one may compare the Phoenician myth (now in a late source) which ascribed the novelty of the use of skins to the hero Usoos (cf. the biblical Esau, q.v.). The loin- or waist-cloth prevailed under a very great variety of minor differentiated forms; In Egypt it was the plain short linen cloth wrapped around the loins and tied in front (see fig. 1). It was the usual garb of scribes, servants and peasants, and in the earlier dynasties was worn even by men of rank. Sometimes, however, it was of matting or was seated with leather, or it would take the form of a narrow fringed girdle resembling that of many African tribes. The Semites who visited Egypt wore a larger and coloured cloth, orna- mented with parallel stripes of patterns similar to those found upon some early specimens of Palestinian pottery. The border was fringed or was ornamented with bunches of tassels. But a close-fitting skirt or tunic was more usual, and the Semites on the famous Beni-Hasan tombs (about the 20th or 19th century B.C.) wear richly decorated cloth Fig. 1.— Egyptian Loin-cloth, (pattern similar to the above),

while the leader is arrayed in a magnificent wrapper in blue, red and white, with fringed edges, and a neck-ribbon to keep

Fig. 2. — Asiatics visiting Egypt (Beni-Hasan Tombs).

of the gods, their representatives and their ministers — opens out several interesting lines of inquiry. The result of intercourse, whether with other Orientals, or (m later times) with Greeks and

1 The comprehensive description by Herodotus (vii. 61 sqq.) of the costumes of the mercenaries of Xerxes is classical (see Rawlin- son's edition, iv. 56 sqq.). For archaeological parallels one may compare the tombs of Rekhmire (15th cent. B c.) and Harmhab (14th cent.) in Egypt, the " Black Obelisk " of the Assyrian king Shalmaneser II. (gin cent.) or his famous gates at Balawat (ed. W. Birch and T. G. Pinches, and with critical description and plates by A. Billerbeck and F. Delitzsch, Beitrage z. Assyriologie, vi. 1 ; Leipzig,

1908).

it in position (see fig. 2).' In harmony with prevailing custom the women's dress is rather longer than that of the men, but both sexes

have the arms free and the right shoulder is exposed. Returning to Egypt we find that the loin-cloth developed down- wards into a skirt falling below the knees. Among the upper classes it was unusually broad and was made to stand out in

2 Old Babylonian sculptors who represent the enemy as naked (Meyer [see bibliography below], pp. 12, 70 seq., 116), conventionally anticipate the usual treatment of the slain and wounded warriors.

3 Edited P. C. Newberry {Archaeol. Survey of Egypt, 1893). Cf. also the Palestinian short coloured skirt with black tassels of the 14th century {Zeit.f. Agypt. Sprache, 1898, pp. 126 sqq.).

front in triangular form. In the Middle Kingdom an outer fine light skirt was worn over the loin-cloth; ordinary people, however, used thicker material. Egyptian women had a tight foldless tunic which exposed the breasts; it was generally kept up by means of braces over the shoulders. This plain diaphanous garment, without distinction of colour (white, red or yellow), and with perhaps only an embroidered hem at the top, was worn by the whole nation, princess and peasant, from the IVth to the XVIIIth Dynasties (Erman, Life in Ancient Egypt, p. 212). Variation, such as it was, consisted of a sleeveless dress covering

From Hilprecht's Exploralionsin Bible Lands, by permission of A. J. Holman & Co. and T. & T. Clark.

Fig. 3. — Old Babylonian Costume.

the shoulders, the neck being cut in the shape of a V- Female servants and peasants when engaged at work, however, had a short skirt which left the legs free and the upper part of the body bare; a like simplicity was probably customary among female servants or captives throughout (cf. Isa. xlvii. 2). Even at the present day the wardrobe of the Sinaitic Bedouin is much more complicated than that of their female folk.

The earliest dress of Babylonia also covered only the lower half of the body. As worn by gods and men it was a long and rather loose kind of skirt suspended from a girdle. It is sometimes smooth; but sometimes it is a shaggy skin (or woollen) skirt with horizontal rows of vertically furrowed stuff. It allowed a

certain freedom to the legs, but often it is not clear whether it was joined down the middle. An instructive development shows the upper part of the skirt hang- ing over the girdle so that an elementary mantle would be obtained by drawing the loose end up over the shoulders (Meyer, ■ p. 93, cf. pp. 55, 76). The char- acteristic skirt is sometimes sup- plemented by a coarse cloth, per- haps a fleece, thrown over the shoulders; and in later times it is seen fastened outside a tunic by means of a girdle (see fig. 3).

The favourite attitude, one leg planted firmly before the other, shows the right leg fully exposed. A tunic or skirt is found as early as the time of Naram-Sin, son of the great Sargon; it reaches to his knees and appears to be held up by ornamental shoulder- bands (Meyer, pp. n, 115; fig. 4). Egyptian monuments depict Semites with .long bordered tunics reaching from neck to ankle; they have sleeves, which' are sometimes curiously decorated, and are tied at the neck with tasselled cords; some-

Fig.

4. — Naram-Sin on Stele of Victory.

times there is a peculiar design at the neck resembling a cross (Miiller, Asien und Europa, pp. 298 seq.). The Hittite warriors upon north Syrian sculptures (Zenjlrli, perhaps nth to 9th centuries) have a short-sleeved tunic which ends above the knees, and this type of garment recurs over a large area with numerous small variations (with or without girdle, slits at the neck, or bordering). An interesting example of the long plain variety is afforded by the prisoners of Lachish before Sennacherib (701 B.C.); the circumstances and a comparison of the details would point to its being essentially a simple dress indicative of mourning and humiliation. It may be compared in its general form with the woollen jubba of Arabia, which reached to the knees and was sewn down the front (except at the top and bottom). A modern Bedouin equivalent has long sleeves; it is common to both sexes, the chief difference lying in the colour — white for men, dyed with indigo for women.

mmmMmmmmmmmm

Fig. 5. — Asiatic Envoys in Egypt. •? Another very characteristic garment suggests an original loin-cloth considerably longer than the elementary article which was noticed above. The Arab izar, though now a large outer wrapper, was once a loin-cloth (like the Hebrew Szor), which, however, was long enough to be trodden upon. At the

present day male and female pilgrims at Mecca wear such a cloth (the ihrSm) ; it covers the knees and one end of it may be cast over the shoulder. In Egyptian tombs have been found linen bands no less than 30 ft. in length and 3 ft. in width. The distinctive feature is the spiral arrangement of the garment, the body being wrapped to a greater or less extent with a bandage of varying length in more or less parallel stripes. In old Babylonia both the arms and the whole of the right shoulder were originally un- covered, and one end of the garment was* allowed to hang loose over the left arm. It is frequently found upon deities, kings and magnates, and appears to have been composed of some thick furrowed or fluted material, sometimes of bright and variegated design. Not seldom it is difficult to distinguish between the true spiral garment and a dress with parallel horizontal stripes, and

one could sometimes suppose that the flounced dress with volants, well known in the Aegean area, had its parallel in Babylonia. 1 Egypt furnishes admirable painted and sculptured representa- tions of the forms taken by the Semitic spiral dress in the XVIIIth and XlXth Dynasties; the highly-coloured and gay apparel of Palestine and Syria standing in the strongest contrast to the plain, simple and often scanty garments of the Egyptians (fig. 5). While the common Semite wore a short skirt, often with tassels and sometimes with an upper tunic, the more important had an elaborate scarf (extending from waist to knee) wound over the long tunic, or a longer and close-fitting variety coloured blue and red and generally adorned with rich embroidery. A significant feature is the kind of cape which covers the shoulders ; it would not and no doubt was not intended to leave play for the arms; it was the Ac- dress of the leisured classes, and a typical

6 ‘ˆOfficer gyPtlan SCene de P icts the chiefs of Lebanon thus arrayed submissively felling cedars for Seti I. (about 1300 B.C.).

Not until the XVIIIth and XlXth Dynasties does a change come over Egyptian costume. The Asiatic conquests made Egypt politically.supreme, the centre of life and intercourse, and the tendency arose to pay some attention to outward appearance. From the highest to the lowest — with the important exception of the priests — the new age of luxury wiped out the earlier simplicity. The upper part of the body was covered with a tunic fastened over the girdle. Often the left arm had a short sleeve while the right was bare, but flowing sleeves came into use and various pleated skirts became

customary. Garments were multiplied, and the cape and long mantle, which had previously been uncommon, were now usual. Fashions changed in quick succession; upper clases were successively copied by those

beneath them and were forced to ensure their dignity by as- suming new styles. Whether for ordinary or for special occa- sions a great variety of costume prevailed, and several types can be distinguished among both sexes (Er- man, pp. 207 seq., 213 sqq.;see fig. 6). The fashionable material was linen, and al- though, according to Herodotus (ii. 81), a woollen mantle was worn over the fringed linen skirt, wool was forbidden to the priests in the temple. The preference for fine white linen, quite in keeping with the exaggerated Egyp- tian ideas of cleanli- ness, brought the art of spinning and weaving to a singularly high level; in embroidery, as in tapestry, however, it is prob- able that western Asia more than held its own (see figs. 7 and 8). Quite distinct from the spiral is the old Babylonian cloak, which was thrown over the left shoulder, passed under the right 1 See e.g. Ball, Light from the East, p. 36. On the Aegean dress (whether a development from spiral swathes or perhaps rather from a series of skirts one above the other), see the discussion of the Aegean loin-cloth by D. Mackenzie, Annual of the British School at Athens, xii. 233-249 (esp. 242 seq.).

armpit, and hung down, leaving sufficient freedom for the legs. It is often decorated with a fringed border from top to bottom. In time this mantle covered both shoulders and assumed sleeves, and in one form or another it is frequently represented. So

Drawn from a photo by Giraudon.

Fig. 7. Sargon and his Commander-in-Chief.

Fig. 8. — Assyrian Officers.

Jehu’s tribute-bearers wear short sleeves, trimmed border, and the general effect could even suggest an Assyrian dress (see fig. 9). Not unlike this is the style on the bilingual Hittite boss of Tarkudimme, where the skirt ends in a point nearly to the ground and one leg stands out bare to the front — the very favourite attitude. Long fringed robes were worn by Hittites of both sexes, and the women represented at Mar’ash and Zenjirli wear

Fig. 9. — Israelite Tribute-bearers introduced by two Assyrian Officers.

it hung over the characteristic Hittite cylindrical head-dress (fig. 10). On the other hand, the unhappy females of Lachish have a long plain mantle which covers the head and forehead (fig. n), and the same principle recurs in modern usage, where the tunic will be supplemented by a veil or shawl which (generally bound to the head by a band) frames the face and falls back to the waist. A large mantle could thus serve as a veil, and Rebekah covered her face with her square or oblong wrapper on meeting Isaac (Gen. xxiv. 65). Veiling was ceremonial (1 Cor. xi. 5), and customary on meeting a future bridegroom or at marriage (see Gen. xxix. 23-25). Nevertheless veils were not usually worn out of doors, the countrywoman of to-day is not veiled, and it is uncertain whether there is any early parallel for the yashmak, the narrow strip which covers the face below the eyes and hangs down to the feet.

Before passing to the special covering for the feet and head some further reference to the Old Testament usage may be made. Among the Hebrews the outer garment, as distinct from the inner loin wrapper (Zzor) or tunic, evidently took many forms.

The tunic (kuttoneth, cf. xit&v, tunica), like its Greek counterpart, was apparently of two kinds, for, although essentially a simple and probably sleeveless garment, there was a special variety worn by royal maidens and men of distinction, explicitly described as a tunic of palms or soles (passim), that is, one presumably reaching to the hands and feet (Gen. xxxvii. 3; 2 Sam. xiii. 18 sq.). 1 The kuttoneth could be removed at night (Cant. v. 3). For the outer garments the most distinctive term

From Der altc Orient, by permission of J. C. Hinrichs'sche Buchhandlung. Fig. 10. — Hittite Women.

is the simlah. This was worn by both sexes, though obviously there was some difference as regards length, &c. (Deut. xxii. 5). Ruth put one on before going out of doors, and its folds could be used for carrying small loads (Ruth iii. 9; Ex. xii. 34). The law forbade the creditor to retain it over-night as a pledge (Ex. xxii. 26 sq.), and consequently we may assume that it was a large outer wrapper which could be dispensed with out of doors by men, or indoors by women. The simlah of the warrior (Isa. ix. 5) can be illustrated from the Assyrian sculptures (Ency. Bib., art. "Siege"); according to Herodotus

(vii. 69) the Arabs under Xerxes wore a long cloak fastened by a girdle. The outer girdle (Heb. hagorah; the Arabic equivalent term is a kilt from thigh to knee) varied, as the monuments show, in richness and design, and could be used as a sword-belt or

pocket much in the same way as the modern native uses the long cloth twined twice or thrice around his body. The more ornate variety, called abnet, was worn by promi- nent officials (Isa. xxii. 21) and by the high priest. The modern oriental open waistcoat finds its fellow in the jacket or bolero from ancient Crete, and seems to have been distinctively Aegean. The same may also be true of breeches. The pantaloons worn by modern females, with short tunic and waistcoat, are not found among the Bedouin {e.g. of Sinai), trousers being considered undignified even for men. But a baggy kind of knickerbockers is represented in old

1 Joseph's familiar " coat of many colours," which we owe to the Septuagint, can perhaps be justified: R. Eisler, Orient. Lit. Zeitung, August, 1908

Fig. 11.— Prisoners of Lachish.

Footgear.

Aegean scenes, and it is noteworthy that the Arab mi'zar (drawers such as were worn by wrestlers or sailors) takes its name from the izar or loin-cloth (Ency. Bib. 1734). Such a cloth may once have passed between the legs, being kept in position by the waistband (examples in Perrot and Chipiez, Greece, ii. 198 sq., 456). On the other hand, among the Africans of Punt the waistcloth passes from each knee to the opposite thigh, and two sashes hang down to conceal the parts where they intersect (Miiller, 108). The people of Keft (Aegeans) wore a similar arrangement which is a step in the direction of the proper drawers. The latter are found exceptionally upon Semitic Bedouin with an upper covering of bands wound round the body (Miiller, 140). However, the woven decorated drawers in Cyprus do not appear to be of Semitic origin (J. L. Myres, Classical Review, x. 355), and it is not until later that they were prescribed to the Israelite priests (Ezek. xliv. 18). But the garment as explained by Josephus (Ant. iii. 7. 1) was properly a lion-cloth (cf. the examples from Punt), and the reason given for its use (Ex. xxviii. 42) points to a later date than the law which enforced the same regard for decency by forbidding the priests to ascend altars with steps (ib. xx. 26). As trousers were distinctively Persian — though the Persians had the reputation for borrowing Median and foreign dress (Herod, i. 71, vii. 61) — they were no doubt

familiar in Palestine in the post-exilic age, and in the Roman period the braccae and feminalia were certainly known. On supposed references to breeches in Dan. iii. 21, see J own. of Philology, xxvi. 307-313.

Special protection for the feet was chiefly necessary in rocky districts or upon long journeys. In early Egypt men of rank would be followed by a servant carrying a pair of sandals in case of need ; but in the New Kingdom they were in common use, although a typical difference is observed when princes appear unshod in the presence of the Pharaoh, who wears sandals him- self. The simplest kind was a pad or sole of leather or papyrus bound to the foot by two straps, one passing over the in- step, the other between the toes. 2 A third was sometimes fastened be- hind the heel, and the front is often turned up to protect the toe (Egypt and elsewhere). The Semites of the XHth Dynasty wore on their journeys sandals of black leather, those ‘of the women and children being more serviceable, and, in the case of women, parti-coloured. Practically the same simple sandal came into use everywhere when required. But the warrior had something stouter, and the Hittites wore a turned -up shoe bound round the legs with thongs. Among the latter is also found a piece of protecting leather reaching halfway up the shin, and similar developments with tight-fitting bandages, buskins or laced garters were worn in Assyria and Asia Minor (see fig. 12). Such coverings find their analogies among the peasants of modern Cilicia and Cappadocia. Stockings, it may be added, do not appear, and are quite exceptional at the present daj

The treatment of the hair, moustache and beard is extremely interesting in the study of oriental archaeology (see Miiller, Meyer, opp. citt.). A special covering for the head # ead r» ear . was not indispensable. The Semites often bound their bushy locks with a fillet, which varies from a single band (so often, e.g. Palestinian captives, 10th century) to a fourfold

2 Erman, 226 sqq., cf. the modern Bedouin shoe, Jennings- Bramley, Quart. Stat, of Palest. Explor. Fund (1908), p. 115 sq. (on dress of Sinai tic Bedouin generally).

Fig. 12. Assyrian Warriors with captured Idols.

From Palestine Exploration Fund Quarterly Statement, Oct., 1907.

Fig. 13. — Sacrificial Scene on a Seal From Gezer.

one, from a plain band to highly decorated diadems. The Ethiopians of Tirhakah's army (7th cent.) stuck a single feather in the front of their fillet, and a feathered ornament recurs from the old Babylonian goddess with two large feathers on her head to the feathered crown common from Assur-bani-pal's Arabians to Ararat, and is familiar from the later distinctive Persian head- dress. 1 But the ordinary Semitic head covering was a cloth which sometimes appears with two ends tied in front, the third falling behind. Or it falls over the nape of the neck and is kept in position with a band; or again as a cloth cap has lappets

to protect the ears. Sometimes it

has a more bulky appearance. In general, the use of a square or rectangular cloth (whether folded diagonally or not) corresponds to the modern keffiyeh woven with long fringes which are plaited into cords knitted at the ends or worked into little balls sewn over with coloured silks and golden threads. 2 The keffiyeh covering cheek, neck and throat, is worn over a small skull-cap and will be accompanied with the rela- tively modern fez (tarbilsk) and a woollen cloth. Probably the oldest head-dress is the circular close-fitting cap (plain or braided), which, according to Meyer, is of Sumerian (non-Semitic) origin. But it has a long history. Palestinian captives in the Assyrian age wear it with a plain close-fitting tunic, and it appears upon the god Hadad in north Syria (cf. also the Gezer seal, fig. 13). With some deities (e.g. the moon-god Sin) it has a kind of straight brim which gives it a certain resemblance to a low-crowned " bowler." Very character- istic is the conical cap which, like the Persian hat (Gr. kurbasia), resembled a cock's comb. It is worn by gods and men, and with the latter sometimes has ear-flaps (at Lachish, with other varieties, Ball, 190) or is surmounted by a feather or crest. It was probably made of plaited leather or felt. Veritable helmets of metal, such as Herodotus ascribes to Assyrians and Chalybians (vii. 63, 76), and metal armour, though known farther west, scarcely appear in old oriental costume, and the passage which attri- butes bronze helmets

and coats of mail to the Philistine Goliath and the Israelite Saul cannot be held (on other grounds) to be necessarily reliable for the middle or close of the nth century (1 Sam. xvii.). A loftier head-covering was sometimes spherical at the top and narrowed in the middle; with a brim or border turned up back and front it is worn by Hittite warriors of Zenjirli and by their god of storm and war (fig. 14). Elongated and more pointed it is the archaic crown of the Pharaohs (symbolical of upper Egypt), worn by a Hittite god of the 14th century, and finds parallels upon old cultus images from Asia Minor, Crete and Cyprus. Later, Herodotus describes it as (vii. 64). Finally the cylindrical hat of

Fig. 14. — Hittite Weather-god.

distinctively Scythian

Hittite kings and queens reappears with lappets in Phoenicia (Perrot and Chipiez, Phocn. ii. 77); without the brim it resembles the crown of the Babylonian Merodach-nadin-akhi, with afeathered top it distinguishes Adad (god of storm, &c.) at Babylonia. Narrower at the top and surmounted by a spike it distinguishes the Assyrian kings.

1 Meyer, 97, see F. Hommel, Aufsatze u. Abhandlungen (Munich, fsjoo), 160 sqq., 214 sqq. For other feathered head-dresses in western Asia, see Miiller, 361 sqq.

2 Such tasselled or fringed caps were used by the Syrians in the Christian era, see W. Budge, Book of Governors, ii, 339, 367.

When the deities were regarded as anthropomorphic they naturally wore clothing which, on the whole, was less subject to change of fashion and was apt to be symbolical of their attributes. The old Babylonian hero Gilgamesh Costum < > and the Egyptian Bes (perhaps of foreign extraction) g 0ds ° are nude, and so in general are the figurines of the Ishtar-Astarte type. Numerous bronze images of a kneeling god at Telloh give him only a loin-cloth, and often the deity, like the monarch, has only a skirt. In course of time various plaids or mantles are assumed, and in Babylonia the goddesses were the first to have both shoulders covered. Distinctive features are found in the head-dress, e.g. crowns (cf. the Ammonite god, 2 Sam. xii. 30) or horns (a single pair or an arrangement of four pairs), and in Babylonia symbolical emblems are attached to the shoulders {e.g. the rays of the sun-god, stalks, running water). Long garments ornamented with symbolical designs (stars, &c.) are worn by Marduk and Adad. The custom of clothing images is well known in the ancient world, and at the restoration of an Egyptian temple care was taken to anoint the

divine limbs and to prepare the royal linen for the god. The ceremonial clothing of the god on the occasion of festal processions, undertaken in Egypt by the ” master of secret things,” may be compared with the well-known Babylonian representations of such promenades. The Babylonian temples received garments as payment in kind, and the Egyptian lists in the Papyrus Harris (Rameses III.) enumerate an enormous number of skirts, tunics and mantles, dyed and undyed, for the various deities. A priest, ” master of the wardrobe,” is named as early as the Vlth Dynasty, and later texts refer to the weavers and laundry servants of the temple. It is probable that 2 Kings xxiii. 7 originally referred to the women who wove garments for the goddess in the temple at Jerusalem.

In Egypt the king was regarded as the incarnation of the deity, his son and earthly likeness. The underlying conception shows itself under differing though not unrelated forms over „ western Asia, and in their light the question of religious costume. and ceremonial dress is of great interest. Throughout Egyptian history the official costume was conventionalized, and the latest kings and even the Roman emperors are arrayed like their predecessors of the IVth Dynasty. The crook which figures among royal and divine insignia may go back to the boomerang- like object which was a prominent weapon in antiquity (Miiller, 123 sq.). It appears in old Babylonia as a curved stick, and, like the club, is a distinctive symbol of god and king. It resembles the sceptre curved at the end, which was carried by old Hittite gods. The Pharaoh’s ; characteristic crown (or crowns) symbolized his royal domains, the sacred uraeus marked his divine ancestry, and he sometimes appeared in the costume of the gods with their fillets adorned with double feathers and horns. In Babylonia Naram-Sin in the guise of a god wears the pointed helmet and two great horns distinctive of the deities. 3 This relationship between the gods and their human representa- tives is variously expressed. Khammurabi and the sun-god Shamash, on the former’s famous code of laws, have the same features and almost the same frizzled beard, and, according to Meyer, the king in claiming supremacy over Sumer and Akkad wears the costume of the lands. 4 Ordinary folk could not claim these honours, and in Egypt, where shaving was practically universal, artificial beards were worn upon solemn occasions as a peculiar duty. But the appendage of the official was shorter than that of the king, and the gods had a distinctive shape for themselves; if it appears upon the dead it is because they in their death had become identified with the god Osiris (Erman, 59, 225 sq.). Young Egyptian princes and youthful kings had

3 Comp. the horns of Bau (” mother of the gods “), Samas (Sha-

mash), (H)adad, and (in Egypt) of the Asiatic god assimilated to Set (so, too, Rameses III. is styled ” strong-horned ” like Baal). With the band dependent from the conical hat of Marduk-bal-iddin II. (Meyer, 8) and other kings, cf. the tail on the head-dress of this foreign Set (e.g. Proc. Soc. of Bibl. Arch. xvi. 87 sq.). The consort of the Pharaoh, in turn, wore the sacred vulture head-dress.

4 On the resemblance between divine and royal figures in costume, &c, see further Meyer, 9, 14 sq., 17, 23, 53 sq., 67, 79, 102, 105 sq.

a long plaited lock (or later a lappet) on the side of their head in imitation of the youthful Horus, and the peculiar tonsure adopted by the later Arabs of Sinai was inspired by the desire to copy their god Orotal-Dionysus. 1 Thus we perceive that ancient costume and toilet involves the relations between the gods and men, and also, what is extremely important, the political conditions among the latter. When the king symbolizes both the god and the extent of his kingdom, ceremonies which couid appear commonplace often acquire a new significance, any discussion of which belongs to the intricacies of the history of religion and pre-monarchical society. It must suffice, therefore, to record the Pharaoh’s simple girdle (with or without a tunic) from which hangs the lion’s tail, or the tail-like band suspended from the extremity of his head-dress (above), or the panther or leopard skin worn over the shoulders by the high priest at Memphis, subsequently a ceremonial dress of men of rank. That the Pharaoh’s skirt, sometimes decorated with a pleated golden material, should become an honorific garment, the right of wear- ing which was proudly recorded among the bearer’s titles, is quite intelligible, but many difficulties arise when one attempts to identify the individuals represented, or to trace the evolution of ideas. 2

The well-known conservatism of religious practice manifests itself in ceremonial festivals (where there is a tendency for the original religious meaning to be obscured) and among moalal t ˆ le priests, an0 ” it is interesting to observe that despite costume, the great changes in Egyptian costume in the New Kingdom the priests still kept to the simple linen skirt of earlier days (Erman, 206). Religious dress (whether of priests or worshippers) was regulated by certain fundamental ideas concerning access to the deity and its consequences. That it was proper to wear special garments (or at least to rearrange one’s weekday clothes) on the Jewish sabbath was

recognized in the Talmud, and Mahommedans, after discussing at length the most suitable raiment for prayer, favoured the use of a single simple garment (Bukhari, viii.). It was a deep-seated belief that those who took part in religious functions were liable to communicate this ” holiness ” to others (compare the complex ideas associated with the Polynesian taboo) . Hence priests would remove their ceremonial dress before leaving the sanctuary ” that they sanctify not the people with their garments ” (Ezek. xliv. 19; cf. xlii. 14), and every precaution was taken on religious occasions to ensure purity by special ablutions and by cleansing the clothes. 3 In the old ritual at Mecca, the man who wore his own garments must leave them in the sanctuary, as they had become “taboo”; hence the sacred circumambulation of the Ka’ba was performed naked (prohibited by Mahomet), or in clothes provided for the occasion. The old archaic waist-cloth was used, and at the present day both male and female pilgrims enter bare-footed and clad in the scanty ihrdnt (C. M. Doughty, Arabia Deserta, ii. 479, 481, 537). In several old Babylonian representations the priests or worshippers appear before the deity in a state of nature. 4 It is known that laymen were required to wear special garments, and the priests (who wore dark-red or purple) were sometimes called upon to change their garments in the course of a ceremony. Thus the temples required clothing not merely for the gods but also for the attendants (so at Samaria, 2 Kings x. 22).

In the late usage at Harran the worshipper, after purifying his garments and his heart, was advised to put on the clothing of the particular god he addressed (de Goeje, Oriental Congress, Leiden,

1 Herod, iii. 8. If the bald Sumerians wore wigs in time of war, (Meyer, 81, 86), war itself from beginning to end was essentially a religious rite ; see W. R. Smith, Rel. of Semites, pp. 401 sqq., 491 sq. ; F. Schwally, Semitische Kriegsaltertiimer , i. On the importance attached to the beard, see Ency. Bib., s.v.

2 A typical example is afforded by the solitary representation of a Moabite (Perrot and Chipiez, Phoen. ii. 45) whose helmet and dress suggest a god or king. Equally perplexing is the Egyptian style on the Phoenician statue, ib. 28.

3 Cf. Lev. xvi. 23 sq.; Ex. xix. 10; Herod, ii. 37 (ed. Wiedemann) ; Lagrange, Etudes sur Us relig. sem. 239.

4 M. Jastrow, Relig. of Bab. and Ass. p. 666; cf. Rev. biblique, 1908, p. 466 sq., and Meyer, 59, 86, 97, 101. According to the latter Sumerian priests served naked (p. 112).

1883, pp. 341 sqq.). The reason is obvious, and the principle could be variously expressed. But we are not told whether the prophetess who wore bands on her arm and drew a mantle over her head (so read in Ezek. xiii. 17-23) actually used the clothing peculiar to some , deity, nor is it quite clear what is meant when a Babylonian ritual text refers to the magical use of. the linen garment of Eridu (seat of the cult of Ea). The Bishop Gregentius denounced as heathenish the rites in which the Arabs wore masks (W. R. Smith, 438), and one is tempted to compare the use of masks elsewhere in animal worship. Next, one may observe upon old Babylonian seals, eagle-headed deities with short feathered skirts attended by humjn beings similarly arrayed (Ball, 151) or figures draped in a fish skin (Menant, Rev. de I'hist. des relig. xi, 295-301) or a worshipper arrayed somewhat like a cock (Meyer, 63; cf. Lucian's De Dea Syria, § 48; for " bees," &c, as titles of sacred attendants, see J. G. Frazer, Pausanias, iv. 223, v. 621). Although there is much that is obscure in this line of research, it is a natural assumption that, in those ritual functions where the gods were supposed to participate, the role was taken by men, and the general idea of assimilating oneself to the god (and the reverse process) manifests itself in too many ways to be ignored (cf. W. R. ˆSmith, 293, 437_ sq., 474; C. J. Ball, Ency. Bib., art. " Cuttings "). But the deities were not originally anthropomorphic, and it is with the earlier stages in their development that some of the more remarkable costumes are apparently concerned.

Of all priestly costumes 5 the most interesting is undoubtedly that of the Jewish Levitical high-priest. In addition to a tunic (kuttoneth) and a seamless mantle or robe (me'il), he wore the breastplate (hosheri), the ephod, and a rich outer girdle. Breeches were assumed on the Day of Atonement. His head-dress was as distinctive as that of the high priest at Hierapolis, who wore a golden tiara and a purple dress, while the ordinary priests had a pilos (conical cap, also worn in Israel, Ex. xxviii. 40) and white garments. But the various descriptions cannot be easily re- conciled. 6 The robe had pomegranates and golden bells that the sound might give warning as he went in and out of the sanctuary, and " that he died not " (Ex. xxviii. 35). According to Josephus they symbolized the lightning and thunder respectively. The " ephod of prophecy " (so Test, of Levi, viii. 2) was essentially once an object of divination (see Ephod). The "breastplate of judgment " was set with twelve jewels engraved with the names of the tribes; the foreordained covering of the semi- divine being in the garden of the gods bore the same number of stones (Ezek. xxviii. 13, Septuagint). This breast ornament finds analogies in the royal and high priestly dress of Egypt, and in the six jewels of the Babylonian king. 7 The sacred lots which

gave ” judgment ” in accordance with the divine oracle (Num. xxvii. 21) have been plausibly compared with the Babylon- ian tablets of destiny worn by the gods and the mystic lots upon the bosom of Noah. 8 The two jewels also engraved with the names of the tribes in a suitable setting, worn upon the shoulder (see p. 102, c), served, like the twelve mentioned, for a memorial before the Deity, effectively bringing them to remembrance, without any action on the part of the bearer, and thus tacitly involving supernatural intervention as amulets are regularly expected to do. The golden plate inscribed ” holy to Yahweh ” placed over the head (the details are discrepant) had a mystic atoning force (Ex. xxviii. 38), and in general writers recognized the peculiar efficacy of the costume and its symbolical meaning (Philo, Vita Mosis, iii. 14; Jos. Ant. iii. 7. 7; Talm. Zeb. 88b). Although Jewish tradition ascribed this gorgeous and significant array to the Mosaic age (if not to the pre-Mosaic days of Levi, so the Test, of Levi), its very character, in common with the high priest’s status, combines kingly and priestly powers in a manner which is impossible for the period (about isth-i3th cent.). Where the king is the human representative of the Deity he is theoretically and officially the priesthood, although the priests carry on the ordinary subordinate functions. The Hebrew

5 For the conspicuous dress of Syrian and Phrygian priests in Rome and for other incidental references, see D. Chwolsohn, Die Ssabier (1856), ii. 655, 712 sq.

6 Ex. xxviii., xxix. 5; Lev. viii. 6-9, xvi.; Ecclus. xlv. ; Joseph. Ant. iii. 7, Wars, v. 5, 7; see commentaries and special dictionaries of the Bible.

J Zimmern, Keilinschrift. u. Alte Test. 629, n. 5; cf. the Bab. priests’ pectoral; Lagrange, op. cit., 236, n. I.

8 Jubilees, viii. 11, see W. Muss-Arnolt, Amer. Journ. of Semit. Lang., 1900, pp. 207-212.

kings, at all events, undertook priestly duties, and not until after the fall of Jerusalem does the history allow that usurpation of monarchical rights upon which the prophet Ezekiel (q.v.) en- croaches. The embodiment of political and religious supremacy displayed in the high priest’s authority, clothing and symbols can only

reflect exilic or rather post-exilic conditions. 1 (See further Priest.) In the Maccabaean age the high priest Jonathan received the purple robe and crown and the buckle of gold worn on the shoulder as a sign of priestly and secular rank (i Mace. x. 20, 38, 89, xi. 58). His brother Simon received similar honours (xiv. 48 sq.), and Hyrcanus, the " second David," was supposed to have had two crowns, one royal and the other priestly (Talm. Kidd. 66a). The later Rabbis wore most sumptuous apparel, and were crowned until the death of Eliezer ben Azarya.

Thus there was a real significance in ceremonial investiture (cf. Num. xx. 26, 28) and in the transference of clothes (cf. Elisha and Elijah's mantle, 2 Kings ii. 13). Further the exchange of garments was not meaningless, and the prohibition in Deut. xxii. 5 points to religious or superstitious beliefs, on which see J. G. Frazer, Adonis, Attis and Osiris (2nd ed.), pp. 428-435. On the claim involved by the act of throwing a garment over another (Ruth iii. 9 ; cf . 1 Kings xix. 19), see W. R. Smith, Kinship and Marriage*, 105 sq. ; J. Well- hausen, Archiv f. Religionswiss. (1907), pp. 40 sqq. ; and on some interesting ideas associated with sandals, see Ency. Bib., s.v." Shoes." As a sign of grief, or on any occasion when the individual felt himself brought into closer contact with his deity, the garments were rent (subsequently a conventional slit at the breast sufficed) and he donned the sak, a loin-cloth or wrapper which appears to be a survival of older and more primitive dress. 2 Later tradition (Mish., Kit. ix. 1) does not endorse Ezekiel's prohibition of woollen garments among the priests in the sanctuary (xliv. 17 sq.). Why the layman was forbidden a mixture of wool and linen (sha'atnez, Deut. xxii. 1 1) is difficult to explain, though Maimonides perhaps correctly regarded the law as a protest against heathenism (on the magical use of representatives of the animal and vegetable kingdom, in conjunction with a metal ring, see I. Goldziher, Zeit.f. alttest. Wissens. xx. 36 sq.).

Ancient oriental costume then cannot be severed from the history and development of thought. On the one side we may see the increase of rich apparel and the profusion of clothes by which people of rank indicated their position. On the other are such figures as the Hebrew prophets, distinguished by their hairy garment and by their denunciation of the luxury of both sexes. 3 Superfluous clothing was both weakening and deteriorat- ing; this formed the point of the advice of Croesus to Cyrus (Herod, i. 155)- But "foreign apparel" was only too apt to involve ideas of foreign worship (Zeph. i.8. sq.), and the recogni- tion that national costume, custom and morality were inseparable underlay the objection to the Greek cap (the 7rer euros) introduced among the Jews under Antiochus Epiphanes (2 Mace. iv.

10-17, with the parallel 1 Mace, i 11-15). The Israelite distinctive costume and toilet as part of a distinctive national religion was in harmony with oriental thought, and, as a people chosen and possessed by Yahweh, ” a kingdom of priests and an holy nation” (Ex. xix. 5 sq.; cf. Is. lxi. 6), certain outward signs assumed a new significance and continued to be cherished by orthodox Jews as tokens of their faith. The tassels attached by blue threads to the four corners of the outer garment were unique only as regards the special meaning attached to them (Num. xv. 37-41; Deut. xxii. 12), and when in the middle ages they marked out the Jew for persecution they were transferred to a small under-garment (the little talith), the proper tdlith being • worn over the head in the synagogue. Similarly, sentences bound on the left arm or placed upon the forehead (Deut. xi.

1 The relations between sacerdotal and civic authority may be seen in the vestments of the church (chasuble, alb, stole), which probably were once the official garments of magistrates.

2 See articles on mourning customs in the Bible Dictionaries, and, for special studies, Biichler, Zeit.f. alttest. Wissens., 1901, pp. 81-92; M. Jastrow, ib., 1907, 117 sqq.; and in Journ. Amer. Or. Soc. xx. 133 sqq., xxi. 23-39. F° r the Babylonian evidence see Zimmern, op. cit., 603. The sculptures of Sennacherib show the bare-headed and bare-footed suppliants of Lachish meanly clad before Sennacherib (Ball, p. 192, contrast the warriors with caps and helmets, ib. p. 190, and on the simple dress, cf. above).

3 Ezek. xvi. xxiii. ; Isa. iii. 16-iv. I. For the hairy garb, cf. John the Baptist (Matt. iii. 4) ; it became the ascete’s dress. The founder of the Jacobite Church in Asia owed his surname (Burde’ana) to his rough horse-cloth. Here may be mentioned the archaic revival in Egypt in the 8th century B.C., which also extended to the costume.

18, cf. the high priest’s plate) find analogies in the means taken elsewhere to ensure the protection of or to manifest one’s adherence to a deity; the novelty lies in the part these sentences took in the religion (see Phylactery). While the particular prohibition regarding the beard and hair in Lev. xix. 27 (cf. Ezek. xliv. 20) was for the avoidance of heathen customs, the peyotk or long curls which became typical in the middle ages are reminiscent of the Horus-curl of Egypt and the Mahommedan ” heaven lock ” and evidently served as positive distinctive marks. Apart from these details later Jewish dress does not belong to this section. In the Greek and Roman period foreign influence shows itself very strongly in the introduction of novelties of costume and of classical terms, and the subject belongs

rather to the Greek and Roman dress of the age. 4 Two conflicting tendencies were constantly at work, and reached their climax in the middle ages. There was an anxiety to avoid articles of dress peculiar to other religions, especially when these were associated with religious practices; and there was a willingness to refrain from costume contrary to the customs of an unsympathetic land. On the one hand, there was a conservatism which is exemplified when the Jews in course of immigration took with them the characteristic dress of their former adopted home, or when they remained unmoved by the changes of the Renaissance. On the other hand, the prominent badge enforced by Pope Innocent III. in 1 21 5 was intended to prevent Jews from being mistaken for Christians, and similarly in Mahommedan lands they were compelled to wear some distinctive indication of their sect. Thus the many quaint and interesting features of later Jewish costume have arisen from certain specific causes, any considera- tion of which concerns later and medieval costume generally. See I. Abrahams, Jewish Life in the Middle Ages (1896), chap, xv. sq. ; and especially the Jew. Encyc, s.v. “Dress” (with numerous illustrations).

Authorities.— Much useful material will be found in popular illustrated books (especially C. J. Ball, Light from the East, London, 1899) and in the magnificent volumes on the history of ancient art by G. Perrot and C. Chipiez. On Egyptian costume see especially J. G. Wilkinson, Manners and Customs of the Ancient Egyptians (ed. by S. .Birch, 1878), and A. Erman Life in Ancient Egypt (1894, especially pp. 200-233) ; for Egyptian evidence, see W. M. Muller, Asien und Europa nach altagypt. Denkmdler (Leipzig, 1893), Mitteil. d. vorderasiat. Gesellschaft (1904), ii. (and elsewhere). The most important study on old Babylonian dress is that of E. Meyer, ” Sumerier und Semiten in Babylonien,” in the Abhandlungen of the Berlin University (1906). For Hittite material, see the collection by L. Messerschmidt, Mitteil. d. vorderas. Ges. (1900 and 1902). For special discussions, see H. Weiss, Kostiimkunde, i. (Stuttgart, 1881), articles in Diet. Bible (Hastings), Ency. Biblica, and Jewish Encyc, and I. Benzinger, Hebr. Archaologie (Tubingen, 1907), pp. 73 sqq. See also the general bibliography at the end. (S. A. C).

ii. Aegean Costume. — The discoveries made at Mycenae and other centres of ” Mycenaean” civilization, and those of more recent date due to the excavations of Dr A. J. Evans and others in Crete, have shown that Hellenic culture was preceded in the Aegean by a civilization differing from it in , many respects (see Aegean Civilization), and not least in costume. The essential feature both of male and female dress during the”Minoan” and “Mycenaean” periods was the loin-cloth, which is best represented by the votive terra-cotta

statuettes from Fetsofa in Crete discovered by Professor J. L. Myres and published in the ninth volume of the Annual of the British School at Athens (fig. 15). J. L. Myres shows that the costume consists of three parts — the loin-cloth itself, a white wrapper or kilt „ „

, , , , i • ,, ,., From Pet3ofa {Annual

worn over it, and a knotted girdle which of the Brit. School at secured the whole and perhaps played its Allims ‘>- part in producing and maintaining the wasp cotta’statlltte.” waists characteristic of the Aegean race. The loin-cloth was the only costume (except for high boots, probably made of pale leather, since they are represented 4 See for details, A. Briill, Trachten d. Juden (1873).

with white paint) regularly worn by the male sex, though we sometimes find a hood or wrapper, as on a lead statuette found in Laconia (fig. 16), but the Aegean women developed it into a bodice-and-skirt costume, well represented by the

frescoes of Cnossus and the statuettes of the snake-goddess and her votaries there dis- covered. This trans- formation of the loin- cloth has been illustrated by Mr D. Mackenzie(see below) from Cretan seal-impressions. In place of the belted kilt of the men we find a belted panier or polonaise, con- siderably elongated in front, worn by Aegean women; and Mackenzie shows that this was re- peated several times until it formed the compound skirt with a number of flounces which is represented on many Mycenaean gems. On a fresco discovered at Phaestus (Hagia Triada) (fig. 17) and a sealing from the same place this multiple skirt is clearly shown as divided; but this does not seem to have been the general rule. On other sealings we find a single overskirt with a pleated underskirt. The skirts were held in place by a thick rolled belt, and the upper part of the body remained quite nude in the earliest times; but from the middle Minoan period onward we often find an important addition in the shape of a low-cut bodice, which sometimes has sleeves, either tight-fitting or puffed, and ultimately develops into a laced corsage. A figurine from Petsofa (fig. 18) shows the bodice-and-skirt costume, together with a high pointed head-dress, in one of its most

Perrot et Chipiez’s Art in Primitive Greece, by permission of Chapman & Hall.

Fig. 16. — Lead Statuette from Kampos

From Monumenti antichi (Acad. Lincei).

Fig. 17. — Part of a Fresco discovered at Phaestus.

From Annual of the Brit. School at Athens.

Fig. 18. — Terra-cotta Statuette from Petsofa.

elaborate forms. The bodice has a high peaked collar at the back. Other forms of head-dress are seen on the great signet from Mycenae. The fact that both male and female costume amongst the primitive Aegean peoples is derivable from the simple loin-cloth with additions is rightly used by Mackenzie as a proof that their original home is not to be sought in the colder regions of central Europe, but in a warm climate such as that of North Africa. It is not until the latest Mycenaean period that we find brooches, such as were used in historical Greece, to fasten woollen garments, and their presence in the tombs of the lower city of Mycenae indicates the coming of a northern race.

See Annual of the British School at Athens, ix. 356 sqq. (Myres) ; xii. 233 sqq. (Mackenzie) ; Tsountas and Manatt, The Mycenaean Age, ch. vii.

iii. Greek Costume. — All articles of Greek costume belong either to the class of ivdvuara, more or less close-fitting, sewn garments, or of irepiffKrifiara, loose pieces of stuff draped round the body in various ways and fastened with pins or brooches. For the former class the generic name is xˆt6 > v, a word of Semitic origin, which denotes the Eastern origin of the garment; for the latter we find in Homer and early poetry irbfSas, in later times IfiarLov. The xexXos (also called eavos and apos in Homer) was the sole indispensable article of dress in early Greece, and, as it was always retained as such by the women in Dorian states, is of ten called the ” Doric dress ” {koQris Acopis). It was a square piece of woollen stuff about a foot longer than the height of the wearer, and equal in breadth to twice the span of the arms measured from wrist to wrist. The upper edge was folded over for a distance equal to the space from neck to waist — this folded portion was called anrimTiryˆa or SnrXois, — and the whole garment was then doubled and wrapped round the body below the armpits, the left side being closed and the right open. The back and front were then pulled up over the shoulders and fastened together with brooches like safety-pins (irepovai). This was the Doric costume, which left the right side

of the body exposed and provoked the censure of Euripides (Andr. 598). It was usual, however, to hold the front and back of the weirhos together by a girdle {{iivq), passed round the waist below the a.TtbKTvyy.a; the superfluous length of the garment was pulled up through the girdle and allowed to fall over in a baggy fold (koKttos) (see Greek Art, fig. 75). Sometimes the aK&KTvy ixa was made long enough to fall below the waist, and the girdle passed outside it (cf . the figure of Artemis on the vase shown in Greek Art, fig. 29); this was the fashion in which the Athena Parthenos of Pheidias was draped. The " Attic " or " Corinthian " 7r«rXos was sewn together on the right side from below the arm, and thus became an evSv/xa. The 7r«rXos was worn in a variety of colours and often decorated with bands of ornament, both horizontal and vertical; Homer uses the epithets KpoKowewKos and KvavoTeThos , which show that yellow and dark blue wbr\oi were worn, and speaks of embroidered ttotXoi (xoikiXoi). Such embroideries are indicated by painting on the statues from the Acropolis and are often shown on vase paintings.

The chiton, xirkv, was formed by sewing together at the sides two pieces of linen, or a double piece folded together, leaving spaces at the top for the arms and neck, and fastening the top edges together over the shoulders and upper arm with buttons or brooches; more rarely we find a plain sleeveless chiton. The length of the garment varied considerably. The x i "' uv ' urK oi, worn in active exercise, as by the so-called " Atalanta " of the Vatican, or the well-known Amazon statues (Greek Art, fig. 40), reached only to the knee; the x<-t&v iro5ripr]s covered the feet. This long, trailing garment was especially characteristic of Ionia; in the Homeric poems (//. xiii. 685) we read of the Taoees eX/ceˆtraices. If worn without a girdle it went by the name of x<-t&v opdoo-radios. The long chiton was regularly used by musicians (e.g. Apollo the lyre-player) and charioteers. In ordinary life it was generally pulled up through the girdle and formed a koXxos (Greek Art, fig. 2).

Herodotus (v. 82-88) tells a story (cf. Aegina), the details of which are to all appearance legendary, in order to account for a change in the fashion of female dress which took place at Athens in the course of the 6th century B.C. Up to that time the " Dorian dress " had been universal, but the Athenians now gave up the use of garments fastened with pins or brooches, and adopted the linen chiton of the Ionians. The statement of Herodotus is illustrated both by Attic vase-paintings and also by the series of archaic female statues from the Acropolis of Athens, which (with the exception of one clothed in the Doric .7r €7rXos) wear the Ionic chiton, together with an outer garment, sometimes laid over both shoulders like a cloak (Greek Art, fig. 3), but

more usually fastened on the right shoulder only, and passed diagonally across the body so as to leave the left arm,

free. The garment (which resembles the Doric ir«rXos, but seems to have been rectangular rather than square) is folded over at the top, and the central part is drawn up towards the right shoulder to produce an elaborate system of zigzag folds (Greek Art, fig. 22). The borders of the garment are painted with geometrical patterns in vivid colours; a broad stripe of ornament runs down the centre of the skirt. 1

This fashion of dress was only temporary. Thucydides (i. 6) tells us that in his own time the linen chiton of Ionia had again been discarded in favour of the Doric dress, and the monuments show that after the Persian wars a reaction against Oriental- ism showed itself in a return to simpler fashions. The long linen chiton, which had been worn by men as well as women, was now only retained by the male sex on religious and festival occasions; a short chiton was, however, worn at work or in active exercise (Greek Art, fig. 3) and often fastened on the left shoulder only, when it was called x'tojv trepo/ xacrxaXos or «£a>pis. But the garment usually worn by men of mature age was the tfiariov, which was (like the ireirXos) a plain square of woollen stuff. One corner of this was pulled over the left shoulder . from the back and tucked in under the left arm; the rest of the garment was brought round the right side of the body and either carried under the right shoulder, across the chest and over the left shoulder, if it was desired that the right arm should be free, . or wrapped round the right arm as well as the body, leaving the right hand in a fold like a sling (Greek Art, fig. •2). The lp.ix.Ti.ov was also worn by women over the linen chiton, and draped in a great variety of ways, which may be illustrated by the terra- cotta figurines from Tanagra (4th-3rd cent. B.C.) and the numerous types of female statues, largely represented by copies of Roman date, made to serve as grave-monuments. The upper part of the tfiariov was often drawn over the head as in the example here shown (Plate, fig. 2 1) , a statue formerly in the duke of Sutherland's collection at Trentham and now in the British Museum.

A lighter garment was the xKap,vs, chlamys, a mantle worn by young men, usually over a short chiton girt at the waist, and fastened on the right shoulder (cf . the figure of Hermes in Greek Art, fig. 2). The xˆaiva. was a heavy woollen cloak worn in cold weather. Peasants

wore sheepskins or garments of hide called /3 am/ or ciavpa; slaves, who were required by custom to conceal their limbs as much as possible, wore a sleeved chiton and long hose.

A woman's head was usually covered by drawing up the IfxarLov (see above), but sometimes instead of this, a separate- piece of cloth was made to perform this service, the end of it falling over the himation. This was the KahvKTpa, or veil called KpriSefxvov in Homer. A cap merely intended to cover in the hair and hold it together was called KeKpv

1 These ornamental bands are carefully described and reproduced" in colour by A. Lermann, Altgriechische Plastik (1907), pp. 85 ff., pis. i.-xx. Some authorities hold that the skirt forms part of the over-garment, but it seems clear that it belongs to the x«'t«x'-

tied in a large knot above the forehead, as in the case of Artemis, or of Apollo as leader of the Muses. The early Athenians wore their hair in the fashion termed /cpd>/3i;Xos, with fastenings called " grasshoppers " (rimyes), in allusion to their claim of having originally sprung from the soil (Thuc. i. 6). The rerriyts have been identified by Helbig with small spirals of gold wire, such as are found in early Etruscan tombs lying near the head of the skeleton. Such spirals were used in early Athens to confine the back hair, and this fashion may therefore be identified as the /cpd)/3uXos. In archaic figures the hair is most frequently arranged oyer the brow and temples in parallel rows of small curls which must have been kept in their places by artificial means. Ear-rings {kvuma, eXX6/3«x, eKiKrrjpes) of gold, silver, or bronze plated with gold, and frequently ornamented with pearls, precious stones, or enamel, were worn attached to the lobes of the ear. For neck- laces (oppot), bracelets (ofcis), brooches (irepovai), and finger- rings (5a/tri)Xioi or (Tˆpaylses) the same variety and preciousness of material was employed. For the feet the sandal {aavbahov, nkbihov) was the usual wear; for hunting and travelling high boots were worn. The hunting-boot (ivdpopis) was laced up the front, and reached to the calves; the Kodopvos (cothurnus) was a high boot reaching to the middle of the leg, and as worn by tragic actors had high soles. Slippers (irepcnKai) were adopted from the East by women; shoes (epfiddes) were worn by the poorer classes. Gloves (x«pi6es) were worn by the Persians, but ap- parently never by the Greeks unless to protect the hands when working (Odyssey, xxiv. 230). Hats, which were as a rule worn only by youths, workmen and slaves, were of circular shape, and either of some stiff material, as the Boeotian hat observed in terra-cottas from Tanagra, or of pliant material which could be bent down at the sides like the ireTacros

worn by Hermes and sometimes even by women. The Kavcia, or Macedonian hat, seems to have been similar to this. The Kvpfiao-la, or Ki5ap«, was a high-pointed hat of Persian origin, as was also the ridpa, which served the double purpose of an ornament and a covering for the head. Workmen wore a close-fitting felt cap (irtXos).

See F. Studniczka, ” Beitrage zur Geschichte der altgriechischen Tracht ” (Abhandlungen des arch.epigr. Seminars in Wien, vii. 1886) ; Lady Evans, Chapters on Greek Dress (1893) ; W. Kalkmann, ” Zur Tracht archaischer Gewandfiguren ” (Jahrb. des k. deutschen arch. Instityts, 1896, pp. 19 ff.); S. Cybulski, Tabulae quibus anti quitates Graecae et Romanae ittustrantur, Nos. 16-18 (1903), with text by W. Amelung; Ethel B. Abrahams, Greek Dress (1908).’

iv. Etruscan Costume. — The female dress of the Etruscans did not differ in any important respect from that of the Greeks; it consisted of the chiton and himation, which was in earlier times usually worn as a shawl, not after the fashion of the Doric 7r«rXos. Two articles of costume, however, were peculiar to the Etruscans – — the high conical hat known as the tutulus? and the shoes with turned-up points (Latin calcei repandi). These have oriental analogies, and lend support to the tradition that the Etruscans came from Asia. Both are represented on a small bronze figure in the British Museum (fig. 1 9) . On a celebrated terra- cotta sarcophagus in the British Museum of much later date (fig. 20), the female figure reclining on the lid wears a Greek chiton of a thin white material, with short sleeves fastened on the outside of the arm, by means of buttons and loops; a himation of

apparently of leather, and attached to the foot and leg with leather straps; under the straps are thin socks which do not cover the toes; she wears a necklace of heavy pendants; her ears are pierced for ear-rings; her hair is partly gathered together with a ribbon at the roots behind, and partly hangs in long tresses before and behind; a flat diadem is bound round her head a little way back from the brow- and 2 The tutulus was worn at Rome by the flaminica.

temples, Purple, pale green and white, richly embroidered, are favourite colours in the dresses represented on the painted tombs.

The chief article of male dress was called the tebenna. We are told by ancient writers that the toga praetexta, with its purple border

(irepiTopipvpos Trjˆevva), as worn by Roman magistrates and priests, had been derived from the Etruscans (Pliny, N.H . ix. 63, ” praetextae apud Etruscos originem invenere “); and the famous statue of the orator in Florence (Plate, fig. 22), an Etruscan work of the 3rd century B.C., represents a man clothed in this garment, which will be described below. Under the tebenna, or toga, which was necessary only for public appearance, the Etruscans wore a short tunic similar to the Greek chiton. For workmen and others of inferior occupation this appears to have been the only dress. Youths, when engaged in horseman- ship and other exercises, wore a chlamys round the shoulders, which, however, was semicircular in cut, and was fastened on the breast by buttons and a loop, or tied in a knot, whereas the Greek chlamys was oblong and fastened on the shoulder by a brooch. On public or festal occasions the Etruscan noble wore, besides the tebenna, a bulla, or necklace of bullae, and a wreath, corona Etrusca. The bulla was a circular gold locket containing a charm of some kind against evil. 1 On the later sarcophagi the

Hedrawn from photo (Mansell).

Fig. 20.

male figures wear not only a wreath or corona proper, bu,t also a garland of flowers hung round the neck. The male head-dress was the galerus, a hat of leather, said to have been worn by the Lucumos in early times, or the apex, a pointed hat corresponding to the tutulus worn by females. The fashion of shoes worn by Roman senators was said to have been derived from Etruria. Etruscan shoes were prized both in Greece and in Rome.

Helbig’s articles, referred to at the close of the next section, should be consulted. J. Martha, L’Art etrusque, gives reproductions of the most important monuments. See also the works on Etruscan civilization named in the art. Etruria.

v. Roman Costume. — We are told that the toga, the national garment of the Romans, was originally worn both by men and by women; and though the female dress of the Romans was in historical times essentially the same as that of the Greeks, young girls still wore the toga on festal occasions, as we see from the reliefs of the Ara Pads Augustae. In early times no under- garment was worn save a loin-cloth (subligaculum), which seems to be a survival of early Mediterranean fashions (see above, sect. Aegean Costume), and candidates for office in historical times appeared in the toga and subligaculum only. In this period, however, the tunica, corresponding to the Greek chiton, was

universally worn in ordinary life, and the toga gradually became a full-dress garment which was only worn over the tunica on important social occasions; Juvenal (iii. 171) tells us that.in a great part of Italy no one wore the toga except at his burial !

The toga was a piece of woollen cloth in the form of a segment of a circle, 2 the chord of the arc being about three times the height of the wearer, and the height a little less than one-half of this length. One end of this garment was thrown over the left shoulder and allowed to hang down in front; the remainder

‘ It was also worn by Roman children.

1 This seems more likely than the alternative view that it was of elliptical shape and was folded before being put on. Quintilian (xi. 3, 139, a locus classicus for the toga) speaks of it as ” rotunda_ˆ; but this need not be taken literally

was drawn round the body and disposed in various ways. In the cinctus Gabinus, which was the fashion adopted in early times when fighting was in prospect, the end of the toga was drawn tightly round the waist and formed a kind of girdle; this was retained in certain official functions, such as the opening of the temple of Janus in historical times. 3 In time of peace the toga was wrapped round the right arm, leaving the hand only free, much after the fashion of the Greek himation, and thrown over the left shoulder so as to fall down behind (see Roman Art, Plate II., fig. 11, male figure to r.); or, if greater freedom were desired, it was passed under the right arm-pit. In religious ceremonies, the magistrate presiding at the sacrifice drew the back of the toga over his head; see in the same illustration the priest with veiled head, ritu Gabino, who also wears his toga with the cinctus Gabinus. Towards the end of the republic a new fashion was generally adopted. A considerable length of the toga was allowed to hang from the left shoulder; the remainder was passed round the body so as to rise like a baldric (balteus) from the right hip to the left shoulder, being folded over in front (the fold was called sinus) , then brought round the back of the neck so that the end fell over the right shoulder; the hanging portion on the left side was drawn up through the sinus, and bulged out in an umbo (Plate, fig. 24). Later still, this portion, instead of forming a bundle of folds in the centre, was carefully folded over and carried up over the left shoulder, and in course of time these folds were carefully arranged in several thicknesses resembling boards, tabulae, hence called contabulatio (Plate, fig. 23). Yet another fashion was that adopted by the flamens, who passed the right-hand portion of the toga over the right shoulder

and arm and back over the left shoulder, so that it hung down in a curve over the front of the body; the upper edge was folded over. The flamens are thus represented on the Ara Pacis Augustae.

The plain white toga (toga pura) was the ordinary dress of the citizen, but the toga praetexta, which had a border of purple, was worn by boys till the age of sixteen, when they assumed the plain toga virilis, and also by curule magistrates and some priests. A purple toga with embroidery {toga picta) was worn together with a gold-embroidered tunic (tunica palmata) by generals while celebrating a triumph and by magistrates pre- siding at games; it represented the traditional dress of the kings and was adopted by Julius Caesar as a permanent costume. The emperors wore it on occasions of special importance. The trabea, which in historical times was worn by the consuls when opening the temple of Janus, by the equites at their yearly in- spection and on some other occasions, and by the S.alii at their ritual dances, and had (according to tradition) formed the original costume of the augurs and flamens (who afterwards adopted the toga praetexta) , was apparently a toga smaller in size than the ordinary civil dress, decorated with scarlet stripes (trabes). It was fastened with brooches (fibulae) and appears to have been worn by the equites, e.g. at the funeral ceremony of Antoninus Pius.

The tunica was precisely like the Greek chiton; that of the senator had two broad stripes of purple (latus clavus) down the centre, that of the knight two narrow stripes (angustus clavus). A woollen undergarment (subucula) was often worn by men; the women's under-tunic was of linen (indusium). When women gave up the use of the toga, they adopted the stola, a long tunic with a border of a darker colour (instita) along the lower edge; the neck also sometimes had a border (patagium) . The tunic with long sleeves (tunica manicata) was a later fashion. Over this the ricinium or rica, a shawl covering the head and shoulders, was worn in early times, and retained by certain priestesses as an official costume; 4 but it gave place to the palla, the equivalent of the Greek himation, and the dress of the Roman women henceforward differed in no essential particular from that of the Greek.

3 The Lares are thus represented in art.

4 The suffibulum of the vestals, which was fastened on the breast by a brooch (fibula), was a garment of this sort. The marriage-veil (flammeum) derived its name from its bright orange colour. The palliolum was a kind of mantilla.

A variety of cloaks were worn by men during inclement weather; in general they resembled the Greek chlamys, but often had a hood (cucullus) which could be drawn over the head. Such were the birrus (so-called from its red colour), abolla and lacerna. The paenula, which was the garment most commonly worn, especially by soldiers when engaged on peace duties, was an oblong piece of cloth with a hole in the centre for the neck; a hood was usually attached to the back. It survives in the ritual chasuble of the Western Church. The Greek military chlamys appears in two forms — the paludamentum of the general (e.g. Trajan as represented on the Arch of Constantine, Roman Art, Plate III., fig. 16), and the sagum worn by the common soldier (e.g. by some of the horsemen on the base of the Antonine column, Roman Art, Plate V., fig. 21). When the toga went out of use as an article of everyday wear, the pallium, i.e. the Greek himation, was at first worn only by Romans addicted to Greek fashions, but from the time of Tiberius, who wore it in daily life, its use became general. Long robes bearing Greek names (synthesis, syrma, &c.) were worn at dinner-parties-

The Romans often wore sandals (soleae) or light shoes (socci), but in full dress (i.e. with the toga) it was necessary to wear the calceus, which had various forms by which classes were dis- tinguished, e.g. the calceus patricius, mulleus (of red leather) and senatorius (of black leather). This was a shoe with slits at the sides and straps knotted in front; its forms may be seen on the relief from the Ara Pacis. The senators' calceus had four such straps (quattuor corrigiae), which were wound round the ankle (cf. the flamen on the Ara Pacis), and was also adorned with an ivory crescent (lunula). A leathern tongue (lingula) is often seen to project from beneath the straps. The soldier's- boot (caliga, from which the emperor Gaius derived his nickname, Caligula) was in reality a heavy hobnailed sandal with a number of straps wound round the ankle and lower leg. A high hunting boot was called compagus. Women at times wore the calceus, but are generally represented in art with soft shoes or sandals.

Hats were seldom worn except by those who affected Greek fashions, but the close-fitting leather pileus seems to have been an article of early wear in Italy, since its use survived in the ceremony of manumission, and the head-dress of the pontifices and flamines (cf . the relief of the Ara Pacis already referred to) consisted in such a cap (galerus) with an apex, or spike, of olive wood inserted in the crown.

For personal ornament finger-rings of great variety in the material and design were worn by men, sometimes to the extent of one or more on each finger, many persons possessing small cabinets of them. But at first the Roman citizen wore only an iron signet ring, and this continued to be used at marriages. The jus annuli aurei, or right of wearing a gold ring, originally a military distinction, became a senatorial privilege, which was afterwards extended to the knights and gradually to other classes. Women's ornaments consisted of brooches (fibulae), bracelets (armillae), armlets (armillae, bracchialia) , ear-rings (inaures), necklaces (monilia), wreaths (coronae) and hair-pins (crinales). The tore (torques), or cord of gold worn round the neck, was introduced from Gaul. A profusion of precious stones, and absence of skill or refinement in workmanship, distinguish Roman from Greek or Etruscan jewelry; but in the character of the designs there is no real difference.

See Marquardt-Mau, Privatleben der Romer, pp. 550 seq. (givesafull collection of literary references) ; Cybulski, op. cit., pis. xix., xx., with Amelung's text; articles by W. Helbig, especially Sitzungsberichle der bayrischen Akademie (1880), pp. 487 seq. (on headgear); Hermes xxxix. 161 seq. (on toga and trabea), and Mimoires de VAcadAmie des inscriptions, xxxvii. (1905) (on the costume of the Salii) ; articles by L. Heuzey in Daremberg and Saglio's Dictionnaire des antiquites, also in Revue de Vart, i. 98 seq., 204 seq., ii. 193 seq., 295 seq. (on the toga). See also the general bibliography at the end. (H.S.J.)

II. Costume in Medieval and Modern Europe i. Pre-Roman and Roman Britain. —Men who had found better clothing than the skins of beasts were in Britain when Caesar landed. Little as we know of England before the English, we have at least the knowledge that Britons, other than the poorer and wilder sort of the north and the fens, wore cloaks and

hats, sleeved coats whose skirts were cut above the knee and loose trousers after the fashion of the Gauls. They were not an armoured race, for they would commonly fight naked to the waist, dreadful with tattooing and woad staining, but Pliny describes their close-woven felts as all but sword-proof. Dyers as well as weavers, their cloaks, squares of cloth like a Highland plaid, were of black or blue, rough on the one side, while coats and trousers were bright coloured, striped and checkered, red being the favourite hue. For ornament the British chiefs wore golden torques about their necks and golden arm-rings with brooches and pins of metal or ivory, beads of brass, of jet and amber from their own coasts, and of glass bought of the Southern merchants. Their women had gowns to the ankle, with shorter tunics

above them. The Druid bards had their vestments of blue, while the star-gazers and leeches went in green.

Agricola's Romanizing work must have made great changes in dress as in policy. The British chief with the Latin tongue in his mouth, living in a Roman villa and taking his bath as did the Romans, wore the white woollen toga and the linen tunic, his wife having the stole, the pall and the veil.

ii. Old English Dress. — The skill of their artists gives us many accurate pictures of the dress of the English before the Norman Conquest, the simple dress of a nation whose men fight, hunt and plough. The man's chief garment is coaqaesu a sleeved tunic hanging to the knee, generally open at the side from hip to hem and in front from the throat to the breast. Sleeves cut loosely above the elbow are close at the

Fig. 25.— Old English Fig. 26.— The Blessed Dress. From the Bene Virgin. From the Bene- dictional of St ˆEthel- dictional of St ˆEthel- wold (c. 963-984). wold (c. 963-984).

forearm. The legs are in hose like a Highlander's or in lopg breeches bandaged or cross-gartered below the knee. A short mantle to the calf is brooched at the shoulder or breast (fig. 25). There are long gowns and toga-like cloaks, but these as a rule seem garments for the old man of rank. In the open air the cloak is often pulled over the head, for hats and caps are rare, the Phrygian bonnet being the commonest form. Girdles of folded cloth gather the loose tunic at the waist. Most paintings show the ankle shoe as black, cut with a pointed tab before and behind, the soles being sometimes of wood like the sole of the Lancashire clog of our own days. A nobleman will have his shoes embroidered with silks or coloured yarns, and the like decoration for the hem and collar of his tunic. Poor men wear little but the tunic, often going barelegged, although the hinds in the well-known pictures of the twelve months have shoes, and the shepherd as he watches his flock covers himself with a cloak. In every grave- yard of the old English we find the brooches, armlets, rings and pins of a people loving jewelry. Women wore a long gown covering the feet, the loose sleeves sometimes hanging over the hands to the knee. Over this there is often a shorter tunic with short sleeves. Their mantles were short or long, the hood or

Fig. 2 1— G RAVE-STATUE.

Photo, Alinari.

Fig. 22— THE ORATOR (R. Arch. Mus., Florence).

Phoio, Anderson.

Fig. 23.— BUST OF PHILIP THE ARABIAN (Vatican). VII. 336.

Photo, Moscioni.

Fig. 24. — TITUS (Vatican).

head rail wrapped round the chin (fig. 26). In broidery and ornament the women's dress matched that of the men. The Danes, warriors of the sea, soon took the English habit, becoming notable for their many changes of gay clothing.

The Norman Conquest is marked by no great change in English clothing, the conquerors inclining towards the island fashions, as we may see by the fact that they gave up their curious habit of shaving the back of the head. But with the reign of the second William came the taste for the luxury of clothing and that taste for flowing hair and shoes with sharp points which is lamented by William of Malmesbury. In this reign we have the story of the Red King refusing to put on boots that cost but three shillings — the price of an ox — and wearing the same gladly when his chamberlain told him that they were a new pair worth a mark. Even more than the fashion of long cloaks and trailing gowns whose sleeves hang far below the hands, the fantastic boot and shoe toes bring the curses of the clergy and the moralizings of chroniclers. Fulk Rechin of Anjou is said by Orderic to have invented such gear to hide the monstrous bunions upon his toes, but a worthless Robert, a hanger-on of the court of William II., distinguishes himself and gains the surname of Cornard by stuffing his shoe tips with tow and twisting them like the horns of the ram.

There are many illuminations which give us in plenty the details of all costumes of the 1 2th century. Thus the devil in a well-known MS. wears the gown of a lady of rank, the 13th" bodice tightly laced, the

hanging sleeve knotted to centuries, keep it out of the mud. A MS. at Corpus Christi College, Oxford, shows in a picture of the vision of Henry I. that the men who reap and dig are simply clad in loose skirted tunics with close sleeves, that they have hats with brims, and cloaks caught by a brooch at the shoulder. Hats and caps are common in all classes and take many shapes — the Phrygian cap, the flat bonnet, the brimmed hat and the skull-cap. With the coming of the house of Anjou English dress clears itself of the more fantastic features of an earlier generation. Henry II. brought in the short Angevin mantle and from it had his name of Curtmantle, but it was not a mastering fashion and the long cloak holds its own. Rich stuffs, cloth of gold or silk woven with gold, webs of damask wrought with stripes or rays and figured with patterns are brought in from the ports. Rare furs are eagerly sought. But the simplicity of line is remarkable. The drawings made for Matthew Paris's lives of the two Offas show people of all ranks clad without a trace of the tailor's

fantasy. Kings and lords, church- men and men of substance go in long gowns to the feet, the great folk having an orphrey or band of embroidery at the somewhat low- cut neck (fig. 27). Some of the sleeves have wide ends cut off at the mid-forearm, showing the tight sleeve of a shirt or smock below. Fashion, however, tends to lengthen sleeves to a tight wrist, the upper halves being cut wide and loose with the large armholes characteristic of most ancient tailoring. Over this gown is worn an ample cloak Fig. 27.— A Lady and a fastened at the neck with a brooch King(temp. Hen. HI.). (From ° r clasp, and sometimes fitted with Cotton MS. Nero, D. i.) a hood. The dress of the common

folk and of men of rank when actively employed is a tunic which is but the gown shortened to the knee, a short cloak to the knee being worn with it (fig. 28). Belts and girdles are narrow and plain, the thongs without enrichment, showing no beginnings of the rich buckles and heavy bosses of a later fashion. Shoes and low-cut boots are slightly pointed, and hats, caps, hoods and coifs of many types cover the head. The women are like to the men in their long gown, but the head is wrapped in a coverchef hanging over the shoulder and bound with a fillet round the brow.

Gloves are common in this age; " scraps of the cloth or the skin," says a poet, " do not want for a use: of them gloves are made."

14th century.

Fig. 28. — Labourers (temp. Hen. III.). (From Cotton MS. Nero, D.i.)

At the court of Edward II., son of a king who went simply clad, Piers Gaveston and his like began to set the fashions for a century which to the curious antiquary is a garden of delights. For the history of the 14th-century clothing illuminations are supplemented by a number of effigies upon which the carver has wrought out the last details, by monumental brasses, and by contemporary literature and records (fig. 29). Garments take many shapes; sleeves, skirts and head-dresses run through many fashions; while personal ornaments are rich and beautiful to a degree never yet surpassed. With the beginning of the century there is seen a tendency to shorten the long gown, which had been the best wear of a man of good estate, to a more convenient length, although ‘ the knees are still well covered . Loose sleeves falling below the elbow leave to view the sleeve of an under-garment, buttoned tightly to the arm. In winter time a man’s gown will have long sleeves that cover the hands when the arms are at length. The full cloak, although still found, is some- what rare among a people

that has, perhaps, learned Fig. 29.— A Group of Clerks (early- to wear more clothes and 14th century). (From Royal MS. warmer upon the body. x 9 B. xv.)

Hoods are worn in many fashions, to be cast back upon the shoulders like a monk’s cowl, the part at the back of the head being drawn out into a ” liripipe ” long enough at times, when

Fig. 30. — English Ploughmen of the 14th century.

the hood is drawn up, to be knotted round the brow turban-‘ fashion (fig. 30). Long hose are drawn up the legs to join the

short breech, and the toes of the ankle-shoes are pointed so long that holy men see visions of little devils using them as chariots. The women love trailing gowns. They have under-skirts and loose over-garments, sometimes sleeveless. Their hair at least would not shock those earlier prelates who cursed the long plaits, for it is caught up in a caul or braided at the sides of the head. In the second half of the century men of rank borrow from Germany the fashion of the cote-hardie. In its plainest form this short tunic, covering the fork of the leg, is cut closely to the body and arms (fig. 31). Sometimes the sleeve ends at the elbow and then another streamer is added to the one which falls from the hood, a strip of stuff continuing the elbow-sleeve

as low as the coat edge. This strip and the hem of the skirt are

Fig. 31. — Sons and Daughters of Edward III. (From his tomb in Westminster Abbey.)

often ” slittered ” with fanciful jags, a fashion which soon draws down the satirist’s anger. Parti-coloured garments were an added offence; a gentleman would have his coat parted down the middle in red and white, with hose of white and red to match. Men and women of rank wear a twisted garland of rich stuff, crown-wise on the head, set with pearls and precious stones, a fashion which is followed on the great helm of the knights, being the ” wreath ” or ” torce ” of heraldry. The dames of such as wear the cote-hardie imitate its tightness in the sleeves and bodices of their long gown. A curious fashion which now begins is the sleeveless upper gown whose sides are cut away in curved sweeps from the shoulder to below the waist, the edges of the opening being deeply furred. The strange head-dress with a steeple-horn draped with lawn kerchiefs makes its appearance to shock the moralists. Although it was probably a rare sight in this century, the horn could easily fulfil its mission of drawing notice to all its wearers.

Of the cote-hardie it might at least be said that it was the symbol of a knightly age in arms, the garment of a man who must have hand and limbs free, and, save for its sleeves, it faith- fully copied the coat-armour of the armed knight. The softer days of Richard II. are remarkable for a dress which has also its significance, men of high rank taking to themselves gowns of such fulness that the satirists may be justified who declare that men so clad may be hardly known from women. The close collar of these gowns rises high as the neckcloth of a French incroyable, the upper edge turned slightly over and jagged. The full skirts sweep on the ground, which is touched by the last jags of the vast sleeves, whose openings, wide as a woman’s skirts, are dagged like the edges of vine or oak leaves. ” And but if the slevis,” says the satirist, ” slide on the erthe, thei wolle be wroth as the wynde.” Sometimes this gown is slit at the sides that the gallant may the better show his coloured hose and tips of shoes that pike out two feet from heel to toe. When not wearing the gown such a lord would have a high-necked coat, shorter even than the cote-hardie, but looser in the skirt, the sleeves ending full and loose with dagged edges turned over at

the cuff. Hats are more commonly worn in this century, and in its latter half take many shapes, a notable one being that of a shortened sugar-loaf or thimble with a brim turned up, either all round, or, more frequently, behind or before. The long shoes, as their name of

crackowes or poleynes implies, were a fashion which, by repute, came from Poland, a land ruled by the grandfather of Richard's first queen. When medieval fashions were past, they were remembered as a type of the old time, and a certain French conteur begins a tale of old days, not with jadis, but with " In the time when they wore poleynes." Even parish priests, whose preaching should " dryve out the daggis and alle the Duche cotis," went, in this age of fine apparel, gaily clad in gowns of scarlet and green, " shape of the newe," in " cutted clothes " with " long pikes on her shone." More than this, they made scandal by ruffling with weapons — " bucklers brode and sweardes long, bandrike with baselardes kene." The skill of goldsmiths and craftsmen decorates all the appurtenances of the dress of this 14th century. Buttons, which appear in the first Edward's time as a scandalous ornament on men of low degree, have now become common, and, cunningly wrought, are used as much for queintise as for service. A close row of them will run from wrist to elbow of tight sleeve. A row of buttons goes from the neck of a woman's gown, and the cote-hardie may be fastened down the front with a dozen and a half of rich buttons. A purse or gipciere hung by a ring to the girdle gives more room for ornament in the silver or brass bar on which the bag depends. Above all the girdle, which — in harness or in silk — rich men wear broad and bossed with jewels across the thigh below the waist, makes work for the jeweller's craftsman. Such a girdle is for great folk alone; but lesser men, wearing a strap about their waists, will yet have a handsome buckle and a fanciful pendant of metal guarding the loose end of the strap.

However fantastic the fashions of this or any other ages, folk of the middling sort will avoid the extremes. From the Knight to the Reve, no man of Chaucer's company calls to us by the fantasy of his clothing. The Knight himself rides in his fustian gipoun, the grime of his habergeon upon it, although his son's short gown, the gayest garment at the Tabard, had long and wide sleeves and is embroidered with flowers like any mead. A coat and hood of green mark the Yeoman, who has a silver Christopher brooch for ornament. The Merchant is in motley stuff, his beaver hat from Flanders and his clasped boots taking Chaucer's eye, as do the aulas and silken gipser which hang at the rich Franklin's belt. As for the London burgesses, their knife-chapes, girdles and pouches are in clean silver. The Shipman wears his knife in a lanyard about his neck, as his fellows do to this day, and his coat is of coarse falding to the knee. 4 The Wife of Bath has the wimple below her broad hat and rides in a foot mantle about her hips. Poorer men's dress is on the Reve and the Ploughman, the one in a long surcote of sky-blue and the other in the. tabard which we may recognize as that

smock-frock, which goes down the ages with little change.

In the 15th century the middle ages run out. Fashions in this period become, if not more fantastic, more various. Its earlier years see men of rank still inclined to the rich modes of the last age: Harry of Monmouth, drawn century. about 1410 by an artist who shows him as Occleve's patron, wears a blue gown which might have passed muster at the

Fig. 32. — Henry, Prince of Wales, and Occleve the Poet (c. 1410). (From Arundel MS. 38.)

court of Richard II. for its trailing skirts and its long sleeves, their slittered edges turned back (fig. 32). A strange fancy at this time was the hanging of silver bells on the dress. One William Staunton, in 1409, seeing in a vision at St Patrick's Purgatory the fate of earth's proud ones, is exact to note that in the place of torment the jags in men's clothes turn to adders, that women's trailing skirts are burnt over their heads, and that those men whose garments are overset with silver gingles and bells have burning nails of fire driven through each gingle. As for the chaplets of gold, of pearls and precious stones, they turn into nails of iron on which the fiends hammer.

The common habit of a well-clad man in the first half of this century is a loose tunic, lined with fur, or edged with fur at neck,

Fig. 33. — The Squire. (From Ellesmere MS. of the Canter- bury Tales.)

Fig. 34. — An English Squire and his Wife. (From a brass of 1409.)

wrist and skirt. At first the sleeves are long and bag-like, like to the Richard II. sleeve but drawn in to the wrist, where early examples are fastened with a button. A shorter tunic is worn below, whose tight sleeves are seen beyond the furred edge of the upper garment, mittens being sometimes attached to them. Over the shoulders the hood is thrown, or, in foul weather, a hood and cloak. The gown is girdled at the waist with a girdle from which hangs the anelace or baselard (fig. 34) . Shoes are pointed. Hats and caps are seen in many shapes, but the most remarkable is the developed form of that head-dress which the 14th-century man seems to have achieved by putting his pate into the face- hole of his hood and twisting its liripipe round his brows. In the 15th century the effect is produced with a thick, turban-like roll of

stuff from the top of which hung down on one side folds of

cloth coming nigh to the shoulder, and on the other the liripipe broadened and lengthened to 4 or 5 ft. of a narrower folded cloth. As the century advances the bagpipe sleeves shrink in size and the tunic skirts are shortened (fig. 35). The old habit of going armed with anelace or baselard dies away in spite of troublous times. In the .middle of the century the tunic is often no longer than a modern frock-coat, its sleeves little wider than those of a modern overcoat. Dress, indeed, becomes at this time convenient and attractive to our modern eyes. The last quarter of the century sees a new and important change. The tunic or gown, which was the garment of ceremony answering at once to our dress coats and frock coats, runs down to the feet. An act of 1463 ordered that coats should at least cover the buttocks, but fashion achieved

Fig. 35. — English Dress, c. 1433. (From Harl. MS. 2278.)

suddenly what law failed to enforce. Men who had polled their hair short allowed it to grow and hang over the shoulders. The belt carries the purse or gipciere more commonly, although weapons are rarely seen, and it is notable that, as the Reforma- tion approaches, the fashion of wearing a large ” pair of beads ” in the belt becomes a very common one. Last of all, the shoes change their shape. The reign of Edward IV. had seen the pointed toes as iniquitously long as ever the 14th century saw them. Even the long riding boot has the curving point, although otherwise much resembling the jack-boot of the 18th century. But after Bos- worth Field the soles broaden, the point shrinks back and then disappears, and the foot- print becomes shovel-shaped.

Women’s dress in the 15th century often follows the man’s fashion of the furred gown, the skirts being lengthened for all difference. But the close-bodied and close-sleeved gown, with skirts broadening into many folds below the hips, is often seen with the long and plain cloak drawn with a cord at the breast, widows

Fig. 36. — A Gentleman and his Wife. (From a brass of 1435.)

wearing this

dress with the barbe, a crimped cloth of linen drawn up under the chin and ears and covering the collar-bone. With the barbe went the kerchief, draping head and shoulders. The bossed cauls of the earlier head-dress, drawn high on either side of the head until face and head-dress took the shape of a heart, are characteristic of the age (fig. 36).

In some cases the cauls are drawn out at the sides to the form of a pair of bulls' horns or of a mitre set sideways. In the time of Edward IV. we have a popular head-dress to which has been given the name of the butterfly. The hair in its caul is pulled backward, and wires set in it allow the ends of a cambric veil to float behind like the wings of a butterfly settled on a flower.

The new England of the 16th century breaks with the past in most of its fashions. Never again does an Englishman return to the piked shoes. High fashion under Henry VIII. is all for broad toes, so broad that the sumptuary laws, from century. banning long toes, swing about to condemn excess in the new guise. Under Henry VII. the medieval influence is still strong in the body-clothing. ' A bravely dressed man will go in long hose, cut close to the body, and a short vest under which the shirt is seen at waist and wrist. Over this he will wear the open gown, lined with fur, and cut short as a jacket but having the sleeves hanging below the knee. Such sleeves are commonly slashed open at the sides to allow the forearm to pass through. Shorter false sleeves of this pattern had become popular in the age of Edward IV. Graver men will wear, in place of this short gown, a long one dropping to the broad shoe- toes, the sleeves wide-mouthed (fig. 37). Sometimes it hangs loosely; sometimes it has the girdle with purse and beads, to the girdle a penner, or bottle.

ps;

Fig. 37. — A Genlleman and his Wife. (From a brass of 1508.)

Notaries and scriveners add a penner, or pen-case, and a stoppered ink- Wide hats are found, crowned with huge plumes of feathers, but the characteristic headgear is that made familiar by

portraits of Henry VII., a low-crowned cap whose upturned brim is nicked at one side. A few sober men wear coats differing little from the short gown of forty years before. Among ladies the butterfly head-dress and the steeple cap passed out of fashion, and a grave headgear comes in which has been compared with a dog-kennel, a hood-cap thrown over head and shoulders, the front being edged with a broad band which was often enriched with needlework, the ends falling in lappets to the breast. This band is stiffened until the face looks out as from the open gable-end of a house. The gown is simple in form,

close-fitting to the body, the cuffs turned up with fur and the skirts long. A girdle is worn loosely drawn below the waist, its long strap letting the metal pendant fall nearly to the feet. Long cloaks, plainly cut, are gathered at the neck with a pair of long cords, like tasselled bell-pulls. While Henry VIII. is spending his father's hoards we have a splendid court, gallantly dressed in new fashions. His own broad figure, in cloth of gold, velvet and damask, plaits, puffs and slashes, stiff with jewels, is well known through scores of portraits, and may stand for the high-water mark of the modes of his age. The Hampton Court picture of the

earl of Surrey is characteristic of a great lord's dress of a somewhat soberer style (see fig. 38). The king, proud of his own broad shoulders, set the fashion to accent this breadth, and it will be seen that the earl's figure, leaving out the head and hose, all but fills a perfect square. Such men have the air of playing-card knaves. Surrey's cap is flat, with a rich brooch and a small side – feather. His short doublet of the new style is open in front to show a white shirt covered with black embroidery whose ruffles cover his wrists. His over-garment or jerkin has vast sleeves, rounded, puffed and slashed. Under the doublet are seen wide trunk- breeches. He goes all in scarlet, even to the shoes, which are of moderate size. The girdle carries a sword with the new guard and a dagger of the Renascence art, graced with a vast tassel. All is in the new fashion, nothing recalling the earlier century save the hose and the immodest braguette which, seen in the latter half of the fourteen-hundreds, is defiantly displayed in the dress and armour of this age of Henry VIII. Even the hair follows the new French mode and is cropped close. Other fashionable suits of the time give us the tight doublets, loose upper sleeves and trunk hose as a mass of small slashes and puffs, a fashion which came in from the Germans and Switzers whom Henry saw in the imperial service. Such clothing goes with the shoes whose broad toes are slashed with silk, and the wide and flat caps with slashed edges, bushed with feathers, which head- gear was often allowed to hang upon the shoulders by a pair of knotted bonnet-strings, while a skull-cap covered the head. With all this fantasy the dress of simpler folk has little concern, and a man in a plain, short-skirted doublet, with a flat cap, trunk breeches, long hose and plain shoes, has nothing grotesque or unserviceable in his attire. The new sumptuary laws, which were not allowed to become a dead letter, had their influence in restraining middle-class extravagance. No man under a knight's degree was to wear a neck-chain of gold or gilded, or a " garded or pinched shirte." Brooches of goldsmith's work were for none below a gentleman. Women whose husbands could not afford to maintain a light horse for the king's service had no business with

gowns or petticoats of silk,chains of gold, French hoods, or bonnets ot velvet. This French hood is the smpll bonnet, two of whose many forms may be seen in the best-known portraits of Mary of England and Mary, queen of Scots — a cap stiffened with wires.

Drawn from a photo by Mansell Fig. 38.— The Earl of Surrey (late in reign of Henry VIII.).

With its introduction the fashionable skirt began to lose its graceful folds and to spread stiffly outward in straight lines from the tight-laced waist, the front being open to show a petticoat as stiff and enriched as the skirt. The neck of the gown, cut low and square, showed the partlet of fine linen pleated to the neck. In the days of Edward VI. and Queen Mary the dress of most men and women loses the fantastic detail of the earlier Tudor age. In the dress of both sexes the joining of the sleeve to the shoulder has, as a rule, that large puff which stage dressmakers bestow so lavishly upon all old English costumes, but otherwise the woman's gown and hood and the man's doublet, jerkin and trunk hose are plain enough, even the shoes losing all the fanciful width. Mary, indeed, added to the statute book more stringent laws against display of rich apparel, laws that would fine even a gentleman of under £20 a year if silk were found in his cap or shoe. Small ruffs, however, begin to appear at the neck, and most wrists are ruffled. The ruff, which began simply enough in the first half of this century as a little cambric collar with a goffered edge, is for all of us the distinguishing noteˆof Elizabethan dress. It grew wide and flapping, therefore it was stiffened upon wires and spread from a concealed frame, row on row of ruffs being added one above the other until the wearer, man or woman, seemed to carry the head in a cambric charger. Starch, cursed as a devilish liquor by the new Puritan, gave it help, and English dress acquired a deformity which can only be compared with the great farthingale or with the last follies of the wig. The skirt of a woman of fashion, which had already begun to jut from the waist, was drawn out before the end of Elizabeth's reign at right angles from the waist until the dame had that air of standing within a great drum which Sir Roger de Coverley remarked in the portrait of an ancestress. Elizabeth herself, long-waisted and of meagre body, set the fashions of her court, other women pinching their waists into the long and straight stomacher ending in a peak before. She herself followed her father's taste in ornament, and on great days was set about like the Madonna of a popular shrine with decorations of all kinds, patterns in pearl, quiltings, slashings, puffings and broidery, tassels and rich buttons. Among men the important change is the disappearance of the last of the long hose, all men taking to trunk-hose and nether-stocks or stockings, while their

doublets tend to follow the same long-waisted fashion as the bodices of the women, whose doublets and jerkins, buttoned up the breast, bring the Puritan satirists against them. Of these satirists Philip Stubbes is the best-known, his Anatomie of Abuses, published in 1583, being a very wardrobe of Elizabethan fashions, although false or dyed hair, the ruff and its starch, and the ear-rings worn by some women and many men draw his hottest anger. William Harrison sings on a like note about the same time, declaiming especially against the mutability of fashion, declaring that the imported Spanish, French and German guises made it easier to inveigh against such enormities than to describe the English attire with any certainty. For him women were become men, and men transformed into monsters. ” Neither was it ever merrier with England than when an English- man was known abroad by his own cloth and contented himself at home with his fine carsey hosen and a mean slop; his coat, gown and cloak of brown, blue or puke, with some pretty furniture of velvet or fur and a doublet of sad tawny or black velvet or other comely silk, without such cuts and garish colours as are worn in these days, and never brought in but by the consent of the French, who think themselves the gayest men when they have most diversities of jags and change of colours about them.” He adds that ” certes of all estates our merchants do least alter their attire . . . for albeit that which they wear be very fine and costly, yet in form and colour it representeth a great piece of the ancient gravity appertaining to citizens and burgesses.” But as for the ” younger sort ” of citizens’ wives, Harrison finds in their attire ” all kind of curiosity … in far greater measure than in women of a higher calling.”

The coming of King James is not marked by any sudden change of attire, most of the Elizabethan fashions running on into his reign. The tight doublet has stiff wings at the shoulders, close sleeves and short skirt. The many fashions of breeches are still

popular, most of them padded or stuffed. There are trunk hose that have the air of petticoats rolled inward half way up the thigh. There is the ” great round abominable breech,” pegtop shaped from below the knee to waist, as it appears in the well-known print of James himself with hawk on fist. Among women of fashion obtained a remarkable mode of exposing the breast, when the ruff and bodice were cut away ; and the wheel fardingale was still worn, an order against

17th century.

Fig. 39. — An English Lady. From a brass of

1605.

Fig. 40.- of rank Hollar.

-An English Lady in 1643. After

it in 1613 rather increasing than diminishing its size. But simpler fashions were setting in, and with the reign of Charles I. the extravagances of padding and slashing disappear. The ruff gives place at last to the falling band, a wide collar of lace or plain linen. The belt or girdle ceases to be common wear, save for those who hang a sword from it. Parties in the state come to be known by their dress, and we have the Puritan, his crop head covered by a wide-brimmed, high-crowned felt, without hatband or feather, and his plain falling band over a staidly-cut coat. Beside him we set the cavalier, lace at his band edge, wrist and wide boot tops. His hat is feathered, his doublet lets the fine cambric of the shirt be seen at the waist, his short breeches are fringed with points or tags. His long hair has one lock brought over the left shoulder to be marked as a lovelock by a ribbon at the end. But the clothing of this age has been illustrated by Van Dyck and by a hundred other portrait painters, who as illustrators of costume take the place of the monu- mental sculptors, then less commonly called on for an effigy in the habit of life. And the time of the Common- wealth passes without notable change. Those who were in power favoured a

Fig. 41 Countrywoman After Hollar.

The of En i643 h soberhabit, although we find General

Harrison in scarlet and clinquant matching with Colonel Hutchinson

in courtly apparel, and before the Restoration the tract-writers

find matter of condemnation, especially in the items of patches,

hair-powder and face paints.

So far as the court was concerned, King Charles II. brought in

the extravagant fashions of the courtiers of Louis XIV. The

Fig. 42.— A Squire of a Knight of the Bath at the Crowning of Charles

short-waisted doublets with loose sleeves slashed open at the sides, the short and wide petticoat breeches, their lining lower than the petticoat edge and tied below the knee, and the hose whose tops bagged over the garter, were in England before King Charles returned. He added to the breeches the rows of looped ribbons, gave falling ruffles to the knees of the hose and many feathers to the hat. The long, narrow-bladed rapier hung in a broad, em- broidered belt, passed over the right shoulder, and the high-heeled shoes and knots of ribbons. Lely painted the women of this court in a studied negligence, but^many pictures show us the loose sleeves turned up to the elbow with bows of ribbon, the close bodice ending in a loose gown worn over a full skirted petti- coat, a wide collar covering the shoulders.

Pepys is our chief authority for the remarkable resolution of Charles to change the fashion of his dress to one which he would never alter, a decision which the king com- municated to his council in October 1666. On the 15th of that month the diarist noted that ” this day the king begins to put on his vest, and I did see several persons of the House of Lords and Commons too, great courtiers, who are in it; being a long cassocke close to the body, of black cloth and pinked with white silk under it, and a coat over it, and the legs ruffled with black riband like a pigeon’s leg . . . a very fine and handsome garment.” Rugge’s diary records the same change to ” a close coat of cloth pinkt, with a; white taffety under the cutts. This in length reached the calf of the leg, and upon that a sercoatt cutt at the breast, which hung loose and shorter than the vest six inches. The. breeches the Spanish cut, and buskins, some of cloth, some of leather, but of the same colour as the vest or garment.” Says Evelyn, ” a comely and manly habit, too good to hold.” Later in the same month Pepys saw the court ” all full of vests, only my Lord St Albans not pinked, but plain black; and they say the king says the pinking upon whites makes them look too much like magpies, and therefore hath bespoke one of plain velvet.” The change, although the court was fickle, isof the first importance in the history of costume, for we have here the coat and waist- coat in a form from which our own coats and waistcoats derive without a break. Another important change affects dress for a century and a half. Just as costume begins to take the modern path we have the wig or peruke, strangest of all the fantasies of fashion, introduced as the wear for all men of standing. Pepys, the son of a tailor and a man with a shy affection for fine clothing, may again here be quoted. On a Sunday in February 1661 he ” began to go forth in my coat and sword, as the manner now among gentlemen is.” In November 1663 he takes another step with fashion, going to the periwig-maker to have his hair

cut off and to put on his first periwig, for which he paid 3′ , another to be made up of the hair with which he had parted. The next day he wore the periwig to his office, and ” no great matter was made of it.” Two days later my Lord Sandwich ” wondered at first to see me in my peruque,” but even in church Pepys found that he drew little attention in the new guise. The same month the duke of York announced that he would wear the periwig, ” and they say the king also will.” Thus began this costly and inconvenient mode. At home and at their ease men commonly replaced the wig with a soft silk or velvet ” night-cap,” and the coat with a ” morning gown ” like our modern dressing gown.

Powder, which had been dusted about the hair by a few courtiers and fashionable folk since the reign of Elizabeth, was used by- most wearers of the wig. Hair ” dressed with a powder ” was often seen in London under the Commonwealth, and now the great periwig brought powder into frequent use.

Before the end of the 17th century the periwig reached its greatest height and breadth, the curls of a fine gentleman towering in a mass above the brow and flowing far down over the shoulders or nigh to the waist. Guardsmen wore them tossing over their corslets, although a smaller variety, the cam- paign wig, had been introduced for war or travel. Many portraits of this ageshowitslockscontrastingstrangely with the soldier’s steel breastplate and pauldrons, but it must be re-membered that martial gentlemen would often choose to be painted in armour although such harness was disappearing from actual use.

Under James II. the coat adopted in the late reign was firmly established as the principal garment of a well- dressed man. Gowns remained but to make a ceremonial dress for the great officers of state, for the judges and the London liverymen, for such, indeed, as those who wear them in our own days. As for ” the comely cloak, altogether used in the beginning of my time,” Randle Holme notes that it was ” now scarce used but by old and grave persons.” The coat was sometimes buttoned down the front but was more often thrown open to display the waistcoat, a lesser coat with skirts. The great turned over cuffs were now below the elbow, although there was good space for the display of the ruffle, and at the neck was the large cravat with laced ends. After the battle of Steinkirk, in 1692, to which the young French nobles hastened with disarranged neckcloths, the cravat

was sometimes worn twisted, the ends passed through a ring, although the word Steinkirk was in later years often carelessly given to the neckcloth worn in any style. For riding, the big jack-boot of earlier days, with spurs and broad spur-leathers, remained in fashion, although the bell-shaped tops were turned up and not down. Boots, however, were

Fig. 43. — A Gentleman of the Privy Chamber at the Crowning of James II.

‘ Fig. 44. — The Herbwoman and her Maids at the Crowning of James II.

riding-gear. Gondomar, the Spanish ambassador to James I., had laughed over the citizens of London ” all booted and ready to go out of town,” but this custom died away, and a man in boots showed that he was for the road. William III.‘s grave court was not one in which new fashions flourished, but it is remarkable that feminine modes take curious variety before the century end. Long-waisted and straitly cut stays were worn, the gown sleeve is short as the coat-sleeve of a Charles II. courtier. The gown itself has the skirts gathered to show the petticoat,

The 18th century.

and small aprons fringed with lace are often seen. The simple head-dresses of the Restoration are changed for caps with long lace lappets, or for a cap whose top-knot or commode stood up stiff and fan-shaped like a section cut out of an old ruff. When no commode was worn, a loose hood, thrown gracefully over the head and gathered at the shoulders, sometimes took its place. As a riding or walking dress, ladies of quality often wore coats, waistcoats, hats and cravats, not to be distinguished from those of their lords.

For a distinguishing note of the 18th century, we may take the three-cornered cocked hat. Even in the Elizabethan age we have the gallant cocking up one side of his broad- brimmed, high-crowned felt or beaver and securing it with a jewel. Brims were as wide at the end of the 17th century, but the crown was lower. From the French court came the fashion of cocking up three sides, one at least being fastened with a loop of ribbon from which developed the cockade. A black cockade became the sign of a military man in England before 1750, and the same ornament, highly conventionalized, is now at the side of the tall hats worn by the grooms and coach- men of military and naval officers. Following varying fashions, the 18th-century cocked hat was

laced with gold and silver or edged with feathers. It was cocked in a hundred forms, from that which has three sides slightly curled upward to the great Khevenhueller cock, wherewith a very wide-brimmed hat was flapped up at the front and rear, a military or martial hat. Wigs, worn by all the upper- and middle-class men, were generally powdered, but the lesser or Ramillie wig soon drove out the huge and costly full-bottomed periwig, even for ceremonial occasions. Of Lord Bolingbroke it is told that he once attended Queen Anne in haste with a tie or Ramillie wig on his head. Her Majesty showed her displeasure by remarking that his lordship would next come to court in a night-cap. Nevertheless, the tie-wig soon became court wear, secured at the back with a huge bow of ribbon below which hung the plaited pigtail, worn waist-long about 1740. But by that time young bloods were leaving campaign-wigs for the bob-wig which sat yet more closely to the head, the curls leaving the neck uncovered. Bag-wigs, found early in the century, covered the looped up pigtail in a black silk bag. Clergymen and grave physicians affected the full-bottomed wig after it became old fashioned. Subject to slight changes, eagerly followed by the beaux and mocked by the satirists, the habit of well-dressed men shows no great variety — the large-cuffed, collar- less coats whose full skirts are now shortened, now lengthened, the long waistcoat to match, the closely fitting breeches, the stockings, the shoes and jack-boots. The coat tends to be thrown open to show the waistcoat, upon which brocade and embroideries were lavished. Stockings, until the middle of the century, were commonly drawn over the ends of the breeches and gartered below the knee. By 1740 the long cravat with hanging ends grows old fashioned. Young men take to the solitaire, a black cravat which became a mere loop of ribbon passed loosely round the neck and secured to the black tie of the wig.

George III.'s long reign begins with men's fashions little changed from those of his great-grandfather's time, although his sixty years carry us to the beginning of all the modern modes. The small wig long holds its own. The coat begins to show the broad skirts cut away diagonally from the waist to the skirt edge, and stockings are no longer rolled over the knee. Perhaps the most remarkable fashion was that which dis- tinguished the Macaronis, travelled exquisites with whom the wig or long hair was dragged high above the forehead in a tall

Fig. 45. — An English Gentleman (c. 1730).

” toupee ” with two large rows of curls at the side. This head- dress, clubbed into a heavy knot behind, was surmounted by a very little hat. The coat with small cuffs was much cut away before, the skimped skirts reaching midway down the thigh. Waistcoat flaps were but little below the waist. Breeches, striped or spotted like those of a Dresden china shepherd, were fastened at the knee with a bunch of ribbon ends; a watch-guard hung from each fob. The shirt-front was frilled and a white cravat was tied in a great bow at the chin. Macaronis wore a little curved hanger, or replaced the sword with a long, heavily tasselled cane, which served to lift the little hat off the topmost peak of the toupee. The woman-Macaroni wore no hoop but in full dress. Her gown was a loose wrapper, the sleeves short and wide with many ruffles, the skirt pulled aside to show a petti- coat laced and embroidered with flowers. But her distinguishing mark was her head-dress, which exaggerated the male fashion, towering upward until the flowers and feathers at the top threatened the candelabra of the assembly room. The Macaronis appear about 1772 and stay but a short while, for the revolu- tionary fashions tread upon their heels.

Women’s dress in this 18th century is dominated by the hoop-petticoat which Sir Roger de Coverley recognizes in 1711 as a

new fashion and an old one revived. A stiff bodice laced in front, a gown, with short and wide – ended sleeves, gathered up in folds above the petticoat, a laced apron ‘ and a lace cap with hanging lappets, is the dress of the century’s beginning. So the women of fashion are com- pared with children in go- carts, their tight -laced waists rising from vast bells of petticoats over which the gown is looped up like a drawn curtain. By 1 7 50 the hoop-petticoat ringed with whalebone is so vast that architects begin to allow for its passage up London stair-ways by curving the balusters outward. Great variety of women’s dress appears under George II., but those in the height of the mode affected a shepherdess simplicity in their walking clothes, wearing the flat-crowned or high-crowned hats and long aprons of the dairymaid. At this time a new fashion comes in, the sacque, a gown, sometimes sleeveless, open to the waist, hanging loosely from the shoulders to near the edge of the hoop-petticoat. George III.‘s reign saw women’s head-dressings reach an extravagance of folly passing all that had come before it. Hair kneaded with pomatum and flour was drawn up over a cushion or pad of wool, and twisted into curls and knots and decorated with artificial flowers and bows of ribbon. As this could not be achieved without the aid of a skilled barber, the ” head ” some-times remained unopened for several weeks. At the end of that time sublimate powder was needed to kill off the tenantry which had multiplied within. At the beginning of the last quarter of the century

the feathers grew larger, chains of beads looped about the curls, while ships in full sail, coaches and horses, and butterflies in blown glass, rocked upon the upper heights. Loose mob-caps or close ” Joans ” were worn in undress, often as simple as the full dress was fantastic. Varieties of the gown and sacque remained in fashion, the petticoat being still much in evidence, flounced or quilted, or festooned with ribbons. Before the ‘eighties of this century were over, a new taste, encouraged by the painters of the school of Reynolds, began to sweep away many follies, and the revolutionary fashions of France, breaking with all that spoke of the old regime, expelled many more. The age of powder and gold lace, of peach-bloom brocade coats with

Fig. 46. — An English Lady (c. 1730).

muff-shaped cuffs, of bag-wigs and three-cornered hats drew suddenly to an end. Mr Pitt killed hair-powder by his tax of 1795, but before that time fashionable men, who since the begin- ning of George Ill’s, reign had been somewhat inconstant to the wig, were wearing their own hair unpowdered and tied in a club at the back of the coat collar. Before the century end the roughly cropped ” Brutus ” head was seen. The wig remained here and there on some old-fashioned pates. Bishops wore it until far into the Victorian age, and it may still be seen in the Houses of Parliament and in the courts of law. Even breeches were passing, tight pantaloons showing themselves in the streets. The coat, cut away over the hips, began to take a high collar and the beginnings of the lappel. Its cuffs were of the modern shape, showing a narrow ruffle. The waistcoat ended at the waist. Loose neck-cloths were worn above a frilled shirt-front. Great jack-boots were given to postillions, and men of fashion walked the streets in short top-boots of soft black leather. Most remarkable of the revolutionary changes, the round hat came back, sometimes in a form which recalled the earlier 1 7th century, and at last took shape as the predecessor of our modern silk hat. Court dresses kept something of their magnificence, but men at home or in the streets were giving up in this time of change their ancient right to wear rich and figured stuffs. Laces and embroideries were henceforward but for military and civil uniforms.

Before 1790 women had begun to dismantle their high head- gear, returning to nature by way of a frizzled bush, like a bishop’s wig, with a few curls hanging over the shoulders. Over such heads would be seen towering mob-caps tied with ribbon and edged deeply with lace. Skirts took a moderate size and even court hoops were but panniers hung on either side of the hips. Short jackets with close half-sleeves were worn with the neck and breast covered with a cambric bujfant

that borrowed a mode from the pouter pigeon. A riding habit follows as far as the short waist the new fashions for men's coats, the wide-brimmed hat being to match. Short waists came in soon after 1790, the bodice ending under the arm pits, " a petticoat tied round the neck: the arms put through the pocket-holes." With these French gowns came small coal-scuttle-shaped bonnets of straw, hung with many ribbons and decorated with feathers. At last the woman of fashion, dressed by a Parisian modiste after the orders of David the painter, gathered her hair in a fillet and clothed herself in little more than a diaphanous tunic gown over a light shift and close, flesh-coloured drawers. Her shoes became sandals: her jewels followed the patterns of old Rome. Yet the same woman, shivering half-clad in something that wrapped her less than a modern bathing-dress, appeared at court in the ancient hoop-skirt, tasselled, ribboned and garlanded, hung with heavy swags of coloured silk, and this until George IV. at last broke the antique order by a special command.

The 19th century soon made an end of 18th century fashions already discredited by the revolutionary spirit. The three- cornered hat had gone, the heavy coat cuff and the cravat with hanging ends. Civilians had given up the ancient custom of going armed with a sword. The wig and even the pigtail tied with black shalloon were abandoned by all but a few old folk. Soldiers cut off their pigtails in 1808. But judges and lawyers wear their wigs in court in the 20th century, state coachmen wear them on the box, and physicians and the higher clergy wore them even in the street long after laymen had given them up. George IV. refused to receive a bishop of London who appeared at court without a wig, and Sumner, archbishop of Canterbury, wore one. until his death in 1862. A few powdered heads were seen as late as the 'forties. M. de Ste Aulaire, the ambassador, made, as Lord Palmerston writes, a very deep and general impression in London society of 1 84 1, not because he wore hair-powder but because he used so much of it. It is now used only by a few lacqueys. In the early Victorian period the cropped " Brutus " head was out of fashion, many men wearing their hair rather long and so freely oiled that the " anti-macassar " came in to protect drawing- room chair-backs.

19th century.

With powdered hair and the pigtail passed away the 18th century cloth breeches. Here again' some old-fashioned people made a stand

against the change, the opposition of the clergy being commemorated in the black breeches still worn by bishops and other dignitaries of the church. But in the regent's time pantaloons of closely fitting and elastic cloth were worn with low shoes or Hessians, and pantaloons and Hessians did not utterly disappear from the streets until the end of the 'fifties. Squires and sportsmen put on buckskins of an amazing tightness and walked the street in top-boots. But the loose Cossack trousers soon made their appearance. The regent's influence made the blue coat with a very high velvet collar, a high-waisted Marcella waistcoat and white duck trousers strapped under the instep, a mode in which men even ventured to appear at evening receptions, although, in the year before Waterloo, the duke of Wellington was refused admittance to Almack's when thus clad. Long skirted overcoats, fur-collared and tight in the waist, completed this costume. Coats were blue, claret, buff and brown. " Pea-green Hayne " was known among clubmen by a brighter coloured garment. Civilians, like Jos Sedley, would sometimes affect a frock frogged and braided in semi-military fashion. The shirt collar turned upward, the points showing above vast

cravats whose careful arrangement was maintained by one or two scarf- pins. Brummel the master dandy of his age, may be called the first dandy of the modern school. Dress- ing, as a rule, in black, he distin- guished himself, not as the bucks of A an earlier age by bright colours, rich f materials or jewellery, but by his extravagant neatness and by the superb fit of garments which set the fashion for* lesser men. To him, according to Grantley Berkeley, we owe the modern dress-coat. An idle phrase in Bulwer-Lyttcn's Pelham (1828), that "people must be very distinguished in appearance " to look well in black, made black hence- forward the colour of evening coats and frock coats. With the perfection of the silk hat in the 'thirties, English costume enters on its last phase. The coat cut away squarely in front was then out of the mode; it remains but in the evening-dress coat now always worn unbuttoned, and in the dress of the hunting field. The rest is a record of such slight changes as tailors may cautiously introduce among customers, no one of whom will dare to lead a new fashion boldly. For many decades the fashionably dressed man has been eager to conform to the last authorized vogue and to lose himself among others as shyly obedient. The tubular lines of 20th-century clothing advantage the tailor by the tendency of new clothing to crease at the elbow and bag at the knee. In preserving the necessary straight lines of his garments, in following the season's fashions in details which only an expert eye would mark, and in providing himself with clothes specialized for every hour of the day, for a score

of sports and for the gradations of social ceremonial — in these things only can the modern dandy rival his magnificent predecessors. For ornament, other than plain shirt studs, a plain seal ring, a simple watch guard and a rarely-worn scarf pin, is denied him.

Women at the beginning of the 19th century were clad in those fashions which revolutionary France borrowed from the antique. The simplicity of this style gave it a certain grace; it was at the other pole from the absurdity of the court dress which, until George IV. ordered otherwise, perpetuated the bunched draperies, the flounces and furbelows and even the hoop of the worst period of the 18th century. The gown, lightly girdled near the arm-pits with a tasselled cord, fell in straight clinging folds. Soft muslin was the favourite material, and in muslin fashionable

From Fraser's Magazine, Dec. 1834. Fig. 47. — Count D'Orsay. Dress of a man of Fashion in Early Victorian Period.

women faced the winter winds, protected only by the long pelisses which in summer were replaced by short spencers. Turbans, varying from a light headscarf of lace or muslin to a velvet confection like that of a Turk on a signboard, were the favourite headgear, although bonnets, hats and caps are found in a hundred shapes. Muslin handkerchiefs or small ruffs were worn about the neck in the morning dress. About the Waterloo period the elegance of the classical gown disappeared. The waist was still high at first but the gown was shorter and wider at the skirt. For evening dress these skirts were stiffened with buckram and trimmed with much tasteless trumpery. Large bonnets we're common, and the hair was dragged stiffly to the back of the head, to be secured by a large comb. From 1830 begins a period of singular ugliness. Tight stays came back again, the skirt swept the pavements, a generation of over-clad matrons seemed to have followed a generation of nymphs. The 'fifties showed even more barbarous devices, and about 1854 came in from France the crinoline, that strange revival of the ancient hoop. Plaids, checks and bars, bright blues, crude violets and hideous crimsons, were seen in French merinos, Irish poplins and English alpacas. Women in short jackets, hooped skirts, hideous bonnets and shawls seemed to have banished their youth. The empress Eugenie, a leader of European fashion, decreed that white muslin should be the evening mode, and at balls, where the steels and whalebones of the crinoline were impossible) the women swelled their skirts by wearing a dozen or fourteen muslin petticoats at once. Towards the end of the 'sixties the, crinolines disappeared as suddenly as they came, and by 1875 skirts were so tight at the knees that walking upstairs in them was an affair of

deliberation. Before 1880 dress-reformers and aesthetes had attacked on two sides the fashions which had halted at the ” Princesse ” robe, draped and kilted. Both movements failed, but left marked effects. From that time fashion has been less blindly followed, and women have enjoyed some limited individual freedom in designing their costumes. Of 20th-century fashions it is most notable that they change year by year with mechanical regu- larity. The clothes of smart women can no longer be said to express any tendency of an age. Year by year the modes are deliberately altered by a conclave of the great modistes whose desire is less to produce rich or beautiful garments than to make that radical alteration from loose sleeve to tight sleeve, from draped skirt to plain skirt, which will force every women to cast aside the last season’s garments and buy those of the newer device. But of modern dress it may at least be said that cheaper materials, the sewing machine and the popular fashion papers allow women of the humbler classes to dress more decently and tastefully. Their dress is no longer that frowsy parody of richer women’s frippery which shocked observant foreigners a generation ago.

Underclothing. — Of the underclothing worn next the skin something may be said apart from the general history of costume. Linen shirts were worn by both men and women in the age before the Conquest, and even in the 10th century it was a penance to wear a woollen one. After that time we soon hear of embroidery and ornament applied to them, presumably at the collar which would be visible above gown or tunic. Men added short drawers, or breeches, a word which does not secure its modern value until the end of the 16th century. ” Drawers ” signified various descriptions of overall, Cotgrave explaining the word as coarse stockings drawn over others although Randle Holme gives it in its later sense. Isaac of Cyprus is named by Robert of Brunne as escaping ” bare in his serke and breke.” Henry Christall, who brought four Irish kings to London, told Froissart how, finding that they wore no breeches, he bought linen cloth for them. Medieval romances and the like give us the choice of shirts of linen, of fine Holland, of cloth of Rennes and even of silk, and Chaucer speaks of women’s smocks wrought with silk, em- broidered behind and before. Poorer folk went, like Thynne’s poor countryman, in shirts of ” canvas hard and tough,” or of coarse Breton dowlas. Under the first Tudors, shirts are decorated with gold, silk and black thread embroideries, the latter being seen in the ruffled shirt worn by the earl of Surrey

in our illustration (see fig. 38). Stubbes, in his often-quoted Anatomie of Abuses (1583) declaims against the extravagant sums spent in shirts, the meanest of which would cost a crown or

a noble, while the most curiously stitched were valued at ten pounds a piece, ” which is horrible to hear.” The Puritans, many of whom, like the later Clapham sect, were careful of intimate luxuries, had a curious fashion of wearing shirts and smocks worked with ” holy embroideries,” Biblical sentences or figures, which recall a similar custom among the early Christians. At this time under- clothing had increased in quan- tity, for there are many indica- tions that the men and women of the middle ages were often content with a bare change of linen at the best. The Book of Courtesy (temp. Hen. VII.) orders the servant to provide ” clene Fig. 48.— A Man-at-arms and herte and brec he ” against his a Man in a Shirt (early 14th , , . . ? . ,,

century). From Royal MS. 19 master’s uprising, but the B. xv. laundering of the linen of the

Percy household, a hundred and seventy people, costs but forty shillings a year in the reign of Henry VIII.

With that modern period of dress which may be said to begin with the Restoration, shirts increased in number. Women shifted their smocks when coming in from field sports, fine gentlemen became proud of the number of their shirts, as was that 18th- century lord who boasted to Casanova of his changing a shirt several times in the day, his chin being shaved on each occasion. A valuable document concerning the underclothing worn by a citizen in the reign of Charles II. is afforded by the evidence of the man who helped to strip the body of the suicide Sir Edmond Berry Godfrey. ” I pulled off his shoes,” says Fisher, ” three pairs of stockings and a pair of socks, his black breeches and his drawers.” His coat and waistcoat, his shirt and his flannel shirt are also named. The knight came by his end on an October day. He was therefore warmly clad. His three pair of stockings will be noted: two pair are worn at the present day by most men in court dress. The socks are a rarely named addition, and the flannel shirt may be remarked. Loose ruffles of lace were attached to shirt cuffs until during the great part of the 18th century, and the ruffled or goffered shirt-front, which became common under George III., continued in use in the early Victorian period, the stiffly starched shirt-front taking its place at last even in evening dress. The last quarter of the 10th century, breaking through the strange mock-modesty which spoke of breeches as ” inexpressibles,” saw the question of hygienic underclothing a subject much in debate, and now most men other

than the poorer sort wear, besides the shirt, a light woollen vest and short drawers or long pantaloons of wool or wool's counterfeit. Woollen shirts are worn by bicyclists, cricketers and tennis players. In morning dress the inconvenience of the starched shirt-front is commonly avoided. A goffered shirt-front worn with evening dress is the mark of a foreigner in London, but some few men venture to clothe themselves for the evening in a shirt whose front is pleated and but slightly starched. Loose collars, formerly known as false collars, descendants of the Puritan's " plain band," have been attached to the shirt by studs at least for the last fifty years. Their fashions often change, but the older type turned down at the edge is not often seen. To women's under- clothing drawers have been added in the 19 th century. Brant6me, writing in the 16th, speaks of this garment as then lately intro- duced since the time of Henri II., but the fashion, apparently, did not long endure in France. In England they are noted as in occasional use at the Restoration. After 1820 a sort of trouser

with a frilled edge was worn for a time by fashionable women in England. The pantalette which afterwards appears in pictures of young girls was a mere legging fastened by tapes above the knees. Many women of the better class only adopted drawers at the end of the 'forties, and it may be presumed that the fashion reached the humble sort at a much later date. Towards the end of the 19th century both drawers and smock or " chemise " were commonly exchanged for a more convenient " combination garment."

European Fashions. — Race, climate, poverty and wealth have all had their part in the fashion of clothing. A mountaineer is not clad as a lowlander; the Tirolese in his short breeches, the Highlanders of Scotland and Albania in their tartan or white linen kilts go with uncovered knees. The Russian moujik in winter has his frowsy sheepskin coat, and the Russian prince imitates it in costly furs. While the rich man's clothing alters with every fancy of the tailors, the poor man's garments, fewer and cheaper, change slowly in the ages. An old Lincolnshire peasant wearing his smock frock and leathern gaiters might pass unnoted in a peasant crowd of centuries ago. Here and there in Europe we find in the 20th century a peasantry in whose clothing fashion seems to have been suddenly stayed. A Breton peasant in his holiday dress gives us a man of the late 1 7th century, even as an Irish peasant may keep the breeches, shoes and tailed coat of the early 19th. But the old fashions are passing from Europe: the sewing machine and tjie railway sweep before them the pleasant provincialisms of dress. A shirt with the bosom heavily embroidered, a skirt with a year's stitching in the hem are not to be imitated by the dealer in ready-made clothing, who offers, instead, cheap- ness and

the brisk variety of the town. Old writers, each in turn, set up their wail that the time was come when you could not tell Jack from his master, the burgess from the knight. And now that time has come in some sort, for the town dress of the richer classes of London or Paris is imitated by all peoples

From Hottenroth, Trachten der Vblker, by permission of Gustav Weise Verlag.

Fig. 49. — German Dress (early 16th century).

From Hottenroth, Trochlea der

VUker.

Fig. 50. — A French Nobleman (c. 1660).

From Hottenroth, VUker.

Trachten der

Fig. 51. — A Spanish Nobleman (latter half of 16th century).

and by rich and poor. Especially is this the case in England where the clean and honourable blouse of the French workman is not, a journeyman painter or labourer often going to his work

in a frayed and greasy morning coat after the cut of that in which a rich man will pay a London morning call. English fashions for men are followed in Paris. London women follow the modes of the rue de la Paix. Berlin tailors and dressmakers laboriously misapprehend both styles. To those who do not understand the international trafficking of the middle ages and the age of renascence it is strange to note how little the fashions varied in European lands. All kinds of folks, crusaders and merchants, diplomatists and religious, carried between nation and nation the news of the latest cut of the shears.

Nevertheless, national character touched each nation's dress — the Venetian loving the stateliness of flowing line, the Germans grotesque slashings and jaggings. Frenchmen, says Randle Holme in the 17th century, keep warm and muff themselves in cold weather, " but in summer through fantastical dresses go almost naked." For the same

writer the Spaniard was noted as a man in a high-crowned hat with narrow brim, a ruff about his neck, a doublet with short and narrow skirts and broad wings at the shoulders, ruff-cuffs at his hands, breeches narrow and close to his thighs, hose gartered, shoes with rounded toes, a short cloak and a long sword. In all of those points we may take it that the Spaniard differed from the Englishman as observed by this observant one. Even in our own days we may catch something of those national fashions. The Spaniard may no longer walk with his long sword, his ruff and gartered hose, but he keeps his fancy for sombre blacks, and so do the citizens of those Netherlands which he once ruled. (O. Ba.)

III. National and Class Costume Costume, as readers of Carlyle's Sartor Resartus know, always has a significance deeper than the mere whims of fashion. In the cosmopolitan society of modern times dress everywhere tends to become assimilated to a common model, and this assimilation, however regrettable from the picturesque point of view, is one of the most potent forces in the break-down of the traditional social distinctions. In the middle ages in Europe, and indeed down to the French Revolution, the various classes of the community were clearly differentiated by their dress. Everywhere, of course, it happened that occasionally jackdaws strutted in peacock's feathers; but even in England, where class distinctions were early less clearly marked than on the continent of Europe, the assumption of a laced coat and a sword marked the development of a citizen into a " gentleman " (q.v.). Nothing has more powerfully contributed to the social amalgamation of the " upper-middle " and the " upper " classes in England than the fashion, introduced in the 10th century, of extreme simplicity in the costume of men. But, apart from the properties of richness in material or decoration as a symbol of class distinction — at one time enforced by sumptuary laws — there have been, and still are, innumerable varieties of costume more or less traditional as proper to certain nationalities or certain classes within those nationalities. Of national costumes properly so called the best known to the English-speaking world is that of the Highlands of Scotland. This is,indeed,no longer generally worn, being usually confined to gentlemen of birth and their dependents, but it remains a national dress and is officially recognized as such by the English court and in the uniforms of the Highland regiments in the British army. The chief peculiarity of this costume, distinguishing it from any others, is the tartan, an arrangement of a prevailing colour with more or less narrow checks of other colours, by which the various clans or septs of the same race can be distinguished, while a certain general uniformity symbolizes the union of the clans in a common nationality.

Thus, e.g. the tartan of the clan MeDonell is green with narrow checks of red, that of the clan Gregarach red with narrow checks of black. The costume consists of a short tunic, vest, a kilt — heavily pleated — fastened round the waist, and reaching not quite to the knees (like a short petticoat), stockings gartered below the bare knee, and shoes. In front of the person, hanging from a belt round the waist, is the ” sporran ” or ” spleuchan,” a pocket-purse covered with fur; and a large ” plaid ” or scarf, usually wrapped round the body, the ends hanging down from a

brooch fastened on the left shoulder, but sometimes gathered up and hanging from the brooch behind, completes the costume. The head-gear is a cloth cap or ” bonnet,” in which a sprig of heather is stuck, or an eagle’s feather in the case of chiefs. A dirk is worn thrust into the right stocking. Up to the end of the 16th century the tunic and ” philibeg ” or kilt formed a single garment; but otherwise the costume has come down the ages without sensible modification. Kilt and plaid are of tartan; and sometimes tartan ” trews,” i.e. trousers, are substituted for the former.

Among other national costumes still surviving in Europe may be mentioned the Albanian- Greek dress (characterized by the spreading, pleated white kilt, or fustanella), and the splendid full-dress of a Hungarian gentleman, the prototype of the well- known hussar uniform; to which may be added the Tirolese costume, which, so far as the men are concerned, is characterized by short trousers, cut off above the knee, and a short jacket, the colour varying in different districts. This latter trait illustrates the fact that most of the still surviving ” national ” costumes in Europe are in fact local and distinctive of class, though they conform to a national type. These “folk-costumes” (Volks- trachten), as the Germans call them, survive most strongly in the most conservative of all classes, that of thepeasants. andnaturally mainly in those districts least accessible to modern ” enterprise.” These peasant costumes, often of astonishing richness and beauty, vary more or less in every village, each community having its own traditional type; and, since this type does not vary, they can be handed down as valuable heirlooms from father to son and from mother to daughter. But they are fast disappearing. In the British islands, where there were no free peasant cultivators to maintain the pride of class, they vanished long since; the white caps and steeple-crowned hats of Welsh women were the last to go; and even the becoming and con- venient ” sun bonnet,” which survives in the United States, has given place almost everywhere to the hideous ” cloth cap ” of commerce; while the ancient smocked frock, the equivalent of the French peasant’s workmanlike blouse, has become a

curiosity. The same process is proceeding elsewhere; for the simple peasant women cannot resist the blandishments of the commercial traveller and the temptation of change and cheap finery. The transition is at once painful and amusing, and not without interest as illustrating the force of tradition in its struggle with fashion ; for it is no uncommon thing, e.g. in France or Holland, to see a ” Paris model ” perched lamentably on the top of the beautiful traditional head-dress. Similarly in the richer Turkish families women are rapidly acquiring a taste for Parisian costumes, frequently worn in absurd combination with their ordinary garments.

The same process has extended far beyond the limits of Europe. Improved communication and industrial enterprise have combined with the prestige of European civilization to commend the European type of costume to peoples for whom it is eminently unsuited. Even the peoples of the East, whose costume has remained unchanged for untold centuries, and for whom the type has been (as in India) often determined by religious considerations, are showing an increasing tendency to yield to the world-fashion. Turkey, as being most closely in touch with Europe, was the first to feel the influence; the introduction of the fez and the frock-coat, in place of the large turban and flowing caftan of the old Turk, was the most conspicuous of the reforms of Sultan Mahmud II.; and when, in 1909, the first Turkish parliament met, only a small minority of its members wore their traditional costumes. The introduction of Japan into the comity of nations was followed by the adoption of European costume by the court and the upper classes, at least in public and on ceremonial occasions; in private the wide-sleeved, loose, comfortable kimono continues to be worn. China, on the other hand, has been more conservative, even her envoys in Europe preserving intact (except sometimes in the matter of boots) the traditional costume of their nation and class, while those of Japan, Corea and Siam appear in the conventional diplomatic or ‘ ‘ evening ‘ ‘ dress in Europe. In the Mussulman East, even when

European dress has been adopted, an exception has usually been made in favour of head-gear, which has a special religious significance. In Turkey, for instance, the hat has not succeeded in displacing the fez; and in India, though the Parsis had by the beginning of the 20th century begun to modify their traditional high turban-like hat into a modified ” bowler,” and Hindus — abroad at least — were affecting

the head-gear of the West, those Mussulman princes who had adopted, wholly or partially, European dress continued to wear the turban. On the other hand, the amir of Afghanistan, when he visited India, had — out of doors at least — discarded the turban for the ugly ” solar topee.” In spite of the natural conservatism, strengthened by religious conventions, of the Eastern races, there is a growing danger that the spread of European enlightenment will more or less rapidly destroy that picturesque variety of costume which is the delight of the traveller and the artist. For Indian costumes see India: Costume; for Chinese see China; &c.

IV. Official Costume Official costumes, in so far as they are not, like the crowns and tabards of heralds, the coronets of peers, or the gold keys tacked to the coat-tails of royal chamberlains— consciously symbolical, are for the most part ceremonious survivals of bygone general fashions. This is as true of the official costume of the past as of the present; as may be illustrated from ancient Rome, where the toga, once the general costume of Roman citizens, in the 3rd and 4th centuries was the official robe of senators and officials (see also under Vestments). Thus, at the present time, the lay chamberlains of the pope and the members of his Swiss guard wear costumes of the 16th century, and the same is true of the king’s yeomen of the guard in England. In general, however (apart from robes, which are much older in their origin), official costumes in Europe, or in countries of European origin, are based on the fashions of the 18th and early 19th centuries. Knee-breeches, however, which survive in the full-dress of many British officials, as in ordinary court dress, had practically disappeared on the continent of Europe, surviving only in certain peasant costumes, when the emperor William II. reintroduced them at the court of Berlin. The tendency in the modern democratic communities of Anglo-Saxon race has been to dispense with official costumes. In the United States the judges of the Supreme Court alone wear robes; the president of the Republic wears on all occasions the dress of an ordinary citizen, unrelieved by order or decoration, and thus symbolizes his pride of place as primus inter pares; an American ambassador appears on state occasions among his colleagues, gorgeous in bullion-covered coats, in the ordinary black ” evening dress ” of a modern gentleman. The principle, which tends to assert itself also in the autonomous ” British dominions beyond the seas,” is not the result of that native dislike of “dressing up ” which characterizes many Englishmen of the upper and middle classes; for modern democracy shares to the full the taste of past ages for official or quasi-official finery, as is proved by the costumes and insignia of the multitudinous popular orders, Knights Templars, Foresters,

Oddfellows and the like. It is rather cherished as the outward and visible sign of that doctrine of the equality of all men which remains the most generally gratifying of the gifts of French 18th-century philosophy to the world. In Great Britain, where equality has ever been less valued than liberty, official costumes have tended to increase rather than to fall into disuse; mayors of new boroughs, for instance, are not considered properly equipped until they have their gown and chain of office. In France, on the other hand, the taste of the people for pomp and display, and, it may be added, their innate artistic sense, have combined with their passion for equality to produce a somewhat anomalous situation as regards official costume. Lawyers have their robes, judges their scarlet gowns, diplomatists their gold-laced uni- forms; but the state costume of the president of the Republic is "evening dress," relieved only by the red riband and star of the Legion of Honour. In the Latin states of South America, which tend to be disguised despotisms ra.ther than democracies, the actual rather than the theoretical state of things is symbolized

by the gorgeous official uniforms which are among the rewards of those who help the dictator for the time being to power. See also Robes; for military costume see Uniforms; for ecclesiastical costume see Vestments and subsidiary articles. (W. A. P.)

Bibliography. — Apart from the enormous number of books especially devotad to costume, innumerable illustrated works exist which are, in various degrees, useful for the study of the history of this subject. It may be noted here, e.g. that the illuminators and painters of the middle ages did not affect historical accuracy in their presentment of biblical or secular subjects, but clothed their patri- archs, apostles or Roman warriors in the dress of their own ages, their pictures thus_ becoming invaluable records of the costume of their time. In this respect the knowledge of classical antiquity revived during the Renaissance introduced a certain confusion. Artists began to realize the incongruity of representing antique figures in modern garb, but, in the absence of exact knowledge, fancy began to play a greater part than research in the dressing of their characters. Portraits and representations of contemporary scenes (e.g. Rembrandt's " Night Watch ") continue to be first-hand authorities for the costume of the period in which they were pro- duced; but representations of biblical or historical scenes have little or no value from this point of view. Thus in Rubens's famous picture of St Ambrose repelling Theodosius from the door of his cathedral, the bishop is vested in the mitre and cope which only came into vogue centuries later, while the emperor wears a military costume modelled on that of Roman imperators of an earlier day. Even in portraiture, however, a certain conservatism tends

to make the record untrustworthy; thus, great men continued to be painted in full armour long after it had in fact ceased to be worn.

Of authorities for English costume the following may be selected as especially useful: J. C. Bruce, The Bayeux Tapestry Elucidated (London, 1856), with 17 plates; F. W. Fairholt, Costume in England to the end of the 18th Century (2nd ed., ib., i860); William Fowler, Examples of Medieval Art (1796-1829), 116 plates; Froissart's Chronicles, translated by T. Johnes (4 vols., 1844), 72 plates and many woodcuts ; R. N. Humphrey, Illuminated Books of the Middle Ages (ib., 1849) ; Facsimiles of Original Drawings by Holbein, in the Collection of His Majesty, for Portraits of Persons of the Court of Henry VIII., engraved by F. Bartolozzi, &c. (London, 1884) ; John Nichols, Progresses, Pageants, &c, of Queen Elizabeth (3 vols., 1823), and of James I. (4 vols., 1828), with numerous plates; Hogarth's Works, engraved by himself, with descriptions by J. Nichols (1822), 153 plates; Edmund Lodge, Portraits of Illustrious Personages of Great Britain (12 vols., 1823-1835), 240 plates; J. R. Planche, Hist, of British Costume (3rd ed., Bohn, 1874), and Cyclo- paedia of Costume (2 vols., 1876-1877) ; ffenry Shaw, Dresses and Decorations of the Middle Ages (2 vols., 1840-1843), 94 plates and many woodcuts; Joseph Strutt, engraver, Dress and Habits of the People of England (2 vols., 1796-1799), and Regal and Ecclesiastical Antiquities of Great Britain, new edition with notes by J. R. Planche (1842), 153 plates; Westwood, Miniatures of Anglo-Saxon and Irish Manuscripts (1868), 54 plates; C. A. Stothard, The Monumental ■Effigies of Great Britain (1817-1832; ed. Hewitt, 1876); Herbert Haines, Manual of Monumental Brasses (Oxford, 1861), with many woodcuts; J. G. and L. A. B. Waller, A Series of Monumental Brasses (London, 1864); H. Druitt, Costume on Brasses (London, 1906). Of foreign works on costume the most important are Hefner- Alteneck, Traehten, &c, vom fruhesten Mitlelalter bis Ende des 18. Jahrhunderts (2nd ed., Frankfort, 1879-1890); Viollet-le-Duc, Dictionnaire raisonne du mobilier francais (6 vols., Paris, 1858-1875), the first four volumes devoted to armour and costume; Friedrich Hottenroth, Traehten der Volker alter und neuer Zeil (2nd ed., Stuttgart, 1882-1890), with excellent plates, Fr. transl. by J. Bern- hoff, Les Costumes chez les peuples, &c. (Paris, 1885), and Handbuch der deutschen Tracht (1898) ; Bonnard et M ercuri, Costumes historiques des XII', XIIP, XIV' et XV' siecles (2 vols., Paris, 1867), 200 plates; Burgmair, Triomphe de I'empereur Maximilien I. (Vienna, 1796), 135 plates; Chapuy, Le Moyen Age pittoresque (2 vols., 1837), 180 plates; Chevignard et Duplessis, Costumes historiques des XVI", XVII" et XVIII' siecles (2 vols., Paris, 1867), 150 plates; du Sommerard, Les Arts au moyen Age

(10 vols., Paris, 1838-1848), 510 plates ; Duflos, Recueil d'estampes, representant les grades, les rangs, et les dignites, suivant le costume de toutes les nations existantes (Paris, 1 779-1 780), 240 plates; Espana artistica y monumental (3 vols.. Paris, 1842-1859), 145 plates; Fabri, Raccolta di varii vestimenti ed arti del regno di Napoli (Naples, 1773), 27 plates; Jaquemin, Iconographie methodique du costume du V" au XIX" siecle (Paris), 200 plates; Lacombe, Galerie de Florence et du palais Pilti (4 vols., Paris, 1789-1807), 192 plates; Paul Lacroix, Manners, Customs and Dress during the Middle Ages and the Renaissance, Eng. trans. (London, 1874), Military and Religious Life in the Middle Ages and the Renaissance (London, 1874), and The 18th Century, its Institutions, Customs, Costumes (London, 1875-1876); L. M. Lante, Galerie francaise de femmes ceiebres, atlas (Paris, 1841), 70 plates; Malliot et Martin, Recherches sur les costumes, les mceurs, les usages religieux, civils et militaires des anciens peuples (3 vols., Paris, 1809), 228 plates ; Pauly, Description ethnographique des peuples (St Petersburg, 1862) ; Pauquet Freres, Modes et costumes historiques et Strangers

(2 vols., Paris, 1873), 196 plates; Auguste Racinet, Le Costume historique, in two forms, large and small (Paris, 1876, another ed. in 6 vols., with 500 plates, 1888); G. M. Straub, Trachten oder Stammbuch (1600), several hundreds of curious woodcuts of costumes ; Vecellio, Habiti antichi et moderni di tutto il mondo (3 vols., Venice,

1 859-1 863).

Examples and illustrations of early costume of great interest and value may be found in the Archaeologia, M. Didron's Annates archeologiques, the Journals of the Archaeological Societies, the various county histories, the Monumenta Vetusta of the London Society of Antiquaries, and other kindred works.

Besides works on costume generally, there are a large number devoted specially to national or " folk " costumes. Of these may be mentioned: F. Hottenroth, Deutsche Volkstrachten, stddtische und landliche, vom XVI. Jahrhundert bis zum Anfange des XIX. Jahr- hunderts (Frankfort, 1898, 1900, 1902, &c), including German, Bohemian, Swiss and Dutch local costumes, with references to further works; L. M. Lante, Costume de divers pays (undated, c. 1825), 177 coloured plates of female costumes, mainly French, some Spanish, German, &c. ; A. Hard,

Swedish Costumes (Stockholm, 1858), 10 coloured plates; Felix Benoist, La Normandie illustree- (2 vols, fob, Nantes, 1854), with excellent coloured lithographs of costumes by Hyppolite Lalaine; E. H. T. Pingret, Galerie royale de costumes (Paris, undated), beautiful lithographs of costumes, principally Italian with some Spanish and Swiss, lithographed from paintings by Pingret by various artists; Edward Harding, Costume of the Russian Empire (London, 1811), with 70 hand-coloured plates, including costumes of many of the semi-barbaric tribes of central Asia; for Turkish costume in the 1 8th century see Recueil de cent estampes representant differentes nations du Levant, engraved by Le Hay (Paris, 1714); for Greek costume at the time of the War of Independence see Baron O. M. von Stackelberg, Costumes et usages des peuples de la Grece moderne (Rome, 1825), with 30 beautiful plates. For Highland costume see R. R. Maclan, Costumes of the Clans (Glasgow, 1899), with letterpress by J. Logan.

COSWAY, RICHARD (c. 1742-1821), English miniature painter, was baptized in 1742; his father was master of Blundell's school, Tiverton, where Cosway was educated, and his uncle mayor of that town. He it was who, in conjunction with the boy's godfather, persuaded the father to allow Richard to proceed to London before he was twelve years old, to take lessons in drawing, and undertook to support him there. On his arrival, the youthful artist won the first prize given by the newly founded Society of Arts, of the money value of five guineas. He went to Thomas Hudson for his earliest instruction, but remained with him only a few months, and then attended William Shipley's drawing class, where he remained until he began to work on his own account in 1760. He was one of the earliest members of the Royal Academy, Associate in 1770 and Royal Academician in 1 77 1. His success in miniature painting is said to have been started by his clever portrait of Mrs Fitzherbert, which gave great satisfaction to the prince of Wales, and brought Cosway his earliest great patron. He speedily became one of the most popular artists of the day, and his residence at Schomberg House, Pall Mall, was a well-known aristocratic rendezvous. In 1791 he removed to Stratford Place, where he lived in a state of great magnificence till 1821, when after selling most of the treasures he had accumulated he went to reside in Edgware Road. He died on the 4th of July 1821, when driving in a carriage with his friend Miss Udney. He was buried in Marylebone New church.

He married in 1781 Maria Hadfield, who survived him many years, and died in Italy in January 1838, in a school for girls which she had founded, and which she had attached to an important religious order devoted to the cause of female educa- tion, known as the Dame Inglesi. She had been created a baroness of the Empire on account of

her devotion to female education by the emperor Francis L in 1834. Her college still exists, and in it are preserved many of the things which had belonged to her and her husband.

Cosway had one child who died young. She is the subject of one of his most celebrated engravings. He painted miniatures of very many members of the royal family, and of the leading persons who formed the court of the prince regent. Perhaps his most beautiful work is his miniature of Madame du Barry, painted in 1791, when that lady was residing in Bruton Street, Berkeley Square. This portrait, together with many other splendid works by Cosway, came into the collection of Mr J. Pierpont Morgan. There are many miniatures by this artist in

the royal collection at Windsor Castle, at Belvoir Castle and in other important collections. His work is of great charm and of remarkable purity, and he is certainly the most brilliant miniature painter of the 18th century.

For a full account of the artist and his wife, see Richard Cosway, R.A., by G. C. Williamson (1905). (G. C. W.)

COTA DE MAGUAQUE, R0DRI60 (d. c. 1498), Spanish poet, who flourished towards the end of the 15th century, was born at Toledo. Little is known of him save that he was of Jewish origin. The Coplas de Mingo Revulgo, the Coplas del Provincial, and the first act of the Celestina have been ascribed to him on insufficient grounds. He is undoubtedly the author of the Dialogo entre el amor y un viejo, a striking dramatic poem first printed in the Cancionero general of 1511, and of a burlesque epithalamium written in 1472 or later. He abjured Judaism about the year 1497, and is believed to have died shortly afterwards.

See ” Epithalame burlesque,” edited by R. Foulche-Delbosc, in the Revue hispanique (Paris, 1894), i. 69-72; A. Bonilla y San Martin, Anales de la literatura espanola (Madrid, 1904), pp. 164-167.

COTE-D’OR, a department of eastern France, formed of the northern region of the old province of Burgundy, bounded N. by the department of Aube, N.E. by Haute-Mame, E. by Haute- Saone and Jura, S. by Saone-et-Loire, and W. by Nievre and Yonne. Area, 3392 sq. m. Pop. (1906) 357,959. A chain of hills named the Plateau de Langres runs from north-east to south- west through the centre of the department, separating the basin of the Seine from that of the Sa6ne, and forming a connecting- link between the Cevennes and the Vosges mountains. Extend- ing southward from Dijon is a portion of this

range which, on account of the excellence of its vineyards, bears the name of Cote-d'Or, whence that of the department. The north-west portion of the department is occupied by the calcareous and densely-wooded district of Chatillonais, the south-west by spurs of the granitic chain of Morvan, while a wide plain traversed by the Sa&ne extends over the eastern region. The Chatillonais is watered by the Seine, which there takes its rise, and by the Ource, both fed largely by the douix or abundant springs characteristic of Burgundy. The Armanfon and other affluents of the Yonne, and the Arroux, a tributary of the Loire, water the south-west.

The climate of C6te-d'Or is temperate and healthy; the rainfall is abundant west of the central range, but moderate, and, in places, scarce, in the eastern plain. Husbandry flourishes, the wealth of the department lying chiefly in its vineyards, especially those of the Cote-d'Or, which comprise the three main groups of Beaune, Nuits and Dijon, the latter the least renowned of the three. The chief cereals are wheat, oats and barley; potatoes, hops, beetroot, rape-seed, colza and a small quantity of tobacco are also produced. Sheep and cattle-raising is carried on chiefly in the western districts. The department has anthracite mines and produces freestone, lime and cement. The manufactures include iron, steel, nails, tools, machinery and other iron goods, paper, earthenware, tiles and bricks, morocco leather goods, biscuits and mustard, and there are flour-mills, distilleries, oil and vinegar works and breweries. The imports of the department are inconsiderable, coal alone being of any importance; there is an active export trade in wine, brandy, cereals and live stock and in manufactured goods. The Paris-Lyon-Mediterranee railway serves the department, its main line passing through Dijon. The canal of Burgundy, connecting the Saone with the Yonne, has a length of 94 m. in the department, while that from the Marne to the Sa6ne has a length of 24 m.

Cote-d'Or is divided into the arrondissements of Dijon, Beaune, Chatillon and Semur, with 36 cantons and 717 communes. It forms the diocese of the bishop of Dijon, and part of the archi- episcopal province of Lyons and of the 8th military region. Dijon is the seat of the educational circumscription (academie) and court of appeal to which the department is assigned. The more noteworthy places are Dijon, the capital, Beaune, Chatillon, Semur, Auxonne, Flavigny and Citeaux, all separately treated. St Jean de Losne, at the extremity of the Burgundy canal, is famous for its brave and successful resistance in 1636 to an immense force of Imperialists. Chateauneuf has a chateau of the

15th century, St Seine-l'Abbaye, a fine Gothic abbey church, and Saulieu, a Romanesque abbey church of the nth century. The chateau of Bussy Rabutin (at Bussy-le-Grand), founded in the 1 2th century, has an interesting collection of pictures made by Roger de Rabutin, comte de Bussy, who also rebuilt the chateau. Montbard, the birthplace of the naturalist Buffon, has a keep of the 14th century and other remains of a castle of the dukes of Burgundy. The remarkable Renaissance chapel (1 536) of Pagny- le-Chateau, belonging to the chateau destroyed in 1768, contains the tomb of Jean de Vienne (d. 1455) and that of Jean de Longwy (d. 1460) and Jeanne de Vienne (d. 1472), with alabaster effigies. At Fontenay, near Marmagne, a paper-works occupies the buildings of a well-preserved Cistercian abbey of the 12th century. At Vertault there are remains of a theatre and other buildings marking the site of the Gallo-Roman town of Vertilium.

COTES, ROGER (1682-1716), English mathematician and philosopher, was born on the 10th of July 1682 at Burbage, Leicestershire, of which place his father, the Rev. Robert Cotes, was rector. He was educated at Leicester school, and afterward at St Paul's school, London. Proceeding to Trinity College, Cambridge, in 1699, he obtained a fellowship in 1705, and in the following year was appointed Plumian professor of astronomy and experimental philosophy in the university of Cambridge. He took orders in 17 13; and the same year, at the request of Dr Richard Bentley, he published the second edition of Newton's Principia with an original preface. He died on the 5th of June 1 716, leaving unfinished a series of elaborate researches on optics, and a large amount of unpublished manuscript. He contributed two memoirs to the Philosophical Transactions, one, " Logo- metria," which discusses the calculation of logarithms and certain applications of the infinitesimal calculus, the other, a " Description of the great fiery meteor seen on March 6th, 1716." After his death his papers were collected and published by his cousin and successor in the Plumian chair, Dr Robert Smith, under the title Harmonia Mensurarum (1722). This work included the " Logometria," the trigonometrical theorem known as " Cotes' Theorem on the Circle " (see Trigonometry), his theorem on harmonic means, subsequently developed by Colin Maclaurin, and a discussion of the curves known as " Cotes' Spirals," which occur as the path of a particle described under the influence of a central force varying inversely as the cube of the distance. In 1738 Dr Robert Smith published Cotes' Hydro- statical and Pneumatical Lectures, a work which was held in great estimation.

The exceptional genius of Cotes earned encomiums from both his contemporaries and successors; Sir Isaac Newton said, ” If Mr Cotes had lived, we should have known something.”

CdTES-DU-NORD, a maritime department of the north-west of France, formed in 1 700 from the northern part of the province of Brittany, and bounded N. by the English Channel, E. by the department of Ule-et-Vilaine, S. by Morbihan, and W. by Finistere. Pop. (1906) 611,506. Area, 2786 sq. m. In general conformation, C6tes-du-Nord is an undulating plateau including in its more southerly portion three well-marked ranges of hills. A granitic chain, the Monts du Mene, starting in the south-east of the department runs in a north-westerly direction, forming the watershed between the rivers running respectively to the Channel and the Atlantic Ocean. Towards its western extremity this chain bifurcates to form the Montagnes Noires in the south-west and the Montagne d’Arree in the west of the department. The rivers of the Channel slope are the Ranee, Arguenon, Gouessan, Gouet, Trieux, Treguier and Leguer, while the Blavet, Meu, Oust and Aulne belong to the southern slope. Off the coast, which is steep, rocky and much indented, are the Sept-Iles, Brehat and other small islands. The principal bays are those of St Malo and St Brieuc.

The climate is mild and not subject to extremes; in the west it is especially humid. Agriculture is more successful on the coast, where seaweed can be used as a fertilizer, than in the interior. Cereals are largely grown, wheat, oats and buck- wheat being the chief crops. Potatoes, flax, mangels, apples, plums, cherries and honey are also produced. Pasture and various kinds of forage are abundant, and there is a large output of milk and butter.

The horses of the department are in repute. It produces slate, building-stone, lime and china-clay. Flour-mills, saw-mills, sardine factories, tanneries, iron-works, manufactories of polish, boat-building yards, and rope-works employ many of the inhabitants, and cloth, agricultural implements and nails are manufactured. The chief imports are coal, wood and salt. Exports include agricultural products (eggs, butter, vegetables, &c), horses, flax and fish. The chief commercial ports are Le Legue and Paimpol; and Paimpol also equips a large fleet for the Icelandic fisheries. The coast fishing is important and large quantities of sardines are preserved. The department is served by the Ouest-Etat railway; its chief waterway is the canal from Nantes to Brest which traverses it for 73 m.

C6tes-du-Nord is divided into the five arrondissements of St Brieuc, Dinan, Guingamp, Lannion and Loudeac, which contain 48 cantons

and 390 communes. Bas Breton is spoken in the arrondissements of Guingamp and Lannion, and in part of those of Loudeac and St Brieuc. The department belongs to the ecclesiastical province, the academie (educational division), and the appeal court of Rennes, and in the region of the X. army corps. St Brieuc, Dinan, Guingamp, Lamballe, Paimpol and Treguier, the more noteworthy towns, are separately treated. Extensive remains of an abbey of the Premonstratensian order, dating chiefly from the 13th century, exist at Kerity; and Lehon has remains of a priory, which dates from the same period. The department is rich in interesting churches, among which those of Ploubezre (12th, 14th and 16th centuries), Perros-Guirec (12th century), Plestin-les-Greves (16th century) and Lanleff (12th century) may be mentioned. The church of St Mathurin at Moncontour, which is a celebrated place of pilgrimage, contains fine stained glass of the 16th century, and the mural paintings of the chapel of Kermaria-an-Isquit near Plouha, which belongs to the 13th and 14th centuries, are celebrated. Near Lannion (pop. 5336), itself a picturesque old town, is the ruined castle of Tonquedec, built in the 14th century and sometimes known as ” the Pierrefonds of Brittany,” owing to its resemblance to the more famous castle. At Corseul are a temple and other Roman remains.

COTGRAVE, RANDLE (?-i634), English lexicographer, came of a Cheshire family, and was educated at Cambridge, entering St John’s College in 1 587. He became secretary to Lord Burghley, and in 1611 published his French-English dictionary (2nd ed., 1632), a work of real historical importance in lexicography, and still valuable in spite of such errors as were due to contemporary want of exact scholarship. _ ‘- _ -

COTHEN, or Kothen, a town of Germany, in the duchy of Anhalt on the Ziethe, at the junction of several railway lines, 42 m. N.W. of Leipzig by rail. Pop. (1905) 22,978. It consists of an old and a new town with four suburbs. The former palace of the dukes of Anhalt-Cothen, in the old town, has fine gardens and contains collections of pictures and coins, the famous ornithological collection of Johann Friedrich Naumann (1780- 1837), and a library of some 20,000 volumes. Of the churches the Lutheran Jakobskirche (called the cathedral), a Gothic building with some fine old stained glass, is noteworthy. Besides the usual classical and modern schools (Gymnasium and Realschule) Cothen possesses a technical institute, a school of gardening and a school of forestry. The industries include iron-founding and the manufacture of agricultural and other machinery, malt, beet-root sugar, leather, spirits, &c; a tolerably active trade is carried on in grain, wool, potatoes and vegetables. Among

others, there is a monument to Sebastian Bach, who was music director here from 1717 to 1723.

In the 10th century Cothen was a Slav settlement, which was captured and destroyed by the German king Henry I. in 927. By the 12th century it had secured town rights and become a considerable centre of trade in agricultural produce. In 1300 it was burned by the margrave of Meissen. In 1547 the town was taken from its prince, Wolfgang (a cadet of the house of Anhalt), who had joined the league of Schmalkalden, and given by the emperor Charles V., with the rest of the prince's possessions, to the Spanish general and painter, Felipe Ladron y Guevara

(1510-1563), from whom it was, however, soon repurchased. Hahnemann, the founder of homoeopathy, lived and worked in Cothen. From 1603 to 1847 Cothen was the capital of the principality, later duchy, of Anhalt- Cothen.

COTMAN, JOHN SELL (1782-1842), English landscape- painter and etcher, son of a well-to-do silk mercer, was born at Norwich on the 1 6th of May 1782. He showed a talent for art and was sent to London to study, where he became the friend of Turner, T. Girtin and other artists. He first exhibited at the Royal Academy in 1800. In 1807 he went back to Norwich and joined the Norwich Society of Artists, of which in 181 1 he became president. In 1825 he was made an associate of the Society of Painters in Water-colours; in 1834 he was appointed drawing- master at King's College, London; and in 1836 he was elected a member of the Institute of British Architects. He died in London on the 24th of July 1842. Cotman's work was not con- sidered of much importance in his own day, and his pictures only procured small prices; but he now ranks as one of the great figures of the Norwich school. He was a fine draughtsman, and a remarkable painter both in oil and water-colour. One of his paintings is in the National Gallery. His fine architectural etchings, published in a series of volumes, the result of tours in Norfolk and Normandy, are valuable records of his interest in archaeology. He married early in life, and had five children, his sons, Miles Edmund (1810-1858) and Joseph John (1814-1878), both becoming landscape-painters of merit; and his younger brother Henry's son, Frederic George Cotman (b. 1850), the water-colour artist, continued the family reputation.

COTONEASTER, a genus of the rose family (Ros'aceae), containing about twenty species of shrubs and small trees, natives of Europe, North Africa and temperate Asia. C. vulgaris is native on the limestone cliffs of the Great Orme in North Wales. Several species are grown in shrubberies and borders, or as wall plants, mainly for their clusters of bright red or yellow berry -like fruits. Plants are easily raised by seeds, cuttings or layers, and grow well in ordinary soil.

COTOPAXI, a mountain of the Andes, in Ecuador, South America, 35 m. S.S.E. of Quito, remarkable as the loftiest active volcano in the world. The earliest outbursts on record took place in 1532 and 1533; and since then the eruptions have been both numerous and destructive. Among the most important are those of 1744, 1746, 1766, 1768 and 1803. In 1744 the thunder- ings of the volcano were heard at Honda on the Rio Magdalena, about 500 m. distant ; in 1 768 the quantity of ashes ejected was so great that • it covered all the lesser vegetation as far as Riobamba; and in 1803 Humboldt reports that at the port of Guayaquil, 160 m. from the crater, he heard the noise day and night like continued discharges of a battery. There were considerable outbursts in 1851, 1855, 1856, 1864 and 1877. In 1802 Humboldt made a vain attempt to scale the cone, and pronounced the enterprise impossible; and the failure of Jean Baptiste Boussingault in 1831, and the double failure of M. Wagner in 1858, seemed to confirm his opinion. In 1872, however, Dr Wilhelm Reiss succeeded on the 27 th and 28th of November in reaching the top; in the May of the following year the same feat was accomplished by Dr A. Stiibel, and he was followed by T. Wolf in 1877, M. von Thielmann in 1878 and Edward Whymper in 1880.

Cotopaxi is frequently described as one of the most beautiful mountain masses of the world, rivalling the celebrated Fuji- yama of Japan in its symmetry of outline, but overtopping it by more than 7000 ft. It is more than 15,000 ft. higher than Vesuvius, over 7000 ft. higher than Teneriffe, and nearly 2000 ft. higher than Popocatepetl. Its slope, according to Orton, is 30 , according to Wagner 29 , the north-western side being slightly steeper than the south-eastern. The apical angle is 122° 30V The snowfall is heavier on the eastern side of the cone which is permanently covered, while the western side is usually left bare, a phenomenon occasioned by the action of the moist trade winds from the Atlantic. Its height according to Whymper is 19,613 ft., and its crater is 2300 ft. in diameter from N. to S., 1650 ft. from E. to W., and has an approximate depth of 1200 ft.

It is bordered by a rim of trachytic rock, forming a black coronet above the greyish volcanic dust and sand which covers its sides to a

great depth. Whymper found snow and ice under this sand. On the southern slope, at a height of 15,059 ft., is a bare cone of porphyritic andesite called El Picacho, ” the beak,” or Cabeza del Inca, ” the Inca’s head,” with dark cliffs rising fully 1000 ft., which according to tradition is the original summit of the volcano blown off at the first-known eruption of 1532. The summit of Cotopaxi is usually enveloped in clouds; and even in the clearest month of the year it is rarely visible for more than eight or ten days. Its eruptions produce enormous quantities of pumice, and deep layers of mud, volcanic sand and pumice surround it on the plateau. Of the air currents about and above Cotopaxi, Wagner says (Nalurw. Reisen im trop. Amerika, p. 514) : ” On the Tacunga Plateau, at a height of 8000 Paris feet, the prevailing direction of the wind is meridional, usually from the south in the morning, and frequently from the north in the evening; but over the summit of Cotopaxi, at a height of 18,000 ft., the north-west wind always prevails throughout the day. The gradually-widening volcanic cloud continually takes a south- eastern direction over the rim of the crater; at a height, however, of about 21,000 ft. it suddenly turns to the north-west, and maintains that direction till it reaches a height of at least- 28,000 ft. There are thus from the foot of the volcano to the highest level attained by its smoke-cloud three quite distinct regular currents of wind.”

COTRONE (anc. Croto, Crotona), a seaport and episcopal see on the E. coast of Calabria, Italy, in the province of Catanzaro, 37 m. E.N.E. of Catanzaro Marina by rail, 143 ft. above sea-level. Pop. (1901) town, 7917; commune, 9545. It has a castle erected by the emperor Charles V. and a small harbour, which everoin ancient times was not good, but important as the only one between Taranto and Reggio. It exports a considerable quantity of oranges, olives and liquorice.

COTTA, the name of a family of German publishers, intimately connected with the history of German literature. The Cottas were of noble Italian descent, and at the time of the Reformation the family was settled in Eisenach in Thuringia.

Johann Georg Cotta (i) (1631-1692), the founder of the publishing house of J. G. Cotta, married in 1659 the widow of the university bookseller, Philipp Braun, in Tubingen, and took over the management of his business, thus establishing the firm which was subsequently associated with Cotta’s name. On his death, in 1692, the undertaking passed to his only son, Johann Georg (2); and on his death in 17 12, to the latter’s eldest son, also named Johann Georg (3), while the second son, Johann Friedrich (see below), became the distinguished theologian.

Although the eldest son of Johann Georg (3), Christoph Friedrich Cotta (1730-1807), established a printing-house to the court at Stuttgart, the business languished, and it was reserved to his youngest son, Johann Friedrich, Freiherr Cotta von Cottendorf (1764-1832), who was born at Stuttgart on the 27th of April 1764, to restore the fortunes of the firm. He attended the gymnasium of his native place, and was originally intended to study theology. He, however, entered the university of Tubingen as a student of mathematics and law, and after graduating spent a considerable time in Paris, studying French and natural science, and mixing with distinguished literary men. After practising as an advocate in one of the higher courts, Cotta, in compliance with his father's earnest desire, took over the publishing business at Tubingen. He began in December 1787, and laboured incessantly to acquire familiarity with all the details. The house connexions rapidly extended; and, in 1794, the Allgemeine Zeitung, of which Schiller was to be editor, was planned. Schiller was compelled to withdraw on account of his health; but his friendship with Cotta deepened every year, and was a great advantage to the poet and his family. Cotta awakened in Schiller so warm an attachment that, as Heinrich Doring tells us in his life of Schiller (1824), when a bookseller offered him a higher price than Cotta for the copyright of Wallen- stein, the poet firmly declined it, replying " Cotta deals honestly with me, and I with him." In 1795 Schiller and Cotta founded

the Horen, a periodical very important to the student of German literature. The poet intended, by means of this work, to infuse higher ideas into the common lives of men, by giving them a nobler human culture, and " to reunite the divided political world under the banner of truth and beauty." The Horen brought Goethe and Schiller into intimate relations with each other and with Cotta; and Goethe, while regretting that he had already promised Wilhelm Meister to another publisher, contributed the Unterhaltung deutscher Ausgewanderten, the Roman Elegies and a paper on Literary Sansculottism. Fichte sent essays from the first, and the other brilliant German authors of the time were also represented. In 1798 the Allgemeine Zeitung appeared at Tubingen, being edited first by Posselt and then by Huber. Soon the editorial office of the newspaper was transferred to Stuttgart, in 1803 to Ulm, and in 1810 to Augsburg; it is now in Munich. In 1799 Cotta entered on his political career, being sent to Paris by the Wurttemberg estates as their representative. Here he made friendships which proved very advantageous for the Allgemeine Zeitung. In 1801 he paid

another visit to Paris, also in a political capacity, when he carefully studied Napoleon's policy, and treasured up many hints which were useful to him in his literary undertakings. He still, however, devoted most of his attention to his own business, and, for many years, made all the entries into the ledger with his own hand. He relieved the tedium of almost ceaseless toil by pleasant intercourse with literary men. With Schiller, Huber, and Gottlieb Konrad Pfeffel (1736-1809) he was on terms of the warmest friendship; and he was also intimate with Herder, Schelling, Fichte, Richter, Voss, Hebel, Tieck, Therese Huber, Matthisson, the brothers Humboldt, Johann Miiller, Spittler and others, whose works he published in whole or in part. In the correspondence of Alexander von Humboldt with Varnhagen von Ense we see the familiar relations in which the former stood to the Cotta family. In 1795 he published the Politischen Annalen and the Jahrbiicher der Baukunde, and in 1798 the Damenalmanach, along with some works of less import- ance. In 1807 he issued the Morgenblatt, to which Schorn's Kunslblatt and Menzel's Liter aturblatt were afterwards added. In 1810 he removed to Stuttgart; and from that time till his death he was loaded with honours. State affairs and an honour- able commission from the German booksellers took him to the Vienna congress; and in 181 5 he was deputy-elect at the Wurttemberg diet. In 1819 he became representative of the nobility; then he succeeded to the offices of member of committee and (1824) vice-president of the Wurttemberg second chamber. He was also appointed Prussian Geheimrat, and knight of the order of the Wurttemberg crown; King William I. of Wurttem- berg having already revived the ancient nobility in his family by granting him the patent of Freiherr (Baron) Cotta von Cottendorf . Meanwhile such publications as the Polytechnische Journal, the Hesperus, the Wilrttembergische Jahrbiicher, the Hertha, the Ausland, and the Inland issued from the press. In 1828-1829 appeared the famous correspondence between Schiller and Goethe. Cotta was an unfailing friend of young struggling men of talent. In addition to his high standing as a publisher, he was a man of great practical energy, which flowed into various fields of activity. He was a scientific agriculturist, arid promoted many reforms in farming. He was the first Wurttemberg land- holder to abolish serfdom on his estates. In politics he was throughout his life a moderate liberal. In 1824 he set up a steam printing press in Augsburg, and, about the same time, founded a literary institute at Munich. In 1825 he started steamboats, for the first time, on Lake Constance, and introduced them in the following year on the Rhine. In 1828 he was sent to Berlin, on an important commission, by Bavaria and Wurttemberg, and was there rewarded with orders of distinction at the hands of the three kings. He died on

the 29th of December 1832 leavingason and a daughter as coheirs.

His son, Johann Georg (4), Freiherr .Cotta von Cotten- dorf (1 796-1863), succeeded to the management of the business on the death of his father, and was materially assisted by his sister's husband, Freiherr Hermann von Reischach. He greatly extended the connexions of the firm by the purchase, in 1839, of

the publishing business of G. J. Goschen in Leipzig, and in 1845 of that of Vogel in Landshut; while, in 1845, " Bible" branches were established at Stuttgart and Munich. He was succeeded by his younger son, Karl, and by his nephew (the son of his sister), Hermann Albert von Reischach. Under their joint partnership, the before-mentioned firms in Leipzig and Landshut, and an artistic establishment in Munich passed into other hands, leaving on the death of Hermann Albert von Reischach, in 1876, Karl von Cotta the sole representative of the firm, until his death in 1888. In 1889 the firm of J. G. Cotta passed by purchase into the hands of Adolf and Paul Kroner, who took others into partnership. In 1899 the business was converted into a limited liability company.

See Albert Schaffle, Cotta (1895) ; Verlags-Katalog der J. G. Cotta' schen Buchhandlung, Nachfolger (1900) ; and Lord Gosehen's Life and Times of G. J. Goschen (1903).

Johann Friedrich Cotta (1701-1779), the theologian, was born on the 12th of March 1701, the son of Johann Georg Cotta (2). After studying theology at Tubingen he began his public career as lecturer in Jena University. He then travelled in Germany, France and Holland, and, after residing several years in London, became professor at Tubingen in 1733. In 1736 he removed to the chair of theology in the university of Gottingen, which had been instituted as a seat of learning, two years before, by George II. of England, in his capacity as elector of Hanover. In 1739, however, he returned, as extraordinary professor of theology, to his Alma Mater, and, after successively filling the chairs of history, poetry and oratory, was appointed ordinary professor of theology in 1741. Finally he died, as chancellor of Tubingen University, on the 31st of December 1779. His learning was at once wide and accurate; his theological views were orthodox, although he did not believe in strict verbal inspiration. He was a voluminous writer. His chief works are his edition of Johann Gerhard's Loci Theologici (1762-1777), and the Kirchenhistorie des Neuen Testaments (1768-1773).

COTTA, BERNHARD VON (1808-1879), German geologist, was born

in a forester's lodge near Eisenach, on the 24th of October 1808. He was educated atFreibergandHeidelberg,andfrom 1842 to 1874 he held the professorship of geology in the Bergakademie of Freiberg. Botany at first attracted him, and he was one of the earliest to use the microscope in determining the structure of fossil plants. Later on he gave his attention to practical geology, to the study of ore-deposits, of rocks and metamorphism; and he was regarded as an excellent teacher. His Rocks classified and described: a Treatise on Lithology (translated by P. H. Lawrence, 1866) was the first comprehensive work on the subject issued in the English language, and it gave great impetus to the study of rocks in Britain. He died at Freiberg on the 14th of September

1879-

Publications. — Geognostische Wanderungen (1836-1838); Grund- riss der Geognosie und Geologie (1846) ; Geologische Brief e aus den Alpen (1850); Praktische Geologie (1852); Geologische Bilder (1852, ed. 4, 1861); Die Gesteinslehre (1855, ed. 2, 1862).

COTTA, 6AIUS AURELIUS (c. 124-73 B.C.), Roman states- man and orator. In 92 he defended his uncle P. Rutilius Rufus, who had been unjustly accused of extortion in Asia. He was on intimate terms with the tribune M. Livius Drusus, who was murdered in 91, and in the same year was an unsuccessful candidate for the tribunate. Shortly afterwards he was prose- cuted under the lex Varia, directed against all who had in any way supported the Italians against Rome, and, in order to avoid condemnation, went into voluntary exile. He did not return till 82, during the dictatorship of Sulla. In 75 he was consul, and excited the hostility of the optimates by carrying a law that abolished the Sullan disqualification of the tribunes from holding higher magistracies; another law de judiciis privalis, of which nothing is known, was abrogated by his brother. In 74 Cotta obtained the province of Gaul, and was granted a triumph for some victory of which we possess no details; but on the very day before its celebration an old wound broke out, and he died suddenly. According to Cicero, P. Sulpicius Rufus and Cotta were the best speakers of the young men of their time. Physically incapable of rising to passionate heights of oratory, Cotta's

successes were chiefly due to his searching investigation of facts; he

kept strictly to the essentials of the case and avoided all irrelevant digressions. His style was pure and simple. He is introduced by Cicero as an interlocutor in the De oratore and De natura deorum (iii.), as a supporter of the principles of the New Academy. The fragments of Sallust contain the substance of a speech delivered by Cotta in order to calm the popular anger at a deficient corn-supply.

See Cicero, De oratore, iii. 3, Brutus, 49, 55, 90, 92; Sallust, Hist. Frag. ; Appian, Bell. Civ. i. 37.

His brother, Lucius Aurelius Cotta, when praetor in 70 B.C. brought in a law for the reform of the jury lists, by which the judices were to be eligible, not from the senators exclusively as limited by Sulla, but from senators, equites and tribuni aerarii. One-third were to be senators, and two-thirds men of equestrian census, one-half of whom must have been tribuni aerarii, a body as to whose functions there is no certain evidence, although in Cicero's time they were reckoned by courtesy amongst the equites. In 66 Cotta and L. Manlius Torquatus accused the consuls-elect for the following year of bribery in connexion with the elections; they were condemned, and Cotta and Torquatus chosen in their places. After the suppression of the Catilinarian conspiracy, Cotta proposed a public thanksgiving for Cicero's services, and after the latter had gone into exile, supported the view that there was no need of a law for his recall, since the law of Clodius was legally worthless. He subsequently attached himself to Caesar, and it was currently reported that Cotta (who was then quindecimvir) intended to propose that Caesar should receive the title of king, it being written in the books of fate that the Parthians could only be defeated by a king. Cotta's intention was not carried out in consequence of the murder of Caesar, after which he retired from public life.

See Cicero, Orelli's Onomasticon; Sallust, Catiline, 18; Suetonius, Caesar, 79; Livy, Epit. 97; Veil. Pat. ii. 32; Dio Cassius xxxvi. 44, xxxvii. I.

COTTABUS (Gr. Korrafios), a game of skill for a long time in great vogue at ancient Greek drinking parties, especially in the 4th and 5th centuries B.C. It is frequently alluded to by the classical writers of the period, and not seldom depicted on ancient vases. The object of the player was to cast a portion of wine left in his drinking cup in such a way that, without breaking bulk in its passage through the air, it should reach a certain object set up as a mark, and there produce a distinct noise by its impact. Both the wine thrown and the noise made were called Xdraˆ. The thrower, in the ordinary form of the game, was expected to retain the recumbent position that was usual at table, and,

in flinging the cottabus, to make use of his right hand only. To succeed in the aim no small amount of dexterity was required, and unusual ability in the game was rated as high as correspond- ing excellen ce in throwing the javelin. Not only was the cottabus the ordinary accompaniment of the festal assembly, but at least in Sicily a special building of a circular form was sometimes erected so that the players might be easily arranged round the basin, and follow each other in rapid succession. Like all games in which the element of chance found a place, it was regarded as more or less ominous of the future success of the players, especially in matters of love; and the excitement was sometimes further augmented by some object of value being staked on the event.

Various modifications of the original principle of the game were gradually introduced, but for practical purposes we may reckon two varieties. (1) In the KoTTa/3os di 6£vfia.o}v shallow saucers (6£vf} a4 > a) were floated in a basin or mixing-bowl filled with water; the object was to sink the saucers by throwing the wine into them, and the competitor who sank the greatest number was considered victorious, and received the prize, which consisted of cakes or sweetmeats. (2) Karraffos ko.tokt6s, 1 is not so easy to under- stand, although there is little doubt as to the apparatus. This consisted of a pa|35os or bronze rod; a TKacnyˆ, a small disk or basin, resembling a scale-pan; a larger disk (Xocaeis); and (in- 1 The epithet KaraKros (let down) may refer to the rod, which might be raised or lowered as required; to the lower disk, which might be moved up and down the stem ; to the moving up and down of the scales, in the supposed variety of the game mentioned below.

most cases) a small bronze figure called nhvrp. The discovery (by Professor Helbig in 1886) of two sets of actual apparatus near Perugia and various representations on vases help to elucidate the somewhat obscure accounts of the method of playing the game contained in the scholia and certain ancient authors who, it must not be forgotten, wrote at a time when the game itself had become obsolete, and cannot therefore be looked to for a trustworthy description of it.

The first specimen of the apparatus found at Perugia resembles a candelabrum on a base, tapering towards the top, with a blunt end, on which the small disk (found near the rod), which has a hole near the edge and is slightly hollow in the middle, could be balanced. At about a third of the height of the rod is a large disk with a hole in the centre through which the rod runs; in a socket at the top is a small bronze figure, with right arm and right leg uplifted. In the second specimen there is no large disk, and the figure is holding up what is apparently

a rhyton or drinking-horn.

According to Prof. Helbig in Mittheilungen des deutschen archaologischen Instituts (Romische Abtheilung i., 1886) three games were played with this apparatus: In the first the smaller disk was placed on the top of the rod, and the object of the player was to dislodge it with a cast of the wine, so that it would fall with a clatter on the larger disk below. In the second (as in the third) the bronze figure was used; the smaller disk was placed above the figure, upon which it fell when hit, and thence on to the larger disk below. In the third, there was no smaller disk; the wine was thrown at the figure, and fell on to the larger disk underneath. Another supposed variety, in which two scales were balanced in such a manner that the weight of the liquid cast into either scale caused it to dip down and touch the top of an image placed under each, probably had no real existence, but is due to a confusion of the ir\acmyl with a scale-pan by reason of its shape. The game appears to have been of Sicilian origin, but it spread through Greece from Thessaly to Rhodes, and was especially fashionable at Athens. Dionysius, Alcaeus, Anacreon, Pindar, Bacchylides, Aeschylus, Sophocles, Euripides, Aristo- phanes, Antiphanes, make frequent and familiar allusion to the Korrafios; but in the writers of the Roman and Alexandrian period such reference as occurs shows that the fashion had died out. In Latin literature it is almost entirely unknown.

The most complete treatise on the subject is C. Sartori's Das Kottabos-Spiel der alien Griechen (1893), in which a full bibliography of ancient and modern authorities is given. English readers may be referred to an article by A. Higgins on " Recent Discoveries of the Apparatus used in playing the Game of Kottabos " (Archaeologia, li. 1888) ; see also " Kottabos " in Daremberg and Saglio's Dictionnaire des antiquites, and L. Becq de Fouquieres,LeJ Jeux des anciens (1873).

COTTBUS, a town of Germany, in the kingdom of Prussia, on the Spree, 72 m. S.E. of Berlin by the main railway to Gorlitz, and at the intersection of the lines Halle-Sagan and Grossenhain- Frankfort-on-Oder. Pop. (1905) 46,269. It has four Protestant churches, a Roman Catholic church and a synagogue. The chief industry of the town is the manufacture of cloth, which has flourished here for centuries and now employs more than 6000 hands. Wool-spinning, cotton-spinning and the manufacture of tobacco, machinery, beer, brandy, &c, are also carried on. The town is also a considerable trading centre, and is the seat of a chamber of commerce and of a branch of the Imperial Bank (Reichsbank) . In the Stadtwald, close to the town, is a women's hospital for diseases of the lungs, a government institution in

connexion with the state system of insurance against incapacity and old age. At Branitz, a neighbouring village, are the magni- ficent chateau and park of Prince Piickler-Muskau.

At one time Cottbus formed an independent lordship of the Empire, but in 1462 it passed by the treaty of Guben to Branden- burg. From 1807 to 1813 it belonged to the kingdom of Saxony.

COTTENHAM, CHARLES CHRISTOPHER PEPYS, 1st Earl of (1781-1851), lord chancellor of England, was born in London on the 29th of April 1781. He was the second son of Sir William W. Pepys, a master in chancery, who was descended from John Pepys, of Cottenham, Cambridgeshire, a great-uncle of Samuel Pepys, the diarist. Educated at Harrow and Trinity College,

Cambridge, Pepyswas called to the bar at Lincoln's Inn in 1804. Practising at the chancery bar, his progress was extremely slow, and it was not till twenty-two years after his call that he was made a king's counsel. He sat in parliament, successively, for Higham Ferrars and Malton, was appointed solicitor-general in

1834, and in the same year became master of the rolls. On the formation of Lord Melbourne's second administration in April

1835, the great seal was for a time in commission, but eventually Pepys, who had been one of the commissioners, was appointed lord chancellor (January 1836) with the title of Baron Cottenham. He held office until the defeat of the ministry in 184 1. In 1846 he again became lord chancellor in Lord John Russell's adminis- tration. His health, however, had been gradually failing, and he resigned in 1850. Shortly before his retirement he had been created Viscount Crowhurst and earl of Cottenham. He died at Pietra Santa, in the duchy of Lucca, on the 29th of April 1851.

Both as a lawyer and as a judge, Lord Cottenham was remark- able for his mastery of the principles of equity. An indifferent speaker, he nevertheless adorned the bench by the soundness of his law and the excellence of his judgments. As a politician he was somewhat of a failure, while his only important contribution to the statute-book was the Judgments Act 1838, which amended the law for the relief of insolvent debtors.

The title of earl of Cottenham descended in turn to two of the earl's sons, Charles Edward (1824-1863), and William John (1825-1881), and then to the latter's son, Kenelm Charles Edward (b. 1874).

Authorities. — Campbell, Lives of the Lord Chancellors (1869); E. Foss, The Judges of England (1848-1864); E. Manson, Builders of our Law (1904); J. B. Atlay, The Victorian Chancellors (1906).

COTTER, Cottar, or Cottier, a word derived from the Latin cota, a cot or cottage, and used to describe a man who occupies a cottage and cultivates a small plot of land. This word is often employed to translate the cotarius of Domesday Book, a class whose exact status has been the subject of some discussion, and is still a matter of doubt. According to Domesday the cotarii were comparatively few, numbering less than seven thousand, and were scattered unevenly throughout England, being principally in the southern counties ; they were occupied either in cultivating a small plot of land, or in working on the holdings of the villani. Like the villani, among whom they were frequently classed, their economic condition may be described as " free in relation to every one except their lord."

See F. W. Maitland, Domesday Book and Beyond (Cambridge, 1897); and P. Vinogradoff, Villainage in England (Oxford, 1892).

COTTESWOLD HILLS, or Cotswolds, a range of hills in the western midlands of England. The greater part lies in Glou- cestershire, but the system covered by the name also extends into Worcestershire, Warwickshire, Oxfordshire, Wiltshire and. Somersetshire. It extends on a line from N.E. to S.W., forming a part of the great Oolitic belt extending through the English midlands. On the west the hills overlook the vales of Evesham, Gloucester and Berkeley (valleys of the Worcestershire Avon and the Severn), with a bold escarpment broken only by a few abrupt spurs, such as Bredon hill, between Tewkesbury and Evesham. On the east they slope more gently towards the basins of the upper Thames and the Bristol Avon. The watershed lies close : to the western line, except where the Stroud valley, with the Frome, draining to the Severn, strikes deep into the heart of the hills. The principal valleys are those of the Windrush, Lech, Coin and Churn, feeders of the Thames, the Thames itself, and the Bristol Avon. The last, wherein lie Bath and Bristol, forms the southern boundary of the Cotteswolds; the northern is formed by the valleys of the Evenlode (draining to the Thames) and the Stour (to the Worcestershire Avon), with the low divide between them. The crest-line from Bath at the south to Meon Hill at the north measures 57 m. The breadth varies from 6 m. in the south to 28 towards the north, and the area is some

300 sq. m. The features are those of a pleasant sequestered pastoral region, rolling plateaus or wolds and bare uplands alternating with deep narrow valleys, well wooded and traversed by shallow, rapid streams. The average elevation is about 600 ft., but Cleeve

Cloud above Cheltenham in the Vale of Gloucester reaches 1 134 ft., and Broadway Hill, in the north, 1086 ft. These heights command splendid views over the rich vales towards the distant hills of Herefordshire and the Forest of Dean. The picturesque village of Broadway at the foot of the hill of that name is much in favour with artists.

In the soil of the hill country is so much lime that a liberal supply of manure is required. With this good crops of barley and oats are obtained, and even of wheat, if the soil is mixed with clay. But the poorest land of the hill country affords excellent pasturage for sheep, the staple commodity of the district; and the sainfoin, which grows wild, yields abundantly under cultiva- tion. The Cotteswolds have been famous for the breed of sheep named from them since the early part of the 15th century, a breed hardy and prolific, with lambs that quickly put on fleece, and become hardened to the bracing cold of the hills, where vegetation is a month later than in the vales. Improved by judicious crossing with the Leicester sheep, the modern Cottes- wold has attained high perfection of weight, shape, fleece and quality. An impulse was given to Cotteswold farming by the chartering in 1845 of the Royal Agricultural College at Cirencester.

A number of small market-towns or large villages lie on the outskirts of the hills, but in the inner parts of the district villages are few. The ” capital of the Cotteswolds ” is Cirencester, in the east. In the north is Chipping Campden, its great Perpendicular church and the picturesque houses of its wide street commemorat- ing the wealth of its wool-merchants between the 14th and 17 th centuries. Near this town, in the parish of Weston-sub-Edge, Robert Dover, an attorney, founded the once famous Cotteswold games early in the 17th century. Horse-racing and coursing were included with every sort of athletic exercise from quoits and skittles to wrestling, cudgels and singlestick. The games were suppressed by act of parliament in 1851.

See Proceedings of the Cotteswold Naturalists’ Field Club, passim; W. H. Hutton, By Thames and Cotswold (London, 1903).

COTTET, CHARLES (1863-), French painter, was born at Puy. He studied at the Ecole des Beaux-Arts, and under Puvis de Chavannes and Roll. He travelled and painted in Egypt, Italy, and on the Lake of

Geneva, but he made his name with his sombre and gloomy, firmly designed, severe and impressive scenes of life on the Brittany coast. His signal success was achieved by his painting of the triptych, ” Au pays de la mer,” now at the Luxembourg museum. The Lille gallery has his ” Burial in Brittany.”

COTTII REGNUM, a district in the north of Liguria, including a considerable part of the important road which led over the pass (6119 ft.) of the Alpis Cottia (Mont Genevre) into Gaul. Whether Hannibal crossed the Alps by this route is disputed, but it was certainly in use about 100 B.C. (see Punic Wars). In 58 B.C. Caesar met with some resistance on crossing it, but seems after- wards to have entered into friendly relations with Donnus, the king of the district; he must have used it frequently, and refers to it as the shortest route. Donnus’s son Cottius erected the triumphal arch at his capital Segusio, the modern Susa, in honour of Augustus. Under Nero, after the death of the last Cottius, it became a province under the title of ” Alpes Cottiae,” being governed by a procurator Augusti, though it still kept its old name also.

COTTIN, MARIE [called Sophie] (1770-1807), French novelist, ne’e Risteau (not Ristaud), was born in Paris in 1770. At seventeen she married a Bordeaux banker, who died three years after, when she retired to a house in the country at Champlan, where she spent the rest of her life. In 1799 she published anonymously her Claire d’Albe. Malvina (1801) was also anony- mous; but the success of Amelie Mansfield (1803) induced her to reveal her identity. In 1805 appeared Mathilde, an extravagant crusading story, and in 1806 she produced her last tale, the famous Elisabeth, ou les exiles de SiMrie, the subject of which was treated later with an admirable simplicity by Xavier de Maistre. Sainte-Beuve asserted that she committed suicide on account of an unfortunate attachment. This story is, however,

unauthenticated. She died at Champlan (Seine et Oise) on the 25th of April 1807.

A complete edition of her works, with a notice by A. Petitot, was published, in five volumes, in 1817.

COTTINGTON, FRANCIS COTTINGTON, Baron (1578-1652), English lord treasurer and ambassador, was the fourth son of Philip Cottington

of Godmonston in Somersetshire. According to Hoare, his mother was Jane, daughter of Thomas Biflete, but according to Clarendon ” a Stafford nearly allied to Sir Edward Stafford,” through whom he was recommended to Sir Charles Cornwallis, ambassador to Spain, becoming a member of his suite and acting as English agent on the latter’s recall, from 1609 to 1611. In 1612 he was appointed English consul at Seville. Returning to England, he was made a clerk of the council in September 1613. His Spanish experience rendered him useful to the king, and his bias in favour of Spain was always marked. He seems to have promoted the Spanish policy from the first, and pressed on Gondomar, the Spanish ambassador, the proposal for the Spanish in opposition to the French marriage for Prince Charles. He was a Roman Catholic at least at heart, becoming a member of that communion in 1623, returning to Protestantism, and again declaring himself a Roman Catholic in 1636, and supporting the cause of the Roman Catholics in England. In 1616 he went as ambassador to Spain, making in 1618 James’s proposal of mediation in the dispute with the elector palatine. After his return he was appointed secretary to the prince of Wales in October 1622, and was knighted and made a baronet in 1623. He strongly disapproved of the prince’s expedition to Spain, as an adventure likely to upset the whole policy of marriage and alliance, but was overruled and chosen to accom- pany him. His opposition greatly incensed Buckingham, and still more his perseverance in the Spanish policy after the failure of the expedition, and on Charles’s accession Cottington was through his means dismissed from all his employments and forbidden to appear at court. The duke’s assassination, however, enabled him to return. On the 12th of November 1628 he was made a privy councillor,and in March 1629 appointed chancellor of the exchequer. In the autumn he was again sent ambassador to Spain; he signed the treaty of peace of the 5th of November 1630, and subsequently a secret agreement arranging for the partition of Holland between Spain and England in return for the restoration of the Palatinate. On the 10th of July 1631 he was created Baron Cottington of Hanworth in Middlesex.

In March 1635 he was appointed master of the court of wards, and his exactions in this office were a principal cause of the unpopularity of the government. He was also appointed a commissioner for the treasury, together with Laud. Between Cottington and the latter there sprang up a fierce rivalry. In these personal encounters Cottington had nearly always the advantage, for he practised great reserve and possessed great powers of self- command, an extraordinary talent for dissembling and a fund of humour. Laud completely lacked these qualities, and though really possessing much greater influence with

Charles, he was often embarrassed and sometimes exposed to ridicule by his opponent. The aim of Cottington ‘s ambition was the place of lord treasurer, but Laud finally triumphed and secured it for his own nominee, Bishop Juxon, when Cottington became ” no more a leader but meddled with his particular duties only.” 1 He con- tinued, however, to take a large share in public business and served on the committees for foreign, Irish and Scottish affairs. In the last, appointed in July 1638, he supported the war, and in May 1640, after the dismissal of the Short Parliament, he declared it his opinion that at such a crisis the king might levy money without the Parliament. His attempts to get funds from the city were unsuccessful, and he had recourse instead to a speculation in pepper. He had been appointed constable of the Tower, and he now prepared the fortress for a siege. In the trial of Strafford in 1 64 1 Cottington denied on oath that he had heard him use the incriminating words about ” reducing this kingdom.” When the parliamentary opposition became too strong to be any longer defied, Cottington, as one of those who had chiefly incurred their 1 Strafford’s Letters, ii. 52.

hostility, hastened to retire from the administration, giving up the court of wards in May 1641 and the chancellorship of the exchequer in January 1642. He rejoined the king in 1643, took part in the proceedings of the Oxford parliament, and was made lord treasurer on the 3rd of October 1643. He signed the surrender of Oxford in July 1646, and being excepted from the idemnity retired abroad. He joined Prince Charles at the Hague in 1648, and became one of his counsellors. In 1649, together with Hyde, Cottington went on a mission to Spain to obtain help for the royal cause, having an interview with Mazarin at Paris on the way. They met, however, with an extremely ill reception, and Cottington found he had completely lost his popularity at the Spanish court, one cause being his shortcomings and waverings in the matter of religion. He now announced his intention of remaining in Spain and of keeping faithful to Roman Catholicism, and took up his residence at Valladolid, where he was maintained by the Jesuits. He died there on the 19th of June 1652, his body being subsequently buried in Westminster Abbey. He had amassed a large fortune and built two magnificent houses at Hanworth and Founthill. Cottington was evidently a man of considerable ability, but the foreign policy pursued by him was opposed to the national interests and futile in itself. According to Clarendon’s verdict ” he left behind him a greater esteem of his parts than love of his person.” He married in 1623 Anne, daughter of Sir William Meredith and widow of Sir Robert Brett. All his children predeceased him, and his title became extinct at his death.

Bibliography. — Article in the Diet, of Nat. Biography and authorities there quoted; Clarendon's Hist, of the Rebellion, passim, and esp. xiii. 30 (his character), and xii., xiii. (account of the Spanish mission in 1649); Clarendon's State Papers and Life; Strafford's Letters; Gardiner's Hist, of England and of the Commonwealth; Hoare's Wiltshire; Laud's Works, vols, iii.-vii.; Winwood's Memorials: A Refutation of a False and Impious Aspersion cast on the late Lord Cottington\ Dart, Westmonasterium, i. 181 (epitaph and monument). , (P. C. Y.)

COTTON, the name of a well-known family of Anglo-Indian administrators, of whom the following are the most notable.

Sir Arthur Thomas Cotton (1803-1899), English engineer, tenth son of Henry Calveley Cotton, was born on the 1 5th of May 1803, and was educated at Addiscombe. He entered the Madras engineers in 1819, served in the first Burmese war (1824-26), and in 1828 began his life-work on the irrigation works of southern India. He constructed works on the Cauvery,Coleroon,Godavari and Kistna rivers, making anicuts (dams) on the Coleroon (183 6-1 83 8) for the irrigation of the Tanjore, Trichinopoly and South Arcot districts; and on the Godivari (1847-1852) for the irrigation of the Godavari district. He also projected the anicut on the Kistna (Krishna), which was carried out by other officers. Before the beginning of his work Tanjore and the adjoining districts were threatened with ruin from lack of water; on its completion they became the richest part of Madras, and Tanjore returned the largest revenue of any district in India. He was the founder of the school of Indian hydraulic engineering, and carried out much of his work in the face of opposition and discouragement from the Madras government; though, in the minute of the 15th of May 1858, that government paid an ample tribute to the genius of Cotton's " master mind." He was knighted in 1861. Sir Arthur Cotton believed in the possibility of constructing a complete system of irrigation and navigation canals throughout India, and devoted the whole of a long life to the partial realization of this project. He died on the 24th of July 1899.

See Lady Hope, General Sir Arthur Cotton (1900).

Sir Henry John Stedman Cotton (1845-)> Anglo-

Indian administrator, son of J. J. Cotton of the Madras Civil Service, was born on the 13th of September 1845, and was educated at Magdalen Collegeˆschool and King's College, London. He entered the Bengal Civil Service in 1867, and held various appointments of

increasing importance until he became chief secretary to the Bengal government (1891-1896), acting home secretary to the government of India (1896), and chief com- missioner of Assam (1896-1902). He retired in 1902, and soon became known as the leading English champion of the Indian

nationalists. In 1906 he entered parliament as Liberal member for East Nottingham. He was the author of New India (1885; revised 1904-1907).

His brother, James Sutherland Cotton (1847-), was born in India on the 17th of July 1847, and was educated at Magdalen College school and Trinity College, Oxford. For many years he was editor of the Academy; he published various works on Indian subjects, and was the English editor of the revised edition of the Imperial Gazetteer of India (1908).

COTTON, CHARLES (1630-1687), English poet, the translator of Montaigne, was born at Beresford in Staffordshire on the 28th of April 1630. His father, Charles Cotton, was a man of marked ability, and counted among his friends Ben Jonson, John Selden, Sir Henry Wotton and Izaak Walton. The son was apparently not sent to the university, but he had as tutor Ralph Rawson, one of the fellows ejected from Brasenose College, Oxford, in 1648. Cotton travelled in France and perhaps in Italy, and at the age of twenty-eight he succeeded to an estate greatly encumbered by lawsuits during his father's lifetime. The rest of his life was spent chiefly in country pursuits, but from his Voyage to Ireland in Burlesque (1670) we know that he held a captain's commission and was ordered to that country. His friendship with Izaak Walton began about 1655, and the fact of this intimacy seems a sufficient answer to the charges sometimes brought against Cotton's character, based chiefly on his coarse burlesques of Virgil and Lucian. Walton's initials made into a cipher with his own were placed over the door of his fishing cottage on the Dove; and to the Compleat Angler he added " Instructions how to angle for a trout or grayling in a clear stream." He married in 1656 his cousin Isabella, who was a sister of Colonel Hutchinson. It was for his wife's sister, Miss Stanhope Hutchinson, that he undertook the translation of Corneille's Horace (1671). His wife died in 1670 and five years later he married the dowager countess of Ardglass; she had a jointure of £1500 a year, but it was secured from his extravagance, and at his death in 1687 he was

insolvent. He was buried in St James's church, Piccadilly, on the 16th of February 1687. Cotton's reputation as a burlesque writer may account for the neglect with which the rest of his poems have been treated. Their excellence was not, however, overlooked by good critics. Coleridge praises the purity and unaffectedness of his style in Biographia Literaria, and Words- worth {Preface, 181 5) gave a copious quotation from the " Ode to Winter. " The " Retirement " is printed by Walton in the second part of the Compleat Angler. His masterpiece in translation, the Essays of M. de Montaigne (1685-1686, 1693, 1700, &c), has often been reprinted, and still maintains its reputation; his other works include The Scarronides, or Virgil Travestie (1664-1670), a gross burlesque of the first and fourth books of the Aeneid, which ran through fifteen editions; Burlesque upon Burlesque, . . . being some of Lucian 's Dialogues newly put into English fustian (167 5) ; The Moral Philosophy of theStoicks (1667), from the French of Guillaume du Vair; The History of the Life of the Duke d'Espernon (1670), from the French of G. Girard; the Com- mentaries (1674) of Blaise de Montluc; the Planter's Manual (1675), a practical book on arboriculture, in which he was an expert; The Wonders of the Peake (1681); the Compleat Gamester and The Fair one of Tunis, both dated 1674, are also assigned to Cotton.

William Oldys contributed a life of Cotton to Hawkins's edition (1760) of the Compleat Angler. His Lyrical Poems were edited by J. R. Tutin in 1903, from an unsatisfactory edition of 1689. His translation of Montaigne was edited in 1892, and in a more elaborate form in 1902, by W. C. Hazlitt, who omitted or relegated to the notes the passages in which Cotton interpolates his own matter, and supplied his omissions.

COTTON, GEORGE EDWARD LYNCH (1813-1866), English educationist and divine, was born at Chester on the 29th of October 1813. He received his education at Westminster school, and at Trinity College, Cambridge. Here he joined the Low Church party, and was also the intimate friend of several dis- ciples of Thomas Arnold, among whom were C. J. Vaughan and W. J. Conybeare. The influence of Arnold determined the character and course of his life. He graduated B.A. in 1836, and

became an assistant-master at Rugby. Here he worked devotedly for fifteen years, inspired with Arnold's spirit, and heartily enter- ing into his plans and methods. He became master of the fifth form about 1840 and was singularly successful with the boys. In 1852 he accepted the appointment of headmaster at Marl- borough College, then in a state of almost hopeless disorganiza- tion, and in his six years of rule raised it to a high position. In 1858 Cotton was offered the see of Calcutta,

which, after much hesitation about quitting Marlborough, he accepted. For its peculiar duties and responsibilities he was remarkably fitted by the simplicity and strength of his character, by his large tolerance, and by the experience which he had gained as teacher and ruler at Rugby and Marlborough. The government of India had just been transferred from the East India Company to the crown, and questions of education were eagerly discussed. Cotton gave himself energetically to the work of establishing schools for British and Eurasian children, classes which had been hitherto much neglected. He did much also to improve the position of the chaplains, and was unwearied in missionary visitation. His sudden death was widely mourned. On the 6th of October 1866 he had consecrated a cemetery at Kushtea on the Ganges, and was crossing a plank leading from the bank to the steamer when he slipped and fell into the river. He was carried away by the current and never seen again.

A memoir of his life with selections from his journals and correspondence, edited by his widow, was published in 1871.

COTTON, JOHN (1585-1652), English and American Puritan divine, sometimes called ” The Patriarch of New England,” born in Derby, England, on the 4th of December 1585. He was educated at Trinity College, Cambridge, graduating B.A. in 1603 and M.A. in 1606, and became a fellow in Emmanuel College, Cambridge, then a stronghold of Puritanism, where, during the next six years, according to his friend and biographer, Rev. Samuel Whiting, he was ” head lecturer and dean, and Catechist,” and ” a dilligent tutor to many pupils.” In June 1612 he became vicar of the parish church of St Botolphs in Boston, Lincolnshire, where he remained for twenty-one years and was extremely popular. Becoming more and more a Puritan in spirit, he ceased, about 16 1 5, to observe certain ceremonies prescribed by the legally authorized ritual, and in 1632 action was begun against him in the High Commission Court. He thereupon escaped, disguised, to London, lay in concealment there for several months, and, having been deeply interested from its beginning in the colonization of New England, he eluded the watch set for him at the various English ports, and in July 1633 emigrated to the colony of Massachusetts Bay, arriving at Boston early in September. On the 10th of October he was chosen ” teacher ” of the First Church of Boston, of which John Wilson (1588-1667) was pastor, and here he remained until his death on the 23rd of December 1652. In the newer, as in the older Boston, his popularity was almost unbounded, and his influence, both in ecclesiastical and in civil affairs, was probably greater than ttiat of any other minister in theocratic New England. According to the contemporary historian, William Hubbard, ” Whatever he delivered in the pulpit was soon put into an order of court, if of a civil, or set up as a practice in the church, if of an ecclesiastical concernment.” His influence, too, was generally beneficent, though it was never used to further the cause of religious freedom, or of democracy, his theory of government being given in an oft- quoted passage: ” Democracy, I do not conceyve that ever God did ordeyne as a fitt government eyther for church or common- wealth. ... As for Monarchy and aristocracy they are both for them clearly approved, and directed in Scripture yet so as (God) referreth the sovereigntie to himselfe, and setteth up Theocracy in both, as the best form of government.” He naturally took an active part in most, if not all, of the political and theological controversies of his time, the two principal of which were those concerning Antinomianism and the expulsion of Roger Williams. In the former his position was somewhat equivocal — he first supported and then violently opposed Anne Hutchinson, — in the latter he approved Williams’s expulsion as ” righteous in the eyes of God,” and subsequently in a pamphlet discussion with

Williams, particularly in his Bloudy Tenent, Washed and made White in the Blond of the Lamb (1647), vigorously opposed religious freedom. He was a man of great learning and was a prolific writer. His writings include : The Keyes to the Kingdom of Heaven and the Power thereof (1644), The Way of the Churches of Christ in New England (1645), and The Way of Congregational Churches Cleared (1648), these works constituting an invaluable exposition of New England Congregationalism; and Milk for Babes, Drawn out of the Breasts of Both Testaments, Chiefly for the Spirituall Nourishment of Boston Babes in either England, but may be of like Use for any Children (1646), widely used for many years, in New England, for the religious instruction of children.

See the quaint sketch by Cotton Mather, John Cotton's grandson, in Magnolia (London, 1702), and a sketch by Cotton's contemporary and friend, Rev. Samuel Whiting, printed in Alexander Young's Chronicles of the First Planters of the Colony of Massachusetts Bay from 1623 to 1636 (Boston, 1846); also A. W. McClure's The Life of John Cotton (Boston, 1846), a chapter in Arthur B. Ellis's History of the First Church in Boston (Boston, 188 1), and a chapter in Williston Walker's Ten New England Leaders (New York, 1901). (W. Wr.)

COTTON, SIR ROBERT BRUCE, Bart, (1571-1631), English antiquary, the founder of the Cottonian library, born at Denton in Huntingdonshire on the 22nd of January 1571, was a descendant, as he delighted to boast, of Robert Bruce. He was educated at Westminster school under William Camden the antiquary, and at Jesus College, Cambridge. His antiquarian tastes were early displayed in the collection of ancient records, charters and other manuscripts, which had been dispersed from the monastic libraries in the reign of Henry VIII. ; and through- out the whole of his life he was an energetic collector of antiquities from all parts of England and the continent. His house at Westminster had a garden going down to the river and occupied part of the site of the present House of Lords. It was the meeting-place in the last years of Elizabeth's reign of the anti- quarian society founded by Archbishop Parker. In 1600 Cotton visited the north of England with Camden in search of Pictish and Roman monuments and inscriptions. His reputation as an expert in heraldry led to his being asked by Queen Elizabeth to discuss the question of precedence between the English ambassador and the envoy of Spain, then in treaty at Calais. He drew up an elaborate paper establishing

the precedence of the English ambassador. On the accession of James I. he was knighted, and in 1608 he wrote a Memorial on Abuses in the Navy, that resulted in a navy commission, of which he was made a member. He also presented to the king an historical Inquiry into the Crown Revenues, in which he speaks freely about the expenses of the royal household, and asserts that tonnage and poundage are only to be levied in war time, and to ” proceed out of good will, not of duty.” In this paper he supported the creation of the order of baronets, each of whom was to pay the crown £1000; and in 161 1 he himself received the title.

Cotton helped John Speed in the compilation of his History of England (16 n), and was regarded by contemporaries as the compiler of Camden’s History of Elizabeth. It seems more likely that it was executed by Camden, but that Cotton exercised a general supervision, especially with regard to the story of Mary queen of Scots. The presentation of his mother’s history was naturally important to James I., and Cotton himself took a keen interest in the matter. He had had the room in Fotheringay where Mary was executed transferred to his family seat at Connington. Meanwhile he was enlarging his collection of documents. In 1614 Arthur Agarde (q.v.) left his papers to him, and Camden’s manuscripts came to him in 1623. In 1615 Cotton, as the intimate of the earl of Somerset, whose innocence he always maintained, was placed in confinement on the charge of being implicated in the murder of Sir Thomas Overbury; he confessed that he had acted as intermediary between Sarmiento, the Spanish ambassador, and Somerset, and had altered the dates of Somerset’s correspondence. He was released after about eight months’ imprisonment without formal trial, and obtained a pardon on payment of £500. His friendship with Gondomar, Spanish ambassador in England from 1613 to 1621,

brought further suspicion, probably undeserved, upon Cotton, of unduly favouring the Catholic party. From Charles I. and Buckingham Cotton received no favour; his attitude towards the court had begun to change, and he became the intimate friend of Sir John Eliot, Sir Simonds d’Ewes and John Selden. He had entered parliament in 1604 as member for Huntingdon; in 1624 he sat for Old Sarum; in 1625 for Thetford; and in 1628 for Castle Rising, Norfolk. In the debate on supply in 1625 Cotton provided Eliot with full notes defending the action of the opposition in parliament, and in 1628 the leaders of the party met at Cotton’s house to decide on their policy. In 1626 he gave advice before the council against debasing the standard of the. coinage; and in January 1628 he was again before the council, urging the summons of a parliament. His arguments on the latter occasion are

contained in his tract entitled The Danger in which the Kingdom now standeth and the Remedy. In October of the next year he was arrested, together with the earls of Bedford, Somerset, and Clare, for having circulated, with ironical purpose, a tract known as the Proposition to bridle Parliament, which had been addressed some fifteen years before by Sir Robert Dudley to James I., advising him to govern by force; the circulation of this by Parliamentarians was regarded as intended to insinuate that Charles's government was arbitrary and unconstitutional. Cotton denied knowledge of the matter, but the original was discovered in his house, and the copies had been put in circulation by a young man who lived after him and was said to be his natural son. Cotton was himself released the next month; but the proceedings in the star chamber continued, and, to his intense vexation, his library was sealed up by the king. He died on the 6th of May 1631, and was buried in Connington church, Huntingdonshire, where there is a monu- ment to his memory.

Many of Cotton's pamphlets were widely read in manuscript during his lifetime, but only two of his works were printed, The Reign of Henry III. (1627) and The Danger in which the Kingdom now Standeth (1628). His son, Sir Thomas (15941-1662), added considerably to the Cottonian library; and Sir John, the fourth baronet, presented it to the nation in 1700. In 173J the collection, which had in the interval been removed to the Strand, and thence to Ashburnham House, was seriously damaged by fire. In 1753 it was transferred to the British Museum.

See the article Libraries, and Edwards's Lives of the Founders of the British Museum, vol. i. Several of Cotton's papers have been printed under the title Cottoni Posthuma ; others were published by Thomas Hearne.

COTTON (Fr. colon; from Arab, qutun), the most important of the vegetable fibres of the world, consisting of unicellular hairs which occur attached to the seeds of various species of plants of the genus Gossypium, belonging to the Mallow order (Malvaceae) . Each fibre is formed by the outgrowth of a single epidermal cell of the testa or outer coat of the seed.

Botany and Cultivation. — The genus Gossypium includes herbs and shrubs, which have been cultivated from time immemorial, and are now found widely distributed throughout the tropical and subtropical regions of both hemispheres. South America, the West Indies, tropical Africa and Southern Asia are the homes of the various members, but the plants have been intro- duced with success into other lands, as is

well indicated by the fact that although no species of Gossypium is native to the United States of America, that country now produces over two- thirds of the world's supply of cotton. Under normal conditions in warm climates many of the species are perennials, but, in the United States for example, climatic conditions necessitate the plants being renewed annually, and even in the tropics it is often found advisable to treat them as annuals to ensure the production of cotton of the best quality, to facilitate cultural operations, and to keep insect and fungoid pests in check.

Microscopic examination of a specimen of mature cotton shows that the hairs are flattened and twisted, resembling somewhat in general appearance an empty and twisted fire hose. This characteristic is of great economic importance, the natural twist facilitating the operation of spinning the fibres into thread or yarn. It also distinguishes the true cotton from the silk cottons or flosses, the fibres of which have no twist, and do not readily

spin into thread, and for this reason, amongst others, are very considerably less important as textile fibres. The chief of these silk cottons is kapok, consisting of the hairs borne on the interior of the pods (but not attached to the seeds) of Eriodendron anfractuosum, the silk cotton tree, a member of the Bombacaceae, an order very closely allied to the Malvaceae.

Classification. — Considerable difficulty is encountered in attempting to draw up a botanical classification of the species of Gossypium. Several are only known in cultivation, and we have but little knowledge of the wild parent forms from which they have descended. During the periods the cottons have been cultivated, selection, conscious or unconscious, has been carried on, resulting in the raising, from the same stock probably, in different places, of well-marked forms, which, in the absence of the history of their origin, might be regarded as different species. Then again, during at least the last four centuries, cotton plants have been distributed from one country to another, only to render

still more difficult any attempt to establish de- finitely the origin of the varieties now grown. Under these circum- stances it is not sur- prising to find that those who have paid attention to the botany of the cottons differ greatly in the number 1 of species they recog- Inize.

Linnaeus de- scribed five or six species, de Candolle thirteen. Of the two Italian botanists who in comparatively recent years have mono- graphed the group, Parlatore (Le Specie dei coloni, 1866) recognizes seven species, whilst Todaro (Relazione sulla culta dei cotoni, 1877-1878) describes over fifty species: many of these, however, are of but little economic im- portance, and, in spite of the difficulties mentioned above, it is possible for practical purposes to divide the commercially important plants into five species, placing these in two groups according to the character of the hairs borne on the seeds. Sir G. Watt's exhaustive work on Wild and Cultivated Cotton Plants of the World (1907) is the latest authority on the subject; and his views on some debated points have been in- corporated in the following account.

A seed of " Sea Island cotton " is covered with long hairs only, which are readily pulled off, leaving the comparatively small black seed quite clean or with only a slight fuzz at the end, whereas a seed of " Upland " or ordinary American cotton bears both long and short hairs; the former are fairly easily detached (less easily, however, than in Sea Island cotton), whilst the latter adhere very firmly, so that when the long hairs are pulled off the seed remains completely covered with a short fuzz. This is also the case with the ordinary Indian and African cottons. There remains one other important group, the so-called " kidney " cottons in which there are only long hairs, and the seed easily comes away clean as with " Sea Island," but, instead of each seed being separate, the whole group in each of the three com- partments of the capsule is firmly united together in a more or less kidney-shaped mass. Starting with this as the basis of classifica-

vii. 9

From Strasburger's Lekrbitch dcr Botanik, by permission of Gustav Fischer.

Fig. 1. — Seed-hairs of the Cotton, Gos- sypium herbaceum. A, Part of seed-coat with hairs; Bi, insertion and lower part; Bi, middle part; and B 3 , upper part of a hair.

tion, we can construct the following key, the remaining principal points of difference being indicated in their proper places-: —

Seeds covered with long hairs only, flowers yellow, turning to red.

{A. Seeds separate. Country of origin,Tropical America — (1) G.barbadense,L,. B. Seeds of each loculus united. Country of origin, S.

America — (2) G.brasiliense, Macf. . Seeds covered with long and short hairs. CA. Flowers yellow or white, turning to red.

a. Leaves 3 to 5 lobed, often large. Flowers white.

Country of origin, Mexico — (3) G. hirsutum, L. Leaves 3 to 5, seldom 7 lobed. Small. Flowers yellow.

Country of origin, India — (4) G. herbaceum, L. B. Flowers purple or red. Leaves 3 to 7 lobed. Place of origin, Old World — (5) G. arboreum, L.

1. G. barbadense, Linn. This plant, known only in cultivation, is usually regarded as native to the West Indies. Watt regards it as closely allied to G. vilifolium, and considers the modern stock a hybrid, and probably not indigenous to the West Indies. He classifies the modern high-class Sea Island cottons as G. barba- dense, var. maritima. Whatever may be its true botanical name it is the plant known in commerce as ” Sea Island ” cotton, owing to its introduction and successful cultivation in the Sea Islands and the coastal districts of South Carolina, Georgia and Florida. It yields the most valuable of all cottons, the hairs being long, fine and silky, and ranging in length from £ to 2§ in. By careful selection (the methods of which are described below) in the United States, the quality of the product was much improved, and on the recent revival of the cotton industry in the West Indies American ” Sea Island ” seed was introduced back again to the original home of the species.

Egyptian cotton is usually regarded as being derived from the same species. Watt considers many of the Egyptian cottons to be races or hybrids of G. peruvianum, Cav. Egyptian cotton in length of staple is intermediate between average Sea Island and average Upland. It has, however, certain characteristics which cause it to be in demand even in the United States, where during recent years Egyptian cotton has comprised about 80% of all the ” foreign ” cottons imported. These special qualities are its fineness, strength, elasticity and great natural twist, which combined enable it to make very fine, strong yarns, suited to the manufacture of the better qualities of hosiery, for mixing with silk and wool, for making lace, &c. It also mercerizes very well. The principal varieties of Egyptian cotton are: Mitafifi, the best-known and most extensively grown, hardy and but little affected by climatic variation. It is usually regarded as the standard Egyptian cotton ; the lint is yellowish brown, the seeds black and almost smooth, usually with a little tuft of short green hairs at the ends. A bassi, a variety comparatively recently obtained by selection. The lint

is pure white, very fine and silky, but not so strong as Mitafifi cotton. Yannovitch, a variety known since about 1897, yields the finest and most silky lint of the white Egyptian cottons. Bamia, yielding a brown lint, very similar to Mitafifi, but slightly less valuable. Ashmouni, a variety principally cultivated in Upper Egypt. The lint is brown and generally resembles Mitafifi but is less valuable.

Other varieties are Zifiri, Hamouli and Gallini, all of minor importance.

2. G. brasiliense, Macf. (G. peruvianum, Engler), or kidney cotton. Amongst the varieties of cotton which are derived from this species appear to be Pernambuco, Maranham, Ceara, Aracaty and Maceio cottons The fibre is generally white, somewhat harsh and wiry, and especially adapted for mixing with wool. The staple varies in length from 1 to about i§ in.

3. G. hirsutum, Linn. Although G. barbadense yields the most valuable cotton, G. hirsutum is the most important cotton- yielding plant, being the source of American cotton, i.e. Upland, Georgia, New Orleans and Texas varieties. The staple varies usually in length between | and ij in. According to Watt there are many hybrids in American cottons between G. hirsutum and G. mexicanum.

4. G. herbaceum, Linn. Levant cotton is derived from this species. The majority of the races of cotton cultivated in India are often referred to this species, which is closely allied to G. hirsutum and has been regarded as identical with it. Amongst the cottons of this source are Hinganghat, Tinnevelly, Dharwar, Broach, Amraoti (Oomras or Oomrawattee), Kumta, Westerns, Dholera, Verawal, Bengals, Sind and Bhaunagar. Watt dissents from this view and classes these Indian cottons as G. obtusifolium and G. Nanking with their varieties. The Indian cottons are usually of short staple (about f in.), but are probably capable of improvement.

5. G. arboreum, Linn. This species is often considered as indigenous to India, but Dr Engler has pointed out that it is found wild in Upper Guinea, Abyssinia, Senegal, etc. It is the ” tree cotton ” of India and Africa, being typically a large shrub or small tree. The fibre is fine and silky, of about an inch in length. In India it is known as Nurma or Deo

cotton, and is usually stated to be employed for making thread for the turbans of the priests. Commercially it is of comparatively minor importance.

The following table, summarized from the Handbook to the Imperial Institute Cotton Exhibition, 1905, giving the length of staple and value on one date (January 16, 1905), will serve to indicate the comparative values of some of the principal com- mercial cottons. The actual value, of course, fluctuates greatly.

Length of Staple. Value

Inches.

Per lb

Sea Island Cotton-

s. d.

Carolina Sea Island .

. 1-8

1 3

Florida ,, ,, ...

. 1-8

1

Georgia „ „ ...

• 1-7

Hi

Barbados ,, „

2-0

1 3

Egyptian Cottons-

• 1-5

91

• i-5

si

Good Brown Egyptian (Mitafifi)

1-2

71

American Cotton —

Good middling Memphis .

• i-3

4*

Good middling Texas

I-O

4t

Good middling Upland

I-O

4

Indian Cottons —

Fine Tinnevelly

. o-8

41

Fine Bhaunagar

1-0

3|

I-O

31

. 09

3i?

. 09

3ll

Fine ginned Sind . .

. o-8

-211

J16

Good ginned Kumta

I-O

3i

The close relationship between the length of the staple and the market price will be at once apparent.

Cultivation. — Cotton is very widely cultivated throughout the world, being grown on a greater or less scale as a commercial crop in almost every country included in the broad belt be- tween latitudes 43 N. and 33° S., or approximately within the isothermal lines of 6o° F.

The cotton plant requires certain conditions for its successful cultivation; but, given these, it is very little affected by seasonal vicissitudes. Thus, for example, in the United States the worst season rarely diminishes the crop by more than about a quarter or one-third; such a thing as a ” half-crop ” is unknown. Various climatic factors may cause temporary checks, but the growing and maturing period is sufficiently long to allow the plants to overcome these disturbances.

Cotton requires for its development from six to seven months of favourable weather. It thrives in a warm atmosphere, even in a very hot one, provided that it is moist and that the transpiration is not in excess of the supply of water. An idea of the require- ments of the plant will perhaps be afforded by summarizing the conditions which have been found to give the best results in the United States.

During April (when the seed is usually sown) and May frequent light showers, which keep the ground sufficiently moist to assist germination and the growth of the young plants, are desired. Three to four inches of rain per month is the average. The active growing period is from early June to about the middle of August. During June and the first fortnight in July plenty of

sunshine is necessary, accompanied by sufficient rain to promote healthy, but not excessive, growth; the normal rainfall in the cotton belt for this period is about 4§ in. per month. During the second portion of July and the first of August a slightly higher rainfall is beneficial, and even heavy rains do little harm, pro- vided the subsequent months are dry and warm. The first flowers usually appear in June, and the bolls ripen from early in August. Picking takes place normally during September and October, and during these months dry weather is essential. Flowering and fruiting go on continually, although in diminishing degree, until the advent of frost, which kills the flowers and young bolls and so puts an end to the production of cotton for the season.

In the tropics the essential requirements are very similar, but there the dry season checks production in much the same way as do the frosts in temperate climates. In either case an adequate but not excessive rainfall, increasing from the time of sowing to the period of active growth, and then decreasing as the bolls ripen, with a dry picking season, combined with surihy days and warm nights, provide the ideal conditions for successful cotton cultivation. In regions where climatic conditions are favourable, cotton grows more or less successfully on almost all kinds of soil; it can be grown on light sandy soils, loams, heavy clays and sandy ” bottom ” lands with varying success. Sandy uplands produce a short stalk which bears fairly well. Clay and ” bottom ” lands produce a large, leafy plant, yielding less lint in proportion. The most suitable soils are medium grades of loam. The soil should be able to maintain very uniform conditions of moisture. Sudden variations in the amount of water supplied are injurious: a sandy soil cannot retain water; on the other hand a clay soil often maintains too great a supply, and rank growth with excess of foliage ensues. The best soil for cotton is thus a deep, well- drained loam, able to afford a uniform supply of moisture during the growing period. Wind is another important factor, as cotton does not do well in localities subject to very high winds; and in exposed situations, otherwise favourable, wind belts have at times to be provided.

Cultivation in the United Stales. — The United States being the most important cotton-producing country, the methods of cultivation

practised there are first described, notes on methods adopted in other countries being added only when these differ considerably from American practice.

The culture of cotton must be a clean one. It is not necessarily deep culture, and during the growing season the cultivation is preferably very shallow. The result is a great destruction of the humus of the soil, and great leaching and washing, especially in the light loams of the hill country of the United States. The main object, therefore, of the American cotton-planter is to prevent erosion. Wherever the planters have failed to guard their fields by hillside ploughing and terracing, these have been extensively denuded of soil, rendering them barren, and devastating other fields lying at a lower level, which are covered by the wash. The hillsides have gradually to be terraced with the plough, upon almost an exact level. On the better farms this is done with a spirit-level or compass from time to time and hillside ditches put in at the proper places. In the moist bottom-lands along the rivers it is the custom to throw the soil up in high beds with the plough, and then to cultivate them deep. This is the more common method of drainage, but it is expensive, as it has to be renewed every few years. More intelligent planters drain their bottom-lands with underground or open drains. In the case of small plantations the difficulties of adjusting a right-of-way for outlet ditches have interfered seriously with this plan. Many planters question the wisdom of deepbreaking and subsoiling. There can be no question that a deep soil is better for the cotton- plant; but the expense of obtaining it, the risk of injuring the soil through leaching, and the danger of bringing poor soil to the surface, have led many planters to oppose this plan. Sandy soils are made thereby too dry and leachy, and it is a questionable proceeding to turn the heavy clays upon the top. Planters are, as a result, divided in opinion as to the wisdom of subsoiling. Nothing definite can be said with regard to a rotation of crops

upon the cotton plantation. Planters appreciate generally the value of broad-leaved and narrow-leaved plants and root crops, but there is an absence of exact knowledge, with the result that their practices are very varied. It is believed that the rotation must differ with every variety of soil, with the result that each planter has his own method, and little can be said in general. A more careful study of the physical as well as the chemical properties of a soil must precede intelligent experimentation in rotation. This knowledge is still lacking with

regard to most of the cotton soils. The only uniform practice is to let the fields ” rest ” when they have become exhausted. Nature then restores them very rapidly. The exhaustion of the soil under cotton culture is chiefly due to the loss of humus, and nature soon puts this back in the excellent climate of the cotton-growing belt. Fields considered utterly used up, and allowed to ” rest ” for years, when cultivated again have produced better crops than those which had been under a more or less thoughtful rotation. In spite of the clean culture, good crops of cotton have been grown on some soils in the south for more than forty successive years. The fibre takes almost nothing from the land, and where the seeds are restored to the soil in some form, even without other fertilizers, the exhaustion of the soil is very slow. If the burning- up of humus and the leaching of the soil could be prevented, there is no reason why a cotton soil should not produce good crops continuously for an indefinite time. Bedding up land previous to planting is almost universal. The bed forms a warm seed-bed in the cool weather of early spring, and holds the manure which is drilled in usually to better advantage. The plants are generally left 2 or 3 in. above the middle of the row, which in four-foot rows gives a slope of 1 in. to the foot, causing the plough to lean from the plants in cultivating, and thus to cut fewer roots. The plants are usually cut out with a hoe from 8 to 14 in. apart. It seems to make little difference exactly what distance they are, so long as they are not wider apart on average land than 1 ft. On rich bottom-land they should be more distant. The seed is dropped from a planter, five or six seeds in a single line, at regular intervals 10 to 1 2 in. apart. A narrow deep furrow is usually run immedi- ately in advance of the planter, to break up the soil under the seed. The only time the hoe is used is to thin out the cotton in the row; all the rest of the cultivation is by various forms of ploughs and so-called cultivators. The question of deep and shallow culture has been much discussed among planters without any conclusion applicable to all soils being reached. All grass and weeds must be kept down, and the crust must be broken after every rain, but these seem to be the only principles upon which all agree. The most effective tool against the weeds is a broad sharp ” sweep,” as it is called, which takes everything it meets, while going shallower than most ploughs. Harrows and cultivators are used where there are few weeds, and the mulching process is the one desired.

The date of cotton-planting varies from March 1 to June 1, according to situation. Planting begins early in March in Southern Texas, and the first blooms will appear there about May 15. Planting may be done as late as April 15 in the Piedmont region of North Carolina, and continue as late as the end of May. The first blooms will appear in this

region about July 1 5. Picking may begin on July 10 in Southern Texas, and continue late into the winter, or until the rare frost kills the plants. It may not begin until September 10 in Piedmont, North Carolina. It is a peculiarity of the cotton-plant to lose a great many of its blooms and bolls. When the weather is not favourable at the fruiting stage, the otherwise hardy cotton plant displays its great Weak- ness in this way. It sheds its ” forms ” (as the buds are called), blooms, and even half-grown bolls in great numbers. It has frequently been noted that even well-fertilized plants upon good soil will mature only 15 or 20% of the bolls produced. No means are known so far for preventing this great waste. Experts are at an entire loss to form a correct idea of the cause, or to apply any effective remedy.

Cotton-picking is at once the most difficult and most expensive operation in cotton production. It is paid for at the rate of from 45 to 50 cents per cwt. of seed cotton. The work is light, and

is effectually performed by women and even children, as well as men; but it is tedious and requires care. The picking season will average 100 days. It is difficult to get the hands to work until the cotton is fully opened, and it is hard to induce them to pick over 100 lb a day, though some expert hands are found in every cotton plantation who can pick twice as much. The loss resulting from careless work is very serious. The cotton falls out easily or is dropped. The careless gathering of dead leaves and twigs, and the soiling of the cotton by earth or by the natural colouring matter from the bolls, injure the quality. It has been commonly thought that the production of cotton in the south is limited by the amount that can be picked, but this limit is evidently very remote. The negro population of the towns and villages of the cotton country is usually available for a consider- able share in cotton-picking. There is in the cotton states a rural population of over 7,000,000, more or less occupied in cotton- growing, and capable, at the low average of 100 lb a day, of picking daily nearly 500,000 bales. It is evident, therefore, that if this number could work through the whole season of 100 days, they could pick three or four times as much cotton as the largest crop ever made. Great efforts have been made to devise cotton- picking machines, but, as yet, complete success has not been attained. Lowne’s machine is useful in specially wide-planted fields and when the ground is sufficiently hard.

Cotton Ginning. — The crop having been picked, it has to be prepared for purpose of manufacture. This comprises separating the fibre or lint from the seeds, the operation being known as ” ginning.” When this has been accomplished the weight of the crop is reduced to about one-third, each 100 lb of seed cotton as picked yielding after ginning some

33 lb of lint and 66 lb of cotton seed. The actual amounts differ with different varieties, condi- tions of cultivation, methods of ginning, &c. ; a recent estimate in the United States gives 35% of lint for Upland cotton and 25% for Sea Island cotton as more accurate.

The separation of lint from seed is accomplished in various ways. The most primitive is hand-picking, the fibre being laboriously pulled from off each seed, as still practised in parts of Africa. In modern commercial cotton production ginning machines are always used. Very simple machines are used in some parts of Africa. The simplest cotton gin in extensive use is the ” churka,” used from early times, and still largely employed in India and China. It consists essentially of two rollers either both of wood, or one of wood and one of iron, geared to revolve in contact in opposite directions; the seed cotton is fed to the rollers, the lint is drawn through, and the seed being unable to pass between the rollers is rejected. With this primitive machine, worked by hand, about 5 lb of lint is the daily output. In the Macarthy roller gin, the lint, drawn by a roller covered with leather (preferably walrus hide), is drawn between a metal plate called the ” doctor ” (fixed tangentially to the roller and very close to it) and a blade called the “beater” or knife, which rapidly moves up and down immediately behind, and parallel to, the fixed plate. The lint is held by the roughness of the roller, and the blade of the knife or beater readily detaches the seed from the lint; the seed falls through a grid, while the lint passes over the roller to the other side of the machine. A hand Macarthy roller gin worked by two men will clean about 4 to 6 lb of lint per hour. A similar, but larger machine, requiring about 1 5 horse-power to run it, will turn out 50 to 60 lb of Egyptian or 60 to 80 lb of Sea Island cleaned cotton per hour. By simple modifications the Macarthy gin can be used for all kinds of cotton. Various attempts have been made to substitute a comb for the knife or beater, and one of the latest productions is the ” Universal fibre gin,” in which a series of blunt combs working horizontally replace the solid beater and so-called knife of the Macarthy gin.

Opposed to the various types of roller gins is the ” saw gin,” invented by Eli Whitney, an American, in 1792. This machine, under various modifications, is employed for ginning the greater portion of the cotton grown in the Southern States of America. It consists essentially of a series of circular notched disks, the so-called saws, revolving between the interstices of an iron bed

upon which the cotton is placed: the teeth of the “saws”. catch the lint and pull it off from the seeds, then a revolving brush removes the detached lint from the saws, and creates sufficient draught to carry the lint out of the machine to some distance. Saw gins do considerable damage to the fibre, but for short-stapled cotton they are largely used, owing to their great capacity. The average yield of lint per ” saw ” in the United States, when working under perfect conditions, is about 6 lb per hour. Some of the American ginners are very large indeed, a number {Bulletin of the Bureau of the Census on Cotton Produc- tion) being reported as containing on the average 1156 saws with an average production of 4120 bales of cotton. Saw gins are not adapted to long-stapled cottons, such as Sea Island and Egyptian, which are generally ginned by machines of the Macarthy type.

The machine which will gin the largest quantity in the shortest time is naturally preferred, unless such injury is occasioned as materially to diminish the market value of the cotton. This has sometimes been to the extent of id. or 2d. per lb and even more as regards Sea Island and other long-stapled cottons. The produc- tion, therefore, of the most perfect and efficient cotton-cleaning machinery is of importance alike to the planter and manu- facturer.

Baling. — The cotton leaves the ginning machine in a very loose condition, and has to be compressed into bales for convenience of transport. Large baling presses are worked by hydraulic power; the operation needs no special description. Bales from different countries vary greatly in size, weight and appearance. The American bale has been described in a standard American book on cotton as ” the clumsiest, dirtiest, most expensive and most wasteful package, in which cotton or any other commodity of like value is anywhere put up.” Suggestions for its improve- ment, which if carried out would (it is estimated) result in a monetary saving of £1,000,000 annually, were made by the Lancashire Private Cotton Investigation Commission which visited the Southern States of America in 1906.

The approximate weights of some of the principal bales on the English market are as follows: —

United States 500 lb

Indian 400 ft

Egyptian 700 lb

Peruvian . . . . . 200 lb

Brazilian . . . . . 200 to 300 lb

With baling the work of the producer is concluded.

Cultivation in Egypt. — Climatic conditions in Egypt differ radically from those in the United States, the rainfall being so small as to be quite insufficient for the needs of the plant, very little rain indeed falling in the Nile Delta during the whole grow- ing season of the crop : yet Egypt is in order the third cotton- producing country of the world, elaborate irrigation works supplying the crop with the requisite water. The area devoted to cotton in Egypt is about 1,800,000 acres, and nine-tenths of it is in the Nile Delta. The delta soil is typically a heavy, black, alluvial clay, very fertile, but difficult to work; admixture of sand is beneficial, and the localities where this occurs yield the best cotton. Formerly in Egypt the cotton was treated as a perennial, but this practice has been generally abandoned, and fresh plants are raised from seed each year, as in America; one great advantage is that more than one crop can thus be obtained each year. The following rotation is frequently adopted. It should be noted that in Egypt the year is divided into three seasons — winter, summer and ” Nili.” The two first explain themselves; Nili is the season in which the Nile overflows its banks. .

First year Second year

Winter.

Summer.

Nili.

Clover

Beans or wheat

Cotton

Corn or fallow

For cotton cultivation the land is ploughed, carefully levelled, and then thrown up into ridges about 3 ft. apart. Channels formed at right angles to the cultivation ridges provide for the

access of water to the crop. The seeds,, previously soaked, are sown, usually in March, on the sides of the ridges, and the land watered. After the seedlings appear, thinning is completed in usually three

successive hoeings, the plants being watered after thinning, and subsequently at intervals of from twelve to fifteen days, until about the end of August when picking commences. The total amount of water given is approximately equivalent to a rainfall of about 35 in. The crop is picked, ginned and baled in the usual way, the Macarthy style action roller gins being almost exclusively employed.

Cotton Seed. — The history of no agricultural product contains more of interest and instruction for the student of economics than does that of cotton seed in the United States. The revolution in its treatment is a real romance of industry. Up till 1870 or thereabouts, cotton seed was regarded as a positive nuisance upon the American plantation. It was left to accumulate in vast heaps about ginhouses, to the annoyance of the farmer and the injury of his premises. Cotton seed in those days was the object of so much aversion that the planter burned it or threw it into running streams, as was most convenient. If the seed were allowed to lie about, it rotted, and hogs and other animals, eating it, often died. It was very difficult to burn, and when dumped into rivers and creeks was carried out by flood water to fill the edges of the flats with a decaying and offensive mass of vegetable matter. Although used in the early days to a limited extent as a food for milch cows and other stock, and to a larger extent as a manure, no systematic efforts were made anywhere in the South to manufacture the seed until the later ‘fifties, when the first cotton seed mills were established. It is said that there were only seven cotton oil mills in the South in i860. The cotton-growing industry was interrupted by the Civil War, and the seed-milling business did not begin again until 1868. After that time the number of mills rapidly increased. There were 25 in the South in 1870, 50 in 1880, 120 in 1890, and about 500 in 1901, about one-third being in Texas.

Experience shows that 1000 lb of seed are produced for every 500 lb of cotton brought to market. On the basis, therefore, of a cotton crop of 10,000,000 bales of 500 lb each, there are produced 5,000,000 tons of cotton seed. If about 3,000,000 tons only are pressed, there remain to be utilized on the farm 2,000,000 tons of cotton seed, which, if manufactured, would produce a total of $100,000,000 from cotton seed. In contrast with the farmers of the ‘sixties, the southern planter of the 20th century appreciates the value of his cotton seed, and farmers, too remote from the mills to get it pressed, now feed to their stock all the cotton seed they conveniently can, and use the residue either in compost or directly as manure. The average of a large number of analyses of Upland cotton seed gives the following figures for its fertilizing constituents: — Nitrogen, 3-07%; phosphoric acid, 1-02%; potash, 1-17%; besides small amounts of lime, magnesia and

other valuable but less important ingredients. Sea Island cotton seed is rather more valuable than Upland: the corresponding figures for the three principal constituents being nitrogen 3-51, phosphoric acid 169, potash 1 • 59 %. Using average prices paid for nitrogen, phosphoric acid and potash when bought in large quantities and in good forms, these ingredients, in a ton of cotton seed, amount to $9.00 worth of fertilizing material. Compared with the com- mercial fertilizer which the farmer has to buy, cotton seed possesses, therefore, a distinct value.

The products of cotton seed have become important elements in the national industry of the United States. The main product is the refined oil, which is used for a great number of purposes, such as a substitute for olive oil, mixed with beef products for preparation of compound lard, which is estimated to consume one-third of cotton seed oil produced in the States. The poorer grades are employed in the manufacture of soap, candles and phonograph records. Miners' lamp oil consists of the bleached oil mixed with kerosene. Cotton seed cake or meal (the residue after the oil is extracted) is one of the most valuable of feeding stuffs, as the following simple comparison between it and oats and corn will show: —

Average Analyses.

Proteins or Flesh Formers.

Carbo- hydrates or Fuel and Fat Suppliers.

Fats.

Ash or Bone Makers.

Cotton seed meal Corn …. Oats ….

43-26

10-5

17-0

22-31

70-0

65-0

13-45 5-5 8-0

7-02

1-02 1-2

Cotton seed meal, though poor in carbohydrates, the fat- and energy-supplying ingredients, is exceedingly rich in protein, the nerve- and muscle-feeding ingredients. But it still contains a large amount of oil, which forms animal fat and heat, and thus makes up for part of its deficiency in carbohydrates. The meal, in fact, is so rich in protein that it is best utilized as a food for animals when mixed with some coarse fodder, thus furnishing a more evenly-balanced ration. In comparative valuations of feeding stuffs it has been found that cotton seed meal exceeds corn meal by 62 %, wheat by 67 %, and raw cotton seed by 26 . Cotton seed meal, in the absence of sufficient stock to consume it, is also used extensively as a fertilizer, and for this purpose it is worth, determining the price on the same basis as used above for the seed, from $19 to $20 per ton. But it has seldom reached this price, except in some of the northern states, where it is used for feeding purposes. A more rational proceeding would be to feed the meal to animals and apply the resulting manure to the soil. When this is done, from 80 to 90 of the fertilizing material of the meal is recovered in the manure, only 10 to 20 % being converted by the animal into meat and milk. The profit derived from the 20 % thus removed is a very large one. These facts indicate that we have here an agricultural product the market price of which is still far below its value as compared, on the basis of its chemical composition, either with other feeding stuffs or with other fertilizers. Though it is probably destined to be used even more extensively as a fertilizer before the demand for it as a feeding stuff becomes equal to the supply, practically all the cotton seed meal of the south will ultimately be used for feeding. One explanation of this condition of things is that there is still a large surplus of cotton seed which cannot be manufactured by the mills. Another reason is found in the absence of cattle in the south to eat it.

With the consideration of cotton seed oil and meal we have not, however, exhausted its possibilities. Cotton seed hulls constitute about half the weight of the ginned seed. After the seed of Upland cotton has been passed through a fine gin, which takes off the short lint or linters left upon it by the farmer, it is passed through what is called a sheller, consisting of a revolving cylinder, armed with numerous knives,

which cut the seed in two and force the kernels or meats from the shells. The shells and kernels are then separated in a winnowing machine. This removal of the shell makes a great difference in the oilcake, as the decorticated cake is more nutritious than the undecorticated. For a long time these shells or hulls, as they are called, were burned at oil mills for fuel, 25 tons being held equal to a cord of wood, and 4J tons to a ton of coal. The hulls thus burned produced an ash containing an average of 9% of phosphoric acid and 24 % of potash — a very valuable fertilizer in itself, and one eagerly sought by growers of tobacco and vegetables. It was not long, however, before the stock-feeder in the South found that cotton seed hulls were an excellent substitute for hay. They are used on a very large scale in the vicinity of oil mills in southern cities like Memphis, New Orleans, Houston, and Little Rock, from 500 to 5000 cattle being often collected in a single yard for this purpose. No other feed is required, the only provision necessary being an adequate supply of water and an occasional allowance of salt. Many thousands of cattle are fattened annually in this way at remarkably low cost.

Careful attention is now given to the employment of the seed in new cotton countries, and oil expression is practised in the West Indies. Hull is the principal seat of the industry in Great Britain, and enormous quantities of Indian and Egyptian cotton seed are imported and worked up.

The following diagram, modified from one by Grimsbaw. in

accordance with the results obtained by the better class of modern mills, gives an interesting risumS of the products obtained from a ton of cotton seed: —

Products from a Ton of Cotton Seed.

Cotton seed, 2000 pounds.

Meats, 1090 pounds.

Cake, 800 pounds.

I Meal.

(Feeding stuff. Fertilizer.)

Linters, 23 pounds.

Hulls, 888 pounds.

Fibre.

I

Crude oil, 290 pounds. (High-grade paper.)

Summer Yellow.

Soap stock.

(Winter yellow

Cotton seed stearin.)

i Soaps.

Salad oil.

Summer white.

Lard.

Cottol

;ne (with beef stearin, cooking oil).

Miners' oil.

Soap.

(Fuel.)

Bran.

(Cattle food.)

Ashei

Fertilizer.

(Cattle food) with the meal.

These together,

a very valuable

manure.

. Pests and Diseases of the Cotton Plant.

Insect Pests. — It is common knowledge that when any plant is cultivated on a large scale various diseases and pests frequently appear. In some cases the pest was already present but of minor importance. As the supply of its favourite food plant is increased, conditions of life for the pest are improved, and it accordingly multiplies also, possibly becoming a serious hindrance to success- ful cultivation. At other times the pest is introduced, and under congenial conditions (and possibly in the absence of some other organism which keeps it in check in its native country) increases accordingly. Some idea of the enormous damage wrought by the collective attacks of individually small and weak animals may be gathered from the fact that a conservative estimate places the loss due to insect attacks on cotton in the United States at the astoundingfigure.of $6o,ooo,ooo(£i2,ooo,ooo) annually. Of this total no less than $40,000,000 (£8,000,000) is credited to a small beetle, the cotton boll weevil, and to two caterpillars. The best means of combating these attacks depends on a knowledge of the life-histories and habits of the pests. The following notes deal only with the practical side of the question, and as the United States produce some seven-tenths of the world's cotton crop attention is especially directed to the principal cotton pests of that country. Those of other regions are only referred to when sufficiently important to demand separate notice.

The cotton boll weevil (A nthonomus grandis), a small grey weevil often called the Mexican boll weevil, is the most serious pest of cotton in the United States, where the damage done by it in 1907 was estimated at about £5,000,000. It steadily increased in destructiveness during the preceding eight years. Attention was drawn to it in 1862, when it caused the abandonment of cotton cultivation about Monclova in Mexico. About 1893 it appeared in Texas, and then rapidly spread. It is easily transported from place to place in seed-cotton, and for this reason the Egyptian government in 1904 prohibited the importation of American cotton seed. Not only is the pest carried from place to place, but it also migrates, and in 1907 it crossed from Louisiana, where it first appeared in 1905, to Mississippi. That the insect is likely to prove adaptable is perhaps indicated by the fact that in 1906 it made a northward advance of about 60 m. in a season with no obvious special features favouring the pest. Its eastern progress was also rapid. " The additional territory infested during 1904 aggregates about 15,000,000 sq. m., representing approximately an area devoted to the culture of cotton of 900,000 acres" {Year-book, U.S. Dept. Agriculture, 1904). In 1906 the additional area invaded amounted to 1,500,000 acres (Ibid., 1906).

The adult weevils puncture the young flower-buds and deposit eggs; and as the grubs from the eggs develop, the bud drops. They also lay eggs later in the year in the young bolls. These do not drop, but as the grubs develop the cotton is ruined and the bolls usually become discoloured and crack, their contents being rendered useless.

No certain remedy is known for the destruction on a com- mercial scale of the boll weevil, but every effort has been made in the United States to check the advance of the insect, to ascertain and encourage its natural enemies, and to propagate races of cotton which resist its attacks. Special interest attaches to the investigations made by Mr O. F. Cook, of the U.S. Dept. of Agriculture, in Guatemala. The Indians in part of Guatemala raise cotton, although the boll weevil is abundant. Examination showed that although the weevil attacked the young buds these did not drop off, but that a special growth of tissue inside the bud frequently killed the grub. Also, inside the young bolls which had been pierced a similar poliferation or growth of the tissue was set up, which enveloped and killed the pest. Probably by unconscious selection of surviving plants through long ages this type has been evolved in Guatemala, and experiments have been made to develop weevil-resistant races in the United States. Mr Cook also found that the boll weevil was attacked, killed and eaten by an ant-like creature, the ” kelep.” Attempts have been made to introduce this into the infested area in Texas; but owing to the winter proving fatal to the ” kelep ” its usefulness may be restricted to tropical and subtropical regions.

The cotton boll worm (Chloridea obsoleta, also known as Heliothis armiger) is a caterpillar. The parent moth lays eggs, from which theyoung”worms”hatch out. Theyboreholesandpenetrateinto flower-buds and young bolls, causing them to drop. Fortunately the ” worms ” prefer maize to cotton, and the inter-planting at proper times of maize, to be cut down and destroyed when well infested, is a method commonly employed to keep down this pest. Paris green kills it in its young stages before it has entered the buds or bolls. The boll worm is most destructive in the south-western states, where the damage done is said to vary from 2 to 60 % of the crop. Taking a low average of 4%, the annual loss due to the pest is estimated at about £2,500,000, and it occupies second place amongst the serious cotton pests of the U.S.A. The boll worm is widely spread through the tropical and temperate zones. It may occur in a country without being a pest to

cotton, e.g. in India it attacks various plants but not cotton. It has not yet been reported as a cotton pest in the West Indies.

The Egyptian boll worm (Earias insulana) is the most important insect pest in Egypt and occurs also in other parts of Africa. Indian boll worms include the same species, and the closely related Earias fabia, which also occurs in Egypt.

The cotton worm ,(Aletia argillacea) — also called cotton caterpillar, cotton army worm, cotton-leaf worm — is also one stage in the life-history of a moth. It is a voracious creature, and unchecked will often totally destroy a crop. In former years the annual damage done by it in the United States was assessed at £4,000,000 to £6,000,000. Dusting with Paris green is, however, an efficient remedy if promptly applied at the outset of the attack. The annual damage was in 1906 reduced to £1,000,000 to £2,000,000, and this on a larger area devoted to cotton than in the case of the estimate given above. It is the most serious pest of cotton in the West Indies. The Egyptian cotton worm is Prodenia littoralis.

The caterpillars (" cut worms ") of various species of Agrotis and other moths occur in all parts of the world and attack young cotton. They can be killed by spreading about cabbage leaves, &c, poisoned with Paris green.

Locusts, green-fly, leaf-bugs, blister mites, and various other pests also damage cotton, in a similar way to that in which they injure other crops.

The" cotton stainers," various species of Dysderctts, are widely distributed, occurring for example in America, the West Indies, Africa, India, &c. The larvae suck the sap from the young bolls and seeds, causing shrivelling and reduction in quantity of fibre. They are called " stainers " because their excrement is yellow

and stains the fibre; also if crushed during the process oi ginning they give the cotton a reddish coloration. The Egyptian cotton seed bug or cotton stainer belongs to another genus, being Oxycarenus hyalinipennis. Other species of this genus occur on the west coast of Africa. They do considerable damage to cotton seed.

Fungoid Diseases. — " Wilt disease," or " frenching," perhaps the most important of the fungoid disease of cotton in the United States, is due to Neocosmospora vasinfecta. Young plants a few inches high are usually attacked; the leaves, beginning with the lower ones, turn

yellow, and afterwards become brown and drop. The plants remain very dwarf and generally unhealthy, or die. The roots also are affected, and instead of growing considerably in length, branch repeatedly and give rise to little tufts of rootlets. There is no method known of curing this disease, and all that can be done is to take every precaution to eradicate it, by pulling up and burning diseased plants, isolating the infected area by means of trenches, and avoiding growing cotton, or an allied plant such as the ochro (Hibiscus esculentus) , in the field. Fortunately the careful work of the U.S. Department of Agriculture and of planters such as Mr E. L. Rivers of James Island, South Carolina, has resulted in the production of disease-resistant races. In one instance Mr Rivers found one healthy plant in a badly affected field. The seed was saved and gave rise to a row of plants all of which grew healthily in an infected field, whereas 95% of ordinary Sea Island cotton plants from seed from a non-infected field planted alongside as a control were killed. The resistance was well maintained in succeeding generations, and races so raised form a practical means of combating this serious disease.

In ” Root rot,” as the name implies, the roots are attacked, the fungus being a species of Ozonium, which envelops the roots in a white covering of mould or mycelium. The roots are prevented from fulfilling their function of taking up water and salts from the soil; the leaves accordingly droop, and the whole plant wilts and in bad attacks dies. It has yearly proved a more serious danger in Texas and other parts of the south-west of the United States, and the damage due to it in Texas during 1905 was estimated at about £750,000. No remedy is known for the disease, and cotton should not be planted on infected land for at least three or four years.

” Boll rot,” or ” Anthracnose,” is a disease which may at times be sufficiently serious to destroy from 10 to 50% of the crop. The fungus which causes it (Colletotrichum gossypii) is closely related to one of the fungi attacking sugar-cane in various parts of the world. Small red-brown spots appear on the bolls, gradually enlarge, and develop into irregular black and grey patches. The damage may be only slight, or the entire boll may ripen prematurely and become dry and dead.

Many other diseases occur, but the above are sufficient to indicate some of the principal ones in the most important cotton countries of the world.

Improvement of Cotton by Seed Selection. In the cotton belt of the United States it would be possible to put a still greater acreage under this crop, but the tendency is rather towards what is known as ”

diversified ” or mixed farming than to making cotton the sole important crop. Cotton, however, is in increasing demand, and the problem for the American cotton planter is to obtain a better yield of cotton from the same area, — by ” better yield ” meaning an increase not only in quantity but also in quality of lint. This ideal is before the cotton grower in all parts of the world, but practical steps are not always taken to realize it. Some of the United States planters are alert to take advantage of the application of science to industry, and in many cases even to render active assistance, and very successful results have been attained by the co-operation of the United States Department of Agriculture and planters. With the improvement of cotton the name of Mr Herbert J. Webber is prominently associated, and a full discussion of methods and results will be found in his various papers in the Year-books of the U.S. Department of Agriculture. The principle on which the work is based is that plants have their individualities

and tend to transmit them to their progeny. Accordingly a selection of particular plants to breed from, because they possess certain desirable characteristics, is as rational as the selection of particular animals for breeding purposes in order to maintain the character of a herd of cattle or of a flock of sheep.

Inspection of a field of cotton shows that different plants vary as regards productiveness, length, and character of the lint, period of ripening, power of resistance to various pests and of withstanding drought. A simple method of increasing the yield is that practised with success by some growers in the States. Pickers are trained to recognize the best plants, ” that is, those most productive, earliest in ripening, and having the largest, best formed and most numerous bolls.” These pickers go carefully over the field, usually just before the second picking, and gather ripe cotton from the best plants only; this selected seed cotton is ginned separately, and the seed used for sowing the next year’s crop.

A more elaborate method of selection is practised by some of the Sea Island cotton planters in the Sea Islands, famous for the quality of their cotton. A field is gone over carefully, and perhaps some 50 of the best plants selected; a second examination in the field reduces these perhaps to one half, and each plant is numbered. The cotton from each is collected and kept separately, and at the end of the season

carefully examined and weighed, and a final selection is then made which reduces the number to perhaps five ; the cotton from each of these plants is ginned separately and the seed preserved for sowing. The simplest possible case in which only one plant is finally selected is illustrated in the diagram.

1st. Year 2nd. Year 3rd. Year 4th. Year 5th. Year

Select Plant

©,

500

Plants

5 Acres w*->

General Crop

-*t 5 °° ˆ Plants

5 Acres

General Crop

Select Plant Tij xw i p ˆ a »m~* 5 Acres

PJˆntsj ˆ- sAcrM »«(»)*■• » Plants

Select PUnt

After Webber, Year-took, V. S. Dept. o} Agriculture, 1902.

Improvement of Cotton by Seed Selection. From the seeds of the selected plant of the ist year about 500 plants can be raised in the next year. One plant is selected again from these 500, and the general crop of seed is used to sow about five acres for the 3rd year, from which seed is obtained for the general crop in the 4th year. One special plant is selected each year from the 500 raised from the previous season's test plant, and in four years' time the progeny of this plant constitutes the " general crop." The practice may be modified according to the size of estate by selecting more than one plant each year, but the principle remains unaltered. This method is in actual use by growers of Sea Island cotton in America and in the islands off the coast of S. Carolina; the greatest care is taken to enhance the quality of the lint, which has been gradually improved in length, fineness and

silkiness. Mr Webber, in summing up, says, ” When Sea Island cotton was first introduced into the United States from the West Indies, it was a perennial plant, unsuited to the duration of the season of the latitude of the Sea Islands of S. Carolina; but, through the selection of seed from early maturing individual plants, the cotton has been rendered much earlier, until now it is thoroughly adapted to the existing conditions. The fibre has increased in length from about if to 2\ in., and the plants have at the same time been increased in productiveness. The custom of carefully selecting the seed has grown with the industry and may be said to be inseparable from it. It is only by such careful and con-

tinuous selection that the staple of these high-bred strains can be kept up to its present superiority, and if for any reason the selection is interrupted there is a general and rapid decline in quality.”

When selection is being made for several characters at the same time, and also in hybridization experiments, where it is important to have full records of the characters of individual plants and their progeny, ” score cards,” such as are used in judging stock, with a scale of points, are used.

The improvements desired in cotton vary to some degree in different countries, according to the present character of the plants, climatic conditions, the chief pests, special market requirements, and other circumstances. Amongst the more important desiderata are: —

1. Increased Yield.

2. Increase in Length of Lint. — Webber records the case of Stamm Egyptian cotton imported into Columbia, in which by simple selection, as outlined above, during two years plants were obtained uniformly earlier, more productive, and yielding longer and better lint.

3. Uniformity in Length of the Lint. — This is important especi- ally in the long-stapled cottons, unevenness leading to waste in manufacture, and consequently to a lower price for the cotton.

4. Strength of Fibre. — Long-stapled cottons have been pro- duced in the States by crossing Upland and Sea Island cotton. These hybrids produce a lint which is long and silky, but often deficient in strength: selection for strength amongst the hybrids, with due regard to length, may overcome this.

5. Season of Maturing. — Seed should be selected from early and late opening bolls, according to requirements. Earliness is especially

important in countries where the season is short.

6. Adaptation to Soil and Climate. — High-class cottons often do not flourish if introduced into a new country. They are adapted to special conditions which are lacking in their new surroundings, but a few will probably do fairly well the first year, and the seeds from these probably rather better the next, and so on, so that in a few years' time a strain may be available which is equal or even superior to the original one introduced.

7. Resistance to Disease.— The method employed is to select, for seed purposes, plants which are resistant to the particular disease. Thus sometimes a field of cotton is attacked by some disease, perhaps " wilt," and a comparatively few plants are but very slightly affected. These are propagated, and there are instances as described above of very successful and commercially important results having been attained. Special interest attaches to experiments made in the United States to endeavour to raise races of cotton resistant to the boll weevil.

8. Resistance to Weather. — Strong winds and heavy rains do much damage to cotton by blowing or beating the lint out of the bolls. In some instances a slight difference in the shape, mode of opening, &c, of the boll prevents this, and accordingly seed is selected from bolls which suffer least under the particular adverse conditions.

Attention has been paid in the West Indies to seed selection, by the officers of the imperial Department of Agriculture, with the object of retaining for West Indian Sea Island cotton its place as the most valuable cotton on the British market.

In India, where conditions are much more diversified and it is more difficult to induce the native cultivator to adopt new methods, attention has also been directed during recent years to the improvement of the existing races. Efforts have been made in the same direction in Egypt, West Africa, &c.

The World's Commercial Cotton Crop. It is impossible to give an exact return of the total amount of cotton produced in the world, owing to the fact that in China, India and other eastern countries, in Mexico, Brazil, parts of the Russian empire, tropical Africa, &c, considerable — in some cases very large — quantities of cotton are made up locally into wearing apparel, &c, and escape all statistical record. It is estimated that the amount thus used in India exclusive of the consumption of mills is equivalent to about4oo,ooobales. Neglecting, however,

these quantifies, which do not affect the world's market, the annual supplies of cotton are approximately as follows : —

Country.

Approximate

Production.

Bales of 500 lb.

Percentage.

United States of America

Egypt . ._ .

All other countries ….

Total

11,000,000 3,000,000 1,000,000 1,000,000

68-75

18-75 6-25 6-25

16,000,000

100-00

In 1905 the world's crop closely approximated to 16,000,000 bales, whilst in 1904 it was nearly 19,000,000 bales and in 1906 nearly 20,000,000 bales. The United States produced very nearly seven-tenths of the total " visible " cotton crops of the world. This, however, is quite a modern development, comparatively speaking. " During the period from 1786 to 1790 the West Indies furnished about 70% of the British supply, the Mediter- ranean countries 20%, and Brazil 8%; whilst the quantity contributed by the United States and India was less than 1 % and Egypt contributed none. In 1906 the United States contributed 65% of the commercial cotton, British India 19%, Egypt 7%, and Russia 3 %. Of the countries which were prominent in the production of cotton in 1790, Brazil and Asiatic Turkey alone remain "

(U.S.A. Bureau of the Census, Bulletin No. 76). The actual figures for the chief countries for 1904-1906, taken from the same source, are as follows : —

The World's Commercial Cotton Crop. (In 500 lb Bales.)

Country.	1904.	1905.	1906.
United States .	13,085,000	2,843,000	1,258,000
British India .	554.000	468,000	210,000
Peru	114,000	40,000	100,000
Other countries	45,000	16,000	70,000
Total . .	10,340,000		

2,519,000

1,181,000

585,000

415,000

258,000

125,000

55,ooo

107,000

47,000

15,000

100,000

13,016,000

3,708,000

1 ,400,000

675,000

418,000

275,000

130,000

55.000

107,000

47,00a

1 1 ,000

100,000

18,803,000

15,747,000

19,942,000

This title serves to indicate the principal countries contributing to the world's supply of cotton. The following notes afford a summary of the position of the industry in the more important countries.

United States of America. — The cultivation of cotton as a staple crop in the United States dates from about 1770, 1 although efforts appear to have been made in Virginia as far back as 1621. The supplies continued to be small up to the end of the century. In 1792 the quantity exported from the United States was only

1 It is related that in the year 1784 William Rathbone, an Ameri- can merchant resident in Liver- pool, received from one of his correspondents in the southern states a consignment of eight bags of cotton, which on its arrival in Liverpool was seized by the custom-house officers, on the allegation that it could not have been grown in the United States, and that it was liable to seizure under the Shipping Acts, as not being imported in a vessel belonging to the country of its growth. When afterwards re- leased, it lay for many months unsold, in consequence of the spin- ners doubting whether it could be profitably worked up.

equivalent to 275 bales, but by the year 1800 it had increased to nearly 36,000 bales. At the close of the war in 1815 the revival of trade led to an increased demand, and the progress of cotton cultivation in America became rapid and continuous, until at length about 85 % of the raw material used by English manufacturers was derived from this one source. With a capacity for the production of cotton almost boundless, the crop which was so insignificant when the century began had in i860 reached the enormous extent of 4,824,000 bales. This great source of supply, when apparently most abundant and secure, was shortly after suddenly cut off, and thousands were for a time deprived of employment and the means of subsistence. In this period of destitution the cotton-growing resources of every part of the globe. were tested to the utmost; and in the exhibition of 1862 the representatives of every country from which supplies might be expected met to concert measures for obtaining all that was wanted without the aid of America. The colonies and dependencies of Great Britain, including India, seemed well able to grow all the cotton that could be required, whilst numerous other countries were ready to afford their co-operation. A powerful stimulus was thus given to the growth of cotton in all directions; a degree of activity and enterprise

never witnessed before was seen in India, Egypt, Turkey, Greece, Italy, Africa, the West Indies, Queensland, New South Wales, Peru, Brazil, and in short wherever cotton could be produced; and there seemed no room to doubt that in a short time there would be abundant supplies independently of America. But ten years afterwards, in the exhibition of 1872, which was specially devoted to cotton, a few only of the thirty-five countries which had sent their samples in 1862 again appeared, and these for the most part only to bear witness to disappointment and failure. America had re-entered the field of competition, and was rapidly gaining ground so as to be able to bid defiance to the world. True, the supply from India had been more than doubled, the adulteration once so rife had been checked, and the improved quality and value of the cotton had been fully acknowledged, but still the superiority of the produce of the United States was proved beyond all dispute, and American cotton Was again king. Slave labour disappeared, and under new and more promising auspices a fresh career of progress began. With rare combination of facilities and advantages, made available with remarkable skill and enterprise, the production of cotton in America seems likely for a long series of years to continue to increase in magnitude and importance. The total area of the cotton-producing region in the States is estimated at 448,000,000 acres, of which in 1906 only about one acre in fifteen was devoted to cotton. The potentialities of the region are thus enormous.

Cotton is now the second crop of the United States, being surpassed in value only by Indian corn (maize). The area devoted to this crop in 1879 was 14,480,619 acres, and the-total

Upland Cotton.

Sea Island Cotton.

Total Value.

Quantity.

Value.

Quantity.

Value.

Alabama

Arkansas

Florida

Georgia

Indian Territory

Kansas

Kentucky

Louisiana

Mississippi .

Missouri

New Mexico

North Carolina

Oklahoma

South Carolina

Tennessee

Texas

Virginia

lb

603,651,989

45o,99i.36i

17,876,133 750,762,910 196,648,765

9,844

1,008,290

473,222,310

732,755,978

26,040,093

74,340

276,215,506

233,396,905

415,386,362

146,569,434

2,001,181,289

6,609,963

$ 60,425,564 45,144,235 1,789,401

75,151,367, 19,684,542

985 100,930

47,369,553

73,348,874

2,606,613

7,442

27,649,172

23.363,030

41,580,175

14,671,600

200,318,247

661,657

lb

9,031,896 9,950,634

2,723,859

$

2,587,638 2,850,857

999,656

$ 60,425,564 45,144,235

4.377.039 78,002,224 19,684,542

985 100,930

47.369,553

73,348,874

2,606,613

7,442 27,649,172 23,363.030

42.579.831

14,671,600

200,318,247

661,657

Total— United Si

ates

6,332,401,472 (= 12,644,803

bales)

633,873,387

21,706,389

(= 43.413

bales)

6,438,151

640,311,538

COTTON

commercial crop was 5,755,359 bales. In 1899 the acreage had increased to 24,275,101 and the crop to 9,507,786 bales. In 1906 the total area was 28,686,000 acres and the crop 13,305,265 bales.

The preceding table gives the quantity, value and character of the crop for each of the cotton-growing states in 1906, as reported by the Bureau of the Census.

Mexico. — Cotton is extensively grown in Mexico, and large quantities are used for home consumption. The cultivation is of very old standing. Cortes in 1519 is said to have received cotton garments as presents from the natives of Yucatan, and to have found the Mexicans using cotton extensively for clothing. From 1900 to 1905 the crop was about 100,000 bales per annum; the whole is consumed in local mills, and cotton is imported also from the United States.

Brazil. — The cotton-growing region in Brazil comprises a belt some 200 m. in width, in the north-eastern portion of the country, and a strip along the valley of the San Francisco, where a large amount of the present crop is produced. The cotton is known in commerce under the name of the place of export, e.g. Maceio, Pernambuco or Pernam, Ceara, Rio Grande, &c. The export fluctuates greatly.

	Bales of 500 lb.	Approx. Value.
1901 . . .	53,002	£500,000
1902 . . .	143,963	1,200,000
1903 . . .	126,896	1,300,000
1904 . . .	59,413	800,000
1905 . . .	107,887	1,000,000
1906 . . .	142,972	1,500,000

The total production in 1906 was estimated at about 275,000 bales, but only a portion was available for export, there being an increasing consumption in Brazil itself.

Peru. — Cotton is an important crop in Peru, where it has long been cultivated. Most of the crop is grown in the irrigated coastal valleys. With more water available, the output could be considerably

increased, e.g. in the Piura district. ” Rough Peruvian,” the produce of one of the tree cottons, has a special use, as being rather harsh and wiry it is well adapted for mixing with wool. Egyptian cotton is also grown. The annual export is about 30,000 bales.

British West Indies. — Cotton was cultivated as a minor crop in parts of the West Indies as long ago as the 1 7th century, and at the opening of the 18th century the islands supplied about 70 % of all the cotton used in Great Britain. Greater profits obtained from sugar caused the industry to be abandoned, except in the small island of Carriacou. In 1900 the Imperial Department’ of Agriculture and private planters began experiments with the* object of reintroducing the cultivation, owing to the decline in value of sugar. The department was actively assisted by the

Cotton Production in the British West Indies: 1905-1906. 1

Island.

Area in Acres.

Yield =

Bales of

500 lb.

Average

Price

in Pence

per lb.

Value of

Lint and

Seed.

Barbados …. St Vincent …. Grenada (mostly Marie

galante cotton) . St Kitts ….

Anguilla …. Antigua …. Montserrat. Virgin Islands . Jamaica ….

Total . .

2,000 790

3,690

1,000

1 ,700

1,000

700

770

40

1,500

959 330

623 241 240 161 200 196

14 123

15-2 18-0

5-0 15-0 130 15-0 14-2 15-0

£33,557

13.557

8,400 8,380

8,364 5,280 6,522 6,789 400 4.025

12,900

3087

£95.274

British Cotton Growing Association, and the results have been very successful, as was shown at an exhibition held in Manchester in 1908. A supply of seed of a high grade of Sea Island cotton was obtained from Colonel Rivers's estate in the Sea Islands, S. Carolina, and so

successful has the cultivation been that from some of the islands West Indian Sea Island cotton obtains a

v Taken with some modifications from the Agricultural News (1007), vi. p. 38.

higher price than the corresponding grade of cotton from the Sea Islands themselves.

In 1902 the total area under cotton cultivation in the British West Indies was 500 acres. The industry made rapid progress. In 1903 it was 4000; in 1905-1906 it was 12,900; and for 1906- 1907 it was 18,166 acres. The table indicates the chief cotton- producing islands, the acreage in each, yield, average value per pound and total value of the crop in 1905-1906.

The whole of this crop was Sea Island cotton, with the excep- tion of the ” Marie galante ” grown in Carriacou. Marie galante is a harsh cotton of the Peruvian or Brazilian type. The low yield per acre in this island, and also the low value of the lint per lb compared with the Sea Island cotton, is clearly apparent.

In 1906-1907 the acreage was substantially increased in many of the islands, e.g. Barbados from 2000 to 5000; St Vincent 700 t0 !533> St Kitts and Anguilla 1000 to 1500 each; Antigua 700 to 1883. In Jamaica, on the other hand, it was reduced from 1500 to 300 acres.

Spain. — Cotton was formerly grown in southern Spain on an extensive scale, and as recently as during the American Civil War a crop of 8000 to 10,000 bales was obtained. It is con- sidered that with facilities for irrigation Andalusia could produce 150,000 bales annually. The former industry was abandoned as other crops became more remunerative. The government is encouraging recent efforts to re-establish the cultivation.

Malta. — Cotton has long been cultivated in Malta, but the acreage diminished from 1750 acres in 1899 to 670 acres in 1906. A considerable quantity of the produce is spun and woven locally; e.g. in 1904 the export was equivalent to about 1 20 bales out of a total production of 330 bales, and in 1905 to 258 out of 333 bales (of 500 lb each).

Cyprus has a soil and climate suited to cotton, which was formerly grown here on a large scale. The rainfall is uncertain and low, however, never exceeding 40 in., and on the supply of water by irrigation the future of the industry mainly depends. The exports

dwindled from 3600 bales in 1865 to 946 in 1905; great fluctuations occur, the export in 1904, for example, being only 338 bales. The cotton grown is rather short-stapled and goes mainly to Marseilles and Trieste. Some is used locally in the manufacture of cloth.

Egypt. — The position of Egypt as the third cotton-producing country of the world has already been pointed out, and the varieties grown and the mode of cultivation described. The introduction of the exotic varieties dates from the beginning of the 19th century. The industry was actively promoted by a Frenchman named Jumel, in the service of Mehemet Ali, from 1820 onwards with great success. The area under cotton is about 1,800,000 acres.

1850 1865 1890 1904 1905 1906

Cotton Production in Egypt.

87,200 bales of 500 lb. . 439,000 „ . 798,000 „

. 1,258,000 ,, . 1,250,000 ,, ,,

. 1,400,000 „ ,,

The Egyptian Sudan. — Egyptian cotton was cultivated in the Sudan to the extent of 21,788 acres in 1906 chiefly on non- irrigated land. The exports, however, are small, almost all the crop being used locally. The chief difficulties are the supply of water, labour and transport facilities. Lord Cromer in his report on the Sudan for 1906 remarks that: ” There seems to be some reason for thinking that the future— or at all events the immediate future — of Sudan agriculture lies more in the direction of cultivat- ing wheat and other cereals than in that of cultivating cotton.” •

West Africa. — Cotton has long been grown in the various countries on the west coast of Africa, ginned by hand or by very primitive means, spun into yarn, and woven on simple looms into ” country cloths “; these are often only a few inches wide, so that any large cloths have to be made by sewing the narrow strips together. These native cloths are exceedingly durable, and many of them are ornamented by using dyed yarns and in other ways.

Southern Nigeria (Lagos) and northern Nigeria are the most important

cotton countries amongst the British possessions on the coast. From the former there has been an export trade for many years which fluctuates remarkably according to the demand. Northern Nigeria is the seat of a very large native cotton industry, to supply the demand for cotton robes for the Mahommedan races inhabiting the country. The province of Zaria alone is estimated to produce annually 30,000 to 40,000 bales, all of which is used locally. Northern Nigeria contributes to the cotton exported from Lagos. The country offers a fairly promis- ing field for development, especially now that arrangements have been made for providing the necessary means of transport by the construction of the new railways. The profits obtained from ground-nuts (Arachis hypogea) in Gambia, gold mining in the Gold Coast, and from products of the oil palm {Elaeis guineensis) in the palm-oil belt serve to prevent much attention being given to cotton in these districts.

Exports of Cotton from Lagos. 1865 …. 868 bales of 500 lb.

1869 1900 1901 1902

1903 1904

1905

1785 48

15

25

582

1725

2578

Exports of Cotton from British West Africa, 1904, 1905 and 1906.

1904.

1905-

1906.

Gold Coast . . . Southern Nigeria and Lagos Northern Nigeria ….

Total .

Bales

(500 lb).

120

56

115

2296

574

Bales (500 lb).

5

139

50

2771

250 1

Bales

(500 lb).

176

186

5392 712

3161

3215

6466

Nyasaland (British Central Africa). — The cultivation of cotton on a commercial scale is quite new in Nyasaland, and although general conditions of soil and climate appear favourable the question of transport is serious and labour is not abundant. The exports were equivalent to 2 bales of 500 lb in 1 902-1 903, 114 bales in 1903-1904, 570 bales in 1904-1905, 1553 bales in 1 905-1 906 and

1052 bales in 1 906-1 907. In the lower river lands Egyptian cotton has been the most successful, whilst Upland cotton is more suited to the highlands. t _ . – ‘ ‘

British East Africa and Uganda. — In these adjoining pro- tectorates wild cottons occur, and suitable conditions exist in certain localities. Experimental work has been carried on, and in 1904 Uganda exported about 43 bales of cotton, and British East Africa about 177 bales. In 1906 the combined exports had risen to 362 bales, including a little from German East Africa. In 1004-1905 there were some 300 acres under cotton in British East Africa. Lack of direct transport facilities is a difficulty. Some of the native cottons are of fair quality, but Egyptian cotton appears likely to be best suited for growing for export.

India is probably the most ancient cotton-growing country. For five centuries before the Christian era cotton was largely used in the domestic manufactures of India; and the clothing of the inhabitants then consisted, as now, chiefly of garments made from this vegetable product. More than two thousand years before Europe or England had conceived the idea of applying modern industry to the manufacture of cotton, India had matured a system of hand-spinning, weaving and dyeing which during that vast period received no recorded improvement. The people, though remarkable for their intelligence whilst Europe was in a state of barbarism, made no approximation to the mechanical operations of modern times, nor was the cultivation of cotton either improved or considerably extended. Possessing soil, climate and apparently all the requisite elements from nature for the production of cotton to an almost boundless extent, and of a 1 Approximately.

useful and acceptable quality, India for a long series of years did but little towards supplying the manufactures of other countries with the raw material which they required. Between the years 1788 and 1850 numerous attempts were made by the East India Company to improve the cultivation and to increase the supply of cotton in India, and botanists and American planters were engaged for the purpose. One great object of their experiments was to introduce and acclimatize exotic cottons. Bourbon, New Orleans, Upland, Georgia, Sea Island, Pernambuco, Egyptian, &c, were tried but with little permanent success. The results of these and similar attempts led to the conclusion that efforts to improve the indigenous cottons were most likely to be rewarded with success. Still more recently, however, experiments have been made to grow Egyptian cotton in Sind with the help of irrigation. Abassi has given the best results, and the experiments have been so

successful that in 1904-1905 an out-turn of not less than 100,000 bales ” was prophesied in the course of a few years ” (Report of Director, Land Records and Agriculture). The average annual production in India approximates to 3,000,000 bales. The area under cotton in all British India is about 20,000,000 acres, the crop being grown in a very primitive manner. The bulk of the cotton is of very short staple, about three-quarters of an inch, and is not well suited to the require- ments of the English spinner, but very large mills specially fitted to deal with short-stapled cottons have been erected in India and consume about one-half the total crop, the remainder being exported to Germany and other European countries, Japan and China. In 1906 the United Kingdom took less than 5% of the cotton exported.

Cotton Production in British India. 1

1859 . , . 1,316,800 bales of 500 lb.

1904 . . . 3,172,800 ,, ,,

1905 . . . 2,848,800 „ ,,

1906 . . . 4,038,400 „

About 50% of the cotton produced is consumed in Indian mills and the remainder is exported.

China. — Cotton has not been cultivated in China from such early times as in India, and although cotton cloths are mentioned in early writings it was not until about a.d. 1300 that the plant was grown on any considerable scale. There are no figures obtainable as to the production, but it must be very large, considering that the crop provides clothing for a large proportion of the population of China. During recent years a considerable quantity of cotton has been exported, but more than a com- pensating amount of raw cotton, yarns and textiles, is imported. An estimate of the crop puts it at about 1,500,000 bales.

Korea is stated to have originally received its cotton plants from China some 500 years ago. Conditions are well adapted to the cultivation of the plant, and since the cessation of the Russo- Japanese War the Japanese have undertaken the development of the industry. Figures are difficult to obtain, but an official report from the Japanese Residency General in 1907 estimated the crop at about 214,000 bales, all being used locally. In the future Korea may become an important source of supply for Japan, especially if, as appears likely, Korea proves suited to the cultivation of American cotton.

Japan received cotton from India before China, and the plant is extensively grown, especially in West and Middle Japan. The production is not sufficient to meet the home demand; during the five years of normal trade before the war with Russia Japan imported annually about 800,000 bales of cotton, chiefly from British India, China and the United States, and during the same period exported each year some 2000 bales, mainly to Korea.

Dutch East Indies. — In Java and other Dutch possessions in the East cotton is cultivated. A considerable amount is used locally, and during the six years ending in 1907 the surplus exported ranged from about 24,000 to 40,000 bales per annum.

Russia. — Some cottpn is produced in European Russia in the southern Caucasus, but Turkestan in central Asia is by far the

1 Cotton Production 1906, U.S.A. Bureau of the Census, Bulletin No. 76.

more important source of Russian-grown cotton. In this region cotton has been cultivated from very early times to supply local demands, and to a minor degree for export. Since about 1875 the Russians have fostered the industry, introducing American Upland varieties, distributing seed free, importing gins, providing instruction, and guaranteeing the purchase of the crops. The Trans-Caspian railway has been an important factor; almost all the cotton exported passes over this line, and the statistics of this trade indicate the progress made. The shipments increased from 250,978 bales in 1896-1897 to 495,962 bales in 1901-1902 — part, however, being Persian cotton. The production of cotton in Russia in 1906 was estimated at 675,000 bales of 500 lb each. About one-third of the cotton used in Russian mills is grown on Russian territory, the remainder coming chiefly from the United States.

Asia Minor.— Smyrna is the principal centre of cotton cultivation in this region. A native variety known as ” Terli,” and American cotton, are grown. The general conditions are favourable. According to the Liverpool Cotton Gazette, Asiatic Turkey produced in 1906 about 100,000 bales, and Persia about 47,000 bales. Cotton was formerly cultivated profitably in Palestine.

Australasia. — The quantity of cotton now produced in Austra- lasia is

extremely small. Queensland, New South Wales and South Australia possess suitable climatic conditions, and in the first-named state the cotton has been grown on a commercial scale in past years, the crop in 1897 being about 450 bales. Considerable interest attaches to the ” Caravonica ” cotton raised in South Australia, which has been experimented with in Australia, Ceylon and elsewhere. It is probably a hybrid between Sea Island and rough Peruvian cotton, but lacks most of the essential features of Sea Island.

In Fiji the cotton exported in the ‘sixties and ‘seventies was worth £93,000 annually; but the cultivation has been practically abandoned. In 1899 about 60 bales, and in 1900 about 6 bales, were exported. During 1901-1903 there were no exports of cotton, and in 1904 only 70 bales were sent out.

Into the Society Islands Sea Island cotton was introduced about 1 860-1 8 70. Up to the year 1885 there was an average yearly export equivalent to about 2140 bales of 500 lb, after which date the export practically ceased. The industry has, however, been revived, and in 1906 over 100 bales, valued at £1052, were exported. (W. G. F.)

Marketing and Supply

In the days of slave-grown cotton, the American planters, being men of wealth farming on a large scale, consigned the bulk Moving of their produce as a rule direct to the ports. Now, the however, a large proportion of the crop is sold to local

harvest to s tore-keepers who transfer it to exporting firms in

ep0 ‘ neighbouring cities. The cultivators, whether owners of the plantations, as is usual in some districts, or tenants, as is customary in others, are financed as a rule by commission agents. The decline of ” spot ” sales at the ports, partly but not entirely in consequence of the appearance of the small cultivator, has proceeded steadily. Hammond 1 has constructed a table from information supplied by the secretaries of the cotton exchanges at New York, Charleston, Savannah, Mobile, New Orleans and Galveston, showing the sales of ” spot ” cotton at those ports for the twenty-two years between 1874-1875 and 1895-1896, and in all cases an absolute decline is evident. The receipts of cotton in the season 1 904-1 905 at the leading interior towns and ports of the United States are given below.

Receipts of Cotton at 28 Interior Towns. (In Thousand Statistical Bales of 500 lb each.)

Brenham, Tex.

17

Memphis, Tenn. .

984

Dallas, Tex. .

96

Nashville, Tenn. .

10

Shreveport, La.

256

Selma, Ala. .

126

Little Rock, Ark.

219

Montgomery, Ala.

211

Helena, Ark..

91

Eufaula, Ala.

29

Vicksburg, Miss.

100

Columbus, Ga.

74

Columbus, Miss.

57

Macon, Ga. .

87

Natchez, Miss.

76

Albany, Ga.

35

Atlanta, Ga. Rome, Ga. . Augusta, Ga. Columbia, S.C. Newberry, S.C. Charlotte, N.C. Raleigh, N.C. St Louis, Mo.

134 72

446 68

17 21

19 672

Houston, Tex.

Meridian, Miss. . Cincinnati, Ohio . Yazoo City, Miss .

2.423

133

167

65

6712

Total .

Crop. 13,565

Receipts of Cotton at American Ports. (In Thousand Statistical Bales of 500 lb each.)

Galveston, Tex. New Orleans, La. Mobile, Ala. Savannah, Ga. Charleston, S.C. Wilmington, N.C Norfolk, Va. Baltimore, Md. New York

2,879 2,690

330 1.877

225

375

820

62

34

Boston, Mass. Philadelphia, Pa. Brunswick, Ga. Pensacola, Fla. Minor Ports .

Total .

Crop .

14 200

187-

5i8

10,295 13,565

Cotton Culture and the Cotton Trade, p. 298.

Galveston and Savannah have risen considerably in relative importance of late years.

Before the Civil War each planter would have his own gin- house. Now, however, ginning is a distinct business, and one gin willserve on an average about thirty farmers. Moveable gins were tried for a time in some places; they were Oinning dragged by traction engines from farm to farm, like packing. threshing machines in parts of England, but the plan proved uneconomical because, among other reasons, farmers were not prepared to meet the cost of providing facilities for storing their cotton. In addition to the small country ginneries, large modern ginneries have now been set up in all the leading Southern

market towns. The cotton is pressed locally and afterwards ” compressed ” into a very small compass. The bales are usually square, but cylindrical bales are becoming more common, though their cost is greater. In the latter, the cotton is arranged in the form of a rolled sheet or ” lap.” Owing to complaints of the careless packing of American cotton, attention has been devoted of late to the improvement of the square bale.

London used to be the chief cotton port of England, but Liverpool had assumed undisputed leadership before the 19th century began. Some arrivals have been diverted to Manchester since the opening of the Manchester ship English canal; shipments through the canal from the 1st of entry,” September to the 30th of August in each year for the decade 1894-1895 to 1904-1905 are appended — six to eight times as much is still unloaded at Liverpool.

A Manchester cotton-importing company was recently formed for increasing deliveries direct to Manchester, and establishing a ” spot ” market there, an end to which the Manchester Cotton Association had directed its efforts for some time past. The latter association was established at the end of 1894, with a membership of 265, in the interests of those spinners who desired importations direct to Manchester. The objects of the associa- tion are officially stated to be: (1) to frame suitable and authori- tative forms of contract, and to make rules and regulations for the proper conduct of the trade; (2) to supervise and facilitate the delivery of the importations of cotton at the Manchester docks to the various consignees; (3) to provide and maintain trustworthy standards of classification; (4) to procure and disseminate useful information on all subjects pertaining to the trade; (5) to act in concert with chambers of commerce and other bodies throughout the world for mutual protection; (6) to establish a market for cotton at Manchester. Spinning members preponderate, but almost all the Manchester cotton merchants and cotton brokers have also joined the association. The importance of the original spinners' representation on the association is shown by the fact that they worked over 14,000,000 spindles: in December 1905 the spindles represented by members had risen to nearly 20,000,000. Some 73,000 looms are also represented. As most of the Lancashire cotton mills lie far from Manchester, direct importations to that city do not usually dispense with a ” hand- ling,” and frequently save little or nothing in freight rates, though in some cases the economy derived from direct importa- tion is considerable. One gain accruing to Lancashire from the

Canal, however, is that its competition has brought down railway rates.

Fundamental alterations have been made in the structure of the leading cotton markets, and in methods of buying and selling

cotton, in the last hundred years. We shall not attempt Cotton to trace the changes as they appeared in every market methods, of importance, but shall confine our attention to one

only, and that perhaps the most important of all, namely, the market at Liverpool. This selection of one market for detailed examination does not rob our sketch of generality, as might at first be thought, since broadly the history of the development of one market is the history of the development of all, and on the whole th'e economic explanation of the evolution that has taken place may be universalized.

with less easy terms for payment than were usual in Manchester, prevented any great numbers from departing from the beaten track. Cotton dealers up to this time had regularly financed the spinners, who were frequently men of little capital, by allowing long credit, and had even employed them to spin on commission. As men of substance increased among the ranks of the spinners, the Manchester cotton dealers found it impossible to retard a movement set on foot by the prospects of such appreciable advantages. Ultimately many of the old Manchester cotton dealers became brokers for their old customers. In 1875 there were said to be upwards of 100 cotton dealers in Manchester, but from that time onward their members steadily declined. It is interesting to observe that a later development of transport between Manchester and Liverpool, namely, the Manchester

Cotton landed at the Port of Manchester since the Canal was opened. (In thousand Bales.) The season is from the 1st of September to the 31st of August each year.

Jan. 1894, to

Aug. 31,

1894.

Season

1894-1895.

Season

1 895-1 896.

Season

1896-1897.

Season

1897-1898.

Season

1898-1899

East Indian …. West African ….

Total

Total American Crop 1 . Total Egyptian Crop (in bales of 7i cantars) 2

21 1-4

32

34

121 68

211

88

245 98

3″

84

22

66

189

299

344

395

7.549. 657

9,901 615

7 > i57

703

8,757 783

11,199

872

11,274

745

Season

1 899-1 900.

Season

1 900-1 90 1.

Season

1901-1902.

Season

1902-1903.

Season

1903-1904.

Season

1904-1905.

East Indian .

West African ….

Total

Total American Crop 1 . Total Egyptian Crop

(in bales of 7 J cantars) 2 .

415 136

442 107

421 125

478

145 2-5

365

148

6

552 183

i-3 •1

551

549

546

626

519

736

9436

868

10,383 723

10,680 849

10,727 778

10,011 867

13,565 846

Originally cotton was imported by the Liverpool dealer as an agent for American firms or at his own risk, and then sold by private treaty, auction, or through brokers, to Evolution M anc hester dealers, who retailed it to the spinners. “broking. This statement is, of course, only roughly correct. Some Manchester dealers imported themselves, and some spinners bought direct from Liverpool importers, but the rule was the arrangement first described. Early in the 19th century it became customary for Manchester dealers and Liver- pool importers to carry on business with one another through representatives known as ” buying ” and “selling” brokers. About this time the broker of cotton only began to specialize from the ranks of the brokers who dealt in all kinds of colonial produce. Previously there had not been enough business done in cotton to make it worth any person’s while to devote himself to the buying and selling on commission of cotton only. The evolution of the distinct business of cotton broking is readily comprehensible when we remind ourselves that the requirements, as regards raw material, of all spinners are much alike generally, and that no spinner could afford to pay an expert to devote himself entirely to purchasing cotton for his mill.

So far change had been gradual, but the success of the Manchester and Liverpool railway undermined beyond repair the old system of doing business. Spinners could easily run over to Liverpool and buy their cotton from the large stocks displayed at that port. Before the railway was opened some spinners had been in the habit of making their purchases of raw material in Liverpool,but the great inconveniences of the journey, combined

1 Commercial crop. 2 A cantar is 99ˆ05 lb avoirdupois.

Ship Canal, has drawn back into Manchester a part of the cotton market which was attracted from Manchester into Liverpool by the famous improvement in transport opened to the public three-quarters of a century ago.

‘ The centralization of the cotton market in Liverpool fixed firmly the system of buying through brokers, for the Liverpool importer, or his broker, was in no sense a professional adviser to the spinners,

informally pledged to advance the latter's interests, as the old Manchester dealers had been. The system was rendered comparatively inexpensive by the drop in commissions from 1 to 7 % which had followed the adoption of selling by sample. This custom of buying and selling through brokers continued unshaken until the laying of the Atlantic cable tempted selling brokers occasionally, and even some buying brokers, to buy direct from American factors by telegraph and thus transform themselves into quasi-importers. The temptation was made the more difficult to resist by the development of " future " dealings. When the agents of the spinners, that is, the buying brokers, by becoming principals in some transactions, had acquired interests diametrically opposed to those of their customers, the consequent feeling of distrust among spinners gave birth to the Cotton Buying Company, which, constituted originally of twenty to thrity limited cotton -spinning companies, represents to-day nearly 6,000,000 spindles distributed among nearly one hundred firms. Its object was to squeeze out some middlemen and economize for its members on brokerage. This company, it is said, helped to attract the brokers back to the spinners, and an informal understanding was arrived at that the buying broker should not figure both as agent and principal in the same transaction.

Cotton- Gearing house f Cotton Bank and periodic

By 1876 ” forward ” operations had become so vast and complicated that a cotton-clearing house had to be established to deal with the confusing networks of debits and credits created by them. Its principle was exactly that of the clearing houses used by the railways and the banks, the cancellation of indebtedness and discharge simply of balances. The final settlement of a ” future ” settlement contract involved usually a crowd of persons, and the ot ” differ- p assa g e f i ar g e sums of money backwards and for- wards, so that the amount of cash required for cir- culation on the exchange became unreasonably excessive and an annoying waste of time was entailed. The cotton-clearing house substituted book-keeping for the bulk of these payments. The establishment of the Cotton Bank naturally followed. Now debts are discharged in the first instance by vouchers. Dealers pass their debit and credit vouchers into the Cotton Bank and pay or receive the balances which they owe or are entitled to. In order to protect dealers against the losses due to the insolvency of those with whom they have had transactions, weekly settlements on the exchange have been made compulsory; between brokers and their clients they are also usual. At the settlement, every member of the exchange receives the ” differ- ences ” owing to him and pays those which he has incurred. Thus if a person holds futures for 10,000 bales which stood at 5-20 on the last settlement day and now stand at 5-30, and in the course of the previous week has sold 5000 bales of ” futures ” at 5-10, he receives 10,000 X xVVd. on his old holding, and has to pay 5000 X iVVd- on his sales, and therefore on balance neither receives nor pays. Differences may be very large sums. The unit of a ” future ” being 100 bales, an alteration in the price of cotton of oid. causes a difference on each unit of £2. Periodic settlements are obviously periodic tests of the solvency of dealers. If the test of the settlement were not frequently applied, speculators who were unfortunate would be tempted to plunge deeper until finally some became insolvent for large sums. As it is, the speculator who has incurred losses beyond his means tends to be discovered before his creditors are heavily involved. Settlement days fall on Thursday, and the closing prices on the preceding Monday are taken as the basis of the settlement. From all differences interest at 5% is deducted for the time between settlement day and the tenth day of the second month on which the ” future ” elapses, since settlement terms mean that money is paid in instalments before it is actually due. To the admission of periodic settlements there was for a time vehement opposition on the ground that the door would be opened to gambling on ” differences.” Hence at first, in 1882, they were used only by a section of the market

constituted of members who had voluntarily agreed to do business with one another upon these terms alone. By 1884, however, the advantages of " settle ment terms " became so evident that they were adopted by the Cotton Association, at first for fortnightly periods, with the saving clause originally that they should not be compulsory.

As soon as the clearing house was set up it became evident that " futures " were an impossibility away from it. At the same time " futures " were becoming an increasing necessity to importers, because through " futures " alone could they hedge on their purchases of cotton, or buy when the market seemed favourable, and they were not prepared to assume heavy risks. Now from the clearing house importers were rigorously excluded, and on invoking the aid of " futures," therefore, they were penalized to the extent of double broker's commission, one commission being charged on the sale of the " futures " and one on their purchase back. The importers, therefore, found it necessary to establish a club of their own, the Liverpool Cotton Exchange, which they as rigorously guarded against brokers. The split in the market so caused was so damaging to both parties that a satisfactory arrangement was eventually agreed upon, and both institutions were absorbed in the Liverpool Cotton Association.

A condition of specialist dealers working to the public service is that they should not act in the dark. They must watch demand, be able to form reasonable anticipations ot its move-

Origin of Liverpool Cotton Associa- tion.

Publica- tion of in- formation relating to demand and supply.

ments, and at the same time know the existing stocks of cotton; the sales taking place from day to day, and the best forecasts of the coming supplies. A man accustomed to devote the whole of his time to the study of demand and supply in relation to cotton, after some years of experience, will be qualified ordinarily to form fairly accurate judg- ments of the prices to be expected. His success depends upon his ability to interpret rightly the facts and intan- gible signs with which he is brought in contact. The information at the disposal of dealers has steadily enlarged in volume and improved in trustworthiness, though some of it is not yet invariably above suspicion, and the time elapsing between an event and the knowledge of it becoming common property has been reduced to a fraction of what it used to be, in consequence chiefly of the telegraph and cables. All sales that take place on the Exchange must be returned. Estimates are published of the area under cotton cultivation, and conditions of the American crop are issued by

the American agricultural bureau at the beginning of the months of June, July, August, September and October of each year. To represent the standard of perfect healthiness and exemption from injury due to insects, or drought, or any other causes, one hundred is taken. The estimates for 1901 to 1005 are given, to illustrate their variations: —
■

Year.

June 1st.

July 1st.

Aug. 1st.

Sept. 1st.

Oct. ISt.

1901

81-5

8i-l

77-2

71-4

61-4

1902

95-i

847

81-9

64-0

58-3

1903

74-1

77-1

79-7

81-2

65-1

1904

83

88

91-6

84-1

75-8

1905

77-2

77

74-9

72-1

71-2

These estimates are the averages of separate estimates which are published for the states of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, Arkansas, Tennessee. The official figures are supplemented from time to time by numerous private forecasts, for instance those in ” Neild’s circular.” Ellison, in his work on the cotton trade of Great Britain, traces in detail the increase in the volume of information collected and made public. At the close of the 1 8th century there was a tacit understanding among brokers to supply one another with information. There were no printed circulars, except the monthly prices current of all kinds of produce, but brokers used to send particulars of business done to their customers in letters. These letters were the origin of circulars. Messrs Ewart and Rutson pioneered in 1805 by issuing a weekly account of the sales and imports of cotton, and three years later three such circulars were on the market, though Hope’s alone was confined to cotton. For the first associated circular of any importance, the market had to wait until 1832. The issue of this circular by subscribing firms,

on the basis of particulars collected by brokers appointed at a weekly meeting, gave rise in 1841 to the Cotton Brokers' Association, to which the development of the market by the systematizing of procedure is largely due. The rest of the tale may be told in Mr Ellison's own words: —

" Down to 1864 the leading firms continued to issue weekly market reports, but in that year the association commenced the publication of an associated circular. This was followed in the same year by the Daily Table of sales and imports, which in 1874 was succeeded by the present more complete Daily Circular. To these publications were at various times added the annual report, issued in December, the American crop report, issued in September, and the daily advices by cable from America, issued every morning." 1

We shall now enter upon a detailed analysis of " forward " operations. The term " futures " is used broadly and narrowly: broadly it is a generic term denoting " futures " in the „ . narrow sense, and also " options " and " straddles "; narrowly it implies merely contracts for future delivery at a price fixed in the present. Again we must distinguish between the " future " contracts for the delivery of a particular kind of cotton, which may be entered into by spinners and their brokers, and are real purchases in the sense that the spinners want delivery of the cotton referred to, and the " futures," which always relate

1 The Cotton Trade of Great Britain, by Thomas Ellison, p. 186.

to the same grade of cotton, and are drawn up according to certain forms and circulate on the exchange as media for the shifting of risks connected with purchase and sale. The latter are not " real " purchases in the sense given to that term above, but fictitious because delivery of the cotton is not desired. It will no doubt aid the understanding of the functions of the latter if some explanation is offered of the needs met by the former, which are sometimes known technically as " deferred deliveries."

When a spinner is required to quote prices of yarn for delivery

in the future he is fixed on the horns of a dilemma. If he does not

at once buy cotton, but quotes on the assumption that

1 . price will remain steady, he may be involved in serious risks. loss through his estimate being mistaken. If he de-

termines to buy cotton at once, others who risk more, and trust their judgment of the future, may secure the contract. On first thoughts it would seem desirable that all spinners should buy cotton outright to cover their contracts, but on second thoughts the social disadvantage of their doing so becomes apparent. Much buying might take place when stocks were scanty, with the result that prices would be needlessly forced up; and when stocks were plentiful demand might be weak and prices, therefore, be unduly depressed. It is evident that the buying of cotton on the principles suggested would be calculated to cause great unsteadiness of prices, especially as cotton is not continuously forthcoming, but is produced periodically in harvests. Demands for yarn cannot be expected to come always at the most favourable time socially for the distribution of the cotton. One way out of the difficulty is that the spinner should exercise his judgment and buy his raw material at what seems to him the most suitable times. But to this course there are three objections. The first is that spinners would be performing the two functions of industrial management and cotton buying (together with others perhaps), and that in consequence the best industrial men would not necessarily be able to maintain their position in the trade because as buyers of cotton they might be unfortunate. The second is that spinners being required to give attention to two distinct classes of problems would be less likely as a body to become complete masters of either. The third, which is not distinct in principle from the two preceding, is that such limited speculation in cotton buying on the part of spinners worried with other matters would not be likely to steady the cotton market in any high degree. It may be assumed as desirable that the demand for cotton should be so spread as to keep its price as steady as possible — ” steadiness ” will be defined more exactly later — and that to this end it is essential that specialists should devote themselves to the task of spreading it. Such specialists have appeared in the cotton brokers and dealers who make their living out of bearing the risks connected with anticipating demand and supply in relation to cotton. To-day a spinner who is asked to quote for deliveries of yarn for, say, the next six months, may obtain from a broker quotations for deliveries of the cotton that he needs, in quantities as he needs it, for the next six months, and upon these quotations he may base his own for yarn. If a spinner is pressed by a shipper to make quotations with refusal for two or three days to give time for business to be settled by cable, it is evidently not impossible for the spinner to shift the risk involved by getting in turn from his broker refusal quotations for cotton. But

spinners do not try always to take the safest course.

Now it is evident that brokers in turn require some means of passing on the risks that they are bearing, or some portion of them from one to another, or of sharing them with other Method of mar k e t experts, as they find themselves overburdened, lag risks, and as their judgment of the situation changes. I he means have been provided in the ” futures ” which circulate on the Cotton Exchange. The risks of anticipating are carried by those who create or hold ” futures ” without a hedge. In order to facilitate business, ” futures ” are all drawn in the same unit (100 bales), and are all based on the same class of cotton, namely Upland cotton of middling grade of ” no staple ” (i.e. with a fibre of about f in.) and of the worst growth. American cotton, we may remind the reader, is graded into a number of classes, both on the Liverpool and New York Ex-

changes, and an attempt is made in each market to keep the grades as fixed as possible. But what, it may be inquired, is the value of ” futures ” relating to ” middling ” cotton to a broker whose contracts with spinners are not in ” middling ” cotton? The answer is that though the ratios between the prices of the various grades alter, the prices of all of them move generally together, and that the ” futures ” of the Exchange at least provide a hedge against the latter movements. Other things being equal, the broker would be better off if he could hedge with equal ease against all his risks. But other things are not equal: the market would be more confusing and quotations would be complicated if ” futures ” were in use for all grades.

We may now examine the exchange ” futures ” in minuter detail. They are quoted as a rule for about ten months ahead. Thus in January the futures quoted will be January (technically termed ” current,” ” present month ” or f^f^ “near month,” “futures”), January- Feb ruary, “futures.” February-March, March-April, April-May, May- June, June-July, July-August, and perhaps two or three more. Each group, it will be observed, except ” current futures,” culminates in two defined months. The rule is that on the first of the two months the seller of ” futures ” may, and before the last day of the second month must, deliver cotton against them, or, what comes to the same thing, buy back the ” futures ” on the basis of the price of ” spot ” cotton of middling grade. Various grades of cotton are tenderable against ” futures “: if this were not so ” futures ” would be in danger of defeating their object, because the price of the grade upon which they were founded would probably at times be thrown widely out of relation to the general level of prices in the cotton market. The lowest grade tenderable used to be ” low middling,” but since October 1901 ”

good ordinary ” has also been accepted. Arbitrators report on deliveries and award allowances on those of grades above ” middling ” and deductions of price from those below. A sample is taken from each bale and the ” points on or off ” are fixed for each bale separately. If either party is dissatisfied with the award, he may appeal to an appeals committee on paying £3:3:0: which is refunded to him by the other party if the appeal be upheld. The detailed arrangements described above are those of the Liverpool market. The great bulk of ” futures,” however, are bought back and not delivered against.

Beneath are the official Liverpool quotations of ” futures,” as they appeared on the morning of the 19th of April 1906: —

American Deliveries, any port, basis of middling, good ordinary clause (the fractions are given in looths of a penny).

Quota- tions.

Yesterday’s Close.

To-day’s Early Sales.

Values

12.15.

April ….

6-05

6-03

April-May

6-05

603

May-June

6-05

6-o6, 5,4.3.2, 1,2,3

6-03

June-July .

6-05

6-05,2/3

6-03

July- August

6-04

6-05, 4, 3, 2

603

Aug.-Sept.

5-98

5-99- 8, 6

5-97

Sept. -Oct.

5-34

5-85,4

5-84

Oct. -Nov. .

5-76

5-77, 6

5-76

Nov. -Dec.

575

5-75. 4 1

5-75

Dec-Jan. .

5-74

5-75 ‘

5-75

Jan.-Feb. .

5-75

575 *

5-75

Late Business.

Closing Values.

April ….

6-03 1

5-98

April-May

6-03

5 ; 98

May-June

6-03, 4, 3, 2, 1, 2,

5-99

June-July .

6-04, 3, 2

5-99

July-Aug. .

6 “°3. 4. 3. 2, 1. o. 1 1. 2, 1 1, 0, 5-99. 6-0, 1 5-99, 6-o, 5-99, 8

5-98

Aug.-Sept.

5-98, 1 6, 5, 4, 5

5-92

Sept.-Oct.

5-84, 2 ‘

5-78

Oct.-Nov. .

576, 1 5, 1 4. 3. 4. 3. 1 2, 1,

5-70

Nov.-Dec.

570 ‘

5-69

Dec-Jan. .

572, 1, 2 1

5-69

Jan.-Feb. .

5-69

Transactions of 100 bales only.

COTTON

271

Egyptian Deliveries, fully good fair (in 64/fo of a penny).

Yesterday’s

Business

To-day’s

Business

Afternoon.

Closing

Close.

before Noon.

Values.

April .

IO-II

IO-I

May . . .

10-12

9-62, 3, 10-0

9-63, 2, IO-O

10-2 1

IO-I

June .

IO-II

10-0

July . . .

10-9

9-60, i,o’

9-63, 1 IO-O, 1

9-63- 2

9-62

Aug. . . .

•1 0-0

9-54

Sept. . . .

9-58

9-48

Oct. . . .

9-24

9-18

Nov. .

8-58

8-52, 1 0, 49

8-52

Dec. . . .

8-50

8-39 x

8-42

Jan. .

8-44

8-36

8-35

Egyptian futures, it will be observed, run out in single months. As the cost of dealing in ” futures ” is only one shilling on each transaction for a member of the Cotton Exchange (the outsider is charged in addition a commission by his broker), it is not sur- prising that the

transactions taking place in ” futures ” number legion.

The methods of dealing in cotton are very intricate, and it is necessary here to interpolate an explanation of the relations between the prices paid by spinners for cotton and the quoted ” spot ” prices. We begin by giving the official quotations of ” spot,” and statement of business done, published on the morning of the 19th of April 1906.

Quotations.

L.M. Mid. G.M. F.G.M. M.F.

6-05 6-21 6-41 6-49 6-71

Mid Fair. Fair. Gd. Fair.

6-35 6-6i

6-40 6-62

6-32 6-56

6-34n 6-56n

F.G.F. Good. Fine. ■ioi

American

G.O.

5-87

Pernam . Ceara Paraiba Maceio ,

Fair.

Egyptian br’n . Upper

M. G. Broach Bhownuggar No. 1 Comra Bengal . Tinnevelly .

595

6-02

5-94

5-96n

Gd. Fair. 9l

91

11

9sn

ion

Gd. Fr. F.G.F.

4An 3li

51

4ii n 4iin

3 1! 5&

Gd.

5 A

4lln

4Hn

4S > 2

5A

G.F.

5i!n 4lin 4itn 4 h

Fine. S’fine.

4

5ˆ” 5ˆ A-h 43

Cotton Ships arrived. Boston: Canadian S. Hamburg: Iceland S.

Sales.

Speculation and

Imports

including

Export.

Hull, &c.

Previous

Previous

Week’s

To-day.

this Week.

To-day.

this Week.

To-day.

Total.

American .

6330

18,050

500

1500

17.665

53,684

Pernam, &c. .

150

200

Paraiba, &c. .

460

130

2

Ceara and Arac’ty .

30

Egyptian

500

1200

321

7,983

Peruvian .

460

350

32

32

W. I. and African .

5°

20

Surat

3.664

3,829

Madras .

50

20

Bengal

608

608

Sundries .

Total .

8000

20,000

500

1500

22,290

66,138

Since Wednesday .

8,000

500

28,000

2000

Purchases for ” speculation ” remain in the market and therefore figure again in the sales. These official prices are sometimes prices actually paid, and sometimes prices settled by 1 Transactions of 100 bales only.

a committee according to their notions of the prices that would have been realized at the close of the market had business been done. The work of the committee is by no means (simple, as frequently very few transactions take place on or n //... in the kinds of cotton of which quotations are given. As regards ” middling ” American, the committee fixes ” spot ” by allowing so many ” points on or off ” present month futures. The variations of the gaps between “spot” and “present month futures ” are somewhat mysterious, a matter to which we shall recur. ” Spot ” quotations, the reader will now understand, are partly nominal, and must therefore be taken as affording a general

idea only of movements in the prices of cotton. While quoted ” spot ” remained low, the prices paid by most spinners for the special kinds of cotton that they needed might rise. When the spinner has informed the dealer exactly what quality of cotton he needs, the dealer quotes so many ” points on or off ” the ” future ” quotations prevailing in Liverpool at the time of the purchase, which refer to Upland cotton of ” middling grade,” of ” no staple ” and of the worst growth. Then, according as the spinner wants immediate delivery or delivery in some future month, he pays the price of current ” futures,” or of ” futures ” of the month in which he requires delivery, plus or minus the ” points on or off ” previously fixed.

The considerations which determine the ” points on or off ” charged to the spinner may be taken roughly as three : —

1. The grade, i.e. the colour, cleanliness, &c, of the cotton. These are of importance to the spinner owing to the necessity of his cleaning machinery being adapted to the condition of the cotton. The lower the grade the more elaborate and expensive is the machinery required to clean it, and consequently a spinner is willing to pay a certain amount extra for high grade cotton in order to save expenditure on preparatory machinery.

2. The length of the staple. This determines to a large extent the fineness of the yarn which can be spun. Only the very lowest counts can be spun from cotton with ” no staple,” that is, with a fibre of about three-quarters of an inch. The longer the staple above the minimum the higher the counts that can be spun.

3. The growth. The best American cotton (Sea Island and Florida cotton are always considered quite apart) is grown in the Mississippi valley, the next best in Texas, and the poorest on the Uplands (i.e. in Georgia and Alabama). Considerations of growth determine to a great extent the hardness or softness, and strength or weakness, of the fibre, and thus, indirectly, whether the cotton is suitable for warp or weft.

Some spinners cover their yarn contracts merely by buying ” futures,” but the cover thus provided is frequently most inadequate owing to variations in the ” points on or off ” for the particular cotton that they want. For example, after the size of 1904-1905 crops became known, and the Americans attempted to hold back cotton, the ” points on ” for many qualities rose consider- ably owing to artificial scarcity, though the price of cotton, as indicated by ” spot,” remained low. There is a tendency for cautious spinners in England to run no risks and fix the prices of their yarn in accordance with quotations for actual cotton of

specified qualities made by their brokers.

We now return to exchange ” future ” trans- actions regarded as a genus. In addition to “futures” proper there are “options” and ” straddles.” Options are single “^ oaa ” (” puts ” or ” calls “) or double (that ™strai

ordinary ” futures,” i.e. middling American cotton of ” no staple,” &c. Whether the purchaser of an option gains or loses depends upon the price that he has paid in relation to the gain, if any, that he makes out of his power. The price of options of course varies: that of double options is always highest, but they are little used. A ” straddle ” is a speculation on the difference between the prices of nearer and more distant futures, which varies from time to time, or on the difference between the prices of different kinds of cotton. An example will make the nature of the straddle clear. Suppose a dealer buys April- May ” futures ” at 4d. a lb and sells the same quantity of May-June ” futures ” at 4^-fd. a lb. Then, whether prices rise or fall as a whole, he gains if the difference between the two prices be- comes less than -fd., but if it becomes more, he loses. On the other hand, had the dealer bought May-June at 4-fd. and sold April-May at 4d. he would have gained in the event of the difference increasing, and lost in the event of its decreasing.

A question which has met with a good deal of attention is whether the speculation, which has been encouraged by the Measures various arrangements made for facilitating operations ofsteadl- in ” futures,” has steadied or unsteadied prices. ness in Before we are prepared to answer this question .we must p ces ‘ be furnished with a precise conception of what is meant by ” steadiness ” in prices. It is sometimes assumed that this is measured perfectly by the standard deviation, 1 which is obtained by taking the squares of the differences between the average and the individual prices, summing them and extracting the square root. But obviously the information given by the standard devia- tion is limited: the frequency of movement cannot be inferred from it; two series might have quite different average oscillations and yet the same standard deviation; and the range of movement, or spread of the variations from the average price (though allowed for in the standard deviation more than in the average error) , is hidden. Now frequency of movement, average daily price variation, and range of price movements are matters of funda- mental importance to the public. Hence for practical purposes we require several kinds of

measurement of price movements, and it is impossible to weigh exactly the one against the other in respect of importance. Observe that an increase of the frequency of movement, or even of the average daily movement, is not necessarily objectionable, since changes are less harassing when they take place by small increments than when they are brought about by a few big variations. The difference between the highest and lowest price, we may observe, is a very imperfect indication of the range of movement (though, taken in conjunc- tion with the standard deviation, it is the best at our disposal), because either of the extreme prices might be accidental and quite out of relation to all others. An investigator must be on his guard against using quotations of this kind. There is also a difficulty about the frequency of movement, because as a rule many movements take place in one day the total over a period sufficiently lengthy to yield general results is enormous, and many are unrecorded. In one day, for instance, when the net drop was 33 points and the range of variation 59 points (namely, 8-45 to 7-86), 150 price fluctuations were recorded. However, the count of frequency of movement from daily closing prices would prob- ably afford a roughly satisfactory comparative measurement in markets in which prices sometimes remain the same for a day or two together. The points just noted apply also to the average fluctuation and the standard deviation, but it is probable in these cases that daily or even weekly quotations would be sufficient to yield the information sought for with sufficient exactness for purposes of comparison.

Now, supposing dealing to be confined to experts, what effects upon the course of prices would one expect from the Ett ct t s P ec i a li sm °f the cotton market and improved facilities specula- f° r dealing, on the assumption that dealers were tion on governed wholly in their actions by the course of prices st f»ˆoess an(j never tried to manipulate them? The frequency

of prices.

of movement ought to increase because the market

1 See article on ” Dealings in Futures in the Cotton Market,” in the Journal of the Royal Statistical Society, vol. lxix, p. 325.

would become more sensitive, but, other things being equal, the range of movement ought to diminish, and ultimately the average daily movement also, though at first the latter might not fall appreciably if, indeed, it did not rise, owing to the increased frequency of movement. These results would prove beneficial to the community. May we infer

deductively that they have been attained because of the increase of speculative transactions? By no means, and for two reasons. In the first place, the public speculates to a large extent on the cotton exchange, and its speculation (taken as a whole) is sheer gambling. But, it may be replied, the outsiders, being as a whole completely ignorant of the forces at work, so that they cannot form rational anticipations, cannot have any effect either way: by the law of chance their influences would neutralize one another. This would be so if people acted independently and without guidance, but actually they are sometimes misled by published advice and movements in the market intended to deceive them, and, even when they are not, they watch each other's attitudes and tend to act as a crowd. The mass becomes unduly sanguine or weakly surrenders to panic. Hence the law of error does not apply, and speculation by the public may unsteady prices. Again, dealers sometimes try to create corners and form powerful syndicates for that purpose: the dealing syndicate of late years has become a force to be reckoned with. Many large-scale operations are entered into, not because prices are relatively high or low, but to make them high or low for ulterior purposes; i.e. the market is deliberately "bulled or beared." In consequence of this tampering with the market no certainty can be felt about the effect even of expert dealing.

What, then, we may ■ profitably inquire next, has actually happened to price movements generally as the market has developed? This question can readily be answered as regards the past forty years or so, for which material „˚Ij[image] s "' t has been collected, but the reader must bear in mind that if improvement can be traced it cannot logically be attributed unhesitatingly to the perfecting of the machinery of speculation, whereby a larger use has been made of " futures," since many other economic changes have taken place concomitantly and they may have wrought the major effect. The world may be steadying and steeling its nerves. Now, turning to the actual effects, we discover somewhat remarkable facts. Expressed both absolutely and as percentages of the price averaged from the 1st of October to the 31st of July, the range of movement, standard deviation, and mean weekly movement calculated between the times mentioned above (October 1st to July 31st), after diminishing significantly for some years after the later 'sixties, have risen appreciably on the whole of late years. The figures in the table below are from the Journal of the Royal Statistical Society, June 1906: quotations for August and September were omitted to avoid the transition movements between the price levels of two crops.

In this table measurements of price movements stated both absolutely

and as percentages of price levels are given, because authorities have expressed doubts as to whether the former or the latter might be expected to remain constant, other things being equal, when price rose. On the one hand, it is argued that speculators are affected only by the absolute variations in price, while on the other hand it is contended that a movement of one ” point,” say, is less influential when the price is about 8d. than when it is about 4d. In response to the first view it might be argued that if speculators are influenced only by the differences for which they become liable, a ” point ” movement would have a somewhat slighter effect on their action, other things being equal, when price was high, because, supplies being relatively short, each of them would tend to be engaged in a smaller volume of transactions measured in quantity of cotton, than when supplies were larger. But the point need not be discussed further here, since both percentage and absolute indices of unsteadiness have risen of late years. The explanation of this change in the direction of indices of steadiness cannot be proved to consist in any peculiarity in the supplies of recent years. But the dealing syndicate has probably been of late more common and more powerful— that is, the syndicate which exists to make profits out

Table calculated from Weekly Prices between the 1st of October and the 31st of July in each Year.

Expressed as Percentage of

Average (1st Oct. to 3 Weekly Prices.

1st July)

Year.

Average

Lowest

Highest

Range of

Standard

Mean Weekly

Range of

Standard

Mean

Weekly

Movement.

Price.

Price.

Price.

Movement.

Deviation.

Movement.

Movement.

Deviation.

d.

d.

d.

d.

d.

d.

d.

d.

d.

1867-1868

9f

7i

“t

51

1-74

031

57-1

18-1

3‘22

1868-1869

ni

10J

“1

»*

0-58

019

i8-s

5-°

165

1869-1870

ni

7i

»i

4t.

092

0-23

416

83

2-07

1870-1871

8*

7ft

9ft

2

0-65

0-17

24-6

80

2-09

1871-1872

10J

9t

“1

a*

o-75

0-15

i9-5

6-9 .

1-38

1872-1873

9l

8}

1 oft

ift

o-53

O’lO

16-9

57

108

1873-1874

8ft

7i

9i

if

0-32

O-IO

165

3-9

1-20

1874-1875

1\

6}I

8

ift

0-26

007

13-8-

3-4

089

1875-1876

61

Si

7i

ii

o-3 7

0-08

19- 2

57

1-23

1876-1877

6ft

Si

7

ii

°-33

Oil

17-8

5-2

i-74

1877-1878

6i

Si

6ft

ili

0-21

007

no

34

I-I2

1878-1879

6

4tl

7ft

2i

067

0-13

37-5

II-2

2-17

1879-1880

7

6}§

7f

ii

O’ 24

0‘12

107

3-4

I-7I

1880-1881

6ft

5*.

611

1 ft

0-34

0-08

168

5‘4

1-27

1881-1882

61

6f

. 7ft

H

015

0-07

10-4

2-3

1-06

1882-1883

sH

5ft

6f

ift

0-31

0-07

20-4

5-3

i- 20

1883-1884,

6ft

Si

6ft

H

0‘20

0-08

n-3

33

132

1884-1885

sil

5ft

6i

n :

0-19

007

n-8

33

i- 20

1885-1886

si

4i ■

5ft ■

i

Ol8

0-07

14-5

3-5

i-35

18S6-1887 ‘

Si’s

si

6

i

028

0-05

161

S-2

092

1887-1888

Si

5 is

SH

1

0-14

0-05

91

2-5

091

1888-1889

si

5ft

6ft

i

023

006

150

40

1 04

1 889-1 890

6i

5ft

6}i

i

o-34

008

184

5-5

131

1890-189 X

5

4i

si

if

036

0-06

27-5

7-2

I- 20

1891-1892

4i

3ft

4H

if

0-36

0-07

333

8-7

170

1892-1893

4l

4i

SH

ift

o-37

0-09

25-0

7-8

1-89

1893-1894

4i

3H

4H

H

0-22

004

18-4

52

094

1894-1895

3i

»H

3*

A

0-30

0-06

269

8.9

i-79

1895-1896

4f

3i

411

ft

0-28

0-07

25-0

64

160

1896-1897

4ft

3il

4li

1!

0-22

007

21-6

5-2

167

1897-1898

3H

3ft

3i?

f

, 0-18

005

i8-5

5‘3

1-47

1898-1899

3 ft

3

3 IS

11

0-15

0‘04

14-3

46

1-22

1899-1900

4H

311

6ft

II

063

0.12

43-6

12-8

2-48

1900-1901

5i

4ft

61

2ft

°‘53

013

42-7

10-3

2-54

1901— 1902

4i

4ft

Sil

ift

024

009

22-4

5-o

1.89

1902-1903

5-35

442

7-12

2-70

078

0-13

5°-5

146

2-43

1903-1904

7-04

5-7»

8-92

3-i4

091

o-33

44.4

129

483

1904-1905

4-86

3 6 3

6’Oi

2-38

0-71

0-15

48.9

14-6

3-09

of manipulating the market — and the public has probably been speculating increasingly. It is plausible, then, to suppose that the dealing syndicate primarily, and the speculations of the public secondarily (secondarily, because in all likelihood the effect of its operation would be much less in magnitude), may account for the change. •>

“Futures” are not used in all markets — for instance, they are not to be found at Bremen; and in those in which they are used they play parts of different prominence — at Havre, for instance, the

transactions in “futures” are of incomparably less relative importance than they are at Liverpool. But it is futile to seek the effect of much dealing in ” futures ” in the differences between price movements in the various markets, because (1) demand expresses itself in different ways — in Germany, for example, spinners buy to hold large stocks — and (2) the markets are in telegraphic com- munication, so that their price movements are kept parallel. Mr Hooker has shown with reference to the wheat market how close is the correlation between prices in different places, 1 and the same has been observed of the - cotton market, though the

Price move’ meats In different markets.

Conceivably some indication of the working of “futures” might be gleaned from observation of the relations of near and distant “futures” to one another and of both to _.„ “spot.” The complete explanation of changes in between these relations is still a mystery. 3 Probably an the prices infinitude of subtle influences came into play, and ofnearand among these there seems reason to include the in- ?//ˆ„ˆ s … tentional and unintentional ” bulling ” or “bearing” of the market. Some examples of the diverse relations to be found, even when all the “future’s” fall in the same crop year, may be quoted here — quotations running into the new crop year are obviously affected by anticipations of the new crop.

As we pass from the ” future ” of the month in which the quotation is made to the most distant “future” it will be observed that in the first and second cases price rises continuously, in the second case even passing “spot,” whereas in the third case it falls first and then rises. Instances might be given of its falling un- intermittently. It seems a plausible conjecture that if ” futures ” were “bulling” the market in the first case, they were at least “bulling” it less in the second case ceteris paribus, and probably

Spot.

Jan.- Feb.

Feb.- March

March- April.

April- May.

May- June.

June- July.

July- Aug.

Aug.-. Sept.

Sept.- Oct.

Gct.-

Nov.

Nov.- Dec.

Dec- Jan.

Nov. 18th, 1895 . . Jan. 18th, 1899 . Sept. 14th, 1899 . .

4-34

3-8

3-36

27

61 24!

28 61

25

28| 25i

29!

8i

26

3I i

27

32

IOj

33

ill

12

3°

12’i

28

261

27 25

27 61

24I

correlations have not been worked out. 2 It is worthy of note that Liverpool “futures” are largely used for hedging by continental cotton dealers.

1 Journal of the Statistical Society, 1906.

1 See paper in the Journal of the Statistical Society for June 1906.

“bearing” it in the last case. A closer examination will reveal further that the magnitude of these gaps varies a great deal; and

3 Attempts to explain them were made in an article in the Economic Journal in December 1904, and in the paper already referred to read to the Royal Statistical Society.

if the “futures” do “bear” and “bull,” as has been supposed, they probably influence these magnitudes. It might be thought that the “futures” of different months, being substitutes in proportion to their temporal proximity to one another, should vary together exactly; but it would seem to be a sufficient reply that as they are not perfect substitutes they are in some slight degree independent variables. The “spot” market might be judged generally as too high, in view of crops and the probable normal demand of the year, but it might not

therefore drop immediately, owing partly to the pressure of demand that must be satisfied instantaneously. “Current futures” would be affected more than ” spot ” by this impression as to the relation of “spot” to a conceived normal price for the year, and they might therefore be expected to drop more than “spot” when this impression was at all widely entertained. But the fall of “current futures” would be checked by the demands that must be satisfied in the near future. Probably the prices of the more distant “futures” are determined in a higher degree by far- reaching imagination than the prices of nearer futures. This explains what has been called above the unintentional “bearing” of “spot” by “futures.” And it is immediately evident that the deliberate “bear” works by selling “futures,” and that the effect of his sales is propagated to “spot.” These statements are equally true of “bulling.” The influence of expectations of the new crop on “futures” running into the new crop is plain on inspection; but owing to the gap between the two crop years it would be astonishing if “futures” against which cotton from a new crop could be delivered were not appreciably independent of “spot” at the time of their quotation. However, it is noticeable that they are still so closely bound up with “futures” culminat- ing in the old crop year that the daily movements of the former are closely correlated with those of the latter. Concluding cautiously, we may admit the probability of the relations between near and distant “futures” and “spot” (even in respect of “futures” running out in the same crop year) indicating some- times at least the intentional or unintentional “bulling” or “bearing” or “spot” by “futures.” But nothing has yet been proved from these facts as to the effect “futures” are having upon the steadiness of prices. In the case of any crop year, if the relations which are suggested as indicating the “bulling” work of “futures” usually corresponded with “spot” prices being below the normal price of the crop year, or of what was left of the crop year, while the relations which are suggested to indicate the “bearing” work of “futures” on the whole corre- sponded with a relatively abnormal height of “spot,” it would be a legitimate inference that “futures” were tending to smooth prices. However, it is made clear as the result of an elaborate examination that the generality of these correspondences cannot be affirmed. 1 The outcome of the whole matter is that the investigator is still baffled in his attempt to discover what effect the use of “futures” is having upon prices to-day. The sole piece of evidence, from which probable conclusions may be drawn, is that three separate measurements of price fluctua- tions over some forty years reveal a growing unsteadiness of late, whether they be expressed absolutely or as percentages of price.

The uneasiness caused by the excessive dependence of Great Britain upon the United States for cotton, coupled with the belief that shortages of supply are more frequent than they ought to be, and the fear that diminishing returns may operate in America, occasioned the formation in England of the British Cotton Growing Association on the 12th of June 1902. The proportions of England's supplies drawn from different fields is indicated in the table below.

British dependence on American supplies is greater even than that of the continent of Europe, for Russia possesses some internal supplies, and more Indian cotton is used in continental countries than in England.

1 See the paper already mentioned in the Journal of the Royal Statistical Society for June 1906, where the several points noticed briefly above are fully discussed.

Average Quantities of Raw Cotton imported Annually into the United Kingdom from the following Countries in the Periods 1896-1900 and 1901-1904.

Recent attempts to open up new cotton- fields.

Country.

1 896-1 900.

Million lb.

1 90 1 -1 904.

Million lb.

Chile (including the Pacific coast of

Patagonia) .... Venezuela and Republic of Colombia . British West Indies and British Guiana Turkey (European and Asiatic) .

Egypt

British possessions in the East Indies .

Total Re-exported

1436 13-8 8-5

•8 •5 ■3 •5

295-7 407

•035

2-3

1424

31-5 8-6

2-2

•5

•6

i-i

3H-4

61 9

•041

3-8

1800

1849

223

260

The annual average shipments from Bombay to the European continent and to Great Britain in 1900-1904 were as follows: —

To the continent 600 bales of 3 % cwt.

To Great Britain 50 ,, „ „

At the end of the 18th century the bulk of British cotton was obtained from the West Indies. Approximately the supplies were as follows in million lb : —

British West Indies 6-6

French and Spanish settlements … 6

Dutch settlements 1-7

Portuguese „ 2-5

East Indies ,, -i

Smyrna or Turkey 5-7

The British Cotton Growing Association works under the sanction of a royal charter and has met with valuable official support. Financial assistance and assurances as to sales and prices have been given liberally by the association where they are needed; ginning and buying centres have been established; experts have been engaged to distribute seed and afford instruc- tion; and some land has been acquired for working under the direct management of the association. The governments of some colonies have aided the efforts of the association. Professor Wyndham Dunstan of the Imperial Institute, on a reference from the government, made favourable reports as to the possibilities of extending cotton cultivation. The results may be seen in the approximate estimates below of cotton grown more or less directly under the auspices of the association.

Bales of 400 lb.

1903.

1904.

1905.

1906.

Gambia Sierra Leone Gold Coast . Lagos Nigeria

West Africa. West Indies. East Africa . Sind Sundries

50

50

50

500

100

750

1,000

150

100 100 150 2,000 200

2,550

2,000

850

100

300 200 200 3,200 650

4,550

4,000

2,000

500

250

250

250

6,300

1,200

8,000 6,000

3-5oo

2,000 500

Total .

1,900

5,500

1 1 ,300

20,000

Approximate value

£29,000

£75,ooo

£150,000

£270,000

In the West Indies results are most favourable, both as regards quantity and quality of the crops. West Indian grown cotton has realized even higher prices than American grown Sea Island. In West Africa also prospects appear encouraging. In Sierra Leone little success has been met with, but on the Gold Coast some cotton better than middling American has been grown, and the association has concluded an agreement with the government for an extension of its work. In Lagos crops increased rapidly. The cotton is almost entirely grown by natives in small patches round their villages, and generally it

has sold for about the same price as middling American, though some of it realized as much as 25 to 30 “points on.” The quality in greatest demand in England, it should be observed, is worth about |d. to §d. per lb. above middling American. In Southern Nigeria the association has met with only slight success; in Northern Nigeria, a working arrangement was entered into with the Niger Company, and a small ginning establishment was set to work in February 1906. In British Central Africa, the results on the whole have not been satisfactory. Though planters who confined their efforts to the lower lying grounds — of which there is a fairly large tract — succeeded, all the cotton planted on the highlands proved more or less a failure. In Uganda the association took no steps, but activity in cotton growing is not unknown, and some good cotton is being produced. Arrangements were concluded with the British South Africa Company for the formation of a small syndicate for working in Rhodesia.

The general movement for the extension of cotton cultivation was welcomed by the International Congress of representatives of master cotton spinners and manufacturers’ associations at the meeting at

Zurich in May 1904. It placed on record “its cordial appreciation of the efforts of those governments and institutions which have already supported cotton-growing in their respective colonies.” England is pre-eminent but not alone in the matter. Germany and France, and in a less degree Belgium, Portugal and Italy, have taken some steps. Russia, too, is developing her internal supplies.

The advantages that might accrue from the wider distribution of cotton-growing are mainly fourfold. (1) Greater elasticity of supply might be caused. It is probably easier to extend the area under cotton rapidly when crops are raised from many places in proximity to other crops than when the mass of the cotton is obtained from a few highly specialized districts. Possibly the advantages of specialism might be retained and yet the elasticity of supply be enhanced. (2) Greater stability of crops in pro- portion to area cultivated is hoped for. The eggs are now too much in one basket, and local disease, or bad weather, or some other misfortune, may diminish by serious percentages the. supplies anticipated. Were there numerous important centres- the bad fortune of one would be more adequately offset by the good fortune of another. (3) Desirable variations in the raw material might conceivably eventuate from the introduction of cotton to spots in the globe where its growth was previously unknown or little regarded. The results of the enterprise of Mehemet Ali and Jumel in Egypt prove such an idea to be not altogether fanciful, and warn us also against hastily arguing that the plan is too artificial to succeed on a large scale. Without the active intervention of a strong body of interested parties it is sometimes unlikely that new industries will be undertaken even in places well suited for them. (4) Lastly, the countries to which cotton-growing is carried should gain in prosperity.

The general difficulties in the way of the British Cotton Growing Association are many and will be sufficiently evident. Lessons of value may be learnt from the fate of similar The Cotton work undertaken by the Cotton Supply Association, soclatlon*’ which was instituted in April 1857. According to its fifth report, it originated ” in the prospective fears of a portion of the trade that some dire calamity must inevitably, sooner or later, overtake the cotton manufacture of Lancashire, whose vast superstructure had so long rested upon the treacherous foundation of restricted slave labour as the main source of supply for its raw material.” 1 Its methods were stated to be: “To afford information to every country capable of producing cotton, both by the diffusion of printed directions for its cultivation, and sending competent teachers of cotton planting and cleaning, and by direct communication with Christian missionaries whose aid and co – operation it solicits; to supply, gratuitously, in the first instance, the

best seeds to natives in every part of the world who are willing to receive them; to give prizes for the extended cultivation of cotton; and

The Association published a weekly paper known as The Cotton Supply Reporter.

to lend gins and improved machines for cleaning and preparing cotton." Though the association brought about an extension and improvement of the Indian crop, in which result it was enormously assisted by the high prices consequent upon the American Civil War, it sank after a few years into obscurity, and soon passed out of existence altogether, while the effects of its work dwindled finally into insignificance. Much the same had been the ultimate outcome of the spasmodic attempt of the British government to bring about the introduction of cotton to newdistricts, after it had been pressed to take some action a few years prior to the forma- tion of the Cotton Supply Association. A Mr Clegg, who after- wards interested himself keenly in the activities of the Cotton Supply Association reported that in the course of a tour in 1855 through the Eastern countries bordering on the Mediterranean he had found none of the gins presented by the British govern- ment at work or workable.

Bibliography. — On the question of cotton supplies, as treated in this article, the reader may be referred to Brook's Cotton, its Uses, &c. ; Dabney's Cotton Plant (Department of Agriculture of the United States); Foaden's Cotton Culture in Egypt; Dunstan's Report on Cotton Cultivation for the British government; Oppel's Die Baum- wolle; Leconte's Le Colon; publications of the British Cotton Growing Association; Report of the Lancashire Commission on the possibility of extending cotton cultivation in the Southern States of North America; Watt's Lancashire and the Cotton Famine; publica- tions of the old Cotton Supply Association (many will be found in the Manchester public library in the volume marked " 677 I. C. ii."), including their weekly paper, The Cotton Supply Reporter; Ham- mond's Cotton Culture and Trade. On methods of marketing to certain portions of the above must be added : Ellison's Cotton Trade of Great Britain; Chapman's Lancashire Cotton Industry' (ch. vii.); articles by Chapman and Knoop in the Economic Journal (December, 1904) and the Journal of the Royal Statistical Society (April, 1906) ; Emery's Speculation on Stock and Produce Exchanges of the United States (small portions of which relate to cotton). Many statistics will be found in the works mentioned, and these may be supplemented from the trade publications of different countries. Many valuable figures of cotton imports, &c, in early years will be found in Baines' History of the Cotton Trade. Recent statistics bearing upon cotton are collected

annually in the two publications, Shepperson's Cotton Facts and Jones's Handbook for Daily Cable Records of Cotton Crop Statistics. For current information the following may be added : Nield's, Ellison's and Tattersall's circulars; Cotton (the publication of the Manchester Cotton Association); and daily reports and articles in the local press. Price curves are published by Messrs Turner, Routledge & Co. (S. J. C.)

Cotton Goods and Yarn

The two great sections of the cotton industry are yarn and cloth, and in Great Britain the production of both of these is mainly in South Lancashire, though the area extends to parts of Cheshire, Yorkshire and Derbyshire, and there is a Scottish branch, besides certain isolated ventures in other parts of the country. Though there are local rivalries there is nothing in cempetitive division to compare with the northern and southern sections in America, and the British industry is, for its size, more homogeneous than most of the European industries. Both operatives and employers are highly organized and both parties are able to make articulate contribution to the solution of the various problems connected with the trade.

Cotton Yarn. — The yarn trade is mainly in the hands of limited companies, and a private firm is looked upon as something of a survival from the past. The two great centres of production are Oldham, in which American cotton is chiefly, though not exclusively, spun, and Bolton, which spins the finer counts from Egyptian or Sea Island cotton. Spinning mills are established, however, in most of the large Lancashire towns as well as in some parts of Cheshire and in Yorkshire, where there is a considerable industry in doubling yarns. The centre of trade is the Manchester Royal Exchange, and though some companies or firms prefer to do business by means of their own salaried salesmen, managers or directors, most of the yarn is sold by agents. Frequently a single agent has the consignment of the whole of a company's yarn, but many spinners, especially those whose business connexion is not perfectly assured, prefer to have more outlets than can be explored by an individual. At times of bad trade even those who usually depend on their own resources seek the aid of experienced agents, who sometimes find a grievance if their

services are rejected when trade improves and sales are made easily.

Yarn is sold upon various terms, but a regular custom in the home trade is for the spinner to allow 4% discount, for payment in 14 days, of which 2\ goes to the buyer, who is commonly a manufacturer, and i| to the agent for sale and guaranteeing the account. In selling yarn for export it is usual to allow the buyer only 15% for payment in 14 days, or in some cases the discount is at the rate of 5 % per annum for 3 months, Which is equivalent toit%.

The great bulk of the yarn spun in Great Britain ranges between comparatively narrow limits of count, and such staples as 32 s to 36 s twist and 36 s to 46 s weft in American, 50 s to 60 8 twist and 42 s to 62 s weft in Egyptian, make up a large part of the total. It is nevertheless the experience of yarn salesmen that Lancashire produces an increasingly large amount of specialities that indicate a continued differentiation in trade. The tendency to spin finer counts has been to some extent counteracted by the development of the flannelette trade, for which heavy wefts are used, and there has been again a tendency lately to use “condensor” or waste wefts, which has worked to the disadvantage of the spinners of the regular coarse counts spun at Royton and elsewhere. The demand for cloths which require careful handling and regularity in weaving has helped to develop the supply of ring yarns which will stand the strain of the loom better than mule twists. A great amount of doubled and trebled yarn is now sold, though it does not appear that recent expansions have added much to doubling spindles, and considerable developments continue in the use of dyed and mercerized yarns.

Yarns are sold according to their “actual” counts, though when they are woven into cloth they frequently attain nominal or brevet rank. There has been a long- continued discussion, which between buyer and seller sometimes degenerates into a dis- pute, on the subject of moisture in yarns, and the difficulty is not confined to the Lancashire industry. The amount permissible, accord- ing to the recommendation of the Manchester Chamber of Commerce, is 8%, but while it may be assumed that yarns at the time of their sale rarely contain less than this, they frequently contain a good deal more. It is a matter of experience that cotton yarns which when spun contain only a small percentage of moisture will absorb up to about 8 % when they are exposed to what may be rather vaguely described as natural conditions. The exigencies of competition prompted the dis- covery that if yarn were sold by weight fresh from the spindle its comparative dryness made such early sale less profitable than if it were allowed to “condition.” Between loss and delay the spinner found an obvious alter- native in damping the yarn artificially. As it was often clearly to the advantage of the buyer that he should receive immediate delivery

he did not object to water in modera- tion, but art soon began to run a little ahead of nature. The essentially dishonest practice of deluging yarn with water, which has sometimes even degenerated into the use of weighting materials deleterious to weaving, has been recognized as a great nuisance, but while various attempts have been made to protect the buyer the question seems to have pretty well settled itself on the principles which commonly rule the sales of com- modities between those who intend to do business continuously. The spinner who persists in over-weighting his yarn finds it difficult to obtain "repeat" orders.

A remarkable point in the Lancashire yarn trade is the loose- ness of the contracts between spinner and manufacturer. Doubt- less some kind of sale note or acknowledgment usually passes between them, but in the home trade at least it is quite usual to leave the question of delivery an open one. It would not be

correct to say that this system or want of system is satisfactory, but the trade manages to rub along very well with it, although inconveniences and disagreements sometimes arise when prices have advanced or declined considerably. Thus when prices have advanced the manufacturer may find it difficult to obtain delivery of the yarn that he had bought at low rates, for some spinners have a curious, indefensible preference for delivering their higher- priced orders; and, on the. other hand, when prices have fallen the manufacturer sometimes ceases to take delivery of the high- priced yarn and actually purchases afresh for his needs. Yet positive repudiation is very rare though compromises are not uncommon, and a good many illogical arrangements are made that imply forbearance and amity. Litigation in the yarn trade is very unusual, and Lancashire traders generally have only vague notions of the bearing of law upon their transactions, and a wholesome dread of the experience that would lead to better knowledge.

The average yearly values of the exports of cotton, yarn and cloth from Great Britain for the decades 1881-1890 and 1891-1900 respectively, are given by Professor Chapman in his Cotton Industry and Trade, in million pounds: —

Cloth Yarn

381-1890.

£60-4

12-3

Total

£72-7

ji-igoo. £57-3

9-3

£66-6

During the earlier decade the prices of cotton were comparatively high The whole of the cloth exports represent, of course, a corresponding home trade in yarns. The following table, taken from the Manchester Guardian, gives in thousands of lb the amounts of cotton yarns exported from Great Britain during 1903, 1904 and 1905 respectively, according to the Board of Trade returns, together with the average value per tt> for each of the countries : —

Russia . . . .

Sweden

Norway . . Denmark …. Germany …. Netherlands .

Belgium

France

Italy . . . Austria-Hungary .

Rumania

Turkey

Egypt . .

China (including Hong-Kong)

Japan . .

British India —

Bombay ….

Madras ….

Bengal . .

Burma . . Straits Settlements

Ceylon

Other countries

Total and average .

1903.

lb. 1

814

1,526

1,656

2,429

27,239

29,591

3,97°

3,974

204

2,662

4,608

12,966

4,590

4,660

1,406

6,286 6,683

6,777

5,6n

1,945

33

21,129

150,758

Price per lb.

d..

30-22

n-oo

9-54 8-91

16-05 9-10

15-89

17-59

21-78

n-6o

8-55

8-93

8-66

9-45 12-98

io-8o

11-07 11-04 12-17

io-8i

11-92 12-39

n-79

1904.

lb. 1

713 1,486

i,5H

2,368

40,295

29,384

5,864

3,084

174

3,329

5,072

14,253

4,38i

2,457

681

8,145 8,288 6,596 3,388

i,i37

44 21,252

163,901

Price per lb.

d.

30-71

12-55 11-05 1018 16-27 10-48 16-50

20-01 24-70 14-36

IO-I3

10-05

9-83

10-24 11-46

1 1 -88 12-48

12-82

12-39

“•57

16-51 13-28

13-11

1905.

lb. 1

557

1,512

1,606

2,860

39,513

.37,341

7,205

3,5i8

204

3,066

7,856

17,389

4,382

8,441 4,071

13,112

10,930

11,068

4,211

2,149

42

23,970

205,001

Price per lb.

d.

30-66

11-12

9-73

9-51

16-38

8-93 16-12 22-64

22-21

I3-36

9-73 9-37 8-59 8-70

13-99

10-86 11-91

11-20

12-31 10-71 13-55 12-43

12-08

It should be understood, however, that in some cases the Board of Trade figures represent only an approximation to the ultimate distribution, as the exports are sometimes assigned to the intermediate country, and in particular it is understood that a considerable part of the yarn sent to the Netherlands is destined for Germany or Austria. The large business done in yarns with the continent of Europe is in some respects an extension of the British home trade, though certain countries have their own specialities. A considerable business is done with European countries in doubled yarns and in fine counts of Egyptian, including ” gassed ” yarns, which are also sent intermittently to Japan. ” Extra hard ” yarns are sent to Rumania and other Near Eastern markets, and Russia, as the average price indicates, buys sparingly of very fine yarns. The trade with the Far East, which, though not very large for any one market,’ is important in the aggregate, is a good deal specialized, and since the

1 000 omitted.

development of Indian and Japanese cotton mills some of the trade in the coarser counts has been lost. The various Indian markets take largely of 40 8 mule twist and in various proportions of 30 8 mule, water twists, two-folds grey and bleached, fine Egyptian counts and dyed yarns. China also takes 40 s mule, water twists and two- folds. The general export of yarn varies according to influences such as tariff charges, spinning and manufacturing development in the importing countries and the price of cotton. A particular effect of high-priced piece-goods is seen in various Eastern countries that are still partly dependent on an indigenous hand-loom industry. The big price of imported cloths throws the native consumer to some extent upon the local goods, and so stimulates the imports of yarn. It appears that as the native industries decline the weaving section persists longer than the spinning section.

Cotton Goods.— Cotton goods are of an infinite variety, and the titles that experience or fancy have evoked are even more numerous than the kinds. Descriptions of the following fabrics, which are not of

course invariably made of cotton, will be found in separate articles: Baize, Bandana, Bombazine, Brocade, Calico, Cambric, Canvas, Chintz, Corduroy, Crape, Cretonne, Denim, Dimity, Drill, Duck, Flannelette, Fustian, Gauze, Gingham, Longcloth, Moleskin, Mull, Muslin, Nankeen, Print, Rep, Ticking, Twill, Velveteen. The following are notes on other varieties.

Grey cloth is a comprehensive term that includes unbleached cotton cloth generally. It may be a nice question whether ” yellow “• would not have been the more nearly correct descrip- tion. A very large proportion of the Lancashire export trade is in grey goods and a smaller yet considerable proportion of the home trade.

Shirting, which has long since ceased to refer exclusively to shirt cloths, includes a large proportion of Lancashire manu- facture. Grey and white shirtings are exported to all the principal Eastern markets and also to Near Eastern, European, South American, &c. markets. Certain staple kinds, such as 39 in. 37 \ yd. i\ lb. 16X15 (threads to the \ in.), largely exported to China and India, are made in various localities and by many manufacturers. The length quoted is to some extent a con- ventional term, as the pieces in many cases actually measure considerably more. The export shirting trade is done mainly on ” repeat ” orders for well-known ” chops ” or marks. These trade marks are sometimes the property of the manufacturer, but more commonly of the exporter. Generally the China markets use rather better qualities than the Indian markets. The principal China market for shirtings and other staple goods is Shanghai, which holds a large stock and distributes to minor markets. A considerable trade is also done through Hong-Kong and other Far Eastern ports. The principal Indian markets are Calcutta, Bombay, Karachi and Madras.

Shirt-cloth is the term more commonly applied to what is actually used in the manufacture of shirts, and it may be used for either plain or fancy goods.

Sheeting has two meanings in the cotton trade: (1) the ordinary bed sheeting, usually a stout cloth of anything from 45 in. to 1 20 in. wide (the extremes being used on the one hand for children’s cots or ship bunks and on the other for old-fashioned four-posters), which may be either plain or twilled, bleached, unbleached or half bleached; (2) a grey calico, heavier than a shirting, sent largely to China and other markets, usually 36 in. by 40 yd. and weighing about 12 lb. American sheetings com pete with Lancashire goods in the China market. The Cabot is a kind of heavy sheeting, and for the Levant markets the name as a trade mark is said to be the exclusive property of an

American firm, although the general class is known by the name and supplied by other firms.

Mexican is a plain, heavy grey calico, sometimes heavily sized. The origin of the word is doubtful, and it seems to be an arbitrary term. Mexicans are exported to various markets and also used in the home trade. For export the dimensions are commonly 32 or 36 in. by 24 yd., and a usual count is 18X18. In the Mexican the yarns were originally of nearly the same weight and number of threads to the \ in., an arrangement which gave the cloth an even appearance, thus differing from the ” pin-head ” or medium makes. Now, however, Mexicans are

often made with lighter wefts, though the name is usually applied to the better class of cloths of the particular character. Punjum is a Mexican, generally 36 yd. in length, sent mainly to the South African market.

T Cloth is a plain grey calico, similar in kind to the Mexican and exported to the same markets. There is no absolute distinc- tion between the two cloths, but the T cloth is generally lower in quality than the Mexican. The name seems to have been originally an arbitrary identification or trade mark.

Domestic, a name originally used in the sense of ” home-made,” is applied especially to home-made cotton goods in the United States. In Great Britain it is employed rather loosely, but commonly to describe the kind of cloth which if exported would be called a Mexican. It may be either bleached or unbleached.

Medium is a plain calico, grey or bleached, of medium weight, used principally in the home and colonial trade. The word is sometimes particularly applied to cloths with a comparatively heavy weft, the distinction being made between the even “Mexican make” and the “pin-head” or “medium-make.”

Raising-cloths are of various kinds and may be merely mediums with a heavy weft, or ” condensor ” weft made from waste yarns. The essence of the raising-cloth is a weft that will provide plenty of nap and yet have sufficient fibre to maintain the strength of the web.

Wigan is a name derived from the town Wigan and seems to have been originally applied to a stiff canvas-like cloth used for lining skirts. Now it is commonly applied to medium or heavy makes of calico.

Double-warp, as its name implies, is a cloth with a twofold warp. It is

usually a strong serviceable material and may be either twilled or plain. Sheetings for home trade are often double-warp, and double-warp twills and Wigans were and are used for the old-fashioned type of men's night-shirts.

Croydon, which seems to be an arbitrary trade name, is a heavy, bleached, plain calico, usually stiff and glossy in finish. It used to be sold largely in the Irish trade as'well as in the English home trade, but it has been supplanted a good deal by softer finishes.

Printing-cloth is a term with a general significance, but it is also particularly applied to a class of plain cloths in which a very large trade is done both for home trade and export. The chief place in Lancashire for the manufacture of printing-cloths is Burnley, and in the United States, Fall River. The Burnley cloths range in width from 29 in. to 40 in., and are usually about 120 yd. in length. The warp is commonly from 36 s to 44 s , the weft from .36″ to 54 s , and the threads from 13X13 to 20X20 to the j in. Cheshire printers, which are made at Hyde, Stockport, Glossop and elsewhere, are commonly 34 in. to 36 in. wide, the warp is from 32 s to 36 s , the weft 32 s to 40 8 , and the counts 16X16 to 19X22.

Jacconetis understood to be the corruption of an Indian name, and the first jacconets were probably of Indian origin. They now make one of the principal staple trades of Lancashire with India. The jacconet is a plain cloth, lighter than a shirting and heavier than a mull. When bleached it is usually put into a firm and glossyfinish. A nainsook is a jacconet bleached and finished soft. It also goes largely to India.

Dhootie is a name taken from a Hindu word of similar sound and referred originally to the loin-cloth worn by Hindus. It is a light, narrow cloth made with a coloured border which is often so elaborate as to require a dobby loom for its manufacture. The finer kinds, made from Egyptian yarns, are called mull-dhooties. The dhootie is one of the principal staples for India and is exported both white and grey.

Scarf is a kind of dhootie made usually with a taped or corded border,

Madapolam or Madapollam is a name derived from a suburb of Narsapur in the Madras presidency where the cloth was first made. It is now exported grey or white to India and other countries. In weight it is lighter than a shirting, and it is usually ornamented with a distinctive coloured heading.

Baft, probably of Persian derivation, and originally a fine cloth, is now

a coarse and cheap cloth exported especially to Africa.

Country.

Sarong, the Malay word for a garment wrapped round the lower part of the body and used by both men and women, is now applied to plain or printed cloths exported to the Indian or Eastern Archipelago for this purpose.

Jean, said to be derived from Genoa where a kind of fustian with this title was made, is a kind of twilled cloth. The cloth is woven “one end up and two ends down,” and as there are more picks of weft per inch than ends of warp the diagonal lines pass from selvage to selvage at an angle of less than 45 degrees. The weft surface is the face or wearing surface of the cloth. Jeans are exported to China and other markets, and are also used in the home trade. Jeanette is the converse of jean, being a twill of “two ends up to one down”; the diagonal passes from selvage to selvage at a greater angle than 45 degrees and the warp makes the wearing surface.

Oxford is a plain-woven cloth usually with a coloured pattern, and is used for shirts and dresses. The name is comparatively modern, and is, no doubt, arbitrarily selected. Harvard is a twilled cloth similar to the Oxford. Regatta is a stout, coloured shirt cloth similar in make to a

jeanette. It was originally made in blue and white stripes and was used largely and is still used for men’s shirts.

Fancy cotton goods are of great variety, and many of them

have trade names that are

used temporarily or occasion- ally. Apart from the large

class of brocaded cloths made

in Jacquard looms there are

innumerable simpler kinds,

including stripes and checks

of various descriptions, such

as Swiss, Cord, Satin, Doriah

stripes, &c. Mercerized cloths

are of many kinds, as the

mercerizing process can be

applied to almost anything.

Lace and lace curtains are

made largely at Nottingham.

Various light goods are madein

Scotland, such as book muslin,

a fine light muslin with an

elastic finish, so called from

being folded in book-form. Among the fancy cloths

made in cotton may be men- tioned: matting, which in- cludes various kinds with

some similarity in appearance

to a matting texture; mate-

lasse, which is in some degree

an imitation of French dress

goods of that name; piquS,

also of French origin, woven

in stripes in relief, which cross

the width of the piece, and

usually finished stiff; Bedford

cord, a cheaper variety of

pique in which the stripes run

the length of the piece; oatmeal

cloth, which has an irregular

surface suggesting the grain

of oatmeal, commonly dyed

cream colour; crimp cloth, in

which a puckered effect is

obtained by uneven shrinkage;

grenadine, said to be derived

from Granada, a light dress

produced on the surface of the cloth by needles placed in a sliding frame; lustre, a light dress material with a lustrous face sometimes made with a cotton warp and woolen weft; zep hyr, a light, coloured dress material usually in small patterns; bobbin- net, a machine-made fabric, originally an imitation of lace made with bobbins on a pillow.

Some fancy cloths have descriptive names such as herringbone stripe, and there are many arbitrary trade names, such as Yosemite stripe, which may prevail and become the designation of a regular class or die after a few seasons.

Cotton linings include silesia, originally a linen cloth made in Silesia and now usually a twilled cotton cloth which is dyed various colours; Italian cloth, a kind of jean or sateen produced originally in Italy. Various cotton cloths are imitations of other textures and have modified names which indicate their superficial character, frequently produced by finishing processes. Among these are sateen, which, dyed or printed, is largely used for dresses, linings, upholstery, &c; linenette, dyed and finished to imitate coloured linen in the north of Ireland and elsewhere; hollandette, usually unbleached or half-bleached and finished to imitate linen holland; and interlining, a coarse, plain white calico used as padding for linen collars.

Various cotton imitations share the name of the original, such

Germany

Netherlands ….

Belgium

France

Portugal, Azores and Madeira.

Italy

Austria-Hungary

Greece

Turkey

Egypt

Algeria

Morocco

Foreign West Africa

Persia

Dutch East Indies . Philippine Islands China, including Hong-Kong . Japan . . . . . United States of America Foreign West Indies . Mexico …. Central America Colombia and Panama

Venezuela

Peru

Chile

Brazil

Uruguay

Argentine Republic . Gibraltar …

Malta

British W. Africa

S. . „ ...

British India —

Bombay

Madras

Bengal

Burma

Straits Settlements 1 .

Ceylon

Australia

New Zealand ….

Canada

British West India Islands,

Bahamas and British Guiana Other countries ….

Total .

1903.

Thousands of Yards.

60,650 47-570 52,199

17,552 32,824

6,363

2,405

40,973

305,611

229,704

709

52,368

64,589

34,859

156,905

25,558

477,691

67,315

72,360

86,349 19,327 40,879 44,299 52,330 28,962 84,118

152,402 44,062

151,003

11,961

4,065

69,795

61,778

678,684 132,825 ,122,004

64,654 112,006

17,395 106,000

38,499 47,439

49,614 188,662

5,i57,3i6

material originally made of

silk or silk and wool; brilliant, a dress material, usually with a small raised pattern; leno, possibly a corrupt form of the French linon or lawn, a kind of fancy gauze used for veils, curtains, &c; lappet, a light material with a figure or pattern

Price per Yard

377 3-57 4-34 4-61 2-70 5-07 3-44 2-64

2-45 2-41 2-74 2-28 2-92 2-46 2-45 2-59 2-83

3-o8 6-8o

2-08 3-10 1-97 2-25 1-87 2-66 2-50 2-64 2-79

2‘9I

2-39

3-u

3-27

3-6i

2-07 2-48 1-97

2’- 84

2-6l

2-75 3-83 3-58 4-15

2-49 2-84

2-57

1904.

Thousands of Yards.

60,129

46,187 56,237 17,759 29,440

7,904

2,102

32,658

379,557 283,521

438 51,262

55,131

33,H9

185,196

25,969 548,974 42,373 52,391 98,797 21,679

53,oi8

44,648 52,934 32,430 80,836

134,841 35,670

186,022

10,578

3,659

69,308

29,670

818,261

Hi,675

,215,607

. 79,765

100,230

19,336

128,247

33,538

49,903

43,487 197,339

Price per Yard.

5,591,822

4-02 3-68 4-42

4-39 2-92

5-19 3-40

3-ii

2-53 2-57 2-71 2-44 3-12 2-67 2-72 2-86 3-34 3-34 7-18

2-21

3-42 2-21

2-54

2-07 2-85

2-57 2-89 2-85

3-04 2-47

3-45 3-43 4-03

2-23 2-63 2-18 3-10 2-84

2-95 4-01

3-8i

4-25

2-6l

3-14

1905.

Thousands of Yards.

2-75

65,842

56,639

67,509

14,875

29,867

8,746

1,905

28,190

376,209

272,737

455

44,407

69,163

38,647

226,586

42,876

799,732

128,725

65,563 80,679 21,028 49,523

3L798

32,717 39,035 96,996

131,504

56,77o

I59,“5

3,96o

4,006

74,392

50,592

908,619

131,145 1,280,314

72,528 121,690

24,991 136,481

32,315

45.189

47,173 226,971

Price per Yard.

6,198,200

3-98 3-47 4-41

4-65 3-03 5-31 3 60 3-20 2-53 2-53 2-63 2-44

3-o8

2-59 2-57 2-66 3-06 299 7-40 2-24

3-3i

2‘29

2-4I 2-II

278 2-62 2-50

2-95

324

2-73 3-31 3-40 3-69

2-24 2-62 2-18

3-13 2-71 2-94 3-85 3-63 4-47

2-21 303

2-74

as lawn, batiste, serge, huckaback, galloon, and a large number

of names are of obvious derivation and use, such as umbrella

cloth, apron cloth, sail cloth, book-binding cloth, shroud cloth,

1 Including Federated Malay States.

butter cloth, mosquito netting, handkerchief, blanket, towelling, bagging.

Among the miscellaneous cloths made or made partly of cotton may be mentioned: waste cloths, made from waste yarns and usually coarse in texture; khaki cloth, made largely for military clothing in cotton as well as in woollen; cottonade, a name given to various coarse low cloths in the United States and elsewhere; lasting, which seems to be an abbreviation of ” lasting cloth,” a stiff, durable texture used in making shoes, &c; bolting cloth, used in bolting or sifting; brattice cloth, a stout, tarred cloth made of cotton or wool and used for bratticing or lining the sides of shafts in mines; sponge cloths, used for cleaning machinery; shoddy and mungo, which though mainly woollen have frequently a cotton admixture; and splits, either plain or fancy, usually of low quality, which include any cloth woven two or three in the breadth of the loom and “split” into the necessary width. Cotton is used too for many miscellaneous purposes, including the manufacture of lamp wicks and even of billiard balls.

British Cotton Cloth Exports. — The main lines of the Lancashire export trade in cotton goods are indicated in the Board of Trade returns. The table on p. 278 compiled from them is taken from the Manchester Guardian. It gives in thousands of yards the quantities of cotton goods exported from Great Britain during 1903, 1904 and 1905 respectively, together with average value per yard for each of the countries.

The following table gives, approximately, in thousands of yards the quantities exported of the four main divisions of cotton cloths : —

1903.

1904.

1905.

Thousands of Yards.

Thousands of Yards.

Thousands of Yards.

Grey or unbleached . Bleached …. Printed …. Dyed and coloured .

1,880,321

1,326,255

1,027,925

922,735

2,033,895

1,528,165

1,036,901

993,009

2,336,018 1,710,742 1,053,900 1,097,540

In the case of cloth, too, the Board of Trade returns must not be taken as an absolute record of imports to the particular countries, as the ultimate recipient is not always determined. The develop- ment of the Eastern trade has been one of the most remarkable features of the cotton trade in the 19th century. Professor Chapman writes in his Cotton Industry and Trade: “In 1820 Europe received about half the cotton fabrics which were sent abroad, while the United States received nearly one-tenth and eastern Asia little “more than one-twentieth. By 1880 Europe was taking less than one-twelfth, the United States less than one-fiftieth, and eastern Asia more than a half.”

Naturally a trade tends to find out the most direct means of distribution, and Manchester merchants are now generally in direct connexion with native dealers in India. Bombay was the pioneer in the custom, followed now by Calcutta and Karachi, by which deliveries of goods from British merchants remained under the control of the banks until the native dealers took them up. Manchester business with India, China, &c, is done under various conditions, however, and a good

many firms have branches abroad. The regular “indent” by which most of the Manchester Eastern business is conducted now implies a definite offer for shipment from the dealer abroad, either direct or through the exporter’s agents, and commonly includes freight and insur- ance. The term “commission agent” is now discredited, and buying done by Manchester houses on simple commission terms is unusual though not unknown. This has been so since the famous law case of Williamson v. Barbour in 1877, when it was established that whatever might be the custom of the trade a commission agent was not entitled to make a profit over his commission on the various processes, such as handling and packing, which are a necessary part of the exporter’s work. A good deal of business is done, however, for South America and other markets in which the goods are bought for delivery in the Manchester warehouse, all charges for packing, &c, and carriage being extra.

Transactions with distant markets are now done almost en- tirely by cable, and a remarkable development of the telegraphic code has enabled merchants to pack a good deal into a brief message. A cable sent to India in the evening may bring a reply next morning, and in these days of rapid cotton fluctuations mail advices are confined mainly to general discussion, hypothetical inquiry, advice, admonition and complaint. Some Manchester export business is done through London, Glasgow, and continental towns, of which Hamburg is the principal. Glasgow buys largely of yarns and cloth, some considerable part of which is dyed or printed, for India and elsewhere, and has an indigenous manu- facture and trade in fine goods such as book-muslins and lappets, a somewhat delicate department of manufacture which necessi- tates a slower running of machinery than is usual in Lancashire. •

Besides the indent business there is, of course, purely merchant business by Manchester exporters, who buy on their own initia- tive at what they consider to be opportune times or on recom- mendations from their houses or correspondents abroad. In the Indian trade, especially in the Calcutta trade, a large proportion of the total amount is done by a few houses who buy in this way, and there is some difference of opinion as to whether the method, which had fallen out of fashion, may not further develop. It is more speculative than the indent business, but the dealing with large quantities which it involves gives the opportunity to buy very cheaply. A good many firms venture occasionally to buy in anticipation of their customers’ needs, especially when they expect a rising market. During the great trade “boom” of 1905 there was a good deal of buying by exporters in advance of their indents because manufacturers continued to contract

engagements which threatened to exclude dilatory buyers. On the whole, however, what may be called the speculative centre of gravity of Great Britain's export business in cotton goods is not in Manchester but abroad.

The terms on which business is conducted are various even in a single market, and it is sometimes a reproach that British firms are old-fashioned in their reluctance to give credit. The so- called enterprising methods of some German traders are, however, condemned by many experienced English traders, and it is said that in China, for instance, the seeming successes of the new- comers are delusive. The Tientsin developments of German business on credit terms are said to have proved unsatisfactory, and heavy losses were suffered in Hong-Kong some years ago by merchants who endeavoured to initiate a bolder system of trading. The very common complaint of British consuls that British firms neglect to send out travellers may have some foundation, but a commercial house naturally follows the line of least resist- ance to the development of its trade, and cannot be expected to work remote and barren ground when better opportunities are near at hand. On the whole it appears that the British cotton trade continues to increase to a satisfactory degree in fancy and special goods, which require for their production a comparatively high degree of technical skill, and are more lucrative than some of the simpler products in which competitors have been most formidable. Various finishing processes, and particularly the mercerizing of yarn and cloth, have increased the possibilities in cotton materials, and while staples still form the bulk of our foreign trade, it seems that as the stress of competition in these grows acute, more and more of our energy may be transferred to the production of goods which appeal to a growing taste or fancy.

British Home Trade. — The home trade in cotton cloths is a great and important section, but it is not comparable in volume to the export trade. It involves more numerous and more elaborate processes, and the qualities for home use are generally finer and more costly than those for export. Of course by far the larger part of the yarn spun in Lancashire is woven in Lancashire, but of the cotton cloth woven in Lancashire it is roughly estimated that about 20% is used in Great Britain. Not only is the average of quality better, but the variety of kinds and designs is greater in the home trade than in the export trade. A good home trade connexion is considered an extremely valuable asset, and as the trade is highly differentiated the profits are usually good. Some manufacturers devote themselves exclusively to the home trade,

and some exclusively to foreign trade, but there is a large class with what may be called a margin of alternation, which serves to redress the balance as business in one or other of the sections is good or bad.

Certain kinds of light goods made for India and other Eastern markets are not used in the home trade, and the typical Eastern staples are not generally used in their particular “sizings,” but with these exceptions and various specialities almost every kind of cotton cloth is used to some extent in Great Britain. Grey calicoes for home use, except the lowest kinds, are comparatively pure, and of late years the heavy fillings which used to be common in bleached goods have become discredited. The housewife long persisted in deceiving herself by purchasing filled calicoes, and the •movement in favour of purer goods owes a good deal, strangely enough, to the increase in the making-up trade and the consequent inconveniences. to workers of sewing machines, whose needles were constantly broken by hard filled calicoes.

This development of the making-up trade has become an important element in the home trade, and it has greatly reduced the retail sale of piece-goods. The purchase of ready-made shirts, underclothing, &c, corresponds to a change in the habits of the people. The factories which have been erected in the north of Ireland, oti the outskirts of London and elsewhere turn out millions of garments that would, under the old conditions, have been made at home. It is not necessary here to balance the advantages and disadvantages of the two systems, and it must not be supposed that made-up cotton garments are necessarily cheap and inefficient.

The chief distributing centre of cotton made-up goods is London, though a considerable trade is done through wholesale houses in Manchester and elsewhere. Large warehouses in the city of London carry on the trade and frequently supply Lanca- shire with her own goods. Of course the partial loss of the piece-goods trade by the shops is not a loss in aggregate trade, as they are the ultimate distributors of the made-up garments, which are probably at least as profitable to retail as calico or flannelette sold in lengths.

The normal course of home trade piece-goods is from manu- facturer to bleacher, dyer, printer or finisher, either on account of a merchant to whom the goods are sold or on the manufacturer’s own account. By

far the majority of Lancashire manufacturers sell their goods as they come from the loom, or, as it is called, in the ” grey state,” but an increasing number now cultivate the trade in finished goods. Usually the manufacturer sells either directly or through an agent to a merchant who sells again to the shopkeeper, but the last twenty or thirty years have seen a considerable development of more direct dealing. Some manu- facturers now go to the shopkeeper, and this has made it difficult for the merchant with a limited capital and therefore a limited assortment to survive. The great general houses such as Rylands’s, Philips’s and Watt’s in Manchester, and Cook’s and Pawson’s in London, some of which are manufacturers to a minor degree, continue to flourish because under one roof they can supply all that the draper requires, and so enable him to econo- mize in the time spent in buying and to save himself the trouble of attending to many accounts. Some general merchants, indeed, supply what are practically ” tied houses,” which give all their trade in return for pecuniary assistance or special terms.

The tendency to eliminate the middleman has not only brought a good many manufacturers into direct relation with the shopkeeper, but in some exceptional cases the manufacturer, adopting some system of broadcast advertisement and postal delivery, has dealt with the consumer. Naturally, the merchant resents any developments which exclude him, and some mild forms of boycott have occasionally been instituted. In the United States there has been an arduous struggle over this question, and combinations of merchants have sometimes compelled favourable terms. In England, though the merchant has maintained a great part of the trade with shopkeepers, the developing trade with makers of shirts, underclothing, &c, is mainly done by the manufacturers directly, and perhaps the simplification of relations by direct dealing in the cotton trade has now reached

a point of fairly stable compromise. The tendency to direct trading is naturally controlled by the exigencies of capital. Those manufacturers who act as merchants aim to retain the merchant profit and must employ a merchant capital in stocks. There has been a tendency, indeed, to make the manufacturer the stock- keeper, and some merchants do little more than pass on the goods a stage after taking toll. The great improvement in trade during 1905 and 1906 checked this tendency, and probably the manufacturing extensions owed something to the capital set free by the reductions of stocks.

It must be noted, however, that while most of the spinning

concerns are worked by limited companies or individuals with a

considerable capital, a good many small manufacturers exist who

have little capital and are practically financied by their agents or

‘ customers. This is so in both the export and home trades.

The home trade merchant or merchant-manufacturer works largely through agents and travellers, and though railway facilities continue to improve, some shopkeepers rarely visit their markets. The difficulty that is naturally experienced by a traveller in finding sufficient support on a sparsely populated “ground” has brought into vogue the traveller on commission who represents several firms. The traveller with salary and allowances for expenses survives, but the quickening induced by an interest in the amount of sales has caused many firms to adopt the principle of commission, which may, however, be an addition to a minimum salary. Of course, such travellers are not peculiar to the cotton trade, but cotton goods in various forms are an important factor in the home trade.

The profits of manufacturers, merchants and shopkeepers are commonly very much less on the lower classes of cotton goods than on the higher ones. Thus while there may be a difference of id. per yd. between the qualities on a manufacturer’s list, the difference in cost may not be more than a farthing; and, again, while the shopkeeper sometimes pays a|d. or even 2f d. per yd. for a calico to retail at 2|d., his next selling price may be 3 |d. for one which costs him only 2jd. or 3d. per yd. It appears, there- fore, that if the poorer classes of the community have the discretion to avoid the lowest qualities they may obtain very good value in serviceable goods. In the matter of profits, however, there is a good deal of irregularity.

The Manchester Royal Exchange. — There are not many cotton mills or weaving sheds in Manchester, which is, however, the great distributive centre, and its Exchange is the meeting-place of most classes of buyers and sellers in the cotton trade and various trades allied to it. As buyers of finished goods for London and the country do not attend it, certain departments of the home trade are hardly represented, but practically all the spinners and manufacturers and all the export merchants of any importance are subscribers. Transactions between spinners and manu- facturers are largely effected on Tuesdays and Fridays, the old “market days,” when the manufacturing towns are well repre- sented, but a large amount of business is transacted every day. Besides the persons immediately concerned in the cotton trade and connected with allied trades, a large number of members find it convenient to use this great meeting-place as a means of

approach to a body of responsible persons. Thus not only bleachers, carriers, chemical manufacturers, mill furnishers and account- ants find their way there, but also tanners, timber merchants, stockbrokers and even wine merchants. Since the Ship Canal made Manchester into a cotton port there has been a steady development of the raw cotton trade in Manchester, and many cotton brokers and merchants have Manchester offices or pay regular visits from Liverpool.

The various expansions and developments have made it difficult to maintain the ratio between accommodation and requirements, and although overcrowding is troublesome only during some three or four hours a week, at “high ‘Change” on market days, various complaints and suggestions provoked in 1906 an appeal from the chairman of directors to the Manchester corporation. This took the form of a suggestion that the Exchange should be worked as a municipal institution on a new site, and though such a development met with opposition it was

apparent that Manchester must presently have a new or an enlarged Exchange. The present building is, however, the largest of the kind in the world, and the history of the various exchanges coincides with the expansion of the Lancashire industry.

According to semi-official records ” the first building in the nature of an Exchange” was erected in 1729 by Sir Oswald Mosley, and though designed for ” chapmen to meet and transact their business ” it appears that, as to-day, encroachments were made by other traders until cotton manufacturers and merchants preferred to do their business in the street. In 1792 the building was demolished, and for a period of some eighteen years there was nothing of the kind. In 1809 the new Exchange was opened, and terms of membership were fixed at two guineas for those within 5 m. of the building and one guinea for those outside this radius. In the following year plans for enlargement were submitted to the shareholders, and various extensions followed, particularly in 1830 and 1847. The present building was opened partly in 187 1 and partly in 1874. The area of the great room is 4405 sq. yds. The subscription was raised on the 1st of January 1906 from three guineas to four guineas for new members, but the number of members continues to increase and early in 1906 amounted to 8786.

Of course in this great mart a large variety of types is to be found and the members fall into some kind of rough grouping. Export buyers, attended by salesmen, are commonly more or less stationary and prominent; Burnley manufacturers abound in one locality and spinners of Egyptian yarns in another. The import- ance of the Exchange as a bargaining centre is fairly maintained, though buyers are assiduously cultivated in their own offices, and the telephone has done a good deal to abbreviate negotiation. As to the amount of business transacted on the Exchange there is no record. The market reporters make some attempt to materialize the current gossip, and doubtless catch well enough the great movements in the ebb and flow of demand, but the sum of countless obscure transactions cannot be estimated. Some few years ago an attempt was made to mark more clearly the course of business in Manchester, and a scheme was prepared for the recording of daily transactions. This could only have been a somewhat rough affair, but its originator maintained reasonably that it would be of interest if some indication of the daily move- ments could be obtained. For some time a memorandum of the total of daily sales reported was posted on 'Change, but the indifference of traders, together with the distrust that makes any innovation difficult, caused the scheme to be abandoned.

It would be difficult in any attempt to estimate the volume of British home trade to distinguish what may be called the effective movements of goods. There is a considerable amount of re-selling both in yarn and cloth, and, though the bulk of cotton goods finds the way through regular and normal channels to the consumer, these channels are not always direct. A good many transactions on the Manchester Exchange are intermediate, without fulfilling any useful function, and could be accomplished by the principals if they were brought together. Agents, of whom there are many, sometimes occupy a precarious position, but they are protected in some degree by law as well as by the custom of the trade and the point of honour. Points of honour in the Manchester business may seem to be arbitrarily selected, but they are an important part of the scheme. An immense amount of business is done without any apparent check against repudiation. It is, of course, the verbal bargain that binds, and large transac- tions are commonly completed without witnesses, though before the contract or memorandum of sale passes the fluctuations of the market may have made the bargain, to one side or the other, a very bad one. (A. N. M.)

COTTON MANUFACTURE. The antiquity of the cotton industry has hitherto proved unfathomable, as can readily be understood from the difficulty of proving a universal negative, especially from such scanty material as we possess of remote ages. That in the 5th century B.C.

cotton fabrics were unknown or quite uncommon in Europe may be inferred from Herodotus' mention of the cotton clothing of the Indians. Ultimately the

cotton industry was imported into Europe, and by the middle of the 13th century we find it flourishing in Spain. In the New World it would seem to have originated spontaneously, since on the discovery of America the wearing apparel in use included cotton fabrics. After the collapse of Spanish prosperity before the Moors in the 14th century the Netherlands assumed a leadership in this branch of the textile industries as they did also in other branches. It has been surmised that "the cotton manu- facture was carried from the Netherlands to England by refugees during the Spanish persecution of the second half of the 16th century; but no absolute proof of this statement has been forthcoming, and although workers in cotton may have been among the Flemish weavers who fled to England about that time, and some of whom are said to have settled in and about Manchester, it is quite conceivable that cotton fabrics were made on an insignificant scale in England years before, and there is some evidence to show that the industry was not noticeable till many years later. If England did derive her cotton manufacture from the Netherlands she was unwillingly compelled to repay the loan with interest more than two hundred years later when the machine industry was conveyed to the continent through the ingenuity of Lievin Bauwens, despite the precautions taken to preserve it for the British Isles. About the same time English colonists transported it to the United States. Since, as trans- formed in England, the cotton industry, particularly spinning, has spread throughout the civilized and semi-civilized world, though its most important seat still remains the land of its greatest development.

As early as the 13th century cotton-wool was used in England for candle-wicks. 1 The importation of the cotton from the Levant in the 16th century is mentioned by Hakluyt, 2 and according to Macpherson it was brought over V from Antwerp in 1560. Reference to the manufacture England? of cottons in England long before the second half of the 1 6th century are numerous, but the " cottons " spoken of were not cottons proper as Defoe would seem to have mistakenly imagined. Thus, for example, there is a passage by William Camden (writing ;in 1590) quoted below, in which Manchester cottons are specifically described as woollens, and there is a notice in the act of 33 Henry VIII. (c. xv.) of the Manchester linen and woollen industries, and of cottons — which are clearly woollens since their " dressyng and frisyng " is noted, and the latter process, which consists in raising and curling the nap, was not applicable to cotton textiles. John

Lelarld, after his visit to Manchester about 1538, used these words — ” Bolton- upon-Moore market standeth most by cottons; divers villages in the Moores about Bolton do make cottons.” Leland, it is true, might conceivably be referring to manufactures from the vegetable fibre, but it is exceedingly unlikely, since the term ” cottons ” would seem to have been current with a perfectly definite meaning. The goods were probably an English imitation in wool of continental cotton fustians — which would explain the name. Again we may quote from the act of 5 and 6 Edward VI., ” all the cottons called Manchester, Lancashire and Cheshire cottons, full wrought to the sale, shall be in length twenty-two yards and contain in breadth three-quarters of a yard in the water and shall weigh thirty pounds in the piece at least “; and from the act 8 Elizabeth c. xi., ” every of the said cottons being sufficiently milled or thicked, clean scoured, well-wrought and full-dried, shall weigh 21 lb at the least.” 3 These are evidently the weights of woollen goods: further, it may be observed that milling is not applicable to cotton goods. The earliest reference to a cotton manufacture in England which may reasonably be regarded as pointing to the fabrication of textiles from cotton proper, is in the will of James Billston (a not un-English name), who is described as a” cotton manufacturer,” proved at Chester in 1578. 4 It may plausibly be contended that James Billston was a worker in the

1 See the extract from the books of Bolton Abbey, given by Baines (p. 96) and dated 1298.

2 Vol. ii. p. 206; Baines, pp. 96-97.

3 Baines, pp. 93 and 94.

4 Lancashire and Cheshire Record Society, vol. ii.

vegetable fibre, since otherwise ” manufacturer of cottons ” would have been a more natural designation. But the proof of the will of one cotton manufacturer establishes very little.

The next earliest known reference to the cotton industry proper occurs in a petition to the earl of Salisbury, made presum- ably in 1610, asking for the continuance of a grant for reforming frauds committed in the manufacture of ” bambazine cotton such as groweth in the land of Persia being no kind of wool.” 1 But a far more valuable piece of evidence, discovered by W. H. Price, is a petition of ” Merchants and

citizens of London that use buying and selling of fustians made in England, as of the makers of the same fustians.” 2 Its probable date is 1621, anditcontains the following important passages: —

” About twenty years past, divers people in this kingdom, but chiefly in the county of Lancaster, have found out the trade of making of other fustians, made of a kind of bombast .or down, being a fruit of the earth growing upon little shrubs or bushes, brought into this kingdom by the Turkey merchants, from Smyrna, Cyprus, Acra and Sydon, but commonly called cotton wool; and also of linen yarn most part brought out of Scotland, and othersome made in England, and no part of the same fustians of any wool at all, for which said bombast and yarn imported, his majesty has a great yearly sum of money for the custom and subsidy thereof.

” There is at the least 40 thousand pieces of fustian of this kind yearly made in England, the subsidy to his majesty of the materials for making of every piece coming to between 8d. and iod. the piece ; and thousands of poor people set on working of these fustians.

“The right honourable duke of Lennox in n of Jacobus 1613 procured a patent from his majesty, of alnager of new draperies for 60 years, upon pretence that wool was converted into other sorts of commodities to the loss of customs and subsidies for wool transported beyond seas ; and therein is inserted into his patent, searching and sealing; and subsidy for 80 several stuffs; and among the rest these fustians or other stuffs of this kind of cotton wool, and subsidy and a fee for the same, and forfeiture of 20s. for putting any to sale unsealed, the moiety of the same forfeiture to the said duke, and power thereby given to the duke or his deputies, to enter any man’s house to search for any such stuffs, and seize them till the forfeiture be paid; and if any resist such search, to forfeit £10 and power thereby given to the lord treasurer or chancellor of the exchequer, to make new ordinances or grant commissions for the aid of the duke and his officers in execution of their office.”

Here the date of the appearance of the cotton industry on an appreciable scale — it is questionable whether any importance should be attached to the expression “found out ” — is given by those who would be speaking of facts within the memory of themselves or their friends as ” about twenty years past ” from 1 6 2 1 , and the annual output of the industry in 1 6 2 1 is mentioned. Moreover, it is established by this document that for a time at least the cotton manufacture was ” regulated ” like the other textile trades. The date assigned by the petitioners for the first attraction of attention by the

English cotton industry may be supported on negative grounds.

Baines assures us that William Camden, who wrote in 1590, devoted not a sentence to the cotton industry, though Manchester figures among his descriptions: ” This town,” he says, ” excels the towns immediately around it in handsomeness, populousness, woollen manufacture, market place, church and college; but did much more excel them in the last age, as well by the glory of its woollen cloths (laneorum pannorum honore), which they call Manchester cottons, as by the privilege of sanctuary, which the authority of parliament under Henry VIII. transferred to Chester.” 3 It is significant too that in the Elizabethan poor law of 1 60 1 (43 Elizabeth), neither cot ton- wool nor yarn is included among the fabrics to be provided by the overseers to set the poor to work upon; though, of course, it might be argued that so short-stapled a fibre needed for its working, when machinery was rough, a skill in the operative which would be above that of the average person unable to find employment. However, a proposal was made in 1626 to employ the poor in the spinning of cotton and weaving wool. 4

1 State Papers, Domestic, lix. 5. See W. H. Price, Quar. Jour. Econ., vol. xx.

2 London Guildhall Library, vol. Beta, Petitions and Parliamentary Matters (1620-1621), No. 16 (old No. 25).

3 The act referred to is 33 Henry VIII. c. xv., already mentioned.

4 Cunningham, Growth of English Industry and Commerce (1903), Vol. ii. p. 623.

Prior to Mr Price’s discovery of the petition mentioned above, the earliest known notice of the existence in England of a cotton industry of any magnitude was the oft-quoted passage from Lewes Roberts’s Treasure of Traffic (1641), which runs: ” The town of Manchester, in Lancashire, must be also herein re- membered, and worthily for their encouragement commended, who buy the yarne of the Irish in great quantity, and weaving it, return the same again into Ireland to sell: Neither doth their industry rest here, for they buy cotton-wool in London that comes first from Cyprus and Smyrna, and at home work the same, and perfect it into fustians, vermillions, dimities and other such stuffs, and then return it to London, where the same is vented and sold, and not seldom sent into foreign parts.” 5

Despite Lewes Roberts’s flattering reference, the trade of Manchester

about that time consisted chiefly in woollen frizes, fustians, sackcloths, mingled stuffs, caps, inkles, tapes, points, &c, according to ” A Description of the Towns of Manchester and Salford,” 1650, 6 and woollens for a long time held the first place. But before another century had run its course cottons proper had pushed into the first rank, though the woollen industry continued to be of unquestionable importance. In 1 7 2 7 Daniel Defoe could write, ” the grand manufacture which has so much raised this town is that of cotton in all its varieties,” 7 and he did not mean the woollen ” cottons,” as he made plain by other references to the industry in the same connexion; but it was not until some fifty years later that the ousting of the woollen industry from what is now peculiarly the cotton district became unmistakable. 8 As a rule the woollen weavers were driven farther and farther east —Bury lay just outside the cotton area when Defoe wrote — and finally many of them settled in the West Riding. Edwin Butter- worth even tells of woollen weavers who migrated from Oldham to the distant town of Bradford in Wiltshire because of the decline of their trade before the victorious cotton industry. Much the same fate was being shared by the linen industry in Lanca- shire, which was forced out of the county westwards and north- wards. The explanation of the three centralizations, namely of the woollen industry, the cotton industry and the linen industry* is not far to seek. The popularity of the fabrics produced by the rising cotton industry enabled it to pay high wages, which, indeed, were essential to bring about its expansion. This a priori diagnosis is supported by contemporary analysis: thus “the rapid progress of that business (cotton spinning) and the higher wages which it afford, have so far distressed the makers of worsted goods in .that county (Lancashire), that they have found themselves obliged to offer their few remaining spinners larger premiums than the state of their trade would allow.” 9 The best operatives of Lancashire were attracted sooner or later to assist the triumphs of art over the vegetable wool. At the same time the scattered woollen and linen workers of Lancashire were suffering from the competition of rivals enjoying elsewhere the economies of some centralization, and the demand for woollen and linen warps in the cotton industry ceased after the introduction of Arkwright’s water-twist. When the factory became common the economies of centralization(which arise from the wide range of specialism laid open to a large local industry) increased; moreover they were reinforced by the diminution of social friction and the intensification of business sensitiveness which marked the development of the 19th century. Once begun, the centralizing movement proceeded naturally with accelerating speed. The contrast beneath is an instructive statistical comment: —

6 Original edition, pp. 32, 33.

6 Aikin's Description of the Country from Thirty to Forty Miles round Manchester, p. 154.

7 Tour, vol. iii. p. 219.

8 For instance Radcliffe p. 61. Ogden (author of A Description of Manchester, &c, published in 1783), if Aikin's " accurate and well-informed enquirer " by Ogden, says that the period of rapid extension of the cotton industry began about 1770. See also Butterworth's History of Oldham and the passage quoted below in the text.

9 Account of Society for Promotion of Industry in Lindsey (1789), Brit. Mus. 103, L. 56. Quoted from Cunningham's English Industry and Commerce, vol. ii. p. 452, n. ed., 1892.

Distribution of Cotton Operatives in 1838 and i8g8-l8QQ {from Returns of Factory Inspectors).

	1838.
Cheshire	36,400
Cumberland	2,000
Derbyshire .	10,500
Lancashire .	152,200
Nottinghamshire	1,500
Staffordshire	
Yorkshire	
England and Wales l	
Scotland .	
Ireland	
United Kingdom	

2,000

12,400

219,100

35,6oo

4,600

259,300

34-3O0

700

10,500

398,100

1,600

2,300

35,200

496,200

29,000

800

526,000

The distribution of the industry has varied greatly in the two periods. If it had remained constant Lancashire would only have contained 300,000 operatives in 1899, instead of the actual 400,000. Scotland, on the other hand, only contained 30,000 instead of 70,000, and in Ireland the numbers were one-tenth of what they should have been. The percentage of operatives in Lancashire in 1838 was ˆ8-5, but this increased to 75-7 in 1898.

Why, we may naturally inquire, did not the cotton industry localize in the West Riding or Cheshire and the woollen industry maintain its position in Lancashire? Accident no BMnad- doubt partly explains why the cotton industry is vantages, carried on where it is in the various parts of the globe, but apart from accident, as regards Lancashire, it is

sufficient answer to point to the peculiarly suitable congeries of conditions to be found there. There is firstly the climate, which for the purpose of cotton spinning is unsurpassed elsewhere, and which became of the first order of importance when fine spinning was developed. In the Lancashire atmosphere in certain districts just about the right humidity is contained on a great number of days for spinning to be done with the least degree of difficulty. Some dampness is essential to make the fibres cling, but excessive moisture is a disadvantage. Over the county of Lancashire the prevailing west wind carries comparatively continuous currents of humidified air. These currents vary in temperature according to their elevation. Hot and cold layers mix when they reach the hills, and the mixture of the two is nearer to the saturation point than either of its components. The degree of moisture is measured by the ratio of the actual amount of moisture to the moisture of the saturation point for that particular temperature. Owing to the sudden elevation the air is rarefied, its temperature being thereby lowered, and in consequence condensation tends to be produced. In several places in England and abroad, where there is a scarcity of moisture, artificial humidifiers have been tried, but no cheap and satisfactory one has hitherto been discovered. To the advantages of the Lancashire climate for cotton spinning must be added — especially as regards the early days of the cotton industry — its disadvantages for other callings. The unpleasantness of the weather renders an indoor occupation desirable, and the scanty sunshine, combined with the unfruitful nature of much of the soil, prevents the absorption of the popula- tion in agricultural pursuits. In later years the port of Liverpool and the presence of coal supplemented the attractions which were holding the cotton industry in Lancashire. All the raw material must come from abroad, and an enormous proportion of English cotton products figures as exports. The proximity of Liverpool has aided materially in making the cotton industry a great exporting industry.

Before the localization of the separate parts of the industry can be treated the differentiation of the industry must be described. We pass then, at this stage, to consider the manufacture in its earliest form and the lines of its development. First, and some- what incidentally, we notice the early connexion between the conduct of the cotton manufacture, when it was a domestic

J In 1838 the only other county with more than 1000 was Gloucester with 1500. 217,000 of the 219,100 operatives in England and Wales were employed in the counties enumerated. Of the 2000 operatives whose location is not given, about 1000 worked in Flintshire.

industry in its primitive form, and the performance of agri- cultural operations. A few short extracts will place before us all the evidence that it is here needful to adduce. First Radcliffe, an eye-witness, writing of the period about 1770, says ” the land in our township (Mellor) was occupied by between fifty and sixty farmers . . . and out of these fifty or sixty farmers there were only six or seven who raised their rents directly from the produce of their farms, all the rest got their rent partly in some branch of trade, such as spinning and weaving woollen, linen or cotton. The cottagers were employed entirely in this matter, except for a few weeks in the harvest.” 2 Next we may cite Edwin Butterworth who, though not an eye- witness (he was not born till 1812), proved himself by his researches to be a careful and trustworthy investigator. In the parish of Oldham, he recorded, there were “a number of master (cotton-linen fustian) 3 manufacturers, as well as many weavers who worked for manufacturers, and at the same time were holders of land or farmers. . . . The number of fustian farmers who were cottagers working for manufacturers, without holding land, were few; but there were a considerable number of weavers who worked on their own account, and held at the same time small pieces of land.” 4 Other passages might be quoted, but these two will suffice. Weaving was not exactly a by-employment of farm labourers, but many weavers made agriculture a by-employment to some extent, (a) by working small parcels of land, which varied from the size of allotments to farms of a very few acres, and (b) by lending aid in gathering in the harvest when their other work enabled them to do so. The association of manufacturing and weaving survived beyond the first quarter of the 19th century. Of the weavers in many districts and ” more especially in Lancashire ” we read in the report of the committee on emigration, ” it appears that persons of this description for many years past, have been occupiers of small farms of a few acres, which they have held at high rents, and combining the business of the hand-loom weaver with that of a working farmer have assisted to raise the rent of their land from the profits of their loom.” 5 One of the first lines of specialism to appear was the severing of the connexion described above, and the concentration of the weavers in hamlets and towns. Finer fabrics and more complicated fabrics were introduced, and the weaver soon learnt that such rough work as farming unfitted his hands for the delicate tasks required of them. Again, really to prosper a weaver found it necessary to perfect himself by close application. The days of the rough fabrics that anybody could make with moderate success were closing in. As a consequence the dispersion of the weavers becomes

less and less. They no longer wanted allotments or farms; and their looms having become more complicated, the mechanic proved himself a convenient neighbour. Finding spinners too was an easier task in the hamlet or town than in the remote country parts. But there is no reason to suppose that agriculture and the processes of the domestic cotton manufacturer had ever been universally twin callings. There never was a time, probably, when weavers who did nothing but weave were not a significant proportion, if not the major part, of the class of weavers. All again were not independent and all were not employees. Some were simply journeymen in small domestic workshops; others were engaged by fustian masters or Manchester merchants and paid by the piece for what they made out of material supplied them ; others again bought their warp:: and cotton and sold to the merchants their fabrics, which were their own property. The last class was swept away soon after the industry became large, when by the organiza- tion of men of capital consumers and producers were more and

2 W. Radcliffe's Origin of the New System of Manufacturing, p. 59.

3 The term " fustian " had originally been used to designate certain woollen or worsted goods made at Norwich and in Scotland. A reference to Norwich fustians of as early a date as the 14th century is quoted by Baines.

4 E. Butterworth's History of Oldham, p. 101.

5 Parliamentary Reports, &c. (1826-1827), v. p. 5. See for even later examples Gardner's evidence to the committee on hand-loom weavers in 1835.

more kept in touch. In early days most weavers owned their looms, the great part of which they had frequently constructed themselves : later, however, a large number hired looms, and it was as usual in certain quarters for lodgings to be let with a loom as it is to-day for them to be provided with a piano. When it became customary for weavers to undertake a variety of work, the masters usually provided reeds (which had to vary in fineness with the fineness of the warp), healds, and other changeable parts, and sometimes they employed the gaiters to fit the new work in the looms.

Until the success of the water-frame, cotton could not be spun economically of sufficient strength and fineness for warps, and the

warps were therefore invariably made of either linen or wool. Some were manufactured locally, others were imported from Germany, Ireland and Scotland. The weaver prepared them for his loom by the system of peg-warping, 1 but after the introduction of the warping-mill he received them as a rule all ready for insertion into the loom from the Manchester merchant or local fustian master.

" It did not pay the individual weaver to keep a warping-mill for occasional use only, and frequently the contracted space of his work-room precluded even the possibility of his doing so. The invention of the warping-mill necessitated specialism in warping, and it was essential that warping should be done to order, since at that time, the state of the industrial world being what it was, no person could ordinarily have been found to adventure capital in producing warps ready made in anticipation of demand for the great variety of fabrics which was even then produced. Moreover, had the weaver himself placed the orders for his warps, any occasional delay in the execution of his commissions might have stopped his work entirely until the warps were ready; for warps cannot be delivered partially, like weft, in quantities sufficient for each day's work. To ensure con- tinuous working in the industry, therefore, it was almost inevitable that the merchant should himself prepare the warps for such fabrics as he required, or possibly have them prepared. To the system of the merchant delegating the preparation of warps there was less objection than to the system of the weaver doing so, since the merchant, dealing in large quantities, was more likely to get pressing orders completed to time. Further, the merchant knew first what kind of warps would be needed. The first solution, however, that of the merchant undertaking the warping himself, was the surer, and there was no doubt as to its being the one destined for selection in a period when a tendency to centralize organization, responsibility and all that could be easily centralized, was steadily gaining in strength." 2

Guest says the system by which the weaver was supplied with warps and other material was substituted for the purchase of warps and cotton-wool by the weaver about 1740. No doubt the change was very gradual, especially as Aikin mentions the use of warping-mills in the 17th century. The weaver as a rule received his weft material in the form of cotton-wool and was required to arrange himself for its cleaning and spinning. Accord- ing to Aikin, 3 dealers tried the experiment of giving out weft instead of cotton-wool, but " the custom grew into disuse as there was no detecting the knavery of the spinners till a piece came in woven." As it was impossible to unwrap the yarn and test it throughout its length, defects were hidden until it came to be used, and the complaints of weavers were not conclusive as to the

inferiority of the yarn, since their own bad workmanship might have had something to do with its having proved un- satisfactory. It was therefore found best to saddle the weaver with full responsibility for both the spinning and weaving. Women and children cleaned, carded and spun the cotton-wool in their homes. The cotton had to be more thoroughly cleaned after its arrival in this country. The ordinary process of cleaning was known as ” willowing,” because the cotton was beaten with willow switches after it had been laid out on a tight hammock of cords. The cotton used for fine spinning was also carefully washed; and even when it was not washed it was soaked with water and partially dried so that the fibres might be made to cling together. 4 Most of the weaving was done by men, and until

1 This is illustrated in one of the plates to Guest’s History of the Cotton Manufacture. * Chapman’s Lancashire Cotton Industry, pp. 15 and 16.

3 Page 167.

4 Mrs Crompton, wife of Samuel Crompton, we are told, used to

the invention of the fly-shuttle they cast the shuttle from hand to hand in the manner of their remotest ancestors. For the making of the broader fabrics two weavers were required when the width was greater than the easy stretch of a man’s arms. Some- times cloths were woven wide and then split into two or more: hence the term ” splits.” This became a common practice when the hand-loom workers were groaning under the pressure of competition from the power-loom.

We now reach the era of the great inventions. In order to ensure clearness it will be desirable to consider separately the branches of spinning and weaving: to pass from the one to the other, and follow the chronological order, vention might cause confusion. First emphasis must be laid “hinery upon the point that it was not mechanical change alone which constituted the industrial revolution. No doubt small hand-looms factories would have become the rule, and more and more control over production would have devolved upon the factory master, and the work to be done would have been increasingly assigned by merchants, had the steam-engine remained but the dream of Watt, and semi-automatic machinery not been invented. The spirit of the times was centralizing management before any mechanical changes of a revolutionizing character had been devised. Loom-sh’ops, in which several journeymen were employed, were not uncommon: thus ” in the latter part of the last (18th) and the beginning of the present (19th) century,” says Butterworth, describing the state of

affairs in Oldham and the neighbourhood, ” a large number of weavers . . . possessed spacious loom-shops, where they not only employed many journeymen weavers, but a considerable pro- portion of apprentice children.” It is true that both the fly- shuttle and drop-box had been invented by that time, but the loom was still worked by human power. Specialism, however, was on the increase, the capitalist was assuming more control, and the operative was being transformed more and more into the mere executive agent. Further, as creative of enterprise, an atmo- sphere of freedom and a general economic restlessness, consequent upon the reaction against mercantilism, were noticeable. Great changes, no doubt, would soon have swept over Lancashire had a new source of power and big factories not been rendered essential by inventions in spinning.

The chief inventors were Lewis Paul and John Wyatt, James Hargreaves and Samuel Crompton. The two first originated the principle of spinning by rollers. Their patent was taken sninning out in 1 738, but no good came of it immediately, though an< / pre . many trials were made and moderately large sums of paratoty money were lost. Ultimately RichardArkwright brought «>achin- forward the same plan improved: 6 his first patent was ery ‘ dated 1769. Over the real authorship of the fundamental idea there has been much controversy, and it has not been absolutely proved that the second inventor, whether Thomas Highs, Arkwright or John Kay (a clockmaker of Warrington who assisted Arkwright to construct his machine and is said by some to have told him of an invention by Highs) , did not hit upon the device afresh in ignorance of the work already done. Even as between Paul and Wyatt it is not easy to award due measure of praise. Probably the invention, as a working machine, resulted from real collaboration, each having an appreciable share in. it. Robert Cole, in his paper to the British Association in 1858 (reprinted as an appendix to the 1st ed. of French’s Life of Crompton), championed the claims of Paul, but Mantoux, in his La Revolution industrielle au XVIII’ siecle, after studying the Wyatt MSS., inclines to attribute to Wyatt a far more important position, though he dissents from the view of Baines, who ascribes little or nothing to Paul.

Arkwright’s prospects of financial success were much greater than those of his predecessors, because, first, there was more

employ her son George shortly after he could walk, as a ” dolly-peg ” to tread the cotton in the soapy water in which it was placed for washing. See French’s Life of Crompton, pp. 58-59 (3rd ed.). Row- botham in his diary gives two accounts of fires which were caused by carelessness in drying cotton.

6 On the difference between the two machines see Baines's History, p. 138 et seq.

need in his time of mechanical aids, and secondly, he was highly talented as a business man. In 1 7 7 5 he followed up his patent of 1769 with another relating to machinery for carding, drawing and roving. The latter patent was widely infringed, and Arkwright was compelled to institute nine actions in 1781 to defend his rights. An association of Lancashire spinners was formed to defend them, and by the one that came to trial the patent was set aside on the ground of obscurity in the specifications. Arkwright again attempted to recover his patent rights in 1785, after the first patent had been in abeyance for two years. Before making this further trial of the courts he had thought of pro- ceeding by petition to parliament, and had actually drawn up his " case," which he was ultimately dissuaded from presenting. In it he prayed not only that the decision of 1781 should be set aside, but that both patents should be continued to him for the unexpired period of the second patent, i.e. until 1789. In his " case" (i.e. the petition mentioned above) Arkwright stated that he had sold to numbers of adventurers residing in the different counties of Derby, Leicester, Nottingham, Worcester, Stafford, York, Hertford and Lancaster, many of his patent machines, and continued: " Upon a moderate computation, the money ex- pended in consequence of such grants (before 1782) amounted to at least £60,000. Mr Arkwright and his partners also expended in large buildings in Derbyshire and elsewhere upwards of £30,000, and Mr Arkwright also erected a very large and extensive building in Manchester at the expense of upwards of £4000. Thus a business had been formed which already (he calculated) employed upwards of five thousand persons, and a capital on the whole of not less than £200,000." x It is impossible to discover exactly the rights of the matter. Certainly Arkwright had been intentionally obscure in his specifications, as he admitted, and for his defence, namely that it was to preserve the secret for his countrymen, there was only his word. He may have hoped to keep the secret for himself; and as to the originality of both inventions there were grave doubts. But Arkwright has received little sympathy, because his claims were regarded as grasping in view of the large fortune which he had already won. He began work with his first partners at Nottingham (when power was derived from horses) and started at Cromford in 1771 (where the force of water was used). Soon he was involved in numerous undertakings, and he remained active till his death in 1792.

He had met throughout with a good deal of opposition, which possibly to a man of his temperament was stimulating. Even in the matter of getting protective legislation reframed to give scope to the application of the water-frame, a powerful section of Lancashire employers worked against him. This protective legislation must here be shortly reviewed.

In 1700 an act had been passed (ri & 12 William III. c. 10) prohibiting the importation of the printed calicoes of India, Persia and China. In 1721 the act 7 George I. c. 7 prohibited the use of any ” printed, painted, stained or dyed calico,” excepting only calicoes dyed all blue and muslins, neckcloths and fustians. This act was modified by the act 9 George II. c. 4 (allowing British calicoes with linen warps). Thus the matter stood as regards prints when Arkwright had demonstrated that stout cotton warps could be spun in England, and at the same time the officers of excise insisted upon exacting a tax of 6d. from the plain all-cottons instead of the 3d. paid by the cotton-linens, on the ground that the former were calicoes. Arkwright’s plea, however, was admitted, and by the act 14 George II. c. 72 the still operative part of the act of 17 21 was set aside, and the manufacture, use, and wear of cottons printed and stained, &c, was permitted subject to the payment of a duty of 3d. per sq. yd. (the same as the excise on cotton-linens) provided they were stamped ” British manufactory.” The duty was varied from time to time until its repeal in 1832.

Some more powerful force than that of man or horse was soon needed to work the heavy water-frames. Hence Ark- wright placed his second mill on a water-course, fitting it with a water-wheel, and until the steam-engine became eco- nomical most of the new twist mills were built on water- 1 Baines p. 183.

Lancashire

• 41

Flintshire

Derbyshire .

. 22

Berkshire

Nottinghamshire .

• 17

Lanarkshire

Yorkshire .

. 11

Renfrewshire

Cheshire

. 8

Perthshire

Staffordshire

. 7

Midlothian .

Westmorland .

• 5

Isle of Man

courses. On rare occasions the old fire-engines seem to have been tried.

The following passage quoted from a note in Baines's History illustrates the pressing need of the early mills: " On the river Irwell, from the first mill near B?cup, to Prestolee, near Bolton, there is about 900. ft. of fall available from mills, 800 of which is occupied. On this river, and' its branches it is computed that there are no less than three hundred mills. A project is in course of execution to increase the water-power of the district, already so great and so much concentrated, and to equalize the force of the stream by forming eighteen reservoirs on the hills, to be filled in times of flood, and to yield their supplies in the drought of summer. These reser- voirs, according to the plan, would cover 270 acres of ground, and contain 241,300,000 cub. ft. of water, which would give a power equal to 6600 horses. The cost is estimated at £59,000. One reservoir has been completed, another is in course of formation, and it is probable that the whole design will be carried into effect." 2

As early as 1788 there were 143 water-mills in the cotton industry of the United Kingdom, which were distributed as follows among the

counties which had more than one. 3

• • 3

. . 2

• • 4 ■ • 4

• • 3

. 2

. . 1

The need of water to drive Arkwright's machinery, and its value for working other machinery, caused a strong decentralizing tendency to show itself in the cotton industry at this time, but more particularly in the twist-spinning branch. Ultimately the steam-engine (first used in the cotton industry in 1785) drew all branches of the industry into the towns, where the advantages of their juxtaposition — i.e. the external economies of centralization — could be enjoyed. Out of the crowding of the mills in one locality sprang the business specialism which has continued up to the present day. Here it will not be out of place to notice the appearance of the new power, electricity, in the cotton industry, the extension of which may involve striking economic changes. The first electric-driven spinning-mill in Lancashire, that of the " Acme " Spinning Company at Pendlebury, the work of which is confined to the ring-frame, was opened in 1905. Power is obtained from the stations of the Lancashire Power Company at Outwood near Radcliffe, some 5 m. distant.

The chief principle of the water-frame was the drawing out of the yarn to the required degree of tenuity by sets of grip- ping rollers revolving at different speeds. This principle is still applied universally. Twist was given by a " flyer " revolving round the bobbin upon which the yarn was being wound; the spinning so effected was known as throstle-spinning. The plan is still common in the subsidiary processes of the cotton industry, but for spinning itself the ring-frame, which appears to have been invented simultaneously in England and the United States (the first American patent is dated 1828), is rapidly supplanting the throstle-frame, 4 though the " ooziness " of mule yarn has not yet been successfully imitated by ring-frame yarn. The great inven- tion relating to weft-spinning was the jenny, introduced by James Hargreaves probably about 1764, and first tried in a factory four years later. 6 Hargreaves unfortunately was unable to maintain his patent, because he had sold jennies before applying for protection.

Crompton's mule, which combined the principles of the rollers and the jenny, was perfected about 1779. Both jennies and mules were known as " wheels," because they were worked in part by the turning of a wheel. As they could be set in motion without using much power, being light when of moderate

2 Baines's History of the Cotton Manufacture, p. 86 n.

3 These figures are quoted from a pamphlet published in 1788 entitled " An Important Crisis in the Calico and Muslin Manufactory in Great Britain explained." Many of the estimates given in this pamphlet are worthless, but there seems no reason why the figures quoted here should not be at least approximately correct.

4 See article on Cotton-spinning Machinery.

6 Hargreaves' claim to this invention has been disputed, but no satisfactory evidence has been brought forward to disprove his claim. Hargreaves was a carpenter and weaver of Stand-hill near Blackburn, and died in 1778.

size, for a long time they were worked entirely by hand or partially with the aid of horses or water. The first jenny- and mule-factories were small for this reason, and also because skill in the operative was a matter of fundamental importance, 1 as it was not in twist-spinning on the water-frame. The size of the typical weft-spinning mill suddenly increased after the scope for the application of power was enlarged by the use of the self-actor mule, invented in 1825 by Richard Roberts, of the firm of Sharp, Roberts & Co., machinists, of Manchester. In 1830 Roberts improved his invention and brought out the complete self-actor. Self-actors had been put forward by others besides Roberts — for instance by William Strutt, F.R.S. (son of Arkwright's partner), before 1790; William Kelly, formerly of Lanark mills, in 1792; William Eaton of Wiln in Derbyshire ; Peter E wart of Manchester ; de Jongh of Warrington; Buchanan, of Catrine works, Scotland; Knowles of Manchester; and Dr Brewster of America 2 — but none had succeeded. And Roberts's machines did not immediately win popularity. For a long time the winding done by them was defective, and they suffered from other imperfections. Broadly speaking, until the American Civil War the number of hand- mules in use remained high. It was for the fine " counts " in particular that

many employers preferred them. 3 About the end of the ‘sixties, however, and in the early ‘seventies, great improvements were effected in machinery, partly under the stimulus of a desire to elevate its fitness for dealing with short- staple cotton, and it became evident that hand-mules were doomed. Here we may suitably refer to the scutching machine for opening and cleaning cotton, invented by Mr Snodgrass of Glasgow in 1797, and introduced by Kennedy 4 to Manchester in 1808 or 1809; the cylinder carder invented by Lewis Paul and improved by Arkwright; and the lap-machine first constructed by Arkwright’s son.

We now transfer our attention to that accumulation of im- provements in manufacturing (as weaving is technically termed) which, taken in conjunction with the inventions already machinery, described, presaged the large factory system which ‘ covers Lancashire to-day. Gradually, for many years, the loom had been gathering complexities, though no funda- mental alteration was introduced into its structure until 1738, when John Kay of Bury excited the wrath of his fellow-weavers by designing and employing the device of the fly-shuttle. For some unfathomable reason — for the opposition of the weavers hardly explains it, though they expressed their views forcibly and acted upon them violently — this invention was not much applied in the cotton industry until about a quarter of a century after its’ appearance. The plan was merely to substitute for human hands hammers at the ends of a lengthened lathe along which the shuttle ran, the hammers being set in motion by the jerking of a stick (the picking peg) to which they were attached by strings. The output of a weaver was enormously increased in consequence. In 1760 John Kay’s son Robert added the drop-box, by the use of which many different kinds of weft could be worked into the same fabric without difficulty. It was in fact a partitioned lift, any partition of which could be brought to a level with the lathe and made for the time continuous with it. The drop-box usefully supplemented the “draw-boy,” or “draught-boy,” which provided for the raising of warps in groups, and thereby enabled figured goods to be produced. The ” draw-boy ” had been well known in the industry for a long time; in 1687 a Joseph Mason patented an invention for avoiding the expense of an assistant to work it, 5 but there is no evidence to show that his invention was of

1 See Chapman’s Lancashire Cotton Industry, pp. 59 et seq.

2 See Baines p. 207.

3 ” Counts ” are determined by the number of hanks to the lb. A hank is 840 yds. The origin of the hank of 840 yds. is probably that spinners

used a winding-reel of 1 \ yds. in circumference, so that 80 threads (one ” lea ” or ” rap ” according to old phrase- ology) would contain 120 yds., and seven leas {i.e. a hank) would contain 840 yds. A hank of seven leas was the common measure in the woollen industry, in which the reels were 1 yd. or 2 yds. in cir- cumference. For details see an article on the subject in the Textile World Record, vol. xxxi. No. I.

4 The author of the memoir of Crompton (see bibliography). 6 Specification 257.

practical value. Looms with ” draw-boys ” affixed, which could sometimes be worked by the weavers themselves, later became common under the name of harness-looms, which have since been supplanted by Jacquard looms, wherein the pattern is picked out mechanically.

The principle of the fly-shuttle was a first step towards the complete mechanizing of the action required for working a loom. The second step was the power-loom, the initial effort to design which was created by the tardiness of weaving as contrasted with the rapidity of spinning by power. After the general adoption of the jenny, supplies of yarn outran the productive powers of the agencies that existed for converting them into fabrics, and as a consequence, it would seem, some yarn was directed into exports which might have been utilized for the manufacture of cloth for export had the loom been more pro- ductive. The agitation for the export tax on yarn at the end of the 18th, and in the first years of the 19th century, is therefore comprehensible, but there was no foundation for some of the allegations by which it was supported. For a large proportion of the exported yarn, fabrics could not have been substituted, since the former was required to feed the hand-looms in continental homes and domestic workshops, against much of the product of which there was no chance of competing. The hand-loom was securely linked to the home of the peasant, and though he would buy yarn to feed his loom he would not buy cloth and break it up. 6

Cartwright’s loom was not the first design adapted for weav- ing by power. A highly rudimentary and perfectly futile self- actor weaving machine, which would have been adapted for power-working had it been capable of working at all, had been invented by a M. de Gennes: a description of it, extracted from the Journal de sQavans, appeared in the Philosophical Transac- tions for July and August 1678, and again in the Gentleman’s Magazine in 1751 (vol. xxi. pp. 391-392). It consisted of mechanical hands, as it were, that shot in and out of the warp and exchanged the shuttle. 7 Another idea, which however

proved fruitful, was that of grinding the shuttle through the warps by the agency of cog-wheels working at each end upon teeth affixed to the upper side of the shuttle. Though shuttles could not in this fashion be set in rapid movement, the machine turned out to be economical for the production of ribbons and tapes, because many pieces could be woven by it at once. These contrivances were known as swivel-looms, and in 1724 Stukeley in his Itine- rarium curiosum wrote that the people of Manchester have " looms that work twenty-four laces at a time, which was stolen from the Dutch." Ogden says also that they were set up in imitation of Dutch machines by Dutch mechanics invited over for the purpose. Another interesting passage relating to the swivel-looms will be found in the rules of the Manchester small-ware weavers dated 1756, where the complaint is made that the masters have acquired by the employ- ment of " engine or Dutch looms such large and opulent fortunes as hath enabled them to vie with some of the best gentlemen of the country," and it is alleged that these machines, which wove twelve or fourteen pieces at once, " were in use in Man- chester thirty years ago." 8 One power-factory at least was devoted to them as early as 1760, namely that of a Mr Gartside at Manchester, where water-power was applied, but the enterprise failed. 9 Cartwright's invention was probably perfected in its

6 For further analysis of the arguments current see Chapman's Lancashire Cotton Industry, pp. 66 et seq.

7 Also in the 17th century a John Barkstead was granted a patent for a method of manufacturing cotton goods, but the method is not described. 1691, Specification 276.

8 In the parliamentary reports (l84o),xxiv. p. 611, the invention of the swivel-loom is claimed for a " Van Anson." It is a plausible supposition that by " Van Anson " is meant Vaucanson, as he appears to have improved the swivel-loom. But he could not have been the original inventor, since in 1724 (that is, when Vaucanson was at the most fifteen years of age) they were being employed in Manchester.

9 Aikin, pp. 175-176, and Guest, p. 44. An explanation of the mechanism of the swivel-loom will be found in the Encyclopedic methodique, manufactures, arts et metiers, pt. i. vol. ii. pp. 202, 208, and Recueil de planches, vol. vi. (1786), pp. 72-78.

Exports of Cotton Yarns and

Imports

of Cotton Yarns and

Imports of

Raw Cotton

Manufactures, Million £.

Manufactures, Million £.

Year.

Raw Cotton,

re-exported.

Manu-

Million lb.

Million lb.

Yarns.

Manu- factures.

Total.

Yarns.

factures

(excluding

Lace).

Total.

1 700-1 705

1-17

I77I-I775

476

1 785-1 789

1-07 3

1791-1795

26-00

2-09 3

1816-1820

139-00

io-6

2-5

I3 : 8

16-30

1831-1835

3 13 00

230

4-8

14-2

19-00

1851-1855

872-00

124-0

6-8

24-9

3I-70

1876-1880

1456-00

180-0

12-4

56-i

68-30

2

29

2-29

1891-1895

1746-00

217-0

97

56-6

66-30

■42

2

78

3-20

1896-1900

1798-00

223-0

8-9

58-2

67-10

•26

4

27

4-53

1901-1905

1920-00

265-0

8-4

70-7

79-io

•22

5-10

5-32

first form about 1787, but many corrections, improvements and additions had to be effected before it became an unqualified success. Cartwright's original idea was elaborated by numerous followers, and supplementary ideas were needed to make the system complete. Of the latter the most important were those due to William Radcliffe, and an ingenious mechanic who worked with him, Thomas Johnson, which were patented in 1 803 and 1 804. They related to the dressing of the warp before it was placed in the loom, and for the mechanical taking up of the cloth and drawing forward of

the warp, so that the loom had not to be stopped for the cloth to be moved on and the warp brought within play of the shuttle to be sized. Looms fitted with the latter of these devices were known as ” dandy ” looms. The looms that followed need not be described here, nor need we concern ourselves with the degree in which some were imitations of others. It is of interest to note, however, in view of recent developments, that one of Cartwright’s patents included a warp-stop motion, though it was never tried practically so far as the writer is aware. Looms with warp-stop motions are now common in the United States, as are also automatic looms, but both are still the exception in Lancashire for reasons that will be sketched later.

Power-looms won their way only very gradually. Cartwright and others lost fortunes in trying to make them pay, but the former was compensated by a grant of £10,000 from govern- ment. In 1813 there were 2400 only in the whole of the United Kingdom; in 1820 there were 14,000, beside some 240,000 hand-looms; in 1829, 55,500; in 1833, 100,000; and in 1870, 440,700.’ To-day there are about

700,000 in the cotton industry. The beginning, and the final consequences, of the competitive pressure of the power-looms may be read in the reports of official inquiries and in Rowbotham's diary. 2 It was upon the fine work that the hand-loom weavers retained their last hold. In 1829 John Kennedy wrote in his paper to the Manchester Literary and Philosophical Society on " The Rise and Progress of the Cotton Trade," "It is found . . . that one person cannot attend upon more than two power-looms, and it is still problematical [even in 1829, observe] whether the saving of labour counterbalances the expense of power and machinery and the disadvantage of being obliged to keep an establishment of power-looms constantly at work." It was not easy to obtain a sufficiency of good hands for the power-looms, because the operatives, who had acquired their habits under the domestic system, hated factory life. This, in conjunction with the ease with which the art of coarse weaving could be acquired and the cheapness of rough looms, helps to explain the wretched straits into which the hand-loom weavers were driven.

Improvements in machinery, which ultimately affected every process from cleaning the cotton to finishing the fabric, and the application of water and steam-power, so lowered the cost of production as to render Lancashire the cotton factory of the world. Figures are quoted in the table to show the rate of growth in different periods of England's imports and exports as regards the raw material and products of this industry. It is important to remember when reading the last 6 columns that the value of money was the same in 1831-1835, 1851-1855

1 Figures for the years above up to 1838 will be found in parliamentary reports (1840), xxiv. p. 611.

2 This is the manuscript diary of a weaver of Oldham roughly covering the period 1787 to 1830. It is now in the Oldham public library. Mr S. Andrew edited extracts from it in a series of articles in the Standard (an Oldham paper), under the title Annals of Oldham, beginning January I, 1887.

and 1876-1880: the sums of Sauerbeck's index numbers for these periods were 454, 451 and 444 respectively. In the last two periods there were considerable depressions in prices. If prices had remained constant, in the periods 1891-1895 and 1896-1900 the figures of exports would have been £90 millions and £91 millions respectively. The growth in trade has been partly occasioned by the enormous increase in the volume of cotton goods consumed all over the world, which in turn has been due to (1) the growth of population, (2) the increase in productive

efficiency and well-being, and (3) the substitution of cotton fabrics for woollen and linen fabrics. The rate of growth between the periods 1771-1781 and 1781-1791 (which is not shown in the above table) was particularly remarkable, and reached as high a figure (when measured by importations of weight of cotton) as 320%.

Nothing is more interesting in the cotton industry than the processes of differentiation and integration that have taken place from time to time. Weaving and spinning had been to oifferea- a large extent united in the industry in its earliest form, nation in that both were frequently conducted beneath the and/nte- same roof. With mechanical improvements in spinning, S ratlon – that branch of the industry became a separate business, and a substantial section of it was brought under the factory regime. Weaving continued to be performed in cottages or in hand-loom sheds where no spinning at all was attempted. Cartwright's invention carried weaving back to spinning, because both opera- tions then needed power, and the trouble of marketing yarn was largely spared by the reunion. Mr W. R. Grey stated in 1833 to the committee of the House of Commons on manufactures, commerce and shipping, that he knew of no single person then building a spinning mill who was not attaching to it a power- loom factory. Some years later the weaving-shed split away from spinning, partly no doubt because of the economies of industrial specialism, partly because of commercial developments, to be described later, which rendered dissociation less hazardous than it had been, and partly because, in consequence of these developments, much manufacturing (as weaving is termed) was constituted a business strikingly dissimilar from spinning. The manufacturer runs more risks in laying by stocks than the spinner, because of the greater variety of his product and the more frequent changes that it undergoes. The former, therefore, must devote more time than the latter to keeping his order book and the productive power of his shed in close correspondence. The minute care of this kind that must be exercised in some classes of businesses explains why the small manufacturer still holds his own while the small spinner has been crushed out. It also explains to some extent the prevalence of joint-stock companies in spinning, and their comparative rarity in manu-facturing. Here we should notice, perhaps, that the only combination of importance in the cotton industry proper (apart from calico-printing, bleaching, &c, and the manufacture of sewing-cotton) is the Fine Cotton Spinners and Doublers Association, founded in 1898, which is practically coextensive with fine spinning and doubling.

3 Official values.

Localiza- tion of branches of the Industry.

The specialism of the two main branches of the industry has been followed by the specialism of sub-branches and by the localization of specialized parts. Of the localization of certain sections of the cotton industry the late Mr Elijah Helm, who spoke with the authority of great local knowledge, has written as follows: — ” Spinning is largely concentrated in south Lancashire and in the adjoining borderland of north Cheshire. But even within this area there is further allocation. The finer and the very finest yarns are spun in the neighbourhood of Bolton, and in or near Manchester, much of this being used for the manufacture of sewing-thread; whilst other descriptions, employed almost entirely for weaving, are produced in Oldham and other towns. The weaving branches of the industry are chiefly conducted in the northern half of Lanca- shire — most of it in very large boroughs, as Blackburn, Burnley and Preston. Here, again, there is a differentiation. Preston and Chorley produce the finer and lighter fabrics; Blackburn, Darwen and Accrington, shirtings, dhooties and other goods extensively shipped to India; whilst Nelson and Colne make cloths woven from dyed yarn, and Bolton is distinguished for fine quiltings and fancy cotton dress goods. These demarcations are not absolutely observed, but they are sufficiently clear to give to each town in the area covered by the cotton industry a distinctive place in its general organization.” 1

The present local distribution of the cotton industry, as far as it is displayed statistically, is revealed in the table beneath, based upon the figures of spindles and looms given by Worrall and those of operatives in the census returns of 1901.

Distribution of Cotton Operatives in Lancashire and the Vicinity according to the Census Returns of 1901, together with the Number of Spindles and Looms according to Worrall.

Blackburn ….

Bolton

Oldham …. Burnley …. Manchester and Salford Preston …. Rochdale …. Darwen ….

Nelson

Glossop 3 . . . .

Bury

Stockport …. Ashton-under-Lyne . Accrington ….

Colne

Heywood …. Stalybridge Todmorden . . ‘ . Rawtenstall . .

Hyde

Chadderton Haslingden

Bacup

Chorley …. Farnworth, near Bolton

Leigh

Great Harwood Middleton …. Radcliffe ….

No. of Operatives.

41,400 29,800 29,500 27,900 27,200 25,000 14,800 12,500 12,400

10,700 9,700 8,600 8,300

7.3°°

7.300 7,100 6,900 6,600 6,500 6,400 6,100 5.900 5.900 5.700 5.000 4,900 4.900 4,800

No. of Spindles (in Thousands).

1,325

5,035

11,603

687

2,666

2,036

2,168

336

23

968

818

1,803

1,839

417

140 4

869

1,106

261

356

553

148 315 547 738 1,667 72

5H

157

No. of Looms.

75,30o

20,100

18,500

79,300

24,200 2

57,900

25,100

28,700

39,ooo

15,400

22,200

8,700

11,500

36,400

20,500

6,400

7,100

15,800

8,800

7,900

12,000 9,300

17,900

10,600

5,90o

12,400 2,500 8,900

Local markets have steadily lost in importance, partly owing to railway development, and it is now almost entirely in Manchester, on the Exchange, that dealing in yarns and fabrics takes place, and arrangements are made for export. The old Manchester Exchange, built in 1729, was taken down in 1792. A new Exchange, reared on a contiguous site, was opened in 1809, the first stone having been laid in 1806. The present building was erected in 1869. The great bulk of the exports of cotton goods proceeds from Liverpool, though London used to be the leading port, and Liverpool is still the chief English

market for raw cotton, though now from one-sixth to one-eighth of English cotton supplies come up the Manchester Ship Canal.

1 Printed in British Industries. Edited by W. J. Ashley.

2 Manchester only.

3 The number of operatives in places in Derbyshire is not separately specified.

4 Includes Foulridge with Colne.

To understand the present organization of the cotton industry the reader must begin by mentally separating the commercial from the industrial functions. By the industrial functions are meant the arrangements of factors in JModer j' production — choosing the most suitable machinery and a OBt hands, combining them in the most economical system, adapting the material used to this system, and keeping its working at the highest attainable level. The commercial functions consist in business which is not industrial. Analysis will show that there are, broadly speaking, two classes of com- mercial functions, namely (1) arranging for purchases and sales, and (2) the bearing of risks. The character of the former is apparent; it consists, as regards yarn, in discovering for each manufacturer which spinner makes the yarn which is best adapted to his requirements at the lowest cost, and in finding the most suitable customers for spinners. Risk-bearing is a com- mercial function of another kind. Every business that involves anticipation involves commercial risks. Thus the spinner who sells " forward " yarn, trusting that the price of cotton will not rise, is taking commercial risks, and so is the spinner who pro- duces for stock, trusting that the class of yarn that he is making will continue in demand. These two instances will suffice to indicate what is meant by the carrying of commercial risks. To make the rest of our argument clear it will be well to write down formulae. Let A and B represent respectively the industrial operations of spinning and manufacturing. Let a and a represent respectively the commercial operations implied by the separate existence of A, that is, the buying of cotton and the selling of yarn ; and let b and /3 stand for the commercial operations associated with manufacturing, that is, the buying of yarn on the one hand, and the finding of customers and arranging for their purchases on the other hand. Then, A and B being distinct businesses, it is obvious that a range of schemes is possible of which the extremes may be roughly represented as follows: —

i.(aAo), (bB/3)

2. (a),

where the brackets signify independent businesses. In case 1 each spinning business would be engaged with three problems, namely, (i.) buying material at the most favourable time, (ii.) producing at the lowest cost, and (iii.) finding buyers and selling at the highest price, including the arranging for the performance of the most remunerative work. But in case 2 the spinner would confine his attention to purely industrial matters, while the problem of finding cotton and arranging for the bearing of the risks as to future prices would rest with other persons, and the business of bringing spinner and manufacturer together and taking such risks as may be involved in ordering or disposing of yarn would be the function of yet others. In case 2 the com- mercial functions may be said to have differentiated completely from the main body of the industry. We need hardly give illustrations of the intermediate arrangements that formally lie between cases 1 and 2. A may retain commercial risks but find customers through intermediaries; in such an event there would be only partial differentiation of the commercial functions. The reader must be reminded also that for the sake of simplicity in the formulae we have overlooked different classes of A and of B, omitted bleaching, dyeing, printing and finishing, and drawn no distinction between the various classes of commercial work covered by one letter, for instance, selling in the home market and selling abroad.

It may help the reader to appreciate the organic growth of the Cotton industry if we now run over the main lines of its evolution. Originally the industrial units were held together in one homo- geneous commercial setting. The Manchester merchants bought cotton and warps, put them out to the weavers, and arranged for the finishing of the cloth and then for its sale, so far as they had not been acting on orders already received. There were varia- tions of this system — for instance, in early years weavers some- times bought their own yarns and cotton and sold their cloth — but just before the industrial revolution the arrangement sketched above was the most usual. Adverting to our formula, the Manchester merchants, we observe, performed functions

a (in conjunction with importers), b (as regarded warps), and (3. Weft the weaver had to get spun by his family or outsiders. So, broadly speaking, there was one single commercial setting. After the

appearance of the factory, the commercial work as between the water-twist mills, the mule-spinning businesses and the manu- facturers, so far as the businesses were distinct, appears to have been done by the several producing firms concerned. It was not at once that (ab) began to differentiate. /3 was already a separate business in the hands of Manchester merchants and the foreign houses who had established themselves in Manchester to direct the export trade. At the present time an advanced stage of com- mercial specialism has been reached. From the risks connected with the buying of cotton the spinner may if he please escape entirely. 1 Selling work is now done usually through inter- mediaries, but there is no one uniform rule as to the carrying of the commercial risks involved. This appears to be now to some extent a matter of arrangement between the persons concerned, but ultimately no doubt the risks will have to be borne by those most qualified by experience to bear them, namely, the com- mercial specialists. In no other trade in England, and in no other cotton industry abroad, has commercial specialism been carried so far as in the cotton trade of Lancashire. It is partly in consequence of the difference in this respect between the cotton industry in Lancashire and abroad that the separation of spinning from weaving is far more common in England than elsewhere. Elsewhere producers are deterred from specializing processes further in distinct businesses by the fear of the worries of buying and selling as between them.

The explanation of differences in respect of the degree of commercial specialism in different places and industries can be formulated only very generally. Time is required for the differentiation and localization to take place. The English cotton trade had not advanced very far in the ” ‘thirties,” if we are to judge from the evidence given to commissions and parlia- mentary committees. The general conditions under which commercial specialism evolves may be taken to be a moderately limited range of products which do not present many varieties, and the qualities of which can be judged generally on inspection. In such circumstances private markets need not be built up, as they must be, for instance, for a new brand of soap which claims some subtle superiority to all others. Soaps under present conditions must be marketed by their producers. Broadly stated, if there be little competition as to substitutes, though there may be much as to price in relation to quality, commercial functions may specialize. On the whole this is the case in the cotton industry; in so far as it is not and firms

produce specialities, they undertake much of the marketing work themselves.

The advantages of commercial specialism are numerous. Firstly it allows of differentiation of industrial processes, and this, of necessity, is accompanied by increasing returns. When weaving dissociates from spinning, both the number of looms in each business and the number of spindles in each business tend to increase; more division of labour is therefore secured, and lower costs of production are reached, and there is a further gain because producers concentrate their attention upon a smaller range of work. Again when producers are freed entirely, or to some extent, from commercial worries, they can attain a higher level of efficiency at the industrial task of mill organiza- tion, and a more perfect accommodation of capacity to function will be brought about. If the business unit is (aAa), a particular person may retain his place in the market by reason of his excellence at the work a or a, though as works organizer (i.e. at the performances of function A) lie may be incompetent. The heads of businesses will succeed according to their average capacities at the three tasks a, A and a, and there is no guarantee, therefore, that any one of these tasks will be performed with the highest attainable efficiency in our present somewhat immobile economic system. But if the three functions are separated there is more certainty of a person's success in the perform- ance of each determining his continued discharge of it. The problems that arise when specialized markets become very highly developed are dealt with in the article Cotton: Marketing and Supply.

The distribution of cotton operatives among the chief centres has already been shown, but their distribution between processes has yet to be considered, and the proportions of different ages and sexes from time to time, together with the OP er *tlves total. With such statistical material as is available va "° us relating to supplies of labour we may set forth also the P rocesses- official returns made of the quantity of machinery at work from time to time. It hardly need be pointed out that the ratio of machinery to operatives roughly measures the efficiency of labour, other things being equal.

Machinery in the United Kingdom (in Thousands).

Spinning

Doubling

Power-

Years.

Spindles.

Spindles.

Looms.

1874

37,5i6

4366

463

1878

39.528

4679

515

1885

40,120

4228

561

1890

40,512

3993

616

1903

43.905

3952

684

Operatives employed in the Cotton Industry (in Thousands). (From the Census Returns.' 1) (The figures in italics relate to Married and Widowed Women.)

1901.

1891.

1881.

Lancashire.

England and Wales.

Lancashire.

England and Wales.

Lancashire.

England and Wales.

Cotton, card and blowing-room processes Cotton spinning processes ……

Cotton winding, warping, &c

Cotton weaving, warping, &c

Total . Cotton workers in other processes or undefined

Thread, manufacturer dealer …. Fustian, manufacturer dealer . . . .

Cotton, calico, warehouseman, dealer

M.

11-4

49-5 14-8

57-6

F.

28-7

IO-I

19-6

4-3 38-6 13-0

H3-5 38-i

M.

13-8

64-1

18-3

66-1

F.

34-0

12-2 28-6

6-o

48-9

15-8

130-8

44-4

M.

F.

M.

F.

M.

F.

M.

F.

133-3

265-9

162-3

320-7

178-2

281-8

213-2

332-8

150-7

249-8

185.4

302-4

29-0

“•6

6-7

i-8

1-2

■55

34-5

2-1

9.4 2-3

2-6 10

•47 •2 i-i

•25 •9

2-9

•9

•6

3-2

1-5

2-1

5-o

•4 •1

i-7

2-5

•24 •9

3‘5

•3

•7

•5

3-0

3-2

1-2

1-7 5-2

•38

1 This is explained in the article Cotton : Marketing and Supply. ‘■ Census classifications have been altered twice in the period covered by this table.

VII. 10

12

290

COTTON MANUFACTURE

In Scotland there are less than 15,000 cotton operatives distributed as follows : —

In Thousands. Card and blowing-room processes …. -4

Spinning-room processes . 2-1

Winding, warping, &c 2-7

Weaving, warping, &c 6-8

Workers in other processes or undefined . .2-8

Total

14-8

Operatives employed in Cotton Factories in the United Kingdom and Percentages of each Class. (From Returns of Factory Inspectors.)

the proportion of children employed and the steady increase in the number of operatives as a whole until recent years. The contraction of the body of operatives of late years seems to have occurred primarily among children and young persons (where the first check would naturally be looked for), and secondarily among adult males. If allowance be made for the smaller value of children as compared with adults, and the census results be taken, it is not evident that there has been any diminution in the amount of labour-power; and if the factory inspectors' returns be accepted, the falling off in the number of operatives cannot be proved to have taken place

in either of the chief

1835-

1838.

1847.

1850.

1856.

1862.

1867.

Male and Female under 13, or half-timers.

Male, 13 to 18

Male, over 18

Female, over 13

13-2 12-5 26-4

47-9

457 16-6 24-9 53-8

5-8

n-8

27-1 55-3

4-6

II -2

287 55-5

6-5 10-3 27-4 55-8

8-8

91

26-4

557

10-4

8-6

26-0

55-0

Total number of Cotton Operatives

218,000

259.500

316,400

331,000

379.300

451,600

401,100

1870.

1874.

1878.

1885.

1890.

1895.

1901.

Male and Female under 13, or half-timers .

96 8-5

26-0

55-9

14-0

8-0

24- 1

539

12-8

7-2 25-3 54-7

9-9

7.9

26-4

55-8

9-1

8-2

26-9 55-8

5-8

79

27-6

58-7

4-1

7-0

27-8

611

Total number of Cotton Operatives

450,100

479,600

483,000

504,100

528,800

538,900

513,000

Number of Operatives (in Thousands) engaged in Spinning, Manufacturing and Subsidiary Processes (excluding Lace-making, but including the Fustian Manufacture). (From Census Returns.)

Males.

Females.

Males and Females.

Under

15-

15-20.

Over

20.

All Ages.

Under

15-

15-20.

Over

20.

All Ages.

Under

15-

15-20.

Over

20.

All Ages.

1881 1891 1901

29 36 24

39 45 36

121 137 139

189 218 199

40

5o

36

81 94 92

189 197 207

310 341 335

69 86 60

120

139 128

310 334 346

500 560 535

The fact that the branches of work covered by the figures are not identical explains discrepancies between this and the previous table.

Number of Operatives engaged in the Cotton Industry (Processes being distinguished and Ages and Sex). (From Special Returns made by Factory Inspectors.)

branches of the industry at so rapid a rate as to have occasioned the en- forced dismissal of any hands. An industry which was not recruited at all would have dwindled at a greater rate. At least it may be inferred from these figures, when taken in conjunction with the large increase in spindles and looms, that the out- put per head has con- siderably advanced in spite of the rise in the average quality of both yarns and fabrics pro- duced. This rise in the value per unit of the out- put accounts to some extent for the fact that wages have not been adversely affected of late. Mr A. L. Bowley has calculated index numbers of wages for the leading £ rate trades, ln clud-ˆ g

Males in Thousands.

Females in Thousands.

Total in Thousands.

Half- ■’

18 and

Half-

18 and

timers.

Under 18.

over.

timers.

Under 18.

over.

.

Spinnin

g and Pi

eparatory Pro

cesses

1896

5-58

22-24

71-44

4-40

30-12

78-69

212′

I898-I899 1

5-42

21-57

71-37

3-86

30-44

77-64

210

1901

4.98

2I-IO

68-98

Weavin

3-10

g and Pr

30-98

eparatory Pro

81-68

cesses

211

1896

7-54

18-79

75-8i

11-87

49-19

151-34

315

I898-I899 1

6-21

17-29

72-74

10-38

48-38

150-99

306

1901

472

14-86

73-81

8-o

45-66

I55-03

302

The figures in this table are not quite complete except for 1901 ; the relations between the changes shown for each class should nevertheless be accurately represented.

The most noticeable features of these tables are the decrease in

(England), the numbers in each class being allowed for in the average. Side by side with these figures, Sauerbeck's index numbers of general wholesale, prices are given, together with the average prices of wheat per quarter.

It must be remembered that the figures given above for cotton workers and average wages for eight trades do not measure the differences be- tween each, but only the differ- ences between the movements of each. Actual average money wages in the cotton industry have probably been approximately those stated in the second table beneath, but as these figures are culled from various sources they must not be taken to indicate fluctuations. 2

The wage of fine spinners exceeds the average wage of spinners

Index Numbers of Money, Wages and Prices.

1840.

1855-

i860.

1866.

1870.

1874.

1877.

1880.

1883.

1886.

1891.

1902.

Cotton operatives … Average wages for eight trades Sauerbeck's index number Average price of wheat per quarter

50 61 103 66/4

54 61

73 40/3

64 73 99

53/3

74

81

102

49/11

74 83 96

46/n

90

97

102

55/9

90

94

94

56/9

85 89 88

44/4

90 92

82

4i/7

93 90 69

3i/-

100 100

72 37/-

105

io8-7 3

69

28/1

Weekly Wages in the

Mane}

tester and District Cotton Trade.

Big piecers' average ….. Weavers' average …..

1834.

1836.

1839-

1 841.

1849.

1850.

1859-

i860.

1870.

1877.

1882.

1883.

1886.

s. d.

23 4 11 11

s. d.

23 11 93 10 2

s. d.

22 11 80 96

s. d.

22

8 8

9 6

s. d.

21 7 8 6 10 6

s. d.

20 5 13 10 3

s. d.

24 1

10

11 2

s. d.

23 2 10 10 8

s. d.

27 8

11

12 2

s. d.

34 4 12 4

15 1

s. d.

31 6 16 15 6

s. d.

32 4 16 15

s. d.

35 7 13 7 13 3

1 Average for 1898 and 1899.

2 See chapter on cotton in Bowley's Wages in the United Kingdom and table there given. 3 Average for a slightly different group.

by percentages varying from about 25 to 35. In the above figures the earnings of three classes of spinners are averaged.

The highest wages are earned by mule-spinners (who are all males) ; their assistants, known as piecers, are badly paid. Persons can easily be found, however, to work as piecers, because they hope ultimately to become " minders," i.e. mule-spinners in charge of mules. The division of the total wage paid on a pair of mules between the minder and the piecers is largely the result of the policy of the spinners' trade union. Almost without exception in Lancashire one minder takes charge of a pair of mules with two or three assistants according to the amount of work to be done. Among the weavers there is no rule as to the number of assistants to full weavers (who are both male and female), or as to the number of looms managed by a weaver, but the proportion of assistants is much less than in the spinning branches, perhaps because of the inferior strength of the weavers' unions. For the calculation of wages piece-rate lists are universally employed as regards the payment of full weavers and spinners; some piecers get a definite share of the total wage thus assigned to a pair of mules, while others are paid a fixed weekly amount. Many ring-spinners are now paid also by piece-rate lists, and all other operatives are almost

universally so paid, except, as a rule, the hands in the blowing-room and on the carding-machines. Spinning and weaving lists are most complicated ; allowances are made in them for most incidents beyond the opera- tives' control, by which the amount of the wage might be affected. Still, however, they could not cover all circumstances, and much is left to the manner of their application and private arrangement. They should be regarded as giving the basis, rather than as actually settling, the wage in all cases. The history of lists stretches back to the first quarter of the 19th century as regards spinners, and to about the middle of the century generally as regards weavers, though a weaving list agreed to by eleven masters was drawn up as early as 1834. There are still many different district lists in use, but the favourite spinning lists are those of Oldham and Bolton, and the weaving list most generally employed is that known as the " Uniform List, which is a compromise between the lists of Black- burn, Preston and Burnley. Under the " Particulars Clause," first included in a Factory Act in 1891 and given extended application in 1895, the particulars required for the calculation of wages must be rendered by the employer. As in spinning there used to be doubts about the quantity of work done, the " indicator," which measures the length of yarn spun, is coming into general use under pressure from the operatives. We ought to observe here that the Oldham spinning list differs from all others in that its basis is an agreed normal time-wage for different kinds of work on which piece-rates are reckoned. But in effect understandings as to the level of normal time-wages are the real basis everywhere. If the average wages in a particular mill are lower than elsewhere for reasons not connected with the quality of labour (e.g. because of antiquated machinery or the low quality of the cotton used), the men demand " allowances " to raise their wages to the normal level. Advances and reductions are made on the lists, and under the Brooklands Agreement, entered into by masters and men in the cotton spinning industry in 1893, advances and reductions in future must not exceed 5 % or succeed one another by a shorter period than twelve months. The changes as a rule now are 5 % or 2§ %. In all branches of the cotton industry it is usual for a conference to take place between the interested parties before a strike breaks out, on the demand of one or other for an advance or reduction.

Organization among the workers in the cotton industry is remark- ably thorough. Almost all spinners are members of trade unions, Trade an(ˆ though the weavers are not so strongly united,

Unions. the bulk ofthem are organized. The piecers are admitted as members of piecers' associations, connected with the spinners' associations and controlled by them. Attempts to form independent

piecers' unions have failed. Weavers' assistants are included in the weavers' unions, which may be joined in different classes, the benefits connected with which vary with the amounts paid. One subscription only, however, is imposed by each branch spinners' association, but in all branches it is not the same, though every branch pays the same per member to the amalgamation. All the trade unions of the chief workers in the cotton industry are federated in the four societies: (1) the Amalgamated Association of Operative Cotton Spinners (created in 1853 and reformed in 1870), (2) the Northern Counties Amalgamated Association of Weavers (founded 1884), (3) the Amalgamated Association of Card and Blowing-room Operatives (established 1886), and (4) the Amal- gamated Association of Power-loom Overlookers (founded 1884). These were not, however, the first attempts at federation, and the term " federation " must not be taken in any strict sense. The distribution of power between the central authority and the local societies varies, but in some cases, for instance among the spinners, the local societies approximate as closely to the status of mere branches, as to that of independent units federated for limited objects. We ought also to mention the societies of warp-dressers and warpers, tape-sizers and cloth-workers and warehousemen. There is no one federation of all cotton-workers, but the United Textile Factory Workers has been periodically called into being to press the matter of factory legislation, and international textile congresses are occasionally held by the operatives of different countries.

As to employers, four extensive associations include almost all the organization among them, two concerned chiefly with spinning and two with weaving. The former two are the Federation of Master Cotton Spinners' Associations with local associations and including 2 1, 000,000 spindles, and the Bolton Master Cotton Spinners' Association with 7,000,000 spindles; the latter two are the North and North-East Lancashire Spinners' and Manufacturers' Associa- tion, covering about 3,000,000 spindles in addition to a large section of the looms of Lancashire, and the United Cotton Manufacturers' Association. 1

Factory legislation began in the cotton industry, and in no in- dustry is it now more developed. The first acts were those of 1802 and 1819, both of which applied only to cotton-mills, Factory and the former of which related only to parish apprentices. Acts. The first really important measure was that of 1833, which curtailed the abuse of child-labour, enforced some education and provided for factory inspectors, of whom there were at first only four. The next act of importance, that of 1844, was chiefly remark- able for its inclusion of all women among young persons. The proportion of women, young

persons and children engaged in the cotton industry is so high, that most regulations affecting them, e.g. those relating to the hours of labour, must practically be extended to all cotton operatives. This act killed night work for ” young persons,” and children were not allowed to work at night. The year 1847 saw the introduction of what was known as the Ten Hours Act — after the 1st of May 1848 the hours of young persons (women included) and children were not to exceed ten a day and fifty-eight a week. A further limitation of hours to 56J a week was secured in 1874, and this was cut down by another hour (the concession of the 12 o’clock Saturday) in 1901. ” Young persons ” now includes all who are not half-timers and have not attained the age of eighteen, and all women. The rules as regards the employment of children, which have steadily improved, are at present as follows. No child under twelve may be employed. On attaining the age of thirteen the child may become a full-timer if he has obtained the prescribed educational certificate (i.e. fifth standard attainment or three hundred attendances each year for five consecutive years). Failing this he must wait till he is fourteen before he can be employed full time. Half-timers may be employed either (a) on alternate days, which must not be the same days in two successive weeks, or (b) in morning and afternoon sets. In the case of arrangement (a), the child when at work may be employed during the same period as a young person or woman, which in Lancashire is almost uni- versally from 6 to 6 with two hours for meals. 2 In the case of arrangement (b), which is the system generally adopted in Lanca- shire, a half-timer in the morning set works from 6 to 12.30, with half an hour for breakfast, and in the afternoon from 1.30 to 6, except on Saturdays, when the hours are from 6 till 11.30 for a manufacturing operative, or till 12 for other work, for instance, clean- ing. The child must not work two consecutive weeks in the same set (that is, in mornings or afternoons) , nor on two successive Satur- days, nor on Saturday at all if during any other day of the same week the period of employment has exceeded 5! hours (i.e. a child in the morning set does not work on the Saturday). Other important features of factory legislation relate to the fencing cf dangerous machinery and its cleaning when in motion (the regulations being strictest in the case of children and most lax in the case of male adults), and conditions of health, including the amount of steaming allowed, which was first regulated by the Cotton Cloth Factories Act ot 1889.

The Cotton Industry outside England.

A brief survey will now be made of the cotton industry in parts of the globe other than the British Isles, and as a prelude the following broad estimates of the numbers of spindles and looms in the chief national

seats of the cotton industry may be put forward. 3 The table is further supplemented by other figures 4 for the number of spindles at different times in the United Kingdom, the United States and the continent; and finally we may add the figures of cotton consumed.

The different average fineness of counts spun in different places must be borne in mind when the consumption of each district at the same time is being considered, but the relations between the amounts consumed in the contrasted districts in the two periods would not be affected much by this difference.

1 A detailed analysis of the whole labour question in the cotton industry will be found in Chapman's Lancashire Cotton Industry.

2 There are other permissible arrangements, namely from 7 to 7 and from 8 to 8, but they are not used in the textile trades of Lanca- shire,

3 The figures for looms are based upon a number of returns and estimates. Those for spindles are taken from the highly authori- tative, estimates of the International Federation of Master Cotton Spinners.

4 Journal of Board of Trade, April 28th, 1904.

United Kingdom United States . Germany France . Russia . India Austria . Spain

Italy. . . . Switzerland . Japan . . . Belgium .

Estimated

Population

in 1902. •

In Millions.

42

79

58

39 139 294 (1901)

26-7

18-6 (1900)

33 3-4

46

Million Spinning Spindles in 1909.

Thousand Power- Looms about 1906.

53-5 27-8- 9-8 6-8 7-8 5-8 4-2 1-9 4-0

i-5 i-7

1-2

700 550 215

IIO

150

45 80 69 100 30

Cotton Spindles (including Doubling Spindles) in Millions.

United

United

Other

Kingdom.

Europe.

States.

Countries.

Total.

1870

37-7

13

7-1

57-8

1880

44-5

21

io-6

2

78-1

1890

44-5

26

14-2

4

887

1900

46-2

32

19

7

104-2

1903

47-9

33

22-2

7-5

no-6

Average Annual Consumption of Cotton in the Period 1831-1835.

Millions of lb.

United Kingdom 295

Continent of Europe 143

United States 79

Average Annual Consumption of Cotton in the Period iqoo-iqo$.

Millions of lb.

United Kingdom 1634

Continent of Europe 2486

United States 1995

Roughly the consumption of cotton per spindle in the three areas to-day is, in lb, 35 for the United Kingdom, 70 for the continent, and 95 for the United States.

Before the cotton industry in other countries is described it will be necessary to explain how it could have developed there on a large scale at all. Of course this growth is to be accounted for very largely by the natural protection of cost of transport aided by tariffs. But it would be a mistake for Englishmen to imagine that all foreign cotton mills are the product of a forcing culture, and that if the favourable conditions created by import duties were removed they would totally disappear. No doubt some of the growth is artificial, but much is natural and would have taken place under universal free trade conditions. Much of it, indeed, would have appeared in these circumstances even were cost of production a negligible quantity, difficult though it may be at first to reconcile this statement with certain ordinary conceptions of the operations of the law of increasing returns. Lancashire secured an immense lead at the beginning of the 19th century, and if the cost of production may be represented as varying inversely as the magnitude of the industry, every addition to her success increased her advantages. How could the small industry,

with a high cost of production because it was small, compete with Lancashire? The answer is to be found in the peculiar conditions governing international trade and a closer analysis of ” increasing returns.” ” Increasing returns ” in any place are a function of two variables, (1) the magnitude of the world market under conditions of world commerce, and (2) the magnitude of the industry in the spot in question. The economies connected with the first variable, which in such an industry as the cotton in- dustry are enormous, and govern ultimately the limits of business specialism, are shared by every national section of the industry whether it be great or small. If Haiti started a cotton factory she might import all her specialized machinery— the specialism involved in producing which is dependent upon the exportation of some of it — and restrict narrowly the work undertaken by her one factory. The cotton goods outside this range she would still import, and if her specialized product were in excess of local demand she could export some of it, if she were favourably placed in respect of cost of carriage, for cost of production in

Haiti would not be impossibly high, since machinery and the general system of production would be. quite up to date though labour might be highly inefficient. Of course, the country with a large industry enjoys high local economies, and it might be thought that these alone would be a menace to the stability of the small industry, because if the industry in the favoured locality increased these would increase also and the small industry would be undersold. The answer to this difficulty is that foreign trade depends upon ratios between ratios, that is, upon the ratios between the costs of production of all the products of each country in relation to similar ratios for other countries. Relatively, therefore, diminishing returns operate in every country. In every country there must come a time, the utility of commodities being taken into account, when a unit of labour and capital provides less utility when applied to the creation of cotton goods, say, than when applied to producing something else for home consumption or for export in exchange for commodities wanted at home. It becomes apparent, therefore, that cotton industries of widely varying sizes dispersed throughout the world can settle into relations of perfectly stable equilibrium, as that term is understood by the economist. Slow changes, of course, in their relative volumes might be looked for with changes in a mutable world, but very sudden collapses would be impossible unless the general course of human affairs were revolutionized.

The United States. — The machine-cotton industry was carried to North America almost as soon as it evolved in England. Models of Arkwright’s machines were smuggled across the Atlantic in 1786 —

Arkwright's first mill had not been started in England until 1769 — and these with a jenny and stock-card were publicly exhibited. From these models a great mass of machinery was soon constructed. The first mill was erected in 1788 (that of the Beverly Association), the second appeared in 1790, the third five years later, and in 1798 Samuel Slater started with some of his wife's relatives the first mill in which the principle of the water-frame was carried throughout. It is said that it was not until 18 14 that power-loom manufacturing was commenced, but in England success with the power-loom was long delayed. As early as 1831, however, there were in the United States — mainly in the New England states — 800 factories, a million and a quarter spindles, 33,500 looms and 62,200 operatives. At this time the annual consumption of cotton was about 77,000,000 ft) as compared with some 300,000,000 lb in England at the same date, and 2,000,000,000 approximately in the United States at the present time. 1 Writing in 1840, James Montgomery said that, in respect of cost of production, the American industry was 19% behind that of England apart from the cost of raw material, which was then a good deal less to the Americans. In 1878, when there was much interest in the question of British efficiency in the cotton industry because the . passage of the Factory Act of 1874 had cut down the working hours, the Economist contrasted the result of twenty-five years ' growth in England and America: —

" In 1853 the average English production per weaver of 8| lb shirting was 825 yds. per week of sixty hours. In 1878 the working hours had fallen to fifty-seven, and the production had risen to 975 yds. An increased production of 23 % is thus due to improve- ment in the processes of manufacture. In 1865 there were 24,151 persons employed in Massachusetts in the production of cotton goods, and they produced 175,000,000 yds. In 1875 the operatives numbered 60,176, and their product was 874,000,000 yds. The operatives had increased 150 % and their products had increased 500 %. The increase of production due to improved methods was thus in England 23 %, and in Massachusetts 100 %. I do not, of course, suppose that the American manufacturer is in advance of his English rival to the extent of this difference, for I presume that he started upon the career of improvement from a lower plat- form. But a progress so greatly more rapid than ours will be ad- mitted to cast much light on the change which has occurred in our relative positions."

The contrast no doubt was not perfect, as indeed it could not be

1 The early history of the industry in the United States is summarized in one of the official bulletins of the state of Massachusetts, dated

1798. See W. R. Bagnall, Textile Industries of the U. S. (1893).

in view of the varieties of product and their changes, but it proves at any rate that Americans were making vast strides in industrial efficiency even before the period when American methods and American enterprise were monopolizing in a wonderful degree the attention of the business world. 1 About a dozen years later the low real cost of production of simple fabrics in the United States was universally admitted, and also that American manufacturers were making more use of machinery than their European rivals. In a typical weaving shed in Massachusetts, for instance, of which particulars were published, twenty women ” tended ” as many as eight looms apiece, forty-three managed seven, two hundred and thirty-two managed six, and only eleven had five only. 2 Since then, moreover, advance has been rapid, and the sudden development of the South has astonished the business community of other centres of the cotton industry.

Before the lines of development in America are specifically dealt with, and particularly the industrial phenomena in the South, a few words must be said of the general extension of the industry. The consumption of cotton in the United States in million lb was about 75 in 1830, 390 in i860, 1100 in 1890 and nearly 2000 on an average of the five crop years from 1900-1901 to 1 904- 1 905: active spindles advanced from 1,250,000 in 1830 to 10,653,000 in 1880 and about 21,250,000 in 1905. Looms which numbered 33,500 in 1830 had reached 226,000 in 1880 and nearly 550,000 in 1905. At the same time population, it must be remembered, was growing at a phenomenal rate: from 31-4 millions in i860 it had passed to 38-6, 50-2, 62-6 and 76-3 at the succeeding decennial censuses, the decennial rates of increase being in order 22-5, 30, 25 and 20-5 as compared with 8-5, 10-5, 8 and 9 as shown by the corresponding censuses in the United Kingdom. Protection was of course contributory to the growth of the American cotton industry. It may be remarked incident- ally that the New World, including the West Indies and the Chinese empire, take the bulk of American exports, which for so large an industry are inconsiderable. The imports have always been well in excess of the exports. The encouragement of home industries by tariffs was definitely aimed at after the war with England during the Napoleonic struggles, and although a sensible reduction of duties was experienced after 1845 the reaction to protection that followed the Civil War was never significantly departed from except by the

single act of 1883. In 1790 the duties on cotton goods were 7ˆ% ad valorem, and they rose gradually until they reached 25% in 1816. Slight reductions some seventeen years later were followed in the early ‘forties by a tariff of 30%. Diminutions were succeeded by oscillations, though at no point was a low level touched. Severe charges were imposed in 1890, and after some relaxation in 1894 the policy of restrictiveness was restored in 1897. According to the calculations made by the English Board of Trade in 1903 3 no fabrics were admitted at a charge equivalent to less than 68 % ad valorem, and no yarns were admitted at a charge lower than 45 % ad valorem. Cotton thread is subjected to a rate equivalent

to 375 % 4

The character of the growth of the cotton industry in the United States, as revealed by recent census returns, is peculiarly interesting : —

Cotton small wares are included in the totals for 1880 and 1890, but excluded from those for 1900 and 1905. We must observe further that ” capital ” is a vague term. Recent events in the United States afford a valuable empirical indication of the effect that improved machinery actually has upon wages. The new automatic looms caused a saving of labour per unit of product Which recalled the complete subversion at the industrial revolu- tion of the proportions in which the several factors in production were organized. Displacement of labour and falling wages might not unreasonably have been looked for temporarily, but wages stuck at their old level or rose. The rise was caused by numer- ous converging forces which brought their united weight to bear. First, prices so fell as the result of the new machinery that the in- creased volume of commodities which the market could absorb more than counterbalanced, it would seem, the labour-saving of the new machinery, the cotton industry being taken as a whole. It must be remembered that to increase the output from the subsidiary processes where labour had not been saved more hands had to be drafted in. Thus, a contraction of the body of weavers was accompanied by an expansion of the body of cotton operatives. Again weavers’ wages were naturally raised in a special degree because automatic machinery called for quick, trustworthy and intelligent hands, endowed with versatility, especially in the days when the machinery was still in the semi- experimental stage. The American employer tries to save in labour but not to save in wages, if a generalization may be ventured. The good workman gets high pay, but he is kept at tasks requiring his powers and is not suffered to waste his time doing the work of unskilled and boy labour. There is,

certainly, in the American labour problem no serious grievance on the question of wages. If there is any abuse it consists in excessively fierce Work. Mr. T. M. Young, who visited the American cotton districts in 1904 with an informal commission of Lancashire spinners and manufacturers, did not think that the cause of the high wages- allowance being made for the purchasing power of money, they are above those of England, though cotton operatives in England are well paid relatively — was the superiority of the American cotton worker; neither did the representatives of the English cotton operatives who accompanied the Moseley Commission. As often as not “the cotton operative in the United State* is a French Canadian, a German, an Italian, a Hungarian, an Albanian, a Portuguese, a Russian, a Greek, or an Armenian.” It is the extensive ” exploitation ” of machinery seemingly, together with the speed of work, which keep wages high, com- bined with the horizontal and vertical mobility of American labour, which prevents it from accumulating in pools, and causes streams of the best hands to be flowing continuously to other callings and places, and no insignificant proportion to climb the social ladder. The remainder naturally profit, for a local or trade congestion of labour is avoided, and the voluminous recruiting of enterprise by the intensified competition among employers keeps the demand for labour high.

One noticeable point in the table quoted above is that until recently cotton consumed increased much faster than the number of spindles. This might be explained in a variety of ways. Average counts remaining constant, the average speed of the

Thousands.

Percentage Increases.

1880.

1890.

1900.

1905.

1 880-1 890.

1 890-1900.

1 900- 1 905.

Active Spindles

10,653

14,188

19,008

23,156

33-8

34

21-8

226

325

451

541

43-9°

38-7

20

750,344

1,117,946

1,814,003

1,873,075

48-99

62-3

3 – 3

$42,041

$66,025

$85,126

$94,378

57

28-9

109

$208,280

#354>°2i

$460,843

$605,100

70

30-2

3 I- 3

Employees not officers and clerks

174-7

218-9

i. 297-9

3io-5

25-3

36-1

4-2

1 See also the official report of J. P. Harris-Gastrell in 1873.

2 Quoted by Schulze-Gaevernitz.

3 Memorandum on British and foreign trade and industrial conditions.

4 The method of calculating these percentages is discussed in the blue-book mentioned.

spindle might have risen; or the latter remaining constant, counts might have been getting finer. Speeds have certainly gone up a good deal of late on some counts. And it is quite likely, too, that concentration on the manufacture ot coarse goods for export, with stout warps to keep down the

breakages and raise the output per loom, may be reckoned as one cause.

Despite the recent sensational growth in the South, the New England States still remain the most prominent seat of the American cotton industry. They contained in 1905 about 14 million spindles as compared with 7-7 millions in the South and West, and their relative possession of looms approaches, though it does not quite reach, the same proportion. The leading States in the South in order of importance are South Carolina, North Carolina, Georgia and Alabama, and in the North, first Massa- chusetts with an enormous lead, then, in order, Rhode Island, New Hampshire, Connecticut, Maine, New York, Pennsylvania, New Jersey. The bulk of the cotton industry in the North is contained within a small area. A circle around Providence, Rhode Island, of 30 m. radius includes, according to the twelfth census, nearly 7J million spindles, — there were only 58,500 spindles in this area in 1809. Of the chief towns Fall River stood first in 1900 in value output, and was followed in order by Philadelphia, New Bedford, Lowell, Manchester and Pawtucket. The climate of Fall River is very similar to that of English spinning districts. Its population in 1900 was 105,000, and of these only 14,600 were of American parentage. Of the remainder, 16,700 were English, 17,800 Irish, 29,600 French Canadians and about 5000 Portuguese. Among the rest of foreign parentage, Armenians, Russians and Italians are numerous. But Massachusetts is famous for the number of immigrants it attracts. It is almost incredible, but nevertheless a fact accord- ing to a recent statistical report, that in 1903 as many as 91 % of the cotton operatives of the State were of foreign descent— chiefly French Canadian and Irish. In 1902 there were nearly 90 mills at Fall River with 3,000,000 spindles and 16,000 looms. The spindles amount to about one-third of all in Massachusetts, but Fall River's share of the looms of the State is not large. The spindles exceed in number those possessed by any State except of course the one in which it is placed. In comparison with a great spinning town in England, nevertheless, Fall River does not appeal strongly to the English imagination. It has

little over a quarter of the spindles of Oldham, or three-fifths of those of Bolton, — among English towns it would stand third, i.e. between Bolton and Manchester and Salford, which, in spite of the movement of spinning to the hills, still holds in England a leading place. The whole of Massachusetts, it is of interest to observe, has fewer spindles than Oldham, and only about half those of Oldham and Bolton together. Originally it was the river which attracted the mills to Fall River, and as the water- power available was almost inexhaustible, it was possible for the mills to congregate together and for a town to grow up. In England, when much of the industry was dependent for power upon water, decentralization was entailed, for the thin streams of Lancashire could not support more than two or three mills at most in proximity. Hence in England, after Watt's steam- engine had succeeded, the economies of centralization led eventually to the desertion of the mills on the water-courses. But at Fall River the perfecting of the application of steam- power merely involved its use to supplement the water-power on the old site. The presence of water-power explains half the success of New England. In the six States 35 % of all the power used is derived from water, and in the cotton-manufacturing of these States water provides 32-6% of the power. For industrial purposes generally the river most exploited is the Merrimac, upon which stand the leading cotton towns of Lowell, Lawrence and Manchester. Hitherto little has been done in the way of using water to generate electric power. 1

The two most striking features of the American industry to-day are the introduction of the automatic looms, already briefly referred to, and the development of the South. The Northrop Loom Company has spent a fortune in pushing its loom on to the market. It has not hesitated to share risks, and it has run one " advertisement " mill at least, namely that at Burlington, Vermont, with 55,000 spindles and nearly 1300 looms. In this mill the labour-saving is shown by the following 1 Upon the above see Uttlay's report.

figures, the looms being of two sizes, 32 in. and 44 in. Of the former, 3 weavers run 18 each, 39 tend 16 each, only a few odd weavers tend less than 16, and learners even are at work on 8 to 1 1 each; on the latter, of 29 weavers 17 mind 16 looms each and 12 mind 1 2 (on stripped fabrics) . 2 Of course a high level of efficiency would be expected in this show mill. That American employers have readily been converted to a belief in the economy of the new machinery we are not astonished to learn in view of the American temperament, the intensity of competition among business leaders, and the prevailing spirit of adventure. Thousands of workable old looms have been scrapped, and prob- ably at the present time there are 100,000

automatic looms running in the United States. No other country can point to a rate of substitution which approaches that in the United States. The causes, apart from the temperamental and social to which reference has already been made, are probably (1) that there is disagreement as to the present economy of automatic looms on many fabrics, 3 (2) that Americans aim at frequency of renewal of plant, and avoid making their machinery so durable as to prove ultimately, perhaps, a handicapping inheritance, and (3) that a greater bulk of American work is appropriate for the new looms than of English or continental work. But automatic machinery is being used increasingly in Lancashire. 4 And the operatives ultimately benefit. It is the half - developed machine, to which labour must actually be linked as an essential part, which is responsible for monotonous work and creates the dislike of mechanical aids.

Now we turn to the recent development of the Southern States. Never has an industry grown faster than that of the two Carolinas, Georgia and Alabama. Some of the earliest experi- ments with the machine industry were conducted in South Carolina, but from that time till the end of the 19th century nobody imagined the possibility of a great Southern expansion. In 1880 the South contained less than half a million spindles— i.e. about as many as Hyde, Middleton or Chorley, and one- twenty-third of the numbers in Oldham. Twenty years later they had increased twelvefold and the Southern States, in respect of the number of spindles, had taken precedence of Bolton. To-day probably about eight and a half millions might be counted. In addition there are some two hundred thousand looms, or nearly as many as in the three leading cotton-weaving towns of England — Burnley, Blackburn and Preston. The rapid oncoming of the South may also be traced by its consumption of cotton — which as an index, however, is not perfect. This on an annual average was, in thousand bales, 164, 269, 453, 717 and 1233 in each of the periods 1876-1880, 1881-1885, 1886-1889, 1891-1895 and 1895-1900 successively. The consumption since then, as compared with that of the Northern States, Great Britain and the European continent, has been as follows. It must be remembered that the consumption per spindle varies greatly from place to place.

Consumption of Cotton in Thousand Bales of about 500 ft each.

Southern States.

Northern States.

Total United States.

Great Britain.

Europe.

1900-1901 1901-1902

I 902- I 903 I 903-1 904

1904-1905

1583 2017

1958 1889 2270 .

1963 2066 1866 2046 2292.

3546 4083 3824 3935 , 4562

3269 3253 3185 3017 3620

4576 4836 5148

5H8 5H8

The densest distribution 0ˆ mills in, the South is along the line of the Southern railroad, in the district known as the Piedmont. Of this group Charlotte in North Carolina is the natural centre: roughly, half the spindles and half the looms in the Southern States would be included within a circle around Charlotte of a

2 The figures are those quoted by Mr T. M. Young and relate to the year 1902.

3 See e.g. some passages upon this point in Uttley's report.

4 For an account of the numerous types of automatic looms see the article on Weaving : § Machinery,

radius of about 100 m. Of the remainder a large proportion is scattered over a wide area.

Much interest has been excited by this newly created Lanca- shire of a new type, and much speculation as to the causes that account for it

has been elicited. An informal commission of Lancashire spinners and manufacturers crossed the Atlantic to make inquiries in 1902 and investigations have been undertaken by other persons, 1 and much has been written on the subject. A general explanation can now be framed without much difficulty, as in all probability most of the relevant facts have been brought to light. First and foremost the general development of the cotton industry in the United States must be emphasized. The industry was unquestionably foredoomed to expansion at this time, and the only question was where the expansion should take place. It was plain that the growth might be so great as to pre- sent the appearance of a new industry created with new labour rather than an extension of an old industry. It was not altogether surprising, therefore, that the exploitation of a new field of labour was thought of. The labour market of the North was comparatively exhausted; in less developed parts of the country larger supplies of intrinsically good labour might be looked for at lower wages. Skill was not a matter of much moment, because in the North it would have been necessary to incorporate much labour without previous experience in the industry, the work was intended to be of the rough kind upon which manual skill is least important, and it was intended to repose reliance for economy upon machinery in the main. The choice of new fields meant at the outset the sacrifice of some of the economies of localization, but so large an expansion was looked for that projectors did not despair of creating fresh industrial localization of sufficient magnitude to produce such economies as are derived from it, which, it must be observed, are inconsiderable in America, and have declined relatively with falling cost of trans- port and the adoption, as regards machinery, of the principle of interchangeable parts. And at any rate a new local industry would have a slight advantage in supplying markets in proximity to it.

These were the main general considerations, and the scale was turned in favour of the new locality (a) by the advantage of nearer supplies of cotton, and (b) by the known presence of much half-occupied white labour in the vicinity of otherwise suitable sites close to the cotton-fields. It must be borne in mind that the whole calculation had not to be reared merely upon an intangible theoretical basis. Cotton mills already existed in the South, and comparisons of costs of production, as things were then, afforded some groundwork for judgment.

As regards the first of the two special advantages mentioned above, the saving in the cost of carriage of the raw material is not commonly held to be high. Transport to the cotton ports is so well organized and sea-carriage is so cheap that Lancashire's distance from the source of her raw material is not a very appreci- able handicap. A good deal of

the cotton that must be used in some of the Southern mills cannot be supplied locally because it is not grown in the neighbourhood, and the requirements of these mills are met by transport arrangements which at present cost a sum not altogether out of relation to similar costs in the New England States and Lancashire. The percentages of freight charges on raw material in 1900 were $2-18 in Georgia, $1-59 in North Carolina, $1-17 in South Carolina, and the amazingly low figure of $1-20 in Massachusetts, but of course some part of the explanation is the somewhat higher quality of cotton on an average that is worked up in Massachusetts. For some years, however, the saving in labour has been a most important economy. Large supplies of half-occupied white labour existed in the Southern States among the families of small farmers who flocked South after the Civil War, and in the districts of the decayed hand industry in the mountains of Kentucky and North Carolina. For small money wages much of this labour could be attracted to the mills. Negroes do not work in the mills; the reason is said to

1 Of which special mention may be made of Uttley's report as a Gartside scholar of the university of Manchester, already referred to, and Pidgin's report for the Massachusetts Bureau of Labour Statistics.

be partly their own disinclination and partly that they are not very efficient at factory work. As outside labourers, however, they have afforded important aid at a very trifling cost, but the expense of outside labour to a mill is never an item of much weight. The halcyon days to employers, when keen workers could be had for low wages, are now said to be past. The demand for labour was considerable, and as time went on additional supplies could be enticed only with the offer of better pay. In 1904 it was reported that some mills were unable to get fully to work for want of hands even at the improved rates. Again the Southern operatives have been visited by emissaries from the operatives of the New England States, which explains partly the present aspect of the wages question. Mr Pidgin, in his official report to the Massachusetts Bureau of Labour Statistics, questions whether a saving in wages can be expected to continue, and points out that though wages have been low the average efficiency of the operatives has not been high. Some, indeed, were sent to gain experience in Northern mills in the hopes that on their return they would spread the tradition of working at high pressure. Mr Pidgin is at some pains to measure labour efficiency in the South and North as far as it is possible to do so, but no simple sets of figures will prove very much. The value of the product per operative in 1900 was $1200 in Massachusetts, $1010 in Georgia, $937 in North Carolina and $984 in South Carolina, but the value of the product per operative depends as

much upon the fixed capital charge per operative as upon the latter's efficiency. And the amount of machinery used per head is higher in the South than in the North. The percentage of operatives to machinery in Massachusetts being expressed as 100, that of Georgia was 53, that of North Carolina 43 and that of South Carolina 55 in 1900. These figures must be borne in mind when the average numbers employed in a mill in different States are being considered: in 1900 the averages were 565 for Massa- chusetts, 273 for Georgia, 171 for North Carolina and 378 for South Carolina. Measured by quantity of machinery the sizes of mills would stand in quite different relations. Hours of work in the South are bound to fall and the abuse of child labour, which had unquestionably crept in, may be expected to discontinue entirely. The factory conditions of children are better now than they were, but in some places they are still very bad. In Georgia no children under twelve are employed, but infants without fathers may begin work at ten years of age, and accord- ing to Mr Pidgin's report, " it certainly seemed as though the intention was honoured more in the breach than in the observ- ance, or that there must be many widows in the neighbourhood of the cotton mills." In North and South Carolina the employ- ment of children under twelve is illegal, but in these States also conditions are recognized under which it is possible to employ them earlier. According to figures relating to 1 900 the dependence on child labour in the Southern States is very striking. The proportions engaged at different ages in the three chief cotton-manufacturing Southern States and Massachusetts are as follows:

Men, 16 Years and over.

Women, 16 Years and over.

Children under 16.

Massachusetts ….

North Carolina …. South Carolina ….

48-98 39-98 42-22

44-43

44-59 35-52 34-23

28-72

6-43 24-50

23-55 26-85

It might be said that children are more useful when the work is rough, but this argument can hardly be regarded as accounting altogether for the great discrepancy as between Massachusetts and the South. The work is much rougher in the South : in 1900 the counts spun respectively in Massachusetts, Georgia, North Carolina and South Carolina were 25-10, 14-37, I 8 – 83, and 19-04, and on the showing of the American census of 1900 spinning was getting finer over the last decade of the 19th century.

As contributory to the influences already recorded as account- ing for Southern success it has been hinted that in the North employers have been less ready to welcome the new machinery, though in comparison with European rivals they would seem at

first to have acted rashly. However this may be, the South enjoyed the important advantage that its industry began just after a great technical advance had been made. . When Northern mill- owners were anxiously deliberating about the destruction of good machinery merely because it was antiquated in design, the fortunate Southern mill-proprietor was getting to work with appliances up to date in every particular. It will be easier to balance comparative advantages as between North and South when undertakers in the newer district are confronted by problems concerning replacements and alterations. The rapidity of Southern growth need not astonish those who have watched the operations by which new mills are frequently set up in Lancashire and remember that the American business man is more daring than his British cousin. Company promotion in the great financial centres, payment for machinery and other plant in shares, or partially in shares, a general diffusion of risks and pledging of credit, would explain even more rapid growth of industries of even greater magnitude.

Broad generalizations are difficult to frame, hard to estab- lish and liable to be misleading; some generalizations relating Character to the features of the American cotton industry taken ofthe as a whole the author is tempted to venture never-

American theless. The characteristics of labour have already n us ry. ˆ een incidentally commented upon. We have also noticed that the bulk

of the work done is of a rough and simple character. In spite of American nationalism and the prevalence of protective sentiments it is said that there is still a prejudice in the United States against home-made fine cotton goods. 1 ” The product of the American system is a cloth which is, on the whole, distinctly inferior in appearance, ‘ feel ‘ and finish to that produced by’ the Lancashire system. To equal a Lancashire cloth in these respects an American cloth must not only be made of better cotton, but must contain more of it — perhaps 5 % more. To this rule of inferiority there are, it is needless to say, exceptions, notably some of the American drills made for the China market. But the American home market, which absorbs nearly the whole of the product of American looms, is less exacting in these matters than the markets in which Lancashire cloths are sold.” 2 It follows that the average counts spun in the United States are lower than in England, though they have been rising somewhat. Another feature of American spinning as compared with English is the high proportion of ring-frames to mules. In New England between 1890 and 1900 mule-spindles advanced by 100,000 and ring-spindles by nearly 2,000,000: in the South mule-spindles increased only from 108,500 to 180,500, while to the ring-frames 2,700,000 were added. To the general rule Rhode Island is the sole exception; here mule-spindles have increased and ring-spindles decreased; but in Rhode Island much of the fine spinning — for instance that for hosiery — is congregated. 3 One explanation of the preponder- ance of ring-spinning is to be found in the character of American fabrics. Again most of the operatives are not of a kind likely to acquire great excellence at mule-spinning. To the Americans we largely owe the ring-frame, because their encouragement helped it through the difficult period when its defects were serious, though it appears to have been discovered independently in both countries.

American organization displays intense specialism, but of a type different from that in England, where businesses are specialized by processes; in America they are specialized by products but hardly, at all by processes. Independent spinning, independent manufacturing, independent bleaching, dyeing and finishing are the significant features of English industry to the bird’s-eye view; in the United States the typical firm will spin, make up its own yarn, and perhaps complete its fabrics for the market; but the mills, it must be remembered, are intensely specialized as to the range of their product, so that the statement that American mills are less specialized than English mills must be received with caution. For some reasons we should expect to

1 Textile Recorder, August 15th, 1905.

! Young's American Cotton Industry, p. 13.

3 Uttlev's report, p. 4.

find the American method applied even in England for fabrics of the highest qualities, because in their case the adaptation of the yarn to the fabric, and finishing to the fabric, are of great importance, and actually where the American plan is followed in England the explanation is frequently the speciality of the product which is associated with the particular firm producing it. When a firm manufactures a speciality of this kind it cannot always trust bought yarn, or the finishing applied to fabrics in the ton. But for other reasons specialized processes might be looked for where qualities were highest, as by specialism alone can the greatest excellence be attained. The final selection of method depends upon the relative importance for high qualities in the finished product of the connectedness of processes and the perfection of parts; and to these considerations must be added cost of transport between the works devoted to distinct processes, and the development of the commercial functions by which specialized process businesses are kept functioning as a whole, Probably it is the high development of British industry on the commercial side which chiefly explains the arrangements found in England. Attention should also be directed to the huge magnitude of American businesses. This is partly a consequence of American ambition in business, and partly a conseqXience of the undeveloped commercial ligaments by which producing businesses are brought into union. American producers in both North and South are too widely scattered for one town, like Manchester in the English cotton district, to be visited frequently by them for the purpose of making purchases and effecting sales. Even if the Americans did possess a convenient commercial centre, the high cost of transport between works distributed over a very wide area would prevent much specialism of businesses by processes from appearing. Writing capital letters for industrial processes and small letters and Greek letters for commercial functions, the possible arrangements in the cotton industry may be represented broadly as follows, brackets indicating the scope of businesses: 4

I. (a,A,B,C,d) II. (a)(A,B,C)(d).

III. (aAo)(bB/3)(cC 7).

IV. (a)(A)(a,b)(B)G8,c)(C)(Y).

The American industry approximates to the first type, while the

English approximates rather to the last. Differences in respect of specialism by range of product are not shown in the formulae.

Other Parts of America. — Little need be said of the cotton industry in other parts of the New World. In Canada in 1909 there were, approximately, 855,000 spindles, and in Mexico in 1906, where the first factory was established in 1834, 450,000 spindles. In Brazil also there is an appreciable number of spindles, distributed (in 1895) among 134 factories, which are located chiefly in Rio de Janeiro and Minas Geraes, and are run for the most part by turbines and water-wheels.

Germany. — In Germany the cotton industry is by no means so intensely localized as in England, but three large districts may be distinguished : —

1. The north-west district, which consists of the Rhine Province and Westphalia and contained if million spindles in 1901.

2. The country north of the mountain ranges of northern Bohemia comprises the middle district, which contained 2\ million spindles in 1901. In Saxony the industry has been carried on for four centuries.

3. Alsace, Baden, Wurttemberg and Bavarian Swabia make up the south-west district, to which some 33 million spindles were assigned. It is in close proximity to the cotton districts of east France, Switzerland and Vorarlberg.

According to Oppel (1902) the German spinning industry is chiefly localized in —

Prussia with 2020 thousand spindles Saxony ,, 1870 ,, ,,

Alsace ,, 1600 ,, ,,

Bavaria ,, 1390 „ ,,

The spindles of Wurttemberg, which stands next, do not much exceed half a million. Only sixteen places in Germany (shown in tabular form on p. 169) contained as many as 100,000 spindles in 1901. The history of the hand industry in Germany runs back some centuries. At the time when it flourished in the Netherlands we may be sure that it was prosecuted to some extent farther north and east. The start with the machine industry was not long

4 Similar formulae have been used above, where a fuller explana- tion

is given

delayed after its economies had been learnt in England. It was fostered by protection against the cheap products of Lancashire, and in the course of time stimulated by every step taken towards the economic unity of the German states which broke down local barriers

Spindles in

Spindles in

Thousands.

Thousands.

Mtilhausen .

471

Chemnitz .

195

Augsburg .

373

Gebweiler

187

Gronau ….

274

Leipzig

182

Werdau

249

Crimmitzschau .

168

Rheydt . . .

248

Logelbach

141

Miinchen-Gladbach

216

Bocholt …

128

Rheine ….

198

Bamberg

125

Hof

196

Bayreuth

100

and therefore enlarged the German market. Duties upon cotton goods, however, were not immoderately high until the measure of 1879, the policy of which was carried to a further stage in 1885. Slight reactions were brought about in 1888 and 1891, largely by the complaints, not only of the consumers of finished goods, but also of manufacturers whose costs of production were kept up by the high prices of home-spun yarns and the tax on imported substitutes. According to the investigations made by the Board of Trade, the general ad valorem impact of German duties on British goods stood somewhat as follows in 1902 : — ■

Statement showing the Average Incidence (ad valorem) of the Import Duties levied by Germany on British Cotton Goods.

Average Value of Exports from the United Kingdom to all Countries in 1902.

Rate of Duty

estimated

Equivalent.

Approximate Equivalent

Rate of Duty ad valorem.

Cotton manufactures — • Piece goods, unbleached . „ „ bleached „ „ printed ,, „ dyed, &c. .

Cotton thread for sewing .

Cotton yarn —

Bleached or dyed

2-oid. per yd. 2-46d. 2-68d. 3-46d. 26-89d. per lb

lo-49d. n-23d.

o-87d. per yd. i’(>9d. ,, l-3id. „ l-3id. „ 3-8id. per lb

o-98d. „ 1 -6 3 d. „

Per Cent.

43 44 49 38 14

9

15

The duties are not prohibitive — they are much less than those of the United States at the same time — but they are heavy on the classes of goods which come into competition with home-made goods. The general principle of the tariff is to treat easiest commodities which are made with least success at home, or are in the highest degree raw material for a home manufacture. Therefore yarns are not taxed very heavily, and of these the finest counts escape with slight dis-couragement.

In the cotton industry, as well as in numerous other industries of Germany, almost feverish activity was shown after the Franco-German War. Previously great advance had been made, but it was not until the last quarter of the 19th century that Germany forced herself into the first rank. As measured by the annual consumption of cotton the German industry increased as follows : — ■

Metric Tons of Cotton per Annum.

(In Thousands.)

1836-1840 9

1856-1860 46

1876-1880 124

1886-1890 201

1899-1903 324

It must be remembered that the spindles and looms of Alsace and Lorraine were reckoned as German after the war: they amounted in 1895 to one and a half million spindles and nearly forty thousand looms.

In the ‘seventies there was no dispute as to England’s sub- stantial lead in respect of efficiency. Alexander Redgrave, the chief factory inspector, made inquiries on the continent both in 1873, when Lancashire was anxious as to the comparative cost of pro- duction abroad because of the short-time bill then before parliament, and previously, and reported most unfavourably upon the state of the industry in Germany. Hours were long, the skill of the hands was inferior, speeds were low and time was wasted. In several important respects his views were corroborated by M. Taine in his Notes on England, and by the evidence adduced before the German commission upon the cotton and linen industries in 1878. A marked contrast is noticeable between the sketches drawn of this period and the careful picture presented by Professor Schulze-Gaevernitz of the early

‘nineties,” but even in the latter the advantage of England is represented as substantial in every essential respect. The gap

which existed has narrowed, but it is still unmistakable. To give one example, according to Dr Huber’s figures there were in Saxony at the end of the 19th century 106 spindles to an operative and about as

many weavers as looms, whereas in England there were about twice as many spindles to an operative and twice as many looms as persons engaged in weaving sheds. 1 As regards manufacturing, the character of the product may partly explain the difference, but it will not entirely. The reader need hardly be warned that the comparison drawn is exceedingly rough. German cotton operatives taken all round are certainly less efficient than English labour of the same kind. The reason is partly that the proportion of the German workpeople who have been for long specialized to the industry, and look forward to continuing in it all their lives, is not high. Complaint is constantly made of the number of vacancies created in the mills each year by operatives leaving, and of the impossibility of filling them with experienced hands. Many of the vacancies are caused by the return of workpeople to the country parts. Sometimes the mills are in the country, or within easy reach of it, and labour is obtained from the unoccupied members of peasants' families. In these cases the factories do not always succeed in attracting the most capable people, and work in the factory is not infrequently looked upon as a makeshift to supplement a family's earnings. Among Lancashire operatives far more pride of occupation may be met with. In many of the industrial parts of Germany English conditions are evolving, but they are not generally the rule. An American consul may be taken to report to his own country without prejudice as to the rival merits of German and English conditions: one such wrote in 1901 : — " The task of educating labour up to a high degree of efficiency is difficult, and many generations are necessary to achieve that result. The English cotton spinners have attained such a degree of skill and intelligence that, for the most part, no supervision is necessary. In Germany the presence of a technical overseer is indispensable. Another advantage which England enjoys is the cheap price of machinery. Germany imports the major part of her machinery from England, and German wholesale dealers in these machines have not been able, by placing large orders, to overcome the difference caused by freight and tariff." Wages reflect the efficiencies of countries, not of course perfectly, but in some degree. They are much higher in Lancashire than in Germany, as is made evident by an article from the pen of Professor Hasbach in Schmollers Jahrbuch (vol. ii., 1903). The author tries to show that Germany is not so far behind England industrially as is generally believed, and the contrast drawn by him, greatly to the advantage of Lancashire, is not likely to ex- aggerate the superiority of English conditions. It is calculated by Professor Hasbach that the daily wages of spinners are about 5/10 to 6/ at Oldham, 6/6 at Bolton and 5/6 in Stalybridge and neighbouring places. With these he compares the 3-70 to 3-80 marks paid in the Rhine Province and Leipzig, and the 3 to

3-15 marks paid in the Vogtland, Bavaria and Alsace, and mentions an exceptionally high wage of 4§ marks, which was earned by an operative who worked a new and long doubling mule. The wage paid to the big piecer in England, Dr Hasbach goes on to show, is not much greater than that received by a good assistant in Germany. This comparison as it stands will probably give some readers an idea that English advantages are greater than they actually are, because it may be overlooked that the great difference between wages in the case of English and German spinners is not repeated among the piecers. Taking a spinner and his first assistant as the unit, we should have a joint average daily wage of about 8/6 in England and 6/ in Germany. In the case of weavers, comparison of wages is more difficult to draw, but the advantage of England would seem to be but little less. However, in instituting a comparison between two countries, as regards the relative efficiency of labour in some industries, we should do well to remind ourselves that efficiency is a somewhat transitory thing, dependent upon education and experience as much as upon aptitude. In respect of the capacity of labour for the task required in the cotton industry, we could not (writing in 1907) make the statement that England leads significantly with the assurance with which we can assert her superiority in respect of present attainments. The cotton industry has not been prosecuted on a large scale in Germany so long as in England, and the Germans have not, therefore, had the same opportunity for developing their latent powers. But the thoughtful- ness and carefulness of the German workman are beyond dispute, and these qualities will procure for him a leading place where work is not mechanical. Already in the cotton industry it is said that the operatives are displaying quite striking powers of undertaking a wide range of work and changing easily from one pattern to another. Hence German firms feel little hesitation in taking small orders on special designs; they do not experience any great difficulty in getting their factors accommodated to produce the required articles. Apart from the efficiency of labour, reasons exist for the lower

1 Deutschland als Industriestaat.

real cost of production in England in the organization of the industry. The German industry is not only less localized, but, as we might perhaps infer from that circumstance, less specialized. A German factory will turn out scores of patterns where an English firm will confine itself to a few specialities. Time is wasted in accommodating

machinery to changes and in accustoming the hands to new work. The German producer suffers from the undeveloped state of the market. In England specialized markets with specialized dealers have greatly assisted producers both in their buying and selling. A German manufacturer may have to find his customers as the English manufacturer need not; at least, so Professor Schulze- Gaevernitz has assured us, and conditions have not been wholly transformed since he made his careful analysis. He wrote : — ‘ But especially disadvantageous is the decentralization in respect to the sale. Here also the German manufacturer stands under the same disadvantages with which the English had to struggle in the ‘thirties. The German manufacturer still seeks his customers through travellers and agents, and in many instances through retail sellers, whose financial standing is often questionable, whose necessity for credit is always certain. Hence the complaints about the bad conditions of payment in Germany which crop up continually in the enquite. The manufacturers had to wait three, four or six months, and even twelve months and longer for payment. In reality there existed ‘ termless terms,’ a ‘ complete anarchy in the method of payment.’ . . . The manufacturer cannot be at the same time commission agent, banker, merchant and retail dealer; he needs sound customers capable of paying. He fares best if the sale is concentrated in one market, and ‘ change ‘ prices simplify the struggle between buyer and seller. The search for customers, foreign as well as home, and the bearing of all possible risks of disposal, are in any case difficult enough to necessitate the whole strength of a man. The wholesale merchant alone is in a position to pay the manufacturer in cash or on sure, short terms. But especially where export is in question is the dispersal of sales an extreme impediment. The manufacturer cannot follow the fashions in Australia and South America; the foreign buyer cannot travel from mill to mill.” . ...

It is the want of commercial development in Germany which accounts for the more frequent combination of weaving and spinning there than in England. But in Germany to-day economic enterprise is flourishing, and commercial development may confidently be looked for together with advance in other directions. It is not many years since the typical German cotton factory was comparatively primitive: now mills can be exhibited which might have been erected recently in Oldham. Between the early ‘eighties and the ‘nineties the expansion of the German industry was enormous— the imports of cotton-wool rose by nearly 70 %— yet the number of spinning-mills was actually reduced from 6750 to 2450, while the number of weaving-sheds fell from 56,200 to 32,750. At the same time the factories devoted to mixed

goods declined from 25,200 to less than 16,350. From these figures we may gather how rapidly the average size of mills and weaving-sheds enlarged in the period. One cause, no doubt, was that improved economies in the new businesses forced antiquated factories to shut down and make way for still newer erections. There were recently about twice as many persons engaged in weaving as in spinning, but the largest numbers of all— slightly in excess of those in weaving-sheds— were the persons occupied in the manufacture of cotton-lace, trimmings, &c. As we might imagine, Germany's exports of cotton goods are not high. Including yarns they amounted to £13-7 million per annum in 1899-1903. In order of value their largest exports are (1) coloured goods, (2) hosiery, (3) lace and embroidery, (4) yarns, and (5)

trimmings, &c. .

France.— Into the industrial conditions of the two leading rivals of England we have entered in some detail; the state of affairs in the rest of the world must be dealt with more briefly. Of France more ought to be said than we can find place for, though in respect of the magnitude of her cotton industry, as measured by the quantity of spindles, she stands now not fourth, but fifth, Russia taking precedence. But the work of the French is incomparably superior to anything that is turned out from Russia. France suffered a severe blow when the industry of Alsace and Lorraine was lost to Germany, but the inexhaustible originality of French design will always secure for her goods a place in the first rank. As regards artistic results France leads, but the real cost of her spinning and weaving cannot approach in lowness that of Lancashire. After costly strikes the French workmen have succeeded in shortening their hours to ten and a half a day ; and here it may be remarked that the International Association of Textile Operatives tends to equate continental industrial conditions to those of England, ihe French~industry has been fostered by tariffs. When the Board ot Trade calculation was made, French tariffs were found to bear upon British cotton goods with about the same severity as those ot Germany, except that the former treated more hardly yarns and cotton thread for sewing. French protectionism has kept down her exports; such as they are the majority proceed now to her colonics. Normandy, the north and east, in order, are the chief seats of the industry. In Normandy the leading city is Rouen, and Darnetal, Maromme, Sotteville, Havre, Yvetot, Dieppe, Evreux, Gisors, Falaise and Flers are important places. The north contains the

important towns of Lille, Tourcoing, Roubaix, St Quentin, Amiens and Hellemmes. The Vosges is the chief district of the east, and the leading

towns are Epinal, St Die, Remiremont, Senones, Val d'Ajol, Comimont and La Bresse. The following towns which are not in- cluded in any of the districts mentioned above are also noteworthy : — Troyes, Nantes, Cholet, Laval, Tarare, Roanne, Thizy and Ville- franche upon the Sa6ne. Cotton arrives at Havre and Marseilles; at the latter chiefly the product of Egypt and the East. Havre used to be the most important cotton port in continental Europe, but to-day more spindles are fed from Bremen than from Havre. France's consumption of cotton annually in the period 1 899-1903 was 215,000 metric tons. . .

Russia. — Power-spinning was carried into Russia by Ludwig Knoop, who had learnt the trade in Manchester, and to his efforts its early success was due. The growth, largely the result of very heavy protectionism — according to the Board of Trade report, from 50 to more than 100% more severe than that of Germany, — has been rapid, as the following table bears witness:—

Average yearly Importation of Cotton wool and Yarn into Russia.

Raw Cotton in

Cotton Yarn in

thousand tons.

thousand tons.

1824-1826

•9

5-4

1836-1838

4-6

IO-I

1842-1844

8-4

9-5

I 848-1 850

21-4

4-5

1889-1891

117-4

3-4

1899-1903

180-0

29

Table showing approximately the Growth of Spindles and Looms in Russia.

Spindles.

Looms.

1857 1877 1887

1900

1909

1,000,000

4,000,000 6,000,000 7,800,000

55,ooo

85,000

146,000

The chief districts were the following in 1900: —

Government.

Factories.

Spindles (in thousands).

Looms (in thousands).

Moscow . . . •

56

1295

33

Vladimir . . . .

67

1224

42

Piotrkov . . . .

25

745

20

St Petersburg

24

1074

11

Jaroslaw .

4

347

Kostroma . . . .

25

274

20

Tver

6

348

9

Esthonia . . . .

1

440

2

Ryazan . . . .

4

146

3

Elsewhere

Total . .

15

198

4

227

6091

146

Fine spinning has been attempted only recently. Generally speaking 70’s used to be the upper limit, but now counts up to 140 s are tried, though the bulk of the output is coarse yarn. The in- efficiency of the labour was made abundantly plain by Dr Schulze- Gaevernitz in his economic study of Russia, and conditions have not greatly altered for the better since. Roughly, 170,000 operatives worked 6,000,000 spindles in 1900, which means 35 spindles per head as compared with more than 100 in Saxony and more than 200 in England. In weaving the ratio of operatives to machinery worked out at about one loom to

each weaver, which is comparatively much less unfavourable to Russia. The proportion in Saxony is about the same, but in England the average approaches two looms to a weaver. The speed of machinery cannot be compared, and we must remember that the above contrasts are rough only, and made without regard to differences of product. Russia is encouraging the growth of cotton at home. It is of very inferior quality, but 100,000 tons from the provinces of central Asia and Trans-Caucasia were used in 1900: her imports in the same year were about 170,000 tons. _ ˆ

Switzerland.— Swiss spindles advanced until the early seventies, but a decline followed. Details are : —

1830 400,000

1850 . . . • 950,ooo

1876 .... 1,854,000 1883 1,809,000

1898 . . . • 1,704,000

1909 (estimated) . 1,500,000 The falling off is occasioned mainly by (a) the developing indus- trialism of the rest of Europe, notably Germany, and (b) the diminish- ing importance of the natural advantage of water-power with the

improvement of steam-engines. Swiss yarns have been kept out of continental markets in the interests of home spinning. Now fancy cotton goods, laces and trimmings are the leading specialities of the Swiss textile workers. About half the Swiss spindles are in the canton of Zurich, between a quarter and a third in Glarus, about the same in St Gall and 9 % in Aargau. Figures show that the average size of the Swiss mill is small. The average spindles to a mill were 22,000, and very few mills held more than 50,000 spindles. Some 9000 of the power-looms are in Zurich, some 4500 in Glarus and 4000 in St Gall. Wald in the south-east of the canton of Zurich is an important centre of the muslin manufacture.

Austria. — Austria contains about 4,200,000 spindles and more yarn is consumed than it produces, as on balance there is an excess of imports of yarn. Bohemia, lower Austria, Tirol and Vorarlberg account for the mass of Austrian spinning. The following details relating to

these districts recently are of interest : —

Mills.

Spindles.

Average spindles to a mill.

Lower Austria Tirol and Vorarlberg

82

23 20

1,870,000 460,000

435.0O0

22,800 20,000 21,700

Reichenberg and the surrounding district is the chief manufacturing place : here are more than 80,000 looms, nearly a half of which are hand-looms.

Italy. — Recent industrial growth in Italy is remarkable : statistics of spindles since 1 870 are as follows, but the percentage of error is probably high: —

1870 . . . 500,000 1888 . . . 900,000 1898 . . . 2,100,000 1909 . . . 4,000,000

The distribution of spindles is roughly as follows: — Lombardy …. 1,850,000 Piedmont …. 1,000,000

Venetia 550,000

Campania …. 250,000 Liguria 250,000

Tuscany 100,000

The distribution of spindles and power-looms in the chief manufacturing towns in Italy is shown in the following table : —

Spindles.

Spindles.

Turin .

470,000

Genoa .

210,000

Bergamo .

450,000

Salerno

150,000

Como .

250,000

Brescia

310,000

Milan . . .

660,000

Naples.

100,000

Novara

410,000

Udine .

240,000

Power-

Power-

Looms.

Looms.

Milan .

40,000

Pisa . . .

2,500

Turin .

22,000

Como .

6,000

Novara

13,000

Bergamo .

13,000

Genoa .

6,000

Udine .

3.5oo

The district between Milan and Lago Maggiore contains numerous villages devoted to the cotton industry. Many of the factories in the province of Bergamo are situated in the Valle Seriana, which is endowed with abundant water-power. In this district coarse and medium yarns and grey cloth are the chief products. In the province of Milan there are several small towns, notably Gallarate, Busto Arsizio and Monza, in which the manufacture of coloured and fancy goods is extensively carried on. The finest spinning in Italy is done in Turin. The coarsest spinning is done in Venetia.

The Netherlands. — In 1805 the cotton industry was reintroduced into the Netherlands from England in its factory form. Seventeen mules bearing 16,000 spindles are said to have been smuggled across the channel, while forty Englishmen were enticed over to work them, in spite of English legal prohibitions. LieVin Bauwens was the prime mover of the achievement. Expansion rapidly followed, and in 1892 Belgian spindles numbered nearly a million. Since then a decline has

set in. Ghent, with about 600,000 spindles, is the only really important place: no other place has as many as 50,000. Holland possesses about 417,000 spindles: the leading district is Twente and the leading town Enschede ; Twente contains also about 20,000 power-looms. Rotterdam is the chief cotton port ; Amster- dam, always a far-away second, has lost place still further of late.

Spain and Portugal.— The greatness of Spain in the cotton in- dustry lies buried in the remote past, but of late she has awakened somewhat, with the result that her spindles now number about 1,853,000. Catalonia is the chief province where the industry is carried on, and Barcelona surpasses all other centres. Portugal possesses nearly half a million spindles (the bulk in Lisbon and Oporto), many of which have appeared since 1894.

The Rest of Europe. — Of Sweden, Norway, Denmark, Greece and Macedonia no special mention need be made, nor of other parts where the cotton industry may just exist. It may be mentioned here that among the scattered rural populations of many parts of the continent, even m such advanced countries as France and Germany, hand- looms are still to be found in large numbers.

India. — The hand-cotton-industry has been carried on in India since the earliest times, and for many years English fabrics were protected against the all-cottons of India. Soon after the introduction of spinning by rollers, English all-cottons began to rival the Indian in quality as well as in cost. A large export trade to India has grown up, but Indian hand-loom weavers still ply their craft. In 1851 power-spinning was started, and by 1876 there were in India 1,000,000 spindles. Since then they have nearly reached six millions and importations of yarn have been significantly affected. The growth of Indian power-spinning, which is almost entirely of the ring variety, was attributed by some to the depreciation of the rupee after 1873, but the fall in the value of the rupee was stopped in 1893 and the competition continued. The real explanation, no doubt, is that at the cost of Indian labour it is found cheaper to import machinery and coal than to export or cease to grow cotton and import yarn. This was the conclusion of the majority report of the committee of the Manchester Chamber of Commerce, which made an inquiry into Bombay and Lancashire spinning in 1888. Besides, as regards Indian exports to China, the remission in 1875 of the 3 % export duty on yarns must be borne in mind. The efficiency of labour in India is only a small fraction of that of Lancashire operatives. Recently complaint has been made that Indian mills are being run inhumanely long hours with the same set of labour, and that child-labour is being abused, both legally

and illegally — legally as regards children over fourteen who are classed as adults. The working of heavy hours began with the electric lighting of the mills; previously all shut down at sunset largely because of the cost of illumination. The outcry which has been raised is, perhaps, sufficient guarantee that the worst evils will be remedied. Indian spinning, it must be remembered, is still very coarse as a rule, though some fine work is attempted and the average of counts spun is rising. Though there are about a ninth as many spindles in India as in the United Kingdom, there are only about one-fifteenth as many power-looms, 46,400 in all, to which figure they rose between 1891 and 1904 from 24,700. The reason for the paucity of power- looms is probably two-fold, (1) the low cost of production of Lanca- shire weavers, and (2) the habit of hand-loom weaving which is fixed in the Indian people. A rapid increase of power-looms is, however, observable. The hand-loom industry is gigantic, particularly in the Madras Presidency and the Central Provinces; in the latter district alone there were estimated to be 150,000 hand-looms in 1883. The following details relating to the Indian cotton industry are supplied officially : — ■

Cotton Mills in India, including Mills in Native States and French India.

Mills.

1 897-1 898.

1903-1904.

Mills (number)

164

204

Capital (thousand £s) ....

648

1,067

36,946

46,421

Spindles (thousands) ....

4.219

5,213

Persons employed (daily average)

H8.753

186,271

Yarn produced: —

Counts (1 to 20 thousand lb) .

400,384

474.509

Counts (above ,, „ ,,) Total lb . Yarn produced: —

62,212

104,250

462,596

578.759

Bombay (thousand lb)

324.649

4H.932

Bengal „ „ . . .

44,807

46,487

Madras „ ,,

32,5i6

28,714

United Provinces (including Ajmere-

Merwara) (thousand ft)

26,747

29,930

Central Provinces (thousand lb) .

18,334

24.549

Punjab

6,607

u,578

Elsewhere „ ,, „

Total lb . . Woven goods : —

8,936

22,569

462,596

578,759

Grey (thousand ft) . . .

83,136

111,494

Others „ ,,.... Total ft .

8,152

26,550

91,288

138,044

China. —In China spinning has not met with the same success as India, and power-manufacturing has not yet obtained a sure footing.

The ingrained conservatism of the Chinese temperament is no doubt a leading cause. Of the spindles in China — about 600,000 in all — ■ from a half to three-fifths are in Shanghai. The following details

relating to the inception of the power-industry are quoted from a Diplomatic and Consular Report of 1905: —

• “The initial experiment on modern lines was made in 1891, when a semi-official Chinese syndicate started at Shanghai — the Chinese Cotton Cloth Mill and the Chinese Cotton Spinning Company. Its originators claimed for themselves a quasi-monopoly, and prohibited outsiders who were not prepared to pay a fixed royalty.for the privilege from engaging in similar undertakings. Although certain Chinese accepted this onerous condition, foreigners resented it as an undue interference with their treaty rights, and it was only when Japan, in 1895, after her war with China, inserted in the treaty of Shimonoseki an article providing for the freedom of Japanese sub- jects to engage in all kinds of manufacturing industries in the open ports of China, and permitting them to import machinery for such purposes, that outsiders were afforded an opportunity of exploiting the rich field for commercial development thereby thrown open. Accordingly, so soon as the Japanese treaty came into force no time was lost in turning this particular clause to account, and the erection of no less than 1 1 mills — Chinese and foreign — was taken in hand. At that time the pioneer mill, which was burnt to the ground in October 1893, but subsequently rebuilt, and other Chinese-owned mills were together working some 120,000 spindles and 850 looms.” By 1905 the mills increased to 17, the spindles to 620,000 and the looms to 2250, but there is little inclination to expansion. Yarns for the hand-looms are obtained primarily from India and secondarily from Japan. The following are the recent figures relating to imported yarns : — ■

In million lb

1898.

1899.

1900.

1901.

1902.

1903.

British . . Indian Japanese . Hong-Kong . Tongkinese .

Total . .

lb

9-1

186-7

64-7

ft

7-8 254-2 104-0

ft

4-1

I3I-5

62-9

ft

7-0 228-9 66-4

•7

ft

4-3

251-6

69-7

•8

ft

2-2 250-8 1 10-9

1-2

•01

260-5

366-0

198-5

303-0

326-4

365-I

Japan.— If in China the factory cotton industry reveals no pros- pects as yet of a great future, the same cannot be said of Japan.

The chief centres of spinning with their outputs in value of yarn for a year at the beginning of the 20th century are stated beneath :

Thousands.

Thousands.

£ s.

£ s.

Osaka

1226-5

Nara . . .

in-5

Hyogo

495-5

Hiroshima

9i-3

Okayama

374-4

Kyoto

82-2

Miye . . .

238-1

Wakayama .

79-2

Tokyo

227-9

Ehime

70-5

Aichi . . .

224-3

Kajawa .

36-4

Fukuoka .

168 • 1

The following table gives other valuable information :-

Japanese work has been severely criticized, but the recency of the introduction of the cotton industry must not be forgotten.

Bibliography.— The literature relating to the cotton industry is enormous. The most complete bibliographies will be found in Chapman's Lancashire Cotton Industry (where short descriptions of the several works included, which relate only to the United Kingdom, are given) ; Hammond's Cotton Culture and Trade; and Oppel's Die Baumwolle. The list of books set forth here must be select only.

The development of the English industry can be traced through the following: — Aikin, A Description of the Country from Thirty to Forty

Miles round Manchester (1795); Andrew, Fifty Years' Cotton Trade (1887) ; Baines, History of the Cotton Manufacture in Great Britain (1835) ; Banks, A Short Sketch of the Cotton Trade of . Preston for the last Sixty-Seven Years (1888) ; Butterworth, Historical Sketches of Oldham (1847 or 1848); Butterworth, An Historical Account of the Towns of Ashton-under-Lyne, Stalybridge and Dukin- field (1842); Chapman, The Lancashire Cotton Industry (1904); Cleland, Description of the City of Glasgow (1840); A Complete History of the Cotton Trade, &c, by a person concerned in trade (1823); Ellison, The Cotton Trade of Great Britain including a History of the Liverpool Cotton Market and of the Liverpool Cotton Brokers' Association (1886) ; Leon Faucher, £.tudes sur Angleterre (1845); French, The Life and Times of Samuel Crompton (1859); Guest, A Compendious History of the Cotton-manufacture, with a Disproval of the Claim of Sir Richard Arkwright to the Invention of its Ingenious Machinery (1823) ; Guest, The British Cotton Manufacture and a Reply to the Article on Spinning Machinery, contained in a recent Number of the Edinburgh Review (1828) ; Helm, Chapters in the History of the Manchester Chamber of Commerce (1902); Kennedy, Miscellaneous Papers on Subjects connected with the Manufactures of Lancashire (1849); Ogden, A Description of Manchester . . . with a Succinct History of its former original Manufactories, and their Gradual Advancement to the Present State of Perfection at which they are arrived, by a Native of the Town (1783) ; Radcliffe, Origin of the New System of Manufacture, commonly called " Power-Loom Weav- ing " and the Purposes for which this System was invented and brought into use, fully explained in a Narrative concerning William Radcliffe' s Struggles through Life to remove the Cause which has brought this Country to its Present Crisis (1828) ; Rees' Cyclopaedia, articles on Cotton (1808), Spinning (1816) and Weaving (1818); Ure, The Cotton Manufacture of Great Britain, investigated and illustrated, with an Introductory View of its Comparative State in Foreign Countries (2 vols.); Ure, The Philosophy of Manufacture ; or An Exposition of the Scientific, Moral and Commercial Economy of the Factory System of Great Britain (1835) ; Watts, Facts of the Cotton Famine (1866); Wheeler, Manchester: its Political, Social and Commercial History, Ancient and Modern (1836).
*

In addition there are many short papers in the Manchester public library. Much valuable information may be obtained from parliamentary papers; a list of relevant ones is printed as an appendix to Chapman's Lancashire Cotton Industry, but it is too lengthy to repeat here. The most important are the reports relating to the hand-loom weavers, those on the employment of children in factories (of which a

list will be found in Hutchins and Harrison's History of the Factory Legislation), and the state of trade and the annual reports of the factory inspectors. On labour questions there is a list of authorities in Chapman's Lancashire Cotton Industry and also of

Quantity

Average

Average

Average

Average

Gross

Average

of Raw

Total

Number

Number

Daily

Daily

Amount

Number

and

Production

of Male

of Female

Annual

Daily

Wage

Wage of

Year.

of Capital

of

Ginned

of Cotton

Opera-

Opera-

Working

Working

of Male

Female

invested.

Spindles.

Cotton

Yarn.

tives daily

tives daily employed.

Days.

Hours.

Opera- tives.

Opera-

used daily.

demanded.

employed.

tives.

Thousand £

Thousands.

Million lb.

Million ft.

1 892-1 894

1123

420

112-9

97.9

6,916

21,695

290

22

4d. to 4id.

2d. t0 2|d.

1 900- 1 902

3569

1209

335-3

288-0

13.373

50,271

312

19

7K

4id. to 5d.

1903

3441

1290

375-5

322-7

13,160

57.166

308

20

7|d. to 8d.

4id. to 5d.

1904

3470

1306

332-1

285-9

10,967

52.115

309

20

8d.

5d.

With amazing adaptability the Japanese have assumed the methods of Western civilization as a whole. But hand-Weaving more than holds its own, and power-weaving has as yet met with little success. , The custom already mentioned as a cause of the continued triumph of the hand-loom in India and China is strong also in Japan, and the economy of the factory system is greater relatively in spinning than in manufacturing. In Japan it is ring-spinning which prevails: 95 % of the spindles are on ring-frames. Ring-spinning entails less skill on the part of the operative, and ring-yarn is quite satisfactory for the sort of fabrics used most largely in the Far East. The counts produced are low as a rule. Generally mills run day and night with double shifts, and the system seems to pay, though night-work is found to be less economical than day-work there as elsewhere. More operatives are placed on a given quantity of machinery in Japan than in Lancashire — possibly more ” labour ” as well as more operatives, because labour as well as operatives may be cheaper. On the same work the output per spindle per hour is less in Japan than in England, even when day-shifts only are taken into account.

parliamentary papers containing useful material. Printed copies of the ” Wages Lists “are issued by the trade unions. The Factory Acts are dealt with in Hutchins and Harrison’s History, mentioned above, as well as the literature relating to them ; while the hand- books by Redgrave and by Abraham and Davies are specially useful. On the industry abroad the following are the fullest authorities: — Besso, The Cotton Industry in Switzerland, Vorarlberg and Italy (1910) (areportmadeasaGartside Scholar of the University of Manchester) ; Chapman’s Cotton Industry and Trade (1905) ; Hammond, The Cotton Industry; Hasbach’s article, ” Zur Characteristik der en- glischen Industrie,” in Schmollers Jahrbuch, vol. ii. (1903); Leconte, Le Coton-; Lochmuller, Zur Entwicklung der Baumwollindustrie in Deutschland (1906) ; Montgomery, The Cotton Manufacture of the United States of America contrasted and compared with that of Great Britain (1840); Oppel, Die Baumwolle (1902) ; Schulze-Gaevernitz, Der , Grossbetrieb : ein wirtschaftlicher und socialer Fortschritl : eine Studie auf dem

Gebiete der Baumwollindustrie (1892; translated as The Cotton Trade in England and on the Continent) ; T. M. Young,

COTTON-SPINNING MACHINERY

Plate 1.

Fig. ii.— CARDING ROOM.

(From Photographs taken in a Manchester Fine Cotton-spinning Mill, by R. Banks.)

Plate II.

COTTON-SPINNING MACHINERY

Fig. 13.— SPINNING-ROOM. {From Photographs taken in a Manchester Fine Cotton-spinning Mill, by R. Banks.)

COTTON-SPINNING MACHINERY

301

American Cotton Industry (1902); Uttley, Cotton Spinning and Manufacturing in the United States of North America (1905 ; a report of a tour as Gartside scholar of the university of Manchester) ; and the Gartside reports on the cotton industries of France and Germany by Forrester and Dehn respectively. Information will also be found in Diplomatic and Consular Reports, and fragments may be gathered from other books such as G. Drage's Russian Affairs, Dyer's Dai Nippon, and Huber's Deutschland als Industriestaat. Japan has published since 1901 a very full financial and economical annual, and the British government issues annually a good statistical abstract for India. The American census contains much detailed information, and there are, in addition to the statistics issued by the Federal government, those of Massachusetts, the Bureau of Statistics of which has also reported the results of an investigation into the industry in the Southern states. Among official matter the semi- official Bombay and Lancashire cotton spinning inquiry of the Man- chester Chamber of Commerce may be included. The census of pro- duction of the United Kingdom must be mentioned, and the reports of the International Congresses of Cotton Spinners and Manufacturers. As to labour, see the reports of the International Textile Congresses. The periodical literature is of good quality and much of it is filed in the Patent Office library. We may notice particularly the Cotton Factory Times; Textile Journal; Textile Manufacturer; Textile Mercury ; Textile

Recorder ; Textile World Record (American) ; Der Leipzige Monatsschrift fur Textilindustrie ; and the French Textile Journal. Shepperson's Cotton Facts is an annual which relates chiefly, though not entirely, to raw cotton, as does also Cotton, the periodical of the Manchester Cotton Association. For technical works we may refer here to the well-known treatises of Brooks, Guest, Marsden, Nasmith and Walmsley, and to Johannsen's ponderous two-volumed Handbuch der Baumwollspinnerei, Roh- weissweberei und Fabrikanlagen. (S. J. C.)

COTTON-SPINNING MACHINERY. The earliest inventors of spinning machinery (see Spinning) directed their energies chiefly to the improvement of the final stage of the operation, but no sooner were these machines put to practical use than it became apparent that success depended upon mechanically conducting the operations preliminary to spinning. Later inventors were, therefore, called upon not only to improve the inventions of their predecessors, but to devise machinery for preparing the fibres to be spun. Arkwright quickly perceived the importance of this aspect of the problem, and he devoted even more energy to it than

growers, for by the then existing methods of separating cotton lint from seed it would have been impossible to provide an adequate supply of raw material. By inventing the saw gin, Eli Whitney, an American, in the year 1792, did for cotton planters what Paul,

SEED

Fig. 1.

to the invention with which his name is more intimately associ- ated. But, given a complete series of machines for preparing and spinning, the cotton industry (see Cotton Manufacture) must have remained unprogressive without the co-operation of cotton

Arkwright, Crompton, Cartwright, Watt and others did for textile manufacturers, for he provided them with the means for increasing their output almost indefinitely.

Cotton- ginning is the process by which cotton seeds are separated from the adhering fibres. The most primitive machine employed in India and China for this purpose is the churka, which consists of two wooden rollers fixed in a frame and re- volving in contact. Seed cotton is fed into these rollers and the fibres pass forward but the seeds remain behind. It is a device which does not injure the fibres, but no improvement has been found by which the churka can be converted

into a suffi- ciently productive machine for modern re- quirements. In a modified form Whitney's saw gin is still used to clean a large portion of the annual crop of short and medium stapled cottons. It consists of from 60 to 70 saws (A, fig. 1), which are mounted upon a shaft and revolve between the interstices of an iron grid (B) ; against this grid the seed cotton is held whilst the fibres are drawn through, the seeds being left behind. The operation is as follows : — ■ seed cotton is fed into the hopper ©, and conveyed by a lattice (D) to a spiked roller (E), which regulates the supply to the hopper (F). Whilst in (F) the cotton is engaged by the teeth of the saws (A), and drawn through the grid (B), but the bars are too close to permit the seeds to pass. A brush (G) strips the cotton lint from the saws, after which it is drawn through a flue (H) to the surface of a perforated roller (I) by pneumatic action ; it then passesˆ between (I) and (J) out of the machine. The Macarthy gin is the only other type in extensive use; it is employed to clean both long and short stapled cottons. In this gin the fibres are drawn by a leather- covered roller (A, fig. 2) over the edge of a stationary blade (B) called a doctor, which is fixed tangential to the roller. Two cranks (E) move two other blades (C, D) up and down immediately behind, and parallel to, the fixed blade (B). The cotton is thrown into the hopper (F) and the fibres are drawn by the roller (A) until the seeds are against the edge of the doctor (B), when the beaters (C, D) strike them off, but permit the fibres to go forward with the roller. Attempts continue to be made so to improve both machines, that production may be increased,

Fig. 3.

and labour charges, and the risks of injuring the fibres, reduced.

Baling. — As cotton leaves the gin, it is in some cases rolled, under compression, into cylindrical bales; but it is usually packed into rectangular bales, that vary in weight from 160 lb to 750 lb, by steam or hydraulic presses. After pressing, the cotton is covered with coarse jute bagging, and the whole secured by iron bands. In this form it arrives at the spinning mills.

In the mill treatment of cotton it soon became an established practice

to divide the work into the following operations, namely (1) Mixing the fibres into a homogeneous mass; (2) removing im- purities; (3) combing out entanglements in, and ranging the fibres in parallel lines; (4) simultaneous combination and attenuation of groups of parallel fibres ; (5) completing the combination and attenu- ation, and twisting the fibres into a thread; (6) compounding, finishing and making-up of threads. These remain the essential conditions of cotton-spinning. The principal machines used to carry out the foregoing stages are: The bale breaker, opener and scutcher; the card and comber; the drawing, slubbing, intermediate and roving frames; ring and mule spinning; winding, doubling; clear- ing and gassing the reel, and bundling press, together with several auxiliary machines. All the operations included in this list are not

low

necessarily employed in the production of all kinds of yarn; counts require fewer, and high counts more processes.

A bale breaker is used to disentangle fibres which have been, by hydraulic or steam presses, converted into hard masses that resist manual efforts to disentangle them. It may consist of three pairs of spiked and one pair of fluted rollers. If so, the matted cotton is fed into the first pair, seized by the second pair, which have a higher surface velocity, and pulled, while the third pair reduce the whole to a more or less fluffy mass, and the fluted rollers deliver it upon a travelling lattice by which it is conveyed to, and deposited upon, the floor of the mixing room. Instead of rollers, a hopper breaker may be used. In this machine the cotton is carried by a horizontal lattice into contact with a sloping spiked one, whose spikes tear away small tufts and deposit them upon a second lattice for removal to the mixing room. A stack of pulled cotton is formed by superposing thin layers from different bales, and when completed the cotton is drawn from top to bottom of the stack. By this means a thorough mixing of fibres is effected.

The Opener. — Mixed cotton may be thrown upon a lattice and conveyed to a spiked roller to be pulled, beaten, discharged into a trunk, and drawn by pneumatic force to the opener. Or it may be spread (fig. 3) upon a lattice (I), and carried between feed-rollers (E)

ax ax ax err

B

D-M-f-

ZH4-

LiLlULlULlUU

m!g2f§*»

Fig. 4,

COTTON-SPINNING MACHINERY

3ˆ3

ROLLER

Fig. 5.

to be subjected to the action of a beater (A) whose teeth first seize tufts of cotton and then fling them upon a grid (B), to be subsequently seized by other teeth and again flung off until dirt and other impurities pass between the grating. The beater may be cylindrical (as at A) or in the form of a truncated cone: in either event, from four to twelve rows of teeth project from its surface. It is from 18 in. to upwards of 36 in. in diameter, approximately 40 in. wide, and the largest cylindrical beaters make from 300 to 700 revolutions; whilst conical beaters make about 1000, and small ones make from 1000 to 1500 revolutions per minute. The opened cotton is carried, in the direction indicated by the arrows, upon a strong blast of air which is generated by a fan (H), and this deposits it in patches upon the surfaces of two perforated zinc or wire cylinders ©, but dust and foreign particles pass through the interstices. As these cylinders revolve towards each other the cotton passes between them in the form of a sheet to a pair of feed-rollers (D), which may again deliver it to a beater with two or three blades; if so, from this beater the cotton is next borne on an air current to, and between, a second pair of perforated cylinders. In either event, the final cages (C, C) deliver the cotton to feed-rollers (D) and they pass it to calender-rollers (F), by which it is compressed into a sheet, and finally coiled into a lap (G). Various kinds of openers have been patented, all of which differ in some important respects; for example, a hopper feed may be substituted for the trunk or the lattice feed, in which event the cdtton from the mixing room is conveyed mechani- cally upon lattices, and deposited in a hopper affixed to an opener. In this hopper a sloping

spiked lattice elevates the cotton to an evening roller, whose office is to sweep back the surplus supply from the spikes, but allow the requisite quantity to pass forward to the beater. A regular supply of cottonto an opener is of great importance, and in order to insure it a table is often formed by substituting for the lower roller (E) a series of levers (A, fig. 4) all mounted upon a fulcrum (B), and having their free arms weighted by wedge-shaped pendents ©, that are separated by bowls (D). A fluted feed-roller (E) is fixed above this table and the cotton is led over the lever but beneath the roller. If the cotton is unequally distributed, thick places will press down the levers and thin ones will permit them to rise (as at A', E'). The rise of one pendent may be cancelled by the fall of another, but any balance of their movements is transmitted to a belt fork which governs a belt running upon a pair of inverted cones, and by this means the belt is traversed to and fro to drive the feed-roller (E) at a superior speed when the supply of cotton is insufficient, and at an inferior speed when the supply is excessive.

The Scutcher. — In many respects a scutcher resembles an opener; its function is to continue the cleaning and form laps of uniform

weight and density for the carding engine. Occasionally the scutcher is the first cleaning machine, in which event cotton, in a loose fleece, is spread evenly upon a lattice. But in order to carry the combination of fibres one stage further, three or four opener laps are generally placed upon the feeder, so that, as the laps unroll, three or four sheets of cotton will be superposed, and in this form are passed by the lattice (F, fig. 4) and the feed-roller (E) to either one or two beaters, which are furnished with two or three blades. The beater (G) flings the cotton against the bars of a grid (H) to loosen, and cause the dirt to pass between the bars, after which the cotton is carried forward upon an air current, in the same manner as in an opener, and formed into a lap. In case two scutchers are required, the laps from the first are fed into the second, where they are similarly treated; in both machines the lever and pendent mechanism furnishes the means by which uniformity is attained. A beater may consist of a straight, smooth blade (as at G), or of a blade provided with stout teeth; in the latter event the operation resembles combing rather than beating. Two-bladed beaters revolve from 1200 to 1500 times per minute; those with three blades from 900 to 1000 times per minute.

Carding Engine. — The functions of a card (see Carding) are: to place the fibres parallel; to remove remaining impurities and immature fibres ; and to form mature fibres into a porous band, called a sliver. A carding engine consists of three cylinders which are covered with

cards; the first, or taker-in (see fig. 5), is the smallest; the second and largest is the main cylinder ; and the third is the doffer. If the main cylinder is surmounted with a series of small ones (as at A), the engine is called a roller and clearer card. If a series of fixed strips of card are placed above the main cylinder, the engine is known as a stationary flat card. But if the strips move forward (as at B), it is a revolving flat card. In a roller and clearer card the small cylinders (E) are also covered with cards, but their teeth are bent to oppose those on the main cylinder, and they revolve with a different velocity. The taker-in is covered with saw teeth cut in a strip of steel which is fixed in the surface of that cylinder; it re- ceives the cotton (I) from a feed-roller © that turns above a smooth iron table (D) called the feed plate, and strikes out the heaviest particles of remaining dirt. In passing through the fringe of lap, the teeth comb the attached fibres but deliver the loose ones to the main cylinder. The latter carries them into contact with the teeth on the rollers (E), by whose lower surface velocity combing is again effected. Short fibres become fixed amongst the teeth of (A) and (E), but those lying crosswise are transferred from (A) to (E) and from (E) to the clearer, which again presents them to the cylinder.

When long fibres are turned to point in the direction of rotation they advance upon the cylinder A to the doffer teeth, where the

scattered fibres on the surface of A are collected into a light fleece. In this condition they are stripped by a vibrating comb (F), drawn together by a funnel, formed into a sliver, and deposited in a can (G). This machine is now chiefly used to card waste and low-class cotton. If such a card is made with two main cylinders, a connecting cylinder called a tummer collects the fibres from the first and passes them on to a second main cylinder, where they are again treated as already described. In a stationary flat card the teeth in the flats are bent to oppose those on the main cylinder, and by this means the fibres are combed and straightened. In a revolving flat card the flats (H) are formed into an endless chain, and they travel slowly in the same direction as the cylinder. In other respects both flat cards are similar to a roller and clearer card. Formerly double carding, namely, two pa’ssages of the fibres through separate cards, or one passage through a double card, was general, but single carding is now em- ployed for most purposes.

Combing. — For counts from 60 s upward, and for exceptionally good yarn of lower counts, from 14 to 20 cans from the carding engine are taken to a sliver lap machine where the slivers are drawn alongside each other, passed between three pairs of drawing rollers and two pairs of calender rollers, and formed into laps that vary in width from 7i in. to 12 in. This machine is provided with mechani- cal devices for stopping it on the failure of a sliver, and on the completion of a predetermined length of lap. When the sliver lap machine furnishes laps for the comber, the slivers are previously put through one head of drawing, namely, between four lines of drawing rollers, to straighten out the fibres. The more general practice is to pass sliver laps to a ribbon lap machine, at the back of which six laps are placed, end facing end, in one long line and simultaneously unrolled to feed each web between four pairs of drawing rollers. From the rollers the cotton passes in separate films over curved plates to a smooth table where one is superposed upon another, and in the combined state it is led between two pairs of calender rollers and formed into a lap from 7J to I0j in. wide. In the cotton industry the Heilmann comber, or some modification of that

machine, is used to straighten thoroughly the fibres of carded cotton, to cast out all below a certain length, and leave only those that are perfectly clean and approximate to uniformity in length. For fine yarns of medium quality only part of the slivers required to form a thread are combed. But for fine yarns of good quality all slivers are once combed, and those for superfine yarns are twice, or ” double combed.” This machine is made with six or eight heads, each of which is supplied with a ribbon lap. One end of every lap is fed by a pair of rollers between the open jaws of a nipper which immediately closes upon the sheet of cotton, but a fringe is left protruding into the path of a cylinder, on whose periphery either one set of 17, or two sets of 13, graduated needle combs, and one, or two, fluted segments are secured. The first comb to reach the cotton may have as few as 16, and the last 90 teeth per inch. After the combs have passed successively through the overhanging fringe of fibres, the nipper opens and a fresh length of about ˆ to ˆ of an inch is fed in. Meanwhile, a fluted segment on the cylinder has moved up to support the fringe; a top comb, which was inoperative when the cylinder combs were acting, has descended into the fringe, and three rollers first return a portion of the material already combed so that it may overlap that last treated. The rollers then reverse the direction of their rotation ; one of them and the segment engage the fringe, and draw the tail ends of all free fibres through the teeth of the top comb. The product of all the heads is next united, con- densed, formed into a

continuous sliver, and deposited in a can. One cycle of movements, therefore, only combs from j s 5 to ?% of an inch of each fibre; the top comb deals with the tail ends, and the major portion of the work is done by the cylinder combs. The fore- going operations are repeated at the rate of from 85 to 90 times per minute, during which from 15% to upwards of 25% of carded material is removed; but this is capable of being spun into coarse yarns. A comber invented by John W. Nasmith is a modification of the foregoing. In his machine the cylinder combs act upon the forward ends of the fibres whilst under the control of the nipper, after which two pairs of rollers return a sufficient portion of the previously combed film to overlap, and to enable the front rollers to engage the fringe. The rollers then draw a part of the fringe through the teeth of the top comb, which, as a sequence, treats all but the forward ends of the fibres. Since one passage through the cylinder and top combs completes the operation for one set of fibres, this machine gives a higher production ; it also gives a wider range of adaptability, and a lower percentage of waste than the Heilmann machine.

The Drawing Frame. — For fine counts the slivers from the comber, and for low or medium counts those from the card, are passed to the drawing frame, because in both conditions the material is irregularly distributed throughout the several slivers, and it is the function of the drawing frame to eliminate all such irregularities by drawing several slivers down to the dimensions of one, for here the processes of combination and attenuation are carried further than in any other machine. A drawing frame consists of three or four heads, each of four pairs of drawing rollers (A, B, fig. 6). The lower rollers (B) are fluted longitudinally and the upper ones (A) are covered with leather, and weighted as at (H) to give the two a proper hold of the cotton. Each head contains several deliveries. Six or eight slivers © are put up to each delivery and drawn down into one by causing succeeding lines of rollers (A, B) to move at an accelerated speed ; the front one revolving about six or eight times faster than the back one. On leaving the front roller the sliver is conducted to a trumpet-shaped tube (D), thence between a pair of calender rollers (E), and, finally, through a diagonal passage in a plate (F) ;

c\c

ff

H

H

H

H

Fig. 6.

the latter coils the sliver into a rotating can (G). Back and front devices are provided to arrest motion in this machine when a sliver fails. At the back, each sliver passes over and depresses a separate spoon-shaped lever (I), thereby lifting the hooked lower end of (I) high enough to allow an arm (T) to vibrate. On the failure of a sliver the hook of (I) engages with (J) and dislocates the driving gear. In front, the trumpet-shaped tube (D) is mounted on a lever (K), and so long as a sliver presses down the mouth of (D), the machine continues in motion, but when a sliver fails, the lever (K) causes the driving gear to stop the machine. Six or eight cans containing once drawn slivers are put up to the second head and similarly drawn, and finally, a similar number of twice drawn slivers are fed into the third head and again drawn, giving in all 6X6X6 = 216 doublings; or 8X8X8 = 512 doublings. Occasionally four heads of drawings are used and eight slivers drawn into one, which gives 8X8X8X8 = 4096 doublings; hence, irregularities in an original sliver have been minimized by successive combination and attenuation.

Flyer Frames. — Cotton in cans, from the final head of drawing, is transferred to the slubbing frame , by which it is attenuated, slightly twisted, and wound upon spools. Each sliver is drawn out by means of three pairs of rollers, and as it emerges from the front pair, a flyer (A, fig. 7), which revolves uniformly upon a spindle (B), carries the sliver © round with it to twist the fibres axially. This flyer coils the twisted material upon a wooden tube (D) in close-wound spirals and in successive layers. The tube is loosely mounted upon,

but driven independently of, the spindle, in order that as the tube increases in diameter the number of revolutions it makes may be reduced to suit the constant delivery of the roving. This is effected by a differential motion which usually consists of a large wheel, within which two other wheels are made to work ; the interior wheels have a regular motion, but the large wheel is driven from a pair of cone drums at a decreasing speed.

The intermediate frame comes between the slubbing and roving

frames and is of similar construction to the slubber, but has a larger number of spindles and smaller tubes. Instead of having cans put at the back, the slubbing tubes are mounted vertically in a creel, passed in pairs through the rollers, and drawn down to a smaller diameter than a single slubbing. In this machine, there- fore, the fourfold processes of com- bination, attenuation, twisting and winding are effected consecutively and continuously.

The roving frame is similar in principle to the slubber and inter- mediate machines, but it contains a greater number of spindles, and the tubes are smaller than either. It receives the rovings from the inter- mediate frame, draws two into one, twists them and winds them upon tubes. This machine is usually the last employed to prepare cotton for spinning, but for spinning fine yarns from the best Egyptian and Sea Islands cottons, a second roving, or Jack frame may be required, in which event pairs of rovings from the first machine are similarly treated in the second in order to render the final product sufficiently fine for spinning yarns of the requisite counts.

Spinning (see Spinning). — Im- provements upon the Saxony wheel caused continuous spinning to become a mechanical art at an earlier date than intermittent spinning. Ark- wright's water-twist frame was gradu- ally changed to the throstle, which was a duplex machine furnished with one set of drawing rollers, and one set of spindles and flyers at each side of the frame-work. All the bosses of one line of rollers were connected so that one driving gear would serve for the whole length, and all the spindles were driven by bands from a central cylinder. The roving spools were placed vertically in a creel between the two sets of rollers, and the rovings reduced to the requisite fineness by the latter; after which each was passed through a coiled eye at the lower end of a flyer leg, and attached to a double-flanged spool which was loosely mounted upon a spindle. At each revolution of a flyer a twist was put into the attenuated roving, and the flyer wrapped as much thread upon a spool as the rollers delivered. The spools rested upon a piece of woollen cloth stretched over a rail, and this' rail rose and fell through a space equal to the length of the spool barrel. On account of a thread having to pull a spool round, it was not possible to spin finer counts than 60 3 , and since each flyer was mounted upon the top of an unsupported spindle, vibration increased with speed. In order to avoid such vibration Mr Danforth, in or about 1829, placed an inverted cup upon the top of a stationary spindle, and upon the spindle a freely fitting sleeve and wharve ; the former to receive a spool, the latter to rotate both. By a traverse motion all the spools were simul- taneously raised or depressed, so as to have their barrels, when at the highest point, entirely within the cup, and when

at the lowest entirely below it. A thread passed from the drawing rollers, outside the cup, to a spool. As a spool rotated its thread was uniformly twisted, the lower edge of the cup built the yarn equally on every part of the spool barrel, and the requisite drag resulted from friction set up by the thread rubbing against the surface of the cup. The throstle has almost disappeared from the cotton industry, and Danforth's cap frame entirely so, but the latter is still used to spin worsted. ...

Ring spinning is practically the only system of continuous spinning used in the cotton industry; it was first patented in the United States of America by J. Thorpe, in 1828, and in that country was extensively used long before it became established in England. Its chief feature consists in the substitution for the flyer, or the cap, of a smooth annular ring (A, fig. 8) formed with a flange at the upper edge, over which a light C-shaped piece of wire (B), called a traveller, is sprung. The rings are secured in a rail © that rises quickly and falls slowly, but at each succeeding ascent and descent it attains

Fig. 7.

Fig. 8.

a higher point than that previously reached. A spindle (D) is supported by, and turns in a bolster secured to a fixed rail (E). If the bolster only provides a bearing for the centre of the spindle, and so leaves the foot free to find its own position of steadiness, it is known as a self-balancing or gravity spindle. A recess in the bolster is filled with oil to automatically lubricate the bearing. A spindle is placed in the centre of each ring; it has a sleeve fitted upon it which carries a wharve (F) that covers the upper part of the bolster, and a band from a pair of drums is drawn round the wharve to drive the spindle. So per- fect is the construc- tion of these spindles that they can be run without appreciable vibration at speeds far beyond the ability of operatives to at- tend them ; although a speed of 11,000 re- volutions per minute is a practicable one. After passing the drawing rollers (G), the roving (H) is twisted, hooked into the traveller (B), and made fast to a spool (I) placed upon the spindle. As spinning proceeds the traveller is pulled round the ring by the thread ; it thus puts a drag upon, and holds the thread at the winding point. In all con- tinuous spinning the number of twists in- serted into a given length of thread is governed by the sur- face speed of the front roller, relatively to the revolutions of the flyer, or to the speed of the winding surface.

Intermittent Spinning. — The essential difference between continu-

ous and intermittent spinning is that the former draws and twists consecutively, whilst the latter draws and twists simultaneously. In the mule, a creel (A, fig. 9), fixed at the back of the machine, is designed to hold the rovings (B) in three or four tiers, from whence they pass between three lines of drawing rollers © and two faller wires (D). They are next led to spindles (E) mounted in a carriage (F) whose wheels run upon rails (G) called slips. As the rollers © feed the partially attenuated rovings the carriage recedes from the rollers a little faster than the rovings are delivered, thus completing the attenuation. Meanwhile, the spindles are revolved rapidly by bands passing from a tinned cylinder (H) and the threads are twisted. This twist goes first to the thin places where least resistance is offered to it, leaving thick places almost untwisted ; the pull of the carriage, therefore, causes the fibres to slip most readily where there are fewest twists, and gives to a thread an approximation to uniformity in diameter. For fine yarns the rollers cease to rotate slightly before the carriage has attained the end of its outward run, or stretch, and at such times all attenuation is due to the pull of the spindles upon the threads. On the termination of a stretch the carriage stops, the twisting is completed, the spindles reverse the direction of their rotation to back off, or remove the yarn which is coiled round the spindles above the winding point, and whilst one faller wire _(D), operating on all the threads at once, descends to the winding position of each spindle, the other rises to take up the yarn delivered by the spindles. This completed, the carriage returns to the roller beam, and in doing so the spindles revolve in their normal direction to wind the stretch of 48 to 66 in. of yarn spun in the outward journey. AH the foregoing movements are regulated to succeed each other in their proper order, the termination of one operation being the initiation of the next.

Crompton's original machine was controlled manually through- out, but later he devised means for moving the carriage out mechani- cally, for stopping the rollers at the proper time, and for locking the carriage whilst the spindles added the final twist to the threads. After which all parts became stationary and the manual operations commenced. These consisted in backing off, operating the faller wire, rotating the spindles and pushing the carriage home. In the year 1785 the first steam-engine was employed for cotton spinning, and in 1792 William Kelly placed the headstock of a mule, in which the chief mechanism is situated, in the middle of the carriage, instead of at one end. By this device one machine was doubled in length, and shortly afterwards two mules, each of 300 to 400 spindles, were allotted to one spinner and his assistants. Kelly also at- tempted to control all parts of the machine

mechanically, but in

Fig. 9.

this he failed, as did Eaton, Smith and many others, although each contributed something towards the solution of the problems in- volved in automatic spinning. Eventually the hand mule became a machine in which most of the work was done automatically; the spinner being chiefly required to regulate the velocity of the backing off, and the inward run of the carriage, and to actuate the falters. As a result of these alterations the machine was made almost double the length of Kelly's. In this state many mules continued to be used until the last decade of the 19th century, and a few are still in use. Between the years 1824 and 1830 Richard Roberts invented mechanism that rendered all parts of the mule self-acting, the chief parts of which are shown at (IJ), and they regulate the rotation of the spindles during the inward run of the carriage. _ At first his machine was only used to spin coarse and low-medium counts, but it is now employed to spin all counts of yarn. Although numerous changes have since been made in the self-acting mule, the machine still bears indelible marks of the genius of Roberts.

For many purposes the threads as spun by the ring frame or the mule are ready for the manufacturer ; but where extra strength or smoothness is required, as in threads for sewing, crocheting, hosiery, lace and carpets; also where multicoloured effects are needed, as in Grandrelle, or some special form of irregularity, as in corkscrewed, and knopped yarns, two or more single threads are compounded and twisted together. This operation is known as doubling. In order to prepare threads for doubling it may be necessary to wind side by side upon a flanged bobbin, or upon a straight or a tapering spool, from two to six threads before twisting them into one.

Winding machines for this purpose are of various kinds. There are those in which the threads are laid evenly between the flanges of a bobbin, and those that coil the threads upon a straight or a tapering tube to form " cheeses." In the latter the tubes may be laid upon diagonally split drums and rotated by frictional contact. By placing each group of threads to be wound in the slit of a rotating drum, it is drawn quickly to and fro and coiled upon a spool. If solid instead of split drums be used, the guides for all the threads on one side of a

machine are attached to a bar, which is traversed by a cam placed at one end of the frame. Or independent mechan- ism may be provided throughout for treating each group of threads to be wound. The bobbins or tubes may be filled from cops, ring spools or hanks, but a stop motion is required for each thread, which will come into operation immediately a fracture occurs.

Doubters. — In action doublers are continuous and intermittent. The former resemble throstle and ring spinning machines, but since they do not attenuate the material, only one line of rollers is pro- vided. The folded material is placed in a creel and led through the rollers to the spindles to be twisted in a wet or dry condition. If wet, the moisture flattens down most of the protruding ends of the fibres and produces a comparatively smooth thread; if dry, the doubled yarn retains some of its furry character. There are two types of continuous doublers, which are known respectively as English and Scotch. By the English system of dry doubling the yarn from the creel may be treated, on its way to the spindle, in various ways to obtain the desired tension. It may be led under a rod, over a guide, round and between the rollers, and round a glass peg. For wet doubling, a trough containing water is placed behind the rollers, and the yarn passes beneath a glass rod in the water, thence over a guide, beneath, between and over the rollers to the spindles. By the Scotch system the trough is placed below the

rollers, and the bottom roller is partly immersed in water. It is claimed that this system wets the fibres more thoroughly than the English one. For the purpose of twisting the strands together the spindles may be provided either with flyers, as in throstle spinning, or with rings and travellers, as in ring spinning. The twist is gener- ally in the opposite direction to that in the single threads. When more than three strands are required in a compound thread it is customary to pass the material more than once through the doubler, as, for example, in a sixfold thread, two strands may be first twisted together in the same or in the opposite direction to the spinning twist; after which the once-doubled thread is ” cleared,” folded, and three strands of twofold yarn are twisted in the opposite direction to that employed in the first operation. In some machines folding and twisting proceed simultaneously, and some are furnished with an automatic stop motion. But when twisting two threads together to oppose the spinning twist, the failure of one causes the other to untwist and break, therefore, under such circumstances a stop motion is unnecessary.

Intermittent doublers are known as twinners, and these are of two

kinds, namely, English and French. In the former the spindles are fitted in a stationary rail, but the creel, containing the cops or ring spools, is mounted upon a carriage and moves in and out, as in Hargreaves' spinning jenny (see Spinning). French twinners have a stationary creel, and the spindles move in and out with the carriage, as in the spinning mule. The material to be folded is often subjected to the action of steam in order to render it less resilient, after which it is mounted upon skewers in the creel, and two or three threads are passed to each spindle to be twisted together and formed into a cop. Between the creel and the spindles all the strands are kept equally tense by drawing them over flannel-covered boards and under porcelain weights. For wet doubling, the strands pass through a trough containing water, and the flannel surfaces are also wet.

Clearing. — After the first, or the final, doubling it is often necessary to remove lumps, imperfect knots and loose fibres from a thread. This is accomplished by passing each through a slit, or clearer, whose width is adjusted to the diameter of the thread to be treated. By this means anything which gives a thread abnormal bulk will be prevented from passing the slit. Once through the slit, a thread is coiled upon a friction-driven, double or single-headed bobbin. If the former, the coils are evenly laid; if the latter, they are dis- posed into a bottle shape Or, again, cheeses may be wound.

Gassing. — In cases where a thread with a smooth surface is re- quired the ex'tending ends of fibres must be burned off. Thus: each thread from a creel is drawn over a tension rod to two freely mounted pulleys, having parallel grooves cut in their surfaces and axes in the same horizontal plane. After bending a thread forward and backward in the grooves of both pulleys, it passes through a Bunsen flame and is coiled upon a tube, which is held against the face of a rotating drum, while a vibrating guide distributes the thread across the tube. The gas-burner is situated midway between the grooved pulleys, and so mounted beneath the thread that it will automatically swivel sideways and thus move the flame away from a stationary thread. Winding begins slightly before the flame moves beneath a thread, and the rapid motion of the latter permits the flame to burn off undesirable matters without injuring the thread.

Reeling. — Doubled or gassed yarn may be wound upon warpers' bobbins and made into warps for the loom, or it may be reeled into

hanks for the preparing and finishing processes. But a reel hanks yarns for bleaching, dyeing, printing, polishing and bundling, and is adapted for cops, ring spools, doubling bobbins or cheeses. From cops, ring spools and cheeses the yarn is usually drawn over one end, but flanged bobbins are mounted upon spindles and the yarn is drawn from the side. A reel has a circumference of 54 in., and after making 80 or 560 revolutions it automatically stops; the first gives a lea of 120 yds. and the last a hank of 840 yds. For grant reeling, however, a hank may be from 5000 to 10,000 yds. long. Reeling is of two kinds, namely, open and crossed. Open reeling forms leas, and seven of these are united in one hank by a lease band which retains the divisions. In cross reeling a thread is traversed over a portion of the reel surface by a reciprocating guide to form a hank without divisions. On the completion of a set of hanks the reel is made to collapse and thus facilitate the removal of the yarn.

Bundling Press. — Hanks are made into short or long bundles, each weighing 5 or 10 lb. In short bundles it is usual to form groups of ten hanks, and these are twisted together, folded and compressed into bundles; but in long bundles the hanks are com- pressed without being folded. A press consists of a strong table upon which a box, with open ends, is formed. The bottom of this box is grooved transversely and made to rise and fall by wheel gearing or by eccentrics. The sides and top are made of vertical and hori- zontal bars, set to coincide with the grooves in the bottom. To one set of vertical bars a similar number of horizontal top pieces are hinged, and to the other set levers are jointed, which hold the hori- zontal bars in position. When the hinged bars are turned up, strings are drawn through the grooves, and the bottom is covered with stout paper. The hanks are then laid in the box, another paper is placed above them, and the hinged bars are drawn down and locked. The bottom then rises a predetermined distance, and automatically stops. While in this position the strings are tied, the bottom of the press next descends, and the bundle is removed. (T. W. F.)

COTYS, a name common to several kings of Thrace. The most important of them, a cruel and drunken tyrant, who began to reign in 382 B.C., was involved with the Athenians in a dispute for the possession of the Thracian Chersonese. In this he was assisted by the Athenian Iphicrates, to whom he had given his daughter in marriage. On the revolt of Ariobarzanes from Persia, Cotys opposed him and his ally, the Athenians. In 358 he was murdered by the sons of a man whom he had wronged.

See Cornelius Nepos, Iphicrates, Timotheus; Xenophon, Agesilaus;

Demosthenes, Contra Aristocratem; Theopompus in Miiller, Fragmenta Historicorum Graecorum, i.

COUCH, DARIUS NASH (1822-1897), American soldier, was born at South East, Putnam county, N.Y., on the 23rd of July 1822, and graduated from West Point in 1846, serving in the Mexican war and in the war against the Seminole Indians. He left the army in 1855, but soon after the outbreak of the civil war he was made a brigadier-general U.S. V. He served as a divisional commander in the battles of the Army of the Potomac in 1862, and at Fredericksburg (December 1862) and Chancellorsville (May 1863) he commanded the II. corps. He had been made a major-general U.S.V. in July 1862. During the Gettysburg campaign he was employed in organizing the Pennsylvanian militia, and he subsequently served in the West, taking part in the battle of Nashville, and in the final operations in the Carolinas. He left the army after the war. General Couch died on the 1 2th of February 1897 at Norwalk, Connecticut.

COUCY, LE CHATELAIN DE, French irouvire of the 12th century. He is probably the Guy de Couci who was castellan of the castle of that name from 1186 to 1203. Some twenty-six songs are attributed to him, and about fifteen or sixteen are undoubtedly authentic. They are modelled very closely on Provencal originals, but are saved from the category of mere imitations by a grace and simplicity peculiar to the author. The legend of the love of the Chatelain de Coucy and the Lady of Fayel, in which there figures a jealous husband who makes his wife eat the heart of her lover, has no historical basis, and dates from a late 13th century romance by Jakemon Sakesep. It is worth noting that the story, which seems to be Breton in origin, has been also told of a Provencal troubadour, Guilhem de Cabes- taing, and of the minnesinger Reinmar von Brennenberg. Pierre de Belloy, who wrote some account of the family of Couci, made the story the subject of his tragedy Gabrielle de Vergy.

The songs of the Chatelain de Coucy were edited by Fritz Fath

(Heidelberg, 1883). For the romance see Gaston Paris, in the Hist, litt. de la France (vol. 28, pp. 352-360). An exquisite song, ” Chanterai por mon courage,” expressing a woman’s regrets for her lover at the Crusade, is attributed in one MS., probably erroneously, to the Lady of Fayel (Hist. litt. xxiii. 556). An English metrical romance of ” The Knight, of Curtesy,” and the ” Fair Lady of Faguell,” was printed by William Copland, and reprinted in Ritson’s Eng. Metrical Romances (ed. E. Goldsmid, vol. iii., 1885).

COUCY-LE-CHATEAU, a village of northern France, in the department of Aisne, 18 m. W.S!W. of Laon on a branch of the Northern railway. Pop. (1906) 663. It has extensive remains of fortifications of the 13th century, the most remarkable feature of which is the Porte de Laon, a gateway flanked by massive towers and surmounted by a fine apartment. Coucy also has a church of the 15th century, preserving a facade in the Romanesque style. The importance of the place is due, however, to the magnificent ruins of a feudal fortress (see Castle) crowning the eminence on the slope of which the village is built. The remains, which embrace an area of more than 10,000 sq. yds., form an irregular quadrilateral built round a court-yard and flanked by four huge towers. The nucleus of the stronghold is a donjon over 200 ft. high and over 100 ft. in diameter, standing on the south side of the court. Three large vaulted apartments, one above the other, occupy its interior. The court-yard was surrounded on the ground-floor by storehouses, kitchens, &c, above which on the west and north sides were the great halls known as the Salle des preux and the Salle des preuses. A chapel projected from the west wing. The bailey or base-court containing other buildings and covering three times the area of the chateau extended between it and the village. The architectural unity of the fortress is due to the rapidity of its construction, which took place between 1230 and 1242, under Enguerrand III., lord of Coucy. A large part of the buildings was restored or enlarged at the end of the 14th century by Louis d'Orleans, brother of Charles VI., by whom it had been purchased. The place was dismantled in 1652 by order of Cardinal Mazarin. It is now state property. In 1856 researches were carried on upon the spot by Viollet-le-Duc, and measures for the preservation of the ruins were subsequently undertaken.

Sires de Coucy. — Coucy gave its name to the sires de Coucy, a feudal house famous in the history of France. The founder of the family was Enguerrand de Boves, a warlike lord, who, at the end of the nth century seized the castle of Coucy by force. Towards the close of his life, he had to fight against his own son, Thomas de Marie, who in 1115 succeeded him, subsequently becoming notorious for his deeds of violence in the struggles between the communes of Laon and Amiens. He was subdued by King Louis VI. in 1 117, but his son Enguerrand II. continued the struggle against the king. Enguerrand III., the Great, fought at Bouvines under Philip Augustus (12 14), but later he was accused of aiming at the crown of France, and he took part in the disturb- ances which arose during the regency of Blanche of Castile. These early lords of Coucy remained till the 14th century in possession of the land from which they took their name. Enguerrand IV., sire de Coucy, died in 1320 without issue and was succeeded by

his nephew Enguerrand, son of Arnold, count of Guines, and Alix de Coucy, from whom is descended the second fine of the house of Coucy. Enguerrand VI. had his lands ravaged by the English in 1339 and died at Crecy in 1346. Enguerrand VII., sire de Coucy, count of Soissons and Marie, and chief butler of France, was sent as a hostage to England, where he married Isabel, the eldest daughter of King Edward III. Wish- ing to remain neutral in the struggle between England and France, he went to fight in Italy. Having made claims upon the domains of the house of Austria, from which he was descended through his mother, he was defeated in battle (1375-1376). He was entrusted with various diplomatic negotiations, and took part in the crusade of Hungary against the Sultan Bayezid, during which he was taken prisoner, and died shortly after the battle of Nicopolis (1397). His daughter Marie sold the fief of Coucy to Louis, duke of Orleans, in 1400. The Chatelain de Coucy (see above) did not belong to the house of the lords of Coucy, but was castellan of the castle of that name.

COUES, ELLIOTT (1842-1899), American naturalist, was born at Portsmouth, New Hampshire, on the 9th of September 1842. He graduated at Columbian (nowGeorge Washington) University, Washington, D.C., in 1861, and at the Medical school of that institution in 1863. He served as a medical cadet at Washington in 1862-1863, and in 1864 was appointed assistant-surgeon in the regular army. In 1872 he published his Key to North American Birds, which, revised and rewritten in 1884 and 1901, has done much to promote the systematic study of ornithology in America. In 1873-1876 Coues was attached as surgeon and naturalist to the United States Northern Boundary Commission, and in 1876-1880 was secretary and naturalist to the United States Geological and Geographical Survey of the Territories, the publications of which he edited. He was lecturer on anatomy in the medical school of the Columbian University in 1877-1882, and professor of anatomy there in 1882-1887. He resigned from the army in 1881 to devote himself entirely to scientific research. He was a founder of the American Ornithologists' Union, and edited its organ, The A uk, and several other ornithological periodicals. He died at Baltimore, Maryland, on the 25th of December 1899. In addition to ornithology he did valuable work in mammalogy; his book Fur-Bearing Animals (1877) being distinguished by the accuracy and completeness of its description of species, several of which are already becoming rare. In 1887 he became president of the

Esoteric Theosophical Society of America. Among the most important of his publications, in several of which he had collabora- tion, are A Field Ornithology (1874) ; Birds of the North-west (1874) ; Monographs on North American Rodentia, with J. A. Allen (1877) ; Birds of the Colorado Valley (1878); A Bibliography of Ornithology (1878-1880, incomplete); New England Bird Life (1881); A Dictionary and Check List of North American Birds (1882); Biogen, A Speculation on the Origin and Motive of Life (1884); The Daemon of Darwin (1884); Can Matter Think ? (1886); and Neuro-Myology (1887). He also contributed numerous articles to the Century Dictionary, wrote for various encyclopaedias, and edited the Journals of Lewis and Clark (1893), and The Travels of Zebulon M. Pike (1895).

COULISSE (French for " groove," from couler, to slide), a term for a groove in which a gate of a sluice, or the side-scenes in a theatre, slide up and down, hence applied to the space on the stage between the wings, and generally to that part of the theatre " behind the scenes " and out of view of the public. It is also a term of the Paris Bourse, derived from a coulisse, or passage in which transactions were carried on without the authorized agents de change. The name coulissier was thus given to un- authorized agents de change, or " outside brokers " who, after many attempts at suppression, were finally given a recognized status in 1901. They bring business to the agents de change, and act as intermediaries between them and other parties. (See Stock Exchange: Paris.)

COULOMB, CHARLES AUGUSTIN (1736-1806), French natural philosopher, was born at Angouleme on the 14th of June 1736. He chose the profession of military engineer, spent three years, to the decided injury of his health, at Fort Bourbon, Martinique, and was employed on his return at Rochelle, the Isle of Aix and Cherbourg. In 1781 he was stationed permanently at Paris, but on the outbreak of the Revolution in 1789 he resigned his appointment as intendant des eaux et fontaines, and retired to a small estate which he possessed at Blois. He was recalled to Paris for a time in order to take part in the new determination of weights and measures, which had been decreed by the Revolutionary government. Of the National Institute he was one of the first members; and he was appointed inspector of public instruction in 1802. But his health was already very feeble, and four years later he died at Paris on the 23rd of August 1806. Coulomb is distinguished in the history alike of mechanics and of electricity and magnetism. In 1779 he pub- lished an important investigation of the laws of friction (Theorie des machines simples, en ay ant regard au frottement de leurs parties et a la roideur des cordages) , which was followed twenty years later by a memoir on fluid resistance. In 1 785

appeared his Recherches thioriques et experimentales sur la force de torsion et sur I'elasliciti

des fils de mital, &c. This memoir contained a description of different forms of his torsion balance, an instrument used by him with great success for the experimental investigation of the distribution of electricity on surfaces and of the laws of electrical and magnetic action, of the mathematical theory of which he may also be regarded as the founder. The practical unit of quantity of electricity, the coulomb, is named after him.

COULOMMIERS, a town of northern France, capital of an arrondissement in the department of Seine-et-Marne, 45 m. E. of Paris by rail. Pop. (1906) 5217. It is situated in the fertile district of Brie, in a valley watered by the Grand-Morin. The church of St Denis (13th and 16th centuries), and the ruins of a castle built by Catherine of Gonzaga, duchess of Longueville, in the early 17th century, are of little importance. There is a statue to Commandant Beaurepaire, who, in 1792, killed him- self rather than surrender Verdun to the Prussians. Coulom- miers is the seat of a subprefect, and has a tribunal of first instance and a communal college. Printing is the chief industry, tanning, flour-milling and sugar-making being also carried on. Trade is in agricultural products, and especially in cheeses named after the town.

COUMARIN, C9H 6 02, a substance which occurs naturally in sweet woodruff (Asperula odorata), in the tonka bean and in yellow melilot (Melilotus officinalis) . It can be obtained from the tonka bean by extraction with alcohol. It is prepared artificially by heating aceto-ortho-coumaric acid (which is formed from sodium salicyl aldehyde) or from the action of acetic anhydride and sodium acetate on salicyl aldehyde (Sir W. H. Pcrkin, Berichte, 1873, 8, p. 1599). It can also be prepared by heating a mixture of phenol and malic acid with sulphuric acid, or by passing bromine vapour at 107 C. over the anhydride of melilotic acid. It forms rhombic crystals (from ether) melting at 67 C. and boiling at 290 C, which are readily soluble in alcohol, and moderately soluble in hot water. It is applied in perfumery for the preparation of the Asperula essence. On boiling with concentrated caustic potash it yields the potassium salt of coumaric acid, whilst when fused with potash it is completely decomposed into salicylic and acetic acids. Sodium amalgam reduces it, in aqueous solution, to melilotic acid. It forms addition products with bromine and hydrobromic acid. By the – action of phosphorus pentasulphide it is converted into thiocoumarin, which melts at 101° C; and in alcoholic solution, on the addition of hydroxylamine

hydrochloride and soda, it yields coumarin oxime.

Ortho-coumaric acid (o-oxycinnamic acid) is obtained from coumarin as shown above, or by boiling coumarin for some time with sodium ethylate. It melts at 208° C. and is easily soluble in hot water and in alcohol. It cannot be converted into coumarin by heating alone, but it is readily transformed on heating with acetic anhydride or acetyl chloride. By the action of sodium amalgam it is readily converted into melilotic acid, which melts at 8i° C, and on distillation furnishes its lactone, hydrocoumarin, melting at 25 C. For the relations of coumaric and coumarinic acid see Annalen, 254, p. 181. The homologues of coumarin may be obtained by the action of sulphuric acid on phenol and the higher fatty acids (propionic, butyric and isovaleric anhydrides) , substitution taking place at the carbon atom in the a position to the CO group, whilst by the condensation of acetoacetic ester and phenols with sulphuric acid the)3 substituted coumarins are obtained.

Umbelliferone or 4-oxycoumarin, occurs in the bark of Daphne mezereum and may be obtained by distilling such resins as galbanum or asafoetida. It may be synthesized from resorcin and malic anhydride or from (3 resorcyl aldehyde, acetic anhydride and sodium acetate. Daphnetin and Aesculelin are dioxy coumarins.

The structural formulae of coumarin and the related substances are: ,

CH

Orthocoumaric acid.

Melilotic acid.

H ydrocoumarin .

COUMARONES or Benzofttrfuranes, organic compounds

PH

containing the ring system C 6 H 4 <ˆ Q 5>CH. This ring system

may be synthesized in many different ways, the chief methods employed being as follows: by the action of hot alcoholic potash on a-

bromcoumarin(R. Fittig, Ann., 1883, 216, p. 162),

C 6 H 4 C-COOH->C 6 HCH;

from sodium salts of phenols and a-chloracetoacetic ester (A. Hantzsch, Ber., 1886, 19, p. 1292),

H COPH i-*Cri3

C6H4 ‘ C6H4 <0 >C,COOR;

or from ortho-oxyaldehydes by condensation with ketones

(S. Kostanecki and J. lambor, Ber., 1896, 29, p. 237), or with

chloracetic acid (A. Rossing, Ber., 1884, 17, p. 3000),

-OH CH 3 CO-C e H 6 „ „ ˆ-OH ” 2 Br

CeH4<

■CHO”

->C 6 H 4 < CH . ch-COCcHs

■->

C6U4< CHBr-CHBr-COC 6 H 6 >UH4< CH ˆC-CUl, 6 H s ,

OH Cl-CH 2 -COOH CHO CH 3 COONa C 6 H4<. CHO > C6H4< --0-CH 2 -COOH >

C 6 H 4 <

;™>c-cooh.

The parent substance coumarone, CsH 6 0, is also obtained by heating u-chlor-ortho-oxystyrol with concentrated potash solution (G. Komppa, Ber., 1893, 26. p. 2971),

C 6 H 4 <ˆqjj C 6 H 4 < q ˆ>CH.

It is a colourless liquid which boils at 171-1 72 C. and is readily volatile in steam, but is insoluble in water and in potash solution. Concentrated acids convert it into a resin. When heated with sodium and absolute alcohol, it is converted into hydrocoumarone, CsHgO, and ethyl phenol.

COUNCIL (Lat. concilium, from cum, together, and the root cal, to call), the general word for a convocation, meeting, assembly. The Latin word was frequently confused with consilium (from consulere, to deliberate, cf. consul), advice, i.e. counsel, and thus specifically an advisory assembly. Du Cange (Gloss. Med. Infim. Latin.) quotes the Greek words avvodos, ovvkSpiov, ovijfiovXiov as the equivalent of concilium. In French the distinction between conseil (from consilium), advice, and concile, council (i.e. ecclesiastical — its only meaning) has survived, but the two English derivatives are much confused. In the New Testament, ” council ” is the rendering of the Hebrew Sanhedrin, Gr. avvkbpuov. The word is generally used in English for all kinds of congregations or convocations assembled for adminis- trative and deliberative purposes. 1

The present article is confined to a history of the development of the ecclesiastical council, summoned to adjust matters in dispute with the civil authority or for the settlement of doctrinal and other internal disputes. For details see under separate headings, Nicaea, &c.

From a very early period in the history of the Church, councils or synods have been held to decide on matters of doctrine and discipline. They may be traced back to the second half of the 2nd century a.d., when sundry churches in Asia Minor held consultations about the rise of Montanism. Their precise origin is disputed. The common Roman Catholic view is that they are apostolic though not prescribed by divine law, and the apostolic precedent usually cited is the ” council ” of Jerusalem (Acts xv. ; Galatians ii.). Waiving the consideration of vital critical questions and accepting Acts xv. at its face value, the assembly at Jerusalem would scarcely seem to have been a council in the technical sense of the word; it was in essence a meeting of the Jerusalem church at which delegates from Antioch were heard but apparently had no vote, the decision resting solely with the mother church. R. Sohm argues that synods grew from the custom of certain local churches which, when confronted with a

1 For the Greek Council see Boule ; for the Hebdomadal Council see Oxford; see also England: Local Government.

serious problem of their own, augmented their numbers by receiving delegates from the churches of the neighbourhood. Hauck, however, holds that these augmented church meetings, which dealt with the affairs of but a single church, are to be distinguished from the synods, which took cognizance of matters of general interest. Older Protestant writers have contented themselves with saying either that synods were of apostolic origin, or that they were the inevitable outcome of the

need of the leaders of churches to take counsel together, and that they were perhaps modelled on the secular provincial assemblies (concilia provincialia).

Every important alteration in the constitution of the Church has affected the composition and function of synods; but the changes were neither simultaneous nor precisely alike throughout the Roman empire. The synods of the 2nd century were extra- ordinary assemblies which met to deliberate upon pressing problems. They had no fixed geographical liir.its for membership, no ex-officio members, nor did they possess an authority which did away with the independence of the local church. In the course of the 3rd century came the decisive change, which increased the prestige of the councils: the right to vote was limited to bishops. This was the logical outgrowth of the belief that each local church ought to have but one bishop (monarchical episcopate), and that these bishops were the sole legitimate successors of the apostles (apostolic succession), and therefore official organs of the Holy Spirit. Although as late as 250 the consensus of the priests, the deacons and the people was still considered essential to the validity of a conciliar decision at Rome and in certain parts of the East, the development had already run its course in northern Africa. It was a further step in advance when synods began to meet at regular intervals. They were held annually in Cappadocia by the middle of the 3rd century, and the council of Nicaea commanded in 325 that semi- annual synods be held in every province, an arrangement which was not systematically enforced, and was altered in 692, when the Trullan Council reduced the number to one a year.

With the multiplication of synods came naturally a differentia- tion of type. In text-books we find clear lines drawn between diocesan, provincial, national, patriarchal and oecumenical synods; but the first thousand years of church history do not justify the sharpness of the traditional distinction. The pro- vincial synods, presided over by the metropolitan (archbishop), were usually held at the capital of the province, and attempted to legislate on all sorts of questions. The state had nothing to do with calling them, nor did their decrees require governmental sanction. Various abortive attempts were made to set up synods of patriarchal or at least of more than provincial rank. In North Africa eighteen such synods were held between 393 and 424; during part of the 5th and 6th centuries primatial councils assembled at Aries; and the patriarchs of Constantinople were accustomed to invite to their ” endemic synods ” (aivchoi ev&qiwvcraL) all bishops who happened to be sojourning at the capital. Papal synods from the 5th and especially from the 9th century onward included members such as

the archbishops of Ravenna, Milan, Aquileia and Grado, who resided outside the Roman archdiocese; but the .territorial limits from which the membership was drawn do not appear to have been precisely defined.

Before the form of the provincial synod had become absolutely fixed, there arose in the 4th century the oecumenical council. The Greek term avvobos olnovij.evudi* (1) (used by Eusebius, Vita Constantini, iii. 6) is preferable to the Latin concilium universale or generale, which has been applied loosely to national and even to provincial synods. The oecumenical synods were not the logical outgrowth of the network of provincial synods; they were creations of the imperial power. Constantine, who had not even been baptized, laid the foundations when, in response to a petition of the Donatists, he referred their case to a committee of bishops that convened at Rome, which meeting Eusebius calls a

2 From 17 oUovfiivri (yv). the inhabited world; Latin oecu- menicus or universalis. The English forms “oecumenical” and “ecumenical” are both used.

synod. After that the emperor summoned the council of Aries to settle the matter. For both of these assemblies it was the emperor that decided who should be summoned, paid the travelling expenses of the bishops, determined where the council should be held and what topics should be discussed. He regarded them as temporary advisory bodies, to whose recommendations the imperial authority might give the force of law. In the same manner he appointed the time and place for the council of Nicaea, summoned the episcopate, paid part of the expenses out of the public purse, nominated the committee in charge of the order of business, used his influence to bring about the adoption of the creed, and punished those who refused to subscribe. To be sure, the council of Nicaea commanded great veneration, for it was the first attempt to assemble the entire episcopate; but no more than the synods of Rome and of Aries was it an organ of ecclesiastical self-government — it was rather a means whereby the Church was ruled by the secular power. The subsequent oecumenical synods of the undivided Church were patterned on that of Nicaea. Most Protestant scholars maintain that the secular authorities decided whether or not they should be convened, and issued the summons; that imperial commissioners were always present, even if they did not always

preside; that on occasion emperors have confirmed or refused to confirm synodal decrees ; and that the papal confirmation was neither customary nor requisite. Roman Catholic scholars to-day tend to recede from the high ground very generally taken several centuries ago, and Funk even admits that the right to convoke oecumenical synods was vested in the emperor regardless of the wishes of the pope, and that it cannot be proved that the Roman see ever actually had a share in calling the oecumenical councils of antiquity. Others, however, while acknowledging the futility of seeking historical proofs that the popes formally called, directed and confirmed these synods, yet assert that the emperor per- formed these functions not of his own right but in his quality as protector of the Church, that this involved his acting at the request or at least with the permission and approval of the Church, and in particular of the pope, and that a special though not a stereotyped papal confirmation of conciliar decrees was necessary to their validity.

In the Germanic states which arose on the ruins of the Western Empire we find national, and diocesan synods; provincial synods were unusual. National synods were summoned by the king or with his consent to meet special needs ; and they were frequently concilia mixta, at which lay dignitaries appeared. Although the Frankish monarchs were not abolute rulers, nevertheless they exercised the right of changing or rejecting synodal decrees which ran counter to the interests of the state. Clovis held the first French national synod at Orleans in 511; Reccared, the first in Spain in 589 at Toledo. Under Charlemagne they were occasionally so representative that they might almost be ranked as general synods of the West (Regensburg, 792, Frankfort, 794). Contemporaneous with the evolution of the national synod was the development of a new type of diocesan synod, which included the priests of separate and mutually independent parishes and also the leaders of the monastic clergy.

The papal synods came into the foreground with the success of the Cluniac reform of the Church, especially from the Lateran synod of 1059 on. They grew in importance until at length Calixtus II. summoned to the Lateran the synod of n 23 as ” generate concilium.” The powers which the pope as bishop of the church in Rome had exercised over its synods he now extended to the oecumenical councils. They were more completely under his control than the ancient ones had been under the sway of the emperor. The Pseudo-Isidorean principle that all major synods need papal authorization was insisted on, and the decrees were formulated as papal edicts.

The absolutist principles cherished by the papal court in the 1 2th and

13th centuries did not pass unchallenged; but the protests of Marsilius of Padua and the less radical William of Occam remained barren until the Great Schism of 1378. As neither the pope in Rome nor his rival in Avignon would give way, recourse was had to the idea that the supreme power was vested

not in the pope but in the oecumenical council. This ” conciliar theory,” propounded by Conrad of Gelnhausen and championed by the great Parisian teachers Pierre d’Ailly and Gerson, pro- ceeded from the nominalistic axiom that the whole is greater than its part. The decisive revolutionary step was taken when the cardinals independently of both popes ventured to hold the council of Pisa (1409). The council of Constance asserted the supremacy of oecumenical synods, and ordered that these be convened at regular intervals. The last of the Reform councils, that of Basel, appoved these principles, and at length passed a sentence of deposition against Pope Eugenius IV. Eugenius, however, succeeded in maintaining his power, and at the council of Florence (1439) secured the condemnation of the conciliar theory; and this was reiterated still more emphatically, on the eve of the Reformation, by the fifth Lateran council (1516). Thenceforward the absolutist theories of the 13th and 14th centuries increasingly dominated the Roman Church. The popes so distrusted oecumenical councils that between 15 17 and 1869 they called but one; at this (Trent, 1545-1563), however, all treatment of the question of papal versus conciliar authority was purposely avoided. Although the Declaration of the French clergy of 1682 reaffirmed the conciliar doctrines of Constance, since the French Revolution this ” Gallicanism ” has shown itself to be but a passing phase of constitutional theory; and in the 19th century the ascendancy of Ultramontanism became so secure that Pius IX. could confidently summon to the Vatican a synod which set its seal on the doctrine of papal infallibility. Yet it would be a misconception to suppose that the Vatican decrees mean the surrender of the ancient belief in the infallibility of oecumenical synods; their decisions may still be regarded as more solemn and more impressive than those of the pope alone; their authority is fuller, though not higher. At present it is agreed that the pope has the sole right of summoning oecumenical councils, of presiding or appointing presidents and of determining the order of business and the topics which shall come up. The papal confirmation is indispensable; it is conceived of as the stamp without which the expression of conciliar opinion lacks legal validity. In other words, the oecumenical council is now practically in the position of the senate of an absolute monarch. It is in fact an open question whether a council is to be ranked as really oecumenical until after its decrees have been approved by the

pope. (See Vatican Council, Ultramontanism, Infallibility.)

The earlier oecumenical councils have well been called ” the pitched battles of church history.” Summoned to combat heresy and schism, in spite of degrading pressure from without and tumultuous disorder within, they ultimately brought about a modicum of doctrinal agreement. On the one side as time went on they bound scholarship hand and foot in the winding-sheet of tradition, and also fanned the flames of intolerance; yet on the other side they fostered the sense of the Church’s corporate oneness. The diocesan and provincial synods have formed a valuable system of regularly recurring assemblies for disposing of ecclesiastical business. They have been held most frequently, however, in times of stress and of reform, for instance in the nth, 1 6th and 19th centuries; at other periods they have lapsed into disuse: it is significant that to-day the prelate who neglects to convene them suffers no penalty. At present the main function of both provincial and oecumenical synods seems to be to facilitate obedience to the wishes of the central government of the Church.

The right to vote (votuin definitivum) has been distinguished from early times from the right to be heard (votum consultativum) . The Reform Synods of the 15th century gave a decisive vote to doctors and licentiates of theology and of laws, some of them sitting as individuals, some as representatives of universities. Roman Catholic canonists now confine the right to vote at oecumenical councils to bishops, cardinal deacons, generals or vicars general of monastic orders and the praelali nullius (exempt abbots, &c.) ; all other persons, lay or clerical, who are admitted or invited, have merely the votum consultativum — they are chiefly procurators of absent bishops, or very learned priests. It was but a clumsy and temporary expedient, designed to offset the preponderance of Italian bishops dependent on the pope

when the council of Constance subdivided itself into several groups or ” nations,” each of which had a single vote. In voting, the simple majority decides; yet such is the importance attached to a unanimous verdict that an irreconcilable minority may absent itself from the final vote, as was the case at the Vatican Council.

The numbering of oecumenical synods is not fixed; the list most used in the Roman Church to-day is that of Hefele {Con-

ciliengeschichte, 2nd ed., I. 59 f.) :

A.D.

1.

Nicaea I.

• 325

2.

Constantinople I. .

38i

3-

Ephesus

431

4-

Chalcedon

45 1

5-

Constantinople II.

553

6.

Constantinople III.

680

7-

Nicaea II.

787

8.

Constantinople IV.

869

9-

Lateran I.

1 123

10.

Lateran II. .

1 139

11.

Lateran III. .

1 179

12.

Lateran IV. .

1215

13-

Lyons I.

1245

14.

Lyons II.

1274

15-

Vienne .

131 1

16.

Constance (in part)

. 1414-1418

17a.

Basel (in part)

... 1431 ff.

17b.

Ferrara-Florence (a

continuation

of Basel)

• H38-I44 2

18.

Lateran V.

. 1512-1517

19.

Trent

■ 1 545-1 563

20.

Vatican .

. i8(

59-1870

(Each of these and certain other important synods are treated in separate articles.)

By including Pisa (1409) and by treating Florence as a separate synod, certain writers have brought the number of oecumenical councils up to twenty-two. These standard lists are of the type which became established through the authority of Cardinal R. F. Bellarmine (1542-1621), who criticized Constance and Basel, while defending

Florence and the fifth Lateran council against the Gallicans. As late as the 16th century, however, ” the majority did not regard those councils in which the Greek Church did not take part as oecumenical at all ” (Harnack, History of Dogma, vi. 17). The Greek Church accepts only the first seven synods as oecumenical; and it reckons the Trullan synod of 692 (the Quinisextum) as a continuation of the sixth oecumenical synod of 680. But concerning the first seven councils it should be remarked that Constantinople I. was but a general synod of the East; its claim to oecumenicity rests upon its reception by the West about two centuries later. Similarly the only representatives of the West present at Constantinople II. were certain Africans; the pope did not accept the decrees till afterwards and they made their way in the West but gradually. Just as there have been synods which have come to be considered oecumenical though not convoked as such, so there have been synods which though summoned as oecumenical, failed of recognition: for instance Sardica (343), Ephesus (449), Constantinople (754). The last two received the imperial confirma- tion and from the legal point of view were no whit inferior to the others; their decrees, however, were overthrown by subsequent synods. As the Protestant leaders of the 16th century held fast the traditional christology, they regarded with veneration the dogmatic decisions of Nicaea I., Constantinople I., Ephesus and Chalcedon. These four councils had enjoyed a more or less fortuitous pre-eminence both in Roman and in canon law, and by many Catholics at the time of the Reformation were regarded, along with the three great creeds (Apostles', Nicene, Athanasian) , as a sort of irreducible minimum of orthodoxy. In the 17th century the liberal Lutheran George Calixtus based his attempts at reuniting Christendom on this consensus quinquesaecularis. Many other Protestants have accepted Constantinople II. and III. as supporting the first four councils; and still others, notably many Anglican high churchmen, have felt bound by all the oecumenical synods of the undivided Church. The common Protestant attitude toward synods is, however, that they may err and have erred, and that the Scriptures and not conciliar

decisions are the sole infallible standard of faith, morals and worship.

Protestant Councils. — The churches of the Reformation have all had a certain measure of synodal life. The Church of England has maintained its ancient provincial synods or convocations, though for the greater part of the 18th and the first part of the 19th centuries they transacted no business. In the Lutheran churches of Germany there was no strong agitation in favour of introducing synods until the 19th century, when a movement, designed to render the churches less dependent on the govern- mental consistories, won its way, until at

length Prussia itself fell into line (1873 and 1876). As the powers granted to the German synods are very limited, many of their advocates have been disillusioned; but the Lutheran churches of America, being independent of the state, have developed synods both numerous and potent. In the Reformed churches outside Germany synodal life is vigorous; its forms were developed by the Huguenots in days of persecution, and passed thence to Scotland and other presbyterian countries. Even many of the churches of congregational polity have organized national councils (see Congregationalism) ; but here the principle of the independence of the local church prevents the decisions from binding those congregations which do not approve of the decrees. Moreover, in the last decade of the 19th century a growing desire for a rapprochement between the Free Churches in the United Kingdom as a whole led to the annual assembly of the Free Church Council for the consideration of all matters affecting the dissenting bodies. This body has no executive or doctrinal authority and is rather a conference than a council. In general it may be said that synods are becoming more and more powerful in Protestant lands, and that they are destined to still greater prominence because of the growing sentiment for Christian unity.

Authorities. — General Collections: Collectio regia (Paris, 1644, 37 vols.) (the first very extensive work) ; P. Labbe (not Labbe) and G. Cossart,. Sacrosancta concilia (Paris, 1672, 17 vols.), with supplement by Etienne Baluze (Baluzius), 1683 (based on above); J. Hardouin (Harduinus), Conciliorum collectio regia maxima (Paris, 1715), 11 tomi in 12 vols, (to 1714; more exact; indexed; serious omissions); enlarged edition by N. Coletus (Venice, 1 728-1 732), supplemented by J. D. Mansi, Sanctorum conciliorum et decretorum nova collectio (Lucca, 1748, 6 tomi). Convenient but fallible is Mansi's Sacrorum conciliorum et decretorum nova et amplissima collectio (Florence, 1759-1767; completed Venice, 1 769-1 798, 31 vols.); facsimile reproduction by Welter (Paris, 1901 ff.), adding (torn. O) Introductio seu apparatus ad sacrosancta concilia, and (torn. 17B and 18B) Baluze, Capitularia regum Francorum, and con- tinuing to' date by reproducing parts of Coletus and of Mansi's supplement to Coletus, and furnishing (torn. 37 ff.) a new edition of the councils from 1720 on by J. B. Martin and L. Petit. A careful text of Roman Catholic synods from 1682 to 1870 is Collectio Lacensis (Acta et decreta sacrorum conciliorum recentiorum, Friburgi, 1870 ff.), 7 vols.

Special Collections: Great Britain: Concilia Magnae Britanniae et Hiberniae, ed. D. Wilkins (London, 1737, 4 vols.); Councils and Ecclesiastical Documents relating to Great Britain and Ireland, ed. by A. W. Haddan and W. Stubbs (Oxford, 1869 ff., 4 vols.) ; J. W. Joyce,

Handbook of the Convocations or Provincial Synods of the Church of England (London, 1887); Concilia Scotiae (1225-1559), ed. Joseph Robertson (Edinburgh, Bannatyne Club, 1866, 2 torn.).

United States : Collectio Lacensis (Roman Catholic synods) ; The American Church History Series (New York, 1893 S. l 3 vols.) gives information on the various Protestant synods.

France. — Concilia aevi Merovingici, rec. F. Maassen (Hanover, 1893) (Monumenta Germaniae historica, Legum sectio iii., Concilia, torn, i.) ; Concilia antiqua Galliae, cur. J. Sirmond (Paris, 1629, 3 vols.) ; supplement by P. de la Lande (Paris, 1666) ; L. Odespun, Concilia novissima Galliae (Paris, 1646); Conciliorum Galliae tarn editorum quam ineditorum, stud. congreg.S.Mauri,tom.i. (Paris, 1789). Synods of the Reformed Churches of France are contained in J. Quick, Synodicon in Gallia reformata (London, 1692, 2 vols.); J. Aymon, Tous les synodes nationaux des eglises reformees de France (La Haye, 1710, 2 vols.); E. Hugues, Les Synodes du desert (Paris, 1885 f., 3 vols.). For the synods of other countries see Herzog-Hauck, 3rd ed., 19,262 f., and Wetzer and Welte, 2nd ed., 3809 f.

Less Elaborate Texts: Canones apostolorum et conciliorum saeculorum, iv.-vii., rec. H. T. Bruns (Berlin, 1839, 2 vols.) (still useful); J. Fulton, Index Canonum (3rd ed., New York, 1892) (3rd and 4th centuries); W. Bright, Notes on the Canons of the First Four General Councils (2nd ed., Oxford, 1892); Die Kanones der

wichtigsten altkirchlichen Conzilien nebst dew apostolischen Kanones, ed. F. Lauchert (Freiburg i. B., 1896); Enchiridion symbolorum et definitionum, quae de rebus fidei et morum a conciliis oecumenicis et summis pontificibus emanarunt, ed. H. Denzinger (7th ed., Wiirzburg, 1895) ; Bibliothek der Symbole und Glaubensregeln der alten Kirche, ed. by A. Hahn (3rd edition, revised and enlarged, Breslau, 1897), with variant readings ; C.Mirbt, Quellen zur Geschichte des Papstlums und des romischen Katholizismus (2nd much enlarged ed., Tubingen, 1901); E. F. Karl Muller, Die Bekenntnisschriften der reformierten Kirche (Leipzig, 1903) (for all countries). These last five are elaborately indexed.

Translations: John Johnson, A Collection of the Laws and Canons of the Church of England [601-1519], 2 parts (London, 1720; reprinted

Oxford, 1850 f., in the Library of Anglo- Catholic Theology) ; P. Schaff, The Creeds of Christendom (New York, 1877, 3 vols.) (texts and translations parallel); Canons and Creeds of the First Four Councils, ed. by E. K. Mitchell, in Translations and Reprints from the Original Sources of European History, published by the Department of History of the University of Pennsylvania, vol. iv. 2 (1897); H. R. Percival, The Ecumenical Councils (New York, 1900) (Nicene and Post-Nicene Fathers, second series, vol. xiv. ; translates canons and compiles notes; bibliography in Introduction).

General Histories of Councils: C. J. von Hefele, Concilien- geschichte (Freiburg i. B., 1855); English translation of the earlier volumes to a.d. 787, from a.d. 326 on, based on the second German edition (Edinburgh, 1871 ff.); French, by Delarc (Paris, 1869-1874, 10 vols.). This first edition not entirely superseded by the second, made after the Vatican council, and continued by Knppfler and by Hergenrother (Freiburg, 1873-1890, 9 vols.); a French translation, with continuation and critical and bibliographical notes, par un religieux benedictin de Farnborough, tome i. i r ° partie (Paris, Letou- zey, 1907); Paul Viollet, Examen de I'histoire des conciles de Mgr Hefele (Paris, 1876) (Extrait de la Revue historique) ; W. P. du Bose, The Ecumenical Councils (New York, 1896) (popular); P. Guerin, Les Conciles generaux et particulars (Paris, 1868, 3rd impression, 1897, 3 torn.) ; see also A. Harnack, History of Dogma (Boston, 1895-1900, 7 vols.) ; F. Loofs, Leitfaden der Dogmengeschichte (4th ed., enlarged, Halle, 1906). . ,

Literature : Dictionnaire universel et complet des conciles, redige par A. C. Peltier, publie par Migne (Paris, 1847, 2 vols.) (Migne, Encyclopedic theologique, vol. 13 f.) ; Z. Zitelli-Natali, Epitome historico-canonica conciliorum generalium (Rome, 1881); F. X. Kraus, Realencyklopddie der christlichen Altertumer, vol. i.(Freiburg- i.-B., 1882) (art. " Concilien " by Funk); William Smith and S. Cheetham, Dictionary of Christian Antiquities (London, 1876-1880, 2 vols.) (erudite detail); Wetzer und Welte's Kirchenlexikon, 2nd ed. by Hergenrother and Kaulen (Freiburg i. B., 1882-1903, 13 vols.) (art. " Concil " by Scheeben) ; La Grande Encyclopedic (Paris, s.d., 31 vols.) (numerous articles) ; P. Hinschius, Das Kirchen- recht der Katholikin und Protestanten in Deutschland, vol. 3 (Berlin, 1883) (fundamental and masterly); R. von Scherer, Handbuch des Kirckenrechtes, vol. i. (Graz, 1886) (excellent notes and references); E. H. Landon, A Manual of Councils of the Holy Catholic Church, (revised ed., London, [1893], 2 vols.) (paraphrases chief canons; needs revision) ; Martigny, Dictionnaire des antiquites chretiennei (3rd ed., Paris, 1889) (for ceremonial); R. Sohm, Kirchenrecht, vol. i. (Leipzig, 1892) (brilliant); A. Kneer, Die Entstehung der konziliaren Theorie (Rome, 1893) ;

Realencyklopddie fur protestantische Theologie und Kirche, begriindet von J. J. Herzog, 3rd revised ed. by A. Hauck (Leipzig, 1896 ff.) (in vol. 19 Hauck's excellent Synoden, 1907); F. X. Funk, Kirchengeschichtliche Abhandlungen und Untersuchungen (Paderborn, 1897); A. V. G. Allen, Christian Insti- tutions (New York, 1897), chap. xi. ; C. A. Kneller, " Papst und Konzil im ersten Jahrtausend " (Zeitschrift fur katholische Theologie, vols. 27 and 28, Innsbruck, 1893 f.); F. Bliemetzrieder, Das Gencral- konzil im grossen abendlandischen Schisma (Paderborn, 1904) ; Wilhelm and Scannell, Manual of Catholic Theology (3rd ed., London, 1906, sect. 32) ; J. Forget, " Conciles," in A. Vacant and E. Mangeot, Dictionnaire de theologie caiholique, tome 3, 636-676 (Paris, 1906 ff.), with elaborate bibliography ; The Catholic Encyclopedia (New York, 1907 ff.). (W. W. R.*)

COUNCIL BLUFFS, a city and the county-seat of Pottawattamie county, Iowa, U.S.A., about 2% m. E. of the Missouri river opposite Omaha, Nebraska, with which it is connected by a road bridge and two railway bridges. Pop. (1890) 21,474; (1900) 25,802, of whom 3723 were foreign-born; (1910) 29,292. It is pre-eminently a railway centre, being served by the Union Pacific, of which it is the principal eastern terminus, the Chicago, Burlington & Quincy, the Chicago, Milwaukee & Saint Paul, the Chicago & Northwestern, the Chicago, Rock Island & Pacific, the Chicago Great- Western, the Illinois Central, and the Wabash, which together have given it considerable commercialimportance. It is built for the most part on level ground at the foot of high bluffs; and has several parks, the most attractive of which, commanding fine views, is Fairmount Park. With the exception

of bricks and tiles, carriages and wagons, agricultural implements, and the products of its railway shops, its manufactures are relatively unimportant, the factory product in 1905 being valued at only $1,924,109. Council Bluffs is the seat of the Western Iowa Business College, and of the Iowa school for the deaf. On or near the site of Council Bluffs, in 1804, Lewis and Clark held a council with the Indians, whence the city's name. In 1838 the Federal government made this the headquarters of the Pottawattamie Indians, removed from Missouri. They remained until 1846-1847, when the Mormons came, built many cabins, and named the place Kanesville. The Mormons remained only about five years, but on their departure for Utah their places were speedily taken by new immigrants. During 1849- 18 50 Council Bluffs became an important outfitting point for California gold seekers — the goods being brought by boat from Saint Louis — and in 1853 it was incorporated as a city.

COUNSEL AND COUNSELLOR, one who gives advice, more particularly in legal matters. The term ” counsel ” is employed in England as a synonym for a barrister-at-law, and may refer either to a single person who pleads a cause, or collectively, to the body of barristers engaged in a case. Counsellor or, more fully, counsellor-at-law, is practically an obsolete term in England, but is still in use locally in Ireland as an equivalent to barrister. In the United States, a counsellor-at-law is, specifically, an attorney admitted to practice in all the courts; but as there is no formal distinction of the legal profession into two classes, as in England, the term is more often used loosely in the same sense as ” lawyer, ” i.e. one who is versed in, or practises law. 1

COUNT (Lat. comes, gen. comitis, Fr. comte, Ital. conte, Span. conde), the English translation of foreign titles equivalent generally to the English ” earl.” 1 In Anglo-French documents the word counte was at all times used as the equivalent of earl, but, unlike the feminine form ” countess,” it did not find its way into the English language until the 16th century, and then only in the sense defined above. The title of earl, applied by the English to the foreign counts established in England by William the Conqueror, is dealt with elsewhere (see Earl). The present article deals with (1) the office of count in the Roman empire and the Frankish kingdom, (2) the development of the feudal count in France and under the Holy Roman Empire, (3) modern counts.

1 . The Latin comes meant literally a companion or follower. In the early Roman empire the word was used to designate the companions of the emperor (comites principis) and so became a title of honour. The emperor Hadrian chose senators as com- panions on his travels and to help him in public business. They formed a permanent council, and Hadrian’s successors entrusted these comites with the administration of justice and finance, or placed them in military commands. The designation comes thus developed into a formal official title of high officers of state, some qualification being added to indicate the special duties attached to the office in each case. Thus in the 5th century, among the comites attached to the emperor’s establishment, we find, e.g., the comes sacrarum largilionum and the comes rei privatae; while others, forming the council, were styled comites consistorii. Others were sent into the provinces as governors, comites per provincias constituti; thus in the Notitia dignitatum we find a comes Aegypti, a comes Africae, a comes Belgicae, a comes Lugdunensis and others. Two of the generals cf the Roman province of Britain were styled the comes Britanniae and the comes littoris Saxonici (count of the Saxon shore).

At Constartinople in the latter Roman empire the Latin word comes assumed a Greek garb as Kbfit)% and was declined as a Greek noun (gen. ko/uijtos) ; the comes sacrarum largilionum (count of the sacred bounties) was called at Constantinople 6 ubfiip tSjv craxpOiv \apyiTLuvuv and the comes rerum privatarum

1 The exact significance of a title is difficult to reproduce in a foreign language. Actually, only some foreign counts could be said to be equivalent to English earls; but ” earl ” is always translated by foreigners by words [comte, Graf) which in English are represented by ” count,” itself never used as the synonym of ” earl.” Con- versely old English writers had no hesitation in translating as ” earl ” foreign titles which we now render ” count.”

(count of the private estates) was called kojutjs toiv irptfiaruv. The count of the sacred bounties was the lord treasurer or chancellor of the exchequer, for the public treasury and the imperial fisc had come to be identical; while the count of the private estates managed the imperial demesnes and the privy purse. In the 5th century the ” sacred bounties ” corresponded to the aerarium of the early Empire, while the res privatae represented the fisc. The officers connected with the palace and the emperor’s person included the count of the wardrobe {comes sacrae vestis), the count of the residence {comes domorum), and, most important of all, the comes domesticorum et sacri stabuli (graecized as kojutjs rod

An important official of the second rank (spectabilis, ” re- spectable ” as contrasted with those of highest rank who were ” illustrious “) was the count of the East, who appears to have had the control of a department in which 600 officials were engaged. His power was reduced in the 6th century, when he was deprived of his authority over the Orient diocese, and became civil governor of Syria Prima, retaining his ” respectable ” rank. Another important officer of the later Roman court was the comes sacri patrimonii, who was instituted by the emperor Anastasius. In this connexion it should be observed that the word patrimonium gradually changed in meaning. In the be- ginning of the 3rd century patrimonium meant crown property, and res privata meant personal property: at the beginning of the 6th century patrimonium meant personal property, and res privata meant crown property. It is difficult to give briefly a clear idea of the functions of the three important officials comes sacrarum largitionum,

comes rei privatae and comes sacri patri- monii; but the terms have been well translated by a German author as Finanzminister des Reichsschatzes (finance minister of the treasury of the Empire), F. des Kronschatzes (of the crown treasury), and F. des kaiserlichen Privatvermogens (of the emperor's private property).

The Frankish kings of the Merovingian dynasty retained the Roman system of administration, and under them the word comes preserved its original meaning; the comes was a companion of the king, a royal servant of high rank. Under the early Frankish kings some comites did not exercise any definite functions; they were merely attached to the king's person and executed his orders. Others filled the highest offices, e.g. the comes palatii and comes stabuli (see Constable). The kingdom was divided for administrative purposes into small areas called pagi {pays, Ger. Gau), corresponding generally to the Roman civitates (see City). 1 At the head of the pagus was the comes, corresponding to the German Graf {Gaugraf, cf. Anglo-Saxon sare-gerefa* sheriff). The comes was appointed by the king and removable at his pleasure, and was chosen originally from all classes, sometimes from enfranchised slaves. His essential functions were judicial and executive, and in documents he is often described as the king's agent {agens publicus) or royal judge (judex publicus or fiscalis) . As the delegate of the executive power he had the right to military command in the king's name, and to take all the measures necessary for the preservation of the peace, i.e. to exercise the royal " ban " {bannus regis). He was at once public prosecutor and judge, was responsible for the execu- tion of the sentences of the courts, and as the king's representa- tive exercised the royal right of protection {mundium regis) over churches, widows, orphans and the like. He enjoyed a triple wergeld, but had no definite salary, being remunerated by the receipt of certain revenues, a system which contained the germs of discord, on account of the confusion of his public and private

1 The changing language of this epoch speaks of civitates, subse- quently of pagi, and later of comitatus (counties).

2 The A.S. gerefa, however, meaning "illustrious," "chief," has apparently, according to philologists, no connexion with the German Graf, which originally meant " servant " (cf. " knight," " valet," &c.j. It is the more curious that the gerefa should end as a servant (" reeve "), the Graf as a noble (count).

estates. He also retained a third of the fines which he im- posed in his judicial capacity.

Under the early Carolings the title count did not indicate noble birth. A comes was generally raised from childhood in the king's palace, and rose to be a count through successive stages. The count's office was not yet a dignity, nor hereditary; he was not independent nor appointed for life, but exercised the royal power by delegation, as under the Merovingians. While, however, he was theoretically paid by the king, he seems to have been himself one of the sources of the royal revenue. The counties were, it appears, farmed out; but in the 7th century the royal choice became restricted to the larger landed proprietors, who gradually emancipated themselves from royal control, and in the 8th century the term comitatus begins to denote a geographical area, though there was little difference in its extent under the Merovingian kings and the early Carolings. The count was about to pass into the feudatory stage. Throughout the middle ages, however, the original official and personal connotation of the title was never wholly lost; or perhaps it would be truer to say, with Selden, that it was early revived with the study of the Roman civil law in the 12th century. The unique dignity of count of the Lateran palace, 3 bestowed in 1328 by the emperor Louis IV. the Bavarian on Castrucio de' Antelminelli, duke of Lucca, and his heirs male, was official as well as honorary, being charged with the attendance and service to be per- formed at the palace at the emperor's coronation at Rome (Du Cange, s.v. Comites Palatii Later anensis; Selden, op. cil. p. 321). This instance, indeed, remained isolated; but the personal title of " count palatine," though honorary rather than official, was conferred on officials — especially by the popes on those of the Curia — had no territorial significance, and was to the last reminiscent of those early comites palatii whose relations to the sovereign had been purely personal and official (see Palatine). A relic of the old official meaning of " count " still survives in Transylvania, where the head of the political administration of the Saxon districts is styled count (comes, Graf) of the Saxon Nation.

2. Feudal Counts. — The process by which the official counts were transformed into feudal vassals almost independent is described in the article Feudalism. In the confusion of the period of transition, when the title to possession was usually the power to hold, designations which had once possessed a definite meaning were preserved with no defined association. In France, by the 10th century, the process of decomposition of the old organization had gone far, and in the nth century titles of nobility were still very loosely applied. That of " count " was, as Luchaire points out, " equivocal " even as late as the 12th century; any castellan of moderate rank could style himself comte who in the next century would have been called seigneur

(dominus). Even when, in the 13th century, the ranks of the feudal hierarchy in France came to be more definitely fixed, the style of " count " might imply much, or comparatively little. In the oldest register of Philip Augustus counts are reckoned with dukes in the first of the five orders into which the nobles are divided, but- the list includes, besides such almost sovereign rulers as the counts of Flanders and Champagne, immediate vassals of much less importance — such as the counts of Soissons and Dammartin — and even one mediate vassal, the count of Bar-sur-Seine. The title was still in fact " equivocal," and so it remained throughout French history. In the official lists it was early placed second to that of duke (Luchaire, Manuel, p. 181, note 1), hut in practice at least the great comtes-pairs (e.g. of Champagne) were the equals of any duke and the superiors of many. Thus, too, in modern times royal princes have been given the title of count (Paris, Flanders, Caserta), the heir of Charles X. actually changing his style, without sense of loss, from that of due de Bordeaux to that of comte de Chambord. From the 16th

3 " Count of the Lateran Palace " (Comes Sacri Later -anensis Palatii) was later the title usually bestowed by the popes in creating counts palatine. The emperors, too, continued to make counts palatine under this title long after the Lateran had ceased to be an imperial palace.

century onwards the equivocal nature of the title in France was increased by the royal practice of selling it, either to viscounts or barons in respect of their fiefs, or to rich roturiers.

In Germany the change from the official to the territorial and hereditary counts followed at the outset much the same course as in France, though the later development of the title and its meaning was different. In the ioth century the counts were permitted by the kings to divide their benefices and rights among their sons, the rule being established that countships (Grafsckaften) were hereditary, that they might be held by boys, that they were heritable by females and might even be ad- ministered by females. The Grajschaft became thus merely a bundle of rights inherent in the soil; and, the count's office having become his property, the old counties or Gauen rapidly disappeared as administrative units, being either amalgamated or subdivided. By the second half of the 12th century the official character of the count had quite disappeared; he had become a territorial noble, and the foundation had been laid of territorial sovereignty (Landeshoheii) .

The first step towards this was the concession to the counts of the military prerogatives of dukes, a right enjoyed from the first by the counts of the marches (see Margrave), then given to counts palatine (see Palatine) and, finally, to other counts, who assumed by reason of it the style of landgrave (Landgraf, i.e. count of a province). At first all counts were reckoned as princes of the Empire (Reichsfiirsten) ; but since the end of the 12 th century this rank was restricted to those who were immediate tenants of the crown, 1 the other counts of the Empire (Reichsgrafen) being placed among the free lords (bar ones, liberi domini). Counts of princely rank (gefurstete Graf en) voted among the princes in the imperial diet; the others (Reichsgrafen) were grouped in the Grafenbanke — originally two, to which two more were added in the 17th century — each of which had one vote. In 1806, on the formation of the Confedera- tion of the Rhine, the sovereign counts were all mediatized (see Mediatization). Even before the end of the Empire (1806) the right of bestowing the title of count was freely exercised by the various German territorial sovereigns.

3. Modern Counts. — Any political significance which the feudal title of count retained in the 18th century vanished with the changes produced by the Revolution . It is now simply a title of honour and one, moreover, the social value of which differs enormously, not only in the different European countries, but within the limits of the same country. In Germany, for instance, there are several categories of counts: (1) the mediatized princely counts (gefurstete Graf en); who are reckoned the equals in blood of the European sovereign houses, an equality symbolized by the ” closed crown ” surmounting their armorial bearings. The heads of these countly families of the ” high nobility ” are entitled (by a decree of the federal diet, 1829) to the style of Erlaucht (illustrious, most honourable); (2) Counts of the Empire 2 (Reichsgrafen), descendants of those counts who, before the end of the Holy Roman Empire (1806), were Reichs- standisch, i.e. sat in one of the Grafenbanke in the imperial diet, and entitled to a ducal coronet; (3) Counts (a) descended from the lower nobility of the old Empire, titular since the 15th century, (b) created since; their coronet is nine-pointed (cf. the nine points and strawberry leaves of the English earl). The difficulty of determining in any case the exact significance of the title of a German count, illustrated by the above, is increased by the fact that the title is generally heritable by all male descendants, the only exception being in Prussia, where, since 1840, the rule of primogeniture has prevailed and the bestowal of the title is dependent on a rent-roll of £3000 a year. The result

1 Of these there were four who, as counts of the Empire par excellence, were sometimes styled ” simple counts ” (Schlechtgrafen) ,

i.e. the counts of Cleves, Schwarzburg, Cilli and Savoy; they were entitled to the ducal coronet. Three of these had become dukes by the 17th century, but the count (now prince) of Schwarzburg still styled himself " Of the four counts of the Holy Roman Empire, count of Schwarzburg " (see Seldenf ed. 1672, p. 312).

2 This title is borne by certain English families, e.g. by Lord Arundell of Wardour. In other cases it has been assumed without due warrant. See J. H. Round, " English Counts of the Empire," in Z7je Ancestor, vii. 15 (Westminster, October 1903).

is that the title is very widespread and in itself little significant. A German or Austrian count may be a wealthy noble of princely rank, a member of the Prussian or Austrian Upper House, or he may be the penniless cadet of a family of no great rank or antiquity. Nevertheless the title, which has long been very sparingly bestowed, always implies a good social position. The style Altgraf (old count) , occasionally found, is of some antiquity, and means that the title of count has been borne by the family from time immemorial.

In medieval France the significance of the title of count varied with the power of those who bore it; in modern France it varies with its historical associations. It is not so common as in Germany or Italy; because it does not by custom pass to all male descendants. The title was, however, cheapened by its revival under Napoleon. By the decree of the 1st of March 1808, reviving titles of nobility, that of count was assigned ex officio to ministers, senators and life councillors of state, to the president of the Corps Legislatif and to archbishops. The title was made heritable in order of primogeniture, and in the case of archbishops through their nephews. These Napoleonic countships, increased under subsequent reigns, have produced a plentiful crop of titles of little social significance, and have tended to lower the status of the counts deriving from the ancien rigime. The title of marquis, which Napoleon did not revive, has risen proportionately in the estimation of the Faubourg St Germain. As for that of count, it is safe to say that in France its social value is solely dependent on its historical associations.

Of all European countries Italy has been most prolific of counts. Every petty Italian prince, from the pope downwards, created them for love or money; and, in the absence of any regulating authority, the title was also widely and loosely assumed, while often the feudal title passed with the sale of the estate to which it was attached. Casanova remarked that in some Italian cities all the nobles were baroni, in others all were conti. An Italian conte mayor may not be a gentleman;

he has long ceased, qua count, to have any social prestige, and his rank is not re cognized by the Italian government. As in France, however, there are some Italian conti whose titles are respectable, and even illustrious, from their historic associations. The prestige belongs, however, not to the title but to the name. As for the papal countships, which are still freely bestowed on those of all nations whom the Holy See wishes to reward, their prestige naturally varies with the religious complexion of the country in which the titles are borne. They are esteemed by the faithful, but have small significance for those outside. In Spain, on the other hand, the title of conde, the earlier history of which follows much the same development as in France, is still of much social value, mainly owing to the fact that the rule of primogeniture exists, and that, a large fee being payable to the state on succession to a title, it is necessarily associated with some degree of wealth. The Spanish counts of old creation, some of whom are grandees and members of the Upper House, naturally take the highest rank; but the title, still bestowed for eminent public services or other reasons, is of value. The title, like others in Spain, can pass through an heiress to her husband. In Russia the title of count (graf, fern, grafinya), a foreign importation, has little social prestige attached to it, being given to officials of a certain rank. In the British empire the only recognized counts are those of Malta, who are given precedence with baronets of the United Kingdom.

See Selden, Titles of Honor (London, 1672); Du Cange, Glos- sarium Med. hat. (ed. Niort, 1883) s.v. “Comes”; La Grande Encyclopedic, s.v. ” Comte “; A. Luchaire, Manuel des institutions francaises (Paris, 1892); P. Guilhiermoz, Essai sur Vorigine dele noblesse en France au moyen age (Paris, 1902) ; Brunner, Deutsche Rechtsgeschichte, Band ii. (Leipzig, 1892).

COUNTER. (1) (Through the O. Fr. conteoir, modern comptoir, from Lat. computare, to reckon), a round piece of metal, wood or other material used anciently in making calculations, and now for reckoning points in games of cards, &c, or as tokens representing actual coins or sums of money in gambling games such as roulette. The word is thus used, figuratively, of something of no real value, a sham. In the original sense of ” a means of counting money,

or keeping accounts,” ” counter ” is used of the table or flat- topped barrier in a bank, merchant’s office or shop, on which money is counted and goods handed to a customer. The term was aiso applied, usually in the form ” compter,” to the debtors’ prisons attached to the mayor’s or sheriff’s courts in London and some other boroughs in England. The ” compters ” of the sheriff’s courts of the city of London were, at various times, in the Poultry, Bread St., Wood St. and Giltspur St. ; the Giltspur St. compter was the last to be closed, in 1854. (2) (From Lat. contra, opposite, against), a circular parry in fencing, and in boxing, a blow given as a parry to a lead of an opponent. The word is also used of the stiff piece of leather at the back of a boot or shoe, of the rounded angle at the stern of a ship, and, in a horse, of the part lying between the shoulder and the under part of the neck. In composition, counter is used to express contrary action, as in ” countermand,” ” counterfeit,” &c.

COUNTERFEITING (from Lat. contra-facere, to make in opposition or contrast), making an imitation without authority and for the purpose of defrauding. The word is more particularly used in connexion with the making of imitations of money, whether paper or coin. (See Coinage Offences; Forgery.)

COUNTERFORT (Fr. contrefort), in architecture, a buttress or pier built up against the wall of a building or terrace to strengthen it, or to resist the thrust of an arch or other constructional feature inside.

COUNTERPOINT (Lat. contrapunctus, ” point counter point,” ” note against note “), in music, the art happily defined by Sir Frederick Gore Ouseley as that ” of combining ” melodies: this should imply that good counterpoint is the production of beauti- ful harmony by a combination of well-characterized melodies. The individual audibility of the melodies is a matter of which current criticism enormously overrates the importance. What is always important is the peculiar life breathed into harmony by contrapuntal organization. Both historically and aesthetically ” counterpoint ” and ” harmony ” are inextricably blended; for nearly every harmonic fact is in its origin a phenomenon of counterpoint. And if in later musical developments it becomes possible to treat chords as, so to speak, harmonic lumps with a meaning independent of counterpoint, this does not mean that they have really changed their nature; but it shows a difference between modern and earlier musicpreciselysimilarto that between modern English, in which metaphorical and abstract expressions are so constantly used that they have become a mere shorthand for the literal and concrete expression, and classical Greek, where metaphors and abstractions can appear only as elaborate similes or explicit philosophical ideas. The laws of counterpoint are, then, laws of harmony with the addition of such laws of melody as are not already produced by the interaction of harmonic and melodic principles. In so far as the laws of counterpoint are derived from purely harmonic principles, that is to say, derived from the properties of concord and discord, their origin and development are discussed in the article Harmony. In so far as they depend entirely on melody they are too minute and changeable to admit of general discussion; and in so far as they show the interaction of melodic and harmonic principles it is more convenient to discuss them under the head of harmony, because they appear in such momentary phenomena as are more easily regarded as successions of chords than as principles of design. All that remains, then, for the present article is the explanation of certain technical terms.

1. Canto Fermo (i.e. plain chant) is a melody in long notes given to one voice while others accompany it with quicker counterpoints (the term ” counterpoint ” in this connexion meaning accompanying melodies). In the simplest cases the Canto Fermo has notes of equal length and is unbroken in flow. When it is broken up and its rhythm diversified, the gradations between counterpoint on a Canto Fermo and ordinary forms of polyphony, or indeed any kind of melody with an elaborate accompaniment, are infinite and insensible.

2 . Double Counterpoint is a combination of melodies so designed that either can be taken above or below the other. When this

■ change of position is effected by merely altering the octave of

either or both melodies (with or without transposition of the whole combination to another key), the artistic value of the device is simply that of the raising of the lower melody to the surface. The harmonic scheme remains the same, except in so far as some of the chords are not in their fundamental position, while others, not originally fundamental, have become so. But double counterpoint may be in other intervals than the octave; that is to say, while one of the parts remains stationary, the other may be transposed above or below it by some interval other than an octave, thus producing an entirely different set of harmonies.

Double Counterpoint in the 12th has thus been made a powerful means of expression and variety. The artistic value of this device depends not only on the beauty and novelty of the second scheme of harmony obtained, but also on the change of melodic expression produced by transferring one of the melodies to another position in the scale. Two of the most striking illustra- tions of this effect are to be found in the last chorus of Brahms's Triumphlied and in the fourth of his variations on a theme by Haydn.

Double Counterpoint in the 10th has, in addition to this, the property that the inverted melody can be given in the new and in the original positions simultaneously.

Double counterpoint in other intervals than the octave, 10th and 1 2th, is rare, but the general principle and motives for it remain the same under all conditions. The two subjects of the Confileor in Bach's B minor Mass are in double counterpoint in the octave, nth and 13th. And Beethoven's Mass in D is full of pieces of double counterpoint in the inversions of which a few notes are displaced so as to produce momentary double counter- point in unusual intervals, obviously with the intention of, varying the harmony. Technical treatises are silent as to this purpose, and leave the student in the belief that the classical composers used these devices, if at all, in a manner as meaningless as the examples in the treatises.

3. Triple, Quadruple and Multiple Counterpoint. — When more than two melodies are designed so as to combine in interchange- able positions, it becomes increasingly difficult to avoid chords and progressions of which some inversions are incorrect. In triple counterpoint this difficulty is not so great; although a complete triad is dangerous, as it is apt to invert as a " |- " which requires careful handling. On the other hand, in triple counterpoint the necessity for

strictness is at its greatest, because there are only six possible inversions, and in a long polyphonic work most of these will be required. Moreover, the artistic value of the device is at its highest in three-part poly- phonic harmony, which, whether invertible or not, is always a fine test of artistic economy, while the inversions are as evident to the ear, especially where the top part is concerned, as those in double counterpoint. Triple counterpoint (and a fortiori multiple counterpoint) is normally possible only at the octave; for it will be found that if three parts are designed to invert in some other interval this will involve two of them inverting in a third interval which will give rise to incalculable difficulty. This makes the fourth of Brahms's variations on a theme of Haydn almost miraculous. The plaintive expression of the whole variation is largely due to the fact that the flowing semiquaver counterpoint below the main theme is on each repeat inverted in the 1 2th, with the result that its chief emphasis falls upon the most plaintive parts of the scale. But in the first eight bars of the second part of the variation a third contrapuntal voice appears, and this too is afterwards inverted in the 12th, with perfectly natural and smooth effect. But this involves the inversion of two of the counterpoints with each other in the 9th, a kind of double counterpoint which is almost impossible. The case is unique, but it admirably illustrates the difference between artistic and merely academic mastery of technical resource.

Quadruple Counterpoint is not rare with Bach. It would be more difficult than triple, but for the fact that of its twenty-four possible inversions not more than four or five need be correct. Quintuple counterpoint is admirably illustrated in the finale of Mozart's Jupiter Symphony, in which everything in the successive statement and gradual development of the five themes conspires

to give the utmost effect to their combination in the coda. Of course Mozart has not room for more than five of the 1 20 possible combinations, and from these he selects such as bring fresh themes into the outside parts, which are the most clearly audible. Sextuple Counterpoint may be found in Bach's great double chorus, Nun ist das *Heil, and in the final j of his concerto for three claviers in C, and probaLly in other places.

4. Added Thirds and Sixths. — An easy and effective. imitation of triple and quadruple counterpoint, embodying much of the artistic

value of inversion, is found in the numerous combinations of themes in thirds' and sixths which arise from an extension of the principle which we mentioned in connexion with double counterpoint in the 10th, namely, the possibility of performing it in its original and inverted positions simultaneously. The Pleni sunt coeli of Bach's B minor Mass is written in this kind of transformation of double into quadruple counterpoint; and the artistic value of the device is perhaps never so magnificently realized as in the place, at bar 84, where the trumpet doubles the bass three octaves and a third above while the alto and second tenor have the counter subjects in close thirds in the middle.

Almost all other contrapuntal devices are derived from the principle of the canon and are discussed in the article Contra- puntal Forms.

As a training in musical grammar and style, the rhythms of 16th-century polyphony were early codified into " the five species of counterpoint " (with various other species now for- gotten) and practised by students of composition. The classical treatise on which Haydn and Beethoven were trained was Fux's Gradus ad Parnassum (1725). This was superseded in the 19th century by Cherubini's, the first of a long series of attempts to bring up to date as a dead language what should be studied in its original and living form. (D. F. T.)

COUNTERSCARP (= " opposite scarp," Fr. contrescarpe), a term used in fortification for the outer slope of a ditch; see Fortification and Siegecraft.

COUNTERSIGN, a military term for a sign, word or signal pre- viously arranged and required to be given by persons approach- ing a sentry, guard or other post. In some armies the " counter- sign " is strictly the reply of the sentry to the pass-word given by the person approaching.

COUNTRY (from the Mid. Eng. contre or contrie, and O. Fr. cuntree; Late Lat. contrata, showing the derivation from contra, opposite, over against, thus the tract of land which fronts the sight, cf. Ger. Gegend, neighbourhood), an extent of land without definite limits, or such a region with some peculiar character, as the " black country," the " fen country " and the like. The extension from such descriptive limitation to the limitation of occupation by particular owners or races is easy; this gives the common use of the word for the land inhabited by a particular nation or race. Another meaning is that part of the land not occupied by towns, " rural " as opposed to " urban " districts; this appears too in "country-house" and "country town"; so too " countryman " is used both for a rustic and for the native of a

particular land. The word appears in many phrases, in the sense of the whole population of a country, and especially of the general body of electors, as in the expression ” go to the country,” for the dissolution of parliament preparatory to a general election.

COUNTY (through Norm. Fr. counts, cf. O. Fr. cunti, conte, Mod. Fi.comte, from Lat. comitatus, cf. Ital. comilato,l?rov.comtat; see Count) , in its most usual sense the name given to certain important administrative divisions in the United Kingdom, the British dominions beyond the seas, and the United States of America. The word was first introduced after the Norman Conquest as the equivalent of the old English ” shire,” which has survived as its synonym, though occasionally also applied to divisions smaller than counties, e.g. Norhamshire, Hexhamshire and Hallamshire. The word ” county ” is also sometimes used, alternatively with ” countship,” to translate foreign words, e.g. the French comti and the German Grafschaft, which connote the territorial.jurisdiction of a count (q.v.). The present article is confined to a sketch of the origin and development of English

counties, which have served in a greater or less degree as the model for the county organizations in the various countries of the English-speaking world which are described under their proper headings.

About one-third of the English counties represent ancient kingdoms, sub-kingdoms or tribal divisions, such as Kent, Sussex, Norfolk, Devon; but most of the remaining counties take their names from some important town within their re- spective boundaries. The counties to the south of the Thames (except Cornwall) already existed in the time of Alfred, but those of the midlands seem to have been created during the reign of Edward the Elder (901-925) and to have been artificially bounded areas lying around some stronghold which became a centre of civil and military administration. There is reason, however, for thinking that the counties of Bedford, Cambridge, Huntingdon and Northampton are of Danish origin. Northumberland, Cumberland and Westmorland were not recognized as English counties until some time after the Norman Conquest, the last two definitely appearing as fiscal areas in 1177. The origin of Rutland as a county is obscure, but it had its own sheriff in n 54.

In the period preceding the Norrr.an Conquest two officers appear at the head of the county organization. These are the ealdorman or earl, and the scirgerefa or sheriff. The shires of Wessex appear each to have had an ealdorman, whose duties were to command its military forces, to preside over the county assembly (scir gemot), to carry out the laws and to execute justice. The name ealdorman gave way to that of earl,

probably under Danish influence, in the first half of the nth century, and it is probable that the office of sheriff came into existence in the reign of Canute (1017-1035), when the great earldoms were formed and it was no longer possible for the earl to perform his various administrative duties in person in a group of counties. After the Norman Conquest the earl was occasionally appointed sheriff of his county, but in general his only official connexion with it was to receive the third penny of its pleas, and the earldom ceased to be an office and became merely a title. In the 1 2th century the office of coroner was created, two or more of them being chosen in the county court as vacancies occurred. In the same century vcrderers were first chosen in the same manner for the purpose of holding inquisitions on vert and venison in those counties which contained royal forests. It was the business of the sheriff (vicecomes) as the king's representative to serve and return all writs, to levy distresses on the king's behalf, to execute all royal precepts and to collect the king's revenue. In this work he was assisted by a large staff of clerks and bailiffs who were directly responsible to him and not to the king. The sheriff also commanded the armed forces of the crown within his county, and either in person or by deputy presided over the county court which was now held monthly in most counties. In 1300 it was enacted that the sheriffs might be chosen by the county, except in Worcestershire, Cornwall, Rutland, Westmorland and Lancashire, where there were then sheriffs in fee, that is, sheriffs who held their offices hereditarily by royal grant. The elective arrangement was of no long duration, and it was finally decided in 1340 that the sheriffs should be appointed by the chancellor, the treasurer and the chief baron of the exchequer, but should hold office for one year only. The county was from an early period regarded as a community, and approached the king as a corporate body, while in later times petitions were presented through the knights of the shire. It was also an organic whole for the purpose of the conservation of the peace. The assessment of taxation by commissioners appointed by the county court developed in the 13th century into the representation of the county by two knights of the shire elected by the county court to serve in parliament, and this representation continued unaltered save for a short period during the Protectorate, until 1832, when many of the counties received a much larger representation, which was still further increased by later acts.

The royal control over the county was strengthened from the 14th century onward by the appointment of justices of the peace.

COUNTY

This system was further developed under the Tudors, while in the

middle of the 16th century the military functions of the sheriff were handed over to a new officer, the lord-lieutenant, who is now more prominently associated with the headship of the county than is the sheriff. The lord-lieutenant now usually holds the older office of custos rotulorum, or keeper of the records of the county. The justices of the peace are appointed upon his nomination, and until lately he appointed the clerk of the peace. The latter appointment is now made by the joint committee of quarter sessions and county council.

The Tudor system of local government received little alteration until the establishment of county councils by the Local Govern- ment Act of 1888 handed over to an elected body many of the functions previously exercised by the nominated justices of the peace. For the purposes of this act the ridings of Yorkshire, the divisions of Lincolnshire, east and west Sussex, east and west Suffolk, the soke of Peterborough and the Isle of Ely are regarded as counties, so that there are now sixty administrative counties of England and Wales. Between 1373 and 1692 the crown granted to certain cities and boroughs the privilege of being counties of themselves. There were in 1835 eighteen of these counties corporate, Bristol, Chester, Coventry, Gloucester, Lincoln, Norwich, Nottingham, York and Carmarthen, each of which had two sheriffs, and Canterbury, Exeter, Hull, Lichfield, Newcastle-upon-Tyne, Poole, Southampton, Worcester and Haverfordwest, each of which had one sheriff. All these boroughs, with the exception of Carmarthen, Lichfield, Poole and Haverfordwest, which remain counties of themselves, and forty- seven others, were created county boroughs by the Local Govern- ment Act 1888, and are entirely dissociated from the control of a county council. The City of London is also a county of itself, whose two sheriffs are also sheriffs of Middlesex, while for the purposes of the act of 1888 the house-covered district which extends for many miles round the City constitutes a county.

The county has always been the unit for the organization of the militia, and from about 1782 certain regiments of the regular army were associated with particular counties by territorial titles. The army scheme of 1907-1908 provided for the forma- tion of county associations under the presidency of the lords- lieutenant for the organization of the new territorial army.

See Statutes of the Realm; W. Stubbs, Constitutional History of England (1 874-1 878) ; F. W. Maitland, Domesday Book and Beyond (1897) ; Sir F. Pollock and F. W. Maitland, History of English Law (1895) ; H. M. Chadwick, Studies on Anglo-Saxon Institutions (1905), and The Victoria History of the Counties of England. (G. J. T.)

COUNTY COURT, in England, a local court of civil jurisdiction. The county court, it has been said, is at once the most ancient and the most modern of English civil tribunals. The Saxon Curia Comitatus, maintained after the Norman Conquest, was a local court and a small debts court. It was instituted by Alfred the Great, its jurisdiction embracing civil, and, until the reign of William I., ecclesiastical matters. The officers of the court consisted of the earldorman, the bishop and the sheriff. The court was held once in every four weeks, being presided over by the earl, or, in his absence, the sheriff. The suitors of the court, i.e. the freeholders, were the judges, the sheriff being simply a presiding officer, pronouncing and afterwards executing the judgment of the court. The court was not one of record. The appointment of judges of assize in the reign of Henry II., as well as the expensive and dilatory procedure of the court, brought about its gradual disuse, and other local courts, termed courts of request or of conscience, were established. These, in turn, proved unsatisfactory, owing both to the limited nature of their jurisdiction (restricted to causes of debt not exceeding 40s. in value, and to the fact that they were confined to particular places. Accordingly, with the view of making justice cheaper and more accessible the County Courts Act 1846 was passed. This act had the modest title of ” An Act for the Recovery of Small Debts and Demands in England.” The original limit of the jurisdiction of the new courts was £20, extended in 1850 to £50 in actions of debt, and in 1903 (by an act which came into force in 1905) to £100. Thirteen amending acts were passed, by which new jurisdiction was from time to time conferred” on the county

courts, and in the year 1888 an act was passed repealing the previous acts and consolidating their provisions, with some amendment. This is now the code or charter of the county courts.

The grain of mustard-seed sown in 1846 has grown into a goodly tree, with branches extending over the whole of England and Wales; and they embrace within their ambit a more multifarious jurisdiction than is possessed by any other courts in the kingdom. England and Wales were mapped out into 59 circuits (not including the city of London), with power for the crown, by order in council, to abolish any circuit and rearrange the areas comprised in the circuits (sec. 4). There is one judge to each circuit, but the lord chancellor is empowered to appoint two judges in a circuit, provided that the total number of judges does not exceed 60. The salary of a county court judge was originally fixed at £1200, but he now receives £1500. He must at the time of his appointment be a barrister-at-law of at least seven years’ standing, and

not more than sixty years of age; after appointment he cannot sit as a member of parliament or practise at the bar.

Every circuit (except in Birmingham, Clerkenwell, and West- minster) is divided into districts, in each of which there is a court, with a registrar and bailiffs. The judges are directed to attend and hold a court in each district at least once in every month, unless the lord chancellor shall otherwise direct (sees. 10, n). But in practice the judge sits several times a month in the large centres of population, and less frequently than once a month in the court town of sparsely inhabited districts. By sec. 185 of the act of 1888 the judges and officers of the city of London court have the like jurisdiction, powers, and authority as those of a county court, and the county court rules apply to that court.

The ordinary jurisdiction of the county courts may be thus tabulated : —

Subject matter. Pecuniary, limit

01 jurisdiction. Common-law actions, with written consent

of both parties Unlimited.

Actions founded on contract (except for

breach of promise of marriage, in which

the county courts have no jurisdiction) . £lOO. Actions founded on tort (except libel, slander,

and seduction, in which the county courts

have no jurisdiction) £100.

Counter claims (unless plaintiff gives written

notice of objection) Unlimited.

Ejectment or questions of title to reality . £100 annual value.

Equity jurisdiction £500.

Probate jurisdiction £200 personalty

and £300 realty.

Admiralty jurisdiction £300.

Bankruptcy jurisdiction Unlimited.

Replevin Unlimited.

Interpleader transferred from High Court £500. Actions in contract transferred from High

Court £100.

Actions in tort transferred from High Court . Unlimited. Companies (winding up), when the paid-up

capital does not exceed £10,000.

There is no discoverable principle upon which these limits of the jurisdiction of the county courts have been determined. But the above table is not by any means an exhaustive statement of the jurisdiction of the county courts. For many years it has been the practice of parliament to throw on the county court judges the duty of acting as judges or arbitrators for the purpose of new legislation relating to social subjects. It is impossible to classify the many statutes which have been passed since 1846 and which confer some jurisdiction, apart from that under the County Courts Act, on county courts or their judges. Some of these acts impose exceptional duties on the judges of the county courts, others confer unlimited jurisdiction concurrently with the High Court or some other court, others, again, confer limited or, sometimes, exclusive jurisdiction. A list of all the acts will be found in the Annual County Courts Practice. A county court judge may determine all matters of fact as well as law, but a jury may be summoned at the option of either plaintiff or defendant when the amount in dispute exceeds £5, and in actions under £5 the judge may in his discretion, on application of either of the parties, order that the action be tried by jury. The number of

jurymen impanelled and sworn at the trial was, by the County Courts Act 1903, increased from five to eight. » There is an appeal from the county courts on matters of law to a divisional court of the High Court, i.e. to the admiralty division in admiralty cases and to the king's bench division in other cases (sec. 120 of act of 1888). The determination of the divisional court is final, unless leave be given by

that court or the court of appeal (Judicature Acts 1894) . (See further Appeal.) In proceedings under the Workmen's Compensation Act the appeal from a county court judge is to the court of appeal, with a subsequent appeal to the House of Lords. In 1908 a Committee was appointed by the lord chancellor " to inquire into certain matters of county court procedure." The committee presented a report in 1909 (H.C. 71), recommending the extension of existing county court jurisdiction, but a bill introduced to give effect to the recommendations was not proceeded with.

See Annual County Courts Practice, also " Fifty Years of the English County Courts," by County Court Judge Sir T. W. Snagge, in Nineteenth Century, October 1897.

COUPlS (French for " cut off "), a small closed carriage of the brougham type, with four wheels and seats for two persons; the term is also used of the front compartment on a diligence or mail-coach on the continent of Europe, and of a compartment in a railway carriage with seats on one side only.

COUPLET, a pair of lines of verse, which are welded together by an identity of rhyme. The New English Diet, derives the use of the word from the French couplet, signifying two pieces of iron riveted or hinged together. In rhymed verse two lines which complete a meaning in themselves are particularly known as a couplet. Thus, in Pope's Eloisa to Abelard: — " Speed the soft intercourse from soul to soul, And waft a sigh from Indus to the Pole." In much of old English dramatic literature, when the mass of the composition is in blank verse or even in prose, particular emphasis is given by closing the scene in a couplet. Thus, in the last act of Beaumont and Fletcher's Thierry and Theodoret the action culminates in an unexpected rhyme: —

" And now lead on; they that shall read this story Shall find that virtue lives in good, not glory." In French literature, the term couplet is not confined to a pair of lines, but is commonly used for a stanza. A " square " couplet, in French, for instance, is a strophe of eight lines, each composed of eight syllables. In this sense it is employed to distinguish the more emphatic parts of a species of verse which is essentially gay, graceful and frivolous, such as the songs in a vaudeville or a comic opera. In the 18th century, Le Sage, Piron and even Voltaire did not hesitate to engage their talents on the production of couplets, which were often witty, if they had no other merit, and were well fitted to catch the popular ear. This signification of the word couplet is not unknown in England, but it is not

customary; it is probably used in a stricter and a more technical sense to describe a pair of rhymed lines, whether serious or merry. The normal type, as it may almost be called, of English versifica- tion is the metre of ten-syllabled rhymed lines designated as heroic couplet. This form of iambic verse, with five beats to each line, is believed to have been invented by Chaucer, who employs it first in the Prologue The Legend of Good Women the composition of which is attributed to the year 1385. That poem opens with the couplet: —

” A thousand times have I heard man tell That there is joy in heaven and pain in hell.” This is an absolutely correct example of the heroic couplet, which ultimately reached such majesty in the hands of Dryden and such brilliancy in those of Pope. It has been considered proper for didactic, descriptive and satirical poetry, although in the course of the 19th century blank verse largely took its place. Epigram often selects the couplet as the vehicle of its sharpened arrows, as in Sir John Harington’s

” Treason doth never prosper: what’s the reason? Why, if it prosper, none dare call it treason.”

(E. G.)

COUPON (from Fr. couper, to cut), a certificate entitling its owner to some payment, share or other benefit; more specifically,

one of a series of interest certificates or dividend warrants attached to a bond running for a number of years. The word coupon (a piece cut off) possesses an etymological meaning so comprehensive that, while on the Stock Exchange it is only used to denote such an interest certificate or a certificate of stock of a joint-stock company, it may be as suitably, and elsewhere is perhaps more frequently, applied to tickets sold by tourist agencies and others. The coupons by means of which the interest on a bond or debenture is collected are generally printed at the side or foot of that document, to be cut off and presented for payment at the bank or agency named on them as they become due. The last portion, called a ” talon,” is a form of certificate, and entitles the holder, when all the coupons have been presented, to obtain a fresh coupon sheet. They pass by delivery, and are as a rule exempt from stamp duty. Coupons for the payment of dividends are also attached to the share warrants to bearer issued by some joint-stock companies. The coupons on the bonds of most of the principal foreign loans are payable in London in sterling as well as abroad.

COURANTE (a French word derived from courir, to run), a dance in

3-2 time march in vogue in France in the 17th century (see Dance). It is also a musical term for a movement or independent piece based on the dance. In a suite it followed the Allemande (q.v.), with which it is contrasted in rhythm.

COURAYER, PIERRE FRANCOIS LE (1681-1776), French Roman Catholic theological writer, was born at Rouen on the 17th of November 1681. While canon regular and librarian of the abbey of St Genevieve at Paris, he conducted a correspond- ence with Archbishop Wake on the subject of episcopal succes- sion in England, which supplied him with material for his work, Dissertation sur la validity des ordinations des Anglais et sur la succession des eveques de VEglise anglicane, avec les preuves justificatives des fails avancis (Brussels, 1723; Eng. trans, by D. Williams, London, 1725; reprinted Oxford, 1844, with memoir of the author) , an attempt to prove that there has been no break in the line of ordination from the apostles to the English clergy. His opinions exposed him to a prosecution, and with the help of Bishop Atterbury, then in exile in Paris, he took refuge in England, where he was presented by the university of Oxford with a doctor's degree. In 1736 he published a French transla- tion of Paolo Sarpi's History of the Council of Trent, and dedicated it to Queen Caroline, from whom he received a pension of £200 a year. Besides this he translated Sleidan's History of the Reforma- tion, and wrote several theological works. He died in London on the 17th of October 1776, and was buried in the cloisters of Westminster Abbey. In his will, dated two years before his death, he declared himself still a member of the Roman Catholic Church, although dissenting from many of its opinions.

COURBET, GUSTAVE (1810-1877), French painter, was born at Ornans (Doubs) on the 10th of June 1819. He went to Paris in 1839, and worked at the studio of Steuben and Hesse; but his independent spirit did not allow him to remain there long, as he preferred to work out his own way by the study of Spanish, Flemish and French painters. His first works, an " Odalisque," suggested by Victor Hugo, and a " Lelia," illustrating George Sand, were literary subjects; but these he soon abandoned for the study of real life. Among other works he painted his own portrait with his dog, and " The Man with a Pipe," both of which were rejected by the jury of the Salon; but the younger school of critics, the neo-romantics and realists, loudly sang the praises of Courbet, who by 1849 began to be famous, producing such pictures as " After Dinner at Ornans " and " The Valley of the Loire." The Salon of 1850 found him triumphant with the " Burial at Ornans," the " Stone-Breakers " and the " Peasants of Flazey." His style still gained in individuality, as in " Village Damsels " (1852), the "

Wrestlers," " Bathers," and "A Girl Spinning" (1852). Though Courbet's realistic work is not devoid of import- ance, it is as a landscape and sea painter that he will be most honoured by posterity. Sometimes, it must be owned, his realism is rather coarse and brutal, but when he paints the forests of Franche-Comte, the " Stag-Fight," " The Wave," or the " Haunt of the Does," he is inimitable. When Courbet had

made a name as an artist he grew ambitious of other glory; he tried to promote democratic and social science, and under the Empire he wrote essays and dissertations. His refusal of the cross of the Legion of Honour, offered to him by Napoleon III., made him immensely popular, and in 1871 he was elected, under the Commune, to the chamber. Thus it happened that he was responsible for the destruction of the Vendome column. A council of war, before which he was tried, condemned him to pay the cost of restoring the column, 300,000 francs (£12,000). To escape the necessity of working to the end of his days at the orders of the State in order to pay this sum, Courbet went to Switzer- land in 1873, and died at La Tour du Peilz, on the 31st of December 1877, of a disease of the liver aggravated by intemper- ance. An exhibition of his works was held in 1882 at the Ecole des Beaux-Arts.

See Champfleury, Les Grand.es Figures d'hier et d'aujourd' kui (Paris, 1861); Mantz, " G. Courbet," Gaz. des beaux-arts (Paris, 1878); Zola, Mes Haines (Paris, 1879); C. Lemonnier, Les Peintres de la Vie (Paris, 1888). (H. Fr.)

C0UR6EV0IE, a town of northern France, in the department of Seine, 5 m. W.N.W. of Paris on the railway to Versailles. Pop. (1906) 29,339. It is a residential suburb of Paris, and has a fine avenue opening on the Neuilly bridge, and forming with it a continuation of the Champs Elysees. It carries on bleaching and the manufacture of carriage bodies, awnings, drugs, biscuits, &c.

COURCELLE – SENEUIL, JEAN GUSTAVE (1813-1892), French economist, was born at Seneuil (Dordogne) on the 22nd of December 18 13. Seneuil was an additional name adopted from his native place. Devoting himself at first to the study of the law, he was called to the French bar in 1835. Soon after, however, he returned to Dordogne and settled down as a manager of iron- works. He found leisure to study

economic and political questions, and was a frequent contributor to the republican papers. On the establishment of the second republic in 1848 he became director of the public domains. After the coup d'etat of Napoleon III. in 185 1 he went to South America, and held the professorship of political economy at the National Institute of Santiago, in Chile, from 1853 to 1863, when he returned to France. In 1879 he was made a councillor of state, and in 1882 was elected a member of the Academie des sciences morales et politiques. He died at Paris on the 29th of June 1892. Courcelle-Seneuil, as an economist, was strongly inclined towards the liberal school, and was equally partial to the historical and experimental methods; but his best energies were directed to applied economy and social questions. His principal work is Traite theorique et pratique d'economie politique (2 vols., 1858); among his others may be mentioned Traite theorique et pratique des operations de banque (1853); Etudes sur la science sociale (1862); La Banque libre (1867); Liberte" et socialisme (1868); Protection et libre ichange (1879); he also translated into French John Stuart Mill's Principles. '

COURCI, JOHN DE (d. 1219?), Anglo-Norman conqueror of Ulster, was a member of a celebrated Norman family of Oxford- shire and Somersetshire, whose parentage is unknown, and around whose career a mass of legend has grown up. It would appear that he accompanied William Fitz-Aldelm to Ireland when the latter, after the death of Strongbow, was sent thither by Henry II., and that he immediately headed an expedition from Dublin to Ulster, where he took Downpatrick, the capital of the northern kingdom. After some years of desultory fighting de Courci established his power over that part of Ulster comprised in the modern counties of Antrim and Down, throughout which he built a number of castles, where his vassals, known as " the barons of Ulster," held sway over the native tribes. After the accession of Richard I., de Courci in conjunction with William de Lacy appears in some way to have offended the king by his proceedings in Ireland. De Lacy quickly made his peace with Richard, while de Courci defied him; and the subsequent history of the latter consisted mainly in the vicissitudes of a lasting feud with the de Lacys. In 1204 Hugh de Lacy utterly defeated de Courci in battle, and took him prisoner. De Courci, however,

soon obtained his liberty, probably by giving hostages as security for a promise of submission which he failed to carry out, seeking an asylum instead with the O'Neills of Tyrone. He again appeared in arms on hearing that Hugh de Lacy had obtained a grant of Ulster with the title of earl; and in alliance with the king of Man he ravaged the territory of Down; but was com- pletely routed by Walter de Lacy, and

disappeared from the scene till 1207, when he obtained permission to return to England. In 1 2 10 he was in favour with King John, from whom he received a pension, and whom he accompanied to Ireland. There is some indication of his having sided with John in his struggle with the barons; but of the later history of de Courci little is known. He probably died in the summer of 1 2 19. Both de Courci and his wife Affreca were benefactors of the church, and founded several abbeys and priories in Ulster.

A story is told that de Courci when imprisoned in the Tower volunteered to act as champion for King John in single combat against a knight representing Philip Augustus of France; that when he appeared in the lists his French opponent fled in panic; whereupon de Courci, to gratify the French king's desire to witness his prowess, " cleft a massive helmet in twain at a single blow," a feat for which he was rewarded by a grant of the privilege for himself and his heirs to remain covered in the presence of the king and all future sovereigns of England. This tale, which still finds a place in Burke's Peerage in the account of the baron Kingsale, a descendant of the de Courci family, is a legend without historic foundation which did not obtain currency till centuries after John de Courci's death. The statement that he was created earl of Ulster, and that he was thus " the first Englishman dignified with an Irish title of honour," is equally devoid of foundation. John de Courci left no legitimate children.

See J. H. Round's art. " Courci, John de," in Dictionary of National Biography, vol. xii. (London, 1887), to which is added a bibliography of the original and later authorities for the life of de Courci.

COURIER, PAUL LOUIS (1773-1825), French Hellenist and political writer, was born in Paris on the 4th of January 1773. Brought up on his father's estate of Mere in Touraine, he con- ceived a bitter aversion for the nobility, which seemed to strengthen with time. He would never take the name " de Mere," to which he was entitled, lest he should be thought a nobleman. At the age of fifteen he was sent to Paris to complete his educa- tion; his father's teaching had already inspired him with a passionate devotion to Greek literature, and although he showed considerable mathematical ability, he continued to devote all his leisure to the classics. He entered the school of artillery at Chalons, however, and immediately on receiving his appointment as sub-lieutenant in September 1793 he joined the army of the Rhine. He served in various campaigns of the Revolutionary wars, especially in those of Italy in 1798-99 and 1806-7, and in the German campaign of 1809. He became chef d'escadron in

1803.

He made his first appearance as an author in 1802, when he contributed to the Magasin encyclopedique a critique on Johannes Schweighauser's edition of Athenaeus. In the following year appeared his Eloge d'Hilene, a free imitation rather than a translation from Isocrates, which he had sketched in 1798. Courier had given up his commission in the autumn of 1808, but the general enthusiasm in Paris over the preparations for the new campaign affected him, and he attached himself to the staff of a general of artillery. But he was horror-struck by the carnage at Wagram (1809), refusing from that time to believe that there was any art in war. He hastily quitted Vienna, escaping the formal charge of desertion because his new appointment had not been confirmed. The savage independence of his nature rendered subordination intolerable to him; he had been three times disgraced for absenting himself without leave, and his superiors resented his satirical humour. After leaving the army he went to Florence, and was fortunate enough to discover in the Laurentian Library a complete manuscript of Longus's Daphnis and Chloe, an edition of which he published in 1810. In conse- quence of a misadventure — blotting the manuscript — he was

involved in a quarrel with the librarian, and was compelled by the government to leave Tuscany. He retired to his estate at Veretz (Indre-et-Loire) , but frequently visited Paris, and divided his attention between literature and his farm.

After the second restoration of the Bourbons the career of Courier as political pamphleteer began. He had before this time waged war against local wrongs in his own district, and had been the adviser and helpful friend of his neighbours. He now ipade himself by his letters and pamphlets one of the most dreaded opponents of the government of the Restoration. The first of these was his Petition aux deux chambres (1S16), exposing the sufferings of the peasantry under the royalist reaction. In 1817 he was a candidate for a vacant seat in the Institute; and failing, he took his revenge by publishing zbitter Lettre dMessieurs de V Acadtmie des Inscriptions et Belles-Lettres (1819). This was followed (181 9-1820) by a series of political letters of extra-ordinary power published in Le Censeur Europeen. He advocated a liberal monarchy, at the head of which he doubtless wished to see Louis Philippe. The proposal, in 1821, to purchase the estate of

Chambord for the duke of Bordeaux called forth from Courier the Simple Discours de Paul Louis, vigneron de la Chavonniere, one of his best pieces. For this he was tried and condemned to suffer a short imprisonment and to pay a fine. Before he went to prison he published a compte rendu of his trial, which had a still larger circulation than the Discours itself. In 1823 appeared the Livret de Paul Louis, the Gazette de village, followed in 1824 by his famous Pamphlet des pamphlets, called by his biographer,J.rmand Carrel, his swan-song. Courier pub- lished in 1807 his translation from Xenophon, Du commande- ment de la cavalerie et de V equitation, and had a share in editing the Collections des romans grecs. He also projected a translation of Herodotus, and published a specimen, in which he attempted to imitate archaic French; but he did not live to carry out this plan. In the autumn of 1825, on a Sunday afternoon (August 1 8th), Courier was found shot in a wood near his house. The murderers, who were servants of his own, remained undis- covered for five years.

The writings of Courier, dealing with the facts and events of his own time, are valuable sources of information as to the condition of France before, during, and after the Revolution. Sainte-Beuve finds in Courier's own words, " peu de matiere et beaucoup d'art," the secret and device of his talent, which gives his writings a value independent of the somewhat ephemeral subject-matter.

A Collection complete des pamphlets politiques et opuscules litteraires de P. L. Courier appeared in 1826. See editions of his (Euvres (1848), with an admirable biography by Armand Carrel, which is reproduced in a later edition, with a supplementary criticism by F. Sarcey (1876-1877); also three notices by Sainte-Beuve in the Causeries du lundi and the Nouveaux Lundis.

COURIER (from the 0. Fr. courier, modern courrier, from Lat. currere, to run), properly a running messenger, who carried despatches and letters; a system of couriers, mounted or on foot, formed the beginnings of the modern post-office (see Post, and Postal Service). The despatches which pass between the foreign office and its representatives abroad, and which cannot be entrusted to the postal service or the telegraph, are carried by special couriers, styled, in the British service, King's Messengers. " Courier," more particularly, is applied to a travelling attendant, whose duties are to arrange for the carrying of the luggage, obtaining of passports, settling of hotel accommodation, and generally to look. to the comfort and facility of travel. The name " courier " and the similar word "courant " (Ital. coranto) have often been used as the title of a newspaper or periodical

(see Newspapers); the Courier, founded in 1792, was for some time the leading London journal.

COURLAND, or Kurland, one of the Baltic provinces of Russia, lying between 55 45′ and 57° 45′ N. and 21 and 27 E. It is bounded on the N.E. by the river Dvina, separating it from the governments of Vitebsk and Livonia, N. by the Gulf of Riga, W. by the Baltic, and S. by the province of East Prussia and the Russian government of Kovno. The area is 10,535 sq. m., of which 101 so,, m are occupied by lakes. The surface is generally

low and undulating, and the coast-lands flat and marshy. The interior is characterized by wooded dunes, covered with pine, fir, birch and oak, with swamps and lakes, and fertile patches between. The surface nowhere rises more than 700 ft. above sea- level. The Mitau plain divides it into two parts, of which the western is fertile and thickly inhabited, except in the north, while the eastern is less fertile and thinly inhabited. One-third of the area is still forest.

Courland is drained by nearly one hundred rivers, of which only three, the Dvina, the Aa and the Windau, are navigable. They all flow north-westwards and discharge into the Baltic Sea. Owing to the numerous lakes and marshes, the climate is damp and often foggy, as well as changeable, and the winter is severe. Agriculture is the chief occupation, the principal crops being rye, barley, oats, wheat, flax and potatoes. The land is mostly owned by nobles of German descent. In 1863 laws were issued to enable the Letts, who form the bulk of the population, to acquire the farms which they held, and special banks were founded to help them. By this means some 12,000 farms were bought by their occupants; but the great mass of the population are still landless, and live as hired labourers, occupying a low position in the social scale. On the large estates agriculture is conducted with skill and scientific knowledge. Fruit grows well. Excellent breeds of cattle, sheep and pigs are kept. Libau and Mitau are the principal industrial centres, with iron-works, agricultural machinery works, tanneries, glass and soap works. Flax spinning is mostly a domestic industry. Iron and limestone are the chief minerals: a little amber is found on the coast. The only seaports are Libau, Windau and Polangen, there being none on the Courland coast of the Gulf of Riga. The population was 619,154 in 1870; 674,437 in 1897, of whom 345,756 were women; 714,200 (estimate) in 1906. Of the whole, 79 % are Letts, 8 J % Germans, 1-7 % Russians, and 1 % each Poles and Lithuanians. In addition there are about 8 % Jews and some Lives. The chief towns of the ten districts are Mitau (Doblenskiy district), capital of the government (pop. 35,011 in 1897), Bauske (6543), Friedrichstadt

(5223), Goldingen (9733), Grobin (1489), Hasenpoth (3338), Illuxt (2340), Talsen (6215), Tuckum (7542) and Windau (7132). The prevailing religion is the Lutheran, to which 76 % of the population belong; the rest belong to the Orthodox Eastern and the Roman Catholic churches.

Anciently Courland was inhabited by the Cours or Kurs, a Lettish tribe, who were subdued and converted to Christianity by the Brethren of the Sword, a German military order, in the first quarter of the 13th century. In 1237 it passed under the rule of the Teutonic Knights owing to the amalgamation of this order with that of the Brethren of the Sword. At that time it comprised the two duchies of Courland and Semgallen. Under the increasing pressure of Russia (Muscovy) the Teutonic Knights in 1 561 found it expedient to put themselves under the suzerainty of Poland, the grandmaster Gotthard Kettler (d. 1587) becoming the first duke of Courland. The duchy suffered severely in the Russo-Swedish wars of 1700-9. But by the marriage in 1710 of Kettler's descendant, Duke Frederick William (d. 1711), to the princess Anne, niece of Peter the Great and afterwards empress of Russia, Courland came into close relation with the latter state Anne being duchess of Courland from 171 1 to 1730. The celebrated Marshal Saxe was elected duke in 1726, but only managed to maintain himself by force of arms till the next year. The last Kettler, William, titular duke of Courland, died in 1737, and the empress Anne now bestowed the dignity on her favourite Biren, who held it from 1737 to 1740 and again from 1763 till his death in 1772. During nearly the whole of the 18th century Courland, devastated by continual wars, was a shuttlecock between Russia and Poland; until eventually in 1795 the assembly of the nobles placed it under the Russian sceptre. The Baltic provinces — Esthonia, Livonia and Courland — ceased to form collectively one general government in 1876.

See H. Hollmann, Kurlands Agrarverhaltnisse (Riga, 1893), and E. Seraphim, Geschichte Liv-, Esth-, und Kurlands (2 vols., Reval,

1 895-1 896).

COURNOT, ANTOINE AUGUSTIN (1801-1877), French economist and mathematician, was born at Gray (Haute-Saone) on the 28th of August 1 801. Trained for the scholastic pro- fession, he was appointed

assistant professor at the Academy of Paris in 1 83 1 , professor of mathematics at Lyons in 1 834, rector of the Academy of Grenoble in 1835, inspector-general of studies in 1838, rector of the Academy of Dijon and honorary inspector- general in 1854, retiring in 1862. He died in Paris on the 31st of March 1877. Cournot was the first who, with a competent knowledge of both subjects, endeavoured to apply mathematics to the treatment of economic questions. His Recherches sur les principes mathematiques de la Morie des richesses (English trans. by N. T. Bacon, with bibliography of mathematics of economics by Irving Fisher, 1897) was published in 1838. He mentions in it only one previous enterprise of the same kind (though there had in fact been others)— that, namely, of Nicholas Francois Canard (c.1750-1833), whose book, Principes d'&conomie politique (Paris, 1802), was crowned by the French Academy, though " its principles were radically false as well as erroneously applied." Notwithstanding Cournot's just reputation as a writer on mathematics, the Recherches made little impression. The truth seems to be that his results are in some cases of little importance, in others of questionable correctness,- and that, in the abstractions to which he has recourse in order to facilitate h:s calculations, an essential part of the real conditions of ths problem is sometimes omitted. His pages abound in symbols representing unknown functions, the form of the function being left to be ascertained by observation of facts, which he does not regard as a part of his task, or only some known properties of the undetermined function being used as bases for deduction. In his Principes de la tMorie des richesses (1863) he abandoned the mathematical method, though advocating the use of mathe- matical symbols in economic discussions, as being of service in facilitating exposition. Other works of Cournot's .were Traite" iltmentaire de la theorie des fonctions et du calcul infiniUsimal (1841); Exposition de la theorie des chances et des probability (1843); De I'origine et des limites de la correspondance entre I'algebre et la giometrie (1847); Traiti de V ' enchalnement des idees fondamentales dans les sciences et dans Vhisloire (1861) ; and Revue sommaire des doctrines economiques (1877).

COURSING (from Lat. cursus, currere, to run), the hunting of game by dogs solely by sight and not by scent. From time to time the sport has been pursued by various nations against various animals, but the recognized method has generally been the coursing of the hare by greyhounds. Such sport is of great antiquity, and is fully described by Arrian in his Cynegeticus about a.d. 150, when the leading features appear to have been much the same as in the present day. Other Greek and Latin authors refer to the sport; but during the middle ages it was but little heard of. Apart from private coursing for the sake of filling

the pot with game, public coursing has become an exhilarat- ing sport. The private sportsman seldom possesses good strains of blood to breed his greyhounds from or has such opportunities of trying them as the public courser.

The first known set of rules in England for determining the merits of a course were drawn up by Thomas, duke of Norfolk, in Queen Elizabeth's reign; but no open trials were heard of until half a century later, in the time of Charles I. The oldest regular coursing club of which any record exists is that of Swaffham, in Norfolk, which was founded by Lord Orford in 1766 ; and in 1780 the Ashdown Park (Berkshire) meeting was established. During the next seventy years many other large and influential societies sprang up throughout England and Scotland, the Altcar Club (oh the Sefton estates, near Liverpool) being founded in 1825. The season lasts about six months, beginning in the middle of September. It was not until 1858 that a coursing parliament, so to speak, was formed, and a universally accepted code of rules drawn up. In that year the National Coursing Club was founded. It is composed of representatives from all clubs in the United Kingdom of more than a year's standing, and possess- ing more than twenty-four members. Their rules govern meetings, and their committee adjudicate on matters of dispute.

A comparative trial of two dogs, and not the capture of the game pursued, is the great distinctive trait of modern coursing. A greyhound stud-book was started in 1882.

The breeding and training of a successful kennel is a precarious matter; and the most unaccountable ups and downs of fortune often occur in a courser's career. At a meeting an agreed-on even number of entries are made for each stake, and the ties drawn by lot. After the first round the winner of the first tie is opposed to the winner of the second, and so on until the last two dogs left in compete for victory; but the same owner's grey- hounds are " guarded " as far as it is possible to do so. A staff of beaters drive the hares out of their coverts or other hiding- places, whilst the slipper has the pair of dogs in hand, and slips them simultaneously by an arrangement of nooses, when they have both sighted a hare promising a good course. The judge accompanies on horseback, and the six points whereby he decides a course are— (1) speed; (2) the go-by, or when a greyhound starts a clear length behind his opponent, passes him in the straight run, and gets a clear length in front; (3) the turn, where the hare turns at not less than a right angle; (4) the wrench, where the hare turns at less

than a right angle; (5) the kill; (6) the trip, or unsuccessful effort to kill. He may return a ” no course ” as his verdict if the dogs have not been fairly tried together, or an ” undecided course ” if he considers their merits equal. The open Waterloo meeting, held at Altcar every spring, — the name being taken from its being originated by the proprietor of the Waterloo Hotel, Liverpool, — is now the recognized fixture for the decision of the coursing championship, and the Waterloo Cup (1836) is the ” Blue Riband ” of the leash. In the United States, several British colonies, and other countries, the name has been adopted, and Waterloo Coursing Cups are found there as in England. In America an American Coursing Board controls the sport, the chief meetings being in North and South Dakota, Kansas, Nebraska, Iowa and Minnesota.

The chief works on coursing are: — Arrian’s Cynegeticus, translated by the Rev. W. Dansey (1831); T. Thacker, Courser’s Companion and Breeder’s Guide(i83$) ; Thacker’s Courser’ s Annual Remembrancer (1849-1851); D. P. Blaine, Encyclopaedia of Rural Sports (3rd ed., 1870); and J. H. Walsh, The Greyhound (3rd ed., 1875). See; also the Coursing Calendar (since 1857); Coursing and Falconry (Bad- minton Library, 1892) ; The Hare (” Fur and Feather ” series, 1896) ; and The Greyhound Stud Book (since 1882).

COURT, ANTOINE (1606-1760), French Protestant divine, was born in the village of Villeneuve-de-Berg, in the province of the Vivarais. He has been designated the ” Restorer of Protestantism in France,” and was the organizer of the ” Church of the Desert.” He was eight years old when the Camisard revolt was finally suppressed, and nineteen when on the 8th of March 1715 the edict of Louis XIV. was published, declaring that ” he had abolished entirely the exercise of the so-called reformed religion ” (” qu’il avait aboli tout exercice de la religion pretendue reform ee’ ‘) . Antoine, taken to the secret meetings of the persecuted Calvinists, began, when only seventeen, to speak and exhort in these congrega- tions of “the desert.” He came to suspect after a time that many of the so-called ” inspired ” persons were ” dupes of their own zeal and credulity,” and decided that it was necessary to organize at once the small communities of believers into properly constituted churches. To the execution of this vast undertaking he devoted his life. On the 21st of August 1715 he summoned all the preachers in the Cevennes and Lower Languedoc to a conference or synod near the village of Monoblet. Here elders were appointed, and the preaching of women, as well as pretended revelations, was condemned. The village of Monoblet ” thus seems entitled to the honour of having had the first organized Protestant church after the revocation of the edict of Nantes ” (H. M. Baird). But

there were as yet no ordained pastors. Pierre Corteiz was therefore sent to seek ordination. He was ordained at Zurich, and from him Court himself received ordina- tion. The scene of his labours for fifteen years was Languedoc, the Vivarais, and Dauphine. His beginnings were very small prayer-meetings in ” the desert.” Brit the work progressed under his wise direction, and he was able ” to be present, in 1744, at meetings of ten thousand souls.” In 1724 Louis XV., again

assuming that there were no Protestants in France, prohibited the most secret exercise of the Reformed religion, and imposed severe penalties. It was impossible fully to carry out this menace. But persecution raged, especially against the pastors. A price was set on the life of Court; and in 1730 he escaped to Lausanne. He had already, with the aid of some of the Protestant princes, established a theological college (” Seminaire de Lausanne “) there, and during the remaining thirty years of his life he filled the post of director. He had the title of deputy-general of the churches, and was really the pillar of their hope. The Seminary of Lausanne sent forth all the pastors of the Reformed Church of France till the days of the first French Empire. Court formed the design of writing a history of Protestantism, and made large collections for the purpose, which have been preserved in the Public Library of Geneva; but this he did not live to carry out. He died at Lausanne in 1 760. He wrote, amongst other works, a Histoire des troubles des Ctvennes ou de la guerre des Camisards (1 760) . He was the father of the more generally known Antoine Court de Gebelin (q.v.).

For details of his life see Napoleon Peyrat’s Histoire des pasteurs du desert (1842; English translation, 1852); Edmond Hugues, Antoine Court, histoire de la restauration du protestantisme en France au XVIII’ siecle (2nd ed., 1872), Les Synodes du desert (3 vols., 1885-1886), MSmoires d’ Antoine Court (1885): E. and E. Haag, La France protestante, vol. iv. (1884, new edition); H. M. Baird, The Huguenots and the Revocation of the Edict of Nantes (1895), vol. ii. ; cf. Bulletin de la sociSte de Vhistoire du protestantisme francais (1893- 1906).

COURT (from the O. Fr. court, Late Lat. cortis, curtis, a popular form of class. Lat. cohors, gen. cohortis; the mod. Fr. form cour is due to the influence of the Lat. curia, the word used in medieval documents to

translate ” court ” in the feudal sense), a word originally denoting an enclosed place, and so surviving in its architectural sense (courtyard, &c), but chiefly used as a general term for judicial tribunals and in the special sense of the household of the king, called “the court.” 1 All law courts were not, however, purely judicial in character; the old county Court, for instance, was the assembly of the freeholders of the county in which representatives and certain officers were elected. Such assemblies in early times exercised political and legislative as well as judicial functions. But these have now been almost entirely separated everywhere, and only judicial bodies are now usually called courts. In every court, says Blackstone, there must be three parts, — an actor or plaintiff, reus or defendant, and judex, or judge.

The language of legal fictions, which English lawyers invariably use in all constitutional subjects, makes the king the ultimate source of all judicial authority, and assumes his personal presence in all the courts.

” As by our excellent constitution,” says Blackstone, ” the sole executive power of the laws is vested in the person of the king, it will follow that all courts of justice, which are the medium by which he administers the laws, are derived from the power of the crown. For whether created by act of parliament or letters patent, or subsisting by prescription (the only methods by which any court of judicature can exist), the king’s consent in the two former is ex- pressly, in the latter impliedly given. In all these courts the king is supposed in contemplation of law to be always present ; but as that is in fact impossible, he is then represented by his judges, whose nower is only an emanation of the royal prerogative.”

These words might give a false impression of the historical and legal relations of the courts and the crown, if it is not remembered that they are nothing more than the expression of a venerable fiction. The administration of justice was, indeed, one of the functions of the king in early times; the king himself sat on circuit so late as the reign of Edward IV.; and even after regular tribunals were established, a reserve of judicial power still remained in the king and his council, in the exercise of which it was possible for the king to participate personally. The last judicial act of an English king, if such it can be called, was that by which James I. settled the dispute between the court of chancery and courts of common law. Since the establishment of parliamentary government the courts take their law directly from the legislature, and the king is only connected with them

1 Cf . the German Hof for court-yard, court of law, and royal court.

indirectly as a member of the legislative body. The king's nanie, however, is still used in this as in other departments of state action. The courts exercising jurisdiction in England are divided by certain features which may here be briefly indicated.

We may distinguish between (1) superior and inferior courts. The former are the courts of common law and the court of chancery, now High Court of Justice. The latter are the local or district courts, county courts, &c. (2) Courts of record and courts not of record. " A court of record is one whereof the acts and judicial proceedings are enrolled for a perpetual memory and testimony, which rolls are called the records of the court, and are of such high and supereminent authority that their truth is not to be called in question. For it is a settled rule and maxim that nothing shall be averred against a record, nor shall any plea or even proof be admitted to the contrary. And if the existence of the record shall be denied it shall be tried by nothing but itself; that is, upon bare inspection whether there be any such record or no; else there would be no end of disputes. All courts of record are the courts of the sovereign in right of the crown and royal dignity, and therefore any court of record has authority to fine and imprison for contempt of its authority" (Stephen's Black- stone) . (3) Courts may also be distinguished as civil or criminal. (4) A further distinction is to be made between courts of first instance and courts of appeal. In the former the first hearing in any judicial proceeding takes place; in the latter the judgment of the first court is brought under review. Of the superior courts, the High Court of Justice in its various divisions is a court of first instance. Over it is the court of appeal, and over that again the House of Lords. The High Court of Justice is (through divisional courts) a court of appeal for inferior courts. (5) There is a special class of local courts, which do not appear to fall within the description of either superior or inferior courts.' Some, while administering the ordinary municipal law, have or had jurisdiction exclusive of their superior courts; such were the common pleas of Durham and Lancaster. Others have concurrent jurisdiction with the superior courts; such are the lord mayor's court of London, the passage court of Liverpool, &c.

The distribution of judicial business among the various courts of law in England may be exhibited as follows.

Criminal Courts. — (1) The lowest is that of the justice of the peace, sitting in petty sessions of two or more, to determine in a summary way certain specified minor offences. In populous districts, such as London, Manchester, &c, stipendiary magis- trates are appointed, generally with enlarged powers. Besides punishing by summary

conviction, justices may commit prisoners for trial at the assizes. (2) The justices in quarter sessions are commissioned to determine felonies and other offences. An act of 1842 (5 & 6 Vict. c. 38) contains a list of offences not triable at quarter sessions — treason, murder, forgery, bigamy, &c. (see Quarter Sessions, Court of). The corresponding court in a borough is presided over by a recorder. (3) The more serious offences are reserved for the judges of the superior courts sitting under a commission of oyer and terminer or gaol delivery for each county. The assize courts, as they are called, sit in general in each county twice a year, following the division of circuits; but additional assizes are also held under acts of 1876 and 1877, which permit several counties to be united together for that purpose (see Circuit). London, which occupies an exceptional position in all matters of judicature, has a high criminal court of its own, established by the Central Criminal Court Act 1834, under the name of the central criminal court. Its judges usually present are a rota selected from the superior judges of common law, the recorder, common serjeant, and the judge of the City of London court. 2 The criminal appeal court, to which all persons convicted on indictment may appeal, superseded in 1908 (by the Criminal Appeal Act 1907) the court for crown cases reserved, to which any question of law arising on the trial of a prisoner

2 The sittings are held in the court-house in the Old Bailey. The old sessions house was destroyed in the Gordon riots of 1780. The building erected in its place, although enlarged from time to time, was very incommodious, and a new structure, occupying the site of Newgate Prison, which was pulled down for the purpose, was completed in 1907.

could after conviction be remitted by the judge in his discretion. To the criminal appeal court there is an appeal both on questions ol fact and of law (see Appeal) .

Civil Courts. — In certain special cases, civil claims of small Importance may be brought before justices or stipendiaries. Otherwise, and excepting the special and peculiar jurisdictions above mentioned, the civil business of England and Wales may be said to be divided between the county courts (taking small cases) and the High Court of Justice (taking all others).

The effect of the Judicature Acts on the constitution of the nuperior courts may be briefly stated. There is now one Supreme Court of Judicature, consisting of two permanent divisions called the High Court of Justice and the court of appeal. The former takes the jurisdiction of the court of chancery, the three common law courts, the courts of admiralty, probate, and divorce, the courts of pleas at Lancaster and Durham, and the courts created by commissions of assize, oyer and terminer, and gaol delivery. The latter takes the jurisdiction of the court of appeal in chancery (including chancery of Lancaster), the court of the lord warden of the stannaries, and of the exchequer chamber, and the appellate jurisdiction in admiralty and heresy matters of the judicial committee; and power is given to the sovereign to transfer the remaining jurisdiction of that court to the court of appeal. By the Appellate Jurisdiction Act of 1876 the House of Lords is enabled to sit for the hearing of appeals from the English court of appeal and the Scottish and Irish courts during the prorogation and dissolution of parliament. The lords of appeal, of whom three must be present, are the lord chancellor, the lords of appeal in ordinary, and peers who have held ” high judicial office ” in Great Britain or Ireland. The lords in ordinary are an innovation in the constitution of the House. They hold the rank of baron for life only, have a right to sit and vote in the House during tenure of office only, and a salary of £6000 per annum.

There are also many obsolete or decayed courts, of which the most noticeable are dealt with under their individual headings, as Court Baron, Court Leet, &c.

The history of English courts affords a remarkable illustration of the continuity that characterizes English institutions. It might perhaps be too much to say that all the courts now sitting in England may be traced back to a common origin, but at any rate the higher courts are all offshoots from the same original judicature. Leaving out of account the local courts, we find the higher jurisdiction after the Norman Conquest concentrated along with all other public functions in the king and council. The first sign of a separation of the judicial from the other powers of this body is found in the recognition of a Curia Regis, which may be described as the king’s council, or a portion of it, charged specially with the management of judicial and revenue business. In relation to the revenue it became the exchequer, under which name a separate court grew up whose special field was the judicial business arising out of revenue cases. By Magna Carta the inconvenience caused by the curia following the king’s person was remedied, in so far as private litigation was concerned, by the order that common pleas (Communia Placita) should be held at some fixed

place; and hence arose the court of common pleas. The Curia Regis, after having thrown off these branches, is represented by the king's bench, so that from the same stock we have now three courts, differing at first in functions, but through competition for business, and the ingenious use of fictions, becoming finally the co-ordinate courts of common law of later history. But an inner circle of counsellors still surrounded the king, and in his name claimed to exercise judicial as well as other power; hence the chancellor's jurisdiction, which became, partly in harmony with the supra-legal power claimed from which it sprang, and partly through the influence of the ecclesiastical chancellors by whom it was first administered, the equity of English law. Similar developments of the same authority were the court of requests (which was destroyed by a decision of the common pleas) and the court of star chamber — a court of criminal equity, as it has been called, — which, having been made the instrument of tyranny, was abolished in 1641. Even then

the productive power of the council was not exhausted; the judicial committee of the privy council, established in 1832, superseding the previous court of delegates, exercises the juris- diction in appeal belonging to the king in council. The appellate jurisdiction of the Lords rests on their claim to be the representa- tives of the ancient great council of the realm.

See further Admiralty, High Court of; Appeal; Chancery; Common Law; Common Pleas, Court of; Divorce; Equity; &c.

United States. — The Federal judicial system of the United States is made by the Constitution independent both of the Legislature and of the Executive. It consists of the Supreme Court, the circuit courts, and the district courts.

The Supreme Court is created by the Constitution, and consisted in 1909 of nine judges, who are nominated by the President and confirmed by the Senate. They hold office during good behaviour, i.e. are removable only by impeachment, thus having a tenure even more secure than that of English judges. The court sits at Washington from October to July in every year. The sessions of the court are held in the Capitol. A rule requiring the presence of six judges to pronounce a decision prevents the division of the court into two or more benches; and while this secures a thorough consideration of every case, it also retards the despatch of business. Every case is discussed twice by the whole body, once to ascertain the view of the majority, which is then directed to be set forth in a written opinion; then again, when the written opinion, prepared by one of the judges, is submitted for

criticism and adoption by the court as its judgment.

The other Federal courts have been created by Congress under a power in the Constitution to establish ” inferior courts.” The circuit courts consist of twenty-nine circuit judges, acting in nine judicial circuits, while to each circuit there is also allotted one of the justices of the Supreme Court. Circuit courts of appeals, established to relieve the Supreme Court, consist of three judges (two forming a quorum), and are made up of the circuit and district judges of each circuit and the Supreme Court justice assigned to the circuit. Some cases may, however, be appealed to the Supreme Court from the circuit court of appeals, and others directly from the lower courts. The district courts number (1909) ninety, in most cases having a single justice. There is also a special tribunal called the court of claims, which deals with the claims of private persons against the Federal government. It is not strictly a part of the general judicial system, but is a creation of Congress designed to relieve that body of a part of its own labours.

The jurisdiction of the Federal courts extends only to those cases in which the Constitution makes Federal law applicable. All other cases are left to the state courts, from which there is no appeal to the Federal courts, unless where some specific point arises which is affected by the Federal Constitution or a Federal law. The classes of cases dealt with by the Federal courts are as follows: —

1. Cases in law and equity arising under the Constitution, the laws of the United States, and treaties made under their authority;

2. Cases affecting ambassadors, other public ministers and consuls;

3. Cases of admiralty and maritime jurisdiction;

4. Controversies to which the United States shall be a party;

5. Controversies between two or more states, between a state and citizens of another state, between citizens of different states, between citizens of the same state claiming lands under grants of different states, and between a state or the citizens thereof and foreign states, citizens or subjects {Const., Art. III., § 2). Part of this jurisdiction has, however, been withdrawn by the eleventh Amendment to the Constitution, which declares that ” the judicial power of the United States shall not be construed to extend to any suit commenced or prosecuted against one of the United States by citizens of another state, or by citizens or subjects of any foreign state.”

The jurisdiction of the Supreme Court is original in cases affecting

ambassadors, and wherever a state is a party; in othei cases it is appellate. In some matters the jurisdiction of the

Federal courts is exclusive; in others it is concurrent with that of the state courts.

As it frequently happens that cases come before state courts in which questions of Federal law arise, a provision has been made whereby due respect for the latter is secured by giving the party to a suit who relies upon Federal law, and whose contention is overruled by a state court, the right of having the suit removed to a Federal court. The Judiciary Act of 1789 (as amended by subsequent legislation) provides for the removal to the Supreme Court of the United States of " a final judgment or decree in any suit rendered in the highest court of a state in .which a decision could be had, where is drawn in question the validity of a treaty or statute of, or an authority exercised under the United States, and the decision is against their validity; or where is drawn in question the validity of a statute of, or an authority exercised under, any state, on the ground of their being repugnant to the Constitution, treaties or laws of the United States, and the decision is in favour of their validity; or where any title, right, privilege or immunity is claimed under the Constitution, or any treaty or statute of, or commission, held, or authority exercised under the United States, and the decision is against the title, right, privilege or immunity specially set up or claimed by either party under such Constitution, treaty, statute, commission or authority." If the decision of the state court is in favour of the right claimed under Federal law or against the validity or appli- cability of the state law set up, there is no ground for removal, because the applicability or authority of Federal law in the particular case could receive no further protection from a Federal court than has in fact been given by the state court.

The power exercised by the Supreme Court in declaring statutes of Congress or of state legislatures (or acts of the Executive) to be invalid because inconsistent with the Federal Constitution, has been deemed by many Europeans a peculiar and striking feature of the American system. There is, however, nothing novel or mysterious about it. As the Federal Constitu- tion, which emanates directly from the people, is the supreme law of the land everywhere, any statute passed by any lower authority (whether the Federal Congress or a state legislature), which contravenes the Constitution, must necessarily be invalid in

point of law, just as in the United Kingdom a railway by-law which contravened an act of parliament would be invalid. Now, the functions of judicial tribunals — of all courts alike, whether Federal or state, whether superior or inferior — is to interpret the law, and if any tribunal finds a Congressional statute or state statute inconsistent with the Constitution, the tribunal is obliged to hold such statute invalid. A tribunal does this not because it has any right or power of its own in the matter, but because the people have, in enacting the Constitution as a supreme law, declared that all other laws inconsistent with it are ipso jure void. When a tribunal has ascertained that an inferior law is thus inconsistent, that inferior law is therewith, so far as inconsistent, to be deemed void. The tribunal does not enter any conflict with the Legislature or Executive. All it does is to declare that a conflict exists between two laws of different degrees of authority, whence it necessarily follows that the weaker law is extinct. This duty of interpretation belongs to all tribunals, but as constitutional cases are, if originating in a lower court, usually carried by appeal to the Supreme Court, men have grown accustomed to talk of the Supreme Court as in a special sense the guardian of the Constitution.

The Federal courts never deliver an opinion on any consti- tutional question unless or until that question is brought before them in the form of a lawsuit. A judgment of the Supreme Court is only a judgment on the particular case before it, and does not prevent a similar question being raised again in another lawsuit, though of course this seldom happens, because it may be assumed that the court will adhere to its former opinion. There have, however, been instances in which the court has virtually changed its view on a constitutional question, and it is understood to be entitled so to do.

COURT BARON, an English manorial court dating from the middle ages and still in existence. It was laid down by Coke

that a manor had two courts, ” the first by the common law, and is called a court baron,” the freeholders (” barons “) being its suitors; the other a customary court for the copyholders. Stubbs adopted this explanation, but the latest learning, ex- pounded by Professor Maitland, holds that court baron means curia baronis, ” la court de seigneur,” and that there is no evidence for there being more than one court. The old view that at least two freeholders were required for its composition is also now discarded. Prof. Maitland’s conclusionls that the ” court baron ” was not even differentiated from the ” court-leet ” at the close of the 13th century, but that there was a distinction of juris- dictional rights, some courts having only feudal rights, while others had regalities as well. When the court-leet was differ- entiated,

the court baron remained with feudal rights alone. These rights he was disposed to trace to a lord's jurisdiction over his men rather than to his possession of the manor, although in practice, from an early date, the court was associated with the manor. Its chief business was to administer the " custom of the manor " and to admit fresh tenants who had acquired copyholds by inheritance or purchase, and had to pay, on so doing, a " fine " to the lord of the manor. It is mainly for the latter purpose that the court is now kept. It is normally presided over by the steward of the lord of the manor, who is a lawyer, and its pro- ceedings are recprded on " the court rolls," of which the older ones are now valuable for genealogical as well as for legal purposes. See Select Pleas in Manorial and other Seignorial Courts, vol. i., and The Court Baron (Selden Society). (J. H. R.)

COURT DE GEBELIN, ANTOINE (1728-1784), French scholar, son of Antoine Court (q.v.), was born at Nimes in 1728. He received a good education, and became, like his father, a pastor of the Reformed Church. This office, however, he soon re- linquished, to devote himself entirely to literary work. He had conceived the project of a work which should set in a new light the phenomena, especially the languages and mythologies, of the ancient world; and, after his father's death, he went to Paris in order to be near the necessary books. After long years of research, he published in 1775 the first volume of his vast undertaking under the title of Le Monde primitif, analyst et compart avec le monde moderne. The ninth volume appeared in 1784, leaving the work still unfinished. The literary world marvelled at the encyclo- paedic learning displayed by the author, and supposed that the French Academy, or some other society of scholars, must have combined their powers in its production. Now, however, the world has well-nigh forgotten the huge quartos. These learned labours did not prevent Gebelin from pleading earnestly the cause of religious tolerance. In 1760 he published a work entitled Les Toulousaines, advocating the rights of the Protestants; and he afterwards established at Paris an agency for collecting information as to their sufferings, and for exciting general interest in their ' cause. He co-operated with Franklin and others in the periodical work entitled Affaires de I'Angleterre et de I'Amerique (1776, sqq.), which was devoted to the. support of American independence. He was also a supporter of the principles of the economists, and Quesnay called him his well- beloved disciple. In the last year of his life he became acquainted with Mesmer, and published a Lettre sur le magnetisme animal. He was imposed upon by speculators in whom he placed confidence, and was reduced to destitution by the failure of a scheme in which they engaged him. He died at Paris on the 10th of May 1784.

See La France protestante, by the brothers Haag, tome iv. ; Charles Dardier, Court de Gebelin (Nimes, 1890).

COURTENAY, the name of a famous English family. French genealogists head the pedigree of this family with one Athon or Athos, who is said to have fortified Courtenay in Gatinois about the year 1010. His son Josselin had, with other issue, Miles, lord of Courtenay, founder of the Cistercian abbey of Fontaine- Jean. By his wife Ermengarde, daughter of Renaud, count oi Nevers, Miles left a son Renaud, one of the magnates who followed Louis le Jeune to the Holy Land. This was the last lord of Courtenay of the line of Athon. Elizabeth, his elder daughter — a younger daughter died without issue, — carried Courtenay and

other lordships to her husband Pierre, seventh and youngest son of the French king Louis VI. the Fat, the marriage taking place about 1150, and the many descendants of this royal match bore the surname of Courtenay.

Pierre, the eldest son, was founder of a short-lived dynasty of emperors of Constantinople, which ended in 1261 when Baldwin (Baudouin), last of the Frankish emperors, fled before Michael Palaeologus from a capital in flames. Baldwin's son Philip, however, bore the empty title, and his granddaughter Catherine, wife of Charles, count of Valois, was titular empress. Other lines of the royal Courtenays, sprung from Pierre of France, were lords of Champignolles, Tanlai, Yerre, Bleneau, La Ferte Loupiere and Chevillon. On the death of Gaspard, sieur de Bleneau, in 1655, his cousin Louis de Courtenay, comte de Cesi (jure uxoris) and sieur de Chevillon, had Bleneau, and reckoned himself the surviving chief of his house. He styled himself Prince de Courtenay and his family made attempts to obtain recognition for their royal blood. But their laboriously constructed genea- logies availed nothing to this impoverished race. The last " Prince de Courtenay," an ex-captain of dragoons, died in 1730; his uncle Roger de Courtenay, abbe des Eschalis, who died in 1733, was the last recognized member of the line of Pierre of France.

A younger branch of the first house of Courtenay came from Josselin, second son of Josselin, son of Athon. This Josselin, a notable crusader, went to the Holy Land with the count of Blois, and held by the sword

for eleven years the county of Edessa, given him by his cousin King Baldwin II. Edessa was won back by the infidel from his son Josselin, who died a prisoner in Aleppo in 1 147. A grandson, also a Josselin, was seneschal of the kingdom of Jerusalem.

In England a house of Courtenay has flourished with varying fortunes since the reign of the first Angevin king. The monks of Ford, to whom they were benefactors, complacently set down their patrons as the offspring of the royal Courtenays, of whose origin they had some dim knowledge, deriving them from " Floras," son of Louis the Fat. A comparison of dates destroys the story. But they were, doubtless, Courtenays of the stock of Athon. Josselin, the first count of Edessa, has been suggested by modern writers as their founder, but the name Reinaud, borne by the first known ancestor of the English house, suggests that they may have sprung from a younger son of Josselin I. of Courtenay by his marriage about 1095 with Ermengarde, daughter of Reinaud, count of Nevers. It is also notable that the English Courtenays have, from the first introduction of armorial bearings, borne with various differences the three red roundels in a golden field, the arms of the Courtenays in France, the shield of the earls of Devonshire being identical with that of the lords of La Ferte Loupiere.

Several Courtenays whose kinship cannot be exactly ascer- tained, appear in English records of the 12th century. One of them, Robert de Courtenay, married the daughter and heir of Reynold fitz Urse, the leader of the murderers of Arch- bishop Thomas Becket. His son, William, a Shropshire baron, held the castle of Montgomery, as heir by his mother of Baldwin de Buslers, or Boilers, to whom Henry I. had given it with his " niece " Sibil de Falaise. This William married Ada of Dunbar, daughter of Patrick, earl of Dunbar, but died in the reign of King John, without issue.

Reinaud de Courtenay, ancestor of the main English line, may well have been, a brother of the Robert above named. The English pedigrees confuse him with his son of the same name. He was a favourite with Henry II., his attestations of charters showing him as a constant companion at home and abroad of the king, whom he followed to Wexford in the Irish expedition of 1172. Henry gave him Berkshire lands at Sutton, still known as Sutton Courtenay, by a charter to which the date of 1161 can be assigned. In England he had to wife Maude, daughter of Robert fitz Roy by Maude of Avranches, the elder Maude being the heir of the house of Brionne. By her, who survived him, dying before January 1224, he had no issue, but by a wife who may have died before his coming to England he had, with other issue,

Robert and Reinaud. Robert, who succeeded to Sutton about 1 192, was husband of Alice de Rumeli, widow of Gilbert Pipard, and one of the three sisters and co-heirs of William, the boy of Egremond, of whose drowning in the Strid Wordsworth has made a ballad. Robert died childless in 1209. Of his brother Reinaud or Reynold de Courtenay little is known, save that he was a married man in n 78 when he and his wife Eawise were given by the pope a licence to have a free chapel at Okehampton. This wife, Hawise de Ayencourt, was, with Maude his father's second wife, a daughter and co-heir of Maude of Avranches, her father being the lord of Ayencourt, first husband of the last named Maude. Her great inheritance included the honour of Okehampton in Devonshire of which, as a widow, she had livery about 1205. Her son, Robert de Courtenay, succeeded to her land in 12 19, having been his uncle Robert's heir in Sutton ten years before. Like his father he advanced his house by a great marriage, his wife being Mary, the younger daughter of William de Vernon, earl of Devon and of the Isle of Wight. He was succeeded in 1242 by his son John, who by Isabel, a daughter of Hugh de Vere, earl of Oxford, has issue Hugh, whose wife was Eleanor, daughter of the earl of Winchester, elder of the two favourites of Edward II. The son of this marriage, another Hugh, followed his father at Okehampton in 1291. Two years later died Isabel, surviving sister and heir of Baldwin de Reviers, earl of Devon, and widow of William de Forz, last earl of Aumerle (Albemarle). On her death-bed she had granted her lordship of the -Wight to the king, but her cousin Hugh de Courtenay succeeded her in the unalienated estates of the house of Reviers. He was summoned as a baron on the 6th of February 1298/9, and in 1300 he displayed his banner before the castle of Caerlaverock. Claiming the " third penny " of the county of Devon, he was refused by the exchequer as he did not claim in the name of an earl. Following, however, a writ of inquiry, a patent of the 22nd of February 1334/5 declared him earl of Devon and qualified to take such style as his ancestors, earls of Devon, were wont to take. Hugh, his son, the second earl, a warrior who drove the French back from their descent on Cornwall in 1339, made another of the brilliant marriages of this family, his wife being Eleanor, daughter of Humfrey de Bohun, earl of Hereford and Essex, by Elizabeth daughter of Edward I. Their eldest son, Sir Hugh de Courtenay, shared in the honours of Crecy and Calais, and was one of the knights founders of the order of the Garter, the stall-plate of his arms being yet in St George's chapel at Windsor. This knight died in the lifetime of the earl, as did his only son Hugh, summoned as a baron on the 3rd of January 1370/1, a companion at Najara of the Black Prince, whose step-daughter Maude of Holland he had married. The earl was

therefore succeeded by his grandson Edward (son of Edward his third son), earl marshal of England in 1385, who died blind in 1419, the year after the death of Sir Edward his heir apparent, one of the conquerors at Agincourt. Hugh, a second son of Earl Edward, succeeded as fourth earl of the Courtenay line. By his wife, a sister of the renowned Talbot, earl of Shrews- bury, he had issue Thomas the fifth earl, a partisan of Henry VI., whose wife was Margaret Beaufort, daughter of John, earl of Somerset. The effigy of this grandaughter of John of Gaunt, with the shields of Courtenay and Beaufort above it, is in Colyton church. It is less than life size, a fact which has given rise to a village legend that it represents " Little choke-a-bone," an infant daughter of the tenth earl, who died " choked by a fish bone." In spite of the evidence of the shields and the 1 5th century dress of the effigy, the legend has now been strengthened by an inscription upon a brass plate, and in the year 1907 ignorance engaged a monumental sculptor to deface the effigy by giving its broken features the newly carved face of a young child. Both sons of this marriage fell in the Wars of the Roses, Thomas the sixth earl being taken at Towton by the Yorkists and beheaded at York in 1462, his younger brother Henry having the same fate at Salisbury in 1466.

The earldom being extinguished by attainder, Sir Humphrey Stafford was created earl of Devon in 1469, but in the same year, having retired with his men from the expedition against

Robin of Redesdale, another earl of Devon suffered at the headsman's hands, his patent being afterwards annulled by a statute of Henry VII. On the restoration of Henry VI. John Courtenay, only surviving brother of Thomas and Henry, was restored to the earldom by the reversal of attainder. He, too, died in the Lancastrian cause, being killed on the 4th of May 147 1 at Tewkesbury, where he led the rear of the host. The representa- tion of the Reviers earls and of the Courtenay barony fell then to his sisters and their descendants. Beside him at Tewkesbury died his cousin Sir Hugh Courtenay of Boconnoc, son of Hugh, a younger brother of the blind earl, leaving a son Edward, who thus became the heir male of the house though not its heir general. Joining in the cause which had cost so many of his kinsmen their lives, he and his brother Walter shared the duke of Buckingham's rising. On its failure they fled into France to the earl of Richmond, beside whom Sir Edward fought at Bosworth. By a patent of the 26th of October 1485 he was created earl of Devon with

remainder to the heirs male of his body, and by an act of 1485 he was restored to all honours lost in his attainder by the Yorkist parliament. He defended Exeter against Warbeck's rebels and was a knight of the Garter in 1489, dying twenty years later, when the earldom became again forfeit by his son's attainder. That son, William Courtenay, had drawn the jealousy of Henry VII. by a marriage with Catherine, sister of the queen and daughter of King Edward IV., the Yorkist sovereign whose hand had been so heavy on the Courtenays. After the queen's death, Henry sent his wife's brother-in-law to the Tower on a charge of corresponding with Edmund Pole, an attainder following. But on the accession of Henry VIII., the young king released his uncle, who although styled an earl was not fully restored in blood at his death in 1511. His son Henry Courtenay obtained from parliament in December 1512 a reversal of his father's attainder, thus succeeding to the earldom of his grandfather. At the Field of Cloth of Gold he ran a course with the king of France. He was knight of the Garter and on the 15th of June 1525 had a patent as marquess of Exeter. Profiting by the suppression of the monasteries he increased his estate, his power being all but supreme in the west country. But Cromwell was his enemy and the royal strain in his blood was a dangerous thing. Involved in correspondence with Cardinal Pole, he was sent to the Tower with his wife and his young son, and on the 9th of December 1538 he was beheaded as a traitor. The misfortunes of the house were heavy upon the son, who at twelve years old was a prisoner for the sake of his high descent. His honours had been forfeited, and release did not come until the accession of Queen Mary, who took him into favour. Noailles the ambassador found him le plus beau el le plus agr table gentilhomme a" Angleterre, and he had some hopes of becoming king consort. The queen created him earl of Devonshire by a patent of the 3rd of September 1553 and in the next month he was restored in blood. But, disappointed in his hopes, he formed some wild plans for marrying the Lady Elizabeth and making her queen. He could raise Devon and Cornwall. Wyat did raise Kent, but the plot was soon crushed. The earl was sent back to the Tower and thence to Fotheringhay. At Easter of 1555 he was released on parole and exiled, dying suddenly at Padua in 1556. His co-heirs were the descendants of the four sisters of Earl Edward (d. 1519), the wives of four Cornish squires, and with him was extinguished, to the belief of all men, the Courtenays' earldom of Devon. His heir male was Sir William Courtenay, his sixth cousin once removed, head of a knightly line of Courtenays whose seat was Powderham Castle, a line which, during the civil wars, stood for the White Rose. Sir William, who is said to have been killed at St Quintin in 1557, was succeeded by his son, another Sir William, one of the under- takers for the settling of

Ireland, where the family obtained great estates. William Courtenay of Powderham, of whose marriage with the daughter of Sir William Waller (the parliament's general) it is remarked that the years of bride and bridegroom added together were less than thirty when their first child was born, was created a baronet by writ of privy seal in February 1644, the patent being never enrolled. His great grandson, Sir William Courtenay, many years a member of parliament, was on

the 6th of May 1762, ten days before his death, created Viscount Courtenay of Powderham Castle.

Since the death at Padua in 1556 of Edward, earl of Devon, that ancient title had been twice revived. Charles Blount, Lord Mountjoy, who was created earl of Devon in 1603, died without lawful issue in 1606. In 1618 Sir William Cavendish, son of the famous Bess of Hardwick, was given the same title, which is still among the peerage honours of the ducal house descending from him. For the Courtenays, who had without protest accepted a baronetcy and a viscounty, their earldom was dead. In the reign of William IV., the third and last Viscount Courtenay was living unmarried in Paris, an exile who for sufficient reasons was keeping out of the reach of the English criminal law. In the name of this man, his presumptive heir male, William Courtenay, clerk assistant of the parliament, succeeded in persuading the House of Lords that the Courtenay earldom under the patent of 1553 was still in existence, the plea being that the terms of the remainder — to him and his heirs male for ever — did not limit the succession to heirs male of the body of the grantee. Five other cases wherein the words de corpore suo had been omitted from the patent are known to peerage lawyers. In no case had a peerage before been claimed by collateral heirs male. " I have often rallied Brougham," writes Lord Campbell, " upon his creating William Courtenay earl of Devon. He says he consulted Chief Justice Tenterden. But Tenterden knew nothing of peerage law." After the death of the exile in 1835 the clerk of the parliament succeeded him as an earl by force of the House of Lords decision of the 15th of March 1831. His second son, the Rev. Henry Hugh Courtenay (1811-1904), succeeded, as 13th earl, a nephew whose extravagance had im- poverished the estates. He in turn was followed, as 14th earl, by his grandson Charles Pepys Courtenay (b. 1870).

No other recognized branch of this house, once so widely spread in the western counties, is now among the landed houses of England. Among its cadets were many famous warriors, but three prelates must be reckoned as the most eminent of the Courtenays. William, a younger son of the match of Courtenay and Bohun, was bishop of

Hereford in 1370, bishop of London in 1375 and archbishop of Canterbury in 1381. Proceeding against Wycliffe he opposed John of Gaunt, who, taunting him with his trust in his great kinsfolk, threatened to drag him out of St Paul's by his hair, a threat which roused the angry Londoners in his defence. He died in 1396 and lies buried at the feet of the Black Prince in his cathedral of Canterbury. By his will he left his best mitre to his nephew Richard Courtenay — son and pupil, as he styles him — against the time he should be a bishop. This Richard, a friend of Henry V. when prince, and treasurer of his household, was bishop of Norwich in 1413. Twice chancellor of Oxford, he repelled Archbishop Arundel and all his train when that primate would have had a visitation of the university, although the claim of the university to independence was at last broken down. Tall of stature, eloquent and learned, he kept the favour of the king, who was with him when he died of dysentery in the host before Harfleur. Heir of this bishop was his nephew Sir Philip of Powderham, whose younger son Peter Courtenay was the third of the Courtenay prelates, being bishop of Exeter from 1478 to 1487, when he was translated to Winchester. Although of the Yorkist Courtenays, he was of Buckingham's party and, being attainted by Richard III. for joining with certain of his kinsfolk in an attempt to raise the west, he escaped to Brittany, whence he returned with the first Tudor sovereign, who had him in high favour. A fourth prelate of this family was Henry Reginald Courtenay, who was bishop of Bristol 1 794-1 797 and bishop of Exeter from 1797 to his death in 1803.

See charter, patent, close, fine and plea rolls, inquests post mortem and other records. G. E. C.'s Complete Peerage; Dictionary of National Biography; Notes and Queries, series viii. vol. 7; J. H. Round's Peerage Studies; Calendars of State Papers; Machyn's Diary (Camden Society) ; Chronicles of Capgrave, Wavrin, Adam of 'Jsk, &c. (O. Ba.)

COURTENAY, RICHARD (d. 1415), English prelate, was a son of Sir Philip Courtenay of Powderham Castle, near Exeter, and a grandson of Hugh Courtenay, earl of Devon (d. 1377). He

was a nephew of William Courtenay, archbishop of Canterbury, and a descendant of Edward I. Educated at Exeter College, Oxford, he entered the church, where his advance was rapid. He held several prebends, was dean of St Asaph and then dean of Wells, and became bishop of Norwich in 1413. As chancellor of the university of Oxford,

an office to which he was elected in 1407 and again in 1410, Courtenay asserted the independence of the university against Thomas Arundel, archbishop of Canterbury, in 141 1 ; but the archbishop, supported by Henry IV. and Pope John XXIII., eventually triumphed. Courtenay was a personal friend of Henry V. both before and after he came to the throne; and in 1413, immediately after Henry's accession, he was made treasurer of the royal household. On two occasions he went on diplomatic errands to France, and he was also employed by Henry on public business at home. Having accompanied the king to Harfleur in August 1415, Courtenay was attacked by dysentery and died on the 15th of September 1415, his body being buried in Westminster Abbey.

Another member of this family, Peter Courtenay (d. 1492),, a grandnephew of Richard, also attained high position in the English Church. Educated at Exeter College, Oxford, Peter became dean of Windsor, then dean of Exeter; in 1478 bishop of Exeter; and in 1487 bishop of Winchester in succession to William of Waynflete. With Henry Stafford, duke of Bucking- ham, and others he attempted to raise a rebellion against Richard III. in 1483, and fled to Brittany when this enterprise failed. Courtenay was restored to his dignities and estates in 1485 by Henry VII., whom he had accompanied to England, and he died on the 23rd of September 1492.

See J. H. Wylie, History of England under Henry IV. (London,

1884-1898).

COURTENAY, WILLIAM (c. 1342-1396), English prelate, was a younger son of Hugh Courtenay, earl of Devon (d. 1377), and through his mother Margaret, daughter of Humphrey Bohun, earl of Hereford, was a great-grandson of Edward I. Being a native of the west of England he was educated at Stapledon Hall, Oxford, and after graduating in law was chosen chancellor of the university in 1367. Courtenay's ecclesiastical and political career began about the same time. Having been made prebendary of Exeter, of Wells and of York, he was consecrated bishop of Hereford in 1370, was translated to the see of London in 1375, and became archbishop of Canterbury in 1381, succeeding Simon of Sudbury in both these latter positions. As a politician the period of his activity coincides with the years of Edward III.'s dotage, and with practically the whole of Richard II. 's reign. From the first he ranged himself among the opponents of John of Gaunt, duke of Lancaster; he was a firm upholder of the rights of the English Church, and was always eager to root out Lollardry. In 1373 he declared in convocation that he would not contribute to a subsidy

until the evils from which the church suffered were removed; in 1375 he incurred the displeasure of the king by publishing a papal bull against the Florentines; and in 1377 his decided action during the quarrel between John of Gaunt and William of Wykeham ended in a temporary triumph for the bishop. Wycliffe was another cause of difference between Lancaster and Courtenay. In 1377 the reformer appeared before Archbishop Sudbury and Courtenay, when an altercation between the duke and the bishop led to the dispersal of the court, and during the ensuing riot Lancaster probably owed his safety to the good offices of his foe. Having meanwhile become arch- bishop of Canterbury Courtenay summoned a council, or synod, in London, which condemned the opinions of Wycliffe; he then attacked the Lollards at Oxford, and urged the bishops to imprison heretics. He was for a short time chancellor of England during i38i,and in January 1382 he officiated at the marriage of Richard II. with Anne of Bohemia, afterwards crowning the queen. In 1382 the archbishop's visitation led to disputes with the bishops of Exeter and Salisbury, and Courtenay was only partially able to enforce the payment of a special tax to meet his expenses on this occasion. During his concluding years the archbishop appears to have upheld the papal authority in England, although not to the injury of the English Church.

He protested against the confirmation of the statute of provisors in 1390, and he was successful in slightly modifying the statute of praemunire in 1393. Disliking the extravagance of Richard II. he publicly reproved the king, and after an angry scene the royal threats drove him for a time into Devonshire. In 1386 he was one of the commissioners appointed to reform the kingdom and the royal household, and in 1387 he arranged a peace between Richard and his enemies under Thomas of Woodstock, duke of Gloucester. Courtenay died at Maidstone on the 31st of July 1396, and was buried in Canterbury cathedral.

See W. F. Hook, Lives of the Archbishops of Canterbury, vol. iv. (London, 1860-1876); and W. Stubbs, Constitutional History, vols, ii. and iii. (Oxford, 1895-1896).

COURTESY (O. Fr. curtesie, later courtoisie), manners or behaviour that suit a court, politeness, due consideration for others. A special application of the word is in the expression " by courtesy," where something is granted out of favour and not of right, hence " courtesy " titles, i.e. those titles of rank which are given by custom to the eldest sons of dukes, marquesses and earls, usually the second title held by the father; to the younger sons and to the daughters of dukes and marquesses, viz. the prefix " lord " and " lady " with the Christian and

surname. For ” tenure by the courtesy ” see Curtesy. Another form of the word, ” curtsey ” or ” curtsy,” was early confined to the expression of courtesy or respect by a gesture or bow, now only of the reverence made by a woman, consisting in a bending of the knees accompanied by a lowering of the body.

COURTHOPE, WILLIAM JOHN (1842-), English writer and historian of poetry, whose father was rector of South Mailing, Essex, was born on the 17th of July 1842. From Harrow school he went to New College, Oxford; took first-classes in classical ” moderations ” and ” greats “; and won the Newdigate prize for poetry (1864) and the Chancellor’s English essay (1868). He seemed destined for distinction as a poet, his volume of Ludibria Lunae (1869) being followed in 1870 by the remarkably fine Paradise of Birds. But a certain academic quality of mind seemed to check his output in verse and divert it into the field of criticism. Apart from many contributions to the higher journalism, his literary career is associated mainly with his continuation of the edition of Pope’s works, begun by Whitwell Elwin (1816-1900), which appeared in ten volumes from 1871- 1889; his life of Addison (Men of Letters series, 1882); his Liberal Movement- in English Literature (1885); and his tenure of the professorship of Poetry at Oxford (1895-1001), which resulted in his elaborate History of English Poetry (the first volume appearing in 1895), and his Life in Poetry (1901). He deals with the history of English poetry as a whole, and in its unity as a result of the national spirit and thought in succeeding ages, and attempts to bring the great poets into relation with this. In 1887 he was appointed a civil service commissioner, being first commissioner in 1892, and being made a C.B. He was made an honorary fellow of his old college at Oxford in 1896, and was given the honorary degrees of D.Litt. by Durham in 1895 and of LL.D. by Edinburgh University in 1898.

COURT LEET, an English petty criminal court for the punish- ment of small offences. It has been usual to make a distinction between court baron and court leet 1 as being separate courts, but in the early history of the court leet no such distinction

1 The history of the word ” leet ” is very obscure. It appears in Anglo-French documents as lete and in Anglo-Latin as leta. Pro- fessor W. W. Skeat has connected it with Old English laetan, to let, which is very doubtful, though this is the origin of the use of the word in such expressions as ” two-” ” three-way leet,” a place where cross-roads meet. The New English Dictionary suggests a connexion with ” lathe,” a term which survives as a division of the county of Kent, containing several ” hundreds.” This is of Old Norwegian origin, and seems to

have meant ” landed possessions.” There is also another Old Norwegian leith, a court or j udicial assembly, and modern Danish has laegd, a division of the country for military purposes. J. H. Round (Feudal England, p. 101) points out that the Suffolk hundred was divided for assessment into equal blocks called ” leets” (see further F. W. Maitland, Select Pleas in Manorial Courts, Selden Soc. Publications I. lxxiii-lxxvi). ” Leet ” is also used, chiefly in Scotland, for a list of persons nominated for election to an office. This is, apparently, a shortened form of the French ilite, elected.

can be drawn. At a very early time the lords of manors exercised or claimed certain jurisdictional franchises. Of these the most important was the ” view < of frankpledge" and its attendant police jurisdiction. Some time in the later middle ages the court baron when exercising these powers gained the name of leet, and, later, of " court leet." The quo warranto proceedings of Edward I. established a sharp distinction between the court baron, exercising strictly manorial rights, and' the court leet, depending for its jurisdiction upon royal franchise. The court leet was a court of record, and its duty was not only to view the pledges but to present by jury all crimes that might happen within the jurisdiction, and punish the same. The steward of the court acted as judge, presiding wholly in a judicial character, the ministerial acts being executed by the bailiff. The court leet began to decline in the 14th century, being superseded by the more modern courts of the justices, but in many cases courts leet were kept up until nearly the middle of the 19th century. Indeed, it cannot be said that they are now actually extinct, as many still survive for formal purposes, and by s. 40 of the Sheriffs Act 1887 they are expressly kept up.

COURT-MARTIAL, a court for the trial of offences against military or naval discipline, or for the administration of martial law. In England courts-martial have inherited part of the jurisdiction of the old Curia militaris, or court of the chivalry, in which a single marshal and at one time the high constable proceeded ” according to the customs and usages of that court, and, in cases omitted according to the civil law, secundum legem armorum ” (Coke, 4 Ins. 17). The modern form of the courts was adopted by ordinance in the time of Charles I., when English soldiers were studying the ” articles and military laws ” of Gustavus Adolphus and the Dutch military code of Arnheim; it is first recognized by statute in the first Mutiny Act of 1689. The Mutiny Act (with various extensions and amendments) and the statutory articles

of war continued to be the sources of military law which courts-martial administered until 1879, when they were codified in the Army Discipline and Regulation Act 1879, which was, in turn, superseded by the Army Act 1881. This act is re-enacted annually by the Army (Annual) Act. The constitution of courts-martial, their procedure, &c, are dealt with under Military Law.

Naval Courts-Martial. — The administration of the barbarous naval law of England was long entrusted to the discretion of commanders acting under instructions from the lord high admiral, who was supreme over both the royal and merchant navy. It was the leaders of the Long Parliament who first secured something like a regular tribunal by passing in 1645 an ordinance and articles concerning martial law for the govern- ment of the navy. Under this ordinance Blake, Monk and Penn issued instructions for the holding general and ship courts- martial with written records, the one for captains and com- manders, the other for subordinate officers and men. Of the latter the mate, gunner and boatswain were members, but the admirals reserved a control over the more serious sentences. Under an act of 1661 the high admiral again received power to issue commissions for holding courts-martial — a power which continues to be exercised by the board of admiralty. During the 1 8th century, under the auspices of Anson, the jurisdiction was greatly extended, and the Consolidation Act of 1749 was passed in which the penalty of death occurs as frequently as the curses in the commination service. The Naval Articles of War have always been statutory, and the whole system may now be said to rest on the Naval Discipline Act 1866, as amended by the act of 1884. The navy has its courts of inquiry for the con- fidential investigation of charges ” derogatory to the character of an officer and a gentleman.” Under the act of 1866 a court- martial must consist of from five to nine officers of a certain rank, and must be held publicly on board of one of H.M. ships of war, and where at least two such ships are together. The rank of the president depends on that of the prisoner. A judge- advocate attends, and the procedure resembles that in military courts, except that the prisoner is not asked to plead, and the sentence, if not one of death, does not require the confirmation

of the commander-in-chief abroad or of the admiralty at home. The court has a large and useful power of finding the prisoner guilty of a less serious offence than that charged, which might well be imitated in the ordinary criminal courts. The death sentence is always carried out by hanging at the yard-arm; Admiral Byng, however, was shot in 1757. The board of admiralty have, under the Naval Discipline Acts, a general power of suspending, annulling, and modifying sentences

which are not capital. The jurisdiction extends to all persons belonging to the navy, to land forces and other passengers on board, ship- wrecked crews, spies, persons borne on the books of H.M. ships in commission, and civilians on board who endeavour to seduce others from allegiance. The definition of the jurisdiction by locality includes harbours, havens or creeks, lakes or rivers, in or out of the United Kingdom; all places within the jurisdic- tion of the admiralty; all places on shore out of the United Kingdom; the dockyards, barracks, hospitals, &c, of the service wherever situated; all places on shore in or out of the United Kingdom for all offences punishable under the Articles of War except those specified in section 38 of the Naval Discipline Act i860, which are punishable by ordinary law. The Royal Marines, while borne on the books of H.M. ships, are subject to the Naval Discipline Acts, and, by an order in council, 1882, when they are embarked on board ship for service on shore; otherwise they are under the Army Acts. By s. 179, sub. -sec. 7, of the Army Act, in the application of the act to the Royal Marines the admiralty is substituted for military authorities.

Authorities. — Simmons, On the Constitution and Practice of Courts-Martial; Clode, Military and Martial Law; Stephens, Gifford and Smith, Manual, of Naval Law and Court-Martial Pro- cedure. The earlier writers on courts-martial are Adye (1796), M'Arthur (1813), Maltby (1813, Boston), James (1820), D'Aguilar (1843), and Hough, Precedents in Military Law (1855).

COURTNEY, LEONARD HENRY COURTNEY, Baron (1832-), English politician and man of letters, eldest son of J. S. Courtney, a banker, was born at Penzance on the 6th of July 1832. At Cambridge, Leonard Courtney was second wrangler and first Smith's prizeman, and was elected a fellow of his college, St John's. He was called to the bar at Lincoln's Inn in 1858, was professor of political economy at University College from 1872 to 187s, and in December 1876, after a previous unsuccessful attempt, was elected to parliament for Liskeard in the Liberal interest. He continued to represent the borough, and the district into which it was merged by the Reform Act of 1885, until 1900, when his attitude towards the South African War — ■ he was one of the foremost of the so-called " Pro-Boer " party — compelled his retirement. Until 1885 he was a devoted adherens of Mr Gladstone, particularly in finance and foreign affairs. In 1880 he was under-secretary of state for the home department, in 1881 for the colonies, and in 1882 secretary to the treasury; but he was always a stubborn fighter for principle, and upon finding that the government's Reform Bill in 1884 contained no recognition of the scheme for proportional representation, to which he was deeply committed, he

resigned office. He refused to support Mr Gladstone's Home Rule Bill in 1885, and was one of those who chiefly contributed to its rejection, and whose reputation for unbending integrity and intellectual eminence gave solidity to the Liberal Unionist party. In 1886 he was elected chairman of committees in the House of Commons, and his efficiency in this office seemed to mark him out for the speakership in 1895. A Liberal Unionist, however, could only be elected by Conservative votes, and he had made himself objectionable to a large section of the party by his independent attitude on various questions, on which his Liberalism outweighed his party loyalty. He would in any case have been incapacitated by an affection of the eyesight, which for a while threatened to withdraw him from public life altogether. After 1895 Mr Courtney's divergences from the Unionist party on questions other than Irish politics became gradually more marked. He became known in the House of Commons principally for his candid criticism of the measures introduced by his nominal leaders, and he was rather to be ranked among the Opposition than as a Ministerialist ; and when the crisis with the Transvaal

came in 1899, Mr Courtney's views, which remained substantially what they were when he supported the settlement after Majuba in 1 88 1, had plainly become incompatible with his position even as a nominal follower of Lord Salisbury and Mr Chamberlain. He gradually reverted to formal membership of the Liberal party, and in January 1906 unsuccessfully contested a division of Edinburgh as a supporter of Sir Henry Campbell-Bannerman at the general election. Among the birthday honours of 1906 he was elevated to the peerage as Baron Courtney of Penwith (Cornwall). Lord Courtney, who in 1883 married Miss Catherine Potter (an elder sister of Mrs Sidney Webb), was a prominent supporter of the women's movement. In earlier years he was a regular contributor to The Times, and he wrote numerous essays in the principal reviews on political and economic subjects. In 1 90 1 he published a book on The Working Constitution of the United Kingdom.

Two of his brothers, John Mortimer Courtney (b. 1838), and William Prideaux Courtney (b. 1845), also attained public dis- tinction, the former in the government service in Canada (from 1869, retiring in 1906), rising to be deputy-minister of finance, and the latter in the British civil service (1865-1892), and as a prominent man of letters and bibliographer.

COURTOIS, JACQUES (1621-1676) and GUILLAUME (1628- 1679). The two French painters who bore these names are also called by the Italian equivalents Giacomo (or Jacopo) Cortese and Guglielmo Cortese. Each of the brothers is likewise named, from his native province, Le Bourguignon, or II Borgognone.

Jacques Courtois was born at St Hippolyte, near Besancon, in 162 1. His father was a painter, and with him Jacques remained studying up to the age of fifteen. Towards 1 63 7 he came to Italy, was hospitably received at Milan by a Burgundian gentleman, and entered, and for three years remained in, the French military service. The sight of some battle-pictures revived his taste for fine art. He went to Bologna, and studied under the friendly tutelage of Guido; thence he proceeded to Rome, where he painted, in the Cistercian monastery, the ” Miracle of the Loaves.” Here he took a house and after a while entered upon his own characteristic style of art, that of battle-painting, in which he has been accounted to excel all other old masters; his merits were cordially recognized by the celebrated Cerquozzi, named Michel-angelo delle Battaglie. He soon rose from penury to ease, and married a painter’s beautiful daughter, Maria Vagini; she died after seven years of wedded life. Prince Matthias of Tuscany employed Courtois on some striking works in his villa, Lappeggio, representing with much historical accuracy the prince’s military exploits. In Venice also the artist executed for the senator Sagredo some remarkable battle-pieces. In Florence he entered the Society of Jesus, taking the habit in Rome in 1655; it was calumniously r umoured that he adopted this course in order to escape punishment for having poisoned his wife. As a Jesuit father, Courtois painted many works in churches and monasteries of the society. He lived piously in Rome, and died there of apo- plexy on the 20th of May 1676 (some accounts say 1670 or 1671). His battle-pieces have movement and fire, warm colouring (now too often blackened), and great command of the brush,— those of moderate dimensions are the more esteemed. They are slight in execution, and tell out best from a distance. Courtois etched with skill twelve battle-subjects of his own composition. The Dantzig painter named in Italy Pandolfo Reschi was his pupil.

Guillaume Courtois, born likewise at St Hippolyte, came to Italy with his brother. He went at once to Rome, and entered the school of Pietro da Cortona. He studied also the Bolognese painters and Giovanni Barbieri, and formed for himself a style with very little express mannerism, partly resembling that of Maratta. He painted the ” Battle of Joshua ” in the Quirinal Gallery, the ” Crucifixion of St Andrew ” in the church of that saint on Monte Cavallo, various works for the Jesuits, some also in co-operation with his brother. His last production

was Christ admonishing Martha. His draughtsmanship is better than that of Jacques, whom he did not, however, rival in spirit, colour or composition. He also executed some etchings. Guillaume Courtois died of gout on the 15th of June 1679.

- COURTRAI (Flemish, Kortryk), an important and once famous town of West Flanders, Belgium, situated on the Lys. Pop. (1904) 34,564. It is now best known for its fine linen, which ranks with that of Lame. The lace factories are also important and employ 5000 hands. But considerable as is the prosperity of modern Courtrai it is but a shadow of what it was in the middle ages during the halcyon period of the Flemish communes. Then Courtrai had a population of 200,000, now it is little over a sixth of that number. On the nth of July 1302 the great battle of Courtrai (see Infantry) was fought outside its walls, when the French army, under the count of Artois, was vanquished by the allied burghers of Bruges, Ypres and Courtrai with tremendous loss. As many as 700 pairs of golden spurs were collected on the field from the bodies of French knights and hung up as an offering in an abbey church of the town, which has long disappeared. There are still, however, some interesting remains of Courtrai's former grandeur. Perhaps the Pont de Broel, with its towers at either end of the bridge, is as characteristic and complete as any monument of ancient Flanders that has come down to modern times. The hotel de ville, which dated from the earlier half of the 16th century, was restored in 1846, and since then statues have also been added to represent those that formerly ornamented the facade. Two richly and elaborately carved chimney-pieces in the h6tel de ville merit special notice. The one in the council chamber upstairs dates from 1527 and gives an allegorical representation of the Virtues and the Vices. The other, three-quarters of a century later, contains an heraldic representation of the noble families of the town. The church of St Martin dates from the 15th century, but was practically destroyed in 1862 by a fire caused by lightning. It has been restored. The most important building at Courtrai is the church of Notre Dame, which was begun by Count Baldwin IX. in 1191 and finished in 1 2 1 1 . The portal and the choir were reconstructed in the 18th century. In the chapel behind the choir is hung one of Van Dyck's masterpieces, " The Erection of the Cross." The chapel of the counts attached to the church dates from 1373, and contained mural paintings of the counts and countesses of Flanders down to the merging of the title in the house of Burgundy. Most if not all of these had become

obliterated, but they have now been carefully restored. With questionable judgment portraits have been added of the subsequent holders of the title down to the emperor Francis II. (I. of Austria), the last representative of the houses of Flanders and Burgundy to rule in the Netherlands. Courtrai celebrated the 600th anniversary of the battle mentioned above by erecting a monument on the field in 1902, and also by fetes and historical processions that continued for a fortnight.

Courtrai, the Cortracum of the Romans, ranked as a town from the 7th century onwards. It was destroyed by the Normans, but was rebuilt in the 10th century by Baldwin III. of Flanders, who endowed it with market rights and laid the foundation of its industrial importance by inviting the settlement of foreign weavers. The town was once more burnt, in 1382, by the French after the battle of Roosebeke, but was rebuilt in 1385 by Philip the Bold, duke of Burgundy.

COURVOISIER, JEAN JOSEPH ANTOINE (1775-1835), French magistrate and politician, was born at Besancon on the 30th of November 1775. During the revolutionary period he left the country and served in the army of the emigre's and later in that of Austria. In 1801, under the, Consulate, he returned to France and established himself as an advocate at Besancon, being appointed conseiller-auditeur to the court of appeal there in 1808. At the Restoration he was made advocate-general by Louis XVIII., resigned and left France during the Hundred Days, and was reappointed after the second Restoration in 18 15. In 181 7, after the modification of the constitution by the ordonnance of the 5th of September, he was returned to the chamber of deputies, where he attached himself to the left centre and supported the moderate policy of Richelieu and Decazes. He was an eloquent speaker, and master of many subjects; and his proved royalism made it impossible for the ultra-Royalists to discredit him, much as they resented his consistent opposition to

their short-sighted violence. After the revolt at Lyons in 1 8 1 7 he was nominated procureur-giniral of the city, and by his sense and moderation did much to restore order and confidence. He was again a member of the chamber from 1819 to 1824, and vigorously opposed the exceptional legislation which the second administration of Richelieu passed under the influence of the ultra-Royalists. In 1824 he failed to secure re-election, and occupied himself with his judicial

duties until his nomination as councillor of state in 1827. On the 8th of August 1829 he accepted the offer of the portfolio of justice in the Polignac ministry, but resigned on the 19th of May 1830, when he realized that the government intended to abrogate the Charter and the inevitable revolution that would follow. During the trial of the ex-ministers, in December, he was summoned as a witness, and paid a tribute to the character of his former colleagues which, under the circumstances, argued no little courage. He refused to take office under Louis Philippe, and retired into private life, dying on the 18th of September 1835.

COUSCOUS, or Kous-kous (an Arabic word derived from kaskasa, to pound), a dish common among the inhabitants of North Africa, made of flour rubbed together and steamed over a stew of mutton, fowl, &c, with which it is eaten.

COUSIN, JEAN (1 500-1 590), French painter, was born at Soucy, near Sens, and began as a glass-painter, his windows in the Sainte Chapelle at Vincennes being considered the finest in France. As a painter of subject pictures he is ranked as the founder of the French school, as having first departed from the practice of portraits. His ” Last Judgment,” influenced by Parmigiano, is in the Louvre, and a ” Descent from the Cross ” (1523) in the museum at Mainz is attributed to him. He was known also as a sculptor, and an engraver, both in etching and on wood, his wood-cuts for Jean le Clerc’s Bible (1596) and other books being his best-known work. He also wrote a Livre de perspective (1560), and a Livre de portraiture (1571).

See Ambroise Firmin-Didot, Etude sur J. Cousin (1872), and Recueil des osuvres choisies de J. Cousin (1873).

COUSIN, VICTOR (1792-1867), French philosopher, the son of a watchmaker, was born in Paris, in the Quartier St Antoine, on the 28th of November 1792. At the age of ten he was sent to the grammar school of the Quartier St Antoine, the Lycee Charlemagne. Here he studied until he was eighteen. The lycee had a connexion with the university, and when Cousin left the secondary school he was ” crowned ” in the ancient hall of the Sorbonne for the Latin oration delivered by him there, in the general concourse of his school competitors. The classical training of the lycee strongly disposed him to literature. He was already known among his compeers for his knowledge of Greek. From the lycee he passed to the Normal School of Paris, where Laromiguiere was then lecturing on philosophy. In the second preface to the Fragmens philosophiques, in which he candidly states the varied philosophical influences of his life, Cousin speaks of

the grateful emotion excited by the memory of the day in 181 1, when he heard Laromiguiere for the first time. ” That day decided my whole life. Laromiguiere taught the philosophy of Locke and Condillac, happily modified on some points, with a clearness and grace which in appearance at least removed difficulties, and with a charm of spiritual bonhomie which penetrated and subdued.” Cousin was set forthwith to lecture on philosophy, and he speedily obtained the position of master of conferences (maitre de conferences) in the school. The second great philosophical impulse of his life was the teaching of Royer-Collard. This teacher, as he tells us, ” by the severity of his logic, the gravity and weight of his words, turned me by degrees, and not without resistance, from the beaten path of Condillac into the way which has since become so easy, but which was then painful and unfrequented, that of the Scottish philosophy.” In 1815-1816 Cousin attained the position of suppliant (assistant) to Royer-Collard in the history of modern philosophy chair of the faculty of letters. There was still another thinker who influenced him at this early period, — Maine de Biran, whom Cousin regarded as the un- equalled psychological observer of bis time in France.

These men strongly influenced both the method and the matter of Cousin’s philosophical thought. To Laromiguiere he attributes the lesson of decomposing thought, even though the reduction of it to sensation was inadequate. Royer-Collard taught him that even sensation is subject to certain internal laws and principles which it does not itself explain, which are superior to analysis and the natural patrimony of the mind. De Biran made a special study of the phenomena of the will. He taught him to distinguish in all cognitions, and especially in the simplest facts of consciousness, the fact of voluntary activity, that activity in which our personality is truly revealed. It was through this ” triple discipline,” as he calls it, that Cousin’s philosophical thought was first developed, and that in 1815 he entered on the public teaching of philosophy in the Normal School and in the faculty of letters. 1 He then took up the study of German, worked at Kant and Jacobi, and sought to master the Philosophy of Nature of Schelling, by which he was at first greatly attracted. The influence of Schelling may be observed very markedly in the earlier form of his philosophy. He sympathized with the principle of faith of Jacobi, but re- garded it as arbitrary so long as it was not recognized as grounded in reason. In 1817 he went to Germany, and met Hegel at Heidelberg. In this year appeared Hegel’s Encyclopddie der philosophischen Wissenschaften, of which Cousin had one of the earliest copies. He thought Hegel not particularly amiable, but the two became friends. The following year Cousin went to Munich, where he

met Schelling for the first time, and spent a month with him and Jacobi, obtaining a deeper insight into the Philosophy of Nature.

The political troubles of France interfered for a time with

his career. In the events of 18 14-18 15 he took the royalist side.

He at first adopted the views of the party known as

doctrinaire, of which Royer-Collard was the philo- „° u , 1 • , 1 • r- TT , 1 , , troubles.

sopmcal chief. He seems then to have gone farther than his party, and even to have approached the extreme Left. Then came a reaction against liberalism, and in 1821-1822 Cousin was deprived of his offices alike in the faculty of letters and in the Normal School. The Normal School itself was swept away, and Cousin shared at the hands of a narrow and illiberal government the fate of Guizot, who was ejected from the chair of history. This enforced abandonment of public teaching was not wholly an evil. He set out for Germany with a view to further philosophical study. While at Berlin in 1824-1825 he was thrown into prison, either on some ill-defined political charge at the instance of the French police, or on account of certain incautious expressions which he had let fall in conversa- tion. Liberated after six months, he continued under the suspicion of the French government for three years. It was during this period, however, that he thought out and developed what is distinctive in his philosophical doctrine. His eclecticism, his ontology and his philosophy of history were declared in principle and in most of their salient details in the Fragmens philosophiques (Paris, 1826). The preface to the Prag- second edition (1833) an d the Avertissement to the mens third (1838) aimed at a vindication of his principles phiioso- against contemporary criticism. Even the best of his PMques. later books, the Philosophic tcossaise (4th ed., 1863), the Du vrai, du beau, et du Men (12th ed., 1872; Eng. trans., 3rd ed., Edinburgh, 1854), and the Philosophic de Locke (4th ed., 1861) were simply matured revisions of his lectures during the period from 181 5 to 1820. The lectures on Locke were first sketched in 1819, and fully developed in the course of 1829.

During the seven years of enforced abandonment of teaching he produced, besides the Fragmens, the edition of the works of Proclus (6 vols., 1820-1827), and the works of Descartes (n vols., 1826). He also commenced his Translation of Plato (13 vols.), which occupied his leisure time from 1825 to 1840.

We see in the Fragmens very distinctly the fusion of the

different philosophical influences by which his opinions were

finally matured. For Cousin was as eclectic in thought and habit

of mind as he was in philosophical principle and system. It is

1 Fragmens philosophiques — preface deuxiime.

with the publication of the Fragmens of 1826 that the first great widening of his reputation is associated. In 1827 followed the Cours de I'histoire de la philosophic

In 1828 M. de Vatimesnil, minister of public instruction in Martignac's ministry, recalled Cousin and Guizot to their professorial positions in the university. The three fectorer. S * vears which followed were the period of Cousin's greatest triumph as a lecturer. His return to the chair was the symbol of the triumph of constitutional ideas and was greeted with enthusiasm. The hall of the Sorbonne was crowded as the hall of no philosophical teacher in Paris had been since the days of Abelard. The lecturer had a singular power of identifying himself for the time with the system which he expounded and the historical character he portrayed. Clear and comprehensive in the grasp of the general outlines of his subject, he was methodical and vivid in the representation of details. In exposition he had the rare art of unfolding and aggrandizing. There was a rich, deep-toned, resonant eloquence mingled with the speculative exposition; his style of expression was clear, elegant and forcible, abounding in happy turns and striking antitheses. To this was joined a singular power of rhetorical climax. His philosophy exhibited in a striking manner the generalizing tendency of the French intellect, and its logical need of grouping details round central principles.

There was withal a moral elevation in his spiritual philosophy which came home to the hearts of his hearers, and seemed to afford a ground for higher development in national literature and art, and even in politics, than the traditional philosophy of France had appeared capable of yielding. His lectures produced more ardent disciples, imbued at least with his spirit, than those of any other professor of philosophy in France during the 18th century. Tested by the power and effect of his teaching influence, Cousin occupies a foremost place

in the rank of professors of philosophy, who like Jacobi, Schelling and Dugald Stewart have united the gifts of speculative, expository and imaginative power. Tested even by the strength of the reaction which his writings have in some cases occasioned, his influence is hardly less remarkable. The taste for philosophy — especially its history — was revived in France to an extent unknown since the 17th century.

Among the men who were influenced by Cousin we may note T. S. Jouffroy, J. P. Damiron, Gamier, J. Barthelemy St Hilaire, F. Ravaisson-Mollien, Remusat, Jules Simon and Disciples ˆ Franck. Jouffroy and Damiron were first fellow- followers. students and then disciples. Jouffroy, however, always kept firm to the early — the French and Scottish — impulses of Cousin's teaching. Cousin continued to lecture regularly for two years and a half after his return to the chair. Sympathizing with the revolution of July, he was at once recognized by the new government as a friend of national liberty. Writing in June 1833 he explains both his philosophical and his political position: —

" I had the advantage of holding united against me for many years both the sensational and the theological school. In 1830 both schools descended into the arena of politics. The sensational school quite naturally produced the demagogic party, and the theo- logical school became quite as naturally absolutism, safe to borrow from time to time the mask of the demagogue in order the better to reach its ends, as in philosophy it is by scepticism that it under- takes to restore theocracy. On the other hand, he who combated any exclusive principle in science was bound to reject also any exclu- sive principle in the state, and to defend representative government."

The government was not slow to do him honour. He was induced by the ministry of which his friend Guizot was the head to become a member of the council of public instruction and counsellor of state, and in 1832 he was made a peer of France. He ceased to lecture, but retained the title of professor of philosophy. Finally, he accepted the position of minister of public instruction in 1840 under Thiers. He was besides director of the Normal School and virtual head of the university, and from 1840 a member of the Institute (Academy of the Moral and Political Sciences). His character and his official position at this period gave him great power in the university and in the educa-

tional arrangements of the country. In fact, during the seventeen and a half years of the reign of Louis Philippe, Cousin mainly moulded the philosophical and even the literary tendencies of the cultivated class in France.

But the most important work he accomplished during this period was the organization of primary instruction. It was to the efforts of Cousin that France owed her advance, in gelation to primary education, between 1830 and 1848. Prussia primary and Saxony had set the national example, and France eau ˆ tlon was guided into it by Cousin. Forgetful of national calamity and of personal wrong, he looked to Prussia as affording the best example of an organized system of national education; and he was persuaded that ” to carry back the education of Prussia into France afforded a nobler (if a bloodless) triumph than the trophies of Austerlitz and Jena.” In the summer of 1 83 1, commissioned by the government, he visited Frankfort and Saxony, and spent some time in Berlin. The result was a series of reports to the minister, afterwards published as Rapport sur I’ Stat de I’ instruction publique dans quelques pays de I’Allemagne et .particulierement en Prusse. (Compare also De V instruction publique en Hollande, 1837.) His views were readily accepted on his return to France, and soon afterwards through his influence there was passed the law of primary instruction. (See his Exposi des motifs et projet de loi sur I’instruction primaire, prtsentes a la chambre des depute” s, seance du 2 Janvier 1833.)

In the words of the Edinburgh Review (July 1833), these documents ” mark an epoch in the progress of national education, and are directly conducive to results important not only to France but to Europe.” The Report was translated into English by Mrs Sarah Austin in 1834. The translation was frequently reprinted in the United States of America. The legislatures of New Jersey and Massachusetts distributed it in the schools at the expense of the states. Cousin remarks that, among all the literary distinctions which he had received, ” None has touched me more than the title of foreign member of the American Institute for Education.” To the enlightened views of the ministries of Guizot and Thiers under the citizen-king, and to the zeal and ability of Cousin in the work of organization, France owes what is best in her system of primary education,— a national interest which had been neglected under the Revolution, the Empire and the Restoration (see Expose, p. 17). In the first two years of the reign of Louis Philippe more was done for the education of the people than had been either sought or accom- plished in all the history of France. In defence of university studies he stood manfully forth in the chamber of peers in 1844, against the clerical party on the one hand and the levelling or Philistine party on the other. His speeches on this occasion were published in a tractate Defense de I’universite et de la philosophic (1844 and 1845).

This period of official life from 1830 to 1848 was spent, so far as

philosophical study was concerned, in revising his former lectures and writings, in maturing them for publication or reissue, and in research into certain periods of the sol ,hicai history of philosophy. In 1835 appeared De la writings. Metaphysique d'Aristote, suivi d'un essai de traduction des deux premiers livres; in 1836, Cours de philosophie professi d la faculty des leltres pendant I'annee 18 18, and Ouvrages inidits d'AMlard. This Cours de philosophie appeared later in 1854 as Du vrai, du beau, et du bien. From 1825 to 1840 appeared Cours de I'histoire de la philosophie, in 1829 Manuel de I'histoire de la philosophie de Tennemann, translated from the German. In 1840-1841 we have Cours d'histoire de la philosophie morale au XVIII e siecle (5 vols.). In 1841 appeared his edition of the CEuvres philosophiques de Maine-de-Biran; in 1842, Lecons de philosophie sur Kant (Eng. trans. A. G. Henderson, 1854), and in the same year Des Pensies de Pascal. The Nouveaux fragments were gathered together and republished in 1847. Later, in 1859, appeared Petri Abaelardi Opera.

During this period Cousin seems to have turned with fresh interest to those literary studies which he had abandoned for speculation under the influence of Laromiguiere and Royer- Collard. To this renewed interest we owe his studies of men

and women of note in France in the 17th century. As the results of his work in this line, we have, besides the Des PensSes de Pascal, 1842, £tudes sur les femmes et la sociStS du studies? XVII e siecle, 1853. He has sketched Jacqueline Pascal (1844), Madame de Longueville (1853), the marquise de Sable (1854), the duchesse de Chevreuse (1856), Madame de Hautefort (1856).

When the reign of Louis Philippe came to a close through the opposition of his ministry, with Guizot at its head, to the demand for electoral reform and through the policy of the Spanish marriages, Cousin, who was opposed to the government on these points, lent his sympathy to Cavaignac and the Provisional government. He published a pamphlet entitled Justice et charite, the purport of which showed the moderation of his political views. It was markedly anti-socialistic. But from this period he passed almost entirely from public life, and ceased to wield the personal influence which he had done during the preceding years. After the coup d'etat of the 2nd of December, he was deprived of his position as permanent member of the superior council of public instruction. From Napoleon and the Empire he stood aloof. A

decree of 1852 placed him along with Guizot and Villemain in the rank of honorary professors. His sympathies were apparently with the monarchy, under certain constitutional safeguards. Speaking in 1853 of the political issues of the spiritual philosophy which he had taught during his lifetime, he says, — ” It conducts human societies to the true republic, that dream of all generous souls, which in our time can be realized in Europe only by constitutional monarchy.” 1

During the last years of his life he occupied a suite of rooms in the Sorbonne, where he lived simply and unostentatiously. The chief feature of the rooms was his noble library, the cherished collection of a lifetime. He died at Cannes on the 13 th of January 1867, in his sixty-fifth year. In the front of the Sorbonne, below the lecture rooms of the faculty of letters, a tablet records an extract from his will, in which he bequeaths his noble and cherished library to the halls of his professorial work and triumphs. •

Philosophy. — There are three distinctive points in Cousin’s philosophy. These are his method, the results of his method, and the application of the method and its results to history, — especially to the history of philosophy. It is usual to speak of his philosophy as eclecticism. It is eclectic only in a secondary and subordinate sense. All eclecticism that is not self-condemned and inoperative implies a system of doctrine as its basis, — in fact, a criterion of truth. Otherwise, as Cousin himself remarks, it is simply a blind and useless syncretism. And Cousin saw and proclaimed from an early period in his philosophical teaching the necessity of a system on which to base his eclecticism. This is indeed advanced as an illustration or confirmation of the truth of his system, — as a proof that the facts of history correspond to his analysis of consciousness. These three points — the method, the results, and the philosophy of history — are with him intimately connected; they are developments in a natural order. of sequence. They become in practice Psychology, Ontology and Eclecticism in history.

First, as to method. On no point has Cousin more strongly insisted than the importance of method in philosophy. That Method which he adopts, and the necessity of which he so strongly proclaims, is the ordinary one of observation, analysis and induction. This observational method Cousin regards as that of the 18th century, — the method which Descartes began and abandoned, and which Locke and Condillac applied, though imperfectly, and which Reid and Kant used with more success, yet not completely. He insists that this is the true method of philosophy as applied to consciousness, in which alone the facts of experience appear. But the proper condition of the

application of the method is that it shall not through prejudice of system omit a single fact of consciousness. If the authority of consciousness is good in one instance, it is good in all. If not to be trusted in one, it is not to be trusted in any. Previous systems have erred in not presenting the facts of consciousness, 1 Du vrai, du beau, et du bien (preface).

Results.

i.e. consciousness itself, in their totality. The observational method applied to consciousness gives us the science of psycho- logy. This is the basis and the only proper basis of ontology or metaphysics — the science of being — and of the philosophy of history. To the observation of consciousness Cousin adds induction as the complement of his method, by which he means inference as to reality necessitated by the data of consciousness, and regulated by certain laws found in consciousness, viz. those of reason. By his method of observation and induction as thus explained, his philosophy will be found to be marked ofi very clearly, on the one hand from the deductive construction of notions of an absolute system, as represented either by Schelling or Hegel, which Cousin regards as based simply on hypothesis and abstraction, illegitimately obtained; and on the other, from that of Kant, and in a sense, of Sir W. Hamilton, both of which in the view of Cousin are limited to psychology, and merely relative or phenomenal knowledge, and issue in scepticism so far as the great realities of ontology are concerned. What Cousin finds psychologically in the individual consciousness, he finds also spontaneously expressed in the common sense or universal experience of humanity. In fact, it is with him the function of philosophy to classify and explain universal con- victions and beliefs; but common-sense is not with him philosophy, nor is it the instrument of philosophy; it is simply the material on which the philosophical method works, and in harmony with which its results must ultimately be found.

The three great results of psychological observation are Sensibility, Activity or Liberty, and Reason.

These three facts are different in character, but are not found apart in consciousness. Sensations, or the facts of the sensibility, are necessary; we do not impute them to ourselves. The facts of reason are also necessary, and reason is not less independent of the will than the sensibility. Voluntary facts alone are marked in the eyes of consciousness with the characters of imputability and personality. The will alone is the person or Me. The me is the centre of the intellectual

sphere without which conscious- ness is impossible. We find ourselves in a strange world, between two orders of phenomena which do not belong to us, which we apprehend only on the condition of our distinguishing ourselves from them. Further, we apprehend by means of a light which does not come from ourselves. All light comes from the reason, and it is the reason which apprehends both itself and the sensi- bility which envelops it, and the will which it obliges but does not constrain. Consciousness, then, is composed of these three integrant and inseparable elements. But Reason is the im- mediate ground of knowledge and of consciousness itself.

But there is a peculiarity in Cousin's doctrine of activity or freedom, and in his doctrine of reason, which enters deeply into his system. This is the element of spontaneity in volition and in reason. This is the heart of what is ttneitv new alike in his doctrine of knowledge and being. in will. Liberty or freedom is a generic term which means a cause or being endowed with self-activity. This is to itself and its own development its own ultimate cause. Free-will is so, although it is preceded by deliberation and determination, i.e. reflection, for we are always conscious that even after determina- tion we are free to will or not to will. But there is a primary kind of volition which has not reflection for its condition, which is yet free and spontaneous. We must have willed thus spontaneously first, otherwise we could not know, before our reflective volition, that we could will and act. Spontaneous volition is free as reflective, but it is the prior act of the two. This view of liberty of will is the only one in accordance with the facts of humanity; it excludes reflective volition, and explains the enthusiasm of the poet and the artist in the act of creation; it explains also the ordinary actions of mankind, which are done as a rule spon- taneously and not after reflective deliberation.

But it is in his doctrine of the Reason that the distinctive principle of the philosophy of Cousin lies. The reason given to us by psychological observation, the reason of our consciousness, is impersonal in its nature. We do not make it; its character is precisely the opposite of individuality; it is universal and

Laws of reason.

necessary. The recognition of universal and necessary principles in knowledge is the essential point in psychology; it ought to be put first and emphasized to the last that these mperson- ex j stj anc j that they are wholly impersonal or absolute. reason. The number of these

principles, their enumeration and classification, is an important point, but it is secondary to that of the recognition of their true nature. This was the point which Kant missed in his analysis, and this is the fundamental truth which Cousin thinks he has restored to the integrity of philosophy by the method of the observation of consciousness. And how is this impersonality or absoluteness of the conditions of knowledge to be established ? The answer is in substance that Kant went wrong in putting necessity first as the criterion of those laws. This brought them within the sphere of reflection, and gave as their guarantee the impossibility of thinking them reversed; and led to their being regarded as wholly relative to human intelligence, restricted to the sphere of the phenomenal, incapable of revealing to us substantial reality — necessary, yet subjective. But this test of necessity is a wholly secondary one; these laws are not thus guaranteed to us; they are each and all given to us, given to our consciousness, in an act of spontaneous apperception or' apprehension, immediately, instantaneously, in a sphere above the reflective consciousness, yet within the reach of knowledge. And " all subjectivity with all reflection expires in the spontaneity of apperception. The reason becomes subjective by relation to the voluntary and free self; but in itself it is impersonal; it belongs not to this or to that self inhumanity; it belongs not even to humanity. We may say with truth that nature and humanity belong to it, for without its laws both would perish."

But what is the number of those laws? Kant reviewing the enterprise of Aristotle in modern times has given a complete list of the laws of thought, but it is arbitrary in classifica- tion and may be legitimately reduced. According to Cousin, there are but two primary laws of thought, that of causality and that of substance. From these flow naturally all the others. In the order of nature, that of substance is the first and causality second. In the order of acquisition of our knowledge, causality precedes substance, or rather both are given us in each other, and are contemporaneous in consciousness.

These principles of reason, cause and substance, given thus psychologically, enable us to pass beyond the limits of the relative and subjective to objective and absolute reality,- — enable us, in a word, to pass from psychology, or the science of know- ledge, to ontology or the science of being. These laws are inextricably mixed in consciousness with the data of volition and sensation, with free activity and fatal action or impression, and they guide us in rising to a personal being, a self or free cause, and to an impersonal reality, a not-me — nature, the world of force — lying out of us, and modifying us. As I refer to myself the act of attention and volition, so I cannot but refer the sensation to some cause, necessarily other than myself,

that is, to an external cause, whose existence is as certain for me as my own existence, since the phenomenon which suggests it to me is as certain as the phenomenon which had suggested my reality, and both are given in each other. I thus reach an objective impersonal world of forces which corresponds to the variety of my sensations. The'relation of these forces or causes to each other is the order of the universe.

But these two forces, the me and the not-me, are reciprocally limitative. As reason has apprehended these two simultaneous phenomena, attention and sensation, and led us r*f immediately to conceive the two sorts of distinct

absolute, causes, correlative and reciprocally finite, to which they are related, so, from the notion of this limitation, we find it impossible under the same guide not to conceive a supreme cause, absolute and infinite, itself the first and last cause of all. This is relatively to self and not-self what these are to their proper effects. This cause is self-sufficient, and is sufficient for the reason. This is God; he must be conceived under the notion of cause, related to humanity and the world. He is absolute substance only in so far as he is absolute cause,

and his essence lies precisely in his creative power. He thus creates, and be creates necessarily.

This theodicy of Cousin laid him open obviously enough to the charge of pantheism. This he repels, and his answer may be summed up as follows. Pantheism is properly the deification of the law of phenomena, the universe God. £*"?" ot

PuBinG"

But I distinguish the two finite causes self and not-self / smo from each other and from the infinite cause. They are not mere modifications of this cause or properties, as with Spinoza, — they are free forces having' their power or spring of action in themselves, and this is sufficient for our idea of independent finite reality. I hold this, and I hold the relation of these as effects to the one supreme cause. The God I plead for is neither the deity of Pantheism, nor the absolute unity of the Eleatics, a being divorced from all possibility of creation or plurality, a mere metaphysical abstraction. The deity I maintain is creative, and necessarily creative. The deity of Spinoza and the Eleatics is a mere substance, not a cause in any sense. As to the necessity under which Deity exists of acting or creating, this is the

highest form of liberty, it is the freedom of spontaneity, activity without deliberation. His action is not the result of a struggle between passion and virtue. He is free in an unlimited manner the purest spontaneity in man is but the shadow of the freedom of God. He acts freely but not arbitrarily, and with the consciousness of being able to choose the opposite part. He cannot deliberate or will as we do. His spontaneous action excludes at once the efforts and the miseries of will and the mechanical operation of necessity.

The elements found in consciousness are also to be found in the history of humanity and in the history of philosophy. In external nature there are expansion and contraction which correspond to spontaneity and reflection. Ex- ,'!!!?' ternal nature again in contrast with humanity expresses S ophy. ' spontaneity; humanity expresses reflection. In human history the East represents the spontaneous stage; the Pagan and Christian world represent stages of reflection. . This was afterwards modified, expanded and more fully expressed by saying that humanity in its universal development has three principal moments. First, in the spontaneous stage, where reflection is not yet developed, and art is imperfect, humanity has thought only of the immensity around it. It is preoccupied by the infinite. Secondly, in the reflective stage, mind has become an object to itself. It thus knows itself ex- plicitly or reflectively. Its own individuality is now the only or at least the supreme thing. This is the moment of the finite. Thirdly, there comes an epoch in which the self or me is sub- ordinated. Mind realizes another power in the universe. The finite and the infinite become two real correlatives in the relation of cause and product. This is the third and highest stage of development, the relation of the finite and the infinite. As philosophy is but the highest expression of humanity, these three moments will be represented in its history. The East typifies the infinite, Greece the finite or reflective epoch, the modern era the stage of relation or correlation of infinite and finite. In theology, the dominant philosophical idea of each of these epochs results in pantheism, polytheism, theism. In politics we have in correspondence also with the idea, monarchy, democracy, constitutionalism.

Eclecticism thus means the application of the psychological method to the history of philosophy. Confronting the various systems co-ordinated as sensualism, idealism, seep- ticism, mysticism, with the facts of consciousness, the c y* m> result was reached " that each system expresses an order of phenomena and ideas, which is in truth very real, but which is not alone in consciousness, and which at the same time holds an almost exclusive place in the system; whence it follows that each system is not false but incomplete, and that in re-

uniting all incomplete systems, we should have a complete philosophy, adequate to the totality of consciousness.” Philo- sophy, as thus perfected, would not be a mere aggregation of systems, as is ignorantly supposed, but an integration of the truth in each system after the false or incomplete is discarded.

Such is the system in outline. The historical position of the system lies in its relations to Kant, Schelling and Hegel. Cousin Relations was °PP °sed to Kant in asserting that the uncondi- te Kant, tioned in the form of infinite or absolute cause is but Schelling a m ere unrealizable tentative or effort on the part of and Hegel. ˆ jˆˆ something different from a mere negation, yet not equivalent to a positive thought. With Cousin the absolute as the ground of being is grasped positively by the intelligence, and it renders all else intelligible; it is not as with Kant a certain hypothetioal or regulative need.

With Schelling again Cousin agrees in regarding this supreme ground of all as positively apprehended, and as a source of development, but he utterly repudiates Schelling’s method. The intellectual intuition either falls under the eye of conscious- ness, or it does not. If not, how do you know it and its object which are identical? If it does, it comes within the sphere of psychology; and the objections to it as thus a relative, made by Schelling himself, are to be dealt with. Schelling’s intellectual intuition is the mere negation of knowledge.

Again the pure being of Hegel is a mere abstraction, — a hypothesis illegitimately assumed, which he has nowhere sought to vindicate. The very point to be established is the possibility of reaching being per se or pure being; yet in the Hegelian system this is the very thing assumed as a starting-point. Besides this, of course, objections might be made to the method of development, as not only subverting the principle of contradic- tion, but as galvanizing negation into a means of advancing or developing the whole body of human knowledge and reality. The intellectual intuition of Schelling, as above consciousness, the pure being of Hegel, as an empty abstraction, unvindicated, illegitimately assumed, and arbitrarily’ developed, are equally useless as bases of metaphysics. This led Cousin, still holding by essential knowledge of being, to ground it in an analysis of consciousness,— in psychology.

The absolute or infinite — the unconditioned ground and source of all

reality — is yet apprehended by us as an immediate datum ox reality; and it is apprehended in consciousness — under its condition, that, to wit, of distinguishing subject and object, knower and known. The doctrine of Cousin was criticized by Sir W. Hamilton in the Edinburgh Review of 1829, and it was animadverted upon about the same time by Schelling. Hamilton's objections are as follows. The correlation of the ideas of infinite and finite does not necessarily imply their correality, as Cousin supposes; on the contrary, it is a pre- sumption that finite is simply positive and infinite negative of the same — that the finite and infinite are simply contradictory relatives. Of these " the positive alone is real, the negative is only an abstraction of the other, and in the highest generality even an abstraction of thought itself." A study of the few sentences under this head might have obviated the trifling criticism of Hamilton's objection which has been set afloat recently, that the denial of a knowledge of the absolute or in- finite implies a foregone knowledge of it. How can you deny the reality of that which you do not know? The answer to this is that in the case of contradictory statements — A and not A — the latter is a mere negation of the former, and posits nothing; and the negation of a notion with positive attributes, as the finite, does not extend beyond abolishing the given attributes as an object of thought. The infinite or non-finite is not necessarily known, ere the finite is negated, or in order to negate it ; all that needs be known is the finite itself; and the contradictory negation of it implies no positive. Non-organized may or may not correspond to a positive — i.e. an object or notion with qualities contradictory of the organized; but the mere sublation of the organized does not posit it, or suppose that it is known beforehand, or that anything exists corresponding to it. This is one among many flaws in the Hegelian dialectic, and it paralyzes the whole of the Logic. Secondly, the conditions of intelligence, which Cousin allows, necessarily exclude the possibility of know- ledge of the absolute — they are held to be incompatible with its unity. Here Schelling and Hamilton argue that Cousin's absolute is a mere relative. Thirdly, it is objected that in order to deduce

the conditioned, Cousin makes his absolute a relative; for he makes it an absolute cause, i.e. a cause existing absolutely under relation. As such it is necessarily inferior to the sum total of its effects, and dependent for reality on these — in a word, a mere potence or becoming. Further, as a theory of creation, it makes creation a necessity, and destroys the notion of the divine. Cousin made no reply to Hamilton's criticism beyond alleging that Hamilton's doctrine necessarily restricted human knowledge and certainty to psychology and logic, and destroyed meta- physics by introducing nescience and

uncertainty into its highest sphere — theodicy.

The attempt to render the laws of reason or thought impersonal by professing to find them in the sphere of spontaneous appercep- tion, and above reflective necessity, can hardly be regarded as successful. It may be that we first of all //,/s S ™ primitively or spontaneously affirm cause, substance, sophy. time, space, &c, in this way. But these are still in Impersou- each instance given us as realized in a particular form. ˆ.ˆa. In no single act of affirmation of cause or substance, much less in such a primitive act, do we affirm the universality of their application. We might thus get particular instances or cases of these laws, but we could never get the laws themselves in their universality, far less absolute impersonality. And as they are not supposed to be mere generalizations from experience, no amount of individual instances of the application of any one of them by us would give it a true universality. The only sure test we have of their universality in our experience is the test of their reflective necessity. We thus after all fall back on reflection as our ground for their universal application; mere spontaneity of apprehension is futile; their universality is grounded in their necessity, not their necessity in their uni- versality. How far and in what sense this ground of necessity renders them personal are of course questions still to be solved.

But if these three correlative facts are immediately given, it seems to be thought possible by Cousin to vindicate them in reflective consciousness. He seeks to trace the steps which the reason has spontaneously and consciously, but irreflectively, followed. And here the question arises — Can we vindicate in a reflective or mediate process this spontaneous apprehension of reality?

The self is found to be a cause of force, free in its action, on the ground that we are obliged to relate the volition of consciousness to the self as its cause, and its ultimate cause. It is not clear from the analysis whether the self is immediately observed as an acting or originating cause, or whether reflection working on the principle of causality is compelled to infer its existence and character. If self is actually so given, we do not need the principle of causality to infer it; if it is not so given, causality could never give us either the notion or the fact of self as a cause or force, far less as an ultimate one. All that it could do would be to warrant a cause of some sort, but not this or that reality as the cause. And further, the principle of causality, if fairly carried out, as universal and necessary, would not allow us to stop at personality or will as the ultimate cause of its effect — volition. Once applied to the facts at all, it would drive us beyond the first antecedent or term of antecedents of volition to a still further

cause or ground — in fact, land us in an infinite regress of causes.

The same criticism is even more emphatically applicable to the influence of a not-self, or world of forces, corresponding to our sensations, and the cause of them. Starting from sensation as our basis, causality could never give us this, even though it be allowed that sensation is impersonal to the extent of being independent of our volition. Causality might tell us that a cause there is of sensation somewhere and of some sort; but that this cause is a force or sum of forces, existing in space, independently of us, and corresponding to our sensations, it could never tell us, for the simple reason that such a notion is not supposed to exist in our consciousness. Causality cannot add to the number of our notions, — cannot add to the number of realities we know. All it can do is to necessitate us to think that a cause there is of a given change, but what that cause is it cannot of itself inform us, or even suggest to us, beyond implying that it must be adequate

to the effect. Sensation might arise, for aught we know, so far as causality leads us, not from a world of forces at all, but from a will like our own, though infinitely more powerful, acting upon us, partly furthering and partly thwarting us. And indeed such a supposition is, with the principle of causality at work, within the limits of probability, as we are already supposed to know such a reality — a will — in our own consciousness. When Cousin thus set himself to vindicate those points by reflection, he gave up the obvious advantage of his other position that the realities in question are given us in immediate and spontaneous apprehension. The same criticism applies equally to the inference of an absolute cause from the two limited forces which he names self and not-self. Immediate spontaneous apperception may seize this supreme reality; but to vindicate it by reflection as an inference on the principle of causality is impossible. This is a mere paralogism; we can never infer either absolute or infinite from relative or finite.

The truth is that Cousin's doctrine of the spontaneous apper- ception of impersonal truth amounts to little more than a pre- sentment in philosophical language of the ordinary convictions and beliefs of mankind. This is important as a preliminary stage, but philosophy properly begins when it attempts to co- ordinate or systematize those convictions in harmony, to conciliate apparent contradiction and

opposition, as between the correlative notions of finite and infinite, the apparently conflicting notions of personality and infinitude, self and not-self; in a word, to reconcile the various sides of consciousness with each other. And whether the laws of our reason are the laws of all intelligence and being — whether and how we are to relate our fundamental, intellectual and moral conceptions to what is beyond our experience, or to an infinite being — are problems which Cousin cannot be regarded as having solved. These are in truth the outstanding problems of modern philosophy.

Cousin's doctrine of spontaneity in volition can hardly be said to be more successful than his impersonality of the reason through spontaneous apperception. Sudden, unpremeditated volition may be the earliest and the most artistic, but it is not the best. Volition is essentially a free choice between alternatives, and that is best which is most deliberate, because it is most rational. Aristotle touched this point in his distinction between /SoMwjtns and ■Kpoaipecis. The sudden and unpre- meditated wish represented by the former is wholly inferior in character to the free choice of the latter, guided and illumined by intelligence. In this we can deliberately resolve upon what is in our power; in that we are subject to the vain impulse of wishing the impossible. Spontaneity is pleasing, sometimes beautiful, but it is not in this instance the highest quality of the thing to be obtained. That is to be found in a guiding and illumining reflective activity.

Eclecticism is not open to the superficial objection of pro- ceeding without a system or test in determining the complete or incomplete. But it is open to the objection of estimate, assuming that a particular analysis of consciousness has reached all the possible elements in humanity and in history, and all their combinations. It may be asked, Can history have that which is not in the individual consciousness? In a sense not; but our analysis may not give all that is there, and we ought not at once to impose that analysis or any formula on history. History is as likely to reveal to us in the first place true and original elements, and combinations of elements in man, as a study of consciousness. Besides, the tendency of applying a formula of this sort to history is to assume that the elements are developed in a certain regular or necessary order, whereas this may not at all be the case; but we may find at any epoch the whole mixed, either crossing or co-operative, as in the consciousness of the individual himself. Further, the question as to how these elements may possibly have grown up in the general consciousness of mankind is assumed to be non- existent or impossible.

It was the tendency of the philosophy of Cousin to outline things and to fill up the details in an artistic and imaginative interest. This is necessarily the case, especially in the application

to history of all formulas supposed to be derived either from an analysis of consciousness, or from an abstraction called pure thought. Cousin was observational and generalizing rather than analytic and discriminating. His search into principles was not profound, and his power of rigorous consecutive development was not remarkable. He left no distinctive permanent principle of philosophy. But he left very interesting psychological analyses, and several new, just, and true expositions of philo- sophical systems, especially that of Locke and the philosophers of Scotland. He was at the same time a man of impressive power, of rare and wide culture, and of lofty aim, — far above priestly conception and Philistine narrowness. He was familiar with the broad lines of nearly every system of philosophy ancient and modern. His eclecticism was the proof of a reverential sympathy with the struggles of human thought to attain to certainty in the highest problems of speculation. It was eminently a doctrine of comprehension and of toleration. In these respects it formed a marked and valuable contrast to the arrogance of absolutism, to the dogmatism of sensationalism, and to the doctrine of church authority, preached by the theo- logical school of his day. His spirit, while it influenced the youth of France, saved them from these influences. As an educational reformer, as a man of letters and learning, who trod " the large and impartial ways of knowledge," and who swayed others to the same paths, as a thinker influential alike in the action and the reaction to which he led, Cousin stands out conspicuously among the memorable Frenchmen of the 19th century.

Sir W. Hamilton {Discussions, p. 541), one of his most resolute opponents, described Cousin as " A profound and original thinker, a lucid and eloquent writer, a scholar equally at home in ancient and in modern learning, a philosopher superior to all prejudices of age or country, party or profession, and whose lofty eclecticism, seeking truth under every form of opinion, traces its unity even through the most hostile systems."

Bibliography. — J. Barthelemy StHilaire, V. Cousin, sa vie etsa correspondence (3 vols., Paris, 1895) ; H. Hoffding, Hist, of Mod. Phil. ii. 311 (Eng. trans., 1900); C. E. Fuchs, Die Philosophic Victor Cousins (Berlin, 1847); J. Alaux, La Philos. de M. Cousin (Paris, 1864); P. Janet, Victor Cousin et son ceuvre (Paris, 1885); Jules Simon, V.

Cousin (1887) ; Adolphe Franck, Moralistes et philosophes (1872) ; J. P. Damiron, Souvenirs de vingt ans d'enseignement (Paris, 1859); H. Taine in Les Philosophes (Paris, 1868), pp. 79-202.

(J. V.; X.)

COUSIN (Fr. cousin, Ital. cugino, Late Lat. cosinus, perhaps a popular and familiar abbreviation of consobrinus, which has the same sense in classical Latin), a term of relationship. Children of brothers and sisters are to each other first cousins, or cousins- german; the children of first cousins are to each other second cousins, and so on; the child of a first cousin is to the first cousin of his father or mother a first cousin once removed.

The word cousin has also, since the 16th century, been used by sovereigns as an honorific style in addressing persons of exalted, but not equal sovereign, rank, the term " brother " being reserved as the style used by one sovereign in addressing another. Thus, in Great Britain, dukes, marquesses and earls are addressed by the sovereign in royal writs, &c, as " cousin." In France the kings thus addressed princes of the blood royal, cardinals and archbishops, dukes and peers, the marshals of France, the grand officers of the crown and certain foreign princes. In Spain the right to be thus addressed is a privilege of the grandees.

COUSINS, SAMUEL (1801-1887), English mezzotint engraver, was born at Exeter on the 9th of May 1801. He was pre- eminently the interpreter of Sir Thomas Lawrence, his con- temporary. During his apprenticeship to S. W. Reynolds he engraved many of the best amongst the three hundred and sixty little mezzotints illustrating the works of Sir Joshua Reynolds which his master issued in his own name. In the finest of his numerous transcripts of Lawrence, such as " Lady Acland and her Sons," " Pope Pius VII." and " Master Lambton," the distinguishing characteristics of the engraver's work, brilliancy and force of effect in a high key, corresponded exactly with similar qualities in the painter. After the introduction of steel

for engraving purposes about the year 1823, Cousins and his contemporaries were compelled to work on it, because the soft copper previously used for mezzotint plates did not yield a sufficient number of fine impressions to enable the method to compete commercially

against line engraving, from which much larger editions were obtainable. The painter-like quality which distinguished the 18th-century mezzotints on copper was wanting in his later works, because the hardness of the steel on which they were engraved impaired freedom of execution and richness of tone, and so enh anced the labour of scraping that b e accele rated the work by stipple, etching the details instead of scraping them out of the "ground" in the manner of his predecessors. To this "mixed style," previously used by Richard Earlom on copper, Cousins added heavy roulette and rocking-tool textures, tending to fortify the darks, when he found that the "burr" even on steel failed to yield enough fine impressions to meet the demand. The effect of his prints in this method after Reynolds and Millais was mechanical and out of harmony with the picturesque technique of these painters, but the phenomenal popularity which Cousins gained for his works at least kept alive and in favour a form of mezzotint engraving during a critical phase of its history. Abraham Raimbach, the line engraver, dated the decline of his own art in England from the appearance in 1837 of Cousins's print (in the "mixed style") after Landseer's "Bolton Abbey." Such plates as "Miss Peel," after Lawrence (published in 1833); "A Midsummer Night's Dream," after Landseer (1857); "The Order of Release" and "The First Minuet," after Millais (1856 and 1868); "The Strawberry Girl" and "Lavinia, Countess Spencer," after Reynolds; and " Miss Rich," after Hogarth (1873-1877), represent various stages of Cousins's mixed method. It reached its final development in the plates after Millais's "Cherry Ripe" and "Pomona," published in 1881 and 1882, when the invention of coating copper-plates with a film of steel to make them yield larger editions led to the revival of pure mezzotint on copper, which has since rendered obsolete the steel plate and the mixed style which it fostered. The fine draughtsmanship of Cousins was as apparent in his prints as in his original lead-pencil portraits exhibited in London in 1882. In 1885 he was elected a full member of the Royal Academy, to which institution he later gave in trust £15,000 to provide annuities for superannuated artists who had not been so successful as himself. One of the most important figures in the history of British engraving, he died in London, unmarried, on the 7th of May 1887.

See George Pycroft, M.R.C.S.E., Memoir of Samuel Cousins, R.A., Member of the Legion of Honour (published for private circulation by E. E. Leggatt, London, 1899); Algernon Graves, Catalogue of the Works of Samuel Cousins, R.A. (published by H. Graves and Co., London, 1888); and Alfred Whitman, Samuel Cousins (published by George Bell & Sons, London, 1904), which contains a catalogue, good illustrations, and much detail useful to the collector and dealer. (G. P.

R.)

COUSTOU, the name of a famous family of French sculptors.

Nicolas Coustou (1658-1733) was the son of a wood-carver at Lyons, where he was born. At eighteen he removed to Paris, to study under C. A. Coysevox, his mother's brother, who presided over the recently-established Academy of Painting and Sculpture; and at three-and-twenty he gained the Colbert prize, which entitled him to four years' education at the French Academy at Rome. He afterwards became rector and chancellor of the Academy of Painting and Sculpture. From the year 1700 he was a most active collaborator with Coysevox at the palaces of Marly and Versailles. He was remarkable for his facility; and though he was specially influenced by Michelangelo and Algardi, his numerous works are among the most typical speci- mens of his age now extant. The most famous are "La Seine et la Marne," "La Saone," the "Berger Chasseur" in the gardens of the Tuiieries, the bas-relief "Le Passage du Rhin" in the Louvre, and the " Descent from the Cross " placed behind the choir altar of Notre Dame at Paris.

His younger brother, Guillaume Coustou (1677-1746), was a sculptor of still greater merit. He also gained the Colbert prize; but refusing to submit to the rules of the Academy, he

soon left it, and for some time wandered houseless through the streets of Rome. At length he was befriended by the sculptor Legros, under whom he studied for some time. Returning to Paris, he was in 1704 admitted into the Academy of Painting and Sculpture, of which he afterwards became director; and, like his brother, he was employed by Louis XIV. , His finest works are the famous group of the "Horse Tamers," originally at Marly, now in the Champs Elysees at Paris, the colossal group "The Ocean and the Mediterranean" at Marly, the bronze "Rhone" which formed part of the statue of Louis XIV. at Lyons, and the sculptures at the entrance of the Hotel des Invalides. Of these latter, the bas-relief representing Louis XIV. mounted and accompanied by Justice and Prudence was destroyed during the Revolution, but was restored in 1815 by Pierre Cartellier from Coustou's model; the bronze figures of Mars and Minerva, on either side of the doorway, were not interfered with.

Another Guillaume Coustou (1716-1777), the son of Nicolas, also studied at Rome, as winner of the Colbert prize. While to a great extent a copyist of his predecessors, he was much affected by the bad taste of his time, and produced little or nothing of permanent value.

See Louis Gougenot, LXloge de M. Coustou le jeune (1903) ; Arsene Houssaye, Histoire de I'art francais au XVIII' siecle (i860); Lady Dilke, Gazette des beaux-arts, vol. xxv. (1901) (2 articles).

COUTANCES, WALTER OF (d. 1207), bishop of Lincoln and archbishop of Rouen, commenced his career in the chancery of Henry II., was elected bishop of Lincoln in 1182, and in 1184 obtained, with the king's help, the see of Rouen. Throughout his career he was much employed in diplomatic and administra- tive duties. He started with Richard I. for the Third Crusade, but was sent back from Messina to investigate the charges which the barons and the official class had brought against the chan- cellor, William Longchamp. There was no love lost between the two; and they were popularly supposed to be rivals for the see of Canterbury. The archbishop of Rouen sided with the barons and John, and sanctioned Longchamp 's deposition — a step which was technically warranted by the powers which Richard had given, but by no means calculated to protect the interests of the crown. The Great Council now recognized the archbishop as chief justiciar, and he remained at the head of the government till 1193, when he was replaced by Hubert Walter. The archbishop did good service in the negotiations for Richard's release, but subsequently quarrelled with his master and laid Normandy under an interdict, because the border stronghold of Chateau Gaillard in the Vexin had been built on his land without his consent. After Richard's death the archbishop accepted John as the lawful heir of Normandy and consecrated him as duke. But his personal inclinations leaned to Arthur of Brittany, whom he was with difficulty dissuaded from support- ing. The archbishop accepted the French conquest of Normandy with equanimity (1204), although he kept to his old allegiance while the issue of the struggle was in doubt. He did not long survive the conquest, and his latfer history is a blank.

See W. Stubbs's editions of Benedictus A bbas, Hoveden and Diceto (Rolls series) ; R. Hewlett's edition of " William of Newburgh " and " Richard of Devizes " in Chronicles, &C, of the Reigns of Stephen, Henry II. and Richard I. (Rolls series). See also the preface to the third volume of Stubbs's Hoveden, pp. lix.-xeviii. ; J. H. Round's Commune of London, and the French poem on Guillaume le Marechal (ed. P. Meyer, Soc. de V Histoire de France). (H. W. C. D.)

COUTANCES, a town of north-western France, capital of an arrondissement of the department of Manche, 7 m. E. of the English Channel and 58 m. S. of Cherbourg on the Western railway. Pop. (1906) 6089. Coutances is beautifully situated on the right bank of the Soulle on a granitic eminence crowned by the celebrated cathedral of

Notre-Dame. The date of this church has been much disputed, but while traces of Romanesque architecture survive, the building is, in the main, Gothic in style and dates from the first half of the 13th century. The slender turrets massed round the western towers and the octagonal central tower, which forms a lantern within, are conspicuous features of the church. In the interior, which comprises the

nave with aisles, transept and choir with ambulatory and side chapels, there are fine rose-windows with stained glass of the 14th century, and other works of art. Of the other buildings of Coutances the church of St Pierre, in which Renaissance archi- tecture is mingled with Gothic, and that of St Nicolas, of the 16th and 1 7th centuries, demand mention. There is an aqueduct of the 14th century to the west of the town. Coutances is a quiet town with winding streets and pleasant boulevards bordering it on the east; on the western slope of the hill there is a public garden. The town is the seat of a bishop, a court of assizes and a sub-prefect; it has tribunals of first instance and of commerce, a lycee for boys, a communal college and a training college for girls, and an ecclesiastical seminary. Leather-dressing and wool-spinning are carried on and there is trade in live-stock, in agricultural produce, especially eggs, and in marble.

Coutances is the ancient Cosedia, which before the Roman conquest was one of the chief towns in the country of the Unelli. Towards the end of the 3rd century its name was changed to Constantia, in honour of the emperor Constantius Chlorus, who fortified it. It became the capital of the pagus Constantinus (Cotentin), and in the middle ages was the seat of a viscount. It has been an episcopal see since the 5th century. In the 17th century it was the centre of the revolt of the Nu-pieds, caused by the imposition of the salt- tax (gabelle).

A good bibliography of general works and monographs on the archaeology and the history of the town and diocese of Coutances is given in U. Chevalier, Repertoire des sources, &c, Topo-Biblio- graphie (Montbeliard, 1894-1899), s.v.

COUTHON, GEORGES (1755-1794), French revolutionist, was born at Orcet, a village in the district of Clermont in Auvergne. He studied law, and was admitted advocate at Clermont in 1785. At this period he was noted for his integrity, gentle-heartedness and charitable

disposition. His health was feeble and both legs were paralysed. In 1787 he was a member of the provincial assembly of Auvergne. On the outbreak of the Revolution Couthon, who was now a member of the munici- pality of Clermont-Ferrand, published his L' Aristocrate eonverti, in which he revealed himself as a liberal and a champion of constitutional monarchy. He became very popular, was ap- pointed president of the tribunal of the town of Clermont in 1 791, and in September of the same year was elected deputy to the Legislative Assembly. His views had meanwhile been embittered by the attempted flight of Louis XVI., and he distinguished himself now by his hostility to the king. A visit to Flanders for the sake of his health brought him into close intercourse and sympathy with Dumouriez. In September 1792 Couthon was elected member of the National Convention, and at the trial of the king voted for the sentence of death without appeal. He hesitated for a time as to which party he should join, but finally decided for that of Robespierre, with whom he had many opinions in common, especially in matters of religion. He was the first to demand the arrest of the proscribed Girondists. On the 30th of May 1 793 he became a member of the Committee of Public Safety, and in August was sent as one of the commissioners of the Convention attached to the army before Lyons. Impatient at the slow progress made by the besieging force, he decreed a levee en masse in the department of Puy-de-D6me, collected an army of 60,000 men, and himself led them to Lyons. When the city was taken, on the 9th of October 1793, although the Convention ordered its destruction, Couthon did not carry out the decree, and, showed moderation in the punishment of the rebels. The Republican atrocities began only after Couthon was replaced, on the 3rd of November 1793, by Collot d'Herbois. Couthon returned to Paris, and on the 21st of December was elected president of the Convention. He contributed to the prosecution of the Hebertists, and was responsible for the law of the 22nd Prairial, which in the case of trials before the Revolu- tionary Tribunal deprived the accused of the aid of counsel or of witnesses or their defence, on the pretext of shortening the proceedings. During the crisis preceding the 9th Thermidor, Couthon showed considerable courage, giving up a journey to Auvergne in order, as he wrote, that he might either die or

triumph with Robespierre and liberty. Arrested with Robes- pierre and Saint-Just, his colleagues in the triumvirate of the Terror, and subjected to indescribable sufferings and insults, he was taken to the scaffold on the same cart with Robespierre on the 28th of July 1794 (10th Thermidor).

See Fr. Mege, Correspondance de Couthon . . . suivie de " I' Aristo-

crate eonverti," comedie en deux actes de Couthon (Paris, 1872) ; and Nouveaux Documents sur Georges Couthon (Clermont-Ferrand, 1890); also F. A. Aulard, Les Orateurs de la Legislative et de la Convention (Paris, 1885-1886), ii. 425-443.

COUTTS, THOMAS (1735-1822), English banker and founder of the banking house of Coutts & Co., was born on the 7th of September 1735. He was the fourth son of John Coutts (1699- 1751), who carried on business in Edinburgh as a corn factor and negotiator of bills of exchange, and who in 1742 was elected lord provost of the city. The family was originally of Montrose, but one of its members had settled at Edinburgh about 1696. Soon after the death of John Coutts the business was divided into two branches, one carried on in Edinburgh, the other in London. The banking business in London was in the hands of James and Thomas Coutts, sons of John Coutts. From the death of his brother in 1778, Thomas, as surviving partner, became sole head of the firm; and under his direction the banking house rose to the highest distinction. His ambition was to establish his character as a man of business and to make a fortune; and he lived to succeed in this aim and long to enjoy his reputation and wealth. A gentleman in manners, hospitable and benevolent, he counted amongst his friends some of the literary men and the best actors of his day. Of the enormous wealth which came into his hands he made munificent use. His private life was not without its romantic elements. Soon after his settlement in London he married Elizabeth Starkey, a young woman of humble origin, who was in attendance on the daughter of his brother James. They lived happily together, and had three daughters — Susan, married in 1796 to the 3rd earl of Guilford; Frances, married in 1800 to John, 1st marquess of Bute; and Sophia, married in 1793 to Sir Francis Burdett. Mrs Coutts dying in 181 5, her husband soon after married the popular actress, Harriet Mellon; and to her he left the whole of his immense fortune. He died in London on the 24th of February 1822. His widow married in 1827 the 9th duke of St Albans, and died ten years later, having bequeathed her property to Angela, youngest daughter of Sir Francis Burdett, who then assumed the additional name and arms of Coutts. In 1871 this lady was created Baroness Burdett-Coutts (q.v.).

See C. Rogers, Genealogical Memoirs of the Families of Colt and Coutts (1879); and R. Richardson, Coutts & Co. (1900).

COUTURE, THOMAS (1815-1879), French painter, was born at Senlis (Oise), and studied under Baron A. J. Gros and Paul Delaroche, winning a Prix de Rome in 1837. He began exhibiting historical and genre pictures at the Salon in 1840, and obtained several medals. His

masterpiece was his “Romans in the Decadence of the Empire” (1847), now in the Luxembourg; and his “Love of Money ” (1844; at Toulouse), “Falconer” (1855), and “Damocles” (1872), are also good examples.

COUVADE (literally a “brooding,” from Fr. couver, to hatch, Lat. cubare, to lie down), a custom so called in Beam, prevalent among several peoples in different parts of the world, requiring that the father, at and sometimes before the birth of his child, shall retire to bed and fast or abstain from certain kinds of food, receiving the attentions generally shown to women at their confinements. The existence of the custom in ancient classical times is testified to by Apollonius Rhodius, Diodorus (who refers to its existence among the Corsicans), and Strabo (who noticed it among the Spanish Basques, by whom, as well as by the Gascons, it has been said to be still observed, though the most recent researches entirely discredit this). Travellers, from the time of Marco Polo, who relates its observance in Chinese Turkestan, have found the custom to prevail in China, India, Borneo, Siam, Africa and the Americas. Even in Europe it cannot be said to have entirely disappeared. In certain of the Baltic provinces of Russia the husband, on the lying-in of the wife, takes to his bed and groans in mock pain. One writer believes he found traces of

it in the little island of Marken in the Zuyder Zee. Even in rural England, notably in East Anglia, a curiously obstinate belief survives (the prevalence of which in earlier times is proved by references to it in Elizabethan drama) that the pregnancy of the woman affects the man, and the young husband who complains of a toothache is assailed by pleasantries as to his wife’s condition. In Guiana the custom isobserved in its most typical form. The woman works to within a few hours of the birth, but some days before her delivery the father leaves his occupations and abstains from certain kinds of animal food lest the child should suffer. Thus the flesh of the agouti is forbidden, lest the child should be lean, and that of the capibara or water-cavy, for fear he should inherit through his father’s gluttony that creature’s projecting teeth. A few hours before delivery the woman goes alone, or with one or two women-friends, into the forest, where the baby is born She returns as soon as she can stand, to her work, and the man then takes to his hammock and becomes the invalid. He must do no work, must touch no weapons, is forbidden all meat and food, except at first a fermented liquor and after the twelfth day a weak gruel of

cassava meal. He must not even smoke, or wash himself, but is waited on hand and foot by the women. So far is the comedy carried that he whines and groans as if in actual pain. Six weeks after the birth of the child he is taken in hand by his relatives, who lacerate his skin and rub him with a decoction of the pepper-plant. A banquet is then held from which the patient is excluded, for he must not leave his bed till several days later; and for six months he must eat the flesh of neither fish nor bird. Almost identical ceremonies have been noticed among the natives of California and New Mexico; while in Greenland and Kamchatka the husband may not work for some time before and after his wife's confinement. Among the Larkas of Bengal a period of isolation and uncleanness, syn- chronous with that compulsory on the woman, is imperative for the man, on the conclusion of which the child's parentage is publicly proclaimed.

No certain explanation can be offered for the custom. The most reasonable view is that adopted by E. B. Tylor, who traces in it the transition from the earlier matriarchal to the later patriarchal system of tribe-organization. Among primitive tribes, and probably in all ages, the former order of society, in which descent and inheritance are reckoned through the mother alone, as being the earliest form of family life, is and was very common, if not universal. The acknowledgment of a relation- ship between father and son is characteristic of the progress of society towards a true family life. It may well be that the Couvade arose in the father's desire to emphasize the bond of blood between himself and his child. It is a fact that in some countries the father has to purchase the child from its mother; and in the Roman ceremony of the husband raising the baby from the floor we may trace the savage idea that the male parent must formally proclaim his adoption of and responsibility for the offspring. Max Muller, in his Chips from a German Workshop, endeavoured to find an explanation in primitive " henpecking," asserting that the unfortunate husband was tyrannized over by " his female relatives and afterwards frightened into superstition," — that, in fact, the whole fabric of ceremony is reared on nothing but masculine hysteria; but this theory can scarcely be taken seriously. The missionary, Joseph Francois Lafitau, suspected a psychological reason, assuming the custom to be a dim recollec- tion of original sin, the isolation and fast types of repentance. The explanation of the American Indians is that if the father engaged in any hard or hazardous work, e.g. hunting, or was careless in his diet, the child would suffer and inherit the physical faults and peculiarities of the animals eaten. This belief that a person becomes possessed of the nature and form of the animal he eats is widespread, being as prevalent in the Old World as in the Neft, but it

is insufficient to account for the minute ceremonial details of La Couvade as practised in many lands. It is far more likely that so universal a practice has no trivial beginnings, but is to be considered as a mile-stone marking a great transitional epoch in human progress.

AUTHORITIES. — E. B. Tylor's Early History of Man (1865; 2nd

ed. p. 301); F. Max Muller, Chips from a German Workshop (1868-1875), ii. 281; Lord Avebury, Origin of Civilisation (1900); Brett's Indian Tribes of Guiana; Johann Baptist von Spix and Karl F. P. von Martius, Travels in Brazil (1823-1831), ii. 281; J. F. Lafitau, Mosurs des sauvages americains (1st ed., 1724) ; W. Z. Ripley, Races of Europe (1900); A. H. Keane's Ethnology (1896), p. 368 and footnote; A. Giraud-Teulon, Les Origines du mariage et de la famille (Paris, 1884).

COVE, a word mostly used in the sense of a small inlet or sheltered bay in a coast-line. In English dialect usage it is also applied to a cave or to a recess in a mountain-side. The word in O. Eng. is cofa, and cognate forms are found in the Ger. Koben, Norwegian kove, and in various forms in other Teutonic languages. ' It has no connexion with "alcove," recess in a room or building, which is derived through the Span, alcoba from Arab. al, the, and qubbah, vault, arch, nor with "cup" or "coop," nor with "cave" (Lat. cava). The use of the word was first confined to a small chamber or cell or inner recess in a room or tfuilding. From this has come the particular application in architecture to any kind of concave moulding, the term being usually applied to the quadrantal curve rising from the cornice of a lofty room to the moulded borders of the horizontal ceiling. The term "coving" is given in half-timbered work to the curved soffit under a projecting window, or in the 18th century to that occasionally found carrying the gutter of a house. In the Musee Plantin at Antwerp the hearth of the fireplace of the upper floor is carved on coving, which forms part of the design of the chimney-piece in the room below. The slang use of "cove" for any male person, like a "fellow," "chap," &c, is found in the form "cofe" in T. Harman's Caveat for Cursetors (1587) and other early quotations. This seems to be identical with the Scots word "cofe," a pedlar, hawker, which is formed from "coff," to sell, purchase, cognate with the Ger. kaufen, to buy, and the native English "cheap." The word "cove," therefore, is in ultimate origin the same as " chap," short for "chapman," a pedlar.

COVELLITE, a mineral species consisting of cupric sulphide, CuS, crystallizing in the hexagonal system. It is of less frequent occurrence in nature than copper-glance, the orthorhombic cuprous sulphide.

Crystals are very rare, the mineral being usually found as compact and earthy masses or as a blue coating on other copper sulphides. Hardness I5-2; specific gravity 4-6. The dark indigo-blue colour is a characteristic feature, and the mineral was early known as indigo-copper (Ger. Kupferindig) . The name covellite is taken from N. Covelli, who in 1839 observed crystals of cupric sulphide encrusting Vesuvian lava, the mineral having been formed here by the interaction of hydrogen sulphide and cupric chloride, both of which are volatile volcanic products. Covellite is, however, more commonly found in copper-bearing veins, where it has resulted by the alteration of other copper sulphides, namely chalcopyfite, copper-glance and erubescite. It is found in many copper mines; localities which may be specially mentioned are Sangerhausen in Prussian Saxony, Butte in Montana, and Chile; in the Medicine Bow Mountains of Wyoming a platiniferous covellite is mined, the platinum being present as sperrylite (platinum arsenide). (L. J. S.)

COVENANT (an 0. Fr. form, later convenant, from convenir, to agree, Lat. convenire), a mutual agreement of two or more parties, or an undertaking made by one of the parties. In the Bible the Hebrew word ma, berUh, is used widely for many kinds of agreements; it is then applied to a contract between two persons or to a treaty between two nations, such as the covenant made between Abimelech and Isaac, representing p treaty between the Israelites and the Philistines (Gen. xxvi. 26 seq.); more particularly to an engagement made between God and men, or such agreements as, by the observance of a religious rite, regarded God as a party to the engagement. Two suggestions have been made for the derivation of tenth: (ii tracing the word from a root “to cut,” and the reference is to the primitive rite of cutting victims into parts, between which the parties to an agreement passed, cf. the Greek Spiaa. reiivav, and the account (Gen. xv. 17) of the covenant between God and Abraham, where “a smoking furnace and burning lamp passed

between the pieces” of the victims Abraham had sacrificed; (2) connecting it with an Assyrio-Babylonian biritu, fetter, alliance. Birith was translated in the Septuagint by hadr\Kr\, which in classical Greek had the meaning of “will”; hence the Vulgate, in the Psalms and the New Testament, translates the word by testamentum, but elsewhere in the Old Testament by foedus or pactum; similarly Wy cliff e’s version gives “testa- ment” and “covenant” respectively. The books of

Scripture dealing with the old or Mosaic, and new or Christian dispensation are sometimes known as the Books of the Old and the New Covenant. The word appears in the system of theology developed by Johannes Cocceius (q.v.), and known as the “Covenant” or ” Federal ” Theology, based on the two Covenants of Works or Life made by God with Adam, on condition of obedience, and of grace or redemption, made with Christ. In Scottish ecclesiastical history, covenant appears in the two agreements signed by the members of the Scottish Church in defence of their religious and ecclesiastical systems (see Covenanters).

COVENANT, in law, is the English equivalent of the Lat. convenlio, which, although not technical, was the most general word in Roman law for ” agreement.” It was frequently used along with pactum, also a general term, but applied especially to agreements to settle a question without carrying it before the courts of law.

The word ” covenant ” has been used in a variety of senses in English law.

1. In its strict sense, covenant means an agreement under seal, that something has or has not already been done, or shall or shall not be done hereafter (Shep. Touchstone, 160, 162). It is most commonly used with reference to sales or leases of land, but is sometimes applied to any promise or stipulation, whether under seal or not. The person who makes, and is bound to perform, the promise or stipulation is the covenantor: the person in whose favour it is made is the covenantee.

2. Covenants have been subdivided into numerous classes, only a few of which need to be described. It is unnecessary to do more than mention affirmative, and negative covenants, joint or several, alternative or disjunctive covenants, dependent or independent covenants. As to collateral covenants, covenants ” running with the land,” and covenants in leases (including “usual,” “proper” and “restrictive” covenants), see Land- lord and Tenant. But there are other classes as to which something must be said.

A covenant is said to be express when it is created by the express words of the parties to the deed declaratory of their intention. It is not indispensable that the word ” covenant ” should be used. Any word which clearly indicates the intention of the parties to covenant will suffice. An implied covenant, ox covenant in law, ” depends for its existence on the intendment and construction of law. There are some words which of them- selves do not import an express covenant, yet, being made use of in certain contracts, have a similar operation and

are called covenants in law; and they are as effectually binding on the parties as if expressed in the most unequivocal terms ” (Piatt on Covenants, p. 40). Thus, the word “demise,” used in a lease of deed, raises the implication of a covenant both for “quiet enjoyment” and for title to let; and it has been judicially suggested that a covenant for quiet enjoyment may be implied from any word or words of like import (Budd-Scott v. Daniell, 1902, 2 K.B. p. 359). The Conveyancing Act 1881 provides (§ 7) that in a conveyance for valuable consideration, other than a mortgage, there shall be implied, as against the person who conveys and is expressed to convey as ” beneficial owner,” certain qualified covenants — i.e. covenants extending only to the acts or omissions of the vendor, persons through whom he derives title otherwise than by purchase for value, and persons claiming under them — for “right to convey,” “quiet enjoyment,” ” freedom from incumbrances ” and “further assurance.” Of these statutory covenants for title the only one which requires explanation is the covenant for further assurance. It imports an agreement on the part of the covenantor to do such reasonable acts, in addition to those already performed, as may be necessary

for the completion of the transfer made (or intended to be made) at the requirements of the covenantee (Piatt on Covenants, p. 341). All these statutory implied covenants “run with the land” (see Landlord and Tenant). Where a mortgagor conveys, and is expressed to convey, as ” beneficial owner,” there are implied absolute covenants — i.e. covenants amounting to a warranty against and for the acts and’ omissions of the whole world — that he has a right to convey, that the mortgagee shall have quiet enjoyment of the property after default, free from incumbrances and for further assurance. Special provisions as to implied covenants by the lessor in leases are made in England by § 7 (B) of the Conveyancing Act 1881 and in Ireland by the Land Act (Ireland) i860, § 41. The distinction between real and personal covenants is that the former do, while the latter do not, run with the land. An inherent covenant is another name for a real covenant (Shep. Touchstone, 176; Piatt, 60). When a covenant relates to an act already done, it is usually termed a covenant executed; where the performance is future, the covenant is termed executory. The covenant for seisin was an assurance to the grantee that the grantor had the estate which he purported to convey. In England it is now included in the covenant for right to convey; but is still in separate use in several states in America. The covenant to stand seised to uses was an assurance by means of which, under the Statute of Uses [1536] (see Uses), a conveyance of an estate might be effected. When such a covenant is made, the legal estate in the land passes at once to the covenantee

under the statute. The consideration for the covenant must be relationship by blood or marriage. It is still occasionally though very rarely employed. The covenant not to sue belongs to the law of contract and needs no explantion.

Most of the classes of covenants above mentioned are in use in the United States. In New York, Michigan, Minnesota, Oregon, Wisconsin and Wyoming the implication of covenants for title has been, with certain exceptions, prohibited by statute. In Alabama, Arkansas, Delaware, Illinois, Indiana, Mississippi, Missouri, Montana, Nevada, New Mexico, Pennsylvania and Texas the words grant, bar- gain and sell, in conveyances in fee, unless specially restricted, amount to qualified covenants that the grantor was seised in fee, free from incumbrances, and for quiet enjoyment (4 Kent, Commentaries, § 473 ; Bouvier, Law Dictionary, s.v. Covenant). In some of the states a covenant of non-claim, or of warranty, an assurance by the grantor that neither he nor his heirs, nor any other person shall claim any title in the premises conveyed, is in general use.

3. An action of covenant lay for breaking covenant. As to the history of this action see Pollock and Maitland, History of English Law, ii. 106; and Holmes, The Common Law, p. 272. There was also a writ of covenant. But this remedy had fallen into disuse before 1830 (see Piatt on Covenants, p. 543), and was abolished by the Common Law Procedure Acts. Since the Judicature Acts, an action on a covenant follows the same course as, and is indistinguishable from, any ordinary action for breach of contract. The remedy is by damages, decree of specific performance or injunction to prevent the breach.

The term ” covenant ” is unknown to Scots law. But its place is filled to some extent by the doctrine of ” warrandice.” Many of the British colonies have legislated, as to the implication of covenants for title, on the lines of the English Conveyancing Act 1881 ; e.g. Tasmania, Conveyancing and Law of Property Act 1884 (47 Vict. No. 10).

As to covenants in restraint of trade see Restraint.

Authorities. — In addition to the authorities cited in the text see: English Law; Goodeve, Law of Real Property (5th ed., London, 1906) ; C. Foa, Landlord and Tenant (3rd ed., London, 1901) ; Hamilton, Law of Covenants (London) ; Fawcett, Law of Landlord and Tenant (3rd ed., London, 1905). American Law: Rawle, Law of Covenants for Title (Boston, 1887); Encyclopaedia of American. Law (3rd ed., 1890), vol. viii., tit. ” Covenants.” (A. W. R.)

COVENANTERS, the name given to a party which, originating in the Reformation movement, played an important part in the history of Scotland, and to a lesser extent in that of England, during the 17 th century. The Covenanters were thus named because in a series of bands or covenants they bound themselves to maintain the Presbyterian doctrine and polity as the sole religion of their country. The first “godly band” is dated December 1557; but more important is the covenant of 1581, drawn up by John Craig in consequence of the strenuous efforts

which the Roman Catholics were making to regain their hold upon Scotland, and called the King’s Confession or National Covenant. Based upon the Confession of Faith of 1560, this document denounced the pope and the doctrines of the Roman Catholic Church in no measured terms. It was adopted by the General Assembly, signed by King James VI. and his household, and enjoined on persons of all ranks and classes; and was again subscribed in 1590 and 1596. In 1637 Scotland was in a state of turmoil. Charles I. and Archbishop Laud had just met with a reverse in their efforts to impose the English liturgy upon the Scots; and fearing further measures on the part of the king, it occurred to Archibald Johnston, Lord Warriston, to revive the National Covenant of 1581. Additional matter intended to suit the document to the special circumstances of the time was added, and the covenant was adopted and signed by a large gathering in Greyfriars’ churchyard, Edinburgh, on the 28th of February 1638, after which copies were sent throughout the country for additional signatures. The subscribers engaged by oath to maintain religion in the state in which it existed in 1580, and to reject all innovations introduced since that time, while professed expressions of loyalty to the king were added. The General Assembly of 1638 was composed of ardent Covenanters, and in 1640 the covenant was adopted by the parliament, and its subscription was required from all citizens. Before this date the Covenanters were usually referred to as Supplicants, but from about this time the former designation began to prevail.

A further development took place in 1643. The leaders of the English parliament, worsted in the Civil War, implored the aid of the Scots, which was promised on condition that the Scottish system of church government was adopted in England. After some haggling a document called the Solemn League and Covenant was drawn up. This was practically a treaty between England and Scotland for the preservation

of the reformed religion in Scotland, the reformation of religion in England and Ireland “according to the word of God and the example of the best reformed churches,” and the extirpation of popery and prelacy. It was subscribed by many in both kingdoms and also in Ireland, and was approved by the English parliament, and with some slight modifications by the Westminster Assembly of Divines. Charles I. refused to accept it when he surrendered himself to the Scots in 1646, but he made important concessions in this direction in the ” Engagement ” made with the Scots in December 1647. Charles II. before landing in Scotland in June 1650 declared by a solemn oath his approbation of both covenants, and this was renewed on the occasion of his coronation at Scone in the following January.

From 1638 to 1651 the Covenanters were the dominant party in Scotland, directing her policy both at home and abroad. Their power, however, which had been seriously weakened by Cromwell’s victory at Dunbar in September 1651, was practically destroyed when Charles II. was restored nine years later. Firmly seated upon the throne Charles renounced the covenants, which in 1662 were declared unlawful oaths, and were to be abjured by all persons holding public offices. Episcopacy was restored, the court of high commission was revived, and ministers who refused to recognize the authority of the bishops were expelled from their livings. Gathering around them many of the Covenanters who clung tenaciously to their standards of faith, these ministers began to preach in the fields, and a period of persecution marked by savage hatred and great brutality began. Further oppressive measures were directed against the Covenanters, who took up arms about 1665, and the struggle soon assumed the proportions of a rebellion. The forces of the crown under John Graham of Claverhouse and others were sent against them, and although the insurgents gained isolated successes, in general they were worsted and were treated with great barbarity. They maintained, however, their cherished covenants with a zeal which persecution only intensified; in 1680 the more extreme members of the party signed a document known as the ” Sanquhar Declaration,” and were afterwards called Cameronians from the name of their leader, Richard Cameron {q.v.). They renounced their allegiance to King James

and were greatly disappointed when their standards found no’ place in the religious settlement of 1689, continuing to hold the belief that the covenants should be made obligatory upon the entire nation. The Covenanters had a martyrology of their own, and the halo of romance has been cast around their exploits and their sufferings. Their story, however, especially during the time of their political predominance, is part of the general history of Scotland (q.v.).

The texts of the National Covenant and the Solemn League and Covenant are printed in S. R. Gardiner's Constitutional Documents of the Puritan Revolution (Oxford, 1899). See also J. H. Burton, History of Scotland (Edinburgh, 1905) ; A. Lang, History of Scotland (Edinburgh, 1900) ; S. R. Gardiner, History of England (London, 1883-1884) ; G. Grub,' Ecclesiastical History of Scotland (Edinburgh. ' 1861); J. Maepherson, History of the Church in Scotland (Paisley, 1901); and J. K. Hewison, The Covenanters (1908).

COVENT GARDEN, formerly an open space north of the Strand, London, England, now occupied by the principal flower, fruit and vegetable market in the metropolis. This was originally the so-called " cdnvent garden " belonging to the abbey of St Peter, Westminster. In the first half of the 17th century the site of the garden was laid out as a square by Inigo Jones, with a piazza on two sides; and as early as 1656 it was becoming a market place for the same commodities as are now sold in it. Co vent Garden Theatre (1858) is the chief seat of grand opera in London. The site has carried a theatre since 1733, but earlier buildings were burnt in 1809 and 1856.

COVENTRY, SIR JOHN (d. 1682), son of John Coventry, the second son of Thomas, Lord Keeper Coventry, was returned to the Long Parliament in 1640 as member for Evesham. During the Civil War he served for the king, and at the Restoration was created a knight. In 1667, and in the following parliaments of 1678, 1679 and 1681, he was elected for Weymouth, and opposed the government. On the 21st of December 1670, owing to a jest made by Coventry in the House of Commons on the subject of the king's amours, Sir Thomas Sandys, an officer of the guards, with other accomplices, by the order of Monmouth, and (it was said) with the approval of. the king himself, waylaid him as he was returning home to Suffolk Street and slit his nose to the bone. The outrage created an extraordinary sensation, and in conse- quence a measure known as the " Coventry Act " was passed, declaring assaults accompanied by personal mutilation a felony without benefit of clergy. Sir John died in 1682. Sir William Coventry, his uncle, speaks slightingly of him, ridicules his vanity and wishes him out of the House of Commons to be " out of harm's way."

COVENTRY, THOMAS COVENTRY, ist Baron (1578-1640), lord keeper of England, eldest son of Sir Thomas Coventry, judge of the common pleas (a descendant of John Coventry, lord mayor of London in the reign of Henry VI.) , and of Margaret Jeffreys of Earls Croome, or Croome D'Abitot, in Worcestershire, was born in 1578. He entered Balliol College, Oxford, in 1592, and the Inner Temple in 1594, becoming bencher of the society in 1614, reader in 1616, and holding the office of treasurer from 1617 till 1621. His exceptional legal abilities were rewarded early with official promotion. On the 16th of November 1616 he was made recorder of London in spite of Bacon's opposition, who, although allowing him to be " a well trained and an honest man," objected that he was " bred by my Lord Coke and seasoned in his ways." a On the 14th of March 1617 he was appointed solicitor-general and was knighted; was returned for Droitwich to the parliament of 1621; and on the nth of January in that year was made attorney-general. He took part in the proceedings against Bacon for corruption, and was manager for the Commons in the impeachment of Edward Floyd for insulting the elector and electress palatine.

On the ist of November 1625 he was made lord keeper of the great seal; in this capacity he delivered the king's reprirnand to the Commons on the 29th of March 1626, when he declared that " liberty of counsel " alone belonged to them and not " liberty of control." On the 10th of April 1628 he received the title of Baron Coventry of Aylesborough in Worcestershire. At the 1 Spedding's Bacon, vi. 97.

opening of parliament in 1628 he threatened that the king would use his prerogative if further thwarted in the matter of supplies. In the subsequent debates, however, while strongly supporting the king's prerogative against the claims of the parliament to executive power, he favoured a policy of modera- tion and compromise. He defended the right of the council to commit to prison without showing cause, and to issue " general " warrants; though he allowed it should only be employed in special circumstances, disapproved of the king's sudden dis- solution of parliament, and agreed to the liberation on bail of the seven imprisoned members on condition of their giving security for their good behaviour. He showed less subservience than Bacon to Buckingham, and his resistance to the latter's pretensions to the office of lord high constable greatly incensed the duke. Buckingham taunted Coventry with having gained his place by his favour; to which the lord keeper replied, " Did I conceive I had my place by your favour, I would presently unmake myself by returning the seal to his Majesty." 1 After this defiance Buckingham's sudden death alone probably prevented Coventry's displacement. He passed sentence of death on Lord Audley in 163 1, drafted and enforced the proclamation of the 20th of June 1632 ordering the country gentlemen to leave London, and in 1634 joined in Laud's attack on the earl of Portland for pecula- tion. The same year, in an address to the judges, he supported the proposed levy of ship-money on the inland as well as the maritime counties on the plea of the necessity of effectually arming, " so that they might not be enforced to fight," " the wooden walls " being in his opinion " the best walls of this kingdom." 2 In the Star Chamber Coventry was one of Lilburne's judges in 1637, but he generally showed conspicuous moderation, inclining to leniency in the cases of Richard Chambers in 1629 for seditious speeches, and of Henry Sherfield in 1632 for breaking painted glass in a church. He prevented also the hanging of men for resistance to impressment, and pointed out its illegality, since the men were not subject to martial law. While contributing thirty horse to the Scottish expedition in 1638, and lending the king £10,000 in 1639, he gave no support to the forced loan levied upon the city in the latter year. He died on the 14th of January 1640.

Lord Coventry held the great seal for nearly fifteen years, and was enabled to collect a large fortune. He was an able judge, and he issued some important orders in chancery, probably alluded to by Wood, who ascribes to him a tract on " The Fees of all law Officers." 3

Whitelocke accuses him of mediocrity, 4 but his contemporaries in general have united in extolling his judicial ability, his quick despatch of business and his sound and sterling character. Clarendon in particular praises his statesmanship, and compares his capacity with Lord Strafford's, adding, however, that he seldom spoke in the council except on legal business and had little influence in political affairs; to the latter circumstance he owed his exceptional popularity. He describes him as having " in the plain way of speaking and delivery a strange power of making himself believed," as a man of " not only firm gravity but a severity and even some morosity," as " rather exceedingly liked than passionately loved."

Lord Coventry married (1) Sarah, daughter of Sir Edward Sebright of Besford in Worcestershire, by whom besides a daughter he had one son, Thomas, who succeeded him as 2nd baron, and (2) Elizabeth, daughter of John Aldersley of Spurstow, Cheshire, and widow of William Pitchford, by whom he had four sons, John, Francis, Henry and Sir William Coventry, the statesman.

Thomas Coventry, 5th baron (d. 1699), was created an earl in 1697 with a special limitation, on failure of his own male issue, to that of Walter, youngest brother of the lord keeper, from whom the present earl of Coventry is descended.

COVENTRY, SIR WILLIAM (c. 1628-1686), English statesman, son of the lord* keeper, Thomas, Lord Coventry, by his second

1 Hacket's Life of Bishop Williams, ii. 19.

2 Rushworth (1680), part ii. vol. i. 294. 3 Ath. Oxon. ii. 650.

4 There is an adverse opinion also expressed in Pepys's Diary, August 26, 1666, probably based on little real knowledge.

wife Elizabeth Aldersley, was born about 1628. He matriculated at Queen's College, Oxford, at the age of fourteen. Owing to the outbreak of the Civil War he was obliged to quit his studies, but according to Sir John Bramston " he had a good tutor who made him a scholar, and he travelled and got the French language in good perfection." " He was young whilst the war continued," wrote Clarendon, " yet he had put himself before the end of it into the army and had the command of a foot company and shortly after travelled into France." Here he remained till all hopes of obtaining foreign assistance and of raising a new army had to be laid aside, when he returned to England and kept aloof from the various royalist intrigues. When, however, a new

prospect of a restoration appeared in 1660, Coventry hastened to Breda, was appointed secretary to James, duke of York, lord high admiral of England, and headed the royal procession when Charles entered London in triumph.

He was returned to the Restoration parliament of 1661 for Great Yarmouth, became commissioner for the navy in May 1662 and in 1663 was made D.C.L. at Oxford. His great talents were very soon recognized in parliament, and his influence as an official was considerable. His appointment was rather that of secretary to the admiralty than of personal assistant to the duke of York, 6 and was one of large gains. Wood states that he collected a fortune of £60,000. Accusations of corruption in his naval administration, and especially during the Dutch war, were brought against him, but there is nothing to show that he ever transgressed the limits sanctioned by usage and custom in obtaining his emoluments. Pepys in his diary invariably testifies to the excellence of his administration and to his zeal for reform and economy. His ability and energy, however, did little to avert the 'naval collapse, owing chiefly to financial mismanage- ment and to the ill-advised appointments to command. Coventry denied all responsibility for the Dutch War in 1665, which Clarendon sought to place upon his shoulders, and his repudiation is supported by Pepys; it was, moreover, contrary to his well- known political opinion. The war greatly increased his influence, and shortly after the victory off Lowestoft, on the 3rd of June 1665, he was knighted and made a privy councillor (26th of June) and was subsequently admitted to the committee on foreign affairs. In 1667 he was appointed to the board of treasury to effect financial reforms. " I perceive," writes Pepys on the 23rd of August 1667, " Sir William Coventry is the man and nothing done till he comes," and on his removal in 1669 the duke of Albemarle, no friendly or partial critic, declares that " nothing now would be well done." His appointment, however, came too late to ward off the naval disaster at Chatham the same year and the national bankruptcy in 1672.

Meanwhile Coventry's rising influence had been from the first the cause of increasing jealousy to the old chancellor Clarendon, who especially disliked and discouraged the younger generation. Coventry resented this repression and thought ill of the conduct of the administration. He became the chief mover in the success- ful attack made upon Clarendon, but refused to take any part in his impeachment. Two days after Clarendon's resignation (on the 31st of August), Coventry announced his intention of leaving the duke's service and of terminating his connexion with the navy. 6 As the principal agent in effecting Clarendon's fall he naturally acquired new

power and influence, and the general opinion pointed to him as his successor as first minister of the crown. Personal merit, patriotism and conspicuous ability, however, were poor passports to place and power in Charles II. ‘s reign. Coventry retained merely his appointment at the treasury, and the brilliant but unscrupulous and incapable duke of Buckingham, a favourite of the king, succeeded to Lord Clarendon. The relations between the two men soon became unfriendly. Buckingham ridiculed Sir William’s steady attention to business, and was annoyed at his opposition to Clarendon’s impeachment. Coventry rapidly lost influence, was excluded from the cabinet council, and six months after Clarendon’s fall complains he has scarcely a friend at court. Finally, in March

6 Pepysiana, by H. B. Wheatley (1903), 154. 6 Foxcroft, Life of Sir G. Savile, i. 54.

1669, Buckingham having written a play in which Sir William was ridiculed, the latter sent him a challenge. Notice of the challenge reached the authorities through the duke’s second, and Sir William was imprisoned in the Tower on the 3rd of March and subsequently expelled from the privy council. He was superseded in the treasury on the 1 ith of March by Buckingham’s favourite, Sir Thomas Osborne, afterwards earl of Danby and duke of Leeds, and was at last released from the Tower on the 21st in disgrace. The real cause of his dismissal was clearly the final adoption by Charles of the policy of subservience to France and desertion of Holland and Protestant interests. Six weeks before Coventry’s fall, the conference between Charles, James, Arlington, Clifford and Arundel had taken place, which resulted a year and a half later in the disgraceful treaty of Dover. To such schemes Sir William, with his steady hostility to France and active devotion to Protestantism, was doubtless a formidable opponent. He now withdrew definitely from official life, still retaining, however, his ascendancy in the House of Commons, and leading the party which condemned and criticized the reactionary and fatal policy of the government, his credit and reputation being rather enhanced than diminished by his dismissal. 1

In 1673 was published a pamphlet which went through five editions the same year, entitled England’s appeal from the Private Cabal at Whitehall to the Great Council of the Nation . . . by a true Lover of his Country, an anonymous work universally ascribed to Sir William,

which forcibly reflects his opinions on the French entanglement. In the great matter of the Indulgence, while refusing to discuss the limits of prerogative and liberty, he argued that the dispensing power of the crown could not be valid during the session of parliament, and criticized the manner of the declaration while approving its ostensible object.* • He sup- ported the Test Act, but maintained a statesmanlike moderation amidst the tide of indignation rising against the government, and refused to take part in the personal attacks upon ministers, drawing upon himself the same unpopularity as his nephew Halifax incurred later. In the same year he warmly denounced the alliance with France. During the summer of 1674 he was again received at court. In 1675 he supported the bill to ex- clude Roman Catholics from both Houses, and also the measure to close the House of Commons to placemen; and he showed great activity in his opposition to the French connexion, especially stigmatizing the encouragement given by the government to the levying of troops for the French service. In May 1677 he voted for the Dutch alliance. Like most of his contemporaries he accepted the story of the popish plot in 1678. Coventry several times refused the highest court appointments, and he was not included in Sir W. Temple's new-modelled council in April 1679. In the exclusion question he favoured at first a policy of limitations, and on his nephew Halifax, who on his retirement became the leader of the moderate party, he enjoined prudence and patience, and greatly regretted the violence of the opposition which eventually excited a reaction and ruined everything. He refused to stand for the new parliament, and retired to his country residence at Minster Lovell near Witney, in Oxfordshire. He died unmarried on the 23rd of June 1686, at Somerhill near Tunbridge Wells, where he had gone to take the waters, and was buried at Penshurst, where a monument was erected to his memory. In his will he ordered his funeral to be at small expense, and left £2000 to the French Protestant refugees in England, besides £3000 for the liberation of captives in Algiers. He had shortly before his death already paid for the liberation of sixty slaves. He was much beloved and respected in his family circle, his nephew, Henry Savile, alluding to him in affectionate terms as " our dearest uncle " and " incomparable friend."

Though Sir William Coventry never filled that place in the national administration to which his merit and exceptional ability clearly entitled him, his public life together with his correspondence are sufficient to distinguish him from amongst his contemporaries as a statesman of the first rank. Lord Halifax obviously derived from his honoured mentor those principles of government which, by means of his own brilliant 1 Savile Correspondence (Camden Soc), 295.

intellectual gifts, originality and imaginative insight, gained further force and influence. Halifax owed to him his interest in the navy and his grasp of the necessity to a country of a powerful maritime force. He drew his antagonism to France, his religious tolerance, wide religious views but firm Protestantism doubtless from the same source. Sir William was the original “Trimmer.” Writing to his nephew Viscount Weymouth, while denying the authorship of The Character of a Trimmer, he says: — ” I have not been ashamed to own myself to be a trimmer . . . one who would sit upright and not overturn the boat by swaying too much to either side.” He shared the Trimmer’s dislike of party, urging Halifax in the exclusion contest ” not to be thrust by the opposition of his enemies into another party, but that he keep upon a national bottom which at length will prevail.” His prudence is expressed in his ” perpetual unwillingness to do things which I cannot undo.” ” A singular independence of spirit, a breadth of mind which refused to be contracted by party formulas, a sanity which was proof against the contagion of national delirium, were equally characteristic of uncle and nephew.” 2 Sir William Coventry’s conceptions of statesmanship, under the guiding hand of his nephew, largely inspired the future revolution settlement, and continued to be an essential condition of English political growth and progress.

Besides the tract already mentioned Coventry was the author of A Letter to Dr Burnet giving an Account of Cardinal Pool’s Secret Powers . . . (1685). The Character of a Trimmer, often ascribed to him, is now known to have been written by Lord Halifax. ” Notes concerning the Poor,” and an essay ” concern- ing the decay of rents and the remedy,” are among the Malet Papers {Hist. MSS. Comm. Ser. 5th Rep. app. 320 (a)) and Add. MSS. Brit. Mus. (cal. 1882-1887); an ” Essay concerning France ” (4th Rep. app. 229 (b)) and a “Discourseon the Manage- ment of the Navy ” (230b) are among the MSS. of the marquess of Bath, also a catalogue of his library (233(0)).

Bibliography. — No adequate life of Sir William Coventry has been written; the most satisfactory appreciation of his character and abilities is to be found in the several passages relating to him in the Life of George Savile, Marquis of Halifax, by Miss A. C. Fox- croft (1898); see also Hist. MSS. Comm. 3 and 4 Rep. (Longleat Collection), 5 Rep. (Malet Collection and see Index) now in the Brit. Mus. add. Cal. (1882-1887), some of his papers being also at Devon- shire House; MSS. of Marquis of Ormond, iii. of J. M. Heathcote and Miscellaneous Collections; Clarendon’s Life and Continuation (Oxford, 1857); Calendar of Clarendon Papers; Burnet’s Hist, of His Own Times (Oxford, 1823); Hallam’s Constitutional Hist. (1854), chap. xi. ; John Evelyn’s Memoirs; Pepys’s Diary and Pepysiana (ed. H. B. Wheatley,

1903); Calendar of State Papers, Domestic; Savile Correspondence (Camden Society, 1858, vol. lxxi.) ; A. Grey's Debates; Sir John Bramston's Autobiography (Camden Soc, 1845); Wood's Athenae Oxonienses, iv. 190; Saturday Review {Oct. 11, 1873)- (P- C. Y.)

COVENT'RY, a municipal, county and parliamentary borough of Warwickshire, England; 94 m. N.W. from London by the London & North Western railway. Pop. (1901) 69,978. The Coventry canal communicates with the Trent and Mersey and Birmingham canals, and the midland system generally. Coventry stands on a gentle eminence, with higher ground lying to the west, and is watered by the Sherbourne and the Radford Brook, feeders of the Avon, which unite within the town. Of its ancient fortifications two gates and some portions of the wall are still extant, and several of the older streets are picturesque from the number of half-timbered houses projecting over the footways.

The most remarkable buildings are the churches; of these the oldest are St Michael's, one of the finest specimens of Perpen- dicular architecture in England, with a beautiful steeple rising to a height of 303 ft. ; Holy Trinity church, a cruciform structure with a lofty steeple at the intersection ; and St John's, or Bablake church, which is nearly a parallelogram on the ground plan, but cruciform in the clerestory with a central tower. Christ church dates only from 1832, but it is attached to the ancient spire of the Grey Friars' church. Of secular buildings the most interesting is St Mary's hall, erected by the united gilds in the early part of the 15th century. The principal chamber, 2 Foxcroft's Life of Sir G. Savile, i. 36.

situated above a fine crypt, is 76 ft. long, 30 ft. wide and 34 ft. high; its roof is of carved oak, and in the north end there is a large window of old stained glass, with a curious piece of tapestry beneath nearly as old as the building. In the treasury is preserved a valuable collection of ancient muniments. A statue of Sir Thomas White, lord mayor of London (1532-1533), founder of St John's College, Oxford, was erected in 1883. The cemetery, laid out by Sir Joseph Paxton, the architect and landscape gardener, and enlarged in 1887, is particularly beautiful. The educational institutions include a well-endowed free grammar school, founded in the reign of Elizabeth, in modern buildings (1885), a technical school, school of art, endowed charity schools, and a county reformatory for girls; and among the

charitable foundations, which are numerous and valuable, Bond's hospital for old men and Ford's hospital for old women are remarkable as fine specimens of ancient timber work. Swanswell and Spenser Parks were opened in 1883, and a recreation ground in 1880.

Coventry was formerly noted for its woollens, and subsequently acquired such a reputation for its dyeing that the expression "as true as Coventry blue " became proverbial. Existing industries are the making of motor cars, cycles and their accessories, for which Coventry is one of the chief centres in Great Britain; sewing machines are also produced; and carpet- weaving and dyeing, art metal working and watch making are carried on. An ancient fairisheldin Whit-week. A countyof itself till 1843, the town became a county borough in 1888. The corporation consists of a mayor, 10 aldermen and 30 councillors. The parliamentary borough returns one member. In 1 894 a suffragan bishopric of Coventry was established under the see of Wor- cester, but no longer exists. Area, 4149 acres.

The village which afterwards became important as Coventry (Covenlreu, Covenlre) owed its existence to the foundation of a Benedictine monastery by Earl Leofric and his wife Godgyfu, the famous Lady Godiva (q.v.), in 1043. The manor, which in 1066 belonged to the latter, descended to the earls of Chester and to Robert de Montalt, and from him passed to Isabella queen of Edward II. and the crown. Ranulf, earl of Chester, granted the earliest extant charter to the town in 1 1 53, by which his burgesses were to hold of him in free burgage as they held of his father, and to have their portmote. This, with further privileges, was confirmed by Henry II. in n 77, and by nearly every succeeding sovereign until the 17th century. In 1345 Edward III. gave Coventry a corporation, mayor and bailiffs empowered to hold pleas and keep the town prison. Edward the Black Prince granted the mayor and bailiffs the right to hold the town in fee farm of £50 and to build a wall. In 1452 Henry VI. formed the city and surrounding hamlets into a county, and James I. incorporated Coventry in 1622. It first sent two representatives to parliament »in 1295, but the returns were irregular. The prior's market on Fridays was probably of Saxon origin; a second market was granted in 1348, while fairs, still held, were obtained in 1 2 1 7 for the octave of Holy Trinity, and in 1 348 and in 1442 for eight days from the Friday after Corpus Christi. As early as 12 16 Coventry was important for its trade in wool, cloth and caps, its gilds later being particularly numerous and wealthy. In 1568 Flemish weavers introduced new methods, but the trade was destroyed in the wars of the 17th century. During the middle of the 16th century there was a flourishing manufacture of blue thread, but this decayed before 1581; in the 18th century the

manufacture of ribbon was introduced.

The popular phrase ” to send to Coventry ” (i.e. to refuse to associate with a person) is of uncertain derivation. The New English Dictionary selects the period of the Civil War of the 1 7th century as that in which the origin of the phrase is probably to be found. Clarendon (History of the Great Rebellion, 1647) states that the citizens of Birmingham rose against certain small parties of the king’s supporters, and sent the prisoners they captured to Coventry, which was then strongly parliamentarian.

See Victoria County History, Warwick; William Dugdale, The Antiquities of Coventre, illustrated from records (Coventry, 1765).

COVER (from the Fr. convert, from couvrir, to cover, Lat. cooperire), that which hides, shuts»in or conceals, a lid to a

box or vessel, &c, the binding of a book or wrapper of a parcel; as a hunting term, the wood or undergrowth which shelters game. As a commercial term, the word means in its widest sense a security against loss, but is employed more particularly in connexion with stock exchange transactions to signify a ” deposit made with a broker to secure him from being out of pocket in the event of the stocks falling against his client and the client not paying the difference ” (In re Cronmire, 1898, 2 Q. B. 383). It is a mode of speculation engaged in almost entirely by persons who wish to limit their risk to a small amount, and, as a rule, the transactions are largely carried out in England with ” outside ” brokers, i.e. those dealers in securities who are not members of the Stock Exchange. The deposit is so much per cent or per share, usually 1 % on the market value of the securities up to about twice the amount of the turn of the market; the client being able to close the transaction at any time during the currency of the cover, but the broker only when the cover is exhausted or has ” run off.” Cover is not money deposited to abide the event of a wager, but as security against a debt which may arise from a gaming contract, and it may be recovered back, if un- appropriated.

COVERDALE, MILES (1488 ?is69), English translator of the Bible and bishop of Exeter, was born of Yorkshire parents about 1488, studied philosophy and theology at Cambridge, was ordained priest at Norwich in 1514, and then entered the convent of Austin friars at Cambridge. Here he came under the influence of the prior, Robert Barnes, made the acquaintance of Sir Thomas More and of Thomas Cromwell, and began a thorough study of the Scriptures. He was one of those who met at the White Horse tavern to discuss theological

questions, and when Barnes was arrested on a charge of heresy, Coverdale went up to London to assist him in drawing up his defence. Soon afterwards he left the convent, assumed the habit of a secular priest, and began to preach against confession and the worship of images. In 1 53 1 he graduated bachelor of canon law at Cambridge, but from 1528 to 1534 he prudently spent most of his time abroad. No corroboration has, however, been found for Foxe's statement that in 1529 he was at Flamburg assisting Tyndale in his transla tion of the Pentateuch. In 1534 he published two translations of his own, the first Dulichius's Vom alten und newen Gott, and the second a Paraphrase upon the Psalms, and in 1535 he completed his translation of the Bible. The venture seems to have been projected by Jacob van Meteren, who apparently employed Coverdale to do the translation, and Froschover of Zurich to do the printing. No perfect copy is known to exist, and the five or six which alone have title-pages give no name of publisher or place of publication. The volume is dedicated to the king of England, where Convocation at Cranmer's instance had, in December 1534, petitioned for an authorized English version of the Scriptures. As a work of scholarship it does not rank particularly high. Some of the title-pages state that it had been translated out of " Douche " (i.e. German) " and Latyn " : and Coverdale mentions that he used five interpreters, which are supposed to have been the Vulgate, the Latin version of Pagninus, Luther's translation, the Zurich version, and Tyndale's Penta- teuch and New Testament. There is no definite mention of the original Greek and Hebrew texts; but it has considerable literary merit, many of Coverdale's phrases are retained in the authorized version, and it was the first complete Bible to be printed in English. Two fresh editions were issued in 1537, but none of them received official sanction. Coverdale was, however, employed by Cromwell to assist in the production of the Great Bible of 1539, which was ordered to be placed in all English churches. The work was done at Paris until the French govern- ment stopped it, when Coverdale and his colleagues returned to England early in 1539 to complete it. He was also employed in the same year in assisting at the suppression of superstitious usages, but the reaction of 1540 drove him once more abroad. His Bible was prohibited by proclamation in 1 542 , while Coverdale himself defied the Six Articles by marrying Elizabeth Macheson, sister-in-law to Dr John MacAlpine.

For a time Coverdale lived at Tubingen, where he was created

D.D. In 1545 he was pastor and schoolmaster at Bergzabern in the duchy of Pfalz-Zweibriicken. In March 1548 he was at Frankfort, when the new English Order of Communion reached him; he at once translated it into German and Latin and sent a copy to Calvin, whose wife had befriended Coverdale at Strass- burg. Calvin, however, does not seem to have approved of it so highly as Coverdale.

Coverdale was already on his way back to England, and in October 1 548 he was staying at Windsor Castle, where Cranmer and some other divines, inaccurately called the Windsor Com- mission, were preparing the First Book of Common Prayer. His first appointment had been as almoner to Queen Catherine Parr, then wife of Lord Seymour; and he preached her funeral sermon in September 1548. He was also chaplain to the young king and took an active part in the reforming measures of his reign. He was one of the most effective preachers'of the time. A sermon by him at St Paul's on the second Sunday in Lent, 1549, was immediately followed by the pulling down of " the sacrament at the high altar." A few weeks later he preached at the penance of some Anabaptists, and in January 1550 he was put on a commission to prosecute Anabaptists and all who infringed the Book of Common Prayer. In 1549 he wrote a dedication to Edward for a translation of the second volume of Erasmus's Paraphrases; and in 1550 he translated Otto Wermueller's Precious Pearl, for which Protector Somerset, who had derived spiritual comfort from the book while in the Tower, wrote a preface. He was much in request at funerals: he preached at Sir James Wilford's in November 155°, and at Lord Went- worth's before a great concourse in Westminster Abbey in* March 1551.

Perhaps it was his gift of oratory which suggested his appoint- ment as bishop of the refractory men of Devon and Cornwall. He had already, in August 1549, at some risk, gone down with Lord Russell to turn the hearts of the rebels by preaching and persuasion, and two years later he was appointed bishop of Exeter by letters patent, on the compulsory retirement of his pre- decessor, Veysey, who had reached an .almost mythical age. He was an active prelate, and perhaps the vigorous Protestantism of the West in Elizabeth's reign was partly due to his persuasive powers. He sat on the commission for the reform of the canon law, and was in constant attendance during the parliaments of 1552 and 1553. On Mary's accession he was at once deprived on the score of his marriage, and Veysey in spite of his age was restored. Coverdale was called before the privy council on the 1 st of September, and required to find sureties; but he was not further molested, and when Christian III. of Denmark at the instance of Coverdale's brother-in-law, MacAlpine, interceded in his favour, he

was in February 1555 permitted to leave for Denmark with two servants, and his baggage unsearched; one of these ” servants ” is said to have been his wife. He declined Christian’s offer of a living in Denmark, and preferred to preach at Wesel to the numerous English refugees there, until he was invited by Duke Wolfgang to resume his labours at Bergzabern. He was at Geneva in December 1558, and is said to have partici- pated in the preparation of the Geneva version of the Bible.

In 15 59 Coverdale returned to England and resumed his preaching at St Paul’s and elsewhere. Clothed in a plain black gown, he assisted at Parker’s consecration, in spite of the facts that he had himself been deprived, and did not resume his bishopric, and that his original appointment had been by the uncanonical method of letters patent. Conscientious objections were probably responsible for his non-restoration to the see of Exeter, and his refusal of that of Llandaff in 1563. He objected to vestments, and in his living of St Magnus close to London Bridge, which he received in 1563, he took other liberties with the Act of Uniformity. His bishop, Grindal, was his friend, and his vagaries were overlooked until 1566, when he resigned his living rather than conform. He still preached occasionally, and always drew large audiences. He died in February 1568, and was buried on the 19th in St Bartholomew’s behind the Exchange. When this church was pulled down in 1840 to make room for the new Exchange, his remains were removed to St Magnus.

Coverdale’s works, most of them translations, number twenty-six in all; nearly all, with his letters, were published in a collected edition by th’e Parker Soc, 2 vols., 1846. An excellent account is given in the Diet. Nat. Biog. of his life, with authorities, to which may be added R. W. Dixon’s Church History, Bishop and Gasquet’s Edward VI. and the Book of Common Prayer; Acts of the Privy Council; Letters and Papers of Henry VIII.; Lit. Rem. of Edward VI. (Roxburghe Club) ; Whittingham’s Brief Discourse oV Troubles at Frankfort; Pocock’s Troubles connected with the Prayer* Book (Camden Soc). (A. F. P.)

COVERTURE (a covering, an old French form of the modern couverture), a term in English law applied to the condition of a woman during marriage, when she is supposed to be under the cover, influence and protection of her husband, and so immune in certain cases from punishment for crime committed in the presence and on the presumed coercion of her husband. (See further Husband and Wife.)

COVILHA, a town of Portugal, in the district of Castello Brahco,

formerly included in the province of Beira; on the eastern slope of the Serra da Estrella, and on the Abrantes- Guarda railway. Pop. (1900) 15,469. Covilha., which has been often compared with a collection of swallows' nests clinging to the rugged granitic mountain side, is shaped like an amphi- theatre of closely crowded houses, overlooking the river Zezere and its wild valley from a height of 2 1 80 ft. Over 4000 operatives are employed in the manufacture of saragoca, a coarse brown cloth worn by the peasantry throughout Portugal. The village of Unhaes da Serra (1507), 6 m. W.S.W., is noted for its sulphurous springs and baths.

COVILHAM (Covilhao, Covilha), PERO or Pedro de, Portuguese explorer and diplomatist (fl. 1487-1525), was a native of Covilha in Beira. In early life he had gone to Castile and entered the service of Alphonso, duke of Seville; later, when war broke out between Castile and Portugal, he returned to his own country, and attached himself, first as a " groom," then as a " squire," to King Alphonso V. and his successor John II. On the 7th of May 1487, he was despatched, in company with Alphonso de Payva, on a mission of exploration in the Levant and adjoining regions of Asia and Africa, with the special object of learning where " cinnamon and other spices could be found," as well as of discovering the land of Prester John, by " overland " routes. Bartholomeu Diaz, at this very time, went out to find the Prester's country, as well as the termination of the African continent and the ocean route to India, by sea. Covilham and Payva were provided with a " letter of credence for all the countries of the world " and with a " map for navigating, taken from the map of the world" and compiled by Bishop Calcadilha, and doctors Rodrigo and Moyses. The first two of these were prominent members of the commission which advised the Portuguese government to reject the proposals, of Columbus. The explorers started from Santarem and travelled by Barcelona to Naples, where their bills of exchange were paid by the sons of Cosimo de' Medici; thence they passed to Rhodes, where they lodged with two other Portuguese, and so to Alexandria and Cairo, where they posed as merchants. In company with certain Moors from Fez and Tlemcen they now went by way of Tor to Suakin and Aden, where (as it was now monsoon time) they parted, Covilham proceeding to India and Payva to Ethiopia — the two companions agreeing to meet again in Cairo. Covilham thus arrived at Cannanore and Calicut, whence he retraced his course to Goa and Ormuz, the Red Sea and Cairo, making an excursion on his way down the East African coast to Sofala, which he was probably the first European to visit. At Cairo he heard of Payva's death, and met with two Portuguese Jews — Rabbi Abraham of Beja, and Joseph, a shoe-maker of Lamego — • who

had been sent by King John with letters for Covilham and Payva. By Joseph of Lamego Covilham replied with an account of his Indian and African journeys, and of his observa- tions on the cinnamon, pepper and clove trade at Calicut, together with advice as to the ocean way to India. This he truly represented as quite practicable: ” to this they (of Portugal) could navigate by their coast and the seas of Guinea.” The first objective in the eastern ocean, he added, was Sofala or the

Island of the Moon, our Madagascar — ” from each of these lands one can fetch the coast of Calicut.” With this information Joseph returned to Portugal, while Covilham, with Abraham of Beja, again visited Aden and Ormuz. At the latter he left the rabbi; and himself came back to Jidda, the port of the Arabian holy land, and penetrated (as he told Alvarez many years later) even to Mecca and Medina. Finally, by Mount Sinai, Tor and the Red Sea, he reached Zeila, whence he struck inland to the court of Prester John (i.e. Abyssinia). Here he was honourably received; lands and lordships were bestowed upon him; but he was not permitted to leave. When the Portuguese embassy under Rodrigo de Lima, including Father Francisco Alvarez, entered Abyssinia in 1520, Covilham wept with joy at the sight of his fellow-countrymen. It was then forty years since he had left Portugal, and over thirty since he had been a prisoner of state in ” Ethiopia.” Alvarez, who professed to know him well, and to have heard the story of his life, both ” in confession and out of it,” praises his power of vivid description ” as if things were present before him,” and his extraordinary knowledge of ” all spoken languages of Christians, Moors and Gentiles.” His services as an interpreter were valuable to Rodrigo de Lima’s embassy; but he never succeeded in escaping from Abyssinia.

See Francisco Alvarez, Verdadera Informacam das terras do Preste Joam, esp. chs. 73, 89, 98, 102-103, io 5 (PP- 1.77. 22 4> 2 54> 264, 265-270, 275, of the Hakluyt Society’s English edition, The Portu- guese Embassy to Abyssinia . . . 1 520-1727, London, 1881); an abstract of this, with some inaccuracies, is given in Major’s Prince Henry the Navigator (London, 1868), pp. 339-340.

COVIN (from the Fr. covine, or couvine, from Lat. convenire, to come together) , an association of persons, so used in the Statute of Labourers of 1360, which, inter alia, declared void ” all alliances and covins of masons and carpenters.” The more common use of the term

in English law was for a secret agreement between persons to cheat and defraud, but the word is now obsolete, and has been superseded by ” collusion ” or ” conspiracy to cheat and defraud.”

COVINGTON, a city and one of the two county-seats of Kenton county, Kentucky, U.S.A., on the Ohio river opposite Cincinnati, with which it is connected by bridges; and at the mouth of the Licking river (also spanned by bridges), opposite Newport, Ky. Pop. (1890) 37,371; (1900) 42,938, of whom 5223 were foreign- born and 2478 were negroes; (1910) 53,270. In 1900 it ranked second in population among the cities of Kentucky. The city is served by the Chesapeake & Ohio, and the Louisville & Nashville railways, by interurban electric railways, and by steamboat lines to the Ohio river ports. It is built on a plain commanding good views and partly shut in by neighbouring hills. Its streets, mostly named from eminent Kentuckians, are paved chiefly with asphalt, macadam and brick. There are numerous fine residences and several attractive public buildings, including that of the United States government — modern Gothic in style — the court-house and city hall com- bined, and the public library. Covington is the seat of a Roman Catholic bishopric, and its cathedral, in the flamboyant Gothic style, is one of the finest church buildings in the state. In the city are the Academy of Notre Dame and St Joseph’s high school for boys, both Roman Catholic. The principal charitable institutions are the hospital of Saint Elizabeth, a German orphan asylum, a Protestant children’s home, a home for aged women and a Wayfarers’ Rest. Covington is the trade centre of an extensive district engaged in agriculture and stock raising, and as a manufacturing centre it ranked second in the state in 1905 (value of factory products $6,099,715), its products including tobacco, cotton goods, structural iron and steel, foundry and machine shop products, liquors and cordage. A settlement was established here in 1 8 1 2 , and three years later a town was laid out and named in honour of Gen. Leonard Covington (1768-18 13), who was mortally wounded at Chrystler’s Field during the War of 181 2. In 1834 Covington was chartered as a city; and in 1908 it annexed Central Covington (pop. in 1900, 2155).

COWARD, a term of contempt for one who, before danger, pain or trouble, shows fear, whether physical or moral. The derivation of the word has been obscured by a connexion in sense

with the verb ” cow,” to instil fear into, which is derived from old Norse kuga, a word of similar meaning, and with the verb ” cower,” to crouch, which is also Scandinavian in origin. 1 The true derivation is from the French coe, an old form of queue, a tail, from Lat. cauda, hence couart or couard. The reference to ” tail ” is either to the

expression ” turn tail ” in flight, or to the habit of animals dropping the tail between the legs when frightened; in heraldry, a lion in this position is a ” lion coward.” In the fable of Reynard the Fox the name of the hare is Coart, Kywart, Cuwaert or other variants.

COWBRIDGE, a market town and a municipal and contri- butory parliamentary borough of Glamorganshire, Wales, with a station on the Taff Vale railway branch from Llantrisant to Aberthaw on the coast, distant by rail 1625 m. from London, 12 m. W. of Cardiff, 7 m. S.E. of Bridgend, and 6 m. S. of Llan- trisant station. The population in 1901 was 1202, a decrease of over 12 % since 1891. Less than one-third of the number was Welsh-speaking. The town mainly consists of one long street running east and west, and is in a wide valley through which runs the river Thaw (Welsh, Ddawan), here crossed by a stone bridge.

Cowbridge is probably situated on the Roman road from Cardiff westwards, which seems to have kept nearly the course of the present main road. Roman coins have been discovered here. It has in fact been suggested, mainly on etymological grounds, that the town occupies the site of the Roman Bovium: the modern Welsh name, y Bontfaen (” stone bridge “) is probably a corruption of the medieval, Pont y fon, the precise equivalent of ” Cowbridge,” which is first found in documents of the second half of the 13th century as Covbruge and Cubrigg. Others place Bovium on a vicinal road, at Boverton near Llantwit Major, about 6 m. to the south near the coast, though the most likely site is near Ewenny, 5 m. to the west of Cow- bridge. After the Norman conquest of Glamorgan, the town grew up as an appanage of the castle of St Quentin, which occupies a commanding position half a mile south-west of the town. It was walled round before the 13th century. A tower is mentioned in 1487 when it was granted away by the burgesses. Leland in his itinerary (c. 1535) describes the town wall as three- quarters of a mile round and as having three gates. There was even then a considerable suburb on the west bank of the river and outside the walls. The south wall and gateway are still standing.

The town was a borough by prescription until 1682, when it received a charter of incorporation from Charles II. confirming its previous privileges. Under the Unreformed Corporations Act of 1883 the corporation was dissolved, but on the petition of the inhabitants a new charter was granted in March 1887. During the Tudor and Stuart periods Cowbridge was almost if not quite the chief town of Glamorgan, its importance being largely due to its central and accessible position in a rich agri- cultural district where a large

number of the county gentry lived. The great sessions were held here alternately with Cardiff and Swansea from 1542 till their abolition in 1830, and the quarter sessions were held here once a year down to 1850. From 1536 to 1832 it was one of the eight contributory boroughs within the county which returned a member to parliament, but since 1832 it has been contributory with Cardiff and Llantrisant in returning a member. It has a separate commission of the peace. Sir Edward Stradling (1 529-1609) established a grammar school here, but died before endowing it; it was refounded in 1685 by Sir Leoline Jenkins, who provided that it should be administered by Jesus College, Oxford, which body erected the present buildings in 1847. It has throughout its existence been one of the leading schools in Wales. An intermediate school for girls was established here by the county in 1896. The church of St Mary (formerly chapelry to Llanblethian) is of early English style and has a fine embattled tower, of the same military

1 A connexion has also been imagined with cow (O. Eng. cu ; common in Scandinavian languages, and of similar root to Skr. go, whence also Gr. /Sous, Lat. bos), the female bovine animal, on account of its timidity.

type as the towers of Llamblethian and Ewenny. There are three Nonconformist chapels. There are a town hall and market place. The town is now wholly dependent on agriculture, and has good markets and cattle fairs, that on the 4th of May being a charter fair.

COWDENBEATH, a police burgh, Fifeshire, Scotland, 5! m. N.E. of Dunfermline by the North British railway. Pop. (1891) 4249; (1901) 7908. The principal industry is coal-mining, and the public buildings include churches, schools and a hall. Meetings in connexion with the adoption and promulgation of the Covenant were held in the old parish church of Beath.

COWELL, JOHN (1554-1611), English jurist, was born at Ernsborough, Devonshire. He was educated at Eton, and King's College, Cambridge, ultimately becoming professor of civil law in that university, and master of Trinity Hall. In 1607 he compiled a law dictionary, The Interpreter, in which he exalted the king's prerogative so much that he was prosecuted before the House of Commons by Sir Edward Coke, and saved from imprisonment only by the interposition of James I. His

book was burnt by order of the House of Commons. Dr Cowell also wrote a work entitled Institutiones Juris Anglicani. He died at Oxford on the nth of October 1611.

COWEN, FREDERIC HYMEN (1852-), English musical composer, was born at Kingston, Jamaica, on the 29th of January 1852. At four years old he was brought to England, where his father became treasurer to the opera at Her Majesty's theatre, and private secretary to the earl of Dudley. His first teacher was Henry Russell, and his first published composition appeared when he was but six years old. He studied the piano with Benedict, and composition with Goss; in 1865 he was at Leipzig under Hauptmann, Moscheles, Reinecke and Plaidy. Returning home on the outbreak of the Austro-Prussian War, he appeared as a composer for the orchestra in an overture played at the Promenade Concerts at Covent Garden in September 1866. In the following autumn he went to Berlin, where he was under Kiel, at Stern's conservatorium. A symphony and a piano concerto were given in St James's Hall in 1869, and from that time Cowen has been recognized as primarily a composer, his talents as a pianist being subordinate, although his public appearances were numerous for some time afterwards. His cantata, The Rose Maiden, was given in London in 1870, his second symphony by the Liverpool Philharmonic Society in 187 2, and his first festival work, The Corsair, in 1876 at Birmingham. In that year his opera, Pauline, was given by the Carl Rosa Company with moderate success. In 1884 he conducted five concerts of the Philharmonic Society, and in 1888, on the resignation of Arthur Sullivan, became the regular conductor of the society, resigning the post in 1892. In the year of his appointment, 1888, he went to Melbourne as the conductor of the daily concerts given in connexion with the Exhibition there. In 1896 Cowen was appointed conductor of the Liverpool Philharmonic Society and of the Manchester orchestra, in succes- sion to Sir Charles Halle. In 1899 he was reappointed conductor of the Philharmonic Society. His works include: — Operettas: Garibaldi (i860) and One Too Many (1874); operas: Pauline (1876), Thorgrim (1&90), Signa (Milan, 1893), and H arold (1895) ; oratorios: The Deluge (1878), St Ursula (1881), Ruth (1887), Song of Thanksgiving (1888), The Transfiguration (1895); cantatas: The Rose Maiden (1870), The Corsair (1876), The Sleeping Beauty (1885), St John's Eve (1889), The Water Lily (1893), Ode to the Passions (1898), besides short cantatas for female voices; a large number of songs, ranging from the popular " ballad " to more artistic lyrics, anthems, part-songs, duets, &c; six symphonies, among which No 3, the " Scandinavian," has had the greatest success; four overtures; suites, The Language 0} Flowers (1880), In the Olden Times (1883), In Fairy-

land (1896); four English dances (1896); a concerto for piano and orchestra, and a fantasia for the same played by M. Paderewski (1900) ; a quartet in C minor, and a trio in A minor, both early works; pianoforte pieces, &c. Cowen is never so happy as when treating of fantastic or fairy subjects; and whether in his cantatas for female voices, his charming Sleeping

Beauty, his Water Lily or his pretty overture, The Butterfly's Ball (1 901) , he succeeds wonderfully in finding graceful expression for the poetical idea. His dance music, such as is to be found in various orchestral suites, is refined, original and admirably instrumented; and if he is seldom as successful in portraying the graver aspects of emotion, the vogue of his semi-sacred songs has been widespread.

COWEN, JOSEPH (1831-1900), English politician and journalist, son of Sir Joseph Cowen, a prominent citizen and mine-owner of Newcastle-on-Tyne, was born in 1831, and was educated at Edinburgh University, In 1874 he was elected member of parliament for the borough on the death of his father, who had held the seat as a Liberal since 1865. Joseph Cowen was at that time a strong Radical on domestic questions, an advocate of co-operation, an admirer of Garibaldi, Mazzini and Kossuth, a sympathizer with Irish Nationalism, and one who in speech, dress and manner identified himself with the North-country mining class. Short in stature and uncouth in appearance, his individuality first shocked and then by its earnestness impressed the House of Commons; and his sturdy independence of party ties, combined with a gift of rough but genuine eloquence (of which his speech on the Royal Title Bill of 1876 was an example), rapidly made him one of the best-known public men in the country. He was, moreover, an Imperialist and a Colonial Federationist at a time when Liberalism was tied and bound to the Manchester traditions; and, to the consternation of the official wire-pullers, he vigorously supported Disraeli's foreign policy, and in 1881 opposed the Gladstonian settlement with the Boers. His independence (which his detractors attributed in some degree to his alleged susceptibility to Tory compliments) brought him into collision both with the Liberal caucus and with the party organization in Newcastle itself, but Cowen's personal popularity and his remarkable powers as an orator triumphed in his own birthplace, and he was again elected in 1885 in spite of Liberal opposition. Shortly afterwards, however, he retired both from parliament and from public Hie, professing his disgust at the party intrigues of politics, and devoted himself to conduct- ing his newspaper, the Newcastle Daily Chronicle, and to his private business as a mine-owner. In this capacity he exercised a wide influence on local opinion, and the revolt of the Newcastle electorate in later years

against doctrinaire Radicalism was largely due to his constant preaching of a broader outlook on national affairs. He continued behind the scenes to play a powerful part in forming North-country opinion until his death on the 18th of February 1900.

His letters were published by his daughter in 1909.

COWES, a seaport and watering-place in the Isle of Wight, England, 12 m. S.S.E. of Southampton. West Cowes is separ- ated from East Cowes by the picturesque estuary of the river Medina, the. two towns (each of which is an urban district) lying on opposite sides of its mouth at the apex of the northern coast of the island. Pop. (1901) West Cowes, 8652; East Cowes, 3196. The port between them is the chief on the island, and is the headquarters of the Royal Yacht Squadron (founded in 181 2) ; it is in regular steamship communication with Southampton and Portsmouth. West Cowes is served by the Isle of Wight Central railway. A steam ferry and a floating bridge across the Medina, here 600 yds. broad, unite the towns. Behind the harbour the houses rise picturesquely on gentle wooded slopes, and numerous villas adorn the vicinity. The towns owe their origin to two forts or castles, built on each side of the mouth of the Medina by Henry VIII. in 1540, for the defence of the coast; the eastern one has disappeared, but the west castle remains and is used as the club-house of the Yacht Squadron. The marine parade of West Cowes, and the public promenade called the Green, are close to the castle. The industrial population is chiefly employed in the shipbuilding yards, in the manufacture of ships' fittings, and in engineering works. The harbour is under an elective body of commissioners. On the opposite side of the Medina a broad carriageway leads to East Cowes Castle, a handsome edifice built by John Nash, the favourite architect of George IV., in 1798, and immediately beyond it are the grounds surrounding

Osborne House (see Osborne), built in 1845 after the property had been purchased by Queen Victoria, the church of St Mildred, Whippingham, lying a mile to the south.

COWL (through Fr. coule, from Lat. cucullus or cuculla, a covering ; the word is found in various forms in most European languages, cf. Ger. Kugel or Kigel, Dutch hovel, Irish cochal or cochull ; the ultimate origin may be the root kal, found in Lat. clam, secretly, and Gr.

KaKinrreiv, to hide, cover up), an outer garment worn by both sexes in the middle ages; a part of the monastic dress, hence the phrase ” to take the cowl,” signifying entry upon the religious life. The cucullus worn by the early Egyptian anchorites was a hood covering the head and neck. Later generations lengthened the garment until it reached to the heels, and St Benedict issued a rule restricting its length to two cubits. Chapter 55 of his Institute prescribes the following dress in temperate climates: a cowl and tunic, thick in winter and thin in summer, with a scapular for working hours and shoes and stockings, all of simple material and make. In the 14th century the cowl and the frock were frequently confounded, but the council of Vienne defined the former as ” a habit long and full without sleeves,” and the latter as ” a long habit with long and wide sleeves.” While the term thus seems strictly to imply a hooded gown it is often applied to the hood alone. It is also used to describe a loose vestment worn over the frock in the winter season and during the night office.

The word ” cowl ” is also applied to a hood-shaped covering to a chimney or ventilating shaft, to help down-draught, and to clear the up-current of foul air (see Ventilation).

COWLEY, ABRAHAM (1618-1667), English poet, was born in the city of London late in 1618. His father, a wealthy citizen, who died shortly before his birth, was a stationer. His mother was wholly given to works of devotion, but it happened that there lay in her parlour a copy of The Faery Queen. This became the favourite reading of her son, and he had twice devoured it all before he was sent to school. As early as 1628, that is, in his tenth year, he composed his Tragicall History of Piramus and Thisbe, an epical romance written in a six-line stanza, of his own invention. It is not too much to say that this work is the most astonishing feat of imaginative precocity on record; it is marked by no great faults of immaturity, and possesses con- structive merits of a very high order. Two years later the child wrote another and still more ambitious poem, Constantia and Philetus, being sent about the same time to Westminster school. Here he displayed the most extraordinary mental precocity and versatility, and wrote in his thirteenth year yet another poem, the Elegy on the Death of Dudley, Lord Carlton. These three poems of considerable size, and some smaller ones, were collected in 1633, and published in a volume entitled Poetical Blossoms, dedicated to the head master of the school, and prefaced by many laudatory verses by schoolfellows. The author at once became famous, although he had not, even yet, completed his fifteenth year. His next composition was a pastoral comedy, entitled Love’s Riddle, a marvellous production for a boy of sixteen, airy, correct and harmonious in language, and rapid in movement. The

style is not without resemblance to that of Randolph, whose earliest works, however, were at that time only just printed. In 1637 Cowley was elected into Trinity College, Cambridge, where he betook himself with enthusiasm to the study of all kinds of learning, and early distinguished himself as a ripe scholar. It was about this time that he composed his scriptural epic on the history of King David, one book of which still exists in the Latin original, the rest being superseded in favour of an English version in four books, called the Davideis, which he published a long time after. This his most grave and important work is remarkable as having suggested to Milton several points which he afterwards made use of. The epic, written in a very dreary and turgid manner, but in good rhymed heroic verse, deals with the adventures of King David from his boyhood to the smiting of Amalek by Saul, where it abruptly closes. In 1638 Love's Riddle and a Latin comedy, the Nau- fragium Joculare, were printed, and in 1641 the passage of Prince Charles through Cambridge gave occasion to the production of

another dramatic work, The Guardian, which was acted before the royal visitor with much success. During the civil war this play was privately performed at Dublin, but it was not printed till 1650. It is bright and amusing, in the style common to the " sons " of Ben Jonson, the university wits who wrote more for the closet than the public stage.

The learned quiet of the young poet's life was broken up by the Civil War; he warmly espoused the royalist side. He became a fellow of Trinity College, Cambridge, but was ejected by the Parliamentarians in 1643. He made his way to Oxford, where he enjoyed the friendship of Lord Falkland, and was tossed, in the tumult of affairs, into the personal confidence of the royal family itself. After the battle of Marston Moor he followed the queen to Paris, and the exile so commenced lasted twelve years. This period was spent almost entirely in the royal service, " bearing a share in the distresses of the royal family, or labouring in their affairs. To this purpose he performed several dangerous journeys into Jersey, Scotland, Flanders, Holland, or wherever else the king's troubles required his attendance. But the chief testimony of his fidelity was the laborious service he underwent in maintain- ing the constant correspondence between the late king and the queen his wife. In that weighty trust he behaved himself with indefatigable integrity and unsuspected secrecy; for he ciphered and deciphered with his own hand the greatest part of all the letters that passed between their majesties, and managed a vast intelligence in many other parts, which for some years together took up all his days, and two or three nights every week." In spite of these labours he did

not refrain from literary industry. During his exile he met with the works of Pindar, and determined to reproduce their lofty lyric passion in English. At the same time he occupied himself in writing a history of the Civil War, which he completed as far as the battle of Newbury, but un- fortunately afterwards destroyed. In 1647 a collection of his love verses, entitled The Mistress, was published, and in the next year a volume of wretched satires, The Four Ages of England, was brought out under his name, with the composition of which he had nothing to do. In spite of the troubles of the times, so fatal to poetic fame, his reputation steadily increased, and when, on his return to England in 1656, he published a volume of his collected poetical works, he found himself without a rival in public esteem. This volume included the later works already mentioned, the Pindarique Odes, the Davideis, the Mistress and some Miscellanies. Among the latter are to be found Cowley's most vital pieces. This section of his works opens with the famous aspiration —

" What shall I do to be for ever known, And make the coming age my own?"

It contains elegies on Wotton, Vandyck, Falkland, William Hervey and Crashaw, the last two being among Cowley's finest poems, brilliant, sonorous and original; the amusing ballad of The Chronicle, giving a fictitious catalogue of his supposed amours; various gnomic pieces; and some charming para- phrases from Anacreon. The Pindarique Odes contain weighty lines and passages, buried in irregular and inharmonious masses of moral verbiage. Not more than one or two are good through- out, but a full posy of beauties may easily be culled from them. The long cadences of the Alexandrines with which most of the strophes close, continued to echo in English poetry from Dryden down to Gray, but the Odes themselves, which were found to be obscure by the poet's contemporaries, immediately fell into disesteem. The Mistress was the most popular poetic reading of the age, and is now the least read of all Cowley's works. It was the last and most violent expression of the amatory affectation of the 17th century, an affectation which had been endurable in Donne and other early writers because it had been the vehicle of sincere emotion, but was unendurable in Cowley because in him it represented nothing but a perfunctory exercise, a mere exhibition of literary calisthenics. He appears to have been of a cold, or at least of a timid, disposition; in the face of these elaborately erotic volumes, we are told that to the end of his days he nevei summoned up courage to speak of love to a single woman in real life. The " Leonora " of The Chronicle is said to have been the

only woman he ever loved, and she married the brother of his biographer, Sprat.

Soon after his return to England he was seized in mistake for another person, and only obtained his liberty on a bail of £1000. In 1658 he revised and altered his play of The Guardian, and prepared it for the press under the title of The Cutter of Coleman Street, but it did not appear until 1663. Late in 1658 Oliver Cromwell died, and Cowley took advantage of the confusion of affairs to escape to Paris, where he remained until the Restora- tion brought him back in Charles's train. He published in 1663 Verses upon several occasions, in which The Complaint is included.

Wearied with the broils and fatigues of a political life, Cowley obtained permission to retire into the country; through his friend, Lord St Albans, he obtained a property- near Chertsey, and here, devoting himself to the study of botany, and buried in his books, he lived in comparative solitude until his death. He took a great and practical interest in experimental science, and he was one of those who were most prominent in advocating the foundation of an academy for the protection of scientific enter- prise. Cowley's pamphlet on The Advancement of Experimental Philosophy, 1661, led directly to the foundation of the Royal Society, to which body Cowley, in March 1667, at the suggestion of Evelyn, addressed an ode which is the latest and one of the strongest of his poems. He died in the Porch House, in Chertsey, on the 28th of July 1667, in consequence of having caught a cold while superintending his farm-labourers in the meadows late on a summer evening. On the 3rd of August Cowley was buried in Westminster Abbey beside the ashes of Chaucer and Spenser, where in 1675 the duke of Buckingham erected a monument to his memory. His Poemata Latina, including six books " Plantarum," were printed in 1668.

Throughout their parallel lives the fame of Cowley completely eclipsed that of Milton, but posterity instantly and finally reversed the judgment of their contemporaries. The poetry of Cowley rapidly fell into a neglect as unjust as the earlier popularity had been. As a prose writer, especially as an essayist, he holds, and will not lose, a high position in literature; as a poet it is hardly possible that he can enjoy more than a very partial revival. The want of nature, the obvious and awkward art, the defective melody of his poems, destroy the interest

that their ingenuity and occasional majesty would otherwise excite. He had lofty views of the mission of a poet and an insatiable ambition, but his chief claim to poetic life is the dowry of sonorous lyric style which he passed down to Dryden and his successors of the 18th century.

The works of Cowley were collected in 1668, when Thomas Sprat, afterwards bishop of Rochester, brought out a splendid edition in folio, to which he prefixed a graceful and elegant life of the poet. There were many reprints of this collection, which formed the standard edition till 1 881, when it was superseded by A. B. Grosart's privately printed edition in two volumes, for the Chertsey Worthies library. The Essays have frequently been revived with approval. (E. G.)

COWLEY, HANNAH (1743-1809), English dramatist and poet, daughter of Philip Parkhouse, a bookseller at Tiverton, Devon- shire, was born in 1743. When about twenty-five years old she married Mr Cowley, of the East India Company's service, who died in 1797. ' Some years after her marriage, being at the theatre with her husband, she expressed the opinion that she could write as good a piece as the one being performed, and within a fortnight she had written her first play, The Runaway. She sent it to Garrick, who produced it at Drury Lane in 1776. Between then and 1795 she wrote twelve more plays, all of which (with one exception) were produced at Drury Lane or Covent Garden; and The Belle's Stratagem (1782), with one or two others, still survives in the list of acting plays. Among other, piecesi were Albina, Countess Raimond, A Bold Stroke for a Husband, More Ways than One, and A School for Greybeards, or The Mourning Bride. Mrs Cowley was the author of a number of indifferent poems, mainly historical, and under the name of " Anna Matilda," which has since become proverbial, she carried on a sentimental correspondence in the World with Robert Merry. She died at Tiverton on the nth of March 1809.

COWLEY, HENRY RICHARD CHARLES WELLESLEY, ist

Earl (1804-1884), British diplomatist, was the eldest son of Henry Wellesley, ist Baron Cowley (1773-1847), and Charlotte, daughter of Charles, ist Earl Cadogan, and was consequently a nephew of the duke of Wellington and of the marquess Wellesley. Born on the 17th of June 1804, he entered the diplomatic service in 1824, receiving his first important appointment in 1848, when he became minister plenipotentiary to the Swiss cantons; and in the same year he was sent to Frankfort to watch the proceed- ings of the German parliament.

This was followed by his appointment as envoy extraordinary to the new Germanic confederation, a position which he only held for a short time, as he was chosen in 1852 to succeed the ist marquess of Normanby as the British ambassador in Paris. Baron Cowley, as Wellesley had been since his father's death in 1847, held this important post for fifteen years, and the story of his diplomatic life in Paris cannot be separated from the general history of England and France. As minister during the greater part of the reign of Napoleon III., he conducted the delicate negotiations between the two countries during the time of those eastern complications which preceded and followed the Crimean War, and also during the excitement and unrest produced by the attempt made in 1858 by Felice Orsini to assassinate the emporor of the French; while his diplomatic skill was no less in evidence during the war between France and Austria and the subsequent course of events in Italy. In 1857 he had been created Earl Cowley and Viscount Dangan; in 1866 he was made a knight of the Garter; and having assisted Richard Cobden to conclude the commercial treaty between Great Britain and France in i860, he retired in 1867 from a position which he had filled with distinction to himself and with benefit to his country. In 1863 Cowley had inherited the estate of Draycot in Wiltshire from his kinsman the 5th earl of Mornington, and he lived in retirement until his death on the 15th of July 1884. He had married in 1833 Olivia Cecilia (d. 1885), daughter of Charlotte, baroness de Ros and Lord Henry Fitzgerald, by whom he had three sons and two daughters, and was succeeded in his titles by his eldest son, William Henry, 2nd Earl Cowley (1834-1895), father of Henry Arthur Mornington, 3rd earl (b. 1866).

COWLEY FATHERS, the name commonly given to the members of the Society of Mission Priests of St John the Evangelist, an Anglican religious community, the headquarters of which are in England, at Cowley St John, close to Oxford. The society was founded in 1865 by the Rev. R. M. Benson " for the cultiva- tion of a life dedicated to God according to the principles of poverty, chastity and obedience." The society, which is occupied both with educational and missionary work, has a house in London and branch houses at Bombay and Poona in India, at Cape Town and at St Cuthbert's, Kaffraria, in South Africa; and at Boston in the United States of America. The costume of the Cowley Fathers consists of a black frock or cassock confined by a black cord and a long black cloak.

COWPENS, a town of Spartanburg county, South Carolina, U.S.A., in the N. part of the state. Pop. (1900) 692; (1910) 1101. It is served by the Southern railway. In colonial days cattle were rounded up and branded here — whence the name. Seven miles N. of the town is the

field of the battle of Cowpens, fought on the 17th of January 1781, during the War of American Independence, between the Americans under Gen. Daniel Morgan and the British under Gen. Banastre Tarleton, the British being defeated. A monument was erected on the battle- field in 1859, but was much defaced during the Civil War. The town of Cowpens was founded in 1876, and was incorporated in 1880.

COWPER, WILLIAM COWPER, ist Earl (c. 1665-1723), lord chancellor of England, was the son of Sir William Cowper, Bart., of Ratling Court, Kent, a Whig member of parliament of some mark in the two last Stuart reigns. Educated at St Albans school, Cowper was called to the bar in 1688; having promptly given his allegiance to the prince of Orange on his landing in England, he was made recorder of Colchester in 1694, and in 1695 entered parliament as member for Hertford. He

enjoyed a large practice at the bar, and had the reputation of being one of the most effective parliamentary orators of his generation. He lost his seat in parliament in 1702 owing to the unpopularity caused by the trial of his brother Spencer on a charge of murder. In 1705 he was appointed lord keeper of the great seal, and took his seat on the woolsaskwithoutapeerage. In the following year he conducted the negotiations between the English and Scottish commissioners for arranging the union with Scotland. In November of the same year (1706) he succeeded to his father's baronetcy; and on the 14th of December he was raised to the peerage as Baron Cowper of Wingham, Kent.

When the union with Scotland came into operation in May 1707 the queen in council named Cowper lord high chancellor of Great Britain, he being the first to hold this office. He presided at the trial of Dr Sacheverell in 17 10, but resigned the seal when Harley and Bolingbroke took office in the same year. On the death of Queen Anne, George I. appointed Cowper one of the lords justices for governing the country during the king's absence, and a few weeks later he again became lord chancellor. A paper which he drew up for the guidance of the new king on constitutional matters, entitled An Impartial History of Parties, marks the advance of English opinion towards party government in the modern sense. It was published by Lord Campbell in his Lives of the Lord Chancellors. Cowper supported the impeach – ment of Lord Oxford for high treason in 1715, and in 1716 presided as lord high steward at the trials of the peers charged

with complicity in the Jacobite rising, his sentences on whom have been censured as unnecessarily severe. He warmly sup- ported the septennial bill in the same year. On the 18th of March 17 18 he was created Viscount Fordwich and Earl Cowper, and a month later he resigned office on the plea of ill-health, but probably in reality because George I. accused him of espousing the prince of Wales's side in his quarrel with the king. Taking the lead against his former colleagues, Cowper opposed the proposal brought forward in 1710 to limit the number of peers, and also the bill of pains and penalties against Atterbury in 1723. In his last years he was accused, but probably without reason, of active sympathy with the Jacobites. He died at his residence, Colne Green, built by himself on the site of the present mansion of Panshanger on the 10th of October 1723.

Cowper was not a great lawyer, but Burnet says that "tie managed the court of chancery with impartial justice and great despatch " ; the most eminent of his contemporaries agreed in extolling his oratory and his virtues. He was twice married — first, about 1686, to Judith, daughter and heiress of Sir Robert Booth, a London merchant; and secondly, in 1706, to Mary, daughter of John Clavering, of Chopwell, Durham. Swift {Examiner, xvii., xxii.) alludes to an allegation that Cowper had been guilty of bigamy, a slander for which there appears to have been no solid foundation. His younger brother, Spencer Cowper (1669-1728), was tried for the murder of Sarah Stout in 1699, but was acquitted; the lady, who had fallen in love with Cowper, having in fact committed suicide on account of his inattention. He was one of the managers of the impeachment of Sacheverell; was attorney-general to the prince of Wales (1714), chief justice of Chester (1717), and judge of the common pleas (1727). He was grandfather of William Cowper, the poet.

The 1st earl left two sons and two daughters by his second wife. The eldest son, William (1 709-1 764), who succeeded to the title, assumed the name of Clavering in addition to that of Cowper on the death of his maternal uncle. His wife was a daughter of the earl of Grantham, and grand-daughter of the earl of Ossory. The son of this marriage, George Nassau, 3rd Earl Cowper (1738-1789), inherited the estates of the earl of Grantham; and in 1778 he was created by the emperor Joseph II. a prince of the Holy Roman Empire. The 5th earl (1778-1837) married a daughter of Lord Melbourne, the prime minister, by whom he had two sons; and his widow married as her second husband Lord Palmerston, who devised his property of Broad- lands to her second son, William Francis Cowper-Temple (181 1- who was created Baron Mount Temple in 1880. The

Cowper, married Anne Florence, daughter of Thomas Philip, earl de Grey; and this lady at her father's death became suo jure baroness Lucas of Cradwell. Francis Thomas de Grey, 7th Earl Cowper (1834-1905), in addition to the other family titles, became in 187 1 10th Baron Dingwall in the peerage of Scotland, and 8th Baron Butler of Moore Park in the peerage of Ireland as heir-general of Thomas, earl of Ossory, son of the 1 st duke of Ormonde; the attainder of 1715 affecting those titles having been reversed in July 1871. On the death of his mother he also inherited the barony of Lucas of Cradwell. On the death without issue in 1905 of the 7th earl, who was lord lieutenant of Ireland 1880-1882, the earldom and barony of Cowper, together with the viscountcy of Fordwich, became extinct; the barony of Butler fell into abeyance among his sisters and their heirs, and the baronies of Lucas and Dingwall devolved on his nephew, Auberon Thomas Herbert (b. 1876).

See Private Diary of Earl Cowper, edited by E. C. Hawtrey for the Roxburghe Club (Eton, 1833) ; The Diary of Mary, Countess Cowper, edited by the Hon. Spencer Cowper (London, 1864); Lord Camp- bell, Lives of the Lord Chancellors and Keepers of the Great Seal (8 vols., London, 1 845-1 869); Edward Foss, The Judges of England (9 vols., London, 1848-1864); Gilbert Burnet, History of his Own Time (6 vols., Oxford, 1833); T. B. Howell, State Trials, vol. xii.-xv. (33 vols., London, 1809-1828); G. E. C, Complete Peerage (London, 1889). (R- J-M.)

COWPER, WILLIAM (1731-1800), English poet, was born in the rectory (now rebuilt) of Great Berkhampstead, Hertfordshire, on the 26th of November (O.S. 15th) 1731, his father the Rev. John Cowper being rector of the parish as well as a chaplain to George II. On both the father's and the mother's side he was of ancient lineage. The father could trace his family back to the time of Edward IV. when the Cowpers were Sussex land- owners, while his mother, Ann, daughter of Roger Donne of Ludham Hall, Norfolk, was of the same race as the poet Donne, and the family claimed to have Plantagenet blood in its veins. Of more human interest were Cowper's immediate predecessors. His grandfather was that Spencer Cowper who, after being tried for his life on a charge of murder, lived to be a judge of the court of common pleas, while his elder brother became lord chancellor and Earl Cowper, a title which became extinct in 1905. Here is the poet's genealogical tree.

John Cooper, 1 Alderman of London (d. 1609).

Sir William Cowper, Bart. (d. 1642).

John Cowper (died in prison 1643).

Sir William Cowper, 2nd Bart. (d. 1706).

William, Earl Cowper, Lord Chancellor (d. 1723).

Spencer Cowper, Judge (1669-1728).

William Cowper (d. 1740).

Rev. John Cowper (d. 1756).

Ashley Cowper (d. 1788).

£

elder son, George Augustus Frederick (1806-1856), 6th Earl

William Cowper,

the poet Lady Hesketh. Theodora.

(1731-1800).

The Rev. John Cowper was twice married. Cowper's mother, to whom the memorable lines were written beginning " Oh that these lips had language," was his first wife. She died in 1737 at the age of thirty-four, when the poet was but six years old, and she is buried in Berkhampstead church. Cowper's step- mother is buried in Bath, and a tablet on the walls of the cathedral commemorates her memory. The father, who appears to have been a conscientious clergyman with no special interest in his sons, died in 1756 and was buried in the Cowper tomb at Pans- hanger. Only one other of his seven children grew to manhood — John, who was born in 1737.

The poet appears to have attended a dame's school in earliest infancy, but on his mother's death, when he was six years old, he was sent to boarding-school, to a Dr Pitman at Markyate, a

1 Alderman Cooper thus spelt his name and all the family from that day to this, including the poet, have so pronounced it.

village 6 m. from Berkhampstead. From 1738 to 1741 he was placed

in the care of an oculist, as he suffered from inflammation of the eyes. In the latter year he was sent to Westminster school, where he had Warren Hastings, Impey, Lloyd, Churchill and Colman for schoolfellows. It was at the Markyate school that he suffered the tyranny that he commemorated in Tirocinium. His days at Westminster, Southey thinks, were ” probably the happiest in his life,” but a boy of nervous temperament is always unhappy at school. At the age of eighteen Cowper entered a solicitor’s office in Ely Place, Holborn. Here he had Thurlow, the future lord chancellor, as a fellow-clerk, and it is stated that Thurlow promised to help his less pushful comrade in the days of realized ambition. Three years in Ely Place were rendered happy by frequent visits to his uncle Ashley’s house in South- ampton Row, where he fell deeply in love with his cousin Theodora Cowper. At twenty-one years of age he took chambers in the Middle Temple, where we first hear of the dejection of spirits that accompanied him periodically through manhood. He was called to the bar in 1754. In 1759 he removed to the Inner Temple and was made a commissioner of bankrupts. His devotion to his cousin, however, was a source of unhappiness. Her father, possibly influenced by Cowper’s melancholy tendencies, perhaps possessed by prejudices against the marriage of cousins, interposed, and the lovers were separated — as it turned out for ever. During three years he was a member of the Nonsense Club with his two schoolfellows from Westminster, Churchill and Lloyd, and he wrote sundry verses in magazines and trans- lated two books of Voltaire’s Henriade. A crisis occurred in Cowper’s life when his cousin Major Cowper nominated him to a clerkship in the House of Lords. It involved a preliminary appearance at the bar of the house. The prospect drove him insane, and he attempted suicide; he purchased poison, he placed a penknife at his heart, but hesitated to apply either measure of self-destruction. He has told, in dramatic manner, of his more desperate endeavour to hang himself with a garter. Here he all but succeeded. His friends were informed, and he was sent to a private lunatic asylum at St Albans, where he remained for eighteen months under the charge of Dr Nathaniel Cotton, the author of Visions. Upon his recovery he removed to Huntingdon in order to be near his brother John, who was a fellow of St Benet’s College, Cambridge. John had visited his brother at St Albans and arranged this. An attempt to secure suitable lodgings nearer to Cambridge had been ineffectual. In June 1765 he reached Huntingdon, and his life here was essentially happy. His illness had broken him off from all his old friends save only his cousin Lady Hesketh, Theodora’s sister, but new acquaintances were made, the Unwins being the most valued. This family consisted of Morley Unwin (a clergyman), his wife Mary, and his son (William) and daughter

(Susannah) . The son struck up a warm friendship which his family shared. Cowper entered the circle as a boarder in November (1765). All went serenely until in July 1767 Morley Unwin was thrown from his horse and killed. A very short time before this event the Unwins had received a visit from the Rev. John Newton (q.v.), the curate of Olney in Buckinghamshire, with whom they became friends. Newton suggested that the widow and her children with Cowper should take up their abode in Olney. This was achieved in the closing months of 1767. Here Cowper was to reside for nineteen years, and he was to render the town and its neighbourhood memorable by his presence and by his poetry. His residence in the Market Place was converted into a Cowper Museum a hundred years after his death, in 1900. Here his life went on its placid course, interrupted only by the death of his brother in 1770, until 1773, when he became again deranged. It can scarcely be doubted that this second attack interrupted the contemplated marriage of Cowper with Mary Unwin, although Southey could find no evidence of the circumstance and Newton was not in- formed of it. J. C. Bailey brings final evidence of this (The Poems of Cowper, page 1 5) . The fact was kept secret in later years in order to spare the feelings of Theodora Cowper, who thought that her cousin had remained as faithful as she had done to their early love.

It was not until 1776 that the poet's mind cleared again. In 1779 he made his first appearance as an author by the Olney Hymns, written in conjunction with Newton, Cowper's verses being indicated by a " C." Mrs Unwin suggested secular verse, and Cowper wrote much, and in 1782 when he was fifty-one years old there appeared Poems of William Cowper of the Inner Temple, Esq. : London, Printed for J. Johnson, No. 72 St Paul's Churchyard. The volume contained "Table Talk," "The Progress of Error," " Truth," "Expostulation " and much else that survives to be read in our day by virtue of the poet's finer work. This finer work was the outcome of his friendship with Lady Austen, a widow who, on a visit to her sister, the wife of the vicar of the neighbouring village of Clifton, made the acquaint- ance of Cowper and Mrs Unwin. The three became great friends. Lady Austen determined to give up her house in London and to settle in Olney. She suggested The Task and inspired John Gilpin and The Royal George. But in 1784 the friendship was at an end, doubtless through Mrs Unwin's jealousy of Lady Austen. Cowper's second volume appeared in 1785; — The Task : A Poem in Six Books. By William Cowper of the Inner Temple, Esq.; To which are added by the same author An Epistle to Joseph Hill, Esq., Tirocinium or a Review of Schools, and the History of John Gilpin: London, Printed for J. Johnson, No. 72 St Paul's Church Yard; 1785. His first book had been a failure, one critic

even declaring that ” Mr Cowper was certainly a good, pious man, but without one spark of poetic fire.” This second book was an instantaneous success, and indeed marks an epoch in literary history. But before its publication — in 1784 — the poet had commenced the translation of Homer. In 1786 his life at Olney was cheered by Lady Hesketh taking up a temporary residence there. The cousins met after an interval of twenty-three years, and Lady Hesketh was to be Cowper’s good angel to the end, even though her letters disclose a considerable impatience with Mrs Unwin. At the end of 1786 a removal was made to Weston Underwood, the neighbouring village which Cowper had frequently visited as the guest of his Roman Catholic friends the Throckmortons. This was to be his home for yet another ten years. Here he completed his translation of Homer, materially assisted by Mr Throckmorton’s chaplain Dr Gregson. There are six more months of insanity to record in 1787. In 1790, a year before the Homer was published, commenced his friendship with his cousin John Johnson, known to all biographers of the poet as ” Johnny of Norfolk.” Johnson also aspired to be a poet, and visited his cousin armed with a manuscript. Cowper discouraged the poetry, but loved the writer, and the two became great friends. New friends were wanted, for in 1792 Mrs Unwin had a paralytic stroke, and henceforth she was a hopeless invalid. A new and valued friend of this period was Hayley, famous in his own day as a poet and in history for his association with Romney and Cowper. He was drawn to Cowper by the fact that both were contemplating an edition of ” Milton,” Cowper having received a commission to edit, writing notes and trans* latiiig the Latin and Italian poems. The work was never com- pleted. In 1794 Cowper was again insane and his lifework was over. In the following year a removal took place into Norfolk under the loving care of John Johnson. Johnson took Cowper and Mary Unwin to North Tuddenham, thence to Mundesley, then to Dunham Lodge, near Swaffham, and finally in October 1796 they moved to East Dereham. In December of that year Mrs Unwin died. Cowper lingered on, dying on the 25th of April 1800. The poet is buried near Mrs Unwin in East Dereham church.

Cowper is among the poets who are epoch-makers. He brought a new spirit into English verse, and redeemed it from the arti- ficiality and the rhetoric of many of his predecessors. With him began the ” enthusiasm of humanity ” that was afterwards to become so marked in the poetry of Burns and Shelley, Words- worth and Byron. With him began the deep sympathy with nature, and love of animal life, which was to characterize so much of later poetry.

Although Cowper cannot rank among the world’s greatest poets or

even among the most distinguished of poets of his own country, his place is a very high one. He had what is a rare

quality among English poets, the gift of humour, which was very singularly absent from others who possessed many other of the higher qualities of the intellect. Certain of his poems, moreover, — for example, ” To Mary,” ” The Receipt of my Mother’s Portrait,” and the ballad ” On the Loss of the Royal George,” — will, it may safely be affirmed, continue to be familiar to each successive generation in a way that pertains to few things in literature. Added to this, one may note Cowper’s distinction as a letter-writer. He ranks among the half-dozen greatest letter- writers in the English language, and he was perhaps the only great letter-writer with whom the felicity was due to the power of what he has seen rather than what he has read.

Bibliography. — The first important life of Cowper was by Hayley in 1803. In its complete form it appeared in 4 volumes in 1806 and was reprinted in 1809 and 1812. It was reprinted again by the Rev. T. S. Grimshawe with the Correspondence in 8 volumes in 1835. Robert Southey’s much more valuable Life and Letters appeared also in 15 volumes in 1834-1837. The Private Correspondence, edited by John Johnson, appeared in 2 volumes in 1824 and again in 1835. The Complete Correspondence, edited by Thomas Wright, was pub- lished in 1904, but more correspondence appeared in Notes and Queries, July, August and September 1904, and in The Poems of William Cowper, edited by J. C. Bailey (1905). Edward Dowden unearthed new correspondence with William Hayley in The Atlantic Monthly (1907). Short lives of Cowper have appeared in many quarters, from Thomas Taylor’s (1833) to Goldwin Smith’s in the ” English Men of Letters ” series (1880). Another brief biography of great merit is attached to the Globe edition of Cowper’s Works. Essays by Leslie Stephen, Stopford Brooke, Whitwell Elwin, George Eliot and Walter Bagehot deserve attention. See also St Beuve’s Causeries du Lundi (1868), vol. xi. ; Letters of Lady Hesketh to John Johnson (1901); John Newton, by the Rev. Josiah Bull (1868); Cowper and Mary Unwin, by Caroline Gearey (1900); and A Con- cordance to the. Poetic Works of William Cowper, by John Neave (1887). (C. K. S.)

COWRY, the popular name of the shells of the Cypraeida, a family of mollusks. Upwards of 100 species are recognized, and they are widely distributed over the world — their habitat being the shallow water

along the sea-shore. The best known is the money cowry or Cypraea moneta, a small shell about half an inch in length, white and straw-coloured without and blue within, which derives its distinctive name from the fact that in various countries it has been employed as a kind of currency. (See Shell-money.) In Africa among those tribes, such as the Niam-Niam, who do not recognize their monetary value, the shells are in demand as fashionable decorations, just as in Germany they were in use as an ornament for horses' harness, and were popular enough to acquire several native names, such as Brustharnisch or breastplates, and Otterkopfchen or little adders' heads. Besides the Cypraea moneta various species are employed in this decorative use. The Cypraea aurora is a mark of chieftain- ship among the natives of the Friendly Islands; the Cypraea annulus is a favourite with the Asiatic islanders; and several of the larger kinds have been used in Europe for the carving of cameos. The tiger cowry, Cypraea tigris, so well known as a mantelpiece ornament in England and America, is commonly used by the natives of the Sandwich Islands to sink their nets; and they have also an ingenious plan of cementing portions of several shells into a smooth oval ball which they then employ as a bait to catch the cuttle-fish. While the species already mentioned occur in myriads in their respective habitats, the Cypraea princeps and the Cypraea umbilicala are extremely rare.

COW-TREE, or Milk-tree, Brosimum Galactodendron (natural order Moraceae) , a native of Venezuela. As in other members of the order, the stem contains a milky latex, which flows out in considerable quantities when a notch is cut in it. The " milk " is sweet and pleasant tasting. Another species, B. AKcastrum, the bread-nut tree, a native of central America and Jamaica, bears a fruit which is cooked and eaten. The bread-fruit (Artocarpus) is an allied genus of the same natural order.

COX, DAVID (1783-18 59), English painter, was born on the 29th of April 1783, in a small house attached to the forge of his father,a hardworking master smith, in a mean suburb of Birming- ham. Turning his hand to what he could get to do, Joseph Cox, the father, was both blacksmith and whitesmith, and when the war with France began took to the making of bayonets and horse

shoes, on wholesale commission, and immediately the boy David was thought able to assist he was taken from the poor elementary school in the neighbourhood, and set to the anvil. The attempt to turn the boy to this kind of labour had, however, been made too early; it was too heavy for his strength, and he was sent to what was called by the cyclops of Birmingham a " toy trade," making lacquered buckles,

painted lockets, tin snuff-boxes and other ” fancy “articles. Here David very soon acquired some power of painting miniatures, and his talents might have been misdirected had his master, Fieldler by name, not released him from his apprenticeship by dying by his own hand; and David found an opening as colour-grinder and scene-painter’s fag in the theatre then leased, with several others, by the father of Macready, the tragedian.

This obscure step, not one of promotion at the time, was really the most important incident in the uneventful career of Cox. The boy, who had inherited a rather weakly body, and had been trained with care by a pious mother, while intellectually negative and unable to cope with any kind of learning whatever, had endless perseverance, great strength of application, and all through life remained genial, gentle, simple-minded and modest, his penetration and self-reliance being wholly professional, inspired by his love of nature and his knowledge of his subject. Not very quick, and with little versatility, he went step by step in one line of study from the time he began to get the smallest remuneration for his pictures to the age of seventy-five, when he painted large in oil very much the same class of subjects he had of old produced small in water-colours, with the same impressive and unaffectedly noble sentiment, only increased by the mastery of almost infinite practice. He was never led astray by fictitious splendour of any kind, except once indeed in 1825, when he imitated Turner, and produced a classic subject he called ” Carthage, Aeneas, and Achates.” He never visited Venice or Egypt, or crossed the Channel except for a week or two in Belgium and Paris, and never even went to Scotland for painting purposes. Bettws-y-Coed and its neighbourhood was everything to him, and characteristics most truly English were beloved by him with a sort of filial instinct. So completely did he love the country, that even London, where it was his interest to live, had few attractions, and did not retain him long.

This residence in the metropolis which began in 1804 was, however, of the most essential educational advantage to him. The Water-Colour Society was established the year after he arrived, and was mainly supported by landscape-painters. He was not,of course,admitted at first into membership, not till 1813, before which time an attempt to establish a rival exhibition had been made. In this Cox joined, the result being very serious to him, an entire failure entailing the seizure and forced sale of all the pictures. At that time the tightest economy was the rule with him, and to save the trifling cost of new strainers or stretch- ing boards, he covered up one picture by another. When these works were prepared for re-sale, fifty years afterwards, some of them yielded picture after picture, peeled off the boards like the waistcoats

from the body of the gravedigger in Hamlet !

While lodging near Astley's Circus he married his landlady's daughter, and then took a modest cottage at Dulwich, where he gradually left off scene-painting and became teacher, giving lessons at ten shillings a lesson. This entailed walking to the pupils' homes, and the gift of the paintings done before the pupils. These have since been frequently sold for large sums, but his own price, when lucky enough to sell his best works, was never over a few pounds, and more frequently about fifteen shillings. Sometimes, indeed, he sold them in quantities at two pounds a dozen to be resold to country teachers. By and by he resisted the leaving of the work done to the pupil, but with little advantage to himself, as he saw no end to the accumulation of his own productions, and actually tore them up, and threw them into areas, or pushed them into drains during his trudge homeward. A number of years after he pointed out a particular drain to a friend, and said, " Many a work of mine has gone down that way to the Thames!"

Shortly after he had turned thirty, his stay in London suddenly

ended. He was offered the enormous sum of £100 per annum, by a ladies' college in Hereford, and thither he went. This sum he supplemented by teaching in the Hereford grammar school for many years, at six guineas a year, and in other schools at better pay, but still, and up to his fortieth year, we find his prices for pictures from eight to twenty-five shillings. Cox has no history apart from his productions, and these particulars as to his remuneration possess an interest almost dramatic when we contrast them with the enormous sums realized by his later works, and with the " honours and observance, troops of friends," that accompanied old age with him, when settled down in his own home at Harborne, near his native town, where he died on the 7th of June 1859.

Cox's second short residence in London, dating from 1835 to 1840, marks the period of his highest powers. During those years, and for twelve years after, his productiveness kept pace with his mastery, and it would be difficult to overrate the impressiveness of effect, and high feeling, within the narrow range of subject displayed by many of these works. He was now surrounded by dealers, and wealth flowed in upon him. Still he remained the same, a man with few wants and scarcely any enjoyments except those furnished by his brush and his colours.

The home at Harborne was a pleasant one, but the approach to the front was useless as the door was kept fastened up, the only entrance being through the garden at the back, and the principal room appropriated as his studio he was content to reach by a narrow stair from the kitchen. Neither in it nor elsewhere was there any luxury or even taste visible:— no bric-d-brac, no objects of interest, few or no books, no pictures except landscapes by his friends. When in winter, after his wife's death, the fire went out, and the cold at last surprised him, he lifted his easel into the little dining-room and began again. A union of his friends was formed in 1855 to procure a portrait of him, which was painted by Sir J. Watson Gordon ; and an exhibition of his works was opened in London in 1858 and again another in 1859. This was actually open when the news of his death arrived.

The number of David Cox's works, great and small, is enormous. He produced hundreds annually for perhaps forty-five years. Before his death and for ten years thereafter, their prices were remarkable, as witness the following obtained at auction — " Going to the Mill," £1575; " Old Mill at Bettws-y-Coed," £1575; " Outskirts of a Wood, with Gipsies," £2305; " Peace and War," £3430.

See Hall, Biography of David Cox (1881). (W. B. Sc.)

COX, SIR GEORGE WILLIAM (1827-1902), English divine and scholar, was born on the 10th of January 1827, at Benares, India, and was educated at Rugby and Trinity College, Oxford. In 1830 he was ordained, and in i860 took a mastership at Cheltenham College, which he held for only a year. He had already contributed to the Edinburgh Review, and had published in 1850 Poems, Legendary and Historical (with E. A. Freeman), and in 1853 a Life of St Boniface. From 1 861 he devoted himself entirely to literary work, chiefly in connexion with history and comparative mythology. Many of his works were avowedly popular in character, and the most important, the History of Greece, has been superseded and is now of little value. His studies in mythology were inspired by Max Miiller, but his treatment of the subjects was his own. He was an extreme supporter of the solar and nebular theory as the explanation of myths. He also edited (with W. T. Brande) A Dictionary of Science, Literature and Art (1875). Sir George Cox (who suc- ceeded to the baronetcy in 1877)was a Broad Churchman, and a prominent** supporter of Bishop Colenso in 1863-1865; and five years after Colenso 's death he published (1888) his Life of the bishop. He was himself nominated to the see of Natal, but was refused consecration. In 1881 he was made vicar of Scrayingham, York, but resigned the living in 1897. In 1896 he was given a civil list pension. He died at Walmer on the 9th of February

1902.

Works. — Tales from Greek Mythology (1861); A Manual of Mythology (1867); Latin and Teutonic Christendom (1870); The Mythology of the Aryan Nations (1870, new ed., 1882) ; History

of Greece (1874); General History of Greece (1876) ; History of the Establishment of British Rule, in India, and An Introduction to the Science of Comparative Mythology (1881,); Lives of Greek Statesmen (188S); Concise History of ‘England (1887).

COX, JACOB DOLSON (1828-1900), American general, political leader and educationalist, was born on the 27th of October 1828 in Montreal, Canada, His father, a shipbuilder of German descent (Koch) ,and his mother,a descendant of William Brewster, were natives of New York City, where the boy grew up, studying law in an office in 184 2-1.844,. and working in a broker’s office in 1844ˆ1846, and where, under the influence of Charles G. Finney (1792-1875), whose daughter he afterwards married, he prepared himself for the ministry. He graduated at Oberlin College in 1851, having in the meantime given up his theological: studies in rebellion at Finney’s dogmatism. In 1851-1853 he was super- intendent of schools at Warren, Ohio; in 1853 was admitted to the Ohio bar, being at that time an anti-slavery Whig; and in 1859 was elected to the state senate, in which with Garfield and JamesMonroe(i82i-i898) he formed the “Radical Triumvirate,” Cox himself presenting a petition for a personal liberty law and urging woman’s rights, especially larger property rights to married women. Appointed by Governor Dennisonone of three brigadiers- general of militia in i860, he eagerly undertook the study of tactics, strategy and military history. He rendered great assistance in raising troops for the Union service in 1861, enlisted himself in spite of poor health and a family of six small children, and in April was commissioned a brigadier-general, U.S.V. He took, part in the West Virginia campaign of 1861, served in the Kanawha region, in supreme command after Rosecrans’s relief in the spring, until August 1862, when his troops were ordered to join Burnside’s 9th Corps in Virginia. After the death at his side of General Reno in the battle of South Mountain, and during Antietam, Cox commanded the corps, and at the close of the campaign (6th Oct. 1862) he was appointed major-general, U.S. V., but the appointment was not confirmed. In April-December 1863 he was head of the department of Ohio. In 1864 he took part in the Atlanta campaign under Sherman, as a divisional and subsequently corps-commander: at the battle of Franklin he commanded the 23rd Corps, and he served at Nashville also. He led an expedition following Sherman into the Carolinas and fought two

successful actions with Bragg at Kinston, N.C. He was governor of Ohio in 1866-1867, and as such advocated the colonization of the freedmen in a restricted area, and sympathized with President Johnson's programme of Reconstruction and worked for a compromise between Johnson and his opponents, although he finally deserted Johnson. In 1868 he was chairman of the Republican national convention which nominated Grant. He was secretary of the interior in 1869-1870; opposed the confirmation of the treaty for the annexation of Santo Domingo, negotiated by O. E. Babcock and urged by President Grant; introduced the merit system in his department, and resigned in October 1870 because of pressure put on him by politicians piqued at his prohibition of campaign levies on his clerks, and because of the interference of Grant in favour of William McGarrahan's attempt by legal proceedings to obtain from Cox a patent to certain California mining lands. He took up legal practice in Cincinnati, became president in 1873, and until 1877 was receiver, of the Toledo & Wabash & Western. In 1877-1879 he was a representative in Congress. From 1881 to 1897 he was dean of the Cincinnati law school, and from 1885 to 1889 president of the University of Cincinnati. He died at Magnolia, Massachusetts, on the 4th of August 1900. A successful lawyer, and in his later years a prominent microscopist, who won a gold medal of honour for microphotography at the Antwerp Exposition of 1891, he is best known as one of the greatest " civilian " generals of the Civil War, and, with the possible exception of J. C. Ropes, the highest American authority of his time on military history, particularly the history of the American Civil War. He wrote Atlanta (New York, 1882) and The March to the Sea, Franklin and Nashville (New York, 1882), both in the series Campaigns of the Civil War; The Second Battle of Bull Run, as Connected

wilh the Fitz-John Porter Case (Cincinnati, 1882); and the valuable Military Reminiscences of the Civil War (2 vols., New York, 1900) published posthumously.

See J. R. Ewing, Public Services of Jacob Dolson Cox (Washington, 1902), a Johns Hopkins University dissertation; and W. C. Cochran, " Early Life and Military Services of General Jacob Dolson Cox," in Bibliotheca Sacra, vol. 58 (Oberlin, Ohio, 1901).

COX, KENYON (1856-), American painter, was born at Warren, Ohio,

on the 27th of October 1856, being the son of Gen. Jacob Dolson Cox. He was a pupil of Carolus-Duran and of J. L. Gerome in Paris from 1877 to 1882, when he opened a studio in New York, subsequently teaching with much success in the Art Students' League. His earlier work was mainly of the nude drawn with great academic correctness in somewhat conventional colour. Receiving little encouragement for such pictures, he turned to mural decorative work,in which he achieved prominence. Among his better-known examples are the frieze for the court room of the Appellate Court, New York, and decora- tions for the Walker Art Gallery, Bowdoin College; for the Capitol at Saint Paul, Minnesota, and for other public and private buildings. He wrote with much authority on art topics, and is the author of the critical reviews, Old Masters and New (1905) and Painters and Sculptors (1907), besides some poems. He became a National Academician in 1903. His wife, nte Louise H. King (b. 1865), whom he married in 1892, also became a figure and portrait-painter of note.

COX, RICHARD (1500 ?-is8i), dean of Westminster and bishop of Ely, was born of obscure parentage at Whaddon, Buckinghamshire, in 1499 or 1500. He was educated at the Benedictine priory of St Leonard Snelshall near Whaddon, at Eton, and at King's College, Cambridge, where he graduated B.A. in 1524. At Wolsey's invitation he became a member of the cardinal's new foundation at Oxford, was incorporated B.A. in 1525, and created M.A. in 1526. In 1530 he was engaged in persuading the more unruly members of the university to approve of the king's divorce. A premature expression of Lutheran views is said to have caused his departure from Oxford and even his imprisonment, but the records are silent on these sufferings which do not harmonize with his appointment as master of the royal foundation at Eton. In 1533 he appears as author of an ode on the coronation of Anne Boleyn, in 1535 he graduated B.D. at Cambridge, proceeding D.D. in 1537, and in the same year subscribing the Institution of a Christian Man. In 1 540 he was one of the fifteen divines to whom were referred crucial questions on the sacraments and the seat of authority in the Church; his answers (printed in Pocock's Burnet, iii. 443-496) indicate a mind tending away from Catholicism, but susceptible to " the king's doctrine "; and, indeed, Cox was one of the divines by whom Henry said the " King's Book " had been drawn up when he wished to impress upon the Regent Arran that it was not exclusively his own doing. Moreover, he was present at the examination of Barnes, subscribed the divorce of Anne of Cleves, and in that year of reaction became archdeacon and prebendary of Ely and canon of Westminster. He was employed on other royal business in

1541, was nominated to the projected bishopric of Southwell, and was made king's chaplain in 1542. In 1543 he was employed to ferret out the " Prebendaries' Plot " against Cranmer, and became the archbishop's chancellor. In December he was appointed dean of Oseney (afterwards Christ Church) Oxford, and in July was made almoner to Prince Edward, in whose education he took an active part. He was present at Dr Crome's recantation in 1546, denounced it as insincere and insufficient, and severely handled him before the privy council.

After Edward's accession, Cox's opinions took a more Pro- testant turn, and he became one of the most active agents of the Reformation. He was consulted on the compilation of the Communion office in 1548, and the first and second books of Common Prayer, and sat on the commission for the reform of the canon law. As chancellor of the university of Oxford (1547- 1552) he promoted foreign divines such as Peter Martyr, and was a moving spirit of the two commissions which sought with some success to eradicate everything savouring of popery from the

books, MSS., ornaments and endowments of the university, and earned Cox the sobriquet of its cancellor rather than its chan- cellor. He received other rewards, a canonry of Windsor (1548), the rectory of Harrow (1547) and the deanery of Westminster (1549). He lost these prefermentson Mary's accession, and wasfor a fortnight in August 1553 confined to the Marshalsea. He was not of the stuff of which martyrs are made; he remained in obscurity until after the failure of Wyatt's rebellion, and then in May 1554 escaped in the same ship as the future archbishop Sandys, to Antwerp. Thence in March 1 555 he made his way to Frankfort, where he played an important part in the first struggle between Anglicanism and Puritanism. The exiles had, under the influence of Knox and Whittingham, adopted Calvinistic doctrine and a form of service far more Puritanical than the Prayer-Book of 1 552. Cox stood up for that service, and the exiles were divided into Knoxians and Coxians. Knox attacked Cox as a pluralist, Cox accused Knox of treason to the emperor Charles V. This proved the more dangerous charge: Knox and his followers were expelled, and the Prayer-Book of 1552 was restored.

In 1559 Cox returned to England, and was elected bishop of Norwich, but the queen changed her mind and Cox's destination to Ely, where he remained twenty-one years. He was an honest, but narrow-minded ecclesiastic, who held what views he did hold intolerantly, and was always wanting more power to constrain those who differed from him (see his letter in Hatfield MSS. i. 308) . While he refused to minister in

the queen's chapel because of the crucifix and lights there, and was a bitter enemy to the Roman Catholics, he had little more patience with the Puritans. He was grasping, or at least tenacious of his rights in money matters, and was often brought into conflict with courtiers who coveted episcopal lands. The queen herself intervened, when he refused to grant Ely House to her favourite, Sir Christopher Hatton; but the well-known letter beginning " Proud Prelate " and threatening to unfrock him seems to be an impudent forgery which first saw the light in the Annual Register for 1761. It hardly, however, misrepresents the queen's meaning, and Cox was forced to give way. These and other trials led him to resign his see in 1580, and it is significant that it remained vacant for nineteen years. Cox died on the 22nd of July 1581: a monument erected to his memory twenty years later in Ely cathedral was defaced, owing, it was said, to his evil repute. Strype (Whitgift, i. 2) gives Cox's hot temper and marriage as reasons why he was not made archbishop in 1583 in preference to Whitgift, who had been his chaplain; but Cox had been dead two years in 1583. His first wife's name is unknown; she was the mother of his five children, of whom Joanna married the eldest son of Archbishop Parker. His second wife was the widow of William Turner (d. 1568), the botanist and dean of Wells.

Voluminous details about Cox's life are given in Strype's Works, Parker Soc. Publ., and Cooper's Athenae Cantab, i. 437-445. See also Letters and Papers of Henry VIII. ; Acts of the Privy Council; Cal. Dom. State Papers; Cal. Hatfield MSS.; Lit. Rem. of Edward VI.; Whittingham's Troubles at Frankfort; Machyn's Diary; Pocock's Burnet; Bentham's Ely; Willis's Cathedrals; Le Neve's Fasti; R. W. Dixon's Church History. (A. F. P.)

COX, SAMUEL (1826-1893), English nonconformist divine, was born in London on the 19th of April 1826. For some years he worked as an apprentice in the London docks, and then entered the Baptist College at Stepney. In 1851 he became pastor of a Baptist church at Southsea, removing in 1855 to Ryde, and in 1863 to Nottingham. He was president of the Baptist Association in 1873 and received the degree of D.D. from St Andrews in 1882. Cox had distinct gifts as a biblical expositor and was the founder and first editor of a monthly journal The Expositor (18 7 5-1 884). Among the best known of his numerous theological publicationsare SalvatorMundi (i&'j'j), A Commentary on the Book of Job (1880), The Larger Hope (1883).

COX, SAMUEL HANSON (1 793-1880), American Presbyterian divine, was born at Rahway, N.J., on the 25th of August 1793, of Quaker stock. He was pastor of the Presbyterian church at Mendham, N.J., in

1817-1821, and of two churches in New York from 1821 to 1834. He helped to found the University of the City of New York, and from 1834 to 1837 was professor of pastoral

theology at Auburn. The next seventeen years were passed in active ministry at Brooklyn, whence in 1854, owing to a throat affection, he removed to Owego, N.Y. He died at Bronxville, N.Y., on the 2nd of October 1880. Cox was a fine orator, and a speech made in Exeter Hall in 1833, in which he put the responsi- bility for slavery in America on the British government, made a great impression. It was he who described the appellation D.D. as a couple of ” semi-lunar fardels.”

His son, Arthur Cleveland Coxe (1818-1896), who changed the spelling of the family name, graduated at the University of the City of New York in 1838 and at the General Theological Seminary in 1841. He was rector of St John’s Church, Hartford, in 1843-1854, of Grace Church, Baltimore, in 1854-1863, and of Calvary Church, New York City, in 1863. In 1863 he became assistant bishop and in 1865 bishop of western New York. He was strongly influenced by the Oxford Movement. Bishop Coxe wrote spirited defences of Anglican orders and published several volumes of verse, notably Christian Ballads (1845).

COXCIE, MICHAEL (1490-1592), Flemish painter, was born at Malines, and studied under Bernard van Orley, who probably induced him to visit Italy. At Rome in 1532 he painted the chapel of Cardinal Enckenvoort in the church of Santa Maria dell’ Anima; and Vasari, who knew him, says with truth ” that he fairly acquired the manner of an Italian.” But Coxcie’s principal occupation was designing for engravers; and the fable of Psyche in thirty-two sheets by Agostino Veneziano and the Master of the Die are favourable specimens of his skill. During a subsequent residence in the Netherlands Coxcie greatly extended his practice in this branch of art. But his productions were till lately con- cealed under an interlaced monogram M.C.O.K.X.I.N. Coxcie returned in 1539 to Malines, where he matriculated, and painted for the chapel of the gild of St Luke the wings of an altar-piece now in Sanct Veit of Prague. The centre of this altar- piece, by Mabuse, represents St Luke portraying the Virgin; the side pieces contain the Martyrdom of St Vitus and the Vision of St John in Patmos. At van Orley’s death in 1541 Coxcie succeeded to the office of

court painter to the regent Mary of Hungary, for whom he decorated the castle of Binche. He was subsequently patronized by Charles V., who often coupled his works with those of Titian; by Philip II., who paid him royally for a copy of van Eyck's " Agnus Dei "; and by the duke of Alva, who once protected him from the insults of Spanish soldiery at Malines. There are large and capital works of his (1 587-1 588) in St Rombaud of Malines, in Ste Gudule of Brussels, and in the museums of Brussels and Antwerp. His style is Raphaelesque grafted on the Flemish, but his imitation of Raphael, whilst it distantly recalls Giulio Romano, is never free from affectation and stiffness. He died at Malines on the 5th of March 1592.

COXE, HENRY OCTAVIUS (1811-1881), English librarian and scholar, was born at Bucklebury, in Berkshire, on the 20th of September 181 1. He was educated at Westminster school and Worcester College, Oxford. Immediately on taking his degree in 1833, he began work in the manuscript department of the British "" Museum, became in 1838 sub-librarian of the Bodleian, at Oxford, and in i860 succeeded Dr Bandinel as head librarian, an office he held until his death in 188 1. Having proved himself an able palaeographer, he was sent out by the British government in 1857 to inspect the libraries in the monasteries of the Levant. He discovered some valuable manuscripts, but the monks were too wise to part with their treasures. One valuable result of his travels was the detection of the forgery attempted by Constantine Simonides. He was the author of various catalogues, and under his direction that of the Bodleian, in more than 720 volumes, was completed. He published Rogiri de Wendover Chronica, 5 vols. (184 1- 1 844); the Black Prince, an historical poem written in French by Chandos Herald (1842); and Report on the Greek Manuscripts yet remaining in the Libraries of the Levant (1858). He was not only an accurate librarian but an active and hard- working clergyman, and was for the last twenty-five years of his life in charge of the parish of Wytham, near Oxford. He was likewise honorary fellow of Worcester and Corpus Christi Colleges. He died on the 8th of July 1881.

COXE, WILLIAM (1747-1828), English historian, son of Dr William Coxe, physician to the royal household, was born in London on the 7th of March 1747. Educated at Marylebone grammar school and at Eton College, he proceeded to King's College, Cambridge, and was elected a fellow of this society in 1768. In 1771 he took holy orders, and afterwards visited many parts of Europe as tutor and travelling companion to various noblemen and gentlemen. In 1786 he was appointed vicar of Kingston-on-Thames, and in 1788 rector of Bemerton, Wiltshire. He also held the rectory of Stourton from 1801 to 181 1 and that of Fovant from 181 1 until his death. In 1791 he

was made prebendary of Salisbury, and in 1804 archdeacon of Wiltshire. He married in 1803 Eleanora, daughter of William Shairp, consul- general for Russia, and widow of Thomas Yeldham of St Peters- burg. He died on the 8th of June 1828.

During a long residence at Bemerton Coxe was mainly occupied in literary work. His Memoirs of Sir Robert Walpole (London, 1798), Memoirs of Horatio, Lord Walpole (London, 1802), Memoirs of John, duke of Marlborough (London, 1818-1819), Private and Original Correspondence of Charles Talbot, duke of Shrewsbury (London, 1821), Memoirs of the Administrations of Henry Pelham (London, 1829), are very valuable for the history of the 18th century. His History of the House of Austria (London, 1807, new ed. 1853 and 1873), and Memoirs of the Bourbon Kings of Spain (London, 1813), give evidence of careful and painstaking work on the part of the author. The style, however, as in all his works, is remarkably dull. His other works are mainly accounts of his travels: Sketches of the Natural, Political and Civil State of Switzerland (London, 1779), Account of the Russian Discoveries between Asia and America (London, 1780), Account of Prisons and Hospitals in Russia, Sweden and Denmark (London, 1781), Travels into Poland, Russia, Sweden and Denmark (London, 1784), Travels in Switzerland (London, 1789), Letter on Secret Tribunals of Westphalia (London, 1796), Historical Tour in Monmouthshire (London, 1801). He also edited Gay's Fables, and wrote a Life of John Gay (Salisbury, 1797), Anecdotes of G. F. Handel and J. C. Smith (London, 1798), and a few other works of minor importance. Some of his books have been translated into French, and several have gone through two or more editions.

COXSWAIN (properly " cockswain," and pronounced cox'n, usually shortened to " cox "; from " cock," a small boat, and swain, a servant), in the navy, a petty officer in charge of a ship's boat and its crew, who steers; the coxswain of the captain's gig takes a special rank among petty officers. In the National Lifeboat Institution of Great Britain the " coxswain " is a paid permanent official on each station, who has charge of the lifeboat and house, is responsible for its care, and steers and takes com- mand when afloat. The word is also used, generally, of any one Who steers a boat.

COXWELL, HENRY TRACEY (1819-1900), English aeronaut, was born at Wouldham, Kent, on the 2nd of March 18 19, the son of a naval officer. He was educated for the army, but became a dentist. From a boy he had been greatly interested in ballooning, then in its infancy, but his own first ascent was not made until 1844. In 1848 he became a professional aeronaut, making numerous public ascents in the chief

continental cities. Returning to London, he gave exhibitions from the Crerhorne and subsequently from the Surrey Gardens. By 1861 he had made over 400 ascents. In 1862 in company with Dr James Glaisher, he attained the greatest height on record, about 7 m. His companion became insensible, and he himself, unable to use his frost-bitten hands, opened the gas-valve with his teeth, and made an extremely rapid but safe descent. The result of this and other aerial voyages by Coxwell and Glaisher was the making of some important contributions to the science of meteorology. Coxwell was most pertinacious in urging the practical utility of employing balloons in time of war. He says: " I had hammered away in The Times for little less than a decade before there was a real military trial of ballooning for military purposes at Aldershot." His last ascent was made in 1885, and he died on the 5th of January 1900.

See his My Life and Balloon Experiences (1887).

COYOTE, the Indian name for a North American member of the dog family, also known as the prairie-wolf, and scientifically as Canis latrans. Ranging from Canada in the north to Guatemala in the south, and chiefly frequenting the open plains on both sides of the chain of the Rocky Mountains, the coyote, under all its various local phases, is a smaller animal than the true wolf, and may apparently be regarded as the New World repre- sentative of the jackals, or perhaps, like the Indian wolf (C. pallipes), as a type intermediate between wolves and jackals. In addition to its inferior size, the coyote is also shorter in the leg than the wolf, and carries a more luxuriant coat of hair. The average length is about 40 in., and the general tone of colour tawny mingled with black and white above and whitish below, the tail having a black tip and likewise a dark gland- patch near the root of the upper surface. There is, however, considerable local variation both in the matter of size and of colour from the typical coyote of Iowa, which measures about 50 in. in total length and is of a full rich tint. The coyote of the deserts of eastern California, Nevada and Utah is, for instance, a smaller and paler-coloured animal, whose length is usually about 42 in. On this and other local varia- tions a number of nominal species have been founded; but it is preferable to regard them in the light of geographical phases or races, such as the above-mentioned C. latrans estor of Nevada and Utah, C. I. mearnsi of Arizona and Sonora, and C. I. frustor of Oklahoma and the Arkansas River district.

It is to distinguish them from the grey, or timber, wolves that coyotes have received the name of ” prairie-wolves “; the two titles indicating the nature of the respective habitats of the two species. Coyotes are creatures of slinking and stealthy habits, living in burrows in the plains, and hunting in packs at night, when they utter yapping cries and blood-curdling yells as they gallop. Hares (” jack-rabbits “) , chipmunks or ground-squirrels, and mice form a large portion of their food; but coyotes also kill the fawns of deer and prongbuck, as well as sage-hens and other kinds of game-birds. ” In the flat lands,” write Messrs Witmer Stone and W. E. Cram, in their American Animals (1902), ” they dig burrows for themselves or else take possession of those already made by badgers and prairie-dogs. Here in the spring the half-dozen or more coyote pups are brought forth; and it is said that at this season the old ones systematically drive any large game they may be chasing as near to their burrow, where the young coyotes are waiting to be fed, as possible before killing it, in order to save the labour of dragging it any great distance. When out after jack-rabbits two coyotes usually work together. When a jack-rabbit starts up before them, one of the coyotes bounds away in pursuit while the other squats on his haunches and waits his turn, knowing full well that the hare prefers to run in a circle, and will soon come round again, when the second wolf takes up the chase and the other rests in his turn. . . . When hunting antelope (prongbuck) and deer the coyotes spread out their pack into a wide circle, endeavouring to surround their game and keep it running inside their ring until exhausted. Sage-hens, grouse and small birds the coyote hunts successfully alone, quartering over the ground like a trained pointer until he succeeds in locating his bird, when he drops flat in the grass and creeps forward like a cat until close enough for the final spring.”

When hard put to it for food, coyotes will, it is reported, eat hips, juniper-berries and other wild fruits. (R. L.*)

COYPEL, the • name of a French family of painters. Noel Coypel (1628-1707), also called, from the fact that he was much influenced by Poussin, Coypel le Poussin, was the son of an unsuccessful artist. Having been employed by Charles Errard to paint some of the pictures required for the Louvre, and having afterwards gained considerable fame by other pictures produced at the command of the king, in 1672 he was appointed director of the French Academy at Rome. After four years he returned to France; and not long after he became director of the Academy of Painting. The Martyrdom of St James in Notre Dame is perhaps his finest work.

His son, Antoine Coypel (1661-1772), was still more celebrated

than his father. Antoine studied under his father, with whom he spent four years at Rome. At the age of eighteen he was admitted into the Academy of Painting, of which he became professor and rector in 1707, and director in 1714. In 1716 he was appointed king's painter, and he was ennobled in the follow- ing year. Antoine Coypel received a careful literary education, the effects of which appear in his works; but the graceful imagination displayed by his pictures is marred by the fact that he was not superior to the artificial taste of his age. He was a clever etcher, and engraved several of his own works. His Discours prononces dans les conferences de V AcadSmie royale de Peinture, &°c; appeared in 1741.

Antoine's half-brother, Noel Nicholas Coypel (1602-1734), was also an exceedingly popular artist; and his son, Charles Antoine (1694-1752), was painter to the king and director of the Academy of Painting. The latter published interesting academical lectures in Le Mercure and wrote several plays which were acted at court, but were never published.

COYPU, the native name of a large South American aquatic rodent mammal, known very generally among European residents in the country as nutria (the Spanish word for otter) and scientifi- cally as Myocastor (or Myopotamus) coypu. Its large size, aquatic habits, partially webbed hind-toes, and the smooth, broad, orange-coloured incisors, are sufficient to distinguish this rodent from the other members of the family Capromyidae. Coypu are abundant in the fresh waters of South America, even small ponds being often tenanted by one or more pairs. Should the water dry up, the coypu seek fresh homes. Although subsisting to a considerable extent on aquatic plants, these rodents frequently come ashore to feed, especially in the evening. Several young are produced at a birth, which are carried on their mother's back when swimming. The fur is of some commercial value, although rather stiff and harsh; its colour being reddish- brown. (See Rodentia.)

COYSEVOX, CHARLES ANTOINE (1640- 1720), French sculptor, was born at Lyons on the 29th of September 1640, and belonged to a family which had emigrated from Spain. The name should be pronounced Coezevo. He was only seventeen when he produced a statue of the Madonna of considerable merit; and having studied under Lerambert and trained himself by taking copies in marble from the Greek masterpieces (among others from the Venus de Medici and the Castor and Pollux), he was engaged by the bishop of Strassburg, Cardinal Furstenberg, to adorn with statuary his chateau at Saverne (Zabern). In 1666 he married Marguerite Quillerier, Lerambert's niece,

who died a year after the marriage. In 167 1, after four years spent on Saverne, which was subsequently destroyed by fire in 1780, he returned to Paris. In 1676 his bust of the painter Le Brun obtained admission for him to the Academie Royale. A year later he married Claude Bourdict.

In consequence of the influence exercised by Le Brun between the years 1677 and 1685, he was employed by Louis XIV. in producing much of the decoration and a large number of statues for Versailles; and he afterwards worked, between 1701 and 1709, with no less facility and success, for the palace at Marly, subsequently destroyed in the Revolution.

Among his works are the ” Mercury and Fame,” first at Marly and afterwards in the gardens of the Tuileries; “Neptune and Amphitrite,” in the gardens at Marly; ” Justice and Force,” at Versailles; and statues, in which the likenesses are said to have been remarkably successful, of most of the celebrated men of his age, including Louis XIV. and Louis XV. at Versailles, Colbert (at Saint-Eustache), Mazarin (in the church desQuatre-Nations), Conde the Great (in the Louvre), Maria Theresa of Austria, Turenne, Vauban, Cardinals de Bouillon and de Polignac, Fenelon, Racine, Bossuet (in the Louvre), the comte d’Harcourt, Cardinal Furstenberg and Charles Le Brun (in the Louvre). Coysevox died in Paris on the 10th of October 1720.

Besides the works given above he carved about a dozen memorials, including those to Colbert (at Saint-Eustache), to Cardinal Mazarin(in the Louvre), and to the painter Le Brun (in the church of Saint Nicholas-du-Chardon).

Among the pupils of Coysevox were Nicolas and Guillaume Coustou.

See Henry Jouin, A. Coysevox, sa vie, son osuvre (1883); Jean du Seigneur, Revue universelle des arts, vol. i. (1855), pp. 32 et seq.

CRAB (Ger. Krabbe, Krebs), a name applied to the Crustacea of the order Brachyura, and to other forms, especially of the order Anomur a, which resemble them more or less closely in appearance and habits.

The Brachyura, or true crabs, are distinguished from the long- tailed lobsters and shrimps which form the order Macrura, by the fact that the abdomen or tail is of small size and is carried folded up under the

body. In most of them the body is trans- versely oval or triangular in outline and more or less flattened, and is covered by a hard shell, the carapace. There are five pairs of legs. The first pair end in nippers or chelae and are usually much more massive than the others which are used in walking or swimming. The eyes are set on movable stalks and can be withdrawn into sockets in the front part of the carapace. There are six pairs of jaws and foot-jaws (maxiliipedes) enclosed within a " buccal cavern," the opening of which is covered by the

FlG. I. — Side view of Crab (Morse), the abdomen extended and

carrying a mass of eggs beneath it ; e, eggs.

broad and flattened third pair of foot-jaws. The abdomen is usually narrow and triangular in the males, but in the females it is broad and rounded and bears appendages to which the eggs are attached after spawning (fig. 1).

As in most Crustacea, the young of nearly all crabs, when newly hatched, are very different from their parents. The first

larval stage is known as a Zoea, this name having been given to it when it was believed by naturalists to be a distinct and inde- pendent species of animal. The Zoea is a minute transparent organism, swimming at the surface of the sea. It has a rounded body, armed with long spines, and along segmented tail. The eyes are large but not set on stalks, the legs are not yet developed, and the foot-jaws form swimming paddles. After casting its skin several times as it

Fig. 2 .-Zoea of Common Shore-Crab in S rows { \ size > . the its second stage, r. Rostral spine; s, Dorsal young crab passes into spine; m, Maxillipeds; t, Buds of thoracic a stage known as the feet; a, Abdomen. (Spence Bate.) Megalopa (fig. 2), also

formerly regarded as an independent animal, in which the body and limbs are more crab-like, but the abdomen is large and not filled up'. After a

further moult the animal assumes a form very similar to that of the adult. There are a few crabs, living on land or in fresh water, which do not pass through a metamorphosis but leave the egg as miniature adults.

Most crabs live in the sea, and even the land-crabs, which are abundant in tropical countries, nearly all visit the sea occasionally and pass through their early stages in it. Many shore-crabs living between

tide-marks are more or less amphibious, and the river-crab of southern Europe or Lenten crab (Potamon edule, better known as Thelphusa fluviatilis) is an example of the fresh- water crabs which are abundant in most of the warmer regions of the world. As a rule, crabs breathe by gills, which are lodged in a pair of cavities at the sides of the carapace, but in the true land-crabs the cavities become enlarged and modified so as to act as lungs for breathing air.

Walking or crawling is the usual mode of locomotion, and the peculiar sidelong gait familiar to most people in the common shore-crab, is characteristic of most members of the group. The crabs of the family Portunidae, and some others, swim with great dexterity by means of their flattened paddle-shaped feet.

Like many other Crustacea, crabs are often omnivorous and act as the scavengers of the sea, but many are predatory in their habits and some are content with a vegetable diet.

Though no crab, perhaps, is truly parasitic, some live in relations of ” commensalism ” with other animals. The best known examples of this are the little ” mussel-crabs ” (Pinno- theridae) which live within the shells of mussels and other bivalve mollusca and probably share the food of their hosts. Some crabs live among corals, and one species at least gives rise to hollow swellings on the branches of a coral like the “galls” which are formed on plants by certain insects. Another crab (Melia tesselata) carries in each of its claws a living sea- anemone which it uses as an animated weapon of defence and an implement for the capture of prey. Many of the sluggish spider-crabs (Maiidae) have their shells covered- by a forest of growing sea-weeds, zoophytes and sponges, which are ” planted ” there by the crab itself, and which afford it a very effective disguise.

Many of the larger crabs are sought for as food by man. The most important and valuable are the edible crab of British and European coasts (Cancer pagurus) and the blue crab of the Atlantic coast of the United States (Callinectes sapidus).

Among the Anomura, the best known are the hermit-crabs, which live in the empty shells of Gasteropod Mollusca, which they carry about with them as portable dwellings. In these, the abdomen is soft-skinned and spirally twisted so as to fit into the shells which they inhabit. The common hermit-crab of the British coasts {Pagurus or Eupagurus Bernhardus) is sometimes called the soldier-crab from its pugnacity. Small specimens are found between tide-marks inhabiting the shells of periwinkles and other small molluscs, but the full-grown specimens

live in deeper water and are usually found in the shell of the whelk (Buccinum). As the crab grows it changes its dwelling from time to time, often having to fight with its fellows for the pos- session of an empty shell. Sometimes an annelid worm lives inside the shell along with the hermit and often the outside is covered with zoophytes. In some species, as in the British Eupagurus prideauxi, a sea-anemone is constantly found attached to the shell, profiting by the active locomotion of the crab and probably sharing the crumbs of its food, while it affords its host protection by its stinging powers.

In tropical countries the hermit-crabs of the family Coeno- bitidae live on land, often at considerable distances from the sea, to which, however, they return for the purpose of hatching out their spawn. The large robber-crab or cocoa-nut crab of the Indo-Pacific islands (Birgus latro), which belongs to this family, has given up the habit of carrying a portable dwelling, and the upper surface of its abdomen has become covered by shelly plates. The stories of its climbing palm-trees to get the fruit were long doubted, but it has been seen, and even photo- graphed in the act. (W. T. Ca.)

Fig. 6. — Eupagurus Bern- hardus (Soldier Crab).

Fig. 7. — Pinnotheres pisum (Pea Crab).

Fig. 8. — Corysles Cassivelaunus (Masked Crab).

Fig. 9. — Eupagurus angulatus (a Hermit Crab).

CRABBE, GEORGE (1754-1832), English poet, was born at Aldeburgh in Suffolk on the 24th of December 1754. His family was partly of Norfolk, partly of Suffolk origin, and the name was doubtless originally derived from ” crab.” His grandfather, Robert Crabbe, was the first of the family to settle at Aldeburgh, where he held the appointment of collector of customs. He died in 1 734, leaving one son, George,who practised many occupations, including that of a schoolmaster, in the adjoining village of Orford. Finally the poet’s father obtained a small post in the customs of Aldeburgh, married Mary Lodwick, the widow of a publican, and had six children, of

whom George was the eldest.

The sea has swept away the small cottage that was George Crabbe's birthplace,but one may still visit the quay at Slaughden, some half-mile from the town, where the father worked and the son was at a later date to work with him. At first attending a dame's school in Aldeburgh, when nine or ten years of age he was sent to a boarding-school at Bungay, and at twelve to a school at Stowmarket, where he remained two years. His father dreamt of the medical profession for his clever boy, and so in 1768 he went to Wickham Brook near Newmarket as an apothecary's assistant. In 1 771 we find him assisting a surgeon at Woodbridge, and it was while here that he met Sarah Elmy. Crabbe was now only eighteen years of age, but he became " engaged " to this lady in 1772. It was not until 1783 that the pair were married. The intervening years were made up of painful struggle, in which, however, not only the affection but the purse of his betrothed assisted him. About the time of Crabbe's return from Wood-bridge to Aldeburgh he published at Ipswich his first work, a poem entitled Inebriety (1775). He found his father fallen on evil days. There was no money to assist him to a partnership, and surgery for the moment seemed out of the question. For a few weeks Crabbe worked as a common labourer, rolling butter casks on Slaughden quay. Before the year was out, however, the young man bought on credit " the shattered furniture of an apothecary's shop and the drugs that stocked it." This was at Aldeburgh. A year later Crabbe installed a deputy in the surgery and paid his first visit to London. He lodged in White-chapel, took lessons in midwifery and walked the hospitals. Returning to Aldeburgh after nine months — in 1777 — he found his practice gone. Even as a doctor for the poor he was an utter failure, poetry having probably taken too firm a hold upon his mind. At times he suffered hunger, so utterly unable was he to earn a livelihood. After three years of this, in 1780 Crabbe paid his second visit to London, enabled thereto by the loan of five pounds from Dudley Lang, a local magnate. This visit to London, which was undertaken by sea on board the " Unity " smack, made for Crabbe a successful career. His poem The Candidate, issued soon after his arrival, helped not at all. For a time he almost starved, and was only saved, it is clear, by gifts of money from his sweetheart Sarah Elmy. He importuned the great, and the publishers also. Everywhere he was refused, but at length a letter which reached Edmund Burke in March 1781 led to the careful consideration on the part of that great man of Crabbe's many manuscripts. Burke advised the publi- cation of The Library, which appeared in 1781. He invited him to Beaconsfield, and made interest in the right quarters to secure Crabbe's entry into the church. He was

ordained in December 1 781 and was appointed curate to the rector of Aldeburgh.

Crabbe was not happy in his new post. The Aldeburgh folk could not reverence as priest a man they had known as a day labourer. Crabbe again appealed to Burke, who persuaded the duke of Rutland to make him his chaplain (1782), and Crabbe took up his residence in Belvoir Castle, accompanying his new patron to London, when Lord Chancellor Thurlow (who told him he was ” as like Parson Adams as twelve to the dozen “) gave him the two livings of Frome St Quentin and Evershot in Dorsetshire, worth together about £200 a year. In May 1783 Crabbe’s poem The Village was published by Dodsley, and in December of this year he married Sarah Elmy. Crabbe continued his duties as ducal chaplain, being in the main a non-resident priest so far as his Dorsetshire parishes were concerned. In 1 785 he published The Newspaper. Shortly after this he moved

with his wife from Belvoir Castle to the parsonage of Stathern, where he took the duties of the non-resident vicar Thomas Parke, archdeacon of Stamford. Crabbe was at Stathern for four years. In 1789, through the persuasion of the duchess of Rutland (now a widow, the duke having died in Dublin as lord-lieutenant of Ireland in 1787), Thurlow gave Crabbe the two livings of Muston in Leicestershire and West Allington in Lincolnshire. At Muston parsonage Crabbe resided for twelve years, divided by a long interval. He had been four years at Muston when his wife inherited certain interests in a property of her uncle’s that placed her and her husband in possession of Ducking Hall, Parham, Suffolk. Here he took up his residence from 1793 to 1796, leaving curates in charge of his two livings. In 17.96 the loss of their son Edmund led the Crabbes to remove from Parham to Great Glemham Hall, Suffolk, where they lived until 1801. In that year Crabbe went to live at Rendham, a village in the same neighbourhood. In 1805 he returned to Muston. In 1807 he broke a silence of more than twenty years by the publication of The Parish Register, in 1810 of The Borough, and in 1812 of Tales in Verse. In 1813 Crabbe’s wife died, and in 1814 he was given the living of Trowbridge, Wiltshire, by the duke of Rutland, a son of his early patron, who, it is interesting to recall, wanted the living of Muston for a cousin of Lord Byron. From 18 14 to his death in 1832 Crabbe resided at Trowbridge.

These last years were the most prosperous of his life. He was a constant visitor to London, and in friendship with all the literary celebrities of the time. ” Crabbe seemed to grow young again,” remarks his biographer, M. Rene Huchon. He certainly carried on a succession of mild flirtations, and one Of his parishioners, Charlotte

Ridout, would have married him. The elderly widower had proposed to her and had been accepted in 1814, but he drew out of the engagement in 1816. He proposed to yet another friend, Elizabeth Charter, somewhat later. In his visits to London Crabbe was the guest of Samuel Rogers, in St James's Place, and was a frequent visitor to Holland House, where he met his brother poets Moore and Campbell. In 1817 his Tales of the Hall were completed, and John Murray offered £3000 for the copyright, Crabbe's previous works being included. The offer after much negotiation was accepted, but Crabbe's popularity was now on the wane.

In 1822 Crabbe went to Edinburgh on a visit to Sir Walter Scott. The adventure, complicated as it was by the visit of George IV. about the same time, is most amusingly described in Lockhart's biography of Scott, although one episode — that of the broken wine-glass — is discredited by Crabbe's biographer, M. Huchon. Crabbe died at Trowbridge on the 3rd of February 1832, and' was buried in Trowbridge church, where an ornate monument was placed over his tomb in August 1833.

Never was any poet at the same time so great and continuous a favourite with the critics, and yet so conspicuously allowed to fall into oblivion by the public. All the poets of his earlier and his later years, Cowper, Scott, Byron, Shelley in particular, have been reprinted again and again. With Crabbe it was long quite otherwise. His works were collected into eight volumes, the first containing his life by his son, in 1832. The edition was intended to continue with some of his prose writings, but the reception of the eight volumes was not sufficiently encouraging. A reprint, however, in one volume was made in 1847, and it has been reproduced since in 1854, 1867 and 1901. The exhaustion of the copyright, however, did no good for Crabbe's reputation, and it was not until the end of the century that sundry volumes of " selections " from his poems appeared; Edward FitzGerald, of Omar Khayyam fame, always a loyal admirer, made a " Selection," privately printed by Quaritch, in 1879. A " Selec- tion " by Bernard Holland appeared in 1899, another by C. H. Herford in 1902 and a third by Deane in 1903. The Complete Worki were published by the Cambridge University Press in three volumes, edited by A. W. Ward, in 1906.

Crabbe's poems have been praised by many competent pens, by Edward FitzGerald in his Letters, by Cardinal Newman in his Apologia, and by Sir Leslie Stephen in his Hours in a Library, most notably. His verses comforted the last hours of Charles

James Fox and of Sir Walter Scott, while Thomas Hardy has acknowledged their influence on the realism of his novels. But his works have ceased to command a wide public interest. He just failed of being the artist in words who is able to make the same appeal in all ages. Yet to-day his poems will well repay perusal. His stories are profoundly poignant and when once read are never forgotten. He is one of the great realists of English fiction, for even considered as a novelist he makes fascinating reading. He is more than this: for there is true poetry in Crabbe, although his most distinctively lyric note was attained when he wrote under the influence of opium, to which he became much addicted in his later years.

Bibliography. — Tlie Works of Crabbe (8 vols., Murray, 1834; I vol. .Murray, 1901), and the Works in the Cambridge Press Classics, edited by A. W. Ward (1906), have already been referred to. The life by Crabbe's son in one volume, The Life of the Rev. George Crabbe, LL.B., by his son the Rev. George Crabbe, A.M. (1834), has not been separately reprinted as it deserves to be. A recent biography is George Crabbe and His Times, 1754-1832; A Critical and Bio- graphical Study, by Rene Huchon, translated from the French by Frederick Clarke (1907). Brief biographies by T. H. Kebbel (" Great Writers " series) and by Canon Ainger (" English Men of Letters " series) also deserve attention. (C. K. S.)

CRACKER (from " crack," a common Teutonic word, cf. Ger. krachen, Dutch kraken, meaning to break with a sharp sound), that which " cracks "; it is, therefore, applied (1) to a firework so constructed that it explodes with several reports and jumps at each explosion, when placed on the ground (see Fireworks); (2) to a roll of coloured and ornamented paper containing sweets, small articles of cheap jewelry, paper caps and other trifles, together with a strip of card with a fulminant which explodes with a " crack " on being pulled; (3) to a thin crisp biscuit (q.v.); in America the general name for a biscuit. In the southern states of America, " cracker " is a term of contempt for the " poor " or " mean whites," particularly of Georgia and Florida; the term is an old one and dates back to the Revolution, and is supposed to be derived from the "cracked corn " which formed the staple food of the class to whom the term refers.

CRACOW (Pol. Krakov; Ger. Krakau), a town and episcopal see of Austria, in Galicia, 212 m. W. by N. of Lemberg by rail. Pop. (1900)

91,310, of which 21,000 were Jews, 5000 Germans and the remainder Poles. Although in regard to its population it is only the second place in Galicia, Cracow is the most interest- ing town in the whole of Poland. No other Polish town possesses so many old and historic buildings, none of them contains so many national relics, or has been so closely associated with the development and destinies of Poland as Cracow. And the ancient capital is still the intellectual centre of the Polish nation.

Cracow is situated in a fertile plain on the left bank of the Vistula (which becomes navigable here) and occupies a position of great strategical importance. It consists of the old inner town and seven suburbs. The only relics of the fortifications of the old town, whose place is now occupied by shady promenades, is the Florian's Gate and the Rondell, a circular structure, built in 1498. Cracow has 39 churches — about half the number it formerly had — and 25 convents for monks and nuns. Of these the most important is the Stanislaus cathedral, in Gothic style, consecrated in 1359, and built on the Wawel, the rocky eminence to the S.W. of the old town. Here the kings of Poland were crowned, and this church is also the Pantheon of the Polish nation, the burial place of its kings and its great men. Here he the remains of John Sobieski, of Thaddaeus Kosciuszko, of Joseph Poaiatowski and of Adam Mickiewicz. Here also are conserved the remains of St Stanislaus, the patron saint of the Poles, who, as bishop of Cracow, was slain before the altar by King Boleslaus in 1079. The cathedral is adorned with many valuable objects of art, paintings and sculptures, by such artists as Veit Stoss, Guido Reni, Peter Vischer, Thorwaldsen, &c. Part of the ancient Polish regalia is also kept here. The Gothic church of St Mary, founded in 1223, rebuilt in the 14th century with several chapels added in the 15th and 16th centuries, was restored in 1889-1893, and decorated with paintings from the designs by Matejko. It contains a huge high altar, the master- piece of Veit Stoss, who was a native of Cracow, executed in

1477-1489; a colossal stone crucifix, dating from the end of the 15th century, and several sumptuous tombs of noble families from the 16th and 17th centuries. The Dominican church, a Gothic building of the 13th century, but practically rebuilt after a fire in 1850; the Franciscan church, also of the 13th century, also much modernized; the church of St Florian of the 12th century, rebuilt in 1768, which contains the late-Gothic altar by Veit Stoss, executed in 15 18, during his last sojourn in Cracow; the church of St Peter, with a colossal dome, built in 1597, after the model of that of St Peter at Rome, and the beautiful Augustinian church in the suburb of Kazimierz, are all worth mentioning. Of the principal secular buildings, the royal castle

(Zamek Krdlowsk), a huge building, begun in the 13th century, and successively enlarged by Casimir the Great and by Sigismund I. Jagiello (1510-1533), is situated on the Wawel, and was until 1610 the residence of the Polish kings. It suffered much from fires and other disasters, and from 1846 onward was used as a barracks and a military hospital; it has now, however, been cleared out and restored. The Jagellonian university, now housed in a magnificent Gothic building erected in 1881-1887, was attended in 1901 by 1255 students, and had 175 professors and lecturers. The language of instruction is Polish. It is the second oldest university in Europe — the oldest being that of Prague- — and was famous during the 15th and 16th centuries. It was founded by Casimir the Great in 1364, and completed by Ladislaus Jagiello in 1400. Its rich library is now housed in the old university buildings, erected in the 15th century, in the beautiful Gothic court of which a bronze statue of Copernicus was placed in 1900. The Polish Academy of Science, founded in 1872, is housed in the new university buildings. In the Ring-Platz, or the principal square, opposite the church of St Mary, is the Tuchhaus (cloth-hall, Pol. Sukiennice), a building erected in 1257, several times renovated and enlarged, most recently in 1879, which contains the Polish national museum of art. Behind it is a Gothic tower, the only relic of the old town hall, demolished in 1820. The Czartoryski museum contains a large collection of objects of art, a rich library and a precious collection of manu- scripts, relating to the history of Poland.

Among the manufactures of the town are machinery, agri- cultural implements, chemicals, soap, tobacco, &c. But Cracow is more important as a trading than as an industrial centre. Its position on the Vistula and at the junction of several railways makes it the natural mart for the exchange of the products of Silesia, Hungary and Russian and Austrian Poland. Its trade in timber, salt, textiles, cattle, wine and agricultural produce of all kinds is very considerable. In the neighbourhood of Cracow there are mines of coal and zinc, and not far away lies the village of Krzeszowice with sulphur baths. About 2\ m. N.W. lies the Kosciuszko Hill, a mound of earth 100 ft. high, thrown up in 1820-1823 on the Borislava hill (1093 ft.), in honour of Thaddaeus Kosciuszko, the hero of Poland. On the opposite bank of the Vistula, united to Cracow by a bridge, lies the town of Podgorze (pop. 18,142); near it is the Krakus Hill, smaller than the Kosciuszko Hill, and a thousand years older than it, erected in honour of Krakus, the founder of Cracow. About 8 m. S.E. of Cracow is situated Wieliczka (q.v.), with its famous salt mines.

History. — Tradition assigns the foundation of Cracow to the mythical

Krak, a Polish prince who is said to have built a strong- hold here about a.d. 700. Its early history is, however, entirely obscure. In the latter part of the 10th century it was annexed to the Bohemian principality, but was recaptured by Boleslaus Chrobry, who made it the seat of a bishopric, and it became the capital of one of the most important of the principalities into which Poland was divided from the 12th century onwards. The city was practically ruined during the first Tatar invasion in 1 24 1, but the introduction of German colonists restored its prosperity, and in 1257 it received ” Magdeburg rights,” i.e. a civic constitution modelled on that of”Magdeburg. In this year the Tuchhalle was built. The town, however, had yet to pass through many vicissitudes. It suffered again from Tatar in- vasions; in 1290 it was captured by Wenceslaus II. of Bohemia and was held by the Bohemians until, in 1305, the Polish king

Ladislaus Lokietek recovered it from Wenceslaus III. Ladislaus made it his capital, and from this time until 1764 it remained the coronation and burial place of the Polish kings, even after the royal residence had been removed by Siegmund III. (1587- 1632) to Warsaw. On the third partition of Poland in 1795 Austria took possession of Cracow; but in 1809 Napoleon wrested it from that power, and incorporated it with the duchy of Warsaw, which was placed under the rule of the king of Saxony. In the campaign of 181 2 the emperor Alexander made himself master of this and the other territory which formed the duchy of Warsaw. At the general settlement of the affairs of Europe by the great powers in 181 5, it was agreed that Cracow and the adjoining territory should be formed into a free state; and, by the Final Act of the congress signed at Vienna in 181 5, ” the town of Cracow, with its territory, is declared to be for ever a free, independent and strictly neutral city, under the protection of Russia, Austria and Prussia.” In February 1846, however, an insurrection broke out in Cracow, apparently a ramification of a widely spread conspiracy throughout Poland. The senate and the other authorities of Cracow were unable to subdue the rebels or to maintain order, and, at their request, the city was occupied by a corps of Austrian troops for the protection of the inhabitants. The three powers, Russia, Austria and Prussia, made this a pretext for extinguishing this independent state; and as the outcome of a conference at Vienna (November 1846) the three courts, contrary to the assurance previously given, and in opposition to the expressed views of the British and French governments, decided to extinguish the state of Cracow and to incorporate it with the dominions of

Austria.

CRADDOCK, CHARLES EGBERT (1850-), the pen-name of Mary Noaixles Murfree, American author, who was born near Murfreesboro, Tennessee, on the 24th of January 1850, the great-granddaughter of Col. Hardy Murfree. She was crippled in childhood by paralysis. She attended school in Nashville and Philadelphia. Spending her summers in the mountains of eastern Tennessee, she came to know the primitive people there with whose life her writings deal. She contributed to Appleton's Journal, and, first in 1878, to The Atlantic Monthly. No one, apparently, suspected that the author of these stories was a woman, and her identity was not disclosed until 1885, a year after the publication of her first volume of short stories, In the Tennessee Mountains. She deals mainly with the narrow, stern life of the Tennessee mountaineers, who, left behind in the advance of civilization, live amid traditions and customs, and speak a dialect, peculiarly their own; and her work abounds in exquisite descriptions of scenery. Among her other books are: Where the Battle was Fought (1884), a novel dealing with the old aristo- cratic southern life; Down the Ravine (1885) and The Story of Keedon Bluffs (1887) for young people; The Prophet of the Great Smoky Mountains (1885), a novel; In the Clouds (1886), a novel ; The Despot of Broomsedge Cow (1888), a novel; In the " Stranger- People's" Country (1891); His Vanished Star (1894), a novel; The Mystery of Witch-Face Mountain and Other Stories (1895); The Phantoms of the Footbridge and Other Stories (1895); The Young Mountaineers (1897), short stories; The Juggler (1897)4 The Story of Old Fort Loudon (1899); The Bushwhackers and Other Stories (1899); The Champion (1902); A Spectre of Power (1903); The Frontiersman (1904); The Storm Centre (1905); The Amulet (1906) ; The Windfall (1907) ; and Fair Mississippian

(1908).

CRADLE (of uncertain etymology, possibly connected with " crate " and " creel," i.e. basket; the derivation from a Celtic word, with a sense of rocking, is scouted by the New English Dictionary), a child's bed of wood, wicker or iron, with enclosed sides, slung upon pivots or mounted on rockers. It is a very ancient piece of furniture, but the date when it first assumed its characteristic swinging or rocking form is by no means clear. A miniature in an illuminated Hisloire de la belle Hilaine in the Bibliotheque Nationale in Paris (end of the 14th or beginning of the 15th century) shows an infant sleeping in a tiny four-post bed slung upon rockers. In its oldest forms the cradle is an oblong oak box without a lid — originally the rockers appear to

have been detachable— but, like all other household appliances, it has been subject to changes of fashion alike in shape and adornment. It has been panelled and carved, supported on Renaissance pillars, inlaid with marqueterie or mounted in gilded bronze. The original simple shape persisted for two or three centuries — even the hood made its appearance very early. In the 1 8th century, however, cradles were often very elaborate — indeed in France they had begun to be so much earlier, but the richly carved and upholstered examples were used chiefly for purposes of state, being in fact miniature His de parade. In modern times they have become lighter and simpler, the old hood being very often replaced by a draped curtain dependent from a carved or shaped upright. About the middle of the 1 9th century iron cradles were introduced, along with iron bedsteads. A number of undoubted historic cradles have been preserved, together with many others with doubtful attributions. Two alleged cradles of Henry V. exist ; one which claims to have been used by the unhappy earl of Derwentwater is in the Victoria and Albert Museum in London; the other is at Windsor Castle. That of Henry IV. of France, now in the Chateau de Pau, is mounted upon a large tortoiseshell. That of the king of Rome (" Napoleon II.") was designed by Prud'hon, and along with that of the comte de Chambord is preserved in the Garde Meuble. In England a cradle is now often called a " bassinet " (i.e. little basket), and the " cot "has to some extent taken its place. By analogy, the word " cradle " is also applied to various sorts of framework in engineering, and to a rocking-tool used in engraving.

CRADOCK, a town of South Africa, capital of a division of the Cape province, in the upper valley of the Great Fish river, 181 m. by rail N. by E. of Port Elizabeth. Pop. (1904) 7762. It is one of the chief centres of the wool industry of the Cape, and does also a large trade in ostrich feathers, mohair, &c. The town enjoys a reputation as one of the best health resorts in the province. It stands at an altitude of 2856 ft.; the climate is very dry, the average annual rainfall being 14- 50 in. The mean maximum temperature is 77-6° F. Three miles N. of the town are sulphur baths (temp. ioo° F.) used for the treatment of rheumatism. In the neighbouring district survive a few herds of zebras, now protected by the game laws. The town dates from the beginning of the 19th century and is named after Sir John Cradock, governor of the Cape 1811-1813. The division has an area of 3048 sq. m. and a pop. (1904) of 18,803, of whom 41 % are white. CRAFT (a word common to Teutonic languages for strength, or power; cf. Get. Kraft), a word confined in English only, of the Teutonic languages in which it occurs, to intellectual power, and used as a synonym of " art." It then means skill or in- genuity, especially in the manual arts, hence its use in the

expression ” Arts and Crafts ” (q.v.), and it is ‘thus applied to the trade or profession in which such skill is displayed, to an association of workmen of a particular trade, a trade gild, and in particular to Freemasons, “the craft”; the word appears also in words such as ” handicraft ” or ” craftsman.” Skill applied to outwit or deceive gives the common sense of cunning or trickery, and it is this meaning which is implied in such combined words as ” priestcraft,” ” witchcraft ” and the like. A more particular use of the word is in the nautical sense of vessels of transport by water; this is probably a colloquially shortened form either of ” vessels of a fisherman’s, lighterman’s &c, craft,” i.e. “art,” or of “vessels of a heavier or lighter craft,” i.e. burden or capacity; in both cases the , qualifying words are dropped and the word comes to be used of vessels in general.

CRAG (a Celtic word, cf . Gael, creag, Manx cr eg, and Welsh and modern Scots craig), a steep rock. The word appears in many place-names in the north of England and in Scotland, and is also connected with ” carrick,” a word of similar meaning, also found in place-names. In geology, the term is applied to the strata in which a shelly sand deposit is found, and, in the expres- sion ” crag and tail,” to a formation of hills, in which one side is precipitous and lofty and the other slopes or ” tails ” gradually away, as in the Castle Rock in Edinburgh.

CRAGGS, JAMES (1657-1721), English politician, was a son of Anthony Craggs of Holbeck, Durham, and was baptized on the 10th of June 1657. After following various callings in London, Craggs, who was a person of considerable financial ability, entered the service of the duchess of Marlborough, and through her influence became in 1702 member of parliament for Gram- pound, retaining his seat until 1713. He was in business as an army clothier and held several official positions, becoming joint postmaster-general in 1715; and, making the most of his opportunities in all these capacities, he amassed a great deal of money. Craggs also increased his wealth by mixing in the affairs of the South Sea Company, but after his death an act of parliament confiscated all the property which he had acquired since December 1719. He left an enormous fortune when he died on the 16th of March 1721. It is possible that Craggs committed suicide.

His son, Jakes Craggs the younger (1686-1721), was born at Westminster on the 9th of April 1686. Part of his early life was spent

abroad, where he made the acquaintance of George Louis, elector of Hanover, afterwards King George I. In 17 13 he became member of parliament for Tregoney, in 171 7 secretary – at-war, and in the following year one of the principal secretaries of state. Craggs was implicated in the South Sea Bubble, but not so deeply as his father, whom he predeceased, dying on the 16th of February 1721. Among Craggs's friends were Pope, who wrote the epitaph on his monument in Westminster Abbey, Addison and Gay.

CRAIG, JOHN (1512 ?-i6oo), Scottish reformer, born about 1512, was the son of Craig of Craigston, Aberdeenshire, who was killed at Flodden in 1513. After an education at St Andrews, and acting as tutor to the children of Lord Darcy, the English warden of the North, he became a Dominican, but was soon in trouble as a heretic. In 1536 he made his way to England, but failing to obtain the preferment he desired at Cambridge, he went on to Italy, where the influence of Cardinal Pole, who was himself accused of heresy, secured him the post of master of the novices in the Dominican convent at Bologna. For some years he was busy travelling in the Levant in the interests of his order, but a perusal of Calvin's Institutes revived his heretical tendencies, and he was condemned to be burnt. Like the English scholar and statesman, Thomas Wilson, he owed his escape to the riot which broke out on the death of Paul IV. on the 18th of August 1559, when the mob burst open the prison of the Inquisition. After various adventures he reached Vienna, where he preached, and was protected by the semi-Lutheran archduke (afterwards the emperor) Maximilian II.

In 1560 he returned to Scotland, where in 1561 he was ordained minister of Holyrood, and in 1562 Knox's colleague in the High Church. His defence of church property and privilege against the predatory instincts of the nobles and the pretensions of the state brought him into conflict with Lethington and others; but he seems to have condoned, if he was not privy to, Riccio's murder. At first he refused to publish the banns of marriage between Mary and Bothwell, though in the end he yielded with a protest that he " abhorred and detested the marriage." He had been associated with Knox in various commissions for the organization of the church, but he wished to compromise between the two extreme parties. From 1571-1579 Craig was in the north, whither he had been sent to " illuminate those dark places in Mar, Buchan and Aberdeen." In 1579 he was appointed chaplain to the young James VI., and returned to Edinburgh. In 1581 episcopacy was abolished as a result of the report of a commission on which Craig had sat; he also assisted at the composition of the Second Book of Discipline and the National Covenant of 1580, and in 1581

compiled “Ane Shorte and Generate Confession” called the ” King’s Confession,” which was imposed on all parish ministers and graduates and became the basis of the Covenant of 1638. He approved of the Ruthven raid, and admonished James in terms which made him weep, but produced no alteration in his conduct, and before long Craig was denouncing the supremacy of Arran. But he was averse from the violence of Melville, and was willing to admit the royal supremacy ” as far as the word of God

allows.” James VI., Like Henry VIII., accepted this compromise, and the oath in this form was taken by Craig, the royal chaplains and some others. In 1592 was published Craig’s Catechism. He died on the 12th of December 1600.

See T. G. Law’s Pref. to Craig’s Catechism (1885) ; Bain’s Cal. Scottish State Papers; Reg. P. C. Scotl. ; Hew Scott’s Fasti Eccles. Scot. ; Knox’s, Calderwood’s and Grub’s Eccles. Histories ; McCrie’s Life of Melville; Hay Fleming’s Mary, Queen of Scots; Bannatyne’s Memorials. (A. F. P.)

CRAIG, SIR THOMAS (c. 1538-1608), Scottish jurist and poet, was born about 1538. It is probable that he was the eldest son of William Craig of Craigfintray, or Craigston, in Aberdeenshire, but beyond the fact that he was in some way related to the Craigfin- tray family nothing regarding his birth is known with certainty. He was educated at St Andrews, where he took the B.A. degree in 1555. From St Andrews he went to France, to study the canon and the civil law. He returned to Scotland about 1561, and was admitted advocate in February 1563. In 1564 he was appointed justice-depute by the justice-general, Archibald, earl of Argyll; and in this capacity he presided at many of the criminal trials of the period. In 1573 he was appointed sheriff -depute of Edinburgh, and in 1606 procurator for the church. He never became a lord of session, a circumstance that was unquestionably due to his own choice. It is said that he refused the honour of knighthood which the king wished to confer on him in 1604, when he came to London as one of the Scottish commissioners regarding the union between the kingdoms — the only political object he seems to have cared about; but in accordance with James’s commands he has always been styled and reputed a knight. Craig was married to Helen, daughter of Heriot of Lumphoy in Midlothian, by whom he had four sons and three daughters. His eldest son, Sir Lewis Craig (1569-1622), was raised to the bench in 1604, and among his other descendants are several well-known names*in the list of Scottish lawyers. He died on the 26th of February 1608.

Except his poems, the only one of Craig’s works which appeared

during his lifetime was his Jus feudale (1603; ed. R. Burnet, 1655; Leipzig, 1716; ed. J. Baillie 1732). The object of this treatise was to assimilate the laws of England and Scotland, but, instead of this, it was an important factor in building up and solidifying the law of Scotland into a separate system. Other works were De unione regnorum Britanniae tractatus, De jure successionis regni Angliae and De hominio dispulalio. Translations of the last two have been published, and in 1910 an edition of the De Unione appeared, with translation and notes by C. S. Terry. Craig's first poem, an Epithalamium in honour of the marriage of Mary queen of Scots and Darnley, appeared in 1 565. Most of his poems have been reprinted in the Delitiae poetarum Scolorum.

See P. F. Tytler, Life of Craig (1823) ; Life prefixed to Baillie's edition of the Jus feudale.

CRAIGIE, PEARL MARY TERESA (1867-1906), Anglo- American novelist and dramatist, who wrote under the pen-name of " John Oliver Hobbes," was born at Boston, U.S.A., on the 3rd of November 1867. She was the elder daughter of John Morgan Richards, and was educated in London and Paris. When she was nineteen she married Reginald Walpole Craigie, by whom she had one son, John Churchill Craigie: but the marriage proved an unhappy one, and was dissolved on her petition in July 1895. She was brought up as a Nonconformist, but in 1892 was received into the Roman Catholic Church, of which she remained a devout and serious member. Her first little book, the brilliant and epigrammatic Some Emotions and a Moral, was published in 189 1 in Mr Fisher Un win's " Pseudonym Library," and was followed by The Sinner's Comedy (1892), A Study in Temptations (1893), A Bundle of Life (1894), The Gods, Some Mortals, and Lord Wickenham. The Herb Moon (1896), a country love story, was followed by The School for Saints (1897), with a sequel, Robert Orange (1900). Mrs Craigie had already written a one-act " proverb," Journeys end in Lovers Meeting, produced by Ellen Terry in 1894, and a three-act tragedy, " Osbern and Ursyne," printed in the Anglo-Saxon Review (1899), when her successful piece, The Ambassador, was produced at the St James's Theatre in 1898. A Repentance (one

act, 1899) and The Wisdom of the Wise (1900) were produced at the same theatre, and The Flute of Pan (1904) first at Manchester and then at the Shaftesbury theatre; she was also part author of The

Bishop's Move (Garrick Theatre, 1902). Later books are The Serious Wooing (1901), Love and the Soul Hunters (1902), Tales about Temperament (1002), The Vineyard (1 904) . Mrs Craigie died suddenly of heart failure in London on the 13th of August 1906.

CRAIK, DINAH MARIA (1826-1887), English novelist, better known by her maiden name of Mulock, and still better as " the author of John Halifax, Gentleman," was the daughter of Thomas Mulock, an eccentric religious enthusiast of Irish extraction, and was born on the 20th of April 1826 at Stoke-upon- Trent, in Staffordshire, where her father was the minister of a small congregation. She settled in London about 1846, deter- mined to obtain a livelihood by her pen, and, beginning with fiction for children, advanced steadily until John Halifax, Gentleman (1857), placed her in the front rank of the women novelists of her day. A Life for a Life (1859), though inferior, maintained a high position, but she afterwards wrote little of importance except some very charming tales for children. Her most remarkable novels, after those mentioned above, were The Ogiivies (1849), Olive (1850), The Head of the Family (1851), Agatha's Husband (1853). There is much passion and power in these early works, and all that Mrs Craik wrote was characterized by high principle and deep feeling. Some of the short stories in Avillion and other Tales also exhibit a fine imagination. She published some poems distinguished by genuine lyrical spirit, narratives of tours in Ireland and Cornwall, and A Woman's Thoughts about Women. She married Mr G. L. Craik, a partner in the house of Macmillan & Company, in 1864, and died at Short- lands, near Bromley, Kent, on the 12th of October 1887.

CRAIK, GEORGE LILLIE (1798-1866), English man of letters, the son of a schoolmaster, was born at Kennoway, Fifeshire, in 1798. He studied at the university of St Andrews with the intention of entering the church, but, altering his plans, became the editor of a local newspaper, and went to London in 1824 to devote himself to literature. He became connected with a short- lived literary paper called the Verulam; in 1831 he published his Pursuit of Knowledge under Difficulties among the works of the Society for the Diffusion of Useful Knowledge ; he contributed a considerable number of biographical and historical articles to the Penny Cyclopaedia; and he edited the Pictorial History of England, himself writing much of the work. In 1844 he published his History of Literature and Learning in England from the Norman Conquest to the Present Time, illustrated by extracts. Craik is best known for his abridged version of this work, The History of English Literature and the English Language (1861), which passed through several editions. In the next year appeared his Spenser

and his Poetry, an abstract of Spenser's poems, with historical and biographical notes and frequent quotations; and in 1847 his Bacon, his Writings and his Philosophy, a work of a similar kind. The two last-mentioned works appeared among Knight's Weekly Volumes. Two years later Craik obtained the chair of history and English literature at Queen's College, Belfast, a position which he held till his death, which took place on the 25th of June 1866. He had married Miss Jeannette Dempster (d. 1856) in 1826, and his daughter, Georgiana Marion Craik (Mrs A. W. May), wrote over thirty novels, of which Lost and Won (1859) was the best. Besides the works already noticed, Craik published the History of British Commerce from the Earliest Times (1844), Romance of the Peerage (1848-1850) and The English of Shakespeare (1856).

CRAIL (formerly Karel) , a royal and police burgh of Fifeshire, Scotland, 2 m. from Fife Ness, the most easterly point of the county, and n m. S.E. of St Andrews by the North British railway, but 2 m. nearer by road. Pop. (1901) 1077. It is said to have been a town of some note as early as the 9th century; and its castle, of which there are hardly any remains, was the residence of David I. and other Scottish kings. It was consti- tuted a royal burgh by a charter of Robert Bruce in 1306, and had its privileges confirmed by Robert II. in 1371, by Mary in 1553, and by Charles I. in 1635. Of its priory, dedicated to

St Rufus, a few ruins still exist. The church of Maelrubha, the patron saint of Crail, is an edifice of great antiquity. Many of the ordinary houses are massive and quaint. The public buildings include a library and reading-room and town hall. The chief industries comprise fisheries, especially for crabs, shipping and brewing. It is growing in favour as a summer resort. It unites with St Andrews, the two Anstruthers, Kilrenny, Pittenweem and Cupar in returning one member to parliament.

Balcomie Castle, about 2 m. to the N.E., dates from the 14th century. Here Mary of Guise landed in 1538, a few days before her marriage to James V. in St Andrews cathedral. In the 18th century it passed through the hands of various proprietors and was ultimately shorn of much of its original size and grandeur. The East Neuk is a term applied more particularly to the country round Fife Ness, and more generally to all of the peninsula east of an imaginary line drawn from St Andrews to Elie. For fully half the year the cottages of its villages are damp with the haar, or dense mist, borne on the east wind from the North Sea.

CRAILSHEIM, or Krailsheim, a town of Germany, in the kingdom of Wurttemberg, on the Jagst, a tributary of the Neckar, at the junction df railways to Heilbronn and Furth. Pop. (1900) 5251. There are two Evangelical churches and a Roman Catholic church, and a handsome town hall, with a tower 225 ft. high. The industrial establishments include extensive tanneries and machine workshops, and there is a brisk trade in cattle and agricultural produce.

Crailsheim was incorporated as a town in 1338, successfully withstood a siege by the forces of several Swabian imperial cities (13 79-1380), a feat which is annually celebrated, passed later into the possession of the burgraves of Nuremberg, and came in 1791 to Prussia, in 1806 to Bavaria and 1810 to Wurttemberg.

CRAIOVA, or Krajova, the capital of the department of Doljiu, Rumania, situated near the left bank of the river Jiu, and on the main Walachian railway from Verciorova to Bucharest. Pop. (1900) 45,438. A branch railway to Calafat facilitates the export trade with Bulgaria. Craiova is the chief commercial town west of Bucharest; the surrounding uplands are very rich in grain, pasturage and vegetable products, and contain extensive forests. The town has rope and carriage factories, and close by is a large tannery, worked by convict labour, and supplying the army. The principal trade is in cattle, cereals, fish, linen, pottery, glue and leather. In the town, which is the head- quarters of the First Army Corps, there are military and com. mercial academies, an appeal court and a chamber of commerce, besides many churches, Greek Orthodox, Roman Catholic, and Protestant, with synagogues for the Jews.

Craiova, which occupied the site of the Roman Castra Nova, was formerly the capital of Little Walachia. Its ancient bans or military governors were, next to the princes, the chief dignitaries of Walachia, and the district is still styled the banat of Craiova. Among the holders of this office were Michael the Brave (1593- 1601), and several members of the celebrated Bassarab family (q.v.). The bans had the right of coining money stamped with their own effigies, and hence arose the name of bani (centimes). The Rumanian franc, or leu (” lion “) , so called from the imagg’it bore, came likewise from Craiova. In 1397 Craiova was the scene of a victory won by Prince Mircea over Bayezid I. sultan of the Turks; and in October 1853, of an engagement between Turks and Russians.

CRAMBO, an old rhyming game which, according to Strutt (Sports and Pastimes), was played as early as the 14th century under the name of the ABC of Aristotle. In the days of the Stuarts it was very popular,

and is frequently mentioned in the writings of the time. Thus Congreve's Love for Love, i. 1 , contains the passage, " Get the Maids to Crambo in an Evening, and learn the knack of Rhiming." Crambo, or capping the rhyme, is now played by one player thinking of a word and telling the others what it rhymes with, the others not naming the actual word they guess but its meaning. Thus one says " I know a word that rhymes with bird." A second asks "Is it ridiculous?" " No, it is not absurd." " Is it a part of speech ? " " No, it is not a word." This proceeds until the right word is guessed.

In Dumb Crambo the guessers, instead of naming the word, express its meaning by dumb show, a rhyme being given them as a clue.

CRAMER, JOHANN BAPTIST (1771-1858), English musician, of German extraction, was born in Mannheim, on the 24th of February 1771. Hewas theson of Wilhelm Cramer (1 743-1 799), a famous London violinist and musical conductor, one of a numerous family who were identified with the progress of music during the 18th and 19th centuries. Johann Baptist was brought to London as a child, and it was in London that the greater part of his musical efforts was exercised. From 1782 to 1784 he studied the pianoforte under Muzio Clementi, and soon became known as a professional pianist both in London and on the continent; he enjoyed a world-wide reputation, and was particularly appreciated by Beethoven. He died in London on the 16th of April 1858. Apart from his pianoforte-playing Cramer is important as a composer, and as principal founder in 1824 of the London music-publishing house of Cramer & Co. He wrote a number of sonatas, &c, for pianoforte, and other compositions; but his £tudes is the work by which he lives as a composer. These " studies " have appeared in numerous editions, from 1810 onwards, and became the staple pieces in the training of pianists.

CRAMER, JOHN ANTONY (1793-1848), English classical scholar and geographer, was born at Mitlodi in Switzerland. He was educated at Westminster and Christ Church, Oxford. He resided in Oxford till 1844, during which time he held many important offices, being public orator, principal of New Inn Hall (which he rebuilt at his own expense), and professor of modern history. In 1844 he was appointed to the deanery of Carlisle, which he held until his death at Scarborough on the 24th of August 1848. His works are of considerable importance: A Dissertation on the Passage of Hannibal

over the Alps, published anonymously with H. L. Wickham (2nd ed., 1828), ” a scholar- like work of first-rate ability”; geographical and historical descriptions of Ancient Italy (1826), Ancient Greece (1828), Asia Minor (1832); Travels of Nicander Nucius of Corcyra [Greek traveller of the 16th century] in England (1841); Catenae Graecorum Patrum in Novum Testamentum (1838-1844); Anecdola Graeca (from the MSS. of the royal library in Paris,

1839-1841).

CRAMER, KARL VON (1818-1902), Bavarian politician, had a very remarkable career, rising gradually from a mere workman in a factory at Doos near Nuremberg to the post of manager, and finally becoming part proprietor of the establishment. Leav- ing business in 1870 he devoted his time entirely to politics. From 1848 he had been a member of the Bavarian second chamber, at first representing the district of Erlangen-Fiirth, and after- wards Nuremberg, which city also sent him after the war of 1866 as its deputy to the German customs parliament, and from 1871 to 1874 to the first German Reichstag. He sat in these bodies as a member of the Progressive party (Fortschrittspartei) , and in Bavaria was one of the leaders of the Liberal (Freisinnige) party. His eloquence had a great hold upon the masses. As a parliamentarian he was very clear-headed, and thoroughly understood how to lead a party. For many years he was the reporter of the finance committee of the chamber. In 1882, on account of his great services in connexion with the Bavarian National Exhibition of Nuremberg, the order of the crown of Bavaria was conferred upon him, carrying with it the honour of nobility. He died at Nuremberg on the 31st of December 1902.

CRAMP, CHARLES HENRY (1828-), American ship- builder, was born in Philadelphia, Pennsylvania, on the 9th of May 1828, of German descent, his family name having been Krampf. He was the eldest of eleven children of William Cramp (1807-1869)ˆ pioneer American shipbuilder, who in 1830 established shipyards on the Delaware river near Philadelphia. The son was educated at the Philadelphia Central high school, after which he was employed in his father’s shipyards and made himself master of every detail of ship construction. He showed especial aptitude as a naval architect and designer, and after becoming his father’s partner in 1849 it was to that branch of

the work that he devoted himself. His inventive capacity and resourcefulness, together with the complete success of his innovations in naval construction, soon gave him high rank as an authority on shipbuilding, and made his influence in that industry widely felt. In

the Mexican War he designed surf boats for the landing of troops at Vera Cruz; during the Civil War he designed and built several ironclads for the United States navy, notably the ” New Ironsides ” in 1862, and the light-draught monitors used in the Carolina sounds ; and after 1887 constructed wholly or in part from his own designs many of the most powerful ships in the ” new ” navy, including the cruisers “Columbia,” “Minneapolis” and “Brooklyn,” and the battleships ” Indiana,” ” Iowa,” ” Massachusetts,” ” Alabama ” and ” Maine.” In every progressive step in ocean shipbuilding, in the transformation from sail to steam, and from wood to iron and steel, Cramp had a prominent part. His fame as a shipbuilder extended to Europe, and he built war- ships for several foreign navies, among others the ” Retvizan ” and the ” Variag ” for the Russian government. He also con- structed a number of freight and passenger steamships for several trans-Atlantic lines.

See A. C. Buel, Memoirs of C. H. Cramp (Philadelphia, 1906).

CRAMP, a painful spasmodic contraction of muscles, most frequently occurring in the limbs, but also apt to affect certain internal organs. This disorder belongs to the class of diseases known as local spasms, of which other varieties exist in such affections as spasmodic asthma and colic. The cause of these painful seizures resides in the nervous system, and operates either directly from the great nerve centres, or, as is generally the case, indirectly by reflex action, as, for example, when attacks are brought on by some derangement of the digestive organs.

In its most common form, that of cramp in the limbs, this disorder comes on suddenly, often during sleep, the patient being aroused by an agonizing feeling of pain in the calf of the leg or back of the thigh, accompanied in many instances with a sensation of sickness or faintness from the intensity of the suffer- ing. During the paroxysm the muscular fibres affected can often be felt gathered up into a hard knot. The attack in general lasts but a few seconds, and then suddenly departs, the spasmodic contraction of the muscles ceasing entirely, or, on the other hand, relief may come more gradually during a period of minutes or even hours. A liability to cramp is often associated with a rheumatic or gouty tendency, but occasional attacks are common enough apart from this, and are often induced by some peculiar posture which a limb has assumed during sleep. Exposure of the limbs to cold will also bring on cramp, and to this is probably to be ascribed its frequent occurrence in swimmers. Cramp of the extremities is also well known as one of the most distressing accompaniments of cholera. It is likewise of frequent occurrence in the process of parturition, just

before delivery.

This painful disorder can be greatly relieved and often entirely removed by firmly grasping or briskly rubbing the affected part with the hand, or by anything which makes an impression on the nerves, such as warm applications. Even a sudden and vigorous movement of the limb will often succeed in terminating the attack.

What is termed cramp of the stomach, or gastralgia, usually occurs as a symptom in connexion with some form of gastric disorder, such as aggravated dyspepsia, or actual organic disease of the mucous membrane of the stomach.

The disease known as Writer's Cramp, or Scrivener's Palsy, is a spasm which affects certain muscles when engaged in the per- formance of acts, the result of education and long usage, and which does not occur when the same muscles are employed in acts of a different kind. This disorder owes its name to the relative frequency with which it is met in persons who write much, although it is by no means confined to them, but is liable to occur in individuals of almost any handicraft. It was termed by Dr Duchenne Functional Spasm.

The symptoms are in the first instance a gradually increasing difficulty experienced in conducting the movements required for executing the work in hand. Taking, for example, the case of writers, there is a feeling that the pen cannot be moved with

the same freedom as before, and the handwriting is more or less altered in consequence. At an early stage of the disease the difficulty may be to a large extent overcome by persevering efforts, but ultimately, when the attempt is persisted in, the muscles of the fingers, and occasionally also those of the forearm, are seized with spasm or cramp, so that the act of writing is rendered impossible. Sometimes the fingers, instead of being cramped, move in a disorderly manner and the pen cannot be grasped, while in other rare instances a kind of paralysis affects the muscles of the fingers, and they are powerless to make the movements necessary for holding the pen. It is to be noted that it is only in the act of writing that these phenomena present themselves, and that for all other movements the fingers and arms possess their natural power. The same symptoms are observed and the same remarks apply mutatis mutandis in the case of

musicians, artists, compositors, seamstresses, tailors and many mechanics in whom this affection may occur. Indeed, although actually a rare disease, no muscle or group of muscles in the body which is specially called into action in any particular occupation is exempt from liability to this functional spasm.

The exact pathology of writer's cramp has not been worked out, but it is now generally accepted that the disease is not a local one of muscles or nerves, but that it is an affection of the central nervous system. The complaint never occurs under thirty years of age, and is more frequent in males than females. Occasionally there is an inherited tendency to the disease, but more usually there is a history of alcoholism in the parents, or some neuro- pathic heredity. In its treatment the first requisite is absolute cessation from the employment which caused it. Usually, however, complete rest of the arm is undesirable, and recovery takes place more speedily if other actions of a different kind are regularly practised. If a return to the same work is a necessity, then Sir W. R. Gowers insists on some modification of method in performing the act, as writing from the shoulder instead of the wrist.

CRAMP-RINGS, rings anciently worn as a cure for cramp and " falling-sickness " or epilepsy. The legend is that the first one was presented to Edward the Confessor by a pilgrim on his return from Jerusalem, its miraculous properties being explained to the king. At his death it passed into the keeping of the abbot of Westminster, by whom it was used medically and was known as St Edward's Ring. From that time the belief grew that the successors of Edward inherited his powers, and that the rings blessed by them worked cures. Hence arose the custom for the successive sovereigns of England each year on Good Friday formally to bless a number of cramp-rings. A service was held; prayers and psalms were said; and water " in the name of the Father, Son and Holy Ghost " was poured over the rings, which were always of gold or silver, and made from the metal that the king offered to the Cross on Good Friday. The ceremony survived to the reign of Queen Mary, but the belief in the curative powers of similar circlets of sacred metal has lingered on even to the present day.

For an account of the ceremony see F. G. Waldron, The Literary Museum (London, 1792); see also Notes and Queries, yol. vii.,1853; vol. ix., 1878.

CRANACH, LUCAS (1472-1553), German painter, was born at Cronach in upper Franconia, and learnt the art of drawing from his father. It has not been possible to Irace his descent or the name of his parents. We are not informed as to the school in which he was taught,

and it is a mere guess that he took lessons from the south German masters to whom Mathew Grunewald owed his education. But Grunewald practised at Bamberg and Aschaffenburg, and Bamberg is the capital of the diocese in which Cronach lies. According to Gunderam, the tutor of Cranach's children, Cranach signalized his talents as a painter before the close of the 15th century. He then drew upon himself tne attention of the elector of Saxony, who attached him to his person in 1 504. The records of Wittenberg confirm Gunderam's statement to this extent that Cranach's name appears for the first time in the public accounts on the 24th of June 1504, when he drew 50 gulden for the salary of half a year, as pictor ducalis.

The only clue to Cranach's settlement previous to his Witten- berg appointment is afforded by the knowledge that he owned a house at Gotha, and that Barbara Brengbier, his wife, was the daughter of a burgher of that city.

Of his skill as an artist we have sufficient evidence in a picture dated 1504. But as to the development of his manner prior to that date we are altogether in ignorance. In contrast with this obscurity is the light thrown upon Cranach after 1504. We find him active in several branches of his profession, — sometimes a mere house-painter; more frequently producing portraits and altar-pieces, a designer on wood, an engraver of copper-plates, and draughtsman for the dies of the electoral mint. Early in the days of his official employment he startled his master's courtiers by the realism with which he painted still life, game and antlers on the walls of the country palaces at Coburg and Lochau ; his pictures of deer and wild boar were considered striking, and the duke fostered his passion for this form of art by taking him out to the hunting field, where he sketched " his grace " running the stag, or Duke John sticking a boar. Before 1508 he had painted several altar-pieces for the Schlosskirche at Wittenberg in competition with Diirer, Burgkmair and others; the duke and his brother John were portrayed in various attitudes and a number of the best woodcuts and copper-plates were published. Great honour accrued to Cranach when he went in 1509 to the Nether- lands, and took sittings from the emperor Maximilian and the boy who afterwards became Charles V. Till 1 508 Cranach signed his works with the initials of his name. In that year the elector gave him the winged snake as a motto, and this motto or Kleinod, as it was called, superseded the initials on all his pictures after that date. Somewhat later the duke conferred on him the monopoly of the sale of medicines at Wittenberg, and a printer's patent with exclusive privileges as to copyright in Bibles. The presses of Cranach were used by Luther. His chemist's shop was open for centuries, and only perished by fire in 1 87 1 . Relations of friend-

ship united the painter with the Reformers at a very early period; yet it is difficult to fix the time of his first acquaintance with Luther. The oldest notice of Cranach in the Reformer's corre- spondence dates from 1520. In a letter written from Worms in 1 521, Luther calls him his gossip, warmly alluding to his " Gevatterin," the artist's wife. His first engraved portrait by Cranach represents an Augustinian friar, and is dated 1520. Five years later the friar drdpped the cowl, and Cranach was present as " one of the council " at the betrothal festival of Luther and Catherine Bora. The death at short intervals of the electors Frederick and John (1525 and 1532) brought no change in the prosperous situation of the painter; he remained a favourite with John Frederick I., under whose administration he twice (1537 and 1540) filled the office of burgomaster of Witten- berg. But 1 547 witnessed a remarkable change in these relations. John Frederick was taken prisoner at the battle of Miihlberg, and Wittenberg was subjected to stress of siege. As Cranach wrote from his house at the corner of the market-place to the grand-master Albert of Brandenburg at Konigsberg to tell him of John Frederick's capture, he showed his attachment by saying, " I cannot conceal from your Grace that we have been robbed of our dear prince, who from his youth upwards has been a true prince to us, but God will help him out of prison, for the Kaiser is bold enough to revive the Papacy, which God will certainly not allow." During the siege Charles bethought him of Cranach, whom he remembered from his childhood and summoned him to his camp at Pistritz. Cranach came, reminded his majesty of his early sittings as a boy, and begged on his knees for kind treatment to the elector. Three years afterwards, when all the dignitaries of the Empire met at Augsburg to receive commands from the emperor, and when Titian at Charles's bidding came to take the likeness of Philip of Spain, John Frederick asked Cranach to visit the Swabian capital ; and here for a few months he was numbered amongst the household of the captive elector, whom he afterwards accompanied home in 1552. He died on the 16th of October 1553 at Weimar, where the house in which he lived still stands in the market-place.

The oldest extant picture of Cranach, the " Rest of the Virgin

during the Flight into Egypt," marked with the initials L.C., and the date of 1504, is by far the most graceful creation of his pencil. The scene is laid on the margin of a forest of pines, and discloses the habits of a painter familiar with the mountain scenery of Thuringia.

There is more of gloom in landscapes of a later time ; and this would point to a defect in the taste of Cranach, whose stag hunts are otherwise not unpleasing. Cranach's art in its prime was doubtless influenced by causes which but slightly affected the art of the Italians, but weighed with potent con- sequence on that of the Netherlands and Germany. The business of booksellers who sold woodcuts and engravings at fairs and markets in Germany naturally satisfied a craving which arose out of the paucity of wall-paintings in churches and secular edifices. Drawing for woodcuts and engraving of copper-plates became the occupation of artists of note, and the talents devoted in Italy to productions of the brush were here monopolized for designs on wood or on copper. We have thus to account for the comparative unproductiveness as painters of Dtirer and Holbein, and at the same time to explain the shallowness apparent in many of the later works of Cranach; but we attribute to the same cause also the tendency in Cranach to neglect effective colour and light and shade for strong contrasts of flat tint. Constant attention to mere contour and to black and white appears to have affected his sight, and caused those curious transitions of pallid light into inky grey which often characterize his studies of flesh; whilst the mere outlining of form in black became a natural substitute for modelling and chiaroscuro. There are, no doubt, some few pictures by Cranach in which the flesh-tints display brightness and enamelled surface, but they are quite exceptional. As a composer Cranach was not greatly gifted. His ideal of the human shape was low; but he showed some freshness in the delineation of incident, though he not unfrequently bordered on coarseness. His copper-plates and woodcuts are certainly the best outcome of his art; and the earlier they are in date the more conspicuous is their power. Striking evidence of this is the " St Christopher" of 1506, or the plate of " Elector Frederick praying before the Madonna " (1 509). It is curious to watch the changes which mark the development of his instincts as an artist during the struggles of the Reformation. At first we find him painting Madonnas. His first woodcut (1505) represents the Virgin and three saints in prayer before a crucifix. Later on he composes the marriage of St Catherine, a series of martyrdoms, and scenes from the Passion. After 1517 he illustrates occasionally the old gospel themes, but he also gives expression to some of the thoughts of the Reformers. In a picture of 15 18 at Leipzig, where a dying man offers " his soul to God, his body to earth, and his worldly goods to his relations," the soul rises to meet the Trinity in heaven, and salvation is clearly shown to depend on faith and not on good works. Again sin and grace become a familiar subject of pictorial delineation. Adam is observed sitting between John the Baptist and a prophet at the foot of a tree. To the

left God produces the tables of the law, Adam and Eve partake of the forbidden fruit, the brazen serpent is reared aloft, and punishment super- venes in the shape of death and the realm of Satan. To the right, the Conception, Crucifixion and Resurrection symbolize redemption, and this is duly impressed on Adam by John the Baptist, who points to the sacrifice of the crucified Saviour. There are two examples of this composition in the galleries of GothS and Prague, both of them dated 1529. One of the latest pictures with which the name of Cranach is connected is the altar- piece which Cranach's son completed in 1555, and which is now in the Stadtkirche (city church) at Weimar. It represents Christ in two forms, to the left trampling on Death and Satan, to the right crucified, with blood flowing from the lance wound. John the Baptist points to the suffering Christ, whilst the blood-stream falls on the head of Cranach, and Luther reads from his book the words, " The blood of Christ cleanseth from all sin." Cranach sometimes composed gospel subjects with feeling and dignity. " The Woman taken in Adultery " at Munich is a favourable speci- men of his skill, and various repetitions of Christ receiving little children show the kindliness of his disposition. But he was not

exclusively a religious painter. He was equally successful, and often comically naive, in mythological scenes, as where Cupid, who has stolen a honeycomb, complains to Venus that he has been stung by a bee (Weimar,iS3o; Berlin, 1534), or where Hercules sits at the spinning-wheel mocked by Omphale and her maids. Humour and pathos are combined at times with strong effect in pictures such as the "Jealousy" (Augsburg, 1527; Vienna, 1530), where women and children are huddled into telling groups as they watch the strife of men wildly fighting around them. Very realistic must have been a lost canvas of 1545, in which hares were catching and roasting sportsmen. In 1 546, possibly under Italian influence, Cranach composed the " Fons Juventutis " of the Berlin Gallery, executed by his son, a picture in which hags are seen entering a Renaissance fountain, and are received as they issue from it with all the charms of youth by knights and pages.

Cranach's chief occupation was that of portrait-painting, and we are indebted to him chiefly for the preservation of the features of all the German Reformers and their princely adherents. But he sometimes condescended to depict such noted followers of the papacy as Albert of Brandenburg, archbishop elector of Mainz, Anthony Granvelle and the duke of Alva. A dozen likenesses of Frederick III. and his brother John are found to bear the date of 1532. It is characteristic of Cranach's readiness, and a proof that he possessed ample material for mechanical reproduction, that he received payment at Wittenberg in

1533. for “sixty pairs of portraits of the elector and his brother ” in one day. Amongst existing likenesses we should notice as the best that of Albert, elector of Mainz, in the Berlin museum, and that of John, elector of Saxony, at Dresden.

Cranach had three sons, all artists: — John Lucas, who died at Bologna in 1536; Hans Cranach, whose life is obscure; and Lucas, born in 1515, who died in 1586.

See Heller, Leben und Werke Lukas Cranachs (2nd ed., Bamberg, 1844) ; Chr. Schuchard, Lukas Cranachs des dlteren Leben und Werke (3 vols., Leipzig, 1851-1871) ; Warnecke, Cranach derMtere (Gorlitz, 1879); M. B. Lindau, Lucas Cranach (1883); Lippmann, Lukas Cranach, Sammlung, &c. (Berlin, 1895), reproductions of his most notable woodcuts and engravings; Woermann, Verzeichnis der Dresdener Cranach- Ausstellung von iSgg (Dresden, 1899); Flechsie, Tafelbilder Cranach’s des altern und seiner Werkstatt (Leipzig, 1900) ; Muther, Lukas Cranach (Berlin, 1902) ; Michaelson, L. Cranach der altere (Leipzig, 1902). , (J. A. C.)

CRANBERRY, the fruit of plants of the genus Oxycoccus, (natural order Vacciniaceae) , often considered part of the genus V actinium. 0. palustris (or V actinium Oxycoccus), the common cranberry plant, is found in marshy land in northern and central Europe and North America. Its stems are wiry, creeping and of varying length; the leaves are evergreen, dark and shining above, glaucous below, revolute at the margin, ovate, lanceolate or elliptical in shape, and not more than half an inch long; the flowers, which appear in May or June, are small and stalked, and have a four-lobed, rose-tinted corolla, purplish filaments, and anther-cells forming two long tubes. The berries ripen in August and September; they are pear-shaped and about the size of currants, are crimson in colour and often spotted, and have an acid and astringent taste. The American species, O. macro- carpus, is found wild from Maine to the Carolinas. It attain&a greater size than O. palustris, and bears bigger and finer berries, which are of three principal sorts, the cherry or round, the bugle or oblong, and the pear or bell-shaped, and vary in hue from light pink to dark purple, or may be mottled red and white. O. erythrocarpus is a species indigenous in the mountains from Virginia to Georgia, and is remarkable for the excellent flavour of its berry.

Air and moisture are the chief requisites for the thriving of the cranberry plant. It is cultivated in America on a soil of peat or vegetable mould, free from loam and clay, and cleared of turf, and having a surface layer of clean sand. The sand, which needs renewal

every two or three years, is necessary for the vigorous existence of the plants, and serves both to keep the underlying soil cool and damp, and to check the growth of grass and weeds. The ground must be thoroughly drained, and should be provided with a supply of water and a dam for flooding the plants during

winter to protect them from frost, and occasionally at other seasons to destroy insect pests; but the use of spring water should be avoided. ‘The flavour of the fruit is found to be improved by growing the plants in a soil enriched with well- rotted dung, and by supplying them with less moisture than they obtain in their natural habitats. Propagation is effected by means of cuttings, of which the wood should be wiry in texture, and the leaves of a greenish-brown colour. In America, where, in the vicinity of Cape Cod, Massachusetts, the cultivation of the cranberry commenced early in the last century, wide tracts of waste land have been utilized for that purpose — low, easily flooded, marshy ground, worth originally not more than from $10 to $20 an acre, having been made to yield annually $200 or $300 worth of the fruit per acre. The yield varies between 50 and 400 bushels an acre, but 100 bushels, or about 35 barrels, is estimated to be the average production when the plants have begun to bear well. The approximate cranberry crop of the United States from 1890 to 1899 varied from 410,000 to 1,000,000 bushels.

Cranberries should be gathered when ripe and dry, otherwise they do not keep well. The darkest-coloured berries are those which are most esteemed. The picking of the fruit begins in New Jersey in October, at the close of the blackberry and whortleberry season, and often lasts until the coming in of cold weather. From 3 to 4 bushels a day may be collected by good workers. New York, Philadelphia, Boston and Baltimore are the leading American markets for cranberries, whence they are exported to the West Indies, England and France in great quantities. England was formerly supplied by Lincolnshire and Norfolk with abundance of the common cranberry, which it now largely imports from Sweden and Russia. The fruit is much used for pies and tarts, and also for making an acid summer beverage. The cowberry, or red whortleberry, Vaccinium Vitis-Idaea, is sometimes sold for the cranberry. The Tasmanian and the Australian cranberries are the produce respectively of Astroloma humifusum and Lissanthe sapida, plants of the order Epacridaceae.’

For literature of the subject see the Proceedings of the American Cranberry Growers' Association (Trenton, N. J.). There is a good article on the American cranberry in L. H. Bailey's Cyclopaedia, of American Horticulture (1900).

CRANBROOK, GATHORNE GATHORNE-HARDY, ist Earl of (1814-1906), British statesman, was born at Bradford on the ist of October 18 14, the son of John Hardy, and belonged to a Yorkshire family. Entering upon active political life in 1847, eleven years after his graduation at Oxford, and nine years after his call to the bar, he offered himself as a candidate for Bradford, but was unsuccessful. In 1856 he was returned for Leominster, and in 1865 defeated Mr Gladstone at Oxford. In 1866 he became president of the Poor Law Board in Lord Derby's new administra- tion. When in 1867 Mr Walpole resigned, from dissatisfaction with Mr Disraeli's Reform Bill, Mr Hardy succeeded him at the home office. In 1874 he was secretary for war; and when in 1878 Lord Salisbury took the foreign office upon the resignation of Lord Derby, Viscount Cranbrook (as Mr Hardy became within a month afterwards) succeeded him at the India office. At the same time he had assumed the additional family surname of Gathorne, which had been that of his mother. In Lord Salisbury's administrations of 1885 and 1886 Lord Cranbrook was president of the council, and upon his retirement from public life concurrently with the resignation of the cabinet in 1892 he was raised to an earldom. He died on the 30th of October 1906, being succeeded as 2nd earl by his son John Stewart Gathorne-Hardy, previously known as Lord Medway (b. 1839), who from 1868 to 1880 sat in parliament as a conserva- tive for Rye, and from 1884 to 1892 for a division of Kent.

See Gathorne Hardy, ist earl of Cranbrook, a memoir with extracts from his correspondence, edited by the Hon. A. E. Gathorne-Hardy

(1910).

CRANBROOK, a market-town in the southern parliamentary division of Kent, England, 45 m. S.E. of London on a branch of the South-Eastern & Chatham railway from Paddock Wood. Pop. (1901) 3949. It lies on the Crane brook, a feeder of the river Beult, in a pleasant district, hilly and well wooded. It has

a fine church (mainly Perpendicular) dedicated to St Dunstan, which is remarkable for a baptistery, built in the early part of the 1 8th century, and some ancient stained glass. As the centre of the agricultural district of the Kentish Weald, it carries on an extensive

trade in malt, hops and general goods; but its present condition is in striking contrast to the activity it displayed from the 14th to the 17th century, when it was one of the principal seats of the broadcloth manufacture. Remains of some of the old factories still exist. The town has a grammar school of Elizabethan foundation, which now ranks as one of the smaller public schools. In the neighbourhood are the ruins of the old mansion house of Sissinghurst, or Saxenhurst, built in the time of Edward VI.

CRANDALL, PRUDENCE (1803-1889), American school- teacher, was born, of Quaker parentage, at Hopkinton, Rhode Island, on the 3rd of September 1803. She was educated in the Friends' school at Providence, R. I., taught school at Plainfield, Conn., and in 1831 established a private academy for girls at Canterbury, Windham county, Connecticut. By admitting a negro girl she lost her white patrons, and in March 1833, on the advice of William Lloyd Garrison and Samuel J. May (1797- 187 1), she opened a school for " young ladies and little misses of colour." For this she was bitterly denounced, not only in Canter- bury but throughout Connecticut, and was persecuted, boycotted and socially ostracized; measures were taken in the Canterbury town-meeting to break up the school, and finally in May 1833 the state legislature passed the notorious Connecticut " Black Law," prohibiting the establishment of schools for non-resident negroes in any city or township of Connecticut, without the consent of the local authorities. Miss Crandall, refusing to submit, was arrested, tried and convicted in the lower courts, whose verdict, however, was reversed on a technicality by the court of appeals in July 1834. Thereupon the local opposition to her redoubled, and she was finally in September 1834 forced to close her school. Soon afterward she married the Rev. Calvin Philleo. She died at Elk Falls, Kansas, on the 28th of January 1889. The Connecticut Black Law was repealed in 1838. Miss CrandalFs attempt to educate negro girls at Canterbury attracted the attention of the whole country; and the episode is of considerable significance as showing the attitude of a New England community toward the negro at that time.

See J. C. Kimball's Connecticut Canterbury Tale (Hartford, Conn., 1889), and Samuel J.May's Recollections of Our Anti-Slavery Conflict (Boston, 1869).

CRANE, STEPHEN (1870-1900), American writer, was born at Newark, New Jersey, on the ist of November 1870, and was educated at Lafayette College and Syracuse University. His first story, Maggie, a Girl of the Streets, was published in 189 1, but his greatest success was made with The Red Badge of Courage (1 896) , a brilliant and

highly realistic, though of course imaginary, description of the experiences of a private in the Civil War. He was also the author of various other stories, and acted as a war correspondent in the Greco-Turkish War (1897) and the Spanish American War (1898). His health became seriously affected in Cuba, and on his return he settled down in England. He died at Badenweiler, Germany, on the 5 th of June 1900.

CRANE, WALTER (1845-), English artist, second son of Thomas Crane, portrait painter and miniaturist, was born in Liverpool on the 15th of August 1845. The family soon removed to Torquay, where the boy gained his early artistic impressions, and, when he was twelve years old, to London. He early came under the influence of the Pre-Raphaelites, and was a diligent student of Ruskin. A set of coloured page designs to illustrate Tennyson's " Lady of Shalott " gained the approval of William James Linton, the wood-engraver, to whom Walter Crane was apprenticed for three years (1859-1862). As a wood- engraver he had abundant opportunity for the minute study of the contemporary artists whose work passed through his hands, of Rossetti, Millais, Tenniel and F. Sandys, and of the masters of the Italian Renaissance, but he was more influenced by the Elgin marbles in the British Museum. A further and important element in the development of his talent, was the study of

Japanese colour-prints, the methods of which he imitated in a series of toy-books, which started a new fashion. In 1862 a picture of his, " The Lady of Shalott," was exhibited at the Royal Academy, but the Academy steadily refused his maturer work; and after the opening of the Grosvenor Gallery in 1877 he ceased to send pictures to Burlington House. In 1864 he began to illustrate for Mr Edmund Evans, the colour printer, a series of sixpenny toy-books of nursery rhymes, displaying admirable fancy and beauty of design, though he was limited to the use of three colours. He was allowed more freedom in a delightful series begun in 1873, The Frog Prince, &c, which showed markedly the influence of Japanese art, and of a long visit to Italy following on his marriage in 1871. The Baby's Opera was a book of English nursery songs planned in 1877 with Mr Evans, and a third series of children's books with the collective title, A Romance of the Three R's, provided a regular course of instruc- tion in art for the nursery. In his early " Lady of Shalott " the artist had shown his preoccupation with unity of design in book illustration by printing in

the words of the poem himself, in the view that this union of the calligrapher's and the decorator's art was one secret of the beauty of the old illuminated books. He followed the same course in The First of May: A Fairy Masque by his friend John R. Wise, text and decoration being in this case reproduced by photogravure. The " Goose Girl " illustra- tion taken from his beautiful Household Stories from Grimm (1882) was reproduced in tapestry by William Morris, and is now in the South Kensington Museum. Flora's Feast, A Masque of Flowers had lithographic reproductions of Mr Crane's line drawings washed in with water colour; he also decorated in colour The Wonder Book of Nathaniel Hawthorne, and Margaret Deland's Old Garden; in 1894 he collaborated with William Morris in the page decoration of The Story of the Glittering Plain, published at the Kelmscott press, which was executed in the style of 16th-century Italian and German woodcuts; but in purely decorative interest the finest of his works in book illustra- tion is Spenser's Faerie Queene (12 pts., 1894-1896) and the Shepheard's Calendar. The poems which form the text of Queen Summer (1891), Renascence (1891), and The Sirens Three (1886) are by the artist himself.

In the early 'eighties under Morris's influence he was closely associated with the Socialist movement. He did as much as Morris himself to bring art into the daily life of all classes. With this object in view he devoted much attention to designs for textile stuffs, for wall-papers, and to house decoration; but he also used his art for the direct advancement of the Socialist cause. For a long time he provided the weekly cartoons for the Socialist organs, Justice and The Commonweal. Many of these were collected as Cartoons for the Cause. He devoted much time and energy to the work of the Art Workers' Guild, and to the Arts and Crafts Exhibition Society, founded by him in 1888. His own easel pictures, chiefly allegorical in subject, among them " The Bridge of Life " (1884) and " The Mower " (1891), were exhibited regularly at the Grosvenor Gallery and later at the New Gallery. " Neptune's Horses," which, with many other of Mr Crane's pictures, came into the possession of Herr Ernst Seeger of Berlin, was exhibited at the New Gallery in 1893, and with it may be classed his " The Rainbow and the Wave."

His varied work includes examples of plaster relief, tiles, stained glass, pottery, wall-paper and textile designs, in all of which he applied the principle that in purely decorative design " the artist works freest and best without direct reference to nature, and should have learned the forms he makes use of by heart." An exhibition of his work of different kinds was held at the Fine Art Society's galleries in Bond Street in 1891, and taken over to the United States in the same year by the

artist himself. It was afterwards exhibited in the chief German, Austrian and Scandinavian towns, arousing great interest throughout the continent.

Mr Crane became an associate of the Water Colour Society in 1888; he was an examiner of the science and art department at South Kensington; director of design at the Manchester Municipal school (1894); art director of Reading College (1896);

and in 1898 for a short time principal of the Royal College of Art. His lectures at Manchester were published with illustrated drawings as The Bases of Design (1898) and LineandForm{ 1900). The Decorative Illustration of Books, Old and New (2nd ed., London and New York, 1900) is a further contribution to theory. A well-known portrait of Mr Crane by G. F. Watts, R.A., was exhibited at the New Gallery in 1893. There is a comprehensive and sumptuously illustrated book on The Art of Walter Crane, by P. G. Konody; a monograph (1902) by Otto von Schleinitz in the Kunstler Monographien series (Bielefeld and Leipzig) ; and an account of himself by the artist in the Easter number of 1898 of the Art Journal.

CRANE, WILLIAM HENRY (1845-), American actor, was born on the 30th of April 1845, m Leicester, Massachusetts, and made his first appearance at Utica, New York, in Donizetti's Daughter of the Regiment in 1863. Later he had a great success as Le Blanc the Notary, in the burlesque Evangeline (1873). He made his first hit in the legitimate drama with Stuart Robson (1836-1903), in The Comedy of Errors and other Shakespearian plays, and in The Henrietta (1881) by Bronson Howard (1842- 1908). This partnership lasted for twelve years, and subse- quently Crane appeared in various eccentric character parts in such plays as The Senator and David Harum. In 1904 he turned to more serious work and played Isidore Izard in Business is Business, an adaptation from Octave Mirbeau's Les Affaires sont les affaires.

CRANE (in Dutch, Kraan; O. Ger. Kraen; cognate, as also the Lat. grus, and consequently the Fr. grue and Span, grulla, with the Gr. ytpavos), the Grus communis or G. cinerea of ornithologists, one of the largest wading-birds, and formerly a native of England, where William Turner, in 1544, said that he had very often seen its young (" earum pipiones saepissime vidi "). Notwithstanding the protection afforded it by sundry acts of parliament, it has long since ceased from breeding in England. Sir T. Browne (ob. 1682) speaks of it as being found in the open parts of Norfolk in winter. In Ray's time it was only known as occurring at the same season in large flocks in the fens of Lincoln-

shire and Cambridgeshire; and though mention is made of cranes' eggs and young in the fen-laws passed at a court held at Revesby in 1780, this was most likely but the formal repetition of an older edict; for in 1768 Pennant wrote that after the strictest inquiry he found the inhabitants of those counties to be wholly unacquainted with the bird. The crane, however, no doubt then appeared in Britain, as it does now, at uncertain intervals and in unwonted places, having strayed from the migrating bands whose movements have been remarked from almost the earliest ages. Indeed, the crane's aerial journeys are of a very extended kind; and on its way from beyond the borders of the Tropic of Cancer to within the Arctic Circle, or on the return voyage, its flocks may be descried passing overhead at a marvellous height, or halting for rest and refreshment on the wide meadows that border some great river, while the seeming order with which its ranks are marshalled during flight has long attracted attention. The crane takes up its winter quarters under the burning sun of Central Africa and India, but early in spring returns northward. Not a few examples reach the chill polar soils of Lapland and Siberia, but some tarry in the south of Europe and breed in Spain, and, it is supposed, in Turkey. The greater number, however, occupy the intermediate zone and pass the summer in Russia, north Germany, and Scandinavia. Soon after their arrival in these countries the flocks break up into pairs, whose nuptial ceremonies are accompanied by loud and frequent trumpetings, and the respective breeding-places of each are chosen. '

The nest is formed with little art on the ground in large open marshes, where the herbage is not very high — a tolerably dry spot being selected and used apparently year after year. Here the eggs, which are of a rich brown colour with dark spots, and always two in number, are laid. The young are able to run soon after they are hatched, and are at first clothed with tawny down. In the course of the summer they assume nearly the same grey plumage that their parents wear, except that the elongated plumes, which in the adults form a graceful covering of the hinder

parts of the body, are comparatively undeveloped, and the clear black, white and red (the last being due to a patch of papillose skin of that colour) of the head and neck are as yet indistinct. During this time they keep in the marshes, but as autumn approaches the different families unite by the rivers and lakes, and ultimately form the enormous bands which after much more trumpeting set out on their

southward journey.

The crane's power of uttering its sonorous and peculiar trumpet-like notes is commonly ascribed to the formation of its trachea, which on quitting the lower end of the neck passes backward between the branches of the furcula and is received into a hollow space formed by the bony walls of the carina or keel of the sternum. Herein it makes three turns, and then runs upwards and backwards to the lungs. The apparatus on the whole much resembles that found in the whooping swans (Cygnus musicus, C. buccinator and others), though differing in some not unimportant details; but at the same time somewhat similar convolutions of the trachea occur in other birds which do not possess, so far as is known, the faculty of trumpeting. The crane emits its notes both during flight and while on the ground. In the latter case the neck and bill are uplifted and the mouth kept open during the utterance of the blast, which may be often heard from birds in confinement, especially at the beginning of the year.

As usually happens in similar cases, the name of the once familiar British species is now used in a general sense, and applied to all others which are allied to it. Though by former systematists placed near or even among the herons, there is no doubt that the cranes have only a superficial resemblance and no real affinity to the Ardeidae. In fact the Gruidae form a somewhat isolated group. Huxley included them together with the Rallidae in his Geranomorphae; but a more extended view of their various characters would probably assign them rather as relatives of the Bustards — not that it must be thought that the two families have not been for a very long time distinct. Grus, indeed, is a very ancient form, its remains appearing in the Miocene of France and Greece, as well as in the Pliocene and Post-pliocene of North America. In France, too, during the " Reindeer Period " there existed a huge species — the G. primigenia of Alphonse Milne-Edwards — which has doubtless been long extinct. At the present time cranes inhabit all the great zoogeographical regions of the earth, except the Neotropical, and some sixteen or seventeen species are discriminated. In Europe, besides the G. communis already mentioned, the Numidian or demoiselle-crane (G. virgo) is distinguished from every other by its long white ear-tufts. This bird is also widely distributed throughout Asia and Africa, and is said to have occurred in Orkney as a straggler. The eastern part of the Palaearctic Region is inhabited by four other species that do not frequent Europe (G. antigone, G. japonensis, G. monachus, and G. leucogeranus), of which the last is perhaps the finest of the family, with nearly the whole plumage of a snowy white. The Indian Region, besides being visited in winter by four of the species already named, has two that are peculiar to it (G. torquata and

G. indica, both commonly confounded under the name of G. antigone). The Australian Region possesses a large species known to the colonists as the ” native companion ” (G. australis), while the Nearctic is tenanted by three species (G. americana, G. canadensis and G.fraterculus), to say nothing of the possibility of a fourth (G. schlegeli), a little-known and somewhat obscure bird, finding its habitat here. In the Ethiopian Region are two species (G. paradisea and G. carunculata) , which do not occur out of Africa, as well as three others forming the group known as ” crowned cranes ” — differing much from other members of the family, and justifiably placed in a separate genus, Balearica. One of these (B. pavonina) inhabits northern and western Africa, while another (B. regulorum) is confined to the eastern and southern parts of that continent. The third (B. ceciliae), from the White Nile, has been described by Dr P. Chalmers Mitchell (P.Z.S., 1904).

With regard to the literature of this species, a paper ” On the Breeding of the Crane in Lapland ” (Ibis, 1859, p. 191), by John Wolley, is one of the most pleasing contributions to natural history

ever written, and an admirably succinct account of all the different species was communicated by Blyth to The Field in 1873 (vol. xl. p. 631, vol. xli. pp. 7, 61, 136, 189, 248, 384, 408, 418). A beautiful picture representing a flock of cranes resting by the Rhine during one of their annual migrations is to be found in Wolf’s Zoological Sketches. (A. N.)

CRANES (so called from the resemblance to the long neck of the bird, cf. Gr. ykpavos, Fr. grue), machines by means of which heavy bodies may be lifted, and also displaced horizontally, within certain defined limits. Strictly speaking, the name alludes to the arm or jib from which the load to be moved is suspended, but it is now used in a wider sense to include the whole mechanism by which a load is raised vertically and moved horizontally. Machines used for lifting only are not called cranes, but winches, lifts or hoists, while the term elevator or conveyor is commonly given to appliances which continuously, not in separate loads, move materials like grain or coal in a vertical, horizontal or diagonal direction (see Conveyors) . The use of cranes is of great antiquity, but it is only since the great industrial development of the 19th century, and the introduction of other motive powers than hand labour, that the crane has acquired the important and indispensable position it now occupies. In all places where finished goods are handled, or manufactured goods are made, cranes of various forms are in universal use.

Cranes may be divided into two main classes — revolving and non-revolving. In the first the load can be lifted vertically, and then moved round a central pivot, so as to be deposited at any convenient point within the range. The type of a ™ ca ~ this class is the ordinary jib crane. In the second class there are, in addition to the lifting motion, two horizontal movements at right angles to one another. The type of this class is the overhead traveller. The two classes obviously represent respectively systems of polar and rectangular co- ordinates. Jib cranes can be subdivided into fixed cranes and portable cranes; in the former the central- post or pivot is firmly fixed in a permanent position, while in the latter the whole crane is mounted on wheels, so that it may be transported from place to place.

The different kinds of motive power used to actuate cranes — manual, steam, hydraulic, electric — give a further classification. Hand cranes are extremely useful where the load is not excessive, and the quantities to be dealt with are not great; also where speed is not important, and first cost is an essential consideration. The net effective work of lifting that can be performed by a man turning a handle may be taken, for intermittent work, as being on an average about 5000 foot-lb per minute; this is equivalent to 1 ton lifted about 2| ft. per minute, so that four men can by a crane raise 1 ton 9 ft. in a minute or 9 tons 1 ft. per minute. It is at once evident that hand power is only suitable for cranes of moderate power, or in cases where heavy loads have to be lifted only very occasionally. This point is dwelt upon, because the speed limitations of the hand-crane are often overlooked by engineers. Steam is an extremely useful motive power for all cranes that are not worked off a central power station. The steam crane has the immense advantage of being completely self-contained. It can be moved (by its own locomotive power, if desired) long distances without requiring any complicated means of conveying power to it; and it is rapid in work, fairly economical, and can be adapted to the most varying circumstances. Where, however, there are a number of cranes all belonging to the same installation, and these are placed so as to be conveniently worked from a central power station, and where the work is rapid, heavy and con- tinuous, as is the case at large ports, docks and railway or other warehouses, experience has shown that it is best to produce the power in a generating station and distribute it to the cranes. Down to the closing decades of the 19th century hydraulic power was practically the only system available for working cranes from a power station. The hydraulic crane is rapid in action, very smooth and silent in working, easy to handle, and not excessive in cost or upkeep, — advantages which have secured its adoption in every part of the world. Electricity as a motive power for cranes is of

more recent introduction. The electric

Motive powers.

transmission of energy can be performed with an efficiency not reached by any other method, and the electric motor readily adapts itself to cranes. When they are worked from a power station the great advantage is gained that the same plant which drives them can be used for many other purposes, such as working machine tools and supplying current for lighting. For dock-side jib cranes the use of electric power is making rapid strides. For overhead travellers in workshops, and for most of the cranes which fall into our second class, electricity as a motive power has already displaced nearly every other method. Cranes driven by shafting, or by mechanical power, have been largely superseded by electric cranes, principally on account of the much greater economy of transmission. For many years the best workshop travellers were those driven by quick running ropes; these performed admirable service, but they have given place to the more modern electric traveller. – ■,

The principal motion in a crane is naturally the hoisting or lifting motion. This is effected by slinging the load to an eye or hook, and elevating the hook vertically. There are three typical methods: (1) A direct pull may be applied to the hook, either by screws, or by a cylinder fitted with piston and rod and actuated by direct hydraulic or other pressure, as shown diagrammatically in fig. I. These methods are used in exceptional cases, but present the obvious difficulty of giving

Lifting

mechaa

Isms.

gi-

f

1.

Fig. 1.

Fig 2.

Fig. 3.

a very short range of lift. (2) The hook maybe attached to a rope or chain, and the pulling cylinder connected with a system of pulleys around which the rope is led ; by these means the lift can be very largely increased. Various arrangements are adopted; the one indicated in fig. 2 gives a lift of load four times the stroke of the cylinder. This second method forms the basis of the lifting gear in all hydraulic cranes. (3) The lifting rope or chain is led over pulley to a lifting barrel, upon which it is coiled as the barrel is rotated by the source of power (fig. 3). Sometimes, especially in the case of overhead travelling cranes for very heavy loads, the chain is a special pitch chain, formed of flat links pinned together, and the barrel is reduced to a wheel provided with teeth, or " sprockets," which engage in the links. In this case the chain is not coiled, but simply passes over the lifting wheel, the free end hanging loose. All the methods in this third category require a rotating lifting or barrel shaft, and this is the important difference between them and the hydraulic cranes mentioned above. Cranes fitted with rotating hydraulic engines may be considered as coming under the third category.

When the loads are heavy the above mechanisms are supple- mented by systems of purchase blocks suspended from the jib or the traveller crab; and in barrel cranes trains of rotating gearing are interposed between the motor, or manual handle, and the barrel

When a load is lifted, work has to be done m overcoming the action of gravity and the friction of the mechanism; when it is „ . lowered, energy is given out. To control the speed and

Brakes. a b sor t) this energy, brakes have to be provided. The hydraulic crane has a great advantage in possessing an almost ideal brake, for by simply throttling the exhaust from the lifting cylinder the speed of descent can be regulated within very wide limits and with perfect safety. Barrel cranes are usually fitted with band brakes, consisting of a brake rim with a friction band placed round it, the band being tightened as required. In ordinary cases conduc- tion and convection suffice to dissipate the heat generated by the brake, but when a great deal of lowering has to be rapidly performed, or heavy loads have to be lowered to a great depth, special arrange- ments have to be provided. An excellent brake for very large cranes is Matthew's hydraulic brake, in which water is passed from end to end of cylinders fitted with reciprocating pistons, cooling jackets being provided. In electric cranes a useful method is to arrange the connexions so that the lifting motor acts as a dynamo, and, driven by the energy of the falling load, generates a current which is converted into heat by being passed through resistances. That the quantity of heat to be got rid of may become very considerable is seen when it is considered that the energy of a load of 60 tons

descending through 50 ft. is equivalent to an amount of heat sufficient to raise nearly 6 gallons of water from 60° F. to boiling point. Crane brakes are usually under the direct control of the driver, and they are generally arranged in one of two ways. In the first, the pressure is applied by a handle or treadle, and is removed by a spring or weight; this is called " braking on." In the second, or " braking off " method, the brake is automatically applied by a spring or weight, and is released either mechanically or, in the case of electric cranes, by the pull of a solenoid or magnet which is energized by the current passing through the motor. When the motor starts the brake is released; when it stops, or the current ceases, the brake goes on. The first method is in general use for steam cranes; it allows for a far greater range of power in the brake, but is not automatic, as is the second.

In free-barrel cranes the lifting barrel is connected to the revolving

shaft by a powerful friction clutch; this, when interlocked with the brake and controller, renders electric cranes exceedingly rapid in working, as the barrel can be detached and lowering performed at a very high speed, without waiting for the lifting motor to come to rest in order to be reversed. This method of working is very suitable for electric dock-side cranes of capacities up to about 5 or 7 tons, and for overhead travellers where the height of lift is moderate. Where high speed lowering is not required it is usual to employ a reversing motor and keep it always in gear.

In steam cranes it is usual to work all the motions from one double cylinder engine. In order to enable two or more motions to be worked together, or independently as required, reversing friction cones are used for the subsidiary motions, especially the slewing motion. With the exception of a few special cranes in which friction wheels are employed, it is universally the practice, in steam cranes, to connect the engine shaft with the barrel shaft by spur toothed gearing, the gear being connected or disconnected by sliding pinions. In electric cranes the motor is connected to the barrel, either in a similar manner by spur gear or by worm gear. The toothed wheels give a slightly better efficiency, but the worm gear is somewhat smoother in its action and entirely silent ; the noise of gearing can, however, be considerably reduced by careful machining of the teeth, as is now always done, and also by the use of pinions made of raw- hide leather or other non-resonant material. When quick-running metal pinions are used they are arranged to run in closed oilˆbaths. Leather pinions must be protected from rats, which eat them freely. Worm wheel gearing is of very high efficiency if made very quick in pitch, with properly formed teeth perfectly lubricated, and with the end thrust of the worm taken on ball bearings. Much attention has been paid to the improvement of the mechanical details of the lifting and other motions of cranes, and in important installations the gearing is now usually made of cast steel. In revolving cranes ease of slewing can be greatly increased by the use of a live ring of conical rollers.

Electric motors for barrel Cranes are not essentially different from those used for other purposes, but in proportioning the sizes th* > intermittent output has to be taken into consideration. _ This fact has led to the introduction of the ” crane rated ” rower motor, With a given ” load factor.” This latter gives the re 9 u ‘ re *- ratio of the length of the working periods to the whole time; e.g. a motor rated for a quarter load factor means that the motor is capable of exerting its full normal horse-power for three minutes out of every twelve, the pause being nine minutes, or one minute out of every four, the pause being three minutes. The actual load factor to be chosen depends on

the nature of the work and the kind of crane. A dock-side crane unloading cargo with high lifts follow- ing one another in rapid succession will require a higher load factor than a workshop traveller with a very short lift and only a very occasional maximum load ; and a traveller with a very long longi- tudinal travel will require a higher load factor for the travelling motor than for the lifting motor. In practice, the load factor for electric crane motors varies from \ to 5. In steam cranes much the same principle obtains in proportioning the boiler; e.g. the engines of a 10-ton steam crane have cylinders capable of indicating about 60 horse-power when working at full speed, but it is found that, in consequence of the intermittent working, sufficient steam can be supplied with a boiler whose heating surface is only J to i of that necessary for the above power, when developed continuously by a stationary engine.

In well-designed, quick-running cranes the mechanical efficiency of the lifting gear may be taken as about 85 %; a good electric jib crane will give an efficiency of 72 %, i.e. when actually lifting at full speed the mechanical work of lifting represents about 72 %

The motor in most common use for electric cranes is the series wound, continuous current motor, which has many advantages. It has a very large starting torque, which enables it to overcome the inertia of getting the load into motion, and it lifts heavy loads at a slower speed and lighter loads at a quicker one, behaving, under the action of the controller in a somewhat similar manner to that in which the cylinders of the steam crane respond to the action of the stop-valve. Three-phase motors are also much used for

crane-driving, and ft is probable that improvements in single and two-phase motors will eventually largely increase their use for this class of work.

Tests of the comparative efficiencies of hydraulic and electric cranes tend to show that, although they do not vary to any very considerable extent with full load, yet the efficiency of the hydraulic crane falls away very much more rapidly than that of the electric crane when working on smaller loads. This drawback can be corrected to a slight extent by furnishing the hydraulic crane with more than one cylinder, and thus compounding it, but the arrange- ment does not give the same economical range of load as in an electric crane. In first cost the

hydraulic crane has the advantage, but the power mains are much less expensive and more convenient to arrange in the electric crane.

The limit of speed of lift of hand cranes has already been men- tioned; for steam jib cranes average practice is represented by the Speed. formula V = 30 + 20o/T, where V is the speed of lift in ‘ feet per minute, and T the load in tons. Where electric or hydraulic cranes are worked from a central station the speed is greater, and may be roughly represented by V = 5-|-30o/T; e.g. a 30-cwt. crane would lift with a speed of about 200 ft. per minute, and 100-ton crane with a speed of about 8 ft. per minute, but these speeds vary with local circumstances. The lifting speed of electric travellers is generally less, because the lift is generally much shorter, and may in ordinary cases be taken as V = 3-(85/T. The cross traversing speed of travellers varies from 60 to 120 ft. per minute, and the longitudinal from 100 to 300 ft. per minute. The speed of these two motions depends much on the length of the span and of the longitudinal run, and on the nature of the work to be done; in certain cases, e.g. foundries, it is desirable to be able to lift, on occasions, at an extremely slow speed. In addition to the brakes on the lifting gear of cranes it is found necessary, especially in quick- running electric cranes, to provide a brake on the subsidiary motions, and also devices to stop the motor at the end of the lift or travel, so as to prevent over-running.

There are many other important points of crane construction too numerous to mention here, but it may be said generally that the advent of electricity has tended to increase speeds, and in conse- quence great attention is paid to all details that reduce friction and wear, such as roller and ball bearings and improved methods of lubrication; and, as in all other quick-running machinery, great stress has to be laid on accuracy of workmanship. The machinery, thus being of a higher class, requires more protection, and cranes that work in the open are now fitted with elaborate crane-houses or cabins, furnished with weather-tight doors and windows, and more care is taken to provide proper platforms, hand-rails and ladders of access, and also guards for the revolving parts of gearing.

Typical Forms of Cranes. — Fig. 4 is a diagram of a fixed hand revolving jib crane, of moderate size, as used in railway goods yards and similar places. It consists of a heavy base, which is securely bolted to the foundation, and which carries the strong crane-post, or pillar, around which the crane re- volves. The revolving part is made with two side frames of cast iron or steel plates, and to these the lifting gear is attached. The

Fixed

Fig. 4.

Fig. 5.

load is suspended from the crane jib; this jib is attached at the lower end to the side frames, and the upper end is supported by tie- rods, connected to the framework, the whole revolving together. This simple form of crane thus embodies the essential elements of foundation, post, framework, jib, tie-rods and gearing.

Fig. 5 shows another type of fixed crane, known as a derrick crane. Here the crane-post is extended into a long mast and is furnished with pivots at the top and bottom; the mast is supported by two ” back ties,” and these are connected to the socket of the bottom pivot by the ” sleepers.” This is a very good and comparatively cheap form of crane, where a long and variable radius is required, but it cannot slew through a complete circle. Derrick cranes are made of all powers, from the timber i-ton hand derrick to the steel 150-ton derrick used in shipbuilding yards. The derrick crane introduces a problem for which many solutions have been sought, that of preventing the load from being lifted or lowered when the jib is pivoted up or down to alter the radius. To keep the load level, there are various devices for automatically coupling the jib- raising and the load-lowering motions.

Somewhat allied to the derrick are the sheer legs (fig. 6). Here the place of the jib is taken by two inclined legs joined together

at the top and pivoted at the bottom ; a third back-leg is connected at the top to the other two, and at the bottom is coupled to a nut which runs on a long horizontal screw. This horizontal movement of the lower end of the back leg allows the whole arrange- ment to assume the position shown in fig. 7, so that a load can be taken out of a vessel and deposited on a quay wall. The same effect can be produced by shorten- ing the back leg by a screw placed in the direction of its length. Sheer legs are gener- ally built in very large sizes, #”” and their use is practically confined to marine work.

Another type of fixed crane Fig. 6.

is the ” Fairbairn ” crane,

shown in fig. 8. Here the jib, superstructure and post are all united in one piece, which revolves in a foundation well, being supported at the bottom by a toe-step and near the ground level by horizontal

Fig. 7.

Fig. 8.

rollers. This type of crane used to be in great favour, in consequence of the great clearance it gives under the jib, but it is expensive and requires very heavy foundations.

The so-called ” hammer-headed ” crane (fig. 9) consists of a steel braced tower, on which revolves a large horizontal double cantilever; the forward part of this cantilever or jib carries the lifting crab, and the jib is extended backwards in order to form a support for the machinery and counter-balance. Besides the motions of lifting and revolving, there is provided a so-called “racking” motion, by which the lifting crab, with the load suspended, can be moved in and out along the jib without altering the level of the load. Such horizontal movement of the load is a marked feature of later crane design; it first became prominent in the so-called ” Titan ” cranes, mentioned below (fig. 14). Hammer-headed cranes are generally constructed in large sizes, up to 200 tons.

Another type of fixed revolving crane is the foundry or smithy crane (fig. 10). It has the horizontal racking motion mentioned

Fig.

Fig. 10.

above, and revolves either on upper and lower pivots supported by the structure of the workshop, or on a fixed pillar secured to a heavy foundation. The type is often used in foundries, or to serve heavy hammers in a smithy, whence the name.

_ Portable cranes are of many kinds. Obviously, nearly every kind of crane can be made portable by mounting it on a carriage, fitted with wheels; it is even not unusual to make the Scottish derrick portable by using three trucks, one under Portable the mast, and the others under the two back legs. cranes.

Fig. 11 represents a portable steam jib crane; it contains the same elements as the fixed crane (fig. 4), but the foundation bed is mounted on a truck which is carried on railway or road wheels. With portable cranes means must be provided to ensure the requisite stability against overturning ; this is done by weighting the tail of the revolving, part with heavy weights, and in steam cranes the

boiler is so placed as also to form part of the counterbalance. Where the rail-gauge is narrow and great weight is not desired, blocking girders are provided across the under side of the truck; these are arranged so that, by means of wedges or screws, they can be made to increase the base. In connexion with the stability of portable cranes, it may be mentioned that accidents more often arise from

Fig. 11.

Fig. 12.

Fig. 13.

overturning backwards than forwards. In the latter case the overturning tendency begins as soon as the load leaves the ground, but ceases as soon as the load again touches the ground and thus relieves the crane of the extra weight, whereas overturning backwards is caused either by the reaction of a chain breaking or by excessive counterweight. When portable cranes are fitted with springs and

axle-boxes, drawgear and buffers, so that they can be coupled to an ordinary railway train, they are called ” break- down ” or ” wrecking ” cranes. Dock-side jib cranes for working general cargo are almost always made portable, in order to enable them to be placed in correct position in regard to the hatchways of the vessels which they serve. Fig. 12 shows an ordinary hydraulic dock-side jib crane. This type is usually fitted with a very high jib, so as to lift goods in and out of high-sided vessels. The hydraulic lifting cylinders are placed inside the revolving steel mast or post, and the cabin for the driver is arranged high up in the front of the post, so as to give a good view of the work. The pressure is conveyed to the crane by means of jointed ” walking ” pipes, or flexible hose, connected to hydrants placed at regular intervals along the quay. It is often very desirable to have the quay space as little obstructed by the cranes as possible, so as not to interfere with railway traffic ; this has led to the intro- duction of cranes mounted on high trucks or gantries, sometimes also called ” portal ” cranes. Where warehouses or station buildings run parallel to the quay line, the high truck is often extended, so as to span the whole quay; on one side the ” long leg ” runs on a rail at the quay edge, and on the other the ” short leg ” runs on a runway placed on the building. Cranes of this type are called ” half -portal ” cranes. Fig. 13 shows an

electric crane of this class.

They give the minimum of interference with quay space and have rapidly come into favour. Where the face of the warehouse is sufficiently close to the water to permit of the crane rope plumbingthe hatches without requiring a jib of ex- cessive radius, it is a very convenient plan to place the whole crane on the warehouse roof.

A special form of jib crane, designed to meet a particular purpose, is the ” Titan ” (fig. 14) largely used in the construction of piers and breakwaters. It contains all the essential elements of the hammer-headed crane, of which it may be considered to be the parent ; in fact, the only essential difference is that the Titan is portable and the hammer-head crane fixed. The Titan was the first type of large

portable crane in which full use was made of a truly horizontal movement of the load; for the purpose for which the type is de-signed, viz. setting concrete blocks in courses, this motion is almost a necessity.

p-fl pp

J

Fig. 15.

Fig. 16.

As types of non-revolving cranes, fig. 15 shows an overhead traveller worked by hand, and fig. 16 a somewhat similar machine worked by electric power. The principal component N parts of a traveller are the main cross girders forming the on ‘. . bridge, the two end carriages on which the bridge rests, the rev0 v “^ running wheels which enable the end carriages to travel craaes – on the longitudinal gantry girders or runway, and the crab or jenny, which carries the hoisting mechanism, and moves across the span on

J

^^m^^

Fig. 17.

Fig. 18.

rails placed on the bridge girders. There are numerous and important

variations of these two types, but the above contain the elements out of which most cranes of the class are built.

One variation is illustrated in fig. 17, and is called a ” Goliath ” or ” Wellington.” It is practically a traveller mounted on high legs, so as to permit of its being travelled on rails placed on the ground level, instead of on an elevated gantry. Of other variations and combinations of types, fig. 18 shows a modern design of crane intended to command the maximum of yard space, and having some of the character- istics both of the Goliath and of the revolving jib crane, and fig. 19 depicts a combination of a traveller and a hanging jib crane.

When the cross traverse motion of a traveller crab is suppressed, and the longitudinal travelling motion is increased in importance we come to a type of crane, the use of which is rapidly increasing; it goes by the name of “transporter.” Transporters can only move the load to any point on a vertical surface (generally a plane surface) ; they Jjave a lifting _ motion and a movement of translation. They are of two Tra ” Sm kinds: (1) those in which the motive power and lifting porters. gear are self-contained on the crab ; and (2) those in which the motive power is placed in a fixed position. A transporter of the first class is shown in fig. 20. From the lower flange of a. suspended runway, made of a single I section, run wheels, from the axles of which the trans- porter is suspended. The latter consists of a frame- work carrying the hoisting barrel, with its driving motor and gearing, and a travelling motor, which is geared to the running wheels in such a manner as to be able to propel the whole machine; a seat is provided for the

Q*

Fig. 20.

driver who manipulates the controllers. A transporter of this kind, when fitted with a grab, is a very efficient machine for taking coal from barges and depositing it in a coal store.

In the other class of transporter the load is not usually moved

through such long distances. It consists essentially of a jib made of single | -sections, and supported by tie-rods (fig. 21), the load to be lifted being suspended from a small travelling carriage which runs on the lower flange. The lifting gear is located in any convenient

fixed position. In order that only one motor may be used, and also that the load may be lifted by a single part of rope, various devices have been in- vented. The jib is usually in- clined, so as to enable the travel to be performed by

rmbm r 1 gravity in one direction, and

1 I ii'i the object of the transporter

I mechanism is to ensure that

I pulling in or slacking out the

p IG 2 j * lifting rope shall perform the

cycle of operations in the following order: — Supposing the load is ready to be lifted out of a vessel on to a quay, the pull of the lifting rope raises the load, the travelling jenny being meanwhile locked in position. On arriving at a certain height the lift ceases and the jenny is released, and by the continued pull of the rope, it runs up the jib; on arriving at an adjustable stop, the jenny is again locked, and the load can be lowered out ; the hook can then be raised, when the jenny is auto- matically unlocked, and on paying out the rope the jenny gravitates to its first position, when the load is lowered and the cycle repeated. The jibs of transporters are often made to slide forward, or lift up, so as to be out of the way when not in use. Transporters are largely used for dealing with general cargo between vessels and warehouses, and also for coaling vessels; they have a great advantage in not interfering with the rigging of vessels.

Nearly all recent advances in crane design are the result of the introduction of the electric motor. It is now possible to apply motive power exactly where it is wanted, and to do so economically, so that the crane designer has a perfectly free hand in adding, the various motions required by the special circumstances of each case. The literature which deals specially with cranes is not a large one, but there are some good German text-books on the subject, amongst which may be mentioned Die Hebezeuge by Ernst (4th ed., Berlin, 1903), and Cranes, by Anton Bottcher, translated with additions by A. Tolhausen (London, 1908). (W. P.*)

CRANIOMETRY. The application of precise methods of measurement marks a definite phase in the development of most branches of modern science, and thus craniometry, a compre- hensive expression for all methods of measuring the skull (cranium), provides a striking landmark in the progress of anthropological studies. The origin of

craniometry appears to be twofold. Certain artists made measurements of heads and skulls with a view to attaining greater accuracy in their representation of those parts of the human frame. Bernard de Palissy and A. Diirer may be mentioned as pioneers in such researches. Again, it is clearly shown in the literature of this subject, that anatomists were led to employ methods of measurement in their study of the human skull. The determining cause of this improvement in method is curious, for it appeared at the end of a famous anatomical controversy of the later middle ages, namely the dispute as to whether the Galenic anatomy was based on the study of the human body or upon those of apes. In the descrip- tion of the dissection of a chimpanzee (in 1680) Tyson explains that the measurements he made of the skull of that animal were devised with a view to exhibiting the difference between this and the human skull.

The artists did not carry their researches very far. The anatomists on the contrary continued to make measurements, and in 1764 Daubenton published a noteworthy contribution to craniometry. Six years later, Pieter Camper, distinguished both as an artist and as an anatomist, published some lectures contain- ing an account of his craniometrical methods, and these may be fairly claimed as having laid the foundation of all subsequent work. That work has been described above as anthropological, but as the studies thus defined are very varied in extent, it is necessary to consider the subdivisions into which they naturally fall.

In the first place (and omitting further reference to the contri- butions of artists), it has been explained that the measurements were first made with a view to elucidating the comparison of the skulls of men with those of other animals. This wide comparison constitutes the first subdivision of craniometric studies. And craniometric methods have rendered the results of comparison

much more clear and comprehensible than was formerly the case. It is further remarkable that among the first measurements employed angular determinations occur, and indeed the name of Camper is chiefly perpetuated in anthropological literature by the ” facial angle ” invented by that artist-anatomist (fig. 1). It appears impossible to improve on the simple terms in which

M

Fig. 1. — The skull and head of a young orang-utan, and of a negro, showing the lines including the facial angle (MGND) devised by Pieter Camper.

Camper describes the general results of the employment of this angle for comparative purposes, as will appear from the following brief extract from the translation of the original work: ” The two extremities of the facial line are from 70 to 80 degrees from the negro to the Grecian antique: make it under 70, and you describe an ourang or an ape: lessen it still more, and you have the head of a dog. Increase the minimum, and you form a fowl, a snipe for example, the facial line of which is nearly parallel with the horizon.” (Camper’s Works, p. 42, translated by Cogan, 1821.)

In the 19th century the names of notable contributors to the literature of craniometry quickly increase in number; while it is impossible to analyse each contribution, or even record a complete list of the names of the authors, it must be added that for the purposes of far-reaching comparisons of the lower animals with mankind, craniometric methods were used by P. P. Broca in France and by T. H. Huxley (figs. 2 and 3) in England, with such genius and success as have not yet been surpassed.

The second division of craniometric studies includes those in which the skulls of the higher and lower races of mankind are compared. And in this domain, the advent of accurate numerical methods of recording observations brought about great advances. In describing the facial angle, it will be seen that the modern European, the Greek of classical antiquity and the Negro are compared. Thus it is that Camper’s name appears as that of a pioneer in this second main division of the subject. Broca and Huxley cultivated similar comparative racial fields of research, but to these names that of Anders Retzius of Stockholm must be added here. The chief claim of Retzius to distinction rests on the merits of his system of comparing various dimensions of the skull, and of a classification based on such comparisons. These indices will be further defined below. It is convenient to mention here that the first aim of all these investigators was to obtain from the skull reliable data having reference to the conformation or size of the brain once contained within it. Only in later days did the tendency to overlook this, the fundamental aim and end

of craniometry, make its appearance; such nevertheless was the case, much to the detriment of craniometric science, which for a time seems to have become purely empirical.

The third subdivision of craniometric researches is one in which the field of comparison is still further narrowed. For herein the

Fig. 2. — The spheno-ethmoidal, spheno-maxillary and foramino-basal angles are shown in the crania of: — A, a New Britain native (male); B, a gorilla (male); C, a dog. N.Pr.B, Spheno- ethmoidal angle; P. Pr. B, Spheno-maxillary angle; Pr. B.Op, Foramino-basal angle. The spheno-ethmoidal and spheno-maxillary angles were first employed by Huxley.

various sub-racial types such as the dark and fair Europeans are brought together for the purposes of comparison or contrast. But although the range of research is thus narrowed and re- stricted, the guiding principles and the methods remain un- changed. In this department of craniometry, Anders Retzius has gained the foremost place among the pioneers of research.

Fig. 3. — The spheno-ethmoidal, spheno-maxillary and foramino-basal angles are shown in the crania of : — A, a New Guinea native (male); B, a European woman. N.Pr.B, Spheno-ethmoidal angle; P.Pr.B, Spheno-maxillary angle; Pr.B.Op, Foramino-basal angle.

Retzius's name is, as already mentioned, associated not with any particular angle or angular measurement, but rather with a method of expressing as a formula two cranial dimensions which have been measured and which are to be compared. Thus for instance one skull may be so proportioned that its greatest width measures 75% of its greatest length {i.e. its width is to its length as three to four).

This ratio (of 75%) is termed the cephalic or breadth-index, which in such an instance would be described as equal to 75.

A B C

f 'rom Tylor's Anthropology, by permission of Macmillan & Co., Ltd.

Fig. 4. — Top view of skulls. (A) Negro, index 70, dolichocephalic ; (B) European, index 80, mesaticephalic ; (C) Samoyed, index 85, brachycephalic.

A skull providing a breadth-index of 75 will naturally possess very different proportions from another which provides a corre- sponding index equal to 85. And in fact this particular index in human skulls varies from about 58 to 90 in undistorted examples (fig. 4). Such is the general scheme of Retzius's system of classification of skulls by means of indices, and one of his earliest applications of the method

was to the inhabitants of Sweden.

One striking result was to exhibit a most marked contrast in respect of the breadth-index of the skull, between the Lapps and their Scandinavian neighbours, and thus a craniometric difference was added to the list of characters (such as stature, hair-colour and complexion) whereby these two types were already dis- tinguished. Since the publication of Retzius's studies, the cephalic or breadth-index of the skull has retained a premier position among its almost innumerable successors, though it is of historical interest to note that, while Retzius had un- doubtedly devised the method of comparing " breadth-indices," he always qualified the results of its use by reference to other data. These qualifications were over- looked by the immediate successors of Retzius, much to the disadvan- tage of craniometry. In addition to the researches on the skull forms of Lapps and Swedes, others dealing with the comparison of Finns and Swedes (by Retzius) as well as the investigation of the form of skull in Basques and Guanches (by Broca) possess historic interest.

Thus far little or nothing has been said with regard to instru- ments. Camper devised a four-sided open frame with cross- wires, through which skulls were viewed and by means of which accurate drawings could be pro- jected on to paper. The methods of Retzius as here described require the aid of callipers of various sorts, and such instru- ments were quickly devised and applied to the special needs of the case. Such instruments are still in use, and two forms of simple craniometer are shown in the accompanying illustrations (figs. 5 and 6). For the more accurate comparison required in the study of various European types, delicate instruments for measuring angles were invented by Anthelme in Paris (1836) and John Grattan in Belfast (1853). These instruments enabled the observer to transmit to the plane surface of a sheet of drawing paper a correct tracing of the contour of the specimen under investigation. A further modification was devised by the talented Dr Busk in the year 1861, and since that date the number and forms of these instruments have been greatly multiplied. With reference to contributors to the advance of knowledge in this particular department of craniometry, there should be added to the foregoing names those of Huxley, Sir W. H. Flower and Sir W. Turner in England, J. L. A. de Quatrefages in France, J. C. G. Lucae and H. Welcker in Germany. Moreover, the methods have also been multi- plied, so that in addition to angular and linear measurements, those of the capacity or cubical contents of the cranium and those of the curva- ture of its surface demand reference. The masterly work of Cleland claims And finally while two

Fig. 5. — Callipers used in Craniometry, Professor Martin's (P. Hermann, Zurich) model.

Fig. 6. — Flower's Craniometer as modi- fied by Dr W. L. H. Duckworth.

special mention in this connexion, dimensions are combined in the cephalic index of Retzius, the combination of three dimen- sions (in a formula called a modulus) distinguishes some recent work, although the employment of the modulus is

actually a return to a system devised in 1859 by Karl E. von Baer.

The fourth subdivision of craniometry is closely allied to that which has just been described, and it deals with the comparison of the prehistoric and the recent types of mankind. The methods are exactly similar to those employed in the comparison of living races; but in some particular instances where the pre- historic individual is represented only by a comparatively minute portion of the skull, some special modifications of the usual procedures have been necessitated. In this field the works of W. His and L. Rutimeyer on the prehistoric races of Switzerland, those of Ecker (South Germany), of Broca in France, of Thurnam and Davis in England, must be cited. G. Schwalbe, Kramberger,

Fig. 7. — The facial angle of the Frankfort Agreement is shown in the crania of : — A, a New Britain native (male) 62°; B, a gorilla (male) 50 ; C, a dog 42°. This angle has now replaced the facial angle of Camper (cf. fig. 1).

W. J. Sollas and H. Klaatsch are the most recent contributors to this department of craniometry.

Thus the complexity of craniometric studies has inevitably increased. In the hands of von Torok of Budapest, as in those of M. Benedikt of Vienna at an earlier date, the number of measure- ments regarded as necessary for the complete " diagnosis " of a skull has reached a colossal total. Of the trend and progress of craniometry at the present day, three particular developments are noteworthy. First come the attempts made at various times to co-ordinate the systems of measurements so as to ensure uniformity among all observers; of these attempts two, viz. that of the German anthropologists at Frankfort in

1882 (figs. 7 and 8), and that of the Anthropometric Committee of the British

Fig. 8. — The facial angle of the Frankfort Agreement is shown in the crania of : — A, a New Guinea native (male) 75 ; B, a European (woman) 93°; C, a new-born infant (93 °).

Association (1906) seem to require at least a record. In the second place, the application of the methods of statistical science in dealing with large numbers of craniometric data has been richly rewarded in Prof. Karl Pearson's hands. Thirdly, and in connexion with such methods, there may be mentioned the extension of these systems of measurement, and of the methods of dealing with them on statistical principles, to the study of large numbers of the skulls of domestic and feral animals, such as white rats or the varieties of the horse. And lastly no account of craniometry would be complete without mention of the revolt, headed by the Italian anthropologist Sergi, against metrical methods of all kinds. It cannot, however, be alleged that the substitutes offered by the adherents of Sergi's principles encourage others to forsake the more orthodox numerical methods.

Literature. — Tyson, The Anatomy of a Pygmie (London, 1699) ; Daubenton, " Sur la difference de la situation du tron occipital dans

l'homme et dans les animaux," Comptes rendus de I'academie des sciences (Paris, 1764); Camper, Works (1770, translated by Cogan, 1821); Broca, Memoires (1862 and following years); Huxley, Journal of Anatomy and Physiology, vol. 1 (1867); Retzius, Uber die Schadelformen der Nordbewohner (Stockholm, 1842); Anthelme, Physiologie de la pensee (Paris, 1836); Grattan, Ulster Journal of Archaeology, vol. 1 (1853); Busk, "A System of Craniometry, Transactions of the Ethnological Society (1861); Flower, Catalogue of the Hunterian Museum, Osteology, part 1 (London, 1879) ; Turner, " ' Challenger ' Reports," Zoology, vol. x. pt. 29, " Human Crania " (1884); de Quatrefages, Crania ethnica (Paris, 1873); Lucae, Architectur des menschlichen Schddels (Frankfort, 1855); Welcker, Bau und Wachsthum des menschlichen Schddels (1862); Cleland, " An Inquiry into the Variations of the Human Skull," Phil. Trans. Roy. Society (1870), vol. 160, pp. 117 et seq. ; von Baer, " Crania selecta," Academie imperiale des sciences de S. Petersbourg (1859);

His and Rutimeyer, Crania Helvetica (Basel, 1866); Ecker, Crania Germaniae meridionalis (1865) ; Thurnam and Davis, Crania Britannica; von Torok, Craniometrie (Stuttgart, 1890) ; Benedikt, Manuel technique et pra- tique d' anthropometric cranio-ckpha- lique (Paris,

1889); Pearson, Biome- trika, from vol. 1 (in 1902) onwards; Sergi, ” The Varieties of the Human Species,” English translation, Smithsonian Institution (Washington, 1894); Schwalbe, “Der Neanderthalschadel,” Bonner Jahrbiicher, Heft 106; also Sonderheft der Zeitschrift fur Morphologic und Anthropologie ; Kramberger, Der palaolithische Mensch von Krapina (Nagele, Stutt- gart, 1901); Sollas, “The Cranial Characters of the Neanderthal Race,” Phil. Transactions of the Royal Society, vol. 199, Series B, p. 298, 1908 ; Klaatsch, ” Bericht uber einen anthropologischen Streifzug nach London,” Zeitschrift fur Ethnologie, Heft 6, 1903, p. 875.

Handbooks. — Topinard, Elements a” anthropologie generate (Paris, 1885); Schmidt, Anthropologische Methoden (Leipzig, 1888); Duckworth, Morphology and Anthropology (Cambridge, 1904).

Journals. — Bulletins de la Societi d’ ‘Anthropologic de Paris, Journal of the Royal Anthropological Institute of Great Britain and Ireland, Archiv fur Anthropologie, Zeitschrift filr Morphologie und Anthropologie. (W. L. H. D.)

CRANK, a word of somewhat obscure etymology, probably connected with a root meaning ” crooked,” and appearing in the Ger. krank, ill, a figurative use of the original word; among other words in English containing the same original meaning are ” cringe ” and ” crinkle.” In mechanics, a crank is a device by

which reciprocating motion is con- verted into circular motion or vice versa, consisting of a crank- arm, one end of which is fastened rigidly at right angles to the rotating shaft or axis, while the other end bears a crank-pin, pro- jecting from it at right angles and parallel to the shaft. When the reciprocating part of a machine, as the piston and piston-rod of a steam engine, is linked to this crank by a crank-rod or connecting rod, one end of which works on the crank-pin and the other on a pin in the end of the reciprocating part, the to-and-fro motion of the latter imparts a circular motion to the shaft and vice versa. The crank, instead of being made up as de- scribed above, may be formed by bending the shaft to the required shape, as sometimes in the handle of a winch. A bell-crank, so called because of its use in bell-hanging to change the direction of motion of the wires from horizontal to vertical or vice versa, consists of two arms rigidly connected at an angle, say of 90°, to each other and pivoted on a pin placed at the point of junction.

Crank is also the name given to a labour machine used in prisons as a means of punishment (see Tread-mill). Other uses of the word,

connected with the primary meaning, are for a crooked path, a crevice or chink; and a freakish turn of thought or speech, as in Milton's phrase " quips and cranks." It is also used as a slang expression, American in origin, for a harmless

lunatic, or a faddist, whose enthusiasm for some one idea or hobby becomes a monomania. " Crank " or " crank-sided " is a nautical term used of a ship which by reason of her build or from want of balance is liable to overturn. This strictly nautical sense is often confused with " crank " or " cranky," that is, rickety or shaky, probably derived direct from the German krank, weak or ill.

CRANMER, THOMAS (1480-1556), archbishop of Canterbury, born at Aslacton or Aslockton in Nottinghamshire on the 2nd of July 1489, was the second son of Thomas Cranmer and of his wife Anne Hatfield. He received his early education, according to Morice his secretary, from " a marvellous severe and cruel schoolmaster," whose discipline must have been severe indeed to deserve this special mention in an age when no schoolmaster bore the rod in vain. The same authority tells us that he was initiated by his father in those field sports, such as hunting and hawking, which formed one of his recreations in after Kfe. To early training he also owed the skilful horsemanship for which he was conspicuous. At the age of fourteen he was sent by his mother, who had in 1501 become a widow, to Cambridge. Little is known with certainty of his university career beyond the facts that he became a fellow of Jesus College in 1510 or 1511, that he had soon after to vacate his fellowship, owing to his marriage to " Black Joan," a relative of the landlady of the Dolphin Inn, and that he was reinstated in it on the death of his wife, which occurred in childbirth before the lapse of the year of grace allowed by the statutes. During the brief period of his married life he held the appointment of lecturer at Buckingham Hall, now Magdalene College. The fact of his marrying would seem to show that he did not at the time intend to enter the church; possibly the death of his wife caused him to qualify for holy orders. He was ordained in 1523, and soon after he took his doctor's degree in divinity. According to Strype, he was invited about this time to become a fellow of the college founded by Cardinal Wolsey at Oxford; but Dean Hook shows that there is some reason to doubt this. If the offer was made, it was declined, and Cranmer continued at Cambridge filling the offices of lecturer in divinity at his own college and of public examiner in divinity to the university. It is interesting, in

view of his later efforts to spread the knowledge of the Bible among the people, to know that in the capacity of examiner he insisted on a thorough acquaintance with the Holy Scriptures, and re- jected several candidates who were deficient in this qualification.

It was a somewhat curious concurrence of circumstances that transferred Cranmer, almost at one step, from the quiet seclusion of the university to the din and bustle of the court. In August 1529 the plague known as the sweating sickness, which prevailed throughout the country, was specially severe at Cambridge, and all who had it in their power forsook the town for the country. Cranmer went with two of his pupils named Cressy, related to him through their mother, to their father's house at Waltham in Essex. The king (Henry VIII.) happened at the time to be visiting in the immediate neighbourhood, and two of his chief counsellors, Gardiner, secretary of state, afterwards bishop of Winchester, and Edward Fox, the lord high almoner, afterwards bishop of Hereford, were lodged at Cressy's house. Meeting with Cranmer, they were naturally led to discuss the king's meditated divorce from Catherine of Aragon. Cranmer suggested that if the canonists and the universities should decide that marriage with a deceased brother's widow was illegal, and if it were proved that Catherine had been married to Prince Arthur, her marriage to Henry could be declared null and void by the ordinary ecclesiastical courts. The necessity of an appeal to Rome was thus dispensed with, and this point was at once seen by the king, who, when Cranmer's opinion was reported to him, is said to have ordered him to be summoned in these terms: " I will speak to him. Let him be sent for out of hand. This man, I trow, has got the right sow by the ear."

At their first interview Cranmer was commanded by the king to lay aside all other pursuits and to devote himself to the question of the divorce. He was to draw up a written treatise, stating the course he proposed, and defending it by arguments

from scripture, the fathers and the decrees of general councils. His material interests certainly did not suffer by compliance. He was commended to the hospitality of Anne Boleyn's father, the earl of Wiltshire, in whose house at Durham Place he resided for some time; the king appointed him archdeacon of Taunton and one of his chaplains; and he also held a parochial benefice, the name of which is unknown. When the treatise was finished Cranmer was called upon to defend its argument before the universities of Oxford and Cambridge, which he visited, accom- panied by Fox and Gardiner. Immediately afterwards he was sent to plead the cause before a more powerful if

not a higher tribunal. An embassy, with the earl of Wiltshire at its head, was despatched to Rome in 1530, that " the matter of the divorce should be disputed and ventilated," and Cranmer was an important member of it. He was received by the Pope with marked courtesy, and was appointed " Grand Penitentiary of England," but his argument, if he ever had the opportunity of stating it, did not lead to any practical decision of the question.

Cranmer returned in September 1530, but in January 1531 he received a second commission from the king appointing him " Conciliarius Regius et ad Caesarem Orator." In the summer of 1 53 1 he accordingly proceeded to Germany as sole ambassador to the emperor. He was also to sound the Lutheran princes with a view to an alliance, and to obtain the removal of some restrictions on English trade. At Nuremberg he became ac- quainted with Osiander, whose somewhat isolated theological position he probably found to be in many points analogous to his own. Both were convinced that the old order must change; neither saw clearly what the new order should be to which it was to give place. They had frequent interviews, which had doubtless an important influence on Cranmer's opinions. But Osiander's house had another attraction of a different kind from theological sympathy. His niece Margaret won the heart of Cranmer, and in 1532 they were married. Hook finds in the fact of the marriage corroboration of Cranmer's statement that he never expected or desired the primacy; and it seems probable enough that, if he had foreseen how soon the primacy was to be forced upon him, he would have avoided a disqualification which it was difficult to conceal and dangerous to disclose.

Expected or not, the primacy was forced upon him within a very few months of his marriage. In August 1532 Archbishop Warham died, and the king almost immediately afterwards intimated to Cranmer; who had accompanied the emperor in his campaign against the Turks, his nomination to the vacant see. Cranmer's conduct was certainly consistent with his profession that he did not desire, as he had not expected, the dangerous promotion. He sent his wife to England, but delayed his own return in the vain hope that another appointment might be made. The papal bulls of confirmation were dated February and March 1533, and the consecration took place on the 30th March. One peculiarity of the ceremony had occasioned considerable discussion. It was the custom for the archbishop elect to take two oaths, the first of episcopal allegiance to the pope, and the second in recognition of the royal supremacy. The latter was so wide in its scope that it might fairly be held to supersede the former in so far as the two were inconsistent. Cranmer, however, was not satisfied with this. He had a

special protest recorded, in which he formally declared that he swore allegiance to the pope only in so far as that was consistent with his supreme duty to the king. The morality of this course has been much canvassed, though it seems really to involve nothing more than an express declaration of what the two oaths implied. It was the course that would readily suggest itself to a man of timid nature who wished to secure himself against such a fate as Wolsey's. It showed weakness, but it added nothing to whatever immorality there might be in successively taking two incompatible oaths.

In the last as in the first step of Cranmer's promotion Henry had been actuated by one and the same motive. The business of the divorce — or rather, of the legitimation of Anne Boleyn's expected issue — had now become very urgent, and in the new archbishop he had an agent who might be expected to forward it with the needful haste. The celerity and skill with which

Cranmer did the work intrusted to him must have fully satisfied his master. During the first week of April Convocation sat almost from day to day to determine questions of fact and law in relation to Catherine's marriage with Henry as affected by her previous marriage with his brother Arthur. Decisions favourable to the object of the king were given on these questions, though even the despotism of the most despotic of the Tudors failed to secure absolute unanimity. The next step was taken by Cranmer, who wrote a letter to the king, praying to be allowed to remove the anxiety of loyal subjects as to a possible case of disputed succes- sion, by finally determining the validity of the marriage in his archiepiscopal court. There is evidence that the request was prompted by the king, and his consent was given as a matter of course. Queen Catherine was residing at Ampthill in Bedford- shire, and to suit her convenience the court was held at the priory of Dunstable in the immediate neighbourhood. Declining to appear, she was declared contumacious, and on the 23rd of May the archbishop gave judgment declaring the marriage null and void from the first, and so leaving the king free to marry whom he pleased. The Act of Appeals had already prohibited any appeal from the archbishop's court. Five days later he pronounced the marriage between Henry and Anne — which had been secretly celebrated about the 25th of January 1533 — to be valid. On the 1 st of June he crowned Anne as queen, and on the 10th of Sep- tember stood godfather to her child, the future Queen Elizabeth.

The breach with Rome and the subjection of the church in England to the royal supremacy had been practically achieved before Cranmer's appointment as archbishop: and he had little to do with the other constitutional changes of Henry's reign. But his position as chief minister of Henry's ecclesiastical jurisdiction forced him into unpleasant prominence in connexion with the king's matrimonial experiences. In 1536 he was required to revise his own sentence in favour of the validity of Henry's marriage with Anne Boleyn; and on the 17th of May the marriage was declared invalid. The ground on which this sentence is pronounced is fairly clear. Anne's sister, Mary Boleyn, had been Henry VIII. 's mistress; this by canon law was a bar to his marriage with Anne — a bar which had been removed by papal dispensation in 1527, but now the papal power to dispense in such cases had been repudiated, and the original ob- jection revived. The sentence was grotesquely legal and unjust. With Anne's condemnation by the House of Lords Cranmer had nothing to do. He interceded for her in vain with the king, as he had done in the cases of Fisher, More and the monks of Christchurch. His share in the divorce of Anne of Cleves was less prominent than that of Gardiner, though he did preside over the Convocation in which nearly all the dignitaries of the church signified their approval of that measure. To his next and last interposition in the matrimonial affairs of the king no discredit attaches itself. When he was made cognizant of the charges against Catherine Howard, his duty to communicate them to the king was obvious, though painful.

Meanwhile Cranmer was actively carrying out the policy which has associated his name more closely, perhaps, than that of any other ecclesiastic with the Reformation in England. Its most important feature on the theological as distinct from the political side was the endeavour to promote the circulation of the Bible in the vernacular, by encouraging translation and procuring an order in 1538 that a copy of the Bible in English should be set up in every church in a convenient place for reading. Only second in importance to this was the re -adjustment of the creed and liturgy of the church, which formed Cranmer's principal work during the latter half of his life. The progress of the archbishop's opinion towards that middle Protestantism, if it may be so called, which he did so much to impress on the formularies of the Church of England, was gradual, as a brief enumeration of the successive steps in that progress will show. In 1 538 an embassy of German divines visited England with the design, among other things, of forming a common confession for the two countries. This proved impracticable, but the frequent conferences Cranmer had with the theologians composing the embassy had

doubtless a great influence in modifying his views. Both in parliament and

in Convocation he opposed the Six Articles of 1539, but he stood almost alone. During the period between 1540 and 1543 the archbishop was engaged at the head of a commission in the revision of the “Bishop’s Book” (1537) or Institutions of a Christian Man, and the preparation of the Necessary Erudition (1543) known as the ” King’s Book,” which was a modification of the former work in the direction of Roman Catholic doctrine. In June 1545 was issued his Litany, which was substantially the same as that now in use, and shows his mastery of a rhythmical English style.

The course taken by Cranmer in promoting the Reformation exposed him to the bitter hostility of the reactionary party or ” men of the old learning,” of whom Gardiner and Bonner were leaders, and on various occasions — notably in 1543 and 1545 — conspiracies were formed in the council or elsewhere to effect his overthrow. The king, however, remained true to him, and ail the conspiracies signally failed. It illustrates a favourable trait in the archbishop’s character that he forgave all the conspirators. He was, as his secretary Morice testifies, ” a man that delighted not in revenging.”

Cranmer was present with Henry VIII. when he died (1547). By the will of the king he was nominated one of a council of regency composed of sixteen persons, but he acquiesced in the arrangement by which Somerset became lord protector. He officiated at the coronation of the boy king Edward VI., and is supposed to have instituted a sinister change in the order of the ceremony, by which the right of the monarch to reign was made to appear to depend upon inheritance alone, without the concurrent consent of the people. But Edward’s title had been expressly sanctioned by act of parliament, so that there was no more room for election in his case than in that of George I., and the real motive of the changes was to shorten the weary ceremony for the frail child.

During this reign the work of the Reformation made rapid progress, the sympathies both of the Protector and of the young king being decidedly Protestant. Cranmer was therefore enabled without let or hindrance to complete the preparation of the church formularies, on which he had been for some time engaged. In 1547 appeared the Homilies prepared under his direction. Four of them are attributed to the archbishop himself — those on Salvation, Faith, Good Works and the Reading of Scripture. His translation of the German Catechism of Justus Jonas, known as Cranmer’s Catechism, appeared in the

following year. Im- portant, as showing his views on a cardinal doctrine, was the Defence of the True and Catholic Doctrine of the Sacrament, which he published in 1550. It was immediately answered from the side of the ” old learning ” by Gardiner. The first prayer-book of Edward VI. was finished in November 1548, and received legal sanction in March 1549; the second was completed and sanctioned in April 1552. The archbishop did much of the work of compilation personally. The forty-two articles of Edward VI. published in 1553 owe their form and style almost entirely to the hand of Cranmer. The last great undertaking in which he was employed was the revision of his codification of the canon law, which had been all but completed before the death of Henry. The task was one eminently well suited to his powers, and the execution of it was marked by great skill in definition and arrange- ment. It never received any authoritative sanction, Edward VI. dying before the proclamation establishing it could be made, and it remained unpublished until 1571, when a Latin translation by Dr Walter Haddon and Sir John Cheke appeared under the title Reformatio legum ecclesiasticarum. It laid down the lawfulness and necessity of persecution to the death for heresy in the most absolute terms; and Cranmer himself condemned Joan Bocher to the flames. But he naturally loathed persecution, and was as tolerant as any in that age.

Cranmer stood by the dying bed of Edward as he had stood by that of his father, and he there suffered himself to be persuaded to take a step against his own convictions. He had pledged himself to respect the testamentary disposition of Henry VIII. by which the succession devolved upon Mary, and now he violated his oath by signing Edward’s ” device ” of the crown to Lady Jane Grey.

On grounds of policy and morality alike the act was quite indefensible; but it is perhaps some palliation of his perjury that it was committed to satisfy the last urgent wish of a dying man, and that he alone remained true to the nine days’ queen when the others who had with him signed Edward’s device deserted her. On the accession of Mary he was summoned to the council — most of whom had signed the same device — reprimanded for his conduct, and ordered to confine himself to his palace at Lambeth until the queen’s pleasure was known. He refused to follow the advice of his friends and avoid the fate that was clearly impending over him by flight to the continent. Any chance of safety that lay in the friendliness of a strong

party in the council was more than nullified by the bitter personal enmity of the queen, who could not forgive his share in her mother's divorce and her own disgrace. On the 14th of September 1 553 he was sent to the Tower, where Ridley and Latimer were also confined. The immediate occasion of his imprisonment was a strongly worded declaration he had written a few days previously against the mass, the celebration of which, he heard, had been re-established at Canterbury. He had not taken steps to publish this, but by some unknown channel a copy reached the council, and it could not be ignored. In November, with Lady Jane Grey, her husband, and two other Dudleys, Cranmer was condemned for treason. Renard thought he would be executed, but so true a Romanist as Mary could scarcely have an ecclesiastic put to death in consequence of a sentence by a secular court, and Cranmer was reserved for treatment as a heretic by the highest of clerical tribunals, which could not act until parliament had restored the papal jurisdiction. Accordingly in March 1554 he and his two illustrious fellow-prisoners, Ridley and Latimer, were removed to Oxford, where they were confined in the Bocardo or common prison. Ridley and Latimer were unflinching, and suffered bravely at the stake on the 16th of October 1555. Cranmer had been tried by a papal commission, over which Bishop Brooks of Gloucester presided, in September 1555. Brooks had no power to give sentence, but reported to Rome, where Cranmer was summoned, but not permitted, to attend. On the 25th of November he was pronounced contumacious by the pope and excommunicated, and a commission was sent to England to degrade him from his office of archbishop. This was done with the usual humiliating ceremonies in Christ Church, Oxford, on the 14th of February 1556, and he was then handed over to the secular power. About the same time Cranmer subscribed the first two of his " recantations." His difficulty consisted in the fact that, like all Anglicans of the 16th century, he recognized no right of private judgment, but believed that the state, as represented by monarchy, parliament and Convocation, had an absolute right to determine the national faith and to impose it on every Englishman. All these authorities had now legally established Roman Catholicism as the national faith, and Cranmer had no logical ground on which to resist. His early " recantations " are merely recognitions of his lifelong conviction of this right of the state. But his dilemma on this point led him into further doubts, and he was eventually induced to revile his whole career and the Reformation. This is what the govern- ment wanted. Northumberland's recantation had done much to discredit the Reformation, Cranmer's, it was hoped, would complete the work. Hence the enormous effect of Cranmer's recovery at the final scene. On the 21st of March he was taken to St Mary's church, and asked to

repeat his recantation in the hearing of the people as he had promised. To the surprise of all he declared with dignity and emphasis that what he had recently done troubled him more than anything he ever did or said in his whole life; that he renounced and refused all his recantations as things written with his hand, contrary to the truth which he thought in his heart; and that as his hand had offended, his hand should be first burned when he came to the fire. As he had said, his right hand was steadfastly exposed to the flames. The calm cheerfulness and resolution with which he met his fate show that he felt that he had cleared his conscience, and that his recantation of his recantations was a repentance that needed not to be repented of.

It was a noble end to what, in spite of its besetting sin of infirmity of moral purpose, was a not ignoble life. The key to his character is well given in what Hooper said of him in a letter to Bullinger, that he was " too fearful about what might happen to him." This weakness was the worst blot on Cranmer's character, but it was due in some measure to his painful capacity for seeing both sides of a question at the same time, a temperament fatal to martyrdom. As a theologian it is difficult to class him. As early as 1538 he had repudiated the doctrine of Transubstantiation; by 1550 he had rejected also the Real Presence (Pref. to his Answer to Dr Richard Smith) . But here he used the term " real " somewhat unguardedly, for in his Defence he asserts a real presence, but defines it as exclusively a spiritual presence; and he repudiates the idea that the bread and wine were " bare tokens." His views on church polity were dominated by his implicit belief in the divine right of kings (not of course the divine hereditary right of kings) which the Anglicans felt it necessary to set up against the divine right of popes. He set practically no limits to the ecclesiastical authority of kings; they were as fully the representatives of the church as the state, and Cranmer hardly distinguished between the two. Church and state to him were one.

Authorities. — Letters and Papers of Henry VIII. vols, iv.-xx. : Acts of the Privy Council, 1542-1556; Cal. of State Papers, Dom. and Foreign; Foxe's Acts and Monuments; Strype's Memorials of Cranmer (1694) ; Anecdotes and Character of Archbishop Cranmer, by Ralph Morice, and two contemporary biographies (Camden Society's publications) ; Remains of Thomas Cranmer, by Jenkyns (1833) ; Lives of Cranmer, by Gilpin (1784), Todd (1831), Le Bas, in Hook's Lives of the Archbishops of Canterbury, vols. vi. and vii. (1868), by Canon Mason (1897), A. D. Innes (1900) and A. F. Pollard (1904) ; Froude's History; R. W. Dixon's History; J. Gairdner's History of the Church, 1485-15 58; Bishop Cranmer's Recantacyons, ed. Gairdner (1885). R. E. Chester Waters's Chesters of Chicheley (1877) contains a vast amount of

genealogical information about Cranmer . which has only been used by one of his biographers. (A. F. P.)

CRANNOG (Celt, crann, a tree), the term applied in Scotland and Ireland to the stockaded islands so numerous in ancient times in the lochs of both countries. The existence of these lake- dwellings in Scotland was first made known by John Mackinlay, a fellow of the Society of Antiquaries of Scotland, in a letter sent to George Chalmers, the author of Caledonia, in 1 813, describing two crannogs, or fortified islands in Bute. The crannog of Lagore, the first discovered in Ireland, was examined and described by Sir William Wilde in 1840. But it was not until after the discovery of the pile-villages of the Swiss lakes, in 1853, had drawn public attention to the subject of lake-dwellings, that the crannogs of Scotland and Ireland were systematically investigated.

The results of these investigations show that they have little in common with the Swiss lake-dwellings, except that they are placed in lakes. Few examples are known in England, although over a hundred and fifty have been examined in Ireland, and more than half that number in Scotland. As a rule they have been constructed on islets or shallows in the lochs, which have been adapted for occupation, and fortified by single or double lines of stockaded defences drawn round the margin. To enlarge the area, or raise the surface-level where that was necessary, layers of logs, brushwood, heather and ferns were piled on the shallow, and consolidated with gravel and stones. Over all there was laid a layer of earth, a floor of logs or a pavement of flagstones. In rare instances the body of the work is entirely of stones, the stockaded defence and the huts within its enclosure being the only parts constructed of timber. Occasionally a bridge of logs, or a causeway of stones, formed a communication with the shore, but often the only means of getting to and from the island was by canoes hollowed out of a single tree. Remains of huts of logs, or of wattled work, are often found within the enclosure. Three crannogs in Dowalton Loch, Wigtownshire, examined by Lord Lovaine in 1863, were found to be constructed of layers of fern and birch and hazel branches, mixed with boulders and penetrated by oak piles, while above all there was a surface layer of stones and soil. The remains of the stockade round the margin were of vertical piles mortised into horizontal bars, and secured by pegs in the mortised holes. The crannog of

Lochlee, near Tarbolton, Ayrshire, explored by Dr R. Munro in 1878, was 100 ft. in diameter, and had a double row of piles, bound by horizontal stretchers with square mortise-holes, enclosing an area 60 ft. in diameter. In the centre was a space 40 ft. square, bounded by the remains of a wooden wall and paved inside with split logs. A partition divided it into two equal parts, one of which had a doorway opening to the south, and close by it an extensive refuse-heap. In the middle of the other part was a stone-paved hearth, with remains of three former hearths underneath. The substructure was built up from the bottom of the loch, partly of brushwood but chiefly of logs and trunks of trees with the branches lopped off, placed in layers, each disposed transversely or obliquely across the one below it. A crannog in Loch-an-Dhugael, Balinakill, Argyllshire, described by the same explorer in 1893, revealed a substructure similar to that at Lochlee, with a double row of piles enclosing an area 45 to 50 ft. in diameter, within which was a circular construction 3 2 ft. in diameter, which had been supported by a large central post and about twenty uprights ranged round the circumference.

From their common feature of a substructure of brushwood and logs built up from the bottom, the crannogs have been classed as fascine-dwellings, to distinguish them from the typical pile- dwellings of the earlier periods in Switzerland, whose platforms are supported by piles driven into the bed of the lake. The crannog of Cloonfinlough in Connaught had a triple stockade of oak piles, connected by horizontal stretchers and enclosing an area 130 ft., in diameter, laid with trunks of oak trees. In the crannog of Lagore, county Meath, there were about 1 50 cartloads of bones, chiefly of oxen, deer, sheep and swine, the refuse of the food of the occupants. In the crannog of Lisnacroghera, county Antrim, iron swords, with sheaths of thin bronze ornamented with scrolls characteristic of the Late Celtic style, iron daggers, an iron spear-head i6| in. in length, and pieces of what, are called large, caldrons of iron, were found. Among the few remains of lacustrine settlements in England and Wales, some are suggestive of the typical crannog structure. The most important of these is the Glastonbury lake village, excavated by Mr A. Bulleid and Mr St George Gray. It consists of more than sixty separate dwellings, grouped within a triangular palisaded defence, formed in the midst of a marsh now partially reclaimed. The dwellings were circular, from 18 to 35 ft. in diameter, the substructure formed of logs and brushwood mingled with stones and clay, and outlined by piles driven into the bottom of the shallow lake. The walls of the houses seem to have been made of wattle-work, supported by posts sometimes not more than a single foot apart. The floors are of clay, with a hearth of stones in the centre, often showing

several renewals over the original. The relics recovered show unmistakably that the occupation must be dated within the Iron Age, but probably pre-Roman, as no evidence of contact with Roman civilization has been discovered. The stage of civilization indicated is nevertheless not a low one. Besides the implements and weapons of iron there are fibulae and brooches of bronze, weaving combs and spindle-whorls, a bronze mirror and tweezers, wheel-made pottery as well as hand-made, ornamented with Late Celtic patterns, a bowl of thin bronze decorated with bosses, the nave of a wooden wheel with holes for twelve – spokes, and a dug-out canoe. Another site in Holderness, Yorkshire, examined by Mr Boynton in 1881, yielded evidence of fascine construction, with suggestions of occupation in the latter part of the Bronze Age. Similar indications are adduced by Professor Boyd Dawkins from the site on Barton Mere. On the other hand, the implements and weapons found in the Scottish and Irish crannogs are usually of iron, or, if objects of bronze and stone are found, they are commonly such as were in use in the Iron Age. Crannogs are frequently referred to in the Irish annals. Under the year 848 the Annals of the Four Masters record the burning of the island of Lough Gabhor (the crannog of Lagore), and the same stronghold is noticed as again destroyed by the Danes in 933. Under the year 1246 it is recorded that Turlough O'Connor made his escape from the crannog of Lough Leisi, and drowned his keepers. Many other entries occur in the succeeding centuries. In the register of the privy council of

Scotland, April 14, 1608, it is ordered that " the haill houssis of defence, strongholds, and crannokis in the YUis (the western isles) pertaining to Angus M'Conneill of Dunnyvaig and Hector M'Cloyne of Dowart sal be delyverit to His Majestie." Judging from the historical evidence of their late continuance, and from the character of the relics found in them, the crannogs may be included among the latest prehistoric strongholds, reaching their greatest development in early historic times, and surviving through the middle ages. In Ireland, Sir William Wilde has assigned their range approximately to the period between the 9th and 1 6th centuries; while Dr Munro holds that the vast majority of them, both in Ireland and in Scotland, were not only inhabited, but constructed during the Iron Age, and that their period of greatest development was as far posterior to Roman civilization as that of the Swiss Pfahlbauten was anterior to it. (See Lake Dwellings.)

Authorities. — Dr R. Munro, The Lake Dwellings of Europe: being the Rhind Lectures in Archaeology for 1888 (with a bibliography of the subject) (London, 1890); Ancient Scottish Lake-Dwellings or Crannogs (Edinburgh, 1882); Col. W. G. Wood-Martin, The Lake-Dwellings of

Ireland, or Ancient Lacustrine Habitations of Erin, commonly called Crannogs (Dublin, 1886); Sir W. Wilde, Descriptive Catalogue of the A ntiquities in the Museum of the Royal Irish A cademy, article "Crannogs," pp. 220-233 (Dublin, 1857); John Stuart, " Scottish Artificial Islands or Crannogs," in the Proceedings of the Society of Antiquaries of Scotland, vol. vi. (Edinburgh, 1865); A. Bulleid, " The Lake Village near Glastonbury," in Proceedings of the Somersetshire Archaeological Society, vol. xl. (1894). (J. An.)

CRANSAC, a town of southern France, in the department of Aveyron, 28 m. N.W. of Rodezby rail. Pop. (1906) town, 4988; commune, 6953. The town is a coal-mining centre and has cold mineral springs, known in the middle ages. There are iron- mines in the neighbourhood. Hills to the north of the town contain disused coal-mines which have been on fire for centuries. About 5 m. to the south is the fine Renaissance chateau of Bournazel, built for the most part by Jean de Buisson, baron of Bournazel, about 1545- The barony of Bournazel became a marquisate in 1624.

CRANSTON, a city of Providence county, Rhode Island, U.S.A., adjoining the city of Providence on the S. Pop. (1890) 8099; (1900) 13,343; (1910) 21,107; area, 30 sq. m. It is served by the New York, New Haven & Hartford railway. The surface of the E. part is level, that of the W. part is some- what rolling. Within the city are several villages, including Arlington, Auburn, Edgewood, Fiskeville and Oaklawn. The inhabitants of the country districts are engaged largely in the growing of hay, Indian corn, rye, oats and market-garden produce; in the several villages cotton and print goods, fuses for electrical machinery, and automatic fire-protection sprinklers are manufactured. The value of Cranston's factory product increased from $1,402,359 in 1900 to $2,130,969 in 1905, or 52%. The state has a farm of 667 acres in the S. part of the city; on this are the state prison, the Providence county jail, the state workhouse and the house of correction, the state alms- house, the state hospital for the insane, the Sockanosset school for boys, and the Oaklawn school for girls — the last two being departments of the state reform school. The post-office address of all these state institutions is Howard. Cranston was settled as a part of Providence about 1640 by associates of Roger Williams, and in 1754 was incorporated as a separate township, but in 1868, in 1873 and in 1892 portions of it were reannexed to Providence. The township is said to have been named in honour of Samuel Cranston (1659-1727), governor of Rhode Island from 1698 until his death. It was incorporated as a city in 1910.

CRANTOR, a Greek philosopher of the Old Academy, was born,

probably about the middle of the 4th century B.C., at Soli in Cilicia. He was a fellow-pupil of Polemo in the school of Xeno- crates at Athens, and was the first commentator on Plato. He is said to have written some poems which he sealed up and deposited in the temple of Athens at Soli (Diog. Laertius iv. 5- 25). Of his celebrated work On Grief (Hepl Tevdovs), a letter of condolence to his friend Hippocles on the death of his children, numerous extracts have been preserved in Plutarch's Consolatio ad Apollonium and in the De consolatione of Cicero,

who speaks of it (Acad. ii. 44. 135) in the highest terms (aureolus et ad verbum ediscendus). Crantor paid especial attention to ethics, and arranged " good " things in the following order — virtue, health, pleasure, riches.

See F. Kayser,,Z)e Crantore Academico (1841); M. H. E. Meier, Opuscula academica, ii. (1863); F. Susemihl, Ceschichte der griechi- schen Litteratur in der Alexandrinerzeit, i. (1891), p. 118.

CRANWORTH, ROBERT MONSEY ROLFE, Baron (1790- 1868), lord chancellor of England, elder son of the Rev. E. Rolfe, was born at Cranworth, Norfolk, on the 18th of December 1790. Educated at Bury St Edmunds, Winchester, and Trinity College, Cambridge, he was called to the bar at Lincoln's Inn in 18 16, and attached himself to the chancery courts. He repre- sented Penryn and Falmouth in parliament from 1832 till his promotion to the bench as baron of the exchequer in 1839. In 1850 he was appointed a vice-chancellor and created Baron Cranworth, and in 1852 he became lord chancellor in Aberdeen's ministry. He continued to hold the chancellorship in the administration of Palmerston until the latter's resignation in 1857. He was not reappointed when Palmerston returned to office in 1859, but on the retirement of Lord Westbury in 1865 he accepted the great seal for a second time, and held it till the fall of the Russell administration in 1866. Cranworth died in London on the 26th of July 1868. Never a very zealous law reformer, Cranworth's name is associated in the statute book with only one small measure on conveyancing. But as a judge he will continue to hold first rank. His judgments were marked by sound common sense, while he himself was remarkably free from the prejudices of his profession. Few men of his day enjoyed greater personal popularity than Cranworth. He left no issue and the title became extinct on his death.

See The Times, 27th of July 1868; E. Manson, The Builders of our Law (1904) ; E. Foss, The Judges of England (1848-1864) ; J. B. Atlay, Lives of the Chancellors, vol. ii. (1908).

CRAPE (an anglicized version of the Fr. crepe), a silk fabric of a gauzy texture, having a peculiar crisp or crimpy appearance. It is woven of hard spun silk yarn ” in the gum ” or natural condition. There are two distinct varieties of the textile — soft, Canton or Oriental crape, and hard or crisped crape. The wavy appearance of Canton crape results from the peculiar manner in which the weft is prepared, the yarn from two bobbins being twisted together in the reverse way. The fabric when woven is smooth and even, having no crepe appearance, but when the gum is subsequently extracted by boiling it at once becomes soft, and the weft, losing its twist, gives the fabric the waved structure which constitutes its distinguishing feature. Canton crapes are used, either white or coloured, for ladies’ scarves and shawls, bonnet trimmings, &c. The Chinese and Japanese excel in the manufacture of soft crapes. The crisp and elastic structure of hard crape is not produced either in the spinning or in the weaving, but is due to processes through which the gauze passes after it is woven. What the details of these processes are is known to only a few manufacturers, who so jealously guard their secret that, in some cases, the different stages in the manufacture are conducted in towns far removed from each other. Commercially they are distinguished as single, double, three-ply and four-ply crapes, According to the nature of the yarn used in their manufacture. They are almost exclusively dyed black and used in mourning dress, and among Roman Catholic communities for nuns’ veils, &c. In Great Britain hard crapes are made at Braintree in Essex, Norwich, Yarmouth, Manchester and Glasgow. The crape formerly made at Norwich was made with a silk warp and worsted weft, and is said to have afterwards degenerated into bombazine. A very successful imitation of real crape is made in Manchester of cotton yarn, and sold under the name of Victoria crape.

CRASH, a technical textile term applied to a species of narrow towels, from 14 to 20 in. wide. The name is probably of Russian origin, the simplest and coarsest type of the cloth being known as ” Russia crash.” The latter is made from grey flax or tow yarns, and sometimes from boiled yarns. The simple term ” crash ” is given to all these narrow cloths, but the above distinction is very convenient, as also are the following: grey, boiled, bleached,

plain, twilled and fancy crash. A large variety obtains with and without fancy borders, while of late years cotton has been introduced as warp, as well as mixed and jute yarns for weft. After the cloth has

passed through all the finishing operations, it is cut up into lengths of about 3 yds., the two ends sewn together and it is then ready to be placed over a suspended roller; for this reason it is often termed “roller towelling.” (< CRASHAW, RICHARD (1613-1650), English poet, styled ” the divine,” was born in London about 1613. He was the son of a strongly anti-papistical divine, Dr William Crashaw (1572-1626), who distinguished himself, even in those times, by the excessive acerbity of his writings against the Catholics. In spite of these opinions, however, he was attracted by Catholic devotion, for he translated several Latin hymns of the Jesuits. Richard Crashaw was originally put to school at Charterhouse, but in July 1631 he was admitted to Pembroke College, Cambridge, where he took the degree of B.A. in 1634. The publication of Herbert’s Temple in 1633 seems to have finally determined the bias of his genius in favour of religious poetry, and next year he published his first book, Epigrammatum sacrorum liber, a volume of Latin verses. In March 1636 he removed to Peter- house, was made a fellow of that college in 1637, and proceeded M.A. in 1638. It was about this time that he made the acquaint- ance and secured the lasting friendship of Abraham Cowley. He was also on terms of intimacy with the Anglican monk Nicholas Ferrar, and frequently visited him at his religious house at Little Gidding. In 1641 he is said to have gone to Oxford, but only for a short time; for when in 1643 Cowley left Cambridge to seek a refuge at Oxford, Crashaw remained behind, and was forcibly ejected from his fellowship in 1644. In the confusion of the civil wars he escaped to France, where he finally embraced the Catholic religion, towards which he had long been tending.

During his exile his religious and secular poems were collected by an anonymous friend, and published under the title of Steps to the Temple and The Delights of the Muses, in one volume, in 1646. The first part includes the hymn to St Teresa and the version of Marini’s Sospetto d’ Herode. This same year Cowley found him in great destitution at Paris, and induced Queen Henrietta Maria to extend towards him what influence she still possessed. At her introduction he proceeded to Italy, where he became attendant to Cardinal Palotta at Rome. In 1648 he published two Latin hymns at Paris. He remained until 1649 in the service of the cardinal, to whom he had a great personal attachment; but his retinue contained persons whose violent and licentious behaviour was a source of ceaseless vexation to the sensitive English mystic. At last his denunciation of their excesses became so public that the animosity of those persons was excited against him, and in order to shield him from their revenge he was sent by the cardinal in 1650 to Loretto, where he was made a canon of the

Holy House. In less than three weeks, however, he sickened of fever, and died on the 2 5th of August, not without grave suspicion of having been poisoned. He was buried in the Lady chapel at Loretto. A collection of his religious poems, entitled Carmen Deo nostro, was brought out in Paris in 1652, dedicated at the dead poet's desire to the faithful friend of his sufferings, the countess of Denbigh. The book is illustrated by thirteen engravings after Crashaw's own designs.

Crashaw excelled in all manner of graceful accomplishments; besides being an excellent Latinist and Hellenist, he had an intimate knowledge of Italian and Spanish ; and his skill in music, painting and engraving was no less admired in his lifetime than his skill in poetry. Cowley embalmed his memory in an elegy that ranks among the very finest in our language, in which he, a Protestant, well expressed the feeling left on the minds of contemporaries by the character of the young Catholic poet: —

"His faith, perhaps, in some nice tenets might Be wrong; his life, I'm sure, was in the right: And I, myself, a Catholic will be, So far at least, dear saint, to pray to thee ! "

The poetry of Crashaw will be best appreciated by those who can with most success free themselves from thebondage of a traditional

sense of the dignity of language. The custom of his age permitted the use of images and phrases which we now justly condemn as incongruous and unseemly, and the fervent fancy of Crashaw carried this licence to excess. At the same time his verse is studded with fiery beauties and sudden felicities of language, unsurpassed by any lyrist between his own time and Shelley's. There is no religious poetry in English so full at once of gross and awkward images and imaginative touches of the most ethereal beauty. The temper of his intellect seems to have been delicate and weak, fiery and uncertain; he has a morbid, almost hysterical, passion about him, even when his ardour is most exquisitely expressed, and his adoring addresses to the saints have an effeminate falsetto that makes their ecstasy almost repulsive. The faults and beauties of his very peculiar style can be studied nowhere to more advantage than in the Hymn to Saint Teresa. Among the secular poems of Crashaw the best are Music's Duel, which deals with that strife between the musician and the night- ingale which has inspired so many poets, and Wishes to his supposed Mistress. In his

latest sacred poems, included in the Carmen Deo noslro, sudden and eminent beauties are not wanting, but the mysticism has become more pronounced, and the ecclesi- astical mannerism more harsh and repellent. The themes of Crashaw's verses are as distinct as possible from those of Shelley's, but it may, on the whole, be said that at his best moments he reminds the reader more closely of the author of Epipsychidion than of any earlier or later poet.

Crashaw's works were first collected, in one volume, in 1858 by VV. B. Turnbull. In 1872 an edition, in 2 volumes, was printed for private subscription by the Rev. A. B. Grosart. A complete edition was edited (1904) for the Cambridge University Press by Mr A. R. Waller. (E. G.)

CRASSULACEAE, in botany, a natural order of dicotyledons, containing 13 genera and nearly 500 species; of cosmopolitan distribution, but most strongly developed in South Africa. The plants are herbs or small shrubs, generally with thick fleshy stems and leaves, adapted for life in dry, especially rocky places. The fleshy leaves are often reduced to a more or less cylindrical structure, as in the stonecrops (Sedum), or form closely crowded rosettes as in the house-leek (Sempervivum). Correlated with their life in dry situations, the bulk of the tissue is succulent, forming a water-store, which is protected from loss by evapora- tion by a thickly cuticularized epidermis covered with a waxy secretion which gives a glaucous appearance to the plant. The flowers are generally arranged in terminal or axillary clusters, and are markedly regular with the same number of parts in each series. This number is, however, very variable, and often not

Stonecrop (Sedum acre) slightly reduced. I , Horizontal plan of arrangement of flower of stonecrop ; 2, flower of Sedum rubens.

constant in one and the same species. The sepals and petals are free or more or less united, the stamens as many or twice as many as the petals; the carpels, usually free, are equal to the petals in number, and form in the fruit follicles with two or more seeds.

Opposite each carpel is a small scale which functions as a nectary. Means of vegetative propagation are general. Many species spread by means of a creeping much-branched rootstock, or as in house-leek, by runners which perish after producing a terminal leaf-rosette. In other cases small portions of the stem or leaves give rise to new plants by budding, as in Bryophyllum, where buds develop at the edges of the leaf and form new plants.

The order is almost absent from Australia and Polynesia, and has but few representatives in South America; it is otherwise very generally distributed. The largest genus, Sedum, contains about 140 species in the temperate and colder parts of the northern hemisphere; eight occur wild in Britain, including S. Telephium (orpine) and S. acre (common stonecrop) (see fig.). The species are easily cultivated and will thrive in almost any soil. They are readily propagated by seeds, cuttings or divisions. Crassula has about 100 species, chiefly at the Cape. Cotyledon, a widely distributed genus with about 90 species, is represented in the British Isles by C. Umbilicus, pennywort, or navelwort, which takes its name from the succulent peltate leaves. It grows profusely on dry rocks and walls, especially on the western coasts, and bears a spike of drooping greenish cup-shaped flowers. The Echeveria of gardens is now included in this genus. Semper- vivum has about 50 species in the mountains of central and southern Europe, in the Himalayas, Abyssinia, and the Canaries and Madeira; S. tectorum, common house-leek, is seen often growing on tops of walls and house-roofs. The hardy species will grow well in dry sandy soil, and are suitable for rockeries,old walls or edgings. They are readily propagated by offsets or by seed.

The order is closely allied to Saxifragaceae, from which it is distinguished by its fleshy habit and the larger number of carpels.

CRASSUS (literally ” dense,” ” thick,” ” fat “), a family name in the Roman gens Licinia (plebeian). The most important of the name are the following:

1. Ptjblius Licinius Crasstjs, surnamed Dives Mucianus, Roman statesman, orator and jurist, consul, 131 B.C. He was the son of P. Mucius Scaevola (consul 175) and was adopted by a P. Licinius Crassus Dives. An intimate friend of Tiberius Gracchus, he was chosen after his death to take his place on the agrarian commission (see Gracchus). In 131 when Crassus was consul with L. Valerius Flaccus, Aristonicus, an illegitimate son of Eumenes II. of Pergamum, laid claim to the kingdom, which had been bequeathed by Attalus III. to Rome. Both consuls were anxious to obtain the command against him; Crassus was pontifex maximus, and Flaccus a flamen of Mars. Crassus declared that Flaccus could not neglect his sacred office, and im- posed a conditional fine on him in the event of his leaving Rome. The popular assembly remitted the fine, but Flaccus was ordered to obey the pontifex maximus. Crassus accordingly proceeded to Asia, although in doing so he violated the rule which forbade the pontifex maximus to leave Italy. Nothing is known of his military operations. But in the following year, when he was making preparations to return,

he was surprised near Leucae. He was himself taken prisoner by a Thracian band, and provoked his captors, who were ignorant of his identity, to put him to death. Crassus does not seem to have possessed much military ability, but he was greatly distinguished for his knowledge of law and his accomplished oratory. He had acquired such a mastery of the Greek language that, when he presided over the courts in Asia, he was able to answer each suitor in ordinary Greek or any of the dialects in use.

Cicero, De oratore, i. 50; Philippics, xi. 8; Plutarch, Tib. Gracchus, 21; Livy, Epit. 59; Val. Max. iii. 2. 12, viii. 7. 6; Veil. Pat. ii. 4; Justin xxxvi. 4; Orosius v. 10.

2. Lucius Licinius Crassus (140-01 B.C.), the orator, of unknown parentage. At the age of nineteen (or twenty-one) he made his reputation by a speech against C. Papirius Carbo, the friend of the Gracchi. The law passed by him and his colleague Q. Mucius Scaevola during their consulship (95), to prevent those passing as Roman citizens who had no right to the title, was one of the prime causes of the Social War (Cicero, Pro Balbo, xxi., De officiis, iii. 11). During his censorship Crassus suppressed the newly founded schools of Latin rhetoricians (Aulus Gellius

xv. 11). He died from excitement caused by his passionate speech against the consul L. Marcius Philippus, who had insulted the Senate. Crassus is one of the chief speakers in the De oratore of Cicero, who has also preserved a few fragments of his speeches.

3. Publius Licinius Crassus, called Dives, father of the triumvir. Little is known of him before he became consul in 97, except that he proposed a law regulating the expenses of the table, which met with general approval. During his consulship the practice of magic arts was condemned by a decree of the senate, and human sacrifice was abolished. He was subsequently governor of Spain for some years, during which he gained several successes over the Lusitanians, and on his return in 93 was honoured with a triumph. After the Social War, as censor with L. Julius Caesar, he had the task of enrolling in new tribes certain of the Latins and Italians as a reward for their loyalty to the Romans, but the proceedings seem to have been interrupted by certain irregularities. They also forbade the introduction of foreign wines and unguents. Crassus committed suicide in 87, to avoid falling into the

hands of the Marian party.

Plutarch, Crassus, 4; Aulus Gellius ii. 24; Macrobius, Saturnalia, ii. 13; Livy, Epit. 80; Pliny, Nat. Hist. xxx. 3; Appian, Bell. Civ. i. 72 ; Festus, under Referri.

4. Marcus Licinius Crassus (c. 115-53 B.C.), the Triumvir, surnamed Dives (rich) on account of his great wealth. His wealth was acquired by traffic in slaves, the working of silver mines, and judicious purchases of lands and houses, especially those of proscribed citizens. The proscription of Cinna obliged him to flee to Spain; but after Cinna's death he passed into Africa, and thence to Italy, where he ingratiated himself with Sulla. Having been sent against Spartacus, he gained a decisive victory, and was honoured with a minor triumph. Soon after- wards he was elected consul with Pompey, and (70) displayed his wealth by entertaining the populace at 10,000 tables, and distributing sufficient corn to last each family three months. In 65 he was censor, and in 60 he joined Pompey and Caesar in the coalition known as the' first triumvirate. In 55 he was again consul with Pompey, and a law was passed, assigning the provinces of the two Spains and Syria to the two consuls for five years. Crassus was satisfied with Syria, which promised to be an inexhaustible source of wealth. Having crossed the Euphrates he hastened to make himself master of Parthia; but he was defeated at Carrhae (53 B.C.) and taken prisoner by Surenas, the Parthian general, who put him to death by pouring molten gold down his throat. His head was cut off and sent to Orodes, the Parthian king. Crassus was a man of only moderate abilities, and owed his importance to his great wealth.

See Plutarch's Life; also Caesar-j Gaius Julius; Pompey; Rome: History, II. " The Republic."

CRATER, the cavity at the mouth of a volcanic duct, usually funnel-shaped or presenting the form of a bowl, whence the name, from the Gr. Kparrip, a bowl. A volcanic hill may have a single crater at, or near, its summit, or it may have several minor craters on its flanks: the latter are sometimes called " adventitious craters " or " craterlets." Much of the loose ejected material, falling in the neighbourhood of the vent, rolls down the inner wall of the crater, and thus produces a stratification with an inward dip. The crater in an active volcano is kept open by intermittent explosions, but in a volcano which has become dormant or extinct the vent may become plugged, and the bowl- shaped cavity may subsequently be filled with water, forming a crater-lake, or as it is called in the Eifel a Maar. In some basaltic cones, like those of the Sandwich Islands, the crater may be a broad

shallow pit, having almost perpendicular walls, with horizontal stratification. Such hollows are consequently called pit-craters. The name caldera (Sp. for cauldron) was suggested for such pits by Capt. C. E. Dutton, who regarded them as having been formed by subsidence of the walls. The term caldera is often applied to bowl-shaped craters in Spanish- speaking countries. (See Volcano.)

CRATES, Athenian actor and author of comedies, flourished about 470 B.C. He was regarded as the founder of Greek comedy proper, since he abandoned political lampoons on individuals, and introduced more general subjects and a well-developed plot

(Aristotle, Poetica, 5). He is stated to have been the first to represent the drunkard on the stage (Aristophanes, Knights,

37 ff.)-

Fragments in Meineke, Poetarum Comicorum Graecorum frag- menta, i.

CRATES, the name of two Greek philosophers.

1. Crates, of Athens, successor of Polemo as leader of the Old Academy.

2. Crates, of Thebes, a Cynic philosopher of the latter half of the 4th century. He was the famous pupil of Diogenes, and the last great representative of Cynicism. It is said that he lost his ample fortune owing to the Macedonian invasion, but a more probable story is that he sacrificed it in accordance with his principles, directing the banker, to whom he entrusted it, to give it to his sons if they should prove fools, but to the poor if his sons should prove philosophers. He gave up his life to the attainment of virtue and the propagation of ascetic self-control. His habit of entering houses for this purpose, uninvited, earned him the nickname QvperavolKT7]s (" Door-opener "). His marriage with Hipparchia, daughter of a wealthy Thracian family, was in curious contrast to the prosaic character of his life. Attracted by the nobility of his character and undeterred by his poverty and ugliness, she insisted on becoming his wife in defiance of her father's commands. The date of his death is unknown, though he seems to have lived into the 3rd century. His writings were few. According to Diogenes Laertius, he was the author of a number of letters on philosophical subjects; but those extant under the name of Crates (R. Hercher, Epistolographi Graeci, 1873) are, spurious, the work of later rhetoricians. Diogenes Laertius credits him with a short poem,

Haiyvia, and several philosophic tragedies. Plutarch's life of Crates is lost. The great importance of Crates' work is that he formed the link between Cynicism and the Stoics, Zeno of Citium being his pupil.

See N. Postumus, De Cratete Cynico (1823) ; F. Mullach, Frag. Philosophorum Graecorum, ii. (1867); E. Wellmann in Ersch and Gruber's Allgemeine Encyklopadie ; Diog. Laert. vi. 85-93, 96-98.

CRATES, of Mallus in Cilicia, a Greek grammarian and Stoic philosopher of the 2nd century B.C., leader of the literary school and head of the library of Pergamum. His principles were opposed to those of Aristarchus, the leader of the Alexandrian school. He was the chief representative of the allegorical theory of exegesis, and maintained that Homer intended to express scientific or philosophical truths in the form of poetry. About 170 B.C. he visited Rome as ambassador of Attalus II., king of Pergamum; and having broken his leg and been compelled to stay there for some time, he delivered lectures which gave the first impulse to the study of grammar and criticism among the Romans (Suetonius, De grammaticis, 2). His chief work was a critical and exegetical commentary on Homer.

See C. Wachsmuth, De Cratete Mallota (i860), containing an account of the life, pupils and writings of Crates; J. E. Sandys, Hist, of Class. Schol. i. 156 (ed. 2, 1906).

CRATINUS (c. 520-423 B.C.), Athenian comic poet, chief representative of the old, and founder of political, comedy. Hardly anything is known of his life, and only fragments of his works have been preserved. But a good idea of their character can be gained from the opinions of his contemporaries, especially Aristophanes. His comedies were chiefly distinguished by their direct and vigorous political satire, a marked exception being the burlesque '08vcro-e?s, dealing with the story of Odysseus in the cave of Polyphemus, probably written while a law was in force forbidding all political references on the stage. They were also remarkable for the absence of the parabasis and chorus. Persius calls the author " the bold," and even Pericles at the height of his power did not escape his vehement attacks, as in the Nemesis and Archilochi, the last-named a lament for the loss of the recently deceased Cimon, with whose conservative sentiments Cratinus was in sympathy. The Panoptae was a satire on the sophists and omniscient speculative philosophers of the day. Of his last comedy the plot has come down to us. It was occasioned by the sneers of Aristophanes and others, who declared that he was no better than a doting drunkard. Roused by the taunt, Cratinus put forth all his strength, and in 423 B.C. produced the Hvrivri,

or Bottle, which gained the first prize over the Clouds of Aristophanes. In this comeaV, good-humouredly making fun of his own weakness, Cratinus represents the comic muse as the faithful wife of his youth. His guilty fondness for a rival — the bottle — has aroused her jealousy. She demands a divorce from the archon; but her husband's love is not dead and he returns penitent to her side. In Grenfell and Hunt's Oxyrhynchus Papyri, iv. (1904), containing a further instalment of their edition of the Behnesa papyri discovered by them in 1896-189 7, one of the greatest curiosities is a scrap of paper bearing the argument of a play by Cratinus, — the Dionysalexandros {i.e. Dionysus in the part of Paris), aimed against Pericles; and the epitome reveals something of its wit and point. The style of Cratinus has been likened to that of Aeschylus ; and Aristophanes, in the Knights, compares him to a rushing torrent. He appears to have been fond of lofty diction and bold figures, and was most successful in the lyrical parts of his dramas, his choruses being the popular festal songs of his day. According to the statement of a doubtful authority, which is not borne out by Aristotle, Cratinus increased the number of actors in comedy to three. He wrote 21 comedies and gained the prize nine times.

Fragments in Meineke, Fragmenta Comicorum Graecorum, or Kock, Comicorum Atticorum fragmenta. A younger Cratinus flourished in the time of Alexander the Great. It is considered that some of the comedies ascribed' to the elder Cratinus were really the work of the younger.

CRATIPPUS (fl. c. 375 B.C.), Greek historian. There are only three or four references to him in ancient literature, and his importance is due to the fact that he has been identified by several scholars {e.g. Blass) with the author of the historical fragment discovered by Grenfell and Hunt, and published by them in Oxyrhynchus Papyri, vol. v. It may be regarded as a fairly certain inference from # a passage in Plutarch {De Gloria Athe- niensium, p. 345 e, ed. Bernardakis, ii. p. 455) that he was an Athenian writer, intermediate in date between Thucydides and Xenophon, and that his work continued the narrative of Thucy- dides, from the point at which the latter historian stopped (410 B.C.) down to the battle of Cnidus (394 B.C.).

The fragments are published in C. Muller' sFragmentaHistoricorum Graecorum. For authorities see under Theopompus.

CRATIPPUS, of Mitylene (1st century B.C.), Peripatetic philosopher, contemporary with Cicero, whose son he taught at Athens, and by whom he is praised in the De officiis as the greatest of his school. He was the friend of Pompey also and shared his flight after the battle of Pharsalia, for the purpose, it is said, of convincing him of the justice of providence. Brutus, while at Athens after the assassination of Caesar, attended his lectures. The freedom of Rome was conferred upon him by Caesar, at the request of Cicero. The only work attributed to him is a treatise on divination, but his reputation may be gauged by the fact that in 44 b.c the Areopagus invited him to succeed Andronicus of Rhodes as scholarch. He seems to have held that, while motion, sense and appetite cannot exist apart from the body, thought reaches its greatest power when most free from bodily influence, and that divination is due to the direct action of the divine mind on that faculty of the human soul which is not dependent on the body.

Cicero, De divinatione, i. 3, 32, 50, ii. 48, 52 ; De officiis, i. I, iii. 2 ; Plutarch, Cicero, 24.

CRAU (from a Celtic root meaning ” stone “), a region of southern France, comprised in the department of Bouches-du- Rhone, and bounded W. by the canal from Aries to Port du Bouc and the Rhone, N. by the chain of the Alpines separating it from an analogous region, the Petite Crau, E. by the hills around Salon and Istres, S. by the gulf of Fos, an inlet of the Mediter- ranean Sea. Covering an area of about 200 sq. m., the Crau is a low-lying, waterless plain, owing its formation to a sudden inundation, according to some authorities, of the Rhone and the Durance, according to others of the Durance alone. Its surface is formed chiefly of stones varying in size from an egg to a man’s head; these, mixed with a proportion of fine soil, overlie a subsoil formed of stones cemented into a hard mass by deposits of calcareous mud, beneath which lies a bed of loose stones, once the

sea-bed. Naturally sterile and poor in lime, the Crau is adapted for agriculture by the process of warping, carried out by means of the Canal de Craponne, which dates from the middle of the 16th century; about one-quarter of the region in the north and east has thus been covered by the rich deposits of the waters of the Durance. The soil also responds in places to deep cultivation and the application of artificial manures. By these aids, un- cultivated land, which before supplied only rough and scanty pasture for a few sheep, has been fitted for the growth of the vine, olive and other fruits; where irrigation is practicable, water- meadows have been formed. The dryness of the climate is unfavourable to the production of cereals.

CRAUCK, GUSTAVE (1827-1905), French sculptor, was born and died at Valenciennes, where a special museum for his works was erected in his honour. Though little known to the world at large during his long life, he ranks among the best modern sculptors of France. At Paris his ” Coligny ” monument is in the rue de Rivoli; his ” Victory ” in the Place des Arts et Metiers; and ” Twilight ” in the Avenue de l’Observatoire. Among his finest works is his ” Combat du Centaure,” on which he was engaged for thirty years, the figure of the Lapith having been modelled after the athlete, Eugene Sandow. In 1907 an exhibi- tion of his works was held in the Ecole des Beaux-Arts.

CRAUFURD, QUINTIN (1743-1819), British author, was born at Kilwinnock on the 22nd of September 1743. In early life he went to India, where he entered the service of the East India Company. Returning to Europe before the age of forty with a handsome fortune, he settled in Paris, where he gave himself to the cultivation of literature and art, and formed a good library and collection of paintings, coins and other objects of antiquarian interest. Craufurd was on intimate terms with the French court especially with Marie Antoinette, and was one of those who arranged the flight to Varennes. He escaped to Brussels, but in 1792 he returned to Paris in the hope of rescuing the royal prisoners. He lived among the French emigre’s until the peace of Amiens made it possible to return to Paris. Through Talley- rand’s influence he was able to remain in Paris after the war was renewed, and he died there on the 23rd of November 1819.

He wrote, among other works, The History, Religion, Learning and Manners of the Hindus (I 790) , Secret History of the King of France and his Escape from Paris (first published in 1885), Researches con- cerning the Laws, Theology, Learning and Commerce of Ancient and Modern India (18 17), History of the Bastille (1798), On Pericles and the Arts in Greece (1815), Essay on Swift and his Influence on the British Government (1808), Notice sur Marie Antoinette, (1809), Memoires de Mme du Hausset (1808).

CRAUFURD, ROBERT (1764-1812), British major-general, was born at Newark, Ayrshire, on the 5th of May 1764, and entered the 25th Foot in 1779. As captain in the 75th regiment he first saw active service against Tippoo Sahib in 1 790-92. The next year he was employed, under his brother Charles, with the Austrian armies operating against the French. Returning to England in 1797, he soon saw further service, as a lieutenant- colonel, on Lake’s staff in the Irish rebellion. A year later he was British commissioner onSuvarov’s staff when the Russians invaded Switzerland, and at the end of 1799 was in the Helder expedition. From 1 801 to 1805 Lieutenant-Colonel Craufurd

sat in parliament for East Retford, but in 1807 he resumed active service with Whitelock in the unfortunate Buenos Aires expedition. He was almost the only one of the senior officers who added to his reputation in this affair, and in 1808 he received a brigade command under Sir John Moore. His regiments were heavily engaged in the earlier part of the famous retreat, but were not present at Corunna, having been detached to Vigo, whence they returned to England. Later in 1809, once more in the Peninsula, Brigadier- General Craufurd was three marches or more in rear of Wellesley's army when a report came in that a great battle was in progress. The march which followed is one almost un- paralleled in military annals. The three battalions of the " Light Brigade " (43rd, 52nd and 95th) started in full marching order, and arrived at the front on the day after the battle of Talavera, having covered 62 m. in twenty-six hours. Beginning their career with this famous march, these regiments and their

chief, under whom served such men as Charles and William Napier, Shaw and Colborne, soon became celebrated as one of the best corps of troops in Europe, and every engagement added to their laurels. Craufurd's operations on the Coa and Agueda in 1810 were daring to the point of rashness, but he knew the quality of the men he led better than his critics did, and though Wellington censured him for his conduct, he at the same time increased his force to a division by the addition of two picked regiments of Portuguese Cacadores. The conduct of the renowned " Light Division " at Busaco is described by Napier in one of his most vivid passages. The winter of 1810-1811 Craufurd spent in England, and his division was commanded in the interim by another officer, who did not display much ability. He reappeared on the field of the battle of Fuentes d'Onoro amidst the cheers of his men, and nothing could show his genius for war better than his conduct on this day, in covering the strange readjustment of his line which Wellington was compelled to make in the face of the enemy. A little later he obtained major-general's rank;- and on the 19th of January 181 2, as he stood on the glacis of Ciudad Rodrigo, directing the stormers of the Light Division, he fell mortally wounded. His body was carried out of action by his staff officer, Lieutenant Shaw of the 43rd (see Shaw Kennedy), and, after lingering four days, he died. He was buried in the breach of the fortress where he had met his death, and a monument in St Paul's cathedral commemorates Craufurd and Mackinnon, the two generals killed at the storming of Ciudad Rodrigo. The exploits of Craufurd and the Light Division are

amongst the most cherished traditions of the British and Portuguese armies.. One of the quickest and most brilliant, if not the very first, of Wellington's generals, he had a fiery temper, which rendered him a difficult man to deal with, but to the day of his death he possessed the confidence and affection of his men in an extraordinary degree.

His elder brother, Lieutenant-General Sir Charles Craufurd (1761-1821), entered the 1st Dragoon Guards in 1778. Made captain in the Queen's Bays in 1785, he became the equerry and intimate friend of the duke of York. He studied in Germany for some time, and, with his brother Robert's assistance, translated Tielcke's book on the Seven Years' War {The Remarkable Events of the War between Prussia, Austria and Russia from 1756 to 1763). As aide-de-camp he accompanied the duke of York to the French War in 1793, and was at once sent as commissioner to the Austrian headquarters, with which he was present at Neerwinden, Caesar's Camp, Famars, Landrecies, &c. Major in 1793, and lieutenant-colonel in 1794, he returned to the English army in the latter year, and on one occasion distinguished himself at the head of two squadrons, taking 3 guns and 1000 prisoners. When the British army left the continent Craufurd was again attached to the Austrian army, and was present at the actions on the Lahn, the combat of Neumarkt, and the battle of Amberg. At the last battle a severe wound rendered him incapable of further service, and cut short a promising career. He succeeded his brother Robert as member of parliament for East Retford (1806- 1812). He died in 1821, having become a lieutenant-general and aG.C.B.

CRAVAT (from the Fr. cravate, a corruption of " Croat "), the name given by the French in the reign of Louis XIV. to the scarf worn by the Croatian soldiers enlisted in the royal Croatian regiment. Made of linen or muslin with broad edges of lace, it became fashionable, and the name was applied both in England and France to various forms of neckerchief worn at different times, from the loosely tied lace cravat with long flowing ends, called a " Steinkirk " from the battle of 1692 of that name, to the elaborately folded and lightly starched linen or cambric neckcloth worn during the period of Beau Brummell.

CRAVEN, PAULINE MARIE ARMANDE AGLAE (1808- 1891), French author, the daughter of an emigre' Breton nobleman, was born in London on the 12th of April 1808. Her father, the comte Auguste de la Ferronays, was a close friend of the due de Berri, whom he accompanied on his return to France in 1814. He and his wife were attached to the court of Charles X. at the Tuileries, but a momentary quarrel with the due de Berri made

retirement imperative to the count's sense of honour. He was appointed ambassador at St Petersburg, and in 1827 became foreign minister in Paris. Pauline was thus brought up in brilliant surroundings, but her strongest impressions were those which she derived from the group of Catholic thinkers gathered round Lamennais, and her ardent piety furnishes the key of her life. In 1828 her father was sent to Rome, and Pauline, at the suggestion of Alexis Rio, the art critic, made her first literary essay with a description of the emotions she experienced on a visit to the catacombs. At the revolution of July, M. de la Ferronays resigned his position, and retired with his family to Naples. Here Pauline met her future husband, Augustus Craven, who was then attache to the British embassy. His father, Keppel Richard Craven, the well-known supporter of Queen Caroline, objected to his son's marriage with a Catholic; but his scruples were overcome, and immediately after the marriage (1834) Augustus Craven was received into the Roman Catholic Church. Mrs Craven, whose family life as revealed in the Ricit d'une sozur was especially tender and intimate, suffered several severe bereavements in the years following on her marriage. The Cravens lived abroad until 1851, when the death of Keppel Craven made his son practically independent of his diplomatic career, in which he had not been conspicuously successful. He stood unsuccessfully for election to parliament for Dublin in 1852, and from that time retired into private life. They went to live at Naples in 1853, and Mrs Craven began to write the history of the family life of the la Ferronays between 1830 and 1836, its Incidents being grouped round the love story of her brother Albert and his wife Alexandrine. This book, the Ricit d'une sozur (1866, Eng. trans. 1868), was enthusiastically received and was awarded a prize by the French Academy. Straitened circumstances made it desirable for Mrs Craven to earn money by her pen. Anne Severin appeared in 1868, Fleurange in 1871, Le Mot d'enigme in 1874, Le Valbriant (Eng. trans., Lucia) in 1886. Among her miscellaneous works may be mentioned La Sozur 'Natalie Narischkin (1876), Deux Incidents de la question catholique en Angleterre (1875), Lady Georgiana Fullerton, sa vie et ses ceuvres (1888). Mrs Craven's charming personality won her many friends. She was a frequent guest with Lord Palmerston, Lord Ellesmere and Lord Granville. She died in Paris on the 1st of April 1891. Her husband, who died in 1884, translated the correspondence of Lord Palmerston and of the Prince Consort into French.

See Memoir of Mrs Augustus Craven (1894), by her friend Mrs Mary Catherine Bishop ; also Paolina Craven, by T. F. Ravaschieri Fieschi (i892) ; There is a biography of Mrs Craven's father, " En Emigration,"

in Etienne Lamy's Temoins des jours passes (1907).

CRAVEN, WILLIAM CRAVEN, Earl of (1608-1697), eldest son of Sir William Craven, lord mayor of London, and of Elizabeth, daughter of Alderman William Whitmore, was born in June 1608, matriculated at Trinity College, Oxford, in 1623, and joined the society of the Middle Temple in 1624. He had already inherited his father's vast fortune by the latter's death in 1618, and before he came of age he had distinguished himself in the military service of the princes of Orange. Returning home he was knighted and created Baron Craven of Hampstead Marshall in Berkshire in 1627. He early showed enthusiasm for the cause of the unfortunate king and queen of Bohemia, driven from their dominions, and in 1632 joined Frederick in a military expedition to recover the Palatinate, meeting Gustavus Adolphus at Hochst, whose praise he gained by being the first, though wounded, to mount the breach at the capture of Kreuznach on the 22nd of February. The Swedish king, however, refused to allow the elector an independent command for the defence of the Palatinate, and Craven returned to England. In May 1633 he was placed on the council of Wales. In 1637 he took part in a second expedition in aid of the palatine family on the Lower Rhine, with the young elector Charles Louis and his brother Rupert, and offered as a contribution the sum of £30,000, but their forces were defeated near Wessel and Craven wounded and taken prisoner together with Rupert. He purchased his freedom in 1639, and then joined the small court of the exiled queen

Elizabeth at the Hague and at Rhenen, supplying her generously with funds on the cessation of her English pension owing to the outbreak of the Civil War. He contributed also large sums in aid of Charles I., and, after his execution, of Charles II., the amount bestowed upon the latter being alone computed at £50,000/ notwithstanding that since 1651 the greater part of his estates had been confiscated by the parliament and his house at Caversham reduced to ruins. 2 At the Restoration he accompanied Charles to England, regained his estates, and was rewarded with offices and honours. He was made colonel of several regiments including 'the Coldstream, and in 1667 lieutenant-general and also high steward of Cambridge University. In 1666 he became a privy councillor, but was not included later in 1679 in Sir William Temple's remodelled council. 3 In 1668 he became a governor of the Charterhouse, was appointedlord-lieu tenant of Middlesex, and master

of the Trinity House in 1670; and in 1673 a commissioner for Tangier. He was one of the lords proprietors of Carolina and a member of the Fishery Committee.

In March 1664 he was created viscount and earl of Craven. Meanwhile his devotion to the interests of the queen of Bohemia was unceasing, and on her return to England he offered her hospitality at his house in Drury Lane, where she remained till February 1662. At her death, within a fortnight afterwards, she bequeathed to Craven her papers and her valuable collection of portraits, but there is no foundation for the belief entertained later that she had married him. In 1682 he became the guardian of Ruperta, the natural daughter of his old comrade in arms, Prince Rupert. He was again made a privy councillor and lieutenant-general of the forces by James on his accession, and at the age of eighty was in command of the Coldstreams at Whitehall on the 17th of December 1688 when the Dutch troops arrived. He refused to withdraw them at the bidding of Count Solms, the Dutch commander, but obeyed later James's own orders to retire. His public career now closed and he filled no office after the revolution. Although his claims upon the gratitude of the Stuart royal family were immense, Craven had never been considered a possible candidate for high political place. His ability was probably small, and he is spoken of with little respect in the Verney Papers and by the electress Sophia in her Memoirs. The latter retails some foolish observations made by Craven, and Pepys was disgusted at his coarse and stupid jests at the Fishery Board, where his " very confused and very ridiculous proceedings " are also censured. 4 His military prowess, however, his generosity and his public spirit are undoubted. He showed great activity during the plague and fire of London. He was a patron of letters and a member of the Royal Society. He inherited Combe Abbey near Coventry from his father, and purchased Hampstead Marshall in Berkshire, where he built a house on the model of Heidelberg Castle.

He died unmarried on the 9th of April 1697, when the earldom became extinct, the barony passing by special remainder to his cousin William, 2nd Baron Craven; the present earl of Craven (the earldom being revived in 1801) is descended from John, a younger brother of the latter. The first Lord Craven's brother John, who was created Baron Craven of Ryton in Shropshire and who died in 1648, was the founder of the Craven scholarships at Oxford and Cambridge universities, of which the first was awarded in 1649.

Bibliography. — See the article in the Diet, of Nat. Biography (and Errata) ; Lives of the Princesses of England (Elizabeth, eldest daughter of James I.), vol. vi., by M. A. E. Green (1854); Memoirs of Elizabeth

Stuart, by Miss Benger (1825) ; Memoiren der Herzogin Sophie, ed. by A. Kocher in Publ. aus den k. preussischen Staats- archiven, Bd. iv. (1879) ; " Briefe der Elisabeth Stuart " in Bibliothek des Utterarischen Vereins (Stuttgart, 1903), 155, 157; G. E. C.'s Complete Peerage (1889), ii. 404; Lives and Characters of the Most Illustrious Persons (1713), p. 546; Macaulay's Hist, of England, ii. 584 (1858); Verney Papers (Camden Soc, 1853); Cal. of St. Pap. Dom. ; Tracts relating to the confiscation of his estate in Cat. of the British Museum. Much information also doubtless exists in the Craven MSS. at Combe Abbey. (P. C. Y.)

1 Verney Papers, 189 note. 2 Evelyn's Diary, June 8th, 1654.

3 Hist. MSS. Com.: Various Collections, ii. 394.

4 Diary, Oct. 18th and Nov. 18th, 1664, and March 10th, 1665.

CRAWFORD, EARLS OF. The house of Lindsay, of which the earl of Crawford is the head, traces its descent back to the barons of Crawford who flourished in the 12 th century, and has included a number of men who have played leading parts in the history oi Scotland. It is said that " though other families in Scotland may have been of more historic, none can in genealogical importance equal that of Lindsay," and the Lindsays claim that " the pre- decessors of the 1 st earl of Crawford were barons at the period oi the earliest parliamentary records, and that, in fact, they were never enrolled in the modern sense of the term, but were among the pares, of which kings are primi, from the commencement oi recorded history." Again we are told, " the earldom of Crawford, therefore, like those of Douglas, of Moray, Ross, March and others of the earlier times of feudalism, formed a petty principality, an imperium in imperio." Moreover, the earls " had also a concilium, or petty parliament, consisting of the great vassals of the earldom, with whose advice they acted on great and important occasions."

Sir James Lindsay (d. 1396), 9th lord of Crawford in Lanark- shire, was the only son of Sir James Lindsay, the 8th lord (d. c. 1357), and was related to King Robert II.; he was descended from Sir Alexander Lindsay of Luffness (d. 1309), who obtained Crawford and other estates in 1 297 and who was high chamberlain of Scotland. The 9th lord fought at Otterburn, and Froissart tells of his wanderings after the fight. He was succeeded by his cousin, Sir David Lindsay (c. 1360-1407), son of Sir Alexander Lindsay of Glenesk (d. 1382), and in 1398 Sir David, who married a daughter of Robert II., was made earl of Crawford. •

The most important of the early earls of Crawford are the 4th and the 5th earls. Alexander Lindsay, the. 4th earl (d. 1454), called the ” tiger earl,” was, like his father David the 3rd earl, who was killed in 1446, one of the most powerful of the Scottish nobles; for some time he was in arms against King James II., but he submitted in 1452. His son David, the 5th earl (c. 1440- 1495), was lord high admiral and lord chamberlain; he went frequently as an ambassador to England and was created duke of Montrose in 1488, but the title did not descend to his son. Montrose fought for James III. at the battle of Sauchieburn, and his son John, the 6th earl (d. 1513), was slain at Flodden.

David Lindsay, 8th earl of Crawford (d. 1542), son of Alexander, the 7th earl (d. 1517), had a son Alexander, master of Crawford (d. 1542), called the ” wicked master,” who quarrelled with his father and tried to kill him. Consequently he was sentenced to death, and the 8th earl conveyed the earldom to his kinsman, David Lindsay of Edzell (d. 1558), a descendant of the 3rd earl of Crawford, thus excluding Alexander and his descend- ants, and in 1542 David became 9th earl of Crawford. But the 9th earl, although he had at least two sons, named the wicked master’s son David as his heir, and consequently in 1558 the earldom came back to the elder line of the Lindsays, the 9th earl being called the ” interpolated earl.”

David Lindsay, 10th earl of Crawford (d. 1574) , was a supporter of Mary Queen of Scots; he was succeeded by his son David (c. 1547-1607) as nth earl. This David, a grandson of Cardinal Beaton, was concerned in some of the risings under James VI. ; he was converted to Roman Catholicism and was in communica- tion with the Spaniards about an invasion of England. After his death the earldom passed to his son David (d. 1621), a lawless ruffian, and then to his brother, Sir Henry Lindsay or Charteris (d. 1623), who became 13th earl of Crawford. Sir Henry’s three sons became in turn earls of Crawford, the youngest, Ludovic, succeeding in 1639.

Ludovic Lindsay, 16th earl of Crawford (1600-1652), took part in the strange plot of 1641 called the ” incident.” Having joined Charles I. at Nottingham in 1642, he fought at Edgehill, at Newbury and elsewhere during the Civil War; in 1644, just after Marston Moor, the Scottish parliament declared he had forfeited his earldom, and, following the lines laid down when this was regranted in 1642, it was given to John Lindsay, 1st earl of Lindsay. Ludovic was taken prisoner at Newcastle in 1644 and was condemned to death, but the sentence was not carried out, and in 1645 he was released by Montrose, under whom he served until the surrender of the king at Newark. Later he was in

Ireland and in Spain and he died probably in France in 1652. He left no issue.

The earl of Lindsay, who thus supplanted his kinsman, belonged to the family of Lindsay of the Byres, a branch of the Lindsays descended from Sir David Lindsay of Crawford (d. c. 1355), the grandfather of the 1st earl of Crawford. Sir David's descendant, Sir John Lindsay of the Byres (d. 1482), was created a lord of parliament as Lord Lindsay of the Byres in 1445, and his son David, the and lord (d. 1490), fought for James III. at the battle of Sauchieburn. The most prominent member of this line was Patrick, 6th Lord Lindsay of the Byres (d. 1589), a son of John the 5th lord (d. 1563), who was a temperate member of the reforming party. Patrick was one of the first of the Scottish nobles to join the reformers, and he was also one of the most violent. He fought against the regent, Mary of Lorraine, and the French; then during a temporary reconciliation he assisted Mary, queen of Scots, to crush the northern rebels at Corrichie in 1562, but again among the enemies of the queen he took part in the murder of David Rizzio and signed the bond against Bothwell, whom he wished to meet in single combat after the affair at Carberry Hill in 1565. Lindsay, who was a brother-in-law and ally of the regent Murray, carried Mary to Lochleven castle and obtained her signature to the deed of abdication; he fought against her at Langside, and after Murray's murder he was one of the chiefs of the party which supported the throne of James VI. In 1578, however, he was among those who tried to drive Morton from power, and in 1582 he helped to seize the person of the king in the plot called the " raid of Ruthven," afterwards escaping to England. Lindsay had returned to Scotland when he died on the 1 1 th of December 1 589. His successor was his son, James the 7th lord (d. 1601).

Patrick's great-grandson, John Lindsay, 17th earl of Crawford and 1st earl of Lindsay (c. 1598-1678), was the son of Robert Lindsay, 9th Lord Lindsay of the Byres, whom he succeeded as 10th lord in 1616. In 1633 he was created earl of Lindsay, and having become a leader of the Covenanters he marched with the Scottish army into England in 1644 and was present at Marston Moor; in 1644 also he obtained the earldom of Crawford in the manner already mentioned. In the same year he became lord high treasurer of Scotland, and in 1645 president of the parlia- ment. Having fought against Montrose at Kilsyth, the earl of Crawford-Lindsay, as he was called, changed sides, and in 1647

he signed the ” engagement ” for the release of Charles I., losing all his offices by the act of classes when his enemy, the marquess of Argyll, obtained the upper hand. After the defeat of the Scots at Dunbar, however, Crawford regained his influence in Scottish politics, but from 1651 to 1660 he was a prisoner in England. In 1661 he was restored to his former dignities, but his refusal to abjure the covenant compelled him to resign them two years later. His son, William, 18th earl of Crawford and 2nd earl of Lindsay (1644-1698), was, like his father, an ardent covenanter; in 1690 he was president of the Convention parlia- ment. Mr Andrew Lang says this earl was ” very poor, very presbyterian, and his letters, almost alone among those of the statesmen of the period, are rich in the texts and unctuous style of an older generation.”

William’s grandson, John Lindsay, 20th earl of Crawford and 4th earl of Lindsay (1 702-1 749), won a high reputation as a soldier. He held a command in the Russian army, seeing service against the Turk, and he also served against the same foe under Prince Eugene. Having returned to the English army he led the life-guards at Dettingen and distinguished himself at Fontenoy; later he served against France in the Netherlands. He left no sons when he died in December 1749, and his kinsman, George Crawford-Lindsay, 4th Viscount Garnock (c. 1723-1781), a descendant of the 17th earl, became 21st earl of Crawford and 5th earl of Lindsay. When George’s son, George, the 22nd earl (1758-1808), died unmarried in January 1808, the earldoms of Crawford and Lindsay were separated, George’s kinsman, David Lindsay (d. 1809), a descendant of the 4th Lord Lindsay of the Byres, becoming 7th earl of Lindsay. Both David and his successor Patrick (d. 1839) died without sons, and in 1878 the vii. 13

House of Lords decided that Sir John Trotter Bethune ; Bart. (182 7-1 894), also a descendant of the 4th Lord Lindsay of the Byres, was entitled to the earldom. In 1894 John’s cousin, David Clark Bethune (b. 1832), became nth earl of Lindsay.

The earldom of Crawford remained dormant from 1808, when this separation took place, until 1848, when the House of Lords adjudged it to James Lindsay, 7th earl of Balcarres.

The earls of Balcarres are descended from John Lindsay, Lord Menmuir (1 552-1 598), a younger son of David Lindsay, oth earl of Crawford. John, who bought the estate of Balcarres in Fifeshire, became a lord of session as Lord Menmuir in 1 581; he was a member of the Scottish privy council and one of the com- missioners of the treasury called the Octavians. He had great influence with James VI.,

helping the king to restore episcopacy after he had become, in 1595, keeper of the privy seal and a secretary of state. Menmuir, a man of great intellectual attain- ments, left two sons, the younger, David, succeeding to the family estates on his brother's death in 1601. David (c. 1586- 1641), a notable alchemist, was created Lord Lindsay of Balcarres in 1633, and in 1651 his son Alexander was made earl of Balcarres.

Alexander Lindsay, 1st earl of Balcarres (1618-1659), the " Rupert of the Covenant," fought against Charles I. at Marston Moor, at Alford and at Kilsyth, but later he joined the royalists, signing the " engagement " for the release of the king in 1647, and having been created earl of Balcarres took part in Glencairn's rising in 1653. Richard Baxter speaks very highly of the earl, who died at Breda in August 1659. His son Charles (d. 1662) became 2nd earl of Balcarres, and another son, Colin (c. 1654- 1722), became 3rd earl. Colin, who was perhaps the most trusted of the advisers of James II., wrote some valuable Memoirs touching the Revolution in Scotland, i688-i6go; these were first published in 1714, and were edited for the Bannatyne Club by the 25th earl of Crawford in 1841. Having been allowed to return to Scotland after an exile in France, the earl joined the Jacobite rising in 171 5. His successor was his son Alexander, the 4th earl (d. 1736), who was followed by another son, James, the 5th earl (1691-1768), who fought for the Stuarts at Sheriffmuir. Afterwards James was pardoned and entered the English army, serving under George II. at Dettingen. This earl wrote some Memoirs of the Lindsays, which were completed by his son Alexander, the 6th earl (1752-1825). Alexander was with the English troops in America during the struggle for independence, and was governor of Jamaica from 1794 to 1801, filling a difficult position with great credit to himself. He became a general in 1803, and died at Haigh Hall, near Wigan, which he had received through his wife, Elizabeth Dalrymple (1759-1816), on the 27th of May 1825. This earl did not claim the earldom of Crawford, although he became earl dejure in 1808, but in 1843 his son James Lindsay (1 783-1 869) did so, and in 1848 the claim was allowed by the House of Lords. James was thus 24th earl pf Crawford and 7th earl of Balcarres; in 1826 he had been created a peer of the United Kingdom as Baron Wigan of Haigh Hall.

His son, Alexander William Crawford Lindsay, 25th earl of Crawford (1812-1880), was born at Muncaster Castle, Cumber- land, on the 16th of October 181 2, and educated at Eton and Cam- bridge. He travelled much in Europe and the East, and was most learned in genealogy and history. His more important works include Lives of the Lindsays (3 vols., 1849), Letters on Egypt, Edom and the Holy Land

(1838), Sketches of the History of Christian Art (1847 aR d 1882), Etruscan Inscriptions Analysed (1872), and The Earldom of Mar during §00 years (1882). He succeeded to the title in September 1869, and died at Florence on the 13th of December 1880. A year later it was discovered that the family vault at Dunecht had been broken into and the body stolen. It was not until the 18th of July 1882 that the police, acting on the confession of an eye-witness of the desecra- tion, found the remains, which were then reinterred at Haigh Hall, Wigan.

His only son, James Ludovic Lindsay, 26th earl of Crawford (1847-), British astronomer and orientalist, was born at St Germain-en-Laye, France, on the 28th of July 1847. Educated at Eton and Trinity College, Cambridge, he devoted himself to

astronomy, in which he early achieved distinction. In 1870 he went to Cadiz to observe the eclipse of the sun, and, in 1874, to Mauritius to observe the transit of Venus. ‘ In the interval, with the assistance of his father, he had built an observatory at Dunecht, Aberdeenshire, which in 1888 he presented, together with his unique library of astronomical and mathe- matical works, to the New Royal Observatory on Blackford Hill, Edinburgh, where they were installed in 1895. His services to science were recognized by his election to the presidentship of the Royal Astronomical Society in 1878 and 1879 in succession to Sir William Huggins, and to the fellowship of the Royal Society in 1878. He also received the degree of LL.D. from Edinburgh University in 1882, and in the following year was nominated honorary associate of the Royal Prussian Academy of Sciences. An enthusiastic bibliophile, he became a trustee of the British Museum, and acted for a term as president of the Library Association. To the free library of Wigan, Lancashire, he gave a series of oriental and English MSS. of the oth to the 19th centuries in illustration of the progress of handwriting, while for the use of specialists and students he issued the invaluable Bibliotheca Lindesiana. He represented Wigan in the House of Commons from 1874 till his succession to the title in 1880.

Another title held by the Lindsays was that of Spynie, Sir Alexander Lindsay (c. 1555-1607), created Baron Spynie in 1590, being a younger son of the 10th earl of Crawford. The 2nd Lord Spynie was Alexander’s son, Alexander (d. 1646), who served in Germany under Gustavus Adolphus and assisted Charles I. in Scotland during the Civil War; and the 3rd lord was the latter’s son, George. When George, a

royalist who was taken prisoner at the battle of Worcester, died in 167 1 this title became extinct.

The dukedom of Montrose, which had lapsed on the death of the 5th earl of Crawford in 1495 and had been revived in 1707 in the Graham family, was claimed in 1848 by the 24th earl of Crawford, but in 1853 the House of Lords gave judgment against the earl.

The Lindsays have furnished the Scottish church with several prelates. John Lindsay (d. 1335) was bishop of Glasgow; Alexander Lindsay (d. 1639) was bishop of Dunkeld until he was deposed in 1638; David Lindsay (d. c. 1641) was bishop of Brechin and then of Edinburgh until he, too, was deposed in 1638; and a similar fate attended Patrick Lindsay (1566-1644), bishop of Ross from 1613 to 1633 and archbishop of Glasgow from 1633 to 1638. Perhaps the most famous of the Lindsay prelates was David Lindsay (c. 1531-1613), a nephew of the 9th earl of Crawford. David, who married James VI. to Anne of Denmark at Upsala, was one of the leaders of the Kirk party; he became bishop of Ross under the new scheme for establishing

episcopacy in 1600.

See Lord Lindsay (25th earl of Crawford), Lives of the Lindsays (1849) ; A. Jervise, History and Traditions of the Land of the Lindsays (1882); G. E. C(okayne), Complete Peerage (1887-1898); H. T. Folkard, A Lindsay Record (1899); and Sir J. B. Paul's edition of the Scots Peerage of Sir R. Douglas, vol. iii. (1906).

CRAWFORD, FRANCIS MARION (1854-1909), American author, was born at Bagni di Lucca, Italy, on the 2nd of August 1854, being the son of the American sculptor Thomas Crawford (5.11.), and the nephew of Julia Ward Howe, the American poet. He studied successively at St Paul's school, Concord, New Hampshire; Cambridge University; Heidelberg; and Rome. In 1879 he went to India, where he studied Sanskrit and edited the Allahabad Indian Herald. Returning to America he con- tinued to study Sanskrit at Harvard University for a year, contributed to various periodicals, and in 1882 produced his first novel, Mr Isaacs, a brilliant sketch of modern Anglo-Indian life mingled with

Roman Singer (1884), An American Politician (1884), To Leeward (1884), Zoroaster (1885), A Tale of a Lonely Parish (1886), Marzio's Crucifix (1887), Saracinesca (1887), Paul Palojf (1887), Withthe Immortals (1888), Greifenstein (1889), Sant' Ilario (1889), A Cigarette-maker' s Romance (1890), Khaled (1891), The Witch of

Prague (1891), The Three Fates (1892), The Children of the King (1892), Don Orsino (1892), Marion Darche (1893), Pietro Ghisleri (1893), Katharine Lauderdale (1894), Love in Idleness (1894), The Ralstons, (1894), Casa Braccio (1895), Adam Johnston's Son (1895), Taquisara (1896), A Rose of Yesterday (1897), Corleone (1897), Via Crucis (1899), In the Palace of the King (1900), Marietta (1901), Cecilia (1902), Whosoever Shall Of end (1904), Soprano (1905), A Lady of Rome (1906). He also published the historical works, Ave Roma Immortalis (1898), Rulers of the South (1900) — renamed Sicily, Calabria and Malta in 1904, — and Gleanings from Venetian History (1905). In these his intimate knowledge of local Italian history combines with the romancist's imaginative faculty to excellent effect. But his place in con- temporary literature depends on his novels. He was a gifted narrator, and his books of fiction, full of historic vitality and dramatic characterization, became widely popular among readers to whom the realism of " problems " or the eccentricities of subjective analysis were repellent, for he could unfold a romantic story in an attractive way, setting his plot amid picturesque surroundings, and gratifying the reader's intelligence by a style at once straightforward and accomplished. The Saracinesca series shows him perhaps at his best. A Cigarette- maker's Romance was dramatized, and had considerable popu- larity on the stage as well as in its novel form; and in 1902 an original play from his pen, Francesca da Rimini, was produced in Paris by Sarah Bernhardt. He died at Sorrento on the 9th of April 1909.

CRAWFORD, THOMAS (1814-1857), American sculptor, was born of Irish parents in New York on the 22nd of March 1814. He showed at an early age great taste for art, and learnt to draw and to carve in wood. In his nineteenth year he entered the studio of a firm of monumental sculptors in his native city; and in the summer of 1835 he went to Rome and became a pupil of Thorwaldsen. The first work which made him generally known as a man of genius was his group of " Orpheus entering Hades in Search of Eurydice," executed in 1839. This was followed by other poetical sculptures, among which were the " Babes in the Wood," " Flora," " Hebe and Ganymede," " Sappho," " Vesta," the " Dancers," and the " Hunter." Among his statues and busts are especially noteworthy the bust of Josiah Quincy, executed for Harvard University (now in the Boston Athenaeum), the equestrian statue of Washington at Richmond, Virginia, the statue of Beethoven in the Boston music hall, statues of Channing and Henry Clay, and the colossal figure of " Armed Liberty " for the Capitol at Washington. For this building he executed also the figures for the pediment and began the bas-reliefs for the bronze doors, which were afterwards completed

by W. H. Rinehart. The groups of the pediment symbolize the progress of civilization in America. Crawford's works include a large number of bas-reliefs of Scriptural subjects taken from both the Old and the New Testaments. He made Rome his home, but he visited several times his native land — first in 1844 (in which year he married Louisa Ward), next in 1849, and lastly in 1856. He died in London on the 10th of October 1857.

See Das Lincoln Monument, eine Rede des Senator Charles Sumner, to which are appended the biographies of several sculptors, in- cluding that of Thomas Crawford (Frankfort a. M., 1868) ; Thomas Hicks, Eulogy on Thomas Crawford (New York, 1865).

CRAWFORD, WILLIAM HARRIS (17 7 2-1834), American statesman, was born in Amherst county, Virginia, on the 24th of February 1772. When he was seven his parents moved into Edgefield district, South Carolina, and four years later into Columbus county, Georgia. The death of his father in 1788 left the family in reduced circumstances, and William made what he could by teaching school for six years. He then studied at Carmel Academy for two years, was principal, for a time, of one of the largest schools in Augusta, and in 1798 was admitted to the

bar. From 1800 to 1802, with Horatio Marbury, he prepared a digest of the laws of Georgia from 1755 to 1800. From 1803 to 1807 he was a member of the State House of Representatives, becoming during this period the leader of one of two personal- political factions in the state that long continued in bitter strife, occasioning his fighting two duels, in one of which he killed his antagonist, and in the other was wounded in his wrist. From 1807 to 1813 he was a member of the United States Senate, of which he was president pro tempore from March 181 2 to March 1813. In 1813 he declined the offer of the post of secretary of war, but from that year until 181 5 was minister to the court of France. He was then secretary of war in 1815-1816, and secretary of the treasury from 1816 to 1825. In 1816 in the congressional caucus which nominated James Monroe for the presidency Crawford was a strong opposing candidate, a majority being at first in his favour, but when the vote was finally cast 65 were for Monroe and 54 for Crawford. In 1824, when the congressional caucus was fast becoming extinct, Crawford, being prepared to control it, insisted that it should be held, but of 216 Republicans only 66

attended; of these, 64 voted for Crawford. Three other candidates, however, Andrew Jackson, John Quincy Adams, and Henry Clay, were otherwise put in the field. During the campaign Crawford was stricken with paralysis, and when the electoral vote was cast Jackson received 99, Adams 84, Crawford 41, and Clay 37. It remained for the house of representatives to choose from Jackson, Adams and Crawford, and through Clay's influence Adams became president. Crawford was invited by Adams to continue as secretary of the treasury, but declined. He recovered his health sufficiently to become (in 1827) a circuit judge in his own state, but died while on circuit, in Elberton, Georgia, on the 15th of September 1834. In his day he was undoubtedly one of the foremost political leaders of the country, but his reputation has not stood the test of time. He was of imposing presence and had great conversational powers; but his inflexible integrity was not sufficiently tempered by tact and civility to admit of his winning general popularity. Consequently, although a skilful political organizer, he incurred the bitter enmity of other leaders of his time — Jackson, Adams and Calhoun. He won the admiration of Albert Gallatin and others by his powerful support of the move- ment in 18 1 1 to recharter the Bank of the United States; he earned the condemnation of posterity by his authorship in 1820 of the four-years-term law, which limited the term of service of thousands of public officials to four years, and did much to develop the " spoils system." He was a Liberal Democrat, and advised the calling of a constitutional convention as preferable to nullification or secession.

CRAWFORDSVILLE, a city and the county-seat of Mont- gomery county, Indiana, U.S.A., situated about 40 m. N.W. of Indianapolis. Pop. (1890) 6089; (1900) 6649, including 230 negroes and 221 foreign-born; (1910) 9371. It is served by the Chicago, Indianapolis & Louisville, the Cleveland, Cincinnati, Chicago & St Louis, and the Vandalia railways, and by interurban electric lines. Wabash College, founded here in 1832 by Presby- terian missionaries but now non-sectarian, had in 1908 27 instructors, 345 students, and a library of 43,000 volumes. Among manufactures are flour, iron, wagons and carriages, acetylene lights, wire and nails, matches, brick paving blocks, and electrical machinery. North-east of the city there are valuable mineral springs, from which the city obtains its water-supply. Crawfordsville, named in honour of W. H. Crawford, was first settled about 1820, was laid out as a town in 1823, and was chartered as a city in 1863. It was for many years the home of Gen. Lew Wallace.

CRAWFURD, JOHN (1783-1868), Scottish orientalist, was born in the island of Islay, Scotland, on the 13th of August 1783. After studying at Edinburgh he became surgeon in the East India Company's service. He

afterwards resided for some time at Penang, and during the British occupation of Java from 181 1 to 1817 his local knowledge made him invaluable to the government. In 1821 he served as envoy to Siam and Cochin-China, and in 1823 became governor of Singapore. His last political service in

the East was a difficult mission to Burma in 1827. In 1861 he was elected president of the Ethnological Society. He died at South Kensington on the nth of May 1868.

Crawfurd wrote a History of the Indian Archipelago (1820), Descriptive Dictionary of the Indian Islands and Adjacent Countries (1856), Journal of an Embassy to the Court of Ava in 1827 (1829), Journal of an Embassy to the Courts of Siam and Cochin-China, exhibit- ing a view of the actual State of these Kingdoms (1830), Inquiry into the System of Taxation in India, Letters on the Interior of India, an attack on the newspaper stamp-tax and the duty on paper entitled Taxes on Knowledge (1836), and a valuable Malay grammar and dictionary (1852).

CRAYER, GASPARD DE (1582-1669), Flemish painter, was born at Antwerp, and learnt the art of painting from Raphael Coxcie. He matriculated in the guild of St Luke at Brussels in 1607, resided in the capital of Brabant till after 1660, and finally settled at Ghent. Amongst the numerous pictures which he painted in Ghent, one in the town museum represents the martyrdom of St Blaise, and bears the inscription A° 1668 aet. 86. Crayer was one of the most productive yet one of the most conscientious artists of the later Flemish school, second to Rubens in vigour and below Vandyck in refinement, but nearly equalling both in most of the essentials of painting. He was well known and always well treated by Albert and Isabella, governors of the Netherlands. The cardinal-infant Ferdinand made him a court-painter. His pictures abound in the churches and museums of Brussels and Ghent; and there is scarcely a country chapel in Flanders or Brabant that cannot boast of one or more of his canvases. But he was equally respected beyond his native country; and some important pictures of his composition are to be found as far south as Aix in Provence and as far east as Amberg in the Upper Palatinate. His skill as a decorative artist is shown in the panels executed for a triumphal arch at the entry of Cardinal Ferdinand into the Flemish capital, some of which are publicly exhibited in the museum of Ghent. Crayer died at Ghent. His best works are the ” Miraculous Draught of Fishes ” in the gallery of Brussels, the ” Judgment of Solomon ” in the gallery of Ghent, and ” Madonnas with Saints ” in the Louvre, the Munich Pinakothek, and the Belvedere at Vienna. His portrait by Vandyck was

engraved by P. Pontius.

CRAYFISH (Fr. Screvisse), the name of freshwater crustaceans closely allied to and resembling the lobsters, and, like them, belonging to the order Macrura. They are divided into two families, the Astacidae and Paraslacidae, inhabiting respectively the northern and the southern hemispheres.

The crayfishes of England and Ireland (Astacus, or Potamobius, pailipes) are generally about 3 or 4 in. long, of a dull green or brownish colour above and paler brown or yellowish below. They

Crayfish (Cambarus sp.) from the Mississippi River. (After Morse.)

are abundant in some rivers, especially where the rocks are of a calcareous nature, sheltering under stones or in burrows which they dig for themselves in the banks and coming out at night in search of food. They are omnivorous feeders, killing and eating insects, snails, frogs and other animals, and devouring any carrion that comes in their way. It is stated that they sometimes come on land in search of vegetable food.

On the continent of Europe, Astacus pailipes occurs chiefly in the west and south, being found in France, Spain, Italy and the

Balkan Peninsula. It is known in France as Screvisse a pattes blanches and in Germany as Steinkrebs, and is little used as food. The larger Astacus fluviatilis (ecrevisse a pattes rouges, Edelkrebs) is not found in Britain, but occurs in France and Germany, southern Sweden, Russia, &c. It is distinguished, among other characters, by the red colour of the under side of the large claws. It is the species most highly esteemed for the table. Other species of the genus are found in central and eastern Europe and as far east as Turkestan. Farther east a gap occurs in the distribution and no crayfishes are met with till the basin of the Amur is reached, where a group of species occurs, extending into northern Japan. In North America, west of the Rocky Mountains, the genus Astacus again appears, but east of the watershed it is replaced by the genus Cambarus, which is repre- sented by very numerous species, ranging from the Great Lakes to Mexico. Several blind species inhabit the subterranean waters of caves. The best known is Cambarus pellucidus, found in the Mammoth Cave of Kentucky.

The area of distribution occupied by the southern crayfishes or Parastacidae is separated by a broad equatorial zone from that of the northern group, unless, as has been asserted, the two come into contact or overlap in Central America. None is found in any part of Africa, though a species occurs in Madagascar. They are absent also from the oriental region of zoologists, but reappear in Australia and New Zealand. Some of the Australian species, such as the ” Murray River lobster ” (Astacopsis spinifer), are of large size and are used for food. In South America crayfishes are found in southern Brazil, Argentina and Chile. (W. T. Ca.)

CRAYON (Fr. crate, chalk, from Lat. creta), a coloured material for drawing, employed generally in the form of pencils, but sometimes also as a powder, and consisting of native earthy and stony friable substances, or of artificially prepared mixtures of a base of pipe or china clay with Prussian blue, orpiment, vermilion, umber and other pigments. Calcined gypsum, talc and com- pounds of magnesium, bismuth and lead are occasionally used as bases. The required shades of tints are obtained by adding varying amounts of colouring matter to equal quantities of the base. Crayons are used by the artist to make groupings of colours and to secure landscape and other effects with ease and rapidity. The outline as well as the rest of the picture is drawn in crayon. The colours are softened off and blended by the finger, with the assistance of a stump of leather or paper; and shading is produced by cross-hatching and stippling. The art of painting in crayon or pastel is supposed to have originated in Germany in the 17th century. Byjohann Alexander Thiele (1685-1752) it was carried to great perfection, and in France it was early practised with much success. Amongst the earlier pastellists may be mentioned Rosalba Camera (1675-1757), W. Hoare (1707-1792), F. Cotes (1726-1770), and J. Russell (1744-1806); and in recent years the art has been successfully revived. (See Pastel.)

CREASY, SIR EDWARD SHEPHERD (1812-1878), English historian, was born at Bexley in Kent, and educated at Eton and King’s College, Cambridge. He became a fellow of King’s College in 1834, and having been called to the bar at Lincoln’s Inn three years later, was made assistant judge at the West- minster sessions court. In 1840 he was appointed professor of modern and ancient history in the university of London, and in i860 became chief justice of Ceylon and a knight. Broken down in health he returned to England in 1870, and after a further but short stay in Ceylon died in London on the 27th of January 1878. Creasy’s most popular work is his Fifteen decisive Battles of the World, which, first published in 1851, has passed through many editions. He also wrote The History of the Ottoman Turks (London,

1854-1856); History of England (London, 1869-1870); Rise and Progress of the English Constitution (London, 1853, and other editions); Historical and Critical Account of the several Invasions of England (London, 1852); a novel entitled Old Love and the New (London, 1870) ; and various other works.

CREATIANISM AND TRADUCIANISM. Traducianism is the doctrine about the origin of the soul which was taught by Tertullian in his De anima — that souls are generated from souls in the same way and at the same time as bodies from bodies:

creatianism is the doctrine that God creates a soul for each body that is generated. The Pelagians taunted the upholders of original sin with holding Tertullian's opinion, and called them Traduciani (from tradux: vid. Du Cange s. vv.), a name which was perhaps suggested by a metaphor in De an. 19, where the soul is described " velutsurculusquidam exmatriceAdaminpropaginem deducta." Hence we have formed " traducianist," " traducian- ism," and by analogy " creatianist," " creatianism." Augustine denied that traducianism was necessarily connected with the doctrine of original sin, and to the end pi his life was unable to decide for or against it. His letter to Jerome (Epist. Clas. iii. 166) is a most valuable statement of his difficulties. Jerome condemned it, and said that creatianism was the opinion of the Church, though he admitted that most of the Western Christians held traducianism. The question has never been authoritatively determined, but creatianism, which had always prevailed in the East, became the general opinion of the medieval theologians, and Peter Lombard's creando infundit animas Deus et infundendo creat was an accepted formula. Luther, like Augustine, was undecided, but Lutherans have as a rule been traducianists. Calvin favoured creatianism.

Peter Lombard's phrase perhaps shows that even in his time it was felt that some union of the two opinions was needed, and Augustine's toleration pointed in the same direction, for the tradu- cianism he thought possible was one in which God operatur institutas administrando non novas instituendo naturas (Ep. 166. 5. n). Modern psychologists teach that while " personality " can be dis- cerned in its " becoming," nothing is known of its origin. Lotze, however, who may be taken as representing the believers in the immanence of the divine Being, puts forth — but as a " dim con- jecture " — something very like creatianism (Microcosmus, bk. iii. chap. v. ad fin.). It is still, as in the days of Augustine, a question whether a more exact division of man into body, soul and spirit may help to throw light on this subject.

See indices to Augustine, vol. xi., and Jerome, vol. xi. in Migne's Patrologia, s.v. "Anima"; Franz Delitzsch, Biblical Psychology, ii. § 7 ; G. P. Fisher, History of Chr. Doct. pp. 187 ff . ; A. Harnack, History of Dogma (passim; see Index); Liddon, Elements of Religion, Lect. iii.; Mason, Faith of the Gospel, iv. §§ 3, 4, 9, 10.

(A. N.*)

CREBILLON, PROSPER JOLYOT DE (1674-1762), French tragic poet, was born on the 13th of January 1674 at Dijon, where his father, Melchior Jolyot, was notary-royal. Having been educated at the Jesuits' school of the town, and at the College Mazarin, he became an advocate, and was placed in the office of a lawyer named Prieur at Paris. With the encourage- ment of his master, son of an old friend of Scarron's, he produced a Mort des enfants de Brutus, which, however, he failed to bring upon the stage. But in 1705 he succeeded with Idom&nee; in 1707 his Atree et Thyeste was repeatedly acted at court; Electre appeared in 1709; and in 1711 he produced his finest play, the Rhadamiste et Zenobie, which is his masterpiece and held the stage for a long period, although the plot is so complicated as to be almost incomprehensible. But his Xerxes (1714) was only once played, and his SSmiramis (1717) was an absolute failure. In 1707 Crebillon had married a girl without fortune, who had since died, leaving him two young children. His father also had died, insolvent. His three years' attendance at court had been fruitless. Envy had circulated innumerable slanders against him. Oppressed with melancholy, he removed to a garret, where he surrounded himself with a number of dogs, cats and ravens, which he had befriended; he became utterly careless of cleanli- ness or food, and solaced himself with constant smoking. But in 1 73 1, in spite of his long seclusion, he was elected member of the French Academy; in 1735 he was appointed royal censor; and in 1745 Mme de Pompadour presented him with a pension of 1000 francs and a post in the royal library. He returned to the stage in 1726 with a successful play, Pyrrhus; in 1748 his Catilina was played with great success before the court; and in 1754, when he was eighty years old, appeared his last tragedy, Le Triumvirat. Crebillon died on the 1 7th of June 1 7 54. The enemies of Voltaire maintained that Crebillon was his superior as a tragic poet. The spirit of rivalry thus provoked induced Voltaire to take the subjects of no less than five of Crebillon's tragedies — Simiramis, Electre, Catilina, Le Triumvirat, Atree — as subjects for tragedies

of his own. The so-called Eloge de Crebillon (1762), really a depreciation, which appeared in the year of the poet's death, is generally attributed to Voltaire, though he strenuously denied the authorship. Crebillon's drama is marked by a force too often gained at the expense of scenes of unnatural horror; his pieces show lack of culture and a want of care which displays itself even in the mechanism of his verse, though fine isolated passages are not infrequent.

There are numerous editions of his works, among which may be noticed: CEuvres (1772), with preface and " eloge," by Joseph de la Porte; CEuvres (1828), containing D'Alembert's Eloge de Crebillon (1775); and Thedtre complet (1885) with a notice by Auguste Vitu. A complete bibliography is given by Maurice Dutrait, in his Etude sur la vie et le theatre de Crebillon (1895).

His only son, Claude Prosper Jolyot Crebillon (1707- 1777), French novelist, was born at Paris on the 14th of February 1707. His life was spent almost entirely in Paris, but the publication of L'Ecumoire, ou Tanzal et Neadarne, histoire japonaise (1734), which contained veiled attacks on the bull Unigenitus, ithe cardinal de Rohan and the duchesse du Maine, brought Crebillon into disgrace. He was first imprisoned and afterwards forced to live in exile for five years at Sens and elsewhere. With Alexis Piron and Charles Colle he founded in 1752 the gay society which met regularly to dine at the famous " Caveau," where many good stories were elaborated. From 1759 onwards he was to be found at the Wednesday dinners of the Pelletier, at which Garrick, Sterne and Wilkes were sometimes guests. He married in 1748 an English lady of noble family, Lady Henrietta Maria Stafford, who had been his mistress from 1744. Their life is said to have been passed in much affection and mutual fidelity; and there could be no greater contrast than that between Crebillon's private life and the tone of his novels, the immorality of which lent irony to the author's tenure of the office of censor, bestowed on him in 1759 through the favour of Mme de Pompadour. He died in Paris on the 12th of April 1777. The most famous of his numerous novels are: Les Amours de Ztokinizul, rot des Kofirans (1740), in which " Zeokinizul " and " Kofirans " may be translated Louis XIV. and the French respectively; and Le Sopha, conte moral (1740), where the moral is supplied in the title only. This last novel is given by some authorities as the reason for his imprisonment.

His CEuvres were collected and printed in 1772. See a notice of Crebillon prefixed to O. Uzanne's edition of his Contes dialogues in the. series of Conteurs du XVIII 6 siecle. Crebillon's novels might be

pronounced immoral to the last degree if it were not that two writers slightly later in date surpassed even his achievements in this particular. Andre Robert de Nerciat (1 739-1 800) produced under a false name a number of licentious tales, and was followed by Donatien, marquis de Sade.

CR&CHE (Fr. for a ” crib ” or cradle), the name given to a day-nursery, a public institution for the feeding and care of infants while the mothers are engaged in work outside their homes, or are otherwise prevented from giving them proper attention. Infants are usually admitted when over a month old, and are kept till they are capable of looking after themselves. The advantages of such institutions are that the attention of skilled and trained nurses is given to the children, the food is better and more adapted to their needs than that given in their homes, the surroundings are cleaner and healthier, and habits of discipline and cleanliness are instilled, which, in many cases, react on the mothers. The nurseries are usually under medical supervision, and the small fees charged, which average in London from 3d. to 4d. a day, and on the continent of Europe about 2d., are much less than the cost to the mother who places her young children under the care of neighbours when at work or away from home. Institutions of this kind were started in France in 1844, and have been established in the majority of the large towns on the continent of Europe. In the industrial centres of France and Germany they have helped to check infantile mortality. The state or municipality in nearly every case grants subsidies, but few are maintained entirely by public authorities; voluntary contributions are depended upon for the main support, and the organization and management are left in the hands of private societies and charitable institutions, although some outside

official supervision with regard to the number of infants admitted to each institution, air-space, and ventilation and general hygienic conditions is considered useful. In Great Britain the establishment of such institutions has been left almost entirely to private initiative; and in comparison with the continent the provision is inadequate and unsatisfactory, Paris having nearly double the proportion of accommodation for infants to the population that is provided in London. The National Society of Day Nurseries was founded in 1901 for the purpose of providing a bureau where information may be found of good methods of founding and managing a creche.

See the Report of the Consultative Committee upon the School Attendance of Children below the Age of Five, issued by the Board of Education (1908).

CRˆCY (Cressy), a town of northern France, in the department of Somme, on the Maye, 12 m. N. by E. of Abbeville by road. It is famous in history for the great victory gained here on the 26th of August 1346 by the English under Edward III. over the French of King Philip of Valois. After its campaign in northern France, the English army retired into Ponthieu, and encamped on the 25th of August at Crecy, the French king in the meantime marching from Abbeville on Braye. Early on the 26th Edward's army took up its position for battle, and Philip's, hearing of this, moved to attack him, though the French army marched in much disorder, and on arrival formed only an imperfect line of battle. The English lay on the forward slope of a hillside, with their right in front of the village of Crecy, their left resting on Wadicourt. Two of the three divisions or " battles " were in first line, that of the young prince of Wales (the Black Prince) on the right, that of the earls of Northampton and Arundel on the left;

EnwryVaUccftc

the third, under the king's own command, in reserve, and the baggage was packed to the rear. Each battle consisted of a centre of dismounted knights and men-at-arms, and two wings of archers. The total force was 3900 men-at-arms, 11,000 English archers, and 5000 Welsh light troops (Froissart, first edition, the second gives a different estimate) . The French were far stronger, having at least 1 2,000 men-at-arms, 6000 mercenary crossbowmen (Genoese), perhaps 20,000 of the milice des communes, besides a certain mimber of foot of the feudal levy. Along with these served a Luxemburg contingent of horse under John, king of Bohemia, and other feudatories of the Holy Roman Empire, and the whole force was probably about 60,000 strong.

The day was far advanced when the French came upon the English position. Philip, near Estrees, decided to halt and bivouac, deferring the battle until the army was better closed up, but the indiscipline of his army committed him to an immediate action, and he ordered forward the Genoese crossbowmen, while a line of men-at-arms deployed for battle behind them; the rest of the army was still marching in an irregular column of route along the road from Abbeville. A sudden thunderstorm caused a short delay, then the archers and the crossbowmen opened the battle. Here, for the first time in continental warfare, the English

long-bow proved its worth. After a brief contest the crossbow- men, completely outmatched, were driven back with enormous loss. Thereupon the first line of French knights behind them charged down upon the ” faint-hearted rabble ” of their own fugitives, and soon the first two lines of the French were a mere mob of horse and foot struggling with each other. The archers did not neglect the opportunity, and shot coolly and rapidly into the helpless target in front of them. The second attack was made by another large body of knights which had arrived, and served but to increase the number of the casualties, though here and there a few charged up to the English line and fell near it, among them the blind king of Bohemia, who with a party of devoted knights penetrated, and was killed amongst, the ranks of the prince of Wales’s men-at-arms. The battle was now one long series of desperate but ill-conducted charges, a fresh onslaught being made as each new corps of troops appeared on the scene. The English archers on the flanks of the two first line battles had been wheeled up, the centres of dismounted men-at-arms held back, so that the whole line resembled a ” herse ” or harrow with three points formed by the archers (see sketch). Each successive body of the French sought to come to close quarters with the men- at-arms, and exposed themselves therefore at short range to the arrows on either flank. Under these circumstances there could be but one issue of the battle. Though sixteen distinct attacks were made, and the fighting lasted until long after dark, no impression was made on the English line. At one moment the prince was so far in danger that his barons sent to the king for aid. Even then Edward was not disquieted and he sent a mere handful of knights to the prince’s battle, saying, ” Let the boy win his spurs.” The left battle of the English, hitherto somewhat to the rear, moved up into line with the prince, and the French attack slackened. By midnight the army of France was practic- ally annihilated; 1542 men of gentle blood were left dead on the field and counted by Edward’s heralds, the losses of the remainder are unknown. Some fifty of the victors fell in the battle. The story that the Black Prince adopted from the fallen king of Bohemia the crest and motto now borne by the princes of Wales lacks foundation (see John, King of Bohemia). A memorial to the French and their allies was erected, by public subscription in France, Luxemburg and Bohemia, in 1905.

See H. B. George, Battles of English History (London, 1S95), and C. W. C. Oman, A History of the Art of War; The Middle Ages (London, 1898).

CREDENCE, or Ckedence Table, a small side-table, originally an article of furniture placed near the high table in royal or noble houses, at which the ceremony of the praegustatio, Italian credenziare, the ”

assay ” or tasting of food and drink for poisons was performed by an official of the household, the praegustator or credentiarius as he was caHed in Medieval Latin. Both the ceremony and the table were known as credentia (Lat. credere, to believe, trust), Ital. credenza, Fr. credence. After the need for the ceremony had disappeared the name still survived, and the table developed a back and several shelves for the display of plate, and gradually merged into the buffet (q.v.). It is, however, as an article of ecclesiastical furniture that the credence table is most familiar. I’t takes the form of a small table of wood or stone, sometimes fixed and sometimes merely a shelf above or near the piscina. It usually stands on the south or Epistle side of the altar, and on it are placed, in the Roman Catholic Church, the cruets containing the wine and water, the chalice, the candlesticks to be carried by the acolytes, and other objects to be used in the ceremony of the Mass. The use of such a table, to which earlier the name of paratorium or oblationarium was given, appears to have come into use when the personal presentation of the obla- tions at the Mass became obsolete. When the pope celebrates Mass a special credence table on the Gospel side of the altar is used, and the ceremony of tasting for poison in the unconsecrated elements is still observed. In some churches in England the old credence tables still exist, as at the church of St Cross near Winchester, where there is a fine stone 15th-century example; more frequent are examples of the stone shelf near the piscina. There are some carved wooden ones surviving, one type being

with a semicircular top and three legs placed in a triangle with a lower shelf. The formal use of the credence table for the un-consecrated elements and the holy vessels before the celebration has been revived in the English Church.

CREDENTIALS (leltres de cr&ance), a document which ambassadors, ministers plenipotentiary, and charges d’affaires hand to the government to which they are accredited, for the purpose, chiefly, of communicating to the latter the envoy’s diplomatic rank. It also contains a request that full credence be accorded to his official statements. Until his credentials have been presented and found in proper order, an envoy receives no official recognition. The credentials of an ambassador or minister plenipotentiary are signed by the chief of the state, those of a charge d’affaires by the foreign minister.

CREDI, LORENZO DI (1459-1537), Italian artist, whose surname was Barducci, was born at Florence. He was the least gifted of three artists who began life as journeymen with Andrea del Verrocchio. Though he

was the companion and friend of Leonardo da Vinci and Perugino, and closely allied in style to both, he had neither the genius of the one nor the facility of the other. We admire in Da Vinci's heads a heavenly contentment and smile, in his technical execution great gloss and smoothness of finish. Credi's faces disclose a smiling beatitude; his pigments have the polish of enamel. But Da Vinci imparted life to his creations and modulation to his colours, and these are qualities which hardly existed in Credi. Perugino displayed a well- known form of tenderness in heads, moulded on the models of the old Umbrian school. Peculiarities of movement and attitude become stereotyped in his compositions; but when put on his mettle, he could still exhibit power, passion, pathos. Credi often repeated himself in Perugino's way; but being of a pious and resigned spirit, he generally embodied in his pictures a feeling which is yielding and gentle to the verge of coldness. Credi had a respectable local practice at Florence. He was consulted on most occasions when the opinion of his profession was required on public grounds, e.g. in 1491 as to the fronting, and in 1498 as to the lantern of the Florentine cathedral, in 1 504 as to the place due to Michelangelo's " David." He never painted frescoes; at rare intervals only he produced large ecclesiastical pictures. The greater part of his time was spent on easel pieces, upon which he expended minute and patient labour. But he worked with such industry that numbers of his Madonnas exist in European galleries. The best of his altar-pieces is that which represents'the Virgin and Child with Saints in the cathedral of Pistoia. A fine example of his easel rounds is in the gallery of Mainz. Credi rivalled Fra Bartolommeo in his attachment to Savonarola; but he felt no inclination for the retirement of a monastery. Still, in his old age, and after he had outlived the perils of the siege of Florence (1527), he withdrew on an annuity into the hospital of Santa Maria Nuova, where he died. The National Gallery, London, has two pictures of the Virgin and Child by him.

CREDIT (Lat. credere, to believe), in a general sense, belief or trust. The word is used also to express the repute which a person has, or the estimation in which he is held. In a commercial sense credit is the promise to pay at a future time for valuable con- sideration in the present: hence, a reputation of solvency and ability to make such payments is also termed credit. In book- keeping credit is the side of the account on which payments arc entered; hence, sometimes, the payments themselves.

The part which credit plays in the production and exchange of wealth is discussed in all economic text-books, but special reference may be made to K. Knies, Geld und Kredit (1873-1879), and H. D. Macleod,

Theory of Credit (1889-1891). See also Hartley Withers, The Meaning of Money (1909).

CREDIT FONCIER, in France, an institution for advancing money on mortgage of real securities. Due to a great extent to the initiative of the economist L. Wolowski, it was created by virtue of a governmental decree of the 28th of February 1852. This decree empowered the issue of loans at a low rate of interest, secured by mortgage bonds, extending over a long period, and repayable by annuities, including instalments of capital. On its inception it had a capital of 25,000,000 francs and took the title

of Banque Fonciere de Paris. The parent institution in Paris was followed by similar institutions in Nevers and Marseilles. These two were afterwards amalgamated with the first under the title of Credit Fonder de France. The capital was increased to 60,000,000 francs, the government giving a subvention of 10,000,000 francs, and exercising control over the bank by directly appointing the governor and two deputy-governors. The administration was vested in a council chosen by the shareholders, but its decisions have no validity without the approval of the governor. The Credit Foncier has the right to issue bonds, repayable in fifty or sixty years, and bearing a fixed rate of interest. A certain number of the bonds carry prizes. The loans must not exceed half the estimated value of the property mortgaged, upon which the bank has the first mortgage. The bank also makes advances to local bodies, departmental and communal, for short or long periods, and with or without mortgage. Its capital amounts to £13,500,000. Its charter was renewed in 1881 for a period of ninety-nine years.

In i860 the Credit Foncier lent its support to the foundation of an organization for supplying capital and credit for agricultural and allied industries. This Credit Agricole rendered but trifling services to agriculture, however, and soon threw itself into speculation. Between 1873 and 1876 it lent enormous sums to the Egyptian government, obtaining the money by opening credit with the Credit Foncier and depositing with it the securities of the Egyptian government. On the failure of the Egyptian government to meet its payments the Credit Agricole went into liquidation, and the Credit Foncier suffered severely in conse- quence. The impracticability of the credit system to aid agri- culture as worked by the Credit Agricole was very marked, and, as a consequence, the financing of agricultural associations is

now entirely in the hands of the Banque de France.

The Credit Mobilier is an institution for advancing loans on personal or movable estate. It was constituted in 1871, on the liquidation of the Societe Generate de Credit Mobilier, founded in 1852, which it absorbed. v r > ~”

CREDIT MOBILIER OF AMERICA, a construction company whose operations in connexion with the building of the Union Pacific Railroad gave rise to the most serious political scandal in the history of the United States Congress. The company was originally chartered as the Pennsylvania Fiscal Agency in 1859. In March 1864 a controlling interest in the stock was secured by Thomas Durant, vice-president of the Union Pacific Railroad Company, and the Pennsylvania legislature authorized the adoption of the name Credit Mobilier of America. Durant proposed to utilize it as a construction company, pay it an extravagant sum for the work, and thus secure for the stock- holders of the Union Pacific, who now controlled the Credit Mobilier, the bonds loaned by the United States government. The net proceeds from the government and the first mortgage bonds issued to the construction company were $50,863,172.05, slightly more than enough to pay the entire cost of construction. According to the report of the Wilson Congressional Committee, the Credit Mobilier received in addition, in the form of stock, income bonds, and land grant bonds, $23,000,000 — a profit of about 48%. The defenders of the company assert that several items of expense were not included in this report, and that the real net profit was considerably smaller, although they admit that it was still unusually large. The work extended over the years 1865-1867. During the winter of 1867-1868, when adverse legislation by Congress was feared, it is alleged that Oakes Ames (q.v.) , a representative from Massachusetts and principal promoter of the Credit Mobilier, distributed a number of shares among congressmen and senators to influence their attitude. Shares were sold at par when a few dividends repaid a purchaser at this price. Some in fact received dividends without any initial outlay at all. As the result of a lawsuit between Ames and H. S. McComb, some private letters were brought out in September 1872 which gave publicity to the entire proceedings. The House appointed two investigating committees, the Poland and the Wilson committees, and on the report of the former (1873) Ames and James Brooks of New York were formally censured by the

House, the former for disposing of the stock and the latter for improperly using his official position to secure part of it. Charges were also made against Schuyler Colfax, then vice-president but Speaker of the House at the time of the transaction, James A. Garfield, William D.

Kelley (1814-1880), John A. Logan, and several other members either of the House or of the Senate. The Senate later appointed a special committee to investigate the charges against its members. This committee, on the 27th of February 1873, recommended the expulsion from the Senate of James W. Patterson, of New Hampshire; but as his term expired within five days no action was taken. The evidence was exagger- ated by the Democrats for partisan purposes, but the investiga- tion showed clearly that many of those accused were at least indiscreet if not dishonest. The company itself was merely a type of the construction companies by which it was the custom to build railways between i860 and about 1880.

See J. B. Crawford, The CrSdit Mobilier of America (Boston, 1880), and R. Hazard, The Credit Mobilier of America (Providence, 1881), both of which defend Ames; also the histories of the Union Pacific Railroad Company by J. P. Davis (Chicago, 1894) and H. K. White (Chicago, 1895); and for a succinct and impartial account, James Ford Rhodes, History of the United States, vol. vii. (New York, 1906). The Poland and Wilson reports are to be found in House of Represent- atives Reports, 42nd Congress, 3rd session, Nos. 77 and 78, and the report of the Senate Committee in Senate Reports, 42nd Congress, 3rd session, No. 519.

CREDITON, a market town in the South Molton parlia- mentary division of Devonshire, England, 8 m. N.W. of Exeter by the London & South- Western railway. Pop. of urban district (1901) 3974. It is situated in the narrow vale of the river Creedy near its junction with the Exe, between two steep hills, and is divided into two parts, the east or old town and the west or new town. The church of Holy Cross, formerly collegiate, is a noble Perpendicular building with Early English and other early portions, and a fine central tower. The grammar school, founded by Edward VI. and refounded by Elizabeth, has exhibitions to Oxford and Cambridge universities. Shoe-making, tanning, agricultural trade, tin-plating, and the manufacture of confectionery and cider have superseded the former large woollen and serge industries. In 1897 Crediton was made the seat of a suffragan bishopric in the diocese of Exeter.

The first indication of settlement at Crediton (Credington, Cryditon, Kirton) is the tradition that Winfrith or Boniface was born there in 680. Perhaps in his memory (for the great extent of the parish shows that it was thinly populated) it became in 909 the seat of the first bishopric in Devonshire. It was probably only a village in 1049, when Leofric, bishop of Crediton, requested Leo IX. to transfer the see to Exeter, as Crediton was ” an open town and much exposed to the

incursions of pirates." At the Domesday Survey much of the land was still uncultivated, but its prosperity increased, and in 1269 each of the twelve prebends of the collegiate church had a house and farmland within the parish. The bishops, to whom the manor belonged until the Reformation, had difficulty in enforcing their warren and other rights; in 13 51 Bishop Grandison obtained an exemplification of judgments of 1282 declaring that he had pleas of withernam, view of frank pledge, the gallows and assize of bread and ale. Two years later there was a serious riot against the increase of copyhold. Perhaps it was at this time that the prescriptive borough of Crediton arose. The jury of the borough are mentioned in 1275, and Crediton returned two members to parliament in 1306-1307, though never afterwards represented. A borough seal dated 1469 is extant, but the corporation is not mentioned in the grant made by Edward VI. of the church to twelve principal inhabitants. The borough and manor were granted by Elizabeth to William Killigrew in 1595, but there is no indication of town organization then or in 1630, and in the 18th century Crediton was governed by commissioners. In 1231 the bishop obtained a fair, still held, on the vigil, feast and morrow of St Lawrence. This was important as the wool trade was established by 1249 and certainly continued until 1630, when the market for kersies is mentioned in conjunction with a saying " as fine as Kirton spinning."

See Rev. Preb. Smith, " Early History o£Credition," in Devonshire Association for the Advancement of Science, Literature and Art, Transactions, vol. xiv. (Plymouth, 1882); Richard J. King, "The Church of St Mary and of the Holy Cross, Credition," in Exeter Diocesan Architectural Society, Transactions, vol. iv. (Exeter, 1878).

CREDNER, CARL FRIEDRICH HEINRICH (1809-1876), German geologist, was born at Waltershausen near Gotha, on the 13th of March 1809. He investigated the geology of the Thuringer Waldes, of which he published a map in 1846. He was author of a work entitled Uber die Gliederung der oberen Juraformation und der Wealden-Bildung im nordwestlichen Deutschland (Prague, 1863), also of a geological map of Hanover (1865). He died at Halle on the 28th of September 1876.

His son, Carl Hermann Credner (1841-), was born at Gotha on the 1st of October 1841, educated at Breslau and Gottingen, and took the degree of Ph.D. at Breslau in 1864. In 1870 he was appointed

professor of geology in the university of Leipzig, and in 1872 director of the Geological Survey of Saxony. He is author of numerous publications on the geology of Saxony, and of an important work, Elemente der Geologie (2 vols., 1872; 7th ed., 1891), regarded as the standard manual in Germany. He has also written memoirs on Saurians and Labyrinthodonts.

CREE, a tribe of North American Indians of Algonquian stock. They are still a considerable tribe, numbering some 15,000, and living chiefly in Manitoba and Assiniboia, about Lake Winnipeg and the Saskatchewan river. They gave trouble by their constant attacks upon the Sioux and Blackfeet, but are now peaceable and orderly. , See Handbook of American Indians (Washington, 1907).

CREECH, THOMAS (1659-1700), English classical scholar, was born at Blandford, Dorsetshire, in 1659. He received his early education from Thomas Curgenven, master of Sherborne school. In 1675 he entered Wadham College, Oxford, and obtained a fellowship in 1683 at All Souls'. He was headmaster of Sherborne school from 1694 to 1696, and in 1699 he received a college living, but in June 1700 he hanged himself. The immediate cause of the act was said to be a money difficulty, though according to some it was a love disappointment; both of these circumstances no doubt had their share in a catastrophe primarily due to an already pronounced melancholia. Creech's fame rests on his translation of Lucretius (1682) in rhymed heroic couplets, in which, according to Otway, the pure ore of the original " somewhat seems refined." He also published a version of Horace (1684), and translated the Idylls of Theocritus (1684), the Thirteenth Satire of Juvenal (1693), the Astronomicon of Manilius (1697), and parts of Plutarch, Virgil and Ovid.

CREEDS (Lat. credo, I believe) , or Confessions of Faith. We are accustomed to regard the whole conception of creeds, i.e. reasoned statements of religious belief, as inseparably connected with the history of Christianity. But the new study of com- parative religion has something to teach us even here. The saying lex orandi lex credendi is true of all times and of all peoples. And since we must reckon praise as the highest form of prayer, such an early Christian hymn as is found in 1 Tim. iii. 16 must be acknowledged to be of the nature of a creed: " He who was manifested in the flesh, justified in the spirit, seen of angels, preached among the nations, believed on in the world, received up in glory." It justifies the expansion of the second article of the developed Christian creed from the standpoint of the earliest Christian tradition. It also supplies a reason for including in our survey of creeds some reference to pre-Christian hymns and beliefs.

The pendulum has swung back. Rather than despise the faulty presentation of truth which we find in heathen re- ligions and their more or less degraded rites, we follow the apostle Paul in his endeavour to trace in them attempts ” to feel after God ” (Acts vii. 27). Augustine, the great teacher of the West, was true to the spirit of the great Alexandrians, when he wrote (Ep. 166): ” Let every good and true Christian understand that truth, wherever he finds it, belongs to his Lord.”

We are not concerned with the question whether the earliest forms of recorded religious consciousness such. as animism, or totemism, or fetishism, were themselves degradations of a

primitive revelation or not. 1 We are only concerned with the fact of experience that the human soul yearns to express its belief. The hymn to the rising and setting sun in the Book of the Dead (ch. 15), which is said by Egyptologists to be the oldest poem in the world, carries us back at once to the dawn of history.

” Hail to thee, Ra, the self-existent . . . Glorious is thine uprising from the horizon. Both worlds are illumined by thy rays . . . Hail to thee, Ra, when thou returnest home in renewed beauty, crowned and almighty.”

In a later hymn Amen-Ra is confessed as “the good god – beloved, maker of men, creator of beasts, maker of things below and above, lord of mercy most loving.” A similar note is struck in the Indian Vedas. In the more ethical religion of the Avesta the creator is more clearly distinguished from the creature: ” I desire to approach Ahura and Mithra with my praise, the lofty eternal, and the holy two.” 2 The Persian poet is not far from the kingdom into which Hebrew psalmists and prophets entered.

The whole history of the Jewish religion is centred in the gradual purification of the idea of God. The morality of the Jews did not outgrow their religion, but their interest was always ethical and not speculative. The highest strains of the psalmists and the most fervent appeals of the prophets were progressively directed to the great end of praising and preaching the One true God, everlasting, with sincere and pure devotion. The creed of the Jew, to this day, is summed up in the well-remembered words, which have been ever on his lips, living or dying: ” Hear, O Israel, the Lord our God is one Lord ” (Deut. vi. 4).

The definiteness and persistence of this creed, which of course is the strength also of Mahommedanism, presents a contrast to the fluid

character of the statements in the Vedas, and to the chaos of conflicting opinions of philosophers among the Greeks and Romans. As Dr J. R. Illingworth has said very concisely: ” The physical speculations of the Ionians and Atomists rendered a God superfluous, and the metaphysical and logical reasoning of the Eleatics declared Him to be unknowable.” 3 Plato regarding the world as an embodiment of eternal, archetypal ideas, which he groups under the central idea of Good, identified with the divine reason, at the same time uses the ordinary language of the day, and speaks of God and the gods, feeling his way towards the conception of a personal God, which, to quote Dr Illingworth again, neither he nor Aristotle could reach because they had not ” a clear conception of human personality.” They were followed by an age of philosophizing which did little to advance specula- tion. The Stoics, for example, were more successful in criticizing the current creed than in explaining the underlying truth which they recognized in polytheism. The final goal of Greek philosophy was only reached when the great thinkers of the early Christian Church, who had been trained in the schools of Alexandria and Athens, used its modes of thought in their analysis of theChristian idea of God. ” In this sense the doctrine of the Trinity was the synthesis, and summary, of all that was highest in the Hebrew and Hellenic conceptions of God, fused into union by the electric touch of the Incarnation.” 4

Space does not permit enlargement on this theme, but enough has been said to introduce the direct study _of the ancient creeds of Christendom.

I. The Ancient Creeds of Christendom.- — The three creeds which may be called oecumenical, although the measure of their acceptance by the universal church has not been uniform, represent three distinct types provided for the use of the cate- chumen, the communicant, and the church teacher respectively. The Apostles’ Creed is the ancient baptismal creed, held in common both by East and West, in its final western form. Tne Nicene Creed is the baptismal c eed of an eastern church enlarged in order to combine theological interpretation with the facts of the historic faith. Its use in the Eucharist of the undivided Church has been continued since the great schism, although the Eastern Church protests against the interpolation

1 Jevons, Introd. to the History of Religion, p. 394.

2 Sacred Books of the East, xxxi.

8 Personality, Human and Divine (cheap edition), p. 36. * lb. p. 38.

of the words ” And the Son ” in clause 9. The Athanasian Creed is an instruction designed to confute heresies which were current in the 5th century.

1. The Apostles’ Creed. — The increased interest which has been shown in the history of all creed-forms since the latter part of the 19th century is due in a great measure to the work of Creed * S t ˆ le veteran pioneer, Professor P. Caspari of Christiania, who began the herculean task of classifying the enormous number of creed-forms which have been recovered from obscure pages of early Christian literature. In England we owe much to Professors C. A. Heurtley and Swainson. In Germany the monumental work of Professor Kattenbusch has overshadowed all other books on the subject, providing even his most ardent critics with an indispensable record of the literature of the subject.

The majority of critics agree that the only trace of a formal creed in tne New Testament is the simple confession of Jesus as the Lord, or the Son of God (Rom. x. 9; 1 Cor. xii. 3). While the apostles were agreed on an outline of teaching (Rom. vi. 17) which included the doctrine of God, the person and work of Christ, and the person and work of the Holy Spirit, it does not appear that they provided any summary, which would cover this ground, as an authoritative statement of their belief. The tradition which St Paul received included, so to speak, the germ of the central prayer in the Eucharist (1 Cor. xi. 23 fL), and no doubt included also teaching on conduct, ” the way of a Christian life ” (1 Thess. iv. 1; Gal. v. 21). The creed in all its forms lies behind worship, which it preserves from idolatry, and behind ethics, to which it supplies a motive power which the pre-Christian system so manifestly lacked. Whether the first creed of the primitive Church was of the simple Christological character which confession of Jesus as the Lord expresses, or of an enlarged type based on the baptismal formula (Matt, xxviii. 19), makes no difference to the statement that the faith which overcame the world derived its energy from convictions which strove for utterance. “With the heart man believeth unto righteousness, and with the mouth confession is made unto salvation ” (Rom. x. 10).

When St Paul reminds Timothy (1 Tim. vi. 13) of his confession before many witnesses he does not seem to imply more than confession of Christ as king. He calls it ” the beautiful con- fession ” to which Christ

Jesus had borne witness before Pontius Pilate, and charges Timothy before God, who quickeneth all things, to keep this commandment. Some writers, notably Professor Zahn, 1 piecing together this text with 2 Tim. i. 13, ii. 8, iv. 1, 2, reconstructs a primitive Apostles' Creed of Antioch, the city from which St Paul started on his missionary journeys. But there is no mention of a third article in the creed, beyond a reference to the Holy Ghost in the context of 2 Tim. i. 14, which would prove the apostolic use of a Trinitarian confession imagin- able as the parent of the later Eastern and Western forms. The eunuch's creed interpolated in Acts viii. 57, " I believe that Jesus is the Son of God," since the reading was known to Irenaeus, probably represents the form of baptismal confession used in some church of Asia Minor, and supplies us with the type of a primitive creed. This theory is confirmed by the evidence of the Johannine epistles (1 John iv. 15, v. 5; cf. Heb. iv. 14).

From this point of view it is easy to explain the occurrence of creed-like phrases in the New Testament as fragments of early hymns (1 Tim. iii. 16) or reminiscences of oral teaching (1 Cor. xv. 1 ff.). The following form which Seeberg gives as the creed of St Paul is an artificial combination of fragments of oral teaching, which naturally reappear in the teaching of St Peter, but finds no attestation in the later creeds of particular churches which would prove its claim to be their parent form :

” The living God who created all things sent His Son Jesus Christ, born of the seed of David, who died for our sins according to the scriptures, and was buried, who was raised on the third day according to the scriptures, and appeared to Cephas and the XII., who sat at the

1 Der Katechismus der Urchristenheit, p. 85. Zahn’s reasoned argument stands in contrast to the blind reliance on tradition shown by Macdonald, The Symbol of the Apostles, and the fanciful reconstruction of the primitive creed by Baeumer, Harnack or Seeberg.

right hand of God in the heavens, all rule and authority and power being made subject unto Him, and is coming on the clouds of heaven with power and great glory.”

The evidence of the apostolic fathers is disappointing. Clement {Cor. lviii. 2) supplies only parallels to the baptismal formula (Matt, xxviii. 19). Polycarp (Ep. 7) echoes St John. But Ignatius might seem to offer in the following passage some confirmation of Zahn’s theory of a primitive creed of Antioch (Trail. 9) : “Be ye deaf, therefore, when any man speaketh to you apart from Jesus Christ, who was of the race of David, who was the Son of Mary, who was truly born and ate and drank, was truly persecuted under Pontius Pilate, was truly crucified and died in the sight of those in heaven and those on earth and those under the earth; who, moreover, was truly raised from the dead, His Father having raised Him, who in the like fashion will so raise us also who believe on Him — His Father, I say, will raise us — in Christ Jesus, apart from whom we have not true life.”

The differences, however, which divide this from the later creed forms are scarcely less noticeable than their agreement, and the evidence of the Ignatian epistles generally (Eph. xviii. ; Smyrn. i.), while it confirms the conclusion that instruction was given in Antioch on all points characteristic of the developed creed, e.g. the Miraculous Birth, Crucifixion, Resurrection, the Catholic Church, forgiveness of sins, the hope of resurrection, does not prove that this teaching was as yet combined in a Trinitarian form which classified the latter clauses under the work of the Holy Ghost.

At this point a word must be said on the important question of interpretation. While we may hope for eventual agreement on the history of the different types of creed forms, there can be no hope of agreement on the interpretation of the words Holy Spirit between Unitarian and Trinitarian critics. Writers who follow Harnack explain ” holy spirit ” as the gift of impersonal influence, and between wide

limits of difference agree in regarding Christ as Son of God by adoption and not by nature. Amid the chaos of conflicting opinions as to the original teaching of Jesus, the Gospel within the Gospel, the central question ” What think ye of Christ ? ” emerges as the test of all theories. ” No man can say that Jesus is the Lord save in the Holy Ghost ” (1 Cor. xii. 3). Belief in the fact of the Incarnation of the eternal Word, as it is stated in the words of Ignatius quoted above, or in any of the later creeds, stands or falls with belief in the Holy Ghost as the guide alike of their convictions and destinies, no mere impersonal influence, but a living voice.

If the essence of Christianity is winnowed down to a bare imitation of the Man Jesus, and his religion is accepted as Buddhists accept the religion of Buddha, still it cannot be denied that the early Christians put their trust in Christ rather than his religion. ” I am the life,” not ” I teach the life,” ” I am the truth,” not merely ” I teach the truth,” are not additions of Johannine theology but the central aspect of the presentation of Christ as the good physician, healer of souls and bodies, which the most rigid scrutiny of the Synoptic Gospels leaves as the residuum of accepted fact about Jesus of Nazareth. To say more would be out of place in this article, but enough has been said to introduce the exhaustive discussion by Kattenbusch (ii. 471-728) of the meaning of the theological teaching both of the New Testament and of the earliest creeds.

To return within our proper limits. Kattenbusch, with whom Harnack is in general agreement, regards the Old Roman Creed, which comes to light in the 4th century, as the parent of all developed forms, whether Eastern or Western. Marcellus, the exiled bishop of Ancyra, is quoted by Epiphanius as presenting it to Bishop Julius of Rome c. a.d. 340. Ussher’s recognition of the fact that this profession of faith by Marcellus was the creed of Rome, not of Ancyra, is the starting-point of modern discussions of the history of the creeds. Some sixty years later Rufinus, a priest of Aquileia, wrote a commentary on the creed of his native city and compared it with the Roman Creed. His Latin text is probably as ancient as the Greek text of Marcellus, because the Roman Church must always have been bilingual in its early days. It was as follows:

I. i. I believe in God (the) Father almighty; II. 2. And in Christ Jesus His only Son our Lord,

3. who was born of the Holy Spirit and the Virgin Mary,

4. crucified under Pontius Pilate and buried

5. the third day He rose from the dead,

6. He ascended into heaven,

7. sitteth at the right hand of the Father,

8. thence He shall come to judge living and dead. III. 9. And in the Holy Ghost,

10. (the) holy Church,

11. (the) remission of sins,

12. (the) resurrection of the flesh.

This Old Roman Creed may be traced back in the writings of Bishops Felix and Dionysus (3rd century), and in the writings of Tertullian in the 2nd century.

Tertullian calls the creed the ” token ” which the African Church shares with the Roman (de Praescr. 36): ” The Roman Church has made a common token with the African Churches, has recognized one God, creator of the universe, and Christ Jesus, of the Virgin Mary, Son of God the Creator, and the resurrection of the flesh.” The reference is to the earthenware token which two friends broke in order that they might commend a stranger for hospitality by sending with him the broken half. Their creed became the passport by which Christians in strange cities could obtain admission to assemblies for worship and to common meals. The passage quoted is obviously a condensed quotation of the Roman Creed, which reappears also in the following (de Virg. vel. i.):

” The rule of faith is one altogether … of believing in one God Almighty, maker of the world, and in His Son Jesus Christ, born of Mary the Virgin, crucified under Pontius Pilate; the third day raised from the dead, received in the heavens, sitting now at the right hand of the Father, about to come and judge quick and dead through the resurrection also of the flesh.”

There are many references in Tertullian to the teaching of the Gnostic Marcion, whose breach with the Roman Church may be dated a.d. 145. He seems to have still held to the Roman creed interpreted in his

own way. An ingenious conjecture by Zahn enables us to add the words ” holy Church ” to our recon- struction of the creed from the writings of Tertullian. In his revised New Testament Marcion speaks of ” the covenant which is the mother of us all, which begets us in the holy Church, to which we have vowed allegiance.” He uses a word used by Ignatius of the oath taken on confession of the Christian faith. It follows that the words ” holy Church ” were contained in the Roman Creed. 1

While all critics agree in tracing back this form to the earliest years of the 2nd century, and regard it as the archetype of all similar Western creeds, there is great diversity of opinion on its relation to Eastern forms. Kattenbusch maintains that the Roman Creed reached Gaul and Africa in the course of the 2nd century, and perhaps all districts of the West that possessed Christian congregations, also the western end of Asia Minor possibly in connexion with Polycarp’s visit to Rome a.d. 154. He finds that materials fail for Pontus, Galatia, Cappadocia, Syria, Palestine, Egypt. Further, he holds that all the Eastern creeds which are known to us as existing in the 4th century, or may be traced back to the 3rd, lead to Antioch as their starting- point. He concludes that the Roman Creed was accepted at Antioch after the fall of Paul of Samosata in a.d. 272, and was adapted to the dogmatic requirements of the time, all the later creeds of Palestine, Asia Minor and Egypt being dependent on it.

On the other hand, Kunze, Loofs, Sanday, and Zahn find evidence of the existence of an Eastern type of creed of equal or greater antiquity and distinguished from the Roman by such phrases as ” One ” (God), ” Maker of heaven and earth,” ” suffered,” ” shall come again in glory.” Thus Kunze recon- structs a creed of Antioch for the 3rd century, and argues that it is independent of the Roman Creed.

Creed of Antioch. I. I. I believe in one and one only true God, Father Almighty, maker of all things, visible and invisible.

1 McGiffert, on the other hand, argues that the Roman Creed was composed to meet the errors of Marcion, p. 58 ff . He omits, however, to mention this, which is Zahn’s strongest argument.

II. 2. And in our Lord Jesus Christ, His Son, the only-begotten and first born of all creation, begotten of Him before all the ages, through whom also the ages were established, and all things came into existence ;

3. Who for our sakes, came down, and was born of Mary the

Virgin.

4. And crucified under Pontius Pilate, and buried,

5. And the third day rose according to the scriptures,

6. and ascended into heaven.

7-

8. And is coming again to judge quick and dead.

9. [The beginning of the third article has not been recorded.]

10.

11. Remission of sins.

12. Resurrection of the dead, life everlasting.

Along similar lines Loofs selects phrases as typical of creeds which go back to a date preceding the Nicene Council.

A. Creed of Eusebius of Caesarea, presented to the Nicene

Council.

B. Revised Creed of Cyril of Jerusalem.

C. Creed of Antioch quoted by Cassian.

D. Creed of Antioch quoted in the Apostolic Constitutions.

E. Creed of Lucian the Martyr (Antioch).

F. Creed of Arius (Alexandria).

1. One (God), A, B, C, D, E, F.

Maker of heaven and earth and of all things visible and invisible (or a like phrase), A, B, C, D, E.

2. Lord Jesus Christ, His Son, the only begotten (or a like

phrase), A, B, C, D, E, F.

3. Crucified under Pontius Pilate, B, C, D (A, E, F omit

because they are theological creeds. Loofs thinks that the baptismal creeds on which they are based may have contained the words).

5. Rose the third day, A, B, D, E (F omits ” the third day ”

being a theological creed; the translation of C is un- certain).

6. Went up, A, B, D, E, F.

+and . . . and . . . and, A, B, C, D, E, F. 8. And is coming, B, C, D, E, F; and is about to come, A; +again, A, C, D, E, F(B?); -fin glory, A, B; with glory, D, E. 10. -fCatholic, B, D, F (A, C, E?) 12. -(-life eternal, B, C ; -{-life of the age to come, D, F.

Sanday (Journal Theol. Studies, iii. 1) does not attempt a recon- struction on this elaborate scale, but contents himself with pointing out evidence, which Kattenbusch seems to him to have missed, for the existence of creeds of Egypt, Cappadocia and Palestine before the time of Aurelian. He criticizes Harnack’s theory that there existed in the East, that is, in Asia Minor, or in Asia Minor and Syria as far back as the beginning of the 2nd century, a Christological instruction (ixddr)jj.a) organically related to the second article of the Roman Creed, and formulas which taught that the ” One God ” was ” Creator of heaven and earth,” and referred to the holy prophetic spirit, and lasted on till they influenced the course of creed-development in the 4th century. He asks, is it not simpler to believe that there was a definite type in the background?

Another English student, the Rev. T. Barns, engaged specially in work upon the history of the creed of Cappadocia, points out the importance of the extraordinary influence of Firmilian ol Caesarea in the affairs of the church of Antioch in the early part of the 3rd century. He is led to argue that the creed of Antioch came rather from Cappadocia than Rome. Whether his con- clusion is justified or not, it helps to show how strongly the trend of contemporary research is setting against the theory of Katten- busch that the Roman Creed when adopted at Antioch became the parent of all Eastern forms. It does not, however, militate against the possibility that the Roman Creed was carried from Rome to Asia Minor and to Palestine in the 2nd century. It is evidently impossible to arrive at a final decision until much more spade work has been done in the investigation of early Eastern creeds. Connolly’s study of the early Syrian creed (Zeilschrift fur die neutestamentliche Wissenschaft, 1906, p. 202) deserves careful consideration. His reconstruction of the creed of Aphraates is interesting in relation to the other traces of a Syriac creed

form existing prior to the 4th century.

[I believe] in God the Lord of all, that made the heavens and the earth and the seas and all that in them is ; [And in our Lord Jesus

Christ] [the Son of God,] God, Son of God, King, Son of the King, Light from Light, (Son and Counsellor, and Guide, and Way, and Saviour, and Shepherd, and Gatherer, and Door, and Pearl, and Lamo,) and first-born of all creatures, who came and put on a body from Mary the Virgin (of the seed of the house of David, from the Holy Spirit), and put on our manhood, and suffered, or and was crucified, went down to the place of the dead, or to Sheol, and lived again, and rose the third day, and ascended to the height, or to heaven, and sat on the right hand of His Father, and He is the Judge of the dead and of the living, who sitteth on the throne ; [And in the Holy Spirit ;] [And I believe] in the coming to life of the dead ; [and] in the mystery of Baptism (of the remission of sins).

The probable battle-ground of the future between the oppos- ing theories lies in the writings of Irenaeus. He has most of the characteristic expressions of the Eastern creeds. He inserts ” one ” in clause i and 2. He has the phrases ” Maker of heaven and earth,” ” suffered,” and ” crucified,” with ” under Pontius Pilate ” after instead of before it. Probably also he had ” in glory ” in clause 8. But there is always the possibility to be faced that Irenaeus drew his creed from Rome rather than Asia Minor. Kattenbusch does not shrink from suggesting that he shows acquaintance with the Roman Creed, and that Justin Martyr also knew it, in which case all the so-called Eastern characteristics have been imprinted on the original Roman form, and are not derived from an Eastern archetype. But the ordinary reader need not feel concern about the future victory of either theory. The plain fact is that the same facts were taught in Palestine, Asia Minor and Gaul, whether gathered up in a parallel creed form or not. The contrast which Rufinus draws between the Roman Creed and others, both of the East and the West, is justified. In comparison with them it was guarded more carefully from change. 1 We have yet to inquire how it received the additions which distinguish the derived form now in use as the baptismal creed of all Western Christendom. Some had already found an entrance into Western creeds. We find ” suffered ” in the creed of Milan, ” descended into hell ” in the creed of Aquileia, the Danubian lands and Syria; the words ” God ” and ” almighty ” were

shortly added to clause 7 in the Spanish creed; ” life everlasting ” had stood from an early date in the African creed. The creed of Caesarius of Aries (d. 543) proves that these varia- tions had all been united in one Gallican creed together with ” catholic ” and ” communion of saints,” but this Gallican form still lacked ” Maker of heaven and earth ” and the additions in clause 7.

Two newly-discovered creeds help us greatly to narrow down the limits of the problem. The creed of Niceta of Remesiana in Dacia proves that c. a.d. 400 the Dacian church had added to the Roman Creed ” maker of heaven and earth,” ” suffered,” ” dead,” ” Catholic,” ” communion of saints ” and ” life everlasting.” Parallel to it is the Faith of St Jerome discovered in 1903 by Dom. Morin. 2

The Faith of St Jerome.

” I believe in one God the Father almighty, maker of things visible and invisible. I believe in one Lord Jesus Christ, the Son of God, born of God, God of God, Light of Light, almighty of almighty, true God of true God, born before the ages, not made, by whom all things were made in heaven and in earth. Who for our salvation descended from heaven, was conceived of the Holy Ghost, born of the Virgin Mary, suffered by suffering under Pontius Pilate, under Herod the King, crucified, buried, descended into hell, trod down the sting of death, rose again the third day, appeared to the apostles. After this He ascended into heaven, sitteth at the right of God the Father, thence shall come to judge the quick and the dead. And I believe in the Holy Ghost, God not unbegotten nor begotten, not created nor made, but co-eternal with the Father and the Son. I believe (that there is) remission of sins in the holy catholic church, communion of saints, resurrection of the flesh unto eternal life. Amen.”

This creed may be the form which Jerome mentions in one of his letters (Ep. 17, n. 4)as sent to Cyril of Jerusalem. It is important as connecting the creeds of East and West. Since Jerome was born in Pannonia we may conjecture that he is inserting Nicene phrases from the Jerusalem creed into his baptismal creed, and

1 It is probable that ” one ” has dropped out of the first clause. Zahn acutely suggests that it was omitted in the time of Zephyrinus to counteract Monarchian teaching such as the formula : believe in one God, Jesus Christ.”

2 Anecdota Maredsolana, iii. iii. p. 199.

that this form added to Niceta's creed proves that the creed of the Danube lands possessed the clauses " maker of heaven and earth " and " communion of saints."

The first occurrence of the completed form is in a treatise (Scarapsus) of the Benedictine missionary Pirminius, abbot of Reichenau (c. a.d. 730). The difficulty hitherto has been to trace the source from which the clause " maker of heaven and earth " has come into it. It has been known that the forms in use in the south of France approximated to it but without those words. In the 6th century we find creed forms in use in Gaul which include them, but include also other variations distinguish- ing them from the form which we seek. The missing link which has hitherto been lacking in the evidence has been found by Barns in the influence of Celtic missionaries who streamed across from Europe until they came in touch with the remnants of the Old Latin Christianity of the Danube. The chief documents of the date a.d. 700, which contain forms almost identical with the received text, are connected with monasteries founded by Columban and his friends : Bobbio, Luxeuil, S. Gallen, Reichenau. From one of these monasteries the received text seems to 'have been taken to Rome. Certainly it was from Rome that it was spread. We can trace the use of the received text along the line of the journeys both of Pirminius and Boniface, and there is little doubt that they received it from the Roman Church, with which Boniface was in frequent communication. Pope Gregory II. sent him instructions to use what seems to have been an official Roman order of Baptism, which would doubtless include a Roman form of creed. Pirminius, who was far from being an original writer, made great use of a treatise by Martin of Braga, but substituted a Roman form of Renunciation, and refers to the Roman rite of Unction in a way which leads us to suppose that the form of creed which he substituted for Martin's form was also Roman. It seems clear, therefore, that the received text was either made or accepted in Rome, c. a.d. 700, and disseminated through the Benedictine missionaries. At the end of the 8th century Charlemagne inquired of the bishops of his empire as to current forms. The reply of Amalarius of Trier is important because it shows that he not only used the received text, but also connected it with the Roman order of Baptism. The emperor's wish for uniformity doubtless led in a measure to its eventual triumph over all other forms.

2. The Nicene Creed of the liturgies, often called the Constanti- nopolitan creed, is the old baptismal creed of Jerusalem revised by the insertion of Nicene terms. The idea that the council merely added to the last section has been disproved by Hort's famous dissertation in 1876. 3 The text of the creed of the Nicene Council was based on the

creed of Eusebius of Caesarea, and a comparison of the four creeds side by side proves to demonstration their distinctness, in spite of the tendency of copyists to confuse and assimilate the forms. 4

Nicene Creed

Creed of Eusebius, A.D. 325 (Caesarea). We believe I. 1. In one God the Father Almighty, the maker of all things visible and in- visible. II. 2. And in one Lord Jesus Christ, the Word of God.

God of God, Light of Light, (Life of Life,) only begotten Son (first-born of all creation, before all worlds begotten of God the Father), by whom all things were made ;

Revision by the Council of Nicaea, A.D. 325. We believe I. I. In one God the Father Almighty, the maker of all things visible and invisible. II. 2. And in one Lord Jesus Christ, the Son of God, begotten of the Father, only begotten, that is of the substance of the Father, God of God, Light of Light, very God of very God, be- gotten not made, of one substance with the Father, by whom all things were made, both those in heaven and those on earth.

3 Dorholt has shown that Petavius (d. 1652) was the first to remark that the. so-called Constantinopolitan form was quoted by Epi- phanius before the Council met, but was not able to explain the fact.

4 Burn, ” Note on the Old Latin text,” Journal of Theol. Studies.

3. Who for our salvation

was incarnate (and lived as a citizen amongst men),

4. And suffered,

5. And rose the third day,

6. And ascended (to the

Father) ,

7. And shall come again

(in glory) to judge quick and dead. III. 8. And (we believe) in (one)

Holy Ghost.

Creed of Jerusalem, A.D.348.

I (or We) believe I. 1. In one God the Father, Almighty, maker of heaven and earth, and of all things visible and invisible. II. 2. And in one Lord Jesus Christ, the only be- gotten Son of God, be- gotten of His Father,

very God before all worlds,

by whom all things were made;

was incarnate,

and was made Man, 4. Crucified and buried.

5. Rose again the third day,

6. And ascended into

heaven and sat on the right hand of the Father,

7. And shall come in glory

to judge the quick and the dead, whose king- dom shall have no end. III. 8. And in One Holy Ghost, the Paraclete,

who spake in the Prophets, 9. And in one baptism of repentance for re- mission of sins,

10. And in one holy Catholic

Church,

11. And in resurrection of

the flesh,

12. And in life eternal.

3. Who for us men and for

our salvation came down and was incarnate, was made man,

4. And suffered,

5. And rose the third day,

6. Ascended into Heaven,

7. Is coming to judge quick

and dead.

III. 8. And in the Holy Ghost. Revision by Cyril, AD. 362.

Council of Constantinople, a.d.

381. Council of Chalcedon,

A.D. 451-

We believe

I. 1. In one God the Father Almighty, maker of heaven and earth, and of all things visible and invisible. II. 2. And in one Lord Jesus Christ, the only be- gotten Son of God, be- gotten of His Father before all worlds, [God of God,] Light of Light, very God of very God, begotten, not made, being of one substance with the Father, by whom all things were made; Who for us men and for our salvation came down from heaven and Was incarnate of the Holy Ghost and the Virgin Mary, and was made Man.

4. And was crucified also

for us under Pontius Pilate, and suffered and was buried, and

5. He rose again the third

day, according to the Scriptures,

6. And ascended into

heaven and sitteth on the right hand of the Father,

7. And He shall come again

to judge the quick and the dead, whose king- dom shall have no end. III. 8. And in the Holy Ghost, the Lord and Giver of Life, who proceedeth from the Father [and the Son], who with the Father and the Son together is worshipped and glorified, who spake by the Prophets, 9. In the Catholic and Apostolic Church.

10. We acknowledge one

baptism for remission of sins.

11. We look for the resur-

rection of the dead,

12. And the life of the world

to come.

The revised Jerusalem Creed was quoted by Epiphanius in his treatise The Anchored One, c. a.d. 374, some years before the council of Constantinople (a.d. 381). We gather that it had already been introduced into Cyprus asabaptismal creed. Hort's identification of it as the work of Cyril of Jerusalem is now generally accepted. On his return from exile in a.d. 362 Cyril would find " a natural occasion for the revision of the public creed by the skilful insertion of some of the conciliar language, including the term which proclaimed the restoration of full

communion with the champions of Nicaea, and other phrases and clauses adapted for impressing on the people positive truth." Some of Cyril's personal preferences expressed in his catechetical lectures find expression, e.g. " resurrection of the dead " for " flesh."

The weak point in Hort's theory was the suggestion that the creed was brought before the council by Cyril in self justification. The election of Meletius of Antioch as the first president of the council carried with it the vindication of his old ally Cyril. Kunze's suggestion is far more probable that it was used at the baptism of Nektarius, praetor of the city, who was elected third president of the council while yet unbaptized. Unfortunately the acts of the council have been lost, but they were quoted at the council of Chalcedon in a.d. 451, and the revised Jerusalem Creed was quoted as " the faith of the 150 Fathers," that is, as confirmed in some way by the council of Constantinople, while at the time it was distinguished from " the faith of the 3 18 Fathers " of Nicaea. One of the signatories of the Definition of Faith made at Chalcedon, in which both creeds were quoted in full, Kalemikus, bishop of Apamea in Bithynia, refers to the council of Constantinople as having been held at the ordination of the most pious Nektarius the bishop. Obviously there was some connexion in his mind between the creed and the ordination.

The reasons which brought the revised creed into prominence at Chalcedon are still obscure. It is possible that Leo's letter to Flavian gave the impulse to put it forward because it contained a parallel to

words which Leo quoted from the Old Roman Creed, ” born of the Holy Ghost and the Virgin Mary,” “crucified and buried,” which do not occur in the first Nicene Creed. If, as is probable, it was from the election of Nektarius the baptismal creed of Constantinople, we may even ask whether the pope did not refer to it when he wrote emphatically of the ” common and indistinguishable confession ” of all the faithful. Kattenbusch supposes that Anatolius, bishop of Constantinople, or his arch- deacon Aetius, who read the creed at the 2nd session of the council, took up the idea that through its likeness to the Roman Creed it would be a useful weapon against Eutyches and others who were held to interpret the Nicene Creed in an Apollinarian sense. But Kunze thinks that it was not used as a base of opera- tions against Eutyches because there is some evidence that Monophysites were willing to accept it. Certainly it won its way to general acceptance in the East as the creed of the church of the imperial city; regarded as an improved recension of the Nicene Faith. The history of the introduction of the creed into liturgies is still obscure. Peter Fullo, bishop of Antioch, was the first to use it in the East, and in the West a council held by King Reccared at Toledo in 589. The theory of Probst that it had been used in Rome before this time has not been confirmed. King Reccared’s council is usually credited with the introduction of the words ” And the Son ” into clause 9 of the creed. But some MSS. 1 omit them in the creed-text While inserting them in a canon of the faith drawn up at the time. Probably they were inter- polated in the creed by mistake of copyists. When attention was called to the interpolation in the 9th century it became one cause of the schism between East and West. Charlemagne was unable to persuade Pope Leo III. to alter the text used in Rome by including the words. But it was so altered by the pope’s successor.

The interpolation really witnessed to a deep-lying difference between Eastern and Western theology. Eastern theologians expressed the mysterious relationship of the Holy Spirit to the Father and the Son in such phrases as ” Who proceedeth from the Father and receiveth from the Son,” rightly making the Godhead of the Father the foundation and primary source of the eternally derived Godhead of the Sonand the Spirit. Western theologians approached the problem from another point of view. Hilary, starting from the thought of Divine self-consciousness

1 e.g. Cod. Escurial J.c. 12, saec. x. xi. In Cod. Matritensis, p. 21 (1872), saec. x. xi., and Cod. Matritensis 10041 (begun in the year a.d 948), the words are omitted under the heading council of Constan- tinople but inserted under the heading council of Toledo, in the former MS., above the line and in a later hand, which shows con-

clusively how the interpolation crept in.

as the explanation of the coinherence of the Father in the Son and the Son in the Father, says that the Spirit receives of both. Augustine teaches that the Father and the Son are the one principle of the Being of the Spirit. From this it is a short step to say with the Quicumque vult that the Spirit proceeds from the Son, while guarding the idea that the Father is the one fountain of Deity. Since Eastern theologians would be willing to say " pro- ceeds from the Father through the Son," it is clear that the two views are not irreconcilable.

3. The Athanasian Creed, so called because in many MSS. it bears the title " The Faith of S. Athanasius," is more accurately designated by its first words Quicumque vult} Its Athaa- history has been the subject of much controversy for Creed. years past, but no longer presents an insoluble problem. Critics indeed agree on the main outline. Until 1870 the standard work on the subject was Waterland's Critical History of the A thanasian Creed, first published in 1 7 2 3 . Having traced " the opinions of the learned moderns " from Gerard Vossius, a.d. 1642," who led the way to a more strict and critical inquiry," Waterland passed in review all the known MSS. and commentaries, and after a searching investigation concluded that the creed was written in Gaul between 420 and 430, probably by Hilary of Aries.

In 1870 the controversy on the use of the creed in the Book of Common Prayer led to fresh investigation of the MSS., and a theory known as the " Two-portion theory " was started by C. A. Swainson, developed by J. R. Lumby, and adopted by Harnack. Swainson thought that the Quicumque was brought into its present shape in the 9th century. The so-called profession of Denebert, bishop-elect of Worcester, in a.d. 798 presented to the archbishop of Canterbury (which includes clauses 1, 3-6, 20-22, 24, 25), and the Treves fragment (a portion of a sermon in Paris bibl. nat. Lat. 3836, saec. viii., which quoted clauses 27-34, 36-40), seemed to him to represent the component parts of the creed as they existed separately. He conjectured that they were brought together in the province of Rheims c. 860.

This theory, however, depended upon unverified assumptions, such as the supposed silence of theologians about the creed at the beginning of the 9th century; the suggestion that the completed creed would

have been useful to them if they had known it as a weapon against the heresy of Adoptianism; the assertion that no MS. containing the complete text was of earlier date than c. 813. This was Lumby ‘s revised date, but the progress of palaeographical studies has made it possible to demonstrate that MSS. of the 8th century do exist which contain the complete creed.

The two-portion theory was vigorously attacked by G. D. W. Ommanney, who was successful in the discovery of new docu- ments, notably early commentaries, which contained the text of the creed embedded in them, and thus supplied independent testimony to the fact that the creed was becoming fairly widely known at the end of the 8th century. Other new MSS. and commentaries were found and collated by the Rev. A. E. Burn and Dom Morin. In 1897 Loofs, summing up the researches of 25 years in his article Athanasianum {Realencyclopiidie f. prot. Theol. u. Kirche, 3rd ed. ii. p. 177), declared that the two-portion theory was dead.

This conclusion has never been seriously challenged. It has been greatly strengthened by the discovery of a MS. which was presented by Bishop Leidrad of Lyons with an autograph in- scription to the altar of St Stephen in|that town,[some time before 814. As M. Delisle at once pointed out {Notices et extraits des manuscrits, 1898), this MS. supplies a fixed date from which palaeographers can work in dating MSS. The Quicumque occurs in a collection of materials forming an introduction to the psalter. The suggestion has been made that Leidrad intended to use the Quicumque in his campaign against the Adoptianists in 798. But the phrases of the creed seem to have needed sharpening

1 The first person who doubted the authorship seems to have been Joachim Camerarius, 1551, who was so fiercely attacked in consequence that he omitted the passage from his Latin edition. Zeitschrift fur K.G. x. (1889), p. 497.

against the .Nestorian tendency of the Adoptianists. It is more probable that Leidrad was interested in the growing use of the creed as a canticle, and was consulted in the preparation of the famous Golden Psalter, now at Vienna, which contains the same collection of documents as an introduction. This MS. may now without hesitation be assigned to the date 7 7 2-788. The earliest known MS. is at Milan {Cod. Ambros. O, 212, sup.), and is dated by Traube as early as c. 700.

There is a reference to the Quicumque in the first canon of the fourth

council of Toledo of the year 633, which quotes part or the whole of clauses 4, 20-22, 28 f., 31, 33, 35 f., 40. The council also quoted phrases from the so-called Creed of Damasus, a docu- ment of the 4th century, which in some cases they preferred to the phrases of the Quicumque. Their quotations form a connect- ing link in the chain of evidence by which the use of the creed may be traced back to the writings of Caesarius, bishop of Aries (503-543). Dom Morin has now demonstrated (" Le Symbole d'Athanase et son premier temoin S. Cesaire d'Arles," Rev. Benedictine, Oct. 1901) that Caesarius used the creed continually as a sort of elementary catechism. The fact that it exactly reproduces both the qualities and the literary defects of Caesarius is a strong argument in favour of Morin's suggestion that he may have been the author. Further, Caesarius was in the habit of putting some words of a distinguished writer at the head of his compositions, which would account for the fact that the name of Athanasius was subsequently attached to the creed.

The use, however, of the Quicumque by Caesarius as a catechism may be explained by the suggestion that it had been taught him in his youth, so that his style had been moulded by it. He was not an original thinker. Moreover, the creed is quoted by his rival Avitus, bishop of Vienne 490-523, who quotes clause 22, as from the Rule of Catholic Faith, but was not likely to value a composition of Caesarius so highly. Morin does not deal fully with the arguments from internal evidence which point back to the beginning of the 5th century as the date of the creed. If the creed-phrases needed sharpening against the revived Nestorian error of the Adoptianists, it is scarcely likely to have been written during the generation following the condemnation of Nestorius in 431. Burn suggests that it was written to meet the Sabellian and Apollinarian errors of the Spanish heretic Priscillian, possibly by Honoratus, bishop of Aries (d. 429). He suggests further that the Creed of Damasus was the reply of that pope to Priscillian's appeal. This would explain the quotation of the two documents together by the council of Toledo, since the heresy lasted on for a long time in Spain. But the theory has been carried to extravagant lengths by Kiinstle, who thinks that the creed was written in Spain in the 5th century, and soon taken to the monastery of Lerins. There are phrases in the writings of Vincentius of Lerins and of Faustus, bishop of Riez, which are parallel to the teaching of the creed, though they cannot with any confidence be called quotations. They tend in any case to prove that the Quicumque comes to us from the school of Lerins, of which Honoratus was the first abbot, and to which Caesarius also belonged.

The earliest use of the Quicumque was in sermons, in which the

clauses were quoted, as by the council of Toledo without reference to the creed as a whole. From the 8th century, if not from earlier times, commentaries were written on it. The writer of the Oratorian Commentary (Theodulf of Orleans?) addressing a synod which instructed him to provide an ex- position of this work on the faith, writes of it, as ” here and there recited in our churches, and continually made the subject of meditation by our priests.” It was soon used as a canticle. Angilbert, abbot of St Riquier (c. 814), records that it was sung by his school in procession on rogation days. It passed into the office of Prime, apparently first at Fleury. In the first Prayer Book of Edward VI. it was ” sung or said ” after the Benedictus on the greater feasts, and this use was extended in the second Prayer Book. In 1662 the rubric was altered and it was sub- stituted for the Apostles' Creed. It has no place in the offices of the Eastern Orthodox Church, but is found, without the words ” And the Son ” of clause 22, in the appendix of many modern

editions. In the Russian service books it appears at the beginning of the psalter.

The controversy on its use in modern times has turned mainly on the interpretation of the warning clauses. No new translation can put an end to the difficulty. While it is true that the Church has never condemned individuals, and that the warnings refer only to those who have received the faith, and do not touch the question of the unbaptized, there is a growing feeling that they go beyond the teaching of Holy Scripture on the responsi- bility of intellect in matters of faith. 1 ■

On the other hand the creed is a valuable statement of Catholic faith on the Trinity and the Incarnation, and its use for students and teachers at least is by no means obsolete. The special characteristic of its theology is in the first part where it owes most to the teaching of Augustine, who in his striving after self-knowledge analysed the mystery of his own triune person- ality and illustrated it with psychological images, ” I exist and I am conscious that I exist, and I love the existence and the consciousness; and all this independently of any external influence.” Such a riper analysis of the mystery of his own personality enabled him to arrive at a clearer conception of the

idea of divine personality, ” whose triunity has nothing potential or unrealized about it; whose triune elements are eternally actualized, by no outward influence, but from within; a Trinity in Unity.” 2

II. Modern Confessions or Faith. — The second great cieed-making epoch of Church history opens in the 16th century with the Confession of Augsburg. The famous theses which Luther nailed to the door of the church at Wittenberg in 151 7 cannot be called a confession, but they expressed a protest which could not rest there. Some reconstruction of popular beliefs was needed by many consciences. There is a striking contrast between the crudeness of much and widely accepted medieval theology and the decrees of the council of Trent. Even from the Roman Catholic standpoint such a need was felt. Luther himself had a gift of words which through his catechisms made the re- formed theologypopular in Germany. Ini53oitbecamenecessary to define his position against both Romanists and Zwinglians.

1. The Confession of Augsburg was drawn up by Melanchthon, revised by Luther, and presented to the emperor Charles V. at the diet of Augsburg. Some 21 of its articles dealt confession, with doctrine, 7 with ecclesiastical abuses. It ex- pounded in terse and significant teaching the doctrine (1) of God, (2) of original sin, (3) of the Son of God, (4) of justi- fication . . . , (21) of the worship of saints. The abuses which it was maintained had been corrected by Lutheranism were discussed in articles (1) on Communion in both kinds, (2) on the marriage of clergy, (3) on the Mass, &c. (see Augsburg, Confession of).

The main difference between these, the first of a long series of articles of religion and the ancient creeds, lies in the fact that they are manifestoes embodying creeds and answering more than one purpose. This is the reason of their frequent failure to convey any sense of proportion in the expression ‘ of truth. The disciplinary question of clerical marriage is not of the same primary importance as the doctrinal questions involved in the restoration of the cup to the laity, or discussed in the subsequent article on the mass. As has been well said by a learned Baptist theologian, Dr Green: ” It was by a true divine instinct that the early theologians made Christ Himself, in His divine-human per- sonality, their centre of the creeds.” 3 The fundamental questions of Christianity, exhibited in theApostles’ Creed, should be marked

1 In response to an invitation issued by the archbishop of Canter- bury, acting on a resolution of the Lambeth Conference of 1908, a committee of eminent scholars met in April and May 1909 for the purpose of preparing a new translation. Their report, issued on the 1

8th of October, stated that they had ” endeavoured to represent the Latin original more exactly in a large number of cases.” The general effect of the new version is to make the creed more comprehensible, eg. by the substitution of “infinite” and “reasoning” for such archaisms as ” incomprehensible ” and ” reasonable.” The sense of the damnatory clauses has, however, not been weakened. [Ed.]

2 Illingworth, Personality, Human and Divine, p. 40.

8 The Christian Creed and the Creeds of Christendom, p. 181.

off as standing on a higher plane than others. In this respect catechisms of modern times, from Luther’s down to the recent Evangelical catechism of the Free Churches, and including from their respective points of view both the catechism of the Church of England and the catechism of the council of Trent, are markedly superior to articles and synodical decrees. The failure of the latter was really inevitable. In the 16th century a spirit of universal questioning was rife, and it is this utter unsettlement of opinion which is reflected in the discussions of doubts on matters only remotely connected with ” the faith once for all delivered unto the saints ” (Jude 3). Moreover, fresh complica- tions arose from the confusion in which the question of the duties and rights of the civil power was entangled. In an age when the foundations of the system on which society had rested for cen- turies were seriously shaken, such subjects as the right of the magistrate to interfere with the belief of the individual, and the limits of his authority over conscience, naturally assumed a prominence hitherto unknown. 4

2. Other Lutheran Formularies. — For the purpose of classifica tion it will be convenient to discuss Lutheran, Zwinglian and Calvinistic confessions separately.

An elaborate Apology for the confession of Augsburg was drawn up by Melanchthon in reply to Roman Catholic criticisms. This, together with the confession, the articles of L U t aeran . Schmalkalden, drawn up by Luther in 1536, Luther’s catechisms, and the Formula of Concord which was an attempt to settle doctrinal divisions promulgated in 1580, sum up what is called ” the confessional theology of Lutheranism.” Of less influence in the subsequent history of Lutheranism, but of interest as used by Archbishop Parker in the preparation of the Elizabethan articles of 1563, is the confession of Wurttemberg. It was presented to the council of Trent by the ambassador of the state of Wurttemberg in 1552. Its thirty-five articles contain a moderate statement of Lutheran teaching.

3. Zwinglian and Calvinistic Confessions. — The confession of the Four Cities, Strassburg, Constance, Memmingen and London, was drawn up by M. Bucer and was presented to Charles

V. at Ausburg in 1 530. These cities were inclined to Zw "X ,laa follow Zwingli in his sacramental teaching which was calvinist more fully expressed in the Confession of Basel (1534) and the First Helvetic Confession (1536). Calvin's views were expressed in the Gallican Confession, containing forty articles, which was drawn up in 1559, and was presented both to Francis II. of France and to Charles IX. On the same lines the Belgian Confession of 1561, written by Guido de Bres in French, and translated into Dutch was widely accepted in the Netherlands and confirmed by the synod of Dort (1619). The second Helvetic Confession was the work of Bullinger, published at the request of the Elector Palatine Frederick III. in 1566, and was held in repute in Switzerland, Poland and France as well as the Pala- tinate. It was sanctioned in Scotland and was well received in England.

These confessions teach the root idea of Calvin's theology, the immeasurable awfulness of God, His eternity, and the immutability of His decrees. Such strict Calvinism was the strength also of the Westminster Confession (see below), but was soon weakened in Germany. This same Elector Frederick invited two young divines, Zacharias Ursinus and Caspar Olevianus, to prepare the afterwards celebrated Heidelberg catechism, which in 1563 superseded Calvin's catechism in the Palatinate. While Calvin began sternly with the question; " What is the chief end of human life? " Ans. : " That men may know God by whom they were created," — the Heidelberg catechism has: " What is thy only comfort in life and death?" Ans.: " That I with body and soul, both in life and death, am not my own, but belong to my faithful Saviour Jesus Christ." This catechism has been called the charter of the German Reformed Church. It contains three divisions dealing with (1) man's sin, misery, redemption, (2) the Trinity, (3) thankfulness, under which is included all practical Christian life lived in gratitude for mercies received.

4 Gibson, The Thirty-nine Articles, p. 2,

Articles of religion.

4. English Articles of Religion. — The ten articles of 1536 were drawn

up by Convocation at the bidding of Henry VIII. ” to stablysh Christian Quietnes and Unitie.” They exhibit a traditional character, a compromise be- tween the old and the new learning. Thus the doctrine of the Real Presence is asserted, but no mention is made of Transubstantiation. Medieval ceremonies are described as useful but without power to remit sins. Two years later, after negotiations with the Lutheran princes, a conference on theological matters was held at Lambeth with Lutheran envoys. Thirteen articles were drawn up, which, though never published (they were found among Cranmer’s papers at the beginning of the 19th century), had some influence on the forty-two articles. Some of them were taken from the confession of Augsburg, but the sections on Baptism, the Eucharist and penance, show that the English theologians desired to lay more emphasis on the character of sacraments as channels of grace. The Statute of the Six Articles (1539), ” the whip with six strings,” was the outcome of the retro- grade policy which distinguished the latter years of Henry VIII.

With the accession of Edward VI. liturgical reforms were set on foot before an attempt was made to systematize doctrinal teaching. But as early as 1549 Cranmer had in hand ” Articles of Religion ” to which he required all preachers and lecturers to subscribe. In 1552 they were revised by other bishops and were laid before the council and the royal chaplains. They were then published as ” Articles agreed on by the bishops and other learned men in the Synod of London.” But there is considerable doubt whether they really received the sanction of Convocation (Gibson, p. 15). They were not devised as a complete scheme of doctrine, but only as a guide in dealing with current errors of (i.) the Medievalists and (ii.) the Anabaptists. Under (i.) they condemned the doctrine of the school authors on congruous merit (Art. xii.), the doctrine of grace ex opere operato (xxvi.). Transubstantiation (xxix.). Under (ii.) they laid stress on the fundamental articles of the faith (Art. i.-iv.), affirmed the Three Creeds (vii.), since many Anabaptists held Arian and Socinian opinions which were rife in Switzerland, Italy and Poland, condemning also their views on original sin (viii.), community of goods (xxxvii.), and on other subjects in articles which do not mention them by name.

The revision undertaken in 1563 by Archbishop Parker, aided by Edm. Guest, bishop of Rochester, shows ” an attempt to give greater completeness to the formulary,” and to make clearer the Catholic position of the Church of England. For the clause (Art. xxviii.) which denied the Real Presence was substituted one by Guest with the desire ” not to deny the reality of the presence of the Body of Christ in the Supper, but only the grossness and sensibleness in the receiving thereof.” At the same time the substitution of ” Romish doctrine ” for ”

doctrine of School authors ” (Art. xxii.) marks an effort to define the line of the Church of England sharply against current Roman teaching. The revision was passed by Convocation and again revised in 1571, when the queen had been excommunicated by papal bull, and an act was passed ordering all clergy to subscribe to them. They have remained unchanged ever since, though the terms of subscription have been modified.

An attempt was made to add nine articles of a strong Calvin- istic tone, which were drawn up by Dr Whitaker, regius professor of divinity at Cambridge, and submitted to Archbishop Whitgift. They were rejected both by Queen Elizabeth, and, after the Hamp- ton Court Conference petitioned about them, by King James I.

The first Scottish confession dates from 1 560. It is a memorial of the intellectual power and enthusiasm of John Knox. It exhibits the leading features of the Reformed theology, but ” disclaims Divine authority for any fixed form of church govern- ment or worship.” It also asks that ” if anyone shall note in this our confession any articles or sentence repugnant of God’s Holy Word, that it would please him of his gentleness and for Christian charity’s sake, to admonish of the same in writing,” promising that if the teaching cannot be proved, to reform it. Between this and the Westminster Confession must be noted the first Baptist confession, published in Amsterdam in 161 1.

It shows the influence of Arminian theology against Calvinism, which was vigorously upheld in the Quin-particular formula, put forward by the synod of Dort in 1619 to uphold the five points of Calvinism, after heated discussion, in which English delegates took part, of the problems of divine omniscience and human free-will.

5. The Westminster Confession (1648), with its two catechisms. is perhaps the ablest of the reformed confessions from the stand-‘ point of Calvinism. Its keynote is sovereignty. west-

” The Decrees of God are His eternal Purpose according minster to the Counsel of His Will, whereby for His Own Glory Contes- He hath foreordained whatsoever comes to pass.” sion ‘ Man’s part is to accept them with submission. As the Anglican divines soon ceased to attend the assembly, and the Independents were few in number, it was the work of Presbyterians only, the Scottish members carrying their proposal to make it an independ- ent document and not a mere revision of the Thirty-nine Articles. After discussions lasting for two years it was debated in parlia- ment, finished on the 22nd of March 1648, and was adopted by the Scottish parliament in the following

year. It is the only confession which has been imposed by authority of parliament on the whole of the United Kingdom. This lasted in England for ten years. In Scotland its influence has continued to the present day, contributing not a little to mould the high qualities of religious insight and courage and perseverance which have honourably distinguished Scottish Presbyterians all the world over. This was the last great effort in constructive theology of the Reformation period. When Cromwell before his death in 1658 allowed a conference to prepare a new confession of faith for the whole commonwealth, the Westminster Confession was accepted as a whole with an added statement on church order and disci- pline. We must note, however, that the Baptist divines who were excluded from the Westminster Assembly issued a declara- tion of their principles under the title, ” A Confession of Faith of seven Congregations or Churches in London which are commonly but unjustly called Anabaptists, for the Vindication of the Truth and Information of the Ignorant.”

Two other declarations may be quoted to show how necessary such confessions are even to religious societies which refuse to be bound by them. In 1675 Robert Barclay published an ” Apology for the Society of Friends,” in which he declared what they held concerning revelation, scripture, the fall, redemption, the inward light, freedom of conscience.

In 1833 the Congregational Union published a Declaration or Confession of Faith, Church Order and Discipline. It was prepared by Dr George Redford or Worcester, and was presented, not as a scholastic or critical confession of faith, but merely such a state- ment as any intelligent member of the body might offer as con- taining its leading principles. It deals with the Bible as the final appeal in controversy, the doctrines of God, man, sin, the Incar- nation, the Resurrection of our Lord Jesus Christ, ” both the Son of man and the Son of God,” the work of the Holy Spirit, justi- fication by faith, the perpetual obligation of Baptism and the Lord’s Supper, final judgment, the law of Christian fellowship. The same principles have been lucidly stated in the Evangelical Free Church catechism.

6. Confessions in the Eastern Orthodox Church. — The Eastern Church has no general doctrinal tests beyond the Nicene Creed, but from time to time synods have approved exposi- tions of the faith such as the Athanasian Creed (without the words “And the Son”), and the Orthodox Confession of the Catholic and Apostolic Eastern Church. This was the work of Petrus Mogilas, metro- politan of Kiev, and other theologians. It was written in 1640 in Russian, was translated into Greek, and approved by the council of Jassy and the patriarchs of

Constantinople, Alexan- dria, Antioch and Jerusalem. It was affirmed by the council of Jerusalem in 1672, which also affirmed the Confession of Dositheus, patriarch of Jerusalem. Both of these confessions were drawn up to confute the teaching of a remarkable man who had been patriarch of Constantinople, Cyril Lucar. He was a student of Western theology, a correspondent of Archbishop Laud, and had travelled in Germany and Switzerland. In 1629 he

Oreek church.

published a confession in which he attempted to incorporate ideas of the reformers while preserving the leading ideas of Eastern traditional theology. The controversy chiefly turned on the question of the necessity of episcopacy. Dositheus taught that the existence of bishops is as necessary to the Church as ” breath to a man and the sun to the world.” Christ is the universal and perpetual Head of the Church, but he exercises his rule by means of “the holy Fathers,” that is, the bishops whom the Holy Ghost has appointed to be in charge of local churches.

Mention may also be made of the longer catechism of the Orthodox Catholic Church compiled by Philaret, metropolitan of Moscow, revised and adopted by the Russian Holy Synod in 1839. The Church is defined as “a divinely-instituted community of men, united by the orthodox faith, the law of God, the hier- archy and the sacraments.”

7. Roman Catholic Formularies. — For our present purpose the

distinctive features of Roman Catholicism may be said to be

summed up in the decrees of the council of Trent and

*°™ a f. the creed of Pope Pius IV. The council sat at intervals Catholic. ;T * , 111.

from 1545-1563, but there was a marked divergence

between the opinions advocated by prominent members of the

council and its final decrees. Cardinal Pole had to leave the

council because he advocated the doctrine of justification by

faith. Even at the later sessions the cardinal of Lorraine with the French prelates supported the German representatives in requests for the cup for the laity,the permission of the marriage of priests, and the revision of the breviary. Finally the decisions of the council were promulgated in a declaration of XII. articles, usually called the Creed of Pius IV., which reaffirmed the Nicene Creed, and dealt with the preservation of the apostolic and ecclesiastical traditions, the interpretation of the Holy Scriptures ” according to the sense which our Holy Mother Church has held,” the seven sacraments, the offering of the mass, transubstantiation, purgatory, the veneration of saints, relics, images, the efficacy of indulgences, the supremacy of the Roman Church and of the bishop of Rome as vicar of Christ. To this summary of doctrine should be added the dogmas of the immaculate conception of the Blessed Virgin declared in 1854, and of papal infallibility decreed by the Vatican council of 1870.

Conclusion. — In this survey of Christian confessions it has been impossible to do more than barely name many which deserve discussion. This is a subject which has grown in import- ance and is likely to grow further. The very intensity of that phase of modern thought which declaims fervently against all creeds, and would maintain what George Eliot called ” the right of the individual to general haziness,” is likely to draw all Christian thinkers nearer to one another in sympathy through acceptanceof the Apostles’ Creed as the common basis of Christian thought. In the words of Hilary of Poitiers, ” Faith gathers strength through opposition.”

The question at once arises, Can the simple historic faith be maintained without adding theological interpretations, those arid wastes of dogma in which the springs of faith and reverence run dry? The answer is No. We cannot ask to be as if through nineteen

centuries no one had ever asked a question about the relation of the Lord Jesus Christ to the Father and the Holy Spirit. If we could come back to the Bible and use biblical terms only, as Cyril of Jerusalem wished in his early days, we know from experience that the old errors would reappear in the form of new questions, and that we should have to pass through the dreary wilderness of controversy from implicit to explicit dogma, from ” I believe that Jesus is the Lord ” to the confession that the Only Begotten Son is ” of one substance with the Father.” In the words of Hilary again:

” Faithful souls would be contented with the word of God which bids us: ‘ Go teach all nations, baptizing them in the name of the Father and of the Son and of the Holy Ghost.’ But also we are drawn by the faults of our heretical opponents to do things unlawful, to scale heights inaccessible, to speak out what is unspeakable, to presume where we ought not. And whereas it is by faith alone that we should worship the Father and reverence the Son, and be filled with the Spirit, we are now obliged to strain our weak human language in the utterance of things beyond its scope; forced into

this evil procedure by the evil procedure of our foes. Hence what should be matter of silent religious meditation must now needs be imperilled by exposition in words.”

The province of reverent theology is to aid accurate thinking by the use’ ofimetaphysical or psychological terms. Its definitions are no more an end in themselves than an analysis of good drinking water, which by itself leaves us thirsty but encourages us to drink. So the Nicene Creed is the analysis of the river of the water of life of which the Sermon on the Mount is a descrip- tion, flowing on from age to age, freely offered to the thirsty souls of men.

This justification of the ancient creeds carries with it the justification of later confessions so far as they answered questions which would be fatal to religion if they were not answered. As Principal Stewart puts it very clearly: ” The answer given is based on the philosophy or science of the period. It does not necessarily form part of the religion itself, but is the best which with the materials at its command, in its own defence and in its love for truth, the religion (and its advocates) can give. But the answers may be superseded by better answers, or they may be rendered unnecessary because the questions are no longer asked. Thus the Calvinism of the 16th and 17th centuries elaborated answers to questions, which if no attempt had been made to answer them, would have perplexed earnest souls and condemned the ‘system; but many parts of the system are now obsolete, because the conditions

which suggested the questions which they sought to answer no longer exist or have no longer any interest or importance.”

Literature. — See J. Pearson, Exposition of the Creed (new ed., 1849); A. E. Burn, Introduction to the Creeds (1899), and The Athanasian Creed in vol. iv. of Texts and Studies (1896) ; H. B. Swete, The Apostles’ Creed (1899) ; F. Kattenbusch, Das apostolische Symbol (1894-1900); C. A. Heurtley, Harmonia Symbolica (1858): C. P. Caspari, Quellen zur Geschichte des Taufsymbols und der Glaubens-regel (Christiama, 1866) ; and Alte und neue Quellen (1879) ; T. Zahn, Das apostolische Symbolum (1893) ; C. A. Swainson, The Nicene and Apostles’ Creed (1875); G. D. W. Ommanney, The Athanasian Creed (1897); B. F. Westcott, The Historic Faith (1882); J. Jayne, The ; Athanasian Creed (1905) ; J. A. Robinson, The Athanasian Creed (1905); E. C. S. Gibson, The Three Creeds (1908); F. J. A. Hort, Two Dissertations (1876); D. Waterland, Crit. Hist, edited by E. King (Oxford, 1870); F. Loofs and A. Harnack articles in Herzog- Hauck’s Realencyklopddie (” Athanasianum ” and ” Konstantino- politanisches Symbol”) (1896), &c. ; K. Kunstle, Antipriscilliana (Freiburg i. B., 1905); A. Stewart, Croall Lectures (in the press); S. G. Green, The Christian Creed (1898); P. Hall, Harmony of Protestant Confessions (London, 1842) ; F. Kattenbusch, Con- fessionskunde (Freiburg i. B., 1890); Winex’s Confessions of Christendom (Eng. trans., Edinburgh, 1865) ; A. Seeberg, Der Katechismus der Urchristenheit (Leipzig, 1903) ; F. Wiegand, Die Stellung des apostolischen Symbols (Leipzig, 1899); H. Goodwin, The Foundations of the Creed (London, 1889); T. H. Bindley, The Oecumenical Documents of the Faith (London, 1906) ; J. Kunze, Das nicdnisch-konstantinopolitanische Symbol; S. Baeumer, Das apostolische Glaubensbekenntnis (Mainz, 1893); B. Doxholt, Das Taufsymbol. der alten Kirche (Paderborn, 1898); L. Hahn, Bibliothek der Symbole u. Glaubensregeln (Breslau, 1897) ; A. C. McGiffert, The Apostles’ Creed (Edinburgh, 1902) ; and F. Loofs, Symbolik (Leipzig, 1902). (A. E. B.)

CREEK (Mid. Eng. crike or creke, common to many N. European languages), a small inlet on a low coast, an inlet in a river formed by the mouth of a small stream, a shallow narrow harbour for small vessles. In America and Australia especially there are many long streams which can be everywhere forded and sometimes dry up, and are navigable only at their tidal estuaries, mere brooks in width which are of great economic importance. They form complete river-systems, and are the only supply of surface water over many thousand square miles. They are at some seasons a mere chain of ” water-holes,” but occasionally they are strongly flooded. Since exploration began at the coast and advanced inland, it is probable that the explorers, advancing

up the narrow inlets or ” creeks,” used the same word for the streams which flowed into these as they followed their courses upward into the country. The early settlers would use the same word for that portion of the stream which flowed through their own land, and in Australia particularly the word has the same local meaning as brook in England. On a map the whole system is called a river, e.g. the river Wakefield in South Australia gives

its name to Port Wakefield, but the stream is always locally called ” the creek.”

CREEK or MUSKOGEE (Muscogee) INDIANS (Algonquin maskoki, ” creeks,” in reference to the many creeks and rivulets running through their country) , a confederacy of North American Indians, who formerly occupied most of Alabama and Georgia. The confederacy seems to have been in existence in 1 540, and then included the Muskogee, the ruling tribe, whose language was generally spoken, the Alabama, the Hichiti, Koasati and others of the Muskogean stock, with the Yuchi and the Natchez, a large number of Shawano and the Seminoles of Florida as a branch. The Creeks were agriculturists living in villages of log houses. They were brave fighters, but during the 18th century only had one struggle, of little importance, with the settlers. The Creek War of 1813-14 was, however, serious. The confederacy was completely defeated in three hard-fought battles, and the peace treaty which followed involved the cession to the United States government of most of the Creek country. In the Civil War the Creeks were divided in their allegiance and suffered heavily in the campaigns. The so-called Creek nation is now settled in Oklahoma, but independent government virtually ceased in 1906. In 1904 they numbered some 16,000, some two-thirds being of pure or mixed Creek blood.

CREETOWN, a seaport of Kirkcudbrightshire, Scotland. Pop. (1901) 991. It is situated near the head of Wigtown Bay, 18 m. W. of Castle Douglas, but 235 m. by the Portpatrick and Wigtownshire Railway. The granite quarries in the vicinity constitute the leading industry, the stone for the Liverpool docks and other public works having been obtained from them. The village dates from 1785, and it became a burgh of barony in 1792. Sir Walter Scott laid part of the scene of Guy Mannering in this neighbourhood. Dr Thomas Brown, the metaphysician (1778-1820), was a native of the parish (Kirkmabreck)

in which Creetown lies.

CREEVEY, THOMAS (1 768-1838), English politician, son of William Creevey, a Liverpool merchant, was born in that city in March 1768. He went to Queen's College, Cambridge, and graduated as seventh wrangler in 1789. The same year he be- came a student at the Inner Temple, and was called to the bar in 1794. In 1802 he entered parliament through the duke of Norfolk's nomination as member for Thetford, and married a widow with six children, Mrs Ord, who had a life interest in a cgmfortable income. Creevey was a Whig and a follower of Fox, and his active intellect and social qualities procured him a con- siderable intimacy with the leaders of this political circle. In 1806, when the brief " All the Talents " ministry was formed, he was given the office of secretary to the Board of Control; in 1830, when next his party came into power, Creevey, who had lost his seat in parliament, was appointed by Lord Grey treasurer of the ordnance; and subsequently Lord Melbourne made him treasurer of Greenwich hospital. After 1818, when his wife died, he had very slender means of his own, but he was popular with his friends and was well looked after by them; Greville, writing of him in 1829, remarks that " old Creevey is a living proof that a man may be perfectly happy and exceedingly poor. I think he is the only man I know in society who possesses nothing." He died in February 1838. He is remembered through the Creevey Papers, published in 1903 under the editorship of Sir Herbert Maxwell, which, consisting partly of Creevey's own journals and partly of correspondence, give a lively and valuable picture of the political and social life of the late Georgian era, and are characterized by an almost Pepysian outspokenness. They are a useful addition and correction to the Croker Papers, written from a Tory point of view. For thirty-six years Creevey had kept a " copious diary," and had preserved a vast miscellane- ous correspondence with such people as Lord Brougham, and his step-daughter, Elizabeth Ord, had assisted him, by keeping his letters to her, in compiling material avowedly for a collection of Creevey Papers in the future. At his death it was found that he had left his mistress, with whom he had lived for four years, his sole executrix and legatee, and Greville notes in his Memoirs the anxiety of Brougham and others to get the papers into their I

hands and suppress them. The diary, mentioned above, did not survive, perhaps through Brougham's success, and the papers from which Sir Herbert Maxwell made his selection came into his hands from Mrs Blackett Ord, whose husband was the grand- son of Creevey's eldest step-daughter.

CREFELD, or Krefeld, a town of Germany, in the Prussian Rhine

province, on the left side of and 3 m. distant from the Rhine, 3 2 m. N.W. from Cologne, and 15 m.N.W. fromDiisseldorf. with which it is connected by a light electric railway. Pop. (1875) 62,905; (1905) 110,410. The town is one of the finest in the Rhine provinces, being well and regularly built, and possessing several handsome squares and attractive public gardens. A striking point about the inner town is that it forms a large rect- angle, enclosed by four wide boulevards or " walls." This feature, rare in German towns, is due to the fact that Crefeld was always an " open place," and that therefore the circular form of a fortress town could be dispensed with. It has six Roman Catholic and four Evangelical churches (of which the Gothic Friedens-kirche with a lofty spire, and the modern church of St Joseph, in the Romanesque style, are alone worth special mention) ; there are also a Mennonite and an Old Catholic church. The town hall, decorated with frescoes by P. Janssen (b.1844), and the Kaiser Wilhelm Museum are the most noteworthy secular buildings. In the promenades are monuments to Moltke, Bismarck and Karl Wilhelm, the composer of the Wacht am Rhein. Among the schools and scientific institutions of the town the most important is the higher grade technical school for the study of the textile industries, which is attended by students from all parts of the world. Connected with this are subsidiary schools, notably one for dyeing and finishing.

Crefeld is the most important seat of the silk and velvet manufactures in Germany, and in this industry the larger part of the population of town and neighbourhood is employed. There are upwards of 12,000 silk power-looms in operation, and the value of the annual output in this branch alone is estimated at £3,000,000. A special feature is the manufacture of silk for covering umbrellas; while of its velvet manufacture that of velvet ribbon is the chief. The other industries of the town, notably dyeing, stuff-printing and stamping, are very considerable, and there are also engineering and machine shops, chemical, cellulose, soap, and other factories, breweries, distilleries and tanneries. The surrounding fertile district is almost entirely laid out in market gardens. Crefeld is an important railway centre, and has direct communication with Cologne, Rheydt, Miinchen-Gladbach and Holland (via Zevenaar).

Crefeld is first mentioned in records of the 12th century. From the emperor Charles IV. it received market rights in 1361 and the status of a town in 1373. It belonged to the counts of Mors, and was annexed to Prussia, with the countship, in 1702. It remained a place of little importance until the 17th century, when religious persecution drove to it a number of Calvinists and Separatists from Julich and Berg (followed later by Mennonites), who introduced the manufacture of

linen. The number of such immigrants still further increased in the 18th century, when, the silk industry having been introduced from Holland, the town rapidly developed. The French occupation in 1795 and the resulting restriction of trade weighed for a while heavily upon the new industry; but with the termination of the war and the re-establishment of Prussian rule the old prosperity returned.

CREIGHTON, MANDELL (1843-1901), English historian and bishop of London, was born at Carlisle on the 5th of July 1843, being the eldest son of Robert Creighton, a well-to-do upholsterer of that city. He was educated at Durham grammar school and at Merton College, Oxford, where he was elected to a postmaster- ship in 1862. He obtained a first-class in literae humaniores, and a second in law and modern history in 1866. In the same year he became tutor and fellow of Merton. He was ordained deacon, on his fellowship, in 1870, and priest in 1873; in 1872 he had married Louise, daughter of Robert von Glehn, a London merchant (herself a writer of several successful books of history). Meanwhile he had published several small historical works; but his college and university duties left little time for writing,

and in 1875 he accepted the vicarage of Embleton, a parish on the coast of Northumberland, near Dunstanburgh, with an ancient and beautiful church and a fortified parsonage house, and within reach of the fine library in Bamburgh Keep. Here he remained for nearly ten years, acquiring that experience of parochial work which afterwards stood him in good stead, taking private pupils, studying and writing, as well as taking an active part in diocesan business. Here too he planned and wrote the first two volumes of his chief historical work, the History of the Papacy; and it was in part this which led to his being elected- in 1884 to the newly-founded Dixie professor- ship of ecclesiastical history at Cambridge, where he went into residence early in 1885. At Cambridge his influence at once made itself felt, especially in the reorganization of the historical school. His lectures and conversation classes were extra- ordinarily good, possessing as he did the rare gift of kindling the enthusiasm without curbing the individuality of his pupils. In 1886 he combined with other leading historians to found the English Historical Review, of which he was editor for five years. Meanwhile the vacations were spent at Worcester, where he had been nominated a canon residentiary in 1885. In 1891 he was made canon of Windsor; but he never went into residence, being appointed in the same year to the see of

Peterborough. He threw himself with characteristic energy into his new work, visiting, preaching and lecturing in every part of his diocese. He also found time to preach and lecture elsewhere, and to deliver remarkable speeches at social functions; he worked hard with Archbishop Benson on the Parish Councils Bill (1894) ; he became the first president of the Church Historical Society (1894), and continued in that office till his death; he took part in the Laud Commemoration (1895); he represented the English Church at the coronation of the tsar (1896). He even found time for academical work, delivering the Hulsean lectures (1893-1894) and the Rede lecture (1894) at Cambridge, and the Romanes lecture at Oxford (1896).

In 1897, on the translation of Dr Temple to Canterbury, Bishop Creighton was transferred to London. During Dr Temple's episcopate ritual irregularities of all kinds had grown up, which left a very difficult task to his successor, more especially in view of the growing public agitation on the subject, of which he had to bear the brunt. As was only natural, his studied fairness did not satisfy partisans on either side; and his efforts towards conciliation laid him open to much misunderstanding. His administration, none the less, did much to preserve peace. He strained every nerve to induce his clergy to accept his ruling on the questions of the reservation of the Sacrament and of the ceremonial use of incense in accordance with the archbishop's judgment in the Lincoln case; but when, during his last illness, a prosecutor brought proceedings against the clergy of five recalcitrant churches, the bishop, on the advice of his arch- deacons, interposed his veto. One other effort on behalf of peace may be mentioned. In accordance with a vote of the diocesan conference, the bishop arranged the " Round Table Conference " between representative members of various parties, held at Fulham in October 1900, on " the doctrine of the Holy Eucharist and its expression in ritual," and a report of its proceedings was published with a preface by him. The true work of his episcopate was, however, positive, not negative. He was an excellent administrator; and his wide knowledge, broad sympathies, and sound common sense, though they placed him outside the point of view common to most of his clergy, made him an invaluable guide in correcting their too often in- discreet zeal. He fully realized the special position of the English Church in Christendom, and firmly maintained its essential teaching. Yet he was no narrow Anglican. His love for the English Church never blinded him to its faults, and no man was less insular than he. As he was a historian before he became a bishop, so it was his historical sense which determined his general attitude as a bishop. It was this, together with a certain native taste for ecclesiastical pomp, which made him —

while condemning the unhistorical extravagances of the ultra-ritualists — himself a ritualist. He was the first bishop of London,

since the Reformation, to ” pontificate ” in a mitre as well as the cope, and though no man could have been less essentially ” sacerdotal ” he was always careful of correct ceremonial usage. His interests and his sympathies, however, extended far beyond the limits of the church. He took a foremost part in almost every good work in his diocese, social or educational, political or religious; while he found time also to cultivate friendly relations with thinking men and women of all schools, and to help all and sundry who came to him for advice and assistance. It was this multiplicity of activities and interests that proved fatal to him. By degrees the work, and especially the routine work, began to tell on him. He fell seriously ill in the late summer of 1900, and died on the 14th of January 1901. He was buried in St Paul’s cathedral, where a statue surmounts his tomb.

He was a man of striking presence and distinguished by a fine courtesy of manner. His irrespressible and often daring humour, together with his frank distaste for much conventional religious phraseology, was a stumbling-block to some pious people. But beneath it all lay a deep seriousness of purpose and a firm faith in what to him were the fundamental truths of religion.

Bishop Creigh ton’s principal published works are: History oj the Papacy during the Period of the Reformation (5 vols., 1882- 1897, new ed.); History of the Papacy from the Great Schism to the Sack of Rome (6 vols., 1897); The Early Renaissance in England (1895); Cardinal Wolsey (1895); Life of Simon de Montfort (1876, new ed. 1895); Queen Elizabeth (1896). He also edited the series of Epochs of English History, for which he wrote “The Age of Elizabeth” (13th ed., 1897); Historical Lectures and Addresses by Mandell Creighton, htc, edited by Mrs Creighton, were published in 1903.

See Life and Letters of Mandell Creighton, &fc, by his wife (2 vols., 1904) ; and the article ” Creighton and Stubbs ” in Church Quarterly Review for Oct. 1905.

CREIL, a town of northern France, in the department of Oise, 32 m. N. of Paris on the Northern railway, on which it is an important junction. Pop. (1906) 9234. The town is situated on the Oise, on which it has a busy port. The manufacture of machinery, heavy iron goods and nails, and copper and iron founding, are important industries, and there are important metallurgical and engineering works at Montataire, about 2 m. distant; bricks and tiles and glass are also manufactured, and the

Northern railway has workshops here. The church (12th to 15th centuries) is in the Gothic style. There are some traces of a castle in which Charles VI. resided during the period of his madness. Creil played a part of some importance in the wars of the 14th, 15th and 1 6th centuries.

CRELL (or Krell), NICHOLAS (c. 1551-1601), chancellor of the elector of Saxony, was born at Leipzig, and educated at the university of his native town. About 1580 he entered the service of Christian, the eldest son of Augustus I., elector of Saxony, and when Christian succeeded his father as elector in 1586, be- came his most influential counsellor. Crell's religious views were Calvinistic or Crypto-Calvinistic, and both before and after his appointment as chancellor in 1589 he sought to substitute his own form of faith for the Lutheranism which was the accepted religion of electoral Saxony. Calvinists were appointed to many important ecclesiastical and educational offices; a translation of the Bible with Calvinistic annotations was brought out; and other measures were taken by Crell to attain his end. In foreign politics, also, he sought to change the traditional policy of Saxony, acting in unison with John Casimir, administrator of the Rhenish Palatinate, and promising assistance to Henry IV. of France. These proceedings, coupled with the jealousy felt at Crell's high position and autocratic conduct, made the chan- cellor very unpopular, and when the elector died in October 1 59 1 he was deprived of his offices and thrown into prison by order of Frederick William, duke of Saxe-Altenburg, the regent for the young elector Christian II. His trial was delayed until 1 595, and then, owing partly to the interference of the imperial court of justice (Reichskammergericht) , dragged on for six years. At length it was referred by the emperor Rudolph II. to a court

of appeal at Prague, and sentence of death was passed. This was carried out at Dresden on the 9th of October 1601.

See A. V. Richard, Der kurfurstliche sdchsische Kanzler Dr Nicolaus Krell (Frankfort, i860) ; B. Bohnenstadt, Das Prozessver- fahren gegen den kursdchsischen Kanzler Dr Nikolaus Krell (Halle, 1901); F. Brandes, Der Kanzler Krell, ein Opfer des Orthodoxismus (Leipzig, 1873) ; and E. L. T. Henke, Caspar Peucer und Nicolaus Krell (Marburg, 1865).

CREMA, a town and episcopal see of Lombardy, Italy, in the province

of Cremona, 26 m. N.E. by rail from the town of Cremona. Pop. (1901) town, 8027; commune, 9609. It is situated on the right bank of the Serio, 240 ft. above sea-level, in the centre of a rich agricultural district. The cathedral has a fine Lombard Gothic facade of the second half of the 14th century ; the campanile belongs to the same period; the rest of the church has been restored in the baroque style. The clock tower opposite dates from the period of Venetian dominion in the 16th and 1 7th centuries. The castle, which was one of the strongest in Italy, was demolished in 1809. The church of S. Maria, f m. E. of the town, was begun in 1490 by Giov. Batt. Battaggio; it is in the form of a Greek cross, with a central dome, and the exterior is a fine specimen of polychrome Lombard work (E. Gussalli in Rassegna d' arte, 1905, p. 17).

The date of the foundation of Crema is uncertain. In the 10th century it appears to have been the principal place of the territory known as Isola Fulcheria. In the 12th century it was allied with Milan and attacked by Cremona, but was taken and sacked by Barbarossa in 1160. It was rebuilt in 1185. It fell under the Visconti in 1338, ajid joined the Lombard republic in 1447 ; but was taken by the Venetians in 1449, and, except from 1509 to 1529, remained under their dominion until 1797.

CREMATION (Lat. cremare, to burn), the burning of human corpses. This method of disposal of the dead may be said to have been the general practice of the ancient world, with the important exceptions of Egypt, where bodies were embalmed, Judaea, where they were buried in sepulchres, and China, where they were buried in the earth. In Greece, for instance, so well ascertained was the law that only suicides, unteethed children, and persons struck by lightning were denied the right to be burned. At Rome, one of the XII. Tables said, " Hominem mortuum in urbe ne sepelito, neve urito " ; and in fact, from the close of the republic to the end of the 4th Christian century, burning on the pyre or rogus was the general rule. 1 Whether in any of these cases cremation was adopted or rejected for sanitary or for superstitious reasons, it is difficult to say. Embalming would probably not succeed in climates less warm and dry than the Egyptian. The scarcity of fuel might also be a consideration. The Chinese are influenced by the doctrine of Feng-Shui, or incomprehensible wind water; they must have a properly placed grave in their own land, and with this view their corpses are sent home from long distances abroad. Even the Jews used cremation in the vale of Tophet when a plague came; and the modern Jews of Berlin and the Spanish and Portuguese Jews at Mile End cemetery were among the first to welcome the lately revived process. Probably also, some nations had religious objections

to the pollution of the sacred principle of fire, and therefore practised exposure, suspension, throwing into the sea, cave- burial, desiccation or envelopment. 2 Some at least of these methods must obviously have been suggested simply by the readiest means at hand. ■ Cremation is still practised over a great part of Asia and America, but not always in the same form. Thus, the ashes may be stored in urns, or buried in the earth, or thrown to the wind, or (as among the Digger Indians) smeared with gum on the heads of the mourners. In one case the three processes of embalming, burning and burying are gone through ; and in another, if a member of the tribe die at a great distance from home, some of his money and clothes are nevertheless burned by the family. As food, weapons, &c, are sometimes

1 Macrobius says it was disused in the reign of the younger Theodosius (Gibbon v. 411).

2 The Colchians, says Sir Thos, Browne, made their graves in the air, i.e. on trees.

buried with the body, so they are sometimes burned with the body, the whole ashes being collected. 3 The Siamese have a singular institution, according to which, before burning, the embalmed body lies in a temple for a period determined by the rank of the dead man, — the king for six months, and so down- wards. If the poor relatives cannot afford fuel and the other necessary preparations, they bury the body, but exhume it* for burning when an opportunity occurs.

There can be little doubt that the practice of cremation in modern Europe was at first stopped, and has since been prevented in great measure, by the Christian doctrine of the resurrection of the body; partly also by the notion that the Christian's body was redeemed and purified. 4 Some clergymen, however, as the late Mr Haweis in his Ashes to Ashes, a Cremation Prelude (London, 1874), have been prominent in favour of cremation. The objection of the clergy was disposed of by the philanthropist Lord Shaftesbury when he asked, " What would in such a case become of the blessed martyrs? " The very general practice of burying bodies in the precincts of a church in order that the dead might take benefit from the prayers of persons resorting to the church, and the religious ceremony which precedes both European burials and Asiatic cremations, have given the question a religious aspect. It is, however, in the ultimate resort, really a sanitary one. The disgusting results of pit-burial made ceme- teries necessary. But cemeteries are equally liable to over- crowding, and are often nearer to inhabited houses than the old churchyards. It is possible, no doubt, to make a cemetery safe approximately by selecting a soil

which is dry, close and porous, by careful drainage, and by rigid enforcement of the rules prescribing a certain depth (8 to 10 ft.) and a certain superficies (4 yds.) for graves. But a great mass of sanitary objections may be brought against even recent cemeteries in various countries. A dense clay, the best soil for preventing the levitation of gas, is the worst for the process of decomposition. The danger is strikingly illustrated in the careful planting of trees and shrubs to absorb the carbonic acid. Vault-burial in metallic coffins, even when sawdust charcoal is used, is still more dangerous than ordinary burial. It must also be remembered that the cemetery system can only be temporary. The soil is gradually filled with bones; houses crowd round; the law itself permits the reopening of graves at the expiry of fourteen years. We shall not, indeed, as Browne says, ” be knaved out of our graves to have our skulls made drinking bowls and our bones turned into pipes!” But on this ground of sentiment cremation would certainly prevent any interruption of that ” sweet sleep and calm rest ” which the old prayer that the earth might lie lightly has associated with the grave. And in the meantime we should escape the horror of putrefaction and of the ” small cold worm that fretteth the enshrouded form.”

In Europe Christian burial was long associated entirely with the ordinary practice of committing the corpse to the grave. But in the middle of the 19th century many distinguished physicians and chemists, especially in Italy, began prominently to advocate cremation. In 1874, a congress called to consider the matter at Milan resolved to petition the Chamber of Deputies for a clause in the new sanitary code, permitting cremation under the super- vision of the syndics of the commune. In Switzerland Dr Vegmann Ercolani was the champion of the cause (see his Cremation the most Rational Method of Disposing of the Dead, 4th ed., Zurich, 1874). So long ago as 1797 cremation was seriously discussed by the French Assembly under the Directory, and the events of the Franco-Prussian War again brought the subject under the notice of the medical press and the sanitary authorities. The military experiments at Sedan, Chalons and Metz, of burying large numbers of bodies with quicklime, or pitch and straw, were not successful, but very dangerous. The matter was considered by the municipal council of Paris in con- nexion with the new cemetery at Mery-sur-Oise; and the prefect

3 In the case of a great man there was often a burnt offering of animals and even of slaves (see Caesar, De bell. Gall. iv.).

4 A temple of the Holy Ghost (see Tertullian, De anima, c. 51, cited in Miiller, Lex. des Kirchenrechts, s.v. ” Begrabniss “).

of the Seine in 1874 sent a circular asking information to all the cremation societies in Europe. In Britain the subject had slumbered for two centuries, since in 1658 Sir Thomas Browne published his quaint Hydriotaphia, or Urn-burial, which was mainly founded on the De funere Romanorum of the learned Kirchmannus. In 181 7 Dr J. Jamieson gave a sketch of the ” Origin of Cremation ” (Proc. Royal Soc. Edin., 1817), and for many years prior to 1874 Dr Lord, medical officer of health for Hampstead, continued to urge the practical necessity for the • introduction of the system.

It was Sir Henry Thompson, however, who first brought the question prominently before the public. Thompson’s problem was — ” Given a dead body, to resolve it into carbonic acid, water and ammonia, rapidly, safely and not unpleasantly.” To solve this problem, experiments were made by Dr Polli at the Milan gas works, fully described in Dr Pietra Santa’s book, La Crema- tion des morts en France et d I’etranger, and by Professor Brunetti, who exhibited an apparatus at the Vienna Exhibition of 1873, and who stated his results in La Cremazione dei cadaveri (Padua, 1873). Polli obtained complete incineration or calcination of dogs by the use of coal-gas mixed with atmospheric air, applied to a cylindrical retort of refracting clay, so as to consume the gaseous products of combustion. The process was complete in two hours, and the ashes weighed about 5% of the weight before cremation. Brunetti used an oblong furnace of refracting brick with side-doors to regulate the draught, and above a cast- iron dome with movable shutters. The body was placed on a metallic plate suspended on iron wire. The gas generated escaped by the shutters, and in two hours carbonization was complete. The heat was then raised and concentrated, and at the end of four hours the operation was over; 180 lb cf wood costing 2s. 4d. sterling was burned. In a reverberating furnace used by Sir Henry Thompson a body, weighing 144 lb, was reduced in fifty minutes to about 4 lb of lime dust. The noxious gases, which were undoubtedly produced during the first five minutes of combustion, passed through a flue into a second furnace and were entirely consumed: In the ordinary Siemens regenerative furnace (which was adapted by Reclam in Germany for crema- tion, and also by Sir Henry Thompson) only the hot-blast was used, the body supplying hydrogen and carbon; or a stream of heated hydrocarbon mixed with heated air was sent from a gasometer supplied with coal, charcoal, peat or wood, — the brick or iron-cased chamber being thus heated to a high degree before cremation begins.

Steps were at once taken to form an English society to pro- mote the practice of cremation. A declaration of its objects was drawn up and signed on the 13th January 1874 by the follow- ing persons — Shirley Brooks, William Eassie, Ernest Hart, the Rev. H. R. Haweis, G. H. Hawkins, John Cordy Jeaffreson, F„ Lehmann, C. F. Lord, W. Shaen, A. Strahan, (Sir) Henry Thomp- son, Major Vaughan, Rev. C. Voysey and (Sir) T. Spencer Wells; and they frequently met to consider the necessary steps in order to attain their object. The laws and regulations having been thoroughly discussed, the membership of the society was con- stituted by an annual contribution for expenses, and a sub- scription to the following declaration : —

” We disapprove the present custom of burying the dead, and desire to substitute some mode which shall rapidly resolve the body into its component elements by a process which cannot offend the living, and shall render the remains absolutely innocuous. Until some better method is devised, we desire to adopt that usually known as cremation.”

Finally, on 29th April a meeting was held, a council was formed, and Sir H. Thompson was elected president and chair- man. Mr Eassie (who in 1875 published a valuable work on Cremation of the Dead) was at the same time appointed honorary secretary. 1 In 1875 the following were added: — Mrs Rose Mary Crawshay, Mr Higford Burr, Rev. J. Long, Mr W. Robinson and the Rev. Brooke Lambert. Subsequently followed Lord Bramwell, Sir Chas. Cameron, Dr Farquharson, Sir Douglas Galton, Lord Playfair, Mr Martin Ridley Smith, Mr James A.

1 This was the first society formed in Europe for the promotion of cremation.

Budgett, Mr Edmund Yates, Mr J. S. Fletcher, Mr J. C. Swin- burne-Hanham, the duke of Westminster (on Lord BramwelFs death), and Sir Arthur Arnold. These may be considered the pioneers of the movement for reform.

On account” of difficulties and prejudices 2 the council was unable to purchase a freehold until 1878, when an acre was obtained at Woking, not far distant from the cemetery. At this time the furnace employed by Professor Gorini of Lodi, Italy, appeared to be the best for working with on a small scale; and he was invited to visit England to superintend its erection. This was completed in 1879, and the body of a horse was cremated rapidly and completely without any smoke or effluvia from the chimney. No sooner was this successful step taken

than the president received a communication from the Home Office, which resulted in a personal interview with the home secretary; the issue of which was that if the society desired to avoid direct hostile action, an assurance must be given that no cremation should be attempted without leave first obtained from the minister. This of course was given, no further building took place, and the society's labours were confined to employing means to diffuse information on the subject. Sir Spencer Wells brought it before the annual meeting of the British Medical Association in 1880, when a petition to the home secretary for permission to adopt cremation was largely signed by the leading men in town and country, but without any immediate result. The next important development was an application to the council in 1882, by Captain Hanham in Dorsetshire, to undertake the cremation of two deceased relatives who had left express in- struction? to that effect. The home secretary was applied to, and refused. The bodies were preserved, and Captain Hanhamerected a crematorium on his estate, and the cremation took place there. He himself, dying a year later, was cremated also; in both cases the result was attained under the supervision of Mr J. C. Swin- burne-Hanham, who succeeded Mr Eassie in 1888 as honorary secretary to the society. The government took no notice. But in 1883 a cremation was performed in Wales by a man on the body of his child, and legal proceedings were taken against him. Mr Justice Stephen, in February 1884, delivered his well-known judgment at the Assizes there, declaring cremation to be a legal procedure, provided no nuisance were caused thereby to others. The council of the society at once declared themselves absolved from their promise to the Home Office, and publicly offered to perform cremation, laying down strict rules for careful inquiry into the cause of death in every case. They stated that they were fully aware that the chief practical objection to cre- mation was that it removed traces of poison or violence which might have caused death. Declining to trust the very imperfect statement generally made respecting the cause of death in the ordinary death certificate (unless a coroner's inquest had been held), they adopted a system of very stringent inquiry, the result of which in each case was to be submitted to the president, to be investigated and approved by him before cremation could take place, with the right to decline or require an inquest if he thought proper; and this course has been followed ever since the first cremation.

It was on 26th March 1885 that the first cremation at Woking took place, the subject being a lady. 3 In 1888 it became necessary, nearly 100 bodies having been by this date cremated, to build a large hall for religious service, as well as waiting-rooms, in connexion with the crematorium there.' The dukes of Bedford and Westminster headed

the appeal for funds, each with £105. The former (the 9th duke of Bedford) especially took great interest in the progress of the society, and offered to furnish further donations to any extent necessary. During the next two years he generously defrayed costs to the amount of £3500, and built a smaller crematorium adjacent for himself and family. The latter building was first used on the 18th of January 1891, a few days after the duke's own death. The number of cremations

2 For a full account of these, see Modern Cremation: Its History and Practice to the Present Date, by Sir H. Thompson, Bart-. F.R.C.§„ &c. (4th ed., Smith, Elder, Waterloo Place, 1901).

3 The Times, 27th March 1885.

slowly increased year by year, and the total at the end of 1900 was 1824. Many of these were persons of distinction — by rank, or by attainments in art, literature and science, or in public life.

The council next turned their attention to the need for a national system of death certification, to be enforced by law

as an essential and much-needed reform in connexion Death with cremation. On the 6th of January 1893 the duke c*rf' /,ca " q j w es t m i ns t er introduced a deputation to the secretary

of state for the home department, Mr Asquith, and the president of the Cremation Society opened the case, showing that no less than 7 % of the burials in England took place without any certificate, while in some districts it was far greater. In con- sequence of this the home secretary appointed a select committee of the House of Commons, which was presided over by Sir Walter Foster, of the Local Government Board, to " inquire into the sufficiency of the existing law as to the disposal of the dead . . . and especially for detecting the causes of death due to poison, violence, and criminal neglect." After a prolonged inquiry and careful consideration of the evidence, a full report and conclusions drawn therefrom were unanimously agreed to, and published as a blue-book in the autumn of 1893. 1

The following conclusions are quoted from this volume: — Page iii. " So far as affording a record of the true cause of death and the detection of it in cases where death may have been due to violence, poison, or where criminal neglect is concerned, the class of certified

deaths leaves much to be desired." Page iv. Certification is ex- tremely important as a deterrent of crime, and numerous proofs are given at length in support of the statement. ..." Contrast this class with that of uncertified deaths, when the result is such as to force upon your Committee the conviction that vastly more deaths occur annually from foul play and criminal neglect than the law recognizes." Page viii. Great uncertainty in resorting to the coroner's court, and want of system in connexion with the practice of it, are affirmed to exist. Page x. It is stated that the opportunity for perpetrating crime is great in the considerable class of uncertified cases ..." in short, the existing procedure plays into the hands of the criminal classes." " Your Committee are much impressed with the serious possibilities implied in a system which permits death and burial to take place without the production of satisfactory medical evidence of the cause of death." Pagexii. " Your Committee have arrived at the conclusion that the appointment of medical officials, who should investigate all cases of death which are not certified by a medical practitioner in attendance, is a proposal which deserves their support."

In considering cremation, the committee reported as follows: — Page xxii. " Your Committee are of opinion that there is only one question in connexion with this method of disposing of a dead body to which it is necessary for them to refer. That question is the sup- posed danger to the community arising from the fact that with the destruction of the body the possibility of obtaining evidence of the cause of death by post-mortem examination also disappears." The mode of proceeding adopted by the Cremation Society of England having been described, " your Committee are of opinion that with the precautions adopted in connexion with cremation, as carried out by the Cremation Society, there is little probability that cases of crime would escape detection, but inasmuch as these precautions are purely voluntary, your Committee consider that in the interests of public safety such regulations should be enforced by law."

The Cremation Society felt that this report much strengthened the case for legislation amending the law of death certification. In August 1894 the president of the society laid the results of the select committee before the British Medical Association at Bristol, and a unanimous vote was obtained in favour of the suggestions made by it. In November a second deputation waited on Mr Asquith, in which the president of the society begged him to carry out the system recommended. The home secretary replied that the business belonged to the department of the Local Government Board, and that it was already dealing with the question and bringing it to a satisfactory solution. Soon afterwards, however, the government changed, other

questions became pressing and further consideration of the subject was postponed.

With reference to the recommendations of the select committee before mentioned, the regulations necessary for registration of death and the disposal of the dead may be outlined as follows: —

1 Reports on Death Certification (1893), Eyre & Spottiswoode, London (373.472).

(1) That no body should be buried, cremated, or otherwise disposed of without a medical certificate of death signed, after personal knowledge and observation, or by information obtained after in- vestigation made by a qualified medical officer appointed for the purpose. (2) A qualified medical man should be appointed as official certifier in every parish, or district of neighbouring parishes, his duty being to inquire into all cases of death and report the cause in writing, together with such other details as may be deemed neces- sary. This would naturally fall within the duties of the medical officer of health for the district, and registration should be made at his office. (3) If the circumstances of death obviously demand a coroner's inquest, the case should be transferred to his court and the cause determined, with or without autopsy. If there appears to be no ground for holding an inquest, and autopsy be necessary to the furnishing of a certificate, the official certifier should make it, and state the result in his report. (4) No person or company should be henceforth permitted to construct or use an apparatus for cremat- ing human bodies without license from the Local Government Board or other authority. (5) No crematory should be so employed unless the site, construction, and system of management have been ap- proved after survey by an officer appointed by government for the purpose. But the licence to construct or use a crematory should not be withheld if guarantees are given that the conditions required are or will be complied with. All such crematories to be subject at all times to inspection by an officer appointed by the government.

(6) The burning of a human body, otherwise than in an officially recognized crematory, should be illegal, and punishable by penalty.

(7) No human body should be cremated unless the official examiner added the words " Cremation permitted." This he should be bound to do if, after due inquiry, he can certify that the deceased has died from natural causes, and not from ill-treatment, poison or violence.

The Cremation Act 1902 (2 Ed. VII. ch. 8), and the regula- tions 2

made thereunder by the home secretary, have since given legislative effect to some of the foregoing recommendations and have laid down a code of laws applicable and binding where cremation is resorted to. But the amendments in the law of death certification generally, so long pressed for by the Cremation Society of England and recommended by the select committee, are none the less necessary.

Undoubtedly in populous communities and in crowded districts the burial of dead bodies is liable to be a source of danger to the living. As early as 1840 a commission had been appointed, including some of the earliest authorities on sanitary science, — namely, Drs Southwood Smith, Chadwick, Milroy, Sutherland, Waller Lewis and others, — to conduct a searching inquiry into the state of the burial-grounds of London and large provincial towns. By the report 3 the existence of such a danger was strikingly demonstrated, and intramural interments were in consequence made illegal. The advocates of burial then declared that interment in certain light soils would safely and efficiently decompose the putrefying elements which begin to be developed the moment death takes place, and which rapidly become dangerous to the living, still more so in the case of deaths from contagious disease. But these light dry soils and elevated spots are precisely those best adapted for human habitation; to say nothing of their value for food-production. Granted the efficiency of such burial, it only effects in the course of a few years what exposure to a high temperature accomplishes with absolute safety in an hour. In a densely populated country the struggle between the claims of the dead and the living to occupy the choicest sites becomes a serious matter. All decaying animal remains give off effluvia — gases — which are transferred through the medium of the atmosphere to become converted into vegetable growth of some kind — trees, crops, garden produce, grass, &c. Every plant absorbs these gases by its leaves, each one of which is provided with hundreds of stomata — open mouths — by which they fix or utilize the carbon to form woody fibre, and give off free oxygen to the atmosphere. Thus it is that the air we breathe is kept pure by the constant interaction between the animal and vegetable kingdoms. It may be taken as certain that the gaseous products arising from a cremated body — amounting, although invisible, to no less than 97 % of its weight, 3 % only remaining as solids, in the form of a pure white ash —

2 Statutory Rules and Orders, 1903, No. 286, Eyre & Spottiswoode.

3 A Special Inquiry into the Practice of Interment in Towns, by Edwin Chadwick (London, 1843), is replete with evidence, and should be read by those who desire to pursue the inquiry further.

become in the course of a few hours integral and active elements in some form of vegetable life. The result of this reasoning has been that, by slow degrees, crematoria have been constructed at many of the populous cities in Great Britain and abroad (see Statistics below).

The subject of employing cremation for the bodies of those who die of contagious disease is a most important one. Sir H. Thompson advocated this course in a paper read before the International Congress of Hygiene held in London in 1801; and a resolution strongly approving the practice was carried unan- imously at a large meeting of experts and medical officers of health. Such diseases are small-pox, scarlet fever, diphtheria, consump- tion, malignant cholera, enteric, relapsing and puerperal fevers, the annual number of deaths from which in the United Kingdom is upwards of 80,000. Complete disinfection takes place by means of the high temperature to which the body is exposed. At the present day it is compulsory to report any case in the foregoing list, whenever it occurs, to the medical officer of health for the district; and it is customary to disinfect the rooms themselves, as well as the clothes and furniture used by the patient if the case be fatal; but the body, which is the source and origin of the evil, and is itself loaded with the germs of a specific poison, is left to the chances which attach to its preserva- tion in that condition, when buried in a fit or unfit soil or situation.

The process of preparing a body for cremation requires a brief notice. The plan generally adopted is to place it (in the usual shroud) in a light pine shell, discarding all heavy oak or other coffin, and to introduce it into the furnace in that manner. Thus there is no handling or exposure of the body after it reaches the crematorium. The type of furnace in general use is on the reverberatory principle, the body being consumed in a separate chamber heated to over 2000 Fahr. by a coke fire. In a few instances a furnace burning ordinary illuminating gas instead of coke is in use. (H. Th.)

Statistics. — The following statistics show the history of modern cremation and its progress at home and abroad: —

Foreign Countries. — The first experiment in Italy was made by Brunetti in 1869, his second and third in 1870. Gorini and Polli published their first cases in 1872. Brunetti exhibited his at Vienna in 1873. All were performed in the open air. The next in Europe was a

single case at Breslau in 1874.- Soon after, an English lady was cremated in a closed apparatus (Siemens) at Dresden. The next cremation in a closed receptacle took place at Milan in 1876. In the same year a Cremation Society was formed, a handsome building was erected, and two Gorini furnaces were at work in i88tt. In 1899 the total number of cremations was 1355. In Italy 28:C#ema- toria exist, viz. at Alessandria, Asti, Bologna, Bra, Brescia,,rGomo, Cremona, Florence, Genoa, Leghorn, Lodi, Mantua, Milan, Mˆdena, Novara, Padua, Perugia, Pisa, Pistoia, Rome, San Remo, Siena, Spezia, Turin, Udine, Verona and Venice. The total number of cremations in Italy in 1906 was 440.

In Germany the first crematorium was erected at Gotha; it was opened in 1878, and the total cremations down to September 1st, 1907, numbered 4584. At Ohlsdorf, Hamburg, the crematorium was opened in November 1892, and the total cremations down to September 1st, 1907, numbered 2521. At Heidelberg the crema- torium was opened in 1 891, and the total cremations down to September 1st, 1907, numbered 1741. Throughout the German empire there are, in addition to the above, crematoria at Bremen, Eisenach, Jena, Karlsruhe, Mannheim, Mainz, Offenbach, Heilbronn, Ulm, Chemnitz and Stuttgart, besides over eighty societies for pro- moting cremation. The total number of cremations which took place in Germany in 1906 was 2057, making a total of 13,614 down to September 1st, 1907.

Other societies exist in Denmark, Holland, Belgium, Sweden, Norway and Switzerland. At the crematorium at Copenhagen 77 bodies were cremated in 1906, the total being 500. The Stock- holm crematorium was opened in October 1887, and the cremations in 1906 numbered 56. The Gothenburg crematorium (also in Sweden) was opened in January 1890, and the cremations there in 1906 were 14. Switzerland has four crematoria, viz. at Basel, Geneva, Zurich and St Gallen — 524 cremations took place in that country in 1906.

In Paris a cremation society was founded in 1880, and in 1886— 1887 a large crematorium was constructed by the municipal council at Pere Lachaise, containing three Gorini furnaces. It was first used in October 1887 for two men who died of small-pox. The demand became large; an improved furnace was soon devised, the unclaimed bodies at the hospitals and the remains at the dissecting

rooms being cremated there, besides a large number of embryos. In 1906 the number, including the last-named class, was 6906. The total number of incinerations at Pere Lachaise down to December 31st, 1906 (including both classes) was 86,962; but the employment of

cremation for the purposes named has deterred a resort to it by many. Had a separate establishment been organized for the public, its success would have been greater. A magnificent edifice has been constructed by the municipality of Paris for the conservation of the ashes of persons who have been cremated. Crematoria have been established also at Rouen, Rheims and Marseilles, and the construction of crematoria in other of the great provincial centres of France was in contemplation.

In Buenos Aires, since 1844, the bodies of all persons dying of contagious disease are cremated, and there is also a separate establishment for the use of the public.

At Tokio in Japan no fewer than 22 crematoria exist, and about an equal number of cremations and burials in earth take place. At Calcutta a crematorium was opened in 1906. At Montreal, Canada, there is a crematorium which began opera- tions in 1902, and completed 44 cremations up to the 31st of December 1905.

United States. — There were 33 crematoria in the United States on September 1st, 1907. At Fresh Pond, New York, erectedin 1885, the total number of cremations to December 31st, 1906, being 8514. At Buffalo, N.Y., the first cremation taking place in 1885, and the total number down to December 31st, 1905, being 787. At Troy (Earl Crematorium) ,N. Y., the first cremation takingplace in 1 890, and the total number down to December 31st, 1905, 249. At Swinburne Island, N.Y., cremations beginning in 1890, total to December 31st, 1905, 123. At Waterville, N.Y., cremations beginning in 1893, total to December 31st, 1906, 62. At St Louis, Missouri, cremations beginning in 1888, total to September 1st, 1907, 2151. At Philadelphia, Penn., cremations beginning in 1888, total to September 1st, 1907, 1685. At San Francisco, Cal., ” Odd Fellows,” opened in 1895, total to December 31st, 1906, 6151. Also at San Francisco, Cal., ” Cypress Lawn,” opened in 1893, total to December 31st, 1905, 1492. At Los Angeles, Cal., No. I, Rosedale, opened in 1887, total to December 31st, 1905, 866; No. 2, Evergreen, opened in 1902, total to December 31st, 1905, 413; No. 3, Gower Street, opened in 1907 with 54 down to September 1st. At Boston, Mass., opened in 1893, total to September 1st, 1907, 2493. At Cincinnati, Ohio, opened in 1887, total to September 1st, 1907, 1245. At Chicago, opened in 1893, total to September 1st, 1907, 2188. At Detroit, Michigan, opened in 1887, total to December 31st, 1905, 689. At Pittsburg, Penn., opened in 1886, total to September 1st, 1907, 377. At Baltimore, opened in 1889, total to December 31st, 1905, 263. At Lancaster, Penn., opened in 1884, total to December 31st, 1906, 106. At Davenport, Iowa,

opened in 1891, total to September 1st, 1907,331. At Milwaukee, opened in 1896, total to October 1905,442. At Washington, opened in 1897, total to December 31st, 1905, 275. The Le Moyne (Washington, Pa.) crematory, the first in the United States, was erected by Dr F. Julius le Moyne in 1876, for private use. The first cremation was that of the baron de Palin, of New York, December 6th, 1876. Dr F. Julius le Moyne died October 1879, and his remains were cremated in his own crematory. Total number of cremations (to 1907) 41. At Pasadena, Cal., opened in 1895, total to September 1st, 1907, 491. At St. Paul, Minn., opened in 1897, total to December 31st, 1905, 145. At Fort Wayne, Ind., opened in 1897, total to September 1st, 1907, 41. At Cambridge, Mass., opened in 1900, total to September 1st, 1907, 1090. At Cleveland, Ohio, opened in 1901, total to December 31st, 1905, 283. At Denver, Col., opened in 1904, total to December 31st, 1905, 109. At Indiana- polis, opened in 1904, total to December 31st, 1905, 32. At Oakland, Cal., opened in 1902, total to September 1st, 1907, 2196. At Port- land, Ore., opened in 1901, total to December 31st, 1905, 327. At Seattle, Washington, opened in 1905, with 21 to the end of that year.

United Kingdom. — There were 13 crematoria in operation in the United Kingdom on September 1st, 1907. The oldest is that at Woking, Surrey, which was first used for the cremation of human remains in 1885. In that year three cremations took place there, the number gradually increasing each year until in 1901 301 bodies were cremated. Up to September 1st, 1907, the total number-of cremations at Woking was 2939. Then followed the crematorium at Manchester, opened in 1892 with 90 in 1906 and a total of 1085; at Glasgow, opened in 1895 with 45 in 1906 and a total of 252; at Liverpool, opened in 1896, with 46 in 1906 and a total of 374; at Hull, opened in 1901 (the first municipal crematorium), with 17 in 1906 and a total of 116; at Darlington, also opened in 1901, with 13 in 1906 and a total of 33. The Leicester Corporation crematorium was opened in 1902, with 12 in 1906 and a total of 50. Next in order came the Golder's Green crematorium, Hampstead, London, which was opened in December 1902. in 1906 298 cremations took place there, making a total of 1091. After this followed the Birmingham crematorium, opened in 1903, with 21 in 1906 and a total of 84; the City of London crematorium at Little Ilford, opened in 1905, with 23 for 1906 and a total of 46; the Leeds crematorium, opened in 1905, with 15 in 1906 and a total of 42 ; the Bradford Corporation crematorium, opened in 1905, with 13 in 1906, and a total of 20; and the Sheffield Corporation crematorium, opened in 1905, with

6 in 1906 and a total of 26. Thus there were 739 cremations in the United Kingdom in 1906, making a total at the above crematoria down to September 1st, 1907, of 6158. The Golder's Green crematorium, situated on the northern boundary of Hampstead Heath, stands in its own grounds of 12 acres, and is but 35 minutes' drive from Oxford Circus. London thus has two crematoria within driving distance of its centre, and the Woking crematorium within easy reach of the south-west suburbs. (J. C. S.-H.)

CREMER, JAKOBUS JAN (1837-1880), Dutch novelist, born at Arnhem in September 1837, started life as a painter, but soon exchanged the brush for the pen. The great success of his first novelettes (Betuwsche Novellen and Overbetuwsche Novellen), published about 1855 — reprinted many times since, and trans- lated into German and French — showed Cremer the wisdom of his new departure. These short stories of Dutch provincial life are written in the quaint dialect of the Betuwe, the large flat Gelderland island, formed by the Rhine, the name recalling the presumed earliest inhabitants, the Batavi. Cremer is strongest in his delineation of character. His picturesque humour, coming out, perhaps, most forcibly in his numerous readings of the Betuwe novelettes, soon procured him the name of the " Dutch Fritz Reuter." In his later novels Cremer abandons both the language and the slight love-stories of the Betuwe, depicting the Dutch life of other centres in the national tongue. The principal are: Anna Rooze (1867), Dpkter Helmond enzijn Vrouw (1870), Hanna de Freule (1873), Daniel Sils, &c. Cremer was less successful as a playwright, and his two comedies, Peasant and Nobleman and Emma Bertholt, did not enhance his fame; nor did a volume of poems, published in 1873. He died at the Hague in June 1880. His collected novels have appeared at Leiden. An English novel, founded by Albert Vandam upon Anna Rooze, considered by many his best work, was published in London (1877, 3 vols.) under the title of An Everyday Heroine.

CREMERA (mod. Fosso della Valchetta), a small stream in Etruria which falls into the Tiber about 6 m. N. of Rome. The identification with the Fosso della Valchetta is fixed as correct by the account in Livy ii. 49, which shows that the Saxa Rubra were not far off, and this we know to be the Roman name of the post station of Prima Porta, about 7 m. from Rome on the Via Flaminia. It is famous for the defeat of the three hundred Fabii, who had established a fortified post on its banks.

CREMIEUX, ISAAC MOISE [known as Adolphe] (1796-1880), French statesman, was born at Nimes, of, a rich Jewish family. He began life as an advocate in his native town. After the revolu- tion of 1830 he came to Paris, formed connexions with numerous political personages, even with King Louis Philippe, and became a brilliant defender of Liberal ideas in the law courts and in the press, — witness his £loge funebre of the bishop Gregoire (1830), his Mimoire for the political rehabilitation of Marshal Ney (1 83 3) , and his plea for the accused of April (1835). Elected deputy in 1842, he was one of the leaders in the campaign against the Guizot ministry, and his eloquence contributed greatly to the success of his party. On the 24th of February 1 848 he was chosen by the Republicans as a member of the provisional government, and as minister of justice he secured the decrees abolishing the death penalty for political offences, and making the office of judge immovable. When the conflict between the Republicans and Socialists broke out he resigned office, but continued to sit in the constituent assembly. At first he supported Louis Napoleon, but when he discovered the prince's imperial ambitions he broke with him. Arrested and imprisoned on the 2nd of December 1851, he remained in private life until November 1869, when he was elected as a Republican deputy by Paris. On the 4th of September 1870 he was again chosen member of the govern- ment of national defence, and resumed the ministry of justice. He then formed part of the Delegation of Tours, but took no part in the completion of the organization of defence. He resigned with his colleagues on the 14th of February 1871. Eight months later he was elected deputy, then life senator in 1875. He died on the 10th of February 1880. Cremieux did much to better the condition of the Jews. He was president of the Universal Israelite Alliance, and while in the government of the national defence he secured the franchise for the Jews in

Algeria. This famous Dicret Crimieux was tne origin of the anti-Semitic movement in Algiers. Cremieux published a Recueil of his political cases (1869), and the Actes de la delegation de Tours et de Bordeaux (2 vols., 1871).

CREMONA, LUIGI (1830-1903), Italian mathematician, was born at Pa via on the 7th of December 1830. In 1848, when Milan and Venice rose against Austria, Cremona, then only a lad of seventeen, joined the ranks of the Italian volunteers, and remained with them, fighting on behalf of his country's freedom, till, in 1849, the capitulation of Venice put an end to the hopeless campaign. He then returned to Pavia, where he pursued his studies at the university under Francesco Brioschi, and deter- mined to seek a career as teacher of mathematics. His first appointment was as elementary mathematical master at the

gymnasium and lyceum of Cremona, and he afterwards obtained a similar post at Milan. In i860 he was appointed to the pro- fessorship of higher geometry at the university of Bologna, and in 1866 to that of higher geometry and graphical statics at the higher technical college of Milan. In this same year he competed for the Steiner prize of the Berlin Academy, with a treatise entitled ” Memoria sulle superficie de terzo ordine,” and shared the award with J. C. F. Sturm. Two years later the same prize was conferred on him without competition. In 1873 he was called to Rome to organize the college of engineering, and was also appointed professor of higher mathematics at the university. Cremona’s reputation had now become European, and in 1879 he was elected a corresponding member of the Royal Society. In the same year he was made a senator of the kingdom of Italy. He died on the 10th of June 1903.

As early as 1856 Cremona had begun to contribute to the Annali di scienze matematiche e fisiche, and to the Annali di matematica, of which he became afterwards joint editor. Papers by him have appeared in the mathematical journals of Italy, France, Germany and England, and he has published several important works, many of which have been translated into other languages. His manual on Graphical Statics and his Elements of Projective Geometry (translated by C. Leudesdorf), have been published in English by the Clarendon Press. His life was devoted to the study of higher geometry and reforming the more advanced mathematical teaching of Italy. His reputation mainly rests on his Introduzione ad una teoria geometrica delle curve piane, which proclaims him as a follower of the Steinerian or synthetical school of geometricians. He notably enriched our knowledge of curves and surfaces.

CREMONA, a city and episcopal see of Lombardy, Italy, the capital of the province of Cremona, situated on the N. bank of the Po, 155 ft. above sea-level, 60 m. by rail S.E. of Milan. Pop. (1901) town, 31,655; commune, 39,344. It is oval in shape, and retains its medieval fortifications. The line of the streets is as a rule irregular, but the town as a whole is not very picturesque.

The finest building is the cathedral, in the Lombard Roman- esque style, begun in 1107 and consecrated in 1190.’ The wheel window of the main fagade dates from 1274. The transepts, added in the 13th and 14th centuries (before 1370), have pictur- esque brick facades, with fine terra-cotta ornamentation. The great Torrazzo, a tower 397 ft. high, which stands by the cathedral, and is connected with it by a series of galleries, dates from 1267- 1291. It is square below, with an octagonal summit of a slightly later period. The main facade of the

cathedral was largely altered in 1491, to which date the statues upon it belong; the portico in front was added in 1497. The building would be much improved by isolation, which it is hoped may be effected. The interior is fine, and is covered with frescoes by Cremonese masters of the 16th century (Boccaccio Boccaccino, Romanino, Pordenone, the Campi, &c), which are not of first-rate import- ance. The choir has fine stalls of 1489-1490, upon one of which there is a view of the facade of the cathedral before its alteration in 1 49 1. The treasury contains a richly worked silver crucifix 9 ft. high, of 1478, the base of which was added in 1774-1775. It contains 408 statues and busts altogether, the central three of which belong to an earlier cross of 1231. Adjacent to the

cathedral is the octagonal baptistery of 1167, 92 ft. in height and 75 ft. in external diameter, also in the Lombard Romanesque style. The so-called Campo .Santo, close to the baptistery, contains a mosaic pavement with emblematic figures belonging probably to the 8th and 9th centuries, and running under the cathedral. Of the other churches, S. Michele has a simple and good Lombard Romanesque 13th-century facade, and a plain interior of the 10th century; and S. Agata a good campanile in the former style. Many of them contain paintings by the later Cremonese masters, especially Galeazzo Campi (d. 1536) and his sons Giulio and Antonio. The latter are especially well repre- sented in S. Sigismondo, 1 1 m. outside the town to the E. On the side of the Piazza del Comune opposite to the cathedral are two 13th-century Gothic palaces in brick, the Palazzo Comunale and the former Palazzo dei Giureconsulti, now the seat of the com- missioners for the water regulation of the district. Another palace of the same period is now occupied by the Archivio ■jsfotarile. The modern Palazzo Ponzoni contains a museum and a technical institute. In front of it is a statue of the com- poser Amilcare Ponchielli, who was a native of Cremona. The Palazzo Fodri, now the Monte di Pieta, has a beautiful 15th-century frieze of terra-cotta bas-reliefs, as have some other palaces in private hands.

Cremona was founded by the Romans in 218 B.C. (the same year as Placentia) as an outpost against the Gallic tribes. It was strengthened in 190 B.C. by the sending of 6000 new settlers and soon became one of the most flourishing towns of upper Italy. It probably acquired municipal rights in 90 B.C., but Augustus, owing to the fact that it did not support him, assigned a part of its territory to his veterans in 41

B.C., and henceforth it is once more called colonia. It remained prosperous (we may note that Virgil came here to school from Mantua) until it was taken and destroyed by the troops of Vespasian after the second battle of Betriacum (Bedriacum) in a.d. 69; the temple of Mefitis alone being left standing (see Tacitus, Hist. iii. 15 seq.). One of the bronze plates which decorated the exterior of the war-chest of the legio III. Macedonica, one of the legions which had been defeated at Betriacum, has been found near Cremona itself (F. Barnabei in Notiz. scavi, 1887, p. 210). Vespasian ordered its immediate reconstruction, but it never recovered its former prosperity, though its position on the N. bank of the Po, at the meeting-point of roads from Placentia, Mantua (the Via Postumia in both cases), Brixellum (where the roads from Cremona and Mantua to Parma met and crossed the river), Laus Pompeia and Brixia, still gave it considerable importance. It was destroyed once more by the Lombards under Agilulf in a.d. 60s, and rebuilt in 615, and was ruled by dukes; but in the 9th century the bishops of Cremona began to acquire considerable temporal power. Landulf, a German to whom the see was granted by Henry II., was driven out in 1022, and his palace destroyed, but other Germans were invested with the see after- wards. The commune of Cremona is first mentioned in a docu- ment of 1098, recording its investiture by the countess Matilda with the territory known as Isola Fulcheria. It had to sustain many wars with its neighbours in order to maintain itself in its new possessions. In the war of the Lombard League against Barbarossa, Cremona, after having shared in the destruction of Crema in 1160 and Milan in 1162, finally joined the league, but took no part in the battle of Legnano, and thus procured itself the odium of both sides. In the Guelph and Ghibelline struggles Cremona took the latter side, and defeated Parma decisively in 1250. It was during this period that Cremona erected its finest buildings. There was, however, a Guelph reaction in 1264; the city was taken and sacked by Henry VII. in 1311, and was a prey to struggles between the two parties, until Galeazzo Visconti took possession of it in 1322. In 1406 it fell under the sway of Cabrino Fondulo, who received with great festivities both the emperor Sigismund and Pope John XXIII. , the latter on his way to the council at Constance; he, however, handed it over to Filippo Maria Visconti in 1419. In 1499 it was occupied by Venetians, but in 151 2 it came under Massimiliano Sforza. In 1535, like the rest of Lombardy, it fell under Spanish domina-

tion, and was compelled to furnish large money contributions. The population fell to 10,000 in 1668. The surprise of the French garrison on the 2nd of February 1702, by the Imperialists under Prince Eugene,

was a celebrated incident of the War of the Spanish Succession. The Imperialists were driven from Cremona after a sharp struggle, but captured Marshal Villeroi, the French commander. Hence the celebrated verse:

” Francais, rendons gr&ce a Bellone;

Notre bonheur est sans 6gal ;

Nous avons conserve Cremonee,

Et perdu notre general.”

In the 1 8th century the prosperity of Cremona revived. In the Italian republic it was the capital of the department of the upper Po. Like the rest of Lombardy it fell under Austria in 1814, and became Italian in 1859. See Guida di Cremona (Cremona, 1904). (T. As.)

CREMORNE GARDENS, formerly a popular resort by the side of the Thames in Chelsea, London, England. Originally the property of the earl of Huntingdon (c. 1750), father of Steele’s ” Aspasia,” who built a mansion here, the property passed through various hands into those of Thomas Dawson, Baron Dartrey and Viscount Cremorne (1725-1813), who greatly beautified it. It was subsequently sold and converted into a proprietary place of entertainment, being popular as such from 1845 to 1877. It never, however, acquired the fashionable fame of Vauxhall, and finally became so great an annoyance to residents in the neighbourhood that a renewal of its licence was refused; and the site of the gardens was soon built over. The name survives in Cremorne Road.

CRENELLE (an O. Fr. word for ” notch,” mod. crSneau; the origin is obscure; cf. ” cranny “), a term generally considered to mean an embrasure of a battlement, but really applying to the whole system of defence by battlements. In medieval times no one could ” crenellate ” a building without special licence from his supreme lord.

CREODONTA, a group of primitive early Tertiary Carnivora, characterized by their small brains, the non-union in most cases of the scaphoid and lunar bones of the carpus, and the general absence of a distinct pair of ” sectorial ” teeth (see Carnivora). In many respects the Lower Eocene creodonts come very close to the primitive ungulates, or Condylarthra (see Phenacodus), from which, however, they are distinguished by the approxima- tion in the form of the skull to the carnivorous type, the more trenchant teeth (at least in most cases) and the more claw-like character of the terminal joints of the toes. The

general char- acter of the dentition in the more typical forms,such as Hyaenodon (see fig.), recalls that of the carnivorous marsupials, this being especially the case with the Patagonian species, which have been

Dentition of Hyaenodon leptorhynchus, from the Lower Oligocene of France. The last upper molar is concealed by the penultimate tooth.

separated as a distinct group under the name of Sparassodonta (q.v.). The skull, however, is not of the marsupial type, and in the European forms at any rate there is a complete replacement of the milk-molars by pre-molars, while the minute structure of

the enamel of the teeth is of the carnivorous as distinct from the marsupial type. The head is large in proportion to the body, the lumbar region is unusually rigid, owing to the complexity of the articulations, and the tail and hind-limbs are relatively long and powerful. In life the tail probably passed almost impercept- ibly into the body, as in the Tasmanian thylacine.

That the Creodonta are the ancestors of the modern Carnivora is now generally admitted. They are apparently the most generalized and primitive of all (placental?) mammals, and probably the direct descendants of the mammal-like anomodont or theromorphous reptiles of the Triassic epoch; the evolution from that group having perhaps taken place in Africa or in the lost area connecting that continent with India. The relationship of the creodonts to the carnivorous marsupials is not yet deter- mined, but it seems scarcely probable that the remarkable resemblance existing between the teeth of the two groups can be solely due to parallelism; and it has been suggested by Dr L. Wortman that both creodonts and marsupials are descended from a common non-placental stock. In other words, the latter are a side-branch from the anomodont-creodont line of descent. Dr C. W. Andrews has pointed out that certain of the Egyptian creodonts appear to have been aquatic or subaquatic in their habits; and it is possible that from such types are derived the true seals, or Phocidae.

With the exception of Australasia, and perhaps South Africa, creodonts (on the supposition that the Patagonian forms are rightly included) appear to have had a nearly world-wide dis- tribution. In Europe and

North America they date from the Lowest Eocene and lived till the early Oligocene, while in India they apparently survived till a much later epoch. Some of the Oligocene forms, alike as regards dentition, the union of the scaphoid and lunar of the carpus, and the complexity of the brain, approximated to modern Carnivora.

As regards classification Mr W. D. Matthew includes in the typical family Hyaenodontidae not only the widely spread genera Hyaenodon and Pterodon, but likewise Sinopa (Stypolophus) , Cynohyaenodon and Proviverra; but Viverravus (Didymictis) and Vulpavus (Miacis) are assigned to a separate family (Viver- ravidae). It is these latter forms which come nearest to modern Carnivora, most of them being of Oligocene age. The American and European Oxyaena apparently represents a family by itself, as does the American Oxyclaena; and Palaeonictis and Patriofelis are assigned to yet another family; while the North American Lower Eocene and Eocene Arctocyon typifies a family character- ized by the somewhat bear-like type of dentition. Mesonyx is also a very distinct type, from the North American Eocene and Oligocene. Some of the species of Patriofelis and Hyaenodon attained the size of a tiger, although with long civet-like skulls. In the earlier forms the claws often retained somewhat of a hoof- . like character.

The South American Borhyaenidae include Borhyaena, Prothy- lacinus, Amphiproviverra, and allied forms from the Santa Cruz beds of Patagonia, and have been referred to a distinct group, the Sparassodonta, mainly on account of the alleged replacement of some only of the milk-molars by premolars. By their first describer, Dr F. Ameghino, they were regarded as nearly related to the marsupials, to which group they were definitely referred in 1905 by Mr W. J. Sinclair, by whom they are considered near akin to Thylacinus, but this view seems to be disproved by the investigations of Mr C. S. Tomes into the structure of the dental enamel.

It should be added that Dr J. L. Wortman transfers Viverravus and its allies, together with Palaeonictis, to the true Carnivora, the latter genus being regarded as the ancestral type of the sabre- toothed cats (see Machaerodus).

Authorities. — J. L. Wortman, ” Eocene Mammalia in the Pea- body Museum, pt. i. Carnivora,” Amer. J. Sci. vols, xi.xiv. (1901 1902); W. D. Matthew, “Additional Observations on the Creo- donta,” Bull. Amer. Mus. vol. xiv. p. i. (1901); C. W. Andrews, Descriptive Catalogue of the Tertiary Vertebrata of the Fayum, British Museum (1906); W. J. Sinclair, “The Marsupial Fauna of the Santa Cruz Beds,”

Proc. Amer. Phil. Soc. vol. xlix. p. 73 (1905).

(R. L.*)

CREOLE (the Fr. form of criollo, a West Indian, probably a negro corruption of the Span, criadillo, the dim. of criado, one bred or reared, from criar, to breed, a derivative of the Lat. creare, to create), a word used originally (16th century) to denote persons born in the West Indies of Spanish parents, as dis- tinguished from immigrants direct from Spain, aboriginals, negroes or mulattos. It is now used of the descendants of non- aboriginal races born and settled in the West Indies, in various parts of the American mainland and in Mauritius, Reunion and some other places colonized by Spain, Portugal, France, or (in the case of the West Indies) by England. In a similar sense the name is used of animals and plants. The use of the word by some writers as necessarily implying a person of mixed blood is totally erroneous; in itself ” Creole ” has no distinction of colour; a Creole may be a person of European, negro, or mixed extraction — or even a horse.

Local variations occur in the use of the word as applied to people. In the West Indies it designates the descendants of any European race; in the United States the French-speaking native portion of the white race in Louisiana, whether of French or Spanish origin. The French Canadians are never termed Creoles, nor is the word now used of the South Americans of Spanish or Portuguese descent, but in Mexico whites of pure Spanish ex- traction are still called Creoles. In all the countries named, when a non-white Creole is indicated the word negro is added. In Mauritius, Reunion, &c, on the other hand, Creole is commonly used to designate the black population, but is also occasionally used of the inhabitants of European descent. The difference in type between the white Creoles and the European races from whom they have sprung, a difference often considerable, is due principally to changed environment — especially to the tropical or semi-tropical climate of the lands they inhabit. The many patois founded on French and Spanish, and used chiefly by Creole negroes, are spoken of as Creole languages, a term extended by some writers to include similar dialects spoken in countries where the word Creole is rarely used.

See G. W. Cable, The Creoles of Louisiana (1884) ; A. Coelho, ” Os Dialetos romanicos on neo latinos na Africa, Asia e America,” Bol. Soc. Geo. Lisboa (1 884-1 886), with bibliography. For the Creole French of Haiti see an article by. Sir H. H. Johnston in The Times, April 10th, 1909.

CREON, in Greek legend, son of Lycaethus, king of Corinth and father of Glauce or Creusa, the second wife of Jason.

CREON, in Greek legend, son of Menoeceus, king of Thebes after the death of Laius, the husband of his sister Jocasta. Thebes was then suffering from the visitation of the Sphinx, and Creon offered his crown and the hand of the widowed queen to whoever should solve the fatal riddle. Oedipus, the son of Laius, ignorant of his parentage, successfully accomplished the task and married Jocasta, his mother. By her he had two sons, Eteocles and Polyneices, who agreed after their father's death to reign in alternative years. Eteocles first ascended the throne, being the elder, but at the end of the year refused to resign, whereupon his brother attacked him at the head of an army of Argives. The war was to be decided by a single combat between the brothers, but both fell. Creon, who had resumed the government during the minority of Leodamas, the son of Eteocles, commanded that the Argives, and above all Polyneices, the cause of all the bloodshed, should not receive the rites of sepulture, and that any one who infringed this decree should be buried alive. Antigone, the sister of Polyneices, refused to obey, and sprinkled dust upon her brother's corpse. The threatened penalty was inflicted; but Creon's crime did not escape un- punished. His son, Haemon, the lover of Antigone, killed himself on her grave; and he himself was slain by Theseus. According to another account he was put to death by Lycus, the son or descendant of a former ruler of Thebes (Euripides, Here. Fur. 31; Apollodorus iii. 5, 7; Pausanias ix. 5).

CREOPHYLUS of Samos, one of the earliest Greek epic poets. According to an epigram of Callimachus (quoted in Strabo xiv. p. 638) he was the author of a poem called OtxaXias oXoxris, which told the story of the conquest of Oechalia by Heracles. Creophylus was said to have been a friend or relative

of Homer, who, according to another tradition, was himself the author of the "AAawus, and presented it to Creophylus in return for the latter's hospitality.

See F. G. Welcker, Der epische Cyclus (1865-1882).

CREOSOTE, Creasote or Kreasote (from Gr. Kpkas, flesh, and cruˆav, to preserve), a product of the distillation of coal, bone oil, shale oil,

and wood-tar (more especially that made from beech-wood). The creosote is extracted from the distillate by means of alkali, separated from the filtered alkaline solution by sulphuric acid, and then distilled with dilute alkali; the distillate is again treated with alkali and acid, till its purification is effected; it is then redistilled at 200 C, and dried by means of calcium chloride. It is a highly refractive, colourless, oily liquid, and was first obtained in 1832 by K. Reichenbach from beech-wood tar. It consists mainly of a mixture of phenol, cresol, guaiacol, creosol, xylenol, dimethyl guaiacol, ethyl guaiacol, and various methyl ethers of pyrogallol. Creosote has a strong odour and hot taste, and burns with a smoky flame. It dissolves sulphur, phosphorus, resins, and many acids and colouring matters; and is soluble in alcohol, ether, and carbon disulphide, and in 80 parts by volume of water. It is distinguished from carbolic acid by the following properties: — it rotates the plane of polarized light to the right, forms with collodion a transparent fluid, and is nearly insoluble in glycerin; whereas carbolic acid has no effect on polarized light, gives with about two-thirds of its volume of collodion a gelatinous mass, and is soluble in all proportions in glycerin; further, alcohol and ferric chloride produce with creosote a green solution, turned brown by water, with carbolic acid a brown, and on the addition of water a blue solution. Creosote, like carbolic acid, is a powerful antiseptic, and readily coagulates albuminous matter; wood-smoke and pyroligneous acid or wood-vinegar owe to its presence their efficacy in preserving animal and vegetable sub- stances from putrefaction.

Creosote oil is the name generally applied to the fraction of the coal tar distillate which boils between 200° and 300 C. (see Coal Tar). It is a greenish-yellow fluorescent liquid, usually containing phenol, cresol, naphthalene, anthracene, pyridine, quinoline, acridine and other substances. Its chief use is for the preservation of timber.

Pharmacology and Therapeutics. — Creosote derived from wood- tar is given medicinally in doses of from one to five minims, either suspended in mucilage, or in capsules. It should always be administered after a meal, when the gastric contents dilute it and prevent irritation. Creosote and carbolic acid (q.v.) have a very similar pharmacology; but there is one conspicuous excep- tion. Beech-wood creosote alone should be used in medicine, as its composition renders it much more valuable than other creosotes. Its constituents circulate unchanged in the blood and are excreted by the lungs. Although carbolic acid has no value in phthisis (pulmonary tuberculosis) or in any other bacterial condition of the lungs, creosote, having volatile con- stituents which are excreted in the expired air and which are powerfully antiseptic, may well be of much value in these con-

ditions. In phthisis creosote is now superseded by both its carbonate (creosotal) — given in the same doses — which causes less gastric disturbance, and by guaiacol itself, which may be given in doses up to thirty minims in capsules. The phosphate (phosote or phosphote), phosphite (phosphotal), and valerianate (eosote) also find application. Similarly the carbonate of guaiacol may be given in doses even as large as a drachm. Creosote may also be used as an inhalation with a steam atomizer. It is applic- able not only in phthisis but in bronchiectasis, bronchitis, broncho-pneumonia, lobar pneumonia and all other bacterial lung diseases. Like carbolic acid, creosote may be used in toothache, and the local antiseptic and anaesthetic action which it shares with that substance is often of value in relieving gastric pain due to simple ulcer or cancer, and in those forms of vomiting which are due to gastric irritation.

For the determination and separation of the various constituents of creosote see F. Tiemann, Ber. (1881), 14, p. 2005; A. Behal and C. Choay, Comptes rendus (1893), 116, p. 197; and L. F. Kebler, Amer. Jour. Phartn. (1899), p. 409.

CREPUSCULAR (from Lat. crepusculum, twilight), of or belonging to the twilight, hence indistinct or glimmering; in zoology the word is used of animals that appear before sunrise or nightfall.

CREQUY, a French family which originated in Picardy, and took its name from a small lordship in the present Pas-de-Calais. Its genealogy goes back to the 10th century, and from it origin- ated the noble houses of Blecourt, Canaples, Heilly and Royon. Henri de Crequy was killed at the siege of Damietta in 1240; Jacques de Crequy, marshal of Guienne, was killed at Agincourt with his brothers Jean and Raoul; Jean de Crequy, lord of Canaples, was in the Burgundian service, and took part in the defence of Paris against Joan of Arc in 1429, received the order of the Golden Fleece in 143 1, and was ambassador to Aragon and France; Antoine de Crequy was one of the boldest captains of Francis I., and died in consequence of an accident at the siege of Hesdin in 1523. Jean VIII., sire de Crequy, prince de Poix, seigneur de Canaples (d. 1 5 5 5) , left three sons, the eldest of whom > Antoine de Crequy (1535-1574), inherited the family estates on the death of his brothers at St Quentin in 1557. He was raised to the cardinalate, and his nephew and heir, Antoine de Blanche- fort, assumed the name and arms of Crequy.

Charles I. de Blanchefort, marquis de Crequy, prince de Poix, due de Lesdiguieres (1 578-1638), marshal of France, son of the last-named, saw his first fighting before Laon in 1594, and was wounded at the

capture of Saint Jean d'Angely in 1621. In the next year he became a marshal of France. He served through the Piedmontese campaign in aid of Savoy in 1624 as second in command to the constable, Francois de Bonne, due de Lesdi- guieres, whose daughter Madeleine he had married in 1595. He inherited in 1626 the estates and title of his father-in-law, who had induced him, after the death of his first wife, to marry her half-sister Francoise. He was also lieutenant-general of Dauphine. In 1633 he was ambassador to Rome, and in 1636 to Venice. He fought in the Italian campaigns of 1630, 1635, 1636 and 1637, when he helped to defeat the Spaniards at Monte Baldo. He was killed on the 17th of March 1638 in an attempt to raise the siege of Crema, a fortress in the Milanese. He had a quarrel extending over years with Philip, the bastard of Savoy, which ended in a duel fatal to Philip in 1599; and in 1620 he defended Saint-Aignan, who was his prisoner of war, against a prosecution threatened by Louis XIII. Some of his letters are preserved in the Bibliotheque Nationale in Paris, and his life was written by N. Chorier (Grenoble, 1683).

His eldest son, Francois, comte de Sault, due de Lesdiguieres (1600-1677), governor and lieutenant-general of Dauphine, took the name and arms of Bonne. The younger, Charles II. de Crequy, seigneur de Canaples, was killed at the siege of Chambery in 1630, leaving three sons — Charles III., sieur de Blanchefort, prince de Poix, due de Crequy (i623?-i687); Alphonse de Crequy, comte de Canaples (d. 1711), who became on the extinction of the elder branch of the family in 1702 due de Lesdiguieres, and eventually succeeded also to his younger brother's honours; and Francois, chevalier de Crequy and marquis de Marines, marshal of France (1625-1687).

The last-named was born in 1625, and as a boy took part in the Thirty Years' War, distinguishing himself so greatly that at the age of twenty-six he was made a mare'chal de camp, and a lieutenant-general before he was thirty. He was regarded as the most brilliant of the younger officers, and won the favour of Louis XIV. by his fidelity to the court during the second Fronde. In 1667 he served on the Rhine, and in 1668 he com- manded the covering army during Louis XIV. 's siege of Lille, after the surrender of which the king rewarded him with the marshalate. In 1670 he overran the duchy of Lorraine. Shortly after this Turenne, his old commander, was made marshal-general, and all the marshals were placed under his orders. Many re- sented this, and Crequy, in particular, whose career of uninter- rupted success had made him over-confident, went into exile rather than serve under Turenne. After the death of Turenne and the retirement of Conde, he became the most important general officer in the army, but his over-confidence was punished

by the severe defeat of Conzer Briick (1675) and the surrender of Trier and his own captivity which followed. But in the later campaigns of this war (see Dutch Wars) he showed himself again a cool, daring and successful commander, and, carrying on the tradition of Turenne and Conde, he was in his turn the pattern of the younger generals of the stamp of Luxembourg and Villars. He died in Paris on the 3rd of February 1687.

Alphonse de Crequy had not the talent of his brothers, and lost his various appointments in France. He went to London in 1672, where he became closely allied with Saint Evremond, and was one of the intimates of King Charles II.

Charles III. de Crequy served in the campaigns of 1642 and 1645 in the Thirty Years' War, and in Catalonia in 1640. In 1646, after the siege of Orbitello, he was made lieutenant-general by Louis. By faithful service during the king's minority he had won the gratitude of Anne of Austria and of Mazarin, and in 1652 he became due de Crequy and a peer of France. The latter half of his life was spent at court, where he held the office of first gentle- man of the royal chamber, which had been bought for him by his grandfather. In 1659 he was sent to Spain with gifts for the infanta Maria Theresa, and on a similar errand to Bavaria in 1680 before the marriage of the dauphin. He was ambassador to Rome from 1662 to 1665, and to England in 1677 ; and became governor of Paris in 1675. He died in Paris on the 13th of February 1687. His only daughter, Madeleine, married Charles de la Tremoille (1655-1709).

The marshal Francois de Crequy had two sons, whose brilliant military abilities bade fair to rival his own. The elder, Francois Joseph, marquis de Crequy (1662-1702), already held the grade of lieutenant-general when he was killed at Luzzara on the 13th of August 1702; and Nicolas Charles, sire de Crequy, was killed before Tournai in 1696 at the age of twenty-seven.

A younger branch of the Crequy family, that of Hemont, was represented by Louis Marie, marquis de Crequy (1705-1741), author of the Principes philosophiques des saints solitaires d'Egypte (1779), and husband of the marquise separately noticed below, and became extinct with the death in 1801 of his son, Charles Marie, who had some military reputation.

For a detailed genealogy of the family and its alliances see Moreri, Dictionnaire historique; Annuaire de la noblesse francaise (1856 and 1867). There is much information about the Crequys in the Memoires of Saint-Simon. ,

CREQUY, RENEE CAROLINE DE FROULLAY, Marquise de (1714-1803), was born on the 19th of October 17 14, at the chateau of Monfleaux (Mayenne), the daughter of Lieutenant-General Charles Francois de Froullay. She was educated by her maternal grandmother, and married in 1737 Louis Marie, marquis de Crequy (see above), who died four years after the marriage. Madame de Crequy devoted herself to the care of her only son, who rewarded her with an ingratitude which was the chief sorrow of her life. In 1755 she began to receive in Paris, among her intimates being D'Alembert and J. J. Rousseau. She had none of the frivolity generally associated with the women of her time and class, and presently became extremely religious with inclinations to Jansenism. D'Alembert's visits ceased when she adopted religion, and she was nearly seventy when she formed the great friendship of her life with Senac de Meilhan, whom she met in 1781, and with whom she carried on a correspondence (edited by Edouard Fournier, with a preface by Sainte-Beuve in 1856). She commented on and criticized Meilhan's works and helped his reputation. She was arrested in 1793 and imprisoned in the convent of Les Oiseaux until the fall of Robespierre (July 1794). The well-known Souvenirs de la marquise de Crequy (1710-1803), printed in 7 volumes, 1834-1835, and purporting to be addressed to her grandson, Tancrede de Crequy, was the production of a Breton adventurer, Cousin de Cour- champs. The first two volumes appeared in English in 1834 and were severely criticized in the Quarterly Review.

See the notice prefixed by Sainte-Beuve to the Lettres; P. L. Jacob, Enigmes et decouvertes bibliographiques (Paris, 1866) ; Querard, Supercheries litteraires, s.v. " Crequy " ; L 'Ombre de la marquise de Crequy aux lecteurs des souvenirs (1836) exposes the forgery of the Memoires.

CRESCAS, HASDAI BEN ABRAHAM (1340-1410), Spanish philosopher. His work, The Light of the Lord ('Or 'Adonai) i deeply affected Spinoza, and thus his philosophy became of wide importance. Maimonides (q.v.) had brought Jewish thought entirely under the domination of Aristotle. The work of Crescas , though it had no immediate success, ended in effecting its libera- tion. He refused to base Judaism on speculative philosophy alone; there was a deep emotional side to his thought. Thus he based Judaism on love, not on knowledge; love was the bond between God and man, and man's

fundamental duty was love as expressed in obedience to God's will. Spinoza derived from Crescas his distinction between attributes and properties; he shared Crescas's views on creation and free will, and in the whole trend of his thought the influence of Crescas is strongly marked.

See E. G. Hirsch, Jewish Encyclopaedia, iv. 350. (I. A.)

CRESCENT (Lat. crescens, growing), originally the waxing moon, hence a name applied to the shape of the moon in its first quarter. The crescent is employed as a charge in heraldry, with its horns vertical ; when they are turned to the dexter side of the shield, it is called increscent, when to the sinister, decrescent. A crescent is used as a difference to denote the second son of a house; thus the earls of Harrington place a crescent upon a crescent, as descending from the second son of a second son. An order of the crescent was instituted by Charles I. of Naples and Sicily in 1268, and revived by Rene of Anjou in 1464. A Turkish order or decoration of the crescent was instituted by Sultan Selim III. in 1799, in memory of the diamond crescent which he had presented to Nelson after the battle of the Nile, and which Nelson wore on his coat as if it were an order.

The crescent is the military and religious symbol of the Ottoman Turks. ■ According to the story told by Hesychius of Miletus, during the siege of Byzantium by Philip of Macedon the moon suddenly appeared, the dogs began to bark and aroused the inhabitants, who were thus enabled to frustrate the enemy's scheme of undermining the walls. The grateful Byzantines erected a statue to " torch-bearing " Hecate, and adopted the lunar crescent as the badge of the city. It is gener- ally supposed that it was in turn adopted by the Turks after the capture of Constantinople in 1453, either as a badge of triumph, or to commemorate a partial eclipse of the moon on the night of the final attack. In reality, it seems to have been used by them long before that event. Ala ud-din, the Seljuk sultan of Iconium (1245-1254), and Ertoghrul, his lieutenant and the founder of the Ottoman branch of the Turkish race, assumed it as a device, and it appeared on the standard of the janissaries of Sultan Orkhan (1326-1360). Since the new moon is associated with special acts of devotion in Turkey — where, as in England, there is a popular superstition that it is unlucky to see it through glass — it may originally have been adopted in consequence of its re- ligious significance. According to Professor Ridgeway, however, the Turkish crescent, like that seen on modern horse-trappings, has nothing to do with the new moon, but is the result of the base- to-base conjunction of two claw or tusk amulets, an example of which has been brought to light during the excavations of the site

of the temple of Artemis Orthia at Sparta (see Athenaeum, March 21, 1908). There is nothing distinctively Turkish in the combination of crescent and star which appears on the Turkish national standard; the latter is shown by coins and inscriptions to have been an ancient Illyrian symbol, and is of course common in knightly and decorative orders. It is doubtful whether any opposition between crescent and cross, as symbols of Islam and Christianity, was ever intended by the Turks; and it is an historical error to attribute the crescent to the Saracens of crusading times or the Moors in Spain.

Crescent is also the name of a Turkish musical instrument. In architecture, a crescent is a street following the arc of a circle; the name in this sense was first used in the Royal Crescent at Bath.

CRESCIMBENI, GIOVANNI MARIO (1663-1728), Italian critic and poet, was born at Macerata in 1663. Having been educated by a French priest at Rome, he entered the Jesuits' college of his native town, where he produced a tragedy on the

story of Darius, and versified the Pharsalia. In 1679 he received the degree of doctor of laws, and in 1680 he removed again to Rome. The study of Filicaja and Leonico having convinced him that he and all his contemporaries were working in a wrong direction, he resolved to attempt a general reform. In 1690, in conjunction with fourteen others, he founded thecelebrated academy of the Arcadians, and began the contest against false taste and its adherents. The academy was most successful; branch societies were opened in all the principal cities of Italy; and the influence of Marini, opposed by the simplicity and ele- gance of such models as Costanzo, soon died away. Crescimbeni officiated as secretary to the Arcadians for thirty-eight years. In 1705 he was made canon of Santa Maria; in 17 15 he obtained the chief curacy attached to the same church; and about two months before he died (1728) he was admitted a member of the order of Jesus.

His principal work is the Istoria delta, volgar poesia (Rome, 1698), an estimate of all the poets of Italy, past and contemporary, which may yet be consulted with advantage. The most important of his numerous other publications are the Commentary (5 vols., Rome, 1702-1711), and La Bellezza delta volgar poezia (Rome, 1700).

CRESILAS, a Cretan sculptor of Cydonia. He was a con- temporary of Pheidias, and one of the sculptors who vied in producing statues of amazons at Ephesus (see Greek Art) about 450 B.C. As his amazon was wounded (volnerata; Pliny, Nat. Hist, xxxiv. 75), we may safely identify it with the figure, of which several copies are extant, who is carefully removing her blood-stained garment from a wound under the right breast. Another work of Cresilas of which copies survive is the portrait of Pericles, the earliest Greek portrait which has been with certainty identified, and which fully confirms the statement of ancient critics that Cresilas was an artist who idealized and added nobility to men of noble type. An extant portrait of Anacreon is also derived from Cresilas.

CRESOLS or Methyl Phenols, C 7 H s O or C 6 H 4 -CH 3 OH. The three isomeric cresols are found in the tar obtained in the destructive distillation of coal, beech wood and pine. The crude cresol obtained from tar cannot be separated into its different constituents by fractional distillation, since the boiling points of the three isomers are very close together. The pure substances are best obtained by fusion of the corresponding toluene sul- phonic acids with potash.

Ortho-cresol, CH 3 (i)-C 6 H 4 -OH(2), occurs as sulphate in the urine of the horse. It may be prepared by fusion of ortho-toluene sulphonic acid with potash; by the action of phosphorus pent- oxide on carvacrol; or by the action of zinc chloride on camphor. It is a crystalline solid, which melts at 30 C. and boils at 190-8° C. Fusion with alkalis converts it into salicylic acid.

Meta-cresol,CH 3 (i) • C

Para-cresol, CH 3 (i)-C 6 H 4 OH(4), occurs as sulphate in the urine of the horse. It is also found in horse's liver, being one of the putrefaction products of tyrosine. It may be prepared by the fusion of para toluene sulphonic acid with potash; by the action of nitrous acid on para-toluidine; or by heating para-oxyphenyl acetic acid with lime. It crystallizes in prisms which melt at 36° C. and boil at 2oi°-8 C. It is soluble in water, and the aqueous solution gives a blue coloration with ferric chloride. When treated with hydrochloric acid and potassium chlorate, no chlorinated quinones are obtained (M. S. Southworth, Ann. (1873), 168, p. 271), a behaviour which distinguishes it from ortho- and meta-cresol.

On the composition of commercial cresylic acid see A. H. Allen, Jour. Soc. Chem. Industry (1890), 9, p. 141. See also Creosote.

CRESPI, DANIELE (1 590-1630), Italian historical painter, was born near Milan, and studied under Giovanni Battista Crespi and Giulio Procaccini. He was an excellent colourist; his drawing was correct and vigorous, and he grouped his composi- tions with much ability. His best work, a series of pictures from the life of Saint Bruno, is in the monastery of the Carthusians at Milan. Among the most famous of his paintings is a ” Stoning of St Stephen ” at Brera, and there are several excellent examples of his work in the city of his birth and at Pa via.

CRESPI, GIOVANNI BATTISTA (1557-1663), called II Cerano, Italian painter, sculptor, and architect, was born at Cerano in the Milanese. He was a scholar of considerable attainments, and held a position of dignity in his native city. He was head of the Milanese Academy founded by Cardinal Frederigo Borromeo, and he was the teacher of Guercino. He is most famous as a painter; and, though his figures are neither natural nor graceful, his colouring is good, and his designs full of ideal beauty.

CRESPI, GIUSEPPE MARIA (1665-1747), Italian painter, called ” Lo Spagnuolo ” from his fondness for rich apparel, was born at Bologna, and was trained under Angelo Toni, Domenico Canuti and Carlo Cignani. He then went through a course of copying from Correggio and Barocci; this he followed up with a journey to Venice for the sake of Titian and Paul Veronese; and late in life he # proclaimed himself a follower of Guercino and Pietro da Cortona. He was a good colourist and a facile executant, and was wont to employ the camera obscura with great success in the treatment of light and shadow; but he was careless and unconscientious. He was a clever portrait- painter and a brilliant caricaturist; and his etchings after Rembrandt and Salvator are in some demand. His greatest work, a ” Massacre of the Innocents,” is at Bologna; but the Dresden gallery possesses twelve examples of him, among which is his celebrated series of the Seven Sacraments.

CRESS, in botany. ” Garden Cress ” (Lepidium sativum) is an annual plant (nat. ord. Cruciferae), known as a cultivated plant at the present day in Europe, North Africa, western Asia and India, but its origin is obscure. Alphonse de Candolle (L’Origine des plantes cultiv&es) says its cultivation must date from ancient times and be widely diffused, for very different names for it exist in ths Arab, Persian, Albanian, Hindustani and Bengali tongues. He considered the plant to be of Persian origin, whence it may have spread after the Sanskrit epoch (there is no Sanskrit name for it) into the gardens of India, Syria, Greece and North Africa. It is used in salads, the young plants being cut and eaten while still in the seed-leaf, forming, along with plants of

the white mustard in the same stage of growth, what is commonly called ” small salad.” The seeds should be sown thickly broadcast or in rows in succession every ten or fourteen days, according to the demand. The sowings “may be made in the open ground from March till October, the earliest under hand-glasses, and the summer ones in a cool moist situation, where water from trees, shrubs, walls, &c, cannot fall on or near them. The grit thrown up by falling water pierces the tender tissues of the cress, and cannot be thoroughly removed by washing. During winter they must be raised on a slight hotbed, or in shallow boxes or pans placed in any of the glass-houses where there is a temperature of 6o° or 65°. Cress is subject to the attack of a fungus (Pythium de- Baryanum) if kept too close and moist. The pest very quickly infects a whole sowing. There is no cure for it; preventive measures should therefore be taken by keeping the sowings fairly dry and well ventilated. The seed should be sown on new soil, and should not be covered.

The ” Golden ” or ” Australian ” cress is a dwarf, yellowish- green, mild-flavoured sort, which is cut and eaten when a little more advanced in growth but while still young and tender. It should be sown at intervals of a month from March onwards, the autumn sowing, for winter and spring use, being made in a sheltered situation.

The ” curled ” or ” Normandy ” cress is a very hardy sort, of good flavour. In this, which is allowed to grow like parsley, the leaves are picked for use while young; and, being finely cut

and curled, they are well adapted for garnishing. It should be sown thinly, in drills, in good soil in the open borders, in March, April and May, and for winter and spring use at the foot of a south wall early in September, and about the middle of October.

Water – cress. — “Water-cress” (Nasturtium officinale) is a member of the same natural order, and a native of Great Britain. Although now so largely used, it does not appear to have been cultivated in England prior to the 19th century, though in Germany, especially near Erfurt, it had been grown long pre- viously. Its flavour is due to an essential oil containing sulphur. Water-cress is largely cultivated in shallow ditches, prepared in wet, low-lying meadows, means being provided for flooding the ditches at will. Where the amount of water available is limited, the ditches are arranged at successively higher levels, so as

to allow of the volume admitted to the upper ditch being passed successively to the others. The ditches are usually puddled with clay, which is covered to the depth of 9 to 12 in. with well-manured soil.

A stock of plants may be raised in two ways — by cuttings, and by seeds. If a stock is to be raised from cuttings, the desired quantity of young shoots is gathered — those sold in bunches for salad serve the purpose well — and reduced where necessary to about 3 in. in length, the basal and frequently rooted portion being rejected. They are dibbled thickly into one of the ditches, and only enough water admitted to just cover the soil. If the start is made in late spring, the cuttings will be rooted in a week. They are allowed to remain for another week or two, and are then taken up and dropped about 9 in. apart into the other ditches, which have been slightly flooded to receive them. There is no need to plant them — the young roots will very soon be securely anchored. The volume of water is increased as the plants grow. If raised from seed, the seed-bed is prepared as for cuttings, and seed sown either in drills or broadcast. No flooding is done until the seedlings are up. Water is then admitted, the level being raised as the plants grow. When 5 or 6 in. high, they are taken up and dropped into their permanent quarters precisely like those raised from cuttings.

Cultivated as above described, the plants afford frequent cuttings of large clean cress of excellent flavour for market purposes. Sooner or later growth will become less vigorous and flowering shoots will be produced. This will be accompanied by a pronounced deterioration of the remaining vegetative shoots. These signs will be interpreted by the grower to mean that his plants, as a market crop, are worn out. He will therefore take steps to repeat the routine of culture above described. In the winter the ditches are flooded to protect the cress from frost.

The best-flavoured water-cress is produced in the pure water of running streams over chalk or gravel soil. Should the water be contaminated by sewage or other undesirable matter, the plants not only absorb some of the impurities but also serve to anchor much of the solid particles washed as scum among them. This is extremely difficult to dislodge by washing, and renders the cress a source of danger as food.

Water-cress for domestic use may be raised as a kitchen-garden crop if frequently watered overhead. Beds to afford cress during the summer should be made in broad trenches on a border facing north. It may also be raised in pots or pans stood in saucers of water and frequently

watered overhead.

In recent years in America attention has been paid to the injury done to water-cress beds by the ” water-cress sow-bug ” (Mancasellus brachyurus) , and the ” water-cress leaf -beetle ” (Phaedon aeruginosa). Another species of Phaedon is known in England as ” blue beetle ” or ” mustard beetle,” and is a pest also of mustard, cabbage and kohlrabi (see F. H. Chittenden, in Bulletin 66, part ii. of Bureau of Entomology, United States Department of Agriculture, 1907).

The name “nasturtium” is applied in gardens, but incorrectly, to species of Tropaeolum.

CRESSENT, CHARLES (1685-1768), French furniture-maker, sculptor and fondeur-ciseleur. As the second son of Francois Cressent, sculpteur du roi, and grandson of Charles Cressent, a furniture-maker of Amiens, who also became a sculptor, he

inherited the tastes and aptitudes which were likely to make a finished designer and craftsman. Even more important perhaps was the fact that he was a pupil of Andre Charles Boulle. Trained in such surroundings, it is not surprising that he should have reached a degree of achievement which has to a great extent justified the claim that he was the best decorative artist of the 18th century. Cressent’s distinction is closely connected with the regency, but his earlier work had affinities with the school of Boulle, while his later pieces were full of originality. He was an artist in the widest sense of the word. He not only designed and made furniture, but created the magnificent gilded enrichments which are so characteristic of his work. He was likewise a sculptor, and among his plastic work is known to have been a bronze bust of Louis, due d’Orleans, the son ‘ of the regent, for whom Cressent had made one of the finest examples of French furniture of the 18th century — the famous medaillier now in the Bibliotheque Nationale. Cressent’s bronze mounts were executed with a sharpness of finish and a grace and vigour of outline which were hardly excelled by his great con- temporary Jacques Caffieri. His female figures placed at the corners of tables are indeed among the most delicious achieve- ments of the great days of the French metal worker. Much of Cressent’s work survives, and can be identified; the Louvre and the Wallace collection are especially rich in it, and his commode at Hertford House with gilt handles representing Chinese dragons is perhaps the most elaborate piece he ever produced. The work of identification is rendered comparatively easy in his case by the fact that he published catalogues of three sales of his work. These

catalogues are highly characteristic of the man, who shared in no small degree the personal bravoura of Cellini, and could sometimes execute almost as well. He did not hesitate to describe himself as the author of ” a clock worthy to be placed in the very finest cabinets,” “the most distinguished bronzes,” or pieces of “the most elegant form adorned with bronzes of extra richness.” He worked much in marqueterie, both in tortoiseshell and in brilliant coloured woods. He was indeed an artist to whom colour appealed with especial force. The very type and exemplar of the ” feeling ” of the regency, he is worthy to have given his own name to some of the fashions which he deduced from it.

CRESSWELL, SIR CRESSWELL (1794-1863), English judge, was a descendant of an old Northumberland family, and was born at Newcastle in 1 794. He was educated at the Charterhouse and at Emmanuel College, Cambridge. He graduated B.A. in 1814, and M.A. four years later. Having chosen the profession of the law he studied at the Middle Temple, and was called to the bar in 1819. He joined the northern circuit, and was not long in earning a distinguished position among his professional brethren. In 183 7 he entered parliament as Conservative member for Liverpool, and he soon gained a reputation as an acute and learned debater on all constitutional questions. In January 1842 he was made a judge of the court of common pleas, being knighted at the same time; and this post he occupied for sixteen years. When the new court for probate, divorce and matrimonial causes was established (1858), Sir Cresswell Cresswell was requested by the Liberal government to become its first judge and undertake the arduous task of its organization. Although he had already earned a right to retire, and possessed large private wealth, he accepted this new task, and during the rest of his life devoted himself to it most assiduously and conscientiously, with complete satisfaction to the public. In one case only, out of the very large number on which he pronounced judgment, was his decision reversed. His death was sudden. By a fall from his horse on the nth of July 1863 his knee-cap was injured. He was recovering from this when on the 29th of the same month he died of disease of the heart.

See Foss’s Lives of the Judges; E. Manson, Builders of our Law

(1904).

CRESSY, HUGH PAULINUS DE (c. 1605-1674), English Bene- dictine monk, whose religious name was Serenus, was born at Wakefield, Yorkshire, about 1605. He went to Oxford at the age of fourteen, and in 1626 became a fellow of Merton College. Having taken orders, he

rose to the dignity of dean of Leighlin,

Ireland, and canon of Windsor. He also acted as chaplain to Lord Wentworth, afterwards the celebrated earl of Strafford. For some time he travelled abroad as tutor to Lord Falmouth, and in 1646, during a visit to Rome, joined the Roman Catholic Church. In the following year he published his Exomologesis (Paris, 1647), or account of his conversion, which was highly valued by Roman Catholics as an answer to William Chillingworth's attacks. Cressy entered the Benedictine Order in 1649, and for four years resided at Somerset House as chaplain to Catherine of Braganza, wife of Charles II. He died at West Grinstead on the 10th of August 1674. Cressy's chief work, The Church History of Brittanny or England, from the beginning of Christianity to the Norman Conquest (1st vol. only published, Rouen, 1668), gives an exhaustive account of the foundation of monasteries during the Saxon heptarchy, and asserts that they followed the Benedictine rule, differing in this respect from many historians. The work was much criticized by Lord Clarendon, but defended by Antony a. Wood in his Athenae Oxoniensis, who supports Cressy's state- ment that it was compiled from original MSS. and from the Annates Ecclesiae Britannicae of Michael Alford, Dugdale's Monasticon, and the Decern Scriptores Historiae Anglicanae. The second part of the history, which has never been printed, was discovered at Douai in 1856. To Roman Catholics Cressy's name is familiar as the editor of Walter Hilton's Scale of Perfection (London, 1659); of Father A. Baker's Sancla Sophia (2 vols., Douai, 1657); and of Juliana of Norwich's Sixteen Revelations on the Love of God (1670). These books, which would have been lost but for Cressy's zeal, have been frequently reprinted, and have been favourably regarded by a section of the Anglican Church.

For a complete list of Cressy's works see J. Gillow's Bibl. Diet, of Eng. Catholics, vol. i.

CREST, a town of south-eastern France, in the department of Drome, on the right bank of the Drome, 20 m. S.S.E. of Valence by rail. Pop. (1906) town, 3971; commune, 5660. It carries on silk-worm breeding, silk-spinning, and the manufacture of woollens, paper, leather and cement. There is trade in truffles. On the rock which commands the town stands a huge keep, the sole survival of a castle (12th century) to which Crest was in- debted for its importance in the middle ages and

the Religious Wars. The rest of the castle was destroyed in the first half of the 17 th century, after which the keep was used as a state prison. Crest ranked for a time as the capital of the duchy of Valentinois, and in that capacity belonged before the Revolution to the prince of Monaco. The communal charter, graven on stone and dating from the 12th century, is preserved in the public archives. Ten miles south-east of Crest lies the picturesque Forest of Saon.

CREST (Lat. crista, a plume or tuft), the ” comb ” on an animal’s head, and so any feathery tuft or excrescence, the ” cone ” of a helmet (by transference, the helmet itself), and the top or summit of anything. In heraldry (q.v.) a crest is a device, originally borne as a cognizance on a knight’s helmet, placed on a wreath above helmet and shield in armorial bearings, and used separately on a seal or on articles of property.

Cresting, in architecture, is an ornamental finish in the wall or ridge of a building, which is common on the continent of Europe. An example occurs at Exeter cathedral, the ridge of which is ornamented with a range of small fleurs-de-lis in lead.

CRESTON, a city and the county-seat of Union county, Iowa, U.S.A., about 60 m. S.W. of Des Moines, at the crossing of the main line and two branches of the Chicago, Burlington & Quincy railway. Pop. (1890) 7200; (1900) 7752; (1905, state census) 8382 (753 foreign-born); (1910) 6924. The city is on the crest of the divide between the Mississippi and the Missouri basins at an altitude of about 1310 ft. — whence its name. It is situated in a fine farming and stock-raising region, for which it is a shipping point. The site was chosen in 1869 by the Burlington & Missouri River Railroad Company (subsequently merged in the Chicago, Burlington & Quincy Railroad Company) for the location of its shops. Creston was incorporated as a town in 1869, and was chartered as a city in 1871.

CRESWICK, THOMAS (1811-1860), English landscape-painter, was born at Sheffield, and educated at Hazelwood, near Birming- ham. At Birmingham he first began to paint. His earliest appearance as an exhibitor was in 1827, at the Society of British Artists in London; in the ensuing year he sent to the Royal Academy the two pictures named ” Llyn Gwynant, Morning,” and ” Carnarvon Castle.” About the same time he settled in London; and in 1836 he took a house in Bayswater. He soon attracted some attention as a landscape-painter, and had a career of uniform and encouraging, though not signal success. In 1842 he was elected an associate, and in 1850 a full member of the Royal Academy, which, for several years before his

death, numbered hardly any other full members representing this branch of art. In his early practice he set an example, then too much needed, of diligent study of nature out of doors, painting on the spot all the substantial part of several of his pictures. English and Welsh streams may be said to have formed his favourite subjects, and generally ‘British rural scenery, mostly under its cheerful, calm and pleasurable aspects, in open daylight. This he rendered with elegant and equable skill, colour rather grey in tint, especially in his later years, and more than average technical accomplishment; his works have little to excite, but would, in most conditions of public taste, retain their power to attract. Creswick was industrious and extremely prolific; he produced, besides a steady outpouring of paintings, numerous illustrations for books. He was personally genial — a dark, bulky man, somewhat heavy and graceless in aspect in his later years. He died at his house in Bayswater, Linden Grove, on the 28th of December 1869, after a few years of declining health. Among his principal works may be named ” England ” (1847); ” Home by the Sands, and a Squally Day” (1848); “Passing Showers ” (1849); ” The Wind on Shore, a First Glimpse of the Sea, and Old Trees” (1850); “A Mountain Lake, Moonrise ” (1852); “Changeable Weather” (1865); also the “London Road, a Hundred Years ago”; “The Weald of Kent”; the “Valley Mill” (a Cornish subject); a “Shady Glen”; the ‘Windings of a River”; the ” Shade of the Beech Trees”; the ” Course of the Greta” ; the ” Wharfe “; ” Glendalough,” and other Irish subjects, 1836 to 1840; the ” Forest Farm.” Frith for figures, and Ansdell for animals, occasionally worked in collaboration with Creswick.

In 1873 T. O. Barlow, the engraver, published a catalogue of Creswick’s works.

CRESWICK, a borough of Talbot county, Victoria, Australia.. 85! m. by rail N.W. of Melbourne. Pop. (1901) 3060. It is the centre of a mining, pastoral and agricultural district. Gold is found both in alluvial and quartz formations, the quartz being especially rich. The surrounding country is fertile and well- timbered, and there is a government plantation and nursery in connexion with the forests department.

CRETACEOUS SYSTEM, in geology, the group of stratified rocks which normally occupy a position above the Jurassic system and below the oldest Tertiary deposits; therefore it is in this system that the closing records of the great Mesozoic era are to be found. The name furnishes an excellent illustration of the inconvenience of employing a local lithological feature in the descriptive title of a wide-ranging rock-system. The white chalk (Lat. creta), which gives its name to the system, was first studied in the Anglo-Parisian basin, where it takes a

prominent place; but even in this limited area there is a considerable thickness and variety of rocks which are not chalky, and the Cretaceous system as a whole contains a remarkable diversity of types of sediment.

Classification. — The earlier subdivisions of the Cretaceous rocks were founded upon the uncertain ground of similarity in litho- logical characters, assisted by observed stratigraphical sequence. This method yielded poor results even in a circumscribed area like Great Britain, and it breaks down utterly when applied to the correlation of rocks of similar age in Europe and elsewhere Study of the fossils, however, has elicited the fact that certain forms characterize certain ” zones,” which are preceded and succeeded by other zones each bearing a peculiar species or

distinctive assemblage of species. By these means the Cretaceous rocks of the world have now been correlated zone with zone, with a degree of exactitude proportional to the palaeontological information gained in the several areas of occurrence.

The Cretaceous system falls naturally into two divisions, an upper and a lower, in all but a few limited regions. In the table on page 288 the names of the principal stages are enumerated; these are capable of world-wide application. The sub-stages are of more local value, and too much importance must not be attached to them for the correlation of distant deposits. The general table is designed to show the relative position in the system of some of the more important and better-known formations; but it must be remembered that the Cretace- ous rocks of Europe can now be classified in considerable detail

by their fossils, the most accurate group for this purpose being the cephalopods. The smaller table was compiled by T. C. Chamberlin and R. D. Salisbury to show the main subdivisions of the North American Cretaceous rocks. The correlation of the minor subdivisions of Europe and America are only approximate.

Relation of the Cretaceous Strata to the Systems above and below. — In central and northern Europe the boundary between the Cretaceous and Tertiary strata is sharply defined by a fairly general unconformity, except in the Danian and Montian beds, where there is a certain commingling of Tertiary with Cretaceous fossils. The relations with

the underlying Jurassic rocks are not so clearly defined, partly because the earliest Cretaceous rocks are obscured by too great a thickness of younger strata, and partly because the lowest observable rocks of the system are not the oldest, but are higher members of the system that have overlapped on to much older rocks. However, in the south of England, in the Alpine area, and in part of N. W. Germany the passage from Jurassic to Cretaceous is so gradual that there is some divergence of opinion as to the best position for the line of separation. In the Alpine region this passage is formed by marine beds, in the other two by brackish-water deposits. In a like manner the Potomac beds of N. America grade downwards into the Jurassic; while in the Laramie formation an upward passage is observed into the Eocene deposits. There is a very general unconformity and break between the Lower and Upper Cretace- ous; this has led Chamberlin and Salisbury to suggest that the Lower Cretaceous should be regarded as a separate period with the title ” Comanchean.”

Physiographical Conditions and Types of Deposit. — With the opening of the Cretaceous in Europe there commenced a period of marine transgression; in the central and western European region this took place from the S. towards the N., slow at first and local in effect, but becoming more decided at the beginning of the upper division. During the earlier portion of the period, S. England, Belgium and Hanover were covered by a great series of estuarine sands and clays, termed the Wealden formation (

Meanwhile, in the rest of Europe alternations of marine and estuarine deposits were being laid down; but over the Alpine region lay the open sea, where there flourished coral reefs and great banks of clam-like molluscs. The sea gradually encroached upon the estuarine Wealden area, and at the time of the Aptian deposits uniform marine conditions prevailed from western Europe through Russia into Asia. This extension of the sea is illustrated in England by the overlap of, the Gault over the Lower Greensand on to the older rocks, and by similar occurrences in N. France and Germany.

Almost throughout the Upper Cretaceous period the marine invasion continued, varied here and there by slight movements in the opposite sense which did not, however, interfere with the quiet general advance of the sea. This marine extension made itself felt over the old central plateau of France, the N. of Great Britain, the Spanish peninsula, the Armorican peninsula, and also in the Bavarian Jura and Bohemia; it affected the northern part of Africa and East Africa; in N. America the sea spread over the entire length of the Rocky Mountain region; and in Brazil, eastern Asia and western Australia, Upper

Cretaceous deposits are found resting directly upon much older rocks. Indeed, at this time there happened one of the greatest changes in the distribution of land and water that have been recorded in geological history.

We have seen that in early Cretaceous times marine limestones were being formed in southern Europe, while estuarine sands and muds were being laid down in the Anglo-German delta, and that beds of intermediate character were being made in parts of N. France and Germany. During later Cretaceous times this striking difference between the northern and southern fades was main- tained, notwithstanding the fact that the later deposits were of marine origin in both regions. In the northern region the gradual deepening and accompanying extension of the sea caused the sandy deposits to become finer grained in N.W. Europe. The sandy beds and clays then gave way to marly deposits, and in these early stages glauconitic grains are very characteristically present both in the sand and in the marls. In their turn these marly deposits in the Anglo-Parisian basin were succeeded gradually and somewhat intermittently by the purer, soft lime- stone of the chalk sea, and by limestones, similar in character, in N. France, extra-Alpine Germany, S. Scandinavia, Denmark and Russia. Meanwhile, the S. European deposits maintained the characters already indicated; limestones (not chalk) prevailed, except in certain Alpine and Carpathian tracts where detrital sandstones were being laid down.

The great difference between the lithological characters of the northern and southern deposits is accompanied by an equally striking difference between their respective organic contents. In the north, the genera Inoceramus and Belemnitella are particu- larly abundant. In the south, the remarkable, large, clam-like, aberrant pelecypods, the Hippurilidae, Rudistes, Caprotina, &c, attained an extraordinary development; they form great lenticular banks, like the clam banks of warm seas, or like our modern oyster-beds; they appear in successive species in the different stages of the Cretaceous system of the south, and can be used for marking palaeontological horizons as the cephalopods are used elsewhere. Certain genera of ammonites, Haploceras, Lytoceras, Phylloceras, rare in the north, are cemmon in the south; and the southern fades is further characterized by the peculiar group of swollen belemnites {Dumontia), by the gastero- pods Aclionella, Nerinea, &c, and by reef-building corals. The southern fades is far more widespread and typical of the period than is the chalk; it not only covers all southern Europe, but spreads eastwards far into Asia and round the Mediterranean basin into Africa. It is found again in Texas, Alabama, Mexico, the West Indies and

Colombia; though limestones of the chalk type are found in Texas, New Zealand, and locally in one or two other places. The marine deposits are organically formed limestones, in which foraminifera and large bivalve mollusca play a leading part, marls and sandstones; dolomite and oolitic and pisolitic limestones are also known.

The Cretaceous seas were probably comparatively shallow;

European Classification.

Britain.

Germany, &c, several other parts of Europe.

s o

■&

0)

cu c

‘ft

<

CO CJ

<

■3

3

.2 “3

u en

3 <

8

_o! “c3

CJ

N

1*

CJ

CI) CJ

“C

CJ

E

<

t/5

3

CO

ft CO

X!

3

_«

“c

CU

a o

Stages.

Sub-stages.

Upper Cretaceous.

Senonian.

Montian. Danian.

Aturian.

Emscherian.

Turonian.

Cenomanian.

(placed by some in the Tertiary).

Maestrichtian (Dor- donian).

Campanian.

Santonian.

Coniacian.

Angoumian.

Ligerian.

Carentonian.

Rothomagian.

Chalk of Trim- ingham.

Upper Chalk with Flints.

Middle Chalk with- out Flints.

Grey Chalk. Chalk marl. Cambridge Green- sand.

Marls and pisolitic Lime- .

stone of Meudon. § Limestone of Saltholm’tJ

and Faxo (Denmark) . gj

• a

CO cu

Upper Quader Sand- 3 stone. jj

0)

Quader Marls and-3 Planer Marls. |

XI

s

Upper Planer. JJ

a

3

co >-<

Lr. Planer and Lr. c Quader. v

3

O

Tourtia of Mons, &c. ˆ

3

co en o O

en”

en

•a a co

en

en rt ,- en • a c SxJC/j

o S.2 JcV cj -3 co ˆ + J 2 c ™ ˆ3

U,°? tu cj

_o

<

en

en

-a

cu

pa -a

3

“3

-o

. 3

■ a) O ■•-Oh

t/)

X)

3

cj

CO

_cj

<

H

3

CO cj

CJ

CU

Q

en XI

cu

pa i-i

o _o

.2

<

CU

3

O

4J en

T>

3

CO

t/i

+j j-

OJ

en

CJ

Q

■a

“n

J3

CJ

enT3 CJ 3 3 cd O en

4J 3

en cu cu cu

ˆX)

ˆ C

3 CO

03 en en-r

cu tj

pais

rt en”

2 3

9-— ‘5fc

en

‘u cu t/3

_C

ccj

3

cS

en

‘C cu t/)

en

CJ

‘u

t/)

o

12

X ■o

3

CO cu

3

en

13 3

CO

W

‘B

3

N

CO

a ft

3

o

u

O

o o

4J

CO

Ph

d

3

O

O

‘S

CO

<

c

2

‘3 Gault and Upper

Greensand.

“3

t/)

03

O

o u a

0)

u

u

CU

o

-1

Albian.

Aptian.

Barremian.

Neocomian.

Gault.

Gargasian. Bedoulian.

Hauterivian.

Valangian.

Berriasian.

en CJ C

o

4J

en

Flammen mergel. Clay g of N. Germany. —

0J

Urgonian ‘Ej

Requienia a

(caprotina) Kalk .2″

or Schrattenkalk. t?

e # o

6

U

o

<->-H

£

c

cO

S u

OJ

o

J3

o

-a

CJ en

E

O

oj ■ u a +->

u

03*

.St/5

-* S |8

<

‘o

OJ

c

y„

X>

3

CTS

t/5

C

.2

ˆ,

3

1. CJ

<

t/j

en

■c

OJ

pa

CJ c£

co “s

CJ

1 ‘^

ft

3

p

o

3

13

5

XI

3

eO

cO

‘s

O

c

.2

*4J

CO

e

o fcc

3

o

Q

M _C

“o

en

M O CJ

en

3

O

3

‘s

3

pa

‘?

“C

(/)

f (J *■ + -‘

rt

)_

a;

s

_o “m

3

O U

M CJ

6

3

CO t- _M

‘cj

pa

en

_CU

“C

CJ t/)

3

O

■o

CJ u

‘&

o

_CJ

‘C

CJ

t/j

CJ en O > > Pi

XI

3

CO

CJ

3

O

en

CU

E J

CO

d

1. 3

o

ft

3

O u

o

o

6

o

Lower Greensand.

Weald Clay ;

and Hastings sands.

s o

CJ

01

a

en

■o

cu

03

cO

iVofe to Table.

Montian from Mons in Belgium.

Danian ,, Denmark = Garumnien of Leymene.

Aturian ,, Adour.

Maestrichtian „ Maestricht.

Campanian „ Champagne.

Emscherian ,, Emscher river in Westphalia.

Santonian „ Saintonge.

Coniacian „ Cognac.

Senonian , ,, Sens in department of Yonne.

Turonian „ Touraine.

Angoumian „ Angoumois.

Ligerian ,, the Loire.

Cenomanian „ Le Mans (Cenomanum).

Carentonian „ Charente.

Rothomagian „ Rouen (Rothomagus) .

Albian „ dept. of Aube.

Selbornian ,, Selborne in Hampshire.

Aptian „ Apt in Vaucluse.

Gargasian ,, Gargas near Apt.

Bedoulian „ la Bedoule (Var) = Rhodanien of Renevier.

Barremian „ Barreme in Basses Alpes.

Hauterivian ,, Hauterive on Lake of Neuchatel.

Valengian ,, Chateau de Valengin near Neuchatel.

Neocomian ,, Neuchatel (Neocomum).

Berriasian ,, Berrias (Ardeche) near Besseges.

Urgonian „ Orgon near Aries.

this was certainly the case where the deposits are sandy, and in the regions occupied by the hippuritic fauna. Much discussion has taken place as to the depth of the chalk sea. Stress has been laid upon the resemblance of this deposit to the modern deep-sea globigerina-ooze; but on the whole the evidence is in favour of moderate depth, perhaps not more than iooo fathoms; the freedom of the deposit from detrital matter being regarded as due to the low elevation of the surrounding land, and the main lines of drainage being in other directions. Sandy and shore deposits are common throughout the system in every region. Besides the Weald, there were great lacustrine and terrestrial deposits in N. America (the Potomac, Kootenay, Morrison, Dakota and Laramie formations) as well as in N. Spain, and in parts of Germany, &c. The general distribution of land and sea is indi- cated in the map.

Earth Movements and Vulcanicily. — During the greater part of the Cretaceous period crustal movements had been small and local in effect, but towards the close a series of great deformative movements was inaugurated and continued into the next period. These movements make it possible to discriminate between the Cretaceous and Tertiary rocks, because the conditions of sedi- mentation were profoundly modified by them, and in most

j

Atlantic Coast.

Eastern Gulf Region.

Western Gulf Region.

Western Interior.

Pacific Coast.

European.

tfi

3

in O

u

W u

Manasquan. Rancocas.

Denver,Livingstone, &c. (possibly Eocene).

Laramie.

Not differ- entiated or wanting.

Danian.

Monmouth.

Ripley. Selma.

Montana Series. Navarro.

Montana Series. 2. Fox Hills. 1. Fort Pierre and Belly River.

Senonian.

3MANCHEAN Cf

er Cretaceous. Uppe

- , , _ _

Matawan.

Eutaw.

Colorado Series. 2. Austin. 1. Eagle Ford.

Colorado Series. 2. Niobrara. 1. Benton.

Chico.

Turonian.

Un

Dakota. Woodbine.

conformity.

Dakota.

Cenomanian. Albian.

Unconformity in places.

Potomac Series. 4. Raritan. 3. Patapsco.

Tuscaloosa Series.

Washita. Fredericksburg.

Trinity.

Kootenay and Morrison (or Como).

Horsetown”| c

la I s

Knoxville J jjj

Aptian. Urgonian.

Neocomian. Wealden.

►J

2. Arundel 1

‘55

-

[2 1. Patuxentj ˆ

parts of the world there resulted a distinct break in the sequence of fossil remains. Great tracts of our modern continental land areas gradually emerged, and several mountainous tracts began to be elevated, such as the Appalachians, parts of the Cordilleras, and the Rocky Mountains, and their northern continuation, and indeed the greater part of the western N. American continent was intensely affected; the uplifting was associated with extensive faulting. Volcanic activity was in abeyance in Europe and in much of Asia, but in America there were many eruptions and intrusions of igneous rock towards the close of the period. Diabases and peridotites had been formed during the Lower Cretaceous in the San Luis Obispo region. Great masses of ash and conglomerate occur in the Crow's Nest Pass in Canada; porphyries and porphyritic tuffs of later Cretaceous age are important in the Andes; while similar rocks are found in the Lower Cretaceous of New Zealand. It is, however, in the Deccan lava flows of India that we find eruptions on a scale more vast than any that have been recorded either before or since. These outpourings of lava cover 200,000 sq. m. and are from 4000 to 6000 ft. thick. They lie upon an eroded Cenomanian surface and are to some extent interbedded with Upper Cretaceous sediments. Economic Products of Cretaceous Rocks. — Coal is one of the most important products of the rocks of this system. The principal Cretaceous coal-bearing area is in the western interior of N. America, where an enormous amount of coal — mostly lignitic, but in places converted into anthracite — lies in the rocks at the foot of the Rocky Mountains; most of this is of Laramie age. Similar beds occur locally in Montana. Coal seams of Lower Cretaceous age are found in the Black Hills (S. Dakota), Alaska, Greenland, and in New Zealand; and the " Upper Quader " of Lowenberg in Silesia also contains coal seams. Coals also occur in the brackish and fresh-water deposits of Carinthia, Dalmatia and Istria, while unimportant lignitic beds are known in many other regions. The Fort Pierre beds are oil-bearing at Boulder, Colorado; and the Trinity formation bears asphalt and bitumen. Important clay deposits are worked in the Raritan formation of New Jersey, &c, and pottery clays are found in the Lowenberg district in Germany. The Washita beds yield the well-known hone stone. Great beds of gypsum exist in the Cretaceous rocks of S. America. Near Salzburg a variety of the hippuritic lime-

stone is quarried for marble. Lithographic stone occurs in the Pyrenees. The economic products peculiar to the chalk are mentioned in the article Chalk. Beds of iron ore are found in the Lower Cretaceous of Germany and England.

The Life of the Cretaceous Period. — The fossils from the Cretaceous series comprise marine, fresh-water and terrestrial animals and plants. Foremost in interest and importance is the appearance in the Lower Potomac (Lower Cretaceous) of eastern and central N. America of the earliest representatives of angio- spermous dicotyledons, and undoubted monocotyledons, the progenitors of our modern flowering plants. The angiosperms spread outward from the Atlantic coast region of N. America, and first appeared in Europe in the Aptian of Portugal; towards the close of the Lower Cretaceous period they occupied parts of Greenland, the remaining land areas of N. America, and were steadily advancing in every quarter of the globe. At first the Jurassic plants, the Cycads, ferns and conifers, lived on and were the dominant plant forms. Gradually, however, they took a subordinate place, and by the close of the Cretaceous period the angiosperms had gained the upper hand. The earliest of these fossil angiosperms is not in a true sense a primitive form, and no records of such types have yet been discovered. Some of the early forms of the Lower Cretaceous are distinctly similar to modern genera, such as Ficus, Sassafras and Aralia; others bore leaves closely resembling our elm, maple, willow, oak, eucalyptus, &c. Before the close of the period many other representatives of living genera had appeared, beech, walnut, tamarisk, plane, laurel (Laurus), cinnamon, ivy, ilex, viburnum, buckthorn, breadfruit, oleander and others; there were also junipers, thujas, pines and sequoias and monocotyledons such as Potamogeton and Arundo. This flora was widely spread and uniform; there was great similarity between that of Europe and N. America, and in parts of the United States (Virginia and Maryland) the plants were very like those in Greenland. The general aspect of the flora was sub-tropical; the eucalyptus and other plants then common in Europe and N. America are now confined to the southern hemisphere.

The marine fauna comprised foraminifera which must have swarmed in the Chalk and some of the limestone seas; their shells have formed great thickness of rock. Common forms are

the genera Alveolina, Cristellaria, Rotalia, Textularia, Orbito- lina Globigerina. Radiolarians were doubtless abundant, but their remains are rare. Sponges with calcareous (Peronidilla, Barroisia) and siliceous skeletons (Siphonia, Coeloptychium, Ventriculites) were very

numerous in certain of the Cretaceous waters. Corals were comparatively rare, Trochosmilia, Para- smilia, Holocystis being typical genera; reefs were formed in the Maestricht beds of Denmark and Faxoe, in the Neocomian and Turonian of France, in the Turonian of the Alps and Pyrenees, and also in the Gosau beds and in the Utatur group of India. Sea-urchins were a conspicuous feature, and many nearly allied- forms are still living; Cidaris, Micr aster, Discoidea are examples. Crinoids were represented by Marsupites, Uintacrinus and Bourgueticrinus; starfish {Collider ma and Pentagonaster) were not uncommon. Polyzoa were abundant; brachiopods were fairly common, though subordinate to the pelecypods; they were mostly rhynchonellids and terebratulids, which lived side by side with the ancient forms, like Crania and Discina. The bivalve mollusca were very important during this period, Inoceramus, Ostrea, Spondylus, Gervillia, Exogyra, Pecten, Trigonia being particularly abundant in the northern seas, while in the southern waters the remarkable Hippurites, Radio- lites, Caprotina, Caprina, Monopleura and Requienia prevailed. Gasteropods were well represented and included many modern genera. Cephalopods were important as a group, but the ammonites, so vigorous in the foregoing period, were declining and were assuming curious degenerate forms, often with a tendency to uncoil the shell; Baculites, Hoplites, Turrilites, Plychoceras, Hamites are some of the typical genera, while Belemnites and Belemnitella were abundant in the northern seas.

The vertebrate fauna of the Cretaceous period differed in many features from that of the present day; mammals appear to have been only poorly represented by puny forms, related to Triassic and Jurassic types; they were mainly marsupials (Batodon, Cimolestes) with a few monotreme-like forms; carnivores, rodents and ungulates were still unknown. As in Jurassic times, reptiles were the dominant forms, and not a few genera lived on from the former period into the Cretaceous; but, on the whole, the reptilian assemblage was no longer so varied, and most of the distinctive mesozoic types had passed away before the close of this period. Dinosaurs were represented by herbivorous and carniv- orous genera as in the Jurassic period, but the latter were less abundant than before. The Iguanodon of the Sussex-Weald and Bernissart in Belgium is perhaps the best-known genus; but there were many others, their remains being particularly abundant and well-preserved in the Cretaceous deposits of N. America. Titanosaurus, Acanthopholis, Megalosaurus and Hypsilophodon may be mentioned, some of these being of great size, while Diclonius was a curious duck-billed creature; but most remarkable in appearance must have been the horned Dinosaurs, Ceratops and Triceratops, gross,

unwieldy creatures, 25 to 30 ft. long, whose huge heads were grotesquely armed with horns and bony frills.

Coincident, perhaps, with the widespread extension of the sea was the development of aquatic habits and structures. suitable thereto amongst all the reptilian groups including also the birds. The foremost place was undoubtedly taken by the pythono- morphs or sea-serpents, including Mosasaurus and many others; these were enormously elongated creatures, reaching up to 75 ft., with swimming flappers and powerful swimming tails, and they lived a predatory life in the open sea. Ichthyosaurians soon disappeared from Cretaceous waters; but the plesiosaurians (Cimoliosaurus and others) reached their maximum develop- ment in this period. The remarkable flying lizards, pterosaurs, likewise attained their great development and then passed away; they ranged in size from that of a pigeon to creatures with a wing-spread of 25 ft.; notable genera are Pteranodon, Ornitho-

cheirus, Nyctiosaurus. Ordinary lizard-like forms were repre- sented by Coniosaurus, Dolichosaurus, &c; and true crocodiles, Goniopholis, Suchosaurus, appeared in this period, and continued to approximate to modern genera. The earliest known river turtles are found in the Belly River deposits of Canada; marine turtles also made their first appearance and were widely repre- sented, some of them, Archelon and Protostega, being of great size. True snakes appeared later in the period.

The birds, as far as existing evidence goes, were aquatic; some, like Ichthyornis, were built for powerful flight; others, like Hesperornis, were flightless. Enaliornis is a form well known from the Cambridge Greensand. They were toothed birds having structural affinities with the Dinosaurs and Pterodactyles.

Fish remains of this period show that a marked change was taking place; teleosteans (with bony internal skeleton) were taking a more prominent place, and although ganoids were still represented {Macropoma, Lepidotus, Amiopris, &c.) they had quite ceased to be the dominant types before the close of Creta- ceous times. Sharks and rays were of the modern types, though distinct in species. Amongst the early forms of Cretaceous teleosteans may be mentioned Elopopsis, Ichthyodectes, Diplo- mystus (herring), Haplopteryx and Urenchelys (eel).

For further information see the articles Chalk; Greensand; Wealden. Sir A. Geikie’s Text-book of Geology, vol. ii. (4th ed., !9 3)> contains in addition to a full general account of the system very full references

to the literature.

CRETE (Gr. Kpifrij; Turk. Kiridjtal. Candia), after Sicily, Sar- dinia and Cyprus the largest island in the Mediterranean, situated between 34°5o'and 35°4o' N. lat. and between 23°3o' and 26°2o' E. long. Its north-eastern extremity, Cape Sidero, is distant about no m. from Cape Krio in Asia Minor, the interval being partly filled by the islands of Carpathos and Rhodes; its north-western, Cape Grabusa, is within 60 m. of Cape Malea in the Morea. Crete thus forms the natural limit between the Mediterranean and the Archipelago. The island is of elongated form; its length from E. to W. is 160 m., its breadth from N. to S. varies from 35 to 7! m., its area is 3330 sq. m. The northern coast-line is much indented. On the W. two narrow mountainous pro- montories, the western terminating in Cape Grabusa or Busa

Longitude Easi 25″ of Greenwich

(ancient Corycus), the eastern in Cape Spada, shut in the Bay of Kisamos; beyond the Bay of Canea, to the E., the rocky peninsula of Akrotiri shelters the magnificent natural harbour of Suda (85 sq. m.), the only completely protected anchorage for large vessels which the island affords. Farther E. are the bays of Candia and Malea, the deep Mirabello Bay and the Bay of Sitia. The south coast is less broken, and possesses no natural harbours, the mountains in many parts rising almost like a wall from the sea; in the centre is Cape Lithinos, the southernmost point of the island, partly sheltering the Bay of Messara. on the W. Immediately to the E. of Cape Lithinos is the small bay of Kali Limenes or Fair Havens, where the ship conveying St Paul took refuge (Acts xxvii. 8). Of the islands in the neighbourhood of the Cretan coast the largest is Gavdo (ancient Clauda, Acts

xxvii. 16), about 25 m. from the south coast at Sphakia, in the middle ages the see of a bishop. On the N. side the small island of Dia, or Standia, about 8 m. from Candia, offers a convenient shelter against northerly gales. Three small islands on the northern coast — Grabusa at the N.W. extremity, Suda, at the entrance to Suda harbour, and Spinalonga, in Mirabello Bay — remained for some time in the possession of Venice after the conquest of Crete by the Turks. Grabusa, long regarded as an impregnable fortress, was surrendered in 1692, Suda (where the flags of Turkey and the four protecting powers are now hoisted) and Spinalonga in 171 5.

Natural Features. — The greater part of the island is occupied by ranges of mountains which form four principal groups. In the western portion rises the massive range of the White Mountains (Aspra .Vouna), directly overhanging the southern coast with spurs projecting towards the W. and N.W. (highest summitˆ Hagios Theodoros, 7882 ft.). In the centre is the smaller, almost detached mass of Psiloriti (‘Ti/‘iXopemo!’, ancient Ida), culminating in Stavros (8193 ft.), the highest summit in the island. To theE. are theLassithi mountains with Aphenti Christos (7165 ft.), and farther E. the mountains of Sitia with Aphenti Kavousi (4850 ft.). The Kophino mountains (3888 ft.) separate the central plain of Messara from the southern coast. The isolated peak of Iuktas (about 2700 ft.), nearly due S. of Candia, was regarded with veneration in antiquity as the burial-place of Zeus. The principal groups are for the greater part of the year covered with snow, which remains in the deeper clefts throughout the summer; the intervals between them are filled by connecting chains which sometimes reach the height of 3000 ft. The largest plain is that of Monofatsi and Messara, a fertile tract extending between Mt. Psiloriti and the Kophino range, about 37 m. in length and 10 m. in breadth. The smaller plain, or rather slope, adjoining Canea and the valley of Alikianu, through which the Platanos (ancient Iardanos) flows, are of great beauty and fertility. A peculiar feature is presented by the level upland basins which furnish abundant pasturage during the summer months; the more remarkable are the Omalo in the White Mountains (about 4000 ft.) drained by subterranean outlets (KaraPodpa), Nida (ets rfiv’ISav) in Psiloriti (between 5000 and 6000 ft.), and the Lassithi plain (about 3000 ft.), a more extensive area, on which are several villages. Another remarkable characteristic is found in the deep narrow ravines (4 > apayyi.a) , bordered by precipitous cliffs, which traverse the mountainous districts; into some of these the daylight scarcely penetrates. Numerous large caves exist in the mountains; among the most remarkable are the famous Idaean cave in Psiloriti, the caves of Melidoni, in Mylopotamo, and Sarchu, in Malevisi, which sheltered hundreds of refugees after the insurrection of 1866, and the Dictaean cave in Lassithi, the birth-place of Zeus. The so-called Labyrinth, near the ruins of Gortyna, was a subterranean quarry from which the city was built. The principal rivers are the Metropoli Potamos and the Anapothiari, which drain the plain of Monofatsi and enter the southern sea E. and W. respectively of the Kophino range; the Platanos, which flows northwards from the White Mountains into the Bay of Canea; and the Mylopotamo (ancient Oaxes) flowing northwards from Psiloriti to the sea E. of Retimo.

Geology. 1 — The metamorphic rocks of western Crete form a series

some 9000 to 10,000 ft. in thickness, of very varied composition. They include gypsum, dolomite, conglomerates, phyllites, and a basic series of eruptive rocks (gabbros, peridotites, serpentines). Glaucophane rocks are widely spread. In the centre of the folds fossilifeious beds with crinoids have been found, and the black slates at the top of the series contain Myophoria and other fossils, indicat- ing that the rocks are of Triassic age. It is, however, not impossible that the metamorphic series includes also some of the Lias. The later beds of the island belong to the Jurassic, Cretaceous and Tertiary systems. At the western foot of the Ida massif calcareous beds with corals, brachiopods (Rhynchonella inconstans, &c.) have been found, the fossils indicating the horizon of the Kimmeridge clay. Lower Cretaceous limestones and schists, with radiolarian cherts, are ex- tensively developed ; and in many parts of the island Upper Creta-

1 See L. Cayeux, ” Les Lignes directrices des plissements de l’ile de Crete,” C.R. IX. Cong.geol. internat. Vienna, pp. 383-392 (1904).

ceous limestones with Rudistes and Eocene beds with nummulites have been found. All these are involved in the earth movements to which the mountains of the island owe their formation, but the Miocene beds (with Clypeaster) and later deposits lie almost un- disturbed upon the coasts and the low-lying ground. With the Jurassic beds is associated an extensive series of eruptive rocks (gabbro, peridotite, serpentine, diorite, granite, &c.) ; they are chiefly of Jurassic age, but the eruptions may have continued into the Lower Cretaceous.

The structure of the island is complex. In the west the folds run from north to south, curving gradually westward towards the southern and western coasts; but in the east the folds appear to run from west to east, and to be the continuation of the Dinaric folds of the Balkan peninsula. The structure is further complicated by a great thrust-plane which has brought the Jurassic and Lower Cretaceous beds upon the Upper Cretaceous and Eocene beds.

Vegetation. — The forests which once covered the mountains have for the most part disappeared and the slopes are now desolate wastes. The cypress still grows wild in the higher regions; the lower hills and the valleys, which are extremely fertile, are covered with olive woods. Oranges and lemons also abound, and are of excellent quality, furnishing almost the whole supply of continental Greece and Constantinople. Chestnut woods are found in the Selino district, and forests of the valonia oak in that of Retimo; in some parts the carob tree is abundant and supplies an important article of consumption.

Pears, apples, quinces, mulberries and other fruit-trees flourish, as well as vines; the Cretan wines, however, no longer enjoy the reputation which they possessed in the time of the Venetians. Tobacco and cotton succeed well in the plains and low grounds, though not at present cultivated to any great extent.

Animals. — Of the wild animals of Crete, the wild goat or agrimi (Capra aegagrus) alone need be mentioned; it is still found in considerable numbers on the higher summits of Psiloriti and the White Mountains. The same species is found in the Caucasus and Mount Taurus, and is distinct from the ibex or bouquetin of the Alps. Crete, like several other large islands, enjoys immunity from dangerous serpents — a privilege ascribed by popular belief to the intercession of Titus, the companion of St Paul, who accord- ing to tradition was the first bishop of the island, and became in consequence its patron saint. Wolves also are not found in the island, though common in Greece and Asia Minor. The native breed of mules is remarkably fine.

Population.— The population of Crete under the Venetians was estimated at about 250,000. After the Turkish conquest it greatly diminished, but afterwards gradually rose, till it was supposed to have attained to about 260,000, of whom about half were Mahommedans, at the time of the outbreak of the Greek revolution in 1821. The ravages of the war from 1821 to 1830, and the emigration that followed, caused a great diminution, and the population was estimated by Pashley in 1836 at only about 130,000. In the next generation it again materially increased; it was calculated by Spratt in 1865 as amounting to 210,000. According to the census taken in 1881, the complete publication of which was interdicted by the Turkish authorities, the popula- tion of the island was 279,165, or 35-78 to the square kilometre. Of this total, 141,602 were males, 137,563 females; 33,173 were literate, 242,114 illiterate; 205,010 were orthodox Christians, 73,234 Moslems, and 921 of other religious persuasions. The Moslem element predominated in the principal towns, of which the population was— Candia, 21,368; Canea, 13,812; Retimo, 9274. According to the census taken in June 1900, the popula- tion of the island was 301,273, the Christians having increased to 267,266, while the Moslems had diminished to 33,281. The Moslems, as well as the Christians, are of Greek origin and speak Greek.

Towns. — The three principal towns are on the northern coast and possess small harbours suitable for vessels of light draught. Candia, the former capital and the see of the archbishop of Crete (pop. in 1900, 22,501), is officially styled Herakleion; it is surrounded by

remarkable Venetian fortifications and possesses a museum with a valuable collection of objects found at Cnossus, Phaestus, the Idaean cave and elsewhere. It has been occupied since 1897 by British troops. Canea (Xavia), the seat of govern- ment since 1840 (pop. 20,972), is built in the Italian style; its

walls and interesting galley-slips recall the Venetian period. The residence of the high commissioner and the consulates of the powers are in the suburb of Halepa. Retimo (Pedv/xvos) is, like Canea, the see of a bishop (pop. 9311). The other towns, Hierapetra, Sitia, Kisamos, Selino and Sphakia, are unimportant.

Production and Industries. — Owing to the volcanic nature of its soil, Crete is probably rich in minerals. Recent experiments lead to the conclusion that iron, lead, manganese, lignite and sulphur exist in considerable abundance. Copper and zinc have also been found. A large number of applications for mining con- cessions have been received since the establishment of the autonomous government. The principal wealth of the island is derived from its olive groves; notwithstanding the destruction of many thou- sands of trees during each successive insurrection, the production is apparently undiminished, and will probably increase very con- siderably owing to the planting of young trees and the improved methods of cultivation which the Government is endeavouring to promote. The orange and lemon groves have also suffered con- siderably, but new varieties of the orange tree are now being intro- duced, and an impulse will be given to the export trade in this fruit by the removal of the restriction on its importation into Greece. Agriculture is still in a primitive condition ; notwithstanding the fertility of the arable land the supply of cereals is far below the requirements of the population. A great portion of the central plain of Monofatsi, the principal grain-producing district, is lying fallow owing to the exodus of the Moslem peasantry. The cultivation of silk cocoons, formerly a nourishing industry, has greatly declined in recent years, but efforts are now being made to revive it. There are few manufactures. Soap is produced at fifteen factories in the principal towns, and there are two distilleries of cognac at Candia.

Commerce. — The expansion of Cretan commerce has been retarded by many drawbacks, such as the unsatisfactory condition of the harbours, the want of direct steamship lines to England and other

countries, and the deficiency of internal communications. The total value of imports in the four years 1901-1904 was £1,756,888, of exports £1,386,777; excess of imports over exports, £370,111. Exports in 1904 were valued at £419,642, the principal items being agricultural products (oranges, lemons, carobs, almonds, grapes, valonia, &c), value £153,858, olives and products of olives (oil, soap, &c), £134,788, and wines and liquors, £48,544. The countries which accept the largest share of Cretan produce are Turkey, England, Egypt, Austria and Russia. Imports in 1904 were valued at £549,665, including agricultural products (mainly flour and corn), value £162,535, and textiles, £129,349. Cereals are imported from the Black Sea and Danube ports, ready-made clothing from Austria and Germany, articles of luxury from Austria and France, and cotton textiles from England. Imports are charged 8%, exports I % ad valorem duty. According to a law published in 1899, Turkish merchandise became subjected to the same rates as that of foreign nations.

Constitution and Government. — During the past half-century the affairs of Crete have repeatedly occupied the attention of Europe. Owing to the existence of a strong Mussulman minority among its inhabitants, the warlike character of the natives, and the mountainous configuration of the country, which enabled a portion of the Christian population to maintain itself in a state of partial independence, the island has constantly been the scene of prolonged and sanguinary struggles in which the numerical superiority of the Christians was counterbalanced by the aid rendered to the Moslems by the Ottoman troops. This unhappy state of affairs was aggravated and perpetuated by the intrigues set on foot at Constantinople against successive governors of the island, the conflicts between the Palace and the Porte, the duplicity of the Turkish authorities, the dissensions of the representatives of the great powers, the machinations of Greek agitators, the rivalry of Cretan politicians, and prolonged financial mismanagement. A long series of insurrections — those of 182 1, 1833, 1841, 1858, 1866-1868, 1878, 1889 and 1896 may be especially mentioned — culminated in the general rebellion of 1897, which led to the interference of Greece, the intervention of the great powers, the expulsion of the Turkish authorities, and the establishment of an autonomous Cretan government under the suzerainty of the sultan. According to the autonomous constitution of 1899 the supreme power was vested in Prince George of Greece, acting as high commissioner of the protecting powers. The authority thus conferred was confided exclusively to the prince, and was declared liable to modification by law in the case of his successor. The

modified constitution of February 1 907 curtailed the large exceptional legislative and administrative powers then accorded. The high commissioner is irresponsible,

but his decrees, except in certain specified cases, must be counter-signed by a member of his council. He convokes, prorogues and dissolves the chamber, sanctions laws, exercises the right of pardon in case of political offences, represents the island in its foreign relations and is chief of its military forces. The chamber (j3ov\rf) , which is elected in the proportion of one deputy to every 5000 inhabitants, meets annually for a session of two months. New elections are held every two years. The chamber exercises a complete financial control, and no taxes can be imposed without its consent. The high commissioner is aided in the administra- tion by a cabinet of three members, styled ” councillors ” (o-fyt/fouXoi), who superintend the departments of justice, finance, education, public security and the interior. The councillors, who are nominated and dismissed by the high com- missioner, are responsible to the chamber, which may impeach them before a special tribunal for any illegal act or neglect of duty. In general the Cretan constitution is characterized by a con-servative spirit, and contrasts with the ultra-democratic systems established in Greece and the Balkan States. A further point of difference is the more liberal payment of public functionaries in Crete. For administrative purposes the departmental divisions existing under the Turkish government have been retained. There are 5 nomoi or prefectures (formerly sanjaks) each under a prefect (vonapxos), and 23 eparchies (formerly kazas) each under a sub-prefect (eTapxos). All these functionaries are nominated by the high commissioner. The prefects are assisted by depart- mental councils. The system of municipal and communal government remains practically unchanged. The island is divided into 86 communes, each with a mayor, an assistant- mayor, and a communal council elected by the people. The councils assess within certain limits the communal taxes, maintain roads, bridges, &c, and generally superintend local affairs. Public order is maintained by a force of gendarmerie (xo)po4 > vKanrf) organized and at first commanded by Italian officers, who were replaced by Greek officers La December 1906. The constitution authorizes the formation of a militia (iro\i.TOv\aicri) to be enrolled by conscription, but in existing circumstances the embodiment of this force seems unnecessary.

Justice. — The administration of justice is on the French model. A supreme court of appeal, which also discharges the functions of a court of cassation, sits at Canea. There are two assize courts at Canea and Candia respectively with jurisdiction in regard to serious offences

(icaKovpyripaTa). Minor offences (1rX1jnij.eKr1ij.aTa) and civil causes are tried by courts of first instance in each of the five departments. There are 26 justices of peace, to whose decision are referred slight contraventions of the law {xralanaTa) and civil causes in which the amount claimed is below 600 francs. These functionaries also hold monthly sessions in the various communes. The judges are chosen without regard to religious belief, and precautions have been taken to render them independent of political parties. They are appointed, promoted, transferred or removed by order of the council of justice, a body composed of the five highest judicial dignitaries, sitting at Canea. An order for the removal of a judge must be based upon a con- viction for some specified offence before a court of law. The jury system has not been introduced. The Greek penal code has been adopted with some modifications. The Ottoman civil code is maintained for the present, but it is proposed to establish a code recently drawn up by Greek jurists which is mainly based on Italian and Saxon law. The Mussulman cadis retain their jurisdiction in regard to religious affairs, marriage, divorce, the wardship of minors and inheritance.

Religion and Education. — The vast majority of the Christian population belongs to the Orthodox (Greek) Church, which is governed by a synod of seven bishops under the presidency of the metropolitan of Candia. The Cretan Church is not, strictly speaking, autocephalous, being dependent on the patriarchate of Constantinople. There were in 1907 3500 Greek churches in the island with 53 monasteries and 3 nunneries; 55 mosques, 4 Roman Catholic churches and 4 synagogues. Education ‘s nominally compulsory. In 1907 there were 547 primary schools (527 Christian and 20 Mahommedan), and 31 secondary schools

(all Christian). About £20,000 is granted annually by the state for the purposes of education.

Finance. — Owing to the havoc wrought during repeated insur- rections, the impoverishment of the peasants, the desolation of the districts formerly inhabited by the Moslem agricultural population, and the drain of gold resulting from the sale of Moslem lands and emigration of the former proprietors, together with other causes, the financial situation has been unsatisfactory. Notwithstanding the advance of £160,000 made by the four protecting powers after the

institution of autonomous government and the profits (£61,937) derived from the issue of a new currency in 1900, there was at the beginning of 1906 an accumulated deficit of £23,470, which represents the floating debt. In addition to the above-mentioned debt to the powers, the state contracted a loan of £60,000 in 1901 to acquire the rights and privileges of the Ottoman Debt, to which the salt monopoly has been conceded for 20 years. In the budgets for 1905 and 1906 considerable economies were effected by the curtailment of salaries, the abolition of various posts, and the reduction of the estimates for education and public works. The estimated revenue and expenditure for 1906 were as follows: —

Revenue. Expenditure.

Drachmae (gold). Drachmae (gold).

Direct taxes . 1,494,000 High Commissioner . 200,000

Indirect taxes . 1,715,000 Financial adminis- tration. . . . 694,670

Stamp dues . . 351,700 Interior (including

gendarmerie) . . 1,678,566

Other sources . 780,967 Education and Justice 1,453,500

4,341,667

4,026,736

The salary of the high commissioner was reduced in 1907 to 100,000 drachmae.

Improved communications are much needed for the transport of agricultural produce, but the state of the treasury does not admit of more than a nominal expenditure on road-making and other public works. On these the average yearly expenditure between 1898 and 1905 was £13,404. The prosperity of the island depends on the development of agriculture, the acquirement of industrious habits by the people, and the abandonment of political agitation. The Cretans were in 1906 more lightly taxed than any other people in Europe. The tithe had been replaced by an export tax on exported agricultural produce levied at the custom-houses, and the smaller peasant proprietors and shepherds of the mountainous districts were practically exempt from any contribution to the state. The communal tax did not exceed on the average two francs annu- ally for each

family. The poorer communes are aided by a state subvention. (J. D. B.)

Archaeology.

The recent exploration and excavation of early sites in Crete have entirely revolutionized our knowledge of its _ rl remote past, and afforded the most astonishing

Middle evidence of the existence of a highly advanced and Late civilization going far back behind the historic period. “*”” an ” Great ” Minoan ” palaces have been brought to light at Cnossus and Phaestus, together with a minor but highly interesting royal abode at Hagia Triada near Phaestus. ” Minoan ” towns, some of considerable extent, have been discovered at Cnossus itself, at Gournia, Palaikastro, and at Zakro. The cave sanctuary of the Dictaean Zeus has been explored, and throughout the whole length and breadth of the island a mass of early materials has now been collected. The comparative evidence afforded by the dis- covery of Egyptian relics shows that the Great Age of the Cretan palaces covers the close of the third and the first half of the second millennium before our era. But the contents of early tombs and dwellings and indications supplied by such objects as stone vases and seal-stones show that the Cretans had already attained to a considerable degree of culture, and had opened out com- munication with the Nile valley in the time of the earliest Egyptian dynasties. This more primitive phase of the indigenous culture, of which several distinct stages are traceable, is known as the Early Minoan, and roughly corresponds with the first half of the third millennium B.C. The succeeding period, to which the first palaces are due and to which the name of Middle Minoan is appropriately given, roughly coincides with the Middle Empire of Egypt. An extraordinary perfection was at this time attained in many branches of art, notably in the painted pottery, often with polychrome decoration, of a class known as ” Kamares ” from its first discovery in a cave of that name on

Mount Ida. Imported specimens of this ware were found by Flinders Petrie among Xllth Dynasty remains at Kahun. The beginnings of a school of wall painting also go back to the Middle Minoan period, and metal technique and such arts as gem engraving show great advance. By the close of this period a manufactory of fine faience was attached to the palace of Cnossus. The succeeding Late Minoan period, best illustrated by the later palace at Cnossus and that at Hagia Triada, corre- sponds in Egypt with the Hyksos period and the earlier part of the New Empire. In the first phase of this the Minoan civiliza- tion

attains its acme, and the succeeding style already shows much that may be described as rococo. The later phase, which follows on the destruction of the Cnossian palace, and corresponds with the diffused Mycenaean style of mainland Greece and else- where, is already partly decadent. Late Minoan art in its finest aspect is best illustrated by the animated ivory figures, wall paintings, and gesso duro reliefs at Cnossus, by the painted stucco designs at Hagia Triada, and the steatite vases found on the same site with zones in reliefs exhibiting life-like scenes of warriors, toreadors, gladiators, wrestlers and pugilists, and of a festal throng perhaps representing a kind of " harvest home." Of the more conventional side of Late Minoan life a graphic illustra- tion is supplied by the remains of miniature wall paintings found in the palace of Cnossus, showing groups of court ladies in curiously modern costumes, seated on the terraces and balustrades of a sanctuary. A grand " palace style " of vase painting was at the same time evolved, in harmony with the general decoration of the royal halls.

It had been held till lately that the great civilization of pre- historic Greece, as first revealed to us by Schliemann's discoveries at Mycenae, was not possessed of the art of writing. In 1893, however, Arthur Evans observed some signs on script seal-stones from Crete which led him to believe that a hieroglyphic system of writing had existed in Minoan times. Explorations carried out by him in Crete from 1894 onwards, for the purpose of investigating the prehistoric civilization of the island, fully corroborated this belief, and showed that a linear as well as a semi-pictorial form of writing was diffused in the island at a very early period (" Cretan Pictographs and Prae- Phoenician Script," J own. of Hellenic Studies, xiv. pt. 11). In 1895 he obtained a libation-table from the Dictaean cave with a linear dedication in the prehistoric writing (" Further Dis- coveries," &c, J.H.S. xvii.). Finally in 1900 all scepticism in the learned world was set at rest by his discovery in the palace of Cnossus of whole archives consisting of clay tablets inscribed both in the pictographic (hieroglyphic) and linear forms of the Minoan script (Evans, " Palace of Knossos," Reports of Excavation, igoo-igos; Scripta Minoa, vol. i., 1909). Supplementary finds of inscribed tablets have since been found at Hagia Triada (F. Halbherr, Rapporto, &c., Monumenti antichi, 1903) and elsewhere (Palaikastro, Zakro and Gournia). It thus appears that a highly developed system of writing existed in Minoan Crete some two thousand years earlier than the first introduction under Phoenician influence of Greek letters. In this, as in so many other respects, the old Cretan tradition receives striking confirmation. According to the Cretan version preserved by Diodorus (v. 74), the Phoenicians did not

invent letters but simply altered their forms.

There is evidence that the use in Crete of both linear and pictorial signs existed in the Early Minoan period, contemporary with the first Egyptian dynasties. It is, however, Earlier during the Middle Minoan age, the centre point of which picto- corresponds with the Xllth Egyptian dynasty, accord- f££w /c ing to the Sothic system of dating, c. 2000-1850 B.C., that a systematized pictographic or hieroglyphic script makes its appearance which is common both to signets and clay tablets. During the Third Middle Minoan period, the lower limits of which approach 1600 B.C., this pictographic script finally gives way to a still more developed linear system — which is itself divided into an earlier and a later class. The earlier class (A) is already found in the temple repositories of Cnossus belong- ing to the age immediately preceding the great remodelling of the

palace, and this class is specially well represented in the tablets of Hagia Triada (M.M. iii. and L.M. i.). The later class (B) of the linear script is that used on the great bulk of the clay tablets of the Cnossian palace, amounting in number to nearly 2000.

These clay archives are almost exclusively inventories and business documents. Their general purport is shown in many cases by pictorial figures relating to various objects which appear on them — such as chariots and horses, ingots and metal vases, arms and implements, stores of corn, &c, flocks and herds. Many showing human figures apparently contain lists of personal names. A decimal system of numeration was used, with numbers going up to 10,000. But the script itself is as yet undeciphered, though it is clear that certain words have changing suffixes, and that there were many compound words. The script also recurs on walls in the shape of graffiti, and on vases, sometimes ink- written; and from the number of seals originally attached to perishable documents it is probable that parchment or some similar material was also used. In the easternmost district of Crete, where the aboriginal ” Eteocretan ” element survived to historic times (Praesus, Palaikastro) , later inscriptions have been discovered belonging to the 5th and succeeding centuries B.C., written in Greek letters but in the indigenous language (Comparetti, Mon. Ant. iii. 451 sqq.; R. S. Conway, British School Annual, viii. 1 25 sqq. and ib. xl.). In 1908 a remarkable discovery was made by the Italian Mission at Phaestus of a clay disk with imprinted hieroglyphic characters

belonging to a non-Cretan system and probably from W. Anatolia.

The remains of several shrines within the building, and the religious element perceptible in the frescoes, show that a con- siderable part of the Palace of Cnossus was devoted C /./H/ ,Cter t0 P ur P oses °f cu ^- ft * s c l ear tna t the rulers, as so religion. commonly in ancient states, fulfilled priestly as well as royal functions. The evidence supplied by this and other Cretan sites shows that the principal Minoan divinity was a kind of Magna Mater, a Great Mother or nature goddess, with whom was associated a male satellite. The cult in fact corre- sponds in its main outlines with the early religious conceptions of Syria and a large part of Anatolia — a correspondence probably explained by a considerable amount of ethnic affinity existing between a large section of the primitive Cretan population and that of southern Asia Minor. The Minoan goddess is sometimes seen in her chthonic form with serpents, sometimes in a more celestial aspect with doves, at times with lions. One part of her religious being survives in that of the later Rhea, another in that of Aphrodite, one of whose epithets, Ariadne (=the exceeding holy), takes us back to the earliest Cnossian tradition. Under her native name, Britomartis (= the sweet maiden) or Dictynna, she approaches Artemis and Leto, again associated with an infant god, and this Cretan virgin goddess was worshipped in Aegina under the name of Aphaea. It is noteworthy that whereas, in Greece proper, Zeus attains a supreme position, the old superi- ority of the Mother Goddess is still visible in the Cretan traditions of Rhea and Dictynna and the infant Zeus.

Although images of the divinities were certainly known, the principal objects of cult in the Minoan age were of the aniconic class; in many cases these were natural objects, such as rocks and mountain peaks, with their cave sanctuaries, like those of Ida or of Dicte. Trees and curiously shaped stones were also worshipped, and artificial pillars of wood or stone. These latter, as in the well-known case of the Lion's Gate at Mycenae, often appear with guardian animals as their supporters. The essential feature of this. cult is the bringing down of the celestial spirit by proper incantations and ritual into these fetish objects, the dove perched on a column sometimes indicating its descent. It is a primitive cult similar to that of Early Canaan, illustrated by the pillow stone set up by Jacob, which was literally " Bethel " or the " House of God." The story of the baetylus, or stone swallowed by Saturn under the belief that it was his son, the Cretan Zeus, seems to cover the same idea and has been derived from the same Semitic word.

A special form of this " baetylic " cult in Minoan Crete was the

representation of the two principal divinities in their fetish form by double axes. Shrines of the Double Axes have been found in the palace of Cnossus itself, at Hagia Triada, and in a small palace at Gournia, and many specimens of the sacred emblem occurred in the Cave Sanctuary of Dicte, the mythical birthplace of the Cretan Zeus. Complete scenes of worship in which libations are poured before the Sacred Axes are, moreover, given on a fine painted sarcophagus found at Hagia Triada.

The same cult survived to later times in Caria in the case of Zeus Labrandeus, whose name is derived from labrys, the native name for the double axe, and it had already been suggested on philological grounds that the Cretan *I ” labyrinthos ” was formed from a kindred form of Miaotaur. the same word. The discovery that the great Minoan foundation at Cnossus was at once a palace and a sanctuary of the Double Axe and its associated divinities has now supplied a striking and it may well be thought an overwhelming confirma- tion of this view. We can hardly any longer hesitate to recognize in this vast building, with its winding corridors and subterranean ducts, the Labyrinth of later tradition; and as a matter of fact a maze pattern recalling the conventional representation of the Labyrinth in Greek art actually formed the decoration of one of the corridors of the palace. It is difficult, moreover, not to connect the repeated wall-paintings and reliefs of the palace illustrating the cruel bull sports of the Minoan arena, in which girls as well as youths took part, with the legend of the Minotaur, or bull of Minos, for whose grisly meals Athens was forced to pay annual tribute of her sons and daughters. It appears certain from the associations in which they are found at Cnossus, that these Minoan bull sports formed part of a religious ceremony. Actual figures of a monster with a bull’s head and man’s body occurred on seals of Minoan fabric found on this and other Cretan sites.

It is abundantly evident that whatever mythic element may have been interwoven with the old traditions of the spot, they have a solid substratum of reality. With such remains Hlstor j c before us it is no longer sufficient to relegate Minos to su b- the regions of sun-myths. His legendary presentation stratum of as the ” Friend of God,” like Abraham, to whom as to Cretan Moses the law was revealed on the holy mountain, calls m y tns – up indeed just such a priest-king of antiquity as the palace-sanctu- ary of Cnossus itself presupposes. It seems possible even that the ancient tradition which recorded an earlier or later king of the name of Minos may, as suggested above, cover a dynastic title. The earlier and later palaces at Cnossus and Phaestus, and the interrupted phases of each, seem to point to a succession of dynasties, to which, as to its civilization as a whole, it is

certainly convenient to apply the name ” Minoan.” It is interesting, as bringing out the personal element in the traditional royal seat, that an inscribed sealing belonging to the earliest period of the later palace of Cnossus bears on it the impression of two official signets with portrait heads of a man and of a boy, recalling the ” associations ” on the coinage of imperial Rome. It is clear that the later traditions in many respects accurately summed up the performances of the ” Minoan ” dynast who carried out the great buildings now brought to light. The palace, with its wonderful works of art, executed for Minos by the craftsman Daedalus, has ceased to belong to the realms of fancy. The extraordinary architectural skill, the sanitary and hydraulic science revealed in details of the building, bring us at the same time face to face with the power of mechanical invention with which Daedalus was credited. The elaborate method and bureaucratic control visible in the clay documents of the palace point to a highly developed legal organization. The powerful fleet and maritime empire which Minos was said to have established will no doubt receive fuller illustration when the sea-town of Cnossus comes to be explored. The appearance of ships on some of the most important seal-impressions is not needed, however, to show how widely Minoan influence made itself felt in the neighbouring Mediterranean regions.

The Nilotic influence visible in the vases, seals and other fabrics of the Early Minoan age, seems to imply a maritime

land of Greece.

activity on the part of the islanders going back to the days of the first Egyptian dynasties. In a deposit at Kahun, belonging to Early *- ne Xllth Dynasty, c. 2000 B.C., were already found

relations imported polychrome vases of ” Middle Minoan ” wft* fabric. In the same way the important part played by

Egypt. Cretan enterprise in the days of the New Egyptian empire is illustrated by repeated finds of Late Minoan pottery on Egyptian sites. A series of monuments, moreover, belonging to the early part of the XVIIIth Dynasty show the representa- The Kefts tives of the Kefts or peoples of ” The Ring ” and of the and ” Lands to the West ” in the fashionable costume of

Phitis- the Cnossian court, bearing precious vessels and other s ”

objects of typical Minoan forms. Farther to the east

the recent excavations on the old Philistine sites like Gezer have brought to light swords and vases of Cretan manufacture in the later palace style. The principal Philistine tribe is indeed known in the biblical records as the Cherethims or Cretans, and the Minoan name and the cult of the Cretan Zeus were preserved at Gaza to the latest classical days. Similar evidence relations °^ Minoan contact, and indeed of wholesale colonization with from the Aegean side, recurs in Cyprus. The culture of

Cyprus the more northerly Aegean islands, best revealed to us n”a ky the excavations of the British School at Phylakopi

in Melos, also attest a growing influence from the Cretan side, which, about the time of the later palace at Cnossus, becomes finally predominant.

Turning to the mainland of Greece we see that the astonishing remains of a highly developed prehistoric civilization, which Minoan Schliemann first brought to light in 1876 at Mycenae, influence and which from those discoveries received the general on main- name of ” Mycenaean,” in the main represent a trans- marine offshoot from the Minoan stock. The earlier remains both at Mycenae and Tiryns, still imperfectly investigated, show that this Cretan influence goes back to the Middle Minoan age, with its characteristic style of polychrome vase decoration. The contents of the royal tombs, on the other hand, reveal a wholesale correspondence with the fabrics of the first, and, to a less degree, the second Late Minoan age, as illustrated by the relics belonging to the Middle Period of the later palace at Cnossus and by those of the royal villa at Hagia Triada. The chronological centre of the great beehive tombs seems to be slightly lower. The ceiling of that of Orchomenos, and the painted vases and gold cups from the Vaphio tomb by Sparta, with their marvellous reliefs showing scenes of bull-hunting, represent the late palace style at Cnossus in its final development.

The leading characteristics of this mainland civilization are thus indistinguishable from the Minoan. The funeral rites are similar, and the religious representations show an identical form of worship. At the same time the local traditions and conditions differentiate the continental from the insular branch. In Crete, in the later period, when the rulers could trust to the ” wooden walls ” of the Minoan navy, there is no parallel for the massive fortifications that we see at Tiryns or Mycenae. The colder winter climate of mainland Greece

dictated the use of fixed hearths, whereas in the Cretan palaces these seem to have been of a port- able kind, and the different usage in this respect again reacted on the respective forms of the principal hall or ” Megaron.”

Minoan culture under its mainland aspect left its traces on the Acropolis at Athens, — a corroboration of the tradition which Minoan ma de the Athenians send their tribute children to Influences Minos.’ Similar traces extend through a large part of >pN. northern Greece from Cephallenia and Leucadia to

Thessaly, and are specially well marked at Iolcus (near mod. Volo), the legendary embarking place of the Argonauts. This circumstance deserves attention owing to the special con- nexion traditionally existing between the Minyans of Iolcus and those of Orchomenus, the point of all others on this side where the early Cretan influence seems most to have taken root. The Minoan remains at Orchomenus which are traceable to the latest period go far to substantiate the philological comparison between the name of Minyas, the traditional ancestor of this ancient race, and that of Minos.

Still farther to the north-west a distinct Minoan influence is perceptible in the old Illyrian lands east of the Adriatic, and its traces reappear in the neighbourhood of Venice. It is Adriatic well marked throughout southern Italy from Taranto and to Naples. It was with Sicily, however, that the later Italian history of Minos and his great craftsman Daedalus was extens,on – in a special way connected by ancient tradition. Here, as in Crete, Daedalus executed great works like the temple of Eryx, and it was on Sicilian soil that Minos, engaged in a western campaign, was said to have met with a violent death at the hands of the native king Kokalos (Cocalus) and his daughters. His name is preserved in the Sicilian Minoa, and his tomb was pointed out in the neighbourhood of Agrigentum, with a shrine above dedicated to his native Aphrodite, the lady of the dove; and in this connexion it must be observed that the cult of Eryx perpetuates to much later times the characteristic features of the worship of the Cretan Nature goddess, as now revealed to us in the palace of Cnossus and elsewhere. These ancient indications of a Minoan connexion with Sicily have now received interesting confirmation in the numerous discoveries, principally due to the recent excavations of P. Orsi, of arms and painted vases of Late Minoan fabric in Bronze Age tombs of the provinces of Syracuse and Girgenti (Agrigentum) belonging to the late Bronze Age. Some of these objects, such as certain forms of swords and vases, seem to be of local fabric, but derived from originals going back to the beginning of the Late Minoan age.

The abiding tradition of the Cretan aborigines, as preserved by Herodotus (vii. 171), ascribes the eventual settlement of the Greeks in Crete to a widespread desolation that had Minoan fallen on the central regions. It is certain that by crisis: the beginning of the 14th century B.C., when the signs c – ,400 of already decadent Minoan art are perceptible in the imported pottery found in the palace of Akhenaton at Tell el- Amarna, some heavy blows had fallen on the island power. Shortly before this date the palaces both of Cnossus and Phaestus had undergone a great destruction, and though during the ensu- ing period both these royal residences were partially reoccupied it was for the most part at any rate by poorer denizens, and their great days as palaces were over for ever. Elsewhere at Cnossus, in the smaller palace to the west, the royal villa and the town houses, we find the evidence of a similar catastrophe followed by an imperfect recovery, and the phenomenon meets us again at Palaikastro and other early settlements in the east of Crete. At the same time, to whatever cause this serious setback of Minoan civilization was owing, it would be very unsafe to infer as yet any large displacement of the original inhabitants by the invading swarms from the mainland or elsewhere. The evidence of a partial restoration of the domestic quarter of the palace of Cnossus tends to show a certain measure of dynastic continuity. There is evidence, moreover, that the script and with it the indigenous language did not die out during this period, and that therefore the days of Hellenic settlement at Cnossus were not yet. The recent exploration of a cemetery belonging to the close of the great palace period, and in a greater degree to the age succeeding the catastrophe, has now conclusively shown that there was no real break in the continuity of Minoan culture. This third Late Minoan period — the beginning of which may be fixed about 1400 — is an age of stagnation and decline, but the point of departure continued to be the models supplied by the age that had preceded it. Art was still by no means extinct, and its forms and decorative elements are simply later derivatives of the great palace style. Not only the native form of writing, but the household arrangements, sepulchral usages, and religious rites remain substantially the same. The third Late Minoan age corresponds generally with the Late Mycenaean stage in the Aegean world (see Aegean Civilization). It is an age indeed in which the culture as a whole, though following a lower level, attains the greatest amount of uniformity. From Sicily and even the Spanish coast to the Troad, southern Asia Minor, Cyprus and Palestine, — from the Nile valley to the mouth of the Po, very similar forms were now diffused. Here and there, as in Cyprus, we watch the development of some local schools. How far Crete

itself continued to preserve the hegemony which may reasonably be ascribed to it at an earlier age must remain doubtful. It is certain that towards the close of this third and concluding Late Minoan period in the island certain mainland types of swords and safety-pins make their appearance, which are symptomatic of the great invasion from that side that was now impending or had already begun.

Principal Minoan Sites. It will be convenient here to give a general view of the more important Minoan remains recently excavated on various Cretan sites.

Cnossus. — The palace of Cnossus is on the hill of Kephala about 4 m. inland from Candia. As a scene of human settlement this site is of immense antiquity. The successive ” Minoan ” strata, which go well back into the fourth millennium B.C., reach down to a depth of about 17 ft. But below this again is a human deposit, from 20 to 26 ft. in thickness, representing a long and gradual course of Neolithic or Later Stone- Age development. Assuming that the lower strata were formed at approximately the same rate as the upper, we have an antiquity of from 12,000 to 14,000 years indicated for the first Neolithic settlement on this spot. The hill itself, like a Tell of Babylonia, is mainly formed of the debris of human settlements. The palace was approached from the west by a paved Minoan Way communicating with a considerable building on the opposite hill. This road was flanked by magazines, some belonging to the royal armoury, and abutted on a paved area with stepped seats on two sides (theatral area). The palace itself approximately formed a square with a large paved court in the centre. It had a N.S. orienta- tion. The principal entrance was to the north, but what appears to have been the royal entrance opened on a paved court on the west side. This entrance communicated with a corridor showing frescoes of a processional character. The west side of the palace contained a series of 18 magazines with great store jars and cists and large hoards of clay documents. A remarkable feature of this quarter is a small council chamber with a gypsum throne of curiously Gothic aspect and lower stone benches round. The walls of the throne room show frescoes with sacred griffins confronting each other in a Nile landscape, and a small bath chamber — perhaps of ritual use — is attached. This quarter of the palace shows the double axe sign constantly repeated on its walls and pillars, and remains of miniature wall-paintings showing pillar shrines, in some cases with double axes stuck into the wooden

columns. Here too were found the repositories of an early shrine containing exquisite faience figures and reliefs, including a snake goddess — another aspect of the native divinity — -and her votaries. The central object of cult in this shrine was apparently a marble cross. Near the north-west angle of the palace was a larger bath chamber, and by the N. entrance were remains of great reliefs of bull-hunting scenes in painted gesso duro. South of the central court were found parts of a relief in the same material, showing a personage with a fleur-de-lis crown and collar. The east wing of the palace was the really residential part. Here was what seems to have been the basement of a very large hall or " Megaron," approached directly from the central court, and near this were found further reliefs, fresco representations of scenes of the bull-ring with female as well as male toreadors, and remains of a magnificent gaming-board of gold-plated ivory with intarsia work of crystal plaques set on silver plates and blue enamel {cyanus). The true domestic quarter lay to the south of the great hall, and was approached from the central court by a descending staircase, of which three flights and traces of a fourth are preserved. This gives access to a whole series of halls and private rooms (halls " of the Colonnades," " of the Double Axes," " Queen's Megaron" with bath-room attached and remains of the fish fresco, " Treasury " with ivory figures and other objects of art), together with extensive remains of an upper storey. The drainage system here, including a water-closet, is of the most complete and modern kind. Near this domestic quarter was found a small shrine of the Double Axes, with cult objectsˆ and offertory vessels in their places. The traces of an earlier " Middle Minoan " palace beneath the later floor-levels are most visible on the east side, with splendid ceramic remains. Here also are early magazines with huge store jars. At the foot of the slope on this side, forming the eastern boundary of the palace, are massive supporting walls and a bastion with descending flights of steps, and a water-channel devised with extraordinary hydraulic science (Evans, " Palace of Knossos," " Reports of Excavations 1900-1905," in Annual of British School at Athens, vi. sqq.; Journ. R.I.B.A. (1902), pt. iv. For the palace pottery see D. Mackenzie, Journ. of Hellenic Studies, xxiii.). The palace site occupies nearly six acres. To the N.E. of it came to light a " royal villa " with staircase, and a basilica-like hall (Evans, B.S. Annual, ix. 130 seq.). To the N.W. was a dependency containing an important hoard of bronze vessels (ib. p. 112 sqq.). The building on the hill to the W. approached by the Minoan paved way has the appearance of a smaller palace {B.S. Annual, xii., 1906). Many remains of private houses belonging to the prehistoric town have also come to light (Hogarth, B.S. A. vi. ˆ1900], p. 70 sqq.). A little N. of the town, at a spot called Zafer

Papoura, an extensive Late Minoan cemetery was excavated in 1904 (Evans, The Prehistoric Tombs of Knossus, 1906), and on a height about 2 m. N. of this, a royal tomb consisting of a square chamber, which originally had a pointed vault of ” Cyclopaean ” structure approached by a forehall or rock-cut passage. This monumental work seems to date from the close of the Middle Minoan age, but has been re-used for interments at successive periods (Evans, Archaeo- logia, 1906, p. 136 sqq.). It is possibly the traditional tomb of Idomeneus. (For later discoveries see further Cnossus.)

Phaestus. — The acropolis of this historic city looks on the Libyan Sea and commands the extensive plain of Messara. On the eastern hill of the acropolis, excavations initiated by F. Halbherr on behalf of the Italian Archaeological Mission and subsequently carried out by L. Pernier have brought to light another Minoan palace, much resembling on a somewhat smaller scale that of Cnossus. The plan here too was roughly quadrangular with a central court, but owing to the erosion of the hillside a good deal of the eastern quarter has disappeared. The Phaestian palace belongs to two distinct periods, and the earlier or ” Middle Minoan ” part is better preserved than at Cnossus. The west court and entrance belonging to the earlier building show many analogies with those of Cnossus, and the court was commanded to the north by tiers of stone benches like those of the ” theatral area ” at Cnossus on a larger scale. Magazines with fine painted store jars came to light beneath the floor of the later ” propylaeum.” The most imposing block of the later building is formed by a group of structures rising from the terrace formed by the old west wall. A fine paved corridor running east from this gives access to a line of the later magazines, and through a columnar hall to the central court beyond, while to the left of this a broad and stately flight of steps leads up to a kind of entrance hall on an upper terrace. North of the central court is a domestic quarter presenting analogies with that of Cnossus, but throughout the later building there was a great dearth of the frescoes and other remains such as invest the Cnossian palace with so much interest. There are also few remaining traces here of upper storeys. It is evident that in this case also the palace was overtaken by a great catastrophe, followed by a partial reoccupation towards the close of the Late Minoan age (L. Pernier, Scavi delta missione italiana a Phaestos; Monumenti antichi, xii. and xiv.).

About a kilometre distant from the palace of Phaestus near the village of Kalyvia a Late Minoan cemetery was brought to light in 1901, belonging to the same period as that of Cnossus (Savignoni, Necropoli di Phaestos, 1905).

Hagia Triada. — On a low hill crowned by a small church of the above name, about 3 m. nearer the Libyan Sea than Phaestus, a small palace or royal villa was discovered by Halbherr and excavated' by the Italian Mission. In its structure and general arrangements it bears a general resemblance to the palace of Fhaestus and Cnossus on a smaller scale. The buildings themselves, with the usual halls, bath-rooms and magazines, together with a shrine of the Mother Goddess, occupy two sides of a rectangle, enclosing a court at a higher level approached by flights of stairs. Repositories also came to light containing treasure in the shape of bronze ingots. In con- trast to the palace of Phaestus, the contents of the royal villa proved exceptionally rich, and derive a special interest from the fact that the catastrophe which overwhelmed the building belongs to a somewhat earlier part of the Late Minoan age than that which overwhelmed Cnossus and Phaestus. Clay tablets were here found belonging to the earlier type of the linear script (Class A), together with a great number of clay sealings with religious and other devices and incised countermarks. Both the signet types and the other objects of art here discovered display the fresh naturalism that characterizes in a special way the first Late Minoan period. A remarkable wall-painting depicts a cat creeping over ivy-covered rocks and about to spring on a pheasant. The steatite vases with reliefs are of great importance. One of these shows a ritual pro- cession, apparently of reapers singing and dancing to the sound of a sistrum. On another a Minoan warrior prince appears before his retainers. A tall funnel-shaped vase of this class, of which a con- siderable part has been preserved, is divided into zones showing bull-hunting scenes, wrestlers and pugilists in gladiatorial costume, the whole executed in a most masterly manner. The small palace was reconstructed at a later period, and at a somewhat higher level. To a period contemporary with the concluding age of the Cnossian palace must be referred a remarkable sarcophagus belonging to a neighbouring cemetery. The chest is of limestone coated with stucco, adorned with life-like paintings of offertory scenes in connexion with the sacred Double Axes of Minoan cult. There ha\e also come to light remains of a great domed mortuary chamber of primitive con- struction containing relics of the Early Minoan period (Halbherr, Monumenti Antichi, xiii. (1903), p. 6 sqq., and Mem one del instituto lombardo, 1905; Paribeni, Lavori eseguiti delta missione italiana nel Palazzo e nella necropoli di Haghia Triada; Rendiconti, &c, xi. and xii. ; Savignoni, // Vaso di Haghia Triada).

Palaikastro. — Near this village, lying on the easternmost coast of Crete, the British School at Athens has excavated a section of a considerable Minoan town. The buildings here show a stratification

analogous to that of the palace of Cnossus. The town was traversed by a well-paved street with a stone sewer, and contained several important private houses and a larger one which seems to have been

CRETE

Plate I.

Fig. i.-PALACE OF CNOSSL'S. GENERAL VIEW OF THE SITE FROM THE EAST.

Fig. 3.— VIEW OK PART OF GRAND STAIRCASE AND HALL OF COLONNADES (WOODEN COLUMNS RESTORED) (CNOSSUSJ. (By permission of Dr A. J. Evans.)

CRETE

Fig. 4— GYPSUM THRONE (FRESCO PAINTING VISIBLE Fig. 5.— BASE OF WEST WALL NEAR ROYAL

ON WALL) (CNOSSUS). ENTRANCE (CNOSSUS).

(By permission of Dr A. J. Evans.)

CRETE

425

a small palace. Among the more interesting relics found were ivory figures of Egyptian or strongly Egyptianizing fabric. On an ad- jacent hill were the remains of what seems to have been in later times a temple of the Dictaean Zeus, and from the occurrence of rich deposits of Minoan vases and sacrificial remains at a lower level, the religious tradition represented by the later temple seems to go back to prehistoric times. On the neighbouring height of Petsofa, by a rock-shelter, remains of another interesting shrine were brought to light dating from the Middle Minoan period, and containing interest- ing votive offerings of terra-cotta, many of them apparently relating to cures or to the warding off of diseases (R. C. Bosanquet, British School Annual, viii. 286 sqq., ix. 274 sqq.; R. M. Dawkins, ibid. ix. 290 sqq., x.; J. L. Myres, ibid. ix. 356 sqq.).

Gournia. — Near this hamlet on the coast of the Gulf of Mirabello in east Crete.the American archaeologist MissHarriet Boyd has excavated a great part of another Minoan town. It covers the sides of a long hill, its main avenue being a winding roadway leading to a small palace. It

contained a shrine of the Cretan snake goddess, and was rich in minor relics, chiefly in the shape of bronze implements and pottery for household use. The bulk of the remains belong here, as at Hagia Triada, to the beginning of the Late Minoan period, but there are signs of reoccupation in the decadent Minoan age. The remains supply detailed information as to the everyday life of a Cretan country town about the middle of the second millennium B.C. (H. Boyd, Excavations at Gournia).

Zakro. — Near the lower hamlet of that name on the S.E. coast important remains of a settlement contemporary with that of Gournia were explored by D. G. Hogarth, consisting of houses and pits containing painted pottery of exceptional beauty and a great variety of seal impressions. The deep bay in which Zakro lies is a well-known port of call for the fishing fleets on their way to the sponge grounds of the Libyan coast, and doubtless stood in the same stead to the Minoan shipping (D.G.Hogarth, Annual of the British School, vii. 121 sqq., and Journ. of Hellenic Studies, xxii. 76 sqq. and 333 sqq.).

Dictaean Cave. — Near the village of Psychro on the Lassithi range, answering to the western Dicte, opens a large cave, identified with the legendary birthplace of the Cretan Zeus. This cavern also shared with that of Ida the claim to have been that in which Minos, Moses- like, received the law from Zeus. The exploration begun by the Italian Mission under Halbherr and continued by Evans, who found here the inscribed libation table (see above), was completed by Hogarth in 1900. Besides the great entrance hall of the cavern, which served as the upper shrine, were descending vaults forming a lower sanctuary going down deep into the bowels of the earth. Great

auantities of votive figures and objects of cult, such as the fetish ouble axes and stone tables of offering, were found both above and below. In the lower sanctuary the natural pillars of stalagmite had been used as objects of worship, and bronze votive objects thrust into their crevices (Halbherr, Museo di antichiti classica, ii. pp. 906-910; Evans, Further Discoveries, &c, p. 350 sqq., Myc. Tree and Pillar Cult, p. 14 sqq.; Hogarth, “The Dictaean Cave,” Annual of British School at Athens, vi. 94 sqq.).

Pseira and Mochlos. — On these two islets on the northern coast of E. Crete, R. Seager, an American explorer, has found striking remains of flourishing Minoan settlements. The contents of a series of tombs at Mochlos throw an entirely new light on the civilization of the Early Minoan age.

The above summary gives, indeed, a very imperfect idea of the extent to which the remains of the great Minoan civiliza- tion are spread throughout the island. The “hundred

Third La e c j t j es » ascr ibed to Crete by Homer are in a fair way minoan . . , ,. ˆ J

period. of becoming an ascertained reality. The great days

of Crete lie thus beyond the historic period. The period of decline referred to above (Late Minoan III.), which begins about the beginning of the 14th century before our era, must, from the abundance of its remains, have been of consider- able duration. As to the character of the invading elements that hastened its close, and the date of their incursions, contemporary Egyptian monuments afford the best clue. The Keftiu who represented Minoan culture in Egypt in the concluding period of the Cnossian palace (Late Minoan II.) cease to appear on Egyptian monuments towards the end of the XVIIIth Dynasty (c. 1350 B.C.), and their place is taken by the “Peoples of the Sea.” The Achaeans, under the name Akaiusha, already appear among the piratical invaders of Egypt in the time of Rameses III. (c. 1200 B.C.) of the XXth Dynasty (see H. R. Hall, ” Keftiu and the Peoples of the Sea,” Annual of British School at Athens, viii. 157 sqq.).

Greek About the same time the evidences of imports of

settle- Late Minoan or ” Mycenaean ” fabrics in Egypt menu la definitely cease. In the Odyssey we already find the

Achaeans together with Dorians settled in central Crete. In the extreme east and west of the island the aboriginal

” Eteocretan ” element, however, as represented respectively by the Praesiansor Cydonians, still held its own, and inscriptions written in Greek characters show that the old language survived to the centuries immediately preceding the Christian era.

The mainland invasions which produced these great ethnic changes in Crete are marked archaeologically by signs of wide- spread destruction and by a considerable break in the continuity of the insular civilization. New burial a „, g# customs, notably the rite of cremation in place of the older corpse-burial, are introduced, and in many cases the earlier tombs were pillaged and re-used by new comers. The use of iron for arms and implements now finally triumphed over bronze. Northern forms of swords and safety-pins are now found in general use. A new geometrical style of decoration like that of contemporary

Greece largely supplants the Minoan models. The civic foundations which belong to this period, and which include the greater part of the massive ruins of Goulas and Anavlachos in the province of Mirabello and of Hyrtakina in the west, affect more or less precipitous sites and show a greater tendency to fortification. The old system of writing now dies out, and it is not till some three centuries later that the new alphabetic forms are introduced from a Semitic source. The whole course of the older Cretan civilization is awhile interrupted, and is separated from the new by the true dark ages of Greece.

It is nevertheless certain that some of the old traditions were preserved by the remnants of the old population now reduced to a subject condition, and that these finally leavened the whole lump, so that once more — this time under a Hellenic guise — Crete was enabled to anticipate mainland Greece in nascent civilization. Already in 1883 A. Milchhofer {Anfange der Kunst) had called attention to certain remarkable examples of archaic Greek bronze-work, and the subsequent discovery of the votive bronzes in the cave of Zeus on Mount Ida, and notably the shields with their fine embossed designs, shows that by the 8th century B.C. Cretan technique in metal not only held its own beside imported Cypro-Phoenician work, but was distinctly ahead of that of the rest of Greece (Halbherr, Bronzi del antro di Zeus Ideo). The recent excavations by the British School on the site of the Dictaean temple at Palaikastro bear out this conclusion, and an archaic marble head of Apollo found at Eleutherna shows that classical tradition was not at fault in recording the existence of a very early school of Greek sculpture in the island, illustrated by the names of Dipoenos and Scyllis.

The Dorian dynasts in Crete seem in some sort to have claimed descent from Minos, and the Dorian legislators sought their sanction in the laws which Minos was said to have received from the hands of the Cretan Zeus. The great monument of Gortyna discovered by Halbherr and Fabricius (Momtmenti antichi, iii.) is the most important monument of early law hitherto brought to light in any part of the Greek world.

Among other Greek remains in the island may be mentioned, besides the great inscription, the archaic temple of the Pythian Apollo at Gortyna, a plain square building with a pronaos added in later times, excavated by Halbherr, remains. 1885 and 1887 (Mon. Ant. iii. 2 seqq.), the Hellenic bridge and the vast rock-cut reservoirs of Eleutherna, the city walls of Itanos, Aptera and Polyrrhenia, and at Phalasarna, the rock-cut throne of a divinity, the port, and the remains of a temple. The most interesting record, however, that has been

preserved of later Hellenic civilization in the island is the coinage of the Cretan cities (J. N. Svoronos, Numismatique de la Crete ancienne; W. Wroth, B. M. Coin Catalogue, Crete, &c: P. Gardner, The Types of Greek Coins), which during the good period display a peculiarly picturesque artistic style distinct from that of the rest of the Greek world, and sometimes indicative of a revival of Minoan types. But in every case these artistic efforts were followed at short intervals by gross relapses into barbarism which reflect the anarchy of the political conditions.

Under the Pax Rotnana the Cretan cities again enjoyed a large measure of prosperity, illustrated by numerous edifices still existing at the time of the Venetian occupation. A good

account of these is preserved in a-MS. description of the island drawn up under the Venetians about 1538, and existing in the

library of St Mark (published by Falkener, Museum remains ˚f Classical Antiquities, ii. pp. 263-303). Very little

of" all this, however, has escaped the Turkish conquest and the ravages caused by the incessant insurrections of the last two centuries. The ruin-field of Gortyna still evokes something of the importance that it possessed in Imperial days, and at Lebena on the south coast are remains of a temple of Aesculapius and its dependencies which stood in connexion with this city. At Cnossus, save some blocks of the amphitheatre, the Roman monuments visible in Venetian times have almost wholly disappeared. Among the early Christian remains of the island far and away the most important is the church of St Titus at Gortyna, which perhaps dates from the Constantinian age.

Literature. — See the authorities already quoted, for further details. Previous to the extensive excavations referred to above, Crete had been carefully examined and explored by Tournefort, Pococke, Olivier and other travellers, e.g. Pashley {Travels in Crete, 2 vols., London, 1837) and Captain Spratt (Travels and Researches in Crete, 2 vols., London, 1865). A survey sufficiently accurate as regards the maritime parts was also executed, under the orders of the British admiralty, by Captain Graves and Captain (afterwards Admiral) Spratt. Most that can be gathered from ancient authors concerning the mythology and early history of the island is brought together by Meursius (Creta, &c,

in the 3rd vol. of his works) and Hoeck (Kreta, 3 vols., Gottingen, 1823-1829), but the latter work was published before the researches which have thrown so much light on the topography and antiquities of the island. Much new material, especially as to the western provinces of Crete, has been recently collected by members of the Italian Archaeological Mission (Monumenti Antichi, vol. vi. 154 seqq., ix. 286, 1899; xi. 286 seqq.).

(A. J. E.)

History.

Ancient. — Lying midway between three continents, Crete was from the earliest period a natural stepping-stone for the passage of early culture from Egypt and the East to mainland Greece. On all this the recent archaeological discoveries (see the section on Archaeology) have thrown great light, but the earliest written history of Crete, like that of most parts of continental Greece, is mixed up with mythology and fable to so great an extent as to render it difficult to arrive at any clear conclusions concerning it. The Cretans themselves claimed for their island to be the birthplace of Zeus, as well as the parent of all the other divinities usually worshipped in Greece as the Olympian deities. But passing from this region of pure mythology to the semi-mythic or heroic age, we find almost all the early legends and traditions of the island grouped around the name of Minos. According to the received tradition, Minos was a king of Cnossus in Crete; he was a son of Zeus, and enjoyed through life the privilege of habitual intercourse with his divine father. It was from this source that he derived the wisdom which enabled him to give to the Cretans the excellent system of laws and governments that earned for him the reputation of being the greatest legislator of antiquity. At the same time he was reported to have been the first monarch who established a naval power, and acquired what was termed by the Greeks the Thalassocracy, or dominion of the sea.

This last tradition, which was received as an undoubted fact both by Thucydides and Aristotle, has during the last few years received striking confirmation. The remarkable remains recently brought to light on Cretan soil tend to show that already some 2000 years before the Dorian conquest the island was exercising a dominant influence in the Aegean world. The great palaces now excavated at Cnossus and Phaestus, as well as the royal villa of Hagia Triada, exhibit the successive phases of a brilliant primi- tive civilization which had already attained mature development by the date of the Xllth Egyptian dynasty. To this civilization as a whole it is convenient to give the

name “Minoan,” and the name of Minos itself may be reasonably thought to cover a dynastic even more than a personal significance in much the same way as such historic terms as “Pharaoh” or “Caesar.”

The archaeological evidence outside Crete points to the actual existence of Minoan plantations as far afield on one side as Sicily and on the other as the coast of Canaan. The historic

tradition which identifies with the Cretans the principal element of the Philistine confederation, and places the tomb of Minos himself in western Sicily, thus receives remarkable confirmation. Industrial relations with Egypt are also marked by the occurrence of a series of finds of pottery and other objects of Minoan fabric among the remains of the XVIIIth, Xllth and even earlier dynasties, while the same seafaring enterprise brought Egyptian fabrics to Crete from the times of the first Pharaohs. Even in the Homeric poems, which belong to an age when the great Minoan civilization was already decadent, the Cretans appear as the only Greek people who attempted to compete with the Phoenicians as bold and adventurous navigators. In the Homeric age the population of Crete was of a very mixed character, and we are told in the Odyssey (xix. 175) that besides the Eteocretes, who, as their name imports, must have been the original inhabitants, the island contained Achaeans, Pelasgians and Dorians. Subse- quently the Dorian element became greatly strengthened by fresh immigrations from the Peloponnesus, and during the historical period all the principal cities of the island were either Dorian colonies, or had adopted the Dorian dialect and institutions. It is certain that at a very early period the Cretan cities were celebrated for their laws and system of government, and the most extensive monument of early Greek law is the great Gortyna inscription, discovered in 1884. The origin of the Cretan laws was of course attributed to Minos, but they had much in common with those of the other Dorian states, as well as with those of Lycurgus at Sparta, which were, indeed, according to one tradition, copied in great measure from those already existing in Crete. 1

It is certain that whatever merits the Cretan laws may have possessed for the internal regulation of the different cities, they had the one glaring defect, that they made no provision for any federal bond or union among them, or for the government of the island as a whole. It was owing to the want of this that the Cretans scarcely figure in Greek history as a people, though the island, as observed by Aristotle, would seem from its natural position calculated to exercise a preponderating influence over Greek affairs. Thus they took no part either in the Persian or in the Peloponnesian War, or in any of the subsequent civil

contests in which so many of the cities and islands of Greece were engaged. At the same time they were so far from enjoying tranquillity on this account that the few notices we find of them in history always represent them as engaged in local wars among one another; and Polybius tells us that the history of Crete was one continued series of civil wars, which were carried on with a bitter animosity exceeding all that was known in the rest of Greece.

In these domestic contests the three cities that generally took the lead, and claimed to exercise a kind of hegemony or supremacy over the whole island, were Cnossus, Gortyna and Cydonia. But besides these three, there were many other independent cities, which, though they generally followed the lead of one or other of these more powerful rivals, enjoyed complete autonomy, and were able to shift at will from one alliance to another. Among the most important of these were — Lyttus or Lyctus, in the interior, south-east of Cnossus; Rhaucus, between Cnossus and Gortyna; Phaestus, in the plain of Messara, between Gortyna and the sea; Polyrrhenia, near the north-west angle of the island; Aptera, a few miles inland from the Bay of Suda; Eleutherna and Axus, on the northern slopes of Mount Ida; and Lappa, between the White Mountains and the sea. Phalasarna on the west coast, and Chersonesus on the north, seem to have been dependencies, and served as the ports of Polyrrhenia and Lyttus. Elyrus stood at the foot of the White Mountains, just

1 Among the features common to the two were the syssitia, or public tables, at which all the citizens dined in common. Indeed, the, Cretan system, like that of Sparta, appears to have aimed at training up the young, and controlling them, as well as the citizens of more mature age, in all their habits and relations of life. The supreme governing authority was vested in magistrates called Cosmi, answering in some measure to the Spartan Ephori, but there was nothing corresponding to the two kings at Sparta. These Cretan institutions were much extolled by some writers of antiquity, but receive only qualified praise from the judicious criticisms of Aristotle {Polit. ii. 10).

above the south coast. In the eastern portion of the island were Praesus in the interior, and Itanus on the coast, facing the east, while Hierapytna on the south coast was the only place of importance on the side facing Africa, and on this account rose under the Romans to be one of the principal cities of the island. (A. J. E.)

Medieval to igth Century. — Though it was continually torn by civil dissensions, the island maintained its independence of the various Macedonian monarchs by whom it was surrounded; but having incurred the enmity of Rome, first by an alliance with the great Mithradates, and afterwards by taking active part with their neighbours, the pirates of Cilicia, the Cretans were at length attacked by the Roman arms, and, after a resistance protracted for more than three years, were finally subdued by Q. Metellus, who earned by this success the surname of Creticus (67 B.C.) . The island was now reduced to a Roman province, and subsequently united for administrative purposes with the district of Cyrenaica or the Pentapolis, on the opposite coast of Africa. This arrange- ment lasted till the time of Constantine, by whom Crete was incorporated in the prefecture of Ulyria. It continued to form part of the Byzantine empire till the 9th century, when it fell into the hands of the Saracens (8 23) . It then became a formidable nest of pirates and a great slave mart; it defied all the efforts of the Byzantine sovereigns to recover it till the year 960, when it was reconquered by Nicephorus Phocas. In the partition of the Greek empire after the capture of Constantinople by the Latins in 1 204, Crete fell to the lot of Boniface, marquis of Montferrat, but was sold by him to the Venetians, and thus passed under the dominion of that great republic, to which it continued subject for more than four centuries.

Under the Venetian government Candia, a fortress originally built by the Saracens, and called by them ” Khandax,” became the seat of government, and not only rose to be the capital and chief city of the island, but actually gave name to it, so that it was called in the official language of Venice ” the island of Candia,” a designation which from thence passed into modern maps. The ancient name of Krete or Kriti was, however, always retained in use among the Greeks, and is gradually resuming its place in the usage of literary Europe. The government of Crete by the Venetian aristocracy was, like that of their other de- pendencies, very arbitrary and oppressive, and numerous insurrections were the consequence. Daru, in his history of Venice, mentions fourteen between the years 1207 and 1365, the most important being that of 1361-1364, — a revolt not of the natives against the rule of their Venetian masters, but of the Venetian colonists against the republic. But with all its defects their administration did much to promote the material prosperity of the country, and to encourage commerce and industry; and it is probable that the island was more prosperous than at any subsequent time. Their Venetian masters at least secured to the islanders external tranquillity, and it is singular that the Turks were content to leave

them in undisturbed possession of this opulent and important island for nearly two centuries after the fall of Constantinople. The Cretans themselves, however, were eager for a change, and, disappointed in the hope of a Genoese occupation, were ready, as is stated in the report of a Venetian commissioner, to exchange the rule of the Venetians for that of the Turks, whom they fondly expected to find more lenient, or at any rate less energetic, masters. It was not till 1645 that the Turks made any serious attempt to effect the conquest of the island; but in that year they landed with an army of 50,000 men, and speedily reduced the important city of Canea. Retimo fell the following year, and in 1648 they laid siege to the capital city of Candia. This was the longest siege on record, having been protracted for more than twenty years; but in 1667 it was pressed with renewed vigour by the Turks under the grand vizier Ahmed Kuprili, and the city was at length compelled to surrender (September 1669). Its fall was followed by the submission of the whole island. Venice was allowed to retain possession of Grabusa, Suda and Spinalonga on the north, but in 1 7 18 these three strongholds reverted to the Turks, and the island was finally lost to Venice.

From this time Crete continued subject to Ottoman rule without interruption till the outbreak of the Greek revolution. After the conquest a large part of the inhabitants embraced Mahommedanism, and thus secured to themselves the chief share in the administration of the island. But far from this having a favourable effect upon the condition of the population, the result was just the contrary, and according to R. Pashley (Travels in Crete, 1837) Crete was the worst governed province of the Turkish empire. In 1770 an abortive attempt at revolt, the hero of which was ” Master ” John, a Sphakiot chief, was repressed with great cruelty. The regular authorities sent from Constantinople were wholly unable to control the excesses of the janissaries, who exercised without restraint every kind of violence and oppression. In 1813 the ruthless severity of the governor-general, Haji Osman, who obtained the co-operation of the Christians, broke the power of the janissaries; but after Osman had fallen a victim to the suspicions of the sultan, Crete again came under their control. When in 182 1 the revolution broke out in continental Greece, the Cretans, headed by the Sphakiots, after a massacre at Canea at once raised the standard of insurrection. They carried on hostilities with such success that they soon made themselves masters of the whole of the open country, and drove the Turks and Mussulman population to take refuge in the fortified cities. The sultan then invoked the assistance of Mehemet Ali, pasha of Egypt, who despatched 7000 Albanians to the island. Hostilities continued with no decisive result till 1824, when the

arrival of further reinforcements enabled the Turkish commander to reduce the island to submission. In 1827 the battle of Navarino took place, and in 1830 (3rd of February) Greece was declared independent. The allied powers (France, England and Russia) decided, however, that Crete should not be included amongst the islands annexed to the newly formed kingdom of Greece; but recognizing that some change was necessary, they obtained from the sultan Mahmud II. its cession to Egypt, which was con firmed by a firman of the 20th of December 1832. This change of masters brought some relief to the unfortunate Cretans, who at least exchanged the licence of local misrule for the oppression of an organized despotism; and the government of Mustafa Pasha, an Albanian like Mehemet Ali, the ruler of the island for a considerable period (1832-1852), was more enlightened and intelligent than that of most Turkish governors. He encouraged agriculture, improved the roads, introduced an Albanian police, and put down brigandage. The period of his administration has been called the “golden age” of Crete.

In 1840 Crete was again taken from Mehemet Ali, and replaced under the dominion of the Turks, but fortunately Mustafa still retained his governorship until he left for Constantinople to become grand vizier in 1852. Four years later an insurrection broke out, owing to the violation of the provisions of an imperial decree (February 1856), whereby liberty of conscience and equal rights and privileges with Mussulmans had been conferred upon Christians. The latter refused to lay down their arms until a firman was issued (July 1858), confirming the promised con- cessions. These promises being again repudiated, in 1864 the inhabitants held an assembly and a petition was drawn up for presentation at Constantinople by the governor. The sultan’s reply was couched in the vaguest terms, and the Cretans were ordered to render unquestioning obedience to the authorities. After a period of great distress and cruel oppression, in 1866, on the demand for reforms being again refused, a general insurrec- tion took place, which was only put down by great exertions on the part of the Porte. It was followed by the concession of additional privileges to the Christians of the island and of a kind of constitutional government and other reforms embodied in what is known as the “Organic Statute” of 1868. (J. H. F.)

Modern Constitutional. — Cretan constitutional history may be said to date from 1868, when, after the suppression of an insurrec- tion which had extended over three years, the Turkish govern- ment consented to grant a certain measure of autonomy to the island. The privileges now accorded were embodied in what is known as the Organic Statute, an instrument which eventually obtained a somewhat wider importance,

being proposed by

Article XXIII. of the Berlin Treaty as a basis of reforms to be introduced in other parts of the Ottoman empire. Various privileges already acquired by the Christian population were confirmed; a general council, or representative body, was brought into existence, composed of deputies from every district in the island; mixed tribunals were introduced, together with a highly elaborate administrative system, under which all the more important functionaries, Christian and Mussulman, were provided with an assessor of the opposite creed. The new constitution, however, preved costly and unworkable, and failed to satisfy either section of the population. The Christians were ready for another outbreak, when, in 1878, the Greek government, finding Hellenic aspirations ignored by the treaty of San Stefano, gave the signal for agitation in the island. During the insurrec- tion which followed, the usual barbarities were committed on both sides; the Christians betook themselves to the mountains, and the Mussulman peasants crowded into the fortified towns. Eventually the Cretan chiefs invoked the mediation of England, which Turkey, exhausted by her struggle with Russia, was

ready to accept, and the convention known as the tialepa. Pact of Halepa was drawn up in 1878 under the auspices

of Mr Sandwith, the British consul, and Adossides Pasha, both of whom enjoyed the confidence of the Cretan population. The privileges conferred by the Organic Statute were confirmed; the cumbersome and extravagant judicial and administrative systems were maintained; the judges were declared independent of the executive, and an Assembly com- posed of forty-nine Christian and thirty-one Mussulman deputies took the place of the former general council. A parliamentary regime was thus inaugurated, and party warfare for a time took the place of the old religious antagonism, the Moslems attaching themselves to one or other of the political factions which now made their appearance among the Christians. The material interests of the island were neglected in the scramble for place and power; the finances fell into disorder, and the party which came off worst in the struggle systematically intrigued against the governor-general of the day and conspired with his enemies at Constantinople. A crisis came about in 1889, when the ” Con- servative ” leaders, finding themselves in a minority in the chamber, took up arms and

withdrew to the mountains. Though the outbreak was unconnected with the religious feud, the latent fanaticism of both creeds was soon aroused, and the island once more became a scene of pillage and devastation. Unlike the two preceding movements, the insurrection of 1889 resulted unfavour- ably for the Christians. The Porte, having induced the Greek government to persuade the insurgents not to oppose the occupa- tion of several strategic posts, despatched a military governor to the island, proclaimed martial law, and issued a firman abrogating many important provisions of the Halepa Pact. The mode of election to the assembly was altered, the number of its members reduced, and the customs revenue, which had hitherto been shared with the island, was appropriated by the Turkish treasury. The firman was undoubtedly illegal, as it violated a convention possessing a quasi-international sanction, but the Christians were unable to resist, and the powers abstained from intervention. The elections held under the new system proved a failure, the Christians refusing to go to the polls, and for the next five years Crete was governed absolutely by a succes- sion of Mahommedan Valis. The situation went from bad to worse, the deficit in the budget increased, the gendarmery, which received no pay, became insubordinate, and crime multiplied. In 1894 the Porte, at the instance of the powers, nominated a Christian, Karatheodory Pasha, to the governorship, and the Christians, mollified by the concession, agreed to take part in the assembly which soon afterwards was convoked; no steps, however, were taken to remedy the financial situation, which became the immediate cause of the disorders that followed. The refusal of the Porte to refund considerable sums which had been illegally diverted from the Cretan treasury or even to sanction a loan to meet immediate requirements caused no little exaspera- tion in the island, which was increased by the recall of Kara- theodory (March 1895). Before that event an Epitrope, or

” Committee of Reform,” had appeared in the mountains — the harbinger of the prolonged struggle which ended in the emanci- pation of Crete. The Epitrope was at first nothing more than a handful of discontented politicians who had ˆ ,sur ™ c ” failed to find places in the administration, but some 1896-97. slight reverses which it succeeded in inflicting on the Turkish troops brought thousands of armed Christians to its side, and in April 1896 it found itself strong enough to invest the important garrison town of Vamos. The Moslem peasantry now flocked to the fortified towns and civil war began. Serious disturbances broke out at Canea on the 24th of May, and were only quelled by the arrival of foreign warships. The foreign consuls intervened in the hope of bringing about a peaceful settlement, but

the Sultan resolved on the employment of force, and an expedition despatched to Vamos effected the relief of that town with a loss of 200 men. The advance of a Turkish detach- ment through the western districts, where other garrisons were besieged, was marked by pillage and devastation, and 5000 Christian peasants took refuge on the desolate promontory of Spada, where they suffered extreme privations. These events, which produced much excitement in Greece, quickened the energies of the powers. An international blockade of the island was proposed by Austria but rejected by England. The ambassadors at Constantinople urged peaceful counsels on the Porte, and the Sultan, alarmed at this juncture by an Armenian outbreak, began to display a conciliatory disposition. The Pact of Halepa was restored, the troops were withdrawn from the interior, financial aid was promised to the island, a Christian governorrgeneral was appointed, the assembly was summoned, and an imperial commissioner was despatched to negotiate an arrangement. The Christian leaders prepared a moderate scheme of reforms, based on the Halepa Pact, which, with a few exceptions, were approved by the powers and eventually sanctioned by the sultan.

On the 4th of September 1896 the assembly formally accepted the new constitution and declared its gratitude to the powers for their intervention. The Moslem leaders acquiesced in the arrangement, which the powers undertook to guarantee, and, notwithstanding some symptoms of discontent at Candia, there was every reason to hope that the island was now entering upon a period of tranquillity. It soon became evident, however, that the Porte was endeavouring to obstruct the execution of the new reforms. Several months passed without any step being taken towards this realization; difficulties were raised with regard to the composition of the international commissions charged with the reorganization of the gendarmery and judicial system ; intrigues were set on foot against the Christian governor- general; and the presence of a special imperial commissioner, who had no place under the constitution, proved so injurious to the restoration of tranquillity that the powers demanded his immediate recall. The indignation of the Christians increased, a state of insecurity prevailed, and the Moslem peasants refused to return to their homes. A new factor now became apparent in Cretan politics. Since the outbreak in May 1896 the Greek government had loyally co-operated with the powers in their efforts for the pacification of the island, but towards the close of the year a secret society known as the Ethnike Hetaeria began to arrogate to itself the direction of Greek foreign policy. The aim of the society was a war with Turkey with a view to the acquisi- tion of Macedonia, and it found a ready instrument for its designs in

the growing discontent of the Cretan Christians. Emissaries of the society now appeared in Crete, large consign- ments of arms were landed, and at the beginning of 1897 the island was practically in a state of insurrection. On the 21st of January the Greek fleet was mobilized. ?™ e £ Affairs were brought to a climax by a series of conflicts vention. which took place at Canea on the 4th of February; the Turkish troops fired on the Christians, a conflagration broke out in the town, and many thousands of Christians took refuge on the foreign warships in the bay. The Greek government now despatched an ironclad and a cruiser to Canea, which were followed a few days later by a torpedo flotilla commanded by

Prince George. The prince soon retired to Melos, but on the night of the 14th of February a Greek expeditionary force under Colonel Vassos landed at Kolymbari, near Canea, and its com- mander issued a proclamation announcing the occupation of the island in the name of King George. On the same day Georgi Pasha, the Christian governor-general, took refuge on board a Russian ironclad, and, on the next, naval detachments from the warships of the powers occupied Canea. This step paralysed the movements of Colonel Vassos, who after a few slight engage- ments with the Turks remained practically inactive in the interior. The insurgents, however, continued to threaten the town, and their position was bombarded by the international fleet (21st February). The intervention of Greece caused immense excite- ment among the Christian population, and terrible massacres of Moslem peasants took place in the eastern and western districts. The forces of the powers shortly afterwards occupied Candia and the other maritime towns, while the international fleet blockaded the Cretan coast. These measures were followed by

the presentation of collective notes to the Greek and D o7the” Turkish governments (2nd March), announcing the powers. decision of the powers that (1) Crete could in no case

in present circumstances be annexed to Greece; (2) in view of the delays caused by Turkey in the application of the reforms Crete should now be endowed with an effective auto- nomous administration, intended to secure to it a separate government, under the suzerainty of the sultan. Greece was at the same time summoned to remove its army and fleet from the island, while the Turkish troops were to be concentrated in the fortresses and eventually withdrawn. The cabinet

of Athens, however, declined to recall the expeditionary force, which remained in the interior till the 9th of May, when, after the Greek reverses in Thessaly and Epirus, an order was given for its return. Meantime Cretan autonomy had been proclaimed (20th March). After the departure of the Greek troops the Cretan leaders, who had hitherto demanded annexation to Greece, readily acquiesced in the decision of the powers, and the insurgent Assembly, under its president Dr Sphakianakis, a man of good sense and modera- tion, co-operated with the international commanders in the maintenance of order. The pacification of the island, however, was delayed by the presence of the Turkish troops and the in- ability of the powers to agree in the choice of a new governor- general. The prospect of a final settlement was improved by the withdrawal of Germany and Austria, which had favoured Turkish pretensions, from the European concert (April 1898); the re- maining powers divided the island into four departments, which they severally undertook to administer. An attack made by the Moslems of Candia on the British garrison of that town, with the connivance of the Turkish authorities, brought home to the powers the necessity of removing the Ottoman troops, and the last Turkish soldiers quitted the island on the 14th of November

1898.

On the 26th of that month the nomination of Prince George of Greece as high commissioner of the powers in Crete for a Prince period of three years (renewed in 1901) was formally George's announced, and on the 21st of December the prince

landed at Suda and made his public entry into Canea

amid enthusiastic demonstrations. For some time after his arrival complete tranquillity prevailed in the island, but the Moslem population, reduced to great distress by the prolonged insurrection, emigrated in large numbers. On the 27th of April 1899 a new autonomous constitution was voted by a constituent assembly, and in the following June the local administration was handed over to Cretan officials by the inter- national authorities. The extensive powers conferred by the constitution upon Prince George were increased by subsequent enactments. In 1901 M. Venezelo, who had played a noteworthy part in the last insurrection, was dismissed from the post of councillor by the prince, and soon afterwards became leader of a strong opposition party, which denounced the arbitrary methods of the government. During the next four years party spirit ran high; in the spring of 1904 a deputation of chiefs and politicians addressed a protest to the prince, and early in the following

adminis- tration.

year a band of armed malcontents under M. Venezelo raised the standard of revolt at Theriso in the White Mountains. The insurgents, who received moral support from Dr Sphakianakis, proclaimed the union of the island with Greece (March 1905), and their example was speedily followed by the assembly at Canea. The powers, however, reiterated their decision to main- tain the status quo, and increased their military and naval forces; the Greek flag was hauled down at Canea and Candia, and some desultory engagements with the insurgents took place, the international troops co-operating with the native gendarmerie. In the autumn M. Venezelo and his followers, having obtained an amnesty, laid down their arms. A commission appointed by the powers to report on the administrative and financial situation drew up a series of recommendations in January 1906, and a constituent assembly for the revision of the constitution met at Canea in the following June. On the 25th of July the powers announced a series of reforms, including the reorganiza- tion of the gendarmerie and militia under Greek officers, as a preliminary to the eventual withdrawal of the international troops, and the extension to Crete of the system of financial control established in Greece. On the 14th of September, under an agreement dated the 14th of August, they invited King George of Greece, in the event of the high commissionership becoming vacant, to propose a candidate for that post, to be nominated by the powers for a period of five years, and on the 25th of September Prince George left the island. He had done much for the welfare of Crete, but his participation in party struggles and his attitude towards the representatives of the powers had rendered his position untenable. His successor, M. Alexander Zaimis, a former prime minister of Greece, arrived in Crete on the 1st of October. (J. D. B.)

On the 22nd of February 1907 M. Zaimis, as high commissioner, took the oath to the new constitution elaborated after much debate by the Cretan national assembly. His position was one of singular difficulty. Apart from the rivalry of the factions within the Assembly, there was the question of the Mussulman minority, dwindling it is true, 1 but still a force to be reckoned with. The high commissioner, true to his reputation as a prudent statesman and astute politician, showed great skill in dealing with the situation. From the first he had taken up an attitude of great reserve, appearing little in public and careful not to identify himself with any faction. In such matters as appoint- ments to the judicial bench, indeed, his studied impartiality offended both parties; but on the whole his administration was a marked success, and the cessation of the chronic state of dis- turbance in the island justified the powers in preparing for the withdrawal of their troops. In

spite of the admission of their co-religionists to high office in the government, the Mussulmans, it is true, still complained of continuous ill-treatment having for its object their expatriation; but these complaints were declared by Sir Edward Grey, in answer to a question in parlia- ment, to be exaggerated. The protecting powers had fixed the conditions preliminary to evacuation — (1) the organization of a native gendarmerie, (2) the maintenance of the tranquillity of the island, (3) the complete security of the Mussulman popula- tion. On the 20th of March 1908 M. Zaimis called the attention of the powers to the fact that these conditions had been fulfilled, and on the nth of May the powers announced to the high commissioner their intention of beginning the evacuation at once and completing it within a year. The first withdrawal of the troops (July 27), hailed with enthusiasm by the Cretan Christians, led to rioting by the Mussulmans, who believed themselves abandoned to their fate.

Meanwhile M. Zaimis had made a further advance towards the annexation of the island to Greece by a visit to Athens, where he arranged for a loan with the Greek National Bank and engaged Greek officers for the new gendarmerie. The issue was pre- cipitated by the news of the revolution in Turkey. On the 1 2th

1 The Mussulman population, 88,000 in 1895, had sunk to 40,000 in 1907, and the emigration was still continuing. The loss to the country in wealth exported and land going out of cultivation has been very serious.

of October the Cretan Assembly once more voted the union with Greece, and in the absence of M. Zaimis — who had gone for a holiday to Santa Maura — elected a committee of six to govern the island in the name of the king of Greece.

Against this the Mussulman deputies protested, in a memor- andum addressed to the British secretary of state for foreign affairs. His reply, while stating that his government would safeguard the interests of the Mussulmans, left open the question of the attitude of the powers, complicated now by sympathy with reformed Turkey. The efforts of diplomacy were directed to allaying the resentment of the “Young Turks” on the one hand and the ardour of the Greek unionists on the other; and meanwhile the Cretan administration was carried on peaceably in the name of King George. At last (July 13, 1909) the

powers announced to the Porte, in answer to a formal remonstrance, their decision to withdraw their remaining troops from Crete by July 26 and to station four war-ships off the island to protect the Moslems and to safeguard “the supreme rights” of the Ottoman Empire. This arrangement, which was duly carried out, was avowedly ” provisional ” and satisfied neither party, leading in Greece especially to the military and constitutional crises of 1909 and 1910. (W. A. P.)

Authorities. — Pashley, Travels in Crete (2 vols., Cambridge and London, 1837); Spratt, Travels and Researches in Crete (2 vols., London, 1867) ; Raulin, Description physique del’ilede Crete (3 vols, and Atlas, Paris, 18C9); W. J. Stillman, The Cretan Insurrection of 1866-68 (New York, 1874); Edwardes, Letters from Crete (London, 1887) ; Stavrakis, XrancrTiKri rod tt\ij0v

CRETINISM, the term given to a chronic disease, either sporadic or endemic, arising in early childhood, and due to’ absence or deficiency of the normal secretion of the thyroid gland. It is characterized by imperfect development both of mind and body. The thyroid gland is either congenitally absent, imperfectly developed, or there is definite goitre. The origin of the word is doubtful. Its southern French form Chrestiaa suggested to Michel a derivation from cresta (crite), the goose foot of red cloth worn by the Cagots of the Pyrenees. The Cagots, however, were not cretins. The word is usually explained as derived from chretien (Christian) in the sense of “innocent.” But Christianus (which appears in the Lombard cristanei; compare the Savoyard innocents and gens du bon dieu) is probably a translation of the older cretin, and the latter is probably connected with creta {crate) — a sallow or yellow-earthy complexion being a common mark of cretinism.

The endemic form of cretinism prevails in certain districts, as in the valleys of central Switzerland, Tirol and the Pyrenees. In the United Kingdom cretins have been found in England at Oldham, Sholver Moor, Crompton, Duffield, Cromford (near Matlock), and other points in Derbyshire; endemic goitre has been seen near Nottingham, Chesterfield, Pontefract, Ripon, and the mountainous parts of Staffordshire and Yorkshire, the east of Cumberland, certain parts of Worcester, Warwick, Cheshire, Monmouth, and Leicester, near Horsham in Hampshire, near Haslemere in Surrey, and near Beaconsfield in Buckingham. There are cretins at Chiselborough in Somerset. In Scotland cretins and cases of goitre have been seen in Perthshire, on the east coast of Fife, in Roxburgh, the upper portions of Peebles and Selkirk, near Lanark and Dumfries, in the east of Ayrshire, in the west of Berwick, the east of Wigtown, and in

Kirkcudbright. The disease is not confined to Europe, but occurs in North and South America, Australia, Africa and Asia. Wherever endemic goitre is present, endemic cretinism is present also, and it has been constantly observed that when a new family moves into a goitrous district, goitre appears in the first generation, cretinism in the second. The causation of goitre has now been shown to

be due to drinking certain waters, though the particular impurity in the water which gives rise to this condition has not been determined (see Goitre). The causation of the sporadic form of cretinism is, however, obscure.

Cretinism usually remains unrecognized until the child reaches some eighteen months or two years, when its lack of mental development and uncouth bodily form begin to attract attention. Occasionally the child appears to be normal in infancy, but the cretinoid condition develops later, any time up to puberty. The essential point in the morbid anatomy of these cases is the absence or abnormal condition of the thyroid gland (see Metabolic Diseases). It may be congenitally absent, atrophied, or the seat of a goitre, though this last condition is very rare in cases of sporadic cretinism. The skeleton shows arrested growth, most marked in the case of the long bones. The skull in the endemic form of cretinism is usually brachycephalic, but in the sporadic cases it is more commonly dolichocephalic. The pathology of cretinism and its allied condition myxoedcma (

The condition has existed and been described in far back ages, but mingled with so many other entirely different de- formities and degenerations that it is now often almost impossible to classify them satisfactorily. The following is a vivid picture by Beaupre (Dissertation sur les cretins, translated in Blackie on Cretinism, Edin., 1855):—

” I see a head of unusual form and size, a squat and bloated figure, a stupid look, bleared hollow and heavy eyes, thick projecting eyelids, and a flat nose. His face is of a leaden hue, his skin dirty, flabby, covered with tetters, and his thick tongue hangs down over his moist livid lips. His mouth, always open and full of saliva, shows teeth going to decay. His chest is narrow, his back curved, his breath asthmatic, his limbs short, misshapen, without power. The knees are thick and inclined inward, the feet flat. The large head drops listlessly on the breast; the abdomen is like a bag.”

When fully grown the height rarely exceeds 4 ft., and is often less than 3 ft. The skin feels doughy from thickening of the sub- cutaneous tissues, and it hangs in folds over the abdomen and the bends of the

joints. Very frequently there is an umbilical hernia. The hair has a far greater resemblance to horse-hair than to that of a human being, and is usually absent on the body of an adult cretin. The temperature is subnormal, and the exposed parts tend to become blue in cold weather. The blood is usually deficient in haemoglobin, which is often only 40-50 % of the normal. The mental capacity varies within narrow limits; an intelligent adult cretin may reach the intellectual development of a child 3-4 years of age, though more often the standard attained is even below this. The child cretin learns neither t.o walk nor talk at the usual time. Often it is unable even to sit without support. Some years later a certain power of move- ment is acquired, but the gait is waddling and clumsy. Speech is long delayed, or in bad cases may be almost entirely lacking. The voice is usually harsh and unpleasant. Of the senses smell and taste are but slightly developed, more or less deafness is generally present, and only the sight is fairly normal. In the adult the genital organs remain undeveloped. If the cretin is untreated he rarely has a long life, thirty years being an exceptional age. Death results from some intercurrent disease.

Cretinism has to be distinguished from the state of a Mongolian idiot, in whom there is no thickening of the subcutaneous tissues, and much greater alertness of mind; from achondroplasia, in which condition there is usually no mental impairment; and from infantilism, which covers a group of symptoms whose only common point is that the primary and secondary sexual characteristics fail to appear at the proper time.

Before 1891 there was no treatment for this disease. The patients lived in hopeless imbecility until their death. But in that year Dr George Murray published his discovery of the effect of hypodermic injections of thyroid gland extract in cases of myxoedema. In the following year Drs Hector Mac- kenzie, E. L. Fox of Plymouth, and Howitz of Copenhagen, each working independently, showed the equally potent effect of, the gland administered by the mouth. The remedy was soo?

after applied to cretinism and its effects were found to be even more wonderful. It has to be used, however, with the greatest care and discrimination, since personal idiosyncrasy seems to be a very variable factor. Even small doses, if beyond the patient’s power, may produce fever, excitement, headache, insomnia and vomiting. The administration must be persisted in throughout life, otherwise

myxoedematous symptoms appear. The first most apparent results are those of growth, and this may supervene even in patients up to 25-30 years of age. Once started, 4 to 6 in. may be gained in stature in the first year's treatment, though this is usually in inverse ratio to the age of the patient, and also diminishes in later stages of treatment. In young adolescents it may be so rapid that the patient has to be kept lying down to prevent permanent bending of the long bones of the leg, softened by their rapid growth. A very typical case under Dr Hector Mackenzie, showing what can be expected from early treatment, is that of a cretin aged n years in 1893, when thyroid treatment was started. He grew very rapidly and became a normal child, passed through school, and in 1908 was at one of the universities.

Bibliography. — Sardinian Commission, " Relazione della commissione di Sardegna per studiare il cretinismo " (Torino, 1848); C. Hilton Fagge, " On Sporadic Cretinism occurring in England," Med. Chir. Trans. (London, 1870); Vincenzo Allara, " Sulla causa del cretinesimo," studio (Milano, 1892) ; Victor Horsley, " Remarks on the Function of the Thyroid Gland," Brit. Med. Journ. (1892); " The Treatment of Myxoedema and Cretinism, being a Review of the Treatment of those Diseases by Thyroid Gland," Journ. Merit. Sc. (London, 1893); W. Osier, " On Sporadic Cretinism in America," Am. Journ. of Med. Sc. (1893) ; C. A. Ewald, Die Erkrankungen der Schilddruse, Myxodeme und Cretinismus (Wien, 1896); G. R. Murray, Diseases of the Thyroid Gland, part i. (1900) ; R. Virchow, " Uber Cretinismus," Wiirzburger Vcrhand. ; Hector Mackenzie, " Organotherapy," Textbook of Pharmacology and Therapeutics (1901) ; Weygandt, Der heutige Stand der Lehre vom Kretinismus (Halle, 1903) ; Hector Mackenzie, " Cretinism," Allbutt& Rolleston's System of Medicine, part iv. (1908).

CRETONNE, originally a strong, white fabric with a hempen warp and linen weft. The word is said to be derived from Creton, a village in Normandy where the manufacture of linen was carried on. It is now applied to a strong, printed cotton cloth, stouter than chintz but used for very much the same purposes. It is usually unglazed and may be printed on both sides and even with different patterns. Frequently the cretonne has a woven fancy pattern of some kind which is modified by the printed design. It is sometimes made with a weft of cotton waste.

CREUSE, a department of central France, comprising the greater portion of the old province of Marche, together with portions of Berry, Bourbonnais, Auvergne, Limousin and Poitou. Area, 2164 sq. m. Pop. (1906) 274,094. It lies on the north-western border of the central plateau and is bounded N. by the departments of Indre and Cher, E. by

Allier and Puy-de- Dome, S. by Correze and W. by Haute- Vienne. The surface is hilly, with a general inclination north-westward in the direction of the valley of the Creuse, sloping from the mountains of Auvergne and Limousin, branches of which project into the south of the department. The chief of these starts from the Plateau de Gentioux, and under the name of the Mountains of Marche extends along the left bank of the Creuse. The highest point is in the forest of Chateauvert (3050 ft.) in the extreme south-east of the department. Rivers, streams and lakes are numerous, but none are navigable; the principal is the Creuse, which rises on the north side of the mass of Mount Odouze on the border of the department of Correze, and passes through the department, dividing it into two nearly equal portions, receiving the Petite Creuse from the right, and afterwards flowing on to join the Vienne. The valleys of the head-streams of the Cher and of its tributary the Tardes, which near Evaux passes under a fine viaduct 300 ft. in height, occupy the eastern side; those of the heads of the Vienne and its tributary the Thaurion, and of the Gartempe joining the Creuse, are in the west of the department. The climate is in general cold, moist and variable; the rigorous winter covers the higher cantons with snow; rain is abundant in spring, and storms are frequent in summer, but the autumn is fine. Except in the valleys the

soil is poor and infertile, and agriculture is also handicapped by the dearness of labour, due to the annual emigration of from 15,000 to 20,000 of the inhabitants to other parts of France, where they serve as stonemasons, &c. The produce of cereals, chiefly rye, wheat, oats and buckwheat, is not sufficient for home consumption. The chestnut abounds in the north and west; hemp and potatoes are also grown. Cattle-rearing and sheep- breeding are the chief industries of the department, which supplies Poitou and Vendee with draught oxen. Coal is mined to some extent, chiefly in the basin of Ahun. There are thermal springs at Evaux in the east of the department, where remains of Roman baths are preserved. The chief industrial establish- ments are the manufactories of carpets and hangings and the dyeworks of Aubusson and Felletin. Saw-mills and the manufacture of wooden shoes and hats have some importance. Exports include carpets, coal, live-stock and hats; imports comprise raw materials for the manufactures and food-supplies. The department is served by the Orleans railway company, whose line from Montlucon to Perigueux traverses it from east to west. It is divided into the four arrondissements of Gueret, the capital Aubusson, Bourganeuf, and Boussac, and further into 25 cantons and 266 communes. With Haute-Vienne, Creuse forms the diocese of Limoges, where also is its court of appeal. It forms part of the academie (educational division) of

Clermont and of the region of the XII. army corps. The principal towns are Gueret and Aubusson. La Souterraine, Chambon-sur-Voueize and Benevent-l'Abbaye possess fine churches of the 12th century. At Moutier-d'Ahun there is a church, which has survived from a Benedictine abbey. The nave of the 15th century with a fine portal, and the choir with its carved stalls of the 17 th century, are of considerable interest. The small industrial town of Bourganeuf has remains of a priory, including a tower (15th century) in which Zizim, brother of the sultan Bajazet II. , is said to have been imprisoned.

CREUTZ, GUSTAF FILIP, Count (1729-1785), Swedish poet, was born in Finland in 1729. After concluding his studies in Abo he received a post in the court of chancery at Stockholm in 1751. Here he met Count Gyllenborg, with whom his name is indissolubly connected. They were closely allied with Fru Nordenflycht, and their works were published in common; to their own generation they seemed equal in fame, but. posterity has given the palm of genius to Creutz. His greatest work is contained in the 1762 volume, the idyll of Atis och Camilla; the exquisite little pastoral entitled "Daphne" was published at the same time, and Gyllenborg was the first to proclaim the supremacy of his friend. In 1763 Creutz practically closed his poetical career; he went to Spain as ambassador, and after three years to Paris in the same capacity. In 1783 Gustavus III. recalled him and heaped honours upon him, but he died soon after, on the 30th of October 1785. Atis och Camilla was long the most admired poem in the Swedish language; it is written in a spirit of pastoral which is now to some degree faded, but in comparison with most of the other productions of the time it is freshness itself. Creutz introduced a melody and grace into the Swedish tongue which it lacked before, and he has been styled " the last artificer of the language."

See Creutz och Gyllenborgs Vitterhetsarbeten (Stockholm, 1795)-
CREUZER, GEORG FRIEDRICH (1 771-1858), German philo- logist and archaeologist, was born on the 10th of March 1771, at Marburg, the son of a bookbinder. Having studied at Marburg and Jena, he for some time lived at Leipzig as a private tutor; but in 1802 he was appointed professor at Marburg, and two years later professor of philology and ancient history at Heidel- berg. The latter position he held for nearly forty-five years, with the exception of a short time spent at the university of Leiden, where his health was affected by the Dutch climate. He was one of the principal founders of the Philological Seminary established at Heidelberg in 1807. The Academy of Inscriptions of Paris appointed him one of its members, and from the grand- duke of Baden he received the dignity of privy councillor. He died on the 16th of February 1858. Creuzer's first and

most famous work was his Symbolik und Mythologie der alien Vfflker,

besonders der Griechen (1810-1812), in which he maintained that the mythology of Homer and Hesiod came from an Eastern source through the Pelasgians, and was the remains of the sym- bolism of an ancient revelation. This work was vigorously attacked by Hermann in his Briefen iiber Homer und Hesiod, and in his letter, addressed to Creuzer, fiber das Wesen und die Behandlung der Mythologies by J. H. Voss in his Antisymbolik; and by Lobek in his Aglaophamos. Of Creuzer's other works the principal are an edition of Plotinus; a partial edition of Cicero, in preparing which he was assisted by Moser; Die historische Kunst der Griechen (1803); Epochen der griech. Liter alur geschichte (1802); Abriss der romischen Antiquitaten (1824) ; Zur Geschichte altromischer Cultur am Oberrhein und Neckar (1833); Zur Gemmenkunde (1834); Das Mithreum von Neuenheim (1838); Zur Galerie der alten Dramatiker (1839); Zur Geschichte der classischen Philologie (1854).

See the autobiographical Aus dem Leben eines alten Professors (Leipzig and Darmstadt, 1848), to which was added in the year of his death Paralipomena der Lebenskizze eines alten Professors (Frankfort, 1858); also Starck, Friederick Kreuzer, sein Bildungsgang und seine bleibende Bedeutung (Heidelberg, 1875).

CREVASSE, a French word used in two senses. (1) In French Switzerland, and thence universally in high mountain regions, it designates a fissure in a glacier caused by gigantic cracks in the ice-mass, sometimes of great depth, into which climbers fre- quently fall through a light bridge of snow which conceals the crevasse. (2) Adopted from the French of Louisiana, it signifies locally a wide crack or breach in the bank of a canal or river, and particularly of the " levee " of the Mississippi.

CREVIER, JEAN BAPTISTE LOUIS (1693-1765), French author, was born at Paris, where his father was a printer. He studied under Rollin and held the professorship of rhetoric in the college of Beauvais for twenty years. He completed Rollin's Histoire romaine by the addition of six volumes (17 50-1 756); he also published two editions of Livy, with notes; L' Histoire des empereurs des Romains, jusqu'a Constantin (1749); Histoire de V University de Paris, and a Rhitorique francoise, which enjoyed much popularity.

CREVILLENTE, a town of eastern Spain, in the province of Alicante, and on the Murcia- Alicante railway. Pop. (1900) 10,726. Crevillente is a picturesque old town built among the eastern foothills of the Sierra de Crevillente. Its flat-roofed Moorish houses are enclosed by gardens of cactus, dwarf palm, orange and other subtropical plants, interspersed with masses of rock. The surrounding country, though naturally sterile, is irrigated from two adjacent springs, which differ in temperature by no less than 25° F. The district is famous for its melons, and also produces wine, olives, wheat and esparto grass. Local industries include the manufacture of coarse cloth, esparto fabrics, oil and flour.

CREW, NATHANIEL CREW, 3 rd Baron (1633-1721), bishop of Durham, was a son of John Crew (1598-1679), who was created Baron Crew of Stene in 1 661, and a grandson of Sir Thomas Crew (1565-1634), speaker of the House of Commons. Born on the 31st of January 1633, Nathaniel was educated at Lincoln College, Oxford, and was appointed rector of the college in 1668. He became dean and precentor of Chichester in 1669, clerk of the closet to Charles II. shortly afterwards, bishop of Oxford in 1671, and bishop of Durham in 1674. He owed his rapid prefer- ment to James, then duke of York, whose favour he had gained by conniving at the duke's leanings to the Roman Church. After the accession of James II. Crew received the deanery of the Chapel Royal. He served in 1686 on the revived ecclesiastical commis- sion which suspended Compton, bishop of London, and then shared the administration of the see of London with Sprat, bishop of Rochester. In 1687 he was a member of another ecclesiastical commission, which suspended the vice-chancellor of the university of Cambridge for refusing the degree of M.A. to a monk who would not take the customary oath. On the de- cline of James's power Crew dissociated himself from the court, and made a bid for the favour of the new government by voting for the motion that James had abdicated. He was excepted

from the general pardon of 1690, but afterwards was allowed to retain his see. He left large estates to be devoted to charitable ends, and his benefaction to Lincoln College and to Oxford University is commemorated in the annual Crewian oration. In 1697 Crew succeeded his brother Thomas as 3rd Baron Crew, He died on the 18th of September 1721, when the barony became extinct.

CREW (sometimes explained as a sea term of Scandinavian origin, cf. O. Icel. kru, a swarm or crowd, but now regarded as a shortened form of accrue, accrewe, used in the 16th century in the sense of a reinforcement, O. Fr. acreue, from accroitre, to grow, increase), a

band or body of men associated for a definite purpose, a gang who jointly carry out a particular piece of work, and especially those who man a ship, exclusive of the captain, and sometimes also of the officers.

CREWE, ROBERT OFFLEY ASHBURTON CREWE-MILNES, ist Earl of (1858-), English statesman and writer, was born on the 12th of January 1858, being the son of Lord Houghton (q.v.), and was educated at Harrow and Trinity, Cambridge. In 1880 he married Sibyl Marcia Graham, who died in 1887, leaving him with two daughters. He inherited his father's literary tastes, and published Stray Verses in 1890, besides other miscellaneous literary work. A Liberal in politics, he became private secretary to Lord Granville when secretary of state for foreign affairs (1883-1884), and in 1886 was made a lord-in-waiting. In the Liberal administration of 1892-1895 he was lord-lieutenant for Ireland, having Mr John Morley as chief secretary. In 1895 he was created ist earl of Crewe, his maternal grandfather, the 2nd Baron Crewe, having left him his heir. In 1899 he married Lady Margaret Primrose, daughter of the 5th earl of Rosebery. In 1905 he became lord president of the council in the Liberal government; and in 1908, in Mr Asquith's cabinet, he became secretary of state for the colonies and Liberal leader in the House of Lords.

CREWE, a municipal borough in the Crewe parliamentary division of Cheshire, England, 158 m. N.W. of London, on the main line of the London & North-Western railway. Pop. (1901) 42,074. The town was built on an estate called Oak Farm in the parish of Monk's Coppenhall, and takes its name from the original stations having been placed in the township of Crewe, in which the seat of Lord Crewe is situated. It is a railway junction where lines converge from London, Manchester, North Wales and Holyhead, North Stafford and Hereford. It is inhabited principally by persons in the employment of the London & North- Western railway company, and was practically created by that corporation, at a point where in 1841 only a farmhouse stood in open country. Crewe is not only one of the busiest railway stations in the world, but is the locomotive metropolis of the London & North-Western company, which has centred here enormous workshops for the manufacture of the material and plant used in railways. In 1901 the 4000th locomotive was turned out of the works. A series of subterranean ways extending many miles have been constructed to enable merchandise traffic to pass through without interfering with passenger trains on the surface railways. The company possesses one of the finest electric stations in the world, and electrical apparatus for the working of train signals is in operation. The station is fitted with an extensive suite of offices for the interchange of postal traffic, the

chief mails to and from Ireland and Scotland being stopped here and arranged for various distributing centres. Its enormous railway facilities and its geographical situation as the junction of the great trunk lines running north and south, tapping also the Staffordshire potteries on the one side and the great mineral districts of Wales on the other, constitute Crewe station one of the most important links of railway and postal communication in the kingdom. The railway company built its principal schools, provided it with a mechanics' institute, containing library, science and art classes, reading rooms, assembly rooms, &c. Victoria Park, also the gift of the company, was opened in 1888. The municipal corporation built the technical school and school of art. The borough incorporated in 1877, is under a mayor, 7 aldermen and 21 councillors. Area, 2185 acres.

CREWKERNE, a market town in the southern parliamentary division of Somersetshire, England, 132 m. W.S.W. of London by the London & South-Western railway. Pop. of urban district (1901ˆ 4226. It is pleasantly situated in a wooded hollow, in the upper valley of the river Parret. The church of St Bartholomew, one of the finest in the county, is in the Perpen- dicular style characteristic of the district. The ornamentation throughout is beautiful, and the west front especially notable. The grammar school dates from 1499, but occupies modern build- ings. Sail-cloth, horsehair, cloth and webbing are manufactured.

CRIB (a word common to some Teutonic languages, cf. Dutch krib and Ger. Krippe; it has a common origin with the 0. Eng. " cratch," a manger or crib, cf. Fr. creche), a manger or framework receptacle for holding fodder for cattle and horses, and so, from early times in English, particularly the manger in which Jesus was laid. It is thus used of a " cradle," from which in form it should be distinguished as being a small bed with high closed-in sides. The word has many transferred meanings, as a rough, small hut or dwelling, from which comes the slang use of " crib " as a berth or situation, or, as a burglar's term for a house to be broken into; also, technically, in engineer- ing for a timber framework for masonry constructed with a caisson in laying foundations below water, or in mining for a timber lining to a shaft. " Crib-biting " is a vicious habit in horses, probably due in the first instance to indigestion; the horse seizes the manger or other object in its teeth, and draws in the breath, known as " wind-sucking "; the habit may be checked by the use of a throat-strap. The slang meaning of the verb " crib," to steal, especially used of petty thefts, is

probably derived from an obsolete use of the substantive for a small wicker basket; this meaning occurs in the expression ” time- cribbing,” used of an illicit increase of the hours of labour in a factory or workshop, especially by the running of machinery each day slightly beyond the time of ceasing work. ” Crib ” and ” cribbing ” in this sense are also applied to any unacknow- ledged appropriation or plagiarism from an author, and particu- larly to the secret copying by a schoolboy of another’s work or from a book, and also to the secret use of a translation and to such translation itself. ” Crib,” in the game of cribbage, of which it is a shortened form, is the term for the cards thrown away by each player and scored by the dealer.

CRIBBAGE, a game of cards. A very similar game called ” Noddy ” was formerly played, the game being fifteen or twenty- one up, marked with counters, occasionally by means of a noddy board. Cribbage seems to be an improved form of Noddy. According to John Aubrey {Brief Lives) it was invented by Sir John Suckling (1609-1642).

A complete pack of fifty-two cards is required, and a cribbage board for scoring, drilled with sixty holes for each player and one hole (called ” the game hole “) at each end, the players usually scoring from opposite ends. Each player has two scoring pegs. The game is marked by inserting the pegs in the holes, one after the other, as the player makes a fresh score, commencing with the outer row at the game-hole end and going up the board. When the thirtieth hole is reached the player comes down the board, using the inner row of holes, until he places his foremost peg in the game-hole. If the losing player fails to obtain half the holes, his adversary wins a “lurch,” or double game.

The game may be played by two players, five or six cards being dealt to each, and each putting out two for what is called ” crib “; or by three players (with a triangular scoring board), five cards being dealt to each, each putting out one for crib, and a card from the top of the pack being dealt to complete the crib; or by four players (two being partners against the other two, sitting and playing as at whist, and one partner scoring for both), five cards being dealt to each, and each putting out one card for crib.

Two-handed five-card cribbage was formerly considered the most scientific game, but this verdict has now been reversed in favour of the six-card game. In six-card cribbage both hands and crib contain four cards, and 121 holes are scored.

The players cut for deal, the lowest dealing. If more than one

game is played, the winner of the last game deals. The cards rank from king (highest) to the ace (lowest) . At the two-handed five-card game, the non-dealer scores three holes (called ” three for last “) at any time during the game, but usually while the dealer is dealing the first hand. This is not part of the six-card game, which we take as our example.

The dealer deals six cards to each, singly. The undealt cards are placed face downwards on the table. The players then look at their hands and ” lay out,” each putting two cards face downwards on the table, on the side of the board nearest to the dealer, for the ” crib.” A player must not take back into his hand a card he has laid out if the cards have been covered, nor must the crib be touched during the play of his hand.

After laying out, the non-dealer (when more than two play, the player to the dealer’s left) cuts the pack, and the dealer turns up the top card of the lower packet, called the “start,” or “turn- up.” If this is a knave, the dealer marks two ” for his heels.” This score is forfeited if not marked before the dealer plays a card.

The non-dealer plays first by laying face upwards on the table on his side of the board any card from his hand; the dealer then does the same, and so on alternately. When more than two play, the player to the leader’s left plays the second card, and so on. As soon as the first card is laid down the player calls out the number of pips on it; if a picture card, ten. When the second card is laid down, the player calls out the sum of the pips on the two cards played, and so on until all the cards are played, or until neither player can play without passing the number thirty- one. If one player has a card or cards that will come in and the other has not, he is at liberty to play them; at the six-card game he must play as long as they can come in, and he can score runs or make pairs, &c, with them. If one player’s cards are exhausted, the adversary plays out his own, and can score with them. When more than two play, the player next in rotation is bound to play, and so on until no one can come in. At the two- handed five-card game, when neither can come in the play stops; at the other gamesthe cards are played turned down, and the remainder of the cards are played in rotation, and so on until all are played out.

The object of the play is to make pairs, fifteens, sequences, and the ” go,” and to prevent the adversary from scoring.

Pairs. — If a card is put down of the same denomination as the one last played, the player pairing scores two holes. If a third card of the same denomination is next played, a ” pair royal ” (abbreviated to ”

prial “) is made, and the maker scores six holes. If a fourth card of the same denomination is next played, twelve holes are scored for the ” double pair royal.” Kings pair only with kings, queens with queens, and so with knaves and tens, notwithstanding that they all count ten in play.

Fifteens. — If either player during the play reaches fifteen exactly, by reckoning the values of all the played cards, he marks two.

Sequences. — If during the play of the hand three or more cards are consecutively played which make an ascending or descending sequence, the maker of the sequence marks one hole for each card forming the sequence or run. King, queen, knave and ten reckon in sequence in this order, notwithstanding that they are all tenth cards in play; the other cards according to the number of their pips. The ace is not in sequence with king, queen. If one player obtains a run of three, his adversary can put down a card in sequence and mark four, and so on. And, if there is a break in the sequence, and the break is filled ‘p during the play, without the intervention of a card not in sequence, the player of the card that fills the break scores a run. Thus the cards are played in this order: A-4, B-3, A-2, B-ace, A gets a run of three, B a run of four. Had B’s last card been a five, he would similarly have scored a run of four, as there is no break. Had B’s last card been a four, he would have scored a run of three. The cards need not be played in order. Thus the cards being played in this order, A-4, B-2, A-5, B-3, A-6, A-4, B-2, A-5, B-3, A-5, B-6, B takes a run of four for the fourth card played, but there is no run for any one else, as the second five inter- venes. Again, if the cards at six-card cribbage are thus played, A-4, B-2, A-3, B-ace, A-5, B-2, A-4. B-ace, A takes a run of three, B a run of four, A a run of five. B then playing the deuce has no run, as the deuce previously played intervenes.

The ” go,” end hole or last card is scored by the player who approaches most nearly to thirty-one during the play, and entitles to a score of one. If thirty -one is reached exactly, it is a go of two instead of one. After a go no card already played can be counted for pairs or sequences.

Compound Scores. — More than one of the above scores can be made at the same time. Thus a player pairing with the last card that will come in scores both pair and go. Similarly a pair and a fifteen, or a

sequence and a fifteen, can be reckoned together.

When the play is over, the hands are shown and counted aloud. The non-dealer has first show and scores and marks first ; the dealer afterwards counts, scores and marks what he has in hand, and then takes what is in crib. In counting both hands and crib the ” start ” is included, so that five cards are involved.

The combinations in hand or crib which entitle to a score are fifteen, pairs or pairs royal, sequences, flushes and ” his nob.”

Fifteens. — All the combinations of cards that, taken together, make fifteen exactly, count two. For example, a ten (King, Queen, Knave or Ten) card and a five reckon two, called as ” fifteen two.” Another five in the hand or turned up would again combine with the ten card, and entitle to another fifteen (” fifteen four “) ; if the other cards were a two and a three, two other fifteens would be counted (” fifteen six,” ” fifteen eight “) — one for the combination of the three and two with the ten card, and one for the combination of the two fives with the three and two. Similarly two ten cards and two fives reckon eight; a nine and three threes count six; and so on for other cards.

Pairs. — Pairs are reckoned as in play.

Sequences. — Three or more cards in sequence count one for each card. If one sequence card can be substituted for another of the same denomination, the sequence reckons again. For example, 3, 4, 5 and a 3 turned up reckon two sequences of three ; with another 3 there would be three sequences of three, and so on.

Flushes. — If all the cards in hand are of the same suit, one is reckoned for each card. If the start is also of the same suit, one is reckoned for that also. In crib, no flush is reckoned unless the start is of the same suit as the cards in crib.

His Nob. — If a player holds the knave of the suit turned up for the start he counts one ” for his nob.”

A dialogue will illustrate the technical conversation of the game, in a game at six-card cribbage. The cards for crib having been dis- carded, A holds knave of hearts, a four and a pair of twos: B holds a pair of nines, a six and a four. Two of hearts is turned up by B. The hand might be played thus. A lays down a two and says ” Two ” : B plays a nine and says ” Eleven ” : A follows with a four, saying ” Fifteen two “; pegging two holes at once: B plays his four and says ” Nineteen; two for a pair,” and pegs: A putting on his knave, ” Twenty-nine “: B says ”

Go.” A lays down his two, his last card, and says ” Thirty-one; good for two.” B plays his nine and six, saying ” Fifteen two, and one for my last — three.” The points are marked as they are made. A then counts his hand aloud. ” Six for a pair-royal ” or ” Three twos— good for six,” and ” One for his nob — seven,” and throws down his hand for B’s inspection. B, ” Fifteen two, fifteen four, fifteen six, fifteen eight, and a pair are ten.” B then looks at his crib and counts it. It contains, say, king, eight, three, ace and the “start ” is also reckoned. B counts ” Fifteen two and a run of three — five.”

After the points in hand and crib are reckoned, the cards are shuffled and dealt again, and so on alternately until the game is won.

The highest possible score in hand is 29 — three fives and a knave, with a five, of the same suit as the knave, turned up.

CRICCIETH, a watering-place and contributory parliamentary-borough of Carnarvonshire, Wales, on Cardigan Bay, served by the Cambrian railway. Pop. of urban district (1901) 1406. It is interesting for its high antiquity and the ruined castle, a fortress on an eminence where a neck of land ends, projecting into the sea. Portions of two towers are on the very verge of the rock. A double fosse and vallum, with the outer and inner court lines, can be traced. Apparently British, the castle was repaired later, probably in the time of Edward I. Across the bay is seen Harlech castle, backed by the Merionethshire hills. An old county-family mansion near Criccieth is Gwynf ryn (happy hill) , the seat of the Nanneys, situated near the stream Dwyfawr and within some 7 m. of Pwllheli. Not far is a tumulus, Tomen fawr. At a distance of 5 m. is Tremadoc (which owes its name, Town of Madocks — as does Portmadoc.— to Mr W. Madocks, of Morfa Lodge, who made the embankment here). Criccieth has become a favourite watering-place, as well as a centre of excursions. The neighbourhood is agreeable, and the Cardigan Bay shore is shelving and suitable for safe bathing. Cantref y Gwaelod (the hundred of the bottom) is the Welsh literary name of this bay, on the shores of which geological depression has certainly taken place. Mythical history relates how Seithennin’s drunkenness inundated the land now covered by the bay, and how King Arthur’s ship was wrecked upon Meisdiroedd Enlli near Bardsey. The Mabinogion tell how Harlech was a port. Similarly, in Carnarvon Bay, about 2 m. seaward, at

low water, are visible the ruins of Caerarianrhod (fortified town of the silver wheel), a submerged town — due to another geological depression.

CRICHTON, JAMES (1560-? 1582), commonly called the ” Admirable Crichton,” was the son of Robert Crichton, lord advocate of Scotland in the reign of Mary and James VI., and of Elizabeth, daughter of Sir James Stewart of Beath, through whom he claimed royal descent. He was born probably at Eliock in Dumfriesshire in 1560, and when ten years old was sent to St Salvator’s College, St Andrews, where he took his B.A. in i574andhisM.A.ini575. In 1577 Crichton was undoubtedly in Paris, but his career on the continent is difficult to follow. That he displayed considerable classical knowledge, was a good linguist, a ready and versatile writer of verse, and above all that he possessed an astounding memory, seems certain, not only from the evidence of men of his own time, but from the fact that even Joseph Scaliger (Prima Scaligerana, p. 58, 1669) speaks of his attainments with the highest praise. But those works of his which have come down to us show few traces of unusual ability; and the laudation of him as a universal genius by Sir Thomas Urquhart and Aldus Manutius requires to be discounted. Urquhart (in his Discovery of a most exquisite jewel) states that while in Paris Crichton successfully held a dispute in the college of Navarre, on any subject and in twelve languages, and that the next day he won a tilting match at the Louvre. There is, how- ever, no contemporary evidence for this, the only certain facts being that for two years Crichton served in the French army, and that in 1 579 he arrived in Genoa. The latter event is proved by a Latin address (of no particular merit) to the Doge and Senate entitled Oratio J. Critonii Scoti pro Moderatorum Genuensis Reipubl. electione coram Senatu habita . . . (Genoa, 1579). The next year Crichton was in Venice, and won the friendship of Aldus Manutius by his Latin ode In appulsu ad urbem Venetam de Propria statu J. Critonii Scoti Carmen adAldumManuccium . . . (Venice, 1580). The best contemporary evidence for Crich ton’s stay in Venice is a handbill printed by the Guerra press in 1580 (and now in the British Museum) , giving a short biography and an extravagant eulogy of his powers; he speaks ten languages, has a command of philosophy, theology, mathematics; he improvises Latin verses in all metres and on all subjects, has all Aristotle and his commentators at his fingers’ ends; is of most beautiful appearance, a soldier from top to toe, &c. This work is un- doubtedly by Manutius, as it was reprinted with his name in

1 581 as Relatione delta qualita di . . . Crettone, and again in

1582 (reprinted Venice, 1831).

In Venice Crichton met and vanquished all disputants except Giacomo Mazzoni, was followed from place to place by crowds of admirers, and won the affection of the humanists Lorenzo Massa and Giovanni

Donati. In March 1581 he went to Padua, where he held two great disputations. In the first he extemporized in succession a Latin poem, a daring onslaught on Aristotelian ignorance, and an oration in praise of ignorance. In the second, which took place in the Church of St John and St Paul, and lasted three days, he undertook to refute innumerable errors in Aristo- telians, mathematicians and schoolmen, to conduct his dispute either logically or by the secret doctrine of numbers, &c. Accord- ing to Aldus, who attended the debate and published an account of it in his dedication to Crichton prefixed to Cicero's " Paradoxa " (1581), the young Scotsman was completely successful. In June Crichton was once more in Venice, and while there wrote two Latin odes to his friends Lorenzo Massa and Giovanni Donati, but after this date the details of his life are obscure. Urquhart states that he went to Mantua, became the tutor of the young prince of Mantua, Vincenzo di Gonzaga, and was killed by the latter in a street quarrel in 1 582. Aldus in his edition of Cicero's De universitate (1583), dedicated to Crichton, laments the 3rd of July as the fatal day; and this account is apparently con- firmed by the Mantuan state papers recently unearthed by Mr Douglas Crichton (Proc. Soc. of Antiquaries of Scotland, 1909). Mr Sidney Lee (Diet. Nat. Biog.) argued against this date, on the ground that in 1584 and 1585 Crichton was alive and in Milan, as certain works of his published in that year testified, and

regarded it as probable that he died in Mantua c. 1585/6- But these later works seem to have been by another man of the same name. The epithet " admirable " (admirabilis) for Crichton first occurs in John Johnston's Heroes Scoti (1603) . It is probably impossible to recover the whole truth either as to Crichton's death or as to the extent of his attainments, which were so quickly elevated into legendary magnitude.

Bibliography. — Sir Thomas Urquhart's Discovery of a most excellent jewel (1652; reprinted in the Maitland Club's edition of Urquhart's Works in 1834) is written with the express purpose of glorifying Scotland. The panegyrics of Aldus Manutius require to be received with some caution, since he was given to exaggerating the merits of his friend, and uses almost the same language about a young Pole named Stanilaus Niegosevski; see John Black's Life of Torquato Tasso, ii. 413-451 (1810), for a criticism. The Life of Crichton, by P. Fraser Tytler (2nd ed., 1823), contains many extracts from earlier writers; see also " Notices of Sir Robert Crichton of Cluny and of his son

James," by John Stuart, in Proceedings Soc. of Antiquaries of Scotland, vol. ii. pp. 103-118 (1855); and the article by Andrew Lang, " The death of the Admirable Crichton," in the Morning Post (London), Feb. 25, 1910. W. Harrison-Ainsworth in his novel Crichton (new ed., 1892) reprints and translates some documents relating to Crichton, as well as some of his poems.

CRICKET (Gryllidae), a family of saltatory Orthopterous Insects, closely related to the Locustidae. The wings when folded form long slender filaments, which often reach beyond the extremity of the body, and give the appearance of a bifid tail, while in the male they are provided with a stridulating apparatus by which the well-known chirping sound, to which the insect owes its name, is produced. The abdomen of the female ends in a long slender ovipositor, which, however, is not exserted in the mole cricket. The house cricket (Gryllus domesticus) is of a greyish-yellow colour marked with brown. It frequents houses, especially in rural districts, where its lively, if somewhat monotonous, chirp may be heard nightly in the neighbourhood of the fireplace. It is particularly fond of warmth, and is thus frequently found in bakeries, where its burrows are often sunk to within a few inches of the oven. In the hot summer it goes out of doors, and frequents the walls of gardens, but returns again to its place by the hearth on the first approach of cold, where, should the heat of the fire be withdrawn, it becomes dormant. It is nocturnal, coming forth at the evening twilight in search of food, which consists of bread crumbs and other refuse of the kitchen. The field cricket {Gryllus campestris) is a larger insect than the former, and of a darker colour. It burrows in the ground to a depth of from 6 to 12 in., and in the evening the male may be observed sitting at the mouth of its hole noisily stridulating until a female approaches, " when," says Bates, " the louder notes are succeeded by a more subdued tone, whilst the successful musician caresses with his antennae the mate he has won." The musical apparatus in this species consists of upwards of 130 transverse ridges on the under side of one of the nervures of the wing cover, which are rapidly scraped over a smooth, projecting nervure on the opposite wing. The female deposits her eggs — about 200 in number — on the ground, and when hatched the larvae, which resemble the perfect insect except in the absence of wings, form burrows for themselves in which they pass the winter. The mole cricket (Gryllotalpa vulgaris) owes its name to the striking analogy in its habits and structure to those of the common mole. Its body is thick and cylindrical in shape, and it burrows by means of its front legs, which are short and greatly flattened out and thickened, with the outer edge partly notched so as somewhat to resemble a hand. It

prefers loose and sandy ground in which to dig, its burrow consisting of a vertical shaft from which long horizontal galleries are given off; and in making those excavations it does immense injury to gardens and vineyards by destroying the tender roots of plants, which form its principal food. It also feeds upon other insects, and even upon the weak of its own species in the absence of other food. It is exceedingly fierce and voracious, and is usually caught by inserting a stem of grass into its hole, which being seized, is retained till the insect is brought to the surface. The female deposits her eggs in a neatly constructed subterranean chamber, about the size of a hen's egg, and sufficiently near the surface to allow of the eggs being hatched by the heat of the sun.

CRICKET. The game of cricket may be called the national summer pastime of the English race. The etymology of the word itself is the subject of much dispute. The Century Dictionary connects with O. Fr. criquet, " a stick used as a mark in the game of bowls," and denies the connexion with A.S. crice or cryce, a staff. A claim has also been made for cricket, meaning a stool, from the stool at which the ball was bowled, while in the wardrobe account of King Edward I. for the year 1300 (p. 126) is found an allusion to a game called creag. Skeat, in his Etymological Dictionary, states that the word is probably derived from A.S. crice (repudi- ated by the first authority quoted), the meaning of which is a staff, and suggests that the " et " is a diminutive suffix; the word is of the same origin as " crutch." Finally the New English Dictionary traces the O. Fr. criquet, defined by Littre as " jeu d'addresse," to M. Flem. Krick, Kriike, baston a s'appuyer, quinette, potence.

History. — In a MS. of the middle of the 13th century, in the King's library, 14 Bv, entitled Chronique d'Angleterre, depuis Ethelberdjusqu'a Hen. III., there is found a grotesque delineation of two male figures playing a game with a bat and ball. This is undoubtedly the first known drawing of what was destined to develop into the scientific cricket of modern times. The left- hand figure is that of the batsman, who holds his weapon upright in the right hand with the handle downwards. The right-hand figure shows the catcher, whose duty is at once apparent by the extension of his hands. In another portion of the same MS., however, there is a male figure pointing a bat towards a female figure in the attitude of catching, but the ball is absent. In a Bodleian Library MS., No. 264, dated the 18th of April 1344, and entitled Romance of the Good King Alexander, fielders for the first time appear in addition to the batsman and bowler. All the players are monks (not female figures, as Strutt misinterprets their dress in his Sports and Pastimes), and on the

extreme left of the picture, the bowler, with his cowl up, poises the ball in the right hand with the arm nearly horizontal. The batsman comes next with his cowl down, a little way only to the right, standing sideways to the bowler with a long roughly-hewn and slightly- curved bat, held upright, handle downwards in the left hand. On the extreme right come four figures — with cowls alternately down and up, and all having their hands raised in an attitude to catch the ball. It has been argued that the bat was always held in the left hand at this date, since on the opposite page of the same MS. a solitary monk is figured with his cowl down, and also. holding a somewhat elongated oval-shaped implement in his left hand; but it is unsafe to assume that the accuracy of the artist can be trusted.

The close roll of 39 Edw. III. (1365), Men. 23, disparages certain games on account of their interfering with the practice of archery, where the game of cricket is probably included among the pastimes denounced as " ludos inhonestos, et minus utiles aut valentes." In this instance cricket was clearly considered fit for the lower orders only, though it is evident from the entry in King Edward's wardrobe account, already mentioned, that in 1300 the game of creag was patronized by the nobility. Judging from the drawings, it can only be conjectured that the game consisted of bowling, batting and fielding, though it is known that there was an in-side and an out-side, for sometime during the 15th century the game was called " Hondyn or Hondoute," or " Hand in and Hand out." Under this title it was interdicted by 17 Edw. IV. c. 3 (1477-1478), as one of those illegal games which still continued to be so detrimental to the practice of archery. By this statute, any one allowing the game to be played on his premises was liable to three years' imprisonment and £20 fine, any player to two years' imprisonment and £10 fine, and the implements to be burnt. The inference that hand in and hand out was analogous to cricket is made from a passage in the Hon. Daines Barrington's Observations on the more Ancient Statutes from Magna Charta to 21 James I. cap. 27. Writing in 1766, he comments thus on the above statute, viz. : " This is, perhaps, the most severe law ever made against gaming, and some of these forbidden sports seem to have been manly exercises, particularly the handyn and handoute, which I should suppose

to be a kind of cricket, as the term hands is still retained in that game."

The word “cricket ” occurs about the year 1550. In Russell’s History of Guildford it appears there was a piece of waste land in the parish of Holy Trinity in that city, which was enclosed by one John Parish, an innholder, some five years before Queen Elizabeth came to the throne. In 35 Elizabeth (1593) evidence was taken before a jury and a verdict returned, ordering the garden to be laid waste again and disinclosed. Amongst other witnesses John Derrick, gent., and one of H.M.‘s coroners for Surrey, aetat. fifty-nine, deposed he had known the ground for fifty years or more, and ” when he was a scholler in the free school of Guildford, he and several of his fellowes did runne and play there at crickett and other plaies.” In the original edition of Stow’s Survey of London (1598) the word does not occur, though he says, ” The ball is used by noblemen and gentlemen in tennis courts, and by people of the meaner sort in the open fields and streets.”

Some noteworthy references to the game may be cited. In Giovanni Florio’s dictionary A Worlde of Wordes most Copious and Exact, published in Italy in 1595 and in London three years later, squillare is defined as “to make a noise as a cricket, to play cricket-a-wicket and be merry.” Sir William Dugdale states that in his youth Oliver Cromwell, who was born in 1599, threw ” himself into a dissolute and disorderly course,” became ” famous for football, cricket, cudgelling and wrestling,” and acquired ” the name of royster.” In Randle Cotgrave’s Diction- ary of French and English, dated 1611, Crosse is translated “crosier or bishop’s staffe wherewith boys play at cricket,” and Crosser ” to play at cricket.”

Among the earliest traces of cricket at public schools is an allusion to be found in the Life of Bishop Ken by William Lisle Bowles (1830). Concerning the subject of this biography, who was admitted to Winchester on the 13th of January 1650/1, it is said ” on the fifth or sixth day, our junior … is found for the first time attempting to wield a cricket bat.” In 1688 a “ram and bat ” is charged in an Etonian’s school bill, but it is possible this may only refer to a cudgel used for ram-baiting. In The Life of Thomas Wilson, Minister of Maidstone, published anonymously in 1672, Wilson having been born in 1601 and dying in or about 1653, occurs the following passage (p. 40): ” Maidstone was formerly a very profane town, in as much as I have seen morrice-dancing, cudgel-playing, stool-ball, crickets, and many other sports openly and publicly indulged in on the Lord’s Day.” Cricket is found enumerated as one of the games of Gargantua in The Works of Rabelais, translated in 1653 by Sir Thomas Urchard (Urquhart), vol. i. ch. xxii. p. 97. In a poem entitled The Mysteries of Love and Eloquence or the Arts of Wooing and Complimenting (1658), by Edward Phillips, John Milton’s nephew, the mistress of a country

bumpkin when she goes to a fair with him says ” Would my eyes had been beaten out of my head with a cricket ball.” The St Alban’s Cricket Club was founded in 1661, one of its earliest presidents being James Cecil, 4th earl of Salisbury (1666-1694).

In 1662 John Davies of Kidwelly issued his translation of Adam Olearius’ work entitled The Voyages and Travels of the Ambassadors from the Duke of Holstcin to the Grand Duke of Muscovy, and the King of Persia. Begun in the year 1633 and finished in 1639. On page 297 is a description of the exercises indulged in by the Persian grandees in 1637, and the state- ment is made that ” They play there also at a certain game, which the Persians call Kuitskaukan, which is a kind of Mall, or Cricket.” In the Clerkenwell parish book of 1668 the proprietor of the Rum Inn, Smithfield, is found rated for a cricket field.

The chaplain of H.M.S., “Assistance,” Rev. Henry Teonge, states in his diary that during a visit to Antioch on the 6th of May 1676, several of the ship’s company, accompanied by the consul, rode out of the city early and amongst other pastimes indulged in ” krickett. ” During the first half of the 1 8th century the popularity of the game increased and is frequently mentioned by writers of the time, such as Swift, who alludes sneeringly to

” footmen at cricket,” D’Urfey, Pope, Soame Jenyns, Strype in his edition of Stow’s Survey of London, and Arbuthnot in John Bull, iv. 4, ” when he happened to meet with a football or a match at cricket.”

In 1748 it was decided that cricket was not an illegal game under the statute 9 Anne, cap. 19, the court of king’s bench holding ” that it was a very manly game, not bad in itself, but only in the ill use made of it by betting more than ten pounds on it; but that was bad and against the law.” Frederick Louis, prince of Wales, died in 1751 from internal injuries caused by a blow from a cricket ball whilst playing at Cliefden House. Games at this period were being played for large stakes, ground proprietors and tavern-keepers farming and advertising matches, the results of which were not always above suspicion. The old Artillery Ground at Finsbury was one of the earliest sites of this type of fixture. Here it was that the London Club — formed about 1700 — played its matches. The president was the prince of Wales, and many noblemen were among its supporters. It flourished for more than half a century. One of the very earliest full-scores kept in the modern fashion is that of the match between Kent and All England, played on the Artillery Ground on the 1 8th of June 1744.

Cricket, however, underwent its most material development in the southern counties, more especially in the hop-growing districts. It was at the large hop-fairs, notably that of Weyhill, to which people from all the neighbouring shires congregated, that county matches were principally arranged.

The famous Hambledon Club lasted approximately from 1750 to 1791. Its matches were played on Broad Half-Penny and Windmill Downs, and in its zenith the club frequently contended with success against All England. The chief players were more or less retainers of the noblemen and other wealthy patrons of cricket. The original society was broken up in 1791 owing to Richard Nyren, their ” general,” abandoning the game, of which in consequence ” the head and right arm were gone.” The dispersion of the players over the neighbouring counties caused a diffusion of the best spirit of the game, which gradually ex- tended northward and westward until, at the close of the 18th century, cricket became established as the national game, and the custom became general to play the first game of each year on Good Friday.

The M.C.C. (or Marylebone Cricket Club), which ranks as the leading club devoted to the game in any part of the globe, sprang from the old Artillery Ground Club, which played at Finsbury until about 1780, when the members migrating to White Conduit Fields became the White Conduit Cricket Club. In 1787 they were remodelled under their present title, and moved to Lord’s ground, then on the site of what is now Dorset Square; thence in 181 1 to Lord’s second ground nearer what is now the Regent’s Canal; and in 1814, when the canal w?-s cut, to what is now Lord’s ground in St John’s Wood. Thomas Lord, whose family were obliged to leave their native Scotland on account of their participation in the rebellion of 1745, was born in Thirsk, Yorkshire, in 1757, and is first heard of as an attendant at the White Conduit Club, London, in 1780. Soon afterwards he selected and superintended a cricket ground for the earl of Winchilsea and other gentlemen, which was called after his name. He died in 1832 on a farm at West Meon, Hampshire, of which he took the management two years before. Lord took away the original turf of his cricket-ground at each migration and relaid it. In 1825 the pavilion was burnt down, invaluable early records of the game being destroyed; and in the same year the ground would have been broken up into building plots had not William Ward purchased Lord’s interest. Dark bought him out in 1836, selling the remainder of his lease to the club in 1864. Meanwhile, in i860, the freehold had been purchased at public auction by a Mr Marsden — n£ Moses — for £7000, and he sold it to the club six years later for nearly £18,500, a similar sum being paid in

1887 for additional ground. In 1897 the Great Central railway company conveyed a further portion to the club, making the ground complete as it now is; the total area is about 20 acres, including the site of various villas adjoining

the ground which are part of the property. The number of members now considerably exceeds five thousand.

Laws.— The oldest laws of cricket extant are those drawn up by the London Club in 1744. These were amended at the ” Star and Garter ” in Pall Mall, London, in 1755, and again in 1774, and were also revised by the M.C.C. in 1788. From this time the latter club has been regarded as the supreme authority, even though some local modifications have in recent years been effected in Australia. Alterations and additions have been frequently made, and according to the present procedure they have to be approved by a majority of two-thirds of the members present at the annual general meeting of the whole club; the administration being in the hands of a president, annually nominated by his outgoing predecessor, a treasurer and a committee composed of sixteen members, four annually retiring, in conjunction with a secretary and a large subordinate staff.

Implements. — Concerning the implements of the game, in the 1744 rules it was declared that the weight of the ball must be ” between five and six ounces,” and it was not until 1774 that it was decided that it ” shall weigh not less than five ounces and a half nor more than five ounces and three-quarters,” as it is to the present day. Not until 1838 however came the addition, ” it shall measure not less than nine inches nor more than nine inches and a quarter in circumference.” The materials out of which the old balls were made are not on record. At present a cube of cork forms the foundation, round which layers of fine twine and thin shavings of cork are accumulated till the proper size and shape are attained, when a covering of red leather is sewn on with six parallel seams. Various ” compositions ” have been tried as a substitute for cork and leather, but without taking their place.

For the bat, English willow has been proverbially found the best wood. The oldest extant bats resemble a broad and curved hockey stick, and it has been claimed to be an evolution of the club employed in the Irish game of ” hurley.” The straight blade was adopted as soon as the bowler began to pitch the ball up, an alteration which took

place about 1750, but pictures show slightly curved bats almost to the time of the battle of Waterloo. The oldest were all made in one piece and were so used until the middle of the 19th century, when handles of ash were spliced into the blade, and the whole cane-handle was introduced about i860. No limit was set to the length of the bat until 1840, though the width was restricted to 4! in. ” in the widest part ” by the laws of 1788, and a gauge was made for the use of the Hambledon Club. The length of the bat is now restricted to 38 in., 36 being more generally used, as a rule the handle being 14 in. long and the blade 22 in. As to weight, though there is no restriction, 2 lb 3 oz. is considered light, 2 lb 6 oz. fairly heavy; but W. Ward (1787-1849) used a bat weighing 4 lb.

At present the wicket consists of three stumps (round straight pieces of wood) of equal thickness, standing 27 in. upright out of the ground. On the top are two ” bails,” short pieces of wood which fit into grooves made in the top of the stumps so as not to project more than half an inch above them. But the evolution of the wicket has been very gradual, and the history of it is very obscure, since different types of wickets seem to have existed simultaneously. If early pictures are to be trusted, no wicket was required in primitive times: the striker was either caught out, or run out, the fieldsman having to put the ball into a hole scooped in the ground, before the batsman could put his bat into it. A single stump, it is supposed, was sometimes substituted for the hole to save collision between the bat and the fieldsman’s fingers. In due course, but at an unknown date, a wicket — a ” skeleton gate ” — was raised over the hole; it consisted of two stumps each 12 in. high, set 24 in. apart, with a third laid on the top of them. John Nyren, however, writing in 1833, and discussing some memoranda given him by Mr W. Ward, says apropos of these dimensions, ” There must be a mistake in this account of the width of the wicket.” Undoubtedly such wickets were all against the bowler, who must have bowled over or through the wicket twenty times for every

occasion when he succeeded in hitting either the uprights or the cross stump. In pictures of cricket played about 1743 we find only two stumps and a cross stump, or bail, the wicket varying apparently both in height and width. In a picture, the property of H.M. the King, entitled ” A Village Match in 1768,” three stumps and a bail are distinctly shown. Two stumps are shown as used in 1779, afterwards three always with one exception. Two prints, advertisements, representing matches played between women on consecutive days in 181 1, show, one of them a wicket of three stumps, the other a wicket of two. The addition of the third stump, as is universally agreed, was due to an incident which occurred in a match of the Hambledon Club

in 1775. “It was observed at a critical point in the game, that the ball passed three times between Mr Small’s two stumps without knocking off the bail; and then, first a third stump was added, and seeing that the new style of balls which rise over the bat also rise over the wicket, then but 1 ft. high, the wicket was altered to the dimensions of 22 in. by 8, and to its present dimensions of 27m. by 8in 1817.” So writes the Rev. J. Pycroft (1813-1895), quoting fairly closely from Nyren, who wrote many years after the event; but Pycroft is wrong in writing 22 by 8, which should really be 22 by 6. It is hard to believe that the 12 by 24 wicket lasted as long as 1775, for in the laws issued after the meeting held at the ” Star and Garter,” Pall Mall, where many ” noblemen and gentlemen ” attended ” finally to settle ” the laws of the game, we read that the stumps are to be 2 2 in. and the bail 6. ” N.B . — It is lately settled to use three stumps instead of two to each wicket, the bail the same length as before.” Regarding all the circumstances one is tempted to believe that Small defended a wicket of two stumps, 22 in. high and 6 in. apart, strange as is the circumstance that the ball should thrice in a short innings — for Small only made 14 runs — pass through them without dislodging the bail, even though the diameter of the ball is a trifle less than 3 in. Allusion is also found to a wicket 12 in. by 6, but it is hard to believe in its existence, unless it was used as a form of handicap. It should be recorded that in advertisements of matches about this time (1787) the fact that three stumps will be used ” to shorten the game ” is especially mentioned, and that the Hamp- shire Chronicle of the 15th of July 1797 records that ” The earl of Winchilsea has made an improvement in the game of cricket, by having four stumps instead of three, and the wickets 2 in. higher. The game is thus rendered shorter by easier bowling out.” In 1788, however, when the M.C.C. revised the laws, reference is made to stumps (no number given, but probably three) 22 in. high and a bail of 6 in. Big scoring in 1796 caused the addition next year of 2 in. to the height and of 1 to the breadth, making the wicket 24 in. by 7. That three stumps were employed is shown by a print of the medallion of the Oxfordshire County C.C. 1797, forming the frontispiece to Taylor’s Annals of Lord’s (1903). In 1817 the dimensions now in use were finally settled, three stumps 27 in. high, and a wicket 8 in. wide. Larger wickets have occasionally been used by way of handicap or experiment. The distance between the wickets seems always, or at least as far back as 1 700, to have been 22 yds. — one chain.

The Game. — Cricket is defined in the New English Dictionary as ” an open-air game played with bats, ball and wickets by two sides of eleven players each; the batsman defends his wicket against the ball

which is bowled by a player of the opposing side, the other players of this side being stationed about the field in order to catch or stop the ball." The laws define that the score shall be reckoned by runs. The side which scores the greatest number of runs wins the match. Each side has two innings taken alternately, except that the side which leads by 150 runs in a three days' match or by 100 runs in a two days' match or by 75 runs in a one day match shall have the option of requiring the other side to " follow their innings." In England cricket is invariably played on turf wickets, but in the Colonies matting wickets are often employed, and sometimes matches have taken place on sand, earth and other substances. The oldest form of the game is probably single wicket, which consists of one

batsman defending one wicket, but this has become obsolete, though it was very popular in the time when matches were played for money with only one or two, or perhaps four or five, players on a side. Matches between an unequal number of players are still sometimes arranged, but mainly in the case of local sides against touring teams, or " colts " playing against eleven experienced cricketers. In any case two umpires are always appointed, and for English first-class county cricket these are now annually chosen beforehand by the county captains. Two scorers are officially recognized. All the arrangements as to scoreboards, and accommodation for players, members of the club and general spectators, vary considerably according to local requirements. Between six and seven acres forms the most suitable area for a match, but the size of a cricket ground has never been denned by law.

The wickets are pitched opposite and parallel to one another at a distance of 22 yds.; the "bowling crease" being marked with whitewash on the turf on a line with the stumps 8 ft. 8 in. in length, with short " return creases " at right angles to it at each end; but the "popping crease," marked parallel to the wicket and 4 ft. in front of it, is deemed of unlimited length. The captains of the opposing sides toss for choice of innings, and the winner of the toss, though occasionally, owing to the condition of the ground or the weather prospects, electing to put his adversaries in first, as a general rule elects for his own side to bat first. The captain of the batting side sends his eleven (or whatever the number of his team may be) in to bat in any order he thinks best, and much judgment is used in deciding what this order shall be. Two batsmen with strong defensive powers and good nerve

are usually selected to open the innings, the most brilliant run-getters immediately following them, and the weakest batsmen going in last. As there must always, except in the obsolete single-wicket cricket, be two batsmen in together, it follows that when ten of the side (in a side of eleven) have been put out, one of the final pair must be ” not out “; that is to say, his innings is terminated without his getting out because there is none of his side left to become his partner. The batsman who is thus ” not out ” is said to ” carry his bat,” a phrase that recalls a period when two bats sufficed for the whole side, each retiring batsman leaving the implement on the ground for the use of his successor, till at the close of the innings the ” not out ” man carried it back to the tent or pavilion. As the phrase is not also applied to the last batsman to get out, who would of course have carried the second bat off the ground, it was possibly at one time restricted to a player who going in first survived through the whole innings. It should be observed that the term ” wicket ” is used by cricketers in a number of different senses. Besides being the name given to the set of three stumps with their two bails when pitched for a match, it is in an extended sense applied to that portion of the ground, also called the ” pitch,” on which the stumps are pitched, as when it is described as being ” a fast wicket,” a ” sticky wicket ” and so forth. It also in several idiomatic expressions signifies the getting out of a batsman and even the batsman himself, as in the phrases: ” Grace lost his wicket without scoring,” ” Grace went in first wicket down,” ” when Grace got out England lost their best wicket,” ” England beat Australia by two wickets.”

The umpires are required to decide questions arising in the course of play and to call the ” overs,” the ” over ” being a series of successive deliveries of the ball (usually six) by the bowler from one end of the pitch, the rest of the ” out ” side, or fielders, being stationed in various positions in the field according to well-defined principles. When an ” over ” has been bowled from one end a different bowler then bowls an ” over ” from the opposite end, the alternation being continued without interrup- tion throughout the innings, and the bowlers being selected and changed from time to time by the captain of their side at his discretion. At the end of every over the fielders ” change over ” or otherwise rearrange their places to meet the batting from the other end. An over from which no runs are made off the bat is called a ” maiden.” A ” run ” is made when the two

batsmen change places, each running from his own to the opposite wicket without being ” run out.” The aim of the batting side is to make as many runs as possible, while the object of the fielding side is to get their opponents out, and to prevent their making runs while in.

There are nine ways in which the batsman, or ” striker,” can be put out. Of these the following five are the most important. (1) The striker is ” bowled ” out if the bowler hits the wicket with the ball, when bowling, and dislodges the bail; (2) he is ” caught ” out if the ball after touching his bat or hand be held by any member of the fielding side before it touches the ground; (3) he is ” stumped ” out if the wicket-keeper dislodges the bail with the ball, or with his hand holding the ball, at a moment when the striker in playing at the ball has no part of his person or bat in contact with the ground behind the popping crease, i.e. when the batsman is ” out of his ground “; (4) he is out ” l.b.w.” (leg before wicket) if he stops with any part of his person other than his hand, or arm below the elbow, a ball which in the umpire’s judgment pitched straight between the wickets, and would have bowled the striker’s wicket; (5) if when the batsmen are attempting to make a run a wicket is put down (i.e. the bail dislodged) by the ball, or by the hand of any fieldsman holding the ball, at a moment when neither batsman has any part of his person or bat on the ground behind the popping crease, the nearer of the two batsmen to the wicket so put down is ” run out.” The remaining four ways in which a batsman may be dismissed are (6) hit wicket, (7) handling the ball, (8) hitting the ball more than once ” with intent to score,” and (9) obstructing the field.

The positions of the fieldsmen are those which experience proves to be best adapted for the purpose of saving runs and getting the batsmen caught out. During the middle of the 19th century these positions became almost stereotyped according to the pace of the bowler’s delivery and whether the batsmen were right or left handed. A certain number of fielders stood on the ” on ” side, i.e. the side of the wicket on which the batsman stands, and a certain number on the opposite or ” off ” side, towards which the batsman faces. ” Point ” almost invariably was placed square with the striker’s wicket some ten or a dozen yards distant on the “off” side; “cover point” to the right of ‘ point ” (as he is looking towards the batsman) and several yards deeper; ” mid on ” a few yards to the right of the bowler, and ” mid off ” in a corresponding position on his left, and so forth. Good captains at all times exercised judgment in modify- ing to some extent the arrangement of the field according to circumstances, but in this respect much was learnt from the Australians, who on their first visit to England in 1878 varied the positions of the field according to the idiosyncrasies of the batsmen and other exigencies to a degree not previously practised in England. The perfection of wicket-keeping displayed by the Australian, McCarthy Blackham (b. 1855), taught English cricketers that on modern grounds the ” long stop ” could be

altogether dispensed with; and this position, which in former days was considered a necessary and important one, has since been practically abolished. In many matches at the present day, owing to the character of modern bowling, no more than a single fieldsman is placed on the ” on ” side, while the number and positions of those ” in the slips,” i.e. behind the wicket on the ” off ” side, are subject to no sort of rule, but vary according to the nature of the bowling, the state of the ground, or any other circumstances that may influence the judgment of the captain of the fielding side. Charts such as were once common, showing the positions of the fielders for fast, slow and medium bowling respectively, would therefore to-day give no true idea of the actual practice; and much of the skill of modern captaincy is shown in placing the field.

The score is compiled by runs made by the batsman and by the addition of ” extras,” the latter consisting of ” byes,” ” leg- byes,” ” wides ” and ” no-balls.” All these are included in the designation ” runs,” of which the total score is composed, though neither ” wides ” nor ” no-balls ” involve any actual run on the part ‘of the batsmen. They are called by the umpire on his own

initiative, in the one case if the bowler’s delivery passes the batsman beyond the reach of his bat (” wide “), and in the other if he delivers the ball without having either foot touching the ground behind the ” bowling crease ” and within the ” return crease,” or if the ball be jerked or thrown instead of being bona fide ” bowled.” ” Wides ” and ” no-balls ” count as one ” run ” each, and all ” extras ” are added to the score of the side without being credited to any individual batsman. The batsman may, however, hit a ” no-ball ” and make runs off it, the runs so made being scored to the striker’s credit instead of the “no-ball” being entered among the ” extras.” The batsman may be ” run out ” in attempting a run off a ” no-ball,” but cannot be put out off it in any other way. ” Byes ” are runs made off a ball which touches neither the bat nor the person of the batsman, ” leg-byes ” off a ball which, without touching the bat or hand, touches any other part of his person. With the exception of these ” extras ” the score consists entirely of runs made off the bat.

Batting is the most scientific feature of the game. Proficiency in it, as

in golf and tennis, depends in the first instance to a great extent on the player assuming a correct attitude for making his stroke, the position of leg, shoulder and elbow being a matter of importance; and although a quick and accurate eye may occasionally be sufficient by itself to make a tolerably successful run-getter, good style can never be acquired, and a consistently high level of achievement can seldom be gained, by a batsman who has neglected these rudiments. Good batting consists in a defence that is proof against all the bowler's craft, combined with the skill to seize every opportunity for making runs that the latter may inadvertently offer. If the batsman's whole task consisted in keeping the ball out of his wicket, the accomplishment of his art would be comparatively simple; it is the necessity for doing this while at the same time he must prevent the ball from rising off his bat into the air in the direction of any one of eleven skilfully-placed fielders, each eager to catch him out, that offers scope for the science of a Grace, a MacLaren or a Trumper. In early days when the wickets were low and the ball was trundled along the ground, the curved bats of the old pictures were probably well adapted for hitting, defence being neglected; but when the height of the wickets was raised, and bowlers began to pitch the ball closer to the batsman so that it would reach the wicket on the first bound, defence of the wicket became more necessary and more difficult. Hence the modern straight-bladed bat was produced, and a more scientific method of batting became possible. Batting and bowling have in fact developed together, a new form of attack requiring a new form of defence. One of the first principles a young batsman has to learn is to play with a " a straight bat " when.defending his wicket against straight balls. This means that the whole blade of the bat should be equally opposite to the line on which the ball is travelling towards him, in order that the ball, to whatever height it may bound from the ground, may meet the bat unless it rises altogether over the batsman's hands; the tendency of the untutored cricketer being on the contrary to hold the bat sloping outwards from the handle to the point, as the golf-player holds his " driver," so that the rise of the ball is apt to carry it clear of the blade. Standing then in a correct position and playing with a straight bat, the batsman's chief concern is to calculate accurately the " length " of the ball as soon as he sees it leave the bowler's hand. The " length " of the ball means the distance from the batsman at which it pitches, and " good length " is the first essential of the bowler's art. The distance that consitutes " good length " is not, however, to be defined by precise measure- ment; it depends on the condition of the ground, and on the reach of the batsman. A " good-length ball " is one that pitches too far from the batsman for him to reach out to meet it with the bat at the moment it touches the ground or immediately it begins to rise, in the

manner known as ” playing forward “; and at the same time not far enough from him to enable him to wait till after it has reached the highest point in its bound before playing it with the bat, i.e. ” playing back.” When, owing to the good length of the ball, the batsman is unable to play it in either of these two ways, but is compelled to play at it in the middle of its

rise from the ground, he is almost certain, if he does not miss it altogether, to send it up in the air with the danger of being caught out. If through miscalculation the batsman plays forward to a short-pitched ball, he will probably give a catch to the bowler or ” mid off,” if he plays back to a well-pitched-up ball, he will probably miss it and be bowled out. The bowler is therefore continually trying to pitch balls just too short for safe forward play, while the batsman defends his wicket by playing forward or back as his judgment directs so long as the bowling is straight and of approximately good length, and is ready the instant he receives a bad-length ball, or one safely wide of the wicket, to hit it along the ground clear of the fieldsmen so as to make as many runs as he and his partner can accomplish before the ball is returned to the wicket-keeper or the bowler. But even those balls off which runs are scored are not to be hit recklessly or without scientific method. A different stroke is brought into requisition according to the length of the ball and its distance wide of the wicket to the ” off ” or ” on ” as the case may be; and the greatest batsmen are those who with an almost impregnable defence combine the greatest variety of strokes, which as occasion demands they can make with confidence and certainty. There are, however, comparatively few cricketers who do not excel in some particular strokes more than in others. One will make most of his runs by ” cuts ” past ” point,” or by wrist strokes behind the wicket, while others, like the famous Middlesex Etonian C. I. Thornton, and the Australian C. J. Bonnor, depend mainly on powerful ” drives ” into the deep field behind the bowler’s wicket. Some again, though proficient in all-round play, develop exceptional skill in some one stroke which other first-class players seldom attempt. A good illustration is the ” glance stroke ” off the legs which K. S. Ranjitsinhji made with such ease and grace. All great cricketers in fact, while observing certain general principles, display some individuality of style, and a bowler who is familiar with a batsman’s play is often aware of some idiosyn- crasy of which he can take advantage in his attack.

Bowling is, indeed, scarcely less scientific than batting. It is not, however, so systematically taught to young amateurs, and it may be partly in consequence of this neglect that Bowling. amateur bowling is exceedingly weak in England as compared with that of professionals.

The evolution of the art of bowling, for it has been an evolution, is an interesting chapter in the history of cricket which can only be briefly outlined here. The fundamental law as to the proper mode of the bowler's delivering the ball is that the ball must be bowled, not thrown or jerked. When bowling underhand along the ground was superseded by " length bowling," it was found that the ball might be caused, by jerking, to travel at a pace which on the rough grounds was considered dangerous; hence the law against jerking, which was administered practically by chalking the inside of the bowler's elbow; if a chalk mark was found on his side, the ball was not allowed as fair. The necessity of keeping the elbow away from the side led gradually to the extension of the arm horizontally and to round-arm bowling, the invention of which is usually attributed to John Wills (or Willes; b. 1777) of Kent and Sussex. Nyren, however, says " Tom Walker (about 1790) began the system of throwing instead of bowling now so much the fashion"; and, "The first I recollect seeing revive this fashion was Wills, a Sussex man," the date of the revival being 1807. Walker was no-balled. Beldham (1766- 1862) says, " The law against jerking was owing to the frightful pace Tom Walker put on, and I believe that he afterwards tried something more like the modern throwing-bowling. Willes was not the inventor of that kind, or round-arm bowling. He only revived what was forgotten or new to the young folk." Curiously enough, Beldham also writes of the same Tom Walker that he was " the first lobbing slow bowler " he ever saw, and that he " did feel so ashamed of such baby bowling, but after all he did more than even David Harris himself." Round- arm bowling was long and vigorously opposed, especially in 1826 when three matches were arranged between England and Sussex, the Sussex bowlers being round-arm bowlers. When England had lost the first two matches, nine of the professionals refused

to take part in the third, " unless the Sussex bowlers bowl fair, that is, abstain from throwing." Five of them did play and Sussex lost, but the new style of bowling had indicated its existence. In 1844 the M.C.C.'s revised law reads, " The ball must be bowled, not thrown or jerked, and the hand must not be above the shoulder in delivery." Round- arm bowling was thenceforth legal. In 1862 Willsher (1828-1885), the Kent bowler, was no-balled by the umpire (Lillywhite) for raising his hand too high, amid a scene of excitement that almost equalled a tumult. Overhand bowling was legalized on the 10th cjf June 1864 after strenuous opposition. In early days much importance was

attached to great pace, but the success of the slow lobbing bowling (pitched up underhand) led to its cultivation; in both styles some of the best performers delivered the ball with a curious high action, thrusting the ball, as it were, from close under the arm-pit. When the advantages of bias (or twist, or break) were first known is not closely recorded, but we read of one Lamborn who (about 1800) could make the ball break from leg so that ” the Kent and Surrey men could not tell what to make of that cursed twist of his.” Whatever the pace of bowling, accuracy is the essential point, or, more correctly, the power of accurately varying pace, pitch and direction, so that the batsman is never at peace. If the bowler is a mere machine, the batsman soon becomes his master; but the question as to which of the two is supreme depends very largely on the condition of the turf, whether it be hard and true, soft and wet, hard and rough or soft and drying: the first pair of conditions favour the bats- men, the second pair the bowler.

The immense amount of’ labour and expense devoted to the preparation and care of cricket grounds has produced during the past quarter of a century a perfection of smoothness in the turf which has materially altered the character of the game. On the rough and fiery pitches of earlier days, on which a ” long stop ” was indispensable, the behaviour of the ball could not be reckoned upon by the batsman with any degree of confidence. The first ball of an ” over ” might be a ” shooter,” never rising as much as an inch off the ground, the next might bound over his head, and the third pursue some equally eccentric course. But on the best grounds of to-day, subject to the well-understood changes due to weather, the bound of the ball is so regular as to be calculable with reasonable certainty by the batsman. The result has been that in fine weather, when wickets are true and fast, bowlers have become increasingly powerless to defeat the batsmen. In other words the defence has been strengthened out of proportion to the attack. Bowlers have consequently to a great extent abandoned all attempt to bowl the wicket down, aiming instead at effecting their purpose by bowling close to but clear of the wicket, with the design of getting the batsman to give catches. Many batsmen of the stubbornly defensive type, known in cricket slang as ” stonewallers,” retaliated by leaving such balls alone together, or stopping them deliberately with the legs instead of the bat.

These tactics caused the game to become very slow; over after over was bowled without an attempt being made to score a run and without apparent prospect of getting a wicket. This not only injured the popularity of the game from the spectator’s point of view, but, in conjunction with the enormous scores that became common in dry

seasons, made it so difficult to finish a match within the three days to which first-class matches in England are invariably limited, that nearly 70% of the total number of fixtures in some seasons were drawn. Cricketers of an older generation have complained that the cause of this is partly to be found in the amount of time wasted by contemporary cricketers. These critics see no reason why half of a summer's day should be allowed to elapse before cricket begins, and they comment with some scorn on the interval for tea, and the fastidiousness with which play is frequently interrupted on account of imperfect light or for other unimperative reasons. Various suggestions have been made, including proposals for enlarging the wicket, for enabling the attack to hold its own against the increasing strength of the defence. But the M.C.C., the only recognized source of cricket legislation, has displayed

a cautious but wise conservatism, due to the fact that its authority rests on no sanction more formal than that of prestige tacitly admitted by the cricketing world; and consequently no drastic changes have been made in the laws of the game, the only im- portant amendments of recent years being that which now permits a side to close its innings voluntarily under certain conditions, and that which, in substitution for the former hard and fast rule for the " follow on," has given an option in the matter to the side possessing the requisite lead on the first innings.

Early Players. — If the era of the present form of cricket can very properly be dated from the visit of the first Australian team to England in 1878, some enumeration must be made of a few of the cricketers who took part in first-class matches in the earlier portion of the 19th century. Among amateurs should be noted the two fast bowlers, Sir F. H. Bathurst (1807-1881; E"ton, Hampshire), and Harvey Fellowes (b. 1826; Eton); the batsman N. Felix (1804-1876; Surrey and Kent), who was a master of " cutting " and one of the earliest to adopt batting gloves; the cricketing champion of his time Alfred Mynn (1807- 1861; Kent); and the keen player F. P. Miller (1828-1875; Surrey). The three Marshams, Rev. C. D. Marsham (b. 1835), R. H. B. Marsham (b. 1833) and G. Marsham (b. 1849), all of Eton and Oxford, were as famous as the Studds in the 'eighties; and R. Hankey (1832-1886; Harrow and Oxford) was a great scorer. In the next generation one of the greatest bats of his own or any time was R. A. H. Mitchell (1 843-1 905 ; Eton, Oxford, Hants). A very attractive run-getter was C. F. Buller (b. 1846; Harrow, Middlesex); an all too brief career was that of C. J. Ottaway (1850-1878; Eton, Oxford, Kent and Middle- sex); whilst A. Lubbock (b. 1845; Eton, Kent) was a sound bat, and D. Buchanan (1830-1900; Rugby and Cambridge) a destruc- tive bowler, as was also A. Appleby

(1843-1902; Lancashire).

Of the professionals, Fuller Pilch (1803-1870) and E. G. Wenman (1803-1897) were great bats; T Box (1808-1876) the most skilled wicket-keeper of his time; W. Lillywhite (1792- 1854), one of the first round-arm bowlers, renowned for the accuracy of his pitch, and W. Clark (1798-1856) possessed wonderful variety of pace and pitch. It was the last-named who organized the All England Eleven, and he was not chosen to represent the players until he had reached the age of forty-seven. George Parr (1826-1891), the greatest leg-hitter in England, had no professional rival until the advent of Richard Daft (1835- 1900). J. Dean (1816-1891) was the finest long-stop, Julius Caesar (1830-1878) a hard clean hitter, as was G.Anderson (1826-1902), and T..Lockyer (1826-1869) seems to have been the first prominent wicket-keeper who took balls wide on the leg-side. Of bowlers, E. Willsher (1828-1885) would seem to have been the most difficult, W. Martingell (1818-1897) bfting a very good medium-paced bowler, and J. Wisden (1826-1884) a very fast bowler but short in his length. Four famous bowlers of a later date are George Freeman (1844-1895), J. Jackson (1833-1903), G. Tarrant (1838-1870) and G. Wootton (b. 1834). With them must be mentioned the great batsmen, T. Hayward (1835-1876) and R. Carpenter (1830-1901), as well as two other keen cricketers, H. H. Stephenson (1833-1896) andT. Hearne (1826-1900).

Since the first half of the 19th century the sort of cricket to engage public attention has very greatly changed, and the change has become emphasized since the exchange of visits between Australian and English teams has become an established feature of first-class cricket. First-class cricket has become more formal, more serious and more spectacular. The contest for the co *mty championship has introduced an annual competition, closely followed by the public, between standing rivals familiar with each other's play and record; an increased importance has become attached to " averages " and " records," and it is felt by some that the purely sporting side of the game has been damaged by the change. Professionalism has increased, and it is an open secret that not a few players who appear before the public as amateurs derive an income under some pretext or other from the game. Cricket on the village green has in many parts of the country almost ceased to exist, while immense crowds congregate

to watch county matches in the great towns; but this must no doubt be in part attributed to the movement of population from the country districts; and some compensation is to be found in league cricket (see below), and, in the numerous clubs for the employees of business firms and large shops, and for the members of social institutes of all kinds, which play matches in the suburbs of London and other cities. At an earlier period two great pro- fessional organizations, ” The All England,” formed in 1846, and ” The United All England,” toured the country, mainly for profit, playing local sides in which ” given men,” generally good pro- fessional players, figured. They did much good work in popu- larizing the game, and an annual match between the two at Lord’s on Whit- Monday was once a great feature of the season; but the increase of county cricket led eventually to their disbandment.

At this period, and much later, the first-class matches of “M.C.C. and ground” (i.e. ground-staff, or professionals attached to the club) occupied a far greater amount of importance than is at present the case. In recent years over 150 minor matches of the utmost value in propagating the best interests of cricket are annually played by the leading club. League cricket has of late become exceedingly popular, especially in the North of England, a number of clubs — about twelve to sixteen — combining to form a ” League ” and playing home-and-home matches, each one with each of the others in turn ; points are scored according as each club wins, loses, or draws matches, the championship of the ” League ” being thus decided.

English County Cricket— The first English inter-county match which is recorded was played on Richmond Green in 1730 between Surrey and Middlesex; but for very many years, though counties played counties, there was no systematic organiza- tion, matches often being played at odds or with “given” players, who had no county connexion with the side they repre- sented. This was the natural outcome of the custom of playing for stakes. It was not till 1872 that any real effort was made to organize county cricket. In that year the M.C.C. took the initiative by offering a cup for competition between the counties, six of which were to be selected by the M.C.C, the matches to be played at Lord’s, but the scheme fell through owing to the coolness of the counties’ themselves. It was only in 1890 that the counties were formally and officially classified, Notts (the county club dating from 1859), Lancashire (1864), Surrey (1845), Kent (1842), Middlesex (1864), Gloucestershire (1869), Yorkshire (1S62), and Sussex (1839), being regarded as “first-class,” as indeed had been the case from the time of their existence; and by degrees other counties were promoted to this class; Somerset in 1893; Derbyshire, Essex, Leicestershire, Warwickshire in 1894; Hampshire in 1895; Worcestershire in 1899;

North- amptonshire in 1905.

In 1887 the County Cricket Council had been formed, working with and not against the Marylebone Club, for the management of county cricket, but the council dissolved itself in 1890, and it was then arranged that the county secretaries and delegates should meet and discuss such matters, and request the M.C.C. to consider the result of their deliberations, and practically to act as patron and arbitrator. In 1905 an Advisory Cricket Com- mittee was formed ” with the co-operation of the counties, with a view to improve the procedure in dealing with important matters arising out of the development of cricket, the effect of which will be” (the quotation is from the annual report of M.C.C. in 1905) ” to bring the counties into closer touch with the M.C.C.” Various methods have been tried as to the assignment of points or marks, the following being the list of champion counties up to 1909:

1864

Surrey

1865

Notts

1866

Middlesex

1867

Yorkshire

1868

Yorkshire

1869

Notts

1870

Yorkshire

1871

Notts

1872

Surrey

Gloucestershire

[equal

1873

Surrey

1874

Gloucestershire

1875

Notts

1876

Gloucestershire

1877

Gloucestershire

1878

Notts

1879

Lancashire J equal

1880

Notts

1881

Lancashire

1882

Lancashire J equal

1883

Yorkshire

1884

Notts

1885

Notts

1886

Notts

1887

Surrey

1888

NottTiˆ 1

1889

L a r n r C e a y Shire i ˆual

1890

Surrey

1891

Surrey

1892

Surrey

1893

Yorkshire

1894

Surrey

1895

Surrey

1896

Yorkshire

1897

Lancashire

1898

Yorkshire

1899

Surrey

1900

Yorkshire

1901

Yorkshire

1902

Yorkshire

1903

Middlesex

1904

Lancashire

I9°5

Yorkshire

1906

Kent

1907

Notts

1908

Yorkshire

1909

Kent

English county cricket is now the most firmly established cricketing institution in the world, but in its earlier stages it owed much in different counties to enthusiastic individuals and famous The Q races cricketing families whose energies were devoted to its attd q[ou . encouragement and support. To Gloucestershire belongs ceS f er . the honour of the greatest name in the history of the game. s ft/ re . Dr W. G. Grace (q.v.) was not only the most brilliant all- round cricketer in the world, but he remained supreme after reaching an age when most cricketers have long abandoned the game. He and his two famous brothers, E. M. Grace (b. 1841) and G. F. Grace (1850-1880), rendered invaluable service to their county for many years; and not to their county alone, for the great part they played for a generation in first-class cricket did much to increase the growing popularity of the county fixtures. A separate article is devoted to Dr W. G. Grace, whose name as the champion of the game will always be associated with its history. And of Dr E. M. Grace it may be mentioned that, besides being the most daring field at ” point ” ever seen, he altogether took 11,092 wickets and scored 75,625 runs. In more recent years some excellent cricketers have been associated with Gloucestershire, such as F. Townsend, and the professional Board ; but foremost stands G. L. Jessop, a somewhat ” unorthodox ” batsman famous for his powers of hitting.

What W. G. Grace did for Gloucestershire, Lord Harris (b. 1851) did for Kent, and his services are not to be estimated by his perform-ances in the field alone, great as they were. His influence Kent. was always exerted to impart a spirit of sportsmanship and honourable distinction to the national game. Kent had been a home of cricket since the first half of the 18th century, but it was Lord Harris more than any other individual who made it a first-class county, celebrated for the number of distinguished amateurs who have taken part in its matches. /The Hon. Ivo Bligh, afterwards Lord Darnley (b. 1859), and

F. Marchant (b. 1864), both Etonians like Lord Harris himself; the two Harrovians, W. H. Patterson (b. 1859) and M. C. Kemp (b. 1862), and the Wykehamist J. R. Mason (b. 1874) are names that show the place taken by public school men in the annals of Kent cricket, while the family of Hearnes supplied the county with some famous professionals. Amateur batsmen like W. Rashleigh, C. J. Burnup, E. W. Dillon and A. P. Day have been prominent in the Kent eleven; and in Fielder and Blythe they have had two first-class professional bowlers. The " Kent nursery " at Tonbridge has proved a valuable institution for training young professional players, and contributed not a little to the rising reputation of Kent, which justified itself when the county won the championship in 1906, largely owing to the admirable batting of the amateur K. L. Hutchings.

Middlesex and Lancashire, not less than Kent, have been indebted to the great public schools, and especially to Harrow, which provided both counties with famous captains who directed their Middlesex fortunes for an uninterrupted period of over twenty years. ˆ Lan- I. D. Walker, the most celebrated of seven cricketing cas j J [re , brothers, all Harrovians, who founded the Middlesex County Club, handed on the captaincy, after a personal record of astonishing brilliancy, to a younger Harrow and Oxford cricketer, A. J. Webbe, who was one of the finest leg-hitters and one of the safest out-fielders of his day, and a captain of consummate judgment and knowledge of the game. A. N. Hornby, a contemporary at Harrow of I. D. Walker, was for many years the soul of Lancashire cricket, and was succeeded in the captaincy of the county by the still more famous Harrovian, A. C. MacLaren, one of the greatest batsmen in the history of cricket, whose record for England in test matches against Australia was almost unrivalled. In 1895, when he headed the batting averages, MacLaren made the highest individual score in a first-class match, viz. 424 against Somersetshire. Middlesex has also the distinction of having produced the two greatest amateur wicket-keepers in the history of English cricket, namely, the Hon. Alfred Lyttelton (b. 1857) and Gregor MacGregor, both of whom, after playing for Cambridge University, gave their services to the Metropolitan county; while Lancashire can boast of the greatest professional wicket-keeper in Richard Pilling (1855-1891), whose reputation has not been eclipsed by that of the most proficient of more recent years. Another famous Cambridge University cricketer, a contemporary of Lyttelton, who was invaluable to Lancashire for

some years when he was one of the very finest all-round cricketers in the country, was A. G. Steel (b. 1858), equally brilliant as a bats- man and as a slow bowler; and other names memorable in Lanca- shire cricket were R. G. Barlow (b. 1859), whose stubborn batting was a striking contrast to the rapid run-getting of Hornby and the perfect style of Steel; John Briggs (1862-1902), whose slow left- hand bowling placed him at the head of the bowling averages in 1890; John Grassland (1853-1903) and A. Mold (b. 1865), both of whom were destructive fast bowlers; J. T. Tyldesley and R. H. Spooner, both among the most brilliant batsmen of a later genera- tion ; and W. Brearley, the amateur fast bowler.

Middlesex, like Kent, has been better served by amateurs than professionals. Indeed, with the notable exceptions of J. T. Hearne, who headed the bowling averages in 1891, 1896 and 1898, and of the imported Australian A. E. Trott, few professionals of high merit are conspicuously associated with the history of the county cricket. Trott, in 1899 and again in 1900, performed the previously unprece- dented feat of taking over two hundred wickets and scoring over one thousand runs in the same season. And in his ” benefit match ” in May 1907 at Lord’s he achieved the ” hat trick ” twice in one innings, taking first four and then three wickets with successive balls. But if there has been a dearth of professionals in Middlesex cricket, the county has produced an abundance of celebrated amateurs. In addition to the Walkers and A. J. Webbe, the metro- politan county was the home of the celebrated hitter, C. I. Thornton, and of the Studd family, who learnt their cricket at Eton and Cambridge University. C. T. Studd, one of the most polished batsmen who ever played cricket, was at the same time an excellent medium-paced bowler, and his brother G. B. Studd is remembered especially for his fielding, though like his elder brother, J. E. K. Studd, he was an all-round cricketer of the greatest value to a county team. Sir T. C. O’Brien, who made his reputation by a fine innings for Oxford University against the Australian team of 1882, sustained it in the following years by many brilliant performances for Middlesex. A. E. Stoddart for several years was the best run- getter in the Middlesex eleven; and W. J. Ford and his younger brother, F. G. J. Ford, were conspicuous among many prominent Middlesex batsmen. In more recent times the Oxonian P. F. Warner (b. 1873), both as captain and as batsman, did splendid work; and B. J. T. Bosanquet, besides assisting powerfully with the bat, became famous for inaugurating a new style of curly bowling (” googlies “) of a very effective type.

A glance at the table given above shows the high place occupied by Surrey in the past. Surrey county cricket can be traced as far back as

1730. Pycroft observes that ” the name of Surrey Surrey. ag Qne un ;j-ec j CO unty club is quite lost in the annals of cricket from 1817 to 1845.” But before that date two of the most celebrated cricketers, William Lilly white and Fuller Pilch, had occasionally played for the county, and so also had James Broad- bridge (1796-1843) and W. Lambert (1779-1851). Kennington Oval became the Surrey county ground in 1845, the property being leased from the duchy of Cornwall ; and in the years immediately following the county team included H. H. Stephenson (1833-1896), Caffyn (b. 1828), N. Felix, and Lockyer (1826-1869) ; among a later genera- tion appeared such well-remembered names as Jupp, Southerton, Pooley and R. Humphrey. After being champion county in 1873, Surrey did not again attain the same position for fourteen years, but for the next ten years maintained an almost uninterrupted supremacy. The greatest credit was due to the energetic direction of J. Shuter (b. 1855), who kept together a remarkable combination of cricketers, such as W. W. Read (1855-1906), Maurice Read (b. 1859), George Lohmann (1865-1901), and Robert Abel (b. 1859), all of whom were among the greatest players of their period. Loh- mann in 1 885-1 890 would alone have made any side famous; and in the same years when he was heading the bowling averages and proving himself the most deadly bowler in the country, W. W. Read was performing prodigies of batting. No sooner did the latter begin to decline in power than Abel took his place at the head of the batting averages, scoring with astonishing consistency in 1897-1900. In 1899 he made 357 not out in an innings against Somersetshire, and in 1901 his aggregate of 3309 was the largest then compiled. The Oxonian K. J. Key was another famous batsman whose services as captain were also exceedingly valuable to the county. An almost inexhaustible supply of professionals of the very highest class has been at Surrey’s service. W. Lockwood (b. 1868) became almost as deadly a bowler as Lohmann, and Tom Richardson (b. 1870) was the terror of all Surrey’s opponents for several seasons after 1893. Richardson took in all no less than 1340 wickets at the cost of 20,000 runs. Tom Hay ward (b. 1867), nephew of the renowned Cambridge

Erofessional of the same name, succeeded Abel as the leading Surrey atsman, his play in the test matches of 1899, when he averaged 65, being superb. During the following years his reputation was fully maintained, and in 1906 he had a particularly successful season. Key was followed in the captaincy by D. L. A. Jephson, but the county did not in the opening years of the 20th century maintain the high place it occupied during the last quarter of the 19th. It possessed some excellent professionals, however, in Hayes, Hobbs and Lees, and the

season of 1906, under the captaincy of Lord Dalmeny, showed a revival, a new fast bowler being found in N. A. Knox, and a fine batsman and bowler in J. N. Crawford.

Several of the celebrated cricketers of early times already men tioned as having played for the Surrey club were more closely associated with the adjoining county of Sussex, whose records go back as far as 1734, in which year a match was ussex.

played against Kent, the chief promoters of which were the duke of Richmond and Sir William Gage. One of the earliest famous cricketers, Richard Newland (d. 1791), was a Sussex man ; and James Broadbridge, W. Lambert, Tom Box, and the great Lillywhite family were all members of the Sussex county team. Lambert, in a match against Epsom, played at Lord's in 1817, made a " century " (one hundred runs) in each innings, a feat not repeated in first-class cricket for fifty years; and the occasion was the first when the aggregate of a thousand runs was scored in a match. Broadbridge played for Sussex in five reigns, while Box (1808-1876) kept wicket for the county for twenty-four years without missing a match. Notwithstanding this distinguished history, Sussex never attained the highest place in the county rivalry, and for a number of years towards the end of the 19th century the left-handed batting of F. M. Lucas (1860-1887) alone saved the county from complete insignific- ance. A revival came when W. L. Murdoch (b. 1855), of Australian celebrity, qualified for Sussex; and at a still later date the fortunes of the county were raised by the inclusion in its eleven of Kumar Shri Ranjitsinhji, afterwards H.H. the Jam of Nawanagar (b. 1872), the Indian prince, who had played for Cambridge University. Ranjitsinhji's dexterity, grace and style were unrivalled. He scored 2780 runs in 1896, averaging 57, while in county matches in 1899 his aggregate was 2555, with an average of 75. Even this performance was beaten in 1900 when he scored a total of 2563 runs, giving an average for the season of 83. In all matches his aggregates were 3159 in 1899, and 3065 in 1900. Not less remarkable was the cricket of C. B. Fry (b. 1872), who came from Oxford University to become a mainstay of Sussex cricket, and who in 1901 performed the unparalleled feat of scoring in successive innings 106, 209, 149, 105, 140 and 105, his aggregate for the season being 3147 with an average of 78. In 1905 his average for Sussex was 86, but in the following year an accident kept him out of the cricket field throughout the season ; and in 1909 he transferred his services to Hampshire.

If Kent and Middlesex may be described as the counties of amateurs, Yorkshire and Nottinghamshire should be called the counties of

famous professionals. Between 1864 and „

1 889 Nottinghamshire was champion county twelve times Notts.

and the county eleven was as a rule composed almost entirely of professional players, among whom have been many of the greatest names in the history of the game. Richard Daft (1835-1900), after playing as an amateur, became a professional in preference to abandoning the game, scorning to resort to any of the pretexts by which cricketers have been known to accept payment for their services while continuing to cling to the status of the amateur. William Oscroft (1843-1905) was one of Nottinghamshire's early batting heroes, and in Alfred Shaw (b. 1842) and F. Morley (1850-1884) the county possessed an invaluable pair of bowlers. William Gunn (b. 1858), besides being a magnificent fielder " in the country," was an exceptionally able batsman; but his performances did not equal those of his greater contemporary, Arthur Shrewsbury, who in six years between 1885 and 1892 headed the English batting averages. Shrewsbury's perfect style combined with inexhaustible patience placed him in the front rank of the " classical " batsmen of English cricket. Of the batsmen nicknamed " stonewallers," who at one time endangered the popularity of first-class cricket, was W. Scotton (1 856-1 893); and among the other numerous professionals whose cricket contributed to the renown of Nottinghamshire were Barnes (1852-1899), at times a most formidable bat; Flowers (b. 1856), always useful both with the bat and the ball; W. Attewell (b. 1861), a remarkably steady bowler who bowled an abnormal number of maiden overs; Mordecai Sherwin (b. 1851), an excellent successor to T. Plumb (b. 1833) and F. Wild (1847-1893) as wicket-keeper for the county; and among more recent players, J. Iremonger (b. 1877) and John Gunn, both of whom proved themselves cricketers worthy of the Notts traditions. J. A. Dixon (b. 1861), one of the few amateurs of the Nottinghamshire records, was for some time captain of the county team ; and he was succeeded by A. 0. Jones (b. 1873), a dashing batsman, who in 1899 was partner with Shrews- bury when the pair scored 391 for the first wicket in a match against Gloucestershire.

The history of Yorkshire cricket is modern in comparison with that of Surrey, Sussex or Kent. The county club only dates from 1 861, and for some years the team was composed entirely v of professionals. But though Yorkshire attained the Yorkshlre – championship three times during the first ten years of the county club's existence, thirteen years elapsed after 1870 before it again occupied the place of honour. In the ten years 1896-1906 Yorkshire was no less than six times at the head of the list, this position of supremacy being in no small measure due

to the captaincy of Lord Hawke (b. i860), who played continuously for the county from his university days for more than twenty years, and whose influence on Yorkshire cricket was unique. But before his time Yorkshire had already produced some notable cricketers, such as George Ulyett (1857-1898), who headed the batting averages in 1878, and who was also a fine fast bowler; Louis Hall (b. 1852), a patient bat; and another excellent scorer, Ephraim Lockwood (b.t845). William

Bates (1855-1900), too, was effective both as batsman and bowler; and Tom Emmett (1841-1904), long proverbial for bowling " a wide and a wicket," was deservedly popular. To the earlier period belonged two fast bowlers, George Freeman (1844-1895) and Allan Hill (b. 1845), and the eminent wicket-keeper Pincher (1841-1903), who was succeeded by J. Hunter (1857-1891), and later by his brother Daniel Hunter (b. 1862). The full effect of Lord Hawke's energetic captaincy was seen in 1900, when Yorkshire played through a programme of twenty-eight fixtures without sustaining a defeat; and the county's record was but little inferior in both the following years and again in 1905, in each of which years it retained the championship. It was during this period that as notable a group of cricketers wore the Yorkshire colours as ever appeared in county matches. Edmund Peate (1856-1900), one of the finest bowlers in his day, did not survive to take part in the later triumphs of his county; but the period beginning in 1890 saw J. T. Brown, J. Tunni- cliffe, R. Peel, W. Rhodes, George Hirst and the Hon. F. S. Jackson in the field. The two first named became famous for their first wicket partnerships. In 1896 in a match against Middlesex at Lord's these two batsmen scored 1 39 before being separated in the first innings, and in the second knocked off the 147 required to'win the match. In the following year they made 378 for the first wicket against Surrey, and during their careers they scored over a hundred for the first wicket on no less than fifteen occasions, the greatest feat of all being in 1898, when they beat the world's record by staying together till 554 runs had been compiled. Peel was for many years an untiring bowler, and Yorkshire was fortunate in discovering a successor of even superior skill in Wilfrid Rhodes, who in 1900 took over 200 wickets at a cost of 12 runs each in county matches alone, and was also an excellent bat. Hirst and Jackson were the two finest all-round cricketers in England about 1905. The Hon. F. S. Jackson (b. 1870), like his fellow-Harrovian A. C. MacLaren, had a wonderful record in test matches against Australia ;

he captained the England eleven in 1905, and his wonderful nerve enabled him to extricate his side when in a difficulty, and to render his best service at an emergency. Hirst (b. 1871) in 1904 and in 1905 scored over 2000 runs and took more than 100 wickets; and in 1906 he surpassed all previous records by scoring over 2000 runs and taking over 200 wickets during the season. A concourse of 78,000 people watched his ” benefit ” match (Yorkshire against Lancashire) in August 1904. Besides cricketers like these, such fine players were included in the team as Wainwright (b. 1865), Haigh (b. 1871), Denton (b. 1874), and E. Smith (b. 1869); with such material the Yorkshire eleven had no ” tail,” and was able to win the championship six times in a decade.

Somersetshire hardly fulfilled the promise held out by the success achieved in the closing decade of the 19th century; this had been Somerset- ‘ ar gely owing to the captaincy and brilliant batting of shire. H. T. Hewett (b. 1864), who in partnership with L. C. H.

Palairet (b. 1870), famous for his polished style, scored 346 for the first wicket in a match against Yorkshire in 1892. Hewett was succeeded in the command of the county eleven by the Cambridge fast bowler, S. M. J. Woods (b. 1868); and among other members of the eleven the most valuable was L. C. Braund (b. 1876), a pro- fessional who excelled as an all-round cricketer.

The counties above referred to are those which have figured most prominently in the history of county cricket. Individual players of Minor tne highest excellence are, however, to be found from time counties, to time in all parts of the country. Warwickshire, for example, can boast of having had in A. A. Lilley (b. 1867) the best wicket-keeper of his day, who represented England against Australia in the test matches; while Worcestershire pro- duced one of the best all-round professionals in the country for a number of years in Arnold (b. 1877), and a batsman of extreme brilliancy in R. E. Foster, a member of a cricketing family to whom belongs the credit of raising Worcestershire into a cricketing county of the first class. Derbyshire, similarly, can claim some well-known cricket names, the bowler W. Mycroft (1841-1894), W. Chatterton (b. 1863), and W. Storer (b. 1868), a first-class wicket-keeper. Essex possesses at Leyton one of the best county grounds in the country, and the club was helped over financial difficulties by the munificent support of an old Uppingham and Cambridge cricketer, C. E. Green. It has produced a fair number of excellent players, notably the bats- men P. Perrin, C. MacGahey, and the fast bowler C. J. Kortright; and A. P. Lucas, afterwards a member of the county club, was a famous cricketer who played for England in

1880 in the first Australian test match. Hampshire had a fine batsman in Captain E. G. Wyn- yard, and its annals are conspicuous for the phenomenal scores made during the single season of 1899 by Major R. M. Poore; these two put together 411 against Somersetshire in that year before being separated. Among the later Hants professionals, Llewellyn was most prominent.

The distribution of cricketing ability in England might be the subject of some interesting speculation. In the first forty years of the annual competition for the championship six counties alone gained the coveted distinction, and three of these, Surrey, Notts and Yorkshire, won it thirty-four times between them. Why, it may be asked, is it that one county excels in the game while another has no place whatever in the history of cricket? How comes it that great names recur continually in the annals of Surrey and Yorkshire, for

example, while those of Berkshire and Lincolnshire are entirely barren? No doubt proximity to great centres of population favours the cultivation of the game, but in this respect Kent and Sussex are no better situated than Hertfordshire, nor does it account for Notting- hamshire having so illustrious a record while Staffordshire has none at all, nor for Somersetshire having outclassed Devon. It is strange, moreover, that while the universities are the chief training-grounds for amateur cricketers, neither Oxfordshire nor Cambridgeshire has made any mark among the counties. The influence of individuals and families, such as the Graces in Gloucestershire, the Walkers in Middlesex, and in recent times the Fosters in Worcestershire, has of course been of inestimable benefit to cricket in those counties; but Buckinghamshire and Norfolk and Cheshire send their sons to the public schools and universities no less than Lancashire or Kent. It is difficult, therefore, to understand why county cricket should so persistently confine itself to a small number of counties; but such is the fact.

Cricket has never flourished vigorously in Scotland, Ireland or Wales, a fact that may partly be accounted for by the comparative difficulty of obtaining good grounds in those parts of the kingdom, and by the inferiority, for the purpose of cricket, of their climate. In the south of Scotland, and especially in the neighbourhood of Edinburgh, there are clubs which keep the game alive ; and Scotland, though it has produced no great cricketers, either amateur or pro- fessional, has sent a few players to the English university elevens who have found places in English county teams. In Ireland cricket is fairly popular, especially in those parts of the island where local sides can obtain assistance from soldiers quartered in the neighbour- hood. One or two counties

play annual matches, that between Kildare and Cork in particular exciting keen rivalry. Trinity College, Dublin, has turned out some excellent players; and the Phoenix and Leinster clubs in Dublin, and the North of Ireland club in Belfast, play a full programme of matches every season. D. N. Trotter, who played for county Meath for many years towards the close of the 19th century, was a batsman who would have found a place in any English county eleven; so also would William Hone, one of several brothers all of whom were keen and skilful cricketers. About the same period Lieutenant Dunn scored so many centuries in Irish cricket that he was played, though without any great success, for his native county of Surrey. More recently L. H. Gwynn (1873- 1902) batted in a style and with a success that proved him capable of great things. Sir T. C. O'Brien, though an Irishman, belongs as a cricketer to Middlesex; but T. C. Ross, who was chosen to play for Gentlemen v. Players at Lord's in 1902, was a bowler who played regularly for county Kildare.

Gentlemen v. Players. — The most important match of the year as far as purely English cricket is concerned is the match between the gentlemen and players (amateurs and professionals) played at Lord's. For many years a match played between sides similarly composed at the Oval excited equal interest, but latterly county cricket has rather starved this particular game, though it still continues as a popular fixture. Other matches with the same title have been played in London on Prince's Ground (now built over), and at Brighton, Hastings and Scarborough and elsewhere, but those games in no way rank with the London matches.

The Lord's fixture was first established in 1806, in which year two matches were played; it became annual in 1819, but in those days the amateurs, being no match for their opponents, generally received odds, while in 1832 they defended wickets 22 in. by 6, and in 1837 the professionals stood in front of wickets of four stumps, measuring in all 36 in. by 12 in. This match was known as " The Barndoor Match " or " Ward's Folly," and the professionals won by an innings and 10 runs. Odds were not given after 1838, the gentlemen having then won eight matches and lost thirteen. From 1839 to 1866 the gentlemen only won 7 matches as compared with 21 losses. In 1867 the tide turned, for the brothers Grace, especially Dr W. G. Grace, became a power in the cricket-field, and from 1867 to 1884 the gentlemen, winning fifteen matches, only lost One. From 1885 the balance swung round, and by 1903 the professionals had won eleven matches and lost but four. The gentlemen won on nine successive occasions between 1874 and 1884, a draw intervening; while begin- ning with 1854 the professionals won eleven matches " off the reel." The

professionals won in i860 by an innings and no less than 181 runs; in 1900 they only won by two wickets, but to do so had to make, and did make, 501 runs in the last innings of the match. In 1903 the gentlemen, heavily in arrears after each side had played an innings, actually scored 500 in their second innings with only two men out. In 1904 the gentlemen won by two wickets after being 156 runs behind on the first innings, thanks to fine play by K. S. Ranjitsinhji and A. O. Jones. J. H. King had scored a century in each innings, a feat previously only performed by R. E. Foster in 1900. C. B. Fry's 232 not out in 1903 was the largest innings scored in the match. Dr W. G. Grace, who is credited with eight centuries, is the only cricketer who exceeded the hundred more than twice at Lord's in the fixture, 164 by J. T. Brown being the highest innings by a professional. There were seven instances before 1864 of two bowlers being unchanged in the match, and the Hon. F. S. Jackson and S. M.J. Woods repeated this in 1894. The Oval match was first played in 1857. The amateurs effected their first win in 1866, and though several games were drawn the professionals did not win again

till 1880. As at Lord's, it was the era of Grace, but from this point the amateurs could only win two matches, and by the narrowest of margins, till 1903, this making their sum of victories up to then thirteen, as opposed to twenty-three. In 1879 the gentlemen won in one innings by 126 runs, the heaviest beating that one side had inflicted on the other. The highest individual score was Robert Abel's 247, and the next Dr W. G. Grace's 215. Hayward scored 203 in 1904; A. G. Steel and A. H. Evans bowled unchanged in

l8 79- . . . ,

School and Club Cricket. — Cricket is the standing summer game at every English private and public school, where it is taught as carefully and systematically as either classics or mathematics. There are also numbers of amateur clubs which possess no grounds of their own and are connected with no particular locality, but which are in fact mere associations of cricketers who play matches against the universities, schools or local teams, or against each other. Of these the best known, perhaps, is I Zingari (The Wanderers), popularly known as I.Z., whose well-known colours, red, yellow and black stripes, are prized rather as a social than as a cricketing distinction. This club was founded in 1845 by Lorraine Baldwin and Sir Spencer Ponsonby-Fane. The first

rule of the club humorously declares that ” the entrance fee shall be nothing, and the annual subscription shall not exceed the entrance fee.” It is a rule of the club that no member shall play on the opposing side. I.Z. has long been con- nected with the social festivities forming a feature of the ” Canter- bury Week,” a cricket festival held at Canterbury during the first week in August, of the Scarborough week, and of the Dublin horse- show. Dr W. G. Grace, who almost invariably appeared in the cricket field wearing the red and yellow stripes of the M.C.C., and some other notable amateurs, never belonged to I.Z. or any similar club ; but Dr Grace was instrumental in the formation of the London county club, whose ground was at the Crystal Palace at Sydenham. Other amateur clubs, similar to I Zingari, are the Free Foresters, Incogniti, Etceteras, and in Ireland Na Shuler; while the Eton Ramblers, Harrow Wanderers, Old Wykehamists, and others are clubs whose membership is restricted to ” old boys.”

The Oxford and Cambridge universities match was first played in 1827, but was not an annual fixture till 1838. Five matches, those of 1829, 1843, 1846, 1848 and 1850, were played at Oxford, the rest at Lord’s. The ” ‘Varsity match,” and that between the two great

Eublic schools, Eton and Harrow, are great ” society ” events at ord’s every summer. Up to 1909 Eton won thirty times, and Harrow on thirty- five occasions. D. C. Boles by scoring 183 in 1904 set up a new record for this match, beating the 152 obtained in 1841 by Emilius Bayley (afterwards the Rev. Sir John Robert Laurie) ; and in 1907 the Harrow captain, M. C. Bird, established a further record by scoring over a hundred runs in each innings. Of the contests between Oxford and Cambridge, the latter (up to 1909) had lost thirty-one and won thirty-five. Oxford’s 503 in 1900 and Cambridge’s 392 in the same match furnished the highest aggregates. The largest individual innings was 172 not out by J. F. Marsh in 1904; but as a feat of batting it was intrinsically inferior to the 171 by R. E. Foster in 1900. Of the thirty centuries scored up to 1909, Oxford was credited with sixteen. Eustace Crawley (b. 1868) made a hundred both in the Eton v. Harrow and Oxford v. Cambridge matches. In the match of 1870 F. C. Cobden (b. 1849) took the last three Oxford wickets with consecutive balls, winning the match for Cambridge by 2 runs.

Australian Cricket. — Naturally popular in a British colony, cricket made but little progress in Australia before the arrival of an English professional eleven in 1861-1862, which carried all before it. Subsequent visits, and the coaching of imported professionals, so promoted the game that in 1878 a representative eleven of Aus- tralians visited England. The visits were repeated biennially till 1890,

and then triennially. The visits of the Australian teams to England aroused unparalleled interest and acted as an immense incentive to the game. A great sensation was caused when the first team, captained by D. W. Gregory, on the 27th of May 1878, defeated a powerful M.C.C. eleven in a single day, disposing of them for 33 and 19, the fast bowler F. R. Spofforth (b. 1853) taking 6 wickets for 4 runs, and H. F. Boyle (b. 1847) 5 for 3. Their prowess was well maintained when in September 1880 Australia for the first time met the whole strength of England, such matches between representatives of Australia and England being known as ” test matches,” a term that was applied later to matches between England and South Africans also. Although in 1880 the old country won by 5 wickets, the honours were fairly divided, especially as Spofforth could not play. Dr W. G. Grace with a score of 152 headed the total of 420, but even finer was the Australian captain W. L. Murdoch’s imperturb- able display, when he carried his bat for 153. From 1882 onwards the Colonials, with two exceptions, at Blackpool and Skegness, only played eleven-a-side matches. Such bowlers as Spofforth, Boyle, G. E. Palmer (b. 1861), T. W. Garrett (b. 1858), and G. Giffen (1859) became household names. Nor was the batting less admirable, for Murdoch was supported by H. H. Massie (b. 1854), P. S. McDonnell (1860-1896), A. C. Bannerman (b. 1859), T. Horan (b. 1855), C. J. Bonnor (b. 1855), and S. P. Jones (b. 1861), whilst the wicket-keeper was McCarthy Blackham (b. 1855). This visiting side in 1882 was the greatest team of all; 23 matches were won, only 4 lost, and England was defeated at the Oval by ‘ runs. In

1884 English cricket had improved, and the visiting record was hardly so good. The match against England at the Oval will not soon be forgotten. The Colonials scored 551 (Murdoch2ii, McDonnell 103, Scott 102), and England responded with 346, Scotton and W. W. Read adding 151 for the ninth wicket.

The team of H. J. H. Scott (b. 1858) in 1886 proved less successful, for all three test matches were lost, and eight defeats had to be set against nine victories, but Giffen covered himself with distinction. This was the first tour under the auspices of the Melbourne Club. McDonnell’s team in 1888 marked the appearance of the bowlers C. T. B. Turner (b. 1862) and J. J. Ferris (1 867-1900). The former took 314 wickets for 11 runs each, and the latter 220 for 14 apiece. To ail appearance they redeemed a poor tour, 19 matches being won and 14 lost. The 1890 tour, though Murdoch reappeared as captain, proved disappointing, both the test matches being lost and defeats for the first time exceeding victories, though the two bowlers again performed marvellously well. After an interval of three years, M. Blackham

captained the seventh team, which was moderately fortunate. H. Graham (b. 1870) and S. E. Gregory (b. 1870) batted admirably, and the 149 of J. J. Lyons (b. 1863) in the match against M.C.C. was an extraordinary display of punishing cricket. In 1896, though they did not win the rubber of test matches, the colonials were most successful, 19 matches being victories and only 6 lost. S. E. Gregory, J. Darling (b. 1870), F. A. Iredale (b. 1867), G. Giffen, C. Hill (b. 1877), and G. H. S. Trott (1866-1905) were the best bats, and the last-named made an admirable captain. H. Trumble (1867) kept an excellent length, and E. Jones (1869) was deadly with his fast bowling.

The Australian representatives in 1899 demonstrated that they were the best since 1882, 16 successes and only 3 defeats (v. Essex, Surrey and Kent) being emphasized by a victory over England at Lord's by 10 wickets, the only one of the five test matches brought to a conclusion. M. A. Noble (b. i873)and Victor Trumper (b. 1 877) , both newcomers, batted superbly. The latter, v. Sussex, made 300, the largest individual score hitherto made by an Australian in England, the previous best having been 286 by Murdoch in the corresponding match in 1882. H. Trumble scored 1183 runs and took 142 wickets for 18 runs apiece, and Darling not only made a judicious captain, but scored the biggest aggregate, 1941, up to then obtained by any batsman touring with a colonial eleven in England. On the home side, Hayward did sound service with the bat, and his stand with F. S. Jackson in the fifth test match yielded 185 runs for the first wicket.

In 1902 another fine Australian eleven, captained by Darling, won 23 and lost only 2 matches. They won the rubber of test matches at Manchester by 3 runs, but lost the final at the Oval by one wicket after an even more remarkable struggle, G. L. Jessop having scored 104 in an hour and a quarter. The other defeat was by Yorkshire by 5 wickets, when they were dismissed for 23 by Hirst and Jackson. The rest of the tour was characterized by brilliant batting. The performance of Trumper in making 2570 runs (with an average of 48) surpassed anything previously seen; R. A. Duff (b. 1878) also proved a brilliant run-getter. W. W. Armstrong (b. 1879) was useful in all departments, and J. V. Saunders (b. 1876) proved a successful left-handed bowler.

In 1905 there was a marked falling-off, as England won two and drew the other three test matches; but only one other defeat, by Essex by 19 runs, had to be set against 16 Australian victories. The persistent bowling off the wicket by Armstrong, and the inability to finish games within three days, were the chief drawbacks. Arm- strong eclipsed all previous colonial records in England by heading both tables of

averages, scoring 2002 (average 48) and taking 130 wickets at a cost of 17 runs each. He also compiled the largest individual score (303 not out v. Somerset) ever made on an Australian tour. M. A. Noble also exceeded 2000 runs. For a long time the fast bowler, A. Cotter (b. 1882, N.S.W.), failed, but eventually " came off," just as F. Laver (b. 1869), who had taken many wickets in the earlier part of the tour, was becoming less formidable. Duff saved the colonials by a great innings in the fifth test match; Trumper was less certain than formerly, and Clement Hill more reckless; whilst J. J. Kelly (b. 1867) on his fifth tour was better than ever before with the gloves.

The Australians who visited England under the leadership of M. A. Noble in 1909 were generally held to be a weaker team than most of their predecessors, but they greatly improved as the season advanced, proving that the side included several cricketers of the highest merit, and as a captain Noble has seldom been surpassed in consummate generalship. Their record of thirteen wins to four defeats offered little evidence of inferiority, while the large number of twenty-one drawn matches was accounted for by the cold wet weather that largely prevailed throughout the summer. Two out of the five test matches were unfinished, and Australia won the rubber by two matches to one. In all the test matches England was under the command of A. C. MacLaren, but the great Harrovian was no longer the batsman he had been some years earlier; Jackson had abandoned first-class cricket ; Hirst and Hayward were becoming veterans; and, speaking generally, the English batting was decidedly inferior, and it collapsed feebly in three of the test matches. England's failure, for which poor fielding and missed catches were also responsible, was the more disappointing since they began well by winning the first test match at Birmingham by ten wickets.

C. B. Fry and Hobbs knocking off the 105 runs required to win in the second innings without the loss of a wicket. In the third test match, at Leeds, England was deprived of the services of Hayward and Blythe through illness, and an accident to Jessop during the match compelled the side to play a man short. It was in bowling that the Australians were thought to be least strong; but Laver's analysis in the Manchester test match, when he took 8 wickets for 31 runs in England's first innings, was the most notable feature of the match ; and although his record at the head of the bowling averages for the tour, 70 wickets at an average cost of 14-9 runs, had frequently been beaten in earlier

Australian tours in England, it proved him a worthy successor of Spofforth, Boyle and Turner. Armstrong, although he did not equal his record of 1905, again scored over 1000 runs and took over 100 wickets, his exact figures being 1439 runs and 120 wickets. The most remarkable Australian batting was that of two young left-handed players who on this occasion visited England for the first time, W. Bardsley (b. 1884) and Vernon Ransford (b. 1885), the latter of whom headed the averages both for test matches (58-8) and for the whole tour (45-5), his principal achievement being an innings of 143 not out in the test match at Lord's. Bardsley, who was second in the test matches averages (39-6), fell into the third place slightly below Armstrong in the averages for the tour; but he alone scored over 200 in an innings, which he accomplished twice, and over 2000 in aggregate for the tour, and he established a test match " record " by scoring 136 and 130 in the match at the Oval. Of the twenty-two " centuries " scored by Australians during the season Bardsley and Ransford each made six. Trumper and Noble each scored over a thousand runs, and Macartney was an invaluable member of the side both in batting and bowling. As a wicket- keeper Carter worthily filled the place of Kelly, and the fielding of the Colonials fully maintained the brilliant Australian standard of former years.

The following " records " of Australian cricket in England up to 1909 are of interest: — Highest total by an Australian team: 843 v. Past and Present of Oxford and Cambridge Universities in 1893. Highest total against an Australian team: 576 by England at the Oval in 1899. Lowest total by an Australian team: 18 v. M.C.C. in 1896. Lowest total against an Australian team : 17 by Gloucester- shire in 1896. Highest individual Australian score in one innings: 303 not out by W. W. Armstrong v. Somersetshire in 1905. Highest individual Australian aggregate in a tour: 2570 by V. T. Trumper in 1902. Two centuries in a match: V. T. Trumper 109 and 119 v. Essex in 1902; W. Bardsley 136 and 130 v. England in 1909 (test match record).

The following table shows the Australians who headed the batting and bowling averages respectively in tours in England up to 1909.

Batting.

Year.

Inn.

Not out.

Runs.

Most.

Aver.

1878

C. Bannerman, N.S.W. .

31

1

723

133

24-10

1880

W. L. Murdoch, N.S.W. .

19

1

465

*i53

25-80

1882

W. L. Murdoch, N.S.W. .

61

5

1711

♦286

30-50

1884

W. L. Murdoch, N.S.W. .

50

5

1378

211

30-60

1886

G. Giffen, S.A. . .

63

9

1453

119

26-90

1888

P. M’Donnell, V.

62

1

1393

i°5

22-50

1890

W. L. Murdoch, N.S.W. .

64

2

1459

*I58

23-33

1893

H. Graham, V. . .

55

3

1492

219

28-36

1896

S. E. Gregory, N.S.W. .

48

2

1464

154

3I-38

1899

J. Darling, S.A. . .

56

9

1941

Ib 7

41-29

1902

V. T. Trumper, N.S.W. .

53

2570

128

48-49

1905

W. W. Armstrong, V. . .

48

7

2002

*3°3

48-82

1909

V. S. Ransford . .

43

4

1778

190

45-58

- Not out. Bowling.

Year.

O.

M.

R.

W.

Aver.

1878

T. W. Garrett, N.S.W.

296-2

144

394

38

10-30

1880

F. R. Spofforth, N.S.W.

240-8

82

396

46

8-60

1882

H. F. Boyle, V.. .

1200-14

525

1680

144

n-6o

1884

F. R. Spofforth, N.S.W.

1544-32

649

2642

216

12-20

1886

G. Giffen, S.A. . .

1693-26

722

2711

159

17-05

1888

C. T. B. Turner, N.S.W.

2589-3

1222

3492

314

II- 3 8

1890

C. T. B. Turner, N.S.W.

1651-1

724

2725

215

12-45

1893

C. T. B. Turner, N.S.W.

1 148

450

2202

160

13-12

1896

T. R. M’Kibbin, N.S.W.

647-1

198

1441

101

14-27

1899

H. Trumble, V. .

1249-1

43i

2618

142

18-43

1902

H. Trumble, V. .

948

305

1998

I40

14-27

1905

W. W. Armstrong, V. .

1027

308

2288

1.30

17-60

1909

F. Laver …

495-5

161

The first English team to visit Australia was organized in 1862, and was captained by H. H. Stephenson. George Parr (1826-1891) took out the next in 1864, Dr E. M. Grace being the only amateur. In 1873 the Melbourne Club invited Dr W. G. Grace to take out an

eleven, and three years later James Lillywhite conuuoted a team of professionals. On this tour for the first time colonials contended on equal terms, one match v. Australia being won by 4 wickets and the other lost by 45 runs. Lord Harris in the autumn of 1878 took a team of amateurs assisted by Ulyett and Emmett, winning 2 and losing 3 eleven-a-side encounters, Emmett's 137 wickets averaging 8 runs each. Shaw, Shrewsbury and Lillywhite jointly organized the expedition of 1881, when Australia won the second test match by 5 wickets. The Hon. Ivo Bligh (afterwards Lord Darnley) in 1882 took a fine team, which was crippled owing to an injury sus- tained by the bowler F. Morley. Four victories could be set against three defeats; Australia winning the only test match, owing to the batting of Blackham. Shaw's second tour in 1884 showed Barnes heading both batting and bowling averages, while six victories counterbalanced two defeats. In the third tour Shrewsbury became captain, but the English for the first time encountered the bowling of C. T. B. Turner, who took 27 wickets for 113 runs in two matches. Australia was twice defeated, the English captain batting in fine form. On this tour was played the Smokers v. Non-Smokers, when the latter scored 803 for 9 wickets (Shrewsbury 236, W. Bruce 131, Gunn 150), against the bowling of Briggs, Boyle, Lohmann, Palmer and Flowers. The winter of 1887 saw two English teams in Australia, one under Lord Hawke and G. F. Vernon, the other under Shrews- bury and Lillywhite. Both teams played well, the batting being headed by W. W. Read with an average of 65, and Shrewsbury with 58. The ill-success of Lord Sheffield's team in two out of three test matches did not disprove the great merits of his eleven. Dr W. G. Grace headed the averages with 44, and received the best support from Abel and A. E. Stoddart, whilst Attewell, Briggs and Lohmann all possessed fine bowling figures. A. E. Stoddart's first team (in 1894) achieved immense success and was the best of all. In the first test match they went in against 586 runs and ultimately won by 10 runs, Ward making 75 and 117. Stoddart himself averaged 51, scoring 173 in the second test match, and A. C. MacLaren (who made 228 i>. Victoria), Brown and Ward all averaged over 40. The last tour

conducted by Stoddart proved less satisfactory, four of the five test matches being lost, and some friction being caused by various incidents. K. S. Ranjitsinhji, who averaged 60 and made 175 in a test match and 189 v. South Australia, and A. C. MacLaren, who scored five hundreds and averaged 54, were prominent, Hayward also doing good work; but the bowling broke down. Weakness in bowling was the cause of the ill -success of A. C. MacLaren's side in 1901. After a brilliant victory by an innings and 124 runs at Sydney, the other four test matches were all lost. MacLaren himself batted magnificently, and so did Hayward and Tyldesley. Braund stood alone as an all-round man. The M.C.C. in 1903 officially despatched a powerful side led by P. F. Warner, and in every sense except the financial the success was complete. Three test matches were won and two lost, while two new records were set up, one by Rhodes obtaining 15 wickets at Melbourne, the other by R. E. Foster, who in seven hours of brilliant batting compiled 287. Tyldesley and Hayward both did good work as batsmen; Rhodes and Braund both bowled consistently. The catch-phrase about " bringing back the ashes " became almost proverbial; its origin is to be found in the Sporting Times in 1882 after Australia had defeated England at the Oval.

New Zealand. — Although cricket has not attained a degree of perfection in New Zealand commensurate with that in Australia, it is keenly played. Lord Hawke sent out from England a team in 1902-1903 which won all the eighteen matches arranged.

Cricket in India. — Not only the English who live in India, but the natives also — Parsees, Hindus and Mahommedans alike — play cricket. A Parsee eleven visited England in 1884 and 1888.

South Africa. — South African cricketers visiting England are handicapped by playing on turf instead of on the matting wickets used in South Africa. The side which came over during the Boer War in 1901 won 13, lost 9, and drew 2 matches, playing a tie with Worcestershire, and showing marked improvement on the team which had visited England in 1894. E. A. Halliwell (b. 1864) proved a fine wicket-keeper, J. H. Sinclair (b. 1876) a good all-round crirketer, J. J. Kotze (b. 1879) a very fast bowler, and G. A. Rowe (b. 1872) clever with the ball. In 1904 more decided success was achieved, for on a more ambitious programme ten victories could be set against two defeats by Worcestershire and Kent, with a tie with Middlesex. The most important success was a victory by 189 runs over a powerful England eleven at Lord's, when R. O. Schwarz (b. 1875) scored 102 and 26, and took 8 wickets for 106, dismissing Ranjit- sinhji twice. Kotze and Sinclair again bore the brunt of the attack. Of the English

teams visiting South Africa, that taken by Lord Hawke in 1894 did not meet with such important opposition as the one he led in 1900, yet the side came back undefeated, having won all three test matches. P. F. Warner and F. Mitchell, with Tyldesley, were the chief run-getters, Haigh, Trott and Cuttell bowling finely. In the winter of 1905 the M.C.C. sent out a side under P. F. Warner, but it lost four out of the five test matches, F. L. Fane and J. N. Crawford being the most successful of the Englishmen, and G. C. White (1882) and A. D. Nourse proving themselves great colonial batsmen. In 1907 a representative South African team came to England, and their improved status in the cricketing world was shown by the arrangement of test matches. In the winter of 1909-1910 an English

team under Mr Leveson Gower went to South Africa, and played test matches.

West Indies. — West Indian cricketers toured in England in 1900, winning 5 matches and losing 8. The best batsman was C. A. Olivierre (b. 1876), who subsequently qualified for Derbyshire. The brunt of the bowling devolved on S. Woods and T. Burton (b. 1878). In 1897 teams under Lord Hawke and A. Priestly (b. 1865) both visited West Indies, Trinidad defeating both powerful combinations. R. S. Lucas (b. 1867) had in 1895 taken out a successful side. A much weaker combination in 1902 suffered five defeats but won 13 matches. B. J. T. Bosanquet, E. R. Wilson (b. 1879) and E. M. Dowson (b. 1880) were the chief performers. In 1906 another West Indian side visited England,, but were not particularly successful.

America. — In the United States cricket has always had to contend with the popularity of baseball, and in Canada with the rival attractions of lacrosse. Nevertheless it has grown in popularity, Philadelphia being the headquarters of the game in the New World.

The Germantown, Belmont, Merion and Philadelphia Clubs play annually for the Halifax Cup, and the game is controlled by the Associated Cricket clubs of Philadelphia. In the neighbourhood of New York matches are arranged by the Metropolitan District Cricket League and the New York Cricket Association; similar organizations are the Northwestern, the California and the Massa- chusetts associations, while the Intercollegiate Cricket League consists of college teams representing Harvard, Pennsylvania and Haverford. R. S. Newhall (b.

1852) and D. S. Newhall (b. 1849) may almost claim to be the fathers of cricket in the United States ; while D. W. Saunders (b. 1862) did much for the game in Canada. Other eminent names in American cricket are A. M. Wood; H. Livingston, of the Pittsburg Club, who scored three centuries in one week in 1907; H. V. Hordern, University of Pennsylvania, a very successful bowler; J. B. King, who in 1906 made 344 not out for Belmont v. Merion, and who as a fast bowler proved most effective during two tours in England. At San Francisco in 1894 W. Robertson and A. G. Sheath compiled a total of 340 without the loss of a wicket, the former scoring 206 not out, and the latter 118 not out. A large number of English cricket teams have visited the United States and Canada. The first county to do so was Kent in 1904, in which year the Philadelphians also made a tour in England, in the course of which J. B. King (b. 1873) took 93 wickets at an average cost of 14 runs, and proved himself the best all-round man on the side. P. H. Clark (b. 1873), a clever fast bowler, and J. A. Lester (b. 1872), the captain of the team, also showed themselves to be cricketers of merit, while N. Z. Graves (b. 1880) and F. H. Bohlen (b. 1868) were quite up to English county form. The team did not, however, include G. S. Patterson (b. 1868), one of the best batsmen in America. The Philadelphians again visited Great Britain in 1908, when they won 7 out of 14 matches, one being drawn. On this tour King surpassed his former English record by taking 115 wickets, and Wood, who played one fine innings of 132, was the most successful of the American batsmen.

Other Countries. — The English residents of Portugal support the game, but were no match for a moderate English team that visited them in 1898. In Holland, chiefly at the Hague and Haarlem, cricket is played to a limited extent on matting wickets. Dutch elevens have visited England, and English elevens have crossed to Holland, the most important visit being that of the gentlemen of the M.C.C in 1902, the Englishmen winning all the matches.

Professionalism. — The remuneration of the first-class English professionals is £6 per match, out of which expenses have to be paid ; a man engaged on a ground to bowl receives from £2, 10s. to £3, 10s. a week when not away playing matches. A professional player generally receives extra reward for good batting or bowling, the amount being sometimes a fixed sum of £1 for every fifty runs, more frequently a sum awarded by the committee on the recommendation of the captain. Some counties give their men winter pay, others try to provide them with suitable work when cricket is over. A few get cricket in other countries during the English winter. For inter- national matches professional players and ” reserves ” receive £20 each,

though before 1896 the fee was only £10; players (and reserves) in Gentlemen v. Players at Lord's are paid £10. A good county professional generally receives a " benefit " after about ten years' service; but the amount of the proceeds varies capriciously with the weather, the duration of the match, and the attendance. In the populous northern counties of England benefits are far more lucrative than in the south, but £800 to £1000 may be regarded as a good average' result. County clubs generally exercise some control over the sums received. Umpires are paid £6 a match; in minor games they receive about £1 a day.

Records. — Records other than those already cited may be added for reference. A schoolboy named A. E. J. Collins, at Clifton College in 1899, excited some interest by scoring 628 not out in a boy's match, being about seven hours at the wicket. C. J. Eady (b. 1870) scored 566 for Break o' Day v. Wellington in eight hours in 1902, the total being 911. A. E. Stoddart made 485 for Hampstead v. Stoics in 1886. In first-class cricket the highest individual score for a batsman is A. C. MacLaren's 424 for Lancashire v. Somerset at Taunton in 1895. Melbourne University scored 1094 against Essendon in March 1898, this being the highest authenticated total on record. M.C.C. and Ground made 735 v. Wiltshire ir 1888, the highest total at Lord's.

In the match between A. E. Stoddart's team and New South Wales at Sydney in 1898, 1739 runs were scored, an aggregate unparalleled in first-class cricket. The highest total for an innings in a first-class match is 918 for N.S.W. v. South Australia in January 1901. York- shire scored 887 v. Warwickshire at Birmingham in May 1896. The lowest total in a, first-class match is 12 by Northamptonshire v. Gloucestershire in June 1907. The record for first wicket is 472 by S. Colman and P. Coles at Eastbourne in 1892. The longest partner- ship on record is 623 by Captain Oates and Fitzgerald at the Curragh in 1895. The best stand that has been made for the last wicket in a first-class match is 230 runs, which was run up by R. W. Nicholls and Roche playing for Middlesex v. Kent at Lord's in 1899.

The " averages " of individual players for batting and bowling annually excite a good deal of interest, and there is a danger that some players may think too much of their averages and too little of the sporting side of the game. Any comparison of the highest averages during a scries of years would be misleading, owing to improvements in grounds, difference of weather, and the variations in the number of innings.

The following table of aggregates, compiled from the figures to the

end of 1905, affords a summary of the records of a select list of historic cricketers ; it will serve to supplement some details already given above about them and others.

Batting.

Innings.

Not Out.

Runs.

Most.

Aver.

K. S. Ranjitsinhji .

448

57

22,277

285

56-3

C. B. Fry …

481

29

22,865

244

50-4

T. Hayward .

667

61

25,225

315

41-3

J. T. Tyldesley .

491

38

18,683

250

41-1

Dr W. G. Grace

1463

103

54.073

344

39-i

A. Shrewsbury .

784

88

25,819

267

37-6

R. Abel ….

964

69

32,810

357

36-5

A. C. MacLaren .

526

37

17,364

424

35-2

G. H. Hirst . . .

626

92

18,615

34i

34-4

Hon. F. S. Jackson .

490

35

15,498

160

34-2

W. Gunn

821

66

25,286

273

33-3

W. W. Read . . .

739

. 53

22,919

328

33-2

A. E. Stoddart . .

513

16

16,081

221

32-2

Bowling.

Overs.

Maid.

Runs.

Wkts.

Aver.

A. Shaw ….

22,830

12,803

21,887

1916

n-8

F. R. Spofforth . .

5,342

2,168

8,773

682

12-5

C. T. B. Turner

5,388

2,396

8,419

649

12-6

T. Emmett .

14,672

6,870

20,811

1523

I3-I

G. Lohmann

15,196

6,508

23,958

1734

I3-I

F. Morley

12,610

6,239

15,938

1213

I3-I

E. Peate ….

11,669

5,593

14,299

1061

13-5

W. Rhodes . . .

11,014

3,476

23,336

1564

141

W. Attewell . . .

22,461

11,408

28,671

1874

15-5

J. Briggs ….

20,300

8,275

34,4U

2161

15-2

R. Peel ….

18,255

7,856

27,795

1733

16-6

S. Haigh . . .

7,749

2,279

18,516

1 102

16-8

J. T. Hearne

19,895

7,395

40,532

2350

17-5

W. H. Lockwood

8,733

2,241

22,981

1273

18-6

T. Richardson (1904)

14,474

3,835

38,126

2081

18-6

Dr W. G. Grace (1904)

28,502

10,892

50,441

2730

18-1

G. H. Hirst .

11,586

3,525

27,028

Bibliography. — The chief works on cricket are, apart from well-known annuals : — H. Bentley's Scores from 1786 to 1S22 (published in 1823) ; John Nyren's Young Cricketer's Tutor (1833) ; N. Wanostrocht's Felix on the Bat (various editions, 1845-1855); F. Lillywhite's Cricket Scores and Biographies, 1746 to 1840 (1862) ; Rev. J. Pycroft's Cricket Field (various editions, 1862-1873); C. Box's Theory and Practice of Cricket (1868) ; F. Gale's Echoes from Old Cricket Fields (1871, new ed. 1896); Marylebone Cricket Club Scores and Biographies (1876), a continuation of Lillywhite's Scores and Biographies; C. Box's English Game of Cricket (1877); History of a Hundred Centuries, by W. G. Grace (1895) ; History of the Middlesex County Cricket Club, by W. J. Ford (1900) ; History of the Cambridge University Cricket Club, by W. J. Ford (1902); History of Yorkshire County Cricket, by R. S. Holmes (1904) ; History of Kent County Cricket, ed. by Lord Harris, (1907); Annals of Lord's, by A. D. Taylor (1903) ; Curiosities of Cricket, by F. S. Ashley Cooper (1901) ; " Cricket," by Lord Hawke, in English Sport, by A. E. T. Watson (1903) ; Cricket, edited by H. G. Hutchinson (1903) ; Cricket Form at a Glance, by Home Gordon (1903) ; Cricket (Badminton Library), by A. G. Steel and Hon. R. H. Lyttleton (1904) ; Old English Cricketers, by Old Ebor (1900) ; Cricket in Many Climes, by P. F. Warner (1903) ; How We Recovered the Ashes,by P.F.Warner (1904) ; England v. Australia, by J. N. Pentelow (records from 1877 to 1904) (1904) ; The Jubilee Book of Cricket, by K. S. Ranjitsinhji

(1897)-

CRICKHOWELL, a market town of Brecknockshire, Wales, 14 m. E. of Brecon, beautifully situated on the left bank of the Usk, which divides it from Llangattock. Pop. (1901) 1150. The nearest railway stations are Govilon (5 m.) and Gilwern (4 m.) on the London & North-Western railway, but a mail and passenger motor service running between Abergavenny and Brecon passes through the town. It is also served by the Brecon & Newport Canal, which passes through Llangattock about a mile distant. Agriculture is almost the sole industry of the district. The town derives its name from a British fortress, Crug Hywel, commonly called Table Mountain, about 2 m.

N.N.E. of the town. Crickhowell Castle, of which only a tower remains, probably dated from the Norman conquest of the country. The manor of Crickhowell used to be regarded as a borough by prescription, but there is no record of its ever having possessed any municipal institutions. The church is in transi- tional Decorated style.

CRICKLADE, a market town in the Cricklade parliamentary division of Wiltshire, England, 9 m. N.W. of Swindon, on the Midland & South-Western Junction railway. Pop. (1901) 1517. It is pleasantly situated in the plain which borders the south bank of the Thames, not far from the Thames & Severn Canal. The cruciform church of St Sampson is mainly Per- pendicular, with a fine ornate tower, and an old rood-stone in its churchyard. The small church of St Mary has an Early English tower, Perpendicular aisles and a Norman chancel-arch. There is some agricultural trade.

Legend makes Cricklade the abode of a school of Greek philosophers before the Roman conquest, and the name is given as ” Greeklade ” in Drayton’s Polyolbion. It owed its importance in Saxon times to its position at the passage of the Thames. During the revolt of /Ethelwald the ˆEtheling in 905 he and his army ” harried all the Mercian’s land until they came to Cricklade and there they went over the Thames ” (Anglo-Sax. Chron. sub anno), and in 1016 Canute came with his army over the Thames into Mercia at Cricklade {ibid.). There was a mint at Cricklade in the time of Edward the Confessor and William I., and William of Dover fortified a castle here in the reign of Stephen. In the reign of Henry III. a hospital dedicated to St John the Baptist was founded at Cricklade, and placed under the government of a warden or prior. Cricklade was a borough by prescription at least as early as the Domesday Survey, and returned two members to parliament from 1295 until dis- franchised by the Redistribution Act of 1885. The borough was never incorporated, but certain liberties, including exemption from toll and passage, were granted to the townsmen by Henry III. and confirmed by successive sovereigns. In 1257 Baldwin de Insula obtained a grant of a Thursday market, and an annual three days’ fair at the feast of St Peter ad Vincula. The market was subsequently changed to Saturday, and was much frequented by dealers in corn and cattle, but is now inconsiderable. During the 14th century Cricklade formed part of the dowry of the queens of England. In the reign of Henry VI. the lordship was acquired by the Hungerford family, and in 1427 Sir Walter Hungerford granted the reversion of the manor to the dean and chapter of Salisbury cathedral to aid towards the repair of their belfry.

CRIEFF, a police burgh of Perthshire, Scotland, capital of Strathearn,

17! m. W. of Perth by the Caledonian railway. Pop. (1901) 5208. Occupying the southern slopes of a hill on the left bank of the Earn, here crossed by a bridge, it practically consists of a main street, with narrower streets branching off at right angles. Its climate is the healthiest in mid-Scotland, the air being pure and dry. Its charter is said to date from 1218, and it was the seat of the courts of the earls of Strathearn till 1747, when heritable jurisdictions were abolished. A Runic sculptured stone, believed to be of the 8th century, and the old town cross stand in High Street, but the great cattle fair, for which Crieff was once famous, was removed to Falkirk in 1770. It was probably in connexion with this market that the ” kind gallows of Crieff ” acquired their notoriety, for they were mostly used for the execution of Highland cattle-stealers. The principal

buildings are the town hall, tolbooth, public library, assembly rooms, mechanics’ institute, Morison’s academy (founded in 1859), and Strathearn House, a hydropathic establishment built on an eminence at the back of the town, and itself sheltered by the Knock of Crieff (911 ft. high). The industries consist of manufactures of cotton, linen, woollens and worsteds, and leather. Drummond Castle, about 3 m. S., is celebrated for its gardens. They cover an area of 10 acres, are laid out in terraces, and illustrate Italian, Dutch and French styles. They were planned by the 2nd earl of Perth (d. 1662), and take rank with the most magnificent in the United Kingdom. The keep of the castle dates from 1490, and much of the original building was demolished in 1689, a few years after its siege by Cromwell. The present structure was erected subsequent to the extinction of the Jacobite rebellion.

CRIME (Lat. crimen, accusation), the general term for offences against the Criminal Law {q.v.). Crime has been defined as ” a failure or refusal to live up to the standard of conduct deemed binding by the rest of the community.” Sir James Stephen describes it as ” some act or omission in respect of which legal punishment may be inflicted on the person who is in default whether by acting or omitting to act.” Such action or neglect of action may be injurious or hurtful to society. It is a wrong or tort, to be prevented and corrected by the strong arm of the law.

Crimes vary in character with times and countries. Under different circumstances of place and custom, that which at one time is denounced as a crime, at another passes as a meritorious act. It was once an imperative duty for the family to avenge the death of a kinsman, and the blood feud had a sanction that made killing no murder. Again, among primitive tribes to make away with parents at an advanced age or suffering from an incurable disease was a filial

duty. Polyandry was sometimes encouraged, and cannibalism practised with general approval; religious sentiment elevated into heinous crimes, blasphemy, heresy, sacrilege, sorcery and even science when it ran counter to accepted dogmas of the church. Offences multiplied when people gathered into communities and the rights of property and of personal security were understood and established. The law of the strongest might still interfere with individual ownership; the weakest went to the wall; authority, whether exercised by one master or by the combined government of the many, was resisted, and this resistance constituted crime. As civilization spread and the bulk of the population settled into orderliness, society, for its own comfort, convenience and protection, would not tolerate the infraction of its rules, and rising against all law- breakers decreed reprisals against them as the common enemy. Then began that constant warfare between criminals and the forces of law and order which has been continuously waged through the centuries with varying degrees of bitterness.

The combat with crime was long waged with great cruelty. Extreme penalties were thought to constitute the best deterrent, and the principle of vengeance chiefly inspired the penal law. The harshness of ancient codes makes a more humane age shudder. It was the custom to hang or decapitate, or otherwise take life in some more or less barbarous fashion, on the smallest excuse. The final act was preceded by hideous torture. It was performed with the utmost barbarity. Victims were put to death by breaking on the wheel, burning at the stake, by dis- memberment and flaying or boiling alive. These were the aggravations of the original idea of riddance, of checking crime by the absolute removal of the offender. Only slowly and gradually milder methods came into force. Revenge and retaliation were no longer the chief aims, the law had a larger mission than to coerce the criminal and force him by severity to mend his ways. To withdraw him for a lengthened period from the sphere of his baneful activity was something; to subject him to more or less irksome processes, to solitary confinement upon short diet, deprived of all the solaces of life, with severe labour, were sharp lessons limited in effect to those actually subjected to them, but too remote to deter the outside crowd of potential wrongdoers. The higher duty of the administrator

is to utilize the period of detention by labouring to reform the

criminal subjects and send them out from gaol reformed characters. If no very remarkable success has been achieved in this direction, it is obviously the right aim, and it is being more and more steadfastly pursued. But it is generally accepted in principle that to eradicate criminal proclivities and cut off recruits from the permanent army of crime the work must be undertaken when the subject is of an age susceptible of reform; hence the extreme value attaching to the more enlightened treatment of crime in embryo, a principle becom- ing more and more largely accepted in practice among civilized nations.

It may safely be asserted that the germ of crime is universally present in mankind, ever ready to show under conditions favour- able to its growth. Children show criminal tendencies in their earliest years. They exhibit evil traits, anger, resentment, mendacity; they are often intensely selfish, are strongly acquisi- tive, greedy of gain, ready to steal and secrete things at the first opportunity. Happily the fatal consequences that would other- wise be inevitable are checked by the gradual growth of inhibitory processes, such as prudence, reflection, a sense of moral duty, and in many cases the absence of temptation. From this Dr Nicholson deduces that ” in proportion as this development is prevented or stifled, either owing to an original brain defect or by lack of proper education or training, so there is the risk of the individual lapsing into criminal-mindedness or into actual crime.” In the lowest strata of society this risk is largely increased from the conditions of life. The growth of criminals is greatly stimulated where people are badly fed, morally and physically unhealthy, infected with any forms of disease and vice. In such circumstances, moreover, there is too often the evil influence of heredity and example. The offspring of criminals are constantly impelled to follow in their parents' footsteps by the secret springs of nature and pressure of childish imitativeness. The seed is thrown, so to speak, into a hot-bed where it finds congenial soil in which to take root and flourish.

Wherever crime shows itself it follows certain well-defined lines and has its genesis in three dominant mental processes, the result of marked propensities. These are malice, acquisitiveness and lust. Malicious crimes may be amplified into offences against the person originating in hatred, resentment, violent temper, and rising from mere assaults into manslaughter and murder. Crimes of greed and acquisitiveness cover the whole range of thefts, frauds and misappropriation; of larcenies of all sorts; obtaining by false pretences; receiving stolen goods; robberies; house-breaking, burglary, forgery and coining. Crimes of lust embrace the whole range of illicit sexual relations, the result of ungovernable passion and criminal depravity. The proportions in which these three categories are manifested have

been worked out in England and Wales to give the following figures. The percentage in any 100,000 of the population is: —

Crimes of malice 15%

Crimes of greed 75 %

Crimes of lust 10%

The members of these categories do not form distinct classes; their crimes are interdependent and constantly overlap. Crime in many is progressive and passes through all the stages from minor offences to the worst crimes. Murder — the culminating point of malice — is constantly preceded by petty larceny; theft by forcible entry; and robbery is associated with violence and armed resistance to capture. Criminality rising into its highest development shows itself under many forms. It is instinctive, passionate, accidental, deliberate and habitual, the outcome of abnormal appetite, of weak and disordered moral sense. The causation of crime varies, but a predominating motive is idleness, leading to the predatory instincts of gain easily acquired without the labour of continuous effort. To deprive the more industrious or more happily placed of their hard-won earnings or possessions, inspires the bulk of modern serious crime. It no doubt has produced one peculiar feature in modern crime: the extensive scale on which it is carried out. The greatest frauds are now commonly perpetrated; great robberies

are planned in one capital and executed in another. The whole is worked by wide associations of cosmopolitan criminals.

Other features of modern crime are especially interesting. It is extraordinarily precocious. Children of quite tender years commit murders, and boys and girls are frequently to be met with as professional thieves. Again, the comparative propor- tions of crime in the two sexes may be considered. Everywhere women are less criminal than men. Naturally they have fewer facilities for committing crimes of violence, although they have offences peculiar to their sex, such as infanticide, and are more frequently guilty of poisoning than men by 70 % against 30 %. Statistics presented to the Prison Congress at Stockholm fix the percentage of female criminals at 3 % in Japan, the East gener- ally, South America and some parts of North America. In some states of the American Union it is 10%; in China, 20 %; in Europe generally it varies between 10 % and 21%. In France the proportion of accused women is fifteen to eighty-five men. In Great Britain it is now one in four, but has been less. The total sentenced in

1905-1906 to penal servitude and imprisonment was 139,389 men and 44,294 women, the balance being made up by summary convictions. The curious fact in female crime is that one-seventh of the women committed to prison had already been convicted from eleven to twenty times. It has been well said from the above proportions that women are less criminal according to the figures, because when a woman wants a crime committed she can generally find a man to do it for her.

It has often been debated whether or not prison methods react upon the criminality of the country; whether, in other words, severity of treatment deters, while milder methods encourage the wrongdoers to despise the penalties imposed by the law. Evidence for and against the verdict may be drawn from the whole civilized world. In England, as judged by the increase or decrease of the prison population, it might be supposed that the prison system was at one time effective in diminishing crime. Between 1878 and 1891 there was a steady decrease in numbers because of it. More recently there has been an appreciable increase in the number of crimes and proportionately of those imprisoned. The figures for 1906 showed a distinct increase in criminality for that year as compared with the years immediately preceding. The proportion of indictable offences had increased in 1906 from 59,079 as against 50,494 in 1899, or m the proportion of 171-01 per 100,000 of the population as against 158-97, a very marked increase over earlier years. Nevertheless the figures for 1906, although high, are by no means the highest, as on eight occasions during the fifty odd years for which statistics were available in 1909 the total crimes exceeded 60,000, and in the quinquennial period i860- 1864 the annual average was 280 per 100,000 as compared with 171-01 for 1906 and 175 for the quin- quennial period 1902-1906. The quality of the crime varied, and while offences against property have increased, those against the person have constantly fallen. Quite half the whole number of crimes were committed by old offenders (see Recidivism) .

Statistics have not been kept with the same care in all other countries, but some authentic figures may be quoted for France, where the number of thefts increased while offences against the person diminished. In Belgium there has been a satisfactory decrease in recent years. In Prussia the prison population has on the whole increased, but there has been a slight diminution in more serious crime. Some very noticeable figures are forth- coming from the United States, and comparison is possible of the relative amount of' crime in the two countries, America and England. Here the want of statistics covering a large period is much to be regretted. On the general

question serious crime in the ten years between 1880 and 1890 slightly increased, while petty crime was very considerably less during the period. Charges for homicide have heen much more numerous. There were in 1880, 4608, or a ratio of 9-1 to 100,000 of the population; but in 1890 these offences rose to”735i, or a ratio of 11-7. Com- paring America with England, it has been calculated in round numbers that the proportion of prisoners to the general popula- tion was in the United States as 1 to every 759, and in England 1 to every 1764 persons. As regards the more serious crimes

the number in English convict prisons was as i to 10,000, and in the American state prisons (the corresponding institutions) the ratio was 1 to every 1358. In the lesser prisons, i.e. the English local prisons and the American city or county gaols, the numbers more nearly approximate, being in England 1 to 2143 and in America 1 to 1721. It has been argued that much of the crime in America is attributable to the preponderance of foreign immigrants, but the ratio of native born prisoners is that of 1237 to the million, of foreign born prisoners 1777 to the million.

Authorities. — A. MacDonald, Criminology (New York, 1893) ; A. Drahms, The Criminal (New York, 1900) ; E. Ferri, La Sociologie criminelle, trans. Ferrier (Paris, 1905) ; all these contain extensive bibliographies. See also under Criminoi.ogy. (A. G.)

CRIMEA (ancient Tauris or Tauric Chersonese, called by the Russians by the Tatar name Krym or Crim), a peninsula on the north side of the Black Sea, forming part of the Russian govern- ment of Taurida, with the mainland of which it is connected by the Isthmus of Perekop (3-4 m. across) . It is rudely rhomboid in shape, the angles being directed towards the cardinal points, and measures 200 m. between 44 23′ and 46 10′ N., and no m. between 32° 30′ and 36 40′ E. Its area is 9700 sq. m.

Its coasts are washed by the Black Sea, except on the north-east, where is the Sivash or Putrid Sea, a shallow lagoon separated from the Sea of Azov by the Arabat spit of sand. The shores are broken by several bays and harbours — on the west side of the Isthmus of Perekop by the Bay of Karkinit; on the south-west by the open Bay of Kalamita, on the shores of which the allies landed in 1854, with the ports of Eupatoria, Sevastopol and Balaklava; by the Bay of Arabat on

the north side of the Isthmus of Yenikale or Kerch; and by the Bay of Kaffa or Feodosiya (Theodosia), with the port of that name, on the south side of the same. The south-east coast is flanked at a distance of 5 to 8 m. from the sea by a parallel range of mountains, the Yaila-dagh, or Alpine Meadow mountains, and these are backed, inland, by secondary parallel ranges; but 75% of the remaining area consists of high arid prairie lands, a southward continuation of the Pontic steppes, which slope gently north-westwards from the foot of the Yaila-dagh: The main range of these mountains shoots up with extraordinary abruptness from the deep floor of the Black Sea to an altitude of 2000 to 2500 ft., beginning at the south-west extremity of the peninsula, Cape Fiolente (anc. Parthenium), supposed to have been crowned by the temple of Artemis in which Iphigeneia officiated as priestess. On the higher parts of this range are numerous flat mountain pastures (Turk, yailas), which, except for their scantier vegetation, are analogous to the almen of the Swiss Alps, and are crossed by various passes (bogaz) , of which only six are available as carriage roads. The most conspicuous summits in this range are the Demir-kapu or Kemal-egherek (5040 ft.), Roman-kosh (5060 ft.), Chatyr-dagh (5000 ft.), and Karabi-yaila (3975 ft.). The second parallel range, which reaches altitudes of 1500 to 1900 ft., likewise presents steep crags to the south-east and a gentle slope towards the north-west. In the former slope are thousands of small caverns, probably inhabited in prehistoric times; and several rivers pierce the range in picturesque gorges. A valley, 10 to 12 m. wide, separates this range from the main range, while another valley 2 to 3 m. across separates it from the third parallel range, which reaches altitudes of only 500 to 850 ft. Evidences of a fourth and still lower ridge can be traced towards the south-west.

A number of short streams, none of them anywhere navigable, leap down the flanks of the mountains by cascades in spring, e.g. the Chernaya, Belbek, Kacha and Alma, to the Black Sea, and the Salghir, with its affluent, the Kara-su, to the Sivash lagoon.

In point of climate and vegetation there exist marked differ- ences between the open steppes and the south-eastern littoral, with the slopes of the Yaila-dagh behind it. The former, although grasses and Liliaceae grow on them in great variety and luxuriance in the early spring, become completely parched up by July and August, while the air is then filled with clouds

of dust. There also high winds prevail, and snowstorms, hail- storms

and frost are of common occurrence. Nevertheless this region produces wheat and barley, rye and oats, and supports numbers of cattle, sheep and horses. Parts of the steppes are, however, impregnated with salt, or studded with saline lakes; there nothing grows except the usual species of Artemisia and Salsola. As a rule water can only be obtained from wells sunk 200 to 300 ft. deep, and artesian wells are now being bored in considerable numbers. All over the steppes are scattered numerous kurgans or burial-mounds of the ancient Scythians. The picture which lies behind the sheltering screen of the Yaila- dagh is of an altogether different character. Here the narrow strip of coast and the slopes of the mountains are smothered with greenery. This Russian Riviera stretches all along the south-east coast from Cape Sarych (extreme S.) to Feodosiya (Theodosia), and is studded with summer sea-bathing resorts — ■ Alupka, Yalta, Gursuv, Alushta, Sudak, Theodosia. Numerous Tatar villages, mosques, monasteries, palaces of the Russian imperial family and Russian nobles, and picturesque ruins of ancient Greek and medieval fortresses and other buildings cling to the acclivities and nestle amongst the underwoods of hazel and other nuts, the groves of bays, cypresses, mulberries, figs, olives and pomegranates, amongst the vineyards, the tobacco plantations, and gardens gay with all sorts of flowers; while the higher slopes of the mountains are thickly clothed with forests of oak, beech, elm, pines, firs and other Coniferae. Here have become acclimatized, and grow in the open air, such plants as magnolias, oleanders, tulip trees, bignonias, myrtles, camellias, mimosas and many tender fruit-trees. Vineyards cover over 19,000 acres, and the wine they yield (3! million gallons annually) enjoys a high reputation. Fruits of all kinds are produced in abundance. In some winters the tops of the mountains are covered with snow, but snow seldom falls to the south of them, and ice, too, is rarely seen in the same districts. The heat of summer is moderated by breezes off the sea, and the nights are cool and serene; the winters are mild and healthy. Fever and ague prevail in the lower-lying districts for a few weeks in autumn. Dense fogs occur sometimes in March, April and May, but seldom penetrate inland. The difference of climate between the different parts of the Crimea is illustrated by the following data: annual mean, at Melitopol, on the steppe N. of Perekop, 48 Fahr.; at Simferopol, just within the mountains, 50 ; at Yalta, on the south-east coast, 56-5°; the respective January means being 20 , 31 and 39-5°, and the July means 74 , 70 and 75-5°. The rainfall is small all over the peninsula, the annual average on the steppes being 13-8 in., at Simferopol 17-5, and at Yalta 18 in. It varies greatly, however, from year to year; thus at Simferopol it ranges between the extremes of 7-5 and 26-4 in.

Other products of the Crimea, besides those already mentioned, are salt, porphyry and limestone, ‘and ironstone has recently been brought to light at Kerch. Fish abound all round the coast, such as red and grey mullet, herring, mackerel, turbot, soles, plaice, whiting, bream, haddock, pilchard, a species of pike, whitebait, eels, salmon and sturgeon. Manufacturing industries are represented by shipbuilding, flour-mills, ironworks; jam and pickle factories, soap-works and tanneries. The Tatars excel in a great variety of domestic industries, especially in the working of leather, wool and metal. A railway, coming from Kharkov, crosses the peninsula from north to south, terminating at Sevastopol and sending off branch lines to Theodosia and Kerch.

The bulk of the population consist of Tatars, who, however, are racially modified by intermarriage with Greeks and other ethnic elements. The remainder of the population is made up of Russians, Germans, Karaite Jews, Greeks and a few Albanians. The total in 1897 was 853,900, of whom only 150,000 lived in the towns. Simferopol is the chief town; others of note, in addition to those already named, are Eupatoria and Bakhchi- sarai, the old Tatar capital.

History. — The earliest inhabitants of whom we have any authentic traces were the Celtic Cimmerians, who were expelled

*.a

45°

CRIMEAN WAR

by the Scythians during the 7th century B.C. A remnant, who took refuge in the mountains, became known subsequently as the Tauri. In that same century Greek colonists began to settle on the coasts, e.g. Dorians from Heraclea at Chersonesus, and Ionians from Miletus at Theodosia and Panticapaeum (also called Bosporus). Two centuries later (438 B.C.) the archon or ruler of the last-named assumed the title of king of Bosporus, a state which maintained close relations with Athens, supplying that city with wheat and other commodities. The last of these kings, Paerisades V., being hard pressed by the Scythians, put himself under the protection of Mithradates VI., king of Pontus, in 114 B.C. After the death of this latter sovereign his son Pharnaces, as a reward for assistance rendered to the Romans in their war against his father, was (63 B.C.) invested by Pompey with the kingdom of Bosporus. In 15 B.C. it was once more restored to the king of Pontus, but henceforward ranked as a tributary state of Rome. During the

succeeding centuries the Crimea was overrun or occupied successively by the Goths (a.d. 250), the Huns (376), the Khazars (8th century), the Byzantine Greeks (1016), the Kipchaks (1050), and the Mongols (1237). In the 13th century the Genoese destroyed or seized the settlements which their rivals the Venetians had made on the Crimean coasts, and established themselves at Eupatoria, Cembalo (Balaklava), Soldaia (Sudak), and Kaffa (Theodosia), flourishing trading towns, which existed down to the conquest of the peninsula by the Ottoman Turks in 1475- Meanwhile the Tatars had got a firm footing in the northern and central parts of the peninsula as early as the 13th century, and after the destruction of the Golden Horde by Tamerlane they founded an independent khanate under a descendant of Jenghiz Khan, who is known as Hadji Ghirai. He and his successors reigned first at Solkhat (Eski-krym), and from the beginning of the 15th century at Bakhchi-sarai. But from 1478 they ruled as tributary princes of the Ottoman empire down to 1777, when having been defeated by Suvarov they became dependent upon Russia, and finally in 1783 the whole of the Crimea was annexed to the Russian empire. Since that date the only important phase of its history has been the Crimean War of 1854-56, which is treated of under a separate article. At various times, e.g. after the acquisition by Russia, after the Crimean War of 1854-56, and in the first years of the 20th century, the Tatars emigrated in large numbers to the Ottoman empire.

See Antiquites du Bosphore cimmerien (3 vols., St Petersburg, 1854); C. Bossoll, The Beautiful Scenery of the Crimea (52 large drawings, London, 1855-1856); P. Brunn, Notices hist, et topogr. concernant les colonies italiennes en Gazarie (St Petersburg, 1866); J. B. Telfer, The Crimea and Transcaucasia (2 vols., London, 2nd ed., 1877); F. Remy, Die Krim in ethnographischer , landschaftlicher und hygienischer Bcziehung (Leipzig, 1872); Joseph, Baron von Hammer- Purgstall, Geschichte der Chane der Krim unter osmanischer Herrschaft (Vienna, 1856); M. G. Canale, Delia Crimea e dei suoi dominatori dalle sue origini fino al trattato di Parigi (3 vols., Genoa, 1855- 1856) ; and Sir Evelyn Wood, The Crimea in 1854 and 18(14 (London, 1895). (See also Bosporus Cimmerius.) (P. A. K.; J. T. Be.)

CRIMEAN WAR. The war of 1853-56, usually known by this name, arose from causes the discussion of which will be found under the heading Turkey: History. When Turkey, after a period of irregular fighting, declared war on Russia in October 1853, Great Britain and France (subsequently assisted by Sardinia) intervened in the quarrel. At first this intervention was represented merely by the presence of an allied squadron in the Bosporus, but the storm of indignation aroused in Great Britain and France by the destruction of the Turkish fleet at

Sinope (30th November) soon impelled these powers to more active measures. On the 27th of January 1854 they declared war on the tsar, and prepared to carry their armaments to the Danube. In this, the main, theatre of war, the Turks had hitherto proved quite capable of holding their own. The Russian commander, Prince Michael Gorchakov, had crossed the Pruth with two corps early in July 1853, and had overrun Moldavia and Wallachia without difficulty. Omar Pasha, however, disposing of superior forces, was able to check any further advance. During October, November and December the Turks won a succession of actions, of which that at Oltenitza

(Nov. 4th) may be particularly mentioned, and a little later Gorchakov found himself compelled to fight at Cetatea (Tchetati) before reinforcements could come up. The defeat he sustained was for the time being decisive (6th Jan. 1854). Three months later, the Russians, now under command of the veteran Prince Paskievich, took the offensive in great force. Crossing the Danube near its mouth atˆGalatz and Braila, they advanced through the Dobrudja and closed upon the fortress of Silistria, which offered a strong and steady resistance, with an effect all the greater as the Turks from the side of Shumla, now supported by the leading British and French brigades at Varna, prevented a close investment. The Turks, however, avoided a decisive encounter, and the stormers stood ready in the trenches before Silistria, when the siege was suddenly raised. The decision had passed into other hands. The tsar had learned that the Austrian army of observation in Transylvania, 50,000 strong under Feldzeugmeister Hess, was about to enforce the wishes of the ” Four Powers.” The Russian offensive was at an end, the

\ \ N

Hˆs”* 8 ^^ ”

Seat of

>^’ . ‘

CRIMEAN WAR

pidFm\ \

English Miles

w \ \

(

. . 5 ■< >

^$~tj Simferoj»5g

B L A C

wm$$

%1SL ArfH&USsL^^

fti^jsA^ifSF

% 1

>’ \^^«^*

w* w^^jjf^(

l%5»»/ — ~^$$ S %*

s^^Sifw

V ,Zj**»/W^S,

j* ‘ J^*-

^^tjMffh -A^J^^Kwk

SEA

Y~*t?*^ **, -Jin

^^^^^*

t^^f^^ciT^Jt

C^’^2

>#^#

vbt^Q 1 ”’^^”’’■^ ivl

^^^^^^ESv

f\ Sevastopo

H x’%w*&” 3>»&«»!

f^Sia^i ‘ 1 “t^lf^lV^

\WU T h T^Up la

^ js&SIIkS

E.W. sc.

*^s^w%jlk

army hastily fell back, and on the 2nd of August 1854 the last man recrossed the Pruth. The principalities were at once occupied by Hess.

The Invasion of the Crimea.— The primary object of the war had thus easily been obtained. But Great Britain and France were by no means content with a triumph that left untouched the vast resources of an enemy who was certain to employ them at the next opportunity. The two nations felt that Sevastopol, the home of the Black Sea fleet, the port whence Admiral Nachimov had sailed for Sinope, must be crippled for some years at least, and as early as June 29th Lord Raglan and Marshal Saint Arnaud, the allied commanders of England and France, had received instructions to ” concert measures for the siege of Sevastopol.” Dynastic considerations reinforced the argu ments of policy and popular opinion in the case of France; in Great Britain soldier and civilian alike saw the menace of a Russian Mediterranean fleet in the unfinished forts and busy dockyards. The popular strategy for once coincided with the views of the responsible leaders. Yet there is no sign that either the commanders on the spot or their governments realized the magnitude of the undertaking. Few but the most urgently necessary preparations were made, and cholera, breaking out virulently amongst the French at this time, reduced the army

at Varna, and even the fleet at sea, to impotence. The troops were so weakened that, even in September, the five-mile march from camp to transport exhausted most of the men. Heavy weather still further delayed the start, and it was not until the 7th of September that the expedition began to cross the Black Sea. One hundred and fifty war-vessels and transports conveyed the army, which, guarded on all sides by the fighting fleet, crossed without incident and drew up on the Crimean coast on September 13th. Tactical considerations prevailed in the choice of place. The landlocked harbours south of Sevastopol were

for the time being neglected, and a spot known as Old Fort preferred, because the long beach, the heavy metal of the ships' broadsides, and a line of lagoons covering the front offered singularly favourable conditions for the delicate operation of disembarkation. Still, on this side of Sevastopol there was no good harbour, and it is quite open t<5 question whether in this case the strategic necessities of the situation were not neglected in favour of purely tactical and temporary advantages. As a matter of fact no opposition was offered to the landing, but the weather prevented the disembarkation being completed until the 18th. St Arnaud and Raglan had at this time under their 1 orders 51,000 British, French and Turkish infantry, 1000 British cavalry, and 128 guns, and on the 19th this force (less some detachments) began the southward march in order of battle, the British (who alone had their cavalry present) on the exposed left flank, the French next the sea, the fleet moving in the same direction parallel to the troops.

The Alma. — Old Fort was beyond the reach of Menshikov, the Russian commander, but, as the fortress communicated with the interior of Russia via Kerch and Simferopol, it was to be expected that he would either accept battle on the Sevastopol road, or cover Simferopol by a flank attack on Lord Raglan. Both these contingencies were provided for by the order of march, and in due course it was ascertained that the Russians adopted the former alternative, and barred the Sevastopol road on the heights of the river Alma. Menaced by the guns of the fleet, Menshikov had wheeled back his left, and at the same time he strengthened his right in order to cover the Simferopol road. From this it followed naturally that the brunt of the attack fell upon the British divisions, whilst the French, nearer the sea, struck to some extent dans le vide. The two commanders, after a reconnaissance, decided upon their plan. The French divisions in echelon from the right were to cross the river and force Men- shikov inwards, whilst the British were to move straight to their front against the strongest part of the Russian line. Substantially this plan was carried out on the 20th of September. Owing to want of men (he had but 36,400 against over 50,000) Menshikov was unable to hold his left wing very strongly, and the French were scarcely checked save by physical obstacles; but opposite the British force the ground sloped glacis-wise up to the Russian line, and nothing but their iron discipline, the best heritage of the Peninsular War, brought them victorious to the crest of Kurghane hill. The Russians had no option but to retreat, which they did without molestation. The allies lost about 3000 men, mostly British (though Prince Napoleon's men also suffered heavily); the Russians reported 5709 casualties.

The March on Sevastopol. — On the 23rd of September the advance was resumed, and by the 25 th Sevastopol was in full view of the allied outposts. It was now that the necessary consequences of the choice of Old Fort as the landing-place presented themselves as a problem for instant solution. What- ever chance there had been of assaulting the north side of Sevastopol was now gone. Menshikov had sacrificed some ships in order to seal up the harbour mouth, and naval co-operation in attack was now impossible, while the other Russian ships could in safety aid the defenders with their heavy guns. A siege, based on the beach of Old Fort or the open roads of Kacha, was out of the question, as was re-embarkation for a fresh landing. There remained only a flank march by Mackenzie's farm and the river Chernaya. Once established on the south side, the allies could use the excellent harbours of Kamiesh and Balaklava ; this could almost certainly be effected without

fighting, while in besieging Sevastopol itself and not merely the north side, the allies would be striking at the heart. But a flank march is almost always in itself a hazardous undertaking, and in this case the invaders were required further to abandon their line of retreat on Old Fort. In point of fact, the army, covered by a division opposite the Russian works, successfully accomplished the task. At the same moment Menshikov, after providing for the defence of Sevastopol, had marched out with a field army towards Bakhchiserai, and on the 25th of September each army, without knowing it, actually crossed the other's front. On arrival at Balaklava the allies regained contact with the fleet, and the detachment left on the north side, its mission being at an end, followed the same route and rejoined the main body. The French now took possession of Kamiesh, the British of Balaklava.

Beginning of the Siege. — Thus secured, the allies closed upon the south side of the fortress. A siege corps was formed, and the British army and General Bosquet's French corps covered its operations against interruption from the Russian field army. The harbour of Sevastopol, formed by the estuary of the Chernaya, was protected against attack by sea not only by the Russian war-vessels, afloat and sunken, but also by heavy granite forts on the south side and by the works which had defied the allies on

■ˆ Russian Works

1. Whit* Works j. The Redan t. Ualakaff 6. Flagstaff

j. Uamelon 7. Central Bastlo

e.Uttle Hedaa <• at

SEVASTOPOL

1854-1856

English Mile! •A • ?

the north. For the town itself and the Karabelnaya suburb the trace of the works had been laid down for years. The Malakoff, a great tower of stone, covered the suburb, flanked on either side by the Redan and the Little Redan. The town was covered by a line of works marked by the Flagstaff and central bastions, and separated from the Redan by the inner harbour. Lieut.-Col. Todleben, the Russian chief engineer, had very early begun work on these sites, and daily re-creating, rearming and improving the fortifications, finally connected them by a continuous enceinte. Yet Sevastopol was not, early in October 1854, the towering fortress it afterwards became, and Todleben himself maintained that, had the allies immediately assaulted, they would have succeeded in taking the place. There were, however, many reasons against so decided a course, and it was not until the 17th of October that the first attack took place. All that day a tremendous artillery duel raged. The French siege corps lost heavily and its guns were overpowered. The fleet engaged the harbour batteries close inshore, and suffered a loss of 500 men, besides severe damage to the ships. On the other hand the British siege batteries silenced the Malakoff and its annexes, and, if failure had not occurred at the other points of attack, an assault might have succeeded. As it was, Todleben, by daybreak, had repaired and improved the damaged works. Meanwhile General Canrobert had succeeded St Arnaud (who died on the 29th of September) in the joint leadership of

the allies. It was not long before Menshikov and the now augmented field army from Bakhchiserai appeared on the Chernaya and moved towards the Balaklava lines and the British base.

Balaklava.— A long line of works on the upland secured the siege corps from interference, and the Balaklava lines themselves were strong, but the low Vorontsov ridge between the two was weakly held, and here the Russian commander hoped to sever the line of communications. On the 25th of October .Liprandi's corps carried its slight redoubts at the first rush. But the British cavalry stationed at the

foot of the upland was situated on their flank, and as the Russian cavalry moved towards Kadikoi, the ” Heavy Brigade ” under General Scarlett charged home with such effect that Menshikov’s troopers only rallied behind their field batteries near Traktir bridge. At the same time some of the Russian squadrons, coming upon the British 93rd regiment outside the Balaklava lines, were completely broken by the steady volleys of the ” thin red line.” The ” Light Brigade ” of British cavalry, farther north, had hitherto remained inactive, even when the Russians, broken by the ” Heavies,” fled across their front. The cavalry commander, Lord Lucan, now received orders to prevent the withdrawal of the guns taken by Liprandi. The aide-de-camp who carried the order was killed by the first shell, and the whole question of responsibility for what followed is wrapped in obscurity. Lord Cardigan led the Light Brigade straight at the Russian field batteries, behind which the enemy’s squadrons had re-formed. From the guns in front, on the Fedukhin heights, and on the captured ridge to their right, the advancing squadrons at once met a deadly converging fire, but the gallant troopers nevertheless reached the guns and cut down the artillerymen. Small parties even charged the cavalry behind, and at least two unbroken squadrons struck out right and left with success, but the combat could only end in one way. The 4th Chasseurs d’Afrique relieved the British left by a dashing charge. The ” Heavies ” made as if to advance, but came under such a storm of fire that they were withdrawn. By twos and threes the gallant survivors of the ” Light Brigade ” made their way back. Two-thirds of its numbers were left on the field, and the day closed with the Russians still in possession of the Vorontsov ridge.

Inkerman. — If the heights lost in this action were not absolutely essential to the safety of the allies, the point selected for the next attempt at relief was of vital importance. The junction of the covering army and the siege corps near Inkerman was the scene of a slight action on the day following Balaklava, and the battle of Inkerman followed on the 5th of November. By that time the French had made good the losses of the 17 th of October, their approaches were closing upon Flagstaff bastion, and the British batteries daily maintained their superiority over the Malakoff. On the 5th there was to have been a meeting of generals to fix the details of an assault, but at dawn the Russian army, now heavily reinforced from Odessa, was attacking with the utmost fury the British divisions guarding the angle between Bosquet and the siege corps. The battle of Inkerman defies description; every regiment, every group of men bore its own separate part in the confused and doubtful struggle, save when leaders on either side obtained a momentary control over its course by means of reserves

which, carrying all before them with their original impetus, soon served but to swell the melee. It was a ” soldiers’ battle ” pure and simple. After many hours of the most desperate fighting the arrival of Bosquet (hitherto contained by a force on the Balaklava ground) confirmed a success won by supreme tenacity against overwhelming odds, and Menshikov sullenly drew off his men, leaving over 12,000 on the field. The allies had lost about 3300 men, of whom more than two-thirds belonged to the small British force on which the strain of the battle fell heaviest. Their losses included several generals who could ill be spared, but they had held their ground, which was all that was required of them, with almost unrivalled tenacity. Lord Raglan was promoted to be field marshal after the battle.

The Winter of 1854-1855. — It was now obvious that the army

must winter in the Crimea, and preparations in view of this were begun betimes. But on the night of November 14th a violent storm arose which wrecked nearly thirty vessels with their precious cargoes of treasure, medical comforts, forage, clothing and other necessaries. After so grave a calamity it was to be expected that the troops would be called upon to undergo great hardships. But the direct cause of sufferings that have become a byword for the utmost depths of misery was the loss of twenty days’ forage in the great storm. Of food and clothing enough was in store to tide over temporary diffi- culties, but the only paved road from Balaklava to the British camps was now in Russian hands, and the few starving transport animals were utterly inadequate for the work of drawing wagons over the miry plain; things went from bad to worse with Raglan’s troops, until from the outposts before the Redan to the hospitals at Scutari a state of the utmost misery prevailed, relieved only by the example of devotion and self-sacrifice set by officers and men. The British hospital returns showed eight thousand sick at the end of November. Even the French, whose base of Kamiesh had escaped the storm, were not unhurt by the severity of the winter, but Napoleon III. sent freely all the men his general asked, while the Russians in Sevastopol, who had made long painful marches from the interior, were the survivors of the fittest. Canrobert took over the lines before the Malakoff to relieve the British. He had at the end of January 1855 78,000 men for duty; Raglan could barely muster 12,000. But, with the advent of spring, paved roads and a railway were promptly taken in hand, and during the remainder of the war the British troops were so well cared for that their death-rate was lower than at home, while the hospitals in rear, thanks to the energy and devotion of Florence Nightingale and her nurses, became models of good management.

Course of the Siege. — Meanwhile the siege works were making but slow progress, and the fortress grew day by day under the skilful direction of Todleben. Rifle-pits pushed out in front of the defenders' lines were connected so as to form a veritable envelope. Beyond the left wing a new line, the " White Works," sprang up in a single night, and the hill of the Mamelon was suddenly crowned with a lunette to cover the still defiant Malakoff. But the absence of bomb-proof cover exposed the huge working parties necessary for these defences to an almost incessant feu d'enfer, by which the Russians every week suffered the losses of a pitched battle. Meanwhile the field army was idle, Menshikov had been replaced by Prince Michael Gorchakov, Liprandi's corps had withdrawn from the Vorontsov ridge, and Omar Pasha, with a detachment of the troops he had led at Oltenitza and Cetatea, repulsed a Russian attack on Eupatoria (Feb. 17th). The besiegers steadily approached the White Works, Mamelon, Redan and Flagstaff bastion, and as spring arrived the logistic and material advantages of the allies returned. On Easter Sunday (April 8th, 1855) another terrific bombardment began, which lasted almost uninterruptedly for ten days. The White Works and the Mamelon were practically destroyed, and the Russians, drawn up in momentary expectation of assault, lost between six and seven thousand men.

But the bombardment ceased, and assault did not follow. For, at the allied headquarters and at Paris, grave differences of opinion on the conduct of the war had developed. Napoleon III. wished active operations to be undertaken against the Simferopol field army, whereas the leaders on the spot, while admitting the theoretical soundness of the French emperor's views, considered that they were wholly beyond the means of the two armies. The discussions culminated in Canrobert's resignation of the chief command, though he would not leave the army, and took a subordinate post, which he filled with great distinction to the end of the war. His successor, General Pelissier, was a soldier trained in the hard school of Algerian warfare, and endowed, as was soon evident, with the most inflexible resolution of character. He did not hesitate to take up and maintain a position of decided opposition to his sovereign's views; and the capture of Kerch (24th May 1855), carried out by a joint expedition, was the first earnest of new vigour in the

operations. This success served all the purposes of a complete investment of Sevastopol, the want of which had greatly troubled the

allied generals. The line of communication and supply between Sevastopol and the interior was cut, vast stores intended for the fortress were destroyed, and the sea of Azov was cleared of shipping. On the 25 th Canrobert established himself on the Fedukhin heights, his right continued along the Chernaya by General la Marmora's newly arrived Sardinians, 15,000 strong, while masses of Turks occupied the Vorontsov ridge and the old Balaklava battlefield.

As June approached, Raglan and Pelissier, who, unlike most allied commanders, were in complete accord and sympathy, initiated very vigorous methods of attack. They decided that the works west of Flagstaff could be comparatively neglected, and the full weight of the bombardment once more fell upon the Mamelon and the Malakoff. Once more these works were reduced to ruins, but the rest of the defences still held out.

The Assault of the Redan. — On the 7 th of June 1855 the French stormed the Mamelon and the White Works, the British captured and maintained some quarries close to the Redan, and next morning the whole of Todleben's envelope had become a siege- parallel. The losses were, as usual, heavy, 8500 to the Russians, 6883 to the allies. This was merely a preliminary to the great assault fixed for the 18th, the fortieth anniversary of Waterloo. But meanwhile Pelissier's temper and Raglan's health had been strained to breaking-point by continued dissensions with Paris and London. The telegraph, a new strategic factor, daily tormented the unfortunate commanders with the latest ideas of the Paris strategists, and on the fateful day the two armies rushed on to failure. The French attack on the Malakoff dwindled away into a meaningless fire-fight: the British, attacking the Redan in face of a cross-fire of one hundred heavy guns, at first succeeded in entering the work, but in the end sustained a bloody and disastrous repulse. Of the six generals who led the two attacks, four were killed and one wounded, and on the 17 th and 18th the losses to the Russians were 5400, to the allies 4000. But the defenders' resources were almost at an end, and the bombardment reopened at once with increased fury. On the 20th Todleben was wounded, and soon afterwards Nakhimov, the victor of Sinope, found a grave by the side of three other admirals who had fallen in the defence. Pelissier resolutely clung to his plans, in spite of the failure of the 18th, against ever-increasing opposition at home. Raglan, worn out by his troubles and heartbroken at the Redan failure, died on the 28th, mourned by none more deeply than by his stern colleague.

The Storming of the Malakoff. — During July the Russians lost on an average 250 men a day, and at last it was decided that Gorchakov and

the field army must make another attack at the Chernaya — the first since Inkerman. On the 16th of August the corps of Generals Liprandi and Read furiously attacked the 37,000 French and Sardinian troops on the heights above Traktir Bridge. The assailants came on with the greatest determination, but the result was never for one moment doubtful. At the end of the day the Russians drew off baffled, leaving 260 officers and 8000 men on the field. The allies only lost 1700. With this defeat vanished the last chance of saving Sevastopol. On the same day (Aug. 16th) the bombardment once more reduced the Malakoff and its dependencies to impotence, and it was with absolute confidence in the result that Pelissier planned the final assault. On the 8th of September 1855 at noon, the whole of Bosquet's corps suddenly swarmed up to the Malakoff. The fighting was of the most desperate kind. Every casemate, every traverse, was taken and retaken time after time, but the French maintained the prize, and though the British attack on the Redan once more failed, the Russians crowded in that work became at once the helpless target of the siege guns. Even on the far left, opposite Flagstaff and Central bastions, there was severe hand-to-hand fighting, and throughout the day the bom- bardment mowed down the Russian masses along the whole line. The fall of the Malakoff was the end of the siege. All night the Russians were filing over the bridges to the north side, and on

the 9th the victors took possession of the empty and burning prize. The losses in the last assault had been very heavy, to the allies over 10,000 men, to the Russians 13,000. No less than nineteen generals had fallen on that day. But the crisis was surmounted. With the capture of Sevastopol the war loses its absorbing interest. No serious operations were undertaken against Gorchakov, who with the field army and the remnant of the garrison held the heights at Mackenzie's Farm. But Kinburn was attacked by sea, and from the naval point of view the attack is interesting as being the first instance of the employment of ironclads. An armistice was agreed upon on the 26th of February and the definitive peace of Paris was signed on the 30th of March

1856.

Decisive Importance of the Victory. — The importance of the siege of Sevastopol, from the strategical point of view, lies beneath the surface. It may well be asked, why did the fall of a place, at first almost unfortified, bring the master of the Russian empire to his knees? At first sight Russia would seem to be almost invulnerable to a sea power, and no first success, however crushing, could have humbled Nicholas I. Indeed the capture of Sevastopol in October 1854 would

have been far from decisive of the war, but once the tsar had decided to defend to the last this arsenal, the necessity for which he was in the best position to appreciate, the factor of unlimited resources operated in the allies' favour. The sea brought to the invaders whatever they needed, whilst the desert tracks of southern Russia were marked at every step with the corpses of men and horses who had fallen on the way to Sevastopol. The hasty nature, too, of the fortifica- tions, which, daily crushed by the fire of a thousand guns, had to be re-created every night, made huge and therefore unprotected working parties necessary, and the losses were correspondingly heavy. The double cause of loss completely exhausted even Russia's resources, and, when large bodies of militia appeared in line of battle at Traktir Bridge, it was obvious that the end was at hand. The novels of Tolstoy give a graphic picture of the war from the Russian point of view; the miseries of the desert march, the still greater miseries of life in the casemates, and the almost daily ordeal of manning the lines under shell-fire to meet an assault that might or might not come; and no student of the siege can leave it without feeling the profoundest respect for the courage, discipline and stubborn loyalty of the defenders.

Minor Operations. — A few words may be added on the minor operations of the war. The Asiatic frontier was the scene of severe fighting between the Turks and the Russians. Hindered at first by Shamyl and his Caucasian mountaineers, the Russians stood on the defensive during 1853, but next year they took the offensive, and, while their coast column won an action on the 16th of June at the river Churuk, another force from Erivan gained an important success on the Araxes and took Bayazid, and General Bebutov completely defeated a Turkish column from Kars at Kuruk Dere (July 31st, 1854). Next year Count Muraviev completely isolated the garrison of Kars, which made a magnifi- cent defence, inspired by Fenwick Williams Pasha and other British officers. In one assault alone 7000 Russians were killed and wounded, and it was not until the 26th of November 1855 that the fortress was forced to surrender. The naval operations in the Baltic furnish many interesting examples for the study of naval war. The allied fleet in 1854, after a first repulse, succeeded in landing a French force under Baraguay d'Hilliers before Bomarsund, and the place fell after an eight days' siege. In 1855 seventy allied warships appeared before Kronstadt, which defied them. Reinforced they attacked Sveaborg, but after two days' fighting had to draw off baffled.

The numbers engaged in the Crimean War and the cost in men and money is stated in round numbers below. In May 1855 the Crimean theatre of war occupied 174,500 allies (of whom 32,000 were British)

and 170,000 Russians. The losses in battle were: allies 70,000 men, Russians 128,700; and the total losses, from all causes and in all theatres of the war: allies 252,600 (including 45,000 English), Russians 256,000 men (Berndt, Die Zahl im Kriege, p. 3 5) . In the siege of Sevastopol the Russians are stated by Berndt to have lost 102,670 men dead, wounded and missing.

Mulhall (Diet, of Statistics, 1903 ed., pp. 586-587) gives much greater losses to each of the four powers principally engaged. The cost of the war in money is stated by Mulhall to have been £69,000,000 to Great Britain, £93,000,000 to France, £142,000,000 to Russia.

Authorities. — Of the many works on the Crimean War those of the greatest value are the following. English : the official work on the Siege of Sebastopol; A. VV. Kinglake, The Invasion of the Crimea (London, 1863 ; ” Student’s edition ” by Sir G. S. Clarke) ; Sir E. B. Hamley, The War in the Crimea (London, 1891) ; (Sir) W. H. Russell, The War in the Crimea (London, 1855-1856); Sir Evelyn Wood, The Crimea in 1854 and in 1894 (London, 1895); Sir D. Lysons, The Crimean War from First to Last (London, 1895) ; Col. A. Lake, The Defence of Kars (London, 1857). French: Official, Guerre de VOrient, Hist, de I’artillerie (Paris, 1859); (Marshal Niel), Siege de Sebastopol (official account of engineer operations, Paris, 1858), and Atlas historique et topographique de la guerre de Crimee (see also the map of Russia by the French staff, sheets 56 and 57) ; Baron C. de Bazancourt, L’ Expedition de Crimee (Paris, 1856) ; C. Rousset, Histoire de la guerre de Crimee (Paris, 1877). Russian: the work of Todleben, Die Vertheidigung von Sebastopol (St Petersburg, 1864) ; Defense de Sebastopol (St Petersburg, 1863); Anitschkoff, Feldzug in der Krim (German trans., Berlin, 1857); Bogdanovitch, Der Orient-krieg (St Petersburg, 1876); Petroff, Der Donaufeldzug Russlands gegen Tiirkei (German trans., Berlin, 1891). Of German works the most useful are : Kunz, Die Schlachten und Treffen des Krimkrieges (Berlin, 1889); Der Feldzug in der Krim; Sammlung der Berichte beider Parteien (Leipzig, 1855-1856). (C. F. A.)

CRIMINAL LAW. By criminal, or penal, law is now understood the law as to the definition, trial and punishment of crimes, i.e. of acts or omissions forbidden by law which affect injuriously public rights, or constitute a breach of duties due to the whole community. The sovereign is taken to be the person injured by the crime, as he

represents the whole community, and prosecu- tions are in his name. Criminal law includes the rules as to the prevention, the investigation, prosecution and punishment of crime (q.v.). It lays down what constitutes a criminal offence, what proof is necessary to establish the fact of a criminal offence and the culpability of the offender, what excuse or justification for the act or omission can be legally admitted, what procedure should be followed in a criminal court, what degrees and kinds of punishment should be imposed for the various offences which come up for trial. Finally, it regulates the constitution of the tribunals established for the trial of offences according to the gravity of the infraction of law, and deals with the organization of the police and the proper management of prisons, and the maintenance of prison discipline. (See Evidence; Prison; Police.)

Many acts or omissions, which are technically criminal and classified as offences and punished by fine or imprisonment, cannot be said to have a strictly criminal character, since they do not fall within the popular conception of crime. To this class belong such matters as stopping up a highway under claim of right, or failing to repair it, or allowing a chimney to emit black smoke in excessive quantities, or to catch fire from being unswept, or breach of building by-laws, or driving a motor car on a highway at a speed in excess of the legal limit. Such breaches of law are under the French law described as contraventions. In England most of them are described as petty misdemeanours or offences punishable on summary conviction, or less happily as ” summary offences,” and some writers speak of them as mala prohibita as distinguished from mala in se, i.e. as not in- volving any breach of ordinary morality other than a breach of positive regulations. Continental jurists at times speak of crimes de droit commun (i.e. offences common to all systems of law as distinguished from offences which are crimes only by a particular municipal law) . To this class of crimes de droit commun belong most of the offences included in extradition treaties.

Criminal and civil law overlap, and many acts or omissions are not only ” wrongs ” for which the person injured is entitled to recover compensation for his own personal injury or damage, but also ” offences ” for which the offender may be prosecuted and punished in the interest of the state. In non-English European systems care is taken to prevent civil remedies from being extinguished by punishment: it is quite usual for the civil and criminal remedies to be pursued concurrently, the

individual appearing as partie civile and receiving an award of compensation by the judgment which determines the punishment to

be inflicted for the offence against the state. Under English law it is now exceptional to allow civil and criminal remedies to be pursued concurrently or in the same proceeding, or to award compensation to the injured party in criminal proceedings, and he is usually left to seek his remedy by action. Among the exceptions are the restitution of stolen goods on conviction of the thief if the prosecution has been at the instance or with the aid of the owner of the goods (Larceny Act 1861, § 100), and the award of compensation to persons who have suffered injury to property by felony (Forfeiture Act 1870).

As Sir Henry Maine says (Ancient Law, ed. 1906, p. 381), ” All civilized systems of law agree in drawing a distinction between offences against the state or community (crimes or Develop- crimina) and offences against the individual (wrongs, mentot torts or delicto) .” But the process of historical develop- modem ment by which this distinction has been ultimately « rim/na/ established has given great occasion for study of early laws and institutions by eminent men, whose researches have disclosed the extremely gradual evolution of the modern notion of criminal law enforced by the state from the primitive conceptions and customs of barbarous or semi-civilized com- munities. Of the oldest codes or digests of customs which are available to the student it has been said the more archaic a code the fuller and minuter is its penal legislation: but this penal legislation is not true criminal law; it is the law, not of crimes, but of wrongs. The intervention of the community or tribe is in the first instance to persuade or compel the wronged person or his family or tribe to abandon private vengeance or a blood feud and to accept compensation for the wrong collectively or individually sustained; and in the tariffs of compensation preserved in early laws the importance of the injured person was the measure of the compensation or vengeance which he was recognized to be entitled to exact, and the scales of punish- ment or compensation are fixed from this point of view.

The laws of Khammurabi (2285-2242), the oldest extant code, contain definite schemes and scales of offences and punishments, and indicate the existence of tribunals to try the Babylon. offences and to award the appropriate remedy. The punishments are very severe. It is not distinctly indicated whether the proceedings were at the instance of the state or the person wronged, but compensation and penalty could be awarded in the same proceeding, and the provisions as to the lex talionis and scale of compensation for injuries tend to show that the procedure was on private complaint and not on behalf of the state (see further Babylonian Law).

Of the early criminal laws of Greece only fragments survive, e.g. those of Solon and Draco. In Athens in early times crime was dealt with in the Areopagus from the point of view areece. of religion and by the archons from the point of view of compensation: and it was only when the state interests were directly affected that proceedings by way of ilo-ayyiKla or impeachment were taken. In classical times crimes fell to be tried by panels of jurors or judges drawn from the assembly and described as Stxacrrˆpia.

The earliest materials for ascertaining the criminal law of Rome are to be found in the Twelve Tables, Table VIII. The criminal law of imperial Rome is collected in books 47 and 48 of the Digest. The classification of crimes therein is capricious and anomalous. ” In the early Roman law the idea of legislative power was so fully grasped and that of judicial power so little understood that the criminal juris- diction arose in the form of a legislative enactment applicable to particular cases.” Crimes were classified according to the mode of prosecution into:

1. Publica judicia, dealing with crimes specifically forbidden by definite laws, which took the place of the standing com- missions (quaestiones perpetuae) of the time of the republic. In the earlier stages of Roman law the state only interfered to punish offences which gravely affected it, and did so by privilegia, which correspond to impeachment or Bill of Pains and Penalties.

2. Extraordinaria crimina, crimes for which no special pro- cedure or punishment was provided: the punishment being, within limits, left to the discretion of the judge and the prosecution to the injured party.

3. Privata delicta, offences for which a special form of action was open to the injured party, e.g. actio furti.

The multiplicity of tribunals under the republic was replaced under the empire by a complete organization of the judiciary throughout the districts (dioceses) under the supervision of the emperor in his privy council (see Maine, Ancient Law, ed. 1906, p. 393). Public prosecution under the empire began by arrest of the accused, who was taken

before an eirenarcha, who examined him (by torture in the case of a slave or parricide) and sent him on for trial before the praeses of the diocese (Siouojoxs). Private prosecution followed, a procedure closely resembling that of civil actions, beginning with citatio (summons), followed by libellus or accusation, and appointment of a day for hearing. The right of either party to call witnesses was very imperfectly established.

The early laws of the Celtic races are preserved as to Wales in the laws of Hywel Dda, and as to Ireland in the Book of Aicill and other Brehon law tracts, which are pro- fessional collections of precedents and formulae made by the hereditary law caste (Brehons), whose business it was ” to pass sentence from precedents and commentaries.” (See Brehon Laws.) The development of Celtic law was arrested by the Saxon and Anglo-Norman conquest: but the materials preserved indicate an origin common with that of Germanic law.

The special characteristics of Irish criminal law, if it can be so called, were: —

1. The law was customary and theoretically unchangeable, and no legislative or judicial authority existed to alter or enforce it.

2. All crimes were treated as wrongs, for which compensation was made by assessment of damages by a consensual tribunal whose power to make awards depended on submission of the parties and the ultimate sanction of public opinion or custom. A customary tariff for compensation existed for all offences from wilful murder downwards. No crime was unamendable. The Irish law recognized a body price or compensation (S. bot) and an honour price or eric (S. wer), for which the family or tribe of the offender was collectively liable; but there is no clearly ascertained equivalent to the Saxon wite, or fine to the chief.

The laws of the Germanic tribes, so far as preserved in the Germania of Tacitus, and in the compilations of customs known as the Salic and Ripuarian laws, the Leges Barbarorum, the Dooms of ˆEthelberht and the collections of

Germanic law.

Anglo-Saxon law and custom (to be found in Thorpe’s Ancient Laws and Institutes of England), do not indicate any adequate or definite division between crimes and causes of civil action, but, like the laws of Babylon, recognize the system and contain the tariffs of

compensation for wrongs. The idea of the compensation was originally to put an end (finis) to blood feuds and private war or vengeance.

These laws formed the foundation of the criminal law of Germany, including the Netherlands, of England and of Scandi- navia. But in each country the development of criminal law has been affected by influences other than Germanic, mainly consisting in an infusion more or less great of ideas derived from Roman law. In England under Alfred some part of the Levitical law (Exod. xxi. 12-15) was incorporated, just as in 1567 the criminal law as to incest in Scotland was taken bodily from Leviticus xviii.

The stage which the development of criminal law had reached

in England by the reign of Edward the Confessor is thus described

by Pollock and Maitland (Hist. Eng. Law, ii. 447):

Anglo- 11 Q n j-jjg eve f tne N orman Conquest what we may call

law. the criminal law of England (but it was also the law

of torts or civil wrongs) contained four elements which deserve attention: Its past history had in the main consisted of the varying relations between them. We have to speak of outlawry, of the blood feud (faidus), of the tariffs of wer and wite

(fredus or friede), and bot, of punishment in life and limb. As regards the malefactor the community may assume one of four attitudes: it may make war on him; it may have him exposed to the vengeance of those whom he has wronged; it may suffer him to make atonement; it may inflict on him a determinate punishment, death, mutilation or the like." The wite or sum paid to the king or lord is now thought to have been originally not a penalty but a fee for time and trouble taken in hearing and determining a controversy. But at an early stage fines for breach of peace were imposed. An evil result from the public point of view followed from the system of atoning for crime by pecuniary mulct. " Criminal jurisdiction became a source of revenue." So early as Canute's time certain crimes were pleas of the crown; but grants of criminal jurisdiction, with the attendant forfeitures, were freely made to prelates, towns and lords of manors, and some traces of this jurisdiction still survive (e.g. the criminal jurisdiction of the justices of the soke (soc) of Peterborough, and the rights of some boroughs, e.g. Nottingham, to forfeitures). Outlawry soon ceased to be a mode of punish- ment, and became, as it still is, a process to compel submission to justice (Crown Office Rules, 1906, rules 88-110).

Certain crimes, such as murder, rape, arson and burglary, became unamendable or bootless, i.e. placed the offender's life, limb, lands and goods at the king's mercy. These crimes came to be generally described by the name felony (q.v.). Other crimes became punishable by fines which took the place of wites. These were styled trespasses and correspond to what is now called misdemeanour (q.v.).

Minor acts of violence, dishonesty or nuisance, were dealt with in seigniorial and borough courts by presentment of the jurors of courts baron and courts, leet, and punished by fine or in some cases by pillory, tumbril or stocks. Grave f f g °~ acts were dealt with by the sheriff as breaches of the period. peace. He sat with the freeholders in the county court, wjiich sat twice a year, or in the hundred court, which sat every four weeks. So far as this involved dealing with pleas of the crown the sheriff's jurisdiction was abolished and was ultimately replaced by that of the justices or conservators of the peace. The sheriff then ceased to be a judge in criminal cases, but remained and still is in law responsible for the peace of his county, and is the officer for the execution of the law. The royal control over crime was effectually established by the itinerant justices sent regularly throughout the realm, who not only dealt with the ordinary proprietary and fiscal rights of the crown but also with the graver crimes (treason and felony), and ulti- mately were commissioned to deal with the less grave offences now classed as indictable misdemeanours. The change resulted from the strengthening of royal authority throughout England, which enabled the crown gradually to enlarge the pleas of the crown and to weaken and finally to supersede the criminal jurisdiction, notably of the sheriff, but also of prelates and lords in ecclesiastical and other manors and franchises. " In the early English laws and constitution there existed a national sovereignty and original criminal jurisdiction, but the ideas of legislative power and crime were very slowly developed." During the 12th century the criminal law was affected by the influence of the church, which introduced into it elements from the Canon and Mosaic laws, and also by the memory of the Roman empire and the renewed study of the Roman law, which enabled lawyers to draw a clearer distinction than had before been recognized between the criminal (dolus) and civil (culpa) aspect of wrongful acts. The Statute of Treasons (1351) is to a large extent an admixture of Roman with feudal law; and to the same source is probably due the more careful analysis of the mental elements necessary to create criminal responsibility, summed up in the somewhat misleading expression nemo reus est nisi mens sit rea.

In the 14th century justices of the peace and quarter sessions were

established to deal with offences not sufficiently important for the king's judges, and from that time the course of criminal justice in England has run substantially on the same lines, with the single and temporary interruption caused by the court of star chamber.

Classifica- tion of crimes.

The penal laws of modern states classify crimes somewhat differently, but in the main on the same general principles, dividing them into: —

i. Offences against the external and internal order and security of the state.

2. Offences against the administration of police and against public authority.

3. Acts injurious to the public in general.

4. Offences against the person (life, health, liberty and reputation), and conjugal and parental rights and duties.

5. Offences relating to property and contracts (including theft, fraud, forgery and malicious damage).

The terminology by which crimes are described by reference to their comparative gravity varies considerably. In many continental codes distinctions are drawn between crimes (Ger. Verbrechen; Norse vorbrydelser; Span. crimenes; Ital. reato), delicts (Ger. Vergehen; Ital. delilti; Span, delitos), and contraventions (Ital. contravenzioni; Span, faltas).

The classification adopted by English law is peculiar to itself, " treason," " felony " and " misdemeanour," with a tentative fourth class described as " summary offences." The particular distinctions between these three classes are dealt with under the titles Treason; Felony; Misdemeanour, &c. Here it is enough to say that the distinction is a result of history and is marked for abolition and reclassification. Treason and most felonies and some misdemeanours would under foreign codes fall under the head of crime. Misdemeanour, roughly but not exactly, corresponds to the French dtiit, and summary offence to contravention.

Elements I n au systems of criminal law it is found necessary ol criminal to determine the criterion of criminal responsibility, responsi- the mental elements of crime, the degrees of crimin- bility. a lity and the point at which the line is to be drawn

between intention and commission.

The full definition of every crime contains expressly or by implication a proposition as to a state of mind, and in all systems of criminal law, competent age, sanity and some degree of freedom from coercion, are assumed to be essential to criminality; and it is also generally recognized that an act does not fall within the sanction of the criminal law if done by pure accident or in an honest and reasonable belief in circumstances which if true would make it innocent; e.g. when a married person marries again in the honest and reasonable but mistaken belief that the former spouse is dead. Honest and reasonable mistake of fact stands on the same footing as absence of the reasoning faculty, as in infants, or perversion of that faculty, as in lunatics.

Besides the elements essential to constitute crime generally, particular mental elements, which may differ widely, are involved in the definition of particular crimes; and in the case of statutory offences adequately and carefully defined, the mental elements necessary to constitute the crime may be limited by the definition so as to make the prohibition of the law against a particular act absolute for all persons who are not infants or lunatics. As a general rule of English law, it is enough to prove that the acts alleged to constitute a crime were done by the accused, and to leave him to rebut the presumption that he intended the natural consequences of the acts by showing facts justifying or excusing him or otherwise making him not liable. Children are con- clusively presumed to be incapable of crime up to seven years of age; and from seven to fourteen the presumption is against the capacity, but is not absolute.

Under the common law, insanity was an absolute answer to an accusation of crime. Since 1883, where insanity is proved to have existed at the date of the commission of the incriminated acts, the accused is found guilty of the acts but insane when he did them, and is relegated to a criminal lunatic asylum. There was also at common law a presumption that a married woman committing certain crimes in the presence of her husband did so under his coercion. But under modern decisions and practice the presumption has become feeble almost to inanition (R. v. Mary Baines, 1900, 69 L.J. Q.B. 681). Distinctions are also drawn between degrees of guilt or complicity.

English criminal law punishes attempts to commit crime if the attempt passes from the stage of resolution or intention to the stage of action, when the completion of the full offence is frustrated by something other than the will of the accused. Except in the case of attempt to commit murder, which is a felony, attempts to commit a crime are punished as mis- demeanours. It also punishes the solicitation or incitement of others to commit crime, as a separate offence if the incitement fails, as the offence of being accessory before the fact or abettor if the offence is committed as a result of the incitement; and it punishes persons who, after a more serious crime — felony — has been committed, do any act to shield the offender from justice. In the case of the crimes described as felonies the law distinguishes between principals in the first or second degree and accessories before or after the fact. In the case of mis- demeanours the same punishment is incurred by the principal offenders, and by persons who are present aiding and abetting the commission of the offence, or who, though not present, counselled or procured the commission of the offence (see Accessory). Be- sides these degrees of crime there is one almost peculiar to English law known as conspiracy, i.e. an agreement to commit crime or to do illegal acts (including interference with the due course of justice), which is punishable even if the conspiracy does not get beyond the stage of agreement. The exact nature of this form of crime and the propriety of abolishing it or limiting its scope have been the subject of much controversy, especially with reference to combinations by trade unions.

The English law does not, but most European laws do, allow the jury to reduce the penalty of an offence by finding in their verdict that the commission of the offence was attended by extenuating circumstances; but when the jury recommend to mercy a person whom they find guilty the judge may give effect to the recommendation or report it to the Home Office.

In systems of criminal law derived from England the forms of crime or degrees of complicity above stated reappear with or without modification, but as to conspiracy with a good deal of alteration. In the Indian penal code, for instance, conspiracy is limited to cases of treason (§ 121 A), and when it goes beyond agreement in the case of other offences it is merely a form of abetment or participation (§ 107).

The criminal law of England ‘ is not codified, but is composed of a large number of enactments resting on a basis of common law. A very large part is reduced to writing in Deflnl- statutes. The unwritten portion of the law includes tioasof (1) principles relating to the excuse or justification of partlculat acts or omissions which are prima facie

criminal, (2) crimes. the definitions of many offences, e.g. murder, assault, theft, forgery, perjury, libel, riot, (3) parts of the law relating to procedure. The law is very rich in principles and rules embodied in judicial decisions and is extremely detailed and explicit, leaving to the judges very little latitude of interpretation or expression. So far as the legislature is concerned there is an absence of systematic arrangement. The definitions of particular crimes are still to be sought in the common law and the decisions of the judges. The Consolidation Acts of 1861 for the most part leave definitions as they stood, e.g. the Larceny Act 1861 does not define the crime of 'larceny. The consequence is that exact definitions are very difficult to frame, and the technical view of a crime sometimes includes more, sometimes less, than it ought. Thus the crime of murder, as settled by the existing law, would include offences of such very different moral gravity as killing

1 " It is founded," said Sir J. Fitzjames Stephen, writing in 1863, " on a set of loose definitions and descriptions of crimes, the most important of which are as old as Bracton. Upon this foundation there was built, principally in the course of the 18th century, an entire and irregular superstructure of acts of parliament, the enact- ments of which were for the most part intended to supply the deficiencies of the original system. These acts have been re-enacted twice over in the present generation — once between 1826 and 1832 and once in 1861; besides which they were all amended in 1837. Finally, every part of the whole system has been made the subject of judicial comments and constructions occasioned by particular cases, the great mass of which have arisen within the last fifty years." (View of the Criminal Law of England, by J. Fitzjames Stephen.)

a man deliberately for the sake of robbing him, and killing a man accidentally in an attempt to rob him. On the other hand, offences which ought to have been criminal were constantly declared by the judges not to fall within the definition of the particular crimes alleged, and the legislature has constantly had to fill up the lacunae in the law as interpreted by the judges.

The jurisdiction to deal with crime is primarily territorial, and can be exercised only as to acts done within the territory or territorial waters, or on the ships of the law-giver. diction. Extra territorium jus dicenti impune non paretur. No state will enforce the penal laws of another

nor permit the officer of another state to execute its laws outside its own territory. But international law recognizes the competence of a state to make its criminal law binding on its own subjects wherever they are, and perhaps even to punish foreigners who outside its territory do acts which menace its internal or external security, e.g. by dynamite plots or falsification of coin. Apart from extradition arrangements the national law cannot reach such persons, be they citizens or aliens, until they come within the territory of the state whose law has been broken.

The codes of France, Germany and Italy make the penal law national or personal and not territorial. In some British colonies whose legislatures have a derived and limited legislative authority, indirect methods have been taken to deal within the colony with persons who commit offences outside its territory.

Throughout the development of the English criminal law it showed and retains one particular characteristic that crime was treated as local, which means not merely that the common law of England was limited to English soil, but that an offence on English soil could be ” inquired of, dealt with, tried, deter- mined and punished ” only in the particular territorial division of England in which it was committed, which was and is known as the venue (q.v.). Each township was responsible for crimes within its boundaries, a responsibility made effective by the ” view of frankpledge,” now obsolete, and the guilt or innocence of every man had to be determined by his neighbours. This rule excluded from trial by the courts of common law, treasons, &c. committed by Englishmen abroad and piracy; and it was not till Henry VIII. ‘s reign (1536, 1544) that the common-law mode of trial was extended to these offences. The legislature has altered the common law as to numerous offences, but on no settled plan, and except for a bill introduced about 1888, at the instance of the 3rd marquess of Salisbury, no attempt has been made to make the English criminal law apply generally to subjects when outside the realm; and in view of the complicated nature of the British empire and the absence of a common criminal code it has been found desirable to remain content with extradition in the case of crimes abroad, and with the provisions of the Fugitive Offenders Act 1881 in the case of criminals who flee from one part to another of the empire.

The localization in England of crime, and the procedure for punishing it, differ largely from the view taken in France and most European countries. The French theory is that a French- man owes allegiance to the French state, and commits a breach of that allegiance whenever he commits a crime against French law, even although he is not at the

time within French territory. In modern days this theory has been extended so as to allow French and German courts to punish their subjects for crimes committed in foreign countries, and by reason of this power certain countries refuse to extradite their subjects who have committed crimes in other states.

The principle of the French law, though not expressly re- cognized in England, must be invoked to justify two departures from the English principle — (1) as regards offences on the on tne m S n seas, and (2) as regards certain offences high seas, committed outside the United Kingdom. In early days offences committed by Englishmen on the high seas were punished by the lord high admiral, and he encroached so much on the ordinary courts as to render it necessary to pass an act in Richard II. ‘s reign (15 Rich. II. st. 2, c. 3) to restrain him.

In the time of Henry VIII. (1536, 28 Hen. VIII. c. 15) an act was passed stating that, as the admiral tried persons according to the course of civil law, they could not be convicted unless either they confessed or they or the witnesses were submitted to torture, and that therefore it was expedient to try the offences according to the course of the common law. Under that act a special commission of oyer and terminer was issued to try these offences at the Old Bailey, and English law was satisfied by per- mitting the indictment to state that the offence was committed on board a ship on the high seas, to wit in the county of Middlesex. Since 1861 these special commissions have been rendered un- necessary by the provision (contained in each of the Criminal Law Consolidation Acts of that year) that all offences committed on the high seas may be tried as if they had been committed in England. As regards offences on land, it was found necessary as early as the reign of Henry VIII. (1 544) to provide for the trial in England of treasons and murders committed on land outside England. This was largely due to the constant presence in France of the king and many of his nobles and knights, f fences but the aid of this statute had to be invoked in 1903 commuted* in the case of Lynch, tried for treason in South Africa, on land Tlje latest legislation on the subject was in 1861 outsUe (Offences against the Person Act, § 9), and any murder ng,an or manslaughter committed on land out of the United Kingdom, whether within the king’s dominions or without, and whether the person killed were a subject of His Majesty or > not, may be dealt with in all respects as if it were committed in England. The jurisdiction has been extended to a few other cases such as slave trade, bigamy, perjury, committed with reference to proceedings in an English court, and offences connected with explosives. But these offences must be committed on land and not on board a foreign ship, because if a man takes service on board a foreign ship he is treated for

the time as being a member of the foreign state to which that ship belongs. The principle has been also extended to misdemeanours (but not to felonies) committed by public officers out of Great meanours Britain, whether within or without the British commuted dominions. Thus a governor or an inferior officer of a °y P" bllc colony, if appointed by the British government, may be colonies 1 " prosecutedforanymisdemeanourcommitted by him by virtue of his office in the colony; and cases have occurred where governors have been so prosecuted, such as that of General Picton at the beginning of the 19th century, and of Governor Eyre of Jamaica in 1865, and the attempt to prosecute Governor MacCallum of Natal in 1906. As a corollary to the system of " capitulations " applied to certain non-Christian states in Asia and Africa, it has been necessary to take powers for punishing under English law offences by British subjects in those states, which would otherwise go unpunished either by the law of the land where the offence was committed or by the law of the state to which the offender belonged (Jenkyns, Foreign Jurisdiction of the Crown) .

An essential part of the criminal law is the punishment or sanction by which the state seeks to prevent or avenge offences. See also under Criminology. Here it is enough to say that during the 19th century great changes Punish- have been made throughout the world in the modes ment. of punishing crime.

In England until early in the 19th century, punishments for crime were ferocious. The severity of the law was tempered by the rule as to benefit of clergy and by the rigid adherence of the judges {in favorem vitae) to the rules of correct pleading and proof, whereby the slightest error on the part of the prosecution led to an acquittal. Bentham pointed out that certainty of punishment was more effective than severity, that severe punishments induced juries to acquit criminals, and that thus the certainty of punishment was diminished. But his arguments and the eloquence of Sir Samuel Romilly produced no effect until after the reform of parliament in 1832, shortly after which statutes were passed abolishing the death sentence for all felonies where benefit of clergy existed. The severity of capital sentences had already been modified by the pardoning power of the crown,

which pardoned convicts under sentence of death on their consenting to be transported to convict settlements in the colonies. (See

Deportation.) For some years this was only done by the consent of the convict, who agreed to be transported if his death sentence was remitted, but in 1824, when a convict refused to give this consent, parliament authorized the crown to substitute transportation for a death sentence, and the same course was adopted in Ireland in 1851 when some treason-felony prisoners refused commutation of their sentence to transportation.

The punishments now in use under the English law for indict- able offences are: —

1. Death, inflicted by hanging, with a provision that other modes of execution may be authorized by royal warrant in cases of high treason.

2. Penal servitude, which in 1853 was substituted for trans- portation to penal settlements outside the United Kingdom. The minimum term of penal servitude is three years (Penal Servitude Act 1891), and the sentence is carried out in a convict prison, in the United Kingdom, but there is still power to send the convicts out of the United Kingdom.

3. Imprisonment in a local prison, which must be without hard labour unless a statute specially authorizes a sentence of hard labour. At common law there is no limit to a term of imprison- ment for misdemeanour; but for many offences (both felonies and misdemeanours) the term is limited by statute to two years, and in practice this limit is not exceeded for any offence. The treatment of prisoners is regulated by the prison acts and rules.

4. Police supervision, on conviction or indictment of felony and certain misdemeanours after a previous conviction of such offences. Prevention of Crimes Act, c. 112, §§ 8, 20.

5. Pecuniary fine, a punishment appropriate only to mis- demeanours and never imposed for a felony except under statutory authority, e.g. manslaughter (Offences against the Person Act, § 5). The amount of the fine is in the discretion of the judge, subject to the directions of Magna Carta and the Bill of Rights and of any statute limiting the maximum for a particular offence.

6. Whipping was a common law punishment for misdemean- ants of either sex. Under the present law the whipping of females is prohibited, and the punishment is not inflicted on males except under statutory authority, which is given in the case of certain assaults on the sovereign, of certain forms of robbery with violence or assaults

with intent to commit felony (Garrotters Act 1863), of incorrigible rogues, larceny and malicious damage, and certain other offences by youthful offenders.

7. Recognizances (caution) to keep peace and be of good behaviour, i.e. a bond with or without sureties creating a debt to the crown not enforceable unless the conditions as to conduct therein made are broken. This bond may be taken from any misdemeanant, and, under statutory authority, from persons convicted of any felony (except murder) falling within the Criminal Law Consolidation Acts of 186 1.

8. In the case of any offence which is not capital the court, if it is a first offence or if any other grounds for mercy appear, may simply bind the offender over to come up for judgment when required, intimating to him that if his conduct is good no further steps will be taken to punish him.

Except in the case of the death penalty, the court of trial has a discretion as to the quantum of a particular punishment, no minimum being fixed. In the case of offences punishable on summary conviction the maximum punishment is always fixed by statute. It consists of imprisonment with or without hard labour, or a fine of a limited amount, or both. The imprison- ment in very few cases may exceed six months. If the maximum exceeds three months the accused must be informed that he has a right, if he so elects, to be tried by a jury.

Where power is given to deal summarily with offences which under ordinary circumstances would be tried on indictment, the punishments are as follows (Summary Jurisdiction Act

1870):—

(a) In the case of adults pleading guilty, imprisonment not exceeding six months without the option of a fine.

(b) In the case of adults (consenting to be summarily tried), where the offence affects property not worth over forty shillings, imprisonment not over three months, or fine not exceeding £20.

(c) In the case of young persons, between twelve and sixteen years, imprisonment not over three months, or fine not exceeding £10.

(d) In the case of children under twelve, imprisonment not over one month, or fine not exceeding forty shillings.

If the offence is trifling, the accused may be discharged without

punishment, and under the First Offenders Act (1887) the justices have a discretionary power to forgo punishment. The justices have also the power, under the Prevention of Crime Act 1908, in lieu of passing a sentence of penal servitude or imprisonment, to commit persons between the ages of sixteen and twenty-one to a Borstal institution, for a period of detention ranging from one to three years (see Juvenile Offenders)!

In the criminal law of Europe the scale of punishments is on similar lines in most states, and is more elaborate than that of England, and less is left to the discretion of the court of trial. The following examples will indicate the kind of punishments awarded under the French penal code. Punishments are classified as (1) ajflictives et infamantes, including death, travaux forces a perpetuite ou a temps, deportation, detention, reclusion; (2) infamantes, viz. banishment and civil degradation; (3) peines en matiere correctionnelle, viz. imprisonment in a house of correction (six days to five years), interdiction from certain civic rights, and fine. The punishments in no case have any effect to extinguish the civil claims of individuals who have suffered by the offence (arts. 6 and 55). Special provisions are made for rScidivistes, police supervision and first offenders (Lot Birenger).

In the German code of 1872 the legal punishments are: (1) death; (2) penal servitude for life or for a term not exceeding fifteen years nor less than one year; (3) imprisonment with labour for a term not exceeding five years nor less than one day; (4) confinement in a fortress (terms same as for penal servitude but involving only withdrawal of freedom and supervision) ; (5) arrest for not more than six weeks nor less than one day; (6) fine (not less than three marks in the case of crimes or delicts nor one mark in case of petty offences). Sentence of imprison- ment is in certain cases followed by liability to be placed under police supervision for a term after release. In the case of a sentence of death or of penal servitude, the court may order forfeiture of civil privileges, and a condemnation to penal servitude permanently disqualifies for service in the army and public office (Code pt. 1, chap. 1, arts. 13-40).

Under the Italian code of 1889 (arts. 11-30) the punishments are (1) ergastolo (for life); (2) reclusione (from three days to twenty-four years), which involves hard labour and cellular confinement; (3) detenzione (like term), which involves labour and at night separate confinement; (4) confino (one month to three years), a form of banishment from the commune of origin or residence of the offender; (5a) fine (multa), from ten to ten thousand lire; (56) amende, from

one to two thousand lire; (6) arrest (one day to two years) ; (7) interdiction from public office; (8) suspension from professional calling. Punishments (S*)i (6) and (8) are applied only to contraventions, the others to crimes (delitti).

The Spanish law (Codigo Penal, title 3, chaps. 2 and 3) contains a general scale of punishments classified as afflictive, correctional, light and accessory. The first class begins with death and runs down through many forms of imprisonment to disqualification (inhabilitacion) . The second includes forms of imprisonment, (presidio and prision), and arrest, public censure and suspension from the exercise of certain offices or callings. The slight punishments are minor arrest and private censure. Offenders in any of the three classes may also be fined or put under recog- nizance (caucidn). The accessory punishments include payment of costs, degradation, civil interdiction.

In England indictable offences (i.e. offences which must be tried by a judge and jury) are thus dealt with: —

1. Courts of assize (sitting under old commissions known as

commissions of assize, oyer and terminer, and general gaol delivery) are held twice or oftener in every year in each county Tribunals an(ˆ a ˆ s0 * n some large cities and boroughs. They are the lineal successors of the justices in eyre 1 of the middle ages; but they are now integral parts of the High Court of Justice. These courts can try any indictable offence presented by a grand jury for the district in which they sit.

2. For the counties of London and Middlesex and certain adjoining districts, a special court of assize known as the central criminal court sits monthly.

3. In all counties and many boroughs the justices of the peace sit quarterly or oftener under the commission of the peace to try the minor indictable offences. (See Quarter Sessions, Court of.)

4. The High Court of Justice in the king's bench division tries a few special offences in its original jurisdiction, and where justice requires may transfer indictments from other courts for trial before itself.

5. The court of criminal appeal has been instituted by the Criminal Appeal Act 1907; to it all persons convicted on indictment have a right of appeal. (See Appeal.)

The substantive law as to crime applies in England to all persons except the reigning sovereign, and criminal procedure is the same for all subjects alike, except in the case of peers or peeresses charged with felony, who have the right of trial by their peers in the House of Lords if it be sitting, or in the court of the lord high steward.

There are in England no courts of a special character, such as exist in some foreign countries, for the determination of disputes between the governing classes themselves tribunals. or w * tn tne governed classes, whether of a civil or criminal character. There are a few exceptional courts with criminal jurisdiction. The court of chivalry, which used to punish offences committed within military lines outside the kingdom, is obsolete. Special tribunals exist for trying naval or military offences committed by members of the navy and army, but those members are not exempt from being tried by the ordinary tribunals for offences against the ordinary law, as though they were civilians. The naval courts can be held only on board a ship, and can as a general rule try only persons entered on the books of a king's ship. The military courts can only try persons who are actually members of the army at the time, and their authority is annually renewed by parliament, in consequence of the jealousy still felt against the trial of any man except by the ordinary courts of law. Military and naval courts can try in any part of the world, and whenever the forces are in active service can try followers of the camp as if they were actual members of the forces. (See Military Law; Martial Law.)

The ecclesiastical courts, which were formerly very powerful in England, and punished persons for various offences, such as perjury, swearing, and sexual offences, have now almost fallen into disuse. Their authority over Protestant dissenters from the established church was taken away by statute; their authority over lay members of the Church of England has disappeared by disuse. Occasionally suits are instituted in them against the clergy for offences either against morality or against doctrine or ritual. In these cases their sentences are enforced by penalties, such as suspension, or deprivation of benefice, or by imprisonment; which has replaced the old punishment of excommunication.

A system of procedure, with the judicial machinery required to work it, may be created either by the direct legislative action of the supreme power or by custom and the action of the courts. Both at

Rome and in England it was through usage and by the courts themselves that the earlier system was slowly moulded: both at Rome and in England it was direct legislation that established the later system. (See Bryce, Studies in History and Jurisprudence, 1901 ,

ii. 334-) The characteristics of English criminal procedure which most 1 i.e. Itinerant justices. From the Latin in itinere, on a journey.

Ecclesi- astical courts.

Pro- cedure.

distinguish it from the procedure of other countries are as follows: —

1. It is litigious or accusatory and not inquisitorial (Stephen, Prel. View Cr. Law) . It is for the prosecutor to prove by evidence the commission of the alleged offence. No power exists to interrogate the accused unless he consents to be sworn as a witness in his own defence, which since 1898 he may do. The right to cross-examine him even when he is so sworn is limited by law, with the object of excluding inquiry into his past character or into past offences not relevant to the particular charge on which he is being tried.

2. The forms of criminal pleading still in use are in substance framed on the lines of the old system of pleading at common law in civil cases, which was swept away by the judicature acts. Criminal pleadings have, however, one peculiarity. Indictments, being in form the presentment of a grand jury, could not be amended until provision for that purpose was made in 1851. (See Indictment.)

3. Criminal prosecutions are ordinarily undertaken by the individuals who have suffered by a crime. There is not in England, as in Scotland and all European countries, a public department concerned to deal with all prosecutions for crime. The result is that the prosecution of most ordinary crime is left to individual enterprise or the action of the local police force or the justices' clerk.

The attorney-general has always represented the crown in criminal matters, and in state prosecutions appears in person on behalf of the crown, and when he so appears has certain privileges as respects the reply to the prisoner's defence and the mode of trial. In the Prosecution of Offences Acts of 1879, 1884 and 1908 there is to be found the nucleus of a system of public prosecution such as obtains in other countries in case of crime. Under these acts the director of public prosecutions (up to 1908 an office conjoint with that of solicitor to the Treasury) acts under the attorney-general, but unless

specially directed he only undertakes a limited number of prosecutions, e.g. for murder, coining and serious crimes affecting the government.

4. Where an indictable offence is supposed to have been committed the accused is arrested, with or without the warrant of a justice, according to the nature of the offence, or is sum- moned by a justice before him. On his appearance a preliminary inquiry is held for the purpose of ascertaining whether there is a prima facie case against him. The procedure is regulated by the Indictable Offences Act 1848, and is entirely different from the procedure for summary offences. It may be, though usually it is not, held in private; it is an inquiry and not a trial; the justices have to consider not whether the man is guilty, but whether there is such a prima facie case against him that he ought to be tried. If they think that there is, they commit him to prison to wait his trial, or require him to give security, with or without sureties, to the amount named by them, for appearing to take his trial. If they think the charge unsubstantial they discharge the accused at once. The prosecutor in cases of felony may if he likes go before the grand jury whether the case has or has not been the subject of a preliminary inquiry, but in the case of many misdemeanours it is obligatory first to have a preliminary inquiry, as a protection against vexatious indict- ments.

Whether there has or has not been a preliminary inquiry before a magistrate, no person can be tried for any of the graver crimes, treason or felony, except upon indictment found by a grand jury of the county or place where Mˆf™” the offence is said to have been committed or is by statute made cognizable. In olden days, and even now in theory, the grand jury inquire of their own knowledge, by the oath of good and lawful men of the neighbourhood, into the crime of the county, but in practice the charges against the accused persons are always first submitted to the proper officer of the court. The grand jurors are instructed as to their inquisition by a charge from the judge, as regards the indictments concern- ing which they are called upon to enquire whether there is a prima facie case to send them for trial to the petty jury. The

grand jury must consist of not less than twelve, nor more than twenty- three, good and lawful men of the county. But any person who prefers an indictment is entitled to have it presented to the grand jury.

Officers of the court lay the indictments before the grand jury. The charges are then called bills, and if the grand jury considers that there is no prima facie case the foreman endorses the bill with the words " no true bill," and it is then presented to the judge. The jury are then said to have ignored the bill, and if the person charged is in custody he is released, but is liable to be indicted again on better evidence.

As a means of constitutional protection in times of monarchical aggression this practice had no doubt a great value, but in the present day, when few offenders are tried without a preliminary inquiry by justices, the functions of a grand jury are of secondary importance, and the jurors' time is perhaps needlessly occupied. The institution of the grand jury prevented the crown in the days of its great power from removing a person whom it wished to get rid of from among his neighbours, and placing him on trial in a strange place where the influence of the crown was greater. This is still true to a certain extent, as great injustice may be caused to a man by removing him from his neighbours and trying him at a distance from his friends, and from the witnesses whom he might call for his defence. In Ireland, for instance, the greatest injustice might be done by removing an Orangeman from Belfast and trying him in a Roman Catholic county or vice versa. But it has its evils where the area from which the jurors are drawn is small, such as a town of a few thousand inhabitants. In that case a man charged, say, with fraud, may be protected by his friends from being properly punished for that fratid. But where justice requires, an order may be made for the trial of the offence in another county or at the central criminal court.

In many colonies the Scottish system has been adopted, by which the ordinary form of accusation is by indictment framed by the public prosecutor, and a grand jury is only im- pannelled in cases where an individual claims to prosecute an offence as to which the public officials decline to proceed. In England criminal informations by the attorney-general, or by leave of the court without the intervention of a grand jury, are permitted in cases of misdemeanour, but are now rarely pre- ferred.

If a coroner's jury, on inquiring into any sudden death, finds that murder or manslaughter has been committed, that finding has the same effect as an indictment by a grand jury, courts" S an d *-^ e man cnar g e d ma y be tried by the petty jury accordingly. The law and procedure of the coroner's courts are now regulated by the Coroners Act 1887. When there is a dead body of a person lying within the area of his jurisdiction, and there is reasonable cause to suspect that such person died a violent or unnatural death, or a sudden death of which

the cause is unknown, or has died in prison, the coroner is entitled to hold an inquest, and if the verdict or inquisition finds murder or manslaughter, it is followed by trial in the same way as if the person accused had been indicted.

When an indictment is found by the grand jury (twelve at least must concur) the person charged is brought before the court, the indictment is read to him, he is asked lurr. Y whether he is guilty or not guilty. If he pleads guilty he is then sentenced by the court; if he pleads not guilty, a petty jury of twelve is formed from the panel or list of jurors who have been summoned by the sheriff to attend the court. He is tried by these jurors in open court. The common law method of trial of crimes by a jury of twelve, native to English law, has been in modern times transplanted to European countries. It was not the original form of trial, for it was pre- ceded by wager of battle (which was not finally abolished till 1819); and by ordeal, which was suppressed as to criminal trials in 12 19 in consequence of the decree of the Lateran Council (1216). The first was alio wed only on an appeal by an individual accuser; the second was resorted to on an accusation by public fame, which the accused was allowed to meet by submitting to the ordeal. It was after 1210 that trial by the jury of twelve (known

as trial in pais) began to develop. At the outset the accused used to be asked how he would be tried, and could not be directly compelled to plead to the charge or to accept trial by a jury; which led to the indirect pressure known as the peine forte et dure, which fell into disuse after the Revolution and was formally abolished in 1772. But it was not until 1827 that refusal to plead was treated as a plea of not guilty, entailing a trial by a jury, and some old-fashioned officials still ask the old question “How will you be tried?” to which the old answer was “By God and my country.”

The original trial jury or inquest certainly acted on its own knowledge or inquiries without necessarily having evidence laid before it in court. The impartiality of the jurors was to some extent secured by the power of challenge. The exact time when the jury came into its present position is difficult accurately to define. On the trial before the petty jury the procedure and the rules of evidence differ in very few points from an ordinary civil case. The proceedings as already stated are accusatory. The prosecutor must begin to prove his case. Confessions (which are the object sought by French procedure) are regarded with some suspicion, and admissions alleged to have been made by the accused are not admitted unless it is clear that they were not extracted by inducements of a temporal nature held out by

persons in authority over him. During the spring assizes of 1877 a prisoner was charged with having committed a murder twenty years before, and the counsel for the prosecution, with the consent of the judge, withdrew from the case because the only evidence, besides the prisoner's own confession, was that of persons who either had never known him personally or could not identify him. The accused may not be interrogated by the judge or the prosecuting counsel unless he consents to be sworn as a witness. In this respect the contrast between a criminal trial in England and a criminal trial in France is very striking. The interrogation and browbeating of the prisoner by the judge, consistent as it may be with the inquisitorial theory of their procedure, is strange to English lawyers, accustomed to see in every criminal trial a fair fight between the prisoner and the prosecution, and not a contest between the judge and the prisoner. The accused may, if he choose, be defended by counsel, and if poor may get legal aid at the public expense if the co*urt certify for it. He is entitled to cross-examine the witnesses for the prosecution and to call witnesses in his defence. At the conclusion of the evidence and speeches the judge sums up to the jury both as to the facts and the law, and the jury by their verdict acquit or convict. Immediate discharge follows on acquittal; sentence by the judge on conviction.

Justices of the peace may under many statutes convict in a summary manner (without the intervention of a jury) for offences of minor importance. The procedure for punishing summary offences is before two justices, tr-fals""* or a stipendiary magistrate. This proceeding must not be confused with the preliminary inquiry already mentioned before justices for an indictable offence, nor with the procedure before justices in relation to civil matters, such as the recovery of small sums of money. The proceeding begins either by the issue of a warrant for the arrest of the person charged, in which case a sworn information must be filed, or by a summons directing the person charged to appear on a certain day to answer the complaint made by the prosecutor. The justices hear the case in open court; the person charged can make his defence either in person or by his solicitor or counsel, he can cross-examine the witnesses for the prosecution, call his own wit- Procedure nesses, and address the justices in his defence. The for justices, after hearing the case, either acquit or convict s »'«' n ˆ r y him, and in case of conviction award the sentence. If the sentence is a fine, and the fine is not paid, the person coh- victed is liable to be imprisoned for the term fixed by the justices, not exceeding a scale fixed by an act of 1879, the maximum of which is one month. The imprisonment may be with or without hard labour.

Of late years this summary jurisdiction of the justices has received

very large extensions, and many offences which were

formerly prosecuted as serious offences by an indictment before the court of assize or quarter sessions have, where the offence was a trivial one, been made punishable, on summary proceedings before justices, by a small fine or a short term of imprisonment.

The extension of the jurisdiction of the justices is open to the observation that it deprives a person charged of the protection of a jury, and also that it throws upon him, if convicted, and upon the prosecution if there is no conviction, the cost of the proceed- ings. The former objection is much mitigated by the enactment made in 1879, that a person if liable on conviction to be sentenced to imprisonment for more than three months, or to a fine exceed- ing £100, can claim to be tried by a jury. But the objection as to the costs remains, and the payment of costs is often a very serious addition to the trivial fine; and it is anomalous that a person convicted of a trifling offence should bear the cost of the prosecution, while if he is convicted before a superior tribunal of the most serious offence he does not pay the costs.

In English law until 1907, where a criminal case had been tried by a jury the verdict of the jury of guilt or innocence was final and there was no appeal on the facts. Any considerable ‘ defect or informality in the procedure might be the subject of a writ of error. And if any question of law arose at the trial, the judge might, if he chose, reserve it for the opinion of the court for the consideration of crown cases reserved, by whom the conviction might be either quashed or confirmed.

By the Criminal Appeal Act 1907, a new court was established, to which any person convicted on indictment might appeal. (See Appeal.)

The expenses of prosecution for crime in England are dealt with in the following manner. Prosecutions for high treason and the cognate offence known as treason-felony os s ‘ are at the expense of the state, which alone undertakes such prosecutions. In the case of all other felonies and of many misdemeanours the expense of the prosecution falls on the local rate. In the case of other misdemeanours the expense falls on the prosecutor. Where an offence is summarily prosecuted the costs are in the discretion of the court, which may order the accused

to pay them, if convicted, or the prosecutor to pay on acquittal, or may leave the parties to pay their own expenses. On charges of felony and a few misdemeanours the court may order the accused person to pay the expenses of his prosecution in relief of the local rate. In a few cases, chiefly where the prosecution is vexatious, the court may order the prosecution to pay the expenses of the defence. The expenses of witnesses for the defence in any indictable offence may be paid out of the local rate when they have been called at the preliminary inquiry; and where the court in the case of a poor prisoner has certified that he should have legal aid, the expenses of the defence may be charged to the local rate. The local rate upon which the expenses fall is usually that of the county or borough in which the offence was committed; but sometimes is that of the place where the offence is tried.

Between 1852 and 1888 parliament reimbursed to the local authorities the expense imposed on the local rate. In 1888 the proceeds of certain taxes were set aside and handed over to the local authorities as a set-off to the expense incurred in prosecu- tions. In one class of case, offences committed in the admiralty jurisdiction, i.e. outside England, the treasury directly reimburses to the local authorities the expense incurred.

Under most, if not all, European codes, the state pays for the prosecution, subject to reimbursement by the accused, if the court so orders.

The English system of criminal procedure is the basis of that of most of the states which form the United States of America, jv 01I . and, with few exceptions, of the procedure throughout

British the British empire.

criminal The French penal code and code of criminal

procedure. proce(j ure are substantially the model of all systems of continental criminal law. They were promulgated in 18 11 by Napoleon I., and although he called in the aid of the greatest French jurists, he guided, and occasionally even revised, their labours. The French codes have been improved upon by later

European codes, and more especially by the Italian penal code. All European codes have an opening chapter where the general principles of criminal law in its practical application are enunci- ated, such as, for instance, the rules that — (1) no person is liable to punishment for any act not expressly declared to be an offence; (2) no person can be

punished for an act which by virtue of a subsequent law is declared not to be an offence; (3) whoever commits an offence within the kingdom is tried and punished according to the criminal law of the kingdom, and by the tribunals created' for the administration of justice, to the exclusion of special tribunals created for temporary purposes. This rule really lays down that no citizen can be deprived of his own judges when he is accused of a criminal offence. (4) A citizen, although he may have been tried in a foreign country for an offence committed within the kingdom, can be retried according to the law of the kingdom. (5) Extradition only applies to foreigners, not to citizens. The preliminary chapter is followed by the classification of offences according to the importance of the punishments the law assigns to them. The lowest degree of offence is denominated " contravention." It applies mainly to the pettiest offences, or to infractions of police regulations, and can be punished by fine or by imprisonment under a week, or by both fine and imprisonment, limited to a week. Next comes the " dSlit," which includes all offences punished by imprisonment over a week and under five years. Then, finally, we arrive at the " crime," the highest form of offence in French criminal law. It includes all offences subject to a more severe sentence than the punishment assigned to a dilit. All cases are held to be crimes where death, life-imprison- ment with or without hard labour, deportation out of the king- dom, detention or seclusion in a fortress or other expressly assigned place, are the punishments mentioned by the law. A certain number of explanatory definitions follow, of which the most important concern attempts to commit offences, and in " crimes " they are punishable if the execution of the attempt was only prevented by circumstances beyond the will of the offender, whilst in " delits ." an attempt is not punishable as an offence unless the law specially provides that it should be punished. As regards " contraventions," attempts not carried out are not held to be offences at all. Accomplices are generally subject to the same punishment as the principal. Old offenders (recidivistes) are subject to severer punishments. The usual exceptions as regards responsibility for crime, such as madness and extreme youth and force majeure, are to be found in all codes. The excuse of youth extends to all offenders under the age of sixteen, when the tribunal decides whether the offender has acted without " discernment," and acquits where the discern- ment, is not found, whilst one-half of the usual punishment is inflicted where discernment is found. Foreign codes differ from the English law in allowing the injured party to claim damages in the criminal suit, appearing as partie civile. On another question there is a wide divergence on the continent of Europe from English law. According to the law of England there is no prescription in criminal law (with a few

exceptions created by statute). An offender is always liable to punishment whatever time may have elapsed since the committal of the offence. On the continent of Europe the limitation of a judg- ment and sentence for a crime is twenty years; five years for a d&lit, and for a contravention two years. No proceedings can be taken as regards a crime after a lapse of ten years, whilst as regards a delit the limit is three years, and two years for a contravention.

There are three main differences between English criminal procedure and European criminal procedure.

1. A criminal prosecution directed on European criminal procedure at once passes into the hands of the state as an infringe- ment of law which must be repressed, on the ground that the whole community bases its security on obedience to law. In England the repression of all minor crime is left to the injured party.

2. In England every criminal trial from beginning to end is, and has always been, public. Preliminary inquiries into an

indictable offence may be, but rarely if ever are, conducted in private. On the continent of Europe, with rare exceptions, all preliminary proceedings in a criminal charge are secret. Outside English-speaking countries this secret investigation continues more or less. But of the two systems, accusatory or inquisitorial — the first meaning the right of the accused to defend himself, the second meaning the right of the state to examine any legal offence in private in order to ensure the safety of society, — the accusatory is gaining ground in every country. In English-speaking countries it is an established law that an accused person should have the right of publicity of the pro- ceedings and the right to defend himself by counsel and by witnesses. In Europe the inquisitorial system is gradually being abandoned. Perhaps the best code of criminal procedure in Europe is that promulgated in Austria in 1873. It followed a fundamental law of the Empire which laid down inter alia that all legal proceedings, civil or criminal, should be oral and public, and that the accusatory system in criminal cases should be adopted. Germany followed this example. Italy, Holland, Switzerland and Spain have followed Austria and Germany as regards the preliminary investigation; Italy and Belgium have surrounded the accused with guarantees against arbitrary confinement before trial; Holland has conferred upon the accused the right of seeing the

adverse testimony and of being confronted with the witnesses, and, further, has formally insisted that no insidious questions, such as questions assuming a fact as true which is not known to be true, should be allowed. Other countries still remain on the old lines. But everywhere, whether reform has actually been accomplished or not, there is a demand for even-handed justice, and a growing conviction that the accused should have all his rights, now that society is no longer in danger from undiscovered criminals and unpunished crime. Even in France, the champion of the inquisitorial system, a change is being made. Up to 1897 secrecy was imposed invari- ably in the preliminary investigation of crime, and was held necessary for the discovery and punishment of the offender. The Loi de I' instruction contradictoire, December 8, 1897, however, was a long step towards complete justice in the treat- ment of the accused in the preliminary inquiry. The main reform is that the accused, after he has once appeared before the judge and a formal charge has been made against him, is entitled to the assistance of counsel, either chosen by himself or assigned to him if he is poor. If he is in prison he is allowed to communicate freely with his counsel, who is entitled to see all the proceedings, and in every appearance before the judge his counsel accompanies him. There are, however, certain limita- tions. The counsel cannot address the judge without leave, which may be refused, nor can he insist on any proceeding he thinks necessary in his client's interest. He can only solicit. He has no right to be present at the examination of witnesses, who continue to be interrogated by the judge alone and not in the presence of the accused; but he must receive twenty -four hours' notice of every appearance of the accused, and he is entitled to be present whenever his client, after the first formal appearance, comes before the judge. In England, as already pointed out, although the prosecution is in the name of the crown, and although a public prosecutor has been appointed, still as a rule it is conducted by the person injured as the person injured, or by the police.

3. In England the single-judge system is universal, save in appeal; on the continent of Europe plurality of judges is insisted upon, save in the most trivial cases, where the punishment is insignificant. In most countries of the continent of Europe the whole machinery for the prevention, investigation and punishment of crime, is conducted by what is called the parquet, which represents society as a collective unit and not the individual injured. The head of the whole parquet in France is the procureur- gtn&ral, who holds equal rank with the members of the supreme court. Under him there are procureurs-generaux attached to each of the courts of appeal, of which in France

there are twenty- six, and under each of these subordinate procureurs there are procureurs (prosecutors) of a lesser degree. The next stage

Ireland.

to the parquet is the juge d' instruction, who corresponds to the English magistrate, and is the most formidable personage in the whole system of French criminal law. He can detain and accuse a person in prison, can send for him at any time and ask him such questions as he pleases.

After the first examination the prisoner is entitled, in most European countries, to the assistance of counsel, but the powers of counsel are so limited that the juge d 'instruction has a com- plete discretionary power regarding the investigation of the case. The natural consequence of this procedure is that the preliminary investigation really decides the ultimate resuit, and the final trial becomes more or less a solemn form.

The criminal law of Ireland is to a great extent the same as that of England, resting on the same common law and on statutes which extend to both countries or are in almost the same terms, and is administered by courts of assize and quarter sessions, and by justices, as in England. In a few instances statutes passed for England or Great Britain before the Union have not been extended to Ireland, or statutes passed by the Irish parliament before the Union or by the British parlia- ment since the Union create offences not known to English law. In Ireland the system of prosecution is nominally the same as in England, but in practice almost all prosecutions are instituted and conducted under the direction of the attorney-general for Ireland, who is a member of the government of the day, and so responsible to parliament, as in the case of the lord advocate. In Ireland, owing to the police being a centralized force, under the management of commissioners residing in Dublin, any prosecu- tion which in England might be conducted by the local police, would in Ireland be conducted under the direction of the chief of the police in Dublin, who is necessarily in close communication with and under the control of the attorney-general.

In Scotland hardly any crimes are constituted by statute law, the common law being to the effect that if a judge will direct any act to be a crime, and a jury will convict, Scotland that act is a crime. This great elasticity of the common law to include every sort of new crime which might arise was in times past very dangerous to political liberty, as it greatly enlarged the power of the crown to oppress

political opponents, but in modern days it has its convenience in facilitating the punishment of persons committing crimes for the punishment of which in England a new act of parliament may be necessary. Criminal procedure in Scotland is regulated by an act of 1887 which greatly simplified indictments and proceedings. The prosecution of crime is in the hands of public officers, procurators fiscal, under the control of the lord advocate. Private pro- secutions are possible, but rare. Except in the case of the law of treason, imported from England at the Union, no grand jury is required, and the indictments are filed by the public officer.

The criminal law of England forms the basis of the criminal

law of all British possessions abroad, with a few exceptions, e.g.

the Channel Islands (still subject to the custom of other

Normandy) and the anomalous case of Cyprus, where British

Mahommedan law is to some extent in force. As to P° sses – T .. . ,- slons.

India, see infra.

In many British colonies the criminal law has been codified or at the least consolidated. Criminal codes have been passed in Canada, New Zealand (1893), Queensland (1899) and W. Australia (1901). Many crown colonies have codes framed on the model prepared by the late Sir R. S. Wright for Jamaica and revised in 1901, and in British Guiana opportunity was taken (in 1893) to abolish the remnants of Roman-Dutch criminal law.

The criminal law of South Africa, which is based on the Roman- Dutch law, including the Constitutio Cfiminalis Carolina (1532), is not codified. In the Transvaal and Orange River colonies codes of criminal procedure are in force, drawn mainly from the common and statute law of the Cape Colony with the addition of provisions borrowed from English and colonial legislation.

In Mauritius the criminal law is comprised in a penal code of 1838 and a procedure code of 1853, which, with the incorporated amendments, are to be found in the Revised Laws of Mauritius

(1903-1904), ii. 466 et seq. The penal code is based on the Code Napoleon.

” Criminal law has everywhere grown out of custom, and has in all civilized states been largely dealt with by direct legislation. In most civilized states (including Japan) it has been Uon ” codified by statute, to the general satisfaction of the people; and the conspicuous success of the Indian penal code shows that English criminal law is susceptible of being so treated ” (Bryce, Studies, ii. 34).

The expediency, if not the necessity, of codifying the criminal law of England has long been apparent. The writings of Bentham drew attention to many of its substantial defects, and the efforts of Romilly and Mackintosh ledtocertainimprovementsembodied in what are known as Peel’s Acts (1826 to 1832). In 1833, at the instance of Lord Chancellor Brougham, a royal commission was appointed to deal with the criminal law. The nature of the instructions indicate the crudity of the ideas then ruling as to codification. The commissioners were directed to digest into one statute all enactments touching crimes and the punishment thereof, and into another statute the provisions of the common unwritten law touching the same. The commission was renewed in 1836 and 1837, and in 1843 a second commission was appointed. Numerous and voluminous reports were published, including (1848) a bill for consolidating and amending the law as to crimes and punishments, and (1849) a like bill for criminal procedure, indicating that the commissioners had in the meantime learned the distinction between substantive and adjective law. Lord Brougham in 1848 unsuccessfully introduced the first bill, and in the end the only fruit of the reports has been certain amendments of procedure in 1851 and the passing of the seven Criminal Law Consolidation Acts of 1861, which deal with the statute law as to theft, forgery, malicious injuries to property, coinage offences and offences against the person. The reports, however, proved of value in the revision of Macaulay’s draft of the Indian penal code, and led to the formation of the Statute Law Com- mittee, which has relieved the statute book of much dead matter. On his return from India, impressed by the success of the Indian penal code, Sir J. Stephen made a strong effort to obtain codifica- tion. In 1878, at the instance of Lord Cairns, he prepared a draft code (based on his well-known Digest of the Criminal Law), which was laid before parliament and then submitted to judicial criticism and revision. As a result of this revision a code bill was introduced in 1880; but a dissolution intervened and no serious effort was then made. The obstacle in the way is not lack of reports or digests on which to frame a code, but the in- capacity of parliament to do the work itself, and its unwillingness to trust the work to other

hands.

The Indian penal code and criminal procedure code, by their history, their form, and the extent and diversity of the races and peoples to which they apply, are perhaps the most important codes in the whole world. While the East India Company was merely a trading company holding certain forts and trading ports in India and elsewhere, such criminal justice as was administered under its auspices was in the main based on the English criminal law, said to have been introduced to some extent by the company's charter of 1661, but reintroduced into the presidency laws by later charters of 1726, 1753 and 1774. (See Nuncomar and Impey, by Sir J. Stephen.) From 177 1 until i860 the criminal law administered was the Mahommedan law. When in 177 1 the East Indian Company determined to stand forth as diwan, Warren Hastings required the courts of the mofussil (provinces), as distinct from those of the presidency town of Fort William, to be guided in the administration of criminal justice by, Mahommedan law, which under the Moguls had been used in criminal cases to the exclusion of Hindu law. Difficulties arose in administration, from the definition of crime, the nature of punishments, and in matters of procedure, which were removed by regulations and by enactments on English lines, especially in Bombay (1827); and great delays and considerable injustice were caused by the want of unity in judicial organization.

Between" 1834 and 1837 Macaulay with three other com-

missioners, Macleod, Anderson and Millet, prepared a draft penal code for India, for which they drew not only upon English and Indian laws and regulations but also upon Livingstone's Louisiana code and the Code Napoleon. Little or nothing was taken from the Mahommedan law. A revised draft of the pena) code by Sir B. Peacock, Sir J. W. Colville and others was com- pleted in 1856. In framing it the reports of the English criminal law commissioners (published after Macaulay's draft code) were considered. The draft was presented to the legislative council in 1856, but owing to the mutiny and to objections from missionaries, &c, its passing was delayed till the 6th of October i860. A draft scheme of criminal procedure was prepared in India in 1847-1848, which, after submission to a commission in England in 1853 (Government of India Act 1853), was moulded into a draft code which passed the India legislative council in 1861 (Act No. XXV.) and came into force in 1862. It has been re-enacted with amendments in 1872 (Act X.), 1882 (Act X.) and 1898 (Act V.).

The result is that in India the criminal law is the law of the conqueror, though for many civil purposes the law of race, religion and caste governs. Under the codes, one set of courts has been established throughout the country, composed of well-paid, well-educated judges, most of the higher judicial appointments being held by Englishmen; all those who hold subordinate judicial posts at the same time are subjected to a combined system of appeal and revision. The arrangement of the Indian penal code is natural as well as logical; its basis is the law of England stripped of technicality and local peculiarities, whilst certain modifications are introduced to meet the exigencies of a country such as British India. It opens with a chapter of general explanations, and interpretations of the terms used throughout the code. It then describes the various punish- ments to which offenders are liable; follows with a list of the exceptions regarding criminal responsibility under which a person who otherwise would be liable to punishment is exempted from the penal consequences of his act, such as offences com- mitted by children, by accident or misfortune without any criminal intention, offences committed by lunatics, offences committed in the exercise of the right of private defence. It may be worth while to add, as an innovation on English law, that an act which results in harm so slight that no person of ordinary sense and temper would complain of such harm is not considered an offence under the code. Then follows a chapter on abetment, in other words, the instigation of a person to do a wrongful act. The next chapters deal with offences against the public, including the state, the army and navy, public tranquillity, public servants, contempts of the lawful authority of public servants, perjury; offences relating to coin and government stamps, to weights and measures; offences affect- ing the public health, safety, convenience, decency and morals; offences relating to religion; and offences relating to the human body, from murder down to the infliction of any hurt. The code then passes on to offences against property; offences relating to forgery, including trade marks, criminal breach of contracts for service; offences relating to marriage, defamation, criminal intimidation, insult and annoyance. Under this last head is included an attempt to cause a person to do anything which that person is not legally bound to do, by inducing him to believe that he would otherwise become subject to Divine displeasure. The last chapter deals with attempts to commit offences punishable by the code with transportation or imprison- ment, and the punishment is limited to one-half of the longest term provided for the offence had it been carried out.

One peculiarity of the Penal Code which has proved eminently

successful lies in the system of illustration of the offence declared in every section by a brief statement of some concrete case. For instance, as illustration of the offence of an attempt to commit an offence the following examples are given : —

I. “A. makes an attempt to steal some jewels by breaking open a box, and finds on opening the box there is no jewel in it. He has done an act towards the commission of theft, and therefore is guilty under this section. L II. ” A. makes an attempt to pick the pocket of Z. by thrusting

his hand into Z.‘s pocket. A. fails in the attempt in consequence of Z. having nothing in his pocket. A. is guilty under this section.”

Passing on to the system of criminal procedure which is set forth in detail in the Code of Criminal Procedure as amended Indian i n 1898, it is no doubt modelled on the English system, code of but with considerable modifications. The principal criminal steps are — (1) arrest by the police and inquiries by procedure. ˆ p jj ce . (2) (-jj e j ssue f summons or warrant by

the magistrate; (3) the mode of procedure before the magistrate, who may either try the accused himself or commit him to the sessions or the High Court, according to the importance of the case; (4) procedure before the court of session; (5) appeals, reference and revision by the High Court.

Elaborate provision is made for the prevention of offences, as regards security for keeping the peace and for good behaviour, the dispersion of unlawful assemblies, the suppression of nuis- ances, disputes as to immovable property, which in all Oriental countries constitute one of the most frequent causes of a breach of the peace.

Ample provision is thus made for the prevention of offences, and the code next deals with the mode of prosecution of offences actually committed.

As a general rule, every offence is inquired into and tried by the court within the local limits of whose jurisdiction it was committed. Differing from the practice of continental countries, all offences, even attempts, may be prosecuted after any lapse of time. As in England, there is no statutory limitation to a criminal offence.

A simple procedure is provided for what are called summons cases, as distinguished from warrant cases — the first being offences for which a police officer may arrest without warrant, the second being offences where he must have a warrant, or, in other words, minor offences and important offences. In summons cases no formal charge need be framed. The magistrate tells the accused the particulars of the offence charged; if he admits his guilt, he is convicted; if he does not, evidence is taken, and a finding is given in accordance with the facts as proved. When the complaint is frivolous or vexatious, the magistrate has the power to fine the complainant. The code gives power of criminal appeal which goes much further than the system in England.

In cases tried by a jury, no appeal lies as to matters of fact, but it is allowed as to matters of law; in other cases, criminal appeal is admitted on matters of law and fact.

In addition to the system of appeal, the superior courts are entrusted with a power of revision, which is maintained auto- matically by the periodical transmission to the High Courts of calendars and statements of all cases tried by the inferior courts; and at the same time, whenever the High Court thinks fit, it can call for the record of any trial and pass such orders as it ■deems right. All sentences of death must be confirmed by the High Court. No appeal lies against an acquittal in anj criminal case. This system of appeal, superintendence and revision would be totally inapplicable to England, but it has proved eminently successful as applied to the present social condition of the inhabitants of India. The appeals keep the judges up to their work, revision corrects all grave mistakes, superintendence .is necessary as a kind of discipline over the conduct of judges, who are not subjected, as. in England, to the criticism of enlightened public opinion.

These Indian codes form the basis of the penal, &c, codes in force in Ceylon (superseding there the Roman-Dutch law), the Straits Settlements, the Sudan and the East Africa protectorates.

It has already been stated that most European states have codified their criminal law. The earliest of continental codes is that of Charles V., promulgated in 1532, and known as Constitutio Criminolis Carolina. Austria made further codes in 1768 (Constitutio Criminolis Theresiana) and 1787 (Emperor Joseph's code). A new code was framed in 1 803 , and amended in 1 85 2 by reference to the Code Napoleon; and in 1906 a completely new' code existed in draft. The Hungarian peDal code dates from 1880. The Bavarian code

of 1768 of Maximilian, revised in 1861, and the Prussian code of 1780, have been superseded by the German penal code of 1872.

The most important of the continental criminal codes are those of France, the Code Pinal (1810) and the Code d 'Instruction Criminelle (1808) — the work of Napoleon the Great and his advisers, which professedly incorporate much of the Roman law.

The Belgian codes (1867), and the Dutch penal code (1880), closely follow the French model. In Spain the penal code dates from 1870, the procedure code from 1886. The Spanish American republics for the most part also have codes. Portugal has a penal code (1852). In Italy the procedure code and the penal code, perhaps the completest yet framed, are of 1890. The Swedish code dates from 1864. The Norwegian code was passed in May 1902, and came into force in 1905. Japan has a code based on a study of European and American models; and Switzerland is framing a federal criminal code.

In the United States no federal criminal code is possible; but most states, following the lead of Louisiana, have digested their criminal law and procedure more or less effectually into penal codes. (W. F. C.)

CRIMINOLOGY, the name given to a new branch of social science, devoted to the discussion of the genesis of crime (q.v.), which has received much attention in recent years. The expres- sion is one of modern coinage, and originated with the speculative theories first advanced by the school of sociologists which had the Italian savant, Professor Lombroso, at its head. He dis- covered or was supposed to have discovered a criminal type, the " instinctive " or " born " criminal, a creature who had come into the world predestined te evil deeds, and who could be surely recognized by certain stigmata, certain facial, physical, even moral birthmarks, the possession of which, presumably ineradicable, foredoomed him to the commission of crime. Dr Lombroso, in his ingenious work L' Uomo delinquente, found many attentive and appreciative, not to say bigoted followers. Large numbers of dissentients exist, however, and the conclusions of the Italian school have been warmly contested and on very plausiblf grounds. If the doctrines be fully accepted the whole theory of free-will breaks down, and we are faced with the paradox that we have no right to punish an irresponsible being who is impelled to crime by congenital causes, entirely beyond his control. The " instinctive " criminal, under this reasoning, must be classed with the lunatic whom we cannot justly, and practically never do, punish. There are other

points on which proof of the existence of the criminal type fails absolutely. The whole theory illustrates a modern phase of psychological doctrine, and the subject has exercised such a potent effect on modern thought that the claims and pretensions of the Lombroso school must be examined and disposed of.

The alleged discovery of the ” born-criminal ” as a separate and distinct genus of the human species was first published by Dr Lombroso in 1876 as the result of long continued investigation and examination of a number of imprisoned criminals. The personality of this human monster was to be recognized by certain inherent moral and physical traits, not all displayed by the same individual but generally appearing in conjunction and then constituting the type. These traits have been defined as follows: — various brain and cerebral anomalies; receding foreheads; massive jaws, prognathous chins; skulls without symmetry; ears long, large and projecting (the ear ad ansa); noses rectilinear, wrinkles strongly marked, even in the young and in both sexes, hair abundant on the head, scanty on the cheeks and chin; eyes feline, fixed, cold, glassy, ferocious; bad repellent faces. Much ‘stress is laid upon the physiognomy, and it is said that it is independent of nationality; two natives of the same country do not so nearly resemble each other as two criminals of different countries. Other peculiarities are: — great width of the extended arms (I’envergure of the French), extraordinary ape-like agility; left-handedness as well as ambi-dexterism; obtuse sense of smell, taste and sometimes of hearing, although the eyesight is superior to that of normal people. ” In general,” to quote Lombroso, ” the born criminal has projecting ears, thick

hair and thin beard, projecting frontal eminences, enormous jaws, a square and protruding chin, large cheek bones and frequent gesticulation.” So much for the anatomical and physiological peculiarities of the criminal. There remain the psychological or mental characteristics, so far as they have been observed. Moral insensibility is attributed to him, a dull conscience that never pricks and a general freedom from remorse. He is said to be generally lacking in intelligence, hence his stupidity, the want of proper precautions, both before and after an offence,which leads so often to his detection and capture. His vanity is strongly marked and shown in the pride taken in infamous achievements rather than personal appearance.

No sooner was this new theory made public than the very existence of the supposed type was questioned and more evidence demanded. A French savant declared that Lombroso's portraits were very similar to the photographs of his friends. Save for the dirt, the recklessness, the weariness and the misery so often seen on it.the face of the criminal does not differ from that of an honest man's. It was pointed out that if certain traits denoted the criminal, the converse should be seen in the honest man. A pertinent objection was that the deductions had been made from insufficient premises. The criminologists had worked upon a comparatively small number of criminals, and yet made their discoveries applicable to the whole class. The facts were collected from too small an area and no definite conclusions could be based upon them. Moreover, the criminologists were by no means unanimous. They differed amongst themselves and often contradicted one another as to the characteristics exhibited.

The controversy was long maintained. Many eminent persons have been arrayed on either side. In Italy Lombroso was supported by Colajanni, Ferri, Garofalo; in France by J. A. Lacassagne. In Germany Lombroso has found few followers; Dr Naecke of Hubertusburg near Leipzig, one of the most eminent of German alienists, declined to admit there was any special animal type. Van Hamel of Amsterdam gives only a qualified approval. In England it stands generally condemned, because it gives no importance to circumstance and passing temptation, or to domestic or social environment, as affecting the causation of crime. Dr Nicholson of Broadmoor has said that " if the criminal is such by predestination, heredity or accidental flaws or anomalies in brain or physical structure, he is such for good and all; no cure is possible, all the plans and processes for his betterment, education, moral training and disciplinary treatment are nugatory and vain." No weight can then be attached to evil example, or unfavourable social surroundings, in moulding and forming character, particularly during the more plastic periods of childhood and youth.

The pertinent question remains, has the study and development of criminology served any useful purpose? Little perhaps can come of it in its restricted sense, but it has taken a wider meaning and embraces larger researches. It has inquired into the sources and causes of crime, it has collected criminal statistics and deduced valuable lessons from them, it has sought and obtained guidance in the best methods of prevention, repression, and forms of procedure. The champions of law and order have been greatly aided by the criminologist in carrying on the continual combat with crime, and in dealing with the most complicated of social phenomena. The new science has, in fact, by accumulat- ing a number of curious details, in recording the

psychology, the secret desires, the springs of the criminal's nefarious actions, his corrigibility or the reverse, " prepared the way to his socio- logical explanation" (Tarde). Thanks to the labours of the criminologist we are moving steadily forward to a future im- proved treatment of the criminal, and may thus arrive at the increased morality and greater safety of society. Very appreci- able advance has been made in the increased attention paid to juvenile and adult crime, the acceptance of the theory, now well established, that there is an especially criminal age, a period when the moral fibre is weaker and more yielding to temptation to crime, when happily human nature is more malleable and susceptible to improvement and reform.

The study of criminology has, however, gone far to satisfy

us that the true genesis of crime is not to be sought in the anatomi- cal anomalies of individuals, or in the fact that there are people who under " any social conditions whatever and of any nation- ality at no matter what epoch, would have undoubtedly become murderers and thieves." On the contrary it may be safely assumed that many such would have done no wrong if they had, e.g., been born rich, had been free from the pressing needs that drove them into crime, and had escaped the evil influences of their surroundings. The criminologists have strengthened the hands of administrators, have emphasized the paramount import- ance of child-rescue and judicious direction of adults, have held the balance between penal methods, advocating the moraliz- ing effect of open-air labour as opposed to prolonged isolation, and have insisted upon the desirability of indefinite detention for all who have obstinately determined to wage perpetual war against society by the persistent perpetration of crime.

Authorities. — See A. Weingart, Kriminaltaktik, ein Handbuch fur das Untersuchen von Verbrechen (Leipzig, 1904); F. H. Wines, Punishment and Reformation (New York, 1895) ; C. Perrier, Les Criminels (Paris, 1905) ; G. Mace, Femmes criminelles (Paris, 1904) ;

E. Carpenter, Prisons, Police and Punishment (1905) ; R. R. Rentoul, Proposed Sterilization of certain Mental and Physical Degenerates (1904); R. Sommer, Kriminalpsychologie und strafrechtliche Psycho- pathologie auf naturwissenschaftlicher Grundlage (Leipzig, 1904) ;

F. Kitzinger, Die internationale kriminalistische Vereinigung (1905) ; Reports of Committee on the best mode of giving efficiency to Secondary Punishments (1831-1832); Reports of the House of Commons Committee of 1853, of the royal commission of 1884, of the departmental committee of 1895, and the annual reports of H. M.

inspectors for Great Britain and Ireland. (A. G.)

CRIMMITZSCHAU, or Krimhitschau, a town of Germany, in the kingdom of Saxony, on the Pleisse and the main Leipzig- Hof railway, 7 m. N.W. from Zwickau. Pop. (1900) 22,845. The most important industries of the town are the manufacture of buckskin, the spinning of carded yarn and vicuna-wool, and the processes of dyeing, finishing and wool-spinning con- nected with these. Among other manufactures are brushes, boilers and the like, machinery, metal ware generally, the cases and other parts of watches. The town has a modern school (Realschule), a commercial school, and technical schools for weaving and finishing.

CRIMP (possibly connected with ” crimp,” to draw together, or fold in parallel lines, in the sense of ” confine “; the primary meaning, however, seems to be that of ” agent,” and the word may be a distinct one, of which the origin is lost), an agent for the supplying of soldiers and sailors, by kidnapping, drugging, decoying or other illegal means. Crimps were’formerly regularly employed in the days of impressment (q.v.). Now the term is used, first of any one who engages to supply merchant seamen without a. licence from the Board of Trade, and is not either the owner, master or mate of the ship, or is not bona fide the servant, and in the constant employment of the owner, or is not a super- intendent (Merchant Shipping Act 1894, § in); and, with a wide application, of the extortionate lodging or boarding-house keepers, who are generally in league with the ” crimp ” proper.

Sections 212 to 219 inclusive of the above act provide for the protection of merchant seamen in the United Kingdom from imposition. Local authorities at seaports have power to make by-laws for the licensing and regulating of lodging-houses for sailors, and to inflict penalties for the infringement thereof. If this power be not exercised, the Board of Trade may do so. Penalties are also imposed by the act for overcharging by lodging-house keepers, for detaining of seamen’s effects, and for soliciting. Unauthorized persons are prohibited from boarding a ship in port without leave. The Board of Trade officer at a port may provide money for sending a seaman to his home on dis- charge, and may forward his wages after deducting the expenses. Facilities are also given for having wages sent home from foreign ports at a small charge. These provisions have practically killed ” crimping” in the United Kingdom. In the ports of the United States of America crimping was long prevalent, especially on the Pacific coast, and its prevention was very difficult, but state regulations as to the licensing of boarding-houses, and the limitation of the amount of so-called ” blood-money ” paid

by masters of vessels to the suppliers of crews to ships denuded by desertions, have reduced the abuse materially.

The term ” to shanghai ” is used of a more serious offence. Literally meaning ” to ship to Shanghai,” in China, it is applied to the drugging or rendering unconscious by violence or other means of persons, whether sailors or not, and shipping them to distant ports, in order fraudulently to obtain money in advance of wages, or for the sake of the premium paid for supplying crews.

CRIMSON, the name of a strong, bright red colour tinged to a greater or less degree with purple. It is the colour of the dye produced from the dried bodies of the cochineal insect (Coccus cacti). The word, in its earlier forms cremesin, crymysyn, also cramoysin, cf. ” cramoisy,” the name of a red cloth, is adapted from the Med. Lat. cremesinus for kermesinus or carmesinus, the dye produced from the insect Kermes (Coccus ilicis), Arab. quirmiz, which Skeat (Etym. Diet., 1898) connects with the Sanskrit krimi, cognate with Lat. vermis and Eng. ” worm.” From the Lat. carminus, a shortened form of carmesinus, comes “carmine” (q.v.).

CRINAGORAS, of Mytilene, Greek epigrammatist, flourished during the reign of Augustus (Strabo xiii. p. 617). A number of epigrams appear under his name in the Greek Anthology. From inscriptions discovered at Mytilene, he appears to have been one of the ambassadors sent from that city to Rome in 45 and 26 B.C.

The epigrams have been edited by M. Rubensohn (1888).

CRINOLINE (a Fr. word formed of the Lat. crinis, hair, and linum, thread), a stiffening material made of horse-hair and cotton or linen thread. Substitutes for this, such as the straw- like material used in making hat shapes, are also known by the same name. From the use of the material to expand ladies’ skirts the term was applied, during the third quarter of the 19th century, when the fashion of wearing greatly expanded skirts was at its height, to the whalebone and steel hoops employed to support the skirts thus worn (see Costume). The term is also used of structures resembling these articles, especially of the framework of booms, spars and netting forming a protection for a warship against torpedo attack.

CRINUM, a genus (nat. ord. Amaryllidaceae) of bulbous plants with

rather broad leaves and a solid leafless stem, bearing a cluster of handsome white or red funnel-shaped regular flowers. They are well known in cultivation, and owing to the wide distribution of the genus different methods are adopted with different species. Some require the hot, moist temperature of a stove; such are C. amabile, a native of Sumatra, C. amoenum (India), C. Baljourii (Socotra), C. giganteum (West tropical Africa), C. Kirkii (Zanzibar), C. latifolium (India), C. zeylanicum (tropical Asia and Africa), and others. Others thrive in a green- house; such are C. asiaticum, a widely distributed plant on the sea-coast of tropical Asia, C. capense and C. longiflorum, from the Cape, and C. Macowani and C. Moorei from Natal. C. asiaticum, C. capense and C. Macowani will also thrive in sheltered positions in the garden.

CRIOBOLIUM, the sacrifice of a ram in the cult of Attis and the Great Mother. It seems to have been a special ceremony instituted after the rise, and on the analogy of the taurobolium (q.v.), which was performed in honour of the Great Mother, for the purpose of giving fuller recognition to Attis in the duality which he formed with the Mother. There is no evidence of its existence either in Asia or in Italy before the taurobolium came into prominence (after a.d. 134). When the criobolium was performed in conjunction with the taurobolium, the altar was almost invariably inscribed to both the Mother and Attis, while the inscription was to the Mother alone when the taurobolium only was performed. The celebration of the criobolium was widespread, and its importance such that it was sometimes performed in place of the taurobolium (Corp. Inscr. Lat. vi. 505, 506). The details and effect of the ceremony were no doubt similar to those of the taurobolium. (G. Sn.)

CRIPPLE CREEK, a city and the county-seat of Teller county, almost at the geographical centre of Colorado, U.S.A., one of the phenomenal mining camps of the West. Pop. (1900)

10,147 (1408 foreign-born); (1910) 6206. The city is served by three railways — the Colorado Springs & Cripple Creek District (a branch of the Colorado & Southern), the Midland Terminal (which connects at Divide, 30 m. distant by rail, with the Colorado Midland), and the Florence & Cripple Creek. Cripple Creek is situated on a mountain slope in a pocket amid the ranges, about 9600 ft. above the sea at the head of the stream after which it is named. The municipal water-supply is drawn from Pike's Peak, 10 m. distant. The interest of the city is in its extraordinary mines and their history. Cripple Creek's site was frequently prospected after i860, and " colours " and gold " float " were always found, but not until February 1891 was the source

discovered. Cripple Creek was at that time a cattle range. In 1891 the output of gold in the district was valued at $449, in 1892 at $583,010, and in the next three years at $2,010,367, $2,908,702 and $6,879,137 respectively. From 1 89 1 to 1906 the total production of gold was valued at $168,584,331; in 1905 1 the product of gold was valued at $15,411,724, the total for the whole state being valued at $25,023,973; in 1906 the output for the district was valued at $14,253,245, out of $23,210,629 for the entire state. The development of the camp into a yellow-pine town and then into something more like a substantial city was marvellously rapid. The first railway was completed in 1894. In the same year a great strike — one of the most famous in American industrial history — threatening civil war, temporarily closed the mines; in 1896 fire almost destroyed the city; in 1903-1904 a second strike, lasting more than a year and greater than the first, occurred. The first strike, which was for an eight-hour day and $3.00 wage, was won by the miners. The second, for the recognition outright of the union organization of the miners, secured only a reaffirmation of the former conditions. The ores are almost exclusively gold, tellurides being the most character- istic form, and occur in fissure veins. Outcroppings were very rare, as the veins were covered with loose wash, and this accounted for the late opening of the field. The field covers a district about 8X10 m. Some peculiarities of the ores have required the use of new methods in their treatment, and in general the development of mining methods and machinery is of a wonderful character. The whole surrounding country is seamed with miles of tunnels in granite, and the hillsides are dotted everywhere with enormous dumps. The most famous mines have been the ” Independence ” (1891) and the ” Port- land ” (1892). The latter had in 1904 more than 25 m. of workings above the noo-ft. level. In 1903 the El Paso drain was completed, to unwater the western half of the field to the 880-ft. level, greatly increasing many mine values and outputs; in 1906 the work of drainage was again taken up, and work on a long bore was begun in May 1907. There are smelters and cyanide extracters in the district, but the bulk of the ore product is shipped to other places for treatment. Among the towns around Cripple Creek in the same mining district is Victor, pop. (1910) 3162, incorporated in 1894, chartered as a city in

1898.

See W. Lindgren and F. L. Ransome, Geology and Gold Deposits of the Cripple Creek District, Colorado, with maps (Washington, 1906), being Professional Paper No. 54 of the United States Geological Survey; and Benjamin McKie Rastall, The Labor History of the Cripple Creek District; A Study in Industrial Evolution (Madison, Wis., 1908),

a full account of the strikes of 1894 and of 1903-1904.

CRISA, or Crissa, in ancient geography, one of the oldest cities of Greece, situated in Phocis, on one of the spurs of Parnassus. Its name occurs both in the Iliad and in the Homeric Hymns, where it is described as a powerful place, with a rich and fertile territory, reaching to the sea, and including within its limits the sanctuary of Pytho. As the town of Delphi grew up around the shrine, and the seaport of Cirrha arose on the Crisean Gulf, Crisa gradually lost much of its importance. By the ancients themselves the name of Cirrha was so often sub- stituted for that of Crisa, that it soon became doubtful whether

1 The value of gold mined in 1899-1902 was greater, annually, than the product of 1905 or 1906; up to 1905 the greatest annual value was in 1900, $18,073,539.

these names indicated the same city or not. The question was practically settled by the investigations of H. N. Ulrichs. From its position Cirrha commanded the approach to Delphi, and its inhabitants became obnoxious to the Greeks from the heavy tolls which they exacted from the devotees who thronged to the shrine. The Amphictyonic Council declared war (the first Sacred War) against the Criseans in 595 B.C., and having taken the town, razed it to the ground, and consecrated its territory to the temple at Delphi. The plunder of the town was sold to defray the expenses of the Pythian games. In 339 the people of Amphissa began to rebuild the town of Cirrha and to cultivate the plain. This act brought on the second Sacred War, the conduct of which was entrusted by the Amphictyons to Philip of Macedon, who took Amphissa (mod. Salona) in the following year. The ruins of Crisa may be still seen where the ravine of the Pleistus joins the plain ; its name is probably preserved by the modern Chryso. See J- G. Frazer's Pausanias, v. 459 (note on x. 37.5).

(E. Gr.)

CRISPI, FRANCESCO (1819-1901), Italian statesman, was born at Ribera in Sicily on the 4th of October 1819. In 1846 he established himself as advocate at Naples. On the outbreak of the Sicilian revolution at Palermo (January 12, 1848) he hastened to the island and took an active part in guiding the insurrection. Upon the

restoration of the Bourbon government (May 15, 1849) he was excluded from the amnesty and compelled to flee to Piedmont. Here he unsuccessfully applied for a situation as communal secretary of Verolengo, and eked out a penurious existence by journalism. Implicated in the Mazzinian conspiracy at Milan (February 6, 1853), he was expelled from Piedmont, and obliged to take refuge at Malta, whence he fled to Paris. Expelled from France, he joined Mazzini in London, and continued to conspire for the redemption of Italy. On the 15th of June 1859 he returned to Italy after publishing a letter repudiating the aggrandizement of Piedmont, and proclaim- ing himself a republican and a partisan of national unity. Twice in that year he went the round of the Sicilian cities in disguise, and prepared the insurrectionary movement of i860.

Upon his return to Genoa he organized, with Bertani, Bixio, Medici and Garibaldi, the expedition of the Thousand, and overcoming by a stratagem the hesitation of Garibaldi, secured the departure of the expedition on the 5th of May i860. Dis- embarking at Marsala on the nth, Crispi on the 13th, at Salemi, drew up the proclamation whereby Garibaldi assumed the dictatorship of Sicily, with the programme: ” Italy and Victor Emmanuel.” After the fall of Palermo, Crispi was appointed minister of the interior and of finance in the Sicilian provisional government, but was shortly afterwards obliged to resign on account of the struggle between Garibaldi and the emissaries of Cavour with regard to the question of immediate annexation. Appointed secretary to Garibaldi, Crispi secured the resignation of Depretis, whom Garibaldi had appointed pro-dictator, and would have continued his fierce opposition to Cavour at Naples, where he had been placed by Garibaldi in the foreign office, had not the advent of the Italian regular troops and the annexation of the Two Sicilies to Italy brought about Garibaldi’s withdrawal to Caprera and Crispi’s own resignation. Entering parliament in 1861 as deputy of the extreme Left for Castelvetrano, Crispi acquired the reputation of being the most aggressive and most impetuous member of the republican party. In 1864, however, he made at the chamber a monarchical profession of faith, in the famous phrase afterwards repeated in his letter to Mazzini : ” The monarchy unites us; the republic would divide us.” In 1866 he refused to enter the Ricasoli cabinet; in 1867 he worked to impede the Garibaldian invasion of the papal states, foreseeing the French occupation of Rome and the disaster of Mentana. By methods of the same character as those subse- quently employed against himself by Cavallotti, he carried on the violent agitation known as the Lobbia affair, in which sundry conservative deputies were, on insufficient grounds, accused of corruption. On the

outbreak of the Franco-German War he

worked energetically to impede the projected alliance with France, and to drive the Lanza cabinet to Rome. The death ol Ratazzi in 1873 induced Crispi's friends to put forward his candidature to the leadership of the Left; but Crispi, anxious to reassure the crown, secured the election of Depretis. After the advent of the Left he was elected (November 1876) president of the chamber. During the autumn of 1877 he went to London, Paris and Berlin on a confidential mission, establishing cordial personal relationships with Gladstone, Granville and other English statesmen, and with Bismarck.

In December 1877 he replaced Nicotera as minister of the interior in the Depretis cabinet, his short term of office (70 days) being signalized by a series of important events. On January 9, 1878, the death of Victor Emmanuel and the accession of King Humbert enabled Crispi to secure the formal establishment of a unitary monarchy, the new monarch taking the title of Humbert I. of Italy instead of Humbert IV. of Savoy. The remains of Victor Emmanuel were interred in the Pantheon instead of being transported to the Savoy Mausoleum at Superga. On the 9th of February, 1879, the death of Pius IX. necessitated a conclave, the first to be held after the unification of Italy. Crispi, helped by Mancini and Cardinal Pecci (afterwards Leo XIII.), persuaded the Sacred College to hold the conclave in Rome, and prorogued the chamber lest any untoward manifestation should mar the solemnity of the event. The statesmanlike qualities displayed on this occasion were unavailing to avert the storm of indignation conjured up by Crispi's opponents in connexion with a charge of bigamy not susceptible of legal proof. Crispi was compelled to resign office, although the judicial authorities upheld the invalidity of his early marriage, contracted at Malta in 1853, and ratified his subsequent union with Signora Barbagallo. For nine years Crispi remained politically under a cloud, but in 1887 returned to office as minister of the interior in the Depretis cabinet, succeeding to the premiership upon the death of Depretis (July 29, 1887).

One of his first acts as premier was a visit to Bismarck, whom he desired to consult upon the working of the Triple Alliance. Basing his foreign policy upon the alliance, as supplemented by the naval entente with Great Britain negotiated by his predecessor, Count Robilant, Crispi assumed a resolute attitude towards France, breaking off the prolonged and unfruitful negotiations for a new Franco-Italian commercial treaty, and refusing the French invitation to organize an Italian section at the Paris Exhibition of 1889. At home Crispi secured the adoption of the Sanitary and Commercial Codes, and reformed the

administration of justice. Forsaken by his Radical friends, Crispi governed with the help of the Right until, on the 31st of January 1891, an intemperate allusion to the sante memorie of the conservative party led to his overthrow. In December 1893 the impotence of the Giolitti cabinet to restore public order, then menaced by disturbances in Sicily and in Lunigiana, gave rise to a general demand that Crispi should return to power. Upon resuming office he vigorously suppressed the disorders, and steadily supported the energetic remedies adopted by Sonnino, minister of finance, to save Italian credit, which had been severely shaken by the bank and financial crises of 1892-1893. Crispi's uncom- promising suppression of disorder, and his refusal to abandon either the Triple Alliance or the Eritrean colony, or to forsake his colleague Sonnino, caused a breach between him and the radical leader Cavallotti. Cavallotti then began against him a pitiless campaign of defamation. An unsuccessful attempt upon Crispi's life by the anarchist Lega brought a momentary truce, but Cavallotti's attacks were soon renewed more fiercely than ever. They produced so little effect that the general election of 1895 gave Crispi a huge majority, but, a year later, the defeat of the Italian army at Adowa in Abyssinia brought about his resignation. The ensuing Rudini cabinet lent itself to Cavallotti's campaign, and at the end of 1897 the judicial authorities applied to the chamber for permission to prosecute Crispi for embezzle- ment. A parliamentary commission, appointed to inquire into the charges against him, discovered only that Crispi, on assuming office in 1893, had found the secret service coffers empty, and

had borrowed from a state bank the sum of £12,000 for secret service, repaying it with the monthly instalments granted in regular course by the treasury. The commission, considering this proceeding irregular, proposed, and the chamber adopted, a vote of censure, but refused to authorize a prosecution. Crispi resigned his seat in parliament, but was re-elected by an over- whelming majority in April 1898 by his Palermo constituents. For some time he took little part in active politics, chiefly on account of his growing blindness. A successful operation for cataract restored his eyesight in June 1900, and notwithstand- ing his 81 years he resumed to some extent his former political activity. Soon afterwards, however, his health began to give way permanently, and he died at Naples on the 12th of August

1901.

The importance of Crispi in Italian public life depended less upon the many reforms accomplished under his administrations than upon his intense patriotism, remarkable fibre, and capacity for administering to his fellow-countrymen the political tonic of which they stood in constant need. In regard to foreign politics he greatly contributed to raise Italian prestige and to dispel the reputation for untrustworthiness and vacillation acquired by many of his predecessors. If in regard to France his policy appeared to lack suavity and circumspection, it must be re- membered that the French republic was then engaged in active anti-Italian schemes and was working, both at the Vatican and in the sphere of colonial politics, to create a situation that should compel Italy to bow to French exigencies and to abandon the Triple Alliance. Crispi was prepared to cultivate good relations with France, but refused to yield to pressure or to submit to dicta – tion; and in this attitude he was firmly supported by the bulk of his fellow-countrymen. The criticism freely directed against him was based rather upon the circumstances of his unfortunate private life and the misdeeds of an unscrupulous entourage which traded upon his name than upon his personal or political short- comings.

See Scritti e discorsi politici di F. Crispi, 1847-1890 (Rome, 1890) ; Francesco Crispi, by W. J. Stillman (London, 1899).

CRISPIN and CRISPINIAN, the patron saints of shoemakers, whose festival is celebrated on the 25th of October. Their history is largely legendary, and there exists no trace of it earlier than the 8th century. It is said that they were brothers and members of a noble family in Rome. They gave up their property and travelled to Soissons (Noviodunum, Augusta Suessionum), where they supported themselves by shoemaking and made many converts to Christianity. The emperor Maximianus (Herculius) condemned them to death. His prefect Rictiovarus endeavoured to carry out the sentence, but they emerged unharmed from all the ordeals to which he subjected them, and the weapons he used recoiled against the executioners. Rictiovarus in disgust cast himself into the fire, or the caldron of boiling tar, from which they had emerged refreshed. At last Maximian had their heads cut off (c. 287-300). Their remains were buried at Soissons, but were afterwards removed, partly by Charlemagne to Osna- . briick (where a festival is observed annually on the 20th of June) and partly to the chapel of St Lawrence in Rome. The abbeys of St Crepin-en-Chaye (the remains of which still form part of a farmhouse on the river Aisne, N.N. W. of Soissons) , of St Crepin- le-Petit, and St Crepin-le-Grand (the site of which is occupied by a house belonging to the Sisters of Mercy), in or near Soissons, commemorated the places sanctified by their imprisonment and burial. There are also

relics at Fulda, and a Kentish tradition claims that the bodies of the martyrs were cast into the sea and cast on shore on Romney Marsh (see Acta SS. Bolland, xi. 495; A. Butler, Lives of the Saints, October 25th).

Especially in France, but also in England and in other parts of Europe, the festival of St Crispin was for centuries the occasion of solemn processions and merry-making, in which gilds of shoe- makers took the chief part. At Troyes, where the gild of St Crispin was reconstituted as late as 1820, an annual festival is celebrated in the church of St Urban. In England and Scotland the day acquired additional importance as the anniversary of the battle of Agincourt (cf . Shakespeare, Henry V. iv. 3) ; the

symbolical processions in honour of ” King Crispin ” at Stirling and Edinburgh were particularly famous. •’

For other examples see Notes and Queries, 1st series, v. 30, vi. 243; W. S. Walsh, Curiosities of Popular Customs (London, 1898).

CRITIAS, Athenian orator and poet, and one of the Thirty Tyrants. In his youth he was a pupil of Gorgias and Socrates, but subsequently devoted himself to political intrigues. In 415 B.C. he was implicated in the mutilation of the Hermae and imprisoned. In 411 he helped to put down the Four Hundred, and was instrumental in procuring the recall of Alcibiades. He was banished (probably in the democratic reaction of 407) and fled to Thessaly, where he stirred up the Penestae (the helots of Thessaly) against their masters, and endeavoured to establish a democracy. Returning to Athens he was made ephor by the oligarchical party; and he was the most cruel and unscrupulous of the Thirty Tyrants who in 404 were appointed by the Lacedae- monians. He was slain in battle against Thrasybulus and the returning democrats. Critias was a man of varied talents — poet, orator, historian and philosopher. Some fragments of his elegies will be found in Bergk, Poetae Lyrici Graeci. He was also the author of several tragedies and of biographies of dis- tinguished poets (possibly in verse) .

See Xenophon, Hellenica, ii. 3. 4. 19, Memorabilia, i. 2; Cornelius Nepos, Thrasybulus, 2 ; R. Lallier, De Critiae tyranni vita ac scriptis (1875) ; Nestle, Neue Jakrb. f. d. kl. Altert. (1903).

CRITICISM (from the Gr. Kplrqs, a judge, npivav, to decide, to give an authoritative opinion), the art of judging the qualities and values of an aesthetic object, whether in literature or the fine arts. 1 It involves, in

the first instance, the formation and expression of a judgment on the qualities of anything, and Matthew Arnold defined it in this general sense as ” a disinterested endeavour to learn and propagate the best that is known and thought in the world.” It has come, however, to possess a secondary and specialized meaning as a published analysis of the qualities and characteristics of a work in literature or fine art, itself taking the form of independent literature. The sense in which criticism is taken as implying censure, the ” picking holes ” in any statement or production, is frequent, but it is entirely unjustifiable. There is nothing in the proper scope of criticism which presupposes blame. On the contrary, a work of perfect beauty and fitness, in which no fault could possibly, be found with justice, is as proper a subject for criticism to deal with as a work of the greatest imperfection. It may be perfectly just to state that a book or a picture is ” beneath criticism,” i.e. is so wanting in all qualities of originality and technical excellence that time would merely be wasted in analysing it. But it can never be properly said that a work is ” above criti- cism,” although it may be ” above censure,” for the very com- plexity of its merits and the fulness of its beauties tempt the skill of the analyser and reward it.

It is necessary at the threshold of an examination of the history of criticism to expose this laxity of speech, since nothing is more confusing to a clear conception of this art than to suppose that it consists in an effort to detect what is blameworthy. Candid criticism should be neither benevolent nor adverse; its function is to give a just judgment, without partiality or bias. A critic (kpitikos) is one who exercises the art of criticism, who sets himself up, or is set up, as a judge of literary and artistic merit. The irritability of mankind, which easily forgets and neglects praise, but cannot forgive the rankling poison of blame, has set upon the word critic a seal which is even more unamiable than that of criticism. It takes its most savage form in Benjamin Disraeli’s celebrated and deplorable dictum, ” the critics are the men who have failed in literature and art.” It is plain that such names as those of Aristotle, Dante, Dryden, Joshua Reynolds, Sainte-Beuve and Matthew Arnold are not to be thus swept by a reckless fulmination. There have been

1 It is in this general sense that the subject is considered in this article. The term is, however, used in more restricted senses, generally with some word of qualification, e.g. ” textual criticism ” or ” higher criticism “; see the article Textual Criticism and the article Bible for an outstanding example of both ” textual ” and ” higher.”

many critics who brought from failure in imaginative composition a cavilling, jealous and ignoble temper, who have mainly exercised their function in indulging the evil passion of envy. But, so far as they have done this, they have proved themselves bad critics, and neither minute care, nor a basis of learning, nor wide experience of literature, salutary as all these must be, can avail to make that criticism valuable which is founded on the desire to exaggerate fault-finding and to emphasize censure unfairly. The examination of what has been produced by other ages of human thought is much less liable to this dangerous error than the attempt to estimate contemporary works of art and literature. There are few indeed whom personal passion can blind to the merits of a picture of the 15th or a poem of the 17th century. In the higher branches of historical criticism, prejudice of this ignoble sort is hardly possible, and therefore, in considering criticism in its ideal forms, it is best to leave out of consideration that invidious and fugitive species which bears the general name of ” reviewing.” This pedestrian criticism, indeed, is useful and even indispensable, but it is, by its very nature, ephemeral, and it is liable to a multitude of drawbacks. Even when the reviewer is, or desires to be, strictly just, it is almost impossible for him to stand far enough back from the object under review to see it in its proper perspective. He is dazzled, or scandalized, by its novelty; he has formed a pre- conceived notion of the degree to which its author should be encouraged or depressed; he is himself, in all cases, an element in the mental condition which he attempts to judge, and if not positively a defendant is at least a juryman in the court over which he ought to preside with remote impartiality.

It may be laid down as the definition of criticism in its pure sense, that it should consist in the application, in the most com- petent form, of the principles of literary composition. Those principles are the general aesthetics upon which taste is founded ; they take the character of rules of writing. From the days of Aristotle the existence of such rules has not been doubted, but different orders of mind in various ages

have given them diverse application, and upon this diversity the fluctuations of taste are founded. It is now generally admitted that in past ages critics have too often succumbed to the temptation to regulate taste rigidly, and to lay down rules that shall match every case with a formula. Over-legislation has been the bane of official criticism, and originality, especially in works of creative imagina- tion, has been condemned because it did not conform to existing rules. Such instances of want of contemporary appreciation as the reception given to William Blake or Keats, or even Milton, are quoted to prove the futility of criticism. As a matter of fact they do nothing of the kind. They merely prove the immutable principles which underlie all judgment of artistic products to have been misunderstood or imperfectly obeyed during the life-times of those illustrious men. False critics have built domes of glass, as Voltaire put it, between the heavens and themselves, domes which genius has to shatter in pieces before it can make itself comprehended. In critical application formulas are often useful, but they should be held lightly; when the formula becomes the tyrant where it should be the servant of thought, fatal error is imminent. What is required above all else by a critic is knowledge, tempered with good sense, and combined with an exquisite delicacy of taste. He who possesses these qualities may go wrong in certain instances, but his error cannot become radical, and he is always open to correction. It is not his business' crudely to pronounce a composition "good " or " bad "; he must be able to show why it is " good " and wherein it is " bad "; he must admire with independence and blame with careful candour. He must above all be assiduous to escape from pompous generalizations, which conceal lack of thought under a flow of words. The finest criticism should take every circumstance of the case into consideration, and hold it necessary, if possible, to know the author as well as the book. A large part of the reason why the criticism of productions of the past is so much more fruitful than mere contemporary reviewing, is that by remoteness from the scene of action the critic is able to make himself familiar with all the elements of

age, place and medium which affected the writer at the moment of his composition. In short, knowledge and even taste are not sufficient for perfect criticism without the infusion of a still rarer quality, breadth of sympathy.

Criticism has been one of the latest branches of literature to reach maturity, but from very early times the instinct which induces mankind to review what it has produced led to the composition of imperfect but often extremely valuable bodies of opinion. What makes these early criticisms tantalizing is that the moral or political aspects

of literature had not disengaged themselves from the purely intellectual or aesthetic.

To pass to an historical examination of the subject, we find that in antiquity Aristotle was regarded as the father and almost as the founder of literary criticism. Yet before his day, three Greek writers of eminence had examined, in more or less fulness, the principles of composition; these were Plato, Isocrates and Aristophanes. The comedy of The Frogs, by the latter, is the earliest specimen we possess of hostile literary criticism, being devoted to ridicule of the plays of Euripides. In the cases of Plato and Isocrates, criticism takes the form mainly of an examination of the rules of rhetoric. We reach, however, much firmer ground when we arrive at Aristotle, whose Poetics and Rhetoric are among the most valuable treatises which antiquity has handed down to us. Of what existed in the literature of his age, extremely rich in some branches, entirely empty in others, Aristotle speaks with extraordinary authority; but Mr G. Saintsbury has justly remarked that as his criticism of poetry was injuriously affected by the non-existence of the novelist, so his criticism of prose was injuriously affected by the omnipresence of the orator. This continues true of all ancient criticism. A work by Aristotle on the problems raised by a study of Homer is lost, and there may have been others of a similar nature; in the two famous treatises which remain we have nothing less important than the foundation on which all subsequent European criticism has been raised. It does not appear that any of the numerous disciples of Aristotle understood his attitude to litera- ture, nor do the later philosophical schools offer much of interest. The Neoplatonists, however, were occupied with analysis of the Beautiful, on which both Proclus and Plotinus expatiated; still more purely literary were some of the treatises of Porphyry. There seems to be no doubt that Alexandria possessed, in the third century, a vivid school of critic-grammarians; the names of Zenodotus, of Crates and of Aristarchus were eminent in this connexion, but of their writings nothing substantial has survived. They were followed by the scholiasts, and they by the mere rhetoricians of the last Greek schools, such as Hermogenes and Aphthonius. In the 2nd century of our era, Dio Chrysostom, Aristides of Smyrna, and Maximus of Tyre were the main representatives of criticism, and they were succeeded by Philo- stratus and Libanius. The most modern of post- Christian Greek critics, however, is unquestionably Dionysius of Halicarnassus, who leads up to Lucian and Cassius Longinus. The last- mentioned name calls for special notice; in ” the lovely and magnificent personality of Longinus ” we find the most in- telligent judge of literature who wrote between Aristotle and the moderns. His book On the Sublime (nept vipovs),

probably written about a.d. 260, and first printed in 1554, is of extreme importance, while his intuitions and the splendour of his style combine to lift Longinus to the highest rank among the critics of the world.

In Roman literature criticism never took a very prominent position. In early days the rhetorical works of Cicero and the famous A rt of Poetry of Horace exhaust the category. During the later Augustan period the only literary critic of importance was the elder Seneca. Passing over the valuable allusions to the art of writing in the poets, especially in Juvenal and Martial, we reach, in the Silver Age, Quintilian, the most accomplished of all the Roman critics. His Institutes of Oratory has been described as the fullest and most intelligent application of criticism to literature which the Latin world produced, and one which places the name of Quintilian not far below those of Aristotle and Longinus. He was followed by Aulus Gellius.

by Macrobius (whose reputation was great in the middle ages), by Servius (the great' commentator on Virgil), and, after a long interval, by Martianus Capella. Latin criticism sank into mere pedantry about rhetoric and grammar. This continued throughout the Dark Ages, until the 13th century, when rhythmical treatises, of which the Labyrinthus of Eberhard (1212?) and the Ars rhythmica of John of Garlandia (John Garland) are the most famous, came into fashion. These writings testified to a growing revival of a taste for poetry.

It is, however, in the masterly technical treatise De vulgari eloquio, generally attributed to Dante, the first printed (in Italian) in 1 529, that modern poetical criticism takes its first step. The example of this admirable book was not adequately followed; throughout the 14th and 15th centuries, criticism is mainly indirect and accidental. Boccaccio, indeed, is the only figure worthy of mention, between Dante and Erasmus. With the Renaissance came a blossoming of Humanist criticism in Italy, producing such excellent specimens as the Sylvae of Poliziano, the Poetics (1527) of Vida, and the Poetica of Trissino, the best of a whole crop of critical works produced, often by famous names, between 1525 and 1 560. These were followed by sounder scholars and acuter theorists: by Scaliger with his epoch- making Poetices (1561); by L. Castelvetro, whose Poetica (1570) started the modern cultivation of the Unities and asserted the value of the Epic; by Tasso with his Discorsi (1587); and by Francesco Patrizzi in his

Poetica (1586).

In France, the earliest and for a long time the most important specimen of literary criticism was the Defense et illustration de la langue franqaise, published in 1549 by Joachim du Bellay. Ronsard, also, wrote frequently and ably on the art of poetry. The theories of the Pleiade were summed up in the Art poetique of Vauquelin de la Fresnaye, which belongs to 1574 (though not printed until 1605).

In England, the earliest literary critic of importance was Thomas Wilson, whose Art of Rhetoric was printed in 1553, and the earliest student of poetry, George Gascoigne, whose Instruction appeared in 1575. Gascoigne is the first writer who deals intelligently with the subject of English prosody. He was followed by Thomas Drant, Harvey, Gosson, Lodge and Sidney, whose controversial pamphlets belong to the period between 1575 and 1580. Among Elizabethan ” arts ” or ” de- fences ” of English poetry are to be mentioned those of William Webbe (1586), George Puttenham (1589), Thomas Campion (1602), and Samuel Daniel (1603). With the tractates of Ben Jonson, several of them lost, the criticism of the Renaissance may be said to close.

A new era began throughout Europe when Malherbe started, about 1600, a taste for the neo-classic or anti-romantic school of poetry, taking up the line which had been foreshadowed by Castelvetro. Enfin Malherbe vint, and he was supported in his revolution by Regnier, Vaugelas, Balzac, and finally by Corneille himself, in his famous prefatory discourses. It was Boileau, however, who more than any other man stood out at the close of the 17 th century as the law-giver of Parnassus. The rules of the neo-classics were drawn together and arranged in a system by Rene Rapin, whose authoritative treatises mainly appeared between 1668 and ˆ674. It is in writings of this man, and of the Jesuits, Le Bossu and Bouhours, that the preposterous rigidity of the formal classic criticism is most plainly seen. The influence of these three critics was, however, very great through- out Europe, and we trace it in the writings of Dryden, Addison and Rymer. In the course of the 18th century, when the neo- classic creed was universally accepted, Pope, Blair, Karnes, Harris, Goldsmith and Samuel Johnson were its most dis- tinguished exponents in England, while Voltaire, Buffon (to whom we owe the phrase ” the style is the man “), Marmontel, La Harpe and Suard were the types of academic opinion in France.

Modern, or more properly Romantic, criticism came in when the neo-classic tradition became bankrupt throughout Europe at the very close

of the 18th century. It has been heralded in Germany by the writings of Lessing, and in France by those of

Diderot. Of the reconstruction of critical opinion in the 19th century it is impossible to speak here with any fulness, it is contained in the record of the recent literature of each European language. It is noticeable, in England, that the predominant place in it was occupied, in violent contrast with Disraeli's dictum, by those who had obviously not failed in imaginative composition, by Wordsworth, by Shelley, by Keats, by Landor, and pre-eminently by S. T. Coleridge, who was one of the most penetrative, original and imaginative critics who have ever lived. In France, the importance of Sainte-Beuve is not to be ignored or even qualified; after manifold changes of taste, he remains as much a master as he was a precursor. He was followed by Theophile Gautier, Saint-Marc, Girardin, Paul de Saint Victor, and a crowd of others, down to Taine and the latest school of individualistic critics, comparable with Matthew Arnold, Pater, and their followers in England.

See G. Saintsbury, A History of Criticism (3 vols., 1902-1904) ; J. E. Spingarn, A History of Literary Criticism in the Renaissance (2nd ed. 1908) ; Thery, Histoire des opinions litteraires (1849) ; J. A. Symonds, The Revival of Learning (1877) ; Matthew Arnold, Essays in Criticism, i. (1865), ii. (1868) ; Bourgoin, Les Mattres de la critique au XVII' siecle (1889) ; Paul Hamelius, Die Kritik in der englischen Literatur (1897); S. H. Butcher, The Poetics of Artistotle (1898); H. L. Havell and Andrew Lang, Longinus on the Sublime (1890). See also the writings of Sainte-Beuve, Matthew Arnold, F. Brunetiere, Anatole France, Walter Pater, passim. (E. G.)

CRITIUS and NESIOTES, two Greek sculptors of uncertain school, of the time of the Persian Wars. When Xerxes carried away to Persia the statues of Harmodius and Aristogiton made by Antenor, Critius and Nesiotes were commissioned to replace them. By the help of coins and reliefs, two statues at Naples, wrongly restored as gladiators, have been identified as copies of the tyrannicides of Critius; and to them well apply the words in which Lucian {Rhetor, praecepta, 9) describes the works of Critius and Nesiotes, " closely knit and sinewy, and hard and severe in outline." Critius also made a statue of the armed runner Epicharinus.

CRITOLAUS, Greek philosopher, was born at Phaselis in the 2nd century B.C. He lived to the age of eighty-two and died probably before in B.C. He studied philosophy under Aristo of Ceos and became one of the leaders of the Peripatetic school by his eminence as an

orator, a scholar and a moralist. There has been considerable discussion as to whether he was the immediate successor of Aristo, but the evidence is confused and unprofitable. In general he was a loyal adherent to the Peri- patetic succession (cf. Cicero, De fin. v. 5 ” C. imitari antiquos voluit “) , though in some respects he went beyond his predecessors. For example, he held that pleasure is an evil (Gellius, Nodes Atticae, ix. 5. 6), and definitely maintained that the soul consists of aether. The end of existence was to him the general perfection of the natural life, including the goods of the soul and the body, and also external goods. Cicero says in the Tusculans that the goods of the soul entirely outweighed for him the other goods (” tantum propendere illam bonorum animi lancem “)• Further, he defended against the Stoics the Peripatetic doctrine of the eternity of the world and the indestructibility of the human race. There is no observed change in the natural order of things; mankind re-creates itself in the same manner according to the capacity given by Nature, and the various ills to which it is heir, though fatal to individuals, do not avail to modify the whole. Just as it is absurd to suppose that man is merely earth-born, so the possibility of his ultimate destruction is inconceivable. The world, as the manifestation of eternal order, must itself be immortal. The life of Critolaus is not recorded. One incident alone is preserved. From Cicero {Acad. ii. 45) it appears that he was sent with Carneades and Diogenes to Rome in 156-155 B.C. to protest against the fine of 500 talents imposed on Athens in punishment for the sack of Oropus. The three ambassadors lectured on philosophy in Rome with so much success that Cato was alarmed and had them dismissed the city. Gellius describes his arguments as scita et teretia.

Consult the article Peripatetics, and histories of ancient philo- sophy, e.g. Zeller.

CRITTENDEN, JOHN JORDAN (1787-1863), American statesman, was born in Versailles, Kentucky, on the 10th of September 1787. After graduating at the College of William and Mary in 1807, he began the practice of law in his native state. He served for three months, in 1810, as attorney-general of Illinois Territory, but soon returned to Kentucky, and during the War of 181 2 he was for a time on the staff of General Isaac Shelby. In 1811-1817 he served in the state House of Repre- sentatives, being speaker in 1815-1816, and in 1817-1819 was a United States senator. Settling in Frankfort, he soon took high rank as a criminal lawyer, was in the Kentucky House of Repre- sentatives

in 1825 and 1829-1832, acting as speaker in the latter period, and from 1827 to 1829 was United States district-attorney. He was removed by President Jackson, to whom he was radically opposed. In 1835, as a Whig, he was again elected to the United States Senate, and was re-elected in 1841, but resigned to enter the cabinet of President W. H. Harrison as attorney-general, continuing after President Tyler's accession and serving from March until September. He was again a member of the United States Senate from 1842 to 1848, and in 1848-1850 was governor of Kentucky. He was an ardent and outspoken supporter of Clay's compromise measures, and in 1850 he entered President Fillmore's cabinet as attorney-general, serving throughout the administration. From 1855 to 1861 he was once more a member of the United States Senate. During these years he was perhaps the foremost champion of Union in the South, and strenuously opposed the Kansas-Nebraska Bill, which he declared prophetically would unite the various elements of opposition in the North, and render the breach between the sections irreparable. Nevertheless he laboured unceasingly in the cause of com- promise, gave his strong support to the Bell and Everett ticket in i860, and in 1860-1861 proposed and vainly contended for the adoption by congress of the compromise measures which bear his name. When war became inevitable he threw himself zealously into the Union cause, and lent his great influence to keep Kentucky in the Union. In 1861-1863 he was a member of the national House of Representatives, where, while advocating the prosecution of the war, he opposed such radical measures as the division of Virginia, the enlistment of slaves and the Conscription Acts. He died at Frankfort, Kentucky, on the 26th of July 1863.

See the Life of J. J. Crittenden, by his daughter Mrs Chapman Coleman (2 vols., Philadelphia, 1871).

His son, George Bibb Crittenden (1812-1880), soldier, was born in Russellville, Kentucky, on the 20th of March 1812, and graduated at West Point in 1832, but resigned his commission in 1833. He re-entered the army as a captain of mounted rifles in the Mexican War, served with distinction, and was breveted major for bravery at Contreras and Churubusco. After the war he remained in the army, and in 1856 attained the rank of lieutenant-colonel. In June 1861 he resigned, and entered the service of the Confederacy. He was commissioned major- general and given a command in south-east Kentucky and Tennessee, but after the defeat of his forces by General George H. Thomas at Mill Springs (January 9, 1862), he was censured and gave up his command. He served subsequently as a volunteer aide on the staff of Gen. John S. Williams. From 1867 to 1871 he was state

librarian of Kentucky. He died at Danville, Kentucky, on the 27th of November 1880.

Another son, Thomas Leonidas Crittenden (1815-1893), soldier, was also born at Russellville, Kentucky. He studied law, and practised with his father, and in 1842 became common- wealth's attorney. He served in the Mexican War as a lieutenant- colonel of Kentucky volunteers, and was an aide on Gen. Zachary Taylor's staff at the battle of Buena Vista. From 1849 to 1853 he was United States consul at Liverpool, England. Like his father, he was a strong Union man, and in September 1861 he was commissioned by President Lincoln a brigadier-general of volunteers. He commanded a division at Shiloh, for gallantry in which battle he was promoted major-general in July 1862. He was in command of a corps in the army of the Ohio under Gen. D. C. Buell, and took part in the battles of Stone River

and Chickamauga. Subsequently he served in the Virginia campaign of 1864. He resigned his commission in December 1864, but in July 1866 entered the regular army with the rank of colonel of infantry, receiving the brevet of brigadier-general in r867, served on the frontier and in several Indian wars, and retired in 1881. He died on the 23rd of October 1893.

CRIVELLI, CARLO, Venetian painter, was born in the earlier part of the 1 5th century. The only dates that can with certainty be given are 1468 and 1493; these are respectively the earliest and the latest years signed on his pictures — the former on an altar-piece in the church of San Silvestro at Massa near Fermo, and the latter on a picture in the Oggioni collection in Milan. Though born in Venice, Crivelli seems to have worked chiefly in the March of Ancona, and especially in and near Ascoli; there are only two pictures of his proper to a Venetian building, both of these being in the church of San Sebastiano. He is said to have studied under Jacobello del Fiore, who was painting as late at any rate as 1436; at that time Crivelli was probably only a boy . The latter always signed as ' ' Carolus Crivellus Venetus ' ' ; from 1490 he added " Miles," having been then knighted (" Cavaliere") by Ferdinand II. of Naples. He painted in tempera only, and is seen to most advantage in subject pictures of moderate size. He introduced agreeable landscape back- grounds; and was particularly partial to giving fruits and flowers (the peach is one of his favourite fruits) as accessories, often in pendent festoons. The National Gallery in London is well supplied with examples of Crivelli; the " Annunciation," and the " Beato Ferretti " (of the same family as Pope Pius IX.) in religious ecstasy, may be specified. Another of his principal pictures is in San Francesco di Matelica; in Berlin is a " Madonna and Saints " (1491) ;

in the Vatican Gallery a " Dead Christ," and in the Brera of Milan the painter's own portrait, with other examples. Crivelli is a painter of marked individu- ality, — hard in form, crudely definite in contour; stern, forced, energetic, almost grotesque and repellent, in feature and expres- sion, and yet well capable of a prim sort of prettiness; simply vigorous in his effect of detachment and relief, and sometimes admitting into his pictures objects actually raised in surface; distinct and warm in colour, with an effect at once harsh and harmonious. His pictures gain by being seen in half-light, and at some little distance; under favouring conditions they grip the spectator with uncommon power. Few artists seem to have worked with more uniformity of purpose, or more forthright command of his materials, so far as they go. It is surmised that Carlo was of the same family as the painters Donato Crivelli (who was working in 1459, and was also a scholar of Jacobello) and Vittorio Crivelli. Pietro Alamanni was his pupil.

See, along with Crowe and Cavalcaselle, Berenson, Venetian Painters of the Renaissance (1899); Morelli, Italian Painters (1892- 1893); Rushforth, Carlo Crivelli (1900). (W. M. R.)

CROATIA-SLAVONIA (Serbo-Croatian Hrvatska i Slavonija; Hung. Horvdt-Szlavonorszdg; Ger. Kroalien und Slawonien), a kingdom of the Hungarian monarchy; bounded on the N. by Carniola, Styria and Hungary proper; E. by Hungary and Servia; S. by Servia, Bosnia and Dalmatia; and W. by the Adriatic Sea, Istria and Carniola. Until 1881 Croatia, in the N.W. of this region, was divided from Slavonia, in the N.E., by a section of the Austrian Military Frontier. This section is now the county of Bjelovar, and forms part of the united kingdom of Croatia-Slavonia. The river Kulpa, which bisects the county of Agram, is usually regarded as the north-eastern limit of the Balkan Peninsula; and thus the greater part of Croatia, lying south of this river, falls within the peninsular boundary, while the remainder, with all Slavonia, belongs to the continental mainland. According to the official survey of 1900, the total area of the country is 16,423 sq. m. The Croatian littoral extends for about 90 m. from Fiume to the Dalmatian frontier. A narrow strait, the Canale della Morlacca (or della Montagna), separates it from Veglia, Arbe, Pago and other Istrian or Dal- matian islands. The city and territories of Fiume, the sole important harbour on this coast, are included in Hungary proper, and controlled by the Budapest government. Westward from

Warasdin, and along the borders of Styria, Carniola, Istria, Dalmatia and north-western Bosnia, the frontier is generally mountainous and follows an irregular course. The central and eastern region, situated between the Drave and Danube on the north, and the Save on the south, forms one long wedge, with its point at Semlin.

Physical Features. — Croatia-Slavonia is naturally divided into two great sections, the highlands of the west and the low- lands of the east.

The plateau of the Istrian Karst is prolonged in several of the bare and desolate mountain chains between the Save and the Adriatic, notably the Great and Little Kapella (or Kapela), which link together the Karst and the Dinaric Alps, culminating in Biela Lazica (5029 ft.); the Pljesevica or Plisevica Planina (5410 ft.), overlooking the valley of the river Una ; and the Velebit Planina, which follows the westward curve of the coast, and rises above the sea in an abrupt wall, unbroken by any considerable bay or inlet. As it skirts the Dalmatian border, this range attains its greatest altitude in the adjacent peaks of Sveto Brdo (5751 ft.), and Vakanski Vrh (5768 ft.). Large tracts of the Croatian highlands are well-nigh waterless, and it is only in the more sheltered hoik ws that sufficient soil collects for large trees to flourish. In northern Croatia and Slavonia the mountains are far more fertile, being often densely wooded with oaks, beeches and pines. They comprise the Uskoken Gebirge, or Uskoks Mountains, named after the piratical Uskoks (q.v.) of Zengg, who were deported hither after the fall of their stronghold in 161 7; the Warasdin Mountains, with the peak of Ivanscica (3478 ft.); the Agram Mountains, culminating in Sljeme or Slema (3396 ft.), and including the beautiful stretches of Alpine pasture known as the Zagorje, or ” land beyond the hills “; the Bilo Gebirge, or White Mountains, a low range of chalk, and, farther to the south, several groups of mountains, among which Psunj (3228 ft.), Papuk (3217 ft.) Crni Vrh (2833 ft.), and the Ravna Gora (2808 ft.) are the chief summits. All these ranges, except the Uskoken Gebirge, constitute the central watershed of the kingdom, between the Drave and Save. In the east Slavonian county of Syrmia 1 the Fruska Gora or Vrdnik Mountains rise to a height of 1768 ft. along the southern bank of the Danube, their picturesque vineyards and pine or oak woods contrasting strongly with the plains that surround them.

The lowlands, in the valleys of the Drave, Danube, Save and Kulpa, belong partly to the great Hungarian Plains, or Alfold. Besides the sterile and monotonous steppes, valuable only as pasture, and so sparsely populated that it is possible to travel for many hours without encountering any sign of human life except a primitive artesian well

or a shepherd's hut, there are wide expanses of fen-country, regularly flooded in spring and autumn. The marshes which line the Save below Sissek are often impassable except at Brod and Mitrovica, and the river is constantly scooping out fresh channels in the soft soil, only to abandon each in turn. The total area liable to yearly inundation exceeds 200 sq. m. But along the Drave and Danube the plains are sometimes strikingly fertile, and yield an abundance of grain, fruit and wine.

The main rivers of Croatia-Slavonia, the Danube, Drave and Save, are fully described under separate headings. After reaching Croatian territory 13 m. N.W. of Warasdin, the Drave flows along the northern frontier for 155 m., receiving the Bednja and Karasnica on the right, and falling, near Esseg, into the Danube, which serves as the Hungaro-Slavonian boundary for an additional 1 16 m. The Save enters the country 16 m. W. of Agram, and, after winding for 106 m. S.E. to Jase- novac, constitutes the southern frontier for 253 m., and meets the Danube at Belgrade. It is joined by the Sotla, Krapina, Lonja, Ilova, Pakra and Oljana, which drain the central water- shed; but its only large tributaries are the Una, a Bosnian stream, which springs in the Dinaric Alps, and skirts the Croatian border for 40 m. before entering the Save at Jasenovac ; and

1 Also written Sirmia and Sirmium; Serbo-Croatian Sriem; Hungarian Szerem.

the Kulpa, which follows a tortuous course of 60 m. from its headwaters north of Fiume, to its confluence with the Save at Sissek. The Mreznica, Dobra, Glina and Korana are right-hand tributaries of the Kulpa. In the Croatian Karst the seven streams of the Lika unite and plunge into a rocky chasm near Gospic, and the few small brooks of this region usually vanish underground in a similar manner. Near Fiume, the Recina, Rjeka or Fiumara falls into the Adriatic after a brief course. There is no large lake in Croatia-Slavonia, but the upland pools and waterfalls of Plitvica, near Ogulin, are celebrated for their beauty. After a thaw or heavy rain, the subterranean rivers flood the mountain hollows of the Karst; and a lake thus formed by the river Gajka, near Otocac, has occasionally filled its basin to a depth of 160 ft.

Minerals. — The mineral resources of the kingdom, though capable of further development, are not rich. They are chiefly confined to the mountains, where iron, coal, copper, lead, zinc, silver and sulphur are mined in small quantities. Warm mineral springs rise at Krapina, at Toplice near Warasdin, at Stubica near Agram, and elsewhere.

Climate. — The climate of Croatia-Slavonia varies greatly in different regions. In the Karst it is liable to sudden and violent changes, and especially to the bora, a fierce N.N.E. wind, which renders navigation perilous among the islands off the coast, and, in winter, blocks the roads and railway-cuttings with deep snowdrifts. The sheltered bays near Fiume enjoy an equable climate; but in all other districts the temperature in mid-winter falls regularly below zero, and the summer heats are excessive. Earthquakes are common among the mountains, and the eastern lowlands are exposed to the great winds and sandstorms which sweep down the Alfold. At Agram, during the years 1896-1900, the mean annual temperature was 52° F., with 34-6 in. of rain and snow; at Fiume, the figures for the same period were 57° and 71 in.

Agriculture. — The agricultural inquiry of 1895 showed that 94.5 % of the country consisted of arable land, gardens, vineyards, meadows, pastures and forests; but much of this area must be set down as mountainous and swampy pasture of poor quality. The richest land occurs in the Zagorje and its neighbourhood, in the hills near Warasdin and in the northern half of Syrmia. The Karst and the fens are of least agricultural value. Indian corn heads the list of cereals, but wheat, oats, rye and barley are also cultivated, besides hemp, flax, tobacco and large quantities of potatoes. The extensive vine- yards were much injured by phylloxera towards the close of the 19th century. The Slavonian plum orchards furnish dried prunes, besides a kind of brandy largely exported under the name of sliwowitz or shlivovitsa. Near Fiume the orange, lemon, pomegranate, fig and olive bear well ; mulberries are planted on many estates for silkworms ; and the heather-clad uplands of the central region favour the keeping of bees. Large herds of swine fatten in the oak and beech forests; and dairy-farming is a thriving industry in the highlands between Agram and Warasdin, where, during the last years of the 19th century, systematic attempts were made to replace the mountain pastures by clover and sown grass. The proportion of sheep to other live-stock is lower than in most of the South Slavonic lands, and the scarcity of goats is also noteworthy. Horsebreeding is a favourite pursuit in Slavonia; and between 1900 and 1902 many thousands of remounts were shipped to the British army in South Africa. The local administration endeavours to better the quality ot live-stock by importing purer breeds, distributing prizes, and other measures; but the native farmers are slow to accept improvements.

Forests. — Forests, principally of oak, pine and beech, covered 3,734,000 acres in 1895, about one-fifth being state property. Especially valuable are the Croatian oak-forests, near Agram and Sissek.

Timber is exported from Fiume and down the Danube.

Industries. — Apart from the distilleries and breweries scattered throughout the country, the rude flour-mills which lie moored in the rivers, and a few glass-works, saw-mills, silk-mills and tobacco factories, the chief industrial establishments of Croatia-Slavonia are at Agram, Fiume, Semlin, Buccari and Porto Re. Only 8-3 of the population was, in 1900, engaged in industries other than farming, which occupied 85-2 %. The exports mainly consist of foodstuffs, especially grain, of live-stock, especially pigs and horses, and of timber. The imports include textiles, iron, coal, wine and colonial products; with machinery and other finished articles. Goods in transit to and from Hungary figure largely in the official returns for Fiume 2 and Semlin, which are the centres of the foreign trade. In 1900 Croatia-Slavonia possessed 253 banking establishments.

Communications. — The commerce of the country is furthered by upwards of 2000 m. of carriage-roads, the most remarkable of these

2 It is impossible to exclude Fiume from any survey of Croatian trade, although Fiume belongs politically to Hungary proper, and is the main outlet for Hungarian emigration and maritime commerce.

being the Maria Louisa, which connects Karlstadt with Fiume, and the Josephina, which passes inland from Zengg. Many excellent highways were built for strategic purposes before the abolition of the Military Frontier in 1881. The railways, which are all owned and managed by the Hungarian state, intersect most parts of the country except the mountains south of Ogulin, where there is, nevertheless, a considerable traffic over the passes into Dalmatia and Bosnia. Agram is the principal railway centre, from which lines radiate S. W. to Fiume, W. into Austria, N.N.E. to Warasdin and into Hungary, and S.E. into Bosnia by way of Kostajnica. The main line eastward from Agram passes through Brod, where it meets the Bosnian system, and on to Belgrade ; throwing out two branch lines to Brcka and Samac in Bosnia, and several branches on the north, which traverse the central watershed, and cross the Hungarian frontier at Zakany, Bares, Esseg, Erdar and Peterwardein. Above Agram the Save is used chiefly for floating rafts of timber; east of Sissek it is navigable by small steamboats, but, despite its great volume, the multitude of its perpetually shifting sandbanks interferes greatly with traffic. Steamers

also ply on the Una, the Drave below Bares, and the Danube. The marshes of Syrmia are partially drained by the so-called ” Canal of Probus,” the one large artificial waterway in the country, said to have been cut by the Romans in the 3rd century.

Chief Towns. — The principal towns are Agram, the capital, with 61,002 inhabitants in 1900; Esseg, the capital of Slavonia (24,930); Semlin (15,079) ; Mitrovica (11,518) ; Warasdin (12,930) ; Karlstadt (7396); Brod (7310); Sissek (7047); Djakovo (6824); Karlowitz (5643); Peterwardein (5019); Zengg (3182); and Buccari (1870). These are described in separate articles. The centre of the coasting trade is Novi, and other small seaports are San Giorgio (Sveto Juraj), Porto Re (Kraljevica) and Carlopago. Agram, Gospic (10,799), Ogulin (8699), Warasdin and Bjelovar (6056) are respectively the capitals of the five counties which belong to Croatia proper, — Agram (Hung. Zdgrdb), Modrus-Fiume, Lika- Krbava, Warasdin {Varasd) and Bjelovar (Belov&r-Koros); while the capitals of the three Slavonian counties, Virovitica (Verocze), Pozega (Pozsega) and Syrmia (Szerem), are Esseg, Pozega (5000) and Semlin.

Population and National Characteristics. — The population rose from 1,892,499 in 1881 to 2,416,304 in 1900, an increase of little less than one-third, resulting from a uniformly low death rate, with a high marriage and birth rate, and characterized by that preponderance of male over female children which is common to all the South Slavonic lands. More than 75% of the inhabitants are Croats, the bulk of the remainder being Serbs, who predominate in eastern Slavonia. Outside Croatia-SIavonia, the Croats occupy the greater part of Dalmatia and northern Bosnia. There are large Croatian settlements in the south of Hungary, and smaller colonies in Austria. The numbers of the whole nation may be estimated at 3,500,000 or 4,000,000. The distinction between Croats and Serbs is religious, and, to a less extent, linguistic. Croats and Serbs together constitute a single branch of the Slavonic race, frequently called the Serbo-Croatian branch. The literary language of the two nations is identical, but the Croats use the Latin alphabet, 1 while the Serbs prefer a modified form of the Cyrillic. The two nations have also been politically separated since the 7th century, if not for a longer period; but this division has produced little difference of character or physical type. Even the costume of the Croatian peasantry, to whom brilliant colours and intricate embroideries are always dear, proclaims their racial identity with the Serbs; their songs, dances and musical instruments, the chief part of their customs and folk-lore, their whole manner of life, so little changed by its closer contact with Western civilization, may be studied in Servia (q.v.) itself. In both countries rural society was based

on the old-fashioned household community, or zadruga, which still survives in the territories that formed the Military Frontier, though everywhere tending to disappear and be replaced by individual ownership. The Croatian peasantry are least prosperous in the riverside districts, where marsh- fevers prevail, and especially beside the Save. Even in many of the towns the houses are mere cabins of wood and thatch. As in Servia, there is practically no middle class between the peasants and the educated minority; and the commercial element consists to a great extent of foreigners, especially Germans, Hungarians, Italians and Jews. Numerically this

1 It is important to notice the value of the following letters and signs, which recur frequently: — c = ls; c = ch (hard); £ = ch (soft); i = y, orj in German ; $ = sh; z = zh, or j in French.

alien population is insignificant. The Italians are chiefly confined to the coast; the Germans congregate at Semlin and Warasdin; the Slovenes are settled along the north-western frontier, where they have introduced their language, and so greatly modified the local dialect; the gipsies wander from city to city, as horse-dealers, metal workers or musicians; there are numerous Moravian and Bohemian settlements; and near Mitrovica there is a colony of Albanians. It is impossible to give accurate statistics of the alien population; for, in the compilation of the official figures, language is taken as a test of nationality, an utterly untrustworthy method in a country where every educated person speaks two or three languages. Croatian nationalists also maintain that official figures are systematically altered in the Hungarian interest.

Constitution and Government. — By the fundamental law of the 21st of December 1867 Austria-Hungary was divided, for pur- poses of internal government, into Cisleithania, or the Austrian empire, and Transleithania, or the kingdoms of Hungary and Croatia-SIavonia. In theory the viceroy, or ban of Croatia- SIavonia is nominated by the crown, and enjoys almost unlimited authority over local affairs; in practice the consent of the crown is purely formal, and the ban is appointed by the Hungarian premier, who can dismiss him at any moment. The provincial government is subject to the ban, and comprises three ministries — the interior, justice, and religion and education, — for whose working the ban is responsible to the Hungarian premier, and to the national assembly of Croatia-SIavonia (Narodna SkupStina). This body consists of a single chamber, composed partly of elected deputies, partly of privileged members, whose numbers cannot exceed half those of the deputies. There are 69 con- stituencies, besides the 21 royal free cities which also return

deputies. Electors must belong to certain professions or pay a small tax. The privileged members are the heads of the nobility, with the highest ecclesiastics and officials. As a rule, they represent the " Magyarist " section of society, which sympathizes with Hungarian policy. The chamber deals with religion, education, justice and certain strictly provincial affairs, but even within this limited sphere all its important enactments must be countersigned by the minister for Croatia-SIavonia, a member, without portfolio, of the Hungarian cabinet. At the polls, all votes are given orally, a system which facilitates corruption; the officials who control the elections depend for their livelihood on the ban, usually a Magyarist; and thus, even apart from the privileged members, a majority favourable to Hungary can usually be secured. The constitutional relations between Hungary and Croatia-SIavonia are regulated by the agreement, or nagoda, of 1868. This instrument determines the functions of the ban; the control of common interests, such as railways, posts, telegraphs, telephones, commerce, industry, agriculture or forests; and the choice of delegates by the chamber, to sit in the Hungarian parliament. See also below, under History. ■

For administrative purposes Croatia-SIavonia is divided into 8 rural counties, already enumerated; besides the 4 urban counties, or municipalities of Agram, Semlin, Warasdin and Esseg. incal These are subdivided into rural and urban communes, adminls- each with its representative council. The affairs of each tratlon. rural county are managed by an assembly chosen for 6 years, which comprises not only elected members, but delegates from all the cities except Agram and Esseg, with certain high ecclesiastics and officials.

The highest judicial authority is the supreme court or Septemviral Table, which sits at Agram, and ranks above the royal Justice. courts of appeal, the county courts of first instance, and the district courts or magistracies.

Fully four-fifths of the population belong to the Roman Catholic Church, which has an archbishop at Agram and bishops at Zengg and Djakovo. There are about 12,000 Greek Catholics, Religion. with a bishop at Kreuz (Krizevac). The Serb congrega- tions, who had previously been classed as Orthodox Greek, were officially recognized as members of the Orthodox Church of Servia after 1883. Their episcopal sees of Karlowitz and Pakrac depend upon the metropolitanate of Belgrade; but from 1830 to 1838 Karlowitz was itself the headquarters of the Servian Church.

During the 19th century strenuous efforts to better the state of

education were made by Bishop Strossmayer (1815-1905) and other

reformers; but, although some success was achieved, only one-third of the population could read and write in 1900. Foremost among the educational institutions is the South Slavonic Academy Educa- Q f Sciences and Arts (Jugoslavenska Akademija Znanosti *”’”• i Umjetnosti), founded by Strossmayer and others in

1867, as an improvement on a learned society which had existed since 1836. The academy is the headquarters of the nationalist propaganda. Its numerous publications, though sometimes biased by political passion, throw much light on Serbo-Croatian history, law, philology and kindred topics. Agram University, founded in 1874, possesses three faculties — theology, philosophy and law; but, unlike other Hungarian universities, it lacks a faculty of medi- cine. Its average number of students varies from 300 to 350. In 1900 there were also 19 real-gymnasia, teaching science, art and modern languages, as well as classics and mathematics; 1400 elementary schools ; and a few special institutions, such as the naval and military academies of Fiume, ecclesiastical seminaries and commercial colleges. In almost every case the language of instruc- tion is Serbo-Croatian. The development of higher education, without a corresponding advance of technical education, has created an intellectual class, comprising many men of letters, and several painters, musicians and sculptors, though none of great eminence; it also tends to produce many aspirants to official or professional careers, who find employment difficult to obtain. The want of a strong native middle class may partly be traced to this tendency.

History.

Medieval historians did not use the terms Croatia and Slavonia in their present sense. The Croatia of the middle ages comprised north-western Bosnia, Turkish Croatia, and the region now known as Upper Croatia. The whole country between the Drave and Save, thus including a large part of modern Croatia, was called in Latin Slavonia, in German Windisches Land, and in Hungarian Totorszdg, to distinguish it from the territories in which the Croats were racially supreme (Horvdtorszdg) . At the time of their conquest by the Romans (35 B.C.) both these divisions were occupied by the Pannonians, who in Slavonia had displaced an older population, the Scordisci; and both

were included in the Roman province of Pannonia Inferior, although Slavonia had the distinctive name of Pannonia Savia (see Pannonia). When the Roman dominions were broken up in a.d. 395, Croatia-Slavonia remained part of the Western empire. The Ostrogoths overran it in 489; in 535 it was annexed by Justinian; in 568 it was conquered by the Avars. These were in turn expelled from Croatia by the Croats, a Slavonic people from the western Carpathians, who, according to some authorities, had occupied the territories of the Marcomanni in Bohemia, and been driven thence in the 6th century by the Czechs. The main body of the Croats, whose tribal and racial names respec- tively are perpetuated in the names of Croatia and Slavonia, entered Croatia between 634 and 638, and were encouraged by the emperor Heraclius to attack the Avars. Smaller bodies had led the way southwards since 548. The Croats formed the western division of the great migratory horde of Serbo-Croats which colonized the lands between Bulgaria and the Adriatic. Contemporary chroniclers called them Chrobati, Belochrobati ("White Croats"), Chrovati, Horvati, or by some similar Latin or Byzantine variant of the Slavonic Khrvaly. The Croats occupied most of the region now known as Croatia-Slavonia, Dalmatia, and north-western Bosnia, displacing or absorbing the earlier inhabitants everywhere except along the Dalmatian littoral, where the Italian city-states usually maintained their independence, and in certain districts of Slavonia, where, out of a mixed population of Slavonic immigrants, Avars and Pannonians, the Slavs, and especially the Serbo-Croats, gradually became predominant. The Croats brought with them their primitive tribal institutions, organized on a basis partly military, partly patriarchal, and identical with the Zhupanates of the Serbs (see Servia); agriculture, war and hunting were their chief pursuits. Although they at first acknowledged no alien sovereign, they passed gradually under Italian influence in the extreme west, and under Byzantine influence in the south and south-east. In 806 the northern and north-eastern districts were added to the empire of the Franks, and thus won for the Western Church. Frankish predominance was long commem- orated by the name Francochorion, given by the Byzantines

to Syrmia; it is still commemorated by the name Fruska Gora, " Mountains of the Franks," in that province.

The Croatian Kingdom: c. gio-iogi. — In 877 the Croats were temporarily subdued by the Byzantine emperor, but after successive insurrections which tended to centralize their loosely knit tribal organization, and to place all power in the hands of a military chief, they regained their independence and founded a national kingdom about 910. It is probable that Tomislav or Timislav, who had led their

armies to victory, assumed the title of king in that year. Some authorities, however, state that Tomislav only bore the title of veliki zupan or “paramount chief,” and was only one in a long line of princes which can be traced without interruption back to 818. On this view, Drzislav (c. 978-1000) was the first king properly so called. But Tomislav, whatever his official style, was certainly the first of a series of independent national rulers which lasted for nearly two centuries. The records of this period, regarded by many Croats as the golden age of their country, are often scanty, and its chronology is still unsettled. Little is known of Trpimir, who preceded Drzislav, or of Stephen I. (1035-1058), but a few of the kings gained a more lasting fame by their success in war and diplomacy. Among these were Kresimir I. (c. 940-946), his successor Miroslav, and especially Kresimir II., surnamed the Great (c. 1000-1035), who harried the Bulgarians, at that time a powerful nation, and conquered a large part of Dalmatia, including some of the Italian cities. Already, under his predecessors, the Croats had built a fleet, which they used first for piracy and afterwards for trade. Their skill in maritime affairs, exemplified first in the 9th century by the pagan corsairs of the Narenta (see Dalmatia: History), and later by the numerous Dalmatian and Croatian sailors who served in the navies of Venice and Austria, is remark- able in a Slavonic people, and one which had so recently migrated from central Europe. At the end of the 10th century they even for a short period exacted tribute from Venice, but their power was temporarily destroyed in 1000, when the Venetians captured and sacked Biograd or Belgrade, the Italian Zaravecchia. This Dalmatian port was not only the Croatian arsenal, but the seat of the kings, who here sought to enhance their dignity by borrow- ing the grandiose titles and elaborate procedure of the Byzantine court. Kresimir II. and Kresimir Peter (c. 1058-1073), the hero of many national legends and lays, restored the naval power of the Croats. After the death of Kresimir Peter, Slavic or Slaviza reigned until 1076, when he was succeeded by Zvonimir (Svinimir or Zvoinimir) Demetrius. Zvonimir was crowned by the legate of Pope Gregory VII., and appears to have been regarded as a vassal of the papacy. Both he and Stephen II., a nephew of Kresimir II., died in 1089.

Hungarian Supremacy: iogi-c. 1526. — Amid the strife of rival claimants to the throne, Helena, the widow of Stephen, appealed for aid to her brother Ladislaus I., king of Hungary. Ladislaus took possession of the country in 109 1. He founded the bishopric of Agram and introduced Hungarian law. His death in 1095 was the signal for a nationalist insurrection, but after two years the rebels were crushed by his successor Coloman. This monarch reorganized the administration

on a system which has been maintained, with modifications in detail, by almost all subsequent rulers. He respected the existing institutions of the conquered territory so far as to leave its autonomy in domestic affairs intact; but delegated his own sovereignty, and especially the control of foreign affairs and war, to a governor known as the ban (q.v.). This office was sometimes held by princes of the royal house, often by Croatian nobles. Coloman also extended his authority over Dalmatia and the islands of the Quarnero, but the best modern. authorities reject the tradition that in 1102 he was crowned king of Croatia, Slavonia and Dalmatia. In 1127 Syrmia, which had been annexed to Bulgaria from about 700 to 1018, and to the Eastern empire from 1019, was united to Slavonia. The Hungarian government left much liberty to the Croatian nobles, a turbulent and fanatical class, ever ready for civil war, rebellion or a campaign against the Bosnian heretics. Their most powerful leaders were the counts of Zrin and Bribir (or Brebir), whose surname was Subid. This

family played an important part in local politics from the 13 th century to 1670, when Peter Subic was its last member to hold the office of ban. Paul Subic (d. 1312) and Mladen Subic (d. 1322) even for a short period united Croatia, Slavonia, Bosnia and part of Dalmatia under their own rule. From 1322 to 1326 the Croatian nobles successfully withstood the armies of Hungary and Bosnia; from 1337 to 1340, instigated by the Vatican, they carried on a crusade against the Bosnian Bogomils; and in the Krajina (Turkish Croatia) hostilities were resumed at intervals until the Turkish conquest.

The Turkish Occupation: c. 1526-1718. — Here, as elsewhere, the Ottoman invasion was facilitated by the feuds of the Christian sects. When King Matthias Corvinus undertook to defend Slavonia in 1490 it was too late; Matthias lost Syrmia and died in the same year. His successor Ladislaus of Poland (1490-1 516) added Slavonia to the kingdoms named in the royal title, which now included the words ” King of Dalmatia and Croatia and Slavonia” (Rex Dalmatiae et Croatiae et Slavoniae). But he failed to repel the Turks, who in 1526 destroyed the power of Hungary at .the battle of Mohacs. In 1527 the Croats were compelled to swear allegiance to Ferdinand I. of Austria, who had been elected king of Hungary. Ferdinand founded the generalcy of Karlstadt and thus laid the foundation of the military frontier. The provinces of Agram, Warasdin and Kreutz, previously included in Slavonia, were added to Croatia, to counterbalance the

loss of territory in the Krajina. Through- out the century the Turks continued to extend their conquests until, in 1606, the emperor retained only western Croatia, with the cities of Agram, Karlstadt, Warasdin and Zengg. During the same period the doctrines of the Reformation had spread among the Croats; but they were forcibly suppressed in 1607- 1610. The military occupation by the Turks left little perma- nent impression; colonization was never attempted; and the continuous wars by which the victors strove to secure or enlarge their dominions north of the Save left no time for the introduction of Moslem religion or civilization among the vanquished. Thus in the reconquest of Croatia-Slavonia there was none of the local opposition which afterwards hindered the Austrian occupa- tion of Bosnia. The successes of Prince Eugene in 1697 led two years later to the peace of Carlowitz, by which the Turks ceded the greater part of Slavonia and Hungary to Austria; and the remainder was surrendered in 171 8 by the treaty of Passarowitz. Only Turkish Croatia henceforth remained part of the Ottoman empire.

Austrian and French Supremacy: 1718- 1814. — Austrian influence predominated throughout Croatia-Slavonia during most of the 18th century, although Slavonia was constitutionally regarded as belonging to Hungary. Despite Magyar protests the misleading name ” Croatia ” was popularly and even in official documents applied to the whole country, including the purely Slavonian provinces of Virovitica, Pozega and Syrmia. From 1767 to 1777 Croatia, Slavonia and Dalmatia were col- lectively named Illyria, and governed from Vienna, but each of these divisions was subsequently declared a separate kingdom, with a separate administration, while the military frontier remained under military rule. In 1776 the Croatian seaboard, which had previously been under the same administration as the rest of the Austrian coast, was annexed to Croatia, but three years later Fiume was declared an integral part of Hungary. These administrative changes, and especially the brief existence of united ” Illyria,” stimulated the dormant nationalism of the Croats and their jealousy of the Magyars. In 1809 Austria was forced to surrender to Napoleon a large part of Croatia, with Dalmatia, Istria, Carinthia, Carniola, Gorz and Gradisca. These territories received the name of the Ulyrian Provinces, and remained under French rule until 1813. All the Croats capable of service were enrolled under the French flag; their country was divided for administrative purposes into Croatie civile and Croatie militaire. In 1814 Dalmatia was incorporated in Austria, while Istria, Carinthia, Carniola, Gorz and Gradisca became the Ulyrian kingdom of Austria, and retained their united government until 1849, Croatia and Slavonia were

declared appanages of the Hungarian crown — partes adnexae t or subject provinces, according to the Magyars; regna soda, or allied kingdoms, according to their own view. Each phrase afterwards became the watchword of a political party: neither is accurate. The Croats preserved their local autonomy, the use of their language for official purposes, their elected diet and other ancient institutions, but Hungarian control was represented by the ban.

The National Revival. — The Croats acquiesced in their position of inferiority until 1840, when the Magyars endeavoured to introduce Hungarian as the official language. A nationalist or ” Illyrist ” party was formed under Count Draskovic and Bishop J. Strossmayer (q.v.) to combat Hungarian influence and promote the union of the ” Ulyrian ” Slavs, i.e. the Slovenes, Croats and Serbs. Ljudevit Gaj, the leading Croatian publicist, strongly supported the movement. The elections of 1842 were marked by a series of sanguinary conflicts between Illyrists and Magyarists, but not until 1848 were the Illyrists returned to office. One of their leaders, Baron Josef Jellachich, was appointed ban in 1848. He strongly advocated the union of Croatia with Carinthia, Carniola and Styria, but found his policy thwarted as much by the apathy of the Slovenes as by the hostility of the Magyars. A Croatian deputation was received at Innsbruck by Ferdinand V., but before its arrival the Hungarians had obtained a royal manifesto hostile to Illyrism. But failure only increased the agitation among the southern Slavs; all attempts at mediation proved unsuccessful, and on the 31st of August the Croats claimed to have convinced the king that justice was on their side. On the nth of September the advance-guard of their army crossed the Drave under the command of Jellachich. On the 29th they were driven back from Pakozd by the Hungarians, and retired towards Vienna; they subsequently aided the Austrian army against the Hungarian revolutionaries (see Jellachich, Josef, and Hungary: History). The consti- tution of 1849 proclaimed Croatia and Slavonia separated from Hungary and united as a single Austrian crownland, to which was annexed the Croatian littoral, including Fiume. Austrian supremacy lasted until 1867; no ban was appointed, and owing to the suspension of local autonomy from 1850 to i860 this period is known as ” the ten years of reaction.” It was ended by the celebrated ” October Diploma ” of the 20th of October i860, which promised the restoration of constitutional liberty. But the so-called “Constitution of February” (21st February 1 861) placed all practical power in the hands of an executive controlled by the government at Vienna. The newly elected diet was soon dissolved for its advocacy of a great South Slavonic confederation under imperial rule, and no other was elected until 1865.

From 1865 to 1867 Strossmayer and the nationalists en- deavoured to secure the formation of a subordinate Austrian kingdom comprising Dalmatia, Croatia-Slavonia and the islands of the Quarnero. The Magyars had, however, resolved to subject Croatia-Slavonia to the crown of St Stephen, and in i867had secured control of the finances and electoral machinery The office of ban was revived, and its holder, Baron Levin Rauch, was an ardent Magyarist. At the elections of December 1867 a majority of Hungarian partisans was easily obtained, and on the 29th of January the diet passed a resolution in favour of reunion with Hungary. The whole Opposition refused to take any part in the proceedings, as a protest against the alleged illegality of the elections; but by the 25th of June the Croatian commissioners and the Hungarian government had framed a new constitution, which was ratified in September. Besides substituting Hungarian for Austrian sovereignty, it provided that the diet and the ban should control local affairs, subject to the Croatian minister in the Hungarian cabinet, and that Croatia-Slavonia should pay 55% of its revenue to Hungary for mutual and imperial expenses, but should be represented in the Hungarian parliament by thirty-six delegates, and should continue to use Serbo-Croatian as the official language. Hungary guaranteed that the 45% retained by the territorial government should be not less than two and a half million gulden (£250,000).

In May 1870 Fiume was annexed to Hungary, but in 1873 the Croats received as compensation an increase of their guaranteed revenue to £350,000, an addition of seven to the number of their representatives at Budapest, and a promise that the military frontier should be incorporated in the existing civil provinces. In 1877 a convention with Hungary regulated the control of public estates in the military frontier, and on the 15th of July 1881 the frontier, including the district of Sichelburg claimed by Carniola, was handed over to the local administration.

Meanwhile the events of 187 5-1878 in the Balkans, culminating in the Austrian occupation of Bosnia and Herzegovina, revived the agitation for a ” Great Croatia.” A party separate from the regular Opposition, and known as the “Party of the Right,” was formed to oppose the Magyarists. Its activity resulted in the riots of 1883, which were with difficulty quelled; in 1885 its leader, N. Starcevic, was condemned to imprisonment for the violence of his speeches against the ban, Count Khuen- Hedervary. In 1888 the moderate Opposition

also lost its leader, Bishop Strossmayer, who was censured by the king on account of his famous Panslavist telegram to the Russian Church (see Strossmayer). In 1889 the financial agreement with Hungary was revised and the contribution of Croatia-Slavonia to the expenses shared with Hungary or common to the whole of the Dual Monarchy was raised by 1 . This added burden combined with bad harvests, a fall in the revenue and a deficit in the budget to heighten popular discontent. Count Khuen-Hedervary was responsible for several administrative improvements, but the prosperity of the country declined from year to year. The government was accused of illegal inter- ference with the elections, with the use of the Hungarian arms and language in official documents, and with undue harshness in the censorship of the press. In May 1903 there were outbreaks of rioting in Agram, Sissek and other towns, besides serious agrarian disturbances directed against the Magyarist land- owners; in a debate in the Reichsrath (18th May) an Austrian deputy named Bianchini unsuccessfully attempted to induce the imperial government to intervene. At the end of June Count Khuen-Hedervary was made Hungarian prime minister; Count T. Pejacevic succeeded him as ban, and restored quiet by promising freedom of assembly and greater liberty of the press. Since 1898 the financial agreement had only been renewed from year to year. But the estimates for 1904 revealed another heavy deficit; and this was only paid by Hungary on condition that the' agreement should be renewed until the 31st of December 1913, and the contribution of 56 maintained.

The constitutional crisis of 1905 in Hungary stimulated the nationalist agitation. A congress of Croatian and Dalmatian deputies met at Spalato to advocate Serbo-Croatian unity, and in 1906 the municipality of Agram endeavoured to petition the king in favour of union with Bosnia and Herzegovina. This propaganda was severely discouraged. Baron Rauch, appointed ban in 1908, refused to summon the diet, in which he could not command a single vote, and much excitement was caused in 1909 by the trial of 57 nationalist leaders for high treason. The policy of the nationalists, who now aimed at the political union, under the king-emperor, of all Serbo-Croats in Austria-Hungary — upwards of 4,500,000 — was less visionary than the older Illyrism, and less aggressively Panslavist. It no longer sought to include Carinthia, Carniola and Styria in the proposed " Great Croatia." It was opposed by Austria as tending to create a new and formidable Slavonic nation within the Dual Monarchy, and by Hungary as a menace to Magyar predominance in Transleithania.

Language and Literature.

For the place of the Croatian dialects among Slavonic languages generally, see Slavs. The Croatian dialects, like the Servian, have gradually developed from the Old Slavonic, tvhich survives in medieval liturgies and biblical or apocryphal /vritings. The course of this development was similar in both cases, except that the Croats, owing to their dependence on Austria-Hungary, were not so deeply influenced as the Serbs by

Byzantine culture in the middle ages, and by Russian linguistic forms and Russian ideas in modern times. The Orthodox Serbs, moreover, use a modified form of the Cyrillic alphabet, while the Roman Catholic Croats use Latin characters, except in a few liturgical books which are written in the ancient Glagolitic script. As the literary language of both nations is now practi- cally the same, and is, indeed, commonly known as ” Serbo- Croatian,” the reader may be referred to the article Servia: Language and Literature, for an account of its history, of its chief literary monuments up to the 19th century and inclusive of Dalmatian literature, and of the principal differences between the dialects spoken in Servia and Croatia-Slavonia.

The three most important Croatian dialects are known as the Cakavci, Cakavstina or, in Servian, Chakavski, spoken along the Adriatic littoral; the Stokavci {Stokavstina, Shtokavski), spoken in Servia and elsewhere in the north-west of the Balkan Peninsula; and the Kajkavci (Kajkavstina, Kaykavski) , spoken by the partly Slovene population of the districts of Agram, Warasdin and Kreuz. This classification is based on the form, varying in different localities, of the pronoun da, Ho, or kaj, meaningˆ ” what.”

The Cakavci literature includes most of the works of the Dalmatian writers of the 15th and 16th centuries — the golden age of Serbo-Croatian literature. Its history is indissolubly interwoven with that of the Stokavci, which ultimately super- seded it, and became the literary language of all the Serbo- Croats, as it had long been the language of the best national ballads and legends

Kajkavci had from about 1550 to 1830 a distinctive literature, consisting of chronicles and histories, poems of a religious or educational character, fables and moral tales. These writings possess more philological interest than literary merit, and are hardly known outside Croatia-Slavonia and the Slovene districts of Austria.

Apart from the Kajkavci dialect, the whole body of Serbo- Croatian literature up to the 19th century may justly be regarded as the common heritage of Serbs and Croats. The linguistic and literary

reforms which Dossitey Obradovich and Vuk Stefanovich Karajich carried out in Servia about the close of this period helped to stimulate among the Croats a new interest in their national history, their traditions, folk-songs and folk- tales. One result of this nationalist revival was the unsuccessful attempt made between 18 14 and 1830 to raise the Cakavci dialect to the rank of a distinctive literary language for Croatia- Slavonia; but the Illyrist movement of 1840 led to the adoption of the Stokavci, which was already the vernacular of the majority of Serbo-Croats. Ljudevit Gaj (1809-1872), though he failed to create an artificial literary language by the fusion of the principal dialects spoken by Serbs, Croats and Slovenes, was by his championship of Illyrism instrumental in securing the triumph of the Stokavci. Gaj was a poet of considerable talent, and one of the founders of Croatian journalism. Among other writers of the first half of the 19th century may be mentioned Ivan Mazuranic (18 13-1890), whose first poems were published in the Danica ilirska ("Ulyrian Dawnstar"), a journal founded and for a time edited by Gaj. In 1846 Mazuranic published his Smrt Smail Aga Cengica ("Death of Ismail Aga Cengic"), called by Serbo-Croats the " Epos of Hate." This remarkable poem, written in the metre of the old Servian ballads, gives a vivid description of life in Bosnia under Turkish rule, and of the hereditary border feuds between Christians and Moslems. In later life Mazuranic distinguished himself as a statesman, and became ban of Croatia from 1873 to 1880. Other writers repre. sentative of Croatian literature before 1867 were the lyric poet Stanko Vraz (1810-1851) and Dragutin Rakovac (1813-1854), the author of many patriotic songs.

With the foundation of the South Slavonic Academy at Agram, in 1867, the study of science and history received a new impetus. Under the presidency of Franko Racki (1825-1894) the academy, with its journal the Rad jugoskovenske Akademije, became the headquarters of an active group of savants, among whom may be mentioned Vastroslav Jagic (b. 1838), sometime editor of the

Archiv fur slavische Philologie; the historians Sime Ljubid (1822-1896) and Vjekoslav Klaic, author of several standard works on Croatia and the Croats; the lexicographer Bogoslav Sulek (1816-1895); the ethnographer and philologist Franko Karelac (1811-1874). In Dalmatia, where the Ragusan journal Slovinac has served, like the Agram Rod, as a focus of literary activity, there have been numerous

poets and prose writers, associated, in many cases, with the Illyrist or the nationalist propaganda. Among these may be mentioned Count Medo Pucic (1821-1882), and the dramatist Matija Ban (1818-1903), whose tragedy Meyrimah is considered by many the finest dramatic poem in the Serbo-Croatian language.

Authorities. — For the topography, products, inhabitants and modern condition of Croatia-Slavonia, see Bau und Bild Osterreichs, by C. Diener, F. E. Suess, R. Hoernes and V. Uhlig (Leipzig, 1903) ; Die osterreich-ungarische Monarchic in Wort und Bild, vol. xxiv., edited by J. von Weilen (Vienna, 1902) ; Fiihrer durch Ungarn, Kroatien und Slawonien, by B. Alfoldi (Vienna, 1900) ; Reisefuhrer durch Kroatien und Slawonien, by A. Luksic (Agram, 1893); Vegeta-

tionsverhdltnisse von Kroatien, by A. Neilreich (Vienna, itv W , ” Die Slowenen,” by J. Suman, and ” Die Kroaten,” by F. Stare, in vol. x. of Die Volker Osterreich- Ungarns (Vienna, 1881-1882); Die Serbokroaten der adriatischen Kiislenlander, by A. Weisbach (Berlin, 1884); and the map Zemljovid Hrvatske i Slavonije, by M. Katzenschlager (Vienna, 1895). The only detailed history is one in Serbo-Croatian, written by a succession of the highest native authorities, and published by the South Slavonic Academy (Agram, from 1861). It is largely based on the following works: Vetera monumenta historica Hungarian! sacram illustrantia, containing documents from the Vatican library edited by A. Theiner (Rome, i860) ; Vetera monumenta hisloriam Slavorum meridionalium illustrantia, published by the South Slavonic Academy (Agram, 1863, &c.) ; Jura regni Croatiae, Dalmatiae, et Slavoniae cum privi- legiis, by J. Kukuljevic (Agram, 1861-1862); Monumenta historica Slavorum meridionalium, by V. Makushev, in Latin and Italian, with notes in Slavonic (Belgrade, 1885); De regno Dalmatiae et Croatiae, by G. Lucio (Amsterdam, 1666; see Dalmatia, under bibliography) ;_ Regno degli Slavi, by M. Orbini (Pesaro, 1601); and, for ecclesiastical history, Illyricum sacrum, by D. Farlatus and others (Venice, 1751-1819). See also Hrvatska i Hrvati, by V. Klaic (Agram, 1890, &c.) ; and Slawonien vom 10. bis zum 13. Jahrhundert, translated from the Serbo-Croatian of Klaic by J. von Voinicic (Agram, 1882). (K. G. J.)

CROCIDOLITE, a mineral described in 1815 by M. H. Klaproth under the name Blaueisenstein (blue ironstone), and in 1831 by J. F. Hausmann, who gave it its present name on account of its nap-like appearance (Gr. upoKvs, nap of cloth). It is a blue fibrous mineral belonging to the amphibole group and closely related to riebeckite; chemically it is an iron sodium silicate. Its resemblance to asbestos has gained for it the name Cape Asbestos, the chief occurrence being in

Cape Colony. The mineral suffers alteration by removal of alkali and peroxidation of the ferrous iron, and further by deposition of silica between the fibres, or by their replacement by silica; a hard siliceous mineral is thus formed which when polished shows, in con- sequence of its fibrous structure, a beautiful chatoyance or silky lustre. This is the ornamental stone which is known when blue as ” hawk’s-eye,” and when of rich golden brown colour as ” tiger-eye.” The latter, which represents the final alteration of the crocidolite, has become very fashionable as ” South African cat’s eye,” and is often termed ” crocidolite,” though practically only a mixture of quartz with brown oxide of iron. The following are analyses by A. Renard and C. Klement of the unaltered crocidolite and of the blue and brown products of alteration: —

■

Crocidolite.

Hawk’s-eye.

Tiger-eye.

Ferric oxide Alumina …. Ferrous oxide . Magnesia ….

Lime

Soda

Water

Total . .

51-89 19-22

17-53 2-43 0-40 7-71 0-15 2-36

93-45 2-41 0-23

i-43

0-22 0-13

0-82

93-05 4.94

066

0-26 0-44

0-76

101-69

98-69

IOO-II

Another alteration product of the crocidolite, consisting of silica and ferric hydrate, has been called griqualandite. Croci- dolite and the minerals resulting from its alteration occur in seams, associated with magnetite and other iron-ores, in the jasper-slates of the Asbestos Mountains in Griqualand West, Cape Colony. It is known also from a few other localities, but only in subordinate quantity. (See Cat's-Eye.)

CROCKET (Ital. uncinetti, Fr. crochet, crosse, Ger. Hdklein, Knollen), in architecture, an ornament running up the sides of gablets, hood-moulds, pinnacles, spires; generally a winding: stem like a creeping plant, with flowers or leaves projecting at intervals, and terminating in a nnial.

CROCKETT, DAVID (1786-1836), American frontiersman, was born in Greene county, Tennessee, on the 17th of August 1786. His education was obtained chiefly in the rough school of experience in the Tennessee backwoods, where he acquired a wide reputation as a hunter, trapper and marksman. In 1813- 1814 he served in the Creek War under Andrew Jackson, and subsequently became a colonel in the Tennessee militia. In 1821-1824 he was a member of the state legislature, having won his election not by political speeches but by telling stories. In 1827 he was elected to the national House of Representatives as a Jackson Democrat, and was re-elected in 1829. At Washington his shrewdness, eccentric manners and peculiar wit made him a conspicuous figure, but he was too independent to be a sup-porter of all Jackson's measures, and his opposition to the president's Indian policy led to administration influences being turned against him with the result that he was defeated for re-election in 1831. He was again elected in 1853, but in 1835 lost his seat a second time, being then a vigorous opponent of many distinctively Jacksonian measures. Discouraged and disgusted, he left his native state, and emigrated to Texas, then engaged in its struggle for independence. There he lost his life as one of the defenders of the Alamo at San Antonio on the 6th of March 1836.

A so-called " autobiography," which he very probably dictated or at

least authorized, was published in Philadelphia in 1834; a work purporting to be a continuation of this autobiography and entitled Colonel Crockett's Exploits and Adventures in Texas (Phil- adelphia, 1836) is undoubtedly spurious. These two works were subsequently combined in a single volume, of which there have been several editions. Numerous popular biographies have been written, the best by E. S. Ellis (Philadelphia, 1884).

CROCKETT, SAMUEL RUTHERFORD (i860-), Scottish novelist, was born at Duchrae, Galloway, on the 24th of September i860, the son of a Galloway farmer. He was brought up on a Galloway farm, and graduated from Edinburgh University in 1879. After some years of travel he became in 1886 minister of Penicuik, but eventually abandoned the Free Church ministry for novel-writing. The success of Mr J. M. Barrie had created a demand for stories in the Scottish dialect when Mr Crockett published his successful story of The Stickit Minister in 1893. It was followed by a rapidly produced series of popular novels dealing often with the past history of Scotland, or with his native Galloway. Such are The Raiders, The Lilac Sun-bonnet and Mai Sir Uchtred in 1894; The Men of the Moss Hags in 1895; Cleg Kelly and The Grey Man in 1896; The Surprising Adven- tures of Sir Toady Lion (1897); The Red Axe (1898); Kit Kennedy (1899) ; Joan of the Sword Hand and Little Anna Mark in 1900; Flower 0′ the Corn (1902); Red Cap Tales (1904), &c.

CROCKFORD, WILLIAM (1775-1844), proprietor of Crock- ford's Club, was born in London in 1775, the son of a fishmonger, and for some time himself carried on that business. After winning a large sum of money — according to one story £100,000 — either at cards or by running a gambling establishment, he built, in 1827, a luxurious gambling house at 50 St James's Street, which, to ensure exclusiveness, he organized as a club. Crockford's quickly became the rage; every English social celebrity and every distinguished foreigner visiting London hastened to become a member. Even the duke of Wellington joined, though, it is averred, only in order to be able to blackball his son, Lord Douro, should he seek election. Hazard was the favourite game, and very large sums changed hands. Crockford

retired in 1840, when, in the expressive language of Captain R. H. Gronow, he had "won the whole of the ready money of the then existing generation." He took, indeed, about £1,200,000 out of the

club, but subsequently lost most of it in unlucky speculations. Crockford died on the 24th of May 1844.

See John Timbs, Club Life of London (London, 1866); Gronow, Celebrities of London and Paris, 3rd series (London, 1865).

CROCODILE, a name for certain reptiles, taken from ancient Gr. KopSvKos, signifying lizard and newt; with reduplication KopKopdv \os, and by metathesis ‘ ultimately KpoicoSeihos. Hero- dotus makes mention of them, and tells us that the Egyptian name was champsa. The Arabic term is ledschun. The same root kar leads through something like kar-kar-ta, glakarta (glazard in Breton), to lacerta and to “lizard.” Lacerta in turn has become, in Spanish, lagarto, which, with the article, el lagarto, is the origin of the term “alligator.” This word is, however, artificial, although now widely used; Spanish and Portuguese- speaking people in America universally call the crocodile and the alligator simply lagarto, which is never intended for lizard.

The Crocodilia form a separate order of reptiles with many peculiarities. The premaxillae are short and always enclose the nostrils. The posterior nares or choanae open far behind in the roof of the mouth, in recent forms within the pterygoids. The under jaws are hinged on to the quadrate bones, which extend obliquely backwards, and are immovably wedged in between the squamosal and the lateral occipital wings. The teeth form a complete series in the under jaw, and in the upper jaw on the premaxillary and maxillary bones. They are conical and deeply implanted in separate sockets. They are often shed throughout life, the successors lying on the inner side, and with their caps partly fitting into the wide open roDts of the older teeth. Especi- ally in alligators the upper teeth overlap laterally those of the lower jaw, whilst in most crocodiles the overlapping is less marked and the teeth mostly interlock, a feature which increases with the slenderness of the snout. In old specimens some of the longer, lower teeth work their tips into deep pits, and ultimately even perforate the corresponding parts of the upper jaw. The first and second vertebrae each have a pair of long, movable ribs. There is a compound abdominal sternum. The so-called pubic bones are large and movable. There are five fingers and four toes, provided with claws, excepting the outer digits.

The tongue is flat and thick, attached by its whole under surface; its hinder margin is raised into a transverse fold, which, by meeting a similar fold from the palate, can shut off the mouth completely from the wide cavity of the throat. Dorsally the posterior nares open into this cavity. Consequently the beast can lie submerged in the water,

with only the nostrils exposed, and with the mouth open, and breathe without water entering the windpipe. Within the glottis is a pair of membranous folds which serve as vocal cords; all the Crocodilia are possessed of a loud, bellowing voice.

The stomach is globular, rather muscular, with a pair of tendinous centres like those of birds; its size is comparatively small, but the digestion is so rapid and powerful that every bone of the creature's prey is dissolved whilst still being stowed away in the wide and long gullet. The anal opening forms a longitudinal slit; within it, arising from its anterior corner, is the unpaired copulatory organ. The vascular system has attained the highest state of development of all reptiles. The heart is practically quadrilocular, the right and left halves being completely partitioned, except for a small communication, the foramen Panizzae, between the right and left aortae where these cross each other on leaving their respective ventricles. The outer ear lies in a recess which can be closed tightly by a dorsal flap of skin. The power of hearing is acute, and so is the sight, the eyes being protected by upper and lower lids and by a nictitating membrane. The skin of the whole body is scaly, with a hard, horny, waterproof covering of the epidermis, but between these mostly flat scales the skin is soft. The scutes or dermal portions of the scales are more or less ossified, especially on the back, and form the characteristic dermal armour. The skins or

" hides " of commerce consist entirely of the tanned cutis minus, the epidermis and the horny coverings of the scutes. All the Crocodilia possess two pairs of musk-glands in the skin; one is situated on the inner side of the lower jaw. The opening of the glands is slit-like and leads into a pocket, which is filled with a smeary, strongly scented matter. The other pair lies just within the lips of the cloacal opening.

Propagation takes place by eggs, which are oval, quite white, with a very hard and strong shell. Their size varies from 2 to 4 in. in length, according to the size of the species and the age of the female. She lays several dozen eggs in a carefully prepared nest. The Nile crocodile makes a hole in white sand, which is then filled up and smoothed over; the mother sleeps upon the nest, and keeps watch over her eggs, and when these are near hatching — after about twelve weeks — she removes the 18 in. or 2 ft. of sand. Other species, especially the alligators, make a very large nest of leaves, twigs and humus, scraping together a mound about a yard high and two or more yards in diameter. The eggs, in several layers, are laid near the top. The adults fre- quently dig long subterranean passages into the banks of streams, and, during dry seasons, they have been found deep in the hardened

mud, whence they emerge with the beginning of the rains. They spend most of their time in the water, but are also very fond of basking in the hot sun on the banks of rivers or in marshes, usually with the head turned towards the water, to which they take on the slightest alarm. They can walk perfectly well, and they do so deliberately with the whole body raised a little above the ground. When their pools dry up, or when in search of new hunting-grounds, they sometimes undertake long wanderings over land. But the water is their true element. They swim rapidly, propelled by the powerful tail and by the mostly webbed limbs, or they submerge themselves, with only the tip of the nose and the eyes showing, or sometimes also the back. They then look like floating logs; and thus they float or gently approach their prey, which consists of anything they can over- power. Many a large mammal coming to drink at its accustomed place is dragged into the water by the lurking monster. Certainly there are occasional man-eaters amongst them, and in some countries they are much feared. As a rule, however, they are so wary and suspicious that they are very difficult to approach, and their haunts are so well stocked with fish and other game that they make off and hide rather than attack a man swimming in their waters. But if a dog is sent in there Will be a sudden yelp, the splash from a big tail, and a widening eddy.

Crocodile stories, not all fabulous, are plentiful, and begin with one of the oldest writings in the world, the book of Job. “Canst thou draw leviathan with a hook? or his tongue with a cord which thou lettest down? . . . Lay thine hand upon him, remember the battle, do no more.” This is a very interesting passage, since it can apply only to a large-sized crocodile. Now nothing is known of the occurrence of such in Arabia, but a few specimens of rather small size seem still to exist in Syria, in the Wadi Zerka, an eastern tributary of the Jordan.

Crocodiles are caught in various ways,- — for instance, with two pointed sticks, which are fastened crosswise within the bait, an animal’s entrails, to which is attached a rope. When the creature has swallowed the spiked bait it keeps its jaws so firmly closed that it can be dragged out of the water. A kind of plover, Pluvianus aegyptiv.s, often sits upon basking crocodiles, and, since the latter often rest with gaping mouth, it is possible that these agile birds do pick the reptiles’ teeth in search of parasites. Being a very watchful bird, its cry of warning, when it flies off on the approach of danger, is probably appreciated by the crocodile. But the story of the ichneumon or mongoose is a fable. Although an inveterate destroyer of eggs, this little creature prefers those of birds and the soft-shelled eggs of lizards to the very hard and strong-shelled eggs which are deeply buried in the crocodile’s nest.

Considering the interest which is taken in crocodiles and their allies, on account of their size, their dangerous nature and the sporting trophies which they yield, the following ” key,” based upon easily ascertained characters of the skull, is given.

I. Snout very long and slender. The mandibular symphysis extends backwards at least to the fifteenth tooth.

(a) Nasal bones very small, and widely separated from the

premaxilla (which encloses the nostrils) by the maxillaries which join each other for a long distance along the dorsal mid-line. . . . Gavialis gangeticus of India, the ” gharial ” or fish-eater.

(b) Nasal bones long, so as to be in contact with the premaxilla

at the hinder corner of the nostril groove. . . .Tomistoma schlegeli of Borneo, Malacca and Sumatra.

II. Snout mostly triangular or rounded off. The mandibular symphysis does not reach beyond the eighth tooth.

(a) The fourth mandibular tooth fits into a notch in the upper

jaw. Crocodiles.

1. Without a bony nasal septum between the nostrils.

. . . Crocodiles.

2. The nasal bones project through the nasal groove,

forming a bony septum. Osteolaemus frontatus s. tetraspis of West Africa.

(b) Fourth mandibular tooth fitting into a pit in the upper jaw.

Alligators.

1. Without a bony nasal septum. . . . Caiman, Central

and South America.

2. Nasal bones dividing the nasal groove. . . . Alli-

gator, America and China.

The genus Crocodilus contains seven species. C. vulgaris or niloticus of most of Africa, is found from the Senegal to Egypt and to Madagascar, reaching a length of 15 ft. It has eighteen or nineteen upper and fifteen lower teeth on each side. C. palustris, the ” mugger ” or ” marsh crocodile ” of India and Ceylon, extends westwards into Baluchistan, eastwards into the Malay islands. It has nineteen upper and lower teeth on either side. The scutes on the neck, six in number, are packed closely together, the four biggest forming a square. The length of 12 ft. is a fair size for a large specimen. C. porosus or biporcatus is easily recognised by the prominent longitudinal ridge which exten'ds in front of each eye. Specimens of more than 20 ft. in length are not uncommon, and a monster of 33 ft. is on record. It is essentially an inhabitant of tidal waters and estuaries, and often goes out to sea; hence its wide distribution, from the whole coast of Bengal to southern China, to the northern coasts of Australia and even to the Fiji islands. Australians are in the habit of calling their crocodiles alligators. C. cala- phractus is the common crocodile of West Africa, easily recognised by the slender snout which resembles that of the gavial, but the mandibular symphysis does not reach beyond the eighth tooth. C. johnstoni of northern Australia and Queensland is allied to the last species mentioned, with which it agrees by the slender snout. Lastly there are two species of true crocodiles in America, C. intermedins of the Orinoco, allied to the former, and C. americanus or acutus of the West Indies, Mexico, Central America to Venezuela and Ecuador; its characteristic feature is a median ridge or swelling on the snout, which is rather slender.

The above list shdws that the usual statement that crocodiles inhabit the Old World and alligators the New World is not strictly true. In the Tertiary epoch alligators, crocodiles and long-snouted gavials existed in Europe. (H. F. G.)

CROCOITE, a mineral consisting of lead chromate, PbCr0 4 , and crystallizing in the monoclinic system. It is sometimes used as a paint, being identical in composition with the artificial product chrome-yellow; it is the only chromate of any import- ance found in nature. It was discovered at Berezovsk near Ekaterinburg in the Urals in 1766; and named crocoise by F. S. Beudant in 1832, from the Greek Kponos, saffron, in allusion to its colour, a name first altered to crocoisite and afterwards to crocoite. It is found as well-developed crystals of a bright hyacinth-red colour, which are translucent and have an ada-

mantine to vitreous lustre. On exposure to light much of the translucency and brilliancy is lost. The streak is orange-yellow; hardness 25-3; specific gravity 60. In the Urals the crystals are found in quartz-veins traversing granite or gneiss: other localities which have yielded good crystallized specimens are Congonhas do Campo near Ouro Preto in Brazil, Luzon in the Philippines, and Umtali in Mashonaland. Gold is often found associated with this mineral. Crystals far surpassing in beauty any previously known have been found in the Adelaide Mine at

Dundas, Tasmania; they are long slender prisms, 3 or 4 in. in length, with a brilliant lustre and colour.

Associated with crocoite at Berezovsk are the closely allied minerals phoenicochroite and vauquelinite. The former is a basic lead chromate, Ph 3 Cr 2 09, and the latter a lead and copper phosphate-chromate, 2(Pb,Cu)Cr0 4 . (Pb,Cu) 3 (P04) 2 . Vauquelinite forms brown or green monoclinic crystals, and was named after L. N. Vauquelin, who in 1797 discovered (simultaneously with and independently of M. H. Klaproth) the element chromium in crocoite. (L. J. S.)

CROCUS, a botanical genus of the natural order Iridaceae, containing about 70 species, natives of Europe, North Africa, and temperate Asia, and especially developed in the dry country of south-eastern Europe and western and central Asia. The plants are admirably adapted for climates in which a season favourable to growth alternates with a hot or dry season; during the latter they remain dormant beneath the ground in the form of a short thickened stem protected by the scaly remains of the bases of last season's leaves (known botanically as a "corm"). At the beginning of the new season of growth, new flower- and leaf-bearing shoots are developed from the corm at the expense of the food-stuff stored within it. New corms are produced at the end of the season, and by these the plant is multiplied.

These crocuses of the flower garden are mostly horticultural varieties of C. vernus, C. versicolor and C. aureus (Dutch crocus), the two former yielding the white, purple and striped, and the latter the yellow varieties. The crocus succeeds in any fairly good garden soil, and is usually planted near the edges of beds or borders in the flower garden, or in broadish patches at intervals along the mixed borders. The corms should be planted 3 in. below the surface, and as they become crowded they should be taken up and replanted with a refreshment of the soil, at least every five or six years. Crocuses have also a pleasing effect when dotted about on the lawns and grassy

banks of the pleasure ground.

Some of the best of the varieties are: — Purple: David Rizzio, Sir J. Franklin, purpureus grandiflorus. Striped: Albion, La Majestueuse, Sir Walter Scott, Cloth of Silver, Mme Mina. White: Caroline Chisholm, Mont Blanc. Yellow: Large Dutch.

The species of crocus are not very readily obtainable, bu<ˆ those who make a specialty of hardy bulbs ought certainly to search them out and grow them. They require the same culture as the more familiar garden varieties; but, as some of them are apt to suffer from excess of moisture, it is advisable to plant them in prepared soil in a raised pit, where they are brought nearer to the eye, and where they can be sheltered when necessary by glazed sashes, which, however, should not be closed except when the plants are at rest, or during inclement weather in order to protect the blossoms, especially in the case of winter flowering species. The autumn blooming kinds include many plants of very great beauty. The following species are recommended: —

Spring flowering: — Yellow: C. aureus, aureus var. sulphureus, chrysanthus, Olivieri, Korolkowi, Balansae, ancyrensis, Susianus, stellaris. Lilac: C. Imperati, Sieberi, etruscus, vernus, Toma- sinianus, banaticus. White: C. biflorus and vars., candidus, vernus vars. Striped: C. versicolor, reticulatus.

Autumn flowering: — Yellow: C. Scharojani. Lilac: C. asturicus, cancellatus var., cilicicus, byzantinus (iridiflorus) , longiflorus, tnedius, nudiflorus, pulchellus, Salzmanni, salivus vars. speciosus, zonatus. White: caspius, cancellatus, hadriaticus, marathonisius.

Winter flowering: — C. hyemaeis, laevigatus, vitellinus.

CROESUS, last king of Lydia, of the Mermnad dynasty, (560-546 B.C.), succeeded his father Alyattes after a war with his half-brother. He completed the conquest of Ionia by capturing Ephesus, Miletus and other places, and extended the Lydian empire as far as the Halys. His wealth, due to trade, was proverbial, and he used part of it in securing alliances with the Greek states whose fleets might supplement his own army. Various legends were told about him by the Greeks, one of the most famous being that of Solon’s visit to him with the lesson

it conveyed of the divine nemesis which waits upon overmuch prosperity (Hdt. i. 29 seq.; but see Solon). After the over- throw of the Median empire (549 B.C.) Croesus found himself confronted by the rising power of Cyrus, and along with Nabonidos of Babylon took measures to resist it. A coalition was formed between the Lydian and Babylonian kings, Egypt promised troops and Sparta its fleet. But the coalition was defeated by the rapid movements of Cyrus and the treachery of Eurybatus of Ephesus, who fled to Persia with the gold that had been entrusted to him, and betrayed the plans of the con- federates. Fortified with the Delphic oracles Croesus marched to the frontier of his empire, but after some initial successes fortune turned against him and he was forced to retreat to Sardis. Here he was followed by Cyrus who took the city by storm. We may gather from the recently discovered poem of Bacchylides (iii. 23-62) that he hoped to escape his conqueror by burning himself with his wealth on a funeral pyre, like Saracus, the last king of Assyria, but that he fell into the hands of Cyrus before he could effect his purpose. 1 A different version of the story is given (from Lydian sources) by Herodotus (followed by Xenophon), who makes Cyrus condemn his prisoner to be burnt alive, a mode of death hardly consistent with the Persian reverence for fire. Apollo, however, came to the rescue of his pious worshipper, and the name of Solon uttered by Croesus resulted in his deliverance. According to Ctesias, who uses Persian sources, and says nothing of the attempt to burn Croesus, he subsequently became attached to the court of Cyrus and received the governorship of Barene in Media. Fragments of columns from the temple of Artemis now in the British Museum have upon them a dedication by Croesus in Greek.

See R. Schubert, De Croeso et Solone fabula (1868); M. G. Radet, La Lydie et le monde grec au temps des Mermnades (1892-1893); A. S. Murray, Journ. Hell. Studies, x. pp. 1-10 (1889); for the supposition that Croesus did actually perish on his own pyre see G. B. Grundy, Great Persian War, p. 28; Grote, Hist, of Greece (ed. 1907), p. 104. Cf. Cyrus; Lydia.

CROFT, SIR HERBERT, Bart. (1751-1816), English author, was born at Dunster Park, Berkshire, on the 1st of November 1751, son of Herbert Croft (see below) of Stifford, Essex. He matriculated at University College, Oxford, in March 1771, and was subsequently entered at Lincoln’s Inn. He was called to the bar, but in 1782 returned to Oxford with a view to prepar- ing for holy orders. In 1786 he received the vicarage of Prittle- well, Essex, but he remained at Oxford for some years accumulating materials for a proposed English dictionary. He was twice married, and on the day after his second wedding day he

was imprisoned at Exeter for debt. He then retired to Hamburg, and two years later his library was sold. He had succeeded in 1797 to the title, but not to the estates, of a distant cousin, Sir John Croft, the fourth baronet. He returned to England in 1800, but went abroad once more in 1802. He lived near Amiens at a house owned by Lady Mary Hamilton, said to have been a daughter of the earl of Leven and Melville. Later he removed to Paris, where he died on the 26th of April 1816. In some of his numerous literary enterprises he had the help of Charles Nodier. Croft wrote the Life of Edward Young inserted in Johnson's Limes of the Poets. In 1780 he published Love and Madness, a Story too true, in a series of letters between Parties whose names could perhaps be mentioned were they less known or less lamented. , This book, which passed through seven editions, narrates the passion of a clergyman named James Hackman for Martha Ray, mistress of the earl of Sandwich, who was shot by her lover as she was leaving Co vent Garden in 1779 (see the Case and Memoirs of the late Rev. Mr James Hackman, 1779). Love and Madness has permanent interest because Croft inserted, among other miscellaneous matter, information about Thomas Chatterton gained from letters which he obtained from the poet's sister, Mrs Newton, under false pretences, and used without payment. Robert Southey, when about to publish an edition of Chatterton's works for the benefit of his family, published (November 1799) details of Croft's proceedings in the Monthly

1 This is probably a Greek legend (cf. the Attic vase of about 500 B.C. in Journ. of Hell. Stud., 1898, p. 268).

Review. To this attack Croft wrote a reply addressed to John Nichols in the Gentleman's Magazine, and afterwards printed separately as Chatterton and Love and Madness . . . (1800,). This tract evades the main accusation, and contains much abuse of Southey. Croft, however, supplied the material for the exhaustive account of Chatterton in A. Kippis's Biographia Britannica (vol. iv., 1789). In 1788 he addressed a letter to William Pitt on the subject of a new dictionary. He criticized Samuel Johnson's efforts, and in 1790 he claimed to have collected 11,000 words used by excellent authorities but omitted by Johnson. Two years later he issued proposals for a revised edition of Johnson's Dictionary, but subscribers were lacking and his 200 vols, of MS. remained unused. Croft was a good scholar and linguist, and the author of some curious books in French.

The Love Letters of Mr H. and Miss R. I77S~ 1 779 were edited from Croft's book by Mr Gilbert Burgess (1895). See also John Nichols's Illustrations . . . (1828), v. 202-218.

CROFT, SIR JAMES (d. 1590), lord deputy of Ireland, belonged to an old family of Herefordshire, which county he represented in parliament in 1541. He was made governor of Haddington in 1549, and became lord deputy of Ireland in 1551. There he effected little beyond gaining for himself the reputation of a conciliatory disposition. Croft was all his life a double-dealer. He was imprisoned in the Tower for treason in the reign of Mary, but was released and treated with consideration by Elizabeth after her accession. He was made governor of Berwick, where he was visited by John Knox in 1559, and where he busied himself actively on behalf of the Scottish Protestants, though in 1560 he was suspected, probably with good reason, of treason- able correspondence with Mary of Guise, the Catholic regent of Scotland; and for ten years he was out of public employment. But in 1570 Elizabeth, who showed the greatest forbearance and favour to Sir James Croft, made him a privy councillor and controller of her household. He was one of the commis- sioners for the trial of Mary queen of Scots, and in 1588 was sent on a diplomatic mission to arrange peace with the duke of Parma. Croft established private relations with Parma, for which on his return he was sent to the Tower. He was released before the end of 1589, and died on the 4th of September 1590.

Croft's eldest son, Edward, was put on his trial in 1589 on the curious charge of having contrived the death of the earl of Leicester by witchcraft, in revenge for the earl's supposed hostility to Sir James Croft. Edward Croft was father of Sir Herbert Croft (d. 1622), who became a Roman Catholic and wrote several controversial pieces in defence of that faith. His son Herbert Croft (1603-1691), bishop of Hereford, after being for some time, like his father, a member of the Roman church, returned to the church of England about 1630, and about ten years later was chaplain to Charles I., and obtained within a few years a prebend's stall at Worcester, a canonry of Windsor, and the deanery of Hereford, all of which preferments he lost during the Civil War and Commonwealth. By Charles II. he was made bishop of Hereford in 1661. Bishop Croft was the author of many books and pamphlets, several of them against the Roman Catholics; and one of his works, entitled The Naked Truth, or the True State of the Primitive Church (London, 1675), was very celebrated in its day, and gave rise to prolonged controversy. The bishop died in 1691. His son Herbert was created a baronet in 1671, and was the ancestor of Sir Herbert Croft (q.v.), the 18th century writer.

Bibliography. — See Richard Bagwell, Ireland under the Tudors, vol. i. (3 vols., London, 1885); David Lloyd, State Worthies from the Reformation to the Revolution (2 vols., London, 1766) ; John Strype,

Annals of the Reformation (Oxford, 1824), which contains an account of the trial of Edward Croft; S. L. Lee's art. " Croft, Sir James," in Diet, of National Biography, vol. xiii.; and for Bishop Croft see Anthony a Wood, Athenae Oxonienses (ed. Bliss, 1813-1820); John Le Neve, Fasti Ecclesiae Anglicanae (ed. by T. D. Hardy, Oxford,

1854)-

CROFT (or Crofts), WILLIAM (1678-1727), Flnglish composer, was born in 1678, at Nether Ettington in Warwickshire. He received his musical education in the Chapel Royal under Dr Blow. He early obtained the place of organist of St Anne's, Soho,and in 1700 was admitted a gentleman extraordinary of the Chapel

Royal. In 1707 he was appointed joint-organist with Blow; and upon the death of the latter in 1708 he became solo organist, and also master of the children and composer of the Chapel Royal, besides being made organist of Westminster Abbey. In 171 2 he wrote a brief introduction on the history of English church music to a collection of the words of anthems which he had edited under the title of Divine Harmony. In 17 13 he obtained his degree of doctor of music in the university of Oxford. In 1724 he published an edition of his choral music in 2 vols, folio, under the name of Musica Sacra, or Select Anthems in score, for two, three, four, five, six, seven and eight voices, to which is added the Burial Service, as it is occasionally performed in Westminster A bbey. This handsome work included a portrait of the composer and was the first of the kind executed on pewter plates and in score. John Page, in his Harmonia Sacra, published in 1800 in 3 vols, folio, gives seven of Croft's anthems. Of instrumental music, Croft published six sets of airs for two violins and a bass, six sonatas for two flutes, six solos for a flute and bass. He died at Bath on the 14th of August 1727, and was buried in the north aisle of Westminster Abbey, where a monument was erected to his memory by his friend and admirer Humphrey Wyrley Birch. Burney in his History of Music devotes several pages of his third volume (pp. 603-612) to Dr Croft's life, and criticisms of some of his anthems. During the earlier period of his life Croft wrote much for the theatre, including overtures and incidental music for Courtship d la mode (1700), The Funeral (1702) and The Lying Lover (1703).

CROFTER, a term used, more particularly in the Highlands and islands

of Scotland, to designate a tenant who rents and cultivates a small holding of land or ” croft.” This Old English word, meaning originally an enclosed field, seems to correspond to the Dutch kroft, a field on high ground or downs. The ultimate origin is unknown. By the Crofters’ Holdings (Scotland) Act 1886, a crofter is defined as the tenant of a holding who resides on his holding,the annual rent of which does not exceed £30 in money, and which is situated in a crofting parish. The wholesale clear ances of tenants from their crofts during the 19th century, in violation of, as the tenants claimed, an implied security of tenure, has led in the past to much agitation on the part of the crofters to secure consideration of their grievances. They have been the subject of royal commissions and of considerable legisla- tion, but the effect of the Crofters Act of 1886, with subsequent amending acts, has been to improve their condition markedly, ind much of the agitation has now died out. A history of the legislation dealing with the crofters is given in the article Scotland.

CROKER, JOHN WILSON (1780-1857), British statesman and author, was born at Galway on the 20th of December 1780, being the only son of John Croker,the surveyor-general of customs and excise in Ireland. He was educated at Trinity College, Dublin, where he graduated in 1800. Immediately afterwards he was entered at Lincoln’s Inn, and in 1802 he was called to the Irish bar. His interest in the French Revolution led him to collect a large number of valuable documents on the subject, which are now in the British Museum. In 1804 he published anonymously Familiar Epistles to J. F. Jones, Esquire, on the State of the Irish Stage, a series of caustic criticisms in verse on the management of the Dublin theatres. The book ran through five editions in one year. Equally successful was the Intercepted Letter from Canton (1805), also anonymous, a satire on Dublin society. In 1807 he published a pamphlet on The State of Ireland, Past and Present, in which he advocated Catholic emancipation.

In the following year he entered parliament as member for Downpatrick, obtaining the seat on petition, though he had been unsuccessful at the poll. The acumen displayed in his Irish pamphlet led Spencer Perceval to recommend him in 1808 to Sir Arthur Wellesley, who had just been appointed to the command of the British forces in the Peninsula, as his deputy in the office of chief secretary for Ireland. This connexion led to a friendship which remained unbroken till Wellington’s death. The notorious case of the duke of York in connexion with his

abuse of military patronage furnished him with an opportunity for distinguishing himself. The speech which he delivered on the 14th of March 1809, in answer to the charges of Colonel Wardle, was regarded as the most able and ingenious defence of the duke that was made in the debate; and Croker was appointed to the office of secretary to the Admiralty, which he held without interruption under various administrations for more than twenty years. He proved an excellent public servant, and made many improvements which have been of permanent value in the organization of his office. Among the first acts of his official career was the exposure of a fellow-official who had misappropriated the public funds to the extent of £200,000.

In 1827 he became the representative of the university of Dublin, having previously sat successively for the boroughs of Athlone, Yarmouth (Isle of Wight), Bodmin and Aldeburgh. He was a determined opponent of the Reform Bill, and vowed that he would never sit in a reformed parliament; his parlia- mentary career accordingly terminated in 1832. Two years earlier he had retired from his post at the admiralty on a pension of £1500 a year. Many of his political speeches were published in pamphlet form, and they show him to have been a vigorous and effective, though somewhat unscrupulous and often viru- lently personal, party debater. Croker had been an ardent supporter of Peel, but finally broke with him when he began to advocate the repeal of the Corn Laws. He is said to have been the first to use (Jan. 1830) the term ” conservatives.” He was for many years one of the leading contributors on literary and historical subjects to the Quarterly Review, with which he had been associated from its foundation. The rancorous spirit in which many of his articles were written did much to embitter party feeling. It also reacted unfavourably on Croker’s reputa- tion as a worker in the department of pure literature by bringing political animosities into literary criticism. He had no sympathy with the younger school of poets who were in revolt against the artificial methods of the 18th century, and he was responsible for the famous Quarterly article on Keats. It is, nevertheless, unjust to judge Croker by the criticisms which Macaulay brought against his magnum opus, his edition of Boswell’s Life of Johnson (1831). With all its defects the work had merits which Macaulay was of course not concerned to point out, and Croker’s researches have been of the greatest value to subsequent editors. There is little doubt that Macaulay had personal reasons for his attack on Croker, who had more than once exposed in the House the fallacies that lay hidden under the orator’s brilliant rhetoric. Croker made no immediate reply to Macaulay’s attack, but when the first two volumes of the History appeared he took the oppor- tunity of pointing out the

inaccuracies that abounded in the work. Croker was occupied for several years on an annotated edition of Pope's works. It was left unfinished at the time of his death, but it was afterwards completed by the Rev. Whitwell Elwin and Mr W. J. Courthope. He died at St Albans Bank, Hampton, on the 10th of August 1857.

Croker was generally supposed to be the original from which Disraeli drew the character of " Rigby " in Coningsby, because he had for many years had the sole management of the estates of the marquess of Hertford, the " Lord Monmouth " of the story; but the comparison is a great injustice to the sterling worth of Croker's character.

The chief works of Croker not already mentioned were his Stories for Children from the History of England (18 17), which provided the model for Scott's Tales of a Grandfather; Letters on the Naval War with America; A Reply to the Letters of Malachi Malagrowther (1826) ; Military Events of the French Revolution of 1830 (1831) ; a translation of Bassompierre s Embassy to England (1819); and several lyrical pieces of some merit, such as the Songs of Trafalgar (1806) and The Battles of Talavera (1809). He also edited the Suffolk Papers (1823), Hervey's Memoirs of the Court of George II. (1817), the Letters of Mary Lepel, Lady Hervey (1 821-1822), and Walpole' s Letters to Lord Hertford (1824). His memoirs, diaries and correspondence were edited by Louis J. Jennings in 1884 under the title of The Croker Papers (3 vols.).

CROKER, RICHARD (1843-), American politician, was born at Blackrock, Ireland, on the 24th of November 1843. He was taken to the United States by his parents when two years old, and was educated in the public schools of New York

City, where he eventually became a member of Tammany Hall and active in its politics. He was an alderman from 1868 to 1870, a coroner from 1873 to 1876, a fire commissioner in 1883 and 1887, and city chamberlain from 1889 to 1890. After the fall of John Kelly he became the leader of Tammany Hall (q.v.), and for some time almost completely controlled the organization. His greatest political success was his bringing about the election of Robert A. van Wyck as first mayor of greater New York in 1897, and during van Wyck's administration Croker is popularly supposed to have dominated completely the government of the city. After Croker's failure to " carry

” the city in the pre- sidential election of 1900 and the defeat of his mayoralty candidate, Edward M. Shepard, in 1901, he resigned from his position of leadership in Tammany, and retired to a country life in England and Ireland. In 1907 he won the Derby with his race-horse Orby.

CROKER, THOMAS CROFTON (1798-1854), Irish antiquary and humorist, was born in Cork on the 15th of January 1798. He was apprenticed to a merchant, but in 1819, through the interest of John Wilson Croker, who was, however, no relation of his, he became a clerk in the Admiralty. Moore was indebted to him in the production of his Irish Melodies for ” many curious fragments of ancient poetry.” In 1825 he produced his most popular book, the Fairy Legends and Traditions of the South of Ireland, which he followed up by the publication of his Legends of the Lakes (1829), his Adventures of Barney Mahoney (1852), and an edition of the Popular Songs of Ireland (1839). In 1827 he was made a member of the Irish Academy; in 1839 and 1840 he helped to found the Camden and Percy Societies, and in 1843 the British Archaeological Association. He wrote Narratives Illustrative of the Contests in Ireland in 1641 and 1688 (1841), for the Camden Society, Historical Songs of Ireland, &c. (1841) , for the Percy Society, and several other works. He was also a member of the Hakluyt and the Antiquarian Society. He died in London on the 8th of August 1854.

CROLL, JAMES (1821-1890), Scottish man of science, was born of a peasant family at Little Whitefield, in the parish of Cargill, in Perthshire, on the 2nd of January 1821. He was regarded as an unpromising boy, but a trifling circumstance aroused a passion for reading, and he made great progress in self-education. He was apprenticed to a wheelwright at Collace in Perthshire, but being debarred by ill-health from manual labour, he became successively a shop-keeper and an insurance agent. In 1859 he was made keeper of the Andersonian Museum in Glasgow, a humble appointment, which, however, gave him congenial occupation. In 1857, being deeply impressed by the metaphysics of Jonathan Edwards, he had published an anony- mous volume entitled The Philosophy of Theism; but his connexion with the Museum induced him to take up physical science, and from 1861 onwards he studied with such perseverance that he was enabled to contribute papers to the Philosophical Magazine and other journals. For that magazine in 1864 he wrote his celebrated essay ” On the Physical Cause of the Changes of Climate during Geological Epochs.” This led to his receiving an appointment on the Scottish Geological Survey in 1867, and for thirteen years he took charge of the Edinburgh Office. In 1875 he summed up his researches

upon the ancient condition of the earth in his Climate and Time, in their Geological Relations, in which he contends that terrestrial revolutions are due in a measure to cosmical causes. This theory excited warm controversy. Croll's replies to his opponents are collected in his Climate and Cosmology (1885). He had been compelled by ill-health to withdraw from the public service in 1880; yet, working under the greatest difficulties, and harassed by the inadequacy of his retiring pension, he managed to produce Stellar Evolution, discussing, among other things, the age of the . sun, in 1889; and The Philosophical Basis of Evolution, partly a critique of Herbert Spencer's philosophy, in 1890. He died on the 15th of December 1890. The soundness of Croll's astro- nomical theory regarding the glacial .period has since been criticized by E. P. Culverwell in the Geological Magazine for 1895, and by others; and it is now generally abandoned. Never-

theless it must be admitted that his character as a scientific worker under great discouragements was nothing less than heroic. The hon. degree of LL.D. was conferred on him in 1876 by the university of St Andrews; and he was elected F.R.S. in the same year.

An A utobiographical Sketch of James Croll, with Memoir of his Life and Work, was prepared by J. C. Irons, and published in 1896.

CROLY, GEORGE (1780-1860), British divine and author, son of a Dublin physician, was born on the 17th of August 1780. He was educated at Trinity College, Dublin, and after ordination was appointed to a small curacy in the north of Ireland. About 1810 he came to London, and occupied himself with literary work. A man of restless energy, he claims attention by his extraordinary versatility. He wrote dramatic criticisms for a short-lived periodical called the New Times ; he was one of the earliest contributors to Blackwood's Magazine; and to the Literary Gazette he contributed poems, reviews and essays on all kinds of subjects. In 1819 he married Margaret Helen Begbie. Efforts to secure an English living for Croly were frustrated, according to the Gentleman's Magazine (Jan. 1861), because Lord Eldon confounded him with a Roman Catholic of the same name. Excluding his contributions to the daily and weekly press his chief works were: — Paris in 1815 (1817), a poem in imitation of Childe Harold; Catiline (1822), a tragedy lacking in dramatic force; Salathiel: A Story of the Past, the Present and the Future (1829), a successful romance of the " Wandering Jew " type; The Life and Times of his late Majesty George the Fourth (1830); Marston; or, The Soldier and Statesman (1846), a novel of modern life; The Modern Orlando (1846), a satire which owes something to Don Juan; and some

biographies, sermons and theological works.

Croly was an effective preacher, and continued to hope for preferment from the Tory leaders, to whom he had rendered considerable services by his pen; but he eventually received, |n 1835, the living of St Stephen's, Walbrook, London, from a Whig patron, Lord Brougham, with whose family he was connected. In 1847 he was made afternoon lecturer at the Foundling hospital, but this appointment proved unfortunate. He died suddenly on the 24th of November i860, in London.

His Poetical Works (2 vols.) were collected in 1830. For a list of his works see Allibone's Critical Dictionary of English Literature

(1859).

CROMAGNON RACE, the name given by Paul Broca to a type of mankind supposed to be represented by remains found by Lartet, Christy and others, in France in the Cromagnon cave at Les Eyzies, Tayac district, Dordogne. At the foot of a steep rock near the village this small cave, nearly filled with debris, was found by workmen in 1868. Towards the top of the loose strata three human skeletons were unearthed. They were those of an old man, a young man and a woman, the latter's skull bearing the mark of a severe wound. The skulls presented such special characteristics that Broca took them as types of a race. Palaeolithic man is exclusively long-headed, and the dolicho- cephalic appearance of the crania (they had a mean cephalic index 01 73 – 34) supported the view that the " find " at Les Eyzies was palaeolithic. It is, however, inaccurate to state that brachycephaly appears at once with the neolithic age, dolicho- cephaly even of a pronounced type persisting far into neolithic times. The Cromagnon race may thus be, as many anthro- pologists believe it, early neolithic, a type of man who spread over and inhabited a large portion of Europe at the close of the Pleistocene period. Some have sought to find in it the sub- stratum of the present populations of western Europe. Quatrefages identifies Cromagnon man with the tall, long-headed, fair Kabyles (Berbers) who still survive in various parts of Mauritania. He suggests the introduction of the Cromagnon from Siberia, " arriving in Europe simultaneously with the great mammals (which were driven by the cold from Siberia), and no doubt following their route."

See A. H. Keane's Ethnology (1896); Mortillet, Le Prehistoriquc (1900); Sergi, The Mediterranean Race (1901); Lord Avebury, Prehistoric Times, p. 317 of 1900 edition.

CROMARTY, GEORGE MACKENZIE, ist Earl of (1630- 1714), Scottish statesman, was the eldest son of Sir John Mackenzie, Bart., of Tarbat (d. 1654), and belonged to the same family as the earls of Seaforth. In 1654 he joined the rising in Scotland on behalf of Charles II. and after an exile of six years he returned to his own country and took some part in public affairs after the Restoration. In 1661 he became a lord of session as Lord Tarbat, but having been concerned in a vain attempt to overthrow Charles II. 's secretary, the earl of Lauderdale, he was dismissed from office in 1664. A period of retirement followed until 1678 when Mackenzie was appointed lord justice general of Scotland; in 1681 he became lord clerk register and a lord of session for the second time, and from 1682 to 1688 he was the chief minister of Charles II. and James II. in Scotland, being created viscount of Tarbat in 1685. In 1688, however, he deserted James and soon afterwards made his peace with William III., his experience being very serviceable to the new government in settling the affairs of Scotland. From 1692 to 1695 Tarbat was again lord clerk register, and having served for a short time as a secretary of state under Queen Anne he was created earl of Cromarty in 1703. He was again lord justice general from 1704 to 1 710. He warmly supported the union between England and Scotland, writing some pamphlets in favour of this step, and he died on the 17th of August 17 14. Cromarty was a man of much learning, and among his numerous writings may be mentioned his Account of the conspiracies by the earls of Gowry and R. Logan (Edinburgh, 1713).

The earl's grandson George, 3rd earl of Cromarty (c. 1703- 1766), succeeded his father John, the 2nd earl, in February 1731. In 1 745 he joined Charles Edward, the young pretender, and he served with the Jacobites until April 1746 when he was taken prisoner in Sutherlandshire. He was tried and sentenced to death, but he obtained a conditional pardon although his peerage was forfeited. He died on the 28th of September 1766.

This earl's eldest son was John Mackenzie, Lord Macleod (1727-1789), who shared his father's fortunes in 1745 and his fate in 1 746. Having pleaded guilty at his trial Macleod was pardoned on condition that he gave up all his rights in the estates of the earldom, and he left England and entered the Swedish army. In this servicehe rose to high rank and was made Count Cromarty. The count returned to England in 1777 and was successful in raising, mainly among the Mackenzies, two

splendid battalions of Highlanders, the first of which, now the Highland Light Infantry, served under him in India. In 1784 he regained the family estates and he died on the 2nd of April 1789. Macleod wrote an account of the Jacobite rising of 1745, and also one of a campaign in Bohemia in which he took part in 1757; both are printed in Sir W. Fraser's Earls of Cromartie (Edinburgh, 1876).

Macleod left no children, and his heir was his cousin, Kenneth Mackenzie (d. 1796), a grandson of the 2nd earl, who also died childless. The estates then passed to Macleod's sister, Isabel (1725-1801), wife of George Murray, 6th Lord Elibank. In 1861 Isabel's descendant, Anne (1829-1888), wife of George, 3rd duke of Sutherland, was created countess of Cromartie with remainder to her second son Francis (1852-1893), who became earl of Cromartie in 1888. In 1895, two years after the death of Francis, his daughter Sibell Lilian (b. 1878) was granted by letters patent the title of countess of Cromartie.

CROMARTY, a police burgh and seaport of the county of Ross and Cromarty, Scotland. Pop. (1901) 1242. It is situated on the southern shore of the mouth of Cromarty Firth, 5 m. E. by S. of Invergordon on the opposite coast, with which there is daily communication by steamer, and 9 m. N.E. of Fortrose, the most convenient railway station. Before the union of the shires of Ross and Cromarty, it was the county town of Cromarty- shire, and is one of the Wick district group" of parliamentary burghs. Its name is variously derived from the Gaelic crom, crooked, and bath, bay, or ard, height, meaning either the " crooked bay," or the " bend between the heights " (the high rocks, or Sutors, which guard the entrance to the Firth), and gave the title to the earldom of Cromarty. The principal buildings are the town hall and the Hugh Miller Institute. The harbour,

enclosed by two piers, accommodates the herring fleet, but the fisheries, the staple industry, have declined. The town, however, is in growing repute as a midsummer resort. The thatched house with crow-stepped gables in Church Street, in which Hugh Miller the geologist was born, still stands, and a statue has been erected to his memory. To the east of the burgh is Cromarty House, occupying the site of the old castle of the earls of Ross. It was the birthplace of Sir Thomas Urquhart, the translator of Rabelais.

Cromarty, formerly a county in the north of Scotland, was incorporated with Ross-shire in 1889 under the designation of the county of Ross and Cromarty. The nucleus of the county con- sisted of the lands of Cromarty in the north of the peninsula of the Black Isle.

To this were added from time to time the various estates scattered throughout Ross-shire — the most considerable of which were the districts around Ullapool and Little Loch Broom on the Atlantic coast, the area in which Ben Wyvis is situated, and a tract to the north of Loch Fannich — which had been acquired by the ancestors of Sir George Mackenzie (1630- 17 14), afterwards Viscount Tarbat (i685)and ist earl of Cromarty (1 703) . Desirous of combining these sporadic properties into one shire, Viscount Tarbat was enabled to procure their annexation to his sheriffdom of Cromarty in 1685 and 1698, the area of the enlarged county amounting to nearly 370 sq. m. (See Ross and Cromarty.)

CROMARTY FIRTH, an arm of the North Sea, belonging to the county of Ross and Cromarty, Scotland. From the Moray Firth it extends inland in a westerly and then south-westerly direction for a distance of 19 m. Excepting at the Bay of Nigg, on the northern shore, and Cromarty Bay, on the southern, where it is about 5 m. wide (due N. and S.), and at Alness Bay, where it is 2 m. wide, it has an average width of 1 m. and a depth varying from 5 to 10 fathoms, forming one of the safest and most com- modious anchorages in the north of Scotland. Besides other streams it receives the Conon, Peffery, Skiack and Alness, and the principal places on its shores are Dingwall near the head, Cromarty near the mouth, Kiltearn, Invergordon and Kilmuir on the north. The entrance is guarded by two precipitous rocks — the one on the north 400 ft., that on the south 463 ft. high — called the Sutors from a fancied resemblance to a couple of shoe- makers (Scotice, souter) , bending over their lasts. .There are ferries at Cromarty, Invergordon and Dingwall.

CROME, JOHN (1769-1821), English landscape painter, founder and chief representative of the ” Norwich School,” often called Old Crome, to distinguish him from his son, was born at Norwich, on the 21st of December 1769. His father was a weaver, and could give him only the scantiest education. His early years were spent in work of the humblest kind; and at a fit age he became apprentice to a house-painter. To this step he appears to have been led by an inborn love of art and the desire to acquaint himself by any means with its materials and processes. During his apprenticeship he sometimes painted signboards, and devoted what leisure time he had to sketching from nature. Through the influence of a rich art-loving friend he was enabled to exchange his occupation of house-painter for that of drawing-master; and in this he was engaged throughout his life. He took great delight in a collection of Dutch pictures to which he had access, and these he carefully studied. About 1790 he was introduced to Sir William Beechey, whose house in London he frequently visited,

and from whom he gathered additional knowledge and help in his art. In 1805 the Norwich Society of Artists took definite shape, its origin being traceable a year or two further back. Crome was its president and the largest contributor to its annual exhibitions. Among his pupils were James Stark, Vincent, Thirtle and John Bernay (Barney) Crome (1 794-1 842), his son. J. S. Cotman, too, a greater artist than any of these, was associated with him. Crome continued to reside at Norwich, and with the exception of his short visits to London had little or no communication with the great artists of his own time. He first exhibited at the Royal Academy in 1806; but in this and the following twelve years he exhibited there only fourteen of his works. With very

few exceptions Crome's subjects are taken from the familiar scenery of his native county. Fidelity to nature was his dominant aim. " The bit of heath, the boat, and the slow water of the flattish land, trees most of all — the single tree in elaborate study, the group of trees, and how the growth of one affects that of another, and the characteristics of each," — these, says Frederick Wedmore (Studies in English Art), are the things to which he is most constant. He" still remains, says the same critic, of many trees the greatest draughtsman, and is especially the master of the oak. His most important works are — " Mousehold Heath, near Norwich," now in the National Gallery; " Clump of Trees, Hautbois Common"; "Oak at Poringland "; the "Willow"; " Coast Scene near Yarmouth "; " Bruges, on the Qstend River"; "Slate Quarries"; the "Italian Boulevards"; and the " Fishmarket at Boulogne." He executed a good many etchings, and the great charm of these is in the beautiful and faithful representation of trees. Crome enjoyed a very limited reputation during his life, and his pictures were sold at low prices; but since his death they have been more and more appreciated, and have given him a high place among English painters of landscape. He died at Norwich on the 22nd of April 1821. His son, J. B. Crome, was his assistant in teaching, and his best pictures were in the same style, his moonlight effects being much admired.

A collection of " Old " Crome's etchings, entitled Norfolk Pictur- esque Scenery, was published in 1 834, and was re-issued with a memoir by Dawson Turner in 1838, but in this issue the prints were retouched by other hands.

CROMER, EVELYN BARING, ist Earl (1841-), British statesman and

diplomatist, was born on the 26th of February 1841, the ninth son of Henry Baring, M.P., by Cecilia Anne, eldest daughter of Admiral Windham of Felbrigge Hall, Norfolk. Having joined the Royal Artillery in 1858, he was appointed in 1861 A.D.C. to Sir Henry Storks, high commissioner of the Ionian Islands, and acted as secretary to the same chief during the inquiry into the Jamaica outbreak in 1865. Gazetted captain in 1870, he went in 1872 as private secretary to his cousin Lord Northbrook, Viceroy of India, where he remained until 1876, when he became major, received the C.S.I., and was appointed British commissioner of the Egyptian public debt office. Up to this period Major Baring had given no unusual signs of promise, and the appointment of a comparatively untried major of artillery as the British representative on a Financial Board composed of representatives of all the great powers was considered a bold one. Within a very short time it was recognized that the Englishman, though keeping himself carefully in the background, was unmistakably the predominant factor on the board. He was mainly responsible for the searching report, issued in 1878, of the commission of inquiry that had been instituted into the financial methods of the Khedive Ismail; and when that able and unscrupulous Oriental had to submit to an enforced abdication in 1879, it was Major Baring who became the British controller-general and practical director of the Dual Control. Had he remained in Egypt, the whole course of Egyptian history might have been altered, but his services were deemed more necessary in India, and under Lord Ripon he became financial member of council in June 1880. He remained there till 1883, leaving an unmistakable mark on the Indian financial system, and then, having been rewarded by the K.C.S.I., he was appointed British agent and consul-general in Egypt and a minister plenipotentiary in the diplomatic service.

Sir Evelyn Baring was at that time only a man of forty-two, who had gained a reputation for considerable financial ability, combined with an abruptness of manner and a certain autocracy of demeanour which, it was feared, would impede his success in a position which required considerable tact and diplomacy. It was a friendly colleague who wrote —

” The virtues of Patience are known,

But I think that, when put to the touch, The people of Egypt will own, with a groan, There’s an Evil in Baring too much.”

When he arrived in Cairo in 1883 he found the administration of the country almost non-existent. Ismail had ruled with all

the vices, but also with all the advantages, of autocracy. Dis- order in the finances, brutality towards the people, had been combined with public tranquillity and the outer semblance of civilization. Order, at least, reigned from the Sudan to the Mediterranean, and such trivial military disturbances as had occurred had been of Ismail's own devising and for his own purposes. Tewfik, who had succeeded him, had neither the inclination nor character to be a despot. Within three years his government had been all but overthrown, and he was only khedive by the grace of British bayonets. Government by bayonets was not in accord with the views of the House of Commons, yet Ismail's government by the kourbash could not be restored. The British government, under Mr Gladstone, desired to establish in Egypt a sort of constitutional government; and as there existed no single element of a constitution, they had sent out Lord Dufferin (the first marquess of Dufferin) to frame one. That gifted nobleman, in the delightful lucidity of his picturesque report, left nothing to be desired except the material necessary to convert the flowing periods into political entities. 1 In the absence of that, the constitution was still-born, and Sir Evelyn Baring arrived to find, not indeed a clean slate, but a worn-out papyrus, disfigured by the efforts of centuries to describe in hieroglyph a method of rule for a docile people.

From that date the history of Sir Evelyn Baring, who became Baron Cromer in 1892, G.C.B. in 189s, viscount in 1897, and earl in 1901, is the history of Egypt, and requires the barest mention of its salient points here. From the outset he realized that the task he had to perform could only be effected piecemeal and in detail, and his very first measure was one which, though severely criticized at the time, has been justified by events, and which in any case showed that he shirked no responsibility, and was capable of adopting heroic methods. He counselled the abandonment, at least temporarily, by Egypt of its authority in the Sudan provinces, already challenged by the mahdi. His views were shared by the British ministry of the day and the policy of abandonment enforced upon the Egyptian government. At the same time it was decided that efforts should be made to relieve the Egyptian garrisons in the Sudan and this resolve led to the mission of General C. G. Gordon (q.v.) to Khartum. Lord Cromer subsequently told the story of Gordon's mission at length, making clear the measure of responsibility resting upon him as British agent. The proposal to employ Gordon came from the British government and twice Sir Evelyn rejected the suggestion. Finally, mistrusting his own judgment, for he did not consider Gordon the proper person for the mission, Baring yielded to pressure from Lord Granville. Thereafter he gave Gordon all the support possible, and in

the critical matter of the proposed despatch of Zobeir to Khartum, Baring — after a few days' hesitation — cordially endorsed Gordon's request. The request was refused by the British government — and the catas- trophe which followed at Khartum rendered inevitable.

The Sudan crisis being over, for the time, Sir Evelyn Baring set to work to reorganize Egypt itself. This work he attacked in detail. The very first essential was to regulate the financial situation; and in Egypt, where the entire revenue is based on the production of the soil, irrigation was of the first importance. With the assistance of Sir Colin Scott Moncrieff, in the public works department, and Sir Edgar Vincent, as financial adviser, these two great departments were practically put in order before he gave more than superficial attention to the rest. The ministry of justice was the next department seriously taken in hand, with the assistance of Sir John Scott, while the army had been re- formed under Sir Evelyn Wood, who was succeeded by Sir Francis (afterwards Lord) Grenfell. Education, the ministry

1 In 1892 Lord Dufferin wrote to'Lord Cromer : " These institutions were a good deal ridiculed at the time, but as it was then uncertain how long we were going to remain, or rather how soon the Turks might not be reinvested with their ancient supremacy, I desired to erect some sort of barrier, however feeble, against their intolerable tyranny." In 1906 Lord Cromer bore public testimony to the good results of the measures adopted on Lord Dufferin's " statesmanlike initiative." Such results were, however, only possible in consequence of the continuance of the British occupation.

of the interior, and gradually every other department, came to be reorganized, or, more correctly speaking, formed, under Lord Cromer's carefully persistent direction, until it may be said to-day that the Egyptian administration can safely challenge comparison with that of any other state. In the meantime the rule of the mahdi and his successor, the khalifa, in the temporarily abandoned provinces of the Sudan, had been weakened by internal dissensions; the Italians from Massawa, the Belgians from the Congo State, and the French from their West African possessions, had gradually approached nearer to the valley of the Nile; and the moment had arrived at which Egypt must decide either to recover her position in the Sudan or allow the Upper Nile to fall into hands hostile to Great Britain and her position in Egypt. Lord Cromer was as quick to recognize the moment for

action and to act as he had fifteen years earlier been prompt to recognize the necessity of abstention. In March- September 1896 the first advance was made to Dongola under the Sirdar, Sir Herbert (afterwards Lord) Kitchener; between July 1897 and April 1898 the advance was pushed forward to the Atbara; and on the 2nd of September 1898, the battle of Omdurman finally crushed the power of the khalifa and restored the Sudan to the rule of Egypt and Great Britain. In the negotiations which resulted in the Anglo-French Declaration of the 8th of April 1904, whereby France bound herself not to obstruct in any manner the action of Great Britain in Egypt and the Egyptian government acquired financial freedom, Lord Cromer took an active part. He also successfully guarded the interests of Egypt and Great Britain in 1906 when Turkey attempted by encroachments in the Sinai Peninsula to obtain a strategic position on the Suez Canal. To have effected all this in the face of the greatest difficulties — political, national and international — and at the same time to have raised the credit of the country from a condition of bankruptcy to an equality with that of the first European powers, entitles Lord Cromer to a very high place among the greatest administrators and statesmen that the British empire has produced. In April 1907, in consequence of the state of his health, he resigned office, having held the post of British agent in Egypt for twenty-four years. In July of the same year parliament granted £50,000 out of the public funds to Lord Cromer in recognition of his ” eminent services ” in Egypt. In 1908 he published, in two volumes, Modern Egypt, in which he gave an impartial narrative of events in Egypt and the Sudan since 1876, and dealt with the results to Egypt of the British occupation of the country. Lord Cromer also took part in the political controversies at home, joining himself to the free-trade wing of the Unionist party.

Lord Cromer married in 1876 Ethel Stanley, daughter of Sir Rowland Stanley Errington, eleventh baronet, but was left a widower with two sons in 1898; and in 1901 he married Lady Katherine Thynne, daughter of the 4th marquess of Bath.

CROMER, a watering-place in the northern parliamentary division of Norfolk, England, 139 m. N.E. by N. from London by the Great Eastern railway; served also by the Midland and Great Northern joint line. Pop. of urban district (1901) 3781. Standing on cliffs of considerable elevation, the town has re- peatedly suffered from ravages of the sea. A wall and esplanade extend along the bottom of the cliffs, and there is a fine stretch of sandy beach. There is also a short pier. The church of St Peter and St Paul is Perpendicular (largely restored) with a lofty tower. On a site of three acres stands the convalescent home of the Norfolk and Norwich hospital. There is an excellent golf course. The

herring, cod, lobster and crab fisheries are prosecuted. The village of Sheringham (pop. of urban district, 2359), lying to the west, is also frequented by visitors. A so-called Roman camp, on an elevation overlooking the sea, is actually a modern beacon.

CROMORNE, also CRUMHORNE 1 (Ger. Krummhorn ; Fr. tournebout), a wind instrument of wood in which a cylindrical

1 Crumhorne need not be regarded as a corruption of the German, since the two words of which it is composed were both in use in medieval England. Crumb = curved ; crumbe = hook, bend; crome = a staff with a hook at the end of it. See Stratmann's Middle English Dictionary (1891), and Halliwell, Dictionary of Archaic and Provincial Words (London, 1881).

column of air is set in vibration by a reed. The lower extremity is turned up in a half circle, and from this peculiarity it has gained the French name tournebout. The reed of the cromorne, like that of the bassoon, is formed by a double tongue of cane adapted to the small end of a conical brass tube or crook, the large end fitting into the main bore of the instrument. It presents, how ever, this difference, that it is not, like that of the bassoon, in contact with the player's lips, but is covered by a cap pierced in the upper part with a raised slit against which the performer's lips rest, the air being forced through the opening into the cap and setting the reed in vibration. The reed itself is therefore not subject to the pressure of the lips. The compass of the instrument is in consequence limited to the simple fundamental sounds produced by the successive opening of the lateral holes. The length of the cromornes is inconsiderable in proportion to the deep sounds produced by them, which arises from the fact that these instruments, like all tubes of cylindrical bore provided with reeds, have the acoustic properties of the stopped pipes of an organ. That is to say, theoretically they require only half the length necessary for the open pipes of an organ or for conical tubes provided with reeds, to produce notes of the same pitch. Moreover, when, to obtain an harmonic, the column of air is divided, the cromorne will not give the octave, like the oboe and bassoon, but the twelfth, corresponding in this peculiarity with the clarinet and all stopped pipes or bourdons. In order, however, to obtain an harmonic on the cromorne, the cap would have to be discarded, for a reed only overblows to give the harmonic overtones when pressed by the lips. With the ordinary boring of eight lateral holes the cromorne possesses a limited compass of a ninth. Sometimes, however, deeper sounds are obtained by the addition of one or more keys. By its construction the cromorne is one of the oldest wind instruments; it is evidently derived from the Gr.

aulos 2 and the Roman tibia, which likewise consisted of a simple cylindrical pipe of which the air column was set in vibration, Bass Tournebout. at first by a double reed, and, we have

reason to believe, later by a single reed (see Aulos and Clarinet). The Phrygian aulos was sometimes curved (see Tib. ii. 1. 85 Phrygio tibia curva sono; Virgil, Aen. xi. 737 curva choros indixit tibia Bacchi). 3

Notwithstanding the successive improvements that were intro- duced in the manufacture of wind instruments, the cromorne scarcely ever varied in the details of its construction. Such as we see it represented in the treatise by Virdung 4 we find it again about the epoch of its disappearance. 6 The cromornes existed as a complete family from the 15th century, consisting, according to Virdung, of four instruments; Praetorius 6 cites five — the deep bass, the bass, the tenor or alto, the cantus or soprano and the high soprano, with compass as shown. A band, or, to use the expression of Praetorius,

ˆm

|:

ˆ

Deep Bass.

Bass.

Tenor.

art Soprano,

w

High Soprano.

an ” accort ” of cromornes comprised I deep bass, 2 bass, 3 tenor, 2 cantus, I high soprano =9.

Mersenne 7 explains the construction of the cromorne, giving careful illustrations of the instrument with and without the cap. From him we learn that these instruments were made in England, where they were played in concert in sets of four, five and six. Their scheme of construction and especially the reed and cap is very similar to that of the chalumeau of the musette (see Bag- pipe), but its timbre is by

2 See A. Howard, ” Aulos or Tibia,” Harvard Studies, iv. (Boston,

1893).

3 See also A. A. Howard, op. cit., ‘ Phrygian Aulos, pp. 35-38.

4 Musica getutscht und auszgezogen (Basel, 1511).

6 See Diderot and d’Alembert’s Encyclopedic (Paris, 1751-1780), t. 5, ” Lutherie,” pi. ix.

6 Organographia (Wolfenbiittel, 1618).

7 L’Harmonie universelle (Paris, 1636-1637), book v. pp. 289 and 290. Cf, ” Musette,” pp. 282-287 and 305.

no means so pleasant. Mersenne’s cromornes have ten fingerholes, Nos. 7 and 8 being duplicates for right and left-handed players. They were probably sometimes used, as was the case with the hautbois de Poitou (see Bag-pipe) .without the cap, when an extended compass, was required.

The cromornes were in very general use in Europe from the 14th to the 17th century, and are to be found in illustrations of pageants, as for instance in the magnificent collection of woodcuts designed by Hans Burgmair, a pupil of Albrecht Diirer, representing the triumph of the emperor Maximilian, 1 where a bass and a tenor Krumbhorn player figure in the procession among countless other musicians. In the inventory of the wardrobe, &c, belonging to Henry VIII. at Westminster, made during the reign of Edward VI., we find eighteen crumhornes (see British Museum, Harleian MS. 1419, ff. 202b and 205). The cromornes did not always form an orchestra by themselves, but were also used in concert with other instruments and notably with flutes and oboes, as in municipal bands and in the private bands of princes. In 1685 the orchestra of the Neue Kirche at Strassburg comprised two tournebouts or cromornes, and until the middle of the 18th century these instruments formed part of the court band known as ” Musique de la Grande Ecurie ” in the service of the French kings. They are first mentioned in the accounts for the year 1662, together with the tromba-marina, although the instrument was already highly esteemed in the 16th century. In that year five players of the cromorne were enrolled among the musicians of the Grande Ecurie du Roi ; 2 they received a yearly salary of 120 livres, which various supplementary allowances brought up to about 330 livres. In

1729 one of the cromorne players sold his appointment for 4000 francs. This was a sign of the failing popularity of the instrument. The duties of the cromorne and tromba-marina players consisted in playing in the great divertisse- ments and at court functions and festivals in honour of royal marriages, births and thanksgivings.

Cromornes have become of extreme rarity and are not to be found in all collections. The Paris Conservatoire possesses one large bass cromorne of the 16th century, the Kgl. Hochschule fur Musik, 3 Berlin, a set of seven, and the Ambroser Sammlung, Vienna, a cromorne in Eb. 4 The museum of the Conservatoire Royal de Musique at Brussels has the good fortune to possess a complete family which is said to have belonged to the duke of Ferrara, Alphonso II. d'Este, a prince who reigned from 1559 to 1597. The soprano (cantus or discant) has the same compass as above, while those of the alto, the tenor (furnished with a key) and the bass are as shown.

w

£=

gi

±=-

W

Alto.

Tenor.

Bass.

The bass (see figure), besides having two keys, is distinguished from the others by two contrivances like small bolts, which slide in grooves and close the two holes that give the lowest notes of the instrument. The use of these bolts, placed at the extremity of the tournebout and out of reach of the fingers of the instrumentalist, renders neces- sary the assistance of a person whose sole mission is to attend to them during the performance. E. van der Straeten 6 mentions a key belonging to a large cromorne bearing the date 1537, of which he gives a large drawing. A cromorne appears in a musical scene with a trumpet in Hermann Finck's Practica Musical

The " Platerspil," of which Virdung gives a drawing, is only a kind of cromorne. It is characterized by having, instead of a cap to cover the

reed, a spherical receiver surrounding the reed, to which the tube for insufflation is adapted. The Platerspiel is also frequently classified among bagpipes. In the Cantigas di Sante Maria, 1 a MS. of the 13th century preserved in the Escorial, Madrid, two instruments of this type are represented. One of these has two straight, parallel pipes, slightly conical; the other is frankly conical with wide bore turned up at the end.

1 See ” Triumphzug des Kaisers Maximilian I.” Beilage zum II. Band des Jahrb. der Sammlungen des Atterhbchsten Kaiserhauses (Vienna, 1884-1885), pi. 20. Explanatory text and part i. in Band i. of the same publication, 1 883-1 884. A French edition with 135 plates was also published in Vienna by A. Schmidt, and in London by J. Edwards (1796). See also Dr August Reissmann, Illustrierte Geschichte der deutschen Musik (Leipzig, 1881), where a few of the plates are reproduced.

2 See J. Ecorcheville, ” Quelques documents sur la musique de la grande ecurie du roi,” Sammelband d. Intern. Musik. Ges. Jahrg. ii., Heft 4 (1901, Leipzig, London, &c), pp. 630-632.

3 Oskar Fleischer, Fuhrer (Berlin, 1892), p. 29, Nos. 400 to 406.

4 For an illustration see Captain C. R. Day, Descriptive Catalogue (London, 1891), pi. iv. E. and p. 99.

5 Histoire de la musique aux Pays-Bas avant le XIX” siecle (Brussels, 1867-1888), vol. vii. p. 336, and description, p. 333 et seq.

6 Wittenberg, 1556; reproduced by A, Reissmann, op. cit., pp. 233 and 226.

7 Reproduced in Riano’s Notes on Early Spanish Music (London, 1887), pp. 119-127.

Other instruments belonging by their most important character- istics of cylindrical bore and double reed to the same family as the cromorne, although the bore was somewhat differently disposed, are the racket bassoon and the sourdine or sordelline. The latter was introduced into the orchestra by Cavaliere in his opera Rap- presentazione di anima e di corpo, and is described by Giudotto 8 in his edition of the score as ” Flauti overo due tibie all’ antica che noi chiamiamo sordelline,” a description which tallies with what has been said above concerning the aulos and tibia. (V. M. and K. S.)

CROMPTON, SAMUEL (1753-1827), English inventor, was born on the

3rd of December 1753 at Firwood near Bolton-le- Moors, Lancashire. While yet a boy he lost his father, and had to contribute to the family resources by spinning yarn. The defects of the spinning jenny imbued him with the idea of devising something better, and for five or six years the effort absorbed all his spare time and money, including what he earned by playing the violin at the Bolton theatre. About 1779 he succeeded in producing a machine which span yarn suitable for use in the manufacture of muslin, and which was known as the muslin wheel or the Hall-in-the-Wood wheel (from the name of the house in which he and his family resided), and later as the spinning mule. After his marriage in 1 780 a good demand arose for the yarn which he himself made at Hall-in-the-Wood, but the prying to which his methods were subjected drove him, in the absence of means to take out a patent, to the choice of destroying his machine or making it public. He adopted the latter alternative on the promise of a number of manufacturers to pay him for the use of the mule, but all he received was about £60. He then resumed spinning on his own account, but with indifferent success. In 1800 a sum of £500 was raised for his benefit by subscription, and when in 1809 Edmund Cartwright, the inventor of the power-loom obtained £10,000 from parlia- ment, he determined also to apply for a grant. In 1811 he made a tour in the manufacturing districts of Lancashire and Scotland to collect evidence showing how extensively his mule was used, and in 181 2 parliament allowed him £5000. With the aid of this money he embarked in business, first as a bleacher and then as a cotton merchant and spinner, but again without success. In 1824 some friends, without his knowledge, bought him an annuity of £63. He died at Bolton on the 26th of June 1827.

CROMPTON, an urban district of Lancashire, England, 2\ m. N. of Oldham, within the parliamentary borough of Oldham. Pop. (1901) 13,427. At Shaw, a populous village included within it, is a station on the Lancashire & Yorkshire railway. Cotton mills and the collieries of the neighbourhood employ the large industrial pppulation.

CROMWELL, HENRY (1628-1674), fourth son of Oliver Cromwell, was born at Huntingdon on the 20th of January 1628, and served under his father during the latter part of the Civil War. His active life, however, was mainly spent in Ireland, whither he took some troops to assist Oliver early in 1650, and he was one of the Irish representatives in the Little, or Nominated, Parliament of 1653. In 1654 he was again in Ireland, and after making certain recommendations to his father, now lord pro- tector, with regard to the government of that country, he became major-general of the forces in Ireland and a member of the Irish council of state, taking up his new duties in July 1655. Nominally Henry was subordinate to the lord-deputy, Charles

Fleetwood, but Fleetwood's departure for England in September 1655 left him for all practical purposes the ruler of Ireland. He moderated the lord-deputy's policy of deporting the Irish, and unlike him he paid some attention to the interests of the English settlers; moreover, again unlike Fleetwood, he appears to have held the scales evenly between the different Protestant sects, and his undoubted popularity in Ireland is attested by Clarendon. In November 1657 Henry himself was made lord-deputy; but before this time he had refused a gift of property worth £1500 a year, basing his refusal on the grounds of the poverty of the country, a poverty which was not the least of his troubles. In 1657 he advised his father not to accept the office of king, although in 1654 he had supported a motion to this effect;

8 See Hugo Goldschmidt, " Das Orchester der italienischen Oper im 17. Jahrh." Sammelband der Intern. Musikgesellschaft, Jahrg. ii., Heft 1 (Leipzig, 1900), p. 24.

and after the dissolution of Cromwell's second parliament in February 1658 he showed his anxiety that the protector should act in a moderate and constitutional manner. After Oliver's death Henry hailed with delight the succession of his brother Richard to the office of protector, but although he was now appointed lieutenant and governoi general of Ireland, it was only with great reluctance that he remained in that country. Having rejected proposals to assist in the restoration of Charles II., Henry was recalled to England in June 1659 just after his brother's fall; quietly obeying this order he resigned his office at once. Although he lost some property at the Restoration, he was allowed after some solicitation to keep the estate he had bought in Ireland. His concluding years were passed at Spinney Abbey in Cambridgeshire; he was unmolested by the govern- ment, and he died on the 23rd of March 1674. In 1653 Henry married Elizabeth (d. 1687), daughter of Sir Francis Russell, and he left five sons and two daughters.

CROMWELL, OLIVER (1 599-1658), lord protector of England, was the 5 th and only surviving son of Robert Cromwell of Huntingdon and of Elizabeth Steward, widow of William Lynn. His paternal grandfather was Sir Henry Cromwell of Hinchin- brook, a leading personage in Huntingdonshire, and grandson of Richard Williams, knighted by Henry VIII., nephew of Thomas Cromwell, earl of Essex, Henry VIII. 's minister, whose name he adopted. His mother was descended from a

family named Styward in Norfolk, which was not, however, connected in any way, as has been often asserted, with the royal house of Stuart. Oliver was born on the 25th of April 1599, was educated ander Dr Thomas Beard, a fervent puritan, at the free school at Huntingdon, and on the 23rd of April 1616 matriculated as a fellow-commoner at Sidney Sussex College, Cambridge, then a hotbed of puritanism, subsequently studying law in London. The royalist anecdotes relating to his youth, including charges of ill-conduct, do not deserve credit, the entries in the register of St John's, Huntingdon, noting Oliver's submission on two occasions to church censure being forgeries; but it is not improbable that his youth was wild and possibly dissolute. 1 According to Edmund Waller he was " very well read in the Greek and Roman story." Burnet declares he had little Latin, but he was able to converse with the Dutch ambassador in that language. According to James Heath in his Flagellum, " he was more famous for his exercises in the fields than in the schools, being one of the chief match-makers and players at football, cudgels, or any other boisterous game or sport." On the 22nd of August 1620 he married Elizabeth, daughter of Sir James Bourchier, a city merchant of Tower Hill, and of Felstead in Essex; and his father having died in 161 7 he settled at Hunting- don and occupied himself in the management of his small estate. In 1628 he was returned to parliament as member for the borough, and on the nth of February 1629 he spoke in support of puritan doctrine, complaining of the attempt by the king to silence Dr Beard, who had raised his voice against the " flat popery " inculcated by Dr Alabaster at Paul's Cross. He was also one of the members who refused to adjourn at the king's command till Sir John Eliot's resolutions had been passed.

During the eleven years of government without parliament very little is recorded of Cromwell. His name is not connected with the resistance to the levy of ship-money or to the action of the ecclesiastical courts, but in 1630 he was one of those fined for refusing to take up knighthood. The same year he was named one of the justices of the peace for his borough; and on the grant of a new charter showed great zeal in defending the rights of the commoners, and succeeded in procuring an alteration in the charter in their favour, exhibiting much warmth of temper during the dispute and being committed to custody by the privy council for angry words spoken against the mayor, for which he afterwards apologized. He also defended the rights of the commoners of Ely threatened by the " adventurers " who had drained the Great Level, and he was nicknamed afterwards by a royalist newspaper " Lord of the Fens." He was again later the champion of the commoners of St Ives in the Long

Parliament 1 Life of Sir H. Vane, by W. W. Ireland, 222.

against enclosures by the earl of Manchester, obtaining a com- mission of the House of Commons to inquire into the case, and drawing upon himself the severe censure of the chairman, the future Lord Clarendon, by his ” impetuous carriage ” and ” insolent behaviour,” and by the passionate vehemence he imparted into the business. Bishop Williams, a kinsman of Cromwell’s, relates at this time that he was ” a common spokes- man for sectaries, and maintained their part with great stubborn- ness “; and his earliest extant letter (in 1635) is an appeal for subscriptions for a puritan lecturer. There appears to be no foundation for the statement that he was stopped by an order of council when on the point of abandoning England for America, though there can be little doubt that the thoughts of emigra- tion suggested themselves to his mind at this period. He viewed the ” innovations in religion ” with abhorrence. According to Clarendon he told the latter in 1641 that if the Grand Remon- strance had not passed ” he would have sold all he had the next morning and never have seen England more.” In 1631 he con- verted his landed property into money, and John Hampden, his cousin, a patentee of Connecticut in 1632, was on the point of emigrating. Cromwell was perhaps arrested in his project by his succession in 1636 to the estate of his uncle Sir Thomas Steward, and to his office of farmer of the cathedral tithes at Ely, whither he now removed. Meanwhile, like Bunyan and many other puritans, Cromwell had been passing through a trying period of mental and religious change and struggle, beginning with deep melancholy and religious doubt and depression, and ending with ” seeing light ” and with enthusiastic and convinced faith, which remained henceforth the chief characteristic and impulse in his career.

He represented Cambridge in the Short and Long Parliaments of 1640, and at once showed extraordinary zeal and audacity in his opposition to the government, taking a large _ share in business and serving on numerous and im- well’s portant committees. As the cousin of Hampden and first St. John he was intimately associated with the leaders P”riia- of the parliamentary party. His sphere of action, TttortsT however, was not in parliament. He was not an orator, and though he could express himself forcibly on occasion, his speech was incoherent and devoid of any of the arts of rhetoric. Clarendon notes on his first appearance in parliament that ” he seemed to have a person in no degree gracious, no ornament of discourse, none of those talents which use to recon- cile the affections of the standers by; yet as he grew into place and authority his parts seemed to be renewed.” He supported stoutly the extreme party of opposition to the king, but did not take the lead except on a few less important occasions, and was

apparently silent in the debates on the Petition of Right, the Grand Remonstrance and the Militia. His first recorded in- tervention in debate in the Long Parliament was on the gth of November 1640, a few days after the meeting of the House, when he delivered a petition from the imprisoned John Lilburne. He was described by Sir Philip Warwick on this occasion: — ” I came into the House one morning well clad and perceived a gentleman speaking whom I knew not, very ordinarily apparelled; for it was a plain cloth suit which seemed to have been made by an ill country tailor; his linen was plain and not very clean; . . . his stature was of a good size; his sword stuck close to his side; his countenance swollen and reddish; his voice sharp and untunable and his eloquence full of fervour … I sincerely profess it much lessened my reverence as to that great council for he was very’much hearkened unto.” On the 30th of December he moved to the second reading of Strode’s bill for annual parlia- ments. His chief interest from the first, however, lay in the re- ligious question. He belonged to the Root and Branch party, and spoke in favour of the petition of the London citizens for the abolition of episcopacy on the 9th of February 1641, and pressed upon the House the Root and Branch Bill in May. On the 6th of November he carried a motion entrusting the train-bands south of the Trent to the command of the earl of Essex. On the 14th of January 1642, after the king’s attempt to seize the five members, he moved for a committee to put the kingdom in a

posture of defence. He contributed £600 to the proposed Irish campaign and £500 for raising forces in England — large sums from his small estate — and on his own initiative in July 1642 sent arms of the value of £100 down to Cambridge, seized the magazine there in August, and prevented the king’s commission of array from being executed in the county, taking these important steps on his own authority and receiving subsequently indemnity by vote of the House of Commons. Shortly afterwards he joined Essex with sixty horse, and was present at Edgehill, where his troop was one of the few not routed by Rupert’s charge, Cromwell himself being mentioned among those officers who ” never stirred from their troops but fought till the last minute.”

During the earlier part of the year 1643 the military position of Charles was greatly superior to that of the parliament. Essex

was inactive near Oxford; in the west Sir Ralph Be . gln ~ . Hopton had won a series of victories, and in the north Civa war. Newcastle defeated the Fairfaxes at Adwalton Moor,

and all Yorkshire except Hull was in his hands. It seemed likely that the whole of the north would be laid open and the royalists be able to march upon London and join Charles and Hopton there. This stroke, which would most probably have given the victory to the king, was prevented by the ” Eastern Association,” a union of Norfolk, Suffolk, Essex, Cambridgeshire and Hertfordshire, constituted in December 1642 and augmented in 1643 by Huntingdonshire and Lincolnshire, of which Crom- well was the leading spirit. His zeal and energy met everywhere with conspicuous success. In January 1643 he seized the royalist high sheriff of Hertfordshire in the act of proclaiming the king’s commission of array at St Albans; in February he was at Cambridge taking measures for the defence of the town; in March suppressing royalist risings at Lowestoft and Lynn; in April those of Huntingdon, when he also recaptured Crowland from the king’s party. In May he defeated a greatly superior royalist force at Grantham, proceeding afterwards to Nottingham in accordance with Essex’s plan of penetrating into Yorkshire to relieve the Fairfaxes; where, however, difficulties, arising from jealousies between the officers, and the treachery of John Hotham, whose arrest Cromwell was instrumental in effecting, obliged him to retire again to the association, leaving the Fairfaxes to be defeated at Adwalton Moor. He showed extraordinary energy, resource and military talent in stemming the advance of the royalists, who now followed up their victories by advancing into the association; he defeated them at Gainsborough on the 28th of July, and managed a masterly retreat before over- whelming numbers to Lincoln, while the victory on the nth of October at Winceby finally secured the association, and main- tained the wedge which prevented the junction of the royalists in the north with the king in the south.

One great source of Cromwell’s strength was the military reforms he had initiated. At Edgehill he had observed the

inferiority of the parliamentary to the royalist horse,

w” composed as it was of soldiers of fortune and the dregs

soldiers, of the populace. ” Do you think,” he had said, ” that

the spirits of such base, mean fellows will ever be able to encounter gentlemen that have honour and courage and resolution in them? You must get men of a spirit that is likely to go as far as gentlemen will go

or you will be beaten still.” The royalists were fighting for a great cause. To succeed the parliamentary soldiers must also be inspired by some great principle, and this was now found in religion. Cromwell chose his own troops, both officers and privates, from the ” religious men,” who fought not for pay or for adventure, but for their faith. He declared, when answering a complaint that a certain captain in his regiment was a better preacher than fighter, that he who prayed best would fight best, and that he knew nothing could ” give the like courage and confidence as the knowledge of God in Christ will.” The superiority of these men — more intelligent than the common soldiers, better disciplined, better trained, better armed, excellent horsemen and fighting for a great cause — not only over the other parliamentary troops but over the royalists, was soon observed in battle. According to Clarendon the latter, though frequently victorious in a charge,

could not rally afterwards, ” whereas Cromwell’s troops if they prevailed, or though they were beaten and routed, presently rallied again and stood in good order till they received new orders “; and the king’s military successes dwindled in pro- portion to the gradual preponderance of Cromwell’s troops in the parliamentary army. At first these picked men only existed in Cromwell’s own troop, which, however, by frequent additions became the nucleus of a regiment, and by the time of the New Model included about 11,000 men.

In July 1643 Cromwell had been appointed governor of the Isle of Ely; on the 22nd of January 1644 he became second in command under the earl of Manchester as lieutenant-general of the Eastern Association, and on the 16th of February 1644 a member of the Committee of Both Kingdoms with greatly increased influence. In March he took Hillesden House in Buckinghamshire; in May was at the siege of Lincoln, when he repulsed Goring’s attempt to relieve the town, and subsequently took part in Manchester’s campaign in the north. At Marston Moor {q.v.) on the 2nd of July he commanded all the horse of the Eastern Association, with some Scottish troops; and though for a time disabled by a wound in the neck, he charged and routed Rupert’s troops opposed to him, and subsequently went to the support of the Scots, who were hard pressed by the enemy, and converted what appeared at one time a defeat into a decisive victory. It was on this occasion that he earned the nickname of ” Ironsides,” applied to him now by Prince Rupert, and afterwards to his soldiers, ” from the impenetrable strength of his troops which could by no means be broken or divided.”

The movements of Manchester after Marston Moor were marked by

great apathy. He was one of the moderate party who desired an accommodation with the king, and was opposed to Cromwell's sectaries. He remained at Lincoln, did nothing to prevent the defeat of Essex's army in the west, and when he at last advanced south to join Essex's and Waller's troops his management of the army led to the failure of the attack upon the king at Newbury on the 27th of October 1644. He delayed supporting the infantry till too late, and was repulsed; he allowed the royal army to march past his outposts; and a fortnight afterwards, without any attempt to prevent it, and greatly to Cromwell's vexation, permitted the moving of the king's artillery and the relief of Donnington Castle by Prince Rupert. " If you beat the king ninety-nine times," Manchester urged at Newbury, " yet he is king still and so will his posterity be after him; but if the king beat us once we shall all be hanged and our posterity be made slaves." " My lord," answered Cromwell, " if this be so, why did we take up arms at first? This is against fighting ever hereafter. If so let us make peace, be it ever so base." The contention brought to a crisis the struggle between the moderate Presbyterians and the Scots on the one side, who decided to maintain the monarchy and fought for an accommodation and to establish Presbyterianism in England, and on the other the republicans who would be satisfied with nothing less than the complete overthrow of the king, and the Independents who regarded the establishment of Presbyterianism as an evil almost as great as that of the Church of England. On the 25th of November Cromwell charged Manchester with " unwillingness to have the war prosecuted to a full victory"; which Manchester answered by accusing Cromwell of having used expressions against the nobility, the Scots and Presbyterianism; of desiring to fill the army of the Eastern Association with Independents to prevent any accom- modation; and of having vowed if he met the king in battle he would as lief fire his pistol at him as at anybody else. The lords and the Scots vehemently took Manchester's part; but the Commons eventually sided with Cromwell, appointed Sir Thomas Fairfax general of the New Model Army, and passed two self-denying ordinances, the second of which, ordering all members of both houses to lay down their commissions within forty days, was accepted by the lords on the 3rd of April 1645.

Meanwhile Cromwell had been ordered on the 3rd of March by the House to take his regiment to the assistance of Waller, under whom he served as an admirable subordinate. " Although

he was blunt," says Waller, " he did not bear himself with pride or disdain. As an officer he was obedient and did never dispute my orders or argue upon them." He returned on the 19th of April, and on the 23rd was sent to Oxfordshire to prevent a junction between Charles and Prince Rupert, in which he succeeded after some small engagements and the storming of Blechingdon House. His services were felt to be too valuable to be lost, and on the 10th of May his command was prolonged for forty days. On the 28th he was sent to Ely for the defence of the eastern counties against the king's advance; and on the 10th of June, upon Fairfax's petition, he was named by ˆhe Commons lieutenant-general, joining Fairfax on the 13th with six hundred horse. At the decisive battle of Naseby (the 14th of June 1645) he commanded the parliamentary right *** wing and routed the cavalry of Sir Marmaduke Lang-

Naseby. dale, subsequently falling upon and defeating the royalist centre, and pursuing the fugitives as far as the outskirts of Leicester. At Langport again, on the 10th of July 1645, hi s management of the troops was largely instru- mental in gaining the victory. As the king had no longer a field army, the war after Naseby resolved itself into a series of sieges which Charles had no means of raising. Cromwell was present at the sieges of Bridgwater, Bath, Sherborne and Bristol; and later, in command of four regiments of foot and three of horse, he was employed in clearing Wiltshire and Hampshire of the royalist garrisons. He took Devizes and Laycock House, Winchester and Basing House, and rejoined Fairfax in October at Exeter, and accompanied him to Cornwall, where he assisted in the defeat of Hopton's forces and in the suppression of the royalists in the west. On the 9th of January 1646 he surprised Lord Wentworth's brigade at Bovey Tracey, and was present with Fairfax at the fall of Exeter on the 9th of April. He then went to London to give an account of proceedings to the parlia- ment, was thanked for his services and rewarded with the estate of f he marquess of Worcester. He was present again with Fairfax at the capitulation of Oxford on the 24th of June, which practically terminated the Civil War, when he used his influence in favour of granting lenient terms. He then removed with his family from Ely to Drury Lane, London, and about a year later to King Street, Westminster.

The war being now over, the great question of the establish- ment of Presbyterianism or Independency had to be decided. Cromwell, without naming himself an adherent of any denomina- tion, fought vigorously for Independency as a policy. In 1644 he had remonstrated at the removal by Crawford of an ana- baptist lieutenant-colonel. " The state," he said, "in choosing men to serve it, takes no notice of

their opinions. If they be willing faithfully to serve it, that satisfies. Take heed of being sharp . . . against those to whom you can object little but that they square not with you in every opinion concerning matters of religion." He had patronized Lilburne and welcomed all into his regiment, and the Independents had spread from his troops throughout the whole army. But while the sectarians were in a vast majority in the army, the parliament was equally strong in Presbyterianism and opposed to toleration. The proposed disbandment of the army in February 1647 would have placed the soldiers entirely in the power of the parliament; while the negotiations of the king, first with the Scots and then with the parliament, appeared to hazard all the fruits of victory. The petition from the army to the parliament for arrears of pay was suppressed and the petitioners declared enemies of the state. In consequence the army organized a systematic opposition, and elected representatives styled Agitators or Agents to urge their claims.

Cromwell, though greatly disliking the policy of the Presby- terians, yet gave little support at first to the army in resisting parliament. In May 1647 in company with Skippon,

ar f* . Ireton and Fleetwood, he visited the army, inquired went and . ‘
, , ,

the army. ln ^° an d reported on the grievances, and endeavoured

to persuade them to submit to the parliament. " If

that authority falls to nothing," he said, " nothing can follow

but confusion." The Presbyterians, however, now engaged in

a plan for restoring the king under their own control, and by the means of a Scottish army, forced on their policy, and on the 27th of May ordered the immediate disbandment of the army, without any guarantee for the payment of arrears. A mutiny was the consequence. The soldiers refused to disband, and on the 3rd of June Cromwell, whom, it was believed, the parliament intended to arrest, joined the army. "If he would not forthwith come and lead them," they had told him, " they would go their own way without him." The supremacy of the army without a guiding hand meant anarchy, that of the Presbyterians the outbreak of another civil war.

Possession of the king's person now became an important consideration. On the 31st of May 1647 Cromwell had ordered Cornet Joyce to prevent the king's removal by the parliament or the Scots

from Holmby, and Joyce by his own authority and with the king's consent brought him to Newmarket to the headquarters of the army. Cromwell soon restored order, and the representative council, including privates as well as officers chosen to negotiate with the parliament, was subordinated to the council of war. The army with Cromwell then advanced towards London. In a letter to the city, possibly written by Cromwell himself, the officers repudiated any wish to alter the civil government or upset the establishment of Presbyterianism, but demanded religious toleration. Subsequently, in the declaration of the 14th of June, arbitrary power either in the parliament or in the king was denounced, and demand was made for a representative parliament, the speedy termination of the actual assembly, and the recognition of the right to petition. Cromwell used his influence in restraining the more eager who wished to march on London immediately, and in avoiding the use of force by which nothing permanent could be effected, urging that " whatsoever we get by treaty will be firm and dur- able. It will be conveyed over to posterity." The army faction gradually gathered strength in the parliament. Eleven Presby- terian leaders impeached by the army withdrew of their own accord on the 26th of June, and the parliament finally yielded. Fairfax was appointed sole commander-in-chief on the 19th of July, the soldiers levied to oppose the army were dismissed, and the command of the city militia was again restored to the committee approved by the army. These votes, however, were cancelled later, on the 26th of July, under the pressure of the royalist city mob which invaded the two Houses; but the two speakers, with eight peers and fifty-seven members of the Commons, themselves joined the army, which now advanced to London, overawing all resistance, escorting the fugitive members in triumph to Westminster on the 6th of August, and obliging the parliament on the 20th to cancel the last votes, with the threat of a regiment of cavalry drawn up by Cromwell in Hyde Park.

Cromwell and the army now turned with hopes of a settlement to Charles. On the 4th of July Cromwell had had an interview with the king at Caversham. He was not insensible to Charles's good qualities, was touched by the paternal affection he showed for his children, and is said to have declared that Charles " was the uprightest and most conscientious man of his three kingdoms." The Heads of the Proposals, which, on Charles raising objections, had been modified by the influence of Cromwell and Ireton, demanded the control of the militia and the choice of ministers by parliament for ten years, a religious toleration, and a council of state to which much of the royal control over the army and foreign policy would be delegated. These proposals

without doubt largely diminished the royal power, and were rejected by Charles with the hope of maintaining his sovereign rights by ” playing a game,” to use his own words, i.e. by negotiating simultaneously with army and parliament, by inflaming their jealousies and differences, and finally by these means securing his restoration with his full prerogatives unimpaired. On the 9th of September Charles refused once mere the Newcastle Propositions offered him by the parliament, and Cromwell, together with Ireton and Vane, obtained the passing of a motion for a new application; but the terms asked by the parliament were higher than before and included a harsh condition — the

exclusion from pardon of all the king’s leading adherents, besides the indefinite establishment of Presbyterianism and the refusal of toleration to the Roman Catholics and members of the Church of England.

Meanwhile the failure to come to terms with Charles and provide a settlement appeared to threaten a general anarchy. Cromwell’s moderate counsels created distrust in his good faith amongst the soldiers, who accused him of ” prostituting the liberties and persons of all the people at the foot of the king’s interest.” The agitators demanded immediate settlement by force by the army. The extreme republicans, anticipating Rousseau, put forward the Agreement of the People. This was strongly opposed by Cromwell, who declared the very considera- tion of it had dangers, that it would bring upon the country ” utter confusion ” and ” make England like Switzerland.” Universal suffrage he rejected as tending ” very much to anarchy,” spoke against the hasty abolition of either the monarchy or the Lords, and refused entirely to consider the abstract principles brought into the debate. Political problems were not to be so resolved, but practically. With Cromwell as with Burke the question was ” whether the spirit of the people of this nation is prepared to go along with it.” The special form of government was not the important point, but its possi- bility and its acceptability. The great problem was to found a stable government, an authority to keep order. If every man should fight for the best form of government the state would come to desolation. He reproached the soldiers for their in- subordination against their officers, and the army for its rebellion against the parliament. He would lay hold of anything ” if it had but the force of authority,” rather than have none. Cromwell’s influence prevailed and

these extreme proposals were laid aside.

Meanwhile all hopes of an accommodation with Charles were dispelled by his flight on the nth of November from Hampton Court to Carisbroke Castle in the Isle of Wight, his /&' object being to negotiate independently with the king. Scots, the parliament and the army. His action,

however, in the event, diminished rather than increased his chances of success, owing to the distrust of his intentions which it inspired. Both the army and the parliament gave cold replies to his offers to negotiate; and Charles, on the 27th of December 1647, entered into the Engagement with the Scots by which he promised the establishment of Presbyterianism for three years, the suppression of the Independents and their sects, together with privileges for the Scottish nobles, while the Scots undertook to invade England and restore him to his throne. This alliance, though the exact terms were not known to Cromwell — " the attempt to vassalize us to a foreign nation," to use his own words — convinced him of the uselessness of any plan for maintaining Charles on the throne; though he still appears to have clung to monarchy, proposing in January 1648 the trans- ference of the crown to the prince of Wales. A week after the signing of the treaty he supported a proposal for the king's deposition, and the vote of No Addresses was carried. Meanwhile the position of Charles's opponents had been considerably strengthened by the suppression of a dangerous rebellion in November 1647 by Cromwell's intervention, and by the return of troops to obedience. Cromwell's difficulties, however, were immense. His moderate and trimming attitude was understood neither by the extreme Independents nor by the Presbyterians. He made one attempt to reconcile the disputes between the army and the politicians by a conference, but ended the barren dis- cussion on the relative merits of aristocracies, monarchies and democracies, interspersed with Bible texts, by throwing a cushion at the speaker's head and running downstairs. On the 19th of January 1648 Cromwell was accused of high treason by Lilburne. Plots were formed for his assassination. He was overtaken by a dangerous illness, and on the 2nd of March civil war in support of the king broke out.

Cromwell left London in May to suppress the royalists in Wales, and took Pembroke Castle on the 11th of July. Meanwhile behind his back the royalists had risen all over England, the

fleet in the Downs had declared for Charles, and the Scottish army under Hamilton had invaded the north. Immediately on the fall of Pembroke Cromwell set out to relieve Lambert, who was slowly

retreating before Hamilton's superior forces; he joined him near Knaresborough on the 12th of August, and started next day in pursuit of Hamilton in Lancashire, placing himself at Stonyhurst near Preston, cutting off Hamilton from the north and his allies, and defeating him in detail on the 17th, 18th and 19th at Preston and at Warrington. He then marched north into Scotland, following the forces of Monro, and established a new government of the Argyle faction at Edinburgh; replying to the Independents who disapproved of his mild treatment of the Presbyterians, that he desired " union and right understanding between the godly people, Scots, English, Jews, Gentiles, Presbyterians, Anabaptists and all; ... a more glorious work in our eyes than if we had gotten the sacking and plunder of Edinburgh . . . and made a con- quest from the Tweed to the Orcades."

The incident of the Second Civil War and the treaty with the Scots exasperated Cromwell against the king. On his return to London he found the parliament again negotiating Cromwell with Charles, and on the eve of making a treaty which supports Charles himself had no intention of keeping and the regarded merely as a means of regaining his power, R " noa – and which would have thrown away in one moment all the advantages gained during years of bloodshed and struggle. Cromwell therefore did not hesitate to join the army in its opposition to the parliament, and supported the Remonstrance of the troops (20th of November 1648), which included the demand for the king's punishment as " the grand author of all our troubles," and justified the use of force by the army if other means failed. The parliament, however, continued to negotiate, and accordingly Charles was removed by the army to Hurst Castle on the 1st of December, the troops occupied London on the 2nd; while on the 6th and 7th Colonel Pride " purged " the House of Commons of the Presbyterians. Cromwell was not the originator of this act, but showed his approval of it by taking his seat among the fifty or sixty Independent members who remained.

The disposal of the king was now the great question to be decided. During the next few weeks Cromwell appears to have made once more attempts to come to terms with Charles; but the king was inflexible in his refusal to part with the essential powers of the monarchy, or with the Church; and at the end of December it was resolved to bring him to trial. The exact share which Cromwell had in this decision and its sequel is obscure, and the later accounts of the regicides when on their trial at the Restoration, ascribing the whole transaction to his initiation and agency, cannot be altogether accepted. But it is plain that, once convinced of the necessity for the king's execution, he was the chief instrument in overcoming all scruples among his judges, and

in resisting the protests and appeals of the Scots. To Algernon Sidney, who refused to take part in proceedings on the plea that neither the king nor any man could be tried by such a court, Cromwell replied, ” I tell you, we will cutoff his head with the crown upon it.”

The execution of the king took place on the 30th of January 1649. This event, the turning-point in Cromwell’s career, casts a shadow, from one point of view, over the whole of The his future statesmanship. He himself never repented execution of the act, regarding it, on the contrary, as “one which °* Christians in after times will mention with honour and all tyrants in the world look at with fear,” and as one directly ordained by God. Opinions, no doubt, will always differ as to the wisdom or authority of the policy which brought Charles to the scaffold. On the one hand, there was no law except that of force by which an offence could be attributed to the sovereign, the anointed king, the source of justice. The ordinance estab- lishing the special tribunal for the trial was passed by a remnant of the House of Commons alone, from which all dissentients were excluded by the army. The tribunal was composed, not of judges- — for all unanimously refused to sit on it — but of

fifty-two men drawn from among the king’s enemies. The execution was a military and not a national act, and at the last scene on the scaffold the triumphant shouts of the soldiery could not overwhelm the groans and sobs raised by the populace. Whatever crimes might be charged against Charles, his past conduct might appear to be condoned by the act of negotiating with him. On the other hand, the execution seemed to Cromwell the only alternative to anarchy, or to a return to despotism and the abandonment of all they had fought for. Cromwell had exhausted every expedient for arriving at an arrangement with the king by which the royal authority might be preserved, and the repeated perfidy and inexhaustible shiftiness of Charles had proved the hopelessness of such attempts. The results produced by the king’s execution were far-reaching and permanent. It is true that Puritan austerity and the lack of any strong central authority after Oliver’s death produced a reaction which temporarily restored Charles’s dynasty to the throne; but it is not less true that the execution of the king, at a later time when all over Europe absolute monarchies ” by divine right” were being established on the ruins of the ancient popular constitu- tions, was an object lesson to all the world; and it produced a profound effect, not only in establishing

constitutional monarchy in Great Britain after James II., with the dread of his father's fate before him, had abdicated by flight, but in giving the impulse to that revolt against the idea of " the divinity that doth hedge a king " which culminated in the Revolution of 1789, and of which the mighty effects are still evident in Europe and beyond.

The king and the monarchy being now destroyed in England, Cromwell had next to turn his attention to the suppression of Cromwell royalism in Ireland and in Scotland. In Ireland la Ormonde had succeeded in uniting the English and the

Ireland. Irish in a league against the supporters of the parlia- ment, and only a few scattered forts held out for the Commonwealth, while the young king was every day expected to land and complete the conquest of the island. Accordingly in March 1649 Cromwell was appointed lord-lieutenant and com- mander-in-chief for its reduction. But before starting he was called upon to suppress disorder at home. He treated the Levellers with some severity and showed his instinctive dislike to revolutionary proposals. " Did not that levelling principle," he said, " tend to the reducing of all to an equality? What was the purport of it but to make the tenant as liberal a fortune as the landlord, which I think if obtained would not have lasted long." Equally characteristic was his treatment of the mutinous army, in which he suppressed a rebellion in May. He landed at Dublin on the 13th of August. Before his arrival the Dublin garrison had defeated Ormonde with a loss of 5000 men, and Cromwell's work was limited to the capture of detached fortresses. On the 10th of September he stormed Drogheda, and by his order the whole of its 2800 defenders were put to the sword without quarter. Cromwell, who was as a rule especially scrupulous in protecting non-combatants from violence, justified his severity in this case by the cruelties perpetrated by the Irish in the rebellion of 1641, and as being necessary on military and political grounds in that it " would tend to prevent the effusion of blood for the future, which were the satisfactory grounds of such actions which otherwise cannot but work remorse and regret." After the fall of Drogheda Cromwell sent a few troops to relieve Londonderry, and marched himself to Wexford, which he took on the nth of October, and where similar scenes of cruelty were repeated; every captured priest, to use Cromwell's own words, being immediately " knocked on the head," though the story of the three hundred women slaughtered in the market-place has no foundation.

The surrender of Trim, Dundalk and Ross followed, but at Waterford Cromwell met with a stubborn resistance and the advent of winter obliged him to raise the siege. Next year Cromwell penetrated into

Munster. Cashel, Cahir and several castles fell in February, and Kilkenny in March; Clonmel repulsing the assault with great loss, but surrendering on the 10th of May 1650. Cromwell himself sailed a fortnight later,

leaving the reduction of the island, which was completed in 1652, to his generals. The re-settlement of the conquered and devastated country was now organized on the Tudor and Straf- fordian basis of colonization from England, conversion to Pro- testantism, and establishment of law and order. Cromwell thoroughly approved of the enormous scheme of confiscation and colonization, causing great privations and sufferings, which was carried out. The Roman Catholic landowners lost their estates, all or part according to their degree of guilt, and these were distributed among Cromwell's soldiers and the creditors of the government; Cromwell also invited new settlers from home and from New England, two-thirds of the whole land of Ireland being thus transferred to new proprietors. The sup- pression of Roman Catholicism was zealously pursued by Cromwell; the priests were hunted down and imprisoned or exiled to Spain or Barbados, the mass was everywhere forbidden, and the only liberty allowed was that of conscience, the Romanist not being obliged to attend Protestant services.

These methods, together with education, " assiduous preaching . . . humanity, good life, equal and honest dealing with men of different opinion," Cromwell thought, would convert the whole island to Protestantism. The law was ably and justly ad- ministered, and Irish trade was admitted to the same privileges as English, enjoying the same rights in foreign and colonial trade; and no attempt was made to subordinate the interests of the former to the latter, which was the policy adopted both before and after Cromwell's time, while the union of Irish and English interests was further recognized by the Irish representation at Westminster in the parliaments of 1654, 1656 and 1659. These advantages, however, scarcely benefited at all the Irish Roman Catholics, who were excluded from political life and from the corporate towns; and Cromwell's union meant little more than the union of the English colony in Ireland with England. A just administration, too, did not compensate for unjust laws or produce contentment; the policy of conversion and coloniza- tion was unsuccessful, the descendants of many of Cromwell's soldiers becoming merged in the Roman Catholic Irish, and the union with England, political and commercial, being extinguished at the Restoration. Cromwell's land settlement — modified by the restoration under Charles II. of about one-third of the estates to the royalists — survived, and added to the difficulties with which the English

government was afterwards confronted in Ireland.

Meanwhile Cromwell had hurried home to deal with the royalists in Scotland. He urged Fairfax to attack the Scots at once in their own country and to forestall their _. invasion; but Fairfax refused and resigned, and battles of Cromwell was appointed by parliament, on the 26th Dunbar of Tune 1650, commander-in-chief of all the forces a ” d of the Commonwealth. He entered Scotland in July, and after a campaign in the neighbourhood of Edinburgh which proved unsuccessful in drawing out the Scots from their fortresses, he retreated to Dunbar to await reinforcements from Berwick. The Scots under Leslie followed him, occupied Doon Hill com- manding the town, and seized the passes between Dunbar and Berwick which Cromwell had omitted to secure. Cromwell was outmanoeuvred and in a perilous situation, completely cut off from England and from his supplies except from the sea. But Leslie descended the hill to complete his triumph, and Cromwell immediately observed the disadvantages of his antagonist’s new position, cramped by the hill behind and separated from his left wing. A stubborn struggle on the next day, the 3rd of September, gave Cromwell a decisive victory. Advancing, he occupied Edinburgh and Leith. At first it seemed likely that his victories and subsequent remonstrances would effect a peace with the Scots; but by 1651 Charles II. had succeeded in forming a new union of royalists and presbyterians, and another campaign became inevitable. Some delay was caused in beginning opera- tions by Cromwell’s dangerous illness, during which his life was despaired of; but in June he was confronting Leslie entrenched in the hills near Stirling, impregnable to attack and refusing an engagement. Cromwell determined to turn his antagonist’s

position. He sent 14,000 men into Fifeshire and marched to Perth, which he captured on the 2nd of August, thus cutting off Leslie from the north and his supplies. This movement, however, left open the way to England, and Charles immediately marched south, in reality thus giving Cromwell the wished-for opportunity of crushing the royalists finally and decisively. Cromwell followed through Yorkshire, and uniting with Lambert and Harrison at Evesham proceeded to attack the royalists at Worcester; where on the 3rd of September after a fierce struggle the great victory, ” the crowning mercy ” which terminated the Civil War, was obtained over Charles.

Monk completed the subjugation of Scotland by 1654. The settlement here was made on more moderate lines than in Ireland. The estates of only twenty-four leaders of the defeated cause were forfeited by Cromwell, and the national church was left untouched though deprived of all powers of interference with the civil government, the general assembly being dissolved in 1653. Large steps were made towards the union of the two kingdoms by the representation of Scotland in the parliament at West- minster; free trade between the two countries was established, the administration of justice greatly improved, vassalage and heritable jurisdictions abolished, and security and good order maintained by the council of nine appointed by the Protector. In 1658 the improved condition of Scotland was the subject of Cromwell's special congratulation in addressing parliament. But as in Ireland so Cromwell's policy in Scotland was unpopular and was only upheld by the maintenance of a large army, necessitating heavy taxation and implying the loss of the national independence. It also vanished at the Restoration.

On the 12th of September 1651 Cromwell made his triumphal entry into London at the conclusion of his victorious campaigns; and parliament granted him Hampton Court as a residence with £4000 a year. These triumphs, however, had all been obtained by force of arms; the more difficult task now awaited Cromwell of governing England by parliament and by law. As Milton wrote: —

" Cromwell! our chief of men, who through a cloud Not of war only, but detractions rude, Guided by faith and matchless fortitude, To peace and truth thy glorious way hast ploughed,

. . . Peace hath her victories No less renowned than war.”

Cromwell’s moderation and freedom from imperiousness were acknowledged even by those least friendly to his principles. Although the idol of his victorious army, and in a position enabling him to exercise autocratic power, he laboured un- ostentatiously for more than a year and a half as a member of the parliament, whose authority he supported to the best of his ability. While occupied with work on committees and in administration he pressed forward several schemes of reform, including a large measure of law reform prepared by a commission presided over by Matthew Hale, and the settlement of the church; but very little was accomplished by the parliament, which seemed to be almost exclusively taken up with the maintenance and increase of its own powers; and Cromwell’s dissatisfaction, and that of the army which increased every day, was intensified by the knowledge that the parliament, instead of dissolving for a new election, was seeking to perpetuate its tenure of power. At length, in April 1653, a ” bill for a new representation ” was discussed, which provided for the retention of their seats by the existing members without re-election, so that they would also be the sole judges of the eligibility of the rest. This measure, which placed the whole powers of the state — ■ executive, legislative, military and judicial — in the hands of one irresponsible and permanent chamber, ” the horridest arbitrariness that ever was exercised in the world,” Cromwell and the army determined to resist at all costs. On the 1 5th of April they proposed that the parliament should appoint a provisional government and dissolve itself. This compromise was refused by the parliament, which proceeded on the 20th to press through its last stages the ” bill for a new representation.” Cromwell hastened to the House, and at the last moment, on

the bill being put to the vote, whispering to Harrison. ” This is the time; I must do it,” he rose, and after alluding to the former good services of the parliament, proceeded to Cromwell overwhelm the members with reproaches. Striding up expels and down the House in a passion, he made no attempt <*« L°»g to control himself, and turning towards individuals Par,la – as he hurled significant epithets at each, he called men some " whoremasters," others " drunkards, corrupt, unjust, scandalous to the profession of the Gospel." " Perhaps you think," he exclaimed, " that this is not parliamentary language; I confess it is not, neither are you to expect any such from me." In reply to a complaint of his violence he cried, " Come, come, I will put an end to your prating. You are no parliament, I say you are no parliament. I will put an end to your sitting." By his directions

Harrison then fetched in a small band of Cromwell's musketeers and compelled the speaker Lenthall to vacate the chair. Looking at the mace he said, " What shall we do with this bauble?" and ordered a soldier to take it away. The members then trooped out, Cromwell crying after them, "It is you that have forced me to this; for I have sought the Lord night and day that He would rather slay me than put me upon the doing this work." He then snatched the obnoxious bill from the clerk, put it under his cloak, and commanding the doors to be locked went back to Whitehall. In the afternoon he dissolved the council in spite of John Bradshaw's re- monstrances, who said, " Sir, we have heard what you did at the House this morning . . . ; but you are mistaken to think that the parliament is dissolved, for no power under heaven can dissolve them but themselves; therefore take you notice of that." Cromwell had no patience with formal pedantry of this sort; and in point of strict legality " The Rump " of the Long Parliament had little better title to authority than the officers who expelled it from the House. After this Cromwell had nothing left but the army with which to govern, and " henceforth his life was a vain attempt to clothe that force in constitutional forms, and make it seem something else so that it might become something else." 1

By the dissolution of the Long Parliament Cromwell as commander-in-chief was left the sole authority in the state. He determined immediately to summon another parliament. This was the” Little “or” Barebones Parliament,” consisting of one hundred and forty persons selected by the council of officers from among those nominated by the congregations in each county, which met on the 4th of July 1653. This assembly, however, soon showed itself impracticable and incapable, and on the 12 th of December the speaker, followed by the more moderate members, marched to Whitehall and returned their powers to Cromwell, while the rest were expelled by the army.

Cromwell, who had no desire to exercise arbitrary power and whose main object therefore was to devise some constitu- tional limit to the authority which circumstances had placed in his hands, now accepted the written constitution drawn up by some of the officers, called the Instrument of Government, the earliest example of a ” fixed government ” based on ” funda- mentals,” or constitutional guarantees, and the only example of it in English history. Its authors had wished Oliver to assume the title of king, but this he repeatedly refused; and in the instrument he was named Protector, a parliament was estab- lished, limited in powers but whose measures were not restricted by the Protector’s veto unless they contravened the constitution, the Protector’s executive power being also limited by the council. The Protector and the council together were given a life

tenure of office, with a large army and a settled revenue sufficient for public needs in time of peace; while the clauses relating to religion " are remarkable as laying down for the first time with authority a principle of toleration," 2 though this toleration did not apply to Roman Catholics and Anglicans. On the 16th of December 1653 Cromwell was installed in his new office, dressed as a civilian in a plain black coat instead of in scarlet as a general, in order

1 C. H. Firth, Cromwell, p. 324. 2 John Morley, Oliver Cromwell, p. 393.

to demonstrate that military government had given place to civil; for he approached his task in the same spirit that had prompted his declaration to the Little Parliament of his wish " to divest the sword of all power in the Civil ad- ministration."

In the interval between his nomination as Protector and the summoning of his first parliament in September 1654, Cromwell _. was empowered together with his council to legislate by

govern- ordinances; and eighty-two were issued in all, dealing meat of with numerous and various reforms and including the the reorganization of the treasury, the settlement

Protector. Qf Ireland and Scot i anc i anc j tne union of the three

kingdoms, the relief of poor prisoners, and the maintenance of the highways. These ordinances in many instances showed the hand of the true statesman. Cromwell was essentially a con- servative reformer; in his attempts to purge the court of chancery of its most flagrant abuses, and to settle the ecclesiastical affairs of the nation, he showed himself anxious to retain as much of the existing system as could be left untouched without doing positive evil. He was out-voted by his council on the question of commutation of tithes, and his enlightened zeal for reforming the " wicked and abominable " sentences of the criminal law met with complete failure. Most of these ordinances were subsequently confirmed by parliament, and, " on the whole, this body of dictatorial legislation, abnormal in form as it is, in substance was a real, wise and moderate set of reforms." 1 His ordinances for the " Reformation of Manners," the product of the puritan spirit, had but a transitory effect. The Long Parliament had ordered a strict observance of Sunday, punished swearing severely, and made adultery a capital

crime; Cromwell issued further ordinances against duelling, swearing, race- meetings and cock-fights — the last as tending to the disturbance of the public peace and the encouragement of ” dissolute practices to the dishonour of God.” Cromwell himself was no ascetic and saw no harm in honest sport. He was exceedingly fond of horses and hunting, leaping ditches prudently avoided by the foreign ambassadors. Baxter describes him as full of animal spirits, ” naturally of such a vivacity, hilarity and alacrity as another man is when he hath drunken a cup of wine too much,” and notes his ” familiar rustic carriage with his soldiers in sporting.” He was fond of music and of art, and kept statues in Hampton Court Gardens which scandalized good puritans. He preferred that Englishmen should be free rather than sober by compulsion. Writing to the Scottish clergy, and rejecting their claim to suppress dissent in order to extirpate error, he said, ” Your pretended fear lest error should step in is like the man who would keep all wine out of the country lest men should be drunk. It will be found an unjust and unwise jealousy to deprive a man of his natural liberty upon a sup- position he may abuse it. When he doth abuse it, judge.” It is probable that very little of this moral legislation was enforced in practice, though special efforts were made under the govern- ment of the major-generals. Cromwell expected more results from the effects of education and culture. A part of the revenue of confiscated church lands was allotted to the maintenance of schools, and the question of national education was seriously taken in hand by the Commonwealth. Cromwell was especially interested in the universities. In 1640 he had been elected D.C.L. at Oxford, and in 1651 chancellor of the University, an office which he held till 1657, when he was succeeded by his son Richard. He founded a new readership in Divinity, and pre- sented Greek MSS. to the Bodleian. He appointed visitors for the universities and great public schools, and defended the universities from the attacks of the extreme sectaries who clamoured for their abolition, even Clarendon allowing that Oxford ” yielded a harvest of extraordinary good and sound knowledge in all parts of learning.” In 1657 he founded a new university at Durham, which was suppressed at the Restoration. He patronized learning. Mil ton and Marvell were his secretaries. He allowed the royalists Hobbes and Cowley to return to England, and lived in friendship with the poet Waller.

‘Frederic Harrison, Oliver Cromwell, p. 214.

Cromwell’s religious policy’ included the maintenance of a national church, a policy acceptable to the army but much disliked by the Scots, who wanted the church to Crom- control the state, not the state the church. He well’s improved the incomes of poor livings by

revenues church derived from episcopal estates and the fines of delin- po cy ‘ quents. An important feature of his church government was the appointment on the 20th of March 1654 of the ” Triers,” thirty-eight clerical and lay commissioners, who decided upon the qualifications of candidates for livings, and without whose recommendation none could be appointed; while an ordinance of August 1654 provided for the removal of the unfit, the latter class including besides immoral persons those holding ” popish ” or blasphemous opinions, those publicly using the English Prayer Book, and the disaffected to the government. Religious toleration was granted, but with the important exception that some harsh measures were enacted against Anglicans and Roman Catholics, to neither of whom was liberty of worship accorded. The acts imposing fines for recusancy, repealed in 1650, were later executed with great severity. In 1655 a pro- clamation was issued for administering the laws against the priests and Jesuits, and some executions were carried out. Complete toleration in fact was only extended to Protestant nonconformists, who composed the Cromwellian established church, and who now meted out to their antagonists the same treatment which they themselves were later to receive under the Clarendon Code of Charles II.

Cromwell himself, however, remained throughout a staunch and constant upholder of religious toleration. ” I had rather that Mahommedanism were permitted amongst us,” Hls he avowed, ” than that one of God’s children should religious be persecuted.” Far in advance of his contemporaries toiera- on this question, whenever his personal action is on ‘ disclosed it is invariably on the side of forbearance and of moderation. It is probable, from the absence of evidence to the contrary, that much of this severe legislation was never executed, and it was without doubt Cromwell’s restraining hand which moderated the narrow persecuting spirit of the executive. In practice Anglican private worship appears to have been little interfered with; and although the recusant fines were rigorously exacted, the same seems to have been the case with the private celebration of the mass. Bordeaux, the French envoy in England, wrote that, in spite of the severe laws, the Romanists received better treatment under the Protectorate than under any other government. Cromwell’s strong personal inclination towards toleration is clearly seen in his treatment of the Jews and Quakers. He was unable, owing to the opposition of the divines and of the merchants, to secure the full recognition of the right to reside in England of the former who had for some time lived in small numbers and traded unnoticed and untroubled in the country; but he obtained an opinion from two judges that there was no law which forbade their return, and he gave

them a private assurance of his protection, with leave to celebrate their private worship and to possess a cemetery.

Cromwell's policy in this instance was not overturned at the Restoration, and the great Jewish immigration into England with all its important consequences may be held to date practi- cally from these first concessions made by Cromwell. His personal intervention also alleviated the condition of the Quakers, much persecuted at this time. In an interview in 1654 the sincerity and enthusiasm of George Fox had greatly moved Cromwell and had convinced him of theirfreedom from dangerous political schemes. He ordered Fox's liberation, and in November 1657 issued a general order directing that Quakers should be treated with leniency, and be discharged from confinement. Doctrines directly attacking Christianity Cromwell regarded, indeed, as outside toleration and to be punished by the civil power, but at the same time he mitigated the severity of the penalty ordained by the law. In general the toleration enjoyed under Cromwell was probably far larger than at any period since religion became the contending ground of political parties, and certainly greater than under his immediate successors.

Lilburne and the anabaptists, and John Rogers and the Fifth Monarchy men, were prosecuted only on account of their direct attacks upon the government, and Cromwell in his broad- minded and tolerant statesmanship was himself in advance of his age and his administration. He believed in the spiritual and unseen rather than in the outward and visible unity of Christendom.

In foreign policy Cromwell's chief aims appear to have been to support and extend the Protestant faith, to promote English

trade, and to prevent a Stuart restoration by foreign po/fey!" a id — tne religious mission of England in the world,

her commercial interests, and her political independence being indissolubly connected in his mind. The beginning of his rule inherited a war with France and Holland; the former con- sequent on Cromwell's failure to obtain terms for the Huguenots or the cession of Dunkirk, and the latter — for which he was not responsible — the result of commercial rivalry, of disputes concern- ing the rights of neutrals, of bitter memories of Dutch misdeeds in the East Indies, and

of dynastic causes arising from the stadt- holder, William II. of Orange, having married Mary, daughter of Charles I. In 1651 the Dutch completed a treaty with Den- mark to injure English trade in the Baltic; to which England replied the same year by the Navigation Act, which suppressed the Dutch trade with the English colonies and the Dutch fish trade with England, and struck at the Dutch carrying trade. War was declared in May 1652 after a fight between Blake and Tromp off Dover, and was continued with signal victories and defeats on both sides till 1654. The religious element, however, which predominated in Cromwell's foreign policy inclined him to peace, and in April of that year terms were arranged by which England on the whole was decidedly the gainer. The Dutch acknowledged the supremacy of the English flag in the British seas, which Tromp had before refused; they accepted the Navigation Act, and undertook privately to exclude the princes of Orange from the command of their forces. The Protestant policy was further followed up by treaties with Sweden and Denmark which secured the passage of the Sound for English ships on the same conditions as the Dutch, and a treaty with Portugal which liber- ated English subjects from the Inquisition and allowed com- merce with the Portuguese colonies. The two great Roman Catholic powers now both bid for Cromwell's alliance. Cromwell wisely inclined towards France, for Spain was then a greater menace than France alike to the Protestant cause and to the 1 growth of British trade in the western.hemisphere ; but as no concessions could be gained from either France or Spain, the year 1654 closed without a treaty being made with either. In December 1654 Penn and Venables sailed for the West Indies with orders to attack the Spanish colonies and the French shipping; and for the first time since the Plantagenets an English fleet appeared in the Mediterranean, where Blake upheld the supremacy of the English flag, made a treaty with the dey of Algiers, destroyed the castles and ships of the dey of Tunis at Porto Farina on the 4th of April 1655, and liberated the English prisoners captured by the pirates.

The incident of the massacre of the Protestant Vaudois at this time decided Cromwell's policy in favour of France. In response to Cromwell's splendid championship of the persecuted people — which has been well described as " one of the noblest memories of England " — France undertook to put pressure upon Savoy, in consequence of which the persecution ceased for a time; but Cromwell's intervention had less practical effect than has generally been supposed, though " never was the great conception of a powerful state having duties along with interests more magnanimously realized." 1 The treaty of Pinerolo with- drew the edict ordering the persecutions, but they were soon

afterwards renewed, and in 1658 formed the subject of another remonstrance by Cromwell to Louis XIV. in his last extant public letter before his death. The treaty of Westminster (24th of October 1655) dealt chiefly with commercial subjects, and con- tained a clause promising the expulsion from France of political exiles. Meanwhile the West Indian expedition had been defeated 1 John Morley, Oliver Cromwell, p. 483.

at Hispaniola, and war was declared by Spain, who now pro- mised help to Charles II. for regaining his throne. Cromwell sent powerful English fleets to watch the coast of Spain and to prevent communications with the West Indies and America; on the 8th of September 1656 a fleet of treasure ships was de- stroyed off Cadiz by Stayner, and on the 20th of April 1657 Blake performed his last exploit in the destruction of the whole Spanish fleet of sixteen treasure ships in the harbour of Santa Cruz in Teneriffe. These naval victories were followed by a further military alliance with France against Spain, termed the treaty of Paris (the 23rd of March 1657) . Cromwell furnished 6000 men with a fleet to join in the attack upon Spain in Flanders, and obtained as reward Mardyke and Dunkirk, the former being captured and handed over on the 3rd of October 1657, and the latter after the battle of the Dunes on the 4th of June 1658, when Cromwell's Ironsides were once more pitted against English royalists fighting for the Spaniards.

Such was the character of Cromwell's policy abroad. The inspiring principle had been the defence and support of Pro- testantism, the question with Cromwell being " whether the Christian world should be all popery." He desired England to be everywhere the protector of the oppressed and the upholder of " true religion." His policy was in principle the policy of Elizabeth, of Gustavus Adolphus, and — in the following genera- tion — of William of Orange. He appreciated, without over- estimating, the value of England's insular position. " You have accounted yourselves happy," he said in January 1658, " in being environed by a great ditch from all the world beside. Truly you will not be able to keep your ditch nor your shipping unless you turn your ships and shipping into troops of horse and companies of foot, and fight to defend yourselves on terra firma." He did not regard himself merely as the trustee of the national resources. These were not to be employed for the advancement of English interests alone. " God's interest in the world," he declared, " is more extensive than all the people of these three nations. God has brought us hither to consider the work we may do in the world as well as at home." In 1653 he had made the astonishing proposal to the Dutch that England and Holland should divide the habitable globe outside Europe between them, that

all states maintaining the Inquisition should be treated as enemies by both the proposed allies, and that the latter ” should send missionaries to all peoples willing to receive them, to inculcate the truth of Jesus Christ and the Holy Gospel.” Great writers like Milton and Harrington supported Cromwell’s view of the duty of a statesman; the poet Waller acclaimed Cromwell as ” the world’s protector “; but the London trades- men complained of the loss of their Spanish trade and regarded Holland and not Spain as the national enemy. But Cromwell’s dream of putting himself at the head of European Protestantism never even approached realization. War broke out between the Protestant states of Sweden, Denmark, Holland and Branden- burg, with whom religion was entirely subordinated to individual aims and interests, and who were far from rising to Cromwell’s great conceptions; while the Vaudois were soon subjected to fresh persecutions. On the other hand, Cromwell could justly boast ” there is not a nation in Europe but is very willing to ask a good understanding with you.” He raised England to a predominant position among the Powers of Europe, and antici- pated the triumphs of the elder Pitt. ” It was hard to discover,” wrote Clarendon, ” which feared him most, France, Spain or the Low Countries.” The vigour and success with which he organized the national resources and upheld the national honour, asserted the British sovereignty of the seas, defended the oppressed, and caused his name to be feared and respected in foreign courts where that of Stuart was despised and neglected, command praise and admiration equally from contemporaries and from modern critics, from his friends and from his opponents. ” He once more joined us to the continent,” wrote Marvell, while Dryden describes him as teaching the British lion to roar. ” Cromwell’s greatness at home,” said Clarendon, ” was a mere shadow of his greatness abroad.” ” It is strange,” wrote Pepys in 1667 under a different regime, ” how everybody nowadays reflect upon Oliver and

commend him, what brave things he did, and made all the neigh- bour princes fear him.” To Cromwell more than to any other British ruler belongs the credit of having laid the foundation of England’s maritime supremacy and of her over-sea empire.

Cromwell’s colonial. policy aimed definitely at the recognition and extension of the British empire. By March 1652 the whole

of the territory governed by the Stuarts had submitted aadthe to the a

uthority of the Commonwealth, and the Na viga- empire. tion Act of the 9th of October 1 651, by which colonial

goods could only be imported to England in British ships and all foreign trade to the colonies was restricted to products of the exporting country, sought to bind the colonies to England and to support the interests of the shipowners and merchants, and therefore of the English maritime supremacy, the act being, moreover, memorable as the first public measure which treated the colonies as a whole and as an integral part of Great Britain. The hindrance, however, to the general develop- ment of trade which the act involved aroused at once loud complaints, to which Cromwell turned a deaf ear, continuing to seize Dutch ships trading in forbidden goods. In the internal administration of the colonies Cromwell interfered very little, maintaining specially friendly relations with the New Englanders, and showing no jealousy of their desire for self-government. The war with France, Holland and Spain offered opportunities of gaining additional territory. A small expedition sent by Cromwell in February 1654 to capture New Amsterdam (New York) from the Dutch was abandoned on the conclusion of peace, and the fleet turned to attack the French colonies; Major Robert Sedg- wick taking with a handful of men the fort of St John's, Port Royal or Annapolis, and the French fort on the river Penobscot, the whole territory from this river to the mouth of the St Lawrence remaining British territory till its cession in 1667. In December 1654 Cromwell despatched Penn and Venables with a fleet of thirty-eight ships and 2500 soldiers to the West Indies, their numbers being raised by recruits at the islands to 7000 men. The attack on Hispaniola, however, was a disastrous failure, and though a landing at Jamaica and the capture of the capital, Santiago de la Vega, was effected, the expedition was almost annihilated by disease; and Penn and Venables returned to England, when Cromwell threw them into the Tower. Cromwell, however, persevered, reminding Fortescue, who was left in com- mand, that the war was one against the " Roman Babylon," that they were " fighting the Lord's battles "; and he sent out reinforcements under Sedgwick, offering inducements to the New Englanders to migrate to Jamaica. In spite of almost insuperable difficulties the colony took root, trade began, the fleet lay in wait for the Spanish treasure ships, the settlements of the Spaniards were raided, and their repeated attempts to retake the island were successfully resisted. In 1658 Colonel Edward Doyley, the governor, gained a decisive victory over thirty companies of Spanish foot, and sent ten of their flags to Cromwell. The Protector, however, did not live to witness the final triumph of his undertaking, which gave to England, as he had wished, " the mastery of those seas," ensuring the

English colonies against Spanish attacks, and being maintained and followed up at the Restoration.

Meanwhile, the first parliament of the Protectorate had met in September 1654. A scheme of electoral reform had been Pariia- carried by which members were taken from the small meatary and corrupt boroughs and given to the large hitherto iU f~ unrepresented towns, and which provided for thirty

representatives from Scotland and from Ireland. Instead, however, of proceeding with the work of practical legislation, accepting the Instrument of Government without challenge as the basis of its authority, the parliament immedi- ately began to discuss and find fault with the constitution and to debate about " Fundamentals." About a hundred members who refused to engage not to attempt to change the form of government were excluded on the 12th of September. The rest sat on, discussing the constitution, drawing up lists of damnable heresies and of incontrovertible articles of faith, producing plans for the reduction of the army and demanding

for themselves its control. Incensed by the dilatory and factious proceedings of the House, Cromwell dismissed the parliament on the 22nd of January 1655. Various dangerous plots against his government and person were at this time rife. Vane, Ludlow, Robert Overton, Harrison and Major Wildman, the head of the Levellers, were all arrested, while the royalist rising under Penruddock was crushed in Devonshire. Other attacks upon his authority were met with the same resort to force. The judges and lawyers began to question the legality of his ordinances, and to doubt their competency to convict royalist prisoners of treason. A merchant named Cony refused to pay customs not imposed by parliament, his counsel declaring their levy by ordinance to be contrary to Magna Carta, and Chief Justice Rolle resigning in order to avoid giving judgment. Cromwell was thus inevitably drawn farther along the path of arbitrary government. He arrested the persons who refused to pay taxes, and sent Cony's lawyers to the Tower. Hitherto he had been scrupulously impartial in raising the best men to the judicial bench, including the illustrious Matthew Hale, but he now appointed compliant judges, and, alluding to Magna Carta in terms impossible to transcribe for modern readers, declared that " it should not control his actions which he knew were for the safety of the Commonwealth." The country was now divided into twelve districts each governed by a major-general, to whom was entrusted the duty of maintaining order, ma / OP . stamping out disaffection and plots, and executing generals. the laws relating to public morals. They had power to transport royalists and those who

could not produce good characters, and supported themselves by a special tax of 10% on the incomes of the royalist gentry. Enormous numbers of ale-houses were closed — a proceeding which excited intense re- sentment and was probably no slight cause of the royalist reaction. Still more serious an encroachment upon the constitu- tion perhaps even than the institution of the major-generals was Cromwell's tampering with the municipal franchise by confiscating the charters, depriving the burgesses, now hostile to his government, of their parliamentary votes, and limiting the franchise to the corporation; thereby corrupting the national liberties at their very source, and introducing an evil precedent only too readily followed by Charles II. and James II.

It was in these embarrassed and perilous circumstances that Cromwell summoned a new parliament in the summer of 1656. In spite of the influence and interference of the major- generals a large number of members hostile to the ofthe" government were returned, of whom Cromwell 's crown. council immediately excluded nearly a hundred. The major-generals were the object of general attack, while the special tax on the royalists was declared unjust, and the bill for its continuation rejected by a large majority. An attempt at the assassination of Cromwell by Miles Sindercombe added to the general feeling of anxiety and unrest. The military rule excited universal hostility; there was an earnest desire for a settled and constitutional government, and the revival of the monarchy in the person of Cromwell appeared the only way of obtaining it. On the 23rd of February 1657 the Remonstrance offering Cromwell the crown was moved by Sir Christopher Packe in the parliament and violently resisted by the officers and the army party, one hundred officers waiting upon Cromwell on the 27th to petition against his acceptance of it. On the 25th of March the Remonstrance, now termed the Petition and Advice, and including a new scheme of government, was passed by a majority of 123 to 62 in spite of the opposition of the officers; and on the 31st it was presented to Cromwell in the Banqueting House at Whitehall whence Charles I. had stepped out on to the scaffold. Cromwell replied by requesting a brief delay to ask counsel of God and his own heart. On the 8th of May about thirty officers presented a petition to parliament against the revival of the monarchy, and Fleetwood, Desborough and Lambert threatened to lay down their commissions. Accordingly Cromwell the same day refused the crown definitely, greatly to the astonishment both of his followers and his enemies, wbc- considered his decision a fatal neglect of an opportunity of

consolidating his rule and power. In particular, his acceptance of the crown would have guaranteed his followers, under the act of Henry VII., from liability in the future to the charge of high treason for having given allegiance to himself as a de facto king. Cromwell himself, however, seems to have regarded the question of title as of secondary importance, as merely (to use his own words) ” a feather in the hat,” ” a shining bauble for crowds to gaze at or kneel to.” ” Your father,” wrote Sir Francis Russell to Henry Cromwell, ” hath of late made more wise men fools than ever; he laughs and is merry, but they hang down their heads and are pitifully out of countenance.”

On the 25th of May the petition was presented to Cromwell again, with the title of Protector substituted for that of King, and he now accepted it. On the 26th of June 1657 he was once more installed as Protector, this time, however, with regal ceremony in contrast with the simple formalities observed on the first occasion, the heralds proclaiming his accession in the same manner as that of the kings. Cromwell’s government seemed now established on the firmer footing of law and national approval, he himself obtaining the powers though not the title of a constitutional monarch, with a permanent revenue of £1,300,000 for the ordinary expenses of the administration, the command of the forces, the right to nominate his successor and, subject to the approval of parliament, the members of the council and of the new second chamber now established, while at the same time the freedom of parliament was guaranteed in its elections. Difficulties, however, appeared immediately the parliament got to work. The republicans hostile to the Pro- tectorate, excluded before, now returned, took the places vacated by strong supporters of Cromwell who had been removed to the Lords, and attacked the authority of the new chamber, opened communications with the disaffected in the city and army, protested against unparliamentary taxation and arbitrary im- prisonment, and demanded again the supremacy of parliament. In consequence Cromwell summoned both Houses to his presence on the 4th of February 1658, and having pointed out the perils to which they were once more exposing the state, dissolved parliament, dismissing the members with the words, ” let God be judge between me and you. ”

During the period following the dissolution Cromwell’s power appeared outwardly at least to be at its height. The revolts of royalists and sectaries against his government had been easily suppressed, and the various attempts to assassinate him, con- temptuously referred to by Cromwell as ” little fiddling things,” were anticipated and

prevented by an excellent system of police and spies, and by his bodyguard of 160 men. The victory at Dunkirk increased his reputation, while Louis XIV. showed his respect for the ruler of England by the splendid reception given to the Protector's envoy, Lord Fauconberg, and by a com- plimentary mission despatched to England.

The great career, the incidents of which we have been following, was now, however, drawing to a close. Cromwell's health had long been impaired by the hardships of campaigning. Now at the age of 58 he was already old, and his firm, strong signature had become feeble and trembling. The responsibilities and anxieties of government unassisted by parliament, and the continued struggle against the force of anarchy, weighed upon him and exhausted his physical powers* " It has been hitherto," Cromwell said, " a matter of, I think, but philosophical discourse, that a great place, a great authority, is a great burthen. I know it is." "I can say in the presence of God, in comparison of whom we are but like poor creeping ants upon- the earth, I would have lived under my woodside to have kept a flock of sheep rather than undertook such a government as this." " I doubt not to say," declared his steward Maidston, " it drank up his spirits, of which his natural constitution afforded a vast stock, and brought him to his grave."

Domestic bereavements added further causes of grief and of weakened vitality. On the 6th of February 1658 he lost his favourite daughter, Elizabeth Claypole,. and he was much cast down by the shock of his bereavement and of her long sufferings. Shortly afterwards he fell ill of an intermittent fever, but seemed

to recover. On the 20th of August George Fox met him riding at the head of his guards in the park at Hampton Court, but declared " he looked like a dead man." The next day he again fell ill and was removed from Hampton Court to Whitehall, where his condition became worse. The anecdotes believed and circulated by the royalists that Cromwell died in all the agonies of remorse and fear are entirely false. On the 31st of August he seemed to rally, and one who slept in his bedchamber and who heard him praying, declared, " a public spirit to God's cause did breathe in him to the very last." During the next few days he grew weaker and resigned himself to death. " I would," he said, " be willing to be further serviceable to God and his people, but my work is done." For the first time doubts as to his spiritual state seemed to have troubled him. " Tell me is it possible to fall from grace ? " he asked the attendant minister. " No, it is not possible," the latter replied. " Then," said Cromwell, " I am safe, for I know that I was once in grace." He refused medicine to induce sleep,

declaring ” it is not my design to drink or to sleep, but my design is to make what haste I can to be gone.” Towards the morning of the 3rd of September he again spoke, ” using divers holy expressions, implying much inward consolation and peace,” together with ” some exceeding self-debasing words, annihilating and judging himself.” He died on the afternoon of the same day, his day of triumph, the anniversary both of Dunbar and of Worcester. His body was privately buried in the chapel of Henry VII. in Westminster Abbey, the public funeral taking place on the 23rd of November, with great ceremony and on the same scale as that of Philip II. of Spain, and costing the enormous sum of £60,000. At the Restoration his body was exhumed, and on the 30th of January 1661, the anniversary of the execution of Charles I., it was drawn on a sledge from Holborn to Tyburn, together with the bodies of Ireton and Bradshaw, accompanied by ” the universal outcry and curses of the people.” There it was hanged on a gallows, and in the evening taken down, when the head was cut off and set up upon Westminster Hall, where it remained till as late as 1684, the trunk being thrown into a pit underneath the gallows. According to various legends Cromwell’s last burial place is stated to be Westminster Abbey, Naseby Field or New- burgh Abbey; but there appears to be no evidence to support them, or to create any reasonable doubt that the great Protector’s dust lies now where it was buried, in the neighbourhood of the present Connaught Square.

As a military commander Cromwell was as prompt as Gustavus, as ardent as Conde, as exact as Turenne. These, moreover, were soldiers from their earliest years. Conde’s fame crom- was established in his twenty-second year, Gustavus well’s was twenty-seven and Turenne thirty-three at the military beginning of their careers as commanders-in-chief. g eoius – Cromwell, on the other hand, was forty-three when he fought in his first battle. In less than two years he had taken his rank as one of the great cavalry leaders of history. His campaigns of 1648 and 1651 placed him still higher as a great commander. Worcester, his crowning victory, has been indicated by a German critic as the prototype of Sedan. Yet his early military education could have consisted at most of the perusal of the Swedish Intelligencer and the practice of riding. It is not, therefore, strange that Cromwell’s first essays in war were characterised more by energy than technical skill. It was some time before he realized the spirit of cavalry tactics, of which he was later so complete a master. At first he speaks with complacence of a mttee, and reports that he and his men ” agreed to charge ” the enemy. But before long he came to understand, as no other commander of the age save Gustavus understood it, the value of true ” shock-action.” Of Marston Moor he writes, ” we never charged

but we routed them “; and thereafter his battles were decided by the shock of closed squadrons, the fresh impulse of a second and even a third line, and above all by the unquestioning dis- cipline and complete control over their horses to which he trained his men. This gave them not merely greater steadi- ness, but, what was far more important, the power of rallying and reforming for a second effort. The Royalist cavalry was

disorganized by victory as often as “by defeat, and illustrated on numerous fields the now discredited maxim that cavalry cannot charge twice in one day. Cromwell shares with Frederick the Great the credit of founding the modern cavalry spirit. As a horsemaster he was far superior to Murat. His marches in the eastern campaign of 1643 show a daily average at one time of 28 m. as against the 21 of Murat’s cavalry in the celebrated pursuit after Jena. And this result he achieved with men of less than two years’ service, men, too, more heavily equipped and worse mounted than the veterans of the Grande Armee. It has been said that his battles were decided by shock action; the real emphasis should be laid upon the word ” decided.” The swift, unhesitating charge was more than unusual in the wars of the time, and was possible only because of the peculiar earnestness of the men who fought the English war. The professional soldiers of the Continent could rarely be brought to force a decision; but the English, contending for a cause, were imbued with the spirit of the modern ” nation in arms “; and having taken up arms wished to decide the quarrel by arms. This feeling was not less conspicuous in the far-ranging rides, or raids, of the Cromwellian cavalry. At one time, as in the case of Blechingdon, they would perform strange exploits worthy of the most daring hussars; at another their speed and tenacity paralyses armies. Not even Sheridan’s horsemen in 1864-65 did their work more effectively than did the English squadrons in the Preston campaign. Cromwell appreciated this feeling at its exact worth, and his pre-eminence in the Civil War was due to this highest gift of a general, the power of feeling the pulse of his army. Resolution, vigour and clear sight marked his conduct as a commander-in-chief. He aimed at nothing less than the annihilation of the enemy’s forces, which Clausewitz was the first to define, a hundred and fifty years later, as the true objective of military operations. Not merely as exemplifying the tactical envelopment, but also as embodying the central idea of grand strategy, was Worcester the prototype of S6dan. The contrast between a campaign of Cromwell’s and one of Turenne’s

is far more than remarkable, and the observation of a military critic who maintains that Cromwell's art of war was two centuries in advance of its time, finds universal acceptance.

At a time when throughout the rest of Europe armies were manoeuvring against one another with no more than a formal result, the English and Scots were fighting decisive battles; and Cromwell's battles were more decisive than those of any other leader. Until his fiery energy made itself felt, hardly any army on either side actually suffered rout; but at Marston Moor and Naseby'the troops of the defeated party were completely dis- solved, while at Worcester the royalist army was annihilated. Dunbar attested his constancy and gave proof that Cromwell was a master of the tactics of all arms. Preston was an example like Austerlitz of the two stages of a battle as defined by Napoleon, the first flottante, the second fondroyante.

Cromwell's strategic manoeuvres, if less adroit than those of Turenne or Montecucculi, were, in accordance with his own genius and the temper of his army, directed always to forcing a decisive battle. That he was also capable of strategy of the other type was clear from his conduct of the Irish War. But his chief work was of a different kind and done on a different scale. The greatest feat of Turenne was the rescue of one province in 1674-1675; Cromwell, in 1648 and again in 1651, had two-thirds of England and half of Scotland for his theatre of war. Turenne levelled down his methods to suit the ends which he had in view. The task of Cromwell was far greater. Any comparison between the generalship of these two great commanders would therefore be misleading, for want of a common basis. It is when he is contrasted with other commanders, not of the age of Louis XIV., but of the Civil War, that Cromwell's greatness is most con- spicuous. Whilst others busied themselves with the application of the accepted rules of the Dutch, the German, and other formal schools of tactical thought, Cromwell almost alone saw clearly into the heart of the questions at issue, and evolved the strategy, the tactics, and the training suited to the work to which he had set his hand.

Cromwell's career as a statesman has been already traced in its different spheres, and an endeavour has been made to show the breadth and wisdom of his conceptions and at the Crom- same time the cause of the immediate failure of his well's constructive policy. Whether if Cromwell had sur- states ~ M vived he would have succeeded in gradually establishing legal government is a question which can never be answered. His administration as it stands in history is undoubtedly open to the charge that after abolishing the absolutism of the ancient monarchy he substituted for it, not law and

liberty, but a military tyranny far more despotic than the most arbitrary administration of Charles I. The statement of Vane and Ludlow, when they refused to acknowledge Cromwell's government, that it was " in substance a re-establishment of that which we all engaged against," was true. The levy of ship money and customs by Charles sinks into insignificance beside Cromwell's wholesale taxation by ordinances; the inquisitional methods of the major-generals and the unjust and exceptional taxation of royalists outdid the scandals of the extra-legal courts of the Stuarts; the shipment of British subjects by Cromwell as slaves to Barbados has no parallel in the Stuart administration; while the prying into morals, the encouragement of informers, the attempt to make the people religious by force, were the counter- part of the Laudian system, and Cromwell's drastic treatment of the Irish exceeded anything dreamed of by Strafford. He discovered that parliamentary government after all was not the easy and plain task that Pym and Vane had imagined, and Cromwell had in the. end no better justification of his rule than that which Strafford had suggested to Charles I., — " parliament refusing (to give support and co-operation in carrying on the government) you are acquitted before God and man." The fault was no doubt partly Cromwell's own. He had neither the patience nor the tact for managing loquacious parliamentary pedants. But the chief responsibility was not his but theirs. John Morley {Oliver Cromwell, p. 297) has truly observed of the execution of Charles I., that it was " an act of war, and was just as defensible or just as assailable, and on the same grounds, as the war itself." The parliamentary party took leave of legality when they took up arms against the sovereign, and it was therefore idle to dream of a formally legal sanction for any of their subsequent revolutionary proceedings. An entirely fresh start had to be made. A new foundation had to be laid on which a new system of legality might be reared. It was for this that Cromwell strove. If the Rump or the Little Parliament had in a business-like spirit assumed and discharged the functions of a constituent assembly, such a foundation might have been provided. It was only when five years had passed since- the death of the king without any " settlement of the nation " being arrived at, that Cromwell at last accepted a constitution drafted by his military officers, and attempted to impose it on the parliament. And it was not until the parliament refused to acknowledge the Instrument as the required starting point for the new legality, that Cromwell in the last resort took arbitrary power into his hands as the only method remaining for carrying on the government. For much as he hated arbitrariness, he hated anarchy still more. While therefore Cromwell's adminis- tration became in practice little different from that of Strafford, the aims and ideals of the two statesmen had nothing in

common. It is therefore profoundly true, as observed by S. R. Gardiner (Cromwell, p. 315), that “what makes Cromwell’s biography so interesting in his perpetual effort to walk in the paths of legality — an effort always frustrated by the necessities of the situation. The man — it is ever so with the noblest — was greater than his work.” The nature of Cromwell’s statesmanship is to be seen rather in his struggles against the retrograde influences and opinions of his time, in the many political reforms anticipated though not originated or established by himself, and in his religious, perhaps fanatical, enthusiasm, than in the outward character of his administration, which, however, in spite of its despotism shows itself in its inner spirit of justice, patriotism and self-sacrifice, so immeasurably superior to that of the Stuarts.

Cromwell’s personal character has been inevitably the subject of unceasing controversy. According to Clarendon he was

” a brave bad man,” with ” all the wickedness against character. wnicn damnation is pronounced and for which hell fire

is prepared.” Yet he cannot deny that ” he had some virtues which have caused the memory of some men in all ages to be celebrated”; and admits that “he was not a man of blood,” and that he possessed ” a wonderful understanding in the natures and humour of men,” and ” a great spirit, an admirable circumspection and sagacity and a most magnanimous resolution.” According to contemporary republicans he was a mere selfish adventurer, sacrificing the national cause ” to the idol of his own ambition.” Richard Baxter thought him a good man who fell before a great temptation. The writers of the next century generally condemned him as a mixture of knave, fanatic and hypocrite, and in 1839 John Forster endorsed Landor’s verdict that Cromwell lived a hypocrite and died a traitor. These crude ideas of Cromwell’s character were extin- guished by Macaulay’s irresistible logic, by the publication of Cromwell’s letters by Carlyle in 1845, which showed Cromwell clearly to be ” not a man of falsehoods, but a man of truth “; and by Gardiner, whom, however, it is somewhat difficult to follow when he represents Cromwell as ” a typical Englishman.” In particular that conception which regarded ” ambition ” as the guiding motive in his career has been dispelled by a more intimate and accurate knowledge of his life; this shows him to have been very little the creator of his own career, which was largely the

result of circumstances outside his control, the influence of past events and of the actions of others, the pressure of the national will, the natural superiority of his own genius. ” A man never mounts so high,” Cromwell said to the French ambassador in 1647, ” as when he does not know where he is going.” ” These issues and events,” he said in 1656, ” have not been forecast, but were providences in things.” His ” hypocrisy ” consists principally in the Biblical language he employed, which with Cromwell, as with many of his contemporaries, was the most natural way of expressing his feelings, and in the ascription of every incident to the direct intervention of God’s providence, which was really Cromwell’s sincere belief and conviction. In later times Cromwell’s character and adminis- tration have been the subject of almost too indiscriminate eulogy, which has found tangible shape in the statue erected to his memory at Westminster in 1899. Here Cromwell’s effigy stands in the midst of the sanctuaries of the law, the church, and the parliament, the three foundations of the state which he subverted, and in sight of Whitehall where he destroyed the monarchy in blood. Yet Cromwell’s monument is not altogether misplaced in such surroundings, for in him are found the true principles of piety, of justice, of liberty and of governance.

John Maidston, Cromwell’s steward, gives the “character of his person.” ” His body was compact and strong, his stature under six foot (I believe about two inches), his head so shaped as you might see it a storehouse and a shop both of a vast treasury of natural parts.” ” His temper exceeding fiery, as I have known, but the flame of it, . . . kept down for the most part, was soon allayed with those moral endowments he had. He was naturally compassionate towards objects in distress even to an effeminate measure; though God had made him a heart wherein was left little room for fear, . . . yet did he exceed in tenderness towards sufferers. A larger soul I think hath seldom dwelt in a house of clay than his was. I believe if his story were impartially trans- mitted and the unprejudiced world well possessed with it, she would add him to her nine worthies.” By his wife Elizabeth Bourchier, Cromwell had four sons, Robert (who died in 1639), Oliver (who died in 1644 while serving in his father’s regiment), Richard, who succeeded him as Protector, and Henry. He also had four daughters. Of these Bridget was the wife successively of Ireton and Fleetwood, Elizabeth married John Claypole, Mary was wife of Thomas Belasyse, Lord Fauconberg; and Frances was the wife of Sir Robert Rich, and secondly of Sir John Russell. The last male descendant of the Protector was his great-great-grandson, Oliver Cromwell of Cheshunt, who died

in i82r. By the female line, through his children Henry, Bridget and Frances, the Protector has had numerous descendants, and is the

ancestor of many well-known families. 1

Bibliography. — A detailed bibliography, with the chief authorities for particular periods, will be found in the article in the Diet, of Nat. Biography, by C. H. Firth (1888). The following works may be mentioned: S. R. Gardiner's Hist, of England (1883-1884) and of the Great Civil War (1886), Cromwell's Place in History (1897), Oliver Cromwell (1901), and History of the Commonwealth and Protectorate (1894-1903) ; Cromwell, by C. H. Firth (1900) ; Oliver Cromwell, by J. Morley (1904); The Last Years of the Protectorate, 1656-1658, 2 vols., by C. H. Firth (1909); Oliver Cromwell, by Fred. Harrison (1903) ; Letters and Speeches of Oliver Cromwell, by T. Carlyle, ed. by S. C. Lomas, with an introd. by C. H. Firth (the best edition, rejecting the spurious Squire papers, 1904) ; Oliver Cromwell, by F. Hoenig (1887) ; Oliver Cromwell, the Protector, by R. F. D. Palgrave (1890) ; Oliver Cromwell . . . and the Royalist Insurrection … of March 1655, by the same author (1903); Oliver Cromwell, by Theodore Roosevelt (1900) ; Oliver Cromwell, by R. Pauli (tr. 1888) ; Cromwell, a Speech delivered at the Cromwell Tercentenary Celebration 1899, by- Lord Rosebery (1900) ; The Two Protectors, by Sir Richard Tangye (valuable for its illustrations, 1899) ; Life of Sir Henry Vane, by W. W. Ireland (1905) ; Die Politik des Protectors Oliver Cromwell in der Auffassung und Tdtigkeit . . . des Staatssekretars John Thurloe, by Freiherr v. Bischofshausen (1899) ; Cromwell as a Soldier, by T. S. Baldock(l899); Cromwell' s Army , by C. H. Firth (1902) ; The Diplomatic Relations between Cromwell and Charles X. of Sweden, by G. Jones (1897) ; The Interregnum, by F. A. Inderwick (dealing with the legal aspect of Cromwell's rule, 1891) ; Administration of the Royal Navy, by M. Oppenheim (1896) ; History of the English Church during the Civil Wars, by W. Shaw (.19°°) ; The Protestant Interest in Cromwell's Foreign Relations, by J. N. Bowman (1900) ; Cromwell's Jewish Intelligences (1891), Crypto- Jews under the Commonwealth (1894), Menasseh Ben Israel's Mission to Oliver Cromwell (1901), by L. Wolf.

(P. C. Y.; C. F. A.; R. J. M.)

CROMWELL, RICHARD (1626-1712), lord protector of England, eldest surviving son of Oliver Cromwell and of Elizabeth Bourchier, was born on the 4th of October 1626. He served in the parliamentary army, and in 1647 was admitted a member of Lincoln's Inn. In 1649 he married Dorothy, daughter of Richard Mayor, or Major, of Hursley in Hampshire. He represented Hampshire in the parliament of 1654, and Cambridge University in that of 1656, and in November 1655 was appointed one of the council of trade. But he was not brought forward

by his father or prepared in any way for his future greatness, and lived in the country occupied with field sports, till after the institution of the second protectorate in 1657 and the recognition of Oliver's right to name his successor. On the 18th of July he succeeded his father as chancellor of the university of Oxford, on the 31st of December he was made a member of the council of state, and about the same time obtained a regiment and a seat in Cromwell's House of Lords. He was received generally as his father's successor, and was nominated by him as such on his death-bed. He was proclaimed on the 3rd of September 1658, and at first his accession was acclaimed with general favour both at home and abroad. Dissensions, however, soon broke out between the military faction and the civilians. Richard's elevation, not being " general of the army as his father was," was distasteful to the officers, who desired the appointment of a commander-in-chief from among themselves, a request refused by Richard. The officers in the council, moreover, showed jealousy of the civil members, and to settle these difficulties and to provide money a parliament was summoned on the 27th of January 1659, which declared Richard protector, and incurred the hostility of the army by criticizing severely the arbitrary military government of Oliver's last two years, and by impeaching one of the major-generals. A council of the army accordingly established itself in opposition to the parliament, and demanded on the 6th of April a justification and confirmation of former proceedings, to which the parliament replied by forbidding meetings of the army council without the permission of the protector, and insisting that all officers should take an oath not to disturb the proceedings in parliament. The army now broke into open rebellion and assembled at St James's. Richard was completely in their power; he identified himself with their cause, and the same night dissolved the parliament. The Long 1 Frederic Harrison, Cromwell, p. 34.

Parliament (which re-assembled on the 7th of May) and the heads of the army came to an agreement to effect his dismissal; and in the subsequent events Richard appears to have played a purely passive part, refusing to make any attempt to keep his power or to forward a restoration of the monarchy. On the 25th of May his submission was communicated to the House. He retired into private life, heavily burdened with debts incurred during his tenure of office and narrowly escaping arrest even before he quitted Whitehall. In the summer of 1660 he left England for France, where he lived in seclusion under the name of John Clarke, subsequently removing elsewhere, either (for

the accounts differ) to Spain, to Italy, or to Geneva. He was long regarded by the government as a dangerous person, and in 1671 a strict search was made for him but without avail. He returned to England about 1680 and lived at Cheshunt, in the house of Sergeant Pengelly, where he died on the 12 th of July 1712, being buried in Hursley church in Hampshire. Richard Cromwell was treated with general contempt by his contempor- aries, and invidiously compared with his great father. According to Mrs Hutchinson he was ” gentle and virtuous but a peasant in his nature and became not greatness.” He was nevertheless a man of respectable abilities, of an irreproachable private character, and a good speaker.

Bibliography. — See the article in the Diet, of Nat. Biography, and authorities there cited ; Noble’s Memoirs of the Protectoral House of Cromwell (1787) ; Memoirs of the Protector . . . and of his Sons, byO. Cromwell (1820); The Two Protectors , by Sir R. Tangye (1899); Kebleland and a Short Life of Richard Cromwell, by W. T. Warren (1900); Letters and Speeches of O. Cromwell, by T. Carlyle (1904); Eng. Hist. Review, xiii. 93 (letters) and xviii. 79 ; Col. of State Papers, Domestic, Lansdowne MSS. in British Museum. (P. C. Y.)

CROMWELL, THOMAS, Earl of Essex (14857-1540), born probably not later than 1485 and possibly a year or two earlier, was the only son of Walter Cromwell, alias Smyth, a brewer, smith and fuller of Putney. His grandfather, John Cromwell, seems to have belonged to the Nottinghamshire family, of whom the most distinguished member was Ralph, Lord Cromwell (i394?i456), lord treasurer; and he migrated from Norwell, Co. Notts, to Wimbledon some time before 1461. John’s son, Walter, seems to have acquired the alias Smyth from being apprenticed to his uncle, William Smyth, ” armourer,” of Wimble don. He was of a turbulent, vicious disposition, perpetually being fined in the manor-court for drunkenness, for evading the assize of beer, and for turning more than his proper number of beasts on to Putney Common. Once he was punished for a sanguinary assault, and his connexion with Wimbledon ceased in 1514 when he ” falsely and fraudulently erased the evidences and terrures of the lord.” Till that time he had flourished like the bay-tree.

Under these circumstances the absence of Thomas Cromwell’s name from the Wimbledon manor rolls is almost a presumption of respectability. Perhaps it would be safer to attribute it to Cromwell’s absence from the manor. He is said to have quarrelled with his father — no great crime considering the father’s character — and fled to Italy, where he served as a soldier in the French army at the battle of the Garigliano (Dec. 1503). He escaped from the battle-field to

Florence, where he was befriended by the banker Frescobaldi, a debt which he appears to have repaid with superabundant interest later on. He is next heard of at Antwerp as a trader, and about 15 10 he was induced to accompany a Bostonian to Rome in quest of some papal indulgences for a Boston gild; Cromwell secured the boon by the timely present of some choice sweetmeats to Julius II. In 151 2 there is some slight evidence that he was at Middelburg, and also in London, engaged in business as a merchant and solicitor. His marriage must have taken place about the same time, judging from the age of his son Gregory. His wife was Elizabeth Wykes, daughter of a well-to-do shearman of Putney, whose business Cromwell carried on in combination with his own.

For about eight years after 151 2 we hear nothing of Cromwell. A letter to him from Cicely, marchioness of Dorset, in which he is seen in confidential business relations with her ladyship, is probably earlier than 1520, and it is possible that Cromwell owed

his introduction to Wolsey to the Dorset family. On the other hand, it is stated that his cousin, Robert Cromwell, vicar of Battersea under the cardinal, gave Thomas the stewardship of the archiepiscopal estate of York House. At any rate he was advising Wolsey on legal points in 1520, and from that date he occurs frequently not only as mentor to the cardinal, but to noblemen and others when in difficulties, especially of a financial character; he made large sums as a money-lender.

In 1523 Cromwell emerges into public life as a member of parliament. The official returns for this election are lost and it is not known for what constituency he sat, but we have a humorous letter from Cromwell describing its proceedings, and a remarkable speech which he wrote and perhaps delivered, opposing the reckless war with France and indicating a sounder policy which was pursued after Wolsey's fall. If, he said, war was to be waged, it would be better to secure Boulogne than advance on Paris; if the king went in person and were killed without leaving a male heir, he hinted there would be civil war; it would be wiser to attempt a union with Scotland, and in any case the proposed subsidy would be a fatal drain on the resources of the realm. Neither Henry nor Wolsey was so foolish as to resent this criticism, and Cromwell lost nothing by it. He was made a collector of the subsidy he had opposed — a doubtful favour perhaps — and in 1524 was admitted at Gray's Inn; but he now became the most confidential servant of the cardinal. In 1525 he was Wolsey's agent in the dissolution of the smaller monasteries which were designed to provide the endowments for Wolsey's foundations at Oxford and

Ipswich, a task which gave Cromwell a taste and a facility for similar enterprises on a greater scale later on. For these foundations Cromwell drew up the necessary deeds, and he was receiver-general of cardinal's college, constantly supervising the workmen there and at Ipswich. His ruthless vigour and his accessibility to bribes earned him such unpopularity that there were rumours of his projected assassination or imprisonment. All this constituted a further bond of sympathy between him and his master, and Cromwell grew in Wolsey's favour until his fall. His wife had died in 1527 or 1528, and in July 1529 he made his will, in which one of the chief beneficiaries was his nephew, Richard Williams, alias Cromwell, the great-grandfather of the protector.

Wolsey's disgrace reduced Cromwell to such despair that Cavendish once found him in tears and at his prayers " which had been a strange sight in him afore." Many of the cardinal's servants had been taken over by the king, but Cromwell had made himself particularly obnoxious. However, he rode to court from Esher to " make or mar," as he himself expressed it, and offered his services to Norfolk. Possibly he had already paved the way by the pensions and grants which he induced Wolsey to make through him, out of the lands and revenues of his bishoprics and abbeys, to nobles and courtiers who were hard pressed to keep up the lavish style of Henry's court. Cromwell could be most useful to the government in parliament, and the government, represented by Norfolk, undertook to use its influence in procuring him a seat, on the natural understanding that Cromwell should do his best to further government business in the House of Commons. This was on the 2nd of November 1529; the elections had been made, and parliament was to meet on the morrow. A seat was, however, found or made for Crom- well at Taunton. He signalized himself by a powerful speech in opposition to the bill of attainder against Wolsey which had already passed the Lords. The bill was thrown out, possibly with Henry's connivance, though no theory has yet explained its curious history so completely as the statement of Cavendish and other contemporaries, that its rejection was due to the arguments of Cromwell. Doubtless he championed his fallen chief not so much for virtue's sake as for the impression it would make on others. He did not feel called upon to accompany Wolsey on his exile from the court.

Cromwell had now, according to Cardinal Pole, whose story has been too readily accepted, been converted into an " emissary of Satan " by the study of Machiavelli's Prince. In the one interview which Pole had with Cromwell, the latter, so Pole

wrote ten years later in 1539, recommended him to read a new Italian book on politics, which Pole says he afterwards dis- covered was Machiavelli's Prince. But this, disco very was not made for some years: the Prince was not published until 1532, three years after the conversation; there is evidence that Cromwell was not acquainted with it until 1537 or 1539, and there is nothing in the Prince bearing on the precise point under discussion by Pole and Cromwell. On the other hand, the point is discussed in Castiglione's // Cortegiano which had just been published in 1528, and of which Cromwell promised to lend Bonner a copy in 1530. The Cortegiano is the antithesis of the Prince; and there is little doubt that Pole's account is the offspring of an imagination heated by his own perusal of the Prince in 1538, and by Cromwell's ruin of the Pole family at the same time; until then he had failed to see in Cromwell the Machiavellian " emissary of Satan."

Equally fanciful is Pole's ascription of the whole responsibility for the Reformation to Cromwell's suggestion. It was impossible for Pole to realize the substantial causes of that perfectly natural development, and it was his cue to represent Henry as having acted at the diabolic suggestion of Satan's emissary. In reality the whole programme, the destruction of the liberties and confiscation of the wealth of the church by parliamentary agency, had been indicated before Cromwell had spoken to Henry. The use of Praemunire had been applied to Wolsey; laymen had supplanted ecclesiastics in the chief offices of state; the plan of getting a divorce without papal intervention had been the original idea, which Wolsey had induced the king to abandon, and it had been revived by Cranmer's suggestion about the universities. The root idea of the supreme authority of the king had been asserted in Tyndale's Obedience of a Christian Man published in 1528, which Anne Boleyn herself had brought to Henry's notice: " this," he said, " is a book for me and all kings to read," and Campeggio had felt compelled to warn him against these notions, of which Pole imagines that he had never heard until they were put into his head by Cromwell late in 1530. In the same way Cromwell's influence over the government from iS 2 9-i533 has been grossly exaggerated. It was not till 1 53 1 that he was admitted to the privy council nor till 1534 that he was made secretary, though he had been made master of the Jewel-House, clerk of the Hanaper and master of the Wards in 1532, and chancellor of the exchequer (then a minor office) in 1533. It is not till 1533 that his name is as much as mentioned in the correspondence of any foreign ambassador resident in London. This obscurity has been attributed to deliberate suppression: but no secrecy was made about Cranmer's sugges- tion,

and it was not Henry's habit to assume a responsibility which he could devolve upon others. It is said that Cromwell's life would not have been safe, had he been known as the author of this policy \ but that is not a consideration which would have appealed to Henry, and he was just as able to protect his minister in 1530 as he was in 1536. Cromwell, in fact, was not the author of that policy, but he was the most efficient instrument in its execution.

He was Henry's parliamentary agent, but even in this capacity his power has been overrated, and he is supposed to have invented those parliamentary complaints against the clergy, which were transmuted into the legislation of 1 53 2 . But the complaints were old enough; many of them had been heard in parliament nearly twenty years before, and there is ample evidence to show that the petition against the clergy represents the " infinite clamours " of the Commons against the Church, which the House itself resolved should be " put in writing and delivered to the king." The actual drafting of the statute, as of all the Reformation Acts between 1532 and 1539, was largely Cromwell's work; and the success with which parliament was managed during this period was also due to him. It was not an easy task, for the House of Commons more than once rejected government measures, and members were heard to threaten Henry VIII. with the fate of Richard III.; they even complained pf Cromwell's reporting their proceedings to the king. That was his business rather than conveying imaginary royal orders to the House. " They be

contented," he wrote in one of these reports, " that deed and writing shall be treason," but words were only to be misprision: they refused to include an heir's rebellion or disobedience in the bill " as rebellion is already treason, and disobedience is no cause of forfeiture of inheritance." There was, of course, room for manipulation, which Cromwell extended to parliamentary elections; but parliamentary opinion was a force of which he had to take account, and not a negligible quantity.

From the date of his appointment as secretary in 1534, Cromwell's biography belongs to the history of England, but it is necessary to define his personal attitude to the revolution in which he was the king's most conspicuous agent. He was included by Foxe in his Book of Martyrs to the Protestant faith: more recent historians regard him as a sacrilegious ruffian. Now, there were two cardinal principles in the Protestantism of the 16th century — the supremacy of the temporal sovereign over the church in matters of government, and the supremacy of the Scriptures over the Church in matters of faith. There is no room for doubt as to the sincerity of Cromwell's belief in the first

of these two articles: he paid at his own expense for an English translation of Marsiglio of Padua's Defensor Pads, the classic medieval advocate of that doctrine; he had a scheme for governing England by means of administrative councils nominated by the king to the detriment of parliament; and he urged upon Henry the adoption of the maxim of the Roman civil law — quod principi placuit legis habet vigorem. He wanted, in his own words, " one body politic " and no rival to the king's authority; and he set the divine right of kings against the divine right of the papacy. There is more doubt about the sincerity of Cromwell's attachment to the second article; it is true that he set up a Bible in every parish church, and regarded them as invaluable; and the correspondents who unbosom themselves to him are all of a Protestant way of thinking. But Protestantism was the greatest support of absolute monarchy. Hence its value in Cromwell's eyes. Of religious conviction there is in him little trace, and still less of the religious temperament. He was a polished representative of the callous, secular middle class of that most irreligious age. Sentiment found no place, and feeling little, in his composition; he used the axe with as little passion as the surgeon does the knife, and he operated on some of the best and noblest in the land. He saw that it was wiser to proscribe a few great opponents than to fall on humbler prey; but he set law above justice, and law to him was simply the will of the state.

In 1534 Cromwell was appointed master of the Rolls, and in 1535 chancellor of Cambridge University and visitor-general of the monasteries. The policy of the Dissolution has been theoretically denounced, but practically approved in every civilized state, Catholic as well as Protestant. Every one has found it necessary, sooner or later, to curtail or to destroy its monastic foundations; only those which delayed the task longest have generally lagged farthest behind in national progress. The need for reform was admitted by a committee of cardinals appointed by Paul III. in 1 535, and it had been begun by Wolsey. Cromwell was not affected by the iniquities of the monks except as arguments for the confiscation of their property. He had boasted that he would make Henry VIII. the richest prince in Christendom; and the monasteries, with their direct dependence on the pope and their cosmopolitan organization, were obstacles to that absolute authority of the national state which was Cromwell's ideal. He had learnt how to visit monasteries under Wolsey, and the visitation of 1535 was carried out with ruthless efficiency. During the storm which followed, Henry took the management of affairs into his own hands, but Cromwell was rewarded in July 1536 by being knighted, created lord privy seal, Baron Cromwell, and vicar-general

and viceregent of the king in ” Spirituals.”

In this last offensive capacity he sent a lay deputy to preside in Convocation, taking precedence of the bishops and archbishops, and issued his famous Injunctions of 1536 and 1538; a Bible was to be provided in every church; the Paternoster, Creed and Ten Commandments were to be recited by the incumbent in

English; he was to preach at least once a quarter, and to start a register of births, marriages and deaths. During these years the outlook abroad grew threatening because of the alliance, under papal guarantee, between Charles V. and Francis I.; and Cromwell sought to counterbalance it by a political and theological union between England and the Lutheran princes of Germany. The theological part of the scheme broke down in 1538 when Henry categorically refused to concede the three reforms demanded by the Lutheran envoys. This was ominous, and the parliament of 1539, into which Cromwell tried to intro- duce a number of personal adherents, proved thoroughly re-actionary. The temporal peers were unanimous in favour of the Six Articles, the bishops were divided, and the Commons for the most part agreed with the Lords. Cromwell, however, succeeded in suspending the execution of the act, and was allowed to proceed with his one independent essay in foreign policy. The friendship between Francis and Charles was apparently getting closer; Pole was exhorting them to a crusade against a king who was worse than the Turk; and anxious eyes searched the Channel in 1539 for signs of the coming Armada. Under these circumstances Henry acquiesced in Cromwell’s negotiations /or a marriage with Anne of Cleves. Anne, of course, was not a Lutheran, and the state religion in Cleves was at least as Catholic as Henry’s own. But her sister was married to the elector of Saxony, and her brother had claims on Guelders, which Charles V. refused to recognize. Guelders was to the emperor’s dominions in the Netherlands what Scotland was to England, and had often been used by France in the same way, and an alliance between England, Guelders, Cleves and the Schmalkaldic League would, Cromwell thought, make Charles’s position in the Netherlands almost untenable. Anne herself was the weak point in the argument; Henry conceived an invincible repugnance to her from the first; he was restrained from an immediate breach with his new allies only by fear of Francis and Charles. In the spring of 1540 he was reassured on that score; no attack on him from that quarter was impending; there was a rift between the two Catholic sovereigns, and there was no real need for Anne and her German friends.

From that moment Cromwell's fate was sealed; the Lords loathed him as an upstart even more than they had loathed Wolsey; he had no church to support him; Norfolk and Gardiner detested him from pique as well as on principle, and he had no friend in the council save Cranmer. As lay viceregent he had given umbrage to nearly every churchman, and he had put all his eggs in the one basket of royal favour, which had now failed him. Cromwell did not succumb without an effort, and a desperate struggle ensued in the council. In April the French ambassador wrote that he was tottering to his fall; a few days later he was created earl of Essex and lord great chamberlain, and two of his satellites were made secretaries to the king; he then despatched one bishop to the Tower, and threatened to send five others to join him. At last Henry struck as suddenly and remorselessly as a beast of prey; on the 10th of June Norfolk accused him of treason; the whole council joined in the attack, and Cromwell was sent to the Tower. A vast number of crimes was laid to his charge, but not submitted for trial. An act of attainder was passed against him without a dissentient voice, and after contributing his mite towards the divorce of Anne, he was beheaded on Tower Hill on the 28th of July, repudiating all heresy and declaring that he died in the Catholic faith.

In estimating Cromwell's character it must be remembered that his father was a blackguard, and that he himself spent the formative years of his life in a vile school of morals. A ruffian he doubtless was, as he says, in his youth, and he was the last man to need the tuition of Machiavelli. Nevertheless he civilized himself to a certain extent; he was not a drunkard nor a forger like his father; from personal immorality he seems to have been singularly free; he was a kind master, and a stanch friend; and he possessed all the outward graces of the Renaissance period. He was not vindictive, and his atrocious acts were done in no private quarrel, but in what he conceived to be the interests

of his master and the state. Where those interests were concerned he had no heart and no conscience and no religious faith; no man was more completely blighted by the 16th century worship of the state.

The authorities for the early life of Cromwell are the Wimbledon manor rolls, used by Mr John Phillips of Putney in The Antiquary (1880), vol. ii., and the Antiquarian Mag. (1882), vol. ii. ; Pole's Apologia, 1. 126; Bandello's Novella, xxxiv. ; Chapuys' letter to Granvelle, 21 Nov. 1535: and Foxe's Acts and Mon. From 1522 see Letters and Papers of Henry VIII., vols. iii. -xvi. ; Cavendish's Life of

Wolsey; Hall's Chron.; Wriothesley's Chron. These and practically all other available sources have been utilized in R. B. Merriman's Life and Letters of Thomas Cromwell (2 vols., 1902). For Cromwell and Machiavelli see Paul van Dyke's Renascence Portraits (1906), App. (A. F. P.)

CRONJE, PIET ARNOLDUS {c. 1840-), Boer general, was born about 1840 in the Transvaal and in 1881 took part in the first Boer War in the rank of commandant. He commanded in the siege of the British garrison at Potchefstroom, though he was unable to force their surrender until after the conclusion of the general armistice. The Boer leader was at this time accused of withholding knowledge of this armistice from the garrison (see Potchefstroom). He held various official positions in the years 1881-1899, and commanded the Boer force which compelled the surrender of the Jameson raiders at Doornkop (Jan. 2, 1896). In the war of 1899 Cronje was general commanding in the western theatre of war, and began the siege of Kimberley. He opposed the advance of the British division under Lord Methuen, and fought, though without success, three general actions at Belmont, Graspan and Modder River. At Magers- fontein, early in December 1899, he completely repulsed a genera] attack made upon his position, and thereby checked for two months the northward advance of the British column. In the campaign of February 1900, Cronje opposed Lord Roberts's army on the Magersfontein battleground, but he was unable to prevent the relief of Kimberley; retreating westward, he was surrounded near Paardeberg, and, after a most obstinate resistance, was forced to surrender with the remnant of his army (Feb. 27, 1900). As a prisoner of war Cronje was sent to St Helena, where he remained until released after the conclusion of peace (see Transvaal: History),

CROOKES, SIR WILLIAM (1832-), English chemist and physicist, was born in London on the 17th of June 1832, and studied chemistry at the Royal College of Chemistry under A. W. von Hofmann, whose assistant he became in 1851. Three years later he was appointed an assistant in the meteorological department of the Radcliffe observatory, Oxford, and in 1855 he obtained a chemical post at Chester. In 1861, while conduct- ing a spectroscopic, examination of the residue left in the manu- facture of sulphuric acid, he observed a bright green line which had not been noticed previously, and by following up the indication thus given he succeeded in isolating a new element, thallium, a specimen of which was shown in public for the first time at the exhibition of 1862. During the next eight years he carried out a minute investigation of this metal and its properties. While determining its atomic weight, he thought it desirable, for the

sake of accuracy, to weigh it in a vacuum, and even in these circumstances he found that the balance behaved in an anomalous manner, the metal appearing to be heavier when cold than when hot. This phenomenon he explained as a ” repulsion from radiation,” and he expressed his discovery in the statement that in a vessel exhausted of air a body tends to move away from another body hotter than itself. Utilizing this principle he constructed the radiometer (q.v.), which he was at first disposed to regard as a machine that directly transformed light into motion, but which was afterwards perceived to depend on thermal action. Thence he was led to his famous researches on the phenomena produced by the discharge of electricity through highly exhausted tubes (sometimes known as ” Crookes’ tubes ” in consequence), and to the development of his theory of ” radiant matter ” or matter in a ” fourth state,” which led up to the modern electronic theory. In 1883 he began an inquiry into the nature and constitution of the rare earths. By repeated

fractionations he was able to divide yttrium into distinct portions which gave different spectra when exposed in a high vacuum to the spark from an induction coil. This result he considered to be due, not to any removal of impurities, but to an actual splitting-up of the yttrium molecule into its constituents, and he ventured to draw the provisional conclusion that the so-called simple bodies are in reality compound molecules, at the same time suggesting that all the elements have been produced by a process of evolution from one primordial stuff or ” protyle.” A later result of this method of investigation was the discovery of a new member of the rare earths, monium or victorium, the spectrum of which is characterized by an isolated group of lines, only to be detected photographically, high up in the ultra-violet; th? existence of this body was announced in his presidential address to the British Association at Bristol in 1898. In the same address he called attention to the conditions of the world’s food supply, urging that with the low yield at present realized per acre the supply of wheat would within a comparatively short time cease to be equal to the demand caused by increasing population, and that since nitrogenous manures are essential for an increase in the yield, the hope of averting starvation, as regards those races for whom wheat is a staple food, depended on the ability of the chemist to find an artificial method for fixing the nitrogen of the air. An authority on precious stones, and especially the diamond, he succeeded in artificially making some minute specimens of the latter gem; and on

the discovery of radium he was one of the first to take up the study of its properties, in particular inventing the spinthariscope, an instrument in which the effects of a trace of radium salt are manifested by the phosphorescence produced on a zinc sulphide screen. In addition to many other researches besides those here men- tioned, he wrote or edited various books on chemistry and chemical technology, including Select Methods of Chemical Analysis, which went through a number of editions; and he also gave a certain amount of time to the investigation of psychic phenomena, endeavouring to effect some measure of correlation between them and ordinary physical laws. He was knighted in 1897, and received the Royal (1875), Davy (1888), and Copley (1904) medals of the Royal Society, besides filling the offices of president of the Chemical Society and of the Institution of Electrical Engineers. He married Ellen, daughter of W. Humphrey, of Darlington, and their golden wedding was cele- brated in 1906.

CROOKSTON, a city and the county-seat of Polk county, Minnesota, U.S. A., on the Red Lake river in the Red River valley, about 300 m. N.W. of Minneapolis, and about 25 m. E. of Grand Forks, North Dakota. Pop. (1890) 3457; (1900) 53S9'> (I 9°S. state census) 6794, 2049 being foreign-born, includ- ing 656 from Norway (2 Norwegian weeklies are published), 613 from Canada, 292 from Sweden; (1910 U.S. census) 7559. Crookston is served by the Great Northern and the Northern Pacific railways. It has a Carnegie library, and the St Vincent and Bethesda hospitals, and is the seat of a Federal Land Office and of a state agricultural high school (with an experimental farm). Dams on the Red Lake river provide a fine water-power, and among the city's manufactures are lumber, leather, flour, farm implements, wagons and bricks. The city is situated in a fertile farming region, and is a market for grain, potatoes and other agricultural products, and lumber. Crookston was settled about 1872, was incorporated in 1879, received its first city charter in 1883, arid adopted a new one in 1906. It was named in honour of William Crooks, an early settler.

CROP (a word common in various forms, such as Germ. Kropf, to many Teutonic languages for a swelling, excrescence, round head or top of anything; it appears also in Romanic languages derived from Teutonic, in Fr. as croupe, whence the English " crupper "; and in Ital. groppo, whence English " group "), the ingluvies, or pouched expansion of a bird's oesophagus, in which the food remains to undergo a preparatory process of digestion before being passed into the true stomach. From the meaning of " top " or " head," as applied to a plant, herb or flower, comes the common use of the word for the

produce of cereals or other cultivated plants, the wheat-crop, the

cotton-crop and the like, and generally, ” the crops “; more particular expressions are the ” white-crop,” for such grain crops as barley or wheat, which whiten as they grow ripe, and ” green-crop ” for such as roots or potatoes which do not, and also for those which are cut in a green state, like clover (see Agriculture). Other uses, more or less technical, of the word are, in leather-dressing, for the whole untrimmed hide; in mining and geology, for the ” outcrop ” or appearance at the surface of a vein or stratum and, particularly in tin mining, of the best part of the ore produced after dressing. A ” hunting- crop ” is- a short thick stock for a whip, with a small leather loop at one end, to which a thong- may be attached. From the verb “to crop,” i.e. to take off the top of anything, comes “crop” meaning a closely cut head of hair, found in the name ” croppy ” given to the Roundheads at the time of the Great Rebellion, to the Catholics in Ireland in 1688 by the Orangemen, probably with reference to the priests’ tonsures, and to the Irish rebels of 1798, who cut their hair short in imitation of the French revolutionaries.

CROPSEY, JASPER FRANCIS (1823-1900), American land- scape painter, was born at Rossville, Staten Island, New York, on the 18th of February 1823. After practising architecture for several years, he turned his attention to painting, studying in Italy from 1847 to 1850. In 1851 he was elected a member of the National Academy of Design. From 1857 to 1863 he had a studio in London, and after his return to America enjoyed a considerable vogue, particularly as a painter of vivid autumnal effects, along the lines of the Hudson River school. He was one of the original members of the American Water Color Society. He continued actively in this profession until within a few days of his death, at Hastings-on- Hudson, New York, on the 22nd of June 1900. He made the architectural designs for the stations of the elevated railways in New York City.

CROQUET (from Fr. croc, a crook, or crooked stick), a lawn game played with balls, mallets, hoops and two pegs. The game has been evolved, according to some writers, from the paille- maille which was played in Languedoc at least as early as the 1 3 th century. Under the name of lejeu de la crosse, or la crosserie, a. similar game was at the same period immensely popular in Normandy, and especially at Avranches, but the object appears to have been to send the ball as far as possible by driving it with the mallet (see Sports etjeux d’adresse, 1904, p. 203). Pall Mall, a fashionable game in England in the time of the Stuarts, was played with a ball and a mallet, and with two hoops or a hoop and a peg, the game being won by the player who ran the hoop or hoops and touched the peg under certain conditions in the fewest strokes. Croquet certainly has some resemblance to paille-

maille, played with more hoops and more balls. It is said that the game was brought to Ireland from the south of France, and was first played on Lord Lonsdale's lawn in 1852, under the auspices of the eldest daughter of Sir Edmund Macnaghten. It came to England in 1856, or perhaps a few years earlier, and soon became popular.

In 1868 the first all-comers' meeting was he'd at Moreton-in- the-Marsh. In the same year the All England Croquet Club was formed, the annual contest for the championship taking place en the grounds of this club at Wimbledon. 1 But after being for ten years or so the most popular game for the country house and garden party, croquet was in its turn practically ousted by lawn tennis, until, with improved implements and a more scientific form of play, it was revived about 1894-1895. In 1896-1897 was formed the United All England Croquet Association, on the initiative of Mr Walter H. Peel. Under the name of the Croquet Association, with more than 2000 members and nearly a hundred affiliated clubs (1909), this body is the recognized ruling authority on croquet in the British Islands. Its headquarters are at the Roehampton Club, where the

1 This was largely the work of W. T. Whitmore-Jones (1831-1872), generally known as W. Jones Whitmore, who subsequently formed the short-lived National Croquet Club, and was largely responsible for the first codification of the laws.

championship and champion cup competitions are held each year.

The Game and its Implements. — The requisites for croquet are a level grass lawn, six hoops, two posts or pegs, balls, mallets, and hoop-clips to mark the progress of the players. The usual game is played between two sides, each having two balls, the side consisting of two players in partnership, each playing one ball, or of one player playing both balls. The essential characteristic of croquet is the scientific combination between two balls in partnership against the other two. The balls are distinguished by being coloured blue, red, black and yellow, and are played in that order, blue and black always opposing the other two.

The ground for match play measures 35 yds. by 28 yds., and should be carefully marked out with white lines. In each corner a white spot is marked 1 yd. from each boundary. The hoops are made of round iron, not less than 5 in. and not more than \ in. in diameter, and standing

12 in. out of the ground. For match play they are 3J or 4 in. across, inside measurement. They are set up as in the accompanying diagram, the numbers and arrows indicating the order and direction in which they must

28 uds.

-?»A.

«lt

6\Penultimate ‘, <

I it I

1 1 1 1 ■ ii

*• ■ t -ri *•*

*j; *5\lioaer Hoop ;•*

*■ » * ■ it*

11 . .; 11

*11 » *. .1*

*!• * K .*

i\ $

; |l2Back

3 E

*~*Winnlng \Peg*

*■ <• *» ■ $ ■ ■> ‘*

f|4 V 1J

Fig. 1. — Diagram of croquet ground, showing setting of hoops and pegs, and order of play in accordance with the official Laws (1909) of the Croquet Association.

be passed. Each hoop is run twice, and each peg struck once. The pegs may be struck from any direction.

The pegs are I2 in. in diameter and when fixed stand 18 in. above the ground. The balls were formerly made of boxwood (earlier still of beechwood) ; composition balls are now in general use for tournaments. They must be 35 in. in diameter and 15 oz. to 163 oz. in weight. It will be seen that for match play the hoops are only % or at the most f in. wider than the diameter of the ball. The mallets may be of any size and weight, but the head must be made of wood (metal may be used only for weighting or strengthening purposes), and the ends must be parallel and similar. Only one mallet may be used in the course of a game, except in the case of bona fide damage.

The object of the player is to score the points of the game by striking his ball through each of the hoops and against each of the pegs in a fixed order; and the side wins which first succeeds in scoring all the points with both the balls of the side. A metal clip corresponding in colour with the player's ball is attached to the hoop or peg which that ball has next to make in the proper order, as a record of its progress in the game. No point is scored by passing through a hoop or hitting a peg except in the proper order. Thus, if a player has in any turn or turns driven his ball successively through hoops 1, 2, and 3, his clip is attached to

hoop 4, and the next point to be made by him will be that hoop; and so on till all the points (hoops and pegs) have been scored. Each player starts in turn from any point in a " baulk " or area 3 ft. wide along the left-hand half of the " southern " boundary, marked A on the diagram, of the lawn — till 1906, from a point 1 ft. in front of the middle of hoop 1. If he fails either to make a point or to " roquet " 1 (i.e. drive his ball against) another ball in play, his turn is at an end and the next player in order takes his turn in like manner. If he succeeds in scoring a point, he is entitled (as in billiards) to another stroke; he may then either attempt to score another point, or he may roquet a ball. Having roqueted a ball— provided he has not already roqueted the same ball in the same turn without having scored a point in the interval — he is entitled to two further strokes: first he must " take croquet," i.e. he places his own ball (which from the moment of the roquet is " dead " or " in hand ") in contact with the roqueted ball on any side of it, and then strikes his own ball with his mallet, being bound to move or shake both balls per- ceptibly. If at the beginning of a turn the striker's ball is in contact with another ball, a " roquet " is held to have been made and " croquet " must be taken at once. After taking croquet the striker is entitled to another stroke, with which he may score another point, or roquet another ball not previously roqueted in the same turn since a point was scored, or he may play for safety. Thus, by skilful alternation of making points and roqueting balls, a " break " may be made in which point after point, and even all the points in the game (for the ball in play), may be scored in a single turn, in addition to 3 or 4

points for the partner ball. The chief skill in the game perhaps consists in playing the stroke called ” taking croquet ” (but see below on the ” rush “). Expert players can drive both balls together from one end of the ground to the other, or send one to a distance while retaining the other, or place each with accuracy in different directions as desired, the player obtaining position for scoring a point or roqueting another ball according to the strategical requirements of his position. Care has, however, to be taken in playing the croquet-stroke that both balls are absolutely moved or perceptibly shaken, and that neither of them be driven over the boundary line, for in either event the player’s next stroke is forfeited and his turn brought summarily to an end.

There are three distinct methods of holding the mallet among good players. A comparatively small number still adhere to the once universal ” side stroke,” in which the player faces more or less at right angles to the line of aim, and strikes the ball very much like a golfer, with his hands close together on the mallet shaft. The majority use ” front play,” in which the player faces in the direction in which he proposes to send the ball. The essential characteristic of this stroke is that eye, hand and ball should be in the same vertical plane, and the stroke is rather a swing — the ” pendulum stroke ” — than a hit. There are two ways of playing it. The majority of right-handed front players swing the mallet outside the right foot, holding it with the left hand as a pivot at the top of the shaft, while the right hand (about 12 in. lower down) applies the necessary force, though -it must always be borne in mind that the heavy mallet-head, weighing from 3 to 3§ lb or even more, does the work by itself, and the nearer the stroke is to a simple swing, like that of a pendulum, the more likely it is to be accurate. Either the right or the left foot may be in advance, and should be roughly parallel to the line of aim, the player’s weight being mainly on the rear foot. Most cf the best Irish and some English players swing the mallet between their feet, using a grip like that of the side player or golfer, with the hands close together, and often interlocking. It is claimed that the loss of power caused by the hampered swing — usually compensated by an extra heavy mallet— is more than counterbalanced by the greater accuracy in aim. The beginner is well advised to try all these methods, and adopt that which comes most natural to him. Skirted players, of course, are unable to use the Irish stroke; and, as

1 The words ” roquet ” and ” croquet ” are pronounced as in French, with the t mute.

one of the most meritorious features of croquet is that it is the only out-of-door game in which men and women can compete on terms of real equality, this has been put forward as a reason for barring it, if it is actually an advantage.

When a croquet ground is thoroughly smooth and level, the game gives scope for considerable skill; a great variety of strokes may be played with the mallet, each having its own well-defined effect on the behaviour of the balls, while a knowledge of angles is essential. Skilful tactics are at least as necessary as skilful execution to enable the player so to dispose the balls on the ground while making a break that they may most effectively assist him in scoring his points. The tactics of croquet are in this respect similar to those of billiards, that the player tries to make what progress he can during his own break, and to leave the balls " safe " at the end of it; he must also keep in mind the needs of the other ball of his side by leaving his own ball, or the last player's ball, or both, within easy roqueting distance or in useful positions, and that of the next player isolated. Good judgment is really more valuable than mechanical skill. Croquet is a game of combination, partners endeavouring to keep together for mutual help, and to keep their opponents apart. It is important always to leave the next player in such a position that he will be unable to score a point or roquet a ball; a break, however profitable, which does not end by doing this is often fatal. Formerly this might be done by leaving the next player's ball in such a position that either a hoop or a peg lay between it and all the other balls (" wiring "), or so near to a hoop or peg that there was no room for a proper stroke to be taken in the required direction. Under rule 36 of the Laws of Croquet for 1906, a ball left in such a position, provided it were within a yard of the obstacle (" close-wired "), might at the striker's option be moved one yard in any direction. This rule left to the striker whose ball was " wired " more than a yard from the hoop or peg (" distance-wired ") the possibility of hitting his ball in such a way as to jump the obstacle. The jump-shot is, however, very bad for the lawn, and in 1907 a further provision was made by which the player whose ball is left " wired " from all the other balls by the stroke of an opponent may lift it and play from the " baulk " area. This practically means that " wiring " is impossible. The most that can be done is to " close- wire " the next player from two balls and leave him with a difficult shot at the third. If, however, the next player's ball has not been moved by the adversary, the adversary is entitled to wire the balls as best he can.

The following is a specimen of elementary croquet tactics, If a player is going up to hoop 5 (diagram 1) in the course of a break, he should have contrived, if possible, to have a ball waiting for him at that hoop and another at hoop 6. With the aid of the first he runs hoop 5 and sends it on to the turning peg, stopping his ball in taking croquet close to the ball at 6.

The corner hoops are the difficult ones, and after running hoop 6 the assisting ball is croqueted to 1 back, the peg being struck with the aid of the ball already there, which is again struck and driven to 2 back. If the player has been able to leave the fourth ball in the centre of the ground (known as a centre ball), he hits this after taking croquet, takes croquet, going off it to the ball at 1 back, and continues the break, leaving the centre ball where it will be useful for 3 back and 4 back. A first-class player should, however, be able to make a break with 3 balls almost as easily as with 4. A useful device, especially in a losing game, is to get rid of the opponent's advanced ball if a " rover " {i.e. one which has run all the hoops and is for the winning peg) by croqueting it in such a way that it hits the peg and is thus out of the game. This can be done only by a ball which is itself also a rover. The opponent has then only one turn out of every three, and may be rendered practically helpless by leaving him always in a " safe " position. Inasmuch as a skilful player can cause an opponent's ball to pass through the last two or even three hoops in the course of his turn and then peg it out, it is considered prudent to leave unrun the last three hoops until the partner's ball is well advanced. There is a perennial agitation in the croquet world for a law prohibiting the player from pegging out

his opponent's ball. Many good players also think it desirable, that the four-ball break should be restricted or wholly forbidden, e.g. by barring the dead ball.

To " rush " a ball is to roquet it hard so that it proceeds for a considerable distance in a desired direction. This stroke requires absolute accuracy and often considerable force, which must be applied in such a way as to drive the player's ball evenly; otherwise it is very liable, especially if the ground be not perfectly smooth, to jump the object ball. The rush stroke is absolutely essential to good play, as it enables croquet to be taken {e.g.) close to the required hoop, whereas to croquet into position frcm a great distance and also provide a ball for use after run- ning the hoop is extremely difficult, often impossible. To "rush " successfully, the striker's ball must lie near the object ball, preferably, though not necessarily, in the line of the rush. By means of the rush it is possible to accomplish the complete round with the assistance of one ball only. To " cut " a ball is to hit it on the edge and cause it to move at some desired angle. " Rolling croquet " is made either by hitting near the top of the player's ball which gives it " follow," or by making the mallet so hit the ball as to keep up a sustained pressure. The first impact must, however, result in a distinctly audible single tap; if a prolonged rattle or a second tap is heard the stroke is foul. The passing stroke is merely an extension of this. Here the player's ball proceeds a greater distance than the croqueted ball, but in somewhat the same direction. The " stop stroke " is made by a short, sharp tap, the mallet being withdrawn immedi- ately after contact; the player's ball only

rolls a short distance, the other going much farther. The " jump stroke " is made by striking downwards on to the ball, which can thus be made to jump over another ball, or even a hoop. ■ " Peeling " (a term derived from Walter H. Peel, a famous advocate of the policy) is the term applied to the device of putting a partner's or an opponent's ball through the hoops with a view to ultimately pegging it out.

The laws of croquet, and even the arrangement of the hoops, have not attained complete uniformity wherever the game is played. Croquet grounds are not always of full size, and some degree of elasticity in the rules is perhaps necessary to meet local conditions. The laws by which matches for, the champion- ship and all tournaments are governed are issued annually by the Croquet Association; and though from time to time trifling amendments may be made, they have probably reached permanence in essentials.

See The Encyclopaedia of Sport; The Complete Croquet Player (London, 1896) ; the latest Laws of Croquet, published annually by the Croquet Association, and its official organ The Croquet Gazette. For the principles of the game and its history in England, see C. D. Locock, Modern Croquet Tactics (London, 1907) ; A. Lillie, Croquet up to Date (London, 1900).

Croquet in the United States : Roque. — Croquet was brought to America from England soon after its introduction into that country, and enjoyed a wide popularity as a game for boys and girls before the Civil War (see Miss Alcott's Little Women, cap. 12). American croquet is quite distinct from the modern English game. It is played on a lawn 60 ft. by 30, and preserves the old-fashioned English arrangement of ten hoops, including a central " cage " of two hoops. The balls, coloured red, white, blue and black, are 3} in. in diameter, and the hoops are from 3-| to 4 in. wide, according to the skill of the players. This game, however, is not taken seriously in the United States; the Official Croquet Guide of Mr Charles Jacobus emphasizes " the ease with which the game can be established," since almost every country home has a grass plot, and " no elaboration is needed." The scientific game of croquet in the United States is known as " roque." Under this title a still greater departure from the English game has been elaborated on quite independent lines from those of the English Croquet Association since 1882, in which year the National Roque Association was formed. Roque also suffered from the popularity of lawn tennis, but since 1897 it has developed almost as fast as croquet in England. A great national championship tournament is held in Norwich, Conn.,

-which is fully as scientific as numerous devotees, especially

every August, and the game- modern English croquet — has in New England.

Roque is played, not on grass, but on a prepared surface something like a cinder tennis-court. The standard ground, as adopted by the National Association in 1903, is hexagonal in shape, with ten arches (hoops) and two stakes (pegs) as shown in diagram 2. The length is 60 ft., width 30, and the " corner pieces " are 6 ft. long. An essential feature of the ground is that it is surrounded by a raised wooden border, often lined with india-rubber to facilitate the rebound of the ball, and it is permissible to play a " carom " (or rebounding shot) off this border; a skilful player can often thus hit a ball which is wired to a direct shot. A boundary line is marked 28 in. inside the border, on which a ball coming to rest outside it must be replaced. The hoops are run in the order marked on the diagram, so that the game consists of 36 points. Red and white are always partners against blue and black, and the essential features and tactics of the game are, mutatis mutandis, the same as in modern English croquet — i.e. the skilful player goes always for a break and utilizes one or both of the opponent's balls in making it. The balls are 31 in. in diameter, of hard rubber or composition, and the arches are 3! or 35 in. wide for first- and

Fig. 2. — Diagram of roque ground, showing setting of arches and stakes and order of play, in accordance, with the official laws (1906) of the National Roque Association.

second-class players respectively; they are made of steel \ in. in diameter and stand about 8 in. out of the ground. The stakes are 1 in. in diameter and only i\ in. above the ground. The mallets are much shorter than those commonly employed in England, the majority of players using only one hand, though the two-handed " pendulum stroke," played between the legs, finds an increasingly large number of adherents, on account of the greater accuracy which it gives. The " jump shot " is a necessary part of the player's equipment, as dead wiring is allowed; it is supplemented by the carom off the border or off a stake or arch, and roque players justly claim that their game is more like billiards than any other out-of-door game.

The game of roque is opened by scoring (stringing) for lead from an imaginary line through the middle wicket (cage), the player whose ball rests nearest the southern boundary line having the choice of lead and balls. The balls are then placed on the four corner spots marked A in diagram, partner balls being diagonally opposite one another, and the starting ball having the choice of either of the upper corners. The leader, say red, usually begins by shooting at white; if he misses, a carom off the

border will leave him somewhere near his partner, blue. White then shoots at red or blue, with probably a similar result. Blue is then " in," with a certain roquet and the choice of laying for red or going for an immediate break himself. The general strategy of the game corresponds to that of croquet, the most important differences being that " pegging out " is not allowed, and that on the small ground with its ten arches and two stakes the three-ball break is usually adopted,

the next player or "danger ball" being wired at the earliest opportunity.

See Spalding's Official Roque Guide, edited by Mr Charles Jacobus (New York, 1906).

CRORE (Hindustani karor) , an Anglo-Indian term for a hundred lakhs or ten million. It is in common use for statistics of trade and especially coinage. In the days when the rupee was worth its face value of 2s. a crore of rupees was exactly worth a million sterling, but now that the rupee is fixed at 15 to the £1, a crore is only worth £666,666.

CROSBY, HOWARD (1826-1891), American preacher and teacher, great-grandson of Judge Joseph Crosby of Massa- chusetts and of Gen. William Floyd of New York, a signer of the Declaration of Independence, was born in New York City on the 27th of February 1826. He graduated in 1844 from the University of the City of New York (now New York Univer- sity); became professor of Greek there in 1851, and in 1859 became professor of Greek in Rutgers College, New Brunswick, New Jersey, where two years later he was ordained pastor of the first Presbyterian church. From 1870 to 1881 he was chancellor of the University of the City of New York; from 1872 to 1 88 1 was one of the American revisers of the English version of the New Testament; and in 1873 was moderator of the general assembly of the Presbyterian Church. He took a prominent part in politics, urged excise reform, opposed " total abstinence," was one of the founders and was the first president of the New York Society for the Prevention of Crime, and pleaded for better management of Indian affairs and for inter- national copyright. Among his publications are The Lands of the Moslem (1851), Bible Companion (1870), Jesus: His Life and Works (1871), True Temperance Reform (1879), True Humanity of Christ (188.0), and commentaries on the book of Joshua (1875), Nehemiah (i877)and the New Testament (1885).

His son, Ernest Howard Crosby (1856-1907), was a social reformer, and was born in New York City on the 4th of November 1856. He graduated at the University of the City of New York in 1876 and at Columbia Law School in 1878; served in the New York Assembly in 1887-1889, securing the passage of a high-licence bill; in 1889-1894 was a judge of the Mixed

Tribunal at Alex- andria, Egypt, resigning upon coming under the influence of Tolstoy; and died in New York City on the 3rd of January 1907. He was the first president (1894) of the Social Reform Club of New York City, and was president in 1900-1905 of the New York Anti-Imperialist League; was a leader in settlement work and in opposition to child labour, and was a disciple of Tolstoy as to universal peace and non-resistance, and of Henry George in his belief in the " single tax " principle. His writings, many of which are in the manner of Walt Whitman, comprise Plain Talk in Psalm and Parable (1899), Swords and Plough- shares (1902), and Broadcast (1905), all in verse; an anti- military novel, Captain Jinks, Hero (1902); and essays on Tolstoy (1904 and 1905) and on Garrison (1905).

CROSS, and CRUCIFIXION (Lat. crux, crucis 1). The meaning ordinarily attached to the word " cross " is that of a figure composed of two or more lines which intersect, or touch each other transversely. Thus, two pieces of wood, or other material, so placed in juxtaposition to one another, are understood to form a cross. It should be noted, however, that Lipsius and other writers speak of the single upright stake to which criminals were bound as a cross, and to such a stake the name of crux simplex has been applied. The usual conception, however, of a cross is that of a compound figure.

Punishment by crucifixion was widely employed in ancient times. It is known to have been used by nations such as those of Assyria, Egypt, Persia, by the Greeks, Carthaginians,

1 Derivatives of the Latin crux appear in many forms in European languages, cf. Ger. Kreuz, Fr. croix, It. croce, &c. ; the English form seems Norse in origin (O.N. Krosse, mod. Kors). The O.E. name was rod, rood (q.v.).

Macedonians, and from very early times by the Romans. It has been thought, too, that crucifixion was also used by the Jews themselves, and that there is an allusion to it (Deut. xxi. 22, 23) as a punishment to be inflicted.

Two methods were followed in the infliction of the punishment of crucifixion. In both of these the criminal was first of all usually stripped naked, and bound to an upright stake, where he was so cruelly scourged with an implement, formed of strips of leather having pieces of iron, or some other hard material, at their ends, that not merely was the flesh often

stripped from the bones, but even the entrails partly protruded, and the anatomy of the body was disclosed. In this pitiable state he was reclothed, and, if able to do so, was made to drag the stake to the place of execution, where he was either fastened to it, or impaled upon it, and left to die. In this method, where a single stake was employed, we have the crux simplex of Lipsius. The other method is that with which we are more familiar, and which is described in the New Testament account of the cruci- fixion of Jesus Christ. In such a case, after the scourging at the stake, the criminal was made to carry a gibbet, formed of two transverse bars of wood, to the place of execution, and he was then fastened to it by iron nails driven through the outstretched arms and through the ankles. Sometimes this was done as the cross lay on the ground, and it was then lifted into position. In other cases the criminal was made to ascend by a ladder, and was then fastened to the cross. Probably the feebleness, or state of collapse, from which the criminal must often have suffered, had much to do in deciding this. It is not quite clear which of these two plans was followed in the case of the cruci- fixion of Christ, but the more general opinion has been that He was nailed to the cross on the ground, and that it was then lifted into position. The contrary opinion, has, however, prevailed to some extent, and there are representations of the crucifixion which depict Him as mounting a ladder placed against the cross. Such representations may, however, have been due to a pious desire, on the part of their authors, to emphasize the voluntary offering of Himself as the Saviour of the World, rather than as being intended for actual pictures of the scene itself. It may be noted, however, that among the " Emblems of the Passion," as they are called, and which were very favourite devices in the middle ages, the ladder is not infrequently found in con- junction with the crown of thorns, nails, spear, &c.

From its simplicity of form, the cross has been used both as a religious symbol and as an ornament, from the dawn of man's civilization. Various objects, dating from periods long anterior to the Christian era, have been found, marked with crosses of different designs, in almost every part of the old • world. India, Syria, Persia and Egypt have all yielded number- less examples, while numerous instances, dating from the later Stone Age to Christian times, have been found in nearly every part of Europe. The use of the cross as a religious symbol in pre-Christian times, and among non-Christian peoples, may probably be regarded as almost universal, and in very many cases it was connected with some form of nature worship. Two of the forms of the pre-Christian cross which are perhaps most fre- quently met with are the tau cross, so named from its resem- blance to the Greek capital letter J, and the svastika or fylfot 1 IJ-j , also called " Gammadion " owing to its form being that of four Greek capital letters gamma f placed together. The tau cross

1 The acceptance of this word as the English equivalent for this peculiar form of the cross rests only, according to the New English Dictionary, on a MS. of about 1500 in the Lansdowne collection, which gives details for the erection of a memorial stained-glass window, "... the fylfot in the nedermost pane under ther I knele_. . . "; in the sketch given with the instructions a cross occupies the space indicated. It is a question, therefore, whether " fylfot " is a name for any device suitable to" fill the foot " of any design, or the name peculiar to this particular form of cross. The word is not, as was formerly accepted, a corruption of the O. Eng. feowerfete, four-footed.

Fig. 1.

Fig. 2.

is a common Egyptian device, and is indeed often called the Egyptian cross. The svastika has a very wide range of dis- tribution, and is found on all kinds of objects. It was used as a religious emblem in India and China at least ten centuries before the Christian era, and is met with on Buddhist coins and inscriptions from various parts of India. A fine sepulchral urn found at Shropham in Norfolk, and now in the British Museum, has three bands of cruciform ornaments round it. The two uppermost of these are plain circles, each of which contains a plain cross; the lowest band is formed of a series of squares, in each of which is a svastika. In the Vatican Museum there is an Etruscan fibula of gold which is marked with the svastika, but it is a device of such common occurrence on objects of pre-Christian origin, that it is hardly necessary to specify individual instances. The cross, as a device in different forms, and often enclosed in a circle, is of frequent occurrence on coins and medals of pre-Christian date in France and elsewhere. Indeed, objects marked with pre-Christian crosses are to be seen in every important museum.

The death of Christ on a cross necessarily conferred a new significance on the figure, which had hitherto been associated with a conception of religion not merely non-Christian, but in its essence often directly opposed to it. The Christians of early times were wont to trace, in things around them, hidden pro- phetical allusions to the truth of their faith, and such a testimony they seem to have readily recognized in the use of the cross as a religious emblem by those whose employment of it betokened a belief most repugnant to their own. The adoption by them of such forms, for example, as the tau cross and the svastika or fylfot was no doubt influenced by the idea of the occult Christian significance which they thought they recognized in those forms, and which they could use with a special meaning among them- selves, without at the same time arousing the ill-feeling or shocking the sentiment of those among whom they lived.

It was not till the time of Constantine that the cross was publicly used as the symbol of the Christian religion. Till then its employment had been restricted, and private among the Christians themselves. Under Constantine it became the acknowledged symbol of Christianity, in the same way in which, long afterwards, the crescent was adopted as the symbol of the Mahommedan religion. Constantine's action was no doubt influenced by the vision which he believed he saw of the cross in the sky with the accompanying words a> tovtciJ v'iko., as well as by the story of the discovery of the true cross by his mother St Helena in the year 326. The legend is that, when visiting the holy places in Palestine, St Helena was guided to the site of the crucifixion by an aged Jew who had inherited traditional knowledge as to its position. After the ground had been dug to a considerable depth, three crosses were found, as well as the superscription placed over the Saviour's head on the cross, and the nails with which he had been crucified. The cross of the Lord was distinguished from the other two by the working of a miracle on a crippled woman who was stretched upon it. This finding, or " invention," of the holy cross by St Helena is commemorated by a festival on the 3rd of May, called the " Invention of the Holy Cross. " The legend was widely accepted as true, and is related by writers such as St Ambrose, Rufinus, Sulpicius Severus and others, but it is discounted by the existence of an older legend, according to which the true cross was found in the reign of Tiberius, and while St James the Great was bishop of Jerusalem, by Protonice, the wife of Claudius.

In recent times an attempt has been made to reconcile the two accounts, by attributing to St Helena the rediscovery of the true cross, originally found by Protonice, and which had been buried again on the spot. A change was made in 1895 in the Diario Romano, when the word Rilrovamento was sub- stituted for that of Invenzione, in the name of the festival of the 3rd of May. After St Helena's discovery a church was built upon the site, and in it she placed the greater portion of the cross. The remaining portion she conveyed to Byzantium, and thence Constantine sent a piece to Rome, where it is said to be still preserved in the church of S. Croce in Gerusalemme,

which was built to receive so precious a relic. It is exposed for the veneration of the faithful on Good Friday, 3rd of May, and the third Sunday in Lent, each year.

Another festival of the holy cross is kept on the 14th of September, and is known as the " Exaltation of the Holy Cross." It seems to have originated

with the dedication, in the year 335, of the churches built on the sites of the crucifixion and the holy sepulchre. The observance of this festival passed from Jerusalem to Constantinople, and thence to Rome, where it appears to have been introduced in the 7th century. By some it is thought that the feast of the Exaltation of the Cross had its origin in Constantine's vision of the cross in the sky in the year 317, but whether it originated then, or, as is more generally supposed, at the dedication of the churches at Jerusalem, there is no doubt that it was afterwards kept with much greater solemnity in consequence of the recovery of the portion of the cross St Helena had left at Jerusalem, which had been taken away in the Persian victory, and was restored to Jerusalem by Heraclitus in 627. Pope Clement VIII. (1592-1604) raised the festival of the Exaltation of the Holy Cross to the dignity, liturgically known as that of a Greater Double.

Before leaving the story of St Helena and the cross, it may be convenient to allude briefly to the superscription placed over the Saviour's head, and the nails, which it is said that she found with the cross. The earlier tradition as to the super- scription is obscure, but it would seem that it ought to ,be considered part of the relic which Constantine sent to Rome. By some means it was entirely lost sight of until the year 1492, when it is said that it was accidentally found in a vault in the church of S. Croce in Gerusalemme at Rome. Pope Alexander III. published a bull certifying to the truth of this rediscovery of the relic, and authenticated its character.

As regards the nails, a question has arisen whether there were three or four. In the earliest pictures of the Crucifixion the feet are shown as separately nailed to the cross, but at a later period they are crossed, and a single nail fixes them. In the former case there would be four nails, and in the latter only three. Four is the number generally accepted, and it is said that one was cast by St Helena into the sea, during a storm, in order to subdue the waves, another is said (but the legend cannot be traced far back) to have been beaten out into the iron circlet of the crown of Lombardy, while the remaining two are reputed to be preserved among the relics at Milan and Trier respectively.

The employment of the cross as the Christian symbol has been so manifold in its variety and application, and the different forms to which the figure has been adapted and elaborated are so complex, that it is only possible to deal with the outline of the subject.

We learn from Tertullian and other early Christian writers of the constant use which the Christians of those days made oi the sign of the cross. Tertullian (De Cor. Mil. cap. iii.) says: " At each journey and progress, at each coming in and going out, at the putting on of shoes, at the bath, at meals, at the kindling of lights, at bedtime, at sitting down, whatsoever

occupation engages us, we mark the brow with the sign of the cross." With so frequent an employment of the sign of the cross in their domestic life, it would be strange if we did not find that it was very frequently used in the public worship of the church. The earliest liturgical forms are comparatively late, and are without rubrics, but the allusions by different writers in early times to the ceremonial use of the sign of the cross in the public services are so numerous, and so much importance was attached to it, that we are left in no manner of doubt on the point. St Augustine, indeed, speaks of the sacraments as not duly ministered if the use of the sign of the cross were absent from their ministration (Horn, cxviii. in S. Joan.). Of the later liturgical use of the sign of the cross there is little need to speak, as a reference to the service books of the Greek and Latin churches will plainly indicate the frequency of, and the import- ance attached to, its employment. Its "occasional use is retained by the Lutherans, and in the Church of England it is authori-

Fig. 5-

Fig. 6.

tatively used at baptism, and at the " sacring " or anointing of the sovereign at the coronation.

Passing from the sign to the material figures of the cross, a very usual classification distinguishes three main forms: (1) the crux immissa, or capitata "f (fig. 3) known also as the Latin cross, or if each limb is of the same length, + (fig. 4) as the Greek cross; (2) the crux decussata, formed like the letter X, and (3) the crux commissa or tau cross, already mentioned. It was on a crux immissa that Christ is believed to have been crucified. The crux decussata is known as St Andrew's cross, from the traditioa that St Andrew was _, _

put to death on a cross of that form. The 3 " 4 '

crux commissa is often called St Anthony's cross, probably only because it resembles the crutch with which the great hermit is generally depicted.

The cross in one form or other appears, appropriately, on the flags and ensigns of many Christian countries. The English cross of St George is a plain red cross on a white ground, the Scottish cross of St Andrew is a plain diagonal white cross on a blue ground, and the Irish cross of St Patrick is a plain diagonal red cross on a white ground. These three crosses are combined in the Union Jack (see Flag).

The cross has also been adopted by many orders of knighthood. Perhaps the best known of these is the cross of the knights of Malta. It is a white

cross of eight points on a black ground (fig. 5) and is the proper Maltese cross, a name which is often wrongly applied to the cross patie (fig. 6). The knights of the Garter use the cross of St George, as do those of the order of St Michael and St George, the knights of the Thistle use St Andrew's cross, and those of St Patrick the cross of St Patrick charged with a shamrock leaf. The cross of the Danish order of the Dannebrog (fig. 7) affords a good example of this use of the cross. It is in form a white cross patee, superimposed upon a red one of the same form, and is surmounted by the royal cipher and crown, and has upon its surface the royal cipher repeated, and the legend, or motto, " Gud og Kongen " = " God and the King." (For crosses of monastic orders see Costume.) ■ –

Akin to the crosses of knightly orders are those which figure as charges on coats of arms. The science of heraldry evolved a wonderful variety of cross-forms during the period it held sway in the middle ages. The different forms of cross used in heraldry are, in fact, so numerous that it is only the larger works on that subject which attempt to record them all. For such crosses see Heraldry.

In the middle ages the cross form, in one way or another, was predominant everywhere, and was introduced whenever opportunity offered itself for doing so. The larger churches were planned on its outline, so that the ridge line of their roofs pro- claimed it far and wide. This was more particularly followed in the north of Europe, but when it was first introduced is not quite certain. All the ancient cathedral churches of England and Wales are cruci- form in plan, except Llandaff.

The artistic skill and ingenuity of the medieval designer has produced cross designs of endless variety, and of singular G 'X' c ^° ssoft " e elegance and beauty. Some of the most beautiful of these designs are the gable crosses of the old churches. Fig. 8 shows the west gable cross of Washburn church, Worcestershire; fig. 9 that of the nave of Castle Acre church, Norfolk; and fig. 10 the east gable cross of Hethersett church in that county. They may be taken as good examples of a type of cross which is often of great beauty, but it is ovei- looked, owing to its bad position for observation.

Other architectural crosses, of great beauty of design, are those which occur on the grave slabs of the middle ages. Instances of a plainer type occur in Saxon times, but it was not till after the nth century that they were fashioned after the intricate and beautiful designs with which our ancient churches are, as a rule, so plentifully supplied. Sometimes these crosses are

incised in the slab, and almost as often they are executed in low relief. The long shaft of the cross is most commonly plain, but there are a very large number of instances in which this is not so, and in which branches, with leaf designs, are thrown

Fig. 8.

Fig. 9.

Fig. 10.

out at intervals the entire length of the shaft. In some cases the shaft rises from a series of steps at its base, and in such a case the name of a Calvary cross is applied to it. Fig. 1 1 , from Strad- sett church, Norfolk, and fig. 12 from Bosbury church, Hereford- shire, are good examples of the designs at the head of sepulchral crosses. Often, by the side of the cross, an emblem or symbol is placed, denoting the calling in life of the person commemorated. Thus a sword is placed to indicate a knight or soldier, a chalice for a priest, and so forth; but it would be travelling beyond the scope of this article to enter into a discussion as to such symbols. Of upright standing crosses, the Irish and Iona types are well known, and their great artistic beauty and elaboration and excellence of sculpture are universally recognized. These crosses are sometimes spoken of as " Runic Crosses " ; and the inter- lacing knotwork design with which many of them are ornamented

Fig. 11.

Fig. 12.

is also at times spoken of as " Runic." This is an erroneous application of the word, and has arisen from the fact that some of these crosses bear inscriptions in Runic characters. Standing crosses, of different kinds, were commonly set up in every suitable place during the middle ages, as the mutilated bases and shafts still remaining readily testify. Such crosses were erected in the centre of the market place, in the churchyard, on the village green, or as boundary stones, or marks to guide the traveller. Some, like the Black Friars cross at Hereford, were preaching stations, others, like the beautiful Eleanor crosses at North- ampton, Geddington and Waltham, were commemorative ip character. Of these latter crosses, which marked the places

where the funeral procession of Queen Eleanor halted, there were originally ten or more, erected between 1241 and 1294. They were placed at Lincoln, Northampton, Stony Stratford, Woburn, Dunstable, St Albans, Waltham and London (Cheapside and Charing Cross). The cross at Geddington

differs in outline from those at Northampton and Waltham, and it is not recorded on the roll of accounts for the nine others, all of which are mentioned, but there is no real doubt that it commemorates the resting of the coffin of the queen in Geddington church on its way from Harby. These crosses, like the Black Friars cross at Hereford, are elaborate architectural erections, and very similar to them in this respect are the beautiful market crosses at Winchester, Chichester, Salisbury, Devizes, Shepton Mallet, Leighton Buzzard, &c. Of churchyard crosses, as distinguished from memorial crosses in churchyards, one only is believed to have escaped in a perfect condition the ravages of time, and the fanaticism of the past. It stands in the churchyard of Somerby, in Lincolnshire (Tennyson's birthplace), and is a tall shaft surmounted by a pedimented tabernacle, on one side of which is the crucifixion, and on the other the figure of the Virgin and Child. Churchyard crosses may have been used as occasional preaching stations, for reading the Gospel in the Palm Sunday procession, and generally for public proclamations, made usually at the conclusion of the chief Sunday morning service, much in the same way that market crosses were used on market days as places for proclamations in the towns.

Of the ecclesiastical use of the sign of the cross mention has already been made, and it is desirable to mention briefly one or two instances of the ecclesiastical use of the cross itself. From a fairly early period it has been the prerogative of an archbishop or metropolitan, to have a cross borne before him within the limits of his province. The question urged between the arch- bishops of Canterbury and York about the carrying of their crosses before tnem, in each other's province, was a fruitful source of controversy in the middle ages. The archiepiscopal cross must not be confused with the crozier or pastoral staff The latter, which is formed with a crook at the end, is quite distinct, and is used by archbishops and bishops alike, who bear it with the left hand in processions, and when blessing the people. The archiepiscopal cross, on the contrary, is always borne before the archbishop, or during the vacancy of the archiepiscopal see before the guardian of the spiritualities se.de vacante. The bishop of Dol in Brittany, of ordinary diocesan bishops, alone possessed the privilege of having a cross borne before him in his diocese. Good illustrations of the archiepiscopal cross occur on the monumental brasses of Archbishop Waldeby, of York (1397), at Westminster Abbey, and of Archbishop Cranley, of Dublin (1417) in New College chapel, Oxford.

The custom of carrying a cross at the head of an ecclesiastical procession can be traced back to the end of the 4th century. The cross was originally taken from the altar, and raised on a pole, and so borne before the procession. Afterwards a separate cross was provided for processions, but in poor churches, where this was not the case, the altar cross continued to be used till quite a late period. A direction to this effect occurs as late as

1829, in the Rituel published for the diocese of La Rochelle in that year. In England altar crosses were not very usual in the middle ages.

As a personal ornament the cross came into common use, and was usually worn suspended by a chain fiom the neck. A cross of this kind, of very great interest and beauty, was found about 1690, on the breast of Queen Dagmar, the wife of Waldemar II., king of Denmark (d. 12 13). It is of Byzantine design and workmanship, and is of enamelled gold (fig. 13 shows both sides of it) ; on one side is the Crucifixion, and on the other side the half figure of our Lord in the centre, with the Virgin and St John the Evangelist on either side, and St Chrysostom and St Basil above and below. From the way in which such crosses were worn, hanging over the chest, they are called pectoral crosses. At the present day a pectoral cross forms part of the recognized insignia of a Roman Catholic bishop, and is worn by him over his robes, but this official use of the pectoral cross is not ancient, and no instance is known of it in England before the Reformation.

The custom appears to have taken rise in the 16th century on the continent. It was not unusual to wear cruciform reliquaries, as objects of personal adornment, and such a reliquary was found on the body of St Cuthbert, when his tomb was opened in 1827, but it was placed under, and not over his episcopal vest- ments, and formed no part of his bishop's attire. The custom

Fig. 13. — Dagmar Cross.

or wearing a pectoral cross over ecclesiastical robes has, curiously enough, been copied from the comparatively modern Roman Catholic usage by the Lutheran bishops and superintendents in Scandinavia and Prussia; and in Sweden the cross is now delivered to the new bishop, on his installation in office, by the archbishop of Upsala, together with the mitre and crozier. Within the last generation the use of a pectoral cross, worn over their robes as part of the insignia of the episcopal office, has been adopted by some bishops of the Church of England, but it has no ancient sanction or authority.

Authorities.— Mortillet, Le Signe de la croix avant le Christianisme (Paris, 1866); Bingham, Antiquities of the Christian Church; Lipsius, De Cruce Christi; Lady Eastlake, History of our Lord, vol. ii. ; Cutts, Manual of Sepulchral Slabs and Crosses; (Anon.) Hand- book to Christian and Ecclesiastical Rome, part ii. (London, 1897); Veldeuer, History of the Holy

Cross (reprint, 1863). (T. M. F.)

CROSSBILL (Fr. Bec-croise, Ger. Kremschnabel) , the name given to a genus of birds, belonging to the family Fringillidae, or finches, from the unique peculiarity they possess among the whole class of having the horny sheaths of the bill crossing one another obliquely, 1 whence the appellation Loxia (Xo£6s, obliquus), conferred by Gesner on the group and continued by Linnaeus. At first sight this singular structure appears so like a deformity that writers have not been wanting to account it such, 2 ignorant of its being a piece of mechanism most beautifully adapted to the habits of the bird, enabling it to extract with the greatest ease, from fir-cones or fleshy fruits, the seeds which form its usual and almost invariable food. Its mode of using this unique instrument seems to have been first described by Townson {Tracts on Nat. Hist., p. 116, London, J 799), but only partially, and it was Yarrell who, in 1829 (Zool. Journ., iv. pp. 457-465, pi. xiv. figs. 1-7), explained fully the means whereby the jaws and the muscles which direct their movements become so effective in riving asunder cones or apples, while at the proper moment the scoop-like tongue is instantaneously thrust out and withdrawn, conveying the hitherto protected seed to the bird's mouth. The articulation of the mandible to the quadrate-bone is such as to 'allow of a very considerable amount of lateral play, and, by a particular arrangement of the muscles which move the former, it comes to pass that so soon as the bird opens its mouth the point of the mandible is brought immediately opposite to that of the maxilla (which itself is movable vertically), instead of crossing or overlapping it — the usual position when the mouth is closed. The two points thus meeting, the bill is

1 This peculiarity is found as an accidental malformation in the crows (Corvidae) and other groups; it is comparable to the mon- strosities seen in rabbits and other members of the order Glires, in which the incisor teeth grow to an inordinate length. _ 2 A medieval legend ascribes the conformation of bill and colora- tion of plumage to a divine recognition of the bird's pity, bestowed on Christ at the crucifixion.

inserted between the scales or into the pome, but on opening the mouth still more widely, the lateral motion of the mandible is once more brought to bear with great force to wrench aside the portion of the fruit attacked, and then the action of the tongue completes the operation, which is so rapidly performed as to defy scrutiny, except on very close inspection. Fortunately the birds soon become tame in confinement, and a little patience will enable an attentive observer to satisfy himself as to the process, the result of which at first seems almost as unaccountable as that of a clever conjuring trick.

The common crossbill of the Palaearctic region (Loxia curvi- rostra) is

about the size of a skylark, but more stoutly built. The young (which on leaving the nest have not the tips of the bill crossed) are of a dull olive colour with indistinct dark stripes on the lower parts, and the quills of the wings and tail dusky. After the first moult the difference between the sexes is shown by the hens inclining to yellowish-green, while the cocks become diversified by orange-yellow and red, their plumage finally deepening into a rich crimson-red, varied in places by a flame- colour. Their glowing hues, are, however, speedily lost by examples which may be kept in confinement, and are replaced by a dull orange, or in some cases by a bright golden-yellow, and specimens have, though rarely, occurred in a wild state exhibiting the same tints. The cause of these changes is at present obscure, if not unknown, and it must be admitted that their sequence has been disputed by some excellent authorities, but the balance of evidence is certainly in favour of the above statement. De- pending mainly for food on the seeds of conifers, the movements of crossbills are irregular beyond those of most birds, and they would seem to rove in any direction and at any season in quest of their staple sustenance. But the pips of apples are also a favourite dainty, and it is recorded by the old chronicler Matthew Paris (Hist. Angl. MS. fol. 252), that in 1251 the orchards of England were ravaged by birds, " pomorum grana, & non aliud de eisdem pomis comedentes," which, from his description, " Habebant autem partes rostri cancellatas, per quas poma quasi forcipi vel cultello dividebant," could be none other but crossbills. Notice of a like visitation in 1593 is recorded, but of late it has become evident that not a year passes without crossbills being observed in some part or other of England, while in certain localities in Scotland they seem to breed annually. The nest is rather rudely constructed, and the eggs, generally four in number, resemble those of the greenfinch, but are larger in size. This species ranges throughout the continent of Europe, 3 and occurs in the islands of the Mediterranean and in the fir- woods of the Atlas. In Asia it would seem to extend to Kamtschatka and Japan, keeping mainly to the forest-tracts.

Three other forms of the genus also inhabit the Old World — two of them so closely resembling the common bird that their specific validity has been often questioned. The first of these, of large stature, the parrot-crossbill (L. pityopsittacus), comes occasionally to Great Britain, presumably from Scandinavia, where it is known to breed. The second (L. himalayana) , which is a good deal smaller, is only known from the Himalaya Mountains. The third, the two-barred crossbill (L. tacnioptera), is very distinct, and its proper home seems to be the most northern forests of the Russian empire, but it has occasionally occurred in western Europe and even in England.

The New World has two birds of the genus. The first (L. americana), representing the common British species, but with a smaller bill, and the

males easily recognizable by their more scarlet plumage, ranges from the northern limit of coniferous trees to the highlands of Mexico, or even farther. The other (L. leucoptera) is the equivalent of the two-barred crossbill, but smaller. It has twice occurred in England. (A. N.)

CROSSEN, or Krossen, a town of Germany, in the kingdom of Prussia, on the Oder, here crossed by a bridge, at the influx of the Bober, 31 m. S.E. of Frankfort-on-Oder by rail. Pop. (1900) 7369. Of the churches in the town three are Protestant.

8 Dr Malmgren found a small flock on Bear Island (lat. 74I N.), but to this barren spot they must have been driven by stress of weather.

and one Roman Catholic. Besides the modern school (Real-progymnasium), there are a technical school for viniculture and fruit-growing and a dairy school. There are manu- factories of copper and brass ware, cloth, &c, while in the surrounding country the chief industries are fruit and grape growing. There is a brisk shipping trade, mainly in wine, fruit and fish. Crossen was founded in 1005 and was important during the middle ages as a point of passage across the Oder. It attained civic rights in 1232, was for a time.the capital of a Silesian duchy, which, on the death of Barbara of Brandenburg, widow of the last duke, passed to Brandenburg (1482). In May 1886 the town was devastated by a whirlwind.

CROSSING, in architecture, the term given to the intersection of the nave and transept, frequently surmounted by a tower or by a dome on pendentives.

CROSSKEY, HENRY WILLIAM (1826-1893), English geologist and Unitarian minister, was born at Lewes in Sussex, on the 7th of December 1826. After being trained for the ministry at Manchester New College (1 843-1 848), he became pastor of Friargate chapel, Derby, until 1852, when he accepted charge of a Unitarian congregation in Glasgow. In 1869 he removed to Birmingham, where until the close of his life he was pastor of the Church of the Messiah. While in Glasgow his interest was awakened in geology by the perusal of A. C. Ramsay's Geology of the Isle of Arran, and from 1855 onwards he devoted his leisure to the pursuit of this science. He became an authority on glacial geology, and wrote much, especially in conjunction with David Robertson, on the post-tertiary fossiliferous beds of Scotland {Trans. Geol. Soc. Glasgow). He also prepared for the British Association a valuable series of Reports

(1873-1892) on the erratic Blocks of England, Wales and Ireland. In conjunction with David Robertson and G. S. Brady he wrote the Monograph of the Post Tertiary Entomostraca of Scotland, &c. for the Palaeontographical Society (1874); and he edited H. Carvill Lewis' Papers and Notes on the Glacial Geology of Great Britain and Ireland, issued posthumously (1894). He died at Edgbaston, Birmingham, on the 1st of October 1893.

See H. W. Crosskey: his Life and Work, by R. A. Armstrong (with chapter on his geological work by Prof. C. Lapworth, 1895).

CROSS RIVER, a river of West Africa, over 500 m. long. It rises in 6° N , io° 30′ E. in the mountains of Cameroon, and flows at first N.W. In 8° 48′ E., 5° 50′ N. are a series of rapids; below this point the river is navigable for shallow-draught boats. At 8° 20′ E., 6° 10′ N., its most northern point, the river turns S. W. and then S., entering the Gulf of Guinea through the Calabar estuary. The Calabar river, which rises about 5° 30′ N., 8° 30′ E., has a course parallel to, and 10 to 20 m. east of, the Cross river. Near its mouth, on its east bank, is the town of Calabar (q.v.). It enters the estuary in 4 45′ N. The Cross, Calabar, Kwa and other streams farther east, which rise on the flanks of the Cameroon Mountains, form a large delta. The Calabar and Kwa rivers are wholly within the British protectorate of Southern Nigeria, as is the Cross river from its mouth to the rapids mentioned. The upper course of the river is in German territory.

CROSS-ROADS, BURIAL AT, in former times the method of disposing of executed criminals and suicides. At the cross-roads a rude cross usually stood, and this gave rise to the belief that these spots were selected as the next best burying-places to consecrated ground. The real explanation is that the ancient Teutonic peoples often built their altars at the cross-roads, and as human sacrifices, especially of criminals, formed part of the ritual, these spots came to be regarded as execution grounds. Hence after the introduction of Christianity, criminals and suicides were buried at the cross-roads during the night, in order to assimilate as far as possible their funeral to that of the pagans. An example of a cross-road execution-ground was the famous Tyburn in London, which stood on the spot where the Oxford, Edgware and London roads met.

CROSS SPRINGER, in architecture, the block from which the diagonal ribs of a vault spring or start: the top of the springer is known as the skewback (see Arch).

CROTCH, WILLIAM (1775-1847), English musician, was born in Green's Lane, Norwich, on the 5th of July 1775. His father was a master carpenter. The child was extraordinarily pre- cocious, and when scarcely more than two years of age he played upon an organ of his parent's

construction something like the tune of " God save the King." At the- age of four he came to London and gave daily recitals on the organ in the rooms of a milliner in Piccadilly. The precocity of his musical intuition was almost equalled by a singularly early aptitude for drawing. In 1786 he went to Cambridge as assistant to Dr Randall the organist. His oratorio The Captivity of Judah was played at Trinity Hall, Cambridge, on the 4th of June 1789. He was then only fourteen years of age. His intention of entering the church carried him to Oxford in 1788, but the superior attractions of a musical career acquired an increasing influence over him, and in 1790 he was appointed organist of Christ Church. At the early age of twenty-two he was appointed professor of music in the university of Oxford, and there in 1799 he took his degree of doctor in that art. In 1800 and the four following years he read lectures on music at Oxford. Next he was appointed lecturer on music to the Royal Institution, and subsequently, in 1822, principal of the London Royal Academy of Music. His last years were passed at Taunton in the house of his son, the Rev. W. R. Crotch, where he died suddenly on the 29th of December 1847. He published a number of vocal and instrumental compositions, of which the best is his oratorio Palestine, produced in 1812. In 1831 appeared an 8vo volume containing the substance of his lectures on music, delivered at Oxford and in London. Previously, he had published three volumes of Specimens of Various Styles of Music. Among his didactic works is Elements of Musical Composition and Thorough- Bass (London, 1812). The oratorio bearing the title The Captivity of Judah, and produced on the occasion of the installa- tion of the duke of Wellington as chancellor of the university of Oxford in 1834, is a totally different work from that which he wrote upon the same subject as a boy of fourteen. He arranged for the pianoforte a number of Handel's oratorios and operas, besides symphonies and quartetts of Haydn, Mozart and Beethoven. The great expectations excited by his infant precocity were not fulfilled; for he manifested no extraordinary genius for musical composition. But he was an industrious student and a sound artist, and his name remains familiar in English musical history.

CROTCHET (from the Fr. croche, a hook; whence also the Anglicized " crochet," pronounced as in French, for the knitting- work done with a hook instead of on pins), properly a small hook, and so used of the hook-like setae or bristles found in certain worms which burrow in sand. In music, a "crotchet " is a note of half the value of a minim and double that of a quaver; it is marked by a round black head and a line without a tail or hook; the French croche is used of a " quaver " which has a tail, but in ancient music the semiminima, the modern crotchet, is marked by an open note with a hook. Derived either from an old French proverbial phrase, il a des crochues en teste, or from a meaning of twist or turn, as in the similar expression " crank," comes the sense of a whim, fancy or perverse idea,

seen also in the adjective " crotchety " of a fussy unreasonable person.

CROTONA, Croto or Croton (Gr. Kporow, mod. Cotrone) a Greek town on the E. coast of the territory of the Bruttii (mod. Calabria), on a promontory 7 m. N.W. of the Lacinian promontory. It was founded by a colony of Achaeans led by Myscellus in 710 B.C. Its name was, according to the legend, that of a local prince who afforded hospitality to Heracles, but was accidentally killed by him and buried on the spot. Like Sybaris, it soon became a city of power and wealth. It was especially celebrated for its successes in the Olympic games from 588 B.C. onwards, Milo being the most famous of its athletes. Pythagoras established himself here between 540 and 530 B.C. and formed a society of 300 disciples (among whom was Milo), who acquired considerable influence with the supreme council of 1000 by which the city was ruled. In 510 B.C. Crotona was strong enough to defeat the Sybarites, with whom it had

previously been on friendly terms, and raze their city to the ground. Shortly afterwards, however, an insurrection took place, by which the disciples of Pythagoras were driven out, and a demo- cracy established. The victory of the Locrians and Phlegians over Crotona in 480 B.C. marked the beginning of its decline. It suffered after this from the attacks of Dionysius I., who became its master for twelve years, of the Bruttii, and of Agathocles, and even more from the invasion of Pyrrhus, after which in 277 the Romans obtained possession of it. Livy states that the walls had a length of 1 2 m. and that about half the area within them had at that time ceased to be inhabited. After the battle of Cannae Crotona revolted from Rome, and Hannibal made it his winter quarters for three years. It was made a colony by the Romans at the end of the war (194 B.C.). After that time but little is heard of it, though Petronius mentions the corrupt morals of its inhabitants; but it continues to be mentioned down to the Gothic wars. The importance of the city was mainly due to its harbour, which, though not a good one, was the only port between Tarentum and Rhegium. The original settlement occupied the hill above it (143 ft.) and later became the acropolis. Its healthy situation was famous in antiquity, and to this was ascribed its superiority in athletics; it was the seat also of a medical school which in the days of Herodotus was considered the first in Greece. Of the exact site of the ancient city and its remains practically nothing is known; a few fragments of the productions of its art preserved in private hands at Cotrone are described by F. von Duhn in Notizie degli scam, 1897, 343 seq. (T. As.)

CROTONIC ACID (C 4 H 6 2). Three acids of this empirical formula are known, viz. crotonic acid, isocrotonic acid and methacrylic acid; the constitutional formulae are —

HC-C0 2 H HC-CCUH r ˆ-CH 3

HC-CH, ‘ CH 3 -CH ‘ CH2:(~\C0 2 H –

Crotonic Acid. Isocrotonic Acid. Methacrylic Acid.

The isomerism of crotonic and isocrotonic acids is to be explained on the assumption of a different spatial arrangement of the atoms in the molecule (see Stereochemistry).

Crotonic acid, so named from the fact that it was erroneously supposed to be a saponification product of croton oil, may be prepared by the oxidation of croton-aldehyde, CH 3 – CH :CH- CHO, obtained by dehydrating aldol, or by treating acetylene suc- cessively with sulphuric acid and water: by boiling allyl cyanide with caustic potash; by the distillation of /3-oxybutyric acid; by heating paraldehyde with malonic acid and acetic acid to ioo° C. (T. Komnenos, Ann., 1883, 218, p. 149).

CH 2 (COOH) 2 +CH3CHO-ˆCH 3 CH:C(COOH)2ˆCH s -CH:CH-COOH;

or by heating pyruvic acid with an excess of acetic anhydride and sodium acetate to 160-180 C. (B. Homolka, Ber., 1885, 18, p. 987). It crystallizes in needles (from hot water) which melt at 72 C. and boil at 180-181° C. It is moderately soluble in cold water. It combines directly with bromine, and, with fuming hydrobromic acid at 100° C, it gives chiefly ct-brom- butyric acid. With hydriodic acid it gives only /3-iodobutyric acid. Potash fusion converts it into acetic acid; nitric acid oxidizes it to acetic and oxalic acids; chromic acid mixture to acetaldehyde and acetic acid, and potassium permanganate to

Isocrotonic acid (Quartenylic acid) is obtained from (3-chloriso- crotonic acid, formed when acetoacetic ester is treated with phosphorus pentachloride and the product poured into water, by the action of sodium amalgam (A. Geuther). It is an oil, possessing a smell like that of butyric acid. It boils at 171-9° C., with partial conversion into crotonic acid; the transformation is complete when the acid is heated to 1 70-180° C. in a sealed tube. Potassium permanganate oxidizes it to /37-dioxybutyric acid.

Methacrylic acid was first obtained in the form of its ethyl ester by E. Frankland and B. F. Duppa (Annalen, 1865, 136, p. 12) by acting with phosphorus pentachloride on oxyisobutyric ester (CH 3) 2 -C(OH)-COOC 2 H 6 . It is, however, more readily ob-

tained by boiling citra- or meso-brompyrotartaric acids with alkalis. It crystallizes in prisms, which are soluble in water, melt at 16° C, and boil at 160-5° C. When fused with an alkali, it forms propionic acid; with bromine it yields a/3-dibromiso- butyric acid. Sodium amalgam reduces it to isobutyric acid. A polymeric form of methacrylic acid has been described by F. Engelhorn (Ann., 1880, 200, p. 70).

CROTON OIL (Crotonis Oleum), an oil prepared from the seeds of Croton Tiglium, a tree belonging to the natural order Euphor- biaceae, and native or cultivated in India and the Malay Islands. The tree is from 15 to 20 ft. in height, and has few and spreading branches, alternate, oval-oblong leaves, acuminate at the point, and covered when young with stellate hairs, and terminal racemes of small, downy, greenish-yellow, monoecious flowers. The male blossoms have five petals and fifteen stamens; the females have no petals but a large oblong ovary bearing three bifid styles. The fruit or capsule is obtusely three-cornered, and about the size of a hazel-nut; it contains three cells each enclosing a seed. The seeds resemble those of the castor-oil plant; they are about half an inch long, and two-fifths of an inch broad, and have a cinnamon-brown, brittle integument; between the two halves of the kernel lie the large cotyledons and radicle. The ocular distinction between the two kinds of seeds may be of great practical importance. The most obvious distinction is that the castor-oil seeds have a polished and mottled surface. The kernels contain from 50 to 60 % of oil, which is obtained by pressing them, when bruised to a pulp, between hot plates. Croton oil is a transparent and viscid liquid of a brownish or pale-yellow tinge, and acrid, peculiar and persistent taste, a disagreeable odour and acid reaction. It is soluble in volatile oils, carbon disulphide, and ether, and to some extent in alcohol. It contains acetic, butyric and valeric acids, with glycerides of acids of the same series, and a volatile body, C 5 H 8 2 , tiglic acid, metameric with angelic acid, and identical with methyl- crotonicacid, CH 3 -CH:C(CH 3)(C0 2 H). The odour is due to various volatile acids, which are present to the extent of about 1 %. A substance called crotonal appears to be responsible for its external, but not its internal, action. The latter is probably due to crotolinic acid, C 9 Hi 4 2 , which has active purgative properties. The maximum dose of croton oil is two minims, one-fourth of that quantity being usually ample.

Applied to the skin, croton oil acts as a powerful irritant, inducing so much inflammation that definite pustules are formed. The destruction of the true skin gives rise to ugly scars which constitute, together with the pain caused by this application, abundant reason why croton oil should never be employed externally. Despite the pharmacopoeial liniment and the practice of a few, it may be said that this employment of croton oil is now entirely without justification or excuse.

Taken internally, even in the minute doses already detailed, croton oil very soon causes much colic and the occurrence of a fluid diarrhoea which usually recurs several times. It is char- acteristic of this purgative that it is a hydragogue even in minimal dose, the fluid secretions of the bowel being most markedly increased. The drug appears to act only upon the small intestine. In somewhat larger doses it produces severe gastro-enteritis. The flow of bile is somewhat increased. Such effects may all be produced, even up to the discharge of blood, by the absorption of croton oil from the skin.

The minuteness of the dose, the certainty of the action, and the large amount of fluid drained away constitute this the best drug for administration to an unconscious patient (especially in cases of apoplexy, when it is desirable to remove fluid from the body), or to insane patients who refuse to take any drug. One drop of the oil, placed on the back of the tongue, must inevitably be swallowed by reflex action. A dose should never be repeated. The characters of this drug obviously contra- indicate its use in all cases of organic disease or obstruction of the bowel, in pregnancy, or in cases of constipation in children or the aged.

CROUP, a name formerly given to diseases characterized by distress in breathing accompanied by a metallic cough and some

hoarseness of speech. It is now known that these symptoms are often associated with diphtheria (q.v.), spasmodic laryngitis (q.v.), and a third disease, spasmodic croup, to which the term is now alone applied. This occurs most frequently in children above two years of age; the child goes to bed quite well, and a few hours later suddenly awakes with great difficulty in inspira- tion, the chest wall becomes markedly retracted, and there is a metallic cough. The child becomes cyanosed, and, to the inexperienced nurse, seems in an almost moribund condition. In the course of four or five minutes, normal respiration starts again, and the attack is over for the time being; but it may recur several times a day. The seizure may be accompanied by convulsions, and death has occurred from dyspnoea. The best treatment is to plunge the child into a warm bath, and sponge the back and chest with cold water. Subsequently this can be done two or three times a day. Should the cyanosis become very severe, respiration can be restarted by making the child sick, either with a dose of ipecacuanha wine, or by forcing one's finger down the throat. Generally the bowels should be attended to; and the throat carefully examined for enlarged tonsils or adenoids, which if present should be treated.

CROUSAZ, JEAN PIERRE DE (1663-1750), Swiss writer, was born at Lausanne. He was a many-sided man, whose numerous works on many subjects had a great vogue in their day, but are now forgotten. He has been described as an initiateur plutdt qu'un createur, chiefly because he introduced at Lausanne the philosophy of Descartes in opposition to the reigning Aristotelianism, and also as a Calvinist pendant (for he was a pastor) of the French abbes of the 18th century. He studied at Geneva, Leyden and Paris, before becoming (1700) professor of philosophy and mathematics at the academy of Lausanne, of which he was four times rector before 1724, when the theological disputes connected with the Consensus 1 led him to accept a chair of philosophy and mathematics at Groningen. In 1726 he was appointed governor to the young prince Frederick of Hesse-Cassel, and in 1735 returned to Lausanne with a good pension. In 1737 he was reinstated in his old chair, which he retained to his death. Gibbon, describing his first stay at Lausanne (1752-1755), writes in his Autobiography, "the logic of de Crousaz had prepared me to engage with his master Locke and his antagonist Bayle."

The most important of his works are: Nouvel Essai de logique (1712), Ceometrie des lignes et des surfaces rectilignes et circulaires (1712), Traite du beau (17 14), Examen du traite de la liberie de penser d'Antoine Collins (1718), De Veducation des enfants (1722, dedicated to the then Princess of Wales), Examen du pyrrhonisme ancien et moderne (1733, an attack chiefly on Bayle), Examen de V essai de M. Pope sur I'homme (1737, an attack on the Leibnitzian theory of that poem), Logique (6 vols., 1741), De I'esprit humain (1741), and Reflexions sur I'ouvrage intitule: La Belle Wolfienne (1743)- , (W. A. B. C.)

CROW (Dutch, kraai, Ger. Krdhe, Fr. corbeau, Lat. corvus), a name most commonly applied in Britain to the bird properly called a rook (Corvus frugilegus) , but perhaps originally peculiar to its congener, nowadays usually distinguished as the black or carrion-crow (C. cor one). By ornithologists it is also used in a far wider sense, as under the title crows, or Corvidae, is included a vast number of birds from almost all parts of the world, and this family is probably the most highly developed of the whole class Aves. Leaving out of account the best known of these, as the raven, rook, daw, pie and jay, with their immediate allies, our attention will here be confined to the crows in general; and then the species of the family to which the appellation is more strictly applicable may be briefly considered. All authorities admit that the family is very extensive, and is capable of being parted into several groups, but scarcely any two agree. Especially must reserve be exercised as regards the group Streperinae, or piping crows, belonging to the Australian Region, and referred by some writers to the shrikes (Laniidae) : and the jays too have been erected into a distinct family (Garrulidae) ,

1 The " Consensus ecclesiarum Helveticarum reformatarum " was a document drawn up in 1675 and imposed in 1722 — as a test of strict Protestant orthodoxy as to the doctrine of grace — by Bern on its subjects in Lausanne and Vaux.

though it seems hardly possible to separate them even as a subfamily from the pies (Pica and its neighbours), which lead almost insensibly to the typical crows (Corvinae). Dismissing these subjects for the present, it will perhaps be most convenient to treat of the two groups which are represented by the genera Pyrrhocorax or choughs, and Corvus or true crows in the most limited sense.

Pyrrhocorax comprehends at least two very good species, which have been needlessly divided generically. The best known of them is the Cornish chough (P. graculus), formerly a denizen of the precipitous cliffs of the south coast of England, of Wales, of the west and north coasts of Ireland, and some of the Hebrides, but now greatly reduced in numbers, and only found in such places as are most free from the intrusion of man or of daws (Corvus monedula), which last seem to be gradually dispossessing it of its sea-girt strongholds, and its present scarcity is probably in the main due to its persecution by its kindred. In Britain, indeed, it would appear to be only one of the survivors of a more ancient fauna, for in other countries where it is found it has been driven inland, and inhabits the higher mountains of Europe and North Africa. In the Himalayas a larger form occurs, which has been specifically distinguished (P. himalay- anus), but whether justifiably so may be doubted. The general colour is a glossy black, and it has the bill and legs bright red. The remaining species (P. alpinus) is altogether a mountaineer, and does not affect a sea-shore life. Otherwise it frequents much the same kind of localities, but it does not occur in Britain. The alpine chough is somewhat smaller than its congener, and is easily distinguished by its shorter and bright yellow bill. Remains of both have been found in French caverns the deposits in which were formed during the " Reindeer Age." Commonly placed by systematists next to Pyrrhocorax is the Australian genus Corcorax, represented by a single species (C. melanorhamphus) , but this assignment of the bird, which is chiefly a frequenter of woodlands, cannot be admitted without hesitation.

Coming now to what may be literally considered crows, our attention is mainly directed to the black or carrion-crow (Corvus cor one) and the grey, hooded or Royston crow (C. comix). Both these inhabit Europe, but their range and the time of their appearance are very different. The former is, speaking generally, a summer visitant to the south-western part of Europe, and the latter occupies the north-eastern portion — an irregular line drawn diagonally from about the Firth of Clyde to the head of the Adriatic roughly marking their respective distribution. But both are

essentially migrants, and hence it follows that when the black crow, as summer comes to an end, retires south- ward, the grey crow moves downward, and in many districts replaces it during winter. Further than this, it has been incon- testably proved that along or near the boundary where these two birds march they not infrequently interbreed, and it is believed that the hybrids, which sometimes wholly resemble one or other of the parents and at other times assume an inter- mediate plumage, pair indiscriminately among themselves or with the pure stock. Hence it has seemed to many ornithologists who have studied the subject, that these two birds, so long unhesitatingly regarded as distinct species, are only local races of one and the same dimorphic species. No structural difference — or indeed any difference except that of range (already spoken of) and colour — can be detected, and the problem they offer is one of which the solution is exceedingly interesting if not important to zoologists in general. 2 Almost omnivorous in their diet, there is little edible that comes amiss to them, and, except in South America, they are mostly omnipresent. The fish-crow of North America (C. ossifragus) demands a few words, since it betrays a taste for maritime habits beyond that of other species, but the crows of Europe are not averse on occasion to prey cast up by the waters. The house-crow of India (C. splendens) i& not very nearly allied to its European namesakes, from which

2 As bearing upon this question may be mentioned the fact that the crow of Australia (C. australis) is divisible into two forms or races, one having the irides white, the other of a dark colour. It is stated that they keep apart and do not intermix.

it can be readily distinguished by its smaller size and the lustrous tints of its darkest feathers; while its confidence in the human race has been so long encouraged by its intercourse with an unarmed and inoffensive population that it becomes a plague to the European abiding or travelling where it is abundant. Hardly a station or camp in British India is free from a crowd of feathered followers of this species, ready to dispute with the kites and the cooks the very meat at the fire. (A. N.)

CROWBERRY, or Crakeberry, the English name for a low- growing heath-like shrub, found on heaths and rocks in Scotland, Ireland and mountainous parts of England. It is known botanic- ally as Empetrum nigrum, and has slender, wiry, spreading branches covered with short, narrow, stiff leaves, the margins of which are recurved so as to form a hollow cylinder concealing the hairy under face of the leaf — a device to

avoid excessive loss of water from the leaf under the exposed conditions in which the plant grows. The minute flowers are succeeded by black, edible, berry-like fruits, one-fourth to one-third of an inch in diameter. The plant has a wide distribution, occurring in suitable localities throughout the north temperate zone, and on the Andes of South America.

CROWD, Crouth, Crowth (Welsh crwth; Fr. Grout; Ger. Chrotta, Hrotla), a medieval stringed instrument derived from the lyre, characterized by a sound-chest having a vaulted bac 1 : and an open space left at each side of the strings to allow th j hand to pass through in order to stop the strings on the finger- board. The Welsh crwth, which survived until the end of the 1 8th century, is best represented by a specimen of that date preserved in the Victoria and Albert Museum, and described and illustrated by Carl Engel. 1 The instrument consists of a rectangular sound-chest 22 in. long, o| in. wide and 2 in. deep; the body is scooped out of a single block, the flat belly being glued on. Right through the sound-chest on each side of the finger-board is the character- istic open sp.ace left for the hand to pass through. There are two circular sound-

isThcentu?™' ' holes ; the left foot of the flat bridge, which lies obliquely across the belly, passes through the left sound-hole and rests inside on the back of the instrument. Six catgut strings fastened to a tail-piece are wound round pegs at the top of the crwth; four of these strings lie over the sound-board and bridge, and are set in vibration by means of a bow, while the two others, used as drones and stretched across the left-hand aperture, are twanged by the thumb of the left hand. The shape and shallowness of the bridge make it impossible to sound a single string with the bow; the arrangement of the strings suggests that they were intended to be sounded in pairs. The instrument is

tuned thus:

At the beginning of the 19th century, William Bingley 2 heard a Welsh peasant playing national airs on a crwth strung as

folio

m

Sir John Hawkins 3 relates

that in his time there was still a Welshman living in Anglesca who understood how to play the crwth according to traditional usage. Edward Jones 4 and Daines Barrington 5 both give an account of the Welsh crwth of the 18th century which agrees substantially with Engel's; the illustration communicated by Daines Barrington shows the strings of the crwth -drawn

through holes at the top, and fastened on the back, as on the Persian rebab and other Oriental stringed instruments. On these somewhat scanty authentic records of the instrument, several historians of music

1 See Early History of the Violin Family (London, 1883), pp. 24-36.

2 See A Tour round North Wales (London, 1804), vol. ii. p. 332.

3 History of Music (London, 1766), vol. ii. bk. iii. ch. iii., description and illustration.

4 Musical and Poetical Relicks of Welsh Bards (London, 1794), illustration of crwth, also reproduced by Carl Engel; see note above.

s Archaeologia. vol. iii. (London, 1775).

have based an illogical claim that the crwth, or rather chrotta or rotta, mentioned by Venantius Fortunatus as a British instrument, was the Welsh crwth as it was known in the 18th century, and was the earliest bowed instrument, and therefore the ancestor of the violin. The lines of Fortunatus, who was bishop of Poictiers during the second half of the 6th century, ran thus : — 6

" Romanusque lyra, plaudat tibi Barbarus harpa, Graecus Achilliaca, chrotta Britanna canat."

The bow is not mentioned by Fortunatus, and there is no ground whatever for believing that the Welsh crwth was played with a bow in the 6th century, or indeed for several centuries after. The string- ing of the Welsh crwth with the two drone strings still twanged, the form of the body without incurvations, the flat bridge which rendered bowing, even in the most highly developed specimens of the 1 8th century, a difficult task, together with what is known of the early history of the chrotta and rotta derived from the lyre and cithara and like them twanged by fingers or plectrum, all make the claim untenable. Carl Engel was probably the first to expose the fallacy in his work on the violin. 7

British lexicographers all agree in deriving the words crwth, crowd and other forms of the name, from some word meaning a bulging protuberant bellying form, while in German the etymology of the word Chrotta is given as Chrota or Chreta, the O.H.G. for Krote = toad, Sckildkrote = tortoise. This word Chrotta was un- doubtedly the German equivalent term for the lyre of Hermes, having as back a tortoise-shell, xˆus in Greek and testudo in Latin. Chrotta was also spelt hrotta, and it is easy to see how this

became rotta. A thoughtful and suggestive treatment of the whole subject will be found in Engel's work, to which reference has been made. Just as the lyre and cithara, which appeared to be similar to the casual observer, and are indeed still confused at the present day, were instruments differing essentially in construction 8 ; so there were, during the early middle ages, while lyre and cithara were still in transition, two types of chrotta or rotta. (1) The rotta or im- proved cithara had a body either rectangular with the corners rounded, or guitar-shaped with incurvations, back and sound-board being nearly or quite flat, joined as in the cithara by ribs or sides. This rotta must be reckoned among the early ancestors of the violin before the advent of the bow; it was known both as rotta and cithara, and with a neck added it became the guitar-fiddle. (2) The tortoise or lyre chrotta consisted of a protuberant, very convex back cut out of a block of wood, to which was glued a flat sound- board, at first like the lyre, with- out intermediary ribs. This in- strument became the crwth, and there was no further develop- ment. The first step in the transition of both lyre and cithara was the incorporation of arms and cross-bar into the body, the same outline being preserved ; the second step was the addition of a finger-board against which the strings were stopped, thus increasing the compass while restricting the number of strings to three or four; the third step, observed only in the rotta-cithara, con- sisted in the addition of a neck, 9 as in the guitar. The crwth, crowd, crouth did not undergo this third transition even when the bow was used to set the strings in vibration.

The earliest representation of the crwth yet discovered dates from the Carolingian period. In the miniatures of the Bible of Charles the Bald, 10 in the Bibliotheque Nationale, Paris, one of the musicians of King David is seen stopping strings on the finger-board with his left hand and plucking them with the right (fig. 2) ; this crwth has only three strings, and may be the crwth trithant of Wales. A second example occurs in the Bible of St Paul, 11 another of the magnificent MSS. prepared for Charles the Bald, and preserved during the middle ages in the monastery of St Paul extra muros in Rome (now deposited

ˆ Venantius Fortunatus, Poemata, lib. vii. cap. 8, p. 245 ; see Migne's Patrologia Sacra, vol. 88.

7 Op. cit. chapters " Crwth," " Chrotta," " Rotta."

8 See Kathleen Schlesinger, Orchestral Instruments, part ii., " The Precursors of the Violin Family " (London, 1909), pp. 14 to 23, with illustrations.

9 See also Kathleen Schlesinger, op. cit. ch. vii., " The Cithara in Transition," pp. 111-135 with illustrations.

10 See Auguste de Bastard, Peintures et ornements des MSS. de France, and Peintures, ornements, &c, de la bible de Charles le Chauve, in facsimile (Paris, 1883).

11 See J. O. West wood, Photographic Facsimile of the Bible of St Paul (London, 1876).

12

Drawn from a plate in Auguste de Bastard's Peintures et ornements de la bible de diaries le Chauve.

Fig. 2. — Early Crwth, 9th century.

in that of St Calixtus in Rome). Other representations are in the miniatures of the nth, 12th and 13th centuries. To Edward Heron- Allen {De fidiculis opuscula, viii., 1895) is due the discovery of a representation of the Welsh crwth, showing the form still retained in the 18th cent. On the seal of Roger Wade (1316) is a crwth differing but little from the specimen in the Victoria and Albert

Museum. The 14th-century in- strument had four strings instead of six, and the foot of the bridge does not appear to pass through the sound-hole — a detail which may have escaped the notice of the artist who cut the seal. The original seal lies in the muniment room at Berkeley Castle in Gloucestershire attached to ~ defeasance of a bond between the crowder and his debtor Warren de l'lsle, and a cast (see fig. 3) is preserved at the British Museum. The British M useum also possesses two interesting MSS. which con- cern the crwth : one of these (Add. MS. 14939 ff. 4 and 27) contains an extract made by Lewis Morris in 1742 from an ancient Welsh MS. of " Instructions supposed to be wrote for the Crowd "; the other (Add. MS. 15036 ff. 656 and 66) consists of tracings from a 16th-century Welsh MS. copied in 1610 of a bagpipe, a harp and a krythe, together with the names of those who played the last at the Eisteddfod. The drawing is crude, and shows an instrument similar to Roger Wade's crowd, but having three strings instead of four.

The genealogical tree of the violin given below shows the relative positions of both kinds of rotta and chrotta.

Fig. 3. — Crowd on a 14th- century Seal.

Egyptian \yre-kissar

I Greek lyre or chelys

Roman testudo

Assyrian ketharah

Greek cithara Roman fidicula

Persian cithara

.1

Arab cuitra, guitra

or cuitara

Latin chrotta, Old High Germ. Anglo-Saxon Welsh Cithara in transition, |

rotta, rote Chrota or crowd crwth or rotta Moorish guitarra

Chreta

r

Spanish viguela or vihuela de arco

Guitarra Latina or vihuela de mano

Spanish guitar

Italian viola Violin

French vielle or viole

Guitar-fiddle

The Welsh crwth was therefore obviously not an exclusively Welsh instrument, but only a late 18th-century survival in Wales of an archaic instrument once generally popular in Europe but long obsolete. An interesting article on the subject in German by J. F. W. Wewertem will be found in Monatshefte fur Musik (Berlin, 1881), Nos. 7-12, p. 151, &c. (K. S.)

CROWE, EYRE EVANS (1 799-1868), English journalist and historian, was born about the year 1799. He commenced his work as a writer for the London newspaper press in connexion with the Morning Chronicle, and he

afterwards became a leading contributor to the Examiner and the Daily News. Of the latter journal he was principal editor for some time previous to his death. The department he specially cultivated was that of continental history and foreign politics. He published Lives of Foreign Statesmen (1830), The Greek and the Turk (1853), and Reigns of Louis X VIII. and Charles X. (1854). These were followed by his most important work, the History of France (5 vols., 1858-1868). It was founded upon original sources, in order to consult which the author resided for a considerable time in Paris. He died in London on the 25th of February 1868.

CROWE, SIR JOSEPH ARCHER (1828-1896), English consular official and art critic, son of Eyre Crowe, was born in London on the 25th of October 1828. At an early age he showed consider- able aptitude for painting and entered the studio of Delaroche in Paris, where his father was correspondent of the Morning Chronicle. During the Crimean War he was the correspondent of

the Illustrated London News, and during the Austro-Italian War represented The Times in Vienna. He was British consul- general in Leipzig from i860 to 1872, and in Diisseldorf from 1872 to 1880, when he was appointed commercial attache in Berlin, being transferred in a like capacity to Paris in 1882. In 1883 he was secretary to the Danube Conference in London; in 1889 plenipotentiary at the Samoa Conference in Berlin; and in 1890 British envoy at the Telegraph Congress in Paris, in which year he was made K.C.M.G. During a sojourn in Italy, 1846-1847, he cemented a lifelong friendship with the Italian critic Giovanni Battista Cavalcaselle (1820-1897), arid together ;hey produced several historical works on art of classic import- ance, notably Early Flemish Painters (London, 1857); A New History of Painting in Italy from the Second to the Sixteenth Century (London, 1864-1871, 5 vols.). In 1895 Crowe published Remin- iscences of Thirty-Five Years of My Life. He died at Schloss Gamburg in Bavana on the 6th of September 1896.

Crowe and Cavalcaselle's great History of Painting was under revision by Crowe up to the time of his death, and then by S. A. Strong (d. 1904) and Langton Douglas, who in 1903 brought out vols. i. and ii. of Murray's new six-volume edition, the 3rd vol., edited by Langton Douglas, appearing in 1909. A reprint of the original edition, brought up to date by annotations by Edward Huttons, was published by Dent in 3 vols, in 1909.

CROW INDIANS, or Absarokas (the name for a species of hawk), a tribe of North American Indians of Siouan stock. They are now settled to the number of some 1800 on a reservation in southern Montana to the south of the Yellowstone river.

Their original range included this reservation and extended eastward and southward, and no part of the country for hundreds of miles around was safe from their raids. They have ever been known as marauders and horse-stealers, and, though they have generally been cunning enough to avoid open war with the whites, they have robbed them when- ever opportunity served. Physically they are tall and athletic, with very dark complexions.

CROWLAND, or Croyland, a market-town in the S. Kesteven or Stamford parliamentary division of Lincolnshire, England; in a low fen district on the river Welland, 8 m. N.E. of Peter- borough, and 4 m. from Postland'station on the March-Spalding line of the Great Northern and Great Eastern railways, and Peakirk on the Great Northern. Pop. (1901) 2747. Amonastery was founded here in 716 by King ˆEthelbald, in honour of St Guthlac of Mercia (d. 714), a young nobleman who became a hermit and lived here, and, it was said, had foretold ˆEthelbald's accession to the throne. The site of St Guthlac's cell, not far from the abbey, is known as Anchor (anchorite's) Church Hill. After the abbey had suffered from the Danish incursions in 870, and had been burnt in that year and in 1091, a fine Norman abbey was raised in 11 13. Remains of this building appear in the ruined nave and tower arch, but the most splendid fragment is the west front, of Early English date, with Perpendicular restoration. The west tower is principally in this style. The north aisle is restored and used as the parish church. Among the abbots was Ingulphus (1085-1109), to whom was formerly attributed the Historia Monasterii Croylandensis. A curious triangular bridge remains, apparently of the 14th century, but referred originally to the middle of the 9th century, which spanned three streams now covered, and affords three footways which meet at an- apex in the middle.

The town of Crowland grew up round the abbey. By a charter dated 716, / Ethelbald granted the isle of Crowland, free from all secular services, to the abbey with a gift of money, and leave to build and enclose the town. The privileges thus

Fidel, fidula,

fyella, fythele,

&c.

Fiddle

obtained were confirmed by numerous royal charters extending over a period of nearly 800 years. Under Abbot ˆEgelric the fens were tilled, the monastery grew rich, and the town increased in size, enormous tracts of land being held by the abbey at the Domesday Survey. The town was nearly destroyed by fire (1469-1476), but the abbey tenants were given money to rebuild it. By virtue of his office the abbot had a seat in parliament, but the town was never a parliamentary borough. Abbot Ralph Mershe in 1257 obtained a grant of a market every Wednesday, confirmed by Henry IV. in 1421, but it was afterwards moved to Thorney. The annual fair of St Bartholomew, which originally lasted twelve days, was first mentioned in Henry III.'s con- firmatory charter of 1227. The dissolution of the monastery in 1539 was fatal to the progress of the town, which had prospered under the thrifty rule of the monks, and it rapidly sank into the position of an umimportant village. The abbey lands were granted by Edward VI. to Lord Clinton, from whose family they passed in 1671 to the Orby family. The inhabitants formerly carried on considerable trade in fish and wild fowl.

See R. Gough, History and Antiquities of Croyland (Bibl. Top. Brit, iii. No. 11) (London, 1783); W. G. Searle, Ingulf and the Historia Croylandensis (Camb. Antiq. Soc, No. 27); Dugdale, Monasticon, ii. 91 (London, 1846; Cambridge, 1894).

CROWLEY, ROBERT (1518 ?-i 588), English religious and social reformer, was born in Gloucestershire, and educated at Magdalen College, Oxford, of which he was successively demy and fellow. Coming to London, he set up a printing-office in Ely Rents, Holborn, where he printed many of his own writings. As a typographer, his most notable production was an edition of Pierce Plowman in 1550, and some of the earliest Welsh printed books came from his press. As an author, his first venture seems to have been his " Information and Petition against the Oppressors of the poor Commons of this realm," which internal evidence shows to have been addressed to the parliament of 1547. It contains a vigorous plea for a further religious reformation, but is more remarkable for its attack on the " more than Turkish tyranny " of the landlords and capitalists of that day. While repudiating communism, Crowley was a Christian Socialist, and warmly approved the efforts of Protector Somerset to stop enclosures. In his Way to Wealth, published in 1550, he laments the failure of the Protector's policy, and attributes it to the organized resistance of the richer classes. In the same year he published (in verse) The Voice of the last Trumpet blown by the seventh Angel; it is a rebuke in twelve " lessons " to twelve different classes of people; and a similar production was his One-and-Thirty Epigrams (1550). These, with Pleasure and Pain (1551), were edited for the Early English Text Society in 1872 (Extra Ser. xv.). The dozen or more other works which Crowley published are more distinctly theological:

indeed, the failure of the temporal policy he advocated seems to have led Crowley to take orders, and he was ordained deacon by Ridley on the 29th of September 1 5 5 1 . During Mary's reign he was among the exiles at Frankfort. At Elizabeth's accession he became a popular preacher, was made archdeacon of Hereford in 1559, and prebendary of St Paul's in 1563, and was incumbent first of St Peter's the Poor in London, and then of St Giles' without Cripplegate. He refused to minister in the " conjuring garments of popery," and in 1566 was deprived and imprisoned for resisting the use of the surplice by his choir. He stated his case in " A brief Discourse against the Outward Apparel and Ministering Garments of the Popish Church," a tract " memorable," says Canon Dixon, " as the first distinct utterance of Nonconformity." He con- tinued to preach occasionally, and in 1576 was presented to the living of St Lawrence Jewry. Nor had he abandoned his con- nexion with the book trade, and in 1578 he was admitted a freeman of the Stationers' Company. He died on the 18th of June 1588, and was buried in St Giles'. The most important of his works not hitherto mentioned is his continuation of Languet and Cooper's Epitome of Chronicles (1559).

See J. M. Cowper's Pref. to the Select Works of Crowley (1872); Strype's Works; Gough's General Index to Parker Soc. Publ.;

Machyn's Diary; Macray's Reg. Magdalen College; Newcourt's Rep. Eccles. Lond.; Hennessy's Nov. Rep. Eccl. (1898); Le Neve's Fasti Eccl. Angl.; Pocock's Burnet; Pollard's England under Somerset; R. W. Dixon's Church History. (A. F. P.)

CROWN, an English silver coin of the value of five shillings, hence often used to express the sum of five shillings. It was originally of gold and was first coined in the reign of Henry VIII. Edward VI. introduced silver crowns and half-crowns, and down to the reign of Charles II. crowns and half-crowns and some- times double crowns were struck both in gold and silver. In the reign of Edward VI. also was introduced the practice of dating coins and marking them with their current value. The " Oxford crown " struck in the reign of Charles I. was designed by Rawlins (see Numismatics: Medieval). Since the reign of Charles II. the crown has been struck in silver only. At one time during the 19th century it was proposed to abandon the issue of the crown, and from 1861 until 1887 none was struck, but since the second issue in 1887 it has been freely in circulation again.

CROWN and CORONET, an official or symbolical ornament worn on or round the head. The crown (Lat. corona) at first had no regal significance. It was a garland, or wreath, of leaves or flowers, conferred on the winners in the athletic games. After- wards it was often made of gold, and among the Romans was bestowed as a recognition of honourable service performed

or distinction won, and on occasion it took such a form as to correspond with, or indicate the character of, the service rendered. The corona obsidionalis was formed of grass and flowers plucked on the spot and given to the general who conquered a city. The corona civica, made of oak leaves with acorns, was bestowed on the soldier who in battle saved the life of a Roman citizen. The mural crown (corona tnuralis) was the decoration of the soldier who was the first to scale the walls of a besieged city, and was usually a circlet of gold adorned with a series of turrets. The naval crown (corona navalis), decorated in like manner with a series of miniature prows of ships, was the reward of him who gained a notable victory at sea. These latter crowns form charges in English heraldry (see Heraldry).

Many other forms of crown were used by the Romans, as the conqueror's triumphal crown of laurel, the myrtle crown, and the convivial, bridal, funeral and other crowns. Some of the emperors wore crowns on occasion, as Caligula and Domitian, at the games, and stellate or spike crowns are depicted on the heads of several of the emperors on their coins, but no idea of imperial sovereignty was indicated thereby. The Roman people, who had accepted imperial rule as a fact, were very jealous of the employment of its emblem on the part of their rulers. That emblem was the diadem, and although the diadem and crown are frequently confused with each other they were quite distinct, and it is well to bear this in mind. The diadem, which was of eastern origin, was a fillet or band of linen or silk, richly embroidered, and was worn tied round the forehead. Selden (Titles of Honour, chap. viii. sect. 8) says that the diadem and crown " have been from ancient times confounded, yet the diadem strictly was a very different thing from what a crown now is or was, and it was no other then than only a fillet of silk, linen, or some such thing." It is desirable to remember the distinction, for, although diadem and crown are now used as synonymous terms, the two were originally quite distinct. The confusion between them has, perhaps, come about from the fact, that the modern crown seems to be rather an evolution from the diadem than the lineal descendant of the older crowns. The linen or silk diadem was eventually exchanged for a flexible band of gold, which was worn in its place round the forehead. The further development of the crown from this was readily effected by the addition of an upper row of ornament. Thus the medieval and modern crowns may be considered as radiated diadems, and so the diadem and crown have become, as it were, merged in one another.

Among the historical crowns of Europe, the Iron Crown of Lombardy, now preserved at Monza, claims notice. It is a band of iron, enclosed in a circlet formed of six plates of gold,

hinged one to the other, and richly jewelled and enamelled. It is regarded with great reverence, owing to a legend that the inner band of iron has been hammered out of one of the nails of the true cross. The crown is so small, the diameter being only 6 in., and the circlet only 2\ in. in width, that doubts have been felt as to whether it was originally intended to be worn on the head or was merely meant to be a votive crown. The legend as to the iron being that of one of the nails of the cross is rejected by Miiratori and others, and cannot be traced far back. How it arose or how any credence came to be reposed in the legend, it is difficult to surmise. Another historical crown is that of Charlemagne, preserved at Vienna. It is composed of a series of four larger and four smaller plaques of gold, rounded at the tops and set together alternately. The larger plaques art richly ornamented with emeralds and sapphires, and the smaller plaques have each an enamelled figure of Our Lord, David, Solomon, and Hezekiah respectively. A jewelled cross rises from the large front plaque, and an arch bearing the name of the emperor Conrad springs across from the back of this cross to the back of the crown.

At Madrid there is preserved the crown of Svintilla, king of the Visigoths, 621-631. It is a circlet of thick gold set with pearls, sapphires and other stones. It has been given as a votive offering at some period to a church, as was often the custom. Attached to its upper rim are the chains whereby to suspend it, and from the lower rim hang letters of red-coloured glass or paste which read +svintilanvs rex offeret. Two other Visigothic crowns are also preserved with it in the Armeria Real.

In 1858 a most remarkable discovery was made near Toledo, of eight gold crowns of the 7th century, fashioned lavishly with barbaric splendour. They are now in the Cluny Museum at Paris, having been purchased for £4000, the intrinsic value of the gold, without reckoning that of the jewels and precious stones, being not less than £600. The largest and most magnifi- cent is the crown of Reccesvinto, king of the Visigoths from 653 t0 675. It is composed of a circlet of pure gold set with pearls and precious stones in great profusion, which gives it a most sumptuous appearance. It is 9 in. in diameter and more than 5 in. in thickness, the width of the circlet being 4 in. It has also been given as a votive offering to a church, and has

soon afterwards followed they were buried out of sight for safety, where they were eventually discovered absolutely unharmed centuries afterwards. For a detailed description of these most remarkable crowns the reader must be referred to a paper by the late Mr Albert Way {Archaeological Journal, xvi. 253). Mr Way, in the article alluded to, says of the custom of offering crowns to churches that frequent notices of the usage may be found in the

lives of the Roman pontiffs by Anastasius. " They are usually described as having been placed over the altar, and in many instances mention is made of jewelled crosses of gold appended within such crowns as an accessory ornament. . . •. The crowns suspended in churches suggested doubtless the sumptuous pensile luminaries, frequently desig- nated from a very early period as coronae, in which the form of the royal circlet was preserved in much larger proportions, as exemplified by the remarkable corona still to be seen suspended in the cathedral at Aix-la- Chapelle over the crypt in which the body of Charlemagne was deposited."

Of modern continental crowns the imperial crown of Austria (fig. 4) may be mentioned. It is composed of a circlet of gold, adorned with precious stones and pearls, heightened with fleurs-de-lys, and is raised above the circlet in the form of a cap which is opened in the middle, so that the lower part is crescent- shaped; across this opening from front to back rises an arched fillet, enriched with pearls and surmounted by an orb, on which is a cross of pearls.

The papal tiara (a Greek word, of Persian origin, for a form of ancient Persian popular head-dress, standing high erect, and worn encircled by a diadem by the kings), the triple crown worn by the popes, has taken various forms since the 9th century. It is important to remember that the tiaras in old Italian pictures are inventions of the artists and not copied from actual examples. In its present shape, dating substantially from the Renaissance, it is a peaked head-covering not unlike a closed mitre (q.v.), round which are placed one above the other three circlets or open

Fig. 1. — The Papal Tiara (without the infulae).

Figs. 2-4 from Meyer's Konversations Lexikon.

Fig. 2. — Crown of the Holy Roman Empire.

Fig. 3. — Crown of the German Empire.

Fig. 4. — Crown of the Austrian Empire.

the chains to hang it by attached to the upper rim, while from the lower rim depend pearls, sapphires and a series of richly jewelled letters 2 in. each in depth, which read +RECCES- vinthvs rex OFFERET. The second of these crowns in size is generally thought to be that of the queen of Reccesvinto. It has no legend, but merely a cross hanging from it. The six others are smaller, and are all most richly ornamented. They are believed to have been the crowns of Reccesvinto's children. From one of them hangs a legend which relates that they were an offering to a church, which has been identified with much probability as that of Sorbas, a small town in the province of Almeria. It has been surmised that in the disturbances which

crowns. 1 Two bands, or infulae, as they are called, hang from it as in the case of a mitre. The tiara is the crown of the pope as a temporal sovereign (see Tiara).

1 A coloured drawing, done in the first half of the 18th century, of the magnificent tiara made by the celebrated goldsmith, Cara- dosso, for Julius II., is in the Print-Room, British Museum. It was re-fashioned by Pius VI., but went with other treasure as part of the indemnity to Napoleon. The splendid emerald at the summit, which was engraved with the arms of Gregory XIII., was restored by Napoleon and now adorns another papal tiara at Rome. In this drawing the three crowns (a feature introduced at the beginning of the 14th century) are represented by three bands of X-shaped ornament in enamelled gold.

Pictorial representations in early manuscripts, and the rude effigies on their coins, are not very helpful in deciding as to the form of crown worn by the Anglo-Saxon and Danish kings of England before the Norman Conquest. In some cases it would appear as if the diadem studded with pearls had been worn, and in others something more of the character of a crown. We reach surer ground after the Conquest, for then the great seals, monu- mental effigies, and coins become more and more serviceable in determining the forms the crown took.

The crown of William the Conqueror and his immediate successors seems

to have been a plain circlet with four uprights,

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8. Fig. 9. Fig. 10.

Royal Crowns. William I. to Henry IV.

which terminated in trefoils (fig. 5), but Henry I. enriched the circlet with pearls or gems (fig. 6), and on his great seal the trefoils have something of the character of fleurs-de-lys. The effigy of Richard I. at Fontevrault shows a development of the crown; the trefoil heads are expanded, and are chased and jewelled. The crown of John is shown on his effigy at Worcester, though unfortunately it is rather badly mutilated. It shows, however, that the upper ornament was of neurons set with jewels. Fig. 7 shows generally this development of the crown in a restored form. The crown on the effigy of Henry III. at Westminster had a beaded row below the circlet, which is narrow and plain, and from it rises a series of plain trefoils with slightly raised points between them. The tomb was opened in 1774, and on the king's head was found an imitation crown of tin or latten gilt, with trefoils rising from its upper edge. This, although only made of base metal for the king's burial, may nevertheless be taken as exhibiting the form of the royal crown at the time, and it may be usefully compared with that on the effigy of the king, which was made in Edward I.'s reign (fig. 8). Edward I. used a crown of very similar design. In the crown of Edward II. we have perhaps the most graceful and elegant of all the forms which the English medieval crown assumed (fig. 9), and it seems to have continued without any marked alteration during the reigns of Edward III. and Richard II. The crown on the head of the effigy of Henry IV. at Canterbury evidently represents one of great magnificence, both of design and ornament. What is perhaps lost of the grace of form of the crown of Edward II. is made up for by a profusion of adorn- ment and ornamentation unsurpassed at any later period (fig. 10). The circlet is much wider and is richly chased and jewelled, and from it rise eight large leaves, the intervening spaces being filled with fleurs-de-lys of definite outline. It will be noted that this crown is, like its predecessors, what is known as an open crown, without any arches rising from the circlet, but in the accounts of the coronation of Henry IV. by Froissart and Waurin it is distinctly stated that the crown was arched in the form of a cross. This is the earliest mention of an arched crown, which is not represented on the great seal till that of Edward IV. in 1461. The crown, as shown on Henry

IV. 's effigy, very probably represents the celebrated " Harry crown " which was afterwards broken up and employed as surety for the loan required by Henry V. when he was about to embark on his expedition to France. Fig. n shows the crown of Henry V. The crown of

Henry VI. seems to have had three arches, and there is the same number shown on the crown of Henry VII., which ensigns the hawthorn bush badge of that king. The crown of Edward IV. (fig. 1 2) shows two arches, and a crown similarly arched appears on the great seal of Richard III. Crowns, both open and arched, are represented in sculpture and paintings until the end of the reign of Edward IV., and the royal arms are occasionally ensigned by an open crown as late as the reign of Henry VIII. The crown of Henry VII. on his effigy in Westminster Abbey shows a circlet surmounted by four crosses and four fleurs-de-lys alternately, and has two arches rising from it. A similar crown appears on the great seal of Henry VIII. The crown of Henry VII. (fig. 13), which ensigns the royal arms above the south door of King's College chapel, Cambridge, has the motto of the order of the Garter round the circlet. Fig. 14 shows the form of crown used by Edward VI., but a tendency (not shown in the illustra- tion) began of flattening the arches of the crown, and on some of the coins of Elizabeth the arches are not merely flattened, but are depressed in the centre, much after the character of the arches of the crown on many of the silver coins of the 19th century prior to 1887. The crowns of James I. and Charles I. had four arches, springing from the alternate crosses and fleurs- de-lys of the circlet (fig. 15). The crown which strangely enough surmounts the shield with the arms of the Commonwealth on the coins of Oliver Cromwell (as distinguished from those of the Commonwealth itself, which have no crown) is a royal crown with alternate crosses and fleurs-de-lys round the circlet, and is surmounted by three arches, which, though somewhat flattened, are not bent. On them rests the orb and cross. The crown used by Charles II. (fig. 16) shows the arches depressed in the centre, a feature of the royal crown which seems to have been continued henceforward till 1887, when the pointed form of the arches was resumed, in consonance with an idea that such a form indicated an imperial rather than a regal crown, Queen Victoria having been proclaimed empress of India in 1877. In the foregoing account the changes of the form of the crowns of the kings have been briefly noticed. Those crowns were the personal crowns, worn by the different kings on various state occasions, but they were all crowned before the Commonwealth with the ancient crown of St Edward, and the queens consort with that of Queen Edith. There were, in fact, two sets of regalia, the one used for the coronations and kept at Westminster,

Fig. ii.

Fig. 12.

Fig. 13.

Fig. 14. Royal Crowns.

Fig. 15. Henry V. to Charles I.

and the other that used on other occasions by the kings and kept in the Tower. The crowns of this latter set were the personal crowns made to fit the different wearers, and are those which have been briefly described. The crown of St Edward; with which the sovereigns were crowned, had a narrow circlet from which rose alternately four crosses and four fleurs-de-lys, and from the crosses sprang two arches, which at their crossing supported an orb and cross. These arches must have been a later addition, and possibly were first added for the coronation of Henry IV. {vide supra). Queen Edith's crown had a plain

circlet with, so far as can be determined, four crosses of pearls or gems on it, and a large cross patee rising from it in front, and arches of jewels or pearls terminating in a large pearl at the top. A valuation of these ancient crowns was made at the time of the Commonwealth prior to their destruction. From this valuation we learn that St Edward's crown was of gold filigree or " wirework " as it is called, and was set with stones, and was valued at £248. Queen Edith's crown was found to be only of silver-gilt, with counterfeit pearls, sapphires and other stones,

Fig. 16. Fig. 17.

Recent Forms of the English Crown,

and was only valued at £16. At the Restoration an endeavour was made to reproduce as well as possible the old crowns and regalia according to their ancient form, and a new crown of St Edward was made on the lines of the old one for the coronation of Charles II. The framework of this crown, bereft of its- jewels, is in the possession of Lady Amherst of Hackney. The crowns of James II., William III. and Anne generally resembled it in form (fig. 16). The later crowns of the Georges and William IV. are represented in general form in fig. 17. Although the marginal note in the coronation order of Queen Victoria indicates " K. Edward's crown " as that with which the late queen was to be crowned, it was actually the state or imperial crown worn by the sovereign when leaving the church after the ceremony that was used. It had been altered for the coronation, and the arches were formed of oak leaves (fig. 18). Fig. 19 shows Queen Victoria's crown with

raised arches and without the inner cap of estate, which since the reign of Henry VII. has been degraded into forming a lining to the crowns of the sovereigns and the coronets of the peers. Fig. 20 shows the coronation crown of King Edward VII. The crown of Scotland, preserved with the Scottish regalia at Edinburgh, is believed to be composed of the original circlet worn by King Robert the Bruce. James V.

Fig. 18. Fig. 20.

Coronation Crowns of Queen Victoria and King Edward VII.

made additions to it in 1535, and in general characteristics it much resembles an English crown of that date.

The kings of arms in England, Scotland and Ireland wear crowns, the ornamentation of which round the upper rim of the circlet is composed of a row of acanthus or oak leaves. Round the circlet is the singularly inappropriate text from Psalm li., " Miserere mei Deus secundum magnam misericordiam tuam." The form of these crowns seems to have been settled in the reign of Charles II. Before that period they varied at different times, according to representations given of them in grants of arms, &c.

This brings us to the crowns of lesser dignity, known for that reason as coronets, and worn by the five orders of peers.

The use of crowns by dukes originated in 1362, when Edward III. created his sons Lionel and John dukes of Clarence and Lancaster respectively. This was done by investing them with a sword, a cap of maintenance or estate, and with a circlet of gold set with precious stones, which was imposed on the head. Previous to this dukes had been invested at their creation by the girding on of a sword only. In 1387 Richard II. created Richard de Vere marquess of Dublin, and invested him by girding on a sword, and by placing a golden circlet on his head. The golden circlet was confined to dukes and marquesses till 1444, when Henry VI. created Henry Beauchamp, earl of Warwick, premier earl, and the letters patent effecting this concede that the earl and his heirs shall wear a golden circlet on the head on feast days, even in the royal presence. As to the form of these circlets we have no clear knowledge. The dignity of a viscount was first created by Henry VI. in 1439, but nothing is said of any insignia pertaining to that dignity.

Fig. 21.

Fig. 22.

Fig. 23. Coronets of Dukes, Marquesses and Earls.

It is believed that a circlet of gold with an upper rim of pearls was first conferred on a viscount by James I., who conceded it to Robert Cecil, Viscount Cranborne. However, in 1625-1626 it is definitely recorded that the viscounts carried their coronets in their hands in the coronation procession from Westminster Hall to the Abbey church. The use of a coronet by the barons dates from the coronation of Charles II., and by letters patent of the 7th of August

1 66 1 their coronet is de- / Hl?r'fc^^' , $iflB > ^ ^ ■ ■ iVtT? i ■ ■ Stt t ' '}*

scribed as a circle of gold with six pearls on it.

At the present day the coronet of a duke (fig. 21) is formed of

Fig. 24. Fig. 25.

Coronets of Viscounts and Barons.

a circlet of gold, from which rise eight strawberry leaves. The coronet of a marquess (fig. 22) differs from that of a duke in having only four strawberry leaves, the intervening spaces being occupied by four low points which are surmounted by pearls. The coronet of an earl (fig. 23) differs again by having eight tall rays on each of which is set a pearl, the intervening spaces being occupied by strawberry leaves one-fourth of the height of the rays. The coronet of a viscount (fig. 24) has sixteen small pearls fixed to the golden circlet, and the coronet of a baron (fig. 25) has six large pearls similarly arranged.

Authorities. — L. G. Wickham Legg, English Coronation Records (London, 1901); The Ancestor, Nos. i. and ii. (London, 1902); Stothard, The Monumental Effigies of Great Britain (London, 1817).

(T. M. F.)

CROWN DEBT, in English law, a debt due to the crown. By various statutes — the first dating from the reign of Henry VIII. (1541) — the crown has priority for its debts before all other creditors. At common law the crown always had a lien on the lands and goods of debtors by record, which could be enforced even when they had passed into the hands of other persons. The difficulty of ascertaining whether lands were subject to a crown lien or not was often very great, and a remedy was pro- vided by the Judgments Act 1839, and the Crown Suits Act

1865. Now by the Land Charges Act 1900, no debt due to the crown operates as a charge on land until a writ of execution for the purpose of enforcing it has been registered under the Land Charges Registration and Searches Act 1888. By the Act of 1541 specialty debts were put practically on the same footing as debts by record. Simple contract debts due to the crown also become specialty debts, and the rights of the crown are enforced by a summary process called an extent (see Writ).

CROWNE, JOHN (d. c. 1703), British dramatist, was a native of Nova Scotia. His father " Colonel " William Crowne, accom- panied the earl of Arundel on a diplomatic mission to Vienna in 1637, and wrote an account of his journey. He emigrated to Nova Scotia where he received a grant of land from Cromwell, but the French took possession of his property, and the home government did nothing to uphold his rights. When the son came to England his poverty compelled him to act as gentleman usher to an Independent lady of quality, and his enemies asserted that his father had been an Independent minister. He began his literary career with a romance, Pandion and Amphigenia, or the History of the coy Lady of Thessalia (1665). In 1671 he produced a romantic play, Juliana, or the Princess of Poland, which has, in spite of its title, no pretensions to rank as an historical drama. The earl of Rochester procured for him, apparently with the sole object of annoying Dryden by infringing on his rights as poet-laureate, a commission to supply a masque for performance at court. Calisto gained him the favour of Charles II., but Rochester proved a fickle patron, and his favour was completely alienated by the success of Crowne's heroic play in two parts, The Destruction of Jerusalem J>y Titus Vespasian (1677). This piece contained a thinly disguised satire on the Puritan party in the description of the Pharisees, and about 1683 he produced a distinctly political play, The City Politiques, satirizing the Whig party and containing characters which were readily recognized as portraits of Titus Oates and others. This made him many enemies, and he petitioned the king for a small place that would release him from the necessity of writing for the stage. The king exacted one more comedy, which should, he suggested, he based on the No pued esser of Moreto. This had already been unsuccessfully adapted, as Crowne discovered later, by Sir Thomas St Serfe, but in Crowne's hands it developed into Sir Courtly Nice, It Cannot Be (1685), a comedy which kept its place as a stock piece for nearly a century. Unfortunately Charles II. died before the play was completed, and Crowne was disappointed of his reward. He continued to write plays, and it is stated that he was still living in 1703, but nothing is known of his later life.

Crowne was a fertile writer of plays with an historical setting, in which

heroic love was, in the fashion of the French romances, made the leading motive. The prosaic level of his style saved him as a rule from the rant to be found in so many contemporary heroic plays, but these pieces are of no particular interest. He was much more successful in comedy of the kind that depicts " humours."

The History of Charles the Eighth of France, or The Invasionof Naples by the French (1672) was dedicated to Rochester. In Timon, generally supposed to have been written by the earl, a line from this piece — " whilst sporting waves smil'd on the rising sun " — was held up to ridicule. The Ambitious Statesman, or The Loyal Favourite (1679), one of the most extravagant of his heroic efforts, deals with the history of Bernard d'Armagnac, Constable of France, after the battle of Agincourt; Thyestes, A Tragedy (1681), spares none of the horrors of the Senecan tragedy, although an incongruous love story is interpolated; Darius, King of Persia (1688), Regulus (acted 1692, pr. 1694) and Caligula (1698) complete the list of his tragedies. The Country Wit: A Comedy (acted 1675, pr. 1693), derived in part from Moliere's Le Sicilien, ou V amour peintre, is remembered for the leading character, Sir Mannerly Shallow; The English Frier; or The Town Sparks (acted 1689, pr. 1690), perhaps suggested by Moliere's Tartuffe, ridicules the court Catholics, and in Father Finical caricatures Father Petre; and The Married Beau; or The Curious Impertinent (1694), is based on the Curioso Impertinente in Don Quixote. He also produced a version of Racine's Andromaque, an adaptation from Shakespeare's Henry VI., and an unsuccessful comedy, Justice Busy.

See The Dramatic Works of John Crowne (4 vols., 1873), edited by James Maidment and W. H. Logan for the Dramatists of the Restoration.

CROWN LAND, in the United Kingdom, land belonging to the crown, the hereditary revenues of which were surrendered to parliament in the reign of George III.

In Anglo-Saxon times the property of the king consisted of (a) his private estate, (b) the demesne of the crown, comprising palaces, &c, and © rights over the folkland of the kingdom. By the time of the Norman Conquest the three became merged into the estate of the crown, that is, land annexed to the crown, held by the king as king. The king, also, ceased to hold as a private owner, 1 but he had full power of disposal by grant of the crown lands, which were increased from time to time by confiscation, escheat, forfeiture, &c. The history of the crown lands to the reign of William III. was one of continuous alienation to favourites. Their wholesale distribution by William III. necessitated the intervention of parliament, and in the reign of Queen Anne an act was passed limiting the right of alienation of crown lands to a period of not more than thirty-one years or three lives. The

revenue from the crown lands was also made to constitute part of the civil list. At the beginning of his reign George III. surrendered his interest in the crown lands in return for a fixed " civil list" (q.v.). The control and management of the crown lands is now regulated by the Crown Lands Act 1829 and various amending acts. Under these acts their management is entrusted to the commissioners of Woods, Forests and Land Revenues, who have certain statutory powers as to' leasing, selling, exchanging, &c.

In theory, also, state lands in the British colonies are supposed to be vested in the crown, and they are called crown lands; actually, however, the various colonial legislatures have full control over them and power of disposal. The term " crown- lands," in Austria, is applied to the various provinces into which that country is divided. (See Austria.)

CROWN POINT, a village of Essex county, New York, U.S.A., in a township of the same name, about 90 m. N.E. of Albany and about 10 m. N. of Ticonderoga, on the W. shore of Lake Champlain. Pop. of the township (1890) 313s; (1900) 2112; (1905) 1890; (1910) 1690; of the village, about 1000. The village is served by the Delaware & Hudson Railway and by the Champlain Canal. Among the manufactures are lumber and woodenware. Graphite has been found in the western part of the township, and spar is mined. In 1609 Champlain fought near here the engagement with the Iroquois Indians which marked the beginning of the long enmity between the Five (later Six) Nations and the French. Subsequently Dutch and English traders trafficked in the vicinity, the latter maintaining here for many years a regular trading-post. In 1731 the French built here Fort Frederic, the first military post at Crown Point, and the place was subsequently for many years of considerable strategic importance, owing to its situation on Lake Champlain, which with Lake George furnished a comparatively easy route from Canada to New York. Twice during the French and Indian War, in 1755 and again in 1756, English and colonial expeditions were sent against it in vain; it remained in French hands until 1759, when, after Lord Jeffrey Amherst's occupation of Ticon- deroga, the garrison joined that of the latter place and retreated to Canada. Crown Point was then'occupied by Amherst, who during the winter of 1759-1760 began the construction, about a quarter of a mile from the old Fort Frederic, of a large fort, which was garrisoned but was never completed; the ruins of this fort (not of Fort Frederic) still remain. At the outbreak of the War of Independence, on the nth of May 1775, the fort, whose garrison then consisted of only a dozen men, was captured by Colonel Seth Warner and a force of " Green Mountain Boys," sent from Ticonderoga by Ethan Allen; and it remained in American hands save for a brief period in 1777, when it was occupied by a detachment of Burgoyne's invading army.

CROWTHER, SAMUEL ADJAI (i8o9?i89i), African mis sionary-bishop, was born at Ochugu in the Yoruba country,

1 The duchy of Lancaster, which was the private property of Henry IV. before he ascended the throne, was assured to him and his heirs by a special act of parliament. In the first year of Henry VII. it was united to the crown, but as a separate property.

West Africa, and was sold into slavery in 1821. Next year he was rescued, with many other captives, by H.M. ship " Myrmidon," and was landed at Sierra Leone. Educated there in a missionary school, he was baptized on the nth of December 1825. In time he became a teacher at Furah Bay, and afterwards an energetic missionary on the Niger. He came to England in 1842, entered the Church Missionary College at Islington, and in June 1843 was ordained by Bishop Blomfield. Returning to' Africa, he laboured with great success amongst his own people and afterwards at Abeokuta. Here he devoted himself to the preparation of school-books, and the translation of the Bible and Prayer-Book into Yoruba and other dialects. He also established a trade in cotton, and improved the native agriculture. In 1857 he commenced the third expedition up the Niger, and after labouring with varied success, returned to England and was consecrated, on St Peter's Day 1864, first bishop of the Niger territories. Before long a commencement was'made of the missions to the delta of the Niger, and between 1866 and 1884 congregations of Christians were formed at Bonny, Brass and New Calabar, but the progress made was slow and subject to many impediments. In 1888 the tide of persecu- tion turned, and several chiefs embraced Christianity, and on Crowther's return from another visit to England, the large iron church known as " St Stephen's cathedral " was opened. Crowther died of paralysis on the 31st of December 1891, having displayed as a missionary for many years untiring industry, great practical wisdom, and deep piety.

CROYDON, a municipal, county and parliamentary borough of Surrey, England, suburban to London, 10 m. S. of London Bridge. Pop. (1891) 102,695; (1901) 133,895. The borough embraces a great residential district. Several railway stations give it communication with all parts of the metropolis, the principal railways serving it being the London, Brighton & South Coast and the South-Eastern & Chatham. It stands ne.ir the sources of the river Wandle, under Banstead Downs, and is a place of great antiquity. The original site, farther west than the present town, is mentioned in Domesday Book. The derivation indicated is from the O. Fr.

croie dune, chalk hill. The supposition that here was the Roman station of Noviomagus is rejected. The site is remarkable for the number of springs which issue from the soil. One of these, called the " Bourne," bursts forth a short way above the town at irregular intervals of one to ten years or more ; and after running a torrent for two or three months, as quickly vanishes. Until its course was diverted it caused destructive floods. This phenomenon seems to arise from rains which, falling on the chalk hills, sink into the porous soil and reappear after a time from crevices at lower levels. The manor of Croydon was presented by William the Conqueror to Archbishop Lanfranc, who is believed to have founded the archiepiscopal palace there, which was the occasional residence of his successors till about 1750, and of which the chapel and hall remain. Addington Park, 35 m. from Croydon, was purchased for the residence, in 1807, of the archbishop of Canterbury, but was sold in consequence of Archbishop Temple's decision to reside at the palace, Canterbury. The neighbouring church, which is Norman and Early English, contains several memorials of archbishops. Near the park a group of tumuli and a circular encampment are seen. Croydon is a suffragan bishopric in the diocese of Canterbury. The parish church of St John the Baptist appears to have been built in the 14th and 15th centuries, but to have contained remains of an older building. The church was restored or rebuilt in the 1 6th century, and again restored by Sir Gilbert Scott in 1857-1859. It was destroyed by fire, with the exception of the tower, on the 5th of January 1867, and was at once rebuilt by Scott on the old lines. In 1596 Archbishop Whitgift founded the hospital or almshouse which bears his name, and remains in its picturesque brick buildings surrounding two quadrangles. His grammar school was housed in new buildings in 1871, and is a flourishing day school. The principal public building of Croydon is that erected by the corporation for municipal business; it included court-rooms and the public library. At Addiscombe in the

neighbourhood was formerly a mansion dating from 1702, and acquired by the East India Company in 1809 for a Military College, which on the abolition of the Company became the Royal Military College for the East Indian Army, and was closed in 1862. Croydon was formed into a municipal borough in 1883, a parliamentary borough, returning one member, in 1885, and a county borough in 1888. The corporation consists of a mayor, 12 aldermen and 36 councillors. Area, 9012 acres.

CROZAT, PIERRE (1661-1740), French art collector, was born at Toulouse, one of a family who were prominent French financiers and collectors. He became treasurer to the king in Paris, and gradually acquired a magnificent collection of pictures Andobjetsd'art. Between 1729 and 1742 a finely illustrated work was published in two volumes, known as the Cabinet Crozat, including the finest pictures in French collections. Most of

his own treasures descended to his nephews, Louis Francois (d. 1750), Joseph Antoine (d. 1750), and Louis Antoine (d. 1770), and were augmented by them, being dispersed after their deaths; the collection of Louis Antoine Crozat went to St Petersburg.

CROZET ISLANDS, an uninhabited group in the Indian Ocean, in 46°-47° S. and 51° E. They are mountainous, with summits from 4000 to 5000 ft. high, and are disposed in two divisions — Penguin or Inaccessible, Hog, Possession and East Islands; and the Twelve Apostles. Like Kerguelen, and other clusters in these southern waters, they appear to be of igneous formation; but owing to the bleak climate and their inaccessible character they are seldom visited, and have never been explored since their discovery in 1772 by Marion-Dufresne, after one of whose officers they are named. Possession, the highest, has a snowy peak said to\xceed 5000 ft. Hog Island takes its name from the animals which were here let loose by an English captain many years ago, but have since disappeared. Rabbits burrow in the heaps of scoria on the slopes of the mountains.

CROZIER, WILLIAM (1855-), American artillerist and inventor, born at Carrollton, Carroll county, Ohio, on the 19th of February 1855, was the son of Robert Crozier (1827-1895), chief justice of Kansas in 1863-1866, and a United States senator from that state from December 1873 to February 1874. He graduated at West Point in 1876, was appointed a 2nd lieutenant in the 4th Artillery, and served on the Western frontier for three years against the Sioux and Bannock Indians. From 1879 to 1884 he was instructor in mathematics at West Point, and was superintendent of the Watertown (Massachusetts) Arsenal from 1884 to 1887. In 1888 he was sent by the war department to study recent developments in artillery in Europe, and upon his return he was placed in full charge of the construction of gun carriages for the army, and with General Adelbert R. Buffmgton (1837-), the chief of ordnance, he invented the Buffington-Crozier disappearing gun carriage (1896). He also invented a wire-wound gun, and perfected many appliances connected with heavy and field ordnance. In 1890 he attained the rank of captain. During the Spanish-American War he was inspector- general for the Atlantic and Gulf coast defences. In 1899 he was one of the American delegates to the Peace Conference at the Hague. He later served in the Philippine Islands on the staffs of Generals John C. Bates and Theodore Schwan, and in 1900 was chief of ordnance on the staff of General A. R. Chaffee during the Pekin Relief Expedition. In November 1901 he was appointed brigadier-general and succeeded General Buffing- ton as chief of ordnance of the United States army. His Notes on the Construction of Ordnance, published by the war depart- ment, are used as text-books in the schools for officers, and he is also the author of other important publications on military subjects.

CROZIER, or pastoral staff, one of the insignia of a bishop, and probably derived from the lituus of the Roman augurs. It is crook-headed, and borne by bishops and archbishops alike (see Pastoral Staff). The x word "crozier" or "crosier" re- presents the 0. Fr. crocier, Med. Lat. crociarius, the bearer of the episcopal crook (Med. Lat. crocea, croccia, &c, Fr. croc). The English representative of crocea was crose, later crosse, which, becoming confused with" cross " (?.».), was replaced by " crozier-

staff " or ' crozier's staff," and then, at the beginning of the 16th century, by " crozier " (see J. T. Taylor, Archaeologia, lii., " On the Use of the Terms Crosier, Pastoral Staff and Cross ").

CRUCIAL (from Lat. crux, a cross), that which has the form of a cross, as the " crucial ligaments " of the knee-joint, which cross each other, connecting the femur and the tibia. From Francis Bacon's expression instantia crucis (taken, as he says, from the finger-post or crux at cross-roads) for a phenomenon which decides between two causes which have each similar analogies in its favour, comes the use of " crucial " for that which decides between two alternatives, hence, generally, as a synonym for " critical." The word is also used, with a reference to the use of a " crucible," of something which tests and tries.

CRUCIFERAE, or Crucifer family, a natural order of flowering plants, which derives its name from the cruciform arrangement of the four petals of the flower. It is an order of herbaceous

Fig. I. — Wallflower (Cheiranthus Cheiri), reduced. 1, Flower in vertical section. 2, Horizontal plan of arrangement of flower in Barbarea.

plants, many of which, such as wallflower, stock, mustard, cabbage, radish and others, are well-known garden or field-plants. Many of the plants are annuals; among these are some of the commonest weeds of cultivation, shepherd's purse (Capsella Bursa-pastoris), charlock (Brassica Sinapis), and such common

FlG. a. — Cruciferae. Floral Fig. 3. — Cardamine pratensis. Diagram (Brassica). Flower with Perianth removed.

(After Baillon.)

plants as hedge mustard (Sisymbrium officinale), Jack-by-the- hedge (5. Alliaria or Alliaria officinalis). Others are biennials producing a number of

leaves on a very short stem in the first year, and in the second sending up 'a flowering shoot at the expense of the nourishment stored in the thick tap-root during

the previous season. Under cultivation this root becomes much enlarged, as in turnip, swede and others. Wallflower (Cheiranthus Cheiri) (fig. 1) is a perennial. The leaves when borne on an elongated stem are arranged alternately and have no stipules. The flowers are arranged in racemes without bracts; during the life of the flower its stalk continues to grow so that the open flowers of an inflorescence stand on a level (that is, are corymbose). The flowers are regular, with four free sepals arranged in two pairs at right angles, four petals arranged cross- wise in one series, and two sets of stamens, an outer with two members and an inner with four, in two pairs placed in the middle line of the flower and at right angles to the outer series. The four inner stamens are longer than the two outer; and the stamens are hence collectively described .as tetradynamous. The pistil, which is above the rest of the members of the flower, consists of two carpels joined at their edges to form the ovary, which becomes two-celled by subsequent ingrowth of a septum from these united edges; a row of ovules springs from each edge. The frui^ is a pod or siliqua splitting by two valves from

A ' C J>

Fig. 4. — Cruciferous Fruits. (After Baillon.)

A, Cheiranthus Cheiri. D, Lunaria biennis, showing the septurv

B, Lepidium sativum. after the carpels have fallen away.

C, Capsella Bursa-pastoris. E, Crambe maritima.

below upwards and leaving the placentas with the seeds attached to the replum or framework of the septum. The seeds are filled with the large embryo, the two cotyledons of which are variously folded. In germination the cotyledons come above ground and form the first green leaves of the plant.

Pollination is effected by aid of insects. The petals are generally white or yellow, more rarely lilac or some other colour, and between the bases of the stamens are honey-glands. Some or all of the anthers become twisted so that insects in probing for honey will touch the anthers with one side of their head and the capitate stigma with the other. Owing, however, to the close proximity of stigma and anthers, very slight ir- regularity in the movements of the visiting insect will cause self-pollination, which may also occur by the drop- _£ ~

ping of pollen from the _ c , , „ .,

r ,? r f, , , Fig. 5. — Seeds of Cruciferae cut

anthers of the larger stamens across ° to show the radicle and

on to the stigma. cotyledons. (After Baillon.)

Cruciferae is a large order A, Cheiranthus Cheiri.

containing nearly 200 genera B, Sisymbrium Alliaria.

and about I20O Species. It Figures 2-5 are from Strasburger's Lehrbuck

*has a world-wide distribution, der Bo,anik ' b * P« missim of Gustav Fischer but finds its chief development in the temperate and frigid zones, especially of the northern hemisphere, and as Alpine plants. In the subdivision of the order into tribes use is made of differences in the form of the fruit and the manner of folding of the embryo. When the fruit is several times longer than broad it is known as a siliqua, as in stock or wallflower; when about as long as broad, a silicula, as in shepherd's purse.*

Fig. 6. — Honesty {Lunaria biennis), showing Flower and Fruit. Reduced.

The order is well represented in Britain — among others by Nasturtium (N. officinale, water-cress), Arabis (rock-cress), Cardamine (bitter-cress), Sisymbrium (hedge mustard, &c;

5. Irio is London rocket, so-called because it sprang up after the fire of 1666), Brassica (cabbage and mus- tard), Diplotaxis (rocket), Cochlearia (scurvy-grass), Capsella (shepherd'spurse) , Lepidium (cress) , Thlaspi (penny-cress), Cakile (sea rocket) , Raphanus (radish) , and others. Of economic importance are species of Brassica, including mus- tard {B. nigra), white mustard, used when young in salads (B.alba), cabbage (q.v.) and its numerous forms derived from B. oler- acea, turnip (B.campestris), and swede (B. Napus), Raphanus sativus (radish), Cochlearia Armor acia (horse-radish), Nasturtium officinale (water – cress) , Lepidium sativum (garden cress) . I satis affords a blue dye, woad. Many of the genera are known as ornamental garden plants; such are Cheiranthus (wallflower), Matthiola (stock), Iberis (candy-tuft), Alyssum (Alison), Hesperis (dame's violet), Lunaria (honesty) (fig. 6), Aubrietia and others.

CRUDEN, ALEXANDER (1701-1770), author of the well-known concordance (q.v.) to the English Bible, was born at Aberdeen on the 31st of May 1701. He was educated at the grammar school, Aberdeen, and studied at Marischal College, intending to enter the ministry. He took the degree of master of arts, but soon after began to show signs of insanity owing to a disappoint- ment in love. After a term of confinement he recovered and removed to London. In 1722 he had an engagement as private tutor to the son of a country squire living at Eton Hall, South- gate, and also held a similar post at Ware. Years afterwards, in an application for the title of bookseller to the queen, he stated that he had been for some years corrector for the press in Wild Court. This probably refers to this time. In 1729 he was employed by the 10th earl of Derby as a reader and secretary, but was discharged on the 7th of July for his ignorance of French pronunciation. He then lodged in a house in Soho frequented exclusively by Frenchmen, and took lessons in the language in the hope of getting back his post with the earl, but when he went to Knowsley in Lancashire, the earl would not see him. He returned to London and opened a bookseller's shop in the Royal Exchange. In April 1735 he obtained the title of book- seller to the queen by recommendation of the lord mayor and most of the Whig aldermen. The post was an unremunerative sinecure. In 1737 he finished his concordance, which, he says, was the work of several years. It was presented to the queen on the 3rd of November 1 73 7 , a fortnight before her death.

Although Cruden's biblical labours have made his name a household word among English-speaking people, he was dis- appointed in his hopes of immediate profit, and his mind again became unhinged. In spite of his earnest and self-denying piety, and his exceptional intellectual powers, he developed idiosyn- crasies, and his life was marred by a harmless but ridiculous egotism, which so nearly bordered on insanity that his friends sometimes thought it necessary to have him confined. He paid unwelcome addresses to a widow, and was confined in a madhouse in Bethnal Green. On his release he published a pamphlet dedicated to Lord H. (probably Harrington, secretary of state) entitled The London Citizen exceedingly injured, or a British Inquisition Displayed. He also published an account of

his trial, dedicated to the king. In December 1740 he writes to Sir H. Sloane saying he has been employed since July as Latin usher in a boarding-school at Enfield. He then found work as a proof-reader, and several editions of Greek and Latin classics are said to have owed their accuracy to his care. He super- intended the printing of one of Matthew Henry's commentaries, and in 1750 printed a small Compendium of the Holy Bible (an abstract of the contents of each chapter), and also reprinted a larger edition of the Concordance.

About this time he adopted the title of ” Alexander the Corrector,” and assumed the office of correcting the morals of the nation, especially with regard to swearing and Sunday observance. For this office he believed himself divinely com- missioned, but he petitioned parliament for a formal appoint- ment in this capacity. In April 1755 he printed a letter to the speaker and other members of the House of Commons, and about the same time an ” Address to the King and Parliament.” He was in the habit of carrying a sponge, with which he effaced all inscriptions which he thought contrary to good morals. In September 1753, through being involved in a street brawl, he was confined in an asylum in Chelsea for seventeen dˆys at the instance of his sister, Mrs Wild. He brought an unsuccessful action against his friends, and seriously proposed that they should go into confinement as an atonement. He published an account of this second restraint in ” The Adventures ok Alexander the Corrector.” He made attempts to present to the king in person an account of his trial, and to obtain the honour of knighthood, one of his predicted honours. In 1754 he was nominated as parliamentary candidate for the city of London, but did not go to the poll. In 1755 he paid unwelcome addresses to the daughter of Sir Thomas Abney, of Newington (1640-1722), and then published his letters and the history of his repulse in the third part of his ” Adventures.” In June and July 1755 he visited Oxford and Cambridge. He was treated with the respect due to his learning by officials and residents in both universities, but experienced some boisterous fooling at the hands of the undergraduates. At Cambridge he was knighted with mock ceremonies. There he appointed ” deputy cor- rectors ” to represent him in the university. He also visited Eton, Windsor, Tonbridge and Westminster schools, where he appointed four boys to be his deputies. (An Admonition to Cambridge is preserved among letters from J. Neville of Emmanuel to Dr Cox Macro, in the British Museum.) The Corrector’s Earnest Address to the Inhabitants of Great Britain, published in 1756, was occasioned by the earthquake at Lisbon. In 1762 he saved an ignorant seaman, Richard Potter, from the gallows, and in 1763 published a pamphlet recording the history of the case. Against John Wilkes, whom he hated, he wrote a small pamphlet, and used to delete with his sponge the number 45 wherever he found it, this being the offensive number of the North Briton. In 1769 he lectured in Aberdeen as ” Corrector,” and distributed copies of the fourth commandment and various religious tracts. The wit that made his eccentricities palatable is illustrated by the story of how he gave to a conceited young minister whose appearance displeased him A Mother’s Catechism dedicated to the young and ignorant. The Scripture Dictionary, com- piled about this time, was printed in Aberdeen in two volumes shortly after his death. Alexander Chalmers, who in his boyhood heard Cruden lecture in Aberdeen and wrote his biography, says that a verbal index to Milton, which accompanied the edition of Thomas Newton, bishop of

Bristol, in 1769, was Cruden's.

The second edition of the Bible Concordance was published in 1 76 1 , and presented to the king in person on the 2 1st of December. The third appeared in 1769. Both contain a pleasing portrait of the author. He is said to have gained £800 by these two editions. He returned to London from Aberdeen, and died suddenly while praying in his lodgings in Camden Passage, Islington, on the 1st of November 1770. He was buried in the ground of a Protestant dissenting congregation in Dead Man's Place, Southwark. He bequeathed a portion of his savings for a £5 bursary at Aberdeen, which preserves his name on the list of benefactors of the university. (D. Mn.)

CRUDEN, a village and parish on the E. coast of Aberdeen- shire, Scotland. Pop. of parish (1901) 3444. It is situated at the head of Cruden Bay, 291 m. N.N.E. of Aberdeen by the Great North of Scotland railway company's branch line from Ellon to Boddam. The golf-course of 18 holes is one of the best in Scotland, and there is a sandy beach, with good bathing. There is some good fishing at Port Erroll, also called Ward of Cruden. Prehistoric remains have been found in the parish, and near Ardendraught, not far from the shore, Malcolm II. is said to have defeated Canute in 1014. The Water of Cruden, which rises a few miles to the west, flows through the village into the North Sea. Slains Castle, a seat of the earl of Erroll, lies to the north of Cruden, but must not be confounded with the old castle of Slains, about 5 m. to the south-west, near the point where, according to tradition, the " St Catherine " of the Spanish Armada foundered in 1588. The Bullers of Buchan are within 2 m. walk of Cruden.

CRUELTY (through the O. Fr. crualti, mod. cruaute, from the Lat. crudelilas) , the intentional infliction of pain or suffering. It is only necessary to deal here with the legal relations involved. Statutory provision for the prevention of cruelty to those who are unable to protect themselves has been particularly marked in the 19th century. The increase of legislation for the protection of children, lunatics and animals is a proof of the growing humanitarianism of the age. There was at one time a tendency among jurists to question whether, for instance, the prevention of cruelty to animals was not a recognition of a certain quasi- right in animals, or whether it was merely that such exhibitions as bull- and bear-baiting, cock-fights, &c, were demoralizing to the public generally. The true fact seems to be that the first introduction of such legislation was undoubtedly due to the desire for the promotion of humanity, but that the principle, for the

recognition of which the time was not yet ripe, had to be excused in the eyes of the public by the plea that cruelty had a demoralizing effect upon spectators (see A. V. Dicey, Law and Opinion in England, p. 188; T. E. Holland, Jurisprudence, 10th ed., p. 372).

Cruelty to Animals. — The English common law has never taken cognizance of the commission of acts of cruelty upon animals, and direct legislation upon the subject, dating from the 19th century, was due in a great measure to public agitation, supported by the Royal Society for the Prevention of Cruelty to Animals (founded in 1824). Various acts were passed in 1822 (known as Martin's Act) , 1 83 5 and 1 83 7 , and these were amended and consolidated by the Cruelty to Animals Acts 1849 and 1854, which, with the Wild Animals in Captivity Protection Act 1900, are the main acts upon the subject. There are also, in addition, many other acts that impose certain liabilities in respect of animals and indirectly prevent cruelty. The Cruelty to Animals Acts 1849 and 1854 render liable to prosecution and fine prac- tically any act of cruelty to an animal; such acts as dubbing a cock, cropping the ears of a dog or dishorning cattle, are offences. The latter practice, however, is allowed both in Scotland and Ireland, the courts having held that the advantages to be obtained from dishorning outweigh the pain caused by the operation. The word " animal " is defined as meaning " any domestic animal " of whatever kind or species, and whether a quadruped or not. The act of 1849 also forbids bull- and bear- baiting, or fighting between any kinds of animals; requires the provision of food and water to animals impounded; lays down regulations as to the treatment of animals sent for slaughter, and imposes a penalty for improperly conveying animals. The Wild Animals in Captivity Protection Act 1900 extends to wild animals in captivity that protection which the acts of 1849 and 1854 conferred on domestic animals, making exception of any act done or any omission in the preparation of animals for the food of man or for sport. The word "animal" in the act includes bird, beast, fish or reptile. The Dogs Act 1865 rendered owners of dogs liable for injuries to cattle and sheep; the Dogs Act 1906 extended the owner's liability for injury done to any cattle by a dog, and further, where a dog is proved to have injured cattle or chased sheep it may be treated

as a dangerous dog and must be kept under proper control or be destroyed. The Drugging of Animals Act 1876 imposes a penalty on giving poisonous drugs to any domestic animal unlawfully. The Cruelty to Animals Act 1876 was passed for the purpose of regulating the practice of vivisection (q.v.). The Ground Game Act 1880, prohibits night shooting, or the use of spring traps above ground or poison. The Injured Animals Act 1907 enables police constables to cause any animal when mortally or seriously injured to be slaughtered. The Diseases of Animals Act 1894 and orders under it are for the purpose of securing animals from unnecessary suffering, as well as*

from disease. Finally, the Wild Birds Protection Acts 1880 to 1904, with various game acts (see Game Laws), extend the protection of the law to wild birds. The acts establish a close time for wild birds and impose penalties for shooting or taking them within that time; prohibit the exposing or offering for sale within certain dates any wild bird recently killed or taken unless bought or received from some person residing out of the United Kingdom; the taking or destroying of wild birds' eggs, the setting of pole traps, and the taking of a wild bird by means of a hook or other similar instrument.

For the law relating to the prevention of cruelty to children see Children, Law Relating to; for cruelty in the sense of such conduct as entitles a husband or wife to judicial separation see Divorce. (T. A. I.)

CRUIKSHANK, GEORGE (1792-1878), English artist, caricaturist and illustrator, was born in London on the 27th of September 1792. By natural disposition and collateral circum- stances he may be accepted as the type of the born humoristic artist predestined for this special form of art. His grandfather had taken up the arts, and his father, Isaac Cruikshank, followed the painter's profession. Amidst these surroundings the children were born and brought up, their first playthings the materials of the arts their father practised. George followed the family traditions with amazing facility, easily surpassing his compeers as an etcher. When the father died, about 181 1, George, still in his teens, was already a successful and popular artist. All his acquisitions were native gifts, and of home-growth; outside training, or the serious apprenticeship to art, were dispensed with, under the necessity of working for immediate profit. This lack of academic training the artist at times found cause to regret, and at some intervals he made exertions to cultivate the knowledge obtainable by studying from the antique and drawing from life at the schools. From boyhood he was accus- tomed to turn his artistic talents to ready account, disposing of designs and etchings to the printsellers, and helping his father in forwarding his plates. Before he was twenty his spirited style and talent had secured popular recognition; the contemporary of Gillray, Rowlandson, Aiken, Heath, Dighton, and the estab- lished caricaturists of that generation, he developed great pro- ficiency as an etcher. Gillray's matured and trained skill had some influence upon his executive powers, and when the older caricaturist passed away in 181 5, George Cruikshank had already taken his place as a satirist. Prolific and dexterous beyond his competitors, for a generation he delineated Tories, Whigs and Radicals with fine impartiality. Satirical capital came to him from every public event, — wars abroad, the enemies of England (for he was always fervidly patriotic), the camp, the court, the senate, the Church; low life, high life; the humours of the people, the follies of the great. In this wonderful gallery the student may grasp the popular side of most questions which for the time being engaged public attention.

George Cruikshank's technical and manipulative skill as an etcher was such that Ruskin and the best judges have placed his productions in the foremost rank; in this respect his works have been compared favourably with the masterpieces of etching. He died at 263 Hampstead Road on the 1st of February 1878. His remains rest in St Paul's cathedral.

A vast number of Cruikshank's spirited cartoons were pub- lished as separate caricatures, all coloured by hand; others formed series, or were contributed to satirical magazines, the Satirist, Town Talk, The Scourge (1811-1816) and the like

ephemeral publications. In conjunction with William Hone's scathing tracts, G. Cruikshank produced political satires to illustrate the series of facetiae and miscellanies, like The Political House that Jack Built (1819).

Of a more genially humoristic order are his well-known book illustrations, now so deservedly esteemed for their inimitable fun and frolic, among other qualities, such as the weird and terrible, in which he excelled. Early in this series came T.he Humorist (1819-1821) and Life in Paris (1822). The well-known series of Life in London, conjointly produced by the brothers I. R. and G. Cruikshank, has enjoyed a prolonged reputation, and is still sought after by collectors. Grimm's Collection of German Popular Stories (1824-1826), in two series, with 22 inimitable etchings, are in themselves sufficient to account for G. Cruikshank's reputation. To the first fourteen volumes (1837-1843) of Bentley's Miscellany Cruikshank contributed 126 of his best plates, etched on steel, including the famous illustrations to Oliver Twist, Jack Sheppard, Guy Fawkes and The Ingoldsby Legends. For W. Harrison Ainsworth, Cruikshank illustrated Rookwood (1836) and The Tower of London (1840); the first six volumes of Ainsworth 's Magazine (1842-1844) were illustrated by him with several of his finest suites of etchings. For C. Lever's Arthur O'Leary he supplied 10 full-page etchings (1844), and 20 spirited graphic etchings for Maxwell's lurid History of the Irish Rebellion in 17 gS (1845). Of his own speculations, mention must be made of George Cruikshank's Omnibus (1841) and George Cruikshank's Table Book (1845), as well as his Comic Almanack (1835-1853). The Life of Sir John Falstaff contained 20 full-page etchings (1857-1858). These are a few leading items amongst the thousands of illus- trations emanating from that fertile imagination. As an enthusi- astic teetotal advocate, G. Cruikshank produced a long series of pictures and illustrations, pictorial pamphlets and tracts; the best known of these are The Bottle, 8 plates (1847), with its sequel, The Drunkard's Children, 8 plates (1848), with

the ambitious work, The Worship of Bacchus, published by sub- scription after the artist's oil painting, now in the National Gallery, London, to which it was presented by his numerous admirers.

See Cruikshank's Water- Colours, with introduction by Joseph Grego (London, 1903). (J. Go.)*

CRUNDEN, JOHN (d. 1828), English architectural and mobiliary designer. Most of his early inspiration was drawn from Chippendale and his school, but he fell later under the influence of a bastard classicism. He produced a very large number of designs which were published in numerous volumes; among the most ambitious were ornamental centres for ceilings in which he introduced cupids with bows and arrows, Fame sounding her trumpet, and such like motives. Sport and natural history supplied him with many other themes, and one of his ceilings is a hunting scene representing a " kill." His principal works were Designs for Ceilings; Convenient and Ornamental Architecture; The Carpenter's Companion for Chinese Railings, Gates, &c. (1770); The Joiner and Cabinet-maker's Darling, or Sixty Designs for Gothic, Chinese, Mosaic and Ornamental Frets (1765); and The Chimney Piece Maker's Daily Assistant (1776). Much of his work was either absurd or valueless.

CRUSADES, the name given to the series of wars for delivering the Holy Land from the Mahommedans, so-called from the cross worn as a badge by the crusaders. By analogy the term " crusade " is also given to any campaign undertaken in the same spirit.

1. The Meaning of the Crusades. — The Crusades may be regarded partly as the decumanus fluctus in the surge of religious revival, which had begun in western Europe during the 10th, and had mounted high during the nth century; partly as a chapter, and a most important chapter, in the history of the interaction of East and West. Contemporaries regarded them in the former of these two aspects, as " holy wars " and " pil- grims' progresses " towards Christ's Sepulchre; the reflective eye of history must perhaps regard them more exclusively from the latter point of view. Considered as holy wars the Crusades

must be interpreted by the ideas of an age which was dominated by the spirit of otherworldliness, and accordingly ruled by the clerical power which represented the other world. They are a novum salutis genus — a new path to Heaven, to tread which counted " for full and complete satisfaction " pro omni poenitentia and gave " forgiveness of sins " (peccaminum remissio) 1 ; they are, again, the "foreign policy" of the papacy, directing its faithful subjects to the great war of Christianity against the infidel. As such a novum salutis genus, the Crusades connect

themselves with the history of the penitentiary system; as the foreign policy of the Church they belong to that clerical purifica- tion and direction of feudal society and its instincts, which appears in the institution of " God's Truce " and in chivalry itself. The penitentiary system, according to which the priest enforced a code of moral law in the confessional by the sanction of penance — penance which must be performed as a condition of admission to the sacrament of the Eucharist — had been from early times a great instrument in the civilization of the raw Germanic races. Penance might consist in fasting, it might consist in flagellation; it might consist in pilgrimage. The penitentiary pilgrimage, which seems to have been practised as. early as a.d. 700, was twice blessed; not only was it an act of atonement in itself, like fasting and flagellation; it also gained for the pilgrim the merit of having stood on holy ground. Under the influence of the Cluniac revival, which began in the 10th century, pilgrimages became increasingly frequent; and the goal of pilgrimage was often Jerusalem. Pilgrims who were travelling to Jerusalem joined themselves in companies for security, and marched under arms; the pilgrims of 1064, who were headed by the archbishop of Mainz, numbered some 7000 men. When the First Crusade finally came, what was it but a penitentiary pilgrimage under arms — with the one additional object of conquering the goal of pilgrimage ? That the Pilgrims' Progress should thus have turned into a Holy War is a fact readily explicable, when we turn to consider the attempts made by the Church, during the nth century, to purify, or at any rate to direct, the feudal instinct for private war (Fehde). Since the close of the 10th century diocesan councils in France had been busily acting as legislatures, and enacting " forms of peace " for the maintenance of God's Peace or Truce (Pax Dei or Treuga Dei). In each diocese there had arisen a judicature (judices pads) to decide when the form had been broken ; and an executive, or communitas pads, had been formed to enforce the decisions of the judicature. But it was an easier thing to consecrate the fighting instinct than to curb it; and the institu- tion of chivalry represents such a clerical consecration, for ideal ends and noble purposes, of the martial impulses which the Church had hitherto endeavoured to check. In the same way the Crusades themselves may be regarded as a stage in the clerical reformation of the fighting laymen. As chivalry directed the layman to defend what was right, so the preaching of the Crusades directed him to attack what was wrong — the possession by " infidels " of the Sepulchre of Christ. The Crusades are the offensive side of chivalry: chivalry is their parent — as it is also their child. The knight who joined the Crusades might thus still indulge the bellicose side of his genius — under the aegis and at the bidding of the Church; and in so doing he would also attain what the spiritual side of his nature ardently sought — a perfect salvation and remission of sins. He might butcher all day, till he waded ankle-deep in blood, and then at nightfall kneel, sobbing for very joy, at the altar of the Sepulchre — for

was he not red from the winepress of the Lord? One can readily understand the popularity of the Crusades, when one reflects that they permitted men to get to the other world by fighting hard on earth, and allowed them to gain the fruits of asceticism by the ways of hedonism. Nor was the Church merely able, through the Crusades, to direct the martial instincts of

'Fulcher of Chartres, 1, i. For what follows, with regard to the Church's conversion of guerra into the Holy War, cf. especially the passage — " Procedant contra infideles ad pugnam jam incipi dignam . . . qui abusive privatum certamen contra fideles consuescebant distendere quondam."

a feudal society; it was also able to pursue the object of its own immediate policy, and to attempt the universal diffusion of Christianity, even at the edge of the sword, over the whole of the known world.

Thus was renewed, on a greater scale, that ancient feud of East and West, which has never died. For a thousand years, from the Hegira in 622 to the siege of Vienna in 1683, the peril of a Mahommedan conquest of Europe was almost continually present. From this point of view, the Crusades appear as a reaction of the West against the pressure of the East — a reaction which carried the West into the East, and founded a Latin and Christian kingdom on the shores of Asia. They protected Europe from the new revival of Mahommedanism under the Turks; they gave it a time of rest in which the Western civilization of the middle ages developed. But the relation of East and West during the Crusades was not merely hostile or negative. The Latin kingdom of Jerusalem was the meeting-place of two civilizations: on its soil the East learned from the West, and — perhaps still more — the West learned from the East. The culture developed in the West during the 13 th century was not only permitted to develop by the protection of the Crusades, it grew upon materials which the Crusades enabled it to import from the East. Yet the debt of Europe to the Crusades in this last respect has perhaps been unduly emphasized. Sicily was still more the meeting-place of East and West than the kingdom of Jerusalem; and the Arabs of Spain gave more to the culture of Europe than the Arabs of Syria.

2. Historical Causes of the Crusades. — Within fifteen years of the Hegira Jerusalem fell before the arms of Omar (637), and it continued to remain in the hands of Mahommedan rulers till the end of the First Crusade. For centuries, however, a lively intercourse was maintained between the Latin Church in Jerusalem, which the clemency of the Arab conquerors tolerated,

and the Christians of the West. Charlemagne in particular was closely connected with Jerusalem: the patriarch sent him the keys of the city and a standard in 800; and in 807 Harun al-Rashid recognized this symbolical cession, and acknowledged Charlemagne as protector of Jerusalem and owner of the church of the Sepulchre. Charlemagne founded a hospital and a library in the Holy City; and later legend, when it made him the first of crusaders and the conqueror of the Holy Land, was not without some basis of fact. The connexion lasted during the 9th century; kings like Alfred of England and Louis of Germany sent contributions to Jerusalem, while the Church of Jerusalem acquired estates in the West. During the 10th century this intercourse still continued; but in the nth century interruptions began to come. The fanaticism of the caliph Hakim destroyed the church of the Sepulchre and ended the Frankish protectorate (1010); and the patronage of the Holy Places, a source of strife between the Greek and the Latin Churches as late as the begin- ning of the Crimean War, passed to the Byzantine empire in 1021. This latter change in itself made pilgrimages from the West increasingly difficult: the Byzantines, especially after the schism of 1054, did not seek to smooth the way of the pilgrim, and Victor II. had to complain to the empress Theodora of the exactions practised by her officials. But still worse for the Latins was the capture of Jerusalem by the Seljukian Turks in 107 1. Without being intolerant, the Turks were a rougher and ruder race than the Arabs of Egypt whom they displaced; while the wars between the Fatimites of Egypt and the Abbasids of Bagdad, whose cause was represented by the Seljuks, made Syria (one of the natural battle-grounds of history) into a troubled and unquiet region. The native Christians suffered; the pilgrims of the West found their way made still more difficult, and that at a time when greater numbers than ever were throng- ing to the East. Western Christians could not but feel hampered and checked in their natural movement towards the fountain- head of their religion, and it was natural that they should ultimately endeavour to clear the way. In much the same way, at a later date and in a lesser sphere, the closing of the trade- routes by the advance of the Ottoman Turks led traders to endeavour to find new channels, and issued in the rounding of

the Cape of Good Hope and the discovery of America. Nor, indeed, must it be forgotten that the search for new and more direct connexions with the routes of Oriental trade is one of the motives underlying the Crusades themselves, and leading to what may be called the 13th-century discovery of Asia.

It was thus natural, for these reasons, that the conquest of the Holy Land should gradually become an object for the ambition of Western Christianity — an object which the papacy, eager to realize its dream of a universal Church subject to its sway, would naturally cherish and attempt to advance. Two causes combined to make this object still more natural and

more definite. On the one hand, the reconquest of lost territories from the Mahommedans by Christian powers had been proceeding steadily for more than a hundred years before the First Crusade; on the other hand, the position of the Eastern empire after 1071 was a clear and definite summons to the Christian West, and proved, in the event, the immediate occasion of the holy war. As early as 970 the recovery of the territories lost to Mahom- medanism in the East had been begun by emperors like Nice- phoras Phocas and John Zimisces: they had pushed their conquests, if only for a time, as far as Antioch and Edessa, and the temporary occupation of Jerusalem is attributed to the East Roman arms. At the opposite end of the Mediterranean, in Spain, the Omayyad caliphate was verging to its fall: the long Spanish crusade against the Moor had begun; and in 1018 Roger de Toeni was already leading Normans into Catalonia to the aid of the native Spaniard. In the centre of the Mediter- ranean the fight between Christian and Mahommedan had been long, but was finally inclining in favour of the Christian. The Arabs had begun the conquest of Sicily from the East Roman empire in 827, and they had attacked the mainland of Italy as early as 840. The popes had put themselves at the head of Italian resistance: in 848 Leo IV. is already promising a sure and certain hope of salvation to those who die in defence of the cross; and by 916, with the capture of the Arab fortress on the Garigliano, Italy was safe. Then came the reconquest of the Mediterranean islands near Italy. The Pisans conquered Sardinia at the instigation of Benedict VIII. about 1016; and, in a thirty years' war which lasted from 1060 to 1090, the Normans, under a banner blessed by Pope Alexander II., wrested Sicily from the Arabs. The Norman conquest of Sicily may with justice be called a crusade before the Crusades; and it cannot but have given some impulse to that later attempt to wrest Syria from the Mahommedans, in which the virtual leader was Bohemund, a scion of the same house which had conquered Sicily. But while the Christians of the West were thus winning fresh ground from the Mahommedans, in the course of the nth century, the East Roman empire had now to bear the brunt of a Mahommedan revival under the Seljuks — a revival which, while it crushed for a time the Greeks, only acted as a new incentive to the Latins to carry their arms tc the East. The Seljukian Turks, first the mercenaries and then the masters of the caliph, had given new life to the decadent caliphate of Bagdad. Under the rule of their sultans, who assumed the role of mayors of the palace in Bagdad about the middle of the nth century, they pushed westwards towards the caliphate of Egypt and the East Roman empire. While they wrested Jerusalem from the former (1 071), in the same year they inflicted a crushing defeat on the Eastern emperor at Manzikert. The result of the defeat was the loss of almost the whole of Asia Minor; the dominions of the Turks extended to the sea of Marmora. An appeal for assistance, such as was often to be heard again in succeeding centuries, was sent by Michael VII. of Constantinople to

Gregory VII. in 1073. Gregory listened to the appeal; he projected — not, indeed, as has often been said, a crusade, 1 but a great expedition, which should recover

1 Tradition credits a pope still earlier than Gregory VII. with the idea of a crusade. Silvester II. is said to have preached a general expedition for the recovery of Jerusalem ; and the same preaching is attributed to Sergius IV. in ion. But the supposed letter of Silvester is a later forgery; and in 1000 the way of the Christian to Jerusalem was still free and open.

Asia Minor for the Eastern empire, in return for a union of the Eastern with the Western Church. In 1074 Gregory actually assembled a considerable army; but his disagreement with Robert Guiscard, followed by the outbreak of the war of in- vestitures, hindered the realization of his plans, and the only result was a precedent and a suggestion for the events of 1095. The appeal of Michael VII. was re-echoed by Alexius Comnenus himself. Brave and sage as he was, he could hardly cope at one and the same time with the hostility of the Normans on the west, of the Petchenegs (Patzinaks) on the north, and of the Seljuks on the east and south. Already in 1087 and 1088 he had appealed to Baldwin of Flanders, verbally and by letter, 1 for troops; and Baldwin had answered the appeal. The same appeal was made, more than once, to Urban II.; and the answer was the First Crusade. The First Crusade was not, indeed, what Alexius had asked or expected to receive. He had appealed for rein- forcements to recover Asia Minor; he received hundreds of thousands of troops, independent of him, and intending to conquer Jerusalem for themselves, though they might incident- ally recover Asia Minor for the Eastern empire on their way. Alexius may almost be compared to a magician, who has uttered a charm to summon a ministering spirit, and is surrounded on the instant by legions of demons. In truth the appeal of Alexius had set free forces in the West which were independent of, and even ultimately hostile to, the interests of the Eastern empire.

The primary force, which thus transmuted an appeal for reinforcements into a holy war for the conquest of Palestine, was the Church. The creative thought of the middle ages is clerical thought. It is the Church which creates the Carolingian empire, because the clergy thinks in terms of empire. It is the Church which creates the First Crusade, because the clergy believes in penitentiary pilgrimages, and the war against the Seljuks can be turned into a pilgrimage to the Sepulchre; because, again, it wishes to direct the fighting instinct of the laity, and the consecrating name of Jerusalem provides an

unimpeachable channel; above all, because the papacy desires a perfect and universal Church, and a perfect and universal Church must rule in the Holy Land. But it would be a mistake to regard the Crusades (as it would be a mistake to regard the Carolingian empire) as a pure creation of the Church, or as merely due to the policy of a theocracy directing men to the holy war which is the only war possible for a theocracy. It would be almost truer, though only half the truth, to say that the clergy gave the name of Crusade to sanctify interests and ambitions which, while set on other ends than those of the Church, happened to coincide in their choice of means. There was, for instance, the ambition of the adventurer prince, the younger son, eager to carve a principality in the far East, of whom Bohemund is the type; there was the interest of Italian towns, anxious to acquire the products of the East more directly and cheaply, by erecting their own emporia in the eastern Mediterranean. The former was the driving force which made the First Crusade successful, where later Crusades, without its stimulus, for the most part failed; the latter was the one staunch ally which alone enabled Baldwin I. and Baldwin II. to create the kingdom of Jerusalem. So far as the Crusades led to permanent material results in the East, they did so in virtue of these two forces. Unregulated enthusiasm might of itself have achieved little or nothing; enthusiasm caught and guided by the astute Norman, and the no less astute Venetian or Genoese, could not but achieve tangible results. The principality or the emporium, it is true, would supply motives to the prince and the merchant only; and it may be urged that to the mass of the crusaders the religious motive was all in all. In this way we may return to the view that the First Crusade, at any rate, was un fait ecclesiastique.

1 The comte de Riant impugned the authenticity of Alexius' letter to the count of Flanders. It is very probable that the versions of this letter which we possess, and which are to be found only in later writings like Guibert de Nogent, are apocryphal ; Alexius can hardly have held out the bait of the beauty of Greek women, or have written that he preferred to fall under the yoke of the Latins rather than that of the Turks. But it is also probable that these apocryphal versions are based on a genuine original.

It is indeed true that to thousands the hope of acquiring spiritual merit must have been a great motive; it is also true, as the records of crusading sermons show, that there was a strong element of " revivalism " in the Crusades, and that thousands were hurried into taking the cross by a gust of that uncontrollable enthusiasm which is excited by revivalist meetings to-day. But it must also be admitted that there were motives of this world to attract the masses to the Crusades. Famine and pesti- lence at home drove men to emigrate hopefully to the golden East. In 1094 there was pestilence from Flanders to Bohemia: in 1095 there was famine in Lorraine. Francigenis occidentalibus facile persuaderi polerat sua rura relinquere;

nam Gallias per annos aliquot nunc seditio civilis, nunc fames, nunc mortalitas nimis afflixerat. 2 No wonder that a stream of emigration set towards the East, such as would in modern times flow towards a newly discovered gold-field — a stream carrying in its turbid waters much refuse, tramps and bankrupts, camp-followers and hucksters, fugitive monks and escaped villeins, and marked by the same motley grouping, the same fever of life, the same alternations of affluence and beggary, which mark the rush for a gold-field to-day.

Such were the forces set in movement by Urban II., when, after holding a synod at Piacenza (March, 1095), and receiving there fresh appeals from Alexius, he moved to Clermont, in the S.E. of France, and there on the 26th of November delivered the great speech which was followed by the First Crusade. In this speech he appealed, indeed, for help for the Greeks, auxilio . . . saepe acclamato indigis (Fulcher i. c. i.); but the gist of his speech was the need of Jerusalem. Let the truce of God be observed at home; and let the arms of Christians be directed to the winning of Jerusalem in an expedition which should count for full and complete penance. Like Gregory, Urban had thus sought for aid for the Eastern empire; unlike Gregory, who had only mentioned the Holy Sepulchre in a single letter, and then casually, he had struck the note of Jerusalem. The instant cries of Deus vult which answered the note showed that Urban had struck aright. Thousands at once took the cross; the first was Bishop Adhemar of Puy, whom Urban named his legate and made leader of the First Crusade (for the holy war, according to Urban's original conception, must needs be led by a clerk). Fixing the 15th of August 1096 as the time for the departure of the crusaders, and Constantinople as the general rendezvous, Urban returned from France to Italy. It is notice- able that it was on French soil that the seed had been sown. 3 Preached on French soil by a pope of French descent, the Crusades began — and they continued — as essentially a French (or perhaps better Norman-French) enterprise; and the kingdom which they established in the East was essentially a French kingdom, in its speech and its customs, its virtues and its vices. It was natural that France should be the home of the Crusades. She was already the home of the Cluniac movement, the centre from which radiated the truce of God, the chosen place of chivalry; she could supply a host of feudal nobles, somewhat loosely tied to their place in society, and ready to break loose for a great enterprise; she had suffered from battle and murder, pestilence and famine, from which any escape was welcome. To the Normans particularly the Crusades had an intimate appeal. They appealed to the old Norse instinct for wandering — an instinct which, as it had long before sent the Norseman eastward to find his El Dorado of Micklegarth, could now find a natural outlet in the expedition to Jerusalem: they appealed to the Norman religiosity, which had made them a people of

pilgrims, the allies of the papacy, and, in England and Sicily, crusaders before the Crusades: finally, they appealed to that desire to gain fresh territory,- upon which Malaterra remarks as characteristic of Norman princes. 4 No wonder, then, that

2 Ekkehard, Chronica, p. 213.

3 The Chanson de Roland, which cannot be posterior to the First Crusade — for the poem never alludes to it — already contains the idea of the Holy War against Islam. The idea of the crusade had thus already ripened in French poetry, before Urban preached his sermon.

4 Book i. c. iii. (in Muratori, S.R.I., v. 550).

the crusading armies were recruited in France, or that they were led by men of the stock of the d'Hautevilles. Meanwhile newly-conquered England had its own problems to solve; and Germany, torn by civil war, and not naturally quick to kindle, could only deride the " delirium " of the crusader. 1

3. Course of the First Crusade. — The First Crusade falls natur- ally into two parts. One of these may be called the Crusade of the people: the other may be termed the Crusade of the princes. Of these the people's Crusade — prior in order of time, if only secondary in point of importance — may naturally be studied first. The sermon of Urban II. at Clermont became the staple for wandering preachers, among whom Peter the Hermit dis- tinguished himself by his fiery zeal. 2 Riding on an ass from place to place through France and along the Rhine, he carried away by his eloquence thousands of the poor. Some three or four months before the term fixed by Urban II., in April and May 1096, five divisions of pauperes had already collected. Three of these, led by Fulcher of Orleans, Gottschalk and William the Carpenter respectively, failed to reach even Con- stantinople. The armies of Fulcher and Gottschalk were destroyed by the Hungarians in just revenge for their excesses (June) ; the third, after joining in a wild Judenhetze in the towns of the valley of the Rhine, during which some 10,000 Jews perished as the first-fruits of crusading zeal, was scattered to the winds in Hungary (August). Two other divisions, however, reached Constantinople in safety. The first of these, under Walter the Penniless, passed through Hungary in May, and reached Constantinople, where it halted to wait for the Hermit, in the middle of July. The second, led by Peter himself, passed safely through Hungary, but suffered severely in

Bulgaria, and only attained Constantinople with sadly diminished numbers at the end of July. These two divisions (which in spite of good treatment by Alexius began to commit excesses against the Greeks) united and crossed the Bosporus in August, Peter himself remaining in Constantinople. By the end of October they had perished utterly at the hands of the Seljuks; a heap of whitening bones also remained to testify to the later crusaders, when they passed in the spring of 1097, of the fate of the people's Crusade.

Meanwhile the knights had already begun to assemble in March 1096. In small bands, and by divers ways, they streamed gradually southward and eastward, in a steady flow, through- out 1096. But three large divisions, under three considerable leaders, were pre-eminent among the rest. Godfrey of Bouillon, with his brother Baldwin, led the crusaders of Lorraine along " the road of Charles the Great," through Hungary, to Con- stantinople, where he arrived on the 23rd of December. Raymund of Toulouse (the first prince to join the crusading movement) along with Bishop Adhemar, the papal commissary, led the Provencals down the coast of Illyria, and then due east to Constantinople, arriving towards the end of April 1097. Bohemund of Otranto, the destined leader of the Crusade, with his nephew Tancred, led a fine force of Normans by sea to Durazzo, and thence by land to Constantinople, which he reached about the same time as Raymund. To the same great rendezvous other leaders also gathered, some of higher rank than Godfrey or Raymund or Bohemund, but none destined to exercise an equal influence on the fate of the Crusade. Hugh of Vermandois, younger brother of Philip I. of France, had reached Constanti- nople in November 1096, in a species of honourable captivity, and had done Alexius homage; Robert of Normandy and Stephen of Blois, to whom Urban II. had given St Peter's banner at Lucca, only arrived — the last of the crusaders — in May 1097 (their original companion in arms, Count Robert of Flanders, having left them to winter at Bari, and crossed to Constantinople before the end of 1096).

Thus was gathered at Constantinople, in the spring of

1 Ekkehard, Chronica, 214.

2 Later legend ascribed the origin of the First Crusade to the preaching of Peter the Hermit. The legend has been followed by modern historians; but in point of fact Peter is a figure of secondary importance. (See Peter the Hermit.)

1097, a great host, which Fulcher computes at 600,000 men (I. c. iv.), Urban II. at 300,000, and which was probably some 150,000 strong. 3 Before we follow this host into Asia, we may pause to inquire into the various factors which would deter- mine its course, or condition its activity.

On the Western side, and among the crusaders themselves, there were two factors of importance, already mentioned above — the aims of the adventurer prince, and the interests of the Italian merchant; while on the Eastern side there are again two — the policy of the Greeks, and the condition of the Mahommedan East. We have already seen that among the princes who joined the First Crusade there were some who were rather politiques than devots, and who aimed at the acquisition of temporal profit as well as of spiritual merit. Of these the type — and, it may almost be said, the inspirer of the rest — was Bohemund. From the first he had an Eastern principality in his mind's eye; and if we may judge from the follower of Bohemund who wrote the Gesta Francorum, there had already been some talk at Constantinople of Antioch as the seat of this principality. Bohemund's policy seems to have inspired Baldwin, the brother of Godfrey of Bouillon to emulation; on the one hand he strove to thwart the endeavours of Tancred, the nephew of Bohemund, to begin the foundation of the Eastern principality for his uncle by conquering Cilicia, and, on the other, he founded a principality for himself in Edessa. Raymond of Provence, the third and last of the great politiques of the First Crusade, was, like Baldwin, envious of Bohemund; and jealousy drove him first to attempt to wrest Antioch from Bohemund, and then to found a principality of Tripoli to the south of Antioch, which would check the growth of his power. The political motives of these three princes, and the interaction of their different policies, was thus a great factor in determining the course and the results of the First Crusade. The influence of the Italian towns did not make itself greatly felt till after the end of the First Crusade, when it made possible the foundation of a kingdom in Jerusalem, in addition to the three principalities established by Bohemund, Baldwin and Raymond; but during the course of the Crusade itself the Italian ships which hugged the shores of Syria were able to supply the crusaders with provisions and munition of war, and to render help in the sieges of Antioch and Jerusalem. 4 Sea-power had thus some influence in determining the victory of the crusaders.

In the East the conditions were, on the whole, favourable to the crusaders. The one difficulty — and it was serious — was the attitude adopted by Alexius. Confronted by crusaders where he had asked for auxiliaries, Alexius had two alternative policies presented to his choice. He might, in the first place, have frankly admitted that the crusaders were independent allies, and treating them as equals, he might have waged war in concert with them, and divided the conquests achieved in the war. A boundary line might have been drawn somewhere to the N.W. of Antioch; and the crusaders might have been left to acquire what they could to the south and east of that line. Unhappily, clinging to the conviction that all the lands which the crusaders would traverse were the " lost provinces " of his

empire, he induced the crusaders to do him homage, so that, whatever they conquered, they would conquer in his name, and whatever they held, they would hold by his grant and as his vassals. Thus Hugh of Vermandois became the man of Alexius in November 1096; Godfrey of Bouillon was induced, not with- out difficulty, to do homage in January 1097; and in April and May the other leaders, including Bohemund and the obstinate Raymond himself, followed his example. The policy of Alexius was destined to produce evil results, both for the Eastern empire and for the crusading movement. The West had already its grievances against the East: the Greek emperors had taken advantage of their protectorate of the Holy Places to lay charges

3 Godfrey's army numbered some 30,000 infantry and 10,000 cavalry (Rohricht, Erst. Kreuzz. 61): Urban II. reckons Bohemund's knights as 7000 in number (ibid. 71, n. 7).

4 The Genoese had been invited by Urban II. in September 1096 " to go with their gallies to Eastern parts in order to set free the path to the Lord's Sepulchre."

on the pilgrims, against which the Papacy had already been forced to remonstrate; nor were the Italian towns, with the exception of favoured Venice, disposed to be friendly to the great monopolist city of Constantinople. The old dissension of the Eastern and Western Churches had blazed out afresh in 1054; and the policy of Alexius only added new rancours to an old grudge, which culminated in the Latin conquest of Constantinople in 1204. On the other hand, the success of the crusading movement was imperilled, both now and afterwards, by the jealousy of the Comneni.' Always hostile to the princi- pality, which Bohemund established in spite of his oath, they helped by their hostility to cause the loss of Edessa in 1 144, and thus to hasten the disintegration of the Latin kingdom of Jerusalem. Yet one must remember, in justice to Alexius, the gravity of the problem by which he was confronted; nor was the conduct of the crusaders themselves such that he could readily make them his brethren in arms.

The condition of Asia Minor and Syria in 1097 was almost altogether such as to favour the success of the crusaders. The Seljukian sultans had only achieved a military occupation of the country which they had conquered. There were Seljukian garrisons in towns like Nicaea and Antioch, ready to offer an obstinate resistance to the crusaders; and here and ther; in the country thers were Seljukian armies, either cantoned or nomadic. But the

inhabitants of the towns were often hostile to the garrisons, and over wide tracts of country there were no forces at all. Accordingly, when the crusaders had captured the town at Nicaea, and defeated the Seljukian field-army at Dorylaeum their way lay clear before them through Asia Minor. Not only so, but they could count, at the very least, on a benevolent neutrality from the native population; while from the Armenian principalities in the S.E. of Asia Minor, which survived unsubdued in the general deluge of Seljukian conquest, they could expect active assistance (the hope of which will explain the north-easterly line of march which they followed after leaving Heraclea). But the purely military character of the Seljukian occupation helped the crusaders in yet another way. Strong generals were needed in the separate divisions of the empire, and these, as has always been the case in Eastern empires, made themselves independent in their spheres of command, because there was no organization to keep them together under a single control. On the death of Malik Shah, the last of the great Seljukian emperors (1092), the empire dissolved. A new sultan, Barki- yaroq or Barkiarok, ruled in Bagdad (1 094-1 104); but in Asia Minor Kilij Arslan held sway as the independent sultan of Konia (Iconium), while the whole of Syria was also practically inde- pendent. Not only was Syria thus weakened by being detached from the body of the Seljukian empire; it was divided by dissensions within, and assailed by the Fatimite caliph of Egypt from without. In 1095 two brothers, Ridwan and Dekak, ruled in Aleppo and Damascus respectively; but they were at war with one another, and Yagi-sian, the ruler of Antioch, was a party to their dissensions. Ridwan and Yagi-sian were only stopped in an attack on Damascus by news of the approach of the crusaders, which led the latter to throw himself hastily into Antioch, in the autumn of 1097. Meanwhile the Fatimites were not slow to take advantage of these dissensions. A great religious difference divided the Fatimite caliph of Cairo, the head of the Shiite sect, from the Abbasid caliph of Bagdad, who was the head of the Sunnites. The difference may be :ompared to the dissension between the Greek and the Latin Churches; but it had perhaps more of the nature of a political difference. In any case, it hampered the Mahommedans as much as the jealousy between Alexius and the Latins hampered the progress of the Crusade. The crusading princes were well enough aware of the gulf which divided the caliph of Cairo from the Sunnite princes of Syria; and they sought by envoys to put themselves into connexion with him, hoping by his aid to gain Jerusalem (which was then ruled for the Turks by Sokman, the son of the amir Ortok). 1 But the caliph preferred to act for

1 Thus already on the First Crusade the path of negotiation is attempted simultaneously with the Holy War. On the Third

himself, and took advantage of the wars of the Syrian princes, and of the terror inspired by the advance of the crusaders to conquer Jerusalem

(August 1098). But though the leaders of the First Crusade did not succeed in utilizing the dissensions of the Mahommedans as fully as they desired, it still remains true that these dissensions very largely explain their success. It was the disunion of the Syrian amirs, and the division between the Abbasids and the Fatimites, that made possible the conquest of the Holy City and the foundation of the kingdom of Jerusalem. When a power arose in Mosul, about 1130, which was able to unify Syria — when, again, in the hands of Saladin, unified Syria was in turn united to Egypt — the cause of Latin Christianity in the East was doomed.

We are now in a position to follow the history of the First Crusade. By the beginning of May 1097 the crusaders were crossing the Bosporus, and entering the dominions of Kilij Arslan. Their first operation was the siege of Nicaea, defended by a Seljuk garrison, but eventually captured, with the aid of Alexius, after a month's siege (June 18). Alexius took possession of the town; and though he rewarded the crusading princes richly, some discontent was excited by his action. After the capture of Nicaea, the field-army of Kilij Arslan had to be met. In a long and obstinate encounter, it was defeated at Dorylaeum (July 1); and the crusaders marched unmolested in a south- easterly direction to Heraclea. Here Tancred, followed by Baldwin, turned into Cilicia, and began to take possession of the Cilician towns, and especially of Tarsus — thus beginning, it would seem, the creation of the Norman principality of Antioch. The main army turned to the N.E., in the direction of Caesarea (in order to bring itself into touch with the Armenian princes of this district), and then marched southward again to Antioch. At Marash, half way between Caesarea and Antioch, Baldwin, who had meanwhile wrested Tarsus from Tancred, rejoined the ranks; but he soon left the main body again, and struck east-ward towards Edessa, to found a principality there. At (he end of October the crusaders came into position before Antioch, which was held by Yagi-sian, and began the siege of the city, which lasted from October 21, 1097, to June 3, 1098. The great figure in the siege was naturally Bohemund (who had also been the hero of Dorylaeum). He repelled attempts at relief made by Dekak (Dec. 31, 1097) and Ridwan (Feb. 9, 1098); he put the besiegers in touch with the Genoese ships lying in the harbour of St Simeon, the port of Antioch (March 1098) — a move which at once served to remedy the want of provisions from which the crusaders suffered, and secured materials for the building of castles, with which Bohemund sought — in the Norman fashion — to overawe the besieged city. But it was finally by the treachery of one of Yagi-sian's commanders, the amir Firuz, that Bohemund was able to effect its capture. The other leaders had, however, to promise him possession of the city, before he would bring his negotiations with Firuz to a conclusion; and the matter was so long protracted that an army of relief under Kerbogha' of Mosul was only at a

distance of three days' march, when the city was taken (June 3, 1098). The besiegers were no sooner in the city, than they were besieged in their turn by Kerbogha; and the twenty-five days which followed were the worst period of stress and strain which the crusaders had to encounter. Under the pressure of this strain " spiritualistic " phenomena began to appear. It was in the ranks of the Provencals, where the religiosity of Count Raymund seems to have extended to his followers, that these phenomena appeared; and they culminated in the discovery of the Holy Lance, which had pierced the side of the Saviour. The excite- ment communicated itself to the whole army; and the nervous strength which it gave enabled the crusaders to meet and defeat

Crusade, and above all on the Sixth, this path was still more seriously attempted. It is interesting, too, to notice the part which the laity already plays in directing the course ot the Crusade. From the first the Crusade, however clerical in its conception, was largely secular in its conduct; and thus, somewhat paradoxically, a religious enterprise aided the growth of the secular motive, and contributed to the escape of the laity from that tendency towards a papal theocracy, which was evident in the pontificate of Gregory VII.

Kerbogha in the open (June 28), but not before many of their number, including even Count Stephen of Blois, had deserted and fled.

With the discovery of the Lance, which became as it were a Provencal asset, Count Raymund assumes a new importance. Mingled with the religiosity of his nature there was much obstinacy and self-seeking; and when Kerbogha was finally repelled, he began to dispute the possession of Antioch with Bohemund, pleading in excuse his oath to Alexius. The struggle lasted for some months, and helped to delay the further progress of the crusaders. Raymund, indeed, left Antioch in November, and moved S.E. to Marra; but his men still held two positions in Antioch, from which they were not dislodged by Bohemund till January 1090. Expelled from Antioch, the obstinate Raymund endeavoured to recompense himself in the south (where indeed he subsequently created the county of Tripoli); and from February to May 1099 he occupied himself with the siege of Area, to the N.E. of Tripoli. It was during the siege of Area that Peter Bartholomew, to whom the vision of the Holy Lance had first appeared, was subjected, with no definite result, to the ordeal of fire — the hard-headed Normans doubting the genuine character of any Provencal vision, the more when, as in this case, it turned to the political advantage of the Provencals. The siege

was long protracted; the mass of the pilgrims were anxious to proceed to Jerusalem, and, as the altered tone of the author of the Gesta sufficiently indicates, thoroughly weary of the obstinate political bickerings of Raymund and Bohemund. Here Godfrey of Bouillon finally came to the front, and placing himself at the head of the discontented pilgrims, he forced Raymund to accept the offers of the amir of Tripoli, to desist from the siege, and to march to Jerusalem (in the middle of May 1099). Bohemund remained in Antioch: the other leaders pressed forward, and following the coast route, arrived before Jerusalem in the beginning of June. After a little more than a month's siege, the city was finally captured (July 15). The slaughter was terrible; the blood of the conquered ran down the streets, until men splashed in blood as they rode. At nightfall, " sobbing for excess of joy," the crusaders came to the Sepulchre from their treading of the winepress, and put their blood-stained hands together in prayer. So, on that day of July, the First Crusade came to an end.

It remained to determine the future government of Jerusalem ; and here the eternal problem of the relations of Church and State emerged. It might seem natural that the Holy City, conquered in a holy war by an army of which the pope had made a churchman, Bishop Adhemar, the leader, should be left to the government of the Church. But Adhemar had died in August 1098 (whence, in large part, the confusion and bickerings which followed in the end of 1098 and the beginning of 1099); nor were there any churchmen left of sufficient dignity or weight to secure the triumph of the ecclesiastical cause. In the meeting of the crusaders on the 22nd of July, some few voices were raised in support of the view that a " spiritual vicar " should first be chosen in the place of the late patriarch of Jerusalem (who had just died in Cyprus), before the election of any lay ruler was taken in hand. But the voices were not heard; and the princes proceeded at once to elect a lay ruler. Raymund of Provence refused to accept their nomination, nominally on the pious ground that he did not wish to reign where Christ had suffered on the cross; though one may suspect that the establishment of a principality in Tripoli — in which he had been interrupted by the pressure of the pilgrims — was still the first object of his ambition. The refusal of Raymund meant the choice of Godfrey of Bouillon, who had, as we have seen, become prominent since the siege of Area; and Godfrey accordingly became — not king, but " advocate of the Holy Sepulchre," while a few days after- wards Arnulf, the chaplain of Robert of Normandy, and one of the sceptics in the matter of the Holy Lance, became " vicar " of the vacant patriarchate. Godfrey'sfirst business was to repel an Egyptian attack, which he accomplished successfully at Ascalon, with the aid of the other crusaders (August 12). At

the end of August the other crusaders returned, 1 and Godfrey was left with a small army of 2000 men, and the support of Tancred, now prince of

Galilee, to rule in some four isolated districts — Jaffa, Jerusalem, Ramlah and Haifa. At the end of the year came Bohemund and Godfrey's brother Baldwin (now count of Edessa) on a pilgrimage to Jerusalem. The result of Bohemund's visit was new trouble for Godfrey. Bohemund procured the election of Dagobert, the archbishop of Pisa, to the vacant patriarchate, disliking Arnulf, and perhaps hoping to find in the new patriarch a political supporter. Bohemund and Godfrey together became Dagobert's vassals; and in the spring Godfrey even seems to have entered into an agreement with the patriarch to cede Jerusalem and Jaffa into his hands, in the event of acquiring other lands or towns, especially Cairo, or dying without direct heirs. When Godfrey died in July 1100 (after successful forays against the Mahommedans which took him as far as Damascus), it might seem as if a theocracy were after all to be established in Jerusalem, in spite of the events of 1099.

4. The Latin Kingdom of Jerusalem under the First Three Kings, 2 1100-1143. — The theocracy, however, was not destined to be established. Godfrey had died without direct heirs; but in far Edessa there was his brother Baldwin, ready to take his place. Dagobert had at first consented to the dying Godfrey's wish that Baldwin should be his successor; but when Godfrey died he saw an opportunity too precious to be missed, and opposed Baldwin, counting on the support of Bohemund, to whom he sent an appeal for assistance. 3 But a party in Jerusalem, headed by the late " vicar " Arnulf, opposed itself to the hierarchical pretensions of Dagobert and the Norman influence by which they were backed; and this party, representing the Lotharingian laity, carried the day. Baldwin was summoned from Edessa; and when he arrived, towards the end of the year, he was crowned king by Dagobert himself. Thus was founded, on Christmas day 1100, the Latin kingdom of Jerusalem; and thus was the possibility of a theocracy finally annihilated. A feudal kingdom of Frankish seigneurs was to be planted on the soil of Palestine, instead of a dominium temporale of the patriarch like that of the pope in central Italy. Nor were any great difficulties with the Church to hamper the growth of this kingdom. For two years, indeed, a struggle raged between Baldwin I. and Dagobert: Baldwin accused the patriarch of treachery, and attempted to force him to contribute to the defence of the kingdom. But in 1102 the struggle ceased with the deposition of the patriarch and the victory of the king; and though it was renewed for a time by the patriarch Stephen in the reign of Baldwin II. (n 28-1 130), the new struggle was of short duration, and was soon ended by Stephen's death.

The establishment of a kingdom in Jerusalem in 1100 was a blow, not only to the Church but to the Normans of Antioch. At the end of 1099 any contemporary observer must have believed that the capital of Latin Christianity in the East was destined to be Antioch. Antioch lay in one of

the most fertile regions of the East; Bohemund was almost, if not quite, the greatest genius of his generation; and when he visited Jerusalem at the end of 1099, he led an army of 25,000 men — and those men, at any rate in large part, Normans. What could Godfrey avail against such a force? Yet the principality of Godfrey was destined to higher things than that of Bohemund. Jerusalem, like Rome, had the shadow of a mighty name to lend prestige to its ruler; and as residence in Rome was one great reason of the strength of the medieval papacy, so was

1 Before he left, Raymund had played in Jerusalem the same part of dog in the manger which he had also played at Antioch, and had given Godfrey considerable trouble. See the articles, Godfrey of Bouillon and Raymund of Toulouse.

2 For an account of the kings of Jerusalem see the articles on the five B ALDWiNS.on the two Amalrics, on Fulk and John of Brienne and on the Lusignan (family).

3 The genuineness of the letter (on which, by the way, depends the story of Godfrey's agreement with Dagobert) has been impeached by Prutz and Kugler, and doubted by Rohricht. It is accepted by von Sybel and Hagenmeyer.

residence in Jerusalem a reason for the ultimate supremacy of the Lotharingian kings. Jerusalem attracted the flow of pilgrims from the West as Antioch never could; and though the great majority of the pilgrims were only birds of passage, there were always many who stayed in the East. There was thus a steady immigration into the kingdom, to strengthen its armies and recruit with new blood the vigour of its inhabitants. Still more important perhaps was the fact that the ports of the kingdom attracted the Italian towns; and it was therefore to the kingdom that they lent the strength of their armies and the skill of their siege-artillery — in return, it is true, for concessions of privileges so considerable as to weaken the resources of the kingdom they helped to create. While Jerusalem possessed these advan- tages, Antioch was not without its defects. It had to meet — or perhaps it would be more true to say, it brought upon itself — the Ziostility of strong Mahommedan powers in the vicinity. As early as uoo Bohemund was captured in battle by Danish- mend of Sivas; and it was his captivity, depriving the patriarch as it did of Norman assistance, which allowed the uncontested accession of Baldwin I. Again, in 1104, the Normans, while attempting to capture Harran, were badly defeated on the river Balikh, near Rakka; and this defeat may be said to have been fatal to the chance of a great Norman principality. 1 But the hostility of Alexius, aided and abetted by the jealousy of Ray- mund of Toulouse, was almost equally fatal. Alexius claimed Antioch; was it not the old possession of his empire, and had not Bohemund done him homage? Raymund was ready to defend the claims of Alexius; was not Bohemund a successful rival? Thus it came about that Alexius and Raymund became allies; and by the aid of Alexius Raymund established, from 1 102 onwards, the principality which, with the capture of Tripoli in 1109, became the principality of Tripoli, and barred the advance of Antioch to the south. Meanwhile the armies of Alexius not only prevented any farther advance to the N.W., but conquered the Cilician towns (1 104). No wonder that Bohemund flung himself in revenge on the Eastern empire in 1108 — only, however, to meet with a humiliating defeat at Durazzo.

Thus it was that Baldwin waxed while Bohemund waned. The growth of Baldwin's kingdom, as it was suggested above, owed more to the interests of Italian traders than it did to crusading zeal. In 1100, indeed, it might appear that a new Crusade from the West, which the capture of Antioch in 1098 had begun, and the conquest of Jerusalem in 1099 had finally set in motion, was destined to achieve great thing , for the nascent kingdom. Thousands had joined this new Crusade, which should deal the final blow to Mahommedanism: among the rest came the first of the troubadours, William IX., Count of Poitiers, to gather copy for his muse, and even some,

like Stephen of Blois and Hugh of Vermandois, who had joined the First Crusade, but had failed to reach Jerusalem. The new crusaders cherished high plans; they would free Bohemund and capture Bagdad. But each of the three sections of their army was routed in turn in Asia Minor by the princes of Sivas, Aleppo and Harran, in the middle of 1101; and only a few escaped to report the crushing disaster. Baldwin I. had thus no assistance to expect from the West, save that of the Italian towns. From an early date Italian ships had followed the crusaders. There were Genoese ships in St Simeon's harbour in the spring of 1098 and at Jaffa in 1099; in 1099 Dagobert, the archbishop of Pisa, led a fleet from his city to the Holy Land; and in n 00 there came to Jaffa a Venetian fleet of 200 sail, whose leaders promised Venetian assistance in return for freedom from tolls and a third of each town they helped to conquer. But it was the Genoese who helped Baldwin I. most. The Venetians already enjoyed, since 1080, a favoured position in Constantinople, and had the less reason to find a new emporium in the East; while Pisa connected

1 Yet the north always continued to be more populous than the south ; and the Latins maintained themselves in Antioch and Tripoli a century after the loss of Jerusalem. The land was richer in the north: it was protected by its connexion with Cyprus and Armenia: it was more remote from Egypt — the basis of Mahom- medan power from the reign of Saladin onwards.

itself, through Dagobert, with Antioch 2 rather than with Jerusalem, and was further, in 1111, invested by Alexius with privileges, which made an outlet in the Holy Land no longer necessary. But the Genoese, who had helped with provisions and siege-tackle in the capture of Antioch and of Jerusalem, had both a stronger claim on the crusaders, and a greater interest in acquiring an eastern emporium. An alliance was accordingly struck in 1101 (Fulcher II. c. vii.), by which the Genoese promised their assistance, in return for a third of all booty, a quarter in each town captured, and a grant of freedom from tolls. In this way Baldwin I. was able to take Arsuf and Caesarea in noi and Acre in 1104. But Genoese aid was given to others beside Baldwin (it enabled Raymund to capture Byblus in 1104, and his successor, William, to win Tripoli in 1109); while, on the other hand, Baldwin enjoyed other aid besides that of the Genoese. In mo, for example, he was enabled to capture Sidon by the aid of Sigurd of Norway, the Jorsalafari, who came to the Holy Land with a fleet of 55 ships, starting in 1107, and in a three years' " wandering," after the old Norse fashion, fighting the Moors in Spain, and fraternizing with the Normans in Sicily. At a later date, in the reign of Baldwin II., Venice also gave her aid to the kings of Jerusalem. Irritated by the con- cessions made by Alexius to the Pisans in nil, and furious at the revocation of her own privileges by John Comnenus in n 18, the republic naturally sought a new outlet in the Holy Land. A Venetian fleet of 120 sail came in 11 23, and

after aiding in the repulse of an attack, which the Egyptians had taken advantage of Baldwin II. 's captivity to deliver, they helped the regent Eustace to capture Tyre (1124), in return for considerable , privileges — freedom from toils throughout the kingdom, a quarter in Jerusalem, baths and ovens in Acre, and in Tyre one- third of the city and its suburbs, with their own court of justice and their own church. After thus gaining a new footing in Tyre, the Venetians could afford to attack the islands of the Aegean as they returned, in revenge for the loss of their privileges in Constantinople; but the hostility between Venice and the Eastern empire was soon afterwards appeased, when John Comnenus restored the old privileges of the Venetians. The Venetians, however, maintained their position in Palestine; and their quarters remained, along with those of the Genoese, as privileged commercial franchises in an otherwise feudal state. In this way the kingdom of Jerusalem expanded until it came to embrace a territory stretching along the coast from Beirut (captured in mo 3) to el-Arish on the confines of Egypt — a territory whose strength lay not in Judaea, like the ancient kingdom of David, but, somewhat paradoxically (though commercial motives explain the paradox), in Phoenicia and the land of the Philistines. With all its length, the territory had but little breadth: towards the north it was bounded by the amirate of Damascus; in the centre, it spread little, if at all, beyond the Jordan; and it was only in the south that it had any real extension. Here there were two considerable annexes. To the south of the Dead Sea stretched a tongue of land, reaching to Aila, at the head of the eastern arm of the Red Sea. This had been won by Baldwin I., by way of revenge for the attacks of the Egyptians on his kingdom; and here, as early as 1116, he had built the fort of Monreal, half way between Aila and the Dead Sea. To the east of the Dead Sea, again, lay a second strip of territory, in which the great fortress was Krak (Kerak) of the Desert, planted somewhere about 1140 by the royal butler, Paganus, in the reign of Fulk of Jerusalem. These extensions in the south and east had also, it is easy to see, a commercial motive. They gave the kingdom a connexion of its own with the Red Sea and its shipping; and they enabled the Franks to

2 Pisa naturally connected itself with Antioch, because Antioch was hostile to Constantinople, and Pisa cherished the same hostility, since Alexius I. had in 1080 given preferential treatment to Venice, the enemy of Pisa.

3 This is the year in which the kingdom may be regarded as definitely founded. The period of conquest practically ends at this date, though isolated gains were afterwards made. The year 1 1 10 is additionally important by reason of the accession of Maudud a) Mosul, which marks the beginning of a Moslem reaction.

control the routes of the caravans, especially the route from Damascus to Egypt and the Red Sea. Thus, it would appear, the whole of the expansion of the Latin kingdom (which may be said to have attained its height in 1131, at the death of Baldwin II.) may be shown to have been dictated, at any rate in large part, by economic motives; and thus, too, it would seem that two of the most powerful motives which sway the mind of man — the religious motive and the desire for gain — conspired to elevate the kingdom of Jerusalem (at once the country of Christ, and a natural centre of trade) to a position of supremacy in Latin Syria. During this process of growth the kingdom stood in relation to two sects of powers — the three Frankish principalities in northern Syria, and the Mahommedan powers both of the Euphrates and the Nile — whose action affected its growth and character.

Of the three Frankish principalities, Edessa, founded in 1098 by Baldwin I. himself, was a natural fief of Jerusalem. Baldwin de Burgh, the future Baldwin II., ruled in Edessa as the vassal of Baldwin I. from 1100 to n 18; and thereafter the county was held in succession by the two Joscelins of Tell-bashir until the conquest of Edessa by Zengi in 1144. Lying to the east of the Euphrates, at once in close contact with the Armenians, and in near proximity to the great route of trade which came up the Euphrates to Rakka, and thence diverged to Antioch and Damascus, the county of Edessa had an eventful if brief life. The county of Tripoli, the second of these principalities, had also come under the aegis of Jerusalem at an early date. Founded by Raymund of Toulouse, between 1102 and 1105, with the favour of Alexius and the alliance of the Genoese, it did not acquire its capital of Tripoli till 1109. Even before the conquest of Tripoli, there had been dissensions between William, the nephew and successor of Raymund, and Bertrand, Raymund 's eldest son, which it had needed the interference of Baldwin I. to compose; and it was only by the aid of the king that the town of Tripoli had been taken. At an early date therefore the county of Tripoli had already come under the influence of the kingdom. Meanwhile the principality of Antioch, ruled by Tancred, after the departure of Bohemund (1104-1112), and then by Roger his kinsman (1 11 2-1 119), was, during the reign of Baldwin I., busily engaged in disputes both with its Christian neighbours at Edessa and Tripoli, and with the Mahommedan princes of Mardin and Mosul. On the death of Roger in 1119, the principality came under the regency of Baldwin II. of Jerusalem, until 1 1 26, when Bohemund II. came of age. Bohe- mund had married a daughter of Baldwin; and on his death in 1 130 Baldwin II. had once more become the guardian of Antioch. From his reign therefore Antioch may be regarded as a depend- ency of Jerusalem ; and thus the end of Baldwin's reign (1 13 1) may be said to mark the time when the Latin kingdom of Jerusalem stands complete, with its own boundaries stretching from Beirut in the

north to el-Arish and Aila in the south, and with the three Frankish powers of the north admitting its suzerainty.

The Latin power thus established and organized in the East had to face in the north a number of Mahommedan amirs, in the south the caliph of Egypt. The disunion between the Mahom- medans of northern Syria and the Fatimites of Egypt, and the political disintegration of the former, were both favourable to the success of the Franks; but they had nevertheless to maintain their ground vigorously both in the north and the south against almost incessant attacks. The hostility of the decadent caliphate of Cairo was the less dangerous; and though Baldwin I. had at the beginning of his reign to meet annual attacks from Egypt, by the end he had pushed his power to the Red Sea, and in the very year of his death (n 18) he had penetrated along the north coast of Egypt as far as Farama (Pelusium). The plan of conquering Egypt had indeed presented itself to the Franks from the first, as it continued to attract them to the end; and it is significant that Godfrey himself, in 1 100, promised Jerusalem to the patriarch, " as soon as he should have conquered some other great city, and especially Cairo."- But the real menace to the Latin kingdom lay in northern Syria; and here a power was eventually destined to rise, which outstripped the kings of

Jerusalem in the race for Cairo, and then — with the northern and southern boundaries of Jerusalem in its control — was able to crush the kingdom as it were between the two arms of a vice. Until 1 1 27, however, the Mahommedans of northern Syria were disunited among themselves. The beginning of the 1 2th century was the age of the atabegs (regents or stadtholders). The atabegs formed a number of dynasties, which displaced the descendants of the Seljukian amirs in their various principalities. These dynasties were founded by emancipated mamelukes, who had held high office at court and in camp under powerful amirs, and who, on their death, first became stadtholders for their descendants, and then usurped the throne of their masters. There was an atabeg dynasty in Damascus founded by Tughtigin (1103-1128): there was another to the N.E., that of the Ortokids, represented by Sokman, who established himself at Kaifa in Diarbekr about 1101, and by his brother Ilghazi, who received Mardin from Sokman about 1 108, and added to it Aleppo in 1 1 1 7. 1 But the greatest of the atabegs were those of Mosul on the Tigris • — Maudud, who died in 11 13; Aksunkur, his successor; and finally, greatest of all, Zengi himself, who ruled in Mosul from 1 1 27 onwards.

Before the accession of Zengi, there had been constant fighting, which had led, however, to no definite result, between the various Mahommedan princes and the Franks of northern Syria. The constant pressure of Tancred of Antioch and Baldwin de Burgh of Edessa led to a series of retaliations

between n 10 and 1115; Edessa was attacked in 1110, 1111, 1112 and 1114; and in 1 1 13 Maudud of Mosul had even penetrated as far as the vicinity of Acre and Jerusalem. 2 But the dissensions of the Mahommedans made their attacks unavailing; in 1115, for instance, we find Antioch actually aided by Ilghazi and Tughtigin against Aksunkur of Mosul. Again, in the reign of Baldwin II., there was steady fighting in the north; Roger of Antioch was defeated by Ilghazi at Balat in 1119, and Baldwin II. himself was captured by Balak, the successor of Ilghazi, in n 23, but on the whole the Franks held the upper hand. Baldwin con- quered part of the territory of Aleppo (in 1 1 2 1 and the following years), and extorted a tribute from Damascus (n 26). But when Zengi established himself in Mosul in 11 27, the tide gradually began to turn. He created for himself a great and united principality, comprising not only Mosul, but also Aleppo, 3 Harran, Nisibin and other districts; and in 1130, Alice, the widow of Bohemund II., sought his alliance in order to maintain herself in power at Antioch. In the beginning of the reign of Fulk of Jerusalem (1131-1143) the progress of Zengi was steady. He conquered in 1135 several fortresses in the east of the princi- pality of Antioch, and in this year and the next pressed the count of Tripoli hard; while in 1137 he defeated Fulk at Barin, and forced the king to capitulate and surrender the town. If Fulk had been left alone to wage the struggle against Zengi, and if Zengi had enjoyed a clear field against the Franks, the fall of the kingdom of Jerusalem might have come far sooner than it did. 4 But there were two powers which aided Fulk, and impeded the progress of Zengi — the amirate of Damascus and the emperors of Constantinople. The position of Damascus is a position of crucial importance from 1130 to 1154. Lying between Mosul and Jerusalem, and important both strategically

1 Ilghazi died in 1 122. His successor was Balak, who ruled from 1122 to 1124, and succeeded in capturing in 1123 Baldwin II. of Jerusalem. The union of Mardin and Aleppo under the sway of these two amirs, connecting as it did Mesopotamia with Syria, marks an important stage in the revival of Mahommedan power (Stevenson, Crusades in the East, p. 109).

2 Maudud (the brother of the sultan Mahommed) may be regarded as the first to begin the jihad, or counter-crusade, and his attack expedition of 1 113, which carried him so far into the heart of Palestine, may be considered as the first act of the jihad (Stevenson, op. cit. pp. 87, 96).

3 Aleppo had passed from the rule of Timurtash (son of Ilghazi and successor of Balak) into the possession of Aksunkur, 1125.

4 Stevenson, however, believes that Zengi was not animated by the idea of recovering Jerusalem. He thinks that his prinpipal aim was simply the formation of a compact Mahommedan state, which was, indeed, in the

issue destined to be the instrument of the jihad, but was not so intended by Zengi (op. cit. pp. 123-124).

and from its position on the great route of commerce from the Euphrates to Egypt, Damascus became the arbiter of Syrian politics. During the greater part of the period between 1130 and 1 1 54 the policy of Damascus was guided by the vizier Muin eddin Anar, who ruled on behalf of the descendants of the atabeg Tughtigin. He saw the importance of finding an ally against the ambition of Zengi, who had already attacked Damascus in 1130. The natural ally was Jerusalem. As early as 1133 the alliance of the two powers had been concluded; and in 1140 the alliance was solemnly renewed between Fulk and the vizier. Henceforth this alliance was a dominant factor in politics. One of the great mistakes made by the Franks was the breach of the alliance in 1147 — a breach which was widened by the attack directed against Damascus during the Second Crusade; and the conquest of Damascus by Nureddin in 1154 was ulti- mately fatal to the Latin kingdom, removing as it did the one possible ally of the Franks, and opening the wa> to Egypt for the atabegs of Mosul.

The alliance of the emperors of Constantinople was of far more dubious value to the kings of Jerusalem. We have already seen that it was the theory of the Eastern emperors — a theory which logically followed from the homage of the crusaders to Alexius — that the conquests of the crusaders belonged to their empire, and were held by the crusading princes as fiefs. We have seen that the action of Bohemund at Antioch was the negation of this theory, and that Alexius in consequence helped Raymund to establish himself in Tripoli as a thorn in the side of Bohemund, and sent an army and a fleet which wrested from the Normans the towns of Cilicia (1 104). The defeat of Bohemund at Durazzo in 1 108 had resulted in a treaty, which made Antioch a fief of Alexius; but Tancred (who in 1107 had recovered Cilicia from the Greeks) refused to fulfil the terms of the treaty, and Alexius (who attempted — but in vain — to induce Baldwin I. to join an alliance against Tancred in n 12) was forced to leave Antioch independent. Thus, although Alexius had been able, in the wake of the crusading armies, to recover a. large belt of land round the whole coast of Asia Minor, — the interior remaining subject to the sultans of Konia (Iconium) and the princes of Sivas, — he left the territories to the east of the western boundary of Cilicia in the hands of the Latins when he died in n 18. Not for 20 years after his death did the Eastern empire make any attempt to gain Cilicia or wrest homage from Antioch. But in 1 137 John Comnenus appeared, instigated by the opportunity of dissensions in

Antioch, and received its long-denied homage, as well as that of Tripoli; while in the following year he entered into hostilities with Zengi, without, however, achieving any considerable result. In 1142 he returned again, anxious to create a principality in Cilicia and Antioch for his younger son Manuel. The people of Antioch refused to submit; a projected visit to Jerusalem, during which John was to unite with Fulk in a great alliance against the Moslem, fell through; and in the spring of 1 143 the emperor died in Cilicia, with nothing accom- plished. On the whole, the interference of the Comneni, if it checked Zengi for the moment in 1138, may be said to have ultimately weakened and distracted the Franks, and to have helped to cause the loss of Edessa (1144), which marks the turning-point in the history of the kingdom of Jerusalem.

5. Organization of the Kingdom. — Before we turn to describe the Second Crusade, which the loss of Edessa provoked, and to trace the fall of the kingdom, which the Second Crusade rather hastened than hindered, we may pause at this point to consider the organization of the Frankish colonies in Syria. The first question which arises is that of the relation of the kingdom of Jerusalem to the three counties or principalities of Antioch, Tripoli and Edessa, which acknowledged their dependence upon it. The degree of this dependence was always a matter of dispute. The rights of the king of Jerusalem chiefly appear when there is a vacancy or a minority in one of the principalities, or when there is dissension either inside one of the principalities or between two of the princes. On the .death of one of the princes without heirs of full age, the kings of Jerusalem were entitled to act as regents, as Baldwin II. did twice at Antioch, in ma

and 1 130; but the kings regarded this right of regency as a burden rather than a privilege, and it is indeed characteristic of the relation of the king to the three princes, that it imposes upon him duties without any corresponding rights. It is his duty to act as regent; it is his duty to compose the dissensions in the principality of Antioch, and to repress the violences of the prince towards his patriarch (1 1 54) ; it is his duty to reconcile Antioch with Edessa, when the two fall to fighting. The princes on their side acted independently: if they joined the king with their armies, it was as equals doing a favour; and they some- times refused to join until they were coerced. They made their own treaties with the Mahommedans, or attacked them in spite of the king's treaties; they dated their documents by the year of their own reign, and they had each their separate laws or assizes. There was, in a word, co-ordination rather than subordination; nor did the kings ever attempt to embark on a policy of centralization.

The relation of the king to his own barons within his immediate kingdom of Jerusalem is not unlike the relation of the king to the three princes. In Norman England the king insisted on his rights; in Frankish Jerusalem the

barons insisted on his duties. The circumstances of the foundation of the kingdom explain its characteristics. As the crusaders advanced to Jerusalem, says Raymund of Agiles (c. xxxiii.), it was their rule that the first-comer had the right to each castle or town, provided that he hoisted his standard and planted a garrison there. The feudal nobility was thus the first to establish itself, and the king only came after its institution — the reverse of Norman England, where the king first conquered the country, and then plotted it out among his nobles. The predominance of the nobility in this way became as characteristic of feudalism in the Latin kingdom of Jerusalem as the supremacy of the crown was of contemporary feudalism in England; and that predominance expressed itself in the position and powers of the high court, in which the ultimate sovereignty resided. The kingdom of Jerusalem consisted of a society of peers, in which the king might be primus, but in which he was none the less subject to a punctilious law, regulating his position equally with that of every member of the society. In such a society the election of the head by the members may seem natural; and in the case of Godfrey and the first two Baldwins this was the case. But the conception of the equality of the king and his peers in the long run led to hereditary monarchy; for if the king held his kingdom as a fief, like other nobles, the laws of descent which applied to a fief applied to the kingdom, and {hose laws demanded heredity. Yet the high court, which decided all problems of descent, would naturally intervene if a problem of descent arose, as it frequently did, in the kingdom; and thus the barons had the right of deciding between different claimants, and also of formally " approving " each new successor to the throne. The conception of the kingdom as a fief not only subjected it to the jurisdiction of the high court; it involved the more disastrous result that the kingdom, like other fiefs, might be carried by an heiress to her husband; and the proximate causes of the collapse of the kingdom in 1187 depend on this fact and the dissensions which it occasioned.

Thus conceived as the holder of a great fief, the king had only the rights of suzerain over the four great baronies and the twelve minor fiefs of his kingdom. He had not those rights of sovereign which the Norman kings of England inherited from their Anglo- Saxon predecessors, or the Capetian kings of France from the Carolings; nor was he able therefore to come into direct touch with each of his subjects, which William I., in virtue of his sovereign rights, was able to attain by the Salisbury oath of 1086. Amalric I. indeed, by his assise sur la ligece, attempted to reach the vassals of his vassals; he admitted arriere-vassaux to the haute cour, and encouraged them to carry their cases to it in the first instance. But this is the only attempt at that policy of immediatisation which in contemporary England was carried to far greater lengths; and even this attempt was unsuccessful. No alliance was actually formed between the king and the mesne nobility

against the immediate baronage. The body of the tenants-in-chief continued to limit the power of the crown:

their consent was necessary to legislation, and grants of fiefs could not be made without their permission. Nor was the crown only limited in this way. The duties of the king towards his tenants are prominent in the assises. The king's oath to his men binds him to respect and maintain their rights, which are as prominent as are his duties; and if the men feel that the royal oath has not been kept, they may lawfully refuse military service (gager le roi) , and may even rise in authorized and legal rebellion. The system of military service and the organization of justice corresponded to the part which the monarchy was thus con- strained to play. The vassal was bound to pay military service, not, as in western Europe, for a limited period of forty days, but for the whole year — the Holy Land being, as it were, in a perpetual state of siege. On the other hand, the vassal was not bound to render service, unless he were paid for his service; and it was only famine, or Saracen devastation, which freed the king from the obligation of paying his men. The king was also bound to insure the horses of his men by a system called the restor: if a vassal lost his horse otherwise than by his own fault, it must be replaced by the treasury (which was termed, as it also was in Norman Sicily, the secretum). 1 But the king had another force in addition to the feudal levy — a paid force of soudoyers, 2 holding fiefs, not of land, but of pay [fiefs de soudie). Along with this paid cavalry went another branch of the army, the Turcopuli, a body of light cavalry, recruited from the Syrians and Mahommedans, and using the tactics of the Arabs; while an infantry was found among the Armenians, the best soldiers of the East, and the Maronites, who furnished the kingdom with archers. To all these various forces must be added the knights and native levies of the great orders, whose masters were practi- cally independent sovereigns like the princes of Antioch and Tripoli; 3 and with these the total levy of the kingdom may be reckoned at some 25,000 men. But the strength of the kingdom lay less perhaps in the army than in the magnificent fortresses which the nobility, and especially the two orders, had built; and the most visible relic of the crusades to-day is the towering ruins of a fortress like Krak (Kerak) des Chevaliers, the fortress of the Knights of St John in the principality of Tripoli. These fortresses, garrisoned not by the king, as in Norman England, but by their possessors, would only strengthen the power of the feudatories, and help to dissipate the kingdom into a number of local units.

In the organization of its system of justice the kingdom showed its most

characteristic features. Two great central courts sat in Jerusalem to do justice — the high court of the nobles, and the court of burgesses for the rest of the Franks. (1) The high court was the supreme source of justice for the military class; and in its composition and procedure the same limitation of the crown, which appears in regard to military service, is again evident. The high court is not a curia regis, but a curia baronum, in which the theory of judicium parium is fully realized. If the king presides in the court, the motive of its action is none the less the preservation of the rights of the nobles, and not, as in England, the extension of the rights of the crown. It is a court of the king's peers: it tries cases of dispute between the king and his peers — with regard, for instance, to military service — and it settles the descent of the title of king. (2) The court of

1 There are certain connexions and analogies between the kingdom of Sicily and that of Jerusalem during the twelfth century. In either case there is an importation of Western feudalism into a country originally possessed, of Byzantine institutions, but affected by an Arabic occupation. The subject deserves investigation.

2 The holders of fiefs (sodeers) both held fiefs of land and received pay; the paid force of soudoyers only received pay. An instance of the latter is furnished by John of Margat, a vassal of the seignory of Arsuf. He has 200 bezants along with a quantity of wheat, barley, lentils and oil ; and in return he must march with four horses (Rey, Les Colonies frangues en Syrie, p. 24).

3 For the history of the orders see the articles on the Templars; St John of Jerusalem, Knights of ; Knights, and the Teutonic Order. The Templars were founded about the year 11 18 by a Burgundian knight, Hugh de Paganis; the Hospitallers sprang from a foundation in Jerusalem erected by merchants of Amalfi before the First Crusade, and were reorganized under Gerard le Puy, master until 1 120. The Teutonic knights date from the Third Crusade.

burgesses was almost equally sovereign within its sphere. While the body of the noblesse formed the high court, the court of the burgesses was composed of twelve legists (probably named by the king) under the presidency of the vicomte — a knight also named by the king, who was a great financial as well as a judicial officer. The province of the court included all acts and contracts between burgesses, and extended to criminal cases in which burgesses were involved. Like the high court, the court of burgesses had also its assizes 4 — a body of unwritten legal

4 As was noticed above, there were apparently separate assizes for the three principalities, in addition to the assizes of the kingdom. The assizes of

Antioch have been discovered and published. The assizes of the kingdom itself are twofold — the assizes of the high court and the assizes of the court of burgesses. (1) The assizes of the high court are preserved for us in works by legists — John of Ibelin, Philip of Novara and Geoffrey of Tort — composed in the 13th century. We possess, in other words, law-books (like Bracton's treatise De legibus), but not laws — and law-books made after the loss of the kingdom to which the laws belonged. There are two vexed questions with regard to these law-books, (a) The first con- cerns the origin and character of the laws which the law-books profess to expound. According to the story of the legists who wrote these books — e.g. John of Ibelin — the laws of the kingdom were laid down by Godfrey, who is thus regarded as the great vofix>6kTr)s of the kingdom. These laws (progressively modified, it is admitted) were kept in Jerusalem, under the name of " Letters of the Sepulchre," until 1 187. In that year they were lost; and the legists tell us that they are attempting to reconstruct par oir dire the gist of the lost archetype. The story of the legists is now generally rejected. Godfrey never legislated: the customs of the kingdom gradually grew, and were gradually defined, especially under kings like Baldwin III. and Amalric I. If there was thus only a customary and un- written law (and William of Tyre definitely speaks of a jus consue- tudinarium under Baldwin III., quo regnum regebatur), then the " Letters of the Sepulchre " are a myth — or rather, if they ever existed, they existed not as a code of written law, but, perhaps, as a register of fiefs, like the Sicilian Defetarii. Thus the story of the legists shrinks down to the regular myth of the primitive legislator, used to give an air of respectability to law-books, which really record an unwritten custom. The fact is that until the 13th century the Franks lived consuetudinibus antiquis et jure non scripto. They preferred an unwritten law, as Prutz suggests, partly because it suited the barristers (who often belonged to the baronage, for the Frankish nobles were " great pleaders in court and out of court "), and partly because the high court was left unbound so long as there was no written code. In the 13th century it became necessary for the legists to codify, as it were, the unwritten law, because the upheavals of the times necessitated the fixing of some rules in writing, and especially because it was necessary to oppose a definite custom of the kingdom to Frederick II., who sought, as king of Jerusalem, to take advantage of the want of a written law, to substitute his own conceptions of law in the teeth of the high court, (b) The second difficulty concerns the text of the law-books themselves. The text of Ibelin became a textus receptus — but it also became overlaid by glosses, for it was used as authoritative in the kingdom of Cyprus after the loss of the kingdom of Jerusalem, and it needed expounding. Recensions and revisions were twice made, in 1368 and 1531 ; but how far the true Ibelin was recovered, and what additions or altera- tions were made at these two dates, we cannot tell. We can only say that we have the text of Ibelin

which was used in Cyprus in the later middle ages. At the same time, if our text is thus late, it must be remembered that its content gives us the earliest and purest ex- position of French feudalism, and describes for us the organization of a kingdom, where all rights and duties were connected with the fief, and the monarch was only a suzerain of feudatories. (2) The assizes of the court of burgesses became the basis of a treatise at an earlier date than the assizes of the high court. The date of the redaction (which was probably made by some learned burgess) may well have been the reign of Baldwin III., as Kugler suggests: he was the first native king, and a king learned in the law; but Beugnot would refer the assizes to the years immediately preceding Saladin's capture of Jerusalem. These assizes do not, of course, appear in Ibelin, who was only concerned with the feudal law of the high court. They were used, like the assizes of the high court, in Cyprus; and, like the other assizes, they were made the subject of investigation in 1531, with the object of discovering a good text. The law which is expounded in these assizes is a mixture of Frankish law with the Graeco- Roman law of the Eastern empire which prevailed among the native population of Syria.

In regard to both assizes, it is most important to bear in mind that we possess not laws, but law-books or custumals — records made by lawyers for their fellows of what they conceived to be the law, and supported by legal arguments and citations of cases. But, as Prutz remarks, Philip of Novara lehrt nicht die Wissenschaft des Rechts, sondern die des Unrechts: he does not explain the law so much as the ways of getting round it.

custom. The independent position of the burgesses, who thus assumed a position of equality by the side of the feudal class, is one of the peculiarities of the kingdom of Jerusalem. It may be explained by reference to the peculiar conditions of the kingdom. Burgesses and nobles, however different in status, were both of the same Frankish stock, and both occupied the same superior position with regard to the native Syrians. The commercial motive, again, had been one of the great motives of the crusade; and the class which was impelled by that motive would be both large and, in view of the quality of the Eastern goods in which it dealt, exceptionally prosperous. Finally, when one remembers how, during the First Crusade, the pedites had marched side by side with the principes, and how, from the beginning of 1099, they had practically risen in revolt against the selfish ambitions of princes like Count Raymund, it becomes easy to understand the independent position which the burgesses assumed in the organization of the kingdom. Burgesses could buy and possess property in towns, which

knights were forbidden to acquire; and though they could not intermarry with the feudal classes, it was easy and regular for a burgess to thrive to knighthood. Like the nobles, again, the burgesses had the right of confirming royal grants and of taking part in legislation; and they may be said to have formed — socially, politically and judicially — an independent and powerful estate. Yet (with the exception of Antioch, Tripoli and Acre in the course of the 13th century) the Frankish towns never developed a communal government: the domain of their development was private law and commercial life.

Locally, the consideration of the system of justice administered in the kingdom involves some account of three things — the organization of the fiefs, the position of the Italian traders in their quarters, and the privileges of the Church. Each fief was organized like the kingdom. In each there was a court for the noblesse, and a court (or courts) for the bourgeoisie. There were some thirty-seven cours de bourgeoisie (several of the fiefs having more than one), each of which was under the presidency of a vicomte, while all were independent of the court of burgesses at Jerusalem. Of the feudal courts there were some twenty-two. Each of these followed the procedure and the law of the high court; but each was independent of the high court, and formed a sovereign court without any appeal. On the other hand, the revolution wrought by Amalric I. in the status of the arriere-vassaux, which made them members of the high court, allowed them to carry their cases to Jerusalem in the first instance, if they desired. Apart from this, the characteristic of seignorial justice is its independence and its freedom from the central- court; though, when we reflect that the central court is a court of seigneurs, this characteristic is seen to be the logical result of the whole system. Midway between the seignorial cours de bourgeoisie and the privileged jurisdictions of the Italian quarter, there were two kinds of courts of a commercial character — the cours de la fonde in towns where trade was busy, and the cours de la chaine in the sea-ports. The former courts, under their bailiffs, gradually absorbed the separate courts which the Syrians had at first been permitted to enjoy under their own rets; and the bailiff with his 6 assessors (4 Syrians and 2 Franks) thus came to judge both commercial cases and cases in which Syrians were involved. The cours de la chaine, whose institution is assigned to Amalric I. (1162-1174), had a civil jurisdiction in admiralty cases, and, like the cours de la fonde, they were com- posed of a bailiff and his assessors. Distinct from all these courts, if similar in its sphere, is the court which the Italian quarter generally enjoyed in each town under its own consuls — a court privileged to try all but the graver cases, like murder, theft and forgery. The court was part of the general immunity which made these quarters imperia in imperio: their exemptions from tolls and from financial contributions is parallel to their judicial privileges. Regulated by

their mother-town, both in their trade and their government, these Italian quarters outlasted the collapse of the kingd.om, and continued to exist under Mahommedan rulers. The Church had its separate courts, as in the West; but their province was perhaps greater than

elsewhere. The church courts could not indeed decide cases of perjury; but, on the other hand, they tried all matters in which clerical property was concerned, and all cases of dispute between husband and wife. In other spheres the immunities and exemp- tions of the Church offered a far more serious problem, and especially in the sphere of finance. Perhaps the supreme defect of the kingdom of Jerusalem was its want of any financial basis. It is true that the king had a revenue, collected by the vicomte and paid into the secretum or treasury — a revenue composed of tolls on the caravans and customs from the ports, of the profits of monopolies and the proceeds of justice, of poll-taxes on Jews and Mahommedans, and of the tributes paid by Mahommedan powers. But his expenditure was large: he had to pay his feudatories; and he had to provide fiefs in money and kind to those who had not fiefs of land. The contributions sent to the Holy Land by the monarchs of western Europe, as commutations in lieu of personal participation in crusades, might help; the fatal policy of razzias against the neighbouring Mahommedan powers might procure temporary resources; but what was really necessary was a wide measure of native taxation, such as was once, and once only, attempted in 1183. To any such measure the privileges of the Italian quarters, and still more those of the Church, were inimical. In spite of provisions somewhat parallel to those of the English statute of mortmain, the clergy continued to acquire fresh lands at the same time that they refused to contribute to the defence of the kingdom, and rigorously exacted the full quota of tithe from every source which they could tap, and even from booty captured in war. The richest proprietor in the Holy Land, 1 but practically immune from any charges on its property, the Church helped, unconsciously, to ruin the kingdom which it should have supported above all others. It refused to throw its weight into the scale, and to strengthen the hands of the king against an over-mighty nobility. On the other hand, it must be admitted that the Church did not, after the first struggle between Dagobert and Baldwin I., actively oppose by any hierarchical pretensions the authority of the crown. The assizes may speak of patriarch and king as conjoint seigneurs in Jerusalem; but as a matter of fact the king could secure the nomination of his own patriarch, and after Dagobert the patriarchs are, with the temporary exception of Stephen in 1 1 28, the confidants and supporters of the kings. It was the two great orders of the Templars and the Hospitallers which were, in reality, most dangerous to the kingdom. Honeycombed as it was by immunities — of seigneurs, of Italian quarters, of the clergy — the kingdom was most seriously impaired by these overweening immunists,

who, half-lay and half-clerical, took advantage of their ambiguous position to escape from the duties of either character. They built up great estates, especially in the principality of Tripoli; they quarrelled with one another, until their dissensions prevented any vigorous action; they struggled against the claims of the clergy to tithes and to rights of juris- diction; they negotiated with the Mahommedans as separate powers; they conducted themselves towards the kings as independent sovereigns. Yet their aid was as necessary as their influence was noxious. Continually recruited from the West, they retained the vigour which the native Franks of Palestine gradually lost; and their corporate strength gave a weight to their arms which made them indispensable.

In describing the organization of the kingdom, we have also been describing the causes of its fall. It fell because it had not the financial or political strength to survive. " Les vices du gouvernement avaient ete plus puissants que les vertus des gouvernants." But the vices were not only vices of the govern- ment: they were also vices, partly inevitable, partly moral, in the governing race itself. The climate was no doubt responsible for much. The Franks of northern Europe attempted to live a life that suited a northern climate under a southern sun. They rode incessantly to battle over burning sands, in full armour

1 For instance, the abbey of Mount Sion had large possessions, not only in the Holy Land (at Ascalon, Jaffa, Acre, Tyre, Caesarea and Tarsus), but also in Sicily, Calabria, Lombardy, Spain and France (at Orleans, Bourges and Poitiers).

— chain mail, long shield and heavy casque — as if they were on their native French soil. The ruling population was already spread too thin for the work which it had to do; and exhausted by its efforts, it gradually became extinct. A constant immigra- tion from the West, bringing new blood and recruiting the stock, could alone have maintained its vigour; and such immigration never came. Little driblets of men might indeed be added to the numbers of the Franks; but the great bodies of crusaders either perished in Asia Minor, as in noi and 1147, or found themselves thwarted and distrusted by the native Franks. It was indeed one of the misfortunes of the kingdom that its inhabitants could never welcome the reinforcements which came to their aid. 1 The barons suspected the crusaders of ulterior motives, and of designing to get new principalities for themselves. In any case the native Frank, accustomed to commercial intercourse and diplomatic negotiations with the Mahommedans, could hardly share the

unreasoning passion to make a dash for the " infidel." As with the barons, so with the burgesses: they profited too much by their intercourse with the Mahommedans to abandon readily the way of peaceful commerce, and they were far more ready to hinder than to help any martial enterprise. Left to itself, the native population lost physical and moral vigour. The barons alternated between the extravagances of Western chivalry and the attractions of Eastern luxury: they returned from the field to divans with frescoed walls and floors of mosaic, Persian rugs and embroidered silk hangings. Their houses, at any rate those in the towns, had thus the characteristics of Moorish villas; and in them they lived a Moorish life. Their sideboards were covered with the copper and silver work of Eastern smiths and the confectioneries of Damascus. They dressed in flowing robes of silk, and their women wore oriental gauzes covered with sequins. Into these divans where figures of this kind moved to the music of Saracen instruments, there entered an inevitable voluptuousness and corruption of manners. The hardships of war and the excesses of peace shortened the lives of the men; the kingdom of Jeru- salem had eleven kings within a century. While the men died, the women, living in comparative indolence, lived longer lives. They became regents to their young children; and the experience of all medieval minorities reiterates the lesson — woe to the land where the king is a child and the regent a woman. Still worse was the frequent remarriage of widowed princesses and heiresses. By the assizes of the high court, the widow, on the death of her husband, took half of the estate for herself, and half in guardianship for her children. Liberae ire cum terra, widows carried their estates or titles to three or four husbands; and as in 1 5th-century England, the influence of the heiress was fatal to the peace of the country. At Antioch, for instance, after the death of Bohemund II. in 1130, his widow Alice headed a party in favour of the marriage of the heiress Constance to Manuel of Constantinople, and did not scruple to enter into negotiations with Zengi of Mosul. Her policy failed; and Constance successively married Raymund of Antioch and Raynald of Chatillon. The result was the renewed enmity of the Greek empire, while the French adventurers who won the prize ruined the prospects of the Franks by their conduct. In the kingdom matters were almost worse. There was hardly any regular succession to the throne; and Jerusalem, as Stubbs writes, " suffered from the weakness of hereditary right and the jealousies of the elective system " at one and the same time. With the frequent remarriages of the heiresses of the kingdom, relationships grew confused and family quarrels frequent; and when Sibylla carried the crown to Guy de Lusignan, a new- comer disliked by all the relatives of the crown, she sealed the fate of the kingdom. It may be doubted — though it seems a harsh verdict to pass 1 One must remember that these reinforcements would often consist of desperate characters. It was one of the misfortunes of Palestine that it served as a Botany Bay, to which the

criminals of the West were transported for penance. The natives, already prone to the immorality which must infect a mixed population living under a hot sun, the immorality which still infects a place like Aden, were not improved by the addition of convicts.

on a kingdom founded by religious zeal on holy soil — whether the kingdom possessed that moral basis which alone can give a right of survival to any institution or organization. The crusad- ing states had been founded by adventurers who thirsted for gain; and the primitive appetite did not lose its edge with the progress of time. We cannot be certain, indeed, how far the Frankish lords oppressed their Syrian tenants: the stories of such oppression have been discredited; while if we may trust the evidence of a Mahommedan traveller, Ibn Jubair, the lot of the Mahommedan who lived on Frankish manors was better than it had been under their native lords. 2 But the habits of the Franks were none the less habits of lawless greed: they swooped down from their castles, as Raynald of Chatillon did from Krak of the Desert, to capture Saracens and hold them to ransom or to plunder caravans. The lust of unlawful gain had infected the Frankish blood, as it seems to have infected England during the Hundred Years' War; and in either case nemesis infallibly came. The Moslems might have endured a state of " infidels "; they could not endure a state of brigands.

6. The History of the Kingdom and the Crusades from the Loss of Edessa in 1144 to the Fall of Jerusalem in 1187. — The years 1143-1144 are in many ways the turning point in the history of the Latin East. In 1143 began the reign of the first native king; 3 and about this date may be placed the final organization of the kingdom, witnessed by the completion of its body of customary law. At the same date, however, the decline of the kingdom also begins; the fall of Edessa is the beginning of the end. In n 43 John Comnenus and Fulk had just died, and Zengi, seeing his way clear, threw himself on the great Christian outpost, against which the tides of Mahommedan attack had so often vainly surged, and finally entered on Christ- mas Day 1 144. Two years later Zengi died; but he left an able successor in his son, Nureddin, and an attempt to recover Edessa was successfully repelled in November 1146. Not only so, but in the spring of 1147 the Franks were unwise enough to allow the hope of gaining two small towns to induce them to break the vital alliance with Damascus. Thus, in itself, the position of affairs in the Holy Land in 1147 was certainly ominous; and the kingdom might well seem dependent for its safety on such aid as it might receive from the West.

Early in 1145 news had come from Antioch to Eugenius III. of the fall of Edessa, and at the end of the year he had sent an encyclical to France — the natural soil, as we have seen, of crusading zeal. The response was instantaneous: the king of France himself, who bore on his conscience the

burden of an unpunished massacre by his troops at Vitry in 1142, 4 took the crusading vow on the Christmas day of 1145. But the greatest success was attained when St Bernard — no great believer in pilgrimages, and naturally disposed to doubt the policy of a second Crusade — was induced by the pope to become the preacher of the new movement. To the crusading king of

2 The manorial system in the Latin kingdom of Jerusalem was a continuation of the village system as it had existed under the Arabs. In each village {casale) the rustici were grouped in families (foci) : the tenants paid from \ to % of the crop, besides a poll-tax and labour-dues. The villages were mostly inhabited by Syrians: it was rarely that Franks settled down as tillers of the soil. Prutz regards the manorial system as oppressive. Absentee landlords, he thinks, rack-rented the soil (p. 167), while the " inhuman severity " of their treatment of villeins led to a progressive decay of agriculture, destroyed the economic basis of the Latin kingdom, and led the natives to welcome the invasion of Saladin (pp. 327-331).

The French writers Rey and Dodu are more kind to the Franks; and the testimony of contemporary Arabic writers, who seem favourably impressed by the treatment of their subjects by the Franks, bears out their view, while the tone of the assizes is ad- mittedly favourable to the Syrians. One must not forget that there was a brisk native manufacture of carpets, pottery, ironwork, gold-work and soap; or that the Syrians of the towns had a definite legal position.

3 After 1 143 one may therefore speak of the period of the Epigoni — the native Franks, ready to view the Moslems as joint occupants of Syria, and to imitate the dress and habits of their neighbours.

4 Doubt has been cast on the view that a troubled conscience drove Louis to take the cross ; and his action has been ascribed to simple religious zeal (cf. Lavisse, Histoire de France, iii. 12).

France St Bernard added the king of Germany, when, in Christ- mas week of 1146, he induced Conrad III. to take the vow by his sermon in the cathedral of Spires. Thus was begun the Second Crusade, 1 under auspices still more favourable than those which attended the beginning of the First, seeing that kings now took the place of knights, while the new crusaders would no longer be penetrating into the wilds, but would find a friendly

basis of operations ready to their hands in Frankish Syria. But the more favourable the auspices, the greater proved the failure. Already at the final meeting at Etampes, in 1147, difficulties arose. Manuel Comnenus demanded that all con- quests made by the crusaders should be his fiefs; and the question was debated whether the crusaders should follow the land route through Hungary, along the old road of Charlemagne, or should go by sea to the Holy Land. In this question the envoys of Manuel and of Roger of Sicily, who were engaged in hostilities with one another, took opposite sides. Conrad, related by marriage to Manuel, decided in favour of the land route, which Manuel desired because it brought the Crusade more under his direction, and because, if the route by sea were followed, Roger' of Sicily might be able to divert the crusading ships against Constantinople. As it was, a struggle raged between Roger and Manuel during the whole progress of the Crusade, which greatly contributed towards its failure, preventing, as it did, any assistance from the Eastern empire. Nor was there any real unity among the crusaders themselves. The crusaders of northern Germany never went to the Holy Land at all; they were allowed the crusaders' privileges for attacking the Wends to the east of the Elbe — a fact which at once attests the cleavage between northern and southern Germany (intensified of late years by the war of investitures), and anticipates the age of the Teutonic knights and their long Crusade on the Baltic. The crusaders of the Low Countries and of England took the sea route, and attacked and captured Lisbon on their way, thus helping to found the kingdom of Portugal, and achieving the one real success which was gained by the Second Crusade. 2 Among the great army of crusaders who actually marched to Jerusalem there was little real unity. Conrad and Louis VII. started separately, and at different times, in order to avoid dissensions between their armies; and when they reached Asia Minor (after encountering some difficulties in Greek territory) they still acted separately Eager to win the first spoils, the German crusaders, who were in advance of the French, attempted a raid into the sultanate of Iconium; but after a stern fight at Dory- laeum they were forced to retreat (October 1147), and for the most part perished by the way. Louis VII., who now appeared, was induced by this failure to take the long and circuitous route by the west coast of Asia Minor; but even so he had lost the majority of his troops when he reached the Holy Land in 1148. Here he joined Conrad (who had come by sea from Constanti- nople) and Baldwin III., and after some deliberation the three*

1 We speak of First, Second and Third Crusades, but, more exactly, the Crusades were one continuous process. Scarcely a year passed in which new bands did not come to the Holy Land. We have already noticed the great if disastrous Crusade of iioo-noi, and the Venetian Crusade of n 23-1 124; and we may also refer to the Crusade of Henry the Lion in 1 172,

and to that of Edward I. in 1271-1272 — all famous Crusades, which are not reckoned in the usual numbering. Crusades appear to have been dignified by numbers when they followed some crushing disaster — the loss of Edessa in 1 144, or the fall of Jerusalem in 1187 — and were led by kings and emperors; or when, like the Fourth and Fifth Crusades, they achieved some conspicuous success or failure. But it is im- portant to bear in mind the continuity of the Crusades — the constant flow of new forces eastward and back again westward ; for this alone explains why the Crusades formed a great epoch in civilization, familiarizing, as they did, the West with the East.

2 This body of crusaders ultimately reached the Holy Land, where it joined Conrad (who had lost his own original forces), and helped in the fruitless siege of Damascus. The services which it rendered to Portugal were repeated by later crusaders. Crusaders from the Low Countries, England and the Scandinavian north took the coast route round western Europe; and it was natural that, landing for provisions and water, they should be asked, and should consent, to lend their aid to the natives against the Moors. Such aid is recorded to have been given on the Third and the Fifth Crusades.

sovereigns resolved to attack Damascus. The attack was impolitic: Damascus was the one ally which could help the Franks to stem the advance of Nureddin. It proved as futile as it was impolitic; for the vizier of Damascus, Muin-eddin- Anar, was able to sow dissension between the native Franks and the crusaders; and by bribes and promises of tribute he succeeded in inducing the former to make the siege an absolute failure, at the end of only four days (July 28th, 1148). The Second Crusade now collapsed. Conrad returned to Constanti- nople in the autumn of 1148, and Louis VII. returned by sea to France in the spring of 1149. The only effects of this great movement were effects prejudicial to the ends towards which it was directed. The position of the Franks in the Holy Land was not improved by the attack on Damascus; while the ignominious failure of a Crusade led by two kings brought the whole crusading movement into discredit in western Europe, and it was utterly in vain that Suger and St Bernard attempted to gather a fresh Crusade in n 50.

The result of the failure of the Second Crusade was the renewal of Nureddin's attacks. The rest of the county of Edessa, including Tell-bashir on the west, was now conquered (1150); while Raymund of Antioch was defeated and killed (in 1149), and several towns in the east of his principality were captured. Baldwin III. attempted to make head against these troubles, partly by renewing the old alliance with Damascus, partly by drawing closer to Manuel of Constantinople. For the next twenty years, during the reigns of Baldwin and his brother Amalric I., there is indeed a

close connexion between the kingdom of Jerusalem and the East Roman empire. Baldwin and Amalric both married into the Comnenian house, while Manuel married Mary of Antioch, the daughter of Raymund. In the north Manuel enjoyed the homage of Antioch, which his father had gained in 1137, and the nominal possession of Tell-bashir, which had been ceded to him by Baldwin III. : in the south he joined with Amalric I. in the attempt to acquire Egypt (1168-1171). In this way he acquired a certain ascendancy over the Latin kings: Baldwin III. rode behind him at Antioch in 1159 without any of the insignia of royalty, and in an inscription at Bethlehem of 1 172 Amalric I. had the name of the emperor written above his own. 3 The patronage of Constantinople, to which Jerusalem was thus practically surrendered, contributed to some slight extent in maintaining the kingdom against Nureddin. But there were dissensions within, both between Baldwin and his mother, Melisinda, who sought to protract her regency unduly, and between contending parties in Antioch, where the hand of Constance, Raymund's widow, was a desirable prize 4 ; while from without the horns of the crescent were slowly closing in on the kingdom. Nureddin pursued in his policy the tactics which the Mahommedans used against the Franks in battle: he sought to envelop their territories on every side. In 1 1 54 fell Damascus, and the crescent closed perceptibly in the north: the most valuable ally of the kingdom was lost, and the way seemed clear from Aleppo (the peculiar seat of Nureddin's power) into Egypt. On the other hand, in n 53 Baldwin III. had taken Ascalon, which for fifty years had mocked the efforts of successive kings, and by this stroke he might appear to have closed for Nureddin the route to Egypt, and to have opened a path for its conquest by the Franks. For the future, events hinged on the situation of affairs in Egypt, and in Egypt the fate of the kingdom of Jerusalem was finally decided (see Egypt: History, " Mahom- medan Period "). There was a race for the possession of the country between Nureddin's lieutenant Shlrgtih or Shirkuh and Amalric I., the brother and successor of Baldwin III.; and in the race Shirkuh proved the winner.

Since the days of Godfrey and Baldwin I., Egypt had been a

3 Manuel was an ambitious sovereign, apparently aiming at a world-monarchy, such as was afterwards attempted from the other side by Henry VI. As Henry VI. had designs on Constantinople and the Eastern empire, so Manuel cherished the ambition of acquir- ing Italy and the Western empire, and he negotiated with Alexander III. to that end in 1167 and 1169: cf. the life of Alexander III. in Muratori, S. R. I. iii. 460.

4 The prize was won by Raynald of Chatillon (q.v.).

goal of Latin ambition, and the capture of Ascalon must obviously have given form and strength to the projects for its conquest. Plans of attack were sketched: routes were traced: distances were measured; and finally in 1163 there came the impulse from within which turned these plans into action. The Shiite caliphs of Egypt were by this time the playthings of contending viziers, as the Sunnite caliphs of Bagdad had long been the puppets of Turkish sultans or amirs; and in 11 64 Amalric I. and Nureddin were fighting in Egypt in support of two rival viziers, Dirgham and Shawar. For Nureddin the fight meant the acquisition of an heretical country for the true faith of the Sunnite, and the final enveloping of the Latin kingdom: 1 for Amalric it meant the escape from Nureddin's net, and a more direct and lucrative contact with Eastern trade. Into the vicissitudes of the fight it is not necessary here to enter; but in the issue Nureddin won, in spite of the support which Manuel gave to Amalric. Nureddin's Kurdish lieutenant, Shlrguh, succeeded in establishing in power the vizier whom he favoured, and finally in becoming vizier himself (January 1169) ; and when he died, his nephew Saladin (Sala-ed-din) succeeded to his position (March n 69), and made himself, on the death of the caliph in n 71, sole ruler in Egypt. Thus the Shiite caliphate became extinct: in the mosques of Cairo the name of the caliph of Bagdad was now used; and the long-disunited Mahommedans at last faced the Christians as a solid body. But nevertheless the kingdom of Jerusalem continued almost unmenaced, and practically undiminished, for the next sixteen years. If a religious union had been effected between Egypt and northern Syria, political disunion still remained; and the Franks were safe as long as it lasted. Saladin acted as the peer of Nureddin rather than as his subject; and the jealousy between the two kept both inactive till the death of Nureddin in 1 1 74. Nureddin only left a minor in his place: Amalric, who died in the same year, left a son (Baldwin IV.) who was not only a minor but also a leper; and thus the stage seemed cleared for Saladin. He was confronted, however, by Raymund, count of Tripoli, the one man of ability among the decadent Franks, who acted as guardian of the kingdom; while he was also occupied in trying to win for himself the Syrian possessions of Nureddin. The task engaged his attention for nine years. Damascus he acquired as early as n 74; but Raymund supported the heir of Nureddin in his capital at Aleppo, and it was not until 1183 that Saladin entered the city, and finally brought Egypt and northern Syria under a single rule.

The hour of peril for the Latin kingdom had now at last struck. It had done little to prepare itself for that hour. Repeated appeals had been sent to the West from the beginning of the Egyptian affair (1163) onwards; while in 1184-1185 a great mission, on which the patriarch of Jerusalem and the masters of the Templars and the Hospitallers were all present, came to

France and England, and offered the crown of Jerusalem to Philip Augustus and Henry II. in turn, in order to secure their presence in the Holy Land. 2 The only result of these appeals was the rise of a regular system of taxation in France and England, ad sustentationem Jerosolimitanae terrae, which starts about 1 185 (though there had already been isolated taxes in 1 147 and 1 1 66), and which has been described as the beginning of modern taxation. In the East itself, with the exception of the tax of 1183, 3 nothing was done that was good, and two things were done which were evil. Sibylla married her second husband , Guy de Lusignan, in 1180 — a marriage destined to be the cause of many dissensions; for Sibylla, the eldest daughter

1 Nureddin, unlike his father, was definitely animated by a religious motive: he fought first and foremost against the Latins (and not, like his father, against Moslem states), and he did so as a matter of religious duty.

2 Henry II., as an Angevin, was the natural heir of the kingdom of Jerusalem on the extinction of the line descended from Fulk of Anjou. This explains the part played by Richard I. in deciding the question of the succession during the Third Crusade.

3 The taxation levied in the West was also attempted in the East, and in 1 183 a universal tax was levied in the kingdom of Jerusalem, at the rate of 1 % on movables and 2 % on rents and revenues. Cf. Dr A. Cartellieri, Philipp II. August, ii. pp. 3-18 and p. 85.

of Amalric I., carried to her husband— a French adventurer — a presumptive title to the crown, which would never be admitted without dispute. In 1186 Guy eventually became king, after the death of Baldwin V. (Sibylla's son by her first marriage); but his coronation was in violation of the promise given to Raymund of Tripoli (that in the event of the death of Baldwin V. without issue the succession should be determined by the pope, the emperor and the kings of France and England), and Guy, with a weak title, was unable to exercise any real control over the kingdom. At this point another French adventurer, who had already made himself somewhat of a name in Antioch, gave the final blow to the kingdom. Raynald of Chatillon, the second husband of Constance of Antioch, after languishing in captivity from n 59 to n 76, had been granted the seignory of Krak, to the east and south of the Dead Sea. From this point of vantage he began depredations on the Red Sea (1182), building a fleet, and seeking to attack Medina and Mecca — a policy which may be interpreted either as mere buccaneering, or as a calculated attempt to deal a blow at Mahommedanism in its very centre. Driven from the Red Sea by Saladin, he turned from buccaneering to brigandage, and infested the great trade-route from Damascus to Egypt, which passed close by his seignory. In n 86

he attacked a caravan in which the sister of Saladin was travelling, thus violating a four years' truce, which, after some two years' skirmishing, Saladin and Raymund of Tripoli had made in the previous year owing to the general prevalence of famine. 4 The coronation of one French adventurer and the conduct of another, whom the first was unable to control, meant the ruin of the kingdom; and Saladin at last delivered in full force his long- deferred attack. The Crusade was now at last answered by the counter-Crusade — the jihad; for though for many years past Saladin had, in his attempt to acquire all the inheritance of Nureddin, left Palestine unmenaced and intact, his ultimate aim was always the holy war and the recovery of Jerusalem. The acquisition of Aleppo could only make that supreme object more readily attainable; and so Saladin had spent his time in acquiring Aleppo, but only in order that he might ultimately " attain the goal of his desires, and set the mosque of Asha free, to which Allah once led in the night his servant Mahomet. " Thus it was on a kingdom of crusaders who had lost the crusading spirit that a new Crusade swept down; and Saladin's army in 1187 had the spirit and the fire of the Latin crusaders of 1099. The tables were turned; and fighting on their own soil for the recovery of what was to them too a holy place, the Mahommedans easily carried the day. At Tiberias a little squadron of the brethren of the two Orders went down before Saladin's cavalry in May; at Hattin the levy en masse of the kingdom, some 20,000 strong, foolishly marching over a sandy plain under the heat of a July sun, was utterly defeated; and after a fortnight's siege Jerusalem capitulated (October 2nd, 1187). In the kingdom itself nothing was left to the Latins by the end of n 89 except the city of Tyre; and to the north of the kingdom they only held Antioch and Tripoli, with the Hospitallers' fortress at Margat. The fingers of the clock had been pushed back; once more things were as they had been at the time of the First Crusade; once more the West must arm itself for the holy war and the recovery of Jerusalem — but now it must face a united Mahommedan world, where in 1096 it had found political and religious dissension, and it must attempt its vastly heavier task without the morning freshness of a new religious impulse, and with something of the weariness of a hundred years of struggle upon its shoulders.

7. The Forty Years' Crusade for the Recovery of Jerusalem, 1 189-1229. — The forty years from 1189 to 1229 form a period of incessant crusading, occupied by Crusades of every kind. There are the Third, Fifth and Sixth Crusades against the " infidel " Mahommedans encamped in the Holy Land; there is the Albigensian Crusade against the heretic Cathars; there is the Fourth Crusade, directed in the issue against the schismatic

4 Stevenson argues (op. cit. p. 240) that this truce was already practically dissolved before Raynald struck, and that Raynald's " action may reasonably be viewed as the practical outcome of the feeling of a party."*

Greeks; lastly, there are the Crusades waged by the papacy against revolted Christians — John of England and Frederick II. Our concern lies with the first kind of Crusade, and with the other three only so far as they bear on the first, and as they illustrate the immense widening which the, term "Crusade" now underwent — a widening accompanied by its inevitable corollary of shallowness of motive and degradation of impulse.

The Third Crusade, 1189-1192. — Conrad of Montferrat was, as much as any one man, responsible for the Third Crusade. Compelled to leave the court of Constantinople, which he had been serving, he had sailed for the Holy Land and reached Tyre about three weeks after the battle of Hattin. He had saved Tyre; and from it he sent his appeals to the West. Not the least effective of these appeals was a great poster which he had circulated in Europe, and which represented the Holy Sepulchre denied by the horses of the Mahommedans. Meanwhile the papacy, as soon as the news reached Rome, despatched encyclicals throughout Europe; and soon a new Crusade was in full swing. But the Third Crusade, unlike the First, does not spring from the papacy, which was passing through one of its epochs of depression; it springs from the lay power, which, represented by the three strong monarchies of Germany, England and France, was at this time dominant in Europe. In Germany it was the solemn national diet of Mainz (Easter 1188) which " swore the expedition " to the Holy Land; in France and England the agreement of the two kings decided upon a joint Crusade. The very means which Philip Augustus and Henry II. took, in order to further the Crusade, show its lay aspect. A scheme of taxation — the Saladin tithe — was imposed on all who did not take the cross; and this' taxation, while on the one hand it drove many to take the cross in order to escape its incidence, on the other hand provided a necessary financial basis for military operations. 1 The lay basis of the Third Crusade made it, in one sense, the greatest of all Crusades, in which all the three great monarchs of western Europe participated; but it also made it a failure, for the kings of France and England, changing caelum, non animum, carried their political rivalries into the movement, in which it had been agreed that they should be sunk. Spiritu- ally, therefore, the Third Crusade is inferior to the First, however imposing it may be in its material aspects. Yet it must be admitted that the idea of a spiritual regeneration accompanied the crusading movement of 1188. Europe had sinned in the face of God; otherwise Jerusalem would never have fallen; and the idea of a spiritual reform from within, as the necessary corollary and accompaniment of the expedition of Christianity without, breathes in some of the papal letters, just as, during the conciliar movement, the causa reformationis was

blended with the causa wnionis.

We may conceive of the Third Crusade under the figure of a number of converging lines, all seeking to reach a common centre. That centre is Acre. The siege of Acre, as arduous and heroic in many of its episodes as the siege of Troy, had been begun in the summer of 1189 by Guy de Lusignan, who, captured by Saladin at the battle of Hattin, and released on parole, had at once broken his word and returned to the attack. The army which was besieging Acre was soon joined by various contingents ; for Acre, after all, was the vital point, and its capture would open the way to Jerusalem. Two of these contingents alone concern us here — the German and the Anglo-French. Frederick I. of Germany, using a diplomacy which corresponds to the lay character of the Third Crusade, had sought to prepare his way by embassies to the king of Hungary, the Eastern emperor and the sultan of Iconium. Starting from Regensburg in May 1 1 89, the German army marched quietly through Hungary; but difficulties arose, as they had arisen in 1147, as soon as the frontiers of the Eastern empire were reached. The emperor Isaac Angelus had not only the old grudge of all Eastern

1 The " economic " motive for taking the cross was strengthened by the papal regulations in favour of debtors who joined the Crusade. Thousands must have joined the Third Crusade in order to escape paying either their taxes or the interest on their debts; and the atmosphere of the gold-digger's camp (or of the cave of Adullam) must have begun more than ever to characterize the crusading armies.

emperors against the " upstart " emperor of the West; he had also allied himself with Saladin, in order to acquire for his empire the patronage of the Holy Places and religious supremacy in the Levant. The difficulties between Frederick and Isaac Angelus became acute: in November 11 89 Frederick wrote to his son Henry, asking him to induce the pope to preach a Crusade against the schismatic Greeks. But terms were at last arranged, and by the end of March 11 90 the Germans had all crossed to the shores of Asia Minor. Taking a route midway between the eastern route of the crusaders of 1097 and the westerh route of Louis VII. in 1148, Frederick marched by Philadelphia and Iconium, not without dust and heat, until he reached the river Salof, in Armenian territory. Here, with the burden of the day no w past, the fine old crusader — he had joined before in the Second Crusade, forty years ago — perished by accident in the river; and of all his fine army only a thousand men won their way through, under his son, Frederick of Swabia, to join the ranks before Acre (October 1 190) . The Anglo-French detachment achieved a far greater immediate success. War had indeed disturbed the original agreement of Gisors between Philip Augustus and Henry II., but a new agreement was made between Henry's

successor, Richard I., and the French king at Nonancourt (December 1189), by which the two' monarchs were to meet at Vezelay next year, and then follow the sea route to the Holy Land together. They met, and by different routes they both reached Sicily, where they wintered together (1190-1191). The enforced inactivity of a whole winter was the mother of disputes and bad blood; and when Philip sailed for the Holy Land, at the end of March 1191, the failure of the Crusade was already decided. Richard soon followed; but while Philip sailed straight for Acre, Richard occupied himself by the way in conquering Cyprus — partly out of knight-errantry, and in order to avenge an insult offered to his betrothed wife Berengaria by the despot of the island, partly perhaps out of policy, and in order to provide a basis of supplies and of operations for the armies attempting to recover Palestine. In any case, he is the founder of the Latin kingdom of Cyprus (for he afterwards sold his new acquisition to Guy de Lusignan, who established a dynasty in the island); and thereby he made possible the survival of the institutions and assizes of Jerusalem, which were continued in Cyprus until it was conquered by the Ottoman Turks. From Cyprus Richard sailed to Acre, arriving on the 8th of June, and in little more than a month he was able, in virtue of the large reinforcements he brought, and in spite of dissensions in the Christian camp which he helped to foment, to bring the two years' siege to a successful issue (July 12th, 1191)'. It was indeed time; the privations of the besiegers during the previous winter had been terrible; and the position of affairs had only been made worse by the dissensions between Guy de Lusignan and Conrad of Montferrat, who had begun to claim the crown in return for his services, and had, on the death of Sibylla, the wife of Guy, reinforced his claim by a marriage with her younger sister, Isabella. In these dissensions it was inevitable that Philip Augustus and Richard I., already dis- cordant, should take contrary sides; and while Richard naturally sided with Guy de Lusignan, who came from his own county of Poitou, Philip as naturally sided with Conrad. At the end of July it was decided that Guy should remain king for his life, and Conrad should be his successor; but as three days after- wards Philip Augustus began his return to France (pleading ill-health, but in reality eager to gain possession of Flanders), the settlement availed little for the success of the Crusade. Richard stayed in the Holy Land for another year, during which he won a battle at Arsuf and refortified Jaffa. But far more important than any hostilities are the negotiations which, for the whole year, Richard conducted with Saladin. They show the lay aspect of the Third Crusade; they anticipate the Crusade of Frederick II. — for Richard was attempting to secure the same concessions which Frederick secured by the same means which he used. They show again the closer approxi- mation and better understanding with the Mahommedans, which marks this Crusade. Nothing is more striking in these

respects than Richard's proposal that Saladin's brother should marry his own sister Johanna and receive Jerusalem and the contiguous towns on the coast. In the event, a peace was made for three years (September 2nd, 1192), by which Lydda and Ramlah were to be equally divided, Ascalon was to be destroyed, and small bodies of crusaders were to be allowed to visit the Holy Sepulchre. Meanwhile Conrad of Montferrat, at the very instant when his superior ability had finally forced Richard to recognize him as king, had been assassinated (April 1192): Guy de Lusignan had bought Cyprus from Richard, and had sailed away to establish himself there ; 1 and Henry of Champagne, Richard's nephew, had been called to the throne of Jerusalem, and had given himself a title by marrying Conrad's widow, Isabella. In this condition Richard left the Holy Land, when he began his eventful return, in October 1102. The Crusade had failed — failed because a leaderless army, torn by political dissensions and fighting on a foreign soil, could not succeed against forces united by religious zeal under the banner of a leader like Saladin. Yet it had at any rate saved for the Christians the principality of Antioch, the county of Tripoli, and some of the coast towns of the kingdom; 2 and if it had failed to accomplish its object, it had left behind, none the less, many important results. The difficulties which had arisen between Isaac Angelus and Frederick Barbarossa contain the germs of the Fourth Crusade; the negotiations between Richard and Saladin contain the germs of the Sixth. National rivalries had been accentuated and national differences brought into prominence by the meeting of the nations in a common enter- prise; while, on the other hand, Mahommedans and Christians had fraternized as they had never done before during the progress of a Crusade. But what the Third Crusade showed most clearly was that the crusading movement was being lost to the papacy, and becoming part of the demesne of the secular state — organized by the state on its own basis of taxation, and conducted by the state according to its own method of negotiation. This after all is the great change ; and even the genius of an Innocent III. " could not make undone what had once been done." On the

1 The Crusades in their course established a number of new states or kingdoms. The First Crusade established the kingdom of Jeru- salem (1100); the Third, the kingdom of Cyprus (1195); the Fourth, the Latin empire of Constantinople (1204) ; while the long Crusade bf the Teutonic knights on the coast of the Baltic led to the rise of a new state east of the Vistula. The kingdom of Lesser Armenia, established in 1195, may also be regarded as a result of the Crusades. The history ot the kingdom of Jerusalem is part of the history of the Crusades: the history of the other

kingdoms or states touches the history of the Crusades less vitally. But the history of Cyprus is particularly important — and for two reasons. In the first place, Cyprus was a natural and excellent basis of opera- tions; it sent provisions to the crusaders in 1191, and again at the siege of Damietta in 1219, while its advantages as a strategic basis were proved by the exploits of Peter of Cyprus in the 14th century. In the second place, as the Latin kingdom of Jerusalem fell, its institutions and assizes were transplanted bodily to Cyprus, where they survived until the island was conquered by the Ottoman Turks. But the monarchy was stronger in Cyprus than in Jerusalem: the fiefs were distributed by the monarch, and were smaller in extent; while the feudatories had neither the collective powers of the haute cour of Jerusalem, nor the individual privileges (such as jurisdiction over the bourgeoisie), which had been enjoyed by the feudatories of the old kingdom. Till 1489 the kingdom of Cyprus survived as an independent monarchy, and its capital, Famagusta, was an important centre of trade after the loss of the coast-towns in the kingdom of Jerusalem. In 1489 it was acquired by Venice, which claimed the island on the death of the last king, having adopted his widow (a Venetian lady named Catarina Cornaro) as a daughter of the republic. On the history of Cyprus, see Stubbs, Lectures on Medieval and Modern History, 156-208. The history of the kingdom of Armenia is closely connected with that of Cyprus. The Armenians in the south-east of Asia M inor borrowed feudal institutions from the Franks and the feudal vocabulary itself. The kingdom was involved in a struggle with Antioch in the early part of the 13th century. Later, it allied itself with the Mongols and fought against the Mamelukes, to whom, however, it finally succumbed in 1375.

2 The kingdom of Jerusalem is thus from 1192 to its final fall a strip of coast, to which it is the object of kings and crusaders to annex Jerusalem and a line of communication connecting it with the coast. This was practically the aim of Richard I.'s negotiations ; and this was what Frederick II. for a time secured.

contrary, the thing once done would go further; and the state would take up the name of Crusade in order to cover, and under such cover to achieve, its own objects and ambitions, as in the future it was destined again and again to do.

The Fourth Crusade, 1202-1204. — The history of the Fourth Crusade is a history of the predominance of the lay motive, of the attempt of the papacy to escape from that predominance, and to establish its old direction of the Crusade, and of the complete failure of its attempt. Until the accession of Innocent III. in 1 1 98 the lay motive was supreme; and its representative was Henry VI. — the greatest politician of his day, and in many ways the greatest emperor since Charlemagne. In 1 195 Amalric, the brother of Guy

de Lusignan, and his successor in Cyprus, sought the title of king from Henry and did homage; and at the same time Leo of Lesser Armenia, in order to escape from dependence on the Eastern empire, took the same course. Henry thus gained a basis in the Levant; while the death of Saladin in 1 193, followed by a civil war between his brother, Malik-al- Adil, and his sons for the possession of his dominions, weakened the position of the Mahommedans. As emperor, Henry was eager to resume the imperial Crusade which had been stopped by his father's death; while both as Frederick's successor and as heir to the Norman kings of Sicily, who had again and again waged war against the Eastern empire, he had an account to settle with the rulers of Constantinople. The project of a Crusade and of an attack on Constantinople wove themselves into a single thread, in a way which very definitely anticipates the Fourth Crusade of 1 202-1 204. In 1195 Henry took the cross; some time before, he had already sent to Isaac Angelus to demand compensation for the injuries done to Frederick I., along with the cession of all territories ever conquered by the Norman kings of Sicily, and a fleet to co-operate with the new Crusade. In the same year, however, Isaac was dethroned by his brother, Alexius III.; but Henry married Isaac's daughter Irene to his brother, Philip of Swabia, and thus attempted to give the Hohenstaufen a new title and a valid claim against the usurper Alexius. Thus armed he pushed forward the prepara- tions for the Crusade in Germany — a Crusade whose first object would have been an attack on Alexius III.; but in the middle of his preparations he died in Sicily in the autumn of 11 97, and the Crusade collapsed. Some results were, however, achieved by a body of German crusaders which had sailed in advance of Henry; by its influence Amalric of Cyprus succeeded Henry of Champagne, who died in 1197, as king of Jerusalem, and a vassal of the emperor thus became ruler in the Holy Land; while the Teutonic order, which had begun as a hospital during the siege of Acre (1190-1191), now received its organization. Some of the coast towns, too, were recovered by the German crusaders, especially Beirut; and in 1198 the new king Amalric II. was able to make a truce with Malik-al-Adil for the next five years.

" The true heir of Henry VI.," Ranke has said, " is Innocent III.," and nowhere is this more true than in respect of the crusading movement. Throughout the course of his crowded and magnificent pontificate, Innocent III. made the Crusade his ultimate object, and attempted to bring it back to its old religious basis and under its old papal direction. By the spring of 1200, owing to Innocent's exertions, a new Crusade was in full progress, especially in France, where Fulk of Neuilly played the part once played by Peter the Hermit. Like the First Crusade, the Fourth Crusade also — in its personnel, but not its direction — was a French enterprise; and its leading members were French feudatories like Theobald of Champagne (who was chosen leader of the Crusade), Baldwin of Flanders (the future

emperor of Constantinople), and the count of Blois. The objective, which these three original chiefs of the Fourth Crusade proposed to themselves, was Egypt. 3 Since 1 163 the importance of acquiring Egypt had, as we have seen, been definitely understood, and

3 M. Luchaire, in the volume of his biography of Innocent III. called La Question d' Orient, shows how, in spite of the pope, the Fourth Crusade was in its very beginnings a lay enterprise. The crusading barons of France chose their own leader, and determined their own route, without consulting Innocent.

in the summer of 1192 Richard I. had been advised by his counsellors that Cairo and not Jerusalem was the true point of attack; while in 1200 there was the additional reason for preferring an attack on Egypt, that the truce in the Holy Land between Amalric II. and Malik-al-Adil had still three years to run. It is Egypt therefore — to which, it must be remembered, the centre of Mahommedan power had now been virtually shifted, and to which motives of trade impelled the Italian towns (since from it they could easily reach the Red Sea, and the commerce of the Indian Ocean) — it is Egypt which is hence- forth the normal goal of the Crusades. This is one of the many facts which differentiate the Crusades of the 13 th from those of the preceding century. But, with Syria in the hands of the Mahommedans, the attack on Egypt must necessarily be directed by sea; and thus the Crusade henceforth becomes — what the Third Crusade, here as elsewhere the turning-point in crusading history, had already in part been — a maritime enter- prise. Accordingly, early in 1201, envoys from each of the three chiefs of the Fourth Crusade (among whom was Villehardouin, the historian of the Crusade) came to Venice to negotiate for a passage to Egypt. An agreement was made between the doge and the envoys, by which transport and active help were to be given by Venice in return for 85,000 marks and the cession of half of the conquests made by the crusaders. But the Fourth Crusade was not to be plain sailing to Egypt. It became involved in a maelstrom of conflicting political motives, by which it was swept to Constantinople. Here we must distinguish between cause and occasion. There were three great causes which made for an attack on Constantinople by the West. There was first of all the old crusading grudge against the Eastern empire, and its fatal policy of regarding the whole of the Levant as its lost provinces, to be restored as soon as conquered, or at any rate held in fee, by the Western crusaders — a policy which led the Eastern emperors either to give niggardly aid or to pursue obstructive tactics, and caused them to be blamed for the failure of the Crusades in 1101, and 1149, and

in 1190. It is significant of the final result of these things that already in 1147 Roger of Sicily, engaged in war with Manuel, had proposed the sea-route for the Second Crusade, perhaps with some intention of diverting it against Constantinople; and in the winter of n 89-1 190 Barbarossa, as we have seen, had actually thought and spoken of an attack on Constantinople. In the second place, there was the commercial grudge of Venice, which had only been given large privileges by the Eastern empire to desire still larger, and had, moreover, been annoyed not only by alterations or revocations of those privileges, such as the usurper Alexius III. had but recently attempted, but also by the temporary destruction of their colony in Constantinople in n 71. Lastly, and perhaps most of all, there is the old Norman blood- feud with Constantinople, as old as the old Norse seeking for Micklegarth, and keen and deadly ever since the Norman conquest of the Greek themes in South Italy (1041 onwards). The heirs of the Norman kings were the Hohenstaufen; and we have already seen Henry VI. planning a Crusade which would primarily have been directed against Constantinople. It is this Hohenstaufen policy which becomes the primary occasion of the diversion of the Fourth Crusade. Philip of Swabia, engaged in a struggle with the papacy, found Innocent III. planning a Guelph Crusade, which should be under the direction of the church; and to this Guelph project he opposed the Ghibelline plan of Henry VI., with such success that he transmuted the Fourth Crusade into a political expedition against Constantinople. To such a policy of transmutation he was urged by two things. On the one hand, the death of the count of Champagne (May 1201) had induced the crusaders to elect as their leader Boniface of Montferrat, the brother of Conrad; and Boniface was the cousin of Philip, and interested in Con- stantinople, where not only Conrad, but another brother as well, had served, and suffered for their service at the hands of their masters. On the other hand Alexius, the son of the dethroned Isaac Angelus, was related to Philip through his marriage with Irene; and Alexius had escaped to the German court to urge

the restoration of his father. On Christmas day 1201, Philip, Alexius and Boniface all met at Hagenau 1 and formulated (one may suppose) a plan for the diversion of the Crusade. Events played into their hands. When the crusaders gathered at Venice in the autumn of 1202, it was found impossible to get together the 85,000 marks promised to Venice. The Venetians — already, perhaps, indoctrinated in the Hohenstaufen plan — indicated to the leaders a way of meeting the difficulty: they had only to lend their services to the republic for certain ends which it desired to compass, and the debt was settled. The conquest of Zara, a port on the Adriatic claimed by the Venetians from the king of Hungary, was the only object overtly mentioned; but the idea of the expedition to Constantinople was in the air, and the crusaders knew what was ultimately expected It

took time and effort to bring them round to the diversion: the pope — naturally enough — set his face sternly against the project, the more as the usurper, Alexius III., was in negotiation with him in order to win his support against the Hohenstaufen, and Innocent hoped to find, as Alexius promised, a support and a reinforcement for the Crusade in an alliance with the Greek empire. But they came round none the less, in spite of Innocent's renewed prohibitions. In November 1202 Zara was taken; and at Zara the fatal decision was made. The young Alexius joined the army; and in spite of the opposition of stern crusaders like Simon de Montfort, who sailed away ultimately to Palestine, he succeeded by large promises in inducing the army to follow in his train to Constantinople. By the middle of July 1203 Constantinople was reached, the usurper was in flight, and Isaac Angelus was restored to his throne. But when the time came for Alexius to fulfil his promises, the difficulty which had arisen at Venice in the autumn of 1202 repeated itself. Alexius's resources were insufficient, and he had to beg the crusaders to wait at Constantinople for a year in order that he might have time. They waited; but the closer contact of a prolonged stay only brought into fuller play the essential antipathy of the Greek and the Latin. Continual friction developed at last into the open fire of war; and in March 1204 the crusaders resolved to storm Constantinople, and to divide among themselves the Eastern empire. In April Constantinople was captured; in May Baldwin of Flanders became the first Latin emperor of Constantinople. Venice had her own reward; a Venetian, Thomas Morosini, became patriarch; and the doge of Venice added " a quarter and a half " of the Eastern empire — chiefly the coasts and the islands — to the sphere of his sway. If Venetian cupidity had not originally deflected the Crusade (and it was the view of contemporary writers that Venice had com- mitted her first treason against Christianity by diverting the Crusade from Egypt in order to get commercial concessions from Malik-al-Adil, 2 yet it had at any rate profited exceedingly from that deflection; and the Hohenstaufen and their protege Alexius only reaped dust and ashes. For, however Ghibelline might be the original intention, the result was not commensurate with the subtlety of the design, and the power of the pope was rather increased than diminished by the event of the Crusade. The crusaders appealed to Innocent to ratify the subjugation of a schismatic people, and the union of the Eastern and Western Churches; and Innocent, dazzled by the magic of the fait accompli, not unwillingly acquiesced. He might soothe himself by reflecting that the basis for the Crusade, which he had hoped to find in Alexius III., was still more securely offered by Baldwin; he could not but feel with pride that he had become " as it were pope and apostolicus of a second world." Yet the result of the Fourth Crusade was on the whole disastrous both for the papacy and for the crusading movement. The pope had been forced to

1 As a matter of fact, there is some doubt whether Alexius arrived in Germany before the spring of 1202. But there seems to be little doubt of Philip's complicity in the diversion of the Fourth Crusade to Constantinople (cf. M. Luchaire, La Question d'Orient, pp. 84-86).

2 It is true that in 1208 Venice received commercial concessions from the court of Cairo. But this ex post facto argument is the sole proof of this view ; and it is quite insufficient to prove the accusation. Venice is not the primary agent in the deflection of the Fourth Crusade.

see the helm of the Crusades wrenched from his grasp; and the Albigensian Crusade against the heretics of southern France was soon afterwards to show that the example could be followed, and that the land-hunger of the north French baronage could exploit a Crusade as successfully as ever did Hohenstaufen policy leagued with Venetian cupidity. The Crusade lost its elan when it became a move in a political game. If the Third Crusade had been directed by the lay power towards the true spiritual end of all Crusades, the Fourth was directed by the lay power to- its own lay ends; and the political and commercial motives, wh^ch were deeply implicit even in the First Crusade, had now become dominantly explicit. In a simpler and more immediate sense, the capture of Constantinople was detrimental to the movement from which it sprang. The precarious empire which had been founded in 1204 drained away all the vigorous adventurers of the West for its support for many years to come, and the Holy Land was starved to feed a land less holy, but equally greedy of men. 1 No basis for the Crusades was ever to be found in the Latin empire of the East; and Innocent, after vainly hoping for the new Crusade which was to emerge from Constantinople, was by 1208 compelled to return to the old idea of a Crusade proceeding simply and immediately from the West to the East.

The Fifth Crusade, 1218-1221. — The glow and the glamour of the Crusades disappear save for the pathetic sunset splendours of St Louis, as Dandolo dies, and gallant Villehardouin drops his pen. But before St Louis sailed for Damietta there inter- vened the miserable failure of one Crusade, and the secular and diplomatic success of another. The Fifth Crusade is the last which is started in that pontificate of Crusades — the pontificate of Innocent III. It owed its origin to his feverish zeal for the recovery of Jerusalem, rather than to any pressing need in the Holy Land. Here there reigned, during the forty years of the loss of Jerusalem, an almost unbroken peace. Malik-al-Adil, the brother of Saladin, had by 1200 succeeded to his brother's possessions not only in Egypt but also in Syria,

and he granted the Christians a series of truces (1198-1203, 1204-1210, 1211— 121 7). While the Holy Land was thus at peace, crusaders were also being drawn elsewhere by the needs of the Latin empire of Constantinople, or the attractions of the Albigensian Crusade. 2 But Innocent could never consent to forget Jerusalem, as long as his right hand retained its cunning. The pathos of the Children's Crusade of 1212 only nerved him to. fresh efforts. A shepherd boy named Stephen had appeared in France, and had induced thousands to follow his guidance: with his boyish army he rode on a wagon southward to Marseilles, promising to lead his followers dry-shod through the seas. In Germany a child from Cologne, named Nicolas, gathered some 20,000 young crusaders by the like promises, and led them into Italy. Stephen's army was kidnapped by slave-dealers and sold into Egypt; while Nicolas's expedition left nothing behind it but an after-echo in the legend of the Pied Piper of Hamelin. But for Innocent these outbursts of the revivalist element, which always accompanied the Crusades, had their moral: " the very children put us to shame," he wrote; " while we sleep

1 Already under Innocent III. the benefits of the Crusade were promised to those who went to the assistance of the Latin empire of the East.

2 In 1208 Innocent excommunicated Raymund VI. of Toulouse on account of the murder of a papal legate who was attempting to suppress Manichaeism, and offered all Catholics the right to occupy and guard his territories. Thus was begun the First Crusade against heresy. Raymund at once submitted to the pope, but the Crusade continued none the less, because, as Luchaire says, " the baronage of the north and centre of France had finished their preparations," and were resolved to annex the rich lands of the south. In this way land-hunger exploited the Albigensian, as political and commercial motives had helped to exploit the Fourth Crusade; and in the former, as in the latter, Innocent had reluctantly to consent to the results of the secular motives which had infected a spiritual enter- prise. The Albigensian Crusades, however, belong to French history ; and it can only be noted here that their ultimate result was the absorption of the fertile lands, and the extinction of the peculiar civilization, of southern France by the northern monarchy. (See the article Albigenses.)

they go forth gladly to conquer the Holy Land." In the fourth Lateran council of 1215 Innocent found his opportunity to rekindle the flickering fires. Before this great gathering of all Christian Europe he proclaimed a Crusade for the year 121 7, and in common deliberation it was resolved that a truce of God should reign for the next four years, while for the same time all trade with the Levant should cease. Here were two things attempted — neither, indeed, for the first time 3 — which 14th century pamphleteers on the subject of the Crusades unanimously advocate as the necessary

conditions of success; there was to be peace in Europe and a commercial war with Egypt. This statesmanlike beginning of a Crusade, preached, as no Crusade had ever been preached before, in a general council of all Europe, presaged well for its success. In Germany (where Frederick II. himself took the cross in this same year) a large body of crusaders gathered together: in 1217 the south-east sent the duke of Austria and the king of Hungary to the Holy Land; while in 1 218 an army from the north-west joined at Acre the forces of the previous year. Egypt had already been indicated by Innocent III. in 1 2 15 as the goal of attack, and it was accordingly resolved to begin the Crusade by the siege of Damietta, on the eastern delta of the Nile. The original leader of the Crusade was John of Brienne, king of Jerusalem (who had succeeded Amalric II., marrying Maria, the daughter of Amalric's wife Isabella by her former husband, Conrad of Montferrat); but after the end of 1 2 18 the cardinal legate Pelagius, fortified by papal letters, claimed the command. In spite of dissensions between the cardinal and the king, and in spite of the offers of Malik-al-Kamil (who succeeded Malik-al-Adil at the end of 1218), the crusaders finally carried the siege to a successful conclusion by the end of 1 2 19. The capture of Damietta was a considerable feat of arms, but nothing was done to clinch the advantage which had been won, and the whole of the year 1220 was spent by the crusaders in Damietta, partly in consolidating their immediate position, and partly in waiting for the arrival of Frederick II., who had promised to appear in 122 1. Ini22i Hermann of Salza, the master of the Teutonic order, along with the duke of Bavaria, appeared in the camp before Damietta; and as it seemed useless to wait any longer for Frederick II., 4 the cardinal, in spite of the opposition of King John, gave the signal for the march on Cairo. The army reached a fortress (erected by the sultan in I2i9(afterwards, from 1221, the town of Mansura),and encamped there at the end of July. Here the sultan reiterated terms which he had already offered several times, before — the cession of most of the kingdom of Jerusalem, the surrender of the cross (captured by Saladin in n 87), and the restoration of all prisoners. King John urged the acceptance of these terms. The legate insisted on a large indemnity in addition: the negotiations failed, and the sultan prepared for war. The crusaders were driven back towards Damietta; and at the end of August 1221 Pelagius had to make a treaty with Malik-al-Kamil, by which he gained a free retreat and the surrender of the Holy Cross at the price of the restoration of Damietta. The treaty was to last for eight years, and could only be broken on the coming of a king or emperor to the East. In pursuance of its terms the crusaders evacuated Egypt, and the Fifth Crusade was at an end. It is difficult to decide whether to blame the legate or the emperor more for its failure. If Frederick had only come in person, a single month of his presence might have meant everything: if Pelagius had only listened to King John, the sultan was ready to concede practically everything which was at issue.

Unhappily Frederick preferred to put his Sicilian house in order, and the legate preferred to listen to the Italians, who had their own

3 A canon of the third Lateran council (1179) forbade traffic with the Saracens in munitions of war; and this canon had been renewed by Innocent in the beginning of his pontificate.

4 He had promised the pope, at his coronation in 1220, to begin his Crusade in August 1221. But he declared himself exhausted by the expenses of his coronation; and Honorius III. consented to defer his Crusade until March 1222. The letter of the pope informing Pelagius of this delay is dated the 20th of June: it would probably reach his hands after his departure from Damietta; and thus the Cardinal gave the signal for the march, when, as he thought, the emperor's coming was imminent.

commercial reasons for wishing to establish a strong position in Egypt, and to the Templars and Hospitallers, who did not feel satisfied by the terms offered by the sultan, because he wished to retain in his hands the two fortresses of Krak and Monreal.

The Sixth Crusade (1228-1229) succeeded as signally as the Fifth Crusade had failed; but the circumstances under which it took place and the means by which it was conducted made its success still more disastrous than the failure of 1221. The last Crusade had, after all, been under papal control: if Richard I. had directed the Third Crusade, and the policy of the Hohen-staufen and the Venetians had directed the Fourth, it was a papal legate who had steered the Fifth to its ultimate fate. The Crusade of Frederick II. in 1228-1220 finds its analogy in the projected Crusade of Henry VI.; it is essentially lay. It is unique in the annals of the Crusades. Alone of all Crusades (though the Fourth Crusade offers some analogy) it was not blessed but cursed by the papacy: alone of all the Crusades it was conducted without a single act of hostility against the Mahommedan. St Louis, the true type of the religious crusader, once said that a layman ought only to argue with a blasphemer against Christian law by running his sword into the bowels of the blasphemer as far as it would go: 1 Frederick II. talked amicably with all unbelievers, if one may trust Arabic accounts, and he achieved by mere negotiation the recovery of Jerusalem, for which men had vainly striven with the sword for the forty years since 1187. It was in 121 5 that the leader of this strange Crusade had first taken the vow ; it was twelve years afterwards when he finally attempted to carry the vow into effective execu- tion. Again and again he had excused himself to the

pope, and been excused by the pope, because the exigencies of his policy in Germany or Sicily tied his hands. After the failure of the Fifth Crusade — for which these delays were in part responsible — HonoriusIII. had attempted to bind him more intimately to the Holy Land by arranging a marriage with Isabella, the daughter of John of Brienne, and the heiress of the kingdom of Jerusalem. In 1 2 2 5 Frederick married Isabella, and immediately after the marriage he assumed the title of king in right of his wife, and exacted homage from the vassals of the kingdom. 2 It was thus as king of Jerusalem that Frederick began his Crusade in the autumn of 1 227. Scarcely, however, had he sailed from Brindisi when he fell sick of a fever which had been raging for some time among the ranks of his army, while they waited for the crossing. He sailed back to Otranto in order to recover his health, but the new pope, Gregory IX., launched in hot anger the bolt of excommunication, in the belief that Frederick was malingering once more. None the less the emperor sailed on his Crusade ir the summer of 1228, affording to astonished Europe the spectacle of an excommunicated crusader, and leaving his territories to be invaded by papal soldiers, whom Gregory IX. professed to regard as crusaders against a non- Christian king, and for whom he accordingly levied a tithe from the churches of Europe. The paradox of Frederick's Crusade is indeed astonishing. Here was a crusader against whom a Crusade was proclaimed in his own territories; and when he arrived in the Holy Land he found little obedience and many insults from all but his own immediate followers. Yet by adroit use of his powers of diplomacy, and by playing upon the dissensions which raged between the descendants of Saladin's brother (Malik-al-Adil), he was able, without striking a blow, to conclude a treaty with the sultan of Egypt which gave him all that Richard I. had vainly attempted to secure by arduous fighting and patient negotiations. By the treaty of the 18th of February 1229, which was to last for ten years, the sultan conceded to Frederick, in addition to the coast towns already in the possession of the Christians, Nazareth, Bethlehem and Jerusalem, with a strip of territory connecting Jerusalem with the port of Acre. As king of Jerusalem Frederick was now able

1 Joinville, ch. x.

2 John of Brienne had only ruled in right of his wife Mary. On her death (1212) John might be regarded as only ruling " by the courtesy of the kingdom " until her daughter Isabella was married, when the husband would succeed. That, at any rate, was the view Frederick II. took.

to enter his capital: as one under excommunication, he had to see an interdict immediately fall on the city, and it was with his own hands — for no churchman could perform the office — that he had to take his crown from the altar of the church of the Sepulchre, and crown himself king of his

new kingdom. He stayed in the Holy Land little more than a month after his coronation; and leaving in May he soon overcame the papal armies in Italy, and secured absolution from Gregory IX. (August 1229). By his treaty with the sultan he had secured for Christianity the last fifteen years of its possession of Jerusalem (1 229-1 244): no man since Frederick II. has ever recovered the holy places for the religion which holds them most holy. Yet the church might ask, with some justice, whether the means he had used were excused by the end which he had attained. After all, there was nothing of the holy war about the Sixth Crusade: there was simply huckstering, as in an Eastern bazaar, between a free-thinking, semi-oriental king of Sicily and an Egyptian sultan. It was indeed in the spirit of a king of Sicily, and not in the spirit — though it was in the role — of a king of Jerusalem, that Frederick had acted. It was from his Sicilian predecessors, who had made trade treaties with Egypt, that he had learned to make even the Crusade a matter of treaty. The Norman line of Sicilian kings might be extinct; their policy lived after them in their Hohenstaufen successors, and that policy, as it had helped to divert the Fourth Crusade to the old Norman objective of Constantinople, helped still more to give the Sixth Crusade its secular, diplomatic, non-religious aspect.

Forty years of struggle ended in fifteen years' possession of Jerusalem. During those fifteen years the kingdom of Jerusa- lem was agitated by a struggle between the native barons, championing the principle that sovereignty resided in the collective baronage, and taking their stand on the assizes, and Frederick II., claiming sovereignty for himself, and opposing to the assizes the feudal law of Sicily. It is a struggle between the king and the haute cour: it is a struggle between the aristo- cratic feudalism of the Franks and the monarchical feudalism of the Normans. Already in Cyprus, in the summer of 1228, Frederick II. had insisted on the right of wardship which he enjoyed as overlord of the island, 3 and he had appointed a commission of five barons to exercise his rights. In 1229 this commission was overthrown by John of Ibelin, lord of Beirut, against whom it had taken proceedings. John of Beirut, like many of the Cypriot barons, was also a baron of the kingdom of Jerusalem; and resistance in the one kingdom could only produce difficulties in the other. Difficulties quickly arose when Frederick, in 1231, sent Marshal Richard to Syria as his legate. This in itself was a serious matter; according to the assizes, the barons maintained, the king must either personally reside in the kingdom, or, in the event of his absence, be replaced by a regency. The position became more difficult, when the legate took steps against John of Beirut without any authorization from the high court. A gild was formed at Acre — the gild of St Adrian — which, if nominally religious in its origin, soon came to represent the political opposition to Frederick, as was significantly proved by its reception of the rebellious John of Beirut as a member (1232). The

opposition was successful: by 1233 Frederick had lost all hold on Cyprus, and only retained Tyre in his own kingdom of Jerusalem. In 1236 he had to promise to recognize fully the laws of the kingdom : and when, in 1239, he was again excommunicated by Gregory IX., and a new quarrel of papacy and empire began, he soon lost the last vestiges of his power. Till 1 243 the party of Frederick had been successful in retaining Tyre, and the baronial demand for a regency had remained without effect; but in that year the opposition, headed by the great family of Ibelin, succeeded, under cover of asserting the rights of Alice of Cyprus to the regency, in securing possession of Tyre, and the kingdom of Jerusalem thus fell back into the power of the baronage. The very next year (1244) Jerusalem was finally and for ever lost. Its loss was the natural corollary of these dissensions. The

3 Amalric I. of Cyprus had done homage to Henry VI., from whom he had received the title of king (1 195).

treaty of Frederick with Malik-al-Kamil (d. 1238) had now- expired, and new succours and new measures were needed for the Holy Land. Theobald of Champagne had taken the cross as early as 1230, and 1239 he sailed to Acre in spite of the express prohibition of the pope, who, having quarrelled with Frederick II., was eager to divert any succour from Jerusalem itself, so long as Jerusalem belonged to his enemy. Theobald was followed (1 240-1 241) by Richard of Cornwall, the brother of Henry III., who, like his predecessor, had to sail in the teeth of papal prohibitions; but neither of the two achieved any permanent result, except the fortification of Ascalon. It was, however, by their own folly that the Franks lost Jerusalem in 1244. They consented to ally themselves with the ruler of Damascus against the sultan of Egypt; but in the battle of Gaza they were deserted by their allies and heavily defeated by Bibars, the Egyptian general and future Mameluke sultan of Egypt. Jerusalem, which had already been plundered and destroyed earlier in the year by Chorasmians (Khwarizmians), was the prize of victory, and Ascalon also fell in 1247.

8. The Crusades of St Louis. — As the loss of Jerusalem in 1 187 produced the Third Crusade, so its loss in 1244 produced the Seventh: as the preaching of the Fifth Crusade had taken place in the Lateran council of 121 5, so that of the Seventh Crusade began in the council of Lyons of 1 245. But the preaching of the Crusade by Innocent IV. at Lyons was a curious thing. On the one hand he repeated the provisions of the Fourth Lateran council on behalf of the Crusade to the Holy Land ; on the other hand he preached a Crusade against Frederick II., and promised to all who

would join the full benefits of absolution and remission of sins. While the papacy thus bent its energies to the destruc- tion of the Crusades in their genuine sense, and preferred to use for its own political objects what was meant for Jerusalem, a layman took up the derelict cause with all the religious zeal which any pope had ever displayed. Paradoxically enough, it was now the turn for the papacy to exploit the name of Crusade for political ends, as the laity had done before; and it was left to the laity to champion the spiritual meaning of the Crusade even against the papacy. 1 It was at the end of the year in which Jerusalem had fallen that St Louis had taken the cross, and by all the means in his power he attempted to ensure the success of his projected Crusade. He sought to mediate, though with no success, between the pope and the emperor; he descended to a whimsical piety, and took his courtiers by guile in distribut- ing to them, at Christmas, clothing on which a cross had been secretly stitched. He started in 1248 with a gallant company, which contained his three brothers and the sieur de Joinville, his biographer; and after wintering in Cyprus he directed his army in the spring of 1249 against Egypt. The objective was unexpected: it may have been chosen by St Louis, because he knew how seriously the power of the sultan was undermined by the Mamelukes, who were in the very next year to depose the Ayyubite dynasty, which had reigned since 1171, and to sub- stitute one of their number as sultan. Damietta was taken with- out a blow, and the march for Cairo was begun, as it had been begun by the legate Pelagius in 1221. Again the invading army halted before Mansura (December 1249); again it had to retreat. The

1 It may be argued that the Crusade against a revolted Christian like

Frederick II. was not misplaced, and

that the pope had a true sense of |

religious values when he attacked Malik-al-Adil II. Frederick. The answer is partly that deposed 1240. men like St Louis did think that the Crusade was misplaced, and partly that Frederick was really attacked not as a revolted Christian, but as the would-be unifier of Italy, the enemy of the states of the church.

retreat became a rout. St Louis was captured, and a treaty was made by which he had to consent to evacuate Damietta and pay a ransom of 800,000 pieces of gold. Eventually St Louis was released on surrendering Damietta and paying one-half of his ransom, and by the middle of May 1250 he reached Acre, having abandoned the Egyptian expedition. For the next four years he stayed in the Holy Land, seeking to do what he could for the establishing of the kingdom of Jerusalem. He was able to do but little. The struggle of papacy and empire paralysed Europe, and even in France

itself there were few ready to answer the calls for help which St Louis sent home from Acre. The one answer was the Shepherds' Crusade, or Crusade of the Pastoureaux — " a religious Jacquerie," as it has been called by Dean Milman. It had some of the features of the Children's Crusade of 121 2. That, too, had begun with a shepherd boy: the leader of the Pastoureaux, like the leader of the children, promised to lead his followers dry-shod through the seas; and tradition even said that this leader, " the master of Hungary," as he was called, was the Stephen of the Children's Crusade. But the anti-clerical feeling and action of the Shepherds was new and ominous; and moved by its enormities the government suppressed the new movement ruthlessly. None came to the aid of St Louis; and in 1254, on the death of his mother Blanche, the regent, he had to return to France.

The final collapse of the kingdom of Jerusalem had been really determined by the battle of Gaza in 1244, and by the deposition of the Ayyubite dynasty by the Mamelukes. The Ayyubit.es had always been, on the whole, chivalrous and tolerant: Saladin and his successors, Malik-al-Adil and Malik-al- Kamil, had none of them shown an implacable enmity to the Christians. The Mamelukes, who are analogous to the janissaries of the Ottoman Turks, were made of sterner and more fanatical stuff; and Bibars, the greatest of these Mamelukes, who had commanded at Gaza in 1 244, had been one of the leaders in 1 2 50, and was destined to become sultan in 1260, was the sternest and most fanatical of them all. The Christians were, however, able to maintain a footing in Syria for forty years after St Louis' departure, not by reason of their own strength, but owing to two powers which checked the advance of the Mamelukes. The first of these was Damascus. The kingdom of Jerusalem, as we have seen, had profited by the alliance of Damascus as early as 1130, when the fear of the atabegs of Mosul had first drawn the two together; and when Damascus had been acquired by the rule of Mosul, the hostility between the house of Nureddin in Damascus and Saladin in Egypt had still for a time preserved the kingdom (from 1171 onwards). Saladin had united Egypt and Damascus; but after his death dissensions broke out among the members of his family, 2 which more than once led to wars between Damascus and Cairo. It has already been noticed that such a war between the sons of Malik-al-Adil accounts in large

2 The following table of the Ayyubite rulers serves to illustrate the text : —

Shadhy.

Shirguh.

Ayyub (both generals in the army of the Atabegs of Mosul).

Saladin t H93-

I

Malik-al-Adil I.

t 1218.

i

Malik-al-Kamil,

Sultan of Egypt

t 1238.

Malik-al-Muazzam,

Sultan of Damascus,

j 1227.

J I

*I Malik-al-Nasi**

Malik-al-SalihNajm of Kerak.

Malik-al-Ashraf, ruler of Khelat, and after 1227 of Damascus, t 1237-

al-din Ayyub, sul tan of Egypt, and after 1 244 of Dam- ascus, f 1249.

Turanshah, deposed 1250, and succeeded by the Mameluke Aibek.

I Malik-al-Salih Isma'il, sultan of Damascus, 1237-1244. From him Damascus passed to Malik-al- Salih Ayyub of Egypt at the battle of Gaza.

measure for the success of the Sixth Crusade; and it has been seen that the battle of Gaza was an act in the long drama of strife between Egypt and northern Syria. The revolution in Egypt in 1250 separated Damascus from Cairo more trenchantly than they had ever been separated since 1171 : while a Mameluke ruled in Cairo, Malik-al-Nasir of Aleppo was elected as sultan by the emirs of Damascus. But an entirely new and far more important factor in the affairs of the Levant was the extension of the

empire of the Mongols during the 13th century. That empire had been founded by Jenghiz Khan in the first quarter of the century; it stretched from Peking on the east to the Euphrates and the Dnieper on the west. Two things gave the Mongols an influence on the history of the Holy Land and the fate of the Crusades. In the first place, the south-western division of the empire, comprising Persia and Armenia, and governed about 1250 by the Khan Hulaku or Hulagu, was inevitably brought into relations, which were naturally hostile, with the Mahommedan powers of Syria and Egypt. In the second place, the Mongols of the 13th century were not as yet, in any great numbers, Mahommedans; the official religion was " Shamanism," but in the Mongol army there were many Christians, the results of early Nestorian missions to the far East. This last fact in particular caused western Europe to dream of an alliance with the great khan " Prester John," who should aid in the reconquest of Jerusalem and the final conversion to Christianity of the whole continent of Asia. The Crusades thus widen out, towards their close, into a general scheme for the christianization of all the known world. 1 About 1220 James of Vitry was already hoping that 4000 knights would, with the assistance of the Mongols, recover Jerusalem; but it is in 1245 that the first definite sign of an alliance with the Mongols appears. In that year Innocent IV. sent a Franciscan friar, Joannes de Piano Carpini, to the Mongols of southern Russia, and despatched a Dominican mission to Persia. Nothing came of either of these missions; but through them Europe first began to know the interior of Asia, for Carpini was conducted by the Mongols as far as Karakorum, the capital of the great khan, on the borders of China. Again in 1252 St Louis (who had already begun to negotiate with the Mongols in the winter of 1 248-1 249) sent the friar William of Rubruquis to the court of the great khan; but again nothing came of the mission save an increase of geo- graphical knowledge. It was in the year 1260 when it first seemed likely that any results definitely affecting the course of the Crusades would flow from the action of the Mongols. In that year Hulagu, the khan of Persia, invaded Syria and captured Damascus. His general, a Christian named Kitboga, marched southwards to attack the Mamelukes of Egypt, but he was beaten by Bibars (who in the same year became sultan of Egypt), and Damascus fell into the hands of the Mamelukes. Once more, in spite of Mongol intervention, Damascus and Cairo were united, as they had been united in the hands of Saladin; once more they were united in the hands of a devout Mahommedan, who was resolved to extirpate the Christians from Syria.

While these things were taking place around them, the Christians of the kingdom of Jerusalem only hastened their own fall by internal dissensions which repeated the history of the period preceding 1187. In part the war of Guelph and Ghibelline fought itself out in the East; and while one party demanded a regency, as in 1243, another argued for the recogni- tion of

Conrad, the son of Frederick II., as king. In part, again, a commercial war raged between Venice and Genoa, which attracted into its orbit all the various feuds and animosities of the Levant (1257). Beaten in the war, the Genoese avenged themselves for their defeat by an alliance with the Palaeologi, which led to the loss of Constantinople by, the Latins (1261), and to the collapse of the Latin empire after sixty years of infirm and precarious existence. On a kingdom thus divided

1 Though Europe indulged in dreams of Mongol aid, the eventual results of the extension of the Mongol Empire were prejudicial to the Latin East. The sultans of Egypt were stirred to fresh activity by the attacks of the Mongols; and as Syria became the battle- ground of the two, the Latin principalities of Syria were fated to fall as the prize of victory to one or other of the combatants.

against itself, and deprived of allies, the arm of Bibars soon fell with crushing weight. The sultan, who had risen from a Mon- golian slave to become a second Saladin, and who combined the physique and audacity of a Danton with the tenacity and religiosity of a Philip II., dealt blow after blow to the Franks of the East. In 1265 fell Caesarea and Arsuf; in 1268 Antioch was taken, and the principality of Bohemund and Tancred ceased to exist. 2 In the years which followed on the loss of Antioch several attempts were made in the West to meet the progress of the new conqueror. In 1269 James the Conqueror of Aragon, at the bidding of the pope, turned from the long Spanish Crusade to a Crusade in the East in order to atone for his offences against the law matrimonial. An opportune storm, however, gave the king an excuse for returning home, as Frederick II. had done in 1227; and though his followers reached Acre, they hardly dared venture outside its walls, and returned home promptly in the beginning of 1270. More serious were the plans and the attempts of Charles of Anjou and Louis IX., in which the Crusades may be said to have finally ended, save for sundry disjointed epilogues in the 14th and 15th centuries.

Charles of Anjou had succeeded, as a result of the long " crusade " waged by the papacy against the Hohenstaufen from the council of Lyons to the battle of Tagliacozzo (1245-1268), in establishing himself in the kingdom of Sicily. With the kingdom of Frederick II. and Henry VI. he also took over their policy— the " forward " policy in the East which had also been followed by" the old Norman kings. On the one hand he aimed at the conquest of Constantinople as Henry VI. had done before; and by the treaty of Viterbo of 1267 he secured from the last Latin emperor of the East, Baldwin II., a right of eventual succession. On the other hand, like Frederick II., he aimed at uniting the kingdom of Jerusalem with that of Sicily; and here, too, he was able to provide himself with a title. On the death of Conradin, Hugh of Cyprus had been recognized in the East as king

of Jerusalem (1269); but his pretensions were opposed by Mary of Antioch, a granddaughter of Amalric II., who was prepared to bequeath her claims to Charles of Anjou, and was therefore naturally supported by him. But the policy of Charles, which thus prepared the way for a Crusade similar to those of 1197 and 1202, was crossed by that of his brother Louis IX. Already in 1267 St Louis had taken the cross a second time, moved by. the news of Bibars' conquests; and though the French baronage, including even Joinville himself, refused to follow the lead of their king, Prince Edward of England imitated his example. Louis had been led to think that the bey of Tunis might be converted, and in that hope he resolved to begin this eighth and last of the Crusades by an expedition to Tunis. Charles, as anxious to attack Constantinople as he was reluctant to attack Tunis, with which Sicily had long had commercial relations, was forced to abandon his own plans and to join in those of his brother. 3 St Louis had barely landed in Tunis when he sickened and died, murmuring " Jerusalem, Jerusalem " (August 1270); but Charles, who appeared immedi- ately after his brother's death, was able to conduct the Crusade to a successful conclusion. Negotiating in the spirit of a Frederick II., and acting not as a Crusader but as a king of Sicily, he not only wrested a large indemnity from the bey for himself and the new king of France, but also secured a large annual' tribute for his Sicilian exchequer. So ended the Eighth Crusade — much as the Sixth had done — to the profound disgust of many of the crusaders, including Prince Edward of England, who only arrived on the eve of the conclusion of the treaty. Baulked of any opportunity of joining in the main Crusade, Edward, after wintering in Sicily, conducted a Crusade of his own to Acre in the spring of 1271. For over a year he stayed in the Holy Land, making little sallies from Acre, and negotiating

2 Of the four Latin principalities of the East, Edessa was the first to fall, being extinguished between 1144 and 1 150. Antioch fell in 1268; Tripoli in 1289; and the kingdom itself may be said to end with the capture of Acre, 1291.

3 Michael Palaeologus had actually appealed to Louis IX. against Charles of Anjou, who in 1270 had actively begun preparations for

I the attack on Constantinople.

with the Mongols, but achieving no permanent results. He returned home at the end of 1272, the last of the western crusaders; and thus all the attempts of St Louis and Charles of Anjou, of James of Aragon and Edward of

England left Bibars still in possession of all his conquests.

Two projects of Crusades were started before the final expulsion of the Latins from Syria. In 1274, at the council of Lyons, Gregory X., who had been the companion of Edward in the Holy Land, preached the Crusade to an assembly which con- tained envoys from the Mongol khan and Michael Palaeologus as well as from many western princes. All the princes of western Europe took the cross; not only so, but Gregory was successful in uniting the Eastern and Western churches for the moment, and in securing for the new Crusade the aid of the Palaeologi, now thoroughly alarmed by the plans of Charles of Anjou. Thus was a papal Crusade begun, backed by an alliance with Con- stantinople, and thus were the plans of Charles of Anjou tem- porarily thwarted. But in 1276 Gregory X. died, and all his plans died with him; there was to be no union of the monarchs of the West with the emperor of the East in a common Crusade. Charles was able to resume his plans. In 1277 Mary of Antioch ceded to him her claims, and he was able to establish himself in Acre; in 1278 he took possession of the principality of Achaea. With these bases at his disposal he began to prepare a new Crusade, to be directed primarily (like that of Henry VI. in 1197, and like his own projected Crusade of 1270) against Constantinople. Once more his plans were crossed finally and fatally: the Sicilian Vespers, and the coronation of Peter of Aragon as Sicilian king (1282), gave him troubles at home which occupied him for the rest of his days. This was the last serious attempt at a Crusade on behalf of the dying kingdom of Jerusalem which was made in the West; and its collapse was quickly followed by the final extinction of the kingdom. A precarious peace had reigned in the Holy Land since 1272, when Bibars had granted a truce of ten years; but the fall of the great power of Charles of Anjou set free Kala'un the successor of Bibars' son (who reigned little more than two years), to complete the work of the great sultan. In 1289 Kala'un took Tripoli, and the county of Tripoli was extinguished; in 1290 he died while preparing to besiege Acre, which was captured after a brave defence by his son and successor Khalil in 1291. Thus the kingdom of Jerusalem came to an end. The Franks evacuated Syria altogether, leaving behind them only the ruins of their castles to bear witness, to this very day, of the Crusades they had waged and the kingdom they had founded and lost.

9. The Ghost of the Crusades. — The loss of Acre failed to stimulate the powers of Europe to any new effort. France, always the natural home of the Crusades, was too fully occupied, first by war with England and then by a struggle with the papacy, to turn her energies towards the East. But it is often the case that theory develops as practice fails; and as the theory of the Holy Roman Empire was never more vigorous than in the days of its decrepitude, so it was with the Crusades. Particularly in the first quarter of the 14th century, writers were busy in explaining the causes of the failures

of past Crusades, and in laying down the lines along which a new Crusade must proceed. Several causes are recognized by these writers as accounting for the failure of the Crusades. Some of them lay the blame on the papacy; and it is true that the papacy had contributed towards the decay of the Crusades when it had allowed its own particular interests to overbear the general welfare of Christianity, and had dignified with the name and the benefits of a Crusade its own political war against the Hohen- staufen. Others again find in the princes of Europe the authors of the ruin of the Crusades; they too had preferred their own national or dynastic interests to the cause of a common Chris- tianity. They had indeed, as has been already noticed, done even more; they had used the name of Crusade, from the days of Henry VI. onwards, as a cover and an excuse for secular ambitions of their own; and in this way they had certainly helped, in very large measure, to discourage the old religious zeal for the Holy War. Other writers, again, blame the com- vii. 18

mercial cupidity of the Italian towns; of what avail, they asked with no little justice, was the Crusade, when Venice and Genoa destroyed the naval bases necessary for its success by their internecine quarrels in the Levant (as in 1257), or — s.till worse— entered into commercial treaties with the common enemy against whom the Crusades were directed? On the very eve of the Fifth Crusade, Venice had concluded a commercial treaty with Malik-al-Kamil of Egypt; just before the fall of Acre the Genoese, the king of Aragon and the king of Sicily had all concluded advantageous treaties with the sultan Kala'un. A fourth cause, on which many writers dwelt, particularly at the time when the suppression of the Templars was in question, was the dissensions between the two orders of Templars and Hospitallers, and the selfish policy of merely pursuing their own interest which was followed by both in common. But one might enumerate ad infinitum the causes of the failure of the Crusades. It is simplest, as it is truest, to say that the Crusades did not fail — they simply ceased; and they ceased because they were no longer in joint with the times. The moral character of Europe in 1300 was no longer the moral character of Europe in 1100; and the Crusades, which had been the active and objective embodiment of the other worldly Europe of 1 100, were alien to the secular, legal, scholastic Europe of 1300. While Edward I. was seeking to found a united kingdom in Great Britain; while the Habsburgs were entrenching themselves in Austria; above all, while Philippe le Bel and his legists were consolidating the French monarchy on an absolutist basis, there could be little thought of the holy war. These were hard-headed men of affairs — men who would not lightly embark on joyous ventures, or seek for an ideal San Grail; nor were the popes, doomed to the Babylonian captivity for seventy long years at Avignon, able to call down the spark from on high which should consume all earthly ambitions in one great act*

of sacrifice.

But it is long before the death of any institution is recognized; and it was inevitable that men should busy themselves in trying to rekindle the dead embers into new life. Pierre Dubois, in a pamphlet " De recuperatione Sanctae Terrae," addressed to Edward I. in 1307, advocates a general council of Europe to maintain peace and prevent the dissensions which — as, for instance, in 1192 — had helped to cause the failure of past Crusades. Along with this advocacy of internationalism goes a plea for the disendowment of the Church, in order to provide an adequate financial basis for the future Crusade. Other proposals, made by men well acquainted with the East, are more definitely practical and less political in their intention. A blockade of Egypt by an international fleet, an alliance with the Mongols, the union of the two great orders — these are the three staple heads of these proposals. Something, indeed, was attempted, if little was actually done, under each of these three heads. The plan of an international fleet to coerce the Mahom- medan is even to this day ineffective; but the Hospitallers, who acquired a new basis by the conquest of Rhodes in 13 10, used their fleet to enforce a partial and, on the whole, ineffective blockade of the coast of the Levant. The union of the two orders, already suggested at the council of Lyons in 1245, was nominally achieved by the council of Vienne in 131 1; but the so-called " union " was in reality the suppression of the Templars, and the confiscation of all their resources by the cupidity of Philippe le Bel. The alliance with the Mongols remained, from the first to the last, something of a chimera; and the last visionary hope vanished when the Mongols finally embraced Mahommedanism, as, by the end of the 14th century, they had almost universally done.

Isolated enterprises somewhat of the character of a Crusade, but hardly serious enough to be dignified by that name, recur during the 14th century. The French kings are all crusaders — in name — until the beginning of the Hundred Years' War; but the only crusader who ever carried war in Palestine and sought to shake the hold of the Mamelukes on the Holy Land was Peter I., king of Cyprus from 1359 to 1369. Peter founded the order of the Sword for the delivery of Jerusalem; and instigated by his chancellor, P. de Mezieres (one of the last of

the theorists who speculated and wrote on the Crusades), he attempted to revive the old crusading spirit throughout the west of Europe. The mission which he undertook with his chancellor for this purpose (1362-1365) only produced a crop of promises or excuses from sovereigns like Edward III. or

the Emperor Charles IV.; and Peter was forced to begin the Crusade with such volunteers as he could collect for himself. In the autumn of 1365 he sacked Alexandria; in 1367 he ravaged the coast of Syria, and inflicted serious damages on the sultan of Egypt. But in 1369 he was assassinated, and the last romantic figure of the Crusades died, leaving only the legacy of his memory to his chancellor de Mezieres, who for nearly forty years longer con- tinued to be the preacher of the Crusades to Europe, advocating — what always continued to be the " dream of the old pilgrim " — a new order of knights of the Passion of Christ for the recovery and defence of Jerusalem. De Mezieres was the last to advocate seriously, as Peter I. was the last to attempt, a Crusade after the old fashion — an offensive war against Egypt for the recovery of the Holy Sepulchre. 1 From 1350 onwards the Crusade assumes a new aspect; it becomes defensive, and it is directed against the Ottoman Turks, a tribe of Turcomans who had established themselves in the sultanate of Iconium at the end of the 13th century, during the confusion and displacement of peoples which attended the Mongol invasions. As early as 1308 the Ottoman Turks had begun to settle in Europe; by 1350 they had organized their terrible army of janissaries. They threatened at once the debris of the old Latin empire in Greece and the archipelago, and the relics of the Byzantine empire round Constantinople; they menaced the Hospitallers in Rhodes and the Lusignans in Cyprus. It was natural that the popes should endeavour to form a coalition between the various Christian powers which were threatened by the Turks; and Venice, anxious to preserve her possessions in the Aegean, zealously seconded their efforts. In 1344 a Crusade, in which Venice, the Cypriots, and the Hospitallers all joined, ended in the conquest of Smyrna; in 1345 another Crusade, led by Humbert, dauphin of Vienne, ended in failure. The Turks continued their progress; in 1363 they captured Philippopolis, and in 1365 they entered Adrianople; the whole Balkan peninsula was threatened, and even Hungary itself seemed doomed. Already in 1365 Urban VI. sought to unite the king of Hungary and the king of Cyprus in a common Crusade against the Turks; but it was not till 1396 that an attempt was at last made to supple- ment by a land Crusade the naval Crusades of 1344 and 1345. Master of Servia and of Bulgaria, as well as of Asia Minor, the sultan Bayezid was now threatening Constantinople itself. To arrest his progress, a Crusade, preached by Boniface IX., led by John the Fearless of Burgundy, and joined chiefly by French knights, was directed down the valley of the Danube into the Balkans; but the old faults stigmatized by de Mezieres, divisio and propria voluntas, were the ruin of the crusading army, and at the battle of Nicopolis it was signally defeated. Not the Western Crusades but an Eastern rival, Timur (Tamerlane), king of Transoxiana and conqueror of southern Russia and India, was destined to arrest the progress of Bayezid; and from the battle of Angora (1402) till the days of Murad II. (1422) the

Ottoman power was paralysed. Under Murad, however, it rose to its old height. To meet the new danger a new union of the churches of the East and the West was attempted. As in 1074 Gregory VII. had dreamed of such a union, to be followed by a joint attack of East and West on the Seljuks, so in 1439, at the council of Florence, a new union of the two churches was again attempted and temporarily secured, in order that a united Christendom might face the new Turkish danger. 2 The logical result of the union was the Crusade of 1443. An army of cosmo- politan adventurers, led by the Cardinal Caesarini, joined the

1 The dream of a Crusade to Jerusalem survived de Mezieres ; a society which read " romaunts " of the Crusades, could not but dream the dream. Henry V., whose father had fought with the Teutonic knights on the Baltic, dreamed of a voyage to Jerusalem.

2 The union of 1274, conceded by the Palaeologi at the council of Lyons in order to defeat the plans of Charles of Anjou, had only been temporary

*forces of Wladislaus of Poland and John Hunyadi of Transyl- vania, and succeeded in forcing on Murad II. a truce of ten years at Szegedin in 1444. But the crusaders broke the truce, to which Caesarini had never consented; and, attempting to better what was already good enough, they were defeated at Varna. Here the last Crusade ended; and nine years afterwards,- in 1453, Mahommed II., the successor of Murad, captured Con- stantinople. It was in vain that the popes sought to gather a new Crusade for its recovery; Pius II., who had vowed to join the crusade in person, only reached Ancona in 1464 to find the crusaders deserting and to die. Yet the ghost of the Crusades still lingered. It became a convention of diplomacy, designed to cover any particularly sharp piece of policy which needed some excuse; and the treaty of Granada, formed between Louis XII. and Ferdinand of Aragon for the partition of Naples in 1500, was excused as a thing necessary in the interests of the Crusades. In a more noble fashion the Crusade survived in the minds of the navigators; " Vasco da Gama, Christopher Columbus, Albuquerque, and many others dreamed, and not insincerely, that they were labouring for the deliverance of the Holy Land, and they bore the Cross on their breasts." 3 " Don Henrique's scheme," it has been said, ■" represents the final effort of the crusading spirit; and the naval campaigns against the Moslem in the Indian seas, in which it culminated, forty years after Don Henrique's death, may be described as the last Crusade." **

10. Results of the Crusades. — In one vital respect the result of the Crusades may be written down as failure. They ended, not in the occupation of- the East by the Christian West, but in the conquest of the West by the Mahommedan East. The Crusades began with the Seljukian

Turk planted at Nicaea; they ended with the Ottoman Turk entrenched by the Danube. Nothing is more striking in history than the recession of Christianity in the East after the 13th century. In the 13th century the whole of Europe was Christian; part of Asia Minor still belonged to Greek Christianity, and there was a Christian kingdom in Palestine. Nor was this all. A wide missionary activity had begun in the 13 th century — an activity which was the product of the Crusades and the contact with the Moslem which they brought, but which yet helped to check the Crusades, substituting as it did peaceful and spiritual conquests of souls for the violence and materialism of even a Holy War. The Eastern mission had been begun by St Francis, who had visited and attempted to convert the sultan of Egypt during the Fifth Crusade (1220) ; within a hundred years the little seed had grown into a great tree. A great field for missionary enterprise opened itself in the Mongol empire, in which, as has already been men- tioned, there were many Christians to be found; and by 1350 this field had been so well worked that Christian missions and Christian bishops were established from Persia to Peking, and from the Dnieper to Tibet itself. But a Mahommedan reaction came, thanks in large measure to the zeal of Timur; and central Asia was lost to Christianity. Everywhere in the 1 5th century, in Europe and in Asia, the crescent was victorious over the cross; and Crusade and mission, whether one regards them as complementary or inimical, perished together. 6

But the history of the Crusades must be viewed rather as a chapter in the history of civilization in the West itself, than as an extension of Western dominion or religion to the East. It is a chapter very difficult to write, for while on the one hand an ingenious and speculative historian may refer to the influence of the Crusades almost everything which was thought or done between 1100 and 1300, a cautious writer who seeks to find

3 Brehier, V&glise et VOrient, p. 347.

4 Cambridge Modern History, i. 11. It is perhaps worth remark- ing that something of the old crusading spirit seems still to linger in the movement of Russia towards Constantinople.

6 While from this point of view the Crusades appear as a failure, it must not be forgotten that elsewhere than in the East Crusades did attain some success. A Crusade won for Christianity the coast of the eastern Baltic (see Teutonic Order) ; and the centuries of the Spanish Crusade ended in the conquest of the whole of Spain for Christianity.

*documentary evidence for every assertion may be rather inclined to attribute to that influence little or nothing. 1 The dissolution of feudalism, the development of towns, the growth of scholasticism, all these and much more have been ascribed to the Crusades, when in truth they were concomitants rather than results, or at any rate, if in part the results of the Crusades, were in far larger part the results of other things. At most, therefore, it may be admitted that the Crusades contributed to the dissolution of feudalism by putting property on the market and disturbing the validity of titles; that they aided the development of towns by vastly increasing the volume of trade; and that they furthered the growth of scholasticism by bringing the West into contact with the mind of the East. If we seek the peculiar and definite results of the Crusades, we must turn to narrower issues. In the first place, the Crusades represent the attempt of a feudal system, bound under the law of primogeniture to dispose of its younger sons. They are attempts at feudal colonization; and as such they resulted in a number of colonies — the kingdom of Jerusalem, the kingdom of Cyprus, the Latin empire of Constantinople. They resulted too in a number of " chartered companies " — that is to say, the three military orders, which, beginning as charitable socities, developed into military clubs, and developed again from military clubs into chartered companies, possessed of banks, navies and considerable territories. In the second place, as has already been noticed, the Crusades represent the attempt of Western commerce to find new and more easy routes to the wealth of the East; and in this respect they led to various results. On the one hand they led to the establishment of emporia in the East — for instance, Acre, and after the fall of Acre Famagusta, both in their day g*eat centres of Levantine trade. On the other hand, the commodities which poured into Venice and Genoa from the East had to find a route for their diffusion through Europe. The great route was that which led from Venice over the Brenner and up the Rhine to Bruges; and this route became the long red line of municipal development, along which — in Lombardy, Germany and Flanders — the great towns of the middle ages sprang to life. Partly as a result of this trade, ever pushing its way farther east, and partly as a result of the Asiatic missions, which were them- selves an accompaniment and effect of the Crusades, a third great result of the Crusades came to light in the 13th century — the discovery of the interior of Asia, and an immense accession to the sphere of geography. When one remembers that mis- sionaries like Piano Carpini, and traders like the Venetian Polos, either penetrated by land from Acre to Peking, or circum- navigated southern Asia from Basra to Canton, one realizes that there was, about 1300, a discovery of Asia as*

new and tremendous as the discovery of America by Columbus two centuries later. At the same time the old knowledge of nearer Asia was immensely deepened. It has already been noticed how military reconnaissances of the routes to Egypt came to be made; but more important were the guide-books, of which a great number were written to guide the pilgrims from one sacred spot of Bible history to another. There were medieval B aedekers in abundance for the use of the annual flow of tourists, who were carried every Easter by the vessels of the Italian towns or of the Orders to visit the Holy Land and to bathe in Jordan, to gather palms, and to see the miracle of fire at the Sepulchre.

Colonization, trade, geography — these then are three things closely connected with the history of the Crusades. The development of the art of war, and the growth of a systematic taxation, are two debts which medieval Europe also owed to the Crusades. Partly by contact with the Byzantines, partly by conflict with the Mahommedans, the Franks learned new methods

'Authors like Heeren (Versuch einer Entwickelung der Folgen der Kreuzziige) and Michaud (in the last volume of his Histoire des croisades) fall into the error of assigning all things to the Crusades. Even Prutz, in bis Kulturgeschichte der Kreuzziige, over-estimates the influence ol the Crusades as a chapter in the history of civilization. He depreciates unduly the Western civilization of the early middle ages, and exalts the civilization of the Arabs; and starting from these two premises, he concludes that modern civilization is the offspring of the Crusades, which first brought East and West together.

both of building and of attacking fortifications. The concentric castle, with its rings of walls, began to displace the old keep and bailey with their single wall, as the crusaders brought back news from the East. 2 The art of the sapper and miner, the use of siege instruments like the mangonel, and the employment of various " fires " as missiles, were all known among the Mahom- medans; and in all these respects the Franks learned from their enemies. The common use of armorial bearings, and the practice of the tournament, may be Oriental in their origin; the latter has its affinities with the equestrian exercises of the Jerid, and the former, though of prehistoric antiquity, may have received a new impulse from contact with the Arabs. The military development which sprang from the Crusades is thus largely a matter of borrowing; the financial development is independent and indigenous in the West. As early as 1147 Louis VII. had imposed a tax in the interests of the Crusades; and that tax had been repeated by Louis, and imitated by Henry II. in 11 66, while it had been still further extended in the Saladin tithe of 1 188. The taxation of 1166 is important as the first to fall on " moveables "; the whole scheme of taxation may be regarded as the

beginning of a modern system of taxation. But it was not only to the lay power that the Crusades gave an excuse for taxation; the papacy also profited. Tithes for the Crusades were first imposed on the clergy by Innocent III. at the Lateran council of 1 2 15; and clerical taxation was thus part of the whole statesmanlike project of the Fifth Crusade as it was sketched by the great pope. Henceforth tithes for the Crusades are regular; under Gregory IX. they become a great part of the papal resources in the Crusade against the Hohenstaufen; and in the 16th century they are still a normal part of the government of the Church.

In many other ways the Europe over which the Crusades had passed was different from the Europe of the nth century. In the first place, many political changes had been wrought, largely under its influence. Always in large part French, the Crusades had on the whole contributed to exalt the prestige of France, until it stood at the end of the 13th century the most considerable power in Europe. It was France which had colonized the Levant ; it was the French tongue which was used in the Levant; and the results of the ancient and continuous connexion with the East are still to be traced to-day. Of the other great powers of Europe, England and Germany had been little changed by the Crusades, save that Germany had been extended towards the East by the conquests of the Teutonic Order; but the Eastern empire had been profoundly modified, and the papacy had suffered a great change. The Eastern empire had been for a time annihilated by the movement which in 1095 it had helped to evoke; and if it rose from its ashes in 1261 for two centuries of renewed life, it was never more than the shadow of its old self, with little hold on Asia Minor and less on Greece and the Archi- pelago, which the Latins still continued to occupy until they were finally conquered by the Ottoman Turks. The papacy, on the other hand, had grown as a result of the Crusades. Popes had preached them; popes had financed them; popes had sent their legates to lead them. Through them the popes had deposed the emperors of the West from their headship of the world, partly because through the Crusades the popes were able to direct the common Christianity of Europe in a foreign policy of their own without consultation with the emperor, partly because in the 13 th century they were ultimately able to direct the Crusade itself against the empire. Yet while they had magnified, the Crusades had also corrupted the papacy. They became an instrument in its hands which it used to its own undoing. It cried Crusade when there was no Crusade; and the long Crusade against the Hohenstaufen, if it gave the papacy an apparent victory, only served in the long run to lower its 2 It is difficult to decide how far Arabic models influenced ecclesi- astical architecture in the West as a result of the Crusades._ Greater freedom of moulding and the use of trefoil and cinquefoil may be, but need not be, explained in this way. The pointed arch owes nothing to the Arabs; it is already used in England in

early Norman work. Generally, one may say that Western architecture is inde- pendent of the East.

prestige in the eyes of Europe. When we turn from the sphere of politics to the history of civilization and culture, we find the effects of the Crusades as deeply impressed, if not so definitely marked. The Crusades had sprung from the policy of a theo- cratic government counting on the motive of otherworldliness ; they had helped in their course to overthrow that motive, and with it the government which it had made possible. In part they had provided a field in which the layman could prove that he too was a priest; in part they had brought the West into a living and continuous contact with a new faith and a new civilization. They had torn men loose from the ancestral custom of home to walk in new ways and see new things and hear new thoughts; and some broadening of view, some lessening in the intensity of the old one-sidedness, was the inevitable result. It is not so much that the West came into contact with a particular civilization in the East, or borrowed from that civilization; it is simply that the West came into contact with something unlike itself, yet in many ways as high as, if not higher than, itself. The spirit of Nathan der Weise may not have been exactly the spirit engendered by the Crusades; and yet it is not without reason that Lessing stages the fable which teaches toleration in the Latin kingdom of Jerusalem. In any case the accusations made against the Templars at the time of their suppression prove that there was, at any rate in the ranks of those who knew the East, too little of absolute orthodoxy. While a new spirit which compares, and tolerates thus sprang from the Crusades, the large sphere of new knowledge and experience which they gave brought new material at once

for scientific thought and poetic imagination. Not only was geography more studied; the Crusades gave a great impulse to the writing of history, and produced, besides innumerable other works, the greatest historical work of the middle ages — the Historia transmarina of William of Tyre. Mathematics received an impulse, largely, it is true, from the Arabs of Spain, but also from the East; Leonardo Fibonacci, the first Christian algebraist, had travelled in Syria and Egypt. The study of Oriental languages began in connexion with the Christian missions of the East; Raymond Lull, the indefatigable missionary, induced the council of Vienne to decide on the creation of six schools of Oriental languages in Europe (1311). But the new field of poetic literature afforded by the Crusades is still more striking than this development of science. New poems in abundance dealt with the history of the Crusades, either in a faithful

narrative, like that of the Chanson of Am- broise, which narrates the Third Crusade, or in a free and poetical spirit, such as breathes in the Chanson a" Antioche. Nor was this all. The Crusades.afforded new details which might be inserted into old matters, and a new spirit which might be infused into old subjects; and a crusading complexion thus came to be put upon old tales like those of Arthur and Charlemagne. By the side of these greater things it may seem little, and yet, just because it is little, it is all the more significant that the Crusades should have familiarized Europe with new plants, new fruits, new manufactures, new colours, and new fashions in dress. Sugar and maize; lemons, apricots and melons; cotton, muslin and damask; lilac and purple (azure and gules are words derived

3 -g ri

6

O O

oa

O.ON

w

►J

<

to

£>

Pi W

•— >

u. o

o

t— <

w

K H

fa. O

o o

<

u a;

U O

> > .

OJOO

1-1 o v .SO A

2 2″

n -5 5

-O

LI

4!

I!

O CTn

o w bo

&S

w

o £ , a! H ,

o

v p

X o

J

jf 1 ”

S ”

•Bi

« 2

J- bo 1 P c 10

., emper t and ki ;m 122

HH

13 so £3

rederick II

of the Wes of Jerusal

O

1/3

CN

V., king of ny and of em 1250-

00

> >

1

M

ON

1

Mary,

ueen unde

CJ

c

1)

be

1-

in

6

6

II

Conrad I Germa

Jerusal

10

IO- CS!

*.ST •a ■ **

_« 10

U CM

6?

CTo)

<•«-<

1 Q

C3

^

t— 1

a =

1

►TON

o >

3*0

K)C0

4) H

•«ho

> > e

cP

roo

> ”

a 1

- ˆ00

2 m

■o c o 52 — •

co ..**- ON

5fiˆ2 £■3 .5

o 5 10 o

k-ˆCN be

M « C

b ■ o D

0 >

K

73

C

3

E

O

O

03

w h

•§ a=^

„ 5 bo J3”o.S

-X >-•*. .2 ^— ^

bo o .H’c

cfi

IS

en” B)

>,

JD

t-

a

>s

H

U

O

i

c«.t2

^

6 is

J3

c

c

_be

'55

3

J

C O

_C3

-o

a

CI) -

>* rt CO

—2 7-

O 4) 0\ .1— HO

M O

■a"

a

Oio o ^

be I *— c^- •-00

.0

3

a

cfl

>^

Dh

U

J3

bo

i: k

c

■a m

n

bo

56 °

from the Arabic) ; the use of powder and of glass mirrors, and also of the rosary itself — all these things came to Europe from the East and as a result of the Crusades. To this day there are many Arabic words in the vocabulary of the languages of western Europe which are a standing witness of the Crusades — words relating to trade and seafaring, like tariff and corvette, or words for musical instruments, like lute or the Elizabethan word " naker."

When all is said, the Crusades remain a wonderful and per- petually astonishing act in the great drama of human life. They touched the summits of daring and devotion, if they also sank into the deep abysms of shame. Motives of self-interest may have lurked in them — otherworldly motives of buying salvation for a little price, or worldly motives of achieving riches and acquiring lands. Yet it would be treason to the majesty of man's incessant struggle towards an ideal good, if one were to deny that in and through the Crusades men strove for righteous- ness'

sake to extend the kingdom of God upon earth. Therefore the tears and the blood that were shed were not unavailing; the heroism and the chivalry were not wasted. Humanity is the richer for the memory of those millions of men, who followed the pillar of cloud and fire in the sure and certain hope of an eternal reward. The ages were not dark in which Christianity could gather itself together in a common cause, and carry the flag of its faith to the grave of its Redeemer; nor can we but give thanks for their memory, even if for us religion is of the spirit, and Jerusalem in the heart of every man who believes in Christ.

Literature. — In dealing with the literature of the Crusades, it is perhaps better, though ideally less scientific, to begin with chronicles and narratives rather than with documents. One of the results of the Crusades, as has just been suggested above, was a great increase in the writing of history. Crusaders themselves kept diaries or itineraria; while home-keeping ecclesiastics in the West — monks like Robert of Reims, abbots Tike Guibert of Nogent, archbishops like Balderich of Dol — found a fertile subject for their pens in the history of the Crusades. The history of a series of actions like the Crusades must primarily be based on these accounts, and more particularly on the former: narratives must precede documents where one is dealing, not with the continuous life of an organized kingdom, but with a number of enterprises — especially when those enterprises have been, as in this case, excellently narrated by contemporary writers.

I. Chronicles and Narratives of the Crusades — (1) Collections. The authorities for the Crusades have been collected in Bongars, Gesta Dei per Francos (Hanover, 1611) (incomplete); Michaud, Bibliotheque des croisades (Paris, 1829) (containing translations of select passages in the authorities) ; the Recueil des historiens des croisades, published by the Academie des Inscriptions (Paris, 1841 onwards) (the best general collection, containing many of the Latin, Greek, Arabic and Armenian authorities, and

also the text of the assizes ; but sometimes poorly edited and still incomplete) ; and the publications of the Societe de l'Orient Latin (founded in 1875), especially the Archives, of which two volumes were published in 1881 and 1884, and the volumes of the Revue, published yearly from 1893 to 1902, and containing not only new texts, but articles and reviews of books which are of great service. (2) Particular authorities. The Crusades — a movement which engaged all Europe and brought the East into contact with the West — must necessarily be studied not only in the Latin authorities of Europe and of Palestine, but also in Byzantine, Armenian and Arabic writers. There are thus some four or five different points of view to be considered.

The First Crusade, far more than any other, became the theme of a multitude of writings, whose different degrees of value it is all- important to distinguish. Until about 1840 the authority followed for its history was naturally the great work of William of Tyre. For the First Crusade William had followed Albert of Aix; and he had consequently depicted Peter the Hermit as the prime mover in the Crusade. But about 1840 Ranke suggested, and von Sybel in his Geschichte des ersten Kreuzzuges proved, that Albert of Aix was not a good authority, and that consequently William of Tyre must be set aside for the history of the First Crusade, and other and more contemporary authorities used. In writing his account of the First Crusade, von Sybel accordingly based himself on the three con- temporary Western authorities — the Gesta Francorum, Raymond of Agiles, and Fulcher. His view of the value of Albert of Aix, and his account of the First Crusade, have been generally followed (Kugler alone having attempted, to some extent, to rehabilitate Albert of Aix) ; and thus von Sybel's work may be said to mark a revolution in the history of the First Crusade, when its legendary features were stripped away, and its real progress was first properly discovered.

Taking the Western authorities for the First Crusade separately,

one may divide them, in the light of von Sybel's work, into four kinds — the accounts of eye-witnesses; later compilations based on these accounts; semi-legendary and legendary narratives; and lastly, in a class by itself, the " History " of William of Tyre, who is rather a scientific historian than a chronicler.

(a) The three chief eye-witnesses are the anonymous author of the Gesta Francorum, Raymund of Agiles, and Fulcher. The anonymous author of the Gesta (see Hagenmeyer's edition, Heidelberg, 1890) was a Norman of South Italy, who followed Bohemund, ancf accordingly depicts the progress of the First Crusade from a Norman point of view. He was a layman, marching and fighting in the ranks; and thus he is additionally valuable as representing the opinion of the ordinary crusader. Finally he was an eye-witness throughout, and absolutely contemporary, in the sense that he wrote his account of each great event practically at the time of the event. He is the primary authority for the First Crusade. Raymund of Agiles, a Provencal clerk and a follower of Raymund of Toulouse, writes his Historia Francorum qui ceperunt Jerusalem from the Provencal point of view. He gives an ecclesiastic's account of the First Crusade, and is specially full on the spiritualistic phenomena which accom- panied and followed the finding of the Holy Lance. His book might almost be called the " Visions of Peter Bartholomew and others," and it is written in the plain matter-of-fact manner of Defoe's narratives. He too was an eye-witness throughout, and thoroughly honest; and his account ranks second to the Gesta. Fulcher of Chartres originally followed Robert of Normandy, but in October 1097 he joined Baldwin of Lorraine in his expedition to Edessa, and afterwards followed his fortunes. His Historia Hierosolymitana, which extends to 1 127, and embraces not only the history of the First Crusade, but also that of the foundation of the kingdom of Jerusalem, is written on the whole from a Lotharingian point of view, and is thus a natural complement to the accounts of the Anonymus and Raymund. His account of the First

Crusade itself is poor (he was absent at Edessa during its course), but otherwise he is an excellent authority. A kindly old pedant, Fulcher interlards his history with much discourse on geography, zoology and sacred history. Besides these three chief eye-witnesses we may also mention the Annates Genuenses by the Genoese consul Caffarus, 1 and the Annates Pisani of Bernardus Marago, useful as giving the mercantile and Italian side of the Crusade; the Hierosolymita of Ekkehard, the German abbot of Aura, who first came to Jerusalem about 1 101 (partly based on the Gesta, but also of independent value: see Hagenmeyer's edition, Tubingen, 1877); and Raoul of Caen's Gesta Tancredi, composed on the basis of information supplied by Tancred himself. The last two works, if not actually the works of eye-witnesses, are at any rate first-hand, and belong to the category of primary writers rather than to that of later compilations. Finally, to contemporary writers we may add contemporary letters, especially those written by- Stephen of Blois and Anselm of Ribemont, and the three letters sent to the West by the crusading princes during the First Crusade (see Hagenmeyer, Epistulae et Chartae, &c, Innsbruck, 1901). 2

(b) The later compilations are chiefly based on the Gesta, whose uncouth style many writers set themselves to mend. In the first place, there is the Historia de Hierosolymitano itinere of Tudebod, which according to Besly, writing in 1641, is the original from which the Gesta was a mere plagiarism — an absolute inversion of the truth, as von Sybel first proved two centuries later. Secondly, besides the plagiarist Tudebod, there are the artistic redacteurs of the Gesta, who confess their indebtedness, but plead the bad style of their original — Guibert of Nogent, Balderich of Dol, Robert of Reims (all c. 1120-1130), and Fulco, the author of a Virgilian poem on the Crusades, continued by Gilo {ob. c. 1 142). Of these, the monk Robert was more popular in the middle ages than either the pompous abbot Guibert or the quiet garden-loving archbishop of Dol.

(c) The growth of a legend, or perhaps better, a saga of the First Crusade began, according to von Sybel, even during the Crusade itself. The basis of this growth is partly the story-telling instinct innate in all men, which loves to heighten an effect, sharpen a point or increase a contrast — the instinct which breathes in Icelandic sagas like that of Burnt Njal; partly the instinct of idolization, if it may be so called, which leads to the perversion into impossible greatness of an approved character, and has created, in this instance, the legendary figures of Peter the Hermit and Godfrey of Bouillon iqq.v.) ; partly the religious impulse, which counted nothing wonder- ful in a holy war, and imported miraculous elements even into the sober pages of the Gesta. These instincts and impulses would be at work already among the soldiers during the Crusade, producing a saga all the more readily, as there were poets in the camp; for we know that a certain Richard, who joined the First Crusade, sang its exploits in verse, while still more famous is the princely troubadour, William of Aquitaine, who joined the Crusade of 1100. If we are to follow von Sybel rather than Kugler, this saga of the First Crusade found one of its earliest expressions (c. 1120) in the prose work of Albert of Aix (Historia Hierosolymitana) — genuine saga in its

1 His somewhat legendary treatise, De liberatione civitatum Orientis, was only composed about 1 155.

2 There is also an Inventaire critique of these letters by the comte de Riant (Paris, 1880).

inconsistencies, its errors of chronology and topography, its poet- ical colour, and its living descriptions of battles. Kugler, however, regards Albert as a copyist, somewhat in the manner of Tudebod, of an unknown writer of value, who belonged to the Lotharingian ranks during the Crusade, and settled in the kingdom of Jerusalem afterwards (see

*Kugler, Albert von Aachen, Stuttgart, 1885). * In the Chanson des chetifs and the Chanson d'Antioche the legend of the Crusades more certainly finds its expression. The former, composed at Antioch about 1 130, contained an idolization of the Hermit: the latter is a poem written about 1180 by Graindor of Douai, who used as his basis the verses of the crusader Richard (see the edition of P. Paris, 1848). It shows the growth of the legend that Graindor regards the vision of the Hermit as responsible for the Crusade, and makes the Crusade led by him precede, and indeed occasion by its failure, the meeting at Clermont (which is dated in May instead of November). Into the legendary overgrowth of the First Crusade we cannot here enter any further 2 ; but it is perhaps worth while to mention that the French legend of the Third Crusade equally perverted the truth; making Richard I. return home in disgrace, while Philip Augustus stays, captures Damascus and mortally wounds Saladin (cf. G. Paris, L'Estoire de la guerre sainte, Paris, 1897; Introduction).*

id) William of Tyre is the scientific historian and rationalizer, weaving into a harmonious account, which was followed by his- torians for centuries, the sober accounts of eye-witnesses and the picturesque details of the saga — with somewhat of a bias towards the latter in regard to the First Crusade. He was a native of Pales- tine, born about 1 130, and educated in the West. On his return he was happy in winning the good opinion of Amalric I. ; he was made first canon and then archdeacon of Tyre, and tutor of the future Baldwin IV. (1170); while on Baldwin's accession he became chancellor of the kingdom and archbishop of Tyre (1174-1175). He was a man often employed on missions and negotiations, and as chancellor he had in his care the archives of the kingdom. His temper was naturally that of a trimmer; and he had thus many qualifications for the writing of well-informed and unbiassed history, fie knew Greek and Arabic; and he was well acquainted with the affairs of Constantinople, to which he went at least twice on

political business, and with the history of the Mahommedan powers, on which he had written a work (now lost) at the command of Amalric. It was Amalric also who set him to write the history of the Crusades which we still possess (in twenty-two books, with a fragment of a twenty- third) — the Historia rerum in partibus transmarinis gestarum. He wrote the book at different times between 1170 and 1183, when it abruptly ends, and its author as abruptly disappears from sight. The book falls into two parts, the first (books i.-xv.) derivative, the second (books xvi.-xxiii.) original. In the second part he had his own knowledge of events and the information of his contemporaries as his source: in the first he used the same authorities which we still possess — the Gesta, Fulcher, and Albert of Aix— in somewhat of an eclectic spirit, choosing now here, now there, according as he could best weave a pleasant narrative, but not according to any real critical principle. His book thus begins to be a real authority only from the date of the Second Crusade onwards; but the perfection of his form (for he is one of the greatest stylists of the middle ages) and the prestige of his position conspired to make his book the one authority for the whole history of the first century of the Crusades. Nor was he (apart from his reception of legendary elements into his narrative) unworthy of the honour in which he was held; for he is really a great historian, in the form of his matter and in hisconception of his subject — diligent, impartial, well-informed and interesting, if somewhat rhetorical in style and vague in chronology.

[During the middle ages his work was current in a French trans- lation, known as the Chronique d'outremer, or the Livre or Roman d'Hracles (so called from the reference at the beginning to the emperor Heraclius). This translation also contained a continuation by various hands down to 1277 ; while besides the continuation embedded in the Livre d'Eracles, there are separate continuations, of the nature of independent works, by Ernoul and Bernard the Treasurer. These latter cover the period from 11

83 to 1228; and of the two Ernoul's account seems primary, while that of Bernard is in large part a mere copy of Ernoul. But the whole subject of the contmuators of William of Tyre is dubious.]

To the Western authorities for the First Crusade must be added the Eastern — Byzantine, Arabic and Armenian. Of these the Byzantine authority, the Alexiad of Anna Comnena, is most im- portant, partly from the position of the authoress, partly from the many points of contact between the Byzantine empire and the crusaders. Anna's narrative both furnishes a useful corrective of

1 Von Sybel's view must be modified by that of Kugler, to which a scholar like Hagenmeyer has to some extent given his adhesion (cf . his edition of the Gesta, pp. 62-68). Hagenmeyer inclines to believe in an original author, distinct from Albert the copyist; and he thinks that this original author (whether or no he was present during the Crusade) used the Gesta and also Fulcher, though he had probably also " eigene Notizen und Aufzeichnungen."

2 See Pigonneau, Le Cycle de la croisade, &c. (Paris, 1877); and Hagenmeyer, Peter der Eremite (Leipzig, 1879).

the prejudiced Western accounts of Alexius, and serves to bring Bohemund forward into his proper prominence. The Armenian view of the First Crusade and of Baldwin's principality of Edessa is presented in the Armenian Chronicle of Matthew of Edessa. There is little in Arabic bearing on the First Crusade : the Arabic authorities only begin to be of value with the rise of the atabegs of Mosul (c. 1 127). But Kemal-ud-din's History of Aleppo (composed in the 13th century) contains some details on the history of the First Crusade; and the Vie d'Ousama (the autobiography of a sheik at Caesarea in northern Syria, edited and paraphrased by Derenbourg in the Publications de VEcole des langues orientates v%vantes) presents the point of view of an Arab whose life covered the first century of the Crusades (1095-1188).

For the Second Crusade the primary authority in the West is the work of Odo de Deuil, De profectione Ludovici VII regis Francorum in Orientem. Odo was a monk attached by Suger to Louis VII. during the Second Crusade; and he wrote home to Suger during the Crusade seven short letters, afterwards pieced together in a single work. The Gesta Friderici Primi of Otto of Freising (who joined in the Second Crusade) gives some details from the German point of view (i. c. 44 sqq.). The former is supplemented by the letters of Louis VII. to Suger; the latter by the letters of Conrad III. to Wibald, abbot of Stablo and Corvey. The Byzantine point of view is presented in the 'Extro^ of Cinnamus, the private secretary of Manuel, who continued the Alexiad of Anna Comnena in a work describing the reigns of John and Manuel. It is from the Second Crusade that William of Tyre, representing the attitude of the Franks of Jerusalem, begins to be a primary authority ; while on the Mahommedan side a considerable authority emerges in Ibn Athlr. His history of the Atabegs was written about 1200, and it presents in a light favourable to Zengi and Nureddin, but unfavourable to Saladin (who thrust Nureddin's descendants aside), the history of the great Mahommedan power which finally crushed the kingdom of Jerusalem. 3

Side by side with Beha-ud-din's life of Saladin, Ibn Athlr's work is the most considerable historical record written by the Arabs. Generally speaking the Arabic writings are late in point of date, and cold and jejune in style; while it must also be remembered that they are set religious works written to defend Islam. On the other hand they are generally written by men of affairs — governors, secretaries or ambassadors; and a fatalistic temper leads their authors to a certain impartial recording of everything, good or evil, which seems of moment.

The Third Crusade was narrated in the West from very different points of view by Anglo-Norman, French and German authorities. The primary Anglo-Norman authority is the Carmen Ambrosii, or, as it is called by _M. Gaston Paris, L'Estoire de la guerre

sainte. This is an octosyllabic poem in French verse, written by Ambroise, a Norman trouvere who followed Richard I. to the Holy Land. The poem first came to be known by scholars about 1873, and has been edited by M. Gaston Paris (Paris, 1897). The Itinerarium Peregri- norum, a work in ornate Latin prose, is (except for the first book) a translation of the Carmen masquerading under the guise of an inde- pendent work. There seems no doubt that it is a piece of plagiary, and that its writer, Richard, " canon of the Holy Trinity " in London, stands to the Carmen as Tudebod to the Gesta, or Albert of Aix to his supposed original. The Third Crusade is also described from the English point of view by all contemporary writers of history in England, e.g. Ralph of Coggeshall, who used information gained from crusaders, and William of Newburgh, who had access to a work by Richard I.'s chaplain Anselm, which is now lost. 4 The French side is presented in Rigord's Gesta Philippi Augusti and in the Gesta (an abridgment and continuation of Rigord) and the Philippeis of William the Breton. The two French writers represent Richard as a faithless vassal : in the German writers — Tagino, dean of Passau, who wrote a Descriptio of Barbarossa's Crusade (1189-1190); and Ansbert, an Austrian clerk, who wrote De expeditione Friderici Imperatoris (1187-1196) — Richard appears rather as a monster of pride and arrogance. From the Arabic point of view the life of Richard's rival, Saladin, is described by Beha-ud-din, a high official under Saladin, who writes a panegyric on his master, some- what confused in chronology and partial in its sympathies, but nevertheless of great value. The various continuations of William of Tyre above mentioned represent the opinion of the native Franks (which is hostile to Richard I.) ; while in Nicetas, who wrote a history of the Eastern empire from 1 1 18 to 1206, we have a Byzantine authority who, as Professor Bury remarks, " differs from Anna and Cinnamus in his tone towards the crusaders, to whom he is surprisingly fair."

For the Fourth Crusade the primary authority is

Villehardouin's La Conqulte de Constantinople, an official apology for the diversion of the Crusade written by one of its leaders, and concealing the arcana under an appearance of frank naivete. His work is usefully supplemented by the narrative (La Prise de Constantinople) of

*3 On the bibliography of the Second Crusade see Kugler, Studien zur Geschichte des zweiten Kreuzzuges (Stuttgart, 1866). _ * Of these writers see Archer's Crusade of Richard I., Appendix (in Nutt's series of Histories from Contemporary Writers).*

Robert de Clary, a knight from Picardy, who presents the non- official view of the Crusade, as it appeared to an ordinary soldier. The XpociKbp tS>v iv 'Pupaviq. (composed in Greek verse some time after 1300, apparently by an author of mixed Frankish, and Greek parentage, and translated into French at an early date under the title " The Book of the Conquest of Constantinople and the' Empire of Rumania ") narrates in a prologue the events of the Fourth (as indeed also of the First) Crusade. The Chronicle of the Morea (as this work is generally called) is written from the Frankish point of view, in spite of its Greek verse; and the Byzantine point of view must be sought in Nicetas. 1

The history of the later Crusades, from the Fifth to the Eighth, enters into the continuations of William of Tyre above mentioned ; while the Historia orientalis of Jacques de Vitry, who had taken part in the Fifth Crusade, and died in 1240, embraces the history of events till 1218 (the third book being a later addition). The Secreta fidelium Cruets of Marino Sanudo, a history of the Crusades written by a Venetian noble between 1306 and 132 1, is also of value, particu- larly for the Crusade of Frederick II. The minor authorities for the Fifth Crusade have been collected by Rohricht, in the publications of

the Societe de l'Orient Latin for 1879 and 1882; the ten valuable letters of Oliver, bishop of Paderborn, and the Historia Damiettina, based on these letters, have also been edited by Rohricht in the Westdeutsche Zeitschrift fiir Geschichte und Kunst (1891). The Sixth Crusade, that of Frederick II., is described in the chronicle of Richard of San Germano, a notary of the emperor, and in other Western authorities, e.g. Roger of Wendover. For the Crusades of St Louis' the chief authorities are Joinville's life of his master (whom he accompanied to Egypt on the Seventh Crusade), and de Nangis' Gesta Ludovici regis. Several works were written on the capture of Acre in 1291, especially the Rxcidium urbis Acconensis, a treatise which emerges to throw light, after many years of darkness, on the last hours of the kingdom. The Oriental point of view for the 13th century appears in Jelaleddin's history of the Ayyubite sultans of Egypt, written towards the end of the 13th century; in Maqrizi's history of Egypt, written in the middle of the 15th century; and in the compendium of the history of the human race by Abulfeda (fl332); while the omniscient Abulfaragius (whom Rey calls the Eastern St Thomas) wrote, in the latter half of the 13th century, a chronicle of universal history in Syriac, which he also issued, in an Arabic recension, as a Compendious History of the Dynasties.

II. The documents bearing on the history of the Crusades and the Latin kingdom of Jerusalem are various. Under the head of charters come the Regesta regni Hierosolymitani, published by Rohricht, Innsbruck, 1893 (with an Additamentum in 1904); the Cartulaire generate des Hospitaliers, by Delaville Leroulx (Paris, 1894 onwards) ; and the Cartulaire de Veglise du St Sepulcre, by de Roziere (Paris, 1849). Under the head of laws come the assizes of the Kingdom, edited by Beugnot in the Recueil des historiens des croisades; and the assizes of Antioch, printed at Venice in 1876. G. Schlumberger has written on the coins and seals of the Latin East in various publications; while Rey has written an Etude sur les monuments de V architecture militaire

(Paris, 1871). The genealogy of the Levant is given in Le Livre des lignages d'outre-mer (published along with the assizes).

Bibliographies. — The best modern account of the original authorities for the Crusades is that of A. Molinier, Les Sources de I'histoire de France, vols. ii. and iii. W. Wattenbach's Deutschlands Geschichtsquellen gives an account of Albert of Aix (vol. ii., ed. 1894, pp. 170-180) and of Ekkehard of Aura {ibid. pp. 189-198). Von Sybel's Geschichte des ersten Kreuzzuges contains a full study of the authorities for the First Crusade ; while the prefaces to Hagenmeyer's editions of the Gesta and of Ekkehard are also valuable. Gaston Dodu, in the work mentioned below, begins by a brief account of the original authorities, which is chiefly of value so far as it deals with William of Tyre and the history of the assizes; and H. Prutz has also a short account of some of the historians of the Crusades (Kultur geschichte, pp. 453-469). Finally reference may be made to the works of Kugler and Klimke above mentioned, and to J. P. Michaud's Bibliographie des croisades (Paris, 1822).

Modern Writers. — The various works of R. Rohricht present the soundest, if not the brightest, account of the Crusades. There is a Geschichte des ersten Kreuzzugs (Innsbruck, 1901), a Geschichte des Konigreichs Jerusalem {ibid. 1898) and a Geschichte der Kreuzzilge in Umris {ibid. 1898). For the First Crusade von Sybel's work and Chalandon's Alexis I" Comnene may also be mentioned; for the Fourth A. Luchaire's volume on Innocent III: La Question d' Orient; while for the whole of the Crusades Norden's Papstum und Byzanz is of value. B. Kugler's Geschichte der Kreuzzilge (in Oncken's series) still remains a suggestive and valuable work; and L. Brehier's L'Eglise et I'orient au moyen age (Paris, 1907) contains not only an up-to-date account of the Crusades, but also a full and useful biblio- graphy, which should be consulted for fuller information. On points of chronology, and on the relations between the crusaders and their Mahommedan neighbours, W. B. Stevenson's The Crusaders in the East (Cambridge,

I907)is very valuable. On the constitutional and

1 The bibliography of the Fourth Crusade is discussed in Klimke, Die Quellen zur Geschichte des vierten Kreuzzuges (Breslau, 1875).

social history of the Latin kingdom of Jerusalem Dodu's Histoire des institutions du royaume latin de Jerusalem is very useful ; E. G. Rey's Les Colonies franques en Syrie contains many interesting details; and Prutz's Kulturgeschichte der Kreuzzilge contains both an account of the Latin East and an attempt to sketch the effects of the Crusades on the progress of civilization. The works of Gmelin and J. Dela-ville-Leroulx on the Templars and Hospitallers respectively are worth consulting; while for Eastern affairs the English reader may be referred to G. Lestrange's Palestine under the Moslem, and to Stanley Lane-Poole's Life of Saladin and his Mahommedan Dynasties (the latter a valuable work of reference). (E. Br.)

CRUSENSTOLPE, MAGNUS JAKOB (1795-1865), Swedish historian, early became famous both as a political and a historical writer. His first important work was a History of the Early Years of the Life of King Gustavus IV. Adolphus, which was followed by a series of monographs and by some politico-historical novels, of which The House of Holstein-Gottorp in Sweden is considered the best. He obtained a great influence over King Charles XIV. (Bernadotte), who during the years 1830- 1833 gave him his fullest confidence, and sanctioned the official character of Crusenstolpe's newspaper Fdderneslandet. In the lastrmentioned year, however, the historian suddenly became the king's bitterest enemy, and used his acrid pen on all occasions in attacking him. In 1838 he was condemned, for one of these angry utterances, to be imprisoned three years in the castle of Waxholm. He continued his literary labours until his death in 1865. Few Swedish writers have wielded so pure and so incisive a style as Crusenstolpe, but his historical work is vitiated by political and personal bias.

CRUSIUS, CHRISTIAN AUGUST (1715–1775), German philosopher and theologian, was born on the 16th of January 171 5 at Lenau near Merseburg in Saxony. He was educated at Leipzig, and became professor of theology there in 1750, and principal of the university in 1773. He died on the 18th of October 1775. Crusius first came into notice as an opponent of the philosophy of Leibnitz and Wolff from the standpoint of religious orthodoxy. He attacked it mainly on the score of the moral evils that must flow from any system of determinism, and exerted himself in particular to vindicate the freedom of the will. The most important works of this period of his life are Entwurf der nothwendigen V ernunftwahrheiten (1745), and Weg zur Gewissheit und Zuverlassigkeil der menschlichen Erkenntniss (1747). Though diffusely written, and neither brilliant nor profound, Crusius' philosophical books had a great but short- lived popularity. His criticism of Wolff, which is generally based on sound sense, had much influence upon Kant at the time when his system was forming; and his ethical doctrines are mentioned with respect in the Kritik of Practical Reason. Crusius's later life was devoted to theology. In this capacity his sincere piety and amiable character gained him great influence, and he led the party in the university which became known as the " Crusianer " as opposed to the " Ernestianer," the followers of J. A. Ernesti. The two professors adopted opposite methods of exegesis. Ernesti wished to subject the Scripture to the same laws of exposition as are applied to other ancient books; Crusius held firmly to orthodox ecclesiastical tradition. Crusius's chief theological works are Hypomnemala ad theologiam pro- pheticam (1764–17 78), and Kurzer Entwurf der Moraltheologie (1772–1773). He sets his face against innovation in such matters as the accepted authorship of canonical writings, verbal inspira- tion, and the treatment of persons and events in the Old Testament as types of the New. His views, unscholarly and uncritical as they seem to us now, have had influence on later evangelical students of the Old Testament, such as E. W. Hengstenberg and F. Delitzsch.

There is a full notice of Crusius in Ersch and Gruber's Allgemeine Encyclopddie. Consult also J. E. Erdmann's History of Philosophy ; A. Marquardt, Kant und Crusius; and art. in Herzog-Hauck, Realencyklopadie (1898). (H. St.)

CRUSTACEA, a very large division of the animal kingdom, comprising the familiar crabs, lobsters, crayfish, shrimps and prawns, the sandhoppers and woodlice, the strangely modified barnacles and the minute water-fleas. Besides these the group also includes a multitude of related forms which, from theii

aquatic habits and generally inconspicuous size, and from the fact that they are commonly neither edible nor noxious, are little known except to naturalists and are undistinguished by any popular names. Collectively, they are ranked as one of the classes forming the sub-phylum Arthropoda, and their distinguishing characters are discussed under that heading. It will be sufficient here to define them as Arthropoda for the most part of aquatic habits, having typically two pairs of antenniform appendages in front of the mouth and at least three pairs of post-oral limbs acting as jaws.

As a matter of fact, however, the range of structural variation within the group is so wide, and the modifications due to parasit- ism and other causes are so profound, that it is almost impossible to frame a definition which shall be applicable to all the members of the class. In certain parasites, for instance, the adults have lost every trace not only of Crustacean but even of Arthropodous structure, and the only clue to their zoological position is that afforded by the study of their development. In point of size also the Crustacea vary within very wide limits. Certain water- fleas (Cladocera) fall short of one-hundredth of an inch in total length; the giant Japanese crab

(Macrocheira) can span over 10 ft. between its outstretched claws.

The habits of the Crustacea are no less diversified than their structure. Most of them inhabit the sea, but representatives of all the chief groups are found in fresh water (though the Cirripedia have hardly gained a footing there), and this is the chief home of the primitive Phyllopoda. A terrestrial habitat is less common, but the widely-distributed land Isopoda or woodlice and the land-crabs of tropical regions have solved the problem of adaptation to a subaerial life.

Swimming is perhaps the commonest mode of locomotion, but numerous forms have taken to creeping or walking, and the robber-crab (Birgus latrd) of the Indo-Pacific islands even climbs palm-trees. None has the power of flight, though certain pelagic Copepoda are said to leap from the surface of the sea like flying-fish. Apart from the numerous parasitic forms, the only Crustacea which have adopted a strictly sedentary habit of life are the Cirripedia, and here, as elsewhere, profound modifications of structure have resulted, leading ultimately to a partial assumption of the radial type of symmetry which is so often associated with a sedentary life.

Many, perhaps the majority, of the Crustacea are omnivorous or carrion-feeders, but many are actively predatory in their habits, and are provided with more or less complex and efficient instru- ments for capturing their prey, and there are also many plant-eaters. Besides the sedentary Cirripedia, numbers of the smaller forms, especially among the Entomostraca, subsist on floating particles of organic matter swept within reach of the jaws by the movements of the other limbs.

Symbiotic association with other animals, in varying degrees of interdependence, is frequent. Sometimes the one partner affords the other merely a convenient means of transport, as in the case of the barnacles which grow on, or of the gulf-weed crab

which clings to, the carapace of marine turtles. From this we may pass through various grades of " commensalism," like that of the hermit-crab with its protective anemones, to the cases of actual parasitism. The parasitic habit is most common among the Copepoda and Isopoda, where it leads to complex modifications of structure and life-history. Perhaps the most complete degeneration is found in the Rhizocephala, which are parasitic on other Crustacea. In these the adult consists of a simple saccular body containing the reproductive organs and attached by root-like filaments which ramify throughout the body of the host and serve for the absorption of nourishment (fig. i).

Many of the larger species of Crustacea are used as food by man, the most valuable being the lobster, which is caught in large quantities on both sides of the North Altantic. Perhaps the most important of all Crustacea, however, with respect to the part which they play in the economy of nature, are the minute pelagic Copepoda, of which incalculable myriads form an important constituent of the " plankton " in all the seas of '

the globe. It is on the plankton that a great part of the higher animal life of the sea ultimately depends for food. The Copepoda live upon the diatoms and other important microscopic vegetable life at the surface of the sea, and in their turn serve as food for fishes and other larger forms and thus, indirectly, for man himself.

Historical Sketch. — In common with most branches of natural history, the science of Carcinology may be traced back to its beginnings in the writings of Aristotle. It received additions

Fig. i.

A, Group of Peltogaster socialis on the abdomen of a small hermit- crab ; in one of them the fasciculately ramified roots, r, in the liver of the crab are shown (Fritz Muller).

B, Young of SaccuMna purpurea with its roots. (Fritz Muller.)

of varying importance at the hands of medieval and later naturalists, and first began to assume systematic form under the influence of Linnaeus. The application of the morphological method to the Crustacea may perhaps be dated from the work of J. C. Fabricius towards the end of the 18th century.

In the first quarter of the 19th century important advances in classification were made by P. A. Latreille, W. E. Leach and others, and J. Vaughan Thompson demonstrated the existence of metamorphosis in the development of the higher Crustacea. A new epoch may be said to begin with H. Milne-Edwards' classical Histoire naturelle des crustacis (1834-1840). It is noteworthy that even at this late date the Cirripedia (Thyro- straca) were still excluded from the Crustacea, though Darwin's Monograph (1851-1854) was soon to make them known with a wealth of anatomical and systematic detail such as was available, at that time, for few other groups of Crustacea. About the same period three authors call for special mention, W. de Haan, J. D. Dana and H. Kroyer. The new impulse given to biological research by the publication of the Origin of Species bore fruit in Fritz Muller's Filr Darwin, in which an attempt was made to reconstruct the phylogenetic history of the class. The same line of work was followed in the long series of important memoirs from the pen of K. F. W. Claus, and noteworthy contributions were made, among many others, by A. Dohrn, Ray Lankester and Huxley. In more recent years the long and constantly increasing list of writers on Crustacea contains no name more honoured than that of the veteran G. O. Sars of Christiania. Morphology.

_ External Structure: Body. — As in all Arthropoda the body con- sists of a series of segments or somites which may be free or more or less coalesced together, fn its simplest form the exoskeleton of a typical somite is a ring of chitin defined from the rings in front and behind by areas of thinner

integument forming moveable joints, and having a pair of appendages articu- lated to its ventral surface on either side of the middle line. Frequently, however, this exoskeletal somite may be differ- entiated into various regions. A dorsal andaventral plate are often distinguished, known respectively as the tergum and the sternum, and the tergum may overhang the insertion of the limb on each side as a free plate called the pleuron. The name epimeron is sometimes applied to what is Somite of a Lobster, sep- here called the pleuron, but the word has arated and viewed from been used in widely different senses in front - f. tergum; s, and it seems better to abandon it. The sternum; pi, pleuron. typical form of a somite is well seen,

for example, in the segments which make up the abdomen or " tail " of a lobster or crayfish (fig. 2). The posterior terminal segment of the body, on which the opening of the anus is situated, never bears appendages. The nature of this segment, which is

Fig. 2. — Abdominal

known as the " anal segment " or telson (fig. 3, T), has been much discussed, some authorities holding that it is a true somite, homo- logous with those which precede it. . Others have regarded it as repre- senting the fusion of a number of sbmites, and others again as a " median appendage " or as a pair of appendages fused. Its morphological nature, however, is clearly shown by its development. In the larval development of the more primitive Crustacea, the number of somites, at first small, increases by the successive appear- ance of new somites between the last-formed somite and the terminal region which bears the anus. The " growing point " of the trunk is, in fact, situated in front of this region, and, when the full number of somites has been reached, the unsegmented part remaining forms the telson of

the adult.

In no Crustacean, however, do all the somites of the body remain distinct. Coalescence, or suppression of segmentation (" lipo- merism "), may involve more or less extensive regions. This is especially the case in the anterior part of the body, where, in corre- lation with the " adaptational shifting of the oral aperture " (see Arthropoda), a varying number of somites unite to form the " cephalon " or head. Apart from the possible existence of an ocular

F1G.3.-

-The Separated Somites and Lobster (Homarus

the

C, carapace covering phalothorax.

Ab, abdominal somites.

T, telson, having the uropods or appendages of the last ab- dominal somite spread out on either side of it, forming the " tail-fan."

I, labrum, or upper lip.

m, metastoma, or lower lip.

1 , eyes.

2, antennule (the arrow points

to the opening of the so- called auditory organ).

3, antenna.

4, mandible.'

5, maxillula (or first maxilla).

6,

7-9,

ex, ep,

Appendages of the Common

gammarus).

maxilla (second maxilla), first, second and third maxil- lipeds. exopodite. epipodite.

s. iU -

sixth thoracic limb (second walking-leg) of female.

last thoracic limb of male. In 10 and II the arrows indicate the genital aper- tures.

sterna of the thoracic somites, from within.

third abdominal somite, with appendages or " swim- merets."

somite corresponding to the eyes (the morphological nature of which is discussed below), the smallest number of head-somites so united in any Crustacean is five. Even where a large number of the somites have fused, there is generally a marked change in the character of the appendages after the fifth pair, and since the integumental fold which forms the carapace seems to originate from this point, it is usual to take the fifth somite as the morphological limit of the cephalon throughout the class. It is quite probable, however, that in the primitive ancestors of existing Crustacea a still smaller number of somites formed the head. The three pairs of appendages present in the " nauplius " larva show certain peculiarities of

structure and development which seem to place them in a different category from the other limbs, and there is some ground for regard- ing the three corresponding somites as constituting a " primary cephalon." For practical purposes, however, it is convenient to include the two following somites also as cephalic.

A remarkable feature found only in the Stomatopoda is the reappearance of segmentation in the anterior part of the cephalic region. Whether the movably

articulated segments which bear the

Fig. 4.— Diagram of an Amphipod. (After Spence Bate and Westwood.)

C, cephalon.

Th, thorax. (Only seven of the eight thoracic somites are visible, the first being fused with the cephalon.)

Ab, abdomen.

The numbers appended to the somites do not correspond to the enumeration adopted in the text. 21 is the telson.

eyestalks and the antennules in this aberrant group correspond to the primitive head somites or not, their distinctness is certainly a secondarily acquired character, for it is not found in the larvae, nor in any of the more primitive groups of Malacostraca.

The body proper is usually divisible into two regions to which the names thorax and abdomen are applied. Throughout the whole of the Malacostraca the thorax consists of eight and the abdomen of six somites (fig. 4), and the two regions are sharply distinguished by the character of their appendages. In the various groups of the Entomostraca, on the other hand, the terms thorax and abdomen, though conveniently employed for purposes of systematic description, do not imply any homology with the regions so named in the Malaco- straca. Sometimes they are applied, as in the Copepoda, to the limb-bearing and limbless regions of the trunk, while in other cases, as in the Phyllopoda, they denote, respectively, the regions in front of and behind the genital apertures.

A character which recurs in the most diverse groups of the Crus- tacea, and which is probably to be regarded as a primitive attribute

Fig. 5.— Phyllopoda and Phyllocarida.
Ceratiocarispapilio, U. Silurian, head showing the labrum and

mouth-parts.

larva of Apus cancrijormis.

Branchipus stagnalis: a, adult

female; b, first larval stage

(Nauplius) ; c, second larval

stage.

Nauplius of Artemia salina.

Lanark.

Nebalia bipes (one side of carapace removed).

Lepidurus Angassi: a, dorsal aspect; b, ventral aspect of

6,

of the class, is the possession of a carapace or shell, arising as a dorsal fold of the integument from the posterior margin of the head-region. In its most primitive form, as seen in the Apddidae (fig. 5, 3) and in Nebaha (fig. 5, 2), this shell-fold remains free from the trunk, which it envelops more or less completely. It may assume the form of a bivalve shell entirely enclosing the body and limbs, as in many

Phyllopoda (fig. 6) and in the Ostracoda. In the Cirripedia it forms a fleshy ” mantle ” strengthened by shelly plates or valves which may assume a very complex structure. In many, cases, however, the shell-fold coalesces with some of the succeeding somites. In the Decapoda (fig. 3), this coalescence

affects only the dorsal region of the thoracic somites, and the lateral portions of the carapace overhang on each side, enclosing a pair of chambers within which lie the gills. The arrangement is similar in Schizopoda and Stomato-

From Morse's Zoology. Fig. 6. — Estkeria, sp.; D from Dubuque, Iowa; (e) the eye. L from Lynn, Massachusetts (nat. size). 5 presents a highly magnified section of one of the valves to show the successive moults. B an enlarged portion of the edge of the shell along the back, showing the overlap of each growth.

poda (fig. 7), except that the coalescence does not usually involve the posterior thoracic somites, several of which remain free, though they may be overlapped by the carapace.

In the Isopoda and Amphipoda, where, as a rule, all the thoracic somites except the first are distinct (fig. 4), there seems at first sight to be no shell-fold. A comparison with the related Tanaidacea (fig. 8) and Cumacea (or Sympoda), however, leads to the conclusion that the coalescence of the first thoracic somite with the cephalon really involves a vestigial shell-fold, and, indeed, traces of this are said to be observed in the embryonic development of some Isopoda. It seems likely that a similar explanation is to be applied to the coalescence of one or two trunk-somites with the head in the Cope-poda, and, if this be so, the only Crustacea remaining in which no trace of a shell-fold is found in the adult are the Anostracous Phyllo- poda such as Branchipus (fig. 5, 5).

General Morphology of Appendages. — Amid the great variety of forms assumed by the appendages of the Crustacea, it is possible to trace, more or less plainly, the modifications of a fundamental type consisting of a peduncle, the protopodite, bearing two branches, the endopodite and exopodite. This simple biramous form is shown

in the swimming-feet of the Copepoda and Branchiura,

the ” cirri ” of the Cirripedia, and the abdominal appen- dages of the Malacostraca (fig. 3, 14). It is also found in the earliest and most primitive form of larva, known as the Nauplius. As a rule the pro- topodite is composed of two segments, though one may be reduced or sup- pressed and occasionally three may be present. In many cases, one of the branches, generally the endopodite, is more strongly developed than the other. Thus, in the thoracic limbs of the Malacostraca, the endopodite generally forms a walking-leg while the exopodite becomes a swimming-branch or may disappear altogether. Very often the basal segment of the protopodite bears, on the outer side, a lamellar appendage (more rarely, two) , the epipodite, which may function as a gill. In the appendages near the mouth one or both of the protopodal segments may bear inwardly-turned processes, assisting in mastication and known as gnathobases. The frequent occurrence of epipodites and gnatho-

p IG » Squilla mantis bases tends to show that the primitive

(Stomatopoda), showing the type of appendage was more complex last four thoracic (leg-bear- than the simple biramous limb, and ing) somites free from the some authorities have regarded the carapace. leaf-like appendages of the rhyllo-

‘ poda as nearer the original form from

which the various modifications found in other groups have been derived. In a Phyllopod such as Apus the limbs of the trunk consist of a flattened, unsegmented or obscurely segmented axis or corm having a series of lobes or processes known as endites and exites on its inner and outer margins respectively. In all the Phyllopoda the number of endites is six, and the proximal one is

more or less distinctly specialized as a gnathobase, working against its fellow of the opposite side in seizing food and transferring it to the mouth. The Phyllopoda are the only Crustacea in which distinct

and functional gnathobasic processes are found on appendages far removed from the mouth. The two distal endites are regarded as corresponding to the endopodite and exopodite of the higher Crus- tacea, the axis or corm of the Phyllopod limb representing the protopodite. The number of exites is less constant, but, in Apus, two are present, the proximal branchial in function and the distal forming a stiffer plate which probably aids in swimming. It is not altogether easy to recognize the homologies of the endites and exites even within the order Phyllopoda, and the identification of the two distal endites as corresponding to the endopodite and exopodite of higher Crustacea is not free from difficulty. It is highly probable, however, that the biramous limb is a simplification of a more com- plex primitive type, to which the Phyllopod limb is a more or less close approximation.

The modifications which this original type undergoes are usually more or less plainly correlated with the functions which the append- ages have to discharge. Thus, when acting as swimming organs, the appendages, or their rami, are more or less flattened, or oar-like, and often have the margins fringed with long plumose hairs. When used for walking, one of the rami, usually the inner, is stout and cylindrical, terminating in a claw, and having the segments united by definite hinge-joints. The jaws have the gnathobasic endites developed at the expense of the rest of the limb, the endopodite

Fig. 8. — Tanais dubius (?) Kr. 9 , showing the orifice of entrance (x) into the cavity overarched by the carapace in which an appen- dage of the maxilliped (/) plays. On four feet (i,k,l,m) are the rudiments of the lamellae which subsequently form the brood-cavity. (Fritz Miiller.)

and exopodite persisting only as sensory ” palps ” or disappearing altogether. When specialized as bearers of sensory (olfactory or tactile) organs, the rami are generally elongated, many-jointed and flagelliform. This modification is usually only found in the an- tennules and antennae, but it may

exceptionally be found in the appendages of the trunk, as, for instance, in the thoracic legs of some Decapods (e.g. Mastigocheirus). Very often one or other of the appendages may be modified for prehension, the seizing of prey or the holding of a mate. In this case, the claw-like terminal segment may be simply flexed against the preceding in the same way as the blade of a penknife shuts up against the handle. The penultimate segment is often broadened, so that the terminal claw shuts against a transverse edge (fig. 4), or, finally, the penultimate segment may be produced into a thumb-like process opposed to the movable terminal segment or finger, forming a perfect chela or forceps, as, for instance, in the large claws of a crab or lobster. This chelate condition may be assumed by almost any of the appen- dages, and sometimes it appears in different appen- dages in closely related forms, so that no very great phylogenetic import- ance can in most cases be attached to it. A peculiar modification is found in the trunk-limbs of the Cirri- pedia (fig. 9), in which both Fig. 9. — A, Balanus (young), side rami are multiarticulate view with cirri protruded. B, Upper and filiform and fringed surface of same; valves closed. C, with long bristles. When Highly magnified view of one of the protruded from the opening cirri. (Morse.) of the shell these " cirri "

are spread out to form a casting-net for the capture of minute floating prey.

Gills or branchiae may be developed by parts of an appendage becoming thin-walled and vascular and either expanded into a thin lamella or ramified. Some of the special modifications of branchiae are referred to below.

Special Morphology of Appendages. — In raany Crustacea the eyes are borne on stalks which are movably articulated with the head and which may be divided into two or three segments. The view is commonly held that these eye-stalks are really limbs, homologous with the other appendages. In spite of much discussion, however, it cannot be said

that this point has been finally settled. The evidence of embryology is decidedly against the view that the eye-stalks are limbs. They are absent in the earliest and most primitive

larval forms (nauplius), and appear only late in the course of develop- ment, after many of the trunk-limbs are fully formed. In the development of the Phyllopod Branchipus, the eyes are at first sessile, and the lateral lobes of the head on which they are set grow out and become movably articulated, forming the peduncles. The most important evidence in favour of their appendicular nature is afforded by the phenomena of regeneration. When the eye-stalk is removed from a living lobster or prawn, it is found that under certain conditions a many-jointed appendage like the flagellum of an antennule or antenna may grow in its place. It is open to question, however, how far the evidence from such " heteromorphic re- generation " can be regarded as conclusive on the points of homology. The fact that in certain rare cases among insects a leg may apparently be replaced by a wing tends to show that under exceptional conditions similar forms may be assumed by non-homologous parts.

The antennules (or first antennae) are almost universally regarded as true appendages, though they differ from all the other appendages in the fact that they are always innervated from the " brain " (or preoral ganglia), and that they are uniramous in the nauplius larva and in all the Entomostracan orders. As regards their innervation an apparent exception is found in the case of Apus, where the nerves to the antennules arise, behind the brain, from the oesophageal commissures, but this is, no doubt, a secondary condition, and the nerve-fibres have been traced forwards to centres within the brain. In the Malacostraca, the antennules are often biramous, but there is considerable doubt as to whether the two branches represent the endopodite

and exopodite of the other limbs, and three branches are found in the Stomatopoda and in some Caridea. In the great majority of Crustacea the antennules are purely sensory in function and carry numerous " olfactory " hairs. They may, however, be natatory as in many Ostracoda and Copepoda, or prehensile, as in some Copepoda. The most peculiar modification, perhaps, is that found in the Cirripedia (Thyrostraca) , in the larvae of which the antennules develop into organs of attachment, bearing the openings of the cement-glands, and becoming, in the adult, involved in the attachment of the animal to its support.

The antennae (second antennae) are of special interest on account of the clear evidence that, although preoral in position in all adult Crustacea, they were originally postoral appendages. In the nauplius larva they lie rather at the sides than in front of the mouth, and their basal portion carries a hook-like masticatory process which assists the similar processes of the mandibles in seizing food. In the primitive Phyllopoda, and less distinctly in some other orders, the nerves supplying the antennae arise, not from the brain, but from the circum-oesophageal commissures, and even in those cases where the nerves and the ganglia in which they are rooted have been moved forwards to the brain, the transverse commissure of the ganglia can still be traced, running behind the oesophagus.

The functions of the antennae are more varied than is the case with the antennules. In many Entomostraca (Phyllopoda, Clado- cera, Ostracoda, Copepoda) they are important, and sometimes the only, organs of locomotion. In some male Phyllopoda they form complex " claspers " for holding the female. They are frequently organs of attachment in parasitic Copepoda, and they may be completely pediform in the Ostracoda. In the Malacostraca they are chiefly sensory, the endopodite forming a long flagellum, while the exopodite may form a lamellar " scale," probably useful as a balancer in swimming, or may disappear altogether. A very curious function sometimes discharged by the antennules or antennae

of Decapods is that of forming a respiratory siphon in sand-burrowing species.

The mandibles, like the antennae, have, in the nauplius, the form of biramous swimming limbs, with a masticatory process originating from the proximal part of the protopodite. This form is retained, with little alteration in some adult Copepoda, where the biramous ” palp ” still aids in locomotion. A somewhat similar structure is found also in some Ostracoda. In most cases, however, the palp loses its exopodite and it often disappears altogether, while the coxal segment forms the body of the mandible, with a masticatory edge variously armed with teeth and spines. In a few Ostracoda, by a rare exception, the masticatory process is reduced or suppressed, and the palp alone remains, forming a pediform appendage used in locomotion as well as in the prehension of food. In parasitic blood- sucking forms the mandibles often have the shape of piercing stylets, and are enclosed in a tubular proboscis formed by the union of the upper lip (labrum) with the lower lip (hypostome or para T gnatha).

The maxillulae and maxillae (or, as they are often termed, first and second maxillae) are nearly always flattened leaf-like appendages, having gnathobasic lobes or endites borne by the segments of the protopodite. The endopodite, when present, is unsegmented or composed of few segments and forms the “palp,” and outwardly- directed lobes representing the exopodite and epipodites may also be present. These limbs undergo great modification in the different groups. The maxillulae are sometimes closely connected with the ‘ paragnatha ’’ or lobes of the lower lip, when these are present, and it has been suggested that the paragnatha are really the basal endites which have become partly separated from the rest of the appendage.

The limbs of the post-cephalic series show little differentiation

among themselves in many Entomostraca. In the Phyllopoda they are for the most part all alike,

though one or two of the anterior pairs may be specialized as sensory (Apus) or grasping (Estheriidae) organs. In the Cirripedia (Thyrostraca) the six pairs of biramous cirriform limbs differ only slightly from each other, and in many Copepoda this is also the case. In other Entomostraca considerable differentiation may take place, but the series is never divided into definite " tagmata " or groups of similarly modified appendages. It is highly characteristic of the Malacostraca, however, that the trunk-limbs are divided into two sharply defined tagmata corresponding to the thoracic and abdominal regions respectively, the limit between the two being marked by the position of the male genital openings. The thoracic limbs have the endopodites converted, as a rule, into more or less efficient walking-legs, and the exopodites are often lost, while the abdominal limbs more generally preserve the biramous form and are, in the more primitive types, natatory. These tagmata may again be subdivided into groups preserving a more or less marked individuality. For example, in the Amphipoda (fig. 4) the abdominal appendages are constantly divided into an anterior group of three natatory " swimmerets " and a posterior group of three limbs used chiefly in jumping or in burrowing. In nearly all Malacostraca the last pair of abdominal appendages (uropods) differ from the others, and in the more primitive groups they form, with the telson, a lamellar " tail-fan " (fig. 3, T), used in springing backwards through the water. In the thoracic series it is usual for one or more of the anterior pairs to be pressed into the service of the mouth, forming " foot-jaws " or maxillipeds. In the Decapoda three pairs are thus modified, and in the Tanaidacea, Isopoda and Amphipoda only one. In the Schizopoda and Cumacea the line of division is less sharp, and the varying number of so-called maxillipeds recognized by different authors gives rise to some confusion of terminology in systematic literature.

Gills. — In many of the smaller Entomostraca (Copepoda and most Ostracoda) no special gills are

present, and respiration is carried on by the general surface of the body and limbs. When present, the branchiae are generally differentiations of parts of the appendages, most often the epipodites, as in the Phyllopoda. In the Cirripedia, however, they are vascular processes from the inner surface of the mantle or shell-fold, and in some Ostracoda they are outgrowths from the sides of the body. In the primitive Malacostraca the gills were probably, as in the Phyllopoda and in Nebalia, the modified epipodites of the thoracic limbs, and this is the condition found in some Schizopoda. In the Cumacea and Tanaidacea only the first thoracic limb has a branchial epipodite. In the Amphipoda, the gills though arising from the inner side of the bases of the thoracic legs are probably also epipodial in nature. In the Isopoda the respiratory function has been taken over by the abdominal append- ages, both rami or only the inner becoming thin or flattened. In the Decapoda the branchial system is more complex. The gills are inserted at the base of the thoracic limbs, and lie within a pair of branchial chambers covered by the carapace. Three series are distinguished, podobranchiae, attached to the proximal segments of the appendages, pleurobranchiae, springing from the body-wall, and an intermediate series, arthrobranchiae, inserted on the articular membrane of the joint between the limb and the body. The podo- branchiae are clearly epipodites, or, more correctly, parts of the epipodites, and it is probable that the arthro- and pleuro-branchiae are also epipodial in origin and have migrated from the proximal segment of the limbs on to the adjacent body-wall.

Adaptations for aerial respiration are found in some of the land- crabs, where the lining membrane of the gill-chamber is beset with vascular papillae and acts as a lung. In some of the terrestrial Isopoda or woodlice (Oniscoidea) the abdominal appendages have ramified tubular invaginations of the integument, filled with air and resembling the tracheae of insects.

Internal Structure: Alimentary System. — In almost

all Crustacea the food-canal runs straight through the body, except at its anterior end, where it curves downwards to the ventrally-placed mouth. In a few cases its course is slightly sinuous or twisted, but the only cases in which it is actually coiled upon itself are found in the Cladocera of the family Lynceidae (Alonidae) and in a single recently-discovered genus of Cumacea (Sympoda). As in all Arthropoda, it is composed of three divisions, a fore-gut or stomodaeum, ecto- dermal in origin and lined by an inturning of the chitinous cuticle, a mid-gut formed by endoderm and without a cuticular lining, and a hind-gut or proctodaeum, which, like the fore-gut, is ecto- dermal and is lined by cuticle. The relative proportions of these three divisions vary considerably, and the extreme abbreviation of the mid-gut found in the common crayfish (Astacus) is by no means typical of the class. Even in the closely-related lobster (Homarus) the mid-gut may be 2 or 3 in. long.

In a few Entomostraca (some Phyllopoda and Ostracoda) the chitinous lining of the fore-gut develops spines and hairs which help to triturate and strain the food, and among the Ostracods there is occasionally (Bairdia) a more elaborate armature of toothed plates moved by muscles. It is among the Malacostraca, however, and especially in the Decapoda, that the " gastric mill " reaches its greatest perfection. In most Decapods the " stomach " or dilated portion of the fore-gut is divided into two chambers, a large anterior " cardiac " and a smaller posterior " pyloric." In the narrow

Fig. io. — Gastric Teeth of Crab and Lobster.

opening between these, three teeth (fig. io) are set, one dorsally and one on each side. These teeth are connected with a framework of movably articulated ossicles developed as thickened and calcified portions of the lining cuticle of the

stomach and moved by special muscles in such a way as to bring the three teeth together in the middle line. The walls of the pyloric chamber bear a series of pads and ridges beset with hairs and so disposed as to form a straining apparatus.

The mid-gut is essentially the digestive and absorptive region of the alimentary canal, and its surface is, in most cases, increased by pouch-like or tubular outgrowths which not only serve as glands for the secretion of the digestive juices, but may also become filled by the more fluid portion of the partially digested food and facilitate its absorption. These outgrowths vary much in their arrangement in the different groups. Most commonly there is a pair of lateral caeca, which may be more or less ramified and may form a massive " hepato-pancreas " or " liver."

The whole length of the alimentary canal is provided, as a rule, with muscular fibres, both circular and longitudinal, running in its walls, and, in addition, there may be muscle-bands running between the gut and the body-wall. In the region of the oesophagus these muscles are more strongly developed to perform the movements of deglutition, and, where a gastric mill is present, both intrinsic and

extrinsic muscles co-operate in producing the movements of its various parts. The hind-gut is also provided with sphincter and dilator muscles, and these may produce rhythmic expansion and contraction, causing an inflow and outflow of water through the anus, which has been supposed to aid in respiration.

In the parasitic Rhizocephala and in a few Copepoda [Monstril- lidae) the alimentary canal is absent or vestigial throughout life.

Circulatory System. — As in the other Arthropoda, the circulatory system in Crustacea is largely lacunar, the blood flowing in spaces or channels without definite walls. These spaces make up the

apparent body-cavity, the Stomach of common crab, true body-cavity or coelom having Cancer pagurus, laid open, been, for the most part, obliter- showing b, b, b, some of the ated by the great expansion pf calcareous plates inserted in the blood-containing spaces. The its muscular coat ; g, g, the heart is of the usual Arthro- lateral teeth, which when podous type, lying in a more or in use are brought in con- less well-defined pericardial blood- tact with the sides of the sinus, with which it communi- median tooth m ; c, c, the cates by valvular openings or muscular coat. ostia. In the details of the system,

and lb", The gastric teeth however, great differences exist enlarged to show their within the limits of the class, grinding surfaces. There is every reason to believe

2, Gastric teeth of common that, in the primitive Arthropoda, lobster, Homarus vulgaris, the heart was tubular in form, 3a and 36, Two crustacean teeth extending the whole length of the (of Dithyrocaris) from the body, and having a pair of ostia Carboniferous series of in each somite. This arrangement is retained in some of the Phyllo- poda, but even in that group a progressive abbreviation of the heart, with a diminution in the number of the ostia, can be traced, leading to the condition found in the closely related Cladocera, where the heart is a sub- globular sac, with only a single pair of ostia. In the Malacostraca, an elongated heart with numerous segmentally arranged ostia is found only in the aberrant group of Stomatopoda and in the transi- tional Phyllocarida. In the other Malacostraca the heart is generally abbreviated, and even where, as in the Amphipoda, it is elongated and tubular, the ostia are restricted in number, three pairs only being usually present. In many Entomostraca the heart is absent, and it is impossible to speak of a " circulation " in the proper sense of the term, the blood being merely driven hither and thither by the movements of the body and limbs and of the alimentary canal.

A very remarkable condition of the blood-system, unique, as far as is yet known among the Arthropoda, is found in a few genera of parasitic Copepoda (Lernanthropus, Mytilicola). In these there is a closed system of vessels, not communicating with the body-cavity, and containing a coloured fluid. There is no heart. The morpho- logical nature of this system is unknown.

Excretory System. — The most important excretory or renal organs of the Crustacea are two pairs of glands lying at the base of the antennae and of the second maxillae respectively. The two are probably never functional together in the same animal, though one may replace the other in the course of development. Thus, in the

Renfrewshire (these, how- ever, may be the toothed edges of the mandibles).

Phyllopoda, the antennal gland develops early and is functional during a great part of the larval life, but it ultimately atrophies, and in the adult (as in most Entomostraca) the maxillary gland is the functional excretory organ. In the Decapoda, where the an- tennal gland alone is well-developed in the adult, the maxillary gland sometimes precedes it in the larva. The structure of both glands is essentially the same. There is a more or less convoluted tube with glandular walls connected internally with a closed ” end- sac ” and opening to the exterior by means of a thin-walled duct. Development shows that the glandular tube is mesoblastic in origin and is of the nature of a coelomoduct, while the end-sac is to be regarded as a vestigial portion of the coelom. In the Branchiopoda the maxillary gland is lodged in the thickness of the shell-fold (when this is present), and, from this circumstance, it often receives the somewhat misleading name of ” shell-gland.” In the Decapoda the antennal gland is largely developed and is known as the ” green gland.” The external duct of this gland is often dilated into a bladder, and may

sometimes send out diverticula, forming a complex system of sinuses ramifying through the body. The green gland and the structures associated with it in Decapods were at one time regarded as constituting an auditory apparatus.

In addition to these two pairs of glands, which are in all probability the survivors of a series of segmentally arranged coelomoducts present in the primitive Arthropoda, other excretory organs have been _ described in various Crustacea. Although the excretory function of these has been demonstrated by physiological methods, however, their morphological relations are not clear. In some cases they consist of masses of mesodermal cells, within which the excretory products appear to be stored up instead of being expelled from the body.

Nervous System. — The central nervous system is constructed on the same general plan as in the other Arthropoda, consisting of a supra-oesophageal ganglionic mass or brain, united by circum-oesophageal connectives with a double ventral chain of segmentally arranged ganglia. In the primitive Phyllopoda the ventral chain retains the ladder-like arrangement found in some Annelids and lower worms, the two halves being widely separated and the pairs of ganglia connected together across the middle line by double trans- verse commissures. In the higher groups the two halves of the chain are more or less closely approximated and coalesced, and, in addition, a concentration of the ganglia in a longitudinal direction takes place, leading ultimately, in many cases, to the formation of an unsegmented ganglionic mass representing the whole of the ventral chain. This is seen, for example, in the Brachyura among the Decapoda. The brain, or supra-oesophageal ganglion, shows various degrees of complexity. In the Phyllopoda it consists mainly of two pairs of ganglionic centres, giving origin respectively to the optic and antennular nerves. The centres for the antennal nerves form gangli- onic swellings on the oesophageal connectives. In the higher forms, as already mentioned, the antennal ganglia have become shifted forwards and coalesced with the brain. In the higher Decapoda, numerous additional centres are developed in the brain and its structure becomes extremely complex.

Eyes. — The eyes of Crustacea are of two kinds, the unpaired, median or " nauplius " eye, and the paired compound eyes. The former is generally present in the earliest larval stages (nauplius), and in some Entomostraca (e.g. Copepoda) it forms the sole organ of vision in the adult. In the Malacostraca it is absent in the adult, or persists only in a vestigial condition, as in some Decapoda and Schizopoda. It is typically tripartite, consisting of three cup-shaped masses of pigment, the cavity of each cup being filled with columnar retinal cells. At their inner ends (towards the pigment) these cells contain rod-like structures, while their outer ends are

connected with the nerve-fibres. In some cases three separate nerves arise from the front of the brain, one going to each of the three divisions of the eye. In the Copepoda the median eye may undergo considerable elaboration, and refracting lenses and other accessory structures may be developed in connexion with it.

The compound eyes are very similar in the details of their structure (see Arthropoda) to those of insects (Hexapoda). They consist of a varying number of ommatidia or visual elements, covered by a transparent region of the external cuticle forming the cornea. In most cases this cornea is divided into lenticular facets correspond- ing to the underlying ommatidia.

As has been already stated, the compound eyes are often set on movable peduncles. It is probable that this is the primitive con- dition from which the sessile eyes of other forms have been derived. In the Malacostraca the sessile eyed groups are certainly less primitive than some of those with stalked eyes, and among the Entomostraca also there is some evidence pointing in the same direction.

Although typically paired, the compound eyes may occasionally coalesce in the middle line into a single organ. This is the case in the Cladocera, the Cumacea and a few Amphipoda.

Mention should also be made of the partial or complete atrophy of the eyes in many Crustacea which live in darkness, either in the deep sea or in subterranean habitats. In these cases the peduncles may persist and may even be modified into spinous organs of defence.

Other Sense-Organs. — As in Arthropoda, the hairs or setae on the surface of the body are important organs of sense and are variously modified for special sensory functions. Many, perhaps all, of them

are tactile. They are movably articulated at the base where they are inserted in pits formed by a thinning away of the cuticle, and each is supplied by a nerve-fibril. When feathered or provided with secondary barbs the setae will respond to movements or vibrations in the surrounding water, and have been supposed to have an auditory function. In certain divisions of the Malacostraca more specialized organs are found which have been regarded as auditory. In the majority of the Decapoda there is a saccular invagination of the integument in the basal segment of the an- tennular peduncle having on its inner surface ' auditory " setae of the type just described. The sac is open to the exterior in most of the Macrura, but completely closed in the Brachyura. In the former case it contains numerous grains of sand which are introduced by the animal itself after each moult and which are supposed to act as otoliths. Where the sac is completely closed it generally contains no solid particles, but in a few Macrura a single otolith secreted by the walls of the sac is present. In the Mysidae among the Schizopoda a pair of similar otocysts are found in the endopodites of the last pair of appendages (uropods). These contain each a single concretionary otolith.

Recent observations, however, make it very doubtful whether aquatic Crustacea can hear at all, in the proper sense of the term, and it has been shown that one function, at least, of the so-called otocysts is connected with the equilibration of the body. They are more properly termed statocysts.

Another modification of sensory setae is supposed to be associated with the sense of smell. In nearly all Crustacea the antennules and often also the antennae bear groups of hair-like filaments in which the chitinous cuticle is extremely delicate and which do not taper to a point but end bluntly. These are known as olfactory filaments or aesthetascs. They are very often more strongly developed in the male sex, and are supposed to guide the males in pursuit

of the females.

Glands. — In addition to the digestive and excretory glands already mentioned, various glandular structures occur in the different groups of Crustacea. The most important of these belong to the category of dermal glands, and may be scattered over the surface of the body and limbs, or grouped at certain points for the discharge of special functions. Such glands occurring on the upper and lower lips or on the walls of the oesophagus have been regarded as salivary. In some Amphipoda the secretion of glands on the body and limbs is used in the construction of tubular cases in which the animals live. In some freshwater Copepoda the secretion of the dermal glands forms a gelatinous envelope, by means of which the animals are able to survive desiccation. In certain Copepoda and Ostracoda glands of the same type produce a phosphorescent substance, and others, in certain Amphipoda and Branchiura, are believed to have a poisonous function. Possibly related to the same group of structures are the greatly-developed cement-glands of the Cirripedia, which serve to attach the animals to their support.

Phosphorescent Organs. — Many Crustacea belonging to very different groups (Ostracoda, Copepoda, Schizopoda, Decapoda) possess the power of emitting light. In the Ostracoda and Copepoda the phosphorescence, as already mentioned, is due to glands which produce a luminous secretion, and this is the case also in certain members of the Schizopoda and Decapoda. In other cases in the last two groups, however, the light-producing organs found on the body and limbs have a complex and remarkable structure, and were formerly described as accessory eyes. Each consists of a globular capsule pierced at one or two points for the entrance of nerves which end in a central cup-shaped " striated body." This body appears to be the source of light, and has behind it a reflector formed of concentric lamellae, while, in front, in some cases, there is a refracting lens. The whole organ can be rotated by special muscles. Organs of this type are best known

in the Euphausiidae among the Schizopoda, but a modified form is found in some of the lower Decapods.

Reproductive System. — In the great majority of Crustacea the sexes are saparate. Apart from certain doubtful and possibly abnormal instances among Phyllopoda and Amphipoda, the only exceptions are the sessile Cirripedia and some parasitic Isopoda {Cymothoidae) , where hermaphroditism is the rule. Parthenogenesis is prevalent in the Branchiopoda and Ostracoda, often in more or less definite seasonal alternation with sexual reproduction. Where the sexes are distinct, a more or less marked dimorphism often exists. The male is very often provided with clasping organs for seizing the female. These may be formed by the modification of almost any of the appendages, often the antennules or antennae or some of the thoracic limbs, or even the mandibular palps (some Ostracoda). In addition, some of the appendages in the neighbourhood of the genital apertures may be modified for the purpose of transferring the genital products to the female, as, for instance, the first and second abdominal limbs in the Decapoda. In the higher Decapoda the male is generally larger than the female and has stronger chelae. On the other hand, in other groups the male is often smaller than the female. In the parasitic Copepoda and Isopoda the disparity in size is carried to an extreme degree, and the minute male is attached, like a parasite, to the enormously larger female.

The Cirripedia present some examples of sexual relationships which are only paralleled, in the animal kingdom, among the para-

sitic Myzostomida. While the great majority are simple herma- phrodites, capable of cross and self fertilization, it was discovered by Darwin that, in certaih species, minute degraded males exist, attached within the mantle-cavity of the ordinary individuals. Since these dwarf males pair, not with females, but with herma- phrodites, Darwin termed them ” complemental ” males. In other species the

large individuals have become purely female by atrophy of the male organs, and are entirely dependent on the dwarf males for fertilization. In spite of the opinion of some distinguished zoologists to the contrary, it seems most probable that the separation of the sexes is in this case a secondary condition, derived from hermaphroditism through the intermediate stage represented by the species having complemental males.

The gonads, as in other Arthropoda, are hollow saccular organs, the cavity communicating with the efferent ducts. They are primitively paired, but often coalesce with each other more or less completely. The ducts are present only as a single pair, except in one genus of parasitic Isopoda (Hemioniscus) , where two pairs of oviducts are found. Various accessory structures may be connected with the efferent ducts in both sexes. The oviducts may have diverticula serving as receptacles for the spermatozoa (in cases where internal impregnation takes place), and may be provided with glands secreting envelopes or shells around the eggs. The male ducts often have glandular walls, secreting capsules or spermatophores within which the spermatozoa are packed for transference to the female. The terminal part of the male ducts may be protrusible and act as an intromittent organ, or this function may be discharged by some of the appendages, as, for instance, in the Brachyura.

The position of the genital apertures varies very greatly in the different groups of the class. They are farthest forward in the case of the female organs of the Cirripedia, where the openings are on the first thoracic (fourth postoral) somite. The most posterior

Fig. II. — Side view of Crab, the abdomen extended and carrying a mass of eggs beneath it ; e, eggs. (After Morse.)

position is occupied by the genital apertures of certain Phyllopoda (P olyartemia) , which lie behind the nineteenth trunk-somite. It is characteristic of

the Malacostraca that the position of the genital apertures is constantly different in the two sexes, the female openings being on the sixth, and those of the male on the eighth thoracic somite.

Very few Crustacea are viviparous in the sense that the eggs are retained within the body until hatching takes place (some Phyllo- poda), but, on the other hand, the great majority carry the eggs in some way or other after their extrusion. In some Phyllopoda (A pus) egg-sacs are formed by modification of certain of the thoracic feet. The eggs are retained between the valves of the shell in some Phyllo- poda and in the Cladocera and Ostracoda, and they lie in the mantle cavity in the Cirripedia. In the Copepoda they are agglutinated together into masses attached to the body of the female. Among the Malacostraca some Schizopoda, the Cumacea, Tanaidacea, Isopoda and Amphipoda (sometimes grouped all together as Peracarida) have a marsupium or brood-pouch formed by overlapping plates attached to the bases of some of the thoracic legs. In most of the Decapoda the eggs are carried by the female, attached to the ab- dominal appendages (fig. n). A few cases are known in which the developing embryos are nourished by a special secretion while in the brood-chamber of the mother (Cladocera, terrestrial Isopoda).

Embryology.

The majority of the Crustacea are hatched from the egg in a form differing more or less from that of the adult, and pass through a series of free- swimming larval stages. There are many cases, however, in which the metamorphosis is suppressed, and the newly- hatched young resemble the parent in general structure. The relative size of the eggs and the amount of nutritive yolk which they contain are generally much greater in those forms which have a direct development.

The details of the early embryonic stages vary considerably within the limits of the class. They are of interest, however, rather from the point of view of general embryology than from that of

the special student of the Crustacea, and cannot be fully dealt with here.

Segmentation is usually of the superficial or centrolecithal type. The hypoblast is formed either by a definite invagination or by the immigration of isolated cells, known as vitellophags, which wander through the yolk and later become associated into a definite mesen- teron, or by some combination of these two methods. The blastopore generally occupies a position corresponding to the posterior end of the body. The mesoblast of the cephalic (naupliar) region probably arises in connexion with the lips of the blastopore and consists of loosely-connected cells or mesenchyme. In the region of the trunk, in many cases, paired mesoblastic bands are formed, growing in length by the division of teloblastic cells at the posterior end, and becoming segmented into somites. The existence of true coelom- sacs is somewhat doubtful. The rudiments of the first three pairs of appendages commonly appear simultaneously, and, even in forms with embryonic development, they show differences in their mode of appearance from the succeeding somites. Further, a definite cuticular membrane is frequently formed and shed at this stage, which corresponds to the nauplius-stage of larval development.

The larval metamorphoses of the Crustacea have attracted much attention, and have been the subject of much discussion in view of their bearing on the phylogenetic history of the group. In those Crustacea in which the series of larval stages is most complete, the starting-point is the form already mentioned under the name of nauplius. The typical nauplius (fig. 12) has an oval .unsegmented body and three pairs of limbs corresponding to the antennules, antennae and mandibles of the adult. The antennules are uniramous, the others biramous, and all three pairs are used in swimming.

Fig. 12. — Nauplius of a Prawn (Penaeus). (Fritz Miiller).

The antennae have a spiniform or hooked masticatory process at the base, and share with the mandibles, which have a similar process, the function of seizing and masticating the food. The mouth is over-hung by a, large labrum or upper lip, and the integument of the dorsal surface of the body forms a more or less definite dorsal shield. The paired eyes are, as yet, wanting, but the unpaired eye is large and conspicuous. A pair of frontal papillae or filaments, probably sensory, are commonly present.

A nauplius larva differing only in details from the typical form just described is found in the majority of the Phyllopoda, Copepoda and Cirripedia, and in a more modified form, in some Ostracoda. Among the Malacostraca the nauplius is less commonly found, but it occurs in the Euphausiidae among the Schizopoda and in a few of the more primitive Decapoda (Penaeidea) (fig. 12). In most of the Crustacea which hatch at a later stage there is, as already mentioned, more or less clear evidence of an embryonic nauplius stage. It seems certain, therefore, that the possession of a nauplius larva must be regarded as a very primitive character of the Crus- tacean stock.

As development proceeds, the body of the nauplius elongates, and indications of segmentation begin to appear in its posterior part. At successive moults the somites increase in number, new, somites being added behind those already differentiated, from a formative zone in front of the telsonic region. Very commonly the posterior end of the body becomes forked, two processes growing out at the sides of the anus and often persisting in the adult as the " caudal furca." The appendages posterior to the mandibles appear as buds on the ventral surface of the somites, and in the most primitive cases they become differentiated, like the somites which bear them, in regular order from before backwards. The limb-buds early become bilobed and grow out into typical biramous appendages which gradually assume

the characters found in the adult. With the elongation of the body, the dorsal shield begins to project posteriorly as a shell-fold, which may increase in size to envelop

more or less of the body or may disappear altogether. The rudiments of the paired eyes appear under the integument at the sides of the head, but only become pedunculated at a comparatively late stage.

The course of development here outlined, in which the nauplius gradually passes into the adult form by the successive addition of somites and appendages in regular order, agrees so well with the process observed in the development of the typical Annelida that we must regard it as being the most primitive method. It is most closely followed by the Phyllopods such as Apus or Branchipus, and by some Copepoda.

In most Crustacea, however, this primitive scheme is more or less modified. The earlier stages may be suppressed or passed through

Fig.

A, Nauplius. e, Eye. C,

B, Cypris-larva with a bivalve

shell and just before becom- D, ing attached (represented feet upwards for comparison E, with E, where it isattached).

Early Stages of Balanus. (After Spence Bate.)

After becoming attached, side

views. Later stage, viewed from

above. Side view, later stage and

with cirri extended. The dots indicate the actual size.

within the egg (or within the maternal brood-chamber), so that the larva, on hatching, has reached a stage more advanced than the nauplius. Further, the gradual appearance and differentiation of the successive somites and appendages may be accelerated, so that comparatively great advances take place at a single moult. In the Cirripedia, for example, the latest nauplius stage (fig. 13, A) gives rise directly to the so-called CyprisAarva (fig. 13, B), differing widely from the nauplius in form, and possessing all the appendages of the adult. Another very common modification of the primitive method of development is found in the accelerated appearance of certain somites or appendages, disturbing the regular order of development. This modification is especially found in the Malacostraca. Even in those which have most fully retained the primi- tive order of develop- ment, as in the Penae- idea and Euphausiidae, the last pair of abdom- inal appendages make their appearance in advance of those im- mediately in front of them. The same pro- cess, carried further, leads to the very peculiar larva known as the Zoea, in the typical form of which, found in the Brachyura (fig. 14), the posterior five or six thoracic somites have their development greatly retarded, and are still represented by short unsegmented

Fig. 14. — Zoea of Common Shore-Crab in its second stage. (Spence Bate.)

Rostral spine. Dorsal spine.

Buds of

feet.

a, Abdomen.

thoracic

region of the body at a time when the abdom- "■ T,'",;-'"a"" inal somites are fully ». Maxilhpeds. formed and even carry*

appendages. The Zoea was formerly regarded as a

recapitulation of an ancestral form, but there can be no doubt that its peculi- arities are the result of secondary modification. It is most typically developed in the most specialized Decapoda, the Brachyura, while the more primitive groups of Malacostraca, the Euphausiidae, Penaeidea and Stomatopoda, retain the primitive order of appearance

of the somites, and, for the most part, of the limbs. At the same time, the tendency to a retardation in the development of the posterior thoracic somites is very general in Malacostracan larvae, and may perhaps be correlated with the fact that in the primitive Phyllocarida the whole thoracic region is very short and the limbs closely crowded together.

Besides the nauplius and the zoea there are many other types of Crustacean larvae, distinguished by special names, though, as their

occurrence is restricted within the limits of the smaller systematic groups, they are of less general interest. We need only mention the Mysis-stage (better termed Schizopod- stage) found in many JVlacrura (as, for example, the lobster), which differs from the adult in having large natatory exopodites on the thoracic legs.

Most of the larval forms

swim freely at the surface

of the sea, and many show

special adaptations to this

habit of life. As in many

other ” pelagic ” organisms,

spines and processes from

the surface of the body are

often developed, which are

probably less important as

„ _ T ,. , _ ,. defensive organs than as

Fig. 15— Nauplius of Tetrachta aids to flotation. This is

porosa after the first moult. well seen in the naup li us f

(Fritz Muller.) many Cirripedia (fig. 15) and

in nearly all zoeae. Perhaps the most striking example is the zoea-like larva of the Sergestidae, known as Elaphocaris , which has an extraordinary armature of ramified spines. The same purpose is probably served by the extreme flattening of the body in the membranous Phyllosoma-larva. of the rock-lobsters and their allies (Loricata).

Past History.

Although fossil remains of Crustacea are abundant, from the most ancient fossiliferous rocks down to the most recent, their study has hitherto contributed little to a precise knowledge of the phylogenetic history of the class. This is partly due to the fact that many important forms must have escaped fossilization altogether owing to their small size and delicate structure, while very many of those actually preserved are known only from the carapace or shell, the limbs being absent or represented only by indecipherable fragments. Further, many important groups were already differentiated when the geological record began. The Phyllopoda, Ostracoda and Cirripedia (Thyrostraca) are represented in Cambrian or Silurian rocks by forms which seem to have resembled closely those now existing, so that palaeon- tology can have little light to throw on the mode of origin of these

groups. With the Malacostraca the case is little better. There is considerable reason for believing that the Ceratiocaridae, which are found from the Cambrian onwards, were allied to the existing Nebalia, and may possibly include the forerunners of the true Malacostraca, but nothing is definitely known of their appendages. In Palaeozoic formations, from the Upper Devonian onwards, numbers of shrimp-like forms are found which have been referred to the Schizopoda and the Decapoda, but here again the scanty information which may _ be gleaned as to the structure of the limbs rarely permits of definite conclusions as to their affinities. The recent discovery in the Tasmanian ” schizopod ” Anaspides, of what is believed to be a living representative of the Carboni- ferous and Permian Syncarida, has, however, afforded a clue to the affinities of some of these problematical forms.

True Decapods are first met with in Mesozoic rocks, the first to appear being the Penaeidea, a primitive group comprising the Penaeidae and Sergestidae, which occur in the Jurassic and perhaps in the Trias. Some of the earliest are referred to the existing genus Penaeus. The Stenopidea, another primitive group, differing from the Penaeidea in the character of the gills, appear in the Trias and Jurassic. The Caridea or true prawns and shrimps appear later, in the Upper Jurassic, some of them presenting primitive characteristics in the retention of swimming

exopodites on the walking-legs. The Eryonidea (fig. 16, 3), a group related to the Loricata but of a more generalized type, are specially interesting since the few existing deep-sea forms appear to be only surviving remnants of what was, in the Mesozoic period, a dominant group. The Mesozoic Clyphaeidae have been supposed to stand in the direct line of descent of the modern rock-lobsters and their allies (Loricata). Some of the Loricata have persisted with little change from the Cretaceous period to the present day.

The Anomura are hardly known as fossils. The

Brachyura, on the other hand, are well represented (fig 16, 1, a). The earliest forms, from the Lower Oolite and later, belonging chiefly to the extinct family Prosoponidae, have been shown to have close relations with the most generalized of existing Brachyura, the deep-sea Homolodromiidae, and to link the Brachyura to the Homarine (lobster-like) Macrura.

A few Isopoda are known from Secondary rocks, but their systematic position is doubtful and they throw no light on the evolution of the group. The Amphipoda are not definitely known to occur till Tertiary times. Stomatopoda of a very modern-looking type, and even their larvae, occur in Jurassic rocks.

In the dearth of trustworthy evidence as to the actual fore- runners of existing Crustacea, we are compelled to rely wholly

Fig. Dromilites Lamarckii, Desm. ;

London Clay, Sheppey. Palaeocorystes Stokesii, Gault ;

Folkestone. Eryon arctiformis, Schl. ;

Lithographic stone, Solen-

hofen.

16.

Mecocheirus longimanus, Schl. ; Lithographic stone, Solen- hofen.

Cypridea tuberculata, Sby. ; (Ostracoda) ; Weald, Sussex.

Loricula pulchella, Sby (Cirri- pedia) ; L. Chalk, Sussex.

on the data afforded by comparative anatomy and embryology in attempting to reconstruct the probable phylogeny of the class. It is unnecessary to insist

on the purely speculative character of the conclusions to be reached in this way, so long as they cannot be checked by the results of palaeontology, but, when this is recognized, such speculation is not only legitimate but necessary as a basis on which to build a natural classification.

The first attempts to reconstruct the genealogical history of the Crustacea started from the assumption that the " theory of recapitulation " could be applied to their larval history. The various larval forms, especially the nauplius and zoea, were supposed to reproduce, more or less closely, the actual structure of ancestral types. So far as the zoea was concerned, this assumption was soon shown to be erroneous, and the secondary nature of this type of larva is now generally admitted.. As regards the nauplius, however, the constancy of its general character in the most widely diverse groups of Crustacea strongly suggests that it is a very ancient type, and the view has been advocated that the Crustacea must have arisen from an unseg- mented nauplius-like ancestor.

The objections to this view, however, are considerable. The resemblances between the Crustacea and the Annelid worms, in such characters as the structure of the nervous system and the mode of growth of the somites, can hardly be ignored. Several structures which must be attributed, to the common

stock of the Crustacea, such as the paired eyes and the shell-fold, are not present in the nauplius. The opinion now most generally held is that the primitive Crustacean type is most nearly ap- proached by certain Phyllopods such as A pus. The large number and the uniformity of the trunk somites and their appendages, and the structure of the nervous system and of the heart in A pus, are Annelidan characters which can hardly be without

significance. It is probable also, as already mentioned, that the leaf like appendages of the Phyllopoda are of a primitive type, and attempts have been made to refer their structure to that of the Annelid parapodium. In many respects, however, the Phyllopoda, and especially A pus, have diverged considerably from the primitive Crustacean type. All the cephalic appendages are much reduced, the mandibles have no palps, and the maxil lulae are vestigial. In these respects some of the Copepoda have retained characters which we must regard as much more primitive. In those Copepods in which the palps of the mandibles as well as the antennae are biramous and natatory, the first three pairs of appendages retain throughout life, with little modification, the shape and function which they have in the nauplius stage, and must, in all likelihood, be regarded as approximating to those of the primitive Crustacea. In other respects, however, such as the absence of paired eyes and of a shell-fold, as well as in the characters of the post-oral limbs, the Copepoda are undoubtedly specialized.

In order to reconstruct the hypothetical ancestral Crustacean, therefore, it is necessary to combine the characters of several of the existing groups. It may be supposed to have approxi- mated, in general form, to Apus, with an elongated body com- posed of numerous similar somites and terminating in a caudal furca; with the post-oral appendages all similar and all bearing gnathobasic processes; and with a carapace originating as a shell-fold from the maxillary somite. The eyes were probably stalked, the antennae and mandibles biramous and natatory, and botn armed with masticatory processes. It is likely that the trunk-limbs were also biramous, with additional endites and exites. Whether any of the obscure fossils generally referred to the Phyllopoda or Phyllocarida may have approximated to this hypothetical form it is impossible to say. It is to be noted, however, that the Trilobita, which, according to the classification here adopted, are dealt with under Arachnida, are not very far removed, except in such characters as the absence of

a shell- fold and of eye-stalks, from the primitive Crustacean here sketched.

On this view, the nauplius, while no longer regarded as reproducing an ancestral type, does not altogether lose its phylogenetic significance. It is an ancestral larval form, corre- sponding perhaps to the stages immediately succeeding the trochophore in the development of Annelids, but with some of the later-acquired Crustacean characters superposed upon it. While little importance is to be given to such characters as the unsegmented body, the small number of limbs and the absence of a shell-fold and of paired eyes, it has, on the other hand, preserved archaic features in the form of the limbs and the masticatory function of the antenna.

The probable course of evolution of the different groups of Crustacea from this hypothetical ancestral form can only be touched on here. The Phyllopoda must have branched off very early and from them to the Cladocera the way is clear. The Ostracoda might have been derived from the same stock were it not that they retain the mandibular palp which all the Phyllo- pods have lost. The Copepoda must have separated themselves very early, though perhaps some of their characters may be persistently larval rather than phylogenetically primitive. The Cirripedia are so specialized both as larvae and as adults that it is hard to say in what direction their origin is to be sought.

For the Malacostraca, it is generally admitted that the Lepto- straca (Nebalia, &c.) provide a connecting-link with the base of the Phyllopod stem. Nearest to them come the Schizopoda, a primitive group from which two lines of descent can be traced, the one leading from the Mysidacea (Mysidae + Lophogastridae)

to the Cumacea and the sessile-eyed groups Isopoda and Amphi- poda, the other from the Euphausiacea (Euphausiidae) to the Decapoda

Classification.

The modern classification of Crustacea may be said to have been founded by P. A. Latreille, who, in the beginning of the 19th century, divided the class into Entomostraca and Malaco- straca. The latter division, characterized by the possession of 19 somites and pairs of appendages (apart from the eyes), by the division of the appendages into two tagmata corresponding to cephalothorax and abdomen, and by the constancy in position of the generative apertures, differing in the two sexes, is unques- tionably a natural group. The Entomostraca, however, are certainly a heterogeneous assemblage, defined only by negative characters, and the name is retained only for the sake of con- venience, just as it is often useful to speak of a still more hetero- geneous and unnatural assemblage of animals as Invertebrata. The barnacles and their allies, forming the group Cirripedia or Thyrostraca, sometimes treated as a separate sub-class, are distinguished by being sessile in the adult state, the larval antennules serving as organs of attachment, and the antennae being lost. An account of them will be found in the article Thyrostraca. The remaining groups are dealt with under the headings Entomostraca and Malacostraca, the annectent group Leptostraca being included in the former.

It may be useful to give here a synopsis of the classification adopted in this encyclopaedia, noting that, for convenience of treatment, it has been thought .necessary to adopt a grouping rot always expressive of the most recent views of affinity. Class Crustacea.

Sub-class Entomostraca. Order Branchiopoda.

Sub-orders Phyllopoda. Cladocera, Branchiura. Orders Ostracoda. Copepoda. Sub-classes Thyrostraca (Cirripedia). Leptostraca. Malacostraca. Order Decapoda.

Sub-orders Brachyura. Macrura. Orders Schizopoda (including Anaspides). Stomatopoda. Sympoda (Cumacea). Isopoda (including Tanaidacea).

Amphipoda. (W. T. Ca.)

CRUSTUMERIUM, an ancient town of Latium, on the edge of the Sabine territory, near the headwaters of the Allia, not far from the Tiber. It appears several times in the early history of Rome, but was conquered in 500 B.C. according to Livy ii. 19, the tribus Crustumina [or Clustumina] being formed in 471 B.C. Pliny mentions it among the lost cities of Latium, but the name clung to the district, the fertility of which remained famous. No remains of it exist, and its exact site is uncertain.

See T. Ashby in Papers of the British School at Rome, iii. 50. CRUVEILHIER, JEAN (1791–1874), French anatomist, was born at Limoges in 1791, and was educated at the university of Paris, where in 1825 he became professor of anatomy. In 1836 he became the first occupant of the recently founded chair of pathological anatomy. He died at Jussac in 1874. His chief works are Anatomie descriptive (1834–1836); Anatomie patho- logique du corps humain (1829–1842), with many coloured plates; Traite d'anatomie pathologique generate (1849–1864); Anatomie du systeme nerveux de I'homme (1845); Traite d'anatomie descriptive (1851).

CRUZ E SILVA, ANTONIO DINIZ DA (1731–1799), Portuguese heroic-comic poet, was the son of a Lisbon carpenter who emigrated to Brazil shortly before the poet's birth, leaving his wife to support and educate her young family by the earnings of her needle. Diniz studied Latin and philosophy with the Oratorians, and in 1747 matriculated at Coimbra University, where he wrote his first verses about 1750. In 1753 he took his degree in law, and returning to the capital, devoted much of the

next six years to literary work. In 1756 he became one of the founders and drew up the statutes of the Arcadia Lusitana, a literary society whose aims were

the instruction of its members, the cultivation of the art of poetry, and the restoration of good taste. The fault was not his if these ends were not attained, for, taking contemporary French authors as his models, he contributed much, both in prose and verse, to its proceedings, until he left in February 1760 to take up the position oijuiz de fora at Castello de Vide. On returning to Lisbon for a short visit, he found the Arcadia a prey to the internal dissensions that caused its dissolution in 1774, but succeeded in composing them, and in 1764 he went to Elvas to act as auditor of one of the regiments stationed there. During a ten years' residence, his wide reading and witty conversation gained him the friendship of the governor of that fortress and the admiration of a circle comprising all that was cultivated in Elvas. As in most cathedral and garrison towns, the clerical and military elements dominated society, and here were mutually antagonistic, because of the enmity between their respective leaders, the bishop and the governor. Moreover, Elvas, being a remote provincial centre, abounded in curious and grotesque types. Diniz, who was a keen observer, noted these, and, treasuring them in his memory, reproduced them, with their vanities, intrigues and ignorance, in his masterpiece, Hyssope. In 1768 a quarrel arose between the bishop, a proud, pretentious prelate, and the dean, as to the right of the former to receive holy water from the latter at a private side door of the cathedral, instead of at the principal entrance. The matter being one of principle, neither party would yield what he considered his rights, and it led to a lawsuit, and divided the town into two sections, which eagerly debated the arguments on both sides and enjoyed the ridiculous incidents which accompanied the dispute. Ultimately the dean died, and was succeeded by his nephew, who appealed to the crown with success and the bishop lost his pretension. The Hyssope arose out of and deals with this affair. It was dictated in seventeen days, in the years 1770-1772, and, in its final redaction, consists of eight cantos of blank verse. The pressure of absolut- ism left open only one form of

expression, satire, and in this poem Diniz produced an original work which ridicules the clergy and the prevailing Gallomania, and contains episodes full of humour. It has been compared with Boileau's Lutrin, because both are founded on a petty ecclesiastical quarrel, but here the resemblance ends, and the poem of Diniz is the superior in everything except metrification.

Returning to Lisbon in 1774, Diniz endeavoured once more to resuscitate the Arcadia, but his long absence had withdrawn its chief support, its most talented members Garcao (q.v.) and Quita were no more, and he only assisted at its demise. In April 1776 he was appointed disembargador of the court of Relagao in Rio de Janeiro and given the habit of Aviz. He lived in Brazil, devoting his leisure to a study of its natural history and mineralogy, until 1789, when he went back to Lisbon to take up the post of disembargador of the Relacao of Oporto; in July 1790 he was promoted, and became disembargador of the Casa da Supplicagao. In this year he was sent again to Brazil to assist in trying the leaders of the Republican conspiracy in Minas, in which Gonzaga (q.v.) and other men of letters were involved, and in December 1792 he became chancellor of the Relac ao in Rio. Six years later he was named councillor of the , Conselho Ultramarino, but did not live to return home, dying in Rio on the 5th of October 1799.

Diniz possessed a poetic temperament, but his love of imitating the classics, whose spirit he failed to understand, fettered his muse, and he seems never to have perceived that mythological comparisons and pastoral allegories were poor substitutes for the expression of natural feeling. The conventionalism of his art prejudiced its sincerity, and, inwardly cherishing the belief that poetry was unworthy of the dignity of a judge, he never gave his real talents a chance to display themselves. His Anacreontic odes, dithyrambs and idylls earned the admiration of contem- poraries, but his Pindaric odes lack fire, his sonnets are weak, and his idylls have neither the truth nor the simplicity of Quita's

work. As a rule Diniz's versification is weak and his verses lack harmony, though the diction is beyond cavil.

His poems were published in 6 vols. (Lisbon, 1807–1817). The best edition of Hyssope, to which Diniz owes his lasting fame, is that of J. R. Coelho (Lisbon, 1879), with an exhaustive introductory study on his life and writings. A French prose version of the poem by Boissonade has gone through two editions (Paris, 1828 and 1867), and English translations of selections have been printed in the Foreign Quarterly Review, and in the Manchester Quarterly (April

1896).

See also Dr Theophilo Braga, A. Arcadia Lusitana (Oporto, 1899).

(E. Pr.)

CRYOLITE, a mineral discovered in Greenland by the Danes in 1794, and found to be a compound of fluorine, sodium and aluminium. From its general appearance, and from the fact that it melts readily, even in a candle-flame, it was regarded by the Eskimos as a peculiar kind of ice; from this fact it acquired the name of cryolite (from Gr. /cptor, frost, and \Wos , stone) , Cryolite occurs in colourless or snow-white cleavable masses, often tinted brown or red with iron oxide, and occasionally passing into a black variety. It is usually translucent, becoming nearly transparent on immersion in water. The mineral cleaves in three rectangular directions, and the crystals occasionally found in the crevices have a cubic habit, but it has been proved, after much discussion, that they belong to the anorthic system. The hardness is 2–5, and the specific gravity 3. Cryolite has the formula NasAlFe, or 3NaF–AlF 3 , corresponding to fluorine 54–4, sodium 32–8, and aluminium 12–8%. It colours a flame yellow, through the presence of sodium, and when heated with sulphuric acid it evolves hydrofluoric acid.

Cryolite occurs almost exclusively at Ivigtut (sometimes written Evigtok) on the Arksut Fjord in S.W. Greenland. There it forms a large deposit, in a granitic vein running through gneiss, and is accompanied by quartz, siderite, galena, blende, chalcopyrite, &c. It is also associated with a group of kindred minerals, some of which are evidently products of alteration of the cryolite, known as pachnolite, thomsenolite, ralstonite, gearksutite, arksutite, &c. Cryolite likewise occurs, though only to a limited extent, at Miyask, in the Ilmen Mountains; at Pike's Peak, Colorado, and in the Yellowstone Park.

Cryolite is a mineral of much economic importance. It has been extensively used as a source of metallic aluminium, and as a flux in smelting the metal. It is largely employed in the manufacture of certain sodium salts, as suggested by Julius Thomsen, of Copenhagen, in 1849; and it has been used for the production of certain kinds of porcelain and glass, remarkable for its toughness, and for enamelled ware.

Although cryolite is known as "ice-stone" (Eisstein), it is not to be confused with " ice-spar " (Eisspatk)., which is a vitreous kind of felspar termed "glassy felspar" or rhyacolite. (F. W. R.)*

CRYPT (Lat. crypta, from the Gr. Kpurrrttv, to hide), a vault or subterranean chamber, especially under churches. In classical phraseology ." crypta " was employed for any vaulted building, either, partially or entirely below the level of the ground. It is used for a sewer (crypta Suburae, Juvenal, Sat. v. 106) ; ; for the " carceres," or vaulted stalls for the horses and chariots in a circus (Sidon. Apoll. Carm. xxiii. 319); for the close porticoes or arcades, more fully known as " cryptoporticus," attached by the Romans to their suburban villas for the sake of coolness, and to the theatres as places of exercise or rehearsal for the performers (Plin. Epist. ii. 15, v. 6, vii. 21; Sueton. Calig. 58; Sidon. Apoll. lib. ii. epist. 2); and for underground receptaclef for agricultural

produce (Vitruv. vi. 8, Varro, De re rust. i. 57). Tunnels, or galleries excavated in the living rock, were also called cryptae. Thus the tunnel to the north of Naples, through which the road passes to Puteoli, familiar to tourists as the ” Grotto of Posilipo,” was originally designated crypta Nea- politana (Seneca, Epist. 57). In early Christian times crypta was appropriately employed for the galleries of a catacomb, or for the catacomb itself. Jerome calls them by this name when describing his visits to them as a schoolboy, and the term is used by Prudentius (see Catacombs).

GRYPT

563

A crypt, as a portion of a church, had its origin in the subter- ranean chapels known as ” confessiones,” erected around the tomb of a martyr, or the place of his martyrdom. This is the origin of the spacious crypts, some of which may be called subterranean churches, of the Roman churches of S. Prisca, S. Prassede, S. Martino ai Monti, S. Lorenzo fuori le Mura, and above all of St Peter’s — the crypt being thus the germ of the church or basilica subsequently erected above the hallowed spot. When the martyr’s tomb was sunk in the surface of the ground, and not placed in a catacomb chapel, the original memorial- shrine would be only partially below the surface, and conse- quently the part of the church erected over it, which was always that containing the altar, would be elevated some height above the ground, and be approached by flights of steps. This fashion of raising the chancel or altar end of a church on a crypt was widely imitated long after the reason for adopting it ceased, and even where it never existed. The crypt under the altar at the basilica of St Maria Maggiore in Rome is merely imita- tive, and the same may be said of many of the crypts of the early churches in England. The original Saxon cathedral of Canterbury had a crypt beneath the eastern apse, containing the so-called body of St Dunstan, and other relics, ” fabricated,” according to Eadmer, ” in the likeness of the confessionary of

St Peter at Rome ” (see Basilica). St Wilfrid constructed crypts still existing beneath the churches erected by him in the latter part of the 7 th century at Hexham and Ripon. These are peculiarly interesting from their similarity in form and arrange- ment to the catacomb chapels with which Wilfrid must have become familiar during his residence in Rome. The cathedral, begun by / Ethelwold and finished by Alphege at Winchester, at the end of the 10th century, had spacious crypts ” supporting the holy altar and the venerable relics of the saints ” (Wulstan, Life of St jEthelwold) , and they appear to have been common in the earlier churches in England. The arrangement was adopted by the Norman builders of the nth and 12th centuries, and though far from universal is found in many of the cathedrals of that date. The object of the construction of these crypts was twofold, — to give the altar sufficient elevation to enable those below to witness the sacred mysteries, and to provide a place of burial for those holy men whose relics were the church’s most precious possession. But the crypt was ” a foreign fashion,” derived, as has been said, from Rome, ” which failed to take root in England, and indeed elsewhere barely outlasted the Romanesque period ” (Essays on Cathedrals, ed. Howson,

P- 33i)-

Of the crypts beneath English Norman cathedrals, that under the choir of Canterbury (g.v.) is by far the largest and most elaborate in its arrangements. It is, in fact, a subterranean church of vast size and considerable altitude. The whole crypt was dedicated to the Virgin Mary, and contained two chapels especially dedicated to her, — the central, one beneath the high altar, enclosed with rich Gothic screen- work, and one under the south transept. This latter chapel was appropriated by Queen Elizabeth to the use of the French Huguenot refugees who had settled at Canterbury in the time of Edv/ard VI. There were also in this crypt a large number of altars and chapels of other saints, some of whose hallowed bodies were buried here. At the extreme east end, beneath the Trinity chapel, the

body of St Thomas (Becket) was buried the day after his martyrdom, and lay there till his translation, July 7, 1220.

The cathedrals of Winchester, Worcester and Gloucester have crypts of slightly earlier date (they may all be placed between 1080 and 1 100), but of similar character, though less elaborate. They all contain piscinas and other evidences of the existence of altars in considerable numbers. They are all apsidal. The most picturesque is that of Worcester, the work of Bishop Wulfstan (1084), which is remarkable for the multiplicity of small pillars supporting its radiating vaults. Instead of having the air of a sepulchral vault like those of Winchester and Gloucester, this crypt is, in Professor Willis's words, " a. complex and beautiful temple." Archbishop Roger's crypt at York, belonging to the next century (n 54–1 181), was filled up with earth when the

present choir was built at the end of the 14th century, and its existence forgotten till its disinterment after the fire of 1829; The choir and presbytery at Rochester are supported by an extensive Crypt, of which" the western portion is Gundulf 's work (1076–1107), but the eastern part, which displays slender cylindrical and octagonal shafts, with light vaulting springing from them, is of the same period as the superstructure, the first years of the 13th century. This crypt, and that beneath the Early English Lady chapel at Hereford, are the latest English existing cathedral crypts. That at Hereford was rendered necessary by the fall of the ground, and is an exceptional case. Later than any of these crypts was that of St Paul's, Londom This was a really large and magnificent church of Decorated date, with a vaulted roof of rich and intricate character resting on a forest of clustered columns. Part of it served as the parish church of St Faith. A still more exquisite work of the Decorated period is the crypt of St Stephen's chapel at Westminster, than which it is difficult to conceive anything more perfect in design or more elaborate in ornamentation. Having happily escaped

the conflagration of the Houses of Parliament in 1834 — before which it was degraded to the purpose of the speaker's state dining-room— it has been restored to its former sumptuousness of decoration, and is now one of the most beautiful architectural gems in England.

Of Scottish cathedrals the only one that possesses a crypt is the cathedral of Glasgow, rendered celebrated by Sir Walter Scott in his novel of Rob Roy (ch. xx.). At the supposed date of the tale, and indeed till a comparatively recent period, this crypt was used as a place of worship by one of the three con- gregations among which the cathedral was partitioned, and was known as " the Laigh or Barony Kirk." It extends beneath the choir transepts and chapter-house; in consequence of the steep declivity on which the cathedral stands it is of unusual height and lightsomeness. It belongs to the 13th century, its style corresponding to Early English, and is simplyconstructional, the building being adapted to the locality. In architectural beauty it is quite unequalled by any crypt in the United Kingdom, and can hardly anywhere be surpassed. It is an unusually rich example of the style, the clustered piers and groining being exquisite in design and admirable in execution. The bosses of the roof and capitals of the piers are very elaborate, and the doors are much enriched with foliage. " There is a solidity in its architecture, a richness in its vaulting, and a variety of perspective in the spacing of its pillars, which make it one of the most perfect pieces of architecture in these kingdoms " (Fergusson).

In the centre of the main alley stands the mutilated effigy of St Mungo, the patron saint of Glasgow, and at the south-east corner is a well called after the same saint.

Crypts under parish churches are not very uncommon in England, but they are Usually small and not characterized by any architectural beauty. A few of the earlier crypts, however, deserve notice. One of the earliest and most remarkable is that of the

church of Lastingham near Pickering in Yorkshire, on the site of the monastery founded in 648 by Cedd, bishop of the East Saxons. The existing crypt, though exceedingly rude in structure, is of considerably later date than Bishop Cedd, forming part of the church erected by Abbot Stephen of Whitby in 1080, when he had been driven inland by the incursions of the northern pirates. This crypt is remarkable from its extending under the nave as well as the chancel of the upper church, the plan of which it accurately reproduces, with the exception of the westernmost bay. It forms a nave with side aisles of three bays, and an apsidal chancel, lighted by narrow deeply splayed slits. The roof of quadripartite vaulting is supported by four very dwarf thick cylindrical columns, the capitals of which and of the responds are clumsy imitations of classical work with rude volutes. Still more curious is the crypt beneath the chancel of the church of Repton in Derbyshire. This also consists of a centre and side aisles, divided by three arches on either side. The architectural character, however, is very different from that at Lastingham, and is in some respects almost unique, the

piers being slender, and some of them of a singular spiral form, with a bead running in the sunken part of the spiral. Another very extensive and curious Norman crypt is that beneath the chancel of St Peter's-in-the-East at Oxford. . This is five bays in length, the quadripartite vaulting being supported by eight low, somewhat slender, cylindrical columns with capitals bearing grotesque animal and human subjects. Its dimensions are 36 by 20 ft. and 10 ft. in height, This crypt has been commonly attributed to Grymboldt in the 9th century; but it is really not very early Norman. Under the church of St Mary-le-Bow in London there is an interesting Norman crypt not very dissimilar in character to that last described. Of a later date is the remarkably fine Early English crypt groined in

stone, beneath the chancel of Hythe in Kent, containing a remarkable collection of skulls and bones, the history of which is quite uncertain. There is also a Decorated crypt beneath the chancel at Wimborne minster, and one of the same date beneath the southern chancel aisle at Grantham.

Among the more remarkable French crypts may be mentioned those of the cathedrals of Auxerre, said to date from the original foundation in 1085; of Bayeux, attributed to Odo, bishop of that see, uterine brother of William the Conqueror, where twelve columns with rude capitals support a vaulted roof; of Chartres, running under the choir and its aisles, frequently assigned to Bishop Fulbert in 1029, but more probably coeval with the superstructure; and of Bourges, where the crypt is in the Pointed style, extending beneath the choir. The church of the Holy Trinity attached to Queen Matilda's foundation — the " Abbaye aux Dames " at Caen — has a Norman crypt where the thirty-four pillars are as closely set as those at Worcester. The church of St Eutropius at Saintes has also a crypt of the nth century, of very large dimensions, which deserves special notice ; the capitals of the columns exhibit very curious carvings. Earlier than any already mentioned is that of St Gervase of Rouen, considered by E. A. Freeman " the oldest ecclesiastical work to be seen north of the Alps." It is apsidal, and in its walls are layers of Roman brick. It is said to contain the remains of two of the earliest apostles of Gaul — St Mello and St Avitian. There are numerous crypts in Germany. One at Gottingen may be mentioned, where cylindrical shafts with capitals of singular design support " vaulting of great elegance and lightness " (Fergusson), the curves being those of a horseshoe arch. The crypts of the cathedrals or churches at Halberstadt, Hildesheim and Naum- burg also deserve to be noticed; that of Liibeck may be rather called a lower choir. It is 20 ft. high and vaulted.

The Italian crypts, when found, as a rule reproduce the " confessio " of the primitive churches. That beneath the chancel of S. Michele at Pavia is an

excellent typical example, probably dating from the 10th century. It is apsidal and vaulted, and is seven bays in length. That at S. Zeno at Verona (c. 1 138) is still more remarkable; its vaulted roof is upborne by forty columns, with curiously carved capitals. It is approached from the west by a double flight of steps and contains many ancient monuments. S. Miniato at Florence, begun in 1013, has a very spacious crypt at the east end, forming virtually a second choir. It is seven bays in length and vaulted. The most remarkable crypt in Italy, however, is perhaps that of St Mark's, Venice. The plan of this is almost a Greek cross. Four rows of nine columns each run from end to end, and two rows of three each occupy the arms of the cross, supporting low stunted arches on which rests the pavement of the church above. This also constitutes a lower church, containing a chorus cantorum formed by a low stone screen, not unlike that of S. Clemente at Rome (see Basilica), enclosing a massive stone altar with four low columns. This crypt is reasonably supposed to belong to the church founded by the doge P. Orseolo in 977. There are also crypts deserving notice at the cathedrals of Brescia, Fiesole and Modena, and the churches of S. Ambrogio and S. Eustorgio at Milan. The former was unfortunately modernized by St Charles Borromeo. The crypt at Assisi is really a second church at a lower level, and being built on the steep side of a hill is well lighted. The whole fabric is a beautiful specimen of Italian

Gothic, and both the lower and upper churches are covered with rich frescoes.

Domestic crypts are of frequent occurrence. Medieval houses had as a rule their chief rooms raised above the level of the ground upon vaulted substructures, which were used as cellars and storerooms. These were sometimes partially underground, sometimes entirely above it. The underground vaults often remain when all the superstructure has been swept away, and from their Gothic character are frequently mistaken for ecclesi- astical buildings. The older English towns are full of crypts of this character,

now used as cellars. They occur in Oxford and Rochester, are very abundant in the older parts of Bristol, and, according to J. H. Parker, ” nearly the whole city of Chester is built upon a series of them with the Rows or passages made on the top of the vaults ” (Domestic Architecture, iii. 91). The crypt of Gerard’s Hall in London, destroyed in the construction of New Cannon Street, figured by Parker (Dom. Arch. ii. 185), was a beautiful example of the lower storey of the residence of a wealthy merchant of the time of Edward I. It was divided down the middle by a row of four slender cylindrical columns supporting a very graceful vault. The finest example of a secular crypt now remaining in England is that beneath the Guildhall of London. The date of this is early in the 15th century — 141 1. It is a large and lofty apartment, divided into four alleys by two rows of clustered shafts supporting a rich lierne vault with ribs of considerable intricacy. There is a fine vaulted crypt of the same date and of similar character beneath St Mary’s Hall, the Guildhall of the city of Coventry. (E. V.)

CRYPTEIA (Gr. Kpimrtiv, to hide), a kind of secret police in ancient Sparta, founded, according to Aristotle, by Lycurgus; there is, however, no real evidence as to the date of its origin. The institution was under the supervision of the ephors, who, on entering office, annually proclaimed war against the helots (serf-class) and thus absolved from the guilt of murder any Spartan who should slay a helot. It was instituted primarily as a precaution against the ever-present danger of a helot revolt, and secondarily perhaps as a training for young Spartans, who were sent out by the ephors to keep watch on the helots and assassinate any who might appear dangerous. Plato (Laws, i. P- 633} emphasizes the former aspect, but there can be little doubt that, at all events after the revolt of 464 (see Cimon), its more sinister purpose was predominant, as we may gather from the secret massacre of 2000 helots who, on the invitation of the ephors, claimed to have rendered distinguished service (Thuc. iv. 80).

See Helots; Ephor; also A. H. J. Greenidge, Handbook of Gk. Const. Hist. (London, 1896) ; G. Gilbert, Gk. Const. Antiq. (Eng. trans., London, 1895).

CRYPTOBRANCHUS, a genus of thoroughly aquatic, but lung-breathing tailed Batrachia, of the family Amphiumidae, characterized by a heavy, flattened build, a very porous tuber- cular skin, with a frilled fold along each side, short stout limbs with four very short fingers and five very short toes, and minute eyes without lids. The vertebrae are biconcave, and although the gills are lost in the adult, ossified gill-arches, two to four in number, persist. A strong series of vomerine teeth extends across the palate. Three species of this genus are known. One is the well-known fossil of Oeningen first described as Homo diluvii testis and shown by Cuvier to be nearly related to the gigantic salamander of Japan, Cryptobranchus maximus, which has since been found to inhabit China also; the third is the hellbender, mud-puppy or water-dog of North America, C, alleghaniensis, also known under the name of Menopoma. Both the fossil C. scheuchzeri and C. maximus grow to a length of over s ft. and are by far the largest Urodeles known, whilst C. alleghaniensis reaches the respectable length of 18 in.

The eggs are laid in rosary-like strings. They have been found, in Japan, deposited in deep holes in the water, where they form large clumps (70 to 80 eggs) round which the female coils herself. The gigantic salamander has also bred in the Amsterdam zoological gardens, the eggs numbering upwards of 500; the male, it is stated, took charge of the eggs, and for the

ten weeks which elapsed before the release of the last larva, he kept close to them, at times crawling among the coiled mass of egg-strings or lifting them up, evidently for the purpose of aeration. The larva

on leaving the egg is about an inch long, provided with three branched external gills on each side, and showing mere rudiments of the four limbs.

CRYPTOGRAPHY (from Gr. /cpwrros, hidden, and ypafyav, to write), or writing in cipher, called also steganography (from Gr. crtyavri, a covering), the art of writing in such a way as to be incomprehensible except to those who possess the key to the system employed. The unravelling of the writing is called deciphering. Cryptography having become a distinct art, Bacon (Lord Verulam) classed it (under the name ciphers) as a part of grammar. Secret modes of communication have been in use from the earliest times. The Lacedemonians had a method called the scytale, from the staff (

The art was in use also amongst the Romans. Upon the revival of letters methods of secret correspondence were intro- duced into private business, diplomacy, plots, &c; and as the study of this art has always presented attractions to the ingenious, a curious body of literature has been the result.

John Trithemius (d. 1516), the abbot of Spanheim, was the first important writer on cryptography. His Polygraphia, published in 1518, has passed through rhany editions, and has supplied the basis upon which subsequent writers have worked. It was begun at the desire of the duke of Bavaria; but Trithemius did not at first intend to publish it, on the ground that it would be injurious to public interests. A Steganographia published at Lyons (71551) and later at Frankfort (1606), is also attributed to him. The next treatises of importance were those of Giovanni Battista della Porta, the Neapolitan mathe- matician, who wrote De furtivis litterarum notis, 1563; and of Blaise de Vigenere, whose Traite des ckiffres appeared in Paris, 1587. Bacon proposed an ingenious system of cryptography on the plan of what is called the double cipher; but while thus lending to the art the influence of his great name, he gave an intimation as to the general opinion formed of it and as to the classes of men who used it. For when prosecuting the earl of Somerset in the matter of

the poisoning of Overbury, he urged it as an aggrayation of the crime that the earl and Overbury ” had cyphers and jargons for the king and queen and all the great men, — things seldom used but either by princes and their ambassadors and ministers, or by such as work or practise against or, at least, upon princes.”

Other eminent Englishmen were afterwards connected with the art. John Wilkins, subsequently bishop of Chester, published in 1 641 an anonymous treatise entitled Mercury, or The Secret and Swift Messenger, — a small but comprehensive work on the subject, and a timely gift to the diplomatists and leaders of the Civil War. The deciphering of many of the royalist papers of that period, such as the letters that fell into the hands of the parliament at the battle of Naseby, has by Henry Stubbe been charged on the celebrated mathematician Dr John Wallis (Athen. Oxon. iii. 1072), whose connexion with the subject of cipher-writing is referred to by himself in the Oxford edition of , his mathematical works, 1689, p. 659; as also by John Davys. Dr Wallis elsewhere states that this art, formerly scarcely known to any but the secretaries of princes, &c, had grown very common and familiar during the civil commotions, ” so that now there is scarce a person of quality but is more or- less acquainted with it, and doth, as there is occasion, make use of it.’ : Subsequent

writers on the subject are John Falconer (Cry ptomenysis pate- facia), 1685; John Davys (An Essay on the Art of Decyphsring: in which is inserted a Discourse of Dr Wallis), 1737; Philip Thicknesse (A Treatise on the Art of Decyphering and of Writing in Cypher), 1772; William Blair (the writer of the comprehensive article “Cipher” in Rees’s Cyclopaedia), 1819; and G. von Marten (Cours diplomatique), 1801 (a fourth edition of which appeared in 1851). Perhaps the best modern work on this subject is the Kryptographik of J. L. Kluber (Tubingen, 1809), who was drawn into the investigation by inclination and official circumstances. In this work the different methods of crypto- graphy are classified. Amongst others of

lesser merit who have treated of this art may be named Gustavus Selenus (i.e. Augustus, duke of Brunswick), 1624; Cospi, translated by Niceron in 1641; the marquis of Worchester, 1659; Kircher, 1663; Schott, 1665; Ludwig Heinrich Hiller, 1682; Comiers; 1690; Baring, 1737; Conrad, 1739, &c. See also a paper on Elizabethan Cipher-books by A. J. Butler in the Bibliographical Society's Transactions, London, 1901.

Schemes of cryptography are endless in their variety. Bacon lays down the following as the " virtues " to be looked for in them: — "that they be not laborious to write and read; that they be impossible to decipher; and, in some cases, that they be without suspicion." These principles are more or less disre- garded by all the modes that have been advanced, including that of Bacon himself, which has been unduly extolled by his admirers as " one of the most ingenious methods of writing in cypher, and the most difficult to be decyphered, of any yet contrived " (Thicknesse, p. 13).

The simplest and commonest of all the ciphers is that in which the writer selects in place of the proper letters certain other letters in regular advance. This method of transposition was used by Julius Caesar. He, " per quartam elementorum literam," wrote d for a, e for b, and so on. There are instances of this arrangement in the Jewish rabbis, and even in the sacred writers. An illustration of it occurs in Jeremiah (xxv. 26), whefe the prophet, to conceal the meaning of his prediction from all but the initiated, writes Sheshak instead of Babel (Babylon), the place meant; i.e. in place of using the second, and twelfth letters of the Hebrew alphabet (b, b, I) from the beginning, he wrote the second and twelfth (sh, sh, k) from the end. To this kind of cipher- writing Buxtorf gives the name Athbash (from a the first letter of the Hebrew alphabet, and th the last; b the second from the beginning, and // the second from the end). Another Jewish cabalism of like nature was called Albam ; of which an example is in Isaiah vii. 6, where Tabeal is written for Remaliah.

In its adaptation to English this method of transposition, of which there are many modifications, is comparatively easy to decipher. A rough key may be derived from an examination of the respec- tive quantities of letters in a type-founder's bill, or a printer's " case." The decipherer's first business is to classify the letters of the secret message in the order of their frequency. The letter that occurs oftenest is e; and the next in order of frequency is /. The following groups come after these, separated from each other by degrees of decreasing recurrence: — a, 0, n, i; r, s,, h;, d, I; c, w, u, m; f, y, g, p, b; v, k; x, q, j, z. All the single letters must be a, I or O. Letters occurring together are ee, oo,Jf,ll, ss, &c. The commonest words of two letters are (roughly arranged in the order of their frequency) of, to, in, it, is, be, he, by, or, as, at, an, so, &c. The commonest words of three letters are the and and (in great excess), for, are, but, all, not, &c; and of four letters — that, with, from, have, this, they, &c. Familiarity with the composition of the language will suggest numerous other points that are of value to the decipherer. He may obtain other hints from Poe's tale called The Gold Bug. As to messages in the continental languages constructed upon this system of trans- position, rules for deciphering may be derived from Breithaupt's Ars decifratoria (1737), and other treatises.

Bacon remarks that though ciphers were commonly in letters and alphabets yet they might be in words. Upon this basis codes have been constructed, classified words taken from dictionaries being made to represent complete ideas In recent

years such codes have been adapted by merchants and others to communications by telegraph, and have served the purpose not only of keeping business affairs private, but also of reducing the excessive cost of telegraphic messages to distant markets.

Obviously this class of ciphers presents greater difficulties to the skill of the decipherer.

Figures and other characters have been also used as letters; and with them ranges of numerals have been combined as the representatives of syllables, parts of words, words themselves, and complete phrases. Under this head must be placed the despatches of Giovanni Michael, the Venetian ambassador to England in the reign of Queen Mary, documents which have only of late years been deciphered. Many of the private letters and papers from the pen of Charles I. and his queen, who were adepts in the use of ciphers, are of the same description. One of that monarch's letters, a document of considerable interest, con- sisting entirely of numerals purposely complicated, was in 1858 deciphered by Professor Wheatstone, the inventor of the ingeni- ous crypto - machine, and printed by the Philobiblon Society. Other letters of the like character have been published in the First Report of the Royal Commission on Historical Manuscripts (1870). In the second and subsequent reports of the same com- mission several keys to ciphers have been catalogued, which seem to refer themselves to the methods of cryptography under notice. In this connexion also should be mentioned the " char- acters," which the diarist Pepys drew up when clerk to Sir George Downing and secretary to th'e earl of Sandwich and to the admiralty, and which are frequently mentioned in his journal. Pepys describes one of them as " a great large character," over which he spent much time, but which was at length finished, 25 th April 1660; "it being," says he, " very handsomely done and a very good one in itself, but that not truly alphabetical."

Shorthand marks and other arbitrary characters have also been largely imported into cryptographic systems to represent both letters and words, but more commonly the latter. This plan is said to have been first put into use by the old Roman poet Ennius. It formed the basis of the method of Cicero's freedman, Tiro, who seems to have systematized the labours of his pre- decessors. A

large quantity of these characters have been engraved in Gruter's Inscriptiones. The correspondence of Charlemagne was in part made up of marks of this nature. In Rees's Cyclopaedia specimens were engraved of the cipher used by Cardinal Wolsey at the court of Vienna in 1524, of that used by Sir Thomas Smith at Paris in 1563, and of that of Sir Edward Stafford in 1586; in all of which arbitrary marks are introduced. The first English system of shorthand — Bright's Characterie, 1588 — almost belongs to the same category of ciphers. A favourite system of Charles I., used by him during the year 1646, was one made up of an alphabet of twenty-four letters, which were represented by four simple strokes varied in length, slope and position. This alphabet is engraved in Clive's Linear System of Shorthand (1830), having been found amongst the royal manu- scripts in the British Museum. An interest attaches to this cipher from the fact that it was employed in the well-known letter .addressed by the king to the earl of Glamorgan, in which the former made concessions to the Roman Catholics of Ireland.

Complications have been introduced into ciphers by the em- ployment of " dummy " letters, — " nulls and insignificants," as Bacon terms them. Other devices have been introduced to perplex the decipherer, such as spelling words backwards, making false divisions between words, &c. The greatest security against the decipherer has been found in the use of elaborate tables of letters, arranged in the form of the multiplication table, the message being constructed by the aid of preconcerted key-words. Details of the working of these ciphers may be found in the treatises named in this article. The deciphering of them is one of the most difficult of tasks. A method of this kind is explained in the Latin and English lives of Dr John Barwick, whose correspondence with Hyde, afterwards earl of Clarendon, was carried on in cryptography. In a letter dated 20th February 1659/60, Hyde, alluding to the skill of his political opponents in deciphering, says that " nobody needs to fear them, if they

write carefully in good cyphers." In his next he allays his correspondent's apprehensiveness as to the deciphering of their letters.

" I confess to you, as I am sure no copy could be gotten of any of my cyphers from hence, so I did not think it probable that they could be got on your side the water. But I was as confident, till you tell me you believe it, that the devil himself cannot decypher a letter that is well written, or find that 100 stands for Sir H. Vane. I have heard of many of the pretenders to that skill, and have spoken with some of them, but have found them all to be mounte- banks; nor did I ever hear that more of the King's letters that were found at Naseby, than those which they found decyphered, or found the cyphers in which they were writ, were decyphered. And I very well remember that in the volume they published there was much left in cypher which could not be understood, and which I believe they would have explained if it had been in their power."

An excellent modification of the key-word principle was con- structed by Admiral Sir Francis Beaufort.

Ciphers have been constructed on the principle of altering the places of the letters without changing their powers. The message is first written Chinese-wise, upward and downward, and the letters are then combined in given rows from left to right. In the celebrated cipher used by the earl of Argyll when plot- ting against James II., he altered the positions of the words. Sentences of an indifferent nature were constructed, but the real meaning of the message was to be gathered from words, placed at certain intervals. This method, which is connected with the name of Cardan, is sometimes called the trellis or card- board cipher.

The wheel-cipher, which is an Italian invention, the string- cipher, the circle-cipher and many others are fully explained, with the necessary diagrams, in the authorities named above — more particularly by Kliiber in his Kryptographik. (J. E. B.)

CRYPTOMERIA, or Japanese Cedar, a genus of conifers, containing a single species, C. japonica, native of China and Japan, which was introduced into Great Britain by the Royal Horticultural Society 'in 1844. It is described as one of the finest trees in Japan, reaching a height of 100 or more feet, usually divested of branches along the lower part of the trunk and crowned with a conical head. The narrow, pointed leaves are spirally arranged and persist for four or five years; the cones are small, globose and borne at the ends of the branchlets, the scales are thickened at the extremity and divided into sharply pointed lobes, three to five seeds are borne on each scale. Crypto- meria is extensively used in Japan for reafforesting denuded lands, as it is a valuable timber tree; it is also planted to form avenues along the public roads. In Veitch's Manual of Coniferae (ed. 2, 1900, p. 265) reference is made to "an avenue of Crypto- merias 7 m. in extent near Lake Hakone " in which " the trees are more than 100 ft. high, with perfectly straight trunks crowned with conical heads of foliage." Professor C. S. Sargent, in his Forest Flora of Japan, says, " Japan owes much of the beauty of its groves and gardens to the Cryptomeria. Nowhere is there a more solemn and impressive group of trees than that which surrounds the temples and tombs at Nikko where they rise to a height of 100 to 125 ft.; it is a stately tree with no rival except in the sequoias of California." Many curious varieties have been obtained by Japanese horticulturists, including some dwarf shrubby forms not exceeding a few feet in height. When grown in Great Britain Cryptomeria requires a deep, well-drained soil with plenty of moisture, and protection from cold winds.

CRYPTO-PORTICUS (Gr. Kprnros, concealed, and Lat. porticus), an architectural term for a concealed or covered passage, generally underground, though lighted and ventilated from the open air. One of the best-known examples is the crypto-porticus under the palaces of the Caesars in Rome. In Hadrian's villa in Rome they formed the principal private intercommunication between the several buildings.

CRYSTAL-GAZING, or Scrying, the term commonly applied to the induction of visual hallucinations by concentrating the gaze on any clear deep, such as a crystal or a ball of polished rock crystal. Some persons do not even find a clear deep necessary, and are content to gaze at the palm of the hand, for example, when hallucinatory pictures, as they declare, emerge.

Among objects used are a pool of ink in the hand (Egypt), the liver of an animal (tribes of the North-West Indian frontier), a hole filled with water (Polynesia), quartz crystals (the Apaches and the Euahlayi tribe of New South Wales), a smooth slab of polished black stone (the Huille-che of South America), water in a vessel (Zulus and Siberians), a crystal (the Incas), a mirror (classical Greece and the middle ages), the finger-nail, a sword- blade, a ring-stone, a glass of sherry, in fact almost anything. Much depends on what the " seer " is accustomed to use, and some persons who can " scry " in a glass ball or a glass water- bottle cannot " scry " in ink.

The practice of inducing pictorial hallucinations by such methods as these has been traced among the natives of North and South America, Asia, Australia, Africa, among the Maoris, who sometimes use a drop of blood, and in Polynesia, and is thus practically of world-wide diffusion. This fact was not observed (that is, the collections of examples were not made) till recently, when experiments in private non-spiritualist circles drew attention to crystal-gazing, a practice always popular among peasants, and known historically to have survived through classical and medieval times, and, as in the famous case of Dr Dee, after the Reformation.

The early church condemned specularii (mirror-gazers), and Aubrey and the Memoirs of Saint-Simon contain " scrying " anecdotes of the 17th and 18th

centuries, while Sir Walter Scott's story, My Aunt Margaret's Mirror, is based on a tradition of about 1750 in a noble Scottish family. The practice, in all times and countries, was used for purposes of divination. The gazer detected unknown criminals, or described remote events, or even professed to foretell things future. Sometimes the supposed magician or medicine man himself did the scrying; occasionally he enabled his client to see for himself; often a child was selected as the scryer. The process was usually explained as the result of the action of a spirit, angel or devil, and many unessential formulae, invocations, " calls," written charms with cabbalistic signs, and fumigations, were employed. These things may have had some effect by way of suggestion; the scryer may have been brought by them into an appropriate frame of mind; but, as a whole, they are tedious and superfluous.

A person can either induce the pictorial hallucinations (he may discover his capacity by accident, like George Sand, as she tells in her Memoirs — and other cases are known), or he cannot induce them, though he stare till his eyes water. It is almost universally found, in cases of successful experiment, that the glass ball, for example, takes a milky or misty aspect, that it then grows black, reflections disappearing, and that then the pictures emerge. Some people arrive at seeing the glass ball milky or misty, and can go no further. Others see pictures of persons or landscapes, only in black and white, and motionless. Others see in the glass coloured figures of men, women and animals in motion; while in rarer cases the ball disappears from view, and the scryer finds himself apparently looking at an actual scene. In a few attested cases two persons have shared the same vision. In experiments with magnifying glasses, and through spars, the ordinary effects of magnifying and of alteration of view are sometimes produced; sometimes they are not. The evidence, of course, is necessarily only that of the scryers themselves, but repeated experiments by persons of probity, and unfamiliar with the topic, combined with the world-

wide existence of the practice, prove that hallucinatory pictures are really induced.

It has not been found possible to determine, before experiment, whether any given man or woman will prove capable of the hallucinatory experiences. Many subjects with strong powers of ” visualization,” or seeing things ” in the mind’s eye,” cannot scry; others are successful in various degrees. We might expect persons who have experienced spontaneous visual hallucinations, of the kind vulgarly styled ” ghosts “or ” wraiths,” to succeed in inducing pictures in a glass ball. As a matter of fact such persons sometimes can and sometimes cannot see pictures in the way of crystal-gazing; while many who can see in the crystal have had no spontaneous hallucinations. It is useless to make experiments with hysterical and visionary people, ” whose word

/

no man relies on “; they may have the hallucinatory experi- ences, but they would say that they had in any case.

The nearest analogy to crystal visions, as described, is the common experience of ” hypnagogic illusions ” (cf. Alfred Maury. Les Rbies etle sommeit) . With closed eyes, between sleeping and waking, many people see faces, landscapes and other things flash upon their view, pictures often brilliant, but of very brief duration and rapid mutation. Sometimes the subject opens his eyes to get rid of an unpleasant vision of this kind. People who cannot scry may have these hypnagogic illusions, and, so far, may partly understand the experience of the scryer who is wide awake. But the visions of the scryer often endure for a considerable time. He or she may put the glass down and con- verse, and may find the picture still there when the ball is taken up again. New figures may join the figure first seen, as when one enters a room. In these respects, and in the awakeness of the scryer, crystal pictures differ from hypnagogic illusions. In other ways the experiences coincide, the pictures are either

fanciful, like illustrations of some unread history or romance, or are revivals of remembered places and faces.

Occasionally, in hypnagogic illusions, the observer can see the- picture develop rapidly out of a blot of light or colour, beheld by the closed eyes. One or two scryers think that they, too, can trace the picture as it develops on the suggestion of some passage of light, colour or shadow in the glass or crystal. But, as a rule, the scryer cannot detect any process of development from such points de mire; though this may be the actual process.

On the whole there seems little doubt that successful crystal- gazing is the exertion of a not uncommon though far from universal faculty, like those of " chromatic audition " — the vivid association of certain sounds with certain colours — and the mental seeing of figures arranged in coloured diagrams (Galton, Inquiry into Human Faculty, pp. 114-154). The experience of hypnagogic illusions also seems far more rare than ordinary dreaming in sleep. Unfortunately, while these phenomena have been carefully studied by officially scientific characters, in England orthodox savants have disdained to observe crystal- gazing, while in France psychologists have too commonly experimented with subjects professionally hysterical and quite untrustworthy. Our remarks are therefore based mainly on considerable personal study of " scrying " among normal British subjects of both sexes, to whom the topic was previously unknown.

The superstitious associations of crystal-gazing, as of hypnot- ism, appear to bar the way to official scientific investigation, and the fluctuating proficiency of the seers, who cannot command success, or determine the causes and conditions of success and failure, tends in the same direction. The existence, too, of paid professionals who lead astray silly women, encourages the natural scientific contempt for the study of the faculty.

The seeing of the pictures, as far as we have spoken

of it, appears to be a thing unusual, but in no way abnormal, any more than dreams or hypnagogic illusions are abnormal. Crystal pictures, however, are commonly dismissed as mere results of " imagination," a theory which, of course, is of no real assistance to psychology. Persons of recognized " imaginativeness," such as novelists and artists, do not seem more or less capable of the hallucinatory experiences than their sober neighbours; while persons not otherwise recognizably " imaginative " (we could quote a singularly accurate historian) are capable of the experi- ences. It is unfortunate, as it awakens prejudice, but in the present writer's opinion it is true, that crystal-gazing sometimes is rewarded with results which may be styled " supra-normal." In addition to the presentation of revived memories, and of " objectivation of ideas or images consciously or unconsciously in the mind of the percipient," there occur " visions, possibly telepathic or clairvoyant, implying acquirement of knowledge by supra-normal means." 1

A number , of examples occurring during experiments made by the present writer and by his acquaintances in 1897 were carefully recorded and attested by the signatures of all concerned 1 Proceedings of the Society for Psychical Research, v. 486.

The cases, or rather a selection of the cases, are printed in A. Lang's book, The Making of Religion (2nd ed., London, 1902, pp. 87-104). Others are chronicled in A. Lang's Introduction to Mr N. W. Thomas's work, Crystal Gazing (1905) . The experi- ments took this form: any person might ask the scryer (a lady who had never previously heard of crystal-gazing) " to see what he was thinking of." The scryer, who was a stranger in a place which she had not visited before, gave, in a long series of cases, a description of the person or place on which the inquirer's thoughts were fixed. The

descriptions, though three or four entire failures occurred, were of remarkable accuracy as a rule, and contained facts and incidents unknown to the inquirers, but confirmed as accurate. In fact, some Oriental scenes and descriptions of incidents were corroborated by a letter from India which arrived just after the experiment; and the same thing happened when the events described were occurring in places less remote. On one occasion a curious set of incidents were described, which happened to be vividly present to the mind of a sceptical stranger who chanced to be in the room during the experiment; events unknown to the inquirer in this instance. As an example of the minuteness of description, an inquirer, thinking of a brother in India, an officer in the army, whose hair had suffered in an encounter with a tiger, had described to her an officer in undress uniform, with bald scars through the hair on his temples, such as he really bore. The number and proportion of successes was too high to admit of explanation by chance coincidence, but success was not invariable. On one occasion the scryer could see nothing, " the crystal preserved its natural diaphaneity," as Dr Dee says; and there were failures with two or three inquirers. On the other hand no record was kept in several cases of success.

Whoever can believe that the successes were numerous and that descriptions were given correctly— not only of facts present to the minds of inquirers, and of other persons present who were not consciously taking a share in the experiments, but also of facts necessarily unknown to all concerned — must of course be most impressed by the latter kind of success. If the process commonly styled " telepathy " exists (see Telepathy), that may account for the scryer's power of seeing facts which are in the mind of the inquirer. But when the scryers see details of various sorts, which are unknown to the inquirer, but are verified on inquiry, then telepathy perhaps fails to provide an explana- tion. We seem to be confronted with actual clairvoyance (q.v.), or vue a distance. It would be vain to form hypotheses as to the conditions or faculties which make vue d

distance possible. This way lie metaphysics, with Hegel's theory of the Sensitive Soul, or Myers' theory of the Subliminal Self. " The intuitive soul," says Hegel, " oversteps the conditions of time and space; it beholds things remote, things long past, and things to come." 1

What we need, if any progress is to be made in knowledge of the subject, is not a metaphysical hypothesis, but a large, carefully tested, and well-recorded collection of examples, made by savants of recognized standing. At present we are where we were in electrical science, when Newton produced curious sparks while rubbing glass with paper. By way of facts, we have only a large body of unattested anecdotes of supra-normal successes in crystal-gazing, in many lands and ages; and the scanty records of modern amateur investigators, like the present writer. Even from these, if the honesty of all concerned be granted (and, even clever dishonesty could not have produced many of the results) , it would appear that we are investigating a strange and important human faculty. The writer is acquainted with no experiments in which it was attempted to discern the future (except in trivial cases as to events on the turf, when chance coincidence might explain the successes), and only with two or three cases in which there was an attempt to help historical science and discern the past by aid of psychical methods. The results were interesting and difficult to explain, but the experi- ments were few. Ordinary scryers of fancy pictures are common enough, but scryers capable of apparently supra-normal successes

1 " Philosophie der Geistes," Hegel's Werke, vii. 179, 406, 408 (Berlin, 1845). Cf. Wallace's translation (Oxford, 1894).

are apparently rare. Perhaps something depends on the inquirer as well as the scryer.

The method of scrying, as generally practised, is simple. It is usual to place a glass ball on a dark ground, to sit with the back to the light, to focus

the gaze on the ball (disregarding reflections, if these cannot be excluded), and to await results. Perhaps from five to ten minutes is a long enough time for the experiment. The scryer may let his consciousness play freely, but should not be disturbed by lookers-on. As a rule, if a person has the faculty he " sees " at the first attempt; if he fails in the first three or four efforts he need not persevere. Solitude is advisable at first, but few people can find time amounting to ten minutes for solitary studies of this sort, so busy and so gregarious is mankind. The writer has no experience of trance, sleep or auto-hypnotization produced in such experiments; scryers have always seemed to retain their full normal consciousness. As regards scepticism concerning the faculty we may quote what Mr Galton says about the faculty of visualization: " Scien- tific men as a class have feeble power of visual reproduction. . . . They had a mental deficiency of which they were unconscious, and, naturally enough, supposed that those who affirmed they were possessed of it were romancing."

Authorities. — A useful essay is that of "Miss X" (Miss Goodrich Freer) in the Proceedings of the Society for Psychical Research, v. The history of crystal-gazing is here traced, and many examples of the author's own experiments are recorded. A. Lang's The Making of Religion, ch. v., contains anthropological examples and a series of experiments. In N. W. Thomas's Crystal Gazing the history and anthropology of the subject are investigated, with modern in- stances. For Egypt, see Lane's Modern Egyptians, and the Journal of Sir Walter Scott, xi. 419-421, with Quarterly Review, No- 117, pp. 196-208. These Egyptian experiments of 1830 were vitiated by their method, the scryer being asked to see and describe a given person, named. He ought not, of course, to be told more than that he is to descry the inquirer's thoughts, and there ought never to be physical contact, as in holding hands, between the inquirer and the scryer during the experiment. There is a chapter on crystal-gazing in Les Nevroses et les idees fixes of Dr Janet

(1898). His statements are sometimes demonstrably inaccurate (see Making of Religion, Ap- pendix C). A curious passage on the subject, by Ibn Khaldun, an Arabian medieval savant, is quoted by Mr Thomas from the printed Extracts of MSS. in the Bibliotheque Nationale. There is also a chapter on crystal-gazing in Myers' Human Personality. (A. L.)

CRYSTALLITE. In media which, on account of their viscosity, offer considerable resistance to those molecular movements which are necessary for the building and growth of crystals, rudimentary or imperfect forms of crystallization very fre- quently occur. Such media are the volcanic rocks when they are rapidly cooled, producing various kinds of pitchstone, obsidian, &c. When examined under the microscope these rocks consist largely of a perfectly amorphous or glassy base, through which are scattered great numbers of very minute crystals (microliths) , and other bodies, termed crystallites, which seem to be stages in the formation of crystals. Crystallites may also be produced by allowing a solution of sulphur in carbon disulphide mixed with Canada balsam to evaporate slowly, and their development may be watched on a microscopic slide. Small globules appear (globulites), spherical and non-crystalline (so far as can be ascertained). They may coalesce or may arrange themselves into rows like strings of beads — margarites — (Gr. fiapyapirris, a pearl) or into groups with a somewhat radiate arrangement — globospherites. Occasionally they take elongated shapes — longulites and baculites (Lat. baculus, a staff). The largest may become crystalline, changing suddenly into polyhedral bodies with evident double refraction and the optical properties belonging to crystals. Others become long and thread-like — trichites (Gr. 0pi£, tdix6s, hair)— and these are often curved, and a group of them may be implanted on the surface of a small crystal. All these forms are found in vitreous igneous rocks. H. P. J. Vogelsang, who was the first to direct much attention to them, believes that the globulites are pre- liminary stages in the formation of crystals.

Microliths, as distinguished from crystallites, have crystalline properties, and evidently belong to definite minerals or salts. When sufficiently large they are often recognizable, but usually

they are so small, so opaque, or so densely crowded together that this is impossible. In igneous rocks they are usually felspar, augite, enstatite, and iron oxides, and are found in abundance only where there is much uncrystallized glassy base; in contact- altered sediments, slags, &c, microlithic forms of garnet, spinel, sillimanite, cordierite, various lime silicates, and many other substances have been observed. Their form varies greatly, e.g. thin fibres (sillimanite, augite), short prisms or rods (felspar, enstatite, cordierite), or equidimensional grains (augite, spinel, magnetite). Occasionally they are perfectly shaped though minute crystals; more frequently they appear rounded (magnet- ite, &c), or have brush-like terminations (augite, felspar, &c). The larger microliths may contain enclosures of glass, and it is very common to find that the prisms have hollow, funnel-shaped ends, which are filled with vitreous material. These microliths, under the influence of crystalline forces, may rank themselves side by side to make up skeleton crystals and networks, or feathery and arborescent forms, which obey more or less closely the laws of crystallization of the substance to which they belong. They bear a very close resemblance to the arborescent frost flowers seen on window panes in winter, and to the stellate snow crystals. In magnetite the growths follow three axes at right angles to one another; in augite this is nearly, though not exactly, the case; in hornblende an angle of 57° may frequently be observed, corresponding to the prism angle of the fully-developed crystal. The interstices of the network may be partly filled up by a later growth. In other cases the crystalline arrangement of the microliths is less perfect, and branching, arborescent or

feathery groupings are produced (e.g. felspar, augite, hornblende). Spherulites may be regarded as radiate aggregates of such microliths (mostly felspar mixed with quartz or tridymite). If larger porphyritic crystals occur in the rock, the microliths of the vitreous base frequently grow outwards from their faces; in some cases a definite parallelism exists between the two, but more frequently the early crystal has served merely as a centre, or nucleus, from which the microliths and spherulites have spread in all directions. (J. S. F.)

CRYSTALLIZATION, the art of obtaining a substance in the form of crystals; it is an important process in chemistry since it permits the purification of a substance, or the separation of the constituents of a mixture. Generally a substance is more soluble in a solvent at a high temperature than at a low, and consequently, if a boiling concentrated solution be allowed to cool, the substance will separate in virtue of the diminished solubility, and the slower the cooling the larger and more perfect will be the crystals formed. If, as sometimes appears, such a solution refuses to crystallize, the expedient of inoculating the solution with a minute crystal of the same substance, or with a similar substance, may be adopted; shaking the solution, or the addition of a drop of another solvent, may also occasion the desired result. ” Fractional crystallization ” consists in re- peatedly crystallizing a salt so as to separate the substances of different solubilities. Examples are especially presented in the Study of the rare-earths. .Other conditions under which crystals are formed are given in the article Crystallography.

CRYSTALLOGRAPHY (from the Gr. xpwTaXXos, ice, and ‘ ypa(pea>, to write), the science of the forms, properties and structure of crystals. Homogeneous solid matter, the physical and chemical properties of which are the same about every point, may be either amorphous or crystalline. In amorphous matter all the properties are the same in every direction in the mass; but in crystalline matter certain of

the physical properties vary with the direction. The essential properties of crystalline matter are of two kinds, viz. the general properties, such as density, specific heat, melting-point and chemical composition, which do not vary with the direction; and the directional properties, such as cohesion and elasticity, various optical, thermal and electrical properties, as well as external form. By reason of the homogeneity of crystalline matter the directional properties are the same in all parallel directions in the mass, and there may be a certain symmetrical repetition of the directions along which the properties are the same.

When the crystallization of matter takes place under conditions free from outside influences the peculiarities of internal structure are expressed in the external form of the mass, and there results a solid body bounded by plane surfaces intersecting in straight edges, the directions of which bear an intimate relation to the internal structure. Such a polyhedron (xoXi>s, many, 'i5pa, base or face) is known as a crystal. An example of this is sugar-candy, of which a single isolated crystal may have grown freely in a solution of sugar. Matter presenting well-defined and regular crystal forms, either as a single crystal or as a group of individual crystals, is said to be crystallized. If, on the other hand, crystals lization has taken place about several centres in a confined space, the development of plane surfaces may be prevented, and a crystalline aggregate of differently orientated crystal-individuals results. Examples of this are afforded by loaf sugar and statuary marble.

After a brief historical sketch, the more salient principles of the subject will be discussed under the following sections: —

I. Crystalline Form.

(a) Symmetry of Crystals.

(b) Simple Forms and Combinations of Forms.

(c) Law of Rational Indices.

(d) Zones.

(e) Projection and Drawing of Crystals. (/) Crystal Systems and Classes.

1. Cubic System.

2. Tetragonal System.

3. Orthorhpmbic System.

4. Monoclinic System.

5. Anorthic System.

6. Hexagonal System

(g) Regular Grouping of Crystals (Twinning, &c).

(«) Irregularities of Growth of Crystals : Characters of

Faces. (t) Theories of Crystal Structure. II. Physical Properties of Crystals.

(a) Elasticity and Cohesion (Cleavage, Etching, &c).

(b) Optical Properties (Interference figures, Pleochroism,

&c).

(c) Thermal Properties.

(d) Magnetic and Electrical Properties.

III. Relations between Crystalline Form and Chemical Composition.

Most chemical elements and compounds are capable of assum- ing the crystalline condition. y Crystallization may take place when solid matter separates from solution (e.g. sugar, salt, alum), from a fused mass (e.g. sulphur, bismuth, felspar), or frorri a vapour (e.g. iodine, camphor, haematite;

in the last case by the interaction of ferric chloride and steam). Crystalline growth may also take place in solid amorphous matter, for example, in the devitrification of glass, and the slow change in metals when subjected to alternating stresses. Beautiful crystals of many substances may be obtained in the laboratory by one or other of these methods, but the most perfectly developed and largest crystals are those of mineral substances found in nature, where crystallization has continued during long periods of time. For this reason the physical science of crystallography has developed side by side with that of mineralogy. Really, however, there is just the same connexion between crystallo- graphy and chemistry as between crystallography and minera- logy, but only in recent years has the importance of determining the crystallographic properties of artificially prepared compounds been recognized.

History. — The word "crystal" is from the Gr. KpbaraXSos, meaning clear ice (Lat. crystallum) , a name which was also applied to the clear transparent quartz (" rock-crystal ") from the Alps, under the belief that it had been formed from water by intense cold. It was not until about the 17th century that the word was extended to other bodies, either those found in nature or obtained by the evaporation of a saline solution, which resembled rock-crystal in being bounded by plane surfaces, and often also in their clearness and transparency.

The first important step in the study of crystals was made by Nicolaus Steno, the famous Danish physician, afterwards bishop of Titiopolis, who in his treatise De solido intra solidum naturaliter contento (Florence, 1669; English translation, 1671) gave the

results of his observations on crystals of quartz. He found that although the faces of different

crystals vary considerably in shape and relative size, yet the angles between similar pairs of faces are always the same. He further pointed out that the crystals must have grown in a liquid by the addition of layers of material upon the faces of a nucleus, this nucleus having the form of a regular six-sided prism terminated at each end by a six-sided pyramid. The thickness of the layers, though the same over each face, was not necessarily the same on different faces, but depended on the position of the faces with respect to the surrounding liquid; hence the faces of the crystal, though variable in shape and size, remained parallel to those of the nucleus, and the angles between them constant. Robert Hooke in his Micrographia (London, 1665) had previously noticed the regularity of the minute quartz crystals found lining the cavities of flints, and had suggested that they were built up of spheroids. About the same time the double refraction and perfect rhomboidal cleavage of crystals of calcite or Iceland-spar were studied by Erasmus Bartholinus (Experimenta crystalli Islandici disdiaclastici, Copenhagen, 1669) and Christiaan Huygens {Traiti de la lumiere, Leiden, 1690); the latter supposed, as did Hooke, that the crystals were built up of spheroids. In 1695 Anton van Leeuwenhoek observed under the microscope that different forms of crystals grow from the solutions of different salts. Andreas Libavius had indeed much earlier, in 1597, pointed out that the salts present in mineral waters could be ascertained by an examination of the shapes of the crystals left on evaporation of the water; and Domenico Guglielmini {Riflessioni filosofiche dedotte dalle figure de' sali, Padova, 1706) asserted that the crystals of each salt had a shape of their own with the plane angles of the faces always the same.

The earliest treatise on crystallography is the Prodromus Crystallographiae of M. A. Cappeller, published at Lucerne in 1723. Crystals were mentioned in works on mineralogy and chemistry; for instance, C. Linnaeus in his Systema Naturae (1735) described some forty common forms of crystals

amongst minerals. It was not, however, until the end of the 18th century that any real advances were made, and the French crystallo- graphers Rome de ITsle and the abbe Haiiy are rightly considered as the founders of the science. J. B. L. de Rome de ITsle (Essai de cristallographie, Paris, 1772; Cristallographie, ou description des formes propres a tous les corps du regne mineral, Paris, 1783) made the important discovery that the various shapes of crystals of the same natural or artificial substance are all intimately related to each other; and further, by measuring the angles between the faces of crystals with the goniometer (q.v.), he established the fundamental principle that these angles are always the same for the same kind of substance and are char- acteristic of it. Replacing by single planes or groups of planes all the similar edges or solid angles of a figure called the " primitive form " he derived other related forms. Six kinds of primitive forms were distinguished, namely, the cube, the regular octahedron, the regular tetrahedron, a rhombohedron, an octahedron with a rhombic base, and a double six-sided pyramid. Only in the last three can there be any variation in the angles: for example, the primitive octahedron of alum, nitre and sugar were determined by Rome de ITsle to have angles of 110°, 120 and 100° respectively. Rene Just Haiiy in his Essai d'une theorie sur la structure des crystaux (Paris, 1784; see also his Treatises on Mineralogy and Crystallography, 1801, 1822) supported and extended these views, but took for his primitive forms the figures obtained by splitting crystals in their directions of easy fracture of " cleavage, " which are aways the same in the same kind of substance. Thus he found that all crystals of calcite, whatever their external form (see, for example, figs. 1-6 in the article Calcite), could be reduced by cleavage to a rhombohedron with interfacial angles of 75°. Further, by stacking together a number, of small rhombohedra of uniform size he was able, as had been previously done by J. G. Gahn in I773> t° reconstruct the various forms of calcite crystals. Fig. 1 shows a scalenohedron .(o^aM^s, uneven) built

up in this manner of rhombohedra; and fig. 2 a regular octahedron built

up of cubic elements, such as are given by the cleavage of galena and rock-salt.

The external surfaces of such a structure, with their step-like arrangement, correspond to the plane faces of the crystal, and the bricks may be considered so small as not to be separately visible. By making the steps one, two or three bricks in width and one, two or three bricks in height the various secondary

Fig. I. — Scalenohedron built up of Rhombohedra.

Fig. 2.-

-Octahedron built up of Cubes.

faces on the crystal are related to the primitive form or ” cleavage nucleus ” by a law of whole numbers, and the angles between them can be arrived at by mathematical calculation. By measuring with the goniometer the inclinations of the secondary faces to those of the primitive form Haiiy found that the secondary forms are always related to the primitive form on crystals of numerous substances in the manner indicated, and that the width and the height of a step are always in a simple ratio, rarely exceeding that of 1 : 6. This laid the foundation of the important ” law of rational indices” of the faces of crystals.

The German crystallographer C. S. Weiss (De indagando formarum crystallinarum charactere geometrico principali dis- sertatio, Leipzig, 1809; Ubersichlliche Darstellung der ver- schiedenen natiirlichen Abtheilungen der KrystallisationS’Systeme, Denkschrift der Berliner Akad. der Wissensdi., 1814-1815) attacked the problem of crystalline form from a purely geo- metrical point of view, without reference to primitive forms or any theory of structure. The faces of crystals were considered by their

intercepts on co-ordinate axes, which were drawn joining the opposite corners, of certain forms; and in this way the various primitive forms of Haiiy were grouped into four classes, corresponding to the four systems described below under the names cubic, tetragonal, hexagonal and orthorhombic. The same result was arrived at independently by F. Mohs, who further, in 1822, asserted the existence of two additional systems with oblique axes. These two systems (the monoclinic and anorthic) were, however, considered by Weiss to be only hemi- hedral or tetartohedral modifications of the orthorhombic system, and they were not definitely established until 1835, when the optical characters of the crystals were found to be distinct. A system of notation to express the relation of each face of a crystal to the co-ordinate axes of reference was devised by Weiss, and other notations were proposed by F. Mohs, A. Levy (1825), C. F. Naumann (1826), and W. H. Miller (Treatise on Crystallography, Cambridge, 1839). For simplicity and utility in calculation the Millerian notation, which was first suggested by W. Whewell in 1825, surpasses all others and is now generally adopted, though those of Levy and Naumann are still in use.

Although the peculiar optical properties of Iceland-spar had been much studied ever since 1669, it was not until much later that any connexion was traced between the optical characters of crystals and their external form. In 1818 Sir David Brewster found that crystals could be divided optically into three classes, viz. isotropic, uniaxial and biaxial, and that these classes corre- sponded with Weiss's four systems (crystals belonging to the cubic system being isotropic, those of the tetragorial and hexa-gonal being uniaxial, and the orthorhombic being biaxial). Optically biaxial crystals were afterwards shown by J. F. W. Herschel and F. E. Neumann in 1822 and 1835 to be of three kinds, corresponding with the orthorhombic, monoclinic and

anorthic systems. It was, however, noticed by Brewster him- self that there are many apparent exceptions, and the ” optical anomalies ” of crystals have been the subject of much study. The intimate relations existing between various other physical properties of crystals and their external form have subsequently been gradually traced.

The symmetry of crystals, though recognized by Rome de ITsle and Haiiy, in that they replaced all similar edges and corners of their primitive forms by similar secondary planes, was not made use of in defining the six systems of crystallization, which depended solely on the lengths and inclinations of the axes of reference. It was, however, necessary to recognize that in each system there are certain forms which are only partially symmetrical, and these were described as hemihedral and tetarto- hedral forms (i.e. 17/xt-, half-faced, and Ttrapros, quarter-faced forms) .

As a consequence of Hatty’s law of rational intercepts, or, as it is more often called, the law of rational indices, it was proved by J. F. C. Hessel in 1830 that thirty-two types of symmetry are possible in crystals. Hessel’s work remained overlooked for sixty years, but the same important result was independently arrived at by the same method by A. Gadolin in 1867. At the present day, crystals are considered as belonging to one or other of thirty-two classes, corresponding with these thirty-two types of symmetry, and are grouped in six systems. More recently, theories of crystal structure have attracted attention, and have been studied as purely geometrical problems of the homogeneous partitioning of space.

The historical development of the subject is treated more fully in the article Crystallography in the 9th edition of this work. Reference may also be made to C. M. Marx, Geschichte der Crystall- kunde (Karlsruhe and Baden, 1825); W. Whewell, History of the Inductive Sciences, vol. iii. (3rd ed., London, 1857); F. von Kobell, Geschichte der Mineralogie von 1650-1860 (Munchen, 1864); L. Fletcher, An

Introduction to the Study of Minerals (British Museum Guide-Book) ; L. Fletcher, Recent Progress in Mineralogy and Crystallography [1832-1894] (Brit. Assoc. Rep., 1894).

I. CRYSTALLINE FORM

The fundamental laws governing the form of crystals are: —

1. Law of the Constancy of Angle.

2. Law of Symmetry.

3. Law of Rational Intercepts or Indices.

According to the first law, the angles between corresponding faces of all crystals of the sarne chemical substance are always the same and are characteristic of the substance.

(a) Symmetry of Crystals.

Crystals may, or may not, be symmetrical with respect to a point, a line or axis, and a plane; these ” elements of symmetry ” are spoken of as a centre of symmetry, an axis of symmetry, and a plane of symmetry respectively.

Centre of Symmetry. — Crystals which are centro-symmetrical have their faces arranged in parallel pairs; and the two parallel faces, situated on opposite sides of the centre (O in fig. 3) are alike in surface characters, such as lustre, striations, and figures of corrosion. An octahedron (fig. 3) is bounded by four pairs of parallel faces. Crystals belonging to many of the hemihedral and tetartohedral classes of the six systems of crystallization are devoid of a centre of symmetry.

Axes’ of Symmetry. — Consider the vertical axis joining the opposite corners

An Axis of symmetry of another kind is that which passing through the centre O is normal to a face of the octahedron. $y rotating the crystal about such

an axis Op (fig. 3) through an 1 angle of 120 those faces which are not perpendicular to the

axis occupy interchangeable positions; for example, the face ffi

An axis passing through the centre and the middle points d of two opposite edges of the octahedron (fig. 4), i.e. parallel

yuzf «,

Fig. 3. Fig. 4.

Axes and Planes of Symmetry of an Octahedron.

to the edges of the octahedron, is a dyad axis of symmetry. About this axis there may be rotation of 180 , and only twice in a complete revolution of 360 (=i8o°X2) is the crystal brought into interchangeable positions. There being six pairs of parallel edges on an octahedron; there are consequently six dyad axes of symmetry.

A regular octahedron thus possesses thirteen axes of symmetry (of three kinds), and there are the same number in the cube. Fig. 5 shows the three tetrad (or tetragonal) axes (aa), four triad (or trigonal) axes (pp), and six dyad (diad or diagonal) axes (dd).

Although not represented in the cubic system, there is still another kind of axis of symmetry possible in crystals. This is the hexad axis or hexagonal axis, for which the angle of rotation is 60°, or one-sixth of 360 . There can be only one hexad axis of symmetry in any crystal (see figs. 77-80).

Planes of Symmetry. — A regular octahedron can be divided into two equal and similar halves by a plane passing through the corners aia 3 did 3 and the centre O (fig. 3). One-half is the mirror reflection of the other in this plane, which is called a plane of sym- metry. Corresponding planes on either side of a plane of symmetry are inclined to it at equal angles. The octa- hedron can also be divided by

similar planes of sym- metry passing through the corners

A regular octahedron can also be divided symmetrically into two equal and similar portions by a plane passing through the corners a 3 and d 3 , the middle points d of the edges a\a\ and

rf!-V.

v! .j»£/

a /iVv-V-

Fig. 5.-

-Axes of Symmetry of a Cube.

A regular octahedron and a cube are thus each symmetrical with respect to the following elements of symmetry: a centre of symmetry, thirteen axes of symmetry (of three kinds), and nine planes of symmetry (of two kinds). This degree of sym- metry, which is the type corresponding to one of the classes of the cubic system, is the highest possible in crystals. As will be pointed out below, it is possible, however, for both the octahedron and the cube to be associated with fewer elements of symmetry than those just enumerated.

(b) Simple Forms and Combinations of Forms.

A single face aiata 3 (figs. 3 and 4) may be repeated by certain of the elements of symmetry to give the whole eight faces of the octahedron. Thus, by rotation about the vertical • tetrad axis aA* the four upper faces are obtained ; and by rotation of these about one or other of the horizontal tetrad axes the eight faces are derived. Or again, the same repetition of the faces may be arrived at by reflection across the three cubic planes of symmetry. (By reflection across the six dodecahedral

planes

• *I I*

Fig. 6. — Cube in combination with Octahedron.

Fig. 7. — Cubo-octahedron.

of symmetry a tetrahedron only would result, but if this is associated with a centre of symmetry we obtain the octahedron.) Such a set of similar faces, obtained by symmetrical repetition, constitutes a " simple form." An octahedron thus consists of eight similar faces, and a cube is bounded by six faces all of which have the same surface characters, and parallel to each of which all the properties of the crystal are identical.

Examples of simple forms amongst crystallized substances are octahedra of alum and spinel and cubes of salt and fluorspar. More usually, however, two or more forms are present on a crystal, and we then have a combination of forms, or simply a " combination." Figs. 6, 7 and 8 represent combinations of the octahedron and the cube; in the first the faces of the cube predominate, and in the third those of the octahedron; fig. 7 with the two forms equally developed is called a cubo-octahedron. Each of these combined forms has all the elements of symmetry proper to the simple forms.

The simple forms, though referable to the same type of symmetry and axes of reference, are quite independent, and cannot be derived one from the other by symmetrical repetition, but, after the manner of Rome de ITsle, they may be derived by replacing edges or corners by a face equally inclined to the faces forming the edges or corners; this is known as " trunca- tion " (Lat. truncate, to cut off). Thus in fig. 6 the corners of the cube are symmetrically replaced or truncated by the faces of the octahedron, and in fig. 8 those of the octahedron are truncated by the cube.

(c) Law of Rational Intercepts.

For axes of reference, OX, OY, OZ (fig. 9), take any three edges formed by the intersection of three faces of a crystal. These axes are called the crystallographic axes, and the planes in which they lie the axial planes. A fourth face on the crystal intersecting these three axes in the points A, B, C is taken as the parametral plane, and the lengths OA : OB : OC are the parameters of the crystal. Any other face on the crystal may be

Fig. 8. — Octahedron in combination with Cube.

referred to these axes and parameters by the ratio of the inter- cepts

OA.OB.OC

h ' k ' I '

Thus for a face parallel to the plane A Be the intercepts are in the ratio OA : OB : Oe, or

OA.OB.OC

1 ' 1 ' 2

and for a plane fgC they are Of: Og : OC or OA.OB.OC.

2 ' 3 ' 1

Now the important relation existing between the faces of a crystal is that the denominators h, k and / are always rational whole numbers, rarely exceeding 6, and usually 0,1, 2 or 3. Written in the form (hkl), h referring to the axis OX, k to OY, and / to OZ, they are spoken of as the indices (Millerian indices) of the face. Thus of a face parallel to the plane A BC the indices are (in), of ABe they are (112), and oifgC (23I). The indices are thus inversely proportional to the intercepts, and the law of rational intercepts is often spoken of as the "law of rational indices."

The angular position of a face is thus completely fixed by its indices; and knowing the angles between

the axial planes and the parametral plane all the angles of a crystal can be calculated when the indices of the faces are known.

Although any set of edges formed by the intersection of three planes may be chosen for the crystallographic axes, it is in practice usual to select certain edges related to the symmetry of the crystal, and usually coincident with axes of symmetry; for then the indices' will be simpler and all faces of the same simple form will have a similar set of indices. The angles between p IG . g.. the axes and the ratio of the lengths of the parameters

OA: OB: OC (usually given as a: b: c) are spoken of as the " elements " of a crystal, and are constant for and characteristic of all crystals of the same substance. <■

The six systems of crystal forms, to be enumerated below, are defined by the relative inclinations of the crystallographic axes and the lengths of the parameters. In the cubic system, for example, the three crystallographic axes are taken parallel to the three tetrad axes of symmetry, i.e. parallel to the edges of the cube (fig. 5) or joining the opposite corners of the octahedron (fig. 3), and they are therefore all at right angles; the parametral plane (in) is a face of the octahedron, and the parameters are all of equal length. The indices of the eight faces of the octahedron will then be (in), (III), (in), (ill), (in), (ill), (ill), (III). The symbol (in) indicates all the faces belonging to this simple form. The indices of the six faces of the cube are (100), (010), (001), (100), (oio), (00I); here each face is parallel to two axes, i.e. intercepts them at infinity, so that the corre- sponding indices are zero.

(d) Zones.

An important consequence of the law of rational intercepts is the arrangement of the faces of a crystal in zones. All faces, whether they belong to

one or more simple forms, which intersect in parallel edges are said to lie in the same zone. A line drawn through the centre O of the crystal parallel to these edges is called a zone-axis, and a plane perpendicular to this axis is called a zone-plane.' On a cube, for example, there are three zones each containing four faces, the zone-axes being coincident with the three tetrad axes of symmetry. In the crystal of zircon (fig. 88) the eight prism-faces a, m, &c. constitute a zone, denoted

-Crystallographic axes of reference. ,

by [a, m, a', &c], with the vertical tetrad axis of symmetry as

zone-axis. Again the faces [a, x, p, e', p', x'" , a"] lie in another

zone, as may be seen by the parallel edges of intersection of the

faces in figs. 87 and 88; three other similar zones may he traced

on the same crystal.

The direction of the line of intersection (i.e. zone-axis) of any

two planes (hkl) and (hkji) is given by the zone-indices [uvw],

where U=kh—lki, V=lhi—hli, and W—hki—khi, these being

obtained from the face-indices by cross multiplication as

follows: —

h k I h k I xxx

h h /j hi ki k.

Any other face (hzkj?) lying in this zone must satisfy the equation

hta + kiV + kvr = o.

This important relation connecting the indices of a face lying in a zone with the zone-indices is known as Weiss's zone-law, having been first enunciated by C. S. Weiss. It may be pointed out that the indices of a face may be arrived at by adding together the indices of faces on either side of it and in the same zone; thus, (311) in fig. 12 lies at the intersections of the three zones [210, 101], [201, no] and [211, 100], and is obtained by adding together each set of indices.

(e) Projection and Drawing of Crystals. The shapes and relative sizes of the faces of a crystal being as a rule accidental, depending only on the distance of the faces

Fig. 10. — -Stereographic Projection of a Cubic Crystal.

from the centre of the crystal and not on their angular relations, it is often more convenient to consider only the directions of the normals to the faces. For this purpose projections are drawn, with the aid of which the zonal relations of a crystal are more readily studied and calculations are simplified.

The kind of projection most extensively used is the " stereo- graphic projection;" The crystal is considered to be placed inside a sphere from the centre of which normals are drawn to all the faces of the crystal. The points at which these normals intersect the surface of the sphere are called the poles of the faces, arid by these poles the positions of the faces are fixed. The poles of all faces in the same zone on the crystal will lie on a great circle of the sphere, which are therefore called zone-circles. The calculation of the angles

between the normals of faces and between zone-circles is then performed by the ordinary methods of spherical trigonometry. The stereographic projection, however, represents the poles and zone-circles on a plane surface and not on a spherical surface. This is achieved by drawing lines joining all the poles of the faces with the north or south pole of the sphere and finding their points of intersection with the plane of the equatorial great circle, or primitive circle, of the sphere, the projection being represented on this plane. In fig. 10 is shown the stereographic projection, or stereogram, of a

cubic crystal; a 1 , a 2 , &c. are the poles of the faces of the cube. o 1 , o 1 , &c. those of the octahedron, and d 1 , d 1 , &c. those' of the rhombic dodecahedron. The straight lines and circular arcs are the projections on the equatorial plane of the great circles in which the nine planes of symmetry intersect the sphere. A drawing of a crystal showing a combination of the cube, octa-hedron and rhombic dodecahedron is shown in fig. n, in which the faces are lettered the same as the corresponding poles in the projection. From the zone-circles in the projection and the parallel edges in the drawing the zonal relations of the faces are readily seen: thus [aVrf 6], [aW], [a'oW], &c. are zones. A stereographic projection of a | rhombohedral crystal is given in fig. 72.

Another kind of projection in common (use is the " gnomonic projection " (fig. 12). Here the plane of projection is tangent to

the sphere, and normals to all the faces are F Clino-

drawn from the centre of the sphere tOg ra p n j,lDrawingofa intersect the plane of projection. In this Cubic Crystal, case all zones are represented by straight lines. Fig. 12 is the gnomonic projection of a cubic crystal, the plane of projection being tangent to the sphere at the pole of an octahedral face (in), which is therefore in

the centre of the projection. The indices of the several poles are given in the figure.

In drawing crystals the simple plans and elevations of descrip- tive geometry (e.g. the plans in the lower part of figs. 87 and 88) have sometimes the advantage of showing the symmetry of a crystal, but they give no idea of solidity. For instance, a cube would be represented merely by a square, and an octahedron by a square with lines joining the opposite corners. True per- spective drawings are never used in the representation of crystals, since for showing the zonal relations it is important to preserve the parallelism of the edges. If, however, the eye, or point of vision, is regarded as being at an infinite distance from the object all the rays will be parallel, and edges which are parallel on the crystal will be represented by parallel lines in the drawing. The plane of the drawing, in which the parallel rays joining the corners of the crystals and the eye intersect, may be either perpendicular or oblique to the rays; in the former case we have an "orthographic" (bpdos, straight; ypafaw, to draw) drawing, and in the latter a " clinographic " (k \Lvuv. to incline)

lit tSo&Ofio '»>»«> no 43pfco' 2«o sio .?« 410 Fig. 12.— Gnomonic Projection of a Cubic Crystal.*

drawing. Clinographic drawings are most frequently used for representing crystals. In representing, for example, a cubic crystal (fig. 11) a cube face a 5 is first placed parallel to the plane on which the crystal is to be projected and with one set of edges vertical; the crystal is then turned through a small angle about a vertical axis until a second cube face a 2 comes into view,

and the eye is then raised so that a third cube face a 1 may be seen.

(f) Crystal Systems and Classes.

According to the mutual inclinations of the crystallographic axes of reference and the lengths intercepted on them by the, parametral plane, all crystals fall into one or other of six groups or systems, in each of which there are several classes depending on the degree of symmetry. In the brief description which follows of these six systems and thirty-two. classes of crystals we shall proceed from those in which the symmetry is most complex to those in which it is simplest.

1. CUBIC SYSTEM

(Isometric ; Regular ; Octahedral ; Tesseral).

In this system the three crystallographic axes of reference are all at right angles to each other and are equal in length. They are parallel to the edges of the cube, and in the different classes Coincide either with tetrad or dyad axes of symmetry. Five classes are in- cluded in this system, in all of which there are, besides other elements of symmetry, four triad axes.

In crystals of this system the angle between any two faces P and Q with the indices (hkl) and {pqr) is given by the equation

Cog PQ —

The angles between faces with the same indices are thus the same in all substances which crystallize in the cubic system: in other systems, the angles vary with the substance and are characteristic of it.

HOLOSYMMETRIC CLASS

(Holohedral (oXos, whole) ; Hexakis-octahedral).

Crystals of this class possess the full number of elements of sym- metry already mentioned above for the octahedron and the cube, viz. three cubic planes of symmetry, six dodecahedral planes, three tetrad axes of symmetry, four triad axes, six dyad axes,

and a centre of symmetry.

Fig. 13. — Rhombic Dodecahedron.

Fig. 14. — Combination of Rhombic Dodecahedron and Octahedron.

There are seven kinds of simple forms, viz. : —

Cube (fig. 5). This is bounded by six square faces parallel to the cubic planes of symmetry; it is known also as the hexahedron. The angles between the faces are 90°, and the indices of the form are (100). Salt, fluorspar and galena crystallize in simple cubes.

Fig. 15.— Triakis-octahedron.

Fig. 16. — Combination of Triakis- octahedron and Cube.

Octahedron (fig. 3). Bounded by eight equilateral triangular faces perpendicular to the triad axes of symmetry. The angles between the faces are 70° 32' and 109 28′, and the indices are (m). Spinel, magnetite and gold crystallize in simple octahedra. Combinations of the cube and octahedron are shown in figs. 6-8.

Rhombic dodecahedron (fi^. 13;. Bounded by twelve rhomb- shaped faces parallel to the six dodecahedral planes of symmetry. The angles between the normals to adjacent faces are 6o°, and

between other pairs of faces 90 ; the indices are {no). Garnet frequently crystallizes in this form. Fig. 14 shows the rhombic dodecahedron in combination with the octahedron.

In these three simple forms of the cubic system (which are shown in combination in fig. 1 1) the angles between the faces and the indices

Fig. 17. — Icositetrahedron.

Fig. 18. — Combination of Icosi- tetrahedron and

are fixed and are the same in all crystals ; in the four remaining simple forms they are variable.

'■ Triakis-Octahedron (three-faced octahedron) (fig. 15). This solid is bounded by twenty-four isosceles triangles, and may be considered as an octahedron with a low triangular pyramid on each of its faces. As the inclinations of the faces may vary there is a series of these forms with the indices {221J, {331}, {332), &c. or in general \hhk.

Fig. 19. — Combination of Icositetrahedron and Octa-hedron.

Fig. 20. — Combination of Icositetrahedron {21 ij and Rhombic Dodecahedron.

Icositetrahedron (fig. 17). Bounded by twenty-four trapezoidal faces, and hence sometimes called a " trapezohedron." The indices are J2 1 1) , (3.1 1 } , (322) , &c. , or in general {hkk} . Analcite, leucite and garnet often crystallize in the simple form {2 1 1 } . Combinations are shown in figs. 18-20. The plane ABe in fig. 9 is one face (112) of an icositetrahedron; the indices of the remaining faces in this octant being (211) and (121).

Fig. 21. — Tetrakis-hexahedron. Fig. 22. — Tetrakis-hexahedron.

Tetrakis-hexahedron (four-faced cube) (figs. 21 and 22). Like the triakis-octahedron this solid is also bounded by twenty-four isosceles triangles, but here grouped in fours over the cubic faces. The two figures show how, with different inclinations of the faces, the form may vary, approximating in fig. 21 to the cube and in fig. 22 to the rhombic dodeca-hedron. The angles over the edges lettered A are different : from the angles over the edges lettered C. Each face is parallel to one of the crystallo-graphic axes and intercepts the two others in different lengths; the in- dices are therefore {210), (310), {320), &c, in general |iio|. Fluorspar

some- times crystallizes in the simple form I310! ; more usually, however, in combination with the cube (fig. 23).

Hexakis-octahedron (fig. 24). Here each face of the octahedron is replaced by six scalene triangles, so that altogether there are

Fig. 23. — Combination of Tetrakis-hexahedron and Cube.

forty-eight faces. This is the greatest number of faces possible for any simple form in crystals. The faces are all oblique to the planes arid axes of symmetry, and they intercept the three crystallographic axes in different lengths, hence the indices are all unequal, being in general [hkl] , or in particular cases I321), {421I, {432} , &c. Such a form is known as the ” general form ” of the class. The interfaeial angles over the three edges of each triangle are all different. These forms usually exist only in combination with other cubic forms (for example, fig; 25), but {42 1 1 has been observed as a simple form on fluorspar.

Fig. 24. — Hexakis-octahedron.

Fig. 25. — Combination of Hexakis - octahedron and Cube.

Several examples of substances which crystallize in this class have been mentioned above under the different forms; many others might be cited — for instance, the metals iron, copper, silver, gold, platinum, lead, mercury, and the non-metallic elements silicon and phosphorus.

Tetrahedral Class

(Tetrahedral-hemihedral ; Hexakis-tetrahedral).

In this class there is no centre of symmetry nor

cubic planes of symmetry; the three tetrad axes become dyad axes of symmetry, and the four triad axes are polar, i.e. they are associated with different faces at their two ends. The other elements of symmetry (s'x dode- cahedral planes and six dyad axes) are the same as in the last class.

Of the seven simple forms, the cube, rhombic dodecahedron and tetrakis-hexahedron are geometrically the same as before, though on actual crystals the faces will have different surface characters.

Fig

Tetrahedron. Fig. 27. — Deltoid Dodecahedron.

For instance, the cube faces will be striated parallel to only one of the diagonals (fig. 90), and etched figures on this face will be sym- metrical with respect to two lines, instead of four as in the last class. The remaining simple forms have, however, only half the number of faces as the corresponding form in the last class, and are spoken of as " hemihedral with inclined faces."

Tetrahedron (fig. 26). This is bounded by four equilateral triangles and is identical with the regular tetrahedron of geometry. The angles between the normals to the faces are 109 28 . It may be derived from the octahedron by suppressing the alternate faces.

Fig. 28. — Triakis-tetrahedron.

Fig. 29. — Hexakis-tetrahedron.

Deltoid 1 dodecahedron (fig. 27). This is the hemihedral form of the triakis-octahedron ; it has the indices {hhk\ and is bounded by twelve trapezoidal faces.

1 From the Greek letter SeXro, A; in general, a triangular-shaped object ; also an alternative name for a trapezoid. ;

Triakis-tetrahedron (fig. 28). The hemihedral form \hkk\ol the icositetrahedron ; it is bounded by twelve isosceles triangles ar- ranged in threes over the tetrahedron faces.

Hexakis-tetrahedron (fig. 29). The hemihedral form {hkl} of the hexakis-octahedron ; it is bounded by twenty-four scalene triangles and is the general form of the class.

Fig. 30. — Combination of two Tetrahedra.

Fig.

31. — Combination of Tetra- hedron and Cubes

Corresponding to each of these hemihedral forms there is another geometrically similar form, differing, however, not only in orient- ation, but also in actual crystals in the characters of the faces. Thus from the octahedron there may be derived two tetrahedra with the -indices |iii(and(Tn|, which may be distinguished as positive and negative respectively. Fig. 30 shows a combination of

, Fig. 32.— Combination of Tetrahedron, Cube and Rhombic Dodecahedron.

Fig. 33. — Combination of Tetrahedron and Rhombic Dodecahedron.

these two tetrahedra, and represents a crystal of blende, in which the four larger faces are dull and striated, whilst the four smaller are bright and smooth. Figs. 31-33 illustrate other tetrahedral com- binations.

Tetrahedrite, blende, diamond, boracite and pharmacosiderite are substances which crystallize in this class.

Pyritohedral 1 Class (Parallel-faced hemihedral; Dyakis-dodecahedral).

Crystals of this class possess three cubic planes of symmetry but no dodecahedral planes. There are only

three dyad axes of sym- metry, which coincide with the crystallographic axes; in addition there are three triad axes and a centre of symmetry.

Here the cube, octahedron, rhombic dodecahedron, triakis-octa- hedron and icositetrahedron are geometrically the same as in the first class. The characters of the faces will, however, be different; thus the cube faces will be striated parallel to one edge only (fig. 89),

, Fig. 34. Pentagonal Dodecahedron.

.Fig. 35. Dyakis-dodecahedron.

and triangular markings on the octahedron faces will be placed obliquely to the edges. The remaining simple forms are ” hemi- hedral with parallel faces,” and from the corresponding holohedral forms two hemihedral forms, a positive and a negative, may be derived.

Pentagonal dodecahedron (fig. 34). This is bounded by twelve pentagonal faces, but these are not regular pentagons, and the angles over the three sets of different edges are different. The regular dodecahedron of geometry, contained by twelve regular pentagons, is not a possible form in crystals. The indices are {hko) : as a simple form | 2lo|is of very common occurrence in pyrites.

Dyakis-dodecahedron (fig. 35). This is the hemihedral form of

1 Named after pyrites, which crystallizes in a typical form of this class.

the hexakis-octahedron and has the indices {hkl} ; it is bounded by twenty-four faces. As a simple form (321) is met with in pyrites.

Combinations (figs. 36-39) of these forms with the

cube and the octahedron are common in pyrites. Fig. 37 resembles in general

Fig. 36. — Combination of Pentagonal Dodecahedron and Cube.

Fig. 37. — Combination of Pentagonal Dodecahedron and Octahedron.

appearance the regular icosahedron of geometry, but only eight of the faces are equilateral triangles. Cobaltite, smaltite and other sulphides and sulpharsenides of the pyrites group of minerals crystallize in these forms. The alums also belong to this class; from an aqueous solution they crystallize as simple octahedra,

Fig. 38. — Combination of Fig. 39. — Combination of

PentagonalDodecahedron.Cube Pentagonal Dodecahedron e

and Octahedron. I210I, Dyakisvdodecahedron /

{321 J, and Octahedron d {m).

sometimes with subordinate faces of the cube and rhombic dode- cahedron, but from an acid solution as octahedra combined with the pentagonal dodecahedron |2io).

Plagihedral 1 Class

(Plagihedral-hemihedral ; Pentagonal icositetrahedral ; Gyroidal 2).

In this class there are the full number of axes of symmetry (three tetrad, four triad and six dyad), but no planes of symmetry and no centre of symmetry.

Pentagonal icositetrahedron (fig. 40). This is the only simple form in this class which differs geometrically from those of the holosymmetric class. By suppressing either one or other set of alternate faces of the hexakis-octahedron two pentagonal icositetrahedra {hkl} and \khl\ are derived. These

are each bounded by twenty-four irregular

Fig. 40. — Pentagonal Icositetrahedron.

Fig. 41.

-Tetrahedral Pentagonal Dodecahedron.

pentagons, and although similar to each other they are respectively right- and left-handed, one being the mirror image of the other; such similar but nonsuperposable forms are said to be enantiomorphous (havTios, opposite, and m°P

Tetartohedral Class (Tetrahedral pentagonal dodecahedral). Here, in addition to four polar triad axes, the only other elements of symmetry are three dyad axes, which coincide with the crystallo-

1 From irXA-ctos, placed sideways, referring to the absence of planes and centre of symmetry. 3 From yvpos, a ring or spiral, and tXSos, form.

graphic axes. Six of the simple forms, the cube, tetrahedron, rhombic dodecahedron, deltoid dodecahedron, triakis-tetrahedron and pentagonal dodecahedron, are geometrically the same in this class as in either the tetrahedral or pyritohedral classes. The general form is the

Tetrahedral pentagonal dodecahedron (fig. 41). This is bounded by twelve irregular pentagons, and is a tetartohedral or quarter-faced form of the hexakis-octahedron. Four such forms may be derived, the indices of which are [hkl], \khl), \hkl] and {khl} ; the first pair are enantiomorphous with respect to one another, and so are the last pair. Barium nitrate, lead nitrate, sodium chlorate and sodium bromate crystallize in this class, as also do the minerals ullmannite (NiSbS) and langbeinite (K 2 Mg 2 (S04) 3).

2. TETRAGONAL SYSTEfl

(Pyramidal; Quadratic; Dimetric).

In this system the three crystallographic axes are all at right angles, but while two are equal in length and interchangeable the third is of a different length. The unequal axis is spoken of as the principal axis or morphological axis of the crystal, and it is always placed in a vertical position ; in five of the seven classes of this system it coincides with the single tetrad axis of symmetry.

The parameters are a: a: c, where a refers to the two equal hori-

Fig. 42.

Tetragonal Bipyramids.

Fig. 43.

zontal axes, and c to the vertical axis; c may be either shorter (as in fig. 42) or longer (fig. 43) than a. The ratio a: c is spoken of as the axial ratio of a crystal, and it is dependent on the angles between the faces. In all crystals of the same substance this ratio is constant, and is characteristic of the substance; for other substances crystal- lizing in the tetragonal system it will be different. For example, in cassiterite it is given as a : c = 1 : 0-67232 or simply as c = 0-67232, o being unity; and in anatase as c = i-777i.

Holosymmetric Class (Holohedral; Ditetragonal bipyramidal).

Crystals of this class are symmetrical with respect to five planes, which are of three kinds ; one is perpendicular to the principal axis, and the other four intersect in it ; of the latter, two are perpendicular to the equal crystallographic axes, while the two others bisect the angles between them. There are five axes of symmetry, one tetrad and two pairs of dyad, each perpendicular to a plane of symmetry. Finally, there is a centre of symmetry.

There are seven kinds of simple forms, viz. : —

Tetragonal bipyramid of the first order (figs. 42 and 43). This is bounded by eight equal isosceles triangles. Equal lengths are inter- cepted on the two horizontal axes, and the indices are {iii|, (221), (112), &c, or in general {hhl}. The parametral plane with the inter- cepts a : a : c is a face of the bipyramid {m}.

Tetragonal bipyramid of the second order. This is also bounded by eight equal isosceles triangles, but differs from the last form in

Fig. 44. Fig. 45.

Tetragonal Bipyramids of the first and second orders.

its position, four of the faces being parallel to each of the horizontaf axes; the indicesare therefore jioij, J201J, |i02J, &c, or {hoi}.

Fig. 44 shows the relation between the tetragonal bipyramids

of the first and second orders when the indices are fill} and {ioi| respectively: ABB is the face (m), and ACC is (101). A com- bination of these two forms is shown in fig. 45.

Ditetragonal bipyramid (fig. 46). This is the general form; it is bounded by sixteen scalene triangles, and all the indices are unequal, being I321I, &c, or \hkl.

Tetragonal prism of the first order. The four faces intersect the horizontal axes in equal lengths and are parallel to the principal axis; the indices are therefore (uo|. This form does not enclose space, and is therefore called an ” open form ” to distinguish it from a ” closed form ” like the tetragonal bipyramids and all the forms of the cubic system. An open form can exist only in com- bination

with other forms ; thus fig. 47 is a combination of the tetragonal prism jiIo| with the basal pinacoid jooij. If the faces (no) and (001) are of equal size such a figure will be geometrically a cube, since all the angles are right angles; the variety of apophyllite known as tesselite crystal- lizes in this form.

Tetragonal prism of the second order. This has the same number of faces as the last prism, but differs in position; each face being parallel to the vertical axis and one of the horizontal axes; the indices are jiooj.

Ditetragonal prism. This consists of eight faces all parallel to the principal axis and intercepting the horizontal axes in different lengths; the indices are |2lo(, J320), &c, or \hko).

Basal pinacoid (from x£ca£, a tablet). This consists of a single pair of parallel faces perpendicular to the principal axis. It is there- fore an open form and can exist only in combination (fig. 47).

Combinations of holohedral tetragonal forms are shown in figs. 47-49 ; fig. 48 is a combination of a bipyramid of the first order with one of the second order and the prism of the first order; fig. 49 a

Fig.

46.— Ditetragonal Bipyramid.

Fig. 47. Combination of Tetragonal Prism and Basal Pinacoid.

Fig. 48. Fig. 49.

Combinations of Tetragonal Prisms and Pyramids.

combination of a bipyramid of the first order with a ditetragonal bipyramid and the prism of the second order. Compare also figs. 87 and 88. _ . . '. .

Examples of substances which crystallize inthisclassarecassiterite, rutile, anatase, zircon,

thorite, vesuvianite, apophyllite, phosgenite, also boron, tin, mercuric iodide.

SCALENOHEDRAL CLASS

(Bisphenoidal-hemihedral).

Here there are only three dyad axes and two planes of symmetry, the former coinciding with the crystalldgraphic axes and the latter bisecting the angles between the horizontal pair. The dyad axis of symmetry, which in this class coincides with the principal axis of the crystal, has certain of the characters of a tetrad axis, and is sometimes called a tetrad axis of ” alternating symmetry ” ; a face on the upper half of the crystal if rotated through 90° about this axis and reflected across the equatorial plane falls into the position of a face on the lower half of the crystal. This kind of symmetry, with simultaneous rotation about an axis and reflection across a plane, is also called ” composite symmetry.”

In this class all except two of the simple forms are geometrically the same as in the holosymmetric class.

Bisphenoid (ariv, a wedge) (fig. 50). This is a double wedge- shaped solid bounded by four equal isosceles triangles; it has the indices (ill), J2il), (i 12 !, &c, or in general \hhl. By suppressing either one or other set of alternate faces of the tetragonal bipyramid of the first order (fig. 42) two bisphenoids are derived; in the

same way that two tetrahedra are derived from the regular octahedron.

Tetragonal scalenohedron or ditetragonal bisphenoid (fig. 51). This is bounded by eight scalene triangle’s and has the indices \hkl. It may be considered as the hemihedral form of the ditetragonal bipyramid.

Fig. 50. — Tetragonal Bisphenoids.

Fig. 51. — Tetragonal Scalenohedron.

The crystal of chalcopyrite (CuFeSz) represented in fig. 52 is a combination of two bisphenoids (P and P')> two bipyramids of the second order (6 and c), and the basal pinacoid (a). Stannite (Cu 2 FeSnS4),acid potassium phosphate (H 2 KPOi),mercuriccyanide, and urea (CO(NH 2) 2) also crystallize in this class.

BlPYRAMIDAL CLASS

(Parallel-faced hemihedral).

The elements of symmetry are a tetrad axis with a plane per- pendicular to it, and a centre of symmetry. The simple forms are the same here as in the holosymmetric class, except the prism \hko\, which has only four faces, and the bipyramid \hkl} , which has eight faces and is distinguished as a " tetragonal pyramid of the third order."

Fig. 52. — Crystal of Chalcopyrite. Fig. 53. — Crystal of Fergusonite.

Fig. 53 shows a combination of a tetragonal prism of the first order with a tetragonal bipyramid of the third order and the basal pinacoid, and represents a crystal of fergusonite. Scheelite (q.v.), scapolite (q.Vi), and erythrite (C4H10O4) also crystallize in this class.

Pyramidal Class (Hemimorphic-tetartohedral).

Here the only element of symmetry is the tetrad axis. The pyra- mids of the first \hhl\, second {hol \ and third \hkl\ orders have each only four faces atone or other end of the crystal, and are hemimorphic. All the simple forms are thus open forms.

Examples are wulfenite (PbMoCu) and barium antimonyl dextro- tartrate (Ba(SbO) 2 (C4H 4 6)-H 2 0).

Ditetragonal Pyramidal Class (Hemimorphic-hemihedral) .

Here there are two pairs of vertical planes of symmetry inter- secting in the tetrad axis. The pyramids \hhl\ and [hol\ and the bipyramid \hkl) are all hemimorphic.

Examples are iodosuccimide (C 4 H 4 2 N I) , silver fluoride (AgF • H2O) , and penta-erythrite (C 6 Hi 2 C>4). No examples are known amongst minerals.

Trafezohedral Class (Trapezohedral-hemihedral) .

Here there are the full number of axes of symmetry, but no planes or centre of symmetry. The general form \hkl\ is bounded by eight trapezoidal faces and is the tetragonal trapezohedron.

Examples are nickel sulphate (NiS0 4 -6H 2 0), guanidine carbonate ((CH 5 N 3) 2 H 2 C0 3), strychnine sulphate((C 2 ,H 22 N 2 2) 2 -H 2 SOi-6H 2 0).

BlSPHENOIDAL CLASS

(Bisphenoidal-tetartohedral).

Here there is only a single dyad axis of symmetry, which coincides with the principal axis. All the forms, except the prisms and basal pinacoid, are sphenoids. Crystals possessing this type of symmetry have not yet been observed.

3. ORTHORHOMBIC SYSTEM

(Rhombic; Prismatic; Trimetric).

In this system the three crystallographic axes are all at right angles, but they are of different lengths and not interchangeable. The parameters, or axial ratios, are a: b: c, these referring to the

axes OX, OY and OZ respectively. The choice of a vertical axis, OZ = c, is arbitrary, and it is customary to place the longer of the two horizontal axes from left to right (OY = b) and take it as unity: this is called the ” macro-axis ” or ” macro-diagonal ” (from iiaKpds, long), whilst the shorter horizontal axis (OX = a) is called the ” brachy-axis ” or ” brachy-diagonal ” (from /3paxis, short). The axial ratios are constant for crystals of any one substance and are characteristic of it; for example, in barytes (BaSCh), a: b: c = 0-8152: 1: 1-3136; inanglesite (PbSOi), 0:6:0 = 0-7852: 1: 1-2894; in cerussite (PbC0 3), a:6:c=o-6loo: 1:0-7230.

There are three symmetry-classes in this system : —

HOLOHEDRAL CLASS

(Holohedral; Bipyramidal).

Here there are three dissimilar dyad axes of symmetry, each coinciding with a crystallographic axis; perpendicular to them are three dissimilar planes of symmetry; there is also a centre of symmetry. There aFe seven kinds of simple forms: —

Bipyramid (figs. 54 and 55). This is the general form and is bounded by eight scalene triangles; the indices are (m), {211),

Fig. 54. Fig. 55.

Orthorhombic Bipyramids.

J22IJ, {112}, (321I, J123I, &c, or in general {hkl). The crystallo- graphic axes join opposite corners of these pyramids and in the fundamental bipyramid (in) the parametral plane has the intercepts a: b: c. This is the only closed form in this class; the others are open forms and can exist only in combination. Sulphur often crystallizes in simple bipyramids.

Prism. This consists of four faces parallel to the vertical axis and intercepting the horizontal axes in the lengths a and b or in any multiples of these;

the indices are therefore jno[, (210), J120) or \hko.

Macro-prism. This consists of four faces parallel to the macro-

Fig. 56. — Macro-prism and Brachy-pinacoid.

Fig.

57. — Brachy-prism and Macro-pinacoid.

axis, and has the indices jioi), {201) ... or {hoi}.

Brachy-prism. This consists of four faces parallel to the brachy- axis, and has the indices (on), {02 1 J . . . {okl}. The macro- and brachy-prisms are often called ” domes.”

Basal pinacoid, consisting of a pair of parallel faces perpendicular to the vertical axis; the indices are jooij. The macro-pinacoid

{100} and the brachy-pinacoid {010} each consist of a pair of parallel faces respectively parallel to the macro- and the brachy-axis.

Figs. 56-58 show combinations of these six open forms, and fig. 59 a combination of the macro-pinacoid (a), brachy-pinacoid (b), a prism (w) , a macro-prism (d) , a brachy-prism (k) , and a bipyramid (») .

*Fig. 58. — Prism a*nd Basal Fig. 59. — Crystal of*

Pinacoid. Hypersthene.

Holohedral Orthorhombic Combinations.

Examples of substances crystallizing in this class are extremely numerous; amongst minerals are sulphur, stibnite, cerussite, chrysoberyl, topaz, olivine, nitre, barytes, columbite and many others; and amongst artificial products iodine, potassium per- manganate, potassium sulphate, benzene, barium formate, &c.

Pyramidal Class (Hemimorphic).

Here there is only one dyad axis in which two planes of symmetry intersect. The crystals are usually so placed that the dyad axis coincides with the vertical crystallographic axis, and the planes of symmetry are also vertical.

The pyramid [hkl] has only four faces at one end or other of the crystal. The macro-prism and the brachy-prism of the last class are here represented by the macro-dome and brachy-dome respectively, so called because of the resemblance of the pair of equally, sloped faces to the roof of a house. The form (001 j is a single plane at the topof the crystal, and is called a ” pedion “; the parallel pedion jooi) , if present at the lower end of the crystal, constitutes a different form. The prisms {hko} and the macro and brachy-pinacoids are geometrically the same in this class as in the last. Crystals of this class are therefore differently developed at the two ends and are said to be ” hemimorphic.”

Fig. 60 shows a crystal of the mineral hemimorphite (H 2 Zn 2 SiOs) which is a combination of the brachy-pinacoid (oio) and a prism,

(^^>

Fig. 60. — Crystal of Hemimorphite.

Fig. 61.— Orthorhombic Bisphenoid.

with the pedion (001), two brachy-domes and two macro-domes at the upper end, and a pyramid at the lower end. Examples of other substances belonging to this class are struvite (NH 4 MgP04-6H 2 O), bertrandite (H 2 Be4Si 2 0(,), resorcin, and picric acid.

BlSPHENOIDAL CLASS

(Hemihedral).

Here there are three dyad axes, but no planes of

symmetry and no centre of symmetry. The general form [hkl] is a bisphenoid (fig. 61) bounded by four scalene triangles. The other simple forms are geometrically the same as in the holosymmetric class.

Examples: epsomite (Epsom salts, MgS04-7H 2 0), goslarite (ZnS04-7H 2 0), silver nitrate, sodium potassium dextro-tartrate (seignette salt, NaKC4H40«-4H 2 0), potassium antimonyl dextro-tartrate (tartar-emetic, K(SbO)C4H 4 06), and asparagine (C4H 8 N 2 0,-H20).

CRYSTALLOGRAPHY

579

4. MONOCLINIC i SYSTEM

(Oblique; Monosymmetric). In this system two of the angles between the crystallographic axes are right angles, but the third angle is oblique, and the axes are of unequal lengths. The axis which is perpendicular to the other two is taken as OY — b (fig. 62) and is called the ortho-axis or ortho-diagonal. The choice of the other two axes is arbitrary ; the vertical axis (OZ = c) is usually taken parallel to the edges of a prominently developed prismatic zone, and the clino-axis or clino-diagonal (OX = a) parallel to the zone-axis of some other prominent zone on the crystal. The acute angle between the axes OX and OZ is usually denoted as ff, and it is necessary to know its magnitude, in addition to the axial ratios a: b: c, before the crystal is completely deter- mined. As in other" systems, except the cubic, these elements, a : b : c and /3, are characteristic of the substance. Thus for gypsum a : b : £=0-6899 : 1:0-4124; /S = 8o° 42'; for orthoclase a : b : c = 0-6585 :l : 0-5^554; = 63° 57'; and for cane-sugar a : b :c = 1-2595 : 1 : 0-8782; = 76° 30'.

HOLOSYMMETRIC CLASS

(Holohedral; Prismatic).

Here there is a single plane of symmetry perpendicular to which is a dyad axis ; there is also a centre of symmetry. The dyad axis coincides with the ortho-axis OY, and the vertical axis OZ and the clino-axis OX lie in the plane of symmetry.

All the forms are open, being either pinacoids or prisms; the former consisting of a pair of parallel faces, and the latter of four faces intersecting in parallel edges and with a rhombic cross-section. The pair of faces parallel to the plane of symmetry is distinguished as the ” clino-pinacoid ” and has the indices joioj. The other pinacoids are all perpendicular to the plane of symmetry (and parallel to the ortho-axis) ; the one parallel to the vertical axis is called the ” ortho-pinacoid ” {100), whilst that parallel to the clino- axis is the ” basal pinacoid ” (001 j ; pinacoids not parallel to the arbitrarily chosen clino- and vertical axes may have the indices |ioi), {201!, {102J . . . (hoi) or |ioi|, (201), JT02! . . . {EoZ), according to whether they lie in the obtuse or the acute axial angle. Of the prisms, those with edges (zone-axis) parallel to the clino-axis, and having indices joul, {021J, {012) . . . \okl\ , are called ” clino- prisms ” ; those with edges parallel to the vertical. axis, and with the indices {noj, (210), {120) . . . \hko], are called simply “prisms.” • Prisms with edges parallel to neither of the axes OX and OY have the indices (in), {221), | 2iij, {321I . . . [hkl\ or {in| . . . {hkl\,

Fig. 62. — Monoclinic Axes and Hemi-pyramid.

Fig. 63. — Crystal of Augite.

and are usually called ” hemi-pyramids ” (fig. 62) ; they are dis- tinguished as negative or positive according to whether they lie in the obtuse or the acute axial angle fi.

Fig. 63 represents a crystal of augite bounded by the clino- pinacoid (I), the ortho-pinacoid ®, a prism (M), and a hemi-pyramid

The substances which crystallize in this class are extremely numerous: amongst minerals are gypsum, orthoclase, the amphi- boles, pyroxenes and micas, epidote, monazite, realgar, borax, mirabilite (Na 2 SO4-10H 2 O), melanterite (FeS0 4 -7H 2 0) and many others; amongst artificial products are monoclinic sulphur, barium chloride (Ba0 2 -2H 2 0), potassium chlorate, potassium ferrocyanide (K 4 Fe(CN) e -3H 2 0), oxalic aqid (C 2 4 H 2 -2H 2 0), sodium acetate (NaC 2 H 3 2 -3H a O) and naphthalene.

Hemimorphic Class (Sphenoidal).

In this class the only element of symmetry is a single dyad axis, which is polar in character, being dissimilar at the two ends.

The form (oioj perpendicular to the axis of symmetry consists of a single plane or pedion; the parallel face is dissimilar in character and belongs to the pedion (olo[. The pinacoids jioo), jooij, [hoi] and {hoi} parallel to the axis of symmetry are geometrically the

1 From jaWs, single, and Mvtiv, to incline, since one axis is inclined to the plane of the other two axes, which are at right angles.

same in this class as in the holosymmetric class. The remaining forms consist each of only two planes on the same side of the axial plane XOZ and equallyjnclined to the dyad axis (e.g. in fig. 62 the two planes XYZ and XYZ); such a wedge-shaped form is some- times called a sphenoid.

Fig. 64. — Enantiomorphous Crystals of Tartaric Acid.

Fig. 64 shows two crystals of tartaric acid, a a right-handed crystal of dextro-tartaric acid, and b a left-handed crystal of laevo- tartaric acid. The two crystals are enantiomorphous, i.e. although they have the same interfacial angles they are not superposable, one being the mirror image of the

other. Other examples are potassium dextro-tartrate, cane-sugar, milk-sugar, quercite, lithium sulphate (Li 2 S04-H 2 0) ; amongst minerals the only example is the hydrocarbon fichtelite (C 5 H 8).

Clinohedral Class (Hemihedral ; Domatic).

Crystals of this class are symmetrical only with respect to a single plane. The only form which is here geometrically the same as in the holosymmetric class is the clino-pinacoid (oioj. The forms per- pendicular to the plane of symmetry are all pedions, consisting of single planes with the indices (100), (100), (001), (001), (hoi), &c. The remaining forms, {kko) ,(okl) and (hkl), are domes or " gonioids " (yawta, an angle, and tlSos, form), consisting of two planes equally inclined to the plane of symmetry.

Examples are potassium tetrathionate (K 2 S 4 6), hydrogen tri- sodium hypophosphate (HNa 3 P 2 6 -9H 2 0) ; and amongst minerals, clinohedrite (H 2 ZnCaSi0 4) and scolectite.

5. ANORTHIC SYSTEM

(Triclinic). In the anorthic (from &.v, privative, and dpdos, right) or triclinic system none of the three crystallographic axes are at right angles, and they are all of unequal lengths. In addition to the parameters a : b : c, it is necessary to know the angles, a, /3, and 7, between the axes. In anorthite, for example, these elements are a : b : c = 0-6347:1:0-5501; a = 93° 13′, /3 = II5°55′, 7 = 91° 12′.

Holosymmetric Class (Holohedral; Pinacoidal).

Here there is only a centre of symmetry. All the forms are pina- coids, each consisting of only two parallel faces. The indices of the three pinacoids parallel to the axial planes are (looj, joio| and {oo 1 1 ; those of pinacoids parallel to only one axis are {hko}, {hol\ and \okl\ ; and the general form is [hkl] .

Several minerals crystallize in this class ; for example, the plagio- clastic felspars, microcline, axinite (fig. 65), cyanite, amblygonite, chalcanthite(CuS04-5H 2 0),sassolite(H 3 BOs); among artificial substances are potassium bichromate, racemic acid (C4H 6 0e-2H 2 0), dibrom-para-nitrophenol, &c.

Asymmetric Class

(Hemihedral, Pediad).

Crystals of this class are devoid of any elements of symmetry. All the forms are pedions, each consisting of a single plane ; they are thus hemihedral with respect to crystals of the last class. Although there is a total absence of symmetry, yet the faces are arranged in zones on the crystals.

Examples are calcium thiosulphate (CaS 2 3 -6H 2 0) and hydrogen strontium dextro-tartrate ((C4H40 e H) 2 Sr-5H 2 0) ; there is no example amongst minerals.

6. HEXAGONAL SYSTEM

Crystals of this system are characterized by the presence of a single axis of either triad or hexad symmetry, which is spoken of as the ” principal ” or ” morphological ” axis. Those with a triad axis are grouped together in the rhombohedral or trigonal division, and those with a hexad axis in the hexagonal division. By some authors these two divisions are treated as separate systems; or again the rhombohedral forms may be considered as hemihedral developments

Fig. 65. — Crystal of Axinite.

of the hexagonal. On the other hand, hexagonal forms may be considered as a combination of two rhombohedral forms.

Owing to the peculiarities of symmetry associated with a single triad or hexad axis, the crystallographic axes of reference are different in this system from those used in the five other systems of crystals. Two methods of axial representation are in common use; rhombo- hedral axes being usually used for crystals of the rhombohedral division, and hexagonal axes for those of the hexagonal division; though sometimes either one or the other set is employed in both divisions.

Rhombohedral axes are taken parallel to the three sets of edges of a rhombohedron (fig. 66). They are inclined to one another at equal oblique angles, and they are all equally inclined to the principal axis; further, they are all of equal length and are interchangeable. With such a set of axes there can be no statement of an axial ratio, but the angle between the axes (or some other angle which may be calculated from this) may be given as a constant of the substance. Thus in calcite the rhombohedral angle (the angle between two faces of the fundamental rhombohedron) is 74 55′, or the angle between the normal to a face of this rhombohedron and the principal axis is

44° 36′-*

Hexagonal axes are four in number, viz. a vertical axis coinciding with the principal axis of the crystal, and three horizontal axes inclined to one another at 6o c in a plane perpendicular to the princi- pal axis. The three horizontal axes, which are taken either parallel or perpendicular to the faces of a hexagonal prism (fig. 71) or the edge of a hexagonal bipyramid (fig. 70), are equal in length (a) but the vertical axis is of a different length ©. The indices of planes referred to such a set of axes are four in number; they are written as \hikl\, the first three (h+i+k=o) referring to the horizontal axes and the last to the vertical axis. The ratio a : c of the para- meters, or the axial ratio, is characteristic of all the crystals of the same substance. Thus for beryl (including emerald) a : c = i: 0-4989 (often written 6 = 0-4989) ; for

zinc £ = 1-3564.

Rhombohedral Division.

In the rhombohedral or trigonal division of the hexagonal system there are seven symmetry-classes, all of which possess a single triad axis of symmetry.

HOLOSYMMETRIC CLASS

(Holohedral; Ditrigonal scalenohedral). In this class, which presents the commonest type of symmetry of the hexagonal system, the triad axis is associated with three similar planes of symmetry inclined to one another at 60° and inter-

Fig. 66. Fig. 67.

Direct and Inverse Rhombohedra.

secting in the triad axis; there are also three similar dyad axes, each perpendicular to a plane of symmetry, and a centre of sym- metry. The seven simple forms are : —

Rhombohedron (figs. 66 and 67), consisting of six rhomb-shaped faces with the edges all of equal lengths : the faces are perpendicular to the planes of symmetry. There are two sets of rhombohedra, distinguished respectively as direct and inverse ; those of one set (fig. 66) are brought into the orientation of the other set (fig. 67) by a rotation of 6o° or 180 about the prin- cipal axis. For the fundamental rhombo- hedron, parallel to the edges of which are the crystallographic axes of reference, the indices are (iooj. Other rhombo- hedra may have the indices (211), (41TJ, jiio}, J22iJ, juTj, &c, or in general \hkk. (Compare fig. 72; for figures of other rhombohedra see Calcite.)

Scalenohedron (fig. 68), bounded by twelve scalene triangles, and with the general indices [hkl] . The zig-zag lateral edges coincide with the similar edges of a rhombohedron, as shown in fig. 69; if the indices of the inscribed rhombo- hedron be (iooj,

the indices of the scalenohedron represented in the figure are {201) . The scalenohedron {201 j is a characteristic form of calcite, which for this reason is some- times called ” dog-tooth-spar.” The angles over the three edges of

Fig. 68. — Scalenohedron.

a face of a scalenohedron are all different; the angles over three alternate polar edges are more obtuse than over the other three polar edges. Like the two sets of rhombohedra, there are also direct and inverse scalenohedra, which may be similar in form and angles, but different in orientation and indices.

Hexagonal bipyramid (fig. 70), bounded by twelve isosceles triangles each of which are equally inclined to two planes of sym- metry. The indices are J210}, (412J, &c, or in general {hkl), where h-2k+l = o.

Fig. 70. — Hexagonal Bipyramid.

c >l

m

1 1 1

1. 1

m mi

1 1 (

j

*i^*

Fig. 69. — Scalenohedron with inscribed Rhombohedron.

Fig. 71. — Hexagonal Prism and Basal Pinacoid.

Hexagonal prism of the first order (2TT), consisting

of six faces parallel to the principal axis and perpendicular to the planes of symmetry ; the angles between (the normals to) the faces are 60 °.

Hexagonal prism of the second order (101), consisting of six faces parallel to the principal axis and parallel to the planes of symmetry. The faces of this prism are inclined to 30° to those of the last prism.

Dihexagonal prism, consisting of twelve faces parallel to the principal axis and inclined to the planes of symmetry. There are two sets of angles between the faces. The indices are {32TJ , {532) . . . \hk~l), where h+k+l = o.

Basal pinacoid {iii)_, consisting of a pair of parallel faces per- pendicular to the principal axis.

Fig. 71 shows a combination of a hexagonal prism (w) with the basal pinacoid ©. For figures of other combinations see Calcite

hoi

101

oh

•^joy

LLL^pU-

An _

*Jt2f^*

**"fcy*

i\ty

OI2

jOoj

*■J V"**^*

*&

241

1 1 2/ \ d

\9*

n \

tjp^ /

Xxtf

^^a. j

\

t2t\

x^Vi”

\ '*>/i\

W

/

Jkf’Q j

\ A>

OW

/ j^

—JJOj

^™W

jNgrw

MI \ /

\ / '-i*

Q2I

yff^v <

3 J£*K/(

Atj.

rSof

jZr™*

t/7i /j>

Oil

~??*tof

Fig. 72.-

-Stereographic Projection of a Holosymmetric Rhombohedral Crystal.

and Corundum. The relation between rhombohedral forms and their indices are best studied with the aid of a stereographic pro- jection (fig. 72); in this figure the thicker lines are the projections of the three planes of symmetry, and on these lie the poles of the rhombohedra (six of which are indicated).

Numerous substances, both natural and artificial, crystallize

=0),

and

in this class; for example, calcite, chalybite, calamine, corundum (ruby and sapphire), haematite, chabazite; the elements arsenic, antimony, bismuth, selenium, tellurium and perhaps graphite; also ice, sodium nitrate, thymol, &c.

Ditrigonal Pyramidal Class

(Hemimorphic-hemihedral) .

Here there are three similar planes of symmetry intersecting in the triad axis; there are no dyad axes and no centre of symmetry. The triad axis is uniterminal and polar, and the crystals are differently developed at the two ends ; crystals of this class are therefore pyro-electric. The forms are all open forms : —

Trigonal pyramid {hkk} , consisting of three faces which correspond to the three upper or the three lower faces of a rhombohedron|of the holosymmetric class.

Ditrigonal pyramid \hkl\, of six faces, corresponding to the six Upper or lower faces of, the scalenohedron.

Hexagonal pyramid (hkl) (where h-2k + / = o), of six faces, corresponding to the six upper or lower faces of the hexagonal bi- pyramid.

Trigonal prism (211) or j5llj, two forms each consisting of three faces parallel to prin- cipal axis and perpendicular to the planes of symmetry.

Hexagonal prism {lot}, which is geo-

t„ _, r^.,ci-t,l n(metrically the same as in the last class.*

Tourmaline Ditrigonal prism {hkl} (where h+k+l

of six faces parallel to the principal axis, with two sets of angles between them.

Basal pedion (ill) or (ITT), each consisting of a single plane perpendicular to the principal axis.

Fig- 73 represents a crystal of tourmaline with the trigonal prism (21T), hexagonal prism (101), and a trigonal pyramid at each end. Other substances crystallizing in this class are pyrargyrite, proustite, iodyrite (Agl), greenockite, zincite, spangolite, sodium lithium sulphate,

tolylphenylketone.

Trapezohedral Class

(Trapezohedral-hemihedral). Here there are three similar dyad axes inclined to one another at 6o° and perpendicular to the triad axis. There are no planes or centre of symmetry. The dyad axes are uniterminal, and are pyro- electric axes. Crystals of most substances of this class rotate the

plane of polarization of a beam of light.

In this class the rhombohedra {hkk} , the hexagonal prism |2iT| , and the basal pinacoid jm) are geometrically the same as in the holosymmetric class ; the trigonal prism jioT) and the ditrigonal prisms are as in the ditrigonal pyramidal class. The remaining : simple forms are: — Trigonal trapezohedron (fig. 74), bounded by six trapezoidal faces. There are two complementary and enantiomorphous trapezo- hedra, {hkl} and {hlk\, derivable from the scalenohedron.

Trigonal bipyramid (fig. 75), bounded by six isosceles triangles; the indices are \hkl\, where h-2k+l = o, as in the hexagonal bipyramid.

The only minerals crystallizing in this class are quartz (q.v.) and cinnabar, both of which rotate the plane of a beam of polarized light transmitted along the triad axis. Other examples are dithio- nates of lead (PbS 2 6 4H 2 0), calcium and strontium, and ot potas sium (K2S2O6), benzil, matico-stearoptene.

Rhombohedral Class ■ (Parallel-faced hemihedral),

The only elements of symmetry are the triad axis and a centre of symmetry. The general form {hkl} is a rhombohedron, and is a hemihedral form, with parallel faces, of the scalenohedron. The form {hkl}, where h-2k+l = o, is also a rhombohedron, being the hemihedral form of the hexagonal bipyramid. The dihexagonal prism {hkl} of the holosymmetric class becomes here a hexagonal prism. The rhombohedra {hkk), hexagonal prisms {21T) and

jioT), and the basal pinacoid |m) are geometrically the same in this class as in the holosymmetric class.

Fig. 76 represents a crystal of dioptase with the fundamental rhombohedron rjiooj and the hexagonal - prism of the second order m jlot| combined with the rhombohedron s 1031).

Examples of minerals which crystallize in this class are phenacite,

Fig. 74. — Trigonal Trapezohedron.

Fig. 75. — Trigonal Bipyramid.

dioptase, willemite, dolomite, ilmenite and pyrophanite: amongst artificial substances is ammonium periodate ((NH4)4l20 9 -3H 2 0).

Trigonal Pyramidal Class (Hemimorphic-tetartohedral).

Here there is only the triad axis of symmetry, which is uniterminal. The general form {hkl} is a trigonal pyramid consisting of three faces at one end of the crystal. All other forms, in which the faces are neither parallel nor perpendicular to the triad axis, are trigonal pyramids. All the prisms are trigonal prisms; and perpendicular to these are two pedions.

The only substance known to crystallize in this class is sodium periodate (NaI04-3H 2 0), the crystals of which are circularly polarizing.

Trigonal Bipyramidal Class

Here there is a plane of symmetry per- pendicular to the triad axis. The trigonal pyramids of the last class are here trigonal bipyramids (fig. 75) ; the prisms are all trigonal prisms, and parallel to the plane of symmetry is the basal pinacoid. No example is known for this class.

Ditrigonal Bipyramidal Class

Fig. 76. — Crystal of Dioptase.

Here there are three similar planes of sym- metry intersecting in the triad axis, and perpendicular to them is a fourth plane of symmetry; at the intersection of the three vertical planes with the horizontal plane are three similar dyad axes ; there is no centre of symmetry.

The general form is bounded by twelve scalene triangles and is a ditrigonal bipyramid. Like the general form of the last class, this has two sets of indices {hkl, pqf}, (hkl) for faces above the equatorial plane of symmetry and (pqf) for faces below: with hexagonal axes there would be only one set of indices. The hexagonal bipyramids, the hexagonal prism jioT} and the basal pinacoid |m) are geometrically the same in this class as in the holosymmetric class. The trigonal prism J2T1J and ditrigonal prisms {hkl} are the same as in the ditrigonal pyramidal class.

The only representative of this type of symmetry is the mineral benitoite (q.v.).

Hexagonal Division.

In crystals of this division of the hexa- Fig. 77. — Dihexagonal gonal system the principal axis is a hexad Bipyramid.

axis of symmetry. Hexagonal axes of

reference are used: if rhombohedral axes be used many of the simple forms will have two sets of indices.

Holosymmetric Class (Holohedral; Dihexagonal bipyramidal).

Intersecting in the hexad axis are six planes of symmetry of two kinds, and perpendicular to them is an equatorial plane of symmetry. Perpendicular to the hexad axis are six dyad axes of two kinds and each perpendicular to a vertical plane of symmetry. The seven simple forms are :—

Dihexagonal bipyramid, bounded by twenty-four scalene triangles (fig. 77; v in fig. 80). The indices are {2131), &c, or in general {hikl}. This form may be considered as a combination of two scalenohedra, a direct and an inverse.

Hexagonal bipyramid of the first order, bounded by twelve

Fig. 80.

isosceles triangles (fig. 70; p and u in fig. 80); indices (ioTl), {2021) . . . (hoJtl). The hexagonal bipyramid so common in quartz is geometrically similar to this form, but it really is a combination of two rhombohedra, a direct and an inverse, the faces of which differ in surface characters and often also in size.

Hexagonal bipyramid of the second order, bounded by twelve faces (s in figs. 79 and 80); indices (1121), (1122} . . . {h.h.2h.l.

Dihexagonal prism, consisting of twelve faces parallel to the hexad axis and inclined to the vertical planes of symmetry; indices {hiko}.

Hexagonal prism of the first order [ioio), consisting of six faces parallel to the hexad axis and perpendicular to one set of three vertical planes of symmetry (m in figs. 71, 78-80). _

Hexagonal prism of the second order {n5o|, consisting of six faces also parallel to the hexad axis, but perpendicular to the other set of three vertical planes of symmetry (a in fig. 78).

Basal pinacoid joooi|, consisting of a pair of parallel planes per- pendicular to the hexad axis (c in figs. 71, 78-80).

Beryl (emerald), connellite, zinc, magnesium and beryllium crystallize in this class.

BlPYRAMIDAL CLASS

(Parallel-faced jemihedral).

Here there is a plane of -symmetry perpendicular to

the hexad axis ; thene is also a centre of symmetry. All the closed forms are hexagonal bipyramids; the open forms are hexagonal prisms or the basal pinacoid. The general form [MM] is hemihedral with parallel faces with respect to the general form of the holosymmetric class.

Apatite (q.v.), pyromorphite, mimetite and vanadinite possess this degree of symmetry.

Dihexagonal Pyramidal Class (Hemimorphic-hemihedral).

Six planes of symmetry of two kinds intersect in the hexad axis. The hexad axis is uniterminal and all the forms are open forms. The general form \hikl} consists of twelve faces at one end of the crystal, and is a dihexagonal pyramid. The hexagonal pyramids \h6ti\ and (h.h.ifi.l) each consist of six faces at one end of the crystal. The prisms are geometrically the same as in the holosymmetric class. Perpendicular to the hexad axis are the pedions (0001) and (000I).

Iodyrite (Agl), greenockite (CdS), wurtzite (ZnS) and zincite (ZnO) are often placed in this class, but they more probably belong to the hemimorphic-hemihedral class of the rhombohedral division of this system.

Trapezohedral Class (Trapezohedral-hemihedral) .

Six dyad axes of two kinds are perpendicular to the hexad axis. The general form \hikl\ is the hexagonal trapezohedron bounded by twelve trapezoidal faces. The other simple forms are geo- metrically the same as in the holosymmetric class. Barium-anti-monyldextro-tartrate+potassiumnitrate(Ba(SbO)2(C 4 H40 6)2-KN03) and the corresponding lead salt crystallize in this class.

Hexagonal Pyramidal Class (Hemimorphic-tetartohedral).

No other element is here associated with the hexad axis, which is uniterminal. The pyramids all consist

of six faces at one end of the crystal, and prisms are all hexagonal prisms; perpendicular to the hexad axis are the pedions.

Lithium potassium sulphate, strontium-antimonyl dextro-tartrate, and lead-antimonyl dextro-tartrate are examples of this type of symmetry. The mineral nepheline is placed in this class because of the absence of symmetry in the etched figures on the prism faces (fig. 92).

(g) Regular Grouping of Crystals. Crystals of the same kind when occurring together may some- times be grouped in parallel position and so give rise to special structures, of which the dendritic (from bkvbpov, a tree) or brancK-like aggregations of native copper or of magnetite and the fibrous structures of many minerals furnish examples. Sometimes, owing to changes in the surrounding conditions, the crystal may continue its growth with a different external form or colour, e.g. sceptre-quartz.

' Regular intergrowths of crystals of totally different substances such as staurolite with cyanite, rutile with haematite, blende with chalcopyrite,calcite with sodium nitrate, are not uncommon. In these cases certain planes and edges of the two crystals are parallel. (See 0. Miigge, "Die regelmassigen Verwachsungen von Mineralien verschiedener Art," Neues Jahrbuchfur Minera- logie, 1903, vol. xvi. pp. 335-475-)

But by far the most important kind of regular conjunction of crystals is that known as "twinning." Here two crystals or individuals of the same kind have grown together in a certain symmetrical manner, such that one portion of the twin may be brought into the position of the other by reflection across a

Fig. 81. — Twinned Fig. 82.— Simple Crystal of Gypsum. Crystal of Gypsum.

plane or by rotation about an axis. The plane of

reflection is called the twin-plane, and is parallel to one of the faces, or to a possible face, of the crystal: the axis of rotation, called the twin-axis, is parallel to one of the edges or perpendicular to a face of the crystal.

In the twinned crystal of gypsum represented in fig. 81 the two portions are symmetrical with respect to a plane parallel to the ortho-pinacoid (100), i.e. a vertical plane perpendicular to the face b. Or we may consider the simple crystal (fig. 82) to be cut in half by this plane and one portion to be rotated through 180 about the normal to the same plane. Such a crystal (fig. 81) is therefore described as being twinned on the plane (100).

An octahedron (fig. 83) twinned on an octahedral face (111) has the two portions symmetrical with respect to a plane parallel to this face (the large triangular face in the figure) ; and either portion may be brought into the position of the other by a rota- tion through 180 about the triad axis of symmetry which is perpendicular to this face. This kind of twinning is especially frequent in crystals of spinel, and is consequently often referred to as the " spinel twin-law."

In these two examples the surface of the union, or composition- plane, of the two portions is a regular surface coinciding with the twin-plane; such twins are called " juxtaposition-twins." In other juxtaposed twins the plane of composition is, however, not necessarily the twin-plane. Another type of twin is the " inter- penetration twin," an example of which is shown in fig. 84. Here one cube may be brought into the position of the other by a rotation of 180 about a triad axis, or by reflection across the octahedral plane which is perpendicular to this axis; the twin- plane is therefore (in).

Since in many cases twinned crystals may be explained by the rotation of one portion through two right angles, R. J. Haiiy introduced the term " hemitrope " (from the Gt. 17/ii-, half, and Tpo7ros, a turn); the word "made" had been earlier used by

Rome d'Isle. There are, however, some rare types of twins which cannot be explained by rotation about an axis, but only

Fig. 83. — -Spinel-twin.

Fig. 84. — Interpenetrating Twinned Cubes.

by reflection across a plane; these are known as " symmetric twins," a good example of which is furnished by one of the twin- laws of chalcopyrite.

Twinned crystals may often be recognized by the presence of re-entrant angles between the faces of the two portions, as may be seen from the above figures. In some twinned crystals (e.g. quartz) there are, however, no re-entrant angles. On the other hand, two crystals accidentally grown together without any symmetrical relation between them will usually show some re-entrant angles, but this must not be taken to indicate the presence of twinning.

Twinning may be several times repeated on the same plane or on other similar planes of the crystal, giving rise to triplets,

quartets and other complex groupings. When often repeated on the same plane, the twinning is said to be " polysynthetic," and gives rise to a laminated structure in the crystal. Sometimes such a crystal (e.g. of corundum or pyroxene) may be readily broken in this direction, which is thus a " plane of parting," often closely resembling a true cleavage in character. In calcite and some other substances this lamellar twinning may be pro- duced artificially by pressure (see below, Sect. II. (a), Glide- plane).

Another curious result of twinning is the production of forms which apparently display a higher degree of symmetry than that actually possessed by the substance. Twins of this kind are known as "

mimetic-twins or pseudo-symmetric twins." Two hemihedral or hemimorphic crystals (e.g. of diamond or of hemimorphite) are often united in twinned position to produce a group with apparently the same degree of symmetry as the holosymmetric class of the same system. Or again, a substance crystallizing in, say, the orthorhombic system (e.g. aragonite) may, by twinning, give rise to pseudo-hexagonal forms: and pseudo-cubic forms often result by the complex twinning of crystals (e'.g. stannite, phillipsite, &c.) belonging to other systems. Many of the so-called " optical anomalies " of crystals may be explained by this pseudo-symmetric twinning.

(h) Irregularities of Growth of Crystals; Character of Faces.

Only rarely do actual crystals present the symmetrical appear- ance shown in the figures given above, in which similar faces are all represented as of equal size. It frequently happens that the crystal is so placed with respect to the liquid in which it grows that there will be a more rapid deposition of material on one part than on another; for instance, if the crystal be attached to some other solid it cannot grow in that direction. Only when a crystal is freely suspended in the mother-liquid and material for growth is supplied at the same rate on all sides does an equably developed form result.

Two misshapen or distorted octahedra are represented in figs. 85 and 86; the former is elongated in the direction of one of the edges of the octahedron, and the latter is flattened parallel to one pair of faces. It will be noticed in these figures that the edges in which the faces intersect have the same directions as before, though here there are additional edges not present in fig. 3. The angles (70 32' or 109° 28') between the faces also remain the same; and the faces have the same inclinations to the axes and planes of symmetry as in the equably developed form. Al- though from a geometrical point of view these figures are no

Fig. 85.

Misshapen Octahedra.

longer symmetrical with respect to the axes and planes of sym- metry, yet crystallographically they are just as symmetrical as the ideally developed form, and, however much their irregularity of development, they still are regular (cubic) octa- hedra of crystallography. A remarkable case of irregular development is presented by the mineral cuprite, which is often found as well-developed octahedra; but in the variety known as chalcotrichite it occurs as a matted aggregate of delicate hairs, each of which is an individual crystal enormously elongated in the direction of an edge or diagonal of the cube.

The symmetry of actual crystals is sometimes so obscured by irregularities of growth that it can only be determined by measure- ment of the angles. An extreme case, where several of the planes have not been developed at all, is illustrated in fig. 87, which shows the actual shape of a crystal of zircon from Ceylon; the ideally developed form (fig. 88) is placed at the side for com-

parison, and the parallelism of the edges between corresponding faces will be noticed. This crystal is a combination of five simple forms, viz. two tetragonal prisms (a and m,) two tetragonal bipyramids (e and p), and one ditetragonal bipyramid (x, with 16 faces).

The actual form, or " habit," of crystals may vary widely in different crystals of the same substance, these differences depending largely on the conditions under which the growth has taken place. The material may have crystallized from a fused

/

Fig. 87.— Actual Crystal. Fig. 88.— Ideal Development.

Crystal of Zircon (clinographic drawings and plans).

mass or from a solution; and in the latter case the solvent may be of different kinds and contain other substances in solution, or the temperature may vary. Calcite (q.v.) affords a good example of a substance crystallizing in widely different habits, but all crystals are referable to the same type of symmetry and may be reduced to the same fundamental form.

When crystals are aggregated together, and so interfere with each other's growth, special structures and external shapes often result, which are sometimes characteristic of certain substances, especially amongst minerals.

Incipient crystals, the development of which has been arrested owing to unfavourable conditions of growth, are known as crystallites (q.v.). They are met with in imperfectly crystallized substances and in glassy rocks (obsidian and pitchstone), or may be obtained artificially from a solution of sulphur in carbon disulphide rendered viscous by the addition of Canada-balsam. To the various forms H. Vogelsang gave, in 1875, the names "globulites," "margarites" (from ixa.pyapiri\%, a pearl), "longu- lites," &c. At a more advanced stage of growth these bodies react on polarized light, thus possessing the internal structure of true crystals; they are then called " microlites." These have the form of minute rods, needles or hairs, and are aggregated into feathery and spherulitic forms or skeletal crystals. They are common constituents of microcrystalline igneous rocks, and often occur as inclusions in larger crystals of other substances.

Inclusions of foreign matter, accidentally caught up during growth, are frequently present in crystals. Inclusions of other minerals are specially frequent and conspicuous in crystals of quartz, and crystals of calcite may contain as much as 60% of included sand. Cavities, either with rounded boundaries or with the same shape (" negative crystals ") as the surrounding crystal, are often to be seen; they may be empty or enclose a liquid with a movable bubble of gas.

The faces of crystals are rarely perfectly plane and smooth, but are usually striated, studded with small angular elevations, pitted or cavernous, and sometimes curved or twisted. These irregularities, however conform with the symmetry of the crystal, and much may be learnt by their study. The parallel grooves or furrows, called " striae," are the result of oscillatory combination between adjacent faces, narrow strips of first one face and then another being alternately developed. Sometimes*

the striae on crystal-faces are due to repeated lamellar twinning, as in the plagioclase felspars. The directions of the striations are very characteristic features of many crystals: e.g. the faces of the hexagonal prism of quartz are always striated horizontally, whilst in beryl they are striated vertically. Cubes of pyrites (fig. 89) are striated parallel to one edge, the striae on adjacent faces being at right angles, and due to oscillatory combination of the cube and the pentagonal dodecahedron (compare fig. 36) ; whilst cubes of blende (fig. 90) are stria f ed parallel to one diagonal of each face, i.e. parallel to the tetrahedron faces (compare

Fig. 89;— Striated Cube of Pyrites.

Fig. 90. — Striated Cube of Blende.

fig. 31). These striated cubes thus possess different degrees of symmetry and belong to different symmetry-classes. Oscillatory combination of faces gives rise also to curved surfaces. Crystals with twisted surfaces (see Dolomite) are, however, built up of smaller crystals arranged in nearly parallel position. Sometimes a face is entirely replaced by small faces of other forms, giving rise to a drusy surface; an example of this is shown by some octahedral crystals of fluorspar (fig. 2) which are built up of minute cubes.

The faces of crystals are sometimes partly or completely replaced by smooth bright surfaces inclined at only a few minutes of arc from the true position of the face; such surfaces are called " vicinal faces," and their indices can be expressed only by very high numbers. In apparently perfectly developed crystals of alum the octahedral face, with the simple indices (in), is usually replaced by faces of very low triakis-octahedra, with indices such as (251-251-250); the angles measured on such crystals will therefore deviate slightly from the true octa- hedral angle. Vicinal faces of this character are formed during the growth of crystals, and have been studied by H. A. Miers (Phil. Trans., 1903, Ser. A. vol. 202). Other faces with high indices, viz. " prerosion faces " and the minute faces forming the sides of etched figures (see below) , as well as rounded edges and other surface irregularities, may, however, result from the corrosion of a crystal subsequent to its growth. The pitted and cavernous faces of artificially grown crystals of sodium chloride and of bismuth are, on the other hand, a result of rapid growth, more material being supplied at the edges and corners of the crystal than at the centres of the faces. ■

(i) Theories of Crystal Structure. The ultimate aim of crystallographic research is to determine the internal structure of crystals from both physical and chemical data. The problem is essentially twofold: in the first place it is necessary to formulate a theory as to the disposition of the molecules, which conforms with the observed types of symmetry —this is really a mathematical problem; in the second place, it is necessary to determine the orientation of the atoms (or groups of atoms) composing the molecules with regard to the crystal axes — this involves a knowledge of the atomic structure of the molecule. As appendages to the second part of our problem, there have to be considered: (1) the possibility of the existence of the same substance in two or more distinct crystal- line forms — polymorphism, and (2) the relations between the chemical structure of compounds which

affect nearly identical or related crystal habits — isomorphism and morphotropy. Here we shall discuss the modern theory of crystal structure; the relations between chemical composition and crystallographical form are discussed in Part III. of this article; reference should also be made to the article Chemistry : Physical.

Hauy.

The earliest theory of crystal structure of any moment is that of Hauy, in which, as explained above, he conceived a crystal as composed of elements bounded by the cleavage planes of the crystal, the elements being arranged contiguously and along parallel lines. There is, however, no reason to suppose that matter is continuous throughout a crystalline body; in fact, it has been shown that space does, separate the molecules, and we may therefore replace the contiguous elements of Hauy by particles equidistantly dis- tributed along parallel lines; by this artifice we retain the reticulated or net-like structure, but avoid the continuity of matter which characterizes Haiiy's theory; the permanence of crystal form being due to equilibrium between the inter- molecular (and , interatomic) forces. The crystal is thus Con- jectured as a " space-lattice," composed of three sets of parallel planes which enclose parallelopipeda, at the corners of which are placed the constituent molecules (or groups of molecules) of the crystal.

*The geometrical theory of crystal structure (i.e. the determina- tion of the varieties of crystal symmetry) is thus reduced to the mathematical problem: " in how many ways can space be partitioned ? " M. L. Frankenheim, in 1835, f r f * en " determined this number as fifteen, but A. Bravais, ; Brav'ala. in 1850, proved the identity of two of Frankenheim's forms, and showed how the remaining fourteen coalesced by pairs, so that really these forms only corresponded to seven distinct systems and fourteen classes of crystal symmetry. These systems, however, only represented holohedral forms,*

leaving the hemihedral and tetartohedral classes to be explained. Bravais attempted an explanation by attributing differences in the symmetry of the crystal elements, or, what comes to the same thing, he assumed the crystals to exhibit polar differences along any member of the lattice; for instance, assume the particles to be (say) pear-shaped, then the sharp ends point in one direction, the blunt ends in the opposite direction.

A different view was adopted by L. Sohncke in 1879, who, by developing certain considerations published by Camille Jordan in 1869 on the possible types of regular repeti- tion in space of identical parts, showed that the lattice-structure of Bravais was unnecessary, it being sufficient that each molecule of an indefinitely extended crystal, repre- sented by its "point" (or centre of gravity), was identically situated with respect to the molecules surrounding it. The problem then resolves itself into the determination of the number of " point-systems " possible; Sohncke derived sixty-five such arrangements, which may also be obtained from the fourteen space-lattices of Bravais, by interpenetrating any one space- lattice with one or more identical lattices, with the condition that the resulting structure should conform with the homo-geneity characteristic of crystals. But the sixty-five arrange- ments derived by Sohncke, of which Bravais' lattices are particular cases, did not complete the solution, for certain of the known types of crystal symmetry still remained unrepresented. These missing forms are characterized as being enantiomorphs consequently, with the introduction of this principle of repetition over a plane, i.e. mirror images. E. S. Fedorov (1890), A Schoenfhes (1891), and W. Barlow (1894), independently and by different methods, showed how Sohncke's theory of regular point-systems explained the whole thirty-two classes of crystal symmetry, 230 distinct types of crystal structure falling into these classes. ... .

By considering the atoms instead of the centres of gravity of the molecules, Sohncke (Zeits. Kryst.

Min., 1888, 14, p. 431), has generalized his theory, and propounded the structure of a crystal in the following terms: "A crystal consists of a finite number of interpenetrating regular point-systems, which all possess like and like-directed coincidence movements. Each separate point-system is occupied by similar material particles, but these may be different for the different interpenetrating partial systems which form the complex system." Or we may quote the words of P. von Groth {British Assoc. Rep., 1904): " A crystal — considered as indefinitely extended— consists pf n

interpenetrating regular point-systems, each of which is formed of similar atoms; each of these point-systems is built up from a number of interpenetrating space-lattices, each of the latter being formed from similar atoms occupying parallel positions. All the space-lattices of the combined system are geometrically identical, or are characterized by the same elementary parallel-opipedon."

A complete r6sum£, with references to the literature, will be found in " Report on the Development of the Geometrical Theories of Crystal Structure, 1666-1901 " (British Assoc. Rep., 1901).

II. PHYSICAL PROPERTIES OF CRYSTALS.

Many of the physical properties of crystals vary with the direction in the material, but are. the same in certain directions; these directions obeying the same laws of symmetry as do the faces on the exterior of the crystal. The symmetry of the internal structure of crystals is thus the same as the symmetry of their external form.

(a) Elasticity and Cohesion.

The elastic constants of crystals are determined by similar methods to those employed with amorphous

substances, only the bars and plates experimented upon must be cut from the crystal with known orientations. The ” elasticity surface ” expressing the coefficients in various directions within the crystal has a configuration symmetrical with respect to the same planes and axes of symmetry as the crystal itself. In calcite, for in- stance, the figure has roughly the shape of a rounded rhombo- hedron with depressed faces and is symmetrical about three vertical planes.- In the case of homogeneous elastic deformation, produced by pressure on all sides, the effect on the crystal is the same as that due to changes of temperature; and the surfaces expressing the compression coefficients in different directions have ; the same higher degree of symmetry, being either a sphere, spheroid or ellipsoid. When strained beyond the limits of elasticity, crystalline matter may suffer permanent deformation in one or other of two ways, or may be broken along cleavage surfaces or with an irregular fracture. In the case of plastic deformation, e.g. in a crystal of ice, the crystalline particles are displaced but without any change in their orientation. Crystals of some substances {e.g. para- azoxyanisol) have such a high degree of plasticity that they are deformed even by their surface tension, and the crystals take the form of drops of doubly refracting liquid which are known as ” liquid crystals.” (See O. Lehmann, Fliissige Kristalle, Leipzig, 1904 ; F. R. Schenck, Kristallinische Flussigkeiten una 1 fliissige Krystalie, Leipzig,

I905-)

In the second, and more usual kind of permanent deformation without fracture, the particles glide along certain planes into “a new (twinned) position of equilibrium. If a knife blade be pressed into the edge of a cleavage rhombohedron of calcite (at 6, fig. 91) the portion abcde of the crystal will take up the , position a’b’cde. The obtuse solid

angle at a becomes acute (a’), whilst the acute angle at b becomes obtuse (b’) ; and the new surface a’ce is as bright and smooth as before. This result

has been effected by the particles in successive layers gliding or rotating over each other, without separation, along planes parallel to cde. This plane, which truncates the edge of the rhombohedron and has the indices (no), is called a "glide-plane." The new portion is in twinned position with respect to the rest of the crystal, being a reflection of it across the plane cde, which is there- fore a plane of twinning. This secondary twinning is often to be observed as a repeated lamination In the grains of calcite composing a crystalline limestone, or marble, which has been subjected to earth movements. Planes of gliding have been observed in many - minerals (pyroxene^ corundum, &c.) and their crystals may often be readily broken along these directions, which are thus " planes of parting " or " pseudo-cleavage."

Fig. 91. — Glide-plane of Calcite.

The characteristic transverse striae, invariably present on the cleavage surfaces of stibnite and cyanite are due to secondary twinning along glide-planes, and have resulted from the bending of the crystals.

One of the most important characters of crystals is that of " cleavage "; there being certain plane directions across which the cohesion is a minimum, and along which the crystal may be readily split or cleaved. These directions are always parallel to a possible face on the crystal and usually one prominently developed and with simple indices, it being a face in which the crystal molecules are most closely packed. The directions of cleavage are symmetrically repeated according to the degree of symmetry possessed by the crystal. Thus in the cubic system, crystals of salt and galena cleave in three directions parallel to the faces of the cube { 100) , diamond and fluorspar cleave in four directions parallel to the octahedral faces {in}, and blende in six directions parallel to the faces of the rhombic dodecahedron { 1 10 j . In crystals of other systems there will be only a single direction of cleavage if this is parallel to the f aCes of a pinacoid ; e.g.

the basal pinacoid in tetragonal (as in apophyllite) and hexagonal crystals; or parallel (as in gypsum) or perpendicu- lar (as in mica and cane-sugar) to the plane of symmetry in monoclinie crystals. Calcite cleaves in three directions parallel to the faces of the primitive rhombohedron. Barytes, which crystallizes in the orthorhombic system, has two sets of cleavages, viz. a single cleavage parallel to the basal pinacoid {ooi(and also two directions parallel to the faces of the prism {no). In all of the examples just quoted the cleavage is described as perfect, since cleavage flakes with very smooth and bright surfaces may be readily detached from the crystals. Different substances, however, vary widely in their character of cleavage; in some it can only be described as good or distinct, whilst in others, e.g. quartz and alum, there is little or no tendency to split along certain directions and the surfaces of fracture are very uneven. Cleavage is therefore a character of considerable determinative value, especially for the purpose of distinguishing different minerals.

Another result of the presence in crystals of directions of mini- mum cohesion are the ” percussion figures,” which are produced oh a crystal-face when this is struck with a sharp point. A percussion figure consists of linear cracks radiating from the point of impact, which in their number and orientation agree with the symmetry of the face. Thus on a cube face of a crystal of salt the rays of the percussion figure are parallel to the diagonals of the face, whilst on an octahedral face a three-rayed star is developed. By pressing a blunt point into a crystal face a somewhat similar figure, known as a ” pressure figure,” is produced. Percussion and pressure figures are readily developed in cleavage sheets of mica (q.v.).

Closely allied to cohesion is the character of “hardness,” which is often defined, and measured by, the resistance which a crystal face offers to scratching. That hardness is a character depending largely on crystalline structure is well illustrated by the two crystalline modifications of carbon:

graphite is one of the softest of minerals, whilst diamond is the hardest of all. The hardness of crystals of different substances thus varies widely, and with minerals it is a character of considerable determinative value; for this purpose a scale of hardness is employed (see Mineralogy) . Various attempts have been made with the view of obtaining accurate determinations of degrees of hardness, but with varying results; an instrument used for this purpose is called a sclerometer (from ctkX»)p6s, hard). It may, however, be readily demonstrated that the degree of hardness on a crystal face varies with the direction, and that a curve ex- pressing these relations possesses the same geometrical symmetry as the face itself. The mineral cyanite is remarkable in having widely different degrees of hardness on different faces of its crystals and in different directions on the same face.

Another result of the differences of cohesion in different directions is that crystals are corroded, or acted upon by chemical solvents, at different rates in different directions. This is strikingly shown when a sphere cut from a crystal, say of calcite

or quartz, is immersed in acid; after some time the resulting form is bounded by surfaces approximating to crystal faces, and has the same symmetry as that of the crystal from which the sphere was cut. When a crystal bounded by faces is immersed in a solvent the edges and corners become rounded and " prerosion faces " developed in their place; the faces become marked all over with minute pits or shallow depressions, and as these are extended by further solution they give place to small eleva- tions on the corroded face. The sides of the pits and elevations are bounded by small faces which have the character of vicinal faces. These markings are known as " etched figures " or " corrosion figures," and they are extremely important aids in determining the

symmetry of crystals. Etched figures are some- times beautifully developed on the faces of natural crystals, e.g. of diamond, and they may be readily produced artificially with suitable solvents.

As an example, the etched figures on the faces of a hexagonal prism and the basal plane are illustrated in figs. 02-04 for three of the several symmetry-classes of the hexagonal system. The classes chosen are those in which nepheline, calcite and beryl (emerald) crystallize, and these minerals often have the simple form of crystal represented in the figures. In nepheline (fig. 92) the only element of symmetry is a hexad axis; the etched figures on the prism are therefore unsymmetrical, though similar on all the faces; the hexagonal markings on the basal plane have none of their edges parallel to the edges of the face; further the crystals being hemimorphic, the etched figures on the basal planes at the two ends will be different in character.

*r^*

*<=> "^*

»

9

9 1

>

t t

<=-'<=> _*

> »

Fig. 92 .—Nepheline. Fig. 93. — Calcite. Fig. 94. — Beryl.

Etched Figures on Hexagonal Prisms.

The facial development of crystals of nepheline give no indication of this type of symmetry, and the

mineral has been referred to this class solely on the evidence afforded by the etched figures. ; In calcite there is a triad axis of symmetry parallel to the prism edges, three dyad axes each perpendicular to a pair of prism edges and three planes of symmetry perpendicular to the prism faces; the etched figures shown in fig. 93 will be seen to conform to all these elements of symmetry. There being in calcite also a centre of symmetry, the equilateral triangles on the basal plane at the lower end of the crystal will be the same in form as those at the top, but they will occupy a reversed position. In beryl, which crystallizes in the holosymmetric class of the hexagonal system, the etched figures (fig. 94) display the fullest possible degree of symmetry; those on the prism faces are all similar and are each symmetrical with respect to two lines, and the hexagonal markings on the basal planes at both ends of the crystal are symmetrically placed with respect to six lines. A detailed account of the etched figures of crystals is given by H. Baum- hauer, Die Resultate der Atzmethode in der krystallographischen Forschung (Leipzig, 1894).

(b) Optical Properties.

The complex optical characters of crystals are not only of considerable interest theoretically, but are of the greatest practical importance. In the absence of external crystalline form, as with a faceted gem- stone, or with the minerals con- stituting a rock (thin, transparent sections of which are examined in the polarizing microscope), the mineral species may often be readily identified by the determination of some of the optical characters.

According to their action on transmitted plane- polarized light (see Polarization of Light) all crystals may be referred to one or other of the five groups enumerated below. These groups

correspond with the six systems of crystallization (in the second group two systems being included together) . The several symmetry-classes of each

system are optically the same, except in the rare cases of substances which are circularly polarizing.

(1) Optically isotropic crystals — corresponding with the cubic system.

(2) Optically uniaxial crystals — corresponding with the tetragonal and hexagonal systems.

(3) Optically biaxial crystals in which the three principal optical directions coincide with the three crystallographic axes — corresponding with the orthorhcmbic system.

(4) Optically biaxial crystals in which only one of the three principal optical directions coincides with a crystallographic axis — corresponding with the monoclinic system.

(5) Optically biaxial crystals in which there is no fixed and definite relation between the optical and crystallographic directions — corresponding with the anorthic system.

Optically Isotropic Crystals. — These belong to the cubic system, and like all other optically isotropic (from Ztros, like, and Tpfriros, character) bodies have only one index of refraction for light of each colour. They have no action on polarized light (except in crystals which are circularly polarizing); and when examined in the polariscope or polarizing microscope they remain dark between crossed nicols, and cannot therefore be distinguished optically from amorphous substances, such as glass and opal.

Optically Uniaxial Crystals. — These belong to the tetragonal and hexagonal (including rhombohedral) systems, and between crystals of these systems there is no optical distinction. Such crystals are anisotropic or doubly refracting (see Refraction: Double) ; but for light travelling through them in a certain, single direction they are singly refracting. This direction, which is called the optic axis, is the same for light of all colours and

at all temperatures; it coincides in direction with the principal crystallographic axis, which in tetragonal crystals is a tetrad (or dyad) axis of symmetry, and in the hexagonal system a triad or hexad axis.

For light of each colour there are two indices of refraction; namely, the ordinary index (co) corresponding with the ordinary ray, which vibrates perpendicular to the optic axis; and the extraordinary index (e) corresponding with the extraordinary ray, which vibrates parallel to the optic axis. If the ordinary index of refraction be greater than the extraordinary index, the crystal is said to be optically negative, whilst if less the crystal is optically positive. The difference between the two indices is a measure of the strength of the double refraction or birefringence. Thus in calcite, for sodium (D) light, a> = 1-6585 and 6=1-4863; hence this substance is optically negative with a relatively high double refraction of o>— 6 = 0-1722. In quartz o> = i-5442, 6=1-5533 and «— (0 = 0-0091; this mineral is therefore optically positive with low double refraction. The indices of refraction vary, not only for light of different colours, but also slightly with the temperature.

The optical characters of uniaxial crystals are symmetrical not only with respect to the full number of planes and axes of symmetry of tetragonal and hexagonal crystals, but also with respect to all vertical planes, i.e. all planes containing the optic axis. A surface expressing the optical relations of such crystals is thus an ellipsoid of revolution about the optic axis. (In cubic crystals the corresponding surface is a sphere.) In the ” optical indicatrix ” (L. Fletcher, The Optical Indicatrix and the Trans- mission of Light in Crystals, London, 1892), the length of the principal axis, or axis of rotation, is proportional to the index of refraction, {i.e. inversely proportional to the velocity) of the extraordinary rays, which vibrate along this axis and are trans- mitted in directions perpendicular thereto; the equatorial diameters are proportional to the index of

refraction of the ordinary rays, which vibrate perpendicular to the optic axis. For positive uniaxial crystals the indicatrix is thus a prolate spheroid (egg-shaped), and for negative crystals an oblate spheroid (orange-shaped).

In " Fresnel's ellipsoid " the axis of rotation is proportional to

*the velocity of the extraordinary ray, and the equatorial dia- meters proportional to the velocity of the ordinary ray; it is therefore an oblate spheroid for positive crystals, and a prolate spheroid for negative crystals. The " ray-surface," or " wave- surface," which represents the distances traversed by the rays during a given interval of time in various directions from a point of origin within the crystal, consists in uniaxial crystals of two sheets; namely, a sphere, corresponding to the ordinary rays, and an ellipsoid of revolution, corresponding to the extra- ordinary rays, The difference in form of the ray-surface for positive and negative crystals is shown in figs. 95 ar *d 96.*

When a uniaxial crystal is examined in a polariscope or polarizing microscope between crossed nicols (i.e. with the principal planes of the polarizer or analyser at right angles, and

Fig. 95. — Section of the Ray-Surface of a Positive Uniaxial Crystal.

Fig. 96. — Section of the Ray-Surface of a Negative Uniaxial Crystal.

so producing a dark field of view) its behaviour differs according to the direction in which the light travels through the crystal, to the position of the crystal with respect to the principal planes of the nicols, and further, whether convergent or parallel polarized light be employed. A tetragonal or hexagonal crystal viewed, in parallel light,

through the basal plane, i.e. along the principal axis, will remain dark as it is rotated between crossed nicols, and will thus not differ in its behaviour from a cubic crystal or other isotropic body. If, however, the crystal be viewed in any other direction, for example, through a prism face, it will, except in certain positions, have an action on the polarized light. A plane-polarized ray entering the crystal will be resolved into two polarized rays with the directions of vibration parallel to the vibration-directions in the crystal. These two rays on leaving the crystal will be combined again in the analyser, and a portion of the light transmitted through the instrument; the crystal will then show up brightly against the dark field. Further, owing to interference of these two rays in the analyser, the light will be brilliantly coloured, especially if the crystal be thin, or if a thin section of a crystal be examined. The particular colour seen will depend on the strength of the double refraction, the orientation of the crystal or section, and upon its thickness. If now, the crystal be rotated with the stage of the microscope, the nicols remaining fixed in position, the light transmitted through the instrument will vary in intensity, and in certain positions will be cut out altogether. The latter happens when the vibration-directions of the crystal are parallel to the vibration- directions of the nicols (these being indicated by cross-wires in the microscope). The crystal, now being dark, is said to be in position of extinction; and as it is turned through a complete rotation of 360° it will extinguish four times. If a prism face be viewed through, it will be seen that, when the crystal is in a position of extinction, the cross-wires of the microscope are parallel to the edges of the prism: the crystal is then said to give " straight extinction."

In convergent light, between crossed nicols, a very different phenomenon is to be observed when a uniaxial crystal, or section of such a crystal, is placed with its optic axis coincident with the axis of the microscope. The rays of light, being

convergent, do not travel in the direction of the optic axis and are therefore doubly refracted in the crystal; in the analyser the vibrations will be reduced to the same plane and there will be interference of the two sets of rays. The result is an " interference figure " (fig. 97), which consists of a number of brilliantly coloured con- centric rings, each showing the colours of the spectrum of white

light; intersecting the rings is a black cross, the arms of which are parallel to the principal planes of the nicols. If mono- chromatic light be used instead of white light, the rings will be alternately light and dark. The number and distance apart of the rings depend on the strength of the double refraction and on the thick- ness of the crystal. By observing the effect produced on such a uniaxial y^^&sSM-a&JJffJ interference figure when a ''quarter undulation (or wave - length) mica-

plate " is superposed on the crystal,

Fig. 97. — Interference

it may be at once decided whether Figure of a Uniaxial the crystal is optically positive or Crystal, negative. Such a simple test may, for

example, be applied for distinguishing certain faceted gem- stones: thus zircon and phenacite are optically positive, whilst corundum (ruby and sapphire) and beryl (emerald) are optically negative.

Optically Biaxial Crystals.— In these crystals there are three principal indices of refraction, denoted by a, /3 and 7; of these 7 is the greatest and a the least (7>|3>a). The three principal vibration- directions, corresponding to these indices, are at right- angles to each other, and are the directions of the three rect- angular axes of the optical indicatrix. The indicatrix (fig. 98) is an ellipsoid with the lengths of its axes proportional to the refractive indices; OC=y, OB=fi,OA—.a, where OC> OB

> OA. The figure is symmetrical with respect to the principal planes OAB,OAC,OBC.

InFresnePs ellipsoid the three rectangular axes are proportional to i/a, i//3, and 1/7, and are usually denoted by a, b and c respectively, where a>b>c: these have often been called ” axes of optical elasticity,” a term now generally discarded.

The ray-surface (represented in fig. 99 by its sections in the three principal planes) is derived from the indicatrix in the following manner. A ray of light entering the crystal and travel- ling in the direction OA is resolved into polarized rays vibrating parallel to OB and OC, and therefore propagated with the velocities i//3 and 1/7 respectively: distances Ob and Oc (fig. 99) proportional to these velocities are marked off in the direction OA. Similarly, rays travelling along OC have the velocities

Fig. 98. — Optical Indicatrix of a Biaxial Crystal.

Fig. 99. — Ray-Surface of a Biaxial Crystal;

i/a and i//3, and those along OB the velocities i/a and 1/7. In the two directions Opi and 0p 2 (fig. 98), perpendicular to the two circular sections P1P1 and P2-P2 of the indicatrix, the two rays will be transmitted with the same velocity 1//8. These two direc- tions are called the optic axes (” primary optic axis “), though they have not all the properties which are associated with the optic axis of a uniaxial crystal. They have very nearly the same direction as the lines Osi and Os 2 in fig. 99, which are distinguished as the ” secondary optic axes.” In most crystals the primary and secondary optic axes are inclined to each other at not more than a few minutes, so that for practical purposes there is no distinction between them.

The angle between Opi and Opi is called the ” optic axial angle”; and the plane OAC in which they lie is called the ” optic axial plane.” The angles between the optic axes are bisected by the vibration-

directions OA and OC ; the one which

bisects the acute angle being called the ” acute bisectrix ” or “first mean line,” and the other the ” obtuse bisectrix ” or ” second mean line.” When the acute bisectrix coincides with the greatest axis OC of the indicatrix, i.e. the vibration-direction corresponding with the refractive index 7 (as in figs. 98 and 00), the crystal is described as being optically positive; and when the acute bisectrix coincides with OA, the vibration-direction for the index a, the crystal is negative. The distinction between positive and negative biaxial crystals thus depends on the relative magnitude of the three principal indices of refraction; in positive crystals /3 is nearer to a than to 7, whilst in negative crystals the reverse is the case. Thus in topaz, which is optically positive, the refractive indices for sodium light are a= 1-6120, /3 = 1-6150, 7 = 1-6224; and for orthoclase which is optically negative, 0=1-5190, (3 = 1-5237, 7 = 1-5260. The difference 7— a represents the strength of the double refraction.

Since the refractive indices vary both with the colour of the light and with the temperature, there will be for each colour and temperature slight differences in the form of both the indicatrix and the ray-surface: consequently there will be variations in the positions of the optic axes and in the size of the optic axial angle. This phenomenon is known as the “dispersion of the optic axes.” When the axial angle is greater for red light than for blue the character of the dispersion is expressed by p>», and when less by p

The type of interference figure exhibited by a biaxial crystal in convergent polarized light between crossed nitols is repre- sented in figs. 100 and ror. The crystal must be viewed along

the acute bisectrix, arid for this purpose it is often necessary to cut a plate from the crystal perpendicular to this direction : sometimes, however, as in mica and topaz, a cleavage flake will be perpendicular to the acute bisectrix. When seen in white light, there are around each optic axis a series of brilliantly coloured ovals, which at the centre join to form an 8-shaped loop, whilst further from the centre the curvature of the rings is approximately that of lemniscates. In the position shown in fig. 100 the vibration-directions in the crystal are parallel to those of the nicols, and the figure is intersected by two black bands or " brushes " forming a cross. When, however, the crystal is rotated with the stage of the microscope the cross breaks up into the two branches of a hyperbola, and when the vibration- directions of the crystal are inclined at 45° to those of the nicols the figure is that shown in fig. ior. The points of emergence of the optic axes are at the middle of the hyperbolic brushes when the crystal is in the diagonal position : the size of the optic axial angle can therefore be directly measured with considerable accuracy.

In orthorhombic crystals the three principal vibration-direc- tions coincide with the three crystallographic axes, and have therefore fixed positions in the crystal, which are the same for light of all colours and at all temperatures. The optical orienta- tion of an orthorhombic crystal is completely defined by stating to which crystallographic planes the optic axial plane and the acute bisectrix are respectively parallel and perpendicular. Examined in parallel light between crossed nicols, such a crystal extinguishes parallel to the crystallographic axes, which are often parallel to the edges of a face or section; there is thus

usually " straight extinction." The interference

figure seen in convergent polarized light is symmetrical about two lines at right angles.

In monoclinic crystals only one vibration-direction has a fixed position within the crystal, being parallel to the ortho-axis (i.e. perpendicular to the plane of symmetry or the plane (010)). The other two vibration-directions lie in the plane (010), but they may vary in position for light of different colours and at different temperatures. In addition to dispersion of the optic axes there may thus, in crystals of this system, be also " dispersion of the bisectrices." The latter may be of one or other of three kinds, according to which of the three vibration-directions coincides with the /ortho-axis of the crystal. When the acute bisectrix is fixed in position, the optic axial planes for different colours may be crossed, and the interference figure will then be sym- metrical with respect to a point only (" crossed dispersion "). When the obtuse bisectrix is fixed, the axial planes may be in- clined to one another, and the interference figure is symmetrical only about a line which is perpendicular to the axial planes (" horizontal dispersion "). Finally, when the vibration-direc- tion corresponding to the refractive index /?, or the "third mean line," has a fixed position, the optic axial plane lies in the plane (010), but the acute bisectrix may vary in position in this plane; the interference figure will then be symmetrical only about a line joining the optic axes ("inclined dispersion "). Examples of substances exhibiting these three kinds of dispersion are borax, orthoclase and gypsum respectively. In orthoclase and gypsum, however, the optic axial angle gradually diminishes as the crystals are heated, and after passing through a uniaxial position they open out in a plane at right angles to the one they previously occupied; the character of the dispersion thus becomes reversed in the two examples quoted. When examined in parallel light between crossed nicols monoclinic crystals will give straight extinction only in faces and sections which are perpendicular to the plane of symmetry (or the plane (010)); in

all other faces and sections the extinction-directions will be inclined to the edges of the crystal. The angles between these directions and edges are readily measured, and, being dependent on the optical orientation of the crystal, they are often character- istic constants of the substance (see, e.g., Plagioclase).

In anorthic crystals there is no relation between the optical and crystallographic directions, and the exact determination of the optical orientation is often a matter of considerable difficulty. The character of the dispersion of the bisectrices and optic axes is still more complex than in monoclinic crystals, and the interference figures are devoid of symmetry.

Absorption of Light in Crystals: Pleochroism.— In crystals other than those of the cubic system, rays of light with different vibration-directions will, as a rule, be differently absorbed; and the polarized rays on emerging from the crystal may be of different intensities and (if the observation be made in white light and the crystal is coloured) differently coloured. Thus, in tourmaline the ordinary ray, which vibrates perpendicular to the principal axis, is almost completely absorbed, whilst the extraordinary ray is allowed to pass through the crystal. A plate of tourmaline cut parallel to the principal axis may there- fore be used for producing a beam of polarized light, and two such plates placed in crossed position form the polarizer or analyser of " tourmaline tongs," with the aid of which the interference figures of crystals may be simply shown. Uniaxial (tetragonal and hexagonal) crystals when showing perceptible differences in colour for the ordinary and extraordinary rays are said to be " dichroic." In biaxial (orthorhombic, monoclinic and anorthic) crystals, rays vibrating along each of the three principal vibration directions may be differently absorbed, and, in coloured crystals, differently coloured; such crystals are therefore said to be " trichroic " or in general " pkochroic " (from irKkoov, more, and xp*

of maximum absorption which lie in the plane of symmetry are not even at right angles.

The pleochroism of some crystals is so strong that when they are viewed through in different directions they exhibit marked differences in colour. Thus a crystal of the mineral iolite (called also dichroite because of its strong pleochroism) will be seen to be dark blue, pale blue or pale yellow according to which of three perpendicular directions it is viewed. The " face colours " seen directly in this way result, however, from the mixture of two '" axial colours " belonging to rays vibrating in two directions. In order to see the axial colours separately the crystal must be examined with a dichroscope, or in a polarizing microscope from which the analyser has been removed. The dichroscope, or dichroiscope (fig. 102), consists of a cleavage rhombohedron

of calcite (Iceland-spar) p, on the ends of which glass prisms w are ce- mented: the lens / is focused on a small square aperture in the tube of the instrument. The eye Fig. 102— Dichroscope. of t h e observer placed at

e will see two images of the square aperture, and if a pleochroic crystal be placed in front of this aperture the two images will be differently coloured. On rotating this crystal with respect to the instrument the maximum difference in the colours will be obtained when the vibration-directions in the crystal coincide with those in the calcite. Such a simple instrument is especially useful for the examination of faceted gem-stones, even when they are mounted in their settings. A single glance suffices to dis- tinguish between a ruby and a " spinel-ruby," since the former is dichroic and the latter isotropic and therefore not dichroic.

The characteristic absorption bands in the spectrum

of white light which has been transmitted through certain crystals, particularly those of salts of the cerium metals, will, of course, be different according to the direction of vibration of the rays.

Circular Polarization in Crystals. — Like the solutions of certain optically active organic substances, such as sugar and tartaric acid, some optically isotropic and uniaxial crystals possess the property of rotating the plane of polarization of a beam of light. In uniaxial (tetragonal and hexagonal) crystals it is only for light transmitted in the direction of the optic axis that there is rotatory action, but in isotropic (cubic) crystals all directions are the same in this respect. Examples of circularly polarizing cubic crystals are sodium chlorate, sodium bromate, and sodium uranyl acetate; amongst tetragonal crystals are strychnine sulphate and guanidine carbonate; amongst rhombohedral are quartz (q.v.) and cinnabar (q.v.) (these being the only two mineral substances in which the phenomenon has been observed) , dithionates of potassium, lead, calcium and strontium, and sodium periodate; and amongst hexagonal crystals is potassium lithium sulphate. Crystals of all these substances belong to one or other of the several symmetry-classes in which there are neither planes nor centre of symmetry, but only axes of sym- metry. They crystallize in two complementary hemihedral forms, which are respectively right-handed and left-handed, i.e. enantiomorphous forms. Some other substances which crystal- lize in enantiomorphous forms are, however, only " optically active " when in solution (e.g. sugar and tartaric acid) ; and there are many other substances presenting this peculiarity of crystal- line form which are not circularly polarizing either when crystal- lized or when in solution. Further, in the examples quoted above, the rotatory power is lost when the crystals are dissolved (except in the case of strychnine sulphate, which is only feebly active in solution) . The rotatory power is thus due to different causes in the two cases, in the one depending on a spiral arrangement of the crystal

particles, and in the other on the structure of the molecules themselves.

The circular polarization of crystals may be imitated by a pile of mica plates, each plate being turned through a small angle on the one below thus giving a spiral arrangement to the pile. ” Optical Anomalies ” of Crystals. — When, in 1818, Sir David*

Brewster established the important relations existing between the optical properties of crystals and their external form, he at the same time noticed many apparent exceptions. For example, he observed that crystals of leucite and boracite, which are cubic: in external form, are always doubly refracting and optically biaxial, but with a complex internal structure; and that cubic crystals of garnet and analcite sometimes exhibit the same phenomena. Also some tetragonal and hexagonal crystals, e.g. apophyllite, vesuvianite, beryl, &c, which should normally be optically uniaxial, sometimes consist of several biaxial portions arranged in sectors or in a quite irregular manner. Such excep- tions to the general rule have given rise to much discussion. They have often been considered to be due to internal strains in the crystals, set up as a result of cooling or by earth pressures, since similar phenomena are observed in chilled and compressed glasses and in dried gelatine. In many cases, however, as shown by E. Mallard, in 1876, the higher degree of symmetry exhibited by the external form of the crystals is the result of mimetic twinning, as in the pseudo-cubic crystals of leucite (q.vl) and boracite (q.v.). In other instances, substances not usually regarded as cubic, e.g. the’ monoclinic phillipsite (q.v.), may by repeated twinning give rise to pseudo-cubic forms. In some cases it is probable that the substance originally crystallized in one modification at a higher temperature, and when the temperature fell it became transformed into a dimorphous modification, though still preserving the external form of the original crystal (see Boracite). A summary of the literature is given by R. Brauns, Die optischen Anomalien der Krystalle

(Leipzig, 1891).

(c) Thermal Properties.

The thermal properties of crystals present certain points in common with the optical properties. Heat rays are transmitted and doubly refracted like light rays; and surfaces expressing the conductivity and dilatation in different directions possess the same degree of symmetry and are related in the same way to the crystallographic axes as the ellipsoids expressing the optical relations. That crystals conduct heat at different rates in different directions is well illustrated by the following experiment. Two plates (fig. 103) cut from a crystal .

of quartz, one parallel to the principal axis and the other perpendicular to it, are coated with a thin layer of wax, and a hot wire is applied to a point on the surface. On the transverse section the wax will be melted in a circle, and on the longitudinal section (or on the natural prism faces) in an ellipse. The isothermal surface in a uniaxial crystal is therefore a spheroid; in cubic crystals it is a sphere; and in biaxial crystals an ellipsoid, the three axes of which coincide, in orthorhombic crystals, with the crystallographic axes.

With change of temperature cubic crystals expand equally in all direc- tions, and the angles between the faces are the same at all temperatures. In

uniaxial crystals there are two principal p IG . I0 , — Conductivity coefficients of expansion; the one of Heat in Quartz, measured in the direction of the prin- cipal axis may be either greater or less than that measured in directions perpendicular to this axis. A sphere cut from a uniaxial crystal at one temperature will be a spheroid at another temperature. In biaxial crystals there are different coefficients of expansion along three rectangular axes, and a sphere at one temperature will be an ellipsoid at another. A result of this is that for

all crystals, except those belonging to the cubic system, the angles between the faces will vary, though only slightly, with changes of temperature. E. Mitscherlich found that the rhombo- hedral angle of calcite decreases 8′ 37″ as the crystal is raised in temperature from 0° to 100° C.

As already mentioned, the optical properties of crystals vary considerably with the temperature. Such characters as specific heat and melting-point, which do not vary with the direction, are the same in crystals as in amorphous substances.

(d) Magnetic and Electrical Properties.

Crystals, like other bodies, are either paramagnetic or dia- magnetic, i.e. they are either attracted or repelled by the pole of a magnet. In crystals other than those belonging to the cubic system, however, the relative strength of the induced magnetiza- tion is different in different directions within the mass. A sphere cut from a tetragonal or hexagonal (uniaxial) crystal will if freely suspended in a magnetic field (between the poles of a strong electro-magnet) take up a position such that the principal axis of the crystal is either parallel or perpendicular to the lines of force, or to a line joining the two poles of the magnet. Which of these two directions is taken by the axis depends on whether the crystal is paramagnetic or diamagnetic, and on whether the principal axis is the direction of maximum or minimum magnetization. The surface expressing the magnetic character in different directions is in uniaxial crystals a spheroid; in cubic crystals it is a sphere. In orthorhombic, monoclinic and anorthic crystals there are three principal axes of magnetic induction, and the surface is an ellipsoid, which is related to the symmetry of the crystal in the same way as the ellipsoids express- ing the thermal and optical properties.

Similarly, the dielectric constants of a non-conducting crystal may be expressed by a sphere, spheroid or ellipsoid. A sphere cut from a crystal will when suspended in an electro-magnetic field set itself so that the axis of maximum induction is parallel to the lines of force.

The electrical conductivity of crystals also varies with the direction, and bears the same relation to the symmetry as the thermal conductivity. In a rhombohedral crystal of haematite the electrical conductivity along the principal axis is only half as great as in directions perpendicular to this axis; whilst in a crystal of bismuth, which is also rhombohedral, the conductivities along and perpendicular to the axis are as i-6:i.

Conducting crystals are thermo-electric: when placed against another conducting substance and the contact heated there will be a flow of electricity from one body to the other if the circuit be closed. The thermo-electric force depends not only on the nature of the substance, but also on the direction within the crystal, and may in general be expressed by an ellipsoid. A remarkable case is, however, presented by minerals of the pyrites group: some crystals of pyrites are more strongly thermo-electrically positive than antimony, and others more negative than bismuth, so that the two when placed together give a stronger thermo-electric couple than do antimony and bismuth. In the thermo-electrically positive crystals of pyrites the faces of the pentagonal dodecahedron are striated parallel to the cubic edges, whilst in the rarer negative crystals the faces are striated perpendicular to these edges. Sometimes both sets of striae are present on the same face, and the corresponding areas are then thermo-electrically positive and negative.

The most interesting relation between the symmetry of crystals and their electrical properties is that presented by the pyro-electrical phenomena of certain crystals. This is a phenomenon which may be readily observed, and one which often aids in the determination of the symmetry of crystals. It is

exhibited by crystals in which there is no centre of symmetry, and the axes of symmetry are uniterminal or polar in character, being associated with different faces on the crystal at their two ends. When a non-conducting crystal possessing this hemi-morphic type of symmetry is subjected to changes of temperature a charge of positive electricity will be developed on the faces in the region of one end of the uniterminal axis, whilst the faces at the opposite end will be negatively charged. With rising temperature the pole which becomes positively charged is called the " analogous pole," and that negatively charged the " anti- logous pole ": with falling temperature the charges are reversed. The phenomenon was first observed in crystals of tourmaline,

the principal axis of which is a uniterminal triad axis of sym-' metry. In crystals of quartz there are three uniterminal dyad axes of symmetry perpendicular to the principal triad axis (which is here similar at its two ends): the dyad axes emerge at the edges of .the hexagonal prism, alternate edges of which become positively and negatively charged on change of temperature. In boracite there are four uniterminal triad axes, and the faces of the two tetrahedra perpendicular to them will bear opposite charges. Other examples of pyro-electric crystals are the orthorhombic mineral hemimorphite (called also, for this reason, " electric calamine ") and the monoclinic tartaric acid and cane-sugar, each of which possesses a uniterminal dyad axis of symmetry. In some exceptional cases, e.g. axinite, prehnite, &c, there is no apparent relation between the distribution of the pyro-electric charges and the symmetry of the crystals.

The distribution of the electric charges may be made visible by the following simple method, which may be applied even with minute crystals observed under the microscope. A finely powdered mixture of red-lead and sulphur is dusted through a sieve over the cooling crystal. In passing through the sieve the particles of red-lead and sulphur become electrified by mutual friction, the former positively and the

latter negatively. The red-lead is therefore attracted to the negatively charged parts of the crystal and the sulphur to those positively charged, and the distribution of the charges over the whole crystal becomes mapped out in the two colours red and yellow.

Since, when a crystal changes in temperature, it also expands or contracts, a similar distribution of ” piezo-electric ” (from Tiifeip, to press) charges are developed when a crystal is sub- jected to changes of pressure in the direction of a uniterminal axis of symmetry. Thus increasing pressure along the principal axis of a tourmaline crystal produces the same electric charges as decreasing temperature.

III. RELATIONS BETWEEN CRYSTALLINE FORM AND CHEMICAL COMPOSITION.

That the generaland physical characters of a chemical substance are profoundly modified by crystalline structure is strikingly illustrated by the two crystalline modifications of the element carbon — namely, diamond and graphite. The former crystallizes in the cubic system, possesses four directions of perfect cleavage, is extremely hard and transparent, is a non-conductor of heat and electricity, and has a specific gravity of 3-5; whilst graphite crystallizes in the hexagonal system, cleaves in a single direction, is very soft and opaque, is a good conductor of heat and electricity, and has a specific gravity of 2-2. Such substances, which are identical in chemical composition, but different in crystalline form and consequently in their physical properties, are said to be ” dimorphous.” Numerous examples of dimorphous sub- stances are known; for instance, calcium carbonate occurs in nature either as calcite or as aragonite, the former being rhombo- hedral and the latter orthorhombic; mercuric iodide crystallizes- from solution as red tetragonal crystals, and by sublimation as yellow orthorhombic crystals. Some substances crystallize in three different modifications, and these are said to be ” tri-

morphous "; for example, titanium dioxide is met with as the minerals rutile, • anatase and brookite (q.v.). In general, or in cases where more than three crystalline modifications are known (e.g. in sulphur no less than six have been described), the term " polymorphism " is applied.

On the other hand, substances which are chemically quite distinct may exhibit similarity of crystalline form. For example, the minerals iodyrite (Agl), greenockite (CdS), and zincite (ZnO) are practically identical in crystalline form; calcite (CaC0 3) and sodium nitrate (NaN0 3); celestite (SrSO) 4 and marcasite (FeS 2); epidote and azurite; and many others, some of which are no doubt only accidental coincidences. Such substances are said to be " homoeomorphous " (Gr. ofwios, like, and iiop4>ri, form).

Similarity of crystalline form in substances which are chemically related is frequently met with and is a relation of much

importance: such substances are described as being " isomorph- ous." Amongst minerals there are many examples of isomorphous groups, e.g. the rhombohedral carbonates, garnet (q.v.), plagio- clase (q.v.) ; and amongst crystals of artificially prepared salts isomorphism is equally common, e.g. the sulphates and selenates of potassium, rubidium and caesium. The rhombohedral car- bonates have the general formula R"C0 3 , where R" represents calcium, magnesium, iron, manganese, zinc, cobalt or lead, and the different minerals (calcite, ankerite, magnesite, chalybite, rhodochrosite and calamine (q.v.)) of the group are not only similar in crystalline form, cleavage, optical and other characters, but the angles between corresponding faces do not differ by more than i° or 2°. Further, equivalent amounts of the different chemical elements represented by R" are mutually replaceable,

and two or more of these elements may be present together in the same crystal, which is then spoken of as a ” mixed crystal ” or isomorphous mixture.

In another isomorphous series of carbonates with the same general formula R” C0 3 , where R” represents calcium, strontium, barium, lead or zinc, the crystals are orthorhombic in form, and are thus dimorphous with those of the previous group (e.g. calcite and aragonite, the other members being only represented by isomorphous replacements). Such a relation is known as ” isodimorphism.” An even better example of this is presented by the arsenic and antimony trioxides, each of which occurs as two distinct minerals: —

AS2O3, Arsenolite (cubic); Claudetite (monoclinic).

SbjOs, Senarmontite (cubic) ; Valentinite (orthorhombic).

Claudetite and valentinite though crystallizing in different systems have the same cleavages and very nearly the same angles, and are strictly isomorphous.

Substances which form isodimorphous groups also frequently crystallize as double salts. For instance, amongst the carbonates quoted above are the minerals dolomite (CaMg(COs) 2) and barytocalcite (CaBa(COs)2). Crystals of barytocalcite (q.v.) are monoclinic; and those of dolomite (q.v.), though closely related to calcite in angles and cleavage, possess a different degree of symmetry, arid the specific gravity is not such as would result by a simple isomorphous mixture of the two carbonates. A similar case is presented by artificial crystals of silver nitrate and potassium nitrate. Somewhat analogous to double salts are the molecular compounds formed by the introduction of ” water of crystallization,” ” alcohol of crystallization,” &c. Thus sodium sulphate may crystallize alone or with either seven or ten molecules of water, giving rise to three crystallographically distinct substances.

A relation of another kind is the alteration in crystalline form resulting from the replacement in the chemical molecule of one or more atoms by atoms or radicles of a different kind. This is known as a ” morphotropic ” relation (Gr. noptjrfi, form, rpowos, habit). Thus when some of the hydrogen atoms of benzene are replaced by (OH) and (NO2) groups the orthorhombic system of crystallization remains the same as before, and the crystallo- graphic axis a is not much affected, but the axis c varies considerably : —

a : b : c

Benzene, C 6 H 6 0891 : 1 : 0799

Resorcin, C 6 H 4 (OH)2 …. 0910 : 1 : 0-540 Picric acid, C 6 H 2 (OH)(N0 2)3 . 0937 :i : 0-974

A striking example of morphotropy is shown by the humite (q.v.) group of minerals: successive additions of the group Mg2Si0 4 to the molecule produce successive increases in the length of the vertical crystallographic axis.

In some instances the replacement of one atom by another produces little or no influence on the crystalline form; this .happens in complex molecules of high molecular weight, the ” mass effect ” of which has a controlling influence on the isomorphism. An example of this is seen in the replacement of sodium or potassium by lead in the alunite (q.v.) group of minerals, or again in such a complex mineral as tourmaline, which, though varying widely in chemical composition, exhibits no variation in crystalline form.

For the purpose of comparing the crystalline forms of iso- morphous and morphotropic substances it is usual to quote the angles or the axial ratios of the crystal, as in the table of benzene derivatives quoted above. A more accurate comparison is, how- ever, given by the ” topic axes,” which are calculated from the axial ratios and the molecular volume; they express the relative distances apart of

the crystal molecules in the axial directions.

The two isomerides of substances, such as tartaric acid, which in solution rotate the plane of polarized light either to the right or to the left, crystallize in related but enantiomorphous forms.

References.— An introduction to crystallography is given in most text-books of mineralogy, e.g. those of H. A. Miers and of E. S. Dana (see Mineralogy). The standard work treating of the subject generally is that of P. Groth, Physikalische Krystallographie (4th ed., Leipzig, 1905). A condensed summary is given by A. J. Moses, The Characters of Crystals (New York, 1899).

For geometrical crystallography, dealing exclusively with the external form of crystals, reference may be made to N. Story- Maskelyne, Crystallography, a Treatise on the Morphology of Crystals (Oxford, 1895) and W. J. Lewis, A Treatise on Crystallography (Cambridge, 1899). Theories of crystal structure are discussed by L. Sohncke, Entwickelung einer Theorie der Krystallstruktur (Leipzig, 1879); A. Schoenflies, Krystallsysteme und Krystallstruciur (Leipzig, 1891) ; and H. Hilton, Mathematical Crystallography and the Theory of Groups of Movements (Oxford, 1903).

The physical properties of crystals are treated by T. Liebisch, Physikalische Krystallographie (Leipzig, 1 891), and in a more elemen- tary form in his Grundriss der physikalischen Krystallographie (Leipzig, 1896) ; E. Mallard, Traite de cristallographie, Cristallographie physique (Paris, 1884) ; C. Soret, Elements de cristallographie physique (Geneva and Paris, 1893).

For an account of the relations between crystalline form and chemical composition, see A. Arzruni, Physikalische Chemie der Krystalle (Braunschweig, 1893); A. Fock, An Introduction to Chemical Crystallography, translated by W. J. Pope (Oxford, 1895); P. Groth, An Introduction to Chemical Crystallography, translated by H. Marshall (London,

1906) ; A. E. H. Tutton, Crystalline Struc- ture and Chemical Constitution, 1910. Descriptive works giving the crystallographic constants of different substances are C. F. Rammelsberg, Handbuch der krystallographisch-physikalischen Chemie (Leipzig, 1881-1882); P. Groth, Chemische Krystallographie (Leipzig, 1906) ; and of minerals the treatises of J. D. Dana ana C. Hintze.

(L. J. S.)

CRYSTAL PALACE, THE, a well-known English resort, standing high up in grounds just outside the southern boundary of the county of London, in the neighbourhood of Sydenham. The building, chiefly of iron and glass, is flanked by two towers and is visible from far over the metropolis. It measures 1608 ft. in length by 384 ft. across the transepts, and was opened in its present site in 1854. The materials, however, were mainly those of the hall set up in Hyde Park for the Great Exhibition of 1851. The designer was Sir Joseph Paxton. In the palace there are various permanent exhibitions, while special exhibitions are held from time to time, also concerts, winter pantomimes and other entertainments. In the extensive grounds there is accommodation for all kinds of games: the final tie of the Association Football Cup and other important football matches are played here, and there are also displays of fireworks and other attractions.

CSENGERY, ANTON (182 2-1880), Hungarian publicist, and a historical writer of great influence on his time, was born at Nagyvarad on the 2nd of June 1822. He took, at an early date, a very active part in the literary and political movements immediately preceding the Hungarian Revolution of 1848. He and Baron Sigismund Kemeny may be considered as the two founders of high-class Magyar journalism. After 1 867 the greatest of modern Hungarian statesmen, Francis Deak, attached Csengery to his personal service, and many of the momentous state documents inspired or suggested by Deak were drawn up by Csengery. In that manner his influence, as represented by the text of many a statute regulating

the relations between Austria and Hungary, is one of an abiding character. As a historical writer he excelled chiefly in brilliant and thoughtful essays on the leading political personalities of his time, such as Paul Nagy, Bertalan, Szemere and others. He also commenced a translation of Macaulay's History. He died at Budapest on the 13th of July 1880.

CSIKY, GREGOR (1842–1891), Hungarian dramatist, was born on the 8th of December 1842 at Pankota, in the county of Arad. He studied Roman Catholic theology at Pest and Vienna, and was professor in the Priests' College at Temesvar from 1870 to 1878. In the latter year, however, he joined the Evangelical Church, and took up literature. Beginning with novels and works on ecclesiastical history, which met with some recognition, he ultimately devoted himself to writing for the stage. Here his success was immediate. In his Az ellendllhatatlan (" L'lrresis- tible "), which obtained a prize from the Hungarian Academy, 'he showed the distinctive features of his talent — directness, freshness, realistic vigour, and highly individual style. In rapid succession he enriched Magyar literature with realistic genre- pictures, such as A Prolet&rok ("Proletariate"), Buborckok (" Bubbles "), KSt szerelem (" Two Loves "), A szigyenlos (" The Bashful "), Athalia, &c, in all of which he seized on one or another feature or type of modern life, dramatizing it with unusual intensity, qualified by chaste and well-balanced diction. Of the latter, his classical studies may, no doubt, be taken as the inspiration, and his translation of Sophocles and Plautus will long rank with the most successful of Magyar translations of the ancient classics. Among the best known of his novels are Arnold, Az Atlasz csaldd ("The Atlas Family"). He died at Budapest on the 19th of November 1891.

CSOKONAI, MIHALY VITEZ (1773–1805), Hungarian poet, was born at Debreczen in 1773. Having been educated

in his native town, he was appointed while still very young to the professorship of poetry there; but soon after he was deprived of the post on account of the immorality of his conduct. The remaining twelve years of his short life were passed in almost constant wretchedness, and he died in his native town, and in his mother's house, when only thirty-one years of age. Csokonai was a genial and original poet. with something of the lyrical fire of Petofi, and wrote a mock-heroic poem called Dorottya or the Triumph of the Ladies at the Carnival, two or three comedies or farces, and a number of love-poems. Most of his works have been published, with a life, by Schedel (1844-1847).

CSOMA DE KOROS, ALEXANDER (c. 1790-1842), or, as the name is written in Hungarian, Korosi Csoma Sandor, Hungarian traveller and philologist, born about 1790 at Koros in Tran- sylvania, belonged to a noble family which had sunk into poverty. He was educated at Nagy-Enyed and at Gottingen; and, in order to carry out the dream of his youth and discover the origin of his countrymen, he divided his attention between medicine and the Oriental languages. In 1820, having received from a friend the promise of an annuity of 100 florins (about £10) to support him during his travels, he set out for the East. He visited Egypt, and made his way to Tibet, where he spent four years in a Buddhist monastery studying the language and the Buddhist literature. To his intense disappointment he soon discovered that he could not thus obtain any assistance in his great object; but, having visited Bengal, his knowledge of Tibetan obtained him employment in the library of the Asiatic Society there, which possessed more than 1000 volumes, in that language; and he was afterwards supported by the government while he published a Tibetan-English dictionary and grammar (both of which appeared at Calcutta in 1834). He also contri- buted several articles on the Tibetan language and literature to the Journal of the Asiatic Society of Bengal, and he published an analysis of the Kah-Gyur, the most important of the Buddhist sacred books. Meanwhile his fame had

reached his native country, and procured him a pension from the government, which, with characteristic devotion to learning, he devoted to the- purchase of books for Indian libraries. He spent some time in Calcutta, studying Sanskrit and several other languages; but; early in 1842, he commenced his second attempt to discover the origin of the Hungarians, but he died at Darjiling on the nth of April 1842. An oration was delivered in his honour before the Hungarian Academy by Eotvos, the novelist.

CTENOPHORA, in zoology, a class of jelly-fish which were briefly described by Professor T. H. Huxley in 1875 (see Actinozoa, Ency. Brit. 9th ed. vol. i.) as united with what we

Onxl pde

now term Anthozoa to form the group Actinozoa; but little was known of the intimate structure of those remarkable and beauti- ful forms till the appearance in 1880 of C. Chun's Monograph of the Ctenophora occurring in the Bay of Naples. They may be defined as Coelentera which exhibit both a radial and bilateral symmetry of organs; with a stomodaeum; with a mesenchyma which is partly gelatinous but partly cellular; with eight meri- dianal rows of vibratile paddles formed of long fused or matted cilia; lacking nematocysts (except in one genus). An example common on the British coasts is furnished by Hormiphora (Cydippe). In outward form this is an egg-shaped ball of clear jelly, having a mouth at the pointed (oral) pole, and a sense- organ at the broader (ab- oral) pole. It possesses eight meridians (costae) of iridescent paddles in con- stant vibration, which run from near one pole towards the other; it has also two pendent feathery tentacles of considerable length, which can be retracted into pouches. The mouth leads into an ectodermal stomo- daeum (" stomach "), and the latter into an endo- dermal funnel (infundi- bulum); these two are compressed in planes at right angles to one another, the sectional long axis of the stomodaeum lying in the so-called sagittal (stomo-

daeal or gastric) plane, that of the funnel in the trans- verse (tentacular or funnel) plane. From the funnel, canals are given off in three directions; (a) a pair of paragastric (stomachal, or stomodaeal) canals run orally, parallel to the stomo- daeum, and end blindly near the mouth; (b) a pair of perradial canals run in the transverse plane towards the equator of the animal; each of these becomes divided into two short canals at the base of the tentacle sheath which they supply, but has previously given off a pair of short interradial canals, which again bifurcate into two adradial canals; all these branches lie in the equatorial plane of the animal, but the eight adra- dial canals then open into eight meridianal canals which run orally and abor- ally under the costae; (c) a pair of aboral vessels which run towards the sense-organ, each of which bifurcates;

of the four vessels thus formed, two only open at the sides of the sense-organ, forming the so-called excretory apertures. These three sets of structures, with the funnel from which they rise, make up the endodermal coelenteron, or gastro-vascular system. The generative organs are endodermal by origin, borne at the sides of the meridianal canals as indicated by the signs $ 9 . There exists a subepithelial plexus with nerve cells

Fig. 1. — Schematic drawing of a Cydippid from the side. (After Chun.)

A , Adradial canals. F, Infundibulum. /, Interradial canal. M, Meridianal canal lying under a

costa. N, Ciliated furrow from sense pole

to costa. Pg, Paragastric canal. SO, Sense-organ. St, Stomodaeum. Subs, Subsagittal costa. Subt, Subtentacular costa. T, Tentacle. Ts, Boundaries of tentacle-sheath.

Suit

T (centrally), Tentacular canal, and (dis- tally) tentacle. Position of testes.

Position of ovaries; other letters as in fig. I . The stomodaeum lies in the sagittal plane, the funnel and tentacles in the transverse or tentacular plane.

and fibres, similar to that of jelly-fishes. The sense-organ of the aboral pole is complex, and lies under a dome of fused cilia shaped like an inverted bell-jar; it consists of an otolith, formed of numerous calcareous spheroids, which is supported on four plates of fused cilia termed balancers, but is otherwise free. The ciliated ectoderm below the organ is markedly thickened, and perhaps functionally represents a nerve-ganglion: from it eight ciliated furrows radiate outwards, two passing under each balancer as through an archway, and diverge each to the head

of a meridianal costa. These ciliated furrows stain deeply with osmic acid, and nervous im- pulses are certainly transmitted along them. Locomotion is effected by strokes of the paddles in an aboral direction, driving the animal mouth forwards through the water: each paddle or comb (Gr. KTtis; hence Cteno- phora) consists of a plate of fused or matted cilia set transversely to Fig. 2.— Schematic drawing of a Cy- the costa. The myoepi-

ChuS fr ° m the ab ° ral P ° le ' (Aft6r thelial Cells < formerl y

termed neuro-muscular

cells), characteristic of other Coelentera, are not to be found in this group. On the other hand there are well- marked muscle fibres in definite layers, derived from special m'esoblastic cells in the embryo, which are embedded in a jelly; these in their origin and arrangement are quite comparable to the meso- derm of Triploblastica, and, although the

muscle-cells of some jelly-fish exhibit a somewhat similar condition, nothing so highly specialized as the mesenchyme of Ctenophora occurs in any other Coelenterate. The nematocysts being nearly absent from their group, their chief function is carried out by adhesive lasso-cells.

The Ctenophora are classified as follows: —

Subclass i. Tentacalata, Order i. Cydippidea, Hormiphora. ,, 2. Lobata, Deiopea.

,, 3. Cestoidea, Cestus. „ ii. Nuda, ,, Beroe.

The Tentaculata, as the name implies, may be recognized by the presence of tentacles of some sort. The Cydippidea are generally spherical or ovoid, with two long retrusible pinnate tentacles: the meridianal and paragastric canals end blindly. An example of these has already been briefly described. The Lobata are of the same general type as the first Order, except for the presence of four circumoral auricles (processes of the subtransverse costae) and of a pair of sagittal outgrowths or lobes, on to which the subsagittal costae are continued. Small accessory tentacles lie in grooves, but there is no tentacular pouch ; the meridianal vessels anastomose in the lobes. In the Cestoidea the body is compressed in the trans- verse plane, elongated in the sagittal plane, so as to become riband- like: the subtransverse costae are greatly reduced, the subsagittal costae extend along the aboral edge of the riband. The subsagittal canals lie immediately below their costae aborally, but continuations of the subtransverse canals round down the middle of the riband, and at its end unite, not only with the subsagittal but also with the paragastric canals which run along the oral edge of the riband. The tentacular bases and pouches are present, but there is no main tentacle as in Cydippidea ; fine accessory tentacles lie in four grooves along the oral edge. The subclass Nuda have no tentacles of any kind; they are conical or ovoid, with a capacious stomodaeum like the cavity of a thimble. There is a coelenteric network formed by

anastomoses of the meridianal and paragastric canals all over the body.

The embryology of Callianira has been.worked out by E. Mechni- kov. Segmentation is complete and unequal, producing macromeres and micromeres marked by differences in the size and in yolk-

contents. The micromeres give rise to the ectoderm; each of the sixteen macromeres, after budding off a small mesoblast cell, passes on as endoderm. A gastrula is established by a mixed process of embole and epibole. The mesoblast cells travel to the aboral pole of the embryo, and there form a cross-shaped mass, the arms of which lie in the sagittal and transverse planes (perradii).

There can be but little question of the propriety of including Ctenophora among the Coelentera. The undivided coelenteron (gastro-vascular system) which constitutes the sole cavity of the body, the largely radial symmetry, the presence of endo-

Fig. 3. — Schematic Drawing of Cestus. (After Chun.) Subs, Subsagittal costae. Pg, Continuation of the para-

subtenta-

Subt, Much reduced

cular costae. Subt, Branch of the subten-

tacular canal which runs

along the centre of the

riband.

gastric canal at right angles to its original direc- tion along the lower edge of the riband. At the right-hand end the last two are seen to unite with the subsagittal canal.

dermal generative organs on the coelenteric canals, the sub- epithelial nerve-plexus, the mesogloea-like

matrix of the body — all these features indicate affinity to other Coelentera, but, as has been stated in the article under that title, the relation is by no means close. At what period the Ctenophora branched off from the line of descent, which culminated in the Hydromedusae and Scyphozoa of to-day, is not clear, but it is practically certain that they did so before the point of divergence of these two groups from one another. The peculiar sense-organ, the specialization of the cilia into paddles with the corresponding modifications of the coelenteron, the anatomy and position of the tentacles, and, above all, the character and mode of formation of the mesen- chyme, separate them widely from other Coelentera.

The last-named character, however, combined with the discovery of two remarkable organisms, Coeloplana and Cteno- plana, has suggested affinity to the flat- worms termed Turbellaria. Ctenoplana, ■ the best known of these, has recently been redescribed by A. Willey (Quart. Journ. Micr. Sci. xxxix., 1896). It is flattened along the axis which unites sense-organ and mouth, so . as to give it a dorsal (aboral) surface, and a ventral (oral) surface on which it frequently creeps. Its costae are very short, and retrusible; its two tentacles are pinnate and are also retrusible. Two crescentic rows of ciliated

papillae lie in the transverse plane on each t~ c u

Kf , ., „,^ . , Fig. 4. — Schematic

side of the sense-organ. Ihe coelenteron rj raw ; n g f Beroe.

exhibits six lobes, two of which Willey (After Chun.) identifies with the stomodaeum of other Ctenophora; the other four give rise to a system of anas- tomosing canals such as are found in Beroe and Polyclad Turbellaria. An aboral vessel embraces the sense-organ, but has no external opening. Ctenoplana is obviously a Cteno- phoran flattened and of a creeping habit. Coeloplana is of similar form and

habit, with two Ctenophoran tentacles: it has no costae, but is uniformly ciliated. These two forms at least indicate a possible stepping-stone from Ctenophora to

Turbellaria, that is to say, from diploblastic to triploblastic Metazoa. By themselves they would present no very weighty argument for this line of descent from two-layered to three- layered forms, but the coincidences which occur in the develop- ment of Ctenophora and Turbellaria, — the methods of segmenta- tion and gastrulation, of the separation of the mesoblast cells, and of mesenchyme formation, — together with the marked similarity of the adult mesenchyme in the two groups, have led many to accept this pedigree. In his Monograph on the Polyclad Turbellaria of the Bay of Naples, A. Lang regards a Turbellarian, so to say, as a Ctenophora, in which the sensory pole has rotated forwards in the sagittal plane through oo° as regards the original oral-aboral axis, a rotation which actually occurs in the develop- ment of Thysanozoon (Muller's larva); and he sees, in the eight lappets of the preoral ciliated ring of such a larva, the rudiments of the costal plates. According to his view, a simple early Turbellarian larva, such as that of Stylochus, most nearly, represents for us to-day that ancestor from which Ctenophora and Turbellaria are alike derived. For details of this brilliant theory, the reader is referred to the original monograph.

Literature. — G. C. Bourne, " The Ctenophora," in Ray Lan- kester's Treatise on Zoology (1900), where a bibliography is given; G. Curreri, " Osservazioni sui ctenofori," Boll. Soc. Zool. Ital. (2), i. pp. 190-193 et ii. pp. 58-76; A. Garbe, " Untersuchungen iiber die Entstehung der Geschlechtsorgane bei den Ctenophoren.," Zeitschr. Wiss. Zool. lxix. pp. 472-491; K. C. Schneider, Lehrbuch der vergleich. Histologic (1902). (G. H. Fo.)

CTESIAS, of Cnidus in Caria, Greek physician and historian, flourished in the 5th century B.C. In early life he was physician to Artaxerxes Mnemon, whom he accompanied (401) on his expedition against his brother Cyrus the Younger. Ctesias was the author of treatises on rivers, and on the Persian revenues, of an account of India (which is of value as recording the beliefs of the Persians about India), and of a history of Assyria and Persia in 23 books, called Persica, written in opposition to Herodotus in the Ionic dialect, and professedly founded on the Persian royal archives. The first six books treated of the history of Assyria and Babylon to the foundation of the Persian empire; the remaining seventeen went down to the year 398. Of the two histories we possess abridgments by Photius, and fragments are preserved in Athenaeus, Plutarch and especially Diodorus Siculus, whose second book is mainly from Ctesias. As to the worth of the Persica there has been much controversy, both in ancient and modern times. Being based upon Persian authorities, it was naturally looked upon with suspicion by the Greeks and censured as untrustworthy.

For an estimate of Ctesias as a historian see G. Rawlinson's Herodotus, i. 71–74; also the edition of the fragments of the Persica by J. Gilmore (1888, with introduction and notes and list of authorities).

CTESIPHON, a large village on the left bank of the Tigris, opposite to Seleucia, of which it formed a suburb, about 25 m. below Bagdad. It is first mentioned in the year 220 by Polybius v. 45. 4. When the Parthian Arsacids had conquered the lands east of the Euphrates in 129 B.C., they established their winter residence in Ctesiphon. They dared not stay in Seleucia, as this city, the most populous town of western Asia, always maintained her Greek self-government and a strong feeling of independence, which made her incline to the west whenever a Roman army attacked the Parthians. The Arsacids also were afraid of destroying the wealth and commerce of Seleucia, if they entered it with their large

retinue of barbarian officials and soldiers (Strabo xvi. 743, Plin. vi. 122, cf. Joseph. Ant. xviii. 9, 2). From this time Ctesiphon increased in size, and many splendid buildings rose; it had the outward appearance of a large town, although it was by its constitution only a village. From a.d. 36–43 Seleucia was in rebellion against the Parthians till at last it was forced by King Vardanes to yield. It is very probable that Vardanes now tried to put Ctesiphon in its place; therefore he is called founder of Ctesiphon by Ammianus Marcellinus (xxiii. 6. 23), where King Pacorus (78–110) is said to have increased its inhabitants and built its walls. Seleucia was destroyed by the Romans in a.d. 164. When Ardashir I.

founded the Sassanian empire (226), and fixed his residence at Ctesiphon, he built up Seleucia again under the name of Veh- Ardashir. Later kings added other suburbs; Chosroes I. in 540 established the inhabitants of Antiochia in Syria, whom he had led into captivity, in a new city, ” Chosrau-Antioch ” (or ” the Roman city “) near his residence. Therefore the Arabs designate the whole complex of towns which lay together around Seleucia and Ctesiphon and formed the residence of the Sassanids by the name Madain, ” the cities,” — their number is often given as seven. In the wars between the Roman and Persian empires, Ctesiphon was more than once besieged and plundered, thus by Odaenathusin 261, andby Carus in 283; Julian in 363 advanced to Ctesiphon, but was not able to take it (Ammianus xxiv. 7). After the battle of Kadisiya (Qadisiya) Ctesiphon and the neighbouring towns were taken and plundered by the Arabs in 637, who brought home an immense amount of booty (see Caliphate). From then, these towns decayed before the in- creasing prosperity of the new Arab capitals Basra and Bagdad. The site is marked only by the ruins of one gigantic building of brick-work, called Takhti Khesra, ” throne of Khosrau ” {i.e. Chosroes) . It is a great vaulted hall ornamented with pilasters, the remainder of the palace and the most splendid example of Sassanian architecture (see Architecture,

vol. ii. p. 558, for further details and illustration). (Ed. M.)

CUBA (the aboriginal name), a republic, the largest and most populous of the West India Islands, included between the meridians of 74 7' and 84° 57' W. longitude and (roughly) the parallels of 19° 48' and 23° 13' N. latitude. It divides the en- trance to the Gulf of Mexico into two passages of nearly equal width, — the Strait of Florida, about no m. wide between Capes Hicacos in Cuba and Arenas in Florida (Key West being a little over 100 m. from Havana); and the Yucatan Channel, about 130 m. wide between Capes San Antonio and Catoche. On the N.E., E. and S.E., narrower channels separate it from the Bahamas, Haiti (50 m.) and Jamaica (85 m.). In 1908, by the opening of a railway along the Florida Keys, the time of passage by water between Cuba and the United States was reduced to a few hours.

The island is long and narrow, somewhat in the form of an irregular crescent, convex toward the N. It has a decided pitch, to the S. Its length from Cape Maisi to Cape San Antonio along a medial line is about 730 m. ; its breadth, which averages about 50 m., ranges from a maximum of 160 m. to a minimum of about 22 m. The total area is estimated at 41,634 sq. m. without the surrounding keys and the Isle of Pines (area about 1180 sq. m.), and including these is approximately 44,164. The geography of the island is still very imperfectly known, and all figures are approximate only. The coast line, including larger bays, but excluding reefs, islets, keys and all minute sinuosities, is about 2500 m. in length. The N. littoral is characterized by bluffs, which grow higher and higher toward the east, rising to 600 ft. at Cape Maisi. They are marked by distinct terraces. The southern coast near Cape Maisi is low and sandy. From Guanti- namo to Santiago it rises in high escarpments, and W. of Santiago, where the Sierra Maestra runs close to the sea, there is a very high abrupt shore. To the W. of Manzanillo it sinks again, and throughout most of the remaining distance to Cape San Antonio is low, with a sandy or marshy littoral; at places sand hills fringe the shore;

near Trinidad there are hills of considerable height; and the coast becomes high and rugged W. of Point Fisga, in the province of Pinar del Rio. On both the N. and the S. side of the island there are long chains of islets and reefs and coral keys (of which it is estimated there are 1300), which limit access to probably half of the coast, and on the N. render naviga- tion difficult and dangerous. On the S. they are covered with mangroves. A large part of the southern littoral is subject to overflow, and much more of it is permanently marshy. The Zapata Swamp near Cienfuegos is 600 sq. m. in area; other large swamps are the Majaguillar, E. of C&rdenas, and the Cienaga del Buey, S. cf the Cauto river. The Isle of Pines in its northern part is hilly and wooded; in its southern part, very low, level and rather barren; a tidal swamp almost cuts the island in two.

GULF dF

*EmcryV*ltar St.*

A remarkable feature of the Cuban coast is the number of excellent anchorages, roadsteads and harbours. On the N. shore, beginning at the W., Bahia Honda, Havana, Matanzas, Cardenas, Nuevitas and Nipe; and on the S. shore running westward Guantanamo, Santiago and Cienfuegos, are harbours of the first class, several of them among the best of the world. Mariel, Cabanas, Banes, Sagua la Grande and Baracoa on the N., and Manzanillo, Santa Cruz, Batabano and Trinidad on the S. are also excellent ports or anchorages. The peculiar pouch-shape of almost all the harbours named (Matanzas being a marked exception) greatly increases their security and defensibility. These pouch harbours are probably "drowned " drainage basins. The number of small bays that can be utilized for coast trade traffic is extraordinary.

In popular language the different portions of the island are distinguished as the Vuelta Abajo (" lower turn "), W. of Havana; the Vuelta Arriba (" upper turn "), E. of Havana to Cienfuegos — Vuelta Abajo and Vuelta' Arriba are also used colloquially at any point in the island to mean " east " and " west " — Las Cinco Villas — i.e. Villa Clara, Trinidad, Remedios, Cienfuegos and Sancti Spiritus — between Cienfuegos and Sancti Spiritus; and Tierra Adentro, referring to the region between Cienfuegos and Bayamo. These names are extremely common. The province and city of Puerto Principe are officially known as Camagiiey, their original Indian name, which has practically supplanted the Spanish name in local usage.

Five topographic divisions of the island are fairly marked. Santiago (now Oriente) province is high and mountainous. Camagiiey is characterized by rolling, open plains, slightly broken, especially in the W., by low mountains. The E. part of Santa Clara province is decidedly rough and broken. The W. part, with the provinces of Matanzas and Havana, is flat and rolling, with occasional hills a few hundred feet high. Finally, Pinar del Rio is dominated by a prominent mountain range and by outlying piedmont hills and mesas. There are mountains in Cuba from one end of the island to the other, but they are not derived from any central mass and are not continuous. As just indicated there are three distinctively mountainous districts, various minor groups lying outside these. The three main systems are known in Cuba as the occidental, central and oriental. The first, the Organ mountains, in Pinar del Rio, rises in a sandy, marshy region near Cape San Antonio. The crest runs near the N. shore, leaving various flanking spurs and foothills, and a coastal plain which at its greatest breadth on the S. is some 20 m. wide. The plain on the N. is narrower and higher. The southern

slope is smooth, and abounds in creeks and rivers. The portion of the southern plain between the bays of Cortes and Majana is the most famous portion of the Vuelta Abajo tobacco region. The mountain range

is capriciously broken at points, especially near Bejucal. The highest part is the Pan de Guajaib6n, near Bahia Honda, at the W. end of the chain; its altitude has been variously estimated from 2500 to 1950 ft. The central system has two wings, one approaching the N. coast, the other covering the island between Sancti Spiritus and Santa Clara. It comprehends a number of independent groups. The highest point, the Pico Potrerillo, is about 2900 ft. in altitude. The summits are generally well rounded, while the lower slopes are often steep. Frequent broad intervals of low upland or low level plain extend from sea to sea between and around the moun- tains. Near the coast runs a continuous belt of plantations, while grazing, tobacco and general farm lands cover the lower slopes of the hills, and virgin forests much of the uplands and mountains. The oriental mountain region includes the province of Oriente and a portion of Camagiiey. In extent, in altitude, in mass, in complexity and in geological interest, it is much the most important of the three systems. Almost all the mountains are very bold. They are imperfectly known. There are two main ranges, the Sierra Maestra, and a line of various groups along the N. shore. The former runs from Cape Santa Cruz eastward along the coast some 125 m. to beyond the river Baconao. The Sierra de Cobre, a part of the system in the vicinity of Santiago, has a general elevation of about 3000 ft. Monte Turquino, 7700-8320 ft. in altitude, is the highest peak of the island. Gran Piedra rises more than 5200 ft., the Ojo del Toro more than 3300, the Anvil de Baracoa is somewhat lower, and Pan de Matanzas is about 1267 ft. The western portions of the range rise abruptly from the ocean, forming a bold and beautiful coast. A multitude of ravines and gullies, filled with torrential streams or dry, according to the season of the year, and character- ized by many beautiful cascades, seam the narrow coastal plain and the flanks of the mountains. The spurs of the central range are a highly intricate complex, covered with dense forests of superb woods. Many points are inaccessible, and the scenery is wild in the extreme. The mountains beyond Guantanamo are

locally known by a variety of names, though topographically a continuation of the Sierra Maestra. The same is true of the chains that coalesce with these near Cape Maisi and diverge northwesterly along the N. coast of the island. The general character of this northern marginal system is much the same as that of the southern, save that the range is much less

continuous. A dozen or more groups from Nipe in the E. to the coast N. of Camaguey in the W. are known only by individual names. The range near Baracoa is entremely wild and broken. The region between the lines of the two coastal systems is a much dissected plateau, imperfectly explored. The Cauto river, the only one flowing E. or W. and the largest of Cuba, flows through it westward to the southern coast near Manzanillo. The scenery in the oriental portion of the island is very beautiful, with wild mountains and tropical forests. In the central part there are extensive prairies. In the west there are swelling hills and gentle valleys, with the royal palm the dominating tree. The valley of the Yumuri, near Matanzas, a small circular basin crossed by a river that issues through a glen to the sea, is perhaps the most beautiful in Cuba.

A very peculiar feature of Cuba is the abundance of caverns in the limestone deposits that underlie much of the island's surface. The caves of Cotilla near Havana, of Bellamar near Matanzas, of Monte Libano near Guantanamo, and those of San Juan de los Remedios, are the best known, but there are scores of others. Many streams are " disappearing," part of their course being through underground tunnels. Thus the Rio San Antonio suddenly disappears near San Antonio de los Bafios; the cascades of the Jatibonico del Norte disappear and reappear in a surprising manner; the Moa cascade (near Guantanamo) drops 300 ft. into a cavern and its waters later reissue from the earth; the Jojo river disappears in

a great ” sink ” and later issues with violent current at the edge of the sea. The springs of fresh water that bubble up among the keys of the S. coast are also supposedly the outlets of underground streams.

The number of rivers is very great, but almost without excep- tion their courses are normal to the coast, and they are so short as to be of but slight importance. The Cauto river in Oriente province is exceptional; it is 250 m. long, and navigable by small vessels for about 75 m. Inside the bar at its mouth (formed by a storm in 1616) ships of 200 tons can still ascend to Cauto. In Camaguey province the jatibonico del Sur; in Oriente the Salado, a branch of the Cauto; in Santa Clara the Sagua la Grande (which is navigable for some 20 ni. and has an important traffic), and the Damuji; in Matanzas, the Canimar; and in Pinar del Rio the Cuyaguateje, are important streams. The water-parting in the four central provinces is very indefinite. There are few river valleys that are noteworthy — those of the Yumuri, the Trinidad and the Giiines. At Guantanamo and Trinidad are other valleys, and between Mariel and Havana is the fine valley of Ariguanabo. Of lakes, there are a few on the coast, and a very few in the mountains. The finest is Lake Ariguanabo, near Havana, 6 sq. m. in area. Of the almost innumerable river cascades, those of the Sierra Maestra Mountains, and in particular the Moa cascade, have already been mentioned. The Guama cascade in Oriente province and the Hanabanilla Fall near Cienfuegos (each more than 300 ft. high), the Rosario Fall in Pinar del Rio, and the Almendares cascade near Havana, may also be mentioned.

Geology. — The foundationof the island is formed of metamorphic and igneous rocks, which appear in the Sierra Maestra and are ex- posed in other parts of the island wherever the comparatively thin covering of later beds has been worn away. A more or less con- tinuous band of serpentine belonging to this series forms the principal watershed, although it nowhere rises to any great height. It is in this band that the greater part of the mineral wealth of

Cuba is situated. These ancient rocks have hitherto yielded no fossils and their age is therefore uncertain, but they are probably pre-Cretaceous at least. Fossiliferous Cretaceous limestones containing Rudistes have been found in several parts of the island (Santiago de los Banos, Santa Clara province, &c). At the base there is often an arkose, composed largely of fragments of serpentine and granite derived from the ancient floor. At Esperanza and other places in the Santa Clara province, bituminous plant-bearing beds occur beneath the Tertiary limestones, and at Baracoa a Radiolarian earth occupies a similar position. The latter, like the similar deposits in other West Indian islands, is probably of Oligocene age. It is the Tertiary limestones which form the predominant feature in the geo- logy of Cuba. Although they do not exceed 1000 ft. in thickness, they probably at one time covered the whole island except the summits of the Sierra Maestra, where they have been observed, resting upon the older rocks, up to a height of 2300 ft. They contain corals, but are not coral reefs. The shells which have been found in

them indicate that they belong for the most part to the Oligocene period. They are frequently very much disturbed and often strongly folded. Around, the coast there is a raised shelf of limestone which was undoubtedly a coral reef. But it is of recent date and does not attain an elevation of more than 40 or 50 ft.

Minerals are fairly abundant in number, but few are present in sufficient quantity to be industrially important. Traditions of gold and silver, dating from the time of the Spanish conquest, still endure, hut these metals are in fact extremely rare. Oriente province is distinctively the mineral province of the island. Large copper deposits of peculiar richness occur here in the Sierra de Cobre, near the city of Santiago; and both iron and manganese are abundant. Besides the deposits in Oriente province, iron is known to exist in considerable amount in Camaguey and Santa Clara, and copper in Camaguey and Pinar del Rio provinces. The iron ores mined at

Daiquiri near Santiago are mainly rich hematites running above 60 % of iron, with very little sulphur or phosphorus admixture. The copper deposits are mainly in well-marked fracture planes in serpentine; the ore is pyrrhotite, with or without chalcopyrite. Manganese occurs especially along the coast between Santiago and Manzanillo; the best ores run above 50 %. Chromium and a number of other rare minerals are known to exist, but probably not in commercially available quantities. Bituminous products of every grade, from clear translucent oils resembling petroleum and refined naphtha, to lignite-like substances, occur in all parts of the island. Much of the bituminous deposits is on the dividing line between asphalt and coal. There is an endless amount of stone, very little of which is hard enough to be good for building material, the greatest part being a soft coralline limestone. The best buildings in Havana are constructed of a very rich white limestone, soft and readily worked when fresh, but hardening and slightly darkening with age. There are extensive and valuable deposits of beautiful marbles in the Isle of Pines, and lesser ones near Santiago. The Organ Mountains contain a hard blue limestone ; and sandstones occur on the N. coast of Pinar del Rio province. Clays of all qualities and colours abound. Mineral waters, though not yet important in trade, are extremely abundant, and a score of places in Cuba and the Isle of Pines are already known as health resorts. Those near San Diego, Guanabacoa and Santa Maria del, Rosario (near Havana) and Madruga (near Giiines) are the best known.

The soil of the island is almost wholly of modern formation, mainly alluvial, with superficial limestones as another prominent feature. In the original formation of the island volcanic disturbances and coral growth played some part ; but there are only very slight superficial evidences in the island of former volcanic activity. Note- worthy earthquakes are rare. They have been most common in Oriente province. Those of 1776, 1842 and 1852 were particularly destructive, and of earlier ones those of 1551 and 1624 at Bayamo and of 1578 and 1678 at

Santiago. Every year there are seismic disturbances, and though Santiago is the point of most frequent visitation, they occur in all parts of the island, in 1880 affecting the entire western end. Notable seismic disturbances in Cuba have coin- cided with similar activity in Central America so often as to make some connexion apparent.

Flora. — The tropical heat and humidity of Cuba make possible a flora of splendid richness. All the characteristic species of the West Indies, the Central American and Mexican and southern Florida seaboard, and nearly all the large trees of the Mexican tropic belt, are embraced in it. As many as 3350 native flowering species were catalogued in 1876. The total number of species of the island flora was estimated in 1892 by a writer in the Revista Cubana (vol. xv. pp. 5-16) to be between 5000 and 6000, but hardly one-third of this number had then been gathered into a herbarium, and all parts of the island had not then been explored. It was estimated officially in 1904 that the wooded lands of the island comprised 3, 628,434acres, of which one-third were in Oriente province, another third in Camaguey, and hardly any in Havana province. Much of this area is of primeval forest ; somewhat more than a third of the total, belonging to the government, was opened to sale (and speculative exspoliation) in 1904. The woods are so dense over large districts as to be impenetrable, except by cutting a path foot by foot through the close network of vines and undergrowth. The jagiiey (Ficus sp.), which stifles in its giant coils the greatest trees of the forest, and the copei {Clusia rosea) are remarkable parasitic lianas. Of the palm there are more than thirty species. The royal palm is the most characteristic tree of Cuba. It attains a height of from 50 to 75 ft., and sometimes of more than 100 ft. Alone, or in groups, or in long aisles, towering above the plantations or its fellow trees of the forest, its beautiful crest dominates every landscape. Every portion, from its roots to its leaves, serves some useful purpose. From it the native draws lumber for his hut, utensils for his

kitchen, thatch for his roof, medicines, preserved delicacies, and a long list of other articles. The corojo palm (Cocos crispa) rivals the royal palm in beauty and utility; oil, sugar, drink and wood are derived from it. The coco palm (Cocos nuctfera) is also put to varied uses. The mango is planted with the royal palm along the avenues of the plantations. The beautiful ceiba (Bombax ceiba L., Ceiba pentandra) or silk cotton tree is the giant of the Cuban forests; it often grows to a height of 100 to 150 ft. with enormous girth. The royal pifion (Erythrina

velatina) is remarkable for the magnificent purple flowers that cover it. The tamarind and banyan are also noteworthy. Utilitarian trees and plants are legion. There are at least forty choice cabinet and building woods. Of these, ebonies, mahogany (for the bird's-eye variety such enormous prices are paid as $1200 to $1800 per.thousand board-feet), culla (or cuya, Bumelia retusa), cocullo (cocuyo, Bumelia nigra), ocuje (Callophyllum viticifolia, Ornitrophis occidentalis, O. coniinia), jigiie (jique, Lysiloma sabicu), mahagua {Hibiscus tiliaceus), granadillo (Brya ebenus), icaquillo (Licania incania) and ag.ua-baria (Cordia gerascanthes) are perhaps the most beautiful. Other woods, beautiful and precious, include guayacan (Guaiacum sanctum), baria (varia, Cordia gerascanthoides) — the fragrant, hard-wood Spanish elm — the quiebra-hacha (Copaijera hymenofolia) , which three are of wonderful lasting qualities; the jiqui (Malpighia obovata), acana (Achras disecta, Bassia albescens),- caigaran (or caguairan, Hymenaea floribunda), and the dagame {Calicophyllum candidissi- mum), which four, like the culla, are all wonderfully resistant to humidity; the caimatillo (Chrysophyllum oliviforme), the yaya (or yayajabico, yayabito: Erylhalis fructicosa, Bocagea virgata, Guateria virgata, A simina Blaini) , a magnificent construction wood ; the maboa (Cameraria latifolia) and the jocuma

(jocum: Sideroxylon mastichodendron, Bumelia saticifolia) , all of individual beauties and qualities. Many species are rich in gums and resins ; the calambac, mastic, copal, cedar, &c. Many others are oleaginous, among them, peanuts, sun-flowers, the bene seed (sesame), corozo, almond and palmachristi. Others (in addition to some already mentioned) are medicinal; as the palms, calabash, manchineel, pepper, fustic and a long list of cathartics, caustics, emetics, astringents, febrifuges, vermifuges, diuretics and tonics. Then, too, there are Various dyewoods; rosewood, logwood (or campeachy wood), indigo, manajii (Garcinia Morella), Brazil-wood and saffron. Textile plants are extremely common. The majagua tree grows as high as 40 ft. ; from its bark is made cordage of the finest quality, which is scarcely affected by the atmosphere. Strong, fine, glossy fibres are yielded by the exotic ramie (Boehmeria nivea), whose fibre, like that of the majagua, is almost incorruptible; by themaya or rat-pineapple (Brbmelia Pinguin), and by the daquilla (or daiguiya — Lagetta lintearia, L. valenzuelana) , which like the maya yields a brilliant, flexible product like silk; stronger cordage by the corojo palms, and various henequen plants, native and exotic (especially Agave americana, A. Cubensis); and various plantains, the exotic San-\ sevieria guineensis, okra, jute, Laportea, various lianas, and a great variety of reeds, supply varied textile materials of the best quality. The yucca is a source of starch. For building and miscellaneous purposes, in addition to the rare woods above named, there are cedars (used in great quantities for cigar boxes) ; the pine, found only in the W., where it gives its name to. the Isle of Pines and the province of Pinar del Rio ; various palms ; oaks of varying hardness and colour, &c. The number of alimentary plants is extremely great. Among economic plants should be mentioned the coffee, cacao, citron, cinnamon, cocoanut and rubber tree. Wheat, Indian corn and many vegetables, especially tuberous, are particularly important. Plantain occurs in several varieties; it is in part a cheap and health- ful

substitute for bread, which is also made from the bitter cassava, after the poison is extracted. The sweet cassava yields tapioca. Bread-trees are fairly common, but are little cared for. White and sweet potatoes, yams, sweet and bitter yuccas, sago and okra, may also be mentioned.

Fruits are varied and delicious. The pineapple is the most favoured by Cubans. Four or five annual crops grow from one plant, but not more than three can be marketed, unless locally, as the product deteriorates. The better (" purple ") varieties are mainly consumed in the island, and the smaller and less juicy " white " varieties exported. The tamarind is everywhere. Bananas are grown particularly in the region about Nipe, Gibara and Baracoa, whence they are exported in large quantities, though there is a tendency to lessen their culture in these parts in favour of sugar. Mangoes, though exotic, are extremely common, and in the E. grow wild in the forests. They are the favourite fruit of the negroes. Oranges are little cultivated, although they offer apparently almost unlimited possibilities; their culture decreased steadily after 1880, but after about 1900 was again greatly extended. Lemons yield continuously through the year, but like oranges, not much has yet been done with them commercially. Pomegranates are as universally Used in Cuba as apples in the United. States. Figs and grapes degenerate in Cuba. Dates grow better, but nothing has been done with them. The coco- nut palm is most abundant in the vicinity of Baracoa. Among the common fruits are various anonas — : the custard apple (Anonacherimolia), sweet-sop (A. squamosa), sour-sop (A. muricala), mamon (A. reticulata), and others, — the star-apple (Chrysophyllum cainito, C. pomiferum), rose-apple (Eugenia jambos), pawpaw, the sapodilla (Sapota achras), the caniste {Sapota Elongata), jagua (Genipa americana), alligator pear (Per sea gratissimd), the . yellow mammee (Mammea americana) and so-called '' red mammee " (Lucuma mammosa) and limes.*

Fauna. — The fauna of Cuba, like the flora, is still

imperfectly known. Collectively it shows long isolation from the other Antilles. Only two land mammals are known to be indigenous. One is the hutia (agouti) or Cuban rat, of which three species are known (Capromys Fournieri, C. melanurus- and C. Poey). It lives in the

most solitary woods, especially in the eastern hills. The other is a peculiar insectivore (Solenodon paradoxus), the only other repre- sentatives of whose family are found in Madagascar. Various animals, apparently indigenous, that are described by the early historians of the conquest, have disappeared. An Antillean rabbit is very abundant. Bats in prodigious numbers, and some of them of extraordinary size, inhabit the many caves of the island ; more than twenty species are known. Rats and mice, especially the guayabita (Mus musculus), an extremely destructive rodent, are very abundant. The manatee, or sea-cow, frequents the mouths of rivers, the sargasso drifts, and the regions of submarine fresh-water springs off the coast. Horses, asses, cows, deer, sheep, goats, swine, cats and dogs were introduced by the early Spaniards. The last three are common in a wild state. Deer are not native, and are very rare ; a few live in the swamps.

Of birds there are more than 200 indigenous species, it is said, and migratory species are also numerous. Waders are represented by more than fifty species. Vultures are represented by only one species, the turkey buzzard, which is the universal scavenger of the fields, and until recent years even of the cities, and has always been protected by custom and, the Laws of the Indies. Falcons are represented by a score of species, at least, several of them noc- turnal. Kestrels are common. The gallinaceous order is rich in Columbidae. Trumpeters are notably represented, and climbers still more so. Among the latter are species of curious habits and remarkable colouring. Woodpeckers (Coloptes auratus), macaws, parrakeets and other small parrots, and trogons, these last of beauti- fully resplendent plumage, deserve particular mention. The Cuban mocking-bird

is a wonderful songster. Of humming-birds there are said to be sixty species, probably only one indigenous. Of the other birds mere mention may be made of the wild pigeon, raven, indigo-bird, English lady-bird and linnet.

Reptiles are numerous. Many tortoises are notable. The croco- dile and cayman occur in the swampy littoral of the south. Of lizards the iguana (Cyclura caudata) is noteworthy. Chameleons are common. Snakes are not numerous, and it is said that none is poisonous or vicious. There is one enormous boa, the maja (Epi- crates angulifer), which feeds on pigs, goats and the like, but does not molest man.

Fishes are present in even greater variety than birds. Felipa Poey, in his Ictiologia Cubana, listed 782 species of fish and crus- taceans, of which 105 were doubtful; but more than one-half of the remainder were first described by Poey. The fish of Cuban waters are remarkable for their metallic colourings'. The largest species are found off the northern coast. Food fishes are relatively not abundant, presumably because the deep sea escarpments of the N. are un- favourable to their life. Shell fish are unimportant. Two species of blind fish, of extreme scientific interest, are found 'in the caves of the island. Of the " percoideos " there are many genera. Among the most important are the robalo (Labrax), an exquisite food fish, the tunny, eel, Spanish sardine and mangua. Of the sharks the genus Squalus is represented by individuals that grow to a length of 26 to 30 ft. The hammer-head attains a weight at times of 600 lb. The saw-fish is common. Of fresh-water fish the lisa, dogro, guaya- con and viajocos (Chromis fuscomaculalus) are possibly the most noteworthy.

Molluscs are extraordinarily numerous ; and many, both of water and land, are rarities among their kind for size and richness of colour. Of crustaceans, land-crabs are remarkable for size and number. Arachnids are prodigiously numerous. Insect life is abundant and beautiful. The bite of the

scorpion and of the numerous spiders produces no serious effects. The nigua, the Cuban jigger, is a pest of serious consequence, and the mal de nigua (jigger sickness) some- times causes the death of lower animals and men. Sand-flies and biting gnats are lesser nuisances. Lepidoptera are very brilliant in colouring. The cucujo or Cuban firefly (Pyrophorus noctilucus) gives out so strong a light that a few of them serve effectively as a lantern. The Stegomyia mosquito, is the agent of yellow fever inoculation. Sponges grow in great variety.

Climate. — The climate of Cuba is tropical and distinctively insular in characteristics of humidity, equability and high mean temperature. There are two distinct seasons: a " dry " season from November to April, and a hotter, " wet " season. About two-thirds of the total precipitation falls in the latter. Droughts, extensive in area and in duration, are by no means uncommon. At Havana the mean temperature is about 76° F , with extreme monthly oscillations ranging on the average from 6° to 12° F. for different months, and with a range between the means of the coldest and warmest months of io° (70 to 8o°); temperatures below 50° or above go° being rare. The mean rainfall at Havana is about 40-6 in. (sometimes over 80), and the mean absolute huniidity of different months ranges from 70 to 80%. These figures represent fairly well the conditions of much of the northern coast. In the N.E. the rainfall is much greater. The equability of heat throughout the day is masked and relieved by the after- noon sea breezes. The trades are steady through the year, and

in the dry season the western part of the island enjoys cool "northers." Despite this the interior is somewhat cooler than the coast, and in the uplands frost is not uncommon. The southern littoral is also (except in sheltered points such as Santiago, which is one of the hottest cities of the island) some-

what cooler than the northern.

More than eight or ten years rarely pass without tornadoes or hurricanes of local severity at least. Notably destructive ones occurred in 1768, 1774, 1842, 1844, 1846, 1865, 1870, 1876, 1885 and 1894. Those of 1842 and 1844 caused extreme distress in the island. In 1846, 300 vessels and 2000 houses were destroyed at Havana; in 1896 the banana groves of the N.E. coast were ruined and the banana industry prostrated; and in 1906 Havana suffered damage. The autumn months, particularly October and November, are those in which such storms most frequently occur.

Health. — Convincing evidence is offered by the qualities of the Spanish race in Cuba that white men of temperate lands can be perfectly acclimatized in this tropical island. As for diseases, some common to Cuba and Europe are more frequent or severe in the island, others rarer or milder. There are the usual malarial, bilious and intermittent fevers, and liver, stomach and intestinal complaints prevalent in tropical countries; but unhygienic living is, in Cuba as elsewhere, mainly responsible for their existence. Yellow fever (which first appeared in Cuba in 1647) was long the only epidemic disease, Havana being an endemic focus. Aside from the recurrent loss of life, the pecuniary loss from such epidemics was enormous, and the interference with commerce and social intercourse with other countries extremely vexatious. The Cuban coast was uninterruptedly full of infec- tion, and the danger of an outbreak in each year was never absent, until the work of the United States army in 1901-1902 conclusively proved that this disease, though ineradicable by the most extreme sanitary measures, based on the accepted theory of its origin as a filth-disease, could -be eradicated entirely by removing the possibility of inoculation by the Stegomyia mosquito. Since then yellow fever has ceased to be a scourge in Cuba. Small-pox was the cause of a greater mortality than yellow fever even before the means of combating the latter had been ascertained. The remarkable sanitary work begun

during the American occupation and continued by the republic of Cuba, has shown that the ravages of this and other diseases can be greatly diminished. Leprosy is rather common, but seemingly only slightly contagious. Consumption is very prevalent.

Agriculture. — Soils are of four classes: calcareous-ferruginous, alluvial, argillous and silicious. Calcareous lands are pre- dominant, especially in the uplands. Deep residual clay soils derived from underlying limestones, and coloured red or black according to the predominance of oxides of iron or vegetable detritus, characterize the plains. A red-black soil known as " mulatto " or tawny is perhaps the best fitted for general cultivation. Tobacco is most generally cultivated on loose red soils, which are rich in clays and silicates; and sugar-cane pre- ferably on the black and mulatto soils; but in general, contrary to prevalent suppositions, colour is no test of quality and not a very valuable guide in the setting of crops. Almost without exception the lands throughout the island are of extreme fertility. The lowlands about Cienfuegos, Trinidad, Mariel and Matanzas are noted for their richness. The census of 1899 showed that farm lands occupied three- tenths of the total area; the cultivated area being one-tenth of the farms or 3 % of the whole. At the end of 1905 it was officially estimated that 16% was in cultiva- tion. In 1902 it was officially estimated that the public land available for permanent agrarian cultivation, including forest lands, was only 186,967 hectares (416,995 acres), almost wholly in the province of Oriente. The average size of a farm in 1899 was 143 acres. More than 85% of all cultivated lands were then occupied by whites; and somewhat more than one-half (56-6%) of all occupiers were renters. Holdings of more than 32 acres constituted only 7% of the total. As regards crops, 47% of the cultivated area was given over to sugar, 11% to sweet potatoes, 9% to tobacco and almost 9% to bananas.

Sugar.

But owing to the disturbed conditions created by the

war it is probable that these figures by no means represent normal conditions. The actual sugar crop of 1899–1900, for example, was not a quarter of that of 1894. With the establishment of peace in 1898 and the influx of American and other capital and of a heavy immigration, great changes took place in agriculture as in other industrial conditions.

Sugar has been the dominant crop since the end of the 18th century. Before the Civil War of 1893–1898 the capital invested in sugar estates was greater by half than that repre- sented by tobacco and coffee plantations, live-stock ranches and other farms. Since that time fruit and live-stock interests have increased. The dependence of the island on one crop has been an artificial economic condition often of grave momentary danger to prosperity; but generally speaking, the progress of the industry has been steady. The competition of the sugar-beet has been felt severely. During and after the war of 1868–1878, when many Cuban estates were confiscated, many families emigrated, and many others were ruined, the ownership of plantations largely passed from the hands of Cubans to Spaniards. Under the conditions of free labour, the develop- ment of railways abroad, the improvement of machinery both in cane and beet producing countries, the general competition of the beet, and the fall of prices, it was impossible for the Cuban industry to survive without radical betterment of methods. About 1885 began an immense development of centralization (the tendency having been evident many years before this). Plantations have increased greatly in size (and also diminished in number), greater capital is involved, bagasse furnaces have been introduced, double grinding mills have increased by more than a half the yield of juice from a given weight of cane, and ex- tractive operations instead of being carried on on all plantations have been (since 1880) concentrated in comparatively few " centrals " (168 in Feb. 1908). Three-fourths of all are in the jurisdictions of Cienfuegos, Cardenas, Havana, Matanzas and Sagua la Grande, which are the great sugar centres of the island (three-fourths of the

crop coming from Matanzas and Santa Clara provinces). Caibarien, Guantanamo and Manzanillo are next in importance. A comparatively low cost of labour, the fact that labour is not, as in the days of slavery, that of unin- telligent blacks but of intelligent free labourers, the centralized organization and modern methods that prevail on the plantations, the remarkable fertility of the soil (which yields 5 or 6 crops on good soil and with good management, without replanting), and the proximity of the United States, in whose markets Cuba disposes of almost all her crop, have long enabled her to distance her smaller West Indian rivals and to compete with the bounty-fed beet. The methods of cultivation, however, are still distinctly extensive, and the returns are much less than they would be (and in some other cane countries are) under more intensive and scientific methods of cultivation. Indeed, conditions were relatively primitive so late as 1880, if compared with those of other sugar-producing countries. More than four-fifths of the total area sown to cane in the island is in the three provinces of Santa Clara, Matanzas and Oriente (formerly Santiago), tlie former two representing two-thirds of the area and three-fourths of the crop. The majority of the sugar estates are of an area less than 3000 acres, and the most common area is between 1500 and 2000 acres; but the extremes range from a very small size to 60,000 acres. Only a part of the great estates is ever planted in any one season. The most profitable unit is calculated to be a daily consumption of 1500 tons of cane, or 150,000 in a grinding season of 100 days, which implies a feeding area not above 6000 acres. In the season of 1904-1905, which may be taken as typical, 179 estates, with a planted area of 431,056 acres, produced 11,576,137 tons of cane, and yielded — in addition to alcohol, brandy and molasses — 1,089,814 tons of sugar. Of this amount 416,862 tons were produced by 24 estates yielding more than 1 1,000 tons each, including one (planting 28,050 acres) that yielded 33,609, and 4 others more than 22,000 tons each. The production of the island from 1850 to 1868 averaged 469,934 tons yearly,

rising from 223,145 -to 749,000; from 1869 to 1886

Tobacco.

(coutinuing high during the period of the Ten Years' War), 632,003 tons; from 1887 to 1907 — omitting the five years 1896- 1900 when the industry was prostrated by war, — 909,827 tons (and including the war period, 758,066); and in the six harvests of 1901-1906, 1,016,899 tons. Prior to 1902 the million mark was reached only twice — in 1894 and 1895. Following the resuscitation of the industry after the last war, the island's crop rose steadily from one-sixth to a full quarter of the total cane sugar output of the world, its share in the world's product of sugar of all kinds ranging from a tenth to an eighth. Of this enormous output, from 98-3% upward went to the United States; 1 of whose total importation of all sugars and of cane sugar the proportion of Cuban cane— steadily rising — was respectively 49-8 and 53-7% in the seasons of 1900-1901 and

1904-1905.

If sugar is the island's greatest crop, tobacco is her most renowned in the markets of the world. Three-fourths of the tobacco of Cuba comes from Pinar del Rio province; the rest mainly from the provinces of Havana and Santa Clara, — the description de partido being applied to the leaf not produced in Havana and Pinar del Rio provinces, and sometimes to all produced outside the vuelta abajo. » This district, including the finest land, is on the southern slope of the Organ Mountains between the Honda river and Mantua; bananas are cultivated with the tobacco. " Vegas " (tobacco fields) of especially good repute are also found near Trinidad, Remedios, Yara, Mayari and Vicana. The tobacco industry has been uniformly prosperous, except when crippled by the destruction of war in 1868-1878 and

1895–1898. Even in the time of slavery tobacco was generally a white-man's crop; for it requires intelligent labour and intensive care. In recent years the growth of the leaf under cloth tents has greatly increased, as it has been abundantly proved that the product thus secured is much more valuable—lighter in colour and weight, finer in texture, with an increased proportion of wrapper leaves, and more uniform qualities, and with lesser amounts of cellulose, nicotine, gums and resins. In these respects the finest Cuban tobacco crops, pro- duced in the sun, hardly rival the finest Sumatra product; but produced under cheese-cloth they do. " Cuban tobacco " does not mean to-day, as a commercial fact, what the words imply; for the original Nicotiana Tabacum, variety havanensis, can probably be found pure to-day only in out-of-the-way corners of Pinar del Rio. After the Ten Year's War seed of Mexican and United States tobaccos was in great demand to re-seed the ruined vegas, and was introduced in great quantities; and although by a later law the destruction of these exotic species was ordered, that destruction was in fact quite impossible. " Lusty growers and coarser than the genuine old-time Cuban . . . Mexican tobaccos (Nicotiana Tabacum, variety macrophyllum) are to-day predominant in a large part of Cuban vegas. . . . Ordinary commercial Cuban seed of to-day is largely, and often altogether, Mexican tobacco." Though improved in the Cuban environment, the foreign tobaccos introduced after the Ten Years' War did not lose their exotic character, but prevailed over the indigenous forms: " Tobaccos with exactly the char- acter of the introduced types are now the prevalent forms " (quotation from Bulletin of the Estacidn Central Agrondmica, Feb. 1908). In the markets of the world Cuban tobacco has always suffered less competition than Cuban sugar, and still less has been done than in the case of sugar cane in the study of methpds of cultivation, which in several respects are far behind those pf other tobacco-growing countries. The crop of 1907 was 201, sj2 bales (109,562,400 lb Sp.).

Coffee-raising was once a flourishing and very promising industry. It first attained prominence with the settlement in Coffee eastern Cuba, late in the 18th century, of French refugee immigrants from San Domingo. Some " cafe- tales " were established by the newcomers near Havana, but the industry has always been almost exclusively one of Oriente province; with Santa Clara as a much smaller producer. Before

•Other countries taking only 27,462 -long tons out of a total of h>T l 9'117 > n the seven fiscal years 1899-1900 to 1905-1906.

*the war of 1868-1878 the production amounted to about 25,000,000 lb yearly. The war of 1895-1898 still further diminished the vitality of the industry. * In 1907 the crop was 6,595,7°° tt>- The berries are of fine quality, and despite the competition of Brazil there is no (agricultural) reason why the home market at least should not be supplied from Cuban estates.*

Of other agricultural crops those of fruits are of greatest import- ance — bananas (which are planted about once in three years), pine-apples (planted about once in five years), coco-nuts, oranges, &c. The coco-nut industry has long been largely confined to the region about Baracoa, owing to the ruin of the trees elsewhere by a disease not yet thoroughly understood, which, appearing finally near Baracoa, threatened by 1908 to destroy the industry there as well. Yams and sweet-potatoes, yuccas, malangas, cacao, rice — ■ which is one of the most important foods of the people, but which is not yet widely cultivated on a profitable basis — and Indian corn, which grows everywhere and yields two crops yearly, may be men- tioned also. In very recent years gardening has become an interest of importance, particularly in the province of Pinar del Rio. Save on the coffee, tobacco and sugar plantations, where competition in large markets has compelled the adoption of adequate modern methods, agriculture in Cuba is still very primitive. The wooden ploughstick, for instance — taking the country as a

whole — has never been displaced. A central agricultural experiment station (founded 1904) is maintained by the government at Santiago de las Vegas; but there is no agricultural college, nor any special school for the scientific teaching and improvement of sugar and tobacco farming or manufacture.

Stock-breeding is a highly important interest. It was the all- important one in the early history of the island, down to about the latter part of the 18th century. Grasses grow luxuriantly, and the savannahs of central Cuba are, in this respect, excellent cattle ranges. The droughts to which the island is recurrently subject are, however, a not unimportant drawback to the industry ; and though the best ranges, under favourable conditions, are luxuriant, never- theless the pastures of the island are in general mediocre. Practically nothing has yet been done in the study of native grasses and the introduction of exotic species. The possibilities of the stock interest have as yet by no means been realized. The civil wars were probably more disastrous to it than to any other agricultural interest of the island. It has been authoritatively estimated, for example, that from 90 to 95 % of all horses, neat cattle and hogs in the entire island were lost in the war years of 1 895-1 898. In the decade after 1898 particularly great progress was made in the raising of live-stock. The fishing and sponge industries are important. Batabano and Caibarien are centres of the sponge fisheries.

Manufactures. — The manufacturing industries of Cuba have never been more than insignificant as compared with what they might be. In 1907 48-5% of all wage-earners were engaged in agriculture, fishing and mining, 16-3 in manufactures, and 17-7 in trade and transportation. Such manufactures as are of any consequence are mostly connected with the sugar and tobacco industries. Forest resources have been but slightly touched (more so since the end of Spanish rule) except mahogany, which goes to the United States, and cedar, which is used to box the tobacco products of the island, much going also to the

United States. The value of forest products in 1 901–1902 amounted to $320,528. There are some tanneries, some preparation of preserves and other fruit products, and some old handicraft industries like the making of hats; but these have been of comparatively scant importance. Despite natural advantages for all meat industries, canned meats have generally been imported. The leading manufactures are cigars and cigarettes, sugar, rum and whisky. The tobacco industries are very largely concentrated in Havana, and there are factories in Santiago de las Vegas and Bejucal. The yearly output of cigars was locally estimated in 1908 at about 500,000,000, but this is prob- ably too high an estimate. In 1904–1906 the yearly average sent to the United States was 234,063,652 cigars, 29,776,429 lb of leaf and 14,203,571 packages of cigarettes. The sugar industry is not similarly centralized. With the improvement of methods the old partially refined grades (moscobados) have disappeared.

Mining. — Mining is of very considerable importance. The Cobre copper mines near Santiago were once the greatest pro- ducers of the world. They were worked from 1524 until about 1730, when they were abandoned for almost a century, after which they were reopened and greatly developed. In 1828- 1840 about two million dollars' worth of ore was shipped yearly

to the United States alone. After 1868 the mines were again abandoned and flooded, the mining property being ruined during the civil war. Finally, after 1900 they again became prosperous producers. The " Cobre " mine is only the most famous and productive of various copper properties. The copper output has not greatly increased since 1890, and is of slight importance in mineral exports. , Iron and manganese have, on the contrary, been greatly developed in the same period. Iron is now the most important mineral product. The iron ores are even more accessible than the famous ones of the Lake

Superior region in the United States. No shafts or tunnels are necessary except for exploration; the mining consists entirely in open-cut and terrace work. The cost of exploitation is accordingly slight. Daiquiri, near Santiago, and mines near Nipe, on the north coast, are the chief centres of production. Nearly the entire product goes to the United States. The first exports from the Daiquiri district were made by an American company in 1884; the Nipe (Cagimaya) mines became prominent in promise in 1906. The shipments from Oriente province from 1884 to 1901 aggregated 5,053,847 long tons, almost all going to the United States (which is true of other mineral products also). After 1900 production was greatly increased and by 1906 had come to exceed half a million, tons annually. There are small mines in Santa Clara and Camaguey provinces. Manganese is mined mainly near La : Maya and El Cristo in Oriente. The traditions as to gold and silver have already been referred to. Evidences of ancient workings remain near Holguin and Gibara, and it is possible that some of these workings are still exploitable. Mining for the precious metals ceased at a very early date, after rich discoveries were made on the continent. Bituminous products, though, as already stated, widely distributed, are not as yet much developed. The most promising deposits and the most important workings are in Matanzas and Santa Clara provinces. Petroleum has been used to some extent both as a fuel and as an illuminant. Small amounts of asphalt have been sent to the United States. Locally, asphalts are used as gas enrichers. Grahamite and glance-pitch are common, and are exported for use in varnish and paint manufactures. The commercial product of stones, brick and cement is of rapidly increasing importance. The founda- tion of the island is in many places almost pure carbonate of lime, and there are numerous small limekilns. The product is used to bleach sugar, as well as for construction and disinfec- tion purposes. The number of small brick plants is legion, almost all very primitive.

Commerce.— Commerce (resting largely upon

specialized agri- culture) is vastly more prominent as yet than manufacturing and mining in the island's economy. The leading articles of export are sugar, tobacco and fruit products; of import, textiles, foodstuffs, lumber and wood products, and machinery. Sugar and tobacco products together represent seven-eighths (in 1904- 1907 respectively 60-3 and 27-3) of the normal annual exports. In the quinquennial period 1890-1894 (immediately preceding the War of Independence) the average yearly commerce of the island in and out was $86,875,663 with the United States; and $28,161,726 with Spain. 1 During the American military occupation of the island in 1899-1902, of the total imports 45 '9 wef e from the United States, 14 from other American countries, 15 from Spain, 14 from the United Kingdom, 6 from France and 4 from Germany; of the exports the corresponding percentages for the same countries were 70-7, 2, 3, 10, 4 and 7. No special favours were enjoyed by the United States in this period, and about the same percentages prevailed in the years following! The total commerical movement of the island in the five calendar years 1902-1906 averaged $177,882,640 (for the five fiscal years 1902-1903 to 1906-1907, $185,987,020) annually, and of this the share of the United States was $108,431,000 yearly, representing 45-8% of all imports and 1 . 'In these same years the trade of the United States with Cuba and Porto Rico was: importations from the islands, $59,221,444 annually; exportations to the islands, $20,017,156. The corre- sponding figures for Spain were $7,265,142 and $20,035,183; and fo>- the United Kingdom, $714,837 and $11,971,129, the trade with other countries being of much less amount.

8 1 • 9% of all exports. The proportion of imports taken from the United States is greatest in foodstuffs, metals and metal manu- factures, timber and furniture, mineral oils and lard. The trade of the United States with the island was as great in 1906-1907 as with Mexico and all the other West Indies combined; as great as its trade with Spain, Portugal and Italy combined; and almost as great as

its trade with China and Japan.

Communications. — Poor means of communication have always been a great handicap to the industries of the island. The first railroad in Cuba (and the first in Spanish lands) was opened from Havana to Giiines in 1837. In succeeding years a fairly ample system was built up between the cities of Pinar del Rio and Santa Clara, with a number of short spurs from the chief ports farther eastward into the interior. After the first American occupation a private company built a line from Santa Clara to Santiago, more than half the length of the island, finally connect- ing its two ends (1 902) . The policy of the railways was always one rather of extortion than of fairness or of any interest in the development of the country, but better conditions have begun. There was ostensible government regulation of rates after 1877, but the roads were guaranteed outright against any loss of revenue, and in fact practically nothing was ever done in the way of reform in the Spanish period. In 1900 the total length of rail- ways was 2097 m., of which 1226 were of 17 public roads arid 871 m. of 107 private roads. In August 1908 the mileage of all railways (including electric) in Cuba was 2329-8 m. The tele- graph and telephone systems are owned by the government. Cables connect the island with Florida, Jamaica, Haiti and San Domingo, Porto Rico, the lesser Antilles, Panama, Venezuela and Brazil. Havana, Santiago and Cienfuegos are cable ports. Wagon roads are still of small extent and primitive character save in a very few localities. The peculiar two-wheeled carts of the country, carrying enormous loads of 4 to 6 tons, destroy even the finest road. Similar carts, slightly lighter, used in the cities, quickly destroy any paving but stone block. The only good highways of any considerable length in 1908 were in the two western provinces and in the vicinity of Santiago. During the second American occupation work was begun on a network of good rural highways.

■. Population. — Various censuses were taken in Cuba beginning in 1774; but the results of those

preceding the abolition of slavery, at least, are probably without exception extremely untrustworthy. The census of 1887 showed a population of 1,631,687, that of 1899 a population of 1,572,792 (the decrease of 3-6 % is explained by the intervening war) ; and by the census of 1907 there were 2,048,980 inhabitants, 30-3 % more than in 1899. The average of settlement per square mile varied from 169-7 in Havana province to n -8 in Camagiiey, and was 46-4 for all of Cuba; the percentage of urban population (in cities, that is, with more than 1000 inhabitants) in the different provinces varied from 18-2 in Pinar deJ Rio to 74-7 in Havana, and was 43 9 for the entire island. There were five cities having popu lations above 25,000 — Havana, 297,159; Santiago, 45,470; Matanzas, 36,009; Cienfuegos, 30,100; Puerto Principe (or Camaguey), 29,616; and fourteen more above 8000— Cardenas, Manzanillo, Guanabacoa, Santa Clara, Sagua la Grande, Sancti Spiritus, Guantanamo; Trinidad, Pinar del Rio, San Antonio de los Banos, Jovellanos, Marianao, Caibarien and Giiines. The proportion of the total population which in 1907 was in cities of 8000 or more was only 30-3%; and the proportion in cities of 25,000 or more was 21-4%. Mainly owing to the large element of transient foreign whites without families (long characteristic of Cuba), males outnumber females — -in 1907 as 21 to 19. Native whites, almost everywhere in the majority, constituted 59-8% of all inhabitants; persons of negro and mixed blood, 29-7%; foreign-born whites, 9-9%; Chinese less than o-6 %. Foreigners constituted 25-6 % of the population in the cityof Havana; only 7 % in Pinar del Rio province. Native blood is most predominant in the provinces of Oriente and Pinar del Rio. After the end of the war of 1895-1898 a large immigra- tion from Spain began; the inflow from the United States was very small in comparison. The Republic strongly encourages

immigration. In 1000- 1906 there were 143,122

immigrants, of whom 124,863 were Spaniards, 4557 were from the United States, 2561 were Spanish Americans, and a few were Italian, Syrian, Chinese, French, English, &c. The Chinese element is a remnant of a former coolie population; their numbers in 1907 (11,217) were less than a fourth the number in 1887. Their introduction began in 1847 and ended in 1871. Conjugal con- ditions in Cuba are peculiar. In 1907 only 20-7% of the total population were legally married; an additional 8-6% were living in more or less permanent consensual unions, these being particu- larly common among the negroes. Including all unions the total is below the European proportion, but above that of Porto Rico or Jamaica in 1899.

The negro element is strongest in the province of Oriente and weakest in Camagiiey; in the former it constituted 43-1% of the population, in the latter 18-3%, and in Havana City 25-5%. In Guantanamo, in Santiago de Cuba, and in seven other towns they exceeded the whites in number. Caibarien and San Antonio de los Banos had the largest proportion of white population. The position of the negroes in Cuba is exceptional. Despite the long period of slavery they are decidedly below the whites in number. The Spanish slave laws (although in practice often frightfully abused) were always comparatively generous to the slave, making relatively easy, among other things, the purchase of his freedom, the number of free blacks being always great. Since the abolition of slavery the status of the black has been made more definite, and his rights naturally much greater. The wars of 1868-1878 and 1895-1898 and the threatened war of 1906 all helped to give to the negro element its high position. There is no antagonism between the divisions of the coloured race. All hold their own with the white in industrial usefulness to the community, and though the blacks are more backward in education and various other tests of social advancement, still their outlook is full of promise. There is practically no colour caste in Cuba ; politically the negro is the white man's equal; socially there

is very little ostensible inequality and almost perfect toleration. The negro in Cuba shows promising though undeveloped traits of landlordship. Women labour habitually in the fields. Miscegenation of blacks and whites was extremely common before emancipation. It is sometimes said that since then there has been a counter - tendency, but it is impossible to prove such a statement conclusively except with the aid of future censuses. Few of the negroes are black; some of the blackest have the regular features of the Caucasian; and racial mixtures are everywhere evidenced by colour of skin and by physiognomy. Its seems certain that the African element has been holding its own in the population totals since emancipation.

Cuba is overwhelmingly Roman Catholic in religion, but under the new Republic there is a complete separation of church and state, and liberalism and indifference are increasing. Illiteracy is extremely widespread. In 1907 the census showed 56-6% (43-3 in 1899) of persons above ten years who could read. Of the voting population 53-2% of native white, and 37-3% of coloured Cuban citizens, and 71-6% of Spanish citizens could read. A revolution in education was begun the first year of the United States military occupation and continued under the Republic.

Constitution. — The constitution upon which the government of Cuba rests was framed during the period of the United States military government; it was adopted the 21st of February igoij and certain amendments or conditions required by the United States were accepted on the 12th of June 1901. The constitution is republican and modelled on the Constitution of the United States, with some marked differences of greater centralization, due to colonial experience under the rule of Spain, notably as regards federalism; the provinces of the island being less important than the states of the American Union. The president of the Republic, who is elected for four years by an electoral college, and cannot hold office for more than two successive terms, has a cabinet whose members he may appoint and remove

freely, their number being determined by law. He sanctions, promulgates and executes the laws, and supplements

them (partly co-ordinately with congress) by administrative regulations in harmony with their ends; holds a veto power and pardoning power; controls with the senate political appoint- ments and removals; and conducts foreign relations, sub- mitting treaties to the senate for ratification. Congress consists of two houses. The senate contains four members from each province, chosen for eight years by a provincial electoral board, which consists of the provincial councilmen plus a double number of electors (half of them paying high taxes) who are selected at a special election by their fellow citizens. Half of the senators retire every four years. The senate is the court of trial for the president, officers of the cabinet, and provincial governors when accused of political offences, It also acts jointly with the president in political appointments and treaty making. The house of representatives, whose members are chosen directly by the citizens for four years, one-half retiring every two years, has the special power of impeaching the president and cabinet officers. Congress meets twice annually, in April and November. Its powers are extensive, including, in addition to ordinary legislative powers, control of financial affairs, foreign affairs, the power to declare war and approve treaties of peace, amnesties,; electoral legislation for the provinces and municipalities, control of the electoral vote for president and vice-president, and designation of an acting president in case of the death or in- capacity of these officers. The subjects of legislative power are very similar to those of the United States congress; but con- trol of railroads, canals and public roads is explicitly given to the federal government. Justice is administered by courts of various grades, with a supreme court at Havana as the head; the members of this being appointed by the president and senate. This court passes on the constitutionality of all laws, decrees and

regulations.

There are six provinces — Pinar del Rio, Havana, Matanzas, Santa Clara, Camagiiey or Puerto Principe, and Oriente. Each has a provincial governor and assembly chosen directly by the people, generally charged with independent control of matters affecting the province; but the president may interfere against an abuse of power by either the governor or the assembly. Municipalities are administered by mayors (alcaldes) and assemblies elected by the people, and control strictly municipal affairs. The ” termino municipal ” is the chief political and administrative civil division. It is an urban district together with contiguous rural territory. Its divisions are ” barrios.” The president may interfere if necessary in the municipality as in the province; and so may the governor of the province. But all interference is subject to review of claims by the courts. Both provinces and munici- palities are forbidden by the constitution to contract debts without a coincident provision of permanent revenue for their settlement.

The franchise is granted to every male Cuban twenty-one years of age, not mentally incapacitated, nor previously a convict of crime, nor serving in the army or navy of the state. Foreigners may become citizens in five years by naturalization. Church and state are completely separated, toleration being guaranteed for the profession and practice of all religious beliefs, and the government may not subsidize any religion.

Primary education is declared by the constitution to be free

and compulsory; and its expenses are paid by the central

government so far as it may be beyond the power of
_, „, ?, ...^ ' , -V, „^ , Education.

the province or municipality to bear them. Secondary

and advanced education is controlled by the state. In the last

days of Spanish rule (1894), there were 904 public and 704

private schools, and not more than 60,000 pupils enrolled; in

1900 there were 3550 public schools with an enrolment of

172,273 and an average attendance of 123,362. In the four

school years from 1903–1904 to 1906–1907 the figures of

enrolment and average attendance were: 201,824 and 110,531;

194,657 and 105,706; 186,571 and 98,329; and 189,289 and

93,865. In 1906–1907 the percentage (31–6) of attendants to

children of school age was twice as large as in 1898–1899. Private

schools, some of very high grade, draw many pupils. Almost

all schools are primary. The university of Havana (founded

1728) was given greatly improved facilities, especially of material equipment, by the American military government, and seems to have begun an ambitious progress. In 1907– the number of students was 554. Below the university there are six provincial institutes, one in each province, in each of which there is a preparatory department, a

department of secondary education, and (this due to peculiar local conditions) a school of surveying; and in that of Havana commercial departments in addition. In Havana, also, there is a school of painting and sculpture, a school of arts and trades, and a national library, all of which are supported or subventioned by the national government, as are also a public library in Matanzas, and the Agricultural Experiment Station at Santiago de las Vegas. In connexion with the university is a botanical garden; with the national sanitary service, a biological laboratory, and special services for small-pox, glanders and yellow fever. Independent of the government are various- schools and learned societies in Havana (q.v.). A school was established by the government in Key West, Florida (U.S.A.), in 1905, for the benefit of the Cuban colony there. Finally, the government sustains about two score of penal establishments, reform schools, hospitals, dispensaries and asylums, which are scattered all over the island, — every town of any considerable size having one or more of these charities.

Under the colonial rule of Spain the head of government was a supreme civil-military officer, the governor and captain- general. His control of the entire administrative life govern- °f tne island was practically absolute. Originally meat. residents at Santiago de Cuba, the captains-general resided after 1 589 at Havana. Because of the isolation of the eastern part of the island, the dangers from pirates, and the important considerations which had caused Santiago de Cuba {q.v.) to be the first capital of the island, Cuba was divided in 1607 into two departments, and a governor, subordinate in military matters to the captain-general at Havana, was appointed to rule the territory east of Puerto Principe. In 1801, when the audiencia — of which the captain-general was ex officio president — began its functions at that point, the governor of Santiago became subordinated in political matters as much as in military. Two chief courts of justice (audiencias) sat at Havana (after 1832) and Puerto

Principe (1800–1853); appeals could go to Spain; below the audiencias were ” alcaldes mayores ” or district judges and ordinary ” alcaldes ” or local judges. The audiencias also held important political powers under the Laws of the Indies. The captaincy-general of Cuba was not originally, however, by any means so broad in powers as the viceroyalties of Mexico and Peru; and by the creation in 1765 of the office of intendant — the delegate of the national treasury — his faculties were very greatly curtailed. The great powers of the intendant were, however, merged in those of the governor- general in 1853; and the captain-general having been given by royal order in 1825 (several times later explicitly confirmed, and not revoked until 1870) the absolute powers (to be assumed at his initiative and discretion) of the governor of a besieged city, and by a royal order of 1834 the power to banish at will persons supposed to be inimical to the public peace; and being by virtue of his office the president and dominator of all the important administrative boards of the government, held the government of the island, and in any emergency the liberty and property of its inhabitants, in his hand. The royal orders following 1825 developed a system of extraordinary and extreme repression. In 1878, as the result of the Ten Years’ War, various adminis- trative reforms, of a decentralizing tendency, were introduced. The six provinces were created, and had governors and as- semblies (” diputaciones “) ; and a municipal law was provided that in many ways was a sound basis for local government. But centralization remained very great. In the municipality the alcalde (mayor) was appointed by the governor-general, and the ayuntamiento (council) was controlled by the veto of the pro- vincial governor and by the assembly of the province. The deputation was subject in turn to the same veto of the provincial governor, and he controlled by the governor-general. There was besides a provincial commission of five lawyers named by the

governor-general from the members of the deputation, who settled election questions, and questions of

eligibility in this body, gave advice as to laws, acted for the deputation wheD it was not sitting, and in general facilitated centralized control of the administrative system. The character of this body was altered in 1890, and in 1898, in which latter year its functions were reduced to the essentially judicial. Despite superficial decentralization after 1878 any real growth of local self-govern- ment was rendered impossible. Moreover, no great reforms were made in the abuses naturally incident to the old personal system. Exile and imprisonment at the will of the government and without trial were common. Personal liberty, liberty of conscience, speech, assembly, petition, association, press, liberty of movement and security of home, were without real guarantee even within the extremely small limits in which they nominally existed. Under the constitution of the Republic the sphere of individual liberty is large and constitutionally protected against the government.

*Finance. — There has been a great change in the budget of Cuba since the advent of the*Republic. In 1 89 1-1 896 the average annual income was $20,738,930, the annual average expenditure $25,967,139. More than half of the revenue was derived from customs duties (two-thirds of the total being collected at Havana) . Of the expenditure more than ten million dollars annually went for the public debt, 5-5 to 6 millions for the army and navy, as much more for civil administration (including more than two millions for purely Peninsular services with which the colony was burdened); and on an average probably one million more went for sinecures. Every Cuban paid about twice as heavy taxes as a Spaniard of the Peninsula. Very little was spent on sanitation, roads, other public works and education. The revenue receipts under the Republic have increased especially over those of the old regime in the item of customs duties; and the expenditure is very differently distributed. Lotteries which were an important source of revenue under Spain were abolished under the Republic. The debt resting on the colony in 1895*

(a large part of it as a result of the war of 1868–1878, the entire cost of which was laid upon the island, but a part as the result of Spain's war adventures in Mexico and San Domingo, home loans, &c.) was officially stated at $168,500,000. The attain- ment of independence freed the island from this debt, and from enormous contemplated additions to cover the expense incurred by Spain during the last insurrection. The debt of the Republic in April 1908 was $48,146,585, including twenty-seven millions which were assumed in 1902 for the payment of the army of independence, four for agriculture, and four for the payment of revolutionary debts, and $2,196,585, representing obligations assumed by the revolution's representative in the United States during the War of Independence. United States and British investments, always important in the agriculture and manu- factures of the island, greatly increased following 1898, and by 1908 those of each nation were supposed to exceed considerably

$100,000,000.

Archaeology. — Archaeological study in Cuba has been limited, and has not produced results of great importance. Almost nothing is actually known of prehistoric Cuba; and a few skulls and implements are the only basis existing for conjecture. Very little also is known as to the natives who inhabited the island at the time of the discovery. They were a tall race of copper hue; fairly intelligent, mild in temperament, who lived in poor huts and practised a limited and primitive agriculture. How numerous they were when the Spaniards first came among them cannot be said; undoubtedly tradition has greatly ex^ aggerated their number. They are supposed to have been practically extinct by 1550. Even in the 19th century reports were spread of communities in which Indian blood was supposedly still plainly dominant; but the conclusion of the competent scientists who have investigated such rumours has been that at least absolutely nothing of the language and traditions of the aborigines has survived.

tlistory. — Cuba was discovered by Columbus in the course of his first voyage, on the 27th of October 1492. He died believing

Cuba was part of a continent. In 1508 Sebastian de Ocampo circumnavigated it. In 1 5 1 1 Diego Velazquez began the conquest of the island. Baracoa (the landing point), Bayamo, Santiago de Cuba, Puerto Principe, Sancti Spiritus, Trinidad and the original Havana were all founded by 1515. Velazquez's reputa- tion and legends of wealth drew many immigrants to the island. From Cuba went the expeditions that discovered Yucatan (1 5 1 7) , and explored the shores of Mexico, Hernando Cortes's expedition for the invasion of Mexico, and de Soto's for the exploration of Florida. The last two had a pernicious effect on Cuba, draining it of horses, money and of men. At least as early as 1523 the African slave trade was begun. In 1544 the Indians,

so far as they had not succumbed to the labour of the mines and fields to which they were put by the Spaniards, were proclaimed emanci- pated. The administration in the 16th century was loose and violent. The local authorities were divided among themselves by bitter feuds — the ecclesiastical against the civil, the ayunia- miento against the governors, the administrative officers among themselves; brigandage, mutinies and intestinal struggles dis- turbed the peace. As a result of the transfer of Jamaica to England, the population of Cuba was greatly augmented by Jamaican immigrants to about 30,000 in the middle of the 17 th century.

The activity of English and French pirates began in the 16th century, and reached its climax in the middle of the 17 th Century. So early also began dissatisfaction with the economic regulations of the colonial system, even grave resistance to their enforcement; and illicit trade with privateers and foreign colonies had begun long before, and in the 17th and 18th centuries was the basis of the island's wealth. In 1762 Havana was captured after a long resistance by a British force under Admiral Sir George Pocock and the earl of Albemarle, with heavy loss to the besiegers. It was returned to Spain the next year in exchange for the Floridas. From this date begins the modern history of the island. The British opened the port to commerce and the slave trade and revealed its possibilities. The government of Spain, begin- ning in 1764, made notable breaches in the old monopolistic system of colonial trade throughout America; and Cuba received special privileges, also, that were a basis for real prosperity. Spain paid increasing attention to the island, and in harmony with the policy of the Laws of the Indies many decrees intended to stimulate agriculture and commerce were issued by the crown, first in the form of monopolies, then with increased freedom and with bounties. Various colonial products and the slave trade were favoured in this way. After the cession of the Spanish portion of San Domingo to France hundreds of Spanish families emigrated to Cuba, and many thousand more immi- grants, mainly

French, followed them from the entire island during the revolution of the blacks. Most of them settled in Oriente province, where their names and blood are still apparent, and with their cafetales and sugar plantations converted that region from neglect and poverty to high prosperity.

Under a succession of liberal governors (especially Luis de las Casas, 1790–1796, and the marques de Someruelos, 1799–1813), at the end of the 18th century and the first part of the 19th, when the wars in Europe cut off Spain almost entirely from the colony, Cuba was practically independent. Trade was comparatively free, and worked a revolution in culture and material conditions. General Las Casas, in particular, left behind him in Cuba an undying memory of good efforts. Free commerce with foreigners — a fact after 1809 — was definitely legalized in 1818 (confirmed in 1824). The state tobacco monopoly was abolished in 181 7. The reported populations by the (untrustworthy) censuses of 1774, 1792 and 1817 were 161,670, 273,301 and 553,033. Something of political freedom was enjoyed during the two terms of Spanish constitutional government under the constitution of 1812. The sharp division between Creoles and peninsulars {i.e. between those born in Cuba and those born in Spain), the question of annexation to the United States or possibly to some other power, the plotting for independence, all go back to the early years of the century.

Partly because of political and social divisions thus revealed,

conspiracies being rife in the decade 1820–1830, and partly as preparation for the defence against Mexico and Colombia, who throughout these same years were threatening the island with invasion, the captains-general, in 1825, received the powers above referred to; which became, as time passed, monstrously in dis- accord with the general tendencies of colonial government and with increasing liberties in Spain, but continued to be the spiritual basis of Spanish rule in the island. Among the governors of the 19th

century Miguel Tacon, governor in 1834–1839, a forceful and high-handed soldier, deserves mention, especially in the annals of Havana; he ruled as a tyrant, rnade many reforms as regarded law and order, and left Havana, in particular, full of municipal improvements. The good he did was limited to the spheres of public works and police; in other respects his rule was a pernicious influence for Cuba. Politically his rule was marked by the proclamation at Santiago in 1836, without his consent, of the Spanish constitution of 1834; he repressed the movement, and in 1837 the deputies of Cuba to the Cortes of Spain (to which they were admitted in the two earlier con- stitutional periods) were excluded from that body, and it was declared in the national constitution that Cuba (and Porto Rico) should be governed by " special laws." The inapplicability of many laws passed for the Peninsula— all of which under a constitutional system would apply to Cuba as to any other province, unless that system be modified — was indeed notorious; and Cuban opinion had repeatedly, through official bodies, protested against laws thus imposed that worked injustice, and had pleaded for special consideration of colonial conditions. The promise of " special laws " based upon such consideration was therefore not, in itself, unjust, nor unwelcome. But as the colony had no voice in the Cortes, while the " special laws " were never passed (Cuba expected special fundamental laws, reforming her government, and the government regarded the old Laws of the Indies as satisfying the obligation of the con- stitution) the arbitrary rule of the captains- general remained quite supreme, under the will of the crown, and colonial dis- content became stronger and stronger. The rule of Leopoldo O'Donnell was marked in 1844 by a cruel and bloody persecution of negroes for a supposed plot of servile war; O'Donnell's actions being partly due to the inquietude that had prevailed for some years over the supposed machinations of English abolitionists and even of English official residents in the island, and also over the mutual jealousies and supposed annexation ambitions of Great Britain and

the United States.

A Cuban international question had arisen before 1820. Spain, the United States, England, France, Colombia and Mexico were all involved in it, the first four continually. In the eighteen-fifties a strong pro-slavery interest in the United States advocated the acquisition of the island. One feature of this was the " Ostend Manifesto " (see Buchanan, James), in which the ministers of the United States at London, Paris and Madrid declared that if Spain refused a money offer for the colony the United States should seize it. Their government gave this document publicity. The Cuban policy of Presidents Pierce and Buchanan (during 1853-1861) was vainly directed to acquiring the island. From 1849 to 1851 there were three abortive filibustering expeditions from the United States, two being under a Spanish general, Narciso Lopez (1798-1851). The domestic problem, the problem of discontent in the island, had become acute by 1850, and from this time on to 1868 the years were full of conflict between liberal and reactionary senti- ment in the colony, centreing about the asserted connivance of the captains-general in the illegal slave trade (declared illegal after 1820 by the treaties of 1817 and 1835 between Great Britain and Spain), the notorious immorality and prodigal wastefulness of the government, and the selfish exploitation of the colony by Spaniards and the Spanish government. From early in the 19th century there had always been separatists, reformists and repressionists in the island, but they were individuals rather than groups. The last were peninsulars, the others mainly Creoles, and among the wealthy classes of the latter the separatists gradually gained increasing support.

An inpffective and extremely corrupt administration, a grave economic condition, new arid heavy taxes, military repression, recurring heavy deficits in the budget, adding to a debt (about $150,000,000 in

1868) already very large and burdensome, and the complete fiasco of the junta of inquiry of Cuban and Porto Rican representatives which met in Madrid in 1866–1867 — all were important influences favouring the outbreak of the Ten Years' War. Among those who waged the war were men who fought to compel reforms, others who fought for annexation to the United States, others who fought for independence. The reformists demanded, besides the correction of the above evils, action against slavery, assimilation of rights between peninsulars and Creoles and the practical recognition of equality, e.g. in the matter of office-holding, a grievance centuries old in Cuba as in other Spanish colonies, and guarantees of personal liberties. The separatists, headed by Carlos Manuel de Cespedes (1819–1874), a wealthy planter who proclaimed the revolution at Yara on the 10th of October, demanded the same reforms, including gradual emancipation of the slaves with indemnity to owners, and the grant of free and universal suffrage. War was confined throughout the ten years almost wholly to the E. provinces. The policy of successive captains-general was alternately uncompromisingly repressive and conciliatory. The Spanish volunteers committed horrible excesses in Havana and other places; the rebels also burned and killed indiscriminatingly, and the war became increasingly cruel and sanguinary. Intervention by the United States seemed probable, but did not come, and after alternations in the fortunes of war, Martinez Campos in January 1878 secured the acceptance by the rebels of the convention (pacto) of Zanj6n, which promised amnesty for the war, liberty to slaves in the rebel ranks, the abolition of slavery, reforms in government, and colonial autonomy. A small rising after peace (the "Little War " of 1879–1880) was easily repressed. Gradual abolition of slavery was declared by a law of the 13th of February 1880; definitive abolition in 1886; and in 1893 the equal civil status of blacks and whites in all respects was proclaimed by General Calleja. There is no more evidence to warrant the wholly erroneous statement sometimes made that emancipation was an economic set-back to

Cuba than could be gathered to support a similar statement regarding the United States. Coolie importa- tion from China had been stopped in 1871.

As for autonomy and political reforms it has already been remarked that the change from the old regime was only super- ficial. The Spanish constitution of 1876 was proclaimed in Cuba in 1881. In 1878-1895 political parties had a complex development. The Liberal party was of growing radicalism, the Union Constitutional party of growing conservatism; and after 1893 a Reformist party was launched that drew the com- promisers and the waverers. The demands of the Liberals were as in 1868; those for personal and property rights Were much more definitely stated, and among explicit reforms demanded were the separation of civil and military power, general recogni- tion of administrative responsibility under a colonial autono- mous constitutional regime; also among economic matters, customs reforms and reciprocity with the United States were demanded. As for the representation accorded Cuba in the Spanish Cortes, as a rule about a quarter of her deputies were Cuban-born, and the choice of only a few autonomists was allowed by those who controlled the elections. Reciprocity with the United States was in force from 1891 to 1894 and was extremely beneficial to Cuba. Its cessation greatly increased disaffection.

Discontent grew, and another war was prepared for. On the 23rd of February 1895 General Calleja suspended the con- stitutional guarantees. The leading chiefs of the Ten Years' War took the field again— Maximo Gomez, Antonio Maceo, Jose Marti, Calixto Garcia and others. Unlike that war, this was carried to the western provinces, and indeed was fiercest there. Among the military means adopted by the Spaniards to isolate their foe were " trochas "" (i.e. entrenchments, barb- wire fences, and lines of block-houses) across the narrow parts of

the island, and " reconcentracion " of non-combatants in camps guarded by the Spanish forces. The latter measure produced extreme suffering and

much starvation (as the reconcentrados were~4argely thrown 1 upon the charity of the beggared com- munities in which they were huddled). In October 1897 the Spanish premier, P. M. Sagasta, announced the policy of autonomy, and the new dispensation was proclaimed in Cuba in December. But again all final authority was reserved to the captain-general. The system was never to have a practical trial, although a full government was quickly organized under it. The American people had sent food to the reconcentrados; President McKinley, while opposing recognition of the rebels, affirmed the possibility of intervention; Spain resented this attitude; and finally, in February 1898, the United States battleship " Maine " was blown up — by whom will probably never be known — in the harbour of Havana.

On the 20th of April the United States demanded the with- drawal of Spanish troops from the island. War followed immedi- ately. ; A fine Spanish squadron seeking to escape from Santiago harbour was utterly destroyed by the American blockading force on the 3rd of July; Santiago was invested by land forces, ahd on the 15th of July the city surrendered. Other operations in Cuba were slight. By the treaty of Paris, signed on the 10th of December, Spain "relinquished" the island to the United States in trust for its inhabitants; the temporary character of American occupation being recognized throughout the treaty, in accord with the terms of the American declaration of war, in which the United States disclaimed any intention to control the ■island except for its pacification, and expressed the determination to lea ve the island thereupon to the control of its people. Spanish authority ceased on the 1st of January 1899, and was followed by American " military " rule (January 1, 1899–May 20, 1902). During these three years the great majority of offices were filled by Cubans, and the government was made as different as possible from the military control to which the colony had been accus- tomed. Very much was done for public works, sanitation, the reform of administration, civil service and education. Most notable of all, yellow fever was

eradicated where it had been endemic for centuries. A constitutional convention sat at Havana from the 5th of November 1900 to the 2rst of February 1901. The provisions of the document thus formed have already been referred to. In the determination of the relations that should subsist between the new-republic and the United s States certain definite conditions known as the Piatt Amendment were finally imposed by the United States, and accepted by Cuba (12th of June 1901) as a part of her constitution. By these Cuba was bound not to incur debts her current revenues will not bear; to continue the sanitary administration undertaken by the military government of intervention; to lease naval stations (since located at Bahia Honda and Guantanamo) to the United States; and finally, the right of the United States to intervene, if necessary, in the affairs of the island was explicitly affirmed in the provision, " That the government of Cuba consents that the United States may exercise the right to intervene for the protection of Cuban independence, the main-tenance of a government adequate for the protection of life, property and individual liberty, and for discharging the obliga- tions with respect to Cuba imposed by the treaty of Paris on the United States, now to be assumed alid undertaken by the government of Cuba." The status thus created is very excep-tional in the history of international relations. The' status of the Isle of Pines was left an open question by the treaty of Paris, but a decision of the Supreme Court of the United States has declared it (in a question of customs duties) to be a part of Cuba, and though a treaty to the same end did not secure ratification (1908) by the United States Senate, repeated efforts by American residents thereon to secure annexation to the United States were ignored by the United States government.

The first Cuban congress met on the 5th of May 1902, pre- pared to take over the government from the American military authorities, which it did on the 20th of May. Tomas Estrada Palma (1835-^08) became the first president of the Republic.

CUBA

In material prosperity the progress of the island from 1902 to 1906 was very great; but in its politics, various social and economic elements, and political habits and examples of Spanish pro- venience that ill befit a democracy, led once more to revolution. Congress neglected to pass certain laws which were required by the constitution, and which, as regards municipal autonomy, independence of the judiciary, and congressional representation of minority parties, were intended to make impossible the abuses of centralized government that had characterized Spanish administration. Political parties were forming without very evident basis for differences outside questions of political patronage and the good or ill use of power; and, in the absence of the laws just mentioned, the Moderates, being in power, used every instrument of government to strengthen their hold on office. The preliminaries of the elections of December 1905 and March 1006 being marked by frauds and injustice, the Liberals deserted the polls at those elections, and instead of appealing to judicial tribunals controlled by the Moderates, issued a manifesto of revolution on the 28th of July 1906. 1 This insurrec- tion rapidly assumed large proportions. The government was weak and lacked moral support in the whole island. After repeated petitions from President Palma for intervention by the United States, commissioners (William H. Taft, Secretary of War, and Robert Bacon, Acting Secretary of State) were sent from Washington to act as peace mediators.

All possible efforts to secure a compromise that would preserve the Republic failed. The president resigned (on the 28th of September), Congress dispersed without choosing a successor, and as an alternative to anarchy the United States was compelled to proclaim on the 29th of September 1906 a provisional govern- ment, — to last " long enough to restore order and peace and public confidence," and hold new elections. The insurrectionists promptly disbanded. Government was maintained under the Cuban flag, — the diplomatic and consular

relations with even the United States remaining in outward forms unchanged; and the regular forms of the constitution were scrupulously maintained so far as possible. No use was made of American military force save as a passive background to the government. The government of intervention at first directed its main effort simply to holding the country together, without undertaking much that could divide public opinion or seem of unpalatably foreign impulse; and later to the establishment of a few funda- mental laws which, when intervention ceased, should give greater simplicity, strength and stability to a new native government. These laws strictly defined the powers of the president; more clearly separated the executive departments, so as to lessen friction and jealousies; reformed the courts; reformed adminis- trative routine; and increased the strength of the provinces at the expense of the municipalities. On the 28th of January 1909 the American administration ceased, and the Republic was a second time inaugurated, with General Jose Miguel Gomez (b. 1 8 56) , the leader of the Miguelista faction of the Liberal party, as president, and Alfredo Zayas, the leader of the Zayista faction of the same party, as vice-president. The last American troops were withdrawn from the island on the 1st of April 1909.

Authorities. — General Description. — There is no trustworthy recent description. The best books are E. Pechardo, Geografia de la isla de Cuba (4 torn., Havana, 1854); M. Rodriguez-Ferrer, Natura- leza y civilization de . . . Cuba, vol. i. (Madrid, 1876). See also : United States Geological Survey, Bulletin 192 (1902), H. Gannett, " A Gazetteer of Cuba." Of general descriptions in English, in addition to travels cited below, may be cited R. T. Hill, Cuba and Porto Rico with the other West Indies (New York, 1898).

Fauna and Flora. — A. H. R. Grisebach, Catalogus plantarum Cubensium (Leipzig, 1866), and F. A. Sauvalle, Flora Cubana: revisio catalogi Grisebachiani (Havana, 1868); and Flora Cubana: enumeratio nova plantarum Cubensium (Havana, 1873);

F. Poey et al., Repertorio fisico-natural de la isla de Cuba (2 vols., Havana, 1 865-1 868), and F. Poey, Memorias sobre la historia natural de . , . Cuba (3 torn., Havana, 1851-1860); Ramon de la Sagra, with many collaborators, Historia fisica, politica y natural de . . . Cuba_ (Paris, 1842-1851, 12 vols.; issued also in French; vols. 3-12 being the

1 In the preliminary registration by. Moderate officials a total electorate was registered of 432,313, — about 30% of the supposed population of the island.

" Historia Natural ") ; Anales of the Academia de Ciencias (Havana, 1863- , annual) ; M. Gomez de laMaza, Flora Habanera (Havana, 1897); S. A. de Morales, Flora arboricolade Cuba aplicada (Havana, 1887, only part published); D. H. Segui, Ojeado sobre la. flora mSdica y toxica de Cuba (Havana, 1900) ; J. Gundlach, Contribution a la entomologia Cubana (Havana, 1881) ; J. M. Fernandez y Jimenez, Tratado de la arboricultura Cubana (Havana, 1867).

Geology and Minerals.- — M. F. de Castro," Pruebas paleontologicas de que la isla de Cuba ha estado unida al continento americano y breve idea de su constitution ge'ologica," Bol. Com. Mapa Geol. de Esp. vol. viii. (1881), pp. 357-372 ; M. F. de Castro and P. Salterain y Legarra, " Croquis geologico de la isla de Cuba," ibid. vol. viii. pi. vi. (published with vol. xi., 1884). Many articles in Anales of the Academy; also, R. T. Hill in Harvard College Museum of Comparative Zoology, Bulletin, vol. 16, pp. 243-288 (1895); United States Geological Survey, 22nd Annual Report, 1901, C. W. Hayes et al., " Geological Reconnaissance of Cuba"; Civil Report of General Leonard Wood, governor of Cuba (1902), vol. v., H. C. Brown, " Report on Mineral Resources of Cuba."

Climate. — See the Boletin Oficial de la Secretaria de Agricultura, and publications of the observatory of Havana. Sanitation.— For conditions 1 899-1902, see Civil Reports of American military governors. For conditions since 1902 consult the Informe

Mensual (1903-) of the Junta Superior de Sanidad.

Agriculture.— Consult the Boletin above mentioned, publications of the Estacion Central Agronomica, and current statistical serial reports of the treasury department (Hacienda) on natural resources, live-stock interests, the sugar industry (annual), &c.

Industries, Commerce, Communications. — See the works of Sagra and Pezuela. For conditions about 1899 consult R. P. Porter (Special Commissioner of the United States government), Industrial Cuba (New York, 1899) ; W. J. Clark, Commercial Cuba (New York, 1898) ; reports of foreign consular agents in Cuba; and the statistical annuals of the Hacienda on foreign commerce and railways.

Population. — The early censuses were extremely unreliable. Illuminating discussions of them can be found in Humboldt's Essay, Saco's Papeles and Pezuela's Diccionario. See United States Depart- ment of War, Report on the Census of Cuba 1899 (Washington, 1899) ; U.S. Bureau of the Census, Cuba: Population, History and Resources,

1907 (1909).

Education. — See Civil Reports of the American military govern- ment, 1899–1902; United States commissioner of education, Report, 1897–1898 ; current reports in Informe del superintendente de escuelasde Cuba . . . (Havana, 1903-). On Letters and Culture. — E. Pechardo y Tapia, Diccionario . . . de voces Cubanas (Havana, 1836, 4th ed., 1875; all editions with many errors); Antonio Bachiller y Morales, Apuntes para la historia de las letras y de la instruction publica de Cuba (3 torn., Havana, 1859–1861); J. M. Mestre, De la filosofia en la Habana (Havana, 1862) ; A. Mitjans, Estudio sobre el movimiento cientifico y literario de Cuba (Havana, 1890); biographies of Varela and Luz Caballero by Rodriguez (see below); files of La Revista de Cuba (16 vols., Havana, 1877–1884) and La Revista Cubana (21 vols., Havana, 1885–1895). The litera- ture of Travel is rich. It suffices to mention Letters from

the Havannah, by the English consul (London, 1821); E. M. Masse, L'lle de Cuba (Paris, 1825) ; D. Turnbull, Travels in the West (London, 1840), and R. R. Madden, The Island of Cuba (London, 1853) — two very important books regarding slavery; J. B. Rosemond de Beauvallon, L'lle de Cuba (Paris, 1844) ; J. G. Taylor, The United States and Cuba (London, 1851); F. Bremer, The Homes of the New World (2 vols., New York, 1853) ; M. M. Ballou, History of Cuba, or Notes of a Traveller (Boston, 1854); R. H. Dana, To Cuba and Back (Boston, 1859); J. von Sivers, Die Perle der Antillen (Leipzig, 1861); A. C. N. Gallenga, The Pearl of the Antilles (London, 1873); S. Hazard, Cuba with Pen and Pencil (Hartford, Conn., 1873); H. Piron, L'lle de Cuba (Paris, 1876). Of later books, F. Matthews, The New-Born Cuba (New York, 1899); R. Davey, Cuba Past and Present (London, 1898). _ Among the writers who have left short impressions are A. Granier de Cassagnac (1844), J. J. A. Ampere (1855), A. Trollope (i860), J. A. Froude (1888).

Administration. — Consult the literature of history and colonial reform given below. Also: Leandro Garcia y Gragitena, Guia del empleado de hacienda (Havana, i860), with very valuable historical data; Carlos de Sedano y Cruzat, Cuba desde i8$o a 1873. Coleccion de informes, memorias, proyectos y antecedentes sobre el gobierno de la isla de Cuba (Madrid, 1875); Vicente Vasquez Queipo, Informe fiscal sobre fomento de la poblacion blanca (Madrid, 1845) ; Infor- mation sobre reformas en Cuba y Puerto Rico celebrada en Madrid en 1866 y 67 por los representantes de ambas islas (2 torn., New York, 1867; 2nd ed., New York, 1877); and the Diccionario of Pezuela. These, with the works of Saco, Sagra, Arango and Alexander von Humboldt's work, Essai politique sur Vile de Cuba (2 vols., Paris 1826; Spanish editions, I vol., Paris, 1827 and 1840; English trans- lation by J. S. Thrasher, with interpolations, New York, 1856), are indispensable. For conditions at the end of the 1 8th century, Fran, de Arango y Parreno, Obras (2 torn., Havana, 1888). For later conditions, E. Valdes Dominguez,

Los Antiguos Diputados de Cuba (Havana, 1879); B. Huber, Apercu statistique de Vile de Cuba (Paris, 1826); Humboldt; Sagra, vols. 1-2 of the book cited above,

being the Historia fisica y politica, and also the earlier work on which they are based, Historia economica-politica y estadistica de . . . Cuba (Havana, 1831); treatises on administrative law in Cuba by J. M. Morilla (Havana, 1847; 2nd ed., 1865, 2 vols.) and A. Govin (3 vols., Havana, 1882-1883) ; A. S. Rowan and M. M. Ramsay, The Island of Cuba (New York, 1896); Coleccion de reales ordenes, decretos y disposiciones (Havana, serial, 1857-1898) ; Spanish Rule in Cuba. Laws Governing the Island. Reviews Published by the Colonial Office in Madrid . . . (New York, for the Spanish legation, 1896) ; and compilations of Spanish colonial laws listed under article Indies, Laws of the. On the new Republican regime: Gaceta Oficial (Havana, 1903-); reports of departments of government; M. Romero Palafox, Agenda de la republica de Cuba (Havana, 1905). See also the Civil Reports of the United States military governors, J. R. Brooke (2 vols., 1899; Havana and Washington, 190a), L. Wood (33 vols., 1900-1902; Washington,

1901-1902).

History. — The works (see above) of Sagra, Humboldt and Arango are indispensable ; also those of Francisco Calcagno, Diccionario biogrdfico Cubano (ostensibly, New York, 1878); Vidal Morales y Morales, Iniciadores y primeros mdrtires de la revolution Cubana (Havana, 1901) ; Jose Ahumada y Centurion, Memoria historica politica de . . . Cuba (Havana, 1874) ; Jacobo de la Pezuela, Diccionario geogrdfico-estadistico-historico de . . . Cuba (4 torn., Madrid, 1863-1866); Historia de . . . Cuba, (4 torn., Madrid, 1868-1878; supplanting his Ensayo historico de . . . Cuba, Madrid and New York, 1842)

; and Jose Antonio Saco, Obras (2 vols., New York, 1853), Papeles (3 torn., Paris, 1858–1859), and Coleccion ■bostuma de Papeles (Havana, 1881). Also: Rodriguez Ferrer, op. oil. above, vol. 2 (Madrid, 1888); P. G. Guiteras, Historia de ... Cuba (2 vols., New York, 1865–1866). Of great value is J. Zaragoza, Las Insurrecciones en Cuba. Apuntes para la historia politica (2 torn., Madrid, 1872–1873); also J. I. Rodriguez, Vida de . . . Felix Varela (New York, 1878), and Vida de D. Josi de la Luz (New York, 1874; 2nd ed., 1879). On. early history see Coleccion de documentos ineditos relativos al descubrimiento . . . de ultramar (series 2, vols. 1, 4, 6, Madrid, 1885–1890). On archaeology, N. Fort y Roldan, Cuba indigena (Madrid, 1881); M. Rodriguez Ferrer (see above) ; and especially A. Bachiller y Morales, Cuba primitiva (Havana, 1883). For the history of the Cuban international problem consult Jose Ignacio Rodriguez, Idea de la anexionde la isla de Cuba a los Estados Unidos de America (Havana, 1900),and J. M. Callahan, Cubaand International Relations (Johns Hopkins University, Baltimore, 1898), which supplement each other. On the domestic reform problem there is an enormous literature, from which may be selected (see general histories above and works cited under § Administration of this bibliography) : M. Torrente, Bosquejo economico-politico (2 torn., Madrid – Havana, 1852–1853); D. A. Galiano, Cuba en 1858 (Madrid, 1859); Jose de la Concha, twice Captain-General of Cuba, Memorias sobre el estado politico, gobierno y adminislracion de . . . Cuba (Madrid, 1853; A. Lopez de Letona, Isla de Cuba, reflexiones "(Madrid, 1856) ; F. A. Conte, Aspiraciones del partido liberal de Cuba (Havana, 1892); P. Valiente, Reformes dans les ties de Cuba et de Porto Rico (Paris, 1869); C. de Sedano, Cuba: Estudios polilicos (Madrid, 1872); H. H. S. Aimes, History of Slavery in Cuba, 1511–1868 (New York, 1907) ; F. Armas y Cespedes, De la esclavitud en Cuba (Madrid, 1866), and Regimen politico de las Antillas Espanolas (Palma, 1882) ; R. Cabrera, Cuba y sus Jueces (Havana, 1887; 9th ed., Philadelphia, 1895 ; 8th ed., in English, Cuba and the Cubans, Philadelphia, 1896) ; P. de Alzola y

Minondo, El Problema Cubano (Bilbao, 1898) ; various works by R. M. de Labra, including La Cueslion social en las Antillas Espanolas (Madrid, 1874), Sistemas coloniales (Madrid, 1874), &c. ; R. Montoro, Discursos . . .1878-1893 (Philadelphia, 1894); Labra et al., El Problema colonial contempordnea (2 vols., Madrid, 1894) ; articles by Em. Castelar et al., in Spanish reviews (1895-1898). On the period since 1899 the best two books in English are C. M Pepper, To-morrow in Cuba (New York, 1899) ; A. G. Robinson, Cuba and the Intervention (New York, 1905). (F. S. P.)

CUBE (Gr. Kvfios, a cube), in geometry, a solid bounded by six equal squares, so placed that the angle between any pair of adjacent faces is a right angle . This solid played an all-important part in the geometry and cosmology of the Greeks. Plato (Timaeus) described the figure in the following terms: — ” The isosceles triangle which has its vertical angle a right angle . . . combined in sets of four, with the right angles meeting at the centre, form a single square. Six of these squares joined together formed eight solid angles, each produced by three plane right angles: and the shape of the body thus formed was cubical, having six square planes for its surfaces.” In his cosmology Plato assigned this solid to ” earth,” for ” ‘ earth ‘ is the least mobile of the four (elements-^’ fire,’ ‘ water,’ ‘ air ‘ and ‘ earth ‘) and most plastic of bodies: and that substance must possess this nature in the highest degree which “has its bases most stable.” The mensuration of the cube, and its relations to other geometrical

solids are treated in the article Polyhedron; in the same article are treated the Archimedean solids, the truncated and snub- cube ; reference should be made to the article Crystallography for its significance as a crystal form.

A famous problem concerning the cube, namely, to construct a cube of twice the volume of a given cube, was attacked with great vigour by the Pythagoreans, Sophists and Platonists. It became

known as the " Delian problem " or the " problem of the duplication of the cube," and ranks in historical importance with the problems of " trisecting an angle " and " squaring the circle." The origin of the problem is open to conjecture. The Pythagorean discovery of " squaring a square," i.e. constructing a square of twice the area of a given square (which follows as a corollary to the Pythagorean property of a right-angled triangle, viz. the square of the hypotenuse .equals the sum of the squares on the sides), may have suggested the strictly analogous problem of doubling a cube. Eratosthenes ic. 200 B.C.), however, gives a picturesque origin to the problem. In a letter to Ptolemy Euergetes he narrates the history of the problem. The Delians, suffering a dire pestilence, consulted their oracles, and were ordered to double the volume of the altar to their tutelary god, Apollo. An altar was built having an edge double the length of the original; but the plague was unabated, the oracles not having been obeyed. The error was discovered, and the Delians applied to Plato for his advice, and Plato referred them to Eudoxus. This story is mere fable, for the problem is far older than Plato.

Hippocrates of Chios (c. 430 B.C.), the discoverer of the square of a lune, showed that' the problem reduced to the determination of two mean proportionals between two given lines, one of them being twice the length of the other. Algebraically expressed, if x and y be the required mean proportionals and a, 2a, the lines, we have a :x::x: y :: y : 2a, from which it follows that x 3 =2a% Although Hippocrates could not determine the proportionals, his statement of the problem in this form was a great advance, for it was perceived that the problem of trisecting an angle was reducible to a similar form which, in the language of algebraic geometry, is to solve geometrically a cubic equation. According to Proclus, a man named Hippias, probably Hippias of Elis (c. 460 B.C.), trisected an angle with a mechanical curve, named the quadratrix (q.v.). Archytas of Tarentum (c. 430 B.C.) solved

the problems by means of sections of a half cylinder; according to Eutocius, Menaechmus solved them by means of the inter- sections of conic sections; and Eudoxus also gave a solution.

All these solutions were condemned by Plato on the ground that they were mechanical and not geometrical, i.e. they were not effected by means of circles and lines. However, no proper geometrical solution, in Plato's sense, was obtained; in fact it is now generally agreed that, with such a restriction, the problem is insoluble. The pursuit of mechanical methods furnished a stimulus to the study of mechanical loci, for example, the locus of a point carried on a rod which is caused to move according to a definite rule. Thus Nicomedes invented the conchoid (q.v.); Diodes the cissoid (q.v.); Dinostratus studied the quadratrix invented by Hippias; all these curves furnished solutions, as is also the case with the trisectrix, a special form of Pascal's limacon (q.v.). These problems were also attacked by the Arabian mathematicians; Tobit ben Korra (836-901) is credited with a solution, while Abul Gud solved it by means of a parabola and an equilateral hyperbola.

In algebra, the " cube " of a quantity is the quantity multiplied by itself twice, i.e. if a be the quantity oX«X«(= fl !) is its cube. Similarly the " cube root " of a quantity is another quantity which when multiplied by itself twice gives the original quantity; thus a J is the cube root of a (see Arithmetic and Algebra). A " cubic equation " is one in which the highest power of the unknown is the cube (see Equation) ; similarly, a " cubic curve " has an equation containing no term of a power higher than the third, the powers of a compound term being added together.

In mensuration, " cubature " is sometimes used to denote the volume of a solid; the word is parallel with " quadrature, " to de termine the area of a surface (see Mensuration; Infinitesimal Calculus).

CUBEBS (Arab, kabdbak), the fruit of several species of pepper (Piper), belonging to the natural order Piperaceae. The cubebs of pharmacy are produced by Piper Cubeba, a climbing woody shrub indigenous to south Borneo, Sumatra, Prince of Wales Island and Java. It has round, ash-coloured, smooth branches; lanceolate, or ovate-oblong, somewhat leathery, shining leaves, 4 to 6J in. long and 15 to 2 in. broad. Male and female flowers are borne on distinct plants. The fruits are small, globose, about £ in. in diameter, and not so large as white pepper; their con- tracted stalk-like bases are between 5 and | in. in length; and from forty to fifty of them are borne upon a common stem. The cubeb is cultivated in Java and Sumatra, the fruits are gathered before they are ripe, and carefully dried. Commercial cubebs consist of the dried berries, usually with their stalks attached; the pericarp is greyish-brown, or blackish and wrinkled; and the seed, when present, is hard, white and oily. The odour of cubebs is agreeable and aromatic; the taste, pungent, acrid, slightly bitter and persistent. About 15% of a volatile oil is obtained by distilling cubebs with water; after rectification with water, or on keeping, this deposits rhombic crystals of camphor of cubebs, C] 5 H 26 0; cubebene, the liquid portion, has the formula C 16 H 24 . Cubebin, CH 2 [0] 2 C 6 H r CH:CH-CH 2 OH, is a crystalline substance existing in cubebs, discovered by Eugene Soubeiran and Capitaine in 1839; it may be prepared from cubebene, or from the pulp left after the distillation of the oil. The drug, along with gum, fatty oils, and malates of magnesium and calcium, contains also about 1 % of cubebic acid, and about 6% of a resin.

The dose of the fruit is 30 to 60 grains, and the British Pharma- copoeia contains a tincture with a dose of 5 to 1 drachm. The volatile oil— oleum cubebae — is also official, and is the form in which this drug is most commonly used, the dose being 5 to 20 minims, which may be suspended in mucilage or given after meals in a cachet. The drug has the

typical actions of a volatile oil, but exerts some of them in an exceptional degree. Thus it is liable to cause a cutaneous erythema in the course of its excretion by the skin; it has a marked diuretic action; and it is a fairly efficient disinfectant of the urinary passages. Its adminis- tration causes the appearance in the urine of a salt of cubebic acid which is precipitated by heat or nitric acid, and is therefore liable to be mistaken for albumin, when these two most common tests for the occurrence of albuminuria are applied. Cubebs is frequently used in the form of cigarettes for asthma, chronic pharyngitis and hay-fever. A small percentage of cubebs is also commonly included in lozenges designed for use in bronchitis, in which the antiseptic and expectoral properties of the drug are useful. But the most important therapeutic application of this drug is in gonorrhoea, where its antiseptic action is of much value. As compared with copaiba in this connexion cubebs has the advantages of being less disagreeable to take and somewhat less likely to disturb the digestive apparatus in prolonged administration. The introduction of the drug into medicine is supposed to have been due to the Arabian physicians in the middle ages. Cubebs were formerly candied and eaten whole, or used ground as a seasoning for meat. Their modern employ- ment in England as a drug dates from 1815. " Cubebae " were purchased in 1284 and 1285 by Lord Clare at 2s. 3d. and 2s. gd. per lb respectively; and in 1307 1 lb for the king's wardrobe cost 9s., a sum representing about £3, 12s. in present value (Rogers, Hist, of Agriculture and Prices, i. 627-628, ii. 544).

A closely allied species, Piper Clusii, produces the African cubebs or West African black-pepper, the berry of which is smoother than that of common cubebs and usually has a curved pedicel. In the 14th century it was imported into Europe from the Grain Coast, under the name of pepper, by merchants of Rouen and Lippe.

CUBICLE (Lat. cubiculum), a small chamber containing a couch or a bed. The small rooms opening into the

atrium of a Pompeian house are known as cubicula. In modern English schools ” cubicle ” is the term given to the separate small bed- rooms into which the dormitories are divided, as opposed to the system of large open dormitories.

CUBITT, THOMAS (1788-1855), English builder, was born at Buxton, near Norwich, on the 25th of February 1788. Few men have exhibited greater self-reliance in early life in the pursuit of a successful career. In his nineteenth year, when he was working as a journeyman carpenter, his father died, and he tried to better his position by going on a voyage to India, as captain’s joiner. He returned to London, two years after, in the possession of a small capital, and began business as a carpenter. The growth of his establishment was steady and rapid. He was one of the first to combine several trades in a “.builder’s ” business; and this very much increased his success. One of the earlier works which gave him reputation was the London Institution in Fins- bury Circus; but it is from 1824 that the vast building operations date which identify his name with many splendid ranges of London houses, such as Tavistock, Gordon, Belgrave and Lowndes Squares, and the district of South Belgravia. While these and similar extensive operations were in progress, a financial panic, which proved ruinous to many, was surmounted in his case by a determined spirit and his integrity of character. He took great interest in sanitary measures, and published, for private circulation, a pamphlet on the general drainage of London, the substance of which was afterwards embodied in a letter to The Times; the plan he advocated was subsequently adopted by the conveyance of the sewage matter some distance below London. He advocated the provision of open spaces in the environs of London as places of public recreation, and was one of the originators of Battersea Park, the first of the people’s parks. At a late period he received professionally the recognition of royalty, the palace at Osborne being erected after his designs, and under his superintendence; and in the Life of

the Prince Consort he is described by Queen Victoria as one " than whom a better and kinder man did not exist." In 1851, although he was not identified with the management of the Great Exhibition, he showed the warmest sympathy with its objects, and aided its projectors in many ways, especially in the profitable investment of their surplus funds. Cubitt, when he rose to be a capitalist, never forgot the interests and well-being of his workpeople. He was elected president of the Builders' Society some time before his death, which took place at his seat Denbies, near Dorking, on the 20th of December 1855.

His son, George Cubitt (1828-), who had a long and useful parliamentary career, as Conservative member for West Surrey (1860-1865) and Mid-Surrey (1885-1892), was in 1892 raised to the peerage as Baron Ashcombe.

CUBITT, SIR WILLIAM (1785-1861), English engineer, was born in 1785 at Dilham in Norfolk, where his father was a miller. After serving an apprenticeship of four years (1800-1804) as a joiner and cabinetmaker at Stalham, he became associated with an agricultural-machine maker, named Cook, who resided at Swanton. In 1807 he patented self-regulating sails for wind- mills, and in 1812 he entered the works of Messrs Ransome of Ipswich, where he soon became chief engineer, and ultimately a partner. Meanwhile, the subject of the employment of criminals had been much in his thoughts; and the result was his introduc- tion of the treadmill about 1818. In 1826 he removed to London, where he gained a very large practice as a civil engineer. Among his works were the Oxford canal, the. Birmingham & Liverpool Junction Canal, the improvement of the river Severn, the Bute docks at Cardiff, the Black Sluice drainage and its outfall sluice at Boston harbour, the Middlesborough docks and coal drops in the Tees, and the South-Eastern railway, of which he was chief engineer. The Hanoverian government consulted him about the harbour and docks at Harburg; the water- works of the city of Berlin were constructed under his immediate superintendence; he

was asked to report on the construction of the Paris & Lyons railway; and he was consulting engineer for the line from Boulogne to Amiens. Among his later works were two floating landing stages at Liverpool, and the bridge for carrying the London turnpike across the Medway at Rochester. In 185 1, when he was president of the Institution of Civil Engineers, he was knighted for his services in connexion with the buildings erected in Hyde Park for the exhibition of that year.

He retired from active work in 1858, and died on the 13th of October 1861 at his house on Clapham Common, London. His son, Joseph Cubitt (1811-1872), was trained under him, and was engineer of various railways, including the Great Northern, London, Chatham & Dover, and part of the London & South-Western.

CUCHULINN (Cuchulinn; pronounced ” Coohoollin “), the chief warrior in the Conchobar-Cuchulinn or older heroic (Ulster) cycle of Ireland. The story of his origin is very obscure. The god Lug is represented as. having been swallowed in a draught of wine by his mother Dechtire, sister of Conchobar, who was king of Ulster. But it is not unlikely that this story was invented to supersede the account of the incestuous union of Conchobar with his sister, which seems to be hinted at on various occasions. Usually, however, he is styled son of Sualdam, an Ulster warrior who plays a very inferior part in the cycle. His earliest name was Setanta, and he was brought up at Dun Imbrith (Louth). When he was six years of age he announced his intention of going to Conchobar’s court at Emain Macha (Navan Rath near Armagh) to play with the boys there. He defeats all the boys in marvellous fashion and is received as one of their number. Shortly after he kills Culann, the smith’s hound, a huge watch-dog. The smith laments that all his property is of no value now that his watchman is slain, whereupon the young hero

offers to guard his domains until a whelp of the hound's has grown. From this the boy received the name of Cu Chulinn or Culann's Hound. The next year Cuchulinn receives arms, makes his first foray, and slays the three sons of Necht, redoubtable hereditary foes of the Ulstermen, in the plain of Meath. The men of Ulster decide that Cuchulinn must marry, as all the women of Ireland are in love with him. Chosen envoys fail to find a bride worthy of him after a year's search, but the hero goes straight to Emer, the daughter of Forgall the Wily, at Lusk (county Dublin). The lady is promised to him if he will go to learn chivalry of Domnall the Soldierly and the amazon Scathach in Alba. After enduring great hardships he goes through the course and leaves a son Connlaech behind in Scotland by another amazon, Aife. On his return he carries off and weds Emer. He is represented as living at Dun Delgan (Dundalk) . The greatest of all the hero's achievements was the defence of the frontier of Ulster against the forces of Medb, queen of Connaught, who had come to carry off the famous Brown Bull of Cualnge (Cooley). The men of Ulster were all suffering from a strange debility, and Cuchulinn had to undertake the defence single-handed from November to February. This was when he was seventeen years of age. The cycle contains a large number of episodes, such as the gaining of the champion's portion and the tragical death by the warrior's hand of his own son Connlaech. When he was twenty- seven he met with his end at the hands of Lugaid, son of Curoi MacDaire, the famous Munster warrior, and the children of Calatln Dana, in revenge for their father's death (see Celt: Irish Literature).'

Medieval Christian synchronists make Cuchulinn's death take place about the beginning of the Christian era. It is not necessary to regard Cuchulinn as a form of the solar hero, as some writers have done. Most, if not all, of his wonderful attributes may be ascribed to the Irish predilection for the grotesque. It is true that Cuchulinn seems to stand in a special relation to

the Tuatha De Danann leader, the god Lug, but in primitive societies there is always a tendency to ascribe a divine parentage to men who stand out pre-eminently in prowess beyond their fellows.

See A. Nutt, Cuchulainn, the Irish Achilles (London, 1900); E. Hull, The Cuchullin Saga (London, 1898). (E. C. Q.)

CUCKOO, or Cuckow, as the word was formerly spelt, the common name of a well-known and often-heard bird, the Cuculus canorus of Linnaeus. In some parts of the United Kingdom it is more frequently called gowk, and it is the Gr. kokkv£, the Ital. cuculo or cucco, the Fr. coucou, the Ger. Kuckuk, the Dutch koekkoek, the Dan. kukker or gjog, and the Swed. gok. The oldest English spelling of the name seems to have been cuccu.

No single bird has perhaps so much occupied the attention

both of naturalists and of those who are not naturalists, or has had so much written about it, as the common cuckoo, and of no bird perhaps have more idle tales been told. Its strange and, according to the experience of most people, its singular habit of entrusting its offspring to foster-parents is enough to account for much of the interest which has been so long felt in its history; but this habit is shared probably by many of its Old World relatives, as well as in the New World by birds which are not in any degree related to it. The cuckoo is a summer visitant to the whole of Europe, reaching even far within the Arctic circle, and crossing the Mediterranean from its winter quarters in Africa at the end of March or beginning of April. Its arrival is at once proclaimed by the peculiar and in nearly all languages onomatopoeic cry of the cock — a true song in the technical sense of the word, since it is confined to the male sex and to the season of love. In a few days the cock is followed by the hen, and amorous contests between keen and loud-voiced suitors are to be commonly noticed, until the respective pretensions of the rivals are decided.

Even by night they are not silent; but as the season advances the song is less frequently heard, and the cuckoo seems rather to avoid observation as much as possible, the more so since whenever it shows itself it is a signal for all the small birds of the neighbourhood to be up in its pursuit, just as though it were a hawk, to which indeed its mode of flight and general appearance give it an undoubted resemblance — a resemblance that misleads some into confounding it with the birds of prey, instead of recognizing it as a harmless if not a beneficial destroyer of hairy caterpillars. Thus pass away some weeks. Towards the middle or end of June its " plain-song " cry alters; it becomes rather hoarser in tone, and its first syllable or note is doubled. Soon after it is no longer heard at all, and by the middle of July an old cuckoo is seldom to be fou^d in the British Islands, though a stray example, or even, but very rarely, two or three in company, may occasionally be seen for a month longer. Of its breeding comparatively few have any personal experience. Yet a diligent search for and peering into the nests of several of the commonest little birds — more especially the pied wagtail(Mofo«'Wa lugubris) , the tit\a.rk(Anthus pratensis) , the reed- wren (Acrocephalus streperus), and the hedge-sparrow (Accentor modularis) — will be rewarded by the discovery of the egg of the mysterious stranger which has been surreptitiously introduced, and those who wait till this egg is hatched may be witnesses (as was Edward Jenner in the 18th century) of the murderous eviction of the rightful tenants of the nest by the intruder, who, hoisting them one after another on his broad back, heaves them over to die neglected by their own parents, of whose solicitous care he thus becomes the only object. In this manner he thrives, and, so long as he remains in the country of his birth his wants are anxiously supplied by the victims of his mother's dupery. The actions of his foster-parents become, when he is full grown, almost ludicrous, for they often have to perch between his shoulders to place in his gaping mouth the delicate morsels he is too indolent or too stupid to take from their bills. Early in September

he begins to shift for himself, and then follows the seniors of his kin to more southern climes. So much caution is used by the hen cuckoo in choosing a nest in which to deposit her egg that the act of insertion has been but seldom witnessed. The nest selected is moreover often so situated, or so built, that it would be an absolute impossibility for a bird of her size to lay her egg therein by sitting upon the fabric as birds commonly do; and there have been a few fortunate observers who have actually seen the deposition of the egg upon the ground by the cuckoo, who, then taking it in her bill, introduces it into the nest. Of these, the earliest in Great Britain seem to have been two Scottish lads, sons of Mr Tripeny, a farmer in Coxmuir, who, as recorded by Macgillivray {Brit. Birds, iii. 130, 131) from information communicated to him by Mr Durham Weir, saw most part of the operation performed, June 24, 1838. But perhaps the most satisfactory evidence on the point is that of Adolf Miiller, a forester at Gladenbach in Darmstadt, who says (Zoolog. Garten, 1866, pp. 374, 375) that through a telescope he watched a cuckoo as she laid her egg on a

bank, and then conveyed the egg in her bill to a wagtail's nest. Cuckoos, too, have been not unfrequently shot as they were carrying a cuckoo's egg, presumably their own, in their bill, and this has probably given rise to the vulgar, but seemingly groundless, belief that they suck the eggs of other kinds of birds. More than this, Mr G. D. Rowley, who had much experience of cuckoos, declares (Ibis, 1865, p. 186) his opinion to be that traces of violence and of a scuffle between the intruder and the owners of the nest at the time of introducing the egg often appear, whence we are led to suppose that the cuckoo ordinarily, when inserting her egg, excites the fury (already stimulated by her hawk-like appearance) of the owners of the nest by turning out one or more of the eggs that may be

already laid therein, and thus induces the dupe to brood all the more readily and more strongly what is left to her. Of the assertion that the cuckoo herself takes any interest in the future welfare of the egg she has foisted on her victim, or of its product, there is no good evidence.

But a much more curious assertion has also been made, and one that at first sight appears so incomprehensible as to cause little surprise at the neglect it long encountered. To this currency was first given by Salerne (L'Hist. nat. &c, Paris, 1767, p. 42), who was, however, hardly a believer in it, and it is to the effect, as he was told by an inhabitant of Sologne, that the egg of a cuckoo resembles in colour that of the eggs normally laid by the kind of bird in whose nest it is placed. In 1853 the same notion was prominently and independently brought forward by Dr A. C. E. Baldamus (Naumannia, 1853, pp. 307–325), and in time became known to English ornithologists, most of whom were naturally sceptical as to its truth, since no likeness whatever is ordinarily apparent in the very familiar case of the blue-green egg of the hedge-sparrow and that of the cuckoo, which is so often found beside it. 1 Dr Baldamus based his notion on a series of eggs in his cabinet, 2 a selection from which he figured in illustration of his paper, and, however the thing may be accounted for, it seems impossible to resist, save on one supposi- tion, the force of the testimony these specimens afford. This one supposition is that the eggs have been wrongly ascribed to the cuckoo, and that they are only exceptionally large examples of the eggs of the birds in the nests of which they were found, for it cannot be gainsaid that some such abnormal examples are occasionally to be met with. But it is well known that abnormally large eggs are not only often deficient in depth of colour, but still more often in stoutness of shell. Applying these rough criteria to Dr Baldamus's series, most of the specimens stood the test very well.

There are some other considerations to be urged. For instance, Herr Braune, a forester at Greiz in the

principality of Reuss (Naumannia, lorn. cil. pp. 307, 313), shot a hen cuckoo as she was leaving the nest of an icterine warbler (Hypolais iclerina). In the oviduct of this cuckoo he found an egg coloured very like that of the warbler, and on looking into the nest he found there an exactly similar egg, which there can be no reasonable doubt had just been laid by that very cuckoo. Moreover, Herr Grunack (Journ. fur Orn., 1873, p. 454) afterwards found one of the most abnormally coloured specimens, quite unlike the ordinary egg of the cuckoo, to contain an embryo so fully formed as to show the characteristic zygodactyl feet of the bird, thus proving unquestionably its parentage.

On the other hand, we must bear in mind the numerous instances in which not the least similarity can be traced — as in the not uncommon case of the hedge-sparrow already mentioned, and if we attempt any explanatory hypothesis it must be one that will fit all round. Such an explanation seems to be this. We know that certain kinds of birds resent interference with their nests much less than others, and among them it may be asserted that the hedge-sparrow will patiently submit to various experiments. She will brood with complacency the egg of a redbreast (Erithacus rubecula), so unlike her own, and for aught we know to the contrary may even be colour-blind. In the case

1 An instance to the contrary has been recorded by Mr A. C. Smith (Zoologist, 1873, p. 3516) on Mr Brine's authority. 1 This series was seen in 1861 by the writer.

of such a species there would be no need OI anything further to ensure success — the terror of the nest-owner a^ seeing her home invaded by a hawk-like giant, and some of her treasures tossed out, would be enough to stir her motherly feelings so deeply that she would without misgiving, if not with joy that something had been spared to her, resume the duty of incubation so soon as the danger was past.

But with other species it may be, and doubtless is, different. Here assimilation of the introduced egg to those of the rightful owner may be necessary, for there can hardly be a doubt as to the truth of Dr Baldamus's theory as to the object of the assimilation being to render the cuckoo's egg "less easily recognized by the foster-parents as a substituted one." It is especially desirable to point out that there is not the slightest ground for imagining that the cuckoo, or any other bird, can voluntarily influence the colour of the egg she is about to lay. Over that she can have no control, but its destination she can determine. It would seem also impossible that a cuckoo, having laid an egg, should look at it, and then decide from its appearance in what bird 's nest she should put it. That the colour of an egg-shell can be in some mysterious way affected by the action of external objects on the perceptive faculties of the mother is a notion too wild to be seriously entertained. Consequently, only one explanation of the facts can here be suggested. Every one who has sufficiently studied the habits of animals will admit the influence of heredity. That there is a reasonable probability of each cuckoo most commonly putting her eggs in the nest of the same species of bird, and of this habit being transmitted to her posterity, does not seem to be a very violent supposition. Without attributing any wonderful sagacity to her, it does not seem unlikely that the cuckoo which bad once successfully foisted her egg on a reed-wren or a titlark should again seek for another reed-wren's or another titlark's nest (as the case may be), when she had another egg to dispose of, and that she should continue her practice from one season to another. It stands on record (Zoologist, 1873, p. 3648) that a pair of wag- tails built their nest for eight or nine years running in almost exactly the same spot, and that in each of those years they fostered a young cuckoo, while many other cases of like kind, though not perhaps established on so good authority, are believed to have happened. Such a habit could hardly fail to become hereditary, so that the daughter of a cuckoo which always put her

egg into a reed-wren's, titlark's or wagtail's nest would do as did her mother. Furthermore it is unquestionable that, whatever variation there may be among the eggs laid by different individuals of the same species, there is a strong family likeness between the eggs laid by the same individual, even at the interval of many years, and it can hardly be questioned that the eggs of the daughter would more or less resemble those of her mother. Hence the supposition may be fairly credited that the hafcit of laying a particular style of egg is also likely to become hereditary. Combining this supposition with that as to the cuckoo's habit of using the nest of the same species becoming hereditary, it will be seen that it requires only an application of the principle of natural selection to show the probability of this principle operat- ing in the course of time to produce the facts asserted by the anonymous Solognot of the 18th century, and by Dr Baldamus and others since. The particular gens of cuckoo which inherited and transmitted the habit of depositing in the nest of any particular species of bird eggs having more or less resemblance to the eggs of that species would prosper most in those members of the gens where the likeness was strongest, and the other members would (ceteris paribus) in time be eliminated. As already shown, it is not to be supposed that all species, or even all individuals of a species, are duped with equal ease. The operation of this kind of natural selection would be most needed in those cases where the species are not easily duped — that is, in those cases which occur the least frequently. Here it is we find it, for observation shows that eggs of the cuckoo deposited in nests of the red-backed shrike (Lanius collurio) , of the bunting (Emberiza miliaria), and of the icterine warbler approximate in their colouring to eggs of those species — species in whose nests the cuckoo rarely (in comparison with others) deposits -eggs.

S3

6i6

Of species which are more easily duped, such as the hedge- sparrow, mention has already been made.

More or less nearly allied to the British cuckoo are many other Forms of the genus from various parts of Africa, Asia and their islands, while one even reaches Australia. In some cases the chief difference is said to lie in the diversity of voice — a character only to be appreciated by those acquainted with the living birds, and though of course some regard should be paid to this distinc tion, the possibility of birds using different "dialects" according to the locality they inhabit must make it a slender specific diagnostic. All these forms are believed to have essentially the same habits as the British cuckoo, and, as regards parasitism the same is to be said of the large cuckoo of southern Europe and North Africa (Cbccysles glandarius) , which victimizes pies (Pica mauritanica and Cyanopica cooki) and crows (Corvus comix). True it is that an instance of this species, commonly known as the great spotted cuckoo, having built a nest and hatched its young, is on record, but the later observations of others tend to cast doubt on the credibility of the ancient report. It is worthy of remark that the eggs of this bird so closely resemble those of one of the pies in whose nest they have been found, that even expert zoologists have been deceived by them, only to discover the truth when the cuckoo's embryo had been extracted from the supposed pie's egg. This species of cuckoo, easily distin- guishable by its large size and long crest, has more than once made its appearance as a straggler in the British Isles. Equally parasitic are many other cuckoos, belonging chiefly to genera which have been more or less clearly defined as Cacomantis, Chrysococcyx, Eudynamis, Oxylophus, Polyphasia and Sumiculus, and inhabiting parts of the Ethiopian, Indian and Australian regions; 1 but there are certain aberrant forms of Old World cuckoos which unquestionably do not shirk parental responsi- bilities. Among these especially are the birds placed in or allied to the

genera Centropus and Coua — the former having a wide distribution from Egypt to New South Wales, living much on the ground and commonly called lark-heeled cuckoos; the latter bearing no English name, and limited to the island of Madagascar. These build a nest, not perhaps in a highly finished style of architecture, but one that serves its end.

Respecting the cuckoos of America, the evidence-, though it has been impugned, is certainly enough to clear them from the charge which attaches to so many of their brethren of the Old World. There are two species very well known in parts of the United States and some of the West Indian Islands (Coccysus .imericanus and C. erythrophthalmus), and each of them has occasionally visited Europe. They both build nests— remarkably small structures when compared with those of other birds of their size — and faithfully incubate their delicate sea-green eggs. In the south-western states of the Union and thence into Central America is found another curious form of cuckoo (Geococcyx) — the chaparral-cock of northern and paisano of southern settlers. The first of these names it takes from the low brushwood (chap- arral) in which it chiefly dwells, and the second is said to be due to its pheasant4ike (faisan corrupted into paisano, properly a countryman) appearance as it runs on the ground. Indeed, one of the two species of the genus was formerly described as a Phasianus. They both have short wings, and seem never to fly, but run with great rapidity. Returning to arboreal forms, the genera Neomorphus, Diplopterus, Saurothera and Piaya (the last two commonly called rain-birds, from the belief that their cry portends rain), may be noticed — all of them belonging to the Neotropical region; but perhaps the most curious form of American cuckoos is the ani (Crotophaga), of which three species inhabit the same region. The best-known species (C. ani) is foud throughout the Antilles and on the opposite continent. In most of the British colonies it is known as the black witch, and is accused of various malpractices — it being, in truth, a perfectly harmless if not a beneficial bird. As regards its

pro- pagation this aberrant form of cuckoo departs in one direction

1 Evidence tends to show that the same is to be said of the curious channel-bill (Scythrops novae-holiandiae) , though absolute proof seems to be wanting. .

from the normal habit of birds, for several females, unite to lay their eggs in one nest. • It is evident that incubation is carried on socially, since an intruder on approaching the rude nest will disturb perhaps half a dozen of its sable proprietors, who, loudly complaining, seek safety either in the leafy branches of the tree that holds it, or in the .nearest available covert, with all the speed that their feeble powers of flight permit. (A. N.)

CUCKOO-SPIT, a frothy secretion found upcn plants, and produced by the immature nymphal stage of various plant-lice of the familiar Cercopidae and Jassidae, belonging to the homo- pterous division of the Hemiptera, which in the adult condition are sometimes called frog-hoppers.

CUCUMBER (Cucumis sativus, Fr. concombre, O. Fr. cou- combre, whence the older English spelling and pronunciation " cowcumber," the standard in England up to the beginning of the 1 8th century), a creeping plant of the natural order Cucurbitaceae. It is widely cultivated, and originated prob- ably in northern India, where Alphonse de Candolle affirms (Origin of Cultivated Plants) that it has been cultivated for at least three thousand years. It spread westward to Europe and was cultivated by the ancient Greeks under the name gIkvos; it did not reach China until two hundred years before the Christian era. It is an annual with a rough succulent trailing stem and stalked hairy leaves with three to five pointed lobes; the stem bears branched tendrils by means of which the plant can be trained to supports. The short-stalked, bell-shaped flowers are unisexual, but staminate and pistillate are borne on the same plant; the latter are recognized by the swollen warty green ovary below

the rest of the flower. The ovary develops into the " cucumber " without fertilization, and unless seeds are wanted, it is advisable to pinch off the male flowers.

There are a great many varieties of cucumber in cultivation, which may be grouped under the two headings (i) forcing, (2). field varieties.

1. The former are large-leaved strong-growing plants, not suited to outdoor culture, with long smooth-rinded fruit; there are many excellent varieties such as Telegraph, Sion House, duke of Edinburgh, &c. The plants are grown in a hot-bed which is prepared towards the end of February from rich stable manure, leaves, &c. A rich turfy loam with a little well-decom- posed stable manure forms a good soil. The seeds are sown singly in rich, sandy soil in small pots early in February and plunged in a bottom heat. After they have made one or two foliage-leaves the seedlings are transferred to larger pots, and ultimately about the middle of March to the hot-bed. Each plant is placed in the centre of a mound of soil about a foot deep and well watered with tepid water. The plants should be well watered during their growing period, and the foliage sprinkled or syringed two or three times a day. In bright sunshine the plants are lightly shaded. When grown in frames the tops of the main stems are pinched off when the stems are about 2 ft. long; this causes the development of side shoots on which fruits are borne. When these have produced one or two fruits, they are also stopped at the joint beyond the fruit. When grown in green- houses the vines may be allowed to reach the full length of the house before they are stopped. To keep the fruits straight they may be grown in cylindrical glass tubes about a foot long, or along narrow wooden troughs. If seeds are required one or more female flowers should be selected and pollen from male flower placed on their stigmas.

2. The outdoor varieties are known as hill or ridge cucumbers. They may be grown in any good soil. A warm, sheltered spot with a south aspect and a mound

of rich, sandv loam with a little leaf- mould placed over a hot-bed of dung and leaves is recommended. The mounds or ridges should be 4 to 5 ft. apart, and one plant is placed in the centre of each. The seeds are sown in March in light, rich soil in small pots with gentle heat. The seedlings are repotted and well hardened for planting out in June. The plants must be well watered in and, until established, shaded by a hand-light from bright sunshine. When the leading shoots are from 1 5 to 2 ft. long the tips are pinched off to induce the forma- tion of fruit-bearing side-shoots. If seed is required a pistillate

flower is selected and pollinated. There are numerous varieties distinguished by size and the smooth or prickly rind. King of the Ridge has smooth fruits a foot or more long; gherkin, a short, prickly form, is much used for pickling.

Cucumber is subject to the attacks of green fly, red spider and thrips; for the two latter, infected leaves should be sponged with soapy water; for green fly careful fumigating is necessary.

The Sikkim cucumber, C. sativus var. sikkimensis, is a large fruited form, reaching 15 in. long by 6 in. thick, grown in the Himalayas of Sikkim and Nepal. It was discovered by Sir Joseph Hooker in the eastern Himalayas in 1848. He says " so abundant were the fruits, that for days together I saw gnawed fruits lying by the natives' paths by thousands, and every man, woman and child seemed engaged throughout the day in devouring them." The fruit is reddish-brown, marked with yellow, and is eaten both raw and cooked.

The West India gherkin is Cucumis Anguria, a plant with small, slender vines, and very abundant small ellipsoid green fruit covered with warts and spines. It is used for pickling.

Cucumbers were much esteemed by the ancients. According to Pliny, the emperor Tiberius was supplied with them daily, both in summer and winter. The kishuim or cucumbers of the scriptures (Num. xi. 5; Isa. i. 8) were probably a wild form of C. Melo, the melon, a plant common in Egypt, where a drink is prepared from the ripe fruit. Peter Forskal, one of the early botanical writers on the country, describes its preparation. The pulp is broken and stirred by means of a stick thrust through a hole cut at the umbilicus of the fruit; the hole is then closed with wax, and the fruit, without removing it from its stem, is buried in a little pit; after some days the pulp is found to be converted into an agreeable liquor (see Flora aegyptiaco- arabica, p. 168, 1775). The squirting cucumber, Ecballium Elaterium, the 'EIkvos aypios of Theophrastus, furnishes the drug elaterium (q.v.).

See Naudin in Annal. des sci. nat. ser. 4 (Botany), t. xi. (1859); G. Nicholson, Dictionary of Gardening (1885) ; L. H. Bailey, Cyclo- paedia of American Horticulture (1900).

CUCURBITACEAE, a botanical order of dicotyledons, con- taining 87 genera and about 650 species, found in the temperate and warmer parts of the earth but especially developed in the

Fig. 1. — Bryonia dioica, Bryony. I, part of corolla of male flower with attached stamens; 2, female flower after removal of calyx and carolla; 3, berries; 1,2,3 about nat. size.

tropics. The plants are generally annual herbs, climbing by means of tendrils and having a rapid growth. The long-stalked leaves are arranged alternately, and are generally palmately

lobed and veined. The flowers or inflorescences are borne in the leaf-axils, in which a vegetative bud is also found, and at the side of the leaf-stalk is a simple or branched tendril. • There has been much difference of opinion as to what member or members the tendril represents; the one which seems most in

accordance with facts regards the tendril as a shoot, the lower portion representing the stem, the upper twining portion a leaf. The flowers are unisexual, and strikingly epigynous, the perianth and stamens being attached to a bell-shaped prolongation of the receptacle above the ovary. The five narrow pointed sepals are followed by five petals which are generally united to form a more or less bell-shaped corolla. There are five stamens in the male flowers; the anthers open towards the outside, are

wKHHHr

mmm ^

of

Fig. 2. cucumber

1, Male flower

(Cucumis).

2, Same, in vertical section,

slightly enlarged.

3, Stamens, after removal of

calyx and corolla.

4, Female flower.

5, Horizontal plan of male flower.

6, Transverse section of fruit.

1 and 4 nat. size.

one-celled, with the pollen-sacs generally curved and variously united. The carpels, normally three in number, form an ovary with three thick, fleshy, bifid placentas bearing a large number of ovules on each side, and generally filling the interior of the ovary with a juicy mass. The short thick style has generally three branches each bearing a fleshy,

usually forked stigma. The fruit is a fleshy many-seeded berry with a tough rind (known as a pepo), and often attains considerable size. The embryo completely fills the seed.

The order is represented in Britain by bryony (Bryonia dioica), (fig. 1) a hedge-climber, perennial by means of large fleshy tubers which send up each year a number of slender angular stems. The leaves are heart-shaped with wavy margined lobes. The flowers are greenish, \ to \ in. in diameter; the fruit, a red several-seeded berry, is about \ in. in diameter.

Many genera are of economic importance; Cucumis (fig. 2) affords cucumber (q.v.) and melon (q.v.) ; Cucurbita, pumpkin and marrow; Citrullus vulgaris is water-melon, and C. Colocynthis, colocynth; Ecballium Elaterium (squirting cucumber) is medicinal; Sechium edule (chocho), a tropical American species, is largely cultivated for its edible fruit; it contains one large seed which germinates in situ. Lagenaria is the gourd (q.v.). The fruits of Luffa aegyptiaca have a number of closely netted vascular bundles in the pericarp, forming a kind of loose felt which supplies the well-known loofah or bath-sponge.

CUDDALORE, a town of British India, in the South Arcot district of Madras, on the coast 125 m. S. of Madras by rail. Pop. (1001) 52,216, showing an increase of 10% in the decade. It lies low, but is regarded as exceptionally healthy, and serves as a kind of sanatorium for the surrounding district. The principal exports are sugar, oil-seeds and indigo. There are two colleges and two high schools. In the neighbourhood are the ruins of Fort St David situated on the river Gadilam, which has

as stirring a history

CUDDAPAH, a town and district of British India, in the Madras Presidency. The town is 6 m. from the right bank of the river Pennar, and 161 m. by rail from Madras. Pop. (1901) 16,432. It is now a poor place, but has some trade in cotton and indigo, and manufactures of cotton cloth. Hills surround it on three sides, and it has a bad reputation for unhealthiness.

The District or Cuddapah has an area of 8723 sq. m. It is in shape an irregular parallelogram, divided into two nearly equal parts by the range of the Eastern Ghats, which intersects it throughout its entire length. The two tracts thus formed possess totally different features. The first, which constitutes the north, east and south-east of the district, is a low-lying plain; while the other, which comprises the southern and south- western portion, forms a high table-land from 1500 to 2500 ft. above sea-level. The chief river is the Pennar, which enters the district from Bellary on the west, and flows eastwards into Nellore. Though a large and broad river, and in the rains containing a great volume of water, in the hot weather months it dwindles down to an inconsiderable stream. Its principal tributaries are the Kundaur, Saglair, Cheyair, and Papagni rivers. One of the most interesting antiquities in the district is the ancient fort of Gurramkonda. The fort is supposed to have been built by the Golconda sultans; it stands on a hill 500 ft. high, three sides of which consist of almost perpendicular precipices. According to a local legend the name Gurramkonda, meaning ” horse hill,” was derived from the fact that a horse was supposed to be guardian of the fort and that the place was impregnable so long as the horse remained there. The story goes that a Mahratta chief at length succeeded in scaling the precipice and in carrying off the horse, and although the thief was captured before reaching the base of the hill, the spell was broken and the fort, when next attacked, fell. The population of the district in 1901 was 1,291,267. The principal crops are millet, rice, other food grains, pulse, oil-seeds, cotton and

indigo. The two last are largely exported. There are several steam factories for pressing cotton, and indigo vats. The district is served by lines of the Madras and the South Indian railways.

CUDWORTH, RALPH (1617–1688), English philosopher, was born at Aller, Somersetshire, the son of Dr Ralph Cudworth (d. 1624), rector of Aller, formerly fellow of Emmanuel College, Cambridge. His father died in 1624, and his mother then married the Rev. Dr Stoughton, who gave the boy a good home education. Cudworth was sent to his father's college, was elected fellow in 1639, and became a successful tutor. In 1642 he published A Discourse concerning the true Notion of the Lord's Supper, and a tract entitled The Union of Christ and the Church. In 1645 he was appointed master of Clare Hall and the same year was elected Regius professor of Hebrew. He was now recognized as a leader among the remarkable group known as the Cambridge Platonists (q.v.) . The whole party were more or less in sympathy with the Commonwealth, and Cudworth was consulted by John Thurloe, Cromwell's secretary of state, in regard to university and government appointments. His sermons, such as that

preached before the House of Commons, on the 31st of March 1647, advocate principles of religious toleration and charity. In 1650 he was presented to the college living of North Cadbury, Somerset. From the diary of his friend John Worthington we learn that Cudworth was nearly compelled, through poverty, to leave the university, but in 1654 he was elected master of Christ's College, whereupon he married. On the Restoration he contributed some Hebrew verses to the Academiae Canta- brigiensis Sworpa, a congratulatory volume addressed to the king. In 1662 he was presented to the rectory of Ashwell, Herts. In 1665 he almost quarrelled with his fellow-Platonist, Henry More, because the latter had written an ethical work which Cudworth feared would interfere with his own long-contemplated treatise on the same subject. To avoid clashing, More brought out his book, the Enchiridion ethicum, in Latin; Cudworth's never appeared. In 1678 he published The

True Intellectual System of the Universe: the first part, wherein all the reason and philosophy of atheism is confuted and its impossibility demonstrated (imprimatur dated 167 1). No more was published, perhaps because of the theological clamour raised against this first part. Cudworth was installed prebendary of Gloucester in 1678. He died on the 26th of June 1688, and was buried in the chapel of Christ's. His only surviving child, Damaris, a devout and talented woman, became the second wife of Sir Francis Masham, and was distinguished as the friend of John Locke. Much of Cudworth's work still remains in manuscript; A Treatise concerning eternal and immutable Morality was published in 1731 ; and A Treatise of Freewill, edited by John Allen, in 1838; both are connected with the design of his magnum opus, the Intellectual System.

The Intellectual System arose, so its author tells us, out of a discourse refuting " fatal necessity," or determinism. Enlarging his plan, he proposed to prove three matters: (a) the existence of God; (b) the naturalness of moral distinctions; and © the reality of human freedom. These three together make up the intellectual (as opposed to the physical) system of the universe; and they are opposed respectively by three false principles, atheism, religious fatalism which refers all moral distinctions to the will of God, and thirdly the fatalism of the ancient Stoics, who recognized God and yet identified Him with nature. The immense fragment dealing with atheism is all that was published by its author. Cudworth criticizes two main forms of materialistic atheism, the atomic, adopted by Democritus, Epicurus and Hobbes; and the hylozoic, attributed to Strato, which explains everything by the supposition of an inward self-organizing life in matter. Atomic atheism is by far the more important, if only because Hobbes, the great antagonist whom Cudworth always has in view, is supposed to have held it. It arises out of the combination of two principles, neither of which is atheistic taken separately, i.e. atomism and

corporealism, or the doctrine that nothing exists but body. The example of Stoicism, as Cudworth points out, shows that corporealism may be theistic. Into the history of atomism Cudworth plunges with vast erudi- tion. It is, in its purely physical application, a theory that he fully accepts; he holds that it was taught by Pythagoras, Empedocles, and in fact, nearly all the ancient philosophers, and was only perverted to atheism by Democritus. It was first invented, he believes, before the Trojan war, by a Sidonian thinker named Moschus or Mochus, who is identical with the Moses of the Old Testament. In dealing with atheism Cud- worth's method is to marshal the atheistic arguments elaborately, so elaborately that Dryden remarked " he has raised such ob- jections against the being of a God and Providence that many think he has not answered them "; then in his last chapter, which by itself is as long as an ordinary treatise, he confutes them with all the reasons that his reading could supply. A subordinate matter in the book that attracted much attention at the time is the conception of the " Plastic Medium," which is a mere revival of Plato's " World-Soul," and is meant to explain the existence and laws of nature without referring all to the direct operation of God. It occasioned a long-drawn controversy between Pierre Bayle and Le Clerc, the former

maintaining, the latter denying, that the Plastic Medium is really favourable to atheism.

No modern reader can endure to toil through the Intellectual System; its only interest is the light it throws upon the state of religious thought after the Restoration, when, as Birch puts it, " irreligion began to lift up its head." It is immensely diffuse and pretentious, loaded with digressions, its argument buried under masses of fantastic, uncritical learning, the work of a vigorous but quite unoriginal mind. As Bolingbroke

said, Cudworth " read too much to think enough, and admired too much to think freely." It is no calamity that natural pro- crastination, or the clamour caused by his candid treatment of atheism and by certain heretical tendencies detected by orthodox criticism in his view of the Trinity, made Cudworth leave the work unfinished.

A much more favourable judgment must be given upon the short Treatise on eternal and immutable Morality, which deserves to be read by those who are interested in the historical develop- ment of British moral philosophy. It is an answer to Hobbes's famous doctrine that moral distinctions are created by the state, an answer from the standpoint of Platonism. Just as knowledge contains a permanent intelligible element over and above the flux of sense-impressions, so there exist eternal and immutable ideas of morality. Cudworth's ideas, like Plato's, have " a constant and never-failing entity of their own," such as we see in geometrical figures; but, unlike Plato's, they exist in the mind of God, whence they are communicated to finite under- standings. Hence " it is evident that wisdom, knowledge and understanding are eternal and self-sub si stent things, superior to matter and all sensible beings, and independent upon them " ; and so also are moral good and evil. At this point Cudworth stops; he does not attempt to give any list of Moral Ideas. It is, indeed, the cardinal weakness of this form of intuitionism that no satisfactory list can be given and that no moral principles have the " constant and never-failing entity," or the definiteness, of the concepts of geometry. Henry More, in his Enchiridion ethicum, attempts to enumerate the " noemata moralia"; but, so far from being self-evident, most of his moral axioms are open to serious controversy.

The Intellectual System was translated into Latin by J. L. Mosheim and furnished with notes and dissertations which were translated into English in J. Harrison's edition (1845). Our chief biographical authority is T. Birch's " Account," which appears in editions of the Works. There is a good chapter on

Cudworth in J. Tulloch's Rational Theology, vol. ii. Consult also P. Janet's Essai sur le mediateur plastique (i860), W. R. Scott's Introduction to Cudworth's " Treatise," and J. Martineau's Types of Ethical Theory, vol. ii.

(H. St.)

CUENCA, a city , and the capital of the province of Azuay, Ecuador, about 190 m. S. of Quito and 70 m. S.E. of Guayaquil. Pop. (1908 estimate) 30,000 (largely Indians), including the suburb of Ejido. Cuenca stands at the northern end of a broad valley, or basin, of the Andes, lying between the transverse ridges of Azuay and Loja, and is about 8640 ft. above sea-level. Near by is the hill of Tarqui which the French astronomers chose for their meridian in 1742. Communication with the coast is difficult. Cuenca is the third most important city of Ecuador, being the seat of a bishopric, and having a college, a university faculty, a cathedral, and several churches, and a considerable industrial and commercial development. It manufactures sugar, woollen goods and pottery, and exports Peruvian bark (cinchona), hats, cereals, cheese, hides, &c. It was founded in 1557 on the site of a native town called Tumibamba, and was made an episcopal see in 1786.

CUENCA, a province of central Spain bounded on the N. by Guadalajara, N.E. by Teruel, E. by Valencia, S. by Albacete, S.W. by Ciudad Real, W. by Toledo and N.W. by Madrid. Pop. (1900) 249,696; area, 6636 sq. m. Cuenca occupies the eastern part of the ancient kingdom of New Castile, and slopes from the Serrania de Cuenca (highest point the Cerro de San Felipe, on the north-eastern border of the province, 5905 ft.), down into the great southern Castilian plain watered by the upper streams of the Guadiana. The lowlands bordering on Ciudad

Real belong to the wide plain of La Mancha (q.v.). The rocky and bare highland of Cuenca on the north and east includes the upper valley of the Jucar and its tributary streams, but in the north-west the province is watered by tributaries of the Tagus. The

forests are proverbial for their pine timber, and rival those of Soria; considerable quantities of timber are floated down the Tagus to Aranjuez and thence taken to Madrid for building purposes. Excessive droughts prevail; the climate of the hills and of the high plateaus is harsh and cold, but the valleys are excessively hot in summer. The soil, where well watered, is fertile, but little attention is paid to agriculture, and three- fourths of the area is left under pasture. The rearing of cattle, asses, mules and sheep is the principal employment of the people; olive oil, nuts, wine, wheat, silk, wax and honey are the chief products. Iron, copper, alum, saltpetre, jasper and agates are found, but in 1903 all the workings had been abandoned except three salt mines ; and there are few manufactures except the weaving of coarse cloth. The roads are in such a backward condition that they cripple not only the mining interests but also the exports of timber, and at the beginning of the 20th century there was no railway except a branch line which passed westwards from Aranjuez through Tarancon to Cuenca, the capital (pop. 1900, 10,756). No other town has as many as 6000 inhabitants, and no other Spanish province is so thinly populated as Cuenca. In 1900 there were only 37-6 inhabitants per sq. m. Education is backward, and extreme poverty almost universal among the peasantry. See also Castile.

CUENCA, the capital of the Spanish province of Cuenca; 125 m. by rail E. by S. of Madrid. Pop. (1900) 10,756. Cuenca occupies a height of the well-wooded Serrania de Cuenca, at an elevation of 2960 ft., overlooking the confluence of the rivers Jucar and Huecar. A fine bridge, built in 1523, crosses the Jucar to the convent of San Pablo. Among several interesting churches in the city, the most noteworthy is the 13th-century Gothic cathedral, celebrated for the beautiful carved woodwork of its 16th-century doorway, and containing some admirable examples of Spanish sculpture. The city has a considerable trade in timber, and was long the headquarters of the provincial wool industry; the loss of which, in modern times, has partly been

compensated by the development of soap, paper, chocolate, match and leather manufactures. Cuenca was captured from the Moors by Alphonso VIII. of Castile in n 77, and shortly afterwards became an episcopal see. In 1874 it offered a pro- longed and gallant resistance to the Carlist rebels.

CUESTA, a name of Spanish origin used in New Mexico for low ridges of steep descent on one side and gentle slope on the other. It has been proposed as a term for the land form which consists of the two elements of a steep scarp or " strike " face, and an inclined plain or gentle " dip " slope.

CUEVAS DE VERA, a town of south-eastern Spain, in the pro- vince of Almeria; on the right bank of the river Almanzora, 8 m. W. of the Mediterranean Sea. Pop. (1900) 20,562. Cuevas de Vera is built at the eastern extremity of the Sierra de los Filabres (6823 ft.), which isolate it from the railway system of Almeria. It is, however, the chief market for the rich agricultural districts towards the south and for the argentiferous lead and other mines among the mountains. In appearance it is modern, with wide streets, two fine squares, and a parish church in Doric style, dating from 1758. But in reality the town is of considerable antiquity. One of the towers in the Moorish palace owned by the marquesses of Villafranca is probably of Roman origin.

CUFF. (1) (Of uncertain origin), the lower edge of a sleeve turned back to show an ornamental border, or with an addition of lace or trimming; now used chiefly of the stiff bands of linen worn under the coat-sleeve either loose or attached to the shirt. (2) Also uncertain in origin, but with no connexion, probably, with (1), a blow with the hand either open or closed, as opposed to the use of weapons.

CUIRASS (Fr. cuirasse, Lat. coriaceus, made of leather, from corium, the original breastplate being of leather), the plate armour, whether formed of a single piece of metal or other rigid material or composed of two or more pieces, which covers the

front of the wearer's person. In a suit of armour, however, since this important piece was generally worn in connexion with a corresponding defence for the back, the term cuirass commonly is understood to imply the complete body-armour, including both the breast and the back plates. Thus this complete body-armour appears in the middle ages frequently to have been described as a " pair of plates." The corslet (Fr. corselet, diminu- tive of the O. Fr. cors, body), a comparatively light cuirass, is more strictly a breast-plate only. As parts of the military equipment of classic antiquity, cuirasses and corslets of bronze, and at later periods also of iron or some other rigid substance, were habitually in use; but while some special kind of secondary protection for the breast had been worn in earlier times by the men-at-arms in addition to their mail hauberks and their " cotes " armed with splints and studs, it was not till the 14th century that a regular body-defence of plate can be said to have become an established component of medieval armour. As this century continued to advance, the cuirass is found gradually to have come into general use, in connexion with plate defences for the limbs, until, at the close of the century, the long familiar inter- linked chain-mail is no longer visible in knightly figures, except in the camail of the bassinet and at the edge of the hauberk. The prevailing, and indeed almost the universal, usage through- out this century was that the cuirass was worn covered. Thus, the globose form of the breast-armour of the Black Prince, in his effigy in Canterbury cathedral, 1376, intimates that a cuirass as well as a hauberk is to be considered to have been covered by the royalty-emblazoned jupon of the prince. The cuirass, thus worn in the 14th century, was always made of sufficient length to rest on the hips; otherwise, if not thus supported, it must have been suspended from the shoulders, in which case it would have effectually interfered with the free and vigorous action of the wearer. Early in the 1 5th

century, the entire' panoply of plate, including the cuirass, began to be worn without any surcoat; but in the concluding quarter of the century the short surcoat, with full short sleeves, known as the tabard, was in general use over the armour. At the same time that the disuse of the surcoat became general, small plates of various forms and sizes (and not always made in pairs, the plate for the right or sword-arm often being smaller and lighter than its companion), were attached to the armour in front of the shoulders, to defend the otherwise vulnerable points where the plate defences of the upper-arms and the cuirass left a gap on each side. About the middle of the century, instead of being formed of a single plate, the breast-plate of the cuirass was made in two parts, the lower adjusted to overlap the upper, and contrived by means of a strap or sliding rivet to give flexibility to this defence. In the second half of the 1 5th century the cuirass occasionally was superseded by the " brigandine jacket," a defence formed of some textile fabric, generally of rich material, lined throughout with overlapping scales (resembling the earlier " imbricated " form) of metal, which were attached to the jacket by rivets, having their heads, like studs, visible on the outside. In the 16th century, when occasionally, and by personages of exalted rank, splendid surcoats were worn over the armour, the cuirass — its breast- piece during the first half of the century, globular in form — was constantly reinforced by strong additional plates attached to it by rivets or screws. About 1550 the breast-piece of the cuirass was characterized by a vertical central ridge, called the " tapul " having near its centre a projecting point; this pro-jection, somewhat later, was brought lower down, and eventually the profile of the plate, the projection having been Carried to its base, assumed the singular form which led to this fashion of the cuirass being distinguished as the " peascod cuirass."

Corslets provided with both breast and back pieces were worn by foot-soldiers in the 17th century,

while their mounted com- rades were equipped in heavier and stronger cuirasses; and these defences continued in use after the other pieces of armour, one by one, had gradually been laid aside. Their use, however, never altogether ceased, and in "modern armies mounted cuirassiers, armed as in earlier days with breast and back plates, have in some degree emulated the martial splendour of the body-

armour of the era; of medieval chivalry. Some years after Waterloo certain historical cuirasses were taken from their repose in the Tower of London, and adapted for service by the Life Guards and the Horse Guards. For parade purposes, the Prussian Gardes du Corps and other corps wear cuirasses of richly decorated leather.

CUIRASSIERS, a kind of heavy cavalry, originally developed out of the men-at-arms or gendarmerie forming the heavy cavalry of feudal armies. Their special characteristic was the wearing of full armour, which they retained long after other troops had abandoned it. Hence they became distinguished as cuirassiers. The first Austrian corps of kyrissers was formed in 1484 by the emperor Maximilian and was 100 strong. In 1705 Austria possessed twenty regiments of cuirassiers. After the war of 1866, however, the existing regiments were converted into dragoons. Russia has likewise in modern times abolished all but a few guard regiments of cuirassiers. The Prussian cuirassiers were first so called under Frederick William I., and in the wars of his successor Frederick the Great they bore a conspicuous part. After the Seven Years' War they ceased to wear the cuirass on service, but after 1814 these were reintro- duced, the spoils taken from the French cuirassiers being used to equip the troops. The cuirass is now worn only on ceremonial parades. In France the cuirassiers date from 1666, when a regiment, subsequently numbered 8th of the line, was formed. During the first Empire many regiments were created, until in 181 2 there were fourteen. The number was reduced after the fall of Napoleon, but in modern times it has been again

increased. The French regiments alone in Europe wear the cuirass on all parades and at manoeuvres.

CUJAS (or Cujacitjs), JACQUES (or as he called himself, Jacques de Cujas) (1520–1590), French jurisconsult, was born at Toulouse, where his father, whose name was Cujaus, was a fuller. Having taught himself Latin and Greek, he studied law under Arnoul Ferrier, then professor at Toulouse, and rapidly gained a great reputation as a lecturer on Justinian. In 1554 he was appointed professor of law at Cahors, and about a year after L'Hopital called him to Bourges. Duaren, however, who also held a professorship at Bourges, stirred up the students against the- new professor, and such was the disorder produced in consequence that Cujas was glad to yield to the storm, and accept an invitation he had received to the university of Valence. Recalled to Bourges at the death of Duaren in 1 559, he remained there till 1567, when he returned to Valence. There he gained a European reputation, and collected students from all parts of the continent, among whom were Joseph Scaliger and de Thou. In 1573 Charles IX. appointed Cujas counsellor to the parlement of Grenoble, and in the following year a pension was bestowed on him by Henry III. Margaret of Savoy induced him to remove to Turin; but after a few months (1575) he once more took his old place at Bourges. But the religious wars drove him thence. He was called by the king to Paris, and permission was granted him by the parlement to lecture on civil law in the university of the capital. A year after, however, he finally took up his residence at Bourges, where he remained till his death in 1590, in spite of a handsome offer made him by Gregory XIII. in 1 584 to attract him to Bologna.

The life of Cujas was altogether that of a scholar and teacher. In the religious wars which filled all the thoughts of his contem- poraries he steadily refused to take any part. Nihil hoc ad edictttm praetoris, " this has nothing to do with the edict of the praetor," was his usual answer to those who spoke to him on the subject. His surpassing merit as a jurisconsult consisted in the fact that he turned

from the ignorant commentators on Roman law to the Roman law itself. He consulted a very large number of manuscripts, of which he had collected more than 500 in his own library; but, unfortunately, he left orders in his will that his library should be divided among a number of purchasers, and his collection was thus scattered, and in great part lost. His emendations, of which a large number were published under the title of Animadversiones et observationes, were not confined to law- books, but extended to many of the Latin and Greek classical

authors. In jurisprudence his study was far from being devoted solely to Justinian; he recovered and gave to the world a part of the Theodosian Code, with explanations; and he procured the manuscript of the Basilica, a Greek abridgment of Justinian, afterwards published by Fabrot (see Basilica). He also com- posed a commentary on the Consueludines Feudorum, and oil some books of the Decretals. In the Paratitla, or summaries which he made of the Digest, and particularly of the Code of Justinian, he condensed into short axioms the elementary principles of law, and gave definitions remarkable for their admirable clearness and precision. His lessons, which he never dictated, were continuous discourses, for which he made no other preparation than that of profound meditation on the subjects to be discussed. He was impatient of interruption, and upon the least noise he would instantly quit the chair and retire. He was strongly attached to his pupils, and Scaliger affirms that he lost more than 4000 livres by lending money to such of them as were in want.

In his lifetime Cujas published an edition of his works (Neville, 1577)- It is beautiful and exact, but incomplete; it is now very scarce. The edition of Colombet (1634) is also incomplete. Fabrot, however, collected the whole in the edition which he published at Paris (1658), in 10 vols, foiio, and

which was reprinted at Naples (1722, 1727), in 11 vols, folio, and at Naples and at Venice (1758), in 10 vols, folio, with an index forming an eleventh volume. In the editions of Naples and Venice there are some additions not to be found in that of Fabrot, particularly a general table, which will be found very useful., and interpretations of all the Greek words used by Cuj»s.

See Papire-Masson, Vie de Cujas (Paris, 1590); Terrasson, His- toire de la jurisprudence romaine, and Melanges d'histoire, de litte- rature, et de jurisprudence; Bernardi, Aloge de Cujas (Lyons, 1775); Hugo, Civilistisches Magazin; Berriat Saint Prix, Memoires dt Cujas, appended to his Histoire du droit romain; Biographie univcrselle; Gravina, De ortu et progressu juris civilis; Spangen- berg, Cujacius und seine Zeitgenossen (Leipzig, 1882).

CULDEES, an ancient monastic order with settlements in Ireland and Scotland. It was long fondly imagined by Pro- testant and especially by Presbyterian writers that they had preserved primitive Christianity free from Roman corruptions in one remote corner of western Europe, a view enshrined in Thomas Campbell's Reidlura:

" Peace to their shades. The pure Culdees

Were Albyn's earliest priests of God,

Ere yet an island of her seas

By foot of Saxon monk was trod."

Another view, promulgated like the above by Hector Boece in his Latin history of Scotland (1516), makes them the direct successors in the 9th to the 12 th century of the organized Irish and lona monasticism of the 6th to the 8th century. Both these views were disproved by William Reeves (1815-1892), bishop of Down, Connor and Dromore.

As found in the Irish MSS. the name is Cile D6, i.e. God's comrade or sworn ally. It was latinized as Coli dei, whence Boece's culdei. The term seems,

like the Latin vir dei, to have been applied generally to monks and hermits. There are very few trustworthy ancient sources of information, but it seems probable that the Rule of Chrodegang, 1 archbishop of Metz (d. 766), was brought by Irish monks to their native land from the monasteries of north-eastern Gaul, and that Irish anchorites originally unfettered by the rules of the cloister bound themselves by it. In the course of the 9th century we find mention of nine places in Ireland (including Armagh, Clon- macnoise, Clones, Devenish and Sligo) where communities of these Culdees were established as a kind of annexe to the regular monastic institutions. They seem especially to have had the care of the poor and the sick, and were interested in the musical part of worship. Meanwhile in Scotland the lona monks had been expelled by the Pictish king Nechtan in 717, and the vacancies thus caused were by no means filled by the Roman monks who thronged into the north from Northumbria. Into

1 Devised originally for the clergy of Chrodegang's cathedral, it was largely an adaptation of St Benedict's rule to secular clergy living in common. In 816 it was confirmed, with.certain modifications, by the synod of Aix-la-Chapelle, and became the law for collegiate and cathedral churches in the Frankish empire. See Canon.

the gap, towards the end of the 8th century, came the Culdees from Ireland. The features of their life in Scotland, which : is the most important epoch in the history of the order, seem to resemble closely those of the secular canons of England and the continent. From the outset they were more or less isolated, and, having no fixed forms or common head, tended to decay. In the 12th century the Celtic Church was completely meta- morphosed on the Roman pattern, and in the process the Culdees also lost any distinctiveness they may formerly have had, being brought, like the secular clergy, under canonical rule. ; The pictures that we have of Culdee life in the 12th century vary considerably. The chief houses in Scotland were at St Andrews, Dunkeld, Lochleven, Monymusk in Aberdeenshire,

Abernethy and Brechin. Each was an independent establishment con- trolled entirely by its own abbot and apparently divided into two sections, one priestly and the other lay and even married. At St Andrews about the year 1 100 there were thirteen Culdees holding office by hereditary tenure and paying more regard' to their own prosperity and aggrandizement than to the services of the church or the needs of the populace. A much-needed measure of reform, inaugurated by Queen Margaret, was carried through by her sons. Alexander I. and David I.; gradually the whole position passed into: the hands of Turgot and his successors in the bishopric. Canons Regular were instituted and some of the Culdees joined the new order. Those who declined were allowed a life-rent of their revenues and lingered on as a separate but ever-dwindling body till the beginning of the 14th century, when, excluded from voting at the election of the bishop, they disappear from history. At Dunkeld, Crinan, the grandfather of Malcolm Canmore, was a lay abbot, and tradition says that even the clerical members were married, though like the priests of the Eastern Church, they lived apart from their wives during their term of sacerdotal service. The Culdees of Lochleyen lived on St Serf's Inch, which had been given them by a Pictish prince, Brude, about 850. In 1093 they surrendered their island to the bishop of St Andrews in return for perpetual food and clothing, but Robert, who was bishop in 1144, handed over all their vestments, books, 2 and other property, with the island, to the newly founded Canons Regular, in which probably the Culdees were incorporated. There is no trace of such partial independence as was experienced at St Andrews itself, possibly because the bishop's grant was backed up by a royal charter. In the same fashion the Culdees of Monymusk, originally perhaps a colony from St Andrews, became Canons Regular of the Augustinian order early in the 13th century, and those of Abernethy in 1273. At Brechin, famous like Abernethy for its round tower, the Culdee prior and his monks helped to form the chapter of the diocese founded by David I. in 1145, though the name

persisted for a generation or two. Similar absorptions no doubt account for the disappearance of the Culdees of York, a name borne by the canons of St Peter's about 925, and of Snowdon and Bardsey Island in north Wales mentioned by Giraldus Cambrensis (c. 11 90) in his Speculum Ecclesiae and Itinerarium respectively. The former community was, he says, sorely oppressed by the covetous Cistercians. These seem to be the only cases where the Culdees are found in England and Wales. In Ireland the Culdees of Armagh endured until the dissolution in 1541, and enjoyed a fleeting resurrection in 1627, soon after which their ancient property passed to the vicars choral of the cathedral.

See W. Reeves, The Culdees of the British Islands (Dublin, 1864) ; W. F. Skene, Celtic Scotland (1876–1880), especially vol. ii.; W. Beveridge, Makers of the Scottish Church (1908). The older view will be found in J. Jamieson's Historical Account of the Ancient Culdees (1811). . • .

CULEBRA, the smaller of two islands lying in the Virgin Passage immediately E. of Porto Rico and known as the Islas de Passaje. It is about 18 m. distant from Cape San Juan and rises from the same submerged plateau with the larger islands of the Antilles. Its extreme dimensions are 3 by 6 m., and its surface is low and comparatively uniform, which gives the

2 The list of these in the deed of transfer is the oldest Scottish library catalogue. : . : . • ■ '

prevailing winds an unbroken sweep across it. For this reason the rainfall is limited to a short season, and the population is compelled to store rainwater in cisterns for drinking purposes. Its soil is fertile, and cattle, poultry, vegetables and small fruits are produced. The island has been a

dependency of Porto Rico since 1879, when its colonization was formally under- taken, and it is now described as a ward of the Vieques district of the department of Humacao. In 1902 the American naval authorities selected the Playa Sardinas harbour on the S. side of Culebra as a rendezvous of the fleet and marine encampments were located on shore. The strategic position of the island, its healthiness and its continued use as a naval station have given it considerable importance. Its population was 704 in 1899, which had increased to nearly 1200 in 1903.

CULLEN, PAUL (1803–1878), cardinal and archbishop of Dublin, was born near Ballytore, Co. Kildare; and educated first at the Quaker school at Carlow and afterwards at Rome, where he joined the Urban College of the Propaganda and, after passing a brilliant course, was ordained in 1829. He then became vice-rector, and afterwards rector, of the Irish National College in Rome; and during the Mazzini revolution of 1848 he was rector of the Urban College, saving the property under the protection of the American flag. In 1849, on the strong recom- mendation of Archbishop John MacHale of Tuam, Cullen was nominated as successor to the primatial see of Armagh; and, on his return to Ireland, presided as papal delegate at the national council of Thurles in the August of 1850. Taking a strong line on the educational question which was then agitating Ireland, he took a leading part in the national movement of 1850–1852, and at first supported the Tenant Rights League. In May 1852 he was translated to Dublin, and soon a divergence of opinion broke out between him and the more ardent National- ists under Archbishop MacHale. When the Irish university was started, with Newman, appointed by Cullen, at its head, the scheme was wrecked by the personal opposition to the archbishop of Dublin. As time went on, his distrust of the national movement grew deeper; and in 1853 he sternly forbade his clergy to take part publicly in politics, and for this he was denounced by the Tablet newspaper. His own political opinion had best be told in his

own words. ” Fqr thirty years I have studied the revolution on the continent, and for nearly thirty years I have watched the Nationalist movement in Ireland. It is tainted at its sources with the revolutionary spirit. If any attempt is made to abridge the rights and liberties of the Catholic Church in Ireland, it will not be by the English government nor by a ‘ No Popery ‘ cry in England, but by the revolutionary and irreligious Nationalists of Ireland ” (Purcell’s Life of Manning, ii. 610). Cullen, therefore, while an ardent patriot, was con- sistently an opponent of Fenianism. He was made cardinal in 1866, being the first Irish cardinal. Energetic as an adminis- trator, churches and schools rose throughout his diocese; and the excellent Mater Misericordiae Hospital and the seminary at Clonlife are lasting memorials of his zeal. He took part in the Vatican Council as an ardent infallibilist. In 1873 he was defendant in a libel action brought against him by the Rev. R. O’Keeffe, parish priest of Callan, on account of two sentences of ecclesiastical censure pronounced by the cardinal as papal delegate. The damages were laid at £10,000. Three of the four judges allowed the defence of the cardinal to be valid; but it was held that the papal rescript upon which he relied for his extraordinary powers as delegate was illegal under statute; and the lord chief justice decided that the plaintiff could not renounce his natural and civil liberty. After several days’ trial, during which Cullen was submitted to a very close examination, the ver- dict was given for the plaintiff with jd. damages. The cardinal died in Dublin on the 24th of October 1878. (E. Tn.)

CULLEN, WILLIAM (1710-1790), Scottish physician and medical teacher, was born at Hamilton, Lanarkshire, on the 15th of April 1710. He received his early education at the grammar-school of Hamilton, and he appears to have sub- sequently attended some classes at the university of Glasgow. He began his medical career as apprentice to John Paisley, a

Glasgow surgeon, and after completing his

apprenticeship he became surgeon to a merchant vessel trading between London and the West Indies. On his return to Scotland in 1732 he settled as a practitioner in the parish of Shotts, Lanarkshire, and in 1 734–1 736 studied medicine at Edinburgh, where he was one of the founders of the Royal Medical Society. In 1736 he began to practise in Hamilton, where he rapidly acquired a high reputation. From 1737 to 1740 William Hunter was his resident pupil, and at one time they proposed to enter into partnership. In 1740 Cullen took the degree of M.D. at Glasgow, whither he removed in 1 744. During his residence at Hamilton, besides the arduous duties of medical practice, he found time to devote to the study of the natural sciences, and especially of chemistry. On coming to Glasgow he appears to have begun to lecture in connexion with the university, the medical school of which was as yet imperfectly organized. Besides the subjects of theory and practice of medicine, he lectured systematically on botany, materia medica and chemistry. His great abilities, enthusiasm and power of conveying instruction made him a successful and highly popular teacher, and his classes increased largely in numbers. At the same time he diligently pursued the practice of his profession. Chemistry was the subject which at this time seems to have engaged the greatest share of his attention. He was himself a diligent investigator and experimenter, and he did much to encourage original research among his pupils, one of whom was Dr Joseph Black. In 1751 he was appointed professor of mediqpe, but continued to lecture on chemistry, and in 1756 he was elected joint professor of chemistry at Edinburgh along with Andrew Plummer, on whose death in the following year the sole appoint- ment was conferred on Cullen. This chair he held for ten years — his classes always increasing in numbers. He also practised his profession as a physician with eminent success. From 1757 he delivered lectures on clinical medicine in the Royal Infirmary. This was a work for which his experience, habits of observation, and scientific training peculiarly fitted him, and in which his popularity as a teacher, no less than his power as a

practical physician, became more than ever conspicuous. On the death of Charles Alston in 1760, Cullen at the request of the students undertook to finish his course of lectures on materia medica; he delivered an entirely new course, which were published in an unauthorized edition in 1771, but which he re- wrote and issued as A Treatise on Materia Medica in 1789.

On the death of Robert Whytt (1714-1766), the professor of the institutes of medicine, Cullen accepted the chair, at the same time resigning that of chemistry. In the same year he had been an unsuccessful candidate for the professorship of the practice of physic, but subsequently an arrangement was made between him and John Gregory, who had gained the appointment, by which they agreed to deliver alternate courses on the theory and practice of physic. This arrangement proved eminently satis- factory, but it was brought to a close by the sudden death of Gregory in 1773. Cullen was then appointed sole professor of the practice of physic, and he continued in this office till a few months before his death, which took place on the 5th of February

1790.

As a lecturer Cullen appears to have stood unrivalled in his day. His clearness of statement and power of imparting interest to the most abstruse topics were the conspicuous features of his teaching, and in his various capacities as a scientific lecturer, a physiologist, and a practical physician, he was ever surrounded with large and increasing classes of intelligent pupils, to whom his eminently suggestive mode of instruction was specially attractive. Living at the time he did, when the doctrines of the humoral pathologists were carried to an extreme extent, and witnessing the ravages which disease made on the solid structures of the body, it was not surprising that he should oppose a doctrine which appeared to him to lead to a false practice and to fatal results, and adopt one which attributed more to the agency of the solids and very little to that of the fluids of the body.

His chief works were First Lines of the Practice of Physic (1774); Institutions of Medicine (i77o”k and Synopsis

Nosologicae Medicae (1785), which contained his classification of diseasesinto four great classes — (1) Pyrexiae, or febrile diseases, as typhus fever; (2) Neuroses, or nervous diseases, as epilepsy; (3) Cachexiae, or diseases resulting from bad habit of body, as scurvy; and (4) Locales, or local diseases, as cancer.

Cullen's eldest son Robert became a Scottish judge in 1796 under the title of Lord Cullen, and was known for his powers of mimicry.

The first volume of an account of Cullen's Life, Lectures and Writings was published by Dr John Thomson in 1832, and was re- issued with the second volume (completing the work) by Drs W. Thomson and D. Craigie in 1859.

CULLEN, a royal, municipal and police burgh of Banffshire, Scotland. Pop. (1901) 1936. It is situated on Cullen Bay, 115 m. W. by N. of Banff and 665 m. N.W. of Aberdeen by the Great North of Scotland railway. Deskford Burn, after a course of '7 J m., enters the sea at Cullen, which it divides into two parts, Seatown, the older, and Newtown, dating only from 1822. St Mary's, the parish church, a cruciform structure, was founded by Robert Bruce, whose second wife died at Cullen. The in- dustries include rope and sail making, boat-building, brewing and fishing. The harbour, constructed between 181 7 and 1834, though artificial, is one of the best on this coast. About 1 m. to the S. is Cullen House, a seat of the earl of Seafield, which con- tains some fine works of art. A mile and a half to the W. is the picturesque fishing village of Port Knockie with a deep-sea harbour, built in 1891. On the cliffs, 2 m. to the E., stand the ruins of Findlater Castle, fortified in 1455. From 1638 to 181 1, when the title expired, it gave the title of earl to the Ogilvies, whose name was adopted in addition to his own by Sir Lewis Alexander Grant, when he succeeded, as 5th earl of Seafield, to the surviving dignities. Five miles to the E. of Cullen is the thriving fishing town of Portsoy, with a small, safe harbour

and a station on the Great North of Scotland railway. Besides the fisheries there is fish-curing and a distillery; and the quarrying of a pink-coloured variety of granite and of Portsoy marble is carried on. Good limestone is also found in the district. Pop.

(1901) 2061.

CULLERA, a seaport of eastern Spain, in the province of Valencia; on the Mediterranean Sea, at the mouth of the river Jucar, and at the southern terminus of the Valencia-Silla-Cullera railway. Pop. (1900) 11,947. Cullera is a walled town, contain- ing a ruined Moorish citadel, large barracks, several churches and convents and a hospital. It occupies the Jucar valley, south of the Sierra de Zorras, a low range of hills which terminates eastward in Cape Cullera, a conspicuous headland surmounted by a lighthouse. To the south and west extends a rich agricul- tural district, noted for its rice. Besides farming and fishing, the inhabitants carry on a coasting trade with various Mediter- ranean ports. In 1903 the harbour was entered by 66 vessels of about 25,060 tons, engaged in the exportation of grain, rice and fruit, and the importation of guano. The town of Sueca (q.v.) is 4 m. W.N.W. by rail.

CULLINAN, a town of the Transvaal, 36 m. by rail E. by N. of Pretoria. It grew up round the Premier diamond mine and dates from 1903, being named after T. Cullinan, the purchaser of the ground on which the mine is situated. Here was discovered in January 1905 a diamond — the largest on record — weighing 3025! carats. This diamond was in 1907 presented by the Transvaal government to Edward VII. and was subsequently cut into two stones, one of 5165 carats, the other of 309 carats, intended to ornament the sceptre and crown of England. The " chippings " yielded several smaller diamonds (see Diamond).

CULLODEN, a desolate tract of moorland, Inverness-shire, Scotland. It forms part of the north-east of Drummossie Muir, and is situated about 6 m. by road

E. of Inverness, and 5 m. from Culloden Muir station on the Highland railway from Aviemore to Inverness via Daviot. It is celebrated as the scene of the battle of the 16th of April 1746 (see Cumberland, William Augustus, Duke of, and Murray, Lord George), by which the fate of the house of Stuart was decided. By Highlanders the battle is more generally described as the battle of Drummossie.

Memorial stones bearing the names of the clans engaged in the conflict were erected in 1881 at the head of each trench where the clansmen — about 1000 in number — were buried. A monumental cairn, 20 ft. high, marks the chief scene of the fight, and the Cumberland Stone, a huge boulder, indicates the spot where the English commander took up his position. A mile to the north is Culloden House, which belonged to Duncan Forbes, the president of the Court of Session. The Culloden Papers, a number of historical documents ranging from 1625 to 1748, were discovered in this mansion in 1812 and published in 1815 by Duncan George Forbes. On the death of the 10th laird, the collection of Jacobite relics and works of art was sold by auction in 1897. About 1 m. to the south of the field, on the right bank of the Nairn, is the plain of Clava, containing several stone circles, monoliths, cairns and other prehistoric remains. » The circles, some apparently never completed, vary in circum- ference from 12 yds. to 140 yds.

CULM, in geology, the name applied to a peculiar local phase of the Carboniferous system. In 1837 A. Sedgwick and R. I. Murchison classified into two divisions the dark shales, grits and impure limestones which occupy a large area in Devonshire and extend into the neighbouring counties of Somerset and Corn- wall. These two divisions were the Upper and Lower Culm Measures, so named from certain impure coals, locally called "culm," 1 contained within the shales near Bideford. Sub- sequently, these two geologists, when prosecuting their researches in Germany and Austria, applied the same name to similar rocks which contained, amongst others, Posidonomya Becheri, common to the phase of

sedimentation in both areas.

The Culm measures of the Devonshire district are folded into a broad syncline with its axis running east and west; but within this major fold the rocks have been subjected to much compression accompanied by minor folding. This circumstance, together with the apparent barrenness of the strata, has always made a correct interpretation of their position and relationships a matter of difficulty; and for long they were regarded as an abnormal expression of the Lower Carboniferous, with the upper- most beds as doubtful equivalents of the Millstone Grit of other parts of Britain. The labours of W. A. E. Ussher and of G. J. Hinde and H. Fox have resulted in the differentiation of the following subdivisions in the Devonshire Culm:' — (1) Upper Culm Measures or Eggesford grits; (2) Middle Culm Measures, comprising the Morchard, Tiverton and Ugbrooke lithological types overlying the Exeter type; (3) Lower Culm, the Posido- nomya limestone and shale overlying the Coddon Hill beds with radiolaria. Ussher's subdivisions were introduced to satisfy the exigencies of geological mapping, but, as he pointed out, while they are necessary in some parts of the district and con- venient in others, the lithological characters upon which they are founded are variable and inconstant. More recently E. A. N. Arber (1 904–1 907) clearly demonstrated that no palaeontological subdivision of the Upper Culm (Middle and Upper) is possible, and that these strata, on the evidence of the fossil plants, represent the Middle Coal Measures of other parts of the country. Wheelton Hind has called attention to the probability that the Pasidonomya limestone and shale may represent the Pendleside group of Lancashire, Derbyshire, &c. The Coddon Hill beds may belong to this or to a lower horizon. Thus the English Culm measures comprise an Upper Carboniferous and a Lower Carboni- ferous group, while in Germany, Austria and elsewhere, as it is important to bear in mind, the Culm, or " Kulm," stage is shown by its contained fossils to belong to the lower division alone.

The typical Carboniferous limestone of the Franco-Belgian area changes as it is traced towards the east and south into the sandy, shaly Culm phase, with the characteristic " Posidonia " (Posidonomya) schists. This aspect of the Culm is found in Saxony, where there are workable coals, in Bohemia, Thuringia, the Fichtelgebirge, the Harz, where the beds are traversed by mineral veins, and in Moravia and Silesia. In the last-mentioned region the thickness of the Culm formation has been estimated

1 This word is possibly connected with col, coal ; distinguish " culm," the stem of a plant, Lat. culmus.

by D. Stur at over 45,000 ft. In the east and south of the Schiefergebirge (a general term for the slaty mountains of the Hundsriick and Taunus range, the Westerwald and part of the Eifel district), the Culm shales pass upwards into a coarser deposit, the " Culm-grauwacke," which attains a considerable thickness and superficial extent. Culm fossils appear in the Carnic Alps, in the Balkans and parts of Spain, also in Spitz- bergen and part of New Guinea.

The most characteristic fossil is of course Posidonomya Becheri; others are Glyphioceras sphaericum, Rhodea patentissima, Asterocalamites scrobiculatus (Schloth), Lepidodendronveltheimia-num., Gastrioceras carbonarium.

*See E. A. N. Arber, " On the Upper Carboniferous Rocks of West Devon and North Cornwall," Q.J.G.S. lxiii. (1Q07), which con- tains a bibliography of the English Culm; E. Hofzapfel, Palaont. *4bhandl. Bd. v. Heft i. (1889); H. PotoniS, Abhandl. preuss. geol. Landesanst., Neue Folge, 36 (1901); D. Stur, " Die Culm Flora," Abhandl. k.k. geol. Reichsanst. viii. (Vienna, 1875). (J. A. H.)*

CULMINATION (from Lat. oilmen, summit), the attainment of the highest point. In astronomy the term is given to the passage of a heavenly body over the meridian of a place. Two culminations take place in the course of the day, one above and the other below the pole. The. first is called the upper, the second the lower. Either or both may occur below the horizon and therefore be invisible.

CULPRIT, properly the prisoner at the bar, one accused of a crime; so used, generally, of one guilty of an offence. In origin the word is a combination of two Anglo-French legal words, culpable, guilty, and prit or prist, i.e. prest, Old French for pret, ready. On the prisoner at the bar pleading " not guilty," the clerk of the crown answered " culpable," and stated that he was ready {prest) to join issue. The words cul. prist (or prit) were then entered on the roll as showing that issue had been joined. When French law terms were discontinued the words were taken as forming one word addressed to the prisoner. The formula " Culprit, how will you be tried ?" in answer to a plea of "not guilty," is first found in the trial for murder of the 7th earl of Pembroke in 1678.

CULROSS (locally pronounced Coo-rus), a royal and police burgh, Fifeshire, Scotland, 6£ m. W. by S. of Dunfermline and 2§ m. from East Grange station on the North British railway company's line from Dunfermline to Stirling. Pop, 348. Until 1890 it belonged to the detached portion of Perthshire. Attrac- tively situated on a hillside sloping gently to the Forth, its placid old-world aspect is in keeping with its great antiquity. Here St Serf Carried on his missionary labours, and founded a church and cemetery, and here he died and was buried. For centuries the townsfolk used to celebrate his day (July 1st) by walking in procession bearing green boughs. Kentigern, the apostle to Cumbria and first bishop of Glasgow, was born at Culross, his mother having been driven ashore during a tempest, and was adopted by St Serf as his son. These religious associa- tions, coupled with the fertility of the soil, led to the founding

of a Cistercian abbey in 1 2 1 7 . Of this structure the only remains are the western tower and the choir, which, greatly altered as well as repaired early in the 19th century, now forms the parish church. It is supposed that a chapel of which some traces exist in the east end of the town was dedicated to Kentigern. James VI. made Culross a royal burgh in 1588. In 1808 there was discovered in the abbey church, embalmed in a silver casket, still preserved there, bearing his name and arms, the heart of Edward, Lord Bruce of Kinloss, who was killed in August 1613 near Bergen-op-Zoom in a duel with Sir Edward Sackville, afterwards earl of Dorset. Robert Pont (1524-1606), the Re- former, was born at Shirresmiln, or Shiresmill, a hamlet in Culross parish. Nearly all its old industries — the coal mines, salt works, linen manufacture, and even the making of iron girdles for the baking of scones — have dwindled, but its pleasant climate and picturesqueness make it a holiday resort. Dunimarle Castle, a handsome structure on the sea-shore, adjoins the site of the Castle where, according to tradition, Macbeth slew the wife and children of Macduff. Culross belongs to the Stirling district group of parliamentary burghs.

Ransome's Spring Tine Cultivator.

CULTIVATOR, 1 also called Scuffler, Scarifier or Grubber, an agricultural implement employed in breaking up land or in stirring it after ploughing. The first all-iron cultivator, known as Finlayson's grubber, was a large harrow with curved teeth carried on wheels, and was brought out about 1820. It was designed to meet the need for some implement of intermediate character between the plough and harrow, which should stir the soil deeply and expeditiously without reversing it, and bring the weeds unbroken to the surface. The chief modern im- provement has been the imparting of vibratory movement and hence greater stirring capacity to | the tines, either by making them of spring steel or by fitting springs to the point of attachment of the tine to the framework of the machine. In its modern form the implement consists of a framework fitted

with rows of curved stems or tines, which may be raised clear of the ground or lowered into work by means of a lever, and differs from the harrow in that it is provided with two wheels, which prevent the tines from embedding themselves too deeply in the soil. The stems may be fitted either with chisel-points or with broad shares, according as it is required to merely stir the soil or to bring up weeds and clean the surface. In the disk cultivator revolving disks take the place of tines. The implement is usually provided with a seat for the driver and is drawn by horses, but steam power is also commonly applied to it, the speed of the operation in that case increasing its effectiveness. The method is the same as that of steam-ploughing (see Plough).

CUMAE (Gr. Ku/i??), an ancient city of Campania, Italy, about 1 2 m. W. of Neapolis, on the W. coast of Campania, on a volcanic eminence, overlooking the plain traversed by the Volturno.

There are many legends as to its foundation, but even the actual period of its colonization by the Greeks is so early (ancient authorities give it as 1050 B.C.) that there is some doubt as to who established it, whether Chalcidians from Euboea or Aeolians from Ku/i7j(Cyme), and it should probably be regarded as a joint settlement. It was certainly, as Strabo says, the oldest of the Greek colonies on the mainland of Italy or in Sicily. Livy tells us (viii. 22) that the settlers first landed on Pithecusae (Ischia) and thence transferred their position to the mainland, which seems a probable story. We find it in 721 B.C. founding Zancle (Messina) in Sicily jointly with Chalcis, and it extended its power gradually over the coast of the Gulf of Puteoli and the harbours of the promontory of Misenum. Puteoli itself under the name Dicaearchia was probably founded by Cumae. In the 7th century, according to the legends, Parthenope, whither the demos of Cumae had taken refuge after an unsuccessful rising against the aristocracy, was attacked by the latter and destroyed, but soon rebuilt under the name of Neapolis (New City, the

present Naples). 2 The most fertile portion of the Campanian plain was also under its dominion; the name ” fossa Graeca ” still lingered onin 205 B.C. to testify to its ancient limits. Cumae was now at the height of its power, and many fine coins testify to its prosperity. In 524 B.C. it was the object of a joint attack by the Etruscans of Capua, the Daunians of the district of Nola, and the Aurunci of the Mons Massicus. A brilliant victory was, however, won in the hilly district outside the town, largely owing

1 From Late Lat. cultivate, through cultivus, from colere, to till, cultivate ; whence cultus, worship, form of religion, cult.

2 Mommsen, however (Corpus Inscrip. Latin, x., Berlin, 1883, p. 170), rightly throws considerable doubt on the existence of Parthenope and even of Palaeopolis, of which there is some men- tion in Roman annals; under both he is inclined to trace Cumae itself.

to the bravery of Aristodemus, who then led a force to the relief of Aricia, which was being attacked by the Etruscans, and, returning at the head of his victorious army, overturned the aristocracy and made himself tyrant, but was ultimately murdered by the aristocrats. These were unable to repel a renewed Etruscan attack without the help of Hiero of Syracuse, who in the battle of Cumae of 474 B.C. drove the Etruscan fleet from the sea, and broke their power in Campania.

The Samnites finally destroyed the Etruscan supremacy by the capture of Capua in the latter half of the 5th century (see Capua; Campania), and the Greeks of Cumae were overwhelmed by the same invasion, either in 420 B.C. (Livy iv. 44) or in 421 (Diodor. Sic. xii. 76) , if his statement is drawn from Greek sources, 428 if it is to be dated by the Roman consuls to whose year he ascribes it. This catastrophe brought to an end the beautiful series

of Greek coins from the town (B. V. Head, Historia Numorum, p. 31), and Oscan became its language, though in many respects the Greek character of the town survived (Strabo v. .4. 3, and the other references given by R. S. Conway, Italic Dialects, p. 84). One or two inscriptions in Oscan survive {id. ib. 88-92), one of which is a Iovila or heraldic dedication. The date of the general disuse of Oscan in the town appears to be fixed about 180 B.C. by the request (Livy xl. 44) which the Cumaeans addressed to Rome that they might be allowed to use Latin for public purposes. Cumae now ceased to have any independent history. It came under the supremacy of Rome in 343 (or 340) as Capua did, obtained the civitas sine suffragio and was governed after 318 by the praefecli Capuam Cupias.

(R. S. C.)

In the Hannibalic wars it remained faithful to Rome. It probably acquired civic rights in the Social War and remained a municipium until Augustus established a colony here. Under the empire it is spoken of as a quiet country town, in contrast to the gay and fashionable Baiae, which, however, with the lacus Avernus and lacus Lucrinus, formed a part of its territory. Cicero's villa on the east bank of the latter, for example, which he called the Academia, was also known as Cumanum. In the Gothic wars the acropolis of Cumae was, except Naples, the only fortified town in Campania, and it retained its military import- ance until it was destroyed by the Neapolitans in 1205, since which time it has been deserted.

The acropolis hill (260 ft. above sea-level), a mass of trachyte which has broken through the surrounding tufa, lies hardly 100 yds. from the low sandy shore. It is traversed by caves, which are at three different levels with many branches. Some of them may belong to a remote date, while others may be quarries, but they have not been thoroughly investigated. They are famous in legend as the seat of the oracle of the Cumaean Sibyl.

The acropolis has only one approach, on the south-east; on all other sides it falls away steeply. Remains. of fortifications of all ages run round the edge of the hill; some of the original Greek work, in finely hewn rectangular tufa blocks, exists on the east. The medieval line follows the ancient, except on the

Within the acropolis stood the temple of Apollo, erected, according to tradition, by Daedalus himself, the remains of which, restored in Roman times, were discovered in 181 7, on the eastern and lower summit. On the higher western summit stood another temple, excavated in 1792, but now covered up again. This may be that of the Olympian Zeus (Liv. xxvii. 23).

There are also various remains of buildings of the imperial period, and these are far more frequent on the site of the lower town (now occupied by vineyards) which lies below the acropolis to the south. The line of the city walls can be traced both on the E. and on the W., though the remains on the E. are insignifi- cant, and on the W. (the seaward side) only the scarping of the hill remains. To the S. of the town, just outside the wall, is the amphitheatre. To the N. of it is the point where the roads from Liternum (the Via Domitiana running along the sandy coast), Capua (a branch of the Via Campana), Misenum and Puteoli meet. The last passes through the Arco Felice, an arch

of brick-faced concrete 63 ft. high which spans a cutting through the Monte Grillo, made by Domitian to shorten the course of the road, which had hitherto run farther north. The Grotto della Pace leads to the shores of Avernus. On the E. side of Cumae are considerable remains of the Roman period, among them those of the temple of Demeter, as restored by the family of the Lucceii.

The cemeteries of Cumae extended on all sides of the ancient city, except towards the sea, but the most important lay on the north, between this temple and the Lago di Licola. Excavations during the 19th

century in Greek, Samnite and Roman graves have produced many important objects, now in the various museums of Europe, but especially at Naples. Recent discoveries in this necropolis (including that of a circular archaic tomb with a conical roof) have led to considerable discussion as to the true date of the foundation of Cumae, and have made it clear that, in any case, a pre-Hellenic indigenous settlement existed here — a result of great importance. ,

See J. Beloch, Campanien (Breslau, 1890), 145 seq. ; G. Pellegrini, Monumenti del Lincei, xiii. (1903); G. Patroni, Atti del Congressa di Scienze Storiche (1904), vol. v. p. 215 seq. (T. As.)

CUMANA, a city and port of Venezuela, capital of the state of Bermudez, situated on the Manzanares river about 1 m. above its mouth, 52 ft. above sea-level and 180 m. E. of Caracas. It is the oldest existing European settlement on the South American continent, having been founded by Diego Castellon in 1523 under the name of Nueva Toledo. The city was almost totally destroyed by an earthquake in 1766, and again in 1797. Slight shocks are very frequent, some of them severe enough to cause considerable damage to the buildings. The mean annual temperature is 83° F. and the climate is enervating. In colonial times the city was rich and prosperous and enjoyed a lucrative trade with the mother country, its population at that time being estimated at 30,000, but much of its prosperity has disappeared and its population is. now estimated at 10,000. Excellent fruits are produced in its vicinity, and its exports include cacao, coffee, sugar, hides, tobacco and sundry products in small quantities. A tramway connects the city with its port at the mouth of the Manzanares.

CUMBERLAND, DUKES AND EARLS OF. The earldom of Cumberland was held by the family of Clifford (q.v.) from 1525 to 1.643, when it became extinct by the death of Henry, the 5th earl. The 1st earl of Cumberland was Henry, nth Lord Clifford (1493-1542), a son of Henry, 10th Lord Clifford (c. 1454-1323).

Created an earl by Henry VIII. in 1525, Henry remained loyal during the great rising in the north of England in 1536, and died on the 22nd of April 1542. His son and successor, Henry, the 2nd earl (c. 1 5 1 7–1 5 70) , married Eleanor (d. 1 547) , a daughter of Charles Brandon, duke of Suffolk, and Mary, daughter of King Henry VII. ; he had the tastes of a scholar rather than a soldier, and died early in 1 570. By his first wife, Eleanor, he left an only daughter Margaret (1540–1596), who married Henry Stanley, 4th earl of Derby, and who in 1557 was regarded by many as the rightful heiress to the English throne. By his second wife he left two sons and a daughter; his elder son George succeeding to the earldom in 1570, and his younger son Francis succeeding his brother in 1605. George, 3rd earl of Cumberland (1558–1605), was born on the 8th of August 1558, and married Margaret (c. 1560–1616), daughter of his guardian, Francis, 2nd earl of Bedford. Although interested in mathematics and geography he passed his early years in dissipation and extrava- gance; then he took to the sea, commanded the ” Bonaveriture ’” against the Spanish Armada, and from this time until his death on the 30th of October 1605 was mainly engaged in fitting out and leading plundering expeditions, some of which, especially the one undertaken in 1589, gained a large amount of booty. The earl left no sons, and his barony was claimed by his only daughter Anne (1590–1676), the wife successively of Richard Sackville, 3rd earl of Dorset, and of Philip Herbert, 4th earl of Pembroke and Montgomery; while his earldom was inherited by his brother Francis (1559–1641). A long law-suit between the new earl and the countess Anne over the possession of the

family estates was settled in 1617. The 5th earl was Francis’s only son Henry (1 591–1643), who was born on the 28th of February 1501, and was educated at Christ Church, Oxford. He was a supporter of Charles I. during his two short wars with the Scots, and

also during the Civil War until his death on the nth of December 1643. He left no sons; his earldom became extinct; his new barony of Clifford, created in 1628, passed to his daughter Elizabeth (1618–1691), wife of Richard Boyle, earl of Cork and Burlington; and the Cumberland estates to his cousin Anne, countess of Dorset and Pembroke.

In 1644 the English title of duke of Cumberland was created in favour of Rupert, son of Frederick V., elector palatine of the Rhine, and nephew of Charles I. Having lapsed on Rupert's death without legitimate issue in 1682, it was created again in 1689 to give an English title to George, prince of Denmark, who had married the lady who afterwards became Queen Anne. It again became extinct when George died in 1708, but was revived in 1726 in favour of William Augustus, third son of George II. As this duke was never married the title lapsed on his death in 1765, but was revived in the following year in favour of Henry Frederick (1745–1790), son of Frederick, prince of Wales, and brother of George III. Having again become extinct on Henry Frederick's death, the title of duke of Cumber- land was created for the fifth time in favour of Ernest Augustus, who was made duke of Cumberland and Teviotdale in 1799. In 1837 Ernest (q.v.) became king of Hanover, and on his death in 185 1 the title descended with the kingdom of Hanover to his son King George V. (q.v.), and on George's death in 1878 to his grandson Ernest Augustus (b. 1845). In 1866 Hanover was annexed by Prussia, but King George died without renouncing his rights. His son Ernest, while maintaining his claim to the kingdom of Hanover, is generally known by his title of duke of Cumberland.

CUMBERLAND, RICHARD (1632–1718), English philosopher and bishop of Peterborough, the son of a citizen of London, was born in the parish of St Ann, near Aldersgate. He was educated in St Paul's school, and at Magdalene College, Cambridge, where he obtained a fellowship. He took the degree of B.A. in 1653; and, having proceeded M.A. in 1656, was next year incorporated to the same degree in the university of Oxford. For some time he studied medicine; and

although he did not adhere to this profession, he retained his knowledge of anatomy and medicine. He took the degree of B.D. in 1663 and that of D.D. in 1680. Among his contemporaries and intimate friends were Dr Hezekiah Burton, Sir Samuel Morland, who was distinguished as a mathe- matician, Sir Orlando Bridgeman, who became keeper of the great seal, and Samuel Pepys. To this academical connexion he appears to have been in a great measure indebted for his advance- ment in the Church. When Bridgeman was appointed lord keeper, he nominated Cumberland and Burton as his chaplains, nor did he afterwards neglect the interest of either. Cumber- land's first preferment, bestowed upon him in 1658 by Sir John Norwich, was the rectory of Brampton in Northamptonshire. In 1 66 1 he was appointed one of the twelve preachers of the university. The lord keeper, who obtained his office in 1667, invited him to London, and soon afterwards bestowed upon him the rectory of Allhallows at Stamford, where he acquired new credit by the fidelity with which he discharged his duties. In addition to his ordinary work he undertook the weekly lecture. This labour he constantly performed, and in the meantime found leisure to prosecute his scientific and philological studies.

At the age of forty he published his earliest work, entitled De legibus naturae disquisitio philosophica, in qua earum forma, summa capita, ordo, promulgaiio, el obligatio e rerum natura investigantur ; quin etiam elementa philosophiae Hobbianae, cum moralis turn civilis, considerantur et refutantur (London, 1672). It is dedicated to Sir Orlando Bridgeman, and is prefaced by an " Alloquium ad Lectorem," contributed by Dr Burton. It appeared during the same year as Pufendorf's Dejure naturae et gentium, and was highly commended in a subsequent publica- tion by Pufendorf, whose approbation must have had the effect of making it known on the continent. Having thus established

a solid reputation, Cumberland next prepared a work on a very different subject — An Essay towards the Recovery of the Jewish Measures and Weights,

comprehending their Monies; by help of ancient standards, compared with ours of England: useful also to state many of those of the Greeks and Romans, and the Eastern Nations (London, 1686). This work, dedicated to Pepys, obtained a copious notice from Leclerc, and was translated into French.

About this period he was depressed by apprehensions respecting the growth of Popery; but his fears were dispelled by the Revolution, which brought along with it another material change in his circumstances. One day in 1691 he went, according to his custom on a post-day, to read the newspaper at a coffee-house in Stamford, and there, to his surprise, he read that the king had nominated him to the bishopric of Peterborough. The bishop elect was scarcely known at court, and he had resorted to none of the usual methods of advancing his temporal interest.

" Being then sixty years old," says his great-grandson, " he was with difficulty persuaded to accept the offer, when it came to him from authority. The persuasion of his friends, particularly Sir Orlando Bridgeman, at length overcame his repugnance; and to that see, though very moderately endowed, he for ever after devoted himself, and resisted every offer of translation, though repeatedly made and earnestly recommended. To such of his friends as pressed an exchange upon him he was accustomed to reply, that Peterborough was his first espoused, and should be his only one."

He discharged his new duties with energy and kept up his episcopal visitations till his eightieth year. His charges to the clergy are described as plain and unambitious, the earnest breathings of a pious mind. When Dr Wilkins (David Wilke) published the New Testament in Coptic he presented a copy to the bishop, who began to study the language at the age of eighty- three. " At this age," says his chaplain, " he mastered the language, and went through great part of this version, and would often give me excellent hints and remarks, as he proceeded in reading of it." He died in 1718, in the eighty-

seventh year of his age; he was found sitting in his library, in the attitude of one asleep, and with a book in his hand. 1 His great-grandson was Richard Cumberland, the dramatist.

Bishop Cumberland was distinguished by his gentleness and humility. He could not be roused to anger, and spent his days in unbroken serenity. The basis of his ethical theory is Benevol- ence, and is the natural outcome of his temperament. He was a man of a sound understanding, improved by extensive learning, and left behind him several monuments of his talents and industry. His favourite motto was that a man had better " wear out than rust out."

The philosophy of Cumberland is expounded in the treatise De legibus naturae. The merits of the work are almost confined to its speculative theories; its style is destitute of strength and grace, and its reasoning is diffuse and unmethodical. Its main design is to combat the principles which Hobbes had promulgated as to the constitution of man, the nature of morality, and the origin of society, and to prove that self-advantage is not the chief end of man, that force is not the source of personal obligation to moral conduct nor the foundation of social rights, and that the state of nature is not a state of war. The views of Hobbes seem

1 The care of his posthumous publications devolved upon his domestic chaplain and son-in-law, Squier Payne, who soon after the bishop's death edited " Sanchonialo' s Phoenician History, translated from the first book of Eusebius, De praeparatione evangelica : with a continuation of Sanchoniato's history of Eratosthenes Cyrenaeus's Canon, which Dicaearchus connects with the first Olympiad. These authors are illustrated with many historical and chronological remarks, proving them to contain a series of Phoenician and Egyptian chronology, from the first man to the first Olympiad, agreeable to the Scripture accounts " (London, 1720). The preface contains an account of the life, character and writings of the author, which was likewise published in a separate form, and exhibits a pleasing picture

of his happy old age. A German translation appeared under the title of Cumberlands phonizische Historie des Sanchoniathons, iibersetzt von J oh. Phil. Cassel (Magdeburg, 1755). The sequel to the work was likewise published by Payne — Origines gentium antiquissimae; or Attempts for discovering the Times of the First Planting of Nations: in several Tracts (London, 1724).

to Cumberland utterly subversive of religion, morality and civil society, and he endeavours, as a rule, to establish directly antagonistic propositions. He refrains, however, from denuncia- tion, and is a fair opponent up to the measure of his insight.

Laws of nature are defined by him as " immutably true pro- positions regulative of voluntary actions as to the choice of good and the avoidance of evil, and which carry with them an obliga- tion to outward acts of obedience, even apart from civil laws and from any considerations of compacts constituting government." This definition, he says, will be admitted by all parties. Some deny that such laws exist, but they will grant that this is what ought to be understood by them. There is thus common ground for the two opposing schools of moralists to join issue. The question between them is, Do such laws exist or do they not? In reasoning thus Cumberland obviously forgot what the position maintained by his principal antagonist really was. Hobbes must have refused to accept the definition proposed. He did not deny that there were laws of nature, laws antecedent to government, laws even in a sense eternal and immutable. The virtues as means to happiness seemed to him to be such laws. They precede civil constitution, which merely perfects the obliga- tion to practise them. He expressly denied, however, that " they carry with them an obligation to outward acts of obedience, even apart from civil laws and from any consideration of com-

pacts constituting governments." And many besides Hobbes must have felt dissatisfied with the definition. It is ambiguous and obscure. In what sense is a law of nature a " proposition "? Is it as the expression of a constant relation among facts, or is it as the expression of a divine commandment? A proposition is never in itself an ultimate fact although it may be the statement of such a fact. And in what sense is a law of nature an " immut- ably true " proposition? Is it so because men always and every- where accept and act on it, or merely because they always and everywhere ought to accept and act on it? The definition, in fact, explains nothing.

The existence of such laws may, according to Cumberland, be established in two ways. The inquirer may start either from effects or from causes. The former method had been taken by Grotius, Robert Sharrock (1630-1684) and John Selden. They had sought to prove that there were universal truths, entitled to be called laws of nature, from the concurrence of the testi- monies of many men, peoples and ages, and through generalizing the operations of certain active principles. Cumberland admits this method to be valid, but he prefers the other, that from causes to effects, as showing more convincingly that the laws of nature carry with them a divine obligation. It shows not only that these laws are universal, but that they were intended as such; that man has been constituted as he is in order that they might be. In the prosecution of this method he expressly declines to have recourse to what he calls " the short and easy expedient of the Platonists," the assumption of innate ideas of the laws of nature. He thinks it ill-advised to build the doctrines of natural religion and morality on a hypothesis which many philosophers, both Gentile and Christian, had rejected, and which could not be proved against Epicureans, the principal impugners of the existence of laws of nature. He cannot assume, he says, that such ideas existed from eternity in the divine mind, but must start from the data of sense and experience, and thence by search into the nature of things discover their laws. It is

only through nature that we can rise to nature's God. His attributes are not to be known by direct intuition. He, therefore, held that the ground taken up by the Cambridge Platonists could not be maintained against Hobbes. His sympathies, however, were all on their side, and he would do nothing to diminish their chances of success. He would not even oppose the doctrine of innate ideas, because it looked with a friendly eye upon piety and morality. He granted that it might, perhaps, be the case that ideas were both born with us and afterwards impressed upon us from without.

Cumberland's ethical theory (see Ethics) is summed up in his principle of universal Benevolence, the one source of moral good. " No action can be morally good which does not in its own nature

contribute somewhat to the happiness of men." The theory is important in comparison (1) with that of Hobbes, and (2) with modern utilitarianism.

1. Cumberland's Benevolence is, deliberately, the precise antithesis to the Egoism of Hobbes. To this fact it owes its existence and also its extravagance. Feeling that the most forcible method of attacking Hobbes was to assert the opposite in the same form, he maintained that the whole-hearted pursuit of the good of all contributes to the good of each and brings personal happiness; that the opposite process involves misery to individuals including the self. If, then, Hobbes went to the one extreme of postulating selfishness as the sole motive of human action, Cumberland was equally extravagant as regards Benevo- lence. The testimony of history shows, prima facie at least, that both motives have operated throughout, and just as self-interest has been increasingly modified by conscious benevolence, so benevolence alone does not explain all personal virtue nor love to God. But it is essential to notice that Cumberland never appealed to the evidence of history, although he believed that the law of universal benevolence had been accepted by all nations and generations; and he carefully abstains from arguments founded on

revelation, feeling that it was indispensable to estab- lish the principles of moral right on nature as a basis. His method was the deduction of the propriety of certain actions from the consideration of the character and position of rational agents in the universe. He argues that all that we see in nature is framed so as to avoid and reject what is dangerous to the in- tegrity of its constitution; that the human race would be an anomaly in the world had it not for end its conservation in its best estate; that benevolence of all to all is what in a rational view of the creation is alone accordant with its 'general plan; that various peculiarities of man's body indicate that he has been made to co-operate with his fellow men and to maintain society; and that certain faculties of his mind show the common good to be more essentially connected with his perfection than any pursuit of private advantage. The whole course of his reasoning proceeds on, and is pervaded by, the principle of final causes.

2. To the question, What is the foundation of rectitude?, he replies, the greatest good of the universe of rational beings. He may be regarded as the founder of English utilitarianism, but his utilitarianism is distinct from what is known as the selfish system; it goes to the contrary extreme, by almost absorbing individual in universal good. Nor does it look merely to the lower pleasures, the pleasures of sense, for the constituents of good, but rises above them to include especially what tends to perfect, strengthen and expand our true nature. Existence and the extension of our powers of body and mind are held to be good for their own sakes without respect to enjoyment. Cumberland's views on this point were long abandoned by utilitarians as destroying the homogeneity and self-consistency of their theory ; but J. S. Mill and some recent writers have reproduced them as necessary to its defence against charges not less serious than even inconsistency.

The answer which Cumberland gives to the question, Whence comes our obligation to observe the laws of

nature ?, is that happiness flows from obedience, and misery from disobedience to them, not as the mere results of a blind necessity, but as the expressions of the divine will. Reward and punishment, supple- mented by future retribution, are, in his view, the sanctions of the laws of nature, the sources of our obligation to obey them. To the other great ethical question, How are moral distinctions apprehended ?, he replies that it is by means, of right reason. But by right reason he means merely the power of rising to general laws of nature from particular facts of experience. It is no peculiar faculty or distinctive function of mind; it involves no original element of cognition; it begins with sense and experience; it is gradually generated and wholly derivative. This doctrine lies only in germ in Cumberland, but will be found in full flower in Hartley, Mackintosh and later associationists.

Bibliography. — Editions of the De legibus naturae (Liibeck, 1683 and 1694; English versions by John Maxwell, prebendary of

Connor, A Treatise of the Laws of Nature (London, 1727), and John Towers (Dublin, 1750); French translation by Jean Barbeyrac (Amsterdam, 1744); James Tyrrell (1642–1718), grandson of Archbishop Ussher, published an abridgment of Cumberland's views in A Brief Disquisition of the Laws of Nature according to the Principles laid down in the Rev. Dr Cumberland's Latin Treatise (London, 1692; ed. 1701). For biographical details see Squier Payne, Account of the Life and Writings of R. Cumberland (London, 1720); Cumberland's Memoirs (1807), i. 3–6; Pepys's Diary. For his philosophy, see E. Albee, Philosophical Review, iv. 3 (1895), pp. 264 and 371 ; F. E. Spaulding, R. Cumberland als Begriinder der englischen Ethik (Leipzig, 1894) ; and text-books on ethics.

CUMBERLAND, RICHARD (1732–1811), English dramatist,

was born in the master's lodge of Trinity College, Cambridge, on the 19th of February 1732. He was the great-grandson of the bishop of Peterborough; and his father, Dr Denison Cumber- land, became successively bishop of Clonfert and of Kilmore. His mother was Joanna, the youngest daughter of the great scholar Richard Bentley, and the heroine of John Byrom's once popular little eclogue, Colin and Phoebe. Of the great master of Trinity his grandson has left a kindly account; he afterwards collected all the pamphlets bearing on the Letters of Phalaris controversy, and piously defended the reputation of his ancestor in his Letter to Bishop Lowth, who had called Bentley " aut caprimulgus aut fossor." Cumberland was in his seventh year sent to the grammar-school at Bury St Edmunds, and he relates how, on the head-master Arthur Kinsman undertaking, in conversation with Bentley, to make the grandson as good a scholar as the grandfather himself, the latter retorted: " Pshaw, Arthur, how can that be, when I have forgot more than thou ever knewest?" Bentley died during his grandson's Bury school-days; and in 1744 the boy, who, while rising to the head of his school^ had already begun to " try his strength in several slight attempts towards the drama," was removed to Westminster, then at the height of its reputation under Dr Nicholls. Among his schoolfellows here were Warren Hastings, George Colman (the elder), Lloyd, and (though he does not mention them as such) Churchill and Cowper. From Westminster Cumberland passed, in his fourteenth year, to Trinity College, Cambridge, where in 1750 he took his degree as tenth wrangler. His account of his degree examination, as well as that for a fellowship at his college, part of which he underwent in the " judges' chamber," where he was born, is curious; he was by virtue of an alteration in the statutes elected to his fellowship in the second year of his degree.

Meanwhile his projects of work as a classical scholar had been interspersed with attempts at imitating Spenser — -whom, by his mother's advice, he "laid upon the shelf" — and a dramatic effort

(unprinted) on the model of Mason's Elfrida, called Caractacus. He had just begun to read for his fellowship, when he was offered the post of private secretary by the earl of Halifax, first lord of trade and plantations in the duke of Newcastle's ministry. His family persuaded him to accept the office, to which he returned after his election as fellow. It left him abundant leisure for literary pursuits, which included, the design of a poem in blank verse on India. He resigned his Trinity fellowship on his marriage— in 1759— to his cousin Elizabeth Ridge, to whom he had paid his addresses on receiving through Lord Halifax " a small establishment as crown-agent for Nova Scotia." In 1761 he accompanied his patron (who had been appointed lord-lieutenant) to Ireland as Ulster secretary; and in acknowledgment of his services was afterwards offered a baronetcy. By declining this he thinks he gave offence; at all events, when in 1762 Halifax became secretary of state, Cumber- land in vain applied for the post of under-secretary, and could only obtain the clerkship of reports at the Board of Trade under Lord Hillsborough. While he takes some credit to himself for his incorruptibility when in Ireland, he showed zeal for his friend and secured a bishopric for his father. On the accession to office of Lord George Germaine (Sackville) in 1775, Cumberland was appointed secretary to the Board of Trade and Plantations, which post he held till the abolition of that board in 1782 by Burke's economical reform. Before' this event he had, in 1780, been sent on a confidential mission to Spain, to negotiate a

separate treaty of peace with that power; but though he was well received by King Charles III. and his minister Floridablanca, the question of Gibraltar proved a stumbling-block, and the Gordon riots at home a most untoward occurrence. He was recalled in 1781, and was refused repayment of the expenses he had incurred, towards which only £1000 had been advanced to him. He thus found himself £4500 out of pocket: in vain, he says, " I wearied the door of Lord North till his very servants drove me from it

"; his memorial remained unread or unnoticed either by the prime minister or by secretary Robinson, through whom the original promise had been made. Soon after this experience he lost his office, and had to retire on a compensation allowance of less than half-pay. He now took up his residence at Tunbridge Wells; but during liis last years he mostly lived in London, where he died on the 7th of May 181 1. He was buried in Westminster Abbey j a short oration being pronounced on this occasion by his friend Dean Vincent.

Cumberland's numerous literary productions are spread over the whole of his long life; but it is only by his contributions to the drama, and perhaps by his Memoirs, that he is likely to be remembered. The collection of essays and other pieces entitled The Observer (1785), afterwards republished together with a translation of The Clouds, found a place among The British Essayists. For the accounts- given in The Observer of the Greek writers, especially the comic poets, Cumberland availed himself of Bentley's MSS. and annotated books in his possession; his translations from the Greek fragments, which are not in- elegant but lack closeness, are republished in James Bailey's Comicorum Graecorum (parti., 1840) and Hermesianactis, Archi- lochi, et Pratinae fragmenta. Cumberland further produced Anecdotes of Eminent Painters hi Spain (1782 and 1787); a Catalogue of the King of Spain's Paintings (1787) ; two novels — Arundel (1789), a story in letters, and Henry (1795), a " diluted comedy" on the construction and polishing of which he seems to have expended great care; a religious epic, Calvary, or the Death of Christ (1792); his last publication was a poem entitled Retrospection. He is also supposed to have joined Sir James Bland Burges in an epic, the Exodiad (1807), and in John de Lancaster, a novel. Besides these he wrote the Letter to the Bishop of 0[xfor]d in vindication of Bentley (1767); another to the Bishop of Llandajf (Richard Watson) on his proposal for equalizing the revenues of the Established Church (1783); a Character of the late Lord Sackville (1785), whom in his Memoirs he

vindicates from the stigma of cowardice; and an anonymous pamphlet, Curtius rescued from the Gulf, against the redoubtable Dr Parr. He was also the author of a version of fifty of the Psalms of David; of a tract on the evidences of Christianity; and of other religious exercises in prose and verse, the former including " as many sermons as would make a large volume, some of which have been delivered from the pulpits." Lastly, he edited, in 1809, a short-lived critical journal called The London Review, intended to be a rival to the Quarterly, with signed articles.

Cumberland's Memoirs, which he began at the close of 1804, and concluded in September 1805, were published in 1806, and a supplement was added in 1807. This narrative, which includes a long aceount of his Spanish mission, contains some interesting reminiscences of several persons of note — more especially Bubb Dodington, Single-Speech Hamilton, and Lord George Sackville among politicians, and of Garrick, Foote and Goldsmith; but the accuracy of some of the anecdotes concerning the last- named is not beyond suspicion. The book exhibits its author as an amiable egotist, careful of his own reputation, given to prolixity and undistinguished by wit, but a good observer of men and manners. The uneasy self-absorption which Sheridan immortalized in the character of Sir Fretful Plagiary in The Critic is apparent enough in this autobiography, but presents itself there in no offensive form. The incidental criticisms of actors have been justly praised.

Cumberland was hardly warranted in the conjecture that no English author had yet equalled his list of dramas in point of number; but his plays, published and unpublished, have been

computed to amount to fifty-four. About 35 of these are regular plays, to which have been added 4 operas

and a farce; and about half of the whole list are comedies. The best known of them belong to what he was pleased to term ” legitimate comedy,” and to that species of it known as ” sentimental.” The essential characteristic of these plays is the combination of plots of domestic interest with the rhetorical enforcement of moral precepts, and with such small comic humour as the author possesses. These comedies are primarily, to borrow Cumber- land’s own phraseology, designed as ” attempts upon the heart.” He takes great credit to himself for weaving his plays out of ” homely stuff, right British drugget,” and for eschewing ” the vile refuse #f the Gallic stage “; on the other hand, he borrowed from the sentimental fiction of his own country, including Richardson, Fielding and Sterne. The favourite theme of his plays is virtue in distress or danger, but safe of its reward in the fifth act; their most constant characters are men of feeling and young ladies who are either prudes or coquettes. Cumber- land’s comic power — such as it was — lay in the invention of comic characters taken from the “outskirts of the empire,” and professedly intended to vindicate from English prejudice the good elements in the Scotch, the Irish and the colonial character. For the rest, patriotic sentiment liberally asserts itself by the side of general morality. If Cumberland’s dialogue lacks brilliance and his characters reality, the construction of the plots is as a rule, skilful, and the situations are contrived with what Cumberland indisputably possessed — a thorough insight into the secrets of theatrical effect. It should be added that, though Cumberland’s sentimentality is often wearisome, his morality is generally sound; that if he was without the genius requisite for elevating the national drama, he did his best to keep it pure and sweet; and that if he borrowed much, as he un- doubtedly did, it was not the vicious attractions of other dramatists of which he was the plagiary.

His debut as a dramatic author was made with a tragedy, The Banishment of Cicero, published in 1761 after its rejection by Garrick; this was followed in

1765 by a musical drama, The Summer's Tale, subsequently compressed into an afterpiece Amelia (1768). Cumberland first essayed sentimental comedy in The Brothers (1769). The theme of this comedy is inspired by Fielding's Tom Jones; its comic characters are the jolly old tar Captain Ironsides, and the henpecked husband Sir Benjamin Dove, whose progress to self-assertion is genuinely comic, though not altogether original. Horace Walpole said that it acted well, but read ill, though he could distinguish in it " strokes of Mr Bentley." The epilogue paid a compliment to Garrick, who helped the production of Cumberland's second comedy The West-Indian (1 7 7 1) . The hero of this comedy, which probably owes much to the suggestion of Garrick, is a young scapegrace fresh from the tropics, " with rum and sugar enough belonging to him to make all the water in the Thames into punch," — a libertine with generous instincts, which in the end prevail. This early example of the modern drame was received with the utmost favour; it was afterwards translated into German by Boden, and Goethe acted in it at the Weimar court. The Fashionable Lover (1772) is a sentimental comedy of the most pronounced type. The Choleric Man (1774), founded on the Adelphi of Terence, is of a similar type, the comic element rather predominating, but philanthropy being duly represented by a virtuous lawyer called Manlove. Among his later comedies may be mentioned The Natural Son (1785), in which Major O'Flaherty who had already figured in The West-Indian, makes his reappearance; The Impostors (1789), a comedy of intrigue; The Box Lobby Challenge (1794), a protracted farce; The Jew (1794), a serious play, highly effective when the character of Sheva was played by the great German actor Theodor Coring; The Wheel of Fortune (1795), in which John Kemble found a celebrated part in the misanthropist Penruddock, who cannot forget but learns to forgive (a character declared by Kotzebue to have been stolen from his Menschenhass und Reue), while the lawyer Timothy Weasel was made comic by Richard Suett; First Love (1795); The Last of the Family (1795); False

Impressions (1797); The Sailor's Daughter (1804); and a Hint to Husbands (1806), which, unlike the rest, is in blank verse. The other works printed during his lifetime include The Note of Hand (1774), a farce; the songs of his musical comedy, The Widow of Delphi (1780); his tragedies of The Battle of Hastings (1778); and The Carmelite (1784), a romantic domestic drama in blank verse, in the style of Home's Douglas, furnishing some effective scenes for Mrs Siddons and John Kemble as mother and son; and the domestic drama (in prose) of The Mysterious Husband (1783). His posthumously printed plays (published in 2 vols, in 1813) include the comedies of The Walloons (acted in 1782); The Passive Husband (acted as A Word for Nature, 1798); The Eccentric Lover (acted 1798); and Lovers' Resolutions (once acted in 1802) ; the serious quasi-historic drama Confession; the drama Don Pedro (acted 1796); and the tragedies of Alcanor (acted as The Arab, 1785); Torrendal; The Sibyl, or The Elder Brutus (afterwards amalgamated with other plays on the subject into a very successful tragedy for Edmund Kean by Payne); Tiberius in Capreae; and The False Demetrius (on a theme which attracted Schiller). Cumberland translated the Clouds of Aristophanes (1797), and altered for the stage Shakespeare's Timon of Athens (1771), Massinger's The Bondman and The Duke of Milan (both 1779).

In 1806-1807 appeared Memoirs of R. Cumberland, written by himself. Cumberland's novel, Henry, was printed, in Ballantyne's Novelists' Library (1 821), with a prefatory notice of the author by Sir Walter Scott. A so : called Critical Examination of Cumberland's works and a memoir of the author based oh his autobiography, with the addition of some more or less feeble criticisms, by William Madford, appeared in 1812. An excellent account of Cumberland is included in " George Paston's " Little Memoirs of the Eighteenth Century (1901). ' Hettner well characterizes Cumberland's position in the history of the English drama in Litteraturgesch. d. 18. Jahr- hunderts (2nd ed., 1865), i. 520. Cumberland's portrait by Romriey (whose talent he was one of the

first to encourage) is in the National Portrait Gallery. (A. W. W.)

CUMBERLAND, WILLIAM AUGUSTUS, Duke of (1721- 1765), son of King George II. and Queen Caroline, was born on the 15th of April 1721, and when five years of age was created duke of Cumberland. His education was well attended to, and his courage and capacity in outdoor exercises were notable from his early years. He was intended by the king and queen for the office of lord high admiral, and in 1740 he sailed as a volunteer in the fleet under the command of Sir John Norris; but he quickly became dissatisfied with the navy, and early in 1742 he began a military career. In December 1742 he was made a major-general, and in the following year he first saw active service in Germany. George II. and the " martial boy " shared in the glory of Dettingen (June 27), and Cumberland, who was wounded in the action, displayed an energy and valour, the report of which in England founded his military popularity. After the battle he was made lieutenant-general. In 1 745, having been made captain-general of the British land forces at home and in the field, the duke was again in Flanders as commander-in- chief of the allied British, Hanoverian, Austrian and Dutch troops. Advancing to the relief of Tournay, which was besieged by Marshal Saxe, he engaged that great general in the battle of Fontenoy (q v.) on the nth of May. It cannot now be doubted that, had the duke been supported by the allies in his marvellously courageous attack on the superior positions of the French army, Fontenoy would not have been recorded as a defeat to the British arms. He himself was in the midst of the heroic column which penetrated the French centre, and his conduct of the inevitable retreat was "unusually cool and skilful.

Notwithstanding the severity of his discipline, the young duke had the power to inspire his men with a strong attachment to his person and a very lively esprit de corps. As a general his> courage and resolution were not sufficiently tempered with sagacity and tact; but he displayed an energy and power in military affairs which pointed him out to

the British people as the one commander upon whom they could rely to put a decisive stop to the successful career of Prince Charles Edward in the rebellion, of 1745-1746. John (Earl) Ligonier wrote of him at this time: " Ou je suis fort trompe ou il se forme la un grand capitaine."

He was recalled from Flanders, and immediately proceeded with his preparations for quelling the insurrection. He joined the midland army under Sir John Ligonier, and was at once in pursuit of his swift-footed foe. But the retreat of Charles Edward from Derby disconcerted his plans; and it was not till they had reached Penrith, and the advanced portion of his army had been repulsed on Clifton Moor, that he became aware how hopeless an attempt to overtake the retreating Highlanders would then be. Carlisle having been retaken, he retired to London, till the news of the defeat of Hawley at Falkirk roused again the fears of the English people, and centred the hopes of Britain on the royal duke. He was appointed commander of the forces in Scotland.

Having arrived in Edinburgh on the 30th of January 1746, he at once proceeded in search of the young Pretender. He diverged, however, to Aberdeen, where he employed his time in training the well-equipped forces now under his command for the peculiar nature of the warfare in which they were about to engage. What the old and experienced generals of his time had failed to accomplish or even to understand, the young duke of Cumberland, as yet only twenty-four years of age, effected with simplicity and ease. He prepared to dispose his army so as to withstand with firmness that onslaught on which all Highland successes depended; and he reorganized the forces and restored their discipline and self-confidence in a few weeks.

On the 8th of April 1746 he set out from Aberdeen

towards Inverness, and on the 15th he fought the decisive battle of Culloden, in which, and in the pursuit which followed, the forces of the Pretender were completely destroyed. He had become convinced that the sternest measures were needed to break down the Jacobitism of the Highlanders. He told his troops to take notice that the enemy's orders were to give no quarter to the " troops of the elector," and they took the hint. No trace of such orders remains (see Murray, Lord George), and it is probable that Cumberland had merely received word of wild talk in the enemy's camp, which he credited the more easily as he thought that those who were capable of rebellion were cap- able of any crime. On account of the merciless severity with which the fugitives were treated, Cumberland received the nickname of the " Butcher." That the implied taunt was unjust need not be laboured. It was used for political purposes in England, and his own brother, the prince of Wales, encouraged, it appears, the virulent attacks which were made upon the duke. In any case there is a marked similarity between Cumberland's conduct in Scotland and that of Cromwell in Ireland. Both dared to do acts which they knew would be cast against them for the rest of their lives, and terrorized an obstinate and unyielding enemy into submission. How real was the danger of a pro- tracted guerrilla warfare in the Highlands may be judged from the explicit declarations of Jacobite leaders that they intended to continue the struggle. As it was, the war came to an end almost at once. Here, as always, Cumberland preserved the strictest discipline in his camp. He was inflexible in the execution of what he deemed to be his duty, without favour to any man. At the same time he exercised his influence in favour of clemency in special cases that were brought to his notice. Some years later James Wolfe spoke of the duke as " for ever doing noble and generous actions."

The relief occasioned to Britain by the duke's victorious efforts was acknowledged by his being voted an income of £40,000 per annum in addition to

his revenue as a prince of the royal house. The duke took no part in the Flanders campaign of 1746, but in 1747 he again opposed the still victorious Marshal Saxe; and received a heavy defeat at the battle of Lauffeld, or Val, near Maestricht (2nd of July 1 747) . During the ten years of peace Cumberland occupied himself chiefly with his duties as captain-general, and the result of his work was clearly shown in the conduct of the army in the Seven Years' War. His un- popularity, which had steadily increased since Culloden, inter- fered greatly with his success in politics, and when the death of the prince of Wales brought a minor next in succession to the throne the duke was not able to secure for himself the contingent

regency, which was vested in the princess-dowager of Wales. In 1757, the Seven Years' War having broken out, Cumberland was placed at the head of a motley army of allies to defend Hanover. At Hastenbeck, near Hameln, on the 26th of July 1757, he was defeated by the superior forces of D'Estrees (see Seven Years' War). In September of the same year his defeat had almost become disgrace. Driven from point to point, and at last hemmed in by the French under Richelieu, he capitulated at Klosterzeven on the 8th of the month, agreeing to disband his army and to evacuate Hanover. His disgrace was completed on his return to England by the king's refusal to be bound by the terms of the duke's agreement. In chagrin and disappoint- ment he retired into private life, after having formally resigned the public offices he held. In his retirement he made no attempt to justify his conduct, applying in his own case the discipline he had enforced in others. For a few years he lived quietly at Windsor, and subsequently in London, taking but little part in politics. He did much, however, to displace the Bute ministry and that of Grenville, and endeavoured to restore Pitt to office. Public opinion had now set in his favour, and he became almost as popular as he had been in his youth. Shortly before his death the duke was requested to open negotiations with Pitt for a return to power. This was, however, unsuccessful. On

the 31st of October 1765 the duke died.

A Life of the. duke of Cumberland by Andrew Henderson was published in 1766, and anonymous (Richard Rolt) Historical Memoirs appeared in 1767. See especially A. N. Campbell Maclachlan, William Augustus, Duke of Cumberland (1876).

CUMBERLAND, the north-westernmost county of England, bounded N. by the Scottish counties of Dumfries and Roxburgh, E. by Northumberland, S. by Westmorland and Lancashire, and W. by the Irish Sea. Its area is 1520-4 sq. m. In the south the county includes about one-half of the celebrated Lake District (q.v.), with the highest mountain in England, Scafell Pike (3210 ft.), and the majority of the principal lakes, among which are Derwentwater and Bassenthwaite, Buttermere and Crummock Water, Ennerdale, Wastwater, and, on the bound- ary with Westmorland, Ullswater. From this district valleys radiate north, west and south to a flat coastal belt, the widest part of which (about 8 m.) is found in the north in the Solway Plain, bordering Solway Firth, which here intervenes between England and Scotland. The valley of the Eden, opening upon this plain from the south-east, separates the mountainous Lake District from the straight westward face of a portion of the Pennine Chain (q.v.), which, though little of it lies within this county, reaches its highest point within it in Cross Fell (2930 ft.). A well-marked pass, called the Tyne Gap, at the water-parting between the rivers Irthing and South Tyne, traversed by the Newcastle & Carlisle railway, intervenes between these hills and their northward continuation in the hills of the Scottish border. Besides the waters of the Eden, Solway Firth receives those of the Esk, which enter Cumberland from Scotland. Liddel Water, joining this river from the north east from Liddis- dale, forms a large part of the boundary with Scotland. The Eden receives the Irthing from the east, and from the Lake District the Caldew, rising beneath Skiddaw and joining the main river at Carlisle, and the Eamont, draining Ullswater and forming part of the boundary with Westmorland. The principal streams flowing east and

south from the Lake District are the Derwent, from Borrowdale and Derwentwater, the Eden from Ennerdale, the Esk from Eskdale, and the Duddon, forming the greater part of the boundary with Lancashire. There are valuable salmon fisheries in the Eden, and trout are taken in many of the streams and lakes.

Geology. — The mountainous portion of Cumberland is built up of two different types of rock. The older, a sedimentary slaty series of Ordovician age, the Skiddaw slates, surrounds Bassenthwaite, Saddleback, Crummock Water, Keswick and Cockermouth and the western end of Ennerdale Water. The same formation is found in the northern flanks of Ullswater also north and east of Whitbeck. The other type of rock is volcanic; it gives a more rugged aspect to the scenery, as may be seen in comparing the rough outlines of Scafell and Honister Crags or Helvellyn with the smoother form of Saddleback or Skiddaw. These volcanic rocks, owing to much

alteration, are often slaty; they have been called the " green slates and porphyries " or the Borrowdale Series. The Skiddaw slates are usually separated from the newer green slates above them by a plane of differential movement, for both have been thrust by earth- pressures from south to north, but the former rocks have travelled farther than the latter which have lagged behind; hence Messrs Marr and Harker describe the plane of separation as a " lag-fault." Much general faulting and folding have resulted from the movement; the thrusting took place in Devonian times. About the same period great masses of granitic rock were intruded into the slates in the form of laccolites, which often lie along the lag planes. Such rocks are the granophyre hills of Buttermere and Ennerdale, the micro-granite patches on either side of the Vale of St John, and the great mass of Eskdale granite which reaches from Wastwater to the flanks of Black Combe.

At Carrock Fell, N.E. of Skiddaw, is an extremely interesting complex of volcanic rocks, and in many other places are diabase and other forms, e.g. the well-known rock at Castle Head, Keswick.

From Pooley Bridge, Ullswater, on the east, by Udale round to Egremont on the west, the mountainous region just described, is surrounded by the Carboniferous Limestone series, with a conglomerate at the base. Upon these rocks the coalfield of Whitehaven rests and extends as far as Maryport. The coal seams are worked for some distance beneath the sea. The vale of Eden between Penrith, Hornsby and Wreay is occupied by Permian sandstone, usually bright red in colour. Red Triassic rocks form a strip about 4 m. broad east of the Permian outcrop; a similar strip forms a coastal fringe from St Bees Head to Duddon Sands. The same formations are spread out round Carlisle, Brampton, Longtown, Wigton and Aspatria. East of Carlisle they are covered by an outlier of Lias. A great dislocation, the Pennine Fault, runs along the eastern side of the vale of Eden; it throws up the Lower Carboni- ferous limestones with their associated shales and sandstones to form the elevated ground in the north and north-east of the county. Several basic intrusions penetrate the limestone scries, the best known being the Whin Sill, which may be traced for a number of miles northward from Crossfell. Evidences of glacial action are abundant ; till with sands and gravel lie on the lower ground ; striated rocks and roches moutonnees are common; perched blocks are found on the plateau by Sprinkling Tarn and elsewhere. Moraine mounds are quite numerous in the valleys, and have frequently been the cause of small lakes.

Climate and Agriculture. — The climate is generally temperate, but in the higher parts bleak, snow sometimes lying fully six months of the year on Cross Fell and the mountains of the Lake District. As regards rainfall, the physical configuration makes for contrast. At Carlisle, on the Solway plain, the mean annual fall is 30.6 in. At Penrith, on the north-eastern flank of the Lake District, it

is 31.67; on the western flank 42.3 in. are recorded at Ravenglass, close to the coast, and 51.78 at Cocker- mouth, some miles inland. In the heart of the district, however, the fall is as a rule much heavier, in fact, the heaviest recorded in the British Isles (see Lake District). Somewhat less than three-fifths of the total area of the county is under cultivation, the proportion being higher than that of the neighbouring counties of Northumberland and Westmorland, but still much below the average of the English counties. Black peaty earth is the most prevalent soil in the mountainous districts; but dry loams occur in the lowlands, and are well adapted to green crops, grain and pasture. Wheat and barley are practically neglected, but large crops of oats are grown. Turnips and swedes form the bulk of the green crops. Hill pasture amounts to nearly 270,000 acres, and a good number of cattle are reared, but the principal resource of the farmer is sheep-breeding. The sheep on the lowland farms are generally of the Leicester class or cross-bred between the Leicester and Herdwick, with a few Southdowns. Throughout the mountainous districts the Herd wicks have taken the place of. the smaller black-faced heath variety of sheep once so commonly met with on the sheep farms. They are peculiar to this part of England; the ewes and wethers and many of the rams are polled, the faces and legs are speckled, and the wool is finer and heavier in fleece than that of the heath breed. They originally came from the neighbourhood of Muncaster in the Duddon and Esk district, and tradition ascribes their origin variously to introduction by Scandinavian settlers, or to parents that escaped from a wrecked ship of the Spanish Armada. In general they belong to the proprietors of the sheep- walks, and have been farmed out with them from time immemorial, from which circumstance it is said they obtained the name of " Herdwicks." Long after the Norman Conquest Cumberland

remained one of the most densely forested regions of England, and much of the low-lying land is still well wooded, the Lake District in particular displaying beautiful contrasts between bare mountain

and tree-clad valley. The oak, ash and birch are the principal natural trees, while sycamores have been planted for shelter round many farmsteads. Plantations of larch are also numerous, and the holly, yew, thorn and juniper flourish locally.

Landed property was formerly much divided in this county, and the smaller holdings were generally occupied by their owners, who were known as " statesmen," i.e. " estatesmen," a class of men long noted for their sturdy independence and attachment to routine husbandry. Most of these estates were held of the lords of manors under customary tenure, which subjected them to the payments of fines and heriots on alienation as well as on the death of the lord or tenant. According to the Agricultural Survey printed in 1794, about two- thirds of the county was held by this tenure, in parcels worth from £15 to £30 rental. On large estates, also, the farms were in general rather small, few then reaching £200 a year, held on verbal contracts, or very short leases, and burdened like the small estates with payments or services over and above a money rent. In modern times these conditions have changed, the " statesmen " gradually becoming extinct as a class, and many of the small holdings falling into the hands of the larger landed proprietors.

Other Industries. — Carlisle is the seat of a variety of manu- factures; there are also in the county cotton and woollen industries, pencil mills at Keswick, and iron shipbuilding yards at Whitehaven. But the mining industry is the most important, coal being raised principally in the district about Whitehaven, Workington and Maryport. Side by side with this industry much iron ore is raised, and there is a large output of pig-iron, and ore is also found in the south, in the neighbourhood of Millom. Gypsum, zinc and some lead are mined. Copper was formerly worked near Keswick, and there was a rich deposit of black lead at the head of Borrowdale. Granite and limestone are extensively quarried. Stone is very largely used even for housebuilding, a fine green slate being often employed. Shap and other granites are worked for

building and roadstones.

Communications. — The chief ports of Cumberland are White- haven, Workington, Maryport, Harrington and Silloth. The London & North- Western railway enters the county near Pen- rith, and terminates at Carlisle, which is also served by the Midland. The Caledonian, North British and Glasgow & South-western lines further serve this city, which is thus an important junction in through communications between England and Scotland. The North-Eastern railway connects Carlisle with Newcastle. The Maryport & Carlisle, the Cockermouth, Keswick & Penrith; and the Cleator & Workington Junction lines serve the districts indicated by their names, while the Furness railway passes along the west coast from the district of Furness in Lancashire as far north as Whitehaven, also serving Cleator and Egremont. The Ravenglass & Eskdale light railway gives access from this system to Boot in Eskdale. Coaches and motor cars maintain passenger communications in the Lake District where the railways do not penetrate.

Population and Administration. — The area of the ancient and the administrative county is 973,086 acres, with a population in 1891-of 266,549 and in 1901 of 266,933. The county contains five wards, divisions which in this and neighbouring counties correspond to hundreds, and also appear in Lanarkshire and Renfrewshire in Scotland. The municipal boroughs are Carlisle (pop. 45,480), a city and the county town, Whitehaven (19,324), and Workington (26,143). The other urban districts are Arlecdon and Frizington (5341), Aspatria (2885), Cleator Moor (8120), Cockermouth (5355), Egremont (5761), Harrington (3679), Holme Cultram (4275), Keswick (4451), Maryport (11,897), Millom (10,426), Penrith (9182), Wigton (3692). Of these all except Keswick, Millom and Penrith are in the industrial district of the west and north-west. The urban district of Holme Cultram includes the port of Silloth. Among lesser towns may be mentioned St Bees (1236), on the coast south of Whitehaven,

until 1897 the seat of a Church of England theological college. The grammar school here, founded in 1533, is liberally endowed, with scholarships and exhibitions. Cumberland is in the northern circuit, and assizes are held at Carlisle. It has one court of quarter sessions and 12 petty sessional divisions. The city of Carlisle has a separate commission of the peace and court of quarter sessions. There are 213 civil parishes. Cumberland is in the diocese of Carlisle, with a small portion in that of Newcastle. There are 167 ecclesiastical parishes or districts within the county. There are four parliamentary divisions, the Northern or Eskdale, Mid or Penrith, Cockermouth and Western or Egremont, each returning one member; while the parlia- mentary boroughs of Carlisle and Whitehaven each return one member.

History. — After the withdrawal of the Romans (of whose occupation there are various important relics in the county) little is known of the region which is now Cumberland, until the great battle of Ardderyd in 573 resulted in its consolidation with the kingdom of Strathclyde. About 670–680 the western district between the Solway and the Mersey was conquered by the Angles of Northumbria and remained an integral portion of that kingdom until the Danish invasion of the 9th century. In 875 the kingdom of the Cumbri is referred to, but without any indication of its extent, and the first mention of Cumberland to denote a geographical area occurs in 945 when it was ceded by Edmund to Malcolm of Scotland. At this date it included the territory north and south of the Solway from the Firth of Forth to the river Duddon. The Scottish supremacy was not uninterrupted, for the district at the time of its invasion by Ethelred in 1000 was once more a stronghold of the Danes, whose influence is clearly traceable in the nomenclature of the Lake District. At the time of the Norman invasion Cumberland was a dependency of the earldom of Northumbria, but its history at this period is very obscure, and no notice of it occurs in the Domesday Survey of 1086;

Kirksanton, Bootle and Whicham, however, are entered under the possessions of the earl of North- umbria in the West Riding of Yorkshire. The real, Norman conquest of Cumberland took place in 1092, when William Rufus captured Carlisle, repaired the city, built the castle, and after sending a number of English husbandmen to till the land, placed the district under the lordship of Ranulf Meschines. The fief of Ranulf was called the Power or Honour of Carlisle, and a sheriff of Carlisle is mentioned in 1 106. The district was again captured by the Scots in the reign of Stephen, and on its recovery in 1157 the boundaries were readjusted to include the great barony of Coupland. At this date the district was described as the county of Carlisle, and the designation county of Cumberland is not adopted in the sheriff's accounts until n 77. The five present wards existed as administrative areas in 1278, when they were termed bailiwicks, the designation ward not appearing until the 16th century, though the bailiwicks of the Forest of Cumberland are termed wards in the 14th century. In the 17 th and 1 8 th centuries each of the five wards was under the administration of a chief constable.

Owing to its position on the Border Cumberland was the scene of constant warfare from the time of its foundation until the union of England and Scotland, and families like the Tilliols, the Lucies, the Greystokes, and the Dacres were famous for their exploits in checking or avenging the depredations of the Scots. During the War of Independence in the reign of Edward I. Carlisle was the headquarters of the English army. In the Wars of the Roses the prevailing sympathy was with the Lancastrian cause, which was actively supported by the representatives of the families of Egremont, Dacre and Greystoke. In 1542 the Scottish army under James V. suffered a disastrous defeat at Solway Moss. After the union of the crowns of England and Scotland in 1603, the countries hitherto known as " the Borders " were called " the Middle Shires," and a period of comparative peace ensued. On the outbreak of the Civil War of the 17th century the northern counties

associated in raising forces for the king, and the families of Howard, Dalston, Dacre and Musgrave rendered valuable service to the royalist cause. In

1645 Carlisle was captured by the parliamentary forces, but in April 1648 it was retaken by Sir Philip Musgrave and Sir Thomas Glenham, and did not finally surrender until the autumn of 1648. Cumberland continued, however, to support the Stuarts; it was one of the first counties to welcome back Charles II.; in 171 5 it was associated with the rising on behalf of the Pretender, and Carlisle was the chief seat of operations in the 1745 rebellion.

In 685 Carlisle and the surrounding district was annexed by Ecgfrith king of Northumbria to the diocese of Lindisfarne, to which it continued subject, at least until the Danish invasion of the gth century. In 1133 Henry I. created Carlisle (q.v.) a bishopric. The diocese included the whole of modern Cumberland (except the barony of Coupland and the parishes of Alston, Over-Denton and Kirkandrews) , and also the barony of Appleby in Westmorland. The archdeaconry of Carlisle, co-extensive with the diocese, comprised four deaneries. Coupland was a deanery in the archdeaconry of Richmond and diocese of York until 1541, when it was annexed to the newly created diocese of Chester. In 1856 the area of the diocese of Carlisle was extended, so as to include the whole of Cumberland except the parish of Alston, the whole of Westmorland, and the Furness district of Lancashire. In 1858 the deaneries were made to number eighteen, and in 1870 were increased to twenty.

The principal industries of Cumberland have been from earliest times connected with its valuable fisheries and abundant mineral wealth. The mines of Alston and the iron mines about Egremont were worked in the 12th century. The Keswick copper mines were worked in the reign of Henry III., but the black-lead mine was not worked to any purpose until the 18th century. Coal- mining is referred to in the

15th century, and after the revival of the mining industries in the 16th century, rose to great importance. The saltpans about the estuaries of the Esk and the Eden, were a source of revenue in the 12th century.

Cumberland returned three members for the county to the parliament of 1 290, and in 1 295 returned in addition two members for the city of Carlisle and two members each for the boroughs of Cockermouth and Egremont. The boroughs did not agair return members until in 1640 Cockermouth regained represen- tation. Under the Reform Act of 1832, Cumberland returned four members for two divisions, and Whitehaven returned one member. The county now returns six members to parliament; one each for the four divisions of the county, Egremont, Cocker- mouth, Eskdale and Penrith, one for the city of Carlisle and one for the borough of Whitehaven.

Antiquities. — Very early crosses, having Celtic or Scandinavian characteristics, are seen at Gosforth, Bewcastle and elsewhere. In ecclesiastical architecture Cumberland is not rich as a whole, but it possesses Carlisle cathedral, with its beautiful choir, and certain monastic remains of importance. Among these are the fine remnants of Lanercost priory (see Brampton). Calder Abbey, near Egremont, a Cistercian abbey founded in 1134, has ruins of the church and cloisters, of Norman and Early English character, and is very beautifully situated on the Calder. The parish Church of St Bees, with good Norman and Early English work, belonged to a Benedictine priory of n 20; but according to tradition the first religious house here was a nunnery founded c. 650 by St Bega, who became its abbess. Among the parish churches there are a few instances of towers strongly fortified for purposes of defence; that at Burgh-on-the-Sands, near Carlisle, being a good illustration. Castles, in some cases ruined, in others modernized, are fairly numerous, both near the Scottish border and elsewhere. Na worth Castle near Brampton is the finest example; others are at Bewcastle, Carlisle, Kirk- oswald, Egremont, Cockermouth and Millom.

Among many notable country seats, Rose Castle, the palace of the bishops of Carlisle; Greystoke Castle and Armathwaite Hall may be mentioned.

See J. Nicolson and R. Burn, History and Antiquities of the Counties of Westmorland and Cumberland (London, 1777); W. Hutchinson, History of Cumberland (Carlisle, 1794); S. Jefferson, History and Antiquities of Cumberland (Carlisle, 1840–1842); S. Gilpin, Songs and Ballads of Cumberland (London, 1866); W. Dickinson, Glossary of Words and Phrases of Cumberland (London, English Dialect

Society, 1878, with a supplement, 1881); Sir G. F. Duckett, Early Sheriffs of Cumberland' (Kendal, 1879); J. Denton, "Account of Estates and Families in the County of Cumberland, 1066–1603," in Antiquarian Society's Transactions (1887) ; R. S. Ferguson, History of Cumberland (London, 1890) ; " Archaeological Survey of Cumber- land," in Archaeologia, vol. liii. (London, 1893); W. Jackson, Papers and Pedigrees relating to Cumberland (2 vols., London, 1892); T. Ellwood, The Landnama Book of Iceland as it illustrates the Dialect and Antiquities of Cumberland (Kendal, 1894); Victoria County History, Cumberland; and Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society.

CUMBERLAND, a city and the county-seat of Allegany county, Maryland, U.S.A., on the Potomac river, about 178 m. W. by N. of Baltimore and about 153 m. S. by E. of Pittsburg. Pop. (1890) 12,729; (1900) 17,128, of whom 1113 were foreign- born and 1100 were of negro descent; (1910) 21,839. Cumberland is served by the Baltimore & Ohio, the Western Maryland, the Pennsylvania, the Cumberland & Pennsylvania (from Cumberland to Piedmont, Virginia), and the George's Creek & Cumberland railways, the last a short line extending to Lonaconing (19 m.); by an electric line extending to

Western Port, Maryland ; and by the Chesapeake & Ohio Canal, of which it is a terminus. The city is about 635 ft. above sea-level, and from a distance appears to be completely shut in by lofty ranges of hills, which are cut through to the westward by a deep gorge called ” The Narrows,” making a natural gateway of great beauty. Cumberland has a large trade in coal, which is mined in the vicinity. As a manufacturing centre it ranked in 1905 second in the state, the chief products being iron, steel, bricks, flour, cement, silk and leather; there is also a large dyeing and clean- ing establishment. The value of the city’s factory products increased from $2,900,267 in 1900 to $4,595,023 in 1905, or 58-4 %. Cumberland is an important jobbing centre also. The municipality owns and operates its water- works and electric lighting plant. The first settlement of the place was made in 1750; in 1754 Fort Cumberland was erected within what are now the city limits, and in the year following this fort was occupied by General Edward Braddock. Cumberland was laid out in 1763, but there was little growth until 1787, and it was not incorporated as a town until 1815; it was chartered as a city in

1850.

CUMBERLAND, a township of Providence county, Rhode Island, U.S.A., in the N.E. part of the state, about 6 m. N. of Providence and having the Blackstone river for most of its W. boundary. Pop. (1890) 8090; (1900) 8925, of whom 3473 were foreign-born; (1910) 10,107; area, 27-5 sq. m. It is served by the New York, New Haven & Hartford railway. Within its borders are the villages of Cumberland Hill, Diamond Hill, Arnold Mills, Abbott Run, Berkeley, Robin Hollow, Happy Hollow, East Cumberland, and parts of Manville, Ashton, Lonsdale and Valley Falls. The surface of the township is gener- ally hilly and rocky. In the N. part is a valuable granite quarry; and limestone, and some coal, iron and gold are also found. Cumberland has been called the ” mineral pocket of New England.” The Blackstone and its tributaries provide consider- able water power; and there are various manufactures, including cotton

goods, silk goods, and horse-shoes and other iron ware. The value of the township's factory product in 1905 was $3,171,3 18, an increase of 8o- 6% since 1900, this ratio of increase being greater than that shown by any other " municipality " in the state having a population in 1900 of 8000 or more. At Lonsdale, William Blackstone (c.1595-1675), the first permanent white settler within the present limits of Rhode Island, built his residence, " Study Hall," about 1635. Cumberland was originally a part of Rehoboth, and then of Attleborough, Massa- chusetts, and for many years was called, like other sparse settle- ments, the Gore, or Attleborough Gore. In 1747, by the royal decree establishing the boundary between Massachusetts and Rhode Island, Attleborough Gore, with other territory formerly under the jurisdiction of Massachusetts, was annexed to Rhode Island, and the township of Cumberland was incorporated, the name being adopted in honour of William Augustus, duke of Cumberland. In 1867 a part of Cumberland was set off to form the township of Woonsocket.

CUMBERLAND MOUNTAINS (or more correctly the Cumber- land Plateau or Highlands), the westernmost of the three great divisions of the Appalachian uplift in the United States, com- posed of many small ranges of mountains (of which Cumberland Mountain in eastern Kentucky is one) . It extends from Pennsyl- vania to Alabama, attaining its greatest height (about 4000 ft.) in Virginia. The plateau is rich in a variety of mineral products, of which special mention may be made of coal, which occurs in many places, and of the beautiful marbles quarried in that portion of the plateau which lies between Virginia and Kentucky and crosses Tennessee. The plateau has an abrupt descent, almost ah escarpment, into the great Appalachian Valley on its E., while the W. slope is deeply and roughly broken. The whole mass is eroded in Virginia into a maze of ridges. Cumberland Mountain parts the waters of the Cumberland and Tennessee rivers. This range and the other ranges about it are perhaps the loveliest portion of the whole plateau. The peaks here and in

the Blue Ridge to the E. are the highest of the Appalachian system. Forest-filled valleys, rounded hills and rugged gorges afford in every part scenery of surpassing beauty. The Cumberland Valley between the Cumberland range and the Pine range is one of special fame. In the former range there are immense caverns and subterranean streams. Cumberland Gap, crossing the ridge at about 167 ft. above the sea, where Kentucky, Virginia and Tennessee meet, is a gorge about 500 ft. deep, with steep sides that barely give room in places for a roadway. The mountains, river and gap were all discovered by a party of Virginians in 1748, and named in honour of the victor of Culloden, William, duke of Cumberland. Afterwards the gap gained a place in American history as one of the main pathways by which emigrants crossed the mountains to Kentucky and Tennessee. During the Civil War it was a position of great strategic im- portance, as it afforded an entrance to eastern and central Tennessee from Kentucky, which was held by the Union arms; and it was repeatedly occupied in alternation by the opposing forces.

The mountaineers of Kentucky and Tennessee are a strange stock, who retain in their customs and habits the primitive conditions of a life that has elsewhere long since disappeared. They have been pictured in the novels of Miss Murfree and John Fox, Junr. They are a tall, straight, angular folk, of fine physical development; the volunteers for the Union army from Kentucky and Tennessee during the Civil War — most of whom came from the non-slave-holding mountain region — exceeded in physical development the volunteers from all other states. For the education of these mountaineers Major-General Oliver Otis Howard founded in 1895 at Cumberland Gap, Tennessee, the Lincoln Memorial University (co-educational; non-sectarian; opened in 1897), which has collegiate, normal training and in- dustrial courses, and an affiliated school of medicine, Tennessee Medical College, at Knoxville. The university had in 1907-1908 14 instructors and 570 students. Berea College in Kentucky was a

pioneer institution for the education of mountaineers.

CUMBERLAND RIVER, a large southern branch of the Ohio river, U.S.A., rising in the highest part of the Cumberland plateau in south-east Kentucky, and emptying into the Ohio in Kentucky (near Smithland) after a devious course of 688 m. through that state and Tennessee. It drains a basin of somewhat more than 18,000 sq. m., and is navigable for light-draught steamers through about 500 m. under favourable conditions — Burnside, Pulaski county, 518 m. from the mouth, is the head of navigation — and through 193 m. — to Nashville — all the year round; for boats drawing not more than 3 ft. the river is navigable to Nashville for 6 to 8 months. At the Great Falls, in Whitley county, Kentucky, it drops precipitously 63 ft. Above the falls it is a mountain stream, of little volume in the dry months. It descends rapidly at its head to the highland bench below the mountains and traverses this to the falls, then flows in rapids (the Great Shoals) for some 10 m. through a' fine gorge with cliffs 300-400 ft. high, and descends between bluffs of decreasing height and beauty into its lower level. Save in the mountains its gradient is slight, and below the falls, except for a number of small rapids, the

flow of the stream is equabk. Timbered ravines lend charm to much of its shores, and in the mountains the scenery is most beautiful. Below Nashville the stream is some 400 to 500 ft. wide, and its high banks are for the most part of alluvium, with rocky bluffs at intervals. At the mouth of the river lies Cumber- land Island, in the Ohio. During low water of the latter stream the Cumberland discharges around both ends of the island, but in high water of the Ohio the gradient of the Cumberland is so slight that its waters are held back, forming a deep quiet pool that extends some 20 m. up the river A system of locks and dams below Nashville was planned in

1846 by a private company, which accomplished practically nothing. Congress appropriated $155,000 in 1832-1838; in the years immediately after 1888 $305,000 was expended, notably for deepening the shoals at the junction of the Cumberland and the Ohio; in 1892 a project was undertaken for 7 locks and dams 52 ft. wide and 280 ft. long below Nashville. Aboye Nashville $346,000 was expended on the open channel project (of 1871-1872) from Nashville to Cumberland Ford (at Pineville); in 1886 a canalization project was undertaken and 22 locks and dams below Burnside and 6 above Burnside were planned, but by the act of 1907 the project was modified — $2,319,000 had been appropriated up to 1908 for the work of canalization. During the Civil War Fort Donelgon on the Cumberland, and Fort Henry near by on the Tennessee were erected by the Confederates, and their capture by Flag- officer A. H. Foote and General Grant (Feb. 1862) was one of the decisive events of the war, opening the rivers as it did for the advance of the Union forces far into Confederate Territory.

CUMBRAES, THE, two islands forming part of the county of Bute, Scotland, lying in the Firth of Clyde, between the southern shores of Bute and the coast of Ayrshire. Great Cumbrae Island, about 15 m. W.S.W. of Largs, is 3J m. long and 2: m. broad, and has a circumference of 10 m. and an area of 3200 acres or 5 sq. m. Its highest point is 417 ft. above the sea. There is some fishing and a little farming, but the mainstay of the inhabitants is the custom of the visitors who crowd every summer to Millport, which is reached by railway steamer from Largs. This town (pop. 1901, 1663) is well situated at the head of a fine bay and has a climate that is both warm and bracing. Its chief public buildings include the cathedral, erected in Gothic style on rising ground behind the town, the college connected with it, the garrison, a picturesque seat belonging to the marquess of Bute, who owns the island, the town hall, a public hall, library and reading room, the Lady Margaret fever hospital, and a marine biological station. The cathedral, originally the

collegiate church, was founded in 1849 by the earl of Glasgow and opened in 1851. In 1876 it was constituted the cathedral of Argyll and the Isles. Millport enjoys exceptional facilities for boating and bathing, and there is also a good golf-course. Pop. (1901) 1754, of whom 1028 were females, and 59 spoke both English and Gaelic. Little Cumbrae Island lies to the south, separated by the Tan, a strait half a mile wide. It is if m. long, barely 1 m. broad, and has an area of almost a square mile. Its highest point is 409 ft. above sea-level. On the bold cliffs of the west coast stands a lighthouse. Robert II. is said to have built a castle on the island which was demolished by Cromwell's soldiers in 1653.

The strata met with in the Great and Little Cumbrae belong to the Upper Old Red Sandstone and Carboniferous systems. The former, consisting of false-bedded sandstones and conglomerates, are con- fined to the larger island. The Carboniferous rocks of the Cumbrae belong to the lower part of the Calciferous Sandstone series with the accompanying volcanic zone. In the larger island these sediments, comprising sandstones, red, purple and mottled clays with occasional bands of nodular limestone or cornstone, occupy a considerable area on the north side of Millport Bay. In the Little Cumbrae they appear on the east side, where they underlie and are interbedded with the lavas. The interesting geological feature of these islands is the development of Lower Carboniferous volcanic rocks. They cover nearly the whole of the Little Cumbrae, where they give rise to marked terraced features and are arranged in a gentle synclinal fold. The flows are often scoriaceous at the top and sometimes display columnar structure, as in the crags at the lighthouse. Those rocks ex- amined microscopically consist of basalts which are often porphyritic.

In Great Cumbrae the intrusive rocks mark four periods of erup- tion, three of which may be of Carboniferous age. The oldest, consisting of trachytes, occur as sheets and dikes trending generally E.N.E., and are confined chiefly to the

Upper Old Red Sandstone. They seem to be of older date than the Carboniferous lavas of Little Cumbrae and south Bute. Next come dikes of olivine basalt of the type of the Lion's Haunch on Arthur's Seat, which, though possess- ing the same general trend as the trachytes, are seen to cut them. The members of the third group comprise dikes of dolerite or basalt with or without olivine, which have a general east and west trend, and as they intersect the two previous groups they must be of later date. They probably belong to the east and west quartz dolerite dikes which are now referred to late Carboniferous time. Lastly there are representatives of the basalt dikes of Tertiary age with a north-west trend.

CUMIN.or Cummin (CuminumCyminum), an annual herbaceous plant, a member of the natural order Umbelliferae and probably a native of some part of western Asia, but scarcely known at the present time in a wild state. It was. early cultivated in Arabia, India and China, and in the countries bordering the Mediter- ranean.. Its stem is slender and branching, and about a foot in height; the leaves are deeply cut, with filiform segments; the flowers are small and white. The fruits, the so-called seeds, which constitute the cumin of pharmacy, are fusiform or ovoid in shape and compressed laterally; they are two lines long, are hotter to the taste, lighter in colour, and larger than caraway seeds, and have on each half nine fine ridges, overlying as many oil-channels or vittae. Their strong aromatic smell and warm bitterish taste are due to the presence of about 3 % of an essential oil. The tissue of the seeds contains a fatty oil, with resin, mucilage and gum, malates and albuminous matter; and in the pericarp there is much tannin. The volatile oil of cumin, which may be separated by distillation of the seed with water, is mainly a. mixture of cymol or cymene, CioHu, and cumic aldehyde, C 6 H 4 (C 3 H7)COH. Cumin is mentioned in Isaiah xxviii. 25, 27, and Matthew xxiii. 23, and in the works of Hippocrates and Dioscorides. From Pliny we learn that the ancients took the ground seed medicinally with bread, water or wine, and that it was accounted

the best of condiments as a remedy for squeamish-ness. It was found to occasion pallor ,of the face, whence the expression of Horace, exsangue cuminum (Epist. i. 19), and that of Persius, pallentis gratia cumini (Sat. v. 55). Pliny relates the story that it was employed by the followers of Porcius Latro, the celebrated rhetorician, in order to produce a complexion such as bespeaks application to study (xx. 57). In the middle ages cumin was one of the commonest spices of European growth. Its average price per pound in England in the 13th and 14th centuries was 2d. or, at present value, about is. 4d. (Rogers, Hist. of Agric. and Prices, i. 631). It is stimulant and carminative, and is employed in the manufacture of curry powder. The medicinal use of the drug is now confined to veterinary practice. Cumin is exported from India, Mogador, Malta and Sicily.

CUMMERBUND, a girdle or waistbelt (Hindostani kamar^band, a loin-band). In the East the principle of health is to keep the head cool and the stomach warm; the turban protects the one from the sun, and the cummerbund ensures the other against changes of temperature. In India the cummerbund consists of many folds of muslin or bright-coloured cloth.

CUMMING, JOSEPH GEORGE (1812-1868), English geologist and archaeologist, was born at Matlock in Derbyshire on the 15 th of February 181 2. He was educated at Oakham grammar school, and Emmanuel College, Cambridge, taking the degree of M.A., and entering holy orders in 1835. In 1841 he was appointed vice-principal of King William's College, Castletown, in the Isle of Man, and this position he held until 1856. During this period his leisure time was devoted to a study of the geology and archaeology of the island. The results were published in a classic volume The Isle of Man; its History, Physical, Ecclesi- astical, Civil and Legendary (1848). In 1856 he became master of Ring Edward's grammar school at Lichfield, in 1858 warden and professor of classical literature and geology in Queen's College, Birmingham, in 1862 rector of Mellis, in Suffolk, and in 1867 vicar of St John's,

Bethnal Green, London. He died in London on the 21st of September 1868.

CUMNOCK AND HOLMHEAD, a police burgh of Ayrshire, Scotland, on the Lugar, 33I m. S. of Glasgow by road, with two stations (Cumnock and Old Cumnock) on the Glasgow & South- western railway. Pop. (1001) 3088. It lies in the parish of Old Cumnock (pop. 5144), and is a thriving town, with a town hall, cottage hospital, public library and an athenaeum. Coal and ironstone are extensively mined in the neighbourhood, and the manufactures include woollens, tweeds, agricultural imple- ments and pottery. When Alexander Peden (1626-1686), the persecuted Covenanter, died, he was buried in the Boswell aisle of Auchinleck church; but his corpse was borne thence with every indignity by a company of dragoons to the foot of the gallows at Cumnock, where they intended to hang it in chains. This proving to be impracticable they buried it at the gallows- foot. After the Revolution the inhabitants out of respect for the ″ Prophet's ″ memory abandoned their then burying-ground and turned the old place of execution into the present cemetery. Five miles S.E. lies the parish of New Cumnock (pop. 5367) at the confluence of Afton Water and the Nith. It is rich in minerals, iron, coal, limestone and freestone, and has a station on the Glasgow & South- Western railway. Two miles N.W. of Cumnock is Auchinleck (pronounced Affleck), with a station on the Glasgow & South- Western railway. Coal and iron mining and farming are important industries. It is the seat of the Boswell family, three generations of which achieved greatness — Lord Auchinleck, the judge (who dubbed Dr Johnson ″ Ursa Major″), his son James, the biographer, and his grandson Sir Alexander, the author of ″ Gude nicht and joy be wi' you a',″ ″ Jenny's Bawbee,″ ″ Jenny dang the weaver,″ and other songs and poems, who perished miserably in a duel. Pop. of Auchinleck parish (1901) 6605.

CUNARD, SIR SAMUEL, Bart. (1787–1865), British civil engineer, founder of the Cunard line of steam-ships, was born at Halifax, Nova Scotia, on the 21st of November 1787. He was the son of a merchant, and was himself trained for the pursuits of commerce, in which, by his abilities and enterprising spirit, he attained a conspicuous position. When, in the early years of steam navigation, the English government made known its desire to substitute steam vessels for the sailing ships then employed in the mail service between England and America, Cunard heartily entered into the scheme, came to England, and accepted the government tender for carrying it out. In con- junction with Messrs Burns of Glasgow and Messrs Maclver of Liverpool, proprietors of rival lines of coasting steamers between Glasgow and Liverpool, he formed a company, and the first voyage of a Cunard steamship was successfully made by the "Britannia" from Liverpool to Boston, U.S.A., between July 4 and 19, 1840 (see Steamship Lines). In acknowledgment of his energetic and successful services Cunard was, in 1859, created a baronet. He died in London on the 28th of April

1865.

CUNAS, a tribe of Central American Indians. Their home is the Isthmus of Panama, from the Chagres to the Atrato. They are sometimes called Darien or San Bias Indians. They are a small active people, with remarkably light complexions.

CUNDINAMARCA, till 1909 a department of the eastern plateau of Colombia, South America, having the departments of Quesada and Tundama on the N., Tolima on the W. and S., and the Meta territory on the S.E. and E. The territorial redistribution of 1905 deprived Cundinamarca of its territories on the eastern plains, and a part of its territory in the Eastern Cordillera out of which Quesada and the Federal district were created — its area being reduced from 79,691 to 5060 sq. m., and its estimated population from 500,000 to 225,000. A considerable part of its area consists of plateaus enjoying a temperate climate and producing the

fruits and cereals of the temperate zone, and another important part lies in the valley of the Magdalena and is tropical in character. The district of Fusagasuga in the southern part of this region is celebrated for the excellence of its coffee. The capital of the department was Facatativa (est. population, 7500), situated on the western margin of the sabana of Bogota, 25 m. N.W. from that capital

by rail. Other important towns are Caque2a, Sibate, La Meza and Tocaima.

CUNEIFORM (from Lat. cuneus, a wedge), a form of writing, ex ensively used in the ancient world, especially by the Baby- lonians and Assyrians. The word ” cuneiform ” was first applied in 1700 by Thomas Hyde, professor of Hebrew in the university of Oxford, in the expression ” dactuli pyramidales seu cuneifo:mes,” and it has found general acceptance, though efforts have been made to introduce the expression ” arrow- headed ” writing. The name ” cuneiform ” is fitting, for each character or sign is composed of a wedge (J or ►—), or a combina- tion of wedges („IiJ50, written from left to right. The wedge is always pointed towards the right (»—) or downwards (]) or aslant(\), or two may be so combined as to form an angle (() called by German Assyriologists a Winkelhaken, a word now sometimes adopted by English writers on the subject. The word cuneiform has passed into most modern languages, but the Germans use Keilschrift {i.e. wedge-script) and the Arabs mismari (t#.A— •») or nail- writing.*

In Persia, 40 m. N.E. of Shiraz, is a range of hills, Mount Rachmet, in front of which, in a semicircular form, rises a vast terrace-like platform. It is partly natural, but was Discovery walled up in front, levelled off and used as the base and of great temples and palaces. The earliest European, decipher- at present known to us, who visited the site was a me ” ‘ Wandering friar Odoricus (about a.d. 1320), who does not seem to have noticed the inscriptions cut in the stone. These were first observed by Josaphat Barbaro, a

Venetian traveller, about 1472. In 1621 the ruins were visited by Pietro della Valle, who was the first to copy a few of the signs, which he sent in a letter to a friend in Naples. His copy was not well made, but it served

<1

\«TT

the useful purpose of directing attention to an unknown script which was certain to attract scholars to the problem of its decipherment. To this end it was necessary that complete inscriptions and not merely separate signs should be made accessible to European scholars. The first man to attempt to satisfy this need was Sir John Chardin, in whose volumes of travels published at Amsterdam in 1711 one of the small inscrip- tions found at the ruins of Persepolis was carefully and accurately reproduced. It was now plainly to be seen, as indeed others had surmised, that these inscriptions at Persepolis had been written in three languages, distinguished each from other by an increasing complexity in the signs with which they were written. The three languages have since been determined as Persian, Susian and Babylonian. But before the decipherment could begin it was necessary that all the available material should be copied and published. The honour of performing this great task fell to Carsten Niebuhr, who visited Persepolis in March 1765, and in three weeks and a half copied all the texts, so well that little improvement has been made in them since. When Niebuhr returned to Denmark he studied carefully the little inscriptions and convinced himself that the guesses of some of his predecessors were correct, and that the inscriptions were to be read from left to right. He observed that three systems of writing were discernible, and that these were always kept distinct in the inscriptions. He did not, however, draw the natural conclusion that they represented three languages, but supposed that the proud builders of Persepolis had written their inscriptions in threefold form. He divided the little inscriptions into three classes, according to

the manner of their writing, calling them classes I., II. and III. He then arranged all those he had copied that belonged to class I., and by careful comparison decided that in them there were employed altogether but forty- two signs. These he copied out and set in order in one of his plates. This list of signs was so nearly complete and accu- rate that later study has made but slight changes in it. When

Niebuhr had made his list of signs he naturally enough decided that this language, whatever it might be, was written in alpha- betic characters, a conclusion which later investigation has not overthrown. Beyond this Niebuhr was not able tc go, and not even one sign revealed its secret to his inquiry. When, however, he had published his copies (in 1777) there were other scholars ready to take up the difficult task. Two scholars independently, Olav Tychsen of Rostock and Friedrich Miinter of Copenhagen, began work upon the problem. Tychsen first observed that there occurred at irregular intervals in the inscriptions of the first class a wedge that pointed neither directly to the right nor downward, but inclined diagonally. This he suggested was the dividing sign used to separate words. This very simple discovery later became of great importance in the hands of Miinter. Tychsen also correctly identified the alphabetic signs for ” a,” ” d ,” ” u ” and ” s,” but he failed to decipher an entire inscription, chiefly perhaps because, through an error in history, he supposed that they were written during the Parthian dynasty (246 b.c- a.d. 227). Miinter was more fortunate than Tychsen in his historical researches, and this made him also more successful in linguistic attempts. He rightly identified the builders of Persepolis with the Achaemenian dynasty, and so located in time the authors of the inscriptions (538-465 B.C.). Inde- pendently of Tychsen he identified the oblique wedge as a divider between words, and found the meaning of the sign for ” b.” These may appear to be small

matters, but it must be remembered that they were made without the assistance of any bilingual text, and were indeed taken bodily out of the gloom which had settled upon these languages centuries before. They did not, however, bring us much nearer to the desired goal of a reading of any portion of the inscriptions. The whole case indeed seemed now perilously near a stalemate. New methods must be found, and a new worker, with patience, persistence, power of combination, insight, the historical sense and the feeling for archaeological indications.

In 1802 Georg Friedrich Grotefend (q.v.) was persuaded by the librarian of Gottingen University to essay the task. He began with the assumption that there were three languages, and that of these the first was ancient Persian, the language of the Achaemenians, who had erected these palaces and caused these inscriptions to be written. For his first attempts at decipherment he chose two of these old Persian inscriptions and laid them side by side. They were of moderate length, and the frequent recurrence of the same signs in them seemed to indicate that their contents were similar. The method which he now pursued was so simple, yet so sure, as he advanced step by step, that there seemed scarcely a chance of error. Miinter had observed in all the Persian texts a word which occurred in two forms, a short and a longer form. This word appeared in Grotefend's two texts in both long and short forms. Miinter had suggested that it meant " king " in the short form and " kings " in the longer, and that when the two words occurred together the expression meant " king of kings." But further, this word occurred in both inscriptions in the first line, and in both cases was followed by the same word. This second word Grotefend supposed to mean " great," the combined expression being " king great," that is, " great king." All this found support in the phraseology of the lately deciphered Sassanian inscriptions, and it was plausible in itself. It must, however, be supported by definite facts, and furthermore each word must be separated into its alphabetic parts, "every one of them identified, and

the words themselves be shown to be philologically possible by the production of similar words in related languages. In other words, the archaeological method must find support in a philological method. • To this Grotefend now devoted himself with equal energy. His method was as simple as before. He had made out to his own satisfaction the titles " great king, king of kings." Now, in the Sassanian inscriptions, the first word was always the king's name, followed immediately by " great king, king of kings," and Grotefend reasoned that this was probably true in his texts. But if true, then these two texts were set up by two different kings, for the names were not the same at the

beginning. Furthermore the name with which his text No. I. began appears in the third line of text No. II., but in a somewhat longer form, which Grotefend thought was a genitive and meant " of N." It followed the word previously supposed to be " king " and another which might mean son (N king son), so that the whole expression would be " son of N king." From these facts Grotefend surmised that in these two inscriptions he had the names of three rulers, grandfather, father and son. It was now easy to search the list of the Achaemenian dynasty and to find three names which would suit the conditions, and the three which he ventured to select were Hystaspes, Darius, Xerxes. According to his hypothesis the name at the beginning of inscription I. was Darius, and he was ready to translate his texts in part as follows: —

I. Darius, great king, king of kings . . . son of Hystaspes. . . . II. Xerxes, great king, king of kings . . . son of Darius king.

The form which he provisionally adopted for Darius was Darheush; later investigation has shown that it ought really to be read as Daryavush, but the error was not serious, and he had safely secured at least the letters D, A, R, SH. It was a most wonderful achievement, the importance of which he did not realize, for in it was the key to the decipherment of three ancient languages. To very few men has it

been given to make discoveries so important both for history and for philology.

To Grotefend it was, however, not given to translate a whole text, or even to work out all the words whose meaning he had surmised. Rasmus Christian Rask (1787–1832), who followed him, found the plural ending in Persian, which had baffled him; and Eugene Burnouf (1801–1852), by the study of a list of Persian geographical names found at Naksh-i-Rustam, dis- covered at a single stroke almost all the characters of the Persian alphabet, and incidentally confirmed the values already deter- mined by his predecessors.

At the same time as Burnouf, the eminent Sanskrit scholar Professor Christian Lassen (1800–1876), of Bonn, was studying the same list of names; and his results were published at the same time. The controversy which resulted as to priority of discovery may be here passed over while we sum up the results in general conclusions. Lassen may certainly claim in the final court of history that he discovered independently of Burnouf the values of at least six and possibly of eight signs. But in another respect he made very definite progress over Burnouf. He discovered that, if the system of Grotefend were rigidly followed, and to every sign were given the- value Grotefend had assigned, some words would be left wholly or almost wholly without vowels; and therefore unpronounceable. As instances of such words he mentioned CPRD, THTGUS, KTPTUK, FRAISJM. This situation led Lassen to a very important discovery, towards which his knowledge of the Sanskrit alphabet did much to bring him. He came, in short, to the conclusion that the ancient Persian signs were not entirely alphabetic, but were at least partially syllabic, that is, that certain signs were used to represent not merely an alphabetic character like ” b,” but also a syllable such as ” ba,” ” bi ” or ” bu.” He claimed that he had successfully demonstrated that the sign for ” a ” was only used at the beginning of a word, or before a consonant, or before another vowel, and that in every other case it was included in the

consonant sign. Thus in the inscription No I. in the second line the signs should be read VA-ZA-RA-KA. This was a most important discovery, and may be said to have revolutionized the study of these long puzzling texts.

During the entire time of this slow process of decipherment, from the first essays of Grotefend in 1802 until the publication of Lassen's book in 1836, there were more sceptics than believers in the results of the deciphering process. Indeed the history of all forms of decipherment of unknown languages shows that scepticism concerning them is far more prevalent than credulity or even a too ready acceptance. There was need for a man of another people, of different training and a fresh and unbiased mind, to put the capstone upon the decipherment, and he was already at work when Lassen's important researches appeared.

CUNEIFORM

631

Major (afterward Sir) Henry Rawlinson had gone out to India, in the service of the East India Company, while still a boy. There he had learned Persian and several of the Indian vernaculars. That was not the sort of training that had prepared Grotefend, Burnouf or Lassen, but it was the kind that the early travellers and copyists had enjoyed. In 1833 young Rawlinson went to Persia, to work with other British officers in the reorganization of the Persian army. While engaged in this service his attention was drawn to the ancient Persian cuneiform inscriptions. In 1835 he copied with great care the texts at Hamadan, and began their decipherment. Of all the eager work which had been going on in Europe he knew little. It is no longer possible to ascertain when he gained his first information of Grotefend's work, for Norris, the secretary of the Royal Asiatic Society, has left us no record of when he began to send notices of the German's work. Whenever it was, there seems to be no doubt that Rawlinson worked independently for a time. His

method was strikingly like Grotefend's. He had copied two trilingual in- scriptions, and recognized at once that he had three languages before him. In 1839 (Journal of the Royal Asiatic Society, x. pp. 5, 6) he thus wrote of his method: " When I proceeded . . . to compare and interline the two inscriptions (or rather the Persian columns of the two inscriptions, for, as the compartments exhibiting the inscription in the Persian language occupied the principal place in the tablets, and were engraved in the least complicated of the three classes of cuneiform writing, they were naturally first submitted to examination) I found that the characters coincided throughout, except in certain particular groups, and it was only reasonable to suppose that the grounds which were thus brought out and individualized must represent proper names. I further remarked that there were but three of these distinct groups in the two inscriptions; for the group which occupied the second place in one inscription, and which, from its position, suggested the idea of its representing the name of the father of the king who was there commemorated, corre- sponded with the group which occupied the first place in the other inscription, and thus not only served determinately to connect the two inscriptions together, but, assuming the groups to represent proper names, appeared also to indicate a genealogical succession. The natural inference was that in these three groups of characters I had obtained the proper names belonging to three consecutive generations of the Persian monarchy; and it so happened that the first three names of Hystaspes, Darius and Xerxes, which I applied at hazard to the three groups, according to the succession, proved to answer in all respects satisfactorily and were, in fact, the true identification."

Rawlinson's next work was the copying of the great inscription of Darius on the rocks at Behistun (q.v.). He had first seen it in 1835, and as it was high up on the rocky face, and apparently inaccessible, he had studied it by means of a field-

glass. He was not able to copy the whole of the Persian text, but in 1837, when he was more skilled in the script, he secured more of it. In the next year he forwarded to the Royal Asiatic Society of London his translation of the first two paragraphs of the Persian text, containing the name, titles and genealogy of Darius. This was little less than a tour de force, for it must be remembered that this had been accomplished without the knowledge of other ancient languages which his European competitors had enjoyed. The translation, received in London on the 14th of March, made a sensation, and a transcript sent in April to the Asiatic Society of Paris secured him an honorary membership in that dis- tinguished body. He was now known, and many made haste to send him copies of everything important which had been pub- lished in Europe. The works of Burnouf, Niebuhr, le Brun and Porter came to his hands, and with such assistance he made rapid progress, and in the winter of 1 838-1 839 his alphabet of ancient Persian was almost complete. In 1839 he was in Bagdad, his work written out and almost ready for publication. But he delayed, hoping for more light, and revising sign by sign with exhaustless patience. He expected to publish his preliminary memoir in the spring of 1840, when he was suddenly sent to Afghanistan as political agent at Kandahar. Here he was too

busily engaged in war administration to attend to his favourite studies, which were not renewed until 1843 when he returned to Bagdad. There he received fresh copies and corrections of the Persepolis inscriptions which had been made by Westergaard, and later made a journey to Behistun to perfect his own copies of the texts which had formed the basis of his own first study. At last, after many delays and discouragements, he published, in 1846, in the Journal of the Royal Asiatic Society, his memoir, or series of memoirs, on the ancient Persian inscriptions, in which for the first time he gave a nearly complete translation of the Persian text of Behistun. In this one publication Rawlinson attained imperishable fame in Oriental research. His work had

been carried on under greater difficulties than those in the path of his European colleagues, but he had surpassed them all in the making of an intelligible and connected translation of a long inscription. He had indeed not done it without assistance from the work of Burnouf, Grotefend and Lassen, but when all allowance is made for these influences his fame is not diminished nor the extent of his services curtailed. His method was adopted before he knew of Lassen's work. That two men of such different training and of such opposite types of mind should have lighted upon the same method, and by it have attained the same results, confirmed in the eyes of many the truth of the decipherment.

The work of the decipherment of the old Persian texts was now complete for all practical purposes. But in 1846 there appeared a paper read before the Royal Irish Academy by the Rev. Edward Hincks of Killyleagh, County.Down, Ireland, whose keen criticisms of Lassen's work, and original contributions to the definite settlement of syllabic values, may be regarded as closing the period of decipherment of Persian cuneiform writing.

The next problem in the study of cuneiform was the decipher- ment of the second language in each of the trilingual groups. The first essay in this difficult task was made in 1844 by Niels Louis Westergaard. His method was very similar to that used by Grotefend in the decipherment of Persian. He selected the names of Darius, Hystaspes, Persians and others, and compared them with their equivalents in the Persian texts. By this means he learned a number of signs, and sought by their use in other words to spell out syllables or words whose meanings were then ascertained by conjecture or by comparison. He estimated the number of characters at eighty-two or eighty-seven, and judged the writing to be partly alphabetic and partly syllabic. The language he called Median, and classified it in " the Scythian, rather than in the Japhetic family." The results of Westergaard were subjected to incisive criticism by Hincks, who made a distinct gain in the problem. It next passed to the hands of

de Saulcy, who was able to see further than either. But the matter moved with difficulty because the copied texts were not accurate. By the generosity of Sir Henry Rawlinson his superb copies of the Behistun text, second column, were placed in the hands of Mr Edwin Norris, who was able in 1852 to present a paper to the Royal Asiatic Society deciphering nearly all of it. Mordt- mann followed him, naming the language Susian, which was met with general acceptance and was not displaced by the name Amardian, suggested by A. H. Sayce in two papers which other- wise made important contributions to the subject. With his contributions the problem of decipherment of Susian may be considered as closed. The latter workers could only be builders on foundations already laid.

The decipherment of the third of the three languages found at Persepolis and Behistun followed quickly on the success with Susian. The first worker was Isadore Lowenstern, who made out the words for " king " and " great " and the sign for the plural, but little more. The first really great advance was made by Hincks in 1846 and 1847. In these he determined successfully the values of several signs, settled the numerals, and was apparently on the high-road toward the translation of an entire Assyrian text. He was, however, too cautious to proceed so far, and the credit of first translating a short Assyrian text belongs to Longperier, who in 1847 published the following as the trans- lation of an entire text: "Glorious is Sargon, the great king, the (. . .) king, king of kings, king of the land of Assyria."

It was nearly all correct, but it advanced our knowledge but slightly because it did not give the forms of the words — because (to put it in another way) he was not able to transliterate the Assyrian words. This was the great problem. In the Persian texts there were but forty-four signs, but in the

third column of the Persepolis texts Grotefend had counted one hundred and thirty different characters, and estimated that in all the Babylonian texts known to him there were about three hundred different signs, while Botta discovered six hundred and forty-two in the texts found by him at Khorsabad. That was enough to make the stoutest heart quail, for a meaning must be found for every one of these signs. There could not be so many syllables, and it was, therefore, quite plain that the Babylonian language must have been written in part at least in ideograms. But in 1851 Rawlinson published one hundred and twelve lines of the Babylonian column from Behistun, accompanied by an inter- linear transcription into Roman characters, and a translation into Latin. That paper, added to Hinck's still more acute detail studies, brought to an end the preliminary decipherment of Babylonian. There were still enormous difficulties to be surmounted in the full appreciation of the complicated script, but these would be solved by the combined labours of many workers.

The cuneiform script had its origin in Babylonia and its

inventors were a people whom we call the Sumerians. Before

the Semitic Babylonians conquered the land it was

ga ' inhabited by a. people of unknown origin variously classified, by different scholars, with the Ural-altaic or . even with the Indo-European family, or as having blood relationship with both. This people is known to us from thousands of cunei-form inscriptions written entirely in their language, though our chief knowledge of them was for a long time derived from Sumerian inscriptions with interlinear translations in Assyrian. Their language is called Sumerian (li-sa-an Su-me-ri) by the Assyrians (Br. Mus. 81-7-27, 130), and its characteristics are being slowly developed by the elaborate study of the immense literature which has come down to us. In 1884 Halevy denied the existence

of the Sumerian language, and claimed that it was merely a cabalistic script invented by the priests of the Semites. His early success has not been sustained, and the vast majority of scholars have ceased to doubt the existence of the language.

*The Sumerians developed their script from a rude picture- writing, some early forms of which have come down to us. In course of time they used the pictures to represent sounds, apart from ideas. They wrote first on stone, and when clay was adopted soon found that straight lines in soft clay when made by a single pressure of the stylus tend to become wedges, and the pictures therefore lost their character and came to be mere conventional groups of wedges. Some of these wedge-shaped signs are of such character that we are still able to recognize or re-construct the original picture from which they came. The Assyrian sign »-*f", which means heaven, appears in early texts in the form ^J6 in which its star-like form is quite evident (star = heaven) and from which the linear form ^j£ may be not improbably pre-supposed. A number of other cases were enumerated by the Assyrians themselves (see Cuneiform Texts from Bab. Tab. in Brit. Museum, vol. v., 1898), and there can be no reasonable doubt that this is the origin of the script.*

The number of the original picture-signs cannot have been great, but the development of new signs never ceased till the _ . cuneiform script passed wholly from use. The simplest

meat and form of development was doubling, to express plurality character- or intensity. After this came the working of two istics. s j gns j ntQ ong . t jj US yj « water » w hen placed in»-t£rj

" mouth " gave the new sign r-zfiTj " t0 drink," and many others. Other signs were formed by the addition of four lines, either vertically or horizontally, to intensify the original meaning. Thus, for instance, the old linear sign r~f^] means dwelling, but with four additional signs, thus CZX^, it means " great house."

History.

This sign gradually changed in form until it came to be £:\<« [. This method of development was called by the Sumerians gunu, and signs thus formed are now commonly called by us, gunu signs. They number hundreds and must be reckoned with in our study of the script development, though perhaps recent scholars have somewhat exaggerated their importance. The process of development is obscure and must always remain so.

*The script as finally developed and used by the Assyrians is cumbrous and complicated, and very ill adapted to the sounds of the Semitic alphabet. It has (1) simple syllables, consisting of one vowel and a consonant, or a vowel by itself, thus ff "a," ttT ab, fcU ib, t£ ub, -Jz{ ba, JlJ bi, ¥»• bu. In addition to these the Assyrian had also (2) compound syllables, such as *hI| bit, «-£ = y£ bal, and (3) ideograms, or signs which express an entire word, such as* $_G$*^\ beltu, lady, f £j abu, father. The difficulty of reading this script is enormously increased by the fact that many signs are polyphonous, i.e. they may have more than one syllabic value and also be used as an ideogram. Thus the sign ^ has the ideographic values of matu, land, shadu, mountain, kashadu, to conquer, napachu, to arise (of the sun), and also the syllabic values kur, mad, mat, shad, shat, ' lat, nad, nat, kin and gin. This method of writing must lead to ambiguity, and this difficulty is helped somewhat by (4) determinatives, which are signs intended to indicate the class to which the word belongs. Thus, the f is placed before names of persons, and V 1 (the ideogram for matu, country, and shadu, mountain) is placed before names of countries and mountains, and >*f (ilu, god) before the names of gods.*

The cuneiform writing, begun by the Sumerians in a period so remote that it is idle to speculate concerning it, had a long and very extensive history. It was first adopted by the Semitic Babylonians, and as we have seen was modified, developed, nay almost made over. Their inscriptions are written in it from circa 4500 B.C. to the 1st

century B.C. From their hands it passed to the Assyrians, who simplified some characters and conventionalized many more, and used the script during the entire period of their national existence from 1500 B.C. to 607 B.C. From the Babylonian by a slow process of evolution the much simplified Persian script was developed, and with the Babylonian is also to be connected the Susian, less complicated than the Babylonian, but less simple than the Persian. The Chaldians (not Chaldaeans), who lived about Lake Van, also adopted the cuneiform script with values of their own, and expressed a considerable literature in it. The discovery in 1887 of the Tell-el-Amarna tablets in upper Egypt showed that the same script was in use in the 15th century B.C., from Elam to the Mediterranean and from Armenia to the Persian Gulf for purposes of correspondence. There is good reason to expect the discovery of its use by yet other peoples. It was one of the most widely used of all the forms of ancient writing.

Bibliography. — The history of the decipherment may be further studied in R. W. Rogers, History of Babylonia and Assyria, vol.i. (N.Y. and London, 1900) ; and in A. J. Booth, The Discovery and Decipher- ment of the Trilingual Cuneiform Inscriptions (London, 1902), which is very exhaustive and accurate. The Sumerian question may best be studied in F. H. Weissbach, Die Sumerische Frage (Leipzig, 1898), and Charles Fossey, Manuel d'Assyriologie, tome i. (Paris, 1904). For development and characteristics, see Friedrich Delitzsch, Die Entstehung des dllesten Schriftsystems (Leipzig, 1897) ; Paul Toscanne, Les Signes sumeriens derives (Paris, 1905). (R. W. R.)

CUNEO (Fr. Coni), a town and episcopal see of Piedmont, Italy, the capital of the province of Cuneo, 55 m. by rail S. of Turin, 1722 ft. above sea-level. Cuneo lies on the railway from Turin to Ventimiglia, which farther on passes under the Col di Tenda (tunnel 5 m.' long). It is also a junction for Mondovi and Saluzzo, and has steam tramways to Borgo S. Dalmazzo, Boves, Saluzzo and Dronero. Pop.

(1901) 15,412 (town), 26,879 (commune). Its name (" wedge ") is due to its position on a hill between two streams, the Stura and the Gesso, with fine views of the mountains. The Franciscan church, now converted into a military storehouse, belongs to the 1 2th century, but there are no other buildings of special interest. The fortifications have

been converted into promenades. Cuneo was founded about 1 1 20 by refugees from local baronial tyranny, who, after the destruction of Milan by Barbarossa, were joined by Lombards. In 1382 it swore fealty to Amedeus VI., duke of Savoy. It was an important fortress, and was ceded by the treaty of Cherasco (1796), with Ceva and Tortona, to the French. In 1799 it was taken after ten days' bombardment by the Austrian and Russian armies, and, in 1800, after the victory of Marengo, the French demolished the fortifications.

CUNEUS (Latin for " wedge "; plural, cunei), the architectural term applied to the wedge-shaped divisions of the Roman theatre separated by the scalae or stairways; see Vitruvius v. 4.

CUNITZ, MARIA (c. 16 10-1664), Silesian astronomer, was the eldest daughter of Dr Heinrich Cunitz of Schweinitz, and the wife (1630) of Dr Elias von Lbven, of Pitschen in Silesia — both of them men of learning and distinction. From her universal accomplishments she was called the " Silesian Pallas," and the publication of her work, Urania propitia (Oels, 1650), a simplifica- tion of the Rudolphine Tables, gained her a European reputation. It was composed at the village of Lugnitz, close by the convent of Olobok (Posen), where, with her husband, she had taken refuge at the outbreak of the Thirty Years' War, and was dedi- cated to the emperor Frederick III. The author became a widow in 1661, and died at Pitschen on the 24th of August 1664.

See A. G. Kastner, Geschichte der Mathematik, iv. 430 (1800) ; N. Henelii, Silesiographia renovata, cap. vi. p. 684; J. C. Eberti's Schlesiens wohlgelehrtes Frauenzimmer , p. 25 (Breslau, 1727) ; Allgemeine deutsche Biographie (Schimmelpfenning) ; &c.

CUNNINGHAM, ALEXANDER (£.1655–1730), Scottish classi- cal scholar and critic, was born in Ayrshire. Very little is known of his uneventful life. It is probable that he completed his education at Leiden or Utrecht. He was tutor to the son of the first duke of Queensberry, through whose influence he was appointed professor of civil law in the university of Edinburgh. In 17 10, the Edinburgh magistrates, regarding the university patronage as their privilege, appointed another professor, ignoring the appointment of Cunningham, who had been installed in the office for at least ten years. Cunningham thereupon left England for the Hague, where he resided until his death. He is chiefly known for his edition of Horace (1721) with notes, mostly critical, which included a volume of Animadversiones upon Richard Bentley's notes and emendations. They marked him as one of the most able critics of Bentley's (in many cases) rash and taste- less conjectural alterations of the text. Cunningham also edited the works of Virgil and Phaedrus (together with the Sententiae of Publilius Syrus and others). He had also been engaged for some years in the preparation of an edition of the Pandects and of a work on Christian evidences.

Life by D. Irving in Lives of Scottish Writers (1839).

The above must not be confused with Alexander Cunningham, British minister to Venice (1715–1720), a learned historian and author, of The History of Great Britain (from 1688 to the accession of George I.), originally written in Latin and published in an English translation after his death.

CUNNINGHAM, ALLAN (1784–1842), Scottish poet and man of letters, was born at Kenj Dumfriesshire, on the

7th of December 1784, and began life as a stone mason's apprentice. His father was a neighbour of Burns at Ellisland, and Allan with his brother James visited James Hogg, the Ettrick shepherd, who became a friend to both. Cunningham contributed some songs to Roche's Literary Recreations in 1807, and in 1809 he collected old ballads for Robert Hartley Cromek's Remains of Nithsdale and Galloway Song; he sent in, however, poems of his own, which the editor inserted, even though he may have suspected their real author- ship. In 18 10 Cunningham went to London, where he supported himself chiefly by newspaper reporting till 1814, when he became clerk of the works in the studio of Francis Chantrey, retaining this employment till the sculptor's death in 1841. He meanwhile continued to be busily engaged in literary work. Cunningham's prose is often spoiled by its misplaced and too ambitious rhetoric; his verse also is often over-ornate, and both are full of manner- isms. Some of his songs, however,, hold a high place among

British lyrics. "A Wet Sheet and a Flowing Sea " is one of the best of our sea-songs, although written by a landsman ; and many other of Cunningham's songs will bear comparison with it. He died on the 30th of October 1842.

He was married to Jean Walker, who had been servant in a house where he lived, and had five sons and one daughter. Joseph Davey Cunningham (1812-1851) entered the Bengal Engineers, and is known by his History of the Sikhs (1849). Sir Alexander Cunningham (1814-1893) also entered the Bengal Engineers; attaining the rank of major-general; he was director general of the Indian Archaeological Survey (1870-1885), and wrote an Ancient Geography of India (1871) and Coins of Medieval India (1894). Peter Cunningham (1816-1869) pub- lished several topographical and biographical studies, of which the most important are his Handbook of London (1849) and The Life of Drummond of Hawthornden (1833). Francis Cunningham (1820-1875) joined the Indian army, and published editions of Ben Jonson (1871), Marlowe (1870) and Massinger

(1871).

The works of Allan Cunningham include Lives of the Most Eminent British Painters, Sculptors and Architects (1829–1833); Sir Marma- duke Maxwell (1820), a dramatic poem; Traditionary Tales of the Peasantry (1822), several novels (Paul Jones, Sir Michael Scott, Lord Roldan) ; the Maid of Elwar, a sort of epic romance ; the Songs of Scotland (1825) ; Biographical and Critical History of the Literature of the Last Fifty Years (1833); an edition of The Works of Robert Burns, with notes and a life containing a good deal of new material (1834); Biographical and Critical Dissertations affixed to Major's Cabinet Gallery of Pictures; and Life, Journals and Correspondence of Sir David Wilkie, published in 1843. An edition of his Poems and Songs was issued by his son, Peter Cunningham, in 1847.

CUNNINGHAM, WILLIAM (1805–1861), Scottish theologian and ecclesiastic, was born at Hamilton, in Lanarkshire, on the 2nd of October 1805, and educated at the university of Edinburgh. He was licensed to preach in 1828, and in 1830 was ordained to a collegiate charge in Greenock, where he remained for three years. In 1834 he was transferred to the charge of Trinity College parish, Edinburgh. His removal coincided with the com- mencement of the period known in Scottish ecclesiastical history as the Ten Years' Conflict, in which he was destined to take a leading share. In the stormy discussions and controversies which preceded the Disruption the weight and force of his intellect, the keenness of his logic, and his firm grasp of principle made him one of the most powerful advocates of the cause of spiritual independence; and he has been generally recognized as one of three to whom mainly the existence of the Free Church is due, the others being Chalmers and Candlish. On the formation of the Free Church in 1843. Cunningham was appointed professor of church history and divinity in the New College, Edinburgh, of which he became principal in 1847 in succession to Thomas Chalmers. His career was very successful, his controversial sympathies

combined with his evident desire to be rigidly impartial qualifying him to be an interesting delineator of the more stirring periods of church history, and a skilful disentanglerof the knotty points in theological polemics. In 1859 he was appointed moderator of the General Assembly. He had received the degree of D.D. from the university of Princeton in 1842. He died on the 14th of December 1861. He was one of the founders of the Evangelical Alliance. A theological lectureship at the New College, Edinburgh, was endowed in 1862, to be known as the Cunningham lectureship.

A Life of Cunningham, by Rainy and Mackenzie, appeared in 1871.

CUNNINGHAM, WILLIAM (1849-), English economist, was born at Edinburgh on the 29th of December 1849. Educated at Edinburgh Academy and University and Trinity College, Cambridge, he graduated 1st class in the Moral Science tripos in 1873, and in the same year took holy orders. He was university lecturer in history from 1884 to 1891, in which year he was appointed professor of economics at King's College, London, a post which he held until 1897. He was lecturer in economic history at Harvard University (1899), and Hulsean lecturer at Cambridge (1885). He became vicar of Great St Mary's, Cam- bridge, in 1887, and was made a fellow of the British Academy. In 1906 he was appointed archdeacon of Ely. Dr Cunningham's

Growth of English Industry and Commerce during the Early and Middle Ages (1890; 4th ed., 1905) and Growth of English Industry and Commerce in Modern Times (1882; 3rd ed., 1903) are the standard works of reference on the industrial history of England. He also wrote The Use and Abuse of Money (1891); Alien Immigration (1897); Western Civilization in its Economic Aspect in Ancient Times (1898), and in Modern Times (1900), and The Rise and Decline of

Free Trade (1905). Dr Cunningham's eminence as an economic historian gave special importance to his attitude as one of the leading supporters of Mr Chamberlain from 1903 onwards in criticizing the English free^ trade policy and advocating tariff reform.

CUP (in O.E. cuppe; generally taken to be from Late Lat. cuppa, a variant of Lat. cupa, a cask, cf. Gr. nvTreWov), a drink- ing vessel, usually in the form of a half a sphere, with or without a foot or handles. The footless type with a single handle is preserved in the ordinary tea-cup. The cup on a stem with a base is the usual form taken by the cup as used in the celebration of the eucharist, to which the name " chalice " (Lat. calix, Gr. kuXi£, a goblet) is generally given. (See Drinking Vessels and Plate.)

CUPAR, a royal, municipal and police burgh, and capital of the county of Fifeshire, Scotland, 11 m. W. by S. of St Andrews by the North British railway. Pop. (1901) 4511. It is situated on the left bank of the Eden, in the east of the Howe (Hollow) of Fife, and is sometimes written Cupar-Fife to distinguish it from Coupar-Angus in Perthshire. Among the chief buildings are the town hall, county buildings, corn exchange, Duncan Institute, cottage hospital, Union Street Hall and the Bell- Baxter school. The school, formerly called the Madras Academy, was originally endowed (1832) by Dr Bell, founder of the Madras system of education, but, having been enriched at a later date by a bequest of Sir David Baxter (1873), it was after- wards called the Bell-Baxter school. The Mercat Cross stands at " the Cross " in the main street, where it was set up in 1897, having been removed from Hilltarvit, an eminence in the neighbourhood of Cupar, on the western slope of which, at Garliebank, the truce was signed between Mary of Guise and the lords of the Congregation. In the parish, but at a distance from the town, are the Fife and Kinross asylum and the Adam- son institute, a holiday home for poor children from Leith. The town received its charter in 1356 from David II., and, being situated between Falkland and St Andrews,

was con- stantly visited by Scottish sovereigns, James VI. holding his court there for some time in 1583. The site of the 12th-century castle, one of the strongholds of the Macduffs, thanes or earls of Fife, is occupied by a public school. On the esplanade in front of Macduff Castle, still called the Playfield, took place in 1552 one of the first recorded performances of Sir David Lind- say's Ane Satyre of the Three Estaits (1540); his Tragedy of the Cardinal (1547), referring to the murder of Beaton, being also performed there. Sir David sat in the Scottish parliament as commissioner for Cupar, his place, the Mount, being within 3 m. north-west of the town. Lord Chancellor Campbell (1799-1861) was a native of Cupar.

Cupar is an agricultural and legal centre. Its chief industry is the manufacture of linen, and tanning is carried on. At Cupar Muir, i| m. to the west, there are a sandstone quarry and brick works. The town has also some repute for the quality of its printing, both in black and colour. This was largely due to the Tullis press, which produced about the beginning of the 19th century editions of Virgil, Horace and other classical writers, under the recension of Professor John Hunter of St Andrews, which were highly esteemed for the accuracy of their typography. Cupar belongs to the St Andrews district group of burghs for returning one member to parliament, the other constituents being Crail, the two Anstruthers, Kil- renny, Pittenweem and St Andrews.

There are several interesting places within a few miles. To the north-east is the parish of Dairsie, where one of the few parliaments that ever met in Fife assembled in 1335. The castle in which the senate sat was also the residence for a period of

Archbishop Spottiswood, who founded the parish church in 1621. Two miles and a half north of Dairsie is situated Kilmany, which was the first charge of Thomas Chalmers. He was ordained to it in May 1803 and held it for twelve years. David Hackston, the Covenanter, who was a passive assister

at the assassination of Archbishop Sharp, belonged to this parish, his place being named Rathillet. After his execution at Edinburgh (1680) one of his hands was buried at Cupar, where a monument inscription records the circumstances of his death. To the west of Kilmany lies Creich, where Alexander Henderson (1583–1646), the Cove- nanting divine and diplomatist, and John Sage (1652–1711), the non-juring archbishop of Glasgow, were born. Henderson took a keen interest in education and gave the school at Creich a small endowment. Some 3 m. to the south-west of Cupar is Cults, where Sir David Wilkie, the painter, was born. His father was minister of the parish, and Pitlessie, the fair of which provided the artist with the subject of the first picture in which he showed distinct promise, lies within a mile of the manse. In the sandstone of Dura Den, a ravine on Ceres Burn, 25 m. E. of Cupar, have been found great quantities of fossils of ganoid fishes. The rocks belong to the Upper Old Red Sandstone.

CUPBOARD, a fixed or movable closet usually with shelves. As the name suggests, it is a descendant of the credence or buffet, the characteristic of which was a series of open shelves for the reception of drinking vessels and table requisites. After the word lost its original meaning — and down to the end of the 16th century we still find the expression ” on the cupboard ” — ■ this piece of furniture was, as it to some extent remains, movable, but it is now most frequently a fixture designed to fill a corner or recess. Throughout the 18th century the cupboard was a distinguished domestic institution, and the housewife found her chief joy in accumulating cupboards full of china, glass and preserves.. With the exception of a very few examples of fine ecclesiastical cupboards which partook chiefly of the nature of the armoire in that they were intended for the storage of vestments, the so-called court-cupboard is perhaps the oldest form of the contrivance. The derivation of the expression is somewhat obscure, but it is generally taken to refer to the French word court, short. This particular

type was much used from the Elizabethan to the end of the Carolinian period. It was really a sideboard with small square doors below, and a recessed superstructure supported upon balusters. Of these many examples remain. Less frequent is the livery cupboard, the meaning of which may be best explained by the following quotation from Spenser's Account of the State of Ireland: — " What livery is we by common use in England know well enough, namely, that it is an allowance of horse-meat, as they commonly use the word stabling, as to keep horses at livery; the which word I guess is derived of livering or delivering forth their nightly food; so in great houses the livery is said to be served up for all night— that is, their evening allowance for drink." The livery cupboard appears usually to have been placed in bedrooms, so that a supply of food and drink was readily available when a very long interval separated the last meal of the evening from the first in the morning. The livery cupboard was often small enough to stand upon a sideboard or cabinet, and had an open front with a series of turned balusters. It was often used in churches to contain the loaves of bread doled out to poor persons under the terms of ancient charities. They were then called dole cupboards; there are two large and excellent examples in St Alban's Abbey. The butter, or bread and cheese cupboard, was a more ordinary form, with the back and sides bored with holes, sometimes in a geometrical pattern, for the admission of air to the food within. The corner cupboard, which is in many ways the most pleasing and artistic form of this piece of furniture, originated in the 18th century, which as we have seen was the golden age of the cupboard. It was often of oak, but more frequently of mahogany, and had either a solid or a glass front. The older solid-fronted pieces are fixed to the wall half-way up, but those of the somewhat more modern type, in which there is much glass, usually have a wooden base with glazed superstructure. Most corner cupboards are attractive

in form and treatment, and many of them, inlaid with satinwood, ebony, holly or box, are extremely elegant.

CUPID {Cupido, ” desire “), the Latin name for the god of love, Eros (q.v.). Cupid is generally identical with Amor. The idea of the god of love in Roman poetry is due to the influence of Alexandrian poets and artists, in whose hands he degenerated into a mischievous boy with essentially human characteristics. His usual attribute is the bow. For the story of Cupid and Psyche, see under Psyche.

CUPOLA (Ital., from Lat. cupula, small cask or vault, cupa, tub), a term, in architecture, for a spherical or spheroidal covering to a building, or to any part of it. In fortification the word is used of a form of armoured structure, in which guns or howitzers are mounted. It is a low flat turret resembling an overturned saucer and showing little above the ground except the muzzles of the guns. See for details and illustrations Fortification and Siegecraft; also Ordnance.

CUPPING. The operation of cupping is one of the methods that have been adopted by surgeons to draw blood from an inflamed part in order to relieve the inflammation. The skin is washed and dried; a glass cup with a rounded edge is then firmly applied, after the air in it has been heated; the cooling of the air causes the formation of a partial vacuum, and the blood is thus drawn from the neighbouring parts to the skin under the cup. Either the blood is drawn from the patient’s body through a number of small wounds which are made in the skin, with a special instrument, before the cup is applied; or the cup is simply applied to the unbroken skin and the blood drawn into the subcutaneous tissue within the circumference of the cup. The result of both methods is the same, — namely, a withdrawal of blood locally from the inflamed part. The former is called moist cupping, the latter dry cupping. This operation has natur- ally declined in vogue with the

obsolescence of blood-letting as a remedy.

CUPRA, the name of two ancient Italian municipia in Picenum.

i. Cupra Maritima (Civita di Marano near the modern Cupra Marittima), on the Adriatic coast, 48 m. S.S.E. of Ancona, erected in the neighbourhood of an ancient temple of the Sabine goddess Cupra, which was restored by Hadrian in a.d. 127, and probably (though there is some controversy on the point) occupied the site of the church of S. Martino, some way to the south, in which the inscription of Hadrian exists. At Civita the remains of what was believed to be the temple were more probably those of the forum of the town, as is indicated by the discovery of fragments of a calendar and of a statue of Hadrian. Some statuettes of Juno were also among the finds. An inscription of a water reservoir erected in 7 B.C. is also recorded. But the more ancient Picene town appears to have been situated near the hill of S. Andrea, a little way to the south, where pre-Roman tombs have been discovered.

See C. Hiilsen in Pauly-Wissowa, Realencyclopadie (Stuttgart, 1901), iv. 1760; G. Speranza, II Piceno (Ascoli Piceno, 1900), i. 119 seq.

2. Cupra Montana, 10 m. S.W. of Aesis (mod. Jesi) by road. The village, formerly called Massaccio, has resumed the ancient name. Its site is fixed by inscriptions— cf. Th. Mommsen in Corp. Inscrip. Lat. ix. (Berlin, 1883), p. 543; and various ruins, perhaps of baths, and remains of subterranean aqueducts have been discovered near the church of S. Eleuterio.

See F. Menicucci in G. Colucci, Antichitd Picene, xx. (1793).

CUPRITE, a mineral consisting of cuprous oxide, CU2O, crystallizing in the cubic system, and forming an important ore of copper, of which element cuprite contains 88-8%. The name cuprite (from Lat. cuprum, copper) was given by W. Haidinger in 1845; earlier

names are red copper ore and ruby copper, which at once distinguish this mineral from the other native copper oxide — cupric oxide — known as black copper ore or melaconite. Well-developed crystals are of common occur- rence; they Usually have the form of the regular octahedron, sometimes in combination with the .cube and the rhombic dodecahedron. A few Cornish crystals have been observed with faces of a form \hkl\ known as the pentagonal icositetrahedron,

since it is bounded by twenty-four irregular pentagons. In this class of cubic crystals there are no planes or centre of sym- metry, but the full number (thirteen) of axes of symmetry; it is known as the trapezohedral hemihedral class, and cuprite affords the best example of this type of symmetry. The etching figures do not, however, conform to this lower degree of symmetry, nor do crystals of cuprite rotate the plane of polarization of plane- polarized light. The colour of the mineral is cochineal-red, and the lustre brilliant and adamantine to sub-metallic in character; crystals are often translucent, and show a crimson- red colour by transmitted light. On prolonged exposure to light the crystals become dull and opaque. The streak is brownish-red. Hardness 3J; specific gravity 6'o; refractive index 2-85.

Compact to granular masses also occur, and there are two curious varieties— chalcotrichite and tile-ore — which require special mention. Chalcotrichite (from Gr. xa^^s, copper, and 0pi£, rptxos, hair) or " plush copper ore " is a capillary form with a rich carmine colour and silky lustre; the delicate hairs are loosely matted together, and each one is an individual crystal enormously elongated in the direction of the diagonal or the edge of the cube. Tile-ore (Ger. Ziegelerz) is a soft earthy variety of a brick-red to brownish-red colour; it contains ad- mixed limonite, and has been formed by the alteration of chalco- pyrite (copper and iron sulphide).

Cuprite occurs in the upper part of copper-bearing lodes, and is of secondary origin, having been

produced by the alteration of copper sulphides. Beautifully crystallized specimens were formerly found in Wheal Gorland and Wheal Unity at Gwennap, and in Wheal Phoenix near Liskeard in Cornwall; they also occur in the copper mines of the Urals, and in Arizona. Isolated crystals bounded by faces on all sides, and an inch or more in diameter, are found embedded in a soft white clay at Chessy near Lyons; they are usually altered on the surface, or throughout, to malachite. Chalcotrichite comes from Wheal Phoenix and Fowey Consols mine in Cornwall, and from Morenci in Arizona; tile-ore from Bogoslovsk in the Urals, Atacama in South America, and other localities. Small crystals of cuprite, together with malachite, azurite and cerussite, are sometimes found encrusting ancient objects of copper and bronze, such as celts and Roman coins, which have for long periods remained buried in the soil. Artificially formed crystals have been observed in furnace products. (L. J. S.)

CUPULIFERAE, a botanical order, or, in recent arrangements, group of orders, containing several familiar trees. The plants are trees or shrubs with simple leaves alternately arranged and small unisexual flowers generally arranged in catkins and pollin- ated by wind-agency. The generally one-seeded nut-like fruit is associated with the persistent often hardened or greatly enlarged bracts forming the so-called cupule which gives the name to the group. The group is subdivided as follows, and these subdivisions are now generally regarded either as distinct natural orders or the first two as sub-orders of one natural order.

Betuleae or Betulaceae. Female flowers arranged, two to three together on scale-like structures formed by the union of bracts, in catkins; ovary two-celled; fruit small, flattened, protected between the ripened scales of the catkin. Includes Betula (birch) and Alnus (alder).

Coryleae or Corylaceae. Female flowers in pairs, the bracts enlarging in the fruit to form a membranous cup (hazel), or a flat three-lobed structure

(hornbeam). Ovary two-celled. In- cludes Corylus (hazel) and Carpinus (hornbeam).

Fagaceae (Cupuliferae in a restricted sense). Bracts forming a fleshy or hard cupule which envelops the one to several fruits. Ovary three-celled. Includes Quercus (oak), Fagus (beech), Castanea (sweet-chestnut) .

Detailed accounts of the trees will be found under separate headings.

6 3 6

CURASAO— CURATOR

CURAQAO, or Curacoa, an island in the Dutch West Indies. It lies 40 m. from the north coast of Venezuela, in 12 N. and 69° W., being 40 m. long from N.W. to S.E., with an average width of 10 m. and an area of 2 1 2 sq. m. The surface is generally flat, but in the south-west there are hills attaining an elevation of 1200 ft. The shores are in places deeply indented, forming several natural harbours, the chief of which is that of St Anna on the south-west coast. Curacao consists of eruptive rocks, chiefly diorite and diabase, and is surrounded by coral reefs. Streams are few and the rainfall is scanty, averaging only 16 in. per annum. Although the plains are for the most part arid wastes, sugar, aloes, tobacco and divi-divi are produced with much toil in the more fertile glens. Salt, phosphates and cattle are exported. The commerce is mainly with the United States, and there is a large carrying trade with Venezuela. The famous Curacoa liqueur (see below) was originally made on the island from a peculiar variety of orange, the Citrus Aurantium curas- suviensis. Willemstad (pop. about 8000), on the harbour of St. Anna, is the principal town. It bears a strong resemblance to a Dutch town, for the houses are built in the style of those of Amsterdam, and the narrow channel separating it from its western suburb of Overzijde and the waters of the Waigat, which intersect it, recall the canals. The narrow entrance leading to

the Schottegat or Inner Harbour is protected by forts. The negroes of the island speak a curious dialect called Papaimento, composed of Spanish, Dutch, English and native words. Curacao gives name to the government of the Dutch West Indies, which consists of Aruba, an island lying W. of Curagao, with an area of 69 sq. m. and a population of 9591; Buen Ayre, lying 20 m. N.E., with an area of 95 sq. m. and a population of 4926; together with St Eustatius, Saba and part of St Martin. The governor is assisted by a council of four members and a colonial council of eight members nominated by the crown. The island of Curacao has a population of 30,119; and altogether the Dutch West Indies have a population of 51,693.

Curacao was discovered by Hojeda about 1499 and occupied by the Spaniards in 1527. In 1634 it fell into the hands of the Dutch, who have held it ever since, except during the year 1798 and from 1806 to 1814 when it passed into the possession of Great Britain.

See Wynmalen, " Les Colonies neerlandaises dans les Antilles," Revue colon, internal. (1887), ii. p. 391; K. Martin, West-Indische Skizzen (Leiden, 1887); De Veer, La Colonie de Curacoa (Les Pays Bas, 1898). Also several articles on all the islands in Tijdschrift v. h. Ned. Aardr. Genootschap (1883-1886).

CURAQOA, a liqueur, chiefly manufactured in Holland. It is relatively simple in composition, the predominating flavour being obtained from the dried peel of the Curacoa orange. The method of preparation is in principle as follows. The peel is first softened by maceration; then a part of the softened peel is distilled with spirit and water, and the remainder is macerated in a portion of the distillate so obtained. After two or three days the infusion is strained and added to the remainder of the original distillate. This simple method is subject to variations in manu- facture, and the addition of a small quantity of Jamaica rum, in particular, is said to much improve the flavour. Dry

Curacoa contains about 39%, the sweet variety about 36% of alcohol. A lighter variety of Curacoa, made with fine brandy, is known as " Grand Marnier."

CURASSOW (Cracinae), a group of gallinaceous birds forming one of the subfamilies of Cracidae, the species of which are among the largest and most splendid of the game birds of South America, where they may be said to represent the pheasants of the Old World. They are large, heavy birds, many of them rivalling the turkey in size, with short wings, long and broad tail, and strong bill. In common with the family to which they belong, they have the hind toe of the foot placed on a level with the others, thus resembling the pigeons, and unlike the majority of gallinaceous birds. With the exception of a single species found north of Panama, the curassows are confined to the tropical forests of South America, .east of the Andes, and not extending south of Paraguay. They live in small flocks, and are arboreal in their habits, only occasionally descending to the

ground, while always roosting and building their nests on the branches of trees. Their nests are neat structures, made of slender branches interlaced with stems of grass, and lined internally with leaves. They feed on fruits, seeds and insects. They are often tamed in several parts of South America, but have never been thoroughly domesticated anywhere. Large numbers of these birds were, according to K. J. Temminck, brought to Holland from Dutch Guiana towards the end of the 18th century, and got so completely acclimatized and domesticated as to breed in confinement, like ordinary poultry; but the establish- ments in which these were kept were broken up during the troubles that followed on the French Revolution. Their flesh is said to be exceedingly white and delicate, and this, together with their size and the beauty of their plumage, would make the curassows an important gain to the poultry yards of Europe, if they were not such bad breeders. The subfamily of curassows contains four genera and twelve species, all confined to South America, with the exception of Crax globicera — a

Central American species, which extends northward into Mexico. This bird is about 3 ft. in length, of a glossy black colour over the whole body, excepting the abdomen and tail coverts, which are white. In common with the other species of this genus its head bears a crest of feathers curled forward at the tips, which can be raised or depressed at will. The female is of a reddish-brown colour, although varying greatly in this respect, and was formerly - described as a separate species — the red curassow. In another species, Crax incommoda, the greater part of the black plumage is beautifully varied with narrow transverse bars of white. The galea ted curassow (Pauxi galeata) is peculiar in having a large blue tubercle, hard and stony externally, but cellular within, and resembling a hen's egg in size and shape, situated at the base of the hill. It only appears after the first moulting, and is much larger in the male than in the female.

CURATE (from the Lat. curare, to take care of), properly a presbyter who has the cure of souls within a parish. The term is used in this general sense in certain rubrics of the English Book of Common Prayer, in which it is applied equally to rectors and vicars as to perpetual curates. So, on the continent of Europe, it is applied in this sense to parish priests, as the Fr. cure, Ital. curato, Span, cura, &c. In a more limited sense it is applied in the Church of England to the incumbent of a parish who has no endowment of tithes, as distinguished from a perpetual vicar, who has an endowment of small tithes, which are for that reason sometimes styled vicarial tithes. The origin of such unendowed curacies is traceable to the fact that benefices were sometimes granted to religious houses pleno jure, and with liberty for them to provide for the cure; and when such appropriations were transferred to lay persons, being unable to serve themselves, the impropriators were required to nominate a clerk in full orders to the ordinary for his licence to serve the cure. Such curates, being not removable at the pleasure of the impropriators, but only on due revocation of the licence of the

ordinary, came to be entitled perpetual curates. The term ” curate ” in the present day is almost exclusively used to signify a clergyman who is assistant to a rector or vicar, by whom he is employed and paid; and a clerk in deacon’s orders is competent to be licensed by a bishop to the office of such assistant curate. The consequence of this misuse of the term ” curate “was that the title of ” per- petual curate ” fell into desuetude in the Anglican Church, and an act of parliament (1868) was passed to authorize perpetual curates to style themselves vicars (see Vicar). The term is in use in the Roman Catholic Church in Ireland to designate an assistant clergyman, and also to a certain extent in the American Episcopal Church, though ” assistant minister ” is usually preferred.

CURATOR (Lat. for ” one who takes care,” curare, to take care of), in Roman law the ” caretaker ” or guardian of a spend- thrift (prodigus) or of a person of unsound mind (furiosus), and, more particularly, one who takes charge of the estate of an adolescens, i.e. of a person sui juris, above the age of a pupillus, fourteen or twelve years, according to sex, and below the full age of twenty- five. Such persons were known as ” minors,”

i.e. minores viginti quinque annis. While the tutor, the guardian of the pupillus, was said to be appointed for the care of the person, the curator took charge of the property. The term survives in Scots law for the guardian of one in the second stage of minority, i.e. below twenty-one, and above fourteen, if a male, and twelve, if a female. Under the Roman empire the title of curator was given to several officials who were in charge of departments of public administration, such as the curatores annonae, of the public supplies of corn and oil, or the curatores regionum, who were responsible for order in the fourteen regiones or districts into which the city of Rome was divided, and who

protected the citizen from exaction in the collection of taxes; the curatores aquarum had the charge of the aqueducts. Many of these curato'rships were instituted by Augustus. In modern usage " curator " is applied chiefly to the keeper of a museum, art collection, public gallery, &c, but in many universities to an official or member of a board having a general control over the university, or with the power of electing to professorships. In the university of Oxford " curators " are nominated to administer certain departments, such as the University Chest.

CURCI, CARLO MARIA (1810-1801), Italian theologian, was born at Naples. He joined the Jesuits in 1826, and for some time was devoted to educational work and the care of the poor and prisoners. He became one of the first editors of the Jesuit organ, the Civilta Catlolica; but then came under the influence of Gioberti, Rosmini and other advocates for reform. He wrote a preface to Gioberti's Primato (1843), but dissented from his Prolegomena. After the events of 1870, Curci, at Florence, delivered a course on Christian philosophy; and in 1874 began to publish several Scriptural works. In his edition of the New Testament (1879-1880) he makes some severe remarks on the neglect of the study of Scripture amongst the Italian clergy. In the meantime he began to attack the political action of the Vatican, and in his II Moderno Dissidio tra la Chiesa e V Italia 1878) he advocated an understanding between the church and state. This was followed by La Nuova Italia ed i Vecchi Zelanti (1881), another attack on the Vatican policy; and by his Vaticano Regio (1883), in which he accuses the Vatican of trafficking in holy things and declares that the taint of worldli- ness came from the false principles accepted by the Curia. His former work at Naples drew him also in the direction of Christian Socialism. He was condemned at Rome, and in a letter to The Times (10th of September 1884) declares that it was on account of his disobedience to the decrees of the Roman Congregation: " I am a dutiful son of the Church who hesitates to obey an order of his mother because he

does not see clear enough the maternal authority in it." He was cast out of the Society of Jesus and suspended, and during this time Cardinal Manning put his purse at Curci's disposal. Finally he accepted the decrees against him and retracted " all that he said contrary to the faith, morals and discipline of the Church." He passed the remainder of his life in retirement at Florence, and, a few months before his death, was readmitted to the Jesuit Society. He died on the 8th of June 1801. (E. Tn.)

CUREL, FRANCOIS, Vicomte de (1854-), French dramatist, was born at Metz on the 10th of June 1854. He was educated at the ficole Centrale as a civil engineer, the family wealth being derived from smelting works. He began his literary career with two novels, L'Etedes fruits sees (i885)and Le Sauvelage du grand due (1889). In 1891 three pieces were accepted by the Theatre Libre. The list of his plays includes L'Envers d'une sainte (1892); Les Fossiles (1892), a picture of the prejudices of the provincial nobility; V Invitee (1893), the story of a mother who returns to her children after twenty years' separation; V Amour brode (1893), which was withdrawn by the author from the Theatre Francais after the second representation; La Figurante (1896); Le Repas du lion (1898), dealing with the relations between capital and labour; La Fille sauvage (1902), the history of the development of the religious idea; La Nouvelle Idole (1899), dealing with the worship. of science; and Le Coup d'aile (1906).

See also Contemporary Review for August 1903.

CURELY, JEAN NICOLAS (1774-1827), French cavalry leader, was the son of a poor peasant of Lorraine. Joining, in 1793, a regiment of hussars, he served with great distinction as private and as sous-qfficier in the Rhine campaigns from 1794 to 1800. He was, however, still a non-commissioned officer of twelve years' service, when at Afflenz (12th of November 1805) he attacked and defeated, with twenty-five men, a whole regiment of Austrian cavalry. This brilliant feat of arms won him the

grade of sous-lieutenant, and the reputation of being one of the men of the future. The next two campaigns of the Grande Armie gained him two more promotions, and as a captain of hussars he performed, in the campaign of Wagram, a feat of even greater daring than the affair of Afflenz. Entrusted with despatches for the viceroy of Italy, Curely, with forty troopers, made his way through the Austrian lines, reconnoitred every- where, even in the very headquarters-camp of the archduke John, and finally accomplished his mission in safety. This exploit, only to be compared to the famous raids of the American Civil War, and almost unparalleled in European war, gained him the grade of chef d'escadrons, in which for some years he served in the Peninsular War. Under Gouvion St Cyr he took part in the Russian War of 18 12, and in 181 3 was promoted colonel. In the campaign of France (1814) Curely, now general of brigade, commanded a brigade of " improvised " cavalry, and succeeded in infusing into this unpromising material some of his own daring spirit. His regiments distinguished themselves in several cbmbats, especially at the battle of Arcis-sur-Aube. The Restoration government looked with suspicion on the most dashing cavalry leader of the younger generation, and in 1815 Curely, who during the Hundred Days had rallied to his old leader, was placed on the retired list. Withdrawing to the little estate of Jaulny (near Thiaucourt) , which was his sole property, he lived in mournful retirement, which was saddened still further when in 1824 he was suddenly deprived of his rank. This last blow hastened his death. Curely, had he arrived at high command earlier, would have been ranked with Lasalle and Montbrun, but his career, later than theirs in beginning, was ended by the fall of Napoleon. His devoted friend, De Brack, in his celebrated work Light Cavalry Outposts, considers Curely incomparable as a leader of light cavalry, and the portrait of Curely to be found in its pages is justly ranked as one of the masterpieces of military literature. The general himself left but a modest manuscript, which was left for a subsequent generation to publish.

See also Thoumas, Le General Curely: itineraires d'un Cavalier leger, 17Q3-1815 (Paris, 1887).

CURES, a Sabine town between the left bank of the Tiber and the Via Salaria, about 26 m. from Rome. According to the legend, it was from Cures that Titus Tatius led to the Quirihal the Sabine settlers, from whom, after their union with the settlers on the Palatine, the whole Roman people took the name Quirites. It was also renowned as the birthplace of Numa, and its import- ance among the Sabines at an early period is indicated by the fact that its territory is often called simply ager Sabinus. At the beginning of the imperial period it is spoken of as an un- important place, but seems to have risen to greater prosperity in the 2nd century. It appears as the seat of a bishop in the 5th century, but seems to have been destroyed by the Lombards in a.d. 589. The site consists of a hill with two summits, round the base of which runs the Fosso Corese : the western summit was occupied by the necropolis, the eastern by the citadel, and the lower ground between the two by the city itself. A temple, the forum, the baths, &c, were excavated in 1874-1877.

See T. Ashby in Papers of the British School at Rome, iii. 34. (T. As.) CURETES (Gr. Kovprires and Kovpr}res). (1) A legendary people mentioned by Homer (II. ix. 529 ff.) as taking part in the quarrel over the Calydonian boar. They were identified in antiquity as either Aetolians or Acarnanians (Strabo 462, 26), and were also represented by a stock in Chalcis in Euboea. (2) In mythology (unconnected with the above), the attendants of Rhea. The story went that they saved the infant Zeus from his father Cronus in Crete by surrounding his cradle and with

clashing of sword and shield preventing his cries from being heard, and thus became the body-guard of

the god and the first priests of Zeus and Rhea. In historic times the cult of the Curetes was widely known in Greece in connexion with that of Rhea (vhich it belonged, spread to Greek soil. The origin of the dance may have lain in the supposed efficacy of noise in averting evil.

The Curetes are represented in art with shield and sword performing the sacred dance about the infant Zeus, sometimes in the presence of a female figure which may be Rhea. Their number in art is usually two or three, but in literature is some- times as high as ten. Of their names the following have survived: Kures, Kres, Biennos, Eleuther, Itanos, Labrandos, Panamoros, Palaxos; but no complete list of names is possible because of their confusion with the names of the Corybantes and other like deities. Their origin is variously related: they were earth-born, sprung of the rain, sons of Zeus and Hera, sons of Apollo and Danais, sons of Rhea, of the Dactyli, contemporary with the Titans (Diod. Sic. v. 66). Rationalism made them the mortal sons of a mortal Zeus, or originators of the Pyrrhic dance, inventors of weapons, fosterers of agriculture, regulators of social life, &c. A plausible theory is that of Georg Kaibel (Gottinger Nachrichten, iooi, pp. 512-514), who sees in them, together with the Corybantes, Cabeiri, Dactyli, Telchines, Titans, &c, only the same beings under different names at different times and in different places. Kaibel holds that they all had a phallic significance, having once been great primitive deities of procreation, and that having: fallen to an indistinct, subordinate position in the course of the development and formalization of Greek religion, they survive in historic times only as half divine, half demonic beings, worshipped in connexion with the various forms of the great nature goddess. The resemblances, especially between Rhea and her Curetes and the Great Mother and her Corybantes (

Consult Immisch in Roscher's Lexicon, s. v. "Kureten." (G. Sn.)

CURETON, WILLIAM (1808-1864), English Orientalist,

was born at Westbury, in Shropshire. After being educated at the free grammar school of Newport, and at Christ Church, Oxford, he took orders in 1832, became chaplain of Christ Church, sub- librarian of the Bodleian, and, in 1837, assistant keeper of MSS. in the British Museum. He was afterwards appointed select preacher to the university of Oxford, chaplain in ordinary to the queen, rector of St Margaret's, Westminster, and canon of West- minster. He was elected a fellow of the Royal Society and a trustee of the British Museum, and was also honoured by several continental societies. He died on the 17th of June 1864.

Cureton's most remarkable work was the edition with notes and an English translation of the Epistles of Ignatius to Polycarp, the Ephesians and the Romans, from a Syriac MS. that had been found in the monastery -of St Mary Deipara, in the desert of Nitria, near Cairo. He held that the MS. he used gave the truest text, that all other texts were inaccurate, and that the epistles contained in the . MS. were the only genuine epistles of Ignatius that we possess — a view which received the support of F. C. Baur, Bunsen, and many others, but which was opposed by Charles Wordsworth and by several German scholars, and is now generally abandoned (see Ignatius). Cureton supported his view by his Vindiciae Ignatianae and his Corpus Ignatianum,—a Complete Collection of the Ignatian Epistles, genuine, interpolated and spurious. He also edited a partial Syriac text of the Festal Letters of St Athanasius , which was translated into English by Henry Burgess (1854), and published in the Library of

Fathers of the Holy Catholic Church; Remains of a very Ancient Recension of the Four Gospels in Syriac, hitherto unknown in Europe ; Spicilegium Syriacum, containing Remains of Bardesan, Meliton, Ambrose, Mara Bar Serapion; The third Part of the Ecclesiastical History of John, Bishop of Ephesus, which was translated by Payne Smith; Fragments of the Iliad of Homer from a Syriac Palimpsest; an Arabic work known as the Thirty-first Chapter of the

Book entitled The Lamp that guides to Salvation, written by a Christian of Tekrit ; The Book of Religious and Philosophical Sects, by Muhammed al Sharastani ; a Commentary on the Book of Lamentations, by Rabbi Tanchum ; and the Pillar of the Creed of the Sunnites. Cureton also published several sermons, among which was one entitled The Doctrine of the Trinity not Speculative but Practical. After his death Dr W. Wright edited with a preface the Ancient Syriac Docu- ments relative to the earliest Establishment of Christianity in Edessa and the neighbouring Countries, from the Year of our Lord's Ascension to the beginning of the Fourth Century ; discovered, edited and annotated by the late W. Cureton.

CURETUS, a tribe of South American Indians, inhabiting the country between the rivers of Japura and Uaupes, north- western Brazil. They are short but sturdy, wear their hair long, and paint their bodies. Their houses are circular, with walls of thatch and a high conical roof. They are a peaceable people, living in small villages, each of which is governed by a chief. . CURFEW, Curfeu or Couvke- fetj, a signal, as by tolling a bell, to warn the inhabitants of a town to extinguish their fires or cover them up (hence the name) and retire to rest. This was a common practice throughout Europe during the middle ages, especially in cities taken in war. In the law Latin of those times it was termed ignitegium or pyritegium. In medieval Venice it was a regulation from which only the Barbers' Quarter was exempt, doubtless because they were also surgeons and their services might be needed during the night. Th e curfew originated in the fear of fire when most cities were built of timber. That it was a most useful and practical measure is obvious when it is remembered that the household fire was usually made in a hole in the middle of the floor, under an opening in the roof through which the smoke escaped. The custom is commonly said to have been introduced into England by William the Conqueror, who ordained, under severe penalties, that at the ringing of the curfew- bell at eight o'clock in the

evening all lights and fires should be extinguished. But as there is good reason to believe that the curfew-bell was rung each night at Carfax, Oxford (see Peshall, Hist, of Oxford), in the reign of Alfred the Great, it would seem that all William did was to enforce more strictly an existing regulation. The absolute prohibition of lights after the ringing of the curfew-bell was abolished by Henry I. in 1100. The practice of tolling a bell at a fixed hour in the evening, still extant in many places, is a survival of the ancient curfew. The common hour was at first seven, and it was gradually advanced to eight, and in some places to nine o'clock. In Scotland ten was not an unusual hour. In early Roman times curfew may possibly have served a political purpose by obliging people to keep within doors, thus preventing treasonable nocturnal assemblies, and generally assisting in the preservation of law and order. The ringing of the " prayer-bell," as it is called, which is still practised in some Protestant countries, originated in that of the curfew-bell. In 1848 the curfew was still rung at Hastings, Sussex, from Michaelmas to Lady-Day, and this was the custom too at Wrexham, N. Wales.

CURIA, in ancient Rome, a section of the Roman people, according to an ancient division traditionally ascribed to Romulus. He is said to have divided the people into three tribes, and to have subdivided each of these into ten curiae, each of which contained a number of families (gentes). It is more prob- able that the curiae were not purely artificial creations, but repre- sent natural associations of familief, artificially regulated and distributed to serve a politicalpurpose. The local names of curiae which have come down to us suggest a local origin for the groups; but as membership was hereditary, the local tie doubtless grew weak with successive generations. Each curia was organized as a political and religious unit. As a political corporation it had no recognized activities beyond the command of a vote in the Comitia Curiata (see Comitia) , a vote whose nature was determined by a majority in the votes of the individual members

(curiales). But as a religious' unit the curia had more individual activity. There were, it is true, ceremonies (sacra) performed by all the curiae to Juno Curis in which each curia offered its part in a collective rite of the whole people; but each curia had also its peculiar sacra and its own special place of worship. The religious affairs of each were conducted by a priest called curio assisted by zflamen curialis. The thirty curiae must always have comprised the whole Roman people; for citizenship de- pended on membership of a gens (gentUitas) and every member of a gens was ipso facto attached to a curia. They therefore included plebeians as well as patricians (q.v .) from the date at which plebeians were recognized as free members of the body politic. But, just as enjoyment of the full rights of gentUitas was only very gradually granted to plebeians, so it is probable that a plebeian did not, when admitted through a gens into a curia, immediately exercise all the rights of a curialis. It is unlikely, for instance, that plebeians voted in the Comitia Curiata at the early date implied by the authorities; but it is probable that they acquired the right early in the republican period, and certain that they enjoyed it in Cicero's time. A plebeian was for the first time elected curio maximus in 209 B.C. The curia ceased to have any importance as a political organization some time before the close of the republican period. But its religious importance survived during the principate; for the two festivals of the Fornacalia and the Fordicidia were celebrated by the Curiales (Ovid, Fasti, ii. 527, iv. 635).

The term curia seems often to have been applied to the common shrine of the curiales, and thus to other places of assembly. Hence the ancient senate house at Rome was known as the Curia Hostilia. The curia was also adopted as a state division in a large number of municipal towns; and the term was often applied to the senate in municipal towns (see

Decurio), probably from the name of the old senate house at Rome.

Authorities. — Mommsen, Romisches Staatsrecht, iii. p. 89 ff. (Leipzig, 1887); Romische Forschungen i. p. 140 ff. (Berlin, 1864, &c); Clason, "Die Zusammensetzung der Curien und ihrer Comitien " (Kritische Erorterungen i., Rostock, 1871); Karlowa, Romische Rechtsgeschichte, i. p. 382 ff. (Leipzig, 1885); E. Hofmann, Patricische und plebeische Curien (Wien, 1879); for the Fornacalia, &c., Marquardt, Staatsverwaltung, iii. p. 197 (Leipzig, 1885) ; for local names of curiae, Pauly-Wissowa, Realencyclopddie, iv. p. 1822 (new edition, 1893, &c.) ; 0. Gilbert, Geschichte und Topographic der Stadt Rom (Leipzig, 1883); for municipal curiae, Mommsen, in Ephemeris epigraphica, ii. p. 125; Schmidt, in Rheinisches Museum, xlv. (1890) p. 599 ff. On the Roman comitia in general see also G. W. Botsford, Roman Assemblies (1909). (A. M. Cl.)

In medieval Latin the word curia was used in the general sense of " court." It was thus used of " the court," meaning the royal household {aula); of "courts" in the sense of solemn assemblies of the great nobles summoned by the king (curiae solennes, &c); of courts of law generally, whether developed out of the imperial or royal curia (see Curia Regis) or not (e.g. curia baronis, Court Baron, curia christianitatis , Court Christian). Sometimes curia means jurisdiction, or the territory over which jurisdiction is exercised; whence possibly its use, instead of cortis, for an enclosed space, the court-yard of a house, or for the house itself (cf. the English " court," e.g. Hampton Court, and the Ger. H of). The word Curia is now only used of the court of Rome, as a convenient term to express the sum of the organs that make up the papal government (see Curia Romana). See Du Cange, Gloss, med. el inf. Lat. (1883), s.v. " Curia." CURIA REGIS, or Aula Regis, a term used in England from the time of the Norman Conquest to about the end of the 13th century to describe a council and a court of justice, the com-position and functions of which varied considerably from time to time. Meaning in general the " king's

court," it is difficult to define the curia regis with precision, but it is important and interesting because it is the germ from which the higher courts of law, the privy council and the cabinet, have sprung. It was, at first the general council of the king, or the commune concilium, i.e. the feudal assembly of the tenants-in-chief; but it assumed a more definite character during the reign of Henry I., when its members, fewer in number, were the officials of the royal house- hold and other friends and attendants of the king. It was thus

practically a committee of the larger council, and assisted' the king in his judicial work, its authority being as undefined as his own. About the same time the curia undertook financial duties, and in this way was the parent of the court of exchequer (curia regis ad scaccarium). The members were called " justices," and in the king's absence the chief justiciar presided over the court. A further step was taken by Henry II. In n 78 he appointed five members of the curia to form a special court of justice, and these justices, unlike the other members of the curia, were not to follow the king's court from place to place, but were to remain in one place. Thus the court of king's bench (curia regis de banco) was founded, and the foundation of the court of common pleas was provided for in one of the articles of Magna Carta. The court of chancery is also an offshoot of the curia regis. About the time of Edward I. the executive and advising duties of the curia regis were discharged by the king's secret council, the later privy council, which is thus connected with the curia regis, and from the privy council has sprung the cabinet.

In his work Tractatus de legibus Angliae, Ranulf de Glanvill treats of the procedure of the curia regis as a court of law. See W. Stubbs, Constitutional History, vol. i. (Oxford, 1883); R. Gneist, Englische Verfassungsgeschichte, English translation by P. A. Ashworth (London, 1891); A. V. Dicey, The Privy Council (London, 1887); and the article Privy Council. (A. W. H.)*

CURIA ROMANA, the name given to the whole body of administrative and judicial institutions, by means of which the pope carries on the general government of the Church; the name is also applied by an extension of meaning to the persons who form part of it, and sometimes to the Holy See itself. Rome is almost the only place where the word curia has preserved its ancient form; elsewhere it has been almost always replaced by the word court (cour, corte), which is etymologically the same. Even at Rome, however, the expression ” papal court ” (corte romana) has acquired by usage a sense different from that of the word curia; as in the case of royal courts it denotes the whole body of dignitaries and officials who surround and attend on the pope; the pope, however, has two establishments: the civil establishment, in which he is surrounded by what is termed his ” family ” (familia) ; and the religious establishment, the members of which form his ” chapel ” (capella). The word curia is more particularly reserved to the, tribunals and departments which actually deal with the general business of the Church.

I. In order to understand the organization of the various constituent parts of the Roman Curia, we must remember that the modern principle of the separation of powers is _ unknown to the Church; the functions of each depart- remarks. ment are limited solely by the extent of the powers delegated to it and the nature of the business entrusted to it; but each of them may have a share at the same time in the legislative, judicial and administrative power. Similarly, the necessity for referring matters to the pope in person, for his approval or ratification of the decisions arrived at, varies greatly according to the department and the nature of the business. But on the whole, all sections of the Curia hold their powers direct from the pope, and exercise them in his name. Each of them, then, has supreme authority within its own sphere, while the official responsibility belongs to the pope, just as in all govern- ments it is the government that is responsible for the acts of its departments. Of

these official acts, however, it is possible to distinguish two categories: those emanating directly from the heads of departments are generally called Acts of the Holy See (and in this sense the Holy See is equivalent to the Curia) ; those which emanate direct from the pope are called Pontifical Acts. The latter are actually the Apostolic Letters, i.e. those documents in which the pope speaks in his own name (bulls, briefs, encyclicals, &c.) even when he does not sign them, as we shall see. The Apostolic Letters alone may be ex cathedra documents, and may have the privilege of infallibility, if the matter admit of it. There are also certain differences between the two sorts of documents with regard to their penal conse- quences. But in all cases the disciplinary authority is evidently the same; we need only note that acts concerning individuals

do not claim the force of general law; the legal decisions serve at most to settle matters of jurisprudence, like the judgments of all sovereign courts.

The constituent parts of the Roman Curia fall essentially into two classes: (i) the tribunals and offices, which for centuries

served for the transaction of business and which

continue their activity; (2) the permanent com- missions of cardinals, known by the name of the Roman Con- gregations. These, though more recent, , have taken precedence of the former, the work of which they have, moreover, greatly relieved; they are indeed composed of the highest , dignitaries of the church, the cardinals (q.v.), and are, as it were, subdivisions of the consistory (q.v.), a council in which the whole of the Sacred College takes part.

II. The Roman Congregations. — The constitution of all of these is the same; a council varying in numbers, the members

of which are cardinals, who alone take part in the Roman deliberations. One of the cardinals acts as president, rations. or prefect, as he is called; the congregation is assisted

by a secretary and a certain number of inferior officials, for secretarial and office work. They have also consultors, whose duty it is to study the subjects for consideration. Their deliberations are secret and are based on prepared documents bearing on the case, written, or more often printed, which are distributed to all the cardinals about ten days in advance. The deliberations , follow a simplified procedure, which is founded more on equity than on the more strictly legal forms, and decisions are given in the shortest possible form, in answer to carefully formulated questions or dubia. The cardinal prefect, aided by the secretariate, deals with the ordinary business, only important matters being submitted for the consideration of the general meeting. To have the force of law the acts of the con- gregations must be signed by the cardinal prefect and secretary, and sealed with his seal. Practically the only exception is in the cases of the Holy Office, and of the Consistorial Congregation of which the pope himself is prefect; the acts of the first are signed by the " notary," and the acts of the second by the assessor.

We may pass over those temporary congregations of cardinals known also as " special," the authority and existence of which extend only to the consideration of one particular question; and also those which had as their object various aspects of the temporal administration of the papal states, which have ceased to exist since 1870. We deal here only with the permanent ecclesiastical congregations, the real machinery of the papal administration. Some of them go quite far back into the 16th century; but it was Sixtus V. who was their great organizer; by his bull Immensa of the 22nd of

January 1587, he apportioned all the business of the Church (including that of the papal states) among fifteen Congregations of cardinals, some of which were already in existence, but most of which were established by him; and these commissions, or those of them at least which are concerned with spiritual matters, are still working. A few others have been added by his successors. Pius X., by the constitution Sapienti Consilio of the 29th of June 1908, proceeded to a general reorganization of the Roman Curia: Congregations, tribunals and offices. In this constitution he declared that the competency of these various organs was not always clear, and that their functions were badly arranged; that certain of them had only a small amount of business to deal with, while others were overworked; that strictly judicial affairs, with which the Congregations had not to deal originally, had developed to an excessive extent, while the tribunals, the Rota and the Signatura, had nothing to do. He consequently withdrew all judicial affairs from the Congregations, and handed them over to the two tribunals, now revived, of the Rota and the papal Signatura; all affairs concerning the discipline of the sacraments were entrusted to a new Congregation of that name; the competency of the remaining Congregations was modified, according to the nature of the affairs with which they deal, and certain of them were amalgamated with others; general rules were laid down for the expedition of business and regarding personnel; in

short, the work of Sixtus V. was repeated and adapted to later conditions. We will now give the nomenclature of the Roman Congregations, as they were until 1908, and mentioning the modifications made by Pius X.

(1) The Holy Inquisition, Roman and universal, or Holy Office (Sacra Congregatio Romanae et universalis Inquisilionis seu Sancti Officii), the first of the Congregations, hence

called the supreme. It is composed of twelve cardinals, office assisted by a certain number of

officials: the assessor, who practically fulfils the functions of the secretary, the com- missary general, some consultors and the qualifica tors, whose duty it is to determine the degree of theological condemnation deserved by erroneous doctrinal propositions (haeretica, erronea, temeraria, &c;). The presidency is reserved to the pope, and the cardinal of longest standing takes the title of secretary. This Congregation, established in 1542 by Paul III., constitutes the tribunal of the Inquisition (q.v.), of which the origins are much older, since it was instituted in the 13th century against the Albigenses. It deals with all questions of doctrine and with the repression of heresy, together with those crimes which are more or less of the character of heresy. Its procedure is subject to the strictest secrecy. Pius X. attached to it all matters concerning indulgences ; on the other hand, he transferred to the Congrega- tion of the Council matters concerning the precepts of the Church such as fasting, abstinence and festivals. The choosing of bishops, which had in recent times been entrusted to the Holy Office, was given to the Consistorial Congregation, and dis- pensations from religious vows to the Congregation of the Re- ligious Orders. The Holy Office continues, however, to deal with mixed marriages and marriages with infidels.

(2) The Consistorial Congregation (Sacra Congregatio Consis- torialis), established by Sixtus V., has as its object the preparation of business to be dealt with and decided in secret consistory (q.v.); notably promotions to cathedral orlal!^" churches' and consistorial benefices, the erection of dioceses, &c. To this congregation is also subject the administra- tion of the common property of the college of cardinals. Pius X. restored this Congregation to a position of great importance; in the first place he gave it the effective control of all matters concerning the erection of dioceses and chapters and the appoint- ment of bishops, except in the case of countries subject to the Propaganda, and save that for countries outside Italy it has to act

upon information furnished by the papal secretary of state. He further entrusted to this Congregation everything relating to the supervision of bishops and of the condition of the dioceses, and business connected with the seminaries. It has also the duty of deciding disputes as to the competency of the other Congrega- tions. The pope continues to be its prefect, and the cardinal secretary of the Holy Office and the secretary of state are ex officio members of it ; the cardinal who occupies the highest rank in it, with the title of secretary, is chosen by the pope ; he is assisted by a prelate with the title of assessor, who is ex officio secretary of the Sacred College. The assessor of the Holy Office and the secretary for extraordinary ecclesiastical affairs are ex officio consultors.

(3) The Pontifical Commission for the reunion of the dissident Churches, established by Leo XIII, in 1895 after his constitution Orientalium. The pope reserved the presidency for himself; its activity is merely nominal. It was attached by Pius X. to the Congregation of the Propaganda.

(4) The Congregation of the Apostolic Visitation (Sacra Congregatio Visitationis apostolicae) . The Visitation is the personal inspection of institutions, churches, religious establishments and their personnel, to correct abuses ™f on Vls>t ' and enforce the observation of rules. Through this Congregation the pope, as bishop of Rome, made the inspection of his diocese; it is for this reason that he was president of this commission, the most important member of which was the cardinal vicar. He takes the place of the pope in the administra- tion of the diocese of Rome; he has his own offices and diocesan assistants as in other bishoprics. The Congregation of the Visitation was suppressed by Pius X. as a separate Congregation,

and was reduced to a mere commission which is

attached, as before, to the Vicariate.

(5) The Congregation on the discipline of the sacraments (Sacra Congregatio de Disciplina Sacratneniorum) , established by Pius X., thus comes to occupy the third rank. With the reservation of those questions, especially of a dogmatic character, which belong to the Holy Office, and of purely ritual questions, which come under the Congregation of Rites, this Congregation brings under one authority all disciplinary questions concerning the sacraments, which were formerly distributed among several Congregations and offices. It deals with dispensations for marriages, ordinations, &c, concessions with regard to the mass, the communion, &c.

(6) The Congregation of the Bishops and Regulars, of which the full official title was, Congregation for the Affairs and Consulta- tions of the Bishops and Regulars (Sacra Congregatio

Bishops super negoliis Episcoporum et Regularium; now Sacra Regulars. Congregatio negoliis religiosorum sodalium praeposita) . It is the result of the fusion of two previous com- missions; that for the affairs of bishops, established by Gregory XIII., and that for the affairs of the regular clergy, founded by Sixtus V.; the fusion dates from Clement VIII. (1601). This congregation was very much occupied, being empowered to deal with all disciplinary matters concerning both the secular and regular clergy, whether in the form of consultations or of con- tentious suits; it had further the exclusive right to regulate the discipline of the religious orders and congregations bound by the simple vows, the statutes of which it examined, corrected and approved; finally it judged disputes and controversies between the secular and regular clergy. On the 26th of May 1 906, Pius X. incorporated in this Congregation two others having a similar object: that on the discipline of the regular clergy (Congregatio super Disciplina Regularium) , founded by Innocent XII. in 1695, and that on the condition of the regular clergy

(Congregatio super Statu Regularium) , established by Pius IX. in 1846. In 1908 Pius X. withdrew from this Congregation all disciplinary matters affecting the secular clergy, and limited its competency to matters concerning the religious orders, both as regards their internal affairs and their relations with the bishops.

(7) The Congregation of the Council (Sacra Congregatio Cardinalium Concilii Tridentini inter prelum), i.e. a number of

cardinals whose duty it is to interpret the disciplinary decrees of the council of Trent, was instituted by Pius IV. in 1563, and reorganized by Sixtus V.; its mission is to promote the observation of these disciplinary decrees, to give authoritative interpretations of them, and to reconcile disputes arising out of them. Pius X. in 1908 entrusted to this Congrega- tion the supervision of the general discipline of the secular clergy and the faithful laity, empowering it to deal with matters con- cerning the precepts of the Church, festivals, foundations, church property, benefices, provincial councils and episcopal assemblies. Proceedings for annulling marriages, which used to be reserved to it, were transferred to the tribunal of the Rota; reports on the condition of the dioceses were henceforth to be addressed to the Consistorial Congregation, which involved the suppression of the commission which had hitherto dealt with them. The other commission, formerly charged with the revision of the decrees of provincial councils, was merged in the Congrega- tion itself. The Congregation of Immunity (Sacra Congregatio Jurisdictionis et Immunitatis ecclesiasticae) was created by Urban VIII. (1626) to watch over the immunities of the clergy in respect of person or property, whether local or general. This, having no longer any object, was also attached to the Congrega- tion of the Council, and is now amalgamated with it.

(8) The Congregation of the Propaganda (Sacra Congregatio de Propaganda Fide) was established by Gregory XV. in 1622,

and added to by Urban VIII., who founded the gaada. celebrated College of the Propaganda for the education

of missionaries, and his polyglot press for printing the liturgical books of the East. It had charge of the administra- tion of the Catholic churches in all non-Catholic countries, for which it discharged the functions of all the Congregations, except

Council.

in doctrinal and strictly legislative matters. Its sphere was very wide; it administered all non-European countries, except Latin America and the old colonies of the Catholic countries of Europe; in Europe it had also charge of the United Kingdom and the Balkan States. But the constitution " Sapienti " of 1908 withdrew from the Propaganda and put under the common law of the Church most of those parts in which the episcopal hierarchy had been re-established, i.e. in Europe, the United Kingdom, Holland and Luxemburg; in America, Canada, Newfoundland and the United States. Further, even for those countries which it continues to administer, the Propaganda has to submit to the various Congregations all questions affecting the Faith, marriage and rites. The missions begin by establishing apostolic pre- fectures under the charge of priests; the prefecture is later transformed into an apostolic vicariate, having at its head a bishop; finally, the hierarchy, i.e. the diocesan episcopate, is established in the country, with residential sees. Thus the hierarchy was re-established in England in 1850 by Pius IX., in 1878 by Leo XIII. in Scotland, in 1886 in India, in 1891 in Japan. It is also the work of the Propaganda to appoint the bishops for the countries it administers. Under the same cardinal prefect is found that section of the Propaganda which deals with matters concerning oriental rites (Congregatio specialis pro negoliis ritus Oricntalis), the object of which is indicated by its name. To the former were attached two commissions, one for the approbation of those religious congregations which

devote themselves to missions, which is now transferred to the Con- gregation of the Religious Orders; the other for the examination of the reports sent in by the bishops and vicars apostolic on their dioceses or missions. With the latter is connected the com- mission for the examination of the liturgical books of the East (Commissio pro corrigendis libris ecclesiae Orientaiis). Finally, the popes have devoted to the missions the income arising from the Chamber of Spoils (Camera Spoliorum), i.e. that portion of the revenue from church property which cannot be bequeathed by the holders of benefices as their own property; this source of income, however, has decreased greatly.

(9) The Congregation of the Index (Congregatio indicis librorum prohibitorum) , founded by St Pius V. in 1571 and reorganized by Sixtus V., has as its object the examina- . tion and the condemnation or interdiction of bad or dangerous books which are submitted to it, or, since the con- stitution " Sapienti," of those which it thinks fit to examine on its own initiative (see Index).

(10) The Congregation of Rites (Congregatio sacrorum Rituum), founded by Sixtus V., has exclusive charge of the liturgy and liturgical books; it also deals with the proceedings

in the beatification and canonization of saints. Of

late years there have been added to it a Liturgical Commission,

a Historico-liturgical Commission, and a Commission for church

song, the functions of which are sufficiently indicated by their

names.

(n) The Ceremonial Congregation (Sacra Congregatio caere- monialis), the prefect of which is the cardinal dean, was instituted by Sixtus V.; its mission is to settle monial. questions of precedence

and etiquette, especially at the papal court ; it is nowadays but little occupied.

(12) The Congregation of Indulgences and Relics (Sacra Congregatio Indulgentiarum et Sacrarum Reliquiarum) , founded in 1669 by Clement IX., devoted itself to eradicating any abuses which might creep into the practice of indulgences and the cult of relics. It had also the duty of considering applications for the concession of indulgences and of interpreting the rules with regard to them. In 1904 Pius X. attached this Congregation to that of Rites, making the personnel of both the same, without suppressing it. In 1908, however, it was suppressed, as stated above, and its functions as to indulgences were transferred to the Holy Office, and those as to relics to the Congregation of Rites.

(13) The Congregation of the Fabric of St Peter's (Sacra Congregatio reverendae Fabricae S. Petri) is charged with the upkeep, repairs and temporal administration of the great basilica'

in this capacity it controls the famous manufacture of the Vatican mosaics. It also formerly enjoyed certain spiritual

powers for the reduction of the obligations imposed by F f %' C pio us legacies and foundations, the objects of which, for Peter's. want of funds or any other reason, could not be fully

carried out, and for the condonation of past omission of such obligations, e.g. of priests to celebrate the foundation masses of their benefices. In 1908 these powers were taken away from it by Pius

X., and transferred to the Congregation of the Council, which already exercised some of them.

(14) The Congregation of Loretto (Congregatio Lauretana) discharged the same functions for the sanctuary of that name; its temporal administration was latterly very much reduced, and in 1908 it was united by Pius X. with the Congregation of the Council.

(15) The Congregation for extraordinary ecclesiastical affairs [Sacra Congregatio super negotiis ecclesiasticis extraordinariis) ,

*established by Pius VI. at the end of the 18th century E *f™' to study the difficult questions relative to France, affairs. was afterwards definitively continued by Pius VII.;*

and there has been no lack of fresh extraordinary matters. It also dealt with the administration of the churches of Latin America, not to mention certain European countries, such as Russia, under the same conditions as the Propaganda in countries under missions. Since the constitution Sapienti, its competency has been confined to the examination, at the request of the secretary of state, of questions which are submitted to it, and especially those arising from civil laws and concordats.

(16) The Congregation of Studies (Congregatio pro Univtrsilate studii Romani, Congregazione degli Studi), founded by Sixtus

V. to act as a higher council for the Roman university

of La Sapienza, had ceased to have any functions when in 1824 it was re-established by Leo X.L1. to supervise education in Rome and the Papal States; since 1870 it has been exclusively concerned with the Catholic universities, so far as the sacred sciences are concerned. With this should be connected the commission for historical studies, instituted in 1883 by Leo XIII., at the same time as

he threw the Vatican archives freely open to scholars.

III. The Tribunals and Offices. — Though it has been relieved of the functions allotted to the Congregations of cardinals, the

old machinery of the ecclesiastical administration has Tribunals not Deen abolished; and the process of centralization offices. which has been accentuated in the course of the last

few centuries, together with the facility of communica- tion, ensured for them a fresh activity, new offices having even been added. The chief thing to be observed is that the prelates who were formerly at the head of these departments have almost all been replaced by cardinals. The following is the list of the tribunals and offices, including the changes introduced by the reorganization of the Curia by Pius X. in 1908. The tribunals are three in number: one for the forum internum, the Peni- tentiary; the other two for judicial matters .in foro exlerno, the Rota and the papal Signatura.

(1) The Penitentiary (Sacra poenitentiaria Apostolica) is the tribunal having exclusive jurisdiction in matters of conscience

(in foro interno),e.g. dispensations from secret impedi- ments and private vows, the absolution of reserved cases. These concessions are applied for anonymously. It also had, previously to the constitution Sapienti, a certain jurisdiction in foro externo, such as over matrimonial dispensa- tions for poor people. Its concessions are absolutely gratuitous. Since the 12th century, the papal court had already had officials known as penitentiaries (poenitentiarii) for matters of conscience; the organization of the Penitentiary, after several modifications, was renewed by Benedict XIV. in 1748. At the head of it is the cardinal grand penitentiary (major poenitentiarius), assisted by the regens (It. regente) and various other functionaries and officials.

(2) The court of the Rota (Sacra Rota Romano.) used to be the supreme ecclesiastical tribunal for civil affairs, and its decisions had great authority. This tribunal goes back at least

Peni- tentiary.

Rota.

Signatura.

as far as the 14th century, but its activity had been reduced as a result of the more expeditious and summary, and less costly, procedure of the Congregations. The constitution Sapienti restored the Rota to existence and activity: it is now once more the ecclesiastical court of appeal for both civil and criminal cases. Pius X. also made special regulations for it, by which its ancient usages are adapted to modern circum- stances. The tribunal of the Rota consists of ten judges called auditors (uditori), of whom the most senior is president with the title of dean. Each judge has an auxiliary; to the tribunal are attached a promotor fiscalis, charged with the duty of securing the due application of the law, and an official charged with the defence of marriage and ordination; there is also a clerical staff (notaries, scribes) attached to the court. Cases are judged by three auditors, who succeed each other periodically (per turnum) according to the order in Which the cases are entered, and in exceptional cases by all the auditors (videntibus omnibus). Under the jurisdiction of the Rota, in addition to cases of first instance submitted to it by the pope, are such judgments of episcopal courts as are strictly speaking subject to appeal; for petitions against non-judicial decisions are referred to the Congre- gations. Appeal is sometimes allowed from one ” turn ” to another; if the second sentence of the Rota confirms the first, it is definitive; if not, a third may be^obtained.

(3) The supreme tribunal of the papal Signatura (Signatura Apostolica) . There were formerly two

sections: the Signatura Justitiae and the Signatura Gratiae; by the con- stitution Sapientis they were suppressed and amal- gamated into one body, the Signatura Apostolica, which is the exact equivalent of other modern courts of cassation. This tribunal is composed of six cardinals, one of whom is the prefect, assisted by a prelate secretary, consultors and the necessary inferior officials. It judges cases in which auditors of the Rota are concerned, such as personal objections, but especially objections (querelae) lodged against sentences of the Rota, with a view to their being annulled or revised (restitutio in integrum).

Next come the offices, now reduced to six in number.

(1) The Chancery (Cancellaria Apostolica), the department from which are sent out the papal letters, has for a long time drawn up only those letters written in solemn form _. known as bulls. The bull, so called from the leaden ncer y. seal (bulla), is written on thick parchment; the special writing known as Lombard, which used to be used for bulls, was abolished by Leo XIII., and the leaden seal reserved for the „ „

more important letters; on the others it has been replaced by a red ink stamp bearing both the emblems repre- sented on the leaden seal: the two heads, face to face, of St Peter and St Paul, and the name of the reigning pope. Bulls are written in the name of the pope, who styles himself ” (Pius) Episcopus servus servorum Dei; (Pius), bishop, servant of the servants of God.” They were formerly dated by kalends and from the era of the Incarnation, which begins on the 25th of March, but in 1908 Pius X. ordered them to be dated according to the common era. It is practically only bulls of canonization which are signed by the pope and all the cardinals present in Rome; the signature of the pope is then ” (Pius) Episcopus Ecclesiae catholicae,” while his ordinary, signature bears only his name and number, ” Pius PP. X.” Ordinary bulls are signed by several officials of the chancery, and a certain number only by the cardinal at its head, who until 1908 was

styled vice- chancellor, because the chancellor used formerly to be a prelate, not a cardinal; but since the constitution Sapienti has been entitled chancellor. He is assisted by several officials, beginning with the regens of the chancery. To the chancery were attached the abbreviatores de parco majori vel minori (see Abbreviators), formerly charged with the drawing up or ” extension ” of bulls; they were suppressed by Pius X., and their functions trans- ferred to the Protonotarii apostolici participants (i.e. active). Further, Pope Pius confined the functions of the chancery to the sending out of bulls under the leaden seal (sub plumbo), for the erection of dioceses, the provision of bishoprics and

consistorial benefices, and other affairs of importance, these bulls being sent out by order of the Consistorial Congregation.

(2) The Apostolic Dataria is the department dealing with matters of grace, e.g. the concession of privileges, nominations

to benefices and dispensations in foro externo, especially Apos- matrimonial ones; but its functions have been greatly toUca. reduced by the reforms of Pius X.; the matrimonial*

section has been suppressed,dispensations for marriages now belonging to the Congregation for the discipline of the sacraments; the section dealing with benefices, which is the only one preserved, deals with non-consistorial benefices reserved to the Holy See; it examines the claims of the candidates, draws up and sends out the letters of collation, gives dispensations, when necessary, in matters concerning the benefices, and manages the charges (i.e. pensions to incumbents who have resigned, &c.) imposed on the benefices by the pope. It has at its head a cardinal formerly called the

pro-datarius, the datarius having formerly been a prelate; and now datarius, since the reform by Pius X. The cardinal is assisted by a prelate called the sub-datarius, and other officials.

(3) The Apostolic Chamber (Referenda Camera Apostolica) was before the abolition of the temporal power of the papacy

the ministry of finance, at once treasury and exchequer, chamber. ° t ' le P°P es as heads of the Catholic Church as well as*

sovereigns of the papal states. Although it is neces- sarily diminished in importance, it has retained the administra- tion of the property of the Holy See, especially during a vacancy. At its head is the cardinal camerlengo (Sanctae Romanae Ecclesiae Cardinalis Camerarius) , who, as we know, exercises the external authority during the vacancy of the Holy See.

(4) Next come the palatine secretariates, the first and principal of which is the secretariate of state (Secretaria status). The

cardinal secretary of state is as it were the pope's shio of' P rmle minister, gathering into one centre the internal State. administration and foreign affairs, by means of the*

nunciatures and delegations depending on his depart- ment. The secretary of state is the successor of what was called in the 17th century the cardinal nephew; his functions and importance have increased more and more. The secretariate of state is the department dealing with the political affairs of the Church. To it belongs the internal administration of the apostolic palaces, with the library, archives, museums, &c. In 1908 Pius X. divided the departments of the secretariate of state into three sections, under the authority of the cardinal secretary. The first is the department of extraordinary ecclesi- astical affairs, having at its head the secretary of the Congregation of the same name; the second, that

of ordinary affairs, directed by a substitute, is the department dealing, among other things, with the concession of honorary distinctions, both for ecclesiastics and laymen; the third is that of the briefs, which hitherto Briefs. formed a separate secretariate. It is this department

which sends out, at the command of the secretary of state or the various Congregations those papal letters which are written in less solemn form, brevi manu, hence the word " brief." They are written in the pope's name, but he only takes the less solemn style of: " Pius PP. X." The brief is written on thin parchment, and dated by the ordinary era and the day of the month; they were formerly signed only by the cardinal secretary of briefs or his substitute, but now by the cardinal secretary of state or the head of the office, called the chancellor of Briefs (cancellarius Brevium). The seal is that of the fisherman's ring, hence the formula of conclusion, " Datum Romae, sub annulo Piscatoris." The " Fisherman's ring " is a red ink stamp representing St Peter on a boat casting out his nets, with the name of the reigning pope.

The reform of Pius X. maintained untouched the two offices called the secretariate of briefs to princes, and the secretariate of

Latin Letters, the names of which are sufficient indica- otfices. t ' on °f their functions. The secretariate of memorials

(Secretaria Memorialium), through which pass requests addressed to the pope for the purpose of obtaining certain favours, was formerly of great importance; it is now suppressed and the

requests are addressed to the proper departments. Finally, the pope has his special secretary, his auditor, with his offices, as well as the papal almonry, the officials of which administer the papal charities.

IV. The pontifical " family " (jamilia) forms the

pope's civil court. First come the palatine cardinals, i.e. those who, on account of their office, have the right' of living in the

papal palaces. These were formerly four in number: p„^ t if ica / the pro-datarius (now datarius) , the secretary of state, "family." the secretary of briefs, and the secretary of the memorials; the two last of these were suppressed in 1908. Next come the four palatine prelates, the majordomo, the superintendent of the household and its staff, and successor of the ancient vicedominus; the master of the chamber, who presides over the arrangement of audiences; the auditor, or private secretary; and finally the master of the sacred palace (magister sacri palatii), a kind of theological adviser, always a Dominican, whose special duty is nowadays the revision of books published at Rome. Other prelates rank with the above, but in a lower degree, notably the almoner and the various secretaries. All ecclesiastics admitted, by virtue of their office or by a gracious concession of the pope, to form part of the " family," are called domestic prelates, prelates of the household; this is an honorary title conferred on many priests not resident in Rome. The ex- ternal service of the palace is performed by the Swiss Guard and the gendarmerie; the service of the ante-chamber by the lay and ecclesiastical chamberlains; this service has also given rise to certain honorary titles both for ecclesiastics, e.g. honorary chamberlain, and for laymen, e.g. secret chamberlain (cameriere segreto). (See Chamberlain.)

V. The pontifical " chapel " (capella) is the papal court for purposes of religious worship. In it the pope is surrounded by the cardinals according to their order; by the patriarchs, archbishops and bishops attending at the chapell throne, and others; by the prelates of the Curia,

and by all the clergy both secular and regular. Among the prelates we should mention the protonotaries, the successors of the old notaries or officials of the papal chancery in the earliest centuries; the seven protonotarii participantes were

restored by Pope Pius X. to the chancery, as noted above, but they have kept important honorary privileges; this is yet another source of distinctions conferred upon a great number of priests outside of Rome, the protonotaries of different classes. In a lower degree there are also the chaplains of honour. Since 1870 the great pontifical ceremonies have lost much of their splendour.

Bibliography. — La Gerarchia cattolica, an annual directory pub- lished at Rome; Lunadoro, Relazione delta corte di Roma (Rome, 1 765) ; Moroni, Dizionario di erudizione, under the various headings ; Card. De Luca, Relatio curiae romanae (Cologne, 1683) ; Bouix, De curia romana (Paris, 1859) ; Ferraris, Prompta bibliotheca (addit. Cassinenses) , s.v. Congregatio; Grimaldi, Les Congregations romaines (Sienna, 1891) ; Dictionnaire de tkeologie catholique, s.v. Cour romaine (Paris, 1907) ; Publications of the acts of the Roman Congregations: Bishops and regulars — Bizzarri, Collectanea in usum Secretariat (Rome, 1866, 1885). Council: the Thesaurus resolutionum has published all business since 1700: a volume is issued every year, and the contents have been published in alphabetical order by Zamboni (4 vols., Rome, 1812; Arras, i860) and by Pallottini (18 vols., Rome, 1868, &c). Immunity: Ricci, Synopsis, decreta et resolutiones (Palestrina, 1 708). Propaganda: De Martinis, Juris pontificii de Propaganda Fide, &c. (Rome, 1888, &c.) ; Collectanea S. C.de Prop. Fide (2nd ed., Rome, 1907). Index: Index librorum prohibitorum (Rome, 1900). Rites: Decreta authentica (Rome, 1898). Indulgences: Decreta authentica (Regensburg, 1882); Rescripta authentica (ib., 1885). (A. Bo.)*

CURICO, a province of central Chile, lying between the provinces of Colchagua and Talca and extending from the Pacific to the Argentine frontier; area, 2978 sq. m.; pop. (1895) 103,242. The eastern and western sections are mountainous, and are separated by the fertile valley of central Chile. The mineral resources are undeveloped, but are said to include copper, gold and silver. Cattle, wheat and wine are

the principal products, but Indian corn and fruit also are produced. On the coast are important salt-producing industries. The climate is mild and the rainfall more abundant than at the northern part of the valley, and the effects of this are to be seen in the better

pasturage. Irrigation is used to a large extent. The province was created in 1865 by a division of Colchagua. The capital is Curic6, on the Mataquito river, in lat. 34 58' S. long. 71 19' W., 114 m. S. of Santiago by the Chilean Central railway, which crosses the province. The city stands on the great central plain, 748 ft. above sea-level, and in the midst of a comparatively well- cultivated district. It was founded in 1742 by Jose de Manso, and is one of the more cultured and progressive provincial towns of Chile. Pop. (1895) 12,669. Vichiquen, on a tide-water lake on the coast, is a prosperous town, the centre of the salt trade.

CURIE, PIERRE (1859-1906), French physicist, was born in Paris on the 15th of May 1859, and was educated at the Sorbonne, where he subsequently became professor of physics. Although he had previously published meritorious researches on piezo- electricity, the magnetic properties of bodies at different tem- peratures, and other topics, he was chiefly known for his work on radium carried out jointly with his wife, Marie Sklodowska, who was born at Warsaw on the 7th of November 1867. After the discovery of the radioactive properties of uranium by Henri Becquerel in 1896, it was noticed that some minerals of uranium, such as pitchblende, were more active than the element itself, and this circumstance suggested that such minerals contained small quantities of some unknown substance or substances possessing radioactive properties in a very high degree. Acting on this surmise M. and Mme Curie subjected a large amount of pitchblende to a laborious process of fractionation, with the result

that in 1898 they announced the existence in it of two highly radioactive substances, polonium and radium. In subsequent years they did much to elucidate the remarkable properties of these two substances, one of which, polonium, came to be regarded as one of the transformation-products of the other (see Radioactivity). In 1903 they were awarded the Davy medal of the Royal Society in recognition of this work, and in the same year the Nobel prize for physics was divided between them and Henri Becquerel. Professor Curie, who was elected to the Academy of Sciences in 1905, was run over by a dray and killed instantly in Paris on the 19th of April 1906.

His elder brother, Paul Jacques Curie, born at Paris on the 29th of October 1856, published an elaborate memoir on the specific inductive capacities of crystalline bodies (Ann. Chim. Phys. 1889, 17 and 18).

CURIO, GAIUS SCRIBONIUS, Roman statesman and orator, son of a distinguished orator of the same name, flourished during the 1st century B.C. He was tribune of the people in 90 B.C., and afterwards served in Sulla's army in Greece against Archelaus, general of Mithradates, and as his legate in Asia, where he was commissioned to restore order in the kingdoms abandoned by Mithradates. In 76 he was consul, and as governor of Macedonia carried on war successfully against the Thracians and Dardanians, and was the first Roman general who penetrated as far as the Danube. On his return he was granted the honour of a triumph. During the discussion as to the punishment of the Catilinarian conspirators he supported Cicero, but he spoke in favour of P. Clodius (q.v.) when the latter was being tried for the Bona Dea affair. This led to a violent attack on the part of Cicero, but it does not appear to have interfered with their friendship. Curio was a vehement opponent of Caesar, against whom he wrote a political pamphlet in the form of a dialogue. He was pontifex maximus in 57, and died in 53. His reputation as an orator was considerable, but according to Cicero he was very illiterate, and his

only qualifications were brilliancy of style and the purity of his Latin. He was nicknamed Burbuleius (after an actor) from the way in which he moved his body while speaking.

Orelli, Onomasticon to Cicero; Florus iii. 4; Eutropius vi. 2; Val. Max. ix. 14, 5; Quintilian, Instit., vi. 3, 76; Dio Cassius xxxviii. 16.

His son, Gaius Scribonius Curio, was first a supporter of Pompey, but after his tribuneship (50 B.C.) went over to Caesar, by whom he was said to have been bribed. But, while breaking off relations with Pompey, Curio desired to keep up the appearance of impartiality. When it was -demanded that Caesar should Jay down his imperium before entering Rome, Curio proposed

that Pompey should do the same adding that, if the rivals refused to do so, they ought both to be declared public enemies. His proposal was carried by a large majority, but a report having spread that Caesar was on the way to attack Rome, the consuls called upon Pompey to undertake the command of all the troops stationed in Italy. Curio's appeal to the people to prevent the levying of an army by Pompey was disregarded; whereupon, feeling himself in danger, he fled to Ravenna to Caesar. He was commissioned by Caesar, who was still unwilling to proceed to extremities, to take a message to the senate. But Curio's reception was so hostile that he hurriedly returned during the night to Caesar. It was now obvious that civil war would break out. Curio collected troops in Umbria and Etruria for Caesar, who sent him to Sicily as propraetor in 49. After having fought with considerable success there against the Pompeians, Curio crossed over to Africa, where he was defeated and slain by Juba, king of Numidia. Curio, although a man of profligate character, possessed conspicuous ability, and was a distinguished orator. In spite of his faults, Cicero, as an old friend of his father, took a great interest in him and did his utmost to reform him. Seven of Cicero's letters {Ad. Fam. ii. 1-7) are addressed to him. There can be no doubt that Curio's*

behaviour in regard to the laying down of the imperium by Caesar and Pompey in great measure contributed to the outbreak of civil war. The first amphitheatre in Rome was erected by him (50), for the celebration of the funeral games in honour of his father.

Orelli, Onomasticon to Cicero; Livy, Epit. 109, no; Caesar, Bell. Civ., ii. 23, for Curio's African campaign; Appian, Bell. Civ., ii. 26-44 ; Veil. Pat. ii. 48.

CURITYBA (also Corityba and Curitiba), capital of the state of Parana, Brazil, situated on an elevated plateau (2916 ft. above sea-level) 68 m. W. of its seaport Paranagua, with which it is connected by a railway remarkable for the engineering difficulties overcome and for the beautiful scenery through which it passes. Pop. (1890) 22,694; of the municipality, 24,553. There is a large foreign element in the population, the Germans preponderating. The city has a temperate, healthy climate, and is surrounded by a charming campo country, which, however, is less fertile than the forested river valleys. Mate is the principal export.

CURLEW (Fr. Courlis or Corlieu), a name given to two birds, of whose cry it is an imitation, both belonging to the group Limicolae, but possessing very different habits and features.

1. The long-billed curlew, or simply curlew of most British writers, the Numenius arquata of ornithologists, is one of the largest of the family Scolopacidae, or snipes and allied forms. It is common on the shores of the United' Kingdom and most parts of Europe, seeking the heaths and moors of the interior and more northern countries in the breeding-season, where it lays its four brownish-green eggs, suffused with cinnamon markings, in an artless nest on the ground. In England it has been ascertained to breed in Cornwall and in the counties of Devon, Dorset, Salop, and Derby — though sparingly. In York- shire it is more numerous, and thence to the extreme north of Scotland, as well as

throughout Ireland, it is, under the name of whaup, familiar to those who have occasion to traverse the wild and desolate tracts that best suit its habits. So soon as the young are able to shift for themselves, both they and their parents resort to the sea-shore or mouths of rivers, from the muddy flats of which they at low tide obtain their living, and, though almost beyond any other birds wary of approach, form an object of pursuit to numerous gunners. While leading this littoral life the food of the curlew seems to consist of almost anything edible that presents itself. It industriously probes the mud or sand in quest of the worms that lurk therein, and is also active in seeking for such crustaceans and molluscs as can be picked up on the surface, while vegetable matter as well has been found in its stomach. During its summer-sojourn on the moorlands insects and berries, when they are ripe, enter largely into its diet. In bulk the curlew is not less than a crow, but it looks larger still from its long legs, wings arid neck. Its bill, from 5 to 7 in. in length, and terminating in the delicate nervous apparatus

common to all birds of its family, is especially its most remark- able feature. Its plumage above is of a drab colour, streaked and mottled with very dark brown; beneath it is white, while the flight-quills are of a brownish black.

Nearly allied to the curlew, but smaller and with a more northern range, is the whimbrel (N. phaeopus), called in some parts jack-curlew, from its small size; May-fowl, from the month in which it usually arrives; and titterel, from one of its cries. 1 This so much resembles the former in habit and appear- ance that no further details need be given of it. In the countries bordering on the Mediterranean occurs a third species (N. tenuirostris) . Some fifteen other species, or more, have been described, but it is probable that this number is too great. The genus

Numenius is almost cosmopolitan. In North America three very easily recognized species are found — the first (N. longirostris) closely agreeing with the European curlew, but larger and with a longer bill; the second {N. hudsonicus) repre- senting the British whimbrel; and the third (N. .borealis), which has several times found its way to Britain, very much less in size — indeed the smallest of the genus. All these essentially agree with the species of the Old World in habit; but it is re- markable that the American birds can be easily distinguished by the rufous colouring of their axillary feathers^a feature which is also presented by the American godwits (Limosa).

2. The curlew of inlanders, or stone-curlew — called also, by some writers, from its stronghold in England, the Norfolk plover, and sometimes the thick-knee — is usually classed among the Charadriidae, but it offers several remarkable differences from the more normal plovers. It is the Charadrius oedicnemus of Linnaeus, the C. scolopax of Sam. Gottl. Gmelin, and the Oedi- cnemus crepitans of K. J. Temminck. With much the same cry as that of the Numenii, only uttered in a far sweeter tone, it is as fully entitled to the name of curlew as the bird most commonly so called. In England it is almost solely a summer visitor, though an example will occasionally linger throughout a mild winter; and is one of the few birds whose distribution is affected by geological formation, since it is nearly limited to the chalk- country — the open spaces of which it haunts, and its numbers have of late years been sensibly diminished by their inclosure. The most barren spots in these districts, even where but a super- ficial coating of light sand and a thin growth of turf scarcely hide the chalk below, supply its needs; though at night (and it chiefly feeds by night) it resorts to moister and more fertile places. Its food consists of snails, coleopterous insects, and earth-worms, but larger prey, as a mouse or a frog, is not rejected. Without making the slightest attempt at a nest, it lays its two eggs on a level spot, a bare fallow being often

chosen. These are not very large, and in colour so closely resemble the sandy, flint- strewn surface that their detection except by a practised eye is difficult. The bird, too, trusts much to its own drab colouring to elude observation, and, on being disturbed, will frequently run for a considerable distance and then squat with outstretched neck so as to become almost invisible. In such a case it may be closely approached, and its large golden eye, if it do not pass for a tuft of yellow lichen, is perhaps the first thing that strikes the searcher. As autumn advances the stone-curlew gathers in large flocks, and then is as wary as its namesake. Towards October these take their departure, and their survivors return, often with wonderful constancy, to their beloved haunts. In size this species exceeds any other European plover, and looks even still larger than it is. The bill is short, blunt, and stout; the head large, broad, and flat at the top; the wings and legs long — the latter presenting the peculiarity of a singular enlarge- ment of the upper part of the tarsus, whence the names Oedi- cnemus and Thick-knee have been conferred. The toes are short and fleshy, and the hind-toe is wanting. This bird seems to have been an especial favourite with Gilbert White, in whose classical writings mention of it is often made. Its range extends to North Africa and India. Five other species of Oedicnemus from Africa

1 The name spowe (cf. Icelandic Spot) also seems to have been anciently given to this bird (see Stevenson's Birds of Norfolk, ii. 201).

have also been described as distinct. Australia possesses a very distinct species (0. grallarius), and the genus has two members in the Neotropical Region (0. bislrialus and 0. superciliaris) . An exaggerated form of Oedicnemus is found in Aesacus, of which two species have been described, one (A. recurvirostris)from the Indian, and the other (A. magnirostris) from the northern parts of the Australian region. (A. N.)

CURLING, THOMAS BLIZARD (1811-1888), British

surgeon, was born in London in 1811. Through his uncle, Sir William Blizard, he became assistant-surgeon to the London hospital in 1833, becoming full surgeon in 1849. After filling other important posts in the College of Surgeons, he was appointed president in 1873. In 1843 he won the Jacksonian prize for his investigations on tetanus; and he became famous for his skill in treating diseases of the testes and rectum, his published works on which went through many editions. He died on the 4th of March 1888.

CURLING, a game in which the players throw large rounded stones upon a rink or channel of ice, towards a mark called the tee. Where the game originated is not precisely known; but it has been popular in Scotland for three centuries at least. Some writers, looking to the name and technical terms of the game, trace its invention to the Netherlands; thus " curl " may have been derived from the Ger. kurzweil, a game; 'tee" from the Teutonic tighen, to point out; " bonspiel," a district curling competition, from the Belgic bonne, a district, and spel, play; the further supposition that " rink " is merely a modification of the Saxon hrink, a strong man, seems scarcely tenable. Curling is called " kuting " in some parts of Lanarkshire and Ayrshire, and very much resembles quoiting on the ice, so that the name may have some connexion with the Dutch coete, a quoit; while Cornells Kiliaan (1528-1607) in his Teutonic Dictionary gives the term khuyten as meaning a pastime in which large globes of stone like the quoit or discus are thrown upon ice. Possibly some of the Flemish merchants who settled in Scotland towards the close of the 16th century may have brought the game to the country. Unfortunately, however, for the theory that assigns to it a far-away origin, we find no early mention of it in the literature of the continent; while Camden, when describing the Orkney Islands in 1607, tells us that one of them supplies " plenty of excellent stones for the game called curling "; and incidental references to it as a game played in Scotland are made by several authors during the first half of the

same century.

If the game be not indigenous to Scotland it certainly owes its development to that country, and in the course of time it has come to be the national sport. It was played at first with very rude engines — random whin boulders fashioned by nature alone, or misshapen granite blocks, bored through to let in the thumb of the player, having been the primitive channel stones. In course of years the rough block was superseded by a sym- metrical object usually made of whinstone or granite, beautifully rounded, brilliantly polished, and supplied with a convenient handle.

Although curling boasts a literature of its own and songs in- numerable, yet it has received but the scantiest notice from such important Scottish writers as Scott and Burns, or from con- temporary literature in general. In 1834 an " Amateur Curling Club of Scotland " was formed, but this " mutual admiration amateur society came to nothing, as might be expected." Far more businesslike were the methods of the men who set afoot the " Grand Caledonian Curling Club," which began its existence on the 15th of November 1838, and which, under its present title of " The Royal Caledonian Curling Club," is regarded in all parts of the. world as the mother-club and legislative body, even in Canada, where, however, curling conditions differ widely from those of Scotland; devotion to the mother-club does not by any means imply submission. Starting with 28 allied clubs the Royal Club grew so rapidly that there were 500 such in 1880 and 720 in 1903. It was under the auspices of the Royal Caledonian that a body of Scottish curlers visited Canada and the United States in the winter of 1 902-1903, and, while a slight margin of victory remained with the home players under their own climatic con-

ditions, the visit did much to bring together the

lovers of the game on both sides of the Atlantic. The assumption of the title ” Royal ” in place of ” Grand ” was due to the visit of Queen Victoria and the prince consort to Scotland in 1842, on which occasion they were initiated into the mysteries of the game on the polished floor of the drawing-room in the Palace of Scone; and the prince consort, who was presented with a pair of curling- stones, consented to become patron of the club. On his death he was succeeded by the prince of Wales, who, as Edward VII., still continued his patronage. The Club’s main duties are to further the interests of the game, to revise the laws and to arrange the important matches, especially the grand match, played annually between the Scottish clubs north of the Forth & Clyde Canal and those south of it. In the first of these matches (1847) only twelve ” rinks ” were played; in 1903 there were no fewer than 286. During this time the southern clubs were usually victorious. Curlers claim to be a united brotherhood within which peer and peasant are equal ” on the ice.” To the same end the laws of the club are framed with a due regard to economy, not forgetting conviviality in the matter of ” beef and greens,” the curler’s traditional dish, washed down with whisky. A formal freemasonry exists among curlers, who must be initiated into the mysteries and instructed in the grip, password and ceremony, being liable at any moment to be examined in these essentials and fined for lapses of memory. Betting, excepting for the smallest stakes, is discountenanced.

- Glossary. — As curling has a language which contains many curious terms, puzzling to the uninitiated, the English equivalents of some of them are here given. Baugh ice, rough or soft ice. Bias, a slope on the ice. Boardhead (also house or parish), the large circle round the tee. Bonspiel, a match between two clubs. Break an egg on a stone, touch it very slightly. Broughs, the small circles round the tee. Chipping, striking a stone of which a small part can be seen. Core, old name for rink. Cowe or kowe, a besom made of broom- twigs. Draw, to

play gently. Drive, to play hard. Drug ice, soft bad ice. Fill the port, to block the interval between two stones. Gogsee, tee. Guard, a stone that covers and protects another. Hack, a hollow cut in the ice for the player's foot, used in place of a crampit. Hands up! stop sweeping. Hog, a stone that stops short of the hog-score, a line drawn one-sixth of the length of the rink from the tee. Head, an innings, both sides delivering all their stones once. Howe, the middle of the rink, gradually hollowed by stones. In- ringing, gaining a good position by rebounding off another stone. In-wick, the same. Lie shot, the stone resting nearest the tee. Mar, to interfere with a stone while running. Out-Turn, to make the stone twist to the left. In-Turn, to make one turn to the right. Out-wick, to strike a stone on the edge so as to drive it towards the tee. Pat-lid, a stone that lies on the tee. Pittycock, the oldest form of curling-stone. Raise, to drive a " friendly " stone nearer the tee. Rebut, to deliver the stone with great force, so as to scatter the stones on the boardhead. Red the ice, clear away the opponents' stones. Rink, the space in which the game is played ; also the members of a side. Sole, the under part of the stone; also to deliver the stone. Soop, to sweep. Souter, to win without allowing the opponents to score at all ; a term derived from a famous team of cobblers (souters) of Lochmaben, whose opponents seldom or never scored a point. Spiel, a match between members of the same club. Spend the stone, to waste a shot by playing wide intentionally. Slug, a fluke. Tee, the mark in the centre of the boardhead, against which it is the curler's object to lay the stone. The tee may be any kind of a mark ; a small iron plate with a spike in it is often used. Tozee, tee. Tramp, crampit, trigger or tricker, an iron plate fitted with spikes which the player stands upon to deliver the stone. Wittyr, tee.

The Rink and Implements. — The rink is marked out in the ice, which should be very hard and smooth, in curling language " keen and clear." To keep it swept every curler carries a broom, sometimes a mere

bundle of broom-twigs, more often an ordinary housemaid's broom. Good " sooping," or sweeping, is part of the curler's art, and is performed subject to strict rules and under the direction of the skip, or captain; its importance lying in the fact that the progress of a stone is retarded by the ice-dust caused by the play, the sweeping of which in front of a running stone consequently prolongs its course. Apart from the broom and the crampit, the " roarin' game," as curlers love to call it, requires no further implement than the stone, a flattened, polished disk, fitted with a handle. In weight it must not exceed 44 lb, 35 to 40 lb being usual. It must not exceed 36 in. in circumference or be less in height than one-eighth of the circumference. The two flat sides, or soles, are so shaped that

one is serviceable for keen ice and the other for ice that is soft, rough or " baugh." The handle can be fitted to either side, as the case demands. The cost of a pair of stones is not less than £2, generally more. In the intense cold of Canada and the United States iron is found more serviceable than stone, and the irons weigh from 60 to 70 lb. Even these are light compared with the earlier rough boulder-stones, some of which weighed over 115 lb, although the very early ones were much lighter. The modern stone took shape at the beginning of the 19th century. The ancient stones had no handles, but notches were hewn in them for finger and thumb, and, as their weight varied from 5 to 25 lb, it is probable that they were thrown after the manner of quoits. Channel-stones, stones rounded by the action of water in a river-bed, were the favourites, while the shape was a matter of individual taste, oblong and triangular stones having been common. The soles were artificially flattened. During the next period we find the heavy boulder-stones, un- hewn blocks fitted with handles and probably used at shorter distances, 70 or 80 lb being no uncommon weight. The rounded stone, made on scientific principles, did not appear until about 1800. Even then it was of all shapes and sizes, with and without handles, and not uncommonly made of wood. The stones of to-day are

named after the places in which they are quarried, Ailsa Craigs, Burnocks, Carsphairn Reds and Crawfordjohns being some of the best-known varieties. The stones are quarried and never blasted, as the shock of the explosion is apt to strain or split the rock.

The Game. — Curling is practically bowls played on the ice, the place of the " jack " being taken by a fixed mark, as at quoits, called the tee, to which the curler aims his stone; every stone that finally lies nearer than any of the opposing stones counting a point or " shot." As each side has four players, each playing two stones, it is possible for one side to score eight points at a " head " or innings; but in practice it is found wiser, when a good shot has been made, to play some or all following stones to such positions as will prevent opposing stones from disturbing the stone lying near the tee. Stones thus placed are called " guards." Strategic matters like this are decided by the skip, or captain, of the rink, who plays last, and who is an autocrat whose will is law. The " lead," or first player, is expected to play quietly up the rink, leaving his stone as close to the tee as possible, but on no account beyond it. He is followed by the " lead " of the other side, who, instructed by his skip, will either try to drive away the first stone, if well placed, or put his own stone in a better position. When the skip's turn comes he is " skipped," or directed, by another player, appointed by himself, usually the third player. When all sixteen stones have been delivered the players cross over, the scores are counted, and the game proceeds from the other end of the rink. If a stone fails to cross the "hog-score" it is a "hog" and is removed from the rink, unless it has struck another stone in position. Stones that pass the back- score or touch the swept snow on either side are also removed. By a cleverly imparted twist a stone may be made to curve round a guard and either drive away an opposing winner or find a favourable lie for itself. This, the equivalent of " bias " in the game of bowls, is the height of scientific play. If the situation

seems desperate a very hard throw, a " thunderin' cast," may succeed in clearing away the opponents' stones from the neighbourhood of the tee. Different methods are adopted in delivering the stone, but in all of them a firm stand should be taken on the crampit, and the stone swung, either quietly , or, if the skip calls for a " thunderin' cast," vigorously; but care must be taken to avoid striking the ice with the stone so as to crack or " star " the ice. All matches are for a certain number of " heads " or of points, or for all that can be made within a certain time limit, as may be agreed.

Abridged Rules. — Tees shall be 38 yds. apart, and with the tee as centre a circle having a radius of 7 ft. shall be drawn. In alignment with the tees, lines, to be called Central Lines, are drawn from the tees to points 4 yds. behind each tee, and at these points Foot Scores 18 in. long shall be drawn at right angles, on which, at 6 in. from Central Line, the heel of the Crampit shall be placed. All matches shall be of a certain number of heads, or shots, or by time, as agreed.

Every rink of players shall be composed of four a side. No shoes likely to break the ice may be worn.

The skips opposing each other shall settle by lot, or in any other way they may agree upon, which party shall lead at the first head, after which the winning party shall do so.

All curling stones shall be of a circular shape, fto stone shall be of a greater weight than 44 lb imperial, or of greater circumference than 36 in., or of less height than one-eighth part of its greatest circumference.

No stone, or side of a stone, shall be changed after a match has been begun, or during its continuance, unless by consent.

Should a stone happen to be broken, the largest fragment shall be considered in the game for that end — the player being entitled after- wards to use another stone or another pair.

If a played stone rolls over, or stops, on its side or top, it shall be put off the ice. Should the handle quit the stone in delivery, the player must keep hold of it, otherwise he shall not be entitled to replay the shot.

Players, during the course of each end, to be arranged along the sides of the rink, anywhere skips may direct ; and no party, except when sweeping according to rule, shall go upon the middle of the rink, or cross it, under any pretence whatever. Skips alone to stand at or about the tee — that of the playing party having the choice of place, and not to be obstructed by the other.

If a player should play out of turn, the stone so played may be stopped in its progress, and returned to the player. Should the mistake not be discovered till the stone be at rest, or has struck another stone, the opposite skip shall have the option of adding one to his score, allowing the game to proceed, or declaring the end null and void. But if a stone be played before the mistake has been discovered, the head must be finished as if it had been properly played from the beginning.

The sweeping shall be under the direction and control of the skips. The player's party may sweep the ice anywhere from the centre line to the tee, and behind it, — the adverse party having liberty to sweep behind the tee, and in front of any of their own stones when moved by another, and till at rest. Skips to have full liberty to clean and sweep the ice behind the tee at any time, except when a player is being directed by his skip.

If in sweeping or otherwise, a running stone be marred by any of the party to which it belongs, it may, at the option of the opposite skip, be put off the ice; if by any of the adverse party, it may be

placed where the skip of the party to which it belongs shall direct. If otherwise marred, it shall be replayed.

Every player to be ready to play when his turn comes, and not to take more than a reasonable time to play. Should he play a wrong stone, any of the players may stop it while running; but if not stopped till at rest, the one which ought to have been played shall be placed instead, to the satisfaction of the opposing skip.

No measuring of shots allowable previous to the termination of the end. Disputed shots to be determined by the skips, or, if they disagree, by the umpire, or, when there is no umpire, by some neutral person chosen by the skips. All measurements to be taken from the centre of the tee, to that part of the stone which is nearest it. No stone shall be considered without a circle, or over a line, unless it clear it; — and in every case, this is to be determined by placing a square on the ice, at the circle or line.

Skips shall have the exclusive regulation and direction of the game for their respective parties, and may play last stone, or in what part of it they please ; and, when their turn to play comes, they may name one of their party to take charge for them.

If any player shall speak to, taunt or interrupt another, not being of his own party, while in the act of delivering his stone, one shot shall be added to the score of the party so interrupted.

If from any change of weather after a match has been begun, or from any other reasonable cause, one party shall desire to shorten the rink, or to change to another one, and, if the two skips cannot agree, the umpire shall, after seeing one end played, determine whether the rink shall be shortened, and how much or whether it shall be changed, and his decision shall be final.

See Annual of the Royal Caledonian Curling Club,

Edinburgh.

CURLL, EDMUND (1675–1747), English bookseller, was born in 1675 in the west of England. His parents were in humble circumstances. After being apprenticed to an Exeter bookseller he came to London and started business on his own account, advertising himself by a system of newspaper quarrels. His connexion with the anonymously-published Court Poems in 17 16 led to the long quarrel with Pope, who took his revenge by immortalizing Curll in the Dunciad. Curll became notorious for his indecent publications, so much so that " Curlicism " was regarded as a synonym for literary indecency. In 1 716 and again in 1721 he had to appear at the bar of the House of Lords for publishing matter concerning its members. In 1725 he was con- victed of publishing obscene books, and fined in 17 28for publishing The Nun in her Smock and Be Usu Flagrorum, while his Memories

of John Ker of Kersland cost him an hour in the pillory. When Curll in 1735 announced the forthcoming publication of "Mr Pope's Literary Correspondence," his stock, at Pope's instigation, was seized. It hassince been proved thatthepublication wasreally instigated by Pope, who wanted an excuse to print his letters, as he actually did (173 7–1 741). Inhisfortyyearsof business Curll published a great variety of books, of which a very large number, fortunately, were quite free from " Curlicisms." A list of his publications contains, indeed, 167 standard wwrks. He died on the nth of December 1747.

For Curll's relations with Pope, see the Life of Pope, by Sir Leslie Stephen in the English Men of Letters series.

CURRAGH, a level stretch of open ground in Co. Kildare, Ireland, famous for its race-course and its military camp. It has an area of upwards of 4800 acres; and its soft natural sward, which has never been broken by the plough, affords excellent pasture for sheep. From the peculiarity of its herbage, the

district is known in the neighbourhood as ” the short grass “; and the young men of Kildare are jocularly distinguished as the ” boys of the short grass.” The land is the property of the crown, which appoints a special officer as the ranger of the Curragh; but the right of pasturage is possessed by the land- owners of the vicinity. The oldest mention of the Curragh occurs in the Liber Hymnorum (the manuscript of which probably dates from the 10th century) in connexion with St Bridget, who is said to have received a grant of the district from the king of Leinster, and is popularly credited with the honour of having turned it into a common. It is evident, however, that long before the days of the saint the downs of Kildare had afforded a regular place of assembly for the people of the south of Ireland. The word cuirrech, cognate with the Lat. cursus, signifies a race- course, and chariot-races are spoken of as taking place on the Curragh as early as ‘the 1st century a.d. The Aenach Colmain (Curragh fair), also called Aenach Life (the fair on the plain of the Liffey), is frequently mentioned in the Irish annals, and both racing and other sports were carried on at this, the principal meeting of its kind in southern Ireland, and the plain appears from time to time as the scene of hostile encounters between the kings of Meath, Leinster and Offaly. In 1234 the earl of Pem- broke was defeated here by the viceroy of Ireland, Lord Geoffrey de Monte Marisco; and in 1406 the Irish under the prior of Connell were routed by the English. In 1789 the Curragh was the great rendezvous for the volunteers, and in 1804 it saw the gathering of 30,000 United Irishmen. The camp was established at the time of the Crimean War, and is capable of accommodating 12,000 men. The races are held in April, June, September and October.

See W. M. Hennessy, in Proceedings of Royal Irish Acad., 1866.

CURRAN, JOHN PHILPOT (1750-1817), Irish politician and judge, was born on the 24th of July 1750, at Newmarket, Cork, where his father, a descendant of one of Cromwell’s soldiers, was seneschal to the

manor-court. He was educated at Middle- ton, through the kind help of a friend, the Rev. Nathaniel Boyse, and at Trinity College, Dublin; and in 1773, having taken his M. A. degree, he entered the Middle Temple. In 1 774 he married a lady who brought him a small dowry; but the marriage proved unhappy, and Mrs Curran finally eloped from her husband.

In 1775 Curran was called to the Irish bar, where he very soon obtained a practice. On his first rising in court excessive nervous- ness prevented him from even reading distinctly the few words of a legal form, and when requested by the judge. to read more clearly he became so agitated as to be totally unable to proceed. But, his feelings once roused, all nervousness disappeared. His effective and witty attack upon a judge who had sneered at his poverty, the success with which he prosecuted a nobleman for a disgraceful assault upon a priest, the duel which he fought with one of the witnesses for this nobleman, and other similar exploits, gained him such a reputation that he was soon the most popular advocate in Ireland.

In 1783 Curran was appointed king's counsel; and in the same year he was presented to a seat in the Irish House of Commons. His conduct in connexion with this affair displays his conduct

in a most honourable light; finding that he differed radically in politics from the gentleman from whom he had received his seat, he expended £1500 in buying another to replace that which he Occupied. In his parliamentary career Curran was throughout sincere and consistent. He spoke vigorously on behalf of Catholic emancipation, and strenuously attacked the ministerial bribery which prevailed. His declamations against the govern- ment party led him into two duels — the first with John Fitz-gibbon, then attorney-general, afterwards Lord Clare; the second with tne secretary of state, Major

Hobart, afterwards earl of Buckinghamshire. The Union caused him the bitterest disappointment; he even talked of leaving Ireland, either for America or for England.

Curran's fame rests most of all upon his speeches on behalf of the accused in the state trials that were so numerous between 1794 and '1803; and among them may be mentioned those in defence of Hamilton Rowan, the Rev. William Jackson, the brothers John and Henry Sheares, Peter Finnerty, Lord Edward Fitzgerald, Wolfe Tone and Owen Kirwan. Another of his most famous and characteristic speeches is that against the marquis of Headfort, who had eloped with the wife of a clergyman named Massey. On the arrest of Robert Emmet, who had formed an attachment to his daughter, Curran was himself under suspicion; but, on examination before the privy council, nothing was brought forward to implicate him in the intended rebellion.

In 1806, on the death of Pitt and the formation of the Fox ministry, Curran received the post of master of the rolls, with a seat in the privy council, much to his disappointment, for he had desired a position of greater political influence. For eight years, however, he held this office. He then retired on a pension of £3000 ; and the three remaining years of his life were spent in London, where he became one of the most brilliant members of the society which included Sheridan, Erskine, Thomas Moore, and William Godwin. He died at his house in Brompton on the 14th of October 1817.

Curran's legal erudition was never profound; and though he was capable of the most ingenious pleading, his appeal was always to the emotions of his audience. His best speeches are one fiery torrent of invective, pathos, national feeling and wit. His diction was lofty and sonorous. He was, too, a most brilliant wit and of wonderful quickness in repartee. To his personal presence he owed nothing; for he was short, slim and boyish- looking, and his voice was thin and shrill.

See Curran and his Contemporaries, a most entertaining work, by Charles Phillips, a personal friend of Curran's (1818), and the Life of Curran, by his son, W. H. Curran (1810), and with additions by Dr Shelton Mackenzie, New York, 1855), both of which contain numerous samples of Curran's eloquence. See also Curran's Speeches (1805, 1808, 1845); Memoirs of Curran, by Wm. O'Regan (1817); Letters to Rev. H. Weston (1819); T. Moore's Memoirs (1853).

CURRANT. (1) The dried seedless fruit of a variety of the grape-vine, Vitis vinifera, cultivated principally in Zante, Cephalonia and Ithaca, and near Patras, in the Morea (see Greece). Currants were brought originally from Corinth, whence their name; in the 13th and 14th centuries they were known as raisins de Corauntz. In the Ionian Islands the currant- vine is grown on the sides of the lower hills, or in the valleys, the grape-vine occupying the higher and less open and rich ground. Gypseous marls, or calcareous marls containing a little gypsum, are preferred to limestone soils, as they allow of deep penetration of the roots of the vines. The most favourable situations are-those where a good supply of water can be obtained for the irrigation of the plantations. This is carried on from the end of October to the close of the year, after which all that is necessary is to keep the ground moist. The vines are planted in rows 3 or 4 ft. apart. Propagation is effected by grafting on stocks of the grape-vine, or by planting out in spring the young, vigorous shoots obtained at the end of the previous year from old currant-vines that have been cut away below the ground. The grafts bear fruit in three years, the slips in about double that time. The vine stock for grafting is cut down to the depth of a foot below the surface of the soil; two or three perpendicular incisions are made near the bark with a chisel; and into these

are inserted shoots of the last year's growth. The engrafted part then receives an application of moist marls, is wrapped in leaves and bound with rushes, and is covered with earth, two or three eyes of the

sioots being left projecting above ground. In December the currant plantations are cleared of dead and weak wood. In February the branches are cut back, and pruned of median shoots, which are said to prevent the lateral ones pro- ceeding from the same bud from bearing fruit. In order effectu- ally to water the trees, the earth round about them is in February and March hoed up so as to leave them in a kind of basin, or is piled up against their stems. In March, when the leaves begin to show, the ground is thoroughly turned, and if requisite manured, and is then re-levelled. By the middle of April the leaves are fully out, and in June it is necessary to break back the newly-formed shoots. The fruit begins to ripen in July, and in the next month the vintage takes place. At this season rain is greatly dreaded, as it always damages and may even destroy the ripe fruit. The plantations, which are commonly much exposed, are watched by dogs and armed men. In Cepha- lonia the currant-grape is said to ripen at least a week earlier than in Zante. To destroy the oidium, a fungal pest that severely injures the plantations, the vines are dusted, at the time the fruit is maturing, with finely-ground brimstone. The currants when sufficiently ripe are gathered and placed on a drying ground, where they are exposed to the sun in layers half an inch thick; from time to time they are turned and swept into heaps, until they become entirely detached from stalk. They are then packed in large butts for exportation. The wine made from the currant- grape is inferior in quality, but is said to be capable of much improvement. The fresh fruit is luscious and highly flavoured, but soon cloys the palate.

(2) The currants of British kitchen-gardens — so called from a resemblance to the foregoing — are the produce of Ribes nigrum and R. rubrum, deciduous shrubs of the natural order Ribesiaceae, indigenous to Britain, northern and central Europe, Siberia and Canada. The former species bears the black, the latter the red currant. White currants are the fruit of a cultivated variety of R. rubrum. Both red and black currants are used for making tarts and pies,

jams, jellies and wine; the latter are also employed in lozenges, popularly supposed to be of value in relieving a sore throat, are occasionally preserved in spirits, and in Russia are fermented with honey to produce a strong liquor.

Currants will flourish in any fairly good soil, but to obtain large crops and fine fruit a good rich loam is desirable; with an annual dressing of farmyard manure or cowdung, after the winter pruning, for established trees. The plants are best propagated by cuttings, which should consist of strong well-ripened young shoots taken off close to the old wood. These should be planted as soon as possible after the wood is matured in autumn about 6 in. apart. The plants are grown with the best results as bushes, but may also be trained against a wall or trellis. In the matter of pruning it must be borne in mind that red and white currants form their fruit buds on wood two to three years old, and the main shoots and side branches may therefore be cut back. Black currants on the other hand form fruit buds on the new wood of the previous year, hence the old wood should be cut away and the young left.

The black currant is subject to the attacks of a mite, Phytoptus ribis, which destroys the unopened buds. The buds, when attacked, recognized by their swollen appearance, should be picked off and burned. The attacks of the caterpillars of the gooseberry and other moths may be met by dusting the bushes with lime and soot when the plants are moist with dew or after syringing.

The following forms are recommended for cultivation: — Black: Lee's Prolific, Baldwin's or Carter's Champion and Black Naples; Red: Cherry, Raby Castle, Red Dutch and Comet; White: White Dutch. A kind of black currant (Ribes magellanicum) , bearing poor and acid fruit, is indigenous to Tierra del Fuego.

CURRICLE (Lat. curriculum, a small car), a light two-wheeled vehicle, generally for driving with two horses.

CURRIE, SIR DONALD (1825–1909), British shipowner, was born at Greenock on the 17th of September 1825. At a very early age he was employed in the office of a shipowner in that port, but at the age of eighteen left Scotland for Liverpool, where shipping business offered more scope. By a fortunate chance he attracted the notice of the chief partner in the newly started Cunard steamship line, who found him a post in that company. In 1849 the Cunard Company started a service between Havre and Liverpool to connect with their transatlantic service. Currie was appointed Cunard agent at Havre and Paris, and secured for his firm a large share of the freight traffic between France and the United States. About 1856 he returned to Liver- poo), where till 1862 he held an important position at the Cunard Company's headquarters. In 1862 he determined to strike out for himself, and leaving the Cunard established the " Castle " line of sailing-ships between Liverpool and Calcutta. Business prospered, but in 1864 Currie found it profitable to substitute London for Liverpool as the home port of his vessels, and himself settled in London. In 1872 he came to the conclusion, after a careful study of all the circumstances, that the development of Cape Colony justified the starting of a new line of steamers between England and South Africa. The result of this decision was the founding of the successful Castle line of steamers (see under Steamship Lines), which after 1876 divided the South African mail contract with the older Union line, and was finally amalgamated with the latter under the title Union Castle line in 1900. Currie's intimate knowledge of South African condi- tions and persons was on several occasions of material service to the British government. His acquaintance with Sir John Brand, the president of what was then the Orange Free State, caused him to be entrusted by the home government with the negotiations in the dispute concerning the ownership of the Kimberley diamond-fields, which were brought to a successful

conclusion. He introduced the two Transvaal deputations which came to England in 1877 and 1878 to protest against annexation, and though his suggestions for a settlement were disregarded by the government of the day, the terms on which the Transvaal was subsequently restored to the Boers agreed, in essentials, with those he had advised. The first news of the disaster of Isandhl- wana in the Zulu War was given to the home government through his agency. At that time there was no cable between England and South Africa, and the news was sent by a Castle liner to St Vincent, and telegraphed thence to Currie. At the same time by diverting his outward mail-boat then at sea from its ordinary course to St Vincent, he enabled the government to telegraph immediate instructions to that island for conveyance thence by the mail, thus saving serious delay, and preventing the annihilation of the British garrison at Eshowe. The present arrangement under which the British admiralty is enabled to utilize certain fast steamers of the mercantile marine as armed cruisers in war-time was suggested and strongly urged by Currie in 1880. In the same year he was returned to parliament as Liberal member for Perthshire, but, though a strong personal friend of W.E. Gladstone, he was unable to follow that statesman on the Home Rule question, and from 1 88 5 to 1 900 he represented West Perthshire as a Unionist. In 188 1 his services in connexion with the Zulu War were rewarded with knighthood, and in 1897 he was created G.C.M.G. He died at Sidmouth on the 13th of April 1909.

CURRIE, JAMES (1756-1805), Scottish physician and editor of Burns, son of the minister of Kirkpatrick-Fleming, in Dumfries- shire, was born there on the 31st of May 1756. Attracted by the stories of prosperity in America he went in 1771 to Virginia, where he spent five hard years, much of the time ill and always in unprofitable commercial business. The outbreak of war be- tween the Colonies and England ended any further chance of success, and sailing for home in the spring of 1776 after many delays he

reached England a year later. He then proceeded to study medicine at Edinburgh, and after taking his degree at Glasgow he settled at Liverpool in 1780, where three years later he became physician to the infirmary. He died at Sidmouth on the 31st of August 1805. Among other pamphlets Currie

was the author of Medical Reports on the Effects of Water, Cold and Warm, as a Remedy in Fevers and Febrile Diseases (1797), which had some influence in promoting the use of cold water affusion, and contains the first systematic record in English of clinical observations with the thermometer. But he is best known for his edition (1800), long regarded as the standard, of Robert Burns, which he undertook in behalf of the family of the poet. It contained an introductory criticism and an essay on the character and condition of the Scottish peasantry.

See the Memoir by W. W. Currie, his son (1831).

CURRY. (1) (Through the O. Fr. correier, from Late Lat. conredare, to make ready, prepare; a later form of the French is courroyer, and modern French is corroyer), to dress a horse by rubbing down and grooming with a comb; to dress and prepare leather already tanned. The currier pares off roughnesses and inequalities, makes the leather soft and pliable, and gives it the necessary surface and colour (see Leather) . The word ” currier,” though early confused in origin with ” to curry,” is derived from the Late Lat. coriarius, a leather dresser, from corium, hide. The phrase ” to curry favour,” to flatter or cajole, is a 16th century corruption of ” to curry favel,” i.e. a chestnut horse. This older phrase is an adaptation of an Old French proverbial expression estriller fauvel, and is paralleled in German by the similar den fahlen Hengst streichen. A chestnut or fallow horse seems to have been taken as typical of deceit and trickery, at least since the appearance of a French satirical beast romarfce the Roman de fauvel (1310), the hero of which is a counterpart of Reynard the Fox (q.v.).

(2) A name applied to a great variety of seasoned dishes, especially those of Indian origin. The word is derived from the Tamil kari, a sauce or relish for rice. In the East, where the staple food of the people consists of a dish of rice, wh eaten cakes, or some other cereal, some kind of relish is required to lend attraction to this insipid food; and that is the special office of curry. In India the following are employed as ingredients in curries: anise, coriander, cumin, mustard and poppy seeds; allspice, almonds, assafoetida, butter or ghee, cardamoms, chillies, cinnamon, cloves, cocoa-nut and cocoanut milk and oil, cream and curds, fenugreek, the tender unripe fruit of Buchanania lancifolia, cheroonjie nuts (the produce of another species, B. lalifolia), garlic and onions, ginger, lime-juice, vinegar, the leaves of Bergera Koenigii (the curry-leaf tree), mace, mangoes, nutmeg, pepper, saffron, salt, tamarinds and turmeric.

The cumin and coriander seeds are generally used roasted. The various materials are cleaned, dried, ground, sifted, thoroughly mixed and bottled. In the East the spices are ground freshly every day, which gives the Indian curry its superiority in flavour over dishes prepared with the curry-powders of the European market.

CURSOR, LUCIUS PAPIRIUS, Roman general, five times consul and twice dictator. In 325 he was appointed dictator to carry on the second Samnite War. His quarrel with Q. Fabius Maximus Rullianus, his magister equitum, is well known. The latter had engaged the enemy against the orders of Cursor, by whom he was condemned to death, and only the intercession of his father, the senate and the people, saved his life. Cursor treated his soldiers with such harshness that they allowed themselves to be defeated; but after he had regained their good-will by more lenient treatment and lavish promises of booty, they fought with enthusiasm and gained a complete victory. After the disaster of the Caudine Forks, Cursor to some extent wiped out the disgrace by compelling Luceria (which had re- volted) to surrender. He delivered the Roman hostages who were

held in captivity in the town, recovered the standards lost at Caudium, and made 7000 of the enemy pass under the yoke. In 309, when the Samnites again rose, Cursor was appointed dictator for the second time, and gained a decisive victory at Longula, in honour of which he celebrated a magnificent triumph. Cursor's strictness was proverbial; he was a man of immense bodily strength, while his bravery was

beyond dispute. He was surnamed Cursor from his swiftness of foot.

Livy viii., ix. ; Aurelius Victor, De viris illustribus, 31; Eutro- pius ii. 8. 9. .

His son of the same name, also a distinguished general, com- pleted the subjection of Samnium (272). He set up a sun-dial, the first of its kind in Rome, in the temple of Quirinus.

Livy x. 39-47; Pliny, Nat. Hist., vii. 60. t

CURSOR MUNDI, an English poem in the Northern dialect dating from the 13th century. It is a religious epic of 24,000 lines " over-running " the history of the world as related in the Old and New Testaments. " Cursur o werld man aght it call, For almast it over-rennes all." The author explains in his prologue his reasons for undertaking the work. Men desire to read old romances of Alexander, Julius Caesar, Greece, Troy, Brut, Arthur, of Tristram, Sweet Ysoude and others. But better than tales of love is the story of the Virgin who is man's best lover, therefore in her honour he will write this book, founded on the steadfast ground of the Holy Trinity. He writes in English for the love of English people of merry England, so that those who know no French may understand. The history is treated under seven ages. The first four include the period from the creation of the world to the

successors of Solomon, the fifth deals with Mary and the birth and childhood of Jesus, the sixth with the lives of Christ and the chief apostles, and with the finding of the holy cross, and the seventh with Doomsday. Four short pOems follow, more in some MSS. The bulk of the poem is written in rhyming couplets of short lines of four accents, and maintains a fair level throughout. The narrative is enlivened by many legends and much entertaining matter drawn from various sources; and the numerous transcripts of it prove that it was able to hold its own against profane romance.

The chief sources of the compilation have been identified by Dr Haenisch. For the Old Testament history the author draws largely from the Historia scholastica of Peter Comestor; for the history of the Virgin he often translates literally from Wace's Etablissement de la fete de la conception Notre Dame; the parables of the king and four daughters, and of the castle of Love and Grace, are taken from " Sent Robert bok " (1.9516), that is, from the Chasteau d' Amour of Robert Grosseteste, bishop of Lincoln; other sources are the apocryphal gospels of Matthew and Nicodemus, a southern English poem on the Assumption of Our Lady, attributed by the writer of Cursor mundi to Edmund Rich of Pontigny, the Vulgate, the Legenda aurea of Jacobus de Voragine, and the De vita et morte sanctorum of Isidore of Seville. The original of the section on the in-vention of the holy cross is still to seek. In its general plan the work is similar to the Livre de sapience of Herman de Valenciennes.

Of the author nothing is known. In the Cotton MS. Vespasian (A III.) the name of the owner William Cosyn is given (for particulars of this family, which is mentioned in Lincolnshire records as early as 1276, see Dr H. Hupe in the E.E.T.S. ed. of Cursor mundi, vol. i. p. 124). The date of the book was placed by Dr J. A.H. Murray (The Dialect of the Southern Counties of Scotland, 1873, p. 30) in the last quarter of the 13th century, and the place of writing near Durham. Dr Hupe (loc. cit. p. 186 *) gives good reasons for believing that the author was*

a Lincoln- shire man, who wrote between 1260 and 1290, although the Cotton MS. probably belongs to the late 14th century. In the Gbttingen MS. there are lines (17099-17110) desiring the reader to pray for John of Lindbergh, " that this bock gart dight," and cursing anybody who shall steal it. Lindberg is probably Limber Magna, near Ulceby, in north Lincolnshire. Dr Hupe hazards an identification of the author with this John of Lindberg, who may have been a member of the Cistercian Abbey of Lindberg; but this is improbable.

Cursor mundi was edited for the Early English Text Society in 1874-1893 by Dr Richard Morris in parallel columns from four MSS. : — Cotton Vespasian A III., British Museum; Fairfax MS. 14, in the Bodleian library, Oxford; MS.-theol. 107 at Gottingen; and MS. R. 3.8 in Trinity College, Cambridge. The edition includes a " Preface " by the editor, " An Inquiry into the Sources of the Cursor

mundi " (1885), by Dr Haenisch, an essay " On the Filiation and the Text of the MSS. of Cursor mundi " (1885), by Dr H. Hupe, " Cursor Studies and Criticisms on the Dialects of its MSS." (1888), by Dr Hupe and a glossary by Dr Max Kaluza.

CURTAIN, a screen of any textile material, running by means of rings fixed to a rod or pole. Curtains are now used chiefly to cover windows and doors, but for many centuries every bed of importance was surrounded by them, and sometimes, as in France, the space thus screened off was much larger than the actual bed and was called the ruelle. The curtain is very ancient — indeed the absence of glass and ill-fitting windows long made it a necessity. Originally single curtains were used; it would appear that it was not until the 17th century that they were employed in pairs. Curtains are made in an infinite variety of materials and styles; when placed over a door they are usually called portieres. In fortification the " curtain " is that part of the enceinte which lies between two bastions, towers, gates, &c.

The word comes into English through the O. Fr. cortine or courtine from the Late Lat. cortina. According to Du Cange (Clossarium, s.v. ” Cortis “) this is a diminutive of corlis, an enclosed space, a court. It is used in the various senses of the English ” curtain.” Classical Latin had also a word cortina, meaning a caldron or round kettle. It was very rarely applied to round objects generally. In the Vulgate cortina is used of the curtains of the tabernacle (Exodus xxvi). There is some difficulty in connecting the classical and the Late Latin words. The earliest use in English is, according to the New English Dictionary, for the hangings of a bed.

CURTANA (a latinized form of the A.-Fr. curtein, from Lat. curtus, shortened), the pointless sword of mercy, known also as Edward the Confessor’s sword, borne at the coronation of the kings of England between the two pointed swords of temporal and spiritual justice (see Regalia). ,,

CURTEA DE ARGESH (Rumanian, Curtea de Arges; also written Curtea d’ Argesh, Curtea d’Ardges, Argish and Ardjish), the capital of the department of Argesh, Rumania; situated on the right bank of the river Argesh, where it flows through a valley of the lower Carpathians; and on the railway from Pitesci to the Rothenthurm Pass. Pop. (1900) 4210. The city is one of the oldest in Rumania. According to tradition it was founded early in the 14th century by Prince Radu Negru, succeeding Campulung as capital of Walachia. Hence its name Curtea, ” the court.” It contains a few antique churches, and was created a bishopric at the close of the 18th century.

The cathedral of Curtea de Argesh, by far the most famous building in Rumania, stands in the grounds of a monastery, 1 5 m. N. of the city. It resembles a very large and elaborate mausoleum, built in Byzantine style, with Moorish arabesques. In shape it is oblong, with a many-sided annexe at the back. In the centre rises a dome, fronted by two smaller cupolas; while a secondary dome, broader and loftier

than the central one, springs from the annexe. Each summit is crowned by an inverted pear-shaped stone, bearing a triple cross, emblematic of the Trinity. The windows are mere slits; those of the tam- bours, or cylinders, on which the cupolas rest, are curved, and slant at an angle of 70°, as though the tambours were leaning to one side. Between the pediment and the cornice a thick corded moulding is carried round the main building. Above this comes a row of circular shields, adorned with intricate arabesques, while bands and wreaths of lilies are everywhere scupltured on the windows, balconies, tambours and cornices, adding lightness to the fabric. The whole is raised on a platform 7 ft. high, and encircled by a stone balustrade. Facing the main entrance is a small open shrine, consisting of a cornice and dome upheld by four pillars. The cathedral is faced with pale grey limestone, easily chiselled, but hardening on exposure. The interior is of brick, plastered and decorated with frescoes. Close by stands a large royal palace, Moorish in style. The archives of the cathedral were plundered by Magyars and Moslems, but several inscriptions, Greek, Slav and Ruman, are left. One tablet records that the founder was Prince Neagoe Bassarab (1512-1521); another that Prince John Radu

completed the work in 1526. A third describes the repairs exe- cuted in 1681 by Prince Sherban Cantacuzino; a fourth, the restoration, in 1804, by Joseph, the first bishop. Between 1875 and 1885 the cathedral was reconstructed; and in 1886 it was re-consecrated. Its legends have inspired many Rumanian poets, among them the celebrated V. Alexandri (1821-1890). One tradition describes how Neagoe Bassarab, while a hostage in Constantinople, designed a splendid mosque for the sultan, returning to build the cathedral out of the surplus materials. Another version makes him employ one Manole or Manoli as architect. Manole^ being unable to finish the walls, the prince threatened him and his

assistant with death. At last Manole suggested that they should follow the ancient custom of building a living woman into the foundations; and that she who first appeared on the following morning should be the victim. The other masons warned their families, and Manole was forced to sacrifice his own wife. Thus the cathedral was built except the roof. So arrogant, however, did the masons become, that the prince bade remove the scaffolding, and all, save Manole, perished of hunger. He fell to the ground, and a spring of clear water, which issued from the spot, is still called after him.

CURTESY (a variant of ” courtesy,” q.v.), in law, the life interest which a husband has in certain events in the lands of which his wife was in her lifetime actually seised for an estate of inheritance. As to the historical origin of the custom and the meaning of the word there is considerable doubt. It has been said to be an interest peculiar to England and to Scotland, hence called the “curtesy of England” and the “curtesy of Scotland “; but this is erroneous, for it is found also in Germany and France. The Mirroir des Justices ascribes it to Henry I. K. E. Digby (Hist. Real Prop. chap, iii.) says that it is connected with curia, and has reference either to the attendance of the husband as tenant of the lands at the lord’s court, or to mean simply that the husband is acknowledged tenant by the courts of England (tenens per legem Angliae). The requisites necessary to make tenancy by the curtesy are: (1) a legal marriage; (2) an estate in possession of which the wife must have been actually seised; (3) issue born alive and during the mother’s existence, though it is immaterial whether the issue live or die, or whether it is born before or after the wife’s seisin; in the case of gavelkind lands the husband has a right to curtesy, whether there is issue born or not; but the curtesy extends only to a moiety of the wife’s lands and ceases if the husband marries again. The issue must have been capable of inheriting as heir to the wife, e.g. if a wife were seised of lands in tail male the birth of a daughter would not entitle the

husband to a tenancy by curtesy; (4) the title to the tenancy vests only on the death of the wife. The Married Women's Property Act 1882 has not affected the right of curtesy so far as relates to the wife's undisposed-of realty (Hope v. Hope, 1892, 2 Ch. 336), and the Settled Land Act 1884, s. 8, provides that for the purposes of the Settled Land Act 1882 the estate of a tenant by curtesy is to be deemed an estate arising under a settlement made by the wife..

See Pollock and Maitland, Hist. Eng. Law; K. E. Digby, Hist. Real Prop. ; Goodeve, Real Property.

CURTILAGE (Med. Lat. curtilagium, from curtile or cortile, a court or yard, cf. " court "), the area of land which immediately surrounds a dwelling-house and its yard and outbuildings. In feudal times every castle with its dependent buildings was protected by a surrounding wall, and all the land within the wall was termed the curtilage; but the modern legal interpretation of the word, i.e. what area is enclosed by the curtilage, depends upon the circumstances of each individual case, such as the terms of the grant or deed which passes the property, or upon what is held to be a convenient amount of land for the occupation of the house, &c. The importance of the word in modern law depends on the fact that the curtilage marks the limit of the premises in which housebreaking can be committed.

CURTIN, ANDREW GREGG (1817-1894), American political leader, was born at Bellefonte, Centre county, Pennsylvania, on the 22nd of April 1817, the son of a native of Ireland who was a pioneer iron manufacturer in Pennsylvania. He graduated.

from the law department of Dickinson College in 1837, was admitted to the bar in 1839, and successfully practised his profession. Entering politics as a Whig, he was chairman of the Whig state central committee in 1854, and from 1855 to 1858 was secretary of the commonwealth. In this capacity he was also ex officio the superintendent of common schools, and rendered valuable services to his state in perfecting and ex- panding the free

public school system, and in establishing state normal schools. Upon the organization of the Republican party he became one of its leaders in Pennsylvania, and in October i860 was chosen governor of the state on its ticket, defeating Henry D. Foster, the candidate upon whom the Douglas and Breckinridge Democrats and the Constitutional Unionists had united, by 32,000 votes, after a spirited campaign which was watched with intense interest by the entire country as an index of the result of the ensuing presidential election. During the Civil War he was one of the closest and most constant advisers of President Lincoln, and one of the most efficient, most energetic and most patriotic of the ” war governors ” of the North. Pennsylvania troops were the first to reach Washington after the president’s call, and from first to last the state, under Governor Curtin’s guidance, furnished 387,284 officers and men to the Northern armies. One of his wisest and most praiseworthy acts Was the organization of the famous ” Pennsylvania Reserves,” by means of which the state was always able to fill at once its required quota after each successive call. In raising funds and equipping and supplying troops the governor showed great energy and resourcefulness, and his plans and organizations for caring for the needy widows and children of Pennsylvania soldiers killed in battle, and for aiding and removing to their homes the sick and wounded were widely copied throughout the North. He was re-elected governor in 1863 and served until January 1867. He was United States minister to Russia from 1869 until 1872, when he returned to America and took part in the Liberal Republican revolt against President U. S. Grant. In 1872-1873 he was a member of the state’ constitutional convention. Subsequently he joined the Democratic party and was a representative in Congress from 1881 to 1887. He died at his birthplace, Bellefonte, Pennsylvania, on the 7th of October

1894.

See William H. Egle’s Life and Times of Andrew Gregg

Curtin (Philadelphia, 1896), which contains chapters written by A. K. McClure, Jno. Russell Young, Wayne McVeagh, Fitz John Porter and others.

CURTIS, GEORGE TICKNOR (1812–1894), American lawyer, legal writer and constitutional historian, was born in Watertown, Massachusetts, on the 28th of November 181 2. He graduated at Harvard in 1832, was admitted to the bar in 1836, and practised in Worcester, Boston, New York and Washington, appearing before the United States Supreme Court in many important cases, including the Dred Scott case, in which he argued the constitutional question for Scott, and the " legal tender " cases. In Boston he was for many years the United States commissioner, and in this capacity, despite the vigorous protests of the abolitionists and his own opposition to slavery, ordered the return to his owner of the famous fugitive slave, Thomas Sims, in 1852. He was the nephew and close friend of George Ticknor, the historian of Spanish literature, and his association with his uncle was influential in developing his scholarly tastes; while his other personal friendships with eminent Bostonians during the period of conservative Whig ascendancy in Massachusetts politics were of direct influence upon his political opinions and published estimates. He is best known as the author of A History of the Origin, Formation and Adoption of the Constitution of the United States, with Notices of its principal Framers (1854), republished, with many additions, as The Constitutional History of the United States from their Declaration of Independence to the Close of their Civil War (2 vols., 1889–1896). This history, which had been watched in its earlier progress by Daniel Webster, may be said to present the old Federalist or " Webster- Whig " view of the formation and powers of the Con- stitution; and it was natural that Curtis should follow it with

a voluminous Life of Daniel Webster (2 vols., 1870),

the most valuable biography of that statesman. Both these works are characterized by solidity and comprehensiveness rather than by rhetorical attractiveness or literary perspective. In his later years Mr Curtis, like so many of the followers of Webster, turned towards the Democratic party; and he wrote, among other works of minor importance, an exculpatory life of President James Buchanan (2 vols., 1883) and two vindications of General George B. McClellan's career (1886 and 1887). He died in New York on the 28th of March 1894.

In addition to the works above mentioned he published: Digest of the English and American Admiralty Decisions (1839); Rights and Duties of Merchant Seamen (1841), which elicited the hearty praise of Justice Joseph Story; Law of Patents (1849); Equity Precedents (1850) ; Commentaries on the Jurisprudence, Practice and Peculiar Jurisdiction of the Courts of the United States (1854–1858); Creation or Evolution: A Philosophical Inquiry (1887); and a novel, John Chambers: A Tale of the Civil War in America (1889).

His brother, Benjamin Robbins Curtis (1809–1874), also an eminent jurist, was born on the 4th of November 1809, in Watertown, Massachusetts, graduated at Harvard in 1829, studied law at Cambridge and at Northfield, Mass., where, after his admission to the bar in 1832, he practised law for two years, and then in Boston in 1834–1851. In 1851, being then a member of the lower house of the Massachusetts legislature, he was on the 22nd of September appointed to the Supreme Court of the United States, where he gained his greatest fame in 1857 by his dissenting opinion in the Dred Scott case, in which he argued that the Missouri Compromise was constitutional, and that negroes could become citizens. His argument was immediately published as an anti-slavery document. On the 1st of September 1857 he resigned from the Supreme Court and resumed his private practice. In 1868 he was one of the counsel for President Andrew Johnson in his impeachment trial, and opened for the defence in a remarkable two-days' speech. He died at Newport,

Rhode Island, on the 15th of September 1874. He prepared Decisions of the Supreme Court (22 vols.) and a Digest of its decisions down to 1854.

A Memoir of Benjamin Robbins Curtis, with Some of his Professional and Miscellaneous Papers, edited by his son Benjamin R. Curtis, was published at Boston in 1879, the Memoir being by George Ticknor Curtis.

CURTIS, GEORGE WILLIAM (1824–1892), American man of letters, was born in Providence, Rhode Island, on the 24th of February 1824, of old New England stock. His mother died when he was two years old. At six he was sent with his elder brother to school in Jamaica Plain, Massachusetts, where he remained for five years. Then, his father having again married happily, the boys were brought home to Providence, where they stayed till, in 1839, their father removed to New York. Three years later, Curtis, being allowed to determine for himself his course of life, and being in sympathy with the spirit of the so- called Transcendental movement, became a boarder at the com- munity of Brook Farm. He was accompanied by his brother, James Burrill Curtis, whose influence upon him was strong and helpful. He remained there for two years, brought into stimulat- ing and serviceable relations with many interesting men and women. Then came two years, passed partly in New York, partly in Concord in order mainly to be in the friendly neighbour- hood of Emerson, and then followed four years spent in Europe, Egypt and Syria.

Curtis returned from Europe in 1850, handsome, attractive, accomplished, ambitious of literary distinction. He instantly plunged into the whirl of life in New York, obtained a place on the staff of the Tribune, entered the field as a popular lecturer, set himself to work on a volume published in the spring of 185 1, under the title of Nile Notes of a Howadji, and became a favourite in society. He wrote much for Putnam's Magazine, of which he was associate editor; and a number of volumes, composed of essays written for that publication and for Harper's Monthly, came in rapid

succession from his pen. The chief of these were the Potiphar Papers (1853), a satire on the fashionable society of the day; and Prue and I (1856), a pleasantly sentimental, fancifully tender and humorous study of life. In 1 8 s 5 he married

Miss Anna Shaw. ‘ Not long after his marriage he became, through no fault of his own, deeply involved in debt owing to the failure of Putnam’s Magazine; and his high sense of honour compelled him to devote the greater part of his earnings for many years to the discharge of obligations for which he had become only by accident responsible, and from which he might have freed himself by legal process. In the period just preceding the Civil War other interests became subordinate to those of national concern. Curtis made his first important speech on the questions of the day at Wesleyan University in 1856; he engaged actively in the presidential campaign of that year, and was soon recognized not only as an effective public speaker, but also as one of the ablest, most high-minded, and most trustworthy leaders of public opinion. In 1863 he became the political editor of Harper’s Weekly, and no other journal exercised during the war and after it a more important part in shaping public opinion. His writing was always clear, direct, forcible; his fairness of mind and sweet- ness of temper were invincible. He never became a mere partisan, and never failed to apply the test of moral principle to political measures. From month to month he contributed to Harper’s Monthly, under the title of ” The Easy Chair,” brief essays on topics of social and literary interest, charming in style, touched with delicate humour and instinct with generous spirit. His service to the Republican party was such, that more than once he was offered nominations to office of high distinction, and might have been sent as minister to England; but he refused all offers of the kind, feeling that he could render more essential service to the country as editor and public speaker.

In 1871 he was appointed by President Grant chairman of the commission to report on the reform of the

civil service. The report which he wrote was the foundation of every effort since made for the purification and regulation of the service and for the destruction of political patronage. From that time till his death Curtis was the leader in this reform, and to his sound judgment, his vigorous presentation of the evils of the corrupt prevailing system, and his untiring efforts, the progress of the reform is mainly due. He was president of the National Civil Service Reform League and of the New York Civil Service Reform Association. In 1884 he refused to support the nomination of James G. Blaine as candidate for the presidency, and thus broke with the Republican party, of which he had been one of the founders and leaders. From that time he stood as the typical independent in politics. In April 1892 he delivered at Baltimore his eleventh annual address as president of the National Civil Service Reform League, and in May he appeared for the last time in public, to repeat in New York an admirable address on James Russell Lowell, which he had first delivered in Brooklyn on the 22nd of the preceding February, the anniversary of Lowell's birth. On the 3 1st of the following August he died. He was a man of consistent virtue, whose face and figure corresponded with the traits and stature of his soul. The grace and charm of his manner were the expression of his nature. Of the Americans of his time few were more widely beloved, and the respect in which he was held was universal.

See George William Curtis, by Edward Cary, in the " American Men of Letters " series (Boston, 1894), an excellent biography ; " An Epistle to George William Curtis," by James Russell Lowell (1874- 1887), in Lowell's Poems; George William Curtis, a Commemorative Address delivered before The Century Association, 17th December 1892, by Parke Godwin (New York, 1893) ; Orations and Addresses by George William Curtis, edited by Charles Eliot Norton (•? vols. New York, 1894). (C.E.N.)

CURTIUS, ERNST (1814-1896), German archaeologist and historian, was born at Liibeck on the 2nd of September 18 14. On completing his university

studies he was chosen by C. A. Brandis to accompany him on a journey to Greece for the prosecution of archaeological researches. Curtius then became Otf ried Midler's companion in his exploration of the Peloponnese, and on Miiller's death in 1840 returned to Germany. In 1844 he became an extraordinary professor at the university of Berlin, and in the same year was appointed tutor to Prince Frederick William (afterwards the Emperor Frederick III.) — a post which he held till 1850. After holding a professorship at Gottingen and

andertaking a further journey to Greece in 1862, Curtius was appointed (in 1863) ordinary professor at Berlin. In 1874 he was sent to Athens by the German government, and concluded an agreement by which the excavations at Olympia (q.v.) were entrusted exclusively to Germany. Curtius died at Berlin on the nth of July 1896. His best-known work fe his History of Greece (1857–1867, 6th ed. 1887–1888; Eng. trans, by A. W. Ward, 1868–1873). It presented in an attractive style what were then the latest results of scholarly research, but was criticized as wanting in erudition. It is now superseded (see Greece : History, Ancient, § Bibliography) . His other writings are chiefly archaeo- logical. The most important are: Die Akropolis von Alhen (1844); Naxos (1846); Peloponnesos, einekistorisch-geographische Beschreibung der Halbinsel (1851); Olympia (1852); Die lonier vor der ionischen Wanderung (1855); Attische Studien (1862- 1865); Ephesos (1874); Die Ausgrabungen zu Olympia (1877, &c); Olympia und Umgegend (edited by Curtius and F. Adler, 1882); Olympia. Die Ergebnisse der von dem deutschen Reich veranstalteten Ausgrabung (with F. Adler, 1890–1898); Die Stadtgeschichte von A then (1891); Gesammelte Abhandlungen (1894). His collected speeches and lectures were published under the title of Altertum und Gegenwart (5th ed., 1903 foil.), to which a third volume was added under the title of

Unter drei Kaisern (2nd ed., 1895).

A full list of his writings will be found in L. Gurlitt, Erinnerungen an Ernst Curtius (Berlin, 1902); see also article by O. Kern in Allgemeine deutsche Biographie, xlvii. (i9°3). t0 which may be added Ernst Curtius. Ein Lebensbild in Briefen, by F. Curtius (1903) ; T. Hodgkin, Ernest Curtius (1905).

His brother, Georg Curtius (1820–1885), philologist, was born at Lubeck on the 16th of April 1820. After an education at Bonn and Berlin he was for three years a schoolmaster in Dresden, until (in 1845) he returned to Berlin University as privat-docent. In 1849 he was placed in charge of the Philological Seminary at Prague, and two years later was appointed professor of classical philology in Prague University. In 1854 he removed from Prague to a similar appointment at Kiel, and again in 1862 from Kiel to Leipzig. He died at Hermsdorf on the 12th of August 1885. His philological theories exercised a widespread influence. The more important of his publications are: Die Sprachvergleichung in ihrem Verhdltniss zur classischen Philologie (1845; Eng. trans, by F. H. Trithen, 1851); Sprachvergleichende Beitrdge zur griechischen und lateinischen Grammatik (1846); Grundziige der griechischen Etymologie (1858–1862, 5th ed. 1879); Das Verbum der griechischen Sprache (1873). The last two works have been translated into English by A. S. Wilkins and E. B. England. From 1878 till his death Curtius was general editor of the Leipziger Studien zur classischen Philologie. His Griechische Schulgrammatik, first published in 1852, has passed through more than twenty editions, and has been edited in English. In his last work, Zur Kritik der neuesten Sprachforschung (1885), he attacks the views of the ” new ” school of philology.

Opuscula of Georg Curtius were edited after his death by E. Windisch (Kleine Schriften von E. C, 1886–1887). For further information consult articles by R. Meister in Allgemeine deutsche Biographie, xlvii. (1903), and by E. Windisch in C. Bursian’s

Bio- graphisches Jahrbuch fur Alterthumskunde (1886).

CURTIUS, MARCUS, a legendary hero of ancient Rome. It is said that in 362 B.C. a deep gulf opened in the forum, which the seers declared would never close until Rome's most valuable possession was thrown into it. Then Curtius, a youth of noble family, recognizing that nothing was more precious than a brave citizen, leaped, fully armed and on horseback, into the chasm, which immediately closed again. The spot was afterwards covered by a marsh called the Lacus Curtius. Two other explanations of the name Lacus Curtius are given: (1) a Sabine general, Mettius (or Mettus) Curtius, hard pressed by the Romans under Romulus, leaped into a swamp which covered the valley afterwards occupied by the forum, and barely escaped with his life; (2) in 445 B.C. the spot was struck by lightning, and en- closed as sacred by the consul, Gaius Curtius. It was marked by an altar which was removed to make room for the games in celebration of Caesar's funeral (Pliny, Nat. Hist. xv. 77), but

restored by Augustus (cf. Ovid, Fasti, vi. 403), in whose time " there was apparently nothing but a dry well. The altar seems to have been restored early in the 4th century a.d. In April 1904, on the N. side of the Via Sacra and 20 ft. N.W. of the Equus Domitiani, remains of the buildings were discovered.

See Liyy i. 12, vii. 6 ; Dion Halic. ii. 42 ; Varro, De lingua Latina, v. 148; Ch. Hiilsen, The Roman Forum (Eng. trans, of 2nd ed,, J. B. Carter, 1906) ; O. Gilbert, Geschichte und Topographie der Stadt Rom im Altertum, i. (1883), 334-338.

CURTIUS RUFUS, QUINTUS, biographer of Alexander the Great. Of his personal history nothing is known, nor can his date be fixed with certainty. Modern authorities regard him as a rhetorician who flourished during the reign of Claudius (a.d. 41-54). His work (De Rebus gestis Alexandri Magni) originally consisted of ten books, of which the first two are entirely lost, and the remaining eight

are incomplete. Although the work is uncritical, and shows the author's ignorance, of geography, chronology and military matters, it is written in a picturesque style.

There are numerous editions : (text) T. Vogel(i889),P. H. Damste (1897), E. Hedicke (1908); (with notes), T. Vogel (1885 and later), M. Croiset (1885), H. W. Reich (1895), C. Lebaigue (1900), T. Stangl (1902). There is an English translation by P. Pratt (1821). See S. Dosson, Etude sur Quinte-Curce, sa vie, et ses ceuvres (1887) a valu- able work; F. von Schwarz, Alexander des Grosseh Feldziige in Turkestan (1893), a commentary on Arrian and Curtius based upon the author's personal knowledge of the topography ; C. Wachsmuthj Einleitung in das Studium der alten Geschichte (1895), p. 574, cf. p. 567, note 2 ; Schwarz, " Curtius Rufus " No. 31 in Pauly-Wissowa

(1901).

CURULE (Lat. currus, " chariot "), in Roman antiquities, the epithet applied to the chair of office, sella curulis, used by the " curule " or highest magistrates and also by the emperors. This chair seems to have been originally placed in the magistrate's chariot (hence the name). It was inlaid with ivory or in some cases made of it, had curved legs but no back, and could be folded up like a camp-stool. In English the word is used in the general sense of " official." (See Consul, Praetor and Aedile.)

CURVE (Lat. curvus, bent), a word commonly meaning a shape represented by a line bending continuously out of the straight without making an angle, but only properly to be defined in its geometrical sense in the terms set out below. This subject is treated here from an historical point of view, for the purpose of showing how the different leading ideas were successively arrived at and developed.

1, A curve is a line, or continuous singly infinite system of points. We consider in the first instance,

and chiefly, a plane curve described according to a law. Such a curve may be re- garded geometrically as actually described, or kinematically as in the course of description by the motion of a point; in the former point of view, it is the locus of all the points which satisfy a given condition; in the latter, it is the locus of a point moving subject to a given condition. Thus the most simple and earliest known curve, the circle, is the locus of all the points at a given distance from a fixed centre, or else the locus of a point moving so as to be always at a given distance from a fixed centre. (The straight line and the point are not for the moment regarded as curves.)

Next to the circle we have the conic sections, the invention of them attributed to Plato (who lived 430–347 B.C.) ; the original definition of them as the sections of a cone was by the Greek geometers who studied them soon replaced by a proper definition in piano like that for the circle, viz. a conic section (or as we now say a ” conic “) is the locus of a point such that its distance from a given point, the focus, is in a given ratio to its (perpendicular) distance from a given fine, the directrix; or it is the locus of a point which moves so as always to satisfy the foregoing condition. Similarly any other property might be used as a definition; an ellipse is the locus of a point such that the sum of its distances from two fixed points (the foci) is constant, &c, &c.

The Greek geometers invented other curves; in particular, the conchoid (q.v.), which is the locus of a point such that its distance from a given line, measured along the line drawn through

it to a fixed point, is constant; and the cissoid (q.v.), which is the locus of a point such that its distance from a fixed point is always equal to the intercept (on the line through the fixed point)

between a circle passing through the fixed point and the tangent to the circle at the point opposite to the fixed point. Obviously the number of such geometrical or kinematical definitions is infinite. In a machine of any. kind, each point describes a curve; a simple but important instance is the " three-bar curve," or locus of a point in or rigidly connected with a bar pivoted on to two other bars which rotate about fixed centres respectively. Every curve thus arbitrarily defined has its own properties; and there was not any principle of classification.

2. Cartesian Co-ordinates. — The principle of classification first presented itself in the Geometrie of Descartes (1637). The idea was to represent any curve whatever by means of a relation between the co-ordinates (x, y) of a point of the curve, or say to represent the curve by means of its equation. (See Geometry: Analytical.)

Any relation whatever between (x, y) determines a curve, and conversely every curve whatever is determined by a relation between (x, y).

Observe that the distinctive feature is in the exclusive use of such determination of a curve by means of its equation. The Greek geometers were perfectly familiar with the property of an ellipse which in the Cartesian notation is a^/a 2 + y i /b 2 = 1, the equation of the curve; but it was as one of a number of properties, and in no wise selected out of the others for the characteristic property of the curve.

3. Order of a Curve. — We obtain from the equation the notion of an algebraical as opposed to a transcendental curve, viz. an algebraical curve is a curve having an equation F(x, y)=o where F(x, y) is a rational and integral function of the co-ordinates (x, y); and in what follows we attend throughout (unless the contrary is stated) only to such curves. The equation is sometimes given, and may conveniently be used, in an irrational form, but we always imagine it reduced to the foregoing

rational and integral form, and regard this as the equation of the curve. And we have hence the notion of a curve of a given order, viz. the order of the curve is equal to that of the term or terms of highest order in the co-ordinates (x, y) conjointly in the equation of the curve; for instance, xy — 1 = is a curve of the second order.

It is to be noticed here that the axes of co-ordinates may be any two lines at right angles to each other whatever; and that the equation of a curve will be different according to the selection of the axes of co-ordinates; but the order is independent of the axes, and has a determinate value for any given curve.

*We hence divide curves according to their order, viz. a curve is of the first order, second order, third order, &c, according as it is represented by an equation of the first order, ax--by--c = o, or say (**$x, y, i)=o; or by an equation of the second order, ax i --2hxy--by 2 +2fy--2gx--c = o, say (**$£, y, i) 2 = o; or by an equation of the third order, &c; or what is the same thing, according as the equation is linear, quadric, cubic, &c.*

A curve of the first order is a right line; and conversely every right line is a curve of the first order. A curve of the second order is a conic, and is also called a quadric curve; and conversely every conic is a curve of the second order or quadric curve. A curve of the third order is called a cubic; one of the fourth order a quartic; and so on.

A curve of the order m has for its equation ($£, y, i) m =o; and when the coefficients of the function are arbitrary, the curve is said to be the general curve of the order m. The number of coefficients is \im--\) (m+2); but there is no loss of generality if the equation be divided by one coefficient so as to reduce the coefficient of the corresponding term to unity, hence the number of coefficients may be reckoned as ^(m--i) 0»+2) — 1, that is, \m{m--i); and a curve of the order m may be made to satisfy this number of conditions ; for example, to pass*

through \m{m--$) points.

It is to be remarked that an equation may break up; thus a

quadric equation may be (ax+by+c) (a'x+b'y+c') =0, breaking up into the two equations ax+by--c = o, a'x--b'y+c' = o, viz. the original equation is satisfied if either of these is satisfied. Each of these last equations represents a curve of the first order, or right line; and the original equation represents this pair of lines, viz. the pair of lines is considered as a quadric curve. But it is an improper quadric curve; and in speaking of curves of the second or any other given order, we frequently imply that the curve is a proper curve represented by an equation which does not break up.

4. Intersections of Curves. — The intersections of two curves are obtained by combining their equations; viz. the elimination from the two equations of y (or x) gives for x (or y) an equation of a certain order, say the resultant equation; and then to each value of x (or y) satisfying this equation there corresponds in general a single value of y (or x), and consequently a single point of intersection; the number of intersections is thus equal to the order of the resultant equation in x (or y).

Supposing that the two curves are of the orders m, n, respec- tively, then the order of the resultant equation is in general and at most = ww ; in particular, if the curve of the order « is an arbitrary line (n=i), then the order of the resultant equation is = w; and the curve of the order m meets therefore the line in m points. But the resultant equation may have all or any of its roots imaginary, and it is thus not always that there are m real intersections.

The notion of imaginary intersections, thus presenting itself, through algebra, in geometry, must be accepted in geometry — and it in fact plays an all-important part in modern geometry. As in

algebra we say that an equation of the mth order has m roots, viz. we state this generally without in the first instance, or it may be without ever, distinguishing whether these are real or imaginary; so in geometry we say that a curve of the mth order is met by an arbitrary line in m points, or rather we thus, through algebra, obtain the proper geometrical definition of a curve of the mth order, as a curve which is met by an arbitrary line in m points (that is, of course, in m, and not more than m, points).

*The theorem of the m intersections has been stated in regard to an arbitrary line; in fact, for particular lines the resultant equation may be or appear to be of an order less than m; for instance, taking m—2, if the hyperbola xy— 1=0 be cut by the line y=/3, the resultant equation in * is /3#— 1=0, and there is apparently only the intersection (x = i//3, y=/3); but the theorem is, in fact, true for every line whatever: a curve of the order m meets every line whatever in precisely m points. We have, in the case just referred to, to take account of a point at infinity on the line y=0; the two intersections are the point (#=i//3, y=/3), and the point at infinity on the line y =)3.*

It is, moreover, to be noticed that the points at infinity may be all or any of them imaginary, and that the points of intersec- tion, whether finite or at infinity, real or imaginary, may coincide two or more of them together, and have to be counted accord- ingly; to support the theorem in its universality, it is necessary to take account of these various circumstances.

5. Line at Infinity.— The foregoing notion of a point at infinity is a very important one in modern geometry; and we have also to consider the paradoxical statement that in plane geometry, or say as regards the plane, infinity is a right line. This admits of an easy illustration in solid geometry. If with a given centre of projection, by drawing from it lines to every point of a given line, we project the given line on a given plane, the projection is a

line, i.e. this projection is the intersection of the given plane with the plane through the centre and the given line. Say the projection is always a line, then if the figure is such that the two planes are parallel, the projection is the intersection of the given plane by a parallel plane, or it is the system of points at infinity on the given plane, that is, these points at infinity are regarded as situate on a given line, the line infinity of the given plane. 1

1 In solid geometry infinity is a plane — its intersection with any given plane being the right line which is the infinity of this given plane.

Reverting to the purely plane theory, infinity is a line, related like any other right line to the curve, and thus intersecting it in m points, real or imaginary, distinct or coincident.

Descartes in the Giomttrie defined and considered the re- markable curves called after him the ovals of Descartes, or simply Cartesians, which will be again referred to. The next important work, founded on the Geometrie, was Sir Isaac Newton's Enutne- ratio linearum tertii ordinis (1706), establishing a classification of cubic curves founded chiefly on the nature of their infinite branches, which was in some details completed by James Stirling (1692-1770), Patrick Murdoch (d. 1774) and Gabriel Cramer; the work also contains the remarkable theorem (to be again re- ferred to), that there are five kinds of cubic curves giving by their projections every cubic curve whatever. Various properties of curves in general, and of cubic curves, are established in Colin Maclaurin's memoir, "De linearum geometricarum proprietatibus generalibus Tractatus " (posthumous, say 1 746, published in the 6th edition of his Algebra). We have in it a particular kind of correspondence of two points on a cubic curve, viz. two points

correspond to each other when the tangents at the two points again meet the cubic in the same point.

6. Reciprocal Polars. Intersections of Circles. Duality. Trilinear and Tangential Co-ordinates. — The Giometrie descriptive, by Gaspard Monge, was written in the year 1704 or 1795 (7th edition, Paris, 1847), and in it we have stated, in piano with regard to the circle, and in three dimensions with regard to a surface of the second order, the fundamental theorem of reciprocal polars, viz. ” Given a surface of the second order and a circumscribed conic surface which touches it . . . then if the conic surface moves so that its summit is always in the same plane, the plane of the curve of contact passes always through the same point.” The theorem is here referred to partly on account of its bearing on the theory of imaginaries in geometry. It is in Charles Julian Brianchon’s memoir ” Sur les surfaces du second degre ” {Jour. Polyt. t. vi. 1806) shown how for any given position ‘of the summit the plane of contact is determined, or reciprocally; say the plane XY is determined when the point P is given, or reciprocally; and it is noticed that when P is situate in the interior of the surface the plane XY does not cut the surface; that is, we have a real plane XY intersecting the surface in the imaginary curve of contact of the imaginary circumscribed cone having for its summit a given real point P inside the surface.

Stating the theorem in regard to a conic, we have a real point P (called the pole) and a real line XY (called the polar), the line joining the two (real or imaginary) points of contact of the (real or imaginary) tangents drawn from the point to the conic; and the theorem is that when the point describes a line the line passes through a point, this line and point being polar and pole to each other. The term “pole” was first used by Francois Joseph Servois, and ” polar ” by Joseph Diez Gergonne (Gerg. t. i. and iii., 1810-1813); and from the theorem we have the method of reciprocal polars for the transformation of geometrical theorems, used already by Brianchon (in the memoir above referred

to) for the demonstration of the theorem called by his name, and in a similar manner by various writers in the earlier volumes of Gergonne. We are here concerned with the method less in itself than as leading to the general notion of duality.

Bearing in a somewhat similar manner also on the theory of imaginaries in geometry (but the notion presents itself in a more explicit form), there is the memoir by L. Gaultier, on the graphi- cal construction of circles and spheres (Jour. Polyt. t. ix., 1813). The well-known theorem as to radical axes may be stated as follows. Consider two circles partially drawn so that it does not appear whether the circles, if completed, would or would not intersect in real points, say two arcs of circles; then we can, by means of a third circle drawn so as to intersect in two real points each of the two arcs, determine a right line, which, if the complete circles intersect in two real points, passes through the points, and which is on this account regarded as a line passing through two (real or imaginary) points of intersection of the two circles. The construction in fact is, join the two

points in which the third circle meets the first arc, and join also the two points in which the third circle meets the second arc, and from the point of intersection of the two joining lines, let fall a perpendicular on the line joining the centre of the two circles; this perpendicular (considered as an indefinite line) is what Gaultier terms the "radical axis of the two circles"; it is a line determined by a real construction and itself always real; and by what precedes it is the line joining two (real or imaginary, as the case may be) intersections of the given circles.

The intersections which lie on the radical axis are two out of the four intersections of the two circles. The question as to the remaining two intersections did not present itself to Gaultier, but it is answered in Jean Victor Poncelet's Traits des propriilts projectives (1822), where we find (p. 49) the statement, " deux circles places arbitrairement sur un plan . . . ont idealement deux points imaginaires communs a. l'infini "; that is, a circle qua curve of the second order is met by the line infinity in two points; but, more than this, they are the same two points for any circle whatever. The points in question have since been called (it is believed first by Dr George Salmon) the circular points at infinity, or they may be called the circular points; these are also frequently spoken of as the points I, J; and we have thus the circle characterized as a conic which passes through the two circular points at infinity; the number of conditions thus im- posed upon the conic is =2, and there remain three arbitrary constants, which is the right number for the circle. Poncelet throughout his work makes continual use of the foregoing theories of imaginaries and infinity, and also of the before-mentioned theory of reciprocal polars.

Poncelet's two memoirs Sur les centres des moyennes harmoniques and Sur la theorie generate des polaires riciproques, although presented to the Paris Academy in 1824, were only published (Crelle, t. iii. and iv., 1828, 1829) subsequent to the memoir by Gergonne, Considerations philosophiques sur les elimens de la science de I'etendue (Gerg. t. xvi., 1825-1826). In this memoir by Gergonne, the theory of duality is very clearly and explicitly stated; for instance, we find " dans la geometrie plane, a. chaque theoreme il en repond necessairement un autre qui s'en d£duit en echangeant simplement entre eux les deux mots points et droites; tandis que dans la geom6trie de l'espace ce sont les mots points et plans qu'il faut echanger entre eux pour passer d'un theoreme a. son correlatif "; and the plan is introduced of printing corre- lative theorems,

opposite to each other, in two columns. There was a reclamation as to priority by Poncelet in the Bulletin universel reprinted with remarks by Gergonne (Gerg. t. xix., 1827), and followed by a short paper by Gergonne, Rectifications de quelques theoremes, &°c, which is important as first introducing the word class. We find in it explicitly the two correlative definitions: ” a plane curve is said to be of the mth degree (order) when it has with a line tn real or ideal intersections,” and ” a plane curve is said to be of the wth class when from any point of its plane there can be drawn to it m real or ideal tangents.”

It may be remarked that in Poncelet’s memoir on reciprocal polars, above referred to, we have the theorem that the number of tangents from a point to a curve of the order m, or say the class of the curve, is in general and at most =m(m- i), and that he mentions that this number is subject to reduction when the curve has double points or cusps.

The theorem of duality as regards plane figures may be thus stated: two figures may correspond to each other in such manner that to each point and line in either figure there corre- spond in the other figure a line and point respectively. It is to be understood that the theorem extends to all points or lines, drawn or not drawn; thus if in the first figure there are any number of points on a line drawn or not drawn, the corresponding lines in the second figure, produced if necessary, must meet in a point. And we thus see how the theorem extends to curves, their points and tangents; if there is in the first figure a curve of the order m, any line meets it in m points; and hence from the corresponding point in the second figure there must be to the corresponding curve m tangents; that is, the corresponding curve must be of the class m.

Trilinear co-ordinates (see Geometry: Analytical)

*were first used by E. E. Bobillier in the memoir Essai sur un nouveau mode de recherche des propriitSs de I'Uendue (Gerg. t. xviii., 1827–1828). It is convenient to use these rather than Cartesian co-ordinates. We represent a curve of the order m by an equation (**$**, y , z) m = o, the function on the left hand being a homogeneous rational and integral function of the order m of the three co-ordinates (x, y, z) ; clearly the number of constants is the same as for the equation (*$x, y, i) m = o in Cartesian co-ordinates.*

The theorem of duality is considered and developed, but chiefly in regard to its metrical applications, by Michel Chasles in the Memoire de g&omUrie sur deux principes gineraux de la science, la dualiti et I'homographie, which forms a sequel to the Apercu historique sur V origine et le developpement des methodes en geometrie (Mem. de Brux. t. xi., 1837).

We now come to Julius Pliicker; his " six equations " were given in a short memoir in Crelle (1842) preceding his great work, the Theorie der algebraischen Curven (1844). Pliicker first gave a scientific dual definition of a curve, viz.; "A curve is a locus generated by a point, and enveloped by a line — the point moving continuously along the line, while the line rotates continuously about the point " ; the point is a point (ineunt.) of the curve, the line is a tangent of the curve. And, assuming the above theory of geometrical imaginaries, a curve such that m of its points are situate in an arbitrary line is said to be of the order m; a curve such that n of its tangents pass through an arbitrary point is said to be of the class n; as already appearing, this notion of the order and class of a curve is, however, due to Gergonne. Thus the line is a curve of the order 1 and class o; and corresponding dually thereto, we have the point as a curve of the order o and class 1.

Pliicker, moreover, imagined a system of line-co-ordinates (tangential coordinates). (See Geometry: Analytical.) The Cartesian co-ordinates (x, y) and

trilinear co-ordinates (x, y, z) are point-co-ordinates for determining the position of a point; the new co-ordinates, say (£, tj, f) are line-co-ordinates for determining the position of a line. It is possible, and (not so much for any application thereof as in order to more fully establish the analogy between the two kinds of co-ordinates) important, to give independent quantitative definitions of the two kinds of co-ordinates; but we may also derive the notion of line-co-ordinates from that of point-co- ordinates ; viz. taking £x+7iy+t;z = o to be the equation of a line, we say that (£, ij,-f) are the line-co-ordinates of this line. A linear relation a%--br)--c$ = between these co-ordinate determines a point, viz. the point whose point-co-ordinates are (a, b, c); in fact, the equation in question a£+foj+cf = ex- presses that the equation £x--r)y+lz = o, where (x, y, z) are current point-co-ordinates, is satisfied on writing therein x, y, z = a, b, c; or that the line in question passes through the point {a, b, c). Thus (£, t\, f) are the line-co-ordinates of any line whatever ; but when these, instead of being absolutely arbitrary, are subject to the restriction a£--bri--c£ =0, this obliges the line to pass through a point {a, b, c) ; and the last-mentioned equation <£+fo?+cf = is considered as the line-equation of this point.*

*A line has only a point-equation, and a point has only a line- equation; but any other curve has a point-equation and also a line-equation; the point-equation (*5#, y, z) m =o is the relation which is satisfied by the point-co-ordinates (x, y, z) of each point of the curve; and similarly the line-equation (*jj £, 77, f)"=o is the relation which is satisfied by the line-co-ordinates (ij, 17, f) of each line (tangent) of the curve.*

There is in analytical geometry little occasion for any explicit use of line-co-ordinates; but the theory is very important; it serves to show that in demonstrating by point-co-ordinates any purely descriptive theorem whatever, we demonstrate the cor- relative theorem; that is, we do not

demonstrate the one theorem, and then (as by the method of reciprocal polars) deduce from it the other, but we do at one and the same time demonstrate the two theorems; our (x, y,z.) instead of meaning point-co-ordinates may mean, line-co-ordinates, and the demonstration is then in every step of it a demonstration of the correlative theorem.

Point-singu- larities —

Line-singu- larities —

i 1 '

J 3-

i

7. Singularities of a Curve. ■ .Pliicker' s Equations. — The above dual generation explains the nature of the singularities of a plane curve. The ordinary singularities, arranged according to a cross division, are

Proper. Improper.

The stationary pcint, 2. The double point

cusp or spinode ; or node ;

The stationary tan- 4. The double tan- gent or inflection ; gent; arising as follows: — -

1. The cusp: the point as it travels along the line may come to

rest, and then reverse the direction of its motion.

3. The stationary tangent : the line may in the course of its

rotation come to rest, and then reverse the direction of its rotation.

2. The node: the point may in the course of its motion come to

coincide with a former position of the point, the two positions of the line not in general coinciding.

4. The double tangent: the line may in the course of its motion

come to coincide with a former position of the line, the tw6 positions of the point not in general coinciding. '

It may be remarked that we cannot with a real point and line obtain the node with two imaginary tangents (conjugate or isolated point or acnode) , nor again the real double tangent with two imaginary points of contact; but this is of little consequence, since in the general theory the distinction between real and imaginary is not attended to.

The singularities (1) and (3) have been termed proper singu- larities, and (2) and (4) improper; in each of the first-mentioned cases there is a real singularity, or peculiarity in the motion; in the other two cases there is not; in (2) there is not when the point is first at the node, or when it is secondly at the node, any peculiarity in the motion; the singularity consists in the point coming twice into the same position; and so in (4) the singularity is in the line coming twice into the same position. Moreover (1) and (2) are, the former a proper singularity, and the latter an improper singularity, as regards the motion of the point; and similarly (3) and (4) are, the former a proper singularity, and the latter an improper singularity, as regards the motion of the line.

But as regards the representation of a curve by an equation, the case is very different.

*First, if the equation be in point-co-ordinates, (3) and (4) are in a sense not singularities at all. The curve (*J *, y, z) m = o, or general curve of the order m, has double tangents and in- flections; (2) presents itself as a singularity, for the equations d t (*lx, y, z) m =o,d v (*lx, y, z) m = o, d 2 {*lx,y, z) m =o, implying (* \x, y,z) m = o, are not*

in general satisfied by any values (a, h, c) whatever of (, y, z), but if such values exist, then the point (a, b, c) is a node or double point; and (1) presents itself as a further singularity or sub-case of (2), a cusp being a double point for which the two tangents becomes coincident.*

In line-co-ordinates all is reversed: — (1) and (2) are not singu- larities ; (3) presents itself as a sub-case of (4).

The theory of compound singularities will be referred to farther on.

In regard to the ordinary singularities, we have m, the order, n ,, class,

S ,, number of double points, k ,, ,, cusps,

t ,, ,, double tangents,

1 ,, ,, inflections;

and this being so, Pliicker's '

(1) n—m (m — 1)— 28 — 3,*

(2) 1 =yn (m — 2)— 68 — 8 'i = i«(m- 2) (m 2 — 9)-*

6Sk%k(«-i), OT = re(re — i)— 2t— 31, K = 3n (n — 2)— 6t — 8i, S = in(n — 2)(n 2 — '<))— (re 2 — re- +fi(«-i). It is easy to derive the further forms —

(7) t — k =3(«— m),

(8) 2(1- — 8) = (» — m) (n+m-

(9) |wt(w-f-3)-8-2K =Jre(re+3)-T-2i, (10) I (m — i, I (to-2) -S-k =i(n-i) (n— 2)— r— i, (n, 12) w ! -2«-3(c =re 2 -2T-3 s , =m+n—* ■

(3)

(4) (5) (6)

' six equations are

-(m 2 -m-6) (2S+3 K)+2«(a-i)

-6) (2t+3i)+2t(t-i)-|-6ti

9)

.CE»yjE

657

the whole system being equivalent to three equations only; and it may be added that using a to denote the equal quantities 3»i+i and 3» +k everything may be expressed in terms of m,n,a. We have

1=0— 3m,

25 = m 2 — m+8n— 3a.

2r=n 2 — n+&m — 3a. '■■'■

It is implied in Plucker's theorem that, m, n, S, k,'t, t signifying as above in regard to any curve, then in regard to trie reciprocal curve, n, m, t, 1, 5, k will have the same significations, viz. for the reciprocal curve these letters denote respectively the order, class, number of nodes, cusps, double tangent and inflections.

The expression f m(m--$)— 6— 2k is that of the number of the disposable constants in a curve of the order m with 8 nodes and k cusps (in fact that there shall be a node is I condition, a cusp 2 conditions) and the equation (9) thus expresses that the curve and its reciprocal contain each of them the same number of disposable constants. '

For a curve of the order m,. the expression \m{m — 1) — S— k is termed the " deficiency " (as, to this more hereafter) ; the equation (10) expresses therefore that the curve and its reciprocal have each of them the same deficiency.

The relations m 2 — 25 — 3k— » 2 — 2r — 31, =»»+», present themselves in the theory of envelopes, as will appear farther on.

With' regard to the demonstration of Plucker's equations it is to be remarked that we are not able to write down the equation in point-co-ordinates of a curve of the order m, having the given numbers 5 and k of nodes and cusps. We can only use the general equation {\x, y, z)"» = 0, say for shortness u =0, of a curve of the wth order, which equation, so long as the coefficients remain arbitrary, represents a curve without nodes or cusps. Seeking then, for this curve, the values, n, 1, r of the class, number of inflections, and number of double tangents, — first, as regards . the class, this is equal to the number of tangents which can be ■ drawn to the curve from an arbitrary point, or what is the same • thing, it is equal to the number of the points of contact of these tangents. The points of contact are found as the intersections ; of the curve u—o by a curve depending oh the position of the arbitrary point, and called the "first polar" of this point; the order of the first polar is =m—i, and the number of interr sections is thus —m(m— 1). But it can be shown, analytically or geometrically, that if the given curve has a node, the first polar passes through this node, which therefore counts as two intersections, and that if the curve has a cusp, the first polar passes through the cusp, touching the curve there, and hence the cusp counts as three intersections. But, as is evident, the node or cusp is not a point of contact of a proper tangent from the arbitrary point; we have, therefore, for a node a diminution 2, and for a cusp a diminution 3, in the number of the intersections; and thus, for a curve with 5 nodes and a cusps^ there is a diminu- tion 25+3/c, and the value of n is n~m (m— 1)^-28— 3*.*

Secondly, as to the inflections, the process is a similar one; it can be shown that the inflections are the intersections of the curve by a derivative curve called (after Ludwig Otto Hesse who first considered it) the Hessian, defined geometrically as the locus of a point such that its conic polar (§8 below) in regard to the curve breaks up into a pair of lines, and which has an equation H = o, where H

is the determinant formed with the second differential coefficients of u in regard to the variables (x, y, z); H=o is thus a curve of the order 3(#»— 2), and the number of inflections is =3«j(«-2). But if the given curve has a node, then not only the Hessian passes through the node, but it has there a node the two branches at which touch respectively the two branches of the curve; and the node thus counts as six intersections; so if the curve has a cusp, then the Hessian not only passes through the cusp, but it has there a cusp through which it again passes, that is, there is a cuspidal branch touching the cuspidal branch of the curve, and besides a simple branch passing through the cusp, and hence the cusp counts as eight intersections. The node or cusp is not an inflection, and we have thus for a node a diminution 6, and for a cusp a diminution 8, in the number of the intersections; hence for a curve with 5 nodes and k cusps, the diminution is =6S-)-8k, and the number of; inflections is 1 =3>»(w— 2) — 65 — 8k.

Thirdly, for the double tangents; the points of contact, of

these are obtained as the intersections of the curve by a curve II — o, which has not as yet been geometrically defined, but which is found analytically to be of the order (m— 2) (w 2 — 9); the number of intersections is thus = m(«i— 2) {nfi— g); but if the given curve has a node then there is a diminution = 4(m 2 — m— 6), and if it -has a cusp then there is a diminution =6(w 2 —m— 6), where, however, it is to be noticed that the factor (m?—m— 6) isift the case of a curve having only a node or only a cusp the number of the tangents which can be drawn from the node or cusp to the curve, and is used as denoting the number of these tangents, and ceases to be the correct expression if the number of nodes and cusps is greater than unity. Hence, in the case of a curve which has 8, nodes and k cusps, the apparent diminution 2(w 2 — m— 6)(25+3<) is too great, and it has in fact to be diminished by 2 {(25(5-i)+65K+fK(/c-i)}, or the half thereof is 4 for each pair of nodes, 6 for each combination of a

node and cusp, and o for each pair ; of cusps. We have thus finally an ex- pression for 2T, =m (m— 2) (m 2 — 9) — &c; or dividing the whole by 2, we have the expression for t given by the third of Plucker's equations. :

Itiis obvious that we cannot by consideration of the equation u — o in point-co-ordinates obtain the remaining three of Plucker's equations; they, might be obtained in a precisely analogous manner by means of the equation v — o in line-co-ordinates,but they follow at once from the principle of duality, viz. they are obtained by the mere interchange of m i S, k, with », t, (respectively.

,To complete Packer's theory it is necessary to take account of compound singularities; it might be possible, but it is at any rate difficult, to effect this by considering the curve as in course of description by the point moving, along the rotating line; and it seems easier to consider the compound singularity as arising from the variation of an actually described curve with ordinary singularities. The most simple case is when three double points come into coincidence, thereby giving rise to a triple point; and a somewhat more complicated one is when we have a cusp of the second kind, or node-cugp arising from the coincidence of a node, a cusp, an inflection, and a double tangent, as shown ia the annexed figure, which represents the singularities as on the

point of coalescing. The general conclusion (see Cayley, Quart. Math. Jour. t.vii., 1866, " On the higher singularities of plane curves "; Collected Works, v. 520) is that every singularity whatever may be considered as compounded of ordinary singu- larities, say we have a singularity =5'-nodes, k' cusps, t' double tangents arid 1' inflections. So that, in fact, Plucker's equations properly understood apply to a curve with any singularities whatever. By means of Plucker's equations we may form a table —

m

n

S

K

T

1

1

–

–

O

i

–

–

2 ‘

2

3

6

9

1;

4

1

3

” 1

3

I

1

4

12

28

24

>>

10

1

16

18

i>

9

I

10

16

M

8

2

8

12

ft

7

1

I

4

10

"

6

2

1

8

)»

,6

3

O

4

6

M

5

2

I

2

4

" »J

4

1

2

1

2

11

3

3

1

6 5 8

CURVE

The table is arranged according to the value of to; and we have w = o, n~i, the point; m=i, « = o, the line; to=2, n=2, the conic; of to = 3, the cubic, there are three cases, the class being 6, 4 or 3, according as the curve is without singularities, or as it has i node or i cusp; and so of to = 4, the quartic, there are ten cases, where observe that in two of them the class is = 6, — the reduction of class arising from two cusps or else from three nodes. The ten cases may be also grouped together into four, according as the number of nodes and cusps (5+k) is =o, i, 2 or 3.

The cases may be divided into sub-cases, by the consideration of compound singularities; thus when w = 4, « = 6, 6 = 3, the three nodes may be all distinct, which is the general case, or two of them may unite together into the singularity called a tacnode, or all three may unite together into a triple point or else into an oscnode.

We may further consider the inflections and double tangents, as well in general as in regard to cubic and quartic curves.

The expression for the number of inflections ^m(m - 2) for a curve of the order to was obtained analytically by Pliicker, but the theory was first given in a complete form by Hesse in the two papers" tjber die Elimination, u.s.w.," and " tlber die Wendepuncte der Gurven dritter Ordnung " (Crelle, t. xxviii., 1844); in the latter of these the points of

inflection are obtained as the intersections of the curve w = o with the Hessian, or curve A = o, where A is the determinant formed with the second derived functions of u. We have in the Hessian the first instance of a covariant of a ternary form. The whole theory of the inflections of a cubic curve is discussed in a very interesting manner by means of the canonical form of the equation x 3 +y 3 +z 3 +6/ ryz = o; and in particular a proof is given of Pliicker' s theorem that the nine points of inflection of a cubic curve lie by threes in twelve lines.

It may be noticed that the nine inflections of a cubic curve represented by an equation with real coefficients are three real, six imaginary; the three real inflections lie in a line, as was known to Newton and Maclaurin. For an acnodal cubic the six imaginery inflections disappear, and there remain three real inflections lying in a line. For a crunodal cubic the six inflections which disappear are two of them real, the other four imaginary, and there remain two imaginary inflections and one real inflection. For a cuspidal cubic the six imaginary inflections and two of the real inflections disappear, and there remains one real inflection.

A quartic curve has 24 inflections; it was conjectured by George Salmon, and has been verified by H. G. Zeuthen that at most eight of these are real. ..

The expression \m(m- 2) (to 2 - 9) for the number of double tangents of a curve of the order to was obtained by Pliicker only as a consequence of his first, second, fourth and fifth equations. An investigation by means of the curve II = 0, which by its inter- sections with the given curve determines the points of contact of the double tangents, is indicated by Cayley, " Recherches sur l'elimination et la theorie des courbes " (Crelle, t. xxxiv., 1847; Collected Works, vol. i. p. 337), and in part carried out by Hesse in the memoir " tlber Curven dritter Ordnung " {Crelle, t. xxxvi., 1848). A better process was indicated by Salmon in the " Note

on the Double Tangents to Plane Curves," Phil. Mag., 1858; considering the to- 2 points in which any tangent to the curve again meets the curve, he showed how to form the equation of a curve of the order (w-2), giving by its inter- section with the tangent the points in question; making the tangent touch this curve of the order (to- 2), it will be a double tangent of the original curve. See Cayley, " On the Double Tangents of a Plane Curve " {Phil. Trans, t. cxlviii., 1859; Collected Works, iv. 186), and O. Dersch {Math. Ann. t. vii., 1874). The solution is still in so far incomplete that we have no properties of the curve II = o, to distinguish one such curve from the several other curves which pass through the points of contact of the double tangents.

A quartic curve has 28 double tangents, their points of contact determined as the intersections of the curve by a curve II = of the order 14, the equation of which in a very elegant form was first obtained by Hesse (1849). Investigations in regard to them

are given by Pliicker in the Theorie der algebraischen Curven, and in two memoirs by Hesse and Jacob Steiner (Crelle, t. xlv., 1855). in respect to the triads of double tangents which have their points of contact on a conic and other like relations. It was assumed by Pliicker that the number of real double tangents might be 28, 16, 8, 4 or o, but Zeuthen has found that the last case does not exist.

8. Invariants and Covariants. Polar Curves. — The Hessian A has just been spoken of as a covariant of the form u; the notion of invariants and covariants belongs rather to the form u than to the curve « = o represented by means of this form; and the theory may be very briefly referred to. A curve u — o may have some invariantive property, viz. a property independent of the particular axes of co-ordinates used in the representation of the curve by its equation; for instance, the curve may have a node, and in order to this, a relation, say A = o, must exist between the coefficients of the equation;

supposing the axes of co-ordinates altered, so that the equation becomes V = o, and writing A′ = o for the relation between the new coefficients, then the relations A = o, A′ = o, as two different expressions of the same geometrical property, must each of them imply the other; this can only be the case when A, A′ are functions differing only by a constant factor, or say, when A is an invariant of u. If, however, the geometrical property requires two or more rela- tions between the coefficients, say A = o, B = o,&c, then we must have between the new coefficients the like relations, A′ = o, B′ = o, &c, and the two systems of equations must each of them imply the other; when this is so, the system of equations, A = o, B=o, &c, is said to be invariantive, but it does not follow that A, B, &c, are of necessity invariants of u. Similarly, if we have a curve U = o derived from the curve u = o in a manner independent of the particular axes of co-ordinates, then from the transformed equation u′ = o deriving in like manner the curve U′ = o, the two equations U = o, U′ = o must each of them imply the other; and when this is so, U will be a covariant of u. The case is less frequent, but it may arise, that there are covariant systems U = o, V = o, &c, and U′ = o, V′ = o, &c, each implying the other, but where the functions U, V, &c, are not of necessity covariants of u.

; If we take a fixed point (′,y′,z′) and a curve «==o of order m, and suppose the axes of reference altered, so that *′, y′ , 2' are linearly transformed in the same way as the current x, y, z,*

the curves \ x ‘^ c y′g^ z ‘g- z) r ^ = °, (r=i, 2, . . .m-i)have the

covariant property. They are the polar curves of the point with regard to .-u—o.

The theory of the invariants and covariants of a ternary cubic function w has been studied in detail, and brought into connexion with the cubic curve w=o; but the theory of the invariants and covariants for the next succeeding case, the ternary quartic

function, is still very incomplete.

9. Envelope of a Curve.— In further illustration of the Pluckerian dual generation of a curve, we may consider the question of the envelope of a variable curve. The notion is very probably older, but it is at any rate to be found in Lagrange's Theorie des fonctions analytiques (1798) ; it is there remarked that the equation obtained by the elimination of the parameter a from an equation/ (x,y,a) = o and the derived equation in respect to a is a curve, the envelope of the series of curves represented by the equation / (x,y,a)=o in question. To develop the theory, consider the curve corre- sponding to any particular value of the parameter; this has with the consecutive curve (or curve belonging to the consecutive value of the parameter) a certain number of intersections and of common tangents, which may be considered as the tangents at the intersections; and the so-called envelope is the curve which is at the same time generated by the points of intersection and enveloped by the common tangents; we have thus a dual generation. But the question needs to be further examined. Suppose that in general the variable curve is of the order to with 5 nodes and k cusps, and therefore of the class n with r double tangents and 1 inflections, to, n, 5, k, t, 1 being connected by the Pluckerian equations, — the number of nodes or cusps may be

greater for particular values of the parameter, but this is a speciality which may be here disregarded. Considering the vari- able curve corresponding to a given value of the parameter, or say simply the variable curve, the consecutive curve has then also 8 and /c nodes and cusps, consecutive to those of the variable curve; and it is easy to see that among the intersections of the two curves we have the nodes each counting twice, and the cusps each counting three times; the number of the remaining inter- sections is = m? — 2 8 — 3/c. Similarly among

the common tangents of the two curves we have the double tangents each counting twice, and the stationary tangents each counting three times, and the number of the remaining common tangents is = w 2 — 27— 31 (= m 2 — 28— 3/c, inasmuch as each of these numbers is as was seen =m--n). At any one of the m 2 — 28— 3/c points the variable curve and the consecutive curve have tangents distinct from yet infinitesimally near to each other, and each of these two tangents is also infinitesimally near to one of the « 2 — 27— 31 common tangents of the two curves; whence, attending only to the variable curve, and considering the consecutive curve as coming into actual coincidence with it, the « 2 — 27-— 31 common tangents are the tangents to the variable curve at the m 2 — 28— 3/c points respectively, and the envelope is at the same time generated by the m 2 — 28— 3/c points, and enveloped by the « 2 — 27—31 tangents; we have thus a dual generation of the envelope, which only differs from Pliicker's dual generation, in that in place of a single point and tangent we have the group of w 2 — 26— 3/c points and « 2 — 27— 31 tangents.

The parameter which determines the variable curve may be given as a point upon a given curve, or say as a parametric point; that is, to the different positions of the parametric point on the given curve correspond the different variable curves, and the nature of the envelope will thus depend on that of the given curve; we have thus the envelope as a derivative curve of the given curve. Many well-known derivative curves present themselves in this manner; thus the variable curve may be the normal (or line at right angles to the tangent) at any point of the given curve; the intersection of the consecutive normals is the centre of curvature; and we have the evolute as at once the locus of the centre of curvature and the envelope of the normal. It may be added that the given curve is one of a series of curves, each cutting the several normals at right angles. Any one of these is a " parallel " of the given curve; and it can be obtained as the envelope of a circle of constant radius having its centre on

the given curve. We have in like manner, as derivatives of a given curve, the caustic, catacaustic or diacaustic as the case may be, and the secondary caustic, or curve cutting at right angles the reflected or refracted rays.

10. Forms of Real Curves. — We have in much that precedes disregarded, or at least been indifferent to, reality; it is only thus that the conception of a curve of the m-th order, as one which is met by every right line in m points, is arrived at; and the curve itself, and the line which cuts it, although both are tacitly assumed to be real, may perfectly well be imaginary. For real figures we have the general theorem that imaginary inter- sections, &c, present themselves in conjugate pairs; hence, in particular, that a curve of an even order is met by a line in an even number (which may be =0) of points; a curve of an odd order in an odd number of points, hence in one point at least; it will be seen further on that the theorem may be generalized in a remarkable manner. Again, when there is in question only one pair of points or lines, these, if coincident, must be real; thus, a line meets a cubic curve in three points, one of them real, and other two real or imaginary; but if two of the inter- sections coincide they must be real, and we have a line cutting a cubic in one real point and touching it in another real point. It may be remarked that this is a limit separating the two cases where the intersections are all real, and where they are one real, two imaginary.

Considering always real curves, we obtain the notion of a branch; any portion capable of description by the continuous motion of a point is a branch; and a curve consists of one or more branches. Thus the curve of the first order or right line

consists of one branch; but in curves of the second order, or conies, the ellipse and the parabola consist each of one branch, the hyperbola of two branches. A branch is either re-entrant, or it extends both ways to infinity, and in this case, we may regard it as consisting of two legs {crura,

Newton), each extending one way to infinity, but without any definite separation. The branch, whether re-entrant or infinite, may have a cusp or cusps, or it may cut itself or another branch, thus having or giving rise to crunodes or double points with distinct real tangents; an acnode, or double point with imaginary tangents, is a branch by itself, — it may be considered as an indefinitely small re-entrant branch. A branch may have inflections and double tangents, or there may be double tangents which touch two distinct branches; there are also double tangents with imaginary points of contact, which are thus lines having no visible connexion with the curve. A re-entrant branch not cutting itself may be everywhere convex, and it is then properly said to be an oval; but the term oval may be used more generally for any re-entrant branch not cutting itself; and we may thus speak of a once indented, twice indented oval, &c. , or even of a cuspidate oval. Other descriptive names for ovals and re-entrant branches cutting themselves may be used when required; thus, in the last-mentioned case a simple form is that of a figure of eight; such a form may break up into two ovals or into a doubly indented oval or hour-glass. A form which presents itself is when two ovals, one inside the other, unite, so as to give rise to a crunode — in default of a better name this may be called, after the curve of that name, a limagon (q.v.). Names may also be used for the different forms of infinite branches, but we have first to consider the distinction of hyper- bolic and parabolic. The leg of an infinite branch may have at the extremity a tangent; this is an asymptote of the curve, and the leg is then hyperbolic; or the leg may tend to a fixed direction, but so that the tangent goes further and further off to infinity, and the leg is then parabolic; a branch may thus be hyperbolic or parabolic as to its two legs; or it may be hyper- bolic as to one leg and parabolic as to the other. The epithets hyperbolic and parabolic are of course derived from the conic hyperbola and parabola respectively. The nature of the two kinds of branches is best understood by considering them as

projections, in the same way as we in effect consider the hyperbola and the parabola as projections of the ellipse. If a line fl cut an arc aa' at b, so that the two segments ab, ba' lie on opposite sides of the line, then projecting the figure so that the line Q goes off to infinity, the tangent at b is projected into the asymptote, and the arc ab is projected into a hyperbolic leg touching the asymptote at one extremity; the arc ba' will at the same time be projected into a hyperbolic leg touching the same asymptote at the other extremity (and on the opposite side), but so that the two hyperbolic legs may or may not belong to one and the same branch. And we thus see that the two hyperbolic legs belong to a simple intersection of the curve by the line infinity. Next, if the line U touch at b the arc aa' so that the two portions ab, ba' lie on the same side of the line 0, then projecting the figure as before, the tangent at b, that is, the line itself, is projected to infinity; the arc ab is projected into a parabolic leg, and at the same time the arc ba' is projected into a parabolic leg, having at infinity the same direction as the other leg, but so that the two legs may or may not belong to the same branch. And we thus see that the two parabolic legs represent a contact of the line infinity with the curve, — the point of contact being of course the point at infinity determined by the common direc- tion of the two legs. It will readily be understood how the like considerations apply to other cases, — for instance, if the line is a tangent at an inflection, passes through a crunode, or touches one of the branches of a crunode, &c. ; thus, if the line passes through a crunode we have pairs of hyperbolic legs belonging to two parallel asymptotes. The foregoing considerations also show (what is very important) how different branches are con- nected together at infinity, and lead to the notion of a complete branch or circuit.

The two legs of a hyperbolic branch may belong to different asymptotes, and in this case we have the forms which Newton

calls inscribed, circumscribed, ambigene, &c; or they may belong to the same asymptote, and in this case we have the serpentine form, where the branch cuts the asymptote, so as to touch it at its two extremities on opposite sides, or the conchoidal form, where it touches the asymptote on the same side. The two legs of a parabolic branch may converge to ultimate parallelism, as in the conic parabola, or diverge to ultimate parallelism, as in the semi-cubical parabola y^ — ofi, and the branch is said to be convergent, or divergent, accordingly; or they may tend to parallelism in opposite senses, as in the cubical parabola y=x?. As mentioned with regard to a branch generally, an infinite branch of any kind may have cusps, or, by cutting itself or another branch, may have or give rise to a crunode, &c.

ii. Classification of Cubic Curves. — We may now consider the various forms of cubic curves as appearing by Newton's Enumeratio, and by the figures belonging thereto. The species are reckoned as 72, which are numbered accordingly 1 to 72; but to these should be added io", 13", 22" and 22 6 . It is not intended here to consider the division into species, nor even completely that into genera, but only to explain the principle of classification. It may be remarked generally that there are at most three infinite branches, and that there may besides be a re-entrant branch or oval. The genera may be arranged as" follows: — 1,2,3,4 redundant hyperbolas

5,6 defective hyperbolas

7,8 parabolic hyperbolas 9 hyperbolisms of hyperbola

10 „ „ ellipse

11 „ „ parabola

12 trident curve

13 divergent parabolas

14 cubic parabola;

and thus arranged they correspond to the different relations of the line infinity to the curve. First, if the three intersections by the line infinity are all distinct, we have the hyperbolas; if the points are real, the redundant hyperbolas, with three hyper- bolic branches; but if only one of them is real, the defective hyperbolas, with one hyperbolic branch. Secondly, if two of the intersections'coincide, say if the line infinity meets the curve in a onefold point and a twofold point, both of them real, then there is always one asymptote: the line infinity may at the twofold point touch the curve, and we have the parabolic hyperbolas; or the twofold point may be a singular point, — viz., a crunode giving the hyperbolisms of the hyperbola; an acnode, giving the hyperbolisms of the ellipse; or a cusp, giving the hyperbolisms of the parabola. As regards the so-called hyper- bolisms, observe that (besides the single asymptote) we have in the case of those of the hyperbola two parallel asymptotes; in the case of those of the ellipse the two parallel asymptotes become imaginary, that is, they disappear; and in the case of those of the parabola they become coincident, that is, there is here an ordinary asymptote, and a special asymptote answering to a cusp at infinity. Thirdly, the three intersections by the line infinity may be coincident and real; or say we have a threefold point: this may be an inflection, a crunode or a cusp, that is, the line infinity may be a tangent at an inflection, and we have the divergent parabolas; a tangent at a crunode to one branch, and we have the trident curve; or lastly, a tangent at a cusp, and we have the cubical parabola.

It is to be remarked that the classification mixes together non-singular and singular curves, in fact, the five kinds presently referred to: thus the hyperbolas and the divergent parabolas in T elude curves of every kind, the separation being made in the species; the hyperbolisms of the hyperbola and

ellipse, and the trident curve, are nodal; the hyperbolisms of the parabola, and t.he cubical parabola, are cuspidal. The divergent parabolas are of five species which respectively belong to and determine the five kinds of cubic curves; Newton gives (in two short para- graphs without any development) the remarkable theorem that the five divergent parabolas by their shadows generate and exhibit all the cubic curves.

The five divergent' parabolas are curves each of them sym- metrical with regard to an axis. There are two non-singular kinds,, the one with, the other without, an oval, but each of them has an infinite (as Newton describes it) campaniform branch; this cuts the axis at right, angles, being at first concave, but ultimately convex, towards the axis, the two legs continually tending to become at right angles to the axis. The oval may unite itself with the infinite branch, or it may dwindle into a point, and we have th« crunodal and the acnodal forms respec- tively; or if simultaneously the oval dwindles into a point and unites itself to the infinite branch, we have the cuspidal form. (See Parabola.) Drawing a line to cut any one of these curves and projecting the line to infinity, it would not be difficult to show how the line should be drawn in order to obtain a curve of any given species. We have herein a better principle of classi- fication; considering cubic curves, in the first instance, according to singularities, the curves are non-singular, nodal (viz. crunodal or acnodal), or cuspidal; and we see further that there are two kinds of non-singular curves, the complex and the simplex. There is thus a complete division into the five kinds, the complex, simplex, crunodal, acnodal and cuspidal. Each singular kind presents itself as a limit separating two kinds of inferior singu- larity; the cuspidal separates the crunodal and the acnodal, and these last separate from each other the complex and the simplex. The whole question is discussed very fully and ably by A. F. Mobius in the memoir " Ueber die Grundformen der Linien dritter Ordnung " (A bh. der K. Sachs. Ges.

zu Leipzig, t. i., 1852). The author considers, not only plane curves, but also cones, or, what is almost the same thing, the spherical curves which are their sections by a concentric sphere. Stated in regard to the cone, we have there the fundamental theorem that there are two different kinds of sheets; viz., the single sheet, not separated into two parts by the vertex (an instance is afforded by the plane considered as a cone of the first order generated by the motion of a line about a' point), and the double or twin -pair sheet, separated into two parts by the vertex (as in the cone of the second order). And it then appears that there are two kinds of non-singular cubic cones, viz. the simplex, consisting of a single sheet, and the complex, consisting of a single sheet and a twin-pair sheet; and we thence obtain (as for cubic curves) the crunodal, the acnodal and the cuspidal kinds of cubic cones. It may be mentioned that the single sheet is a sort of wavy form, having upon it three lines of inflection, and which is met by any plane through the vertex in one or in three lines; the twin -pair sheet has no lines of inflection, and resembles in its form a cone on an oval base;

In general a cone consists of one or more single or twin-pair sheets, and if we consider the section of the cone by a plane, the curve consists of one or more complete branches, or say circuits, each of them the section of one sheet of the cone; thus, a cone of the second order is one twin-pair sheet, and any section of it is one circuit composed, it may be, of two branches. But although we thus arrive by projection at the notion of a circuit, it is not necessary to go out of the plane, and we may (with Zeuthen, using the shorter term circuit for his complete branch) define a circuit as any portion (of a curve) capable of description by the continuous motion of a point, it being understood that a passage through infinity is permitted. And we then say that a curve consists of one or more circuits; thus the right line, or curve of the first order, consists of one circuit; a curve of the second order consists of one circuit; a cubic curve consists of

one circuit or else of two circuits.

A circuit is met by aiiy right line always in an even number, or always in an odd number, of points, and it is said to be an even circuit or an odd circuit accordingly; the right line is an odd circuit, the conic an even circuit. And we ha ve then the theorem, two odd circuits intersect in an odd number of points; an odd and an even circuit, or two even circuits, in an even number of points. An even circuit not cutting itself divides the plane into two parts, the one called the internal part, incapable of containing any odd circuit, the other called the external part, capable of containing an odd circuit.

CURVE

661

We may now state in a more convenient form the fundamental distinction of the kinds of cubic curve. A non-singular cubic is simplex, consisting of one odd circuit, or it is complex, consisting of one odd circuit and one even circuit. It may be added that there are on the odd circuit three inflections, but on the even circuit no inflection; it hence also appears that from any point of the odd circuit there can be drawn to the odd circuit two tan- gents, and to the even circuit (if any) two tangents, but that from a point of the even circuit there cannot be drawn (either to the odd or the even circuit) any real tangent; consequently, in a simplex curve the number of tangents from any point is two ; but in a complex curve the number is four, or none, — four if the point is on the odd circuit, none if it is on the even circuit. It at once appears from inspection of the figure of a non-singular cubic curve, which is the odd and which the even circuit. The singular kinds arise as before; in the crunodal and the cuspidal kinds the whole curve is an odd circuit, but in an acnodal kind the acnode must be regarded as an even circuit.

12. Quartic Curves. — The analogous question of the

classifica- tion of quartics (in particular non-singular quartics and nodal quartics) is considered in Zeuthen's memoir " Sur les differentes formes des courbes planes du quatrieme ordre " {Math. Ann. t. vii., 1874). A non-singular quartic has only even circuits; it has at most four circuits external to each other, or two circuits one internal to the other, and in this last case the internal circuit has no double tangents or inflections. A very remarkable theorem is established as to the double tangents of such a quartic : distinguishing as a double tangent of the first kind a real double tangent which either twice touches the same circuit, or else touches the curve in two imaginary points, the number of the double tangents of the first kind of a non-singular quartic is = 4; it follows that the quartic has at most 8 real inflections. The forms of the non-singular quartics are very numerous, but it is not necessary to go further into the question.

We may consider in relation to a curve, not only the line infinity, but also the circular points at infinity; assuming the curve to be real, these present themselves always conjointly; thus a circle is a conic passing through the two circular points, and is thereby distinguished from other conies. Similarly a cubic through the two circular points is termed a circular cubic; a quartic through the two points is termed a circular quartic, and if it passes twice through each of them, that is, has each of them for a node, it is termed a bicircular quartic. Such a quartic is of course binodal (m = \, 5=2, k = o); it has not in general, but it may have, a third node or a cusp. Or again, we may have a quartic curve having a cusp at each of the circular points: such a curve is a " Cartesian," it being a complete definition of the Cartesian to say that it is a bicuspidal quartic curve (m = 4, 5 = o, k=2), having a cusp at each of the circular points. The circular cubic and the bicircular quartic, together with the Cartesian (being in one point of view a particular case thereof), are interesting curves which have been much studied, generally, and in

reference to their focal properties.

13. Foci. — The points called foci presented themselves in the theory of the conic, and were well known to the Greek geometers, but the general notion of a focus was first established by Pliicker (in the memoir " tlber solche Puncte die bei Curven einer hoheren Ordnung den Brennpuncten der Kegelschnitte ent- sprechen " (Crelle, t. x., 1833). We may from each of the circular points draw tangents to a given curve; the intersection of two such tangents (belonging of course to the two circular points respectively) is a focus. There will be from each circular point X tangents (X, a number depending on the class of the curve and its relation to the line infinity and the circular points, = 2 for the general conic, 1 for the parabola, 2 for a circular cubic, or bicircular quartic, &c); the X tangents from the one circular point and those from the other circular point intersect in X real foci (viz. each of these is the only real point on each of the tangents through it), and in X 2 -X imaginary foci; each pair of real foci determines a pair of imaginary foci (the so-called antipoints of the two real foci), and the JX(X-i) pairs of real foci thus determine the X 2 -X imaginary foci. There are in some cases

points termed centres, or singular or multiple foci (the nomen- clature is unsettled), which are the intersections of improper tangents from the two circular points respectively; thus, in the circular cubic, the tangents to the curve at the two circular points respectively (or two imaginary asymptotes of the curve) meet in a centre.

14. Distance and Angle. Curves described mechanically. — The notions of distance and of lines at right angles are connected with the circular points; and almost every construction of a curve by means of lines of a determinate length, or at right angles to each other, and (as such) mechanical constructions by means of linkwork, give rise to curves passing the same definite number of times through the two circular points respectively, or say

to circular curves, and in which the fixed centres of the construction present themselves as ordinary, or as singular, foci. Thus the general curve of three bar-motion (or locus of the vertex of a triangle, the other two vertices whereof move on fixed circles) is a tricircular sextic, having besides three nodes (w = 6, 5 = 3+3+3, = 9), and having the centres of the fixed circles each for a singular focus; there is a third singular focus, and we have thus the remarkable theorem (due to S. Roberts) of the triple generation of the curve by means of the three several pairs of singular foci.

Again, the normal, qua line at right angles to the tangent, is connected with the circular points, and these accordingly present themselves in the before-mentioned theories of evolutes and parallel curves.

15. Theories of Correspondence. — We have several recent theories which depend on the notion of correspondence: two points whether in the same plane or in different planes, or on the same curve or in different curves, may determine each other in such wise that .to any given position of the first point there correspond a positions of the second point, and to any given position of the second point a positions of the first point; the two points have then an (a, a) correspondence; and if a, a are each = 1, then the two points have a (1, 1) or rational correspond- ence. Connecting with each theory the author's name, the theories in question are G. F. B. Riemann, the rational trans- formation of a plane curve; Luigi Cremona, the rational trans- formation of a plane; and Chasles, correspondence of points on the same curve, and united points. The theory first referred to, with the resulting notion of " Geschlecht," or deficiency, is more than the other two an essential part of the theory of curves, but they will all be considered.

Riemann's results are contained in the memoirs on " Abelian Integrals," &c. (Crelle, t. liv., 1857), and we have next R. F. A. Clebsch, " tjber die Singularitaten algebraischer Curven " (Crelle, t. lxv., 1865), and Cayley, " On the Transformation of

Plane Curves" (Proc. Land. Math. Soc. t. i., 1865; Collected Works, vol. vi. p. 1). The fundamental notion of the rational transformation is as follows: —

Taking u, X, Y, Z to be rational and integral functions (X, Y, Z all of the same order) of the co-ordinates (x, y, z), and u', X', Y', Z' rational and integral functions (X', Y', Z', all of the same order) of the co-ordinates (V, y', z'), we transform a given curve « = o, by the equations of x' : y':z'=X: Y: Z, thereby obtaining a transformed curve «'=o, and a converse set of equations x : y : z = X': Y': Z; viz. assuming that this is so, the point (,* ***y, z) on the curve w = o and the point (****', y', z') on the curve w'=o will be points having a (1,1) correspondence. To show how this is, observe that to a given point (x, y, z) on the curve « = o there corresponds a single point (x', y', z') determined by the equations x' : y' : z' = X : Y : Z; from these equations and the equation u — o eliminating x, y, z, we obtain the equation m'=o of the transformed curve. To a given point (x' t y', z') not on the curve u' =0 there corresponds, not a single point, but the system of points (x, y, z) given by the equations x' : y'\ z' = X : Y : Z, viz., regarding x', y', z' as constants (and to fix the ideas, assuming that the curves X = 0, Y =0, Z = 0, have no common inter- sections), these are the points of intersection of the curves X : Y : Z, = x' : y' : z', but no one of these points is situate on the curve u = o. If, however, the point (x 1 ', y', z') is situate on the curve w'=o, then one point of the system of points in question is situate on the curve m=o, that is, to a given point of the curve u' = o there corresponds a single point of the curve « = o; and hence also this point must be given by a system of equations such as x : y : z = X' : Y' : Z'.*

It is an old and easily proved theorem that, for a curve of

the order m, the number 5+k of nodes and cusps is at most — \(m— i) (m— 2); for a given curve the deficiency of the actual number of nodes and cusps below this maximum number, viz. \{m— 1) (m — 2) — 5— k, is the ” Geschlecht ” or “deficiency,” of the curve, say this is = D. When D = o, the curve is said to be unicursal, when = 1, bicursal, and so on.

The general theorem is that two curves corresponding ration- ally to each other have the same deficiency. [In particular a curve and its reciprocal have this rational or (1, 1) correspond- ence, and it has been already seen that a curve and its reciprocal have the same deficiency.]

A curve of a given order can in general be rationally trans- formed into a curve of a lower order; thus a curve of any order for which D = o, that is, a unicursal curve, can be transformed into a line; a curve of any order having the deficiency 1 or 2 can be rationally transformed into a curve of the order D+2, deficiency D; and a curve of any order deficience = or>3 can be rationally transformed into a curve of the order D+3, deficiency D.

Taking x’ , y’, z’ as co-ordinates of a point of the transformed curve, and in its equation writing x’ : y’ : z’ = 1 : 8 : cj> we have a certain irrational function of 8, and the theorem is that the co-ordinates x, y, z of any point of the given curve can be expressed as proportional to rational and integral functions of 8, (j>, that is, of 8 and a certain irrational function of 0. ...

In particular if D =0, that is, if the given curve be unicursal, the transformed curve is a line, j> is a mere linear function of 8, and the theorem is that the co-ordinates x, y, z of a point of the unicursal curve can be expressed as proportional to rational and integral functions of 8; it is easy to see that for a given curve of the order m, these functions of 8 must be of the same order m.

If D = i, then the transformed curve is a cubic; it can be shown that in a cubic, the axes of co-ordinates being properly chosen, can be expressed as the square root of a quartic function of 8 ; and the theorem is that the co-ordinates x, y, z of a point of the bicursal curve can be expressed as proportional to rational and integral functions of 8, and of the square root of a quartic function of 8.

And so if D = 2, then the transformed curve is a nodal quartic; can be expressed as the square root of a sextic function of 8 and the theorem is, that the co-ordinates x, y, z of a point of the tricursal curve can be expressed as proportional to rational and integral functions of 8, and of the square root of a sextic function of 8. But D=3, we have no longer the like law, viz. is not expressible as the square root of an octic function of 8.

Observe that the radical, square root of a quartic function, is connected with the theory of elliptic functions, and the radical, square root of a sextic function, with that of the first kind of Abelian functions, but that the next kind of Abelian functions does not depend on the radical, square root of an octic function.

It is a form of the theorem for the case D = i, that the co- ordinates x, y, z of a point of the bicursal curve, or in particular the co-ordinates of a point of the cubic, can be expressed as proportional to rational and integral functions of the elliptic functions sn«, cnw, dnw; in fact, taking the radical to be Vi-S'.i-W, and writing 0=sn«, the radical becomes = cnw, dn«; and we have expressions of the form in question.

*It will be observed that the equations x' : y' :z' =X : Y : Z before mentioned do not of themselves lead to the other system of equations x : y : s=X' : Y' : Z', and thus that the theory does not in anywise establish a (1, 1) correspondence between the points (, **y, z) and (**', /, 2') of two planes or of the same plane; this is the correspondence of*

Cremona's theory.

In this theory, given in the memoirs " Sulle trasformazioni geo- metrche delle figure piani," Mem. di Bologna, t. ii. (1863) and t. v. (1865), we have a system of equations x' : y' : z'=X : Y : Z which does lead to a system x : y : z = X' : Y' : Z', where, as before, X, Y, Z denote rational and integral functions, all of the same order, of the co-ordinates x, y, z, and X', Y', Z' rational and integral functions, all of the same order, of the co-ordinates x', y,' z', and there is thus a (1, 1) correspondence given by these equations between the two points (x, y, z) and (', /, ***z'). To explain this, observe that starting from the equations of x' : y' : z' = X : Y : Z, to a given point (****, y, 2) there corresponds one point {x', y' , z'), but that if « be the order of the functions X, Y, Z, then to a given point x', y', z' there would, if the curves X = o, Y = o, Z=o had no common intersections, corre- spond re 2 points (x, y, z). If, however, the functions are such that the curves X = o, Y=o, Z = o have'fe common intersections, then among the k 2 points are included these k points, which are fixed points independent of the point (*', /, z'); so that, disregarding*

these fixed points, the number of points (x, y, z) corresponding to the given point (x', y', z') is = n 2 — k; and in particular if k = ri i — 1, then we have one corresponding point; and hence the original system of equations x' : y' : z' = X : Y : Z must lead to the equivalent system x : y : z =X' : Y' : Z' ; and in this system by the like reason- ing the functions must be such that the curves X'=o, Y' = o, Z' = o have »' 2 — 1 common intersections. The most simple example is in the two systems of equations x' : y' :z' — yz :zx : xy and x :y : z = y'z' : z'x' : x'y' ; where yz = o, zx = o, xy = o are conies (pairs of lines) having three common intersections, and where obviously either system of equations leads to the other system. In the case where X, Y, Z are of an order exceeding 2 the required number n 2 — 1 of common intersections can only occur by reason of common multiple points on the three curves; and

assuming that the curves X = o, Y=o, Z = o have 01+12 + 03. .. +a„-i common intersections, where the ai points are ordinary points, the 02 points are double points, the 03 points are triple points, &c, on each curve, we have the condition

OJ+402+903+... (»-l) 2 a„_i = » 2 -i;

but to this must be joined the condition

01+312+603… +J«(«-l)a„_i = !»(«+3)-2

(without which the transformation would be illusory) ; and the conclusion is that 01, 02, . . . a n _i may be any numbers satisfying these two equations. It may be added that the two equations together give

02+303… +K»-i)(»-2)o»_i = §(«-!)(« 2), which expresses that the curves X = o, Y = o, Z = o are unicursal. The transformation may be applied to any curve u = o, which is thus rationally transformed into a curve u'=o, by a rational trans formation such as is considered in Riemann's theory : hence the two curves have the same deficiency.

Coming next to Chasles, the principle of correspondence is established and used by him in a series of memoirs relating to the conies which satisfy given conditions, and to other geometrical questions, contained in the Comptes rendus, t. Iviii. (1864) et seq. The theorem of united points in regard to points in a right line was given in a paper, June- July 1864, and it was extended to unicursal curves in a paper of the same series (March 1866), " Sur les courbes planes ou a. double courbure dont les points peuvent se determiner individuellement — application du principe de cor-respondance dans la theorie de ces courbes."

The theorem is as follows: if in a unicursal curve two points have an (o, /S) correspondence, then the number of united points (or points each corresponding to itself) is=o+/3. In fact in a unicursal curve the co-ordinates of a point are given as proportional to rational and integral

functions of a parameter, so that any point of the curve is determined uniquely by means of this parameter; that is, to each point of the curve corresponds one value of the parameter, and to each value of the parameter one point on the curve; and the (a, /S) correspondence between the two points is given by an equation of the form ($0, i) a (4>, i)P = o between their para- meters 6 and ; at a united point = 8, and the value of 8 is given by an equation of the order o+/3. The extension to curves of any given deficiency D was made in the memoir of Cayley, " On the corre- spondence of two points on a curve," — Pore. Lond. Math. Soc. t. i. (1866; Collected Works, vol. vi. p. 9), — viz. taking P, P' as the corre- sponding points in an (a, a') correspondence on a curve of deficiency D, and supposing that when P is given the corresponding points P' are found as the intersections of the curve by a curve containing the co-ordinates of P as parameters, and having with the given curve k intersections at the point P, then the number of united points is a = a + a'+2&D; and more generally, if the curve O intersect the given curve in a set of points P' each p times, a set of points Q' each q times, &c, in such manner that the points (P,P') the points (P, Q') &c, are pairs of points corresponding to each other according to distinct laws; then if (P, P') are points having an (a, a') correspond- ence with a number = a of united points, (P-,Q') points havinga (/S, P') correspondence with a number —b of united points, and so on, the theorem is that we have*

p(a- a- a')+q(b-0- F)+ . . .' = 2&D.

The principle of correspondence, or say rather the theorem of united points, is a most powerful instrument of investigation, which may be used in place of analysis for the determination of the number of solutions of almost every geometrical problem. We can by means of it investigate the class of a curve, number of inflections, &c. — in fact, Pliicker's equations; but it is necessary to take account of special solutions: thus, in one of the most simple instances, in finding the class of a

curve, the cusps present themselves as special solutions.

Imagine a curve of order m, deficiency D, and let the corresponding points P, P′ be such that the line joining them passes through a given

point 0; this is an (m — 1, m — 1) correspondence, and the value of k is=i, hence the number of united points is =2m-2+2D; the united points are the points of contact of the tangents from O and (as special solutions) the cusps, and we have thus the relation n+K = 2m — 2+2D; or, writing D = \{m — i)(m — 2) — S — k, this is n = m(m — 1) — 2d — 3, which is right.*

The principle in its original form as applying to a right line was used throughout by Chasles in the investigations on the number of the conies which satisfy given conditions, and on the number of solutions of very many other geometrical problems.

There is one application of the theory of the (a, a′) correspond- ence between two planes which it is proper to notice.

Imagine a curve, real or imaginary, represented by an equation (involving, it may be, imaginary coefficients) between the Cartesian co-ordinates u, u′ ; then, writing u = x+iy, u′ —x′--iy′; the equation determines real values of (x, y), and of (x′, y′), corresponding to any given real values of (x′, y′) and (x, y) respectively ; that is, it establishes a real correspondence (not of course a rational one) between the points (x, y) and (x′ , y′) ; for example in the imaginary circle « 2 +tt′ 2 = (a+ii) 2 , the correspondence is given by the two equations x 2 — y 2 +x′ 2 — y′ 2 = a 2 — b 2 , xy-- x′y′ = ab. We have thus a means of geometrical representation for the portions, as well imagin- ary as real, of any real or imaginary curve. Considerations such as these have been used for

determining the series of values of the inde- pendent variable, and the irrational functions thereof in the theory of Abelian integrals, but the theory seems to be worthy of further investigation.

. 16. Systems Of Curves satisfying Conditions. — The researches of Chasles (Comptes Rendus, t. lviii., 1864, et seq.) refer to the conies which satisfy given conditions. There is an earlier paper by J. P. E. Fauque de Jonquieres, ” Theoremes generaux concernant les courbes geometriques planes d’un ordre quel- conque,” Liouv. t. vi. (1861), which establishes the notion of a system of curves (of any order) of the index N, viz. considering the curves of the order n which satisfy %n(n-- 3) — 1 conditions, then the index N is the number of these curves which pass through a given arbitrary point. But Chasles in the first of his papers (February 1864), considering the conies which satisfy four conditions, establishes the notion of the two characteristics (p., v) of such a system of conies, viz. /x is the number of the conies which pass through a given arbitrary point, and v is the number of the conies which touch a given arbitrary line. And he gives the theorem, a system of conies satisfying four conditions, and having the characteristics (p., v) contains iv—fi line-pairs (that is, conies, each of them a pair of lines), and 2/x— y point-pairs (that is, conies, each of them a pair of points, — coniques infiniment aplaties), which is a fundamental one in the theory. The char- acteristics of the system can be determined when it is known how many there are of these two kinds of degenerate conies in the system, and how often each is to be counted. It was thus that Zeuthen (in the paper Nyt Bydrag, ” Contribution to the Theory of Systems of Conies which satisfy four Conditions ” (Copenhagen, 1865), translated with an addition in the Nouvelles Annates) solved the question of finding the characteristics of the systems of conies which satisfy four conditions of contact with a given curve or curves; and this led to the solution of the further problem of finding the number of the conies which satisfy five conditions of contact with

a given curve or curves (Cayley, Comptes Rendus, t. lxiii., 1866; Collected Works, vol. v. p. 542), and ” On the Curves which satisfy given Conditions ” {Phil. Trans, t. clviii., 1868; Collected Works, vol. vi. p. 191).

It may be remarked that although, as a process of investigation, it is very convenient to seek for the characteristics of a system of conies satisfying 4 conditions, yet what is really determined is in every case the number of the conies which satisfy 5 conditions; the characteristics of the system (4^) of the conies which pass through i,p points are (5^), (4^, 1/), the number of the conies which pass through 5 points, and which pass through 4 points and touch 1 line: and so in other cases. Similarly as regards cubics, or curves of any other order: a cubic depends on 9 constants, and the elementary problems are to find the number of the cubics (gp), (Sp, il), &c, which pass through 9 points, pass through 8 points and touch 1 line, &c. ; but it is in the investigation con- venient to seek for the characteristics of the systems of cubics (8/>), &c, which satisfy 8 instead of 9 conditions.

The elementary problems in regard to cubics are solved very completely by S. Maillard in his These, Recherche des caracteristiques des systemes ilimenlaires des courbes planes du troisieme ordre (Paris, 1871). Thus, considering the several cases of a cubic

No. of consts.

1. With a given cusp 5

2. ,, cusp on given line 6

3. „ cusp , 7

4. ,, a given node 6

5. ,, node on given line 7

6. ,, node , . 8

he determines in every case the characteristics Ox, v) of the corresponding systems of cubics (4^), (3^, il), &c. The same problems, or most of them, and also the elementary problems in regard to quartics are solved by Zeuthen, who in the elaborate memoir " Almindelige Egenskaber, &c," Danish Academy, t. x. (1873), considers the problem in reference to curves of any order, and applies his results to cubic and quartic curves.

The methods of Maillard and Zeuthen are substantially identical; in each case the question considered is that of finding the characteristics (p., v) of a system of curves by consideration of the special or degenerate forms of the curves included in the system. The quantities which have to be considered are very numerous. Zeuthen in the case of curves of any given order establishes between the characteristics p, v, and 18 other quantities, in all 20 quantities, a set of 24 equations (equivalent to 23 independent equations), involving(besides the 20 quantities) other quantities relating to the various forms of the degenerate curves, which supplementary terms he determines, partially for curves of any order, but completely only for quartic curves. It is the discussion and complete enumeration of the special or degenerate forms of the curves, and of the supplementary terms to which they give rise, that the great difficulty of the question seems to consist; it would appear that the 24 equations are a complete system, and that (subject to a proper determina- tion of the supplementary terms) they contain the solution of the general problem.

17. Degeneration of Curves. — The remarks which follow have reference to the analytical theory of the degenerate curves which present themselves in the foregoing problem of the curves which satisfy given conditions.

A curve represented by an equation in point-co-ordinates may break up: thus if Pi, P 21 … be

rational and integral functions of the co-ordinates (x,y,z) of the orders m it mi. . . respectively, we have the curve Pi al P 2 a2 . . . =0, of the order m, — aimi-f-a 2 m 2 + . . . , composed of the curve Pi = o taken ai times, the curve P 2 = o taken a 2 times, &c.

Instead of the equation Pi al P 2 a2 … = 0, we may start with an equation « = o, where u is a function of the order m containing a parameter 8, and for a particular value say = o, of the parameter reducing itself to Pi al P 2 a2 . . . . Supposing indefinitely small, we have what may be called the penultimate curve, and when — o the ultimate curve. Regarding the ultimate curve as derived from a given penultimate curve, we connect with the ultimate curve, and consider as belonging to it, certain points called ” summits ” on the component curves Pi = o, P 2 = o respectively; a summit 2 is a point such that, drawing from an arbitrary point O the tangents to the penultimate curve, we have OS as the limit of one of these tangents. The ultimate curve together with its summits may be re- garded as a degenerate form of the curve u = o. Observe that the positions of the summits depend on the penultimate curve « = o, viz. on the values of the coefficients in the terms multiplied by 0, 2 ,... ; they are thus in some measure arbitrary points as regards the ultimate curve Pi al P 2 a2 … =0.

It may be added that we have summits only on the component curves Pi=o, of a multiplicity ai>i; the number of summits on such a curve is in general = (ai 2 -ai)mi 2 . Thus assuming that the penultimate curve is without nodes or cusps, the number of the tangents to it is = m 2 — m, = (aiWi + a 2 tn 2 -f…) 2 — (ai7»i+a 2 ?re 2 | . ■ .). Taking Pi = o to have 5i nodes and ki cusps, and therefore its class ni to be = Wi 2 — Wi— 281 — 3K1, &c, the expression for the number of tangents to the penultimate curve is

= (ai 2 -ai) «i’+ (a 2 2 -a 2)»z 2 2 + . . . + 2aia 2 raiW 2 f

+ Ol(» 1 -l-2Sl+3lC 1) + Os(»»2+2«2+3K2)+ • • •

where a term 2aia 2 mi?n 2 indicates tangents which are in the limit the lines drawn to the intersections of the curves Pi = o, P 2 = o each line 2

limit the proper tangents to Pi=o each aj times, the lines to its nodes each 2ai times, and the lines to its cusps each 301 times; the remainingterms (m 2 — aOW + W^ o 2)m 2 2 + . . . indicate tangents which are in the limit the lines drawn to the several summits, that is, we have (ai 2 — ai)mi 2 summits on the curve Pi= o, &c.

There is, of course, a precisely similar theory as regards line- co-ordinates; taking Hi, II2, &c, to be rational and integral func- tions of the co-ordinates (£, r\, f) we connect with the ultimate curve Ili'UIIa' 12 . _ .=0, and consider as belonging to it, certain lines, which for the moment may be called " axes " tangents to the component curves Ui = Oi, n 2 = o respectively. Considering an equation in point-co-ordinates, we may have among the component curves right lines, and if in order to put these in evidence we take the equation to be LiT 1 . . Pi al … =0, where Li = o is a right line, Pi = o a curve of the second or any higher order, then the curve will contain as part of itself summits not exhibited in this equation, but the correspond- ing line-equation will be iA 1 …!^ 1 =0, where Ai=o, . ..are the equations of the summits in question, IIi=o, &c., are the line- equations corresponding to the several point-equations Pi = o, &c; and this curve will contain as part of itself axes not exhibited by this equation, but which are the lines Li = 0, ... of the equation in point-co-ordinates.*

18. Twisted, Curves. — In conclusion a little may be said as to curves of double curvature, otherwise twisted curves or curves in space. The analytical theory by Cartesian co-ordinates was first considered by Alexis Claude CJairaut, Recherches sur

les courbes d double courbure (Paris, 1 73 1). Such a curve may be considered as described by a point, moving in a line which at the same time rotates about the point in a plane which at the same time rotates about the line; the point is a point, the line a tangent,' and the plane an osculating plane, of the curve; moreover the line is a generating line, and the plane a tangent plane, of a developable surface or torse, having the curve for its edge of regression. Analogous to the order and class of a plane curve we have the order, rank and class of the system (assumed to be a geometrical one), viz. if an arbitrary plane contains m points, an arbitrary line meets r lines, and an arbitrary point lies in n planes, of the system, then m, r, n are the order, rank and class respectively. The system has singularities, and there exist between m, r, n and the numbers of the several singu- larities equations analogous to Plucker's equations for a plane curve.

It is a leading point in the theory that a curve in space cannot in general be represented by means of two equations U=o, V=o; the two equations represent surfaces, intersecting in a curve; but there are curves which are not the complete intersection of any two surfaces; thus we have the cubic in space, or skew cubic, which is the residual intersection of two quadric surfaces which have a line in common; the equations U=o, V=o of the two quadric surfaces represent the cubic curve, not by itself, but together with the line.

Authorities. — In addition to the copious authorities mentioned in the text above, see Gabriel Cramer, Introduction & Vanalyse des lignes courbes algebriques (Geneva, 1750). Bibliographical articles are given in the Ency. der math. Wiss. Bd. iii. 2, 3 (Leipzig, 1902–1906) ; H. C. F. von Mangoldt, " Anwendung der Differential- und Integral- rechnung auf Kurven und Flachen," Bd. iii. 3 (1902) ; F. R. v. LiTien- th'al, " Die auf einer Flache gezogenen Kurven," Bd. iii. 3 (1902) ; G. W. Scheffers, " Besondere transcendente Kurven," Bd. iii. 3 (1903) ; H. G. Zeuthen, "Abzahlende M ethoden," Bd. iii. 2

(1906) ; L. Berzolari, ” Allgemeine Theorie der hoheren ebenen algebraischen Kurven,” Bd. iii. 2 (1906). Also A. Brill and M. Noether, ” Die Entwickelung der Theorie der algebraischen Funktionen in alterer und neuerer Zeit ” (Jahresb. der deutschen math, ver., 1894) ; E. Kotter, ” Die Entwickelung der synthetischen Geometrie ” {Jahresb. der –deutschen math, ver., 1898–1901); E. Pascal, Reperto rio di matematiche superiori, ii. ” Geometria ” (Milan, 1900) ; H. Wieleitner, Bibliographic der hoheren algebraischen Kurven fur den Zeitabschnitt von 1890–1804 (Leipzig, 1905).

Text–books: — G. Salmon, A Treatise on the Higher Plane Curves (Dublin, 1852, 3rd ed , 1879); translated into German by O. W. Fiedler, Analytische Geometrie der hoheren ebenen Kurven (Leipzig, 2te Aufl., 1882); L. Cremona, Introduzione ad una teoria geometrica delle curve piane (Bologna, 1861); J. H. K. Durege, Die ebenen Kurven dritter Ordnung (Leipzig, 1871); R. F. A. Clebsch and C. L. F. Lindemann, Vorlesungen iiber Geometrie, Band i. and h (Leipzig, 1875–1876); H. Schroeter, Die Theorie der ebenen Kurven dritter Ordnung (Leipzig, 1888); H. Andoyer, Lecons sur la theorie des formes et la geometrie analytique superieure (Paris, 1900) ; Wie- leitner, Theorie der ebenen algebraischen Kurven hoherer Ordnung (Leipzig, 1905). (A. Ca.; E. B. El.)

CURVILINEAR, in architecture, that which is formed by curved or flowing lines; the roofs over the domes and vaults of the Byzantine churches were generally curvilinear. The term is also given to the flowing tracery of the Decorated and the Flamboyant styles.

CURWEN, HUGH (d. 1 568) , English ecclesiastic and statesman, was a native of Westmorland, and was educated at Cambridge, afterwards taking orders in the church. In May 1533 he ex- pressed approval of Henry VIII. ‘s marriage with Anne Boleyn in a sermon preached before the king. In 1541 he became dean of Hereford, and in 1555 Queen Mary nominated him to the archbishopric of Dublin, and in the same year he was appointed lord chancellor of Ireland. He acted as one of the lords justices during the absence from

Ireland of the lord deputy, the earl of Sussex, in 1557. On the accession of Elizabeth, Curwen at once accommodated himself to the new conditions by declaring himself a Protestant, and was continued in the office of lord chancellor. He was accused by the archbishop of Armagh of serious moral delinquency, and his recall was demanded both by the primate and the bishop of Meath. In 1567 Curwen resigned the see of Dublin and the office of lord chancellor, and was appointed bishop of Oxford. He died on the 1st of November 1568.

See John Strype, Life and Acts of Archbishop Parker (3 vols., Oxford, 1824), and Memorials of Thomas Cranmer (2 vols., Oxford, 1840) ; John D'Alton. Memoirs of the Archbishops of Dublin (Dublin,

1838).

CURWEN, JOHN (1816–1880), English Nonconformist minister and founder of the Tonic Sol–Fa system of musical teaching, was born at Heckmondwike, Yorkshire, of an old Cumberland family. His father was a Nonconformist minister, and he himself adopted this profession, which he practised till 1864, when he gave it up in –order to devote himself to his new method of musical nomenclature, designed to avoid the use of the stave with its lines and spaces. He adapted it from that of Miss Sarah Ann Glover (1 785–1867) of Norwich, whose Sol–Fa system was based on the ancient gamut; but she omitted the constant recital of the alphabetical names of each note and the arbitrary syllable indicating key relationship, and also the recital of two or more such syllables when the same note was common to as many keys {e.g. " C, Fa, Ut," meaning that C is the subdominant of G and the tonic of C) . The notes were represented by the initials of the seven syllables, still in use in Italy and France as their names ■ but in the " Tonic Sol–Fa " the seven letters refer to key relation-ship and not to pitch. Curwen was led to feel the importance of a simple way of teaching how to sing by note by his experiences among Sunday–school teachers. Apart from Miss Glover, the same idea had been elaborated in France since J. J. Rousseau's

time, by Pierre Galin (1786–1821), Aime Paris (1798–1866) and Emile Cheve (1804–1864), whose method of teaching how to read at sight also depended on the principle of " tonic relation- ship " being inculcated by the reference of every sound to its tonic, by the use of a numeral notation. Curwen brought out his Grammar of Vocal Music in 1843, and in 1853 started the Tonic Sol–Fa Association; and in 1879, after some difficulties with the education department the Tonic Sol–Fa College was opened. Curwen also took to publishing, and brought out a periodical called the Tonic Sol–fa Reporter, and in his later life was occupied in directing the spreading organization of his system. He died at Manchester on the 26th of May 1880. His son John Spencer Curwen (b. 1847), who became principal of the Tonic Sol–Fa College, published Memorials of J. Curwen in 1882. The Sol–Fa system has been widely adopted for use in education, as an easily teachable method in the reading of music at sight, but its more ambitious aims, which are strenuously pushed, for providing a superior method of musical notation generally, have not recom- mended themselves to musicians at large.

CURZOLA (Serbo–Croatian Korcula or Karkar), an island in the Adriatic Sea, forming part of Dalmatia, Austria; and lying west of the Sabioncello promontory, from which it is divided by a strait less than 2 m. wide. Its length is about 25 m.; its average breadth, 4 m. Curzola {Korlula), the capital and

principal port, is a fortified town on the east coast, and occupies a rocky foreland almost surrounded by the sea. Besides the interesting church (formerly a cathedral), dating from the 12th or 13 th century, the loggia or council chambers, and the palace of its former Venetian governors, it possesses the noble mansion of the Arnieri, and other specimens of the domestic architecture of the

15th and 16th centuries, together with the massive walls and towers, erected in 1420, and the 15th-century Franciscan monastery, with its beautiful Venetian Gothic cloister. The main resources of the islanders are boat-building (for which they are celebrated throughout the Adriatic), fishing and sea- faring, the cultivation of the vine, corn and olives, and breeding of mules. Pop. (1900) of island, 17,377; of capital (town and commune), 6486. Prehistoric grave-mounds are common on the hills of the interior, and in later times Curzola may have been a Phoenician settlement. Its early history is very obscure, but it was certainly colonized by Greeks from Cnidus. The present name is a corruption of the Gr. Kkpicvpa MeXao'a, or Lat. Corcyra Nigra, "Black Corcyra "; and is perhaps due to the dark pines which still partly cover the island. In 998 Curzola first came under Venetian suzerainty. During the 1 2th century it was ruled by Hungary and Genoa in turn, and enjoyed a brief period of independence; but after 1255 its hereditary counts again submitted to Venice. The Roman Catholic see of Curzola, created in 1301, was only suppressed in 1806. Curzola surrendered to the Hungarians in 1358, was purchased by Ragusa (1413-1417), and finally declared itself subject to Venice in 1420. In 1 57 1 it defended itself so gallantly against the Turks that it obtained the designation fidelissima. From 1776 to 1797 it succeeded Lesina as the main Venetian arsenal in this region. During the Napoleonic wars it was ruled successively by Russians, French and British, ultimately passing to Austria in 1815.

CURZON OF KEDLESTON, GEORGE NATHANIEL, ist Baron (1859-), English statesman, eldest son of the 4th baron Scarsdale, rector of Kedleston, Derbyshire, was born on the nth of January 1859, and was educated at Eton and Balliol College, Oxford. At Oxford he was president of the Union, and after a brilliant university career was elected a fellow of All Souls College in 1883. He became assistant private secretary to Lord Salisbury in 1885, and in 1886 entered parliament as member for the Southport

division of S.W. Lancashire. He was appointed under secretary for India in 189 1- 189 2 and for foreign affairs in 1895-1898. In the meantime he had travelled in Central Asia, Persia, Afghanistan, the Pamirs, Siam, Indo-China and Korea, and published several books describing central and eastern Asia and the political problems connected with those regions. In 1895 he married Mary Victoria Leiter (d. 1906), daughter of a Chicago millionaire. In January 1899 he was appointed governor- general of India, where his extensive knowledge of Asiatic affairs showed itself in the inception of a strong foreign policy, while he took in hand the reform of every department of Indian admini- stration. He was created an Irish peer on his appointment, the creation taking this form, it was understood, in order that he might remain free during his father's lifetime to re-enter the House of Commons. Reaching India shortly after the sup- pression of the frontier risings of 1897-98, he paid special attention to the independent tribes of the north-west frontier, inaugurated a new province called the North West Frontier Province, and carried out a policy of conciliation mingled with firmness of control. The only trouble on this frontier during the period of his administration was the Mahsud Waziri campaign of 1 901. Being mistrustful of Russian methods he exerted himself to encourage British trade in Persia, paying a visit to the Persian Gulf in 1903; while on the north-east frontier he anticipated a possible Russian advance by the Tibet Mission of 1903, which rendered necessary the employment of military force for the protection of the British envoys. The mission, which had the ostensible support of China as suzerain of Tibet, penetrated to Lhasa, where a treaty was signed in September 1904. In pursuance of his reforming policy Lord Curzon appointed a number of commissions to inquire into Indian education, irriga- tion, police and other branches of administration, on whose

reports legislation was based during his second term of office as viceroy. With a view to improving

British relations with the native chiefs and raising the character of their rule, he estab- lished the Imperial Cadet corps, settled the question of Berar with the nizam of Hyderabad, reduced the salt tax, and gave relief to the smaller income-tax payers. Lord Curzon exhibited much interest in the art and antiquities of India, and during his viceroyalty took steps for the preservation and restoration of many important monuments and buildings of historic interest. In January 1903 he presided at the durbar held at Delhi in honour of the coronation of King Edward VII. It was attended by all the leading native princes and by large numbers of visitors from Europe and America; and the magnificence of the spectacle surpassed anything that had previously been witnessed even in the gorgeous ceremonial of the East. On the expiration of his first term of office, Lord Curzon was reappointed governor-general. His second term of office was marked by the passing of several acts founded on the recommendations of his previous commissions, and by the partition of Bengal (1905), which roused bitter opposition amongst the natives of that province. A differ- ence of opinion with the commander-in-chief, Lord Kitchener, regarding the position of the military member of council in India, led to a controversy in which Lord Curzon failed to obtain support from the home government. He resigned (1904) and returned to England. In 1904 he was appointed lord warden of the Cinque Ports; in the same year he was given the honorary degree of D.C.L. by Oxford University, and in 1908 he was elected chancellor of the university. In the latter year he was elected a representative peer for Ireland, and thus relinquished any idea of returning to the House of Commons. In 1909-1910 he took an active part in defending the House of Lords against the Liberals. Lord Curzon's publications include Russia in Central Asia (1889); Persia and the Persian Question (1892); Problems of the Far East (1894; new ed., 1896).

See Caldwell Lipsett, Lord Curzon in India, 1898-190J (1906) ; and C. J. O'Donnell, The Failure cf Lord Curzon (1903).

CUSANUS, NICOLAUS (Nicholas of Cusa) (1401–1464), cardinal, theologian and scholar, was the son of a poor fisherman named Krypffs or Krebs, and derived the name by which he is known from the place of his birth, Kues or Cusa, on the Moselle, in the archbishopric of Trier (Treves). In his youth he was employed in the service of Count Ulrich of Manderscheid, who, seeing in him evidence of exceptional ability, sent him to study at the school of the Brothers of the Common Life at Deventer, and afterwards at the university of Padua, where he took his doctor's degree in law in his twenty-third year. Failing in his first case he abandoned the legal profession, and resolved to take holy orders. After filling several subordinate offices he became archdeacon of Liege. He was a member of the council of Basel, and dedicated to the assembled fathers a work entitled De concordantia Catholica, in which he maintained the superiority of councils over popes, and assailed the genuineness of the False Decretals and the Donation of Constantine. A few years later, however, he had reversed his position, and zealously defended the supremacy of the pope. He was entrusted with various missions in the interests of Catholic unity, the most important being to Constantinople, to endeavour to bring about a union of the Eastern and Western churches. From 1440 to 1447 he was in Germany, acting as papal legate at the diets of 1441, 1442, 1445 and 1446. In 1448, in recognition of his services, Nicholas V. raised him to the cardinalate; and in 1450 he was appointed bishop of Brixen against the wish of Sigismund, archduke of Austria, who opposed the reforms the new bishop sought to introduce into the diocese. In 145 1 he was sent to Germany and the Netherlands to check ecclesiastical abuses and bring back the monastic life to the original rule of poverty, chastity and obedience — a mission which he discharged with well-tempered firmness. Soon afterwards his dispute with the arch- duke Sigismund in his own diocese was brought to a point by his claiming certain dues of the bishopric, which the temporal prince had appropriated. Upon this the bishop was imprisoned by the archduke, who, in his turn, was excommunicated

by the pope.

These extreme measures were not persisted in; but the dispute remained unsettled at the time of the' bishop's death, which occurred at Lodi in Umbria on the nth of August 1464. In 1459 he had acted as governor of Rome during the absence of his friend Pope Pius II. at the assembly of princes at Milan; and he wrote his Crebratio Alcorani, a treatise against Mahom- medanism, in support of the expedition against the Turks proposed at that assembly. Some time before his death he had founded a hospital in his native place for thirty-three poor persons, the number being that of the years of the earthly life of Christ. To this institution he left his valuable library.

Although one of the great leaders in the reform movement of the 15th century, Nicholas of Cusa's interest for later times lies in his philosophical much more than in his political or ecclesi- astical activity. As in religion he is entitled to be called one of the " Reformers before the Reformation," so in philosophy he was one of those who broke with scholasticism while it was still the orthodox system. In his principal work, De docta ignorantia (1440), supplemented by De conjecturis libri duo published in the same year, he maintains that all human knowledge is mere conjecture, and that man's wisdom is to recognize his ignorance. From scepticism he escapes by accepting the doctrine of the mystics that God can be apprehended by intuition (inluitio, speculatio), an exalted state of the intellect in which all limitations disappear. God is the absolute maximum and also the absolute minimum, who can be neither greater nor less than He is, and who comprehends all that is or that can be (" deum esse omnia, ut non possit esse aliud quam est "). Cusanus thus laid himself open to the charge of pantheism, which did not fail to be brought against him in his own day. His chief philosophical doctrine

was taken up and developed more than a hundred years later by Giordano Bruno, who calls him the divine Cusanus. In mathematical and physical science Cusanus was much in advance of his age. In a tract, Reparatio Calendarii, presented to the council of Basel, he proposed the reform of the calendar after a method resembling that adopted by Gregory. In his De Quadratures Circuit he professed to have solved the problem; and in his Conjectura de novissimis diebus he prophesied that the world would come to an end in 1734. Most noteworthy, however, in this connexion is the fact that he anticipated Copernicus by maintaining the theory of the rotation of the earth.

The works of Cusanus were published in a complete form by Henri Petrie (1 vol. fol., Basel, 1565). See F. A. Scharpff's Der Kardinal und Bischof Nikolaus von Cusa als Reformator in Kirche, Reich, und Philos. des 75. Jahrhund. (Tubingen, 1871); J. M. Dux, Der deutsche Kurd. Nicolaus von Cusa und die Kirche seiner Zeit (Regensburg, 1848); R. Falckenberg, Grundziige d. Philos. d. Niko- laus Cusanus (Breslau, 1880) and Aufgabe und Wesen d. Erkenntniss bei Nikolaus von Kues (Breslau, 1880); T. Stumpf, Die politischen Ideen des Nikolaus von Cues (Cologne, 1865) ; M. Glossner, Nikolaus von Cusa und Marius Nizolius als Vorldufer der neueren Philo- sophie (Miinster, 1891); F. Fiorentino, II Risorgimento filosofico nel quattro cento (Naples, 1885); Axel Herrlin, Studier i Nicolaus af Cues' Filosofi (Lund, 1892); H. Hoffding, Hist, of Mod. Phil. (Eng. trans., 1900), bk. i. chap. x. ; F. J. Clemens, Giordano Bruno und Nikolaus Cusanus (Bonn, 1847); R. Zimmermann, Der Card. Nikolaus Cusanus als Vorldufer Leibnitzens (Vienna, 1852); J. Ubinger, Philosophic des Nikolaus Cusanus (Wiirzburg, 1881); art. by R. Schmid in Herzog-Hauck, Realencyk. s.v. "Cusanus"; see also Mysticism.

CUSH, the eldest son of Ham, in the Bible, from whom seems to have been derived the name of the " Land of Cush," commonly rendered " Ethiopia " by the Septuagint and by the Vulgate. The locality of the land of Cush has long been a much-vexed question.

Bochart maintained that it was exclusively in Arabia; Schulthess and Gesenius held that it should be sought for nowhere but in Africa (see Ethiopia). Others again, like Michaelis and Rosenmiiller, have supposed that the name Cush was applied to tracts of country both in Arabia and in Africa, but the defective condition of the ancient knowledge of countries and peoples, as also the probability of early migrations of ” Cushite ” tribes (carrying with them their name), will account for the main facts. The existence of an African Cush cannot reasonably be questioned, though the term is employed in the Old Testament with some latitude. The African Cush covers Upper Egypt, and extends

southwards from the first cataract (Syene, Ezek. xxix. 10). That the term was also applied to parts of Arabia is evident from Gen. x. 7, where Cush is the ” father ” of certain tribal and ethnical designations, all of which point very clearly to Arabia, with the very doubtful exception of Seba, which Josephus {Ant. ii. 10. 2) identifies with Meroe. 1 Even in the 5th century a.d. the Himyarites, in the south of Arabia, were styled by Syrian writers Cushaeans and Ethiopians. Moreover, the Babylonian inscriptions mention the Kashshi, an Elamite race, whose name has been equated with the classical Kocrcratot, Ktcrcrioi, and it has been held that this affords a more appropriate explanation of Cush (perhaps rather Kash) , the ancestor of (the Babylonian) Nimrod in Gen. x. 8. Although decisive evidence is lacking, it seems extremely probable that several references to Cush in the Old Testament cannot refer to Ethiopia, despite the likelihood that considerable confusion existed in. the minds of early writers. The Cushite invasion in 2 Chron. xiv. (see Asa) is intelligible if the historical foundation for the story be a raid by Arabians, but in xvi. 8 the inclusion of Libyans shows that the enemy was subsequently supposed to be African. In several passages the interpretation is bound up with that of Mizraim (q.v.), and depends in general upon the question whether Ethiopia at a given time enjoyed the prominence given to it.

On Num. xii. 1 see Jethro; and consult H. Winckler, Keil. u. das alte Test., 3rd ed., p. 144 sq., and Im Kampfe um den alten Orient, ii. pp. 36 seq., and the literature cited under Mizraim. (S. A. C.)

CUSHING, CALEB (1800–1879), American political leader and lawyer, was born in Salisbury, Massachusetts, on the 17 th of January 1800. He graduated at Harvard in 181 7, was tutor in mathematics there in 1820–1821, was admitted to practice in the court of common pleas in December 1821, and began the practice of law in Newburyport, Mass., in 1824. After serving, as a Democratic-Republican, in the state house of representatives in 1825, in the state senate in 1826, and in the house again in 1828, he spent two years, from 1829 to 1831, in Europe, again served in the state house of representatives in 1833 and 1834, and in the latter year was elected by the Whigs a representative in Congress. He served in this body from 1835 until 1843, and here the marked inconsistency which characterized his public life became manifest; for when John Tyler had become president, had been ” read out ” of the Whig party, and had vetoed Whig measures (including a tariff bill), for which Cushing had voted, Cushing first defended the vetoes and then voted again for the bills. In 1843 President Tyler nominated him for secretary of the treasury, but the senate refused to confirm him for this office. He was, however, appointed later in the same year commissioner of the United States to China, holding this position until 1845, and in 1844 negotiating the first treaty between China and the United States. In 1847, while again a representative in the state legislature, he introduced a bill appropriating money for the equipment of a regiment to serve in the Mexican War; although the bill was defeated, he raised the necessary funds privately, and served in Mexico first as colonel and afterwards as brigadier-general of volunteers. In 1847 and again in 1848 the Democrats nominated him for governor of Massachusetts, but on each occasion he was defeated at the polls. He was again a representative in the state legislature in 185 1,

became an associate justice of the supreme court of Massachusetts in 1852, and during the administration (1853-1857) of President Pierce, was attorney-general of the United States. In 1858, 1859, 1862 and 1863 he again served in the state house of representatives. In i860 he presided over the National Democratic Convention which met first at Charleston and later at Baltimore, until he joined those who seceded from the regular convention; he then presided also over the convention of the seceding delegates, who nominated John C. Breckinridge for the presidency. During the Civil War, however, he supported the National Administration. At the Geneva conference for the settlement of the " Alabama " claims in 1871-1872 he was one of the counsel for the United States.

1 For Seba, see Sabaeans, and cf. generally the commentaries on Gen. x. 7. In Hab. iii. 7 Cushan (obviously a related form) is parallel to Midian.

In 1873 President Grant nominated him for chief justice of the United States, but in spite of his great learning and eminence at the bar, his ante-war record and the feeling of distrust ex- perienced by many members of the senate on account of his inconsistency, aroused such vigorous opposition that his nomina- tion was soon withdrawn. From 1874 to 1877 Cushing was United States minister to Spain. He died at Newburyport, Mass., on the 2nd of January 1879. He published History and Present State' of the Town of Newburyport, Mass. (1826); Review of the. late Revolution in France (1833); Reminiscences of Spain (1833); Oration on the Growth and Territorial Pro- gress of the United States (1839); Life and Public Services of William H. Harrison (1840); and The Treaty of Washington

(1873)-

CUSHING, WILLIAM BARKER (1842-1874), American naval

officer, was born in Delafield, Wisconsin, on the 4th of November 1842. He entered the Naval Academy from New York in 1857, but resigned in March 1861. When, however, the Civil War began, he volunteered into the navy, was rated acting master's mate, and became a midshipman in October 1861, and alieutenant in July 1862, serving in the North Atlantic blockading squadron. The work of blockade, and of harassing the Confederates on the coast and the rivers of the Atlantic seaboard, called for much service in boats, and entailed a great deal of exposure. Cushing was distinguished by his readiness to volunteer, his indefatig- ability, and by his good fortune, the reward of vigilance and intelligence. The feat by which he will be remembered was the destruction of the Confederate ironclad " Albemarle " in the Roanoke river on the 27th of October in 1864. The vessel had done much damage to the Federal naval forces, and her destruc- tion was greatly desired. She was at anchor surrounded by baulks of timber, and a cordon of boats had been stationed to row guard against an expected Federal attack. Lieutenant Cushing undertook the attack on her with a steam launch carrying a spar-torpedo and towing an armed cutter. He eluded the Confederate lookout and reached the " Albemarle " unseen. When close to he' was detected, but he had time to drive the steam launch over the baulks and to explode thetorpedo against the " Albemarle " with such success that a hole was made in her and she sank. Cushing's own launch was destroyed. He and the few men with him were compelled to take to the water; one was killed, another was drowned, Cushing and one other escaped, and the rest were captured. Cushing himself swam to the swamps on the river bank, and after wading among them for hours reached a Federal picket boat. For destroying the " Albemarle " he was thanked by Congress and was promoted to be lieutenant- commander. On the 15th of January 1865 he took a conspicuous part in the land attack on the sea-front wall of Fort Fisher. After the war he commanded the " Lancaster" (1866-1867) and the " Maumee " (1868-1869) in the Asiatic Squadron. In 1872 he was

promoted commander at what was an exceptionally early age, but he died on the 17th of December 1874 of brain fever. He had suffered extreme pain for years before his death, and in fact broke down altogether under disease contracted in the discharge of his duty.

CUSHION (from O. Fr. coisson, coussin; according to the New English Did., from Lat. coxa, a hip; others say from Lat. culcita, a quilt), a soft bag of some ornamental material, stuffed with wool, hair, feathers, or even paper torn into fragments. It may be used for sitting or kneeling upon, or to soften the hardness or angularity of a chair or couch. It is a very ancient article of furniture, the inventories of the contents of palaces and great houses in the early middle ages constantly making mention of it. It was then often of great size, covered with leather, and firm enough to serve as a seat, but the steady tendency of all furniture has been to grow smaller. It was, indeed, used as a seat, at all events in France and Spain, at a very much later period, and in Saint-Simon's time we find that at the Spanish court it was still regarded as a peculiarly honourable substitute for a chair. In France the right to kneel upon a cushion in church behind the king was jealously guarded and strictly regulated, as we may learn again from Saint-Simon. This type of cushion was called

a carreau or square. When seats were rude and hard the cushion may have been a necessity; it is now one of the minor luxuries of life.*

The term " cushion " is given in architecture to the sides of the Ionic capital. It is also applied to an early and simple form of the Romanesque capitals of Germany and England, which consist of cubical masses, square at the top and rounded off at the four corners, so as to reduce the lower diameter to a circle of the same size as the shaft.

CUSHMAN, CHARLOTTE SAUNDERS (1816-1876), American actress, was born in Boston, Massachusetts, on the 23rd of July 1816. Her father, a West India

merchant, left his family in straitened circumstances, and Charlotte, who had a fine contralto voice, went on the operatic stage. In 1 83 5 she successfully appeared at the Tremont theatre as the countess Almaviva in The Marriage of Figaro. But her singing voice failing her she entered the drama, and played Lady Macbeth in the same year. She then engaged herself as a stock actress, but was soon given leading parts. In 1842 she managed and played in the Walnut Street theatre in Philadelphia. She accompanied Macready on an American tour, winning a great reputation in tragedy, and in 1845 and in 1854–1855 she fulfilled successful engagements in London. She was a keen student, and acquired a large range of classic roles. Her best parts were perhaps Lady Macbeth and Queen Katherine, her most popular Meg Merrilies, in a dramatiza- tion of Scott's Guy Mannering. Her figure was commanding and her face expressive, and she was animated by a temperament full of vigour and fire. These qualities enabled her to play with success such male parts as Romeo and Cardinal Wolsey. During her later years Miss Cushman worked hard as a dramatic reader, in which capacity she was much appreciated. Her last appear- ance on the stage took place on the 15th of May 1875, at the Globe theatre, Boston, in which city she died on the 18th of February 1876.

See Emma Stebbins's Charlotte Cushman, her Letters and Memories of her Life (Boston, 1878) ; H. A. Clapp's Reminiscences of a Dramatic Critic (Boston, 1902) ; and W. T. Price, A Life of Charlotte Cushman (New York, 1894).

CUSP (Lat. cuspis, a spear, point) , a projecting point, or pointed end. In architecture (Fr. feuille, Ital. cuspide, Ger. Knopf e), a cusp is the point where the foliations of tracery intersect. The earliest example of a plain cusp is probably that at Pytha- goras school, at Cambridge, — of an ornamented cusp at Ely cathedral, where a small roll, with a rosette at the end, is formed at the termination of a cusp. In the later styles the terminations of the cusps were more richly decorated; they also sometimes terminate not only in

leaves or foliages, but in rosettes, heads and other fanciful ornaments. The term " feathering " is used of the junction of the foliated cusps in window tracery, but is usually restricted to those cases where it is ornamented with foliage, &c.

*CUSTARD 1 APPLE, a name applied to the fruit of various species of the genus Anona, natural order Anonaceae. The members of this genus are shrubs or small trees having alternate, exstipulate leaves, and flowers with three small sepals, six petals arranged in a double row and numerous stamens. The fruit of A. reticulata, the common custard apple, or " bullock's heart " of the West Indies, is dark brown in colour, *and marked with depressions, which give it a quilted appearance; its pulp is reddish-yellow, sweetish and very soft (whence the name); the kernels of the seeds are said to be poisonous. The sour-sop is the fruit of A . muricata, native of the West Indies. The plant, which is a small tree, has become naturalized in some parts of India where it is extensively cultivated, as elsewhere in the tropics. It is covered with soft prickles, is of a light-greenish hue, and has a peculiar but agreeable sour taste, and a scent resembling that of black currants. The sweet-sop is produced by A . squa-mosa, also a native of the West Indies and widely cultivated*

1 The term " custard," now given to a dish made with eggs beaten up with milk, &c, and either served in liquid form or baked to a stiff consistency, originally denoted a kind of open pie. It represents the older form " crustade," Fr. croustade, Ital. crostata, from crostare, to encrust.

in the tropics. It is known as the custard apple by Europeans in India. It is an egg-shaped fruit, with a thick rind and luscious pulp. An acrid principle, fatal to insects, is contained in its seeds, leaves and unripe fruits, which, powdered and mixed with

the flour of gram (Cicer arietinum), are used to destroy vermin. A. Cherimolia yield the Peruvian cherimoyer, which is held to be a fruit of very superior flavour, and is much esteemed by the Creoles. A. palustris, alligator apple, or cork-wood, a native of South America and the West Indies, is valued for its wood, which serves the same purposes as cork; the fruit, commonly known as the alligator-apple, is not eaten, being reputed to contain a dangerous narcotic principle.

CUSTER, GEORGE ARMSTRONG (1839-187.6), American cavalry soldier, was born in New Rumley, Harrison county, Ohio, on the 5th of December 1839. He graduated from West Point in 1861, and was at once sent to the theatre of war in Virginia, joining his regiment on the battlefield of Bull Run. Afterwards he served on the staff of General Kearny, and on that of General W. F. Smith in the Peninsular Campaign. His daring and energy, and in particular a spirited reconnaissance on the Chickahominy river, brought him to the notice of General McClellan, who made him an aide-de-camp on his own staff, with the rank of captain. A few hours afterwards Custer attacked a Confederate picket post and drove back the enemy. He continued to serve with McClellan until the general was relieved of his command, when Custer returned to duty with his regiment as a lieutenant. Early in 1863 General Pleasonton selected him as his aide-de-camp, and in June 1863 Custer was promoted to the rank of brigadier-general of volunteers. He distinguished himself at the head of the Michigan cavalry brigade in the battle of Gettysburg, and frequently did good service in the remaining operations of the campaign of 1863. When the cavalry corps of the Army of the Potomac was reorganized under Sheridan in 1864, Custer retained his command, and took part in the various actions of the cavalry in the Wilderness and Shenandoah campaigns. At the end of September 1864, he was appointed to command a division, and on the 9th of October fought, along with General Merritt, the brilliant cavalry action called the battle of Woodstock. Soon afterwards he was made brevet-major-

general, U.S.V., having already won the brevets of major, lieutenant-colonel and colonel U.S.A., for his services at Gettysburg, Yellow Tavern and Winchester. His part in the decisive battle of Cedar Creek (q.v.) was most conspicuous. He served with Sheridan in the last great cavalry raid, won the action of Waynesboro, and in the final campaign added to his laurels by his conduct at Dinwiddie and Five Forks, and in 6ther operations. At the close of the war he received the brevets of brigadier and major-general in the regular army, and was promoted major-general of volunteers. In 1866 Custer was made lieutenant-colonel of the 7th U.S. Cavalry, and took part under General Hancock in the expedition against the Cheyenne Indians, upon whom he inflicted a crushing defeat at Washita river on the 27th of November 1868. In 1873 he was sent to Dakota Territory to serve against the Sioux.

In 1876 an expedition, of which Custer and his regiment formed part, was made against the Sioux and their allies. As the advanced guard of the troops under General Terry, Custer's force arrived at the junction of Big Horn and Little Big Horn rivers, in what is now the state of Montana, on the night of June 24; the main body was due to join him on the 26th. Unfortunately, the presence of what was judged to be a small isolated force of Indians was reported to the general. On the 25th, dividing his regiment into three parties, he moved forward to surround this force. But instead of meeting only a small force of Indians, the 7th were promptly attacked by the full forces of the enemy. The flanking columns maintained themselves with difficulty until Terry came up. Custer and 264 men of the centre column rode into the midst of the enemy and were slaughtered to a man.

The general's wife, Elizabeth Bacon Custer, who accom- panied him in many of his frontier expeditions, wrote Boots and Saddles, Life with General Custer in Dakota (1885), Tenting on the

Plains (1887) and Following the Guidon (1891). General Custer himself wrote My Life on the Plains

(1874).

See F. Whittaker, Life of General George A. Custer (1876).

His brother Thomas Ward Custer (1845–1876), in spite of his youth, fought in the early campaigns of the Civil War. Be- coming aide-de-camp to General Custer, he accompanied him throughout the latter part of the war, distinguishing himself by his daring on all occasions, and winning successively the brevets of captain, major and lieutenant-colonel, though he was barely twenty years of age when the war ended. He was first lieutenant in the 7th cavalry when he fell with his brother at the Little Big Horn.

CUSTINE, ADAM PHILIPPE, Comte de (1740–1793), French general, began his military career in the Seven Years' War. He next served with distinction against the English in the War of American Independence. In 1789 he was elected to the states-general by the bailliage of Metz. In October 1791 he again joined the army, with the rank of lieutenant-general and became popular with the soldiers, amongst whom he was known as " general moustache." General-in-chief of the army of the Vosges, he took Spires, Worms, Mainz and Frankfort in September and October 1792. He carried on the revolutionary propa- ganda by proclamations, and levied heavy taxes on the nobility and clergy. During the winter a Prussian army forced him to evacuate Frankfort, re-cross the Rhine and fall back upon Landau. He was accused of treason, defended by Robespierre, and sent back to the army of the north. But he dared not take the offensive, and did nothing to save Conde, which the Austrians were besieging. Sent to Paris to justify himself, he was found guilty by the Revolutionary Tribunal of having intrigued with the enemies of the republic, and guillotined on the 28th of August 1793. (See French Revolutionary Wars.)

See A. Rambaud, Les Francais sur le Rhin (Paris, 1880) ; A. Chuquet, Les Guerres de la Revolution (1886–1895; vol. vi. " L'Ex- pedition de Custine ").

CUSTOM (from O. Fr. custume, costume or coustume; Low Lat. costuma, a shortened form of consuetudo), in general, a habit or practice. Thus a tradesman calls those who deal with him his ” customers,” and the trade resulting as their ” custom.” The word is also used for a toll or tax levied upon goods; there was at one time a distinction between the tax on goods exported or imported, termed magna custuma (the great custom), and that on goods taken to market within the realm, termed parva custuma (the little custom), but the word is now used in this sense only in the plural, to signify the duties levied upon imported goods. It is also used as a name for that department of the public service which is employed in levying the duty.

In law, such long-continued usage as has by common consent become a rule of conduct is termed custom. Jessel, M. R. (Hamtnerton v. Honey, 24 W. R. 603), has defined it as ” local common law. It is common law because it is not statute law; it is local law because it is the law of a particular place, as distin- guished from the general common law. Local common law is the law of the country (i.e. particular place) as it existed before the time of legal memory.” There has been much discussion among jurists as to whether custom can properly be reckoned a source of law (see Jurisprudence). As to the distinction between prescription (which is a personal claim) and custom, see Prescription. The adoption of local customs by the judiciary has undoubtedly been the origin of a great portion of the English common law. Blackstone divides custom into (1) general, which is the common law properly so called, and (2) particular, which affects only the inhabitants of particular districts. The requisites necessary to make a particular custom good are: (1) it must have been used so long that the memory of man runneth not to the contrary; (2) it must have been continued, and (3) enjoyed peaceably; (4) it must be reasonable, and (5) certain; (6) it must be compulsory, and not left to the option of every man whether he will use it or no; (7) it must be con- sistent with other customs,

for one custom cannot be set up in opposition to another. Customs may be of various kinds, for example, customs of merchants, customs of a certain district

(such as gavelkind and borough English), customs of a particular manor, &c. The word custom is also generally employed for the usage of a particular trade or market; for a trade, custom to be established to the satisfaction of the law it must be a uniform and universal practice so well defined and recognized that con- tracting parties must be assumed to have had it in their minds when they contracted (Russell, C. J., Fox-Bourne v. Vernon, 10 Times Rep. 649).

In the history of France the term " custom " was given to those special usages of different districts, which had grown up into a body of local law, as the '■ custom of Paris," the. " custom of Normandy" (see France: Law and Institutions) .

CUSTOMARY FREEHOLD, in English law, a species of tenure which may be described as a variety of copyhold. It is also termed privileged copyhold or copyhold of frank tenure. It is a tenure by copy of court roll, but not expressed to be at the will of the lord. It is, in fact, only a superior kind of copyhold, and the freehold is in the lord. It is subject to the general law of copyholds, except where the law may be varied by the custom of the particular manor. (See Copyhold.)

CUSTOM-HOUSE, the house or office appointed by a govern- ment where the taxes or duties (if any) are collected upon the importation arid exportation of commodities; where duties, bounties or drawbacks payable or receivable upon exportation or importation are paid or received, and where vessels are entered and cleared. In the United Kingdom there is usually a custom- house established at every port

or harbour to which any consider- able amount of shipping resorts, the officer in charge being called " collector of customs "; in the minor ports the officer is usually termed " superintendent of customs " or " principal coast officer."

CUSTOMS DUTIES, the name given to taxeg on the import and export of commodities. They rank among the most ancient; as they continue to prevail as one of the most common modes, in all countries, of levying revenue for public purposes. In an insular country like the United Kingdom customs duties came in process of time to be levied only or chiefly in the seaports, and thus applied only to the foreign commerce, where they may be brought under the control of fair and reasonable principles of taxation. But this simplification of customs duties was only reached by degrees; and during a long period special customs were levied on goods passing between England and Scotland; and the trade of Ireland with Great Britain and with foreign countries was subjected to fiscal regulations which could not now stand in the light of public reason. The taxes levied, on warrant of some ancient grant or privilege, upon cattle or goods at a bridge or a ferry or other point of passage from one county or province to another, of which there are some lingering remains even in the United Kingdom, and those levied at the gates of cities on the produce of the immediate country — a not uncommon form of municipal taxation on the European continent — are all of the nature of customs dues. It is from the universality of this practice that the English term " customs " appears to have been derived.

See Taxation; Protection; Tariff.

CUSTOS ROTULORUM, the keeper of the English county records, and by virtue of that office the, highest civil officer in the county. The appointment until 1545 lay with the lord chancellor, but is now exercised by the crown under the royal sign-manual, and is usually held by a person of rank, most frequently the lord-lieutenant of the county. He is one of the justices of the peace. In practice the

records are in the custody of the clerk of the peace. This latter official was, until i888>, appointed by the custos rotulorum, but since the passing of the Local Government Act of that year, the appointment is made by the standing joint-committee of the county council. Lambarde described the custos rotulorum as a " man for the most part especially picked out either for wisdom, countenance or credit."

CUSTOZZA, a village of Italy, in the province of Verona, 11 m. S.W. of Verona, famous as the scene of two battles between the Austrians and the Italians in the struggle for Italian unity. The first battle of Custozza was fought on the 23rd-2Sth of July

1848, the Austrians commanded by Field-Marshal Radetzky being victorious over the Piedmontese army under King Charles Albert. The second battle was fought on the 24th of June 1866, and resulted in the complete victory of the Austrians under the archduke Albert, over the Italian army of King Victor Emmanuel I. (See Italian Wars, 1848-1870.)

CUSTRIN, or Kusxrin, a town of Germany, in the kingdom of Prussia, a fortress of the first rank, at the confluence of the Oder and Warthe, 18 m. N.E. from Frankfort-on-Oder and 51m. N.E. of Berlin by rail. Pop. (1900) 16,473 (including the garrison). It consists of the town proper within the strong fortifications, a suburb on the left bank of the Oder, and one on the right bank of the Warthe. There are three Evangelical churches and one Roman Catholic, and a handsome town hall. There are bridges over both rivers. Ciistrin has some manufactories of potato- meal, machinery, pianos, furniture, cigars, &c, and there is a considerable river trade.

About 1250 a town was erected on the site of Ciistrin, where a fishing village originally stood. From 1535 till 1571 it was the residence of John, margrave of Brandenburg-Ciistrin, who died without male heirs in 157 1. Ciistrin was the prison of Frederick the Great when crown-prince, and the scene

of the execution of his friend Hans Hermann von Katte on the 6th of November

i73°-

■ *CUTCH, or Kach, a native state of India within the Gujarat division of Bombay* with an area of 7616 sq. m. It is a peninsular tract of land, enclosed towards the W. by the eastern branch of the Indus, on the S. by the Indian Ocean and the Gulf of Cutch, and on the N. and E. towards the interior, by the great northern Runn, a salt morass or lake. The interior of Cutch is studded with hills of considerable elevation, and a range of mountains runs through it from east to west, many of them of the most fantastic shapes, with large isolated masses of rock scattered in all directions, The general appearance of Cutch is barren and uninteresting. The greater part is a rock destitute of soil, and presenting the wildest aspect; the ground is cold, poor and sterile; and the whole face of the country bears marks of volcanic action. From the violence of tyranny, and the rapine of a dis- orderly banditti, by which this district long suffered, as well as from shocks of earthquakes, the villages have a ruinous and dilapi- dated appearance ; and, With the exception of a few fields in their neighbourhood, the country presents a rocky and sandy waste, with in many places scarcely a show of vegetation. Water is scarce and brackish, and is chiefly found at the bottom of low ranges of hills, which abound in some parts; and the inhabitants of the extensive sandy tracts suffer greatly from the want of it. Owing to the uncertainty of the periodical rains in Cutch, the country is liable to severe famines, and it has suffered greatly from plague.*

The temperature of Cutch during the hot season is high, the thermometer frequently rising to ioo° or 105° F.; and in the months of April and May clouds of dust and sand, blown about by hurricanes, envelop the houses, the glass windows scarcely affording any protection. The influence of the monsoon is greatly moderated before it reaches this region, and the

rains sometimes fail altogether. Bhuj, the capital of the state, is situated inland, and is surrounded by an amphitheatre of hills, some of which approach within 3 or 4 m. of the city. The hill of Bhuja, on which the fort is situated, rises to the height of 500 ft. in the middle of the plain, and is detached from other high ground. The residency is 4 m. distant in a westerly direction. There are many mountain streams, but no navigable rivers. They contain scarcely any water except in the rainy season, when they are very full and rapid, and discharge themselves into the Runn, all along the coast of which the wells and springs are more or less impregnated with common salt and other saline ingredients. Various causes have contributed to thin the population of this country. In 1813 it was ravaged by a famine and pestilence, which destroyed a great proportion of its inhabitants, — according to some accounts, nearly one-half. This, joined to the tyranny and violence of the government Until the year 1819, and sub- sequently to a succession of unfavourable seasons, forced many

»f the cultivators to remove to Sind and other countries. The inhabitants numbered 488,022 in 1001, being a decrease of 13% during the decade, due to the famines of 1899-1900. One-third are Mahommedans and the remainder Hindus of various castes. The Jareja Rajputs form a particular class, being the aristocracy of the country; and all are more or less connected with the family of the rao or prince. There are in Cutch about 200 of these Jareja chiefs, who all claim their descent from a prince who reigned in Sind about 1000 years ago. From him also the reigning sovereign is lineally descended, and he is the liege lord of whom all the chiefs or nobles hold their lands in feu, for services which they or their ancestors had performed, or in virtue of their relationship to the family. They are all termed the brotherhood of the rao or Bhayad, and supposed to be his hereditary advisers, and their possessions are

divided among their male children. To prevent the breaking down of their properties, the necessary consequence of this law of inheritance, there is no doubt that infanticide was common among them, and that it extended to the male as well as the female progeny, but it has been put down by the Infanticide Rules, which provide for the registration of Jareja children. The Jarejas have a tradition that when they entered Cutch they were Mahommedans, but that they after- ward adopted the customs and religion of the Hindus. It is certain, indeed, that they still retain many Mahommedan customs. They take oaths equally on the Koran or on the Shastras; they employ Mussulman books; they eat from their hands; the rao, when he appears in public, alternately worships God in a Hindu pagoda and a Mahommedan mosque; and he fits out annually at Mandvi a ship for the conveyance of pilgrims to Mecca, who are maintained during the voyage chiefly by the liberality of the prince. The Mahommedans in Cutch are of the same degenerate class as those usually found in the western parts of India. The natives are in general of a stronger and stouter make, and even handsomer, than those of western India; and the wOmen of the higher classes are also handsome. The peasants are described as intelligent, and the artizans are justly celebrated for their ingenuity and mechanical skill. The palace at Mandvi, and a tomb of one of their princes at Bhuj, are fair specimens of their architectural skill. The estimated gross revenue is £126,322. Theraare special manufactures of silver filigree-work and embroidery. The maritime population supplies the best sailors in India. There are cotton presses and ginning factories. The country of Cutch was invaded about the 13th century by a body of Mahommedans of the Summa tribe, who under the guidance of five brothers emigrated from Sind, and who gradually subdued or expelled the original inhabitants, consisting of three distinct races. Cutch continued tranquil under their sway for many years, until some family quarrel arose, in which the chief of an elder branch of the tribe was murdered by a rival brother. His son Khengayi fled to Ahmedabad to seek the assist- ance of the

viceroy, who reinstated him in the sovereignty of Cutch, and Morvi in Kathiawar, and in the title of rao, about the year 1 540. The succession continued in the same line from the time of this prince until 1697, when a younger brother, Pragji, murdered his elder brother and usurped the sovereignty. This line of princes continued till 1760 without any remarkable event, when, in the reign of Rao Ghodji, the country was invaded four times by the Sinds, who wasted it with fire and sword. The reign of this prince, as well as that of his son Rao Rayadan, by whom he was succeeded in 1778, was marked by cruelty and blood. The latter prince was dethroned, and, being in a state of mental derangement, was during his lifetime confined by Fateh Mahommed, a native of Sind, who continued, with a short interval (in which the party of the legal heir, Bhaiji Bawa, gained the ascendancy), to rule the country until his death in 18 13. It was in the reign of Fateh Mahommed that a communication first took place with the British government. During the contests for the sovereignty between the usurper and the legal heir, the leader of the royal party, Hansraj, the governor of Mandvi, sought the aid of the British. But no closer connexion followed at that time than an agreement for- the suppression of piracy, or of inroads of troops to the eastward of the Runn or Gulf of

Cutch. But the gulf continued notwithstanding to swarm with pirates, who were openly encouraged or connived at by the son of Hansraj, who had succeeded his father, as well as by Fateh Mahommed. The latter left several sons by different wives, who were competitors for the vacant throne. Husain Miyan succeeded to a considerable portion of his father's property and power. Jugjevan, a Brahman, the late minister of Fateh Mahommed, also received a considerable share of influence; and the hatred of these two factions was embittered by religious animosities, the one being Hindu and the other Mahommedan. The deceased rao had declared himself a Mahommedan, and his adherents were preparing to inter his body in a magnificent tomb, when the Jarejas and other Hindus seized the corpse and

consigned it to the flames, according to Hindu custom.

The administration of affairs was nominally in the hands of Husain Miyan and his brother Ibrahim Miyan. Many sanguinary broils now ensued, in the course of which Jugjevan was murdered, and the executive authority was much weakened by the usurpa- tions of the Arabs and other chiefs. In the meantime Ibrahim Miyan was assassinated; and after various other scenes of anarchy, the rao Bharmulji, son of Rao Rayadan, by general consent, assumed the chief power. But his reign was one continued series of the grossest enormities; his hostility to the British became evident, and accordingly a force of 10,500 men crossed the Runn in November 1815, and were within five miles of Bhuj; the capital of the country, when a treaty was concluded, by which the rao Bharmulji was confirmed in his title to the throne, on agreeing, among other stipulations, to cede Anjar and its dependencies in perpetuity to the British. He was, however, so-far from fulfilling the terms of this treaty that it was determined to depose him; and an army being sent against him, he surrendered to the British, who made a provision for his maintenance, and elevated his infant son Desalji II. to the throne (1819).

In 1822 the relations subsisting between the ruler of Cutch and the British were modified by a new treaty, under which the territorial cessions made by the rao in 181 6 were restored in consideration of an annual payment. The sum fixed was sub- sequently thought too large, and in 1832 the arrears, amounting to a considerable sum, were remitted, and all future payments on this account relinquished. From that time the rao has paid a subsidy of £13,000 per annum to the British for the maintenance of the military force stationed within his dominions.

Rao Desalji II. did much to suppress infanticide, suttee and the slave trade in his state. His successor Maharao Pragmalji in recognition of his excellent administration was in 187 1 honoured with the title of knight grand commander of the Star of

India. During his rule harbour works were built at Mandvi, an immense reservoir for rain water in the Chadwa hills was constructed, and many schools and colleges were endowed. In 1876 he was suc- ceeded by Maharaja Rao Khengarji III., who was also a keen advocate for education and especially the education of women. He founded museums, libraries and schools, and inaugurated scholarships and a fund from which deserving scholars desirous of studying in England and America could obtain their expenses.

CUTCH, GULF OF, an inlet of the sea on the coast of western India. It lies between the peninsula of Kathiawar and that of Cutch, leading into the Runn of Cutch.

CUTCH, RUNN OF, or Rann of Kach, a salt morass on the western coast of India in the native state of Cutch. From May to October it is flooded with salt water and communicates, at its greatest extent, with the Gulf of Cutch on the west and the Gulf of Cambay on the east, these two gulfs being united during the monsoon. It varies in breadth from five to eighty miles across, and during the rains is nearly impassable for horsemen. The total area of this immense morass is estimated at about 8000 sq. m., without including any portion of the Gulf of Cutch, which is in parts so shallow as to resemble a marshy fen rather than an arm of the sea. The Runn is said to be formed by the overflow of the rivers Pharan, Luni, Banas and others, during the monsoon; but in December it is quite dry, and in most places hard, but in some moist and muddy. The soil is impregnated

with salt, and the Runn is an important source for the supply of salt. The present condition of the Runn is probably the result of some natural convulsion, but the exact method of its formation is disputed. The wild ass is very common on the borders of this lake, being seen in herds of 60 or 70 together.

CUTHBERT, SAINT (d. 687), bishop of Lindisfarne, was probably a Northumbrian by birth. According to the extant Lives he was led to take the monastic vows by a vision at the death of bishop Aidan, and the date of his entry at Melrose would be 651. At this time Eata was abbot there, and Boisel, who is mentioned as his instructor, prior, in which office Cuthbert succeeded him about 661, having previously spent some time at the monastery of Ripon with Eata. Bede gives a glowing picture of his missionary zeal at Melrose, but in 664 he was transferred to act as prior at Lindisfarne. In 676 he became an anchorite on the island of Fame, and it is said that he performed miracles there. In 684 at the council of Twyford in Northumberland, Ecgfrith, king of Northumbria, prevailed upon him to give up his solitary life and become a bishop. He was consecrated at York in the following year as bishop of Hexham, but afterwards he exchanged his see with Eata for that of Lindisfarne. In 687 he retired to Fame, and died on the island on the 20th of March 687, the same day as his friend Hereberht, the anchorite of Derwentwater. He was buried in the island of Lindisfarne, but his remains were afterwards deposited at Chester-le-Street, and then at Durham.

Another Cuthbert was bishop of Hereford from 736 to about 740, and archbishop of Canterbury from the latter date until his death in October 758.

There are several lives of St Cuthbert, the best of which is the prose life by Bede, which is published in Bede's Opera, edited by J. Stevenson (1841). See also C. Eyre, The History of St Cuthbert (1887) ; and J. Raine, St Cuthbert (1828).

CUTLASS, the naval side-arm, a short cutting sword with a slightly curved blade, and a solid basket-shaped guard (see Sword). The word is derived from the Fr. coutelas, or coutelace, a form of coutel, modern couteau, a knife, from Lat. cultellus, diminutive of culter, a ploughshare, or cutting instrument. Two variations appear in English: " curtelace," where the r represents probably the / of

the original Latin word, or is a further variant of the second variation; and " curtelaxe," often spelled as two words, " curtal axe," where the prefix curtal is confused with various English words such as " curtan," " curtal " and " cur- tail," which all mean " shortened," and are derived from the Lat. curtus; the word thus wrongly derived has been supposed to refer to some non-existent form of battle-axe. In every case the weapon to which these various forms apply is a broad cutting or slashing sword.

CUTLER, MANASSEH (1742-1823), American clergyman, was born in Killingly, Connecticut, on the 13th of May 1742. He graduated at Yale College in 1765, and after being a school teacher and a merchant, and occasionally appearing in the courts as a lawyer, he decided to enter the ministry, and from 177 1 until his death was pastor of the Congregational church at what is now Hamilton, but until 1793 was a parish of Ipswich, Massachusetts. During the War of Independence he was for several months in 1776 chaplain to the regiment of Colonel Ebenezer Francis, raised for the defence of Boston; and in 1778, as chaplain to the brigade of General Jonathan Titcomb (1728-1817), he took part in General John Sullivan's expedition to Rhode Island. Soon after his return from this expedition he fitted himself for the practice of medicine, in order to supple- ment the scanty income of a minister, and in 1782 he established a private boarding school, which he conducted for about a quarter of a century. In 1786 he became interested in the settle- ment of western lands, and in the following year, as agent of the Ohio Company (q.v.), which he had taken a prominent part in organizing, he made a contract with Congress, whereby his associates, former soldiers in the War of Independence, might purchase, with the certificates of indebtedness issued to them by the government for their services, '1,500,000 acres of land in the region north of the Ohio at the mouth of the Muskingum

river, He also took a leading part in drafting the famous Ordinance of 1 787 for the government of the

Northwest Territory, the instrument as it was finally presented to Congress by Nathan Dane (1752–1835), a Massachusetts delegate, probably being largely Cutler's work. From 1801 to 1805 he was a Federalist representative in Congress. He died at Hamilton, Massachusetts, on the 28th of July 1823. A versatile man, Cutler was one of the early members of the American Academy of Arts and Sciences, and besides being proficient in the theology, law and medicine of his day, conducted painstaking astronomical and meteorological investigations, and was one of the first Americans to make researches of a real scientific value in botany. In 1789 the degree of doctor of laws was conferred upon him by Yale.

See William P. and Julia P. Cutler, The Life, Journals, and Corre- spondence of Manasseh Cutler (2 vols., Cincinnati, 1888); and an article," The Ordinance of 1787 and Dr Manasseh Cutler," by W. F. Poole, in vol. 122 of the North American Review.

CUTLERY (Fr. coutellerie, from the Lat. cultellus, a little knife), a branch of industry which originally embraced the manufacture of all cutting instruments of whatever form or material. The progress of manufacturing industry has, however, detached from it the fabrication of several kinds of edge-tools, saws and similar implements, the manufacture of which is now regarded as forming distinct branches of trade. On the other hand modern cutlery includes a great number of articles which are not strictly cutting instruments, but which, owing to their more or less intimate relation to table or pocket cutlery, are classed with such articles for convenience' sake. A steel table or carving fork, for example, is an important article of cutlery, although it is not a cutting tool.

The original cutting instruments used by the human race consisted of fragments of flint, obsidian, or similar stones, rudely flaked or chipped to a cutting edge; and of these tools numerous remains yet exist. Stone knives and other tools must have been employed for a long period by the prehistoric

races of man- kind, as their later productions show great perfection of form and finish. In the Bronze period, which succeeded the Stone Age, the cutlery of our ancestors was fabricated of that alloy. The use of iron was introduced at a later but still remote period; and it now, in the form of steel, is the staple article from which cutlery is manufactured.

From the earliest period in English history the manufacture of cutlery has been peculiarly associated with the town of Sheffield, the prominence of which in this manufacture in his own age is attested by Chaucer, who says of the miller of Trumpington —

" A ShefTeld thwitel baar he in his hose." That town still retains a practical monopoly of the ordinary cutlery trade of Great Britain, and remains the chief centre of the industry for the whole world. Its influence on methods of production has also been widely extended; for instance, many Sheffield workmen emigrated to the United States of America to take part in the manufacture of pocket-knives when it was started in Connecticut towards the middle of the 19th century.

The thwitel or whittle of Chaucer's time was a very poor rude implement, consisting of a blade of bar steel fastened into a wooden or horn handle. It was used for cutting food as well as for the numerous miscellaneous duties which now fall to the pocket-knife. To the whittle succeeded the Jack knife,— the Jacques-de-Liege, or Jock-te-leg of the Scottish James VI., — which formed the prototype of the modern clasp-knife, inasmuch as the blade closed into a groove in the handle. About the begin- ning of the 17th century, the pocket-knife with spring back was introduced, and no marked improvement thereafter took place till the early part of the 19th century. In 1624, two centuries after the incorporation of the Cutlers' Company of London, the cutlers of Hallamshire — the name of the district of which Sheffield is the centre — were formed into a body corporate for the protection of the " industry, labour, and reputation" of the trade, which was being disgraced by the " deceitful and un-workmanlike wares of various persons. ' ' The act of incorporation specifies the manufacture of " knives, scissors, shears, sickles and

other cutlery," and provides that all persons engage! in the" business shall "make the edge of all steel implements rriahu- factured by them of steel, and steel only, and shall strike on their wares such mark, and such only, as should be assigned to therri by the officers of the said company." Notwithstanding these regulations, and the pains and penalties attached to their infringe-ment, the corporation was not very successful' in maintaining the high character of Sheffield wares. Most manufacturers made cutlery to the order of their customers, on which the name of the retailer was stamped, and very inferior malleable or cast iron blades went forth to the public with " London :*

made/’ ” best steel,” and other falsehoods stamped on them to order. The corporate mark and name of a few firms, among which Joseph Rodgers & Sons stand foremost, are a guarantee of the very highest excellence of material and finish; and such firms decline to stamp any name or mark other than their own on their manufactures. In foreign markets, however, the reputation of such firms is much injured by impudent forgeries; and so far was this system of fraud carried that inferior foreign work 1 was forwarded to London to be transhipped and sent abroad osten- sibly as English cutlery. To : protect the trade ag&inst frauds of this class the Trades Mark Act of 1862 was passed chiefly at the instigation of the Sheffield chamber of commerce:*

The variety of materials which go to complete any single article of cutlery is very considerable; and as the stock list of a cutler embraces a vast number of articles different in form, properties and uses, the cutlery manufacturer must have a practical knowledge of a wide range of substances. The leading articles of the trade include carving and table knives and forks, pocket or clasp knives, razors, scissors, daggers, hunting knives and similar articles, surgical knives and lancets butchers’ and shoemakers’ knives, gardeners’ pruning-knives, &c. The blades or cutting portions of a certain number of these articles are made of shear steel, and for others crucible cast steel is employed. Sometimes the cutting edge alone is of steel, backed or strengthened with iron, to which it is welded. The tang, or part of the blade by which it is fastened to the handles, and other non-cutting portions, are also very often of iron. Brass, German silver^ silver, horn, tortoise-shell, ivory, bone, mother-of-pearl, and numerous fancy woods are all brought into requisition for handles and other parts of cutlery, each demanding special treatment according to its nature. The essential processes in making a piece of steel cutlery are (1) forging, (2) hardening and tempering, (3) grinding, (4) polishing, and (5) putting together the various pieces and finishing the knife, the workmen who*

perform these last operations being the only ones known in the trade as ” cutlers.”

The following outline of the stages in the manufacture of a razor will serve to indicate the sequence of operations in making an article which, though simple in form, demands the highest care and skill. The first essential of a good razor is that it be made of the finest quality of cast steel. The steel for razors is obtained in bars the thickness of the back of the instrument. Taking such a bar, the forger heats one end of it to the proper forging tempera- ture, and then dexterously fashions it upon his anvil, giving it roughly the required form, edge- and concavity. It is then separated from the remainder of the bar, leaving only sufficient metal to form the tang, if that is to be made of steel. The tang of the ” mould,” as the blade in this condition is termed, is next drawn out, and the whole ” smithed ” or beaten on the anvil to compact the metal and improve the form and edge of the razor! At this stage the razor is said to be ” forged in the rough,” and so neatly can some workmen finish off this operation that a shaving edge may be given to the blade by simple whetting. The forged blade is next ” shaped “i>y grinding on the dry stone; this operation considerably reduces its weight, and removes the oxidized scale, thereby allowing the hardening and tempering to be done with certainty and proper effect. The shaped razor is now returned to the forge, where the tang is file-cut and pierced with the joint-hole, and into the blade is stamped either the name and corporate mark of the maker, or any mark and name ordered by the tradesman for whom the goods are being manufactured. The hardening is accomplished by heating the blade to a cherry-

red heat arid suddenly quenchirigit in cold water, which leaves the metal, excessively • hard and brittle. To bring it to the proper temper for a razor, it is again heated till the metallic surface assumes a straw colour, and after being plunged into water, it is ready for the process Of wet grinding. The wet grinding is done on stones which vary in

diameter from if to 12 in. accowlmg to the concavity of surface desired ("hollow-ground," "half hollow-ground," &c). •" Lapping," which is the first stage in polishing, is performed on a wheel of the same diameter as the wet- grinding stone. The lap is built up of segments of wood having the fibres' towards the periphery, and covered with a metallic alloy of tin and lead. The lap is fed with a mixture of emery powder and oil. "Glazing" and "polishing," which follow, are for perfecting the polish on the surface of the razor, leather-covered wheels with fine emery being used; and the work is finished off with crocus. The finished blade is then riveted into the scales or handle, Which may be of ivory, bone, horn or other material; and when thereafter the razor is set on a hone it is ready for use!

The processes employed in making a table-knife do not differ essentially from those required for a razor. Table-knife blades are forged from shear - ahd'i other steels, and, if they are not in one piece, a bit of ' malleable iron sufficient for the bolster or shoulder and tang is welded to each, often by machinery, especially in the case of the cheaper qualities. The bolster is formed with the aid of a die and swage called " prints," and the tang is drawn out. The tang is variously formed, according to the method by which it is to be secured in the haft, and the various processes of tempering, Wet grinding and polishing are pursued as described above. Steel forks of an inferior quality are cast and subsequently cleaned and polished; but the best quality are forged from bar steel, and the prongs are cut or stamped out of an extended flattened extremity called the mould or " mood." In the United States of America machinery has been extensively adopted for performing the various mechanical operations in forging and fitting table cutlery, and in Sheffield it is employed to a great ! extent in the manufacture of table and pocket knife blades, scissors and razors. The cutler of the 18th century was an artisan who forged and ground the blades and fitted them in the hafts ready for sale; to-day the division of labour is carried to an extreme degree.

In the making of a common pocket-knife with three blades not fewer than one hundred separate operations are involved,; and these may be performed by as many workmen composed of five distinct classes — the scale and spring makers (the scale being the metal lining which is covered by the handle proper), the blade forgers, the grinders, the cutters of the coverings of ivoryy horn, &c, that form the handles, and the hafters or cutlers proper; Grinders are divided into three classes— dry, wet and mixed grinders, according as they work at dry or wet stones. This branch of trade is, in Sheffield, conducted in distinct establishments called ” wheels,” which are divided up into separate apartments or ” hulls,” the dry grinding being as much as possible separated from the wet grinding. Dry grinding, such as is practised in the shaping of razors described above, the ” humping ” or rounding of scissors, and other operations, used to.be a process especially dangerous to health, lung diseases being induced by the fine- dust of silica and steel with which the atmosphere was loaded; but a great improvement has been effected by resorting to wet grinding as much as possible, by arranging: fans to remove the dust by suction, and by general attention to sanitary conditions.

CUTTACK, a city and district of British India in the Orissa division of Bengal. The city is situated at the head of the delta of the Mahanadi. Pop. (1901) 51,364. It is the centre of the Orissa canal system, and an important station on the East Coast railway from Madras to Calcutta. It contains the government college, named after Mr Ravenshaw, a former commissioner; a high school, a training school, a survey school, a medical school and a law school. The city formed one of the five royal strong- holds of ancient Orissa and was founded by a warlike Hindu prince, Makar Kesari, who reigned from 953 to 961. Native kings protected it from the rivers by a masonry embankment several miles long, built of enormous blocks of hewn stone, and*

in some places 25 ft. high. A fortress defended the north-west corner of the town, and was captured by the English from the Mahrattas in October 1803. It is now abandoned as a place of defence.

The District or Cuttack lies in the centre of Orissa, occupying the deltas of the Mahanadi and Brahmani, together with a hilly tract inland. Its area is 3654 sq. m. It consists of three physical divisions: first, a marshy woodland strip along the coast, from 3 to 30 m. in breadth; second, an intermediate stretch of rice plains; third, a broken hilly region, which forms the western boundary of the district. The marshy strip along the coast is covered with swamps and malaria-breeding jungles. Towards the sea the solid land gives place to a vast network of streams and creeks, whose sluggish waters are constantly depositing silt, and forming morasses or quicksands. Cultivation does not begin till the limits of this dismal region are passed. The intermediate rice plains stretch inland for about 40 m. and occupy the older part of the delta between the sea-coast strip and the hilly frontier. They are intersected by three large rivers, the Baitarani, Brahmani and Mahanadi. These issue in magnificent, streams through three gorges in the frontier hills. The Cuttack delta is divided into two great valleys, one of them lying between the Baitarani and the Brahmani, the other between the Brahmani and the Mahanadi. The rivers having, by the silt of ages, gradually raised their beds, now run along high levels. During floods they pour over their banks upon the surrounding valleys, by a thousand channels which interlace and establish communica- tion between the main streams. After numerous bifurcations they find their way into the sea by three principal mouths. Silt-banks and surf-washed bars render the entrance to these rivers perilous. The best harbour in Cuttack district is at False Point, on the north of the Mahanadi estuary. It consists of an anchorage, land-locked by islands or sand-banks, and with two fair channels navigable towards the land. The famine commissioners in 1867

reported it to be the best harbour on the coast of India from the Hugh to Bombay.

The intermediate tract is a region of rich cultivation, dotted with great banyan trees, thickets of bamboos, exquisite palm foliage and mango groves. The hilly frontier separates the delta of British Orissa from the semi-independent tributary states. It consists of a series of ranges, 10 to 15 m. in length, running nearly due east and west, with densely-wooded slopes and lovely valleys between. The timber, however, is small, and is of little value except as fuel. The political character of these three tracts is as distinct as are their natural features. The first and third are still occupied by feudal chiefs, and have never been subjected to a regular land-settlement, by either the Mussulman or the British government. They pay a light fixed tribute. The intermediate rice plains, known as the Mogholbandi, from their having been regularly settled by the Mahommedans, have yielded to the successive dynasties and conquerors of Orissa almost the whole of the revenues derived from the province. The deltaic portions are of course a dead level; and the highest hills within the district in the western or frontier tract do not exceed 2500 ft. They are steep, and covered with jungle, but can be climbed by men. The most interesting of them are the Assa range, with its sandal trees and Buddhist remains; Udayagiri (Sunrise-hill), with its colossal image of Buddha, sacred reservoir, and ruins; and Assagiri, with its mosque of 1719. The Mahavi-nayaka peak, visible from Cuttack, has been consecrated for ages to Siva-worship by ascetics and pilgrims.

The population of the district in 1901 was 2,062,758, showing an increase of 6% in the preceding decade. The aboriginal tribes here, as elsewhere, cling to their mountains and jungles. They chiefly consist of the Bhumij, Tala, Kol and Savara peoples, the Savaras being by far the most numerous, numbering 14,775. They are regarded by the orthodox Hindus as little better than the beasts of the wildernesses which they inhabit. Miserably poor,

they subsist for the most part by selling firewood or other products of their jungle; but a few of them have patches of cultivated land, and many earn wages as day labourers to the Hindus. They occupy, in fact, an intermediate stage of de- vil. 22

gradation between the comparatively well-to-do tribes in the tributary states (the stronghold and home of the race), and the Pans, Bauris, Kandras and other semi-aboriginal peoples on the lowlands, who rank as the basest castes of the Hindu com- munity. The great bulk of the Indo-Aryan or Hindu population consists of Uriyas, with a residue of immigrant Bengalis, Lala Kayets from Behar and northern India, Telingas from the Madra« coast, Mahrattas from central and western India, a few Sikhs from the Punjab and Marwaris from Rajputana. The Mahommedans are chiefly the descendants of the Pathans who took refuge in Orissa after the subversion of their kingdom in Bengal by the Moguls in the 16th century.

Rice forms the staple product of the district; its three chief varieties are biali or early rice, sarad or winter rice, and dalua or spring rice. The other cereal crops consist of mandua (a grass-like plant producing a coarse grain resembling rice), wheat, barley, and china, a rice-like cereal. Suan, another rice-like cereal, not cultivated, grows spontaneously in the paddy fields. Pulses of different sorts, oilseeds, fibres, sugar-cane, tobacco, spices and vegetables also form crops of the district. The cultivators consist of two classes — the resident husbandmen (thani) and the non-resident or migratory husbandmen (pake).

The Orissa canal system, which lies mainly within Cuttack district, is used both for irrigation and transport purposes. The railway across the district towards Calcutta, a branch of the Bengal-Nagpur system, was opened in 1899. Considerable trade is carried on at the mouth of the rivers along the coast.

CUTTLE-FISH. The more familiar and conspicuous types of the molluscan class Cephalopoda (q.v.) are

popularly known in English as cuttle-fish, squid, octopus and nautilus. The first of these names (from the A.S. cudele) is applied more particularly to the common Sepia (fig. 1), characterized by its internal cal- careous shell, sometimes known as cuttle-bone, and its ink-sac, the contents of which have been long in use as a pigment (sepia) . The term squid is employed among fishermen for the ten-armed Cephalopods in which the shell is represented by an uncalcified flexible structure somewhat resembling a pen. Hence in Italian a squid is called calamaio, from calamus a reed or pen, and in English the similar term calamary is sometimes used. Like the Sepia, squids also possess the ink-sac, whence they have some- times been called pen and ink fish, and in German both Sepia and squid and their allies are known as Tinten-fische. The squids have generally softer and more watery tissues than the Sepia, but the former term is not in general use, and the distinction not generally understood. The term cuttle-fishes is sometimes extended to include all the Cephalopoda, but as the peculiarities of the remarkable shell of the true nautilus, and those of the shell- less Octopoda are widely known, we shall consider the name here as applying only to those forms which have ten arms, an ink-sac, an internal shell-rudiment, and only one pair of gills in the mantle cavity. Technically these form the sub-order Decapoda, of the order Dibranchia.

The cuttle-fishes are characteristically swimming animals, in contrast with the octopods, which creep about by means of their suckers among the rocks, and lurk in holes. In Sepia the integument is produced laterally into two muscular fins, rather narrow and of uniform breadth running the whole length of the body, but separated by a notch behind. There are four pairs of short non-retractile arms surrounding the mouth, and furnished with suckers on their oral surface, and between the third and fourth of these arms on each side is a much longer tentacular arm, which is usually kept entirely withdrawn into a pocket of the skin. The mantle cavity is on the posterior side of the body, which is the lower side

in the swimming position, and the funnel is a tube open at both ends and connected with the body within the mouth of the mantle cavity. The mantle during life performs regular respiratory movements by which water is drawn into the cavity, passing between mantle and funnel, and is expelled through the funnel. In swimming the short arms are directed forwards, the fins undulate, and the motion is slow and deliberate; but if the animal is threatened or alarmed it swims suddenly and rapidly backwards by expelling water

forcibly from the mantle cavity through the funnel, at the same time expelling a cloud of ink from its ink-sac.

The Sepia feeds principally on Crustacea, and in aquaria has been observed to pursue and capture prawns. The method in

Fig. i. — Sepia officinalis, L., about \ natural size, as seen when dead, the long prehensile arms being withdrawn from the pouches at the side of the head, in which they are carried during life when not actually in use. a, Neck; b, lateral fin of the mantle-sac; c, the eight shorter arms of the fore-foot; d, the two long prehensile arms; e, the eyes.

which it secures its prey has been carefully observed and de- scribed by the present writer, who studied the living animal in the aquarium of the biological laboratory at Plymouth. The prawns support themselves on their long slender legs on con- venient points of the rockwork, and the Sepia stalks them with great caution and determination, the rapid play of its chromato- phores giving evidence of its excitement. When it has arrived within striking distance, the two tentacular arms are shot out with great rapidity, and the prawn is seized between the two expanded ends, drawn within the circle of short arms, and devoured; unless, as

sometimes happens, the prawn springs away and the Sepia misses its aim.

Two species of Sepia occur in British and European waters, including the Mediterranean, namely, S. elegans and 5. officinalis. The usual length of the body is about 9 or 10 in. They live mostly between ten and forty fathoms, coming into shallower water in July and August to deposit their eggs, which are about as large as black currants and of somewhat similar colour, and are con- nected by elongated stalks into a cluster attached to the sea- bottom. Other species occur in various parts of the world, e.g. S. cultrata, which is common on the coasts of Australia. The Sepiidae form the only family of cuttle-fishes in which the shell is calcined. They belong to the tribe Myopsida, characterized by the complete closure of the external corneal covering of the eye outside the iris and the lens.

Sepiola and Rossia belong to another family of the Myopsida. Both are British genera living in' shallow water, and entering estuaries. The animals of both genera are small, not more than

2 or 3 in. in length, with the body rounded at the aboral end, and the fins short and rounded, inserted in the middle of the body length, instead of extending from end to end. Sepiola, although it swims by means of its fins and funnel when active, spends much of its time buried in the sand for concealment. Rossia has similar habits. The shell is chitinous and shorter than the body. In other genera of the Sepiolidae the shell is entirely absent. Idiosepius is the smallest of the Cephalopoda, only 1-5 in. in length. It inhabits the Indian Ocean. The body is elongated and the fins rudimentary. In the Sepiadariidae also the shell is absent. The body is short and the mantle united with the head dorsally. The two genera Sepiadarium and Sepioloidea occur in the Pacific Ocean. The common squid Loligo is the type of the only remaining family of the Myopsida. In this species the shell is a well-developed chitinous pen or gladius with a thickened axis narrowing to a point behind, but bearing posteriorly

a wide thin plate on each side. The shape closely resembles that of a quill pen with the quill in front. The fins are large and triangular, extending over rather more than half of the length of the body aborally. The tentacular arms are only partly retractile. The body is elongated and conical, and reaches about a foot in length. The squid is gregarious, and forms a favourite food of the larger fishes, especially of conger. All the Myopsida are more or less littoral in habit, and the British forms are familiar in consequence of their frequent capture in the nets of fishermen. The shell, or " bone " as it is commonly called, of the common Sepia frequently occurs in abundance on the shore among the sea-weed and other refuse left by the tide.

The Oigopsida, or cuttle-fishes in which the corneal covering of the eye is perforated, are on the whole more oceanic than littoral, and many of the species are abyssal. Ommatostrephes sagittatus is one of the forms that occurs off the British coasts,

Fig. 2. — A, Loligo vulgaris; a, arms; t, tentacles. B, Pen of the same reduced in size. C, Side-view of one of the suckers, showing the horny hooks surrounding the margin. D, View of the head from in front, showing the arms (a), the tentacles (t), the mouth (m), and the funnel (/).

especially the more northern, e.g. in the Firth of Forth. In general appearance it resembles the common squid, but the fins are broader and shorter, not extending to the middle of the body.

The shell is similar to that of Loligo, but ends aborally in a little hollow cone. The suckers bear chitinous rings which are toothed along the outer edge. The tentacular arms are rather short and thick. Two specimens of allied species have been taken on British coasts, one of which, captured off, Salcombe in Devon- shire in 1892, had a body 66 cm.

(22 in.) long, and tentacular arms 64 cm. long,, or nearly the same length as the body. Most of the species of Ommatostrephes are naturally gregarious and oceanic, and occur in the open seas in all latitudes, swimming near the surface and often leaping out of the water. They are largely devoured by albatrosses and other marine birds, and by Cetacea. They are used as bait in the Newfoundland cod fishery.

Some of the oceanic cuttle-fishes reach a very large size, and the stories of these ocean monsters which are narrated by the older writers, though to some extent exaggerated, are now known to be founded on fact. The figure given by one author of a gigantic Cephalopod rising from the surface of the ocean and embracing with its arms a full-rigged ship does not accurately represent an actual occurrence, but on the other hand there are authentic instances on record of fishermen in small boats on the banks of Newfoundland being in great peril in consequence of large squids throwing their arms across their boats. In November 1874 a specimen was brought ashore at St John's, Newfoundland, which had been caught in herring nets. Its body was 7 ft. long, its fins 22 in. broad, and its tentacular arms 24 ft. long. Several others have been recorded, taken in the same region, which were as large or larger, the total length of the body and tentacles together varying from 30 to 52 ft., and the estimated weight of one of them being 1000 lb.

In April i87soneof theselarge squids occurredoff Boffin's Island on the Irish coast. The crew of a curragh rowed out to it and attacked it, cutting off two of its arms and its head. The shorter arms measured 8 ft. in length and 1 5 in. in circumference ; the ten- tacular arms are said to have been 30 ft. long. In the Natural History Museum in London there is one of the shorter arms of a specimen; this arm is 9 ft. in length and n in. in circumference, and the total length of the specimen, including body and ten- tacles, is stated to have been 40 ft. The maximum known length of these giant squids is stated to be 18 metres or about 585 ft.

All these gigantic specimens belong, so far as at present known, to one genus called Architeuthis, referred to the same family as Ommatostrephes. They are the largest known invertebrates.

These huge cuttle-fishes as well as those of various other oceanic species form the food of the cachalot or sperm whale, and F. T. Bullen, in his Cruise of the Cachalot and other writings, has graphically described contests which came under his own observation between the cachalot and its prey. The prince of Monaco in his yacht the " Princess Alice " was fortunate enough to be able to make a very complete scientific investigation in the case of one specimen of the cachalot, which not only confirmed the most important of Mr Bullen's statements, but added considerably to our knowledge of oceanic cuttle-fishes. Off the Azores in July 1895 the prince in his yacht witnessed the killing of a cachalot 13-70 metres long (about 45 ft. 8 in.) by the crew of a whaler. The anjmal in its death-agony vomited the contentsof its stomach, most of which were carefully collected and preserved, and after- wards examined by Professor Joubin. On the lips of the whale were found impressions several centimetres wide which corre- sponded exactly to the toothed suckers of the largest cuttle-fish arms obtained from its stomach. The contents of the stomach consisted entirely of cuttle-fish or parts of cuttle-fish, including the giant Architeuthis, and among them was the body, without the head, of a form new to science, distinguished by a condition of the external surface which occurs in no other species of the group. The surface of the skin was divided into small angular flat projections like scales, arranged in a regular spiral like the scales of a pine cone. From this character the new genus was called Lepidoteuthis. The body, without the head, of the specimen obtained was 86 cm. (nearly 3 ft.) in length.

The family Onychotcuthidae is remarkable for the formidable chitinous hooks borne on the arms. These hooks are special modifications of the toothed chitinous ring which covers the

sucker-rim in the Decapoda generally. The teeth of the ring are often unequal in size, and in the Onychoteuthidae one tooth is enormously developed. The maximum development occurs in Veranya, found in the Mediterranean, where the suckers have lost their function and are merely fleshy projections bearing the hooks at their extremities. Onychoteuthis reaches a large size, the length of the body without the arms being in one specimen from the Pacific coast of America 8 ft. Figures of this and several of the following genera are given in the article Cephalopoda.

In the family Cheiroteuthidae many of the species occur at abyssal depths of the ocean, and exhibit curious modifications of structure. In Cheiroteuthis itself the tentacular arms are very long and slender, and are not capable of retraction into pockets. In several species of this genus the suckers are no longer organs of adhesion, but are simple cups containing a network of filaments resembling a fishing net. In Histioteuthis and Histiopsis, as in some Octopods, the six dorsal arms are more or less completely united by a web, which also probably serves for capturing fish. In these two genera and in Calliteuthis the skin bears luminous organs. Cheiroteuthis has been taken at 2600 fms., Calliteuthis at 2200, Histiopsis at nearly 2000. Bathyteuthis, placed in the same family as Ommatostrephes, has been taken at 1700 fms.

The Cranchiidae are remarkable for their small size, the shortness of the ordinary arms, and the protuberance of the eyes, which in Taonius are actually on the ends of stalk-like outgrowths of the body. Cranchia is a deep-sea form taken at 1700 fms. Its body is pear-shaped, swollen posteriorly and quite narrow at the neck.

Spirula is distinguished from all other existing Cephalopods by the structure of its coiled shell, which in many respects re- sembles those of the extinct Ammonites, and is not completely internal. In the structure of the body the animal is a true cuttle- fish in the sense in which the term is here

used, having ten arms and a perforated cornea. Three species are distinguished, and their empty shells occur abundantly on the shores of the tropical regions of the Atlantic, Pacific and Indian Oceans. In German the shells are known from their shape as Posthornchen. They are common on the shores of the Azores. But the animal has very rarely been obtained; only a few specimens occur in museum collections. One specimen was taken by the " Challenger " in a deep-sea trawl, at a depth between 300 and 400 fathoms off Banda Neira in the Molluccas. Dr Willemoes Suhm, in describing the capture, stated that the specimen seemed to have been in the stomach of a fish, as its surface was slightly digested, and he thought it must have habits of concealment which usually prevent its capture, and that it was secured on this occasion only by the capture of the fish which had swallowed it. The fact that the shells are washed ashore in such large numbers is not fully explained. Possibly when freed from the animal the air in the chambers of the shell causes it to float, and in that case it would naturally be sooner or later washed ashore. (J T C)

CUTTS OF GOWRAN, JOHN CUTTS, Baron (1661-1707), British soldier and author, came of an Essex family. After a short university career at Catherine Hall, Cambridge, he came into the enjoyment of the family estates, but evinced a decided preference for the life of court and camp. The double ambition for military and literary fame inspired his first work, which appeared in 1685 under the name La Muse de cavalier, or An Apology for such Gentlemen as make Poetry their Diversion not their Business. The next year saw Cutts serving as a volunteer under Charles of Lorraine in Hungary, and it is said that he was the first to plant the imperialist standard on the walls at the storm of Buda (July 1686). In 1687 he published a book of verse entitled Poetical Exercises, and the following year we find him serving as lieutenant-colonel in Holland. General Hugh Mackay describes Cutts about this time as " pretty tall, lusty and well shaped, an agreeable

companion with abundance of wit, affable and familiar, but too much seized with vanity and self-conceit."

Lieutenant-Colonel Cutts was one of William's companions in the English revolution of 1688, and in 1690 he went in command of a regiment of foot to the Irish war. He served with distinction

at the battle of the Boyne, and at the siege of Limerick (where he was wounded), and King William created him Baron Cutts of Gowran in the kingdom of Ireland. In 1691 he succeeded to the command of the brigade of the prince of Hesse (wounded at Aughrim), and on the surrender of Limerick was appointed commandant of the town . Next year he served again in Flanders as a brigadier, his brigade of Mackay's division being one of those almost destroyed at Steinkirk. At this battle Cutts himself was wounded. For some time after this, Lord Cutts was lieutenant-governor of the Isle of Wight, but he returned to active service in 1694, holding a command in the disastrous Brest expedition. He was one of Carmarthen's companions in the daring reconnaissance of Camaret Bay, and was soon afterwards again wounded. He succeeded Talmash, the commander of the expedition (who died of his wounds), as colonel of the Coldstream Guards. Next year, after serving as a commissioner for settling the bank of Antwerp, he distinguished himself once more at the famous siege of Namur, winning for himself the name of " Salamander " by his indifference to the heaviest fire. Henceforward court service and war service alternated. He was deep in the confidence of William III., and acted as a diplomatic agent in the negotiations which ended in the peace of Ryswick. On the occasion of the great fire in Whitehall (1698) Cutts, at the head of the Coldstreams, earned afresh the honourable nickname of " the Salamander." A little later we find Captain Richard Steele acting as his private secretary. In 1702, now a major-general, Cutts was serving under Marlborough in the opening campaign of the War of the Spanish

Succession, and at the siege of Venloo, conspicuous as usual for romantic bravery, he led the stormers at Fort Saint Michael. His enemies, and even the survivors of the assault, were amazed at the success of a seemingly hare- brained enterprise. Probably, however, Cutts, who was now a veteran of great and varied experience, measured the factors of success and failure better than his critics. It was on this occasion that Swift lampooned the lieutenant-general in his Ode' to a Salamander. He made the campaign of 1703 in Flanders, and in 1704, after a visit to England, he rejoined Marlborough on the banks of the Danube. At Blenheim he was third in command, and it was his division that bore the brunt of the desperate fight- ing at the village which gave its name to the battle.

Blenheim was Cutts's last battle. His remaining years were spent at home, and, at the time of his death, he was the holder of eight distinct political and military offices. He sat in five parlia- ments for the county of Cambridge, and in Queen Anne's first Parliament he was returned for Newport in the Isle of Wight, for which he sat until the time of his death. He was twice married, but left no issue.

CUVIER, GEORGES LEOPOLD CHRETIEN FREDERIC DAGOBERT, Baron (1769-1832), French naturalist, was born on the 23rd of August 1769 at Montbeliard, and was the son of a retired officer on half-pay belonging to a Protestant family which had emigrated from the Jura in consequence of religious persecution. He early showed a bent towards the investigation of natural phenomena, and was noted for his studious habits and marvellous memory. After spending four years at the Academy of Stuttgart, he accepted the position of tutor in the family of the Comte d'Hericy, who was in the habit of spending the summer near Fecamp. It thus came about that he made the acquaintance of the agriculturist, A. H. Tessier, who was then living at Fecamp, and who wrote strongly in favour of his protege to his friends in Paris — with the result that Cuvier, after corresponding with the well-known naturalist E. Geoffroy Saint-Hilaire, was appointed in 1795 assistant to the professor of comparative

anatomy at the Museum d'Histoire Naturelle. The National Institute was founded in the same year and he was elected a member. In 1796 he began to lecture at the Ecole Centrale du Pantheon, and at the opening of the National Institute in April, he read his first palaeontological paper, which was subsequently published in 1800 under the title Mimoires sur les especes d 'elephants vivants et fossiles. In 1798 was published his first separate work, the Tableau elementaire de I'histoire naturelle des animaux, which was an abridgment of his course of lectures at the Ecole du

Panth6on, and may be regarded as the foundation and first and general statement of his natural classification of the animal kingdom.

In 1799 he succeeded L. J. M. Daubenton as professor of natural history in the College de France, and in the following year he published the LeQons d'anatomie comparie, a classical Work, in the production of which he was assisted by A. M. C. Dumeril in the first two volumes, and by G. L. Duvernoy in three later ones. In 1802 Cuvier became titular professor at the Jardin des Plantes; and in the same year he was appointed commissary of the Institute to accompany the inspectors- general of public instruction. In this latter capacity he visited the south of France; but he was in the early part of 1803 chosen perpetual secretary of the National Institute in the department of the physical and natural sciences, and he consequently abandoned the appointment just mentioned and returned to Paris.

He now devoted himself more especially to three lines of inquiry — one dealing with the structure and classification of the mollusca, the second with the comparative anatomy and syste- matic arrangement of the fishes, and the third with fossil mammals and reptiles primarily, and secondarily with the osteology of living forms belonging to the same groups. His papers on the mollusca began as early as 1792, but most of his memoirs on this branch were published in the Annates du musium between 1802 and

1815; they were subsequently collected as Mimoires pour servir a I'histoire et a I'anatomie des mollusques, published in one volume at Paris in 18 17. In the department of fishes, Cuvier's researches, begun in 1801, finally culminated in the publication of the Histoire naturelle des poissons, which con- tained descriptions of 5000 species of fishes, and was the joint production of Cuvier and A. Valenciennes, its publication (so far as the former was concerned) extending over the years 1828-1831. The department of palaeontology dealing with the Mammalia may be said to have been- essentially created and established by Cuvier. In this region of investigation he pub- lished a long list of memoirs, partly relating to the bones of extinct animals, and partly detailing the results of observations on the skeletons of living animals specially examined with a view of throwing light upon the structure and affinities of the fossil forms. In the second category must be placed a number of papers relating to the osteology of the Rhinoceros Indicus, the tapir, Hyrax Capensis, the hippopotamus, the sloths, the manatee, &c. In the former category must be classed an even greater number of memoirs, dealing with the extinct mammals of the Eocene beds of Montmartre, the fossil species of hippo- potamus, the Didelphys gypsorum, the Megalonyx, the Mega- therium, the cave-hyaena, the extinct species of rhinoceros, the cave-bear, the mastodon, the extinct species of elephant, fossil species of manatee and seals, fossil forms of crocodilians, chelonians, fishes, birds, &c. The results of Cuvier's principal palaeontological and geological investigations were ultimately given to the world in the form of two separate works. One of these is the celebrated Recherches sur les ossements fossiles de quadrupedes, published in Paris in 181 2, with subsequent editions in 1821 and 1825; and the other is his Discours sur les revolutions de la surface du globe, published in Paris in 1825.

But none of his works attained a higher reputation than his Regne animal distribuS d'apres son organisation, the first edition of which appeared in

four octavo volumes in 18 1.7, and the second in five volumes in 1829–1830. In this classical work Cuvier embodied the results of the whole of his previous researches on the structure of living and fossil animals. The whole of the work was his own, with the exception of the Insecta, in which he was assisted by his friend P. A. Latreille.

Apart from his own original investigations in zoology and palaeontology Cuvier carried out a vast amount of work as perpetual secretary of the National Institute, and as an official connected with public education generally; and much of this work appeared ultimately in a published form. Thus, in 1808 he was placed by Napoleon upon the council of the Imperial University, and in this capacity he presided (in the years 1809,

1811 and 1813) over commissions charged to examine the state of the higher educational establishments in the districts beyond the Alps and the Rhine which had been annexed to France/and to report upon the means by which these could be affiliated with the central university. Three separate reports on this subject were published by him. In his capacity, again, of perpetual secretary of the Institute, he not only prepared a number of eloges historiques on deceased members of the Academy of Sciences, but he was the author of a number of reports on the history of the physical and natural sciences, the most important of these being the Rapport historique sur le progres des sciences physiques depuis 17 8g, published in 1810. Prior to the fall of Napoleon (1814) he had been admitted to the council of state, and his –position remained unaffected by the restoration of the Bourbons. He was elected chancellor of the university, in which capacity he acted as interim president of the council of public instruction, whilst he also, as a Lutheran, superintended the faculty of Protestant theology. In 1819 he was appointed president of the committee of

the interior, and retained the office until his death. In 1826 he was made grand officer of the Legion of Honour; and in 183 1 he was raised by Louis Philippe to the rank of peer of France, and was subsequently appointed president of the council of state. In the beginning of 1832 he was nominated to the ministry of the interior, but on the 13th of May he died in Paris after a brief illness.

See P. J. M. Flourens, Eloge historique de G. Cuvier, published as an introduction to the Eloges historiques of Cuvier; Histoire des travaux de Georges Cuvier (3rd ed., Paris, 1858); A. P. de Candolle, " Mort de G. Cuvier," Bibliotheque universelle (1832, 59, p. 442); C. L. Laurillard, " Cuvier," Biographie universelle, supp. vol. 61 (1836); Sarah Lee, Memoirs of Cuvier, translated into French by T. Lacordaire (1833).

CUVILLES, FRANCOIS DE (1698–c. 1767); French architect and engraver. He helped to carry the French rococo taste' to Germany — he was summoned about 1720 to Cologne by the elector James Clement; in 1738 he became architect to the elector of Bavaria, and afterwards occupied the same position towards the emperor Charles VII. His style, while essentially thin, is often painfully elaborate and bizarre. He designed mirrors and consoles, balustrades for staircases, ceilings and fireplaces, and in furniture, beds and commodes especially. He also laid out parks and gardens. He wrote several treatises on artistic and decorative subjects, which were edited by his son, Francois de Cuvilles the younger, who succeeded his father at the court of Munich.

CUXHAVEN, or Kuxhaven, a seaport town of Germany, belonging to the state of Hamburg, and situated at the extremity of, the west side of the mouth of the Elbe, 71 m. by rail N.W. from Hamburg. Pop. (1900) 6898. The harbour is good and secure, and is much frequented by vessels delayed in the Elbe by unfavourbale weather. A jiew harbour was made in 1891– 1896, having a depth of 265 ft., with a fore port 1000 ft. long by 800 ft. wide; and it is now

the place of departure and arrival of the mail steamers of the Hamburg-American Steamship Company, who in 1901 transferred here a part of their permanent staff. The port is free, i.e. outside the customs union (Zollverein) , the imports being principally coals, bricks and timber, and the exports fish. There is a fishing fleet, for which a new harbour was opened in 1892. Though lying on a bare strand, the town is much frequented as a bathing place by Hamburgers. It is strongly fortified, and there are a lighthouse, and lifeboat and pilot stations. The town only dates from 1873, having been formed by uniting the villages of Ritzebiittel and Cuxhaven, which had belonged to Hamburg since 1394.

CUYABA, or Cuiaba, capital of the inland state of Matto Grosso, Brazil, about 972 m. N.W. of Rio de Janeiro, on the Cuyaba river near its discharge into the Sao Lourenco, the principal Brazilian tributary of the Paraguay. Pop. (1890) 14,507; of the municipality, 17,815. The surrounding country is thickly populated. Cuyaba has uninterrupted steamer com- munication with Montevideo, about 2500 m. distant, but has no land communication with the national capital, except by telegraph. The climate is hot and malaria is prevalent. Cuyaba

was founded in 1719 by Paalista gold hunters, and its gold- washings, now apparently exhausted, yielded rich results in the 1 8th century. It is the see of a bishopric and headquarters of an important military district, having an arsenal and military barracks.

CUYAPO, a town of the province of Nueva Ecija, Luzon, Philippine Islands, 28 m. N.N.W. of San Isidro, the capital. Pop. (1903) 16,292. Rice is grown here. In 1907 the town of Nampicuan was formed from part of Cuyapo.

CUYP, the name of a Dutch family which produced two generations of painters. The Cuyps were long settled at Dor- drecht, in the neighbourhood of which they had a country hoUse, where Albert Cuyp (the most

famous) was born and bred.

The eldest member of the family who acquired fame was Jacob Gerritsz Cuyp, born it is said at Dordrecht in 1575, and taught by Abraham Bloemaert of Utrecht. He is known to have been alive in 1649, and the date of his death is obscure. J. G. Cuyp's pictures are little known. But he produced portraits in various forms, as busts and half-lengths thrown upon plain backgrounds, or groups in rooms, landscapes and gardens. Solid and clever as an imitator of nature in its ordinary garb, he is always spirited, sometimes rough, but generally plain, and quite as unconscious of the sparkle conspicuous in Frans Hals as in- capable of the concentrated light-effects peculiar to Rembrandt. In portrait busts, of which there are signed examples dated 1624, 1644, 1646 and 1649, in the museums of Berlin, Rotterdam, Marseilles, Vienna and Metz, his treatment is honest, homely and true; his touch and tone firm and natural. In portraying children he is fond of introducing playthings and pets — a lamb, a goat or a roedeer; and he reproduces animal life with realistic care. In a family scene at the Amsterdam Museum we have likenesses of men, women, boys and girls with a cottage and park.- In the background is a coach with a pair of horses. These examples alone give us a clue to the influences under which Albert Cuyp grew up, and explain to some extent the direction which his art took as he rose to manhood.

Albert Cuyp (1620-1691), the son of Jacob Gerritsz by Grietche Dierichsdochter (Dierich's daughter), was born at Dordrecht. He married in 1658 Cornelia Bosman, a rich widow, by whom he had an only daughter. By right of his possessions at Dordwyck, Cuyp was a vassal of the county of Holland, and privileged to sit in the high court of the province. As a citizen he was sufficiently well known to be placed on the list of those from whom William III., stadtholder of the Netherlands, chose the regency of Dordrecht in 1672. His death, and his burial on the 7 th of November 1691 in the church of the Augustines of Dordrecht, are historically proved.

But otherwise the known facts concerning his life are few. He seldom dates his pictures, but it appears probable that he ceased to paint about 1675. It has been said that Albert was the pupil of his father. The scanty evidence of Dutch annalists to this effect seems confirmed by a certain coincidence in the style and treatment of father and son. That he was a pupil of van Goyen has been surmised on the strength of the style of his early works. It has been likewise stated that Albert was skilled, not only in the production of portraits, landscapes and herds, but in the representation of still life. His works are supposed to be divisible into such as bear the distinctive marks C. or A. C. in cursive characters, the letters A. C. in Roman capitals, and the name "A. Cuyp" in full. A man of Cuyp's acknowledged talent may have been versatile enough to paint in many different styles. But whether he was as Versatile as some critics have thought is a question not quite easy to answer. It is to be observed that pieces assigned to Cuyp representing game, shell-fish and fruit, and inscribed A. C. in Roman capitals (Rotterdam, Amsterdam and Berlin museums), though cleverly executed, are not in touch or treat- ment like other pictures of less dubious authenticity, signed either with C. or A. C. or " A. Cuyp " in cursive letters. The panels marked C. and A. C. in cursive are portraits or landscapes, with herds, and interiors of stables or sheds, in which there are cows, horses and poultry. The subjects and their handling are akin to those which strike us in panels bearing the master's full

signature, though characterized, as productions of an artist in the first phase of his progress would naturally be, by tones more uniform, touch more flat, and colour more deep than we find in the delicate and subtle compositions of the painter's later time. Generally speaking, the finished examples of Cuyp's middle and final period all bear his full signature. They are all remarkable for

harmonies attained by certain combinations of shade in gradations with colours in contraposition.

Albert Cuyp, a true child of the Netherlands, does not seem to have wandered much beyond Rotterdam on the one hand or Nijmwegen on the other. His scenery is that of the Meuse or Rhine exclusively; and there is little variety to notice in his views of water and meadows at Dordrecht, or the bolder undulations of the Rhine banks east of it, except such as results from diversity of effect due to change of weather or season or hour. Cuyp is to the river and its banks what Willem Vandevelde is to calm seas and Hobbema to woods. There is a poetry of effect, an eternity of distance in his pictures, which no Dutchman ever expressed in a similar way. His landscapes sparkle with silvery sheen at early morning, they are bathed in warm or sultry haze at noon, or glow with heat at eventide. Under all circumstances they have a peculiar tinge of auburn which is Cuyp's and Cuyp's alone. Burger truly says van Goyen is gray, Ruysdael is brown, Hobbema olive, but Cuyp " is blond." The utmost delicacy may be observed in Cuyp's manner of defining reflections of objects in water, or of sight from water on ship's sides. He shows great cleverness in throwing pale-yellow clouds against clear blue skies, and merging yellow mists into olive-green vegetation. He is also very artful in varying light and shade according to distance, either by interchange of cloud-shadow and sun-gleam or by gradation of tints. His horses and cattle are admirably drawn, and they relieve each other quite as well if contrasted in black and white and black and red, or varied in subtler shades of red and brown. Rich weed-growth is expressed by light but marrowy touch, suggestive of detail as well as of general form. The human figure is given with homely realism in most cases, but frequently with a charming elevation, when, as often occurs, the persons represented are meant to be portraits. Whatever the theme may be it remains impressed with the character and individuality of Cuyp. Familiar subjects of the master's earlier period are stables with cattle and horses (Rotterdam, Amsterdam,

Peters- burg and Brussels museums). Occasionally he painted portraits in the bust form familiar to his father, one of which is dated 1649, and exhibited in the National Gallery, London. More frequently he produced likenesses of ladies and gentlemen on horseback, in which the life and dress of the period and the forms of horses are most vividly represented (Buckingham Palace, Bridgewater Gallery, Louvre and Dresden Museum). Later on we find him fondest of expansive scenery with meadows and cattle and flocks, or rivers and barges in the foreground and distances showing the towers and steeples of Dordrecht. Cuyp was more partial to summer than to winter, to noon than to night, to calm than to storm. But some of his best groups a're occasionally relieved on dark and gusty cloud (Louvre and Robarts's collection). A few capital pieces show us people sledging and skating or netting ice-holes (Yarborough, Neeld and B edf ord collections) . A lovely " Night on the Banks of a River," in the Grosvenor collection, reminds us that Cuyp's friend and contemporary was the painter of moonlights, Aart van der Neer, to whom he was equal in the production of these peculiar effects and superior in the throw of figures. Sometimes Cuyp composed fancy subjects. His " Orpheus charming the Beasts," in the Bute collection, is judiciously arranged with the familiar domestic animals in the foreground, and the wild ones, to which he is a comparative stranger, thrown back into the distance. One of his rare gospel subjects is " Philip baptizing the Eunuch " (Marchmont House, Berwickshire) , described as a fine work by Waagen. The best and most attractive of Cuyp's pieces are his Meuse and Rhine land- scapes, with meadows, cattle, flocks and horsemen, and occasion- ally with boats and barges. In these he brought together and displayed — during his middle and final period— all the skill of one who is at once a poet and a finished artist; grouping, tinting,

touch, harmony of light and shade, and true chords of colours are all combined. Masterpieces of acknowledged beauty are the " Riders with the Boy

and Herdsman ” in the National Gallery; the Meuse, with Dordrecht in the distance, in three or four varieties, in the Bridgewater, Grosvenor, Holford and Brownlow collections; the ” Huntsman ” (Ashburton); ” Herdsmen with Cattle,” belonging to the marquess of Bute; and the ” Piper with Cows,” in the Louvre. The prices paid for Cuyp’s pictures in his own time were comparatively low. In 1 750, 30 florins was considered to be the highest sum to which any one of his panels was entitled. But in more recent times the value of the pictures has naturally risen very largely. At the sale of the Clewer collection at Christie’s in 1876 a small ” Hilly Landscape in Morning Light ” was sold for £5040, and a view on the Rhine, with cows on a bank, for £3150. (J. A. C.)

John Smith’s Catalogue raisonne of the Dutch and Flemish painters, in 9 vols. (1840), enumerated 335 of Albert Cuyp’s works, of which in 1877 Sir J. A. Crowe wrote in this encyclopaedia that ” it would be difficult now to find more than a third of them.” In C. Hofstede de Groot’s Catalogue raisonnS, vol. ii. (1909), revising Smith’s, the number is extended to nearly 850, but he accepts too readily the attributions of sale catalogues ; the work is, however, the best modern authority on the painter.

CUZA (or Cotjza), ALEXANDER JOHN [Alexandra Joan] (1820–1873), first prince of Rumania, was born on the 20th of March 1820, at Galatz in Moldavia, and belonged to an ancient boiar, or noble, family. He was educated at Jassy, Pavia, Bologna and Athens; and, after a brief period of military service, visited Paris from 1837 to 1840 for a further course of study. In 1845 he married the daughter of another boiar, Elena Rosetti, who in 1862 founded the Princess Elena refuge for orphans, at Bucharest. Cuza was imprisoned by the Russian authorities for taking part in the Rumanian revolution of 1848, but escaped to Vienna. On his return, in 1850, he was appointed prefect of Galatz. In 1857 he rejoined the army, and within a few months rose to the rank of colonel. He became minister of war in 1858, and represented Galatz in the Assembly which was elected

in the same year to nominate a prince for Moldavia. Cuza was a prominent speaker in the critical debates which ensued when the assembly met at Jassy, and strongly advocated the union of the two Danubian principalities, Moldavia and Walachia. In default of a foreign prince, he was himself elected prince of Moldavia by the assembly at jassy (1 7th Jan. 1859) , and prince of Walachia by the assembly at Bucharest (5th Feb.). He thus became ruler of the united principalities, with the title Prince Alexander John I. ; but as this union was forbidden by the congress of Paris (18th Oct. 1858), his authority was not recognized by his suzerain, the sultan of Turkey, until the 23rd of December 1861, when the union of the principalities under the name of Rumania was formally proclaimed. For a full account of Cuza's reign see Rumania. The personal vices of the prince, and the drastic and unconstitutional reforms which he imposed on all classes, alienated his subjects, although many of these reforms proved to be of lasting excellence. Financial distress supervened, and the popular discontent culminated in revolution. At four o'clock on the morning of the 22nd of February 1866, a band of military conspirators broke into the palace, and compelled the prince to sign his abdication. On the following day they conducted him safely across the frontier. Prince Alexander spent the remainder of his life chiefly in Paris, Vienna and Wiesbaden. He died at Heidelberg on the 15th of May 1873.

CUZCO, an inland city of southern Peru, capital of an Andean department of the same name, about 360 m. E.S.E. of Lima, in lat. 13° 31' S., long. 73 03' W. The population, largely composed of Indians and mestizos, was estimated at 30,000 in 1896, but according to the official estimate of 1906, it was then about 25% less. The city stands at the head of a small valley, 11,380 ft. above sea-level, and is nearly enclosed by mountains of considerable elevation. The valley itself is 9 m. in length and extends S.E. to the valley of Vilcamayu. Overlooking the city from the N. is the famous hill of Sacsahuaman, crowned by ruins of the cyclopean

fortress of the Incas and their predecessors, and separated from adjacent heights by the deep ravines of two

streams, called the Huatenay and Rodadero. The principal part of the city lies between these two streams, with its great plaza in the centre. On the W. side of the Huatenay are two more fine squares, called the Cabildo and San Francisco. The houses of the city are built of stone, their walls commonly showing the massive masonry of the Incas at the bottom, crowned with a light modern superstructure roofed with red tiles. The streets cross each other at right angles and afford fine vistas on every side. The principal public buildings are the cathedral, which is classed among the best in South America, the convent of San Domingo, which partly occupies the site of the great Temple of the Sun of the Incas, the cabildo or government-house, a university founded in 159J5, a college of science and arts, a public library, hospital, mint and museum of Incarial antiquities. Cuzco was made the see of a bishopric soon after it was occupied by the Spaniards. The Church has always exercised a dominating influence in this region, and the city has many churches and religious establish- ments. There are a number of small manufacturing industries in Cuzco, including the manufacture of cotton and woollen fabrics, leather, beer, embroidery and articles of gold and silver. Its trade is not large, however, owing to the costs of transportation. The climate is cool and bracing, and the products of the vicinity include many of the temperate zone. A railway from Juliaca (a station on the line from Mollendo to Puno) to Cuzco was virtu- ally completed early in 1908. This railway gives Cuzco an outlet to the coast, and also direct connexion with La Paz, the Bolivian capital. A branch of the Callao & Oroya railway is also projected southward to Cuzco, and reached Huancayo in 1908. Cuzco was the capital of a remarkable empire ruled by the Incas previous to the

discovery of Peru, and it was one of the largest and most civilized of the native cities of the New World. It was captured by Pizarro in 1533, and it is said that its size and the magnificence of its principal edifices filled the Spaniards with surprise. It was for many years an object of contention among the Spanish factions, but ultimately the greater attractions of Lima and its own isolation diminished its importance.

The department of Cuzco is the second largest in Peru, having an area of 156,317 sq. m., and a population, according to a re- duced official estimate of 1906, of only 328,980. It occupies an extremely mountainous region on the frontier of Bolivia, E. of the departments of Junin, Ayacucho and Apurimac, and extends from Loreto on the N. to Puno and Arequipa on the S. Its area, however, includes a large district E. of the Andes which is claimed by Bolivia, and the settlement of the dispute may materially diminish its size. The elevation of a large part of the department gives it a temperate climate and permits the cultiva- tion of cereals and other products of the temperate zone. Cattle and sheep are produced in large numbers in some of the provinces, while in others mining forms the chief industry. On the eastern forested slopes and in the lower valleys tropical conditions prevail. The population is chiefly composed of Indians who form a sturdy, docile labouring class, but are in great part strongly disinclined to accept the civilization of the dominant white race.

CYANAMIDE, NC-NH 2 , the amide of normal cyanic acid, obtained by the action of ammonia on cyanogen chloride, bromide or iodide, or by the desulphurization of thio-urea with mercuric oxide; it is generally prepared by the latter process. It forms white crystals, which melt at 40 C, and are readily soluble in water, alcohol and ether. Heated above its melting point it polymerizes to dicyandiamide (CN 2 H 2) 2 , which at 150 C. is transformed into the polymer «-tri-cyantri- amide or melamine (CN 2 H 2) 3 , the mass solidifying. Nascent hydrogen reduces cyanamide to ammonia and

methylamine. It gives mono-metallic salts of the type NC-NHM when treated with aqueous or alcoholic solutions of alkalis. Di-metallic salts are obtained by heating cyanates alone, e.g. calcium, or cyanides in a current of nitrogen, e.g. barium.

Calcium cyanamide has assumed importance in agriculture since the discovery of its economic production in the electric furnace, wherein calcium carbide takes up nitrogen from the atmosphere to form the cyanamide with the simultaneous

liberation of carbon. It may also be produced by heating lime or chalk with charcoal to 2000 in a current of air. The com- mercial product (which is known in Germany as " Kalkstick- stojf ") contains from 14 to 22 % of nitrogen, which is liberated as ammonia when the substance is treated with water; to this decomposition it owes its agricultural value. It appears that with soils which are not rich in humus or not deficient in lime, calcium cyanamide is almost as good, nitrogen for nitrogen, as ammonium sulphate or sodium nitrate; but it is of doubtful value with peaty soils or soils containing little lime, nor is it usefully available as a top-dressing or for storing.

CYANIC ACID AND CYANATES. Cyanic acid, CN-OH, was discovered by F. Wohler in 1824, and may be obtained by distilling its polymeride, cyanuric acid, in a current of carbon dioxide (F. Wohler and J. v. Liebig, Berzelius Jahresberichte, 1827, ir, p. 84), the vapours which distil over being condensed in a freezing mixture. It is a very volatile liquid of strong acid reaction, and is only stable below o° C. It has a smell resem- bling that of acetic acid. At 0° C. it is rapidly converted into a mixture of cyanuric acid, C3N3O3H3, and another polymer, cyamelide (CNOH)x; this latter substance is a white amorphous powder, insoluble in water. An aqueous solution of cyanic acid is rapidly hydrolysed (above 0° C.) into a mixture of carbon dioxide and ammonia. Cyanogen chloride, CNC1, may be regarded as the chloride of cyanic acid. It may be prepared by the action of chlorine on hydrocyanic acid or on mercury

cyanide. It is a very poisonous volatile liquid, which boils at 15-5° C. It polymerizes readily to cyanuric chloride, C3N3CI3. Caustic alkalis hydrolyse it readily to the alkaline chloride and cyanate.

The salts of cyanic acid are known as the cyanates, the two most important being potassium cyanate (KOCN) and ammonium cyanate (NH 4 OCN). Potassium cyanate may be prepared by heating potassium cyanide with an oxidizing agent, or by heating potassium ferrocyanide with manganese dioxide, potassium carbonate or potassium dichromate (J. v. Liebig, Ann., 1841, 38, p. 108; C. Lea, Jahresb., 1861, p. 789; L. Gatter- mann, Ber., 1890, 23, p. 1224), the fused mass. being extracted with boiling alcohol. It crystallizes in flat plates and is readily soluble in cold water. It is a somewhat important reagent, and has been used by Emil Fischer in various syntheses in the uric acid group (see Purin). Ammonium cyanate possesses considerable theoretical importance since the first synthetical production of an organic from inorganic compounds was accom- plished by warming its aqueous solution for some time, urea being formed (F. Wohler, Berzelius Jahresberichte, 1828, 12, p. 266). J. Walker and J. K. Wood (Jour. Chem. Soc, 1900, 77, p. 24) prepared pure ammonium cyanate by the union of gaseous ammonia and cyanic acid, special precautions being taken to keep the temperature below the point at which the salt is trans- formed into urea. It crystallizes in fine needles, which melt suddenly at about 8o° C, then resolidify, and melt again at about 128 to 130 C. (this temperature being that of the melting point of urea). Substituted ammonias were also made to combine with cyanic acid, and it was found that the substituted am- monium cyanates produced pass much more readily into the corresponding ureas than ammonium cyanate itself. (On the constitution of cyanic acid see F. D. Chattaway and J. M. Wadmore, Jour. Chem. Soc, 1902, 81, p. 191.)

Esters of normal cyanic acid are not known, but those of isocyanic acid (HN-CO) may be prepared by

the action of alkyl halides on silver cyanate, or by oxidizing the isonitriles with mercuric oxide. They are volatile liquids which boil without decomposition, and possess a nauseating smell. When hydrolysed with caustic alkalis, they yield primary amines (this reaction determines their constitution) . C2H5NCO + H 2 = C 2 H 5 NH 2 + C0 2 . When heated with water they yield carbon dioxide and symmetrical dialkyl ureas; with ammonia and amines they form alkyl ureas; and with acid anhydrides they yield tertiary amides.

Ethyl isocyanate, C 2 H 6 NCO, was first prepared by A. Wurtz (Ann.chim., i854(3),42,p. 43)by distilling a mixture of potassium

ethyl sulphate and potassium cyanate. It is a colourless liquid which boils at 6o° C.

Cyanuric acid, H3C3N3O3, was obtained by Wohler and Liebig by heating urea, and by A. Wurtz by passing chlorine into melting urea. It forms white efflorescent crystals. Treatment with phosphorus pentachloride gives cyanuric chloride, C3N3CI3, which is also formed by the combination of anhydrous chlorine and prussic acid in the presence of sunlight. These substances contain a ring of three carbon and three nitrogen atoms, i.e< they are symmetrical triazines.

CYANIDE, in chemistry, a salt of prussic or hydrocyanic acid, the name being more usually restricted to inorganic salts, i.e. the salts of the metals, the , organic salts (or esters) being termed nitriles. The preparation, properties, &c, of cyanides are treated in the article Prussic Acid; reference should also be made to the articles on the particular metals. The most important cyanide commercially is potassium cyanide, which receives application in the ” cyanide process ” of gold extraction (see Gold). .

CYANITE, a native aluminium silicate, Al 2 Si0 5 , crystallizing in the anorthic system. It has the same percentage chemi- cal composition as andalusite and sillimanite, but differs from these in its crystallographic and physical characters. P. Groth writes the formula as a metasilicate (A10) 2 SiOs. The name cyanite was given by A. G. Werner in 1789, from Kvavos, blue, in allusion i to the characteristic colour of the mineral; the form kyanite is also in common use, and the name disthene,. proposed by R. J. Hapy in 1801, is used by French writers' ,

Distinctly developed crystals with terminal planes are rare, the mineral being commonly found as lamellar cleavage masses or long 1 blade-shaped crystals embedded in crystalline rocks. The colour is usually a pale sky-blue, but may be white, greenish or yellowish; it varies in intensity in different bands, so that the crystals usually present a more or less striped appearance. There is a perfect cleavage parallel to the broad face m (100), and a less perfect one parallel to t (oio) : the basal plane p (001), oblique to the prism zone, is a gliding plane on which secondary twinning is produced by pressure, giving rise to characteristic horizontal striations on the cleavage face m. The accompanying figure represents a crystal twinned on the plane m (100). A negative biaxial optic figure is seen in convergent polarized light through the cleavage plane m, the axial plane being inclined at about 30° to the edge between m and t. A remarkable feature of cyanite is the great difference in hardness on different faces of the same crystal and in different directions on the same face: on the face m in a direction parallel to the edge between m and p the hardness is 7, whilst in a direction parallel to the edge between m and / it is 4§. The name disthene, from 5is, two, and odivos, strong, has reference to these differences in hardness.

Analyses of cyanite often show the presence of a small amount (usually less than 1 %) of ferric oxide and sometimes traces of copper, and to these constituents the. bh»e or green colour of the

mineral is doubtless due. The mineral is infusible before the blowpipe, and is not decomposed by acids. At a high temperature, about 1350 C, it becomes transformed into sillimanite, changing in specific gravity from 3-6 to 3-2.

Cyanite is a characteristic mineral of the metamorphie crystal- line rocks— gneiss, schist, granulite and eclogite^-and is often associated with garnet and staurolite. A typical occurrence is in the white, fine-scaled paragonite-schist of Monte Campione, near St Gotthard in Switzerland, where long transparent crystals of a fine blue colour are abundant. In the gneiss of the Pfitscher Tal near Sterzing in Tirol a white variety known as rhaetizite is found. It occurs at several places in Scotland, for instance, at Botriphnie in Banffshire, with muscovite in a quartz-vein. Fine, specimens are found in mica-schist at Chesterfield in

Massachusetts, and at several other, localities in the United States. It is found in the gold- washings of the southern Urals and in the diamond-washings of Brazil. As minute crystal fragments it is met with in many sands and sandstones.

When of sufficient transparency and depth of colour (deep cornflower-blue) the mineral has a limited application as a gem-stone; it is usually cut en cabochon. (L. J. S.)

CYANOGEN (Gr. nbavos, blue yevvav, to produce), C 2 N 2 , in chemistry, a gas composed of carbon and nitrogen. The name was suggested by Prussian blue, the earliest known com- pound of cyanogen.' It was first isolated in 181 5 by J. Gay- Lussac, who obtained it by heating mercury or silver cyanide; this discovery is of considerable historical importance, since it recorded the isolation of a "compound radical." It may also be prepared by heating ammonium oxalate; by passing induc- tion sparks between carbon points in an atmosphere of nitrogen (see H. von Wartenburg, Abs, J.C.S., 1907, i. p. 299), or by the addition of a concentrated solution of potassium cyanide to one of copper

sulphate, the mixed solutions being then heated. It also occurs in blast-furnace gases. When cyanogen is prepared by heating mercuric cyanide, a residue known as para-cyanogen, (CN)^ is left; this is to be regarded as a polymer of cyanogen. It is a brownish amorphous solid, which is insoluble in water. Cyanogen is a colourless gas, possessing a peculiar characteristic smell, and is very poisonous. It burns with a purple flame, forming carbon dioxide and nitrogen; and may be condensed (by cooling to -2 5 C.) to a colourless liquid, and further to a solid, which melts at -34-4° C. (M, Faraday, Ann., 1845, 56, p. 158). It dissolves readily in water and the aqueous solution decomposes on standing; a dark-brown flocculent precipitate of azulmic acid, C4H5N5O, separating whilst ammonium oxalate, urea and hydrocyanic acid are found in the solution. In many respects it resembles chlorine in its chemical behaviour, a circum- stance noted by Gay-Lussac; it combines directly with hydrogen (at 500° to 550° C.) to form hydrocyanic acid, and with chlorine, bromine, iodine and sulphur, to form cyanogen chloride, &c; it also combines directly with zinc, cadmium and iron to. form cyanides of these metals. It combines with sulphuretted hydrogen, in. the presence of water, to form the compound C 2 N 2 -H 2 S, and in the presence of alcohol, to form the compound C 2 N 2 '2H 2 S. Concentrated hydrochloric acid' converts it into oxamide. Potash solution converts it into a mixture of potassium cyanide and cyanate. When heated with hydriodie acid (specific gravity 1-96) it forms amino-acetic acid, and with tin and hydrochloric acid it yields ethylene diamine.

CYAXARES (Pers. Uvakhshatra), king of Media, reigned according to Herodotus (i. 107) forty years, about 624-584 B.C. That he was the realiounder of the Median empire is proved by the fact that in Darius's time a Median usurper, Fravartish, pretended to be his offspring (Behistun inscr. 2. 43); but about his history we know very little. Herodotus narrates (i. 103 ff .) that he renewed the war against the Assyrians, in which his father Phraortes had

perished, but was, while he, besieged Nineveh, attacked by a great Scythian army under Madyas, son of Protothyes, which had come from the northern shores of the Black Sea in pursuit of the Cimmerians. After their victory over Cyaxares, the Scythians conquered and wasted the whole of western Asia, and ruled twenty-eight years, till at last they were made drunk and slain by Cyaxares at a banquet (cf. another story about Cyaxares and a Scythian host in Herod. i. 73). As we possess scarcely any contemporary documents it is impossible to find out the real facts. But we know from the prophecies of Jeremiah, and Zephaniah that Syria and Pales- tine were really invaded by northern barbarians in 626 B.C., and i is probable that this invasion was the principal cause of the downfall of the Assyrian empire (see M^dia and Persia: Ancient History).*

After the destruction of the Scythians Cyaxares regained the, supremacy, renewed his attack on Assyria, and in 606 B.C. destroyed Nineveh and the other capitals of the empire (Herod, i. 106; Berossus ap. Euseb. Chron. i. 29, 37, confirmed by a stele of Nabonidus found in Babvlon: Scheil in Recueil de

travaux, xviii. ; Messerschmidt, ” Die Inschrift der Stele Nabonaids,” in Mitteilungen der vorderasialischen Gesellschaft, i., 1896). According to Berossus he was allied with Nabopolassar of Babylon, whose son Nebuchadrezzar married Amyitis, the daughter of the Median king (who is wrongly called Astyages). The countries north and east of the Tigris and the northern part of Mesopotamia with the city of Harran (Carrhae) became subject to the Medes. Armenia and Cappadocia were likewise subdued; the attempt to advance farther into Asia Minor led to a war with Alyattes of Lydia. The decisive battle, in the sixth year, was interrupted by the famous solar eclipse on the 28th of May 585

predicted by Thales. Syennesis of Cilicia and Nebuchadrezzar (in Herodotus named Labynetus) of Babylon interceded and effected a peace, by which the Halys was fixed as frontier between the two empires, and Alyattes's daughter married to Cyaxares's son Astyages (Herod, i. 74). If Herodotus's dates are correct, Cyaxares died shortly after- wards.

In a fragmentary letter from an Assyrian governor to King Sargon (about 715 B.C.) about rebellions of Median chieftains, a dynast Uvakshatar {i.e. Cyaxares) is mentioned as attacking an Assyrian fortress (Kharkhar, in the chains of the Zagros). Possibly he was an ancestor of the Median king. (Ed. M.)

CYBELE, or Cybebe (Gr. KvPtfa], Kvftrifiri), a goddess native to Asia Minor and worshipped by most of the peoples of the peninsula, was known to the Romans most commonly as the Great Mother of the Gods (q.v.), or the Great Idaean Mother of the Gods — Magna Deum Mater, Mater Deum Magna Idaea. She was known by many other names, such as Mater Idaea, Dindymene, Sipylene, derived from famous seats of worship, and Mountain Mother, &c, in token of her character, but Cybele is the name by which she is most frequently known in literature. Her cult became centralized in Phrygia, had found its way into Greece, where it never flourished greatly, as early as the latter 6th century B.C. , and was introduced at Rome in 204 B.C. Under the Empire it attained to great importance, and was one of the last pagan cults to die. Cybele was usually worshipped in connexion with Attis (q.v.), as Aphrodite with Adonis, the two being a duality interpreted by the philosophers as symbolic of Mother Earth and her vegetation. (G. Sn.)

CYCLADES, a compact group of islands in the Greek Archi- pelago, forming a cluster around the island of Syra (Syros), the principal town of which, now officially known as Hermoupolis, is the capital of a department. Population of the group (1907) 130,378. The islands, though seldom visited by foreigners,

are for the most part highly interesting and picturesque, notwith- standing their somewhat barren appearance when viewed from the sea; many of them bear traces of the feudal rule of Venetian families in the middle ages, and their inhabitants in general may be regarded as presenting the best type of the Greek race. To the student of antiquity the most interesting are : Delos (q.v.), one of the greatest centres of ancient religious, political and commercial life, where an important series of researches has been carried out by French archaeologists; Melos (q.v.), where, in addition to various buildings of the Hellenic and Roman periods, the large prehistoric stronghold of Phylakopi has been excavated by members of the British school at Athens; and Thera (see Santorin), the ancient capital of which has been explored by Baron Hiller von Gaertringen. Thera is also of special interest to geologists owing to its remarkable volcanic phenomena. Naxos, the largest and most fertile island of the group, contains the highest mountain in the Cyclades (Zia, 3290 ft.); the island annually exp orts upwards of 2000 tons of emery, a state monopoly the proceeds of which are now hypothecated to the foreign debt. The oak woods of Ceos (Zea) and Ios furnish considerable supplies of valonia. Kimolos, which is absolutely treeless, produces fuller's-earth. The famous marble quarries of Paros have been practically abandoned in modern times; the marble of Tenos is now worked by a British syndicate. The mineral wealth of the Cyclades has hitherto been much. neglected; iron ore is exported from Seriphos, manganese and sulphur from Melos, and volcanic cement (pozzolana) from Santorin. Other articles

of expoi't are wine, brandy, hides and tobacco. Cythnos, Melos and other islands possess hot springs with therapeutic qualities. The prosperity of Syra, formerly an important distributing centre for the whole Levant, has been declining for several years.

Population (1907): — Syra 31,939 (communes, Hermoupolis 18,132, Mykonos 4589, Syra 9218); Andros 18,035 (Andros 8536, Ami 2166, Gaurio 2897, Corthion

4436) ; Thera 19,597 (Thera 4226, Egiale 1513, Amorgos 2627, Anaphe 579, Emporium 2172, Therasia 679, Ios 2090, Kafliste 3519, Oea 2192); Ceos 11,032 (Ceos 3817, Dryopis 1628, Cythnos 1563, Seriphos 4024); Melos, 12,774 (Melos 4864, Adamas 529, Siphnos 3777, Kimolos 2015, Pholegandros 962, Sikinos 627); Naxos 25,185 (Naxos 2064, Apiranthe 2421, Vivlos 4343, Coronis 3205, Marpessa 1313, Naoussa 1670, Paros 3586, Tragea 4661, Hyrie 1922); Tenos 11,816 (Tenos 4697, Panorme 2658, Peree 2801, Sosthenion 1660). :

CYCLAMEN, in botany, a genus belonging to the natural order Primulaceae, containing about ten species native in the mountains of central 1 Europe and the Mediterranean region. C. europaeum (Sow-bread) is found as an introduced plant in copses in Kent and Sussex. The plants are low-growing herbs with large tuber- ous rootstocks, from the surface of which spring a number of broad, generally heart-shaped or kidney-shaped, long-stalked leaves, which in cultivated forms are often beautifully marbled, ribbed or splashed. The flowers are nodding, and white, pink, lilac or crimson in colour. The corolla has a short tube and five large reflexed lobes. After flowering the stalk becomes spirally coiled, drawing the fruit down to the soil. Cyclamen is a favourite winter and spring flowering plant. C. persicum is probably the best known. It is a small-growing kind bearing medium-sized leaves and numerous flowers. C. giganteum is a large, strong-growing species; not quite so free flowering as C. persicum, but in all other respects superior to it when well grown. C. papilio differs in the fringed character of the petals. It has been obtained by selection from C. persicum. There is also a very beautiful crested race, probably derived from C. giganteum.

The plants are raised from seed, and, with good cultivation, flower in fifteen to eighteen months from date of sowing. Seed should be sown as soon as ripe, in July or August, in pots or pans, filled up to 2\ in. of the rim with broken crocks for drainage. The soil should consist of fibrous yellow

loam, leaf-mould in flakes, and coarse silver-sand, in equal parts. Sow the seed thinly — j in. to \ in. apart — and cover with a very thin sprinkling of the soil. Protect with a square of glass covered with a piece of brown paper for shade, and place on a shelf in a warm greenhouse. The soil should never be allowed to get dry.

When the seedlings appear, remove the covering, care being taken that they do not suffer for want of shade, water or a moist atmosphere. As soon as the third leaf appears, repot singly into thumb-pots in slightly coarser soil, so that the crowns of the little plants are just above the level of the soil. In December transfer into a little richer soil, consisting of two parts fibrous loam broken into small bits by hand and the fine particles rejected, one part flaked leaf-mould, passed through a half-inch sieve, half a part of plant ash from the burnt refuse heap and half a part of coarse silver-sand. Keep through the winter in a moist atmosphere at a temperature not below 50 Fahr., and as near the glass as possible. In March they should be ready for their next shift into 5-in. pots. The potting compost should be the same as for the last shift, with the addition of half a part of well- sweetened manure, such as a spent mushroom bed. Keep in a warm moist atmosphere and shade from strong sunlight. In June reraove to cold frames and stand them on inverted pots well clear of one another. Slugs show a marked partiality for the succulent young leaves and should be excluded by dusting round the frames occasionally with newly slaked lime. The inverted pots serve as traps. The frames may thus be frequently syringed without keeping the plants unduly wet. Shade heavily from direct sunlight, but afford as much diffused light as practicable. Ventilate on all favourable occasions, and close the frames early after copious syringing.

By the end of the month they will be ready for the final shift into 7-in. pots, Much care must be used in handling them, the leaves being large, tender and numerous. The soil is as for the last potting. The frames should be kept close and heavily shaded

for a few days after potting; then gradually reduce shade and increase ventilation. By the end of July the elegance of the foliage alone should well repay the care bestowed on them. From this time onwards very little shading will be needed, the object of the cultivator being to harden the growth already made. With the advent of cool weather in September, remove to flower- ing quarters in a warm greenhouse. Flowering will begin in November and will continue through the winter and spring. The damping off of the flower-buds may occasionally prove troublesome during winter. This may generally be traced to checks, such as sudden changes in temperature, too low a tempera- ture, careless watering, &c. During spring plants that are flowering freely will require weak manure water about twice a week.

Plants selected to bear seed should be set aside for that purpose, and as soon as the capsules are found to be developing properly they should be reduced to six or seven per plant, and all flower- buds picked off as soon as they are large enough to handle. The production of strong seeds is of the utmost importance.

Plants grown for market purposes, either for decoration or for seed, are sown later than the above, are kept cooler, and during summer receive more ventilation and less shade. This results in the production of plants with much smaller and more erect leaves, which travel well. They are flowered in spring and early summer. The species grown for this purpose is C. persicum.

A few species are hardy in dry sheltered positions, such as rockeries, under walls and old trees, provided the positions are well drained. Such are C. europaeum, with reddish-purple flowers in summer; C. hederifolium in autumn; and C. nea- politanum, with large leaves marbled with silver and rosy-pink flowers.

CYCLE (Gr. kvkSos, a circle), in astronomy, a period of time at the end of which some aspect or relation of the heavenly bodies recurs. The more important cycles are discussed in the articles Calendar and Eclipse. In physics, the term is applied to a series of operations which, performed upon a system, brings it back to its original state; ." Carnot's Cycle " is an example (see Thermodynamics). From the use of the word for any period at the end of which the same events recur in the same order or for any complete series of phenomena, it is used loosely of any long period of time. The name 6 eirmos kwcXos, the epic cycle, was given to the poems which complete the Homeric account of the Trojan War (see below). It is this use which has given rise to the application of the term " cycle " to a series of prose or poetical romances which have for a centre one subject, whether a person, as in the Alexander, Arthurian or Charlemagne cycles, or an object, such as the ring of the Nibelungenlied. In music " Song-cycle " (Ger. Liederkreis) is similarly used of a series of songs written round one subject or set to poems by the same author. Beethoven's An die feme Geliebte (Op. 98), published in 1816, is the earliest instance. Schubert's Die schbne Milllerin, Schumann's Dichterliebe and Brahms's Magelone-Lieder are well-known instances.

Epic Cycle. — This is a collection or corpus of lays written about 776-580 B.C. by poets of the Ionian School, introductory or complementary to the Homeric poems, dealing with the legends of the Trojan and Theban wars. At a later date they were ai ranged so as to form a continuous narrative (the Iliad and the Odyssey included) , perhaps after certain alterations had been made, to fill up gaps and remove inconsistencies and repetitions. By whom, and when, they were so arranged, cannot be decided; it is possible that it was the work of Zenodotus of Ephesus, who had the care of the epic section of the Alexandrian library. In order to furnish the general reader with a comprehensive sketch of mythological history, Proclus — according to Welcker and Valesius (Valois), not the neo-Platonist, but an unknown 2nd

or 3rd century grammarian, perhaps Eutychius Proclus of Sicca 1 in Africa, one of the tutors of Marcus Aurelius (see Proclus) — compiled a prose summary (T pannarucii Xpi?OTOjud0eia)

1 An objection to this view is that according to the Augustan historian Capitolinus (Antoninus, 2) Eutychius of Sicca was a Latin not a Greek grammarian.

of the contents of the poems, to serve as a sort of primer to Greek literature. Extracts from this are preserved in the Codex Venetus of Homer and Photius (cod. 239), according to which the epic cycle began with the union of Uranus and Ge and ended with the death of Odysseus on his return to Ithaca at the hands of his son Telegonus. • The cycle was in existence in his (Proclus's) time, and was in request not so much for its artistic merit, as for the " sequence of the events described in it." Further light is thrown on the subject by pictorial representations, intended for school use during the Roman imperial period, the most famous of which is the Tabula Iliaca in the Capitoline museum.

The expression " epic cycle " in the sense of a poetical collec- tion does not occur before the Christian era; the word kukXos (" cycle," " circle ") is used of a special kind of short poem and also of a prose abstract of mythological history; the adjective has the general sense of " hackneyed," " conventional," and is applied contemptuously (by Callimachus and Horace) to a particular Alexandrian school of poetry.

The most important poems of the Trojan legendary cycle are the Cypria of Stasinus (q.v.); the Aethiopis and Iliou Persis (Sack of Troy) of Arctinus (q.v.); the Little Iliad of Lesches (q.v.); the Nostioi Hagiasor Agias; the Telegonia of Eugammon. To the Theban cycle belong: the Thebais or Expedition of Amphiaraus and the Epigoni of Antimachus. The Oechalias Halosis (capture of Oechalia) of Creophylus (q.v.); the Phocais (or Minyas) of Prodicus; and the Danais of Cercops,

although belonging to the old Homeric epos, cannot with certainty be included in the epic cycle. The names of the authors are in several cases exceedingly doubtful.

Bibliography. — The standard work on the subject is F. G. Welcker, Der epische Cyclus (1865-1882); see also T. W. Allen, " The Epic Cycle," in Classical Quarterly, Jan. and April 1908 (summary of sources and authorities) ; Wilamowitz-Mollendorff, Homerische Untersuchungen (1884), who regards the traditional names and personalities of the poets of the cycle with great scepti- cism; D. B. Monro, Journal of Hellenic Studies, iv. (1883), appendix to his edition of the Odyssey, xiii.-xxiv. (1900), and on the Codex Venetus fragment of Proclus; J. E. Sandys, Hist, of Class. Schol. (2nd ed., 1906), vol. i. ch. 2; J. B. Bury, Ancient Greek Historians (1909), pp. 2-8 on the epics as history ; articles by H. Flach in Ersch and Gruber, Allgemeine Encyklopddie, and by E. Schwartz and others in Pauly-Wissowa, Realencyclopadie.

CYCLING, the clipped term now given comprehensively to the sport or exercise of riding a bicycle (q.v.) or tricycle (q.v.).

Suggestions of vehicles having two or more wheels and propelled by the muscular effort of the rider or riders are to be found in very early times, even on the bas-reliefs of Egypt and Babylon and the frescoes of Pompeii; but though sporadic examples of such contrivances are recorded in the 17 th and 1 8th centuries, it was apparently not till the beginning of the 19th century that they were used to any considerable extent. A " velocipede " invented by Blanchard and Magurier, and described in the Journal de Paris on the 27th of July 1779, differed little from the celerifere proposed by another Frenchman, de Sivrac, in 1690; it consisted of a wooden bar rigidly connect- ing two wheels placed one in front of the other, and was propelled by the rider, seated astride the bar, pushing against the ground with his feet. The next advance was made in the draisine of Freiherr Karl Drais von Sauerbronn

(1785–1851), described in his Abbildung und Beschreibung seiner neu erfundenen Lauf- maschine (Nuremberg, 1 8 1 7) . In this the front wheel was pivoted on the frame so that it could be turned sideways by a handle, thus serving to steer the machine (figs. 1 and 2). A similar machine, the ” celeripede,” also with a movable front wheel, is said to have been ridden by J. N. Niepce in Paris some years before. In England the draisine achieved a great, though temporary, vogue under various names, such as velocipede, patent accelerator, bivector, bicipedes, pedestrian curricle (patented by Dennis Johnson in 18 18), dandy horse, hobby horse, &c, and for a time it was popular in America also. The pro- pulsion of the draisine by pushing with the feet being alleged to give rise to diseases of the legs, arrangements were soon suggested, as by Louis Gompertz in England in 182 1, by which the front wheel could be rotated by the hands with the aid of a system

of gearing, but the idea of providing mechanical connexions between the feet and the wheels was apparently not thought of till later. Pedals with connecting rods working on the rear axle are said to have been applied to a tricycle in 1834 by Kirk-

patrick McMillan, a Scottish blacksmith of Keir, Dum- friesshire, and to a draisine by him in 1840, and by a Scottish cooper, Gavin Dal- zell, of Lesmahagow, Lan- arkshire, about 1845. The draisine thus fitted had wooden wheels, with iron

Fig. i.— Gentleman’s Hobby Horse. *tires > the leading one about*

30 in. in diameter and the driving one about 40 in., and thus it formed the prototype, though not the ancestor, of the modern rear-driven safety bicycle.

For the next 20 years little was done, and then began the evolution of the high ” ordinary ” bicycle with a large driving wheel in front and a small trailing one behind. About 1865

Pierre Lallement in Paris constructed a bicycle in which the front wheel was driven by pedals and cranks attached directly to its axle, but it is doubt- ful whether the origin of this idea must be attributed

Fig. 2— Lady’s Hobby Horse. to h i m or to Ernest Mich-

aux,the son of his employer, who was a carriage repairer. Lallement took his machine to the United States, and in 1866 was granted a patent which had an important influence on the subsequent course of the cycle industry in that country. This machine, consisting of a wooden frame supported on two wooden wheels (fig. 3), soon became

popular in England, as well as in France and America, and came to be called bicycle (or bysicle) by those who took it seriously and ” boneshaker ” by those who did not. Improve- ments quickly followed, chiefly in England, for in America the popularity of the machine was short-lived, and in France the industry was checked by the Franco- German war. Rubber tires, in place of iron ones, appeared in 1868, and in two or three years were made very large, 2 in. or more in width. Suspension wheels, with wire spokes in tension, were seen at the Crystal Palace, London, on the ” Phantom ” (fig. 4) of W. F. Reynolds and J. A. Mays in 1869, and early in

the same year the manu- facture of bicycles, at first for export to France, was begun in England by the Coventry Sewing Machine Company, till then makers of sewing machines. There was a rapid growth in the size of the front wheel, which in the boneshaker nor- mally measured 36 or 38 in. in diameter, with a corresponding shrinkage in the rear wheel (fig. 5), until by 1874, the date of the

invention of the tangent wheel by J. K. Starley 54-in. wheels were being made. The high bicycle was now fairly established in form, and the changes made in the subsequent 10 or 15 years during which it

•The Boneshaker, 1868.

Fig. 4.— The ” Phantom,” 1869.

Fig. 5. — Humber’s ” Spider,” 1872.

retained its supremacy were chiefly in the details of construc- tion, such as the adoption of steel tubing for the frames, the use of hollow rims in the wheels and the application first of cone and then of ball bearings to points of friction. The weight of a 54-in. bicycle, which in 1874-1875 exceeded 50 or even 60 lb, was thus reduced to well under 40 lb in machines intended for use on ordinary roads, and to not much over 20 lb in the case of racers.

The high ” ordinary ” bicycle (fig. 6) gave un- questionable pleasure to many riders, and very fast times were made with it both on the road and on the rac%ig path. In 1882 H. L. Cortis rode 20 m. 300 yds. in one hour, and in April 1884 Thomas Stevens started from San Francisco to ride round the world, a feat which he accomplished in December 1886. But it had various dis- advantages. The vibration set up by the small back wheel was very trying, and in spite of the size of the front one the rider had to move his pedals at an uncomfortably rapid rate if he wished to maintain a good speed. Moreover his seat was placed in such a position that he was liable to be pitched over the handle- bar if his wheel encountered a comparatively small obstacle. Attempts were made to remedy these inconveniences in various ways. From the early ‘eighties much attention was devoted to tricycles, and these were produced in innumerable designs, whether for a single rider, or for two in the form of “sociables,” in which the riders sat side by side, or of ” tandems,” in which one sat behind the other. But their weight, and consequently the exertion of propelling them, was

Fig. 6. — Rudge Racing Ordinary, 1887

necessarily

greater than

in the case of the bicycle, and by the end of the decade, the demand for them had fallen off, though they are still made to a certain extent, chiefly for carrying purposes. The two-track dicycle (fig. 7), invented by E. C. F. Otto about 1879, in which the rider balanced himself between two equal wheels placed abreast, also failed to secure lasting success.

The improvement of the high bicycle was attempted in two directions. On the one hand it was modified by placing the rider farther back, his position ” over his work ” being ensured by arranging the pedals immediately below him and connecting them to the front wheel, which was usually reduced in size, by levers and cranks or by chain-gearing, often with a multiplying action. On the other, the rear wheel was enlarged and made the driving wheel. The ” ‘ Xtraordinary ” (fig. 8), “Facile” (fig. 9) and ” Kangaroo ” were examples of the former kind, which were often spoken of as ” dwarf safeties “; but though a good many of them were used about 1880 and following years, both they and the “ordinary” bicycle ultimately disappeared be fore machines of the second kind, which developed into the modern rear-driven safety. There are numerous claimants for the invention — or rather the reinvention — of this type,

Fig. 7 —Otto Dicycle, 1879.

Fig. 8

-Singers’ ” ‘Xtraordinary,’ ,

1879-

but it appears that the credit for its practical and commercial introduction in substantially its present form is due to J. R. Starley in England. His ” Rover

” (fig. 10), brought out late in 1885, had two nearly equal wheels, the driving wheel 30 in. in diameter and the steering 32 in.; and the rider sat so far back that he could not be thrown forward over the handles. The

motion imparted by the pedals to a sprocket wheel mounted between the wheels was transmitted by an end- less chain to the rear wheel, and by sufficiently increasing the size of this sprocket wheel the machine could be made to travel as far or farther than %e ” ordinary ” for each complete: revolt tion of the pedals. From about 1890 the ■’ safety ” monopolized the field. At first “it was fitted with the narrow rubber tires customary at the time, but these gave way to pneumatic tires, invented in 1888 by J. B. Dunlop, a veterinary surgeon of Belfast, whose idea, however, had been anticipated in the English patent taken out by R. W. Thomson in 1845. The result was a great gain in comfort, due to reduction of vibration, and a remarkable increase of speed or, alternatively, decrease of exertion. Subse- quent progress was mainly in the details of design and manu- facture, tending to secure lightness combined with adequate strength, and such was the success attained, by the application

of scientific principles and of improved methods and materials to the construction of the frames and other parts, that while the weight of the original ” Rover ‘,’ was about 50 lb, that of its successors 20 years later with 28-in. wheels was reduced by 35 or 45%, or even 60% in the case of racing machines. The beginning of the 20th century saw the introduction of two innovations: one was the ” free-wheel,” a device which allows the driving wheel to rotate independently of the chain and pedals, so that the rider, controlling his speed with powerful brakes, can ” coast ” down a hill using the stationary pedals as foot-rests; and the other was the motor-cycle, in which a petrol- engine relieves him, except at starting, from all personal exertion, though at the cost of considerable vibration. A third contrivance, which, however, was an idea of

considerably older date, also began to find favour about the same period in the shape of two-speed and three-speed gears, enabling the rider at will to

alter the ratio between the speed of revolution of his pedals and of his driving wheel, and thereby accommo- date himself to the varying gradients of the road he is traversing .(see also Bicycle, Tricycle and Tire).

The safety bicycle, with Fig. 10.— Starley's" Rover," 1885. pneumat i c tireS; rendered

cycling universally popular, not merely as a pastime but as a con- venient means of locomotion for everyday use. Made with a drop- frame, it also enabled women to cycle without being confined to a heavy tricycle or compelled toassume " rational dress." In con^ sequence there was an enormous expansion in the cycle industry. In England the demand for machines had become so great by 1895 that the makers were unable to cope with it. Numbers of new factories were started, small shops grew into large com- panies, and the capital invested advanced by millions of pounds. The makers who had devoted their mechanical skill to perfecting

Fig. 9.— The "Facile," 1879.

*the.methods bf cyclferconstruction were swallowed up by company promoters and adventurers, bent simply upon filling their own pockets. The march Of mechanical invention and improvement was arrested, and machines, instead of being built by mechanics proud of their work, in many cases were merely put together in the shortest possible time and in a few standard patterns. For these the world clamoured, and for a year they could not be produced fast enough. Then the demand fell off, the British market became over-stocked, and as the British makers declined to consider the wants of foreign customers, their store-rooms remained crowded with machines that could not be sold. Specu- lative finance, such as was exemplified in 1896 by the flotation for £5*000,000 of the Dunlop tire company, which had*

been started in 1889 with a capital of £25,000, had its natural effects. There ensued widespread and continuing disorganization of the trade, which had to be met by extensive reconstructions of over-capitalized companies. English makers too had lost the commanding international position they once enjoyed, when they supplied almost the entire demand for bicycles in many parts of the world, including the United States. In America the manufacture of bicycles was not begun until about 1878, when it was introduced by A. A. Pope (1 843-1 909), and even by 1890, the value of the products barely exceeded 25 million dollars, while for several years later much of the steel tubing required for bicycle manufacture continued to be imported from Great Britain. The industry,, however, thanks to automatic machinery and perfect organization, grew rapidly, and in i960 the value of its products was nearly 32 million dollars. In the two years 1897 and 1898 the exports of cycles and cycle parts alone were worth nearly 14 million dollars, though they fell off in subsequent years, and English makers had to contend with an American invasion, in addition to their domestic troubles. But the competi- tion Vras short-lived. The American makers sent over machines with single tube tires and wooden rims which did not secure the approval of the British purchaser, and so they too lost their hold. In the opening years of the 20th century the industry in Great Britain gradually recovered itself. More attention was paid to the production of cheap machines which were sound and trustworthy, and sales were further stimulated by the introduction of systems of deferred payments. In 1905 about 600,000 machines were made in Great Britain, and 47,604 were exported, the total value of the home-market for cycles and their parts being about 32 millions sterling, and of the export trade about one million. In the same year the number of machines imported was only 2345.

Cycle 1 tours were taken and cycle clubs established almost as soon as the cycle appeared, the Pickwick Bicycle Club in London, founded in 1870, being the oldest in the world. The organization of these clubs

is chiefly of clubs" 3 a social character, and a few possess well-appointed club-houses. To a great extent they have been superseded by the large touring organizations. The Cyclists' Touring Club, organized in 1878 as the Bicycle Touring Club, has members scattered through Europe, America and even the East. Many other countries possess national clubs, as for instance the League of American Wheelmen, founded in 1880, and the Touring Club de France, founded in 1895, of whose objects cycling is only one, though the chief. The aim of these national associations, which have formed an international touring league, is the promotion of cycle touring. To this end they publish road- books, maps and journals; they recommend hotels, with fixed tariffs, in their own and other countries; they appoint repre- sentatives to aid their members when touring; and they have succeeded in inducing most governments to allow their members to travel freely across frontiers without paying duty on their machines. In all countries they have erected warning-boards at dangerous places; in France the best route is suggested by a sign-post, and cyclists who meet with accidents in lonely places find repair outfits provided for their free use. Another important part of the work of these clubs, either directly or indirectly, is the improvement of the roads. France has done more for the cyclist than any other country, owing to the fact

that she possesses the best roads, kept up to a certain extent by the cycle tax, whereby the cyclist acquires a certain official position and right; moreover cycles accompanied by their owners are conveyed without extra charge on the railways, and aid is given to the sport and pastime from public funds. In Belgium the cycle has worked a veritable revolution in the national life. The surface of the greater part of the country being loose and sandy, the roads have been paved, and this paving is so bad as to be impossible for light traffic. The cycle tax

has consequently been devoted, first, to the construction of paths on which cyclists have equal rights with pedestrians, and secondly to the replacing of the paving by macadam. In this way alone cycling has proved of inestimable benefit to Belgium and Luxembourg. In the United States measures for securing good roads and side paths have been introduced in various states, mainly at the instigation first of cyclists and then of motorists, and in Great Britain the Roads Improvement Association has worked for the same end.

Each country also possesses an organization for the govern- ment of cycle racing; and although these unions, one object of which — usually the main one — is the encouragement of cycle racing and cycle legislation, boast an enormous membership, their membership is often composed of clubs and not individuals. Among the most important are the National Cyclists' Union of England and the Union Velocipedique of France. These bodies are also bound together by the International Cyclists' Association, which is devoted mainly to the promotion of racing and legislation connected with it all over the world. The National Cyclists' Union, originally the Bicycle Union, which was the parent body of all, formed in February 1878, was the first to put up danger-boards, and also was early instrumental, alone and with the C.T.C., in framing or suggesting laws for the proper government and regulation of cycle traffic, notably in establishing its position as a vehicle in securing universal rights, in endeavouring, again in conjunction with the C.T.C., to increase facilities for the carriage of cycles on the railways, in securing the opening of parks, and in promoting many other equally praiseworthy objects. For a number of years, however, it has been more prominent as the ruling race-governing body. But cycle racing has fallen upon evil days. At one time cycle racing attracted a large number of spectators, but gradually it lost the public favour, or rather was ignored by the public because it became mainly an advertisement for cycle makers. The presence of the man, directly or indirectly, in the

employ of, or aided by a maker, and the consequent mixing up of trade and sport, lowered racingnot only in the public estimation, but in that of all genuine amateurs. There have always been a few amateurs who have raced for the love of the sport, but the greater number of prominent racing men have raced for the benefit of a firm, so much so that, at one time, an entire section of racing men were classed as " makers' amateurs." They did not confine themselves to the race track, but appropriated the public roads until they became a danger and a nuisance, and road-racing finally was abolished, though record rides, as they are called, are still indulged in, being winked at by the police and by the cycling authorities. The makers' amateurs at least rode to win and to make the best time possible. But the scandal was so great that a system of licensing riders was adopted by the N.C.U., and if this did not effectively kill the sport, the introduction of waiting races did. There probably is considerable skill in riding two-thirds of a race as slowly as possible, and only hurrying the last part of the last lap, but it does not amuse the public, who want to see a fast race as well as a close finish. The introduction of pacing by multicycles and motors next took from cycle racing what interest was left. A motor race, in which the machines are run at top speed, is more exciting than the spectacle of a motor being driven at a rate which the cyclist can follow with the protection of a wind-shield. In America this system of proving what cyclists can do with racing machines was carried so far that in 1899 a board track was laid down on the Long Island railway for about 2 m. between the metals, and a cyclist named Murphy, followed a train, and protected by enormous wind-shields, succeeded in covering a mile

in less than a minute in the autumn of 1900. Other cyclists have devoted themselves, at the instigation of makers, to the riding of 100 m. a day every day for a year. It would be difficult to say what advantage there is in these trials and contests. They are not convincing records, and only prove that

some people are willing to take great personal risks for the benefit of their employers. E. Hale, during 1899–1900, covered 32,496 m. in 313 days. For many years also long-distance races, mostly of six days' duration, have been promoted on covered tracks, and though condemned by all cycling organizations, they find a great deal of pecuniary support.

The cycle has also been taken up for military purposes. For this idea the British army is indebted to Colonel A. R. Savile, who in 1887 organized the first series of cycle manoeuvres in England. Since then military cycling has undergone a great development, not only in the country of its origin but in most others.

Cycling has produced a literature of its own, both of the pastime and of the trade. Owing to the enormous profits which, for several years, were obtained by cycle makers, a trade press … ^ appeared which simply lived by, and out of, its adver- era re " tisers; and though each country has one or more genuine trade journals, the large proportion of these sheets have been worth, in a business aspect, as little practically as from a literary standpoint. On the other hand a vast mass of practical and unpractical, scientific and medical, historical and touring treatises and records have appeared, but mostly of a rather ephemeral character.

CYCLOID (from Gr. kvkKos, circle, and etSos, form), in geometry, the curve traced out by a point carried on a circle which rolls along a straight line. The name cycloid is now restricted to the curve described when the tracing-point is on the circumference of the circle; if the point is either within or without the circle the curves are generally termed trochoids, but they are also known as the prolate and curtate cycloids respectively. The cycloid is the simplest member of the class of curves known as roulettes.

No mention of the cycloid has been found in writings prior to the 1 5th century. Francis Schooten {Commentary on Descartes) assigns the invention of

the curve to Rene Descartes and the first publication on this subject after Descartes to Marin Mersenne. Evangelista Torricelli, in the first regular dissertation on the cycloid (De dimensione cycloidis, an appendix to his De dimen- sione parabolae, 1644), states that his friend and tutor Galileo discovered the curve about 1599. John Wallis discussed both the history and properties of the curve in a tract De cycloide published at Oxford in 1659. He there shows that the cycloid was investigated by Carolus Bovillus about 1 500, and by Cardinal Cusanus (Nicolaus de Cusa) as early as 1451. Honore Fabri (Synopsis geometrica, 1669) treated of the curve and enumerated many theorems concerning it. Many other mathematicians have written on the cycloid — Blaise Pascal, W. G. Leibnitz, the Bernoullis, Roger Cotes and others — and so assiduously was it studied that it was sometimes named the " Helen of Geometers." The determination of the area was the subject of many investiga- tions and much controversy. Galileo attempted the evaluation by weighing the curve against the generating circle; this rough method gave only an approximate value, viz., a little less than thrice the generating circle. Torricelli, by employing the " method of indivisibles," deduced that the area was exactly three times that of the generating circle; this result had been previously established in 1640 in France by G. P. de Roberval, but his investigation was unknown in Italy. Blaise Pascal determined the area of the section made by any line parallel to the base and the volumes and centres of gravity of the solids generated by revolving the curve about its axis and base. Before publishing his results he proposed these problems for public competition in 1658 under the assumed name of Amos Detton- ville. John Wallis in England, and A. la Louere in France, accepted the challenge, but the former could only submit in- correct solutions, while the latter failed completely. Having established his priority, Pascal published his investigations, which occasioned a great sensation among his contemporaries, and Wallis was enabled to correct his methods. Sir Christopher

Wren, the famous architect, determined the length of the arc and

its centre of gravity, and Pierre Fermat deduced the surface of the spindle generated by its revolution. A famous period in the history of the cycloid is marked by a bitter controversy which sprang up between Descartes and Roberval. The evaluation of the area of the curve had made Roberval famous in France, but Descartes considered that the value of his investigation had been grossly exaggerated; he declared the problem to be of an elementary nature and submitted a short and simple solu- tion. At the same time he challenged Roberval and Fermat to construct the tangent; Roberval failed but Fermat suc- ceeded. This problem was solved independently by Vicenzo Viviani in Italy. The cartesian equation was first given by Wilhelm Gottfried Leibnitz (Acta eruditorum, 1686) in the form y = (2X — x i)\+j(2%— x 2)%dx. Among other early writers on the cycloid were Phillippe de Lahire (1640-1718) and Francois Nicole

(1683-1758).

The mechanical properties of the cycloid were investigated by Christiaan Huygens, who proved the curve to be tauto- chronous. His enquiries into evolutes enabled him to prove that the evolute of a cycloid was an equal cycloid, and by utilizing this property he constructed the isochronal pendulum generally known as the cycloidal pendulum. In 1697 John Bernoulli proposed the famous problem of the brachistochrone (see Mechanics), and it was proved by Leibnitz, Newton and several others that the cycloid was the required curve.

The method by which the cycloid is generated shows that it consists of an infinite number of cusps placed along the fixed line and separated by a constant distance equal to the circumference of the

rolling circle. The name cycloid is usually restricted to the portion between two consecutive cusps (fig. 1 , curve a) ; the fixed

line LM is termed the base, and the line PQ which divides the curve symmetrically is the axis. The co-ordinates of any point R on the cycloid are expressible in the form x = a(0+sin 8); y = a (1— cos 0), where the co-ordinate axes are the tangent at the vertex O and the axis of the curve, a is the radius of the generating circle, and 8 the angle R'CO, where RR' is parallel to LM and C is the centre of the circle in its symmetric position. Eliminating 8 between these two relations the equation is obtained in the form x= (2ay— y 2)i+a vers- 1 yja. The clumsiness of the relation renders it practically useless, and the two separate relations in terms of a single parameter 8 suffice for the deduction of most of the properties of the curve. The length of any arc may be determined by geometrical considera- tions or by the methods of the integral calculus. When measured from the vertex the results may be expressed in the forms 5 = 40 sin \8 and s = ^(8ay); the total length of the curve is 80. The intrinsic equation is s = ^a sin 4>, and the equation to the evolute is s — ^a cos i/-, which proves the evolute to be a similar cycloid placed as in fig. 2, in which the curve QOP is the evolute and QPR the original cycloid. The radius of curvature at any point is readily deduced from the intrinsic equation and has the value p = 4 cos §0, and is equal to twice the normal which is 2a cos \8.

The trochoids were studied by Torricelli and F. van Schooten, and more completely by John Wallis, who showed that they possessed properties similar to those of the common cycloid. The cartesian equation in terms similar to those used above is x = ad--b sin 8; y = a — b cos 8, where a is the radius of the generating circle and b the distance of the carried point from the centre of the circle. If the point is without the circle, i.e. if a b, the curve has the form shown in fig. 1, curve c.

The companion to the cycloid is a curve so named on

account of its similarity of con- struction, form and equation to the common cycloid. It is generated as follows : Let ABC be a circle having AB for a diameter. Draw any line DE perpendicular to AB and meeting the circle in E, and take a point P on DE such that the line DP = arc BE ; then the locus of P is the companion to the cycloid. The curve is shown in fig. 3. The cartesian equation, referred to the fixed diameter and the tangent at B as axes may be expressed in the forms x = a6, y = o(l— cos 8) and / y-a = a sin (x/a — Jx) ; the latter form shows that the locus is the harmonic curve.

For epi- and hypo-cycloids and epi- and hypo-trochoids see Epicycloid.

Fig. 1.

Fig. 3.

References. — Geometrical constructions relating to the curves above described are to be found in T. H. Eagles, Constructive Geometry of Plane Curves. For the mechanical and analytical investigation, reference may be made to articles Mechanics and Infinitesimal Calculus. A historical bibliography of these curves is given in Brocard, Notes de bibliographic des courbes geometriques (1897). See also Moritz Cantor, Geschichte der Mathematik (1894-1901).

CYCLOMETER (Gr. kvkKos , circle, and ixerpov, measure), an instrument used especially by cyclists to determine the distance they have traversed. In a common form a stud attached to one spoke of the wheel engages with a toothed pinion and moves it on one tooth at each revolution. The pinion is connected with a train of clockwork, the gearing of which bears such a ratio to the circumference of the wheel that the distance corresponding to the number of times it has revolved is shown on a dial in miles or other units.

CYCLONE (Gr. kvkX&v, whirling, from kukXos, a circle), an atmospheric system where the pressure is

lowest at the centre. The winds in consequence tend to blow towards the centre, but being diverted according to Ferrel's law they rotate spirally inwards at the surface of the earth in a direction contrary to the movement of the hands of a watch in the northern hemisphere, and the reverse in the southern hemisphere. The whole system has a motion of translation, being usually carried forward with the great wind-drifts like eddies upon a swift stream. Thus their direction of movement over the British Islands is usually from S,W. to N.E., though they may remain stationary or move in other directions. The strength of the winds depends upon the atmospheric gradients. (See Meteorology.)

CYCLOPEAN MASONRY (from the Cyclopes, the supposed builders of the walls of Mycenae), a term in architecture, used, in conjunction with Pelasgic, to define the rude polygona! construction employed by the Greeks and the Etruscans in the walls of their cities. In the earliest examples they consist only of huge masses of rock, of irregular shape, piled one on the other and trusting to their great size and weight for cohesion; some- times smaller pieces of rock filled up the interstices. The walls and gates of Tiryns and Mycenae were thus constructed. Later, these blocks were rudely shaped to fit one another. It is not always possible to decide the period by the type of construction, as this depended on the material; where stratified rocks could be obtained, horizontal coursing might be adopted; in fact, there are instances in Greece, where a later wall of cyclopean construc- tion has been built over one with horizontal courses.

CYCLOPES (KvK\uires, the round-eyed, plural of Cyclops), a type of beings variously described in Greek mythology. In Homer they are gigantic cave-dwellers, cannibals having only one eye, living a pastoral life in the far west (Sicily), ignorant of law and order, fearing neither gods nor men. The most prominent among them was Polyphemus. In Hesiod (Theogony, 264) they are the three sons of Uranus and Gaea — Brontes, Steropes and Arges, —storm-gods belonging to the family of the Titans, who furnished

Zeus with thunder and lightning out of gratitude for his having released them from Tartarus. They were slain by Apollo for having forged the thunderbolt with which Zeus slew Asclepius. Later legend transferred their abode to Mt Aetna, the Lipari islands or Lemnos, where they assisted Hephaestus at his forge. A third class of Cyclopes are the builders of the so-called ” Cyclo- pean ” walls of Mycenae and Tiryns, giants with arms in their belly, who were said to have been brought by Proetus from Lycia to Argos, his original home (Pausanias ii. 16. 5; 25. 8). Like the Curetes and Telchines they are mythical types of pre- historic workmen and architects, and as such the objects of worship.

The standard work on these and similar mythological characters is M. Mayer, Die Giganten und Titanen (1887); see also A. Boltz, Die Kyklopen (1885), who endeavours to show that they were an historical people; W. Mannhardt, Wold- und Feldkulte (1904); J. E. Harrison, Myths of the Odyssey (1882); and article in Roscher’s Lexikon der Mythologie (bibliography).

CYCLOSTOMATA, or Marsipobranchii, a group of fishes in- cluding the ordinary lampreys and hagfish, and so called from the wide permanently gaping mouth which is without the hinged jaws characteristic of other vertebrates (Gnathostomata).

The class Cyclostomata consists of two orders, the Myxinoids (or Hyperotreti) and the Petromyzontes (or Hyperoartii), which, while showing sufficient resemblance in structure to warrant their inclusion in the same class, are yet marked off by such deep-seated differences as to indicate that they commenced to diverge from one another far back in evolutionary time. The order Myxinoids includes the hagfish (Myxine), common off the eastern, and occurring also, though less commonly, off the western coasts of the north Atlantic, and the genus

Bdellostoma (also known as Homea, Eptatretus, in part — Polistotrema), including the " borers " of the western American coast, New Zealand and the Cape of Good Hope. The order Petromyzontes includes the widely distributed lampreys. The original genus Petromyzon (which it is now customary to subdivide into a number of genera) includes the large sea lamprey (P. marinus) of the north Atlantic coasts and the two fresh-water lampreys of European streams (P. fluviatilis and P. planeri, the latter of which is possibly only a small-sized variety of the former species). In North America nine or ten species of lampreys are known to occur, descriptions of which are given by Jordan and Evermann (1). In the southern hemisphere occur the two genera Mordacia (Chile, Tasmania) and Geotria (Chile, Australia, New Zealand) (2).

The Cyclostomes are remarkable among vertebrates in that they are semiparasitic in habit. The lampreys — except some of the small fresh-water forms — attach themselves to other fishes by their suctorial mouth and proceed to rasp off the flesh by means of the horny teeth carried by the highly-developed tongue. The Myxinoids have gone a step further and actually bore their way right into the body of their prey, devouring all the soft parts and leaving the skin behind as a mere shell, empty but for the bones. Where the hagfish or borers are abundant, as in certain localities off the east coast of Scotland and off the west coast of California, they may do great damage to fisheries from their habit of attacking fishes which are in difficulties through being caught by a hook or in a net; the fish when drawn up being frequently completely deprived of their flesh.

The Myxinoids retain the ancestral marine habitat, but the lampreys have sought refuge from the struggle for existence by taking to fresh water to a less or greater extent. Such a form as Petromyzon marinus or Entosphenus tridentatus of the west coast of America is what is known as anadromous in habit, i.e. it takes refuge in fresh water during the breeding season, ascending rivers like the salmon

for the purpose of spawning. Certain species of lampreys, on the other hand, have completely deserted the sea and spend their whole lives in fresh- water streams or lakes. The lake lampreys show a reminiscence of their ancestral migratory habits in leaving lakes and ascending streams in order to deposit their spawn.

Anatomy. — In structural features, the Cyclostomes show a curious mixture of features which must be looked on as primitive with others which are indicative of high specialization for their peculiar mode of life. In general appearance they are ” eel-like ” : they are elongated in shape and adapted for swimming in eel fashion, i.e. the body is propelled forward by the backward passage along it of waves of lateral flexure. There are, however, certain conspicuous differences which at once serve to distin- guish a Cyclostome from any other fishes of eel-like shape: — (1) the circular permanently open mouth, (2) the absence of all trace of paired limbs, (3) the absence of paired external nasal openings, and (4) the presence on the roof or at the tip of the bead of a conspicuous median opening — the pituitary opening.

It will be convenient, in describing the structural features of the group, to take as a basis for the description the marine lamprey, Petromyzon marinus. A marine lamprey is an eel-like creature 70 to 75 cm. in length. At the anterior end and situated somewhat yentrally is the circular widely gaping mouth or buccal cavity, its lining studded with sharply pointed thorn-like ” teeth ” and its edge fringed with numerous sensory papillae. On the dorsal side of the head is the conspicuous circular pituitary opening with prominent lips, while on the sides are seen the eyes, and behind these a row of somewhat rounded branchial openings or gill-clefts. At about the beginning of the posterior fourth of the body, and in the midventral line, is the anal opening, and immediately behind it is the prominent papilla carrying the opening of the urogenital sinus. The hinder

portion of the body, in accordance with its function in locomotion, is flattened from side to side, while its surface is increased by the development of a median fin fold, divided, except in early stages of development, into three portions, known as the first and second dorsal fins and the caudal fin. The last mentioned is of the primitive protocercal type. The whole surface of the body — which shows a conspicuous dark marbling, especially dorsally, on a light ground- is covered with highly glandular epidermis. An important feature is the complete absence of all trace of the calcified placoid plates which are so characteristic of the Elasmobranchii.

The Myxinoids differ from the lampreys in regard to several of the above-mentioned characters. The edges of the mouth carry tentacle-like barbels. The pituitary opening is close to the anterior edge of the mouth opening instead of being right up on the dorsal side of the head. The eyes are invisible, being greatly reduced and sunk far below the surface, and in Myxine, though not in Bdellostoma, the row of gill openings is represented by a single opening on each side nearly in the midventral line and situated at about the end of the first quarter of the body length. Ventrally the Myxinoid possesses on each side of the body a row of remarkable epidermal glands which can produce at will enormous quantities of glutinous slime. This secretion, which, no doubt, is of much value as a pro- tection from attack, is composed of very fine threads, formed by the conversion of the protoplasm of certain cells of the epidermal glands (" thread cells ") into an extremely fine, tightly coiled filament, which becomes unwound when discharged to the exterior.

Pituitary Tube. — A remarkable peculiarity of the Cyclostomes lies in the fact that the pituitary ingrowth of ectoderm does not, as in other forms, become involved in the inpushing of ectoderm

From D. Starr Jordan, A Guide to the Study o] Fishes, by permission of A. Constable & Co., Ltd.

Fig. i. — The Marine Lamprey (Petromyzon marinus, L.).

which forms the buccal cavity. On the contrary, it lies outside the edge of the stomodaeum, and in the case of the lampreys active growth takes place in the tissue between the pituitary and stomodaeal ingrowths, so that the two openings come to be widely separated, the pituitary opening being pushed back on to the dorsal side of the head. The pituitary opening remains patent throughout life, as is the case with Crossopterygians alone amongst Gnathostomata. In Myxine a further remarkable peculiarity in regard to the hypophysis, probably adaptive in nature, occurs, inasmuch as the pituitary invagination develops an opening at its posterior end into the pharynx.

Nervous System. — The anterior end of the nervous tube is enlarged and differentiated to form a brain as in other Vertebrates, but this brain in the lampreys at least shows remarkably primitive features. The enlargement as compared with the spinal cord is seen to be com- paratively slight : the brain is much elongated, and its various regions lie in a straight line one behind the other: the roof of the brain retains to a great extent the primitive epithelial condition. On each side anteriorly there is present a comparatively large olfactory lobe, and this is continued posteriorly into a small cerebral hemisphere.

The lampreys are amongst those vertebrates in which there is an eye-like apparatus (3) connected with the roof of the thalamen- cephalon. There grow out from the roof of the thalamencephalon two processes, a posterior (the pineal process), and an anterior (the parapineal process). The pineal process grows forwards so as to overlie the parapineal process. Each of these projections from the roof of the thalamencephalon dilates to form a vesicle, and each vesicle shows certain eye-like characteristics, its deep wall forming a ” retina ” and its superficial wall being clear and translucent (” pellucida “). The retinal cells are packed in the case of the

pineal organ with opaque white pigment : similar pigment occurs in smaller quantity in the parapineal organ. Definite sensory cells are also present with rod-like structures projecting into the lumen of the vesicle. Nerve fibres have been traced — from the pineal organ into the posterior commissure and possibly into the right habenular ganglion. As regards other parts of the brain, the chief point to note is that the cerebellum is in a most rudimentary condition, forming merely a slight transverse thickening of the hind-brain roof at its anterior end. In Myxinoids the brain is much larger as compared with the spinal cord, and it differs from that of the lampreys by being relatively much shorter in an anteroposterior direction. A remarkable negative feature lies in the complete absence of the pineal and parapineal organs so conspicuous in the lampreys. The olfactory organ of Cyclostomes is remarkable for two special characteristics, firstly, that the two olfactory organs of other vertebrates are here represented by a single median structure, and secondly,

that the olfactory organ becomes sunk down beneath the surface through becoming involved in the ectodermal ingrowth which forms the pituitary tube. As a further consequence in the case of the lampreys the olfactory organ becomes transported to the roof of the head along with the pituitary opening, which latter functions as an external nostril. That the unpaired olfactory organ of existing Cyclostomes has passed through, in their ancestors, a paired condition such as exists in other vertebrates, is indicated by the fact that it retains a pair of olfactory nerves.

The eyes in adult lampreys are of moderate size, while in the Myxinoids they are greatly reduced — sunk beneath the skin (Bdello- stoma) or even in amongst the muscles of the head {Myxine).- The lens is completely absent, also the ocular muscles. The

otocyst or auditory organ is unique amongst craniate vertebrates in regard to the semicircular canals. In the lampreys there are only two instead of the normal three, while the Myxinoids have only one.

Alimentary Canal. — The widely gaping buccal funnel is morpho- logically an inpushing of the outer skin, i.e. it is stomodaeal in nature. The thorn-like teeth which stud its lining are formed simply by cornification of the epidermal cells (4) like the provisional horny teeth of a tadpole, and are not homologous with the true teeth of ordinary vertebrates. As to whether they represent the remnant of a once present system of epidermal scales, which may have preceded the coating of placoid elements in the evolution of the vertebrate, there is no evidence.

The pharyngeal region, closely associated with the respiratory function, possesses, on each side, a series of gill-sacs (six in Myxine: seven in Petromyzon, besides an anterior one which is laid down in the embryo but disappears later: up to as many as fourteen in Bdellostoma) opening on the one hand to the pharynx and on the other to the exterior. In Bdellostoma and in the larva of Petromyzon

o/f.br^_ pit.

-pc.v.

l.J.V.

a.v.o.

Modified from T. J. Parker, Zootomy \ fig. 4, by permission of Macmiilan & Co., Ltd.

Fig. 2. — Median longitudinal section through anterior end of Petromyzon.

a.v.o, Atrio-ventricular opening, oes, Oesophagus.

br, Brain. olf, Olfactory organ.

br.o. Internal opening of gill sac. pc, Pericardium.

d.a, Dorsal aorta. p.c.v, Leftpost.eriorcardinalvein.

d.c, Ductus cuvieri. pit, Pituitary tube.

h.v, Hepatic vein. V, Ventricle.

i.j:v, Inferior jugular vein. v, Velum.

N, Notochord.

the gill-sacs open directly from the pharynx to the exterior, but in the adult lamprey and in Myxine the original relations are modified. In Myxine, the external openings of the gill-sacs have migrated backwards along the side of the body and become coincident at a point slightly posterior to the last sac. It follows from this that each sac is connected with the common aperture by a tube, longest in the case of the first sac, shortest in the case of the last. In the adult lamprey a different modification is found. Here the dorsal portion of the pharynx has become nipped off as a narrow tube which functions as an oesophagus from the larger ventral portion, which forms an elongated saccular structure ending blindly at its hinder end and having in its lateral wall the internal openings of the gill- sacs.

Breathing. — The inspiratory current passes inwards by the mouth opening in the larval lamprey, by the pituitary tube in Myxine, while in the adult lamprey both expiration and inspiration takes place through the external gill-openings. In the case of the lampreys the elastic skeleton of the branchial region (see below) plays an important part in respiration. The branchial region shows rhythmic contraction through the agency of the transverse muscles — and expansion, through the elasticity of the branchial skeleton — in the adult lamprey. These rhythmic movements of the branchial region cause successive inflow and outflow through the branchial openings. In the larva, on the other hand, the respiratory current always passes in one direction —

backwards. This is helped by the presence of a velar fold at the front end of the pharynx, which acts as a valve opening only backwards, and to the presence of membranous flaps projecting back from the anterior border of each gill-opening and acting as valves which open only outwards.

Behind the pharynx comes the truly digestive part of the ali- mentary canal in the form of a straight tube showing little differentia- tion into special regions. The lining "of the intestine is increased in area by an inwardly projecting fold, which is compared by some morphologists with the spiral valve of certain other groups. In the

mature river lamprey the digestive tract becomes in great part degenerate.

Coelomic Organs. — The chief point of interest about the splanchno- coele or perivisceral cavity is that in the Myxinoids the adult shows a persistent embryonic condition in that the pericardiac portion never becomes isolated from the main body cavity.

The renal organs are of special interest in the Myxinoids from their very simple character. The kidney duct is seen running along the roof of the coelom on either side. Into the duct open short segmentally arranged tubes, each possessing at its closed rounded extremity a Malpighian body. Each of these short tubes is morpho- logically a nephric tubule, which, however, in correlation with its shortness, is without the turns and twists so characteristic of such tubules generally. A further consequence of the short simple character of the tubules is that they are quite separate from one another, instead of being massed together to form a compact gland such as the kidney is elsewhere. In Petromyzon the kidney has the ordinary compact form, and here also the Malpighian bodies are shut off from the splanchnocoele.

The ovary or testis is a large unpaired structure hanging from the dorsal wall of the splanchnocoele and shedding its products into it ; from the

coelomic space the genital products pass into the urogenital sinus— formed by the fusion of the kidney ducts at their hinder ends — through a small opening, one at each side. This opening, which leads directly from coelom into urogenital sinus, is known as the genital pore. Its morphological significance is doubtful.

Skeleton. — The vertebral column of the lamprey is represented by a persistent^ notochord surrounded by a thick sheath, which shows no signs of invasion by cartilage cells or of segmentation. Resting on the sheath are paired dorsal arch elements, more numerous than the neuromuscular segments. In the tail region these are united into a continuous band of cartilage on each side : similar cartilaginous bands represent the ventral arch elements of the tail region. The skeleton of the head region consists of a cartilaginous cranium, into the formation of which enter typical parachordal and trabecular elements, together with olfactory and auditory capsules. In addition, to these, there are a number of other cartilaginous pieces present in the head region, the homologies of which are doubtful.

Branchial Basket. — One of the most characteristic features of the skeleton of the lamprey is the remarkable cartilaginous " branchial basket," which supports the gill region. In an adult river lamprey the basketwork consists on each side of a series of eight vertical half- hoops of cartilage. The hoops of each side are connected together dorsally by a pair of longitudinal bars, lying ventral to the noto- chord, and ventrally by a similar pair of rods which are fused in the middle line. Slender cartilaginous projections arise from the anterior and posterior sides of the hoops, and certain of these meeting at their ends form additional longitudinal bars connecting together successive hoops. Connected with the basketwork posteriorly is a remarkable cup-shaped cartilage, which supports the hind wall of the peri- cardium. The series of cartilaginous half-hoops naturally suggest the half-hoops of cartilage which form the skeleton of the

visceral arches in the Gnathostomata. They are, however, more superficial in position, and this has led many to doubt their actual homology with the cartilaginous visceral arches. Taking into account, how- ever, our present knowledge of the development of the two sets of structures, it seems on the whole probable that a true homology exists and that the branchial basket of the lamprey represents merely a set of visceral arches modified in accordance with the peculiar breathing methods of the creature. In the Myxinoids the branchial basket is reduced to a few vestigial masses of cartilage.

Vascular System. — The heart (5) of the lamprey consists of an atrium and a single ventricle, the atrium on the left, the ventricle on the right. Into the atrium, on its right side, and behind the atrio-ventricular opening, there opens a nearly vertical chamber usually termed the sinus venosus (see below), the opening guarded by a pair of vertically placed valves. The ventricle passes anteriorly into what is clearly the homologue of the conus arteriosus of other forms. In its interior are present a pair of laterally placed longi- tudinal ridges similar to the ridges which occur in other forms in the conus. The opening from ventricle into conus is guarded by a

Eair of laterally placed pocket valves situated just within the oundary of the ventricle.

The arterial system is of the ordinary piscine type. From the heart there passes forwards a ventral aorta, split into two separate vessels in its anterior half, and giving off on each side a series of efferent vessels to the gill-sacs, one passing between each two gill-sacs and an additional one to the front wall of the front sac and to the posterior wall of the last. The blood is collected from the walls of the gill-sacs by a series of efferent vessels which open into the dorsal aorta. It is to be noted that the dorsal aorta retains the probably primitive unpaired condition, except for a very short extent at its anterior end, where it is split so as to form two short aortic roots.

Venous System. — The main venous channels are like those in other fishes, though their connexion with the heart becomes modified in the adult. The two posterior cardinals — with their continuations forwards, the anterior cardinals — approach the median plane and undergo fusion in the region of their opening into the two ductus Cuvieri. The left ductus Cuvieri then atrophies so that all the blood from the cardinals reaches the heart by way of the originally right

ductus CuvierL It is this right ductus Cuvieri which forms the dorsal part of what is usually termed the sinus venosus. The inferior jugular veins which return the blood from the ventral side of the head also become replaced in the adult by a median unpaired vein which opens posteriorly into the sinus venosus by what probably represents the hinder end of the original right inferior jugular. It is interesting to note that in Polypterus, one of the Crossopterygian ganoids, there is a somewhat similar asymmetrical condition of inferior jugulars and ductus Cuvieri.

Oviposition of Lamprey (6). — The lamprey chooses as spawning ground a part of the stream with fairly rapid current and where the bottom is composed of sand with scattered stones. By means of the suctorial mouth, stones are removed from more or less circular area so as to form a shallow excavation. The male and female frequently work together at the task of preparing the nest. When oviposition is about to take place, the male may be seen to suddenly attach himself to the dorsal surface of the head of the female which holds on to one of the stones at the upper margin of the nest. The uro- genital opening of the male, with its specially prominent papilla, is approximated to that of the female, and with a peculiar quivering movement the eggs and sperms are emitted synchronously amidst clouds of sand stirred up by

the movements of the tail. The eggs fertilized thus at the moment of exit are very sticky from their coating of albumen, and become weighted down by adherent grains of sand.

Development. — The development of the lamprey is of much morphological importance from the archaic nature of the creature and from the fact that the egg is comparatively small (about I mm. in diameter), so that development is not greatly modified by a large mass of yolk. It has been worked out so far only in the river lamprey (7). Segmentation is complete and unequal. It, as well as the process of gastrulation, agrees in its main features with the same

Chenomenon in Amia, Dipnoans and Urodele amphibians. The lastopore persists as the anal opening of the adult. The mesoderm arises in a manner closely comparable with that which occurs in Amphioxus, the chief difference being that the mesoderm segments are solid instead of hollow, except in the anterior head region, where they are true hollow enterocoelic pouches. The rudiment of the central nervous system has the form of a solid keel-like ingrowth of ectoderm along the mid-dorsal line, which only secondarily becomes hollowed out — just as happens in Teleostean fishes. The young lamprey, after completing its embryonic development, passes three or four years, in fact its whole life up to the time of sexual maturity, in a prolonged larval condition in which its structure shows important differences from that of the adult. This larval stage of the fresh- water lamprey of Europe was long supposed to be a separate genus of Cyclostomes and was called Ammocoetes. The Ammocoeles lives in the mud and breathes and feeds by means of a current of water produced by ciliary action, which carries Flagellates and other microscopic organisms in through the mouth opening. Correlated with this mode of feeding the buccal cavity is without the teeth so characteristic of the adult. A number of complicated branched sensory processes grow into and nearly occlude the cavity, forming a kind of sieve with only narrow chinks through which the ingoing current

passes. The water passes out by the gill openings, which in Ammocoetes open direct from pharynx to exterior. Certain arrangements of the pharyngeal wall of Ammocoetes show a remark- able resemblance to what is found in Amphioxus. The thyroid, which in the adult is a complicated ductless gland, has in the young Ammocoetes the form of a longitudinal groove of the ventral wall ot the pharynx. This groove is lined by columnar cells, some carrying cilia, others being glandular and secreting sticky slime. These gland cells are arranged in four longitudinal bands. The thyroid is, in fact, in this stage in a condition corresponding exactly with the endostyle of Amphioxus. The agreement extends to function the secretion, forming sticky threads which entangle food particles. Anteriorly a pair of peripharyngeal bands pass dorsalwards, one on each side, to bend back suprapharyngeal bands which are continued to the hinder end of the pharynx. Here again the resemblance to what occurs in Amphioxus is very close.

The Ammocoetes possesses a functional liver with bileduct, while in the adult river lamprey the alimentary canal is degenerate. It has no arch elements on its notochord. Its eyes are sunk beneath the surface and nonfunctional, and they retain to a great extent an embryonic character (8). There is a rapid process of metamorphosis from the larval to the adult condition, the details of which are by no means sufficiently known. After the metamorphosis the now mature lamprey accomplishes the act of reproduction and then apparently dies almost immediately. The development of the Myxinoids is much less well known than that of the lampreys. As regards the common hagfish (Myxine glulinosa), we are indeed still in complete ignorance in regard to its developmental history in spite of persistent efforts to obtain embryological material. It seems probable that during the breeding period the hagfishes retire into some particularly inaccessible habitat. Within the last few years, however, abundant material illustrating the developmental history of Bdellostoma (9) has been obtained off the

Californian coast, and this when fully worked out will give us a-good idea of the general lines of Myxinoid development. The egg differs greatly from that of the lampreys. It is — as is that of Myxine— of large size, richly

yolked and of a shortened-up sausage shape. It measures about 22 mm. by 8 mm. Surrounding the egg is a protective capsule of a yellow horny appearance. At one end a cap-like portion of this forms a detachable operculum, in the middle of which is a minute opening, the micropyle. Each end of the capsule is prolonged into a group of stiff processes with anchor-like expansions at their tips. Segmentation is, as in other richly yolked eggs, incomplete, confined to the germinal disk at the opercular pole. The central nervous system in Bdellostoma develops by the overarching of medullary folds, not out of a solid keel as is the case with the lampreys.

History in Time. — The softness of the skeletal tissues and the absence of scales in Cyclostomata provide little opportunity for the preservation of fossil remains of this group, and no known fossils can be referred with certainty to the Cyclostomata. The Devonian Palaeospondylus gunni has been regarded as a Cyclostome by some authors, but this relationship is at the least doubtful. Other authors have associated the Ostracoderms, the oldest known vertebrates, with this group.

References. — 1. D. S. Jordan and B. W. Evermann, Fishes of North and Middle America (Washington, 1896), part i. p. 8; 2. L. Plate, SB. Ges. Naturf. (Berlin, Jg. 1897), p. 137; 3. F.Studmcka in Oppel's Lehrbuch der vergleichenden mikroskopischen Anatomie der Wirbeltiere (Jena, 1905), Tcil v. s. i. ; 4. E. Warren, Q. J. Micr. Sci. xlv. (1902) p. 631; 5. L. Vialleton, Arch, d'anat. micr. T. vi. (1903) p. 283; 6. H. A. Surface in D. S. Jordan's Fishes (1905), vol. i. p. 494; 7. A. E. Shipley, Q. J. Micr. Sci. xxvii. (1887), W. B. Scott, Journ. Morphol. i. (1887), C. Kupffer, Arch. mikr. Anat. xxxv. (1890), A. Goette, Entwick. des Flussneunauges (Ham- burg

and Leipzig, 1890) ; 8. C. Kohl, in Bibliotheca zoologica, Heft 13 (Cassel, 1892); 9. Bashford Dean in Kupffer's Festschrift (Jena, 1899). (J. G. K.)

CYCLOSTYLE (Gr. k&k\os, a circle, and ctDXos, a column), a term used in architecture. A structure composed of a circular range of columns without a core is cyclostyiar; with a core the range would be peristyle. This is the species of edifice called by Vitruvius monopteral.

CYGNUS (" The Swan "), in astronomy, a constellation of the northern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.), and fabled by the Greeks to be the swan in the form of which Zeus seduced Leda. Ptolemy catalogued 19 stars, Tycho Brahe 18, and Hevelius 47. In this constellation /3 Cygni is a fine coloured double star, consisting of a yellow star, magnitude 3, and a blue star, magnitude 55. The fine double star, n Cygni, separated by Sir William Herschel in 1779, has magnitudes 4 and 5; it has a companion, of magni- tude 75, which, however, does not form part of the system. A double star, 61 Cygni, of magnitudes 5-3 and 5-9, was the first star whose distance was determined; its parallax is o"-39, and it is therefore the nearest star in the northern hemisphere with the exception of a Centauri. A regular variable, x Cygni, has extreme magnitudes of 5 to 13-5, and its period is 406 days. Nova Cygni is a " new " star discovered by Johann Schmidt in 1876. There is also an extended nebula in the constellation.

CYLINDER (Gr. nvKivhpos, from icvKivoeiv, to roll). A cylindrical surface, or briefly a cylinder, is the surface traced out by a line, named the generatrix, which moves parallel to itself and always passes through the circumference of a curve, named the directrix; the name cylinder is also given to the solid contained between such a surface and two parallel planes which intersect a generatrix. A " right cylinder " is the solid traced out by a rectangle which revolves about one of its sides, or the curved surface of this solid; the surface may

also be denned as the locus of a line which passes through the circumference of a circle, and is always perpendicular to the plane of the circle. If the moving line be not perpendicular to the plane of the circle, but moves parallel to itself, and always passes through the circumference, it traces an ” oblique cylinder.” The ” axis ” of a circular cylinder is the line joining the centres of two circular sections; it is the line through the centre of the directrix parallel to the generators. The characteristic property of all cylindrical surfaces is that the tangent planes are parallel to the axis. They are ” developable ” surfaces, i.e. they can be applied to a plane surface without crinkling or tearing (see Sukface).

Any section of a cylinder which contains the axis is termed a ” principal section “; in the case of the solids this section is a rectangle; in the case of the surfaces, two parallel straight lines. A section of the right cylinder parallel to the base is obviously a circle; any other section, excepting those limited by two

generators, is an ellipse. This last proposition may be stated’in the form: — ” The orthogonal projection of a circle is an ellipse ,”; and it permits the ready deduction of many properties of the ellipse from the circle. The section of an oblique cylinder by a plane perpendicular to the principal section, and inclined to the axis at the same angle as the base, is named the ” subcontrary section,” and is always a circle; any other section is an ellipse.

The mensuration of the cylinder was worked out by Archi- medes, who showed that the volume of any cylinder was equal to the product of the area of the base into the height of the solid, and that the area of the curved surface was equal to that of a rectangle having its sides equal to the circumference of the base, and to the height of the

solid. If the base be a circle of radius r, and the height h, the volume is 7ir 2 A and the area of the curved surface 2irrh. Archimedes also deduced relations between the sphere (q.v.) and cone (q.v.) and the circumscribing cylinder.

The name ” cylindroid ” has been given to two different surfaces. Thus it is a cylinder having equal and parallel elliptical bases; i.e. the surface traced out by an- elhpse moving parallel to itself so that every point passes along a straight line, or by a line moving parallel to itself and always ; passing through the circumference of a fixed ellipse. The name was also’ given by Arthur Cayley to the conoidal cubic surface which has, for its equation z(x 2 +y 2) = 2tnxy; every point on this surface lies on the line given by the intersection of the planes y — -x tan’ 0, z = m sin 20, for by eliminating we obtain the equation to the surface.

CYLLENE (mod. Ziria), a mountain in Greece, in the N.E. of Arcadia (7789 ft.). It was specially sacred to Hermes, who was born in a cave on the mountain, and had a temple and an ancient statue on its summit. The name Cyllene belongs also to an ancient port town in Elis, and, owing to doubtful identifica- tion with this, to a modern port at Glarentza, and also to some mineral baths a little to the south of it.

CYMA (Gr. K.v;j.a, wave), in architecture, a moulding of double curvature, concave at one end, convex at the other. When the concave part is uppermost, it is called a cyma recta; but if the convex portion is’ at the top, it is called a cyma reverse When the crowning moulding of an entablature is of the cyma form, it is called a ” cymatium.”

CYMBALS (Fr. cymbales; Ger. Becken; Ital. piatti or cinelli), a modern instrument of percussion of indefinite musical pitch, whereas the small ancient cup-shaped cymbals sounded a definite note. Cymbals consist of two thin round plates of an alloy con- taining 8 parts of copper to two of tin, each having

a handle- strap set in the little knob surmounting the centre of the plate. The sound is obtained not by clashing them against each other, but by rubbing their edges together by a sliding movement. Sometimes a Weird effect is obtained by suspending one of the cymbals by the strap and letting a drummer execute a roll upon it as it swings; or by holding a cymbal in the left hand and striking it with the soft stick of the bass drum, which produces a sound akin to that of the tam-tam. All gradations of piano and forte can be obtained on the cymbals. The composer indicates his intention of letting the cymbals vibrate by ” Let them vibrate,” and the contrary effect by ■” Damp the sound.” To stop the vibrations the performer presses the cymbals against his chest, as soon as he has played a note. The duration of the vibration is indicated by the value of the note placed upon the staff; the name signifies nothing, since the pitch of the cymbals is indefinite. . The instrument is played from the same part of the score as the bass drum, unless otherwise indicated by senza piatti, or piatti soli if the bass drum is to remain silent. Although cymbals are not often required they form part of every orchestra ; their chief use is for marking the rhythm and for producing weird, fantastic effects or adding military colour, and their sTirill notes hold their own against a full orchestra playing fortissimo. Cymbals are specially suited for suggesting frenzy, fury or bacchanalian revels, as in the Venus music in Wagner’s Tannhauser and Grieg’s Peer Gynt suite. Damping gives a suggestion of impending evil or tragedy. The’ timbre of the ancient cymbals is entirely different, more like that of small*

hand-bells or of the notes of the keyed harmonica. They are not struck full against each other, but by one of their edges, and the note given out by them is higher in proportion as they ‘ are thicker and smaller. Berlioz in Romeo and Juliet scored for two pairs of cymbals, modelled on some ancient Pompeian instruments no larger than the hand (some are no larger than

a crown piece), and tuned to

and

4-*

4?-

The origin of the cymbals must be referred to prehistoric times. The ancient Egyptian cymbals closely resembled our own. The British Museum possesses two pairs, 5! in. in diameter, one of which was found in the coffin of the mummy of Ankhhape, a sacred musician; they are shown in the same case as the mummy, and have been reproduced by Carl Engel. 1 Those used by the Assyrians were both plate- and cup-shaped. The Greek cymbals were cup- or bell-shaped, and are to be seen in the hands of fauns and satyrs innumerable in sculptures and on painted vases. The word cymbal is derived from k4ai/?7j (Lat. cymba), a hollow vessel, and KbnfiaKa = small cymbals. During the middle ages the word cymbal was applied to the Glockenspiel, or peal of small bells, and later to the dulcimer, perhaps on account of the clear bell-like tone produced by the hammers striking the wire strings. After the introduction or invention of the keyed dulcimer or clavichord, and of the spinet, the word clavicymbal was used in the Romance languages to denote the varieties of spinet and harpsichord. Ancient cymbals are among the instruments played by King David and his musicians in the gth- century illuminated MS. known as the Bible of Charles the Bald in the Bibliotheque Nationale, Paris. (K. S.)

CYNEGILS (d. 643), king of the West Saxons, succeeded his uncle King Ceolwulf in 611. With his son Cwichelm (d. 636), he defeated the advancing Britons at Banipton in Oxfordshire in 614, and Cwichelm sought to arrest the growing power of the Northumbrian king Eadwine by procuring his assassination; the attempt, however, failed, and in 626 the West Saxons were defeated in battle and forced to own Eadwine's supremacy.. Cynegils' next struggle was with Penda of Mercia, and here again he was worsted, the battle being fought in 628 at Ciren- , cester, and was probably compelled to

surrender part of his kingdom to Mercia. Cynegils was converted to Christianity through the preaching of Birinus, and was baptized in 635 at: Dorchester in Oxfordshire, where he founded a bishopric. He was succeeded as king by his son Cenwalh.

CYNEWULF (d. 785), king of Wessex, succeeded to the throne in 757 on the deposition of Sigeberht. He was constantly at war with the Welsh. In 779 Offa of Mercia defeated him. and took Bensington. In 785 he was surprised and killed, with all his thegns present, at Marten, Wilts (Merantune), by Cyne-heard, brother of the deposed Sigeberht.

See Earle and Plummer's edition of the Anglo-Saxon Chronicle, 755. 779 (Oxford, 1892).

CYNEWULF, the only Old-English vernacular poet, known by narhe, of whom any undisputed writings are extant. He is, the author of four poems preserved in two MSS., the Exeter Book and the Vercelli Book, both of the early nth century. An epilogue to each poem contains the runic characters answering to the letters c, y, n (e^ ,w, u, I, f. The runes are to be read as the words that served as their names; these words enter into the metre of the verse, and (except in one poem) are significant in their context. The poems thus signed are the following. (1) A meditation on The Ascension, which stands in the Exeter Book between two similar poems on the Incarnation and the Last Judgment. The three are commonly known as Cynewulf's Christ, but the runic signature attests only the second. (2) A version of the legend of the martyr St Juliana, also in the Exeter Book. (3) Elene, in the Vercelli Book, on the story of the empress Helena and the " Invention of the Cross." (4) A short poem on The Fates of the Apostles, in the same MS. The page containing the signature to this poem was first discovered by Professor A. S.Napier in 1888, so that the piece is not included in earlier enumerations of the poet's signed works.

In Juliana and Elene the name is spelt Cynewulf; in The

Ascension the form is Cynwulf. In The Fates of the Apostles

the page is defaced, but the spelling Cynwulf is almost certain,

*1 The Music of the Most Ancient Nations, fig. 7*5; p. 227.* ■

The. absence of the E in The Ascension can hardly be due to a scribal omission, for the name of this letter (meaning ” horse “) would not suit the context; this was perhaps the motive for ,.the choice of the shorter form. The orthography (authenticated as the poet’s own by the nature of his device) has chronological significance. If the poems had been written before 740, the spelling would almost certainly have been Cyniwulf . If it were safe to judge from the scanty extant evidence, we, should con- clude that the form Cynwulf came in about 800; and presumably the poet would not vary his accustomed signature until the new form had become common. In Elene Cynewulf speaks of himself as an old man; and the presence of the runic signature in the four works suggests that they are not far apart in date. They may therefore be referred provisionally to the beginning of the 9th century, any lower date being for linguistic and metrical reasons improbable.

The MSS. of the poems are in the West-Saxon dialect, with occasional peculiarities that indicate transcription from North- umbrian or Mercian. Professor E. Sieyers’s arguments for a Northumbrian original have considerable weight; for the Mercian theory no linguistic arguments have been adduced, but it has been advocated on grounds of historical probability which seem to be of little value.

Cynewulf’s unquestioned poems show that he was a scholar, familiar with Latin arid with religious

literature, and they display much metrical skill and felicity in the use of traditional poetic language; but of the higher qualities of poetry they give little evidence. There are pleasing passages in Elene, but the clumsy and tasteless narration of the Latin original is faithfully reproduced, and the added descriptions of battles and voyages are strings of conventional phrases, with no real imagination. In The Ascension the genuine religious fervour imparts a higher tone to the poetry; the piece has real but not extraordinary merit. Of the other two poems no critic has much to say in praise. If Cynewulf is to be allowed high poetic rank, it must be on the ground of his authorship of other works than those which he has signed. At one time or other nearly the whole body of extant Old English poetry (including Beowulf) has been eonjecturally assigned to him. Some of the attributed works show many striking resemblances in style and diction to his authentic writings. But it is impossible to determine with certainty how far the similarities may be due to imitation or to the following of a Common tradition.

Until recently, it was commonly thought that Cynewulf's authorship of the Riddles (q.v.) in the Exeter Book was beyond dispute. ' The monodramatic lyric Wulf and Eadwacer, imagined to be the first of these " Riddles, was in 1&57 interpreted by Heinrich Leo as a charade on the name Cynewulf. This absurd fancy was for about thirty years generally accepted as a fact, but is now abandoned. Some of the Riddles have been shown by Professor E. Sievers to be older than Cynewulf's time; that he may have written some of the rest remains a bare possibility.

The similarity of tone in the three poems known as the Christ affords some presumption of common authorship, which the counter arguments that have been urged seem insufficient to set aside. Both The Incarnation and The Last Judgment contain many passages of remarkable power and beauty. It is unlikely that the author regarded the three as forming one work. The Christ is followed in. the MS. by two poems on Saint Guthlac, the secQnd of which

is generally; and with much probability, assigned to Cynewulf. The first Guthlac poem is almost universally believed to'be by another hand. Cynewulf's celebration of a midland saint is the strongest of the arguments that have been urged against his Northumbrian origin; but this considera- tion is insufficient to outweigh the probability derived from the linguistic evidence.

Cynewulf's reputation can gain little by the attribution to him of Guthlac, which is far inferior even to Juliana. Very different would be the effect of the establishment of his much disputed claim to Andreas, a picturesque version of the legend of the Apostle Andrew. The poem abounds to an astonishing extent in " Cynewulfian " phrases, but it is contended that these

are due to imitation. If the author of Andreas imitated Elene and Juliana, he bettered his model. The question whether Cynewulf may not have been the imitator has apparently never been discussed. The poem (so far agreeing with The Fates of the Apostles) copies the style of the old heroic poetry.

Cynewulf's authorship has been asserted by some scholars for The Dream of the Rood, the noblest example of Old English religious poetry. But an extract from this poem is carved on the Ruth well Cross; and, notwithstanding the arguments of Prof. A- S. Cook, the language of the inscription seems too early for • Cynewulf's date. The similarities between the Dream and Elene are therefore probably due to Cynewulf's acquaintance with the older poem.

The only remaining attribution that deserves notice is that of the Phoenix. The author of this fine poem was, like Cynewulf, a scholar, and uses many: of his turns of expression, but he was a.man of, greater genius than is shown in Cynewulf's signed compositions.

Professor M. Trautmann, following J, Grimm and F. Dietrich, would identify the poet with Cynewulf, bishop of Lindisfarne, who died in 783. This

speculation conflicts with the chronology suggested in this article, and is destitute of evidence. Cynewulf was indeed probably a Northumbrian churchman, but it is unlikely that there were not many Northumbrian churchmen bearing this common name; and as the bishop is not recorded to have written anything, the identification is at best an un- supported possibility. Professor A. S. Cook has suggested that our Cynewulf may have teen the " Cynulf," priest of Dunwich, whose name is among those appended to a decree of the council of Clofesho in 803, and of whom nothing else is known. This conjecture suits the probable date of Cynewulf, but otherwise there is nothing in its favour.

For the older literature relating to Cynewulf, see R. Wiilker, Grundriss der angelsachsischen Litteratur (1885). References to the most important later discussions will be found in M. Trautmann, Kynewulf, der Bischof und Dichter (1898), and the introductions and notes to the editions of Cynewulf s Christ, by I. Gollancz (1892) and A; S. Cook (1900). For the arguments for Cynewulf's authorship of Andreas, see F. Ramhorst, Andreasund Cynewulf (1885). (H.Br.)

CYNICS, a small but influential school of ancient philosophers. Their name is variously derived from the building in Athens called Cynosarges, the earliest home of the school, and from the Greek word for a dog (kvojv), in contemptuous allusion to the uncouth and aggressive manners adopted by the members of the school. Whichever of these explanations is correct, it is noticeable that the Cynics agreed: in taking a dog as their common badge or symbol (see Diogenes). From a popular conception of the intellectual characteristics of the school comes the modern sense of " cynic," implying a sneering disposition to disbelieve in the goodness of human motives and a contemptuous feeling of superiority.

As regards the members of the school, the separate articles on Antisthenes, Crates, Diogenes and Demetrius contain all biographical information. We

are here concerned only to examine the general principles of the school in its internal and external relations as forming a definite philosophic unit. The importance of these principles lies not only in their intrinsic value as an ethical system, but also in the fact that they form the link between Socrates and the Stoics, between the essentially Greek philosophy of the 4th century B.C. and a system of thought which has exercised a profound and far-reaching influence on medieval and modern ethics. From the time of Socrates in unbroken succession up to the reign of Hadrian, the school was represented by men of strong individuality. The leading earlier Cynics were Antisthenes, Diogenes: of Sinope, Crates of Thebes, and Zeno; in the later Roman period, the chief names are Demetrius (the friend of Seneca), Oenomaus and Demonax. AH these men adhered steadfastly to the principles laid down. by Antisthenes. .

Antisthenes was a pupil of Socrates, from whom he imbibed the fundamental ethical precept that virtue, not pleasure^ is the end of existence. He was, therefore, in the forefront of that intellectual revolution in the course of which speculation ceased

*to move in the realms of the physical * and focused itself upon human reason in its application to the practical conduct of life. ” Virtue,” says Socrates, ” is knowledge “: in the ultimate harmony of morality with reason is to be found the only true existence of, man. Antisthenes adopted this principle in its most literal sense, and proceeded to explain ” knowledge ” in the narrowest terms of practical action and decision, excluding from the conception everything except the problem of individual will realizing itself in the sphere of ordinary existence. Just as in logic the inevitable result was the purest nominalism, so in ethics he was driven to individualism, to the denial of social and national relations, to the exclusion of*

scientific study and of almost all that the Greeks understood by education. This individualism he and his followers carried to its logical conclusion. The ordinary pleasures of life were for them not merely negligible but positively harmful inasmuch as they interrupted the opera- tion of the will. Wealth, popularity and power tend to dethrone the authority of reason and to pervert the soul from the natural to the artificial. Man exists for and in himself alone; his highest end is self-knowledge and self-realization in conformity with the dictates of his reason, apart altogether from the state and society. For this end, disrepute and poverty are advantageous, in so far as they drive back the man upon himself, increasing his self-control and purifying his intellect from the dross of the external. The good man (i.e. the wise man) wants nothing: like the gods, he is avrapKrfi (self - sufficing) ; " let men gain wisdom — or buy a rope "; he is a citizen of the world, not of a particular country (cf . Diogenes Laertius vi. 1 1 \ibvr\v « 6p6^v TokiTela.p elvai ri\v, kv Koaixq) .

It is not surprising that the pioneers of such a system were criticized and ridiculed by their fellows, and this by no means unjustly. We learn that Diogenes and Crates sought to force their principles upon their fellows in an obtrusive, tactless manner. The very essence of their philosophy was the negati6n of the graces of social courtesy; it was impossible to " return to nature " in the midst of a society clothed in the accumulated artificiality of evolved convention without shocking the ingrained sensibilities of its members. Nor is it unjust to infer that the sense of opposition provoked some of the Cynics to an overweening display of superiority. At the same time, it is absurd to regard the eccentricities of a few as the character- istics of the school, still more as a condemnation of the views which they held.

In logic Antisthenes was troubled by the problem of the One and the Many. A nominalist to the core, he held that definition and predication are either false or tautological. Ideas do not exist save for

the consciousness which thinks them. ” A horse,” said Antisthenes, ” I can see, but horsehood I cannot see.” Definition is merely a circuitous method of stating an identity: ” a tree is a vegetable growth ” is logically no more than ” a tree is a tree.”

Cynicism appears to have had a considerable vogue in Rome in the 1st and 2nd centuries a.d. Demetrius (g.v.) and Demonax are highly eulogized by Seneca and Lucian respectively. It is probable that these later Cynics adapted themselves somewhat to the times in which they lived and avoided the crude extrava- gance of Diogenes and others. But they undoubtedly maintained the spirit of Antisthenes unimpaired and held an honourable place in Roman thought. This very popularity had the effect of attracting into their ranks charlatans of the worst type. So that in Rome also Cynicism was partly the butt of the satirist and partly the ideal of the thinker.

Disregarding all the accidental excrescences of the doctrine, Cynicism must be regarded as a most valuable development and as a real asset in the sum of ethical speculation. With all its defective psychology, its barren logic, its immature technique, it emphasized two great and necessary truths, firstly, the absolute responsibility of the individual as the moral unit, and, secondly, the autocracy of the will. These two principles are sufficient ground for our gratitude to these ” athletes of righteousness ” (as Epictetus calls them). Furthermore they are profoundly 1 See Ionian School of Philosophy.

important as the precursors of Stoicism. The closeness of the connexion is illustrated by Juvenal’s epigram that a Cynic differed from a Stoic only by his cloak. Zeno was a pupil of Crates, from whom he learned the moral worth of self-control and indifference to sensual indulgence (see Stoics).

Finally it is necessary to point out two flaws in the Cynic philosophy. In the first place, the

content of the word ” know- ledge ” is never properly developed. ” Virtue is knowledge “; knowledge of what? and how is that knowledge related to the will? These questions were never properly answered by them. Secondly they fell into the natural error of emphasizing the purely animal side of the ” nature,” which was their ethical criterion. Avoiding the artificial restraints of civilization, they were prone to fall back into animalism pure and simple. Many of them upheld the principle of community of wives (see Diogenes Laertius vi. 11); some of them are said to have outraged the dictates of public decency. It was left to the Stoics to separate the wheat from the chaff, and to assign to the words ” knowledge ” and ” nature ” a saner and more comprehensive meaning.

For relation of Cynicism to contemporary thought, compare Cyrenaics, Megarian School. See also Asceticism.

See F. W. Mullach, Fragmenta philosophorum Graecorum (Paris, 1867), ii. 261-438; H. Ritter and L. Preller, Hist. phil. Grace, et Rom. ch. v.; histories of ancient philosophy, and specially Ed. Zeller, Socrates and the Socratic Schools, Eng. trans., O. J. Reichel (1868, 2nd ed. 1877) ; Th. Gomperz, Greek Thinkers, Eng. trans., vol. ii., G. G. Berry (1905); E. Caird, Evolution of Theology in the Greek Philosophers (1904), ii. 44 seq., 55 seq., 62 seq.; arts. Stoics and Socrates.

CYNOSURE (Lat. cynosura, Gr. Kvvcxrovpa, from kvvos, genitive of kvoiv, a dog, and ovph, tail), the name given by the Greeks and Romans to the constellation of the Little Bear, Ursa Minor; the word is applied in English to the pole-star which appears in that constellation, and hence to something bright which, like a ” guiding-star,” draws all attention to it, as in Milton’s ” cynosure of neighbouring eyes.”

CYPERACEAE, in botany, a natural order of the monocotyle- donous group of seed-bearing plants. They are grass-like herbs, sometimes annual, but more often persist by means of an under- ground stem

from which spring erect solitary or clustered, generally three-sided aerial stems, with leaves in three rows. The minute flowers are arranged in spikelets somewhat as in grasses, and these again in larger spike-like or panicled inflor- escences. The flower has in rare cases a perianth of six scale-like leaves arranged in two whorls, and thus conforming to the com- mon monocotyledonous type of flower. Generally the perianth is represented by hairs, bristles or similar developments, often in- definite in number; in the two largest genera, Cyperus, (fig. 1) and Car ex (fig. 2), the flowers are naked. In a few cases two whorls of stamens are present, with three members in each, but generally only three are present; the pistil consists of three or two carpels, united to form an ovary bearing a corresponding number of styles and containing one ovule. The flowers, which are often unisexual, are wind-pollin- ated. The fruit is one-seeded, with a tough, leathery or hard wall. There are nearly 70 genera containing about 3000 species and widely distributed throughout the earth, chiefly as marsh-plants. In the arctic zone they form 10% of the flora; they will flourish in soils rich in humus which are too acid to support grasses. The large genus Cyperus contains about 400 species, chiefly in the warmer parts of the earth; C. Papyrus is the Egyptian Papyrus. Care,*

Fig. 1. — Partial inflorescence of Cyperus longus (Galingale), slightly reduced. I.Spikeletof same; 2, flower.

the largest genus of the order, the sedges, is widely distributed in the temperate, alpine and arctic regions of both hemispheres, and is represented by 60 species in Britain. Carex arenaria, the sea-bent, grows on sand-dunes and helps to bind the sand

Fig. 2. — Carex riparia, the largest British sedge,

from 3 to 5 ft. high. 1, Male flower of Carex; 2, female flower of Carex; 3, seed of Carex, cut lengthwise.

with its long cord-like underground stem which branches widely. Scirpus lacustris (fig. 3, 1) the true bulrush, occurs in lakes, ditches and marshes; it has a spongy, green, cylindrical stem, reaching nearly an inch in thickness and 1 to 8 ft. high, which is usually leafless with a terminal branched inflorescence. Eriophorum (fig. 3), cotton grass,

IP

FlG. 3. — Inflorescence of Cotton-grass {Eriophorum polystachion) , about § nat. size. I, Flower of true bulrush (Scirpus lacustris).

is represented in Britain by several species in boggy land; they are small tufted herbs with cottony heads due to the numerous hair-like bristles which take the place of the perianth and become much elongated in the fruiting stage.

CY-PRES (A.Fr. for ” so near “), in English law, a principle adopted by the court of chancery in dealing with trusts for charitable purposes. When the charitable purpose intended by a

testator cannot be carried into effect, the court will apply the funds to some other purpose, as near the original as possible (whence the name). For instance, a testator having left a fund to be divided into four parts — one-fourth to be used for ” the redemption of British slaves in Turkey and Barbary,” and the other three-fourths for various local charities — it was found that there were no British slaves in Turkey or Barbary, and as to that part of the gift therefore the testator’s purpose failed. In- stead of allowing the portion of the fund devoted to this impossible purpose to lapse to the next of kin, the court devoted it to the purposes specified for the rest of the estate. This

doctrine is only applied where " a general intention of charity is manifest " in the will, and not where one particular object only was present to the mind of the testator. Thus, a testator having left money to be applied in building a church in a par- ticular parish, and that having been found to be impossible, the fund will not be applied cy-pres, but will go to the next of kin.

In the United States, charitable trusts have become more frequent as the wealth of the country has progressed, and are regarded with in- creasing favour by the courts. The cy-pris doctrine has been either expressly or virtually applied to uphold them in several of the states, and in some there has been legisla- tion in the same direction. In others the doctrine has been repudiated, e.g. in Michigan, Tennessee, Indiana and Virginia. For many years the New York courts held that this doctrine was not in force there, but in 1803 the legislature repealed the provisions of the revised statutes on which these decisions rested and restored the ancient law. Statutes passed in Pennsylvania have established the doctrine there, and dissolved any doubt as to its being in force in that state.

CYPRESS (Cupressus), in botany, a genus of fifteen species belonging to the tribe Cupressineae, natural order Coniferae, represented by evergreen aromatic trees and shrubs indigenous to the south of Europe, western Asia, the Himalayas, China, Japan, north-western and north-eastern America, California and Mexico. The leaves of the cypresses are scale-like, over- lapping and generally in four rows; the female catkins are round- ish, and fewer than the male; the cones consist of from six to ten peltate woody scales, which end in a curved point, and open when the seeds are ripe; the seeds are numerous and winged. All the species exude resin, but no turpentine.

C. sempervirens, the common cypress, has been well known throughout the Mediterranean region since classic times; it may have been introduced from western Asia where it is found wild. It is a

tapering, flame-shaped tree resembling the Lombardy poplar; its branches are thickly covered with small, imbricated, shining-green leaves; the male catkins are about 3 lines in length; the cones are between 1 and if in. in diameter, sessile, and generally in pairs, and are made up of large angular scales, slightly convex exteriorly, and with a sharp point in the centre. In Britain the tree grows to a height of 40 ft., in its native soil to .70 or 90 ft. It thrives best on a dry, deep, sandy loam, on airy sheltered sites at no great elevation above the sea. It was introduced into Great Britain before the middle of the 16th century. In the climate of the south of England its rate of growth when young is between 1 and if ft. a year. The seeds are sown in April, and come up in three or four weeks; the plants require protection from frost during their first winter.

The timber of the cypress is hard, close-grained, of a fine reddish hue, and very durable. Among the ancients it was in request for poles, rafters, joists, and for the construction of wine- presses, tables and musical instruments; and on that account was so valuable that a plantation of cypresses was considered a sufficient dowry for a daughter. Owing to its durability the wood was employed for mummy cases, and images of the gods;

a statue of Jupiter carved out of cypress is stated by Pliny to have existed 600 years without showing signs of decay. The cypress doors of the ancient St Peter's at Rome, when removed by Eugenius IV., were about 1100 years old, but nevertheless in a state of perfect preservation. Laws were engraved on cypress by the ancients, and objects of value were preserved in receptacles made of it; thus Horace speaks of poems levi servanda cupresso. The cypress, which grows no more when once cut down, was regarded as a symbol of the dead, and perhaps for that reason was sacred to Pluto; its branches were placed by the

Greeks and Romans on the funeral pyres and in the houses of their departed friends. Its supposed ill-boding nature is alluded to in Shakespeare's Henry VI., where Suffolk desires for his enemies " their sweetest shade, a grove of cypress trees." The cypress was the tree into which Cyparissus, a beautiful youth beloved by Apollo, was transformed, that he might grieve to all time (Ovid, Met. x. 3). In Turkish cemeteries the cypress — " Dark tree, still sad when others' grief is fled, The only constant mourner o'er the dead " —

is the most striking feature, the rule being to plant one for each interment. The tree grows straight, or nearly so, and has a gloomy and forbidding, but wonderfully stately aspect. With advancing age its foliage becomes of a dark, almost black hue. William Gilpin calls the cypress an architectural tree: " No Italian scene," says he, " is perfect without its tall spiral form, appear- ing as if it were but a part of the picturesquely disposed edifices which rise from the middle ground against the distant landscape." The cypress of Somma, in Lombardy, is believed to have been in existence in the time of Julius Caesar; it is about 121 ft. in height, and 23 ft. in circumference. Napoleon, in making the road over the Simplon, deviated from the straight line in order to leave it standing. The cypress, as the olive, is found everywhere in the dry hollows and high eastern slopes of Corfu, of the scenery of which it is characteristic. As an ornamental tree in Britain the cypress is useful to break the outline formed by round- headed low shrubs and trees. The berosh, or beroth, of the Hebrew Scriptures, translated " fir " in the authorized. version, in 1 Kings v. 8 and vi. 15, 2 Chron. ii. 8 and many other passages, is supposed to signify the cypress.

The common or tall variety of C. sempervirens is known as C. fastigiata; the other variety, C. horizontalis, which is little planted in England, is distinguished by its horizontally spreading branches, and its likeness to the cedar. The species C. torulosa of North India, so called from its

twisted bark, attains an altitude of 150 ft.; its branches are erect or ascending, and grow so as to form a perfect cone. In the Kulu and Ladakh country the tree is sacred to the deities of the elements. It has been in- troduced into England, but does not thrive where the winter is severe. The wood, which in Indian temples is burnt as incense, is yellowish-red, close-grained, tough, hard, readily worked, durable, and equal in quality to that of the deodar. Another species, C. lusitanica or glauca, the " cedar of Goa," is a hand- some tree, 50 ft. in height when full-grown, with spreading branches drooping at their extremities; it has been much planted in Portugal, especially in the neighbourhood of Cintra. Its origin is doubtful. It was well established in Portugal before the middle of the 17th century, and has since been cultivated generally in the south of Europe, but is nowhere believed to be indigenous. The name " cedar of Goa " is misleading, as no cypress is found wild anywhere near Goa. It was. cultivated in England in the 17 th century, and the name C. lusitanica was given by Philip Miller, the curator of the Chelsea Physick garden, in 1768, in reference to its supposed Portuguese origin. Ex- perience has shown this cypress to be too tender for British climate generally, though good specimens are to be found in the milder climate of the south and west of England and in Ireland.

The species G. Lawsoniana, the Port Orford cedar, a native of south Oregon and north California, where it attains a height of 100 ft., was introduced into Scotland in 1854; it is much grown for ornamental purposes in Britain, a large number of varieties of garden origin being distinguished by differences in habit and by colour of foliage. Other California!! cypresses

are C. macrocarpa, the Monterey cypress, which is 60 ft. high when mature, with a habit suggesting that of cedar of Lebanon, and C. Joveniana and C. Macnabiana, smaller trees generally from 20 to 30 ft. in height. C. funebris is a native of the north of China, where it is planted near pagodas. C.

nootkaensis, the Nootka Soundcypressor Alaska cedar, was introduced into Britain in 1850. It is a hardy species, reaching a height of from 80 to 100 ft. Several varieties are distinguished by habit and colour of foliage. C, obtusa, a native of Japan, is a tall tree reaching 100 ft. in height, and widely planted by the Japanese for its timber, which is one of the best for interior construction. It is also Cultivated by them as a decorative plant, in many forms, in- cluding dwarf forms not exceeding a foot in height.

The " deciduous cypress," " swamp cypress '■ or '' bald cypress," Taxodium distichum, is another member of the order Coniferae (tribe Taxodineae), a native of the southern United States and Mexico. It is a lofty tree reaching a height of 170 ft. or more, with a massive trunk 10 to 15 ft. or more in diameter, growing in or near water or on low-lying land which is subject to periodical flooding. The lower part of the trunk bears huge buttresses, each of which ends in a long branching far-spreading root, from the branches of which spring the peculiar knees which rise above the level of the water. The knees are of a soft spongy texture and act as breathing organs, supplying the roots with air, which they would otherwise be unable to obtain when submerged. The stout horizontally spreading branches give a cedar-like appearance; the foliage is light and feathery; the leaves and the slender shoots which bear them fall in the autumn. The cones, about the size of a small walnut, bear spirally arranged im- bricated scales which subtend the three-angled winged seeds. The wood is light, soft, straight-grained and easily worked; it is very durable in contact with the soil, and is used for railway-ties, posts, fencing and for construction. The deciduous cypress was one of the first American trees introduced into England; it is described by John Parkinson in his Herbal of 1 640. It thrives only near water or where the soil is permanently moist.

CYPRIAN, SAINT [Caecilius Cyprianus, called Thascius] (c. 200-258), bishop of Carthage, one of the most illustrious in the early history of the

church, and one of the most notable of its early martyrs, was born about the year 200, probably at Carthage. He was of patrician family, wealthy, highly educated, and for some time occupied as a teacher of rhetoric at Carthage. Of an enthusiastic temperament, accomplished in classical litera- ture, he seems while a pagan to have courted discussion with the converts to Christianity. , Confident in his own powers, he entered ardently into what was no doubt the great question of the time at 1 - Carthage as elsewhere. He sought to vanquish, but was himself vanquished by, the new religious force which was making such rapid inroads on the decaying paganism of the Roman empire. Caecilianus (or Caecilius), a presbyter of Carthage, is supposed to have been the instrument of his con- version, which seems to have taken place about 246.

Cyprian carried all his natural enthusiasm and brilliant powers into his new profession. He devoted his wealth to the relief of the poor and other pious uses; and so, according to his deacon Pontius, who wrote a diffuse and vague account of his " life and passion," " realized two benefits: the contempt of the world's ambition, and the observance of that mercy which God has pre- ferred to sacrifice." The result of his charity and activity as a Christian convert was his unanimous call by the Christian people to the head of the church in Carthage, at the end of 248 or beginning of 249. The time was one of fierce persecution directed against the Christians, and the bishop of Carthage became a prominent object of attack. During the persecution of Decius (250-251) Cyprian was exposed to imminent danger, and was compelled for a time to seek safety in retreat. Under Gallus, the successor of Decius, the persecution was relaxed, and Cyprian returned to Carthage. Here he held several Councils for the discussion of the affairs of the church, especially for grave questions as to the rebaptism of heretics, and the re- admission into the church of the lapsi, or those who had fallen

away through fear during the heat of the persecution. Cyprian, although inspired by lofty notions of the prerogatives of the church, and inclined to severity of opinion towards heretics, and especially heretical dissentients from the belief in the divine authorship of the episcopal order and the unity of Christendom, was leniently disposed towards those who had temporarily fallen from the faith. He set himself in opposition to, Novatian, a presbyter of Rome, who advocated their permanent exclusion from the church; and it was his influence which guided the tolerant measures of the Carthaginian synods on the subject. While in this question he went hand in hand with Cornelius, bishop of Rome, his strict attitude in the matter of baptism by heretics brought him into serious conflict with the Roman bishop Stephen. It would almost have come to a rupture, since both parties held firmly to their , standpoint, had not a new persecution arisen under the emperor Valerian, which threw all internal quarrels into the background in face of the common danger. Stephen became a martyr in August 257. Cyprian was at first banished to Curubis in Africa Proconsularis. But soon he was recalled, taken into custody, and finally condemned to death. He was beheaded on the 14th of September 258, the first African bishop to obtain the martyr's crown.

All Cyprian's literary works were written in connexion with his episcopal office; almost all his treatises and many of his letters have the character of pastoral epistles, and their form occasionally betrays the fact that they were intended as addresses. These writings bear the mark of a clear mind and a moderate and gentle spirit. Cyprian had none of that character which makes the reading of Tertullian, whom he himself called his magister, so interesting and piquant, but he possessed other qualities which Tertullian lacked, especially the art of presenting his thoughts in simple, smooth and clear language, yet in a style which is not wanting in warmth and persuasive power. Like Tertullian, and

often in imitation of him, Cyprian took certain apologetic, dogmatic and pastoral themes as subjects of his treatises. By far the best known of these is the treatise De catholicae ecclesiae unilate, called forth in a.d. 251 by the schism at Carthage, but particularly by the Novatian schism at Rome. In this is pro- claimed the doctrine of the one church founded upon the apostle Peter, whose " tangible bond is her one united episcopate, an apostleship universal yet only one — the authority of every bishop perfect in itself and independent, yet not forming with all the others a mere agglomeration of powers, but being a tenure upon a totality like that of a shareholder in some joint property."

Attention must also be called to the treatise Ad Donatum (De gratia dei), in which the new life after regeneration with its moral effects is set forth in a pure and clear light, as contrasted with the night of heathendom and its moral degradation, which were known to the author from personal experience. The numerous Letters of Cyprian are not only an important source for the history of church life and of ecclesiastical law, on account of their rich and manifold contents, but in large part they are important monuments of the literary activity of their author, since, not infrequently, they are in the form of treatises upon the topic in question. Of the eighty-two letters in the present collection, sixty-six were written by Cyprian. In the great majority of cases the chronology of their composition, as far as the year is concerned, presents no difficulties; more precise assignments are mainly conjectural. In the editions of the works of Cyprian a number of treatises are printed which, certainly or probably, were not written by him, and have therefore usually been described as pseudo-Cyprianic. Several of them, e.g. the treatise on dice (De aleatoribus) , have attracted the attention of scholars, who are never weary of the attempt to determine the identity of the author, unfortunately hitherto without much success.

The best, though by no means faultless, edition of Cyprian's works is that of W. von Hartel in the

Corpus scriptorum ecclesiasticorum (3 vols., Vienna, 1868–1871). There is an English translation in the Library of the Ante-Nicene Fathers. The most complete monograph is that by Archbishop E. W. Benson, Cyprian, his Life, his Times, his Work (London, 1897). See also J. A. Faulkner, Cyprian the Churchman (Cincinnati and New York, 1906).

CYPRINODONTS. In spite of their name, the small fishes called Cyprinodonts are in no way related to the Cyprinids, or carp family, but are near allies of the pike, characterized by a flat head with protractile mouth beset with cardiform, villiform, or compressed, bi- or tri-cuspid teeth, generally large scales, and the absence of a well-developed lateral line. About two hundred species are known, mostly inhabitants of the fresh and brackish waters of America; only about thirty are known from the old world (south Europe, south Asia, China and Japan, and Africa) . Several forms occur in the Oligocene and Miocene beds of Europe. Many species are ovo-viviparous, and from their small size and lively behaviour they are much appreciated as aquarium fishes.

In many species the sexes are dissimilar, the female being larger and less brilliantly coloured, with smaller fins; the anal fin of the male may be modified into an intromit tent organ by means of which internal fertilization takes place, the ova develop- ing in a sort of uterus. In the remarkable genus Anableps, from Central and South America, the strongly projecting eyes are divided by a horizontal band of the conjunctiva into an upper part adapted for vision in the air, and a lower for vision in the water, and the pupil is also divided into two parts by a constriction.

The latest monograph of these fishes is by S. Garman in Mem. Mus. Comp. Zool. xix. (1895).

The Amblyopsidae, which include the remarkable blind cave fishes of North America (Mammoth cave and others), are nearly related to the Cyprinodontidae, and like many of them ovo- viviparous. Chologaster,

from the lowland streams and swamps of the south Atlantic states, has the eyes well developed and the body is coloured. Amblyopsis and Typhlichthys, which are evidently derived from Chologaster, or from forms closely related to it, but living in complete darkness, have the eyes rudimentary and more or less concealed under the skin, and the body is colourless.

See F. W. Putnam, Atner. Nat. (1872), p. 6, and P. Boston Soc^ xvii. (1875), p. 222 ; and C. H. Eigenmann, Archiv.fur Entwickelungs- mechanik der Organismen, viii. (1899), p. 545. (G. A. B.)

CYPRUS, one of the largest islands in the Mediterranean, nominally in the dominion of Turkey, but under British adminis- tration, situated in the easternmost basin of that sea, at roughly equal distance from the coasts of Asia Minor to the north and of Syria to the east. The headland of Cape Kormakiti in Cyprus is distant 44 m. from Cape Anamur in Asia Minor, and its north- east point, Cape St Andrea, is 69 m. from Latakieh in Syria; It lies between 34 33' and 35° 41' N., and between 32° 20' and 34 35' E., so that it is situated in almost exactly the same latitude as Crete. Its greatest length is about 141 m., from Cape Drepano in the west to Cape St Andrea in the north-east, and its greatest breadth, from Cape Gata in the south to Cape Kormakiti in the north, reaches 60 m.; while it retains an average width of from 35 to 50 m. through the greater part of its extent, but narrows suddenly to less than 10 m. about 34 E., and from thence sends out a long narrow tongue of land towards the E.N.E. for a distance of 46 m., terminating in Cape St Andrea. The coast-line measures 486 m. Cyprus is the largest island in the Mediterranean after Sicily and Sardinia. In 1885 a trigono- metrical survey and a map on the scale of 1 in. to 1 m. were made by Captain (afterwards Lord) Kitchener, R.E., who worked out the area of the island at 3584 sq. m., or a little more than the area of Norfolk and Suffolk.

Mountains. — Great part of the island is occupied by two mountain ranges, both of which have a general

direction from west to east. Of these the most extensive, as well as the most lofty, is that which fills up almost the whole southern portion of the island, and is generally designated by modern geographers as Mount Olympus, though that name appears to have been applied by the ancients only to one particular peak. The highest summit is known at the present day as Mount Troodos, and attains an elevation of 6406 ft. It sends down subordinate ranges or spurs, of considerable altitude, on all sides, one of which extends to Cape Arnauti (the ancient Acamas). which forms the

north-west extremity of the island, while others descend on both sides quite to the northern and southern coasts. On the south- eastern slope are governmental and military summer quarters. The main range is continued eastward by the lofty summits known as Mount Adelphi (5305ft.), Papoutsa(5i24)andMachaira

m { o 1 r f c.t'T? n

B.V.IC. Lang. E- ?

CAN

"of Greenwich

Reference to Districts

1. Famagusta

2. Kyrenia

3. Larnaca

4. Limasol &. Nicosia 6. Papho

or Chionia (4674), until it ends in the somewhat isolated peak called Santa Croce (Stavrovouni or Oros Stavro), the Hill of the Holy Cross (2260 ft.). This mountain, designated by Strabo Mount Olympus, is a conspicuous object from Larnaca, from which it is only 12 m. distant, and is well known from being frequented as a place of pilgrimage. The northern range of mountains begins at Cape Kormakiti (the ancient Crommyon) and is continued from thence in an unbroken ridge to the eastern extremity of the island, Cape St Andrea, a distance of more than 100 m. It is not known by any collective name; its western part is called the Kyrenia mountains, while the remainder has the name of Carpas. It is inferior in elevation to the southern range, its highest summit (Buffavento) attaining only 3135 ft., while in the eastern portion the elevation rarely exceeds 2000 ft. But it is remarkable for its continuous and unbroken character — consisting throughout of a narrow but rugged and rocky ridge, descending abruptly to the south into the great plain of Lefkosia, and to the north to a narrow plain bordering the coast.

The Mesaoria. — Between the two mountain ranges lies a broad plain, extending across the island from the bay of Fama- gusta to that of Morphou on the west, a distance of nearly 60 m., with a breadth varying from 10 to 20 m. Itisknownby the name of the Mesaoria or Messaria, and is watered by a number of intermittent streams from the mountains on either hand. The chief streams are the Pedias and .the Yalias, which follow roughly parallel courses eastward. The greater part of the plain is open and

uncultivated, and presents nothing but barren downs; but corn is grown in considerable quantities in the northern portions of it, and there is no doubt that the whole is readily susceptible of cultivation. It is remarkable that Cyprus was celebrated in antiquity for its forests, which not only clothed the whole of its mountain ranges, but covered the entire central plain with a dense mass, so that it was with difficulty that the land could be cleared for cultivation. At the present day the whole plain of the Mesaoria is naturally bare and treeless, and it is only the loftiest and central summits of Mount Olympus that still retain their covering of pine woods. The disappearance of the forests (which has in a measure been artificially remedied) naturally affected the rivers, which are mostly mere torrents, dry in summer. Even the Pedias (ancient Pediaeus) does not reach the sea in summer, and its stagnant waters form unhealthy marshes. In the marshy localities malarial fever occurs but is rarely (in modern times) of a severe type. The mean annual temperature in Cyprus is about 69° F. (mean maximum 7 8°, and minimum 57). The mean annual rainfall is about 19 ins. October to March is the cool, wet season. Earthquakes are not uncommon.

Geology. — Cyprus lies in the continuation of the folded belt of the Anti-taurus. The northern coast range is formed by the oldest rocks in the island, consisting chiefly of limestones and marbles with occasional masses of igneous rock. These are supposed to be of Cretaceous age, but no fossils have been found in them. On both sides the range is flanked by sandstones and shales (the Kythraean series), supposed to be of Upper Eocene age; and similar rocks occur around the southern mountain mass. The Oligocene consists of grey and white marls (known as the Idalian series), which are distributed all over the island and attain their greatest development on the south side of the Troodos. All these rocks have been folded, and take part in the formation of the mountains. The great igneous masses of Troodos, &c., consisting of diabase, basalt and serpentine,, are of later date. Pliocene and later

beds cover the central plain and occur at intervals along the coast. The Pliocene is of marine origin, and rests unconformably upon all the older beds, including the Post-oligocene igneous rocks, thus proving that the final folding and the last volcanic outbursts were approximately of Miocene age. The caves of the Kyrenian range contain a Pleistocene mammalian fauna.

Population. — The population of Cyprus in 1901 was 237,022, an increase of 27,736 since 1891 and of 51,392 since 1881. The people are mainly Greeks and Turks. About 22% of the population are Moslems; nearly all the remainder are Christians of the Orthodox Greek Church. The Moslem religious courts, presided over by cadis, are strictly confined to jurisdiction in religious cases affecting the Mahommedan population. The island is divided into the six districts of Famagusta, Kyrenia, Larnaca, Limasol, Nicosia and Papho. The chief towns are Nicosia (pop. 14,752), the capital, in the north central part of the island, Limasol (8298) and Larnaca (7964) on the south- eastern coast. The other capitals of districts are Famagusta on the east coast, Kyrenia on the north, and Ktima, capital of Papho, on the south-west. Kyrenia, a small port, has a castle built about the beginning of the 13th century, and notable, through the troubled history of the island, as never having been captured.

Agriculture, cVc — The most important species of the few trees that remain in the island are the Aleppo pine, the Pinus laricio, cypress, cedar, carob, olive and Quercus alnifolia. Recent additions are the eucalyptus, casuarina, Pinus pinea and ailanthus. Some protection has been afforded to existing plantations, and some attempt made to extend their area; but the progress in both directions is slow. Agriculture is the chief industry in the island, in spite of various disabilities. The soil is extremely fertile, and, with a fair rainfall, say 13 in., between November and April, yields magnificent crops, but the improve- ments in agriculture are scarcely satisfactory. The methods and appliances used are

extremely primitive, and inveterate prejudice debars the average peasant from the use of new implements, fresh seed, er manure; he generally cares nothing for the rotation of crops, or for the cleanliness of his land. Modern improvements and the use of imported machinery have, however, been adopted by some. A director of agriculture was appointed in 1896, and leaflets are issued pointing out improvements within the means of the villager, and how to deal with plant diseases and insect pests. The products of the soil include grain, fruit, including carob, olive, mulberry, cotton, vegetables and oil seeds. Vine- yards occupy a considerable area, and the native wines are pure and strong, but not always palatable. The native practice of conveying wine in tarred skins was deleterious to its flavour, and is now for the most part abolished. A company has exploited and improved the industry. Large sums have been expended on the destruction of locusts; they are now practically harmless, but live locusts are diligently collected every year, a reward being paid by the government for their destruction. Under the superintendence of an officer lent by the government of Madras, two great works of irrigation, from the lack of which agriculture had seriously suffered, were undertaken in 1898 and 1899. The smaller includes a reservoir at Syncrasi (Famagusta), with a catchment of 27 sq. m. and a capacity of 70,000,000 cub. ft. It reclaims 360 acres, and was estimated to irrigate 4320. The larger scheme includes three large reservoirs in the Mesaoria to hold up and temporarily store the flood waters of the Pedias and Yalias rivers. The estimate premised a cost of £50,000, the

irrigation of 42,000 acres, and the reclamation of 10,000. These works were completed respectively in 1899 and 1901.

The rearing of live stock is of no little importance. A com- mittee exists ” for the

improvement of the breeds of Cyprus stock "; stallions of Arab blood have been imported, and prizes are offered for the best donkeys. Cattle, sheep, mules and donkeys are sent in large numbers to Egypt. Cyprus mules have found favour in war in the Crimea, India, Uganda, Eritrea and Egypt. The sea fisheries are not important, with the exception of the sponge fishery, which is under the protection of the administration. The manufactures of the island are insignificant.

Minerals. — Next to its forests, which long supplied the Greek monarchs of Egypt with timber for their fleets, Cyprus was celebrated among the ancients for its mineral wealth, especially for its mines of copper, which were worked from a very early period, and continued to enjoy such reputation among both Greeks and Romans that the modern name for the metal is derived from the term of Aes Cyprium or Cuprium by which it was known to the latter. According to Strabo the most valuable mines were worked at a place called Tamasus, in the centre of the island, on the northern slopes of Mount Olympus, but their exact site has not been identified. An attempt to work copper towards the close of the 19th century was a failure, but some prospecting was subsequently carried on. Besides copper, according to Strabo, the island produced considerable quantities of silver; and Pliny records it as producing various kinds of precious stones, among which he mentions diamonds and emeralds, but these were doubtless nothing more than rock crystal and beryl. Salt, which was in ancient times one of the productions for which the island was noted, is still made in large quantities, and there are extensive salt works in the neighbourhood of Larnaca and Limasol, where there are practically inexhaustible salt lakes. Rock crystal and asbestos are still found in the district of Paphos. Gypsum is exported unburnt from the Carpas, and as plaster of Paris from Limasol and Larnaca. Statuary marble has been found on the slopes of BufEavento in the northern range. Excellent building stone exists throughout the island.

Commerce. — A disability against the trade of Cyprus

has been the want of natural harbours, the ports possessing only open roadsteads; though early in the 20th century the con- struction of a satisfactory commercial harbour was undertaken at Famagusta, and there is a small harbour at Kyrenia. Trade is carried on principally from the ports already indicated among the chief towns. The various agricultural products, cattle and mules, cheese, wines and spirits, silk cocoons and gypsum make up the bulk of the exports. Barley and wheat, carobs and raisins may be specially indicated among the agricultural exports. The annual value of exports and of imports (which are of a general character) may be set down as about £300,000 each. Good roads are maintained connecting the more important towns, and when the harbour at Famagusta was undertaken the con- struction ofa railway from that port to Nicosia was also put in hand. The Eastern Telegraph Co. maintains a cable from Alexandria (Egypt) to Larnaca, and the greater part of the lines on the island. The Imperial Ottoman Telegraph Co. has also some lines. The British sovereign is the current gold coin, the unit of the bronze and silver coinage being the piastre {i\ penny). Turkish weights and measures are used. The oke, equalling 2-8 lb avoirdupois, and the donum, about \ of an acre, are the chief units.

Constitution and Government. — Under a convention signed at Constantinople on the 4th of June 1878, Great Britain engaged to join the sultan of Turkey in defending his Asiatic possessions (in certain contingencies) against Russia, and the sultan, " in order to enable England to make necessary provision for execut- ing her engagement," consented to assign the island of Cyprus to be occupied and administered by England. The British flag was hoisted on the 12th of June, and the conditions of the occupation were explained in an annex to the convention, dated the 1st of July. An order in council of the 14th of September,

modified so far as related to legislation by another of the 30th of November, regulated the government of the island. The administration was placed in the

hands of a high commissioner with the usual powers of a colonial governor. Executive and legislative councils were established; and in each of the six districts into which, for administrative and legal purposes, the island was divided, a commissioner was appointed to represent the government. The executive council consists of the high commissioner, the chief secretary, the king's advocate, the senior officer in charge of the troops, and the receiver-general, with, as " additional " members, two Christians and one Mussul- man. The legislative council consists of six non-elected members, being office-holders, and twelve elected members, three being chosen by the Moslems and nine by the non-Moslem inhabitants. British subjects and foreigners, who have resided five years in Cyprus, can exercise the franchise as well as Ottoman subjects. The qualification otherwise is the payment of any of the taxes classed as Vergi Taxes (see below). The courts in existence at the time of the occupation were superseded by the following, constituted by an order in council dated the 30th of November 1882: — (1) a supreme court of criminal and civil appeal; (2) six assize courts; (3) six district courts; (4) six magistrates' courts; and (5) village courts. Actions are divided, according to the nationality of the defendant, into " Ottoman " and "Foreign"; in the latter, the president of the court alone exercises jurisdiction as a rule, so also in criminal cases against foreigners. The law administered is that contained in the Ottoman codes, modified by ordinances passed by the legislative council.

Finance. — The principal sources of revenue are : — (1) Vergi taxes, or taxes on house and land property, and trade profits and incomes (not including salaries) ; (2) military exemption tax, payable by Moslems and Christians alike, but not by foreigners, of 2s. 6d. a head on males between 18 and 60 years of age ; (3) tithes. All tithes have been abolished, except those on cereals, carobs, silk cocoons.'and, in the form of 10% ad valorem export duties, those on cotton, linseed, aniseed and raisins (all other export duties and a fishing tax

have been abolished) ; (4) sheep, goat, and pig tax; (5) an excise on wine, spirits and tobacco; (6) import duties; (7) stamps, court fees, royalties, licenses, &c. ; (8) salt monopoly. Foreigners are liable to all the above taxes except the military exemption tax. The annual sum of £92,800, payable to Turkey as the average excess (according to the years 1 873–1 878) of revenue over expenditure, but really appropriated to the interest on the British guaranteed loan of 1 855, is a heavy burden. But if not lightened, taxation is at least better apportioned than formerly.

Instruction. — A general system of grants in aid of elementary schools was established in 1882. There are some 300 connected with the Greek Orthodox Church, and 160 elementary Moslem schools. Aid is also given to a few Armenian and Maronite schools. Among other schools are a Moslem high school (maintained entirely by government) , a training college at Nicosia for teachers in the Orthodox Church schools, Greek high schools at Larnaca and Limasol, an English school for boys and a girls' school at Nicosia. By a law of 1895 separate boards of education for Moslem and Greek Christian schools were established, and in each district there are separate committees, presided over by the commissioner. An institution worthy of special notice is the home and farm for lepers near Nicosia, accommodating over a hundred inmates.

History and Archaeology down to the Roman Occupation

The Stone Age has left but few traces in Cyprus; no sites have been found and even single implements are very rare. The "megalithic" monuments of Agia Phaneromeni 1 and Hala Sultan Teke near Larnaca may perhaps be early, like the Palestinian cromlechs; but the vaulted chamber of Agia Katrina near Enkomi seems to be Mycenaean or later; and the perforated monoliths at Ktima seem to belong to oil presses of uncertain but probably not prehistoric date.

The Bronze Age, on the other hand, is of peculiar importance in an area which, like Cyprus, was one of

the chief early sources of copper. Its remains have been carefully studied both on

X M. Ohnefalsch-Richter, Arch. Zeitung (1881), p. 311, pi. xviii. The principal publications respecting this and all sites and phases of culture mentioned in this section are collected in Myres and Ohnefalsch-Riehter, Cyprus Museum Catalogue (Oxford, 1899), pp.

1-35-

settlement sites at Leondari Vouno and Kalopsida, and in tombs in more than thirty places, notably at Agia Paraskevi, Psem- matismeno, Alambra, Episkopi and Enkomi. Throughout this period, which began probably before 3000 B.C. and ended about 1000 B.C., Cyprus evidently maintained a large population, and an art and culture distinct from those of Egypt, Syria and Cilicia. The Cypriote temper, however, lacks originality; at all periods it has accepted foreign innovations slowly, and discarded them even more reluctantly. The island owes its importance, therefore, mainly to its copious supply of a few raw materials, notably copper and timber. Objects of Cypriote manufacture are found but rarely on sites abroad; in the later Bronze Age, however, they occur in Egypt and South Palestine, and as far afield as Thera (Santorin), Athens and Troy (Hissarlik).

The Bronze Age culture of Cyprus falls into three main stages. In the first, the implements are rather of copper than of bronze, tin being absent or in small quantities (2 to 3%); the types are common to Syria and Asia Minor as far as the Hellespont, and resemble also the earliest forms in the Aegean and in central Europe; the pottery is all hand-made, with a red burnished surface, gourd-like and often fantastic forms, and simple geo- metrical patterns incised; zoomorphic art is very rare, and imported objects are unknown. In the second stage, implements

of true bronze (9 to 10% tin) become common; painted pottery of buff clay with dull black geometrical patterns appears along- side the red- ware; and foreign imports occur, such as Egyptian blue-glazed beads (Xllth-XIIIth Dynasty, 2500-2000 B.C.), 1 and cylindrical Asiatic seals (one of Sargon I., 2000 B.C.). 2

In the third stage, Aegean colonists introduced the Mycenaean (late Minoan) culture and industries; with new types of weapons, wheel-made pottery, and a naturalistic art which rapidly becomes conventional; gold and ivory are abundant, and glass and enamels are known. Extended intercourse with Syria, Palestine and Egypt brought other types of pottery, jewelry, &c. (especially scarabs of XVIIIth and XlXth Dynasties, 1600-1200 B.C.), which were freely copied on the spot. There is, however, nothing in this period which can be ascribed to specifically " Phoenician " influence; the only traces of writing are in a variety of the Aegean script. The magnificent tombs from Enkomi and Episkopi illustrate the wealth and advancement of Cyprus at this time. 3

It is in this third stage that Cyprus first appears in history, under the name Asi, as a conquest of Tethmosis (Thothmes) III. of Egypt (XVIIIth Dynasty, c. 1500 B.C.), 4 yielding tribute of chariots, horses, copper, blue-stone and other products. It was still in Egyptian hands under Seti I., and under Rameses III. a list of Cypriote towns seems to include among others the names of Salamis, Citium, Soli, Idalium, Cerynia (Kyrenia), and Curium. Another Egyptian dependency, Alasia, has by some been identified with Cyprus or a part of it (but may perhaps be in North Syria). It sent copper, oil, horses and cattle, ivory and timber; under Amenophis (Amenhotep) III. it exported timber and imported silver; it included a town Sikra, traded with Byblus in North Syria, and was exposed to piratical raids of Lykki (PLycians).

The decline of Egypt under the XXth Dynasty, and the contemporary fall of the Aegean sea-power, left

Cyprus isolated and defenceless, and the Early Iron Age which succeeds is a period of obscurity and relapse. Iron, which occurs rarely, and almost exclusively for ornaments, in a few .tombs at Enkomi, suddenly superseded bronze for tools and weapons, and its intro- duction was accompanied, as in the Aegean, by economic, and probably by political changes, which broke up the high civiliza- tion of the Mycenaean colonies, and reduced them to poverty,

1 Myres, Journ. Hellenic Studies, xvii. p. 146.

2 Sayce, Trans. Soc. Bibl. Arch. v. pp. 441–444. The exact provenance of these cylinders is not known, but there is every reason to believe that they were found in Cyprus.

3 British Museum, Excavations in Cyprus (London, 1900). The official publication stands alone in referring these tombs to the Hellenic period (800–600 B.C.).

4 E. Oberhummer, Die Insel Cypern (Munich, 1903), i. pp. 1–3 (all the Egyptian evidence).

isolation and comparative barbarism. It is significant that the first iron swords in Cyprus are of a type characteristic of the lands bordering the Adriatic. Gold and even silver become rare; 6 foreign imports almost cease; engraved cylinders and scarabs are replaced by conical and pyramidal seals like those of Asia Minor, and dress-pins by brooches (fibulae) like those of south-eastern Europe. Representative art languishes, except a few childish terra-cottas; decorative art becomes once more purely geometrical, but shows only slight affinity with the con- temporary geometrical art of the Aegean.

Lingering thus in Cyprus (as also in some islands of the Aegean) Mycenaean traditions came into contact with new oriental influences from the Syrian coast; and these were felt in Cyprus somewhat earlier than in the West. But there is at present no clear proof

of Phoenician or other Semitic activity in Cyprus until the last years of the 8th century.

No reference to Cyprus has been foundinBabylonian or Assyrian records before the reign of Sargon II. (end of 8th century B.C.), and the occasional discovery of Mesopotamian cylinders of early date in Cyprus is no proof of direct intercourse. 6 Isaiah (xxiii. 1, 12), writing about this time, describes Kittim (a name derived from Citium, q.v.) as a port of call for merchantmen homeward bound for Tyre, and as a shelter for Tyrian refugees; but the Hebrew geographers of this and the next century classify Kittim, together with other coast-lands and islands, under the heading Javan, " Ionian " (q.v.), and consequently reckoned it as pre- dominantly Greek.

Sargon's campaigns in north Syria, Cilicia and south-east Asia Minor (721-71 1) provoked first attacks, then an embassy and submission in 709, from seven kings of Yatnana (the Assyrian name for Cyprus) ; and an inscription of Sargon himself, found at Citium, proves an Assyrian protectorate, and records tribute of gold, silver and various timbers. These kings probably represent that " sea-power of Cyprus " which precedes that of Phoenicia in the Greek " List of Thalassocracies " preserved by Eusebius. Under Sennacherib's rule, Yatnana figures (as in Isaiah) as the refuge of a disloyal Sidonian in 702; but in 668 ten kings of Cypriote cities joined Assur-bani-pal's expedi- tion to Egypt; most of them bear recognizable Greek names, e.g. Pylagoras of Chytroi, Eteandros of Paphos, Onasagoras 1 of Ledroi. They are gazetted with twelve other " kings of the Hatti " (S.E. Asia Minor). Citium, the principal Phoenician state, does not appear by name; but is usually recognized in the list under its Phoenician title -Karti-hadasti, " new town." ■-,,

Thus before the middle of the 7 th century Cyprus reappears in history divided among at least ten cities, of which some are certainly Greek, and one at least certainly Phoenician: with this,' Greek tradition agrees. 7 The Greek colonists traced their

descent, at Curium, from Argos; at Lapathus, from Lacorua; at Paphos, from Arcadia; at Salamis, from the Attic island of that name; and at Soli, also from Attica. The settlements at Paphos and Salamis, and probably at Curium, were believed to date from, the period of the Trojan War, i.e. from the. 13th century, and the latter part of the Mycenaean age; the name of Teucer, the legendary founder of Salamis, probably is a reminiscence of the piratical Tikkara who harried the Egyptian coast under Rameses III. (c. 1200 B.C.), and the discovery of late Mycenaean settlements on these sites, and also at Lapathus, suggests that these legends rest upon history. The Greek dialect of Cyprus points in the same direction; it shows marked resemblances with that of Arcadia, and forms with it a ” South Achaean ” or ” South Aeolic ” group, related to the ” Northern Aeolic ” of Thessaly and other parts of north Greece. 8 Further

5 A. J. Evans, Journ. Anihrop. Inst, pcxx. p. 199 iff. ; J. Naue, Die vorromischen Schwerter (Munich, 1903), p. 25.

6 E. Oberhummer, I.e. p. 5 ff. (all the Assyrian and biblical evidence).

7 W. H. Engel, Kypros (Berlin, 1841) (all the Greek traditions).

8 Moriz Schmidt, Z. f. vergl. Sprachw. (i860), p. 290 ff., 361 ff.; H. W. Smith, Trans. Amer. Philol. Assoc, xviii. (1887) ; R. Meister, Zum eleischen, arkadischen u. kyprischen Dialekte (Leipzig, I890); O. Hoffmann, Die griechischen Dialekte, i. (Gottingen, 1891); C, D. Cobham, Bibliography of Cyprus, pp. 40-45. :-.:’)

evidence of continuity comes from the peculiar Cypriote script, a syllabary related to the linear scripts of Crete and the south Aegean, and traceable

in Cyprus to the Mycenaean age. 1 It remained in regular use until the 4th century; before that time the Greek alphabet occurs in Cyprus only in a few inscrip- tions erected for visitors. 2 In Citium and Idalium, on the other hand, a Phoenician dialect and alphabet were in use from the time of Sargon onward. 3 Sargon's inscription at Citium is cuneiform. 4

The culture and art of Cyprus in this Graeco-Phoenician period are well represented by remains from Citium, Idalium, Tamassus, Amathus and Curium; the earlier phases are best represented round Lapathus, Soli, Paphos and Citium; the later Hellenization, at Amathus and Marion-Arsinoe. Three distinct foreign influences may be distinguished: they originate in Egypt, in Assyria, and in the Aegean. The first two pre- dominate earlier, and gradually recede before the last-named. Their effects are best seen in sculpture and in metal work, though it remains doubtful whether the best examples of the latter were made in Cyprus or on the mainland. Among a great series of engraved silver bowls, 5 found mostly in Cyprus, but also as far off as Nineveh, Olympia, Caere and Praeneste, some examples show almost unmixed imitation of Egyptian scenes and devices; in others, Assyrian types are introduced among the Egyptian in senseless confusion; in others, both traditions are merged in a mixed art, which betrays a return to naturalism and a new sense of style, like that of the Idaean bronzes in Crete. 6 From its intermediate position between the art of Phoenicia and its western colonies (so far as this is known) and the earliest Hellenic art in the Aegean, this style has been called Graeco-Phoenician. The same sequence of phases is represented in sculpture by the votive statues from the sanctuaries of Aphrodite at Dali and of Apollo at Voni and Frangissa; and by examples from other sites in the Cesnola collection; in painting by a rare class of naively polychromic vases; and in both by the elaborately coloured terra-cotta figures from the " Toumba " site at Salamis. Gem-engraving and jewelry follow similar lines; pottery pain ting for the most part remains

geometrical throughout, with crude survivals of Mycenaean curvilinear forms. Those Aegean in fluences, however, which had been predominant in the later Bronze Age, and had never wholly ceased, revived, as Hellenism matured and spread, and slowly repelled the mixed Phoenician orientalism. Imported vases from the Aegean, of the ” Dipylon,” ” proto-Corinthian ” and ” Rhodian ” fabrics, occur rarely, and were imitated by the native potters; and early in the 6th century appears the specific influence of Ionia, and still more of Naucratis in the Egyptian delta. For the failure of Assyria in Egypt in 668-664, and the revival of Egypt as a phil-Hellene state under the XXVIth Dynasty, admitted strong Graeco- Egyptian influences in industry and art, and led about 560 B.C. to the political conquest of Cyprus by Amasis (Ahmosi) II.; 7 once again Cypriote timber maintained a foreign sea-power in the Levant.

The annexation of Egypt by Cambyses of Persia in 525 B.C.

•G. Smith, Tr. Soc. Bibl. Arch. i. 129 ff.; Moritz Schmidt, Monatsb. k. Ak. Wiss. (Berlin, 1874), pp. 614-615; Sammlung kypr. Inschriften (Jena, 1876) ; W. Deecke, Ursprung der kypr. Sylben- schrift (Strassburg, 1877); cf. Deecke-Collitz, Samml. d. gr. Dialekt- inschriften, i. (Gottingen, 1884); cf. C. D. Cobham, I.e. On its Aegean origin, A. J. Evans, ” Cretan Pictographs ” (1895), Journ. Hell. Studies, xiv., cf. xvii. ; British Museum, Exc. in Cypr. (London, 1900), p. 27.

2 British Museum, Exc. in Cypr. (London, 1900), p. 95 (Ionic inscriptions of 5th century from Amathus).

3 M. de Vogue, Melanges d’archeologie orientate (Paris, 1869); J: Euting, Silzb. k. preuss. Ak. Wiss. (1887), pp. 115 ff.; Ph. Berger, C. R. Acad. Inscr. (1887), pp. 155 ff., 187 ff., 203 ff. Cf. Corpus Inscr. Semit. (Paris, 1881), ii. 35 ff.

- *E. Schrader, Abh. d. k. preuss. Ak. Wiss. (1881).*

5 G. Perrot and C. Chipiez, Histoire de Vart dans I'antiquite, iii. (Paris, 1885), interpret these and most other Cypriote materials without reserve as " Phoenician."

6 F. Halbherr and P. Orsi, Antichita dell' antro di Zeus Ideo in Greta (Rome, 1888). Cf. H. Brunn, Griechische Kunstgeschichte (Munich, 1893), i. 90 ff.

' Herod, ii. 182; see also Egypt: History (Dyn. XXVI.).

was preceded by the voluntary surrender of Cyprus, which formed part of Darius's " fifth satrapy." 8 The Greek cities, faring ill under Persia, and organized by Onesilaus of Salamis, joined the Ionic revolt in 500 B.C.; 9 but the Phoenician states, Citium and Amathus, remained loyal to Persia; the rising was soon put down; in 480 Cyprus furnished no less than 150 ships to the fleet of Xerxes; 10 and in spite of the repeated attempts of the Delian League to " liberate " the island, it remained subject to Persia during the 5th century. 11 The occasion of the siege of Idalium by Persians (which is commemorated in an important Cypriote inscription) is unknown. 12 Throughout this period, however, Athens and other Greek states maintained a brisk trade in copper, sending vases and other manufactures in return, and bringing Cyprus at last into full contact with Hellenism. But the Greek cities retained monarchical govern- ment throughout, and both the domestic art and the principal religious cults remained almost unaltered. The coins of the Greek dynasts and autonomous towns are struck on a variable standard with a stater of 170 to 180 grs. 13 The principal Greek cities were now Salamis, Curium, Paphos, Marion, Soli, Kyrenia and Khytri. Phoenicians held Citium and Amathus on the south coast between Salamis and Curium, also Tamassus and Idalium in the interior; but the last named was little more than a sanctuary town, like Paphos. At the end of the 5th century a fresh Salaminian League was formed by Evagoras (q.v.), who became king in 410, aided the Athenian Conon after the fall of

Athens in 404, and revolted openly from Persia in 386, after the peace of Antalcidas. 14 Athens again sent help, but as before the Phoenician states supported Persia; the Greeks were divided by feuds, and in 380 the attempt failed; Evagoras was assassinated in 374, and his son Nicocles died soon after. After the victory of Alexander the Great at Issus in 333 B.C. all the states of Cyprus welcomed him, and sent timber and ships for his siege of Tyre in 332.

After Alexander's death in 323 B.C. Cyprus, coveted still for its copper and timber, passed, after several rapid changes, to Ptolemy I., king of Egypt. Then in 306 B.C. Demetrius Polior- cetes of Macedon overran the whole island, besieged Salamis, and utterly defeated there the Egyptian fleet. Ptolemy, however, recovered it in 295 B.C. Under Ptolemaic rule Cyprus has little history. Usually it was governed by a viceroy of the royal line, but it gained a brief independence under Ptolemy Lathyrus (107-89 B.C.), and under a brother of Ptolemy Auletes in 58 B.C. The great sanctuaries of Paphos and Idalium, and the public buildings of Salamis, which were wholly remodelled in this period, have produced but few works of art; the sculpture from local shrines at Voni and Vitsada, and the frescoed tomb- stones from Amathus, only show how incapable the Cypriotes still were of utilizing Hellenistic models; a rare and beautiful class of terra-cottas like those of Myrina may be of Cypriote fabric, but their style is wholly of the Aegean. It is in this period that we first hear of Jewish settlements, 16 which later become very populous.

In 58 B.C. Rome, which had made large unsecured loans to Ptolemy Auletes, sent M. Porcius Cato to annex the island, nominally because its king had connived at piracy, really because its revenues and the treasures of Paphos were coveted to finance a corn law of P. Clodius. 16 Under Rome Cyprus was at first appended to the province of Cilicia; after Actium (31 B.C.) it became a separate province, which remained in the hands of Augustus and was governed by a legatus Caesaris pro praetore as long

as danger was feared from the East. 17 No monuments

8 Herod, iii. 19. 91 ;"see also Persia: History.

9 Herod, v. 108, 113, 115.

10 Herod, vii. 90. " Thuc. i. 94, 1 12.

12 M. Schmidt, Die Inschrift von Idalion (Jena, 1874). 18 G. F. Hill, Brit. Mus. Cat. Coins of Cyprus (London, 1904) Earlier literature in Cobham, I.e. p. 39.

14 H. F. Talbot, Tr. Soc. Bibl. Arch. v. 447 ff. (translation). For Evagoras and the place of Cyprus in later Greek history, see G. Grote, History of Greece (Index, s.v.), and W. H. Engel, Kypros (Berlin, 1841).

15 I Mace. xv. 23. 16 Livy, Epit. 104; Cic. pro Sestio, 26, 57. 17 Dio Cass. liii. 12 ; Strabo 683, 840.

*remain of this period. In 22 B.C., however, it was transferred to the senate, 1 so that Sergius Paulus, who was governor in a.d. 46, is rightly called avduraros (proconsul). 2 Of Paulus no coins are known, but an inscription exists. 3 Other proconsuls are Julius Cordus and L. Annius Bassus who succeeded him in a.d. 52. * The copper mines, which were still of great importance, were farmed at one time by Herod the Great. 5 The persecution of Christians on the mainland after the death of Stephen drove converts as far as Cyprus; and soon after converted Cypriote Jews, such as Mnason (an " original convert ") and Joses the Levite (better known as Barnabas), were preaching in Antioch. The latter revisited Cyprus twice, first with Paul on hiss " first journey" in a.d. 46, and later with Mark. 6 In 116–11? the Jews of Cyprus, with those of Egypt and Cyrene, revolted, massacred 240,0100 persons, and destroyed a large part of Salamis. Hadrian,*

afterwards emperor, suppressed them, and expelled all Jews from Cyprus.

For the culture of the Roman period there is abundant evidence from Salamis and Paphos, and from tombs everywhere, for the glass vessels which almost wholly supersede pottery are much sought for their (quite accidental) iridescence; not much else is found that is either characteristic or noteworthy; and little attention has been paid to the sequence of style.

The Christian church of Cyprus was divided into thirteen bishoprics. It was made autonomous in the 5th century, in recognition of the supposed discovery of the original of St Matthew's Gospel in a " tomb of Barnabas " which is still shown • at Salamis. The patriarch has therefore the title jua/ capuoTarcs and the right to sign his name in red ink. A council of Cyprus, summoned by Theophilus of Alexandria in a.d. 401, prohibited the reading of the works of Origen (see Cyprus, Church of).

Of the Byzantine period little remains but the ruins of the castles of St Hilarion, Buffavento and Kantara; and a magnifi- cent series of gold ornaments and silver plate, found near Kyrenia in 1883 and 1897 respectively. Christian tombs usually contain nothing of value.

The Frank conquest is represented by the " Crusaders' Tower " at Koiossi, and the church of St Nicholas at Nicosia; and, later, by masterpieces of a French Gothic style, such as the church (mosque) of St Sophia, and other churches at Nicosia; the cathedral (mosque) and others at Famagusta (q.v.), and the monastery at Bella Pais; as well as by domestic architecture at Nicosia; and by forts at Kyrenia, Limasol and elsewhere.

The Turks and British have added little, and destroyed much, converting churches into mosques and grain-stores, and quarrying walls and buildings at Famagusta.

History of Excavation. — Practically all the archaeological discoveries above detailed have been made since 1877. A few chance finds of vases, inscriptions and coins; of a hoard of silver bowls at Dali (anc. Iiaiium)'' in 185 1; and of a bronze tablet with Phoenician and Cypriote bilingual inscriptions, 8 also at Dali, and about the same time, had raised questions of great interest as to the art and the language of the ancient inhabitants. T. B. Sandwith, British consul 1865–1869, had laid the foundations of a sound knowledge of Cypriote pottery; 9 his successor R. H. Lang (1870–1872) had excavated a sanctuary of Aphrodite at Dali ; 10 and at the time of the publication of the oth ed. of the Ency. Brit., 11 General Louis P. di Cesnola (q.v.), American consul, was already exploring ancient sites, and opening tombs, in all parts of the island, though his results were not published till 1877." But though his vast collection, now

1 Dio Cass. liv. 4; Strabo 685. 2 Acts xiii. 7.

3 D. G. Hogarth, Devia Cypria, pp. 114 ff. and app.

4 Corp. Inscr. Lat. 2631–2632.

6 Jos. Ant. 16. 4, 5; 19. 26, 28.

6 Acts iv. 36, xi. 19, 20, xiii. 4–13, xv. 39, xxi. 16.

7 De Longperier, Athenaum francais (1853), pp. 413 ff. ; Musee Napoleon, pis. x. xi.

8 De Luynes, Numismatique et inscriptions chypriotes (1852).

9 Archaeologia, xlv. (1877), PP- 127–142. v :

10 Trans. Roy. Soc. Literature, 2nd sen xi. (1878), pp. 30 ff.

11 Article " Cyprus " ad. fin.

12 Cyprus: its Cities, Tombs and Temples (London, 1877).

in the Metropolitan Museum of New York, remains the largest series of Cypriote antiquities in the world, the accounts which have been given of its origin are so inadequate, and have provoked so much controversy, 13 that its scientific value is small, and a large part of subsequent excavation has necessarily been directed to solving the problems suggested by its practically isolated specimens. From 1876 to 1878 Major Alexander P. di Cesnola continued his brother's work, but the large collection which he exhibited in London in 1880 was dispersed soon afterwards. 14

On the British occupation of Cyprus in 1878, the Ottoman law of 1874 in regard to antiquities was retained in force. Ex- cavation is permitted under government supervision, and the finds are apportioned in thirds, between the excavator, the landowner (who is usually bought out by the former), and the government. The government thirds lie neglected in a " Cyprus Museum " maintained at Nicosia by voluntary subscription. There is no staff, and no effective supervision of ancient sites or monuments. A catalogue of the collections was published by the Oxford University Press in 1899. 15

Since 1878 more than seventy distinct excavations have been made in Cyprus, of which the following are the most im- portant. In 1879 the British government used the acropolis of Citium (Larnaca) to fill up the ancient harbour; and from the destruction a few Phoenician inscriptions and a proto-Ionic capital were saved. In 1882 tombs were opened by G. Hake at Salamis and Curium for the South Kensington Museum, but no scientific record was made. In 1883 the Cyprus Museum was founded by .private enterprise, and on its behalf Max Ohnefalsch-Richter, who had already made trial diggings for Sir Charles Newton and the British Museum, excavated sanctu- aries at Voni and Kythrea (Chytri), and opened tombs on some other sites. 16

In 1885 Dr F. Dummler opened tombs at Dali, Alambra and elsewhere, and laid the foundations of knowledge of the Bronze Age and Early Iron Age; 17 and

Richter, on behalf of officials and private individuals, excavated parts of Frangissa (Tamassus), Episkopi and Dali. 18

In the same year, 1885, and in 1886, a syndicate opened many tombs at P61i-tis-Khrysochou (Marium, Arsinoe), and sold the contents by auction in Paris. From Richter's notes of this excavation, Dr P. Herrmann compiled the first scientific account of Graeco-Phoenician and Hellenistic Cyprus. 19 In 1886 also M. le vicomte E. de^astillon de St Victor opened rich Graeco- Phoenician tombs at Episkopi, the contents of which are in the Louvre. 20

The successes of 1885-1886 led to the foundation of the Cyprus Exploration Fund, on behalf of which (1) in 1888 the sanctuary of Aphrodite at Paphos (Kouklia) was excavated by Messrs E. Gardner, M. R. James, D. G. Hogarth and R. Elsey Smith ; !1 (2) in 1889-1890 more tombs were opened at Poli by Messrs J. A. R. Munro and H. A. Tubbs; 22 (3) in 1890-1891 extensive trials were made at Salamis, by the same ; a (4) minor sites were examined at Leondari Vouno (1888), 24 Amargetti (1888), 26 and Limniti (1889) ; 26 (5) in 1888 Hogarth made a surface-survey of the Karpass promontory; 27 and finally, (6) in 1894 the balance was expended by J. L. Myres in a series of trials, to settle special

13 See Cobham, An Attempt at a Bibliography of Cyprus (4th ed., Nicosia, 1900), Appendix, " Cesnola Controversy," p. 54.

14 The Lawrence-Cesnola Collection (London, 1881); Salaminia, id. 1882.

15 Myres and Ohnefalsch-Richter, A Catalogue of the Cyprus Museum, with a Chronicle of Excavations since the British Occupation, and Introductory Notes on Cypriote Archaeology (Oxford, 1899).

18 Mitt. d. arch. Inst. ii. (Athens, 1881).

17 Mitt. d. arch. Inst. vi. (Athens, 1886) ; Bemerkungen z. Sit, Kunsthandwerk, &c, ii. " Der

kypr. geometrische Stil ” (Halle,

1888).

18 Summarized in Cyprus, the Bible and Homer (London and Berlin,

1893)-

19 Das Graberfeld von Marion (Berlin, 1888).

20 Archives des missions scientifiques, xvii. (Paris, 1891).

21 Journal of Hellenic Studies, ix. (London, 1888). » Id. xi. (1890); xii. (1891). » Id. xii. (1891). 24 Id. ix. (1888). 26 Id. ix. ‘1888).

M Id. xi. (1890). 27 Devia Cypria (Oxford, 1889).

points, at Agia Paraskevi, Kalopsida and Larnaca. 1 In 1894 also Dr Richter excavated round Idalium and Tamassus for the Prussian government: the results, unpublished up to 1902, are in the Berlin Museum. 2 Finally, a legacy from Miss Emma T. Turner enabled the British Museum to open numerous tombs, by contract, of the Graeco-Phoenician age, in 1894, at Palaeo- Lemesso {Amathus); and of the Mycenaean age, in 1894-1895 at Episkopi, in 1895-1896 at Enkomi (near Salamis), and in 1897-1899 on small sites between Larnaca and Limasol. 3

For ancient Oriental references to Cyprus see E. Oberhummer, Die Insel Cypern, i. (Munich, 1903); for classical references, W. H. Engel, Kypros (2 vols., Berlin, 1841) ; for culture and art, G. Perrot and C. Chipiez, Histoire de I’art dans Vantiquite, vol. iii. ” Phenicie et Cypre ” (Paris, 1885) ; L. P. di Cesnola, A Descriptive Atlas of the Cesnola Collection of Cypr. Antiquities in the Metropolitan Museum of Art, New York (3 vols., Boston, U.S.A., 1884-1886) ; M. Ohnefalsch- Richter, Kypros, the

Bible and Homer (2 vols., London and Berlin, 1893); J. L. Myres and M. Ohnefalsch-Richter, Cyprus Museum Catalogue (Oxford, 1899). The principal publications on special topics are given in the footnotes. For Cypriote coins see also Numis- matics. See further the general bibliography below. (J. L. M.)

Modern History

After the division of the Roman empire Cyprus naturally passed, with all the neighbouring countries, into the hands of the Eastern or Byzantine emperors, to whom it continued subject, with brief intervals, for more than seven centuries. Until 644 the island was exceedingly prosperous, but in that year began the period of Arab invasions, which continued intermittently until 975. At the outset the Arabs under the caliph Othman made themselves masters of the island, and destroyed the city of Salamis, which until that time had con- tinued to be the capital. The island was recovered by the Greek emperors and, though again conquered by the Arabs in the reign of Harun al-Rashid (802), it was finally restored to the Byzantine empire under Nicephorus Phocas. Its princes became practically independent, and tyrannized the island, until in 1191 Isaac Comnenus provoked the wrath of Richard I., king of England, by wantonly ill-treating his crusaders. He thereupon wrested the island from Isaac, whom he took captive. He then sold Cyprus to the Knights Templars, who presently resold it to Guy de Lusignan, titular king of Jerusalem.

Guy ruled from 11 92 till his death in n 94; his brother Amaury took the title of king, and from this time Cyprus was governed for nearly three centuries by a succession of kings of the same dynasty, who introduced into the island the feudal system and other institutions of western Europe. During the later part of this period, indeed, the Genoese made themselves masters of Famagusta — which had risen in place of Salamis to be the chief commercial city in the island — and retained possession of it for a considerable time (1376-1464); but it was recovered by King James II., and the whole island was reunited

under his rule. His marriage with Caterina Cornaro, a Venetian lady of rank, was designed to secure the support of the powerful republic of Venice, but had the effect after a few years, in con- sequence of his own death and that of his son James III., of transferring the sovereignty of the island to his new allies. Caterina, feeling herself unable to contend alone with the increas- ing power of the Turks, was induced to abdicate the sovereign power in favour of the Venetian republic, which at once entered into full possession of the island (1489).

The Venetians retained their acquisition for eighty-two years, notwithstanding the neighbourhood of the Turks. Cyprus was now harshly governed by a lieutenant, and the condition of the natives, who had been much oppressed under the Lusignan dynasty, became worse. In 1570 the Turks, under Selim II., made a serious attempt to conquer the island, in which they landed an army of 60,000 men. The greater part of the island was reduced with little difficulty; Nicosia, the capital, was taken after a siege of 45 days, and 20,000 of its inhabitants put to the sword. Famagusta alone made a gallant and pro-

*1 J.H.S. xvii. (1897). * Summarized in Cyprus Museum Catalogue (Oxford, 1899). 3 Excavations in Cyprus (London, 1900).*

tracted resistance, and did not capitulate till after a siege of nearly a year's duration (August 1 57 1) . The terms of the capitula- tion were shamefully violated by the Turks, who put to death the governor Marcantonio Bragadino with cruel torments. From that time Cyprus was under Turkish administration until the agreement with Great Britain in 1878. Its history during that period is almost a blank. A serious insurrection broke out in 1764, but was speedily suppressed; and a few similar incidents are the only evidence of the Turkish oppression of the Christian population of the island, and the. consequent stagnation of its trade.

Authorities. — An Attempt at a Bibliography of

Cyprus, by C. D. Cobham (4th ed., Nicosia, 1900), registers over 700 works which deal with Cyprus. A Handbook of Cyprus, by Sir J. T. Hutchinson and C. D. Cobham (London), treats the island briefly from every standpoint. See also E. Oberhummer, Die Insel Cypern (Munich, 1903 et seq.), a comprehensive work. The most interesting travels may be found under the names of Felix Faber, Evagatorium (Stutt- gart, 1843) ;de Villamont, Voyages (Arras, 1598); van Kootwyck, Cotovici itinerarium (Antwerp, 1619); R. Pococke, Description of the East (London, 1743); A. Drummond, Travels (London, 1754); E. D. Clarke, Travels (London, 1812) ; Sir S. Baker, Cyprus in 1879 (London, 1879) ; W. H. Mallock, In an Enchanted Island (London, 1879). The geology of the island has been handled by A. Gaudry, Giologie de Vile de Chypre (Paris, 1862) ; C. V. Bellamy, Notes on the Geology of Cyprus, to accompany a Geological Map of Cyprus (London, 1905) ; C. V. Bellamy and A. J. Jukes-Brown, Geology of Cyprus (Plymouth, 1905). Its natural history by F. Unger and T. Kotschy, Die Insel Cypern (Wien, 1865). Numismatics by the Due de Luynes, Numismatique et inscriptions Cypriotes (Paris, 1852); R. H. Lang, Numism. Chronicle, vol. xi. (1871); J. P. Six, Rev. num. pp. 249-374 (Paris, 1883); and E. Babelon, Monnaies grecques (Paris, 1893). The coins of medieval date have been described by P. Lambros, Monnaies inSdites (Athens, 1876) ; and G. Scblumberger, Num. de I'orient latin (Paris, 1878). Inscriptions in the Cypriote character have been collected by M. Schmidt, Sammlung (Jena, 1876); and W. Deecke, Die griechisch-kyprischen Inschriften (Gottingen, 1883); in Phoenician in the C.I. P. (Paris, 1881). J. Meursius, Cyprus (Amsterdam, 1675), marshals the classical authorities; and W. Engel, Kypros (Berlin, 1841), gives a good summary of the ancient history of the island. For the Phoenician element, see F. Movers, Die Phonizier (Bonn and Berlin, 1841- 1856). L. Comte de Mas Latrie published between 1852 and 1861 one volume of History (1191-1291), and two of most precious documents in illustration of the reigns of the Lusignan kings. Fra Stefano Lusignano, Chorograffia di Cipro (Bologna, I573),and Bp.

Stubbs, Two Lectures (Oxford, 1878), are useful for the same period; and perhaps a score of contemporary pamphlets — the best of them by N. Martinengo, Relatione di tutto il successo di Famagosta (Venezia, 1572), and A. Calepio (in Lusignan's Chorograffia) — preserve details of the famous sieges of Nicosia and Famagusta. G. Mariti, Viaggi (Lucca, 1769; Eng. trans. C. D. Cobham, 2nd ed., 1909), and Cyprianos, History (Venice, 1768), are the best authorities of Cyprus under Turkish rule. Medieval tombs and their inscriptions are recorded and illustrated in T. J. Chamberlayne, Lacrimae nicossienses (Paris, 1894); and C. Enlart's volumes, L'Art gothique et la Re- naissance en Chypre (Paris, 1899), deal with medieval architecture. For Cypriote pottery in Athens and Constantinople, see G. Nicole, Bulletin de I'Institut Genevois, xxxvii.

CYPRUS, CHURCH OF. The Church of Cyprus is in com- munion and in doctrinal agreement with the other Orthodox Churches of the East (see Orthodox Eastern Church), but is independent and subject to no patriarch. This position it has always claimed (see, however, W. Bright, Notes on the Canons, on Ephesus 8). At any rate, its independence " by ancient custom " was recognized, as against the claims of the patriarch of Antioch, by the council of Ephesus, a.d. 431, by an edict of the emperor Zeno (to whom the church had sent a cogent argument on its own behalf, the alleged body of its reputed founder St Barnabas, then just discovered at Salamis), and by the Trullan Council in 692. Attempts have been made subse^ quently by the patriarchs of Antioch to claim authority over it, the last as recently as 1600; but they came to nothing. And excepting for the period during which Cyprus was in the hands of the Lusignans and the Venetian Republic (1193-1571), the Church has never lost its independence. It receives the holy ointment (/xvpou) from without, till i860 from Antioch and subsequently from Constantinople, but this is a matter of courtesy and not of right. Of old there were some twenty sees in the island. The bishop of the capital, Salamis or Constantia, was constituted metropolitan by Zeno, with the title

” archbishop

foz

CYPSELUS— CYRENAICA

of all Cyprus,” enlarged subsequently into “archbishop of Justiniana Nova and of all Cyprus,” after an enforced expatria- tion to Justinianopolis in 688. Zeno also gave : him the unique privileges of wearing and signing his name in the imperial purple, &c, which are still preserved. A Latin hierarchy was set up : in 1196 (an archbishop at Nicosia with suffragans at Limasol, Paphos and Famagusta), and the Greek bishops were made to minister to their flocks in subjection to it. The sees were forcibly reduced to four, the archbishopric was ostensibly abolished, and the bishops were compelled to do homage and swear fealty to the Latin Church. This bondage ceased at the conquest of the island by the Turks : the Latin hierarchy disappeared (the cathedral at Nicosia is now used as a mosque), and the native church emerged into comparative freedom. In 1821, it is true, all the bishops and many of their flock were put to death by way of discouraging sympathies with the Greeks; but successors were soon consecrated, by bishops sent from Antioch at the request of. the patriarch of Constantinople, and on the whole the Church has prospered. The bishops-elect required the bcrat of the sultan; but having received this, they enjoyed no little civil importance. Since 1878 the berat has not been given, and the bishops are less influential. The suppressed sees have never been restored, but the four which survive (now known as Nicosia, Paphos, Kition and Kyrenia) are of metro- politan rank, so that the archbishop, whose headquarters, first at Salamis, then at Famagusta, are now at Nicosia, is a primate amongst metropolitans. There are several monasteries dating from the nth Century and onwards; also an archiepiscopal school at Nicosia, founded in 181 2 and raised to the status of a ” gymnasion ” in 1893 ; and a high school for girls.

Authorities. — Ph. Georgiou, ElS^crm 'laropucaX vepl rfjs 'EkkXi)(t£os tt}s KvTrpov (Athens, 1875); K. Kouriokurineos (Archbishop of Cyprus), "laTopta xpow^oyMV T v vi\aov Kvirpov (Venice, 1788); de Mas Latrie, Histoire de I' tie de Chypre sous les princes de la maison de Lusignan (Paris, 1852 f.) ; H. T. F. Duckworth, The Church of Cyprus (London, 1900) ; J. Hackett, History of the Orthodox Church of Cyprus (1901). ' (W. E. Co.)*

CYPSELTJS, tyrant of Corinth (c. 657–627 B.C.), was the son of Aeetion and Labda, daughter of Amphion, a member of the ruling family, the Bacchiadae. He is said to have derived his name from the fact that when the Bacchiadae, warned that he would prove their ruin, sent emissaries to kill him in his cradle, his mother saved him by concealing him in a chest (Gr.Kut/'eXij). The story was, of course, a subsequent invention. When he was grown up, Cypselus, encouraged by an oracle, drove out the Bacchiadae, and made himself master of Corinth. It is stated that he first ingratiated himself with the people by his liberal conduct when Polemarch, in which capacity he had to exact the fines imposed by the law. In the words of Aristotle he made his way through demagogy to tyranny. Herodotus, in the spirit of 5th-century Greeks, which conventionally regarded the tyrants as selfish despots, says he ruled harshly, but he is generally represented as mild, beneficent and so popular as to be able to dispense with a bodyguard, the usual attribute of a tyrannis. He pursued an energetic commercial and colonial policy (see Corinth), and thus laid the foundations of Corinthian prosperity. He may well be compared with the Athenian Pei si- stratus in these respects. He laid out the large sums thus derived on the construction of buildings and works of art. At the same time he wisely strove to gain the. goodwill of the powerful priest- hoods of the great sanctuaries of Delphi and Olympia. At Delphi he built' a treasure-house for Corinthian votive offerings; at Olympia he dedicated a colossal statue of Zeus and the famous " chest of Cypselus," supposed to be identical with the chest of the

legend, of which Pausanias (v. 17- 1.9) has given an elaborate description. It was of cedar-wood, gold and ivory, and on it were represented the chief incidents in Greek (especially Corin- thian) mythology and legend. Cypselus was succeeded by his son Periander.

See Corinth: History; histories of Greece; Herodotus v. 92 ; Aristotle, Politics, 1310 b, 1315 b; P. Knapp, Die Kypseliden und die Kypseloslade (Tubingen, 1888); L. Preller, Ausgewdhlte Aufsdtze (1864) ; H. Stuart Jones, in Journ. Hell. Stud. (1894), 30 foil'.

CYRANO DE BERGERAC, SAVINIEN (1620-1655), French romance-writer and dramatist, son of Abel de Cyrano, seigneur de Mauvieres et de Bergerac, was born in Paris on the 6th of March 1619-1620. He received his first education from a country priest, and had for a fellow ; pupil his friend and future biographer, Henri Lebret. He then proceeded to Paris to the college de Beauvais, where he had for master Jean Grangier, whom he afterwards ridiculed in his comedy Le Pedant joui (1654). At the age of nineteen he entered a corps of the guards, serving in the campaigns of 1639 and 1640,: and began the series of exploits that were to make of him a veritable hero of romance. The story of his adventure single-handed against a hundred enemies is vouched for by Lebret as the simple truth. After two years of this life Cyrano left the service and returned to Paris' to pursue literature, producing tragedies cast in the orthodox classical mode. He was, however, as a pupil of Gassendi, suspected of thinking too freely, and in the Mort d' Agrippine (1654) his enemies even found blasphemy. The most interesting section of his work is that which embraces the two romances L' Histoire comique des Hats du soleil (1662) and L' Histoire comique des etats de la lune (1656?). Cyrano's ingenious mixture of science and romance has furnished a model for many subse- quent writers, among them Swift and E. A. Poe. It is impossible to determine whether he adopted his fanciful style in the hope of safely conveying ideas that might be regarded as unorthodox, or whether he simply found

in romance writing a relaxation from the serious study of physics. Cyrano spent a stormy existence in Paris and was involved in many duels, and in quarrels with the comedian Montfleury, with Scarron and others. He entered the household of the due d'Arpajon as secretary in 1653. In the next year he was injured by the fall of a piece of timber, as he entered his patron's house. Arpajon, perhaps alarmed by his reputation as a free-thinker, desired him to leave, and he found refuge with friends in Paris. During the illness which followed his accident, he is said to have been reconciled with the Church, and he died in September 1655. '

M. Edmond Rostand's romantic play of Cyrano de Bergerac (1897) revived interest in the author of the Histoires comiques. A modern edition of his CEuvres (2 vols.), by P. L. Jacob (Paul Lacroix), appeared in 1858, with the preface by H. Lebret originally prefixed to the Histoire comique des etats de la lune (1656?). For an interesting ■ *analysis of the romances see Garnet Smith in the Cornhill for July 1898. See also P. A. Brun, Savinien de Cyrano Bergerac (1394). 'Other studies of Cyrano are those of Charles Nodier (1841), F. Merilhpn (Perigueux, 1856), Fourgeaud-Lagreze (in Le Perigord litteraire, 1875) and of Theophile Gautier, in his Grotesques:*

CYRENAICA, in ancient geography, a district of the N. African coast, lying between the Syrtis Major and Marmarica, the western limit being Arae Philaenorum, and the eastern a vague line drawn inland from the head of the gulf of Platea (Bomba). On the south the limit was undefined, but understood to be the margin of the desert, some distance north of the oasis of Augila (Aujila). ' The northern half of this district, which alone was fertile, was known as Pentapolis from its possession of five considerable cities (1) Hesperides-Berenice (Bengazi), (2) Barca (Merj), (3) Cyrene (Ain Shahat-Grenna), (4) Apollonia (Marsa Susa), (5) Teucheira-Arsinoe (Tocra). In later times two more towns rose to importance, Ptolemais (Tolmeita) and Darnis^Zarine (Derna). These all lay on the coast, with the

exception of Barca and Cyrene, which were situated on the high- land now called Jebel Akhdar, a few miles inland. Cyrene was the first city to arise, being founded among Libyan barbarians by Aristotle of Thera (later called Battus) in the middle of the 7th century B.C. (see Cyrene). For about 500 years this district enjoyed great prosperity, owing partly to its natural products, but more to its trade with interior Africa.

Under the Ptolemies, the inland cities declined in comparison with the maritime ones, and the Cyrenaica began to feel the commercial competition of Egypt and Carthage, whence easier roads lead into the continent. After all N. Africa had passed to Rome, and Cyrenaica itself, bequeathed by Apion, the last Ptolemaic sovereign, was become (in combination with Crete) a Roman province (after 96 B.C.), this competition told' more severely than ever, and the Greek colonists, grown weaker, found

themselves less able to hold their own against the Libyan popula- tion. A great revolt of the Jewish settlers in the time of Trajan settled the fate of Cyrene and Barca; the former is mentioned by Ammianus Marcellinus in the 4th century a.d. as " urbs deserta," and Synesius, a native, describes it in the following century as a vast ruin at the mercy of the nomads. Long before this its most famous article of export, the silphium plant, a repre- sentation of which was the chief coin-type of Cyrene, had come to an end. This plant, credited with wonderful medicinal and aromatic properties, has not been certainly identified with any existing species. The similar Thapsia garganica (Arab. Arias), which now grows freely in Cyrenaica, though it has medicinal properties, has not those ascribed to silphium. Henceforward till the Arab invasion (a.d. 641) Apollonia was the chief city, with Berenice and Ptolemais next in order. After the conquest by Amr ibn el-' Asi, inland Cyrenaica

regained some importance, lying as it did on the direct route between Alexandria and Kairawan, and Barca became its chief place. But with the substitution of Ottoman for Arab empire, resulting in the virtual independence of both Egypt and Tripoli, the district lying between them relapsed to anarchy. This state of things con- tinued even after Mahmud II. had resumed direct control over Tripoli (1835), and in the middle of the 19th century Cyrenaica was still so free of the Turks that Sheik Ali bin-Senussi chose it as the headquarters of his nascent dervish order. All over the district were built Senussi convents (zawia), which still exist and have much influence, although the headquarters of the order were withdrawn about the year 1855 to Jarabub, and in 1895 to Kufra, still farther into the heart of Africa. In 1875 the district, till then a sanjak of the vilayet of Tripoli, was made to depend directly on the Ministry of the Interior at Constantinople; and the Senussites soon ceased to be de facto rulers of Cyrenaica. Their preserves have now been still further encroached upon by a number of Cretan Moslem refugees (1901- 1902). This is not the first effort made by Turkey to colonize Cyrenaica. In 1869 Ali Riza Pasha of Tripoli tried to induce settlers to go to Bomba and Tobruk; and in 1888 an abortive effort was made to introduce Kurds. To protect the Cretans the Ottoman government has extended the civil administration and created several small garrisoned posts. The district is accordingly safer for Europeans than it was; but these still find themselves ill received. The Ottoman officials discourage travel in the interior, partly from fear of the Senussites, partly from suspicions, excited by the lively interest manifested by Italy in Cyrenaica.

At the present day we understand by Cyrenaica a somewhat larger district than of old, and include ancient Marmarica up to the head of the gulf of Solium (Catabathmus Magnus). The whole area is about 30,000 sq. m., and has some 250,000 in- habitants, inclusive of nomads. Projecting like a bastion into the Mediterranean at a very central point, Cyrenaica

seems intended to play a commercial part; but it does not do so to any extent because of (1) lack of natural harbours, Bengazi and Derna having only open and dangerous roads (this is partly due to coastal subsidence; ancient ports have sunk); (2) the difficulty of the desert routes behind it, wells being singularly deficient in this part of the Sahara. The ivory and feather caravans from Wadai and Borku have latterly deserted it altogether. Consequently Cyrenaica is still in a very backward and barbarous state and largely given up to nomad Arabs. There are only two towns, Bengazi and Derna, and not half a dozen settlements beside, worthy to be called villages. In many districts the Senussi convents supply the only settled element, and the local Bedouins largely belong to the Order. There are no roads in the province, and very little internal com- munication and trade; but a wireless telegraphic system has been installed in communication with Rhodes: and there is a landline from Bengazi to Tripoli.

Geologically and structurally Cyrenaica is a mass of Miocene limestone tilted up steeply from the Mediterranean and falling inland by a gentle descent to sea-level again at the line of depres- sion, which runs from the gulf of Sidra through Aujila to Siwa.

This mass is divided into two blocks, the higher being the western Jebel Akhdar, on which Cyrene was built (about 1800 ft.): the lower j the eastern Jebel el-Akabah, the ancient Mar- maric highlands (700 ft.). There is no continuous littoral plain, the longest strip running from the recess of the Syrtis round past Bengazi to Tolmeita. ' Thereafter, except for deltaic patches at Marsa Susa and Derna, the shore is all precipitous. Jebel Akhdar, being without •" faults," has no deep internal valleys, and presents the appearance of downs: but its seaward face is Very deeply eroded, and deep circular sinkings (swallow-holes) are common. There is much forest on its northward slopes, and good red earth on the higher parts, which bears abundant crops of barley, much desired by European maltsters.

Plenty of springs issue on the highlands, and wide expanses of grassy country dotted with trees like an English park are met with. Here the Bedouins (mostly Beni Hassa) pasture flocks and herds, amounting to several million head. The climate is temperate and the rainfall usually adequate, but one year in five is expected to be droughty. The southward slopes fall through ever-thinning pasture lands to sheer desert about 80 m. inland. Jebel el-Akabah is much more barren than Jebel Akhdar, and the desert Comes right down to the sea in Marmarica, whose few inhabitants are more concerned with salt-collecting and sponge fishing than - with agriculture. They have, however, the only good ports on the whole coast, Bomba and Tobruk. Much might be made of Cyrenaica by judicious colonization. All kinds of trees grow well, from the date palm to the oak; and there are over 200,000 wild olives in the country. The conditions in general are very like those of central Italy, and there is ample room for hew settlers.

Bibliography. — (1) Ancient Cyrenaica: J. P. Thrige, Historia Cyrenes (1819) ; O. Ritter, Erdkunde, i. (1822); A. F. Gottschick, Gesch. der Grundung und Bliite deskell. Staates in Kyrenaika (1858).

(2) Modern Cyrenaica: Paul Lucas, Voyage (1712); T. Shaw, Travels and Observations (1738); J. Bruce, Travels (1790); P. della Cella, Viaggio da Tripoli, &c. (1819); G. F. Lyon, Narrative of Travels (1821); A. Cervelli, in Recueil de voyages, pub. by Soc. de Geog., ii. (1825); J. R. Pacho, Relation d'un voyage (1827);. F. W. Beechey, Proceedings of Expedition to explore N. Coast of Africa (1828); H. Barth, Wanderungen, &c. (1849); V. de Bourville, Rapport (1850); J. Hamilton, Wanderings in N. Africa (1856); R. M. Smith and E. A. PorCher, Hist, of Discoveries (1864); G. Rohlfs, Von Tripoli nach Alexandrien (1871).; G. Haimann,. La Cirenaica (1882); M. Camperio, Una Gita in Cirenaica (1881); H. Duveyrier, " La Confr. musulmane de Sidi Moh. Ben Ali es Senousi " (Bull. soc. geog., 1884); H. W. Blundell in Geog. Journ. v. (1895) and Annual Brit. Sch. at Athens, ii. (1895) ; D. G. Hogarth in

Monthly Review (Jan. 1904) ; G. Hildebrand,. Cyrenaika, &c. (1904) ; G. de Martino, Cirene e Cartagine (1908).

(3) Maps: The best are that by P. Carlo, to illustrate Camperio and Haimahn's Report, in Petermann's Mitth. (1881); and Sheet No. 2 of Carte de I'Afrique (Service geog. de l'armee, 1892).

(D. G. H.)

CYRENAICS, a Greek school of philosophy, so called from Cyrene, the birthplace of the founder, Aristippus (q.v.). It was one Of the two earliest Socratic schools, and emphasized one side only of the Socratic teaching (cf. Cynics). Socrates, although he held that virtue was the only human good, admitted to a certain extent the importance of its utilitarian side, making happiness at least a subsidiary end of moral action (see Ethics). Aristippus and his followers seized upon this, and made it the prime factor in existence, denying to virtue any intrinsic value. Logic and physical science they held to be useless, for all know- ledge is immediate sensation (see Protagoras). These sensations are motions (KLvrjo-us) which (1) are purely subjective, and (2) are painful, indifferent or pleasant, according as they are violent, tranquil or gentle. Further they are entirely individual, ' and can in no way be described as constituting absolute objective knowledge. Feeling, therefore, is the only possible criterion alike of knowledge and of conduct. " Our modes of being affected (ird^Tj) alone are knowable." Thus Cyrenaicism goes beyond the critical scepticism of the Sophists and deduces a single, universal aim for all men, namely pleasure. Furthermore, all feeling is momentary and homogeneous. It follows (1) that past and future pleasure have ho" real existence for us, 1 and (2) that among present pleasures there is no distinction of kind, but

only of intensity. Socrates had spoken of the higher pleasures of the intellect; the Cyrenaics denied the validity of this distinc- tion and said that bodily pleasures as being more simple and more intense are to be preferred. Momentary pleasure (jiovd- Xpovos ySovri), preferably of a carnal kind, is the only good for man. Yet Aristippus was compelled to admit that some actions which give immediate pleasure entail more than their equivalent of pain. This fact was to him the basis of the conventional distinction of right and wrong, and in this sense he held that regard should be paid to law and custom. It is of the utmost importance that this development of Cyrenaic hedonism should be fully realized. To overlook the Cyrenaic recognition of social obligation and the hedonistic value of altruistic emotion is a very common expedient of those who are opposed to all hedonistic theories of life. Like many of the leading modern utilitarians, they combined with their psychological distrust of popular judgments of right and wrong, and their firm convic- tion that all such distinctions are based solely on law and con- vention, the equally unwavering principle that the wise man who would pursue pleasure logically must abstain from that which is usually denominated " wrong " or " unjust." This idea, which occupies a prominent position in systems like those of Bentham, Volney, and even Paley, was evidently of prime importance at all events to the later Cyrenaics.

Developing from this is a new point of practical importance to the hedonism of the Cyrenaics. Aristippus, both in theory and in practice, insisted that true pleasure belongs only to him who is self-controlled and master of himself. The truly happy man must have pbvri

The Cyrenaic ideal was, of course, utterly alien to Christianity, and, in general, subsequent thinkers found it an ideal of hopeless pessimism. Yet in modern times it has found expression in many ethical and literary works, and it is common also in other ancient non-Hellenic literature. There are quatrains in the Rubdiydt of Omar Khayyam and pessimistic

verses in Ecclesiastes which might have been uttered by Aristippus . (" Then I com- mended mirth, because a man hath no better thing than to eat and to drink and to be merry; for that shall abide with him of his labour the days of his life which God giveth him under the sun "). So in Byron and Heine, and, in a sense, in Walter Pater (Marius the Epicurean), there is the same tendency to seek relief from the intellectual cul-de-sac in frankly aesthetic satisfaction. Thus Cyrenaicism did not entirely vanish with its absorption in Epicureanism.

See Hedonism, Epicurus; histories of philosophy by Zeller, Windelband, Ueberweg; H. Sidgwick, Methods of Ethics and Outlines of the History of Ethics; J. Watson, Hedonistic Theories (1895); James Seth, Ethical Principles, c. i. (A), (1898); A. Wendt, De philosophia Cyrenaica (1841); H. von Stein, De philosophia Cyrenaica (1855); T. Gomperz, Greek Thinkers (Eng. trans., vol. ii. bk. iv., ad fin., 1905) ; Beare, Greek Theories of Elementary Cognition; G. van Lyng, Om den Kyrenaiske skole (Christiania, 1868) ; and general ethical text-books.

CYRENE [mod. Ain Shahat-Grenna], the original capital of ancient Cyrenaica (q.v.) and one of the greatest of Greek colonies. The Theraean story of its foundation, as told by Herodotus, runs thus. Battus (whose true Greek name seems to have been Aristoteles), a native of Thera (Santorin), itself a Laconian colony, was bidden by the Delphic oracle, if he wished to put

an end to domestic dissensions, to lead a portion of the citizens to Libya and build a city in a " place between waters." (For other stories see Battus.) By this he understood an island, and therefore established his followers on the barren islet of Platea in the gulf of Bomba. The colony being unsuccessful made further application to the oracle and was bidden to transfer itself to the mainland. The Libyan barbarians reported that a fertile and well-watered district lay to the west and were induced to act as guides. They brought the Greeks

through forests to high ground from various points of which issued springs, and Battus, recognizing ” a place between waters,” began to build. This was in the middle of the 7th century B.C.

The result was Cyrene, so called (it was said) from a local nymph, who has been shown by Studniczka to have been a Nature goddess, like the Greek Artemis. The point first occupied was probably the hill above the ” Apollo ” fountain on the west; and there was erected the fortress-palace of the Battiadae, who continued to rule the colony for eight generations. The neighbouring Libyans were conciliated and given a position similar to that of Laconian perioeci, and intermarriage between them and Greeks became so frequent that the colony rapidly assumed a somewhat hybrid character, and while being one of the centres of Hellenic culture, showed barbarian characteristics of violence and luxury. Battus I. reigned c. 630 to 590 B.C. and was succeeded by his son Arcesilaus (c. 590–574) of whom nothing is known. The kings henceforth bore alternately the names Battus and Arcesilaus, of which the first is said to be simply the native Libyan word for “king”: the latter is, of course, Greek. This fact suggests that some compromise with the natives had been come to, resulting, perhaps, in an alternation of the supreme office. Under Battus II. (570 B.C.?) a fresh band of settlers was invited from Greece, and the colony tended to become henceforth more maritime and democratic. Its port, Apollonia (Marsa Susa), now rose to importance: and a Second (winter) port was created at Naustathmos (Marsa Hilal) about 15 m. E. behind a sheltering cape. Fine roads were cut through the rock connecting these harbours with the capital. Trouble followed, however, with the Libyans, who saw them- selves robbed in favour of the new settlers, and they called in Egyptian help; but the force sent by Apries was defeated near the spring Theste, and presently Amasis of Egypt made peace and took a Battiad princess to wife. Under Arcesilaus II. (c. 560–550) domestic dissensions and Libyan revolt led to the founding of a rival inland city, Barca, and a severe defeat and massacre. These

misfortunes, coupled with the fact that Battus III. was thought to have disgraced the house by his lameness, prompted the Cyrenaeans to send to Delphi for more advice, and as a result Demonax of Mantinea arrived as arbitrator and framed a constitution limiting the monarchy and dividing the citizens tribally according to the date of their settlement and their place of origin. Further attempts of the Battiadae (e.g. of Pheretima, wife of Battus III., and Arcesilaus his son) to annul this constitution, and bitter family dissensions, brought about a Persian invasion and finally the extinction of the dynasty about 450 B.C. A republic of more or less Spartan type succeeded, but it was often interrupted by tyrannies; and having made submission by embassy to Alexander in 331, Cyrene passed under Ptolemaic domination ten years later. From this epoch dates a decline which was due to economic causes (see Cyrenaica) and to the Ptolemaic policy of favouring easily controlled harbour-towns rather than an inland place like Cyrene, whose ancient factions still continued to give trouble under the earlier Ptolemies. Apollonia and Berenice gradually superseded Cyrene and Barca respectively, being more in touch with Greece and less exposed to the hostile nomad Libyans, who increased in boldness and power: but Cyrene continued to be a great city after it had passed to Rome (96 B.C.), and up to the reign of Trajan, when a Jewish revolt and the repressive measures taken by the imperial government dealt it an irreparable blow. Ere Christianity became the religion of the empire, it was largely a ruin, and henceforward to the epoch of Arab conquest (a.d. 64 1) its Greek life gradually deserted it for Apollonia. At its

acme Cyrene is said to have had over 100,000 inhabitants. It was noted among the ancients for its intellectual life. Its medical school was famous, and it numbered among its celebrities Callimachus the poet, Carneades, the founder of the New Academy

at Athens, Aristippus, a pupil of Socrates and the founder of the so-called Cyrenaics (q.v.), Eratosthenes the polyhistor, and Synesius, one of the most elegant of the ancient Christian writers.

The first account of the site in modern times seems to be that of M. le Maire, who was French consul at Tripoli from 1703 to 1708, and twice visited Cyrene. Paul Lucas was there in 1710, and again in 1723, and Dr Thomas Shaw in 1738; an Italian, Dr A. Cervelli, who was there in 181 2, furnished some information to the Societe de Geographie of Paris; and P. Delia Cella published an account of his visit, made in 181 7. In 1821-1822 important explorations were made by Lieutenant F. W. Beechey, R.N. ; and he was almost immediately followed by a French artist, M. J. R. Pacho, whose pencil preserved a number of interesting monuments that have since disappeared. L. Delaporte, French consul at Tangier, and Vattier de Bourville come next in order of time. H. Barth, the famous African traveller, published an account of his investigations in his Wanderungen durch die Kiislenldnder des Mittelmeers, 1849, and James Hamilton, who was there in 1851, described the place in his Wanderings in N. Africa. In 1861 excavations were made on behalf of the British Museum by Lieuts. R. Murdoch Smith, R.E., and E. A. Porcher, R.N., the results of which are detailed in their valuable Discoveries in Cyrene (London, 1864). Since that date, owing to the increase of Senussi influence, and the consequent fears of the Ottoman authorities, the site has been very seldom visited. The Italians, M. Camperio and G. Haimann, leading commercial missions, were there in the eighties, and Mr H. W. Blundell succeeded with a special firman and a strong escort in reaching the place in 1895, but had trouble with the local Senussi Arabs. The prohibition of travel became thereafter more stringent, and it has only been overcome by a party from Mr A. V. Armour's yacht " Utowana,'' which marched up from Marsa Susa in April 1904, and stayed one night. They found some fifty families of Cretan refugees established at Ain Shahat and a mudir with a small guard on the spot: but no inhabited houses,

except the Senussi convent and the mudiria. Cretans and Arabs live in the ancient rock-tombs. An Italian senator, Chev. G. de Martino, with two Italian residents at Derna, passed through the place in r907, and found it in Bedouin hands.

The site lies on the crest of the highland of Jebel Akhdar (about 1800 ft.) and 10 m. from the sea. The ground slopes very gradually south, and being entirely denuded of trees, makes good corn land. The northward slope falls more steeply in a succession of shelves, covered here and there with forest. Ravines surround the site on three sides, and there are at least four springs in its area, of which one, having great volume, has been at all times the attraction and focus of the place. This is the so-called " Fount of Apollo," which issues from a tunnel artificially enlarged, and once faced with a portico. The acropolis was immediately above this on the W., and the main entrance of the city, through which came the sacred pro- cessions, passed it. The remains of Cyrene itself are enclosed by a wall having a circuit of about 4 m., of which little remains but the foundations and fragments of two towers; but tombs and isolated structures extend far outside this area. The local Arabs say it takes them six camel-hours to go from one end to the other of the ruins, which they call generally " Grenna " (i.e. Kyrenna). Within the city itself not very much is now to be seen. Below the Apollo fountain on the N. lie a great theatre and the substructures of the main temple of Apollo, both included now in the Senussi convent garden. Above the fountain and by the main road is a smaller theatre. On the E., upon the crown of the plateau, are the sites on which Smith and Porcher placed temples of Bacchus, Venus and Augustus, but they are marked only by rubbish heaps. Remains of a large Byzantine church and a much ruined stadium lie to S.E. On the S. are immense covered tanks of Roman date, with remains of the aqueducts which supplied them. On the W. a fine vii. 23

fragment of a tower, the fortifications of the acropolis, and a pedestal sculptured on four sides

in good 3rd century style, are the only things worth seeing. The Cretan occupation is fast obliterating other traces. The great spectacle, however, which distinguishes the site of Cyrene, is provided by its cemeteries, which for extent, variety and preservation are unparalleled in the classic lands. There is one along each of the approaches to the main gates, but the largest and most splendid lies by the Apollonian road which winds by easy curves up the northern buttresses of the plateau. Here the sepulchres rise in tiers one above the other along fully a mile of the way. The most im- portant have pillared facades, Doric, Ionic, and even a hybrid mixture of both orders. Within, they open out either into large halls, leading one out of another with graves in recesses and pits in the floor; or into rock corridors lined with loculi, disposed one above another like pigeon holes. Most of the wall paintings, seen by Beechey and Pacho, have perished or become black with the smoke of troglodytes' fires; but one tomb below the road at about the middle of the cemetery still retains its decoration comparatively fresh, and seems to be that specially described by Smith and Porcher. The scenes are agonistic, i.e. represent funeral games, in which both white and black persons take part, the latter doubtless Libyan perioeci: but all wear Greek garments. Several tombs are inscribed and on some external paintings are still faintly visible. The commonest type of grave is a simple pit covered by a gabled lid. These occur by hundreds. But not all the .-epulchres are rock-cut: altar tombs and other forms of heroa are found built upon plinths of rock. All visible tombs have long ago been violated, but it is probable that there are others still virgin under the talus of the hill side. To discover these and determine the topography of the city, excavation is urgently needed.

Many historical and artistic questions concerning Cyrene remain unsettled, but since the discoveries made in Laconia in 1908, the much disputed " Cyrenaic ware " has been ascribed to Sparta. A good deal of Cyrenaic sculpture, all of compara- tively

late date, was sent to the British Museum by Smith and Porcher. Nothing has yet been found on the site belonging to the great age of the city's independence, the fine vases sent to the British Museum in 1864, by Mr G. Dennis, having been discovered not there, but near Berenice (Bengazi). The latter site, with Ptolemais and Apollonia, has supplied most of the antiquities found latterly in Cyrenaica.

See authorities for Cyrenaica, and F. Studniczka, Kyrene, eine alt-griechische Gottin (1890). (D. G. H.)

CYRIL (c. 315-386), bishop of Jerusalem, where he was prob- ably born, was ordained a presbyter in 345, and had the instruc- tion of the catechumens entrusted to him. In 3 50 he was elevated to the see of Jerusalem, and became deeply involved in the dogmatic controversies of his time. His metropolitan, Acacius of Caesarea, inclined to Arianism, while Cyril strongly espoused the Nicene creed and was, in consequence, deposed for a time. On the death of the emperor Constantine he was restored; but on the accession of Valens, an Arian emperor, he had once more to resign his post till the accession of Theodosius permitted him to return finally in peace in 379. He attended the second oecumenical council held at Constantinople in 381, where he was received with grateful acclamations for his sufferings in defence of orthodoxy. Cyril was even more conspicuous as a pastor than as a controversialist, and this is seen in his one important work — his twenty-three addresses to catechumens delivered in a.d. 348. The first eighteen of these were meant for candidates for baptism; they deal with general topics like repentance and faith, and then expound in detail the baptismal creed of the Jerusalem church. The remaining five addresses were spoken to the newly-baptized in Easter week and explain the mysteries and ritual of baptism, confirmation and the Eucharist. These lectures are said to be " the first example of a popular compend of religion," and are particularly interesting for the insight which they

give us both into the creed-forms of the early church and the various ceremonies of initiation constituting baptism in the 4th century. The evidence which Cyril supplies as to the

Jerusalem use is supplemented by the S. Silviae peregrinatio, dating from about a generation later. Other tracts and homilies have been ascribed to Cyril of Jerusalem, but they are of doubtful

genuineness.

Editions. — A. A. Touttee (Paris, 1720); W. C. Reischl and J. Rupp (Munich, 1 848–1 860) ; Migne, Patrol. Graeca. xxxiii. Transla- tion: Catecheses ("Oxford Library of Fathers," vol. ii.). See Herzog-Hauck, Realencyk. (Forster); Delacroix, St C. de Jems., sa vie et ses ceuvres (Paris, 1865).

CYRIL (376–444), bishop of Alexandria, a more distinguished father of the church than his namesake of Jerusalem, was born in 376, and died in 444. Becoming patriarch of Alexandria about 412, he soon made himself known by the violence of his zeal against Jews, pagans and heretics or supposed heretics alike. He had hardly entered upon his office when he closed all the churches of the Novatians and seized their ecclesiastical effects. He assailed the Jewish synagogues with an armed force, drove the Jews in thousands from the city, and exposed their houses and property to pillage. The prefect of Egypt, Orestes, who endeavoured to withstand his furious zeal, was in turn denounced himself, and had difficulty in maintaining his ground against the fury of the Christian multitude. It was during one of the violent commotions kindled by the strifes of these parties in Alexandria that the illustrious Hypatia, famed for her beauty and her eloquent advocacy of the Neo- Platonic philosophy in opposition to Christianity, was murdered. Her murder has been attributed to the

direct instigation of the patriarch himself; but this charge is held to be baseless by others, although there can be no doubt that ” the perpetrators were officers of his church,” and undoubtedly drew encouragement from his own violent proceedings. Hypatia was a friend of Orestes, and the hostility that existed betwixt the prefect and the patriarch overflowed towards her, and undoubtedly led to her destruction.

But Cyril’s violence was not merely confined to those who might be considered enemies of the church. He inherited from Theophilus, his uncle and predecessor in the see of Alexandria, a strong aversion to John Chrysostom, the noble bishop of Constantinople, and even after his death opposed’ for a time all attempts to remove the unjust sentence of condemnation which had been passed upon him. Afterwards he so far yielded to remonstrances as to allow the name of Chrysostom to appear in the list of distinguished martyrs and bishops mentioned in the prayers of his church. These names were inserted in what were called ” diptychs ” (8’nnvxa. veKpuw), or two-leaved tablets preserved in the churches — a usage which the Greek Church has continued to this day.

Cyril thus represents — though he differs largely from his predecessors — the tendencies dominant at Alexandria in the 5th century, and their antagonism to the Antiochene school. The story of his opposition to Nestorius at the council of Ephesus in 431 is told elsewhere (see Nestorius). He himself incurred the charge of heresy from the oriental bishops. Satisfied, however, with the deprivation and exile of his opponent, he returned to Alexandria in triumph as the great champion of the faith, and thence continued, by the ” unscrupulous use of all the means at his command,” the theological strife for years. He was a bitter opponent of the great Antiochene expositor and apologist Theodoret.

Altogether Cyril presents a character not only unamiable, but singularly deficient in the graces of the Christian life. His style of writing is as

objectionable as his character and spirit. Yet he takes high rank as a dogmatic theologian, and those who seek precise and rigid definitions of orthodox belief conjoined with tenacity of conviction find him indispensable. In addition to his Twelve Anathematistns and the defence of the same, he wrote five other books against Nestorius, Thesaurus — a treatise in dialogue form on the Trinity, a book On the Right Way and another On the Incarnation. In other fields — mystical, exegetical and apologetical — he was equally prolific and forceful. He wrote a tract ” On worshipping in spirit and in truth ” to defend a spiritual interpretation of the Mosaic law, several commentaries, festival-orations, and a reply to the emperor Julian’s attack

on the church. His letters are valuable sources to the student of the Nestorian controversy.

Literature. — The collected edition of J. Aubert (Paris, 1638) formed the basis of Migne’s reprint in vols. 68-77 of the Pair. Graec. Many of the writings, have been edited separately (see bibliography in Herzog-Hauck). For an account of his career and position in the history of dogma, see A. Harnack, vols. iii. and iv. passim; O. Bardenhewer’s Patrologie (Freiburg, 1894), pp. 335-343; R. L. Ottley’s Doctrine of the Incarnation, ii. 80 ff . ; A. Largent’s Etudes d’hist. eccles.; St Cyrille d’Alexandrie et le concile d’Hphese (Paris, 1892). See also Charles Kingsley’s romance Hypatia.

CYRIL (827-869), apostle of the Slavs, amongst whom he worked in conjunction with his elder brother Methodius (q.v.). Tradition says that while in the Khazar country (where he combated Jewish and Mahommedan influence) he found at Kherson the remains of Clement of Rome, which he bore with him wherever he went, finally depositing them at Rome in 867. His name is associated with the invention of the modified (Cyrillic) form of the Greek alphabet, which largely superseded the ancient Slavonic characters.

CYRILLIC, the alphabet used by the Orthodox Slavs.

It is modelled on the Greek Liturgical Uncial of the 9th century, and its invention is traditionally, though in all probability wrongly, ascribed to the Greek missionary Cyril (d. 869). For an account of its origin and development, with a table of its letters, see Slavs.

CYRILLUS, Greek jurist of the 5th century, was professor in the ancient law college of Berytus, and one of the founders of the oecumenical school of jurists (ttjs oiKovntvys SiSdaxaXot) which preceded the succession of Anastasius to the Eastern empire (a.d. 491), and paved the way for Justinian's legislation. His reputation as a teacher of law was very great; and from the fragments of his works which have been preserved it may be inferred that his merit as a teacher consisted in his going direct to the ancient sources of law, and in interpreting the best writers, such as the commentary of Ulpian on the edict and the Responsa Papiniani. He wrote a treatise on definitions (inronvrifia rwv 8e4>w'i.Tcov) , in which, according to a statement of his con- temporary Patricius, the subject of contracts was treated with superior precision and great method, and which has supplied the materials for many important scholia appended to the first and second titles of the eleventh book of the Basilica. He is generally styled " the great," to distinguish him from a more modern jurist of the same name, who lived after the reign of Justinian, and who compiled an epitome of the Digest.

CYRTO-STYLE (Gr. Kvpros, convex, and crrOXos, column), in architecture, a circular projecting portico with columns; like those of the transept entrances of St Paul's cathedral and the western entrance of St Mary-le-Strand, London.

CYRUS (Gr. KOpos; Pers. Kuru-sh; Babyl. Kurash; Hebr. Koresh), the Latinized form of a Persian name borne by two prominent members of the Achaemenid house.

1. Cyrus the Great, the founder of the Persian empire, was the son of Cambyses I. His family

belonged to the clan of the Achaemenidae — in the inscription on the pillars and columns of the palace of Pasargadae (Murghab) he says: ” I am Cyrus the king, the Achaemenid ” — the principal clan ((jiprp-prj) of the Persian tribe of the Pasargadae (q.v.). But in his proclamation to the Babylonians (V.R. 35; Sir H. Rawlinson, Journal of the R. ‘ Asiat. Soc, n.s., xii., 1880; Schrader, Keilinschriftliche Bibliothek, iii. 2, 120 ff.; Hagen, in Delitzsch and Haupt, Beitrage zur Assyriologie, ii., 1894, where the chronicle of Nabonidus is also published anew with a much improved transla- tion) he calls his ancestors, Teispes, Cyrus I. and Cambyses I., ” kings of Anshan,” and the same title is given to him in the inscriptions and in the chronicle of Nabonidus of Babylon before his victory over Astyages. Anshan is a district of Elam or Susiana, the exact position of which is still subject to much 1 discussion. As we know from Jeremiah xlix. 34 ff. (cf. Ezekiel xxxii. 24 ff.) that the Elamites suffered a heavy defeat in 596 B.C., it is very probable that the Pasargadian dynast Teispes con-quered Anshan in this year. Modern authors have often supposed that Cyrus and his ancestors were in reality Elamites; but this

is contrary to all tradition, and there can be no doubt that Cyrus was a genuine Persian and a true believer in the Zoroastrian religion. In Herodotus vii. 11 the genealogy of Cyrus is given in exactly the same way as in the proclamation of Cyrus himself; Teispes is called here the son of the eponym Achaemenes.

The Pasargadian kings of Anshan were vassals of the Median empire. Their kingdom cannot have been of large extent, as Nabonidus in a contemporary inscription (Cylinder from Abu Habba, VR. 64, Schrader, Keilinschriftl. Bibliothek, iii. 2, 96), where he mentions his rebellion against Astyages, calls Cyrus ” king of Anshan, his {i.e. Astyages’)

small servant (vassal)." From this inscription we learn that the rebellion of Cyrus (who seems to have become king in 558 B.C., as Herod, i. 214 gives him a reign of 29 years) began in 553 B.C., and from the annals that in 550 Astyages marched against Cyrus, but was defeated; his troops revolted against him, he was taken prisoner, and Cyrus occupied and plundered Ecbatana. The relation of Ctesias (preserved by Nic. Dam. fr. 66; Anaximenes of Lampsacus in Steph. Byz. s.v. Haaa.pya.5cu, Strabo xv. p. 729; Polyaen. vii. 6. 1,9, 45. 2) that Cyrus was three times beaten by Astyages and that the decisive battle took place in the mountains of Pasargadae, is certainly in the main historical although Herodotus (i. 127 ff.) only mentions the treason of the Median general Harpagus and the defeat and captivity of Astyages. In the rebellion the Persian tribes of the Maraphians and Maspians joined the Pasargadae (Herod, i. 125), while the other tribes appear not to have acknowledged Cyrus till after his victory (see Persis). From then he calls himself " king of the Persians."

The history of Cyrus very soon became involved and quite overgrown with legends. Herodotus (i. 95) tells us that he knew four different traditions about him. One makes him the son of Mandane, a daughter of Astyages (originally evidently by a god), who is exposed in the mountains by his grandfather on account of an oracle, but suckled by a dog (a sacred animal of the Iranians) and educated by a shepherd; i.e. the myth which we know from the stories of Oedipus, Perseus, Telephus, Pelias and Neleus, Romulus, Sargon of Agade, Moses, the Indian hero Krishna, and many others, has been transferred to the founder of the Persian empire. At the same time, the rule of Cyrus and the Persians is legitimated by his family connexion with Astyages. This account is partly preserved in Justin i. 4. 10 (probably from Charon of Lampsacus) and in Aelian, Var. Hist. xiv. 42, and alluded to by Herodotus i. 95 and 122. The second account, which Herodotus follows, is a rationalized version of the first, where the dog is changed into a woman (the wife of

the shepherd) named Spako (bitch). In the later part of his story Herodotus is dependent on the family traditions of Harpagus, whose treason is justified by the cruelty with which Astyages had treated him (the story of Atreus and Thyestes is transferred to them). Harpagus afterwards stood in high favour with Cyrus, and commanded the army which subdued the coasts of Asia Minor; his family seems to have been settled in Lycia. In a third version, preserved from Ctesias in Nicolaus Damasc. p. 66 (cf. Dinon ap. Athen. xiv. 633 C), Cyrus is the son of a poor Mardian bandit Atradates (the Mardians are a nomadic Persian tribe, Herod, i. 125), who comes as a voluntary slave to the court of Astyages, and finds favour with the king. A Chaldaean sage prophesies to him his future greatness, and another Persian slave, Oebares, becomes his associate. He flies to Persia, evades the pursuers whom Astyages sends after him, and begins the rebellion. After the victory Oebares kills Astyages against the will of Cyrus, and afterwards kills himself to evade the wrath of Cyrus. Parts of this story are preserved also in Strabo xv. p. 729, and Justin i. 6. 1–3; 7. 1; cf. Ctesias ap. Photium 2–7; many traces of it were afterwards transferred to the story of Ardashir I. (q.v.) , the founder of the Sassanid empire. With this version Ctesias and Nicolaus have connected another, in which Cyrus is the son of a Persian shepherd who lives at Pasargadae, and fights the decisive battle at this place. The didactic novel of Xenophon, the Cyropaedia, is a free inven- tion adapted to the purposes of the" author, based upon the account of Herodotus and occasionally influenced by Ctesias,

without any independent traditional element. The accounl of Aeschylus, Pers. 765 ff., is a mixture of Greek traditions with a few oriental elements; here the first king is Medos (the Median empire); his nameless son is succeeded by Cyrus, a blessed ruler, beloved by the gods, who gave peace to all his friends and conquered Lydia, Phrygia, Ionia. Then comes his nameless son, then Mardos (i.e. Smerdis, to whom the name of the Mardians is transferred) who

is killed by Artaphrenes (i.e. Artaphernes, Herod, iii. 78, one of the associates of Darius), then Maraphis (eponym of the Maraphian tribe), then another Artaphrenes, then Darius.

The principal events of the later history of Cyrus are in the main correctly stated by Herodotus, although his account contains many legendary traditions. The short excerpt from Ctesias, which Photius has preserved, contains useful information, although we must always mistrust him. Of great value are a short notice in the fragments of Berossus and another in the Old Testament. The original sources are very scanty, besides the cylinder containing his proclamation to the Babylonians we possess only a great many dated private documents from Babylon. These serve to fix the chronology, which is here as every- where quite in accordance with the dates of the canon of Ptolemy.

Soon after the conquest of the Median empire, Cyrus was attacked by a coalition of the other powers of the East, Babylon, Egypt and Lydia, joined by Sparta, the greatest military power of Greece. In the spring of 546 Croesus of Lydia began the attack and advanced into Cappadocia, while the other powers were still gathering their troops. But Cyrus anticipated them; he defeated Croesus and followed him to his capital. In the autumn of 546 Sardis was taken and the Lydian kingdom became a province of the Persians. The famous story of Herodotus, that the conqueror condemned Croesus to the stake, from which he was saved by the intervention of the gods, is quite inconsistent with the Persian religion (see Croesus).

During the next years the Persian army under Harpagus suppressed a rebellion of the Lydians under Pactyas, and sub- jugated the Ionian cities, the Carians and the Lycians (when the town Xanthus resisted to the utmost). The king of Cilicia (Syennesis) voluntarily acknowledged the Persian supremacy. Why the war with Babylon, which had become inevitable, was delayed until 539, we do not know. Here too Cyrus in a single campaign destroyed

a mighty state. The army of Nabonidus was defeated; Babylon itself attempted no resistance, but surrendered on the 16th Tishri (10th of October) 539, to the Persian general Gobryas (Gaubaruva, see the chronicle of the reign of Nabonidus; the name Gobryas is preserved also by Xenophon, Cyrop. vii. 4. 24); it is possible that the Chaldaean priests, who were hostile to Nabonidus, betrayed the town. In a proclamation issued after his victory Cyrus guarantees life and property to all the inhabitants and designates himself as the favourite of Marduk, the great local god (Bel, Bel-Merodak) of Babel. It is very odd that modarn authors have con- sidered this proclamation as inconsistent with the Zoroastrian creed.

From the beginning of 538 Cyrus dates his years as " king of Babylon and king of the countries " (i.e. of the world). With the capital, the Babylonian provinces in Syria fell to the Persians; in 538 Cyrus granted to the Jews, whom Nebuchadrezzar had transported to Babylonia, the return to Palestine and the rebuilding of Jerusalem and its temple (see Jews, § 19). It is probable that Cyrus had fought more than one war against the peoples of eastern Iran; according to Ctesias he had, before the war with Croesus, defeated the Bactrians and the Sacae (in Ferghana; their king Amorges is the eponym of the Amyrgian Sacae, Herod, vii. 64, called by Darius Haumavarka); and the historians of Alexander mention a march through Gedrosia, where he lost his whole army but seven men (Arrian vi. 24. 2 ; Strabo xv. 722), a tribe Ariaspae on the Etymandros (in Sijistan), who, on account of the support which they gave him against the Scythians, were called Euergetae (Arrian iii. 27. 4; Diod. xvii. 81; Curt. vii. 3. 1), and a town Cyropolis, founded by him

/

o8

CYSTOFLAGELLATA

on the Jaxartes (Arrian iv. 2. 3; Curt. vii. 6. 16;

Strabo xi. 517, called Cyreskhata by Ptolem. vi. 12. 5). In 530, having appointed his son Cambyses king of Babel, he set out for a new expedition against the East. In this war he was killed (Herod.) or mortally wounded (Ctesias). According to Herodotus he attacked the Massagetae beyond the Jaxartes; according to Ctesias, the Derbices, a very barbarous tribe (cf. Strabo xi. 520; Aelian, Var. Hist. iv. 1) on the border of the Caspian, near the Hyrcanians (Strabo xi. 514; Steph. Byz.; Curt. vii. 2. 7; Dion. Perieg. 734 ff.; Pomp. Mela iii. 5), –or on the Oxus (Plin. vi. 48; Ptolem. vi. 10. 2; Tab. Peuting.). Berossus (ap. Euseb. Chron. i. 29) simply says that he fell against the Dahae, i.e. the nomads of the Turanian desert. His death occurred in 528 B.C., as we have a Babylonian tablet from the Adar of the tenth year of Cyrus, i.e. February 528; for in Babylon the first year of Cyrus began in the spring of 538.

In his native district Cyrus had built a city with a palace, called after his tribe Pasargadae (now Murghab), and here he was buried (see Pasargadae). In a short time he, the petty prince of an almost unknown tribe, had founded a mighty empire, which extended from the Indus and Jaxartes to the Aegaean and the borders of Egypt. This result shows that Cyrus must have been a great warrior and statesman. Nor is his character without nobility. He excels in the humanity with which he treated the vanquished. He destroyed no town nor did he put the captive kings to death; in Babylonia he behaved like a constitutional monarch; by the Persians his memory was cherished as ” the father of the people ” (Herod, iii. 80), and the Greek tradition preserved by Aeschylus (cf. above) shows that his greatness was acknowledged also by his enemies. He therefore deserves the homage which Xenophon paid to him in choosing him as hero for his didactic novel.

2. Cyrus the Younger, son of Darius II. and Parysatis, was born after the accession of his father in 424. When, after the victories of Alcibiades, Darius II. decided to continue the war against Athens and give strong support to the

Spartans, he sent in 408 the young prince into Asia Minor, as satrap of Lydia and Phrygia Major with Cappadocia, and commander of the Persian troops, " which gather into the field of Castolos " (Xen. Hell. i. 4. 3; Anab. i. 9. 7), i.e. of the army of the district of Asia Minor. He gave strenuous support to the Spartans; evidently he had already then formed the design, in which he was supported by his mother, of gaining the throne for himself after the death of his father; he pretended to have stronger claims to it than his elder brother Artaxerxes, who was not born in the purple. For this plan he hoped to gain the assistance of Sparta. In the Spartan general Lysander he found a man who was willing to help him, as Lysander himself hoped to become absolute ruler of Greece by the aid of the Persian prince. So Cyrus put all his means at the disposal of Lysander in the Pelopon- nesian War, but denied them to his successor Callicratidas; by exerting his influence in Sparta, he brought it about that after the battle of Arginusae Lysander was sent out a second time as the real commander (though under a nominal chief) of the Spartan fleet in 405 (Xen. Hell. ii. 1. 14). At the same time Darius fell ill and called his son to his deathbed; Cyrus handed over all his treasures to Lysander and went to Susa. After the accession of Artaxerxes' II. in 404, Tissaphernes denounced the plans of Cyrus against his brother (cf. Plut. Artax. 3); but by the intercession of Parysatis he was pardoned and sent back to his satrapy. Meanwhile Lysander had gained the battle of Aegospotami and Sparta was supreme in the Greek world. Cyrus managed very cleverly to gather a large army by beginning a quarrel with Tissaphernes; satrap of Caria, about the Ionian towns; he also pretended to prepare an expedition against the Pisidians, a mountainous tribe in the Taurus, which was never obedient to the Empire. Although the dominant position of Lysander had been broken in 403 by King Pausanias, the Spartan government gave him all the support which was possible without going into open war against the king; it caused a partisan of Lysander, Clearchus, condemned to death on account of atrocious crimes

which he had committed as governor of Byzantium,

to gather an army of mercenaries on the Thracian Chersonesus, and in Thessaly Menon of Pharsalus, head of a party which was connected with Sparta, collected another army.

In the spring of 401 Cyrus united all his forces and advanced from Sardis, without announcing the object of his expedition. By dexterous management and large promises he overcame the scruples of the Greek troops against the length and danger of the war; a Spartan fleet of thirty-five triremes sent to Cilicia opened the passes of the Amanus into Syria and conveyed to him a Spartan detachment of 700 men under Cheirisophus. The king had only been warned at the last moment by Tissa- phernes and gathered an army in all haste; Cyrus advanced into Babylonia, before he met with an enemy. Here ensued, in October 401, the battle of Cunaxa. Cyrus had 10,400 Greek hoplites and 2500 peltasts, and besides an Asiatic army under the command of Ariaeus, for which Xenophon gives the absurd number of 100,000 men; the army of Artaxerxes he puts down at 900,000. These numbers only show that he, although an eyewitness, has no idea of large numbers; in reality the army of Cyrus may at the very utmost have consisted of 30,000, that of Artaxerxes of 40,000 men. Cyrus saw that the decision depended on the fate of the king; he therefore wanted Clearchus, the commander of the Greeks, to take the centre against Artaxerxes. But Clearchus, a tactician of the old school, dis-obeyed. The left wing of the Persians under Tissaphernes avoided a serious conflict with the Greeks; Cyrus in the centre threw himself upon Artaxerxes, but was slain in a desperate struggle. Afterwards Artaxerxes pretended to have killed the rebel himself, with the result that Parysatis took cruel vengeance upon the slayer of her favourite son. The Persian troops dared not attack the Greeks, but decoyed them into the interior, beyond the Tigris, and tried to annihilate them by treachery. But after their commanders had been taken prisoners the Greeks forced their way to the Black Sea. By this achievement they had demonstrated the internal

weakness of the Persian empire and the absolute superiority of the Greek arms.

The history of Cyrus and of the retreat of the Greeks is told by Xenophon in his Anabasis (where he tries to veil the actual participa- tion of the Spartans). Another account, probably from Sophaenetus of Stymphalus, was used by Ephorus, and is preserved in Diodor. xiv. 19 ff. Further information is contained in the excerpts from Ctesias by Photius; cf. also Plutarch's life of Artaxerxes. The character of Cyrus is highly praised by the ancients, especially by Xenophon (cf. also his Occonomics, c. iv.) ; and certainly he was much superior to his weak brother in energy and as a general and statesman. If he had ascended the throne he might have regenerated the empire for a while, whereas it utterly decayed under the rule of Artaxerxes II. (See also Persia: Ancient History.) (Ed. M.)

CYSTOFLAGELLATA (so named by E. Haeckel), a group of Mastigophorous Protozoa, distinguished from Flagellata by their large size (0-15 — 1-5 mm.), and their branched endoplasm, recalling that of Trachelitis among Infusoria, within a firm ectosarc bounded by a strong cuticle. Nutrition is holozoic, a deep groove leading down to a mouth and pharynx. A long fine flagellum arises from the pharynx in Noctiluca (E. Suriray) Leptodiscus and (R. Hertwig); and in the former genus, a second flagellum, thick, long and transversely striated, rises farther out, in the groove; this was likened by E. R. Lankester to a proboscis, whence his name of Rhynchoflagellata, which we discard as unnecessary and posterior to Haeckel's. Noctiluca has thus the form of an apple with a long stalk. Leptodiscus (R. Hertwig) has the form of a medusa without a proboscis — it is menisciform with the thin contractile margin produced inwards like a velum on the concave side, while the mouth is on the convex surface and the single flagellum springs from a blind tube on the same surface. Craspedotella (C. A. Kofoid), the third genus, is still more medusiform, with a broad velum, and the mouth in a convex

central protrusion of the roof of the bell; and a thick flagellum springs from a blind tube on the convex surface. All three genera are pelagic and phosphorescent, this property being seated in the ectoplasm; Noctiluca miliaris is indeed the chief source of the phosphorescence of our summer seas. O. Butschli, like other writers, regards the Cystoflagellates as closely allied to the Dinoflagellates, the small flagellum

corresponding to the longitudinal, the large flagellum to the transverse flagellum of that group.

The reproduction of Noctiluca has been fairly made out; in the adult state it divides by fission down the oral groove; as a preliminary the external differentiations disappear, and the nucleus divides by modified mitosis; then the external organs are regenerated. Under circumstances not well made out,

After E. Ray Lankester, Ency. Bril., 9th ed.

Cystoflagellate Protozoa.

I and 2, Young stages of Noctiluca miliaris.

a, the big flagellum; the unlettered filament becomes the oral flagellum of the adult, n, nucleus.

s, the so-called spine (super- ficial ridge of the adult). 3 and 4, Two stages in the fission of Noctiluca miliaris, Suriray.

n, nucleus. N, food-particles. /, muscular flagellum. 5. Noctiluca miliaris, viewed from the aboral side (after Allman, Quart. Jour. Mic. Sci.,

1872).

a, entrance to atrium or flagellar fossa (= longitudinal groove of Dino- flagellata).

c, superficial ridge.

d, big flagellum (= flagel-

lum of transverse groove of Dinoflagellata). h, nucleus.

6. Noctiluca miliaris, acted upon by iodine solution, showing the protoplasm shrunk away from the structureless pellicle.

o=entrance to atrium.

7. Lateral view of Noctiluca miliaris.

a, entrance to atrium.

b, atrium.

c, superficial ridge.

d, big flagellum.

e = mouth and gullet, in which is seen Krohn's oral flagellum (=the chief nagelium, or flagellum of the longi- tudinal groove of Dino- flagellata).

/, broad process of proto- plasm extending from the superficial ridge c to the central proto- plasm.

g, duplicature of pellicle in connexion with super- ficial ridge.

h, nucleus.

conjugation between two adults takes place by their fusion commencing at the oral region; flagella and pharynx disappear and the nuclei fuse, while the cytoplasts condense into a sphere. The nucleus undergoes broad division, the young nuclei pass to the surface, which becomes imperfectly divided by grooves into as many rounded prominences as there are nuclei (up to 128 or 256); and these become constricted off from the residual useless cytoplasm as zoospores with two unequal flagella, which were at first regarded as Dinoflagellates, of which they have

the form (figs. 5, 6). The metamorphosis of these has not yet been observed.

Literature. — E. Suriray, Magazin de zoologie, 1836; G. J. Allman, Quarterly Journal of Microscopic Science, n.s. xiL, 1872; L. Cienkowsky, " Zoospore formation in Noctiluca," Archivf. mikro- skopische Anatomie, vii., 1871 ; R. Hertwig, " Leptodiscus," Jenaische Zeitschrift, xi., 1877; C. Ischikawa, Journal of the College of Science (Tokyo, 1894), xii., 1899; F. Doflein, " Conjugation of Noctiluca," Zoologische Jahrbucher, Anatomie, xiv., 1900; C. A. Kofoid," Craspe- dotella," in Bull. Mus. Comp. Zool. Harvard, xlvi., 1905; O. Butschli, " Mastigophora," in Protozoa (Braun's Thierreich, vol. i., Protozoa) (1883-1887). (M. Ha.)

CYSTOLITH (Gr. kvcttis, cavity, andXI0os, stone), a botanical term for the inorganic concretions, usually of calcium carbonate, formed in a cellulose matrix in special cells, generally in the leaf of plants of certain families, e. g. Ficus elastica, the india- rubber plant.

CYTHERA (mod. Cerigo, but still officially known as Cythera), one of the Ionian islands, situated not less than 150 m. from Zante, but only about 8 m. from Cape Malea on the southern coast of Greece. Its length from N. to S. is nearly 20 m., and its greatest breadth about 12; its area is 114 sq. m. The surface is rocky and broken, but streams abound, and there are various parts of considerable fertility. Two caves, of imposing dimenr sions, and adorned with stalactites of great beauty, are the most notable among its natural peculiarities; one is situated at the seaward end of the glen of the Mylopotamus, and the other, named Santa Sophia, about two hours' ride from Capsali (Kapsali). Less of the ground is cultivated and more of it is in pasture land than in any other of the seven islands. Some wine and corn are produced, and the quality of the olive oil is good. The honey is still highly prized, as it was in remote antiquity; and a considerable quantity of cheese is manufactured from the , milk of the goat. Salt, flax, cotton and

currants are also mentioned among the produce. The people are industrious, and many of them seek employment as labourers in the Morea and Asia Minor. Owing to emigration, the population appears to be steadily diminishing, and is now only about 6000, or less than half what it was in 1857. Unfortunately the island has hardly a regular harbour on any part of the coast; from its situation at the meeting, as it were, of seas, the currents in the neighbourhood are strong, and storms are very frequent. The best anchorage is at San Nicolo, at the middle of the eastern side of the island. The principal village is Capsali, a place of about 1500 inhabitants, at the southern extremity, with a bishop, and several convents and churches; the lesser hamlets are Modari, Potamo and San Nicolo.

There are comparatively few traces of antiquity, and the identification of the ancient cities has been disputed. The capital, which bore the same name as the island, was at Paleo- Kastro, about 3 m. from the present port of Avlemona. In the church of St Kosmas are preserved some of the archaic Doric columns of the famous temple of Aphrodite of Cythera, whose worship had been introduced from Syria, and ultimately spread over Greece. According to the accepted story, it was here that the goddess first landed when she emerged from the sea. At a very early date Cythera was the seat of a Phoenician settlement, established in connexion with the purple fishery of the neighbour- ing coast; it is said that it was therefore called Porphyris (cf. Pliny iv. 18, 19). For a time dependent on Argos, it became afterwards an important possession of the Spartans, who annually despatched a governor named the Cytherodices. In the Pelo- ponnesian war, Nicias occupied the island, but in 421 it was recovered by Sparta. Its modern history has been very much the same as that of the other Ionian islands; but it was subject to Venice for a much shorter period— from 171 7 to 1797.

See the works referred to under Cephalonia, and also Weil, in Mittheil. d. deutsch. Inst, zu Athen (1880), pp. 224-243.

CYTISINE (Ulexin, Sophorin), C11H14N2O, an alkaloid dis- covered in 1818 by J. B. Chevreul in the seeds of laburnum (Cytisus Laburnum) and isolated by A. Husemann and W. Marme in 1865 (Zeit.f. Chemie, 1865, i.p. 161). It is also found in the seeds of furze (Ulex europaeus), Sophora tormentosa, and Euchresta horsfieldii. It is extracted from the seeds by an

alcoholic solution of acetic acid, and forms large crystals which melt at 153° C, and are easily soluble in water, alcohol and chloroform. It is a secondary and tertiary di-acid base, and is strongly alkaline in its reaction. Hydrogen peroxide oxidizes it to oxycytisine, CnH 14 N 2 02, chromic acid to an acid, C11H9NO3, and potassium permanganate to oxalic acid and ammonia. It acts as a violent poison.

See further, P. C. Plugge, Arch, der Pharm. (1891), 229, p. 48 et seq.; A;- Partheil, Ber. (1890), 23, p. 3201, Arch, der Pharm. (1892), 230, p. 448; M. Freund and A. Friedmann, Ber. (1901), 34, p. 615; and J, Herzig and H. Meyer, Monats. f. Chem. (1897), 18, p. 379.

CYTOLOGY (from kvtos, a hollow vessel, and X670S, science),' the scientific study of the " cells " or living units of protoplasm (q.v.), of which plants and animals are composed. All the higher, 1 and the great majority of the lower, plants and animals are composed of a vast number of these vital units or "cells." In the case of many microscopic forms, however, the entire organism,! plant or animal, consists throughout life of a single cell. Familiar examples of these " unicellular " forms are Bacteria and Diatoms among the plants, and Foraminifera and Infusoria among the animals. In all cases, however, whether the cell-unit lives freely as a unicellular organism or forms an integral part of a multi-j cellular individual, it exhibits in itself all the phenomena char- acteristic of living things. Each cell assimilates food material,, whether this is

obtained by its own activity, as in the majority Of the protozoa, or is brought, as it were, to its own door by the blood stream, as in the higher Metazoa, and builds this food material into its own substance, a process accompanied by respiration and excretion and resulting in growth. Each cell exhibits in greater or less degree "irritability," or the power of responding, to stimuli; and finally each cell, at some time in its life, is capable of reproduction. It is evident therefore that in the multicellular forms all the complex manifestations of life are but the outcome of the co-ordinated activities of the con- stituent cells. The latter are indeed, as Virchow has termed them, " vital units." It is therefore in these vital units that the explanation of vital phenomena must be sought (see Physi- ology); As Verworn 1 said, " It is to the cell that the study of every bodily function sooner or later drives us. In the muscle cell lies the problem of the heart beat and that of muscular contraction; in the gland cell reside the causes of secretion; in the epithelial cell, in the white blood corpuscle, lies the problem of the absorption of food, and the secrets of the mind are hidden in the ganglion cell." So also the problems of development and inheritance have shown themselves to be cell problems, while the study of disease has produced a " cellular pathology." The most important problems awaiting solution in biology are cell problems.

Historical. — The cell-theory ranks with the evolution theory in the far-reaching influence it has exerted on the growth of modern biology; and although almost entirely a product of the 19th century, the history of its development gives place, in point of interest, to that of no other general conception. The cell-theory — in a form, however, very different from that in which we now know it — was originally suggested by the study of plant structure; and the first steps to the formulation, many years later, of a definite cell-theory, were made as early as the later part of the 17th century by Robert Hooke, Marcello Malpighi and Nehemiah

Grew. Hooke(i665) noted and described the vesicular nature of cork and similar vegetable substances, and designated, the cavities by the term ” cells.” A few years later Malpighi (1674) and Grew (1682), still of course working with the low power lenses alone available at that time, gavea more detailed description of the finer structure of plant tissue. They showed that it consisted in part of little cell-like cavities, provided with firm cell-walls and filled with fluid, and in part of long tube-like vessels. A long time passed before the next important step forward was made by C. L. Treviranus,[2] who, working on the growing parts of young plants, showed that the tubes and vessels of Malpighi and Grew arose from cells by the

1 Allgemeine Physiologie, p. 53 (1895). 2 Vom inwendigen Bau der Gewdchse (1806).

latter becoming elongated and attached end to end, the inter- vening walls breaking down; a conclusion afterwards confirmed by Hugo von Mohl (1830). It was not, however, until the appearance of Matthias Jakob Schleiden’s paper Beilrdge zur Phylogenesis (1838) that we have a really comprehensive treat- ment of the cell, and the formulation of a definite cell-theory for plants. It is to the wealth of correlated observations and to the philosophic breadth of the conclusions in this paper that the subsequent rapid progress in cytology is undoubtedly to be attributed. Schleiden in this paper attempted to solve the problem of the mode of origin of cells. The nucleus (vide infra) of the cell had already been discovered by Robert Brown (1831), who, however, failed to realize its importance. Schleiden utilized Brown’s discovery, and although his theory of phyto- genesis is based on erroneous observations, yet the great import- ance which he rightly attached to the nucleus as a cell-structure made it possible to extend the cell-theory to animal tissues also. We may indeed date the birth of animal cytology from Schleiden’s short but epoch-making paper. Comparisons between plant and animal tissues had already been made by several workers, among others by Johannes Miiller (1835), and by F. G. J.

Henle and J. E. Eurkinje (1837). But the first real step to a com- prehensive cell- theory to include animal tissues was made by Theodor Schwann. This author, stimulated by Schleiden's work, published in 1839 a series .of Mikroskopische Untersuchungen iiber die. Ubereinstimmung in der Structur und dem Wachstum der Tiere und Pfianztn. This epoch-making work ranks with that of Schleiden in its stimulating influence on biological research, and in spite of' the greater technical difficulties in the way, raised animal cytology at one blow to the position already, and so laboriously, acquired by plant cytology. In the animal cell it is the nucleus and not the cell-wall that is most con- spicuous 1 , and it is largely to the importance which Schwann, following the example of Schleiden, attached to this structure as a cell constituent, that the success and far-reaching influence of his work is due.' Another feature determining the success of Schwann's work was his selection of embryonic tissue as material for investigation. He showed that in the embryo the cells all closely resemble one another; only becoming later converted into the tissue elements— nerve cells, muscle cells and so forth — as development proceeded; just as a similar mode of investiga- tion had enabled Treviranus to trace the origin from typical cells of the vascular tissue in plants more than 30 years previously. And just as Treviranus showed that there was a union of cells to form the vessels in plants, so Schwann now showed that a union of cells frequently occurred in the formation of animal tissues.

So great was the stimulus given to cytological research by the work of Schleiden and Schwann that these authors are often referred to as the founders of the cell-theory. Their theory, however, differed very greatly from that of the present time. Not only did they suppose new cells to arise by a sort of " crystal- lization " from a formative " mother liquor " or " cytoblastema " (vide infra), but they both defined the cell as a " vesicle " provided with a firm cell-wall and with fluid contents. The cell-wall was regarded as the essential cell-structure,

which by its own peculiar properties controlled the cell-processes. The work of Schleiden and Schwann marks the close of the first period in the history of the cell-theory— the period dominated by the cell-wall. The subsequent history is marked by the gradual recognition of the importance of the cell-contents. Schleiden had noticed in the plant cell a finely granular substance which he termed ” plant slime ” (Pflanzenschleim) . In 1846 Hugo von Mohl applied to this substance the term ” protoplasm ” ; a term already used by Purkinje six years previously for the formative substance of young animal embryos. Mohl showed that the young plant cell was at first completely filled by the protoplasm, and that only later, by the gradual accumulation of vacuoles in the interior, did this substance come to form a thin layer on the inner surface of the cell-wall. Mohl also described the spontaneous movement of the protoplasm, a phenomenon already noted by Schleiden for his plant slime, and originally discovered by Bonaventura Cofti in 1772 for the cells of Chara, and rediscovered in 1807

by Treviranus. Not only was attention thus gradually directed to the importance of the cell-contents, but observations were not lacking, even in the plant kingdom, tending to weaken the importance hitherto attached to the cell- wall. Among these may be mentioned Gohn’s observation that in the reproduction of Algal forms the protoplasm contracts away from the cell-wall and escapes as a nakdd ” swarm spore.” Similarly in the animal kingdom instances began to be noted in which no membrane appeared to.be present (Kolliker, 1845; Bischoff, 1842), and for some time it was hotly debated whether these structures could be regarded as true cells. As a result of the resemblance between the streaming movements in these apparently naked cells (e.g. lymphocytes) and those seen in plant cells, R. Remak was led (1852-1853) to apply Mohl’s term ” protoplasm ” to the sub- stance of these animal

cells also. SimilarlyMax Schultze (1863) and H. A. de Bary (1859), as a result of the study of unicellular animals, came to the conclusion that the substance of these organisms, originally termed ” Sarcode ” by F. Dujardin, was identical with that of the plant and animal cell. Numerous workers now began to realize the subordinate position of the cell-wall (e.g. Nageli, Alexander Braun, Leydig, Kolliker, Cohn, de Bary, &c), but it is to Max Schultze above all that the credit is due for having laid the foundation of the modern conception of the cell — a conception often referred to as the proto- plasmic- theory in opposition to the cell- theory of Schleiden and Schwann. Max Schultze showed that one and the same substance, protoplasm, occurred in unicellular forms and in the higher plants and animals; that in plants this substance, though usually enclosed within a cell membrane, was sometimes naked (e.g. swarm spores), while in many animal tissues and in many of the unicellular forms the cell-membrane was always absent. He therefore concluded that in all cases the cell-mem- brane was unessential, and he redefined the ” cell ” of Schleiden and Schwann as ” a small mass of protoplasm endowed with the attributes of life” (1861). In the same year the physiologist Briicke maintained that the complexity of vital phenomena necessitated the assumption for the cell-protoplasm itself of a complex structure, only invisible because of the limitations of our methods of observation. The cell in fact was to be regarded as being itself an ” elementary organism.” By this time too it was realized that the formation of cells de novo, postulated by Schleiden’s theory of ” phytogenesis,” did not occur. Cells only arose by the division of pre-existing cells,— as Virchow neatly expressed it in his since famous aphorism, omnis cellula e cellula. It was, however, many years before the details of this ” cell-division ” were laid bare (see Cell-Division below).

General Morphology of the Cell.— In its simplest form the cell is a more or less spherical mass of viscid, translucent and granular protoplasm. In

addition to the living protoplasm there is present in the cell food-material in various stages of assimila- tion, which usually presents the appearance of fine granules or spherules suspended in the more or less alveolar or reticular mesh- work of the living protoplasm. In addition there may be more or less obvious accumulations of waste material, pig- ment, oil drops, &c. — products of the cell's metabolic activity. All these relatively passive inclusions 1 are distinguished from the living protoplasm by the term " metaplasm " (Hanstein), or " paraplasm " (Kupffer), although in practice no very sharp distinction can be drawn between them. The cell is frequently, but by no means always, bounded by a cell-wall of greater or less thickness. In plants this cell-wall consists of cellulose, a sub- stance closely allied to starch; in animals only very rarely is this the case. Usually the cell-wall, when this is present, is a product of the cell's secretive activity; sometimes, however, it appears to be formed by an actual conversion of the surface layer of the protoplasm, and retains the power of growth by " intussusception " like the rest of the protoplasm. Even when a limiting membrane is present, however, evidence is steadily accumulating to show that the cell is not an isolated physiological unit, but that, in the vast majority of cases, there is a proto-

1 The Chromoplastids of the vegetable cell come under a different category of cell-inclusions; see Plants: Cytology.

plasmic continuity between the cells of the organism. This continuity, which is effected by fine protoplasmic threads ("cell-bridges") piercing the cell-wall and bridging the inter- cellular spaces when these are present, is to be regarded as the morphological expression of the physiological interdependence of the various — often widely separated- — tissues of the body. 2 It is probable that it is the specialization of this primitive condition which has produced the cell-elements of the nervous system. In many cases the cell-connexions are so extensive as to obliterate cell-

boundaries. A good example of such a ” syn- cytial ” tissue is provided by the heart muscle of Vertebrates and the intestinal musculature of Insects (Webber). 3

In all multicellular, and in the great majority of unicellular, organisms the protoplasm of the cell-unit is differentiated into two very distinct regions, — a more or less central region, the nucleus, and a peripheral region (usually much more exten- sive), the cell-body or cytoplasm. This universal morpho- logical differentiation of the cell-protoplasm is accompanied by corresponding chemical differences, and is the expression of a physiological division of labour of fundamental importance. In some of the simpler unicellular organisms, e.g. Tetramitus, the differentiated protoplasm is not segregated. Such forms are said to have a ” distributed ” nucleus, and among the Protozoa correspond to Haeckel’s “Protista.” It is probable that among plants the Bacteria and Cyanophyceae have a similar distributed nucleus. In all the higher forms, however, the segregation is well marked, and a “nuclear membrane” separates the substance of the nucleus, or ■■” karyoplasm ” 4 from the surrounding “cytoplasm.” Within the nuclear membrane the karyoplasm is differentiated into two very distinct portions, a clear fluid portion, the ” karyolymph,” and a firmer portion in the form of a coarser or finer ” nuclear reticulum.” This latter is again composed of two parts, the ” linin reticulum,” 5 and, embedded in the latter and often ,; irregularly aggregated at its nodal points, a granular substance, the “chromatin,” 6 the latter being the essential constituent of the nucleus. In addition to the chromatin there may be present in the nucleus one or more, usually spherical, and as yet somewhat enigmatical bodies, the ” nucleoli.” In addition to the nucleus and cytoplasm, a third body, the ” centrosome,” has often been considered as a constant cell-structure. It is : a minute granule, usually lying in the cytoplasm not far from the nucleus, and plays an important part in cell-division and fertilization (see below). ■

*Cell-differentiation. — Both among unicellular and multi- cellular individuals the cell assumes the most varied forms and performs the most diverse functions. In all cases, however, whether we examine the free-living shapeless and slowly creeping Amoeba, or the striped muscle cell or spermatozoon of the Metazoa (fig. 1, b and c), the constant recurrence of cytoplasm and nucleus show that we have to deal in each case with a cell. ': The variation in the form and structure of the cell is an expression . of that universal economic law of nature, " division of labour," . with its almost invariable accompanying " morphological differentiation "; the earliest and most fundamental example being in the differentiation of the cell-protoplasm into cytoplasm and nucleus. In multicellular individuals the division of labour to which the structural complexity of the organism is due is between the individual cell-units, some cells developing one * Cf . Pfeffer's classical experiments on the physiological significance of cell-continuity in plant tissues (Uber den Einfluss des Zellkerns auf die Bildung der Zellhaut, 1896). The recent work in physiology on the influence substances secreted by certain tissues and circulating , in the blood-stream exert upon other and widely different tissues, should not be lost sight of in this connexion.*

3 The influence this protoplasmic continuity may have upon our conception of the cell as a unit of organization is referred to below (Present Position of the Cell-theory).

4 A term (from Kapvov, kernel) suggested by Flemming to. replace Strasburger's hybrid term " nucleoplasm " (1882). The earlier workers, e.g. Leydig, Schultze, Briicke, de Bary, &c, restricted the term protoplasm to the cell-body — the " Cytoplasm " of Strasburger, an example still followed by O. Hertwig.

6 From linum, a thread, Schwarz, 1887. ■

6 From xp&M", colour, Flemming, 1879.

aspect, some another, of their vital attributes. Thus one cell specializes in, say, secretion, another in contractility, another in receiving and carrying stimuli, and so forth, so that we have the gland cell, the muscle cell, and the nerve cell, each appropri- ately grouped with its fellows to constitute the particular tissue or organ — gland, muscle or brain — which has for its function that of its constituent cells. In unicellular animals we also find division of labour and its accompanying morphological differentiation, but here there is no subdivision of the protoplasm of the organism into the semi-autonomous units which so greatly facilitate division of labour in the Metazoa; instead, division of labour must be between different regions of protoplasm in the single cell. The sharply defined character of this regional differentiation in the Protozoa, and the surprising structural complexity it may produce, sufficiently clearly show that although multicellular structure has greatly facilitated regional differentia- tion in the Metazoa, it is by no means essential to this process (see below, Present Position of the Cell-theory).

It is not within the scope of this article to attempt a compre- hensive review of the variety in structural complexity to which this division of labour among the cells of the Metazoan and the regional differentiation of the cell-bodies of the Protozoa has given rise. Some indication of the wealth of variety may be best given by taking a general survey of cell-modifications, grouped according to the cell-attributes the expression of which they facilitate.

(a) Structural Complexity facilitating Movement. — One of the most striking, and hence earliest described, of the funda- mental attributes of protoplasm is its power of spontaneous movement. This is seen in the walled cell of plant tissue and

in

and 6 from Schafer's Essentials of Histology, by permission of Longmans, Green & Co. Fig. I. — Types of Cells, o, Fat-cell enclosing a huge fat-globule.

b, Part of a Mammalian " striated

c. Spermatozoa of mouse and bird.

muscle-cell (diagrammatic).

the naked cell-body of Amoeba. In the latter case the streaming movements of the naked protoplasm are accompanied by the formation of " pseudopodia," and result in the highly charac- teristic " amoeboid " creeping movement of this and similar organisms (e.g. lymph corpuscles of the blood). 1 In these examples the whole protoplasm participates in the movement, — there has been no division of labour, and there is, therefore, no visible morphological differentiation. In many cells, movement (either of the entire body or of the surrounding medium) is by means of slender whip-like processes of the protoplasm flagella or cilia. These represent modified pseudopodia, and in the formation of the motile gametes of some of the lower forms, e.g. Myxomycetes (de Bary, 1859), Rhizopods (R. Hertwig, 1874), &c, the actual conversion of a pseudopodium into a flagellum can be witnessed. These vibratile processes may be either one or few in number, and are then large in size and move independ- ently of one another; or they may be very numerous, covering the free surface of the cell (fig. 2, a); they are then very small and move strictly in unison. In the former case they are termed " flagella," in the latter " cilia." In some cases the flagellum is accompanied by an undulating membrane (e.g. Trypanosoma among the protozoa and in many spermatozoa), and it may be situated either at the front end (Euglena) or hind end (sper- matozoa) of the body during motion. The cilia may form a

1 The formation of pseudopodia and accompanying changes in form of Amoeba were observed as early as

1755 by Raesel von Rosenhof, who named it on this account the ” little Proteus.”

uniform coating to the free surface of the cell, as in ciliated epithelium (fig. 2, a) and many infusoria, or the cilia may be variously modified and restricted to special regions of the body, e.g. the ” undulating membrane ” of the peristomial region in many infusoria, the swimming combs of the Ctenophora (q.v.),

From A. Gurwitsch, Morphologic und Biologic ier Zelle, by permission of Gustav Fischer. .

Fig. 2. — Types of Cells, a, Ciliated epithelial cells. (After Heidenhain.) b. Mucus-secreting ” goblet “cells. (After Gur witsch.)

and the flame cells of the Platyelmia (q.v.). In one group of infusoria (Hypotricha), the cilia, ” cirri,” have attained a high degree of differentiation, and reach a considerable size. Both cilia and flagella spring directly from the cell-protoplasm, piercing the cell-membrane, when this is present. At the point where they become continuous with the cell-body there is usually a deeply staining ” basal granule.” In some cases the flagella are in direct connexion with the centrosome (see below, Cell- division), e.g. Trypanosoma and spermatozoa, in some cases even while the centrosome is functioning in mitosis (e.g. insect spermatogenesis, Henneguy 2 and Meves 3 (fig. 3).

In the ability of Amoeba to contract into a spherical mass, and in the presence in its protoplasm of the contractile vacuole, we see another type of spontaneous movement — contractility — : of the protoplasm. In the ” musculo-epithelial ” cells of Hydra,

From O. Hertwig, Allgcmeine Biologic, by permission of Gustav Fischer.

Fig. 3. — Spermatocytes of Bombyx mori, showing the precocious appearance of the spermatozoon flagellum

and its relation to the centrosome. (After Henneguy.)

the elongated basal portion of the cell alone possesses this contractility. In the higher Metazoa the whole cell — muscle cell — is specialized for contractility, and shows, as a result of its specialization, a distinct fibrillation. This fibrillation is foreshadowed in the contractile regions of many Protozoa, e.g.

8 ” Sur les rapports des cils vibratiles avec les centrosomes,” Archives d’anatomie microscopique (1898).

s ” tlber Zentralkorper in mannlichen Geschlechtszellen von Schmetterlingen ” (Anat. Anz. Bd. xiv., 1897). Cf. also the papers of Lenhossek (Vber Flimmerzellen, 1898), Karl Peter (Das Zentrum fur die Flimm-und Giesselbewegung, 1899) and Verworn (Studien sur Physiologie der Flimmerbewegung., 1899).

in the cirri of hypotrichous Infusoria, the tentacle of Noctiluca, and the myophane layer of Gregarines. In the quickly contract- ing muscle cell of Vertebrates and insects, further specialization has produced a structure of considerable complexity (fig. 1, b). Here also the cell is fibrillated, but the fibrillae (sarco-styles) are much more distinct, and are segmented in a manner which gives to the entire cell a ” cross striated ” appearance. Since quick movement is usually (but not always) associated with voluntary control, these striated muscle cells are often termed ” voluntary ” muscle fibres. The great increase in length of these cells is accompanied by the fragmentation of the origin- ally single nucleus.

(6) Cell-modification in Relation to Secretion. — Just as the complex movements considered above were

the result of a great development of the power of spontaneous movement possessed by all protoplasm, so cell-secretion is the result of a development of the metabolic processes underlying all vital phenomena. But whereas specialization of the protoplasm for movement resulted in a very obvious morphological com- plexity, specialization for secretion results in molecular com- plexity, and only rarely and indirectly results in morphological differentiation. Usually indeed the specialization is only rendered evident by the appearance of the formed secretion, e.g. mucus-secreting epithelial cells (fig. 2, b), the ovarian ovum and the fat cell (fig. 1, a). In some cases a distinct fibrillation of the cytoplasm accompanies or precedes the appearance of the cell-secretion (Mathews, pancreas cell of Amphibia). In many cases the internal secretion is no mere accumulation, e.g. the internal skeleton of the Radiolaria, and the nematocysts of the Coelentera. Frequently in animal tissues the cell-secretions are accumulated in the intercellular spaces, and result in the formation of the various " connective tissues," all of which are characterized by the immense amount of intercellular substance, e.g. fibrous tissue, cartilage and bone. Cell-modifications facilitating the general metabolism, but not necessarily indicating specialized secretion, also occur, e.g. the " gullet " of many Protozoa, the suctorial tubules of the Acinetaria, and the " nutri- tive processes " of the ovarian ova in many Lepidoptera. Men- tion may be made here of the network or canal system of the cytoplasm, described for many cells by Golgi, Holgren and others. An enigmatical structure, the " yolk-nuCleus " of many ova, has been frequently regarded as a structure of considerable metabolic importance, e.g. Bambeke (1898) for Pholcus. 1

Striking modifications resulting from specialization in secretion are frequently presented by the nucleus. In many secreting

Fig. 4. — Types of Nuclei.

From Prof. E. B. Wilson's The Cell in Development

and Inheritance, by permission of the author and of the Macmillan Co., New York.

a, Permanent spireme-nuclei in cells from the intestinal epithelium of a dipterous larva, Ptychoptera. (After van Gehuchten.)

From Korschelt and Heider, Lehrbuch der verg. Entivieklungsgcschichte der wirbeUosen Tiere, by permission of Gustav Fischer.

b, Branched nucleus of the ” nutritive ” cell, from a portion of an ovarial tube of Forficula auricularia.

cells this structure is extensively branched, e.g. many gland cells and ovarian nutritive cells of insects (fig. 4, b). In some cases the nucleus of the gland cell contains a persistent spireme thread (fig. 4, a); while almost all actively secreting cells

1 Cf.; however, the present writer’s interpretation of this structure in the oocyte of Antedon. Phil. Trans. Royal Soc. (1906), B. 249.

are characterized by the possession of large or numerous nucleoli.

(c) Specialization for the Reception and Conduction of Stimuli. — One of the most striking of the fundamental attributes of living protoplasm is its ” irritability,” that is to say, its power of responding to external impressions, ” stimuli,” by movement, which, both in kind and intensity, is wholly independent of the amount of energy expended by the stimulus. The stimulus conveyed by the nerve fibre to the muscle is out of all proportion

From Schafer’s Essentials of Histology, by permission of Longmans, Green & Co. Fig. 5. — Nervous and Sensory Cells. A and B, Ganglion cells from the cerebral cortex; in A the only slightly branched axon may extend the whole length of the spinal cord. (After Schafer.)

C, Body of a ganglion-cell showing " Nissl's granules."

D, Sensory cells from olfactory epithelium. (After Schultze.)

E, Diagrammatic representation of the sensory epithelium of retina (rod and cone layer). (After Schwalbe.)

to the amount of work it may cause the muscle to do. Although protoplasmic irritability is thus incapable of a simple mechanical explanation, science has rejected the assumption of a special " vital force," and interprets protoplasmic response as being a long series of chemico-physical changes, 2 initiated, but only initiated, by the original stimulus; the latter thus standing in the same relation to the response it produces as the pull on the trigger to the propulsion of the rifle bullet. The function of receiving stimuli from the outer world, originally possessed to a greater or less extent by all cells, has, in the Metazoa, been relegated to one class of cells, the sensory cells 3 (fig. 5, D and E). Another class of cells — the " ganglion cells " or " neurones " (fig. 5, A and B), are concerned with the conduction of the stimuli so received. The contractile elements in the Metazoa are thus dependent for their stimuli on the nervous elements — the sensory cells and neurones.

Origin of Cells. — In the preceding sections we have considered the structure of the cell in relation to the fundamental attributes of cell-metabolism, irritability, and movement. We have how

s Claude Bernard expressed the same conclusion in 1885. Reject- ing both the view that vital phenomena were identical with chemico- physical phenomena, and that which regarded them as totally distinct, he suggested a third point of view: " l'dtement ultime du phfinomene est physique; ['arrangement est vital."

' Many forms of response to stimulus involve no

visible specializa- tion, e.g. positive and negative heliotropism, chemiotropism, geo- tropism, &c, seen more especially in plants, but occurring also in the animal kingdom.

to consider the cell in relation to yet another vital attribute, that of reproduction. Just as we now know Lhat the phenomena of assimilation, respiration, excretion, response, movement and so forth, characteristic of living things, are but the co-ordinated expressions of the corresponding activities of the constituent cells, so we now know that the reproduction of the organism is, in its ultimate analysis, a cell-process. Our knowledge of the essential fact that cells only arise by the division of pre-existing cells', now a fundamental axiom of biology, and of the details of this process, have been acquired during recent years by the strenuous efforts of numerous workers. 1 Matthias Jakob Schleiden (1838) supposed that in plants the new cell, arose from the parent cell by a sort of " crystallizing " process from the cell fluid or " cytoblastema "; the nucleolus appearing: first, then the nucleus, and finally the cell-body. Theodor Schwann (1839) extended Schleiden's theory to animal tissues, with this yet greater error, that new cells might arise, not only within the mother cell as Schleiden had supposed, but also in the inter- cellular substance so common in animal tissues (to which he also gave the term " cytoblastema ").' By 1846, however, the botanists, thanks mainly to the efforts of Hugo: von Mohl and Nageli, recognized as a general law that cells only arise by the division of a pre-existing cell. But it was long before the universal application of this law was recognized by zoologists; the delay being largely due to pathological phenomena. The work of Kolliker (1844-1845), Karl Bogislaus Reichert (1841-1847), and Remak (1852-1855), however, finally enabled Virchow in 1858 to: maintain the law of the genetic continuity of cells in the since famojis

aphorism omnis cellula e cellula. At this time, however, nothing was known of the details of cell-division,- — one school (Reichert, L. Auerbach, and the majority of the botanists) maintaining that the nucleus disappeared prior to cell-division, the '. other school (von Baer, Remak, Leydig, Haectel, &c.) . maintaining that it took a leading part in the process. It is not until the appearance of Anton Schneider's work in 1873, followed by those of Fol, Auerbach, Strasburger ani|_aaany others, that we begin to gain an insight into the process. In 1882 W. Flemming was able to extend Virchow's aphorism to the nucleus also: omnis nucleus e nucleo.

Outline of Cell-division. — There are two very distinct methods of cell-division. The more general and also more complicated method is accompanied by the formation of a complex fibrillar mechanism, and was on this account termed " mitosis " (jutros, a, thread) by W. Flemming (1882), and " karyokinesis " (itapvov, nut, nucleus, and Kivqais, change, movement) by W. Schleicher (1878). The other method, "amitosis," or direct division, is unaccompanied by any visible mechanism and is of relatively exceptional occurrence. In the more usual method of cell- division, or " mitosis," we can distinguish two distinct but {parallel processes, the one undergone by the chromatin and resulting in the " chromatic figure," the other usually only concerning the cytoplasm and resulting in the " achromatic figure." 2

We will consider the chromatin changes first. The chromatin granules lose their scattered arrangement on the nuclear reticulum, and become instead arranged in a linear series to form a coiled and deeply staining "spireme thread" 3 (fig. 6, a). As the thread contracts, its granular origin becomes less evident, and at the same time the coils become fewer in number; the " close " spireme of earlier stages becomes the " loose " spireme of later stages. ■ As the spireme thread contracts, it segments into a number of short, and usually U-shaped, segments — the "chromosomes" (Waldeyer, 1888). The number of these chromosomes is always

constant for the cells of any given species of plant or animal, but varies greatly in number in different

1 Prominent among these are: Schleiden (1873), Fol (1873–1877), Auerbach (1874), Butschli (1876), Strasburger (1875–1888), O. ■Hertwig (1875–1890), R. Hertwig (1875–1877); Flemming (1879– 1891), van Beneden (1883–1887), Rabl (1889), Boveri (18&7–1903).

2 This distinction between the chromatic and achromatic portions of the mitotic figure is due to Flemming.

'The genesis of the spireme thread was first described by E. G. Balbiani in 1876.

species. Thus in the parasitic worm Ascaris megaiocephala, var. univalens, there are only two. In the crustacean Arteniia Bauer found 168, while in the amphibian Salamandra maculata, as also in the lily, the number is 24. While these changes have been proceeding in the nucleus, changes in the cytoplasm have resulted in the formation of the achromatic figure. These cytoplasmic changes are initiated by the division into two of a minute body, the " centrosome," originally discovered by P. J. van Beneden in 1883, 4 and usually lying not far from the nucleus (fig. 6, a). The daughter centrosomes separate from one another, travelling to opposite poles of the nucleus. At the same time radiations extend out into the cytoplasm from the centrosomes, and, as the nuclear membrane disappears, invade the nuclear area (fig. 7, a). Some of the fibrillae in the latter region become attached to the chromosomes and are

b

a; b and c from Prof. E. B. Wilson's The Cell in Development and Inheritance, by permissionof the author and the Macmillan Co., New York; d from A. Gurwitsch, Morphologic u. Biologic der Zelle, by permission of Gustav Fischer.

Fig. 6. — Diagram of Nuclear Division, a, Spireme stage; 6, Spindle formed; c, Spindle complete; equatorial plate formed; d, Division completed.

termed "mantle fibres-"; others become continuous from one centrosome to the other and constitute the " spindle fibres." The remaining radiations at the two poles of the spindle are the " astral rays." (The details of the formation of the achromatic figure vary considerably, some indication of this is given in the next section in connexion. with the question of the origin of the mitotic mechanism.) The chromosomes now arrange themselves in the " equatorial plate " of the spindle and each splits longi- tudinally into two 6 (fig. 6, b and c). The sister chromosomes now pass to opposite poles of the spindle (fig. 6, d), and there, returning to the " resting " condition, constitute the daughter nuclei. Division of the cell follows, usually, in animals, by simple constriction. Both Theodor Boveri and van Beneden, in their papers of 1887, regarded the centrosome as initiating, not only the division of the cell-body but that of the chromatin also; Beneden even suggested that the pull of the mantle fibres caused the division of the chromatin in the equatorial plate. W. Pfitzner in 1882 was the first to show that the splitting of the chromosomes in the equatorial plate was only the reappearance of a split in the spireme thread and was due to a corresponding ; 4 " Recherchps sur la maturation de l'ceuf, la feeondation et la division cellulaire " (Archives de biologie, vol. iv.).

6 First discovered by Flemming in 1879 and confirmed by Retzius in 1881. , .

division into two of each of the chromatin granules. In the spermatogenic cells of Ascaris, A. Brauer has shown that the chromatin granules divide while still scattered over the nuclear reticulum and before either the formation of a spireme thread or the

division of the centrosome. In many other cases the reverse of this condition occurs, the centrosome dividing long before there is any indication of division in the nucleus (e.g. salamander spermatogenic cells, Meves, &c). We must there- fore, with Boveri and Brauer, regard the division of the chromatin in mitosis as a distinct reproductive act on the part of the chromatin granules, the chromosomes being merely aggregates (temporary or permanent, vide infra) of these self-propagating units.

For convenience of description it is usual to recognize four periods in mitosis : (i.) Prophase, (ii.) Metaphase, (iii.) Arfaphase, and (iv.) Telophase (Strasburger, 1884). The prophase covers all changes up to the completion of the mitotic figure. The metaphase is the parting of the sister chromosomes in the equatorial plate; their passage to opposite poles of the spindle constitutes the anaphase; and their reconstruction to form the resting daughter nuclei, the telophase.

The Achromatic Figure. — The mode of origin of the achro- matic figure varies greatly. In some cases a distinct and con- tinuous spindle, the ” central spindle ” of F. Hermann, is visible from the very first separation of the daughter centrosomes (e.g. salamander spermatogenic cell) 1 (fig. 7, b). In other

Fig. 7. — Centrosomes.

From Prof. E. B. Wilson’s The Cell in Development and Inheritance, by permission of the author and of The Macmillan Co., New York.

a, Leucocyte from a Salamander, showing permanent aster and centrosome.

From A. Gurwitsch, Mbrphologie u. Biologie der Zelle, by permission of Gustav Fischer.

b, Sperm-mother cell of Salamandra maculata, showing Hermann’s ” central spindle.”

cases the rays only invade the nuclear area and become con- tinuous in the equatorial plane after the centrosomes have assumed their definitive positions at the two poles of the nucleus, and may even appear to indent the disappearing nuclear mem- brane as they invade the nuclear area. 2 In the salamander testis cell (fig. 7, b), and in many other cases, the whole of the achromatic figure is obviously of cytoplasmic origin. In many cases, however, it equally obviously arises within the nucleus, 3 while in yet other cases 4 the spindle fibres are of mixed origin. The question, therefore, of the cytoplasmic or nuclear origin of the achromatic figure, at one time regarded as of considerable importance, is wholly immaterial. Various elaborate theories have been propounded to explain the mechanism of the mitotic figure. H. Fol (1873) regarded the centrosomes as centres of attractive forces, and compared the mitotic figure to the lines of force in the magnetic field, a comparison made by numerous subsequent workers. E. Klein's hypotheses of two opposing

1 The discovery by Hermann of the central spindle first clearly showed that' two kinds of fibres must be recognized in the mitotic figure. Those of the central spindle correspond to the continuous spindle fibres of Flemming (1891) and Strasburger (1884), and the mantle fibres, i.e. half-spindle or Polstrahlen, of van Beneden (1887) and Boveri (1 889-1 890),

2 Planter, Watase, GrifTen and others.

' e.g. Euglypha (Schewiakoff, 1888), Infusoria (R. Hertwig, 1898) So also Korschelt for Ophryotrocha, and many other cases. 4 e.g. Bauer, spermatogenic cells of Ascaris univalens.

' systems of contractile fibrillae, elaborated by van Beriedeh (1883, 1887) and accepted by Boveri (1888), >was still further, extended by R. Heidenhain in relation, to the leucocytes of the salamander, in which there is a permanent centrosome and astral rays to which the contractile movements

of the cell appear . to be due 6 (fig. 7, a): Hermann on the other hand confined the: contractility to the astral and mantle fibres; while L. Druner regarded the spindle as exerting a pushing force, for not only do the interzonal spindle fibres elongate during the anaphase, but they were often at this period contorted, while on the other hand astral rays may be entirely absent (e.g. Infusoria), and in some cases the spindle pole may be caused to project at the surface of the cell. The futility of these attempted mechanical explanations of mitosis is sufficiently clearly shown, not only by the contradictory nature of the explanations themselves, but by the fact that, in amitosis, nuclear and cytoplasmic division occur without any fibrillar mechanism whatever.

Centrosome. 6 — This minute body was first detected at the spindle poles by Flemming in 1875, and independently by P. J. van Beneden in 1876. The important part played by the centrosome in fertilization, 7 first described by van Beneden and Theodor Boveri in their papers of 1887–1888, together with . the behaviour of this structure in mitosis, led these authors to regard the centrosome not only as the dynamic centre of the : cell but as a permanent cell-organ, which, like the nucleus, passed by division from one cell-generation to the next. This conclusion appeared to receive considerable support from the recognition of the centrosome in various kinds of resting cells,? and especially from the relation this structure frequently shows • to the locomotor apparatus of the cell (e.g. its position in the. centre of the radiating fibrillae in the contractile lymph and pigment cells, and its relation to the vibratile flagellum in spermatozoa and some protozoa, e.g. Trypanosoma). 9 In' almost all cases the centrosome of the resting cell, when this! can be detected, lies in the cytoplasm, and is often already divided in preparation for the next mitotic division (e.g. spermato- genic cells of the salamander; Meves). In some cases, however, it resides in, or arises from, the nucleus (Brauer; spermatogenesis of Ascaris,

var. univalens). This indifferent nuclear or cyto- plasmic position for the centrosome is paralleled by the attraction sphere or homologue of the centrosome in many Protozoa. Thus in many forms, e.g. Euglena (Keuten), it lies within the. nucleus, while in other forms, e.g. Noctiluca (Ishikawa, 1894,: 1898; Calkins, 1898) and Paramoeba (F. Schaudinn, 1896), it: lies in the cytoplasm, while in Tetramitus it coexists with a • "distributed" nucleus. In the Heliozoa conditions are ex- ceptionally interesting; not only is the centrosome — here resem- bling in appearance that of the higher forms — permanently visible and extranuclear, lying at the centre of the radiations character- istic of these forms, but there is the strongest possible evidence ; for its formation de novo. For Schaudinn has shown in Acantho- cystis that, in the formation of the swarm, spores, the nucleus divides amitotically, the centrosome remaining visible and' unchanged 'at the centre of the radiating processes. Yet a centrosome appears later in the nucleus of the swarm spores and migrates into the cytoplasm. The experiments of T. H. Morgan and E. B. Wilson, in which numerous centrosomes and asters (" cytasters ") are caused to appear in unfertilized sea- urchin eggs by a brief immersion in a 13 % solution of magnesium

6 Cf. also Watase, Solger and Zimmermann.

• This term is due to Boveri (Zellensludien, ii., 1888, p. 68; Jen. Zeit. xxii.), but it was intended by him to include the region of modified cytoplasm or " centrosphere " often enclosing the centro some proper, i.e. " centriole " of Boveri.

7 For outline of fertilization see article Reproduction.

8 e.g. lymph and various epithelial and connective tissue cells of salamander larva (Flemming, 1 89 1 ;. Heidenhain, 1892); pigment cells of fishes (Solger, 189 1); red blood corpuscles (Heidenhain, Eisen, 1897) ; and numerous other cases.

'For an interesting development of this subject see

Watase (1894). This author not only identifies the centrosome with the structures seen in lymph cells, &c, but compares it to the basal granules of ciliated cells and to the varicose swellings on the sarcostyles of striped muscle cells !

chloride in sea-water, 1 as also the possibility in many cases that even in normal fertilization the cleavage centrosomes may arise de novo, 1 make it no longer possible to regard the centrosome as a permanent cell-structure.

Significance of Mitosis. — Whatever may be the nature of the chemico-physical changes occurring during cell-division, of which the achromatic spindle and astral rays are the visible expression, it is certain that the whole of this complicated process has for its function, not the division of the chromatin, for that has already occurred on the spireme thread or even earlier, but the distribution of the divided chromatin granules to the two daughter nuclei. It is indeed usually assumed that the mitotic mechanism is not merely for the distribution, but for the equal distribution, of the sister granules to the two daughter nuclei. The conspicuous part the chromatin is seen to play in the whole mechanism of heredity — in maturation, fertilization and development — indicating as it does that the chromatin is the chief, if not the only, bearer of the specific qualities of the organism, sufficiently clearly emphasizes the importance of the equal distribution of this substance between the daughter cells at successive cell-divisions. There are, however, serious objections to the interpretation of mitosis as an adaptation to ensure this equal distribution of the chromatin. Not only does the occurrence of amitosis show that the mitotic mechanism is not essential for either nuclear or cytoplasmic division, but direct division may occur in the life-history of the germ cells, the very point at which it should not occur*

had mitosis the signifi- cance usually attached to it. On the other hand, the most elaborate mitosis occurs in cell-tissues (e.g. skin of salamander larva) which can take no possible share in the reproduction of the species. Moreover, we have no reason for supposing that the division of the chromatin in amitosis is not as meristic, and its subsequent distribution as equal, as is so visibly the case in mitosis. 4 It is necessary, therefore, to seek for some other explanation of the elaborate mechanism of mitosis than that which assumes it necessary for the equal distribution of the divided chromatin granules. The present writer believes the true explanation to be found in that great economic law of nature, " division of labour." The same economy which, .working under the control of natural selection, has produced the complexly differentiated tissues of the higher metazoa, which has led to the sexual differentiation between the con- jugating gametes and thus to the sexual differentiation of the parents, has resulted in the production of mitosis. Only here the economy finds expression in division of labour, not in space, but in time. The work of the self-propagating chromatin granules is so ordered that periods of undisturbed metabolic activity alternate with periods of reproductive activity. The brief space of time occupied by the latter process has necessitated a more elaborate specialization of the forces — whatever their nature — controlling cell-division; a specialization which has resulted, just as a similar specialization in so many other cases has resulted, in a visible differentiation of the cell-protoplasm. This explanation is in harmony with the occurrence of typical mitosis in active tissue cells on the one hand, and of amitosis in the relatively quiescent primary germ cells on the other.

Individuality of the Chromosomes. — The most striking feature in the behaviour of the chromatin in mitosis is its resolution, at each division, into a — for any particular species — constant number of chromosomes. This constant recurrence of the specific number of chromosomes at every cell-

division is capable

1 The force of this evidence is admitted by Boveri himself. Meves, however, maintains the possibility that the numerous centrosomes appearing in the egg arise by the rapid fragmentation of a centrosome already present.

- *Cf . especially the behaviour of the centrosomes in the fertiliza- tion of the egg of Pleurophyllidia (MacFarland, 1897) and that of Cerebratulus (Coe, 1901). Not only may the sperm centrosomes totally disappear before reaching the egg-nucleus, but in the latter type the definitive centrosomes appear while the last traces of the sperm asters are still visible.*

- *e.g. Meves ; Spermatagonia of Salamandra.*

4 Cf. especially the artificial production of amitosis in Spirogyra; W. Pfeffer, 1899.

of explanation in two radically different ways. One explanation assumes for the organism a specific peculiarity determining the segmentation of the spireme thread into a definite number of segments (Delage, 1899 and 1901). The other regards chromo- somes as independent units of the cell, retaining their identity between successive cell-divisions. The latter ” Individualists Hypothese ” was originally put forward by Theodor Boveri in 1887 as a result of C. Rabl’s observation (1885) that in epidermal cells of the salamander larva the chromosomes reappear in the mitosis of the daughter cells with the same arrangement as they possessed in the prophase of the mother cell — the angles of the U-shaped chromosomes being all directed towards one pole (Rabl’s ” Poleseite “) of the nucleus. In the formation of the “resting” nucleus, the chromatin, becoming metabolically active, flows out on to the linin reticulum, all trace of the chromo- somes being for the time lost. In Ascaris, Boveri (1888) obtained similar but still more striking results. The thickened ends of the four elongated chromosomes*

cause projections on the nuclear surface throughout the resting period, and the ends of the reappearing chromosomes always coincided with these protuberances; cf. also Sutton (1902) on locust spermatagonia. Moreover, the arrangement of the chromosomes must follow one of three well-marked groupings, and this is determined for each individual in the cleavage spindle of the egg and maintained throughout later development (fig. 8).

In the same worm (var. univalens) Boveri (1888 and 1899) found that occasional abnormalities in maturation resulted in

From Boveri's Ergebnisse H. d. Konstitution der chromatischen Substanz des Zellkerns, by permission of Gustav Fischer.

Fig. 8. — Preparation for Mitosis, a. Nucleus of " i blastomere " of Ascaris megalocephala bivalens in resting condition; b and c, nuclei from sister 5 blastomeres in preparation for mitosis.

the suppression of the first polar body and the inclusion of its chromosomes in the second maturation spindle; the egg-nucleus at the time of fertilization thus having two chromosomes instead of one, while the spermatozoon nucleus has only one. Three chromosomes instead of two reappear in subsequent divisions. Boveri's " Individualists Hypothese " received striking support from the work of Herla (1893), L. R. Zoja (1895) and O. zur Strassen (1898). Herla and Zoja showed that if the egg of A scaris megalocephala (var. bivalens), which possesses two chromosomes, be fertilized with the spermatozoon of var. univalens, in which the germ cell has only one chromosome and that smaller than either of the two in the other variety, three chromosomes reappear, two large and one small, in the cleavage divisions of the resulting hybrid embryo. Zur Strassen's observations on the giant embryos of Ascaris also support Boveri's theory. These embryos arise by the fusion of eggs, either before or after fertiliza- tion. The number of chromosomes in the subsequent cleavage- figures is

proportional to the number of nuclei that have fused together. Similar results are given by Boveri's (1893–1895) and T. H. Morgan's (1895) experiments on the fertilization of enucleated sea-urchin egg-fragments; all the nuclei of the resulting embryo having only half the number of chromosomes characteristic of the species {e.g. in Echinus 9 instead of 18). All the above facts point to the conclusion that, as Boveri expressed it in his Grundgesetz der Zahlenkonstanz (1888), " the number of chromosomes arising from a resting nucleus is solely dependent on the number which originally entered into its composition." 6

6 Cf. Boveri, 1904, p. 13. (For Boveri's criticism of Delage's views, cf. Boveri, 1901 and 1902.)

6 It should, however, be noted that the assumption that a particular group of characters remains always associated in a particular chromosome is one that is very difficult to reconcile with the mode of inheritance of Mendelian pairs of characters in the case of organisms with a relatively small chromosome number.

Boveri's Law of Proportional Nuclear Growth. — The chromatin in the nucleus is exactly halved at every cell-division. As the bulk of the chromatin remains constant from one cell-generation to another, it must double its bulk between successive divisions. That this proportional growth of the chromatin is dependent solely on the chromatin mass, and not on that of the cell, is very clearly indicated by cases where the normal chromatin mass has been artificially increased or reduced, 1 the chromatin in either case doubling its bulk between successive cell-divisions, and neither the mass of the chromatin nor the number of the chromosomes undergoing any readjustment. By double or partial fertilization, different regions in the same embryo may show nuclei of different sizes (Boveri). We must

therefore distinguish in the cell between ” young ” and ” adult ” chro- matin. In other words the chromatin must be regarded as being composed of individual units, each with a definite constant structure and maximum growth (Boveri, 1904). This conclusion is strongly suggested, not only by the evidence in favour of the individuality of the chromosomes considered above, but also by the independent reproductive activity of the chromatin granules in the prophase of mitosis.

Differentiation among the Chromosomes. — If we grant the assumption of a persistent individuality for the chromosomes, then it becomes possible to consider whether in one and the same nucleus these structures may not take varying parts in controlling the cell’s activity in development and in inheritance. Such a differentiation among the chromosomes would be due to in- dependent ancestry rather than to the economy resulting from a division of labour; nevertheless a division of labour of a sort would be the result of this gradual divergence of the chromo- somes from one another, and we might therefore expect that, in some cases at least, a morphological would accompany the physiological differentiation. Examples of such a morphological differentiation do indeed occur in the ” accessory ” chromosomes first described by H. Henking (1891) for the spermatogonia of Pyrrhocoris, and since described for numerous other insects,

From Boveri’s Ergebnisse «. d. Konstitulitm der chromatischen Substanz des Zellkerns, by permission of Gustav Fischer.

Fig. 9. — Preparation for Mitosis, a, Spermatogonium of Brachystola magna with resting nucleus; 6, Same with prophase for mitosis. (After Sutton.)

Arachnids and Myriapods. W. Sutton’s work on the spermato- genesis of Brachystola magna is of especial interest in this con- nexion. Not only does the “accessory chromosome” in this insect form a resting nucleus independent, and obviously physio- logically differentiated from that formed from the remaining chromosomes (fig. 9, a), but the latter

are themselves differentiated by size, there being one pair of chromosomes of each size (fig. 9^ b), a point of considerable interest when we remember that half the chromosomes in each cell are necessarily derived from each parent. 3

Although this morphological differentiation among the chromosomes is undoubtedly to be regarded as indicating a corresponding physiological differentiation, it by no means

1 Boveri (1902), ” Fertilization of enucleated Echinus-egg frag- ments,” and M. Boveri (1903); by shaking the egg shortly after fertilization the sperm centrosome is prevented from dividing, and a monaster instead of a diaster results, the divided chromosomes remaining in the one nucleus.

‘ Cf . especially in this connexion Hacker’s paper fiber die Schicksale der elterlichen und grosselterlichen Kernanteile (1902).

follows that the latter need always, or even generally, be accom- panied by the former. Since, however, the specific characters of the organism must be due to the combined activity of all the chromosomes, any physiological differentiation among the latter should result in abnormal development if the full com- plement of chromosomes be not present. 3 Boveri, 4 utilizing Herbst’s method 5 for separating echinoderm blastomeres, has interpreted in this manner the abnormal development which H. Driesch 6 found almost invariably to follow the double fertilization of the sea-urchin egg. In such eggs the first cleavage spindle is four-poled. The chromosomes are half again as numerous as in normally fertilized eggs (54 instead of 36), but each is only divided once, so that in the distribution of the resulting 108 chromosomes the four daughter nuclei receive each only 27 instead of 36 (assuming the distribution to be fairly equal, which is by no means usually the case in four-poled mitosis). Driesch had already (1900) shown that any one of the first four blastomeres of a normally fertilized egg will, if isolated, develop normally.

Boveri found that in the case of the doubly fertilized egg the isolated ” f ” blastomeres develop very variously, a variability only to be accounted for by their varying chromosome equipment. Occasionally a three-poled instead of a four-poled figure resulted from double fertilization. In such cases Driesch found, as we should expect from Boveri’s interpretation, that the percentage of approximately normal larvae was considerably greater; for not only would the chances of an equal distribution of the chromosomes be much greater, but the number received by each of the three daughter cells would approximate to, or even equal, the normal.

Reduction. — In all the Metazoa the prevailing, and in the higher forms the only, method of reproduction is by the union (conjugation) of two ” sexually ” differentiated germ-cells or ” gametes “; a small motile ” microgamete ” or spermatozoon and a large yolk-laden ” macrogamete ” or ovum (see Repro-duction) . This differentiation between the germ-cells is another example of the advantages of division of labour; for while the onus of bringing about the union of the germ-cells is thrown entirely on the spermatozoon, the egg devotes itself to the accumulation of food-material (yolk) for the subsequent use of the developing embryo. Far more yolk is thus secreted than would be possible by the combined efforts of both the germ-cells had each of these at the same time to preserve its motility. The fundamental physiological difference which this division of labour has produced in the germ-cells is reflected on to, the general metabolism of the parents and underlies the sexual differentiation of the latter. 7 Beyond this, however, sexual differentiation does not go. The two germ nuclei which enter into the formation of the first mitotic figure of the developing egg are not only physiologically equivalent, but, at the time of their union in the egg, are usually morphologically identical. 8 The essence of fertilization is, therefore, the union of two germ nuclei only differing from one another in that they are derived from separate individuals. 9 Since the number of chromosomes appearing in mitosis is solely dependent on the number which

3 Each nucleus contains a duplicate set of chromosomes, the one of maternal, the other of paternal origin, and either of these sets alone suffices for development. This is clearly shown by the ex- periments of Loeb (1899) and Wilson (1901) on the artificial partheno- genesis of the sea-urchin egg; and those of O. Hertwig (1889 and 1895), Delage (1899) and Winkler (1901), on the fertilization of enucleated Echinoderm eggs (Merogony] Delage). The fact that in some forms, e.g. Ascaris megalocephala var. univalens, only one

chromosome is derived from each parent, originally led Boveri to conclude that all chromosomes must necessarily be physiologically equivalent.

4 liber mehrpolige Mitosen als Mittel zur Analyse des Zellkerns

(1902).

6 Uber das Auseinandergehen von Furchungs- und Gewebezellen in kalkfreien Medium (1900).

6 ‘ Entwicklungsmechanische Studien V.” (Zeit. fiir wiss. Z00L, Bd. lv., 1892).

7 See Geddes and Thomson, Sex, esp. pp. 127, 137 and 139.

8 The equivalence of the germ nuclei in development is shown by the experiments on the fertilization of enucleated eggs and artificial parthenogenesis already referred to.

9 O. Hertwig, 1873; but esp. van Beneden, 1883.

originally entered into the composition of the nucleus (Boveri’s Law of Chromosome-Constancy), it follows that, in the mitotic figures of the developing embryo, the chromosomes will be half maternal, half paternal in origin ; 1 the germ nuclei thus necessarily possessing only half the number of chromosomes characteristic of the ordinary tissue cells of species, i.e. the somatic number. 2 The manner in which this ” reduction ” in the number of chromosomes in the germ-cells is brought about, and the significance to be attached to the process, constitute the most hotly debated questions in cytology. In all the metazoa the phenomenon of reduction is associated with the two last and, usually, rapidly succeeding ” maturation ” divisions by which the definitive germ-cells — ova or spermatozoa — are produced. 3

Assuming the persistent individuality of the chromosomes, then there are only three conceivable methods by which this numerical reduction can be brought about (Boveri, 1904, p. 60). (1) One-half the chromosomes degenerate. (2) The chromosomes are distributed entire, half to one daughter cell, half to the other (reducing division of Weismann, 1887). (3) The chromosomes fuse in pairs (Conjugation of the Chromosomes, Boveri, 1892). The first possibility — that of an actual degeneration of a part of the chromatin originally suggested by van Beneden and adopted by August Weismann, Boveri and others, has been long abandoned, and a steadily increasing bulk of evidence is tending to prove the general, if not universal, occurrence of the second method — the distribution between the daughter cells of un- divided chromosomes. The occurrence of such a " reducing division " was postulated on theoretical grounds by Weismann (1887) 4 and by Boveri (1888); by the former as a result of his adoption of de Vries's hypothesis of self-propagating and qualita- tively varying units for the chromatin; by the latter in relation to his theory of chromosome individuality. The actual occurrence of this reducing division was first demonstrated by Henking (1891) for Pyrrhocoris, and afterwards by Hacker, vom Rath and many others, but especially by Ruckert (1894) for Cyclops (fig. 10). In this latter type the chromatin of the oocyte, as this prepares for the first maturation division, resolves itself into 1 2 (instead of 24) longitudinally split chromosomes (fig. 10, a). As these continue to thicken and contract a transverse fission appears (fig. 10, c). This is to be regarded as a belated segmenta- tion of the spireme thread, and shows that the reduction so far is only a "pseudo-reduction" (Ruckert), the chromosomes being really all present but temporally united in pairs, i.e. "bivalent" (Hacker). A striking confirmation of this inter- pretation is provided by Korschelt's description of reduction in the annelid Ophryotrocha. In this type the full somatic number of split chromosomes (here only four) appears, and these secondarily associate end to end in pairs, thus forming split " diads " {i.e.

tetrads), in every way similar to those described by Ruckert for Cyclops. In the latter type, at the first matura- tion division, the sister diads are separated from one another, an ” equating ” division thus taking place. At the second division the diads are resolved into their constituent parts, and the ” univalent ” chromosomes are distributed to the daughter

1 Hacker, ” Uber die Selbststandigkeit der vaterlichen und miitterlichen Kernbestandteile,” Arch.f. mikr. Anat. Bd. xlvi. (1896).

2 First discovered by van Beneden (1883, 1887) for the egg of Ascaris.

3 In the case of the egg the whole of the yolk stored by the ” oocyte ” (cell-generation immediately preceding the maturation divisions) is handed on to only one of the four resulting cells — an obvious economy. The three yolkless cells are necessarily function- less — abortive ova — and are known as the ” polar bodies ” (Hertwig). In spermatogenesis the maturation divisions, though bearing the same relation to reduction as in oogenesis (Platner, 1889 ; O. Hertwig, 1890), give rise to four functional germ-cells. The explanation of sexual differentiation given above, and that of polar body formation given here, render it needless to do more than mention the theories of Mimot (1877), van Beneden (1883) and others, by which “matura- tion ” was regarded as removing the ” male ” element from the otherwise ” hermaphrodite ” egg.

‘ Weismann postulated a transverse division of the chromosomes, not a distribution of entire chromosomes; but the result as far as the reduction in the number of hereditary qualities goes is the same. The inability of the mitotic mechanism to effect the transverse division of unsplit chromosomes is pointed out by Boveri (1904).

cells (reducing division). A similar process has since been described for numerous other types {e.g. various arthropods, Hacker, 1895-1898; vom Rath,

1895; and by Sutton for Brachystola, 190 2- 1903). In Ophryotrocha, as in Pyrrhocoris (Henking), Anasa (Paulmeir), Peripatus (Montgomery), &c,

6

Entwicklungsgeschichte d.

From Korschelt and Heider's Lehrbuch d. ver wirbellosen Tiere, by permission of Gustav Fischer.

Fig. 10. — Maturation Divisions, a-d, Formation of the tetrads in Cyclops. (After Ruckert.) e, 1st maturation division; separation of the bivalent sister chromosomes. /, 2nd maturation division; distribution of the univalent chromosomes.

reduction occurs at the first maturation division ("pre-reduction" of Korschelt and Heider, 1900), instead of at the second division (post-reduction) as in most Copepods and Orthoptera. In many cases the tetrads (i.e. split chromosomes associated in pairs) have the form of rings, the genesis of which was first clearly determined by vom Rath (1892) in the mole cricket Gryllotalpa (fig. n). In this form the sister diads remain united

b c

From Prof. E. B. Wilson's The Cell in Development and Inheritance, by permission of the author and of the Macmillan Co., N. Y.

Fig. 11. — Maturation Divisions. Origin of the tetrads by ring formation in the spermatogenesis of the mole-cricket (Gryllotalpa) (vom Rath), a, Primary spermatocyte with six split, bivalent chromosomes, b and c, Split has opened out. d, Concentration of the chromatin has made visible the belated transverse division. e and /, Grouping of the completed tetrads in the equatorial plate of the first maturation division.

by their ends but widely separate in the middle (fig. 11,6). As in Cyclops, the belated transverse segmentation appears as the condensation of the

chromatin proceeds (fig. 11, d), but the symmetrical tetrads which this process here produces make it impossible to determine at which of the two divisions reduction is effected. An essentially similar ring formation occurs in

Enchaeta and Calanus (vom Rath) , and in the Copepods Hetero- cope and Diaptomus (Riickert), and in other types. 1

All the above cases, in which the reduction is effected by the distribution of entire chromosomes at one or other of the maturation divisions, may be grouped together as ” pseudo- mitotic ” (Hacker, and Korschelt & Heider). In sharp contrast to the pseudomitotic method is the ” Eumitotic ” method, in which the chromosomes are longitudinally divided at both divisions. Such a method not only robs the process of any ” reducing ” value in Weismann’s sense, but is in serious conflict with the chromosome-individuality hypothesis. Never- theless it is in this sense that Boveri (1881) and van Beneden (1883-1887) described the maturation of the egg, and at a later period Brauer (1893) that of the spermatozoon, in Ascaris. In each case the tetrads are formed by the double longitudinal splitting of the chromosomes, the latter appearing in the prophase in the reduced number. Not only was the eumitotic method of Ascaris the first method to be described, but the descriptions are fully equal in point of clearness to that of Hertwig for the pseudomitotic maturation of Cyclops. 2 A similar eumitotic maturation has been described for other types also, e.g. Sagitta arid the Heteropods, but nowhere more frequently than in the Vertebrates among animals and the Phanerogams among plants. In these two latter groups the chromosomes of the reducing division only rarely have a ring form comparable to that seen in Gryllotalpa, &c. When such rings do occur their genesis is very obscure, and at no time do they present the appearance of ”

tetrads." It is the characteristic appearance these looped chromosomes give to the first maturation division in many Vertebrates, and especially in the Amphibia (fig. 12), that originally led Hemming (1887) to term this type of mitosis

b c

From O. Hertwig, AUgemeine Biologic, by permission of Gustav Fischer.

Fig. 12. — Heterotypical Mitosis. (Schematic, after Flemming.)

" heterotypical " ; the second division, lacking this peculiar appearance, being distinguished as " homotypical." Until quite recently these looped chromosomes of the heterotypical mitosis of Vertebrates (and plants) were described as arising by the opening out of longitudinally split chromosomes, exactly as this occurs in the early prophase of the maturation divisions in such types as Gryllotalpa, Diaptomus, &c. In the heterotype mitosis, however, no transverse segmentation appears, and the halves of the rings, as they separate in the first division, show an obvious longitudinal split in preparation for the second division. 3 Both divisions were thus interpreted as equating divisions. 4 The more recent works of Farmer and Moore (1903- 1905), Montgomery (1903, Amphibia), and (for plants) Stras- burger (1903-1904) have shown, however, that even for the higher plants and animals, a reducing division in Weismann's sense occurs in an essentially similar manner to that so con- vincingly described by Riickert, vom Rath and others, for

1 For an exhaustive account of reduction in Invertebrates see Korschelt and Heider, Entwicklungsgeschichte, Allgem. Teil li. (Jena, 1903).

2 Nevertheless the possibility of a pseudomitotic interpretation of maturation in Ascaris also has been maintained by O. Hertwig (1890), p. 277, Carnoy

and Boveri (1904).

3 The partial or even complete reconstruction of the nucleus between the heterotype and homotype division in Vertebrates makes it difficult to determine the identity of the split seen in the anaphase of the heterotype with that reappearing in the prophase of the homotype.

4 e.g. Moore, 1895 (Scyllium) ; Flemming, 1897; Carnoy and Lebrun, 1899 {Amphibia); McGregor, 1899; Lenhossek, 1898

' (mammals), and many others. So also for plants: Strasburger and Mottier, 1897; Dixon, 1896; Sargant, 1896–1897; Farmer and Moore, 1895; Gregoire, 1899; Guignard, 1899, &c.

Invertebrate types. For the chromosomes of the heterotype mitosis arise by the looping round, not opening out, of the bivalent chromosomes. The first division is thus a reducing division, while the split appearing in the anaphase of the hetero- type and presumably reappearing in the prophase of the homo- type is the original split of the spireme thread.

The widespread, if not universal, formation of tetrads, i.e. the temporary union in pairs of split chromosomes, in reduction, and the relation this latter process always bears to two rapidly succeeding maturation divisions — those completing the gameto- genic cycle in animals and terminating the sporophytic generation in plants, — has received a suggestive explanation at the hands of Boveri (1904). The growth of the chromatin is an indispens- able prelude to its reproduction (Boveri's Law of Proportional Growth). The chromatin is therefore incapable of undergoing reproductive fission in two successive mitotic divisions when these are not separated by a resting (i.e. growth) period. In addition to this, the " bipolar " condition of the adult chromo- somes, which determines its mode of attachment to mantle fibres from both poles of the spindle, is not possessed by the unripe chromatin.

The undivided, i.e. unripe, chromosomes are therefore incapable of utilizing the mitotic mechanism for such a transverse fission as Weismann originally postulated. The difficulty is, however, at once overcome if the unripe chromo- somes are associated in pairs in the equatorial plate, for the bivalent chromosomes so produced are bipolar just as are the adult {i.e. split) chromosomes in the ordinary and homotype mitosis. 5

Synapsis (avvimruv, to fuse together). — During the prophase of the reducing or heterotype divisions the whole of the chromatin becomes temporarily massed together at one pole of the nucleus (Moore, 1896, for Elasmobranchs). Montgomery (1901) has suggested that this is to facilitate the temporary union in pairs, or ” conjugation ” of homologous paternal and maternal chromo- somes. In Ascaris megalocephala var. univalens, where the somatic number is only two, the association must necessarily be between homologous chromosomes. The assumption that this ” selective pairing ” of equivalent chromosomes is universal is supported by the behaviour of the ” Heterochromosomes ” (Montgomery) of the Hemiptera. These chromosomes, dis- tinguished by their size, are paired before, and single after, the ” pseudoreduction ” has taken place. Even more convincing is Sutton’s account of reduction in Brachystola already referred to. 6 Boveri (1904) has suggested that this temporary association of the chromosomes — presumably facilitated by the synapsis — has a much deeper meaning than to ensure their correct dis- tribution between the daughter nuclei in the heterotype mitosis; the associated chromosomes exchanging material in a manner analogous to conjugation in Paramoecium?

Present Position of the Cell-theory. — Since the time of Schleiden and Schwann a wealth of evidence has accumulated in support of the ” cell-theory ” — the theory which regards the cell as the unit of organic structure. ” The organism consists

6 H. Henking (1899), T. Montgomery (1898) and F. C. Paulmeir (1899) describe the diverging bivalent

halves of the tetrad as being united each by two fibres with the corresponding spindle pole. At the next division, at which the diad is resolved into its constituent univalent chromosomes, the daughter chromosomes are attached to the spindle pole each by only one fibre; the two fibres now passing to opposite poles of the spindle being the same fibres which, in the preceding mitosis, were attached to one and the same pole.

6 Reference may be here made to Rosenberg's description (1904) of the heterotype mitosis in Drosera hybrids. In the one parent (D. rotundifolia) the somatic number is 20, in the other {D. longifolia) 10; while the hybrid itself has a somatic number of 30. The reduced number in the hybrid, however, is not 15 but 20. Of these 10 are large and 10 small, the latter presumably representing the supernumerary, and hence unpaired, chromosomes of the D. rotundi- folia parent.

7 In their 1905 paper J. B. Farmer and J. E. S. Moore describe two successive synaptic stages {e.g. Elasmobranchs), the first during the contraction of the spireme thread, the second during the looping up of the bivalent segments. (In this paper the authors suggest the term " Meiosis " or " Meiotic phase " for the nuclear changes accompanying the two maturation divisions in plants and animals (neioio- Ls, reduction).

morphologically, of cells, and subsists, physiologically, by means of the ' reciprocal action ' of the cells," — this was the cell stand- point of Schleiden and Schwann, and it is no exaggeration to say that this same conception has dominated the cell-theory almost to the present day. 1 The frequently striking correlation between cell-division and cell-differentiation in development has caused this process to be regarded as dependent on cell-division, while a wholly exaggerated importance

has been attached to the distinction between "unicellular" and "multicellular" organ- isms — between " intercellular " and " intracellular " organs. The influence of the " cells " upon one another, the subordination of the cell's growth, division and differentiation, to the require- ments of the whole organism — seen in normal growth, but nowhere more strikingly than in development and regeneration, — is, however, very difficult of explanation in terms of the cell- theory as this was, until quite recently, generally understood. The very elaborate regional differentiation of the protoplasm often seen in the Protozoa sufficiently indicate that multi- cellular structure is no essential condition for complex regional differentiation. That the regional differentiation of the proto- plasm in the Metazoa should usually correspond with cell-limits is scarcely surprising. Nor is it to be wondered at that, with so convenient a mechanism for segregation to hand as cell-division, the progressive differentiation seen during development should often appear to go hand in hand with this process. In recent years, however, evidence has been steadily accumulating to show that this association between cell-division and regional dif- ferentiation of the protoplasm in development is a casual one — as casual, and as natural, as the correspondence between cell limits and regional differentiation in the formed tissues. The fact that the regional differentiation may be foreshadowed in the egg before cleavage begins, 2 — that as Driesch has shown, the mode of cleavage may be artificially altered without affecting the ultimate organization of the embryo, — and many other similar observations, tend to emphasize the importance of the " organism " standpoint (C. O. Whitman, 1903, p. 642) in contradistinction to the widely prevalent "cell" standpoint. The occurrence of syncytial organs and organisms, and the increasing frequency with which protoplasmic continuity is being demonstrated between all kinds of cells, are facts tending in the same direction. In the plant kingdom the growth of the mass has been recognized as the primary factor in development; 3 die Pflanse bildet

Zellen, nicht die Zelle bildet Pflanzen (de Bary). For the animal kingdom this ” Inadequacy of the Cell-Theory of Development ” has been maintained amongst others by Whitman, 4 and by Adam Sedgwick. 5 The latter author, mainly as the result of work on the development of Peripatus and of Elasmobranch embryos, regards the developing embryo as a continuous protoplasmic reticulum, for the nuclei of which the limiting epithelial layers constitute as it were a breeding ground. Differentiation is a regional specialization of this nucleated meshwork, and is not to be regarded as the result of the proliferation and subsequent specialization of cells pre- destined by cleavage for this end.

. It is possible to suggest a mechanico-physical explanation of multicellular structure which will deprive the cell of much of its assumed significance as a unit of organization. The fact that surface area becomes relatively less extensive as bulk increases would alone set a limit to the size of ” unicellular ” organisms; for not only is there a constant reaction between nucleus and cytoplasm through the nuclear membrane, but the surface of the cell serves both for the intake of food and the elimination of waste material. In addition to the limit thus imposed upon the cytoplasmic area which can be effectually controlled by the nucleus, and the necessity for a minimum surface area to the protoplasmic mass, the advantages of the more or less complete

1 Whitman, Jour. Morph., 1903.

‘This “Precocious segregation” (Lankester, 1877) is well seen in the eggs of many Ctenophorae, Annelids, Gastropods and Nema- todes. See the papers by Lillie (1901), Conklin (1902), &c., and especially Wilson on ” Dentalium,” Journ. of Exp. Zool., No. I, 1904.

- *Hofmeister, de Bary, Sachs, &c. ‘ * Loc. oil.*

6 Quart. Journ. Micro. Science, 1894, vol. xxxvii.

subdivision of the living substance into — as far as

their meta- bolism is concerned — semi-autonomous units, is indicated by the mechanical support derived from the specialized cell walls and turgescent cells of the plant, and the intercellular secretions of the animal tissues. It is more than possible that these two conditions — i.e. surface area for diffusion, and mechanical support — are alone responsible for the origin of multicellular structure, and that the sharply defined character this now so generally possesses has been secondarily acquired as a result of the facilities it undoubtedly offers for regional specialization in the protoplasmic mass.

Bibliography. — The special literature of cytology has grown to large dimensions. The following, are the more important text- books and papers of general interest: E. B. Wilson, The Cell in Development and Inheritance (2nd ed., 1900); A. Gurwitsch, Morphologie und Biologie der Zelle (Jena, 1904); O. Hertwig, Allge- meine Biologie (Jena, 1906); Korschelt and Heider, Lehrbuch der vergl. Entwicklungsgeschichte der wirbellosen Tiere, Allgem. Teil, "The Germ Cells and Experimental Embryology" (Jena, 1903); Whitman, " The Inadequacy of the Cell Theory of Development," Journ. Morph. viii., 1893; Adam Sedgwick, "On the Inadequacy of the Cellular Theory of Development," Quart. Journ. Micro. Science, xxxvii. ; G. C. Bourne, " A Criticism of the Cell Theory " (an answer to Sedgwick's paper), Quart. Journ. Micro. Science, xxxviii.; Th. Boveri, " Befruchtung," Merkel-Bonnets Ergebnisse der Anat. u. Entwicklungsgesch. Bd. i. (1892), Das Problem der Befruchtung (Jena, 1902), Ergebnisse iiber die Konstitution der chromatischen Substanz des Zellkerns (Jena, 1904) ; J. Riickert, " Die Chromatinreduktion bei der Reifung der Sexualzellen," Merkel- Bonnets Ergebnisse, Bd. iii. (1894) ; V. Hacker, " Die Reifungs- erscheinungen," Ergebn. Anat. u. Entwicklungsgesch. Bd. viii. (1898) ; F. Meves, " Zellteilung," Merkel-Bonnets Ergebnisse, Bd. viii. (1898, 1899); W. Waldeyer, "Die Geschlechtszellen," in O. Hertwig's Handbuch der vergleich. u. experiment. Entwicklungslehre d.

Wirbeltiere (1901,1903). (G. C. C.)

CYZICENUS, the architectural term given by Vitruvius to the large hall, used by the Greeks, which faced the north, with a prospect towards the gardens; the windows of this hall opened down to the ground, so that the green verdure could be seen by those lying on the couches.

CYZICUS, an ancient town of Mysia in Asia Minor, situated on the shoreward side of the present peninsula of Kapu-Dagh (Arctonnesus), which is said to have been originally an island in the Sea of Marmora, and to have been artificially connected with the mainland in historic times. It was, according to tradi- tion, occupied by Thessalian settlers at the coming of the Argonauts, and in 756 B.C. the town was founded by Greeks from Miletus. Owing to its advantageous position it speedily acquired commercial importance, and the gold staters of Cyzicus were a staple currency in the ancient world till they were super- seded by those of Philip of Macedon. During the Peloponnesian War (431-404 B.C.) Cyzicus was subject to the Athenians and Lacedaemonians alternately, and at the peace of Antalcidas (387 B.C.), like the other Greek cities in Asia, it was made over to Persia. The history of the town in Hellenistic times is closely connected with that of the dynasts of Pergamum, with whose extinction it came into direct relations with Rome. Cyzicus was held for the Romans against Mithradates in 74 B.C. till the siege was raised by Lucullus: the loyalty of the city was rewarded by an extension of territory and other privileges. Still a flourishing centre in Imperial times, the place appears to have been ruined by a series of earthquakes — the last in a.d. 1063 — and the population was transferred to Artaki at least as early as the 13 th century, when the peninsula was occupied by the Crusaders. The site is now known as Bal-Kiz (IlaXaio Kvfiras?) and entirely uninhabited, though under cultivation. The principal extant ruins are: — the walls, which are traceable for nearly their whole extent, a picturesque amphitheatre intersected by a stream, and the substructures of

the temple of Hadrian. Of this magnificent building, sometimes ranked among the seven wonders of the ancient world, thirty-one immense columns still stood erect in 1444. These have since been carried away piece- meal for building purposes by the Turks.

See J. Marquardt, Cyzicus (Berlin, 1830) ; G. Perrot, Exploration de la Galatie (Paris, 1862); F. W. Hasluck and A. E. Henderson in Journal of Hellenic Studies (1904), 135-143. (F. W. Ha.)

CZARNIECKI, STEPHEN (1599-1665), Polish general, learnt the science of war under Stanislaw Koniecpolski in the Prussian campaigns against Gustavus Adolphus (1626-1629), and under Wladislaus IV. in the Muscovite campaign of 1633. On the 15th of April 1648 he was one of the many noble Polish prisoners who fell into the hands of Chmielnicki at the battle of " Yellow Waters," and was sent in chains to the Crimea, whence he was ransomed in 1649. He took an active part in all the subsequent wars with the Cossacks and received more disfiguring wounds than any other commander. When Charles X. of Sweden in- vaded Poland in 1655, Czarniecki distinguished himself by his heroic defence of Cracow, which he only surrendered under the most honourable conditions. His energy and ability as a leader of guerillas hampered Charles X. at every step, and though frequently worsted he from time to time inflicted serious defeats upon the Swedes, notably at Jaroslaw and at Kozienice in 1656. Under his direction the popular rising against the invader ulti- mately proved triumphant. It was he who brought King John Casimir back from exile and enabled him to regain his lost kingdom. It was against his advice that the great battle of Warsaw was fought, and his subsequent strategy neutralized the ill effects of that national disaster. On the retirement of the Swedes from Cracow and Warsaw, and the conclusion of the treaty of Copenhagen with the Danes, he commanded the army corps sent to drive the

troops of Charles X. out of Jutland and greatly contributed to the ultimate success of the Allies. On the conclusion of the Peace of Oliva, which adjusted the long outstanding differences between Poland and Sweden, Czarniecki was transferred to the eastern frontier where the war with Muscovy was still raging. In the campaign of 1660 he won the victories of Polonka and Lachowicza and penetrated to the heart of the enemy's country. The diet of 1661 publicly thanked him for his services; the king heaped honours and riches upon him, and in 1665 he was appointed acting commander-in-chief of Poland, but died a few days after receiving this supreme distinction. By his wife Sophia Kobierzycka he left two daughters. Czarniecki is rightly regarded as one of the most famous of heroic Poland's great captains, and to him belongs the chief merit of extricating her from the difficulties which threatened to overwhelm her during the disastrous reign of John Casimir. Czarniecki raised partisan-warfare to the dignity of a science, and by his ubiquity and tenacity demoralized and exhausted the regular armies to which he was generally opposed.

See Ludwik Jenike, Stephen Czarniecki (Pol.) (Warsaw, 1891); Michal Dymitr Krajewski, History of Stephen Czarniecki (Pol.), (Cracow, 1859).

CZARTORYSKI, ADAM GEORGE, Prince (1770-1861), Polish statesman, was the son of Prince Adam Casimir Czartoryski and Isabella Fleming. After a careful education at home by eminent specialists, mostly Frenchmen, 1 he first went abroad in 1786. At Gotha he heard Goethe read his Iphigenie auf Tauris, and made the acquaintance of the dignified Herder and " fat little Wieland." In 1789 he visited England with his mother, and was present at the trial of Warren Hastings. On a second visit in 1793 he made many acquaintances among the English aristocracy and studied the English constitution. In the interval between these visits he fought for his country during the war of the second partition, and would subsequently have served under Kosciuszko also had he not been arrested on his way to Poland at Brussels by the Austrian government. After the

third, partition the estates of the Czartoryskis were confiscated, and in May 1795 Adam and his younger brother Constantine were summoned to St Petersburg; later in the year they were commanded to enter the Russian service, Adam becoming an officer in the horse, and Constantine in the foot guards. Catherine was so favourably impressed by the youths that she restored them part of their estates, and in the beginning of 1796 made them gentlemen in waiting. Adam had already met the grand duke Alexander at a ball at the princess Golitsuin's, and the youths at once conceived a strong " intellectual friend- ship " for each other. On the accession of the emperor Paul,

1 Among them was the famous democrat Dupont de Nemours.

Czartoryski was appointed adjutant to Alexander, now Cesarevich, and was permitted to revisit his Polish estates for three months. At this time the tone of the Russian court was extremely liberal, humanitarian enthusiasts like Peter Volkonsky and Nikolai Novosiltsov possessing great influence.

Throughout the reign of Paul, Czartoryski was in high favour and on terms of the closest intimacy with the emperor, who in December 1798 appointed him ambassador to the court of Sardinia. On reaching Italy Czartoryski found that the monarch to whom he was accredited was a king without a kingdom, so that the outcome of his first diplomatic mission was a pleasant tour through Italy to Naples, the acquisition of the Italian language, and a careful exploration of the antiquities of Rome. In the spring of 1801 the new emperor Alexander summoned his friend back to St Petersburg. Czartoryski found the tsar still suffering from remorse at his father's assassination, and incapable of doing anything but talk religion and politics to a small circle of private friends. To all remonstrances he only replied " There's plenty of time." The senate did most of the current business; Peter Vasilevich Zavadovsky, a pupil of the Jesuits, was minister of education. Alexander appointed Czartoryski curator

of the academy of Vilna (April 3, 1803) that he might give full play to his advanced ideas. He was unable, however, to give much attention to education, for from the beginning of 1804, as adjunct of foreign affairs, he had the practical control of Russian diplomacy. His first act was to protest energetically against the murder of the due d'Enghien (March 20, 1804), and insist on an immediate rupture with France. On the 7th of June the French minister Hedouville quitted St Petersburg; and on the nth of August a note dictated by Czartoryski to Alexander was sent to the Russian minister in London, urging the formation of an anti-French coalition. It was Czartoryski also who framed the Convention of the 6th of November 1804, whereby Russia agreed to put 115,000 and Austria 235,000 men in the field against Napoleon. Finally, on the nth of April 1805 he signed an offensive-defensive alliance with England. But his most striking ministerial act was a memorial written in 1805, but otherwise undated, which aimed at transforming the whole map of Europe. In brief it amounted to this. Austria and Prussia were to divide Germany between them. Russia was to acquire the Dardanelles, the Sea of Marmora, the Bosphorus with Constantinople, and Corfu. Austria was to have Bosnia, Wallachia and Ragusa. Montenegro, enlarged by Mostar and the Ionian Islands, was to form a separate state. England and Russia together were to maintain the equilibrium of the world. In return for their acquisitions in Germany, Austria and Prussia were to consent to the erection of an autonomous Polish state extending from Danzig to the sources of the Vistula, under the protection of Russia. Fantastic as it was in some particulars, this project was partly realized 2 in more recent times, and it presented the best guarantee for the independent existence of Poland which had never been able to govern itself. But in the meantime Austria had come to an understanding with England as to subsidies, and war had begun.

In 1805 Czartoryski accompanied Alexander both to Berlin and Olmiitz as chief minister. He regarded

the Berlin visit as a blunder, chiefly owing to his profound distrust of Prussia; but Alexander ignored his representations, and in February 1807 he lost favour and was superseded by Andrei Eberhard Budberg. But though no longer a minister Czartoryski continued to enjoy Alexander's confidence in private, and in 1810 the emperor candidly admitted to Czartoryski that his policy in 1805 had been erroneous and he had not made a proper use of his opportunities. The same year Czartoryski quitted St Petersburg for ever; but the personal relations between him and Alexander were never better. The friends met again at Kalisch shortly before the signature of the Russo-Prussian alliance of the 20th of February 1813, and Czartoryski was in the emperor's suite at Paris in 1814, and rendered his sovereign material services at the congress of Vienna.

On the erection of the congressional kingdom of Poland

! e.g. Austria obtained Bosnia, and Montenegro has been enlarged.

every one thought that Czartoryski, who more than any other man had prepared the way for it, would be its first governor- general, but he was content with the title of senator-palatine and a share in the administration. In 1817 the prince married Anna Sapiezanko, the wedding leading to a duel with his rival Pac. On the death of his father in 1823 he retired to his ancestral castle at Pulawy; but the Revolution of 1830 brought him back to public life. As president of the provisional government he summoned (Dec. 18th, 1830) the Diet of 1831, and after the termination of Chlopicki's dictatorship was elected chief of the supreme council by 121 out of 138 votes (January 30th). On the 1 6th of September his disapproval of the popular excesses at Warsaw caused him to quit the government after

sacrificing half his fortune to the national cause; but it must be admitted that throughout the insurrection he did not act up to his great reputation. Yet the energy of the sexagenarian statesman was wonderful. On the 23rd of August he joined Girolano Ramorino's army-corps as a volunteer, and subsequently formed a confederation of the three southern provinces of Kalisch, Sandomir and Cracow. At the end of the war he emigrated to France, where he resided during the last thirty years of his life. He died at his country residence at Montfermeil, near Meaux, on the 15th of July 1861. He left two sons, Witold (1824- 1865), and Wladyslaus (1828-1894), and a daughter Isabella, who married Jan Dzialynski in 1857. The principal works of Czartoryski are Essai sur la diplomatic (Marseilles, 1830); Life of J. U. Niemcewiez (Pol). (Paris, i860); Alexander T. et Czartoryski: correspondance . . . et conversations (1801-1823) (Paris, 1865) ; Memoires et correspondance avec Alex. I., with preface by C. de Mazade, 2 vols. (Paris, 1887); an English translation Memoirs of Czartoryski, &c, edited by A. Gielguch, with documents relating to his negotiations with Pitt, and conversations with Palmerston in 1832 (2 vols., London, 1888).

See Bronislaw Zaleski, Life of Adam Czartoryski (Pol.) (Paris, 1881); Lubomir Gadou, Prince Adam Czartoryski (Pol.) (Cracow, 1892); Ludovik Debicki, Pulawy, vol. iv.; Lubomir Gadon, Prince Adam Czartoryski during the Insurrection of November (Pol.) (Cracow, 1900). (R. N. B.)

CZARTORYSKI, FRYDERYK MICHAL, Prince (1696-1775), Polish statesman, was born in 1696. Of small means and no position, he owed his elevation in the world to extraordinary ability, directed by an energetic but patriotic ambition. After a careful education on the best French models, which he com- pleted at Paris, Florence and Rome, he attached himself to the court of Dresden, and through the influence of Count Fleming, the leading minister there, obtained the vice-chancellorship of Lithuania and many other dignities. Czartoryski was one of the many Polish

nobles who, when Augustus II. was seriously ill at Bialy vostok in 1727, signed the secret declaration guaranteeing the Polish succession to his son; but this did not prevent him from repudiating his obligations when Stanislaus Leszczynski was placed upon the throne by the influence of France in 1733- When Stanislaus abdicated in 1735 Czartoryski voted for Augustus III. (of Saxony), who gladly employed him and his family to counteract the influence of the irreconcilable Potokis. For the next forty years Czartoryski was certainly the leading Polish statesman. In foreign affairs he was the first to favour an alliance with Russia, Austria and England, as opposed to France and Prussia— a system difficult to sustain and not always beneficial to Poland or Saxony. In Poland Czartoryski was at the head of the party of reform. His palace was the place where the most promising young gentlemen of the day were educated and sent abroad that they might return as his coadjutors in the great work. His plan aimed at the restoration of the royal prerogative and the abolition of the liberum veto, an abuse that made any durable improvement impossible. These patriotic endeavours made the Czartoryskis very unpopular with the ignorant szlachta, but for many years they had the firm and constant support of the Saxon court, especially after Briihl succeeded Fleming.

Czartoryski reached the height of his power in 1752 when he was entrusted with the great seal of Lithuania;. but, after that

date the influence of his rival Mniszek began to prevail at Dresden, whereupon Czartoryski sought a reconciliation with his political opponents at home and foreign support both in England and Russia. In 1755 he sent his nephew Stanislaus Poniatowski to St Petersburg as Saxon minister, a mission which failed completely. Czartoryski's philo-Russian policy had by this time estranged Briihl, but he frustrated all the plans of the Saxon court by dissolving the diets of 1760, 1761 and 1762. In 1763 he went a step farther and proposed the dethronement of Augustus III., who died the same year. During the ensuing interregnum the prince chancellor laboured night and

day at the convocation diet of 1764 to reform the constitution, and it was with displeasure that he saw his incompetent nephew Stanislaus finally elected king in 1765. But though disgusted with the weakness of the king and obliged to abandon at last all hope of the amelioration of his country, Czartoryski continued to hold office till the last; and as chancellor of Lithuania he sealed all the partition treaties. He died in the full possession of his faculties and was considered by the Russian minister Repnin " the soundest head in the kingdom." It is a mistake, however, to regard Czartoryski as the sole reforming statesman of his day, and despite his great services there were occasions when the partisan in him got the better of the statesman. His foreign policy, moreover, was very vacillating, and he changed his " system " more frequently perhaps than any contemporary diplomatist. But when all is said he must remain one of the noblest names in Polish history.

See the Correspondence of Czartoryski in the Collections of the Russian Historical Society, vols. 7, 10, 13, 48, 51, 67 (St Petersburg, 1890, &c.) ; Wladyslaw Tadeusz Kisielewski, Reforms of the Czar-torysccy (Pol.) (Sambor, 1 880) ; Adalbert Roepell, Poten um die Mitte des XVIII. Jahrhunderts (Gotha, 1876); Jacques Victor Albert de Broglie, Le Secret du roi (Paris, 1878) ; Antoni Waliszewki, The Potoccy and the Czartorysccy (Pol.) ; Carl Heinrich Heyking, vIms polens und Kurlands letzten Tagen (Berlin, 1897) ; Ludwik Denbicki, Pulawy (Pol.) (Lemberg, 1887–1888). (R. N. B.)

CZECH (in Bohemian, Cech), a name which signifies an inhabitant of Cechy, the native designation of Bohemia. The Czechs belong to the Slavic race, and according to the usually accepted division they form, together with the Poles and the almost extinct Lusatians, the group of the Western Slavs. Speaking generally, it can be said that the Czechs inhabit a large part of Bohemia, a yet larger part of Moravia, parts of Silesia— both Austrian and Prussian — and extensive districts in northern Hungary. In the 19th century the Czechs of Hungary — much to their own

detriment— developed a written language that differs slightly from that used in Bohemia, but as regards their race they are identical with the Bohemians and Moravians. Beyond the borders of this continuous territory there are many Czechs in Lower Austria. Vienna in particular has a large and increasing Czech population. There are also numerous Czechs in Russia, particularly Volhynia, in the United States — where a large num- ber of newspapers and periodicals are published in the Czech language — and in London. Though the statistics are very uncertain and untrustworthy, it can be stated that the Czechs number about eight millions.

The period at which the Czechs settled in Bohemia is very uncertain; all theories, indeed, with regard to the advent of the Slavs in northern and eastern Europe are merely conjectural. It was formerly generally accepted as a fact that all Bohemia was originally inhabited by Celtic tribes, who were succeeded by the Germanic Marcomanni, and later by the Slavic Czechs. According to a very ancient tradition reproduced in the book of Gosmas, the earliest Bohemian chronicler, the Czechs arrived in Bohemia led by their eponymous chief Cechus, and first settled on the Rip Hill (Georgberg) near Roudnice. It is a strange proof of the intense obscurity of the earliest Bohemian history that Cosmas, writing at the beginning of the 12th century, is already unaware of the existence of pre-Slavic inhabitants of Bohemia It is historically certain that the Czechs inhabited parts of Bohemia as early as the 6th century. In the absence of all historical evidence, modern Czech scholars have endeavoured by other means to throw some light on the earliest period of the

Czechs. By craniological studies and a thorough examination of the fields where the dead were burnt (in Czech zdrove pole), still found in some parts of Bohemia, they have arrived at the conclusion that

parts of the country were inhabited by Czechs, or at least by Slavs, long before the Christian era, perhaps about the year 500 B.C.

It is certain that the Slavs at the time when they first appeared in history had a common language, known as the ancient Slavic (praslovansky) language. When in the course of time the Slavs occupied various countries, which were often widely apart, different dialects arose among them, many of which were influenced by the language of the neighbouring non-Slavic populations. Thus the Czech language from an early period absorbed many German words. It is probable that the develop- ment of the Czech language as an independent one, was very gradual. Existent documents, such as the hymn to St Wenceslas, which belongs to the second half of the 10th century, are written partly in old-Slavic, partly in Czech. When the Slavs first occupied Bohemia, they were probably divided into several tribes, of which the Czechs, who inhabited Prague and the country surrounding it, were the most powerful. It is probable that these smaller tribes were only gradually subdued by the Czechs and that some of them had previously to their absorp- tion adopted special dialects. The Netolice, Lucane, Psovane, Sedlcane appear to have been among the more important tribes who were forced to acknowledge the supremacy of the Czechs, and it may be conjectured that their language for a time differed slightly from that of their conquerors. The Czech language has, like all Slavic ones, a strong tendency to develop dialects; this was the case at the time of its first appearance as an inde- pendent language, and has to a certain extent continued up to the present day. The dialects of Moravia and the northern districts of Hungary still show variations from the generally accepted forms of the Czech language, though since the founda- tion of the Czech university of Prague this — at least among the educated classes — is no longer 'true to the same extent as it formerly was. The Czech language at the time of its formation naturally remained closest to those other Slav-speaking countries which were

geographically its neighbours, the Poles and the Lusatians, and it may be said that this is still the case. The Czech language at the time when in the 12th and 13th centuries it first appears as a separate and distinct one, differed consider- ably from that of the present day. Ancient Czech had several diphthongs, such as: ia, ie, iu, uo and au, that are unknown to the present language. The letter ” / ” had a threefold sound, and besides the letters b, p, m, v, the softer forms b’, p’, tri , v’, were also in existence. The letter g (as in other Slavic languages) was often used where modern Czechs employ the letter h. Ancient Bohemian had three numbers, the singular, plural and dual; of the dual only scant vestiges remain in modern Czech.

Once it had obtained its independence, the Czech language developed rapidly, and the philosophical and theological writings of Thomas of Stitny (1331-1401) proved that it could already be used even for dealing with the most abstract subjects, though Stitny- was blamed by the monks for not writing in Latin, as was then customary. The Czech language is greatly indebted also to John Hus, whose best and most original works were written in the language of his country. Hus showed great interest in the orthography and grammar of his language, and has devoted an interesting treatise entitled ” Orihographia bohemica ” to it. ‘ As already mentioned, the Czech language had sprung from diverse dialects, and Hus endeavoured to establish uniformity. To the Bohemian reformer is also due the system of so-called diacritic marks — such as c, u, y — which with some modifications are still in use. 1 The Latin characters which were in the earliest times, as again at the present day, used when writing Czech, are quite unable to reproduce some sounds peculiar to Slavic languages. This was remedied by the introduction of these marks, and Hus’s system of orthography became known as the diacritic one. The Bohemian reformer,

1 For the pronunciation of these see the footnote at the beginning of the article Bohemia.

zealous for the purity of the language of his country, often in his sermons inveighed quaintly and vehemently against those who defiled the Czech language by introducing numerous ” German- isms.” A century later the Czech language was largely indebted to the then recently founded community of the Bohemian (or as they were also often called, Moravian) brethren. A member of the community. Brother John Blakoslav, wrote in 1571 a Grammatika Ceskd, that still has considerable philological interest. It contains a full account of the construction of the Czech language, based on Latin grammar, with which the writer was thoroughly acquainted. Divines belonging to the same com- munity also at the end of the 16th century published at Kralice in Moravia a complete Czech version of the Old and New Testa- ments. Together with the Labyrint Sv£ta (Labyrinth of the World) of Komensky (Comenius), who was also a member of the brotherhood, it can be considered a model of the Czech language in the period immediately preceding its downfall.

The Czechs have always enthusiastically upheld the language of their country. In ancient Czech, indeed, the same word jazyk denotes both ” nation ” and ” language.” As late as in 1608 a decree of the estates of Bohemia declared that Czech was the only official and recognized state-language, and that all who wished to acquire citizenship in the country should be obliged to acquire the knowledge of it. While all patriots thus supported the national language, it was greatly disliked by the absolutists who were opposed to the ancient free constitution of Bohemia, as well as by all who favoured the Church of Rome. The over- throw of Bohemian independence at the battle of the White Mountain (1620) was therefore shortly followed by the decline of the Czech language. All Czech writings which could be found were destroyed by the Austrian authorities as being tainted with heresy, while no new books written in Czech appeared, except occasional prayer- books and almanacs. For these scanty writings the German so-called ” Schwabach ” characters were used,

and this custom only ceased in the middle of the 19th century. The Czech language, for some time entirely excluded from the schools, all but ceased to be written, and its revival at the beginning of the 19th century was almost a resurrection.

The first originator of the movement, Joseph Dobrovsky or Doubravsky- (1753-1829) seems himself, at least at the beginning of his life, to have considered it impossible that Czech should again become a widely-spoken language, and one whose literature could successfully compete with that of larger countries. Yet it was the works of this "patriarch of Slavic philology" which first drew the public attention to the half -forgotten Czech language. Dobrovsky's work was afterwards continued by Kolar, Jungmann, Palacky, Safafek, and many others, and Czech literature has, both as regards its value and its extension, reached a height that in the middle of the 19th century would have appeared incredible.

. Though met by constant opposition on the part of the Austrian authorities, the Czechs have succeeded in re-establishing the use of their language in many of the lower and middle schools of Bohemia and Moravia, and the foundation of a Czech university at Prague (1882-1884) has of course contributed very largely to the ever-increasing expansion of the Czech language. The national language has at all times appeared to the Bohemians as the palladium of their nationality and independence, and the movement in favour of the revival of the Czech language necessarily became a political one, as soon as circumstances permitted. The friends of the national language at the beginning of the 19th century were generally known as the vlastenci (patriots), but when in 1848 representatives of many parts of Austria met at Vienna, the deputies of Bohemia — with the exception of the Germans — formed what was called the national or Czech party. Parliamentary government did not at that period long survive, and at the end of the year 1851 absolutism had been re-established. In i860 a new attempt to establish constitutional government in Austria was made, and

repre- sentatives of the Czech party appeared at the provincial diet of Prague and the central parliament at Vienna. The Czech party endeavoured to obtain the re-establishment of the ancient

Bohemian constitution, but, allied as they were with a large part of the Bohemian nobility, it was their policy to maintain a somewhat conservative attitude. After having absented themselves for a considerable time from the parliament of Vienna, the legality of which they denied, the Czech deputies reappeared in Vienna in 1879, and, together with the repre- sentatives of the Bohemian nobility, formed there what was known as the Cesky Klub.

While the Czechs for a time continued united at Vienna, a schism among them had some time previously occurred at Prague. Dissatisfied with the policy of the Czechs, a new party had been formed in Bohemia which affected more advanced views and became known as the " Young Czech " party. The more conservative Czechs were henceforth known as the " Old Czechs." The " Young Czechs," when the party first became independent in 1872, had thirty-five representatives in the diet of Prague, but at the elections of 1874 their number was reduced to seven. They continued, however, to gain in strength, and obtained for a long time a large majority in the diet, while the Old Czech party for a considerable period almost disappeared. In Vienna also the Old Czech party gradually lost ground. Its leader Dr Rieger, indeed, obtained for the Czechs certain con- cessions which, underrated at the time, have since proved by no means valueless. The decision of the Old Czech party to take part at a conference in Vienna under the presidency of Count Taafe — then Austrian prime- minister — which was to settle the national differences in Bohemia, caused its complete downfall. The proposals of the Vienna conference were rejected with indignation, and the Old Czechs, having become very unpopular, for a time ceased to

contest the elections for the legislative assemblies of Prague and Vienna. The victorious Young Czechs, however, soon proved themselves very unskilful politicians. After very unsuccessfully assuming for a short time an attitude of intransigeant opposition, they soon became subservient to the government of Vienna to an extent which the Old Czechs had never ventured. Dr Kramaf, in particular, as leader of the Young Czech party, supported the foreign policy of Austria even when its tendency was most hostile to the interests of Bohemia. The Vienna government has, in recent years, as regards internal affairs, also adopted a policy very unfavourable to the Czech race. Even the continuance of some of the con- cessions formerly obtained by the Old Czechs has become doubt- ful. At the elections to the diet of Prague which took place in March 1908, the Young Czechs lost many seats to the Old Czechs, while the Agrarians, Clericals and Radicals were also successful.

See J. Dobrovsk^, Geschichte der bohmischen Sprache (1818), and Lehrgebdude der bohmischen Sprache (1819); J. Blahoslav, Gram- matika Ceskd, printed from MS. (1867); Lippert, Social Geschichte Bohmens (1896); Gebauer, Slovnik Starocesky (Dictionary of the ancient Czech language, 1903) ; I. Herzer, Bohmisch-deutsches Worterbuch (Prague, 1901, &c.); Coufal and Zaba, Slovnik Cesko-‘ latinsky’ a Latinsko-lesk^ (Prague, 1904, &c), and Historicka Uluonice Jazyka ieskeha (Historical grammar of the Czech language, 1904) ; Morfill, Grammar of the Bohemian or Cech Language (1899) ; Bourlier, Les Tchiques (1897). (L-)

CZENSTOCHOWA, or Chenstokhov, a town of Russian Poland, in the government of Piotrkow, on the left bank of the Warta (Warthe), 143 ffi. S.W. of Warsaw, on the railway between that city and Cracow. Pop. (1900) 53,650. Here is a celebrated monastery crowning the steep eminence called Yaznagora or Klarenberg. It was founded by King Vladislaus of the house of Jagiello and was at one time fabulously wealthy. In 1430 it was attacked and plundered by the Hussites; in 1655, and again in 1705, it bravely

resisted the Swedes; but in 1772 it was forced to capitulate to the Russians, and in 1793 to the Prussians. The fortifications, which had been built from 1500 onwards, were razed in 18 13. This monastery, which is occupied by monks of the order of Paul the Hermit, contains over the altar in its church a painted image of the Virgin, traditionally believed to have been painted by St Luke,, and visited annually by throngs (400,000) of pilgrims from all over Russia, eastern Prussia and other neighbouring regions. The inhabitants of

the town manufacture cotton, cloth and paper, and do a lively business in rosaries, images, scapularies and so forth.

CZERNOWITZ (Rum. Cernautzi), the capital of the Austrian duchy of Bukovina, 420 m. E. of Vienna and 164 m. S.E. of Lemberg by rail. Pop. (1900) 69,619. It is picturesquely situated on a height above the right bank of the river Pruth, which is crossed here by two bridges, of which one is a railway bridge. Czernowitz is a clean, pleasant town of recent date, and is the seat of the Greek Orthodox archbishop or metropolitan of Bukovina. The principal buildings include the Greek Orthodox cathedral, finished in 1864 after the model of the church of St Isaac at St Petersburg; the Armenian church, in a mixed Gothic and Renaissance style, consecrated in 1875; a handsome new Jesuit church, and a new synagogue in Moorish style, built in 1877. The most conspicuous building of the town is the Episcopal palace, in Byzantine style, built in 1864–1875, which is adorned with a high tower and possesses a magnificent reception hall. In one of the public squares stands the Austrian monument, executed by Pekary and erected in 1875 to com- memorate the centenary of Austria's possession of Bukovina. It consists of a marble statue of Austria erected on a pedestal of green Carpathian sandstone. The Francis Joseph University, also opened in 1875, had 50 lecturers and over 500 students in 1 90 1. The language of instruction is German, and it possesses three faculties: theology, law and philosophy. The industry is not very developed and consists chiefly

in corn-milling and brewing. An active trade is carried on in agricultural produce, wood, wool, cattle and spirits. Czernowitz has a mixed population, which consists of Germans, Ruthenians, Rumanians, Poles, Jews, Armenians and Gypsies. The town presents, therefore, a cosmopolitan and on market days a very varied appearance, when side by side with people turned out in the latest fashions from Paris or Vienna, we meet peasants of various nationalities, attired in their national costume, intermingled with very scantily- clad Gypsies.

On the opposite bank of the Pruth, at a very little distance to the N., is situated the town of Sadagora (pop. 4512, mostly Jews), where a famous cattle fair takes place every year.

Czernowitz was at the time of the Austrian occupation (1775) an unimportant village. It was created a town in 1 786, and at the beginning of the 19th century it numbered only 5000 inhabitants.

CZERNY, KARL (1791-1857), Austrian pianist and composer, was born at Vienna on the 21st of February 1791. His father, who was a teacher of the piano, trained him for that instrument from an early age with such success that he performed in public at the age of nine, and commenced his own career as a teacher at fourteen. He was brought under the notice of Beethoven, and was his pupil in the sense in which the great master had pupils. It is perhaps his greatest claim to distinction as a performer that he was selected to be the first to play Beethoven's celebrated Emperor concerto in public. He soon became the most popular teacher of his instrument in a capital which abounded in pianists of the first rank. Among his pupils he numbered Liszt, Theodor Dohler (1814-1843) and many others who afterwards became famous. As a composer he was prolific to an astonishing degree, considering the other demands on his time. His works, which included every class of composition, numbered 849 at the time of his death. Comparatively few of them possess high merit, and none is the production of genius. He had considerable skill in devising variations for the

piano of the display type, and in this and other ways helped to develop the executive power which in the modern school of pianoforte playing seems to have reached the limits of the possible. His various books of exercises, elementary and advanced, of which the best known are the £tudes de la vilociU, have probably had a wider circulation than any other works of their class. To the theory of music he contributed a translation of Reicha's Trait6 de composition, and a work entitled Umriss der ganzen Musikgeschichte. Czerny died on the 15th of July 1857 at Vienna. Having no family, he left his fortune, which was considerable, to the Vienna Conservatorium and various bene- volent institutions.

D— DACCA

*7*5*

DThe fourth letter in the English alphabet occupies the Same position in the Latin, Greek and Phoenician alphabets, which represent the preceding stages in its history. The Phoenician name Daleth is represented by the Greek Delta. In form D has varied throughout its career comparatively little. In the earliest Phoenician it is <3 with slight variations; in most Greek dialects A which has been adopted as the Greek literary form, but in others as e.g. the earliest Attic fr or ^. The form with the rounded back, which has passed from Latin into the languages of western Europe, was borrowed from the Greeks of S.W. Italy, but is widely spread also amongst the peoples of the Peloponnese and of northern Greece. It arises from a form like t> when the sides which meet to the right are written or engraved at one stroke. From a very early period one side of the triangle was often prolonged, thus producing a form ^ which is characteristic of

Aramaic from 800 B.C. In Greek this was avoided because of the likelihood of its confusion with 9, the oldest form of the symbol for r, but in the alphabets of Italy — which were borrowed from Etruscan — this confusion actually takes place.

Etruscan had no sound corresponding to the symbol D (in inscriptions written from right to left, a), and hence used it as a by-form for Q, the symbol for r. The Oscans and Umbrians took it over in this value, but having the sound d they used for it the symbol for r (9 in Umbrian, 8 in Oscati).

The sound which D represents is the voiced dental correspond- ing to the unvoiced t. The English d, however, is not a true dental, but is really pronounced by placing the tongue against the sockets of the teeth, not the teeth themselves. It thus differs from the d of French and German, and in phonetic ter- minology is called an alveolar. In the languages of India where both true dentals and alveolars are found, the English d is represented by the alveolar symbol (transliterated d). Etymo- logically in genuine English words d represents in most cases dh of the original Indo-European language, but in some cases an original /. In many languages d develops an aspirate after it, and this dh becomes then a voiced spirant (8) , the initial sound of there and that. This has occurred widely in Semitic, and is found also in languages like modern Greek, where 5, except after v, is always spirant, Sev { — not) being pronounced like English then. As the mouth position for / differs from that for d only by the breath being allowed to escape past one or both sides of the tongue, confusion has arisen in many languages between d and /, the best-known being cases like the Latin lacrima as compared with the Greek SaK-pv. The English tear and the forms of other languages show that d and not / is the more original sound. Between vowels in the ancient Umbrian d passed into a sound which was transliterated in the Latin alphabet by rs; this was probably a sibilant r, like the Bohemian f. In many languages it is unvoiced at the end of words, thus becoming almost or altogether identical with t. As an abbrevia- tion it is used in Latin for the praenomen Decimus, and under the empire for the title Divus of certain deceased emperors. As a Roman numeral (=500) it is only the half of the old symbol (D (= 1000); this was itself the old form of the

Greek , which was useless in Latin as that language had no sound identical with the Greek . (P. Gi.)

DACCA, a city of British India, giving its name to a district and division of Eastern Bengal and Assam. It was made the capital of that province on its creation in October 1905. The city is 254 m. N.E. by E. of Calcutta, on an old channel of the Ganges. Railway station, 10 m. from the terminus of the river steamers at Narayanganj. The area is about 8 sq. m. The .population in 1901 was 90,542. The ruins of the English factory, St Thomas's church, and the houses of the European residents lie along the river banks. Of the old fort erected by Islam Khan, who in 1608 was appointed nawab of Bengal, and removed

his capital from Rajmahal to Dacca, no vestige remains; but the jail is built on a portion of its site. The principal Mahom- medan public buildings, erected by subsequent governors and now in ruins, are the Katra and the Lal-bagh palace — the former built by Sultan Mahommed Shuja in 1645, in front of the chauk or market place. Its extensive front faced the river, and had a lofty central gateway, flanked by smaller entrances, and by two octagonal towers rising to some height above the body of the building. The Lal-bagh palace was commenced by Azam Shah, the third son of the emperor Aurangzeb. It origin- ally stood close to the Buriganga river; but the channel has shifted its course, and there is now an intervening space covered with trees between it and the river. The walls on the western side, and the terrace and battlement towards the river, are of a considerable height, and present a commanding aspect from the water. These outworks, with a few gateways, the audience hall and the baths, were the only parts of the building that survived in 1840. Since then their dilapidation has rapidly advanced; but even in ruin they show the extensive and magnificent scale on which this princely residence was originally designed. It appears never to have been completed; and when Jean Baptiste Ta vernier visited Dacca (c. 1666), the nawab was residing in a temporary wooden building in its court. The English factory was built about that year. The central part

of the old factory continued to be used as a court-house till the 19th century, but owing to its ruinous state it was pulled down in 1829 or 1830; in 1840 the only portion that remained was the outward wall. The French and Dutch factories were taken possession of by the English in the years 1778 and 1781 respectively. In the mutiny of 1857 two companies of the 73rd Native Infantry which were stationed in the town joined in the revolt, but were overpowered by a small European force and dispersed. The city still shows some signs of its former magnificence. The famous manufacture of fine muslins is almost extinct, but the carving of shells, carried on from ancient times, is an important industry in the city. There are a Government college, a collegiate school and an unaided Hindu college. There is a large settlement of mixed Portuguese descent, known as Feringhis. Many of the public buildings, including the college, suffered severely from the earthquake of the 12th of June 1897; and great damage was done by tornadoes in April of 1888 and 1902.

The district of Dacca comprises an area of 2782 sq. m. In 1901 the population was 2,649,522, showing an increase of 11% in the decade. The district consists of a vast level plain, divided into two sections by the Dhaleswari river. The northern part, again intersected by the Lakshmia river, contains the city of Dacca, and as a rule lies well above flood-level.

Dacca is watered by a network of rivers and streams, ten of which are navigable throughout the year by native cargo boats of four tons burthen. Among them are the Meghna, the Ganges or Padma, the Lakshmia, a branch of the Brahmaputra, the Jamuna, or main stream of the Brahmaputra, the Mendi-Khali, a large branch of the Meghna, the Dhaleswari, an offshoot of the Jamuna, the Ghazi-khali and the Buriganga. The soil is com- posed of red ferruginous kankar, with a stratum of clay in the more elevated parts, covered by a thin layer of vegetable mould, or by recent alluvial deposits. The scenery along the Lakshmia is very beautiful, the banks being high and wooded. About 20 m. north of Dacca city, small ridges are

met with in the Madhupur jungle, stretching into Mymensingh district. These hills, how- ever, are mere mounds of from 20 to 40 ft. high, composed of red soil containing a considerable quantity of iron ore; and the whole tract is for the most part unproductive. Towards the city the fed soil is intersected by creeks and morasses, whose margins yield crops, of rice, mustard and til seed; while to the east of the town, a broad, alluvial, well-cultivated plain reaches as far as the junction of the Dhaleswari and Lakshmia rivers. The country lying to the south of the Dhaleswari is the most

fertile part of the district. It consists entirely of rich alluvial soil, annually inundated to a depth varying from 2 to 14 ft. of water. The villages are built on artificial mounds of earth, so as to raise them above the flood-level.

The wild animals found in the district comprise a few tigers, leopards and wild elephants, deer, wild pig, porcupines, jackals, foxes, hares, otters, &c. The green monkey is very common; porpoises abound in the large rivers. The manufactures consist of weaving, embroidery, gold and silver work, shell-carving and pottery. The weaving industry and the manufacture of fine Dacca muslins have greatly fallen off, owing to the competition of European piece goods. Forty different kinds of cloth were formerly manufactured in this district, the bulk of which during many years was made from English twist, country thread being used only for the finest muslins. It is said that, in the time of the emperor Jahangir, a piece of muslin, 15 ft. by 3, could be manufactured, weighing only 900 grains, its value being £40. In 1840 the finest cloth that could be made of the above dimen- sions weighed about 1600 grains, and was worth £10. Since then the manufacture has still further decayed, and the finer kinds are not now made at all except to order. The district is traversed by a line of the Eastern

Bengal railway, but most of the traffic is still conducted by water. It is a centre of the jute trade.

The division of Dacca occupies the delta of the Brahmaputra, where it joins the main stream of the Ganges. It consists of the four districts of Dacca, Mymensingh, Faridpur and Backergunge. Its area is 15,837 sq. m. Its population in 1901 was 10,793,988.

DACE, Dare, or Dart (Leuciscus vulgaris, or L. dobula), a freshwater fish belonging to the family Cyprinidae. It is an inhabitant of the rivers and streams of Europe north of the Alps, but it is most abundant in those of France and Germany. It prefers clear streams flowing over a gravelly bottom, and deep, still water, keeping close to the bottom in winter but disporting itself near the surface in the sunshine of summer. It is preyed upon by the larger predaceous fishes of fresh waters, and owing to its silvery appearance is a favourite bait in pike-fishing. The dace is a lively, active fish, of gregarious habits, and exceedingly prolific, depositing its eggs in May, and June at the roots of aquatic plants or in the gravelly beds of the streams it frequents. Its flesh is wholesome, but is not held in much estimation. In appearance it closely resembles the roach, usually attaining a length of 8 or 9 in., with the head and back of a dusky blue colour and the sides of a shining silvery aspect, with numerous dark lines running along the course of the scales. The ventral and anal fins are white, tinged with pale red,; and the dorsal, pectoral and caudal tipped with black. The dace feeds on worms, insects, insect-larvae, and also on vegetable matter. It is abundant in many of the streams of the south of England, but is unknown in Scotland and Ireland. In America the name of dace is also applied to members of other genera of the family; the " horned dace " (Semnotilus atromaculatus) is a well-known variety.

DACH, SIMON (1605-1659), German lyrical poet, was born at Memel in East Prussia on the 29th of July 1605. Although brought up in humble circumstances,

he received a careful education in the classical schools of Konigsberg, Wittenberg and Magdeburg, and entered the university of Konigsberg in 1626 as a student of theology and philosophy. After taking his degree, he was appointed in 1633 Kollaborator (teacher) and in 1636 co-rector of the Domschule (cathedral school) in that city. In 1639 he received the chair of poetry at the university of Konigsberg, which he occupied until his death on the 15th of April 1659. In Konigsberg he entered into close relations with Heinrich Albert (1604-1651), Robert Roberthin (1600-1648) and Sibylla Schwarz (1621-1638), and with them formed the so-called Konigsberger Dictergruppe. He sang the praises of the house of the electors of Brandenburg in a collection of poems entitled Kurbrandenburgische Rose, Adler, Lowe und Scepter (1661), and also produced many occasional poems, several of which became popular; the most famous of them is Anke von Thar aw bss, de my gefollt (rendered by Herder into modern German as Annchen von Tharau), composed in 1637 in honour

of the marriage of a friend. Among his hymns, many of which are of great beauty, are the following: Ich binja, Herr, in deiner Macht, Ich bin bei Gott in Gnaden durch Christi Blut und Tod, and O, wie selig seid ihr boch, ihr Frommen,

Editions of.Dach's poems have been published by W. Miiller (1823), by H. Osterley (for the Stuttgart Literarischer Verein, 1876) ; also selections by the same editor (1876), and in Kursjfchnef's Deutsche Nationalliteratur (1883). See especially the introductions to Osterley's editions; also H. Stiehler, Simon Dach, sein heben und seine ausgewdhlte Dichtungen (1896).

DACIA, in ancient geography, the land of the Daci, a large district of central Europe, bounded on the N. by the Carpathians, on the S. by the Danube, on the W. by the Pathissus (Theiss), on the E. by the Tyras (Dniester), thus corresponding in the main to the modern Rumania and Transylvania. Towards the west it may originally have extended as far as the Danube

where it runs from north to south at Waitzen (Vacz) , while on the other hand Ptolemy puts its eastern boundary as far back as the Hierasus (Sereth). The inhabitants of this district were a Thracian stock, originally called AS01, a name which after the 4th century B.C. gave place to Aaxoi. Of the other Thracian tribes the Getae (q.v.) were most akin to them in' language and manners; by the Greeks the Dacians were usually called Getae, by the Romans Daci. Acios and Tkra (Davus, Geta) were common as names of slaves in Attic comedy and in the adaptations of Plautus and Terence.

The Dacians had attained a considerable degree of civilization when they first became known to the Romans. They believed in the immortality of the soul, and regarded death as merely a change of country (/ieTouafeotfcu.). Their chief priest held a prominent position as the representative of the deity upon earth; he was the king's chief adviser and his decisions were accepted as final. They were divided into two classes — an; aristocracy and a proletariate. The first alone had the right to cover their heads and wore a felt hat (hence tarabostesei= 7riXo06pot, pileati); they formed a privileged class, and were the predecessors of the Rumanian boyars. The second class, who comprised the rank and file of the army, the peasants and artisans, wore their hair long (kojutjtcu, capillati). They dwelt in wooden huts surrounded by palisades, but in later times, aided by Roman architects, built walled strongholds and conical stone towers. Their chief occupations were agriculture and cattle breeding; horses were mainly used as draught animals. They also worked the gold and silver mines of Transylvania, and carried on a considerable outside trade, as is shown by the number of foreign coins found in the country,

A kingdom of Dacia was in existence at least as early as the beginning of the 2nd century B.C. under a king Qroles. Conflicts with the Bastarnae and the Romans (11 2–109, 74), against whom they had assisted the Scordisci and Dardani, had greatly weakened the resources of the Dacians. Under

Burbista (Boere- bista), a contemporary of Caesar, who thoroughly reorganized the army and raised the moral standard of the people, the limits of the kingdom were extended; the Bastarnae and Boii were conquered, and even Greek towns (Olbia, Apollonia) on the Euxine fell into his hands. Indeed the Dacians appeared so formidable that Caesar contemplated an expedition against them, which was prevented by his death. About the same time Burbista was murdered, and the kingdom was divided into four (or five) parts under separate rulers. One of these was Cotiso, whose daughter Augustus is said to have desired to marry and to whom he betrothed his own five-year-old daughter Julia. He is well known from the line in Horace (" Occidit Daci Coti- sonis agmen," Odes, hi. 8. 18), which, as the ode was written on the 1st of March 29, probably refers to the campaign of Marcus Crassus (30-28), not to that of Cornelius Lentulus, who was not consul till 18. The Dacians are often mentioned under Augustus, according to whom, they were compelled to recognize the Roman supremacy. But they were by no means subdued, and in later 1 times seized every opportunity of crossing the frozen Danube and ravaging the province of Moesia. From a.d. 85 tq 89 the Dacians were engaged in two wars with the Romans, under Duras- or Diurpaneus, and the great Decebalus, who ruled from 86-87

to 107. After two severe reverses, the Romans, under Tettius Julianus, gained a signal advantage, but were obliged to make peace owing to the defeat of Domitian by the Marcomanni. Decebalus restored the arms he had taken and some of the prisoners and received the crown from Domitian's hands, an apparent acknowledgment of Roman suzerainty. But the Dacians were really left independent, as is shown by the fact that Domitian agreed to purchase immunity from further Dacian in- roads by the payment of an annual tribute.

To put an end to this disgraceful arrangement, Trajan resolved to crush the Dacians once and for all. The result of his first campaign (101-102) was the occupation of the Dacian capital Sarmizegethusa (Varhely) and the surrounding country; of the second (105-107), the suicide of Decebalus, the conquest of the whole kingdom and its conversion into a Roman province. The history of the war is given in Dio Cassius, but the best commentary upon it is the famous column of Trajan. According to Marquardt, the boundaries of the province were the Tibiscus (Temes) on the W., the Carpathians on the N., the Tyras on the E., and the Danube on the S., but Brandis (in Pauly-Wissowa's Realencyclopddie) maintains that it did not extend farther eastwards than the river Olt (Aluta) — the country beyond belonging to lower Moesia — and not so far as the Theiss west- wards, being thus limited to Transylvania and. Little Walachia. It was under a governor of praetorian rank, and the legio xiii. gemina with numerous auxiliaries had their fixed quarters in the province. To make up for the ravages caused by the recent wars colonists were imported to cultivate the land and work the mines, and the old inhabitants gradually returned. Forts were built as a protection against the incursions of the surround- ing barbarians, and three great military roads were constructed to unite the chief towns, while a fourth, named after Trajan, traversed the Carpathians and entered Transylvania by the Roteturm pass. The two chief towns were Sarmizegethusa (afterwards Ulpia Trajana) and Apulum (Karlsburg). With the religion the Dacians also adopted the language of the conquerors, and, modem Rumanian is full of Latin words easily recognizable.

In 129, under Hadrian, Dacia was divided into Dacia Superior and Inferior, the former comprising Transylvania, the latter Little Walachia, with procurators, probably both under the same praetorian legate (according to Brandis, the procurator of Dacia inferior was independent, but see A. Domaszewski in Rheinisches Museum, xlviii., 1893). Marcus Aurelius re- divided it into three (tres

Daciae) : Porolissensis, from the chief town Porolissum (near Mojrad), Apulensis from Apulum and Maluensis (site unknown) . The tres Daciae formed a commune in so far that they had a common capital, Sarmizegethusa, and a common diet, which discussed provincial affairs, formulated complaints and adjusted the incidence of taxation; but in other respects they were practically independent provinces, each under an ordinary procurator, subordinate to a governor of consular rank.

The Roman hold on the country was, however, still pre- carious. Indeed it is said that Hadrian, conscious of the difficulty of retaining it, had contemplated its abandonment and was only deterred by consideration for the safety of the numerous Roman settlers. Under Gallienus (256), the Goths crossed the Carpathians and drove the Romans from Dacia, with the excep- tion of a few fortified places between the Temes and the Danube. No details of the event are recorded, and the chief argument in support of the statement in Ruf(i)us Festus that ” under the Emperor Gallienus Dacia was lost ” is the sudden cessation of Roman inscriptions and coins in the country after 2 56. Aurelian (270–275) withdrew the troops altogether and settled the Roman colonists on the south of the Danube, in Moesia, where he created the province Dacia Aurefiani. This was subsequently divided into Dacia Ripensis on the Danube, with capital Ratiaria (Arcar in Bosnia), and Dacia Mediterranea, with capital Sardica (Sofia, the capital of Bulgaria), the latter again being subdivided into Dardania and Dacia Mediterranea.

See J. D. F. Neigebaur, Dacien aus den Uberresten des klassischen Alterthums, (Kronstadt, 1851) ; C. Gooss, Studien zur Geographic und G’eschichte des trdjanischen Daciens (Hermannstadt, 1874); E. R.

Rosier, Dacier und Romanen (Vienna, 1866), and Romdnische Studien (Leipzig, 1871); J. Jung, Rbmer und Romanen in den Donaulandern (Innsbruck, 1877), Die romanischen Landschaften des romischen Reiches (1881), and Fasten der Provinz Dacien (1894); W. Toma- schek, ” Die alten Thraker,” in

Sitzungsberichte der k. Akad. der Wissenschaften, exxviii. (Vienna, 1893); J. Marquardt, Romische Staatsverwaltung, i. (1881), p. 308; T. Mommsen in Corpus Inscrip- tionum Latinarum, iii. 160, and Provinces of Roman Empire (Eng. trans., 1886); C. G. Brandis in Pauly-Wissowa's Realencyclo- padie, iv.pt. 2 (1901) ; W. Miller, The Balkans in " The Story of the Nations," vol. 44; on the boundaries of the Roman province of Dacia, see T. Hodgkin and F. Haverfield in English Historical Review, ii. 100, 734. (See also Vlachs.)

DACIER, ANDRE (1651-1722), French classical scholar, was born at Castres in upper Languedoc, on the 6th of April 165 1. His father, a Protestant advocate, sent him first to the academy of Puy Laurens, and afterwards to Saumur to study under Tanneguy Lefevre. On the death of Lefevre in 1672, Dacier re- moved to Paris, and was appointed one of the editors of the Delphin series of the classics. In 1683 he marriedAnne Lefevre, the daughter of his old tutor (see below). In 1695 he was elected member of the Academy of Inscriptions, and also of the French Academy; not long after, as payment for his share in the "medallic" history of the king's reign, he was, appointed keeper of the library of the Louvre, He died two years after his wife, on the 1 8th of September 1722., The most important of his works were his editions of Pompeius Festus and Verrius Flaccus, and his translations of Horace (with notes), Aristotle's Poetics, the Electro, and Oedipus Coloneus of Sophocles, Epictetus, Hippocrates and Plutarch's, Lives.

His wife, Anne Lefevre (1654-1720),, French scholar and translator from the classics, was born at Saumur, probably in March 1654. On her father's death in 1672 she removed to Paris, carrying with her part of an edition of Callimachus, which she afterwards published. This was so well received that she was engaged as one of the editors of the Delphin series of classical authors, in which she edited Floras, Dictys Cretensis, Aurelius Victor and Eutropius. In 1681 appeared her prose version of Anacreon and Sappho, and in the next few years she

published prose versions of Terence and some of the plays of Plautus and Aristophanes. In 1684 she and her husband retired to Castres, with the object of devoting themselves to theological studies. In 1685 the result was announced in the conversion to Roman Catholicism of both M. and Mme Dacier, who were rewarded with a pension by the king. , In 1699 appeared the prose translation of the Iliad (followed nine years later by a similar translation of the Odyssey), which gained for her the position she occupies in French literature. The appearance of this version, which made Homer known for the first time to many French men of letters, and among others to A. Houdart de la Motte, gave rise to a famous literary controversy. In 17 14 la Motte published a poetical version of the Iliad, abridged and altered to suit his own taste, together with a Discours sur Homere, stajting the reasons why Homer failed to satisfy his critical taste. Mme Dacier replied in the same year in her work, Des causes de la corruption du goAt. La Motte carried on the discussion with light gaiety and badinage, and had the happiness of seeing his views supported by the abbe Jean Terrasson, who in 1715 produced. two volumes entitled Dissertation critique sur Flliade, in which he maintained that science and philosophy, and especi- ally the science and philosophy of Descartes, had so developed the human mind that the poets of the 18th century were im- measurably superior to, those of ancient Greece. In the same year Pere C. Buffier published Homere en arbitrage, in which he concluded that both parties were really agreed on the essential point— that Homer was one of the greatest geniuses the world had seen, and that, as a whole, no other poem, could be preferred to his; and, soon after (on the 5th of April 17 16), in the house of M. de Valincourt, Mme Dacier and la Motte met at supper, and drank together to the health of Homer. Nothing of import- ance marks the rest of Mme Dacier's life. She died at the Louvre, on the 17th of August 1720.

See C. A. Sainte-Beuve, Causeries du lundi, vol; ix.; J. F. Bodin, Recherches historigues sur la

villede Saumur (^813-1814),;, P. J. Burette, tloge de Mme Dacier (172 1); Memoires de Mme de Sta'el

(1755); E. Egger, L'Hellenisme en France, ii. (1869); Memoires de Saint-Simon, iii. ; R. Rigault, Histoire de la querelle des anciens et des modernes (1856).

DACITE (from Dacia, mod. Transylvania), in petrology, vol- canic rocks which may be considered a quartz-bearing variety of andesite. Like the latter they consist for the most part of plagioclase felspar with biotite, hornblende, augite or enstatite, and have generally a porphyritic structure, but they contain also quartz as rounded, corroded phenocrysts, or as an element of the ground-mass. Their felspar ranges from oligoclase to andesite and labradorite, and is often very zonal; sanidine occurs also in some dacites, and when abundant gives rise to rocks which form transitions to the rhyolites. The biotite is brown; the hornblende brown or greenish brown; the augite usually green. The ground-mass of these rocks is often micro- crystalline, with a web of minute felspars mixed with interstitial grains of quartz; but in many dacites it is largely vitreous, while in others it is felsitic or cryptocrystalline. In the hand specimen many of the hornblende and biotite dacites are grey or pale brown and yellow rocks with white felspars, and black crystals of biotite and hornblende. Other dacites, especially augite- and enstatite-dacites, are darker coloured. The rocks of this group occur in Hungary, Alnieria (Spain), Argyllshire and other parts of Scotland, New Zealand, the Andes, Martinique, Nevada and other districts of western North America, Greece, &c. They are mostly associated with andesites and trachytes, and form lava flows, dikes, and in some cases massive intrusions in the centres of old volcanoes. Among continental petro- graphers the older dacites (Carboniferous, &c.) are often known as "porphy

rites." (J. S.F.)

DACOIT, a term used in India for a robber belonging to an armed gang. The word is derived from the Hindustani dakait, and being current in Bengal got into the Indian penal code. By law, to constitute dacoity, there must be five or more in the gang committing the crime. In the time of the Thugs (q.v.) a special police department Was created in India to deal with thuggy and dacoity (thagi and dakaiti), which exists down to the present day. In Burma also the word dacoit came to be applied in a special sense to the armed gangs, which maintained a state of guerilla warfare for several years after the defeat of the king and his army. (See Burmese Wars.)

DA COSTA, ISAAK (1798–1860), Dutch poet and theologian, was born at Amsterdam on the 14th of January 1798. His father was a Jew of Portuguese descent, and claimed kindred with the celebrated Uriel D'Acosta. An early acquaintance with Bilderdijk had a strong influence over the boy both in poetry and in theology. He studied at Amsterdam, and after- wards at Leiden, where he took his doctor's degree in law in 1818, and in literature in 1821. In i8i4he wrote De Verlossing van Nederland, a patriotic poem, which placed him in line with the contemporary national romantic poets in Germany and in France. His Poezy (2 vols., 1821–1822) revealed his emancipa- tion from the Bilderdijk tradition, and the oriental colouring of his poems, his hymn to Lamartine, and his translation of part of Byron's Cain, establish his claim to be considered as the earliest of the Dutch romantic poets. In 1822 he became a convert to Christianity, and immediately afterwards asserted himself as a champion of orthodoxy and an assailant of latitudinarianism in his Bezwaren tegen den Geest der Eeuw (1823). He took a lively interest in missions to the Jews, and towards the close of his life was a director of the seminary established in Amsterdam in connexion with the mission of the Free Church of Scotland. He died at Amsterdam on the 28th of April i860. Da Costa ranked first among the poets of Holland after the

death of Bilderdijk. His principal poetical works were: Alphonsiis I. (1818), a tragedy; Poezy (Leiden, 1821); God melons (1826); Festliederh (1828); Vijf-en-twinlig jaren (1840); Hagar (1852); De Slag bij Nieupoort (1857). He also translated The Persians (1816) and the Prometheus (1818) of Aeschylus, and edited the poetical works of Bilderdijk in sixteen volumes, the last volume being an account of the poet. He was the author of a number of theologi- cal works, chiefly in connexion with the criticism of the gospels.

His complete poetical works were edited by J. P. Hasebroek (3 vols., Haarlem, 1 861-1862). See G. Groen van Prinsterer, Srieven van Mr I. da Costa, 1 830-1 840 (1872), and J. ten Brink, Gesehie- denis der Noord-Nederlandsche Letteren in de XIX' Eeuw (vol. i., 1888), which contains a complete bibliography of his works.

DACTYL (from Gr. baxrvKos, a finger), in prosody, a long syllable followed by two short(see Verse).

DAEDALUS, a mythical Greek architect and sculptor, who figures largely in the early legends of Crete and of Athens. He was said to have built the labyrinth for Minos, to have made a wooden cow for Pasiphae and to have fashioned a bronze man who repelled the Argonauts. Falling under the displeasure of Minos, he fashioned wings for himself and his son Icarus, and escaped to Sicily. These legends seem primarily to belong to Crete; and the Athenian element in them which connected Daedalus with the royal house of Erechtheus is a later fabrica- tion. To Daedalus the Greeks of the historic age were in the habit of attributing buildings, and statues the origin of which was lost in the past, and which had no inscription belonging to them. In a later verse in the Iliad (date, 7th or 6th century), Daedalus is mentioned as the maker of a dancing-place for Ariadne in Crete; and such a dancing-place has been discovered by A. J. Evans, in the Minoan palace of Cnossus. Diodorus Siculus says that he executed various works in Sicily for King Cocalus. In many cities of Greece there were rude

wooden statues,, said to be by him. Later critics, judging from their own notions of the natural course of development in art, ascribed to Daedalus such improvements as separating the legs of statues and opening their eyes. In fact the name Daedalus is a mere symbol, standing for a particular phase of early Greek art, when wood was the chief material, and other substances were let into it for variety.

This Daedalus must not be confused with Daedalus of Sicyon, a great sculptor of the early part of the 4th century B.C., none of whose works is extant. (P. G.)

DAFFODIL, the common name of a group of plants of the genus Narcissus, and natural order Amaryllidaceae. (See generally under Narcissus.) The common daffodil, N. Pseudo-narcissus, is common in woods and thickets in most parts of the N. of Europe, but is rare in Scotland. Its leaves are five or six in number, are about a foot in length and an inch in breadth, and have a blunt keel and flat edges. The stem is about 18 in. long, and the spathe single-flowered. The flowers are large, yellow, scented and a little drooping, with a corolla deeply cleft into six lobes, and a central bell-shaped nectary, which is crisped at the margin. They appear early in the year, or, as Shakespeare says, " come before the swallow dares, and take the winds of March with beauty." The stamens are shorter than the cup, the anthers oblong and converging; the ovary is globose, and has three furrows; the seeds are roundish and black. Many new varieties of the flower have recently been cultivated in gardens. The bulbs are large and orbicular, and have a blackish coat; they, as well as the flowers, are reputed to be emetic in properties, The Peruvian daffodil and the sea daffodil are species of the genus Ismene. (For derivation see Asphodel.)

DAFYDD AB GWILYM (c. 1340-c. 1400), son of Gwilym Gam and Ardudful Fychan, greatest of the medieval Welsh poets, was born at Bro Gynin, Cardiganshire, about the year 1340. Educated by a scholarly uncle, Llewelyn ab Gwilym Fychan of Emlyn, he became

steward to his kinsman, Ivor Hael of Maesaleg, Monmouthshire, who also appointed him instructor to his daughter. The latter arrangement leading to an attach- ment between tutor and pupil, the girl was banished to a convent in Anglesey, whither the poet followed her, taking service in an adjacent monastery, but on returning to Maesaleg he was per- mitted to retain his stewardship. He was elected chief bard of Glamorgan and became household bard to Ivor Hael. At Rhosyr in North Wales he met Morfudd Lawgam, to whom he addressed 147 amatory odes. In consequence of attempting to elope with this lady, Dafydd ab Gwilym, being unable to pay the fine demanded by her husband, was imprisoned. Liberated by the goodwill of his friends, he went back to Maesaleg, and after the death of his patron, retired to his birthplace, Bro Gynin.

Tradition states that he was a man of noble appearance, and his poems bear evidence of high mental culture. He was ac- quainted with the works of Homer, Virgil, Ovid and Horace, and was also a student of Italian literature. Especially remark- able as a poet of nature in an age when more warlike themes were chosen by his contemporaries, his poems entitled " The Lark," "The Wind" and "The Mist" are amongst his finest efforts. He has been called the Petrarch, the Ovid, and (by George Borrow) the Horace of Wales. His poems were almost all written in the cywydd form: a short ode not divided into stanzas, each line having the same number of syllables. The poet died about the year 1400, and according to tradition was buried in the graveyard of the monastery of Strata Florida, in Cardiganshire. See also under Celt; Celtic Literature, iv. Welsh. DAGGER, a hand weapon with a short blade. The derivation is obscure (cf. Fr. dague and Ger. Degen), but the word is related to dag, a long pointed jag such as would be made in deeply nicking the edge of a garment. The war knife in various forms and under many names has of course

been in use in all ages and amongst all races. But the dagger as generally understood was not a short sword, but a special stabbing weapon which could be used along with the sword. The distinction is often difficult to estab- lish in a given case owing to the variations in the length of the weapon. The principal medieval dagger was the misiricorde, which from the end of the 12th century was used, in all countries in which chivalry flourished, to penetrate the joints of the armour of an unhorsed adversary (hence Ger. Panzerbrecher, armour-breaker). It was so called either because the threat of it caused the vanquished to surrender " at mercy," or from its use in giving what was called the coup de grdce. From about 1330 till the end of the succeeding century, in many knightly effigies it is often represented as attached on the right side by a cord or a chain to the sword-belt. This weapon and its sheath were often elaborately adorned. It was customary to secure it from accidental loss by a guard-chain fastened to the breast- armour Occasionally the misericorde was fixed to the body- armour by a staple; or, more rarely, it was connected with a gypciere or pouch. The misericorde may be called a poniard. The distinction between the dagger and the poniard is arbitrary, and in ordinary language the latter is taken as being the shorter and as having less resemblance to a short sword or cutlass. A weapon, with a longer blade than the misericorde, was habitually worn by civilians, including judges, during the middle ages; such weapons bore the name of anlace (from annulus, as it was fastened by a ring), basilarde or langue de bceuf, the last from the broad ox-tongue shape of the blade. This had often a small knife fixed on the scabbard, like a Highland officer's dirk of the present day. By nobles and knights the dagger or poniard was worn when they had exchanged their armour for the costume of peace. It is recorded besides that when they appeared at a tournament and on some other occasions, ladies at that time wore daggers depending, with their gypcieres, from their girdles. Thus, writing of the year 1348, Knighton speaks of certain ladies who were present at jousts as "

habentes cultellos, quos daggerios vulgariter dicunt, in powchiis desuper impositis." A longer and heavier dagger with a broad blade (Italian) is called cinquedea. The Scottish " dirk " was a long dagger, and survives in name in the dirk worn by midshipmen of the royal navy, and in fact in that worn by officers of Highland regiments. In the 15th and 1 6th centuries the infantry soldiers (Swiss or landsknecht) carried a heavy poniard or dagger. This and the earlier Spanish dagger with a thumb-ring were distinctively the weapons of professional soldiers. The rise of duelling produced another type, called the main gauche, which was a parrying weapon and often had a toothed edge on which the adversary's sword was caught and broken. One form of this dagger had a blade which expanded into a triple fork on pressing a spring; this served the same purpose. The satellites of the Vehmgericht had a similar weapon, in order, it is suggested, that their acts should be done in the name of the Trinity. The smaller poniards are generally called " stilettos." Much ingenuity and skill have been

lavished on the adornment of daggers, and in rendering the blades more capable of inflicting severe wounds. Daggers also were sometimes made to poison as well as to wound. Of oriental daggers may be mentioned the Malay " crease " or " kris," which has a long waxed blade; the Gurkha " kukri," a short curved knife, broadest and heaviest towards the point; and the Hindu " khuttar," which has a flat triangular-shaped blade, and a hilt of H-shape, the cross-bar forming the grip and the sides the guard. DAGHESTAN, a province of Russia, Transcaucasia, occupying the triangular space between the Andi ridge, the south-east division of the main Caucasus range, and the Caspian Sea. It has the province of Terek on the N.W.,the government of Tiflis on the S.W., and that of Baku on the S.E. With the exception of a narrow strip along the sea-coast and a small district in the N., it is entirely mountainous. Area, 11,332 sq. m. The snow- clad Andi ridge, belonging to the system of transverse upheavals which cross the Caucasus, branches off the

latter at Borbalo Peak (10,175 ft.), and reaches its highest altitudes in Tebulos- mta (14,775 ft.) and Diklos-mta (13,740 ft.). It is encircled on the N. by a lower outer ridge, the Karadagh, through which the rivers cut their way. This ridge is thickly clothed with forests, chiefly beech. The Boz-dagh and another ridge run between the four Koisu rivers, the head-streams of the Sulak, which flows into the Caspian. The next most important stream, out of the great number which course down the flanks of the Caucasus and terminate in the Caspian, is the Samur. The most notable feature of the province is, however, according to 0. W. H. Abich (Sur la structure et la giologie du Daghestan, 1862), the successive folds of Jurassic limestones and slates, all nearly parallel to the Caucasus, which form lofty, narrow plateaus. Many of the peaks upon them rise higher than 12,000 ft., and the passes lie at altitudes of 11,000 ft. in the interior and 9000 ft. towards the Caspian. Towards the Caspian, especially between Petrovsk and the river Sulak, the Cretaceous system is well represented, and upon its rocks rest marls, shales, and sandstones of the Eocene period. The country is altogether difficult of access, and only one military route leads up from the river Terek, while every one of the eleven passes known across the Caucasus is a mere bridle-path. The climate is severe on the plateaus, hot towards the Caspian, and dry everywhere. The average tem- peratures are — year 51 , January 26 , July 73° at Temir-khan- shura (42 49' N.; alt. 1510 ft.). The annual rainfall varies from 17 to 21 in. The population, estimated at 605,100 in 1906, numbered 587,326 in 1897, of whom only 5000 were Russians. They consist chiefly of mountaineers known as Lesghians {i.e. 158,550 Avars, 121,375 Darghis, 94,506 Kurins), a race closely akin to the Circassians, intermingled towards the Caspian Sea with Tatars and Georgians. There are also sprinklings of Jews and Persians. The highlands of Daghestan were for many years the stronghold of the Circassians in their struggle against Russia, especially under the leadership of Shamyl, whose last stand was made on the steep mountain fastness

of Gunib, 74 m. S. of Temir- khan-shura, in 1859. The difficulty of communication between the valleys has resulted in the growth of a great number of dialects. Avarian is a sort of inter-tribal tongue, while Lakh or Kazi-kumukh, Kurin, Darghi-kaitakh, Andi, and Tabasaran are some of the more important dialects, each subdivided into sub- dialects. The mountaineers breed some cattle and sheep, and cultivate small fields on the mountain-sides. In the littoral districts excellent crops of cereals, cotton, fruit, wine and tobacco are obtained with the aid of irrigation. Silkworms are bred. The mountaineers excel also in a variety of petty trades. Sulphur, salt and copper are the most important of the minerals. A rail- way line to connect the North Caucasian line (Rostov to Petrovsk) with the Transcaucasian line (Batum to Baku) has been built along the Caspian shore from Petrovsk, through the " gate " or pass of Derbent, to Baku. The province is divided into nine districts — Temir-khan-shura, Avar, Andi, Gunib, Dargo, Kazi-kumukh, Kaitago-Tabasaran, Kurin, and Samur. The only towns are Temir-khan-shura (pop. 9208 in 1897), the capital of the government, Derbent (14,821) and Petrovsk (9806), the last two both on the Caspian.

See G. Radde, " Aus den Daghestanischen Hpchalpen," in Peter- manns Mitteilungen, Erganzungsheft, No. 85, 1887, and, with E. Kdnig, " Der Nordfuss des Daghestan," in Petermantis Mitteil., Erganzungsheft, No. 117, 1895. (P. A. K.; J. T. Be.)

DAGO, a name given somewhat contemptuously to Spanish, Portuguese and Italian sailors, as " Dutchman " is similarly applied to Germans and Scandinavians as well as to natives of Holland. In America the word is generally confined to the poorer class of Italian immigrants. In the South Wales mining districts the casual labourers, who are only engaged when work is plentiful, are so called. The word is apparently a corruption of the common

Spanish and Portuguese Christian name ” Diego.”

DAGOBERT I. (d. 639), king of the Franks, was the son of Clotaire II. In 623 his father established him as king of the region east of the Ardennes, and in 626 revived for him the ancient kingdom of Austrasia, minus Aquitaine and Provence. As Dagobert was yet but a child, he was placed under the authority of the mayor of the palace, Pippin, and Arnulf, bishop of Metz. At the death of Clotaire II. in 629, Dagobert wished to re-establish unity in the Frankish realm, and in 629 and 630 made expeditions into Neustria and Burgundy, where he succeeded in securing the recognition of his authority. In Aquitaine he gave his brother Charibert the administration of. the counties of Toulouse, Cahors, Agen, Perigueux, andSaintes; but at Charibert ‘s death in 632 Dagobert became sole ruler of the whole of the Frankish territories south of the Loire. Under him the Merovingian monarchy attained its culminating point. He restored to the royal domain the lands that had been usurped 1 by the great nobles and by the church; he maintained at Paris a luxurious, though, from the example he himself set, a disorderly court; he was a patron of the arts, and delighted in the exquisite craftsmanship of his treasurer, the goldsmith St Eloi. His authority was recognized through the length and breadth of the realm. The duke of the Basques came to his court to swear fidelity, and at his villa at Clichy the chief of the Bretons of Domnone promised obedience. He intervened in the affairs of the Visigoths of Spain and the Lombards of Italy, and was heard with deference. Indeed, as a sovereign, Dagobert was reckoned superior to the other barbarian kings. He entered into relations with the eastern empire, and swore a ” perpetual peace ” with the emperor Heraclius; and it is probable that the two sovereigns took common measures against the Slav and Bulgarian tribes,: which ravaged in turn the Byzantine state and the German territories subject to the Franks. Dagobert protected the church and placed illustrious prelates at the head of the bishoprics — Eloi (Eligius) at Noyon, Ouen

(Audoenus) at Rouen, and Didier (Desiderius) at Cahors. His reign is also marked by the creation of numerous monasteries and by renewed missionary activity in Flanders and among the Basques. ■ He died on the 19th of January 639, and was buried at St Denis. After his death the Frankish monarchy was again divided. In 634 he had been obliged to give the Austrasians a special king in the person of his eldest son Sigebert, and at the birth of a second son, Clovis, in 635, the Neustrians had immediately claimed him as king. Thus the unification of the realm, which Dagobert had re- established with so much pains, was annulled.

See the Chronicon of Fredegarius; " Gesta Dagoberti I. regis Fran- corum " in Mon. Germ. hist. Script, rer. Meroving. vol. ii. edited by B. Krusch; J. H. Albers, Konig Dagobert in Gesch., Legende, uhd Sage (2nd ed., Kaiserslautern, 1884); E. Vacandard, Vie de Saint Ouen, evique de Rouen (Paris, 1901) ; and H. E. Bonnell, Die Anfdnge des karqling. Hauses (Berlin, 1866). (C. Pf.)

DAGON, a god of the Philistines who had temples at Ashdod (1 Sam. v. 1), and Gaza (Judg. xvi. 21, 23); the former was destroyed by Jonathan, the brother of Judas the . Maccabee (1 Mace. x. 84; 148 B.C.). But Dagon was more than a mere local deity; there was a place called Beth-Dagon in Judah (Josh. xv. 41), another on the borders of Asher (ib. xix. 27), and a third underlies the modern Bet Dejan, south-east of Nablus. Dagon was in all probability an old Canaanite deity; it appears in the name of the Canaanite Dagantakala as early as the 15th century, and is possibly to be identified with the Babylonian god Dagan. Little is known of his cult (Judg. xvi. 23 seq.), although as the male counterpart of Ashtoreth (see Astarte) his worship

would scarcely differ from that of the Baalim (see Baai). The name Dagon seems to come from dag "fish," and that his idol was half-man- half -fish is possible from the ichthyomorphic representations found upon coins of Ascalon and Arvad, and from the fact that Berossus speaks of an Assyrian merman-god.

The true meaning of the name is doubtful. In 1 Sam. v. 4, Thenius and Wellhausen, followed by Robertson Smith and others, read "only his fish-part (dago) was left to him "; against this, see the comm. of H. P. Smith and Budde. The identification: of Dagon with the Babylonian Dagan is doubted by G. F. Moore (Encyc.Bib., col. 985), and that of the latter with Odacon and Ea-Oannes is questionable. Philo Byblius (Miiller^ Fr. Hist. Gra.ec. in. 567 seq.) makes Dagon the inventor of corn and the plough, whence he was called Zeus 'Apdrpios. This points to a natural though possibly late etymology from the Hebrew and Phoenician dagan " corn." It is not improbable that, at least in later times, Dagon had in place of, or in addition to, his old character, that of the god who presided over agriculture; for in the last days of paganism, as we learn from Marcus Diaconus in the Life of Porphyry of Gaza (§ 19); the great god of Gaza, now known as Marna (our Lord), was regarded as the god of rains and invoked against famine. That Marna was lineally descended from Dagon is probable in every way, and it is therefore interesting to note that he gave oracles, that he had a circular temple, where he was sometimes worshipped by human sacrifices, that there were wells in the sacred circuit, and that there was also a place of adoration to him situated, as was usual, outside the town. Certain " marmora " in the temple, which might not be, approached, especially by women, may perhaps be connected with the threshold which the priests of Dagon would not touch with their feet (1 Sam. v. 5, Zeph. i. 9). See further, the comm. on the Old Testament passages, Moore (loc. cit.), and Lagrange, Relig. semit. p. 131 seq.

DAGUERRE, LOUIS JACQUES MANDE (1789-1851), French, painter and physicist, inventor of the daguerreotype, was bom at Cormeilles, in the department of Seine-et-Oise, and died on the 12th of July 1851 at Petit-Brie-sur-Marne, near Paris. He was at first occupied as an inland revenue officer, but soon took to scene-painting for the opera. He assisted Pierre Prevost (1764- 1823) in the execution of panoramic views of Rome, Naples,

London, Jerusalem, and Athens, and subsequently (July 11, 1822)^ in conjunction with Bouton, he opened at Paris the Diorama (Sis, double; opana, view), an exhibition of pictorial views, the effect of which was heightened by changes in the light thrown upon them. An establishment similar to that at Paris was opened by Daguerre in Regent's Park, London. On the 3rd of March 1839 the Diorama, together with the work on which Daguerre was then engaged, was destroyed by fire. This reverse of fortune was soon, however, more than compensated for by the distinction he achieved as the inventor of the daguerreotype phonographic process. J. Nicephore Niepce, who since 1814 had been seeking a means of obtaining permanent pictures by the action of sunlight, learned in 1826 that Daguerre was similarly occupied. In 1829 he communicated to Daguerre particulars of his method of fixing the images produced in the camera lucida by making use of metallic plates coated with a composition pf asphalt and oil of lavender; this, where acted on by the light, remained undissolved when the plate was plunged into a mixture of petroleum and oil of lavender, and the development of the image was effected by the action of acids and other chemical reagents on the exposed surface of the plate. The two investi: gators laboured together in the production of their " heliographic pictures " from 1829 until the death of Niepce in 1833. Daguerre, continuing his experiments, discovered eventually the process connected with his name. This, as he described it, consists of five operations: — the polishing of the silver plate; the coating of the plate with iodide of silver by submitting it for about 20 minutes to the action of iodine vapour; the projection of the image of the object upon the golden-coloured iodized surface, the development of the latent image by means of the vapour o(mercury; and, lastly, the fixing of the picture by immersing the plate in a. solution of sodium " hyposulphite " (sodium thiosulphate). On the 9th of January 1839, at a meeting of the Academy of Sciences, Arago dwelt on the importance of the discovery of the daguerreotype; and, in consequence of the

representations made by him and Gay Lussac to the French government, Daguerre was on the 15th of June appointed an officer of the Legion of Honour. On the same day a bill was presented to the chambers, according to the provisions of which

Daguerre and the heir of Niepce were to receive annuities of 6000 and 4000 francs respectively, on the condition that their process should be made known to the Academy. The bill having been approved at the meetings of the two chambers on the 9th of July and on the 2nd of August, Daguerre's process, together with his system of transparent and opaque painting, was pub- lished by the government, and soon became generally known (see Photography).

Daguerre's Historique et description des procedSs du daguerreotype el du diorama (Paris, 1839) passed through several editions, and was translated into English. Besides this he wrote an octavo work, entitled Nouveau mcyen de preparer la couche sensible des plaques destinies & recevoir les images photographiques (Paris, 1844).

DAGUPAN, a town and the most important commercial centre of the province of Pangasinan, Luzon, Philippine Islands, on a branch; of the Agno river near its entrance into the Gulf of Lingayen, 120 m. by rail N.N.W. of Manila. Pop. (1903), 20,357. It is served by the Manila & Dagupan railway. Dagupan has a healthy climate. It is the chief point of exportation for a very rich province, which produces sugar, indigo, Indian corn, copra, and especially rice. There are several rice mills here. Salt is an important export, being manufactured in salt water swamps and marshes throughout the province of Pangasinan (whose name, from asin, " salt," means " the place where salt is produced ■"). In these marshes grows the nipa palm, from which a liquor is distilled— there are a number of small distilleries here. Dagupan has a small shipyard in which sailing

vessels and steam launches are constructed. The principal language is Pangasinan.

DAHABEAH (also spelt dahabiya, dahabiyeh, dahabeeyah, &c), an Arabic word (variously derived from dahab, gold, and dahqb, one of the forms of the verb to go) for a native passenger boat used on the Nile. The typical form is that of a barge-like house : boat provided with sails, resembling the painted galleys represented on the tombs of the Pharaohs. Similar state barges were used by the Mahommedan rulers of Egypt, and from the circumstance that these vessels were ornamented with gilding is attributed the usual derivation of the name from gold. Before the introduction of steamers dahabeahs were generally used by travellers ascending the Nile, and they are still the favourite means of travelling for the leisured and wealthy classes. The modern dahabeah is often made of iron, draws about 2 ft. of water, and is provided with one very large and one small sail. According to size it provides accommodation for from two to a dozen passengers. Steam dahabeahs are also built to meet the requirements of tourists.

DAHL, HANS (1840-), Norwegian painter, was born at Hardanger. After being in the Swedish army he studied art at Karlsruhe and at Diisseldorf , being a notable painter of landscape and genre. His work has considerable humour, but his colouring is hard and rather crude. In 1889 he settled in Berlin. His pictures are very popular in Norway.

DAHL, JOHANN CHRISTIAN (1778-1857), Norwegian landscape painter, was born in Bergen. He formed his style without much tuition, remaining at Bergen till, he was twenty-four, when he left for the better field of Copenhagen, and ultimately settled in Dresden in 1818. He is usually included in the German school, although he was thus close on forty years of age when he finally tdbk up his abode in Dresden, where he was quickly received into the Academy and became professor. German landscape^painting was not greatly advanced at that time, and Dahl contributed to improve it. He

continued to reside in Dresden, though he travelled into Tirol and in Italy, painting many pictures, one of his best being that of the " Outbreak of Vesuvius, 1820." He was fond of extraordinary effects, as seen in his " Winter at Munich," and his " Dresden by Moonlight;" also the "Haven of Copenhagen," and the " Schloss of Fried- richsburg," under the same condition. At Dresden may be seen many of his works, notably a large picture called " Norway," and a " Storm at Sea." He was received into several academic bodies, and had the orders of Wasa and St Olaf sent him by the king of Norway and Sweden.

DAHL, MICHAEL (1656-1743), Swedish portrait painter, was born at Stockholm. He received his first professional education

from Ernst Klocke, who had a respectable position in that northern town, which, however, Dahl left in his twenty-second year. His first destination was England, where he did not long remain, but crossed over to Paris, and made his way at last to Rome, there taking up his abode for a considerable time, painting the portraits of Queen Christina and other celebrities. In 1688 he returned to England, and became for some years a dangerous rival to Kneller. He died in London. His portraits still exist in many houses, but his name is not always preserved with them. Nagler (Kiinstler -Lexicon) says those at Hampton Court and at Petworth contest the palm with those of the better known and vastly more employed painter.

DAHL (or DALE), VLADIMIR IVANOVICH (1802-1872), Russian author and philologist, was born of Scandinavian parent- age in 1802, and received his education at the naval cadets' in- stitution at St Petersburg. He joined the Black Sea fleet in 1819; but at a later date he entered the military service, and was thus engaged in the Polish campaign of 1831, and in the expedition against Khiva. He was afterwards appointed to a medical post in one of the government hospitals at St Petersburg, and was ultimately transferred to a situation in the civil

service. The latter years of his life were spent at Moscow, and he died there on November 3 (October 22), 1872. Under the name of Kossack Lugansky he obtained considerable fame by his stories of Russian life: — The Dream and the Waking, A Story of Misery, Happiness, and Truth, The Door-Keeper (Dvernik), The Officer's Valet (Denshchik). His greatest work, however, was a Dictionary of the Living Russian Tongue (Tolkovyi Slovar Zhivago Velikorus- skago Yasika), which appeared in four volumes between 1861 and 1866, and is of the most essential service to the student of the popular literature and folk-lore of Russia. It was based on the results of his own investigations throughout the various provinces of Russia,— investigations which had furnished him with no fewer than 4000 popular tales and upwards of 30,000 proverbs. Among his other publications may be mentioned Bemerkungen zu Zimmermann's Entwurf des Kriegstheaters Russlands gegen Khiwa, published in German at Orenburg, and a Handbook of Botany (Moscow, 1849).

A collected edition of his works appeared at St Petersburg in 8 volumes, 1 860-1 86 1.

DAHLBERG (Dahlbekgh), ERIK JOHANSEN, COUNT (1625-1703), Swedish soldier and engineer, was born at Stockholm. His early studies took the direction of the science of fortification, and as an engineer officer he saw service in the latter years of the Thirty Years' War, arid in Poland. As adjutant-general and engineer adviser to Charles X. (Gustavus), he had a great share in the famous crossing of the frozen Belts, and at the sieges of Copenhagen and Kronborg he directed the engineers. In spite of these, distinguished services, Dahlberg remained an obscure lieutenant-colonel for many years. His patriotism, however, proved superior to the tempting offers Charles II. of England made to induce him to enter the British service, though, in that age of professional soldiering, there was nothing in the offer that a man of honour could not accept. At last his talents were recognized, and in 1676 he became director-general of fortifica- tions. In the wars of the next twenty-five years Dahlberg

again rendered distinguished service, alike in attack (as at Helsingborg in 1677, and Dunamunde in 1700) and defence (as in the two sieges of Riga in 1 700) :■ and his work in repairing the fortresses of his own country, not less important, earned for him the title of the ” Vauban of Sweden.” He was also the founder of the Swedish engineer corps. He retired as field-marshal in 1 702, and died the following year.

Erik Dahlberg was responsible for the fine collection of drawings called Sueci’a antiqua et hodierna (Stockholm, 1660- 1716; 2nd edition, 1856; 3rd edition, 1864-1865), and assisted Pufendorf in his Histoire de Charles X Gustave. He wrote a memoir of his life (to be found in Svenska Bibliotek, 1757) and an account of the campaigns of Charles X. (ed. Lundblad, Stockholm,

1823).

DAHLGREN, JOHN ADOLF (1809-1870), admiral in the U.S. navy, was the son of the Swedish consul at Philadelphia, Pennsyl-

vania, and was born in that rity on the 13 th of November 1809. He entered the United States navy in 1826, and saw some service in the Civil War in command of the South Atlantic blockading squadron. But he was chiefly notable as a scientific officer. His knowledge of mathematics caused him to be employed on the coast survey in 1834. In 1837 his eyesight threatened to fail, he retired in 1838-1842, and in 1847 he was transferred to the ordnance department. In this post he applied himself to the improvement of the guns of the U.S. navy. He was the inventor of the smooth bore gun which bore his name, but was from its shape familiarly known as ” the soda water bottle.” It was used in the Civil War, and for several years afterwards in the United States navy. Dahlgren’s guns were first mounted in a

vessel named the ” Experiment,” which cruised under his command from 1857 till 1859. They were ” the first practical application of results obtained by experimental determinations of pressure at different points along the bore, by Colonel Bom- ford’s tests—that is by boring holes in the walls of the gun, through which the pressure acts upon other bodies, such as pistol balls, pistons, &c.” (Cf. article by J. M. Brooke in Hamersley’s Naval Encyclopaedia.) When the Civil War broke out, he was on ordnance duty in the Washington navy yard, and he was one of the three officers who did not resign from confederate sympathies. His rank at the time was commander, and the command could only by held by a captain. President Lincoln insisted on retaining Commander Dahlgren, and he was qualified to keep the post by special act of Congress. He became post-captain in 1862 and rear-admiral in 1863. He commanded the Washington navy yard when he died on the 1 2th of July 1870. A memoir of Admiral Dahlgren by his widow was published at Boston in 1882. (D. H.)

DAHLGREN, KARL FREDRIK (1791-1844), Swedish poet, was born at Stensbruk in Ostergotland on the 20th of June 1791. At a time when literary partisanship ran high in Sweden, and the writers divided themselves into ” Goths ” and ” Phosphorists,” Dahlgren made himself indispensable to the Phosphorists by his polemical activity. In the mock-heroic poem of Markalls somnlbsa natter (Markall’s Sleepless Nights), in which the Phos- phorists ridiculed the academician Per Adam Wallmark and others, Dahlgren, who was a genuine humorist, took a prominent part. In 1825 he published Babels Torn (The Tower of Babel) , a satire, and a comedy, Argus in Qlympen; and in 1828 two volumes of poems. In 1829 he was appointed to an ecclesiastical post in Stockholm, which he held until his death. In a series of odes and dithyrambic pieces, entitled Mollbergs Epistlar (1819, 1820), he strove to emulate the wonderful lyric genius of K. M. Bellman, of whom he was a student and follower. From 1825 to 1827 he edited a critical journal entitled Kometen (The Comet), and

in company with Almqvist he founded the Manhems-forbund, a short-lived society of agricultural socialists. In 1834 he collected his poems in one volume; and in 1837 appeared his last book, Angbats-Sanger (Steamboat Songs). On the 1st of May 1844 he died at Stockholm. Dahlgren is one of the best humorous writers that Sweden has produced; but he was perhaps at his best in realistic and idyllic description. His little poem of Zephyr and the Girl, which is to be found in every selection from Swedish poetry, is a good example of his sensuous and ornamented style.

His works were collected and published after his death by A. J. Arwidsson (5 vols., Stockholm, 1847-1852),

DAHLIA, a genus of herbaceous plants of the natural order Comppsitae, so called after Dr Dahl, a pupil of Linnaeus. The genus contains about nine species indigenous in the high sandy plains of Mexico. The dahlia was first introduced into Britain from Spain in 1789 by the marchioness of Bute. The species was probably D. variabilis, whence by far the majority of the forms now common have originated. The flowers, at the time of the first introduction of the plant, were single, with a yellow disk and dull scarlet rays; under cultivation since the beginning of the 19th century in France and England, flowers of numerous brilliant hues have been produced. The flower has been modified also from a flat to a globular shape, and the arrangement of the

florets has been rendered quite distinct in the ranunculus and anemone-like kinds. The ordinary natural height of the dahlia is about 7 or 8 ft., but one. of the dwarf races grows to only 18 in. With changes in the flower, changes in the shape of the seed have been brought about by cultivation; varieties of the plant have been produced which require more moisture than others; and the period of flowering has been made considerably earlier. In 1808 dahlias were described as flowering from September to November, but some of the dwarf varieties at present grown are in full blossom in

the middle of June.

The large number of varieties may be classed as under the following heads: (1) Single dahlias. These have been derived from D. coccinea; they have a disk of tubular florets surrounded by the large showy ray florets. (2) Show dahlias, large and double with flowers self-coloured or pale-coloured and edged or tipped with a darker colour. (3) Fancy dahlias, resembling the show but having the florets striped or tipped with a second tint. (4) Bouquet or Pompon dahlias, with much smaller double flowers of various colours. (5) Cactus dahlias, derived from D. Juarezi, a form which has given rise to a beautiful race with pointed starry flowers. (6) Paeony-flowered dahlias, a new but not pretty race, with large floppy heads, broad florets and several disk florets in centre.

New varieties are procured from seed, which should be sown in pots or pans towards the end of March, and placed in a hotbed or propagating pit, the young plants being pricked off into pots or boxes, and gradually hardened off for planting out in June; they will flower the same season if the summer is a genial one. The older varieties are propagated by dividing the large tuberous roots, in doing which care must be taken to leave an eye to each portion of tuber, otherwise it will not grow. Rare varieties are sometimes grafted on the roots of others. The best and most general mode of propagation is by cuttings, to obtain which, the old tubers are placed in heat in February, and as the young shoots, which rise freely from them, attain the height of 3 in., they are taken off with a heel, and planted singly in small pots fiDed with fine sandy soil, and plunged in a moderate heat. They root speedily, and are then transferred to larger pots in light rich soil, and their growth encouraged until the planting-Out season arrives, about the middle of June north of the Thames.

Dahlias succeed best in an open situation, and in rich deep loam, but there is scarcely any garden soil in which they will not thrive, if it is

manured. For the production of fine show flowers the ground must be deeply trenched, and well manured annually. The branches as well as the blossoms require a considerable but judicious amount of thinning; they also need shading in some cases. The plants should be protected from cold winds, and when Watered the whole of the foliage should be wetted. They may stand singly like common border flowers, but have the most imposing appearance when seen in masses arranged according to their height. Florists usually devote a plot of ground to them, and plant them in lines 5 to 10 ft. apart. This is done about the beginning of June, sheltering them if necessary from late frosts by inverted pots or in some other convenient way. Old roots often throw up a multitude of stems, which render thinning necessary. As the plants increase in height, they are furnished with strong stakes, to secure them from high winds. Dahlias flower on till they are interrupted by frost in autumn. The roots are then taken up, dried, and stored in a cellar, or some other place where they may be secure from frost and moisture. Ear- wigs are very destructive, eating out the young buds and florets. Small flower-pots half filled with dry moss and inverted on stakes placed among the branches, form a useful trap.

DAHLMANN, FRIEDRICH CHRISTOPH (1785-1860), German historian and politician, was born on the 13th of May 1785; he came of an old Hansearic family of Wismar, which then belonged to Sweden. His father, who was the burgomaster of the town, intended him to study theology, but his bent was towards classical philology, and this he studied from 1802 to 1806 at the universities of Copenhagen and Halle, and again at Copenhagen. After finishing his studies, he translated some of the Greek tragic poets, and the Clouds of Aristophanes. But he

was also interested in modern literature and philosophy; and the troubles of the times, of which

he had personal experience, aroused in him, as in so many of his contemporaries, a strong feeling of German patriotism, though throughout his life he was always proud of his connexion with Scandinavia, and Gustavus Adolphus was his particular hero. In 1809, on the news of the outbreak of war in Austria, Dahlmann, together with the poet Heinrich von Kleist, whom he had met in Dresden, went to Bohemia, and was afterwards with the Imperial army, up till the battle of Aspern, with the somewhat vague object of trying to convert the Austrian war into a German one. This hope was shattered by the defeat of Wagram. He now decided to try his fortunes in Denmark, where he had influential relations. After taking his doctor's degree at Wittenberg (1810) he qualified at Copenhagen in 1811, with an essay on the origins of the ancient theatre, as a lecturer on ancient literature and history, on which he delivered lectures in Latin. His influential friends soon brought him further advancement. As early as 181 2 he was summoned to Kiel, as successor to the historian Dietrich Her- mann Hegewisch (1746-1812). This appointment was in two respects a decisive moment in his career; on the one hand it made him give his whole attention to a subject for which he was admirably suited, but to which he had so far given only a secondary interest; and on the other hand, it threw him into politics.

In 1815 he obtained, in addition to his professorate, the position of secretary to the perpetual deputation of the estates of Schleswig-Holstein. In this capacity he began, by means of memoirs or of articles in the Kieler Blatter, which he founded himself, to appear as an able and zealous champion of the half -forgotten rights of the Elbe duchies, as against Denmark, and of their close connexion with Germany. It was he upon whom the Danes afterwards threw the blame of having invented the Schleswig-Holstein question; certainly his activites form an important link in the chain of events which eventually led to the solution of 1864. So far as this interest affected himself, the chief profit lay in the fact that it deepened his

conception of the state, and directed it to more practical ends. Whereas at that time mere speculation dominated both the French Liberalism of the school of Rotteck, and Karl Ludwig von Haller's Romanticist doctrine of the Christian state, Dahl- mann took as his premisses the circumstances as he found them, and evolved the new out of the old by a quiet process of develop- ment. Moreover, in the inevitable conflict with the Danish crown his upright point of view and his German patriotism were further confirmed. After his transference to Gottingen in 1829 he had the opportunity of working in the same spirit. As confidant of the duke of Cambridge, he was allowed to take a share in framing the Hanoverian constitution of 1833, which remodelled the old aristocratic government in a direction which had become inevitable since the July revolution in Paris; and when in 1837 the new king Ernest Augustus declared the con- stitution invalid, it was Dahlmann who inspired the famous protest of the seven professors of Gottingen. He was deprived of his position and banished, but he had the satisfaction of knowing that German national feeling received a mighty impulse from his courageous action, while public subscriptions prevented him from material cares.

After he had lived for several years in Leipzig and Jena, King Frederick William IV. appointed him in October 1842 to a professorship at Bonn. The years that followed were those of his highest celebrity. His Politik (1835) had already made him a great name as a writer; he now published his Danische Geschichte (1840–1843), a historical work of the first rank; and this was soon followed by histories of the English and French revolutions, which, though of less scientific value, exercised a decisive influence upon public opinion by their open advocacy of the system of constitutional monarchy. As a teacher too he was much beloved. Though no orator, and in spite of a person- ality not particularly amiable or winning, he produced a profound impression upon young men by the pregnancy of his expression, a consistent logical method of thought

based on Kant and by

the manliness of his character. When the revolution of 1848 broke out, the " father of German nationality," as the pro- visional government at Milan called him, found himself the centre of universal interest. Both Mecklenburg and Prussia offered him in vain the post of envoy to the diet of the confederation. Naturally, too, he was elected to the national assembly at Frankfort, and took a leading part in the constitutional com- mittees appointed first by the diet, then by the parliament. His object was to make Germany as far as possible a united constitu- tional monarchy, with the exclusion of the whole of Austria, or at least, of its non-German parts. Prussia was to provide the emperor, but at the same time— and in this lay the doctrinaire weakness of the system — was to give up its separate existence, consecrated by history, in the same way as the other states. When, therefore, Frederick William IV., without showing any anxiety to bind himself by the conditions laid down at Frankfort, concluded with Denmark the seven months' truce of Malmo (26th August 1848), Dahlmann proposed that the national parliament should refuse to recognize the truce, with the express intention of clearing up once for all the relations of the parlia- ment with the court of Berlin. The motion was passed by a small majority (September 5th); but the members of Dahl- mann's party were just those who voted against it, and it was they who on the 17th of September reversed the previous vote and passed a resolution accepting the truce, after Dahlmann had failed to form a ministry on the basis of the resolution of the 5th, owing to his objection to the Radicals. Dahlmann afterwards described this as the decisive turning-point in the fate of the parliament. He did not, however, at once give up all hope. Though he took but little active part in parliamentary debates, he was very active on commissions and in party conferences, and it was largely owing to him that a German constitution was at last evolved, and that Frederick William IV. was elected hereditary emperor (28th of March 1849). He

was accordingly one of the deputation which offered the crown to the king in Berlin. The king's refusal was less of a surprise to him than to most of his colleagues. He counted on being able to compel recognition of the constitution by the moral pressure of the consent of the people. It was only when the attitude of the Radicals made it clear to him that this course would lead to a revolution, that he decided, after a long struggle, to retire from the national parliament (21st May). He was still, however, one of the chief promoters of the well-known conference of the imperial party at Gotha, the proceedings of which were not, however, satisfactory to him; and he took part in the sessions of the first Prussian chamber (1840-1850) and of the parliament of Erfurt (1850). But finally, convinced that for the moment all efforts towards the unity of Germany were unavailing, he retired from political life, though often pressed to stand for election, and again took up his work of teaching at Bonn. His last years were, however, saddened by illness, bereavement and continual friction with his colleagues. His death took place on the 5th of December i860, following on an apoplectic fit. He was a man whose personality had contributed to the progress of the world, and whose teaching was to continue to exercise a far- reaching influence on the development of German affairs.

His chief works were: — Quellenkunde der deutschen Geschichte nach der Folge der Begebenheiten geordnet (1830, 7th edition of Dahlmann- Waitz, Quellenkunde, Leipzig, 1906); Politik, auf den Grund und das Mass der gegebenen Zustdnde zuriickgefuhrt (1 vol., 1835); Geschichte Danemarks (3 vols., 1840- 1843); Geschichte der englischen Revolution (1844); Geschichte der franzosischen Revolution (1845).

See A. Springer, Friedreich Christoph Dahlmann (2 vols., 1870- 1872) ; and H. v. Treitschke, Histor. und polit. Aufsdtze, i. 365 et seq. (F. Lu.)

DAHLSTJERNA, GUNNO (1661-1709), Swedish poet, whose original surname was Eurelius, was born on the 7th of September 1661 in the parish of Ohr in Dalsland,

where his father was rector. He entered the university of Upsala in 1677, and after gaining his degree entered the government office of land-surveying. He was sent in 1681 on professional business to Livonia,

then under Swedish rule. A dissertation read at Leipzig in 1687 brought him the offer of a professorial chair in the university, which he refused. Returning to Sweden he executed commissions ip land-surveying directed by King Charles XI., and in 1699 he became head of the whole department. In 1702 he was ennobled under the name of Dahlstjerna. He wandered over the whole of the coast of the Baltic, Livonia, Rugen and Pomerania, preparing maps which still exist in the office of public land-surveying in Stockholm. His death, which took place in Pomerania on his forty-eighth birthday, 7 th of September 1709, is said to have been hastened by the disastrous news of the battle of Poltava. Dahlstjerna's patriotism was touching in its pathos and intensity, and during his long periods of pro- fessional exile he comforted himself by the composition of songs to his beloved Sweden. His genius was most irregular, but at his best he easily surpasses all the Swedish poets of his time. : His best-known original work is Kungaskald (Stettin, 1697), an elegy on the death of Charles XI. It is written in alexandrines, arranged in oitava rima. The poem is pompous and allegorical, but there are passages full of melody and high thoughts. Dahlstjerna was a reformer in language, and it has been well; said by Atterbom that in this poem "he treats the Swedish: speech just as dictatorially as Charles XL and Charles XII. treated the Swedish nation." In 1690 was printed at Stettin 1 his paraphrase of the Pastor Fido of Guarini. His most popular work is his Gotha kdmpavisa om Konungen och Herr Peder (The Goth's Battle Song, concerning the King and Master Peter; Stockholm, 1701). The King is Charles XII. and Master Peter is the tsar of

Russia. This spirited ballad lived almost until our own days on the lips of the people as a folk-song.

The works of Dahlstjerna have been collected by P. Hanselli, in the Samlade Vilterhetsarbeten af svenska Forfattare frdn Stjernhjelm till Dalin (Upsala, 1856, &c).

DAHN, JULIUS SOPHUS FELIX (1834-), German historian, jurist and poet, was born on the 9th of February 1834 in Hamburg, where his father, Friedrich Dahn , was a leading actor at the city theatre. His mother, Constance Dahn, nSe Le Gay, was a noted actress. In 1834 the family moved to Munich, where the parents took leading roles in the classical German drama, until they retired from the stage: the mother in 1865 and the father in 1878. Felix Dahn studied law and philosophy in Munich and Berlin from 1849 to 1853. His first works were in jurisprudence, Uber die Wirkung der Klagver jakrung bei Obligationen. (Munich, 1855), and Studien zur Ge- schichte der germanischen Gottesurteile (Munich, 1857). In 1857 he; became docent in German law at Munich university, and in 1862 professor-extraordinary, but in 1863 was called to Wiirzburg to; a full professorship. In 1872 he removed to the university of Konigsberg, and in 1888 settled at Breslau, becoming rector of, the university in 1895. Meanwhile in addition to many legal works of high standing, he had begun the publication of that long series of histories and historical romances which has made his name a household word in Germany. The great history of the German migrations, Die Konige der Germanen, Bande i.-vi. (Munich and Wiirzburg, 1861-1870), Bande viL-xi. (Leipzig, 1 894- 1 908), was a masterly study in constitutional ■ history as we.ll as a literary work of high merit, which carries the narrative ; down to the dissolution of the Carolingian empire. In his Urgeschichte der germanischen und romanischen Volker (Berlin, 1 881-1890), Dahn went a step farther back still, but here as in his Geschichte der deutschen Urzeit (Gotha, 1883-1888), a wealth of picturesque detail has been worked over and resolved into history with such imaginative insight and critical skill as to

make real and present the indistinct beginnings of German society. To- gether with these larger works Dahn wrote many monographs and studies upon primitive German society. Many of his essays were collected in a series of six volumes entitled Bausteine (Berlin, 1879-1884). Not less important than his histories are the historical romances, the best-known of which, Ein Kampf urn Rom, in four volumes (Leipzig, 1876), which has gone through many later editions, was also the first of the series: Others are Odhins Trost (Leipzig, 1880); Die Kreuzfahrer (Leipzig, 1884);

Odhins Roche (Leipzig, 1891); Julian der Abtrilnnige (Leipzig, 1894), and one of the most popular, Biszum Tode getreu (Leipzig, 1887). The list is too long to be given in full, yet almost all are well-known. Parallel with this great production of learned and imaginative works, Dahn published some twenty small volumes of poetry. The most notable of these are the epics of the early German period. His wife Therese, ne'e Freiin von Droste- Hiilshoff , was joint-author with him of W alkali, Germanische Gbtter und Heldensagen (Leipzig, 1898).

A collected edition of his works of fiction, both in prose and verse, has reached twenty-one volumes (Leipzig, 1898), and a new edition was published in 1901. Dahn also published four volumes of memoirs, Erinnerungen (Leipzig, 1890-1895)..

DAHOMEY (Fr. Dahome), a country of West Africa, formerly an independent kingdom, now a French colony. Dahomey is bounded S. by the Gulf of Guinea, E. by Nigeria (British), N. and N. W. by the French possessions on the middle Niger, and W. by the German colony of Togoland. The French colony extends far north of the limits of the ancient kingdom of the same name. With a coast-line of only 75 m. (i° 38' E. to 2 46' 55" E.), the area of the colony is about 40,000 sq. m., and the population over 1,000,000. As far as 9 ° N. the width of the colony is no greater than the coast-line. From this point, the colony broadens out both eastward and westward, attaining a maximum width of 200 m. It includes the

western part of Borgu (q.v.), and reaches the Niger at a spot a little above Mo. Its greatest length N. to S. is 430 m.

Physical Features. -^-The littoral, part of the old Slave Coast (see Guinea), is very low, sandy and obstructed by a bar. Behind the seashore is a line of lagoons, where small steamers can ply; east to west they are those of Porto Novo (or Lake Nokue), Whydah and Grand Popo. The Weme (300 m. long), known in its upper course as the Ofe, the most important river running south, drains the colony from the Bariba country to Porto Novo, entering the lagoon so named. The Zu is a western affluent of the Weme. Farther west is the Kuffu (150 m. long), which, before entering the Whydah lagoon, broadens out into a lake or lagoon called Aheme, 20 m. long by 5 m, broad. The Makru and Kergigoto, each of which has various affluents, flow north- east to the Niger, which in the part of its course forming the north-east frontier of the colony is only navigable for small vessels and that with great difficulty (see Niger) .

For some 50 m. inland the country is flat, and, after the first mile or two of sandy waste is passed, covered with dense vegeta- tion. At this distance (50 m.) from the coast is a great swamp known as the Lama Marsh. It extends east to west some 25 m. and north to south 6 to 9 m. North of the swamp the land rises by regular stages to about 1650 ft., the high plateau falling again to the basin of the Niger. In the north-west a range of hills known as the Atacora forms a watershed between the basins of the Weme, the Niger and the Volta. A large part of the interior consists of undulating country, rather barren, with occasional patches of forest. The forests contain the baobab, the coco-nut palm and the oil palm. The fauna resembles that of other parts of the West Coast, but the larger wild animals, such as the elephant and hippopotamus, are rare. The lion is found in the regions bordering the Niger. Some kinds of antelopes are common; the buffalo has disappeared.

Climate. — The climate of the coast regions is very hot and moist. Four seasons are well marked: the harmattan or long dry season, from the 1st December to the 15th March; the season of the great rains, from the 15th March to the 15th July; the short dry season, from the 15th July to the 15th September; and the "little rains," from the 15th September to the 1st December. Near the sea the average temperature is about 80° F. The harmattan prevails for several days in suc- cession, and alternates with winds from the south and south- west. During its continuance the thermometer falls about 10°, there is not the slightest moisture in the atmosphere, vegetation dries up or droops, the skin parches and peels, and all woodwork is liable to warp and crack with a loud report. Tornadoes occur occasionally. During nine months of the year the climate is tempered by a sea-breeze, which is felt as far inland as Abomey

(60 m.). It generally begins in the morning, and in the summer it often increases to a stiff gale at sundown. In the interior there are but two seasons: the dry season (November to May) and the rainy season (June to October). The rains are more scanty and diminish considerably in the northern regions.

Inhabitants. ^-The inhabitants of the coast region are of pure negro stock. The Dahomeyans (Dahomi), who inhabit the central part of the colony, form one of eighteen closely-allied clans occupying the country between the Volta and Porto Novo, and from their common tongue known as the Ewe-speaking tribes. In their own tongue Dahomeyans are called Fon or Fawin. They are tall and well-formed, proud, reserved in demeanour, polite in their intercourse with strangers, warlike and keen traders. The Mina, who occupy the district of the Popos, are noted for their skill as surf-men, which has gained for them the title of the Krumen of Dahomey. Porto Novo is in- habited by a tribe called Nago, which has an

admixture of Yoruba blood and speaks a Yoruba dialect. The Nago are a peaceful tribe and even keener traders than the Dahomi. In Whydah and other coast towns are many mulattos, speaking Portuguese and bearing high-sounding Portuguese names. In the north the inhabitants — Mahi, Bariba, Gurmai, — are also of Negro stock, but scarcely so civilized as the coast tribes. Settled among them are communities of Fula and Hausas. There are many converts to Islam in the northern districts, but the Mahi and Dahomeyans proper are nearly all fetish worshippers.

Chief Towns. — The chief port and the seat of government is Kotonu, the starting-point of a railway to the Niger. An iron pier, which extends well beyond the surf, affords facilities for shipping. Kotonu was originally a small village which served as the seaport of Porto Novo and was burnt to the ground in 1890. It has consequently the advantage of being a town laid out by Europeans on a definite plan. Situated on the beach between the sea and the lagoon of Porto Novo, the soil consists of heavy sand. Good hard roads have been made. Owing to an almost continuous, cool, westerly sea-breeze, Kotonu is, in comparison with the other coast towns, decidedly healthy for white men. Porto Novo (pop. about 50,000), the former French headquarters and chief business centre, is on the northern side of the lagoon of the same name and 20 m. north-east of Kotonu by water. The town has had many names, and that by which it is known to Europeans was given by the Portuguese in the 17th century. It contains numerous churches and mosques, public buildings and merchants' residences. Whydah, 23 m. west of Kotonu, is an old and formerly thickly-populated town. Its population is now about 15,000. It is built on the north bank of the coast lagoon about 2 m. from the sea. There is no harbour at the beach, and landing is effected in boats made expressly to pass through the surf, here particularly heavy. Whydah, during the period of the slave-trade, was divided into five quarters: the English, French, Portuguese, Brazilian and native. The three first quarters once had formidable forts, of which the French fort alone

survives. In consequence of the thousands of orange and citron trees which adorn it, Whydah is called " the garden of Dahomey." West of Whydah, on the coast and near the frontier of Togoland, is the trading town of Grand Popo. Inland in Dahomey proper are Abomey (q.v.), the ancient capital, Allada, Kana (formerly the country residence and burial-place of the kings of Dahomey) and Dogba. In the hinterland are Carnot- ville (a town of French creation), Nikki and Paraku, Borgu towns, and Garu, on the right bank of the Niger near the British frontier, the terminus of the railway from the coast.

Agriculture and Trade. — The agriculture, trade and commerce of Dahomey proper are essentially different from that of the hinterland (Haut Dahome). The soil of Dahomey proper is naturally fertile and is capable of being highly cultivated. It consists of a rich clay of a deep red colour. Finely-powdered quartz and yellow mica are met with, denoting the deposit of disintegrated granite from the interior. The principal product is palm-oil, which is made in large quantities throughout the country. The district of Toffo is particularly noted for its oil-palm orchards. Palm-wine is also made, but the manufacture

is discouraged as the process destroys the tree. Next to palm-oil the principal vegetable products are maize, guinea-corn, cassava^ yams, sweet potatoes, plantains, coco-nuts, oranges, limes and the African apple, which grows almost wild. The country also produces ground-nuts, kola-nuts, pine-apples, guavas, spices of all kinds, ginger, okros [Hibiscus), sugar-cane, onions, tomatoes and papaws. Plantations of rubber trees and vines have been : made. Cattle, sheep, goats and fowls are scarce. There is a large fishing industry in the lagoons. Round the villages, and here and there in the forest, clearings are met with, cultivated in places, but agriculture is in a backward condition. In the grassy uplands of the interior cattle and horses thrive, and cotton of a fairly good quality is grown by the inhabitants for their own use. The prosperity of the country depends chiefly on the

export of palm-oil and palm-kernels. Copra, kola-nuts, rubber and dried fish are also exported, the fish going to Lagos. The adulteration of the palm-kernels by the natives, which became a serious menace to trade, was partially checked (1900- 1903) by measures taken to ensure the inspection of the kernels before shipment. Trade is mainly with Germany and Great Britain, a large proportion of the cargo passing through the British port of Lagos. Only some 25 % of the commerce is with France. Cotton goods (chiefly from Great Britain), machinery and metals, alcohol (from Germany) and tobacco are the chief imports. The volume of trade, which had increased from £701,000 in 1898 to £1,230,000 in 1902, declined in 1903 to £826,000 in consequence of the failure of rain, this causing a decrease in the production of palm-oil and kernels. In 1904 the total rose to £873,399. In 1905 the figure was £734,667, and in 1907 £853,051. By the Anglo-French Convention of 1898 the imposition of differential duties on goods of British origin was forbidden for a period of thirty years from that date.

Communications. — The Dahomey railway from Kotonu to the Niger is of metre gauge (3-28 ft.). Work was begun in 1900, and in 1902 the main line was completed to Toffo, a distance of 55 m. Some difficulty was then encountered in crossing the Lama Marsh, but by the end of 1905 the railway had been carried through Abomey to Pauignan, 120 m. from Kotonu. In 1907 the rails had reached Paraku, 150 m. farther north. A branch ' railway from the main line serves the western part of the colony. It goes via Whydah to Segborue on Lake Aheme. Besides the railways, tramway lines exist in various parts. of Dahomey. One, 28 m. long, runs from Porto Novo through the market-town of Adjara to Sakete, close to the British frontier in the direction of Lagos. This .line serves a belt of country rich in oil-palms. Kotonu is a regular port of call for steamers from Europe to the. West Coast, and there is also regular steamship communication along the lagoons between Porto Novo and Lagos. There is a steamboat service between Porto Novo and Kotonu. A telegraph

line connects Kotonu with Abomey, the Niger and Senegal. ,

Administration. — The colony is administered by a lieutenant governor, assisted by a council composed of official and unofficial members. The colony is divided into territories annexed, territories protected, and " territories of political action," but for administrative purposes the division is into "circles" or provinces. Over each circle is an administrator with extensive powers. Except in the annexed territories the native states are maintained under French supervision, and native laws and customs, as far as possible, retained. Natives, however, may place themselves under the jurisdiction of the French law. Such natives are known as " Assimilfis." In general the adminis- trative system is the same as that for all the colonies of French West Africa (q.v.). The chief source. of revenue is the customs, while the capitation tax contributes most to the local budget.

History. — The kingdom of Dahomey, like those of Benin and Ashanti, is an instance of a purely negro and pagan state, endowed with a highly organized government, and possessing a certain amount of indigenous civilization and culture. Its history begins about the commencement of the 17th century. At that period the country now known as Dahomey was included in the extensive kingdom of Allada or Ardrah, of which the capital was the present town of Allada, on the road from Whydah

to Abomey. Allada became dismembered on the death of a reigning sovereign, and three separate kingdoms were constituted under his three sons. One state was formed by one brother round the old capital of Allada, and retained the name of Allada or Ardrah; another brother migrated to the east and formed a state known under the name of Porto Novo; while the third brother, Takudonu, travelled northwards, and

after some vicissitudes established the kingdom of Dahomey. The word Dahomey means " in Danh's belly," and is explained by the following legend which, says Sir Richard Burton, " is known (1864) to everybody in the kingdom." Takudonu having settled in a town called Uhwawe encroached on the land of a neighbouring chief named Danh (the snake). Takudonu wearied Danh by perpetual demands for land, and the chief one day exclaimed in anger " soon thou wilt build in my belly." So it came to pass. Takudonu slew Danh and over his grave built himself a palace which was called Dahomey, a name thenceforth adopted by the new king's followers. About 1724-1728 Dahomey, having become a powerful state, invaded and conquered successively Allada and Whydah. The Whydahs made several attempts to recover their freedom, but without success; while on the other hand the Dahomeyans failed in all their expeditions against Grand Popo, a town founded by refugee Whydahs on a lagoon to the west. It is related that the repulses they met with in that quarter led to the order that no Dahomeyan warrior was to enter a canoe. • Porto Novo at the beginning of the 19th century became tributary to Dahomey.

Such was the state of affairs at the accession of King Gezo about the year 1818. This monarch, who reigned forty years, raised the power of Dahomey to its highest pitch, extending greatly the border of his kingdom to the north. He boasted of having first organized the Amazons, a force of women to whom he attributed his successes. The Amazons, however, were state soldiery long before Gezo's reign, and what that monarch really did was to reorganize and strengthen the force.

In 1851 Gezo attacked Abeokuta in the Yoruba country and the centre of the Egba power, but was beaten back. In the same year the king signed a commercial treaty with France, in which Gezo also undertook to preserve " the integrity of the territory belonging to the French fort " at Whydah. The fort referred to was one built in the 17th century, and in 1842 made over to a French mercantile house. England, Portugal arid Brazil also had " forts " at Whydah — all in a

ruinous condition and ungarrisoned. But when in 1852 England, to prevent the slave-trade, blockaded the Dahomeyan coast, energetic protests were made by Portugal and France, based on the existence of these " forts." In 1858 Gezo died. He had greatly reduced the custom of human sacrifice, and left instructions that after his death there was to be no general sacrifice of the palace women.

Gezo was succeeded by his son Glegle (or Gelele) , whose attacks on neighbouring states, persecution of native Christians, and encouragement of the slave-trade involved him in difficulties with Great Britain and with France. It was, said Earl Russell, foreign secretary, to check " the aggressive spirit of the king of Dahomey " that England in 1861 annexed the island of Lagos. Nevertheless in the following year Glegle captured Ishagga and in 1864 unsuccessfully attacked Abeokuta, both towns in the Lagos hinterland. In 1863 Commander Wilmot, R.N., and in 1864 Sir Richard Burton (the explorer and orientalist) were sent on missions to the king, but their efforts to induce the Dahomeyans to give up human sacrifices, slave-trading, &c. met with no success. In 1863, however, a step was taken by France which was the counterpart of the British annexation of Lagos. In that year the kingdom of Porto Novo accepted a French protectorate, and an Anglo-French agreement of 1864 fixed its boundaries. This protectorate was soon afterwards abandoned by Napoleon III., but was re-established in 1882. At this period the rivalry of European powers for possessions in Africa was becoming acute, and German agents appeared on the Dahomeyan coast. However, by an arrangement concluded in 1885, the German protectorate in Guinea was confined to

Togo, save for the town of Little Popo at the western end of the lagoon of Grand Popo. In January 1886 Portugal — in virtue of her ancient rights at Whydah — announced that she had assumed a protectorate over the Dahomeyan coast, but she was induced by France to withdraw her protectorate in December 1887. Finally, the last international difficulty in the way of France was removed by the

Anglo-French agreement of 1889, whereby Kotonu was surrendered by Great Britain. France claimed rights at Kotonu in virtue of treaties concluded with Glegle in 1868 and 1878, but the chiefs of the town had placed themselves under the protection of the British at Lagos.

With the arrangements between the European powers the Dahomeyans had little to do, and in 1889, the year in which the Anglo-French agreement was signed, trouble arose between Glegle and the French. The Dahomeyans were the more con- fident, as through German and other merchants at Whydah they were well supplied with modern arms and ammunition. Glegle claimed the right to collect the customs at Kotonu, and to depose the king of Porto Novo, and proceeded to raid the territory of that potentate (his brother). A French mission sent to Abomey failed to come to an agreement with the Dahomeyans, who attributed the misunderstandings to the fact that there was no longer a king in France! G16gle died on the 28th of December 1889, two days after the French mission had left his capital. He was succeeded by his son Behanzin. A French force was landed at Kotonu, and severe fighting followed in which the Amazons played a conspicuous part. In October 1890 a treaty was signed which secured to France Porto Novo and Kotonu, and to the king of Dahomey an annual pension of £800. It was unlikely that peace on such terms would prove lasting, and Behanzin's slave-raiding expeditions led in 1892 to a new war with France. General A. A. Dodds was placed in command of a strong force of Europeans and Senegalese, and after a sharp campaign during September and October completely defeated the Dahomeyan troops. Behanzin set fire to Abomey (entered by the French troops on the 17th of November) and fled north. Pursued by the enemy, abandoned by his people, he surrendered unconditionally on the 25th of January 1894, and was deported to Martinique, being transferred in 1906 to Algeria, where he died on the 10th of December of the same year.

Thus ended the independent existence of Dahomey. The French divided the kingdom in two — Abomey and

Allada— placing on the throne of Abomey a brother of the exiled monarch. Chief among the causes which led to the collapse of the Dahomeyan kingdom was the system which devoted the flower of its womanhood to the profession of arms.

Whydah and the adjacent territory was annexed to France by General Dodds on the 3rd of December 1892, and the rest of Dahomey placed under a French protectorate at the same time. The prince who had been made king of Abomey was found intriguing against the French, and in 1900 was exiled by them to the Congo, and with him disappeared the last vestige of Dahomeyan sovereignty.

Dahomey conquered, the French at once set to work to secure as much of the hinterland as possible. On the north they pene- trated to the Niger, on the east they entered Borgu (a country claimed by the Royal Niger Company for Great Britain), on the west they overlapped the territory claimed by Germany as the hinterland of Togo. The struggle with Great Britain and Ger- many for supremacy in this region forms one of the most in- teresting chapters in the story of the partition of Africa. In the result France succeeded in securing a junction between Dahomey and her other possessions in West Africa, but failed to secure any part of the Niger navigable from the sea (see Africa: History, and Nigeria). A Franco-German convention of 1897 settled the boundary on the west, and the Anglo-French convention of the 14th of June 1898 defined the frontier on the east. In 1899, on the disintegration of the French Sudan, the districts of Fada N'Gurma and Say, lying north of Borgu, were added to Dahomey, but in 1907 they were transferred to Upper Senegal-Niger, with which colony they are closely connected both geographically and ethnographically. From 1894 onward the French devoted great

attention to the development of the material

resources of the country.

The ” Customs. "—Reference has already been made to the Dahomey ” Customs,” which gave the country an infamous notoriety. The ” Customs ” appear to date from the middle of the 17th century, and were of two kinds: the grand Customs performed on the death of a king; and the minor Customs, held twice a year. The horrors of these saturnalia of bloodshed were attributable not to a love of cruelty but to filial piety. Upon the death of a king human victims were sacrificed at his grave to supply him with wives, attendants, &c. in the spirit world. The grand Customs surpassed the annual rites in splen- dour and bloodshed. At those held in 1791 during January, February and March, it is stated that no fewer than 500 men, women and children were put to death. The minor Customs were first heard cf in Europe in the early years of the 18th century. They formed continuations of the grand Customs, and ” periodically supplied the departed monarch with fresh attendants in the shadowy world.” The actual slaughter was preluded by dancing, feasting, speechmaking and elaborate ceremonial. The victims, chiefly prisoners of war, were dressed in calico shirts decorated round the neck and down the sleeves with red bindings, and with a crimson patch on the left breast, and wore long white night-caps with spirals of blue ribbon sewn on. Some of them, tied in baskets, were at one stage of the proceedings taken to the top of a high platform, together with an alligator, a cat and a hawk in similar baskets, and paraded on the heads of the Amazons. The king then made a speech ex- plaining that the victims were sent to testify to his greatness in spirit-land, the men and the animals each to their kind. They were then hurled down into the middle of a surging crowd of natives, and butchered. At another stage of the festival human sacrifices were offered at the shrine of the king’s ancestors, and the blood was sprinkled on their graves. This was known as Zan Nyanyana or ” evil night,” the king going in procession with his wives and officials and himself executing the doomed. These semi-public massacres

formed only a part of the slaughter, for many women, eunuchs and others within the palace were done to death privately. The skulls were used to adorn the palace walls, and the king's sleeping-chamber was paved with the heads of his enemies. The skulls of the conquered kings were turned into royal drinking cups, their conversion to this use being esteemed an honour. Sir Richard Burton insists (A Mission to Gelele, King of Dahome) that the horrors of these rites were greatly exaggerated. For instance, the story that the king floated a canoe in a tank of human blood was, he writes, quite untrue. He denies, too, that the victims were tortured, and affirms that on the contrary they were treated humanely, and, in many cases, even acquiesced in their fate. It seems that cannibalism was a sequel of the Customs, the bodies of the slaughtered being roasted and devoured smoking hot. On the death of the king the wives, after the most extravagant demonstrations of grief, broke and destroyed everything within their reach, and attacked and murdered each other, the uproar continuing until order was restored by the new sovereign.

Amazonian Army. — The training of women as soldiers was the most singular Dahomeyan institution. About one-fourth of the whole female population were said to be " married to the fetich," many even before their birth, and the remainder were entirely at the disposal of the king. The most favoured were selected as his own wives or enlisted into the regiments of Amazons, and then the chief men were liberally supplied. Of the female captives the most promising were drafted into the ranks as soldiers, and the rest became Amazonian camp followers and slaves in the royal households. These female levies formed the flower of the Dahomeyan army. They were marshalled in regiments, each with its distinctive uniform and badges, and they took the post of honour in all battles. Their number has been variously stated. Sir R. F. Burton, in 1862, who saw the army marching out of Kana on an expedition, computed the whole force of female troops at 2500, of whom one-third were unarmed or only half-armed. Their weapons

were blunderbusses, flint

muskets, and bows and arrows. A later writer estimated the number of Amazons at 1000, and the male soldiers at 10,000. The system of warfare was one of surprise. The army marched out, and, when within a few days' journey of the town to be attacked, silence was enjoined and no fires permitted. The regular highways were avoided, and the advance was by a road specially cut through the bush. The town was surrounded at night, and just before daybreak a rush was made and every soul captured if possible; none were killed except in self-defence, as the first object was to capture, not to kill. The season usually selected for expeditions was from January to March, or immediately after the annual " Customs." The Amazons were carefully trained, and the king was in the habit of holding "autumn manoeuvres " for the benefit of foreigners. Many Europeans have witnessed a mimic assault, and agree in ascribing a marvel- lous power of endurance to the women. Lines of thorny acacia were piled up one behind the other to represent defences, and at a given signal the Amazons, barefooted and without any special protection, charged and disappeared from sight. Presently they emerged within the lines torn and bleeding, but apparently insensible to pain, and the parade closed with a march past, each warrior leading a pretended captive bound with a rope.

Bibliography. — Notre Colonie de Dahomey, by G. Francois (Paris, 1906), and Le Dahomey (1909), an official publication, deal with topography, ethnography and economics; L. Brunet and L. Giethlen, Dohomey et dependances (Paris, 1900); Edouard Foa, Le Dahomey (Paris, 1895). Religion, laws and language are specially dealt with in Ewe-Speaking Peoples of the Slave Coast, by A. B. Ellis (London, 1890), and in La Cote des Esclaves et le Dahomey, by P. Bouche (Paris, 1885). Much historical matter, with particular notices of the Amazons and the " Customs, ' ' is contained in A Mission to

Gelele, by Sir R. Burton (London, 1864). The story of the French conquest is told in Campagne du Dahomey, by Jules Poirier (Paris, 1895). The standard authority on the early history is The History of Dahomey, by Archibald Dalzel (sometime governor of the English fort at Whydah) (London, 1793). The annual Reports issued by the British, Foreign, and French Colonial Offices may be consulted, and the Bibliographic raisonnee des outrages concernant le Dahomey, by A. Pawlowski (Paris, 1895), is a useful guide to the literature of the country to that date. A Carte du Dahomey, by A. Meunier, (3 sheets, scale 1 : 500,000), was published in Paris, 1907.

DAILLi (Dallaetjs), JEAN (1594-1670), French Protestant divine, was born at Chatellerault and educated at Poitiers and Saumur. From 1612 to 1621 he was tutor to two of the grand- sons of Philippe de Mornay, seigneur du Plessis Marly. Ordained to the ministry in 1623, he was for some time private chaplain to Du Plessis Mornay, whose memoirs he subsequently wrote. In 1625 Daille was appointed minister of the church of Saumur, and in 1626 was chosen by the Paris consistory to be minister of the church of Charenton. Of his works, which are principally controversial, the best known is the treatise Du vrai emploi des Peres (1631), translated into English by Thomas Smith under the title A Treatise concerning the right use of the Fathers (1651). The work attacks those who made the authority of the Father conclusive on matters of faith and practice. Daille contenas that the text of the Fathers is often corrupt, and that even when it is correct their reasoning is often illogical. In his Sermons on the Philippians and Colossians, Daille vindicated his claim to rank as a great preacher as well as an able contro- versialist. He was president of the last national synod held in France, which met at Loudun in 1659 (H. M. Baird, The Huguenots and the Revocation of the Edict of Nantes, 1895, i. pp. 412 ff.), when, as in the Apologie des Synodes d'Alen(on et de Charenton (1655), he defended the Universalism of Moses*

Amyraut. He wrote also Apologie pour les Uglises Riformies and La Foy fondie sur les Saintes JEcritures. His life was written by his son Adrien, who retired to Zurich at the revocation of the edict of Nantes.

DAIRY and DAIRY-FARMING (from the Mid. Eng. deieris, from dey, a maid-servant, particularly one about a farm; cf. Norw. deia, as in bu-deia, a maid in charge of live-stock, and in other compounds; thus ” dairy ” means that part of the farm buildings where the ” dey ” works). Milk, either in its natural state, or in the form of butter and cheese, is an article of diet so useful, wholesome and palatable, that dairy management, which

includes all that; concerns its production and treatment, con- stitutes a most important branch of husbandry. The physical conditions of the different countries of the world have determined in each case the most suitable animal for dairy purposes. The Laplander obtains his supplies of milk from his rein-deer, the roving Tatar from his mares, and the Bedouin of the desert from his camels. In the temperate regions of the earth many pastoral tribes subsist mainly upon the milk of the sheep. In some rocky, regions the goat is invaluable as a milk-yielder; and the buffalo is equally so amid the swamps and jungles of tropical climates. The milking of ewes was once a common practice in Great Britain; but it has fallen into disuse because-of its hurtful effects upon the flock. A few milch asses and goats are here and there kept for the benefit of infants or invalids; but with these exceptions the cow is the only animal now used for dairy purposes. ,

No branch of agriculture underwent greater changes during the closing quarter of the iath century thari dairy-farming; within the period named, indeed, the dairying industry may be said to have been revolutionized. The two great factors in this

modification were the introduction about the year 1880 of the centrifugal cream-separator, whereby the old slow system of raising cream jn pans was dispensed with, and the invention some ten years later of a quick and easy method of ascertaining the fat content of samples of milk without haying to resort to the tedious processes of chemical analysis. About the year 1875 the agriculturists of the United Kingdom, influenced by various economic causes, began to turn their thoughts more intently in the direction of dairy-farming, and to the increased production of milk and cream, butter and cheese. On the 24th of October 1876 was held the first London dairy show, under the auspices of a committee of agriculturists, and it has been followed by a similar show in every subsequent year. The official report of the pioneer show stated that " there was a much larger attendance and a greater amount of enthusiasm in the movement than even the most Sanguine of its promoters anticipated." On the day flamed Professor J. Prince Sheldon read at the show a paper on the dairying industry, and proposed the formation of a society to be called the British Dairy Farmers' Association. This was unanimously agreed to, and thus was founded an organization which has since been closely identified with the development of the dairying industry of the United Kingdom. In its earlier publications the Association was wont to reproduce from House- hold Words the following tribute to the cow: —

" If civilized people were ever to lapse into the worship of animals, the Cow would certainly be their chief goddess. What a fountain of blessings is the Cow! She is the mother of beef, the source of butter, the original cause of cheese, to say nothing of shoe-horns, hair-combs and upper leather. A gentle, amiable, ever-yielding creature, who has no joy in her family affairs which she does not share with man. We rob her of her children that we may rob her of her mjlk, and we only care for her when the robbing, may be perpetrated." ,

The association has, directly or indirectly, brought about many valuable reforms and improvements in

dairying. Its I/Oadon shows have provided, year after year, a variety of object-lessons in cheese, in butter and in dairy equipment. In order to demonstrate to producers what is the ideal to aim at, there is nothing more effective than a competitive exhibition of products, and the approach to uniform excellence of character in cheese and butter of whatever kinds is most obvious to those who remember what these products were like at the first two or three dairy shows. Simultaneously there has been a no less marked advance in the mechanical aids to dairying, including, in particular, the centrifugal cream-separator, the crude germ of which was first brought before the public at the international dairy show held at Hamburg in the spring of 1877. The associa- tion in good time set the example, now beneficially followed in many parts of Great Britain, of providing means, for technical instruction in the making of cheese and butter, by the establish- ment of a dairy school in the Vale of Aylesbury, subsequently removing it to new and excellent premises at Reading, where it is known as the British Dairy Institute. The initiation of

butter-making contests at the annual dairy shows stimulated the competitive instinct of dairy workers, and afforded the public useful object-lessons; in more recent years milking competitions have been added. Milking trials and butter tests of cows conducted at the dairy shows have afforded results of much practical value. Many of the larger agricultural societies have found it expedient to include in their annual shows a work- ing dairy, wherein butter-making contests are held and public demonstrations are given.

What are regarded as the dairy breeds of cattle is illustrated by the prize schedule of the annual London dairy show, in which sections are provided for cows and heifers of the Shorthorn, Jersey, Guernsey, Red Polled, Ayrshire, Kerry and Dexter breeds (see Cattle). A miscellaneous class is also provided, the entries in which are mostly cross-breds. There are likewise classes for Shorthorn bulls, Jersey bulls, and bulls of any other pure

breed, but it is- stipulated that all bulls must be of proved descent from dams that have won prizes in the milking trials or butter tests of the British Dairy Farmers' Association or other high-class agricultural society. The importance Of securing dairy characters in the sire is thus recognized, and it is notified that, as the object of the bull classes is to encourage the breeding of bulls for dairy purposes, the prizes are to be given solely to animals exhibited in good stock-getting condition. '

Milk and Butter Tests

The award of prizes in connexion with milking trials cannot be determined simply by the quantity of milk yielded in a given period, say twenty-four hours. Other matters must obviously be taken into consideration, such as the quality of the milk and the time that has elapsed since the birth of the last calf. With regard to the former point, for example, it is quite possible for one cow to give more milk than another, but for the milk of the second cow to include the larger quantity of butter-fat. The awards are therefore determined by the total number of points obtained according; to the following scheme: —

One point for every ten days since calving (deducting the first forty days), with a maximum of fourteen points.

One point for every pound of milk, taking the average of two days' yield.

Twenty points for every pound of butter-fat produced.

Four points for every pound of " solids other than fat." ; Deductions.— -Ten points each time the fat is below 3 %.

Ten points each time the solids other than fat fall below 8-5%.

This method of award is at present the best that can be devised, but it is possible that, as experience

accumulates, some rearrange- ment of the points may be found to be desirable. Omitting many of the details, Table I. shows some of the results in the case of Shorthorn arid Jersey prize cows. The days " in milk " denote in each case the number of days that have elapsed since

Table I. — Prize Shorthorn and Jersey Cows in the Milking Trials, London Dairy Show, iqoo.

Cow.

Age.

In Milk.

Milk

per Day.

Fat.

Other Solids.

Total Points.

Years.

Days.

lb

%

. ,'■%

No.

Shorthorns eligible

for Herd-Book — .

Heroine III.

6

61

52–4

3–7

8–3

91 ‘5

Musical . .•:

, 7

16

45–2

3.2

9–3

90–8

Lady Rosedale

8 :

48

47–8

3–5

90

88–7:

Shorthorns not eli-

gible for Herd-

Book- —

Granny .

9

33

70-2

3‘5

8-9

1 44 • I-

Cherry ■,...

9

103

55-5

4-0,

8-9

127-1

Chance

6

23

6o-o

3:6

8-9

124-6

Jerseys — >

Sultane 14th

12

256

41-7

4.9

9–4

112

Queen Bess

> ; ‘7i

136

39–4

4–8

9–0

101

Gloaming IV.

7–.

156

30–5

67

9–5

94–9

calving; and if the one day’s yield of milk is desired in gallons, it can be obtained approximately 1 by dividing the weight in ‘’” 1 A gallon ot milk weighs 10–3 lb, so that very little error is in- volved in converting pounds to gallons by dividing the number of pounds by IQ. , , . ;

pounds by 10: thus, the Shorthorn cow Heroine III. gave 52.4 lb, or 5.24 gallons, of milk per day. The table is incidentally of interest as showing how superior as milch kine are the un- registered or

non-pedigree Shorthorns — which are typical of the great majority of dairy cows in the United Kingdom — as compared with the pedigree animals entered, or eligible for entry, in Coates's Herd-Book. The evening's milk, it should be added, is nearly always richer in fat than the morning's, but the per- centages in the table relate to the entire day's milk.

The milking trials are based upon a chemical test, as it is necessary to determine the percentage of fat and of solids other than fat in each sample of milk. The butter test, on the other hand, is a churn test, as the cream has to be separated from the milk and churned. The following is the scale of points used at the London dairy show in making awards in butter

tests:—

One point for every ounce of butter; one point for every com- pleted ten days since calving, deducting the first forty days. Maxi- mum allowance for period of lactation, 12 points.

Fractions of ounces of butter, and incomplete periods of less than ten days, to be worked out in decimals and added to the total points.

In the case of cows obtaining the same number of points, the prize to be awarded to the cow that has been the longest time in milk.

No prize or certificate to be given in the case of : —

(a) Cows under five years old failing to obtain 28 points.

(b) Cows five years old and over failing to obtain 32 points. The manner in which butter tests are decided will be rendered

clear by a study of Table II. It is seen that whilst the much larger Shorthorn cows— having a bigger frame to maintain and consuming more food — gave

both more milk and more Table II. — Prize Shorthorn and Jersey Cows in the Butter Tests, London Dairy Show, 1900.

tests conducted by the English Jersey Cattle Society over the period of fourteen years 1886 to 1899 inclusive. 'These tests were carried out year after year at half a dozen different shows, and the results are classified in Table III. according to the age of the animals. The average time in milk is measured by the number of days since calving, and the milk and butter yields are those for the day of twenty-four hours. The last column shows the " butter ratio." This number is lower in the case of the Jerseys than in that of the general run of dairy cows. The average results from the total of 1023 cows of the various ages are: — One day's milk, 32 lb 2j oz., equal to about 3 gallons or 12 quarts; one day's butter, 1 lb iof oz.; butter ratio, 19-13 or about 16 pints of milk to 1 lb of butter. Individual yields are sometimes extraordinarily high. Thus at the Tring show in 1899 the three leading Jersey cows gave the following results: — .

Cow.

Age.

Live- Weight.

In Milk.

Butter.

Butter Ratio.

Sundew 4th Madeira 5th Em .

Years.

8

-" 7 7

lb

929 1060

' 864 :

Days.

77 107

44

lb oz. 3 6|

2 155

3 4*

lb

15-10 16-14 13-32

Points

In

Milk

Milk to

Points

for

Total

Cows.

Age.

Milk.

per Day.

Butter.

1 lb Butter.

for Butter.

Lacta- tion.

Points.

Years.

Days.

lb oz.

lb oz.

lb

No.

■ No.

No.

Shorthorns—

1st

9

104

55 2

2 51

23-67

37-25

6-40

43-65

2nd

9

34

72 7

2 10}

27–11

42–75

42–75

3rd . .

7

33

58 5

2 7i

23–47

39–75

39–75

Jerseys — '

1st

7

157

29 10

2 2\

13–83

34–25

11–70

45–95

2nd

4

103

33 IO

2 3

15-37

35-oo

6-30

41-30 :

3rd

12

257

40 13

I 12

23-32

28-00

12-00

40-00

butter in the day of twenty-four hours, the Jersey milk was much the richer in fat. In the case of the first-prize Jersey the " butter ratio," as it is termed, was excellent, as only 13-83 lb of milk were required to yield 1 lb of butter; in the case of the second-prize Shorthorn, practically twice this quantity (or 27-11 lb) was needed. Moreover, if the days in milk are taken into account, the difference in favour of the Jersey is seen to be 123 days.

The butter-yielding capacity of the choicest class of butter cows, the Jerseys, is amply illustrated in the results of the butter

Table III.— Summary of the English Jersey Cattle

Society’s Butter Tests, Fourteen Years, 1886-1899.

Quantity

Average

Average

Average

Milk to

Cows’ Ages:

Time in

Milk

Butter

1 lb

Milk.

Yield.

Yield.

Butter.

Years.

• *No.*

Days.

lb oz.

lb oz.

lb

1 to 2 .

2

34

15 2

13

18-43

2 „ 3 •

57 ■

73

24 I5l

1 51

18-74

3 .. 4 •

108

77

29 Hi

1 10

18-42

4 .. 5 •

165

72

32 5i

I ni

19-01

5 „ 6 .

188

80

32 I5l

I 12

18-76

6 „ 7 •

189

89

34 7f

I 13

1892

7 …8 .

139

84

33 ni

I I3l

18-40

8 „ 9 ■ •

7i

82

33 61

I 12

19-03

9 ,, 10 .

42

92

32 6|

i 1 1 i

18-95

10 ,, 11 .

31

88

35 4

I 141

18-60

11 ,, 12 .

15

89

37 . 1

I 13*

1996

12 „ 13 .

13

95

34 ii

1 iol

20-56

13 ■'., 14 •

3

' 54

2 1|

19-85

The eight prize- winning Jerseys on this occasion, with an average weight of 916 lb and an average of 117 days in milk, yielded an average of 2 lb 9 oz! of butter per cow in the twenty- four hours, the butter ratio working out at 16-69. At the Tring show of 1900 a Shorthorn cow Cherry gave as much as 4 lb 45 oz. of butter in twenty -four hours; she had been in milk 41 days, and her butter ratio worked out at 15-79, which is unusually good for a big cow.

In the six years 1895 to 1900 inclusive 285 cows of the Shorthorn, Jersey, Guernsey and Red Polled breeds were subjected to butter tests at the London dairy show, and the general results are summarized in Table IV.

Although cows in the showyard may perhaps be somewhat upset by their unusual surroundings, and thus not yield so well as at home, yet the average results of these butter-test trials over a number of years are borne out by the private trials that have taken place in various herds. The trials have, moreover, brought into prominence the peculiarities of different breeds, such as: (a) that the Shorthorns, Red Polls and Kerries, being cattle whose milk contains small fat globules, are better for milk than the Jerseys and Guernseys, whose milk is richer,

Table IV. — Average Butter Yields and Butter Ratios at the London Dairy Show, Six Years, 1895-1900.

No. of

In

Milk to 1 lb

Breed.

Cows.

Milk.

Butter.

Butter.

Days.

lb oz.

lb

Shorthorn .

106

50

1 11

28-81

Jersey

126

99

1 ioi

19-15

Guernsey .

23

72

1 94

21-86

Red Polled . .

30

containing larger-sized fat globules, and is therefore more profitable for converting into butter; (b) that the weights of the animals, and consequently the proportionate food, must be taken into account in estimating the cost of the dairy produce; (c) that the influence of the stage reached in the period of lactation is much more marked in some breeds than in others.

An instructive example of the milk -yielding capacity of Jersey cows is afforded in the carefully kept records of Lord Rothschild's herd at Tring Park, Herts. Overleaf are given the figures for four years, the gallons being calculated at the rate of ro ft> of milk to the gallon.

In 1897, 30 cows averaged 6396 lb, or 640 gallons per cow. In 1898, 29 „ „ 6209 „ 621 „ „

In 1899, 37 .. .. 6430 „ 643

In 1900, 39 „ „ 6136 „ 614

The average over the four years works out at about 630 gallons per cow per annum.

Cows of larger type will give more milk than the Jerseys, but" it is less rich in fat. The milk record for the year 1900 of the herd of Red Polled cattle belonging to Mr Garrett Taylor, Whitlingham, Norfolk, affords a good example. The cows in the herd, which had before 1900 produced one or more calves, and in 1900 added another to the list, being in full profit the greater part of the year, numbered 82. Their total yield was 531,950 lb of milk, or an average of 6365 lb — equivalent to about 636 gallons — per cow. In 1899 the average yield of 96 cows was 6283 lb or 628 gallons; in 1898 the

average yield of 75 cows was 6473 lb or 647 gallons. Of cows which dropped a first calf in the autumn of 1899, one of them — Lemon — milked continuously for 462 days, yielding a total of 7166 lb of milk, being still in milk when the herd year closed on the 27th of December. Similar cases were those of Nora, which gave 9066 lb of milk in 455 days; Doris, 8138 lb in 462 days; Brisk, 9248 lb in 469 days; Delia, 8806 lb in 434 days, drying 28 days before the year ended; and Lottie, 6327 lb in 394 days, also drying 28 days before the year ended; these were all cows with their first calf. Eight cows in the herd gave milk on every day of the 52 weeks, and 30 others had their milk recorded on 300 days or more. Three heifers which produced a first calf before the nth of April 1900, averaged in the year 4569 lb of milk, or about 456 gallons. In 1900 three cows, Eyke Jessie, Kathleen and Doss, each gave over 10,000 lb, or 1000 gallons of milk; four cows gave from 9000 lb to 10,000 lb, two from 8000 lb to 0000 lb, 17 from 7000 lb to 8000 lb, 19 from 6000 lb to 7000 lb, 30 from 5000 fi> to 6000 lb, and 16 from 4000 lb to 5000 lb. The practice, long followed at Whitlingham, of developing the milk-yielding habit by milking a young cow so long as she gives even a small quantity of milk daily, is well supported by the figures denoting the results.

Though milking trials and butter tests are not usually available to the ordinary dairy farmer in the management of his herd, it is, on the other hand, a simple matter for him to keep what is known as a milk register. By a milk register is meant a record of the quantity of milk yielded by a cow. In other words, it is a quantitative estimation of the milk the cow gives. It affords no information as to the quality of the milk or as to its butter-yielding or cheese-yielding capacity. Nevertheless, by its aid the milk-producing capacity of a cow can be ascertained exactly, and her character in this respect can be expressed by means of figures about which there need be no equivocation. A greater or less degree of exactness can be secured, according to the greater or less frequency with which the

register is taken. Even a weekly register would give a fair idea as to the milk yields of a cow, and would be extremely valuable as compared with no register at all.

The practice of taking the milk register, as followed in a well- known dairy, may be briefly described. The cows are always milked in the stalls, and during summer they are brought in twice a day for this purpose. After each cow is milked, the pail containing the whole of her milk is hung on a spring balance suspended in a convenient position, and from the gross weight indicated there is detlucted the already known weight of the pail. 1 The difference, which represents the weight of milk, is recorded in a book suitably ruled. This book when open presents a view of one week's records. In the left-hand column are the names of the cows; on the right of this are fourteen columns, two of which receive the morning and evening record of each cow. In a final column on the right appears the week's total yield for each cow; and space is also allowed for any remarks.

1 A portable milk-weighing appliance is made in which the weight

of the pail is included, and an indicator shows on a dial the exact

« weight in pounds and ounces, and likewise the volume in gallons and

pints, of the milk in the pail. When the pail is empty the indicator

of course points to zero.

Fractions of a pound are not entered, but 18 lb 12 oz. would be recorded as 19 lb, whereas 21 lb 5 oz. would appear as 21 lb, so that a fraction of over half a pound is considered as a whole pound, and a fraction of under half a pound is ignored. By dividing the pounds by 10 the yield in gallons is readily ascer- tained.

Every dairy farmer has some idea, as to each of his cows, whether she is a good, a bad or an indifferent milker, but such knowledge is at best only vague. By the simple means indicated the character of each cow as a milk-producer is slowly but surely recorded in a manner which is at once exact and definite. Such a record is particularly valuable to the farmer, in that it shows to him the relative milk-yielding capacities of his cows, and thus enables him gradually to weed out the naturally poor milkers and replace them by better ones. It also guides him in regulating the supply of food according to the yield of milk. The register will, in fact, indicate unerringly which are the best milk-yielding cows in the dairy, and which therefore are, with the milking capacity in view, the best to breed from.

The simplicity and inexpensiveness of the milk register must not be overlooked. These are features which should commend it especially to the notice of small dairy farmers, for with a moderate number of cows it is particularly easy to introduce the register. But even with a large dairy it will be found that, as soon as the system has got fairly established, the additional time and trouble involved will sink into insignificance when compared with the benefits which accrue.

The importance of ascertaining not only the quantity but also, the quality of milk is aptly illustrated in the case of two cows at the Tring show, 1900. The one cow gave in 24 hours 4$ gallons of milk, which at 7d. per gallon would work out at about 2s. 7d. ; she made 2 lb 12 oz. of butter, which at is. 4d. per lb would bring in 3s. 8d.; consequently by selling the milk the owner lost about is. id. per day. The second cow gave 5 J gallons of milk, which would work out at 3s. id.; she made 1 lb 12 oz. of butter, which would only be worth 2s. 4d., so that by convert- ing the milk into butter the owner lost 9d. per day.

The colour of milk is to some extent an indication of its quality — the deeper the colour the better the quality. The colour de- pends upon the size of

the fat globules, a deep yellowish colour indicating large globules of fat. When the globules are of large size the milk will churn more readily, and the butter is better both in quality and in colour.

The following fifty dairy rules relating to the milking and general management of cows, and to the care of milk and dairy utensils, were drawn up on behalf of, and published by, the United States department of agriculture at Washington. They are given here with a few merely verbal alterations : —

The Owner and his Helpers

1. Read current dairy literature and keep posted on new ideas.

2. Observe and enforce the utmost cleanliness about the cattle, their attendants, the cow-house, the dairy and all utensils.

3. A person suffering from any disease, or who has been exposed to a contagious disease, must remain away from the cows and the milk.

The Cow-House

4. Keep dairy cattle in a shed or building by themselves. It is preferable to have no cellar below and no storage loft above.

5. Cow-houses should be well ventilated, lighted and drained; should have tight floors and walls, and be plainly con- structed.

6. Never use musty or dirty litter.

7. Allow no strong-smelling material in the cow-house for any length of time. Store the manure under cover outside the cow-house, and remove it to a distance as often as practicable.

8. Whitewash the cow-house once or twice a year; use gypsum in the manure gutters daily.

9. Use no dry, dusty feed just previous to milking;

if fodder is dusty, sprinkle it before it is fed.

10. Clean and thoroughly air the cow-house before milking; in hot

weather sprinkle the floor. n. Keep the cow-house and dairy room in good condition, and then

insist that the dairy, factory or place where the milk goes

be kept equally well.

The Cows

12. Have the herd examined at least twice a year by a skilled

veterinarian.

13. Promptly remove from the herd any animal suspected of being

in bad health, and reject her milk. Never add an animal to the herd until it is ascertained to be free from disease, especi- ally tuberculosis.

14. Do not move cows faster than a comfortable walk while on the

way to the place of milking or feeding.

15. Never allow the cows to be excited by hard driving, abuse, loud

talking or unnecessary disturbance; do not expose them to cold or storms.

16. Do not change the feed suddenly.

17. Feed liberally, and use only fresh, palatable feed-stuffs; in no

case should decomposed or mouldy material be used.

18. Provide water in abundance, easy of access, and always pure;

fresh, but not too cold.

19. Salt should always be accessible to the cows.

20. Do not allow any strong-flavoured food, like garlic, cabbages

and turnips, to be eaten, except immediately after milking.

21. Clean the entire skin of the cow daily. If hair in the region of

the udder is not easily kept clean, it should be clipped.

22. Do not use the milk within twenty days before calving, nor for

three to five days afterwards.

Milking

23. The milker should be clean in all respects; he should not use

tobacco while milking; he should wash and dry his hands just before milking.

24. The milker should wear a clean outer garment, used only when

milking and kept in a clean place at other times.

25. Brush the udder and surrounding parts just before milking

and wipe them with a clean damp cloth or sponge.

26. Milk quietly, quickly, cleanly and thoroughly. Cows do not like

unnecessary noise or delay. Commence milking at exactly the same hour every morning and evening, and milk the cows in the same order.

27. Throw away (but not on the floor— better in the gutter) the

first two or three streams from each teat; this milk is very watery and of little value, but it may injure the rest.

28. If in any milking a part of the milk is bloody or stringy or unnatural in appearance, the whole should be rejected.

Milk with dry hands; never let the hands come in contact with

the milk. Do not allow dogs, cats or loafers to be around at milking time. If any accident occurs by which a pail, full or partly full, of milk

becomes dirty, do not try to remedy this by straining, but

reject all this milk and rinse the pail. Weigh and record the milk given by each cow, and take a sample

morning and night, at least once a week, for testing by the

fat test.

29.

30.

3»-

32

Care of Milk

33

Remove the milk of every cow at once from the cow-house to a clean dry room, where the air is pure and

sweet. Do not allow cans to remain in the cow-house while they are being filled with milk.

34. Strain the milk through a metal gauze and a flannel cloth or

layer of cotton as soon as it is drawn.

35. Cool the milk as soon as strained — to 45 ° F. if the milk is for

shipment, or to 60° if for home use or delivery to a factory.

36. Never close a can containing warm milk.

37. If the cover is -left off the can, a piece of cloth or mosquito

netting should be used to keep out insects.

38. If milk is stored, it should be kept in tanks of fresh cold water

(renewed as often as the temperature increases to any material

extent), in a clean, dry, cold room. Unless it is desired to

remove cream, it should be stirred with a tin stirrer often

enough to prevent the forming of a thick cream layer. Keep the night milk under shelter so that rain cannot get into

the cans. In warm weather keep it in a tank of fresh cold

water. Never mix fresh warm milk with that which has been cooled. Do not allow the milk to freeze. In no circumstances should anything be added to milk to prevent

its souring. Cleanliness and cold are the only preventives

needed. All milk should be in good condition when delivered at a creamery

or a cheesery. This may make it necessary to deliver twice

a day during the hottest weather. When cans are hauled far they should be full, and carried in a

spring waggon. In hot weather cover the cans, when moved in a waggon, with

a clean wet blanket or canvas.

The Utensils 46. Milk utensils for farm use should be made of metal and have all joints smoothly soldered. Never allow them to become rusty or rough inside.

39

40 42.

43

44.

45–

47. Do not haul waste products back to the farm in the cans used

for delivering milk. When this is unavoidable, insist that the skim milk or whey tank be kept clean.

48. Cans used for the return of skim milk or whey should be emptied,

scalded and cleaned as soon as they arrive at the farm.

49. Clean all dairy utensils by first thoroughly rinsing them in

warm water; next clean inside and out with a brush and hot water in which a cleaning material is dissolved; then rinse and, lastly, sterilize by boiling water or steam. Use pure water only.

50. After cleaning, keep utensils inverted in pure air, and sun if

possible, until wanted for use.

Food and Milk Production

In their comprehensive paper relating to the feeding of animals published in 1895, Lawes and Gilbert discussed amongst other questions that of milk production, and directed attention to the great difference in the demands made on the food — on the one hand for the production of meat (that is, of animal increase), and on the other for the production of milk. Not only, however, do cows of different breeds yield different quantities of milk, and milk of characteristically different composition, but in- dividual animals of the same breed have very different milk- yielding capacity; and whatever the capacity of a cow may be, she has a maximum yield at one period of her lactation, which is followed by a gradual decline. Hence, in comparing the amounts of constituents stored up in the fattening increase of an ox with the amounts of the same constituents removed in the milk of a cow, it is necessary to assume a wide range of difference in the yield of milk. Accordingly, Table V. shows

the

Table V. — Comparison of the Constituents of Food carried off in Milk, and in the Fattening Increase of Oxen.

Non-

Nitro-

Nitro- genous Sub- stance

Min-

Total

[1 Gallon = 10-33 ft]

genous Sub-

Fat.

eral Mat-

Solid Mat-

stance.

not Fat (Sugar).

ter.

ter.

In Milk per Week.

If:—

lb

lb

lb

lb

ft

4 quarts per head per day

2-64

2-53

3-33

o-54

904

6 11 >> 1.

3-96

3-8o

4.99

o-8i

I3-56

8

5-28

506

6-66

1-08

18-08

10

1 M

,

6-6o

6-33

8-32

1–35

22–60

12

1 i»

t

7–92

7–59

9.99

1–62

27–12

14

t »»

1

9–24

8–86

11–65

1–89

31–64

16

t 11

,

10–56

10–12

13–32

2-16

36-16

18

t 11

1

n-88

"•39

14-98

2-43

40-68

20

t 11

1

13-20

12-65

16-65

2-70

45-20

In Increase in Live-Weight per \

?eek. — Oxen.

If 10 lb increase .

o-75

6-35

0-15

7-25

If 15 lb increase .

i-i3

9-53

0-22

10-88

amounts of nitrogenous substance, of fat, of non-nitrogenous substance not fat, of mineral matter, and of total solid matter, carried off in the weekly yield of milk of a cow, on the alternative assumptions of a production of 4, 6, 8, 10, 12, 14, 16, 18 or 20 quarts per head per day. For comparison, there are given at the foot of the table the amounts of nitrogenous substance, of fat, of mineral matter, and of total solid matter, in the weekly increase in live-weight of a fattening ox of an average weight of 1000 lb — on the assumption of a weekly increase, first, of 10 lb, and, secondly, of 15 lb. The estimates of the amounts of constituents in the milk are based on the assumption that it will contain 12-5% of total solids — consisting of 3-65 albu- minoids, 3-50 butter-fat, 4-60 sugar and 0-75 of mineral matter. The estimates of the constituents in the fattening increase of oxen are founded on determinations made at Rothamsted.

With regard to the very wide range of yield of milk per head per day which the figures in the following table assume, it may be remarked that it is by no means impossible that the same animal might yield the largest amount, namely, 20 quarts, or 5 gallons, per day near the beginning, and only 4 quarts, or

i gallon, or even less, towards the end of her period Of lactation. At the same time, an entire herd of, for example, Shorthorns or Ayrshires, of fairly average quality, well fed, and including

animals at various periods of lactation, should not yield an average of less than 8 quarts, or 2 gallons, and would seldom exceed 10 quarts, or 2$ gallons, per head per day the year round.

For the sake of illustration, an average yield of milk of 10 quarts, equal 25 gallons, or between 25 and 26 lb per head per day, may be assumed, and the amount of constituents in the weekly yield at this rate may be compared with that in the weekly increase of the fattening ox at the higher rate assumed in the table, namely, 15 lb per 1000 lb live- weight, or 1-5% per week. It is seen that whilst of the nitrogenous substance of the food the amount stored up in the fattening increase of an ox would be only 1-13 lb, the amount carried off as such in the milk would be 6-6 lb, or nearly six times as much. Of mineral matter, again, whilst the fattening increase would only require about 0-22 lb, the milk would Carry off 1-35 lb, or again about six times as much. Of fat, however, whilst the fattening increase would contain 0-53 lb, the milk would contain only 6- 33 lb, or only about two- thirds as much. On the other hand, whilst the fattening increase contains no other non-nitrogenous substance than fat, the milk would carry off 8-32 lb in the form of milk-sugar. This amount of milk-sugar, reckoned as fat, would 1 correspond approximately to the difference between the fat in 'the milk and' that in the fattening increase.

It is evident, then, that the drain upon the food is very much greater for the production of milk than for that of meat. This is especially the case in the important item of nitrogenous substance; and if, as is frequently assumed, the butter-fat of the milk is at any rate largely derived from the nitrogenous substance of the food, so far as it is so at least about two parts cf such substance would be required to produce one of fat. On such an assumption, therefore, the drain upon the nitrogenous substance of the food would be very much greater than that indicated in the table as existing as nitrogenous substance in the milk. To this point further reference will be made presently.

Attention may next be directed to the amounts of food, and of certain of its constituents, consumed for the production of a given amount of milk. This point is illustrated in Table VI., which shows the constituents consumed per 1000 lb live- weight

Table VI. — Constituents consumed per 1000 lb Live-Weight per Day, for Sustenance and for Milk-Production. The Rothamsted Herd of 30 Cows, Spring 1884. ' .

Total Dry Sub-.

stance.

Digestible.

Nitro- genous

Sub- stance.

Non-Nitrq-

genous Substance (as Starch).

Total Nitro- genous and Non- Nitro- genous Substance.

3-1 lb Cotton cake 2-7 lb Bran . 2-8 ft Hay-chaff . 5-6 ft Oat-straw- chaff …. 62-8 ft Mangel .

Total. Required for sus- tenance .

Available for milk. In 23 '3 ft milk.

Excess in food

ft

2-76 2-33 2;34

4-64 7:85.

ft

1-07

o-33

015

0-08

I-OI

ft

1-50

1-09

2-21

5-73

ft

2-57. . 1 -42

1-33

2-29; .

$•74

1992

■ 2-64* o-57

11-71* 7-40

H-35

7-97

2-07 0-85

4-3i

3-02

6-38

3-87 .

1–22 ;

1–29

‘2–51

Per 1000 ft Live-Weight.

, Wolff .

ft

2 4

ft

2–5

. ,ft

I2–5f

ft

15:4

- *Albuminoid ratio, i–4*4. t Exclusive of 0–4 fat; albuminoid ratio, 1–5–4.*

per day in the case of the Rothamsted herd of 30 cows in the spring of 1884. On the left hand are shown the actual amounts of the different foods consumed per 1000 lb live- weight per day; and in the respective columns are recorded — first the amounts of total dry substance which the foods contained, and then the amounts of digestible nitrogenous, digestible non-nitrogenous (reckoned as starch), and digestible total organic substance which the different foods would, supply; these being calculated according to Lawes and Gilbert’s own estimates of the percentage composition of the foods, and to Wolff’s estimates of the pro- portion of the several constituents which would be digestible.

The first column shows that the amount of total dry substance of food actually consumed by the herd, per

1006 lb live-weight per day, was scarcely 20 lb, whilst Wolff's 1 estimated require- ment, as stated at the foot of the table, is 24 lb. But his ration would doubtless consist to a greater extent of hay and straw- chaff, containing a larger proportion of indigestible and effete woody fibre. The figures show, indeed that the Rothamsted ration supplied, though nearly the same, even a somewhat less amount of total digestible constituents than Wolff's.

Of digestible nitrogen substance the food supplied 2-64 lb per day, whilst the amount estimated to be required for susten- ance merely is 0-57 lb; leaving, therefore, 2-07 lb available for milk production. The 23-3 lb of milk yielded per ioco lb live- weight per day would, however, contain only 0-85 lb; and there would thus remain an apparent excess of 1-22 lb of digest; ible nitrogenous substance in the food supplied. But against the amount of 2-64 lb actually consumed, Wolff's estimate of the" amount required for sustenance and for milk-production is 2- 5 lb, or but little less than the amount actually consumed at Rothamsted. On the assumption that the expenditure of nitrogenous substance in the production of milk is only in the formation of the nitrogenous substances of the milk, there would appear to have been a considerable excess given in the food: But Wolff's estimate assumes no excess of supply, and that the whole is utilized; the fact being that he supposes the butter-fat of the milk to have been derived largely, if not wholly, from the albuminoids of the food.

It has been shown that although it is possible that some of the fat of a fattening animal may be produced from the albu- minoids of the food, certainly the greater part of it, if not the whole, is derived from the carbohydrates. But the physiological conditions of the production of milk are so different from those for the production of fattening increase, that it is not admissible to judge of the sources of the fat of the one from what may be established in regard to the other. It has been assumed, however, by those who maintain that the fat of the fattening animal is formed from

albuminoids, that the fat of milk must be formed in the same way. Disallowing the legitimacy of such a deduction, there do, nevertheless, seem to be reasons for sup- posing that the fat of milk may, at any rate in large proportion, be derived from albuminoids.

; Thus, as compared with fattening increase, which may in a sense be said to be little more than ah accumulation of reserve

; material from excess of food, milk is, a special product, of a special gland, for a special normal exigency of the animal. Further, whilst common experience shows that the herbivorous animal becomes the more fat the more, within certain limits, its

j food is rich in carbohydrates, it points to the conclusion that both the yield of milk and its richness in butter are more connected with a liberal supply of the nitrogenous Constituents in the food.

. Obviously, so far as this is the case, it may be only that thereby more active change in the system, and therefore greater activity of the special function , is maintained. The evidence at command is, at any rate, not inconsistent with the, supposition that a good deal of the fat of milk may have its source in the breaking up of albuminoids, but direct evidence on the point is still wanting; and supposing such breaking up to take place in the gland, the question arises — What becomes of the by-products? Assuming, however, that such change does take place, the amount of nitro- genous substance supplied to the Rothamsted cows would be less 1 Landw. Futterungslehre, 5te Aufl., 1888, p. 249,

in excess of the direct requirement for milk-production than the figures in the table would indicate, if; indeed, in excess at all.

The figures in the column of Table VI. relating to

the estimated amount of digestible non-nitrogenous substance reckoned as starch show that the quantity actually consumed was :i 1-71 lb, whilst the amount estimated by Wolff to be required was 12-5 lb, besides 0-4 lb of fat. The figures further show that, deducting 7-4 lb for sustenance from the quantity actually consumed, there would remain 4-31 ft> available for milk-production, whilst only about 3-02 lb would be required supposing that both the fat of the milk and the sugar had been derived from the carbo- hydrates of the food; and, according to this calculation, there would still be an excess in the daily food of 1-20 It). It is to be borne in mind, however, that estimates of the requirement for mere sustenance are mainly founded on the results of experiments in which the animals are allowed only such a limited amount of food as will maintain them without either loss or gain when at rest. But physiological considerations point to the conclusion that the expenditure, independently of loss or gain, will be the greater the more liberal the ration, and hence it is probable that the real excess, if any, over that required for sustenance and milk-production would be less than that indicated in the table, which is calculated on the assumption of a fixed require- ment for sustenance for a given live-weight of the animal. Supposing that there really was any material excess of either the nitrogenous or the non-nitrogenous constituents supplied over the requirement for sustenance and milk-production, the question arises — 'Whether, or to what extent, it conduced to increase in live-weight of the animals, or whether it was in part, or wholly, voided, and so wasted.

As regards the influence of the period of the year, with its characteristic changes of food, on the quantity and composition of the milk, the first column of the second division of Table VII. shows the average yield of milk per head per day of the Rotham- sted herd, averaging about 42 cows, almost exclusively Short- horns, in each month of the year, over six years, 1884 to 1889

It should, be stated that the Rothamsted cows had

cake throughout the year; at first 4 lb per head per day, but after- wards graduated according to the^ yield of ;milk, on the basis of 4 lb for a yield of 28 lb of milk, the result being that then the amount given averaged more per head per day during the grazing .period, but less earlier and later in the year. Bran, hay and straw-chaff, and roots (generally mangel), were also given when the animals were not turned out to grass. The general plan was, therefore, to give cake alone in addition when the cows were turned out to grass, but some other dry food, and roots, when entirely in the shed during the winter and early spring months.

Referring to the column showing the average yield of milk per head per day each month over the six years, it will be seen that during the six months January, February, September, October, November and December the average yield was sometimes below 20 lb, and on the average only about 21 lb of milk per head per day; whilst over the other six months it averaged 27-63 lb, and over May and June more than 31 lb, perhead per day. That is to say, the quantity of milk yielded was considerably greater during the grazing period than: when the animals had more dry food, and roots instead of grass. < ■ Next, referring to the particulars of composition, according to Dr Vieth's results, which may well be considered as typical for the different periods of. the year, it is seen that the specific gravity of the milk was only average, or lower than average, during the grazing period, but rather higher in the earlier and later months of the year. The percentage of total solids was rather lower than the average at the beginning of the year, lowest during the chief grazing months, but considerably higher in the later months of the year, when the animals were kept in the shed and received more dry food. The percentage of butter- fat follows very closely that of the total solids, being the lowest during the best grazing months, but considerably higher- than the average during the last four or five months of the year, when more dry food was given. The percentage of ^solids not fat was

Table VII.— Percentage Composition of Milk each Month of the Year; also 1 Average Yield of considerably the lowest during the later ■ Milk, and of Constituents, per Head per Day each Month, according to Rothamsted Dairy ■ months of the glazing period, but average,

or higher than average, during the earlier and later months of> the year. It may be observed that, according to the average percentages given in the tabled a gallon of milk will contain more of both total solids and of butter-fat in the' later months of the year; that is, when there is less grass and more dry food given.

Turning to the last three columns of the table, it is seen that although, as has been shown, the percentage of the several constituents in the milk is lower during the grazing months, the actual amounts contained in the quantity of milk yielded per head are distinctly greater during those months. Thus, the amount of butter- fat yielded per head per day is. above the average of .the year from April to Sep- tember inclusive; the amounts of solids hot fat are over average from April to August inclusive; and the amounts of total. solids yielded are average, or over average, from April to August inclusive.; i From the foregoing results it is evident that the quantity of milk yielded per head is very much the greater during the grazing months of the year, but that the percentage composition of the milk is lower during that period

not according to direct analytical determinations made' at •] of hjgjier yield, and considerably higher during the months of

Rothamsted, but according to the results of more than 14,000

analyses made, under the superintendence of Dr Vieth, in the

laboratory of the Aylesbury Dairy Company in 1884; x the

samples analysed representing the milk from a great many

different farrris in each niorith.

■’ 1 The Analyst, April 1885, vol. x. p. 67. ‘ ‘^ ■■■’”–

. Records.

Average

Composit

Month

ion of Milk each

1884.

Rothamsted Dairy.

Estimated Quantity –,.,

(Dr Vieth— 14,

235 analy

ses.)

Average

; of Constituents in . , Milk per Head per

Yield

Specific

Butter–

Solids not

Total

of Milk per Head

Dayeacfh Month. ‘

'■'''

Solids

'

Gravity.

Fat.

Fat.

Solids.

per Day, 6 Years.

Butter-' Fat.

not

Fat.

Total Solids.

%

%

% ■ ■

ft

lb

■lb .

lb

January

1-0325

3-55

9-34

. 12-89

20-31*

0-72

1-90

2.- 62

February .

1-0325

3-53

9-24

12-77

22-81

o-8o

2-II

29I

March .

1-0323

3-50

9-22

12-72

24-19

0-85

'■2-23

3-o8

April . .

1-0323

^3-43

9-22

12-65

26-50

■ 0-91

2-44

3-35

May. .

1-0324

3-34

9-30.

12-64

3I-3I

i'05

2-91

3-96

June.

1-0323

3-3i

9-19

12-50

30-81 ■

; ,1-02 ■

2-83

3-85

July . . .

i-03!9

3-47

9-13

12-60

28-00

o-97

2-56

3/53 '

August .

1-0318

3 : «7

9-08

12-95

25-00

o-97

2-27

3-24

September .

1-0321

4-u

9-17

13-28

22-94

"■ 0-94

2-II

3-05

October

1-0324

4-26

9-27

13-53

21-00

, 0-89

1-95

■ 2-84 ■

November .

1 -0324

4-36

929

13-65

19-19

0-84

■•• 1-78 •

2-62

December . Mean .

1-0326

4-10

9-29

13-39

I93 1

o-79

1-79

2-58

1-0323

374

9-22

12-96

24-28

0-90

... 2-24

3-I 4 :

- *Average over five years only, as the records did not commence until February 1884.*

*inclusive ; and the succeeding columns show that amounts 1 of butter-fat, of solids not fat, and of total solids in the average yield per head per day in each month of the year/calculated^*

more exclusively dry-food feeding. Nevertheless, owing to the much greater quantity of milk yielded' during the grazing months, the actual quantity of constituents yielded per cow is greater during those months than during the months of higher percentage composition, but lower yield of milk per head, it may be added that a careful consideration of the number of*

newly-calved cows brought into the herd each month shows that the results as above stated were perfectly distinct, independently of any influence of the period of lactation of the different individuals of the herd.

The few results which have been brought forward in relation to milk-production are admittedly quite insufficient adequately to illustrate the influence of variation in the quantity and com- position of the food on the quantity and composition of the milk yielded. Indeed, owing to the intrinsic difficulties of experimenting on such a subject, involving so many elements of variation, any results obtained have to be interpreted with much care and reservation. Nevertheless, it may be taken as clearly indicated that, within certain limits, high feeding, and especially high nitrogenous feeding, does increase both the yield and the richness of the milk. 1 But it is evident that when high feeding is pushed beyond a comparatively limited range, the tendency is to increase the weight of the animal — that is, to favour the development of the individual, rather than to enhance the activity of the functions connected with the reproductive system. This is, of course, a disadvantage when the object is to maintain the milk-yielding condition of the animal; but when a cow is to be fattened off it will be otherwise.

It has been stated that, early in the period of six years in which the Rothamsted results that have been quoted were obtained, the amount of oil-cake given was graduated according to the yield of milk of each individual cow; as it seemed unreasonable that an animal yielding, say, only 4 quarts per day, should receive, beside the home foods, as much cake as one yielding several times the quantity. The obvious inference is, that any excess of food beyond that required for sustenance and milk- production would tend to increase the weight of the animal, which,

according to the circumstances, may or may not be desirable.

It may be observed that direct experiments at Rotham&ted confirm the view, arrived at by common experience, that roots, and especially mangel, have a favourable effect on the flow of milk. Further, the Rothamsted experiments have shown that a higher percentage of butter-fat, of other solids, and of total solids, was obtained with mangel than with silage as the suc- culent food. The yield of milk was, however, in a much greater degree increased by grazing than by any other change in the food; and at Rothamsted the influence of roots comes next in order to that of grass, though far behind it, in this respect. But with grazing, as has been shown, the percentage composition of the milk is considerably reduced; though, owing to the greatly increased quantity yielded, the amount of soil-constituents removed in the milk when cows are grazing may nevertheless be greater per head per day than under any other conditions. Lastly, it has been clearly illustrated how very much greater is the demand upon the food, especially for nitrogenous and for mineral constituents, in the production of milk than in that of iattening increase.

1 The evidence on this point taken by the Committee on Milk and Cream Regulations in 1900 is somewhat conflicting. The report states that an impression commonly prevails that the quality of milk is more or less determined by the nature and composition of the food which the cow receives. One witness said that farmers who produce milk for sale feed differently from what they do if they are producing for butter. Another stated that most of the statistics which go to show that food has no effect on milk fail, because the experiments are not carried far enough to counterbalance that peculiarity of the animal first to utilize the food for itself before utilizing it for the milk. A witness who kept a herd of 100 milking cows expressed the opinion that improvement in the quality of milk can be effected by feeding, though not to any large extent. On the other hand, it was

maintained that the fat percentage in the milk of a cow cannot be raised by any manner or method of feeding. It is possible that in the case of cows very poorly fed the addition of rich food would alter the composition of their milk, but if the cows are well-fed to begin with, this would not be so. The proprietor of a herd of 500 milking cows did not think that feeding affected the quality of milk from ordinarily well-kept animals. An experimenter found that the result of resort- ing to rather poor feeding was that the first effect was produced upon the weight of the cow and not upon the milk; the animal began to get thin, losing its weight, though there was not very much effect upon the quality of the milk.

Manurial Value of Food consumed in the Production 02 Milk

In any attempt to estimate the average value of the manure derived from the consumption of food for the production of milk, the difficulty arising from the very wide variation in the amount of milk yielded by different cows, or by the same cow at different periods of her lactation, is increased by the inadequate character of information concerning the difference in the amount of the food actually consumed by the animal coincidently with the production of such different amounts of milk. But although information is lacking for correlating, with numerical accuracy, the great difference in milk-yield of individual cows with the coincident differences in consumption to produce it, it may be considered as satisfactorily established that more food is consumed by a herd of cows to produce a fair yield of milk, of say 10 or 12 quarts per head per day, than by an equal live- weight of oxen fed to produce fattening increase. In the cases supposed it may, for practical purposes, be assumed that the cows would consume about one-fourth more food than the oxen. Accordingly, in the Rothamsted estimates of the value of the manure obtained on the consumption of food for the production of milk, it is assumed that one-fourth more will be con- sumed by 1000 lb live-weight of cows than by the same

weight of oxen; but the estimates of the amounts of the constituents of the food removed in the milk, or remaining for manure, are never- theless reckoned per ton of each kind of food consumed, as in the case of those relating to feeding for the production of fattening increase. It may be added that the calculations of the amounts of the constituents in the milk are based on the same average compo- sition of milk as is adopted in the construction of Table V. Thus the nitrogen is taken at 0-579 (= 3-65 nitrogenous substance) , the phosphoric acid at 0-2175, and the potash at 0-1875% in the milk. > , ' '

Table VIII. shows in detail the estimate of the amount of nitrogen in one, ton of each food, and in the milk produced from its consumption, on the assumption of an average yield of 10 quarts per head per day; also the amount remaining for manure, the amount of ammonia corresponding to the nitrogen, and the value of the ammonia at 4d. per lb. Similar particulars are also given in relation to the phosphoric acid and the potash consumed in the food, removed in the milk, and remaining for manure, &c. This table will serve as a sufficient illustration of the mode of estimating the total or original value of the manure, derived from the consumption of the different foods for the production of milk in the case supposed; that is, assuming an average yield of a herd of 10 quarts per head per day.

In Table IX. are given the results of similar detailed calcula- tions of the total or original manure-value (as in Table VIII. for 10 quarts), on the alternative assumptions of a yield of 6, 8, 12 or 14 quarts per head per day. For comparison there is also given, in the first column, the estimate of the total or original manure-value when the foods are consumed for the production of fattening increase.

So much for the plan and results of the estimations of total or original manure-value of the different foods, that is, deducting only the constituents removed in the milk, and reckoning the remainder at

the prices at which they can be purchased in artificial manures. With a view to direct application to practice, however, it is necessary to estimate the unexhausted manure-value of the different foods, or what may be called their compensation- value, after they have been used for a series of years by the outgoing tenant and he has realized a certain portion of the manure-value in his increased crops. In the calculations for this purpose the rule is to deduct one-half of the original manure-value of the food used the last year, and one-third of the remainder each year to the eighth, in the case of all the more concentrated foods and of the roots — in fact, of all the foods in the list ex- cepting the hays and the straws. For these, which contain larger amounts of indigestible matter, and the constituents of which will be more slowly available to crops, two-thirds of the original manure-value is deducted for the last year, and only

Table VIII. — Estimates of the Total or Original Manure- Value of Cattle Foods after Consumption by Cows for the Production of Milk. Valuation on the assumption of an average production by a herd of 10 quarts of milk per head per day.

Nos.

Description of Food.

Linseed

Linseed cake

Decorticated cotton cake

Palm-nut cake

Undecorti- cated cot- ton cake .

Cocoa-nut cake

Rape cake

Peas Beans Lentils Tares (seed)

Maize

Wheat

Malt

Barley

Oats

Rice meal

Locust beans

Nitrogen.

In I Ton

of Food.

lb

80-64

106-40

147-84

56-00

84-00

76-16 109-76

80-64 89-60 94-08 94-08

In Milk from 1 Ton

of Food.

lb

25-04 20-86

19-27

17-86

15-66

15-66 12-50

Malt coombs Fine pollard Coarse pol lard Bran

Clover hay Meadow hay

Pea straw . Oat straw . Wheat straw Barley straw Bean straw

Potatoes .

Carrots

Parsnips .

Mangel wur- zels

Swedish turnips

Yellow tur- nips

White tur- nips

38-08 40-32 38-08 36-96 44-80 42-56 26-88

87-36 54-88

56-00 56-00

53-76

33-6o

22-40

II-20

10-08

8-96

20-16

5-6o

4.48 4-93

4-93 5-60 4.48 4-03

17-86 17-86 17-86 17-86

In Manure.

Total remain- ing for Manure.

lb

55-6o

85-54

128-57 38-14

68-34

60-50 97-26

I7-38

17-38 17-86 17-38 16-68 16-68 13-90

15-66 16-68

15-66 13-90

8-94 8-36

7-83 6-95 5-98 5-46 5-68

2-07 1-46 1-67

1-32 1-14

o-93

0-84

62-78

71-74 76-22 76-22

Nitro- gen equal Am- monia.

lb

67-52 103-87

156-13 46-31

82-99

73-47 118-11

Value of Am- monia at 4d. per lb.

Phosphoric Acid.

20-70 22-94

20-22 19-58 28-12

25-88 12-98

71-70 38-20

40-34 42-10

44-82 25-24

14-57 4-25 4-10

3-5°

14-48

3-53 302 3-26

3-61

4-46

3-55

3-19

76-24 87-12 9256 92-56

25-H

27–86

24–55 23–78

34–15 31–43 15–76

87–07 46–39

48–99 51–12

54–43 30–65

17–69 5–16 4–98 4–25

17–58

4–29 3–67 3–96

4–38

5–42

4–31

3–87

£ s. d.

126

1 14 7

2 12 1

o 15 5

146 1 19 4

1 5 5 190 1 10 10 1 10 10

8

9 8

7 11 10

5

In 1 Ton

of Food.

lb 34-5°

44-80

69-44

26-88

44-80

3I-36

56-00

19-04 24-64 16-80 17-92

190

o 15 6

o 16 o 17

o 18 o 10

5 11 1 9 1 8

1 5 5 10

o 1 5 o 1 3

014

1 6 1 10

o 1 5 o 1 3

13-44 19-04 17-92 1 6- 80 ,13-44 13-44)

In

Milk from

1 Ton of

Food.

lb

9-34 7-79

7-18 6-68

5-85

5-85 4-69

In Manure.

Total remain- ing for Manure.

6-68 6-68 6-68 6-68

44-80 64-96

78-40 80-64

12-77 8-96

7-84 5-38 5-38 4-03 6-72

3-36

2-02 4-26

1-57 1-34

d-34)

650 6-50 6-68 6-50 6-24 6-24 5-19

5-85 6-24

5-85 5-19

3-35 310

2-91 2-60 2-23 2-04 214

0-78

o-54

063

0-49

0-44

o-34

0-31

lb

25-16 37-01

62-26

20-20

38-95

25-51

5I-3I

12-36 17-96

IO-I2

11-24

6-94

12-54

11-24

10-30

7-20

7-20

38-95 58-72

72-55 75-45

Value at 2d. per lb

s. d.

4 2

6 2

10 5

3 4

6 6

4 3

8 7

2

3 o

1 8 1 10

Potash.

In 1 Ton

of Food.

lb

30-69 3136

44-80

11-20

44-80 44-80

33-6o

In

Milk from 1 Ton

of Food.

In Manure.

1 21-50 29-12 15-68 17-92

1 2

2 1

1 10

1 9 1 2 1 2

6 6 9 9

9-42 5-86

4-93

2-78

3-15 1-99 4-58

2-58 1-48 3-63

1-08

0-90

i-oo

o-8i

o 10 o 6 o 6 o 4 o 9

o 5

o 3

o 7

2

O 2

O 2

O 2

8-29

11-87 11-20 12-32

II-20

(8-29)

44-80 32-70

33-6o

32-48

33-6o

35-84

22-40 22-40 17-92 22-40 22-40

12-32 6-27

8-o6

8-96 4-93 (4-93) 6-72

lb

8-02

6-71

6-22

5-73

5-o7

5-07 4-09

5-73 5-73 5-73 5-73

5-56 5-56 5-73 5-56 5-40 5-40 4-42

5-07 5-40

5-07 4-42

2-94 2-62

2-46 2-29 1-96 1-80

i-8o

o-66

o-49

0-49

0-49

o-33

o-33

o-33

Total remain- ing for Manure

lb

22-67 24-65

38-58

5-47

39-73

39-73 29-51

Value

at

lid.

per lb.

15-77

23-39

9-95

12-19

2-73 631

5-47 6-76

5-8o

2-89

39-73 27-30

28-53 28-06

30-66 33-22

19-94

20-11

I5-96

20-60 20-60

n-66

5-78 7-57

8-47 4-60

(4-6o)

6-39

s. d.

2 10

3 1

4 10

o 8

5 o

5 o

3 8

Total or Original Manure- Value per Ton of Food

con- sumed.

2 o

2 11

1 3 1 6

o 4 o 9 o 8 o 10 o 9 o 4

5 o

3 5

3 7

3 6

3 10

4 2

1 5

o 9

11

1 1

o 7

o 7 o 10

I s- d

1 9 6

2 3 10

3 7 4

19 5

1 19 2

1 13 9

2 11 7

196 1 14 11

1 13 9 1 14 2

o 9 o 12 o 10 o 10 o 13

O 12

2 6

I 8 8

12

13

1 3 7

o 15 5

3 3 023

O 2 10

2 9

2 7

2 2

2 3

one-fifth from year to year to the eighth year back. The results of the estimates of compensation-value so made are given for the five yields of 6, 8, 10, 12 and 14 quarts of milk per head per day respectively in Lawes and Gilbert's paper 1 on the valuation of the manures obtained by the consumption of foods for the production of milk, which may be consulted for fuller details. It must, however, be borne in mind that when cows are fed in sheds or yards the manure is generally liable to greater losses than is the case with fattening oxen. The

manure of the cow contains much more water in proportion to solid matter than that of the ox. Water will, besides, frequently be used for washing, and it may be that a good deal of the manure is washed into drains and lost. In the event, therefore, of a claim for compensation, the management and disposal of the manure requires the attention of the valuer. Indeed, the varying circumstances that will arise in practice must be carefully considered. Bearing these in mind, the estimates may be accepted as at any rate the best approximation to the truth 1 Journ. Roy. Agric. Soc, 1898.

that existing knowledge provides; and they should be found sufficient for the requirements of practical use. Obviously they will be more directly applicable in the case of cows feeding en- tirely on the foods enumerated in the list, and not depending largely on grass; but, even when the animals are partially grass-fed, the value of the manure derived from the additional dry food or roots may be estimated according to the scale given.

Cheese and Cheese-Making For generations, perhaps for centuries, the question has been discussed as to why there should be so large a proportion of bad and inferior cheese and so small a proportion of really good cheese made in farmhouses throughout the land. That the result is not wholly due to skill and care or to the absence of these qualities on the part of the dairymaid may now be taken for granted. Instances might be quoted in which the most painstaking of dairymaids, in the cleanest of dairies, have failed to produce cheese of even second-rate quality and character, and yet others in which excellent cheese has been made under commonplace

conditions as to skill and equipment, and with not much regard to cleanliness in the dairy. The

explanation of what was so long a mystery has been found in the domain of ferments^; It is now. known that whilst various micro-organisms, which in many dairies have free access to the milk, have ruined an in- calculable: quantity of cheese— and of butter also — neither cheese nor butter of first-rate quality can be made without the aid of lactic acid bacilli. As an illustrative case, mention may be made of that of two most painstaking dairymaids who had tried in vain to make good cheese from the freshest of milk in the

organism;; (2) this organism abounds in , all samples of sour milk and sour whey; (3) the use of a whey starter is attended with results equal in every respect to thosie obtained from a milk-starter. It is well within the power of any dairyman to prepare what is practically a pure culture of the same bacterium as 'is supplied from the laboratory. Moreover, the sour- whey starter used by some of the successful cheese-makers before the introduction of the American system is in effect a pure culture, from which it follows that these men had, by empirical methods, attained the same end as that to which bacteriological research subsequently led. Wherever a starter is

*Table IX— Comparison of the Estimates of Total or Original Manure-Value when Foods are „.„,.,.„„. t w …. *f. „ ■ „,n,, rP . nrarHmlrv ■ onsumed for the Production of Fattening Increase, with those when the Food is consumed nece ssary, tne use 01 a culture practically*

by Cows giving different Yields of Milk.

Total or Original

Manure- Value per Ton of Food

consumed —

that is, only deducting the Constituents -in Fattening

Nos.

‘ Description

Increase or in Milk. ;

For the

of Food.

: Produc-

For the Production of Milk, supposing the Yield

tion of Fattening

per Head per Day to be as under —

‘

Increase

6 qts.

8 qts.

Id qts.

12 qt

s.

‘ 14 qts.

£ s. d.

£ s.

d.

£ B. d.

£ s. dv

£ s.

d.

£ s. d.

1

Linseed .

1 19' 2

1 14

7

I 12

1 96

I ; 7

1

1, 4 5

, 2 ;

Linseed cake

2 11 11

2 8

1

260

2 3 10

2; 1

9

1 19 8'

3

Decorticated

cotton cake

3 14 9

3 11

2

392

3 7. 4

3 5

4

33 4

' : 4

Palm-nut cake .

164

1 3

2

I 14

19 5

17

9

15 11

5

Undecorticated

cotton cake

2 5 3

2 2

4

2 O 8

1 19 2

1 17

6

1 15 11

6

Cocoa-nut cake •

1 19 10

1 16

11

1 15 3

1 13 9

t 12

3

1 10 6

7 8

Rape cake Peas

2 16 5

1 14

2

2 12 II;

211 7

2 10

4

291

1 16 5

1 13

1

III 2

1 9 6

1, 7

8

i; 5 9

9

Beans '.

2 1 11

1 18

7

I 16 IO

1 14 11

1 13

1

1 11 4

' 10

Lentils ; ; .

208

r 17

5

115 7

1 13 9

I iI2

2

1 10 r

11 , 12 <

Tares (seed) Maize .

2 1 1

1 17

11

I 16 ■

1 14 2

; I] 12

6

1 id 7

0,16 7

13

4

11 7,

9 ;ii

0: 8

i

0; 6 5

13

Wheat

18 11

15

8

' 13 11

•0 12 1

6 10

5

088

14

Malt

17 7

14

5

12 7

10 8

9

071

15

Barley

17 2

14

012 3:

10 6

8

8

6 II

16

Oats

19 9

16

8

15

013 4

11

7

‘0 9 10

17

Rice meal .

(0 18 6)

15

5

13 9

12

10

5

087

18

‘. J 9

Locust beans Malt coombs

267

2 3

9

2 2 0!

2 ‘o-6

1 18

11

1 17 4

20

Fine pollard

1 15 2

1 12

1 10 5;

1 8 “8

1 6

11

15 3

21

Coarse pollard .

I 18 !

1 15

2

1 13 6

1 12

1 10

5

189

22

23'

Bran

Clover hay . .

I 18 6

1 *5

11

1 14 6

1 13 i

1 11

8

1 10 3

1 7

1 5

5

14 5

I 3 : 7

■•1.2

8

1 1 8

24 25

Meadow hay Pea straw : .

18 7

17

16 31

15; S

014

5

013 7

12 2

10

9

010

093

8

5

o, 7 8

26

Oat straw .

o75

6

2

5 5

04.9

.0. 4

03 3

. 27

Wheat straw

6 6

5

5

4 10

42

3

6

030

, 28

Barley straw

065

5

6

4 10

044

0: 3

9

032

29

3° –

Bean straw Potatoes .

11 5

10

4

099

9 2

8

7

080

04 1

3

9

036

o33

3

1

2 11

31

Carrots

029

2

6

024

023

2

1

I 11

32

Parsnips .,

036

3

3

31

2 10

o 2

8

027

. 33

Mangel wurzels .

032

3

2 10

029

2

7

025

34

. Swedish turnips .

2 11

2

9

028

027

2

5

023

35

Yellow turnips .

(0 2 6)

2

4

023

22

2

1

020

3&

White turnips .

027

‘2

5

24

cleanest of dairies in North Lancashire. Advice to resort to the use of the ferment was acted upon, and the result was a revelation and a transformation, excellent prize-winning cheese being made from that time forward. By- the addition of a ” starter,” in the form of a small quantity of sour milk, whey or buttermilk, in an advanced stage of fermentation, the develop- ment of acidity in the main body of milk is accelerated. It has been ascertained that the starter is practically a culture of bacteria, which, if desired, may be obtained as a pure culture. Professor J. R. Campbell, as the result of experiments on pure cultures for Cheddar cheese-making, states 1 that (1) first-class Cheddar cheese can be made by using pure cultures of a lactic 1 Trans. Highl. and Agric. Soc. Scot., 1899.

pure is imperative, whether such culture be obtained from the laboratory or pre- pared by; what may be; called the ” home- made starter.” Pure’ cultures may be bought for a few shillings in the open market.

The factory-made cheese of Canada, the United States and Australasia, which is so largely imported into the United Kingdom, is all of the Cheddar type. The factory system has made no headway in the original home of the Cheddar cheese in the west of England. The system was thus described in .the Journal .of the British Dairy Farmers’ Association in 1889 by Mr R. J. Drummond:—

” In the year 1885 I was engaged as cheese instructor by the Ayrshire Dairy Associa- tion, to teach the Canadian system of Cheddar cheese-making. I commenced operations under many difficulties, being a total stranger to both the people and the country, and with this, the quantities of milk were

very fnuch less than I had been in the habit of handling. Instead of having the milk from 500 to 1000 cows, we had to operate with the milk from 25 to not over 60 cows.

" The system of cheese-making commonly practised in the county of Ayr at that time Was what .is commonly known as the Joseph Harding or English Cheddar system, which differs from the Canadian system in many details, and in one particular is essentially different, namely, the manner in which the necessary acidity in the milk is produced. In the old method a certain quantity of sour whey was added to the milk each day before adding the rennet, and I have no doubt in my own mind that this whey was often added when the milk was already acid enough, and the consequence was a spoiled cheese.

" Another objection to this system of adding sour whey was, should the stuff be out of condition one day, the same trouble was inoculated with the milk from day to day, and the result was sure to be great unevenness in the quality of the cheese. The utensils commonly in use were very different to anything I had ever seen before; instead of the oblong cheese vat with double casings, as is used by the best makers at the present time, a tub, sometimes of tin and sometimes of wood, from 4 to 7 ft. in diameter by about 30 in. deep, was universally in use. Instead of being able to heat the milk with warm water or steam, as is commonly done now, a large can of a capacity of from 20 to 30 gallons was filled with cold milk and placed in a common hot-water boiler, and heated sufficiently to bring the whole body of the milk in the tub to the desired tem- perature for adding the rennet. I found that many mistakes were made in the quantity of rennet used, as scarcely any two makers used the same quantity to a given quantity of milk. Instead of having a graduated measure for measuring the rennet, a common tea-cup was used for this purpose, and I have found in some dairies as low as 3 oz. of rennet was used to 100 gallons of milk, where in others as high as 6| oz. was used to the same quantity. This of itself would cause a difference in

the quality of the cheese.

" Coagulation and breaking completed, the second heating was effected by dipping the whey from the curd into the can already

mentioned, and heated to a temperature of 140 F., and returned to, the curd, and thus the process was carried on till the desired temperature was reached. This mode of heating I considered very laborious and at the same time very unsatisfactory, as it is impossible to distribute the heat as evenly through the curd in this way as by heating either with hot water or steam. The other general features of the method do not differ from our own very materially, with the exception that in the old method the curd was allowed to mature in the bottom of the tub, where at the same stage we remove the curd from the vat to what we call a curd-cooler, made with a sparred bottom, so as to allow the whey to separate from the curd during the maturing. or ripening process; In regard to the quality of cheese on the one method compared with the other, I think that there was some cheese just as fine made in the old way as anything we can possibly make in the new, with one exception, and that is, that the cheese made according to the old method will not toast- instead of the casein melting down with the butter-fat, the two become separated, which is very much objected to by the consumer — and, with this, want of uniformity through the whole dairy. This is a very short and imperfect description of how the cheese was made at the time I came into Ayrshire; and I will now give a short de- scription of the system that has been taught by myself for the past four years, and has been the means of bringing this county so prominently to the front as one of the best cheese-making counties in Britain.

"Our duty in this system of cheese-making begins the night before, in having. the milk properly set and

cooled according to the temperature of the atmosphere, so as to arrive at a given heat the next morning. Our object in this is to secure, at the time we wish to begin work in the morning, that degree of acidity or ripeness essential to the success of the whole operation. We cannot give any definite guide to makers how, or in what quantities, to set their milk, as the whole thing depends on the good judgment of the operator. If he finds that his milk works best at a temperature of 68° F. in the morning, his study the night before should tend toward such a result, and he will soon learn by experience how best to manage the; milk in his own individual dairy. I have found in some dairies that the milk worked quite fast enough at a temperature of 64 ° in the morning, where in others the milk set in the same way would be very much out of condition by being too sweet, causing hours of delay before matured enough to add the rennet. Great care should be taken at this point, making sure that the milk is properly matured before the rennet is added, as impatience at this stage often causes hours of delay in the making of a cheese. I advise taking about six hours from the time the rennet is added till the curd is ready for salting, which means a six-hours' process; if much longer than this, I have found by experience that it is impossible to obtain the best results. The cream should always be removed from the night's milk in the morning and heated to a temperature of about 84 before returning it to the vat. To do this properly and with safety, the cream should be heated by adding about two-thirds of warm milk as it comes from the cow to one-third of cream, and passed through the ordinary milk-strainers. If colouring matter is used, it should be added fifteen to twenty minutes before the rennet, so as to become thoroughly mingled with the milk before coagulation takes place.

'.' We use from 4 to 4J oz. of Hansen's rennet extract to each 100 gallons of milk, at a temperature of 86° in spring and 84 in summer, or sufficient to coagulate milk firm enough to cut in about forty minutes when in a proper condition. In

cutting, great care should be taken not to bruise the curd. I cut lengthwise, then across with perpendicular knife, then with horizontal knife the same way of the perpendicular, leaving the curd in small cubes about the size of ordinary peas. Stirring with the hands should begin immediately after cutting, and continue for ten to fifteen minutes prior to the application of heat. At this stage we use a rake instead of the hands for stirring the curd during the heating process, which lasts about one hour from the time of beginning until the desired temperature of ioo° or 102 is reached. After heating, the curd should be stirred another twenty minutes, so as to become properly firm before allowing it to settle. We like the curd to lie in the whey fully one hour after allowing it to settle before it is ready for drawing the whey, which is regulated altogether by the condition of the milk at the time the rennet is added. At the first indication of acid, the whey should be removed as quickly as possible. I think at this point lies the greatest secret of cheese-making — to know when to draw the whey.

' ' I depend entirely on the hot-iron test at this stage, as I consider it the most accurate and reliable guide known to determine when the proper acidity has been developed. To apply this test, take a piece of steel bar about 18 in. long by 1 in. wide and J in. thick, and heat to a black heat; if the iron is too hot, it will burn the curd; if too cold, it will not stick; consequently it is a very simple matter to determine the proper heat. Take a small quantity of the card from the vat arid compress it tightly in the hand, so as to expel all the whey; press the curd against the iron, and when acid enough it will draw fine silky threads i in. long. At this stage the Curd should be removed to the curd-cooler as quickly as possible, and stirred till dry enough to allow it to mat, which generally takes from five to eight minutes. The curd is now allowed to stand in one end of the cooler for thirty minutes, when it is cut into pieces from 6 to

8 in. square and turned, and soon every half-hour

until it is fit for milling. After removing the whey, a new acid makes its appearance in the body of the curd, which seems to depend for its development upon the action of the air, and the presence of which experience has shown to be an essential element in the making of a cheese. This acid- should be allowed to develop properly before the addition of salt. To determine when the curd is ready for salting, the hot-iron test is again resorted to; and when the curd will draw fine silky threads i| in. long, and at the same time have a soft velvety feel when pressed in the hand, the butter-fat will not separate with the whey from the curd. I generally advise using 1 lb of salt to 50 lb of curd, more or less, according to the condition of the curd. After salting, we let the curd lie fifteen minutes, so as to allow the salt to be thoroughly dissolved before pressing.

" In the pressing, care should be taken not to press the curd too severely at first, as you are apt to lose some of the butter-fat, and with this I do not think that the whey will come away so freely by heavy pressing at first, We advise three days' pressing before cheese is taken to the curing- room. All cheese should have a bath in water at a temperature of 120 next morning after being made, so as to form a good skin to prevent cracking or chipping. The temperature of the curing-room should be kept as near 60° as possible at all seasons of the year, and I think if a eood plan to ventilate while heating."

With regard to the hot-iron test for acidity, Mr F. J. Lloyd, in describing his investigations on behalf of the Bath and West of England Society, states that cheese-makers have long known that in both the manufacture and the ripening of cheese the acidity produced— known to the chemist as " lactic acid "— materially influences the results obtained, and that amongst other drawbacks to the test referred to is the uncertainty of the temperature of the iron itself. He gives an, account, 1 however, of a chemical method involving the use of a standard solution of an alkali (soda), and of a substance

termed an " indicator " (phenolphthalein), which changes colour according to whether a solution is acid or alkaline. The apparatus used with these reagents is called the acidimeter. The two stages in the manu- facture of a Cheddar cheese most difficult to determine empiri- cally are— (1) when to stop stirring and to draw the whey, and (2) when to grind the curd. The introduction of the acidimeter has done away with these difficulties; and though the use of this apparatus is not actually a condition essential to the manu- facture of a good cheese, it is to many makers a necessity and to all an advantage. By its use the cheese-maker can determine the acidity of the whey, and so decide when to draw the latter off, and will thus secure not only the proper development of acidity in the subsequent changes of cheese-making, but also materially diminish the time which the cheese takes to make. Furthermore, it has been proved that the acidity of the 'whey which drains from the curd when in the cooler is a sufficiently accurate guide to the condition of the curd before grinding; and by securing uniformity in this acidity the maker will also ensure uniformity in the quality and ripening properties of the cheese. Speaking generally, the acidity of the liquid from the press should never fall below o-8o% nor rise above 1-20%, and, the nearer it can be kept to, i-oo% the better. Simul- taneously, of course, strict attention must be paid to temperature, time and every other factor which can be accurately determined. Analyses of large numbers of Cheddar cheeses manufactured in every month of the cheese-making season show the average composition of ripe specimens to be — 'Water, 35-58%; fat, 31-33; casein, 29-12; mineral matter or ash, 3-97. It has been maintained that in the ripening of Cheddar cheese fat is formed out of the. curd, but a comparison of analyses of ripe cheeses with analyses' of the curd from which the cheeses were made affords no evidence that this is the case.

•

The quantity of milk required to make 1 lb of Cheddar cheese may be learnt from Table X-, which

shows the results obtained at the cheese school of the Bath and West of England: Society in the 1 two-seasons of 1899 al, d 1900. The cheese was sold at an average age, of ten to twelve weeks. In 1899 a total of 21,226 gallons of milk yielded 20,537 lb of saleable cheese, and in 1900, 31,808 gallons yielded 29,631 lb. In the two years together 53,028 gallons yielded 50,168 lb, which is equivalent to i-oj gallon of milk to 1 lb of cheese. For practical purposes it may

1 Report on Cheddar Cheese-Making, London, 1899.

be taken that one gallon, or slightly over 10 lb. of milk, yields i lb of pressed cheese. The prices obtained are added as a matter of interest.

Cheshire cheese is largely made in the county from which it takes its name, and in adjoining districts. It is extensively consumed in Manchester and Liverpool, and other parts of the densely populated county of Lancaster.

Table X. — Quantities of Milk employed and of Cheese produced in the Manu- facture of Cheddar Cheese.

When Made.

Milk.

Green Cheese.

Saleable Cheese.

Shrinkage.

Price.

galls.

lb

lb

per cwt.

April 1899 . May .

3077

3100

2924

6 per cent.

60s.

4462

4502

4257

6J lb per cwt.

63s.

June . July .

4316

4434

4141

7 lb 6 oz. per cwt.

70s.

3699

3785

3545

7 lb 2 oz. per cwt.

74s.

August

2495

2539

2353

8 lb 3 oz. per cwt.

74s.

Sept. and Oct.

3171

3583

3317

8 lb 5 oz. per cwt.

74s.

April 1900 . May .

3651

3505

3292

6 per cent.

63s.

6027

6048

5577

^\ per cent.

64s.

Tune .

July and Aug.

5960

5889

5466

7 1 per cent.

68s.

7227

7‘77

6630

7 \ per cent.

66s.

Sept. and Oct.

8943

9635

8666

10 per cent.

66s.

The following is a description of the making of Cheshire cheese: —

The evening’s milk is set apart until the following morning, when the cream is skimmed off. The latter is poured into a pan which has been heated by being placed in the boiling water of a boiler. The new milk obtained early in the morning is poured into the vessel containing the previous evening’s milk with the warmed cream, and the temperature of the mixture is brought to about 75° F. Into the vessel is introduced a piece of rennet, which has been kept in warm water since the preceding evening, and in which a little Spanish annatto {\ oz. is enough for a cheese of 60 lb) is dissolved. (Marigolds, boiled

in milk, are occasionally used for colouring cheese, to which they likewise impart a pleasant flavour. In winter, carrots scraped and boiled in milk, and afterwards strained, will produce a richer colour; but they should be used with moderation, on account of their taste.) The whole is now stirred together, and covered up warm for about an hour, or until it becomes curdled; it is then turned over with a bowl and broken very small. After standing a little time, the whey is drawn from it, and as soon as the curd becomes somewhat more solid it is cut into slices and turned over repeatedly, the better to press out the whey.

The curd is then removed from the tub, broken by hand or cut by a curd-breaker into small pieces, and put into a cheese vat, where it is strongly pressed both by hand and with weights, in order to extract the remaining whey. After this it is transferred to another vat, or into the same if it has in the meantime been well scalded, where a similar process of breaking and expressing is repeated, until all the whey is forced from it. The cheese is now turned into a third vat, previously warmed, with a cloth beneath it, and a thin loop of binder put round the upper edge of the cheese and within the sides of the vat, the cheese itself being previously enclosed in a clean cloth, and its edges placed within the vat, before transfer to the cheese-oven. These various processes occupy about six hours, and eight more are requisite for pressing the cheese, under a weight of 14 or 15 cwt. The cheese during that time should be twice turned in the vat. Holes are bored in the vat which contains the cheese, and also in the cover of it, to facilitate the extraction of every drop of whey. The pressure being continued, the cheese is at length taken from the vat as a firm and solid mass.

On the following morning and evening it must be again turned and pressed ; and also on the third day, about the middle of which it should be removed to the salting-chamber, where the outside is well rubbed with salt, and a cloth binder passed round it which is not turned over the upper surface. The cheese is then placed in brine extending half-way up

in a salting-tub, and the upper surface is thickly covered with salt. Here it emains for nearly a week, being turned twice in the day. It is then left to dry for two or three days, during Which period it is turned once — being well salted at each turning — and cleaned every day. When taken from the brine it is put on the salting benches, with a wooden girth round itof nearly the thickness of the cheese, where it stands a few days, during which time it is again salted and turned every day. It is next washed and dried; and after remaining on the drying benches about seven days, it is once more washed in warm water with a brush, and wiped dry. In a couple of hours after this it is rubbed all over with sweet whey butter, which operation is afterwards frequently repeated; and, lastly, it is deposited in the cheese or store-room — which should be moderately warm and sheltered from the access of air, lest the cheese should crack— and turned every day, until it has become sufficiently hard and firm. These cheeses require to be kept a considerable time.

As a matter of fact, there are three different modes of cheese- making followed in Cheshire, known as the early ripening, themedium ripening and the late ripening processes. There is also a method which produces a cheese that is permeated with " green mould " when ripe, called " Stilton Cheshire "; this, however, is confined to limited districts in the county. The early ripening method is generally followed in the spring of the year, until the middle or end of April; the medium process, from that time till late autumn, or until early in June, when the late ripening process is adopted and followed until the end of September, changing again to the medium process as the season advances. The late ripening process is not found to be suitable for spring or late autumn make. There is a decided difference between these several methods of making. In the early ripening system a larger quantity of rennet is used, more acidity is devel- oped, and less pressure employed than in the other processes. In the medium ripening process a moderate amount of acidity is

developed, to cause the natural drainage of the whey from the curd when under press. In the late ripening system, on the other hand, the development of acidity is prevented as far as possible, and the whey is got out of the curd by breaking down finer, usin^ more heat, and skewering when under press. In the Stilton Cheshire process a larger quantity of rennet is used, and less pressure is employed, than in the medium or late ripening systems.

It is hardly possible to enunciate any general rules for themakingof Stilton cheese, which differs from Cheddar and Cheshire in that it is not subjected to pressure. Mr J. Marshall Dugdale, in 1899, made a visit of inspection to the chief Leicester- shire dairies where this cheese is produced, but in his report 1 he stated that every Stilton cheese-maker worked on his own lines, and that at no two dairies did he find the details all carried out in the same manner. There is a fair degree of uniformity up to the point when the curd is ladled into the straining-cloths, but at this stage, and in the treatment of the curd before salting, diversity sets in, several different methods being in successful use. Most of the cheese is made from two curds, the highly acid curd from the morning's milk being being mixed with the compara- tively sweet curd from the evening's milk . Opinion varies widely as to the degree of tightening of the straining-cloths. No test for acidity appears to be used, the amount of acidity being judged by the taste, feel and smell of the curd. When the desired degree of acidity has developed, the curd is broken by hand to pieces the size of small walnuts, pnd salt is added at the rate of about 1 oz. to 4 lb of dry curd, or 1 oz. to 35 lb of wet curd, care being taken not to get the curd pasty. If a maker has learnt how to rennet the milk properly, and how to secure the right amount of acidity at the time of hooping — that is, when the broken and salted curd is put into the wooden hoops which give the cheese its shape — he has acquired probably two of the most important details necessary to success. It was formerly the custom to add cream to the milk used for making Stilton cheese, but the

more general practice now is to employ new milk alone, which yields a product apparently as excellent and mellow as that from enriched milk.

As a cheese matures or becomes fit for consumption, not only is there produced the characteristic flavour peculiar to the type of cheese concerned, but with all varieties, independently of the quality of flavours developed, a profound physical transforma- tion of the casein occurs. In the course of this change the firm elastic curd ” breaks down ” — that is, bc„jmes plastic, whilst chemically the insoluble casein is converted into various soluble decomposition products. These ripening phenomena — the pro- duction of flavour and the breaking down of the casein (that is, the formation of proper texture) — used to be regarded as different phases of the same process. As subsequently shown, however, these changes are not necessarily so closely correlated. The theories formerly advanced as explanatory of the ripening changes in cheese were suggestive rather than based upon ex- perimental data, and it is only since 1896 that careful scientific studies of the problem have been made. Of the two existing theories, the one, which is essentially European, ascribes the ripening changes wholly to the action of living organisms — the bacteria present in the cheese. The other, which had its origin

1 ” The Practice of Stilton Cheese-Making,” Journ. Roy. Agric. Soc, 1899.

in the United States, asserts that there are digestive enzymes — that is, unorganized or soluble ferments — inherent in the milk itself that render the casein soluble. The supporters of the bacterial theory are ranged in two classes. The one, led by Duclaux, regards the breaking down of the casein as due to the action of liquefying bacteria (Tyrothrix forms). On the other hand, von Freudenreich has

ascribed these changes to the lactic- acid type of bacteria, which develop so luxuriantly in hard cheese like Cheddar.

With regard to the American theory, and in view of the important practical results obtained by Babcock and Russell at the Wisconsin experiment station, the following account 1 of their work is of interest, especially as the subject is of high practical importance. In 1897 they announced the discovery of an inherent enzyme in milk, which they named galactose, and which has the power of digesting the casein of milk, and producing chemical decomposition products similar to those that normally occur in ripened cheese. The theory has been advanced by them that this enzyme is an important factor in the ripening changes; and as in their experiments bacterial action was excluded by the use of anaesthetic agents, they conclude that, so far as the breaking down of the casein is concerned, bacteria are not essential to this process. In formulating a theory of cheese- ripening, they have further pointed out the necessity of con- sidering the action of rennet extract as a factor concerned in the curing changes. They have shown that the addition of increased quantities of rennet extract materially hastens the rate of ripening, and that this is due to the pepsin which is present in all commercial rennet extracts. They find it easily possible to differentiate between the proteolytic action — that is, the decomposing of proteids — of pepsin and galactase, in that the first-named enzyme is incapable of producing decomposition products lower than the peptones precipitated by tannin. They have shown that the increased solubility — the ripening changes — of the casein in cheese made with rennet is attributable solely to the products peculiar to peptic digestion. The addition of rennet extract or pepsin to fresh milk does not produce this change, unless the acidity of the milk is allowed to develop to a point which experience has shown to be the best adapted to the making of Cheddar cheese. The rationale of the empirical process of ripening the milk before the addition of

the rennet is thus explained. In studying the properties of galactase it was further found that this enzyme, as well as those present in rennet extract, is operative at very low temperatures, even below freezing-point. When cheese made in the normal manner was kept at tempera- tures ranging from 25° to 45° F. for periods averaging from eight to eighteen months, it was found that the texture of the product simulated that of a perfectly ripened cheese, but that such cheese developed a very mild flavour in comparison with the normally- cured product. Subsequent storage at somewhat higher tempera- tures gives to such cheese a flavour the intensity of which is determined by the duration of storage. This indicates that the breaking down of the casein and the production of the flavour peculiar to cheese are in a way independent of each other, and may be independently controlled — a point of great economic importance in commercial practice. Although it is generally believed that cheese ripened at low temperatures is apt to develop a more or less bitter flavour, the flavours in the cases described were found to be practically perfect. Under these conditions of curing, bacterial activity is inoperative, and these experiments are held to furnish an independent proof of the enzyme theory.

Not only are these investigations of interest from the scientific standpoint, as throwing light on the obscure processes of cheese- curing, but from a practical point of view they open up a new field for commercial exploitation. The inability to control the temperature in the ordinary factory curing-room results in serious losses, on account of the poor and uneven quality of the product, and the consumption of cheese has been greatly lessened thereby. These conditions may all be avoided by this low-temperature curing process, and it is not improbable that the cheese industry may undergo important changes in methods of treatment. With 1 Experiment Station Record, xii. 9 (Washington, 1901).

the introduction of cold-storage curing, and the necessity of constructing centralized plant for this

purpose, the cheese industry may perhaps come to be differentiated into the manu- facture of the product in factories of relatively cheap construc- tion, and the curing or ripening of the cheese in central curing stations. In this way not only would the losses which occur under present practices be obviated, but the improvement in the quality of the cured product would be more than sufficient to cover the cost of cold-storage curing.

The characteristics of typical specimens'of the different kinds of English cheese may be briefly described. Cheddar cheese possesses the aroma and flavour of a nut — the so-called " nutty " flavour. It should melt in the mouth, and taste neither sweet nor acid. It is of flaky texture, neither hard nor crumbly, and is firm to the touch. It is early-ripening and, if not too much acid is developed in the making, long-keeping. Before all others it is a cosmopolitan cheese. Some cheeses are "plain," that is, they possess the natural paleness of the curd, but many are coloured with annatto — a practice that might be dispensed with. The average weight of a Cheddar cheese is about 70 lb. Stilton cheese is popularly but erroneously supposed to be commonly made from morning's whole milk with evening's cream added, and to be a " double-cream " cheese. The texture is waxy, and a blue-green mould permeates the mass if well ripened; the flavour is suggestive of decay. The average weight of a Stilton is 15 ft). Cheshire cheese has a fairly firm and uniform texture, neither flaky on the one hand nor waxy on the other ; is of somewhat sharp and piquant flavour when fully ripe; and is often — at eighteen months old, when a well-made Cheshire cheese is at its best — permeated with a blue-green mould, which, as in the case of Stilton cheese, contributes a characteristic flavour which is much appreciated. Cheshire cheese is, like Cheddar, sometimes highly-coloured, but the practice is quite unnecessary; the weight is about 55 lb. Gloucester cheese has a firm, somewhat soapy, texture and sweet flavour. Double Gloucester differs from single Gloucester only in size, the former usually weighing 26 to 30 lb, and

the latter 13 to 15 lb. Leicester cheese is somewhat loose in texture, and mellow and moist when nicely ripened. Its flavour is ” clean,” sweet and mild, and its aroma pleasant. To those who prefer a mild flavour in cheese, a perfect Leicester is perhaps the most attractive of all the so- called “hard” cheese; the average weight of such a cheese is about 3 s lb. Derby cheese in its best forms is much like Leicester, being ” clean ” in flavour and mellow. It is sometimes rather flaky in texture, and is slow-ripening and long-keeping if made on the old lines; the average weight is 25 lb. Lancashire cheese, when well made and ripe, is loose in texture and is mellow; it has a piquant flavour. As a rule it ripens early and does not keep long. Dorset cheese — sometimes called ” blue vinny ” (or veiny) — is of firm texture, blue-moulded, and rather sharp-flavoured when fully ripe ; it has local popularity and the best makes are rather like Stilton. Wensleydale cheese, a local pro- duct in North Yorkshire, is of fairly firm texture and mild flavour, and may almost be spread with a knife when ripe; the finest makes are equal to the best Stilton. Cotherstone cheese, also a Yorkshire product, is very much like Stilton and commonly preferable to it. The blue-green mould develops, and the cheese is fairly mellow and moist, whereas many Stiltons are hard and dry. Wiltshire cheese, in the form of ” Wilts truckles,” may be described as small Cheddars, the weight being usually about 16 lb. Caerphilly cheese is a thin, flat product, having the ap- pearance of an undersized single Gloucester and weighing about 8 lb; it has no very marked characteristics, but enters largely into local consumption amongst the mining population of Glamorganshire and Monmouthshire. Soft cheese of various kinds is made in many localities, beyond which its reputation scarcely extends. One of the oldest and best, somewhat resem- bling Camembert when well ripened, is the little ” Slipcote,” made on a small scale in the county of Rutland; it is a soft, mellow, moist cheese, its coat slipping off readily when the cheese is at its best for eating — hence the name. Cream cheese is like- wise made in

many districts, but nowhere to a great extent. A

good cream cheese is fairly firm but mellow^ with a slightly acid yet very attractive flavour. It is the simplest of all cheese to make— cream poured into a perforated box lined with loose muslin practically makes itself into cheese in a few days' time, and is usually ripe in a week. ,

In France the pressed varieties of cheese with hard rinds include Gruyere, Cantal, Roquefort and Port Salut. The first- named, a pale-yellow cheese full of holes of varying size, is made in Switzerland and in the Jura Mountains district in the east of France; whilst Cantal cheese, which is of lower quality, is a product of the midland districts and is made barrel-shape. Roquefort cheese is made from the milk of ewes, which are kept chiefly as dairy animals in the department of Aveyron, and the cheese is cured in the natural mountain caves at the village of Roquefort. It is a small, rather soft, white cheese, abundantly veined with a greenish-blue mould and weighs between 4 and 5 lb. The Port Salut is quite a modern cheese, which originated in the abbey of that name in Mayenne; it is a thin, flat cheese of characteristic, and not unattractive odour and flavour. The best known of the soft unpressed cheeses are Brie, Camembert and Coulommiers, whilst Pont 1'Eveque, Livarot and other varieties are also made. After being shaped in moulds of various forms, these cheeses are laid on straw mats to cure, and when fit to eat they possess about the same consistency as butter. The Neufchatel, Gervais and Bondon cheeses are soft varieties intended to be eaten quite fresh, like cream cheese.

Of the varieties of cheese made in Switzerland, the best known is the Emmenthaler, which is about the size of a cart-wheel, and has a weight varying from 150 to 300, lb. It is full of small holes of almost uniform size and very regularly distributed. In

colour and flavour it is the same as Gruyere. The Edam and Gouda are the common cheeses of Holland. The Edam is spherical in shape, weighs from 3 to 4 lb, and is usually dyed crimson on the outside. The Gouda is a flat cheese with convex edges and is of any weight up to 20 lb. Of the two, the Edam has the finer flavour. Limburger is the leading German cheese, whilst other varieties are the Backstein and Munster; ah are strong-smelling. Parmesan cheese is an Italian product, round and flat, about 5 in. thick, weighing from 60 to 80 lb and possessed of fine flavour. Gorgonzola cheese, so called from, the Italian town of that name near Milan, is made in the Cheddar shape and weighs from 20 to 40 lb. When ripe it is permeated by a blue mould, and resembles in flavour, appearance and consistency a rich old Stilton.

For descriptions of all the named varieties of cheese, see Bulletin 105 of the Bureau of A nimal Industry (U.S. Department of Agriculture, Washington), issued 27th of June 1908, compiled by C. F. Doane and H. W. Lawson.

Butter and Butter-Making

As with cheese, so with butter, large quantities of the latter have been inferior not because the cream was poor in quality, but because the wrong kinds of bacteria had taken possession of the atmosphere in hundreds of dairies. The greatest if not the latest novelty in dairying in the last decade of the 19th century was the isolation of lactic acid bacilli, their cultivation in a suitable medium, and their employment in cream preparatory to churning. Used thus in butter-making, an excellent product results, provided cleanliness be scrupulously maintained. The culture repeats itself in the buttermilk, which in turn may be used again with marked success. Much fine butter, indeed, was made long before the bearing of bacteriological 'Science upon the practice of dairying was recognized — made by using acid butter- milk from a previous churning.

fii Denmark, which is, for its size, the greatest

butter-produc- ing country in the world, most of the butter is made with the aid of "starters," or artificial cultures which are employed in ripening the cream. Though the butter made by such cultures shows. little if any superiority over a good sample made from cream ripened in the ordinary way — that is, by keeping the cream at a fairly high temperature until it is ready for churning, when it must be cooled — it is claimed that the use of these cultures enables the butter-makers of Denmark to secure a much

greater uniformity in the quality of their produce than would be possible if they depended upon the ripening of the cream through the influence of bacteria taken up in the usual way from the air.

Butter-making is an altogether simpler process than cheese- making, but success demands strict attention to sound principles, the observance of thorough cleanliness in every stage of the work, and the intelligent use of the thermometer. The following rules for butter-making, issued by the Royal Agricultural Society sufficiently indicate the nature of the operation: —

Prepare churn, butter-worker, wooden-hands and sieve as follows :— (1) Rinse with cold water. (2) Scald with boiling water. (3) Rub thoroughly with salt. (4) Rinse with cold water.

Always use a correct thermometer.

The cream, when in the churn, to be at a temperature of 56 to 58 ° F. in summer and 60 " to 62 ° F. in winter. The churn should never be more than half full. Churn at number of revolutions suggested by maker of churn, ff none are given, churn at 40 to 45 revolutions per minute. Always churn slowly at first.

Ventilate the churn freely and frequently during churning, until no air rushes out when the vent is opened.

Stop churning immediately the butter comes. This can be ascer- tained by the sound ; if in doubt, look.

The butter should now be like grains of mustard seed. Pour in a small quantity of cold water (1 pint of water to 2 quarts of cream) to harden the grains, and give a few more turns to the churn gently. , Draw off the buttermilk, giving plenty of time for draining. Use a straining-cloth placed over the hair-sieve, so as to prevent any loss, and wash the butter in the churn with plenty of cold water: then draw off the water, and repeat the process until the water comes off quite clear.

To brine butter, make a strong brine, 2 to 3 lb of salt to 1 gallon of water. Place straining-cloth over mouth of churn, pour in brine, put lid on churn, turn sharply half a dozen times, and leave for 10 to 15 minutes. Then lift the butter out of the churn into sieve, turn butter out on worker, leave it a few minutes to drain, and work gently till all superfluous moisture is pressed out.

To drysalt butter, place butter on worker, let it drain 10 to 15 minutes, then work gently till all the butter comes together. Place it on the scales and weigh ; then weight salt, for slight salting, | oz. ; medium, J oz. ; heavy salting, f oz. to the ftp of butter. Roll butter out. on worker and carefully sprinkle salt over the surface, a little at a time; roll up and repeat till all the salt is used.

Never touch the butter with your hands.

Well-made butter is firm and not greasy. It possesses a characteristic texture or " grain," in virtue of which it cuts clean with a knife and breaks with a granular fracture, like that of cast-iron. Theoretically, butter should consist of little else than fat, but in practice this degree of perfection is never attained. Usually the fat ranges from 83 to 88 %, whilst water is present to the extent of from 16 to 15 } There will also be from 0-2 to Q-8 of milk-sugar, and from 0-5 to o-8% of

casein. It is the casein which is the objectionable ingredient, and the presence of which is usually the cause of rancidity. In badly- washed or badly-worked butter, from which the buttermilk has not been properly removed, the proportion of casein or curd left in the product may be considerable, and such butter has only inferior keeping qualities. At the same time, the mistake may be made of overworking or of overwashing the butter, thereby depriving it of the delicacy of flavour which is one of its chief attractions as an article of consumption if eaten fresh. The object of washing with brine is that the small quantity of salt thus introduced shall act as a preservative and develop the flavour. Streaky butter may be due either to curd left in by imperfect washing, or to an uneven distribution of the salt.

Equipment of the Dairy

The improved form of milking-pail shown in fig. 1 has rests or brackets, which the milker when seated on his stool places on his knees; he thus bears the weight on his thighs, and is entirely relieved of the strain involved in gripping the can between the knees. The milk sieve or strainer (fig. 2) is used to remove cow-hairs and any other mechanical impurity that may have fallen into the milk. A double straining surface is provided, the second being of very fine gauze placed vertically, so that the pressure of the milk does not force the dirt through ; the strainer is easily washed. The cheese tub Or vat receives

1 Market butter . is sometimes deliberately over-weighted with water, and a fraudulent profit is obtained by selling this extra moisture at the price of butter.

the milk for cheese-making. The rectangular form shown in fig. 3 is a Cheshire cheese-vat, for steam.

The inner vat'is of tinned steel, and the outer is of iron and is fitted with pipes

FlG. I.— Milkirig-Pail.

Fig. 2.— Milk Sieve.

Fig. 3. — Rectangular Cheese- Vat.

for steam supply. Round cheese-tubs (fig. 4) are made of strong sheets of steel, double tinned to render them lasting. They are fitted with a strong bottom hoop and bands round the sides,

Fig. 4.— Cheese-Tub.

and can be double-jacketed for steam-heating if required. Cu rd- knives (fig. 5) are used for cutting the coagulated mass into

cubes in order to liber- ate the whey. They are made of fine steel, with sharp edges; there are also wire curd-breakers. The object of the curd- mill (fig. 6) is to grind consolidated curd into small pieces, prepara- tory to salting and vat- ting; two spiked rollers work up to spiked breasts. Hoops, into which the curd is

Fig. 5. — Curd-Knives.

placed in order to acquire the shape of the cheese, are of wood or steel, the former being made of well-seasoned oak with iron bands (fig. 7), the latter of tinned steel. The cheese is more easily removed from the steel hoops and they are readily cleaned. The cheese-press (fig. 8) is used only for hard or " pressed " cheese, such as Cheddar. The arrangement is such

that the pressure is continuous; in the case of soft cheese the curd is merely placed in moulds (figs, t) and 10) of the required shape, and then taken cut to ripen; no pressure being applied.

The cheese-room is fitted with easily-turned shelves, on which newly - made " pressed " cheeses

are laid to ripen. . ./"""'.•'

In the butter dairy, when the centrifugal separator is not used, milk is " set," for cream-raising in the milk- pan (fig. 11), a shallow vessel of white porcelain.

Fig. 6.— Curd-Mill.

Fig. 7 — Hoop for Flat Cheese,

tinned steel or enamelled iron. The skimming-dish or skimmer (fig. 12), made of tin, is for collecting the cream from the surface of

F1G.9.— Cheese-Moula(Gervais).

Fig. 10. — Cheese-Mould (Pont.l'Eveque).

*Fig. 8. — Cheese-Press. **

*Fig. it: — Milk*Pan.*

the milk, whence it is transferred to the cream-crock (fig. 13), in which vessel the cream remains from one to three days, till it is required for churning. .•.':*

Many different kinds of churns are in use, and vary much in size, shape 1 and fittings; the one illustrated , in fig. 14 is a very good type of diaphragm churn. The butter-scoop (fig. 15) is of wood and is some- times perforated; it is used fortaking the butter out of the churn. The butter^worker (fig. 16) is employed for consoli- dating newly - churned butter, pressing out superfluous water and mixing in salt. More extended use, however, is now being made; of the " Delaiteuse " butter dryer, a centrifugal machine that' rapidly extracts the moisture from the butter, and renders the

Fig. 12. — Skimmer.

butter-worker unnecessary, whilst the butter produced has a better grain. Scotch hands (fig. 17), made of boxwood, are used for the lifting, moulding and pressing of butter.

In the centrifugal cream-separator the new milk is allowed to flow into a bowl, which is caused to rotate on its own axis

several thousand times per minute. The heavier portion which makes up the watery part of the milk flies to the outer cir- cumference of the bowl, whilst the lighter particles of butter-fat are forced to travel in an inner zone. By a simple mechanical arrangement the separated milk is forced out at one tube and the cream at another, and they are collected in distinct vessels. Separators are made of all sizes, from small machines dealing with 10 or 20 up to 100 gallons an hour, and worked by hand (fig. 18), to large machines separating 150 to 440 gallons an hour, and worked by horse, steam or other power (fig. 19). Separation is found to be most effective at temperatures ranging in different machines

Fig. 13. — Cream-Crock.

y

Fig. 14. — Churn.

from 8o° to 98 F., though as high a temperature as 150° is sometimes employed. The most efficient separators remove nearly the whole of the butter-fat, the quantity of fat left in the separated milk falling in some cases to as low as o-i. When cream is raised by the deep-setting method, from 0-2

to 0-4% of fat is left in the skim-milk; by the shallow-setting method from 0-3 to 0-5% of

Fig. 15— Butter-Scoop. the fat is left behind.

As a rule, therefore, ” separated ” milk is much

poorer in fat than ordinary " skim " milk left by the cream-raising method in deep or shallow vessels. The first continuous working separator was the invention of Dr de Laval. The more recent invention by Baron von Bechtol- sheim of what are known as the Alfa discs, which are placed along the centre of the bowl of the separator, has much increased the separating capacity of the machines without adding to the power required. This has been "of great assistance to dairy farmers by lessening the cost of the manufacture of butter, and

thus enabling a large additional number of factories to be established in different parts of the world, particularly in Ireland, where these disc machines are very extensively used. The pasteurizer — so named after the French chemist Pasteur

Tig. 17.— Scotch Hands.

Fig. 16. — Butter- Worker.

— affords a means whereby at the outset the milk is maintained at a temperature of 170 to 180 F. for a period of eight or ten minutes. The object of this is to destroy the tubercle bacillus, if it should happen to exist in the milk, whilst incidentally the bacilli associated with several other diseases communicable through the medium of milk would also be killed if they were present. Discordant results have been recorded by experimenters who have attempted to kill tubercle bacilli in milk by heating the latter in open vessels, thereby permitting the formation of a scum or " scalded layer " capable of protecting the tubercle bacilli, and enabling them to resist a higher temperature than otherwise would be fatal to them. At a temperature not much above 150° F. milk begins to acquire the cooked flavour which is objection- able to many palates, whilst its " body " is so modified as to lessen its suitability for creaming pur- poses. Three factors really enter into effective pasteurization of milk, namely (1) the temperature to which the milk is raised, (2) the length of time it is kept at that temperature, (3) the maintenance

of a condition of mechanical agitation to prevent the formation of ” scalded layer.” Within limits, what a higher tem- perature will accomplish if main- tained for a very short time may be effected by a lower temperature continued over a longer period. The investigation of the problem forms the subject of a paper 1 in the 17th Annual Report of the Wisconsin Agricultural Experiment Station, 1900. The following are the results of the experiments:— 1. An exposure of tuberculous milk in a tightly closed commercial pas- teurizer for a period of ten minutes _ , destroyed in every case the tubercle bacillus, as determined by the in- oculation of such heated milk into susceptible animals li ke guinea-pigs.

1 ” Thermal Death-Point of Tubercle Bacilli, and Relation of same to Commercial Pasteurization of Milk,” by H. L. Russell and E. G. Hastings.

18. — Hand-Separator.

z. Where milk is exposed under conditions that would enable a pellicle or membrane to form on the surface, the tubercle organism is able to resist the action of heat at 140 F. (5o° C.) for considerably longer periods of time.

3. Efficient pasteurization can be more readily accomplished in a

Fig. 19. — Power Separator.

closed receptacle such as is most frequently used in the commercial treatment of milk, than where the milk is heated in open bottles or open vats.

4. It is recommended, in order thoroughly to pasteurize milk so as to destroy any tubercle bacilli which it may contain, without in any

Fig. 20. — Refrigerator and Can.

way injuring its creaming properties or consistency, to heat the same in closed pasteurizers for a period of not less than twenty minutes at 140 F.

Under these conditions one may be certain that disease bacteria

Fig. 21. — Cylindrical Cooler or Refrigerator.

such as the tubercle bacillus will be destroyed without the milk or cream being injured in any way. For over a year this new standard has been in constant use in the Wisconsin University Creamery, and the results, from a purely practical point of view, reported a year earlier by Farrington and Russell, 1 have been abundantly confirmed.

Dairy engineers have solved the problem as to how large bodies of milk may be pasteurized, the difficulty of raising many hundreds or thousands of gallons of milk up to the required temperature, and maintaining it at that heat for a period of twenty minutes, having been suc- cessfully dealt with. The plant usually employed provides for the thorough filtration of the milk as it comes in from the farms, its rapid heating in a closed receiver and under mechanical agitation up to the desired temperature, its maintenance thereat for the requisite time, and finally its sudden reduc- tion to the temperature of cold water through the agency of a refrigerator, to be next noticed.

Refrigerators are used for reducing the temperature of milk to that of cold water, whereby its keeping properties are en- hanced. The milk flows down the outside of the metal refrigerator (fig. 20), which is corrugated in order to provide a larger cooling surface, whilst cold water circulates through the interior of the refrigerator. The conical vessel into which the milk is represented as flowing from the refrigerator in fig. 20 is absurdly called a " milk-churn," whereas milk-can is a much more appropriate name. For very large quantities of milk, such as flow from a pasteurizing plant, cylindrical refrigerators (fig. 21), made of tinned copper, are

available; the cold water circulates inside, and the milk, flowing down the outside in a very thin sheet, is rapidly cooled from a temperature of 140° F. or higher to i° above the temperature of the water.

The fat test for milk was originally devised by Dr S. M. Babcock, of the Wisconsin, U.S.A., experiment station. It combines the principle of centrifugal force with simple chemical action. Besides the machine itself and its graduated glass vessels, the only require- ments are sulphuric acid of standard strength and warm water. The machines — often termed butyrometers— are com- monly made to hold from two up to two dozen testers. After the tubes or testers have been charged, they are put in the apparatus, which is rapidly rotated as shown (fig. 22) ; in a few minutes the test is complete, and with properly graduated vessels the percentage of fat can be read off at a glance. The butyrometer is extremely useful, alike for measuring periodi- cally the fat-producing capacity of individual cows in a herd, for rapidly ascertaining the percentage of fat in milk delivered to factories and paying for such milk on the basis of quality, and for determining the richness in fat of milk supplied for the urban milk trade. Any intelligent person can soon learn to 1 16th Rept. Wis. Agric. Expt. Station, 1899, p. 129.

Fig. 22. — Butyrometer.

work the apparatus, but its efficiency is of course dependent upon the accuracy of the measuring vessels. To ensure this the board of agriculture have made arrangements with the National Physical Laboratory, Old Deer Park, Richmond, Surrey, to verify at a small fee the pipettes, measuring-glasses, and test- bottles used in connexion with the centrifugal butyrometer, which in recent years has been improved by Dr N. Gerber of Zurich.

Dairy Factories

In connexion with co-operative cheese-making the merit of having founded the first " cheesery " or cheese factory is generally credited to Jesse Williams, who lived near Rome, Oneida county, N.Y. The system, therefore, was of American origin. Williams was a skilled cheese-maker, and the produce of his dairy sold so freely, at prices over the average, that he increased his output of cheese by adding to his own supply of milk other quantities which he obtained from his neighbours. His example was so widely followed that by the year 1866 there had been estab- lished close upon 500 cheese factories in New York state alone. In 1870 two co-operative cheeseries were at work in England, one in the town of Derby and one at Longford in the same county. There are now thousands of cheeseries in the United States and Canada, and also many " creameries," or butter factories, for the making of high-class butter.

The first creamery was that of Alanson Slaughter, and it was built near Wallkill, Orange county, N.Y., in 1861, or ten years later than the first cheese factory; it dealt daily with the milk of 375 cows. Cheeseries and creameries would almost certainly have become more numerous than they are in England but for the rapidly expanding urban trade in country milk. The develop- ment of each, indeed, has been contemporaneous since 187 1, and they are found to work well in conjunction one with the other — that is to say, a factory is useful for converting surplus milk into cheese or butter when the milk trade is overstocked, whilst the trade affords a convenient avenue for the sale of milk when- ever this may happen to be preferable to the making of cheese or butter. Extensive dealers in milk arrange for its conversion into cheese or butter, as the case may be, at such times as the milk market needs relief, and in this way a cheesery serves as a sort of economic safety-valve to the milk trade. The same cannot always be said of creameries, because the machine-skimmed milk of some of these establishments has been far too much used to the prejudice of the legitimate milk trade in urban districts. Be this as

it may, the operations of cheeseries and creameries in conjunction with the milk trade have led to the diminution of home dairying. A rapidly increasing population has maintained, and probably increased, its consumption of milk, which has obviously diminished the farmhouse production of cheese, and also of butter. The foreign competitor has been less successful with cheese than with butter, for he is unable to produce an article qualified to compete with the best that is made in Great Britain. In the case of butter, on the other hand, the imported article, though not ever surpassing the best home-made, is on the average much better, especially as regards uniformity of quality. Colonial and foreign producers, however, send into the British markets as a rule only the best of their butter, as they are aware that their inferior grades would but injure the reputation their products have acquired.

There are no official statistics concerning dairy factories in Great Britain, and such figures relating to Ireland were issued for the first time in 1001. The number of dairy factories in Ireland in 1900 was returned at 506, comprising 333 in Munster, 92 in Ulster, 52 in Leinster and 29 in Connaught. Of the total number of factories, 495 received milk only, 9 milk and cream and 2 cream only. As to ownership, 219 were joint-stock con- cerns, 190 were maintained by co-operative farmers and 97 were proprietary. In the year ended 30th September 1900 these factories used up nearly 121 million gallons of milk, namely, 94 in Munster, 14 in Ulster, 7 in Leinster and 6 in Connaught. The number of centrifugal cream-separators in the factories was 985, of which 889 were worked by steam, 79 by water, 9 by horse-power and 8 by hand-power. The number of hands

permanently employed was 3653, made up of 976 in Munster, 279 in Leinster, 278 in Ulster and 120 in Connaught. The year's output was returned at 401,490 cwt. of butter, 439 cwt. of cheese (made from whole milk) and 46,253 gallons of cream. In most cases the skim-milk is returned to the farmers. A return of the number of separators used in private

establishments gave a total of 899, comprising 693 in Munster, 157 in Leinster, 39 in Ulster and 10 in Connaught. In factories and private establishments together as many as 1884 separators were thus accounted for. Much of the factory butter would be sent into the markets of Great Britain, though some would no doubt be retained for local consumption. A great improvement in the quality of Irish butter has recently been noticeable in the exhibits entered at the London dairy show.

Adulteration of Dairy Produce 1

The Sale of Food and Drugs Act 1899, which came into opera- tion on the 1st of January 1900, contains several sections relating to the trade in dairy produce in the United Kingdom. Section 1 imposes penalties in the case of the importation of produce in- sufficiently marked, such as (a) margarine or margarine-cheese, except in passages conspicuously marked ” Margarine ” or ” Margarine-cheese “; (b) adulterated or impoverished butter (other than margarine) or adulterated or impoverished milk or cream, except in packages or cans conspicuously marked with a name or description indicating that the butter or milk or cream has been so treated; (c) condensed separated or skimmed milk, except in tins or other receptacles which bear a label whereon the words ” machine-skimmed milk ” or ” skimmed milk ” are printed in large and legible type. For the purposes of this section an article of food is deemed to be adulterated or impoverished if it has been mixed with any other substance, or if any part of it has been abstracted, so as in either case to affect injuriously its quality, substance, or nature; provided that an article of food shall not be deemed to be adulterated by reason only of the addition of any preservative or colouring matter of such a nature and in such quantity as not to render the article injurious to health. Section 7 provides that every occupier of a manufactory of margarine or margarine-cheese, and every wholesale dealer in such substances, shall keep a register showing the quantity and destination of each consignment of such sub- stances sent out from his manufactory or place

of business, and this register shall be open to the inspection of any officer of the board of agriculture. Any such officer shall have power to enter at all reasonable times any such manufactory, and to inspect any process of manufacture therein, and to take samples for analysis . Section 8 is of much practical importance, as it limits the quantity of butter-fat which may be contained in margarine; it states that it shall be unlawful to manufacture, sell, expose for sale or import any margarine the fat of which contains more than 10% of butter-fat, and every person who manufactures, sells, exposes for sale or imports any margarine which contains more than that percentage shall be guilty of an offence under the Margarine Act 1887. For the purposes of the act margarine- cheese is defined as " any substance, whether compound or otherwise, which is prepared in imitation of cheese, and which contains fat not derived from milk "; whilst cheese is defined as " the substance usually known as cheese, containing no fat derived otherwise than from milk." The so-called " filled " cheese of American origin, in which the butter-fat of the milk is partially or wholly replaced by some other fat, would come under the head of " margarine-cheese." In making such cheese a cheap form of fat, usually of animal origin, but sometimes vegetable, is added to and incorporated with the skim-milk, and thus takes the place previously occupied by the genuine butter-fat. The act is regarded by some as defective in that it does not prohibit the artificial colouring of margarine to imitate butter.

In connexion with this act a departmental committee was

appointed in 1900 " to inquire and report as to what regulations,

if any, may with advantage be made by the board of agriculture

under section 4 of the Sale of Food and Drugs Act 1899, for

1 See also the article Adulteration.

determining what deficiency in any of the normal constituents of genuine milk or cream, or what addition of extraneous matter or proportion of water, in any sample of milk (including con- densed milk) or cream, shall for the purposes of the Sale of Food and Drugs Acts 1875 to 1899, raise a presumption, until the contrary is proved, that the milk or cream is not genuine." Much evidence of the highest interest to dairy-farmers was taken, and subsequently published as a Blue-Book (Cd. 484). The report of the committee (Cd. 491) included the following "recom- mendations," which were signed by all the members excepting one : —

I. That regulations upder section 4 of the Food and Drugs Act 1899 be made by the board of agriculture with respect to milk (including condensed milk) and cream. II. (a) That in the case of any milk (other than skimmed, sepa- rated or condensed milk) the total milk-solids in which on being dried at ioo° C. do not amount to 12 % a presump- tion shall be raised, until the contrary is proved, that the milk is deficient in the normal constituents of genuine milk.

(b) That any milk (other than skimmed, separated or con- densed milk) the total milk-solids in which are less than 12 %, and in which the amount of milk-fat is less than 3-25 %, shall be deemed to be deficient in milk-fat as to raise a presumption, until the contrary is proved, that it has been mixed with separated milk or water, 'or that some portion of its normal content of milk-fat has been removed. In calculating the percentage amount of deficiency of fat the analyst shall have regard to the above-named limit of 3-25 % of milk-fat.

(c) That any milk (other than skimmed, separated or con- densed milk) the total milk-solids in which are

less than 12 %, and in which the amount of non-fatty milk-solids is less than 8-5 %, shall be deemed to be so deficient in normal constituents as to raise a presumption, until the contrary is proved, that it has been mixed with water. In calculating the percentage amount of admixed water the analyst shall have regard to the above-named limit of 8-5 % of non-fatty milk-solids, and shall further take into account the extent to which the milk-fat may exceed

3- 2 5 %•

III. That the artificial thickening of cream by any addition of

gelatin or other substance shall raise a presumption that the cream is not genuine.

IV. That any skimmed or separated milk in which the total milk-

solids are less than 9 % shall be deemed to be so deficient in normal constituents as to raise a presumption, until the contrary is proved, that it has been mixed with water. V. That any condensed milk (other than that labelled ' ' machine- skimmed milk ” or “skimmed milk,” in conformity with section n of the Food and Drugs Act 1899) in which either the amount of milk-fat is less than 10%, or the amount of non-fatty milk-solids is less than 25 %, shall be deemed to be so deficient in some of the normal con- stituents of milk as to raise a presumption, until the con- trary is proved, that it is not genuine.

The committee further submitted the following expressions of opinion on points raised before them in evidence: —

(a) That it is desirable to call the attention of those engaged

in the administration of the Food and Drugs Acts to the necessity of adopting effective measures to prevent any addition of water, separated or condensed milk, or other extraneous matter, for the

purpose of reducing the quality of genuine milk to any limits fixed by regulation of the board of agriculture.

(b) That it is desirable that steps should be taken with the view

of identifying or ” ear-marking ” separated milk by the addition of some suitable and innocuous substance, and by the adoption of procedure similar to that provided by section 7 of the Food and Drugs Act 1899, in regard to margarine.

(c) That it is desirable that, so far as may be found practicable,

the procedure adopted in collecting, forwarding, and retain- ing pending examination, samples of milk (including con- densed milk) and cream under the Food and Drugs Acts should be uniform.

(d) That it is desirable that, so far as may be found practicable,

the methods of analysis used in the examination of samples of milk (including condensed milk) or cream taken under the Food and Drugs Acts should be uniform.

(e) That it is desirable in the case of condensed milk (other than

that labelled ” machine-skimmed milk ” or ” skimmed milk,” in conformity with section n of the Food and Drugs Act 1899) that the label should state the amount of dilution required to make the proportion of milk-fat equal to that found in uncondensed milk containing not less than 3-25% of milk-fat.

(/) That it is desirable in the case of condensed whole milk to limit, and in the case of condensed machine-skimmed milk to exclude, the addition of sugar.

(g) That the official standardizing of the measuring vessels com- mercially used in the testing of milk

is desirable.

In the minority report, signed by Mr Geo. Barham, the most important clauses are the following: —

(a) That in the case of any milk (other than skimmed, separated or condensed milk) the total milk-solids in which are less than 11-75%, and in which, during the months of July to February inclusive, the amount of milk-fat is less than 3 , and in the case of any milk which during the months of March to June inclusive shall fall below the above-named limit for total solids, and at the same time shall contain less than 2-75 of fat, it shall be deemed that such milk is so deficient in its normal constituent of fat as to raise a presumption, for the purposes of the Sale of Food and Drugs Acts 1875 to 1899, until the contrary is proved, that the milk is not genuine.

(b) That any milk (other than skimmed, separated or condensed milk) the total milk-solids in which are less than 11-75%, and in which the amount of non-fatty solids is less than 8-5 %, shall be deemed to be so deficient in its normal constituents as to raise a presumption, for the purposes of the Sale of Food and Drugs Acts 1875 to 1899, until the contrary is proved, that the milk is not genuine. In calculating the amount of the deficiency the analyst shall take into account the extent to which the milk-fat exceeds the limits above named.

(c) That any skimmed or separated milk in which the total milk- solids are less than 8-75 % shall be deemed to be so deficient in its normal constituents as to raise a presumption, for the purpose of the Sale of Food and Drugs Acts 1875 to 1899, until the contrary is proved, that the milk is not genuine.

Much controversy arose out of the publication of these reports, the opinion most freely expressed being that the standard recom- mended in the majority report was too high. The difficulty of the problem is illustrated by, for example, the diverse legal standards for milk that prevail in the United

States, where the prescribed percentage of fat in fresh cows' milk ranges from 2-5 in Rhode Island to 3-5 in Georgia and Minnesota, and 3-7 (in the winter months) in Massachusetts, and the prescribed total solids range from 12 in several states (11-5 in Ohio during May and June) up to 13 in others. Standards are recognized in twenty- one of the states, but the remaining states have no laws prescribing standards for dairy products. That the public dis- cussion of the reports of the committee was effective is shown by the following regulations which appeared in the London Gazette on the 6th of August 1901, and fixed the limit of fat at 3%:—

The board of agriculture, in exercise of the powers conferred on them by section 4 of the Sale of Food and Drugs Act 1899, do hereby make the following regulations : —

1. Where a sample of milk (not being milk sold as skimmed, or separated or condensed milk) contains less than 3 % of milk-fat, it shall be presumed for the purposes of the Sale of Food and Drugs Acts 1 875 to 1899, until the contrary is proved, that the milk is not genuine, by reason of the abstraction therefrom of milk-fat, or the addition thereto of water.

2. Where a sample of milk (not being milk sold as skimmed, or separated or condensed milk) contains less than 8-5 % of milk-solids other than milk-fat, it shall be presumed for the purposes of the Sale of Food and Drugs Acts 1875 to 1899, until the contrary is proved, that the milk is not genuine, by reason of the abstraction there- from of milk-solids other than milk-fat, or the addition thereto of water.

3. Where a sample of skimmed or separated milk (not being condensed milk) contains less than 9% of milk-solids, it shall be presumed for the purposes of the Sale of Food and Drugs Acts 1875 to 1899, until the contrary is proved, that the milk is not genuine, by reason of the abstraction therefrom of milk-solids other than milk-fat, or the addition thereto of water.

4. These regulations shall extend to Great Britain.

5. These regulations shall come into operation on the 1st of September 1901.

6. These regulations may be cited as the Sale of Milk Regulations

1901.

In July 1901 another departmental committee was appointed by the board of agriculture to inquire and report as to what regulations, if any, might with advantage be made under section 4 of the Sale of Food and Drugs Act 1899, for determining what deficiency in any of the normal constituents of butter, or what addition of extraneous matter, or proportion of water in any sample of butter should, for the purpose of the Sale of Food and Drugs Acts, raise a presumption, until the contrary is proved,

that the butter is not genuine. As bearing upon this point reference may be made to a report of the dairy division of the United States department of agriculture on experimental exports of butter, in the appendix to which are recorded the results of the analyses of many samples of butter of varied origin. First, as to American butters, 19 samples were analysed in Wisconsin, 17 in Iowa, s in Minnesota and 2 in Vermont, at the respective experiment stations of the states named. The amount of moisture throughout was low, and the quantity of fat correspondingly high. In no case was there more than 15 % of water, and only 4 samples contained more than 14%. On the other hand, n samples had less than 10%, the lowest being a pasteurized butter from Ames, Iowa, with only 6-72% of water. The average amount of water in the total 43 samples was 11-24%. The fat varies almost inversely as the water, small quantities of curd and ash having to be allowed for. The largest quantity of fat was 01-23% in the sample

containing only 6–72% of water. The lowest proportion of fat was 80–18%, whilst the average of all the samples shows 85–9%, which is regarded as a good market standard. The curd varied from 0–55 to 1–7 , with an average of 0–98. This small amount indicates superior keeping qualities. Theoretically there should be no curd present, but this degree of perfection is never attained in practice. It was desired to have the butter contain about 25 of salt, but the quantity of ash in the 43 samples ranged from 0–83 to 4–79%, the average being i–88. Analyses made at Washington of butters other than American showed a general average of 13–22% of water over 28 samples representing 14 countries. The lowest were 10–25% in a Canadian butter and 10–38 in an Australian sample. The highest was 19–1 % in an Irish butter, which also contained the remarkably large quantity of 8–28% of salt. Three samples of Danish butter contained 12–65, 14–27 and 15–14% respectively of water. French and Italian unsalted butter included, the former 15–46 and the latter 14–41% of water, and yet appeared to be unusually dry. In 7 samples of Irish butters the percent- ages of water ranged from 11–48 to 19–1. Of the 28 foreign butters 15 were found to contain preservatives. All 5 samples from Australia, the 2 from France, the single ones from Italy, New Zealand, Argentina, and England, and 4 out of the 7 from Ireland, contained boric acid.

The Milk Trade

The term ” milk trade ” has come to signify the great traffic in country milk for the supply of dwellers in urban districts. Prior to i860 this traffic was comparatively small or in its infancy. Thirty years earlier it could not have been brought into existence, for it is an outcome of the great network of railways which was spread over the face of the country in the latter half of the 19th century. It affords an instructive illustration of the process of commercial evolution which has been fostered by the vast increase of urban population within the period indicated. It is a tribute to the spirit of sanitary reform which — as an example in

one special direction — has brought about the disestablishment of urban cow-sheds and the consequent demand for milk pro- duced in the shires. London, in fact, is now being regularly supplied with fresh milk from places anywhere within 150 m., and the milk traffic on the railways, not only to London but to other great centres, is an important item. A factor in the development of the milk trade must no doubt be sought in the outbreak of cattle plague in 1865, for it was then that the dairy- men of the metropolis were compelled to seek milk all over England, and the capillary refrigerator being invented soon after, the production of milk has remained ever since in the hands of dairymen living mainly at a distance from the towns supplied.

This great change in country dairying, involving the continuous export of enormous quantities of milk from the farms, has been accompanied by subsidiary changes in the management of dairy- farms, and has necessitated the extensive purchase of feeding-stuffs for the production of milk, especially in winter-time. It is probable that, in this way, a gradual improvement of the soil on such farms has been effected, and the corn-growing soils of distant countries are adding to the store of fertility of soils in the

British Isles. Country roads, exposed to the wear and tear of a comparatively new traffic, are lively at morn and eve with the rattle of vehicles conveying fresh milk from the farms to the railway stations. Most of these changes were brought about within the limits of the last third of the 19th century.

In the case of London the daily supply of a perishable article such as milk, which must be delivered to the consumer within a few hours of its production, to a population of five millions, is an undertaking of very great magnitude, especially when it is con- sidered that only a comparatively minute proportion of the supply is produced in the metropolitan»area itself. To meet the demand of the London consumer some 5000 dairies proper exist, as

well as a large number of businesses where milk is sold in conjunction with other commodities. It has been computed that some 12,000 traders are engaged in the business of milk- selling in the metropolis, and the number of persons employed in its distribution, &c, cannot be fewer than 25,000. The amount of capital involved is very great, and it may be mentioned that the paid-up capital of six of the principal distributing and retail dairy companies amounts to upwards of one million sterling. The most significant feature in connexion with the milk-supply of the metropolis at the beginning of the 20th century is the gradual extinction of the town " cowkeeper " — the retailer who produces the milk he sells. The facilities afforded by the railway com-panies, the favourable rates which have been secured for the transport of milk, and the more enlightened methods of its treat- ment after production, have made it possible for milk produced under more favourable conditions to be brought from consider-able distances and delivered to the retailer at a price lower than that at which it has been possible to produce it in the metropolis itself. As a result, the number of milk cows in the county of London diminished from 10,000 in 1889 to 5144 in 1900, the latter, on an estimated production of 700 gallons per cow — the average production of stall-fed town cows — representing a yearly milk yield of 3,600,000 gallons. How small a proportion this is of the total supply will be gathered from the fact that the annual quantity of milk delivered in London on the Great Western line amounts to some 11,000,000 gallons, whilst the London & North- western railway delivers 9,000,000, and the Midland railway at St Pancras 5,000,000, and at others of its London stations about 1,000,000, making 6,000,000 in all. The London & South- western railway brings upwards of 8,000,000 gallons to London, a quantity of 7,500,000 gallons is carried by the Great Northern railway, and the Great Eastern railway is responsible for 7,000,000. The London, Brighton & South Coast railway de- livers 1,000,000 gallons, and the South-Eastern & Chatham and the London & Tilbury railways carry approximately 1,000,000

gallons between them. A large quantity of milk is also carried in by local lines from farms in the vicinity of London and delivered at the local stations, and a quantity is also brought by the Great Central railway. In addition to this, milk is taken into London by carts from farms in the neighbourhood of the metropolis. A computation of the total milk-supply of the metropolis reveals a quantity approximating to 60,000,000 gallons per annum, or rather more than a million gallons per week, which, taking 500 gallons as the average yearly production of the cows contributing to this supply, represents the yield of at least 1 20,000 cows. The growth of the supply of country milk to London may be judged from the figures given by Mr George Barham, chairman of the Express Dairy Co. Ltd., in an article on " The Milk Trade " contributed to Professor Sheldon's work on The Farm and Dairy. The quantities carried by the respective railways in 1889 are therein stated in gallons as: — Great Western, 9,000,000; London & North-Western, 7,000,000; Midland, 7,000,000; London & South-Western, 6,000,000; Great Northern, 3,000,000; Great Eastern, 3,000,000; the southern lines, 2,000,000. The increase, therefore, on these lines amounted to no less than 13,500,000 gallons per annum, or 36%. The diminished production in the metropolis itself amounted approxi- mately only to 3,000,000 gallons, and it follows, therefore, that the consumption largely increased.

Previously to 1864 it was only possible to bring milk into London from short distances, but the introduction of the re- frigerator has enabled milk to be brought from places as far removed from the metropolis as North Staffordshire, and it has even been received from Scotland. Practically the whole of the milk supplied to the metropolis is produced in England. Attempts have been made to introduce foreign milk, and in 1898 a company was formed to promote the sale of fresh milk from Normandy, but

the enterprise did not succeed. The trade subsequently showed signs of reviving, owing probably to the increased cost of the home produced article, and during the winter season of 1900-1901 the largest quantity received into the kingdom in one week amounted to 10,000 gallons. Of recent years a large demand has sprung up for sterilized milk in bottles, and a considerable trade is also done in humanized milk, which is a milk preparation approximating in its chemical composition to human milk.

Estimating the average yield of milk of each country cow at 500 gallons per annum, and assuming an average of 28 cows to each farm, as many as 4300 farmers are engaged in supplying London with milk; allotting ten cows to each milker, it needs 12 battalions of 1000 men each for this work alone. Some 3500 horses are required to convey the milk from the farms to the country railway stations. The chief sources of supply are in the counties of Derby, Stafford, Leicester, Northampton, Notts, Warwick, Bucks, Oxford, Gloucester, Berks, Wilts, Hants, Dorset, Essex, and Cambridge. It is not entirely owing to the railways that London's enormous supply of milk has been rendered possible, for the milk must still have been produced in the immediate neighbourhood of the metropolis had not the method of reducing the temperature of the product by means of the refrigerator been devised. There are probably 5700 horses engaged in the delivery of milk in London, and more people are employed in this work than in milking the cows. One of the great difficulties the London dairyman has to contend with, and a cause of frequent anxiety to him, is associated with the rise and fall of the thermometer, for a movement to the extent of ten degrees one way or the other may diminish or increase the supply in an inverse ratio to the demand. Thus, at periods of extreme cold, the cows shrink in their yield of milk, while from the same cause the Londoner is demanding more, in an extra cup of coffee, &c. Again, at periods of extreme heat, which has the same effect on the cow's

production as extreme cold, the customer also demands an increased quantity of milk. Ten degrees fall of temperature in the summer will result in a lessened demand and an enlarged supply — to such an extent, indeed, that a single firm has been known to have had returned by its carriers some 600 gallons in one day. In such cases the cream separator is capable of rendering invaluable assistance. To make cheese in I

London in large quantities and at uncertain intervals has been found to be impracticable, while to set for cream a great bulk of milk is almost equally so. But now a considerable portion of what would otherwise be lost is saved by passing the milk through separators, and churning the cream into butter.

Previously to the enormous development of the urban trade in country milk, dairy farms were in the main self-sustaining in the matter of manures and feeding-stuffs, and the cropping of arable land was governed by routine. To-day, on the contrary, many dairy farms are run at high pressure by the help of purchased materials, — corn, cake, and manure, — and the land is cropped regardless of routine and independent of courses. Such crops, moreover, are grown — white straw crops, green crops, roo.t crops — as are deemed likely to be most needed at the time when they are ready. Green crops, — ” soiling ” crops, as they are termed in North America, — consisting largely of vetches or tares (held up by stalks of oat plants grown amongst them), cabbages, and in some districts green maize, are used to supplement the failing grass-lands at the fall of the year, and root crops, especially mangel, are advantageously grown for the same purpose. For winter feeding the farm is made to yield what it will in the shape of meadow and clover hay, and of course root crops of the several kinds. This provision is supplemented by the purchase of, for example, brewers’ grains as a bulky food, and of oilcake and corn of many sorts as concentrated food.

British Output, Imports and Exports or Dairy Produce

Whilst the quantity of imported butter and cheese consumed in the United Kingdom from year to year can be arrived at with a tolerable degree of accuracy, it is more difficult to form an estimate of the amounts of these articles annually produced at home. Various attempts have, however, from time to time been made by competent authorities to arrive approximately at the annual output of milk, butter and cheese in the United Kingdom, and the results are given by Messrs W. Weddel & Co. in their annual Dairy Produce Review. Table XL shows the estimates for each of the ten years 1890 to 1899, the numbers in the second column of " cows and heifers in milk or in calf " being identical with those officially recorded in the agricultural returns. In thus estimating the quantity of milk, butter and cheese produced within the United Kingdom, the " average milking life " of a cow is taken to be four years, from which it follows that on the average one-fourth of the total herd has to be renewed every year by heifers with their first calf. This leaves 75% of the total herd giving milk throughout the year. Each cow of this 75% is estimated as yielding 49 cwt., or 531 gallons of milk annually. It is assumed that 15% of the total milk yield is used for the calf, 32% utilized for butter-

Table XI. — Estimated Annual Production of Milk, Butter and Cheese in the United Kingdom for the Ten Years ended

31st December 1899.

Year ended Decem- ber 31

Cows and Heifers

in Milk or in Calf on 4th June.

Cows per

1000

of Popu- lation.

Cows and

Heifers giving

Milk all the

year round ;

say 75 % of

Total.

Influence of Season. Per- centage above or below the Average of previous 10 Years.

Estimated Total

Quantity of Milk produced

in the 52 Weeks, by 75 % of the Total Herd, at 49 cwt. or 531

gallons per Cow.

Estimated Total

Quantity of

Butter produced

in the 52 Weeks,

taking 32 % of

the Total Milk

to yield 80 lb

of Butter per

Ton of Milk.

Estimated Total

Quantity of

Cheese produced

in the 52 Weeks,

taking 20 % of

the Total Milk

to yield 220 lb

of Cheese per

Ton of Milk.

1890 1891 1892

1893 1894

1895 1896 1897 1898 1899

10 Years' A verage

No.

31956,220 4."7,707 4,120,451

4.014.055 3,925,486

3.937,59°

3,958,762 3,984,167 4,035,501 4,133,249

No.

105-5 108-9 108-1 104-4

I0I-2

100-5

1000

99-7

IOO-O

101-9

No.

2,967,165 3,088,281

3,090,339 3,010,542

2,944.H5

2,953,193 2,969,387 2,988,126 3,025,526 3,099,937

%•

+3-0

Average.

-5-6 -90 +6-3 -3-5 -4-0

+3-i

+3-2

-3-5

Tons.

7,487,640 7,566,288

7,H7,337

6,712,004 7.667,505 6,982,087

6,983,999 7,547,856 7,645,105 7,329,027

Tons.

85,572 86,472 81,684

76,709 87,628 79,652 79.817 86,261

87.372 83,760

Tons.

147,078 148,624

HO,394

131,843 150,611

137,148 130,000 148,260

150,171 130,020

4,018,318

103.0

• 3,013,660

-0.7

7,906,874

83,992

141,412

75 8

DAIRY

making, 20% for cheese-making, and the remaining 33% consumed in the household as fresh milk. A ton of milk is estimated to produce 80 lb of butter or 220 lb of cheese. A gallon of milk weighs 10-33 ^ (I0 i &)• The probable effects of each season upon the production have been taken into con- sideration in making these estimates, and it will be noticed that owing to the terrible drought of 1893 a reduction of 9% is made from the average. Accepting these estimates with due reservation, 1 it is seen that the annual production of milk varied in the decade to the extent of nearly a million tons, the exact difference between the maximum of 7,667,505 tons in

1894 and the minimum of 6,712,004 tons in 1893 being 955,501 tons. The decennial averages are 7,906,874 tons of milk, 83,992 tons of butter, and 141,412 tons of cheese.

Table XII. furnishes an estimate of the total consumption of butter in the United Kingdom in each of the years 1891 to 1900. Whilst the estimated home production did not vary greatly from year to year, the imports from colonial and foreign sources under-went almost continuous increase. The ten years' average indicates 37-6% home-made, 7-3% imported colonial, and 55-1% imported foreign butter. But whereas at the beginning of the decade the proportions were 45-4% home-made, 1-5% colonial, and 53-2% foreign, at the end of the percentages were 32-8, 14-7 and 52-5 respectively. It thus appears that whilst the United Kingdom was able in 1891 to furnish nearly half of its requirements (45-4%), by 1900 it was unable to supply more than one-third (32-8%).

The rapid headway which colonial butter has made in British markets is shown by the fact that for the five years ended 30th of

Table XII. — Estimated Home Production and Imports of Butter into the United Kingdom for the Ten Years ended 30th June

1900.

Year ended 30th June.

Home

Production,

estimated.

Imported Colonial.

Imported Foreign.

Total.

1891 1892

1893 1894

1895 1896 1897 1898 1899 1900

Tons.

84,961 86,022 84,078 79,196 82,168 83,640 79,734
83,039 87,326 83,760

Tons.

2,883

6,323

9,408

15,550

17,807

12,949 18,111

17,732 22,443 37,534

Tons.

99,598 101,796 105,712

107,534 116,730

133,249 138,800 141,426 142,193 133,957

Tons.

187,442 194,141 199,198 202,280 216,705 229,838
236,645

242,197 251,962

255,251

10 Y

Averc

•*tars' ige*

83,392

16,074

122,099

221,565

June 1900 the import had grown from 12,949 tons to 37,534 tons per annum, or an increase of 24,585 tons. It is during the mid-winter months that the colonial butter from Australasia arrives on the British markets, while that from Canada begins to arrive in July, and virtually ceases in the following January. The bulk of the Canadian butter reaches British markets during August, September and October; the bulk of the Australasian in December, January and February.

It appears to be demonstrated by the experience of the last decade of the 19th century that the United Kingdom is quite unable to turn out sufficient dairy produce to supply its own population. In the year ended 30th of June 1891 the total import of butter was 102,500 tons, and for the year ended 30th of June 1900 it was 170,700 tons, which shows an annual average increase in the decade of 6800 tons. This growth was on the whole very uniform, any disturbance in its regularity being attributable more to the deficient seasons in the colonies and foreign countries than to the bountiful seasons at home. Twice in the decade the import of butter from colonial sources fell off slightly from the previous year, namely, in 1896 and 1898, while only once was there any decrease in the foreign supply, and this occurred in 1906. In 1896 the colonial supply fell off by 5000 tons, principally owing to drought in Australia, but from foreign countries this deficiency was more than made good, as the increased import from these sources exceeded 16,500 tons. In 1900 the position was reversed, for while the foreign import fell away to the extent of over 8000 tons, the supply from the colonies exceeded that of

1899 by 15,000 tons, thus leaving a gain in the quantity of imported butter of nearly 7000 tons on the year. Table XII. shows that over the ten years, 1891–1900, the import of colonial butter was augmented by 34,600 tons, and that of foreign by 33,600 tons, so that the in-

1 A special committee appointed by the council of the Royal Statistical Society commenced in 1901 an inquiry into the home pro- duction of milk and meat in the United Kingdom.

creased import is fairly divided between colonial and foreign sources. If, however, the last five years of the period be taken, it will be seen that the increases in the arrivals of colonial butter have far exceeded those from foreign countries. Between 1891 and 1900 the Austral- asian colonies increased their quota by 13,400 tons, and Canada by 11,100 tons. Of foreign countries, Denmark showed the greatest development in the supply of imported butter, which increased in the ten years by 28,678 tons. Next came Russia and Holland, with increases respectively of 7207 tons and 6589 tons. Sweden, which made steady progress from 1891 to 1896, subsequently declined, and in 1900 sent 1400 tons less than in 1891. France and Germany are rapidly falling away, and the latter country will soon cease its supply altogether. Up to 1896 it was 6000 tons annually; by 1900 it had fallen to 1850 tons. France, which in 1892 sent to the United Kingdom 29,000 tons, regularly declined, and in 1900 sent only 16,800. Among the countries sending the smaller quantities, Argen- tina, Belgium and Norway are all gradually increasing their supplies ; but their totals are comparatively insignificant, as they together contributed in 1900 only 6400 tons out of a total foreign supply of 134,000 tons. The United States was erratic in its supplies during the decade, and up to 1900 had not made butter specially for export to the United Kingdom, as all the other foreign countries had done. Consequently it is only when supplies from elsewhere fail that American butter is sought for by British buyers. The large amount of salt in this butter, although suitable for

the American palate, prevents its becoming popular in the United Kingdom.

The sources whence the United Kingdom receives butter from abroad are sufficiently indicated in Table XIII., which shows the absolute quantities and the relative proportions sent by the chief contributory countries in each of the four years 1897 to 1900, the

Table XIII. — Annual Imports of Butter into the United Kingdom,

1897–1900.

From

1897.

1898.

1899.

1900.

Denmark . Australasia France Holland . Russia Sweden Canada United States Germany . Other countries .*

Total

Denmark . Australasia France Holland . Russia Sweden Canada United States Germany . Other countries*

Total

Cwt.

1,334,726 269,432 448,128 278,631

299,214 109,402 154,196

5i,76i

272,312

Cwt.

1,465,030 228,563 416,821 269,631

294,962

156,865

66,712

41,231 269,645

Cwt.

1,430,052 366,944 353,942 284,810

245,599 250,083

159,137

36,953

262,331

Cwt.

1,486,342 509,910 322,048 282,805 209,738 196,041

138,313 56,046 36,042

141,231

3,217,802

3,209,153

3,389,851

3,378,516

%

41–5

8–4

13–9

8-7

9-3

3-4 4-8 1-6 8-4

% 45-6

7-1 13-0

8-4

9-2

4.9

2-1

1-3

8-4

% 42-2

io-8

10-5

8-4

7-2 7-4 47

i-i

7-7

% 44-0

i5-i

9-5 8-4

6-2

5-8 4-1 1-6

i-i

4-2

IOO-O

IOO-O

IOO-O

IOO-O

- *Not shown separately in the Trade and Navigation Returns prior to 1900.*

order of precedence of the several countries being in accord with the figures for 1900. Denmark, as a result of the efforts made by that little kingdom to supply a sound product of uniform quality, possesses over 40% of the trade, and in the year 1900 received from the United Kingdom upwards of £8,000,000 for butter and over £3,000,000 for bacon, the raising of pigs for the consumption of separated milk being an important adjunct of the dairying industry in Denmark, where butter factories are extensively maintained on the co-operative principle. It is worthy of note that some at least of the butter received in the United Kingdom from Russia is made in Siberia, whence it is sent at the outset on a long land journey in refrigerated railway cars for shipment at a Baltic port, usually Riga. The countries not specially enumerated in Table XIII. from which butter is sent to the United Kingdom are Argentina, Belgium, Norway and Spain — these are included in " other countries."

In Table XIV., relating to the estimated home production of cheese and the imports of that article, the ten years' average indicates a home-made supply of 555-3 %, imports of colonial cheese 24-2 %, and imports of foreign cheese 20-5 . Comparing, however, the first with the last year of the period 1891-1900, it appears that in 1891 the proportions were 58-6 home-made, 17-2% colonial and 24-2 % foreign, whereas in 1900 the percentages were 50-3, 28-9 and 20-8 respectively. Hence the colonial contribution (chiefly

Canadian) has gained ground at the expense both of the home-made and of the foreign. Again, comparing 1891 with 1900, the import of cheese into the United Kingdom increased to the extent of only 24,500 tons, so that it shows no expansion comparable with that of butter, which increased by about 70,000 tons. Simultaneously the estimated home production diminished by 17,000 tons.

Table XIV. — Estimated Home Production and Imports of Cheese into the United Kingdom for the Ten Years ended 30th June

1900.

Year ended

Home

Imported

Imported,

Total.

30th June

estimated.

Colonial

Foreign.

Tons.

Tons.

Tons.

Tons.

1891 .

147,078

43,22»'

60,816

251,122

1892

148,624

45,78i

59,452

253,857

1893

140,394

55,549

56,767

252,710

1894

131,843

57,322

52,498

241,663

1895

150,611

61,622

52,570

264,803

1896

137,148

62,478

44,569

244,195

1897

130,000

67,028

46,317

243,345

1898

148,260

77,620

49,H4

274,994

1899

150,000

73,752

46,985

270,737

1900

130,000

74,702

53,903

258,605

10 J

Ave

'ears' rage

Hi,396

61,908

52,299

255,603

In imported colonial cheese Canada virtually has the field to itself, for the only other colonial cheese which finds its way into the United Kingdom is from New Zealand, but the amount of this kind is comparatively insignificant, having been in 1900 only 4000 tons out of a total import of 128,600 tons. Australia, in several seasons since 1891, sent small quantities, but they are not worth quoting.

From foreign countries the decline in the export of cheese is mainly in the case of the United States, which shipped to British ports 10,000 tons less in 1900 than in 1891. France also is losing its cheese trade in British markets, and is being supplanted by Belgium. In 1891 France supplied over 3000 tons, in 1900 the import was below 2000 tons. Belgium in 1 891 supplied less than 1000 tons, but in 1900 contributed 2600 tons. The import trade in Dutch cheese remains almost stationary. In 1891 it amounted to 15,300 tons, in 1899 it was 15,600 tons, whilst in 1900, owing to exceptionally high prices, which stimulated the manufacture, it reached 17,000 tons.

Over 80% of the cheese imported into the United Kingdom is derived from North America, but the bulk of the trade belongs to Canada, which supplies nearly 60 % of the entire import. The value of the cheese exported from Canada to the United Kingdom in the calendar year 1900 was close upon £3,800,000. As

is shown in Table XV. below, Holland, Australasia and France participate in this trade, whilst amongst the " other countries " are Germany, Italy and Russia. The cheese sent from North America and Aus-

Table XV. — Annual Imports of Cheese into the United Kingdom,

1897–1900.

From	*1897.*	*1898.*	*1899.*	*1900.*
	Cwt.	*Cwt.*	*Cwt.*	*Cwt.*
Canada	*1,526,664*	*1,432,181*	*1,337,198*	*1,511,872*
•*United States*	*631,616*	*485,995*	*590,737*	*680,583*

Holland .

297,604

292,925

328,541

327,817

Australasia

68,615

44,608

32,294

86,513

France

36,358

33,o86

34,307

35,"o

Other countries . Total .

Canada

42,321

50,657

60,992

69,910

2,603,178

2,339,452

2,384,069

2,711,805

% 58-6

%

61-2

%

56-i

% 55-8

United States

24-3

20-8

24-8

25-1

Holland .

114

12-5

13-8

120

Australasia

2-7

1-9

i-3

3-2

France

1-4

1-4

1-4

i-3

Other countries • Total .

16

2-2

2-6

2-6

IOO-O

100-0

100-0

IOO-O

tralasia is mostly of the substantial Cheddar type, whereas soft or ” fancy ” cheese is the dominant feature of the French shipments. Thus, in the calendar year 1900 the average price of the cheese imported into the United Kingdom from France was 61s. per cwt., whilst the average value of the cheese from all other sources was 50s. per cwt., there being a difference of us. in favour of the ” soft ” cheese of France.

The imports of butter and margarine into the United Kingdom were not separately distinguished before the year 1886. Previous to

that date they amounted, at five-year intervals, to the following aggregate quantities: —

1870. 1875. 1880. 1885.

Cwt. . . 1,159,210 1,467,870 2,326,305 2,401,373 For the same years the imports of cheese registered the subjoined totals : —

1870. 1875. 1880. 1885.

Cwt. . . 1,041,281 1,627,748 1,775,997 1,833,832

The imports of butter and margarine, both separately and to- gether, and also the imports of cheese in each year from 1886 to 1900 inclusive, are set out in Table XVI., the most significant feature of which is the rapid expansion it shows in the imports of butter. In. the space of nine years, between 1887 and 1896, the quantity was doubled. On the other hand, the general tendency of the imports of margarine, which have been much more uniform than those of butter, has been in the direction of decline since 1892. It is neces- sary, however, to point out that there has been an increase in the number of margarine factories in the United Kingdom, and in the quantity of margarine manufactured in them, during the last few years. Taking the imports of butter and margarine together, the aggregate in 1889 and also in 1900 was practically three times as large as a quarter of a century earlier, in 1875. The imports of cheese have increased at a less rapid rate than those of butter, and the quantity imported in 1900, which was a maximum, fell con- siderably short of twice the quantity in 1875. In 1886, 1887, 1888, 1890 and 1892 the imports of cheese exceeded those of butter, butsince

Table XVI

—Imports of

Butter, Margarine and Cheese into the

United

Kingdom, 1886-1900.

Total Butter

Year.

Butter.

Margarine.

and Margarine.

Cheese.

Cwt.

Cwt.

Cwt.

Cwt.

1886 .

1,543,566

887,974

2,431,540

1,734,890

1887

1,513,134

1,276,140

2,789,274

1,836,789

1888

1,671,433

1,139,743

2,811,176

1,917,616

1889

1,927,842

1,241,690

3,169,532

1,907,999

1890

2,027,717

1,079,856

3,107,573

2,144,074

1891

2,135,607

1,235,430

3,371,037

2,041,325

1892

2,183,009

1,305,350

3,488,359

2,232,817

1893

2,327,474

1,299,970

3,627,444

2,077,462

1894

2,574,835

1,109,325

3,684,160

2,266,145

1895

2,825,662

940,168

3,765,830

2,133,819

1896

3,037,718

925,934

3,963,652

2,244,525

1897

3,217,802

936,543

4,154,345

2,603,178

1898

3,209,153

900,615

4,109,768

2,339,452

1899

3,389,851

953,175

4,343,026

2,384,069

1900

3,378,516

920,416

4,298,932

2,711,805

the last-named year those of butter have always been the larger, and 1899 were fully a million cwt. more than the cheese imports. The cheapness of imported fresh meat has probably had the effect of checking the growth of the demand for cheese amongst the industrial classes.

The imports of condensed milk into the United Kingdom were not separately distinguished before 1888. In that year they amounted to 352,332 cwt. The quantities imported in subsequent years were the following : —

Year.

Cwt.

Year.

Cwt.

Year.

Cwt.

1889 . 1890

1891 .

1892 .

339,892 407,426 444,666

48i,374

1893 •

1894 .

1895 •

1896 .

501,005 529,465 545,394

6n,335

1897 •

1898 .

1899 . 1900

756,243 817,274

824,599 986,741

The quantity thus increased continuously in each year after 1889, with the result that in 1900 the imports had grown to nearly three times the amount of those in 1 889. Simultaneously, over the period 1889–1900 the annual value of the imports steadily advanced from £704,849 to £1,405,033. Thus, while the imports of condensed milk trebled in quantity, they doubled in value. A fair proportion is, however, exported, as is shown in the following statement of exports of imported condensed milk for the four years 1897 to 1900:—

1897. 1898. 1899. 1900.

Quantity, . cwt. 143,932 133,596 118,394 164,602
Value . . £274,578 £256,525 £228,446 £309,460

There is also an export trade in condensed milk made in the United Kingdom. Thus, in 1892 the exports of

home-made con- densed milk amounted to 61,442 cwt., valued at £133,556. By 1896 the quantity had almost doubled, and reached 111,959 cwt., of the value of £224,831. In subsequent years the exports were:—

	Quantity, . cwt.	Value
1897.	*154,901*	*£302,748*
1898.	*178,055*	*£343,070*
1899.	*185,749*	*£353,819*
1900.	*209,447*	*£390,559*

Milk and cream (fresh or preserved other than condensed) received no separate classification in the imports until 1894, in which year the quantity imported was 161,633 gallons, followed by 126,995 gallons in 1895, and 22,776 gallons in 1896. The quantities have since been returned by weight — 10,006 cwt. in 1897, 10,691 cwt. in 1898, 7859 cwt. in 1899, and 15,638 cwt. in 1900. The values of

these imports in the successive years 1894 to 1900 were £21,371, £i9.99L £5489, £9848. £11,293, £16,068 and £26,837. (l . ,

The total values of the imports of dairy produce of all kinds — butter, margarine, cheese, &c. — into the United Kingdom were, at five-year intervals betv/een 1875 and 1890, the following: —

1875. 1880. 1885. 1890.

Value . £13,211,592 £17,232,548 £15,632,852 £19,505,798

The values in each year of the closing decade of the 19th century are set forth in Table XVII., where the totals in the last column include small sums for margarine-cheese and, since 1893, for fresh milk and cream. The aggregate value more than doubled during the iast quarter of the century. The earliest year for which the value

Table XVII. — Values of Dairy Products imported into the United Kingdom from i8qi to 1900, in Thousands of Pounds Sterling.

Year.

Butter.

Margarine.

Cheese.

Condensed Milk.

Total.

£1000.

£1000.

£1000.

£1000.

£1000.

1891 .

11,591

3558

4813

900

20,863

1892 .

11,965

3713

5417

930

22,025

1893 •

12,754

3655

5161

IOIO

22,580

1894 .

13,457

3045

5475

1079

23.077

1895 •

14,245

2557

4675

1084

22,581

1896 .

15,344

2498

4900

1 170

23,920

1897 .

15,917

2485

5886

1398

25.715

1898 .

15,962

2384

4970

1436

24.779

1899 .

17,214

2549

5503

H55

26,747

1900

i7,45o

2465

6838

1743

28,544

of imported butter is separately available is 1886, when it amounted to £8,141,438. Thirteen years later this sum had more than doubled, and it is an impressive fact that in the closing year of the century the United Kingdom should have expended on imported butter alone a sum closely approximating to 17 J million pounds sterling, equiva- lent to about three-fourths of the total amount disbursed on imported wheat grain. 1

The imports of margarine — that is, of margarine specifically declared to be such — into the United Kingdom are derived almost entirely from Holland. Out of a total of 920,416 cwt. imported in 1900 Holland supplied 862,154 cwt., and out of £2,464,839 expended on imported margarine in the same year Holland received £2,295,174. To the imports in the year named Holland contributed 93-7%; France, 2-9; Norway, 0-9; all other countries, 2-5; so that Holland •possesses almost a monopoly of this trade. The quantities of im- ported butter, margarine and cheese that are again exported from the United

Kingdom are trivial when compared with the imports, as will be seen from the following quantities and values in the three years 1898 to 1900 : —

1898.

1899.

1900.

1898.

1899.

1900.

Butter

Margarine

Cheese

Cwt.

63.491 10,023 56,694

Cwt. 5o,453

13.139 56,390

Cwt.

51,583 11,326 55.982

£

319,806

24,721

159,210

£

257,999

33,319

163,991

£

258,931

27,882

168,369

There is also a very small export trade in butter and cheese made in the United Kingdom, but its insignificant character is evident from the subjoined details as to quantities and values for the years named : —

1898.

1899.

1900.

1898.

1899.

1900.

Butter Cheese

Cwt.

u,359 jo, 126

Cwt.

9,936

9,758

Cwt.

10,127

9,356

£

59,731 36,803

£

53,195 35,890

£

53,701 36,691

American Dairying The development of the dairying industry in the vast region of the United States of America has been described in the official Year-Book by Major Henry E. Alvord, chief of the dairy division of the bureau of animal industry in the department of agriculture at Washington . The beginning of the 20th century found the industry upon an altogether higher level than seemed possible a few decades earlier. The milch cow herself, upon which

1 In 1901 the United Kingdom imported 3,702,810 cwt. of butter, valued at £19,297,005, both totals being the largest on record.

the whole business rests, has become almost as much a machine as a natural product, and a very different creature from the average animal of bygone days. The few homely and incon- venient implements for use in the laborious duties of the dairy have been replaced by perfected appliances, skilfully devised to accomplish their object and to lighten labour. Long rows of shining metal pans no longer adorn rural dooryards. The' factory system of co-operative or concentrated manufacture has so far taken the place of home dairying that in entire states the cheese vat or press is as rare as the handloom, and in many counties it is as difficult to find a farm churn as a spinning-wheel. An illustration of the nature of the changes is afforded in the butter-making district of northern Vermont, at St Albans, the business centre of Franklin county. In 1880 the first creamery was built in this county; ten years later there were 15. Now a creamery company at St Albans has upwards of 50 skimming or separating

stations distributed through Franklin and adjoining counties. To these is carried the milk from more than 30,000 cows. Farmers who possess separators at home may deliver cream which, after being inspected and tested, is accepted and credited at its actual butter value, just as other raw material is sold to mills and factories. The separated cream is conveyed by rail and waggon to the central factory, where in one room from 10 to 12 tons of butter are made every working day — a single churning place for a whole county! The butter is all of standard quality, " extra creamery," and is sold on its reputation upon orders received in advance of its manufacture. The price is relatively higher than the average for the product of the same farms fifty years earlier. This is mainly due to better average quality and greater uniformity — two important advantages of the creamery system.

In one important detail dairy labour is the same as a century ago. Cows still have to be milked by hand. Although many attempts have been made, and patent after patent has been issued, no mechanical contrivance has yet proved a practical success as a substitute for the human hand in milking. Con- sequently, twice (or thrice) daily every day in the year, the dairy cows must be milked by manual labour. This is one of the main items of labour in dairying, and is a delicate and important duty. Assuming 10 cows per hour to a milker, which implies quick work, it requires the continuous service of an army of 300,000 men, working 10 or 12 hours a day throughout the year, to milk the cows kept in the United States.

The business of producing milk for urban consumption, with the accompanying agencies for transportation and distribution, has grown to immense proportions. In many places the milk trade is regulated and supervised by excellent municipal ordin- ances, which have done much to prevent adulteration and to improve the average quality of the supply. Quite as much is, however, being done by private enterprise through large milk companies, well organized and equipped, and establishments

which make a speciality of serving milk and cream of fixed quality and exceptional purity. Such efforts to furnish ” certi- fied ” and ” guaranteed ” milk, together with general competi- tion for the best class of trade, are doing more to raise the standard of quality and improve the service than all the legal measures. The buildings and equipment of some of these modern dairies are beyond precedent. This branch of dairying is advancing fast, upon the safe basis of care, cleanliness and better sanitary conditions.

Cheese-making has been transferred bodily from the domain of domestic arts to that of manufactures. In the middle of the 19th century about 100,000,000 lb of cheese was made yearly in the United States, and all of it in farm dairies. At the beginning of the 20th century the annual production was about 300,000,000 lb, and 96 or 97 % of this was made in factories. Of these there are nearly 3000, but they vary greatly in capacity, and some are very small. New York and Wisconsin possess a thousand each, but the former state makes nearly twice as much cheese as the latter, whilst the two together produce three-fourths of the entire output of the country. A change is taking place in the direction of bringing a number of factories previously independent into a

Table XVIII.-

” combination ” or under the same management. This tends to improve the quality and secure greater uniformity in the product, and often reduces cost of manufacture. More than nine-tenths of all the cheese made is of the familiar standard type, copied after the English Cheddar, but new kinds and imitations of foreign varieties are increasing. The annual export of cheese from the United States ranges between 30,000,000 and 50,000,000 lb. The consumption per capita does not exceed 35 lb per annum, which is much less than in most European countries.

Butter differs from cheese in that it is still made much more largely on farms in the United States than in creameries. Creamery butter con- trols all the large markets, but this represents little more than one-third of the entire business. Estimating the annual butter product of

ous large towns and cities. In the centrai, west and north-west butter is the leading dairy product.

Table XVIII. shows approximately the quantity and value of the dairy products of the United States for a typical year, the grand total representing a value of $45 1 ,600,000. Adding to this the skim-milk, butter-milk and whey, at their proper feeding value, and the calves

-Estimated Number of Cows and Quantity and Value of Dairy Products in the United States in i8gg.

Cows.

1 1 ,000,000 1 ,000,000 5,500,000

Product.

Butter Cheese

Milk

Rate of Product per Cow.

130 lb 300 lb 380 gals.

Total Product.

1,430,000,000 ft 300,000,000 fh 2,090,000,000 gals.

Rate of Value.

Cents.

18

9

Total Value.

Dollars.

257,400,000

27,000,000

167,200,000

the

entire country at 1,400,000,000 lb not much over 500,000,000 lb of this is made at the 7500 or 8000 creameries in operation. Iowa is the greatest butter-producing state, and the one in which the greater proportion is made on the factory plan. The total output of butter in this state is one-tenth of all made in the Union. The average quality of butter has materially improved since the introduction of the creamery system and the use of modern appliances. Nevertheless, a vast quantity of poor butter is made — enough to afford a large and profitable business in collecting it at country stores at grease prices or a little more, and then rendering or renovating it by patent processes. This renovated butter has been fraudu- lently sold to a considerable extent as the true creamery article, of which it is a fair imitation while fresh, and several states have made laws for the identification of the product and to prevent buyers from being imposed upon. No butter is imported, and the quantity exported is insignificant, although there is beginning to be a foreign demand for American butter. The home consump- tion is estimated at the yearly rate of 20 lb per person, which, if correct, would indicate Americans to be the greatest butter-eating people in the world. The people of the United States also con- sume millions of pounds every year of butter substitutes and imitations, such as oleomargarine and butterine. Most of this is believed to be butter by those who use it, and the state dairy commissioners are busily employed in carrying out the laws intended to protect purchasers from these butter frauds.

The by-products of dairying have, within recent

years, been put to economical uses, in an increasing degree. For every pound of butter made there are 15 to 20 lb of skim-milk and abo.ut 3 lb of butter-milk, and for every pound of cheese nearly 9 lb of whey. Up to 1889 or 1890 enormous quantities of skim-milk and butter- milk from the creameries and of whey from the cheese factories were entirely wasted. At farm dairies these by-products are generally used to advantage in feeding animals, but at the factories — especially at the seasons of greatest milk supply — this most desirable method of utilization is to a great extent im- practicable. In many places new branches have been instituted for the making of sugar-of-milk and other commercial products from whey, and for the utilization of skim-milk in various ways. The albumin of the latter is extracted for use with food products and in the arts. The casein is desiccated and prepared as a substitute for eggs in baking, as the basis of an enamel paint, and as a substitute for glue in paper-sizing. It has also been proposed to solidify it to make buttons, combs, brush-backs, electrical insulators and similar articles.

No census of cows in the United States was taken until the year 1840, but they have been enumerated in each subsequent decennial census. From 23 to 27 cows to every 100 of the population were required to keep the country supplied with milk, butter and cheese, and provide for the export of dairy products. The export trade, though it has fluctuated considerably, has never exceeded the produce of 500,000 cows. At the close of the 19th century it was estimated that there was one milch cow in the United States for every four persons, making the number of cows about 17,500,000. They are, however, very unevenly distributed, being largely concen-trated in the great dairy states, Iowa leading with 1,500,000 cows, and being followed closely by New York. In the middle and eastern states the milk product goes very largely to the supply of the numer-

dropped yearly, the annual aggregate value of the produce of the dairy cows exceeds $500,000,000, or

is more than one hundred million pounds sterling. Accepting these estimates as conservative, they show that the commercial importance of the dairy industry of the United States is such as to justify all reasonable provisions for guarding its interests. (\v. Fr.)

DAIS (Fr. dais, estrade, Ital. predella), originally a part of the floor at the end of a medieval hall, raised a step above the rest of the building. On this the lord of the mansion dined with his friends at the high table, apart from the retainers and servants. In medieval halls there was generally a deep recessed bay window at one or at each end of the dais, supposed to be for retirement, or greater privacy than the open hall could afford. In France the' word is understood as a canopy or hanging over a seat; probably the name was given from the fact that the seats of great men were then surmounted by such a feature. In ordinary use, the term means any raised platform in a room, for dignified occupancy.

DAISY (A.S. daeges eage, day's eye), the name applied to the plants constituting the genus Bellis, of the natural order Com- positae. The genus contains ten species found in Europe and the Mediterranean region. The common daisy, B. perennis, is the only representative of the genus in the British Isles. It is a perennial, abundant everywhere in pastures and on banks in Europe, except in the most northerly regions, and in Asia Minor, and occurs as an introduced plant in North America. The stem of the daisy is short; the leaves, which are numerous and form a rosette, are slightly hairy, obovate-spathulate in shape, with rounded teeth on the margin in the upper part; and the root-stock is creeping, and of a brownish colour. The flowers are to be found from March to November, and occasionally in the winter months. The heads of flowers are solitary, the outer or ray- florets pink or white, the disk-florets bright yellow. The size and luxuriance of the plant are much affected by the nature of the soil in which it grows. The cultivated varieties, which are numerous, bear finely-coloured flowers, and make very effective borders for walks.

What is known as the ” hen-and-chicken ” daisy has the main head surrounded by a brood of sometimes as many as ten or twelve small heads, formed in the axils of the scales of the involucre. The ray-florets curve inwards and ” close ” the flower-head in dull weather and towards evening.

Chaucer writes —

” The daisie, or els the eye of the daie, The emprise, and the floure of flouris alle ” ; and again —

” To seen this floure agenst the sunne sprede Whan it riseth early by the morrow, That blissful sight softeneth all my sorrow “;

and the flower is often alluded to with admiration by the other poets of nature. To the farmer, however, the daisy is a weed, and a most wasteful one, as it exhausts the soil and is not eaten by any kind of stock.

In French the daisy is termed la marguerite (fiapyaplrris, a pearl), and ” herb margaret ” is stated to be an old English appellation for it. In Scotland it is popularly called the gowan, and in Yorkshire it is the bairn wort, or flower beloved by children. The Christmas and Michaelmas daisies are species of Aster; the ox-eye daisy is Chrysanthemum Leucanthemum, a common weed in meadows and waste places. B. perennis flore-pleno, the

double daisy, consists of dwarf, showy, 3 to 4 in. plants, flowering freely in spring if grown in rich light soil, and frequently divided and transplanted. The white and pink forms, with the white and red quilled, and the variegated-leaved aucubaefolia, are some of the best.

DAKAR, a seaport of Senegal, and capital of French West Africa, in 14 40' N., 17 24' W. The town, which

is strongly fortified, holds a commanding strategic position on the route between western Europe and Brazil and South Africa, being situated in the Gulf of Goree on the eastern side of the peninsula of Cape Verde, the most westerly point of Africa. It is the only port of Senegal affording safe anchorage for the largest ships. Pop. (1904), within the municipal limits, 18,447; including suburbs, 23,452.

The town consists for the most part of broad and regular streets and possesses several fine public buildings, notably the palace of the governor-general. It is plentifully supplied with good water and is fairly healthy. It is the starting point of the railway to St Louis, and is within five days steam of Lisbon. The harbour, built in 1004-1008, is formed by two jetties, one of 6840 ft., the other of 1968 ft., the entrance being 720 ft. wide. There are three commercial docks, with over 7000 ft. of quayage, ships drawing 26 ft. being able to moor alongside. Cargo is transferred directly to the railway trucks. There is also a naval dock and arsenal with a torpedo-boat basin 755 ft. by 410 ft. and a dry dock 656 ft. long and 92 ft. broad. The Messageries Maritimes Company use the port as a coaling station and provisioning depot for their South American trade. Dakar is a regular port of call for other French lines and for the Elder Dempster boats sailing between Liverpool and the West Coast of Africa. It shares with Rufisque and St Louis the external trade of Senegal and the adjacent regions. For trade statistics see Senegal.

Dakar was originally a dependency of Goree and was founded in 1862, a year after the declaration of a French protectorate over the mainland. The port was opened for commerce in 1867, and in 1885 its importance was greatly increased by the com- pletion of the railway (163 m. long) to St Louis. Dakar thus came into direct communication with the countries of Upper Senegal and the middle Niger. In 1887 the town was made a commune on the French model, all citizens irrespective of colour being granted the franchise. In 1903 the offices of the governor-general and of the court of appeal of French West Africa were

transferred from St Louis to Dakar, which is also the seat of a bishop. In February 1905 a submarine cable was laid between Brest and Dakar, affording direct telegraphic communication between France and her West African colonies by an all French route.

DALAGUETE, a town of the province of Cebu, island of Cebu, Philippine Islands, at the mouth of the Tapon river on the E. coast, 50 m. S.S.W. of Cebu, the capital. The town has a healthy climate, cool during November, December, January and February, and hot during the rest of the year. The in- habitants grow hemp, Indian corn, coffee, sibucao, cacao, cocoa-nuts (for copra) and sugar, weave rough fabrics and manufacture tuba (a kind of wine used as a stimulant), clay pots and jars, salt and soap. There is some fishing here. The language is Cebii-Visayan.

DALBEATTIE, a police burgh of Kirkcudbrightshire, Scotland. Pop. (1901) 3469. It lies on Dalbeattie Burn, 14J m. S.W. of Dumfries by the Glasgow & South-Western railway. The town dates from 1780 and owes its rise to the granite quarries at Craignair and elsewhere in the vicinity, from which were derived the supplies used in the construction of the Thames Embankment, the docks at Odessa and Liverpool and other works. Besides quarrying, the industries include granite- polishing, concrete (crushed granite) works, dye-works, paper- mills and artificial manures. The estuary of the Urr, known as Rough Firth, is navigable by ships of from 80 to 100 tons, and small vessels can ascend as far as the mouth of Dalbeattie Burn, within a mile of the town. A mile to the north-west stand the ruins of the castle of Buittle or Botel, where lived John de

Baliol, founder of Baliol college, who had married Dervorguila, daughter of Alan (d. 1234), the last ” king ” of Galloway.

DALBERG, the name of an ancient and distinguished German noble family, derived from the hamlet and castle (now in ruins) of Dalberg or Dalburg near Kreuznach in the Rhine Province. In the 14th century the original house of Dalberg became extinct in the

male line, the fiefs passing to Johann Gerhard, chamberlain of the see of Worms, who married the heiress of his cousin, Anton of Dalberg, about 1330. His own family was of great antiquity, his ancestors having been hereditary ministerials of the bishop of Worms since the time of Ekbert the chamberlain, who founded in 1119 the Augustinian monastery of Frankenthal and died in 1132. By the close of the 15th century the Dalberg family had grown to be of such importance that, in 1494, the German King Maximilian I. granted them the honour of being the first to receive knighthood at the coronation; this part of the ceremonies being opened by the herald asking in a loud voice " Is no Dalberg present? " (1st kein Dalberg da?). This picturesque privilege the family enjoyed till the end of the Holy Roman Empire. The elder line of the family of Dalberg-Dalberg became extinct in 1848, the younger, that of Dalberg- Herrnsheim, in 1833. The male line of the Dalbergs is now represented only by the family of Hessloch, descended from Gerhard of Dalberg (c. 1239), which in 1809 succeeded to the title and estates in Moravia and Bohemia of the extinct counts of Ostein.

The following are the most noteworthy members of the family:

1. Johann von Dalberg (1445-1503), chamberlain and afterwards bishop of Worms, son of Wolfgang von Dalberg. He studied at Erfurt and in Italy, where he took his degree of doctor utriusque juris at Ferrara and devoted himself more especially to the study of Greek. Returning to Germany, he became privy councillor to the elector palatine Philip, whom he assisted in bringing the university of Heidelberg to the height of its fame. He was instrumental in founding the first chair of Greek, which was filled by his friend Rudolph Agricola, and he also established the university library and a college for students of civil law. He was an ardent humanist, was president of the Sodalitas Celtica founded by the poet Konrad Celtes (?•».), and corresponded with many of the leading scholars of his day, to whom he showed himself a veritable Maecenas. He was employed

also on various diplomatic missions by the emperor and the elector.

See K. Morneweg, Johann von Dalberg, ein deutscher Humanist und Bischof (Heidelberg, 1887).

2. Karl Theodor Anton Maria von Dalberg (1744–1817), archbishop-elector of Mainz, arch-chancellor of the Holy Roman Empire, and afterwards primate of the Confederation of the Rhine and grand-duke of Frankfort. He was the son of Franz Heinrich, administrator of Worms, one of the chief counsellors of the elector of Mainz. Karl had devoted himself to the study of canon law, and entered the church; and, having been appointed in 1772 governor of Erfurt, he won further advancement by his successful administration; in 1787.be was elected coadjutor of Mainz and of Worms, and in 1788 of Constance; in 1802 he became archbishop-elector of Mainz and arch-chancellor of the Empire. As statesman Dalberg was distinguished by his " patriotic " attitude, whether in ecclesiastical matters, in which he leaned to the Febronian view of a German national church, or in his efforts to galvanize the atrophied machinery of the Empire into some sort of effective central government of Germany. Failing in this, he turned to the rising star of Napoleon, believing that he had found in " the truly great man, the mighty genius which governs the fate of the world," the only force strong enough to save Germany from dissolution. By the peace of Luneville, accordingly, though he had to surrender Worms and Constance, he received Regensburg, Aschaffenburg and Wetzlar. On the dissolution of the Empire in 1806 he formally resigned the office of arch-chancellor in a letter to the emperor Francis, and was appointed by Napoleon prince primate of the Confederation of the Rhine. In 1810, after the peace of Vienna (Schonbrunn), the grand-duchy of Frankfort was created for his benefit out of his

territories, which, in spite of the cession of Regensburg to Bavaria, were greatly augmented. Dalberg's subservience, as a prince of the Confederation, to Napoleon was specially resented since, as a priest, he had no excuse of necessity on the ground of saving family or dynastic interests; his fortunes therefore fell with those of Napoleon, and, when he died on the ioth of February 1817, of all his dignities he was in possession only of the archbishopric of Regensburg. Weak and shortsighted as a statesman, as a man and prelate Dalberg was amiable, con- scientious and large-hearted. Himself a scholar and author, he was a notable patron of letters, and was the friend of Goethe, Schiller and Wieland,

See Karl v. Beaulieu-Marconnay, Karl von Dalberg und seine Zeit (Weimar, 1879).

3. Wolfgang Heribert von Dalberg (1750-1806), brother of the above. He was intendant of the theatre at Mannheim, which he brought to a high state of excellence. His chief claim to remembrance is that it was he who first put Schiller's earlier dramas on the stage, and it is to him that the poet's Briefe an den Freiherrn von Dalberg (Karlsruhe, 1819) are addressed. He himself wrote several plays, including adaptations of Shakes- peare. His brother, Johann Friedrich Hugo von Dalberg (1752- 1812), canon of Trier, Worms and Spires, had some vogue as a composer and writer on musical subjects.

4. Emmerich Joseph, dtjc de Dalberg (i 773-1833), son of Baron Wolfgang Heribert. He was born at Mainz on the 30th of May 1773. In 1803 he entered the service of Baden, which he represented as envoy in Paris. After the peace of Schonbrunn (1809) he entered the service of Napoleon, who, in 1810, created him a duke and councillor of state. He had from the first been on intimate terms with Talleyrand, and retired from the public service when the latter fell out of the emperor's favour. In 18 14 he was a member of the provisional government by whom the Bourbons were recalled, and he attended the

congress of Vienna, with Talleyrand, as minister plenipotentiary. He appended his signature to the decree of outlawry launched in 1815 by the European powers against Napoleon. For this his property in France was confiscated, but was given back after the second Restoration, when he became a minister of state and a peer of France. In 1816 he was sent as ambassador to Turin. The latter years of his life he spent on his estates at Herrnsheim, where he died on the 27th of April 1833.

The due de Dalberg had inherited the family property of Herrnsheim from his uncle the arch-chancellor Karl von Dalberg, and this estate passed, through his daughter and heiress, Marie Louise Pelline de Dalberg, by her marriage with Sir (Ferdinand) Richard Edward Acton, 7th baronet (who assumed the addi- tional name of Dalberg), to her son the historian, John Emerich Edward Dalberg-Acton, 1st Baron Acton (q.v.).

DALE, ROBERT WILLIAM (1829-1895), English Noncon- formist divine, was born in London on the 1st of December 1829, and was educated at Spring Hill College, Birmingham, for the Congregational ministry. In 1853 he was invited to Carr's Lane Chapel, Birmingham, as co-pastor with John Angell James (q.v.), on whose death in 1859 he became sole pastor for the rest of his life. In the London University M.A. examination (1853) Dale stood first in philosophy and won the gold medal. The degree of LL.D. was conferred upon him by the university of Glasgow during the lord rectorship of John Bright. Yale University gave him its D.D. degree, but he never used it, " not because it came from America, but because I have a sentimental objection — perhaps it is something more — to divinity degrees." Dale displayed a keen interest in Liberal politics and in the municipal affairs of Birmingham; and his high moral ideal made him a great force on the progressive side. In 1886 he adhered to Mr Chamberlain in opposition to Irish Home Rule, but this difference did not diminish his influence even among those Liberals and Nonconformists who adopted the Glad- stonian standpoint. In the education

controversy of 1870 he took an important part, ably championing the Nonconformist position. When Mr Foster's bill appeared, Dale attacked it on the grounds that the schools would in many cases be purely

denominational institutions, that the conscience clause gave inadequate protection, and that school boards were empowered by it to make grants out of the rates to maintain sectarian schools. He was himself in favour of secular education, claiming that it was the only logical solution and the only legitimate outcome of Nonconformist principles. In Birmingham the con- troversy was terminated in 1879 by a compromise, from which, however, Dale stood aloof. His interest in educational affairs had led him to accept a seat on the Birmingham school board. He was appointed a governor of the grammar school, served on the royal commission of education, and was also chairman of the council of Mansfield College, Oxford, with the foundation of which he had much to do. He was a strong advocate of dis- establishment, holding that the church was essentially a spiritual brotherhood, and that any vestige of political authority impaired its spiritual work. In church polity he held that Congrega- tionalism constituted the most fitting environment in which religion could achieve her work. Perhaps the most effective contributions he made to ecclesiastical literature were those dealing with the history and principles of the congregational system. At his death on the 13th of March 1895 he left an un- finished MS. of the history of Congregationalism, since edited and completed (1907) by his son, A. W. W. Dale, principal of Liverpool University.

Dale's powers were fully appreciated by his colleagues in the congregational ministry, and at the early age of thirty-nine he was elected chairman of the Congregational union of England and Wales. His addresses from the chair on " Christ and the Controversies of Christendom," and the " Holy Spirit and the Christian Ministry " were remarkable for a keen insight into the conditions and demands of the age. For some years he edited the Congregationalist,

a monthly magazine connected with the denomination. In 1877 he was appointed Lyman Beecher lecturer at Yale University, and visited America to deliver his " Lectures on Preaching." At the International Council of Congregationalists, meeting in London in 189 1, the first gathering of the kind, Dale was nominated for the presidency. He accepted the honour and delivered an address on " The Divine Life in Man."

As a theologian Dale occupied an influential position amongst the religious thinkers of the 19th century. He ably interpreted the Evangelical thought of his age, but his Evangelicalism was of a broad and progressive type. His chief contribution to con- structive theological thought is his work On The Atonement, in which he contends that the death of Christ is the objective ground on which the sins of man were remitted. Among his other theological books are: The Epistle to the Ephesians (a series of expositions), Christian Doctrine, The Living Christ and the Four Gospels, Fellowship with Christ, The Epistle to James, and The Ten Commandments.

DALE, SIR THOMAS (d. 1619), British naval commander and colonial deputy -governor of Virginia. From about 1588 to 1609 he was in the service of the Low Countries with the English army originally under Robert Dudley, earl of Leicester; in 1606, while visiting in England, he was knighted by King James; from 1611 to 1 61 6 he was actually though not always nominally in chief control of the province of Virginia either as deputy-governor or as " high marshall," and he is best remembered for the energy and the extreme rigour of his administration there, which estab- lished order and in various ways seems to have benefited the colony; he himself declared that he left it "in great prosperity and peace." Under him began the first real expansion of the colony with the establishment of the settlement of Henrico on and about what was later known as Farrar's Island; it was he who, about 16 14, took the first step toward abolishing the com- munal system by the introduction of private holdings, and it was during his administration that the first code

of laws of Virginia, nominally in force from 1610 to 161 9, was effectively tested. This code, entitled ” Articles, Lawes, and Orders — Divine, Politique, and Martiall,” but popularly known as Dale’s Code, was notable for its pitiless severity, and seems to have been prepared in large part by Dale himself. He left Virginia in 1616

with the intention probably of returning to the service of the Low Countries, but instead was given command of an English fleet sent against the Dutch, defeated the enemy near Batavia in the East Indies late in the year 1618, arrived at Masulipatam in July 1619, and died there on the 9th of the following month.

An account of Dale’s career in Virginia is given in Alexander Brown’s The First Republic in America (Boston, 1898); a scholarly discussion of ” Dale’s Code ” by Walter F. Prince may be found in vol. i. of the Annual Report of the American Historical Association for 1899 (Washington, D.C., 1900), and the code itself is reprinted in Peter Force’s Historical Tracts, vol. iii., No. 11.

DALECARLIA (Dalarne, ” the Dales "), a west midland region of Sweden, virtually coincident with the district (Ian) of Koppar- berg, which extends from the mountains of the Norwegian frontier to within 25 m. of Gefle on the Baltic coast. It is a region full of historical associations, and possesses strong local characteristics in respect of its products, and especially of its people. The Dalecarlians or Dalesmen speak their own peculiar dialect, wear their own peculiar costumes, and are famed for their brave spirit and sturdy love of independence. In 1434, led by Engelbrecht, the miner, they rose against the oppressive tyranny of the officers of Eric XIV. of Denmark, and in 15 19- 1523 it was among them that Gustavus Vasa found his staunchest supporters in his patriotic task of freeing Sweden

from the yoke of the Danes. The districts around Lakes Runn and Siljan (" the Eye of the Dales "), the principal sheets of water in the valleys of the Dal rivers, are consequently classic ground. By the banks of Lake Runn, for example, is seen the barn in which Vasa threshed corn in disguise, when still a fugitive from the Danes. The people are for the most part small peasant proprietors. They eke out their scanty returns from tilling the soil by a variety of home industries, such as making scythes, saws, bells, wooden wares, hair goods, and so forth. About three quarters of the whole district is covered with forest. Besides the wealth of the forests, the Dales contain some of the largest and most prolific iron mines in Sweden, notably those of Grangesberg. Copper is mined at Falun (q.v.), the chief town of Kopparberg, and some silver and lead, zinc and sulphur is found. In conse- quence of this the district has numerous smelting furnaces, blasting and rolling mills, iron and metallurgical works, as well as saw-mills, wood-pulp factories, and chemical works.

See G. H. Mellin, Skildringar af den Skandinaviska Nordens Folklif og Natur, vol. iii. (1865) ; and Frederika Bremer, 2" Dalarne (1845), of which there is an English translation by William and Mary Howitt (1852). For the dialect, see a paper by A. Noreen, in Be Svenska Landsm&len, vol. iv. (1881).

DALGAIRNS, JOHN DOBREE (1818-1876), English Roman Catholic priest, was born in Guernsey on the 21st of October 1818. About the age of seventeen he entered Exeter College, Oxford, and soon after taking his degree he contributed a letter to Louis Veuillot's ultramontane organ L'Univers, on " Anglican Church Parties," which gave him considerable repute. Together with Mark Pattison and others, he translated the Catena aurea of St Thomas Aquinas, a commentary on the Gospels, taken from the works of the Fathers. He was a contributor to New- man's Lives of the English Saints, for which he wrote the beautiful studies on the Cistercian Saints. The Life of St Stephen Harding has been translated into several languages. Dalgairns became a Roman Catholic

in 1845, and was ordained priest in the following year. He joined his friend John Henry Newman in Rome, and, together with him, entered the Congregation of the Oratory. On his return to England in 1848, he was attached to the London Oratory, where he laboured successfully as a priest, with the exception of three years spent in Birmingham. Dalgairns was a prominent member of the well-known " Metaphysical Society." He died at Burgess Hill, near Brighton, on the 6th of April 1876. During the Catholic period of his life, Dalgairns wrote The Devotion to the Sacred Heart of Jesus, with an Introduction on the History of Jansenism (London 1853) ; The German Mystics of the Fourteenth Century (London, 1858); The Holy Communion, its Philosophy, Theology and Practice (Dublin, 1861).

A list of his contributions on religious and philosophical subjects, to the reviews and periodicals, is given in J. Gillow's Bibliographical Dictionary of English Catholics, vol. ii.

DALGARNO. GEORGE (c. 1626-1687), English writer, was born at Oid Aberdeen about 1626. He appears to have studied at Marischal College; but he finally settled in Oxford, where, according to Wood, " he taught a private grammar-school with good success for about thirty years," and where he died on the 28th of August 1687. He was master of Elizabeth school, Guernsey, for some ten years, but resigned in 1672. In his work entitled Didascalocophus, or the Deaf and Dumb Man's Tutor (Oxford, 1680), he explained, for the first time, the hand alphabet for the deaf and dumb, though he does not claim to have invented this method of communication. Twenty years before the pub- lication of his Didascalocophus, Dalgarno had given to the world a very ingenious piece entitled Ars Signorum (1661), dividing ideas into seventeen classes, to be represented by the letters of the Latin alphabet with the addition of two Greek characters. Among the Sloane manuscripts are several tracts by Dalgarno, further elucidating his system of universal shorthand. Leibnitz on various occasions alluded to the Ars signorum in commen-

datory terms.

The chief works of Dalgarno were reprinted (1834) f° r the Maitland Club.

DALHOUSIE, JAMES ANDREW BROUN RAMSAY, ist

Marquess and ioth Earl or (1812–1860), British statesman and Indian administrator, was born at Dalhousie Castle, Scotland, on the 22nd of April 1812. He crowded into his short life conspicuous public services in England, and established an unrivalled position among the master-builders of the Indian empire. Denounced on the eve of his death as the chief offender who failed to notice the signs of the mutiny of 1857, and even aggravated the crisis by his overbearing self-consciousness, centralizing activity and reckless annexations, he stands out in the clear light of history as the far-sighted governor-general who consolidated British rule in India, laid truly the foundations of its later adminis- tration, and by his sound policy enabled his successors to stem the tide of rebellion.

He was the third son of George Ramsay 9th earl of Dalhousie (1770–1838), one of Wellington's generals, who, after holding the highest offices in Canada, became commander-in-chief in India, and of his wife Christina Broun of Coalstoun, a lady of noble lineage and distinguished gifts. From his father he in- herited a vigorous self-reliance and a family pride which urged him to prove worthy of the Ramsays who had " not crawled through seven centuries of their country's history," while to his mother he owed his high-bred courtesy and his deeply seated reverence for religion. The Ramsays of Dalhousie (or Dalwolsie) in Midlothian were a branch of the main line of Scottish Ramsays, of whom the earliest known is Simon de Ramsay, of Huntingdon, England, mentioned in 1140 as the grantee of lands in West Lothian at the hands of David I. A Sir William de Ramsay of Dalhousie swore fealty to Edward I. in 1296, but is famous for having in 1320 signed the letter to the pope asserting the in- dependence of Scotland; and his supposed son, Sir Alexander Ramsay

(d. 1342), was the Scottish patriot and capturer of Roxburgh Castle (1342), who, having been made warder of the castle and sheriff of Teviotdale by David II., was soon afterwards carried off and starved to death by his predecessor, the Douglas, in revenge. Sir John Ramsay of Dalhousie (1580–1626), James VI. 's favourite, is famous for rescuing the king in the Gowrie conspiracy, and was created (1606) Viscount Haddington and Lord Ramsay of Barns (subsequently baron of Kingston and earl of Holderness in England) . The barony of Ramsay of Melrose was granted in 1618 to his brother George Ramsay of Dalhousie (d. 1629), whose son William Ramsay (d. 1674) was made ist earl of Dalhousie in 1633.

The 9th earl was in 18 15 created Baron Dalhousie in the peerage of the United Kingdom, and had three sons, the two elder of whom died early. His youngest son, the subject of this article, was small in stature, but his firm chiselled mouth, high forehead and masterful manner intimated a dignity that none could overlook. Yet his early life gave little promise of the dominating force of his character or of his ability to rise to the full height of his splendid opportunities. Nor did those brought

into closest intimacy with him, whether at school or at Oxford, suspect the higher qualities of statesmanship which afterwards established his fame on so firm a foundation.

Several years of his early boyhood were spent with his father and mother in Canada, reminiscences of which were still vivid with him when governor-general of India. Returning to Scotland he was prepared for Harrow, where he entered in 1825. Two years later he was removed from school, his entire education being entrusted to the Rev. Mr Temple, incumbent of a quiet parish in Staffordshire. To this gentleman he referred in later days as having taught him all he knew, and to his training he must have owed those habits of regularity and that indomitable industry which marked his adult life. In October 1829 he passed on to Christ Church, Oxford, where he worked fairly hard, won some distinction, and made many lifelong friends. His studies, however, were so greatly interrupted by the protracted illness and death in 1832 of his only surviving brother, that Lord Ramsay, as he then became, had to content himself with entering for a " pass " degree, though the examiners marked their appreciation of his work by placing him in the fourth class of honours for Michaelmas 1833. He then travelled in Italy and Switzerland, enriching with copious entries the diary which he religiously kept up through life, and storing his mind with valuable observations.

An unsuccessful but courageous contest at the general election in 1835 for one of the seats in parliament for Edinburgh, fought against such veterans as the future speaker, James Abercrombie, afterwards Lord Dunfermline, and John Campbell, future lord chancellor, was followed in 1837 by Ramsay's return to the House of Commons as member for East Lothian. In the previous year he had married Lady Susan Hay, daughter of the marquess of Tweeddale, whose companionship was his chief support in India, and whose death in 1853 left him a heartbroken man. In 1838 his father had died after a long illness, while less than a year later he lost his mother.

Succeeding to the peerage, the new earl soon made his mark in a speech delivered on the 16th of June

1840 in support of Lord Aberdeen's Church of Scotland Benefices Bill, a controversy arising out of the Auchterarder case, in which he had already taken part in the "general assembly" in opposition to Dr Chalmers. In May 1843 he became vice-president of the board of trade, Gladstone being president, and was sworn in as a member of the privy council. Succeeding Gladstone as president in 1845, he threw himself into the work during the crisis of the railway mania with such energy that his health partially broke down under the strain. In the struggle over the corn laws he ranged himself on the side of Sir Robert Peel, and after the failure of Lord John Russell to form a ministry he resumed his post at the board of trade, entering the cabinet on the retire- ment of Lord Stanley. When Peel resigned office in June 1846, Lord John offered Dalhousie a seat in the cabinet, an offer which he declined from a fear that acceptance might " involve the loss of public character." Another attempt to secure his services in the appointment of president of the railway board was equally unsuccessful; but in 1847 he accepted the post of governor-general of India in succession to Lord Hardinge, on the understanding that he was to be left in " entire and un- questioned possession " of his own " personal independence with reference to party politics."

Dalhousie assumed charge of his dual duties as governor- general of India and governor of Bengal on the 12th of January 1848, and shortly afterwards he was honoured with the green ribbon of the Order of the Thistle. In writing to the president of the board of control, Sir John Hobhouse, he was able to assure him that everything was quiet. This statement, however, was to be falsified by events almost before it could reach England. For on the 19th of April Vans Agnew of the civil service and Lieutenant Anderson of the Bombay European regiment, having been sent to take charge of Multan from Diwan Mulraj, were murdered there, and within a short time the Sikh troops and sardars joined in open rebellion. Dalhousie agreed with Sir Hugh Gough, the commander-in-chief, that the Company's

military forces were neither adequately equipped with transport and supplies, nor otherwise prepared to take the field immedi- ately. He also foresaw the spread of the rebellion, and the necessity that must arise, not merely for the capture of Multan, but also for the entire subjugation of the Punjab. He therefore resolutely delayed to strike, organized a strong army for operations in November, and himself proceeded to the Punjab. Despite the brilliant successes gained by Herbert Edwardes in conflict with Mulraj, and Goagh's indecisive victories at Ramnagar in November, at Sadulapur in December, and at Chillianwalla in the following month, the stubborn resistance at Multan showed that the task required the utmost resources of the government. At length, on the 22nd of January 1849, the Multan fortress was taken by General Whish, who was thus set at liberty to join Gough at Gujrat. Here a complete victory was won on the 21st of February, the Sikh army surrendered at Rawal Pindi, and their Afghan allies were chased out of India. For his services the earl of Dalhousie received the thanks of parliament and a step in the peerage, as marquess.

The war being now over, Dalhousie, without waiting for instructions from home, annexed the Punjab, and made provision for the custody and education of the infant maharaja. For the present the province was administered by a triumvirate under the personal supervision of the governor-general, and later, a place having been found for Henry Lawrence in Rajputana, by John Lawrence as sole commissioner. Twice did Dalhousie tour through its length and breadth, settling on the spot all matters of importance, and when he left India no province could show a better record of progress.

One further addition to the empire was made by conquest. The arrogant Burmese court at Ava was bound by the treaty of Yandabo, 1826, to protect British ships in Burmese waters, but the outrageous conduct of the governor of Rangoon towards the masters of the " Monarch " and " Champion " met with no redress from the king. Dalhousie adopted the

maxim of Lord Wellesley ” that an insult offered to the British flag at the mouth of the Ganges should be resented as promptly and fully as an insult offered at the mouth of the Thames”; but, anxious to save the cost of war, he tried to settle the dispute by diplomacy. When that failed he made vigorous preparation for the campaign to be undertaken in the autumn, giving his attention to the adequate provision of rations, boat transport, and medical supplies, composing differences between the military contingents from Bengal and Madras, and between the military and naval forces employed, and conferring with General Godwin whom he had chosen to command the expedition. Martaban was taken on the 5th of April 1852, and Rangoon and Bassein shortly after- wards. Since, however, the court of Ava showed no sign of submission, the second campaign opened in October, and after the capture of Prome and Pegu the annexation of the province of Pegu was declared by a proclamation dated the 20th of December 1853. To any further invasion of the Burmese empire Dalhousie was firmly opposed, being content to ” consolidate ” the Company’s possessions by uniting Arakan to Tenasserim. By his wise policy he pacified the new province, placing Colonel Arthur Phayre in sole charge of it, personally visiting it, and establishing a complete system of telegraphs and communications.

These military operations added force to the conviction which Dalhousie had formed of the need of consolidating the Company’s ill-knit possessions, and as a step in that direction he decided to apply the doctrine of ” lapse,” and annex any Hindu native states, created or revived by the grants of the British government, in which there was a failure of male lineal descendants, reserving for consideration the policy of permitting adoptions in other Hindu chief ships tributary and subordinate to the British govern- ment as paramount. Under the first head he recommended the annexation of Satara in January 1849, of Jaitpur and Sambalpur in the same ‘year, and of Jhansi and Nagpur in 1853. In these cases his action was approved by the home authorities, but his

proposal to annex Karauli in 1849 was disallowed, while Baghat and the petty estate of Udaipur, which he had annexed in 1851 and 1852 respectively, were afterwards restored to native rule.

Other measures with the same object were carried out in the Company's own territories. Bengal, too long ruled by the governor-general or his delegate, was placed under a separate lieutenant-governor in May 1854; a department of public works was established in each presidency, and engineering colleges were provided. An imperial system of telegraphs followed; the first link of railway communication was completed in 185s; well-considered plans mapped out the course of other lines and their method of administration; the Ganges canal, which then exceeded " all the irrigation lines of Lombardy and Egypt together," was completed; and despite the cost of wars in the Punjab and Burma, liberal provision was made for metalled roads and bridges. The useless military boards were swept away; selection took the place of seniority in the higher com- mands; an army clothing and a stud department were created, and the medical service underwent complete re- organization.

" Unity of authority coupled with direct responsibility " was the keynote of his policy. In nine masterly minutes he suggested means for strengthening the Company's European forces, calling attention to the dangers that threatened the English community, " a handful of scattered strangers "; but beyond the additional powers of recruitment which at his entreaty were granted in the last charter act of 1853, his proposals were shelved by the home authorities, who scented no danger and wished to avoid expense. In his administration Dalhousie vigorously asserted the control of the civil government over military affairs, and when Sir Charles Napier ordered certain allowances, given as compensation for the dearness of provisions, to be granted to the sepoys on a system which had not been

sanctioned from headquarters, and threatened to repeat the offence, the governor-general found it necessary to administer such a rebuke that the hot-headed soldier resigned his command.

Dalhousie's reforms were not confined to the departments of public works and military affairs. He created an imperial system of post-offices, reducing the rates of carrying letters and introducing postage stamps. To him India owes the first department of public instruction; it was he who placed the gaols under proper inspection, abolishing the practice of branding convicts; put down the crime of meriahs or human sacrifices; freed converts to other religions from the loss of their civil rights; inaugurated the system of administrative reports; and enlarged and dignified the legislative council of India. His wide interest in everything that concerned the welfare of the country was shown in the encouragement he gave to the culture of tea, in his protection of forests, in the preservation of ancient and historic monuments. With the object of improving civil ad- ministration, he closed the useless college in Calcutta for the education of young civilians, establishing in its place a proper system of training them in mufasal stations, and subjecting them to departmental examinations. He was equally careful of the well-being of the European soldier, providing him with healthy recreations and public gardens. To the civil service he gave improved leave and pension rules, while he purified its moral by forbidding all share in trading concerns, by vigorously punishing insolvents, and by his personal example of careful selection in the matter of patronage. As a comprehensive view of the constitution of the Indian government, dealing with the functions of its various members and the different parts of the official machinery, nothing could be more masterly than his minute of the 13th of October 1852. Indeed no governor-general ever penned a' larger number of weighty papers dealing with public affairs in India. Even after laying down office and while on his way home, he forced himself, ill as he was, to review his own administration in a

document of such importance that the House of Commons gave orders for its being printed (Blue Book 245 of 1856).

His foreign policy was guided by a desire to recognize the " independence " of the larger native states, and to avoid extending the political relations of his government with foreign powers outside India. Pressed to intervene in Hyderabad, he refused to do so, laying down the doctrine that interference was

only justified " if the administration of native princes tends unquestionably to the injury of the subjects or of the allies of the British government." Protection in his view carried no right of interference in the affairs of what he called " indepen- dent " states. In this spirit he negotiated in 1853 a treaty with the nizam, which provided funds for the maintenance of the contingent kept up by the British in support of that prince's authority, by the assignment of the Berars in lieu of annual payments of the cost and large outstanding arrears. " The Berar treaty," he told Sir Charles Wood, " is more likely to keep the nizam on his throne than anything that has happened for fifty years to him," while at the same time the control thus acquired over a strip of territory intervening between Bombay and Nagpur promoted his policy of consolidation and his schemes of railway extension. The same spirit induced him to tolerate a war of succession in Bahawalpur, so long as the contending candidates did not violate British territory. This reluctance to increase his responsibilities further caused him to refrain from punishing Dost Mahommed for the part he had taken in the Sikh War, and resolutely to refuse to enter upon any negotiations until the amir himself came forward. Then he steered a middle course between the proposals of his own agent, Herbert Edwardes, who advocated an offensive alliance, and those of John Lawrence, who would have avoided any sort of engagement. He himself drafted the short treaty of peace and friendship which Lawrence signed in 1855, that officer receiving in 1856 the order of K.C.B. in acknowledgment of his

services in the matter. While, how- ever, Dalhousie was content with a mutual engagement with the Afghan chief, binding each party to respect the territories of the other, he saw that a larger measure of interference was needed in Baluchistan, and with the khan of Kalat he authorized Major Jacob to negotiate a treaty of subordinate co-operation on the 14th of May 1854. The khan was guaranteed an annual subsidy of Rs. 50,000, in return for the treaty which " bound him to us wholly and exclusively. ' ' To this the home authorities demurred, but the engagement was duly ratified, and the subsidy was largely increased by Dalhousie's successors. On the other hand, he insisted on leaving all matters concerning Persia and Central Asia to the decision of the queen's advisers. The frontier tribes- men it was obviously necessary to coerce into good behaviour after the annexation of the Punjab. " The hillmen," he wrote, "regard the plains as their food and prey," and the Afridis, Mohmands, Black Mountain tribes, Waziris and others had to be taught that their new neighbours would not tolerate outrages. But he proclaimed to one and ail his desire for peace, and urged upon them the duty of tribal responsibility.

The settlement of the Oudh question was reserved to the last. The home authorities had begged Dalhousie to prolong his tenure of office during the Crimean War, but the difficulties of the problem no less than complications elsewhere had induced him to delay operations. In 1854 he appointed Outram as resident at the court of Lucknow, directing him to submit a report on the condition of the province. This was furnished in March 1855. But though the state of disorder and misrule revealed by it called for prompt remedy, Dalhousie, looking at the treaty of 1 801, considered that he was bound to proceed in the matter of reform with the king's consent. He proposed, therefore, to demand a transfer to the Company of the entire administration, the king merely retaining his royal rank, certain privileges in the courts, and a liberal allowance. If he should refuse this arrangement, a general rising was almost

certain to follow, and then the British government would of necessity intervene on its own terms. On the 21st of November 1855 the court of directors instructed Dalhousie to assume the powers essential to the permanence of good government in Oudh, and' to give the king no option unless he was sure that his majesty would surrender the administration rather than risk a revolution. Dalhousie was in wretched health and on the eve of retirement when the belated orders reached him; but he at once laid down instruc- tions for Outram in every detail, moved up troops, and elaborated a scheme of government with particular orders as to conciliating local opinion. The king refused to sign the treaty put before

him, and a proclamation annexing the province was therefore issued on the 13th of February 1856.

Only one important matter now remained to him before quitting office. The insurrection of the half- civilized Kolarian Santals of Bengal against the extortions of landlords and money- lenders had been severely repressed, but the causes of the in- surrection had still to be reviewed and a remedy provided. By removing the tract of country from the ordinary regulations, enforcing the residence of British officers there, and employing the Santal headmen in a local police, he ensured a system of administration which afterwards proved eminently successful.

At length, after seven years of strenuous labour, Dalhousie, on the 6th of March 1856, set sail for England on board the Company's " Firoze," an object of general sympathy and not less general respect. At Alexandria he was carried by H.M.S. " Caradoc " to Malta, and thence by the " Tribune " to Spithead, which he reached on the 13th of May. His return had been eagerly looked for by statesmen who hoped that he would resume his public career, by the Company

which voted him an annual pension of £5000, by public bodies which showered upon him every mark of respect, and by the queen who earnestly prayed for the " blessing of restored health and strength." That blessing was not to be his. He lingered on, seeking sunshine in Malta and medical treatment at Malvern, Edinburgh and other places in vain obedience to his doctors. The outbreak of the mutiny led to bitter attacks at home upon his policy, and to strange misrepresentation of his public acts, while on the other hand John Lawrence invoked his counsel and influence, and those who really knew his work in India cried out, " Oh, for a dictator," and his return " for one hour!" To all these cries he turned a deaf ear, refusing to embarrass those who were responsible by any expressions of opinion, declining to undertake his own defence or to assist in his vindication through the public press, and by his last directions sealing up his private journal and papers of personal interest against publication until fifty years after his death. On the 9th of August 1859 his youngest daughter, Edith, was married at Dalhousie Castle to Sir James Fergusson, Bart. In the same castle Dalhousie died on the 19th of December i860; he was buried in the old churchyard of Cockpen.

Dalhousie's family consisted of two daughters, and the marquessate became extinct at his death.

The detailed events of the period will be found in Sir William Lee- Warner's Life of the Marquis of Dalhousie, K.T. ; Sir E. Arnold's Dalhousie's Administration of British India; Sir C. Jackson's Vin- dication of Dalhousie's Indian Administration; Sir W. W. Hunter's Dalhousie; Capt. L. J. Trotter's Life of the Marquis of Dalhousie; the duke of Argyll's India under Dalhousie and Canning; Broughton MSS. (British Museum) ; and parliamentary papers.

(W. L.-W.)

DALHOUSIE, FOX MAULE RAMSAY, nth Earl or (1801-1874), was the eldest son of William Ramsay Maule,

1st Baron Panmure (1771–1852), and a grandson of George, 8th earl of Dalhousie. Born on the 22nd of April 1801 and christened Fox as a compliment to the great Whig, he served for a term in the army, and then in 1835 entered the House of Commons as member for Perthshire. In Lord Melbourne's ministry (1835–1841) Maule was under-secretary for home affairs, and under Lord John Russell he was secretary-at-war from July 1846 to January 1852, when for two or three weeks he was president of the board of control. In April 1852 he became the 2nd Baron Panmure, and early in 1855 ne joined Lord Palmerston's cabinet, filling the new office of secretary of state for war. Panmure held this office until February 1858, being at the war office during the concluding period of the Crimean War and having to meet a good deal of criticism, some of which was justified and some of which was not. In December i860 he succeeded his kinsman, the marquess of Dalhousie, as nth earl of Dalhousie, and he died childless on the 6th of July 1874. Always interested in church matters, Dalhousie was a prominent supporter of the Free Church of Scotland after the disruption of 1843. On his death the barony became extinct, but his earldom passed to his cousin, George Ramsay (1806–1880), an admiral who, in 1875, was created a

peer of the United Kingdom as Baron Ramsay. George's grandson, Arthur George Maule Ramsay (b. 1878), became the 14th earl in 1887.

. See the Panmure Papers, a selection from Panmure's correspond- ence, edited in two volumes (1908), by Sir G. Douglas, Bart., and Sir G. D. Ramsay. These numerous letters throw much light on the concluding stage of the Crimean War.

DALIN, OLOF VON (1708–1763), Swedish poet, was born on the 29th of August 1708 in the parish of Vinberg in Halland, where his father was the minister. He was nearly related to Rydelius, the philosophical bishop of Lund, and he was sent at a very early age to be instructed by him, Linnaeus being one of his fellow-pupils. While studying at Lund, Dalin had

visited Stockholm in the year 1723, and in 1726 entered one of the public offices there. Under the patronage of Baron Ralamb he rapidly rose to preferment, and his skill and intelligence won him golden opinions. In 1733 he started the weekly Svenska Argus, on the model of Addison's Spectator, writing anonymously till 1736. His next work was Tankar ofver Critiquer (Thoughts about Critics, 1736). With the avowed purpose of enlarging the horizon of his cultivation and tastes, Dalin set off, in company with his pupil, Baron Ralamb's son, on a tour through Germany and France, in 1 739–1 740. On his return the shifting of political life at home caused him to write his famous satiric allegories of The Story of the Horse and Aprilverk (1738), which were very popular and provoked countless imitations. His didactic epos of Svenska Friheten (Swedish Liberty) appeared in 1742. Hitherto Addison and Pope had been his models; in this work he draws his inspiration from Thomson, whose poem of Liberty it emulated. On the accession of Adolphus Freduck in 1751 Dalin received the post of tutor to the crown prince, afterwards Gustavus III. He had enjoyed the confidence of Queen Louisa Ulrika, sister of Frederick the Great of Germany, while she was crown princess, and she now made him secretary of the Swedish academy of literature, founded by her in 1753. His position at court involved him in the queen's political intrigues, and separated him to a vexatious degree from the studies in which he had hitherto been absorbed. He held the post of tutor to the crown prince until 1756, when he was arrested on suspicion of having taken part in the attempted coup d'itat of that year, and was tried for his life before the diet. He was acquitted, but was forbidden on any pretence to show himself at court. This period of exile, which lasted until 1761, Dalin spent in the preparation of the third volume of his great historical work, the Svea Rikes historia (History of the Swedish Kingdom), which came down to the death of Charles IX. in 161 1. The first two volumes appeared in 1746–1750; the third, in two parts, in 1760–1762. Dalin had been ennobled in 1751, and made privy councillor in 1753;

and now, in 1761, he once more took his place at court. During his exile, however, his spirit and his health had been broken; in a fit of panic he had destroyed some packets of his best unpublished works and this he constantly brooded over. On the 12th of August 1763 he died at his house in Drottningholm. In the year 1767 his writings in belles lettres were issued in six volumes, edited by J. C. Bokman, his half- brother. Amid an enormous mass of occasional verses, ana- grams, epigrams, impromptus and the like, his satires and serious poems were almost buried. But some of these former, even, are found to be songs of remarkable grace and delicacy, and many display a love of natural scenery and a knowledge of its forms truly remarkable in that artificial age. His dramas also are of interest, particularly his admirable comedy of Den afvundsjuke (The Envious Man, 1738); he also wrote a tragedy, Brynilda (1739), and a pastoral in three scenes on King Adolphus Frederick's return from Finland. During the early part of his life he was universally admitted to be facile princeps among the Swedish poets of his time.

See also K. Warburg, " Olof von Dalin," in the Handlingar (vol. lix., 1884) of the Swedish Academy. A selection of his works was edited by E. V. Lindblad (Orebro, 1872).

DALKEITH, a municipal and police burgh of Edinburghshire, Scotland, lying between the North and South Esk, 7^ m. S.E.

of Edinburgh, by the North British railway. Pop. (1891) 7035; (1901) 6812. It is an important agricultural centre, and has every week one of the largest grain-markets in Scotland. Besides milling, brewing and tanning, the chief industries are the making of carpets, brushes and bricks, and iron and brass founding. Near Eskbank, a handsome residential quarter with a railway station, coal-mining is

carried on. Market-gardening, owing to the proximity of the capital, flourishes. The parish church — an old Gothic edifice, which was originally the Castle chapel, and was restored in 1852 — the municipal buildings, corn exchange, Foresters' hall and Newmills hospital are among the principal public buildings. Dalkeith was the birthplace of Professor Peter Guthrie Tait, the mathematician (1831-1901). Dalkeith Palace, a seat of the duke of Buccleuch, was designed by Sir John Vanbrugh in 1 700 for the widow of the duke of Monmouth, countess of Buccleuch in her own right. It occupies the site of a castle which belonged first to the Grahams and afterwards to the Douglases, and was sold in 1642 by William, seventh or eighth earl of Morton, to Francis, second earl of Buccleuch, for the purpose of raising money to assist Charles I. in the Civil War. The palace has been the residence of several sovereigns during their visits to Edinburgh, among them George IV. in 1822, Queen Victoria in 1842, and Edward VII. in 1903. The picture gallery possesses important examples of the Old Masters; the gardens are renowned for their fruit and flowers; and the beautiful park of over 1000 acres — containing a remnant of the Caledonian Forest, with oaks, beeches and ashes of great girth and height — is watered by the North and South Esk, which unite before they leave the policy. About 1 m. south is Newbattle Abbey, the seat of the marquess of Lothian, delightfully situated on the South Esk. It is built on the site of an abbey founded by David I., the ancient crypt being incorporated in the mansion. The library contains many valuable books and illuminated MSS., and excellent pictures and carvings. In the park are several remarkable trees, among them one of the largest beeches in the United Kingdom. Two miles still farther south lies Cockpen, immortalized by the Baroness Nairne's humorous song " The Laird of Cockpen," and Dalhousie Castle, partly ancient and partly modern, which gives a title to the earls of Dalhousie. About 6 m. south-east of Dalkeith are Borthwick and Crichton castles, 1 m. apart, both now in ruins. Queen Mary spent three weeks in Borthwick Castle, as in durance vile, after her marriage with

Bothwell, and fled from it to Dunbar in the guise of a page. The castle, which is a double tower, was besieged by Cromwell, and the marks of his cannon-balls are still visible. In the manse of the parish of Borthwick, William Robertson, the historian, was born in 1721. About 4 m. west of Dalkeith is the village of Burdiehouse, the limestone quarries of which are famous for fossils. The name is said to be a corrup- tion of Bordeaux House, which was bestowed on it by Queen Mary's French servants, who lived here when their mistress resided at Craigmillar.

DALKEY, a small port and watering-place of Co. Dublin, Ireland, in the south parliamentary division; 9 m. S.E. of Dublin by the Dublin & South-Eastern railway. Pop. of urban district (1901), 3398. It is pleasantly situated on and about Sorrento Point, the southern horn of Dublin Bay. Dalkey Island, lying off the town, has an ancient ruined chapel, of the history of which nothing is certainly known, and a disused battery, which protected the harbour, a landing-place of some former importance. A castle in the town, of the 15th century, is restored to use as offices for the urban district council. There are also ruins of an old church, the dedication of which, like the island chapel, is ascribed to one St Begnet, perhaps a diminu- tive form of Bega, but the identity is not clear. Until the close of the 18th century Dalkey was notorious for the burlesque election of a " king," a mock ceremony which became invested with a certain political importance.

DALLAS, ALEXANDER JAMES (1759-1817), American statesman and financier, was born on the island of Jamaica, West Indies, on the 21st of June 1759, the son of Dr Robert C. Dallas (d. 1774), a Scottish physician then practising there.

Dr Dallas soon returned to England with his family, and Alexander was educated at Edinburgh and Westminster. He studied law for a time in the Inner Temple, and in 1780 returned to Jamaica. There he met the younger Lewis Hallam (1738- 1808), a pioneer American theatrical manager and actor, who induced

him to remove to the United States', and in 1783 he settled in Philadelphia, where he at once took the oath of allegiance to the United States, was admitted to practise law in 1785, and rapidly attained a prominent position at the bar. He was interested in the theatrical projects of Hallam, for whom he wrote several dramatic compositions, and from 1787 to 1789 he edited The Columbian Magazine. From 1791 to 1801 he was secretary of the commonwealth of Pennsylvania. Partly owing to his publication of an able pamphlet against the Jay treaty in 1795, he soon acquired a position of much influence in the Democratic-Republican party in the state. During the Whisky Insurrection he was paymaster-general of the state militia. His official position as secretary did not entirely prevent him from continuing his private law practice, and, with Jared Ingersoll, he was the counsel of Senator William Blount in his impeachment trial. Dallas was United States attorney for the eastern district of Pennsylvania from 1801 until 1814, a period marked by bitter struggles between the Democratic-Republican factions in the state, in which he took a leading part in alliance with Governor Thomas M'Kean and Albert Gallatin, and in opposition to the radical factions led by Michael Leib (1759-1822) and William Duane (1760-1835), of the Aurora. The quarrel led in 1805 to the M'Kean party seeking Federalist support. By such an alliance, largely due to the political ingenuity of Dallas, M'Kean was re-elected. In October 1814 President Madison appointed Dallas secretary of the treasury, to succeed George W. Campbell (1768-1848), whose brief and disastrous term had been marked by wholesale bank suspensions, and an enormous depreciation of state and national bank notes. The appointment itself inspired confidence, and Dallas's prompt measures still further relieved the situation. He first issued new interest-bearing treasury notes of small denominations, and in addition proposed the re-establishment of a national bank, by which means he expected to increase the stability and uniformity of the circulating medium, and furnish the govern- ment with a powerful engine in the upholding of its

credit. In spite of his already onerous duties, Dallas, with characteristic energy, served also as secretary of war ad interim from March to August 1815, and in this capacity successfully reorganized the army on a peace footing. Although peace brought a more favourable condition of the money market, Dallas's attempt to fund the treasury notes on a satisfactory basis was unsuccessful, but a bill, reported by Calhoun, as chairman of the committee on national currency, for the establishment of a national bank, became law on the 10th of April 1816. Meanwhile (12th of February 1816) Dallas, in a notable report, recommended a protective tariff, which was enacted late in April, largely in accordance with his recommendation. Although Dallaf, left the cabinet in October 1816, it was through his efforts that the new bank began its operations in the following January, and specie payments were resumed in February. Dallas, who belonged to the financial school of Albert Gallatin, deserves to rank among America's greatest financiers. He found the government bankrupt, and after two years at the head of the treasury he left it with a surplus of $20,000,000; moreover, as Henry Adams points out, his measures had " fixed the financial system in a firm groove for twenty years." He retired from office to resume his practice of the law, but the burden of his official duties had undermined his health, and he died suddenly at Philadelphia on the 16th of June 1817. He was the author of several notable political pamphlets and state papers, and in addition edited The Laws of Pennsylvania, 1700–1801 (i8or), and Reports of Cases ruled and adjudged by the Courts of the United States and of Pennsylvania before and since the Revolution (4 vols., 1790–1807; new edition with notes by Thomas J. Wharton, 1830). He wrote An Exposition of the Causes and Character of the War of 1812–15 (1815), which was republished

by government authority in New York and London and widely circulated. He left in MS. an unfinished

History of Pennsylvania.

His brother, Robert Charles Dallas (1754–1824), was born in Jamaica, and lived at various times in the West Indies, the United States, England and France. He was an intimate friend of Lord Byron. He wrote Recollections of Lord Byron (1824), and several novels, plays and miscellaneous works.

See G. M. Dallas, Life and Writings of Alexander James Dallas (Philadelphia, 1871).

DALLAS, GEORGE MIFFLIN (1702–1864), American states- man and diplomat, was born in Philadelphia, Pennsylvania, on the lothof July 1792. He graduated at Princeton in 1810 at the head of his class; then studied law in the office of his father, Alexander J. Dallas, the financier, and was admitted to the bar in 1813. In the same year he accompanied Albert Gallatin, as his secretary, to Russia, and in 1814 returned to the United States as the bearer of important dispatches from the American peace commissioners at Ghent. He practised law in New York and Philadelphia, was chosen mayor of Philadelphia in 1828, and in 1829 was appointed by President Jackson, whom he had twice warmly supported for the presidency, United States attorney for the eastern district of Pennsylvania, a position long held by his father. From 1831 to 1833 he was a Democratic member of the United States Senate, in which he advocated a compromise tariff and strongly supported Jackson's position in regard to nullification. On the bank question he was at first at variance with the president; in January 1832 he presented in the Senate a memorial from the bank's president, Nicholas Biddle, and its managers, praying for a recharter, and subse- quently he was chairman of a committee which reported a bill re-chartering the institution for a fifteen-year period. After- wards, however, his views changed and he opposed the bank. From 1833 to 1835 Dallas was attorney-general of Pennsylvania, and from 1835 to 1839 was minister to Russia. During the following years he was engaged in a long struggle with James Buchanan for party leadership in Pennsylvania. He was vice- president

of the United States from 1845 to 1849, but the appointment of Buchanan as secretary of state at once shut him off from all hope of party patronage or influence in the Polk administration, and he came to be looked upon as the leader of that body of conservative Democrats of the North, who, while they themselves chafed at the domination of Southern leaders, were disposed to disparage all anti-slavery agitation. By his casting vote at a critical period during the debate in the Senate on the tariff bill of 1846, he irretrievably lost his influence with the protectionist element of his native state, to whom he had given assurances of his support of the Tyler tariff of 1842. For several years after his retirement from office, he devoted himself to his law practice, and in 1856 succeeded James Buchanan as United States minister to England, where he remained until relieved by Charles Francis Adams in May 1861. During this trying period he represented his country with ability and tact, making every endeavour to strengthen the Union cause in Great Britain. He died at Philadelphia on the 1st of December 1864. He wrote a biographical memoir for an edition of his father's writings, which was published in 187 1.

His Diary of his residence in St Petersburg and London was published in Philadelphia in 1892.

DALLAS, a city and the county-seat of Dallas county, Texas, U.S.A., about 220 m. N.W. of Houston, on the E. bank of the Trinity river. Pop. (1880) 10,358; (1890) 38,067; (1900) 42,638, of whom 9035 were negroes and 3381 were foreign-born; (1910) 92,104. Area, about 15 sq. m. Dallas is served by the Chicago, Rock Island & Pacific, the Gulf, Colorado & Santa Fe, the Houston & Texas Central, the Missouri, Kansas & Texas, the St Louis South-western, the Texas &New Orleans, the Trinity & Brazos Valley, and the Texas & Pacific railways, and by interurban electric railways to Fort Worth and Sherman. The lower channel of the Trinity river has been greatly improved by the Federal government; but in. 1908 the river was not navigable as far as Dallas. Among public buildings are the Carnegie library (1901),

city hall, the U.S. government building, St Matthew's cathedral (Prot. Episc), the cathedral of the Sacred Heart (Rom. Cath.), the city hospital, St Paul's sanitarium (Rom. Cath.), and the Baptist Memorial sanitarium. Educational institutions include Dallas medical college(1 901) , the colleges of medicine and pharmacy of Baylor University, the medical college of South-western University (at Georgetown, Texas), Oak Cliff female academy, Patton seminary, St Mary's female college (Prot. Episc), and Holy Trinity college (Rom. Cath.). The city had in 1908 three parks — Bachman's Reservoir (500 acres); Fair (525 acres) — the Texas state fair grounds, in which an annual exhibition is held— and City park (17 acres). Lake Cliff, Cycle and Oak Lawn parks are amusement grounds. A Confederate soldiers' monument, a granite shaft 50 ft. high, was erected in 1897, with statues of R. E. Lee, Jefferson Davis, " Stonewall " Jackson and A. S. Johnston. Dallas was in 1900 the third city in population and the most important railway centre in Texas. It is a shipping centre for a large wheat, fruit and cotton-raising region, and the principal jobbing market for northern Texas, Oklahoma and part of Louisiana, and the biggest distributing point for agri- cultural machinery in the South-west. It is a livestock market, and one of the chief centres in the United States for the manu- facture of saddlery and leather goods, and of cotton-gin machinery. It has flour and grist mills (the products of which ranked first in value among the city's manufactures in 1905), wholesale slaughtering and meat-packing establishments, cooper- age works, railway repair shops, cotton compresses, lumber yards, salt works, and manufactories of cotton-seed oil and cake, boots and shoes and cotton and agricultural machinery. In 1900 and 1905 it was the principal manufacturing centre in the state, the value of its factory product in 1905 being $15,627,668, an increase of 64-7 % over that in 190c. The water- works are owned and operated by the city, and the water is taken from the Elm fork of Trinity river. There are

several artesian wells. Dallas, named in honour of G. M. Dallas, was settled in 1841, and first chartered as a city in 1856. The city is governed, under a charter of 1907, by a mayor and four commissioners, who together pass ordinances, appoint nearly all city officers, and generally are responsible for administering the government. In addition a school board is elected by the people. The -charter contains initiative and referendum provisions, provides for the recall of any elective city official, and prohibits the granting of any franchise for a longer term than twenty years.

DALLE (pronounced " dal," Fr. for a flag-stone or flat tile), a rapid falling over flat smooth rock surfaces in a river bed, especially in rivers flowing between basaltic rocks. The name is common in America, and came into use through the French employes of the Hudson's Bay Company. Well-known "dalles" are on the St Louis, St Croix and Wisconsin rivers. The " dalles " of the Columbia river are very beautiful, and have given its name to Dalles (1910 pop. 4880), county-seat of Wasco county, Oregon.

DALLIN, CYRUS EDWIN (1861-), American sculptor, was born at Springville, Utah, on the 22nd of November 1861. He was a pupil of Truman H. Bartlett in Boston, of the Ecole des Beaux Arts, the Academie Julien and the sculptors Henri M. Chapu and Jean Dampt (born 1858), in Paris, and on his return to America became instructor in modelling in the state normal art school in Boston. He is best known for his plastic representa- tions of the North American Indian — especially for " The Signal of Peace " in Lincoln Park, Chicago, and " The Medicine Man," in Fairmount Park, Philadelphia. As a boy he had lived among the Indians in the Far West, and had learned their language. His later works include " Pioneer Monument," Salt Lake City; " Sir Isaac Newton," Congressional Library, Washington; and " Don Quixote." He won a silver medal at the Paris Exposition, 1900, and a gold medal at the St Louis Exposition, 1904.

DALLING AND BULWER, WILLIAM HENRY LYTTON EARLE BULWER, Baron (1801–1872), better known as Sir Henry Bulwer, English diplomatist and author, was born in London on the 13th of February 1801. His father, General William Earle Bulwer, when colonel of the 106th regiment, had married Elizabeth Barbara Lytton, who — as the only child

of Richard Warburton Lytton, of Knebworth Park, in Hertford- shire — was sole heiress of the family of Norreys-Robinson- Lytton of Monacdhu in the island of Anglesea and of Guersylt in Denbighshire. Three sons were the fruit of this marriage. The second, afterwards Lord Dalling, was amply provided for by his selection as heir to his maternal grandmother; the paternal estates in Norfolk went to his elder brother William, and the maternal property in Herts to the youngest, Edward, known first as Bulwer the novelist and dramatist, and after- wards as the first Baron Lytton (q.v.) of Knebworth.

General Bulwer, as brigadier-general of volunteers, was one of the four commanding officers to whom was entrusted the defence of England in 1804, when threatened with invasion by Napoleon. Three years afterwards, on the 7th of July 1807, he died prematurely at fifty-two at Heyden Hall. His young widow had then devolved upon her not only the double charge of caring for the estates in Herts and Norfolk, but the far weightier responsibility of superintending the education of her three sons, then in their earliest boyhood. Henry Bulwer was educated at Harrow, under Dr George Butler, and at Trinity College and Downing College, Cambridge. In 1822 he pub- lished a small volume of verse, beginning with an ode on the death of Napoleon. It is chiefly interesting now for its fraternal dedication to Edward Lytton Bulwer, then a youth of nineteen.

On leaving Cambridge in the autumn of 1824, Henry Bulwer went, as emissary of the Greek committee then

sitting in London, to the Morea, carrying with him £80,000 sterling, which he handed over to Prince Mavrocordato and his colleagues, as the responsible leaders of the War of Independence. He was accompanied on this expedition by Hamilton Browne, who, a year before, had been despatched by Lord Byron to Cephalonia to treat with the insurgent government. Shortly after his return to England in 1826, Bulwer published a record of this excursion, under the title of An Autumn in Greece. Meanwhile, bent for the moment upon following in his father's footsteps, he had, on the 19th of October 1825, been gazetted as a cornet in the 2nd Life Guards. Within less than eight months, however, he had exchanged from cavalry to infantry, being enrolled on the 2nd of June r826 as an ensign in the 58th regiment. That ensigncy he retained for little more than a month, obtaining another unattached, which he held until the 1st of January 1829, when he finally abandoned the army. The court, not the camp, was to be the scene of his successes; and for thirty-eight years altogether — from August 1827 to August 1865 — he contrived, while maturing from a young attache to an astute and veteran ambassador, to hold his own with ease, and in the end was ranked amongst the subtlest intellects of his time as a master of diplomacy. His first appointment in his new profession was as an attache at Berlin. In April 1830 he obtained his next step through his nomination as an attache at Vienna. Thence, exactly a year afterwards, he was employed nearer home in the same capacity at the Hague.

As yet ostensibly no more than a careless lounger in the salons of the continent, the young ex-cavalry officer veiled the keenest observation under an air of indifference. His con- stitutional energy, which throughout life was exceptionally intense and tenacious, wore from the first a mask of languor. When in reality most cautious he was seemingly most negligent. No matter what he happened at the moment to take in hand, the art he applied to it was always that highest art of all, the ars celare artem. His mastery of the lightest but most essential weapon in

the armoury of the diplomatist, tact, came to him as it seemed intuitively, and from the outset was consummate. Talleyrand himself would have had no reason, even in Henry Bulwer's earliest years as an attache, to write entreatingly, " pas de zele," to one who concealed so felicitously, even at starting, a lynx : like vigilance under an aspect the most phlegmatic. He had hardly reached his new post at the Hague when he found and seized his opportunity. The revolutionary explosion of July at Paris had been echoed on the 25 th of August 1830 by an outburst of insurrection at Brussels. During the whole of September a succession of stormy events swept over Belgium,

until the popular rising reached its climax on the 4th of October in the declaration of Belgian independence by the provisional government. At the beginning of the revolution, the young attache was despatched by the then foreign secretary at White-hall, Lord Aberdeen, to watch events as they arose and report their character. In the execution of his special mission he traversed the country in all directions amidst civil war, the issue of which was to the last degree problematic. Under those apparently bewildering circumstances, he was enabled by hi? sagacity and penetration to win his spurs as a diplomatist. Writing almost haphazard in the midst of the conflict, he sent home from day to day a series of despatches which threw a flood of light upon incidents that would otherwise have appeared almost inexplicable. Scarcely a week had elapsed, during which his predictions had been wonderfully verified, when he was summoned to London to receive the congratulations of the cabinet. He returned to Brussels no longer in a merely temporary or informal capacity. As secretary of legation, and afterwards as charge d'affaires, he assisted in furthering the negotiations out of which Belgium rose into a kingdom. Scarcely had this been accomplished when he wrote what may be called the first chapter of the history of the newly created Belgian kingdom. It appeared in 1831 as a brief but luminous paper in the January number of the Westminster Review. And as

the events it recorded had helped to inaugurate its writer's career as a diplomatist, so did his narrative of those occurrences in the pages of the Radical quarterly signalize in a remarkable way the commencement of his long and consistent career as a Liberal politician. Shortly before his appearance as a reviewer, and immediately prior to the carrying of the first Reform Bill, Bulwer had won a seat in the House of Commons as member for Wilton, afterwards in 1831 and 1832 sitting there as M.P. for Coventry. Nearly two years having elapsed, during which he was absent from parliament, he was in 1834 returned to Westminster as member for Maryle- bone. That pdfition he retained during four sessions, winning considerable distinction as a debater. Within the very year in which he was chosen by the Marylebone electors, he brought out in two volumes, entitled France — Literary, Social and Political, the first half of a work which was only completed upon the publication, two years afterwards, of a second series, also in two volumes, under the title of The Monarchy of the Middle Classes. Through its pages he made good his claim to be regarded not merely as a keen-witted observer, but as one of the most sagacious and genial delineators of the generic Frenchman, above all of that supreme type of the race, with whom all through his life he especially delighted to hold familiar intercourse, the true Parisian. Between the issuing from the press of these two series, Henry Bulwer had prefixed an intensely sympathetic Life of Lord Byron to the Paris edition of the poet's works pub- lished by Galignani, — a memoir republished sixteen years after- wards. A political argument of a curiously daring and outspoken character, entitled The Lords, the Government, and the Country, was given to the public in 1836 by Bulwer, in the form of an elaborate letter to a constituent. At this point his literary labours, which throughout life were with him purely labours by-the-way, ceased for a time, and he disappeared during three decades from authorship and from the legislature.

During the period of his holding the position of

charge d'affaires at Brussels, Bulwer had seized every opportunity of making lengthened sojourns at Paris, always for him the choicest place of residence. It was in the midst of one of these dolce far niente loiterings on the boulevards that, on the 14th of August 1837, he received his nomination as secretary of embassy at Constanti- nople. Recognizing his exceptional ability Lord Ponsonby, the British ambassador at Constantinople, at once entrusted to him the difficult task of negotiating a commercial treaty, which had the double object of removing the intolerable conditions which hampered British trade with Turkey and of dealing a blow at the threatening power of Mehemet Ali, pasha of Egypt, by shattering the system of monopolies on which it was largely based. In this difficult task Bulwer was helped by the hatred of Sultan Mahmed II. for Mehemet Ali, but the treaty was none the less a remarkable

proof of his diplomatic skill, and the compliment was well deserved when Palmerston, in writing his congratulations to him from Windsor Castle, on the 13th of September 1838, pronounced the treaty a capo d'opera, adding that without reserve it would be at once ratified. Shortly after this achievement Bulwer was nominated secretary of embassy at St Petersburg. Illness, however, compelled him to delay his northern journey — almost opportunely, as it happened, for in June 1839 he was despatched, in the same capacity, to the more congenial atmosphere of Paris. At that juncture the developments of the feud between Mehemet Ali and the Porte were threatening to bring England and France into armed collision (see Mehemet Ali). In 1839 and 1840, during the temporary absence of his chief, Lord Granville, the secretary of embassy was gazetted ad interim charge d'affaires at the court of France, and thus during this critical time he had fresh opportunities of winning distinction as a diplomatist.

On the 14th of November 1843 he was appointed ambassador at the court of the young Spanish queen Isabella II. Upon his arrival at Madrid signal evidence was afforded of the estimation in which he was then held as a diplomatist. He was chosen arbitrator between Spain and Morocco, then confronting each other in deadly hostility, and, as the result of his mediation, a treaty of peace was signed between the two powers in 1844. In 1846 a much more formidable difficulty arose, — one which, after threatening war between France and England, led at last to a diplomatic rupture between the British and Spanish govern- ments. The dynastic intrigues of Louis Philippe were the immediate cause of this estrangement, and those intrigues found their climax in what has ever since been known in European annals as the Spanish Marriages. The storm sown in the Spanish marriages was reaped in the whirlwind of the February revolu- tion. And the explosion which took place at Paris was answered a month afterwards at Madrid by a similar outbreak. Marshal Narvaez thereupon assumed the dictatorship, and wreaked upon the insurgents a series of reprisals of the most pitiless character. These excessive severities of the marshal-dictator the British ambassador did his utmost to mitigate. When at last, however, Narvaez carried his rigour to the length of summarily suppressing the constitutional guarantees, Bulwer sent in a formal protest in the name of England against an act so entirely ruthless and un- justifiable. This courageous proceeding at once drew down upon the British envoy a counter- stroke as ill-judged as it was un- precedented. Narvaez, with matchless effrontery, denounced the ambassador from England as an accomplice in the conspiracies of the Progressistas; and despite his position as an envoy, and in insolent defiance of the Palmerstonian boast, Civis Britannicus, Bulwer, on the 12th of June, was summarily required to quit Madrid within twenty-four hours. Two days afterwards M. Isturitz, the Spanish ambassador at the court of St James's, took his departure from London. Diplomatic relations were not restored between the two countries until years had elapsed, nor even then

until after a formal apology, dictated by Lord Palmerston, had been signed by the prime minister of Queen Isabella. Before his return the ambassador was gazetted a K.C.B., being promoted to the grand cross some three years afterwards. In addition to this mark of honour he received the formal approbation of the ministry, and with it the thanks of both Houses of Parliament.

Before the year of his return from the peninsula had run out Sir Henry Bulwer was married to the Hon. Georgiana Charlotte Mary Wellesley,' youngest daughter of the 1st Baron Cowley, and niece to the duke of Wellington. Early in the following year, on the 27th of April 1849, he was nominated ambassador at Washington. There he acquired immense popularity. His principal success was the compact known as the Clayton-Bulwer Treaty (q.v.), ratified in May 1850, pledging the contracting governments to respect the neutrality of the meditated ship canal through Central America, bringing the waters of the Atlantic and Pacific into direct communication. After having been accredited as ambassador to the United States for three years, Sir Henry Bulwer, early in 1852, was despatched as minister plenipotentiary at the court of the grand duke of Tuscany at

Florence. Shortly after his retirement from that post in the January of 1855, he was entrusted with various diplomatic missions, in one of which he was empowered as commissioner under the 23rd article of the treaty of Paris, 1856, to investigate the state of things in the Danubian principalities, with a view to their definite reorganization. Finally he was installed, from May 1858 to August 1865, as the immediate successor, after the close of the Crimean war, of the " Great Elchi," Viscount Strat- ford de Redcliffe, as ambassador extraordinary to the Ottoman Porte at Constantinople.

In the winter of 1865 Bulwer returned home from the Bosporus, and retired with a pension. He was elected member for Tam- worth on the 17th of November 1868, and retained his seat until gazetted as a peer of the realm on the 21st of March 1871, under the title

of Baron Dalling and Bulwer of Wood Dalling in the county of Norfolk. Upon the eve of his return to his old haunts as a debater and a politician he had asserted his claim to literary distinction by giving to the world in two volumes his four masterly sketches of typical men, entitled Historical Characters. This work, dedicated to his brother Edward, in testimony of the writer's fraternal affection and friendship, portrayed in luminous outline Talleyrand the Politic Man, Cobbett the Contentious Man, Canning the Brilliant Man, and Mackintosh the Man of Promise. Two other kindred sketches, those of Sir Robert Peel and Viscount Melbourne, having been selected from among their author's papers, were afterwards published posthumously. Another work of ampler outline and larger pretension was begun and partially issued from the press during Lord Dalling's lifetime, but not completed. This was the Life of Viscount Palmerston, the first two volumes of which were pub- lished in 1870. A third volume appeared four years afterwards. Even then it left the story of the English statesman broken off so abruptly that the work remained at the last the merest fragment. It was completed by Evelyn Ashley.

Lord Dalling died unexpectedly on the 23rd of May 1872 at Naples. He had no issue, and the title became extinct. In his public career he enjoyed a three-fold success — as ambassador, as politician and as man of letters. His popularity in society was at all times remarkable, mainly no doubt from his mastery of all the subtler arts of a skilled conversationalist. The apparent languor with which he related an anecdote, flung off a bon mot, or indulged in a momentary stroke of irony imparted interest to the narrative, wings to the wit and point to the sarcasm in a manner peculiarly his own. (C. K.)

DALLMEYER, JOHN HENRY (1830-1883), Anglo-German optician, was born on the 6th of September 1830 at Loxten, Westphalia, the son of a landowner. On leaving school at the age of sixteen he was apprenticed to an Osnabruck optician, and in 1851 he

came to London, where he obtained work with an optician, W. Hewitt, who shortly afterwards, with his workmen, entered the employment of Andrew Ross, a lens and telescope manufacturer. Dallmeyer's position in this workshop appears to have been an unpleasant one, and led him to take, for a time, employment as French and German corrrespondent for a com- mercial firm. After a year he was, however, re-engaged by Ross as scientific adviser, and was entrusted with the testing and finishing of the highest class of optical apparatus. This appoint- ment led to his marriage with Ross's second daughter, Hannah, and to the inheritance, at Ross's death (1859), of a third of his employer's large fortune and the telescope manufacturing portion of the business. Turning from astronomical work to the making of photographic lenses (see Photography), he introduced improvements in both portrait and landscape lenses, in object- glasses for the microscope and in condensers for the optical lantern. In connexion with celestial photography he constructed photo-heliographs for the Wilna observatory in 1863, for the Harvard College observatory in 1864, and, in 1873, several for the British government. Dallmeyer's instruments achieved a wide success in Europe and America, taking the highest awards at various international exhibitions. The Russian government gave him the order of St Stanislaus, and the French government made him chevalier of the Legion of Honour. He was for many

years upon the councils of both the Royal Astronomical and Royal Photographic societies. About 1880 he was advised to give up the personal supervision of his workshops, and to travel for his health, but he died on board ship, off the coast of New Zealand, on the 30th of December 1883.

His second son, Thomas Rudolphus Dallmeyer (1859-1906), who assumed control of the business on the failure of his father's health, was principally

known as the first to introduce tele- photographic lenses into ordinary practice (patented 1891), and he was the author of a standard book on the subject (Telephoto- graphy, 1899). He served as president of the Royal Photographic Society in 1900-1903.

DALL' ONGARO, FRANCESCO (1808-1873), Italian writer, born in Friuli, was educated for the priesthood, but abandoned his orders, and taking to political journalism founded the Favilla at Trieste in the Liberal interest. In 1848 he enlisted under Garibaldi, and next year was a member of the assembly which proclaimed the republic in Rome, being given by Mazzini the direction of the Monitor officiate. On the downfall of the republic he fled to Switzerland, then to Belgium and later to France, taking a prominent part in revolutionary journalism; it was not till i860 that he returned to Italy, where he was appointed professor of dramatic literature at Florence. Subsequently he was transferred to Naples, where he died on the 10th of January 1873. His patriotic poems, Stornelli, composed in early life, had a great popular success; and he produced a number of plays, notably Fornaretto, Bianca Capello, Fasma and II Tesoro. His collected Fantasie drammatiche e liriche were published in his lifetime.

DALMATIA (Ger. Dalmatien; Ital. Dalmazia; Serbo-Croatian, Dalmacija), a kingdom and crownland of the Austro- Hungarian empire, in the north-west of the Balkan Peninsula, and on the Adriatic Sea. Dalmatia is bounded, on the landward side, by Croatia and Bosnia, in the N.and N.E.; and by Herze- govina and Montenegro, in the S.E. and S. Its area amounts to 4923 sq. m.; its greatest length, from north-west to south-east, is 210 m.; its breadth reaches 35 m. between Point Planca and the Bosnian frontier, diminishing to less than 1 m. at Cattaro. Near the ports of Klek and Castelnuoyo the Herzegovinian frontier comes down to the sea, 1 but only for a total distance of 143 m.

Physical Features. — No part of the Mediterranean shore, except the coast of Greece, is so deeply

indented as the Dalmatian littoral, with its multitude of rock-bound bays and inlets. It is sheltered from the open sea by a rampart of islands which vary greatly in size; a few being large enough to support several thousand inhabitants, while others are mere reefs, swept bare by the sea, or tenanted only by rabbits and seabirds. This Dalmatian archipelago, separated from the Istrian by the Gulf of Quarnerolo, forms two island groups, the northern or Liburnian, and the southern; with open water intervening, off Point Planca. In calm weather the channels between the islands and the main- land resemble a chain of landlocked lakes, brilliantly clear to a depth of several fathoms. As a rule, the surrounding hills are rugged, bleached almost white or pale russet, and destitute of verdure; but their monotony is relieved by the half-ruined castles and monasteries clinging to the rocks, or by the beauty of such cities as Ragusa, or Arbe, with its fantastic row of steeples overlooking the beach. The principal islands, Arbe, Brazza, Curzola, Lacroma, Lesina, Lissa and Meleda, are de- scribed under separate headings. The promontory of Sabbion- cello, or»Punt& di Stagno, which juts out for 41 m. into the sea, between Curzola and Lesina, is almost another island; for its breadth, which nowhere exceeds 5 m., dwindles to about 1 m. at the narrow isthmus which unites it with the shore. There are two small ports on this isthmus — on the south, Stagno Grande

1 This arrangement is based on the terms of the peace of Carlowitz 1699 (articles IX. and XI. of the Turco- Venetian Treaty). It is due to the commercial and maritime rivalry between Venice and Ragusa. The Ragusans bribed the Turkish envoys at Carlowitz to stipulate for a double extension of the Ottoman dominions down to the Adriatic ; and thus the Ragusan lands, which otherwise would have bordered upon the Dalmatian possessions of Venice, were surrounded by neutral territory.

(Serbo-Croatian, Ston Veliki), once celebrated for its salt and shipbuilding industries, and, on the north, Stagno Piccolo (Ston Mali). Dalmatia

possesses a magnificent anchorage in the Bocche di Cattaro, and there are numerous lesser havens, at Sebenico, Trau, Zara and elsewhere along the coast and among the islands.

The country is almost everywhere hilly or mountainous. Or. the Croatian border rises the lofty barrier of the Velebit, which, culminates in Sveto Brdo (5751 ft.), and Vakanski Vrh (5768 ft.). The Dinaric Alps form the frontier between Dalmatia and Bosnia; Dinara (6007 ft.), which gives its name to the whole chain, and Troglav (6276 ft.), being the highest Dalmatian summits. North-west of Sinj rise the Svilaja and Mosec Planinas; the ridges of Mosor and Biokovo, with Sveto Juraj (5781 ft.), follow the windings of the coast from Spalato to Macarsca; Orjen marks the meeting-place of the Herzegovinian, Montenegrin and Dalmatian frontiers, and the Sutorman range appears in the extreme south. The barren dry limestone of the Dalmatian highlands has been aptly compared with a petrified sponge; for it is honeycombed with underground caverns and water-courses, into which the rainfall is at once filtered. Thus arises a complete system of subterranean rivers, with waterfalls, lakes and regular seasons of flood. Even the few surface rivers vanish and emerge again at intervals. The Trebinjcica, for in- stance, disappearing in Herzegovina, supplies both the broad and swift estuary of Ombla, near Ragusa, and the fresh-water spring of Doli, which issues from the bottom of the sea. Apart from the Ombla, and the Narenta (Serbo-Croatian, Neretva; Roman, Naro), which creates a broad marshy delta between Metkovic and the sea, Dalmatia has only three rivers more than 25 m. long; the Zermagna (Zrmanja, Tedanium), Kerka, (Krka, Titius), and Cetina [Cetina; Narona or Tilurus). The Zermagna skirts the southern foothills of the Velebit and falls into the harbour of Novigrad. Better known is the Kerka, which rises in the Dinaric Alps and flows south-westward to the Adriatic. Near Scardona (Skradin) it spreads into a broad lake, and forms several fine waterfalls, after receiving its tributary the Cikola (Cikola), from

the east. South of Spalato, the Cetina, which also springs from the Dinaric Alps, descends to the sea at Almissa (Omis), after passing between the Mosor and Biokovo ranges. There are a few small lakes near Zara, Zaravecchia and the Narenta estuary; while the fertile, but unhealthy, hollows among the mountains fill with water after heavy rain, and some- times cause disastrous floods. But most parts of the country suffer from drought.

For an account of the chief geological formations see Balkan Peninsula. Small quantities of iron, lignite, asphalt and bay salt are the only minerals of commercial importance.

The climate is warm and healthy, the mean temperature at Zara being 57° F., at Lesina 62°, and at Ragusa 63 . The pre- vailing wind is the sirocco, or S.E.; but the terrible Bora, or N.N.E., may blow at any season of the year. The average annual rainfall is about 28 in., but a dry and a wet year usually alternate.

Fauna. — Bears, badgers and wild cats, with a larger number of wolves and foxes, find shelter in the Dinaric Alps and on the heights of Svilaja, Mosor and Biokovo; while jackals exist on Curzola and Sabbioncello, almost their last refuges in Europe. Roedeer are uncommon, and the wild boar, chamois, red-deer and beaver are extinct; but hares and rabbits abound. The game- laws are not strict, and are often evaded by the Morlachs ; but moderate sport may be obtained in the fens formed by the Cetina about Sinj, and the lagoons of the Narenta estuary; both regions being frequented by wild swans, geese, duck, snipe and other aquatic birds. Among land-birds, the commonest are quails, woodcock, partridges, and especially the so-called " stone-fowl " (Steinhuhn, Perdix Graeca). Tortoises are numerous; snakes, lizards, scorpions and innumerable sand- flies infest the dry hillsides; and the limestone caverns are peopled by sightless bats, reptiles, fish, flies, beetles, spiders, Crustacea and molluscs.

Fisheries. — No region of Europe is richer in its marine fauna and flora. Sponge and coral fisheries afford a valuable source of

income to the peasantry, many of whom also go northward for the sardine and tunny fisheries of the Istrian coast, while salmon, trout and eels are caught in the Dalmatian rivers.

Flora, — The olive, almond, fig, orange, palm, aloe, myrtle, locust-tree and other characteristic members of the Mediterranean flora thrive in the sheltered valleys of the Dalmatian littoral, where almond-blossoms appear in mid-winter, and the palm occasionally bears ripe fruit. The marasca, or wild cherry, is abundant, and yields the celebrated liqueur called maraschino. But at a little distance from the rivers and on the more exposed parts of the coast the aspect of the country changes entirely. Patches of thin grass, heather, juniper, thyme, tamarisks and mountain roses hardly relieve the bareness and aridity of the seaward slopes.

Forests. — Oaks, pines and beeches still, in a few parts, clothe the landward slopes, but, as a rule, the forests for which Dalmatia was once famous were cut down for the Venetian shipyards or burned by pirates; while every attempt at replanting is frustrated by the shallowness of the soil, the drought and the multitude of goats that browse on the young trees.

Agriculture. — Little more than one- tenth of the whole surface is under the plough; the rest, where it is not altogether sterile, being chiefly mountain pasture, vineyards and garden land. Asses are the favourite beasts of burden; goats are strikingly numerous; and sheep are kept for the sake of their mutton, which is almost the only animal food freely consumed by the peasantry. Cattle-breeding, bee-keeping, and the cultivation of fruit and

vegetables, especially potatoes and beetroot, are among the principal resources of the people, while wheat, rye, barley, oats, Indian corn, hemp and millet are also grown. Viticulture is carried on with great and increasing success (see Wine).

Land-tenure. — Individual proprietorship of the soil is rare, for, despite the decadence of the zadruga or household com- munity, the tenure of land and the privilege of using the com- munal domain still appertain to the family as a whole. There are a few large estates, but most of the land is parcelled out in small holdings.

Industries. — Besides fishing, farming and such allied trades as ship-building, wine and oil pressing, and the distillation of spirits, notably - maraschino, a few other industries are practised, such as tile-burning and the manufacture of soap; but these are of minor importance. Certain crafts are also carried on by the country-folk, in their own homes; thus the peasant is sometimes his own mason, carpenter, weaver and miller. Manufactured goods and foodstuffs are imported, in return for asphalt, lignite, bay salt, wine, spirits, oil, honey, wax and hides; and there is a lucrative transit trade with Bosnia and Herzegovina, Monte- negro, Turkey and various Adriatic and Mediterranean ports.

Communications. — Communications are defective, some parts of the interior being only accessible by the roughest of mountain roads. The principal railway, in point of size, traverses the central districts, linking together Enin, Spalato, Sebenico and Sinj; but the southern lines, which unite Dalmatia with Herze- govina and terminate at Ragusa, Metkovic and Castlenuovo on the Bocche di Cattaro, are almost of equal importance, Cattaro being one of the chief outlets for Montenegrin commerce, while the vessels which steam up the Narenta to Metkovic carry the bulk of the sea-borne trade of Herzegovina. In 1897 Dalmatia possessed 151 post and 98 telegraph offices.

Chief Towns.-^-Tlie chief towns are Zara, the capital, with 32,506' inhabitants in 1900, Spalato (27,198), Sebenico (24,751), Trau (17,064), Ragusa (13,174), Macarsca (11,016), and Cattaro (5418). All these are described under separate headings.

Population and National Characteristics. — With a constant excess of male over female children, the population increased steadily from 1869 to 1900, when it reached 591,597. Of this total 1 % are foreigners and about 3 % Italians, whose numbers

1 These figures, taken from the Austrian official returns, include the population of the entire commune,' not merely the urban resi- dents. Only in Zara, Spalato, Sebenico and Ragusa, do the actual townsfolk number more than 1000.

tend slowly to diminish. The Morlachs, who constitute the remaining 96%, belong to the Serbo-Croatian branch of the Slavonic race, having absorbed the Latinized Illyrians, Albanians and other alien elements with which they have been associated. The name of Morlachs, Morlaks or Morlacks commonly bestowed by English writers on the Dalmatian Slavs, though sometimes restricted to the peasantry of the hills, is an abbreviated form of Mavrovlachi, meaning either " Black Vlachs," or, less probably, " Sea Vlachs." It was originally applied to the scattered remnants of the Latin or Latinized inhabitants of central Illyria, who were driven from their homes by the barbarian invaders during the 7 th century, and took refuge among the mountains. Throughout the middle ages the Mavrovlachi were usually nomadic shepherds, cattle-drovers or muleteers. In the 14th century they emigrated from central Illyria into northern Dalmatia and maritime Croatia; and these regions were thence- forward known as Morlacchia, until the 1 8th century. Gradually, however, the Mavrovlachi became identified with the Slavs, whose language and manners they adopted, and to whom they gave their own name. In northern Dalmatia the Slavs of the interior are still called Morlacchi; in the south this name ex- presses contempt. Of the Vlachs,

properly so called, very few are left in the country; although the name Vlachs (q.v.) is frequently used by the Slavs to designate the Italians and the town-dwellers generally. The literary languages of Dalmatia are Italian and Serbo-Croatian; the spoken language is, in each case, modified by the introduction of various dialect forms.

The Morlachs wear a picturesque and brightly-coloured costume, resembling that of the Serbs (see Servia). In appear- ance they are sometimes blond, with blue or grey eyes, like the Shumadian peasantry of Servia; more often, olive-skinned, with dark hair and eyes, like the Montenegrins, whom they rival in stature, strength and courage; while their conservative spirit, their devotion to national traditions, poetry and music, their pride, indolence and superstition, are typically Servian. Dalmatian public life is deeply affected by the jealousies which subsist between the Slavs and the Italians, whose influence, though everywhere waning, remains predominant in some of the towns; and between Orthodox " Serbs," who use the Cyrillic alphabet, and Roman Catholic " Croats," who prefer the Latin.

Government. — Dalmatia occupies a somewhat anomalous position in the Austro-Hungarian state system. Itself a crown- land of Austria, returning eleven members to the Austrian parliament, it is severed geographically from the other Austrian lands by the Hungarian kingdom of Croatia. Ethnologically it is one with Croatia, and it is included in the official title of the Croatian king, i.e. the emperor. The political system is based on a law of the 26th of February 1861. The provincial diet is composed of 43 members, comprising the Roman Catholic archbishop, the Orthodox bishop of Zara and representatives of the chief taxpayers, the towns and the communes. Benkovac, on the main road from Zara to Spalato, Cattaro, Curzola, Imotski, 21 m. N. by E. of Macarsca, Knin, Lesina, Macarsca, Ragusa, Sebenico, Sinj, Spalato and Zara, give names to the twelve administrative districts, of which they are the capitals.

Defence. — Conscription is in force, as elsewhere in Austria, and the Dalmatian coast furnishes the Austrian — as formerly the Venetian — navy with many of its best recruits.

Religion. — Roman Catholicism is the religion of more than 80% of the population, the remainder belonging chiefly to the Orthodox Church. The Roman Catholic archbishop has his seat in Zara, while Cattaro, Lesina, Ragusa, Sebenico and Spalato are bishoprics. At the head of the Orthodox community stands the bishop of Zara.

The use of Slavonic liturgies written in the Glagolitic alphabet, a very ancient privilege of the Roman Catholics in Dalmatia and Croatia, caused much controversy during the first years of the 20th century. There was considerable danger that the Latin liturgies would be altogether superseded by the Glagolitic, especially among the northern islands and in rural communes, where the Slavonic element is all-powerful. In 1904 the Vatican forbade the use of Glagolitic at the festival of SS. Cyril and

Methodius, as likely to impair the unity of Catholicism. A few years previously the Slavonic archbishop Rajcevic of Zara, in discussing the " Glagolitic controversy," had denounced the movement as " an innovation introduced by Panslavism to make it easy for the Catholic clergy, after any great revolution in the Balkan States, to break with Latin Rome." This view is shared by very many, perhaps by the majority, of the Roman Catholics in Dalmatia.

Education. — Education progressed slowly between i860 and 1900, attendance at school being often a hardship in the poor and widely scattered hamlets of the interior. In 1890 more than 80 % of the population could neither read nor write, although schools are maintained by every commune. In 1893 the

country possessed 5 intermediate and 337 elementary schools, 6 theo- logical seminaries, 6 gymnasia, and about 40 continuation and technical schools.

Antiquities. — To the foreign visitor Dalmatia is chiefly interesting as a treasury of art and antiquities. The grave- mounds of Curzola, Lesina and Sabbioncello have yielded a few relics of prehistoric man, and the memory of the early Celtic conquerors and Greek settlers is preserved only in a few place- names; but the monuments left by the Romans are numerous and precious. They are chiefly confined to the cities; for the civilization of the country was always urban, just as its history is a record of isolated city-states rather than of a united nation. Beyond the walls of its larger towns, little was spared by the barbarian Goths, Avars and Slavs; and the battered fragments of Roman work which mark the sites of Salona, near Spalato, and of many other ancient cities, are of slight antiquarian interest and slighter artistic value. Among the monuments of the Roman period, by far the most noteworthy in Dalmatia, and, indeed, in the whole Balkan Peninsula, is the Palace of Diocletian at Spalato (q.v.). Dalmatian architecture was Byzantine in its general character from the 6th century until the close of the 10th. The oldest memorials of this period are the vestiges of three basilicas, excavated in Salona, and dating from the first half of the 7th century at latest. Byzantine art, in the latter half of this period and the two succeeding centuries, continued to flourish in those cities which, like Zara, gave their allegiance to Venice; just as, in the architecture of Trau and other cities dominated by Hungary, there are distinct traces of German influence. The belfry of S. Maria, at Zara, erected in 1105, is first in a long list of Romanesque buildings. At Arbe there is a beautiful Romanesque campanile which also belongs to the 1 2th century; but the finest example in this style is the cathedral of Trail. The 14th century Dominican and Franciscan convents in Ragusa are also noteworthy. Romanesque lingered on in Dalmatia until it was displaced by Venetian Gothic in the early years of

the 15th century. The influence of Venice was then at its height. Even in the hostile republic of Ragusa the Romanesque of the custom-house and Rectors' palace is com- bined with Venetian Gothic, while the graceful balconies and ogee windows of the Prijeki closely follow their Venetian models. Gothic, however, which had been adopted very late, was aban- doned very early; for in 144 1 Giorgio Orsini of Zara, summoned from Venice to design the cathedral of Sebenico, brought with him the influence of the Italian Renaissance. The new forms which he introduced were eagerly imitated and developed by other architects, until the period of decadence — which virtually concludes the history of Dalmatian art — set in during the latter half of the 17th century. Special mention must be made of the carved woodwork, embroideries and plate preserved in many churches. The silver statuette and the reliquary of St Biagio at Ragusa, and the silver ark of St Simeon at Zara, are fine speci- mens of Byzantine and Italian jewellers' work, ranging in date from the 1 1 th or 1 2 th to the 1 7 th cent ury .

History

Dalmatia under Roman Rule, a.d. 9-1 102. — The history of

Dalmatia may be said to begin with- the year 180 B.C., when the

tribe from which the country derives its name declared itself

independent of Gentius, the Illyrian king, and established a

republic. Its capital was Delminium 1 ; its territory stretched northwards from the Narenta to the Cetina, and later to the Kerka, where it met the confines of Liburnia. In 156 B.C. the Dalmatians were for the first time attacked by a Roman army and compelled to pay tribute; but only in the time of Augustus (31 b.c.-a.d. 14) was their land finally

annexed, after the last of many formidable revolts had been crushed by Tiberius in a.d. 9. This event was followed by total submission and a ready acceptance of the Latin civilization which overspread Illyria (q.v.). The downfall of the Western Empire left this region subject to Gothic rulers, Odoacer and Theodoric, from 476 to S3 5 , when it was added by Justinian to the Eastern Empire. The great Slavonic migration into Illyria, which wrought a complete ehange in the fortunes of Dalmatia, took place in the first half of the 7th century. In other parts of the Balkan Peninsula these invaders — Serbs, Croats or Bulgars — found little difficulty in expelling or absorbing the native population. But here they were baffled when confronted by the powerful maritime city-states, highly civilized, and able to rely on the moral if not the material support of their kinsfolk in Italy. Consequently, while the country districts were settled by the Slavs, the Latin or Italian population flocked for safety to Ragusa, Zara and other large towns, and the whole country was thus divided between two frequently hostile communities. This opposition was in- tensified by the schism between Eastern and Western Chris- tianity (1054), the Slavs as a rule preferring the Orthodox or sometimes the Bogomil creed, while the Italians were firmly attached to the Papacy. Not until the 15th century did the rival races contribute to a common civilization in the literature of Ragusa. To such a division of population may be attributed the two dominant characteristics of local history — the total absence of national as distinguished from civic life, and the remarkable development of art, science and literature. Bosnia, Servia and Bulgaria had each its period of national greatness, but remained intellectually backward; Dalmatia failed ever. to attain political or racial unity, but the Dalmatian city-states, isolated and compelled to look to Italy for support, shared perforce in the march of Italian civilization. Their geographical position suffices to explain the relatively small influence exercised by Byzantine culture throughout the six centuries (535-1102) during which Dalmatia

was part of the Eastern empire. Towards the close of this period Byzantine rule tended more and more to become merely nominal. In 806 Dalmatia was added to the Holy Roman empire, but was soon restored; in 829 the coast was ravaged by Saracens. A strange republic of Servian pirates arose at the mouth of the Narenta. In the 10th century description of Dalmatia by Constantine Porphyrogenitus (De Administrando Imperio, 29–37), this region is called Pagania, from the fact that its inhabitants had only accepted Christianity about 890, or 250 years later than the other Slavs. These Pagani, or Arentani (Narentines) , utterly defeated a Venetian fleet despatched against them in 887, and for more than a century exacted tribute from Venice itself. In 998 they were finally crushed by the doge Pietro Orseolo II., who assumed the title duke of Dalmatia, though without prejudice to Byzantine suzerainty. Meanwhile the Croatian kings had extended their rule over northern and central Dalmatia, exacting tribute from the Italian cities, Trau, Zara and others, and consolidating their own power in the purely Slavonic towns, such as Nona or Belgrad (Zaravecchia). The Church was involved in the general confusion; for the synod of Spalato, in 1059, had forbidden the use of any but Greek or Latin liturgies, and so had accentuated the differences between Latin and Slav. A raid of Norman corsairs in 1073 was hardly defeated with the help of a Venetian fleet.

1 Also written Dalminium, Deminium, and Delmis. Thomas of Spalato (c. 1200–1250) mentions that the site of Delminium had been forgotten in his time, although certain ancient walls among the mountains were believed to be its ruins. It has been variously identified, by modern archaeologists, with Almissa, on the coast, Dalen, in the Herzegovina, Duvno, near Sinj, and Gardun, in the same locality. It was evidently a stronghold of considerable size and importance, and Appian (De bellis Illyricis) alludes to its almost impregnable fortifications.

Rivalry of Venice and Hungary in Dalmatia, 1 102-1420. — Unable amid such dissensions to stand alone, unprotected by the Eastern empire and hindered by their internal dissensions from uniting in a defensive league, the city-states turned to Venice and Hungary for support. The Venetians, to whom they were already bound by race, language and culture, could afford to concede liberal terms because their own principal aims was not the territorial aggrandizement sought by Hungary, but only such a supremacy as might prevent the development of any dangerous political or commercial competitor on the eastern Adriatic. Hungary had also its partisans; for in the Dalmatian city- states, like those of Greece and Italy, there were almost invariably two jealous political factions, each ready to oppose any measure advocated by its antagonist. The origin of this division seems here to have been economic. The farmers and the merchants who traded in the interior naturally favoured Hungary, their most powerful neighbour on land; while the seafaring com- munitydooked to Venice as mistress of the Adriatic. In return for protection, the cities often furnished a contingent to the army or navy of their suzerain, and sometimes paid tribute either in money or in kind. Arbe, for example, annually paid ten pounds of silk or five pounds of gold to Venice. The citizens clung to their municipal privileges, which were reaffirmed after the conquest of Dalmatia in 1102-1105 by Coloman of Hungary. Subject to the royal assent they might elect their own chief magistrate, bishop and judges. Their Roman law remained valid. They were even permitted to conclude separate alliances. No alien, not even a Hungarian, could reside in a city where he was unwelcome ; and the man who disliked Hungarian dominion could emigrate with all his household and property. In lieu of tribute, the revenue from customs was in some cases shared equally by the king, chief magistrate, bishop and municipality. These rights and the analogous privileges granted by Venice were, however, too frequently infringed, Hungarian garrisons being quartered on unwilling towns, while Venice

interfered with trade, with the appointment of bishops, or with the tenure of communal domains. Consequently the Dalmatians remained loyal only while it suited their interests, and insurrections frequently occurred. Even in Zara four outbreaks are recorded between 1180 and 1345, although Zara was treated with special consideration by its Venetian masters, who regarded its posses- sion as essential to their maritime ascendancy. The doubtful allegiance of the Dalmatians tended to protract the struggle between Venice and Hungary, which was further complicated by internal discord due largely to the spread of the Bogomil heresy ; and by many outside influences, such as the vague suzerainty still enjoyed by the Eastern emperors during the 12th century; the assistance rendered to Venice by the armies of the Fourth Crusade in 1 202 ; and the Tartar invasion of Dalmatia forty years later (see Trau). The Slavs were no longer regarded as a hostile race, but the power of certain Croatian magnates, notably the counts of Bribir, was from time to time supreme in the northern districts (see Croatia-Slavonia) ; and Stephen Tvrtko, the founder of the Bosnian kingdom, was able in 1389 to annex the whole Adriatic littoral between Cattaro and Fiume, except Venetian Zara and his own independent ally, Ragusa (see Bosnia and Herzegovina). Finally, the rapid decline of Bosnia, and of Hungary itself when assailed by the Turks, rendered easy the success of Venice; and in 1420 the whole of Dalmatia, except Almissa, which yielded in 1444, and Ragusa, which preserved its freedom, either submitted or was conquered. Many cities welcomed the change with its promise of tranquillity.

Venetian and Turkish Rule, 1420-1797. — An interval of peace ensued, but meanwhile the Turkish advance continued. Con- stantinople fell in 1453, Servia in 1459, Bosnia in 1463 and Herzegovina in 1483. Thus the Venetian and Ottoman frontiers met; border wars were incessant; Ragusa sought safety in friendship with the invaders. In 1508 the hostile league of Cambrai compelled Venice to withdraw its garrison for home service, and after the overthrow of Hungary

at Mohacs in 1526 the Turks were able easily to conquer the greater part of Dal- matia. The peace of 1540 left only the maritime cities to

Venice, the interior forming a Turkish province, governed from the fortress of Clissa by a Sanjakbeg, or administrator with military powers. Christian Slavs from the neighbouring lands now thronged to the towns, outnumbering the Italian population and introducing their own language, but falling under the influence of the Roman Catholic Church. The pirate community of the Uskoks (q.v.) had originally been a band of these fugitives; its exploits contributed to a renewal of war between Venice and Turkey (1571-1573). An extremely curious picture of con- temporary manners is presented by the Venetian agents, 1 whose reports on this war resemble some knightly chronicle of the middle ages, full of single combats, tournaments and other chivalrous adventures. They also show clearly that the Dal- matian levies far surpassed the Italian mercenaries in skill and courage. Many of these troops served abroad; at Lepanto, for example, in 1571, a Dalmatian squadron assisted the allied fleets of Spain, Venice, Austria and the Papal States to crush the Turkish navy. A fresh war broke out in 1645, lasting inter- mittently until 1699, when the peace of Carlowitz gave the whole of Dalmatia to Venice, including the coast of Herzegovina, but excluding the domains of Ragusa and the protecting band of Ottoman territory which surrounded them. After further fight- ing this delimitation was confirmed in 17 18 by the treaty of Passarowitz; and it remains valid, though modified by the destruction of Ragusan liberty and the substitution of Austria- Hungary for Venice and Turkey.

The intellectual life of Dalmatia during the 15th, 16th and 17 th centuries reached a higher level than any attained by the purely Slavonic peoples of the Balkan Peninsula. Its chief monuments are described elsewhere,--the work of the Ragusan poets and historians as a part of Servian literature, the scientific achievements of R. G. Boscovich and Marcantonio de Dominis in separate biographies.*

Architecture and art generally have been discussed above. But this intellectual development was the work of a small and opulent minority in all the cities except Ragusa. Popular education was neglected; Zara had no printing-press until 1796; Venetian Dalmatia possessed only one public school, and that an ecclesiastical seminary; and even the sons of the rich, though free to visit the universities of Italy, France, Holland and England, ran the risk of exile or worse punishment if they brought home too liberal a culture. Poorer students learned what they could from the clergy, and the peasantry were wholly illiterate. Although the secular power of the Church was strictly limited, the country was overrun by ecclesiastics. When Fortis visited the island of Arbe in the 18th century, he found a population of 3000, mostly fishermen, contributing to the stipends of sixty priests. There were also three monasteries and three nunneries. Heavy taxes, the salt monopoly, reckless destruction of timber, and a deliberate attempt to ruin the oil and silk industries, were among the means by which Venice prevented competition with its own trade. Although justice was fairly well administered and some show of municipal autonomy conceded, the right of electing a chief magistrate had been withheld after 1420; and the Grand Council or Senate of each city, losing its original democratic character, had degenerated into a mere tool of the resident Venetian agents (provveditori) , officials who held their post for thirty-two months and were subject to little effective control. Nevertheless, 150 years of war against the common Turkish enemy had drawn the Venetians and their subjects closely together, and the loyalty of the Dalmatian soldiers and sailors abroad, if not of their fellow- citizens at home, rests beyond doubt.

Dalmatia after 1797. — After the fall of the Venetian republic in 1797, the treaty of Campo Formio gave Dalmatia to Austria. The republics of Ragusa and Poglizza retained their independ- ence, and Ragusa grew rich by its neutrality during the earlier Napoleonic wars. By the peace of Pressburg

in 1805 the country was handed over to France, but its occupation was ineffectually contested by a Russian force which seized the Bocche di Cattaro and induced the Montenegrins to render aid. Poglizza was

1 Long extracts from these reports or diaries are published by Wilkinson, Dalmatia and Montenegro (London, 1840), ii. 297–350.

deprived of its independence by Napoleon in 1807, Ragusa in 1808. In 1809 the French troops were withdrawn, but in the same year Dalmatia was restored to France and united to the Illyrian kingdom by the treaty of Vienna. A British naval force under Captain Hoste, after a successful engagement with a small French squadron off Lissa, occupied the islands of Curzola, Lesina and Lagosta from 181 2 to 1815, and established a considerable overland trade through Dalmatia, Austria and Germany. The allied British and Austrian forces drove out the last French garrison in 1814, and in 1815 Dalmatia was finally incorporated in the Austro-Hungarian empire, with which its history has since been identified. Its subsequent tran- quillity has only been disturbed by the ineffectual risings of 1869 and 1881–1882, which took place near Cattaro (q.v.). For an account of the development of Croatian nationalism among the Dalmatians, during the 19th and 20th centuries, see Croatia-

Slavonia.

Bibliography. — A minute and accurate account of Dalmatian history, art (especially architecture), antiquities and topography, is given by T. G. Jackson, in Dalmatia, the Quarnero and Istria (Oxford, 1887), (3 vols, illustrated). E. A. Freeman, Subject and Neighbour Lands of Venice (London, 1881), and G. Modrich, La Dalmazia (Turin, 1892), describe the chief towns, their history and antiquities. Much miscellaneous information is

contained in the following mainly topographical works: — P. Bauron, Les Rives illyriennes (Paris, """); Sir A. A. Paton, Highlands and Islands of the Adriatic

*1000;; oil n.. n.. 1 aiun, n(S i^t»iw «./*i* .« **v** .~ ~, ...-*

(London, 1849); Sir J. G. Wilkinson, Dalmatia and Montenegro (London, 1840); A. Fortis, Travels into Dalmatia (London, 1778); and the periodicals, Rivista Dalmatica (Zara, 1899, &c), and Annu- ario Dalmatico (Zara, 1884, &c). The best maps are those of the Austrian General Staff and Vincenzo de Haardt's Zemljovid Kral- jevine Dalmacije (Zara, 1892). See also for trade, the Annual British Consular Reports; for sport, " Snaffle," In the Land of the Bora (London, 1897); for Roman and pre-Roman antiquities, R. Munro, Bosnia-Herzegovina and Dalmatia (Edinburgh, 1904). Besides the works mentioned above, and those bylFarlatus, Makushev, Miklosich, Theiner, Shafarik; Orbini and du Cange, which are quoted under Bosnia and Herzegovina, the chief authority for Dalmatian history is G. Lucio (Lucius of Traii), De regno Dalmatiae etCroatiae, a gentis origine ad annum 1480 (Amsterdam, 1666). To this edition are appended the works of the Presbyter Diocleas, Thomas of Spalato and other native chroniclers from the 12th century onwards. An Italian translation, omitting the appendix, was published at Trieste in 1892, entitled Storia del Regno di Dalmatia e di Croazia, and edited by Luigi Cesare. Lucio's work is singularly trustworthy and scientific. See also P. Pisani, La Dalmatie de 1797 a 1815 (Paris, 1893). (K. G. J.)

DALMATIC (Lat. dalmatica, tunica dalmatica), a liturgical vestment of the Western Church, proper to deacons, as the tunicle (tunicella) is to subdeacons. Dalmatic and tunicle are now, however, practically identical in shape and size; though, strictly, the latter should be somewhat smaller and with narrower arms. In most countries, e.g. England, France, Spain and Germany, dalmatic and tunicle are now no longer tunics, but scapular-like cloaks, with

an opening for the head to pass through and square lappets falling from the shoulder over the upper part of the arm; in Italy, on the other hand, though open up the side, they still have regular sleeves and are essentially tunics. The most characteristic ornament of the dalmatic and tunicle is the vertical stripes running from the shoulder to the lower hem, these being connected by a cross-band, the position of which differs in various countries (see figs. 3, 4). Less essential are the orphreys on the hem of the arms and the fringes along the slits at the sides and the lower hem. The tassels hanging from either shoulder at the back (see fig. 6), formerly very much favoured, have now largely gone out of use.

The dalmatica, which originated-^-as its name implies — in Dalmatia, came into fashion in the Roman world in the 2nd century a.d. It was a loose tunic with very wide sleeves, and was worn over the tunica alba by the better class of citizens (see. fig. 2). According to the Liber pontificalis (ed. Duchesne, 1. 171) the dalmatic was first introduced as a vestment in public worship by Pope Silvester I. (314-335), who ordered it to be worn by the deacons; but Braun (Liturg. Gewandung, p. 250) thinks that it was probably in use by the popes themselves so early as the 3rd century, since St Cyprian (d. 258) is mentioned as wearing it when he went to his death. If this be so, it was probably given to the Roman deacons to distinguish them

from the other clergy and to mark their special relations to the pope. However this may be, the dalmatic remained for centuries the vestment distinctive of the pope and his deacons, and — according at least to the view held at Rome— could be worn by other clergy only by special concession of the pope. Thus Pope Symmachus (498-514) granted the right to wear it to the deacons of Bishop Caesarius of Aries; and so late as 757 Pope Stephen II. gave permission to Fulrad, abbot of St Denis, to be assisted by six deacons at mass, and these are empowered to wear " the robe of honour of the dalmatic." How far, however, this rule was strictly

observed, and what was the relation of the Roman dalmatic to the diaconal alba and subdiaconal tunica, which were in liturgical use in Gaul and Spain so early as the 6th century, are moot points (see Braun, p. 252). The dalmatic was in general use at the beginning of the 9th century, partly as a result of the Carolingian reforms, which established the Roman model in western Europe; but it con- tinued to be granted by the popes to distinguished ecclesiastics not otherwise entitled to wear it, e.g. to abbots or to the cardinal priests of important cathedrals. So far as the records show, Pope John XIII. (965–972) was the first to bestow the right to wear the dalmatic on an abbot, and Pope Benedict VII. the first to grant it to a cardinal priest of a foreign cathedral (97 s). The present rule was firmly established by the nth century. According to the actual use of the Roman Catholic Church dalmatic and tunicle are worn by deacon and subdeacon when assisting at High Mass, and at solemn processions and benedictions. They are, however, traditionally vestments sym- bolical of joy (the bishop in placing the dalmatic on the newly ordained deacon says:—" May the Lord clothe thee in the tunic of joy and the garment of rejoic- ing "), and they are therefore not worn during seasons of fasting and penitence or functions connected with these, the folded chasuble (paenula plicata) being substi- tuted (see Chasuble). Dalmatic and tunicle are never worn by priests, as priests, but both are worn by bishops under the chasuble (never under the cope) and also

by those prelates, not being bishops, to

whom the pope has conceded the right to ^STappSd wear the episcopal vestments. amice and alb.

In England at the Reformation the dalmatic ultimately shared the fate of the chasuble and other mass vestments. It was, however, certainly one of the " orna- ments of the minister " in the second year of Edward VI., the rubric in the office for Holy Communion directing the priest's " helpers " to wear " albes with tunacles." In many Anglican

churches it has therefore been restored, as a result of the ritual revival of the 19th century, it being claimed that its use is obligatory under the ” ornaments rubric ” of the Book of Common Prayer (see Vestments) .

In the Eastern churches the only vestment that has any true analogy with the dalmatic or liturgical upper tunic is the sakkos, the tunic worn by deacons and subdeacons over their everyday clothes being the equivalent of the Western alb (q.v.). The sakkos, which, as a liturgical vestment, first appears in the 12th century as peculiar to patriarchs, is now a scapular-like robe very similar to the modern dalmatic (see fig. 5). Its origin is almost certainly the richly embroidered dalmatic that formed part of the consular insignia, which under the name of sakkos became a robe of state special to the emperors. It is clear, then, that this vestment can only have been assumed with the emperor’s permission; and Braun suggests (p. 305) that its use was granted to the patriarchs, after the completion of the schism of East and West, in order ” in some sort to give them the character, in outward appearance as well, of popes of the East.” Its use is confined to the Greek rite. In the Greek and Greek-Melchite

DALMATIC

Plate I.

Fig. 2— TUNIC OF From t lie

LlNhN, WOVEN tombs at Akhmim.

WITH BANDS OF PURPLE WOOL EMBROIDERED WITH WHITE FLAX. Egypto-Roman; 1st to 4th century. (In the Victoria and Albert Museum.)

” 1

FIG. 3-— BACK OF A DALMATIC OF STAMPED GREEN WOOLLEN VELVET: THE ORPHRF.YS AND APPARELS

ARE OF EMBROIDERED SILK VELVET. The two figures on

the cross-band or apparel represent St. Gregory the Great and St. Augustine. The shields of arms are for the dukes of Juiich and Berg, counts of Ravensberg, and for the electors of Bavaria. Said to have come from the church of St Severin Cologne. German (Cologne); second half of 15th century, (In the Victoria and Albert Museum.)

DALMATIC

Fig. 4. -DALMATIC OF WHITE SATIN EMBROIDERED WITH COLOURED SILKS AND SILVER-GILT AND SILVER THREAD Spanish; early 17th century. (In the Victoria and Albert Museum.)

I

; <|J|iii» _jjfr ^jt if»5, ■ . f ' • ; . • j>-*

Fk

5.— GREEK SAKKOS, OF RED SATIN EM- BROIDERED WITH SILVER-GILT AND SILVER THREAD WITH SILK. It has the names and arms of two archbishops. 18th century, (In the Victoria and Albert Museum.)

Fig. C— DALMATIC OF TOPE PIUS V. An early example of the modern Roman type. Roman; 16th century. Preserved at Santa Maria Maggiore, Rome. From a photograph taken by Father J. Braun (in Die liturgische Gewandung), by permission of B. Herder.

churches it is confined to the patriarchs and metropolitans; in the Russian, Ruthenian and Bulgarian churches it is worn by all bishops. Unlike the practice of the Latin church, it is not worn under, but has replaced the phelonion (chasuble).

A silk dalmatic forms one (the undermost) of the English coronation robes. Its use would seem to have been borrowed, not from the robes of the Eastern emperors, but from the church, and to symbolize with the other robes the quasi- sacerdotal character of the kingship (see Coronation). The magnificent so-

called dalmatic of Charlemagne, preserved at Rome (see Embroidery), is really a Greek sakkos.

See Joseph Braun, S.J., Die liturgische Cewandung (Freiburg im Breisgau, 1907), pp. 247–305. For further references and illustrations see the article Vestments. (W. A. P.)

DALMELLINGTON, a village of Ayrshire, Scotland, 15 m. S.E. of Ayr by a branch line, of which it is the terminus, of the Glasgow & South-Western railway. Pop. (1901) 1448. The district is rich in minerals — coal, ironstone, sandstone and limestone. Though the place is of great antiquity, the Roman road running near it, few remains of any interest exist. It was, however, a centre of activity in the Covenanting times.

DALOU, JULES (1838–1902), French sculptor, was the pupil of Carpeaux and Duret, and combined the vivacity and richness of the one with the academic purity and scholarship of the other. He is one of the most brilliant virtuosos of the French school, admirable alike in taste, execution and arrangement. He first exhibited at the Salon in 1867, but when in 1871 the troubles of the Commune broke out in Paris, he took refuge in England, where he rapidly made a name through his appointment at South Kensington. Here he laid the foundation of that great improvement which resulted in the development of the modern British school of sculpture, and at the same time executed a remarkable series of terra-cotta statuettes and groups, such as " A French Peasant Woman " (of which a bronze version under the title of " Maternity " is erected outside the Royal Exchange) , the group of two Boulogne women called " The Reader " and " A Woman of Boulogne teUing her Beads." He returned to France in 1879 and produced a number of masterpieces. His great relief of " Mirabeau replying to M. de Dreux-Breze," exhibited in 1883 and now at the Palais Bourbon, and the highly decorative panel, " Triumph of the Republic," were followed in 1885 by " The Procession of Silenus." For the city of Paris he executed his most elaborate and splendid achievement, the vast

monument, " The Triumph of the Republic," erected, after twenty years' work, in the Place de la Nation, showing a sym- bolical figure of the Republic, aloft on her car, drawn by lions led by Liberty, attended by Labour and Justice, and followed by Peace. It is somewhat in the taste of the Louis XIV. period, ornate, but exquisite in every detail. Within a few days there was also inaugurated his great "Monument to Alphand" (1899), which almost equalled in the success achieved the monument to Delacroix in the Luxembourg Gardens. Dalou, who gained the Grand Prix of the International exhibition of 1889, and was an officer of the Legion of Honour, was one of the founders of the New Salon (Society Nationale des Beaux- Arts), and was the first president of the sculpture section. In portraiture, whether statues or busts, his work is not less remarkable.

DALRADIAN, in geology, a series of metamorphic rocks, typically developed in the high ground which lies E. and S. of the Great Glen of Scotland. This was the old Celtic region of Dalradia, and in 1891 Sir A. Geikie proposed the name Dalradian as a convenient provisional designation for the complicated set of rocks to which it is difficult to assign a definite position in the stratigraphical sequence (Q.J.G.S. 47, p. 75).- In Sir A. Geikie's words, " they consist in large proportion of altered sedimentary strata, now found in the form of mica-schist, graphite-schist, andalusite-schist, phyllite, schistose grit, grey- wacke and conglomerate, quartzite, limestone and other rocks, together with epidiorites, chlorite-schists, hornblende schists and other allied varieties, which probably mark sills, 5ava-sheets or beds of tuff, intercalated among the sediments. The total thickness of this assemblage of rocks must be many

thousand feet." The Dalradian series includes the " Eastern or Younger schists " of eastern Sutherland, Ross-shire and Inver- ness-shire — the Moine gneiss, &c. — as well as the metamorphosed sedimentary and eruptive rocks of the central, eastern and south-

western Highlands. The series has been traced into the north-western counties of Ireland. The whole of the Dalradian complex has suffered intense crushing and thrusting.

See Pre-Cambrian; also J. B. Hill, Q.J.G.S., 1899, 55, and G. Barrow, loc. cit., 1901, 57, and the Annual Reports and Summaries of Progress of the Geological Survey of the United Kingdom from 1893 onwards.

DALRIADA, the name of two ancient Gaelic kingdoms, one in Ireland and the other in Scotland. The name means the home of the descendants of Riada. Irish Dalriada was the district which now forms the northern part of county Antrim, and from which about a.d. 500 some emigrants crossed over to Scotland, and founded in Argyllshire the Scottish kingdom of Dalriada. For a time Scottish Dalriada appears to have been dependent upon Irish Dalriada, but about 575 King Aidan secured its independence. One of Aidan's successors, Kenneth, became king of the Picts about 843, and gradually the name Dalriada both in Ireland and Scotland fell into disuse.

See W. F. Skene, Celtic Scotland (Edinburgh, 1876-1880).

DALRY (Gaelic, " the field of the king "), a mining and manufacturing town of Ayrshire, Scotland, on the Garnock, 231 m. S.W. of Glasgow, by the Glasgow & South-Western railway. Pop. (1901) 5316. The public buildings include the library and reading-room, the assembly rooms, Davidshill hospital, Temperance hall and night asylum. There is a public park. The industries consist of woollen factories, worsted spinning, box-, cabinet-, coke- and brick-making, machine- knitting, currying and the manufacture of aerated waters. Coal and iron are found, but mining is not extensively pursued. In the vicinity are the iron works of Blair and Glengarnock, and a curious stalactite cave, known as Elf House, 30 ft. high and about 200 ft. long, offering some resemblance to a pointed aisle. Rye Water flows into the Garnock close to the town. Captain Thomas Crawford of

Jordanhill (1530–1603), the captor of Dumbarton Castle, spent the closing years of his life at Dairy, where a considerable estate had been granted to him.

DALTON, JOHN (1766–1844), English chemist and physicist, was born about the 6th of September 1766 at Eaglesfield, near Cockermouth in Cumberland. His father, Joseph Dalton, was a weaver in poor circumstances, who, with his wife (Deborah Greenup), belonged to the Society of Friends; they had three children— Jonathan, John and Mary. John received his early education from his father and from John Fletcher, teacher of the Quakers' school at Eaglesfield, on whose retirement in 1778 he himself started teaching. This youthful venture was not successful, the amount he received in fees being only about five shillings a week, and after two years he took to farm work. But he had received some instruction in mathematics from a distant relative, Elihu Robinson, and in 178 1 he left his native village to become assistant to his cousin George Bewley who kept a school at Kendal. There he passed the next twelve years, becoming in 1785, through the retirement of his cousin, joint manager of the school with his elder brother Jonathan. About 1790 he seems to have thought of taking up law or medicine, but his projects met with no encouragement from his relatives and he remained at Kendal till, in the spring of 1793, he moved to Manchester, where he spent the rest of his life. Mainly through John Gough (1757–1825), a blind philosopher to whose aid he owed much of his scientific knowledge, he was appointed teacher of mathematics and natural philosophy at the New College in Moseley Street (in 1880 transferred to Manchester College, Oxford), and that position he retained until the removal of the college to York in 1799, when he. became a " public and private teacher of mathematics and chemistry."

During his residence in Kendal, Dalton had contributed solu- tions of problems and questions on various subjects to the Gentlemen's and Ladies' Diaries, and in 1787 he began to keep a meteorological diary in which during the succeeding

years he entered more than 200,000 observations. His first separate publication was Meteorological Observations and Essays (1793). which contained the germs of several of his later dis- coveries ; but in spite of the originality of its matter, the book met with only a limited sale. Another work by him, Elements of English Grammar, was published in 1801. In 1794 he was elected a member of the Manchester Literary and Philosophical Society, and a few weeks after election he communicated his first paper on "Extraordinary facts relating to the vision of colours," in which he gave the earliest account of the optical peculiarity known as Daltonism or colour-blindness, and summed up its characteristics as observed in himself and others. Besides the blue and purple of the spectrum he was able to recognize only one colour, yellow, or, as he says in his paper, " that part of the image which others call red appears to me little more than a shade or defect of light; after that the orange, yellow and green seem one colour which descends pretty uniformly from an intense to a rare yellow, making what I should call different shades of yellow." This paper was followed by many others on diverse topics — on rain and dew and the origin of springs, on heat, the colour of the sky, steam, the auxiliary verbs and participles of the English language and the reflection and refraction of light. In 1800 he became a secretary of the society, and in the following year he presented the important paper or series of papers, entitled " Experimental Essays on the constitution of mixed gases; on the force of steam or vapour of water and other liquids in different temperatures, both in Torricellian vacuum and in air; on evaporation; and on the expansion of gases by heat." The second of these essays opens with the striking remark, " There can scarcely be a doubt enter- tained respecting the reducibility of all elastic fluids of whatever kind, into liquids;

and we ought not to despair of effecting it in low temperatures and by strong pressures exerted upon the unmixed gases " ; further, after describing experiments to ascertain the tension of aqueous vapour at different points between 32 and 212 F., he concludes, from observations on the vapour of six different liquids, " that the variation of the force of vapour from all liquids is the same for the same variation of temperature, reckoning from vapour of any given force." In the fourth essay he remarks, " I see no sufficient reason why we may not conclude that all elastic fluids under the same pressure expand equally by heat and that for any given expansion of mercury, the corresponding expansion of air is proportionally something less, the higher the temperature. ... It seems, therefore, that general laws respecting the absolute quantity and the nature of heat are more likely to be derived from elastic fluids than from other substances." He thus enunciated the law of the expansion of gases, stated some months later by Gay-Lussac. In the two or three years following the reading of these essays, he published several papers on similar topics, that on the " Absorption of gases by water and other liquids " (1803), containing his " Law of partial pressures."

But the most important of all Dalton's investigations are those concerned with the Atomic Theory in chemistry, with which his name is inseparably associated. It has been supposed that this theory was suggested to him either by researches on defiant gas and carburetted hydrogen or by analysis of " pro- toxide and deutoxide of azote," both views resting on the authority of Dr Thomas Thomson (1773-1852), professor of chemistry in Glasgow university. But from a study of Dalton's own MS. laboratory notebooks, discovered in the rooms of the Manchester society, Roscoe and Harden {A New View of the Origin of Dalton's Atomic Theory, 1896) conclude that so far from Dalton being led to the idea that chemical combination consists in the approximation of atoms of definite and character- istic weight by his search for an explanation of the

law of com- bination in multiple proportions, the idea of atomic structure arose in his mind as a purely physical conception, forced upon him by study of the physical properties of the atmosphere and other gases. The first published indications of this idea are to be found at the end of his paper on the " Absorption of gases " already mentioned, which was read on the 21st of October 1803

though not published till 1805. Here he says: " Why does not water admit its bulk of every kind of gas alike? This question I have duly considered, and though I am not able to satisfy myself completely I am nearly persuaded that the circumstance depends on the weight and number of the ultimate particles of the several gases." He proceeds to give what has been quoted as his first table of atomic weights, but on p. 248 of his laboratory notebooks for 1802-1804, under the date 6th of September 1803, there is an earlier one in which he sets forth the relative weights of the ultimate atoms of a number of substances, derived from analysis of water, ammonia, carbon-dioxide, &c. by chemists of the time. It appears, then, that, confronted with the " problem of ascertaining the relative diameter of the particles of which, he was convinced, all gases were made up, he had recourse to the results of chemical analysis. Assisted by the assumption that combination always takes place in the simplest possible way, he thus arrived at the idea that chemical combination takes place between particles of different weights, and this it was which differentiated his theory from the historic speculations of the Greeks. The extension of this idea to substances in general necessarily led him to the law of combination in multiple proportions, and the comparison with experiment brilliantly confirmed the truth of his deduction " (A New View, &"c, pp. 50, 51). It may be noted that in a paper on the " Proportion of the gases or elastic fluids constituting the atmosphere," read by him in November 1802, the law of multiple proportions appears to be anticipated in the words — " The elements of oxygen may combine with a certain

portion of nitrous gas or with twice that portion, but with no intermediate quantity," but there is reason to suspect that this sentence was added some time after the reading of the paper, which was not published till 1805.

Dalton communicated his atomic theory to Dr Thomson, who by consent included an outline of it in the third edition of his System of Chemistry (1807), and Dalton gave a further account of it in the first part of the first volume of his New System of Chemical Philosophy (1808). The second part of this volume appeared in 1810, but the first part of the second volume was not issued till 1827, though the printing of it began in 1817. This delay is not explained by any excess of care in preparation, for much of the matter was out of date and the appendix giving the author's latest views is the only portion of special interest. The second part of vol. ii. never appeared.

Altogether Dalton contributed 116 memoirs to the Manchester Literary and Philosophical Society, of which from 18 17 till his death he was the president. Of these the earlier are the most important. In one of them, read in 1814, he explains the principles of volumetric analysis, in which he was one of the earliest workers. In 1840 a paper on the phosphates and arsenates, which was clearly unworthy of him, was refused by the Royal Society, and he was so incensed that he published it himself. He took the same course soon afterwards with four other papers, two of which — " On the quantity of acids, bases and salts in different varieties of salts " and " On a new and easy method of analysing sugar," contain his discovery, regarded by him as second in importance only to the atomic theory, that certain anhydrous salts when dissolved in water cause no increase in its volume, his inference being that the " salt enters into the pores of the water."

As an investigator, Dalton was content with rough and in- accurate instruments, though better ones were readily attainable. Sir Humphry Davy described him as a " very coarse experi- menter," who " almost

always found the results he required, trusting to his head rather than his hands." In the preface to the second part of vol. i. of his New System he says he had so often been misled by taking for granted the results of others that he " determined to write as little as possible but what I can attest by my own experience," but this independence he carried so far that it sometimes resembled lack of receptivity. Thus he distrusted, and probably never fully accepted, Gay-Lussac 's conclusions as to the combining volumes of gases; he held peculiar and quite unfounded views about chlorine, even after

its elementary character had been settled by Davy; he persisted in using the atomic weights he himself had adopted, even when they had been superseded by the more accurate determinations of other chemists; and he always objected to the chemical notation devised by J. J. Berzelius, although by common consent it was much simpler and more convenient than his cumbersome system of circular symbols. His library, he was once heard to declare, he could carry on his back, yet he had not read half the books it contained.

Before he had propounded the atomic theory he had already attained a considerable scientific reputation. In 1804 he was chosen to give a course of lectures on natural philosophy at the Royal Institution in London, where he delivered another course in 1809-1810. But he was deficient, it would seem, in the qualities that make an attractive lecturer, being harsh and indistinct in voice, ineffective in the treatment of his subject, and " singularly wanting in the language and power of illustra- tion." In 1810 he was asked by Davy to offer himself as a candidate for the fellowship of the Royal Society, but declined, possibly for pecuniary reasons; but in 1822 he was proposed without his knowledge, and on election paid the usual fee. Six years previously he had been made a

corresponding member of the French Academy of Sciences, and in 1830 he was elected as one of its eight foreign associates in place of Davy. In 1833 Lord Grey's government conferred on him a pension of £150, raised in 1836 to £300. Never married, though there is evidence that he delighted in the society of women of education and refinement, he lived for more than a quarter of a century with his friend the Rev. W. Johns (1771–1845), in George Street, Manchester, where his daily round of laboratory work and tuition was broken only by annual excursions to the Lake district and occasional visits to London, " a surprising place and well worth one's while to see once, but the most disagreeable place on earth for one of a contemplative turn to reside in constantly." In 1822 he paid a short visit to Paris, where he met many of the distinguished men of science then living in the French capital, and he attended several of the earlier meetings of the British Association at York, Oxford, Dublin and Bristol. Into society he rarely went, and his only amusement was a game of bowls on Thursday afternoons. He died in Manchester in 1844 of paralysis. The first attack he suffered in 1837, and a second in 1838 left him much enfeebled, both physically and mentally, though he remained able to make experiments. In May 1844 he had another stroke; on the 26th of July he recorded with trembling hand his last meteorological observation, and on the 27th he fell from his bed and was found lifeless by his attendant. A bust of him, by Chantrey, was publicly subscribed for in 1833 and placed in the entrance hall of the Manchester Royal Institution.

See Henry, Life of Dalton, Cavendish Society (1854) ; Angus Smith, Memoir of John Dalton and History of the Atomic Theory (1856), which on pp. 253–263 gives a list of Dalton's publications; and Roscoe and Harden, A New View of the Origin of Dalton's Atomic Theory (1896) ; also Atom.

DALTON, a city and the county-seat of Whitfield county, Georgia, U.S.A., in the N W. part of the state, 100 m. N.N.W. of Atlanta. Pop. (1890)3046; (1900) 4315 (957 negroes) 5(1910) 5324. Dalton is

served by the Southern, the Nashville, Chattanooga & St Louis, and the Western & Atlanta (operated by the Nashville, Chattanooga & St Louis) railways. The city is in a rich agricul- tural region; ships cotton, grain, fruit and ore; and has various manufactures, including canned fruit and vegetables, flour and foundry and machine shop products. It is the seat of Dalton Female College. Dalton was founded by Duff Green and others in 1848, and was incorporated in 1874. Hither General Braxton Bragg retreated after his defeat at Chattanooga in the last week of November 1863. Three weeks afterwards Bragg, in command of the army in northern Georgia in winter quarters here, was replaced by General Joseph E. Johnston, who, with his force of 54,400, adopted defensive tactics to meet Sherman's invasion of Georgia, with his 99,000 or 100,000 men in the Army of the Cumberland (60,000) under General G. H. Thomas, the Army of the Tennessee (25,000) under General J. B. M'Pherson, and the Army of the Ohio (14,000) under General J. M. Schofield. The

Federal forces stretched for 20 m. in a position south of Ringgold and between Ringgold and Dalton. Johnston's line of defences included Rocky Face Ridge, a wall of rock through which the railway passes about 5 m. north-west of the city, Mill Creek (1 m. north-north-west of Dalton), which he dammed so that it could not be forded, and earthworks north and east of the city. On the 7th of May General M'Pherson started for Resaca, 18 m. south of Dalton, to occupy the railway there in Johnston's rear, but he did not attack Resaca, thinking it too strongly protected; Thomas, with Schofield on his left, on the 7th forced the Con- federates through Buzzard's Roost Gap (the pass at Mill Creek) north-west of Dalton; at Dug Gap, 4 m. south-west of Dalton, on the 8th a fierce Federal assault under Brigadier-General John W. Geary failed to dislodge the Confederates from a quite im- pregnable position. On the nth the main body of Sherman's army followed M'Pherson toward Resaca, and Johnston, having evacuated Dalton on the night of the 12th, was thus forced, after five days' manoeuvring and

skirmishing, to march to Resaca and to meet Sherman there.

See J. D. Cox, The Atlanta Campaign (New York, 1882) ; Johnson and Buel, Battles and Leaders of the Civil War (4 vols., New York, 1887) ; and Official Records of the War of the Rebellion, series I, vols. 32, 38, 39, 45, 49; series ii., vol. 8.

DALTON-IN-FURNESS, a market town in the North Lonsdale parliamentary division of Lancashire, England, 4 m. N.E. by N. of Barrow-in-Furness by the Furness railway. Pop. of urban district (1901) 13,020. The church of St Mary is in the main a modern reconstruction, but retains ancient fragments and a font believed to have belonged to Furness Abbey. This fine ruin lies 3 m. south of Dalton (see Furness). St Mary's churchyard contains the tomb of the painter George Romney, a native of the town. Of Dalton Castle there remains a square tower, showing decorated windows. Here was held the manorial court of Furness Abbey. There are numerous iron-ore mines in the parish, and ironworks at Askam-in-Furness, in the northern part of the district. - -

DALY, AUGUSTIN (1838-1899), American theatrical manager and playwright, was born in Plymouth, North Carolina, on the 20th of July 1838. He was dramatic critic for several New York papers from 1859, and he adapted or wrote a number of plays, Under the Gaslight (1867) being his first success. In 1869 he was the manager of the Fifth Avenue theatre, and in 1879 he built and opened Daly's theatre in New York, and, in 1893, Daly's theatre in London. At the former he gathered a company of players, headed by Miss Ada Rehan, which made for it a high reputation, and for them he adapted plays from foreign sources, and revived Shakespearean comedies in a manner before un- known in America. He took his entire company on tour, visiting England, Germany and France, and some of the best actors on the American stage have owed their training and first successes to him. Among these were Clara Morris, Sara Jewett, John Drew, Fanny Davenport, Maude Adams, Mrs Gilbert and many others. Daly was a great book-lover, and

his valuable library was dispersed by auction after his death, which occurred in Paris on the 7th of June 1899. Besides plays, original and adapted, he wrote Woffington: a Tribute to the Actress and the Woman (1888).

DALYELL (or Dalziell or Dalzell), THOMAS (d. 1685), British soldier, was the son of Thomas Dalyell of Binns, Lin- lithgowshire, a cadet of the family of the earls of Carnwath, and of Janet, daughter of the 1st Lord Bruce of Kinloss, master of the rolls in England. He appears to have accompanied the Rochelle expedition in 1628, and afterwards, becoming colonel, served under Robert Munro, the general in Ireland. He was taken prisoner at the capitulation of Carrickfergus in August 1650, but was given a free pass, and having been banished from Scotland remained in Ireland. He was present at the battle of Worcester (3rd of September 1651), where his men surrendered, and he himself was captured and imprisoned in the Tower. In May he escaped abroad, and in 1654 took part in the Highland rebellion and was- excepted from Cromwell's act of grace, a reward of £200 being offered for his capture, dead or alive. The king's cause being now for the time hopeless, Dalyell entered the

service of the tsar of Russia, and distinguished himself as general in the wars against the Turks and Tatars. He returned to Charles in 1665, and on the 19th of July 1666 he was appointed com- mander-in-chief in Scotland to subdue the Covenanters. He defeated them at Rullion Green and exercised his powers with great cruelty, his name becoming a terror to the peasants. He obtained several of the forfeited estates. On the 3rd of January 1667 he was made a privy councillor, and from 1678 till his death represented Linlithgow in the Scottish parliament. He was incensed by the choice of the duke of Monmouth as commander- in-chief in June 1679, and was confirmed in his original appoint-

ment by Charles, but in consequence did not appear at Bothwell Bridge till after the close of the engagement. On the 25th of November 168 1, a commission was issued authorizing him to enrol the regiment afterwards known as the Scots Greys. He was continued in his appointment by James II., but died soon after the latter's accession in August 1685. He married Agnes, daughter of John Ker of Cavers, by whom he had a son, Thomas, created a baronet in 1685, whose only son and heir, Thomas, died unmarried. The baronetage apparently became extinct, but it was assumed about 1726 by James Menteith, a son of the sister of the last baronet, who took the name of Dalyell; his last male descendant, Sir Robert Dalyell, died unmarried in

1886.

DAM. (1) (A common Teutonic word, cf. Swed. and Ger. damm, and the Gothic verb faurdammj an, to block up), a barrier of earth or masonry erected to restrain, divert or contain a body of water, particularly in order to form a reservoir. (2) (Fr. dame, dame; Lat. domina, feminine of dominus, lord, master), the mother of an animal, now chiefly used of the larger quadrupeds, and particularly of a mare, the mother of a foal.

DAMAGES (through O. Fr. damage, mod. Fr. dommage, from Lat. damnum, loss), the compensation which a person who has suffered a legal wrong is by law entitled to recover from the person responsible for the wrong. Loss caused by an act which is not a legal wrong (damnum sine injuria) is not recoverable, e.g. where a father loses a young child by the negligence of a third party.

The principle of compensation in law makes its first appearance as a substitute for personal retaliation. In primitive law some- thing of the nature of the Anglo-Saxon wer-gild, or the ttoivt] of the Iliad, appears to be universal. It marks out with great minuteness the measure of the compensation appropriate to each particular case of personal injury. And there is a resem- blance between the

legal compensation, as it may be called, and the compensation which an injured person, seeking his own remedy, would be likely to exact for himself. In such a system the two entirely different objects of personal satisfaction and criminal punishment are not clearly separated, and in fact, criminal and civil remedies were administered in the same proceeding.

Under modern systems of law, the object of legal compensation is to place the injured person as nearly as possible in the situation in which he would have been but for the injury; and the con- trolling principle is that compensation should be determined so far as possible by the actual amount of the loss sustained. In England, civil proceedings for reparation and criminal proceed- ings for punishment are with few exceptions carefully kept separate. In Scotland, pursuit of the two kinds of remedies in the same proceeding is possible but very rare; but in France and other European states it is lawful and usual in the case of those delicts which are also punishable criminally.

In the law of England the two historical systems of common law and equity viewed compensation or reparation from two different points of view. The principle of the common law was that the amount of every injury might be estimated by pecuniary valuation. The idea was no doubt derived from the old tariffs of were, hot and wife, in which the valuations were elaborate. Until 1858 (Cairns' Act) courts of equity had no direct jurisdic- tion to award damages, and their business was to place the injured party in the actual position to which he was entitled (restitutio ad integrum) . This difference comes out most clearly

in cases of breach of contract. The common law, with a few partial exceptions, could do no more than compel the defaulter to make good the loss of the other party, by paying him an ascer- tained sum of money as damages. Equity, recognizing the fact that complete satisfaction was not in all cases to be obtained by mere money payment, compelled those who

broke certain classes of contracts specifically to perform them, and in the case of acts or defaults not amounting to breach of contract, on satisfactory proof that a wrong was contemplated, would interfere to prevent it by injunction; while at common law no action could be brought until the injury was accomplished, and then only pecuniary damages could be obtained. Since the Judicature Acts this distinction has ceased and the appropriate remedy may be awarded in any division of the High Court of Justice.

Under the common law damages were always assessed by a jury. Under the existing procedure in England they may be assessed (1) by a jury under the directions of a judge; (2) by a judge alone or sitting with assessors; (3) by a referee, official or special, or officer of the courts with or without the assistance of mercantile or other assessors; (4) by a consensual tribunal such as an arbitrator or valuer selected by the parties. Whatever the mode of assessment, it is subject to review if the assessors have clearly mistaken the proper measure of damage.

In the case of assessment by a jury, the verdict may be set aside because the damages are clearly excessive or palpably insufficient, or arrived at by some irregular conduct, e.g. by setting down the sum which each juryman would give and divid- ing the result by twelve. The appellate court, however, cannot, without the consent of the parties, itself fix the amount of damages in a case which has been submitted to a jury (Watt v. Walt, 1905, Appeal Cases 115).

The courts have gradually evolved certain rules or principles for the proper assessment of damages, although extreme difficulty is found in their application to concrete cases. A distinction is drawn between general and special Measure damages. (1) General damage is that implied by law damages. as necessarily flowing from the breach of right, and requiring no proof. (2) Special damage is that in fact caused by the wrong. Under existing practice this form of damage cannot be recovered unless it

has been specifically claimed and proved, or unless the best available particulars or details have been before trial communicated to the party against whom it is claimed.

Contracts. — ” The law imposes or implies a term that upon breach of contract damages must be paid.” The general tend- ency of legal decisions in cases of contract is (i.) to make the amount of damages which may be awarded a matter of legal certainty, (ii.) to leave to a jury or like tribunal little more to do than find the facts, (iii.) and to revise the assessment if it is clear that it has been made in disregard of the terms of the contract or of the natural and direct consequences of the breach. The measure of damage, general speaking, is the sum necessary to place the aggrieved party in the same position so far as money will do it as if the contract had been performed. If the breach is proved, but the person complaining has suffered no real damage, he is entitled to have his legal right recognized by an award of what are called nominal damages, i.e. a sum just suffi- cient to carry a judgment in his favour on the infraction of his rights. Nominal damages, it will therefore be seen, are not the same as ” small damages.” He is, however, also entitled to prove and recover the special or particular damage lawfully attributable to the breach. Where the contract is to pay a fixed sum of money or liquidated amount, the measure of damages for non-payment is the sum agreed to be paid and interest thereon at the rate stipulated in the contract or recog- nized by law.

The law is the same in Scotland and in France (Civil Code, art. 1 1 53). In some contracts the parties themselves fix the sum to be paid as damages if the contract is not fulfilled. These damages are described as liquidated, in Scots law stipulated or estimated. It would be supposed that the sum thus fixed would be the proper damages to be awarded. And under the French

Civil Code (arts. 1152, 1153, 1780) the stipulation of the parties as to the damages to be paid for breach of a stipulation other than for paying a sum of money is binding on the courts. . But in England, Scotland and the United States, courts disregard the words used, and inquire into the real nature of the transaction in order to see whether the sum fixed is to be treated as ascertained damage or as a penalty to be held in terrorem over the defaulter, and in the latter case, notwithstanding the stipulation, will require proof of the actual loss. In Kemble v. Farren (1829, 6 Bingham, 141), a contract between a manager and an actor provided that for a breach of any of the stipulations therein, the sum of £1000 should be payable by the defaulter, not as a penalty, but as liquidated and ascertained damages. Yet, the court, observing that under the stipulations of the contract the sum of £1000, if it were taken to be liquidated damages, might become payable for mere non-payment of a trifling sum, held that it was not fixed as damages, but as a penalty only. The case in which an agreed sum is most usually treated as a penalty is a bond to pay a fixed sum containing a condition that it shall be void if certain acts are done or a certain smaller sum paid. Another case is where a single lump sum is fixed as the liquidated amount of damage to be paid for doing or failing to do a number of different things of very varying degrees of importance (Elphin- stonev.Monkland Iron Co., 1887, n A.C. 333). But the courts have accepted as creating a contractual measure of damage a stipulation to finish sewerage works by a given day (Law v. Reddilch Local Board, 1892, 1 Q.B. 127); or to complete torpedo boats within a limited time for a foreign government (Clydebank Engineering Co. v. Yzquierda, 1905, A.C. 6). In this last case the law lords indicated that the provision of an agreed sum was peculiarly appropriate in view of the difficulty of showing the exact damage which a state sustains by non-delivery of a warship. Where the damage is not liquidated or agreed it is assessed to upon

evidence as to the actual loss naturally and directly flowing from the breach of contract.

In contracts for the sale of goods the measure of damages is fixed by statute. Where the buyer wrongfully refuses or neglects to accept and pay for, or the seller wrongfully neglects or refuses to deliver the goods, the measure is the estimated loss directly and naturally resulting in the ordinary course of events from the buyer's or seller's breach of contract. Where there is an available market for the goods in question, the measure of damages is prima facie to be ascertained by the difference between the contract price and the market or current price at the time or times when the goods ought to have been accepted or delivered, or if no such time was fixed for acceptance or delivery, then at the time of refusal to accept or deliver (Sale of Goods Act 1893, §§ So, Si)-

Where there is no market, the value is fixed by the price of the nearest available substitute. Where the sufferer, at the request of the person in default, postpones purchase or sale, any in- creased loss thereby caused falls on the defaulter. If the buyer, before the time fixed for delivery, has resold the goods to a sub- vendor, he cannot claim against his own vendor any damages which the sub-vendor may recover against him for breach of contract, because he ought to have gone into the market and purchased other goods. But this is subject to modification in cases falling within the rule in Hadley v. Baxendale (1854, 9 Exchequer, 341) . But trouble and expense incurred by the seller of finding a new purchaser or other goods may be taken account of in assessing the damages.

Where the goods delivered are not as contracted the buyer may as a rule sue the seller for a breach of warranty, or set it up as reduction of price. Where the warranty is of quality the loss is prima facie the difference between the value of the goods delivered when delivered and the value which they would have then had if they had answered to the warranty (Sale of Goods Act 1893, § 53). In an

American case, where a person had agreed with a boarding-house keeper for a year, and quitted the house within the time, it was held that the measure of damages was not the price stipulated to be paid, but "only the loss caused by the breach of contract. In contracts to marry, a special class of

considerations is recognized, and the jury in assessing damages will take notice of the conduct of the parties. The social position and means of the defendant may be given in evidence to show what the plaintiff has lost by the breach of contract.

On a breach of contract to replace stock lent, the measure of damages is the price of the stock on the day when it ought to have been delivered, or on the day of trial, at the plaintiff's option.

In contracts for the sale of realty, the measure of damage for breach by the vendor is the amount of any deposit paid by the would-be purchaser and of the expenses thrown away. But the purchaser may, in a proper case, obtain specific performance, and if he has been cheated may obtain damages in an action for deceit.

Breaches of trust are in a sense distinct from breaches of contract, as they fell under the jurisdiction of courts of equity and not of the common law courts. The rule applied was to require a. defaulting trustee to make good to the beneficiaries any loss flowing from a breach of trust and not to allow him to set off against this liability any gain to the trust fund resulting from a different breach of trust or from good management (Lewin on Trusts, ed. 1904, 1146).

In estimating the proper amount to be assessed as damages for a breach of contract, it is not permissible to include every loss caused by the act or default upon which the claim for damages is based. The damage to be awarded must be that fairly and naturally arising from the breach under ordinary circumstances or the special circumstances of the particular contract, or in other words, which may

reasonably be supposed to have been in the contemplation of the parties at the time of making the contract. The chief authority for this rule is the case of Hadley v. Baxendale (1854, 9 Exch. 341), which has been accepted in Scotland and the United States and through- out the British empire, and often differs little, if at all, from the rule adopted in the French civil code (art. 1150). In that case damages were sought for the loss of profits caused by a steam mill being kept idle, on account of the delay of the defendants in sending a new shaft which they had contracted to make. The court held the damage to be too remote, and stated the proper rule as follows: —

"Where two parties have made a contract which one of them has broken, the damages which the other party ought to receive in respect of such breach of contract should be such as may fairly and reason- ably be considered either arising naturally, i.e. according to the usual course of things, from such breach of contract itself, or such as may reasonably be supposed to have been in the contemplation of both parties at the time they made the contract as the probable result of the breach of it. Now if the special circumstances under which the contract was actually made were communicated by the plaintiffs to the defendants, and thus known to both parties, the damages result- ing from such contract which they would reasonably contemplate would be the amount of injury which would ordinarily flow from a breach of contract under these special circumstances so known and communicated. But on the other hand, if those special circumstances were wholly unknown to the party breaking the contract, he at the most could only be supposed to have had in his mind the amount of injury which would arise generally, and in the great multitude of cases not affected by any special circumstances, from such breach of contract." 1

The rule is, however, only a general guide, and does not obviate the necessity of inquiring in each case what are the natural or contemplated damages. In an action by the pro- prietor of a theatre, it was alleged that the defendant had written a libel on

one of the plaintiff's singers, whereby she was

1 In the Indian Contracts Code (Act xii. of 1872), the rule is thus summarized : — •

" When a contract has been broken, the party who suffers by such breach is entitled to receive from the party who has broken the contract, compensation for any loss or damage caused to him thereby, which naturally arose in the usual course of things from such breach, or which the parties knew when they made the contract to be likely to result from the breach of it. Such compensation is not to be given for any remote or indirect loss or damage sustained by reason of the breach. ... In estimating the loss or damage arising from a breach of contract, the means of remedying the inconvenience caused by the non-performance must be taken into account " (§ 73).

deterred from appearing on the stage, and the plaintiff lost his profits; such loss was held to be too remote to be the ground of an action for damages. In Smeed v. Foord (1 Ellis and Ellis, 602), the defendant contracted to deliver a threshing-machine to the plaintiff, a farmer, knowing that it was needed to thresh the wheat in the field. Damages were sought for injury done to the wheat by rain in consequence of the machine not having been delivered in time, and also for a fall in the market before the grain could be got ready. It was held that the first claim was good, as the injury might have been anticipated, but that the second was bad. When, through the negligence of a railway company in delivering bales of cotton, the plaintiffs, having no cotton to work with, were obliged to keep their workmen un- employed, it was held that the wages paid and the profits lost were too remote for damages. On the other hand, where the defendant failed to keep funds on hand to meet the drafts of the plaintiff, so that a draft was returned dishonoured, and his business in consequence was for

a time suspended and injured, the plaintiff was held entitled to recover damage for such loss.

The rule that the contract furnishes the measure of the damages does not prevail in the case of unconscionable, i.e. unreasonable, absurd or impossible contracts. The old school- book juggle in geometrical progression has more than once been before the courts as the ground of an action. Thus, when a man agreed to pay for a horse a barley-corn per nail, doubling it every nail, and the amount calculated as 32 nails was 500 quarters of barley, the judge directed the jury to disregard the contract, and give as damages the value of the horse. And when a defendant had agreed for £5 to give the plaintiff two grains of rye on Monday, four on the next Monday, 1 and so on doubling it every Monday, it was contended that the contract was impossible, as all the rye in the world would not suffice for it ; but one of the judges said that, though foolish, it would hold in law, and the defendant ought to pay something for his folly. And when a man had promised £1000 to the plaintiff if he should find his owl, the jury were directed to mitigate the damages.

Interest is recoverable as damages at common law only upon mercantile securities, such as bills of exchange and promissory notes or where a promise to pay interest has been made in express terms or may be implied from the usage of trade or other circumstances [Mayne, Damages (7th ed.) 166]. Under the Civil Procedure Act 1833, the jury is allowed to give interest by way of damages on debts or sums payable at a certain time, or if not so payable, from the date of demand in writing, and in actions on policies of insurance, and in actions of tort arising out of conversion or seizure of goods.

In the United States, interest is in the discretion of the court, and is made to depend on the equity of the case. In both England and America compound interest, or interest on interest, appears to have been regarded with the horror that formerly attached to usury. Lord Eldon would not recognize as valid an

agreement to pay compound interest. And Chancellor Kent held that compound interest could not be taken except upon a special agreement made after the simple interest became due.

In Scotland compound interest is not allowed by way of damages.

Torts. — In actions arising otherwise than from breach of contract (i.e. of tort, delict or quasi-delict), the principles applied to the assessment of damage in cases arising ex contractu are generally applicable (The Notting Hill, 1884, 9 P. D. 105); but from the nature of the case less precision in assessment is attain- able. The remoteness of the damage claimed is a ground for excluding it from the assessment. In some actions of tort the damages can be calculated with exactness just as in cases of contract, e.g. in most cases of interference with rights of property or injury to property. Thus, for wrongful dispossession from a plantation (in Samoa) it was held that the measure of damage was the annual value of the produce of the lands when wrongfully

1 Quolibet alio die lunae, which was translated by some every Monday, and by others every other Monday. The amount in the latter case would have been 125 quarters, in the former 524,288,000 quarters.

seized, less the cost of management, and that the wilful character of the seizure did not justify the infliction of a penalty over and above the loss to the plaintiff (Mc Arthur v. Cornwall, 1892, A.C. 75). Where minerals are wrongfully severed and carried away, the damage is assessed by calculating the value of the mineral as a chattel and deducting the reasonable expense of getting it. But where the interference with property, whether real or personal, is attended by circumstances of aggravation such as crime or fraud or wanton insult, it is well established that additional damages may be awarded which in effect are penal or vindictive. In actions for injuries to the person or to reputation, it is difficult to make the damages a

matter for exact calculation, and it has been found impossible or inexpedient by the courts to prevent juries from awarding amounts which operate as a punishment of the delinquent rather than as a true assessment of the reparation due to the sufferer. And while a bad motive (malice) is seldom enough to give a cause of action, proof of its existence is a potent inducement to a jury to swell the assessment of damages, as evidence of bad character may induce them to reduce the damages to a derisory amount. In the case of injuries to the person caused by negligence, the tribunal considers, as part of the general damage, the actual pain and suffering, including nervous shock (but not wounded feelings) and the permanent or temporary character of the injury, and as special damage the loss of time and employment during recovery and the cost of cure. It is difficult by any arithmetical calcula- tion to value pain and suffering; nor is it easy to value the effect of a permanent injury; and in the Workmen's Compensation Act and Employers' Liability Act, an attempt has been made in the case of workmen to assess by reference to the earnings of the injured person.

In the case of such wrongs as assault, arrest or prosecution, the motives of the defendant naturally affect the amount of general damage awarded, even when not essential elements in the case, and the damages are " at large." Any other rule would enable a man to distribute blows as he can utter curses at a statutory tariff of so much a curse, according to his rank. This position was strongly asserted in the cases arising out of the celebrated " General Warrants " (1763) in the time of Lord Camden, who is reported in one case to have said, " damages are designed not only as a satisfaction to the injured person, but as a punishment to the guilty, and as a proof of the detesta- tion in which the wrongful act is held by the jury." In another case he mentioned the importance of the question at issue, the attempt to exercise arbitrary power, as a reason why the jury might give exemplary damages. Another judge, in another case, said " I remember a case when the jury

gave £500 damages for knocking a man's hat off; and the court refused a new trial." And he urged that exemplary damages for personal insult would tend to prevent the practice of duelling.

The right to give exemplary or punitive or (as they are some- times called) vindictive damages is fully recognized both in England and in the United States, and especially in the following cases. (1) Against the co-respondent in a divorce suit. This right is the same as that recognized at common law in the abolished action of criminal conversation, but the damages awarded may by the court be applied for the maintenance and education of the children of the marriage or the maintenance of the offending wife. (2) In actions of trespass to land where the conduct of the defendant has been outrageous. (3) In actions of defamation spoken or written, attended by circum- stances of aggravation, and the analogous action of malicious prosecution. (4) In the anomalous actions of seduction and breach of promise of marriage.

In actions for wrongs, as in those ex contractu, the damages may be general or special. In a few cases of tort, the action fails wholly if special damage is not proved, e.g. slander by imputing to a man vicious, unchaste or immoral conduct, slander of title to land or goods or nuisance.

In theory, English law does not recognize " moral or intel- lectual " damage, such as was claimed by the South African Republic after the Jameson Raid. The law of Scotland allows

a solatium for wounded feelings, as does French law under the name of dommage moral, 6prouvi par la partie UsSe dans sa liberty, sa surete, son honneur, sa consideration, ses affections legitimes ou dans lajouissance de son patrimoine. Under this head compensation is awarded to widow, child or sister, for the loss of husband, parent or brother, in

addition to the actual pecuniary loss (Dalloz, Nouveau Code civil, art. 1382). Claims of damage for negligence are defeated by proof of what is known as con- tributory negligence (faute commune). In other claims of tort, as already stated, the conduct of the claimant may materially reduce the amount of his damages.

In cases of damages to ships or cargo by collision at sea, the rule of the old court of admiralty (derived from the civil law and preserved by the Judicature Acts) is that when both or all vessels are to blame, the whole amount of the loss is divided between them. The rule appears not to apply to cases where death or personal injury results from the collision (" Vera Cruz," 1884, 14 A.C. 50. " Bernina," 1888, 13 A.C. 1).

Costs. — The costs of a legal proceeding are no longer treated as damages to be assessed by the jury, nor do they depend on any act of the jury. The right to receive them depends on the court, and they are taxed or assessed by its officers (see Costs). In a few cases where costs cannot be given, e.g. on compulsory acquisition of land in London, the assessing tribunal is invited to add to the compensation price the owner's expense in the compensation proceedings.

Death. — In English law a right to recover damages for a tort as a general rule was lost on the death of the sufferer or of the delinquent. The cause of action was considered not to survive. This rule differs from that of Scots law (under which the claim for damages arises at the moment of injury and is not affected by the death of either party). The English rule has been criti- cized as barbarous, and has been considerably broken in upon by legislation, in cases of taking the goods of another (4 Edw. III., c. 7, 1330), and injuries to real or personal property (3 & 4 Will. IV., c. 42, 1833), but continues in force as to such matters as defamation, malicious prosecution and trespass to the person. By the Fatal Accidents Act 1846 (commonly called Lord Camp- bell's Act), it is enacted that wherever a

wrongful act would have entitled the injured person to recover damages (if death had not ensued), the person who in such case would have been liable " shall be liable to an action for damages for the pecuniary loss which the death has caused to certain persons, and although the death shall have been caused under such circumstances as amount in law to felony." The only persons by whom or for whose benefit such an action may be brought are the husband, wife, parent and child (including grandchild and stepchild, but not illegitimate child) of the deceased. The right of action and the measure of damages are statutory and distinct from the right which the deceased had till he died. It was held in Osborne v. Gillelt, 1873, L.R. 8 Ex. 88, and has since been approved (Clark v. London General Omnibus Co., 1906, 2 K.B. 648), that no person can recover damages for the death of another wrongfully killed by the act of a third person, unless he claims through or represents the person killed, and unless that person in case of an injury short of death would have had a good claim to recover damages.

In Scotland the law of compensation for breach of contract is substantially the same as in England. In cases of delict or quasi- delict, the measure of reparation is a fair and reasonable compensa- tion for the advantage which the sufferer would, but for the wrong, have enjoyed and has lost as a natural and proximate result of the wrong, coupled with a solatium for wounded feelings. The claim for reparation vests as a debt when it arises and survives to the representatives of the sufferer, and against the representatives of the delinquent. In other words, the maxim actio personalis moritur cum persona does not apply in Scots law; and even in cases of murder there has always been recognized a right to " assythement."

See also Mayne on Damages, 7th ed.; Sedgwick on Damage; Bell, Principles of Law of Scotland. (W. F. C.)

DAMANHUR, a town of Lower Egypt, 38 m. E.S.E. of

Alex- andria by rail, capital of the richly- cultivated province of Behera. It is the ancient Timenhor, ” town of Horus,” which in Ptolemaic

times was capital of a nome and lay on the Canopic branch of the Nile. Its name and other circumstances imply that Horus (= Apollo) was worshipped there in the same form as at Edfu (Brugsch, Dictionnaire geographique, p. 521), but its Greek name, Hermopolis Parva, should indicate Thoth as the local god. This apparent contradiction is perhaps due to some early mis- understanding that held its ground after the Greeks knew Egypt better. A much frequented fair is held at Damanhur three times a year, and there are several cotton manufactories. Population (1907) 38,752.

DAMARALAND, a region of south-western Africa, bounded W. by the Atlantic, E. by the Kalahari, N. by Ovampoland, and S. by Great Namaqualand. It forms the central portion of German South-West Africa. Damaraland is alternatively known as Hereroland, both names being derived from the tribes inhabiting the region. The so-called Damara consist of two probably distinct peoples. They are known respectively as ” the Hill Damara ” and ” the Cattle Damara,” i.e. those who breed cattle in the plains. The Hill Damara are Negroes with much Hottentot blood, and have adopted the Hottentot tongue, while the Cattle Damara are of distinct Bantu-Negro descent and speak a Bantu language. The term Damara (” Two Dama Women “) is of Hottentot origin, and is not used by the people, who call themselves Ova- herero, ” the Merry People ” (see Hottentots and Herero).

DAMASCENING, or Damaskeening, a term sometimes applied to the production of damask steel, but properly the art of in- crusting wire of gold (and sometimes of silver or copper) on the surface of iron, steel or bronze. The surface upon which the pattern is to be traced is finely undercut with a sharp instrument, and the gold thread by hammering is forced into and securely held by the minute furrows of the cut surface. This system of

ornamentation is peculiarly Oriental, having been much practised by the early goldsmiths of Damascus, and it is still eminently characteristic of Persian metal work.

DAMASCIUS, the last of the Neoplatonists, was born in Damascus about a.d. 480. In his early youth he went to Alex- andria, where he spent twelve years partly as a pupil of Theon, a rhetorician, and partly as a professor of rhetoric. He then turned to philosophy and science, and studied under Hermeias and his sons, Ammonius and Heliodorus. Later on in life he migrated to Athens and continued his studies under Marinus, the mathematician, Zenodotus, and Isidore, the dialectician. He became a close friend of Isidore, succeeded him as head of the school in Athens, and wrote his biography, part of which is preserved in the Bibliotheca of Photius (see appendix to the Didot edition of Diogenes Laertius). In 529 Justinian closed the school, and Damascius with six of his colleagues sought an asylum, probably in 532, at the court of Chosroes J., king of Persia. They found the conditions intolerable, and in 533, in a treaty between Justinian and Chosroes, it was provided that they should be allowed to return. It is believed that Damascius settled in Alexandria arid there devoted himself to the writing of his works. The date of his death is not known.

His chief treatise is entitled Difficulties and Solutions of First Principles (‘Airopiat /ecu xwreis irepi rwv irpiiTwv apx&v). It examines into the nature and attributes of God and the human soul. This examination is, in two respects, in striking contrast to that of certain other Neoplatonist writers. It is conspicuously free from that Oriental mysticism which stultifies so much of the later pagan philosophy of Europe. Secondly, it contains no polemic against Christianity, to the doctrines of which, in fact, there is no allusion. Hence the charge of impiety which Photius brings against him. His main result is that God is infinite, and as such, incomprehensible; that his attributes of goodness, knowledge and power are, credited to him

only by inference from their effects; that this inference is logically valid and sufficient for human thought. He insists throughout on the unity and the indivisibility of God, whereas Plotinus and Porphyry had admitted not only a Trinity, but even an Ennead (nine-fold personality). Interesting as Damascius is in himself,heis stillmoreinteresting

as the last in the long succession of Greek philosophers. (See Neoplatonism.)

Bibliography. — The 'Airopicu was partly edited bv J. Kopp (1826), and in full by C. E. Ruelle (Paris, 1889). French trans, by Chaignet (1898). See T. Whittaker, The Neo-platonists (Cambridge, 1901); E. Zeller, History of Greek Philosophy; C. E. Ruelle, Le Philosophe Damascius (1861) ; Ch. Levgque, " Damascius " (Journal des savants, February 1891). See also works quoted under Neo- platonism and Alexandrian School.

DAMASCUS, the chief town of Syria, and the capital of a government province of the same name, 57 m. from Beirut, situated in 33 30' N., and 3 6° 18' E.

History. — The origin of the city is unknown, and the popular belief that it is the oldest city in the world still inhabited has much to recommend it. It has been suggested that the ideogram by which it is indicated in Babylonian monuments literally means " fortress of the Amorites "; could this be proved it would be valuable testimony to its antiquity if not its origin. The city is mentioned in the document that describes the battle of the four kings against five, inserted in the book of Genesis (ch. xiv.): Abram (Abraham) is reported to have pursued the routed kings to Hobah north of Damascus (v. 15). The name of the steward of Abram 's establishment is given in Genesis xv. 2, as Dammesek Eliezer, which is explained in the Aramaic and Syriac versions as " Eliezer of Damascus." This reading is adopted by the

author- ized version, but the Hebrew, as it stands, will not support it. There is probably here some textual corruption.

In the period of the Egyptian suzerainty over Palestine in the eighteenth dynasty Damascus (whose name frequently appears in the Tell el-Amarna tablets) was capital of the small province of Ubi. The name of the city in the Tell el-Amarna correspondence is Dimashka. Towards the end of that period tha. overrunning of Palestine and Syria by the Khabiri and Suti, the forerunners of the Aramaean immigration, changed the conditions, language and government of the country. One of the first indications of this change that has been traced is the appearance of the Ara- maean Darmesek for Damascus in an inscription of Rameses III.

The growth of an independent kingdom with Damascus as centre must date from very early in the Aramaean occupation. It had reached such strength that though Tiglath-Pileser I. reduced the whole of northern Syria, and by the fame of his victories induced the king of Egypt to send him presents, yet he did not venture to attack Kadesh and Damascus, so that this kingdom acted as a " buffer " between the king of Assyria and the rising kingdom of Saul.

David, however, after his accession made an expedition against Damascus as a reprisal for the assistance the city had given his enemy Hadadezer, king of Zobah. The expedition was successful; David smote of the Syrians 22,000 men, and took and garrisoned the city; " and the Syrians became servants to David, and brought gifts " (2 Sam. viii. 5, 6; 1 Chron. xviii. 5). This statement, it should be noticed, has been questioned by some modern historical and textual critics, who believe that " Syria " (Hebrew Aram) is here a corruption for " Edom." There is no other evidence — save the corrupt passage, 2 Sam. xxiv. 6, where " Tahtim-hodshi " is explained as meaning " the land of the Hittites to Kadesh " — that David's kingdom was so far extended northward. However this may be, it is evident that the Israelite possession of Syria did not last long.

A subordinate of Hadadezer named Rezon (Rasun) succeeded in establishing himself in Damascus and in founding there a royal dynasty. Throughout the reign of Solomon (1 Kings xi. 23, 24) this Rezon seems to have been a constant enemy to the kingdom of Israel.

It is inferred from 1 Kings xv. 19 that Abijah,son of Rehoboam, king of Judah, made a league with Tab-Rimmon of Damascus to assist him in his wars against Israel, and that afterwards Tab- Rimmon's son Ben-Hadad came to terms with the second suc- cessor of Jeroboam, Baasha. Asa, son of Abijah, followed his father's policy, and bought the aid of Syria, whereby he was enabled to destroy the border fort that Baasha had erected (1 Kings xv. 22).

Hostilities between Israel and Syria lasted to the days of Ahab. From Omri the king of Syria took cities and the right to establish

a quarter for his merchants in Samaria (1 Kings xx. 34). His son Ben-Hadad made an unsuccessful attack on Israel at Aphek, and was allowed by Ahab to depart on a reversal of these terms (loc. cit.). This was the cause of a prophetic denunciation (1 Kings xx. 42). According to the Assyrian records Ahab fought as Ben-Hadad's ally at the battle of Karkar against Shalmaneser in 854. This seems to indicate an intermediate defeat and vassalage of Ahab, of which no direct record remains; and it was probably in the attempt to throw off this vassalage in 853, the year after the battle of Karkar, that Ahab met his death in battle with the Syrians (1 Kings xxii. 34-40). In the reign of Jehoram, Naaman, the Syrian general, came and was cleansed by the prophet Elisha of leprosy (2 Kings v.).

In 843 Hazael assassinated Ben-Hadad and made himself king of Damascus. The states which Ben-Hadad had brought together into a coalition against the advancing power of Assyria all revolted; and Shalmaneser, king of Assyria, took advantage of this in 842 and attacked Syria. He wasted the country, but could not take the capital. Jehu, king of Israel, paid tribute to Assyria, for which Hazael

afterwards revenged himself, during the time when Shalmaneser was distracted by. his Armenian wars, by attacking the borders of Israel (2 Kings x. 32).

Adad-nirari IV. invaded Syria and besieged Damascus in 806. Taking advantage of this and similar succeeding events, Jehoash, king of Israel, recovered the cities that his father had lost to Hazael. '

In 734 Ahaz became king of Judah, and Rezon (Rasun, Rezin), the king of Damascus at the time, came up against him; at the same time the Edomites and the Philistines revolted. Ahaz appealed to Tiglath-Pileser III., king of Assyria, sent him gifts, and besought his protection. Tiglath-Pileser invaded Syria, and in 732 succeeded in reducing Damascus (see also Babylonia and Assyria, Chronology, § 5, and Jews, §§ 10 sqq.).

Except for the abortive rising under Sargon in 720, we hear nothing more of Damascus for a long period. In 333 B.C., after the battle of Issus, it was delivered over by treachery to Par- menio, the general of Alexander the Great; the harem and treasures of Darius had here been lodged. It had a chequered history during the wars of the successors of Alexander, being occasionally in Egyptian hands. In 112 B.C. the empire of Syria was divided by Antiochus Grypus and Antiochus Cyzicenus; the city of Damascus fell to the share of the latter. Hyrcanus took advantage of the disputes of these rulers to advance his own kingdom. Demetrius Eucaerus, successor of Cyzicenus, invaded Palestine in 88 B.C., and defeated Alexander Jannaeus at Shechem. On his dethronement and captivity by the Par- thians, Antiochus Dionysus, his brother, succeeded him, but was slain in battle by Haritha (Aretas) the Arab — the first instance of Arab interference with Damascene politics. Haritha yielded to Tigranes, king of Armenia, who in his turn was driven out by Q. Caecilius Metellus (son of Scipio Nasica), the Roman general. In 63 Syria was made a Roman province.

In the New Testament Damascus appears only in connexion with the miraculous conversion of St Paul (Acts ix., xxii., xxvi.), his escape from Aretas the governor by being lowered in a basket over the wall (Acts ix. 25; 2 Cor. xi. 32, 2,3), and his return thither after his retirement in Arabia (Gal. i. 17).

In 150, under Trajan, Damascus became a Roman provincial city.

On the establishment of Christianity Damascus became the seat of a bishop who ranked next to the patriarch of Antioch. The great temple of Damascus was turned by Arcadius into a Christian church.

In 63 5 Damascus was captured for Islam by Khalid ibn Walid, the great general of the new religion, being the first city to yield after the battle of the Yarmuk (Hieromax). After the murder of AH, the fourth caliph, his successor Moawiya transferred the seat of the Caliphate (q.v.) from Mecca to Damascus and thus commenced the great dynasty of the Omayyads, whose rule extended from the Atlantic to India. This dynasty lasted about ninety years; it was supplanted by that of the Abbasids, who removed the seat of empire to Mesopotamia ; and Damascus

passed through a period of unrest in which it was captured and ravaged by Egyptians, Carmathians and Seljuks in turn. The crusaders attacked Damascus in n 26, but never succeeded in keeping a firm hold of it, even during their brief domination of the country. It was the headquarters of Saladin in the wars with the Franks. Of its later history we need only mention the Mongolian capture in 1260; its Egyptian recapture by the Mameluke Kotuz; the ferocious raid of Timur (Tamerlane) in 1399; and the conquest by the Turkish sultan Selim, whereby it became a city of the Ottoman empire (1516). In its more recent history the only incidents that need be mentioned are its capture by Ibrahim Pasha, the

Egyptian general, in 1832, when the city was first opened to the representatives of foreign powers; its revolt against Ibrahim's tyranny in 1834, which he crushed with the aid of the Druses; the return of the city to Turkish domination, when the Egyptians were driven out of Syria in 1840 by the allied powers; and the massacre of July i860, when the Moslem population rose against the Christians, burnt their quarter, and slaughtered about 3000 adult males.

Modern City. — Damascus is a city with a population estimated at from 154,000 (35,000 Christians and Jews) to 225,000 (55,000 Christians and Jews), situated near the northern edge of a plain called the Ghutah, at the foot of Anti-Lebanon, 2250 ft. above the sea. The river Barada (the Abanah of 2 Kings v. 12) rises in the Anti-Lebanon, runs for about 10 m. in a narrow channel, and then spreads itself fan-wise over the plain. About 18 m, east of the city it loses itself in the marshlands known as the Meadow Lakes. A second river, the 'Awaj (possibly the Pharpar of 2 Kings), pursues a similar course. The plain is thus excep- tionally well irrigated, and its consequent fertility is proverbial over the East. Damascus is situated on both banks of the Barada, about 2 m. from the exit of the river from the gorge. On the right bank is all the older part of the city, and a long suburb called El-Meidan extending about a mile along the Hajj Road. On the left bank are the suburbs El 'Amara and El- Salihia. The waters of the river are carried by channels and conduits to all the houses of the city. The orchards, gardens, vineyards and fields of Damascus are said to extend over a circuit of at least 60 m. In the surrounding plain are one hundred and forty villages, occupied in all by about 50,000 persons (1000 Christians, 2000 Druses).

The rough mud walls in the private houses give poor promise of splendour within. The entrance is usually by a low door, and through a narrow winding passage which leads to the outer court, where the master has his reception room. From this another winding passage leads to the harem, which is the principal

part of the house. The plan of all is the same — an open court, with a tesselated pavement, and one or two marble fountains; orange and lemon trees, flowering shrubs, and climbing plants give freshness and fragrance. All the apartments open into the court; and on the south side is an open alcove, with a marble floor, and raised dais round three sides, covered with cushions; the front wall is supported by an ornamented Saracenic arch. The decoration of some of the rooms is gorgeous, the walls being covered in part with mosaics and in part with carved work, while the ceilings are rich in arabesque ornaments, elaborately gilt. A few of the modern Jewish houses have been embellished at an enormous cost, but they are wanting in taste.

Antiquities. — Considering the great age of Damascus, its comparative poverty in antiquities is remarkable. The walls of the city seem to be Seleucid in origin; some of the Roman gateways being still in good order. The Derb el-Mistakim, or " Straight Street," still runs through the city from the eastern to the western gate. At the north-west corner is a large castle built in a.d. 1219, by El-Malik el-Ashraf, on the site of an earlier palace. It is quadrangular, surrounded by a moat filled by the Barada. The outer walls are in good preservation, but the interior is ruined.

The church of St John the Baptist constructed by Arcadius on the site of the temple was turned by Caliph Walid I. (705-717) to a mosque which was the most important building of Damascus. It was a structure 431 ft. by 125 it. interior dimensions, extending

along the south side of a quadrangle 163 yds.by 108 yds. Except the famous inscription over the door — " Thy kingdom, O Christ, is an everlasting kingdom, and thy dominion endure th throughout all generations " — every trace of Christianity was effaced from the church at its conversion. It was destroyed by fire on the 14th of October 1893, and though it was subsequently rebuilt, much that was of archaeological and historical interest perished. It

is estimated that there are over two hundred mosques in Damascus.

Products, Manufactures, &c. — Damascus occupies an important commercial position, being the market for the whole of the desert; it also is of great importance religiously, as being the starting- point for the Hajj pilgrimage from Syria to Mecca, which leaves on the 15th of the lunar month of Shawwal each year. This of course brings much trade to the city. Its chief manufactures are silk work, cloths and cloaks, gold and silver ornaments, &c, brass and copper work, furniture and ornamental woodwork. The bazaars of Damascus are among the most famous of their kind. It is connected with Beirut and Mezerib by railway, and at the end of the past century the great undertaking of running a line to Mecca was commenced. In the surrounding gardens and fields walnuts, apricots, wheat, barley, maize, &c. are grown. Its commercial importance is referred to by Ezekiel (xxvii. 18), who mentions its trade in wines and wool. The climate is good; in winter there is often hard frost and much snow, and even in summer, with a day temperature of 100° F., the nights are always cool. Fever, dysentery and ophthalmia, chiefly due to exposure to heavy dews and cold nights, are prevalent. Though still the market of the nomads, the surer and cheaper sea route has almost destroyed the transit trade to which it once owed its wealth, and has even diminished the importance of the annual pilgrim caravan to Mecca. The Damascene, however, still retains his skill as a craftsman and tiller of the soil. The chief imports are cloths, prints, muslins, raw silk, sugar, rice, &c.

The value of exports and imports in certain specified years is shown in the following table : —

1890.

1894.

1898.

1905.

Exports …. Imports ….

£325,660

525,710

£400,830

614,490

£302,050

675,080

£386,000

872,400

Most of the Christians belong to the Orthodox and Roman Catholic (United) Greek Churches; and there are also communi- ties of Melchites, Jacobites, Maronites,Nestorians, Armenians and Protestants. There are Protestant missions, founded 1843, and a British hospital.

Authorities. — Lortet, La Syrie d'aujourd'hui, p. 567 f. (Paris, 1884); Von Oppenheim, Vom Mittelmeer zum Persischen Golf, i. 49 f. (Berlin, 1899); G. A. Smith, Historical Geography of the Holy Land; Encyclopaedia Biblica, art, " Damascus " ; Consular Reports; Baedeker- Socin, Handbook to Syria and Palestine. For the Great Mosque see Dickie, Phene Spiers, and Sir C. W. Wilson in Palestine Exploration Fund Quarterly Statement, Oct. 1897. (R. A. S. M.)

DAMASK, the technical term applied to certain distinct types of fabric. The term owes its origin to the ornamental silk fabrics of Damascus, fabrics which were elaborately woven in colours, sometimes with the addition of gold and other metallic threads. At the present day it denotes a linen texture richly figured in the weaving with flowers, fruit, forms of animal life, and other types of

ornament. ” China, no doubt,” says Dr Rock (Catalogue of Textile Fabrics, Victoria and Albert Museum), “was the first country to ornament its silken webs with a pattern. India, Persia, and Syria, then Byzantine Greece followed, but at long intervals between, in China’s footsteps. Stuffs so figured brought with them to the West the name ‘ diaspron ‘ or diaper, bestowed upon them at Constantinople. But about the 12 th century the city of Damascus, even then long celebrated for its looms, so far outstripped all other places for beauty of design, that her silken textiles were in demand everywhere; and thus, as often happens, traders fastened the name of damascen or damask upon every silken fabric richly wrought and curiously designed, no matter whether it came or not from Damascus.” The term is perhaps now best known in reference to damask table-cloths, a

*“22.2*22 1S* # *~*«. ••••■■ ■••• ■••• •••■ ••*

*••I:”::!”’”-:”:”:’::-:”::. *?■*■”■: .:”::^ ::ji s “! ■■■*■« ””.:*: :*

MBCMBMM

aaaa aa

>■ aaa*

aaaa a

■aaa ••

■1 : Mi Ba:j« aaa’ BBBI •• ••••

aaa”

■■■:,■■■ .■■■«..■

■iai aaa

:■•■■’..■

■■• BBBI

trnmn

ri

■ –. ■

” •: .*.”.■

• aa a a

!”•!•[image]

- aa

ia–

■ ■ ■

aS” ■ ‘ . ■ m ‘■ – KSW

•a”!

■ji

i« –

■■_ • ■ a a a . laanal

•■■ ••■■

r ■■

:aaii

• ■ a * a > a

a a

•• a ■ ■■nil

aaaa a la aaaa

- aaaa a *aaa

■aa: aaa ajara

■araa aaaa:;aa

iiiii

• Baaar-MMfi

>a aaaa ■aaanaa ■ ...aaaa:.

aaa ■■«■ aaaa”! ::■■■■■■ ik^iii ■a aaaa •••• •■ ■•■■’ aaaa aaaa

aa i

*: ‘.mm**

■ aa ■a aaaa”!

*IB**

■ lllini :■■■■■«■

i aaaa ‘ aaaa ■*

species of figured cloth usually of flax or tow yarns, but sometimes made partly of cotton. The finer qualities are made of the best linen yarn, and, although the latter is of a brownish colour during the weaving processes, the ultimate fabric is pure white. The high lights in these cloths are obtained by long floats of warp and weft, and, as these are set at right angles, they reflect the light differently according to the angle of the rays of light ; the effect changes also with the position of the observer. Subdued effects are produced by shorter floats of yarn, and sometimes by special weaves. Any subject, however intricate, can be copied by this method of weaving, provided that expense is no object. The finest results are obtained when the so-called double damask weaves are used. These weaves are shown under Die, and it will be seen that each weave gives a maximum float of seven threads. (In some special cases a weave is used which gives a float of nine.) The small figure here shown to illustrate a small section of a damask design is composed of the two single damask weaves; these give a maximum float of four threads or picks.

No shading is shown in the design, and this for two reasons — (i) the single damask weaves do not permit of elaborate shading, although some very good effects are obtain- able; (2) the available space is not sufficiently large to show the method to advantage. The different single damask weaves used

in the shading of these cloths appear, however, at the bottom of the figure, while between these and the design proper there is an illus- tration of the thirty-first pick interweaving with all the forty-eight threads.

The principal British centres for fine damasks are Belfast and Dunferm- line, while the medium qualities are made in several places in Ireland, in a few places in England, and in the counties of Fife, Forfar and Perth in Scotland. Cotton damasks, which are made in Paisley, Glasgow, and several places in Lancashire, are used for toilet covers, table-cloths, and similar purposes. They are often ornamented with colours and sent to the Indian and West Indian markets. Silk damasks for curtains and upholstery decoration are made in the silk- weaving centres.

DAMASK STEEL, or Damascus Steel, a steel with a peculiar watered or streaked appearance, as seen in the blades of fine swords and other weapons of Oriental manufacture. One way of producing this appearance is to twist together strips of iron and steel of different quality and then weld them into a solid mass. A similar but inferior result may be obtained by etching with acid the surface of a metal; parts of which are protected by some greasy substance in such a way as to give the watered pattern desired. The art of producing damask steel has been generally practised in Oriental countries from a remote period, the most famous blades having come from Isfahan, Khorasan, and Shiraz in Persia. DAMASUS, the name of two popes.

Damasus I. was pope from 366 to 384. At the time of the banishment of Pope Liberius (355), the deacon Damasus, like all the Roman clergy, made energetic

protest. When, however, the emperor Constantius sent to Rome an anti-pope in the person of Felix II., Damasus, with the other clergy, rallied to his cause. When Liberius returned from exile and Felix was expelled from Rome, Damasus again took his place among the adherents of Liberius. On the death of Liberius (566) a consider- able party nominated Damasus successor; but the irreconcil- ables of the party of Liberius refused to pardon his trimming, and set up against him another deacon, Ursinus. A serious

conflict ensued between the rival factions, which quickly led to rioting and hand-to-hand fighting. In one of these encounters the then new basilica, called the Liberian Basilica (S. Maria Maggiore), was partially destroyed, and 137 dead bodies were left in the building. On several occasions the secular arm had to intervene, although the government of the emperor Valentinian was averse from involving itself in ecclesiastical affairs. From the outset the prefect of Rome recognized the claims of Damasus, and exerted himself to support him. Ursinus and the leading men of his faction were expelled from Rome, and afterwards from central Italy, or even interned in Gaul. They, however, persisted obstinately in their opposition to Damasus, combating him at first by riots, and then by calumnious law-suits, such as that instituted by one Isaac, a converted and relapsed Jew.

To the official support, which never failed him, Damasus endeavoured to join the popular sympathy. From before his election he had been in high favour with the Roman aristocracy, and especially with the great ladies. At that period the urban masses, but recently converted to Christianity, sought in the worship of the martyrs a sort of substitute for polytheism. Damasus showed great zeal in discovering the tombs of martyrs, adorning them with precious marbles and monumental inscrip- tions. The inscriptions he composed himself, in mediocre verse, full of Virgilian reminiscences. Several have come down to us on the original marbles, entire or in fragments; others are known from old copies. In the

interior of Rome he erected or embellished the church which still bears his name (S. Lorenzo in Damaso), near which his father's house appears to have stood.

The West was recovering gradually from the troubles caused by the Arian crisis. Damasus took part, more or less effectually, in the efforts to eliminate from Italy and Illyria the last cham- pions of the council of Rimini. In spite of his declaration at the council convened by him in 372, he did not succeed in evicting Auxentius from Milan. But Auxentius died soon afterwards, and his successor, Ambrose, undertook to bring these hitherto abortive efforts to a successful conclusion, and to complete the return of Illyria to the confessions of Nicaea. The bishops of the East, however, under the direction of St Basil, were involved in a struggle with the emperor Valens, whose policy was favourable to the council of Rimini. Damasus, to whom they appealed for help, was unable to be of much service to them, the more so because that episcopal group, viewed askance by St Athanasius and his successor Peter, was inces- santly combated at the papal court by the inveterate hatred of Alexandria. The Eastern bishops triumphed in the end under Theodosius, at the council of Constantinople (381), in which the pope and the Western church took no part. They were invited to a council of wider convocation, held at Rome in 382, but very few attended.

This council had brought to Rome the learned monk Jerome, for whom Damasus showed great esteem. To him Damasus entrusted the revision of the Latin text of the Bible and other works of religious erudition. A short time before, the pope had received a visit from the Priscillianists after their condemnation in Spain, and had dismissed them. Damasus died in 384, on the nth of December, the day on which his memory is still celebrated.

Damasus II., pope from the 17th of July to the 9th of August 1048, was the ephemeral successor of Clement II. His original name was Poppo, and he was bishop of Brixen when the emperor Henry III. raised

him to the papacy. (L. D.)*

DAMAUN or Daman, a town of Portuguese India, capital of the settlement of Damaun, situated on the east side of the entrance of the Gulf of Cambay within the Bombay Presidency. The area of the settlement is 82 sq. m. Pop. (1900) 41,671. The settlement is divided into two parts, Damaun proper, and the larger pargana of Nagar Havili, the two being separated by a narrow strip of British territory. The soil is fertile, and rice, wheat and tobacco are the chief crops. The teak forests are valuable. Weaving is an industry less important than formerly; mats and baskets are manufactured, and deep-sea fishing is an

important industry. The shipbuilding business at the town of Damaun is important. Early in the 19th century a large transit trade in opium between Karachi and China was carried on at Damaun, but it ceased in 1837, when the British prohibited it after their conquest of Sind. The settlement is administered as a unit, and has a municipal chamber.

Damaun town was sacked and burnt by the Portuguese in 1531. It was subsequently rebuilt, and in 1558 was again taken by the Portuguese, who made a permanent settlement and converted the mosque into a Christian church. From that time it has remained in their hands. The territory of Damaun proper was conquered by the Portuguese in 1559; that of Nagar Havili was ceded to them by the Mahrattas in 1780 in indemnification for piracy.

DAME (through the Fr. from Lat. domina, mistress, lady, the feminine of dominus, master, lord), properly a name of respect or a title equivalent to ” lady,” now surviving in English as the legal designation of the wife or widow of a baronet or knight and prefixed to the Christian name and surname. It has also been used in modern times by

certain societies or orders, e.g. the Primrose League, as the name of a certain rank among the lady members, answering to the male rank of knight. The ordinary use of the word by itself is for an old woman. As meaning "mistress," i.e. teacher, "dame" was used of the female keepers of schools for young children, which have become obsolete since the advance of public elementary education. At Eton College boarding-houses kept by persons other than members of the teaching staff of the school were known as " Dames' Houses," though the head might not necessarily be a lady. As a term of address to ladies of all ranks, from the sovereign down, "madam," shortened to " ma'am," represents the French madame, my lady.

" Damsel," a young girl or maiden, now only used as a literary word, is taken from the Old French dameisele, formed from dame, and parallel with the popular dansele or doncele from the medieval Latin domicella or dominicella, diminutive of domina. The French damoisette and demoiselle are later formations. The English literary form " damosel " was another importation from France in the 15th century. In the early middle ages damoiseau, medieval Latin domicellus, dameicele, damoisette, domicella, were used as titles of honour for the unmarried sons and daughters of royal persons and lords {seigneurs). Later the damoiseau (in the south donzel, in Beam domengar) was specifically a young man of gentle birth who aspired to knighthood, equivalent to icuyer, esquire, or valet (q.v.). The damoiseau performed certain functions and received training in knightly accomplishments in the domestic service of his lord. Later again the name was also used of nobles who had not been knighted. In certain seigneuries in France, notably in that of Commercy, in Lorraine, damoiseau became the permanent title of the holder. In England the title, when used by the French-speaking nobility and members of the court, was only applied to the son or grandson of the king; thus in the Laws of Edward the Confessor, quoted in Du Cange (Glossarium, s.v. Domicellus), we find " Rex vero Edgarum . . . pro filio nutrivit et quia

cogitavit ipsum heredem facere, nomi- navit Ethelinge, quod nos Domicellum, id, Damisell; sed nos indiscrete de pluribus dicimus, quia Baronum filios vocamus domicellos, Angli vero nullos nisi natos regum." Froissart calls Richard II. during the lifetime of his father the Black Prince, le jeune Demoisel. The use of damoisette followed much the same development; it was first applied to the unmarried daughters of royal persons and seigneurs, then to the wife of a damoiseau, and also to the young ladies of gentle birth who performed for the wives of the seigneurs the same domestic services as the damoiseaus for their husbands. Hence the later form demoiselle became merely the title of address of a young unmarried lady, the mademoiselle of modern usage, the English "miss." At the court of France, after the 17th century, Mademoiselle, without the name of the lady, was a courtesy title given to the eldest daughter of the eldest brother of the king, who was known as Monsieur. To distinguish the daughter of Gaston d'Orleans. brother of Louis XIII., from the daughter of

Philippe d'Orleans, brother of Louis XIV., the former, Anne Marie Louise, duchesse de Montpensier, was called La Grande Mademoiselle, by which title she is known to history (see Mont- pensier, A. M. L., Duchesse de).

DAME'S VIOLET, the English name for Hesperis matronalis, a herbaceous plant belonging to the natural order Cruciferae, and closely allied to the wallflower and stock. It has an erect stout leafy stem 2 to 3 ft. high, with irregularly toothed short- stalked leaves and white or lilac flowers, § in. across, which are scented in the evening (hence the name of the genus, from the Gr. ecnrepos, evening). The slender pods are constricted be- tween the seeds. The plant is a native of Europe and temperate Asia, and is found in Britain as an escape from gardens, in meadows and plantations.

DAMGHAN, a town of Persia in the province of Semnan va Damghan, 216 m. from Teheran on the high-road thence to Khorasan, at an elevation of 3770 ft. and in 36 10' N., 54° 20' E. Pop. about 10,000. There are post and telegraph offices, and a great export trade is done in pistachios and almonds, the latter being of the kind called Kaghazi (" of paper ") with very thin shells, famous throughout the country. Damghan was an im- portant city in the middle ages, but only a ruined mosque with a number of massive columns and some fine wood carvings and two minarets of the nth century remain of that period. Near the city, a few miles south and south-west, are the remains of Hecatompylos, extending from Frat, 16 m. south of Damghan, to near Gtisheh, 20 m. west. Damghan was destroyed by the Afghans in 1723. On an eminence in the western part of the city are the ruins of a large square citadel with a small white-washed building, called Molud Khaneh (the house of birth), in which Fath Ali Shah was born (1772).

DAMIANI, PIETRO (c. 1007-1072), one of the most celebrated ecclesiastics of the nth century, was born at Ravenna, and after a youth spent in hardship and privation, gained some renown as a teacher. About 1035, however, he deserted his secular calling and entered the hermitage of Fonte Avellana, near Gubbio; and winning sound reputation through his piety and his preaching, he became the head of this establishment about 1043. A zealot for monastic and clerical reform, he introduced a more severe

discipline, including the practice of flagellation, into the house, which, under his rule, quickly attained celebrity, and became a model for other foundations. Extending the area of his activities, he entered into communication with the emperor Henry III., addressed to Pope Leo IX. in 1049 a writing denoun- cing the vices of the clergy and entitled Liber Gomorrhianus; and soon became associated with Hildebrand in the work of reform. As a trusted counsellor of a succession of popes he was made cardinal bishop of Ostia, a position which he accepted with some reluctance; and presiding over a council at Milan in 1059, he courageously asserted the authority of Rome over this province, and won a signal victory for the principles which he advocated. He rendered valuable assistance to Pope Alexander II. in his struggle with the anti-pope, Honorius II.; and having served the papacy as legate to France and to Florence, he was allowed to resign his bishopric in 1067. After a period of retire- ment at Fonte Avellana, he proceeded in 1069 as papal legate to Germany, and persuaded the emperor Henry TV. to give up his intention of divorcing his wife Bertha. During his concluding years he was not altogether in accord with the political ideas of Hildebrand. He died at Faenza on the 22nd of February 1072. Damiani was a determined foe of simony, but his fiercest wrath was directed against the married clergy. He was an extremely vigorous controversialist, and his Latin abounds in denunciatory epithets. He was specially devoted to the Virgin Mary, and wrote an Qfficium Beatae Virginis, in addition to many letters, sermons, and other writings.

His works were collected by Cardinal Cajetan, and were published in four volumes at Rome (1606-1615), and then at Paris in 1642, at Venice in 1743, and there are other editions. See A. Vogel, Peter Damiani (Jena, 1856); A. Capecelatro, Storia di S. Pier Damiani e del suo tempo (Florence, 1862); F. Neukirch, Das Leben des Peter Damiani (Gottingen, 1875) ; L. Guerrier, De Petro Damiano (Orleans, 1 881); W. von Giesebrecht, Geschichte der deutschen

(Leipzig, 1885–1890) ; and Herzog–Hauck, Realencyklopddie, Band iv. (Leipzig, 1898).

DAMIEN, FATHER, the name in religion of Joseph de Veuster (1840–1889), Belgian missionary, was born at Tremeloo, near Louvain, on the 3rd of January 1840. He was educated for a business career, but in his eighteenth year entered the Church, joining the Society of the Sacred Heart of Jesus and Mary (also known as the Picpus Congregation), and taking Damien as his name in religion. In October 1863, while he was still in minor orders, he went out as a missionary to the Pacific Islands, taking the place of his brother, who had been prevented by an illness. He reached Honolulu in March 1864, and was ordained priest in Whitsuntide of that year. Struck with the sad condition of the lepers, whom it was the practice of the Hawaian government to deport to the island of Molokai, he conceived an earnest desire to mitigate their lot, and in 1873 volunteered to take spiritual charge of the settlement at Molokai. Here he remained for the rest of his life, with occasional visits to Honolulu, until he became stricken with leprosy in 1885. Besides attending to the spiritual needs of the lepers, he managed, by the labour of his own hands and by appeals to the Hawaian government, to improve materi- ally the water-supply, the dwellings, and the victualling of the settlement. For five years he worked alone; subsequently other resident priests from time to time assisted him. He suc- cumbed to leprosy on the 1 5th of April 1 889. Some ill-considered imputations upon Father Damien by a Presbyterian minister produced a memorable tract by Robert Louis Stevenson (An Open Letter to the Rev. Dr Hyde, 1890).

See also lives by E. Clifford (1889) and Fr. Pamphile (1889).

(J. M'F.)

DAMIENS, ROBERT FRANCOIS (1715–1757), a Frenchman who attained notoriety by his attack on Louis XV. of France in 1757, was born in a village near Arras in 1715, and early enlisted in the army. After his discharge, he became a menial in the college of the Jesuits in Paris, and was dismissed from this as well as from other employments for misconduct, his conduct earning for him the name of Robert le Diable. During the disputes of Clement XI. with the parlement of Paris the mind of Damiens seems to have been excited by the ecclesiastical disorganization which followed the refusal of the clergy to grant the sacraments to the Jansenists and Convulsionnaires; and he appears to have thought that peace would be restored by the death of the king. He, however, asserted, perhaps with truth, that he only intended to frighten the king without wounding him severely. On the 5th of January 1757, as the king was entering his carriage, he rushed forward and stabbed him with a knife, inflicting only a slight wound. He made no attempt to escape, and was at once seized. He was condemned as a regicide, and sentenced to be torn in pieces by horses in the Place de Greve. Before being put to death he was barbarously tortured with red-hot pincers, and molten wax, lead, and boiling oil were poured into his wounds. After his death his house was razed to the ground, his brothers and sisters were ordered to change their names, and his father, wife, and daughter were banished from France.

See Pieces originates et procSdures du proces fait a Robert Francois Damiens (Paris, 1757).

DAMIETTA, a town of Lower Egypt, on the eastern (Damietta or Phatnitic) branch of the Nile, about 12 m. above its mouth, and 125 m. N.N.E. of Cairo by rail. Pop. (1907) 29,354. The town is built on the east bank of the river between it and Lake Menzala. Though in general ill-built and partly ruinous, the town possesses some fine mosques, with lofty minarets, public baths and busy bazaars. Along the river-front are many substantial houses furnished

with terraces, and with steps leading to the water. Their wooden lattices of saw-work are very graceful. After Cairo and Alexandria, Damietta was for cen- turies the largest town in Egypt, but the silting up of the entrance to the harbour, the rise of Port Said, and the remarkable develop- ment of Alexandria have robbed Damietta of its value as a port. It has still, however, a coasting trade with Syria and the Levant. Ships over 6 ft. draught cannot enter the river, but must anchor

in the offing. Lake Menzala yields large supplies of fish, which are dried and salted, and these, with rice, furnish the chief articles of trade.

Damietta is a Levantine corruption of the Coptic name Tamiati, Arabic Dimyat. The original town was 4 m. nearer the sea than the modern city, and first rose into importance on the decay of Pelusium. When it passed into the hands of the Saracens it became a place of great wealth and commerce, and, as the eastern bulwark of Egypt, was frequently attacked by the crusaders. The most remarkable of these sieges lasted eighteen months, from June 1218 to November 1219, and ended in the capture of the town, which was, however, held but for a brief period. In June 1249 Louis IX. of France occupied Damietta without opposition, but being defeated near Mansura in the February following, and compelled (6th April) to surrender himself prisoner, Damietta was restored to the Moslems as part of the ransom exacted. To prevent further attacks from the sea the Mameluke sultan Bibars blocked up the Phatnitic mouth of the Nile (about 1260), razed old Damietta to the ground, and transferred the inhabitants to the site of the modern town. It continued to be a place of commercial importance for a con- siderable period, until in fact Port Said gave the eastern part of the Delta a better port. Damietta gives its name to dimity, a kind of striped cloth, for which the place was at one time famous. Cotton and silk goods are still manufactured here.

DAMIRI, the common name of Kamal ud-Din Muhammad ibn Musa ud-Damiri (1344-1405), Arabian writer on canon

law and natural history, belonged to one of the two towns called Damlra near Damietta and spent his life in Egypt. Of the Shafi'ite school of law, he became professor of tradition in the Rukniyya at Cairo, and also at the mosque el-Azhar; in connexion with this work he wrote a commentary on the Minhaj ut-Talibin of Nawawi (q.v.). He is, however, better known in the history of literature for his Life of Animals (Hay at ul-Hayawan), which treats in alphabetic order of 931 animals mentioned in the Koran, the traditions and the poetical and proverbial literature of the Arabs. The work is a compilation from over 500 prose writers and nearly 200 poets. The correct spelling of the names of the animals is given with an explanation of their meanings. The use of the animals in medicine, their lawfulness or unlawfulness as food, their position in folk-lore are the main subjects treated, while occasionally long irrelevant sections on political history are introduced.

The work exists in three forms. The fullest has been published several times in Egypt; a mediate and a short recension exist in manuscript. Several editions have been made at various times of extracts, among them the poetical one by SuyQti (q.v.), which was translated into Latin by A. Ecchelensis (Paris, 1667). Bochartus in his Hierozoicon (1663) used Damlri's work. There is a translation of the whole into English by Lieutenant-Colonel Jayakar (Bombay, 1906-1908). (G. W. T.)

DAMIRON, JEAN PHILIBERT (1794-1862), French philosopher, was born at Belleville. At nineteen he entered the normal school, where he studied under Burnouf, Villemain, and Cousin. After teaching for several years in provincial towns, he came to Paris, where he lectured on philosophy in various institutions, and finally became professor in the normal school, and titular professor at the Sorbonne. In 1824 he took part with P. F. Dubois and Th. S. Jouffroy in the establishment of the Globe; and he was also a member of the committee of the society which took for its motto Aide-toi, le del t 'aider a. In 1833 he was appointed chevalier of the

Legion of Honour, and in 1836 member of the Academy of Moral Sciences. Damiron died at Paris on the nth of January 1862.

The chief works of Damiron, of which the best are his accounts of French philosophers, are the following: — An edition of the Nouveaux melanges philosophiques de Jouffroy (1842), with a notice of the author, in which Damiron softened and omitted several expressions used by Jouffroy, which were opposed to the system of education adopted by the Sorbonne, an article which gave rise to a bitter controversy, and to a book by Pierre Leroux, De la mutilation des manuscrits de M. Jouffroy (1843); Essai sur I'histoire de la philosophie en France au XIX' siecle (1828, 3rd ed.

1834); Essai sur I'histoire de la philosophie en France au XVII. siecle (1846); Memoir es a servir pour I'histoire de la philosophie en France au X VIII. siecle (1858-1864) ; Cours de la philosophie; De la Providence (1849, 1850).

See A. Franck, Moralistes et philosophes (1872).

DAMJANICH, JANOS (1804-1849), Hungarian soldier, was born at Stasa in the Banat. He entered the army as an officer in the 61st regiment of foot, and on the outbreak of the Hun- garian war of independence was promoted to be a major in the third Honved regiment at Szeged. Although an orthodox Serb, he was from the first a devoted adherent of the Magyar liberals. He won his colonelcy by his ability and valour at the battles of Alibunar and Lagerdorf in 1848. At the beginning of 1849 he was appointed commander of the 3rd army corps in the middle Theiss, and quickly gained the reputation of being the bravest man in the Magyar army, winning engagement after engagement by sheer dash and daring. At the beginning of March 1849 he annihilated a brigade at Szolnok, perhaps his greatest exploit. He was elected deputy for

Szolnok to the Hungarian diet, but declined the honour. Damjanich played a leading part in the general advance upon the Hungarian capital under Gorgei. He was present at the engagements of Hort and Hatvan, converted the doubtful fight of Tapio-Bicsk into a victory, and fought with irresistible elan at the bloody battle of Isaszeg. At the ensuing review at Godollo, Kossuth expressed the sentiments of the whole nation when he doffed his hat as Damjanich's battalions passed by. Always a fiery democrat, Damjanich uncompromis- ingly supported the extremist views of Kossuth, and was appointed commander of one of the three divisions which, under Gorgei, entered Vacz in April 1849. His fame reached its culmination when, on the 19th of April, he won the battle of Nagysarlo, which led to the relief of the hardly-pressed fortress of Komarom. At this juncture Damjanich broke his leg, an accident which prevented him from taking part in field opera- tions at the most critical period of the war, when the Magyars had to abandon the capital for the second time. He recovered sufficiently, however, to accept the post of commandant of the fortress of Arad. After the Vilagos catastrophe, Damjanich, on being summoned to surrender, declared he would give up the fortress to a single company of Cossacks, but would defend it to the last drop of his blood against the whole Austrian army. He accordingly surrendered to the Russian general Demitrius Buturlin (1790-1849), by whom he was handed over to the Austrians, who shot him in the market-place of Arad a few days later.

See Odon Hamvay, Life of Jdnos Damjanich (Hung.), (Budapest, 1904). (R. N. B.)

DAMMAR, or Dammer (Hind. damar = resin, pitch), a resin, or rather series of resins, obtained from various coniferous trees of the genus Dammara (Agathis). East Indian dammar or cat's eye resin is the produce of Dammara orientalis, which grows in Java, Sumatra, Borneo and other eastern islands and some- times attains a height of 80-100 ft. It oozes in large quantities from the tree in a soft viscous state, with a highly aromatic odour, which, however,

it loses as it hardens by exposure. The resin is much esteemed in oriental communities for incense-burning. Dammar is imported into England by way of Singa- pore; and as found in British markets it is a hard, transparent, brittle, straw-coloured resin, destitute of odour. It is readily soluble in ether, benzol and chloroform, and with oil of turpentine it forms a fine transparent varnish which dries clear, smooth and hard. The allied kauri gum, or dammar of New Zealand (Australian dammar), is produced by Dammara australis, or kauri-pine, the wood of which is used for wood paving. Much of the New Zealand resin is found fossil in circumstances analogous to the conditions under which the fossil copal of Zanzibar is obtained. Dammar is besides a generic Indian name for various other resins, which, however, are little known in western com- merce. Of these the principal are black dammar (the Hindustani kala-damar) , yielded by Canarium strictum, and white dammar, Indian copal, or piney varnish (sufed-damar) , the produce of Valeria indica. Sal dammar (damar) is obtained from Shorea

robusta; Hopea micrantha is the source of rock dammar (the Malay dammer-batu) ; and other species yield resins which are similarly named and differ little in physical properties.

DAMMARTIN, a small town of France, in the department of Seine et Marne, 22 m. N.E. of Paris. It is well situated on a hill forming part of the plateau of la Goele, and is known as Dammartin-en-Goele to distinguish it from Dammartin-sous- Tigeaux, a small commune in the same department. Dammartin is historically important as the seat of a countship of which the holders played a considerable part in French history. The earliest recorded count of Dammartin was a certain Hugh, who made himself master of the town in the 10th century; but his dynasty was replaced by another family in the nth century. Reynald I. (Renaud), count of Dammartin (d. 1227), who was one of the coalition crushed by King Philip Augustus at the battle of Bouvines (1214), left two co-heiresses, of whom the elder, Maud (Matilda or Mahaut), married Philip Hurepel, son of

Philip Augustus, and the second, Alix, married Jean de Trie, in whose line the countship was reunited after the death of Philip Hurepel's son Alberic. The countship passed, through heiresses, to the houses of Fayel and Nanteuil, and in the 15th century was acquired by Antoine de Chabannes (d. 1488), one of the favourites of King Charles VII., by his marriage with Marguerite, heiress of Reynald V. of Nanteuil-Aci and Marie of Dammartin. This Antoine de Chabannes, count of Dammartin in right of his wife, fought under the standard of Joan of Arc, became a leader of the Ecorcheurs, took part in the war of the public weal against Louis XL, and then fought for him against the Burgundians. The collegiate church at Dammartin was founded by him in 1480, and his tomb and effigy are in the chancel. His son, Jean de Chabannes, left three heiresses, of whom the second left a daughter who brought the countship to Philippe de Boulainvilliers, by whose heirs it was sold in 1554 to' the dukes of Montmorency. In 1632 the countship was confiscated by Louis XIII. and bestowed on the princes of Conde.

DAMME, a decayed city of Belgium, 5 m. N.E. of Bruges, once among the most important commercial ports of Europe. It is situated on the canal from Bruges to Sluys (Ecluse), but in the middle ages a navigable channel or river called the Zwyn gave ships access to it from the North Sea. The great naval battle of Sluys, in which Edward III. destroyed the French fleet and secured the command of the channel, was fought in the year 1340 at the mouth of the Zwyn. About 1395 this channel began to show signs of silting up, and during the next hundred years the process proved rapid. In 1490 a treaty was signed at Damme between the people of Bruges and the archduke Maximilian, and very soon after this event the channel became completely closed up, and the foreign merchant gilds or " nations" left the place for Antwerp. This signified the death of the port and was indirectly fatal to Bruges as well. The marriage of Charles the Bold and Margaret of York, sister of Edward IV., was celebrated at Damme on the 2nd of July 1468. It will

give some idea of the importance of the town to mention that it had its own maritime law, known as Droit maritime 'de Damme. The new ship canal from Zeebrugge will not revive the ancient port, as it follows a different route, leaving Damme and Ecluse quite untouched. Damme, although long neglected, preserves some remains of its former prosperity, thanks to its remoteness from the area of international strife in the Low Countries. The tower of Notre Dame, dating from n 80, is a landmark across the dunes, and the church behind it, although a shell, merits in- spection. Out of a portion of the ancient markets a hotel-de- ville of modest dimensions has been constructed, and in the hospital of St Jean are a few pictures. Camille Lemonnier has given in one of his Causeries a striking picture of this faded scene of former greatness, now a solitude in which the few residents seem spectres rather than living figures.

DAMOCLES, one of the courtiers of the elder Dionysius of Syracuse. When he spoke in extravagant terms of the happiness of his sovereign, Dionysius is said to have invited him to a sumptuous banquet, at which he found himself seated under

a naked sword suspended by a single hair (Cicero, Tusc. v. 21; Horace, Odes, iii. 1,17; Persius iii. 40).

DAMOH, a town and district of British India, in the Jubbul- pore division of the Central Provinces. The town has a railway station, 48 m. E. of Saugor. Pop. (1901) 13,355. It has a con- siderable cattle-market, and a number of small industries, such as weaving, dyeing and pottery-making.

The District or Damoh has an area of 2816 sq. m. Except on the south and east, where the offshoots from the surrounding hills and patches of jungle break up the country, the district consists of open

plains of varying degrees of fertility, interspersed with low ranges and isolated heights. The richest tracts lie in the centre. The gentle declivity of the surface and the porous character of the prevailing sandstone formation render the drainage excellent. All the streams flow from south to north. The Sunar and the Bairma, the two principal rivers, traverse the entire length of the district. Little use has been made of any of the rivers for irrigation, though in many places they offer great facilities for the purpose. Damoh was first formed into a separate district in 1861. In 1901 the population was 285,326, showing a decrease of 1 2 % in one decade due to famine. Damoh suffered severely from the famine of 1896–1897. Fortunately the famine of 1900 was little felt. A branch of the Indian Midland railway was opened throughout from Saugor to Katni in January 1899.

DAMON, of Syracuse, a Pythagorean, celebrated for his disinterested affection for Phintias (not, as commonly given, Pythias), a member of the same sect. Condemned to death by Dionysius the Elder (or Younger) of Syracuse, Phintias begged to be set at liberty for a short time that he might arrange his affairs. Damon pledged his life for the return of his friend; and Phintias faithfully returned before the appointed day of execution. The tyrant, to express his admiration of their fidelity, released both the friends and begged to be admitted to their friendship (Diod. Sic. x. 4; Cicero, De Off. iii. 10). Hyginus {Fab. 257, who is followed by Schiller in his ballad, Die Biirgschaft) tells a similar story, in which the two friends are named Moerus and Selinuntius.

DAMOPHON, a Greek sculptor of Messene, who executed many statues for the people of Messene, Megalopolis, Aegium and other cities of Peloponnesus. Considerable fragments, including three colossal heads from a group by him representing Demeter, Persephone, Artemis and the giant Anytus, have been discovered on the site of Lycosura in Arcadia, where was a temple of the goddess called ” The Mistress.” They are preserved in part in the museum at Athens

and partly on the spot. Hence there has arisen a great controversy as to the date of the artist, who has been assigned to various periods, from the 4th century B.C. to the 2nd a.d. A good account of the whole matter will be found in Frazer's Pausanias, iv. 372-379. Frazer wisely in- clines to an early date; it is in fact difficult to find any period, when the cities mentioned were in a position to found temples, later than the time of Alexander.

DAMP, a common Teutonic word, meaning vapour or mist (cf. Ger. Dampf, steam), and hence moisture. In its primitive sense the word persists in the vocabulary of coal-miners. Their " firedamp " (formerly fulminating damp) is marsh gas, which, when mixed with air and exploded, produced " choke damp," "after damp," or "suffocating damp" (carbon dioxide). " Black damp " consists of accumulations of irrespirable gases, mostly nitrogen, which cause the lights to burn dimly, and the term " white damp " is sometimes applied to carbon mon- oxide. As a verb, the word means to stifle or check ; hence damped vibrations or oscillations are those which have been reduced or stopped, instead of being allowed to die out natur- ally; the " dampers " of the piano are small pieces of felt- covered wood which fall upon the strings and stop their vibra- tions as the keys are allowed to rise; and the " damper " of a chimney or flue, by restricting the draught, lessens the rate of combustion.

DAMPIER, WILLIAM (1652-1715), English buccaneer, navi- gator and hydrographer, was born at East Coker, Somersetshire,

in 1 65 2 (baptized 8th of June) . Having early become an orphan, he was placed with the master of a ship at Weymouth, in which he made a voyage to Newfoundland. On his return he sailed to Bantam in the East Indies. He served in 1673 in the Dutch War under Sir Edward Sprague, and was present at two engage- ments (28th of May; 4th of June); but then fell sick and was put ashore. In 1674 he became an under-manager of a Jamaica estate, but continued only a short time in this situation. He afterwards

engaged in the coasting trade, and thus acquired an accurate knowledge of all the ports and bays of the island. He made two voyages to the Bay of Campeachy (1675–1676), and remained for some time with the logwood-cutters, varying this occupation with buccaneering. In 1678 he returned to England, again visiting Jamaica in 1679 and joining a party of buccaneers, with whom he crossed the Isthmus of Darien, spent the year 1680 on the Peruvian coast, and sacking, plundering and burn- ing, made his way down to Juan Fernandez Island. After serving with another privateering expedition in the Spanish Main, he went to Virginia and engaged with a captain named Cook for a privateering voyage against the Spaniards in the South Seas. They sailed in August 1683, touched at the Guinea coast, and then proceeded round Cape Horn into the Pacific. Having touched at Juan Fernandez, they made the coast of South America, cruising along Chile and Peru. They took some prizes, and with these they proceeded to the Galapagos Islands and to Mexico, which last they fell in with near Cape Blanco. While they lay here Captain Cook died, and the command devolved on Captain Davis, who, with several other pirate vessels, English and French, raided the west American shores for the next year, attacking Guayaquil, Puebla Nova, &c. At last Dampier, leaving Davis, went on board Swan's ship, and proceeded with him along the northern parts of Mexico as far as southern California. Swan then proposed, as the expedition met with " bad success " on the Mexican coast, to run across the Pacific and return by the East Indies. They started from Cape Corrientes on the 31st of March 1686, and reached Guam in the Ladrones on the 20th of May; the men, having almost come to an end of their rations, had decided to kill and eat their leaders next, beginning with the " lusty and fleshy " Swan. After six months' drunkenness and debauchery in the Philippines, the majority of the crew, including Dampier, left Swan and thirty- six others behind in Mindanao, cruised (1687–1688) from Manila to Pulo Condore, from the latter to China, and from China to the Spice Islands and New Holland (the Australian mainland). In March

1688 they were off Sumatra, and in May off the Nicobars, where Dampier was marooned (at his own request, as he declares, for the purpose of establishing a trade in ambergris) with two other Englishmen, a Portuguese and some Malays. He and his companions contrived to navigate a canoe to Achin in Sumatra; but the fatigues and distress of the voyage proved fatal to several and nearly carried off Dampier himself. After making several voyages to different places of the East Indies (Tongking, Madras, &c), he acted for some time, and apparently somewhat unwillingly, as gunner to the English fort of Benkulen. Thence he ultimately contrived to return to England in 1691.

In 1699 he was sent out by the English admiralty in command of the " Roebuck," especially designed for discovery in and around Australia. He sailed from the Downs, the 14th of January, with twenty months' provisions, touched at the Canaries, Cape Verdes and Bahia, and ran from Brazil round the Cape of Good Hope direct to Australia, whose west coast he reached on the 26th of July, in about 26° S. lat. Anchoring in Shark's Bay, he began a careful exploration of the neighbouring shore-lands, but found no good harbour or estuary, no fresh water or provisions. In September, accordingly, he left Australia, recruited and refitted at Timor, and thence made for New Guinea, where he arrived on the 3rd of December. By sailing along to its easternmost extremity, he discovered that it was terminated by an island, which he named New Britain (now Neu Pommern), whose north, south and east coasts he surveyed. That St George's Bay was really St George's Channel, dividing the island into two, was not perceived by Dampier; it was the discovery

of his successor, Philip Carteret. Nor did Dampier visit the west coast of New Britain or realize its small extent on that side. He was prevented from prosecuting his discoveries by the dis- content of

his men and the state of his ship. In May 1700 he was again at Timor, and thence he proceeded homeward by Batavia (4th July–iyth October) and the Cape of Good Hope. In February 1701 he arrived off Ascension Island, when the vessel foundered (2ist~24th February), the crew reaching land and staying in the island till the 3rd of April, when they were conveyed to England by some East Indiamen and warships bound for home. In 1 703–1 707 Dampier commanded two government privateers on an expedition to the South Seas with grievous unsuccess; better fortune attended him on his last voyage, as pilot to Woodes Rogers in the circumnavigation of 1708–17 n. On the former venture Alexander Selkirk, the master of one of the vessels, was marooned at Juan Fernandez; on the latter Selkirk was rescued and a profit of nearly £200,000 was made. But four years before the prize-money was paid Dampier died (March 1715) in St Stephen's parish, Coleman Street, London. Dampier's accounts of his voyages are famous. He had a genius for observation, especially of the scientific phenomena affecting a seaman's life; his style is usually admirable — easy, clear and manly. His knowledge of natural history, though not scientific, appears surprisingly accurate and trustworthy.

See Dampier's New Voyage Round the World (1697) ; his Voyages and Descriptions (1699), a work supplementary to the New Voyage; his Voyage to New Holland in . . . 1699 (1703, 1709); also Fun- nell's Narrative of the Voyage of 1703–1707; Dampier's Vindication of his Voyage (1707) ; Welbe's Answer to Captain Dampier's Vindication; Woodes Rogers, Cruising Voyage Round the World (17 12). (C. R. B.)

DAN. (from a Hebrew word meaning "judge"), a tribe of Israel, named after a son of Jacob and Bilhah, the maid of Rachel. The meaning of the name (referred to in Gen. xxx. 5 seq., xlix. 16) connects Dan with Dinah (" judgment "), the daughter of Leah, whose story in Gen. xxxiv. (cf. xlix. 5 seq.) seems to point to an Israelite occupation of Shechem, a treacherous massacre of its Canaanite inhabitants by Simeon and Levi, and the subsequent scattering of the latter. But, historically, the occupation of

Shechem, whether by conquest (Gen. xlviii. 22) or purchase (xxxiii. 19), is as obscure as the conquest of central Palestine itself (see Joshua), and the true relation between Dan and Dinah is uncertain. The earliest seats of Dan lay at Zorah, Eshtaol and Kirjath-jearim, west of Jerusalem, whence they were forced to seek a new home, and a valuable narrative detailing some of the events of the move is preserved in the story of the sanctuary of the Ephraimite Micah (q.v.). Laish (Leshem) was taken with the sword and re-named Dan (see below). Here a sanctuary was founded under the guardianship of Jonathan, the grandson of Moses, which survived until the " captivity of the land " (by Tiglath-Pileser IV. in 733-732), or, according to another notice, until the fall of Shiloh (Judg. xviii. 30 seq.). Dan formed the northern limit of the land, 1 and with Abel (beth Maacah) was an old place renowned for Israelite lore (2 Sam. xx. 18; on the text see the commentaries). Little can be made of Dan's history. The reference to it as a seafaring folk (Judg. v. 17) is difficult, and it is uncertain whether its character as represented in Gen. xlix. 17, Deut. xxxiii. 22, refers to its earlier or later seat. The post-exilic accounts of its southern border would make it part of Judah, and both of them are in tradition the greatest of the tribes in the wanderings in the wilderness. Dan was subsequently either regarded as the embodiment of wickedness or entirely ignored; late speculation that the Antichrist should spring from it appears to be based upon an interpretation of Gen. xlix. 17 (see further R. H. Charles, Testaments of the Twelve Patriarchs, pp. 128 seq.).

A brief record of the Danite migration is found in some old detached fragments which K. Budde (Richter und Samuel) ingeniously arranges thus: — Judg. i. 34 (Amorite pressure); Josh. xix. 47a (see the Septuagint), 476; Judg. i. 35. The position

1 On the late phrase " Dan to Beersheba " as the extreme points of religious life in Israel, see H. W. Hsgg, Expositor, viii. 411-421 (1898) ; and for a complete discussion of the tribe, his art. " Dan "

in Encyc. Bib.

of Judg. xvii. seq. (after the stories of Samson) may imply that the Philistines, not the Amorites, caused the migration (cf. 1 Sam. vii. 14, where the two ethnical terms interchange). The Mosaic priesthood and the reference to Shiloh suggest that the story of Eli may have belonged to this cycle of narratives; and the spoliation of the unknown sanctuary of the Ephraimite Micah and the character of the fierce Puritan tribesmen connect Dan with the problems of the tribes of Simeon and Levi. Dan's northern home lay near Beth-rehob, which appears to have been Aramean in David's time (2 Sam. x. 6), and it is possible that the migration has been antedated (cf. similarly the case of Jair, Num. xxxii. 41, Judg. x. 3-5). The Tyrian artificer sent to Solomon by Hiram was partly of Danite descent (2 Chron. ii. 13 seq.; but of Naphtali, so 1 Kings vii. 14); and of the two workers in brass who took part in the building of the tabernacle in the desert, one was Danite (Oholiab, Ex. xxxi. 6), while the other appears to have been Calebite (Bezalel, ib., v. 2; 1 Chron. ii. 20). The Kenites, too, have been regarded as a race of metal-workers (see Cain, Kenites), and there is evidence which would show that Danites, Calebites and Kenites were once closely associated in tradition.

See S. A. Cook, Critical Notes, Index, s.v.: E Meyer, Israeliten, pp. 525 seq. (S. A. C)

DAN, a town of ancient Israel, near the head-waters of the Jordan, inhabited before its conquest by the Danites by a peace- ful commercial population who called their city Laish or Leshem (Josh. xix. 47, Judg. xviii.). It appears to have been even at this early period a sacred city, the shrine of Micah being removed hither, and it was chosen by Jeroboam as the site of one of his calf-shrines. It makes the north limit of Palestine in the pro- verbial expression " from Dan to Beersheba." The town was plundered by Benhadad of Damascus, and appears from that time to have gradually declined. Its site is sought in the mound called Tell-el-Kadi, "the hill

of the judge" (Dan = " judge" in Hebrew), though weighty authorities incline to place it 4 m. east of this, at Banias, the old Caesarea Philippi. (See above.)

DANA, CHARLES ANDERSON (1819–1897), American journalist, was born in Hinsdale, New Hampshire, on the 8th of August 1819. At the age of twelve he became a clerk in his uncle's general store at Buffalo, which failed in 1837. In 1839 he entered Harvard, but the impairment of his eyesight in 1841 forced him to leave college, and caused him to abandon his intention of entering the ministry and of studying in Germany. From September 1841 until March 1846 he lived at Brook Farm, where he was made one of the trustees of the farm, was head waiter when the farm became a Fourierite phalanx, and was in charge of the phalanstery's finances when its buildings were burned in 1846. He had previously written for (and managed) the Harbinger, the Brook Farm organ, and had written as early as 1844 for the Boston Chronotype. In 1847 he joined the staff of the New York Tribune, and in 1848 he wrote from Europe letters to it and other papers on the revolutionary movements of that year. Returning to the Tribune in 1849, he became its managing-editor, and in this capacity actively promoted the anti-slavery cause, seeming to shape the paper's policy at a time when Greeley was undecided and vacillating. In 1862 his resignation was asked for by the board of managers of the Tribune, apparently because of wide temperamental differences between him and Greeley. Secretary of War Stanton immedi- ately made him a special investigating agent of the war "department; in this capacity Dana discovered frauds of quartermasters and contractors, and as the " eyes of the administration," as Lincoln called him, he spent much time at the front, and sent to Stanton frequent reports concerning the capacity and methods of various generals in the field; he went through the Vicksburg campaign and was at Chickamauga and Chattanooga, and urged the placing of General Grant in supreme command of all the armies in the field. Dana was second assistant-secretary of war in

1864–1865, and in 1865–1866 conducted the newly-established and unsuccessful Chicago Republican. He became the editor and part-owner of the New York Sun in 1868, and remained in control of it until his death at Glen Cove, Long Island, New York,

on the 17th of October 1897. Under Dana's control the Sun opposed the impeachment of President Johnson; it supported Grant for the presidency in 1868; it was a sharp critic of Grant as president; and in 1872 took part in the Liberal Republican revolt and urged Greeley's nomination. It favoured Tilden, the Democratic candidate for the presidency, in 1876, opposed the Electoral Commission and continually referred to Hayes as the " fraud president." In 1884 it supported Benjamin F. Butler, the candidate of Greenback-Labor and Anti-Monopolist parties, for the presidency, and opposed Blaine (Republican) and even more bitterly Cleveland (Democrat); it supported Cleveland and opposed Harrison in 1888, although it had bitterly criticized Cleveland's first administration, and was to criticize nearly every detail of his second, with the exception of Federal interference in the Pullman strike of 1894; and in 1896, on the free-silver issue, it opposed Bryan, the Democratic candidate for the presidency. Dana's literary style came to be the style of the Sun — simple, strong, clear, " boiled down." The Art of Newspaper Making, containing three lectures which he wrote on journalism, was published in 1900. With George Ripley he edited The New American Cyclopaedia (15 vols., 1857–1863), reissued as the American Cyclopaedia in 1873–1876. He had excellent taste in the fine arts and edited an anthology, The Household Book of Poetry (1857). He was a very good linguist, published several versions from the German, and read the Romance and Scandinavian languages; he was an art con- noisseur and left a remarkable collection of Chinese porcelain. Dana's Reminiscences of the Civil War was published in 1898, as was his Eastern

Journeys, Notes of Travel. He also edited a campaign Life of U. S. Grant, published over his name and that of General James H. Wilson in 1868.

See James Wilson, The Life of Charles A . Dana (New York, 1907).

DANA, FRANCIS (1743–1811), American jurist, was born in Charlestown, Massachusetts, on the 13th of June 1743. He was the son of Richard Dana (1699–1772), a leader of the Massa- chusetts provincial bar, and a vigorous advocate of colonial rights in the pre-revolutionary period. Francis Dana graduated at Harvard in 1762, was admitted to the bar in 1767, and, being an opponent of the British colonial policy, became a leader of the Sons of Liberty, and in 1774 was a member of the first pro- vincial congress of Massachusetts. During a two years' visit to England he sought earnestly to gain friends to his colony's cause, but returned to Boston in April 1776 convinced that a friendly settlement of the dispute was impossible. He was a member of the Massachusetts executive council from 1776 to 1780, and a delegate to the Continental Congress from 1776 to 1778. As a member of the latter body he became chairman in January 1778 of the committee appointed to visit Washington at Valley Forge, and confer with him concerning the reorganization of the army. This committee spent about three months in camp, and assisted Washington in preparing the plan of reorganization which Con- gress in the main adopted. In this year he was also a member of a committee to consider Lord North's offer of conciliation, which he vigorously opposed. In the autumn of 1779 he was appointed secretary to John Adams, who had been selected as minister plenipotentiary to negotiate treaties of peace and commerce with Great Britain, and in December 1780 he was appointed diplomatic representative to the Russian government. He remained at St Petersburg from 1781 to 1783, but was never formally received by the empress Catherine. In February 1784 he was again chosen a delegate to Congress, and in January 1785 he became a justice of the Massachusetts supreme court. He was chief justice of this court from 1791 to 1806, and

presided with ability and rare distinction. He was an earnest advocate of the adoption of the Federal constitution, was a member of the Massachusetts convention which ratified that instrument, and was one of the most influential advisers of the leaders of the Federalist party. His tastes were scholarly, and he was one of the founders of the American Academy of Arts and Sciences. He died at Cambridge, Massachusetts, on the 25th of April 181 1.

His son, Richard Henry Dana" (1787–1879), was born in Cambridge, Massachusetts, on the 15th of November 1787. He

was educated at Harvard in the class of 1808. Subsequently he studied law and in 181 1 was admitted to practice. But all other interests were early subordinated to his love of literature, to which the greater part of his long life was devoted. He became in 1 8 14 a member of a literary society in Cambridge, known as the Anthology Club. This club began the publication of a monthly magazine, The Monthly Anthology, which gave way in 1815 to The North American Review. In the editorial control of this periodical he was associated with Jared Sparks and Edward T. Channing (1790–1856) until 1821, contributing essays and criticisms which attracted wide attention. In 1821–1822 he edited in New York a short-lived literary magazine, The Idle Man. He published his first volume of Poems in 1827, and in 1833 appeared his Poems and Prose Writings, republished in 1850 in two volumes, in which were included practically all of his poems and of his prose contributions to periodical literature. Although the bulk of his published writings was not large, his influence on American literature during the first half of the 19th century was surpassed by that of few of his contemporaries. Richard Henry Dana (181 5–1882), son of the last-mentioned, was born in Cambridge, Massachusetts, on the 1st of August 1815. He entered Harvard in the class of 1835, but at the beginning of his junior year an illness affecting his sight necessitated a suspen-sion of his college work, and in August 1834 he shipped before the mast for California, returning in

September 1836. The rough experience of this voyage did more than endow him with renewed health; it changed him from a dreamy, sensitive boy, hereditarily disinclined to any sort of active career, into a self- reliant, energetic man, with broad interests and keen sympathies. He re-entered Harvard in December 1836 and graduated in June 1837. He was a student at the Harvard law school from 1837 to 1840, and from January 1839 to February 1840 he was also an instructor in elocution in the college. In 1840 the notes of his sea-trip were published under the title Two Years Before the Mast. The book attained an almost unprecedented popularity both in America and in Europe, where it was translated into several languages ; and it came to be considered a classic. Immediately after the appearance of this book Dana began the practice of law, which brought him a large number of maritime cases. In 1 84 1 he published The Seaman's Friend, republished in England as The Seaman's Manual, which was long the highest authority on the legal rights and duties of seamen. After gaining recognition as one of the most prominent members of the Suffolk bar, he became associated in 1848 with the Free Soil movement, and took a prominent part in the Buffalo convention of that year. This step, which caused him to be ostracized for a time from the Boston circles in which he had been reared, brought him the cases of the fugitive slaves, Shadrach, Sims and Burns, and of the rescuers of Shadrach. On the night following the surrender of Burns (May 1854) Dana was brutally assaulted on the Boston streets. In 1853 he took a prominent part in the state constitu- tional convention. He allied himself with the Republican party on its organization, but his inborn dislike for political man' ceuvring prevented his ever becoming prominent in its councils. In 1857 he became a regular attendant at the meetings of the famous Boston Saturday Club, to the members of which he dedicated his account of a vacation trip, To Cuba and Back (1857). He returned to America from a trip round the world in time to participate in the presidential campaign of i860, and after Lincoln's inauguration he was appointed United States district

attorney for Massachusetts. In this office in 1863 he won before the Supreme Court of the United States the famous prize case of the "Amy Warwick," on the decision in which depended the right of the government to blockade the Con- federate ports, without giving the Confederate States an inter- national status as belligerents. He brought out in 1865 an edition of Wheaton's International Law, his notes constituting a most learned and valuable authority on international law and its bearings on American history and diplomacy; but immediately after its publication Dana was charged by the editor of two earlier editions, William Beach Lawrence, with infringing his copyright, and was involved in litigation which was continued

for thirteen years. In such minor matters as arrangement of notes and verification of citations the court found against Dana, but in the main Dana's notes were vastly different from Lawrence's. In 1865 Dana declined an appointment as a United States district judge. During the Reconstruction period he favoured the congressional plan rather than that of President Johnson, and on this account resigned the district-attorneyship. In 1867-1868 he was a member of the Massachusetts House of Representatives, and in 1867 was retained with William M. Evarts to prosecute Jefferson Davis, whose admission to bail he counselled. In 1877 he was one of the counsel for the United States before the commission which in accordance with the treaty of Washington met at Halifax, N.S., to arbitrate the fisheries question between the United States and Great Britain. In 1878 he gave up his law practice and devoted the rest of his life to study and travel. He died in Rome, Italy, on the oth of January 1882.

See Charles Francis Adams, Richard Henry Dana: a Biography (2 vols., Boston, Mass., 1891).

DANA, JAMES DWIGHT (1813-1895), American geologist,

mineralogist and zoologist, was born in Utica, New York, on the 1 2 th of February 1 8 1 3 . He early displayed a taste for science, which had been fostered by Fay Edgerton, a teacher in theUtica high school, and in 1830 he entered Yale College, in order to study under Benjamin Silliman the elder. Graduating in 1833, for the next two years he was teacher of mathematics to midship- men in the navy, and sailed to the Mediterranean while engaged in his duties. In 1836-1837 he was assistant to Professor Silliman in the chemical laboratory at Yale, and then, for four years, acted as mineralogist and geologist of a United States exploring ex- pedition, commanded by Captain Charles Wilkes, in the Pacific ocean (see Wilkes, Charles). His labours in preparing the reports of his explorations occupied parts of thirteen years after his return to America in 1842. In 1844 he again became a resi- dent of New Haven, married the daughter of Professor Silliman, and in 1850, on the resignation of the latter, was appointed Silliman Professor of Natural History and Geology in Yale College, a position which he held till 1892. In 1846 he became joint editor and during the later years of his life he was chief editor of the American Journal of Science and Arts (founded in 1818 by Benjamin Silliman), to which he was a constant contributor, principally of articles on geology and mineralogy. A bibliographical list of his writings shows 214 titles of books and papers, beginning in 1835 with a paper on the conditions of Vesuvius in 1834, an d ending with the fourth revised edition (finished in February 1895) of his Manual of Geology. His reports on Zoophytes, on the Geology of the Pacific Area, and on Crustacea, summarizing his work on the Wilkes expedition, appeared in 1846, 1849 and 18 S 2- i8S4, in quarto volumes, with copiously illustrated atlases; but as these were issued in small numbers, his reputation more largely rests upon his System of Mineralogy (1837 and many later editions in 1892); Manual of Geology (1862; ed. 4, 1895); Manual of Mineralogy (1848), afterwards entitled Manual of Mineralogy and Lithology (ed. 4, 1887); and Corals and Coral Islands (1872; ed. 2, 1890). In 1887 Dana revisited

the Hawaiian Islands, and the results of his further investigations were published in a quarto volume in 1890, entitled Characteristics of Volcanoes. By the Royal Society of London he was awarded the Copley medal in 1877; and by the Geological Society the Wollaston medal in 1874. His powers of work were extraordinary, and in his 82nd year he was occupied in preparing a new edition of his Manual of Geology, the 4th edition being issued in 1895. He died on the 14th of April 1895.

His son Edward Salisbury Dana, born at New Haven on the 16th of November 1849, is author of A Textbook of Mineralogy (1877; new ed. 1898) and a Text Book of Elementary Mechanics (1881). In 1879–80 he was professor of natural philosophy and then became professor of physics at Yale.

See Life of J. D. Dana, by Daniel C. Gilman (1899).

OANAE, in Greek legend, daughter of Acrisius, king of Argos. Her father, having been warned by an oracle that she would bear a son by whom he would be slain, confined Danae in a brazen

tower. But Zeus descended to her in a shower of gold, and she gave birth to Perseus, whereupon Acrisius placed her and her infant in a wooden box and threw them into the sea. They were finally driven ashore on the island of Seriphus, where they were picked up by a fisherman named Dictys. His brother Polydectes, who was king of the island, fell in love with Danae and married her. According to another story, her son Perseus, on his return with the head of Medusa, finding his mother persecuted by Polydectes, turned him into stone, and took Danae back with him to Argos. Latin legend represented her as landing on the coast of Latium and marrying Pilumnus or Picumnus, from whom Turnus, king of the Rutulians, was descended. Danae formed the subject of tragedies by Aeschylus, Sophocles, Euripides, Livius Andronicus and Naevius. She is the personification oi the earth suffering from drought, on which the fertilizing rain descends from heaven.

Apollodorus ii. 4; Sophocles, Antigone, 944; Horace, Odes, iii. 16; Virgil, Aeneid, vii. 410. See also P. Schwarz, De Fabula Danaeia (1881).

DANAO, a town of the province of Cebu, island of Cebu, Philippine Islands, on the E. coast, at the mouth of the Danao river, 17 m. N.N.E. of Cebu, the capital. Pop. (1903) 16,173. Danao has a comparatively cool and healthy climate, is the centre of a rich agricultural region producing rice, Indian corn, sugar, copra and cacao, and coal is mined in the vicinity. The language is Cebu-Visayan.

DANAUS, in Greek legend, son of Belus, king of Egypt, and twin-brother of Aegyptus. He was born at Chemmis (Panopolis) in Egypt, buthavingbeen driven out byhis brother he fled with his fifty daughters to Argos, the home of his ancestress Io. Here he became king and taught the inhabitants of the country to dig wells. In the meantime the fifty sons of Aegyptus arrived in Argos, and Danaus was obliged to consent to their marriage with his daughters. But to each of these he gave a knife with injunctions to slay her husband on the marriage night. They all obeyed except Hyperm(n)estra, who spared Lynceus. She was brought to trial by her father, acquitted and afterwards married to her lover. Being unable to find suitors for the other daughters, Danaus offered them in marriage to the youths of the district who proved themselves victorious in racing contests (Pindar, Pythia, ix. 117). According to another story, Lynceus slew Danaus and his daughters and seized the throne of Argos (schol. on Euripides, Hecuba, 886). By way of expiation for their crime the Dana'ides were condemned to the endless task of filling with water a vessel which had no bottom. This punishment, originally inflicted on those who neglected certain mystic rites, was trans- ferred to those who, like the Danaides, despised the mystic rite of marriage; cf. the water-bearing figure (KovTpo

Apollodorus ii. 1; Horace, Odes, iii. 11; O. Waser, in Archiv fur Religionswissenschaft, ii. Heft 1, 1899; articles in Pauly-Wissowa's Realencyclopadie

and W. H. Roscher's Lexikon der Mythologie; Campbell Bonner, in Harvard Studies, xiii. (1902).

DANBURITE, a rare mineral species consisting of calcium and boron orthosilicate, CaB 2 (Si0 4) 2 , crystallizing in the ortho- rhombic system. It was discovered by C. U. Shepard in 1839 at Danbury, Connecticut, U.S.A., and named by him after this locality. The crystals are prismatic in habit, and closely re- semble topaz in form and interfacial angles. There is an im- perfect cleavage parallel to the basal plane. Crystals are transparent to translucent, and colourless to pale yellow; hardness 7; specific gravity 3-0. At Danbury the mineral occurs with microcline and oligoclase embedded in dolomite. Large crystals, reaching 4 in. ki length, have been found with calcite in veins traversing granite at Russell in St Lawrence county, New York. Smaller but well-developed crystals have been found on gneiss at Mt. Scopi and Petersthal (the valley of the Vals Rhine) in Switzerland. Splendid crystals have recently been obtained from Japan.

DANBURY, a city and one of the county-seats of Fair- field county, Connecticut, U.S.A., in Danbury township, in the

south-west part of the state, on the Still river, a tributary of the Housatonic. Pop. (1890) 16,552; (1900) 16,537 (3702 foreign- born); (i9io)>20,234. In 1900 the population of the township, in- cluding that of the city, was 19474, andin 1910, 23,502. Danbury is served by three divisions of the New York, New Haven & Hartford railway; by the Danbury & Harlem electric railway, which connects at Goldens Bridge, New York, with the Harlem division of the New York Central; and by an electric line to Bethel, Connecticut. Lake Kenosia, about 2 1 m. from the centre of the city, is a pleasure resort. A state normal school was opened in Danbury in 1904, and there is a home for destitute and homeless children

under private (unsectarian) control. The city has good water-power, and the municipality owns the water works. The principal industry is the manufacture of felt hats, begun in 1780, and in 1905 engaging about thirty factories, with a product for the year valued at $5,798,107 (71-9% of the value of all the factory products of the city, and 15.8% of the value of all the felt hats produced in the United States). The city ranked first among the cities of the country in this industry in 1900 and second in 1905, and in 1905 no other city showed so high a degree of specialization in it. Silver-plated ware (mostly manufactured by Rogers Bros.) is another important product. At Danbury is held annually the well-known agricultural Danbury Fair. The township was settled in 1684 by emigrants from Norwalk, and received its present name in 1687. When the War of Independence opened, Enoch Crosby, believed to be the original of Harvey Birch, the hero of J. F. Cooper's The Spy, was a resident of Danbury. A depot of military supplies was established in the village of Danbury in 1776; in April 1777 Governor William Tryon, of New York, raided the place, destroy- ing the military stores and considerable private property. During his retreat he was attacked (April 26th) at Ridgefield (about 9 m. south by east of Danbury) by the Americans under General David Wooster (1710-1777), who was fatally wounded in the conflict (being succeeded by General Benedict Arnold), and to whose memory a monument was erected in Danbury in 1854. Danbury was chartered as a borough in 1832 and as a city in 1880. In 1870 the Danbury News was established by the consolidation of the Jejfersonian and the Times, by James Montgomery Bailey (1841-1894), from 1865 to 1870 proprietor of the Times. He wrote for the News humorous sketches, which made him and the paper famous, Bailey being known as the " Danbury News Man "; among his books are Life in Dan- bury (1873), The Danbury News Man's Almanac (1873), They All Do It (1877), England from a Back Window (1878), Mr Philip's Goneness (1879), The Danbury Boom (1880), and History of Danbury (1896).

DANBY, FRANCIS (1 793–1861), English painter, was born in the south of Ireland on the 16th of November 1793. His father farmed a small property he owned near Wexford, but his death caused the family to remove to Dublin, while Francis was still a schoolboy. He began to practice drawing at the Royal Dublin Society's schools; and under an erratic young artist named O'Connor he began painting landscape. Danby also made acquaintance with George Petrie, and all three left for London together in 1813. This expedition, undertaken with very in- adequate funds, quickly came to an end, and they had to get home again by walking. At Bristol they made a pause, and Danby, finding he could get trifling sums for water-colour drawings, remained there working diligently and sending to the London exhibitions pictures of importance. There his large pictures in oil quickly attracted attention. " The Upas Tree " (1820) and " The Delivery of the Israelites " (1825) brought him his election as an associate of the Royal Academy. He left Bristol for London, and in 1828 exhibited his " Opening of the Sixth Seal " at the British Institution, receiving from that body a prize of 200 guineas; and this picture was followed by two others from the Apocalypse. He suddenly left London, declaring that he would never live there again, and that the Academy, instead of aiding him, had, somehow or other, used him badly. Some insurmountable domestic difficulty overtook him also, and for eleven or twelve years he lived on the Lake of Geneva, a

Bohemian with boat-building fancies, painting only now and then. He returned to England in 1841, when his sons, James and Thomas, both artists, were growing up. Other pictures by him were " The Golden Age " and " The Evening Gun," the first begun before he left England, the second painted after his return; he had taken up his abode at Exmouth, where he died on the 9th of February 1861.

DANCE, the name of an English family distinguished in architecture, art and the drama. George Dance, the elder (1700–1768), obtained the appointment of architect to the city of London, and designed the

Mansion House (1 739) ; the churches of St Botolph, Aldgate (1741), St Luke's, Old Street; St Leonard, Shoreditch; the old excise office; Broad Street; and other public works of importance. He died on the 8th of February 1768. His eldest son, James Dance (1722-1744), was born on the 17th of March 1722, and educated at the Merchant Taylors' School and St John's College, Oxford, which he left before graduating. He took the name of Love, and became an actor and playwright of no great merit. In the former capacity he was for twelve years connected with Drury Lane theatre. He wrote " an heroic poem " on Cricket, about 1 740, and a volume of Poems on Several Occasions (1754), and a number of comedies — the earliest Pamela (1742).

George Dance's third son, Sir Nathaniel Dance-Holland, Bart. (1735-1811), was born on the 18th of May 1735, and studied art under Francis Hayman, and in Italy, where he met Angelica Kauffmann, to whom he was devotedly and hopelessly attached. From Rome he sent home " Dido and Aeneas " (1763), and he continued to paint occasional historical pictures of the same quasi-classic kind throughout his career. On his return to England he took up portrait-painting with great success, and contributed to the first exhibition of the Royal Academy, of which he was a foundation member, full-length portraits of George III. and his queen. These, and his portraits of Captain Cook and of Garrick as Richard III., engraved by Dixon, are his best-known works. Himself a rich man, in 1790 he married a widow with £15,000 a year, dropped his profession, and became M.P. for East Grinstead, taking the additional name of Holland. He was made a baronet in 1800. He died on the 15th of October 1811, leaving a fortune of £200,000.

George Dance's fifth and youngest son, George Dance, the younger (1741-1825), succeeded his father as city surveyor and architect in 1768. He was then only twenty-seven, had spent several years abroad, chiefly in Italy with his brother Nathaniel, and had already distinguished himself by designs for Blackfriars Bridge sent to the 1761 exhibition of

the Incorporated Society of Artists. His first important public work was the rebuilding of Newgate prison in 1770. The front of the Guildhall was also his. He, too, was a foundation member of the Royal Academy, and for a number of years the last survivor of the forty original academicians. His last years were devoted to art rather than to architecture, and after 1798 his Academy contributions consisted solely of chalk portraits of his friends, seventy-two of which were engraved and published (1808–1814). He resigned his office in 1815, and after many years of illness died on the 14th of January 1825, and was buried in St Paul's. His son, Charles Dance (1794–1863), was for thirty years registrar, taxing officer and chief clerk of the insolvent debtors' court, retiring, when it was abolished, on an allowance. In collaboration with J. R. Planche and others, or alone, he wrote a great number of extravaganzas, farces and comediettas. He was one of the first, if not the first, of the burlesque writers, and was the author of those produced so successfully by Madame Vestris for years at the Olympic. Of his farces, Delicate Ground, Who Speaks First ?, A Morning Call and others are still occasionally revived. He died on the 6th of January 1863.

DANCE (Fr. danse; of obscure origin, connected with Old High Ger. danson, to stretch). The term "dancing" in its widest sense includes three things: — (1) the spontaneous activity of the muscles under the influence of some strong emotion, such as social joy or religious exultation ; (2) definite combinations of graceful movements performed for the sake of the pleasure

which the exercise affords to the dancer or to the spectator; (3) carefully trained movements which are meant by the dancer vividly to represent the actions and passions of other people. In the highest sense it seems to be for prose-gesture what song is for

the instinctive exclamations of feeling. Regarded as the outlet or expression of strong feeling, dancing does not require much discussion, for the general rule applies that such demon- strations for a time at least sustain and do not exhaust the flow of feeling. The voice and the facial muscles and many of the organs are affected at the same time, and the result is a high state of vitality which among the spinning Dervishes or in the ecstatic worship of Bacchus and Cybele amounted to something like madness. Even here there is traceable an undulatory movement which, as Herbert Spencer says, is " habitually generated by feeling in its bodily discharge." But it is only in the advanced or volitional stage of dancing that we find developed the essential feature of measure, which has been said to consist in " the alter- nation of stronger muscular contractions with weaker ones," an alternation which, except in the cases of savages and children, " is compounded with longer rises and falls in the degree of muscular excitement." In analysing the state of mind which this measured dancing produces, we must first of all allow for the pleasant glow of excitement caused by the excess of blood sent to the brain. But apart from this, there is an agreeable sense of uniformity in the succession of muscular efforts, and in the spaces described, and also in the period of their recurrence. If the steps of dancing and the intervals of time be not precisely equal, there is still a pleasure depending on the gradually in- creasing intensity of motion, on the undulation which uniformly rises in order to fall. As Florizel says to Perdita, " When you do dance, I wish you a wave of the sea " (Winter's Tale, iv. 3). The mind feeis the beauty of emphasis and cadence in muscular motion, just as much as in musical notes. Then, the figure of the dance is frequently a circle or some more graceful curve or series of curves, — a fact which satisfies the dancer as well as the eye of the spectator. But all such effects are intensified by the use of music, which not only brings a perfectly distinct set of pleasurable sensations to dancer and spectator, but by the control of dancing produces an

inexpressibly sweet harmony of sound and motion. This harmony is further enriched if there be two dancing together on one plan, or a large company of dancers executing certain evolutions, the success of which depends on the separate harmonies of all the couples. The fundamental condition is that throughout the dance all the dancers keep within their bases of gravity. This is not only required for the dancers' own enjoyment, but, as in the famous Mercury on tiptoe, it is essential to the beautiful effect for the spectator. The idea of much being safely supported by little is what proves attractive in the posturing ballet. But this is merely one condi- tion of graceful dancing, and if it be made the chief object the dancer sinks into the acrobat.

Dancing is, in fact, the universal human expression, by movements of the limbs and body, of a sense of rhythm which is implanted among the primitive instincts of the animal world. The rhythmic principle of motion extends throughout the uni- verse, governing the lapse of waves, the flow of tides, the rever- berations of light and sound, and the movements of celestial bodies; and in the human organism it manifests itself in the automatic pulses and flexions of the blood and tissues. Dancing is merely the voluntary application of the rhythmic principle, when excitement has induced an abnormally rapid oxidization of brain tissue, to the physical exertion by which the over- charged brain is relieved. This is primitive dancing; and it embraces all movements of the limbs and body expressive of joy or grief, all pantomimic representations of incidents in the lives of the dancers, all performances in which movements of the body are employed to excite the passions of hatred or love, pity or revenge, or to arouse the warlike instincts, and all cere- monies in which such movements express homage or worship, or are used as religious exercises. Although music is not an essential part of dancing, it almost invariably accompanies it, even in the crudest form of a rhythm beaten out on a drum.

Primitive and Ancient Dancing. — In Tigre the Abyssinians dance the chassie step in a circle, and keep time by shrugging their shoulders and working their elbows backwards and for- wards. At intervals the dancers squat on the ground, still moving the arms and shoulders in the same way. The Bushmen dance in their low-roofed rooms supporting themselves by sticks; one foot remains motionless, the other dances in a wild irregular manner, while the hands are occupied with the sticks. The Gonds, a hill-tribe of Hindustan, dance generally in pairs, with a shuffling step, the eyes on the ground, the arms close to the body, and the elbows at an angle with the closed hand. Advancing to a point, the dancer suddenly erects his head, and wheels round to the starting point. The women of the Pultooah tribe dance in a circle, moving backwards and forwards in a bent posture. The Santal women, again, are slow and graceful in dance; joining hands, they form themselves into the arc of a circle, towards the centre of which they advance and then retire, moving at the same time slightly towards the right, so as to complete the circle in an hour. The Kukis of Assam have only the rudest possible step, an awkward hop with the knees very much bent. The national dance of the Kamchadale is one of the most violent known, every muscle apparently quivering at every movement. But there, and in some other cases where men and women dance together, there is a trace of deliberate obscenity; the dance is, in fact, a rude representation of sexual passion. It has been said that some of the Tasmanian corrobories have a phallic design. The Yucatan dance of naual may also be mentioned. The Andamans hop on one foot and swing the arms violently backwards and forwards. The Veddahs jump with both feet together, patting their bodies, or clapping their hands, and make a point of bringing their long hair down in front of the face. In New Caledonia the dance consists of a series of twistings of the body, the feet being lifted alternately, but without change of place. The Fijians jump half round from side to side with their arms akimbo. The only modulation of the Samoan dance is one of time — a crescendo movement, which is

well-known in the modern ball-room. The Javans are perhaps unique in their distinct and graceful gestures of the hands and fingers. At a Mexican feast called Huitzilopochtli, the noblemen and women danced tied together at the hands, and embracing one another, the arms being thrown over the neck. This re- sembles the dance variously known as the Greek Bracelet or Brawl, "Opmos, or Bearsfeet; but all of them 1 probably are to a certain extent symbolical of the relations between the sexes. Actual contact of the partners, however, is quite intelligible as matter of pure dancing; for, apart altogether from the pleasure of the embrace, the harmony of the double rotation adds very much to the enjoyment. In a very old Peruvian dance of ceremony before the Inca, several hundreds of men formed a chain, each taking hold of the hand of the man beyond his immediate neighbour, and the whole body moving forwards and backwards three steps at a time as they approached the throne. In this, as in the national dance of the Coles of Lower Bengal, there was perhaps a suggestion of " l'union fait la force." In Yucatan stilts were occasionally used for dancing.

It seldom happens that dancing takes place without accom- paniment, either by the dancers or by others. This is not merely because the feelings which find relief in dancing express them- selves at the same time in other forms; in some cases, indeed, the vocal and instrumental elements largely predominate, and form the ground-work of the whole emotional demonstration. Whether they do so or not will of course depend on the intellectual advancement of the nation or tribe and upon the particular development of their aesthetical sensibility. A striking instance occurs among the Zulus, whose grand dances are merely the accompaniment to the colloquial war and hunting songs, in which the women put questions which are answered by the men. So also in Tahiti there is a set of national ballads and songs, referring to many events in the past and present lives of the

1 Compare the Chica of South America, the Fandango of Spain, and the Angrismene or la Fachee of modern

Greece. See also Romaunt de la rose, v. 776.

people. The fisherman, the woodsman, the canoe-builder, has each his trade song, which on public occasions at least is illus- trated by dancing. But the accompaniment is often consciously intended, by an appeal to the ear, to regulate and sustain the excitement of the muscles. And a close relation will be found always to exist between the excellence of a nation's dancing and the excellence or complexity of its music and poetry. In some cases the performer himself sings or marks time by the clanking of ornaments on his person. In others the accompani- ment consists sometimes of a rude chant improvised by those standing round, or of music from instruments, or of mere clapping of the hands, or of striking one stick against another or on the ground, or of " marking time," in the technical sense. The Tasmanians beat on a rolled-up kangaroo-skin. The Kamcha- dales make a noise like a continuous hiccough all through the dance. The Andamans use a large hollow dancing-board, on which one man is set apart to stamp. Sometimes it is the privilege of the tribal chief to sing the accompaniment while his people dance. The savages of New Caledonia whistle and strike upon the hip.

The rude imitative dances of early civilization are of extreme interest. In the same way the dances of the Ostyak tribes (Northern Asiatic) imitate the habitual sports of the chase and the gambols of the wolf and the bear and other wild beasts, the dancing consisting mainly of sudden leaps and violent turns which exhaust the muscular powers of the whole body. The Kamchadales, too, in dancing, imitate bears, dogs and birds. The Kru dances of the Coast Negroes represent hunting scenes; and on the Congo, before the hunters start, they go through a dance imitating the habits of the gorilla and its movements when attacked. The Damara dance is a mimic representation of the movements of oxen and sheep, four men

stooping with their heads in contact and uttering harsh cries. The canter of the baboon is the humorous part of the ceremony. The Bushmen dance in long irregular jumps, which they compare to the leaping of a herd of calves, and the Hottentots not only go on all-fours to counterfeit the baboon, but they have a dance in which the buzzing of a swarm of bees is represented. The Kennowits in Borneo introduce the mias and the deer for the same purpose. The Australians and Tasmanians in their dances called corrobories imitate the frog and the kangaroo (both leaping animals). The hunt of the emu is also performed, a number of men passing slowly round the fire and throwing their arrows about so as to imitate the movements of the animal's head while feeding. The Gonds are fond of dancing the bison hunt, one man with skin and horns taking the part of the animal. Closely allied to these are the mimic fights, almost universal among tribes to which war is one of the great interests of life. The Bravery dance of the Dahomans and the Hoolee of the Bhil tribe in the Vindhya Hills are illustrations. The latter seems to have been reduced to an amusement conducted by professionals who go from village to - village, — the battle being engaged in by women with long poles on the one side, and men with short cudgels on the other. There is here an element of comedy, which also appears in the Fiji club-dance. This, although no doubt origin- ally suggested by war, is enlivened by the presence of a clown covered with leaves and wearing a mask. The monotonous song accompanying the club-dance is by way of commentary or ex- planation. So, also, in Guatemala there is a public baile or dance, in which all the performers, wearing the skins and heads of beasts, go through a mock battle, which always ends in the victory of those wearing the deer's head. At the end the victors trace in the sand with a pole the figure of some animal; and this exhibi- tion is supposed to have some historical reference. But nearly all savage tribes have a regular war-dance, in which they appear in fighting costume, handle their weapons, and go through the movements of challenge, conflict, pursuit or defeat. The women generally

supply the stimulus of music. There is one very picturesque dance of the Natal Kaffirs, which probably refers to the departure of the warriors for the battle. The women appeal plaintively to the men, who slowly withdraw, stamping on the ground and darting their short spears or assegais towards the sky.

In Madagascar, when the men are absent on war, the women dance for a great part of the day, believing that this inspires their husbands with courage. In this, however, there may be some religious significance. These war-dances are totally distinct from the institution of military drill, which belongs to a later period, when social life has become less impulsive and more re- flective. 1 There can be little doubt that some of the character- istic movements of these primitive hunting and war- dances survive in the smooth and ceremonious dances of the present day. But the early mimetic dance was not confined to these two subjects; it embraced the other great events of savage life — the drama of courtship and marriage, the funeral dance, the consecration of labour, the celebration of harvest or vintage; 2 sometimes, too, purely fictitious scenes of dramatic interest, while other dances degenerated into games. For instance, in Yucatan one man danced in a cowering attitude round a circle, while another followed, hurling at him bohordos or canes, which were adroitly caught on a small stick. Again, in Tasmania, the dances of the women describe their " clamber for the opossum, diving for shell- fish, digging for roots, nursing children and quarrelling with husbands." Another dance, in which a woman by gesture taunts a chieftain with cowardice, gives him an opportunity of coming forward and recounting his courageous deeds in dance. The funeral dance of the Todas (another Indian hill-tribe) consists in walking backwards and forwards, without variation, to a howling tune of "ha! hoo! " The meaning of this is obscure, but it can scarcely be solely an outburst of grief. In Dahomey the blacksmiths, carpenters, hunters, braves and bards, with their various tools and instruments,

join in a dramatic dance. We may add here a form of dance which is almost pre- cisely equivalent to the spoken incantation. It is used by the professional devil-dancer of the wild Veddahs for the cure of diseases. An offering of eatables is put on a tripod of sticks, and the dancer, decorated with green leaves, goes into a paroxysm of dancing, in the midst of which he receives the required infor- mation. This, however, rather belongs to the subject of religious dances.

It is impossible here to enumerate either the names or the forms of the sacred dances which formed so prominent a part of the worship of antiquity. A mystic philosophy found in them a resemblance to the courses of the stars. This Pythagorean idea was expanded by Sir John Davies, in his epic poem Orchestra, published in 1596. They were probably adapted to many purposes, — to thanksgiving, praise, supplication and humiliation. It is only one striking illustration of this widespread practice, that there was at Rome a very ancient order of priests especially named Salii, who struck their shields and sang assamenta as they danced. The practice reappeared in the early church, special provision being made for dancing in the choir. Scaliger, who astonished Charles V. by his dancing powers, says the bishops were called Praesules, because they led the dance on feast days. According to some of the fathers, the angels are always dancing, and the glorious company of the apostles is really a chorus of dancers. Dancing, however, fell into discredit with the feast of the Agapae. St Augustine says, ” Melius est fodere quam saltare “; and the practice was generally prohibited for some time. No church or sect has raged so fiercely against the cardinal sin of dancing as the Albigenses of Languedoc and the Waldenses, who agreed in calling it the devil’s procession. After the middle of the 18th century there were still traces of religious dancing in the cathedrals of Spain, Portugal and Roussillon — especially in the Mozarabic Mass of Toledo. An account of the numerous secular dances, public and private, of Greece and

Rome will be found in the classical histories, and in J. Weaver's Essay towards a History of Dancing, (London, 1712), which, however, must be revised by more recent authorities. The Pyrrhic (derived from the Memphitic) in all its local varieties,

1 The Greek Kapwala represented the surprise by robbers of a warrior ploughing a field. The gymnopaedic dances imitated the sterner sports of the palaestra.

2 The Greek Lenaea and Dionysia had a distinct reference to the seasons.

the Bacchanalia and the Hymenaea were among the more important. The name of Lycurgus is also associated with the Trichoria. Among the stage dances of the Athenians, which formed interludes to the regular drama, one of the oldest was the Delian dance of the Labyrinth, ascribed to Theseus, and called Tepavos, from its resemblance to the flight of cranes, and one of the most powerful was the dance of the Eumenides. A further development of the art took place at Rome, under Augustus, when Pylades and Bathyllus brought serious and comic pantomime to great perfection. The subjects chosen were such as the labours of Hercules, and the surprise of Venus and Mars by Vulcan. The state of public feeling on the subject is well shown in Lucian's amusing dialogue De Saltatione. Before this Rome had only very inferior buffoons, who attended dinner parties, and whose art traditions belonged not to Greece, but to Etruria. 1 Apparently, however, the Romans, though fond of ceremony and of the theatre, were by temperament not great dancers in private. Cicero says: "Nemo fere sal tat sobrius, nisi forte insanit." But the Italic dance of the imperial theatre, supported by music and splendid dresses, supplanted for a time the older dramas. It was the policy of Augustus to cultivate , other than political interests for the people; and he passed

laws for the protection and privilege of the pantomimiets. They were freed from the jus virgarum, and they used their freedom against the peace of the city. Tiberius and Domitian oppressed and banished them; Trajan and Aurelius gave them such titles as decurions and priests of Apollo; but the panto- mime stage soon yielded to the general corruption of the empire.

Modern Dancing. — In modern civilized countries dancing has developed as an art and pastime, as an entertainment. Its direct application to arouse emotion or religious feeling tends to be obscured and finally dropped out.

Italy, in the 15th century, saw the renaissance of dancing, and France may be said to have been the nursery of the modern art, though comparatively few modern dances are really French in origin. The national dances of other countries were brought to France, studied systematically, and made perfect there. An English or a Bohemian dance, practised only amongst peasants, would be taken to France, polished and perfected, and would at last find its way back to its own country, no more recognizable than a piece of elegant cloth when it returns from the printer to the place from which as ” grey ” material it was sent. The fact that the terminology of dancing is almost entirely French is a sufficient indication of the origin of the rules that govern it. The earliest dances that bear any relation to the modern art are probably the danses basses and danses hautes of the 1 6th century. The danse basse was the dance of the court of Charles IX. and of good society, the steps being very grave and dignified, not to say solemn, and the accompaniment a psalm tune. The danses hautes or baladines had a skipping step, and were practised only by clowns and country people. More lively dances, such as the Gaillarde and Volta, were intro- duced into France from Italy by Catherine de’ Medici, but even in these the interest was chiefly spectacular. Other dances of the same period were the Branle (afterwards corrupted to Braule, and known in England as the Brawle) — a kind of generic dance

which was capable of an almost infinite amount of variety. Thus there were imitative dances — Branles mimes, such as the Brattles des Er mites, Branles des flambeaux and the Branles des lavandieres. The Branle in its original form had steps like the Allemande. Perhaps the most famous and stately dance of this period was the Pavane (of Spanish origin), which is very fully described m Tabouret's Orchesographie, the earliest work in which a dance is found minutely described. The Pavane, which was really more a procession than a dance, must have been a very gorgeous and noble sight, and it was perfectly suited to the dress of the period, the stiff brocades of the ladies and the swords and heavily-plumed hats of the gentlemen being displayed in its simple and dignified measures to great advantage. The dancers

*_ * The Pantomimus was an outgrowth from the canticum or choral singing of the older comedies and fabulae Atellanae.*

in the time of Henry III. of France usually sang, while performing the Pavane, a chanson, of which this is one of the verses: " Approche done, ma belle,

Approche-toi, mon bien; Ne me sois plus rebellc,

Puisque mon coeur est tien ; Pour mon ame apaiser, Donne-moi un baiser."

In the Pavane and Branle, and in nearly all the dances of the 17 th and 1 8th centuries, the practice of kissing formed a not unimportant part, and seems to have added greatly to the popu- larity of the pastime. Another extremely popular dance was the Saraband, which, however, died out after the 17 th century. It was originally a Spanish dance, but enjoyed an enormous success for a time in France. Every dance at that time had its own tune or tunes, which were called by its own name, and of the Saraband the chevalier de Grammont wrote that " it either charmed or annoyed everyone, for all the guitarists of the court began to learn it, and God

only knows the universal twanging that followed." Vauquelin des Yveteaux, in his eightieth year, desired to die to the tune of the Saraband, " so that his soul might pass away sweetly." After the Pavane came the Courante, a court dance performed on tiptoe with slightly jumping steps and many bows and curtseys. The Courante is one of the most important of the strictly modern dances. The minuet and the waltz were both in some degree derived from it, and it had much in common with the famous Seguidilla of Spain. It was a favourite dance of Louis XIV., who was an adept in the art, and it was regarded in his time as of such importance that a nobleman's education could hardly have been said to be begun until he had mastered the Courante.

The dance which the French brought to the greatest perfection — which many, indeed, regard as the fine flower of the art — was the Minuet. Its origin, as a rustic dance, is not less antique than that of the other dances from which the modern art has been evolved. It was originally a branle of Poitou, derived from the Courante. It came to Paris in 1650, and was first set to music by Lully. It was at first a gay and lively dance, but on being brought to court it soon lost its sportive character and became grave and dignified. It is mentioned by Beauchamps, the father of dancing-masters, who flourished in Louis XIV. 's reign, and also by Blondy, his pupil; but it was Pecour who really gave the minuet its popularity, and although it was improved and made perfect by Dauberval, Gardel, Marcel and Vestris, it was in Louis XV.'s reign that it saw its golden age. It was then a dance for two in moderate triple time, and was generally followed by the gavotte. Afterwards the minuet was considerably developed, and with the gavotte became chiefly a stage dance and a means of display; but it should be remembered that the minuets which are now danced on the stage are generally highly elaborated with a view to their spectacular effect, and have imported into them steps and figures which do not belong to the minuet at all, but are borrowed from all kinds of other dances. The original court minuet was a grave

and simple dance, although it did not retain its simplicity for long. But when it became elaborated it was glorified and moulded into a perfect expression of an age in which deportment was most sedulously cultivated and most brilliantly polished. The " lan- guishing eye and smiling mouth " had their due effect in the minuet; it was a school for chivalry, courtesy and ceremony; the hundred slow graceful movements and curtseys, the pauses which had to be filled by neatly-turned compliments, the beauty and bravery of attire — all were eloquent of graces and outward refinements which we cannot boast now. The fact that the measure of the minuet has become incorporated in the structure of the symphony shows how important was its place in the polite world. The Gavotte, which was often danced as a pendant to the minuet, was also originally a peasant's dance, a danse des Gavots, and consisted chiefly of kissing and capering. It also became stiff and artificial, and in the later and more prudish half of the 18th century the ladies received bouquets instead of kisses in dancing the gavotte. It rapidly became a stage dance, and it has never been restored to the ballroom. Gretry attempted

to revive it, but his arrangement never became popular. Other dances which were naturalized in France were the Ecossaise, popular in 1760; the Cotillon, fashionable under Charles X., derived from the peasant branles and danced by ladies in short skirts; the Galop, imported from Germany; the Lancers, invented by Laborde in 1836; the Polka, brought by a dancing- master from Prague in 1840; the Schottische, also Bohemian, first introduced in 1844; the Bourree, or French clog-dance; the Quadrille, known in the 18th century as the Contre-danse; and the Waltz, which was danced as a volte by Henry III. of France, but only became popular in the beginning of the 19th century. We shall return to the history of some of these later dances in discussing the dances at present in use.

If France has been the nursery and school of the art of dancing, Spain is its true home. There it is part of the national life, the inevitable expression of the gay, contented, irresponsible, sun- burnt nature of the people. The form of Spanish dances has hardly changed; some of them are of great antiquity, and may be traced back with hardly a break to the performances in ancient Rome of the famous dancing-girls of Cadiz. The connexion is lost during the period of the Arab invasion, but the art was not neglected, and Jovellanos suggests that it took refuge in the Asturias. At any rate, dances of the 10th and 12th centuries have been preserved uncorrupted. The earliest dances known were the Turdion, the Gibidana, the Pie-de-gibao, and (later) the Madama Orleans, the Alemana and the Pavana. Under Philip IV. theatrical dancing was in high popularity, and ballets were organized with extraordinary magnificence of decoration and costume. They supplanted the national dances, and the Zara- banda and Chacona were practically extinct in the 18th century. It is at this period that the famous modern Spanish dances, the Bolero, Seguidilla and the Fandango, first appear. Of these the Fandango is the most important. It is danced by two people in 6-8 time, beginning slowly and tenderly, the rhythm marked by the click of castanets, the snapping of the fingers and the stamping of feet, and the speed gradually increasing until a whirl of exaltation is reached. A feature of the Fandango and also of the Seguidilla is a sudden pause of the music towards the end of each measure, upon which the dancers stand rigid in the attitudes in which the stopping of the music found them, and only move again when the music is resumed. M. Vuillier, in his History of Dancing, gives the following description of the Fan- dango: — " Like an electric shock, the notes of the Fandango ani- mate all hearts. Men and women, young and old, acknowledge the power of this air over the ears and soul of every Spaniard. The young men spring to their places, rattling castanets or imitating their sound by snapping their fingers. The girls are remarkable for the willowy languor and lightness of their move- ments, the voluptuousness

of their attitudes — beating the exactest time with tapping heels. Partners tease and entreat and pursue each other by turns. Suddenly the music stops, and each dancer shows his skill by remaining absolutely motionless, bounding again into the full life of the Fandango as the orchestra strikes up. The sound of the guitar, the violin, the rapid tic-tac of heels (taconeos) , the crack of fingers and castanets, the supple swaying of the dancers, fill the spectator with ecstasy. The measure whirls along in a rapid triple time. Spangles glitter; the sharp clank of ivory and ebony castanets beats out the cadence of strange, throbbing, deepening notes — assonances unknown to music, but curiously characteristic, effective and intoxicating. Amidst the rustle of silks, smiles gleam over white teeth, dark eyes sparkle and droop and flash up again in flame. All is flutter and glitter, grace and animation — quivering, sonorous, passionate, seductive."

The Bolero is a comparatively modern dance, having been invented by Sebastian Cerezo, a celebrated dancer of the time of King Charles III. It is remarkable for the free use made in it of the arms, and is said to be derived from the ancient Zarabanda, a violent and licentious dance, which has entirely disappeared, and with which the later Saraband has practically nothing in common. The step of the Bolero is low and gliding but well marked. It is danced by one or more couples. The Seguidilla is

hardly less ancient than the Fandango, which it resembles. Every province in Spain has its own Seguidilla, and the dance is accompanied by coplas, or verses, which are sung either to traditional melodies or to the tunes of local composers; indeed, the national music of Spain consists largely of these coplas. Baron Davillier, among several specimens of Seguidillas, gives this one

" Mi corazon volando Se f ue a tu pecho ; Le cortaste las alas, Y quedo dentro. Por atrevido Se quedara por siempre En el metido." 1

M. Vuillier quotes a copla which he heard at

Polenza, in the Balearic Islands. This verse is formed on the rhythm of the Malagueiia :

" Una estrella se ha pardida En el ciel y no parece ; En tu cara se ha metido ;

Y en tu frente resplandece." 2

The Jola is the national dance of Aragon, a lively and splendid, but withal dignified and reticent, dance derived from the 16th- century Passacaille. It is still used as a religious dance. The Cachuca is a light and graceful dance in triple time. It is per- formed b y a single dancer of either sex, The head and shoulders play an important part in the movements of this dance. Other provincial dances now in existence are the Jaleo de Jerez, a whirl- ing measure performed by gipsies, the PaloUa, the Polo, the Gallegada, the Muyneria, the Habas Verdes, the Zapateado, the Zorongo, the Vito, the Tirano and the Tripola Trapola. Most of these dances are named either after the places where they are danced or after the composers who have invented tunes for them. Many of them are but slight variations from the Fandango and Seguidilla.

The history of court dancing in Great Britain is practically the same as that of France, and need not occupy much of our attention here. But there are strictly national dances still in existence which are quite peculiar to the country, and may be traced back to the dances and games of the Saxon gleemen. The Egg dance and the Carole were both Saxon dances, the Carole being a Yule-tide festivity, of which the present-day Christmas carol is a remnant. The oldest dances which remain unchanged in England are the Morris dances, which were introduced in the time of Edward III. The name Morris or Moorish refers to the origin of these dances, which are said to have been brought back by John of Gaunt from his travels in Spain. The Morris dances are associated with May- day, and are danced round a maypole to a lively and capering step, some of the performers having bells fastened to their knees in the Moorish manner. They are dressed as characters of old English tradition,

such as B.obin Hood, Maid Marian, Friar Tuck, Little John and Tom the Piper. All the true country dances of Great Britain are of an active and lively measure; they may all, indeed, be said to be founded on the jig; and the hornpipe, which is a kind of jig, is the national dance of England. Captain Cook, on his voyages, made his sailors dance hornpipes in calm weather to keep them in good health. A characteristic of English dances was that they partook to a great extent of the nature of games; there was little variety in the steps, which were nearly all those of the jig or hornpipe, but these were incorporated into various games or plays, of which the Morris dances were the most elaborate. Richard Baxter wrote that " sometimes the Morris dancers would come into the church in all their linen and scarves and antic dresses, with Morris bells jingling at their legs; and as soon as Common Prayer was read, did haste and presently to their play again." May-day has always been celebrated in England with rustic dances and festivities. Before the Reformation there were no

1 " My heart flew to thy breast. Thou didst cut its wings, so that it remained there. And now it has waxed daring, and will stay with thee for evermore."

2 " A star is lost and appears not in the sky ; in thy face it has set itself; on thy brow it shines."

really national dances in use at court; but in the reign of Elizabeth the homely, domestic style of dancing reached the height of its popularity. Remnants of many of these dances remain to-day in the games played by children and country people; " Hunt the Slipper," " Kiss in the Ring," " Here we go round the Mulberry Bush," are examples. All the Tudor dances were kissing dances, and must have been the occasion of a great deal of merriment. Mrs Groves gives the following description of the Cushion dance: — " The dance is begun by a single

person, man or woman, who, taking a cushion in hand, dances about the room, and at the. end of a short time stops and sings: 'This dance it will no farther go,' to which the musician answers: ' I pray you, good sir, why say so? ' ' Because Joan Sanderson will not come to.' ' She must come to whether she will or no,' returns the musician, and then the dancer lays the cushion before a woman; she kneels and he kisses her, singing ' Welcome, Joan Sanderson.' Then she rises, takes up the cushion, and both dance and sing ' Prinkum prankum is a fine dance, and shall we go dance it over again?' Afterwards the woman takes the cushion and does as the man did." Other popular dances — generally adapted to the tunes of popular songs, the nature of some of which may be guessed from their titles — were the Trenchmore, Omnium-gatherum, Tolly-polly, Hoite cum toite, Dull Sir John, Faine I would, Sillinger, All in a Garden Green, An Old Man's a Bed Full of Bones, If All the World were Paper, John, Come Kiss Me Now, Cuckholds All Awry, Green Sleeves and Pudding Pies, Lumps of Pudding, Under and Over, Up Tails All, The Slaughter House, Rub her Down with Straw, Have at thy Coat Old Woman, The Happy Marriage, Dissembling Love, Sweet Kate, Once I Loved a Maiden Fair. Dancing practically disappeared during the Puritan rigime, but with the Restoration it again became popular. It underwent no considerable develop- ments, however, until the reign of Queen Anne, when the glories of Bath were revived in the beginning of the 18th century, and Beau Nash drew up his famous codes of rules for the regulation of dress and manners, and founded the balls in which the polite French dances completely eclipsed the simpler English ones. An account of a dancing lesson witnessed by a fond parent at this time is worth quoting, as it shows how far the writer (but not his daughter) had departed from the jolly, romping traditions of the old English dances: — " As the best institutions are liable to corruption, so, sir, I must acquaint you that very great abuses are crept into this entertainment. I was amazed to see my girl handed by and handing young fellows with so much familiarity, and I could

not have thought it had been my child. They very often made use of a most impudent and lascivious step called setting to partners, which I know not how to describe to you but by telling you that it is the very reverse of bach to back. At last an impudent young dog bid the fiddlers play a dance called Moll Patley, and, after having made two or three capers, ran to his partner, locked his arms in hers, and whisked her round cleverly above ground in such a manner that I, who sat upon one of the lowest benches, saw farther above her shoe than I can think fit to acquaint you with. I could no longer endure these enor- mities, wherefore, just as my girl was going to be made a whirligig, I ran in, seized my child and carried her home." What we may call polite dancing, when it became fashionable, soon invaded London, its first home being Madame Cornely's famous Carlisle House in Soho Square. Ranelagh and Vauxhall and Almack's were all extensively patronized, and the rage for magnificent entertainment and dancing culminated in the erection of the palatial Pantheon in Oxford Street — a place so universally patronized that even Dr Johnson was to be found there. White's and Boodle's were also famous assembly rooms, but the most exclusive of all these establishments was Almack's, the original of Brooks's Club.

The only true national dances of Scotland are reels, strathspeys and flings, while in Ireland there is but one dance — the jig, which is there, however, found in many varieties and expressive of many shades of emotion, from the maddest gaiety to the wildest lament. Curiously enough, although the Welsh dance often, they have no strictly national dances.

Dancing in present-day society is a comparatively simple affair, as five-sixths of almost all ball programmes consists of waltzes. The origin of the waltz is a much-debated subject, the French, Italians and Bavarians each claiming for their respective countries the honour of having given birth to it. As a matter of fact the waltz, as it is now danced, comes from Germany; but it is equally true that its real origin is French, since it is a de- velopment of the Volte, which in its turn came

from the Lavolta of Provence, one of the most ancient of French dances. The Lavolta was fashionable in the 16th century and was the delight of the Valois court. The Volte danced by Henry III. was really a Valse & deux pas; and Castil-Blaze says that " the waltz which we took again from the Germans in 1 795 had been a French dance for four hundred years." The change, it is true, came upon it during its visit to Germany, hence the theory of its German origin. The first German waltz tune is dated 1770 — " Ach! du lieber Augustin." It was first danced at the Paris opera in 1793, in Gardel's ballet La Dansomanie. It was introduced to English ballrooms in 1812, when it roused a storm of ridicule and opposi- tion, but it became popular when danced at Almack's by the emperor Alexander in 1816. The waltz d trois temps has a sliding step in which the movements of the knees play an important part. The tempo is moderate, so as to allow three distinct movements on the three beats of each bar; and the waltz is written in 3-4 time and in eight-bar sentences. Walking up and down the room and occasionally breaking into the step of the dance is not true waltzing, and the habit of pushing one's partner backwards along the room is an entirely English one. But the dancer must be able to waltz equally well in all directions, pivoting and crossing the feet when necessary in the reverse turn. It need hardly be said that the feet should never leave the floor in the true waltz. Gungl, Waldteufel and the Strauss family may be said to have moulded the modern waltz to its present form by their rhythmical and agreeable compositions. There are variations which include hopping and lurching steps; these are degradations, and foreign to the spirit of the true waltz.

The Quadrille is of some antiquity, and a dance of this kind was first brought to England from Normandy by William the Conqueror, and was common all over Europe in the 16th and 17th centuries. The term quadrille means a kind of card game, and the dance is supposed to be in some way connected with the game. A species of quadrille appeared in a French

ballet in 1743, and since that time the dance has gone by that name. Like many other dances, it came from Paris to Almack's in 1 8 1 5, and in its modern form was danced in England for the first time by Lady Jersey, Lady Harriet Butler, Lady Susan Ryder and Miss Montgomery, with Count Aldegarde, Mr Mont- gomery, Mr Harley and Mr Montague. It immediately became popular. It then consisted of very elaborate steps, which in England have been simplified until the degenerate practice has become common of walking through the dance. The quadrille, properly danced, has many of the graces of the minuet. It is often stated that the square dance is of modern French origin. This is incorrect, and probably arises from a mistaken identifica- tion of the terms quadrille and square dance. " Dull Sir John " and " Faine I would " were square dances popular in England three hundred years ago.

An account of the country-dance, with the names of some of the old dance-tunes, has been given above. The word is not, as has been supposed, an adaptation of the French contre-danse, neither is the dance itself French in origin. According to the New English Dictionary, contre-danse is a corruption of " country- dance," possibly due to a peculiar feature of many of such dances, like Sir Roger de Coverley, where the partners are drawn up in lines opposite to each other. The earliest appearance of the French word is in its application to English dances, which are contrasted with the French; thus in the Memoirs of Grammont, Hamilton says: " On quitta les danses francaises pour se mettre aux contre-danses." The English " country-dances " were intro- duced into France in the early part of the 18th century and became popular; later French modifications were brought back

to England under the French form of the name, and this, no doubt, caused the long-accepted but confused derivation.

The Lancers were invented by Laborde in Paris in 1836. They were brought over to England in 1850, and were made fashionable by Madame Sacre at her classes in Hanover Square Rooms. The first four ladies to dance the lancers in England were Lady Georgina Lygon, Lady Jane Fielding, Mdlle. Olga de Lechner and Miss Berkeley.

The Polka, the chief of the Bohemian national dances, was adopted by Society in 1835 at Prague. Josef Neruda had seen a peasant girl dancing and singing the polka, and had noted down the tune and the steps. From Prague it readily spread to Vienna, and was introduced to Paris by Cellarius, a dancing-master, who gave it at the Odeon in 1840. It took the public by storm, and spread like an infection through England and America. Everything was named after the polka, from public-houses to articles of dress. Mr Punch exerted his wit on the subject weekly, and even' The Times complained that its French corre- spondence was interrupted, since the polka had taken the place of politics in Paris. The true polka has three slightly jumping steps, danced on the first three beats of a four-quaver bar, the last beat of which is employed as a rest while the toe of the un- employed foot is drawn up against the heel of the other.

The Galop is strictly speaking a Hungarian dance, which became popular in Paris in 1830. But some kind of a dance corresponding to the galop was always indulged in after Voltes and Contre-danses, as a relief from their grave and constrained measures.

The Washington Post and several varieties of Barn-dance are of American origin, and became fashionable towards the end of the 19th century.

The Polka-Mazurka is extremely popular in Vienna and Buda- pest, and is a favourite theme with Hungarian composers. The six movements of this dance occupy two bars of 3-4 time, and consist of a mazurka step joined to the polka. It is of Polish origin.

The Polonaise and Mazurka are both Polish dances,

and are still fashionable in Russia and Poland. Every State ball in Russia is opened with the ceremonious Polonaise.

The Schottische, a kind of modified polka, was " created " by Markowski, who was the proprietor of a famous dancing academy in 1850. The Highland Schottische is a fling. The Fling and Reel are Celtic dances, and form the national dances of Scotland and Denmark. They are complicated measures of a studied and classical order, in which free use is made of the arms and of cries and stampings. The Strathspey is a slow and grandiose modification of the Reel.

Sir Roger de Coverley is the only one of the old English social dances which has survived to the present day, and it is frequently danced at the conclusion of the less formal sort of balls. It is a merry and lively game in which all the company take part, men and women facing each other in two long rows. The dancers are constantly changing places in such a way that if the dance is carried to its conclusion everyone will have danced with everyone else. The music was first printed in 1685, and is sometimes written in 2-4 time, sometimes in 6-8 time, and sometimes in 3-9 time.

The Cotillon is a modern development of the French dance of the same name referred to above. It is an extremely elaborate dance, in which a great many toys and accessories are employed; hundreds of figures may be contrived for it, in which presents, toys, lighted tapers, biscuits, air-balloons and hurdles are used.

Ballet, b°c. — The modern ballet (q.v.) seems to have been first produced on a considerable scale in 1489 at Tortona, before Duke Galeazzo of Milan. It soon became a common amusement on great occasions at the European courts. The ordinary length was five acts, each containing several entries, and each entree containing several quadrilles. The accessories of painting, sculpture and movable scenery were employed, and the repre- sentation

often took place at night. The allegorical, moral and ludicrous ballets were introduced to France by Baif in the time of Catherine de' Medici. The complex nature of these exhibitions may be gathered from the title of one played at Turin in 1634 —

La verita nemica della apparenza, sollevala dal tempo. Of the ludicrous, one of the best known was the Venetian ballet of I a verita raminga. Now and then, however, a high political aim may be discovered, as in the " Prosperity of the Arms of France," danced before Richelieu in 1641, or " Religion uniting Great Britain to the rest of the World," danced at London on the marriage of Princess Elizabeth to the elector Frederick. Outside the theatre, the Portuguese revived an ambulatory ballet which was played on the canonization of Carlo Borromeo, and to which they gave the name of the Tyrrhenic Pomp. During this time also the ceremonial ball (with all its elaborate detail of courante, minuet and saraband) was cultivated. The fathers of the church assembled at Trent gave a ball in which they took a part. Masked balls, too, resembling in some respects the Roman Saturnalia, became common towards the end of the 17th century. In France a ball was sometimes diversified by a masquerade, carried on by a limited number of persons in character-costume. Two of the most famous were named " au Sauvage " and " des Sorciers." In 1715 the regent of France started a system of public balls in the opera-house, which did not succeed. Dancing, also, formed a leading element in the Opera Francais introduced by Quinault. His subjects were chiefly marvellous, drawn from the classical mythologies; and the choral dancing was not merely divertissement, but was intended to assist and enrich the dramatic action of the whole piece.

Musical Gymnastics. — Dancing is an important branch of physical education. Long ago Locke pointed out (Education, §§ 67, 196) that the effects of dancing are not confined to the body; it gives to children, he says, not mere outward graceful- ness of motion, but manly thoughts and a becoming confidence. Only lately, however, has the advantage been recognized

of making gymnastics attractive by connecting it with what Homer calls ” the sweetest and most perfect of human enjoyments.” The practical principle against heavy weights and intense monotonous exertion of particular muscles was thus stated by Samuel Smiles (Physical Education, p. 148): — “The greatest benefit is derived from that exercise which calls into action the greatest number of muscles, and in which the action of these is intermitted at the shortest intervals.” It required only one further step to see how, if light and changing movements were desirable, music would prove a powerful stimulus to gymnastics. It touches the play-impulse, and substitutes a spontaneous flow of energy for the mechanical effort of the will. The force of imitation or contagion, one of the most valuable forces in education, is also much increased by the state of exhilaration into which dancing puts the system. This idea was embodied by Froebel in his Kindergarten plan, and was developed by Jahn and Schreber in Germany, by Dio Lewis in the United States, and by Ling (the author of the Swedish Cure Movement) in Sweden.

Authorities. — For the old division of the Ars Gymnastica into palaestrica and saltatoria, and of the latter into cubistica, sphaeristica and orchestica, see the learned work of Hieronymus Mercurialis, De arte Gymnastica (Amsterdam, 1572). Cubistic was the art of throwing somersaults, and is described minutely by Tuccaro in his Trois Dialogues (Paris,_ 1599). Sphaeristic included several complex games at ball and tilting — the Greek kupvkos, and the Roman trigonalis and paganica. Orchestic, divided by Plutarch into latio, figura and indicatio, was really imitative dancing, the ” silent poetry ” of Simonides. The importance of the x^povo^la. or hand-movement is indicated by Ovid: — ” Si vox est, canta; si mollia brachia, salta.” For further information as to modern dancing, see Rameau’s Le maitre & danser (1726); Querlon’s Le triomphe des graces (1774); Cahousac, La danse ancienne et moderne (1754) > Vuillier, History of Dancing (Eng. trans., 1897) ; Giraudet, Traite de la

danse (1900).

(W. C. S.; A. B. F. Y.)

DANCOURT, FLORENT CARTON (1661–1725), French drama- tist and actor, was born at Fontainebleau on the 1st of November 1 66 1 . He belonged to a family of rank , and his parents entrusted his education to Pere de la Rue, a Jesuit, who made earnest efforts to induce him to join the order. But he had no religious vocation and proceeded to study law. He practised at the bar for some time, but his marriage to the daughter of the comedian Francois Lenoir de la Thorilliere led him to become an actor, and in 1685, in spite of the strong opposition of his family, he

appeared at the Theatre Francais. His gifts as a comedian gave him immediate and marked success, both with the public and with his fellow actors. He was the spokesman of his company on occasions of state, and in this capacity he frequently appeared before Louis XIV., who treated him with great favour. One of his most famous impersonations was Alceste in the Misanthrope of Moliere. His first play, Le Notaire obligeant, produced in 1685, was well received. La Desolation des joueuses (1687) was still more successful. Le Chevalier a la mode (1687) is generally regarded as his best work, though his claim to original author- ship in this and some other cases has been disputed. In Le Chevalier a la mode appears the bourgeoise infatuated with the desire to be an aristocrat. The type is developed in Les Bour- geoises a la mode (1692) and Les Bourgeoises de qualite (1700). Dancourt was a prolific author, and produced some sixty plays in all. Some years before his death he terminated his career both as an actor and as an author by retiring to his chateau at Courcelles le Roi, in Berry, where he employed himself in making a poetical translation of the Psalms and in writing a sacred tragedy. He died on the 7th of December 1725. The plays of

Dancourt are faithful descriptions of the manners of the time, and as such have real historical value. The characters are drawn with a realistic touch that led to his being styled by Charles Palissot the Teniers of comedy. He is very successful in his delineation of low life, and especially of the peasantry. The dialogue is sparkling, witty and natural. Many of the incidents of his plots were derived from actual occurrences in the ” fast ” and scandalous life of the period, and several of his characters were drawn from well-known personages of the day. Most of the plays incline to the type of farce rather than of pure comedy. Voltaire defined his talent in the words: ” Ce que Regnard etait a 1' egard de Moliere dans la haute comedie, le comedien Dancourt 1' etait dans la farce.”

His two daughters, Manon and Marie Anne (Mimi), both obtained success on the stage of the Theatre Francais.

The complete works of Dancourt were published in 1760 (12 vols. !2mo). An edition of his Thedtre choisi, with a preface by F. Sarcey, appeared in 1884.

DANDELION {Taraxacum officinale), a. perennial herb belong- ing to the natural order Compositae. The plant has a wide range, being found in Europe, Central Asia, North America, and the Arctic regions, and also in the south temperate zone. The leaves form a spreading rosette on the very short stem; they are smooth, of a bright shining green, sessile, and tapering downwards. The name dandelion is derived from the French dent-de-lion, an appellation given on account of the tooth-like lobes of the leaves. The long tap-root has a simple or many- headed rhizome; it is black externally, and is very difficult of extirpation. The flower- stalks are smooth, brittle, leafless, hollow, and very numerous. The flowers bloom from April till August, and remain open from five or six in the morning to eight or nine at night. The flower- heads are of a golden yellow, and reach i| to 2 in. in width; the florets are all strap-shaped. The fruits are olive

or dull yellow in colour, and are each surmounted by a long beak, on which rests a pappus of delicate white hairs, which occasions the ready dispersal of the fruit by the wind; each fruit contains one seed. The globes formed by the plumed fruits are nearly two inches in diameter. The involucre consists of an outer spreading (or reflexed) and an inner and erect row of bracts. In all parts of the plant a milky juice is contained, which has a somewhat complex composition. The chief constituent is taraxacin, a neutral principle. In addition the juice contains taraxacerin (derived from the former), asparagin, inulin, resins and salts. An extract (dose 5–15 grains), a liquid extract (dose 5–1 drachm) and a succus (dose 1–2 drachms) of the root are all used medicinally. For the purposes formerly recognized tarax- acum is now never used, but it has been shown to possess definite cholagogue properties, and may therefore be prescribed along with ammonium chloride in cases of hepatic constipation, which it very constantly relieves. The root — which is the medicinal product — is most bitter from March to July, but the milky juice it contains is less abundant in the summer than in the autumn, (ii. 26

For this reason, the extract and succus are usually prepared during the months of September and October. After a frost a change takes place in the root, which loses its bitterness to a

Dandelion {Taraxacum officinale). I, Unopened head; 2, ripe head from which all the fruits except 3> one floret, enlarged; 4, one fruit.

two have been removed;

large extent. In the dried state the root will not keep well, being quickly attacked by insects. Externally it is brown and wrinkled, internally white, with a yellow centre and concentric paler rings. It is two inches to a foot long, and about a quarter to half an inch in diameter. The leaves are bitter, but are some- times eaten as a salad; they serve as food for silkworms when mulberry leaves are not to be had. The root is roasted as a substitute

for coffee. Several varieties of the dandelion are recognized by botanists; they differ in the degree and mode of cutting of the leaf-margin and the erect or spreading character of the outer series of bracts. The variety palustre, which affects boggy situations, and flowers in late summer and autumn, has nearly entire leaves, and the outer bracts of its involucre are erect.

DANDOLO, the name of one of the most illustrious patrician families of Venice, of which the earliest recorded member was one of the electors of the first doge (a.d. 697). The Dandolo gave to Venice four doges; of these the first and most famous was Enrico Dandolo (c. 1120-1205), elected on the 1st of January 1193 {more Venelo, 1192). He had distinguished himself in various military enterprises and diplomatic negotiations in the course of an active career, and although over seventy years old and of very weak sight (the story that he had been made blind by the emperor Manuel Comnenus while he was at Constantinople is a legend), he proved a most energetic and capable ruler. His first care was to re-establish Venetian authority over the Dalmatians who had rebelled with the king of Hungary's protection, but he failed to capture Zara, owing to the arrival of the Pisan fleet, and although the latter was defeated by the Venetians, the under- taking was suspended. In the meanwhile the situation in the East was becoming critical. The Eastern emperor Isaac II. Angelus had been deposed, imprisoned, and blinded by his

brother Alexius, who usurped the throne. The new emperor proved unfriendly to the Venetians and made difficulties about renewing their privileges. In the West a new crusade to the Holy Land was in preparation, and the crusaders sent am- bassadors, one of whom was Villehardouin, the historian of the expedition, to ask the Venetians to give them passage and means of transport (1201). After much

deliberation the republic agreed to transport 4500 horse and 29,000 foot to Palestine with provisions for one year, for a sum of 85,000 marks; in addition 50 Venetian galleys would be provided free of charge, while Venice was to receive half the conquests made by the crusaders. But as the time agreed upon for the departure approached, it appeared that the crusaders had not the money to pay the stipu- lated advance. Dandolo then proposed that if they helped him to reduce Zara payment might be deferred. Some of the cru- saders disapproved of this attack on a Christian city, but the majority, only too glad of an opportunity for plunder, willingly agreed. The expedition sailed on the 8th of October 1202, three hundred sail in all, with the aged Dandolo himself in command. Zara was taken and pillaged, for which the Venetians were severely reprimanded by the pope. But new possibilities of conquest were now opened up at the suggestion of Alexius, the son of the deposed emperor Isaac. He promised the crusaders that if they went first to Constantinople and re-instated Isaac, the latter would maintain them for a year, contribute 10,000 men and 200,000 marks for the expedition to Egypt, and subject the Eastern to the Western Church. The proposal was accepted, largely owing to the influence of Dandolo, who saw in it a means for further extending the dominions and commerce of the Venetians. After wintering at Zara the fleet set sail on the 7 th of April 1203, and on the 23rd of June anchored in the Bosporus. After long parleys the city was attacked by land and sea on the 17th of July (the fleet being commanded by Dandolo) and taken by storm. The emperor Alexius fled, and Isaac reoccupied the throne, but, although grateful to the crusaders, he was not dis- posed to fulfil the promises made by his son. Tumults between crusaders and Greeks arose, and the people of the city, excited by a certain Alexis Murzuphlus, murmured at the new taxes which were imposed on them. A revolt broke out, and an officer named Nicholas Canabus was placed on the throne; Prince Alexius was strangled by order of Murzuphlus, Isaac died of the shock, Murzuphlus imprisoned Canabus and made himself

emperor (Alexius V.). The crusaders thereupon attacked Con- stantinople a second time (12th of April 1204), and after a desperate struggle captured the city, which they subjected to hideous carnage. Immense booty was secured, the Venetians obtaining among other treasures the four bronze horses which adorn the facade of St Mark's. The Eastern empire was abol- j ished, and a feudal Latin empire erected in its stead. The leaders of the crusaders then met to elect an emperor. Dandolo was one of the candidates, but Count Baldwin of Flanders was elected and crowned on the 23rd of May. The Venetians were given Crete and several other islands and ports in the Levant, which formed an uninterrupted chain from Venice to the Black Sea, a large part of Constantinople (whence the doge assumed the title of " lord of a quarter and a half of Romania "), and many valuable privileges. But hardly had the new state been established when various provinces rose in rebellion and the Bulgarians invaded Thrace. A Latin army was defeated by them at Adrianople (April 1205), and the emperor himself was captured and killed, the fragments of the force being saved only by Dandolo's prowess. But he was now old and ill, and on the 23rd of June 1205 he died. He certainly consolidated Venice's dominion in the East and increased its commercial prosperity to a very high degree. But the policy he pursued in turning the crusaders against Constantinople, in order to promote the interests of the republic, while serving to break up the Greek empire, created in its place a Latin state that was far too feeble to withstand the onslaught of Greek national feeling and Orthodox fanaticism; at the same time the Greeks were greatly weakened and their power of resisting the Turks consequently lessened. This paved the way for the Turkish invasion of

Europe, which proved an unmixed calamity for all Christendom, Venice included.

Enrico Dandolo's sons distinguished themselves in the public service, and his grandson Giovanni was doge from 1280 to 1289. The latter's son Andrea commanded the Venetian fleet in the war against

Genoa in 1294, and, having been defeated and taken prisoner, he was so overwhelmed with shame that he committed suicide by beating his head against the mast (according to Andrea Navagero). Francesco Dandolo, also known as Dandolo Cane, was doge from 1329 to 1339. During his reign the Venetians went to war with Martino della Scala, lord of Verona, with the result that they occupied Treviso and otherwise extended their possessions on the terra firma. Andrea Dandolo (1307/10- 1354), the last doge of the family, reigned from 1343 to 1354. He had been the first Venetian noble to take a degree at the university of Padua, where he had also been professor of juris- prudence. The terrible plague of 1348, wars with Genoa, against whom the great naval victory of Lojera was won in 1353, many treaties, and the subjugation of the seventh revolt of Zara, are the chief events of his reign. The poet Petrarch, who was the doge's intimate friend, was sent to Venice on a peace mission by Giovanni Visconti, lord of Milan. " Just, incorruptible, full of zeal and of love for his country, and at the same time learned, of rare eloquence, wise, affable, and humane," is the poet's verdict on Andrea Dandolo (Varior. epist. xix.). Dandolo died on the 7th of September 1354. He is chiefly famous as a his- torian, a.n&h.b, Annals to the year 1280 are one of the chief sources of Venetian history for that period; they have been published by Muratori (Rer. Ital. Script, torn. xxi.). He also had a new code of laws compiled (issued in 1346) in addition to the statute of Jacopo Tiepolo.

Another well-known member of this family was Silvestro Dandolo (1 796-1866), son of Girolamo Dandolo, who was the last admiral of the Venetian republic and died an Austrian admiral in 1847. Silvestro was an Italian patriot and took part in the revolution of 1848.

Bibliography. — S. Romanin, Storia documentata di Venezia (Venice, 1853); among more recent books H. Kretschmayr's excellent Geschichte von Venedig (Gotha, 1905) should be consulted: it contains a bibliography of the authorities and all the latest

re- searches and discoveries ; C. Cipolla and G. Monticolo have published many essays and editions of chronicles in the A rchivio Veneto, and the ” Fonti per la Storia d’ltalia,” in the Istituto storico italiano; H. Simonsfeld has written a life of Andrea Dandolo in German (Munich, 1876). (L. V.)*

DANDOLO, .VINCENZO, Count (1758-1819), Italian chemist and agriculturist, was born at Venice, of good family, though not of the same house as the famous doges, and began his career as a physician. He was a prominent opponent of the oligarchical party in the revolution which took place on the approach of Napoleon; and he was one of the envoys sent to seek the pro- tection of the French. When the request was refused, and Venice was placed under Austria, he removed to Milan, where he was made member of the great council. In 1799, on the invasion of the Russians and the overthrow of the Cisalpine republic, Dandolo retired to Paris, where, in the same year, he published his treatise Les Hommes nouveaux, ou moyen d’operer une regenera- tion nouvelle. But he soon after returned to the neighbourhood of Milan, to devote himself to scientific agriculture. In 1805 Napoleon made him governor of Dalmatia, with the title of provediteur geniral, in which position Dandolo distinguished himself by his efforts to remove the wretchedness and idleness of the people, and to improve the country by draining the pesti- lential marshes and introducing better methods of agriculture. When, in 1809, Dalmatia was re-annexed to the Illyrian prov- inces, Dandolo returned to Venice, having received as his reward from the French emperor the title of count and several other distinctions. He died in his native city on the 13th of December

1819.

Dandolo published in Italian several treatises on agriculture, vine-cultivation, and the rearing of cattle and sheep; a work on silk- worms, which was translated into French by Fontanelle; a work on the discoveries in chemistry which were made in the last

quarter of the 18th century (published 1796); and translations of several of the best French works on chemistry.

DANDY, a word of uncertain origin which about 1813–1816 became a London colloquialism for the exquisite or fop of the period. It seems to have been in use on the Scottish border at the end of the 18th century, its full form, it is suggested, being " Jack-a-Dandy," which from 1659 had a sense much like its later one. It is probably ultimately derived from the French dandin, " a ninny or booby," but a more direct derivation was suggested at the time of the uprise of the Regency dandies. In The Northampton Mercury, under date of the 17th of April 1819, occurs the following: " Origin of the word ' dandy.' This term, which has been recently applied to a species of reptile very common in the metropolis, appears to have arisen from a small silver coin struck by King Henry VII., of little value, called a dandiprat; and hence Bishop Fleetwood observes the term is applied to worthless and contemptible persons."

It was Beau Brummel, the high-priest of fashion, who gave dandyism its great vogue. But before his day foppery in dress had become something more than the personal eccentricity which it had been in the Stuart days and earlier. About the middle of the 18th century was founded the Macaroni Club. This was a band of young men of rank who had visited Italy and sought to introduce the southern elegances of manner and dress into England. The Macaronis gained their name from their introduction of the Italian dish to English tables, and were at their zenith about 1772, when their costume is described as " white silk breeches, very tight coat and vest with enormous white neckcloths, white silk stockings and diamond-buckled red-heeled shoes." For some time the moving spirit of the club was Charles James Fox. It was with the advent of Brummel, however, that the

cult of dandyism became a social force. Beau Brummel was supreme dictator in matters of dress, and the prince regent is said to have wept when he disapproved of the cut of the royal coat. Around the Beau collected a band of young men whose insolent and affected manners made them universally unpopular. Their chief glory was their clothes. They wore coats of blue or brown cloth with brass buttons, the coat-tails almost touching the heels. Their trousers were buckskin, so tight that it is said they ” could only be taken off as an eel would be divested of his skin.” A pair of highly-polished Hessian boots, a waistcoat buttoned incredibly tight so as to produce a small waist, and opening at the breast to exhibit the frilled shirt and cravat, completed the costume of the true dandy. Upon the Beau’s disgrace and ruin, Lord Alvanleywas regarded as leader of the dandies and ” first gentleman in England.” Though in many ways a worthier man than Brummel, his vanity exposed him to much derision, and he fought a duel on Wimbledon Common with Morgan O’Connell, who, in the House of Commons, had called him a ” bloated buffoon.” After 1825 ” dandy ” lost its invidious meaning, and came to be applied generally to those who were neat in dress rather than to those guilty of effeminacy.

See Barbey D'Aurevilly, Du dandysme et de G, Brummel (Paris,

1887).

DANEGELD, an English national tax originally levied by jEthelred II. (the Unready) as a means of raising the tribute which was the price of the temporary cessation of the Danish ravages. This expedient of buying off the invader was first adopted in 991 on the advice of certain great men of the kingdom. It was repeated in 994, 1002, 1007 and 1012. With the accession of the Danish king Canute, the original raison d'etre of the tax ceased to exist, but it continued to- be levied, though for a different purpose, assuming now the character of an occasional war-tax. It was exceedingly burdensome, and its abolition by Edward the Confessor in 105 1 was welcomed as a great relief. William the Conqueror revived it immediately after his accession, as a convenient method of national taxation, and it was with the object of facilitating its collection that he ordered the compilation of Domesday Book. It continued to be levied until 1163, in which year the name Danegeld appears for the last time in the

Rolls. Its place was taken by other imposts of similar character but different name.

DANELAGH, the name given to those districts in the north and north-east of England which were settled by Danes and other Scandinavian invaders during the period of the Viking invasions. The real settlement of England by Danes began in the year 866 with the appearance of a large army in East Anglia, which turned north in the following year. The Danes captured York and overthrew the Northumbrian kingdom, setting up a puppet king of their own. They encamped in Nottingham in 868, and Northern Mercia was soon in their hands; in 870 Edmund, king of the East Anglians, fell before them. During the next few years they maintained their hold on Mercia, and we have at this time coins minted in London with the inscription " Alfdene rex," the name of the Danish

leader. In the winter of 874–875 they advanced as far north as the Tyne, and at the same time Cambridge was occupied. In the meantime the great struggle with Alfred the Great was being carried on. This was terminated by the peace of Wedmore in 878, when the Danes withdrew from Wessex and settled finally in East Anglia under their king Guthrum. This peace was finally and definitely ratified in the document known as the peace of Alfred and Guthrum, which is probably to be referred to the year 880. The peace determined the boundary of Guthrum's East Anglian kingdom. According to the terms of the agreement the boundary was to run along the Thames estuary to the mouth of the Lea (a few miles east of London), then up the Lea to its source near Leighton Buzzard, then due north to Bedford, then eastwards up the Ouse to Watling Street somewhere near Fenny or Stony Stratford. From this point the boundary is left undefined, perhaps because the kingdoms of Alfred and Guthrum ceased to be conterminous here, though if Northamptonshire was included in the kingdom of Guthrum, as seems likely, the boundary must be carried a few miles along Watling Street. Thus Northern Mercia, East Anglia, the greater part of Essex and Northumbria were handed over to the Danes and henceforth constitute the district known as the Danelagh.

The three chief divisions of the Danelagh were (1) the kingdom of Northumbria, (2) the kingdom of East Anglia, (3) the district of the Five (Danish) Boroughs — lands grouped round Leicester, Nottingham, Derby, Stamford and Lincoln, and forming a loose confederacy. Of the history of the two Danish kingdoms we know very little. Guthrum of East Anglia died in 890, and later we hear of a king Eric or Eohric who died in 902. Another Guthrum was ruling there in the days of Edward the Elder. The history of the Northumbrian kingdom is yet more obscure. After an interregnum consequent on the death of Healfdene the kingdom passed in 883 to one Guthred, son of Hardicanute, who ruled till 894, when his realm was taken over by King Alfred, though probably only under a very loose sovereignty. It may

be noted here that Northumbria north of the Tyne, the old Bernicia, seems never to have passed under Danish authority and rule, but to have remained in independence until the general submission to Edward in 924.

More is known of the history of the five boroughs. From 907 onwards Edward the Elder, working together with yEthelred of Mercia and his wife, worked for the recovery of the Danelagh. In that year Chester was fortified. In 9 1 1–9 1 2 an advance on Essex and Hertfordshire was begun. In 914 Buckingham was fortified and the Danes of Bedfordshire submitted. In 917 Derby was the first of the five boroughs to fall, followed by Leicester a few months later. In the same year after a keen struggle all the Danes belonging to the " borough " of Northampton, as far north as the Welland (i.e. the border of modern Northamptonshire), submitted to Edward and at the sam,e time Colchester was forti- fied; a large portion of Essex submitted and the whole of the East Anglian Danes came in. Stamford was the next to yield, soon followed by Nottingham, and in 920 there was a general submis- sion on the part of the Danes and the reconquest of the Danelagh was now complete.

Though the independent occupation of the Danelagh by Viking invaders did not last for more than fifty years at the

outside, the Danes left lasting marks of their presence in these territories.

The divisions of the land are foreign not native. The grouping of shires round a county town as distinct from the old national shires is probably of Scandinavian origin, and so certainly is the division of Yorkshire and Lincolnshire into " ridings." In Derbyshire, Leicestershire, Lincolnshire, part of Northampton- shire, Nottinghamshire, Rutlandshire (of later formation)

and Yorkshire we have the counties divided into " wapentakes " instead of " hundreds," again a mark of Danish influence.

When we turn to the social divisions we find in Domesday and other documents classes of society in these districts bearing purely Norse names, dreng, karl, karlman, bonde, thrall, lysing, hold; in the system of taxation we have an assessment by carucates and not by hides and virgates, and the duodecimal rather than the decimal system of reckoning.

The highly developed Scandinavian legal system has also left abundant traces in this district. We may mention specially the institution of the " lawmen," whom we find as a judicial body in several of the towns in or near the Danelagh. They are found at Cambridge, Stamford, Lincoln, York and Chester. There can be no doubt that these " lawmen," who can be shown to form a close parallel to and indeed the ultimate source of our jury, were of Scandinavian origin. Many other legal terms can be definitely traced to Scandinavian sources, and they are first found in use in the district of the Danelagh.

The whole of the place nomenclature of Yorkshire, Lincolnshire, Nottinghamshire and Northern Northamptonshire is Scandi- navian rather than native English, and in the remaining districts of the Danelagh a goodly proportion of Danish place-names may be found. Their influence is also evident in the dialects spoken in these districts to the present day. It is probable that until the end of the ioth century Scandinavian dialects were almost the sole language spoken in the district of the Danelagh, and when English triumphed, after an intermediate bilingual state, large numbers of words were adopted from the earlier Scandinavian speech.

See The Anglo-Saxon Chronicle, edited by Earle and Plummer (Oxford, 1892-1899); J. C. H. R. Steenstrup, Normannerne (4 vols., 1876-1882) ; and A. Bugge, Vikingerne (2 vols.). (A. Mw.)

DANGERFIELD, THOMAS (c. 1650–1685), English conspirator, was born about 1650 at Waltham, Essex, the son of a farmer. He began his career by robbing his father, and, after a rambling life, took to coining false money, for which offence and others he was many times imprisoned. False to everyone, he first tried to involve the duke of Monmouth and others by concocting infor- mation about a Presbyterian plot against the throne, and this having been proved a lie, he pretended to have discovered a Catholic plot against Charles II. This was known as the " Meal- tub Plot," from the place where the incriminating documents were hidden at his suggestion, and found by the king's officers by his information. Mrs Elizabeth Cellier, — in whose house the tub was, — almoner to the countess of Powis, who had befriended Dangerfield when he posed as a Catholic, was, with her patroness, actually tried for high treason and acquitted (1680). Danger- field, when examined at the bar of the House of Commons, made other charges against prominent Papists, and attempted to defend his character by publishing, among other pamphlets, Dangerfield' s Narrative. This led to his trial for libel, and on the 29th of June 1685 he received sentence to stand in the pillory on two consecutive days, be whipped from Aldgate to Newgate, and two days later from Newgate to Tyburn. On his way back he was struck in the eye with a cane by a barrister, Robert Francis, and died shortly afterwards from the blow. The barrister was, tried and executed for the murder.

DANIEL, the name given to the central figure 1 of the biblical Book of Daniel (see below), which is now generally regarded as a production dating from the time of Antiochus Epiphanes (175-

1 Four personages of the name of Daniel appear in the Old Testa- ment: (1) the patriarch of Ezekiel (see above); (2) a son of David (1 Chron. iii. 1) ; (3) a Levite contemporary with Ezra (Ezra viii. 2 ; Neh. x. 6) ; (4) our Daniel.

J 164 B.C.). There are no means of ascertaining anything definite concerning the origin of the hero

Daniel. The account of him in Dan. i. has been generally misunderstood. According to i. 3, the Babylonian chief eunuch was commanded to bring " certain of the children of Israel, and of the king's seed, and of the nobles " to serve in the court. Many commentators have considered this to mean that some of the children were of the royal Judaean line of Jewish noble families, an interpretation which is not justified by the wording of the passage, which contains nothing to indicate that the author meant to convey the idea that Daniel was either royal or noble. Josephus, 2 never doubting the historicity of Daniel, made the prophet a relative of Zedekiah and consequently of Jehoiakim, a conclusion which he apparently drew from the same passage, i. 3. Pseudo-Epiphanius, 3 again, probably having the same source in mind, thought that Daniel was a Jewish noble. The true Epiphanius 4 even gives the name of his father as Sabaan, and states that the prophet was born at Upper Beth- Horon, a village near Jerusalem. The after life and death of the seer are as obscure as his origin. The biblical account throws no light on the subject. According to the rabbis, 6 Daniel went back to Jersualem with the return of the captivity, and is supposed to have been one of the founders of the mythical Great Synagogue. Other traditions affirm that he died and was buried in Babylonia in the royal vault, while the Jewish traveller Benjamin of Tudela (12th cent, a.d.) was shown his tomb in Susa, which is also mentioned by the Arab, Abulfaragius (Bar-hebraeus). The author of Daniel did not pretend to give any sketch of the prophet's career, but was content merely with making him the central figure, around which to group more or less disconnected narratives and accounts of visions. In view of these facts, and also of the generally inaccurate character of all the historical statements in the work, there is really no evidence to prove even the existence of the Daniel described in the book bearing his name.

The question at once arises as to where the Maccabaean author of Daniel could have got the name and personality of his Daniel. It is not probable

that he could have invented both name and character. There is an allusion in the prophet Ezekiel (xiv. 14, 20, xxviii. 3) to a Daniel whom he places as a great personality between Noah and Job. But this could not be our Daniel , whom Ezekiel, probably a man of ripe age at the time of the Babylonian deportation of the Jews, would hardly have mentioned in the same breath with two such characters, much less have put him between them, because, had the Daniel of the biblical book, existed at this time, he would have been a mere boy, lacking any such distinction as to make him worthy of so high a mention. It is evident that Ezekiel considered his Daniel to be a celebrated ancient prophet, concerning whose date and origin, however, there is not a single trace to guide research. Hitzig's 6 conjecture that the Daniel of Ezekiel was Melchizedek is quite without foundation. The most that can be said in this connexion is that there may really have been a spiritual leader of the captive Jews who resided at Babylon and who was either named Daniel, perhaps after the unknown patriarch mentioned by Ezekiel, or to whom the same name had been given in the course of tradition by some historical confusion of persons. Following this hypothesis, it must be assumed that the fame of this Judaeo-Babylonian leader had been handed down through the unclear medium of oral tradition until the time of Antiochus Epiphanes, when some gifted Jewish author, feeling the need of producing a work which should console his people in their affliction under the persecutions of that monarch, seized upon the personality of the seer who lived during a time of persecu- tion bearing many points of resemblance to that of Antiochus IV., and moulded some of the legends than extant about the life and activity of this misty prophet into such a form as should be best suited to a didactic purpose. 7

2 Ant. x. 10, 1. s Chap, x., on the Prophets.

4 Panarion, adv. Haeres. 55, 3. 6 Prince, Dan. p. 26, n. 6.

6 Dan. p. viii.

‘ The account in chap. ii. of the firomotion of Daniel to be governor of Babylon, as a reward for his correct interpretation of Nebuchad- rezzar’s dream, is very probably an imitation of the story of Joseph in Gen. xl-xli. The points of resemblance are very striking. In both accounts, we have a young Hebrew raised by the favour of a heathen

Daniel, Book of. — The Book of Daniel stands between Ezra and Esther in the third great division of the Hebrew Bible known as the Hagiographa, in which are classed all works which were not regarded as being part of the Law or the Prophets . The book presents the unusual peculiarity of being written in two languages, i.-ii. 4 and viii.-xii. being in Hebrew, while the text of ii. 4-vii. is the Palestinian dialect of Aramaic. 1 The subject matter, however, falls naturally into two divisions which are not co- ter- minous with the linguistic sections; viz. i.-vi. and vii.-xii. The first of these sense-divisions deals only with narratives regarding the reign of Nebuchadrezzar and his supposed son Belshazzar, while the second section consists exclusively of apocalyptic prophecies. There can be no doubt that a definite plan was followed in the arrangement of the work. The author’s object was clearly to demonstrate to his readers the necessity of faith in Israel’s God, who shall not for ever allow his chosen ones to be ground under the heel of a ruthless heathen oppressor. To illustrate this, he makes use on the one hand (i.-vi.) of carefully chosen narratives, somewhat loosely connected it is true, but all treating substantially the same subject, — the physical triumph of God’s servant over his unbelieving enemies; and on the other hand (vii.-xii.) , he introduces certain prophetic visions illustrative of God’s favour towards the same servant, Daniel. So carefully is this record of the visions arranged that the first two chapters of the second part of the book (vii.-viii.) were no doubt purposely made to appear in a symbolic form, in

order that in the last two revelations (xi.-xii.), which were couched in such direct language as to be intelligible even to the modern student of history, the author might obtain the effect of a climax. The book is probably not therefore a number of parts of different origin thrown loosely together by a careless editor, who does not deserve the title of author. 2 The more or less disconnected sections of the first part of the work were probably so atranged purposely, in order to facilitate its diffusion at a time when books were known to the people at large chiefly by being read aloud in public.

Various attempts have been made to explain the sudden change from Hebrew to Aramaic in ii. 4. It was long thought, for example, that Aramaic was the vernacular of Babylonia and was consequently employed as the language of the parts relating to that country. But this was not the case, because the Babylonian language survived until a later date than that of the events portrayed in Daniel. 3 Nor is it possible to follow the theory of Merx, that Aramaic, which was the popular tongue of the day when the Book of Daniel was written, was therefore used for the simpler narrative style, while the more learned Hebrew was made the idiom of the philosophical portions. 4 The first chapter, which is just as much in the narrative style as are the following Aramaic sections, is in Hebrew, while the distinctly apocalyptic chapter vii. is in Aramaic. A third view, that the bilingual character of the work points to a time when both languages were used indifferently, is equally unsatisfactory, 6 because it is highly questionable whether two idioms can ever be used quite indiffer- ently. In fact, a hybrid work in two languages would be a literary monstrosity. In view of the apparent unity of the entire work, the only possible explanation seems to be that the book was written at first all in Hebrew, but for the convenience of the general reader whose vernacular was Aramaic, a translation, possibly from the same pen as the original, was made into king to great political prominence, owing to his extraordinary God- given ability to interpret

dreams. In both versions, the heathen astrologers make the first attempt to solve the difficulty, which results in failure, whereupon the pious Israelite, being summoned to the royal presence, in both cases through the friendly intervention of a court official, triumphantly explains the mystery to the king's satisfaction (cf. Prince, Dan. p. 29).

1 See Beyan, Dan. 28-40, on the Hebrew and Aramaic of Daniel.

2 According to Lagarde, Mitteilungen, iv. 351 (1891); also Gott, Gelehrte Anzeigen (1891), 497-520.

3 The latest connected Babylonian inscription is that of Antiochus Soter (280-260 B.C.), but the language was probably spoken until Hellenic times; cf. Gutbrod, Zeitschr. fur Assyriol. vi. 27.

4 Prince, Dan. 12.

Bertholdt, Dan. 15; Franz Delitzsch, in Herzog, Realencyklo- ptidie, ->nd ed., iii. 470.

Aramaic. It must be supposed then that, certain parts of the original Hebrew manuscript being lost, the missing places were supplied from the current Aramaic translation. 6

It cannot be denied in the light of modern historical research that if the Book of Daniel be regarded as pretending to full historical authority, the biblical record is open to all manner of attack. It is now the general opinion of most modern scholars who study the Old Testament from a critical point of view that this work cannot possibly have originated, according to the traditional theory, at any time during the Babylonian monarchy, when the events recorded are supposed to have taken place.

The chief reasons for such a conclusion are as follows. 7

1 . The position of the book among the Hagiographa, instead of among the Prophetical works, seems to

show that it was intro- duced after the closing of the Prophetical Canon. Some com- mentators have believed that Daniel was not an actual prophet in the proper sense, but only a seer, or else that he had no official standing as a prophet and that therefore the book was not entitled to a place among official prophetical books. But if the work had really been in existence at the time of the completion of the second part of the canon, the collectors of the prophetical writings, who in their care did not neglect even the parable of Jonah, would hardly have ignored the record of so great a prophet as Daniel is represented to have been.

2. Jesus ben Sirach (Ecclesiasticus), who wrote about 200- 180 B.C., in his otherwise complete list of Israel's leading spirits (xlix.), makes no mention of Daniel. Hengstenberg's plea that Ezra and Mordecai were also left unmentioned has little force, because Ezra appears in the book bearing his name as nothing more than a prominent priest and scholar, while Daniel is repre- sented as a great prophet.

3. Had the Book of Daniel been extant and generally known after the time of Cyrus (537-529 B.C.), it would be natural to look for some traces of its power among the writings of Haggai, Zechariah and Malachi, whose works, however, show no evidence that either the name or the history of Daniel was known to these authors. Furthermore, the manner in which the prophets are looked back upon in ix. 6-10 cannot fail to suggest an extremely late origin for the book. Besides this, a careful study of ix. 2 seems to indicate that the Prophetical Canon was definitely completed at the time when the author of Daniel wrote. It is also highly probable that much of the material in the second part of the book was suggested by the works of the later prophets, especially by Ezekiel and Zechariah.

4. Some of the beliefs set forth in the second part of the book also practically preclude the possibility of the author having lived at the courts of Nebuchadrezzar and his successors. Most

noticeable among these doctrines is the complete system of angelology consistently followed out in the Book of Daniel, according to which the management of human affairs is en- trusted to a regular hierarchy of commanding angels, two of whom, Gabriel and Michael, are even mentioned by name. Such an idea was distinctly foreign to the primitive Israelitish con- ception of the indivisibility of Yahweh's power, and must conse- quently have been a borrowed one. It could certainly not have come from the Babylonians, however, whose system of attendant spirits was far from being so complete as that which is set forth in the Book of Daniel, but rather from Persian sources where a more complicated angelology had been developed. As many commentators have brought out, there can be little doubt that the doctrine of angels in Daniel is an indication of prolonged Persian influence. Furthermore, it is now very generally admitted that the doctrine of the resurrection of the dead, which is advanced for the first time in the Old Testament in Daniel, also originated among the Persians, 8 and could only have been engrafted on the Jewish mind after a long period of intercourse with the Zoroastrian religion, which came into contact with the Jewish thinkers considerably after the time of Nebuchadrezzar.

6 Bevan, Dan. 27 ff. ; Prince, Dan. 13.

7 For this whole discussion, see Prince, Dan. 15 ff.

8 The investigations of Haug, Spiegel and Windischmann show that this was a real Zoroastrian doctrine.

5. All the above evidences are merely internal, but we are now able to draw upon the Babylonian historical sources to prove that Daniel could not have originated at the time of Nebuchad- rezzar. There can be no doubt that the author of Daniel thought that Belshazzar (q.v.), who has now been

identified beyond all question with Bel-sar-uzur , the son of Nabonidus, the last Semitic king of Babylon, was the son of Nebuchadrezzar, and that Belshazzar attained the rank of king. 1 This prince did not even come from the family of Nebuchadrezzar. Nabonidus, the father of Belshazzar, was the son of a nobleman Nabu-baladsu-iqbi, who was in all probability not related to any of the preceding kings of B abylon. Had Nabonidus been descended from Nebuchadrezzar he could hardly have failed in his records, which we possess, to have boasted of such a connexion with the greatest Babylonian monarch; yet in none of his inscriptions does he trace his descent beyond his father. Certain expositors have tried to obviate the difficulty, first by supposing that the expression " son of Nebuchadrezzar " in Daniel means " descendant " or " son," a view which is rendered untenable by the facts just cited. This school has also endeavoured to prove that the author of Daniel did not mean to imply Belshazzar's kingship of Babylon at all by his use of the word " king," but they suggest that the writer of Daniel believed Belshazzar to have been co-regent. If Belshazzar had ever held such a position, which is extremely unlikely in the absence of any evidence from the cuneiform documents, he would hardly have been given the unqualified title " king of Babylon " as occurs in Daniel. 2 For example, Cambyses, son of Cyrus, was undoubtedly co-regent and bore the title " king of Babylon " during his father's lifetime, but, in a contract which dates from the first year of Cambyses, it is expressly stated that Cyrus was still " king of the lands." This should be contrasted with Dan. viii. 1, where reference is made to the " third year of Belshazzar, king of Babylon " without any allusion to another over-ruler. Such attempts are at best subterfuges to support an impossible theory regarding the origin of the Book of Daniel, whose author clearly believed in the kingship of Belshazzar and in that prince's descent from Nebuchadrezzar.

Furthermore, the writer of Daniel asserts (v. 1) that a monarch " Darius the Mede " received the

kingdom of Babylon after the fall of the native Babylonian house, although it is evident, from i. 21, x. 1, that the biblical author was perfectly aware of the existence of Cyrus. 3 The fact that in no other scriptural passage is mention made of any Median ruler between the last Semitic king of Babylon and Cyrus, and the absolute silence of the authoritative ancient authors regarding such a king, make it apparent that the late author of Daniel is again in error in this particular. It is known that Cyrus became master of Media by conquering Astyages, and that the troops of the king of Persia capturing Babylon took Nabonidus prisoner with but little difficulty. Unsuccessful attempts have been made to identify this mythical Darius with the Cyaxares, son of Astyages, of Xeno- phon's Cyropaedia, and also with the Darius of Eusebius, who was in all probability Darius Hystaspis. There is not only no room in history for this Median king of the Book of Daniel, but it is also highly likely that the interpolation of " Darius the Mede " was caused by a confusion of history, due both to the destruction of the Assyrian capital Nineveh by the Medes, sixty-eight years before the capture of Babylon by Cyrus, and also to the fame of the later king, Darius Hystaspis, a view which was advanced as early in the history of biblical criticism as the days of the Bene- dictine monk,' Marianus Scotus. It is important to note in this connexion that Darius the Mede is represented as the son of Xerxes (Ahasuerus) and it is stated that he established 120 satrapies. Darius Hystapis was the father of Xerxes, and according to Herodotus (iii. 89) established twenty satrapies. Darius the Mede entered into possession of Babylon after the death of Belshazzar; Darius Hystaspis conquered Babylon

1 Prince, Dan. 35-42.

2 Certain tablets published by Strassmaier, bearing date con- tinuously from Nabonidus to Cyrus, show that neither Belshazzar nor " Darius the Mede " could have had the title " king of Babylon." See Driver, Introduction, 3 xxii.

from the hands of certain rebels (Her. iii. 153-160). In fine, the interpolation of a Median Darius must be regarded as the most glaring historical inaccuracy of the author of Daniel. In fact, this error of the author alone is proof positive that he must have lived at a very late period, when the record of most of the earlier historical events had become hopelessly confused and perverted.

With these chief reasons why the Book of Daniel cannot have originated in the Babylonian period, -if the reader will turn more especially to the apocalyptic sections (vii.-xii.), it will be quite evident that the author is here giving a detailed account of historical events which may easily be recognized through the thin veil of prophetic mystery thrown lightly around them. It is indeed highly suggestive that just those occurrences which are the most remote from the assumed standpoint of the writer are the most correctly stated, while the nearer we approach the author's supposed time, the more inaccurate does he become. It is quite apparent that the predictions in the Book of Daniel centre on the period of Antiochus Epiphanes (1 7 5-1 64 B.C.) , when that Syrian prince was endeavouring to suppress the worship of Yahweh and substitute for it the Greek religion. 4 There can be no doubt, for example, that in the " Little Horn " of vii. 8, viii. 9, and the " wicked prince " described in ix.-x., who is to work such evil among the saints, we have clearly one and the same person. It is now generally recognized that the king symbolized by the Little Horn, of whom it is said that he shall come of one of four kingdoms which shall be formed from the Greek empire after the death of its first king (Alexander), can be none other than Antiochus Epiphanes, and in like manner the references in ix. must allude to the same prince. It seems quite clear that xi. 21-45 refers to the evil deeds of Antiochus IV. and his attempts against the Jewish people and the worship of Yahweh. In xii. follows the promise of salvation from the same tyrant, and, strikingly

enough, the predictions in this last section, x.–xii., relating to future events, become inaccurate as soon as the author finishes the section describing the reign of Antiochus Epiphanes. The general style of all these prophecies differs materially from that of all other prophetic writings in the Old Testament. Other prophets confine themselves to vague and general predictions, but the author of Daniel is strikingly particular as to detail in everything relating to the period in which he lived, i.e. the reign of Antiochus IV. Had the work been composed during the Babylonian era, it would be more natural to expect prophecies of the return of the exiled Jews to Palestine, as in Jeremiah, Ezekiel and Isaiah, rather than the acclamation of an ideal Messianic kingdom such as is emphasized in the second part of Daniel.

As a specimen of the apocalyptic method followed in Daniel, the celebrated prophecy of the seventy weeks (ix. 24–27) may be cited, a full discussion of which will be found in Prince, Daniel 1 57–161. According to Jer. xxv. 11–12, the period of Israel's probation and trial was to last seventy years. In the angelic explanation in Daniel of Jeremiah's prophecy, these years were in reality year-weeks, which indicated a period of 490 years. This is the true apocalyptic system. The author takes a genuine prophecy, undoubtedly intended by Jeremiah to refer simply to the duration of the Babylonian captivity, and, by means of a purely arbitrary and mystical interpretation, makes it denote the entire period of Israel's degradation down to his own time. This prophecy is really nothing more than an extension of the vision of the 2300 evening-mornings of viii. 14, and of the " time, times and a half a time " of vii. 25. The real problem is as to the beginning and end of this epoch, which is divided into three periods of uneven length; viz. one of seven weeks; one of sixty- two weeks; and the last of one week. It seems probable that the author of Daniel , like the Chronicler, began his period with the fall of Jerusalem in 586. His first seven weeks, therefore, ending with theruleof " Messiah the Prince," 5

probably Joshua ben Jozadak, the first high-priest after the exile (Ezra iii. 2), seem to coincide exactly with the duration of the Babylon exile, i.e. forty-nine years.

4 Prince, Dan. 19-20, 140, 155, 179 ff.

'That " Messiah " or " Anointed One " was used of the High- Priest is seen from Lev. x, 3, v. 16.

The second period of the epoch, during which Jerusalem is to be peopled and built, and at the end of which the Messiah is to be cut off, is much more difficult to determine. The key to the problem lies undoubtedly in the last statement regarding the overthrow of the Messiah or Anointed One. Such a reference coming from a Maccabean author can only allude to the deposi- tion by Antiochus IV. of the high-priest Onias III., which took place about 174 B.C., and the Syrian king's subsequent murder of the same person not later than 171 (2 Mace. iv. 33-36). The difficulty now arises that between 537 and 171 there are only 366 years instead of the required number 434. It was evidently not the author's intention to begin the second period of sixty weeks simultaneously with the first period, as some expositors have thought, because the whole passage shows conclusively that he meant seventy independent weeks. Besides, nothing is gained by such a device, which would bring the year of the end of the second period down to the meaningless date 152, too late to refer to Onias. Cornill therefore adopted the only tenable theory regarding the problem; viz. that the author of Daniel did not know the chronology between 537 and 312, the establishment of the Seleucid era, and consequently made the period too long. A parallel case is the much quoted example of Demetrius, who placed the fall of Samaria (722 B.C.) 573 years before the succes- sion of Ptolemy IV. (222), thus making an error of seventy-three years. Josephus, who places the reign of Cyrus forty to

fifty years too early, makes a similar error.

The last week is divided into two sections (26-27), in the first of which the city and sanctuary shall be destroyed and in the second the daily offering is to be suspended. All critical scholars recognize the identity of this second half week with the " time, times and a half a time " of vii. 25. This last week must, there fore, end with the restoration of the temple worship in 164 b.c.

This whole prophecy, which is perhaps the most interesting in the Book of Daniel, presents problems which can never be thoroughly understood, first because the author must have been ignorant of both history and chronology, and secondly, because, in his effort to be as mystical as possible, he purposely made use of indefinite and vague expressions which render the criticism of the passage a most unsatisfactory task.

The Book of Daniel loses none of its beauty and force because we are bound, in the light of modern criticism, to consider it as a production of the reign of Antiochus Epiphanes, nor should conservative Bible-readers lament because the historical accuracy of the work is thus destroyed. The influence of the work was very great on the subsequent development of Christianity, but it was not the influence of the history contained in it which made itself felt, but rather of that sublime hope for a future deliverance of which the author of Daniel never lost sight. The allusion to the book by Jesus (Matt. xxiv. 1 5) shows merely that our Lord was referring to the work by its commonly accepted title, and implies no authoritative utterance with regard to its date or authorship. Our Lord simply made use of an apt quotation from a well-known work in order to illustrate and give additional force to his own prediction. If the book be properly understood, it must not only be admitted that the author made no pretence at accuracy of detail, but also that his prophecies were clearly in- tended to be merely an historical resume, clothed for the sake of greater literary vividness in a prophetic garb .

The work, which is certainly not a forgery, but only a consolatory political pamphlet, is just as powerful, viewed according to the author's evident intention, as a consolation to God's people in their dire distress at the time of Antiochus Epiphanes, as if it were, what an ancient but mistaken tradition had made it, really an accurate account of events which took place at the close of the Babylonian period. 1

Literature. — See bibliography in Bevan, Daniel 9, and add Kamphausen, Dan., in Haupt's Sacred Books of the Old Testament; Behrmann, Dan. (1894); J- D. Prince, Dan. (1899); G. A. Barton, " The Compilation of the Book of Daniel," in Journ. Bibl. Lit. (1898), 62-86, against the unity of the book, &c, &c.; J. D. Davis, " Persian Words and the Date of O.T. Documents," in Old Testament and Semitic Studies: in Memory of W. R. Harper (Chicago, 1908). ' (J. D. Pr.)

1 Prince, Dan. 22-24.

Additions to Daniel. — The " additions to Daniel " are three in number: Susannah and the Elders, Bel and the Dragon, and The Song of the Three Children. Of these the two former have no organic connexion with the text. The case is otherwise with regard to the last. In some respects it helps to fill up a gap in the canonical text between verses 23 and 24 of chapter iii. And yet we find Polychronius, early in the 5th century, stating that this song was not found in the Syriac version.

Susannah. — This addition was placed by Theodotion before chap, i., and Bel and the Dragon at its close, whereas by the Septuagint and the Vulgate it was reckoned as chap. xiii. after the twelve canonical chapters, Bel and the Dragon as xiv. Theodotion's version is the source of the Peshitto and the Vulgate, for all three additions, and the Septuagint is the source of the Syro-Hexaplaric which has been published by Ceriani (Mon. Sacr. vii.) . The legend recounts how that in the early days of the Captivity Susannah, the beautiful and

pious wife of the rich Joakim, was walking in her garden and was there seen by two elders who were also judges. Inflamed with lust, they made infamous proposals to her, and when repulsed they brought against her a false charge of adultery. When brought before the tribunal she was condemned to death and was on the way to execution, when Daniel interposed and, by cross-questioning the accusers apart, convinced the people of the falsity of the charge.

The source of the story may, according to Ewald (Gesch? iv. 636), have been suggested by the Babylonian legend of the seduction of two old men by the goddess of love (see also Koran, Sur. ii. 96) . Another and much more probable origin of the work is that given by Briill (Das apocr. Susanna-Buch, 1877) and Ball (Speaker's A poor. ii. 3 23-33 1) . The first half of the story is based on a tradition — originating possibly in Jer. xxix. 21-32 and found in the Talmud and Midrash — of two elders Ahab and Zedekiah, who in the Captivity led certain women astray under the delusion that they should thereby become the mother of the Messiah. But the most interesting part of the investigation is concerned with the latter half of the story, which deals with the trial. The characteristics of this section point to its composition about 100- 90 B.C., when Simon ben Shetah was president of the Sanhedrin. Its object was to support the attempts of the Pharisees to bring about a reform in the administration of the law courts. According to Sadducean principles the man who was convicted of falsely accusing another of a capital offence was not put to death unless his victim was already executed. The Pharisees held that the intention of the accusers was equivalent to murder. Our apocryph upholds the Pharisaic contention. As Simon ben Shetah insisted on a rigorous examination of the witnesses, so does our writer: as he and his party required that the perjurer should suffer the same penalty he sought to inflict on another, so our writer represents the death penalty as inflicted on the perjured elders.

The language was in all probability Semitic-Hebrew or Aramaic. The paronomasiae in the Greek in verses

54-55 (oto axivov . . . cxtcret) and 58-59 (inro irplvov . . . irpio-ei) present no cogent difficulty against this view; for they may be accidental and have arisen for the first time in the translation. But as Briill and Ball have shown (see Speaker's Apocr. ii. 324), the same paronomasiae are possible either in Hebrew or Aramaic.

Literature. — Ball in the Speaker's Apocr. ii. 233 sqq.; Schiirer, Gesch. 3 iii. 333; Rothstein in Kautzsch's Apocr. u. Pseud, i. 176 sqq.; Kamphausen in Ency. Bib.; Marshall in Hastings' Bible Diet. ; Toy in the Jewish Encyc.

Bel and the Dragon. — We have here two independent narratives, in both of which Daniel appears as the destroyer of heathenism. The latter had a much wider circulation than the former, and is most probably a Judaized form of the old Semitic myth of the destruction of the old dragon, which represents primeval chaos (see Ball, Speaker's Apocr. ii. 346-348; Gunkel, Schopfung und Chaos, 320-323). Marduk destroys Tiamat in a similar manner to that in which Daniel destroys the dragon (Delitzsch, Das babylonische Weltschopfung Epos), by driving a storm- wind into the dragon which rends it asunder. Marshall (Hastings' Bib. Diet. i. 267) suggests that the " pitch " of the Greek (Aramaic NB'i) arose from the original term for storm- wind (xsyi)-

The Greek exists in two recensions, those of the Septuagint and Theodotion. Most scholars maintain a Greek original, but this is by no means certain. Marshall (Hastings' Bib Diet. i. 268) argues for an Aramaic, and regards Gasters's Aramaic text [Proceedings of the Society of Biblical Archaeology (1894), pp. 280-290, 312-317; (1S95) 75-94] as of primary value in this respect, but this is doubtful.

Literature. — Fritzsche's Handbuch zu den Apoc. ; Ball in the Speaker's Apocr. ii. 344 sqq.; Schurer,

3 Gesch. iii. 332 sqq. ; and the articles in the Ency. Bibl., Bible Diet., and Jewish Encyc.

The Greek text is best given in Swete iii., and the Syriac will be found in Walton's Polyglot, Lagarde and Neubauer's Tobit.

Song of the Three Children. — This section is composed of the Prayer of Azariah and the Song of Azariah, Ananias and Misael, and was inserted after iii. 23 of the canonical text of Daniel. According to Fritzsche, Konig, Schurer, &c, it was composed in Greek and added to the Greek translation. On the other hand, Delitzsch, Bissell, Ball, &c, maintain a Hebrew original. The latter view has been recently supported by Rothstein, Apocr. und Pseud, i. 173–176, who holds that these additions were made to the text before its translation into Greek. These additions still preserve, according to Rothstein, a fragment of the original text, i.e. verses 23–28, which came between verses 23 and 24 of chapter iii. of the canonical text. They certainly fill up excellently a manifest gap in this text. " The Song of the Three Children " was first added after the verses just referred to, and subsequently the Prayer of Azariah was inserted before these verses.

Literature. — Ball in the Speaker's Apocr. ii. 305 sqq. ; Rothstein in Kautzsch's Apocr. und Pseud, i. 173 sqq.; Schurer, 3 Gesch. iii. 332 sqq. (R. H. C.)

DANIEL (Danil), of Kiev, the earliest Russian travel- writer, and one of the leading Russian travellers in the middle ages. He journeyed to Syria and other parts of the Levant about 1106- 1107. He was the igumen, or abbot, of a monastery probably near Chernigov in Little Russia: some identify him with one Daniel, bishop of Suriev (fl. 1115–1122). He visited Palestine in the reign of Baldwin I., Latin king of Jerusalem (1100–1118), and apparently soon after the crusading capture of Acre (1104); he claims to have accompanied Baldwin, who treated him with marked friendliness, on an expedition against Damascus (c. 1 107). Though Daniel's narrative, beginning (as it practically ends) at

Constantinople, omits some of the most interesting sections of his journey, his work has considerable value. His picture of the Holy Land preserves a record of conditions (such as the Saracen raiding almost up to the walls of Christian Jerusalem, and the friendly relations subsisting between Roman and Eastern churches in Syria) peculiarly characteristic of the time; his account of Jerusalem itself is remarkably clear, minute and accurate; his three excursions — to the Dead Sea and Lower Jordan (which last he compares to a river of Little Russia, the Snov), to Bethlehem and Hebron, and towards Damascus — gave him an exceptional knowledge of certain regions. In spite of some extraordinary, blunders in topography and history, his observant and detailed record, marked by evident good faith, is among the most valuable of medieval documents relating to Palestine: it is also important in the history of the Russian language, and in the study of ritual and liturgy (from its descrip- tion of the Easter services in Jerusalem, the Descent of the Holy Fire, &c). Several Russian friends and companions, from Kiev and Old Novgorod, are recorded by Daniel as present with him at the Easter Eve " miracle," in the church of the Holy Sepulchre.

There are seventy-six MSS. of Daniel's Narrative, of which only five are anterior to A.D. 1500; the oldest is of 1475 (St Petersburg, Library of Ecclesiastical History 9/1086). Three editions exist, of which I. P. Sakharov's (St Petersburg, 1849) is perhaps the best known (in Narratives of the Russian People, vol. ii. bk. viii. pp. 1-45). See also the French version in Itineraires russes en orient, ed Me B. de Khitrovo (Geneva, 1889) (Societe de V orient latin); and the account of Daniel in C. R. Beazley, Dawn of Modern Geography, ii. 155-174- (C R. B.)

DANIEL, GABRIEL (1649-17 28), French Jesuit historian, was born at Rouen on the 8th of February 1649. He was educated by the Jesuits, entered the order at the age of eighteen, and

became superior at Paris. He is best known by his

*Histoire de France depuis I'etablissement de la monarchie franqaise (first complete edition, 1713), which was republished in 1720, 1721, 1725, 1742, and (the last edition, with notes by Father Griffet) 1755–1760. Daniel published an abridgment in 1724 (English trans., 1726), and another abridgment was published by Dorival in 1751. Though full of prejudices which affect his accuracy, Daniel had the advantage of consulting valuable original sources. His Histoire de la milice franqaise, &*c. (1721) is superior to his Histoire de France, and may still be consulted with advantage. Daniel also wrote a by no means successful reply to Pascal's Provincial Letters, entitled Entretiens de Cleanthe et d'Eudoxe snr les lettres provinciates (1694); two treatises on the Cartesian theory as to the intelligence of the lower animals, and other works.*

See Sommervogel, Bibliotheque de la Compagnie de Jesus, t. ii.

DANIEL, SAMUEL (1562–1619), English poet and historian, was the son of a music-master, and was born near Taunton, in Somersetshire, in 1562. Another son, John Daniel, was a musician, who held some offices at court, and was the author of Songs for the Lute, Viol and Voice (1606). In 1579 Samuel was admitted a commoner of Magdalen Hall, Oxford, where he remained>for about three years, and then gave himself up to the unrestrained study of poetry and philosophy. The name of Samuel Daniel is given as the servant of Lord Stafford, am- bassador in France, in 1 586, and probably refers to the poet. He was first encouraged and, if we may believe him, taught in verse, by the famous countess of Pembroke, whose honour he was never weary of proclaiming. He had entered her household as tutor to her son, William Herbert. His first known work, a translation of Paulus Jovius, to which some original matter is appended, was printed in 1585. His first known volume of verse is dated 1592; it contains the cycle of sonnets to Delia and the romance called The Complaint of Rosamond. Twenty-seven of the sonnets had already been printed at the end of Sir Philip Sidney's Astrophel and Stella without the author's

consent. Several editions of Delia appeared in 1592, and they were very frequently reprinted during Daniel's lifetime. We learn by internal evidence that Delia lived on the banks of Shakespeare's river, the Avon, and that the sonnets to her were inspired by her memory when the poet was in Italy. To an edition of Delia and Rosamond, in 1594, was added the tragedy of Cleopatra, a severe study in the manner of the ancients, in alternately rhyming heroic verse, diversified by stiff choral interludes. The First Four Books of the Civil Wars, an historical poem in ottava rima, appeared in 1 595. The bibliography of Daniel's works is attended with great difficulty, but as far as is known it was not until 1 599 that there was published a volume entitled Poetical Essays, which contained, besides the " Civil Wars," " Musophilus, " and " A letter from Octavia to Marcus Antonius," poems in Daniel's finest and most mature manner. About this time he became tutor to Anne Clifford, daughter of the countess of Cumberland,. On the death of Spenser, in the same year, Daniel received the somewhat vague office of poet-laureate, which he seems, however to have shortly resigned in favour of Ben Jonson. Whether it was on this occasion is not known, but about this time, and at the recommendation of his brother-in-law, Giovanni Florio, he was taken into favour at court, and wrote a Panegyric Congratulatorie offered to the King at Burleigh Harrington in Rutlandshire, in ottava rima. In 1603 this poem was published, and in many cases copies contained in addition his Poetical Epistles to his patrons and an elegant prose essay called A Defence of Rime (originally printed in 1602) in answer to Thomas Campion's Observations on the Art of English Poesie, in which it was contended that rhyme was unsuited to the genius of the English language. In 1603, moreover, Daniel was appointed master of the queen's revels. In this capacity he brought out a series of masques and pastoral tragi-comedies, — of which were printed A Vision of the Twelve Goddesses, in 1604; The Queen's Arcadia, an adaptation of Guarini's Pastor Fido, in 1606; Tethys Festival or the Queenes Wake, written on the occasion of Prince

Henry's becoming a Knight of the Bath, in 1610; and Hymen's Triumph, in honour

of Lord Roxburgh's marriage in 161 5. Meanwhile had appeared, in 1605, Certain Small Poems, with the tragedy of Philotas; the latter was a study, in the same style as Cleopatra, written some five years earlier. This drama brought its author into difficulties, as Philotas, with whom he expressed some sym- pathy, was taken to represent Essex. In 1607, under the title of Certaine small Workes heretofore divulged by Samuel Daniel, the poet issued a revised version of all his works except Delia and the Civil Wars. In 1609 the Civil Wars had been completed in eight books. In 1612 Daniel published a prose History of England, from the earliest times down to the end of the reign of Edward III. This work afterwards continued, and published in 161 7, was very popular with Drayton's contemporaries. The section dealing with William the Conqueror was published in 1692 as being the work of Sir Walter Raleigh, apparently without sufficient grounds.

Daniel was made a gentleman-extraordinary and groom of the chamber to Queen Anne, sinecure offices which offered no hindrance to an active literary career. He was now acknow- ledged as one of the first writers of the time. Shakespeare, Selden and Chapman are named among the few intimates who were permitted to intrude upon the seclusion of a garden-house in Old Street, St Luke's, where, Fuller tells us, he would " lie hid for some months together, the more retiredly to enjoy the company of the Muses, and then would appear in public to con- verse with his friends." Late in life Daniel threw up his titular posts at court and retired to a farm called " The Ridge," which he rented at Beckington, near Devizes in Wiltshire. Here he died on the 14th of October 16 19.

The poetical writings of Daniel are very numerous, but in spite of the eulogies of all the best critics, they were long neglected. This is the more singular since, during the 18th century, when so little Elizabethan literature was read, Daniel retained his poetical prestige. In later times Coleridge, Charles Lamb and others expended some of their most genial criticisms on this poet. Of bis multifarious works the sonnets are now, perhaps, most read. They depart from the Italian sonnet form in closing with a couplet, as is the case with most of the sonnets of Surrey and Wyat, but they have a grace and tenderness all their own. Of a higher order is The Complaint of Rosamond, a soliloquy in which the ghost of the murdered woman appears and bewails her fate in stanzas of exquisite pathos. Among the Epistles to Dis- tinguished Persons will be found some of Daniel's noblest stanzas tind most polished verse. The epistle to Lucy, countess of Bedford, fe remarkable among those as being composed in genuine terza rima, till then not used in English. Daniel was particularly fond of a four-lined stanza of solemn alternately rhyming iambics, a form of verse distinctly misplaced in his dramas. These, inspired it would seem by like attempts of the countess of Pembroke's, are hard and frigid; his pastorals are far more pleasing; and Hymen's Triumph is perhaps the best of all his dramatic writing. An extract from this masque is given in Lamb's Dramatic Poets, and it was highly praised by Coleridge. In elegiac verse he always excelled, but most of all in his touching address To the Angel Spirit of the Most Excellent Sir Philip Sidney. We must not neglect to quote Musophilus among the most characteristic writings of Daniel. It is a dialogue between a courtier and a man of letters, and is a general defence of learning, and in particular of poetic learning as an instrument in the education of the perfect courtier or man of action. It is addressed to Fulke Greville, and written, with much sententious melody, in a sort of terza rima, or, more properly, ottava rima with the couplet omitted. Daniel was a great reformer in verse, and the introducer of several valuable novelties. It may be

broadly said of his style that it is full, easy and stately, without being very animated or splendid. It attains a high average of general excellence, and is content with level flights. As a gnomic writer Daniel approaches Chapman, but is far more musical and coherent. He is wanting in fire and passion, but he is pre- eminent in scholarly grace and tender, mournful reverie.

Daniel's works were edited by A. B. Grosart in 1 885–1 896.

(E. G.)

DANIELL, JOHN FREDERIC (1790–1845), English chemist and physicist, was born in London on the 12th of March 1790, and in 1831 became the first professor of chemistry at the newly founded King's College, London. His name is best known for his invention of the Daniell cell {Phil. Trans., 1836), still ex- tensively used for telegraphic and other purposes. He also invented the dew-point hygrometer known by his name {Quar. Journ. Sci., 1820), and a register pyrometer (Phil. Trans., 1830) ; and in 1830 he erected in the hall of the Royal Society a water- barometer, with which he carried out a large number of observa- tions (Phil. Trans., 1832). A process devised by him for the manufacture of illuminating gas from turpentine and resin was in use in New York for a time. His publications include Meteoro- logical Essays (1823), an Essay on Artificial Climate considered in its Applications to Horticulture (1824), which showed the necessity of a humid atmosphere in hothouses devoted to tropical plants, and an Introduction to the Study of Chemical Philosophy (1839). He died suddenly of apoplexy on the 13th of March 1845, i n London, while attending a meeting of the council of the Royal Society, of which he became a fellow in 1813 and foreign secretary in 1839.

DANIELL, THOMAS (1749–1840), English landscape painter, was born at the Chertsey inn, kept by his father, in 1749, and apprenticed to an heraldic painter. Daniell, however, was ani- mated with a

love of the romantic and beautiful in architecture and nature. Up to 1784 he painted topographical subjects and flower pieces. By this time his two nephews (see below) had come under his influence, the younger, Samuel, being apprenticed to Medland the landscape engraver, and the elder, William, being under his own care. In this year (1784) he embarked for India accompanied by William, and found at Calcutta ample encourage- ment. Here he remained ten years, and on returning to London he published his largest work, Oriental Scenery, in six large volumes, not completed till 1808. From 1795 till 1828 he continued to exhibit Eastern subjects, temples, jungle hunts, &c, and at the same time continued the publication of illustrated works. These are — Views of Calcutta; Oriental Scenery, 144 plates; Views in Egypt; Excavations at Ellora; Picturesque Voyage to China. These were for the most part executed in aquatint. He was elected an Academician in 1799, fellow of the Royal Society about the same time, and at different times member of several minor societies. His nephews both died before him; his Indian period had made him independent, and he lived a bachelor life in much respect at Kensington till his death on the 19th of March 1840.

William Daniell (1769–1837), his nephew, was fourteen when he accompanied his uncle to India. His own publications, engraved in aquatint, were — Voyage to India; Zoography; Animated Nature; Views of London; Views of Bootan, a work prepared from his uncle's sketches; and a Voyage Round Great Britain, which occupied him several years. The British Institution made him an award of £100 for a " Battle of Trafalgar," and he was elected R.A. in 1822. He turned to panorama painting before his death, beginning in 1832 with Madras, the picture being enlivened by a representation of the Hindu mode of taming wild elephants.

Samuel Daniell, William's younger brother, was brought up as an engraver, and first appears as an exhibitor in 1792. A few years later he went to the Cape and travelled into the interior of Africa, with

his sketching materials in his haversack. The drawings he made there were published, after his return, in his African Scenery. He did not rest long at home, but left for Ceylon in 1806, where he spent the remaining years of his life, publishing The Scenery, Animals and Natives of Ceylon.

DANNAT, WILLIAM T. (1853-), American artist, was born in New York city in 1853. He was a pupil of the Royal Academy of Munich and of Munkacsy, and became an accom- plished draughtsman and a distinguished figure and portrait painter. He early attracted attention with sketches and pictures made in Spain, and a large composition, " The Quartette," now in the Metropolitan Museum of Art, New York, was one of the successes of the Paris Salon of 1884. Dannat settled in Paris,

became an officer of the Legion of Honour, and is represented in the Luxembourg.

DANNECKER, JOHANN HEINRICH VON (1758-1841), German sculptor, was born at Stuttgart, where his father was employed in the stables of the duke of Wurttemberg, on the 15th of October 1758. The boy was entered in the military school at the age of thirteen, but after two years he was allowed to take his own taste for art. We find him at once associating with the young sculptors Scheffauer and Le Jeune, the painters Guibal and Harper, and also with Schiller, and the musician Zumsteeg. His busts of some of these are good; that of Schiller is well known. In his eighteenth year he carried off the prize at the Concours with his model of Milo of Crotona. On this the duke made him sculptor to the palace (1780), and for some time he was employed on child-angels and caryatides for the decoration of the reception rooms. In 1783 he left for Paris with Scheffauer, and placed himself under Pajou. His Mars, a sitting figure sent home to Stuttgart, marks this period; and we next find him, still travel-

ling with his friend, at Rome in 1785, where he settled down to work hard for five years. Goethe and Herder were then in Rome and became his friends, as well as Canova, who was the hero of the day, and who had undoubtedly a great authoritative influence on his style. His marble statues of Ceres and Bacchus were done at this time. These are now in the Residenz-schloss, at Stuttgart. On his return to Stuttgart, which he never afterwards quitted except for short trips to Paris, Vienna and Zurich, the double influence of his admiration for Canova and his study of the antique is apparent in his works. The first was a girl lamenting her dead bird, which pretty light motive was much admired. Afterwards, Sappho, in marble for the Lustschloss, and two offering-bearers for the Jagdschloss; Hector, now in the museum, not in marble; the complaint of Ceres, from Schiller's poem; a statue of Christ, worthy of mention for its nobility, which has been skilfully engraved by Amsler; Psyche; kneeling water-nymph; Love, a favourite he had to repeat. These stock subjects with sculptors had freshness of treatment; and the Ariadne, done a little later, especially had a charm of novelty which has made it a European favourite in a reduced size. It was repeated for the banker Von Bethmann in Frankfort, and it now appears the ornament of the Bethmann Museum. Many of the illustrious men of the time were modelled by him. The original marble of Schiller is now at Weimar; after the poet's death it was again modelled in colossal size. Lavater, Metternich, Countess Stephanie of Baden, General Benkendorf and others are much prized. Dannecker was director of the Gallery of Stuttgart, and received many academic and other distinctions. His death in 1841 was preceded by a period of mental failure.

DANNEWERK, or Danewerk (Danish, Dannevirke or Dane-virke, " Danes' rampart "), the ancient frontier rampart of the Danes against the Germans, extending io| m. from just south of the town of Schleswig to the marshes of the river Trene near the village of Hollingstedt. The rampart was begun by Gu8oSr (Godefridus) , king of Vestfold, early in the 9th

century. In 934 it was passed by the German king Henry I., after which it was extended by King Harold Bluetooth (940–986), but was again stormed by the emperor Otto II. in 974. The chronicler Saxo Grammaticus mentions in his Gesta Danorum the " rampart of Jutland " (Jutiae moenia) as having been once more extended by Valdemar the Great (n 57–1 182), which has been cited among the proofs that Schleswig (Snderjylland) forms an integral part of Jutland (Manuel hist, de la question de Slesvig, 1906). After the union of Schleswig and Holstein under the Danish crown, the Danevirke fell into decay, but in 1848 it was hastily strengthened by the Danes, who were, however, unable to hold it in face of the superiority of the Prussian artillery, and on the 23rd of April it was stormed. From 1850 onwards it was again repaired and strengthened at great cost, and was considered impregnable; but in the war of 1864 the Prussians turned it by crossing the Schlei, and it was abandoned by the Danes on the 6th of February without a blow. It was thereupon .destroyed by the Prussians; in spite of which, however, a long line of imposing ruins still remains. The systematic excavation of these, begun in 1900, has

yielded some notable finds, especially of valuable runic inscrip- tions (F. de Jessen, La Question de Slesvig, pp. 25, 44–50, &c).

See Lorenzen, Dannevirke og Omegn (2nd ed., Copenhagen, 1864): H. Handelmann, Das Dannewerk (Kiel, 1885); Philippsen and Siinksen, Fuhrer durch das Danewerk (Hamburg, 1903).

DANSVILLE, a village of Livingston county, New York, U.S.A., 49 m. S. of Rochester, on the Canaseraga Creek. Pop. (1890) 3758; (1900) 3633, of whom 417 were foreign-born; (1905) 3908; (1910) 3938. The village is served by the Delaware, Lackawanna & Western, and the Dansville & Mount Morris railways. At Dansville is the Jackson Health Resort, a large sanatorium, with which a nurses' training school is connected. There is a public library. The village has large nurseries and vineyards, flour and paper

mills, a large printing establishment, a foundry, and a shoe factory. Dansville, named in honour of Daniel P. Faulkner, was settled about 1800, and was incorpor- ated in 1845.

DANTE, Dante (or Durante) Alighieri (1265–1321), the greatest of Italian poets, was born at Florence about the middle of May 1265. He was descended from an ancient family, but from one which at any rate for several generations had belonged to the burgher and not to the knightly class. His biographers have attempted on very slight grounds to deduce his origin from the Frangipani, one of the oldest senatorial families of Rome. We can affirm with greater certainty that he was connected with the Elisei who took part in the building of Florence under Charles the Great. Dante himself does not, with the exception of a few obscure and scattered allusions, carry his ancestry beyond the warrior Cacciaguida, whom he met in the sphere of Mars (Par. xv. 87, foil.). Of Cacciaguida's family nothing is known. The name, as he told Dante (Par. xv. 139, 5), was given him at his baptism; it has a Teutonic ring. The family may well have sprung from one of the barons who, as Villani tells us, remained behind Otto I. It has been noted that the phrase " Tonde venner quivi " (xvi. 44) seems to imply that they were not Florentines. He further tells his descendant that he was born in the year 1106 (or, if another reading of xvi, 37, 38 be adopted, in 1091), and that he married an Aldighieri from the valley of the Po. Here the German strain appears unmistakably; the name Aldighiero (Aldiger) being purely Teutonic. He also mentions two brothers, Moronte and Eliseo, and that he accompanied the emperor Conrad III. upon his crusade into the Holy Land, where he died (1147) among the infidels. From Eliseo was probably descended the branch of the Elisei; from Aldighiero, son of Cacciaguida, the branch of the Alighieri. Bellincione, son of Aldighiero, was the grandfather of Dante. His father was a second Aldighiero, a lawyer of some reputation. By his first wife, Lapa di Chiarissimo Cialuffii, this Aldighiero had a son Francesco; by his second, Donna Bella, whose family

name is not known, Dante and a daughter. Thus the family of Dante held a most respectable position among the citizens of his beloved city; but had it been reckoned in the very first rank they could not have remained in Florence after the defeat of the Guelphs at Montaperti in 1 260. It is clear, however, that Dante's mother at least did so remain, for Dante was born in Florence in 1 265. The heads of the Guelph party did not return till 1267.

Dante was born under the sign of the twins, " the glorious stars pregnant with virtue, to whom he owes his genius such as it is." Astrologers considered this constellation as favourable to literature and science, and Brunetto Latini, the philosopher and diplomatist, his instructor, tells him in the Inferno (xv. 25, foil.) that, if he follows its guidance, he cannot fail to reach the harbour of fame. Boccaccio relates that before his birth his mother dreamed that she lay under a very lofty laurel, growing in a green meadow, by a very .clear fountain, when she felt the pangs of childbirth, — that her child, feeding on the berries which fell from the laurel, and on the waters of the fountain, in a very short time became a shepherd, and attempted to reach the leaves of the laurel, the fruit of which had nurtured him, — that, trying to obtain them he fell, and rose up, no longer a man, but in the guise of a peacock. We know little of Dante's boyhood except that he was a hard student and was profoundly influenced by

Brunetto Latini. Boccaccio tells us that he became very familiar with Virgil, Horace, Ovid and Statius, and all other famous poets. From the age of eighteen he, like most cultivated young men of that age, wrote poetry assiduously, in the philosophical amatory style of which his friend, older by many years than him- self, Guido Cavalcanti, was a great exponent, and of which Dante regarded Guido Guinicelli of Bologna as the master (Purg. xxvi. 97,

8). Leonardo Bruni of Arezzo, writing a hundred years or more after his death, says that " by study of philosophy, of theology, astrology, arithmetic and geometry, by reading of history, by the turning over many curious books, watching and sweating in his studies, he acquired the science which he was to adorn and explain in his verses." Of Brunetto Latini Dante himself speaks with the most loving gratitude and affection, though he does not hesitate to brand his vices with infamy. Under such guidance Dante became master of all the science of his age at a time when it was not impossible to know all that could be known. He had some knowledge of drawing; at any rate he tells us that on the anniversary of the death of Beatrice he drew an angel on a tablet. He was an intimate friend of Giotto, who has immortalized his youthful lineaments in the chapel of the Bargello, and who is recorded to have drawn from his friend's inspiration the allegories of Virtue and Vice which fringe the frescoes of the Scrovegni Chapel at Padua. Nor was he less sensible to the delights of music. Milton had not a keener ear for the loud uplifted angel trumpets and the immortal harps of golden wires of the cherubim and seraphim; and the English poet was proud to compare his own friendship with Henry Lawes with that between Dante and Casella, " met in the milder shades of purgatory." Of his companions the most intimate and sympathetic were the lawyer-poet Cino of Pistoia, Lapo Gianni, Guido Cavalcanti and others, similarly gifted and dowered with like tastes, who moved in the lively and acute society of Florence, and felt with him the first warm flush of the new spirit which was soon to pass over Europe. He has written no sweeter or more melodious lines than those in which he expresses the wish that he, with Guido and Lapo, might be wafted by enchant-ment over the sea wheresoever they might list, shielded from tempest and foul weather, in such contentment that they should wish to live always in one mind, and that the good enchanter should bring Monna Vanna and Monna Bice and that other lady into their barque, where they should for ever discourse of love and be for ever happy. It is a wonderful

thing (says Leonardo Bruni) that, though he studied without intermission, it would not have appeared to anyone that he studied, from his joyous mien and youthful conversation. Like Milton he was trained in the strictest academical education which the age afforded; but Dante lived under a warmer sun and brighter skies, and found in the rich variety and gaiety of his early life a defence against the withering misfortunes of his later years. Milton felt too early the chill breath of Puritanism, and the serious musing on the experi- ence of life, which saddened the verse of both poets, deepened in his case rather into grave and desponding melancholy, than into the fierce scorn and invective which disillusion wrung from Dante. We must now consider the political circumstances in which lay the activity of Dante's manhood. From ins, the y ear 0I

the death of Matilda countess of Tuscany, to 1215, Hfe< Florence enjoyed a nearly uninterrupted peace.

Attached to the Guelph party, it remained undivided against itself. But in 1215 a private feud between the families of Buondelmonte and Uberti introduced into the city the horrors of civil war. Villani (lib. v. cap. 38) relates how Buondelmonte de' Buondelmonti, a noble youth of Florence, being engaged to marry a lady of the house of Amidei, allied himself instead to a Donati, and how Buondelmonte was attacked and killed by the Amidei and Uberti at the foot of the Ponte Vecchio, close by the pilaster which bears the image of Mars. " The death of Messer Buondelmonte was the occasion and beginning of the accursed parties of Guelphs and Ghibellines in Florence." Of the seventy- two families then in Florence thirty-nine became Guelph under the leadership of the Buondelmonte and the rest Ghibelline under the Uberti. The strife of parties was for a while allayed

by the war against Pisa in 1222, and the constant struggles against Siena; but in 1248 Frederick II. sent into the city his natural son Frederick " of Antioch," with 1600 German knights. The Guelphs were

driven away from the town, and took refuge, part in Montevarchi, part in Capraia. The Ghibellines, masters of Florence, behaved with great severity, and destroyed the towers and palaces of the Guelph nobles. At last the people became impatient. They rose in rebellion, reduced the powers of the podesta, elected a captain of the people to manage the internal affairs of the city, with a council of twelve, established a more democratic constitution, and, encouraged by the death of Frederick II. in December 1250, recalled the exiled Guelphs. Manfred, the bastard son of Frederick, pursued the policy of his father. He stimulated the Ghibelline Uberti to rebel against their position of subjection. A rising of the vanquished party was put down by the people, in July 1258 the Ghibellines were expelled from the town, and the towers of the Uberti razed to the ground. The exiles betook themselves to the friendly city of Siena. Manfred sent them a reinforcement of German horse, under his kinsman Count Giordano Lancia. The Florentines, after vainly demanding their surrender, despatched an army against them. On the 4th of September 1260 was fought the great battle of Montaperti, which dyed the Arbia red, and in which the Guelphs were entirely defeated. The hand which held the banner of the republic was sundered by the sword of a traitor (Inf. xxxii. 106). For the first time in the history of Florence the Carroccio was taken. Florence lay at the mercy of her enemies. A parliament was held at Empoli, in which the deputies of Siena, Pisa, Arezzo and other Tuscan towns consulted on the best means of securing their new war power. They voted that the accursed Guelph city should be blotted out. But Farinata degli Uberti stood up in their midst, bold and defiant as when he stood erect among the sepulchres of hell, and said that if, from the whole number of, the Florentines, he alone should remain, he would not suffer, whilst he could wield a sword, that his country should be destroyed, and that, if it were necessary to die a thousand times for her, a thousand times would he be ready to encounter death. Help came to the Guelphs from an unex- pected quarter. Clement IV., elected pope in 1265, offered

the crown of Apulia and Sicily to Charles of Anjou. The French prince, passing rapidly through Lombardy, Romagna and the Marches, reached Rome by way of Spoleto, was crowned on the 6th of January 1266, and on the 23rd of February defeated and killed Manfred at Benevento. In such a storm of conflict did Dante first see the light. In 1267 the Guelphs were recalled, but instead of settling down in peace with their opponents they summoned Charles of Anjou to vengeance, and the Ghibellines were driven out. The meteor passage of Conradin gave hope to the imperial party, which was quenched when the head of the fair-haired boy fell on the scaffold at Naples. Pope after pope tried in vain to make peace. Gregory X. placed the rebellious city under an interdict; in 1278 Cardinal Latini by order of Nicholas III. effected a truce, which lasted for four years. The city was to be governed by a committee of fourteen buonomini, on which the Guelphs were to have a small majority. In 1282 the constitution of Florence received the final form which it retained till the collapse of freedom. From the three arti maggiori were chosen six priors, in whose hands was placed the government of the republic. Before the end of the century, seven greater arts were recognized, including the speziali, — druggists and dealers in all manner of oriental goods, and in books — among whom Dante afterwards enrolled himself. They remained in office for two months, and during that time lived and shared a common table in the public palace. We shall see what influence this office had upon the fate of Dante. The success of the " Sicilian Vespers " (March 1282), the death of Charles of Anjou (January 1285), and of Martin IV. in the following March, roused again the courage of the Ghibellines. They entered Arezzo, where the Ghibellines at present had the upper hand, and threatened to drive out the Guelphs from Tuscany. Skirmishes and raids, of which Villani and Bruni have left accounts, went on through the winter of 1 288-1 289, forming a prelude to the great

battle of Campaldino in the following summer. Then it was that Dante saw " horsemen moving camp and commencing the assault, and holding muster, and the march of foragers, the shock of tournaments, and race of jousts, now with trumpets and now with bells, with drums and castle signals, with native things and foreign " (Inf. xxii. i, foil.). On the nth of June 1289, at Cam- paldino near Poppi, in the Casentino, the Ghibellines were utterly defeated. They never again recovered their hold on Florence, but the violence of faction survived under other names. In a letter quoted, though not at first hand, by Leonardo Bruni, which is not now extant, Dante is said to mention that he himself fought with distinction at Campaldino. He was present shortly after- wards at the battle of Caprona (Inf. xxi. 95, foil.), and returned in September 1 2 89 to his studies and his love. His peace was of short duration. On the 9th of June 1290 died Beatrice, whose mortal love had guided him for thirteen years, and whose immortal spirit purified his later life, and revealed to himthemysteriesof Paradise. Dante had first met Beatrice Portinari at the house of her father Folco on May-day 1274. In his own words, ' ' already nine times after my birth the heaven of light had returned as it were to the same point, when there appeared to my eyes the glorious lady of mymind, who was by many called Beatrice who knew not what to call her. She had already been so long in this life that already in its time the starry heaven had moved towards the east the twelfth part of a degree, so that she appeared to me about the beginning of her ninth year, and I saw her about the end of my ninth year. Her dress on that day was of a most noble colour, a subdued and goodly crimson, girdled and adorned in such sort as best suited with her tender age. At that moment I saw most truly that the spirit of life which hath its dwelling in the secretest chamber of the heart began to tremble so violently that the least pulses of my body shook therewith; and in trembing it said these words, 'Ecce deus fortior me qui veniens dominabitur mihi.' " In the Vita Nuova is written the story of his passion from its commencement to within a year after

the lady's death (June 9th, 1290). He saw Beatrice only once or twice, and she probably knew little of him. She married Simone de' Bardi. But the worship of her lover was stronger for the remoteness of its subject. The last chapter of the Vita Nuova relates how, after the lapse of a year, " it was given me to behold a wonderful vision, wherein I saw things which determined me to say nothing further of this blessed one until such time as I could discourse more worthily concerning her. And to this end I labour all I can, as she in truth knoweth. Therefore if it be His pleasure through whom is the life of all things that my life continue with me a few years, it is my hope that I shall yet write concerning her what hath not before been written of any woman. After the which may it seem good unto Him who is the master of grace that my spirit should go hence to behold the glory of its lady, to wit, of that blessed Beatrice who now gloriously gazes on the countenance of Him qui est per omnia saecula benedictus." In the Convito he resumes the story of his life. " When I had lost the first delight of my soul (that is, Beatrice) I remained so pierced with sadness that no comforts availed me anything, yet after some time my mind, desirous of health, sought to return to the method by which other disconsolate ones had found consolation, and I set myself to read that little-known book of Boetius in which he consoled himself when a prisoner and an exile. And hearing that Tully had written another work, in which, treating of friendship, he had given words of consolation to Laelius, I set myself to read that also." He so far recovered from the shock of his loss that in 1292 he married Gemma, daughter of Manet to Donati, a connexion of the celebrated Corso Donati, afterwards Dante's bitter foe. It is possible that she is the lady mentioned in the Vita Nuova as sitting full of pity at her window and comforting Dante for his sorrow. By this wife he had two sons and two daughters, and although he never mentions her in the Divina Commedia, and although she did not accompany him into exile, there is no reason to suppose that she was other than a good wife, or that the union was otherwise than happy.

Certain it is that he spares the memory of Corso in his great poem, and speaks kindly of his kinsmen Piccarda and Forese.

In 1293 Giano della Bella, a man of old family who had thrown in his lot with the people, induced the commonwealth to adopt the so-called " Ordinances of Justice," a severely democratic consti- tution, by which among other things it was enacted that no man of noble family, even though engaged in trade, could hold office as prior. Two years later Giano was banished, but the ordinances remained in force, though the grandi recovered much of their power.

Dante now began to take an active part in politics. He was inscribed in the arte of the Medici and Speziali, which made him eligible as one of the six priori to whom the government of the city was entrusted in 1282. Documents still existing in the archives of Florence show that he took part in the deliberations of the several councils of the city in 1295, 1296, 1300 and 1301. The notice in the last year is of some importance. The pope had demanded a contingent of 100 Florentine knights to serve against his enemies, the Colonna family. On the 19th of June we read in the contemporary report of the debate on this question in the Council of a Hundred : " Dantes Alagherius consuluit quod de servitio faciendo Domino Papae nihil fieret." Other instances of his invariable opposition to Boniface occur. Filelfo says that he served on fourteen embassies, a statement not only unsupported by evidence, but impossible in itself. Filelfo does not mention the only embassy in which we know for certain that Dante was engaged, that to the town of San Gemignano in May 1300. From the 15th of June to the 15th of August 1300 he held the office of prior, which was the source of all the miseries of his life. The spirit of faction had again broken out in Florence. The two rival families were the Cerchi and the Donati,- — the first of great wealth but recent origin, the last of ancient ancestry but poor. A quarrel had arisen in Pistoia between the two branches of the Cancellieri,- — the Bianchi and Neri, the Whites and the Blacks. The quarrel spread

to Florence, the Donati took the side of the Blacks, the Cerchi of the Whites. Pope Boniface was asked to mediate, and sent Cardinal Matteo d'Acquasparta to maintain peace. He arrived just as Dante entered upon his office as prior. The cardinal effected nothing, but Dante and his colleagues banished the heads of the rival parties in different directions to a distance from the capital. The Blacks were sent to Citta della Pieve in the Tuscan mountains; the Whites, among whom was Dante's dearest friend Guido Cavalcanti, to Serrezzano in the unhealthy Maremma. After the expiration of Dante's office both parties returned, Guido Cavalcanti so ill with fever that he shortly afterwards died. At a meeting held in the church of the Holy Trinity the Whites were denounced as Ghibellines, enemies of the pope. The Blacks sought for vengeance. Their leader, Corso Donati, hastened to Rome, and persuaded Boniface VIII. to send for Charles of Valois, brother of the French king, Philip the Fair, to act as " peacemaker." The priors sent at the end of September four ambassadors to the pope, one of whom, according to the chronicler Dino, was Dante. There are, how- ever, improbabilities in the story, and the passage quoted in support of it bears marks of later interpolation. He never again saw the towers of his native city. Charles of Valois, after visiting the pope at Anagni, retraced his steps to Florence, entering the city on All Saints' Day and taking up his abode in the Oltr' Arno. Corso Donati, who had been banished a second time, returned in force and summoned the Blacks to arms. The prisons were broken open, the podesta driven from the town, the Cerchi confined within their houses, a third of the city was destroyed with fire and sword. By the help of Charles the Blacks were victorious. They appointed Cante de' Gabrielli of Gubbio as podesta, a man devoted to their interests. More than 600 Whites were condemned to exile and cast as beggars upon the world. On the 27th of January 1302, Dante, with four others of the White party, was charged before the podesta, Cante de' Gabrielli, with baratteria, or corrupt jobbery and peculation when in office, and, not appearing, condemned to pay a fine of 5000 lire

of small florins. If the money was not paid within three days their property was to be destroyed and laid waste; if they did pay the fine they were to be exiled for two years from Tuscany; in any case they were never again to hold office in the

republic. The charge in Dante's case was obviously preposterous, though ingeniously devised; for he was known to be at the time in somewhat straitened circumstances, and had recently been in control of certain public works. But of all sins, that of " barratry " was one of the most hateful to him. No doubt the papal finger may be traced in the affair. On the 10th of March Dante and fourteen others were condemned to be burned alive if they should come into the power of the republic. Similar sentences were passed in September 1311 and October 1315. The sentence was not formally reversed till 1494, under the government of the Medici.

Leonardo Bruni, who accepts the story of the embassy to Rome, states that Dante received the news of his banishment in that city, and at once joined the other exiles at Siena. How he escaped arrest in the papal states is not explained. The exiles met first at Gargonza, a castle between Siena and Arezzo, and then at Arezzo itself. They joined themselves to the Ghibellines, to which party the podesta. Uguccione della Faggiuola belonged. The Ghibellines, however, were divided amongst themselves, and the more strict Ghibellines were not disposed to favour the cause of the White Guelphs. On the 8th of June 1302, however, a meeting was held at San Godenzo, a place in the Florentine territory, Dante's presence at which is proved by documentary evidence, and an alliance was there made with the powerful Ghibelline clan of the Ubaldini. The exiles remained at Arezzo till the summer of 1304. In September 1303 the fleur-de-lis had entered Anagni, and Christ had a second time been made prisoner in the person of his vicar. At the instigation of Philip the Fair, William of

Nogaret and Sciarra Colonna had entered the papal palace at Anagni, and had insulted and, it is said, even beaten the aged pontiff under his own roof. Boniface did not survive the insult long, but died in the following month. He was suc- ceeded by Benedict XI., and in March the cardinal da Prato came to Florence, sent by the new pope to make peace. The people received him with enthusiasm; ambassadors came to him from the Whites ; and he did his best to reconcile the two parties. But the Blacks resisted all his efforts. He shook the dust from off his feet, and departed, leaving the city under an interdict. Foiled by the calumnies and machinations of the one party, the cardinal gave his countenance to the other. It happened that Corso Donati and the heads of the Black party were absent at Pistoia. Da Prato advised the Whites to attack Florence, deprived of its heads and impaired by a recent fire. An army was collected of 16,000 foot and 9000 horse. Communications were opened with the Ghibellines of Bologna and Romagna, and a futile attempt was made to enter Florence from Lastra, the failure of which further disorganized the party. Dante had, however, already separated from the " ill-conditioned and foolish company " of common party-politicians, who rejected his counsels of wisdom, and had learnt that he must henceforth form a party by himself. In 1303 he had left Arezzo and gone to Forli in Romagna, of which city Scarpetta degli Ordelaffi was lord. To him, according to Flavius Blondus the historian (d. before 1484), a native of the place, Dante acted for a time as secretary. From Forli Dante probably went to Bartolommeo della Scala, lord of Verona, where the country of the great Lombard gave him his first refuge and his first hospitable reception. Can ahlbel- Grande, to whom he af terwards'dedicated the Paradiso, llnlsm. was then a boy. Bartolommeo died in 1304, and it is possible that Dante may have remained in Verona till his death. We must consider, if we would understand the real nature of Dante's Ghibellinism, that he had been born and bred a Guelph; but he saw that the conditions of the time were altered, and that other dangers menaced the

welfare of his country. There was no fear now that Florence, Siena, Pisa, Arezzo should be razed to the ground in order that the castle of the lord might overlook the humble cottages of his contented subjects; but there .was danger lest Italy should be torn in sunder by its own jealousies and passions, and lest the fair domain bounded by the sea and the Alps should never properly assert the force of its individuality, and should present a con- temptible contrast to a united France and a confederated

Wander- ings.

Germany. Sick with petty quarrels and dissensions, Dante strained his eyes towards the hills for the appearance of a universal monarch, raised above the jars of faction and the spur of ambition, under whom each country, each city, each man, might, • under the institutions best suited to it, lead the life and do the work for which it was best fitted. United in spiritual harmony with the vicar of Christ, he should show for the first time to the world an example of a government where the strongest force and the highest wisdom were interpenetrated by all that God had given to the world of piety and justice. In this sense and in no other was Dante a Ghibelline. The vision was never realized — the hope was never fulfilled. Not till 500 years later did Italy become united and the ” greyhound of deliverance ” chase from city to city the wolf of cupidity. But is it possible to say that the dream did not work its own realization, or to deny that the high ideal of the poet, after inspiring a few minds as lofty as his own, has become embodied in the constitution of a state which acknowledges no stronger bond of union than a common worship of the exile’s indignant and impassioned verse? It is very difficult to determine with exactness the order and the place of Dante’s wanderings. Many cities and castles in Italy have claimed the honour of giving him shelter, or of being for a time the home of his inspired muse. He certainly spent some time with Count Guido Salvatico in the Casentino near the sources of the Arno, probably in the castle of Porciano, and with Uguccione in the castle of

Faggiuola in the mountains of Urbino. After this he is said to have visited the university of Bologna; and in August 1306 we find him at Padua. Cardinal Napoleon Orsini, the legate of the French pope Clement V., had put Bologna under a ban, dissolved the university and driven the professors to the northern city. In May or June 1307 the same cardinal collected the Whites at Arezzo and tried to induce the Florentines to recall them. The name of Dante is found attached to a document signed by the Whites in the church of St Gaudenzio in the Mugello. This enterprise came to nothing. Dante retired to the castle of Moroello Malespina in the Lunigi- ana, where the marble ridges of the mountains of Carrara descend in precipitous slopes to the Gulf of Spezzia. From this time till the arrival of the emperor Henry VII. in Italy, October 13 10, all is uncertain. His old enemy Corso Donati had at last allied himself with Uguccione della Faggiuola, the leader of the Ghibellines. Dante thought it possible that this might lead to his return. But in 1308 Corso was declared a traitor, attacked in his house, put to flight and killed. Dante lost his last hope. He left Tuscany, and went to Can Grande della Scala at Verona. From this place it is thought that he visited the university of Paris (1309), studied in the rue du Fouarre and went on into the Low Countries. That he ever crossed the Channel or went to Oxford, or himself saw where the heart of Henry, son of Richard, earl of Cornwall, murdered by his cousin Guy of Montfort in 1271, was " still venerated on the Thames," may safely be dis- believed. The only evidence for it is in the Commentary of John of Serravalle, bishop of Fermo, who lived a century later, had no special opportunity of knowing, and was writing for the benefit of two English bishops. The election in 1308 of Henry of Luxem- burg as emperor stirred again his hopes of a deliverer. At the end of 13 10, in a letter to the princes and people of Italy, he pro- claimed the coming of the saviour; at Milan he did personal homage to his sovereign. The Florentines made every preparation to resist the emperor. Dante wrote from the Casentino a letter dated the 31st of

March 13 n, in which he rebuked them for their stubbornness and obstinacy. Henry still lingered in Lombardy at the siege of Cremona, when Dante, on the 16th of April 131 1, in a celebrated epistle, upbraided his delay, argued that the crown of Italy was to be won on the Arno rather than on the Po, and urged the tarrying emperor to hew the rebellious Florentines like Agag in pieces before the Lord. Henry was as deaf to this exhortation as the Florentines themselves. After reducing Lombardy he passed from Genoa to Pisa, and on the 29th of June 13 1 2 was crowned by some cardinals in the church of St John Lateran at Rome; the Vatican being in the hands of his adversary King Robert of Naples. Then at length he moved towards

Tuscany by way of Umbria. Leaving Cortona and Arezzo, he reached Florence on the 19th of September. He did not dare to attack it, but returned in November to Pisa. In the summer of ' the following year he prepared to invade the kingdom of Naples; but in the neighbourhood of Siena he caught a fever and died at the monastery of Buonconvento, on the 24th of August 1313. .He lies in the Campo Santo of Pisa; and the hopes of Dante and his party were buried in his grave.

After the death of the emperor Henry (Bruni tells us) Dante passed the rest of his life as an exile, sojourning in various places

throughout Lombardy, Tuscany and the Romagna, auddlaih. un der the protection of various lords, until at length

he retired to Ravenna, where he ended his life. Very little can be added to this meagre story. There is reason for supposing that he stayed at Gubbio with Bosone dei Rafaelli, and tradition assigns him a cell in the monastery of Sta Croce di Fonte Avellana in the same district, situated on the slopes of

Catria, one of the highest peaks of the Apennines in that region. After the death of the French pope, Clement V., he addressed a letter, dated the 14th of July 13 14, to the cardinals in conclave, urging them to elect an Italian pope. About this time he came to Lucca, then lately conquered by his friend Uguccione. Here he completed the last cantos of the Purgatory, which he dedicated to Uguccione, and here he must have become acquainted with Gentucca, whose name had been whispered to him by her country- man on the slopes of the Mountain of Purification {Purg. xxiv. 37). That the intimacy between the " world-worn " poet and the young married lady (who is thought to be identifiable with Gentucca Morla, wife of one Cosciorino Fondora) was other than blameless, is quite incredible. In August 1315 was fought the battle of Monte Catini, a day of humiliation and mourning for the Guelphs. Uguccione made but little use of his victory; and the Florentines marked their vengeance on his adviser by con- demning Dante yet once again to death if he ever should come into their power. In the beginning of the following year Uguc- cione lost both his cities of Pisa and Lucca. At this time Dante was offered an opportunity of returning to Florence. The con- ditions given to the exiles were that they should pay a fine and walk in the dress of humiliation to the church of St John, and there do penance for their offences. Dante refused to tolerate this shame; and the letter is still extant in which he declines to enter Florence except with honour, secure that the means of life will not fail him, and that in any corner of the world he will be able to gaze at the sun and the stars, and meditate on the sweetest truths of philosophy. He preferred to take refuge with his most illustrious protector Can Grande della Scala of Verona, then a young man of twenty-five, rich, liberal and the favoured head of the Ghibelline party. His name has been immortalized by an eloquent panegyric in the seventeenth canto of the Paradiso. Whilst on a visit at the court of Verona he maintained, on the 20th of January 1320, the philosophical thesis De aqua et terra, on the levels of land and water, which is included in his minor

works. The last three years of his life were spent at Ravenna, under the protection of Guido da Polenta. In his service Dante undertook an embassy to the Venetians. He failed in the object of his mission, and, returning disheartened and broken in spirit through the unhealthy lagoons, caught a fever and died in Ravenna on the 14th of September 13 21. His bones still repose there. His doom of exile has been reversed by the union of Italy, which has made the city of his birth and the various cities of his wanderings component members of a common country. His son Piero, who wrote a commentary on the Divina Cornmedia, settled as a lawyer in Verona, and died in 1364. His daughter Beatrice lived as a nun in Ravenna, dying at some time between 1350 (when Boccaccio brought her a present of ten gold crowns from a Florentine gild) and 1370. His direct line became extinct in 1 509. Dante's Works. — Of Dante's works, that by which he is known to all the educated world, and in virtue of which he holds his

place as one of the half-dozen greatest writers of all Commedia. t™ 6 ! is 0I course the Cornmedia. (The epithet divina,

it may be noted, was not given to the poem by its author, nor does it appear on a title-page until 1555, in the

edition of Ludovico Dolce, printed by Giolito ; though it is applied to the poet himself as early as 1512.) The poem is absolutely unique in literature; it may safely be said that at no other epoch of the world's history could such a work have been produced. Dante was steeped in all the learning, which in its way was considerable, of his time; he had read the Summa Theologica of Aquinas, the Tresor of his master Brunetto, and other encyclopaedic works available hi that age ; he was familiar with all that was then known of the Latin classical and post- classical authors. Further, he was a deep and original political thinker, who had himself borne a prominent part in practical politics. He was born into a generation in which almost every man of education habitually wrote verse, as indeed their

pre- decessors had been doing for the last fifty years. Vernacular poetry had come late into Italy, and had hitherto, save for a few didactic or devotional treatises hitched into rough rhyme, been exclusively lyric in form. Amatory at first, later, chiefly in the hands of Guittone of Arezzo and Guido Cavalcanti, taking an ethical and metaphysical tone, it had never fully shaken off the Provencal influence under which it had started, and of which Dante himself shows considerable traces.

The age also was unique, though the two great events which made the 15th century a turning-point in the world's history — the invention of printing and the discovery of the new world (to which might perhaps be added the intrusion of Islam into Europe) — were still far in the future. But the age was essentially one of great men; of free thought and free speech; of brilliant and daring action, whether for good or evil. It is easy to understand how Dante's bitterest scorn is reserved for those " sorry souls who lived without infamy and without renown, displeasing to God and to His enemies."

The time was thus propitious for the production of a great imaginative work, and the man was ready who should produce it. It called for a prophet, and the prophet said, " Here am I." " Dante," says an acute writer, " is not, as Homer is, the father of poetry springing in the freshness and simplicity of childhood out of the arms of mother earth; he is rather, like Noah, the father of a second poetical world, to whom he pours forth his prophetic song fraught with the wisdom and the experience of the old world." Thus the Commedia, though often classed for want of a better description among epic poems, is totally different in method and construction from all other poems of that kind. Its " hero " is the narrator himself; the incidents do not modify the course of the story; the place of episodes is taken by theological or metaphysical disquisitions; the world through which the poet takes his readers is peopled, not with characters of heroic story, but with men and women known personally or by repute to him and those for whom he wrote. Its aim is not to

delight, but to reprove, to rebuke, to exhort; to form men's characters by teaching them what courses of life will meet with reward, what with penalty, hereafter; " to put into verse," as the poet says, " things difficult to think." For such new matter a new vehicle was needed. We have Bembo's authority for believing that the terza rima, surpassed, if at all, only by the ancient hexameter, as a measure equally adaptable to sustained narrative, to debate, to fierce invective, to clear-cut picture and to trenchant epigram, was first employed by Dante.

The action of the Commedia opens in the early morning of the Thursday before Easter, in the year 1300. The poet finds himself lost in a forest, escaping from which he has his way barred by a wolf, a lion and a leopard. All this, like the rest of the poem, is highly symbolical. This branch of the subject is too vast to be entered on at any length here; but so far as this passage is con- cerned it may be said that it seems to indicate that at this period of his life, about the age of thirty-five, Dante went through some experience akin to what is now called " conversion." Having led up till then the ordinary life of a cultivated Florentine of good family; taking his part in public affairs, military and civil, as an hereditary member of the predominant Guelph party; dallying in prose which with all its beauty and passion is full of the conceits familiar to the 13th century, and in verse which save for the excellence of its execution differs in no way from that of his

predecessors, with the memory of his lost love; studying more seriously, perhaps, than most of his associates; possibly travel- ling a little, — gradually or suddenly he became convinced that all was not well with him, and that not by leading, however blame- lessly, the "active" life could he save his soul. The strong vein of mysticism, found in so many of the deepest thinkers of that age, and

conspicuous in Dante's mind, no doubt played its part. His efforts to free himself from the " forest " of worldly cares were impeded by the temptations of the world — cupidity (including ambition), the pride of life and the lusts of the flesh, symbolized by the three beasts. But a helper is at hand. Virgil appears and explains that he has a commission from three ladies on high to guide him. The ladies are the Blessed Virgin, St Lucy (whom for some reason never yet explained Dante seems to have regarded as in a special sense his protector) and Beatrice. In Virgil we are apparently intended to see the symbol of what Dante calls philosophy, what we should rather call natural religion ; Beatrice standing for theology, or rather revealed religion. Under Virgil's escort Dante is led through the two lower realms of the next world, Hell and Purgatory; meeting on the way with many persons illustrious or notorious in recent or remoter times, as well as many well enough known then in Tuscany and the neighbour- ing states; but who, without the immortality, often unenvi- able, that the poet has conferred on them, would long ago have been forgotten. Popes, kings, emperors, poets and warriors, Florentine citizens of all degrees, are there found; some doomed to hopeless punishment, others expiating their offences in milder torments, and looking forward to deliverance in due time. It is remarkable to notice how rarely, if ever, Dante allows political sympathy or antagonism to influence him in his distribution of judgment. Hell is conceived as a vast conical hollow, reaching to the centre of the earth. It has three great divisions, correspond- ing to Aristotle's three classes of vices, incontinence, brutishness and malice. The first are outside the walls of the city of Dis; the second, among whom are included unbelievers, tyrants, suicides, unnatural offenders, usurers, are within; the first apparently on the same level as those without, the rest separated from them by a steep descent of broken rocks. (It should be said that many Dante scholars hold Jiat Aristotle's " brutishness " has no place in Dante's scheme; but the symmetry of the arrange- ment, the special

reference made to that division, and certain expressions used elsewhere by Dante, seem to make it probable that he would here, as in most other cases, have followed his master in philosophy.) The sinners by malice, which includes all forms of fraud or treachery, are divided from the last by a yet more formidable barrier. They lie at the bottom of a pit, the depth of which is not stated, with vertical sides, and accessible only by supernatural means; a monster named Geryon bearing the poets down on his back. The torments here are of a more terrible, often of a loathsome character. Ignominy is added to pain, and the nature of Dante's demeanour towards the sinners changes from pity to hatred. At the very bottom of the pit is Lucifer, immovably fixed in ice; climbing down his limbs they reach the centre of the earth, whence a cranny conducts them back to the surface, at the foot of the purgatorial mountain, which they reach as Easter Day is dawning. Before the actual Purgatory is attained they have to climb for the latter half of the day and rest at night. The occupants of this outer region are those who have delayed repentance till death was upon them. They include many of the most famous men of the last thirty years. In the morning the gate is opened, and Purgatory proper is entered. This is divided into seven terraces, corresponding to the seven deadly sins, which encircle the mountain and have to be reached by a series of steep climbs, compared by Dante in one instance to the path from Florence to Samminiato. The penalties are not degrading, but rather tests of patience or endurance; and in several cases Dante has to bear a share in them as he passes. On the summit is the Earthly Paradise. Here Beatrice appears, in a mystical pageant ; Virgil departs, leaving Dante in her charge. By her he is led through the various spheres of which, according to both the astronomy and the theology of the time, Heaven is composed, to the supreme

Heaven, or Empyrean, the seat of the Godhead. For one moment there is granted him the intuitive vision of the Deity, and the comprehension of all

mysteries, which is the ultimate' goal of mystical theology ; his will is wholly blended with that of God, and the poem ends.

The Convito, or Banquet, also called Convivio (Bembo uses the first form, Trissino the other), is the work of Dante's manhood, as the Vita Nuova is the work of his youth. It consists, convtto in the form in which it has come down to us, of an introduction and three treatises, each forming an elaborate commentary in a long canzone. It was intended, if completed, to have comprised commentaries on eleven more canzoni, making fourteen in all, and in this shape would have formed a tesoro or handbook of universal knowledge, such as Brunetto Latini and others have left to us. It is perhaps the least well known of Dante's Italian works, but crabbed and unattractive as it is in many parts, it is well worth reading, and contains many passages of great beauty and elevation. Indeed a knowledge of it is quite indispensable to the full understanding of the Divina Commedia and the De Monorchia. The time of its composition is uncertain. As it stands it has very much the look of being the contentsof note-bookspartiallyarranged. Dantementions princes as living who died in 1309; he does not mention Henry VII. as emperor, who succeeded in 1 3 1 o. There are some passages which seem to have been inserted at a later date. The canzoni upon which the commentary is written were probably composedbetween 1292 and 1300, when he was seeking in philosophy consolation for the loss of Beatrice. The Convito was first printed in Florence by Buonaccorsi in 1490. It has never been adequately edited.

The Vita Nuova (Young Life or New Life, for both significations seem to be intended) contains the history of his love for Beatrice. He describes how he met Beatrice as a child, himself a child, how he often sought her glance, how she once Nuova. greeted him in the street, how he feigned a false love to hide his true love, how he fell ill and saw in a dream the death and transfiguration of his beloved, how she died, and how his health failed from sorrow, how the tender compassion of another lady nearly won

his heart from its first affection, how Beatrice appeared to him in a vision and reclaimed his heart, and how at last he saw a vision which induced him to devote himself to study that he might be more fit to glorify her who gazes on the face of God for ever. This simple story is interspersed with sonnets, ballads and canzoni, arranged with a remarkable symmetry, to which Professor Charles Eliot Norton was the first to draw attention, chiefly written at the time to emphasize some mood of his changing passion. After each of these, in nearly every case, follows an explanation in prose, which is intended to make the thought and argument intelligible to those to whom the language of poetry was not familiar. The whole has a somewhat artificial air, in spite of its undoubted beauty; showing that Dante was still under the influence of the Dugentisti, many of whose conceits he reproduces. The book was probably completed by 1300. It was first printed by Sermartelli in Florence, 1576.

Besides the smaller poems contained in the Vita Nuova and Convito there are a considerable number of canzoni, ballate and sonnetti bearing the poet's name. Of these many undoubtedly are genuine, others as undoubtedly nl spurious. Some which have been preserved under the name of Dante belong to Dante de Maiano, a poet of a harsher style; others which bear the name of Aldighiero are referable to Dante's sons Jacopo or Pietro, or to his grandsons; others may be ascribed to Dante's contemporaries and predecessors Cino da Pistoia and others. Those which are genuine secure Dante a place among lyrical poets scarcely if at all inferior to that of Petrarch. Most of these were printed in Sonelti e canzoni (Giunta, 1527). The best edition of the Canzoniere of Dante is that by Fraticelli published by Barbera at Florence. His collec- tion includes seventy-eight genuine poems, eight doubtful and fifty-four spurious. To these are added an Italian paraphrase of the seven penitential psalms in terza rima, and a similar paraphrase of the Credo, the seven sacraments, the ten commandments, the Lord's Prayer and the Ave Maria.

The Latin treatise De monarchia, in three books, contains the mature statement of Dante's political ideas. In it he propounds the theory that the supremacy of the emperor is derived chia from the supremacy of the Roman people over the

world, which was given to them direct from God. As the emperor is intended to assure their earthly happiness, so does their spiritual welfare depend upon the pope, to whom the emperor is to do honour as to the first-born of the Father. The date of its publication is almost universally admitted to be the time of the descent of Henry VII. into Italy, between 13 10 and 13 13, although its composition may have been in hand from a much earlier period. The book was first printed by Oporinus at Basel in 1559, and placed on the Index of forbidden books.

The treatise De vulgari eloquentia, in two books, also in Latin, is mentioned in the Convito. Its object was first to establish the De vul- Italian language as a literary tongue, and to distinguish gari the noble or " courtly " speech which might become the

eloquen- property of the whole nation, at once a bond of internal Wa * unity and a line of demarcation against external

nations, from the local dialects peculiar to different districts; and secondly, to lay down rules for poetical composition in the language so established. The work was intended to be in four books, but only two are extant. The first of these deals with the language, the second with the style and with the composition of the canzone. The third was probably intended to continue this subject, and the fourth was destined to the laws of the ballata and sonetto. It contains much acute criticism of poetry and poetic diction. This work was first published in the Italian translation of Trissino at Yicenza in 1529. The original Latin was not pub- lished till 1577 at Paris by Jacopo Corbinelli, one

of the Italians who were brought from Florence by Catherine de' Medici, from a MS. now preserved at Grenoble. The work was probably left unfinished in consequence of Dante's death.

Boccaccio mentions in his life of Dante that he wrote two eclogues in Latin in answer to Johannes de Virgilio, who invited him to come from Ravenna to Bologna and compose a great work in the Latin language. The most interest- ing passage in the work is that in the first poem, where he expresses his hope that when he has finished the three parts of his great poem his grey hairs may be crowned with laurel on the banks of the Arno. Although the Latin of these poems is superior to that of his prose works, we may feel thankful that Dante composed the great work of his life in his own vernacular. The versification, however, is good, and there are pleasant touches of gentle humour. The Eclogues have been edited by Messrs Wicksteed and Gardiner (Dante and Giovanni del Virgilio, London, 1902).

A treatise De aqua et terra has come down to us, which Dante tells us was delivered at Mantua in January 1320 (perhaps 1321) as a solution of the question which was being at that eiterra. time muc h discussed— whether in any place on the earth's surface water is higher than the earth. It was first published at Venice in 1508, by an ecclesiastic named Moncetti, from a MS. which he alleged to be in his possession, but which no one seems to have seen. Its genuineness is accordingly eery doubtful; but Dr Moore has from internal evidence made out a very strong case for it.

The Letters of Dante are among the most important materials for his biography. Giovanni Villani mentions three as specially remarkable — one to the government of Florence, in which he complains of undeserved exile; another to the emperor Henry VIL, when he lingered too long at the siege of Brescia; and a third to the Italian cardinals to urge them to the election of an Italian pope after the death of Clement V. The first of these letters has not come down to us, the two last are extant. Besides these

we have one addressed to the cardinal da Prato, one to a Florentine friend refusing the base conditions of return from exile, one to the princes and lords of Italy to prepare them for the coming of Henry of Luxembourg, another to the Florentines reproaching them with the rejection of the emperor, and a long letter to Can Grande della Scala, containing directions for interpreting the Divina Commedia, with especial reference to the Paradiso. Of less importance are the letters to the nephews

Eclogues.

Letters.

of Count Alessandro da Romena, to the marquis Moroello Malespina, to Cino da Pistoia and to Guido da Polenta. The genuineness of all the letters has at one time or another been impugned; but the more important are now generally accepted. They have been translated by Mr C. S. Latham, ed. by Mr G. R. Carpenter (Cambridge, Massachusetts and London, 1891).

Dante's reputation has passed through many vicissitudes, and much trouble has been spent by critics in comparing him with other poets of established fame. Read and commented upon with more admiration than intelligence in the Italian universities in the generation immediately succeeding his death, his name became obscured as the sun of the Renaissance rose higher towards its meridian. In the 16th century he was held inferior to Petrarch; in the 17th and first half of the 18th he was almost universally neglected. His fame is now fully vindicated. Trans- lations and commentaries issue from every press in Europe and America, and many studies for separate points are appearing every year.

Authorities. — It would be impossible here to give anything like a complete account even of the editions of Dante's works ; still more of the books which have been written to elucidate the Commedia as a whole, or particular points in it. The section "

Dante ” in the British Museum catalogue down to 1887 occupies twenty-nine folio pages; the supplement, to 1900, as many more. The catalogue of the Fiske collection, id Cornell University library, is in two quarto volumes and covers 606 pages. A few of the more important editions and of the more valuable commentaries and aids may, however, be recorded.

Editions. — The Commedia was first printed by John Numeister at Foligno, in April 1472. Two other editions followed in the same year: one at Jesi (Federicus Veronensis), and Mantua (Georgius et Paulus Teutonici). These, together with a Naples edition of about 1477 (Francesco del Tuppo), were included by Lord Vernon in Le Prime Quattro Edizioni (1858). Another Neapolitan edition, with- out printer’s name, is dated 1477, and in the same year Wendelin of Spires published the first Venetian edition. Milan followed in 1478 with that known from the name of its editor as the Nidobeatine. In 1481 appeared the first Florentine edition (Nicolo and Lorenzo della Magna) with the commentary of Cristoforo Landino, and a series of copper engravings ascribed to Baccio Baldini, varying in number in different copies from two to twenty; a sumptuous and very care- lessly printed volume. Venice supplied most of the editions for many years to come. Altogether twelve existed by the end of the century. In 1502 Aldus produced the first ” pocket ” edition in his new ” italic ” type, probably cut from the handwriting of his friend Bembo. A second edition of this is dated 15 1 5. The firm of Giunta at Florence printed the poem in a small volume with cuts, in 1506; and for the rest of the 16th century edition follows edition, to the number of about thirty in all. The most noteworthy commentaries are thoseof Alessandro Vellutello (Venice, 1544), and Bernardo Daniello (Venice, 1568), both of Lucca. The Cruscan Academicians edited the text in 1595. The first edition with woodcuts is that of Boninus de Boninis (Brescia, 1487). Bernardino Benali followed at Venice in 1491, and from that time onward few if any of the folio editions are without them. The 17th century produced three (or perhaps four) small,

shabby and inaccurate editions. In 1716 a revival of interest in Dante had set in, and before 1800 some score of editions had ap- peared, the best-known being those of G. A. Volpi (Padua, 1727), Pompeo Venturi (Venice, 1739) and Baldassare Lombardi (Rome,

1791).

Commentaries. — The Commedia began to be the subject of com- mentaries as soon as, if not before, the author was in his grave. One known as the Anonimo until in 1881 Dr Moore identified its writer as Graziolo de' Bambaglioli, was in course of writing in 1324. It was published by Lord Vernon, to whose munificence we owe the accessi- bility of most of the earlier commentaries, in 1848. That of Jacopo della Lana is thought to have been composed before 1340. It was printed in the Venice and Milan editions of 1477, and 1478 respec- tively. The so-called Ottimo Comento (Pisa, 1837) is of about the same date. It embodies parts of Lana's, but is largely an independent work. Witte ascribes it to Andrea della Lancia, a Florentine notary. Dante's sons Pietro and Jacopo also commented on their father's poem. Their works were published, again at Lord Vernon's expense, in 1845 and 1848. Boccaccio's lectures on the Commedia, cut short at Inf. xvii. 17 by his death in 1375, are accessible in various forms. His work was achieved by his disciple Benvenuto Rambaldi of Imola (d. c. 1390). Benvenuto's commentary, written in Latin, genial in temper, and often acute, was popular from the first. Extracts from it were used as notes in many MSS. Much of it was printed by Muratori in his Antiquilates Italicae; but the entire work was first published in 1887 by Mr William Warren Vernon, with the aid of Sir James Lacaita. No greater boon has ever been offered to students of Dante. Another early annotator who must not be overlooked is Francesco da Buti of Pisa, who lectured in that city towards the close

of the same century. His commentary, which served as the basis of Landino's already mentioned, was first printed in Pisa in 1858. One more commentary deserves mention. During the council of Constance, John of Serravalle, bishop of Fermo, fell in with the English bishops Robert Hallam and Nicholas Bubwith, and at their request compiled a voluminous exposition of the Commedia. This remained in MS. till recently, when it was printed in a costly form.

Translations. — Probably the first complete translation of Dante into a modern language was the Castilian version of Villena (1428). In the following year Andreu Febrer produced a rendering into Catalan verse. In 1515 Villegas published the Inferno in Spanish. ' The earliest French version is that of B. Grangier (1597). Chaucer has rendered several passages beautifully, and similar fragments are embedded in Milton and others. But the first attempt to reproduce any considerable portion of the poem was made by Rogers, who only completed the Inferno (1782). The entire poem appeared first in English in the version of Henry Boyd (1802) in six-line stanzas; but the first adequate rendering is the admirable blank verse of H. F. Cary (1814, 2nd ed. 1819), which has remained the standard translation, though others of merit, notably those of Pollock (1854) and Longfellow (1867) in blank verse, Plumptre (1887) and Haselfoot (1887) in terza rima ; J. A. Carlyle (inferno only, 1847). C. E. Norton (1891), and H. F. Tozer (1904), in prose, have since appeared. The best in German are those of " Philalethes " (the late King John of Saxony) and Witte, both in blank verse.

Modern Editions and Commentaries. — The first serious attempt to establish an accurate text in recent times was made by Carl Witte, whose edition (1862) has been subsequently used as the basis for the text of the Commedia in the Oxford edition of Dante's complete works (1896 and later issues). Dr Toynbee's text (1900) follows the Oxford, with some modifications. The notes of Cary, Longfellow, Witte

and ” Philalethes,” appended to their several translations, and Tozer’s, in an independent volume, are valuable. Scartazzini’s commentary is the most voluminous that has appeared since the 15th century. With a good deal of superfluous, and some superficial, erudition, it cannot be neglected by any one who wishes to study the poem thoroughly. An edition by A.J. Butler contains a prose version and notes. Of modern Italian editions, Bianchi’s and Fraticelli’s are still as good as any.

Other Aids. — For beginners no introduction is equal to the essay on Dante by the late Dean Church. Maria Rossetti’s Shadow of Dante is also useful. A Study of Dante, by J. A. Symonds, is interesting. More advanced students will find Dr Toynbee’s Dante Dictionary indispensable, and Dr E. Moore’s Studies in Dante of great service in its discussion of difficult places. Two concordances, to the Commedia by Dr Fay (Cambridge, Mass., 1888), and to the minor works by Messrs Sheldon and White (Oxford, 1905), are due to American scholars. Mr W. W. Vernon’s Readings in Dante have profited many students. Dante’s minor works still lack thorough editing and scholarly elucidation, with the exception of the De vulgari eloquentia, which has been well handled by Professor Pio Rajna (1896), and the Vita Nuova by F. Beck (1896) and Barbi (1907). Good translations of the latter by D. G. Rossetti and C. E. Norton, and of the De monarchia by F. C. Church and P. H. Wicksteed are in existence. The best text is that of the Oxford Dante, though much confessedly remains to be done. The dates of their original publication have already been given.

Bibliography. — The first attempt at a bibliography of editions of Dante was made in Pasquali’s edition of his collected works (Venice, 1739); but the first really adequate work on the subject is that of the viscount Colomb de Batines (1846–1848). A supplement by Dr Guido Biagi appeared in 1888. Julius Petzholdt had already covered some of the same ground in Bibliographia Dantea, extend- ing from 1865 to 1880. The period from 1891 to 1900 has been dealt with by SS. Passerini and Mazzi in Un Decennio di

bibliografia Dantesca (1905). The catalogues of the two libraries already named, and that of Harvard University, are worth consulting. For the MSS. Dr E. Moore's Textual Criticism (1889) is the most complete guide. (A. J. B.)*

DANTON, GEORGE JACQUES (1759–1794), one of the most conspicuous actors in the decisive episodes of the French Revolu- tion, was born at Arcis-sur-Aube on the 26th of October 1759. His family was of respectable quality, though of very moderate means. They contrived to give him a good education, and he was launched in the career of an advocate at the Paris bar. When the Revolution broke out, it found Danton following his profession with apparent success, leading a cheerful domestic life, and nourishing his intelligence on good books. He first appears in the revolutionary story as president of the popular club or assembly of the district in which he lived. This was the famous club of the Cordeliers, so called from the circumstance that its meetings were held in the old convent of the order of the Cordeliers, just as the Jacobins derived their name from the refectory of the convent of the Jacobin brothers. It is an odd coincidence that the old rivalries of Dominicans and Franciscans

in the democratic movement inside the Catholic Church should be recalled by the names of the two factions in the democratic movement of a later century away from the church. The Cordeliers were from the first the centre of the popular principle in the French Revolution carried to its extreme point ; they were the earliest to suspect the court of being irreconcilably hostile to freedom; and it was they who most vehemently proclaimed the need for root-and-branch measures. Danton's robust, energetic and impetuous temperament made him the natural leader in such a quarter. We find no traces of his activity in the two great insurrectionary events of 1789 — the fall of the Bastille, and the forcible removal of the court from Versailles to the Tuileries. In the spring of 1790 we hear his voice urging the people to pre- vent the arrest of Marat. In the autumn we find him chosen to be the commander

of the battalion of the national guard of his district. In the beginning of 1791 he was elected to the post of administrator of the department of Paris. This interval was for all France a barren period of doubt, fatigue, partial reaction and hoping against hope. It was not until 1792 that Danton came into the prominence of a great revolutionary chief.

In the spring of the previous year (1791) Mirabeau had died, and with him had passed away the only man who was at all likely to prove a wise guide to the court. In June of that year the king and queen made a disastrous attempt to flee from their capital and their people. They were brought back once more to the Tuileries, which from that time forth they rightly looked upon more as a prison than a palace or a home. The popular exasperation was intense, and the constitutional leaders, of whom the foremost was Lafayette, became alarmed and lost their judgment. A bloody dispersion of a popular gathering, known afterwards as the massacre of the Champ'-de-Mars (July 1791), kindled a flame of resentment against the court and the constitutional party which was never extinguished. The Constituent Assembly completed its infertile labours in September 1791. Then the elections took place to its successor, the short-lived Legislative Assembly. Danton was not elected to it, and his party was at this time only strong enough to procure for him a very subordinate post in the government of the Parisian municipality. Events, however, rapidly prepared a situation in which his influence became of supreme weight. Between January and August 1792 the want of sympathy between the aims of the popular assembly and the spirit of the king and the queen became daily more flagrant and beyond power of disguise. In April war was declared against Austria, and to the confusion and distraction caused by the immense civil and political changes of the past two years was now added the ferment and agitation of war with an enemy on the frontier. The distrust felt by Paris for the court and its loyalty at length broke out in insurrection. On the memorable morning of the 10th

of August 1792 the king and queen took refuge with the Legislative Assembly from the apprehended violence of the popular forces who were marching on the Tuileries. The share which Danton had in inspiring and directing this momentous rising is very obscure. Some look upon him as the head and centre of it. Apart from documents, support is given to this view by the fact that on the morrow of the fall of the monarchy Danton is found in the important post of minister of justice. This sudden rise from the subordinate office which he had held in the commune is a proof of the impression that his character had made on the insurrectionary party. To passionate fervour for the popular cause he added a certain broad steadfastness and an energetic practical judgment which are not always found in company with fervour. Even in those days, when so many men were so astonish- ing in their eloquence, Danton stands out as a master of com- manding phrase. One of his fierce sayings has become a proverb. Against Brunswick and the invaders, "il nous font de I'audace, et encore de I'audace, et toujours de I'audace," — we must dare, and again dare, and for ever dare. The tones of his voice were loud and vibrant. As for his bodily presence, he had, to use his own account of it, the athletic shape and the stern physiognomy of the Liberty for which he was ready to die. Jove the Thunderer, the rebel Satan, a Titan, Sardanapalus, were names that friends or enemies borrowed to describe his mien and port. He was

thought about as a coarser version of the great tribune of the Constituent Assembly; he was called the Mirabeau of the sans- culottes, and Mirabeau of the markets.

In the executive government that was formed on the king's dethronement, this strong revolutionary figure found himself the colleague of the virtuous Roland and others of the Girondins. Their strength

was speedily put to a terrible test. The alarming successes of the enemy on the frontier, and the surrender of two important fortresses, had engendered a naturalpanicin thecapital. But in the breasts of some of the wild men whom the disorder of the time had brought to prominent place in the Paris com- mune this panic became murderously heated. Some hundreds of captives were barbarously murdered in the prisons. There has always been much dispute as to Danton's share in this dreadful transaction. At the time, it must be confessed, much odium on account of an imputed direction of the massacres fell to him. On the whole, however, he cannot be fairly convicted of any part in the plan. What he did was to make the best of the misdeed, with a kind of sombre acquiescence. He deserves credit for insisting against his colleagues that they should not flee from Paris, but should remain firm at their posts, doing what they could to rule the fierce storm that was raging around them.

The elections to the National Convention took place in September, when the Legislative Assembly surrendered its authority. The Convention ruled France until October 1795. Dan ton was a member; resigning the ministry of justice, he took a foremost part in the deliberations and proceedings of the Convention, until his execution in April 1 794. This short period of nineteen months was practically the life of Dan ton, so far as the world is concerned with him.

He took his seat in the high and remote benches which gave the name of the Mountain to the thoroughgoing revolutionists who sat there. He found himself side by side with Marat, whose exaggerations he never countenanced; with Robespierre, whom he did not esteem very highly, but whose immediate aims were in many respects his own; with Camille Desmoulins and Phelip- peaux, who were his close friends and constant partisans. The foes of the Mountain were the group of the Girondins, — eloquent, dazzling, patriotic, but unable to apprehend the fearful nature of the crisis, too full of vanity and exclusive party-spirit, and too fastidious to strike hands with the vigorous and stormy Danton. The Girondins dreaded the people who had sent Danton to the Convention ; and they insisted on seeing on his hands the blood of the prison massacres of September. Yet in fact Danton saw much more clearly than they saw how urgent it was to soothe the insurrectionary spirit, after it had done the work of abolition which to him, as to them too, seemed necessary and indispensable. Danton discerned what the Girondins lacked the political genius to see, that this control of Paris could only be wisely effected by men who sympathized with the vehemence and energy of Paris, and understood that this vehemence and energy made the only force to which the Convention could look in resisting the Germans on the north-east frontier, and the friends of reaction in the interior. " Paris," he said, " is the natural and constituted centre of free France. It is the centre of light. When Paris shall perish there will no longer be a republic."

Danton was among those who voted for the death of the king (January 1793). He had a conspicuous share in the creation of the famous revolutionary tribunal, his aim being to take the weapons away from that disorderly popular vengeance which had done such terrible work in September. When all executive power was conferred upon a committee of public safety, Danton had been one of the nine members of whom that body was origin- ally composed. He was despatched on frequent missions from the

Convention to the republican armies in Belgium, and wherever he went he infused new energy into the work of national liberation. He pressed forward the erection of a system of national education, and he was one of the legislative committee charged with the construction of a new system of government. He vainly tried to compose the furious dissensions between Girondins and Jacobins. The Girondins were irreconcilable, and made Danton the object of deadly attack. He was far too robust in character to lose

himself in merely personal enmities, but by the middle of May (1793) he had made up his mind that the political suppression of the Girondins had become indispensable. The position of the country was most alarming. Dumouriez, the victor of Valmy and Jemmappes, had deserted. The French arms were suffering a series of checks and reverses. A royalist rebellion was gaining formidable dimensions in the west. Yet the Convention was wasting time and force in the vindictive recriminations of faction. There is no positive evidence that Danton directly instigated the insurrection of the 3 1st of May and the 2nd of June, which ended in the purge of the Convention and the proscription of the Girondins. He afterwards spoke of himself as in some sense the author of this revolution, because a little while before, stung by some trait of factious perversity in the Girondins, he had openly cried out in the midst of the Convention, that if he could only find a hundred men, they would resist the oppressive authority of the Girondin commission of twelve. At any rate, he certainly acquiesced in the violence of the commune, and he publicly gloried in the expulsion of the men who stood obsti- nately in the way of a vigorous and concentrated exertion of nationaFpower. Danton, unlike the Girondins, accepted the fury of popular passion as an inevitable incident in the work of deliverance. Unlike Billaud Varenne or Hebert, or any other of the Terrorist party, he had no wish to use this frightful two- edged weapon more freely than was necessary. Danton, in short, had the instinct of the statesman. His object was to reconcile France with

herself; to restore a society that, while emanci- pated and renewed in every part, should yet be stable; and above all to secure the independence of his country, both by a resolute defence against the invader, and by such a mixture of vigour with humanity as should reconcile the offended opinion of the rest of Europe. This, so far as we can make it out, was what was in his mind.

The position of the Mountain had now undergone a complete change. In the Constituent Assembly its members did not number more than 30 out of the 578 of the third estate. In the Legislative Assembly they had not been numerous, and none of their chiefs had a seat. In the Convention for the first nine months they had an incessant struggle for their very lives against the Girondins. They were now (June 1793) for the first time in possession of absolute power. It was not easy, how- ever, for men who had for many months been nourished on the ideas and stirred to the methods of opposition, all at once to develop the instincts of government. Actual power was in the hands of the two committees — that of public safety and of general security. Both were chosen out of the body of the Convention. The drama of the nine months between the expul- sion of the Girondins and the execution of Danton turns upon the struggle of the committee to retain power — first, against the insurrectionary commune of Paris, and second, against the Convention, from which the committees derived an authority that was regularly renewed on the expiry of each short term.

Danton, immediately after the fall of the Girondins, had thrown himself with extraordinary energy into the work to be done. The first task in a great city so agitated by anarchical ferment had been to set up a strong central authority. In this genuinely political task Danton was prominent. He was not a member of the committee of public safety when that body was renewed in the shape that speedily made its name so redoubtable all over the world. This was the result of a self-denying ordinance which he imposed upon himself. It was he who proposed that the powers of the committee should be those of a dictator, and

that it should have copious funds at its disposal. In order to keep himself clear of any personal suspicion, he announced his resolution not to belong to the body which he had thus done his best to make supreme in the state. His position during the autumn of 1793 was that of a powerful supporter and inspirer, from without, of the government which he had been foremost in setting up. Danton was not a great practical administrator and contriver, like Carnot, for instance. But he had the gift of raising in all who heard him an heroic spirit of patriotism and fiery devotion, and he had a clear eye and a cool judgment in the

tempestuous emergencies which aroseinsuch appallingsuccession. His distinction was that he accepted the insurrectionary forces, instead of blindly denouncing them as the Girondins had done. After these forces had shaken down the throne, and then, by driving away the Girondins, had made room for a vigorous government, Danton perceived the expediency of making all haste to an orderly state. Energetic prosecution of the war, and gradual conciliation of civil hatreds, had been, as we have said, the two marks of his policy ever since the fall of the monarchy. The first of these objects was fulfilled abundantly, partly owing to the energy with which he called for the arming of the whole nation against its enemies. His whole mind was now given to the second of them. But the second of them, alas, was desperate. It was to no purpose that, both in his own action and in the writings of Camille Desmoulins {Le Vieux Cordelier), of whom he was now and always the intimate and inspirer, he worked against the iniquities of the bad men, like Carrier and Collot d'Herbois, in the provinces, and against the severity of the revolutionary tribunal in Paris. The black flood could not at a word or in an hour subside from its storm-lashed fury. The commune of Paris was now composed of men like Hebert and Chaumette, to whom the restoration of any sort of

political order was for the time indifferent. They wished to push destruction to limits which even the most ardent sympathizers with the Revolution condemn now, and which Danton condemned then, as extravagant and senseless. Those men were not politicians, they were fanatics; and Danton, who was every inch a politician, though of a vehe- ment type, had as little in common with them as John Calvin of Geneva had with John of Leiden and the Mtinster Anabaptists. The committee watched Hebert and his followers uneasily for many weeks, less perhaps from disapproval of their excesses than from apprehensions of their hostility to the committee's own power. At length the party of the commune proposed to revolt against the Convention and the committees. Then the blow was struck, and the Hebertists were swiftly flung into prison, and thence under the knife of the guillotine (March 24th, 1794). The execution of the Hebertists was the first victory of the revolutionary government over the extreme insurrectionary party. But the committees had no intention to concede anything to their enemies on the other side. If they refused to follow the lead of the anarchists of the commune, they were none the more inclined to give way to the Dantonian policy of clemency. Indeed, such a course would have been their own instant and utter ruin. The Terror was not a policy that could be easily transformed. A new policy would have to be carried out by new men, and this meant the resumption of power by the Convention, and the death of the Terrorists. In Thermidor 1794 such a revolution did take place, with those very results. But in Germinal feeling was not ripe. The committees were still too strong to be overthrown. And Danton seems to have shown a singular heedlessness. Instead of striking by vigour in the Convention, he waited to be struck. In these later days a certain discouragement seems to have come over his spirit. His wife had died during his absence on one of his expeditions to the armies ; he had now married again, and the rumour went that he was allowing domestic happiness to tempt him from the keen incessant vigilance proper to the politician in such a crisis. He must have

known that he had enemies. When the Jacobin club was " purified " in the winter, Danton's name would have been struck out as a moderate if Robespierre had not defended him. The committees had deliberated on his arrest soon afterwards, and again it was Robespierre who resisted the proposal. Yet though he had been warned of the lightning that was thus playing round his head, Danton did not move. Either he felt himself powerless, or he rashly despised his enemies. At last Billaud Varenne, the most prominent spirit of the committee after Robespierre, succeeded in gaining Robespierre over to his designs against Danton. Robespierre was probably actuated by the motives of selfish policy which soon proved the greatest blunder of his life. The Convention, aided by Robespierre and the authority of the committee, assented with ignoble unanimity. On the 30th of March Danton, Desmoulins and others of the

party were suddenly arrested. Danton displayed such vehe- mence before the revolutionary tribunal, that his enemies feared lest he should excite the crowd in his favour. The Convention, in one of its worst fits of cowardice, assented to a proposal made by St Just that, if a prisoner showed want of respect for justice, the tribunal might pronounce sentence without further delay. Danton was at once condemned, and led, in company with fourteen others, including Camille Desmoulins, to the guillotine (April 5th, 1 794). " I leave it all in a frightful welter," he said; " not a man of them has an idea of government. Robespierre will follow me; he is dragged down by me. Ah, better be a poor fisherman than meddle with the government of men!"

Events went as Danton foresaw. The committees presently came to quarrel with the pretensions of Robespierre. Three months after Danton, Robespierre fell. His assent to the execu- tion of Danton had deprived him of the single great force that might have supported him against the committee. The man who had " saved France from Brunswick " might perhaps have saved her from the White reaction of 1 794.

Bibliography. — Sources for the life of Danton abound in the national archives and in the columns of the Moniteur. His (Euvres were published by A. Vermorel (Paris, 1866), and his speeches are included in H. Morse Stephens' Principal Speeches of the Statesmen and Orators of the French Revolution (vol. ii., Oxford, 1892) ; cf. F. V. Aulard, Les Orateurs de la Legislative et de la Convention (Danton and his group; 2 vols., 1885-1886). The charges of corruption freely brought against Danton by contemporaries were accepted by many historians, and he has been persistently accused of instigating or at least abetting, by failure to use the power he possessed, the September massacres. A minute examination of the evidence by F. V. Aulard and J. F. E. Robinet in France, followed by A. H. Beesly in England, has placed his career and his character in a fairer light. The chief books on Danton's life are: — A. Bougeart, Danton, documents pour servir a I'histoire de la Revolution frangaise (Brussels, 1861); J. F. E. Robinet, Danton, memoire sur sa vie privee (Paris, 1865), Le Proces des Dantonistes (Paris, 1879), Danton emigre (Paris, 1887), Danton, homme d'etat (Paris, 1889); F. V. Aulard, Hist. pol. de la Rev. fr. (Paris, 1901), and Danton (Paris, 1887); A. Dubost, Danton et la politique contemporaine (Paris, 1880); A. H. Beesly, Life of Danton (1899, new ed. 1906); H. Belloc, Danton (1899). There is a short " Life of Danton " in Morse Stephens' Principal Speeches, cited above. See also C. F. Warwick, Danton and the French Revolution (1909)- (J. Mo.)

DANUBE (Ger. Donau, Hungarian Duna, Rumanian Dunarea, Lat. Danubius or Danuvius, and in the lower part of its course Ister), the most important river of Europe as regards the volume of its outflow, but inferior to the Volga in length and in the area of its drainage. It originates at Donaueschingen in the Black Forest, where two mountain streams, the Brigach and the Brege, together with a third stream from the Palace Gardens, unite at an elevation of 2187 ft. above the sea to form the Danube so called. From this point it runs in an easterly direction

until it falls into the Black Sea some 1750 m. from its source, being the only European river of importance with a course from west to east. Its basin, which comprises a territory of nearly 300,000 sq. m., is bounded by the Black Forest, some of the minor Alpine ranges, the Bohemian Forest and the Carpathian Mountains on the north, and by the Alps and the Balkan range on the south. From the point where the Danube first becomes navigable, i.e. at its junction with the Uler at Ulm (1505 ft. above sea-level), it is fed by at least 300 tributaries, the principal of which on the right bank are the Inn, the Drave and the Save; while on the left bank are the Theiss or Tisza, the Olt, the Sereth and the Pruth. These seven rivers have a total length of 2920 m. and drain one half of the basin of the Danube.

*The course of this mighty river is rich in historical and political associations. For a long period it formed the frontier of the Roman empire; near Eining (above Regensburg) was w/storica/ the ancient Abusina, which for nearly five centuries an d was the chief Roman outpost against the northern political barbarians. Traces of Trajan's wall still exist between * ssoc/a - that point and Wiesbaden, while another line of forti- fications bearing the same emperor's name are found in the Dobrudja between Cernavoda (on the lower Danube) and Constantza. At intervening points are still found many notable Roman remains, such as Trajan's road, a marvellous work on the*

right bank of the river in the rocky Kazan defile (separating the Balkans on the south from the Carpathians on the north), where a contemporary commemorative tablet is still conspicuously visible. At Turnu Severin below the end of this famous gorge are the remains of a solid masonry bridge constructed by the same emperor at the period of his Dacian conquests. But since Roman days the central

Danube has never formed the boundary of a state; on the contrary it became the route followed from east to west by successive hordes of barbarians — the Huns, Avars, Slavs, Magyars and Turks; while the Franks under Charlemagne, the Bavarians and the Crusaders all marched in the opposite direction towards the east. In more modern days its banks were the scenes of many bloody battles during the Napoleonic Wars. Still more recently it has become the great highway of commerce for central Europe. It has been pointed out by J. G. Kohl (Austria and the Danube, London, 1844) and others that, in consequence of the Danube having been in constant use as the line of passage of migratory hostile tribes, it nowhere forms the boundary between two states from Orsova upwards, and thus it traverses as a central artery Wurttemberg, Bavaria, Austria and Hungary, while on the other hand various tributaries both north and south, which formed serious obstacles to the march of armies, have become lines of separation between different states. Thus Hungary is separated from Austria by the rivers March and Leitha; the river Enns, for a considerable period the extreme western boundary of the Magyar kingdom, still separates Upper and Lower Austria; the Inn and the Salzach divide Austria from Bavaria, and farther west the Iller separates Bavaria from Wurttemberg.

The Danube after leaving Donaueschingen flows south-east in the direction of Lake Constance, and below Immendingen a considerable quantity of its waters escapes through subterranean fissures to the river Ach in the Rhine basin. At Gutmadingen it turns to the north-east, which general direction, although with many windings, it maintains as far as Linz. At Tuttlingen it contracts and the hills crowd close to the banks, while ruins of castles crown almost every possible summit. The scenery is wild and beautiful until the river passes Sigmaringen. At Ulm, where the river leaves Wurttemberg and enters Bavaria, it is joined by a large tributary, the Iller, and from this point becomes navigable downstream for specially constructed boats carrying 100 tons of merchandise. It is here some 78 yds. in breadth,

with an average depth of 3 ft. 6 in. Continuing its north-easterly course it passes through Bavaria, gradually widening its channel first at Steppberg, then at Ingol- stadt, but finally narrowing again until it reaches Regensburg (height 949 ft.). At this point it changes its direction to the south-east, and passing along the southern slopes of the Bavarian Forest enters Austria at Passau (height 800 ft.). In its passage through Bavaria it receives several important affluents on both banks, notably on the right the Alpine rivers Lech, Isar and Inn, the last of which at the junction near Passau exceeds in volume the waters of the Danube.

From Passau the Danube flows through Austria for a distance of 233 m. Closed in by mountains it flows past Linz in an un- broken stream — below, it expands and divides into many arms until it reaches the famous whirlpool near Grein where its waters unite and flow on in one channel for 40 m., through mountains and narrow passes. Beyond Krems it again divides, forming arms and islands beyond Vienna. The Danube between Linz and Vienna is renowned not only for its picturesque beauty but for the numerous medieval and modern buildings of historical and archae- ological interest which crown its banks. The splendid Benedictine monastery of Melk and the ruins of Diirrenstein, the prison of Richard Cceur de Lion, are among the most interesting.

After passing Vienna and the Marchfeld, the Danube (here 316 yds. wide and 429 ft. above sea-level) passes through a defile formed by the lower spurs of the Alps and the Carpathians and enters Hungary at the ruined castle of Theben a little above Pressburg, the old Magyar capital, after leaving which the river passes through the Hungarian plains, receiving several affluents on both sides. It divides into three channels, forming several

islands. After passing the fortress of Komarom it loses its easterly course at Vacz (Waitzen), and flows nearly due south for 230 m. down to its junction with the Drave (81 ft. above sea-level), passing in its course Budapest, the capital of

Hungary, and farther on Mohacs. Below Mohacs the Franz Josef canal con- nects the Danube with the Theiss. After its junction with the Save the Danube follows a south-easterly direction for 200 m. until it is joined on the right bank of the Drave at Belgrade, above which it receives on the left bank the Theiss or Tisz., the largest of its Hungarian affluents. From Belgrade the Danube separates Hungary from Servia. It flows eastward until it has passed through the stupendous Kazan defile, in which its waters (at Semlin 1700 yds. wide and 40 ft. deep) are hemmed in by precipitous rocks to a width of only 162 yds., with a depth of 150 ft. and a tremendous current. Emerging, above Orsova, at a height of 42 ft. above sea-level, it opens to nearly a mile in width and, turning south-eastwards, is again narrowed by its last defile, the Iron Gates, where it passes over the Prigrada rock. The course of the river through Hungary, from Pressburg to Orsova, is some 600 m.

The river now flows south, separating Servia from Rumania down to its junction with the Timok, after which as far as Silistria, a distance of 284 m., it separates Rumania from Bulgaria. The north bank is mostly flat and marshy, whereas the Bulgarian bank is almost continuously crowned by low heights on which are built the considerable towns of Vidin (Widdin), Lorn Palanka, Rustchuk and Silistria, all memorable names in Turko-Russian wars. From Silistria the river flows through Rumanian territory and after passing Cernavoda, where it is crossed by a modern railway bridge, it reaches (left bank) the important commercial ports of Braila and Galatz. A few miles east of Galatz the Pruth enters on the left bank, which is thenceforward Russian territory. The Danube flows in a single channel from Galatz for 30 m. to the Ismail Chatal (or fork), where it breaks up into the several branches of the delta. The Kilia branch from this point flows to the north-east past the towns of Ismail and Kilia, and 17 m. below the latter breaks up into another delta discharging by seven channels into the Black Sea. The Tulcea branch flows south-east from the Ismail

Chatal, and 7 m. below the town of Tulcea separates into two branches. The St George's branch, holding a general, though winding, course to the south-east, discharges by two channels into the sea; and the Sulina branch, taking an easterly direction, emerges into the Black Sea 20 m. south of the Ochakov mouth of the Kilia, and 20 m. north of the Kedrilles mouth of the St George.

In 1857 the proportion of discharge by the three branches of the Danube was Sulina 7%, St George's 30% and Kilia 63%; but in 1905 the relative proportions had altered to Sulina 9%, St George's 24% and Kilia 67%. The average outflow by the three mouths combined is 236,432 cub. ft. per second. The delta enclosed between the Kilia and St George's branches, about 1000 sq. m. in area, mainly consists of one large marsh covered with reeds, and intersected by channels, relieved in places by isolated elevations covered with oak, beech and willows, many of them marking the ancient coast-line. On the eastern side of the. Kilia delta the coast-line is constantly advancing and the sea becoming shallower, owing to the enormous amount of solid deposits brought down by the river. In time of ordinary flood the Kilia branch with its numerous mouths pours into the sea some 3000 cub. ft. of sand and mud per minute. Its effects are felt as far south as Sulina, and tend to necessitate the farther extension into the sea of the guiding piers of that port.

In the course of the 19th century, more especially during its latter half, much was done to render the Danube more available as a means of communication. In 1816 Austria and B avaria made arrangements for the common utilization t ^ a ga ~ of the upper portion of the river, and since then both governments have been liberal in expenditure on its improve- ment. In 1844 the Ludwigs Canal was constructed by King Louis of Bavaria. It is no m. in length and 7 ft. in depth, and connects the Danube at Kelheim (half way between Ulm and Passau) with the Rhine at Mainz by means of the rivers Altmuhl, Regnitz and

Main. Various other projects exist, one for the connexion of the Danube (near Vienna) with the river Oder at Oderberg, another for a canal from the Danube to the Moldau at Budweis, 125 m. in length, which owing to the regularization of the Moldau is the last uncompleted link of a navigable channel 1875 m. in length between Sulina and Hamburg at the mouths of the Danube and the Elbe respectively. There also exist other schemes for joining the Danube with the rivers Neckar and Theiss, and also for connecting the Oder Canal with the Vistula and the Dniester. Between Ulm and Vienna, a distance of 629 m., works of rectification have been numerous and have greatly improved the navigability of the river. The draining of the Donau-moos between Neuburg and Ingolstadt, commenced in 1791, was successfully completed about 1835; and in 1853 the removal of the rocks which obstructed the river below Grein was finally achieved; while at Vienna itself the whole mass of the Danube was conducted nearer the town for a distance of nearly 2 m. through an artificial channel 10 m. in length and 330 yds. in width, with a depth of about 12 ft., and at a cost with subsidiary works of over three millions sterling. The work, begun in 1866, involved the removal of 12,000,000 cub. metres of sand and gravel, and proved a great success, not only amply realizing its principal object, the protection of Vienna from disastrous inun- dations, but also improving the navigability of the river in that portion of its course. The Hungarian government also, through- out the latter half of the 19th century, expended vast sums at Budapest for the improvement of navigation and the protection of the town from inundation, and in the regularization of the Danube down to Orsova.

In prehistoric times a great part of the plains of Hungary formed a large inland sea, which ultimately burst its bounds, whereupon the Danube forced its way through the Carpathians at the Kazan defile.

Much of what then formed the bottom of this sea consisted until modern times of marshes and waste lands lying in the vicinity of its numerous rivers. The problem of draining and utilizing these lands was not the only difficulty to be surmounted by the Hungarian engineers; the requirements of navigation and the necessity in winter of preventing the formation of large ice-fields, such as caused the disastrous floods at Budapest in 1838, had also to be considered. In carrying out these works the Hungarian government between 1867 and 1895 spent seven millions sterling, and a further expenditure of three and a half millions was provided for up to 1907. At Budapest, where the formation of ice-fields at the upper entrance of the two side arms of the Danube — the Promontor on the north, 20 m. in length, and the Soroksar, 35 m. long, — caused the inundation alluded to, the latter branch has been artificially blocked and the whole of the Danube now flows through Budapest in a single channel. For the first section of 60 m. after entering Hungary, the bed of the river, here surcharged with gravel, was constantly changing its course. It has been regularized throughout, the width of the stream varying from 320 to 400 yds. In the second section from Gonyo to Paks, 164 m. in length, the river had a tendency to form islands and sandbanks — its width now varies uniformly from 455 to 487 yds. The third section of 113 m., from Paks to the mouth of the Drave, differed from the others and made innumerable twists and curves. No fewer than seventeen cuttings have been made, reducing the original course of the river by 75 m. The fourth section, 217 m. in length, from the Drave to Old Moldova, resembles in its characteristics the second section and has been similarly treated. Cuttings have also been made where necessary, and the widths of the channel are 487 yds. to the mouth of the Theiss, 650 between that point and the Save, and lower down 760 yds. In the fifth and last section from Old Moldova to Orsova and the Iron Gates the river is enclosed by mountains and rocky banks, and the obstacles to navigation are rocks and whirlpools.

Article VI. of the treaty of London (1871) authorized the powers which possess the shores of this part of the Danube to come to an understanding with the view of removing these impediments, and to have the right of levying a provisional tax on vessels of every flag which may henceforth benefit thereby

until the extinction of the debt contracted for the execution of the works. As the riverain powers could not come to an agreement on the subject, the great powers at the congress of Berlin (1878) entrusted to Austria-Hungary the execution of the works in question. Austria-Hungary subsequently conferred its rights on Hungary, by which country the works were carried out at a cost of about one and a half millions sterling.

The principal obstructions between Old Moldova and Turnu Severin were the Stenka Rapids, the Kozla Dojke Rapids, the Greben section and the Iron Gates. At the first named there was a bank of rocks, some of them dry at low water, extending almost across the river (985 yds. wide). The fall of the river bed is small, but the length of the rapid is 1100 yds. The Kozla Dojke, 9 m. below the Stenka Rapids, extend also for 1100 yds., with a fall of 1 in 1000, where two banks of rocks cause a sudden alternation in the direction of the current. The river is here only 170 to 330 yds. in width. Six miles farther on is the Greben section, the most difficult part of the works of improvement. A spur of the Greben mountains runs out below two shoals where the river suddenly narrows to 300 yds. at low water, but presently widens to i| m. Seven miles lower down are the Jucz Rapids, where the river-bed has a fall of 1 in 433. At the Iron Gates, 34 m. below the Greben, the Prigrada rocky bank nearly blocked the river at the point where it widens out after leaving the Kazan defile. The general object of the works was to obtain a navigable depth of water at all seasons of 2 metres (6-56 ft.) on that portion of the river above Orsova, and a depth of 3 metres (9^84 ft.) below that town. To effect this at Stenka, Kozla Dojke, Islaz and Tachtalia, channels 66 yds. wide

*had to be cut in the solid rock to a depth of 6 ft. 6 in. below low water. The point of the Greben spur had to be entirely removed for a distance of 167 yds. back from its original face. Below the Greben point a training wall 7 to 9 ft. high, 10 ft. at top and nearly 4 m. in length, has been built along the Servian shore in order to confine the river in a narrow channel. At Jucz another similar channel had to be cut and a training wall built. At the Iron Gates a channel 80 yds. wide, nearly 2000 yds. in length and 10 ft. deep (in the immediate vicinity of traces of an old Roman canal) had to be cut on the Servian side of the river through solid rock. Training walls have been built on either side of the channel to confine the water so as to raise its level; that on the right bank having a width of 19 ft. 6 in. at top, and serving as a tow-path; that on the left being 13 ft. in width. These training walls are built of stone with flat revetments to protect them against ice. These formidable and expensive works have not altogether realized the expectations that had been formed of them. One most important result, however, has been attained, i.e. vessels can now navigate the Iron Gates at all seasons of the year when the river is not closed by ice, whereas formerly at extreme low water, lasting generally for about three months in the late summer and autumn, through navigation was always at a standstill, and goods had to be landed and transported considerable distances by land. The canal was opened for traffic on the 1st of October 1898. It was designed of sufficient width, as was supposed, for the simultaneous passage of boats in opposite directions; but on account of the great velocity of the current this has been found to be impracticable. From the Iron Gates down to Braila, which is the highest point to which large sea-going ships ascend the river, there have been no important works of improvement. From Braila to p urooeaa Sulina, a distance of about 100 m., the river falls under commis- the jurisdiction of the European commission of the *>ob of Danube, an institution of such importance as to merit J? e lengthened notice. It was called into existence under Art. XVI. of the*

treaty of Paris (1856), and in November of that year a commission was constituted in which Austria, France, Great Britain, Prussia, Russia, Sardinia and Turkey were each represented by one delegate " to designate and cause to be exe- cuted the works necessary below Isaktcha 1 to clear the mouths of the Danube as well as the neighbouring parts of the sea, from

1 Isakcea was 66 nautical m. from the sea measured by the Sulina arm of the Danube, 37 m. below Braila and 26 m. below Galatz.

the sands and other impediments which obstructed them, in order to put that part of the river and the said parts of the sea in the best possible state for navigation."

In Art. XVIII. of the same treaty it was anticipated that the European commission would have finished the works described within the period of two years, when it was to be dissolved and its powers taken over by a Riverain commission to be established under the same treaty; but this commission has never come into existence. Extended by short periods up to 1871, the powers of the European commission were then prolonged under the treaty of London for twelve years. At the congress of Berlin in 1878 its jurisdiction was extended from Isakcea to Galatz (26 m.), and it was decided that the commission, in which Rumania was henceforward to be represented by a delegate, should exercise its powers in complete independence of the territorial authority. By the treaty of London of 1883 the jurisdiction of the commission was extended from Galatz to Braila and its powers were prolonged for twenty-one years (i.e. till the 24th of April 1904), after which its existence was to continue by tacit prolongation for successive terms of three years unless one of the high contracting powers should propose any modifica- tion in its constitution or attributes. It was also

decided that the European commission should no longer exercise any effective control over that portion of the Kilia branch of which the two banks belonged to one of the riverain powers (Russia and Rumania), while as regards that portion of it which separated the two countries, control was to be exercised by the Russian and Rumanian delegates on the European commission. Russia was also authorized to levy tolls intended to cover the expenses of any works of improvement that might be undertaken by her. Art. VII. of the same treaty declared that the regulations for navigation, river police, and superintendence drawn up on the 2nd of June 1882 by the European commission, assisted by the delegates of Servia and Bulgaria, should be made applicable to that part of the Danube situated between the Iron Gates and Braila. In consequence of Rumania's opposition, the proposed Commission Mixte was never formed, and these regulations have never been put in force. As regards the extension of the powers of the European commission to Braila, 1 1 m. above Galatz, and at the head of the maritime navigation, a tacit understanding has been arrived at, under which questions concerning navigation proper come under the jurisdiction of the commission, while the police of the ports remains in the hands of the Rumanian authorities.

Sir Charles Hartley, who was chief engineer of the commission from 1856 to 1907, 1 in a paper contributed to the Institution of Civil Engineers in 1873 (vol. xxxvi.), gave the following graphic description of the state of the Sulina mouth when the commission entered on its labours in 1856: —

" The entrance to the Sulina branch was a wild open seaboard strewn with wrecks, the hulls and masts of which, sticking out of the submerged sandbanks, gave to mariners the only guide where the deepest channel was to be found. The depth of the channel varied from 7 to II ft., and was rarely more than 9 ft.

" The site now occupied by wide quays extending several miles in length was then entirely covered with water when the sea rose a few inches above

ordinary level, and that even in a perfect calm; the banks of the river near the mouth were only indicated by clusters of wretched hovels built on piles and by narrow patches of sand skirted by tall weeds, the only vegetable product of the vast swamps beyond.

" For some years before the improvements, an average of 2000 vessels of an aggregate capacity of 400,000 tons visited the Danube, and of this number more than three-fourths loaded either the whole or part of their cargoes from lighters in the Sulina roadstead, where, lying off a lee shore, they were frequently exposed to the greatest danger. Shipwrecks were of common occurrence, and occasionally the number of disasters was appalling. One dark winter night in 1855, during a terrific gale, 24 sailing ships and 60 lighters went ashore off the mouth and upwards of 300 persons perished."

The state of affairs in the river was not much better than at the Sulina mouth. Of the three arms of the Danube, the Kilia, the

1 Sir Charles Hartley became consulting engineer in 1872, when he was succeeded as resident engineer by Mr Charles Kiihl, C.E., C.M.G. To those two gentlemen is mainly due the conspicuous success of the engineering works.

Sulina and the St George, the central or Sulinabranch, owing to its greater depth of water over the bar, had from time immemorial been the principal waterway for sea-going vessels; its average ' depth throughout its course, which could not always be counted on, was 8 ft., but it contained numerous shoals where vessels had to lighten, so that cargo had often to be shifted several times in the voyage down the river. It also contained numerous bends and sharp curves, sources of the greatest difficulty to navigation. The commission fixed its seat at Galatz. Provisional works of improvement were begun almost immediately at the mouth of the Sulina branch of the Danube, but two years were spent in discussing the relative

claims to adoption of the Kilia, the Sulina and the St George's mouths. Unable to agree, the delegates referred the question to their respective governments, and a technical commission appointed by France, England, Prussia and Sardinia met at Paris and decided unanimously in favour of St George's; but recommended, instead of the embankment of the natural channel, the formation of an artificial canal 17 ft. in depth closed by sluices at its junction with the river, and reaching the sea at some distance from the natural embouchure. The choice of St George's made by this commission was adopted at Galatz in December 1858, and six of the seven representatives voted for its canalization; but owing to various political and financial considerations, it was ultimately decided to do nothing more in the meantime than render permanent and effective the provisional works already in progress at the Sulina mouth. These consisted of two piers forming a seaward prolongation of the fluvial channel, begun in 1858 and completed in 1861. The northern pier had a length of 4631 ft., the southern of 3000, and the depth of the water in which they were built varied from 6 to 20 ft. At the commencement of the works the depth of the channel was only 9 ft. but by their completion it had increased to 19 ft. The works designed and constructed by Sir Charles Hartley had in fact proved so successful that nothing more was ever heard of the St George's project. In 1865 a new lighthouse was erected at the end of the north pier. The value of these early works of the commission is shown by the fact that of 2928 vessels navigating the lower Danube in 1855, 36 were wrecked, while of 2676 in 1865 only 7 were wrecked. In 1871 it was found expedient to lengthen the piers seaward, and in 1876 the south jetty was prolonged, so as to bring its end exactly opposite the lighthouse on the north pier. This resulted in an increase of the depth to 2o| ft., and for fifteen years, from 1879 to 1895, this depth remained constant without the aid of dredging. In 1894, owing to the constantly increasing size of vessels frequenting the Danube, it was found necessary to deepen the entrance still

further, and to construct two parallel piers between the main jetties, reducing the breadth of the river to 500 ft., and thereby increasing the scour. There is now a continuous channel 24 ft. in depth, 5200 ft. in length, and 300 ft. in width between the piers, and 600 ft. outside the extremities of the piers, until deep water is reached in the open sea. This depth is only maintained by constant dredging. The engineers of the commission have been equally successful in dealing with the Sulina branch of the river. Its original length of 45 m. from St George's Chatal to the sea was impeded at the commencement of the improvement works by eleven bends, each with a radius of less than 1000 ft., besides numerous others of somewhat larger radius, and its bed was encumbered by ten shifting shoals, varying from 8 to 13 ft. in depth at low water. By means of a series of training walls, by groynes thrown out from the banks, by revetments of the banks, and by dredging, all done with the view of narrowing the river, a minimum depth of 11 ft. was attained in 1865, and 13 ft. in 1 87 1. In 1880 the needs of commerce and the increased size of steamers frequenting the river necessitated the construction of a new entrance from the St George's branch. This work, designed in 1857, Dut unexecuted during a quarter of a century, owing to insufficiency of funds, was completed in 1882; and in 1886, after other comparatively short cuttings had been made to get rid of difficult bends and further to deepen the channel without having to resort to dredgers, the desired minimum depth of 15 ft. was attained. Since that date a series of new cuttings

has been made. These have shortened the length of the Sulina canal by 11 nautical m., eliminated all the difficult bends and shoals, and provided an almost straight waterway 34 m. in length from Sulina to St George's Chatal, with a minimum depth of 20 ft. when the river is at its lowest.

In the early days of the commission, i.e. from 1857 to i860, the money spent on the works of improvement, amounting to about £150,000, was advanced as a loan by the then territorial power, Turkey; but in i860 the commission began to levy taxes on vessels frequenting the river, and since then has repaid its debt to the Turkish government, as well as various loans for short periods, and a larger one of £120,000 guaranteed by the powers, and raised in 1868, mainly through the energy of the British commissioner, Sir John Stokes. This last loan was paid off in 1882 and the commission became free from debt in 1887. It has now an average annual income of about £80,000 derived from taxes paid by ships when 1 leaving the river. The normal annual expenditure amounts to about £56,000, while £24,000 is gener- ally allotted to extraordinary works, such as new cuttings, &c. Between 1857 and 1905 a sum of about one and three quarter millions sterling was spent on engineering works, including the construction of quays, lighthouses, workshops and buildings, &c. Sulina from being a collection of mud hovels has developed into a town with 5000 inhabitants; a well-found hospital has been established where all merchant sailors receive gratuitous treat- ment; lighthouses, quays, floating elevators and an efficient pilot service all combine to make it a first-class port.

The result of all the combined works for the rectification of the Danube is that from Sulina up to Braila the river is navigable for sea-going vessels up to 4000 tons register, from Braila to Turnu Severin it is open for sea-going vessels up to 600 tons, and for flat barges of from 1 500 to 2000 tons capacity. From Turnu Severin to Orsova navigation is confined to river steamers, tugs and barges drawing 6 ft. of water. Thence to Vienna, the draught is limited to 5 ft., and from Vienna to Regensburg to a somewhat lower figure. Barges of 600 tons register can be towed from the lower Danube to Regensburg. Here petroleum tanks have been constructed for the storage of Rumanian petroleum, the first consignment of which in 1898, conveyed in

tank boats, took six weeks on the voyage up from Giurgevo. The principal navigation company on the upper Danube is the Societe Imperiale et Royale Autrichienne of Vienna, which started operations in 1830. This company also owns the Fiinfkirchen mines, producing annu^ ally 500,000 tons of coal. The society transports goods and passengers between Galatz and Regensburg. A less important society is the Rumanian State Navigation Company, possessing a large flotilla of tugs and barges, which run to Budapest, where they have established a combined service with the South Danube German Company for the transport of goods from Pest to Regensburg. A Hungarian Navigation Company, subsidized by the state, has also been formed, and the Hungarian railways, the Servian government and private owners own a large number of tugs and barges.

But it is the trade of the lower Danube that has principally benefited. Freights from Galatz and Braila to North Sea ports have fallen from 50s. to about 12s. or even 10s. per ton. Sailing ships of 200 tons register have given way to steamers up to 4000 tons register carrying a deadweight of nearly 8000 tons; and good order has succeeded chaos. From 1847 to i860 an average of 203 British ships entered the Danube averaging 193 tons each; from 1861 to 1889; 486 ships averaging 796 tons; in 1893, 905 vessels of 1,287,762 tons, or 68% of the total traffic, and rather more than two and a half times the total amount of British tonnage visiting the Danube in the fourteen years between 1847 and i860. The average amount of cereals (principally wheat) annually exported from the Danube during the period 1901–1905 was 13,000,000 quarters, i.e. about five times the average annual

1 Ships pay no taxes to the commission on entering the river, but on leaving it every ship of over 1500 tons register pays is. 5d. per registered ton if loaded at Galatz or Braila', or nd. per ton if loaded at Sulina. This includes pilotage and light dues. Smaller vessels pay less and ships of less than 300 tons are exempt.

exportation during the period 1861–1867. It has been calculated that between 1861 and 1902 the total tonnage of ships frequenting the Danube increased five-fold, while the mean size of individual ships increased ten-fold.

Bibliography. — Marsiglius, Danubius Pannonico-Mysicus (the Hague, 1726); Schulte, Donaufahrten .. (1819–1829) ; Planche, Descent of the Danube (1828); Szechenyi, liber die Donauschijfahrt (1836) ; A. M tiller, Die Donau vom Ursprunge bis zu den Mundungen (1839^1841); J. G. Kohl, Die Donau (Trieste, 1853–1854); G. B. Rennie, Suggestions for the Improvement of the Danube (1856); Sir C. A. Hartley, Description of the Delta of the Danube (1862 and 1874) ; Memoire sur le regime administratif etabli aux embouchures du Danube (Galatz, 1867) ; Desjardins, Rhone et Danube, a defence of the canalization scheme (Paris, 1870); Carte du Danube entre Braila et la mer, published by the European Commission (Leipzig, 1874); Peters, Die Donau und ihr Gebiet, eine geologische Studie (1876); A. F. Heksch, Guide illustre sur le Danube (Vienna, 1883); F. D. Millet, The Danube (New York, 1893) ; Schweiger-Lerchenfeld, Die Donau als Volkerweg, Schiffahrtsslrasse, und Reiseroute (Vienna, 1895); D. A. Sturza, La Question des Portes de Fer et des cataractes du Danube (Berlin, 1899); A. de Saint Clair, Le Danube: etude de droit international (Paris, 1899); D. A. Sturdza, Recueil de docu- ments relatifs & la liberie de navigation du Danube, pp. 933 (Berlin, 1904) ; A. Schroth-Ukmar, Donausagen von Passau bis Wien (Vienna, 1904). (H. Tr.)

DANVERS, a township of Essex county, on the coast of Massachusetts, U.S.A., about 19 m. N. by E. of Boston. Pop. (1890) 7454; (1900) 8542, of whom 1873 were foreign-born; (1910 census) 9407. Danvers includes an area of 14 sq. m. of level country diversified by hills. There are several villages or business centres, the largest of which, bearing the same name as the township, is served by the Boston & Maine railway. In the township are a state insane asylum, with accommodation for 1000 patients; St John's Preparatory College (Roman Catholic),

conducted by the Xavierian Brothers; and, in Peabody Park, the Peabody Institute, with a good public library and museum, the gift (1867) of George Peabody. The Danvers historical society has a valuable collection. Although chiefly a residential town, Danvers has various manufactures, the most important of which are leather, boots and shoes, bricks, boxes and electric lamps. The total value of the factory product in 1905 was $2,017,908, of which more than one half was the value of leather. Danvers owns its water-works and its electric lighting and power plant. A part of what is now Danvers was included in the grant made by the court of assistants to Governor John Endecott and the Rev. Samuel Skelton of the Salem church in 1632. Danvers was set off from Salem as a district in 1752 and was incorporated as a township in 1757, but the act of incorporation was disallowed in 1759 by the privy council on the recommendation of the board of trade, in view of George II. 's disapproval of the incorporation of new townships at that time, — hence the significance of the words on the seal of Danvers, " The King Unwilling "; in 1775 the district was again incorporated. Salem Village, a part of the present township, was the centre of the famous witchcraft delusion in 1692. In 1885 South Danvers was set off as a separate township, and in 1868 was named Peabody in honour of George Peabody, who was born and is buried there. In 1857 part of Beverly was annexed to Danvers. Among distinguished natives of Danvers are Samuel Holton (1738-18 16), a member (1 778-1 780 and 1782-1787) of the Continental Congress and (1793-1795) of the Federal Congress; Israel Putnam; Moses Porter (1755-1822), who served through the War of Independence and the War of 1812; and Grenville Mellen Dodge (b. 1831), a prominent rail- way engineer, who fought in the Union army in the Civil War, reaching the rank of major-general of volunteers, was a Re- publican member of the national House of Representatives in 1867-1869, and in 1898 president of the commission which investigated the management of the war with Spain.

See J. W. Hanson, History of the Town of Danvers (Danvers, 1848) ; Ezra D. Hines, Historic Danvers (Danvers, 1894) and Historical Address (Boston, 1907), in celebration of the 150th anniversary of the first incorporation; and A. P. White, " History of Danvers " in History of Essex County, Mass. (Philadelphia, 1888).

DANVILLE, a city and the county-seat of Vermilion county, Illinois, U.S.A., in the E. part of the state, near the Big Vermilion river, 120 m. S. of Chicago. Pop. (1890) 11,491; (1900) 16,354,

of whom 1435 were foreign-born; (1010) 27,871. Danville is served by the Chicago & Eastern Illinois (whose shops are here), the Wabash, the Chicago, Indiana & Southern, and the Cleveland, Cincinnati, Chicago & St Louis railways, and by three interurban lines. There are three public parks (Lincoln, Douglas and Ellsworth), a Carnegie library (1883), and a national home for disabled volunteer soldiers (opened in 1898). Situated in the vicinity of an extensive coalfield (the Grape Creek district), Danville has a large trade in coal; it has also several manufactur- ing establishments engaged principally in the construction and repair of railway cars, and in the manufacture of bricks, foundry products, glass, carriages, flour and hominy. The value of the factory products of the city in 1905 was $3,304,120, an increase of 72-7 % since 1900. Danville was first settled about 1830 and was first incorporated in 1839; in 1874 it was chartered as a city under the general state law of 1872 for the incorporation of municipalities. It annexed Vermilion Heights in 1905, South Danville (pop. in 1900, 898) in 1906, and Germantown (pop. in 1900, 1782) and Roselawn in 1907.

DANVILLE, a city and the county-seat of Boyle county, Kentucky, U.S.A., 113 m. S. by W. of Cincinnati. Pop. (1890) 3766; (1900) 4285 (1913

negroes) (1910) 5420. The city is served by the Southern and the Cincinnati Southern railways, the latter connecting at Junction city (4 m. S.) with the Louis- ville & Nashville railway. Danville is an attractive city, situated in the S.E. part of the fertile ” Blue Grass region ” of Kentucky. In McDowell Park there is a monument to the memory of Dr Ephraim McDowell (1771–1830), who after 1795 lived in Danville, and is famous for having performed in 1809 the first entirely successful operation for the removal of an ovarian tumour. Danville is the seat of several educational institutions, the most important of which is the Central Uni- versity of Kentucky (Presbyterian), founded in 1901 by the consolidation of Centre College (opened at Danville in 1823), and the Central University (opened at Richmond, Ky., in 1874). The law school also is in Danville. The classical, scientific and literary department of the present university is still known as Centre College; the medical and dental departments are in Louis- ville, and the university maintains a preparatory school, the Centre College academy, at Danville. In 1908 the university had 87 instructors and 696 students. Other institutions at Danville are Caldwell College for women (i860; Presbyterian), and the Kentucky state institution for deaf mutes (1823). The Transyl- vania seminary was opened here in 1785, but four years later was removed to Lexington (q.v.), and a Presbyterian theological seminary was founded here in 1853, but was merged with the Louisville theological seminary (known after 1902 as the Presbyterian Theological Seminary of Kentucky) in 1901. The municipality owns and operates its water-works and power plant. From its first settlement in 1781 until the admission of Kentucky into the Union in 1792 Danville was an important political centre. There was an influential political club here from 1786 to 1790, and here, too, sat the several conventions — nine in all — which asked for a separation from Virginia, discussed the proposed conditions of separation from that commonwealth, framed the first state constitution, and chose Frankfort as the capital.

Danville was incorporated in 1789. It was the birthplace of James G. Birney and of Theodore O'Hara.

DANVILLE, a borough and the county-seat of Montour county, Pennsylvania, U.S.A., on the N. branch of the Susque- hanna riverj about 65 m. N. by E. of Harrisburg. Pop. (1890) 7998; (1900) 8042, of whom 771 were foreign-born; (191° census) 7517. It is served by the Delaware, Lackawanna & Western, and the Philadelphia & Reading railways, and by electric railway to Bloomsburg. The borough is built on an elevated bank of the river at the base of Montour Ridge, where the narrow valley appears to be shut in on every side by hills; the river is spanned by a steel bridge, built in 1905. Iron, coal and limestone abound in the vicinity, and the borough has large manufactories of stoves and furnaces, and of iron and steel, in one of which in 1845 a " T "- rail, probably the first in America, was rolled. It is the seat of a state hospital for the insane (established

in 1868) . The water- works and electric light plant are owned and operated by the municipality. A settlement was founded here about 1776 by Captain William Montgomery and his son Daniel; and a town was laid out in 1792 and called Dan's Town until the present name was adopted a few years later. Growth was slow until the discovery of iron ore on Montour Ridge, followed in 1832 by the completion of the N. branch of the Pennsylvania Canal, which runs through the centre of the borough. Danville was incorporated in 1849.

DANVILLE, a city in Pittsylvania county, Virginia, U.S.A., on the Dan river about 140 m. (by rail) S.W. of Richmond. Pop. (1890) 10,305; (1900) 16,520 (6515 negroes); (1910) 19,020. It is on the main line of the Southern railway, and is the terminus of branches to Richmond and Norfolk; it is also served by the Danville & Western railway, a road (75 m. long) connecting with Stuart, Va., and controlled by the Southern, though operated independently. The city is built on high ground above the river. It has

a city hall, a general hospital, a Masonic temple, and a number of educational institutions, including the Roanoke College (i860; Baptist), for young women; the Randolph- Macon Institute (1897; Methodist Episcopal, South), for girls; and a commercial college. The river furnishes valuable water- power, which is utilized by the city's manufactories (value of product in 1900, third in rank in the state, $8,103,484, of which only $3,693,792 was " factory " product; in 1905 the " factory " product was valued at $4,774,818), including cotton mills— in 1905 Danville ranked first among the cities of the state in the value of cotton goods produced — a number of tobacco factories, furniture and overall factories, and flour and knitting mills. The city is a jobbing centre and wholesale market for a consider- able area in southern Virginia and northern North Carolina, and is probably the largest loose-leaf tobacco market in the country, selling about 40,000,000 ft annually. In the industrial suburb of Schoolfield, which in 1908 had a population of about 3000, there is a large textile mill. The city owns and operates its water- supply system (with an excellent filtration plant installed in 1904) and its gas and electric lighting plants. Danville was settled about 1770, was first incorporated as a town in 1792, and became a city in 1833; it is politically independent of Pittsylvania county. To Danville, after the evacuation of Richmond on the 2nd of April 1865, the archives of the Confederacy were carried, and here President Jefferson Davis paused for a few days in his flight southward.

DANZIG, or Dantsic (Polish Gdansk), a strong maritime fortress and seaport of Germany, capital of the province of West Prussia, on the left bank of the western arm of the Vistula, 4 m. S. of its entrance, at Neufahrwasser, into the Baltic, 253 m. N.E. from Berlin by rail. Pop. (1885) 114,805; (1905) 159,088. The city is traversed by two branches of the Mottlau, a small tributary of the Vistula, dredged to a depth of 15 ft., thus enab- ling large vessels to reach the wharves of the inner

town. The strong fortifications which, with ramparts, bastions and wet ditches, formerly entirely surrounded the city, were removed on the north and west sides in 1895–1896, the trenches filled in, and the area thus freed laid out on a spacious plan. One portion, acquired by the municipality, has been turned into promenades and gardens, the Steffens Park, outside the Olivaer Tor, fifty acres in extent, occupying the north-western corner. The remainder of the massive defences remain, with twenty bastions, in the hands of the military authorities; the works for laying the surrounding country under water on the eastern side have been modernized, and the western side defended by a cordon of forts crowning the hills and extending down to the port of Neufahrwasser.

Danzig almost alone of larger German cities still preserves its picturesque medieval aspect. The grand old patrician houses of the days of its Hanseatic glory, with their lofty and often elabor- ately ornamented gables and their balconied windows, are the delight of the visitor to the town. Only one ancient feature is rapidly disappearing — owing to the exigencies of street traffic — the stone terraces close to the entrance doors and abutting on the street. Of its old gates the Hohe Tor, modelled after a Roman triumphal arch, is a remarkable monumental erection of the 16th

century. From it runs the Lange Gasse, the main street, to the Lange Markt. On this square stands the Artus- or Junker-hof (the merchant princes of the middle ages were in Germany styled Junker, squire), containing a hall richly decorated with wood carving and pictures, once used as a banqueting-room and now serving as the exchange. There are twelve Protestant and seven Roman Catholic churches and two synagogues. Gf these the most important is St Mary's, begun in 1343 and completed in 1503, one of the largest Protestant churches in

existence. It possesses a famous painting of the Last Judgment, formerly attributed to Jan van Eyck, but probably by Memlinc. Among other ancient buildings of note are the beautiful Gothic town hall, surmounted by a graceful spire, the armoury (Zeughaus) and the Franciscan monastery, restored in 187 1, and now housing the municipal picture gallery and a collection of antiquities. Of modern structures, the government offices, the house of the provincial diet, the post office and the palace of the commander of the 1 7th army corps, which has its headquarters in Danzig, are the most noteworthy.

The manufacture of arms and artillery is carried on to a great extent, and the imperial and private docks and shipbuilding establishments, notably the Schichau yard, turn out ships of the largest size. The town is famous for its amber, beer, brandy and liqueurs, and its transit trade makes it one of the most important commercial cities of northern Europe. Danzig originally owed its commercial importance to the fact that it was the shipping port for the corn grown in Poland and the adjacent regions of Russia and Prussia; but for some few years past this trade has been slipping away from her. On the other hand, her trade in timber and sugar has grown proportionally. Nevertheless energetic efforts are being made to check any loss of importance — first, in 1898, by a determined attempt to make Danzig an industrial centre, manufacturing on a large scale; and secondly, by the construction and opening in 1899 of a free harbour at Neufahr- wasser at the mouth of the Vistula. The industries which it has been the principal aim to foster and further develop are ship- building (naval and marine), steel foundries and rolling mills, sugar refineries, flour and oil mills, and distilleries.

History. — The origin of Danzig is unknown, but it is mentioned in 997 as an important town. At different times it was held by Pomerania, Poland, Brandenburg and Denmark, and in 1308 it fell into the hands of the Teutonic knights, under whose rule it long prospered. It was one of the four chief towns of the Hanseatic League. In 1455, when the

Teutonic Order had become thoroughly corrupt, Danzig shook off its yoke and sub- mitted to the king of Poland, to whom it was formally ceded, along with the whole of West Prussia, at the peace of Thorn. Although nominally subject to Poland, and represented in the Polish diets and at the election of Polish kings, it enjoyed the rights of a free city, and governed a considerable territory with more than thirty villages. It suffered severely through various wars of the 17 th and 18th centuries, and in 1734, having declared in favour of Stanislus Leszczynski, was besieged and taken by the Russians and Saxons. At the first partition of Poland, in 1772, Danzig was separated from that kingdom; and in 1793 it came into the possession of Prussia. In 1807, during the war between France and Prussia, it was bombarded and captured by Marshal Lefebvre, who was rewarded with the title of duke of Danzig; and at the peace of Tilsit Napoleon declared it a free town, under the protection of France, Prussia and Saxony, restoring to it its ancient territory. A French governor, however, remained in it, and by compelling it to submit to the continental system almost ruined its trade. It was given back to Prussia in 1814.

See J. C. Schultz, Danzig und seine Bauwerke (Berlin, 1873) ; Wistulanus, Geschichte der Stadt Danzig (Danzig, 1891); Defense de Dantzig en 1813 ; documents militaires du lieutenant-general Campredon, pub. by Auriel (Paris, 1888); Daniel, Deutschland (Leipzig, 1895).

DAPHLA (or Dafla) HILLS, a tract of hilly country on the border of Eastern Bengal and Assam, occupied by an independent tribe called Daphla. It lies to the north of the Tezpur and North Lakhimpur subdivisions, and is bounded on the west by the Aka Hills and on the east by the Abor range. Colonel Dalton in

The Ethnology of Bengal considers the Daphlas to be closely allied to the hill Miris, and they are akin to and intermarry with the Abors. They have a reputation for cowardice, and as politically they

are disunited, they are at the mercy of the Akas, their less numerous but more warlike neighbours on the west. Their clothing is scanty, and its most distinguishing feature is a cane cap with a fringe of bearskin or feathers, which gives them a very curious appearance. The men wear their hair in a plait, which is coiled into a ball on the forehead, to which they fasten their caps with a long skewer. In 1872 a party of independent Daphlas suddenly attacked a colony of their own tribesmen, who had settled at Amtola in British territory, and carried away forty- four captives to the hills. This led to the Daphla expedition of 1874, when a force of 1000 troops released the prisoners and reduced the tribe to submission. According to the census of 1901 the Daphlas in British territory numbered 954, the tribal country not being enumerated.

DAPHNAE (Tahpanhes, Taphne; mod. Defenneh), an ancient fortress near the Syrian frontier of Egypt, on the Pelusian arm of the Nile. Here King Psammetichus established a garrison of foreign mercenaries, mostly Carians and Ionian Greeks (Herodotus ii. 154). After the destruction of Jerusalem by Nebuchadrezzar in 588 B.C., the Jewish fugitives, of whom Jeremiah was one, came to Tahpanhes. When Naucratis was given by Amasis II. the monopoly of Greek traffic, the Greeks were all removed from Daphnae, and the place never recovered its prosperity; in Herodotus's time the deserted remains of the docks and buildings were visible. The site was discovered by Prof. W. M. Flinders Petrie in 1886; the name " Castle of the Jew's Daughter " seems to preserve the tradition of the Jewish refugees. There is a massive fort and enclosure; the chief discovery was a large number of fragments of pottery, which are of great importance for the chronology of vase-painting, since they must belong to the time between Psammetichus and Amasis, i.e. the end of the 7th or the beginning of the 6th century B.C. They show the characteristics of Ionian art, but their shapes and other details testify to their local manufacture.

See'W.M. F. Petrie, Tanis II., Nebesheh, and

Defenneh (4th Memoir of the Egypt Exploration Fund, 1888). (E. Gr.)

DAPHNE (Gr. for a laurel tree), in Greek mythology, the daughter of the Arcadian river-god Ladon or the Thessalian Peneus, or of the Laconian Amyclas. She was beloved by Apollo, and when pursued by him was changed by her mother Gaea into a laurel tree sacred to the god (Ovid, Metam. i. 452-567). In the Peloponnesian legends, another suitor of Daphne, Leucippus, son of Oenomatis of Pisa, disguised himself as a girl and joined her companions. His sex was discovered while bathing, and he was slain by the nymphs (Pausanias viii. 20; Parthenius, Erotica, 15).

DAPHNE, in botany, a genus of shrubs, belonging to the natural order Thymelaeaceae, and containing about forty species, natives of Europe and temperate Asia. D. Laureola, spurge laurel, a small evergreen shrub with green flowers in the leaf axils towards the ends of the branches and ovoid black very poisonous berries, is found in England in copses and on hedge-banks in stiff soils. D. Mezereum, mezereon, a rather larger shrub, 2 to 4 ft. high, has deciduous leaves, and bears fragrant pink flowers in clusters in the axils of last season's leaves, in early spring before the foliage. The bright red ovoid berries are cathartic, the whole plant is acrid and poisonous, and the bark is used medicinally. It is a native of Europe and north Asia, and found apparently wild in copses and woods in Britain. It is a well-known garden plant, and several other species of the genus are cultivated in the opeif air and as greenhouse plants. D. Cneorum (Europe) is a hardy evergreen trailing shrub, with bright pink sweet-scented flowers. D. pontica (Eastern Europe) is a hardy spreading evergreen with greenish-yellow fragrant flowers. D. indica (China) and D. japonica (Japan) are greenhouse evergreens with respectively red or white and pinkish-purple flowers.

DAPHNEPHORIA, a festival held every ninth year at Thebes in Boeotia in honour of Apollo Ismenius or

Galaxius. It consisted of a procession in which the chief figure was a boy of good family and noble appearance, whose father and mother must be alive.

Immediately in front of this boy, who was called Daphnephoros (laurel bearer), walked one of his nearest relatives, carrying an olive branch hung with laurel and flowers and having on the upper end a bronze ball from which hung several smaller balls. Another smaller ball was placed on the middle of the branch or pole (called kwtvw), which was then twined round with purple ribbons, and at the lower end with saffron ribbons. These balls were said to indicate the sun, stars and moon, while the ribbons referred to the days qf the year, being 365 in number. The Daphne- phoros, wearing a golden crown, or a wreath of laurel, richly dressed and partly holding the pole, was followed by a chorus of maidens carrying suppliant branches and singing a hymn to the god. The Daphnephoros dedicated a bronze tripod in the temple of Apollo, and Pausanias (ix. 10. 4) mentions the tripod dedicated there by Amphitryon when his son Heracles had been Daphne- phoros. The festival is described by Proclus (in Photius cod. 239). See also A. Mommsen, Feste der Stadt Athen (1898) ; C. O. Miiller, Orchomenos (1844) ; article in Daremberg and Saglio's Dictionnaire des antiquites.

DAPHNIS, the legendary hero of the shepherds of Sicily, and reputed inventor of bucolic poetry. The chief authorities for his story are Diodorus Siculus, Aelian and Theocritus. According to his countryman Diodorus (iv. 84) , and Aelian (Var. Hist.,%. 18), Daphnis was the son of Hermes (in his character of the shepherd- god) and a Sicilian nymph, and was born or exposed and found by shepherds in a grove of laurels (whence his name.) He was brought up by the nymphs, or by shepherds, and became the owner of flocks and herds, which he tended while playing on the syrinx. When in the first bloom of youth, he won the affection of a

nymph, who made him promise to love none but her, threatening that, if he proved unfaithful, he would lose his eye- sight. He failed to keep his promise and was smitten with blind- ness. Daphnis, who endeavoured to console himself by playing the flute and singing shepherds' songs, soon afterwards died. He fell from a cliff, or was changed into a rock, or was taken up to heaven by his father Hermes, who caused a spring of water to gush out from the spot where his son had been carried off. Ever afterwards the Sicilians offered sacrifices at this spring as an expiatory offering for the youth's early death. There is little doubt that Aelian in his account follows Stesichorus (q.v.) of Himera, who in like manner had been blinded by the vengeance of a woman (Helen) and probably sang of the sufferings of Daphnis in his recantation. Nothing is said of Daphnis's blind- ness by Theocritus, who dwells on his amour with Nais; his victory over Menalcas in a poetical competition; his love for Xenea brought about by the wrath of Aphrodite ; his wanderings through the woods while suffering the torments of unrequited love ; his death just at the moment when Aphrodite, moved by com- passion, endeavours (but too late) to save him; the deep sorrow, shared by nature and all created things, for his untimely end (Theocritus i. vii. viii.). A later form of the legend identifies Daphnis with a Phrygian hero, and makes him the teacher of Marsyas. The legend of Daphnis and his early death may be compared with those of Narcissus, Linus and Adonis — all beautiful youths cut off in their prime, typical of the luxuriant growth of vegetation in the spring, and its sudden withering away beneath the scorching summer sun.

See F. G. Welcker, Kleine Schriften zur griechischen Litteratur~ geschichte, i. (1844); C. F. Hermann, De Daphnide Theocriti (1853); R. H. Klausen, Aeneas und die Penaten, i. (1840); R. Reitzenstein, Epigramm und Skolion (1893) ; H. W. Prescott in Harvard Studies, x. (1899); H. W. Stoll in Roscher's Lexikon der Mythologie; and G. Knaack in Pauly-Wissowa's Realencyclopadie.

DARAB (originally DarAbgerd), a district of the province of Fars in Persia. It has sixty-two villages, and possesses a hot climate, snow being rarely seen there in winter. It produces a great quantity of dates and much tobacco, which is considered the best in Persia. The town Darab, the capital of the district, is situated in a very fertile plain, 140 m. S.E. of Shiraz. It has a population of about 5000, and extensive orchards of orange and lemon trees and immense plantations of date-palms. Legend ascribes the foundation of the city to Darius, hence its name Darab-gerd (Darius-town). In the neighbourhood there are

various remains of antiquity, the most important of which 31 m. S., is known as the Kalah i Darab, or citadel of Darius, and consists of a series of earthworks arranged in a circle round an isolated rock. Nothing, however, remains to fix the date or explain the history of the fortification. Another monument in the vicinity is a gigantic bas-relief, carved on the vertical face of a rock, representing the victory of the Sassanian Shapur I. (Sapor) of Persia over the Roman emperor Valerian, a.d. 260.

DARBHANGA, a town and district of British India, in the Patna division of Bengal. The town is on the left bank of the Little Baghmati river, and has a railway station. Pop. (1901) 66,244. The town is really a collection of villages that have grown up round the residence of the raja. This is a magnificent palace, with gardens, a menagerie and a good library. There are a first-class hospital, with a Lady Dufferin hospital attached; a handsome market-place, and an Anglo-vernacular school. The district of Darbhanga extends from the Nepal frontier to the Ganges. It was constituted in 1875 out of the unwieldy district of Tirhoot. Its area is 3348 sq. m. In 1901 the population was 2,912,611, showing an increase of 4% in the decade. The district consists entirely of an alluvial plain, in which the principal rivers are the Ganges, Buri Gandak, Baghmati and Little Baghmati, Balan and Little Balan, and Tiljuga. The land is especially fertile in the more elevated part of the district

S.W. of the Buri Gandak; rice is the. staple crop, and it may be noted that the cultivator in Darbhanga is especially dependent on the winter harvest. The chief exports are rice, indigo, linseed and other seeds, saltpetre and tobacco. There are several indigo factories and saltpetre refineries, and a tobacco factory. The district is traversed by the main line of the Bengal & North- Western railway and by branch lines, part of which were begun as a famine relief work in 1874.

The maharaja bahadur of Darbhanga, a Rajput, whose ancestor Mahesh Thakor received the Darbhanga raj (which includes large parts of the modern districts of Darbhanga, Muzaffarpur, Monghyr, Purnea and Bhagalpur) from the emperor Akbar early in the 16th century, is not only the premier territorial noble of Behar but one of the greatest noblemen of all India. Maharaja Lachhmeswar Singh Bahadur, who succeeded to the raj in i860 and died in 1898, was distinguished for his public services, and especially as one of the most munificent of living philanthropists. Under his supervision his raj came to be regarded as the model for good and benevolent management; he constructed hundreds of miles of roads planted with trees, bridged all the rivers, and constructed irrigation works on a great scale. His charities were without limit; thus he contributed £300,000 for the relief of the sufferers from the Bengal famine of 1873-1874, and it is computed that during his possession of the raj he expended at least £2,000,000 on charities, works of public utility, and charitable remissions of rent. For many years he served as a member of the legislative council of the viceroy with conspicuous ability and moderation of view. As representative of the landowners of Berar and Bengal he took an important part in the discussion on the Bengal Tenancy Bill. He was succeeded by his brother, Maharaja Rameshwar Singh Bahadur, who was born on the 16th of January i860, and on attaining his majority in 1878 was appointed to the Indian Civil Service, serving as assistant magistrate successively at Darbhanga, Chhapra and Bhagalpur. In

1886 he was created a raja bahadur, exempted from attend- ance at the civil courts, and appointed a member of the legislative council of Bengal. He was created a maharaja bahadur on his succession to the raj in 1898. Like his brother, he was educated by an English tutor, and his administration carried on the enlightened traditions of his predecessor.

See Sir Roper Lethbridge, The Golden Book of India.

D'ARBLAY, FRANCES (1752–1840), English novelist and diarist, better known as Fanny Burney, daughter of Dr Charles Burney (q.v.), was born at King's Lynn, Norfolk, on the 13th of June 1752. Her mother was Esther Sleepe, granddaughter of a French refugee named Dubois. Fanny was the fourth child in a family of six. Of her brothers, James (1750–1821) became an admiral and sailed with Captain Cook on his second and third voyages, and Charles Burney (1757–1817) was a well-known

classical scholar. In 1760 the family removed to London, and Dr Burney, who was now a fashionable music master, took a house in Poland Street. Mrs Burney died in 1761, when Fanny was only nine years old. Her sisters Esther (Hetty), afterwards Mrs Charles Rousseau Burney, and Susanna, afterwards Mrs Phillips, were sent to school in Paris, but Fanny was left to educate herself. Early in 1766 she paid her first visit to Dr Burney's friend Samuel Crisp at Chessington Hall, near Epsom. Dr Burney had first made Samuel Crisp's acquaintance about 1745 at the house of Fulke Greville, grandfather of the diarists, and the two studied music while the rest of the guests hunted. Crisp wrote a play, Virginia, which was staged by David Garrick in 1754 at the request of the beautiful countess of Coventry (nee Maria Gunning). The play had no great success, and in 1764 Crisp established himself in retirement at Chessington Hall, where he frequently entertained his sister, Mrs Sophia Gast, of Burford,

Oxfordshire, and Dr Burney and his family, to whom he was familiarly known as " daddy " Crisp. 1 It was to her " daddy " Crisp and her sister Susan that Fanny Burney addressed large portions of her diary and many of her letters. After his wife's death in 1767, Dr Burney married Elizabeth Allen, widow of a King's Lynn wine-merchant.

From her fifteenth year Fanny lived in the midst of an excep- tionally brilliant social circle, gathered round her father in Poland Street, and later in his new home in St Martin's Street, Leicester Fields. Garrick was a constant visitor, and would arrive before eight o'clock in the morning. Of the various " lyons " they entertained she leaves a graphic account, notably of Omai, the Otaheitan native, and of Alexis Orlov, the favourite of Catherine II. of Russia. Dr Johnson she first met at her father's home in March 1777. Her father's drawing-room, where she met many of the chief musicians, actors and authors of the day, was in fact Fanny's only school. Her reading, however, was by no means limited. Macaulay stated that in the whole of Dr Burney's library there was but one novel; Fielding's Amelia; but Austin Dobson points out that she was acquainted with the abbe Prevost's Doyen de Killerine, and with Marivaux's Vie de Marianne, besides Clarissa Harlowe and the books of Mrs Elizabeth Griffith and Mrs Frances Brooke. Her diary also contains the record of much more strenuous reading. Her step- mother, a woman of some cultivation, did not encourage habits of scribbling. Fanny, therefore, made a bonfire of her MSS., among them a History of Caroline Evelyn, a story containing an account of Evelina's mother. Luckily her journal did not meet with the same fate. The first entry in it was made on the 30th of May 1768, and it extended over seventy-two years. The earlier portions of it underwent wholesale editing in later days, and much of it was entirely obliterated. She planned out Evelina, or A Young Lady's Entrance into the World, long before it was written down. Evelina was published by Thomas Lowndes in the end of January 1778, but it was not until June that Dr Burney learned its authorship,

when the book had been reviewed and praised everywhere. Fanny proudly told Mrs Thrale the secret. Mrs Thrale wrote to Dr Burney on the 22nd of July: ” Mr Johnson returned home full of the Prayes of the Book I had lent him, and protesting that there were passages in it which might do honour to Richardson: we talk of it for ever, and he feels ardent after the denouement; he could not get rid of the Rogue, he said.” Miss Burney soon visited the Thrales at Streatham, ” the most consequential day I have spent since my birth ” she calls the occasion. It was the prelude to much longer visits there. Dr Johnson’s best compliments were made for her benefit, and eagerly transcribed in her diary. His affectionate friendship for ” little Burney ” only ceased with his death.

Evelina was a continued success. Sir Joshua Reynolds sat up all night to read it, as did Edmund Burke, who came next to Johnson in Miss Burney’s esteem. She was introduced to Elizabeth Montagu and the other bluestocking ladies, to Richard Brinsley Sheridan, and to the gay Mrs Mary Cholmondeley, the sister of Peg Woffington, whose manners, as . described in the diary,

1 His letters to Mrs Gast and another sister, Anne, were edited with the title of Burford Papers (1906), by W. H. Hutton.

explain much of Evelina. At the suggestion of Mrs Thrale, and with offers of help from Arthur Murphy, and encouragement from Sheridan, Fanny began to write a comedy. Crisp, realizing the limitations of her powers, tried to dissuade her, and the piece, The Witlings, was suppressed in deference to what she called a ” hissing, groaning, catcalling epistle ” from her two ” daddies.” Meanwhile her intercourse with Mrs Thrale proved very exacting, and left her little time for writing. She went with her to Bath in 1780, and was at Streatham again in 1781. Her next book was written partly at Chessington and after much discussion with Mr Crisp. Cecilia; or, Memoirs of an Heiress, by the author of Evelina, was published in 5 vols, in 1782 by Messrs Payne &

Cadell (who paid the author £250 — not £2000 as stated by Macaulay). If Cecilia has not quite the freshness and charm of Evelina, it is more carefully constructed, and contains many happy examples of what Johnson called Miss Burney's gift of " character-mongering." Burke sent her a letter full of high praise. But some of her friends found the writing too often modelled on Johnson's, and Horace Walpole thought the person- ages spoke too uniformly in character.

On the 24th of April 1783, Fanny Burney's " most judicious adviser and stimulating critic," "daddy" Crisp, died. He was her devoted friend, as she was to him, " the dearest thing on earth." The next year she was to lose two more friends. Mrs Thrale married Piozzi, and Johnson died. Fanny had met the celebrated Mrs Delany in 1783, and she now attached herself to her. Mrs Delany, who was living (1785) in a house near Windsor Castle presented to her by George III., was on the friendliest terms with both the king and queen, and Fanny was honoured with more than one royal interview. Queen Charlotte, soon after- wards, offered Miss Burney the post of second keeper of the robes,; with a salary of £200 a year, which after some hesitation was accepted. Much has been said against Dr Burney for allowing the authoress of Evelina and Cecilia to undertake an office which meant separation from all her friends and a wearisome round of court ceremonial. On the other hand, it may be fairly urged that Fanny's literary gifts were really limited. She had written nothing for four years, and apparently felt she had used her best material. " What my daddy Crisp says," she wrote as early as 1779, " ' that it would be the best policy, but for pecuniary advantages, for me to write no more,' is exactly what I have always thought since Evelina was published " {Diary, i. 258). Her misgivings as to her unfitness for court life were quite justified. From Queen Charlotte she received unvarying kind- ness, though she was not very clever with her waiting-maid's duties. She had to attend the queen's toilet, to take care of her lap-dog and her snuff-box, and to help her senior,

Mrs Schwellen- berg, in entertaining the king's equerries and visitors at tea. The constant association with Mrs Schwellenberg, who has been described as " a peevish old person of uncertain temper and impaired health, swaddled in the . buckram of backstairs etiquette, " proved to be the worst part of Fanny's duties. Her diary is full of amusing court gossip, and sometimes deals with graver matters, notably in the account of Warren Hastings' trial, and in the story of the beginning of George III.'s madness, as seen by a member of his household. But the strain told on her health, and after pressure both from Fanny and her numerous friends, Dr Burney prepared with her a joint memorial asking the queen's leave to resign. She left the royal service in July 1 791 with a retiring pension of £100 a year, granted from the queen's private purse, and returned to her father's house at Chelsea. Dr Burney had been appointed organist at Chelsea Hospital in 1783, through Burke's influence.

In 1792 she became acquainted with a group of French exiles, who had taken a house, Juniper Hall, near Mickleham, where Fanny's sister, Mrs Phillips, lived. On the 31st of July 1793 she married one of the exiles, Alexandre D'Arblay, an artillery officer, who had been adjutant-general to La Fayette. They took a cottage at Bookham on the strength, it appears, of Miss Burney's pension. In 1793 she produced her Brief Reflections relative to the Emigrant French Clergy. Her son Alexandre was born on the 18th of December 1794. In the following spring

Sheridan produced at Drury Lane her Edwy and Elgiva, a tragedy which was not saved even by the acting of the Kembles and Mrs Siddons. The play was never printed. Money was now a serious object, and Madame D'Arblay was therefore persuaded to issue her next novel, Camilla: or A Picture of Youth (5 vols., 1796), by subscription. A month after publication Dr

Burney told Horace Walpole that his daughter had made £2000 by the book, and this sum was almost certainly augmented later. It is interest- ing to note that Jane Austen was among the subscribers. Unfor- tunately its literary success was not as great. ” How I like Camilla? ” wrote Horace Walpole to Miss Hannah More (August 29th, 1796), ” I do not care to say how little. Alas! she has reversed experience . . . this author knew the world and penetrated characters before she had stepped over the threshold; and, now she has seen so much of it, she has little or no insight at all: perhaps she apprehended having seen too much, and kept the bags of foul air that she brought from the Cave of Tempests too closely tied.” Nevertheless Camilla has found judicious persons to admire it, notably Jane Austen in Northanger Abbey. A second play, Love and Fashion, was actually put in rehearsal in 1799, but was withdrawn in the next year. In 1801 Madame D’Arblay accompanied her husband to Paris, where General D’Arblay eventually obtained a place in the civil service. In 181 2 she returned to England, bringing with her her son Alexandre to escape the conscription. In 1814 she published The Wanderer ; or Female Difficulties. Possibly because readers expected to find a description of her impressions of revolutionary France, it had a large sale, from which the author realized £7000. Nobody, it has been said, ever read The Wanderer. In the end of the year General D’Arblay came to England and took his wife back to France. During the Hundred Days of 1815 she was in Belgium, and the vivid account in her Diary of Brussels during Waterloo may have been used by Thackeray in Vanity Fair. General D’Arblay now received permission to settle in England. After his death, which took- place at Bath on the 3rd of May 1 81 8, his wife lived in Bolton Street, Piccadilly. There she was visited in 1826 by Sir Walter Scott, who describes her {Journal, November 18th, 1826) as an elderly lady with no remains of personal beauty, but with a gentle manner and a pleasing countenance. The later years of her life were occupied with the editing of the Memoirs of Dr Burney, arranged from his own Manuscripts, from family papers and from

personal recollec- tions (3 vols., 1832). Her style had, as time went on, altered for the worse, and this book is full of extraordinary affectations. Madame D'Arblay died in London on the 6th of January 1840 and was buried at Walcot, Bath, near her son and husband.

Madame D'Arblay is still read in Evelina, but her best title to the affections of modern readers is the Diary and Letters. The small egotisms of the writer do not alienate other readers as they did John Wilson Croker. Dr Johnson lives in its pages almost as vividly as in those of Boswell, and King George and his wife in a friendlier light than in most of their contemporary portraits. Croker, in TheQuarterly Review, April 1833 and June 1842, made two attacks on Madame D'Arblay. The first is an unfriendly but largely justifiable criticism on the Memoirs of Dr Burney. In the second, a review of the first three volumes of the Diary and Letters, Croker abused the writer's innocent vanity, and declared that, considering their bulk and pretensions, the Diary and Letters were " nearly the most worthless we have ever waded through." These pronouncements drew forth the eloquent defence by Lord Macaulay, first printed in The Edinburgh Review, January 1843, which, in spite of some inaccuracies and consider- able exaggeration, has perhaps done more than anything else to maintain Madame D'Arblay's constant popularity.

Bibliography. — The Diary and Letters of Madame D'Arblay was edited by her niece, Charlotte Frances Barrett, in 7 vols. (1842–1846). The text, covering the years 1778–1840, was edited with preface, notes and reproductions of contemporary portraits and other illustrations, by Mr Austin Dobson in 6 vols. (1904–1905). This Diary, which begins with the publication of Evelina, was supple- mented in 1889 by The Early Diary of Frances Burney (1768–1778), which was in the first instance suppressed as being of purely private interest, edited by Mrs Aunie Raine Ellis, with an introduction

giving many particulars of the Burney family. Mrs

Ellis also edited Evelina for " Bohn's Novelist's Library " in 1881, and Cecilia in 1882. See also Austin Dobson's Fanny Burney {Madame D'Arblay) (1903), in the " English Men of Letters Series."

DARBOY, GEORGES (1813-1871), archbishop of Paris, was born at Fayl-Billot in Haut Marne on the 16th of January 1813. He studied with distinction at the seminary at Langres, and was ordained priest in 1836. Transferred to Paris as almoner of the college of Henry IV., and honorary canon of Notre Dame, he became the close friend of Archbishop Affre and of his successor Archbishop Sibour. He was appointed bishop of Nancy in 1859, and in January 1863 was raised to the archbishopric of Paris. The archbishop was a strenuous upholder of episcopal independ- ence in the Gallican sense, and involved himself in a controversy with Rome by his endeavours to suppress the jurisdiction of the Jesuits and other religious orders within his diocese. Pius IX. refused him the cardinal's hat, and rebuked him for his liberalism in a letter which was probably not intended for publication. At the Vatican council he vigorously maintained the rights of the bishops, and strongly opposed the dogma of papal infallibility, against which he voted as inopportune. When the dogma had been finally adopted, however, he was one of the first to set the example of submission. Immediately after his return to Paris the war with Prussia broke out, and his conduct during the disastrous year that followed was marked by a devoted heroism which has secured for him an enduring fame. He was active in organizing relief for the wounded at the commencement of the war, remained bravely at his post during the siege, and refused to seek safety by flight during the brief triumph of the Commune. On the 4th of April 187 1 he was arrested by the communists as a hostage, and confined in the prison at Mazas, from which he was transferred to La Roquette on the advance of the army of Versailles. On the 27th of May he was shot within the prison along with several other distinguished hostages. He died in the attitude of blessing and uttering words of forgiveness. His body was recovered with

difficulty, and, having been embalmed, was buried with imposing ceremony at the public expense on the 7th of June. It is a noteworthy fact that Darboy was the third archbishop of Paris who perished by violence in the period between 1848 and 1871. Darboy was the author of a number of works, of which the most important are a Vie de St Thomas Becket (1859), a translation of the works of St Denis the Areopagite, and a translation of the Imitation of Christ.

See J. A. Foulon, Histoire de la vie et des ceuvres de Mgr. Darboy (Paris, 1889), and J. Guillermin, Vie de Mgr. Darboy (Paris, 1888), biographies written from the clerical standpoint, which have called forth a number of pamphlets in reply.

DARCY, THOMAS DARCY, Baron (1467–1537), English soldier, was ason of Sir William Darcy (d. 1488), and belonged to a family which was seated at Templehurst in Yorkshire. In early life he served, both as a soldier and a diplomatist, in Scotland and on the Scottish borders, where he was captain of Berwick; and in 1505, having been created Baron Darcy, he was made warden of the east marches towards Scotland. In 151 1 Darcy led some troops to Spain to help Ferdinand and Isabella against the Moors, but he returned almost at once to England, and was with Henry VIII. on his French campaign two years later. One of the most influential noblemen in the north of England, where he held several important offices, Darcy was also a member of the royal council, dividing his time between state duties in London and a more active life in the north. He showed great zeal in preparing accusations against his former friend, Cardinal Wolsey; however, after the cardinal's fall his words and actions caused him to be suspected by Henry VIII. Disliking the separation from Rome, Darcy asserted that matrimonial cases were matters for the decision of the spiritual power, and he was soon communicating with Eustace Chapuys, the ambassador of the emperor Charles V., about an invasion of England in the interests of the Roman Catholics. Detained in London against his will by the king, he was not

allowed to return to Yorkshire until late in 1535, and about a year after his arrival in the north the rising known as the Pilgrimage of Grace broke out. For a short time Darcy defended Pontefract Castle against the rebels, but soon

he surrendered to them this stronghold, which he could certainly have held a little longer, and was with them at Doncaster, being regarded as one of their leaders. Upon the dispersal of the insurgents Darcy was pardoned, but he pleaded illness when Henry requested him to proceed to London. He may have assisted to suppress the rising which was renewed under Sir Francis Bigod early in 1537, but the king believed, probably with good reason, that he was guilty of fresh treasons, and he was seized and hurried to London. During his imprisonment he uttered his famous remark about Thomas Cromwell: — ”Crom- well, it is thou that art the very original and chief causer of all this rebellion and mischief, . . . and I trust that or thou die, though thou wouldst procure all the noblemen’s heads within the realm to be stricken off, yet shall there one head remain that shall strike off thy head.” Tried by his peers, Darcy was found guilty of treason, and was beheaded on the 20th of June 1537. In 1548 his barony was revived in favour of his son George (d. 1557), but it became extinct on the death of George’s descendant John in 1635.

DARDANELLES (Turk. Bahr-Sefed Boghazi), the strait, in ancient times called the Hellespont (q.v.), uniting the Sea of Marmora with the Aegean, so called from the two castles which protect the narrowest part and preserve the name of the city of Dardanus in the Troad, famous for the treaty between Sulla and Mithradates in 84 b . c. The shores of the strait are formed by the peninsula of Gallipoli on the N.W. and by the mainland of Asia Minor on the S.E. ; it extends for a distance of about 47 m. with an average breadth of 3 or 4 m. At the Aegean

extremity stand the castles of Sedil Bahr and Kum Kaleh respectively in Europe and Asia; and near the Marmora extremity are situated the important town of Gallipoli (Callipolis) on the northern side, and the less important though equally famous Lamsaki or Lapsaki (Lampsacus) on the southern. The two castles of the Darda- nelles par excellence are Chanak-Kalehsi, Sultanieh-Kalehsi, or the Old Castle of Anatolia, and Kilid-Bahr, or the Old Castle of Rumelia, which were long but erroneously identified with Sestos and Abydos now located farther to the north. The strait of the Dardanelles is famous in history for the passage of Xerxes by means of a bridge of boats, and for the similar exploit on the part of Alexander. It is famous also from the story of Hero and Leander, and from Lord Byron's successful attempt (repeated by others) to rival the ancient swimmer. Strategically the Darda- nelles is a point of great importance, since it commands the approach to Constantinople from the Mediterranean. The passage of the strait is easily defended, but in 1807 the English admiral (Sir) J. T. Duckworth made his way past all the fortresses into the Sea of Marmora. The treaty of July 1841, confirmed by the Paris peace of 1856, prescribed that no foreign ship of war might enter the strait except by Turkish permission, and even merchant vessels are only allowed to pass the castle of Chanak- Kalehsi during the day.

See Choiseul-Gouffier, Voyage pittoresque (Paris, 1842) ; Murray's Handbook for Constantinople (London, 1900).

DARDANELLES (Turk. Sultanieh Kalehsi, or Chanak Kalehsi), the chief town and seat of government of the lesser Turkish province of Bigha, Asia Minor. It is situated at the mouth of the Rhodius, and at the narrowest part of the strait of the Darda- nelles, where its span is but a mile across. Its recent growth has been rapid, and it possesses a lyceum, a military hospital, a public garden, a theatre, quays and water-works. Exclusive of the garrison, the population is estimated at 13,000, of whom one-half are Turkish, and the remainder Greek, Jewish,

Armenian and European. The town contains many mosques, Greek, Armenian and Catholic churches, and a synagogue. There is a resident Greek bishop. The civil governor, and the military command- ants of the numerous fortresses on each side of the strait, are stationed here. Many important works have been added to the defences. The Ottoman fleet is stationed at Nagara (anc. Abydos). The average annual number of merchant vessels passing the strait is 12,000 and the regular commercial vessels calling at the port of Dardanelles are represented by numerous foreign agencies. Besides the Turkish telegraph service, the Eastern Telegraph Company has a station at Dardanelles, and

there are Turkish, Austrian, French and Russian post offices. The import trade consists of manufactures, sugar, flour, coffee, rice, leather and iron. The export trade consists of valonia (largely produced in the province), wheat, barley, beans, chick- peas, canary seed, liquorice root, pine and oak timber, wine and pottery. Excepting in the items of wine and pottery, the export trade shows steady increase. Every year sees a larger area of land brought under cultivation by immigrants, and adds to the number of mature (i.e. fruit-bearing) valonia trees. Vine-growers are discouraged by heavy fiscal charges, and by the low price of wine; many have uprooted their vineyards. The pottery trade is affected by change of fashion, and the factories are losing their importance. The lower quarters of the town were heavily damaged in the winter of 1000-1001 by repeated inundations caused by the overflow of the Rhodius.

See V. Cuinet, Turquie d'Asie (Paris, 1890-1900).

DARDANUS, in Greek legend, son of Zeus and Electra, the mythical founder of Dardanus on the Hellespont and ancestor of the Dardans of the Troad and, through Aeneas, of the Romans. His original home was supposed to have been Arcadia, where he married Chryse, who brought him as dowry the Palladium or image of Pallas, presented to her by the goddess herself Having slain his brother Iasius or Iasion

(according to others, Iasius was struck by lightning), Dardanus fled across the sea. He first stopped at Samothrace, and when the island was visited by a flood, crossed over to the Troad. Being hospitably received by Teucer, he married his daughter Batea and became the founder of the royal house of Troy.

See Apollodorus iii. 12; Diod. Sic. v. 48–75; Virgil, Aeneid, iii. 163 ff. ; articles in Pauly-Wissowa's Realencyclopddie and Roscher's Lexikon der Mythologie.

DARDISTAN, a purely conventional name given by scientists to a tract of country on the north-west frontier of India. There is no modern race called Dards, and no country so named by its inhabitants, but the inhabitants of the right bank of the Indus, from the Kandia river to Batera, apply it to the dwellers on the left bank. In the scientific use of the appellation, Dardistan comprises the whole of Chitral, Yasin, Panyal, the Gilgit valley, Hunza and Nagar, the Astor valley, the Indus valley from Bunji to Batera, the Kohistan-Malazai, i.e. the upper reaches of the Panjkora river, and the Kohistan of Swat. The so-called Dard races are referred to by Pliny and Ptolemy, and are supposed to be a people of Aryan origin who ascended the Indus valley from the plains of the Punjab, reaching as far north as Chitral, where they dispossessed the Khos. They have left their traces in the different dialects, Khoswar, Burishki and Shina, spoken in the Gilgit agency.

The question of Dardistan is debated at length in Leitner's Dardistan (1877); Drew's Jummoo and Kashmir Territories (1875); Biddulph's Tribes of the Hindu-Kush (1880) and Durand's The Making of a Frontier (1899). For further details see Gilgit.

DARES PHRYGIUS, according to Homer (Iliad, v. 9) a Trojan priest of Hephaestus. He was supposed to have been the author of an account of the destruction of Troy, and to have lived before Homer (Aelian, Var. Hist. xi. 2). A work in Latin, purporting to be a

translation of this, and entitled Daretis Phrygii de excidio Trojae historia, was much read in the middle ages, and was then ascribed to Cornelius Nepos, who is made to dedicate it to Sallust; but the language is extremely corrupt, and the work belongs to a period much later than the time of Nepos (probably the 5th century a.d.) . It is doubtful whether the work as we have it is an abridgment of a larger Latin work or an adaptation of a Greek original. Together with the similar work of Dictys Cretensis (with which it is generally printed) the De excidio forms the chief source for the numerous middle age accounts of the Trojan legend. (See Dictys; and O. S. von Fleschenberg, Daresstudien, 1908.)

DAR-ES-SALAAM ("The harbour of peace"), a seaport of East Africa, in 6° 50' S. 39° 20' E., capital of German East Africa. Pop. (1909} estimated at 24,000, including some 500 Europeans. The entrance to the harbor, which is perfectly sheltered (hence its name), is through a narrow opening in the palm-covered shore. The harbour is provided with a floating dock, completed in 1902. The town is built on the northern

sweep of the harbour and is European in character. The streets are wide and regularly laid out. The public buildings, which are large and handsome, include the government and customs offices on the quay opposite the spot where the mail boats anchor, the governor's house, state hospital, post office, and the Boma or barracks. Adjoining the governor's residence are the botanical gardens, where many European plants are tested with a view to acclimatization. There are various churches, and government and mission schools. In the town are the head offices of the Deutsch-Ostafrikanische Gesellschaft, the largest trading com- pany in German East Africa. The mangrove swamps at the north-west end of the harbour have been drained and partially built over.

Until the German occupation nothing but an insignificant village existed at Dar-es-Salaam. In 1862 Said Majid, sultan of Zanzibar, decided to build a town on the shores of the bay, and began the erection of a palace, which was never finished, and of which but scanty ruins remain. In 187 1 Said Majid died, and his scheme was abandoned. In 1876 Mr (afterwards Sir) William McKinnon began the construction of a road from Dar-es-Salaam to Victoria Nyanza, intending to make of Dar-es-Salaam an important seaport. This project however failed. In 1887 Dr Carl Peters occupied the bay in the name of the German East Africa Company. Fighting with the Arabs followed, and in 1889 the company handed over their settlement to the German imperial government. In 1891 the town was made the adminis- trative capital of the colony. It is the starting point of a railway to Mrogoro, and is connected by overland telegraph via Ujiji with South Africa. A submarine cable connects the town with Zanzibar. Dar-es-Salaam was laid out by the Germans on an ambitious scale in the expectation that it would prove an important centre of commerce, but trade developed very slowly. Ivory, rubber and copal are the chief exports. The trade returns are included in those of German East Africa (q.v.).

DARESTE DE LA CHAVANNE, ANTOINE ELISABETH CLlSOPHAS (1820-1882), French historian, was born in Paris on the 28th of October 1820, of an old Lyons family. Educated at the Ecole des Chartes, he became professor in the faculty of letters at Grenoble in 1844, and in 1849 at Lyons, where he remained nearly thirty years. He died on the 6th of August 1882. His works comprise: Histoire de V administration en France depuis Philippe- Auguste (2 vols., 1848); Histoire des classes agricoles en France depuis saint Louis jusqu'a Louis XVI (2 vols., 1853 and 1858), now quite obsolete; and a Histoire de France (8 vols., 1865-1873), completed by a Histoire de la Restauration (2 vols., 1880), a good summary of the work of Veil-Castel, and by a Histoire dn Gouvemement de Juillet, a dry enumeration of dates and facts. Before the publication of Lavisse's great

work, Dareste's general history of France was the best of its kind; it surpassed in accuracy the work of Henri Martin, especially in the ancient periods, just as Martin's in its turn was an improvement upon that of Sismondi.

DARESTE DE LA CHAVANNE, RODOLPHE MADELEINE CLEOPHAS (1824-), French jurist, was born in Paris on the 25th of December 1824. He studied at the Ecole des Chartes and the Ecole de Droit, and starting early on a legal career he rose to be counsellor to the court of cassation (1877 to 1900). His first publication was an Essai sur Francois Hotman (1850), completed later by his publication of Hotman's correspondence in the Revue historique (1876), and he devoted the whole of his leisure to legal history. Of his writings may be mentioned Les Anciennes Lois de I'lslande (1881); Memoire sur les anciens monuments du droit de la Hongrie (1885), and Etudes d'histoire du droit (1889). On Greek law he wrote some notable works: Du prel a la grosse chez les Atheniens (1867) ; Les Inscriptions hypothi- caires en Gr'ece (1885), La Science du droit en Grece: Platon, A ristote, Theophraste (1 893) , and Etude sur la loi de Gortyne (1885). He collaborated with Theodore Reinach and B. Haussoullier in their Recueil des inscriptions juridiques grecques (1905), and his name is worthily associated with the edition of Philippe de Beaumanoir's Coutumes de Beauvaisis, published by Salmon (2 vols., 1899, 1900).

DARFUR, a country of east central Africa, the westernmost state of the Anglo-Egyptian Sudan. It extends from about 10° N. to 16 N. and from 21° E. to 27° 30' E., has an area of some 150,000 sq. m., and an estimated population of 750,000. It is bounded N. by the Libyan desert, W. by Wadai (French Congo), S. by the Bahr-el-Ghazal and E. by Kordofan. The two last- named districts are mudirias (provinces) of the Anglo-Egyptian Sudan. The greater part of the country is a plateau from 2000 to 3000 ft. above sea-level. A range of mountains of volcanic origin, the Jebel Marra, runs N. and S. about the line of the 24 E. for a distance of over

100 m., its highest points attaining from 5000 to 6000 ft. East to west this chain extends about 80 m. Eastward the mountains fall gradually into sandy, bush-covered steppes. North-east of Jebel Marra lies the Jebel Medob (3500 ft. high), a range much distorted by volcanic action, and Bir-el-Melh, an extinct volcano with a crater 150 ft. deep. South of Jebel Marra are the plains of Dar Dima and Dar Uma; S.W. of the Marra the plain is 4000 ft. above the sea. The watershed separating the basins of the Nile and Lake Chad runs north and south through the centre of the country. The mountains are scored by numerous khors, whose lower courses can be traced across the tableland. The khors formerly contained large rivers which flowed N.E. and E. to the Nile, W. and S.W. to Lake Chad, S. and S.E. to the Bahr-el-Ghazal. The streams going N.E. drain to the Wadi Melh, a dry river-bed which joins the Nile near Debba, but on reaching the plain the waters sink into the sandy soil and disappear. The torrents flowing directly east towards the Nile also disappear in the sandy deserts. The khors in the W., S.W. and S., — the most fertile part of Darfur — contain turbulent torrents in the rainy season, when much of the southern district is flooded. Not one of the streams is perennial, but in times of heavy rainfall the waters of some khors reach the Bahr-el-Homr tributary of the Bahr-el-Ghazal. (For some 200 m. the Bahr-el-Homr marks the southern frontier of the country.) In the W. and S. water can always be obtained in the dry season by digging 5 or 6 ft. below the surface of the khors.

The climate, except in the south, where the rains are heavy and the soil is a damp clay, is healthy except after the rains. The rainy season lasts for three months, from the middle of June to the middle of September. In the neighbourhood of the khors the vegetation is fairly rich. The chief trees are the acacias whence gum is obtained, and baobab (Adansonia digitata); while the sycamore and, in the Marra mountains, the Euphorbia candelabrum are also found. In the S.W. are densely forested regions. Cotton and tobacco are indigenous. The most fertile

land is found on the slopes of the mountains, where wheat, durra, dukhn (a kind of millet and the staple food of the people) and other grains are grown. Other products are sesame, cotton, cucumbers, water-melons and onions.

Copper is obtained from Hofrat-el-Nahas in the S.E., iron is wrought in the S.W.; and there are deposits of rock-salt in various places. The copper mines (in 9 48' N. 24 5' E.) are across the Darfur frontier in the Bahr-el-Ghazal province. The vein runs N.W. and S.E. and in places rises in ridges 2 ft. above the general level of ground. There is an immense quanti ty of ore, (silicate and carbonate) specimens containing 14% of metal. Camels and cattle are both numerous and of excellent breeds. Some of the Arab tribes, such as the Baggara, breed only cattle, those in the north and east confine themselves to rearing camels. Horses are comparatively rare; they are a small but sturdy breed. Sheep and goats are numerous. The ostrich, common in the eastern steppes, is bred by various Arab tribes, its feathers forming a valuable article of trade.

Inhabitants. — The population of Darfur consists of negroes and Arabs. The negro For, forming quite half the inhabitants, occupy the central highlands and part of the Dar Dima and Dar Uma districts; they speak a special language, and are sub- divided into numerous tribes, of which the most influential are the Masabat, the Kunjara and the Kera. They are of middle height, and have rather irregular features. The For are described as clean and industrious, somewhat fanatical, but generally amenable to civilization, and freedom-loving. The Massalit are

a negro tribe which, breaking off from the For some centuries back, have now much Arab blood, and speak Arabic ; while the Tunjur are an Arab tribe which must have arrived in the Sudan at a very early date, as they have incorporated a large For element, and

no longer profess Mahommedanism. The Dago (Tago) formerly inhabited Jebel Marra, but they have been driven to the south and west, where they maintain a certain independence in Dar Sula, but are treated as inferiors by the For. The Zaghawa, who inhabit the northern borders, are on the contrary regarded by the For as their equals, and have all the prestige of a race that at one time made its influence felt as far as Bornu. Among other tribes may be mentioned the Berti and Takruri, the Birgirid, the Beraunas, and immigrants from Wadai and Bagirmi, and Fula from west of Lake Chad. Genuine Arab tribes, e.g. the Baggara and Homr, are numerous, and they are partly nomadic and partly settled. The Arabs have not, generally speaking, mixed with the negro tribes. They are great hunters, making expeditions into the desert for five or six days at a time in search of ostriches.

Slaves, ostrich feathers, gum and ivory used to be the chief articles of trade, a caravan going annually by the Arbain (" Forty Days ") road to Assiut in Egypt and taking back cloth, fiie-arms and other articles. The slave trade has ceased, but feathers, gum and ivory still constitute the chief exports of the country. The principal imports are cotton goods, sugar and tea. There is also an active trade in camels and cattle.

The internal administration of the country is in the hands of the sultan, who is officially recognized as the agent of the Sudan government. The administrative system resembles that of other Mahommedan countries.

Towns. — The capital is El-Fasher, pop. about 10,000, on the western bank of the Wadi Tendelty in an angle formed by the junction of that wadi with the Wadi-el-Kho, one of the streams which flow towards the Bahr-el-Homr. Fasher is the residence of the sultan. There are a few fine buildings, but the town consists mainly of tukls and box-shaped straw sheds. It is 500 m. W.S.W. of Khartum. Dara, a small market town, is no m. S. of El-Fasher. Shakka is in the S.E. of the country near the Bahr- el-Homr, and

was formerly the headquarters of the slave dealers.

History. — The Dago or Tago negroes, inhabitants of Jebel Marra, appear to have been the dominant race in Darfur in the earliest period to which the history of the country goes back. How long they ruled is uncertain, little being known of them save a list of kings. According to tradition the Tago dynasty was displaced, and Mahommedanism introduced, about the 14th century, by Tunjur Arabs, who reached Darfur by way of Bornu and Wadai. The first Tunjur king was Ahmed-el-Makur, who married the daughter of the last Tago monarch. Ahmed reduced many unruly chiefs to submission, and under him the country prospered. His great-grandson, the sultan Dali, a celebrated figure in Darfur histories, was on his mother's side a For, and thus was effected a union between the negro and Arab races. Dali divided the country into provinces, and established a penal code, which, under the title of Kitab Dali or Dali's Book, is still preserved, and shows principles essentially different from those of the Koran. His grandson Soleiman (usually distinguished by the Forian epithet Solon, the Arab or the Red) reigned from 1596 to 1637, ana " was a great warrior and a devoted Mahommedan. Soleiman's grandson, Ahmed Bahr (1682-1722), made Islam the religion of the state, and increased the prosperity of the country by encouraging immigration from Bornu and Bagirmi. His rule extended east of the Nile as far as the banks of the Atbara. Under succeeding monarchs the country, involved in wars with Sennar and Wadai, declined in importance. Towards the end of the 18th century a sultan named Mahommed Terab led an army against the Funj, but got no further than Omdurman. Here he was stopped by the Nile, and found no means of getting his army across the river. Unwilling to give up his project, Terab remained at Omdurman for months. He was poisoned by his wife at the instigation of disaffected chiefs, and the army returned to Darfur. The next monarch was Abd-er-Rahman, surnamed el-Raschid or the Just. It was during his reign that Napoleon

Bonaparte was campaigning in Egypt; and in 1799 Abd-

er- Rahman wrote to congratulate the French general on his defeat of the Mamelukes. To this Bonaparte replied by asking the sultan to send him by the next caravan 2000 black slaves upwards of sixteen years old, strong and vigorous. To Abd-er-Rahman likewise is due the present situation of the Fasher, or royal town- ship. The capital had formerly been at a place called Kobbe. Mahommed-el-Fadhl, his son, was for some time under the control of an energetic eunuch, Mahommed Kurra, but he ulti- mately made himself independent, and his reign lasted till 1839, when he died of leprosy. He devoted himself largely to the subjection of the semi-independent Arab tribes who lived in the country, notably the Rizighat, thousands of whom he slew. In 1821 he lost the province of Kordofan, which in that year was conquered by the Egyptians. Of his forty sons, the third, Mahommed Hassin, was appointed his successor. Hassin is described as a religious but avaricious man. In the later part of his reign he became involved in trouble with the Arab slave raiders who had seized the Bahr-el-Ghazal, looked upon by the Darfurians as their especial " slave preserve." The negroes of Bahr-el-Ghazal paid tribute of ivory and slaves to Darfur, and these were the chief articles of merchandise sold by the Darfurians to the Egyptian traders along the Arbain road to Assiut. The loss of the Bahr-el-Ghazal caused therefore much annoyance to the people of Darfur. Hassin died in 1873, blind and advanced in years, and the succession passed to his youngest son Ibrahim, who soon found himself engaged in a conflict with Zobeir (q.11.), the chief of the Bahr-el-Ghazal slave traders, and with an Egyptian force from Khartum. The war resulted in the destruc- tion of the kingdom. Ibrahim was slain in battle in the autumn of 1874, and his uncle Hassab Alia, who sought to maintain the independence of his country, was captured in 1875 by the troops of the khedive, and removed to Cairo with his family. The Darfurians were restive under Egyptian rule. Various revolts were suppressed, but in 1879 General Gordon (then governor- general of the Sudan) suggested the reinstatement of the ancient royal family. This was

not done, and in 1881 Slatim Bey (Sir Rudolf von Slatin) was made governor of the province. Slatin defended the province against the forces of the Mahdi, who were led by a Rizighat sheik named Madibbo, but was obliged to surrender (December 1883), and Darfur was incorporated in the Mahdi's dominions. The Darfurians found Dervish rule as irksome as that of the Egyptians had been, and a state of almost constant warfare ended in the gradual retirement of the Dervishes from Darfur. Following the overthrow of the khalifa at Omdurman in 1898 the new (Anglo-Egyptian) Sudan govern- ment recognized (1899) Ali Dinar, a grandson of Mahommed-el- Fadhl, as sultan of Darfur, on the payment by that chief of an annual tribute of £500. Under Ali Dinar, who during the Mahdia had been kept a prisoner in Omdurman, Darfur enjoyed a period of peace.

The first European traveller known to have visited Darfur was William George Browne (q.v.), who spent two years (1793-1795) at Kobbe. Sheik Mahommed-el-Tounsi travelled in 1 803 through various regions of Africa, including Darfur, in search of Omar, his father, and afterwards -gave to the world an account of his wanderings, which was translated into French in 1845 by M. Perron. Gustav Nachtigal in 1873 spent some months in Darfur, and since that time the country has become well known through the journeys of Gordon, Slatin and others.

Authorities. — Browne's account of Darfur will be found in his Travels in Africa, Egypt and Syria (London, 1799); Nachtigal's Sahara una Sudan gives the results of that traveller's observations. The first ten chapters of Slatin Pasha's book Fire and Sword in the Sudan (English edition, London, 1896) contain much information concerning the country, its history, and a full account of the overthrow of Egyptian authority by the Mahdi. See also The Anglo-Egyptian Sudan (London, 1905), edited by Count Gleichen, and the bibliography given under Sudan.*

DARGAI, the name of a mountain peak and a frontier station in the north-west Frontier Province of India. The mountain peak is situated on the Samana

Range, and the Kohat border, and is famous for the stand made there by the Afridis and Oraizais in

the Tirah Campaign. (See Tirah Campaign.) Dargai station is situated on the Peshawar border, and is the terminus of the frontier railway running from Nowshera to the Malakand Pass.

DARGOMIJSKY, ALEXANDER SERGEIVICH (1813–1869), Russian composer, was born in 1813, and educated in St Peters- burg. He was already known as a talented musical amateur when in 1833 he met Glinka and was encouraged to devote him- self to composition. His light opera Esmeralda was written in 1839, and his Roussalka was performed in 1856, but he had but small success or recognition either at home or abroad, except in Belgium, till the 'sixties, when he became one of Balakirev's circle. His opera The Stone Guest then became famous among the progressive Russian school, though it was not performed till 1872. Dargomijsky died in January 1869. His compositions include a number of songs, and some orchestral pieces.

DARIAL, a gorge in the Caucasus, at the east foot of Mt. Kasbek, pierced by the river Terek for a distance of 8 m. between vertical walls of rock (5900 ft.). It is mentioned in the Georgian annals under the names of Ralani, Dargani, Darialani; the Persians and Arabs knew it as the Gate of the Alans; Strabo calls it Porta Caucasica and Porta Cumana; Ptolemy, Porta Sarmatica; it was sometimes known as Portae Caspiae (a name bestowed also on the " gate " or pass beside the Caspian at Derbent) ; and the Tatars call it Darioly. Being the only avail- able passage across the Caucasus, it has been fortified since a remote period — at least since 150 B.C. In Russian poetry it has been immortalized by Lermontov. The present Russian fort, Darial, which guards this section of the Georgian military road, is at the northern issue of the gorge, at an

altitude of 4746 ft.

DARIEN, a district covering the eastern part of the isthmus joining Central and South America. It is mainly within the republic of Panama, and gives its name to a gulf of the Carribbean Sea. Darien is of great interest in the history of geographical discovery. It was reconnoitred in the first year of the 16th century by Rodrigo Bastidas of Seville; and the first settlement was Santa Maria la Antigua, situated on the small Darien river, north-west of the mouth of the Atrato. In 1513 Vasco Nufiez de Balboa stood "silent upon a peak in Darien," 1 and saw the Pacific at his feet stretching inland in the Gulf of San Miguel; and for long this narrow neck of land seemed alternately to proffer and refuse a means of transit between the two oceans. The first serious attempt to turn the isthmus to permanent account as a trade route dates from the beginning of the 18th century, and forms an interesting chapter in Scottish history. In 1695 an act was passed by the Scottish parliament giving extensive powers to a company trading to Africa and the Indies; and this company, under the advice of one of the most remarkable economists of the period, William Paterson (q.v.), determined to establish a colony on the isthmus of Darien as a general emporium for the commerce of all the nations of the world. Regarded with disfavour both in England and Holland, the project was taken up in Scotland with the enthusiasm of national rivalry towards England, and the " subscriptions sucked up all the money in the country." On the 26th of July 1698 the pioneers set sail from Leith amid the cheers of an almost envious multitude; and on the 4th of November, with the loss of only fifteen out of 1 200 men, they arrived at Darien, and took up their quarters in a well-defended spot, with a good harbour and excellent outlook. The country they named New Caledonia, and two sites selected for future cities were designated respectively New Edinburgh and New St Andrews. At first all seemed to go well; but by and by lack of provisions, sickness and anarchy reduced the settlers to the most miserable plight; and in June

1699 they re-embarked in three vessels, a weak and hopeless company, to sail whither- soever Providence might direct. Meanwhile a supplementary expedition had been prepared in Scotland; two vessels were despatched in May, and four others followed in August. But this venture proved even more unfortunate than the former. The colonists arrived broken in health; their spirits were crushed

'Keats, in his famous sonnet beginning: — " Much have I travelled in the realms of gold," of which this is the concluding line, inaccur- ately substitutes Cort«>z for Balboa,

by the fate of their predecessors, and embittered by the harsh fanaticism of the four ministers whom the general assembly of the Church of Scotland had sent out to establish a regular presbyterial organization. The last addition to the settlement was the company of Captain Alexander Campbell of Fonab, who arrived only to learn that a Spanish force of 1500 or 1600 men lay encamped at Tubacanti, on the river Santa Maria, waiting for the appearance of a Spanish squadron in order to make a combined attack on the fort. Captain Campbell, on the second day after his arrival, marched with 200 men across the isthmus to Tubacanti, stormed the camp in the night-time, and dispersed the Spanish force. On his return to the fort on the fifth day he found it besieged by the Spaniards from the men-of-war; and, after a vain attempt to maintain its defence, he succeeded with a few companions in making his escape in a small vessel. A capitula- tion followed, and the Darien colony was no more. Of those who had taken part in the enterprise only a miserable handful ever reached their native land.

See J. H. Burton, The Darien Papers (Bannatyne Club, 1849); Macaulay, History of England (London, 1866) ; and A. Lang, History of Scotland, vol. iv. (Edinburgh, 1907).

DARIUS (Pers. Ddrayavaush; Old Test. Daryavesh), the name of three Persian kings.

1. Darius the Great, the son of Hystaspes (q.v.). The principal source for his history is his own inscriptions, especially the great inscription of Behistun (q.v.), in which he relates how he gained the crown and put down the rebellions. In modern times his veracity has often been doubted, but without any sufficient reason; the whole tenor of his words shows that we can rely upon his account. The accounts given by Herodotus and Ctesias of his accession are in many points evidently dependent on this official version, with many legendary stories interwoven, e.g. that Darius and his allies left the question as to which of them should become king to the decision of their horses, and that Darius won the crown by a trick of his groom.

Darius belonged to a younger branch of the royal family of the Achaemenidae. When, after the suicide of Cambyses (March 521), the usurper Gaumata ruled undisturbed over the whole empire under the name of Bardiya (Smerdis), son of Cyrus, and no one dared to gainsay him, Darius, " with the help of Ahura-mazda," attempted to regain the kingdom for the royal race. His father Hystaspes was still alive, but evidently had not the courage to urge his claims. Assisted by six noble Persians, whose names he proclaims at the end of the Behistun inscription, he surprised and killed the usurper in a Median fortress (October 521; for the chronology of these times cf. E. Meyer, Forschungen zur alten Geschichte, ii. 472 ff.), and gained the crown. But this sudden change was the signal for an attempt on the part of all the eastern provinces to regain their independence. In Susiana, Babylon, Media, Sagartia, Margiana, usurpers arose, pretending to be of the old royal race, and gathered large armies around them ; in Persia itself Vahyazdata imitated the example of Gaumar.a and was acknowledged by the majority of the people as the true Bardiya. Darius with only a small army of Persians and Medes and some trustworthy generals overcame all difficulties, and in 520 and 519 all the rebellions were put down (Babylon rebelled twice, Susiana even three times), and the authority of Darius was established

throughout the empire.

Darius in his inscriptions appears as a fervent believer in the true religion of Zoroaster. But he was also a great statesman and organizer. The time of conquests had come to an end; the wars which Darius undertook, like those of Augustus, only served the purpose of gaining strong natural frontiers for the empire and keeping down the barbarous tribes on its borders. Thus Darius subjugated the wild nations of the Pontic and Armenian mountains, and extended the Persian dominion to the Caucasus; for the same reasons he fought against the Sacae and other Turanian tribes. But by the organization which he gave to the empire he became the true successor of the great Cyrus. His organization of the provinces and the fixing of the tributes is described by Herodotus iii. 90 ff., evidently from good official sources. He fixed the coinage and introduced the gold coinage

of the Daric (which is not named after him, as the Greeks believed, but derived from a Persian word meaning ” gold “; in Middle Persian it is called zarig) . He tried to develop the commerce of the empire, and sent an expedition down the Kabul and the Indus, led by the Carian captain Scylax of Caryanda, who explored the Indian Ocean from the mouth of the Indus to Suez. He dug a canal from the Nile to Suez, and, as the fragments of a hiero-glyphic inscription found there show, his ships sailed from the Nile through the Red Sea by Saba to Persia. He had connexions with Carthage (i.e. the Karkd of the Nakshi Rustam inscr.), and explored the shores of Sicily and Italy. At the same time he attempted to gain the good-will of the subject nations, and for this purpose promoted the aims of their priests. He allowed the Jews to build the Temple of Jerusalem. In Egypt his name appears on the temples which he built in Memphis, Edfu and the Great Oasis. He called the high-priest of Sais,

Uzahor, to Susa (as we learn from his inscription in the Vatican), and gave him full powers to reorganize the ” house of life,” the great medical school of the temple of Sals. In the Egyptian traditions he is considered as one of the great benefactors and lawgivers of the country (Herod, ii. 1 10, Diod. i. 95). In similar relations he stood to the Greek sanctuaries (cf. his rescript to “his slave” Godatas, the inspector of a royal park near Magnesia, on the Maeander, in which he grants freedom of taxes and forced labour to the sacred territory of Apollo. See Cousin and Deschamps, Bulletin de corresp. hellen., xiii. (1889), 529, and Dittenberger, Sylloge inscr. graec, 2); all the Greek oracles in Asia Minor and Europe therefore stood on the side of Persia in the Persian wars and admonished the Greeks to attempt no resistance.

About 512 Darius undertook a war against the Scythians. A great army crossed the Bosporus, subjugated eastern Thrace, and crossed the Danube. The purpose of this war can only have been to attack the nomadic Turanian tribes in the rear and thus to secure peace on the northern frontier of the empire. It was based upon a wrong geographical conception; even Alexander and his Macedonians believed that on the Hindu Kush (which they called Caucasus) and on the shores of the Jaxartes (which they called Tanais, i.e. Don) they were quite near to the Black Sea. Of course the expedition undertaken on these grounds could not but prove a failure; having advanced for some weeks into the Russian steppes, Darius was forced to return. The details given by Hero- dotus (according to him Darius had reached the Volga!) are quite fantastical; and the account which Darius himself had given on a tablet, which was added to his great inscription in Behistun, is destroyed with the exception of a few words. (See R. W. Macan, Herodotus, vol. ii. appendix 3; G. B. Grundy, Great Persian War, pp. 48-64; J. B. Bury in Classical Review, July 1897.)

Although European Greece was intimately connected with the coasts of Asia Minor, and the opposing parties in the Greek towns were continually

soliciting his intervention, Darius did not meddle with their affairs. The Persian wars were begun by the Greeks themselves. The support which Athens and Eretria gave to the rebellious Ionians and Carians made their punishment inevitable as soon as the rebellion had been put down. But the first expedition, that of Mardonius, failed on the cliffs of Mt. Athos (492), and the army which was led into Attica by Datis in 490 was beaten at Marathon. Before Darius had finished his preparations for a third expedition an insurrection broke out in Egypt (486). In the next year Darius died, probably in October 485, after a reign of thirty-six years. He is one of the greatest rulers the east has produced.

2. Darius II., Ochus. Artaxerxes I., who died in the begin- ning of 424, was followed by his son Xerxes II. But after a month and a half he was murdered by his brother Secydianus, or Sogdianus (the form of the name is uncertain). Against him rose a bastard brother, Ochus, satrap of Hyrcania, and after a short fight killed him, and suppressed by treachery the attempt of his own brother Arsites to imitate his example (Ctesias ap. Phot. 44; Diod. xii. 71, 108; Pausan. vi. 5, 7). Ochus adopted the name Darius (in the chronicles called Nothos, the bastard). Neither Xerxes II. nor Secydianus occurs in the dates of the numerous Babylonian tablets from Nippur; here the dates of Darius II.

follow immediately on those of Artaxerxes I. Of Darius II. 's reign we know very little (a rebellion of the Medes in 409 is mentioned in Xenophon, Hellen. i. 2. 19) , except that he was quite dependent on his wife Parysatis. In the excerpts from Ctesias some harem intrigues are recorded, in which he played a dis- reputable part. As long as the power of Athens remained intact he did not meddle in Greek affairs; even the support which the Athenians in 413 gave to the rebel Amorges in Caria would not have roused him (Andoc. iii. 29; Thuc. viii. 28, 54; Ctesias wrongly names his father Pissuthnes in his stead; an account of these wars is contained in the great Lycian stele from Xanthus in the British Museum) , had not the Athenian power

broken down in the same year before Syracuse. He gave orders to his satraps in Asia Minor, Tissaphernes and Pharnabazus, to send in the overdue tribute of the Greek towns, and to begin war with Athens; for this purpose they entered into an alliance with Sparta. In 408 he sent his son Cyrus to Asia Minor, to carry on the war with greater energy. In 404 he died after a reign of nineteen years, and was followed by Artaxerxes II.

3. Darius III., Codomannus. The eunuch Bagoas (?.».), having murdered Artaxerxes III. in 338 and his son Arses in 336, raised to the throne a distant relative of the royal house, whose name, according to Justin x. 3, was Codomannus, and who had excelled in a war against the Cadusians (cf. Diod. xvii. 5 ff., where his father is called Arsames, son of Ostanes, a brother of Artaxerxes). The new king, who adopted the name of Darius, took warning by the fate of his predecessors, and saved himself from it by forcing Bagoas to drink the cup himself. Already in 336 Philip II. of Macedon had sent an army into Asia Minor, and in the spring of 334 the campaign of Alexander began. In the following year Darius himself took the field against the Macedonian king, but was beaten at Issus and in 331 at Arbela. In his flight to the east he was deposed and killed by Bessus (July 33°)-

The name Darius was also borne by many later dynasts of Persian origin, among them kings of Persis {q.v.), Darius of Media Atropatene who was defeated by Pompeius, and Darius, king of Pontus in the time of Antony. (Ed. M.)

DARJEELING, a hill station and district of British India, in the Bhagalpur division of Bengal. The sanatorium is situated 367 m. by rail north of Calcutta. In 1901 it had a population of 16,924. It is the summer quarters of the Bengal government and has a most agreeable climate, which neither exceeds 8o° F. in summer, nor falls below 30 in winter. The great attraction of Darjeeling is its scenery, which is unspeakably grand. The view across the hills to Kinchinjunga discloses a glittering white wall of

perpetual snow, surrounded by towering masses of granite. There are several schools of considerable size for European boys and girls, and a government boarding school at Kurseong. The buildings and the roads suffered severely from the earthquake of the 1 2th of June 1897. But a more terrible disaster occurred in October 1899, when a series of landslips carried away houses and broke up the hill railway. The total value of the property destroyed was returned at £160,000.

The district of Darjeeling comprises an area of 1164 sq. m. It consists of two well-defined tracts, viz. the lower Himalayas to the south of Sikkim, and the tarai, or plains, which extend from the south of these ranges as far as the northern borders of Purnea district. The plains from which the hills take their rise are only 300 ft. above sea-level; the mountains ascend abruptly in spurs of 6000 to 10,000 ft. in height. The scenery throughput the hills is picturesque, and in many parts magnificent. The two highest mountains in the world, Kinchinjunga in Sikkim (28,156 ft.) and Everest in Nepal (29,002 ft.), are visible from the town of Darjeeling. The principal peaks within the district are— Phalut (11,811 ft.), Subargum (11,636), Tanglu (10,084), Situng and Sinchal Pahai (8163). The chief rivers are the Tista, Great and Little Ranjit, Ramman, Mahananda, Balasan and Jaldhaka. None of them is navigable in the mountain valleys; but the Tista, after it debouches on the plains, can be navigated by cargo boats of considerable burthen. Bears, leopards and musk deer are found on the higher mountains, deer on the lower ranges, and

a few elephants and tigers on the slopes nearest to the plains. In the lowlands, tigers, rhinoceroses, deer and wild hogs are abundant. A few wolves are also found. Of small game, hares, jungle fowl,

peacocks, partridges, snipe, woodcock, wild ducks and geese, and green pigeons are numerous in the larai, and jungle fowl and pheasants in the hills. The mahseer fish is found in the Tista.

In iooi the population was 249,117, showing an increase of 12% since 1 891, compared with an increase of 43% in the previous decade. The inhabitants of the hilly tract consist to a large extent of Nepali immigrants and of aboriginal highland races; in the tarai the people are chiefly Hindus and Mahom- medans. The Lepchas are considered to be the aboriginal inhabitants of the hilly portion of the district. They are a fine, frank race, naturally open-hearted and free-handed, fond of change and given to an out-door life ; but they do not seem to improve on being brought into contact with civilization. It is thought that they are now being gradually driven out of the district, owing to the increase of regular cultivation, and to the government conservation of the forests. They have no word for plough in their language, and they still follow the nomadic form of tillage known as jum cultivation. This consists in selecting a spot of virgin soil, clearing it of forest and jungle by burning, and scraping the surface with the rudest agricultural implements. The productive powers of the land become exhausted in a few years, when the clearing is abandoned, a new site is chosen, and the same operations are carried on de novo. The Lepchas are also the ordinary out-door labourers on the hills. They have no caste distinctions but speak of themselves as belonging to one of nine septs or clans, who all eat together and intermarry with each other. In the upper or northern larai, along the base of the hills, the Mechs form the principal ethnical feature. This tribe inhabits the deadly jungle with impunity, and cultivates cotton, rice and other ordinary crops, by the jum process described above. The cultivation of tea was introduced in 1856, and is now a large industry. Cinchona cultivation was introduced by the government in 1862, and has since been taken up by private enterprise. There is a coal mine at Daling.

The Darjeeling Himalayan railway of 2 ft. gauge, opened in 1880, runs for 50 m. from Siliguri in the plains on the Eastern Bengal line.

The British connexion with Darjeeling dates from 1816, when, at the close of the war with Nepali, the British made over to the Sikkim raja the tarai tract, which had been wrested from him and annexed by Nepal. In 1835 the nucleus of the present district of British Sikkim or Darjeeling was created by a cession of a portion of the hills by the raja of Sikkim to the British as a sanatorium. A military expedition against Sikkim, rendered necessary in 1850 by the imprisonment of Dr A. Campbell, the superintendent of Darjeeling, and Sir Joseph Hooker, resulted in the stoppage of the allowance granted to the raja for the cession of the hill station of Darjeeling, and in the annexation of the Sikkim tarai at the foot of the hills and of a portion of the hills beyond. In August 1 866 the hill territory east of the Tista, acquired as the result of the Bhutan campaign of 1864, was added to the jurisdiction of Darjeeling.

DARLEY, GEORGE (1705-1846), Irish poet, was born in Dublin in 1 795. His parents, who were gentle folks of independent means, emigrated to America, leaving the boy in charge of his grandfather at Springfield, Co. Dublin. He was educated at Trinity College, Dublin, graduating in 1820 ; but an unfortunate stammer prevented him from going into the church or to the bar, and he established himself in London, where he published his first volume of poems, the Errors of Ecstasie, in 1822, and became a regular contributor to The London Magazine. He was intimate with Cary, the translator of Dante, and with Charles Lamb. In 1826 he published under the name of ” Grey Penseval ” a volume of prose tales and sketches, Labour in Idleness (1826), one of which, ” The Enchanted Lyre,” is plainly autobiographical. Sylvia, or the May Queen (1827, reprint 1892), a fairy opera, met with no success, but about 1830, he became dramatic and art critic to the Athenaeum. His other works are: Nepenthe (1835, reprint 1897), his most considerable poem ; introduction to the works

of Beaumont and Fletcher (1840); with two plays,

Thomas a Becket (1840), and Ethelstan (1841). He died in London on the 23rd of November 1846.

Selections from the Poems of George Darley, with an introduction by R. A. Streatfield, appeared in 1904. See also the edition by Ramsay Colles in the " Muses' Library " (1906).

DARLING, GRACE HORSLEY (1815-1842), British heroine, was born at Bamborough, Northumberland, on the 24th of November 181 5. Her father, William Darling, was the keeper of the Longstone (Fame Islands) lighthouse. On the morning of the 7th of September 1838, the " Forfarshire," bound from Hull to Dundee, with sixty-three persons on board, struck on the Fame Islands, forty-three being drowned. The wreck was observed from the lighthouse, and Darling and his daughter determined to try and reach the survivors. They recognized that though they might be able to get to the wreck, they would be unable to return without the assistance of the shipwrecked crew, but they took this risk without hesitation. By a combina- tion of daring, strength and skill, the father and daughter reached the wreck in their coble and brought back four men and a woman to the lighthouse. Darling and two of the rescued men then returned to the wreck and brought off the four remaining survivors. This gallant exploit made Grace Darling and her father famous. The Humane Society at once voted them its gold medal, the treasury made a grant, and a public subscription was organized. Grace Darling, who had always been delicate, died of consumption on the 20th of October 1842.

See Grace Darling, her true story (London, 1880).

DARLING, a river of Australia. It rises in Queensland and flows into New South Wales, forming for a considerable distance the boundary of the two colonies ; in its upper reaches it is known as the Barwon, but from Bourke to its junction on the Victorian border with the river Murray, it is called the Darling. Its length is 1160 m., and with its affluents it drains an area of about 200,000 sq. m. During the dry season its course is marked by a series of shallow pools, but during the winter, when it is subject to sudden floods, it is navigable as far as Bourke for steamers of light draft. Excepting a narrow strip on the banks of the river, the country through which it passes is, for the most part, an arid plain.

DARLINGTON, a market town and municipal and parliamentary borough of Durham, England, 232 m. N. by W. of London, on the North-Eastern railway. Pop. (1891) 38,060; (1901) 44>5 11 - It lies in a slightly undulating plain on the small river Skerne, a tributary of the Tees, not far from the main river. Its appearance is almost wholly modern, but there is a fine old parish church dedicated to St Cuthbert. It is cruciform, and in style mainly transitional Norman. It has a central tower sur- mounted by a spire of the 14th century, which necessitated the building of a massive stone screen across the chancel arch to support the piers. Traces of an earlier church were discovered in the course of restoration. Educational establishments include an Elizabethan grammar school, a training college for school- mistresses (British and Foreign School Society), and a technical school. There is a park of forty-four acres. The industries of Darlington are large and varied. They include worsted spinning mills ; collieries, ironstone mines, quarries and brickworks ; the manufacture of iron and steel, both in the rough and in the form of finished articles, as locomotives, bridge castings, ships' engines, gun castings and shells, &c. The parliamentary borough returns one member. The town was incorporated in 1867, and the corporation consists of a mayor, six aldermen "and eighteen councillors. Area, 3956

acres.

Not long after the bishop and monks of Lindisfarne had settled at Durham in 995, Styr the son of Ulf gave them the vill of Darlington (Dearthington, Darnington), which by 1083 had grown into importance, probably owing to its situation on the road from Watling Street to the mouth of the Tees. Bishop William of St Carileph in that year changed the church to a collegiate church, and placed there certain canons whom he removed from Durham. Bishop Hugh de Puiset rebuilt the church and built a manor house which was for many years the occasional residence of the bishops of Durham. Boldon Book,

dated 1183, contains the first mention of Darlington as a borough, rated at £5, while half a mark was due from the dyers of cloth. The next account of the town is in Bishop Hatfield's Survey (c. 1380), which states that " Ingelram Gentill and his partners hold the borough of Derlyngton with the profits of the mills and dye houses and other profits pertaining to the borough rendering yearly four score and thirteen pounds and six shillings." Darlington possesses no early charter, but claimed its privileges as a borough by a prescriptive right. Until the 19th century it was governed by a bailiff appointed by the bishop. The mention of dyers in the Boldon Book and Hatfield's Survey probably indicates the existence of woollen manufacture. Before the 19th century Darlington was noted for the manufacture of linen, worsted and flax, but it owes its modern importance to the opening of the railway between Darlington and Stockton on the 27th of September 1825. " Locomotive No. 1," the first that ever ran on a public railway, stands in Bank Top station, a remarkable relic of the enterprise. As part of the palatinate of Durham, Darlington sent no members to parliament until 1862, when it was allowed to return one member. The fairs and markets in Darlington were formerly held by the bishop and were in existence as

early as the nth century. According to Leland, Darlington was in his time the best market town in the bishopric with the exception of Durham. In 1664 the bishop, finding that the inhabitants of the town had set up a market " in the season of the year unaccustomed," i.e. from the fortnight before Christmas to Whit Monday, prohibited them from continuing it. The markets and fairs were finally in 1854 purchased by the local authority, and now belong to the corporation.

DARLINGTONIA (called after William Darlington, an American botanist), a Calif ornian pitcher-plant, belonging to the order Sarraceniaceae. There is only one species, D. californica, which is found at 5000 ft. altitude on the Sierra Nevadas of California, growing in sphagnum-bogs along with sundews and rushes.

Darlingtonia californica.

The pitcher-like leaves form a cluster, and are 1 to 2 ft. high, slender, erect, and end in a rounded hooded top, from which hangs a blade shaped like a fish-tail which guards the entrance to the pitcher. Insects are attracted to the leaves by the bright colouring, especially of the upper part; entering they pass down the narrow funnel guided by downward pointing hairs which also prevent their ascent. They form a putrefying mass in the bottom of the pitcher, and the products of" their decomposition are presumably absorbed by the leaf for food.

DARLY, MATTHIAS, 18th-century English caricaturist, designer and engraver. This extremely versatile artist not only issued political caricatures, but designed ceilings, chimney- pieces, mirror frames, girandoles, decorative panels and other mobiliary accessories, made many engravings for Thomas Chippendale, and sold his own productions over the counter. He was apparently an architect by profession. The first publica- tion which can be attributed to him with certainty is a coloured caricature, " The Cricket Players of Europe " (1741). In 1754 he issued A new Book of Chinese

Designs, which was intended to minister to the passing craze for furniture and household decorations in the Chinese style. It was in this year that he engraved many of the plates for the Director of Thomas Chippendale. He published from many addresses, most of them in the Strand or its immediate neighbourhood, and his shop was for a long period perhaps the most important of its kind in London. In his book Nollekens and his Times, J. T. Smith, writing of Richard Cosway, says: — "So ridiculously foppish did he become that Matth. Darly, the famous caricature print seller, introduced an etching of him in his window in the Strand as the ' Macaroni Miniature Painter.' " Darly was for many years in partnership with a man named Edwards, and together they published many political prints, which were originally issued separately and collected annually into volumes under the title of Political and Satirical History. Darly was a member both of the Incorporated Society of Artists and the Free Society of Artists, forerunners of the Royal Academy, and to their exhibitions he contributed many architectural drawings, together with a profile etching of himself (1775). Upon one of these etchings, published from 39 Strand, he is described as " Professor of Ornament to the Academy of Great Britain." Darly's most important publication was The Ornamental Architect or Young Artists' Instructor (1770-1771), a title which was changed in the edition of 1773 to A Compleat Body of Architecture, embellished with a great Variety of Orna- ments. He also issued Sixty Vases by English, French and Italian Masters (1767). In addition to his immense mass of other productions Darly executed many book plates, illustrated various books and cabinet-makers' catalogues, and gave lessons in etching. His skill as a caricaturist brought him into close personal relations with the politicians of his time, and in 1763 he was instrumental in saving John Wilkes, whose partisan he was, from death at the hands of James Dunn, who had determined to kill him. Darly, who described himself as " Liveryman and block maker," issued his last caricature in October 1780, and as his shop, No. 39 Strand, was let to a

new tenant in the following year, it is to be presumed that he had by that time died, or become incapable of further work. As a designer of furniture Darly travelled in a dozen years or so from the extremes of pseudo-Chinese affectation to classical severity of the type popularized by the brothers Adam.

DARMESTETER, JAMES (1849–1894), French author and antiquarian, was born of Jewish parents on the 28th of March 1849 at Chateau Salins, in Alsace. The family name had originated in their earlier home of Darmstadt. He was educated in Paris, where, under the guidance of Michel Breal and Abel Bergaigne, he imbibed a love for Oriental studies, to which for a time he entirely devoted himself. He was a man of vast intel- lectual range. In 1875 he published a thesis on the mythology of the Zend Avesta, and in 1877 became teacher of Zend at the Ecole des Hautes fitudes. He followed up his researches with his Etudes iraniennes (1883), and ten years later published a complete translation of the Zend Avesta, with historical and philological commentary (3 vols., 1892–1893), in the Annates du musee Guimet. He also edited the Zend Avesta for Max Miiller's Sacred Books of the East. Darmesteter regarded the extant texts as far more recent than was commonly believed, placing the earliest in the 1st century B.C., and the bulk in the 3rd century a.d. In 1885 he was appointed professor in the College de France, and was sent to India in 1886 on a mission to collect the popular songs of the Afghans, a translation of which, with a valuable essay on the Afghan language and literature, he published on his return. His impressions of English dominion in India

were conveyed in Lettres sur I' I tide (1888). England interested him deeply; and his attachment to the gifted English writer, A. Mary F. Robinson, whom he shortly afterwards married (and who in 1901 became the wife of Professor E. Duclaux, director of

the Pasteur Institute at Paris), led him to translate her poems into French in 1888. Two years after his death a collection of excellent essays on English subjects was published in English. He also wrote Le Mahdi depuis les origines de l' Islam jusqu'd nos jours (1885); Les Origines de la poSsie persane (1888); ProphUes d' Israel (1892), and other books on topics connected with the east, and from 1883 onwards drew up the annual reports of the SocietS Asialique. He had just become connected with the Revue de Paris, when his delicate constitution succumbed to a slight attack of illness on the 19th of October 1894.

His elder brother, Arsene Darmesteter (1 846-1 888), was a distinguished philologist and man of letters. He studied under Gaston Paris at the Ecole des Hautes Etudes, and became professor of Old French language and literature at the Sorbonne. His Life of Words appeared in English in 1888. He also collaborated with Adolphe Hatzfeld in a Dictionnaire gSniral de la langue francaise (2 vols., 1895-1900). Among his most important work was the elucidation of Old French by means of the many glosses in the medieval writings of Rashi and other French Jews. His scattered papers on romance and Jewish philology were collected by James Darmesteter as Arsene Darmesteter ; reliques scienli- fiques (2 vols., 1890). His valtiable Cours de grammaire historique de la langue francaise was edited after his death by E. Muret and L. Sudre (1891-1895 ; English edition, 1902).

There is an eloge of James Darmesteter in the Journal asiatique (1894, vol. iv. pp. 519-534), and a notice by Henri Cordier, with a list of his writings, in The Royal Asiatic Society's Journal (January 1895); see also Gaston Paris, "James Darmesteter," in Penseurs et poetes (1896), pp. 1-61).

DARMSTADT, a city of Germany, capital of the grand-duchy of Hesse-Darmstadt, on a plain gently sloping from the Odenwald to the Rhine, 21 m. by rail S.E. from Mainz and 17 m. S. from Frankfort-on-Main. Pop.

(1905) 83,000. It is the residence of the grand-duke and the seat of government of the duchy. Darmstadt consists of an old and a new town, the streets of the former being narrow and gloomy and presenting no attractive features. The new town, however, which includes the greater part of the city, contains broad streets and several fine squares. Among the latter is the stately Luisenplatz, on which are the house of parliament, the old palace and the post office, and in the centre of which is a column surmounted by the statue of the grand- duke Louis I., the founder of the new town. The square is crossed by the Rhein-strasse, the most important thoroughfare in the city, leading directly from the railway station to the ducal palace. This last, a complex of buildings, dating from various centuries, but possessing few points of special interest, is sur- rounded by grounds occupying the site of the old moat. Opposite to it, on the north side, and adjoining the pretty palace gardens, are the court theatre and the armoury, and a little farther west the handsome buildings of the new museum, erected in 1905 and containing the valuable scientific and art collections of the state, which were formerly housed in the palace: a library of 600,000 volumes and 4000 MSS., a museum of Egyptian and German antiquities, a picture gallery with masterpieces of old German and Dutch schools, a natural history collection and the state archives. To the right of the entrance to the palace gardens is the tomb of the " great landgravine," Caroline Henrietta, wife of the landgrave Louis IX., surmounted by a marble urn, the • gift of Frederick the Great of Prussia, bearing the inscription femina sexu, ingenio vir. To the south of the castle lies the old town, with the market square, the town hall (lately restored and enlarged) and the town church. Of the eight churches (seven Evangelical) only the Roman Catholic is in any way imposing. There are two synagogues. The town possesses a technical high school, having (since 1900) power to confer the degree of doctor of engineering, and attended by about 2000 students, two gymnasia, a school of agriculture, an artisans' school and a botanical garden. The chemist, Justus

von Liebig, was born

in Darmstadt in 1803. Among the chief manufactures are the production of machinery, carpets, playing cards, chemicals, tobacco, hats, wine and beer.

The surroundings of Darmstadt are attractive and contain many features of interest. To the east of the town lies the Mathildenhohe, formerly a park and now converted into villa residences. Here are the Alice hospital and the pretty Russian church, built (1898–1899) by the emperor Nicholas II. of Russia in memory of the empress Maria, wife of Alexander II. In the vicinity is the Rosenhohe, with the mausoleum of the ducal house, with the tomb of the grand-duchess Alice, daughter of Queen Victoria of England.

Darmstadt is mentioned in the nth century, but in the 14th century it was still a village, held by the counts of Katzeneln- bogen. It came by marriage into the possession of the house of Hesse in 1479, the male line of the house of Katzenelnbogen having in that year become extinct. The imperial army took it in the Schmalkaldic War, and destroyed the old castle. In 1567, after the death of Philip the Magnanimous, his youngest son George received Darmstadt and chose it as his residence. He was the founder of the line of Hesse-Darmstadt. Its most brilliant days were those of the reign of Louis X. (1790–1830), the first grand-duke, under whom the new town was built.

See Walther, Darmstadt wie es war und wie es geworden (Darms. 1865) ; and Zernin und Worner, Darmstadt und seine Umgebung (Zurich, 1890).

DARNLEY, HENRY STEWART or STUART, Lord (1545- 1567), earl of Ross and duke of Albany, second husband of Mary, queen of Scots, was the eldest son of Matthew Stewart, earl of Lennox (1516–1571), and through his mother Lady Margaret Douglas (1515–1578) was a great-grandson of the English king Henry VII. Born at Temple Newsam in Yorkshire on the 7th of December 1545, he was educated in England, and his lack of

intellectual ability was compensated for by exceptional skill in military exercises. After the death of Francis II. of France in 1 560 Darnley was sent into that country by his mother, who hoped that he would become king of England on Elizabeth's death, and who already entertained the idea of his marriage with Mary, queen of Scots, the widow of Francis, as a means to this end. Consequently in 1561 both Lady Margaret and her son, who were English subjects, were imprisoned by Elizabeth ; but they were soon released,, and Darnley spent some time at the English court before proceeding to Scotland in February 1565. The marriage of Mary and Darnley was now a question of practical politics, and the queen, having nursed her new suitor through an attack of measles, soon made up her mind to wed him, saying he " was the properest and best proportioned long man that ever she had seen." The attitude of Elizabeth towards this marriage is difficult to understand. She had permitted Darnley to journey to Scotland, and it has been asserted that she entangled Mary into this union; but on the other hand she and her council declared their dislike of the proposed marriage, and ordered Darnley and his father to repair to London, a command which was disobeyed. In March 1565 there were rumours that the marriage had already taken place, but it was actually celebrated at Holyrood on the 29th of July 1565.

Although Mary had doubtless a short infatuation for Darnley, the union was mainly due to political motives, and in view of the characters of bride and bridegroom it is not surprising that trouble soon arose between them. Contrary to his expectations Darnley did not receive the crown matrimonial, and his foolish and haughty behaviour, his vicious habits, and his boisterous companions did not improve matters. He was on bad terms with the regent Murray and other powerful nobles, who disliked the marriage and were intriguing with Elizabeth. Scotland was filled with rumours of plot and assassination, and civil war was only narrowly avoided. Unable to take any serious part in affairs

of state, Darnley soon became estranged from his wife. He believed that Mary's relations with David Rizzio injured him as a husband, and was easily persuaded to assent to the murder of the Italian, a crime in which he took part. Immediately afterwards, however, flattered and cajoled by the queen, he

betrayed his associates to her, and assisted her to escape from Holyrood to Dunbar. Owing to these revelations he was deserted and distrusted by his companions in the murder, and soon lost the queen's favour. In these circumstances he decided to leave Scotland, but a variety of causes prevented his departure; and meanwhile at Craigmillar a band of nobles undertook to free Mary from her husband, who refused to be present at the baptism of his son, James, at Stirling in December 1566. The details of the conspiracy at Craigmillar are not clear, nor is it certain what part, if any, Mary took in these proceedings. The first intention may have been to obtain a divorce for the queen, but it was soon decided that Darnley must be killed. Rumours of the plot came to his ears, and he fled from Stirling to Glasgow, where he fell ill, possibly by poisoning, and where Mary came to visit him. Another reconciliation took place between husband and wife, and Darnley was persuaded to journey with Mary by easy stages to Edinburgh. Apartments were prepared for the pair at Kirk o' Field, a house just inside the city walls, and here they remained for a few days. On the evening of the 9th of February 1 567 Mary took an affectionate farewell of her husband, and went to attend some gaieties in Edinburgh. A few hours later, on the morning of the 10th, Kirk o' Field was blown up with gunpowder. Darnley's body was found at some distance from the house, and it is supposed that he was strangled whilst making his escape. The remains were afterwards buried in the chapel at Holyrood.

Much discussion has taken place about this crime,

and the guilt or innocence of Mary is still a question of doubt and debate. It seems highly probable, however, that the queen was accessory to the murder, which was organized by her lover and third husband, Bothwell (q.v.). As the father of King James I., Darnley is the direct ancestor of all the sovereigns of England since 1603. Personally he was a very insignificant character and his sole title to fame is his connexion with Mary, queen of Scots.

For further information, and also for a list of the works bearing on his life, see the article Mary, Queen of Scots.

DARRANG, a district of British India, in the provinte of Eastern Bengal and Assam. It lies between the Bhutan and Daphla Hills and the Brahmaputra, including many islands in the river. The administrative headquarters are at Tezpur. Its area is 3418 sq. m. It is for the most part a level plain watered by many tributaries of the Brahmaputra. The two subdivisions of Tezpur Mangaldai differ greatly in character. Tezpur is part of Upper Assam and shares in the prosperity which tea cultivation has brought to that part of the valley. In this portion of the district there are still large areas of excellent land awaiting settlement, and the cultivator finds a market for his produce in the flourishing tea-gardens, to which large quantities of coolies are imported every year. In Mangaldai, on the other hand, most of the good rice land was settled about 1880-1890 when the subdivision had a population of 146 to the square mile, as against 42 for Tezpur ; the soil is not favourable for tea, and the population is stationary or receding. In 1901 the population of the whole district was 337,313, showing an increase of 10% in the decade. The principal grain-crop is rice. The principal means of communication is by river. A steam tramway of 2§ ft. gauge has been opened from Tezpur to Balipara, a distance of 20 m.

Darrang originally formed, according to tradition, part of the dominions of Bana Raja, who was defeated

by Krishna in a battle near Tezpur (" the town of blood "). The massive granite ruins found near by prove that the place must have been the seat of powerful and civilized rulers. In the 16th century Darrang was subject to the Koch king of Kamarupa, Nar Narayan, and on the division of his dominions among his heirs passed to an independent line of rajas. Early in the 17th century the raja Bali Narayan invoked the aid of the Ahoms of Upper Assam against the Mussul- man invaders; after his defeat and death in 1637 the Ahoms domin- ated the whole district, and the Darrang rajas sank into petty feuda- tories. About 1785 they took advantage of the decay of the Ahom kingdom to try and re-establish their independence, but they were defeated by a British expedition in 1792, and in 1826 Darrang, with the rest of Assam, passed under British control.

DARTFORD, a market town in the Dartford parliamentary division of Kent, England, on the Darent, 17 m. E.S.E. of London by the South-Eastern & Chatham railway. Pop. of

urban district (1891), 11,962 ; (1901) 18,644. The town lies low, flanked by two chalky eminences, called East and West Hills. It possesses a town hall, a grammar school (1576), and a Martyr's Memorial Halh The most noteworthy building, however, is the parish church, restored in 1863, which contains a curious old fresco and several interesting brasses, and has a Norman tower. The prosperity of the town depends on the important works in its vicinity, including powder works, paper mills, and engineering, iron, chemical and cement works. One of the first attempts at the manufacture of paper in England was made here by Sir John Spielman (d. 1607), jeweller to Queen Elizabeth. Dartford was the scene, in 1235, of the marriage, celebrated by proxy, between Isabella, sister of Henry III., and the Emperor Frederick II. ; and in 133 1 a famous tournament was held in the place by Edward III. The same monarch established an Augustinian nunnery on West Hill in 1355, of which, however, few remains exist. After the Dissolution it

was used as a private residence by Henry VIII. , Anne of Cleves and Elizabeth. The chantry of St Edmund the Martyr which stood on the opposite side of the town was a part of Edward III.'s endowment to the priory, and became so famous as a place of pilgrimage, especially for those on their way to Canterbury, that the part of Watling Street which crossed there towards London was sometimes called " St Edmund's Way." It was here also that Wat Tyler's insurrection began in 1377, and the house in which he resided is shown. On Dartford Heath is a lunatic asylum of the London County Council, and, at Long Reach, the infectious diseases hospital of the Metropolitan Asylums Board. Stone church, 2 m. E. of Dartford, mainly late Early English (1 251-1274), and carefully restored by G. E. Street in i860, is remarkable ; the richness of the work within increases from west to east, culminating in a choir arcade decorated with work among the finest of its period extant; the period is that of the choir of Westminster Abbey, and from a comparison of building materials, choir arcades and sculpture of foliage, a common architect has been suggested. Greenhithe, on the banks of the Thames, has large chalk quarries in its neighbourhood, from which lime and cement are manufactured.

DARTMOOR, a high plateau in the south-west of Devonshire, England. Its length is about 23 m. from N. to S. and its extreme breadth 20 m., the mean altitude being about 1500 ft. The area exceeding 1000 ft. in elevation is about 200 sq. m. It is the highest and easternmost in a broken chain of granitic elevations which extends through Cornwall to the Stilly Isles. The higher parts are open, bleak and wild, strongly contrasting with the more gentle scenery of the well-wooded lowlands surrounding it. Sloping heights rise from the main tableland in all directions, crested with broken masses of granite, locally named tors, and often singularly fantastic in outline. The highest of these are Yes Tor and High Willhays in the north-west, reaching altitudes of 2028 and 2039 ft. Large parts of the moor, especially in the centre, are

covered with morasses ; and head-waters of all the principal streams of Devonshire (q.v.) are found here. Two main roads cross the moor, one between Exeter and Plymouth, and the other between Ashburton and Tavistock, intersecting at Two Bridges. Both avoid the higher part of the moor, which, for the rest, is traversed only in part by a few rough tracks. The central part of Dartmoor was a royal forest from a date unknown, but apparently anterior to the Conquest. Its woods were formerly more extensive than now, but a few small tracts in which dwarf oaks are characteristic remain in the lower parts. Previous to 1337, the forest had been granted to Richard, earl of Cornwall, by Henry III., and from that time onward it has belonged to the duchy of Cornwall. The districts immediately surrounding the moor are called the Venville or Fenfield districts. The origin of this name is not clear. The holders of land by Venville tenure under the duchy have rights of pasture, fishing, &c. in the forest, and their main duty is to " drive " the moor at certain times in order to ascertain what head of cattle are pastured thereon, and to prevent trespassing. The antiquarian remains of Dart- moor are considered among those of Devonshire.

Dartmoor convict prison, near Princetown, was adapted to its present purpose in 1850 ; but the original buildings were erected

in 1809 for the accommodation of French prisoners. A tract of moorland adjacent to the prison has been brought under cultiva- tion by the inmates.

See S. Rowe, Perambulation of the . . . forest of Dartmoor (Plymouth, 1848) ; J. L. W. Page, Exploration of Dartmoor (London, 1889); S. Baring-Gould, Book of Dartmoor (London, 1900).

DARTMOUTH, a town in Halifax county, Nova Scotia, Canada, on the north-eastern side of Halifax

harbour, connected by a steam ferry with Halifax, of which it is practically a suburb. Pop. (1901) 4806. It contains a large sugar refinery, foundries, machine shops, saw mills, skate, rope, nail, soap and sash factories.

DARTMOUTH, a seaport, market town, and municipal borough in the Torquay parliamentary division of Devonshire, England, 27 m. E: of Plymouth. Pop. (1901) 6579. It is beautifully situated on the west bank and near the mouth of the river Dart, which here forms an almost land-locked estuary. The town is connected by a steam ferry with Kingswear on the opposite bank, which is served by a branch of the Great Western railway. The houses of Dartmouth, many of which are ancient, rise in tiers from the shore, beneath a range of steep hills. An embankment planted with trees fronts the river. The cruciform church of St Saviour is of the 14th and 15th centuries, and contains a graceful rood-screen of the 16th century, an ancient stone pulpit and interesting monuments. Dartmouth Castle, in part of Tudor date, commands the river a little below the town. Portions of the cottage of Thomas Newcomen, one of the inventors of the steam-engine, are preserved. Dartmouth is a favourite yachting centre, and shipbuilding, brewing, engineering and paint-making are carried on. Coal is imported, and resold to ships calling at the harbour. The borough is under a mayor, four aldermen and twelve councillors. Area, 1924 acres.

History. — Probably owing its origin to Saxon invaders, Dart- mouth (Darentamuthan, Dertemue) was a seaport of importance when Earl Beorn was buried in its church in 1049. From its sheltered harbour William II. embarked for the relief of Mans, and the crusading squadron set sail in n 90, while John landed here in 12 14. The borough, first claimed as such in the reign of Henry I., was in existence by the middle of the 13th century, since a deed of Gilbert Fitz-Stephen, lord of the manor, mentions the services due from " his burgesses of Dertemue," and a borough seal of 1 280 is extant. The king in 1 2 24 required the bailiffs and good men of Dartmouth

to keep all ships in readiness for his service, and in 1302 they were to furnish two ships for the Scottish expedition, an obligation maintained throughout the century. The men of the vill were made quit of toll in 1337, and in 1342 the town was incorporated by a charter frequently con- firmed by later sovereigns. Edward III. in 1372 granted that the burgesses should be sued only before the mayor and bailiffs, and Richard II. in 1393 granted extended jurisdiction and a coroner; further charters were obtained in 1604 and 1684. A French attack on the town was repulsed in 1404, and in 1485 the burgesses received a royal grant of £40 for walling the town and stretching a chain across the river mouth. Dartmouth fitted out two ships against the Armada, and was captured by both the royalists and parliamentarians in the Civil War. It returned two representatives to parliament in 1298, and from 1350 to 1832. In the latter year the representation was reduced to one, and was merged in that of the county in 1868. Manorial markets were granted for Dartmouth in 1231 and 1301. These were important since as early as 1225 the fleet resorted there for provisions. During the 14th and 15th centuries there was a regular trade with Bordeaux and Brittany, and complaints of piracies by Dartmouth men were frequent.

DARTMOUTH COLLEGE, an American institution of higher education, in Hanover, New Hampshire. It is Congregational in its affiliations, but is actually non-sectarian. The college is open only to men except during the summer session, when women also are admitted. Dartmouth embraces, in addition to the original college, incorporated in 1769, a medical school, dating from the establishment of a professorship of medicine in the college in 1798; the Thayer school of civil engineering, established in 1867

by the bequest of Gen. Sylvanus Thayer; and the Amos Tuck school of administration and finance, established in 1900 by Edward Tuck — a remarkable feature, as it was the first, and, until the establishment at Harvard of a similar graduate

school, the only commercial school in the country whose work is largely post-graduate. The Chandler school of science and the arts was founded by Abiel Chandler in 1851, in connexion with Dart- mouth, and was incorporated into the collegiate department in 1893 as the Chandler scientific course in the college. From 1866 to 1893 the New Hampshire college of agriculture and the mechanic arts, now at Durham, was connected with Dartmouth. The medical school offers a four years' course, and each of the other two professional schools a two years' course, the first year of which may, under certain conditions, be counted as the senior year of the undergraduate department. The college has a beautiful campus or "yard"; a library of more than 100,000 volumes, housed in Wilson Hall (1885); instruction halls, resi- dence halls — Thornton and Wentworth (i828),Hallgarten (1874), Richardson (1897), and Fayerweather (1900); a gymnasium (Bissell Hall, built in 1867); an athletic field, known as Alumni Oval; Bartlett Hall (1890-1891), the house of the College Young Men's Christian Association; Rollins Chapel (1885); College Hall (1 901), a social headquarters; an astronomical and meteoro- logical observatory (Shattuck Observatory, 1854); the Mary Hitchcock hospital (1893), associated with the medical college; museums (especially the Butterfield Museum); Culver Hall (1871), the chemical laboratory; and Wilder Hall (1899), the physical laboratory. The college in 1908 had 100 officers of administra- tion and instruction and 12 19 students. It is maintained chiefly by the proceeds of a productive endowment fund amounting to $2,700,000 and by tuition fees ($125 a year for each student). The government is entrusted to a board of twelve trustees, five of whom are elected upon the nomination of the alumni.

Dartmouth is the outgrowth of Moor's Indian charity school, founded by Eleazer Wheelock (1711-1779) about 1750 at LebMion, Connecticut; this school was named in 1755 in honour of Jolhua Moor, who in this year gave to it lands and buildings. In 1765 Samson Occom (c. 1723-1792), an Indian preacher and former

student of the school, visited England and Scotland in its behalf and raised £10,000, whereupon plans were made for enlargement and for a change of site to Hanover. In 1 769 the school was incorporated by a charter granted by George III. as Dartmouth College, being named after the earl of Dartmouth, president of the trustees of the funds raised in Great Britain. The first college building, Dartmouth Hall (closely resembling Nassau Hall at Princetown and the University Hall of Brown University), was built in 1 784–1 791 and is still standing, as are the typical college church, built in 1796 and enlarged in 1877 and 1889, and Moor Hall, the second building for Moor's charity school, since 1852 called the Chandler building. During the War of Independence the support from Great Britain was mostly withdrawn. In 1815 President John Wheelock (1754–1817), who had succeeded his father in 1779, and was a Presbyterian and a Republican, was removed by the majority of the board of trustees, who were Congregationalists and Federalists, and Francis Brown was chosen in his place. Wheelock, upon his appeal to the legislature, was reinstated at the head of a new corporation, called Dartmouth University. The state courts upheld the legislature and the " University," but in 1819 after the famous argument of Daniel Webster {q.v.) in behalf of the " College " board of trustees as against the " University " board before the United States Supreme Court, that body decided that the private trust created by the charter of 1769 was inviolable, and Dr Francis Brown and the old " College " board took possession of the institution's property. This was one of the most important decisions ever made by the United States Supreme Court.

See Frederick Chase, A History of Dartmouth College and the Town of Hanover (Cambridge, 1891). For the Dartmouth College Case see Shirley, The Dartmouth College Causes (St Louis, Missouri, 1879); Kent, Commentaries on American Law (vol. i. Boston, 1884); an d Joseph Story, Commentaries on the ConstitutioniyoX. ii., Boston, 1891).

DARTMOUTH, EARL OF— DARU, COUNT

DARTMOUTH, EARL OF, an English title borne by the family of Legge from 17 10 to the present day.

William Legge (c. 1609–1670), the eldest son of Edward Legge (d. 16 16), vice-president of Munster, gained some military experience on the continent of Europe and then returning to England assisted Charles I. in his war against the Scots in 1638. He was also very useful to the king during the months which preceded the outbreak of the Civil War, although his attempt to seize Hull in January 1642 failed. During the war Legge distinguished himself at Chalgrove and at the first battle of Newbury, and in 1645 he became governor of Oxford. However, he only held this position for a few months, as he shared the disgrace of Prince Rupert, to whom he was very devoted; but he was largely instrumental in putting an end to the quarrel between the king and the prince. Legge helped Charles to escape from Hampton Court in 1647, and after attending upon him he was arrested in May 1648. He was soon released, but was again captured in the following year while proceeding to Ireland in the interests of Charles II. Regaining his freedom in 1653, he spent some years abroad, but in 1659 he was once more in England inciting the royalists to rise. Legge enjoyed the favour of Charles II., who offered to make him an earl. The old royalist died on the 13th of October 1670.

Legge's eldest son, George, Baron Dartmouth (1647–1691), served as a volunteer in the navy during the Dutch war of 1665– 1667, and quickly won his way to high rank. He was also a member of the household of the duke of York, afterwards James II.; was governor of Portsmouth and master-general of the army; in 1678 he commanded as colonel the troop at Nieu- port, and in 1682 he was created Baron Dartmouth. In 1683 as " admiral of a fleet " he sailed to Tangiers, dismantled the fortifi- cations and brought back the English troops, a duty which he discharged very satisfactorily. Under James II. Dartmouth was master of the horse and governor of

*the Tower of London; and in 1688, when William of Orange was expected, James II. made him commander-in-chief of his fleet. Although himself loyal to James, the same cannot be said of many of his officers, and an engagement with the Dutch fleet was purposely avoided. Dartmouth, however, refused to assist in getting James Edward, prince of Wales, out of the country, and even reproved the king for attempting this proceeding. He then left the fleet and took the oath of allegiance to William and Mary, but in July 1691 he was arrested for treason, and was charged with offering to hand over Portsmouth to France and to command a French fleet. Macaulay believed that this accusation was true, but there are those who hold that Dartmouth spoke the truth when he pro- tested his innocence. * Further proceedings against him were prevented by his death, which took place in the Tower of London on the 25th of October 1691.*

Lord Dartmouth's only son, William, 1st Earl of Dart- mouth (1672-1750), succeeded to his father's barony in 1691. In 1702 he was appointed a member of the board of trade and foreign plantations, and eight years later he became secretary of state for the southern department and joint keeper of the signet for Scotland. In 171 1 he was created viscount Lewisham and earl of Dartmouth; in 17 13 he exchanged his offices for that of keeper of the privy seal, which he held until the end of 1714. After a long period of retirement from public life he died on the 1 5th of December 1 7 50. Dartmouth's eldest son George,viscount Lewisham (c. 1703-1732), predeceased his father. Other sons were : Heneage Legge (1704-1759), judge of the court of exchequer; Henry Legge (q.i:), afterwards Bilson-Legge ; and Edward Legge (1710-1747), who served for some time in the navy and died on the 19th of September 1747.

William, 2nd Earl or Dartmouth (1731-1801), was a son of George, viscount Lewisham, and a grandson of the 1st earl, whom he succeeded in 1750. For a few months in 1765 and 1766 he was president of the board of trade and foreign plantations; in 1772 he returned to the same office holding also that of

secretary for the colonies; and in 17.75 he became lord privy seal. With regard to the American colonies Dartmouth advised them in 1777 to accept the conciliatory proposals put forward by

Lord North, but in 1776 he opposed similar proposals and advo- cated the employment of force. In March 1782 he resigned his office as lord privy seal and in 1783 he was lord steward of the household; he died on the 15th of July 1801. Dartmouth was a friend of Selina, countess of Huntingdon, and his piety and his intimacy with the early Methodists won for him the epithet of the Psalm-singer. Dartmouth College was named after him, and among his papers preserved at Patshull House, Wolverhampton, are many letters from America relating to the struggle for independence. His sixth son, Sir Arthur Kaye Legge (d. 1835), was an admiral of the blue, and his seventh son, Edward Legge (d. 1827), was bishop of Oxford.

George, 3rd Earl or Dartmouth (1755-1810), the eldest son of the 2nd earl, was lord warden of the stannaries and president of the board of control; later he was lord steward and then lord chamberlain of the royal household. He died on the 1st of November 1810, when his eldest son, William (1784-1853), became 4th earl. William's son, William Walter (1823-1891), became 5th earl in 1853 and was succeeded in 1891 by his son William Heneage Legge (b. 1851) as 6th earl of Dartmouth. As Lord Lewisham this nobleman was a member of parliament from 1878 to 1891, and was vice-chamberlain of the household in 1885-1886, and again from 1886 to 1892.

DARU, PIERRE ANTOINE NOEL BRUNO, Count (1767- 1829), French soldier and statesman, was born at Montpellier on the 12th of January 1767. He was educated at the military school of Tournon, conducted by the Oratorians, and entered the artillery at an early age. His fondness for literature, however, soon made itself felt, and he published seyeral slight pieces, until the outbreak of the French Revolution called him to a sterner occupation. In 1793 he became commissary to the

army, protecting the coasts of Brittany from projected descents of the British, or of French royalists. Thrown into prison on a frivolous charge of friendliness to the royalists and England, he was released after the fall of Robespierre in the summer of 1794, and rose in the service until, in 1799, he became chief commissary to the French army serving under Massena in the north of Switzerland. In that position he won repute for his organizing capacity, great power of work and unswerving probity — the last of which qualities was none too common in the French armies at that time. These exacting tasks did not absorb all his energies. He found time, even during the campaign, to translate part of Horace and to compose two poems, the Poeme des Alpes and the Chant de guerre. The latter celebrated in indignant strains the murder of the French envoys to the congress of Rastadt. ' 1

The accession of Napoleon Bonaparte to power in November 1799 led to the employment of Daru as chief commissary to the Army of Reserve intended for North Italy, and commanded nominally by Berthier, but really by the First Consul. Conjointly with Berthier and Dejean, he signed the armistice with the Austrians which closed the campaign in North Italy in June 1800. Daru now returned, for a time, mainly to civil life, and entered the tribunate, where he ably maintained the principles of democratic liberty. On the renewal of war with England, in May 1803, he again resumed his duties as chief commissary for the army on the northern coasts. It was afterwards asserted that, on Napoleon's resolve to turn the army of England against Austria, Daru had set down at the emperor's dictation all the details of the campaign which culminated at TJlm. The story is apocryphal; but Napoleon's confidence in him was evinced by his being appointed to similar duties in the Grand Army, which in the autumn of 1805 overthrew the armies of Austria and Russia. After the battle of Austerlitz, he took part in the drafting of the treaty of Presburg. At this time, too, he became intendant- general of the military household of Napoleon. In the campaigns of 1806-1807

he served, in his usual capacity, in the army which overthrew the forces of Russia and Prussia; and he had a share in drawing up the treaty of Tilsit (7th of July 1807). After this he supervised the administrative and financial duties in connexion with the French army which occupied the principal fortresses of Prussia, and was one of the chief agents through whom Napoleon pressed hard on that land. At the congress of Erfurt, Daru had

*the privilege of being present at the interview between Goethe and Napoleon, and interposed tactful references to the works of the great poet. Daru fulfilled his usual duties in the campaign of 1809 against Austria. Afterwards, when the subject of the divorce of Josephine and the choice of a Russian or of an Austrian princess came to be discussed, Daru, on being consulted by Napoleon, is said boldly to have counselled his marriage with a French lady; and Napoleon, who admired his frankness and honesty, took the reply in good part. **

In 181 1 he became secretary of state in succession to Maret, due de Bassano, and showed his usual ability in the administra- tion of the vast and complex affairs of the French empire, including the arrangements connected with the civil list and the imperial domains. But neither his devotion to civic duty nor to the administration of the affairs of the Grand Army could ward off disaster. Late in the year 18 13 he took up the portfolio of military affairs. After the first abdication of Napoleon in 1814, Daru retired into private life, but aided Napoleon during the Hundred Days. After the second Restoration he became a member of the Chamber of Peers, in which he ably defended the cause of popular liberty against the attacks of the ultra-royalists. He died at Meulan on the 5th of September 1829.

Few men of the Napoleonic empire have been more generally admired and respected than Daru. On one

occasion when he expressed a fear that he lacked all the gifts of a courtier, Napoleon replied, ” Courtiers! They are common enough about me; I shall never be in want of them. What I want is an enlightened, firm and vigilant administrator; and that is why I have chosen you.” At another time Napoleon said, ” Daru is good on all sides; he has good judgment, a good intellect, a great power for work, and a body and mind of iron.” The only occasion on which he is known to have sunk beneath the weight of his duties was in the course of writing letters at the emperor’s dictation for the third night in succession.

Of Daru’s literary works may be mentioned his Histoire de Venise, published at Paris in 7 vols, in 18 19; the Histoire de Bretagne, in 3 vols. (Paris, 1826); a poetical translation of Horace (of which Le Brun remarked: ” Je ne lis point Daru, j’aime trop mon Horace “) ; Discours en vers sur les faculUs de Vhomme (Paris, 1825), and Astronomie, a didactic poem in six cantos (Paris, 1820).

See the ” Notice ” by Viennet prefixed to the fourth edition of Daru’s Histoire de la republique de Venise (9 vols., 1853), and three articles by Sainte-Beuve in Causeries du lundi, vol. ix. For the many letters of Napoleon to Daru see the Correspondance de Napoleon I” (32 vols., Paris, 1858-1870). (J. Hl. R.)

DARWEN, a municipal borough in the Darwen parliamentary division of Lancashire, England, 20 m. N.W. from Manchester by the Lancashire & Yorkshire railway. Pop. (1891) 34,192; (1901) 38,212. It lies on the river Darwen, which traverses a densely populated manufacturing district, and is surrounded by high-lying moors. Darwen is a centre of the cotton trade and has also blast furnaces, and paper-making, paper-staining and fire-clay works. In the neighbourhood are collieries and stone quarries. The market hall is the chief public building; there are technical schools, a free library, and two public parks. Darwen was incorporated in 1788. The corporation consists of a mayor, six aldermen and

eighteen councillors.

DARWIN, CHARLES ROBERT (1809–1882), English naturalist, author of the Origin of Species, was born at Shrewsbury on the 12th of February 1809. He was the younger of the two sons and the fourth child of Dr Robert Waring Darwin, son of Dr Erasmus Darwin (

patience in long reflecting over any subject, industry in observing and collecting facts, and a fair share of invention as well as of common sense ” (I.e. p. 107). He also says: ” I have steadily endeavoured to keep my mind free so as to give up any hypothesis, however much beloved (and I cannot resist forming one on every subject), as soon as facts are shown to be opposed to it ” (I.e. p. 103) . The essential causes of his success are to be found in this latter sentence, the creative genius ever inspired by existing knowledge to build hypotheses by whose aid further knowledge could be won, the calm unbiassed mind, the transparent honesty and love of truth which enabled him to abandon or to modify his own creations when they ceased to be supported by observation. The even balance between these powers was as important as their remarkable development. The great naturalist appeared in the ripeness of time, when the world was ready for his splendid generalizations. Indeed naturalists were already everywhere considering and discussing the problem of evolution, although Alfred Russel Wallace was the only one who, independently of Darwin, saw his way clearly to the solution. It is true that hypotheses essentially the same as natural selection were sug- gested much earlier by W. C. Wells (Phil. Trans., 1813), and Patrick Matthew (Naval Timber and Arboriculture, 1831), but their views were lost sight of and produced no effect upon the great body of naturalists. In the preparation for Darwin Sir Charles Lyell’s Principles of Geology played an important part, accustoming men’s minds to the vast changes brought about by natural processes, and leading them, by its lucid and temperate discussion of Lamarck’s and other views, to reflect upon evolution. Darwin’s

early education was conducted at Shrewsbury, first for a year at a day-school, then for seven years at Shrewsbury School under Dr Samuel Butler (1 774-1839). He gained but little from the narrow system which was then universal. In 1 8 2 5 he went to Edinburgh to prepare for the medical profession, for which he was unfitted by nature. After two sessions his father realized this, and in 1828 sent him to Cambridge with the idea that he should become a clergyman. He matriculated at Christ's College, and took his degree in 1831, tenth in the list of those who do not seek honours. Up to this time he had been keenly interested in sport, and in entomology, especially the collecting of beetles. Both at Edinburgh, where in 1826 he read his first scientific paper, and at Cambridge he gained the friendship of' much older scientific men — Robert Edmond Grant and William Macgillivray at the former, John Stevens Henslow and Adam Sedgwick at the latter. He had two terms' residence to keep after passing his last examination, and studied geology with Sedgwick. Returning from their geological excursion together in North Wales (August 1 831), he found a letter from Henslow urging him to apply for the position of naturalist on the " Beagle," about to start on a surveying expedition. His father at first disliked the idea, but his uncle, the second Josiah Wedgwood, pleaded with success, and Darwin started on the 27th of December 1831, the voyage lasting until the 2nd of October 1836. It is practically certain that he never left Great Britain after this latter date. After visiting the Cape de Verde and other islands of the Atlantic, the expedition surveyed on the South American coasts and adjacent islands (including the Galapagos), afterwards visiting Tahiti, New Zealand, Australia, Tasmania, Keeling Island, Maldives, Mauritius, St Helena, Ascension; and Brazil, de Verdes and Azores on the way home. His work on the geology of the countries visited, and that on coral islands, became the subject of volumes which he published after his return, as well as his Journal of a Naturalist, and his other contributions to the official narrative. The voyage must be regarded as the real preparation

for his life-work. His observations on the relation between animals in islands and those of the nearest continental areas, near akin and yet not the same, and between living animals and those most recently extinct and found fossil in the same country, here again related but not the same, led him even then to reflect deeply upon the modification of species. He had also been much impressed by ” the manner in which closely allied animals replace one another in proceeding southwards ” in South America. On his return home Darwin worked at his

collections, first at Cambridge for three months and then in London. His pocket-book for 1837 contains the words: ” In July opened first note-book on Transmutation of Species. Had been greatly struck from about the month of previous March [while still on the voyage and just over twenty-eight years old] on character of South American fossils, and species on Galapagos Archipelago. These facts (especially latter) origin of all my views.” From 1838 to 1841 he was secretary of the Geological Society, and saw a great deal of Sir Charles Lyell, to whom he dedicated the second edition of his Journal. On the 29th of January 1839 he married his cousin, Emma Wedgwood, the daughter of Josiah Wedgwood of Maer. They lived in London until September 1842, when they moved to Down, which was Darwin’s home for the rest of his life. His health broke down many times in London, and remained precarious during the whole of his life. The immense amount of work which he got through was only made possible by the loving care of his wife. For eight years (1846 to 1854) he was chiefly engaged upon four mono- graphs on the recent and fossil Cirripede Crustacea (Ray Soc, 1851 and 1854; Palaeonlo graph. Soc, 1851 and 1854). Towards the close of this work Darwin became very wearied of it, especi- ally of the synonymy. For a time he hoped to start a movement which should discourage the habit of appending the name of the describer to the name of the species, a custom which he thought

led to bad and superficial work. From this time he was engaged upon the numerous lines of inquiry which led to the great work of his life, the Origin of Species, published in November 1859.

Soon after opening his note-book in July 1837 he began to collect facts bearing upon the formation of the breeds of domestic animals and plants, and quickly saw " that selection was the keystone of man's success. But how selection could be applied to organisms living in a state of nature remained for some time a mystery to me." Various ideas as to the causes of evolution occurred to him, only to be successively abandoned. He had the idea of " laws of change "which affected species and finally led to their extinction, to some extent analogous to the causes which bring about the development, maturity and finally death of an individual. He also had the conception that species must give rise to other species or else die out, just as an individual dies unrepresented if it bears no offspring. These and other ideas, of which traces exist in his Diary, arose in his mind, together with perhaps some general conception of natural selection, during the fifteen months after the opening of his note-book. In October 1838 he read Malthus on Population, and his observations having long since convinced him of the struggle for existence, it at once struck him " that under these circumstances favourable variations would tend to be preserved, and unfavourable ones to be destroyed. The result of this would be the formation of new species. Here, then, I had a theory by which to work." In June 1842 he wrote out a sketch, which two years later he expanded to an essay occupying 231 pages folio. The idea of progressive divergence as an advantage in itself, because the competition is most severe between organisms most closely related, did not occur to him until long after he had come to Down. During the growth of the Origin Sir Joseph Hooker was his most intimate friend, and on the nth of January 1844 he wrote: " At last gleams of light have come, and I am almost convinced (quite contrary to the opinion I started with) that species are not (it is like

confessing a murder) immutable ” (I.e. ii. 13). In 1855 he began a correspondence with the great American botanist Asa Gray, and in 1857 explained his views in a letter which afterwards became classical. In 1856, urged by Lyell, he began the preparation of a third and far more expanded treatise, and had completed about half of it when, on the 18th of June 1858, he received a manuscript essay from A. R. Wallace, who was then at Ternate in the Moluccas. Wallace wanted Darwin’s opinion on the essay, which he asked should be for- warded to Lyell. Darwin was much startled to find in the essay a complete abstract of his own theory of natural selection. He forwarded it the same day, writing to- Lyell, ” your words have come true with a vengeance— that I should be forestalled.” He placed himself in the hands of Ly

send Wallace’s essay to the Linnean Society, together with an abstract of Darwin’s work, which they asked him to prepare, the joint essay being accompanied by a preface in the form of an explanatory letter written by them to the secretary. The title of the joint communication was ” On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection.” It was read on the 1st of July 1858, and appears in the Linn. Soc. Journal (Zoology) for that year. In this statement of the theory of natural selection, Darwin’s part consisted of two sections, the first being extracts from his 1844 essay, including a brief account of sexual selection, and the second an abstract of his letter to Asa Gray dated the 5th of September 1857. This latter, probably his first attempt to expound natural selection, cannot be surpassed as a clear statement of the theory. Darwin explained at the outset, what he insisted on elsewhere, that the facts of adaptation or contrivance in nature are the real difficulty to be explained by a’ theory of evolution, the stumbling-block of every previous suggestion. Until he could explain ” the mistletoe, with its pollen carried by insects, and seed by birds — the woodpecker, with its feet and tail, beak

and tongue, to climb the tree and secure insects," he was " scientifically 'orthodox." Neverthe- less he was led to believe in evolution, apart from any possible motive-cause, by " general facts in the affinities, embryology, rudimentary organs, geological history, and geographical dis- tribution of organic beings." He then proceeds to describe the manner in which he met the difficulty of adaptation by " his notions on the means by which Nature makes her species." The essentials of the statement are as follows: — I. Man has made his domestic breeds of animals and plants by selection, conscious or unconscious, of very slight or greater variations. II. The material for selection exists in nature, namely, slight variations of all parts of the organism. III. The " unerring power " which sifts these variations is " natural selection . . . which selects exclusively for the good of each organic being." The rate of increase is such that only a few in each generation can live: hence the never sufficiently appreciated struggle for life. " What a trifling difference must often determine which shall' survive and which perish ! " The remaining heads explain the complex nature of the struggle, the reasons for deficient direct evidence, the advantage of divergence, &c. In the joint essay the phrases " natural selection " and " sexual selection " were first made public by Darwin, the " struggle for existence " by Wallace. Darwin and Wallace had met only once before the departure of the latter for the East. Their rivalry in the discovery of the great principle of natural selection was the beginning of a lifelong friendship. Wallace was lying ill with intermittent fever at Ternate in February 1858 when he began to think of Malthus's Essay on Population, read several years before: suddenly the idea of the survival of the fittest flashed upon him. In two hours he had " thought out almost the whole of the theory," and in three evenings had finished his essay. Darwin, also inspired after reading Malthus, in October 1838, did not publish until nearly twenty years had elapsed, and then only when Wallace sent him his essay. Canon H. B. Tristram was the first to apply the new

theory, explaining by its aid the colours of desert birds, &c. (Ibis, October 1859).

Acting under the advice of Lyell and Hooker, Darwin then began to prepare what was to become the great work of his life. It appeared on the 24th of November 1859, with the full title, On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life. The whole edition of 1250 copies was exhausted on the day of issue. The first four chapters explain the operation of artificial selection by man and of natural selection in consequence of the struggle for existence. The fifth chapter deals with the laws of variation and causes of modification other than natural selection. The five succeeding chapters consider difficulties in the way of a belief in evolution generally as well as in natural selection. The three remaining chapters (omitting the recapitulation which occupies the last) deal with the evidence for evolution. The theory which suggested a cause of evolution is thus given the foremost pkce.

and the evidence for the existence of evolution considered last of all. This method of presentation was no doubt adopted because it was just the want of a reasonable motive-cause which more than anything else prevented the acceptance of evolution. But the other side of the book must not be eclipsed by the brilliant theory of Darwin and Wallace. The evidence for evolution itself had never before been thought out and marshalled in a manner which bears any comparison with that of Darwin in the Origin, and the work would have been in the highest degree epoch- making had it consisted of the later chapters alone. In the fifth chapter Darwin incorporated a certain proportion of the doctrines of Buffon, — modifications due to the direct influence of environment; and of Lamarck, — the hereditary effects of use and disuse. Lyell for a long time

hesitated to accept the new teaching, and Darwin carried on a long correspondence with him. His public confession of faith was made at the anniversary dinner of the Royal Society in 1864. A storm of controversy arose over the book, reaching its height at the meeting of the British Association at Oxford in i860, when the celebrated duel between T. H. Huxley and Bishop Wilberforce of Oxford took place. Throughout these struggles Huxley was the foremost champion for evolution and for fair play to natural selection, although he never entirely accepted the latter theory, holding that until man by his selection had made his domestic breed sterile inter se, there was no sufficient evidence that selection accounts for natural species which are thus separated by the barrier of sterility. The theory of natural selection was at first greatly misunderstood. Thus some writers thought it implied conscious choice in the animals themselves, others that it was the personification of some active power. By many it was thought to be practically the same idea as Lamarck's. Herbert Spencer's alternative phrase, " the survival of the fittest," prob- ably helped to spread a clear appreciation of Darwin's meaning. The history of opinion since 1859 may be summed up as follows. Evolution soon gained general acceptance, except among a certain number of those of middle or more advanced age at the time when the Origin appeared. Although natural selection had been an essential force in producing this conviction, there gradually grew up a tendency to minimize its importance in relation to the causes originally suggested by Buffon and Lamarck, ^hich were ably presented and further elaborated by Herbert Spencer. In America a school of Neo-Lamarckians appeared, and for a time flourished under the inspiration of the vigorous personality of E. D. Cope. The writings of August Weismann next raised a controversy over the scope of heredity, assailing the very foundation of the hypotheses of Buffon, Lamarck and Herbert Spencer by demanding evidence that the " acquired characters " upon which they rest are capable of hereditary transmission. The quantitative determination of heredity has been

the subject of much patient investigation under the leadership of Francis Galton. The question of isolation as a factor in species- formation has been greatly discussed, G. J. Romanes proposing, in his hypothesis of " Physiological Selection," that the barrier of sterility may arise spontaneously by variation between two sets of individuals as the beginning instead of the climax of specific distinction. Others have fixed their attention upon the variations, which provided the material for natural selection, and have advocated the view that evolution proceeds by immense strides instead of the minute steps in which Darwin and Wallace believed. Others, again, have found significance in the artificial production of " monstrosities " or huge modifications during individual development. All through the period a varying proportion of naturalists, probably larger now than at any other time, has followed the founders of the theory, and has sought the motive-cause of evolution in " the accumulative power of natural selection," which Darwin, as his first public statement indicates, looked upon " as by far the most important element in the pro- duction of new forms." They hold, with Darwin and Wallace, that although variation provides the essential material, natural selection, from its accumulative power, is of such paramount importance that it may be said to create new species as truly as a man may be said to make a building out of the material provided

by stones of various shapes, a metaphor suggested and elaborated by Darwin, and forming the concluding sentences of The Variation of Animals and Plants under Domestication. This, probably the second in importance of all his works, was published in 1868, and may be looked upon as a complete account of the material of which he had given a very condensed abstract in the first chapter of the Origin, together with the conclusions suggested by it. He finally brought together an immense number of apparently disconnected sets of observations under his " provisional hypo- thesis of pangenesis," which assumes that every cell in the body, at every stage

of growth and in maturity, is represented in each germ-cell by a gemmule. The germ-cell is only the meeting-place of gemmules, and the true reproductive power lies in the whole of the body-cells which despatch their representatives, hence " pangenesis." There are reasons for believing that this infinitely complex conception, in which, as his letters show, he had great confidence, was forced upon Darwin in order to explain the hereditary transmission of acquired characters involved in the small proportion of Lamarckian doctrine which he incorporated. If such transmission does not occur, a far simpler hypothesis based on the lines of Weismann's " continuity of the germ-plasm " is sufficient to account for the facts.

The Descent of Man, and Selection in Relation to Sex, was published in 1871; as the title implies, it really consists of two distinct works. The first, and by far the shorter, was the full justification of his statement in the Origin that " light would be thrown on the origin of man and his history." In the second part he brought together a large mass of evidence in support of his hypothesis of sexual selection which he had briefly described in the 1858 essay. This hypothesis explains the development of colours and structures peculiar to one sex and displayed by it in courtship, by the preferences of the other sex. The majority of naturalists probably agree with Darwin in believing that the explanation is real, but relatively unimportant. It is interesting to note that only in this subject and those treated of in the Varia- tion under Domestication had Darwin exhausted the whole of the material which he had collected. The Expression of the Emotions, published in 1872, offered a natural explanation of phenomena which appeared to be a difficulty in the way of the acceptance of evolution. In 1876 Darwin brought out his two previously published geological works on Volcanic Islands and South America as a single volume. The widely read Formation of Vegetable Mould through the Action of Worms appeared in 1881. He also published various volumes on botanical subjects. The

Fertilization of Orchids appeared in 1862. The subject of cross- fertilization of flowers was in Darwin's mind, as shown by his note-book in 1837. In 1841 Robert Brown directed his attention to Christian Conrad Sprengel's work (Berlin, 1793), which con- firmed his determination to pursue this line of research. The Effects of Cross- and Self Fertilization in the Vegetable Kingdom (1876) contained the direct evidence that the offspring of cross fertilized individuals are more vigorous, as well as more numerous, than those produced by a self-fertilized parent. Different Forms of Flowers on Plants of the Same Species appeared in 1877. It is here shown that each different form, although possessing both kinds of sexual organs, is specially adapted to be fertilized by the pollen of another form, and that when artificially fertilized by its own pollen less vigorous offspring, bearing some resemblance to hybrids, are produced. He says, " no little discovery of mine ever gave me so much pleasure as the making out the meaning of heterostyled flowers " (Autobiography) . Climbing Plants was published in 1875, although it had, in large part, been communi- cated to the Linnean Society, in whose publications much of the material of several of his other works appeared. This inquiry into the nature of the movements of twining plants was suggested to him in a paper by Asa Gray. The Power of Movement in Plants (1880) was produced by him in conjunction with his son Francis. It was an inquiry into the minute power of movement possessed, he believed, by plants generally, out of which the larger movements of climbing plants of many different groups had been evolved. The work included an investigation of other kinds of plant movement due to light, gravity, &c, all of which

he regarded as modifications of the one fundamental movement (circumnutation) which exists in a highly specialized form in climbing plants. Insectivorous Plants (1875) is principally con- cerned with the

description of experiments on the Sun-dew (Drosera) , although other insect-catching plants, such as Dionaea, are also investigated.

Charles Darwin's long life of patient, continuous work, the most fruitful, the most inspiring, in the annals of modern science, came to an end on the 19th of April 1882. He was buried in Westminster Abbey on the 26th. It is of much interest to attempt to set forth some of the main characteristics of the man who did so much for modern science, and in so large a measure moulded the form of modern thought. Although his ill-health prevented Darwin, except on rare occasions, from attending scientific and social meetings, and thus from meeting and knowing the great body of scientific and intellectual workers of his time, probably no man has ever inspired a wider and deeper personal interest and affection. This was in part due to the intimate personal friends who represented him in the circles he was unable frequently to enter, but chiefly to the kindly, generous, and courteous nature which was revealed in his large correspondence and published writings, and especially in his treatment of opponents.

In a deeply interesting chapter of the Life and Letters Francis Darwin has given us his reminiscences of his father's everyday life. Rising early, he took a short walk before breakfasting alone at 7.45, and then at once set to work, " considering the 15 hours between 8.0 and 9.30 one of his best working times." He then read his letters and listened to reading aloud, returning to work at about 10.30. At 12 or 12.15 " he considered his day's work over," and went for a walk, whether wet or fine. For a time he rode, but after accidents had occurred twice, was advised to give it up. After lunch he read the newspaper and wrote his letters or the MS. of his books. At about 3.0 he rested and smoked for an hour while being read to, often going to sleep. He then went for a short walk, and returning about 4.30, worked for an hour. After this he rested and smoked, and listened to reading until tea at 7.30, a meal which he came to prefer to late dinner. He then played two games of backgammon, read

to himself, and listened to music and to reading aloud. He went to bed, generally very much tired, at 10.30, and was often much troubled by wakefulness and the activity of his thoughts. It is thus apparent that the number of hours devoted to work in each day was comparatively few. The immense amount he achieved was due to concentration during these hours, also to the unfailing and, because of his health, the necessary regularity of his life.

The appearance of Charles Darwin has been made well known in numerous portraits and statues. He was tall and thin, being about six feet high, but looked less because of a stoop, which increased towards the end of his life. As a young man he had been active, with considerable powers of endurance, and possessed in a marked degree those qualities of eye and hand which make the successful sportsman.

Charles Darwin was, as a young man, a believer in Christianity, and was sent to Cambridge with the idea that he would take orders. It is probable, however, that he had merely yielded to the influences of his home, without thinking much on the subject of religion. He first began to reflect deeply on the subject during the two years and a quarter which intervened between his return from the ” Beagle ” (October and, 1836) and his marriage (January 29th, 1839). His own words are, ” disbelief crepf over me at a very slow rate, but was at last complete. The rate was so slow that I felt no distress.” His attitude was that of the tolerant unaggressive agnostic, sympathizing with and helping in the social and charitable influences of the English Church in his parish. He was evidently most unwilling that his opinions on religious matters should influence others, holding, as his son, Francis Darwin, says, ” that a man ought not to publish on a subject to which he has not given special and continuous thought” (I.e. i. p. 305).

In addition to the personal qualities and powers of Charles Darwin, there were other contributing causes without which the world could never have’ reaped the benefit of his genius. It is

evident that Darwin'siealth could barely have endured the strain of working for a living, and that nothing would have been left over for his researches. A deep debt of gratitude is owing to his father for placing him in a position in which all his energy could be devoted to scientific work and thought. But his ill-health was such that this important and essential condition would have been insufficient without another even more essential. Francis Darwin, in the Life and Letters (i. pp. 159-160), writes these eloquent and pathetic words: — " No one indeed, except my mother, knows the full amount of suffering he endured, or the full amount of his wonderful patience. For all the latter years of his life she never left him for a night; and her days were so planned that all his resting hours might be shared with her. She shielded him from every avoidable annoyance, and omitted nothing that might save him trouble, or prevent him becoming over-tired, or that might alleviate the many discomforts of his ill-health. I hesitate, to speak thus freely of a thing so sacred as the lifelong devotion which prompted all this constant and tender care. But it is, I repeat, a principal feature of his life, that for nearly forty years he never knew one day of the health of ordinary men, and that thus his life was one long struggle against the weariness and the strain of sickness. And this cannot be told without speaking of the one condition which enabled him to bear the strain and fight out the struggle to the end."

Charles Darwin was honoured by the chief societies of the civilized world. He was made a knight of the Prussian order, " Pour le Merite," in 1867, a corresponding member of the Berlin Academy of Sciences in 1863, a fellow in 1878, and later in the same year a corresponding member of the French Institute in the botanical section. He received the Bressa prize of the Royal Academy of Turin, and the Baly medal of the Royal College of Physicians in 1879, the Wollaston medal of the Geological Society in 1859, a Royal medal of the Royal Society in 1853, and the Copley medal in 1864. His health prevented

him from accepting the honorary degree which Oxford University wished to confer on him, but his own university had stronger claims, and he received its honorary LL.D. in 1877.

Two daughters and five sons survived him, four of the latter becoming prominent in the scientific world, — Sir George Howard (b. 1845), who became professor of astronomy and experimental philosophy at Cambridge in 1883; Francis (b. 1848), the distinguished botanist; Leonard (b. 1850), a major in the royal engineers, and afterwards well known as an economist; and Horace (b. 1851), civil engineer.

See The Life and Letters of Charles Darwin, including an auto- biographical chapter, edited by his son Francis Darwin (3 vols., London, 1887) ; Charles Darwin and the Theory of Natural Selection, by E. B. Poulton (London, 1896) ; Life and Letters of Thomas Henry Huxley, by Leonard Huxley (2 vols., London, 1900) ; A. R. Wallace, Darwinism (1889); G. J. Romanes, Darwin and after Darwin (1895). Also the article on T. H. Huxley. (E. B. P.)

DARWIN, ERASMUS (1 731-1802), English man of science and poet, was born at Elton, in Nottinghamshire, on the 12th of December 1 73 1 . After studying at St John's College, Cambridge, and at Edinburgh, he settled in 1756 as a physician at Notting- ham, but meeting with little success he moved in the following year to Lichfield. There he gained a large practice, and did much, both by example and by more direct effort, to diminish drunkenness among the lower classes. In 1781 he removed to Derby, where he died suddenly on the 18th of April 1802. The fame of Erasmus Darwin as a poet rests upon his Botanic Garden, though he also wrote The Temple of Nature, or the Origin of Society, a Poem, with Philosophical Notes (1803), and The Shrine of Nature (posthumously published). The Botanic Garden (the second part of which — The Loves of the Plants — was published anonymously in 1789, and the whole of which appeared in 1791) is a long poem in the decasyllabic rhymed couplet. Its merit lies in the genuine scientific enthusiasm and interest in. nature which pervade it;

and of any other poetic quality — except a certain, sometimes felicitous but oftener ill-placed, elaborated pomp of words — it may without injustice be said to be almost destitute. It was for the most part written laboriously, and polished with

unsparing care, line by line, often as he rode from one patient to another, and it occupied the leisure hours of many years. The artificial character of the diction renders it in emotional passages stilted and even absurd, and makes Canning's clever caricature — The Loves of the Triangles — often remarkably like the poem it satirizes: in some passages, however, it is not without a stately appropriateness. Gnomes, sylphs and nereids are introduced on almost every page, and personification is carried to an extra-ordinary excess. Thus he describes the Loves of the Plants according to the Linnaean system by means of a most ingenious but misplaced and amusing personification of each plant, and often even of the parts of the plant. It is significant that botanical notes are added to the poem, and that its eulogies of scientific men are frequent. Erasmus Darwin's mind was in fact rather that of a man of science than that of a poet. His most important scientific work is his Zoonomia (i 794-1 796), which contains a system of pathology, and a treatise on generation, in which he, in the words of his famous grandson, Charles Robert Darwin, " anticipated the views and erroneous grounds of opinions of Lamarck. ' ' The essence of his views is contained in the following passage, which he follows up with the conclusion " that one and the same kind of living filaments is and has been the cause of all organic life ": —

" Would it be too bold to imagine that, in the great length of time since the earth began to exist, perhaps millions of ages before the commencement of the history of mankind, — would it be too bold to imagine that all warm-blooded animals have arisen from one living filament, which the great First

Cause endued with animality, with the power of acquiring new parts, attended with new propensities, directed by irritations, sensations, volitions and associations, and thus possessing the faculty of continuing to improve by its own inherent activity, and of delivering down these improvements by generation to its posterity, world without end! ”

In 1799 Darwin published his Phytologia, or the Philosophy of Agriculture and Gardening (1799), in which he states his opinion that plants have sensation and volition. A paper on Female Education in Boarding Schools (1797) completes the list of his works.

Robert Waring Darwin (1766–1848), his third son by his first marriage, a doctor at Shrewsbury, was the father of the famous Charles Darwin; and Violetta, his eldest daughter by his second marriage, was the mother of Francis Galton.

See Anna Seward, Memoirs of the Life of Dr Darwin (1804) ; and Charles Darwin, Life of Erasmus Darwin, an introduction to an essay on his works by Ernst Krause (1879).

DASENT, SIR GEORGE WEBBE (1817–1896), English writer, was born in St Vincent, West Indies, on the 22nd of May 1817, the son of the attorney-general of that island. He was educated at Westminster school, King’s College, and Oxford, where he was a contemporary of J. T. Delane (q.v.), whose friend he had become at King’s College. On leaving the university in 1840 he was appointed to a diplomatic post in Stockholm. Here he met Jacob Grimm, and at his suggestion first interested himself in Scandinavian literature and mythology. In 1842 he published the results of his studies, a version of The Prose or Younger Edda, and in the following year he issued a Grammar of the Icelandic or Old-Norse Tongue, taken from the Swedish. Return- ing to England in 1845, he became assistant editor of The Times under Delane, whose sister he married; but he still continued his Scandinavian studies, publishing translations of various Norse stories. In 1853 he

was appointed professor of English literature and modern history at King's College, London. In 1861–1862 he visited Iceland, and subsequently published Gisli the Outlaw and ether translations from the Icelandic. In 1870 he was appointed a civil service commissioner and consequently resigned his post en The Times. In 1876 he was knighted. He retired from the public service in 1892, and died at Ascot on the nth of June 1896. In addition to the works mentioned above, he published The Story of Burnt Njal, from the Icelandic of the Njals Saga (1861).

See the Life of Delane (1908), by Arthur Irwin Dasent.

DASHKOV, CATHERINA ROMANOVNA VORONTSOV, Princess (1 744–1810), Russian litterateur, was the third daughter of Count Roman Vorontsov, a member of the Russian senate, distinguished for his intellectual gifts. (For the family see

Vorontsov.) She received an exceptionally good education, having displayed from a very early age the masculine ability and masculine tastes which made her whole career so singular. She was well versed in mathematics, which she studied at the university of Moscow, and in general literature her favourite authors were Bayle, Montesquieu, Boileau, Voltaire and Helvetius. While still a girl she was connected with the Russian court, and became one of the leaders of the party that attached itself to the grand duchess (afterwards empress) Catherine. Before she was sixteen she married Prince Mikhail Dashkov, a prominent Russian nobleman, and went to reside with him at Moscow. In 1 762 she was at St Petersburg and took a leading part, according to her own account the leading part, in the coup d'etat by which Catherine was raised to the throne. (See Catherine II.) Another course of events would probably have resulted in the elevation of the Princess Dashkov's elder sister, Elizabeth, who was the emperor's mistress, and in whose favour he made no secret of his intention to depose Catherine. Her relations with the new empress were not of a cordial

nature, though she continued devotedly loyal. Her blunt manners, her unconcealed scorn of the male favourites that disgraced the court, and perhaps also her sense of unrequited merit, produced an estrangement between her and the empress, which ended in her asking permission to travel abroad. The cause of the final breach was said to have been the refusal of her request to be appointed colonel of the imperial guards. Her husband having meanwhile died, she set out in 1768 on an extended tour through Europe. She was received with great consideration at foreign courts, and her literary and scientific reputation procured her the entrie to the society of the learned in most of the capitals of Europe. In Paris she secured the warm friendship and admiration of Diderot and Voltaire. She showed in various ways a strong liking for England and the English. She corresponded with Garrick, Dr Blair and Principal Robertson; and when in Edinburgh, where she was very well received, she arranged to entrust the education of her son to Principal Robertson. In 1782 she returned to the Russian capital, and was at once taken into favour by the empress, who strongly sympathized with her in her literary tastes, and specially in her desire to elevate Russ to a place among the literary languages of Europe. Immediately after her return the princess was appointed " directeur " of the St Petersburg Academy of Arts and Sciences; and in 1784 she was named the first president of the Russian Academy, which had been founded at her suggestion. In both positions she acquitted herself with marked ability. She projected the Russian dictionary of the Academy, arranged its plan, and executed a part of the work herself. She edited a monthly magazine ; and wrote at least two dramatic works, The Marriage of Fabian, and a comedy entitled Toissiokof. Shortly before Catherine's death the friends quarrelled over a tragedy which the princess had allowed to find a place in the publications of the Academy, though it contained revolutionary principles,, according to the empress. A partial reconciliation was effected, but the princess soon afterwards retired from court. On the accession of the emperor Paul in 1 796 she was

deprived of all her offices, and ordered to retire to a miserable village in the government of Novgorod, ” to meditate on the events of 1762.” After a time the sentence was partially recalled on the petition of her friends, and she was permitted to pass the closing years of her life on her own estate near Moscow, where she died on the 4th of January 18 10.

Her son, the last of the Dashkov family, died in 1807 and be- queathed his fortune to his cousin Illarion Vorontsov, who there- upon by imperial licence assumed the name Vorontsov-Dashkov; and Illarion’s son,IUarion IvanovichVorontsov-Dashkov(b. 1837), held an appointment in the tsar’s household from 1881 to 1897.

_ The Memoirs of the Princess Dashkoff written by herself were pub- lished in 1840 in London in two volumes. They were edited by Mrs W. Bradford, who, as Miss Wilmot, had resided with the princess between 1803 and 1808, and had suggested their preparation.

DASS, PETTER (1647 -1708), the “father” of modern Norwegian poetry, was the son of Peter Dundas, a Scottish merchant of Dundee, who, leaving his country about 1630 to

escape the troubles of the Presbyterian chursh, settled in Bergen, and in 1646 married a Norse girl of good family. Petter Dass was born in 1647 on the island of Nord Hero; on the north coast of Norway. Seven years later his father died, and his mother placed him with his aunt, the wife of the priest of another little island-parish. In 1660 he was sent to school at Bergen, in 1665 to the university of Copenhagen, and in 1667 he began to earn his daily bread as a private tutor. In 1672 he was ordained priest, and remained till 1681 as under-chaplain at Nesne, a little parish near his birthplace; for

eight .years more he was resident chaplain at Nesne; and at last in 1689 he received the living of Alstahoug, the most important in the north of Norway. The rule of Alstahoug extended over all the neighbouring districts, including Dass's native island of Hero, and its privileges were accompanied by great perils, for it was necessary to be constantly crossing stormy firths of sea. Dass lived here in quietude, with something of the honours and responsibilities of a bishop, brought up his family in a God-fearing way, and wrote endless reams of verses. In 1700 he asked leave to resign his living in favour of his son Anders Dass, but this was not permitted; in 1704, however, Anders became his father's chaplain. About this time Petter went to Bergen, "where he visited Dorothea Engelbrechtsdatter, with whom he had been for many years in correspondence. He continued to write till 1707, and died in August 1 708. The materials for his biography are very numerous ; he was regarded with universal curiosity and admiration in his lifetime; and, besides, he left a garrulous autobiography in verse. A portrait, painted in middle age, now in the church of Melhus, near Trondhjem, represents him in canonicals, with deep red beard and hair, the latter waved and silky, arid a head of massive proportions. The face is full of fire and vigour. His writings passed in MS. from hand to hand, and few of them were printed in his lifetime. Nordlands Trompel (The Trumpet of Nordland) , his greatest and most famous poem, was not published till 1739; Den nor ska Dale-Vise (The Norwegian Song of the Valley) appeared in 1696; the Aandelig Tidsfordriv (Spiritual Pastime) , a volume of sacred poetry, was published in 1 7 1 1 . The Trumpet of Nordland remains as fresh as ever in the memories of the inhabitants of the north of Norway; boatmen, peasants, priests will alike repeat long extracts from it at the slightest notice, and its popularity is unbounded. It is a rhyming description of the province of Nordland, its natural features, its trades, its advantages and its drawbacks, given in dancing verse of the most breathless kind, and full of humour, fancy, wit and quaint learning. The

other poems of Petter Dass are less uni- versally read; they abound, however, in queer turns of thought, and fine homely fancies.

The collected writings of Dass were edited (3 vols., Christiania, 1 873–1 877) by Dr A. E. Eriksen.

DASYURE, a bookname for any member of the zoological family Dasyuridae. (See Marsupialia.) The name is better restricted to animals of the typical genus Dasyurus, sometimes called true Dasyures. These are mostly inhabitants of the Australian continent and Tasmania, where in the economy of nature they take the place of the smaller predaceous Carnivora, the cats, civets and weasels of other parts of the world. They hide themselves in the daytime in holes among rocks or in hollow trees, but prowl about at night in search of the small living mammals and birds which constitute their prey, and are to some extent arboreal in habit. The spot-tailed dasyure (D. macu- latus), about the size of a cat, inhabiting Tasmania and Southern Australia, has transversely striated pads on the soles of the feet. These organs are also present in the North Australian dasyure (D. hallucatus) and the Papuan D. albopunclatus, and are regarded by Oldfield Thomas as indication of arboreal habits; in the common dasyure (D. viverrinus) from Tasmania and Victoria, and the black-tailed dasyure (D. geojfroyi) from South Australia, these feet-pads are absent, whence these species are believed to seek their prey on the ground. The ursine dasyure {Sarcophilus ursinus), often called the " Tasmanian Devil," constitutes a distinct genus. In size' it may be compared to an English badger; the general colour of the fur is black tinged

with brown, with white patches on the neck, shoulders, rump and chest. It is a burrowing animal, of nocturnal habits, intensely carnivorous, and commits great depredations on the sheepyards and poultry-lofts of the settlers. In writing of this species Kreff t says that one — by no means a large one — escaped from confine- ment and killed in two nights fifty-four fowls, six geese, an albatross and

a cat. It was recaptured in what was considered a stout trap, with a door constructed of iron bars as thick as a lead pencil, but escaped by twisting this solid obstacle aside.

DATE PALIfl. The dates 1 of commerce are the fruit of a species of palm, Phoenix dactylifera, a tree which ranges from the Canary Islands through Northern Africa and the south-east of Asia to India. It has been cultivated, and much prized throughout most of these regions from the remotest antiquity. Its cultivation and use are described on the mural tablets of the ancient Assyrians. In Arabia it is the chief source of national wealth, and its fruit forms the staple article of food in that country. The tree has also been introduced along the Mediterranean shores of Europe; but as its fruit does not ripen so far north, the European plants are only used to supply leaves for the festival of Palm Sunday among Christians, and for the celebration of the Passover by Jews. It was introduced into the new world by early Spanish missionaries, and is now cultivated in the dry districts of the south-western United States and in Mexico. The date palm is a beautiful tree, growing to a height of from 60 to 80 ft., and its stem, which is strongly marked with old leaf-scars, terminates in a crown of graceful shining pinnate leaves. The flowers spring in branching spadices from the axils of the leaves, and as the trees are unisexual it is necessary in cultivation to fertilize the female flowers by artificial means. The fruit is oblong, fleshy and contains one very hard seed which is deeply furrowed on the inside. The fruit varies much in size, colour and quality under cultivation. Regarding this fruit, W. G. Palgrave {Central and Eastern Arabia) remarked: " Those who, like most Europeans at home, only know the date from the dried specimens of that fruit shown beneath a label in shop- windows, cari hardly imagine how delicious it is when eaten fresh and in Central Arabia. Nor is it, when newly gathered, heating,— a defect inherent to the preserved fruit everywhere; nor does its richness, however great, bring satiety ; in short it is an

article of food alike pleasant and healthy." In the oases of Sahara, and in other parts of Northern Africa, dates are pounded and pressed into a cake for food. The dried fruit used for dessert in European countries contains more than half its weight of sugar, about 6 % of albumen, and 12 % of gummy matter. All parts of the date palm yield valuable economic products. Its trunk furnishes timber for house-building and furniture; the leaves supply thatch; their footstalks are used as fuel, and also yield a fibre from which cordage is spun.

Date sugar is a valuable commercial product of the East Indies, obtained from the sap or toddy of Phoenix sylvestris, the toddy palm, a tree so closely allied to the date palm that it has been supposed to be the parent stock of all the cultivated varieties. The juice, when not boiled down to form sugar, is either drunk fresh, or fermented and distilled to form arrack. The uses of the other parts and products of this tree are the same as those of the date palm products. Date palm meal is obtained from the stem of a small species, Phoenix farinifera, growing in the hill country of southern India.

For further details see Sir G. Watt, Dictionary of the Economic Products of India (1892); and The Date Palm, U.S. Depart- ment of Agriculture, Bureau of Plant Industry, Bulletin No. 53 (W. T. Swingle), 1904.

DATIA, a native state of Central India, in the Bundelkhand agency. It lies in the extreme north-west of Bundelkhand, near Gwalior, and is surrounded on all sides by other, states of Central India, except on the east where it meets the United Provinces. The state came under the British government after the treaty of Bassein in 1802. Area, 911 sq. m. Pop. (1901) 173,759. Estimated revenue, £70,000; tribute to Sindhia paid through the

1 Lat. dactylus, finger, hence fruit of the date palm, gave O. Fr. date, mod. dalte; distinguish

"date," in chronology, from Lat. datum, data, given, used at the beginning of a letter, &c, to show time and place of writing, e.g. Datum Romae.

British Government, £1000. The chief, whose title is maharaja, is a Rajput of the Bundela clan, being descended from a younger son of a former chief of Orchha. The state suffered from famine in 1896–1897, and again to a less extent in 1800–1000. It is traversed by the branch of the Indian Midland railway from Jhansi to Gwalior. The town of Datia has a railway station, 16 m. from Jhansi. Pop. (1901) 24,071. It is surrounded by a stone wall, enclosing handsome palaces, with gardens; the palace of Bir Singh Deo, of the 17th century, is " one of the finest examples of Hindu domestic architecture in India " (Imperial Gazetteer of India, 1908).

DATIVE (Lat. datiws, giving or given, from dare, to give), the name, in grammar, of the case of the '' indirect object," the person or thing to or for whom or which anything is given or done. In law, the word signifies something, such as an office, which may be disposed of at will or pleasure, and is opposed to perpetual. In Scots law the term is applied to persons, duties or powers, appointed or granted by a court of law; thus an " executor- dative " is an executor appointed by the court and not by a testator. It answers, therefore, to the English administrator (q.v.). In Roman law, a inter was either dativus, if expressly nominated in a testament, or optivus, if a power of selection was given.

DATOLITE, a mineral species consisting of basic calcium and boron orthosilicate, Ca(B0H)Si04. It was first observed by J. Esmark in 1806, and named by him from 8arelcrdai, " to divide," and \Wos, " stone," in allusion to the granular struc- ture of the massive mineral. It usually occurs as well-developed glassy crystals bounded by numerous bright

faces, many of which often have a more or less pentagonal outline. The crystals were for a long time considered to be orthorhombic, and indeed they approach closely to this system in habit, interfacial angles and optical orientation; humboldtite was the name given by A. Levy in 1823 to monoclinic crystals supposed to be distinct from datolite, but the two were afterwards proved to be identical. The mineral also occurs as masses with a granular to compact texture; when compact the fractured surfaces have the appear- ance of porcelain. A fibrous variety with a botryoidal or globular surface is known as botryolite. Datolite is white or colourless, often with a greenish tinge; it is transparent or opaque. Hard- ness 5-5^; specific gravity 3-0.

Datolite is a mineral of secondary origin, and in its mode of occurrence it resembles the zeolites, being found with them in the amygdaloidal cavities of basic igneous rocks such as basalt; it is also found in gneiss and serpentine, and in metalliferous veins and in beds of iron ore. At Arendal in Norway, the original locality for both the crystallized and botryoidal varieties, it is found in a bed of magnetite. In amygdaloidal basaltic rocks it is found at Bishopton in Renfrewshire and near Edinburgh; and as excellent crystallized specimens at several localities in the United States, e.g. at Westfield in Massachusetts, Bergen and Paterson in New Jersey, and in the copper-mining region of Lake Superior. At St Andreasberg in the Harz it occurs both in diabase and in the veins of silver ore. Fine specimens have recently been obtained from Tasmania.

Large crystals of datolite completely altered to chalcedony were formerly found with magnetite in the Haytor iron mine on Dartmoor in Devonshire ; to these pseudomorphs the name haytorite has been applied. (L. J. S.)

DAUB, KARL (1765-1836), German Protestant theologian, was born at Cassel on the 20th of March 1765. He studied philosophy, philology and theology at Marburg in 1786, and eventually (179s) became

professor ordinarius of theology at Heidelberg, where he died on the 22nd of November 1836. Daub was one of the leaders of a school which sought to reconcile theology and philosophy, and to bring about a speculative reconstruction of orthodox dogma. In the course of his intel- lectual development, he came successively under the influence of Kant, Schelling and Hegel, and on account of the different phases through which he passed he was called the Talleyrand of German thought. There was one great defect in his speculative theology: he ignored historical criticism. His purpose was, as Otto Pfleiderer says, ” to connect the metaphysical ideas, which

had been arrived at by means of philosophical dialectic, directly with the persons and events of the Gospel narratives, thus rais- ing these above the region of ordinary experience into that of the supernatural, and regarding the most absurd assertions as philosophically justified. Daub had become so hopelessly addicted to this perverse principle that he deduced not only Jesus as the embodiment of the philosophical idea of the union of God and man, but also Judas Iscariot as the embodiment of the idea of a rival god, or Satan.” The three stages in Daub’s develop- ment are clearly marked in his writings. His Lehrbuch der Katechetik (1801) was written under the spell of Kant. His Theologumena (1806), his Einleitung in das Studium der chrisil. Dogmatik (1810), and his Judas Ischarioth (2 vols., 1816, 2nd ed., 1818), were allwritten in the spirit of Schelling, the last of them reflecting a change in Schelling himself from theosophy to positive philosophy. Daub’s Die dogmatische Theologiejetziger Zeit oder die Selbstsucht in der Wissenschaft des Glaubens (1833), and Vorlesungen iiber die Prolegomena zur Dogmatik (1839), are Hegelian in principle and obscure in language.

See Rosenkranz, Erinnerungen an Karl Daub (1837) ; D. Fr. Strauss, Charakterisliken und Kritiken (2nd ed., 1844); and cf. F. Lichtenberger, History of German Theology (1889); Otto Pfleiderer, Development

of Theology (1890). (M. A. C.)

DAUBENTON, LOUIS-JEAN-MARIE (1716-1800), French naturalist, was born at Montbar (C6te d'Or) on the 29th of May 1 7 16. His father, Jean Daubenton, a notary, destined him for the church, and sent him to Paris to learn theology, but the study of medicine was more to his taste. The death of his father in 1736 set him free to follow his own inclinations, and accordingly in 1 741 he graduated in medicine at Reims, and returned to his native town with the intention .of practising as a physician. But about this time Buffon, also a native of Montbar, had formed the plan of bringing out a grand treatise on natural history, and in 1742 he invited Daubenton to assist him by providing the anatomical descriptions for that work. The characters of the two men were opposed in almost every respect. Buffon was violent and impatient; Daubenton, gentle and patient; Buffon was rash in his judgments, and imaginative, seeking rather to divine than to discover truths; Daubenton was cautious, and believed nothing he had not himself been able to see or ascertain. From nature each appeared to have received the qualities requisite to temper those of the other; and a more suitable coadjutor than Daubenton it would have been difficult for Buffon to obtain. In the first section of the natural history Daubenton gave descrip- tions and details of the dissection of 182 species of quadrupeds, thus procuring for himself a high reputation, and exciting the envy of Reaumur, who considered himself as at the head of the learned in natural history in France. A feeling of jealousy induced Buffon to dispense with the services of Daubenton in the preparation of the subsequent parts of his work, which, as a consequence, lost much in precision and scientific value. Buffon afterwards perceived and acknowledged his error, and renewed his intimacy with his former associate. The number of disser- tations on natural history which Daubenton published in the memoirs of the French Academy is very great. Zoological descriptions and dissections, the comparative anatomy of recent and fossil animals, vegetable physiology, mineralogy,

experiments in agriculture, and the introduction of the merino sheep into France gave active occupation to his energies; and the cabinet of natural history in Paris, of which in 1744 he was appointed keeper and demonstrator, was arranged and considerably enriched by him. From 1775 Daubenton lectured on natural history in the college of medicine, and in 1783 on rural economy at the Alfort school. He was also professor of mineralogy at the Jardin du Roi. As a lecturer he was in high repute, and to the last retained his popularity. In December 1 799 he was appointed a member of the senate, but at the first meeting which he attended he fell from his seat in an apoplectic fit, and after a short illness died at Paris on the 1st of January 1800.

DAUBENY, CHARLES GILES BRIDLE (1795–1867), English chemist, botanist and geologist, was the third son of the Rev. James Daubeny, and was born at Stratton in Gloucestershire on

the nth of February 1795. In 1808 he went to Winchester, and in 1810 he was elected to a demyship at Magdalen College, Oxford, where the lectures of Dr Kidd first awakened in him a desire for the cultivation of natural science. In 18 14 he graduated with second-class honours, and in the next year he obtained the prize for the Latin essay. From 1815 to 1818 he studied medicine in London and Edinburgh. He took his M.D. degree at Oxford, and was a fellow of the College of Physicians. In 1819, in the course of a tour through France, he made the volcanic district of Auvergne a special study, and his Letters on the Volcanos of Auvergne were published in The Edinburgh Journal, 1820–21. He was elected F.R.S. in 1822. By subsequent journeys in Hungary, Transylvania, Italy, Sicily, France and Germany he extended his knowledge of volcanic phenomena; and in 1826 the results of his observations were given ina work entitled A Description of Active and Extinct Volcanos (2nd ed., 1848). In common with Gay Lussac

and Davy, he held subter- raneous thermic disturbances to be probably due to the contact of water with metals of the alkalis and alkaline earths. In November 1822 Daubeny succeeded Dr Kidd as professor of chemistry at Oxford, and retained this post until 1855; and in 1834 he was appointed to the chair of botany, to which was subsequently attached that of rural economy. At the Oxford botanic garden he conducted numerous experiments upon the effect of changes in soil, light and the composition of the atmo- sphere upon vegetation. In 1830 he published in the Philosophical Transactions a paper on the iodine and bromine of mineral waters. In the following year appeared his Introduction to the Atomic Theory, which was succeeded by a supplement in 1840, and in 1850 by a second edition. In 183 1 Daubeny represented the universities of England at the first meeting of the British Associa- tion, which at his request held their next session at Oxford. In 1836 he communicated to the Association a report on the subject of mineral and thermal waters. In 1837 he visited the United States, and acquired there the materials for papers on the thermal springs and the geology of North Ame- ica, read in 1838 before the Ashmolean Society and the British Associa- tion. In 1856 he became president of the latter body at its meeting at Cheltenham. In 1841 Daubeny published his Lectures on Agriculture; in 1857 his Lectures on Roman Husbandry; in 1863 Climate: an inquiry into the causes of its differences and into its influence on Vegetable Life; and in 1865 an Essay on the Trees and Shrubs of the Ancients, and a Catalogue of the Trees and Shrubs indigenous to Greece and Italy. His last literary work was the collection of his Miscellanies, published in two volumes, in 1867. In all his undertakings Daubeny was actuated by a practical spirit and a desire for the advancement of knowledge; and his personal influence on his contemporaries was in keeping with the high character of his various literary productions. He died in Oxford on the 12th of December 1867.

See Obituary by. John Phillips in Proceedings of

Ashmolean Soc,

1868.

DAUBIGNY, CHARLES FRANCOIS (1817–1878), French land- scape painter, allied in several ways with the Barbizon School, was born in Paris, on the 15th of February 1817, but spent much time as a child at Valmondois, a village on the Oise to the north- west of Paris. Daubigny was the son of an artist, and most of his family were painters. He began to paint very early in life, and at the age of seventeen he took a studio of his own. Within twelve months he had saved enough to go to Italy, where he studied and painted for nearly two years; he then returned to Paris, not to leave it again until, in i860, he took a house at Auvers on the Oise. By 1837 Daubigny had become famous as a river and land- scape painter, although he had been devoting himself as well to drawing in black-and-white, to etching, wood engraving, and lithography. In 1855 his picture, ” Lock at Optevoz,” now in the Louvre, was purchased by the state; four years later Daubigny was created knight of the Legion of Honour, and in 1874 he was promoted to be an officer. In 1866, at the invitation of Lord, then Mr, Leighton and others, he visited London, where, however, he was hurt by his now famous ” Moonlight ” being badly hung in the Old Royal Academy. But the personal

encouragement of his admirers in England made up for the dis- appointment, and the sale of his picture to a Royal Academician greatly pleased him. In 1870–187 1 he again visited London, and subsequently Holland, where he painted a number of river scenes with windmills. In 1874, having returned to Paris, he fell ill, and from that time until he died (on the 19th of February 1878) his work won less distinction than before. In 1904 the muni- cipality of Auvers-sur-Oise decided to erect a bronze monument to Daubigny’s memory.

Daubigny’s finest pictures were painted between 1864 and 1874, and these for the most part consist of carefully completed landscapes with trees, river and

a few ducks. It has curiously been said, yet with some appearance of truth, that when Daubigny liked his pictures himself he added another duck or two, so that the number of ducks often indicates greater or less artistic quality in his pictures. One of his sayings was, ” The best pictures do not sell,” as he frequently found his finest achievements little understood. Yet although during the latter part of his life he was considered a highly successful painter, the money value of his pictures since his death has increased nearly tenfold. Daubigny is chiefly preferred in his riverside pictures, of which he painted a great number, but although there are two large landscapes by Daubigny in the Louvre, neither is a river view. They are for that reason not so typical as many of his smaller Oise and Seine pictures. ‘

The works of Daubigny are, like Corot’s, to be found in many modern collections. His most ambitious canvases are: ” Spring- time” (1857), in the Louvre; ” Borde de la Cure, Morvan” (1864); “VillervillesurMer” (1864); “Moonlight” (1865); “Andresy sur Oise” (1868); and ” Return of the Flock — Moonlight ” (1878).

His followers and pupils were his sen Karl (who sometimes painted so well that his works are occasionally mistaken for those of his father, though in few cases do they equal his father’s mastery), Oudinot, Delpy and Damoye.

See Fred Henriet, C. Daubigny et son wuvre (Paris, 1878); D. Croal Thomson, The Barbizon School of Painters (London, 1890); J. W. Mollett, Daubigny (London, 1890) ; J. Claretie, Peintres et sculpteurs con’temporains : Daubigny (Paris, 1882); Albert Wolff, La Capitate de Part: Ch. Francois Daubigny (Paris, 1881).

(D. C. T.)

DAUBREE, GABRIEL AUGUSTE (1814–1896), French geologist, was born at Metz, on the 25th of June 1814, and educated at the Ecole Polytechnique in

Paris. At the age of twenty he had qualified as a mining engineer, and in 1838 he was appointed to take charge of the mines in the Bas-Rhin (Alsace), and subsequently to be professor of mineralogy and geology at the Faculty of Sciences, Strassburg. In 1859 he became engineer in chief of mines, and in 1861 he was appointed professor of geology at the museum of natural history in Paris and was also elected member of the Academy of Sciences. In the following year he became professor of mineralogy at the Ecole des Mines, and in 1872 director of that school. In 1880 the Geological Society of London awarded to him the Wollaston medal. His published researches date from 1841, when the origin of certain tin minerals attracted his attention; he subsequently discussed the formation of bog-iron ore, and worked out in detail the geology of the Bas-Rhin (1852). From 1857 to 1861, while engaged in engineering works connected with the springs of Plombieres, he made a series of interesting observations on thermal waters and their influence on the Roman masonry through which they made their exit. He was, however, especially distin- guished for his long-continued and often dangerous experiments on the artificial production of minerals and rocks. He likewise discussed the permeability of rocks by water, and the effects of such infiltration in producing volcanic phenomena; he dealt with the subject of metamorphism, with the deformations of the earth's crust, with earthquakes, and with the composition and classifica- tion of meteorites. Hedied_in Paris on the 29th of May 1896.

His publications were: Etudes et experiences synthetiques sur le mttamorphisme et sur la formation des roches cristallines (i860); Etudes synthetiques de gtologie experimentale (1879); Les Eaux souterraines a I'ipoque actuelle (2 vols., 1887) ; Le Eaux souterraines aux epoques anciennes (1887).

DAUDET, ALPHONSE (1840–1897), French novelist, was born at Nlmes on the 13th of May 1840. His family, on both sides, belonged to the bourgeoisie. The father, Vincent Daudet, was a silk manufacturer — a man dogged through life by misfortune and failure. The lad, amid much truancy, had but a depressing boy- hood. In 1856 he left Lyons, where his schooldays had been mainly spent, and began life as an usher at Alais, in the south. The position proved to be intolerable. As Dickens declared that all through his prosperous career he was haunted in dreams by the miseries of his apprenticeship to the blacking business, so Daudet says that for months after leaving Alais he would wake with horror thinking he was still among his unruly pupils. On the 1st of November 1857 he abandoned teaching, and took refuge with his brother Ernest, only some three years his senior, who was trying, " and thereto soberly," to make a living as a journalist in Paris. Alphonse betook himself to his pen likewise, — wrote poems, shortly collected into a small volume Les Amou- reuses (1858), which met with a fair reception, — obtained employ- ment on the Figaro, then under Cartier de Villemessant's energetic editorship, wrote two or three plays, and began to be recognized, among those interested in literature, as possessing individuality and promise. Morny, the emperor's all-powerful minister, appointed him to be one of his secretaries, — a post which he held till Morny's death in 1865,— and showed him no small kindness. He had put his foot on the road to fortune.

In 1866 appeared Lettres de mon moulin, which won the attention of many readers. The first of his longer books, Le petit chose (1868), did not, however, produce any very popular sensation. It is, in its main feature, the story of his owfi earlier years told with much grace and pathos. The year 1872 produced the famous Aventures prodigieuses de Tartarin de Tarascon, and the three-act piece L Arlesienne. But Fromont jeune et Risler aini (1874) at once took the world by storm. It struck a note, not new certainly in English literature, but

comparatively new in French. Here was a writer who possessed the gift of laughter and tears, a writer not only sensible to pathos and sorrow, but also to moral beauty. He could create too. His characters were real and also typical; the rate's, the men who in life's battle had flashed in the pan, were touched with a master hand. The book was alive. It gave the illusion of a real world. Jack, the story of an illegitimate child, a martyr to his mother's selfishness, which followed in 1876, served only to deepen the same impression. Henceforward his career was that of a very successful man of letters, — publishing novel on novel, Le Nabab (1877), Les Rois en exit (1879), Numa Roumestan (1881), Sapho (1884), L'lmmartel (1888), — and writing for the stage at frequent intervals, — giving to the world his reminiscences in Trente ans de Paris (1887), and Souvenirs d'un homme de lettres (1888). These, with the three Tartarins, — Tartarin the mighty hunter, Tartarin the mountaineer, Tartarin the colonist, — and the admirable short stories, written for the most part before he had acquired fame and fortune, constitute his life work.

Though Daudet defended himself from the charge of imitating Dickens, it is difficult altogether to believe that so many similar- ities of spirit and manner were quite unsought. What, however, was purely his own was his style. It is a style that may rightly be called " impressionist," full of light and colour, not descriptive after the old fashion, but flashing its intended effect by a masterly juxtaposition of words that are like pigments. Nor does it convey, like the style of the Goncourts, for example, a constant feeling of effort. It is full of felicity and charm, — un charmeur Zola has called him. An intimate friend of Edmond de Goncourt (who died in his house), of Flaubert, of Zola, Daudet belonged essentially to the naturalist school of fiction. His own experi- ences, his surroundings, the men with whom he had been brought into contact, various persons who had played a part, more or less public, in Paris life — all passed into his art. But he vivified the material supplied by his memory. His

world has the great gift of life. L'Immortel is a bitter attack on the French Academy, to which august body Daudet never belonged.

Daudet wrote some charming stories for children, among which may be mentioned La Belle Nivernaise, the story of an old boat

and her crew. His married life — he married in 1867 Julia Allard — seems to have been singularly happy. There was perfect intellectual harmony, and Madame Daudet herself possessed much of his literary gift; she is known by her Impressions de nature et d'art (1879), L'Enfance d'une Parisienne (1883), and by some literary studies written under the pseudonym of Karl Steen. In his later years Daudet suffered from insomnia, failure of health and consequent use of chloral. He died in Paris on the 17th of December 1897.

The story of Daudet's earlier years is told in his brother Ernest Daudet's Monfrere et moi. There is a good deal of autobiographical detail in Daudet's Trente ans de Paris and Souvenirs d'un homme de lettres, and also scattered in his other books. The references to him in the Journal des Goncourt are numerous. See also L. A. Daudet, Alphonse Daudet (1898), and biographical and critical essays by R. H. Sherard (1894); by A. Gerstmann (1883); by B. Diederich (1900); by A. Hermant (1903), and a bibliography by J. Brivois (1895); also The Works of Alphonse Daudet, translated by L. Ensor, H. Frith, E. Bartow (1902, etc.). Criticism of Daudet is also to be found in F. Brunetiere, Le Roman naturaliste (new ed., 1897); J. Lemaitre, Les Contemporains (vols. ii. and iv.) ; G. Pellissier, Le Mouvement litteraire au XIX' Steele (1890); A. Symons, Studies in Prose and Verse (1904). (F. T. M.)

DAULATABAD, a hill-fortress in Hyderabad state, India, about 10 m. N.W. of the city of Aurangabad. The former city of Daulatabad (Deogiri) has shrunk into a mere village, though to its earlier greatness witness is still borne by its magnificent fortress, and by remains of public buildings noble even in

their decay. The fortress stands on a conical rock crowning a hill that rises almost perpendicularly from the plain to a height of some 600 ft. The outer wall, o\ m. in circumference, once enclosed the ancient city of Deogiri (Devagiri), and between this and the base of the upper fort are three lines of defences. The fort is a place of extraordinary strength. The only means of access to the summit is afforded by a narrow bridge, with passage for not more than two men abreast, and a long gallery, excavated in the rock, which has for the most part a very gradual upward slope, but about midway is intercepted by a steep stair, the top of which is covered by a grating destined in time of war to form the hearth of a huge fire kept burning by the garrison above. Besides the fortifica- tions Daulatabad contains several notable monuments, of which the chief are the Chand Minar and the Chini Mahal. The Chand Minar, considered one of the most remarkable specimens of Mahommedan architecture in southern India, is a tower 210 ft. high and 70 ft. in circumference at the base, and was originally covered with beautiful Persian glazed tiles. It was erected in 1445 by Ala-ud-din Bahmani to commemorate his capture of the fort. The Chini Mahal, or China Palace, is the ruin of a building once of great beauty. In it Abul Hasan, the last of the Kutb Shahi kings of Golconda, was imprisoned by Aurangzeb in 1687.

Deogiri is said to have been founded c. a.d. 1 187 by Bhillama I. the prince who renounced his allegiance to the Chalukyas and established the power of the Yadava dynasty in the west. In 1 294 the fort was captured by Ala-ud-din Khilji, and the rajas, so powerful that they were held by the Mussulmans at Delhi to be the rulers of all the Deccan, were reduced to pay tribute. The tribute falling into arrear, Deogiri was again occupied by the Mahommedans under Malik Kafur, in 1307 and 13 10, and in 13 18 the last raja, Harpal, was flayed alive. Deogiri now became an important base for the operations of the Mussulman conquering expeditions southwards, and in 1339 Mahommed ben Tughlak Shah

determined to make it his capital, changed its name to Daulatabad ("Abode of Prosperity "), and made arrangements for transferring to it the whole population of Delhi. The project was interrupted by troubles which summoned him to the north; during his absence the Mussulman governors of the Deccan revolted; and Daulatabad itself fell into the hands of Zafar Khan, the governor of Gulbarga. It remained in the hands of the Bahmanis till 1526, when it was taken by the Nizam Shahis. It was captured by the emperor Akbar, but in 1595 it again surrendered to Ahmad Nizam Shah of Ahmednagar, on the fall of whose dynasty in 1607 it passed into the hands of the usurper, the Nizam Shahi minister Malik Amber, originally an Abyssinian slave, who was the founder of Kharki (the present Aurangabad?.

His successors held it until their overthrow by Shah Jahan, the Mogul emperor, in 1633; after which it remained in the posses- sion of the Delhi emperors until, after the death of Aurangzeb, it fell to the first nizam of Hyderabad. Its glory, however, had already decayed owing to the removal of the seat of government by the emperors to Aurangabad.

DAUMIER, HONORfi (1808–1879), French caricaturist and painter, was born at Marseilles. He showed in his earliest youth an irresistible inclination towards the artistic profession, which his father vainly tried to check by placing him first with a huissier, and subsequently with a bookseller. Having mastered the technique of lithography, Daumier started his artistic career by producing plates for music publishers, and illustrations for advertisements; these were followed by anonymous work for publishers, in which he followed the style of Charlet and dis- played considerable enthusiasm for the Napoleonic legend. When, in the reign of Louis Philippe, Philipon launched the comic journal, La Caricature, Daumier joined its staff, which included such powerful artists as Deveria, Raffet

and Grandville, and started upon his pictorial campaign of scathing satire upon the foibles of the bourgeoisie, the corruption of the law and the incompetence of a blundering government. His caricature of the king as " Gargantua " led to Daumier's imprisonment for six months at Ste Pelagie in 1832. The publication of La Caricature was discontinued soon after, but Philipon provided a new field for Daumier's activity when he founded the Charivari. For this journal Daumier produced his famous social caricatures, in which bourgeois society is held up to ridicule in the figure of Robert Macaire, the hero of a then popular melodrama. Another series, " L'histoire ancienne," was directed against the pseudo- classicism which held the art of the period in fetters. In 1848 Daumier embarked again on his political campaign, still in the service of Charivari, which he left in i860 and rejoined in 1864. In spite of his prodigious activity in the field of caricature — the list of Daumier's lithographed plates compiled in 1904 numbers no fewer than 3958 — he found time for flight in the higher sphere of painting. Except for the searching truthfulness of his vision and the powerful directness of his brushwork, it would be difficult to recognize the creator of Robert Macaire, of Les Bas bleus, Les Bohemiens de Paris, and the Masques, in the paintings of " Christ and His Apostles " at the Ryks Museum in Amsterdam, or in his " Good Samaritan," " Don Quixote and Sancho Panza," "Christ Mocked," or even in the sketches in the Ionides Collection at South Kensington. But as a painter, Daumier, one of the pioneers of naturalism, was before his time, and did not meet with success until in 1878, a year before his death, when M. Durand- Ruel collected his works for exhibition at his galleries and demonstrated the full range of the genius of the man who has been well called the Michelangelo of caricature. At the time of this exhibition Daumier, totally blind, was living in a cottage at Valmondois, which was placed at his disposal by Corot, and where he breathed his last in 1879. An important exhibition of his works was held at the Ecole des Beaux- Arts in 1900.

His life and art were made the subject of an important volume by Arsene Alexandre in 1888; see also Gustave Geffroy, Daumier (Paris, Libraire de l'Art), and Henri Frantz and Octave Uzanne, Daumier and Gavarni (London, The Studio, 1904), with a large selec- tion of the artist's work.

DAUN (DHAUN), LEOPOLD JOSEF, Count Von (1705-1766), prince of Thiano, Austrian field marshal, was born at Vienna on the 24th of September 1705. He was intended for the church, but his natural inclination for the army, in which his father and grandfather had been distinguished generals, proved irresistible. In 17 18 he served in the campaign in Sicily, in his father's regiment. He had already risen to the rank of colonel when he saw further active service in Italy and on the Rhine in the War of the Polish Succession (1734-35). He continued to add to his distinctions in the war against the Turks (1737-39), in which he attained the rank of a general officer. In the War of the Austrian Succession (1740-42), Daun, already a lieutenant field marshal in rank, distinguished himself by the careful leadership which was afterwards his greatest military quality. He was

present at Chotusitz and Prague, and led the advanced guard of Khevenhiiller's army in the victorious Danube campaign of 1743- Field Marshal Traun, who succeeded Khevenhiiller in 1744, thought equally highly of Daun, and entrusted him with the rearguard of the Austrian army when it escaped from the French to attack Frederick the Great. He held important commands in the battles of Hohenfriedberg and Soor, and in the same year (1745) was promoted to the rank of Feldzeugmeister. After this he served in the Low Countries, and was present at the battle of Val. He was highly valued by Maria Theresa, who made him commandant of Vienna and a knight of the Golden Fleece, and in 1754 he was elevated to the rank of field marshal.

During the interval of peace that preceded the Seven Years' War he was engaged in carrying out an elaborate scheme for the reorganization of the

Austrian army ; and it was chiefly through his instrumentality that the military academy was established at Wiener-Neustadt in 1751. He was not actively employed in the first campaigns of the war, but in 1757 he was placed at the head of the army which was raised to relieve Prague. On the 18th of June 1757 Daun defeated Frederick for the first time in his career in the desperately fought battle of Kolin (q.v.). In commemoration of this brilliant exploit the queen immediately instituted a military order bearing her name, of which Daun was nominated first grand cross. The union of the relieving army with the forces of Prince Charles at Prague reduced Daun to the position of second in command, and as such he took part in the pursuit of the Prussians and the victory of Breslau. Frederick now reappeared and won the most brilliant victory of the age at Leuthen. Daun was present on that field, but was not held accountable for the disaster, and when Prince Charles resigned his command, Daun was appointed in his place. With the campaign of 1758 began the war of manoeuvre in which Daun, if he missed, through over-caution, many opportunities of crush- ing the Prussians, at least maintained a steady and cool resistance to the fiery strategy of Frederick. In 1758 Major-General Loudon, acting under Daun's instructions, forced the king to raise the siege of Olmiitz, and later in the same year Daun himself surprised Frederick at Hochkirch and inflicted a severe defeat upon him (October 14th). In the following year the war of manoeuvre continued, and on the 20th and 21st of November he surrounded the entire corps of General Finck at Maxen, forcing the Prussians to surrender. These successes were counter- balanced in the following year by the defeat of Loudon at Liegnitz, which was attributed to the dilatoriness of Daun, and Daun's own defeat in the great battle of Torgau (q.v.). In this engagement Daun was so severely wounded that he had to return to Vienna to recruit.

He continued to command until the end of the war, and after- wards worked with the greatest energy at the reorganization of the imperial forces. In 1762

he had been appointed president of the Hofkriegsrath. He died on the 5th of February 1766. By the order of Maria Theresa a monument to his memory was erected in the church of the Augustinians, with an inscription styling him the " saviour of her states." In 1888 the 56th regiment of Austrian infantry was named after him. As a general Daun has been reproached for the dilatoriness of his operations, but wariness was not misplaced in opposing a general like Frederick, who was quick and unexpected in his movements beyond all precedent. Less defence perhaps may be made for him on the score of inability to profit by a victory.

See Der deutsche Fabius Cunctator, oder Leben u. Thaten S. E. des H. Leopold Reichsgrafen v. Dhaun K.K.F.M. (Frankfort and Leipzig, 1759-1760), and works dealing with the wars of the period.

DAUNOU, PIERRE CLAUDE FRANCOIS (1761-1840), French statesman and historian, was born at Boulogne-sur-Mer, and after a brilliant career in the school of the Oratorians there, joined the order in Paris in 1777. He was professor in various seminaries from 1780 till 1787, when he was ordained priest. He was already known in literary circles by several essays and poems, when the revolution opened a wider career. He threw himself with ardour into the struggle for liberty, and refused to be

silenced in his advocacy of the civil constitution of the clergy by the offer of high office in the church. Elected to the Con- vention by Pas-le-Calais, he associated himself with the Girondists, but strongly opposed the death sentence on the king. He took little part in the struggle against the Mountain, but was involved in the overthrow of his friends, and was imprisoned for a year. In December 1 794 he returned to the Convention, and was the principal author of the constitution of the year III. It seems to have been due to his Girondist

ideas that the Ancients were given the right of convoking the corps legislatif outside Paris, an expedient which made possible Napoleon's coup d'etat of the 18th and 19th Brumaire. The creation of the Institute was also due to Daunou, who drew up the plan for its organization. His energy was largely responsible for the suppression of the royalist insurrection of the 13th Vendemiaire, and the important place he occupied at the beginning of the Directory is indicated by the fact that he was elected by twenty-seven departments as member of the Council of Five Hundred, and became its first president. He had himself set the age qualification of the directors at forty, and thus debarred himself as candidate, as he was only thirty- four. The direction of affairs having passed into the hands of Talleyrand and his associates, Daunou turned once more to literature, but in 1798 he was sent to Rome to organize the republic there, and again, almost against his will, he lent his aid to Napoleon in the preparation of the constitution of the year VIII. His attitude towards Napoleon was not lacking in inde- pendence, but in this controversy with the pope, the emperor was able again to secure from him the learned treatise Sur la puissance temporelle du Pape (1809). Still he took little part in the new regime, with which at heart he had no sympathy, and turned more and more to literature. At the Restoration he was deprived of the post of archivist of the empire, which he had held from 1807, but from 1819 to 1830 (when he again became archivist of the kingdom) he held the chair of history and ethics at the College de France, and his courses were among the most famous of that age of public lectures. During the reign of Louis Philippe he received many honours. In 1839 he was made a peer. He died in 1840.

In politics Daunou was a Girondist without combativeness; a confirmed republican, who lent himself always to the policy of conciliation, but whose probity remained unchallenged. He belonged essentially to the centre, and lacked both the genius and the temperament which would secure for

him a commanding place in a revolutionary era. As an historian his breadth of view is remarkable for his time; for although thoroughly imbued with the classical spirit of the iSth century, he was able to do justice to the middle ages. His Discours sur I'itat des lettres au XIII' siecle, in the sixteenth volume of the Histoire litUraire de France, is a remarkable contribution to that vast collection, especially as coming from an author so profoundly learned in the ancient classics. Daunou's lectures at the College de France, collected and published after his death, fill twenty volumes (Cours d'etudes historiques, 1842-1846). They treat principally of the criticism of sources and the proper method of writing history, and occupy an important place in the evolution of the scientific study of history in France. All his works were written in the most elegant style and chaste diction; but apart from his share in the editing of the Historiens de la France, they were mostly in the form of separate articles on literary and historical subjects. Personally Daunou was reserved and somewhat austere, preserv- ing in his habits a strange mixture of bourgeois and monk. His indefatigable work as archivist in the time when Napoleon was transferring so many treasures to Paris is not his least claim to the gratitude of scholars.

See Mignet, Notice historique sur la vie el les travaux de Daunou (Paris, 1843); Taillandier, Documents bibliographiques sur Daunou (Paris, 1847), including a full list of his works; Sainte-Beuve, Daunou in his Portraits Contemporains, t. iii. (unfavourable and somewhat unfair).

' DAUPHIN (Lat. Delphinus), an ancient feudal title in France, borne only by the counts and dauphins of Vienne, the dauphins of Auvergne, and from 1364 by the eldest sons of the kings of

France. The origin of this curious title is obscure and has been the subject of much ingenious controversy; but it now seems clear that it was in the first instance a proper name. Among the Norse- men, and in the countries colonized by them, the name Dolphin or Dolfin (dolfr, " a wound ") was

fairly common, e.g. in the north of England; thus a Dolfin is mentioned among the tenants- in-chief in Domesday Book, and there was a Dolphin, lord of Carlisle, towards the end of the nth century. It has thus been conjectured by some that the dauphins of Vienne derived their title from Teutonic sources through Germany. But in the south, too, the name — not necessarily derived from the same root — was not unknown, though exceedingly rare, and was moreover illustrated by two conspicuous figures in the Catholic martyr- ology: St Delphinus, bishop of Bordeaux from 380 to 404, and St Annemundus, surnamed Dalfinus, bishop of Lyons from c. 650 to 657. Whatever its origin, this name was borne by Guigo, orGuigueIV.(d. ii42),countof Albon and Grenoble, as an additional name, during the lifetime of his father, and was also adopted by his son Guigue V. Beatrice, daughter and heiress of Guigue V., whose second husband was Hugh III., duke of Burgundy, bestowed the name on their son Andre, to recall his descent from the ancient house of the counts of Albon, and in the charters he is called sometimes Andreas Dalphinus, sometimes Dalphinus simply, but his style is still " count of Albon and Vienne." His successors Guigue VI. (d. 1270) and John I. (d. 1282) call themselves sometimes Delphinus, sometimes Delphini, the name being obviously treated as a patronymic, and in the latter form it was borne by the sons of the reigning " dauphin." But even under Guigue VI. foreigners had begun to confuse the name with a title of dignity, an imperial diploma of 1248 describing Guigue as " Guigo Dalphinus Viennensis."

It was not until the third dynasty, founded by the marriage of Anne, heiress of John I., with Humbert, lord of La Tour du Pin, that " dauphin " became definitely established as a title. Humbert not only assumed the name of Delphinus, but styled himself regularly Dauphin of the Viennois (Dalphinus Vien- nensis), and in a treaty concluded in 1285 between Humbert and Robert, duke of Burgundy, the word delphinatus (Dauphine) appears for the first time, as a synonym for comitatus (county). In 1349 Humbert

II., the last of his race, sold Dauphin6 to Charles of Valois, who, when he became king of France in 1364, transferred it to his eldest son. From that time the eldest sons of the kings of France were always either actual or titular dauphins of the Viennois. The " canting arms " of a dolphin, which they quartered with the royal fleurs de lys, were originally assumed by Dauphin, count of Clermont, instead of the arms of Auvergne (the earliest extant example is appended to a deed of n 99), and from him they were borrowed by the counts of the Viennois. Guigue VI. used this device on his secret seal from his accession, the earliest extant example dating from 1237, but, though no specimens have survived, M. Prudhomme thinks it probable that the dolphin was also borne by Andre Dauphin. It was also assumed by Guigue V., count of Forez (1 203-1 241), a descendant of Guigue Raymond of the Viennois, count of Forez, in right of his wife Ida Raymonde. It is thus abundantly clear that the name of Dauphin was not assumed from the armorial device, but vice versa.

The eldest son of the French king was sometimes called " the king dauphin " (le roy daulphin), to distinguish him from the dauphin of Auvergne, who was known, since Auvergne became an appanage of the royal house, as " the prince dauphin." The dauphinate of Auvergne, which is to be distinguished from the county, dates from n 55, when William VII., count of Auvergne, was deposed by his uncle William VIII. " the Old." William VII. had married a daughter of Guigue IV. Dauphin, after whom their son was named Dauphin (Delphinus). The name continued, as in Viennois, as a patronymic, and was not used as a title until 1281, when Robert II., count of Clermont, in his will, styles himself for the first time Dauphin of Auvergne (Alvernie delphinus) for the portion of the county of Auvergne left to his house. In 1428 Jeanne, heiress of the dauphin Beraud III., married Louis de Bourbon, count of Montpensier (d. i486), thus bringing the

dauphinate into the royal house of France. It was annexed to the crown in 1693.

See A. Prudhomme, ” De l’origine et du sens des mots dauphin et dauphine ” in Bibliotheque de l’£cole des Charles, liv. an. 1893 (Paris,

1893)-

DAUPHINE, one of the old provinces (the name being still in current use in the country) of pre-Revolutionary France, in the south-east portion of France, between Provence and Savoy; since 1 790 it forms the departments of the Isere, the Dr6me and the Hautes Alpes.

After the death of the last king of Burgundy, Rudolf III., in 1032, the territories known later as Dauphine (as part of his realm) reverted to the far-distant emperor. Much confusion followed, out of which the counts of Albon (between Valence and Vienne) gradually came to the front. The first dynasty ended in 1 162 with Guigue V., whose daughter and heiress, Beatrice, carried the possessions of her house to her husband, Hugh III., duke of Burgundy. Their son, Andre, continued the race, this second dynasty making many territorial acquisitions, among them (by marriage) the Embrunais and the Gapencais in 1232. In 1282 the second dynasty ended in another heiress, Anna, who carried all to her husband, Humbert, lord of La Tour du Pin (between Lyons and Grenoble) . The title of the chief of the house was Count (later Dauphin) of the Viennois, not of Dauphine. (For the origin of the terms Dauphin and Dauphine see Dauphin.) Humbert II. (1333-1349), grandson of the heiress Anna, was the last independent Dauphin, selling his dominions in 1349 to Charles of Valois, who on his accession to the throne of France as Charles V. bestowed Dauphine on his eldest son, and the title was borne by all succeeding eldest sons of the kings of France. In 1422 the Diois and the Valentinois, by the will of the last count, passed to the eldest son of Charles VI., and in 1424 were annexed to the Dauphine. Louis (1440-1461), later Louis XL of France, was the last Dauphin who occupied a semi-independent position, Dauphine being annexed to the crown in 1456. The

suzerainty of the emperor (who in 1378 had named the Dauphin ” Imperial Vicar ” within Dauphine and Provence) gradually died out. In the 16th century the names of the reformer Guillaume Farel (1489–1565) and of the duke of Lesdiguieres (1543–1626) are prominent in Dauphine history. The ” States ” of Dauphine (dating from about the middle of the 14th century) were sus- pended by Louis XIII. in 1628, but their unauthorized meeting (on the 21st of July 1788) in the tennis court {Salle du Jeu de Paume) of the castle of Vizille, near Grenoble, was one of the earliest premonitory signs of the great French Revolution of 1789. It was at Laffrey, near Grenoble, that Napoleon (March 7th, 18 15) was first acclaimed by his old soldiers sent to arrest him.

Bibliography. — J. Brun-Durand, Dictionnaire topographique du departement de la. Drome (Paris, 1891); Jules Chevalier, Essai historique sur Veglise et la ville de Die, Montelimar and Valence (2 vols., 1888 and 1896); W. A. B. Coolidge, H. Duhamel and Felix Perrin, Climbers’ Guide to the Central Alps of the Dauphiny (a revision of a French work by the same, issued at Grenoble in 1887), London, 1892 (new ed. 1905) ; J. J. Guiffrey, Histoire de la reunion du Dauphine & la France (Paris, 1868) ; Joanne, Dauphine” (Paris, 1905) ; A. Prudhomme, Histoire de Grenoble (Grenoble, 1888); lb., ” De l’origine des mots ‘ Dauphin’ et Dauphine ” (article in vol. liv. (1893) of the Bibliotheque de I’Hcole des Charles) ; A. Rochas, Biographie du Dauphine (2 vols., Paris, 1856) ; J. Roman, Dictionnaire topo- graphique (Paris, 1884); Tableau historique (Paris, 2 vols., 1887 and 1890) ; and Repertoire archeologique du departement des Hautes- Alpes (Paris, 1888) ; J. Roman, Histoire de la ville de Gap (Gap, 1892) ; A. De Terrebasse, Notice sur les Dauphins de Viennois (Vienne, 1875); J- M. De Valbonnais, Histoire de Dauphini (2 vols., Geneva, 1722); J. A. Felix Faure, Les Assemblies de Vizille et de Romans, 1788 (Paris, 1887) ; O. Chenavas, La Revolution de 1788 en Dauphine (Grenoble, 1888); C. Lory, Description geologique du Dauphine (Paris, i860). (W. A. B. C.)

DAURAT (or Dorat), JEAN (in Lat. Auratus),

(1508–1588), French poet and scholar, and member of the Pleiade, was born at Limoges in 1508. His name was originally Dinemandy. He belonged to a noble family, and, after studying at the college of Limoges, came up to Paris to be presented to Francis I., who made him tutor to his pages. He rapidly gained an immense

reputation as a classical scholar. As a private tutor in the house of Lazare de Baif, he had J. A. de Baif for his pupil. His son, Louis, showed great precocity, and at the age of ten translated into French verse one of his father's Latin pieces; his poems were published with his father's. Jean Daurat became the director of the College de Coqueret, where he had among his pupils, besides Baif, Ronsard, Remy, Belleau and Pontus de Tyard. Joachim du Bellay was added by Ronsard to this group; and these five young poets, under the direction of Daurat, formed a society for the reformation of the French language and literature. They increased their number to seven by the initiation of the dramatist Etienne Jodelle, and thereupon they named themselves La Pleiade, in emulation of the seven Greek poets of Alexandria. The election of Daurat as their president proved the weight of his personal influence, and the value his pupils set on the learning to which he introduced them, but as a writer of French verse he is the least important of the seven. Meanwhile he collected around him a sort of Academy, and stimulated the students on all sides to a passionate study of Greek and Latin poetry. He himself wrote incessantly in both those languages, and was styled the Modern Pindar. His influence extended beyond the bounds of his own country, and he was famous as a scholar in England, Italy and Germany. In 1556 he was appointed professor of Greek at the College Royale, a post which he continued to hold until, in 1567, he resigned it in favour of his nephew, Nicolas Goulu. Charles IX. gave him the title of poeta regius. His flow of language was the wonder of his time; he is said to have com- posed more than 15,000 Greek and Latin verses. The best of these he published at Paris in 1586 as /. Aurati

Lemovicm poetae et inter pretis regit poemata. He died at Paris on the 1st of November 1588, having survived all his illustrious pupils of the Pleiade, except Pontus de Tyard. He was a little, restless man, of untiring energy, rustic in manner and appearance. His unequalled personal influence over the most graceful minds of his age gives him an importance in the history of literature for which his own somewhat vapid writings do not fully account.

The CEuvres poStiques in the vernacular of Jean Daurat were edited (1875) with biographical notice and bibliography by Ch. Marty-La veaux in his Pleiade franqaise.

DAVENANT, CHARLES (1656-1714), English economist, eldest son of Sir William Davenant, the poet, was born in London, and educated at Cheam grammar school and Balliol College, Oxford, but left the university without taking a degree. At the age of nineteen he had composed a tragedy, Circe, which met with some success, but he soon turned his attention to law, and having taken the degree of LL.D., he became a member of Doctors' Commons. He was member of parliament successively for St Ives, Cornwall, and for Great Bedwyn. He held the post of commissioner of excise from 1683 to 1689, and that of inspector-general of exports and imports from 1705 till his death in 17 14. He was also secretary to the commission appointed to treat for the union with Scotland. As an economist, he must be classed as a strong supporter of the mercantile theory, and in his economic pamphlets — as distinct from his political writings — he takes up an eclectic position, recommending governmental restrictions on colonial commerce as strongly as he advocates freedom of ex- change at home. Of his writings, a complete edition of which was published in London in 1771, the following are the more important: — An Essay on the East India Trade (1697); Two Discourses on the Public Revenues and Trade of England (1698); An Essay on the probable means of making the people gainers in the balance of Trade (1699); A Discourse on Grants and Resump- tions and Essays on the

Balance of Power (1701).

DAVENANT (or D'Avenant), SIR WILLIAM (1 606–1 668), English poet and dramatist, was baptized on the 3rd of March 1606; he was born at the Crown Inn, Oxford, of which his father, a wealthy vintner, was proprietor. It was stated that Shakespeare always stopped at this house in passing through the city of Oxford, and out of his known or rumoured admiration of the hostess, a very fine woman, there sprang a scandalous story which attributed Davenant's paternity to Shakespeare, a legend which there is reason to believe Davenant himself encouraged,

but which later criticism has cast aside as spurious. In 162 1 the vintner was made mayor of Oxford, and in the same year his son left the grammar school of All Saints, where his master had been Edward Sylvester, and was entered an undergraduate of Lincoln College, Oxford. He did not stay at the university, however, long enough to take a degree, but was hurried away to appear at court as a page, in the retinue of the gorgeous duchess of Rich- mond. From her service he passed into that of Fulke Greville, Lord Brooke, in whose house he remained until the murder of that eminent man in 1628. This blow threw him upon the world, not altogether without private means, but greatly in need of a profitable employment.

He turned to the stage for subsistence, and in 1629 produced his first play, the tragedy of Albovine. It was not a very brilliant performance, but it pleased the town, and decided the poet to pursue a dramatic career. The next year saw the production at Blackfriars of The Cruel Brother, a tragedy, and The Just Italian, a tragi-comedy. Inigo Jones, the court architect, for whom Ben Jonson had long supplied the words of masques and compli- mentary pieces, quarrelled with his great colleague in the year 1634, and applied to William Davenant for verses.

The result was The Temple of Love, performed by the queen and her ladies at Whitehall on Shrove Tuesday, 1634, and printed in that year. Another masque, The Triumphs of the Prince D' Amour, followed in 1636. The poet returned to the legitimate drama by the publication of the tragi-comedy of The Platonic Lovers, and the famous comedy of The Wits, in 1636, the latter of which, however, had been licensed in 1633. The masque of Britannica Triumphans (i637)i>rought him into some trouble, for it was suppressed as a punishment for its first performance having been arranged for a Sunday. By this time Davenant had, however, thoroughly ingratiated himself with the court; and on the death of Ben Jonson in 1637 he was rewarded with the office of poet-laureate, to the exclusion of Thomas May, who considered himself entitled to the honour. It was shortly after this event that Davenant collected his minor lyrical pieces in a volume entitled Mada- gascar and other Poems (1638); and in 1639 he became manager of the new theatre in Drury Lane. The civil war, however, put a check upon this prosperous career; and he was among the most active partisans of royalty through the whole of that struggle for supremacy.

As early as May 1642, Davenant was accused before the Long Parliament of being mainly concerned in a scheme to seduce the army to overthrow the Commons. He was accordingly appre- hended at Faversham, and imprisoned for two months in London; he then attempted to escape to France, and succeeded in reaching Canterbury, where he was recaptured. Escaping a second time, he made good his way to the queen, with whom he remained in France until he volunteered to carry over to England some military stores for the army of his old friend the earl of Newcastle, by whom he was induced to enter the service as lieutenant- general of ordnance. He acquitted himself with so much bravery and skill that, after the siege of Gloucester, in 1643, he was knighted by the king. After the battle of Naseby he retired to Paris, where he became a Roman Catholic, and spent some months in the composition of his epic

poem of Gondibert. In 1646 he was sent by the queen on a mission to Charles I., then at Newcastle, to advise him to " part with the church for his peace and security." The king dismissed him with some ,sharpness, and Davenant returned to Paris, where he was the guest of Lord Jermyn. In 1650 he took the command of a colonizing expedi- tion that set sail from France to Virginia, but was captured in the Channel by a parliamentary man-of-war, which took him back to the Isle of Wight. Imprisoned in Cowes castle until 1651, he tempered the discomfort and suspense of his condition by continuing the composition of Gondibert. He was sent up to the Tower to await his trial for high treason, but just as the storm was about to break over his head, all cleared away. It is believed that the personal intercession of Milton led to this result. Another account is that he was released by the desire of two aldermen of York, once his prisoners, whom he had allowed to escape. Davenant, released from prison, immediately published Gondibert,

the work on which his fame mainly rests, a chivalric epic in the four-line stanza which Sir John Davies had made popular by his Nosce teipsum, the influence of which is strongly marked in the philosophical passages of Gondibert. It is a cumbrous, dull production, but is relieved with a multitude of fine and felicitous passages, and lends itself most happily to quotation.

During the civil war one of his plays had been printed, the tragedy of The Unfortunate Lovers, in 1643. One of his best plays, Love and Honour, was published in 1649, but appears to have been acted long before. He found that there were many who desired him to recommence his theatrical career. Such a step, however, was absolutely forbidden by Puritan law. Dave- nant, therefore, by the help of some influential friends, obtained permission to open a sort of theatre at Rutland House,, in Charterhouse Yard, where, on the 21st of May 1656, he began a series of representations, which he called operas, as an inoffensive term. This word was then first introduced into the English language. The

opening piece was a kind of dialogue defending the drama in the abstract. This was followed by his own Siege, of Rhodes, printed the same year, which was performed with stage decorations and machinery of a kind hitherto quite unthought of in England. Two other innovations in its production were the introduction of recitative and the appearance of a woman, Mrs Coleman, on the stage. He continued until the Restoration to produce ephemeral works of this kind, only one of which, The Cruelly of the Spaniards in Peru, in 1658, was of sufficient literary merit to survive. In 1660 he had the infinite satisfaction of being able to preserve the life of that glorious poet who had, nine years before, saved his own from a not less imminent danger. The mutual relations of Milton and Davenant do honour to the generosity of two men who, sincerely opposed in politics, knew how to forget their personal anger in their common love of letters. In. 1659 Davenant suffered a short imprisonment for complicity in Sir George Booth's revolt. Under Charles II. Davenant flourished in the dramatic world; he opened a new theatre in Lincoln's Inn Fields, which he called the Duke's; and he intro- duced a luxury and polish into the theatrical life which it had never before known in England. Under his management, the great actors of the Restoration, Betterton and his coevals, took their peculiar French style and appearance; and the ancient simplicity of the English stage was completely buried under the tinsel of decoration and splendid scenery. Davenant brought out six new plays in the Duke's Theatre, The Rivals (1668), an adaptation of The Two Noble Kinsmen, which Davenant never owned, The Man's the Master (1669), comedies translated from Scarron, News from Plymouth, The Distresses, The Siege, The Fair Favourite, tragi- comedies, all of which were printed after his death, and only one of which survived their author on the stage. He died at his house in Lincoln's Inn Fields on the night of the 7th of April 1668, and two days afterwards was buried in Poets' Corner, Westminster Abbey, with the inscription " O rare Sir William Davenant!" In 1672 his writings were collected in

folio. His last work had been to travesty Shakespeare's Tempest in company with Dryden.

The personal character, adventures and fame of Davenant, and more especially his position as a leading reformer, or rather debaser, of the stage, have always given him a prominence in the history of literature which his writings hardly justify. His plays are utterly unreadable, and his poems are usually stilted and unnatural. With Cowley he marks the process of transition from the poetry of the imagination to ihe poetry of the in- telligence; but he had far less genius than Cowley, and his influence on English drama must be condemned as wholly deplorable. (E. G.)

DAVENPORT, EDWARD LOOMIS (181 6–1 87 7), American actor, born in Boston, made his first appearance on the stage in Providence in support of Junius Brutus Booth. Afterwards he went to England, where he supported Mrs Anna Cora Mowatt (Ritchie) (1819–1870), Macready and others. In 1854 he was again in the United States, appearing in Shakespearian plays and in dramatizations of Dickens's novels. As Bill Sykes he was

especially successful, and his Sir Giles Overreach and Brutus were also greatly admired. He died at Canton, Pennsylvania, on the 1st of September 1877. In 1849 he had married Fanny Vining (Mrs Charles Gill) (d. 1891), an English actress also in Mrs Mowatt's company. Their daughter Fanny (Lily Gipsy) Davenport (1850–1898) appeared in America at the age of twelve as the king of Spain in Faint Heart Never Won Fair Lady. Later (1869) she was a member of Daly's company; and after- wards, with a company of her own, acted with especial success in Sardou's Fedora (1883), Cleopatra (1890), and similar plays. Her last appearance was on the 25 th of March 1898, shortly before her death.

DAVENPORT, ROBERT (fl. 1623–1639), English dramatist, is mentioned as the author of a play licensed in 1624 under the title of Henry I. In 1653 Henry I. and Henry II. was entered at Stationers' Hall by Humphrey Moseley with a second part said to be the work of Davenport and Shakespeare. Of this play or plays nothing has been discovered, but King John and Matilda (printed 1655), which probably dates from about the same time, has survived. Throughout the play, as in its closing scene quoted by Charles Lamb in his Dramatic Specimens, there is much " passion and poetry " which saves the piece from being classed as pure melodrama. The City-Night-Cap was licensed in 1624, but not printed until 1661. The underplot of this unsavoury play was borrowed from Cervantes and Boccaccio, and Mrs Aphra Behn's Amorous Prince (1671) is an adaptation from it. A New Tricke to Cheat the Divell (printed 1639) is a farcical comedy, which contains among other things the idea of the popular supper story which reappears in Hans Andersen's Little dates and Big Claus. As told by Davenport the story closely resembles the Scottish Freires of Berwick, which was printed in 1603. Three other plays entered in the Stationers' Register as Davenport's are lost, and he collaborated in two plays with Thomas Drue.

Davenport's plays were reprinted by A. H. Bullen in Old English Plays (new series, 1890). The volume includes two didactic poems, which first saw the light in 1623.

DAVENPORT, a city and the county seat of Scott county, Iowa, U.S.A., on the Mississippi river, opposite Rock Island, Illinois, with which it is connected by two fine bridges and by a ferry. It is the third largest city in the state. Pop. (1890) 26,872; (1900) 35,254, including 8479 foreign-born (6111 German), and 19,230 of foreign parentage (13,294 German); (1905, state census) 39,797; (1910) 43,028. Davenport is served by the Chicago, Burlington & Quincy, the Chicago, Milwaukee & St Paul, the Chicago, Rock Island & Pacific, the Iowa & Illinois (interurban), and the Davenport, Rock Island & North Western railways; opposite the city

is the western terminus of the Illinois and Mississippi, or Hennepin, Canal (which connects the Mississippi and Illinois rivers). Davenport lies on the slope of a bluff affording extensive views of landscape and river scenery. In the city are an excellent public library, an Academy of Sciences, several turn-halls and other German social organizations, the Iowa soldiers' orphans' home, Brown business college, and several minor Roman Catholic institutions. Davenport is an episcopal see of the Roman Catholic and the Protestant Episcopal churches. The city has a large commerce,and trade by water and rail in coal and grain, which are produced in the vicinity, is of special importance. With Rock Island and Moline it forms one great commercial unit. Among Davenport's manufactures are the products of foundries and machine shops, and of flouring, grist and planing mills; glucose syrup and products; locomotives, steel cars and car parts, washing machines, waggons, carriages, agricultural implements, buttons, macaroni, crackers and brooms. The value of the total factory product for 1905 was $13,695,978, an increase of 38-7% over that of 1900. Davenport was founded in 1835, under the leadership of Colonel George Davenport; it was incorporated as a town in 1838, and was chartered as a city in 1851.

DAVENTRY, a market town and. municipal borough in the Southern parliamentary division of Northamptonshire, England, 74 m. N.W. from London by the London & North Western

railway. Pop. (1901) 3780. It is picturesquely situated on a sloping site in a rich undulating country. On the adjacent Borough Hill are extensive earthworks, and the discovery of remains here and at Burnt Walls, immediately south, proves the existence of a considerable Roman station. The chief industry of the town is the manufacture of boots and shoes. The borough is under a mayor, four aldermen and twelve councillors. Area, 3633 acres.

In spite of the Roman remains on Borough Hill, nothing is known of the town itself until the time of the Domesday Survey, when the manor consisting of

eight hides belonged to the countess Judith, the Conqueror's niece. According to tradition, Daventry was created a borough by King John, but there is no extant charter before that of Elizabeth in 1576, by which the town was incorporated under the name of the bailiff, burgesses and commonalty of the borough of Daventry. The bailiff was to be chosen every year in the Moot Hall and to be assisted by fourteen principal burgesses and a recorder. James I. confirmed this charter in 1605–1606, and Charles II. in 1674–1675 granted a new charter. The " quo warranto " rolls show that a market every Wednesday and a fair on St Augustine's day were granted to Simon son of Walter by King John. The charter of 1576 con- firms this market and fair to the burgesses, and grants them two new fairs each continuing for two days, on Tuesday after Easter and on the feast of St Matthew the Apostle. Wednesday is still the market day. The town was an important coaching centre, and there was a large local industry in the manufacture of whips. During the civil wars Daventry was the headquarters of Charles I. ,in the summer of 1645, immediately before the battle of Naseby, at which he was defeated. A Cluniac priory founded here shortly after the Conquest has left no remains.

DAVEY OF FERNHURST, HORACE DAVEY, Baron (1833–1907), English judge, son of Peter Davey, of Horton, Bucks, was born on the 30th of August 1833, and educated at Rugby and University College, Oxford. He took a double first-class in classics and mathematics, was senior mathematical scholar and Eldon law scholar, and was elected a fellow of his college. In 1861 he was called to the Bar at Lincoln's Inn, and read in the chambers of Mr (afterwards Vice- Chancellor) Wickens. Devoting himself to the Chancery side, he soon acquired a large practice, and in 1875 became a Q.C. In 1880 he was returned to parlia- ment as a Liberal for Christchurch, Hants, but lost his seat in 1885. On Gladstone's return to power in 1886 he was appointed solicitor-general and was knighted, but had no seat in the House, being defeated at both Ipswich and

Stockport in 1886; in 1888 he found a seat at Stockton-on-Tees, but was rejected by that constituency in 1892. As an equity lawyer Sir Horace Davey ranked among the finest intellects and the most subtle pleaders ever known at the English bar. He was standing counsel to the university of Oxford, and senior counsel to the Charity Com- missioners, and was engaged in all the important Chancery suits of his time. Among the chief leading cases in which he took a prominent part were those of The Mogul Steamship Company v. M'Gregor, 1892, Boswell v. Coaks, 1884, Erlanger v. New Sombrero Company, 1878, and the Ooregum Gold Mines Company v. Roper, 1892; he was counsel for the promoters in the trial of the bishop of Lincoln, and leading counsel in the Berkeley peerage case. In 1862 he married Miss Louisa Donkin, who, with two sons and four daughters, survived him. In 1893 he was raised to the bench as a lord justice of appeal, and in the next year was made a lord of appeal in ordinary and a life peer. He died in London on the 20th of February 1907. Lord Davey J s great legal knowledge was displayed in his judgments no less than at the bar. In legislation he took no conspicuous part, but he was a keen promoter of the act passed in 1906 for the checking of gambling.

DAVID (a Hebrew name meaning probably beloved 1), in the Bible, the son of Jesse, king of Judah and Israel, and founder of the royal Judaean dynasty at Jerusalem. The chronology of his period is uncertain: the usual date, 1055-1015 B.C., is probably

1 See further the third edition of Schrader's Keilinschr, v.. das Alte Test. pp. 225, 483.

Source.

thirty years to half a century too early. The books of Samuel (strictly, i Sam. xvi.i Kings ii.), which

are our principal source for the history of David, show how deep an impres sion the personality of the king, his character, his genius and the romantic story of his early years had left on the mind of the nation. Of no hero of antiquity do we possess so life-like a portrait. Minute details and traits of character are portrayed with a vividness which bears all the marks of contem- porary narrative. But the record is by no means all of one piece or of one date. This history, as we now have it, is extracted from various sources of unequal value, which are fitted together in a way which offers considerable difficulties to the critic. In the history of David's early adventures, for example, the narrative is not seldom disordered, and sometimes seems to repeat itself with puzzling variations of detail, which have led critics to the unanimous conclusion that the First Book of Samuel is drawn from at least two sources. It is indeed easy to understand that the romantic incidents of this period were much in the mouths of the people — to whom David was a popular hero — and in course of time were written down in various forms which were not combined into perfect harmony by later editors, who gave excerpts from several sources rather than a new and independent history. These excerpts, however, have been so pieced together, that it is often impossible to separate them with precision, and to distinguish accurately between earlier and later elements. It even appears from a study of the Greek text that some copies of the books of Samuel incorporated narratives which other copies did not acknowledge. For the literary problems of these books, see also Samuel (Books).

The parallel history of David in i Chron. xi.xxix. contains a great deal of additional matter, which can rarely be treated as of equal historical value with the preceding. Where it follows the chapters in Samuel it is important for textual and other critical problems, but it omits narratives in which it is not interested (David's youth, persecution by Saul, Absalom's revolt, &c), and adds long passages (David's arrangements for the temple, &c.) which

reflect the views of a much later age than David's. The lists of officers, &c, are fuller than those in Samuel, and here and there contain notices of value. A comparison of the two records, however, is especially important for its illustration of the later tendency to idealize the figure of David, and the historical critic has to bear in mind the possibility that this tendency had begun long before the Chronicler's time, and that it may be found in the relatively older records pre served in Samuel.

David's father, Jesse, was a citizen of Bethlehem in Judah, 5 m. south of Jerusalem; the polite deprecation in i Sam. xviii. 1 8 means little (cf. Saul in ix. 21). Tradition Introduc- ma(j e him a descendant of the ancient nobles of Saul. Judah through Boaz and the Moabitess Ruth, but the

tendency to furnish a noble ancestry for a noble figure — especially one of obscure birth — is widespread (cf. Genealogy). He was the youngest of eight sons, 1 and spent his youth in an occupation which the Hebrews as well as the Arabs seem to have held in low esteem. He kept his father's sheep in the desert steppes of Judah, and there developed the strength, agility, endurance and courage which distinguished him throughout life (cf. 1 Sam. xvii. 34, xxiv. 2; 2 Sam. xvii. 9). There, too, he ac- quired that skill in music which led to his first introduction to Saul (1 Sam. xvi. 14-23, and the apocryphal Psalm of David, Ps. cli. in the Septuagint). He found favour in the king's eye, and became his armour-bearer. 2 But traditions varied. In 1 Sam. xvii. he does not follow his master to the field against the Philistines; he is an obscure untried shepherd lad sent by his father with supplies for his brothers in the Israelite camp. He does not even present himself before the king, and his brothers treat him with a petulance hardly conceivable if he stood well at court, and it'

1 But four in xvii. 13 sqq., and seven in I Chron. ii. 13-15.

2 An armour-bearer was not a full warrior but a sort

of page or apprentice-in-arms, whose most warlike function is to kill outright those whom his master has struck down — an office which among the Arabs was often performed by women.

appears from the close that neither Saul nor his captain Abner had heard of him before (vv. 55-58). There is, indeed, a flat contradiction between the two accounts, but a family of Greek MSS. represented by the Vatican text omit xvii. 12-31, xvii. 55-xviii. 5, and thus the difficulty is greatly lessened. Character- istic of the omitted portions are the friendship which sprang up between Jonathan and David and the latter's appointment to a command in the army. A further difficulty is caused by 2 Sam. xxi. 19, which makes Elhanan the slayer of Goliath. David's exploit is not referred to in 1 Sam. xxi. 10-15, xxix., and on this and other grounds the simpler tradition in 2 Sam. is usually pre- ferred. (See Goliath.) But it must have been by some valiant deed that Saul was led to notice him (cf. xiv. 52), and David soon became both a popular hero and an object of jealousy to Saul. According to the Hebrew text of 1 Sam. xviii., Saul's jealousy leaped at once to the conclusion that David's ambition would not stop short of the kingship. Such a suspicion would be intelligible if we could suppose that the king had heard something of the significant act of Samuel, which now stands at the head of the history of David in witness of that divine election and unction with the spirit of Yahweh on which his whole career hung (xvi. 1- 13). But this passage is the sequel to the rejection of Saul in xv., and Samuel's position agrees with that of the late writer in vii., viii. and xii. 3

The shorter text, represented by the Septuagint, gives an account of Saul's jealousy which is psychologically more intelligible. 4 According to this text Saul was simply possessed with such a personal dislike and dread of c "amds David as might easily occupy his disordered brain. Saul. To be quit of his hateful presence he gave him a mili- tary command. In this charge David increased his reputation as a soldier and became a general

favourite. Saul's daughter Michal loved him; and her father, whose jealousy continued to increase, resolved to put the young captain on a perilous enter- prise, promising him the hand of Michal as a reward of success, but secretly hoping that he would perish in the attempt. David's good fortune did not desert him; he won his wife, and in this new advancement continued to grow in the popular favour, and to gain fresh laurels in the field. At this point it is necessary to look back on the proposed marriage of David with Saul's eldest daughter Merab (xviii. 17-19; cf. xvii. 25). When the time came for Saul to fulfil his promise, Merab was given to Adriel of Abel-Meholah (perhaps an Aramaean). What is said of this affair interrupts the original context of chap, xviii., to which the insertion has been clumsily fitted by an interpolation in the second half of ver. 21 (LXX omits). We have here, therefore, a notice drawn from a distinct source which connects itself with the other omitted passage, xvii. 12-31, where Saul had promised his daughter to the one who should overthrow Goliath (ver. 25). Since Merab and Michal are confounded in 2 Sam. xxi. 8, the whole episode of Merab and David perhaps rests on a similar confusion of names.

As the king's son-in-law, David was necessarily again at court. He became chief of the bodyguard, as Ewald rightly interprets 1 Sam. xxii. 14, and ranked next to Abner (xx. 25), so that Saul's insane fears were constantly exasperated by personal contact with him. On at least one occasion the king's frenzy broke out in an attempt to murder David with his own hand. 5 At another time Saul actually gave commands to assassinate his son-in-law, but the breach was made up by Jonathan, whose chivalrous spirit had united him to David in a covenant of closest friendship (xix. 1-7). The circumstances of the final outburst of Saul's hatred, which drove David into exile, are not easily disentangled.

3 See Samuel. The older history repeatedly indicates that David's kingship was predicted by a divine oracle, but would hardly .lead us to place the prediction so early (1 Sam. xxv. 30; 2 Sam. iii. 9,

v. 2).

4 The LXX omits xviii. 1–6 (to ” Philistine “), the first and last clauses of 8, 10–n, the reason given for Saul’s fear in 12, 17–19, the second half of 21. It also modifies 28, and omits the second half of 29 and the whole of 30.

6 I Sam. xix. 9. The parallel narrative, xviii. 10 sqq., is wanting in the Greek, and in the light of subsequent events is improbable. Its aim is to paint Saul’s character as black as possible.

DAVID

855

The narrative of 1 Sam. xx., which is the principal account of the matter, cannot originally have been preceded by xix. 11–24; in chap. xx. David appears to be still at court, and Jonathan is even unaware that he is in any danger, whereas the preceding verses represent him as already a fugitive. It may also be doubted whether the narrative of David’s escape from his own house by the aid of his wife Michal (xix. n–17) has any close connexion with ver. 10, and does not rather belong to a later period. 1 David’s daring spirit might very well lead him to visit his wife even after his first flight. The danger of such an enter- prise was diminished by the reluctance to violate the apartments of women and attack a sleeping foe, which appears also in Judges xvi. 2, and among the Arabs. 2

According to chap. xx. David was still at court in his usual position when he became certain that the king was aiming at his life. He betook himself to Jonathan, who thought his suspicions groundless, but undertook to test them. A plan was arranged by which Jonathan should draw from the king an expression of his feelings, and a tremendous explosion revealed that Saul regarded David as the rival of his dynasty, and Jonathan as little better than a fellow-conspirator. After a final interview (xx. 40–42), which must be regarded as a later expansion,

they parted and David fled. He sought the sanctuary at Nob, where he had been wont to consult the priestly oracle (xxii. 15), and here, concealing his disgrace by a fictitious story, he also obtained bread from the consecrated table and the sword of Goliath (chap. xxi. 1–9). 3 His hasty flight — without food and weapon — suggests that the narrative should follow upon xix. 17.

It was perhaps after this that David made a last attempt to find a place of refuge in the prophetic circle of Samuel at Ramah

(xix. 18–24). The episode now stands in another life connexion, where it is certainly out of place. It might,

however, fit into the break that plainly exists in the history at xxi. 10 after the affair at Nob. Deprived of the protection of religion as well as of justice, David tried his fortune among the Philistines at Gath. Recognized and suspected as a redoubtable foe, he made his escape by feigning madness, which in the East has inviolable privileges (xxi. n–16). 4 The passage anticipates chap, xxvii., and it is hardly probable that the slayer of Goliath or of any other Philistine giant fled to the Philistines with their dead hero's sword. He returned to the wilds of Judah, and was joined at Adullam 5 by his father's house and by a small band of outlaws, of which he became the head. Placing his parents under the charge of the king of Moab, he took up the life of a guerilla captain, cultivating friendly relations with the townships of Judah (xxx. 26), which were glad to have on their frontiers a protector so valiant as David, even at the expense of the blackmail which he levied in return. A clear conception of his life at this time, and of the respect which he inspired by the discipline in which he held his men, and of the generosity which tempered his fiery nature, is given in chap. xxv. His force gradually swelled, and he was joined by the prophet Gad (note his message xxii. 5) and by the priest Abiathar, the only survivor of a terrible massacre by which Saul took revenge for the favours

which David had received at the sanctuary of Nob. He was even able to strike at the Philistines, and to rescue Keilah (south of Adullam and to the east of Beit Jibrln) from their attack

1 The close of ver. 10 in the Hebrew is corrupt, and the words ” (and it came to pass) that night ” seem to belong to the next verse (so the Greek). H. P. Smith suggests that the passage origin- ally followed upon xviii. 27.

2 Wellhausen cites a closely parallel case from Sprenger’s Leben Muhammad, vol. ii. p. 543.

3 On the meaning of this difficult passage, see the discussions by W. R. Smith, Religion of the Semites^), p. 455 sqq., and Schwally Semit. Kriegsalterthiimer , p. 60 sqq.

4 Interesting parallels in Barhebraeus Chron., ed. Brun and Kirsch, p. 222, and Ewald, Hist. Israel, iii. p. 84.

5 The cave of Adullam has been traditionally placed (since the 12th century) at Khareitun, two hours’ journey south of Bethlehem. But the town of Adullam, which has not been identified with any certainty, lay in the low country of Judah (Josh. xv. 35). The ” cave ” is also spoken of as a ” hold ” or fortress, and this is every- where the true reading. The name has been identified with ‘Id-el-md (or -miye) about 12 m. S.W. of Bethlehem.

(xxiii. 1-13). Forced to flee by the treachery of the very men whom he had succoured, he lived for a time in constant fear of being captured by Saul, and at length took refuge with Achish king of Gath and established himself in Ziklag. Popular tradi- tion, as though unwilling to let David escape from Saul, told of that king’s continual pursuit of the outlaw, of the attempt of the men of Ziph (S.E. of Hebron) to betray him, of David’s magnan- imity displayed on two occasions, and of Jonathan’s visit to console his bosom friend (xxiv.-xxvi.). 6 The situation was one which lent itself to the imagination.

The site of Ziklag is unknown. It hardly lay near Gath (probably Tell es-Sa.fi, 12 m. E. of Ashdod), but rather to the south of Judah (Josh. xix. 5). Here he occupied himself in chastening the Amalekites and other robber tribes who made raids on Judah and the Philistines without distinction (xxvii.). The details of the text are obscure, and seem to imply that David systematically attacked populations friendly to Achish whilst pretending that he had been making forays against Judah. If this were an attempt to steer a middle course his true actions could not have been kept secret long, and as it is implied that the Philistines subsequently acquiesced in David's sovereignty in Hebron, it is not easy to see what interest they had in embroiling him with the men of Judah. At length, in the second year, he was called to join his master in a great campaign against Saul. The Philistines for once directed their forces towards the plain of Jezreel (Esdraelon) in the north; and Saul, forsaken by Yahweh, already gave himself up for lost. David accompanied the army as a matter of course. But his presence was not observed until they reached their destination, when the jealousy of the Philistines overrode his protestations of fidelity and he was ordered to return. He reached Ziklag only to find the town pillaged by the Amalekites. Pursuing the foes, he inflicted upon them a signal chastisement and took a great booty, part of which he spent in politic gifts to the leading men of the towns in the south country. 7

Meantime Saul had fallen in battle, and northern Israel was in

a state of chaos. The Philistines took possession of the fertile

lowlands of Jezreel and the Jordan, and the shattered forces

of Israel were slowly rallied by Abner in the remote city of

Mahanaim in Gilead, under the nominal sovereignty of

Saul’s son

Ishbaal. David now took the first great step to the throne. He

was no longer an outlaw with a band of wandering companions,

but a petty chieftain, head of a small colony of men, allied with

families of Caleb and Jezreel (in Judah) , and on friendly footing

with the sheikhs south of Hebron. In response to an

oracle he was bidden to move northwards to Judah „"i a 1 r n • t • • i tt i • • Hebron,

and successfully occupied it with Hebron as his capital.

Here he was anointed king, the first ruler of the southern kingdom. If the chronological notice may be trusted, he was then thirty years of age, and he reigned there for seven and a half years (2. Sam. ii. 1-40, 11, v. 4 sq.). The noble elegy on the death of Saul and Jonathan, quoted from the Book of Jashar (2 Sam. i.), is marked by the absence both of religious feeling and of allusions to his earlier experiences with Saul which David might have been expected to make. It was deemed only natural that he should sympathize deeply with the disasters of the northern kingdom. His vengeance on the Amalekite who slew Saul — the account is a doublet of 1 Sam. xxxi. — is consistent with his generous treatment of his late adversary in his outlaw life, and with this agrees his embassy of thanks to the men of Jabesh-Gilead for their chivalrous rescue of the bodies of the fallen heroes (2 Sam. ii. 46-7). The embassy threw out a hint, — their lord was dead and David himself had been anointed king over Judah; but the relation between Jabesh-Gilead and Saul had been a close one, and it was not to be expected that its eyes would be turned upon the king of Judah when Saul’s son was installed at the not distant

Mahanaim.

6 According to a late Rabbinical story, David, like Bruce of Scotland, was once saved by a spider which spun its web over the cave wherein he was concealed.

7 The law of the distribution of booty after war enacted by David (xxx. 24 sqq.) is given as a Mosaic precedent in the post-exilic priestly legislation (Num. xxxi. 27). On the importance of this explicit statement, see W. R. Smith, Old Test, in Jewish Churchi?), 386 sq.

The interest of the narratives is now directed away from the Philistines to the decaying fortunes of Saul's house. (See Abner and Saul.) Abner had taken Saul's son Ishbaal and his authority was gradually consolidated in the north. War broke out between the two parties at Gibeon a few miles north of Jerusalem. A sham contest was changed into a fatal fray by the treachery of Ishbaal's men; and in the battle which ensued Abner was not only defeated, but, by slaying Asahel, drew upon himself a blood-feud with Joab. The war continued. Ishbaal's party became weaker and weaker; and at length Abner quarrelled with his nominal master and offered the kingdom to David. The king seized the opportunity to demand the return of Michal, his wife. The passage (iii. 12-16) is not free from difficulties, but it is intelligible that David should desire to ally himself as closely as possible with Saul's family (cf. xii. 8). The base murder of Abner by Joab did not long defer the inevitable issue of events. Ishbaal lost hope, and after he had been foully assassinated by two of his own followers, all Israel sought David as king.

The biblical narrative is admittedly not so constructed as to enable us to describe in chronological order the thirty-three years of David's reign over all Israel. It is possible that

some of the incidents ascribed to this period properly belong to an earlier part of his life, and that tradition has idealized the life of David the king even as it has not failed to colour the history of David the outlaw and king of Hebron.

In the preceding account the biblical narratives have been followed as closely as possible in the light of the critical results Crtti I generally accepted. That they have been affected by the °fL _ growth of popular tradition is patent from the traces tlons ” °^ duplicate narratives, from the difficulty caused, for example, by the story of Goliath (g.».),and from a closer study of the chapters. The later views of the history of this period are represented in the book of Chronicles, where immediately after Saul’s death David is anointed at Hebron king over all Israel (1 Chron. xi.). It is quite in harmony with this that the same source speaks of the Israelites who joined David at Ziklag (1 Chron. xii. 1–22), and of the host which came to him at Hebron to turn over to him Saul’s kingdom (xii. 23–40). This treatment of history can be at once corrected by the books of Samuel, but it is only from a deeper study of the internal evidence that these, too, appear to give expres- sion to doubtful and conflicting views. It is questionable whether David could have become king over all Israel immediately after the death of Ishbaal. The chronological notices in ii. 10 sqq. allow an interval of no less than five and a half years, and nowhere do the events of these years appear to be recorded. But David’s position in the south of Judah is clear. He is related by marriage with south Judaean clans of Caleb, Jezreel, and probably Geshur. (See Absalom.) He was at the head of a small colony (1 Sam. xxvii. 3), and on friendly terms with the sheikhs south of Hebron (xxx. 26–31). 1 His step forward to Hebron is in every way intelligible and is the natural outcome of his policy. It is less easy to trace his previous moves. There are gaps in the narratives, and the further back we proceed the more serious do their difficulties become. These chapters bring him farther north, and they commence

by depicting David as a man of Bethlehem, high in the court of Saul, the king's son-in-law, and a popular favourite with the people. But notwithstanding this, the relation is broken off, and years elapse before David gains hold upon the Hebrews of north Israel, the weakness of the union being proved by the ease with which it was subsequently broken after Solomon's death. Much of the life of Saul is obscure, and this too, it would seem, because tradition loved rather to speak of the founder of the ideal monarchy than of his less successful rival. (See Saul.) It is not impossible that some traditions did not bring them together. If Jerusalem and its immediate neighbourhood were first conquered by David (2 Sam. v.), it is probable that Beeroth and Gibeon (2 Sam. iv. 2, xxi. 2), Shaalbim, Har-heres and Aijalon (Judg. i. 35), Gezer {ib. i. 29), Chephirah and Kirjath-jearim (Josh. ix. 17) had remained Canaanite. The evidence has obviously some bearing upon the history of Saul, as also upon the intercourse between Judah and Benjamin which David's early history implies. It has been conjectured, therefore, that David's original home lay in the south. Since the early historical narrative (1 Sam. xxv. 2) finds him in Maon, Winckler has suggested that he was a Calebite chief, while a criticism of the details relating to David's family has induced Marquart 2 to conjecture that he was born at Arad (Tell 'Arad)

1 Bethel (ver. 27) is probably the Bethuel near Ziklag (1 Chron. iv. 30). David's friendly relations with the Philistines find a parallel in Isaac's covenant with Abimelech {q.v.). In Ps. xxxiv. the latter name actually appears in place of Ach'ish.

2 Fundamente israel. u. jiid. Gesch. (1896), pp. 23 sqq.; see also Winckler, Gesch. Isr. i. 24; Keilinschr. u. d. Alte Test.(z), p. 228 sqq.

about 17 m. S.E. of Hebron. Once indeed we find him in the wilder- ness of Paran 1 (Sam. xxv. I , LXX reads Maon) , and a more southerly origin has been thought of (Winckler). This is involved with other views of the early history of the Israelites; see

further below.

David owed his success to his troop of freebooters (1 Sam.

xxii. 2), now an organized force, and absolutely attached to his

person. The valour of these ” mighty men ” (gibborim)

was topical. The names of the most honoured are Capture iii r ofJeru-

preserved, and we have some interesting accounts of salem.

their exploits in the days of the giants (2 Sam. xxi.,

xxiii.). We hear of two great battles with the ” Philistines ” in

the valley of Rephaim, near Jerusalem, at a time when David’s

base was Adullam (v. 17–25). In one conflict a giant thought

to slay him, but he was saved by Abishai, the brother of Joab,

and the men took an oath that David should no more go to battle

lest he ” quench the light of Israel.” On another occasion,

Elhanan of Bethlehem slew the giant Goliath of Gath, and

David’s own brother Shimei (or Shammah) overthrew a monster

who could boast of twenty-four fingers and toes. In yet another

incident the Philistines maintained a garrison in Bethlehem,

and David expressed a wish for a drink from its well. The wish

was gratified at the risk of the lives of three brave men, and he

recognized the solemnity of the occasion by pouring out the

water as an offering unto Yahweh.

From a later summary (viii. 1) it seems that the Philistines were at length vanquished, and the unknown Metheg-Ammah taken out of their hands. 3 Not until the district was cleared could Jerusalem be taken, and the capture of the almost impreg- nable Jebusite fortress furnished a centre for future action. Here, in the midst of a region which had been held by aliens, he fortified the " city of David " and garrisoned it with his men. Meanwhile the ark of Yahweh, the only sanctuary of national significance, had remained in obscurity since its return from the Philistines in the early youth of Samuel. (See Ark.) David brought it up from Baalah of Judah with great pomp, and pitched a tent for it in Zion, amidst national rejoicings. The narrative (2 Sam. vi.) represents the act as that of a loyal and God-fearing heart which knew that the true principle of Israel's unity and strength lay in national adherence to Yahweh; but the event was far from having the significance which later times ascribed to it (1 Chron. xiii., xv. sqq.) ; even Solomon visited the sanctuary at Gibeon, and Absalom vowed his vow unto Yahweh at Hebron. It was not unnatural that the king who had his palace built by Tyrian artists should have proposed to erect a permanent temple to Yahweh. Such, at least, was the thought of later writers, who have given effect to the belief in chap. viii. It was said that the prophet Nathan commanded the execution of this plan to be delayed for a generation; but David received at the same time a prophetic assurance that his

house and kingdom should be established for ever before Yahweh.

What remains to be said of his internal policy may be briefly detailed. In civil matters the king looked heedfully to the execution of justice (viii. 15), and was always accessible to the people (xiv. 4) . But he does not appear to have po u C y. made any change in the old local administration of justice, or to have appointed a central tribunal (xv. 2, where, however, Absalom's complaint that the king was inaccessible is merely factious). A few great officers of state were appointed at the court of Jerusalem (viii. 16–18, xx. 23–26), which was not without a splendour hitherto unknown in Israel. Royal pensioners, of whom Jonathan's son Mephibosheth was one, were gathered round a princely table. The art of music was not neglected (xix. 35). A more dangerous piece of magnificence was the harem. Another innovation was the census; it was under- taken despite the protests of Joab, and was checked by the rebukes of the prophet Gad and the visitation of a pestilence (xxiv.). Striking, too, is the conception of the national God who incites the king to do an act for which he was to be punished. 4 To us, the proposal to number the people seems innocent and

3 1 Chron. xviii. I reads " Gath and her dependent villages"; the original reading is a matter for conjecture.

4 Cf. the idea in I Kings xxii. 19–23; Ezek. xiv. 9; contrast I Chron. xxi. I.

laudable, and the latest sources of the Pentateuch contain several such lists. This new procedure, we may imagine, was resented by the northern Hebrews as an encroachment upon their liberties. We learn that the destroying angel was stayed at the threshing-floor of Araunah the Jebusite, 1 and the spot thus

sanctified was made a sanctuary, and commemorated by an altar. It was the very place upon which Solomon's temple was supposed to be founded. The census-taking may have been a preliminary to the great wars, but the latter, on the other hand, are obviously presupposed by the extent of his kingdom. For his wars a larger force than his»early bodyguard was required, and the Chronicler gives an account of the way in which an army of nearly 300,000 was raised and held by David's thirty heroes (1 Chron. xxvii.). It is certain at all events that no small body of soldiers would be needed, and this alone would imply that all Israel was by this time under his entire control.

Apart from the Ammonite war, our sources are confined to a mere summary (viii.), which includes even the Amalekites (viii. 12, cf. 1 Sam. xxx.). After the defeat of the coiTuesti Philistines came the turn of Moab. It was under the care of the king of Moab that David placed his parents when he fled from Saul (1 Sam. xxii. 3 sqq.), and what led to the war is unknown. The severity with which the land was treated may pass for a gentle reprisal if the Moabites of that day were not more humane than their descendants in the days of King Mesha. 2 A deadly conflict with the Ammonites was provoked by a gross insult to friendly ambassadors of Israel; 3 and this war, of which we have pretty full details in 2 Sam. x. i-xi. 1, xii. 26-31, assumed unexpected dimensions when the Ammonites procured the aid of their Aramean neighbours. The defeat of Hadadezer brought about the submission of other lesser kings. The glory of this victory was increased by the complete subjugation of Edom in a war conducted by Joab with characteristic severity (2 Sam. viii. 13; 1 Kings xi. 15-17; Ps. lx., title). The fall of Rabbah concludes David's war-like exploits; he carried off the jewelled crown of their god (Milcom), and subjected the people, not to torture (1 Chron. xx. 3), but to severe menial labour (xii. 26-31).

The Aramean states, Beth-rehob, Maacah, Tob, &c., lay partly to the north of Gilead and partly in the

region which was the scene of the fight with Jabin (Josh. xi. 1-9, Judg. iv. ; see Deborah). Apparently it was here, too, that the Danites found a settlement (Judg. xviii. 28) ; the migration has perhaps been ante-dated. (See Dan, tribe.) The account of David's wars is remarkable for the inclusion of the Syrians of Damascus and beyond the Euphrates; some exaggeration has been suspected (cf. 2 Sam. viii. 5 with x. 16). Some misunder- standing has been caused by the confusion of Edom (nut) and Aram (mi) in viii. 13. A more moderate idea of David's power has been found in Ps. lx. 6-12, or, preferably, in the description of the boundaries (2 Sam. xxiv. 5 sqq.). To the east of the Jordan he held rule from Aroer to Gad and Gilead; on its west his power extended from Beersheba in the south to Dan and Ijon at the foot of Hermon. Moab, Ammon and Edom would appear to have been merely tributary, whilst in the north among his allies David could number the king of Hamath. To the north-west Israel bordered upon Tyre, with whom its relations were friendly. The king of Tyre, who recognized David's newly won position (v. 11 seq.),is called Hiram; possibly — unless the notice is an anticipation of I Kings v. — his father Abibaal is meant. 4

As the birth of Solomon is placed before the capture of Rabbah

of Ammon (xii.), it would appear that David's wars were ended

within the first half of his reign at Jerusalem, and the

troubles, tributary nations thus do not seem to have attempted

any revolt during his lifetime (see 1 Kings xi. 14 sqq.

and 25). It was only when the nation was no longer knit

1 This un-Hebraic name, which is not unlike aron, "

ark," should possibly be corrected to Adonijah (Cheyne, Ency. Bib. s.v.).

2 David destroyed two-thirds of the Moabites — presumably of their fighting men (2 Sam. viii. 2) ; Mesha destroys the inhabitants of the captured cities in honour of his god Chemosh.

3 It finds a parallel in the fate of the heralds of Orchomenus (Frazer, Pausan. v. 135) and in an Arabian story (Ibn Athlr, viii. 360; Noldeke in Budde, Hand-Commentar, ad loc.) ; cf. also Ewald, iii.

I5 2 -

4 On the questions raised see the commentaries upon 2 Sam. viii. and x. and the Ency. Biblica, s.vv. " David," " Merom," " Zobah." The main problem is whether the account of David's rule has been exaggerated, or whether the attempt has been made to throw back to the time of the first king of all Israel later political conditions.

together by the fear of danger from without that the internal difficulties of the new kingdom became more manifest. Such at least is the impression which the narratives convey. 5 So, after David had completed a series of conquests which made Palestine the greatest of the petty states of the age, troubles arose with the Israelites, who in times past had sought for him to be king (iii. 17, v. 1-3), with his old subjects the men of Judah, and with the members of his own household. The northern tribes, who appear to have submitted willingly to his rule, were not all of one mind. There were men of stronger build than the weak Ishbaal and the crippled son of Jonathan, the survivors of Saul's house, and it is only to be expected that David's first care must have been to cement the union of the north and south. The choice of Jerusalem, standing on neutral ground, may be regarded as a stroke of genius, and there is nothing to show that the king exercised that rigour which was to be the cause of his grandson's undoing. (See Rehoboam.) On the other

hand, when Sheba, probably one of Saul's clan, headed a rising and was promptly pursued by Joab to Abel-beth-maacah on the west of Dan, honour was satisfied by the death of the rebel, and no further steps were taken (xx.). s This policy of leniency towards Israel is characteristic of David, and may well have become a popular theme in the tales of succeeding generations. This same magna- nimity towards the survivors of Saul's house has left its mark upon many of the narratives, and helps to a truer understanding of the stories of his early life. Thus it was quite in keeping with the romantic attachment between David and Saul's son Jonathan that when he became king of Israel he took Jonathan's son Meribbaal under his care (ix.). 7 The deed was not merely generous, it was politic to have Saul's grandson under his eyes. The hope of restoring the lost kingdom had not died out (cf. xvi. 3). But from another source we gain quite a different idea of the relations. A disastrous famine ravaged the land for three long years, and when Yahweh was consulted the reply came that there was " blood upon Saul and upon his house because he put the Gibeonites to death." The unavenged blood was the cause of divine anger, and retribution must be made. This David recognized, and, summoning the injured clan, inquired what expiation could be made. Bloodshed could only be atoned by blood-money or by shedding the blood of the offender or of his family. The Gibeonites demanded the latter, and five sons of Merab (the text by a mistake reads Michal) and two sons of Saul's concubine were sacrificed. The awful deed took place at the beginning of harvest (April-May), and the bodies remained suspended until, with the advent of the autumn rains, Yahweh was once more, reconciled to his land (xxi. 1-14). The incident is a valuable picture of crude ideas of Yahweh, and, if nothing else were needed, it was sufficient to involve David in a feud with the Benjamites. 8 Here, too, we learn of the tardy burial of the bones of Saul and Jonathan which had remained in Jabesh- Gilead since the battle of Gilboa;— the history of David's dealings with the family of Saul has been obscured. That he took over

his harem is only in accordance with the Eastern policy (cf . xii. 8).

The harem, an indispensable part of Eastern state, was respons-„ ible for many fatal disorders, although it is clear from 2 Sam. xvi. 21 that the nation at large was not very sensitive ,

to the enormities which flow from this system. David's revolt. deep fall in the matter of Bathsheba (xi.) was too great an iniquity to be passed over lightly, and the base murder of her

6 Viz. the present position of 2 Sam. ix.-xx. after the miscellaneous collection of details in v.-viii. See, on the other hand, the view of I Kings v. 3, 4.

6 The present position of this incident, immediately after Absalom's rebellion was quelled, is almost inconceivable (Winckler, H. P. Smith, B. Luther, Ed. Meyer). See next page.

7 He was five years of age at the battle of Gilboa (iv. 4) , and is now grown up and with a young child (ix. 12). But the narrative loses its point unless David's kindness " for Jonathan's sake " comes at an early date soon after he became king, and although the youth is found at Lo-debar (east of the Jordan) under the protection of Machir, the independent fragment in ii. 8 sqq. implies that the Israelites had recovered the position they had lost at the battle of Gilboa.

8 There is an unmistakable reference to the occurrence in the episode of Shimei, who hovers in the background of Absalom's revolt with a large body of men at his command (xvi. 7 sqq.).

husband Uriah the Hittite could not go unavenged. Bathsheba's influence added a new element of danger to the usual jealousies of the harem, and two of David's sons perished in vain attempts to claim the

throne, which she appears to have viewed as the rightful inheritance of her own child. This, at least, is certain in the revolt of Adonijah (see Solomon), and it was probably believed that the action of the impulsive Absalom arose from the suspicion that the birth of Solomon was the death-blow to his succession.

As a piece of writing the vivid narratives are without an equal. David's sons were estranged from one another, and acquired all the vices of Oriental princes. The severe impartiality of the sacred historian has concealed no feature in this dark picture, — the brutal passion of Amnon, the shameless counsel of the wily Jonadab, the " black scowl " 1 that rested on the face of Absalom through two long years of meditated revenge, the panic of the court when the blow was struck and Amnon was assassinated in the midst of his brethren. Not until five years had elapsed was Absalom fully reconciled with his father. Then he meditated revolt. As heir-apparent he collected a bodyguard, and studi- ously courting personal popularity by a pretended interest in the administration of kingly justice, ingratiated himself with the mass. Four years later (so read in xv. 7) he ventured to raise the standard of revolt in Hebron, with the malcontent Judaeans as his first supporters, and the crafty Ahithophel as his chief adviser. Arrangements had been made for the simultaneous proclamation of Absalom in all parts of the land. The surprise was complete, and David was compelled to evacuate Jerusalem, where he might have been crushed before he had time to rally his faithful subjects. He was warmly received by the Gileadites, and the first battle destroyed the party of Absalom, who was himself captured and slain by Joab. Then all the people repented except the men of Judah, who were not to be conciliated without a virtual admission of prerogative of kinship to the king. This concession involved important consequences. The precedence claimed by Judah was challenged by the northern tribes even on the day of David's victorious return to his capital, and a rupture ensued, headed by Sheba, which but for the

energy of Joab might have led to a second and more dangerous rebellion.

Several indications suggest that the revolt was one in which the men of Judah originally took the leading if not the only part. The unruly clans which David knew how to control when he was at Ziklag or Hebron were doubtless ready to support the rebellious son. The removal of the court to Jerusalem provided a suitable oppor- tunity, and an element of jealousy even may not have been wanting. If Geshur be the district in Josh. xiii. 2, 1 Sam. xxvii. 8, it is sig- nificant that the scene of Absalom's exile lay to the south, that Ahithophel was a south Judaean, and that Amasa probably belonged to the Jezreel 2 with which David was connected through his wife Ahinoam. The eleven years which elapsed between the murder of Amnon and the revolt would seem to disprove any connexion between the two; the chronology may rest upon the tradition that Solomon was twelve years old when he came to the throne. David's hurried flight, attended only by his bodyguard, indicates that his position was not a very strong one, and it is difficult to connect this with the fact that he had already waged the wars mentioned in 2 Sam. viii. and x. If his reason for taking refuge in Ishbaal's capital Mahanaim is not obvious, it is even more remarkable that he should have been received .kindly by the Ammonites whom he had previously decimated. On the theory that the revolt of Absalom chronologically should precede the great wars, a slight correction of the already corrupt text in xvii. 27 makes Nahash himself David's ally, and accounts for David's eagerness to repay to Hanun, the son of Nahash, the kindness which he had received from the father (x. 2). That the revolt of Sheba is in an impossible position is obvious. Tradition has probably confused Benjamite risings with Absalom's misguided enterprise; the parts played by Shimei and Meribbaal, at all events, are extremely suggestive. See Absalom, Ahithophel.

The Appendix ascribes to David a song of triumph and some exceedingly obscure " last words " (xxii.- xxiii. 7) which cannot

*be used as historical material. The history of his life life-work. * s immediately continued in 1 Kings i., where his old*

age and weakness are for the first time vividly empha- sized. The events of the remaining years after 2 Sam. xx. are left untold, but the Chronicler omits the revolt of Absalom and

1 If Ewald's brilliant interpretation of an obscure word in 2 Sam. xiii. 32 be correct.

2 " Israelite " (2 Sam. xvii. 25) is a very unnecessary designation; I Chron. ii. 17 would make him an Ishmaelite.

represents the king as busily occupied with schemes concerning the future temple. The last spark of his old energy was called forth to secure the succession of Solomon against the ambition of Adonijah. It is noteworthy that, as in the case of Absalom, the pretender, though supported by Joab and Abiathar, found his chief stay among the men of Judah (1 Kings i. 9). (See Solomon.)

To estimate the work of David it is necessary to take into account the situation before and after his period. According to the prevailing traditions, Saul at his death had left North Israel disunited and humiliated. From this condition David raised the land to the highest state of prosperity and glory, and by his conquests made the united kingdom the most powerful state of the age. To do this other qualities than mere military capacity were required. David was not only a great captain, he was a national hero in whom all the noblest elements of the Hebrew genius were combined. His talent enabled him to weld together the mixed southern clans which became incorporated under Judah, and to build up a monarchy which represented the highest conception of national life possible under the circum- stances. The structure, it is true, was not permanent. Under his successor it began to decay, and in the next generation it fell asunder and lived only in the hearts of the people as the proudest memory of past

history and the prophetic ideal of future glory. 3 Opinion will differ, however, as to the extent to which later ideals have influenced the narratives upon which the student of Hebrew history and religion is dependent, and how far the reigns of David and Solomon altered the face of Hebrew history. The foundation of the united monarchy was the greatest advance in the whole course of the history of the Israelites, and around it have been collected the hopes and fears which a varied experience of mon- archical government aroused. Many of the narratives furnish a vivid picture of the life of David with a minuteness of personal detail which has suggested to some that their author was inti- mately acquainted with the events, and, if not a contemporary, belonged to the succeeding generation, while to others it has seemed more probable that these reflect rather " the plastic mould of popular tradition." It cannot be doubted that the three types of David, represented by the books of Samuel, of Chronicles, and the superscriptions of the Psalms, are irreconcil- able, and that they represent successive developments of the original traditions. That the oldest of these three does not contain earlier attempts to idealize him is unlikely. " Political circumstances naturally led to an ever-increasing appreciation of his person and his work as the unifier of Israel. In the eyes of posterity he became more and more completely the model of an Israelitish king and the natural consequence was that he was idealized. The hope of the regeneration of his dynasty, and, at a later period, of its restoration to the throne — the Messianic expectation — must have worked powerfully in the same direction. And meanwhile the religious convictions of the highest minds in Israel were undergoing a marked change. The conceptions of Yahweh and of the religion which was acceptable to him were constantly being elevated and purified. This could not but have an influence on the current ideas concerning David. He, too, must be remodelled as the conceptions of God were changed." 4 But what is lost as regards historical material is a distinct gain to the study of the development of Hebrew

thought and philosophy of history.

David's character must be judged partly in the light of the times in which he lived and partly in connexion with the great truths which he represents, truths whose value is not impaired should they prove to be the convictions of later ages. Accord- ingly, David is not to be condemned for failing to subdue the sensuality which is the chief stain on his character, but should rather be judged by his habitual recognition of a generous standard of conduct, by the undoubted purity and lofty justice of an administration which was never stained by selfish considera- tions or motives of personal rancour, 5 and finally by the calm

3 See Hebrew Religion, Messiah, Prophet.

4 Kuenen, " The Critical Method," Modern Review, 1880, p. 701 (Gesammelte Abhandlungen, Germ. ed. by Budde, p. 33).

6 His charges to Solomon in 1 Kings ii. 5-9 do not arise necessarily from motives of revenge; a young and untried sovereign could not

courage which enabled him to hold an even and noble course in the face of dangers and treachery. His great sin in the matter of Uriah would have been forgotten but for his repentance: the things at which modern ideas are most offended are not always those that would have given umbrage to early writers. That he did not reform at a stroke all ancient abuses appears particularly in relation to the practice of blood revenge; to put an end to this deep-rooted custom would have been an impossibility. But it is clear from 2 Sam. iii. 28 sqq., xiv. 1-10, that his sympathies were against the barbarous usage. Nor is it just to accuse him of cruelty in his treatment of enemies. As it was impossible to establish a military cordon along the borders of

Canaan, it was necessary absolutely to cripple the adjoining tribes. From the lust of conquest for its own sake David appears to have been wholly free.

The generous elevation of David's character is seen most clearly in those parts of his life where an inferior nature would have been most at fault, — in his conduct towards Saul, in the blameless reputation of himself and his band of outlaws in the wilderness of Judah, in his repentance under the rebuke of Nathan and in his noble bearing on the revolt of Absalom. His touching love for his worthless son is one of the most beautiful descriptions of paternal affection. His unfailing insight into character, and his power of winning men's hearts and touching their better impulses, appear in innumerable traits (e.g. 2 Sam. xiv. 18-20, iii- 3i-37> xxiii. 15-17), and here, as elsewhere, the charm which the life of David has upon its readers is entirely unaffected by technical questions of literary and historical criticism.

To the later generations David was pre-eminently the Psalmist

and the founder of the Temple service. The Hebrew titles ascribe

, to him seventy-three psalms; the Septuagint adds Growth of ,,. J j , . '. . ^ , f, T . ,

tradition. some fifteen more; and later opinion, both Jewish

and Christian, claimed for him the authorship of the

whole Psalter (so the Talmud, Augustine and others). That the

tradition of the titles requires careful sifting is rto longer doubted,

and the results of recent criticism have been to confirm the view

that " it is no longer possible to treat the psalms

as a record of

David's spiritual life through all the steps of his chequered

career " (W. R. Smith, Old Test, in Jew. Church 2 , p. 224). Nor

can it be maintained that the elaborate ritual ascribed to David

by the chronicler has any historical value. See further

Chronicles, Psalms.

On the other hand, these traditions, however unhistorical in their present form, cannot be pure imagination. The male and female singers (if the reading be correct) whom Sennacherib carried off from Jerusalem in Hezekiah's time, may well have belonged to an old foundation (A. Jeremias, Alte Test, im Lichte d. Allen Orients 2 , p. 527), and though David's skill referred to in Amos vi. 5 may be due to a gloss, it is a Judaean narrative which tells of the inven- tion of music, ascribing it possibly to a Judaean legendary hero (Gen. iv.21). And although the Levitical organization, as ascribed to David, is manifestly post-exilic, it is at least certain that many of the Levitical families were of southern origin. It is in David's history that the clans of the south first attained prominence, and some of them are known to have been staunch upholders of a purer worship of Yahweh, or to have been associated with the introduction of religious institutions among the Israelites. (See Levites.)

The difficulty of the historical problems increases when the nar- ratives of David are more closely studied: (a) 2 Sam. iii. 18, xix. 9 show that according to one view David delivered Israel (not Judah) from the Philistines. This is in contradiction to ii. 8 sqq. (from another source), where Saul's son recovers Israelite territory, but is supported by ix., where Mephibosheth is found at

Lo-debar. This historical view has probably left its trace upon the present traditions of Saul, whose defeat by-the " Philistines " (here found in the north and not as usual in the south) left Israel in much the same position as when he was anointed king (cf. 1 Sam. xxxi. 7 with xiii. 7). Again (b) the primitive stories of conflicts with " Philistine " giants between Hebron and Jerusalem (2 Sam. v. 17 sqq., xxi. 15 sqq. and xxiii.) find their analogy in Caleb's overthrow of the sons of Anak (Judg. i. 10; Josh. xv. 14), and in the allusion to the same prehistoric folk in the account of the spies (Num. xiii. 28). From a number of points of evidence there appears to have been a group of traditions of a movement from the south (probably Kadesh, Num. xiii. 26) associ-

afford to continue the clemency which his father was strong enough to extend to dangerous enemies. Apart from this, it is possible that the words have been written to shift from Solomon's shoulders the blood-shed incurred in establishing his throne.

ated with Caleb, David and the Levites. If the clans of Moses' kin which moved into Judah bore the ark (Num. x. 29 sqq. ; see Kenites), and if Abiathar carried it before David (1 Kings ii. 26), there were traditions of the ark distinct from those which associate it with Joshua and Shiloh (cf. 2 Sam. vii. 6). But the stories of conflicts in a much larger area than the few cities in the immediate neighbourhood of Jerusalem (see above) can scarcely be read with the numerous narratives which recount or imply relations between the young David of Bethlehem and Saul or the Israelites. It is possible, therefore, that one early account of David was that of an entrance into the land of Judah, and that round him have gathered traditions partly individual and partly tribal or national. See further S. A. Cook, Critical Notes on O.T. History, pp. 122 sqq., and art. Jews (History), §§ 6-8.

Literature. — Robertson Smith's later views subsequent to 1877 (when he wrote the article on David for this Encyclopaedia) were expressed partly

in the Old Test, in Jewish Church (1881 and 1892), passim, and partly in the article on the Books of Samuel in the Ency. Brit. (9th ed.) ; on David's character see especially his criticism of Renan, Eng. Hist. Rev., 1888, pp. 13d sqq. Mention may be made of Stahelin's Leben Davids (Basel, 1866), still valuable for the numerous parallels adduced from oriental history; Cheyne's Aids to Devout Study of Criticism (1892), a criticism of David's history in its bearing upon religion; Marcel Dieulafoy, David the King (1902), full, but not critical; H. A. White, Hastings' Diet. art. " David "; Cheyne, Ency. Bib. art. " David "; and (on the romantic element in the narratives) Luther in Ed. Meyer, Israeliten und ihre Nachbarstdmme (1906), pp. 181 sqq. (W. R. S.; S. A. C.)

DAVID, ST (Dewi, Sant), the national and tutelar saint of Wales, whose annual festival, known as " St David's Day," falls on the 1 st of March. Few historical facts are known regarding the saint's life and actions, and the dates both of his birth and death are purely conjectural, although there is reason to suppose he was born about the year 500 and died at a great age towards the close of the 6th century. According to his various biographers he was the son of Sandde, a prince of the line of Cunedda, his mother being Non, who ranks as a Cymric saint. He seems to have taken a prominent part in the celebrated synod of Llanddewi-Brefi (see Cardiganshire), and to have presided at the so-called " Synod of Victory," held some years later at Caerleon-on-Usk. At some date unknown, St David, as pen- escoli or primate of South Wales, moved the seat of ecclesiastical government from Caerleon to the remote headland of Mynyw, or Menevia, which has ever since, under the name of St David's (Ty-Dewi), remained the cathedral city of the western see. St David founded numerous churches throughout all parts of South Wales, of which fifty-three still recall his name, but apparently he never penetrated farther north than the region of Powys, although he seems to have visited Cornwall. With the passing of time the saint's fame increased, and his shrine at St David's

became a notable place of pilgrimage, so that by the time of the Norman conquest his importance and sanctity were fully recog- nized, and at Henry I.'s request he was formally canonized by Pope Calixtus II. about n 20.

Of the many biographies of St David, the earliest known is that of Rhyddmarch, or Ricemarchus (c. 1090), one of the last British bishops of St David's, from whose work Giraldus Cambrensis (q.v.) chiefly compiled his extravagant life of the saint.

DAVID I. (1084-1153), king of Scotland, the youngest son of Malcolm Canmore and (Saint) Margaret, sister of Edgar ^Etheling, was born in 1084. He married in n 13 Matilda, daughter and heiress of Waltheof, earl of Northumbria, and thus became possessed of the earldom of Huntingdon. On the death of Edgar, king of Scotland, in 1 107, the territories of the Scottish crown were divided in accordance with the terms of his will between his two brothers, Alexander and David. Alexander, together with the crown, received Scotland north of the Forth and Clyde, David the southern district with the title of earl of Cumbria. The death of Alexander I. in 1 1 24 gave David posses- sion of the whole. In 1127, in the character of an English baron, he swore fealty to Matilda as heiress to her father Henry I., and when the usurper Stephen ousted her in 1135 David vindicated her cause in arms and invaded England. But Stephen marched north with a great army, whereupon David made peace. The peace, however, was not kept. After threatening an invasion in 1137, David marched into England in 1138, but sustained a crushing defeat on Cutton Moor in the engagement known as the battle of the Standard. He returned to Carlisle, and soon

afterwards concluded peace. In 1 141 he joined Matilda in London and accompanied her to Winchester, but after a narrow escape from capture he returned

to Scotland. Henceforth he remained in his own kingdom and devoted himself to its political and ecclesiastical reorganization. A devoted son of the church, he /ounded five bishoprics and many monasteries. In secular politics he energetically forwarded the process of feudalization which had been initiated by his immediate predecessors. He died at Carlisle on the 24th of May n 53.

DAVID II. (1324–1371), king of Scotland, son of King Robert the Bruce by his second wife, Elizabeth de Burgh (d. 1327), was born at Dunfermline on the 5th of March 1324. In accordance with the terms of the treaty of Northampton he was married in July 1328 to Joanna (d. 1362), daughter of the English king, Edward II., and became king of Scotland on his father's death in June 1329, being crowned at Scone in November 1331. Owing to the victory of Edward III. of England and his protege, Edward Baliol, at Halidon Hill in July 1333, David and his queen were sent for safety into France, reaching Boulogne in May 1334, and being received very graciously by the French king, Philip VI. Little is known about the life of the Scottish king in France, except that Chateau Gaillard was given to him for a residence, and that he was present at the bloodless meeting of the English and French armies at Vironfosse in October 1339. Meanwhile his representatives had obtained the upper hand in Scotland, and David was thus enabled to return to his kingdom in June 1341, when he took the reins of government into his own hands. In 1346 he invaded England in the interests of France, but was defeated and taken prisoner at the battle of Neville's Cross in October of this year, and remained in England for eleven years, living principally in London and at Odiham in Hampshire. His imprisonment was not a rigorous one, and negotiations for his release were soon begun. Eventually, in October 1357, after several interruptions, a treaty was signed at Berwick by which the Scottish estates undertook to pay 100,000 marks as a ransom for their king. David, who had probably recognized Edward III. as his feudal superior, returned at once to Scotland; but owing to

the poverty of the kingdom it was found impossible to raise the ransom. A few instalments were paid, but the king sought to get rid of the liability by offering to make Edward III., or one of his sons, his successor in Scotland. In 1364 the Scottish parlia- ment indignantly rejected a proposal to make Lionel, duke of Clarence, the next king; but David treated secretly with Edward III. over this matter, after he had suppressed a rising of some of his unruly nobles. The king died in Edinburgh Castle on the 22nd of February 1371. His second wife was Margaret, widow of Sir John Logie, whom he divorced in 1369; but he left no children, and was succeeded by his nephew, Robert II. David was a weak and incapable ruler, without a spark of his father's patriotic spirit.

See Andrew of Wyntoun, The orygynale cronykil of Scotland, edited by D. Laing (Edinburgh, 1872-1879); John of Fordun, Chronica gentis Scotorum, edited by W. F. Skene (Edinburgh, 1871- 1872) ; J. H. Burton, History of Scotland, vol. ii. (Edinburgh, 1905) ; and A. Lang, History of Scotland, vol. i. (Edinburgh, 1900).

DAVID, the name of three Welsh princes.

David I. (d. 1203), a son of Prince Owen Gwynedd (d. 1169), came into prominence as a leader of the Welsh during the expedition of Henry II. in 1157. In n 70 he became lord of Gwynedd (i.e. the district around Snowdon), but some regarded him as a bastard, and Gwynedd was also claimed by other members of his family. After fighting with varying fortunes he sought an ally in the English king, whom he supported during the baronial rising in n 73; then after this event he married Henry's half-sister Emma. But his enemies increased in power, and about 11 94 he was driven from Wales by the partisans of his half-brother Llewelyn ab Iorwerth. The chronicler Benedictus Abbas calls David rex, and Rhuddlan castle was probably the centre of his vague authority.

David II. (c. 1 208-1 246) was a son of the great

Welsh prince, Llewelyn ab Iorwerth, and through his mother Joanna was a grandson of King John. He married an English lady, Isabella

de Braose, and, having been recognized as his father's heir both by Henry III. and by the Welsh lords, he had to face the hostility of his half-brother Gruffydd, whom he seized and imprisoned in 1239. When Llewelyn died in April 1240, David, who had already taken some part in the duties of government,was acknow- ledged as a prince of North Wales, doing homage to Henry III. at Gloucester. However, he was soon at variance with the English king, who appears to have espoused the cause of the captive Gruffydd. Henry's Welsh campaign in 1241 was bloodless but decisive. Gruffydd was surrendered to him; David went to London and made a full submission, but two or three years later he was warring against some English barons on the borders. To check the English king he opened negotiations with Innocent IV., doubtless hoping that the pope would recognize Wales as an independent state, but here, as on the field of battle, Henry III. was too strong for him. Just after Henry's second campaign in Wales the prince died in March 1246.

David III. (d. 1283) was a son of Gruffydd and thus a nephew of David II. His life was mainly spent in fighting against his brother, the reigning prince, Llewelyn ab Gruffydd. His first revolt took place in 1254 or 1255, and after a second about eight years later he took refuge in England, returning to Wales when Henry III. made peace with Llewelyn in 1 267. Then about 1274 the same process was repeated. David attended Edward I. during the Welsh expedition of 1277, receiving from the English king lands in North Wales; but in 1282 he made peace with Llewelyn and suddenly attacked the English garrisons, a pro- ceeding which led to Edward's final conquest of Wales. After Llewelyn's death in December 1282 David maintained the last struggle of the Welsh for independence. All his efforts, however, were vain; in June 1283 he was betrayed to Edward, was tried by a special court and sentenced to death, and was executed with great barbarity at Shrewsbury in

October 1283. As the last native prince of Wales, David's praises have been sung by the Welsh bards, but 4iis character was not attractive, and a Welsh historian says " his life was the bane of Wales."

DAVID, FELICIEN (1810-1876), French composer, was born on the 13th of April 1810 at Cadenet, in the department of Vaucluse. As a child he showed unusual musical precocity, and .being early left an orphan he was admitted into the choir of Saint Sauveur at Aix. He was for a time employed in an attorney's office, but quitted his service to become chef d'orcheslre in the theatre at Aix, and chapel-master at Saint Sauveur. Then he went to Paris, being provided with £100 a year by a rich uncle. After having studied for a while at the Paris Conservatoire, he joined the sect of Saint Simonians, and in 1833 travelled in the East in order to preach the new doctrine. After three years' absence, during which Constantinople and Smyrna were visited and some time was spent in Egypt, he returned to France and published a collection of Oriental Melodies. For several years he worked in retirement, and wrote two symphonies, some chamber music and songs. On the 8th of December 1844 he suddenly leapt into fame through the extraordinary success obtained by his symphonic ode LeDisert, which was produced at the Conservatoire. In this work David had struck out a new line. He had attempted in simple strains to evoke the majestic stillness of the desert. Notwithstanding its title of " symphonic ode," Le Disert has little in common with the symphonic style. What distinguishes it is a certain naivete of expression and an effective oriental colouring. In this last respect David may be looked upon as the precursor of a whole army of composers. His succeeding works, Maise au Sinai (1846), Christophe Colomb (1847), L'Eden (1848), scarcely bore out the promise shown in Le Desert, although the second of these compositions was successful at the time of its production. David now turned his attention to the theatre, and produced the following operas in succession: La Perle du BrSsil (1851), Hercidanum (1859), Lalla-Roukh

(1862), Le Saphir (1865). Of these, Lalla-Roukh is the one which has obtained the greatest success. In 1868 he gained the award of the French Institute for the biennial prize given by the emperor; and in 1869 he was made librarian at the Conservatoire instead of Berlioz, whom subsequently he succeeded as a member of the Institute. He died

at Saint-Germain-en-Laye oil the 29th of August 1876. If David can scarcely be placed in the first rank of French composers, he nevertheless deserves the consideration due to a sincere artist, who was undoubtedly inspired by lofty ideals. At a time when the works of Berlioz were still unappreciated by the majority of people, David succeeded in making the public take interest in music of a picturesque and descriptive kind. Thus he may be considered as one of the pioneers of modern French musical art. DAVID, GERARD [Gheeraert Davit], (7-1523), Nether- lands painter, born at Oudewater in Holland between 1450 and 1460, was the last great master of the Bruges school. He was only rescued from complete oblivion in 1860-1863 by Mr W. J. H. Weale, whose researches in the archives of Bruges brought to the light the main facts of the master's life. We have now documentary evidence that David came to Bruges in 1483, presumably from Haarlem, where he had formed his early style under the tuition of Ouwater; that he joined the gild of St Luke at Bruges in 1484 and became dean of the gild in 1501; that he married in 1496 Cornelia Cnoop, daughter of the dean of the Goldsmiths' gild; became one of the leading citizens of the town; died on the 13th of August 1523 ; and was buried in the Church of Our Lady at Bruges. In his early work he had followed the Haarlem tradition as represented by Dirck Bouts, Ouwater and Geertgen of Haarlem, but already gave evidence of his superior power as colourist. To this early period belong the " St John " of the Kaufmann collection in Berlin, and Mr Salting's " St Jerome." In Bruges he applied himself to the study and the copying of the

masterpieces by the Van Eycks, Van der Weyden, and Van der Goes, and came under the direct influence of the master whom he followed most closely, Hans Memlinc. From him he acquired the soulful intensity of expression, the increased realism in the rendering of the human form and the orderly architectonic arrangement of the figures. Yet another master was to influence him later in life when, in 151 5, he visited Antwerp and became impressed with the life and movement of Quentin Matsys, who had introduced a more intimate and more human conception of sacred themes. David's " Pieta " in the National Gallery, and the " Descent from the Cross," in the Cavallo collection, Paris (Guildhall, 1906), were painted under this influence and are remarkable for their dramatic movement. But the works on which David's fame will ever rest most securely are the great altar-pieces executed by him before his visit to Antwerp — ■ the " Marriage of St Catherine," at the National Gallery; the triptych of the "Madonna Enthroned and Saints" of the Brignole-Sale collection in Genoa; the " Annunciation " of the Sigmaringen collection; and, above all, the " Madonna with Angels and Saints " which he painted gratuitously for the Carmelite Nuns of Sion at Bruges, and which is now in the Rouen museum. Only a few of his works have remained in Bruges — " The Judgment of Cambyses," " The Flaying of Sisamnes " and the " Baptism of Christ " in the Town museum, and the " Transfiguration " in the Church of Our Lady. The rest were scattered all over the world, and to this may be due the oblivion into which his very name had fallen — partly to this, and partly to the fact that with all the beauty and soulfulness of his work he had no new page to add to the history of the progressive development of art, and even in his best work only gave new variations of the tunes sung by his great precursors and contempo- raries. That he is worthy to rank among the masters was only revealed to the world when a considerable number of his paintings were assembled at Bruges on the occasion of the exhibition of early Flemish masters in 1902. At the time of his death the glory of Bruges, and also of the Bruges school, was on the

wane, and Antwerp had taken the leadership in art as in political and commercial importance. Of David's pupils in Bruges, only Isenbrandt, A. Cornells and Ambrosius Benson achieved import- ance. Among other Flemish painters Joachim Patinir and Mabuse were to some degree influenced by him.

Eberhard Freiherr von Bodenhausen published in 1905 a very comprehensive monograph on Gerard David and his School (Munich, F. Bruckmann), together with a catalogue raisonne of his works, which, after careful sifting, are reduced to the number of forty-three. (P. G. K.)

DAVID, JACQUES LOUIS (1748-1825), French painter, was born in Paris on the 30th of April 1748. His father was killed in a duel, when the boy was but nine years old. His education was begun at the College des Quatre Nations, where he obtained a smattering of the classics; but, his artistic talent being already obvious, he was soon placed by his guardian in the studio of Francois Boucher. Boucher speedily realized that his own erotic style did not suit the lad's genius, and recommended him to J. M. Vien, the pioneer of the classical reaction in painting. Under him David studied for some years, and, after several attempts to win the prix de Rome, at last succeeded in 1775, with his " Loves of Antiochus and Stratonice." Vien, who had just been appointed director of the French Academy at Rome, carried the youth with him to that city. The classical reaction was now in full tide; Winckelmann was writing, Raphael Mengs painting; and the treasures of the Vatican galleries helped to confirm David in a taste already moulded by so many kindred influences. This severely classical spirit inspired his first important painting, " Date obolum Belisario," exhibited at Paris in 1780. The picture exactly suited the temper of the times, and was an immense success. It was followed by others, painted on the same principles, but with greater perfection of art: " The Grief of Andromache" (1783), "The Oath of the Horatii " (Salbn, 1785), "The Death of Socrates," "Love of Paris and Helen" (1788), "Brutus" (1789). In the French drama an

unimaginative imitation of ancient models had long prevailed; even in art Poussin and Le Sueur were successful by expressing a bias in the same direction; and in the first years of the revolu- tionary movement the fashion of imitating the ancients even in dress and manners went to the most extravagant length. At this very time David returned to Paris; he was now painter to the king, Louis XVI., who had been the purchaser of his principal works, and his popularity was soon immense. At the outbreak of the Revolution in 1789, David was carried away by the flood of enthusiasm that made all the intellect of France believe in a new era of equality and emancipation from all the ills of life.*

The success of his sketch for the picture of the " Oath of the Tennis Court," and his pronounced republicanism, secured David's election to the Convention in September 1792, by the Section du MusSum, and he quickly distinguished himself by the defence of two French artists in Rome who had fallen into the merciless hands of the Inquisition. As, in this matter, the behaviour of the authorities of the French Academy in Rome had been dictated by the tradition of subservience to authority, he used his influence to get it suppressed. In the January follow- ing his election into the Convention his vote was given for the king's death. Thus the man who was so greatly indebted to the Roman academy and to Louis XVI. assisted in the destruction of both, no doubt in obedience to a principle, like the act of Brutus in condemning his sons — a subject he painted with all his powers. Cato and stoicism were the order of the day. Hitherto the actor had walked the stage in modern dress. Brutus had been applauded in red-heeled shoes and culottes jarreties; but Talma, advised by David, appeared in toga and sandals before an enthusiastic audience. At this period of his life Mademoiselle de Noailles persuaded him to paint a sacred subject, with Christ as the hero. When the picture was done, the Saviour was found to be another Cato. " I told you so," he replied to the expostula- tions of the lady, " there is no inspiration in Christianity now!" David's

revolutionary ideas, which led to his election to the presidency of the Convention and to the committee of general security, inspired his pictures " Last Moments of Lepelletier de Saint-Fargeau " and " Marat Assassinated." He also arranged the programme of the principal republican festivals. When Napoleon rose to power David became his enthusiastic admirer. His picture of Napoleon on horseback pointing the way to Italy is now in Berlin. During this period he also painted the " Rape of the Sabines" and "Leonidas at Thermopylae." Appointed painter to the emperor, David produced the two notable pictures "The Coronation " (of Josephine) and the " Distribution of the Eagles."

On the return of the Bourbons the painter was exiled with the other remaining regicides, and retired to Brussels, where he again

returned to classical subjects: " Amor quitting Psyche," " Mars disarmed by Venus," &c. He rejected the offer, made through Baron Humboldt, of the office of minister of fine arts at Berlin, and remained at Brussels till his death on the 29th of December 1825. His end was true to his whole career and to his nationality. While dying, a print of the Leonidas, one of his favourite subjects, was submitted to him. After vaguely looking at it a long time, " 77 n'y a que moi qui pouvais concevoir la tete de Leonidas," he whispered, and died. His friends and his party thought to carry the body back to his beloved Paris for burial, but the government of the day arrested the procession at the frontier, an act which caused some scandal, and furnished the occasion of a terrible song of Beranger's.

It is difficult for a generation which has witnessed another complete revolution in the standards of artistic taste to realize the secret of David's immense popularity in his own day. His style is

severely academic, his colour lacking in richness and warmth, his execution hard and uninteresting in its very perfec- tion. Subjects and treatment alike are inspired by the passing fashion of an age which had deceived itself into believing that it was living and moving in the spirit of classical antiquity. The inevitable reaction of the romantic movement made the masterpieces, which had filled the men of the Revolution with enthusiasm, seem cold and lifeless to those who had been taught to expect in art that atmosphere of mystery which in nature is everywhere present. Yet David was a great artist, and exercised in his day and generation a great influence. His pictures are magnificent in their composition and their draughts- manship; and his keen observation and insight into character are evident, especially in his portraits, notably of Madame Recamier, of the Conventional Gerard and of Boissy d'Anglas.

See E. J. Delecluze, Louis David, son hole et son temps (Paris, 1855), and Le Peintre Louis David. Souvenirs et documents inedits, by J. L. Jules David, the painter's grandson (Paris, 1880).

DAVID, PIERRE JEAN (1789-1856), usually called David d' Angers, French sculptor, was born at Angers on the 1 2th of March 1789. His father was a sculptor, or rather a carver, but he had thrown aside the mallet and taken the musket, fighting against the Chouans of La Vendee. He returned to his trade at the end of the civil war, to find his customers gone, so that young David was born into poverty. As the boy grew up his father wished to force him into some more lucrative and certain way of life. At last he succeeded in surmounting the opposition to his becoming a sculptor, and in his eighteenth year left for Paris to study the art upon a capital of eleven francs. After struggling against want for a year and a half, he succeeded in taking the prize at the Ecole des Beaux-Arts. An annuity of 600 francs (£24) was granted by the municipality of his native town in 1809, and in 181 1 David's " Epaminondas " gained the prix de Rome. He spent five years in Rome, during which his enthusiasm for the works of Canova

was often excessive.

Returning from Rome about the time of the restoration of the Bourbons, he would not remain in the neighbourhood of the Tuileries, which swarmed with foreign conquerors and returned royalists, and accordingly went to London. Here Flaxman and others visited upon him the sins of David the painter, to whom he was erroneously supposed to be related. With great difficulty he made his way to Paris again, where a comparatively prosper- ous career opened upon him. His medallions and busts were in much request, and orders for monumental works also came to him. One of the best of these was that of Gutenberg at Strass- burg; but those he himself valued most were the statue of Barra, a drummer boy who continued to beat his drum till the moment of death in the war in La Vendee, and the monument to the Greek liberator Bozzaris, consisting in a young female figure called " Reviving Greece," of which Victor Hugo said: " It is difficult to see anything more beautiful in the world; this statue joins the grandeur of Pheidias to the expressive manner of Puget." David's busts and medallions were very numerous, and among his sitters may be found not only the illustrious men and women of France, but many others both of England and Germany- countries which he visited professionally in 1827 and 1829. His

medallions, it is affirmed, number 500. He died on the 4th of January 1856. David's fame rests firmly on his pediment of the Pantheon, his monument to General Gobert in Pere Lachaise and his marble " Philopoemen " urthe Louvre. In the Musee David at Angers is an almost complete collection of his works either in the form of copies or in the original moulds. As an example of his bene- volence of character may be mentioned his rushing off to the sick- bed of Rouget de Lisle, the author of the " Marseillaise Hymn," modelling and carving him in marble without delay, making a lottery of the work, and sending to the poet in the extremity of need the seventy-two pounds which resulted from the sale.

See H. Jouin, David d' Angers et ses relations litteraires (1890); Lettres de P. J. David d' Angers a Louis Dupre (Paris, 1891); Collection de portraits des contemporains d'apres les medaillons de P. J. David (Paris, 1838).

DAVIDISTS, a fancy name rather than a recognized designation for three religious sects. It has been applied (1) to the followers (if he had any) of David of Dinant, in Belgium, the teacher or pupil of Amalric (Amaury) of Bena, both of whom taught apparently a species of pantheism. David's Quaterni, or Quaternuli, condemned and burnt at Paris (1209), is a lost book, known only by references in Albertus Magnus and Thomas Aquinas. Its author would have been burnt had he not fled. The name has been given (2) to the followers of David George or Joris (q.v.), and (3) to the followers of Francis David (1510–1579), the apostle of Transylvanian unitarianism. (See Socinus, Unitarianism.)

DAVIDSON, ANDREW BRUCE (1831–1902), Scottish divine, was born in 183 1 at Kirkhill in Aberdeenshire, where his father Andrew Davidson had a farm. The Davidsons belonged to the congregation of James Robertson (1803–1860) of Ellon, one of the ministers of Strathbogie Presbytery, which in the controversy which led to the disruption, resisted the " dangerous claims of the established church to self-government." When the dis- ruption came the principles at stake were keenly canvassed in Ellon, and eventually Andrew Davidson, senior, went with the Free Church. In 1845 the boy, who had been a " herd " on the farm, went for six months to the grammar school at Aberdeen and was there prepared for a university bursary, which was sufficient to pay his fees, but no more. During his four years at the university his mother supplied him fortnightly with pro- visions from the farm; sometimes she walked the whole twenty miles from Kirkhill and handed the coach fee to her son. He graduated in 1849. At the university he had acquired a distrust of philosophy, and found it difficult to choose between mathe- matical and linguistic studies. A Free Church school having been opened in Ellon, he

became master there for three years. Here he developed special aptitude for linguistic and philological studies. Besides Hebrew he taught himself French, German, Dutch, Italian and Spanish. In November 1852 he entered New College, Edinburgh. There he took the four years' theological course, and was licensed in 1856. For two years he preached occasionally and took vacancies. In 1858 the New College authorities appointed him assistant to the professor of Hebrew. He taught during the winter, and in the long vacation continued his preparation for his life work. One year he worked in Germany under Ewald, another year he went to Syria to study Arabic. In 1862 he published the first part of a commentary on Job. It was never finished and deals only with one-third of the book, but it is recognized as the first really scientific commentary on the Old Testament in the English language. In 1863 he was appointed by the general assembly professor of oriental languages at New College. He was junior colleague of Dr John Duncan (Rabbi Duncan) till 1870, and then for thirty years sole professor. He was a member of the Old Testament revision committee, and his work was recognized by several honorary distinctions, LL.D. (Aberdeen), D.D. (Edinburgh), Litt.D. (Cambridge). Among his students were Professors Elmslie, Skinner, Harper of Mel- bourne, Walker of Belfast, George Adam Smith of Glasgow and W. Robertson Smith. He understood it to be the first duty of an exegete to ascertain the meaning of the writer, and he showed that this could be done by the use of grammar and history and the historical imagination. He supplied guidance when it was much

needed as to the methods and results of the higher criticism. Being a master of its methods, but very cautious in accepting assertions about its results, he secured attention early in the Free Church for scientific criticism, and yet threw the whole weight of his learning and his caustic wit into the

argument against critical extravagance. He had thought himself into the ideas and points of view of the Hebrews, and hiswork in Old Testament theology is unrivalled. He excels as an expositor of the governing Hebrew ideas such as holiness, righteousness, Spirit of God, Messianism. In 1897 he was chosen moderator of the general assembly, but his health prevented his accepting the post. He died, unmarried, on the 26th of January 1902.

Besides the commentary on Job he published a book on the Hebrew Accents, the only Scottish performance of the kind since the days of Thomas Boston. His Introductory Hebrew Grammar has been widely adopted as a class-book in theological colleges. His Hebrew Syntax has the same admirable clearness, precision and teach- ing quality. His Commentary on the Epistle to the Hebrews is one of a series of handbooks for Bible classes. These were followed by com- mentaries on Job, Ezekiel, Nahum, Habakkuk and Zephaniah, in the Cambridge series; and a Bible-class primer on The Exile and Restoration. His lectures on Old Testament Prophecy were published after his death by Professor J. A. Paterson. The Theology of the Old Testament in the " International Theological Library " is a posthum- ous volume edited by Professor Salmond. " Isaiah " in the Temple Bible was finished, but not revised, when he died ; and he also had in hand the volume on Isaiah for the International Critical Commentary ; to which must be added a mass of articles contributed to The Imperial Bible Dictionary, The Encyclopaedia Britannica, and the chief religious reviews. Various articles in Dr Hastings' Bible Dictionary were by Davidson, especially the article " God." Two volumes of sermons, The Called of God, and Waiting upon God, were published from MS. after Davidson's death.

DAVIDSON, JOHN (1857-1909), British poet, playwright and novelist, son of the Rev. Alexander Davidson, a minister of the Evangelical Union, was born at Barrhead, Renfrewshire, Scotland, on the 1 ith of April 1857. After a schooling at the Highlanders' Academy, Greenock, at the age of thirteen he was set to work in that town, by helping in a sugar factory

laboratory and then in the town analyst's office; and at fifteen he went back to his old school as a pupil-teacher. In 1876 he studied for a session at Edinburgh University, and then went as a master to various Scotch schools till 1890, varying his experiences in 1884 by being a clerk in a Glasgow thread firm. He had married in 1885, and meanwhile his literary inclinations had shown themselves, without attracting any public success, in the publication of his poetical and fantastic plays, Bruce (1886), Smith; a tragic farce (1888) and Scaramouch in Naxos (1889). Determining at all costs to follow his literary vocation, he went to London in 1890, but at first had a hard struggle. There his prose-romance Perfervid (1890) was published, one of the most original and fascinating stories of "young blood " and child adventure ever written, but for some reason it did not catch the public; and a sort of sequel in The Great Men (1891) met no better fate. He contributed, however, to newspapers and became known among literary journalists, and his volume of verse In a Music-Hall (1891) prepared the way for the genuine success two years later of his Fleet Street Eclogues (1893), which sounded a new and vigorous note and at once established his position among the younger generation of poets. He subsequently produced several more books in prose, romantic stories like Baptist Lake (1894) and Earl Lavender (1895), and an admirable piece of descriptive landscape writing in A Random Itinerary (1894); but his accept- ance as a poet gave a more emphatic impulse to bis work in verse, and most attention was given to the increasing proof of his powers shown in his Ballads and Songs (1894), Second Series of Fleet Street Eclogues (1895), New Ballads. (1896), The Last Ballad, &c. (1 898) , all full of remarkably fresh and unconventional beauty. In spite of the strangely neglected genius of this early Perfervid, it is accordingly as a writer of verse rather than of prose-fiction that he occupies a leading place, with a decided character of his own, in recent English literature, his revival of a modernized ballad form being a considerable achievement in itself, and his poems being packed

with fine thought, robust and masterful in expression and imagery. Meanwhile in 1896 he produced an English verse adaptation, in For the Crown (acted by Forbes

Robertson and Mrs Patrick Campbell), of Francois Coppee's drama Pour la couronne, which had considerable success and was revived in 1905; and he wrote several other literary plays, remarkable none the less for dramatic qualities, — Godfrida (1898), Self's the Man (1901), The Knight of the Maypole (1902) and The Theatrocrat (1905), in the last of which a tendency to be extra- ordinary is rather too manifest. This tendency was not absent from his volume of Holiday and Other Poems (1906), containing many fine things, together with an " essay on blank verse " illustrated from his own compositions, the outspoken criticisms of a writer of admitted originality and insight, but not devoid of eccentric volubility. But if the identification of " eccentricity " and " greatness " by Cosmo Mortimer in Mr Davidson's own Perfervid sometimes obtrudes itself on the memory in considering his more peculiarly " robust " and somewhat volcanic deliver- ances, no such objection can detract from the genuine inspiration of his best work, in which the true poetic afflatus is unmistakable. This is to be found in his poems published from 1893 to 1898, five years during which his reputation steadily and deservedly grew, — the Fleet Street Eclogues, with their passionate modern criticism of life combined with their breath of rural beauty, and such intense ballads as those " Of a Nun," and " Of Heaven and Hell." In his - ethical and didactic utterances, The Testament of a Vivisector and The Testament of a Man Forbid (1901), The Testament of an Empire Builder (1902), Mammon and his Message (1908), &c, the fine quality of the verse is wedded with a certain fervid satirical journalism of subject, less admirable than the detachment of thought in the earlier volumes. In later years he lived at Penzance, provided with a small Civil List pension, but otherwise badly off, for his writings brought in very little money. On March 23rd, 1909, he disappeared, in circumstances

pointing to suicide, and six months later his body was found in the sea.

See an article by Filson Young on " The New Poetry," in the Fortnightly Review, January 1909.

DAVIDSON, RANDALL THOMAS (1848-), archbishop of Canterbury, son of Henry Davidson, of Muirhouse, Edinburgh, was born in Edinburgh and educated at Harrow and Trinity College, Oxford. He took orders in 1874 and held a curacy at Dartford, in Kent, till 1877, when he became resident chaplain and private secretary to Dr Tait, archbishop of Canterbury, a position which he occupied till Dr Tait's death, and retained for a short time (1882-1883) under his successor Dr Benson. He married in 1878 Edith, the second daughter of Archbishop Tait, whose Life he eventually wrote (1891). In 1882 he became honorary chaplain and sub-almoner to Queen Victoria, and in the following year was appointed dean of Windsor, and domestic chaplain to the queen. His advice upon state matters was constantly sought by the queen and greatly valued. From 1891 to 1903 he was clerk of the closet, first to Queen Victoria and afterwards to King Edward VII. He was made bishop of Rochester in 1891, and was translated to Winchester in 1895. In 1903 he succeeded Temple as archbishop of Canterbury. The new archbishop, without being one of the English divines who have made notable contributions to theological learning, already had a great reputation for ecclesiastical statesmanship; and in subsequent years his diplomatic abilities found ample scope in dealing not only with the difficulties caused in the church by doctrinal questions, but pre-eminently with the education crisis, and with the new problems arising in the enlarged Anglican Com- munion. As the chief representative of the Church of England in the House of Lords, his firmness, combined with broadminded- ness, in regard to the attitude of the nonconformists towards denominational education, made his influence widely felt. In 1904 he visited Canada and the United States, and was present at the triennial general convention of the Protestant Episcopal Church of the United States and Canada. In

1908 he presided at the Pan-Anglican congress held in London, and at the Lambeth conference which followed. He had edited in 1889 The Lambeth Conferences, an historical account of the conferences of 1867, 1878 and 1888, giving the official reports and resolutions, and the sermons preached on these occasions.

DAVIDSON, SAMUEL (1807–1898), Irish biblical scholar, was born near Ballymena in Ireland. He was educated at the Royal College of Belfast, entered the Presbyterian ministry in 1835, and was appointed professor of biblical criticism at his own college. Becoming a Congregationalist, he accepted in 1842 the chair of biblical criticism, literature and oriental languages at the Lancashire Independent College at Manchester; but he was obliged to resign in 1857, being brought into collision with the college authorities by the publication of an introduction to the Old Testament entitled The Text of the Old Testament, and the Interpretation of the Bible, written for a new edition of Home's Introduction to the Sacred Scripture. Its liberal tendencies caused him to be accused of unsound views, and a most exhaustive report prepared by the Lancashire College committee was followed by numerous pamphlets for and against. After his resignation a fund of £3000 was subscribed as a testimonial by his friends. In 1862 he removed to London to become scripture examiner in London University, and he spent the rest of his life in literary work. He died on the 1st of April 1898. Davidson was a member of the Old Testament Revision Committee. Among his principal works are: — Sacred Hermeneutics Developed and Applied (1843), rewritten and republished as A Treatise on Biblical Criticism (1852), Lectures on Ecclesiastical Polity (1848), An Introduction to the New Testament (1848–1851), The Hebrew Text of the Old Testament Revised (1855), Introduction to the Old Testament (1862), On a Fresh Revision of the Old Testament (1873), The Canon of

the Bible (1877) , TheDoctrine of Last Things in the New Testament (1883), besides translations of the New Testament from Von Tischendorf's text, Gieseler's Ecclesiastical History (1846) and Furst's Hebrew and Chaldee Lexicon.

DAVIDSON, THOMAS (1817–1885), British palaeontologist, was born in Edinburgh on the 17th of May 1817. His parents possessed considerable landed property in Midlothian. Educated partly in the university at Edinburgh and partly in France, Italy and Switzerland, and early acquiring an interest in natural history, he benefited greatly by acquaintance with foreign languages and literature, and with men of science in different countries. He was induced in 1837, through the influence of Leopold von Buch, to devote his special attention to the brachio- poda, and in course of time he became the highest authority on this group. The great task of his life was the Monograph of British Fossil Brachiopoda, published by the Palaeontographical Society (1850–1886). This work, with supplements, comprises six quarto volumes with more than 200 plates drawn on stone by the author. He also prepared an exhaustive memoir on " Recent Brachiopoda," published by the Linnean Society. He was elected F.R.S. in 1857. He was awarded in 1865 the Wollaston medal by the Geological Society of London, and in 1870 a Royal medal by the Royal Society; and in 1882 the degree of LL.D. was conferred upon him by the university of St Andrews. He died at Brighton on the 14th of October 1885, bequeathing his fine collection of recent and fossil brachiopoda to the British Museum. See biography with portrait and list of papers in Geol. Mag. for 1871, p. 145.

DAVIES, DAVID CHARLES (1826–1891), Welsh noncon- formist divine, was born at Aberystwyth on the nth of May 1826, his father being a merchant and a pioneer of Welsh Method- ism, his mother a niece of Thomas Charles (q.v.) of Bala. He was educated in his native town by a noted schoolmaster, John Evans, at Bala College, and at University College, London, where he graduated B.A. in 1847 and M.A. (in

mathematics) in 1849. He had already begun to preach, and after an evangelistic tour in South Wales supplied the pulpit of the English presbyterian church at Newtown for six months, and settled as pastor of the bilingual church at Builth in 1851. He returned to this charge after a pastorate at Liverpool (1853–1856), left it again in 1858 for Newtown, and went in May 1859 to the Welsh church at Jewin Crescent, London. Here he remained until 1876, and from that date till 1882, although living at Bangor for reasons of health, had the chief oversight pf the church. In 1888 he accepted the principalship of the Calvinistic Methodist College at Trevecca in Brecknockshire. His work here was successful, but

short; he died at Bangor on the 26th of September 1891, and was buried at Aberystwyth.

Though Davies stood somewhat apart from the main currents of thought both without and within his church, and was largely unknown to English audiences or readers, he exercised a strong influence on Welsh life and thought in the 19th century. He was a serious student, especially of anti-theistic positions, a good speaker, and a frequent contributor to Welsh theological journals. Several of his articles have been collected and published, the most noteworthy being expositions on The First Epistle of John (1889), Ephesians (2 vols., 1896, 1901), Psalms (1897), Romans (1902); and The Atonement and Intercession of Christ (1899, English trans, by D. E. Jenkins, 1901).

DAVIES, SIR JOHN (1569–1626), English philosophical poet, was baptized on the 16th of April 1569, at Tisbury, Wiltshire, where his parents lived at the manor-house of Chicksgrove. He was educated at Winchester College, and became a commoner of Queen's College, Oxford, in 1585. In 1588 he entered the Middle Temple, and was called to the bar in 1595. In his general onslaught on literature in 1599 the archbishop of Canterbury ordered to be burnt the notorious and now excessively rare volume, All Ovid's Elegies, 3 Bookes, by C. M. Epigrams by J. D.

(Middleburgh, 1598 ?), which contained posthumous work by Marlowe. The epigrams by Davies, although not devoid of wit, were coarse enough to deserve their fate. It is probable that they were earlier in date of composition than the charming fragment entitled Orchestra (1596), written in praise of dancing. The poet, in the person of Antinoiis, tries to induce Penelope to dance by arguing that all harmonious natural processes partake of the nature of a conscious and well-ordered dance. He closes his argument by foreshadowing in a magic mirror the revels of the court of Cynthia (Elizabeth) . Orchestra was dedicated to the author's " very friend, Master Richard Martin," but in the next year the friends quarrelled, and Davies was expelled from the society for having struck Martin with a cudgel in the hall of the Middle Temple. He spent the year after his expulsion at Oxford in the composition of his philosophical poem on the nature of the soul and its immortality— Nosce teipsum (1599). The style of the work was entirely novel; and the stanza in which it was written — the decasyllabic quatrain with alternate rhymes — had never been so effectively handled. Its force, eloquence and ingenuity, the orderly and lucid arrangement of its matter, place it among the finest of English didactic poems. In 1599 he also published a volume of twenty-six graceful acrostics on the words Elisabetha Regina, entitled Hymns to Astraea. He produced no more poetry except his contributions to Francis Davison's Poetical Rhapsody (1608). These were two dialogues which had been written as entertainments for the queen, and " Yet other Twelve Wonders of the World," satirical epigrams on the courtier, the divine, the maid, &c, and " A Hymn in praise of Music." Ten sonnets to Philomel are signed J. D., and are assigned to Davies (Poetical Rhapsody, ed. A. H. Bullen, 1890). In 1601 Davies was restored to his position at the bar, after making his apologies to Martin, and in the same year he sat for Corfe Castle in parliament. James I. received the author of Nosce teipsum with great favour, and sent him (1603) to Ireland as solicitor- general, conferring the honour of knighthood upon him in the same year. In 1606 he

was promoted to be attorney-general for Ireland, and created serjeant-at-arms. Of the difficulties in the way of the prosecution of his work, and his untiring industry in overcoming them, there is abundant evidence in his letters to Cecil preserved in the State Papers on Ireland. One of his chief aims was to establish the Protestant religion firmly in Ireland, and he took strict measures to enforce the law for attendance at church. With the same end in view he took an active part in the " plantation " of Ulster. In 161 2 he published his prose Discoverie of the true causes why Ireland was never entirely subdued untill the beginning of his Majestie's happie raigne. 1 In the same year he entered the Irish parliament as member for Fermanagh, and was elected speaker after a scene of disorder in which the

1 Edited by Henry Morley in his Ireland under Elizabeth and James I. (1890).

Catholic nominee, Sir John Everard, who had been installed, was forcibly ejected. In the capacity of speaker he delivered an excellent address reviewing previous Irish parliaments. He resigned his Irish offices in 1619, and sat in the English parlia- ment of 1621 for Newcastle-under-Lyme. With Sir Robert Cotton he was one of the founders of the Society of Antiquaries. He was appointed lord chief justice in 1626, but died suddenly (December. 8th) before he could enter on the office. He had married (1609) Eleanor Touchet, daughter of George, Baron Audley. She developed eccentricity, verging on madness, and wrote several fanatical books on prophecy.

In 1615 Davies published at Dublin Le Primer Discours des Cases et Matters in Ley resolues el adjudges en les Courts del Roy en cest Realme (reprinted 1628). He issued an edition of his poems in 1622. His prose publications were mainly posthumous. The Question concerning Impositions,

Tonnage, Poundage . . . was printed in 1656, and four of the tracts relating to Ireland, with an account of Davies and his services to that country, were edited by G. Chalmers in 1786. His works were edited by Dr A. B. Grosart (3 vols. 1869- 1876), with a full biography, for the Fuller Worthies Library.

He is not to be confounded with another poet, John Davies of Hereford (1565 ?i618), among whose numerous volumes of verse may be mentioned Mirum in modum (1602), Microcosmus (1603), The Holy Roode (1609), Wittes Pilgrimage (c. 1610), The Scourge of Folly (c. 161 1), The Muses Sacrifice (1612) and Wittes Bedlam (1607) ; his Scourge of Folly contains verses addressed to many of his con temporaries, to Shakespeare among others; he also wrote A Select Second Husband for Sir Thomas Overbury's Wife (1616), and The Writing Schoolmaster (earliest known edition, 1633); his works were collected by Dr A. B. Grosart (2 vols., 1873) lor the Chertsey Worthies Library.

DAVIES (Davisius), JOHN (1679-1732), English classical scholar and critic, was born in London on the 22nd of April 1679. He was educated at Charterhouse and Queens' College, Cambridge, of which society he was elected fellow (July 7th, 1 701). He subsequently became rector of Fen Ditton, pre- bendary of Ely, and president of his college. He died on the 7th of March 1 731-173 2, and was buried in the college chapel. Davies was considered one of the best commentators on Cicero, his attention being chiefly devoted to the philosophical works of that author. Amongst these he edited the Tusculanae dispu- tationes (1709), De natura deorum (17 18), De divinatione and De fato (1725), Academica (1725), De legibus (1727), De finibus (1728). His nearly finished notes on the De officiis he be- queathed to Dr Richard Mead, with a view to their publication. Mead, finding himself unable to carry out the undertaking, transferred the notes to Thomas Bentley (nephew of the famous Richard Bentley), by whose carelessness they were burnt. Davies's editions, which were intended to supplement

those of Graevius, show great learning and an extensive knowledge of the history and systems of philosophy, but he allows himself too much licence in the matter of emendation. He also edited Maximus of Tyre's Dissertationes (1703); the works of Caesar (1706); the Octavius of Minucius Felix (1707); the Epitome divinarum institutionum of Lactantius (17 18). Although on intimate terms with Richard Bentley, he found himself unable to agree with the great scholar in regard to his dispute with Trinity College.

DAVIES, SIR LOUIS HENRY (1845-), Canadian politician and jurist, was born in Prince Edward Island in 1845, of Huguenot descent. From 1869 to 1879 he took part in local politics, and was premier from 1876-1879; in 1882 he entered the Canadian parliament as a Liberal, and from 1896 to 1901 was minister of marine and fisheries. In the latter year he became one of the judges of the supreme court of Canada. In 1877 he was counsel for Great Britain before the Anglo-American fisheries arbitration at Halifax; in 1897 he was a joint delegate to Washington with Sir Wilfrid Laurier on the Bering Sea seal question; and in 1 898-1 899 a member of the Anglo-American joint high commission at Quebec.

DAVIES, RICHARD (c. 1505-1581), Welsh bishop and scholar, was born in North Wales, and was educated at New Inn Hall, Oxford, becoming vicar of Burnham, Buckinghamshire, in 1550. Being a reformer he took refuge at Geneva during the reign of Mary, returning to England and to parochial work after the

accession of Elizabeth in 1558. His connexion with Wales was renewed almost at once; for, after serving on a commission which visited the Welsh dioceses, he was, in January 1560, conse- crated bishop of St Asaph, whence he was translated, early in 1 56 1, to the bishopric of St Davids. As a bishop Davies was an earnest reformer, very industrious, active and liberal, but not very scrupulous with regard to the property of the church. He was a member of the

council of Wales, was very friendly with Matthew Parker, archbishop of Canterbury, and was regarded both by Parker and by William Cecil, Lord Burghley, as a trust- worthy adviser on Welsh concerns. Another of the bishop's friends was Walter Devereux, first earl of Essex. Assisting William Salisbury, Davies took part in translating the New Testament into Welsh, and also did some work on the Welsh translation of the Book of Common Prayer. He helped to revise the " Bishops' Bible " of 1568, being himself responsible for the book of Deuteronomy, and the second book of Samuel. He died on the 7th of November 1581, and was buried in Abergwili church.

DAVILA, ENRICO CATERINO (1576-1631), Italian historian, was descended from a Spanish noble family. His immediate ancestors had been constables of the kingdom of Cyprus for the Venetian republic since 1464. But in 1570 the island was taken by the Turks; and Antonio Davila, the father of the historian, had to leave it, despoiled of all he possessed. He travelled into Spain and France, and finally returned to Padua, and at Sacco on the 30th of October 1576 his youngest son, Enrico Caterino, was born. About 1 583 Antonio took this son to France, where he became a page in the service of Catherine de' Medici, wife of King Henry II. In due time he entered the military service, and fought through the civil wars until the peace in 1598. He then returned to Padua, where, and subsequently at Parma, he led a studious life until, when war broke out, he entered the service of the republic of Venice and served with distinction in the field. But during the whole of this active life, many details of which are very interesting as illustrative of the life and manners of the time, he never lost sight of a design which he had formed at a very early period, of writing the history of those civil wars in France in which he had borne a part, and during which he had had so many opportunities of closely observing the leading person- ages and events. This work was completed about 1630, and was offered in vain by the author to all the publishers in Venice. At last one Tommaso Baglioni, who had no work for his presses,

undertook to print the manuscript, on condition that he should be free to leave off if more promising work offered itself. The printing of the Istoria delle guerre civili di Francia was, however, completed, and the success and sale of the work were immediate and enormous. Over two hundred editions followed, of which perhaps the best is the one published in Paris in 1644. Davila was murdered, while on his way to take possession of the govern- ment of Cremona for Venice in July i63i,bya ruffian, with whom some dispute seems to have arisen concerning the furnishing of the relays of horses ordered for his use by the Venetian government.

The Istoria was translated into French by G. Baudouin (Paris, 1642) ; into Spanish by Varen de Soto (Madrid, 1651, and Antwerp, 1686); into English by W. Aylesbury (London, 1647), and by Charles Cotterel (London, 1666), and into Latin by Pietro Francesco Cornazzano (Rome, 1745). The best account of the life of Davila is that by Apostolo Zeno, prefixed to an edition of the history printed at Venice in 2 vols, in 1733. Peter Bayle is severe on certain historical inaccuracies of Davila, and it is true that Davila must be read with due remembrance of the fact that he was not only a Catholic but the especial protege of Catherine de' Medici, but it is not to be forgotten that Bayle was as strongly Protestant.

DAVIS, ANDREW JACKSON (1826–1910), American spiritual- ist, was born at Blooming Grove, Orange county, New York, on the nth of August 1826. He had little education, though probably much more than he and his friends pretended. In 1843 he heard lectures in Poughkeepsie on " animal magnetism," as the phenomena of hypnotism was then termed, and found that he had remarkable clairvoyant powers ; and in the following year he had, he said, spiritual messages telling him of his life work. For the next three years (1844–1847) he practised magnetic healing with much success; and in 1847 he published The Principles of Nature, Her Divine Revelations, and a Voice to

Mankind, which in 184s he had dictated while in a trance to his ” scribe,” William Fishbough. He lectured with little success and returned to writing (or ” dictating “) books, publishing about thirty in all, including The Great Harmonia (1850–1861), an ” encyclopaedia ” in six volumes; The Philosophy of Special Providences (1850), which with its evident rehash of old argu- ments against special providences and miracles would seem to show that Davis’s inspiration was literary; The Magic Staff: an Autobiography (1857), which was supplemented by Arabula: or the Divine Guest, Containing a New Collection of New Gospels (1867), the gospels being those ” according to ” St Confucius, St John (G.Whittier),St Gabriel (Derzhavin), St Octavius (Frothingham), St Gerrit (Smith), St Emma (Hardinge), St Ralph (W. Emerson), St Selden (J. Finney), St Theodore (Parker), &c; and A Stellar Key to the Summer Land (1868) and Views of Our Heavenly Home (1 8 78) . each with illustrative diagrams. Davis was much influenced by Swedenborg and by the Shakers, who reprinted his panegyric of Ann Lee in an official Sketch of Shakers and Shakerism (1884).

DAVIS, CHARLES HOWARD (1857-), American land- scape painter, was born at East Cambridge, Massachusetts, on the and of February 1857. A pupil of the schools of the Boston Museum of Fine Arts, he was sent to Paris in 1880. Having studied at the Academy Julian under Lefebvre and Boulanger, he went to Barbizon and painted much in the forest of Fontaine- bleau under the traditions of the ” men of thirty.” He became a full member of the National Academy of Design in 1906, and received many awards, including a silver medal at the Paris Exhibition of 1889. He is represented by important works in the Metropolitan Museum of Art, New York; the Corcoran Art Gallery, Washington; the Pennsylvania Academy, Philadelphia, and the Boston Museum of Fine Arts.

DAVIS, CUSHMAN KELLOGG (1838–1900), American political leader and lawyer, was born in Henderson, New York, on the 16th of June 1838. He was taken by his parents to Wisconsin Territory in the year of his birth, and was educated at Carroll College, Waukesha. Wisconsin, and at the university of Michigan , from w hich he graduated in 1 8 5 7 . After studying law in the office of Alexander W. Randall, he was admitted to the bar in i860. During the Civil War, as a first lieutenant of Federal volunteers, he served in the western campaigns of 1862 and 1863, and in 1864 was an aide to General Willis A. Gorman (1814– 1876). Resigning his commission (1864) on account of ill-health, he soon settled in St Paul, Minnesota, where he practised law in partnership with General Gorman, and soon became prominent both at the bar and, as a Republican, in politics. He served in the State House of Representatives in 1867, 1868–1873 was United States district attorney for Minnesota. In 1874–1876 he was governor of the state, and from 1887 until his death was a member of the United States Senate. In the Senate he was one of the acknowledged leaders of his party, an able and frequent speaker and a committee worker of great industry. In March 1897 he became chairman of the committee on foreign relations at a time when its work was peculiarly influential in shaping American foreign policy. His extensive knowledge of inter- national law, and his tact and diplomacy, enabled him to render services of the utmost importance in connexion with the Spanish-American War, and he was one of the peace com- missioners who negotiated and signed the treaty of Paris by which the war was terminated. He died at St Paul on the 27th of November 1900. Few public men in the United States since the Civil War have combined skill in diplomacy, constructive statesmanship, talent for political organization, oratorical ability and broad culture to such a degree as Senator Davis. In addition to various speeches and public addresses, he published an essay entitled The Law of Shakespeare (1899).

DAVIS, HENRY WILLIAM BANKS (1833-), English painter, received his art training in the Royal Academy schools, where he was awarded two silver medals. He was elected an associate of the Academy in 1873, and academician in 1877. He made a considerable reputation as an accomplished painter of quiet pastoral subjects and carefully elaborated landscapes with cattle. His pictures, ” Returning to the Fold ” (1880), and

” Approaching Night ” (1899), bought for the Chantrey Fund Collection, are now in the National Gallery of British Art (Tate Gallery).

DAVIS, HENRY WINTER (1817-1865), American political leader, was born at Annapolis, Maryland, on the 16th of August 1817. His father, Rev Henry Lyon Davis (1775-1836), was a prominent Protestant Episcopal clergyman of Maryland, and for some years president of St John’s College at Annapolis. The son graduated at Kenyon College, Gambier, Ohio, in 1837, and from the law department of the university of Virginia in 1841, and began the practice of law in Alexandria, Virginia, but in 1850 removed to Baltimore, Maryland, where he won a high position at the bar. Early becoming imbued with strong anti-slavery views, though by inheritance he was himself a slave holder, he began political life as a Whig, but when the Whig party dis- integrated, he became an “American” or “Know-Nothing,” and as such served in the national House of Representatives from 1855 to 1861. By his independent course in Congress he won the respect and esteem of all political groups. In the contest over the speakership at the opening of the Thirty-Sixth Congress (1859) he voted with the Republicans, thereby incurring a vote of censure from the Maryland legislature, which called upon him to resign. In i860, not being quite ready to ally himself wholly with the Republican party, he declined to be a candidate for the Republican nomination for the vice-presidency, and supported the Bell and Everett ticket. He was himself defeated in this year for re- election to Congress. In the winter of 1860-1861 he was active on behalf of compromise measures. Finally, after President

Lincoln's election, he became a Republican, and as such was re-elected in 1862 to the national House of Representatives, in which he at once became one of the most radical and aggressive members, his views commanding especial attention owing to his being one of the few representatives from a slave state. From December 1863 to March 1865 he was chairman of the committee on foreign affairs; as such, in 1864, he was unwilling to leave the delicate questions concerning the French occupation of Mexico entirely in the hands of the president and his secretary of state, and brought in a report very hostile to France, which was adopted in the House, but fortunately, as it proved later, was not adopted by the Senate. With other radical Republicans Davis was a bitter opponent of Lincoln's plan for the reconstruction of the Southern States, and on the 1 5th of February 1864 he reported from committee a bill placing the process of reconstruction under the control of Congress, and stipulating that the Confederate States, before resuming their former status in the Union, must disfranchise all important civil and military officers of the Confederacy, abolish slavery, and repudiate all debts incurred by or with the sanction of the Confederate government. In his speech supporting this measure Davis declared that until Congress should " recognize a government established under its auspices, there is no government in the rebel states save the authority of Congress." The bill — the first formal expression by Congress with regard to Reconstruction — did not pass both Houses until the closing hours of the session, and failed to receive the approval of the president, who on the 8th of July issued a proclamation defining his position. Soon afterwards, on the 5th of August 1864, Davis joined Benjamin F. Wade of Ohio, who had piloted the bill through the Senate, in issuing the so-called " Wade- Davis Manifesto," which violently denounced President Lincoln for encroaching on the domain of Congress and insinuated that the presidential policy would leave slavery unimpaired in the reconstructed states. In a debate in Congress some months later he declared, " When I came into Congress ten years ago

this was a government of law. I have lived to see it a government of personal will." He was one of the radical leaders who preferred Fremont to Lincoln in 1864, but subsequently withdrew his oppo- sition and supported the President for re-election. He early favoured the enlistment of negroes, and in July 1865 publicly advocated the extension of the suffrage to them. He was not a candidate for re-election to Congress in 1864, and died in Baltimore, Maryland, on the 30th of December 1865. Davis was a man of scholarly tastes, an orator of unusual ability and

great eloquence, tireless and fearless in fighting political battles, but impulsive to the verge of rashness, impractical, tactless and autocratic. He wrote an elaborate political work entitled The War of Ormuzd and Ahriman in the Ninteenth Century (1853), in which he combated the Southern contention that slavery was a divine institution.

See The Speeches of Henry Winter Davis (New York, 1867), to which is prefixed an oration on his life and character delivered in the House of Representatives by Senator J. A. J. Creswell of Maryland.

DAVIS, JEFFERSON (1808-1889), American soldier and states- man, president of the Confederate states in the American Civil War, was born on the 3rd of June 1808 at what is now the village of Fairview, in that part of Christian county, Kentucky, which was later organized as Todd county. His father, Samuel Davis (1756-1824), who served in the War of Independence, was of Welsh, and his mother, Jane Cook, of Scotch-Irish descent; during his infancy the family moved to Wilkinson county, Mississippi. Jefferson Davis was educated at Transylvania University (Lexington, Kentucky) and at the United States Military Academy at West Point. From the latter he graduated in July 1828, and became by brevet a second lieutenant of infantry. He was assigned for duty to Jefferson

Barracks at St Louis, and on reaching this post was ordered to Fort Crawford, near Prairie du Chien, Wisconsin. In 1833 he took part in the closing scenes of the Black Hawk War, was present at the capture of Black Hawk, and was sent to Dixon, Illinois, to muster into service some volunteers from that state. Their captain was Abraham Lincoln, and Lieutenant Davis is said to have administered to him his first oath of allegiance. In June 1835 he resigned from the army, married Miss Knox Taylor, daughter of Colonel (later General) Zachary Taylor, and became a cotton planter in Warren county, Miss. In September of the same year, while visiting in Louisiana to escape the fever, his wife died of it and Davis himself was dangerously ill. For the next few months he travelled to regain his health; and in the spring of 1836 returned to his cotton plantation, where for several years he devoted his time largely to reading political philosophy, political economy, public Jaw and the English classics, and by careful management of his estate he acquired considerable wealth. In 1843 Davis entered the field of politics as a Democrat, and exhibited great power as a public speaker. In 1 844 he was chosen as a presidential elector on the Polk and Dallas ticket; in February 1845 he married Miss Varina Howell (1826–1906) of Mississippi (a granddaughter of Governor Richard Howell of New Jersey), and in the same year became a Democratic repre- sentative in Congress. From the beginning of his political career he advocated a strict construction of the Federal constitution. He was an ardent admirer of John C. Calhoun, and eventually became his successor as the leader of the South. In his rare speeches in the House of Representatives he clearly defined his position in regard to states rights, which he consistently held ever afterwards. During his first session, war with Mexico was declared, and he resigned his seat in June 1846 to take command of the first regiment raised in his state — the Mississippi Rifles. He served in the Northern Campaign under his father-in-law, General Taylor, and was greatly distinguished for gallantry and soldierly conduct at Monterey and particularly

at Buena Vista, where he was severely wounded early in the engagement, but continued in command of his regiment until victory crowned the American arms. While still in the field he was appointed (May 1847) by President Polk to be brigadier-general of volunteers; but this appointment Davis declined, on the ground, as he after- wards said, " that volunteers are militia and the Constitution reserves to the state the appointment of all militia officers." Afterwards, Davis himself, as president of the Confederate States, was to appoint many volunteer officers.

Upon his return to his home late in 1847 he was appointed to fill a vacancy in the United States Senate, and in 1850 he was elected for a full term of six years. He resigned in 1851, but was again elected in 1857, and continued as a member from that year until the secession of his State in 1861. As a senator he stood in the front rank in a body distinguished for ability; his purity

of character and courteous manner, together with his intellectual gifts, won him the esteem of all parties; and he became more and more the leader of the Southern Democrats. He was, however, possessed of a logical rather than an intuitive mind. In his famous speech in the Senate on the 12th of July 1848, on the question of establishing a government for Oregon Territory, he held that a slave should be treated by the Federal government on the same basis as any other property, and therefore that it was the duty of Congress to protect the owner's right to his slave in whatever state or territory of the Union that slave might be. In the debates on the Compromise Measures of 1850 he took an active part, strongly opposing these measures, while Henry Stuart Foote (1800-1880), the other Mississippi senator, was one of their leading advocates. But although still holding to the theory expounded in his July speech of 1848, he was now ready with the proposal that slavery might be prohibited north of latitude 36 30' N. provided it should not be interfered with in any territory south of that line. He resigned from the Senate in 1851 to become a candidate of the

Democratic States-Rights party for the governorship of his state against Foote, the candi- date of the Union Democrats. In the campaign he held, in opposition to the wishes of the more radical members of his party, that although secession might be resorted to as a last alternative the circumstances were not yet such as to justify it. A temporary loss of eyesight interfered with his canvass, and he was defeated by a small majority (1009), the campaign having been watched with the greatest interest throughout the country. In 1853 he accepted the position of secretary of war in the cabinet of President Pierce, and for four years performed the duties of the office with great distinction and with lasting benefit to the nation. He organized the engineer companies which explored and reported on the several proposed routes for a rail- way connecting the Mississippi valley with the Pacific Ocean; he effected the enlargement of the army, and made material changes in its equipment of arms and ammunition, utilizing the latest improvements ; he made his appointments of sub- ordinates on their merits, regardless of party considerations; he revised the system of tactics, perfected the signal corps service, and enlarged the coast and frontier defences of the country. During all this time he was on terms of intimate friendship with the president, over whom he undoubtedly exerted a powerful, but probably not, as is often said, a dominating influence; for instance he is generally supposed to have won the president's support for the Kansas-Nebraska Bill of 1854. After the passage of this bill, Davis, who as secretary of war had control of the United States troops in Kansas, sympathized strongly with the pro-slavery party there. At the end of his service in the cabinet, he was returned to the Senate. To his insistence in i860 that the Democratic party should support his claim to the protection of slavery in the territories by the Federal government, the disruption of that party was in large measure due. At the same time he practically told the Senate that the South would secede in the event of the election of a radical Republican to the presidency; and on the 10th of

January 1861, not long after the election of Lincoln, he argued before that body the constitutional right of secession and declared that the treatment of the South had become such that it could no longer remain in the Union without being degraded. When his state had passed the ordinance of secession he resigned his seat, and his speech on the 21st of January was a clear and able statement of the position taken by his state, and a most pathetic farewell to his associates.

On the 25th of January 1861 Davis was commissioned major- general of the forces Mississippi was raising in view of the threatened conflict. On the 9th of February he received the unanimous vote of the Provisional Congress of the seceded states as president of the " Confederate States of America." He was inaugurated on the 18th of February, was subsequently, after the adoption of the permanent constitution, regularly elected by popular vote, for a term of six years, and on the 22nd of February 1862 was again inaugurated. He had not sought the office, preferring service iri the field. His brilliant career, both as

a civilian and as a soldier, drew all eyes to him as best fitted to guide the fortunes of the new Confederacy, and with a deep sense of the responsibility he obeyed the call. He heartily approved of the peace conference, which attempted to draw up a plan of reconciliation between the two sections, but whose failure made war inevitable. Montgomery, in Alabama, was the first Confederate capital, but after Virginia joined her sister states, the seat of government was removed to Richmond, on the 29th of May 1861. How Davis — of whom W. E. Gladstone, in the early days of English sympathy with the South, said that he had " made a nation " — bore himself in his most responsible' position during the gigantic conflict which ensued, cannot here be related in detail. (See Confederate

States; and American Civil War.) In the shortest time he organized and put into the field one of the finest bodies of soldiers of which history has record. Factories sprang up in the South in a few months, supplying the army with arms and munitions of war, and the energy of the president was everywhere apparent. That he committed serious errors, his warmest admirers will hardly deny. Unfortunately his firmness developed into obstinacy, and exhibited itself in continued confidence in officers who had proved to be failures, and in dislike of some of his ablest generals. He committed the great mistake, too, of directing the movements of distant armies from the seat of government, though those armies were under able generals. This naturally caused great dissatisfaction, and more than once resulted in irreparable disaster. Moreover, he was not, like Lincoln, a great manager of men; he often acted without tact; he was charged with being domineering and autocratic, and at various times he was seriously hampered by the meddling of the Confederate Congress and the opposition of such men as the vice-president, A. H. Stephens, Governor Joseph E. Brown of Georgia, and Governor Zebulon Vance of North Carolina.

During the winter of 1864-1865 the resources of the govern- ment showed such exhaustion that it was apparent that the end would come with the opening of the spring campaign. This was clearly stated in the reports of the heads of departments and of General Lee. President Davis, however, acted as if he was assured of ultimate success. He sent Duncan F. Kenner as special commissioner to the courts of England, and France to obtain recognition of the Confederacy on condition of the abolition of slavery. When a conference was held in Hampton Roads on the 3rd of February 1865 between President Lincoln and Secretary Seward on the one side, and A. H. Stephens, R. M. T. Hunter, and Judge James A. Campbell, representing President Davis, on the other, he instructed his representatives to insist on the recognition of the Confederacy as a condition to any arrangement for the termination of the war.

This defeated the object of the conference, and deprived the South of terms which would have been more beneficial than those imposed by the conqueror when the end came a few weeks later. The last days of the Confederate Congress were spent in recriminations between that body and President Davis, and the popularity with which he commenced his administration had almost entirely vanished. In January 1865 the Congress proposed to supersede the president and make General Lee dictator, — a suggestion, however, to which the Confederate commander refused to listen.

After the surrender of the armies of Lee and Johnston in April 1865, President Davis attempted to make his way, through Georgia, across the Mississippi, in the vain hope of continuing the war with the forces of Generals Smith and Magruder. He was taken prisoner on the 10th of May by Federal troops near Irwin - ville, Irwin county, Georgia, and was brought back to Old Point, Virginia, in order to be confined in prison at Fortress Monroe. In prison he was chained and treated with great severity. He was indicted for treason by a Virginia grand jury, persistent efforts were made to connect him with the assassination of President Lincoln, he was unjustly charged with having deliber- ately and wilfully caused the sufferings and deaths of Union prisoners at Andersonville and for two years he was denied trial or bail. Such treatment aroused the sympathy of the Southern people, who regarded him as a martyr to their cause, and in a great measure restored him to that place in their esteem which

by the close of the war he had lost. It also aroused a general feeling in the North, and when finally he was admitted to bail (in May 1867), Horace Greeley, Gerrit Smith, and others in that section who had been his political opponents, became his sureties. Charles O'Conor, a leader of the New York bar, volunteered to act as his counsel. With him was associated Robert Ould of Richmond, a lawyer of great ability. They moved to quash the indictment on which he was brought to trial. Chief Justice Chase and Judge John C. Underwood constituted the United

States circuit court sitting for Virginia before which the case was brought in December 1868; the court was divided, the chief justice voting to sustain the motion and Underwood to overrule it. The matter was thereupon certified to the Supreme Court of the United States, but as the general amnesty of the 25th of December 1868 included Davis, an order of nolle prosequi was entered in February 1869, and Davis and his bondsmen were thereupon released. After his release he visited Europe, and spent the last years of his life in retirement, during which he wrote his Rise and Fall of the Confederate Government (2 vols., 1881). In these volumes he attempted to vindicate his adminis- tration, and in so doing he attacked the records of those generals he disliked. He also wrote a Short History of the Confederate States of America (1890). He died on the 6th of December 1889, at New Orleans, leaving a widow and two daughters — Margaret, who married J. A. Hayes in 1877, and Varina Anne (1864–1898), better known as ” Winnie ” Davis, the "daughter of the Con- federacy," who was the author of several books, including A Sketch of the Life of Robert Emmet (1888), a novel, The Veiled Doctor (1895), and A Romance of Summer Seas (1898). A monu- ment to her, designed by George J. Zolnay, and erected by the Daughters of the Confederacy, was unveiled in Hollywood cemetery, Richmond, Va.,on the 9th of November 1899. Mrs Davis, who exerted a marked influence over her husband, sur- vived him many years, passed the last years of her life in New York City, and died there on the 16th of October 1906.

Authorities. — Several biographies and memoirs of Davis have been published, of which the best are : Jefferson Davis, Ex-President of the Confederate States (2 vols., New York, 1890), by his widow; F. H. Alfriend's Life of Jefferson Davis (Cincinnati, 1868), which defended him from the charges of incompetence and despotism brought against him; E. A. Pollard's Life of Jefferson Davis, with a Secret History of the Southern Confederacy (Philadelphia, 1869), a somewhat partisan arraignment by a prominent Southern journalist ; and W. E. Dodd's

Jefferson Davis (Philadelphia, 1907), which embodies the results of recent historical research. The Prison Life of Jefferson Davis (New York, 1866) by John J. Craven (d. 1893), a Federal army surgeon who was Davis's physician at Fortress Monroe, was long popular; it gives a vivid and sympathetic picture of Mr Davis as a prisoner, but its authenticity and accuracy have been questioned. (W. W. H.; N. D. M.)*

DAVIS (or Davys), JOHN (1550 ?–i6os), one of the chief English navigators and explorers under Elizabeth, especially in Polar regions, was born at Sandridge near Dartmouth about 1550. From a boy he was a sailor, and early made several voyages with Adrian Gilbert; both the Gilbert and Raleigh families were Devonians of his own neighbourhood, and through life he seems to have profited by their friendship. In January 1 583 he appears to have broached his design of a north-west passage to Walsing- ham and John Dee; various consultations followed; and in 1 585 he started on his first north-western expedition. On this he began by striking the ice-bound east shore of Greenland, which he followed south to Cape Farewell; thence he turned north once more and coasted the west Greenland littoral some way, till, finding the sea free from ice, he shaped a " course for China " by the north-west. In 66° N., however, he fell in with Baffin Land, and though he pushed some way up Cumberland Sound, and professed to recognize in this the " hoped strait," he now turned back (end of August). He tried again in 1586 and 1587; in the last voyage he pushed through the straits still named after him into Baffin's Bay, coasting west Greenland to 73° N., almost to Upernavik, and thence making a last effort to find a passage westward along the north of America. Many points in Arctic latitudes (Cumberland Sound, Cape Walsingham, Exeter Sound, &c.) retain names given them by Davis, who ranks with Baffin and Hudson as the greatest of early Arctic explorers and, like

Frobisher, narrowly missed the discovery of Hudson's Bay via Hudson's Straits (the " Furious Overfall " of Davis). In 1588 he seems to have commanded the " Black Dog " against the Spanish Armada; in 1589 he joined the earl of Cumberland off the Azores; and in 1591 he accompanied Thomas Cavendish on his last voyage, with the special purpose, as he tells us, of searching " that north-west discovery upon the back parts of America." After the rest of Cavendish's expedition returned unsuccessful, he continued to attempt on his own account the passage of the Strait of Magellan; though defeated here by foul weather, he discovered the Falkland Islands. The passage home was extremely disastrous, and he brought back only fourteen of his seventy-six men. After his return in 1593 he published a valuable treatise on practical navigation in The Seaman's Secrets (1594), and a more theoretical work in The World's Hydro graphical Description (1595). His invention of back-staff and double quadrant (called a " Davis Quadrant " after him) held the field among English seamen till long after Hadley's reflecting quadrant had been introduced. In 1 596-1 597 Davis seems to have sailed with Raleigh (as master of Sir Walter's own ship) to Cadiz and the Azores; and in 1 598-1600 he accom- panied a Dutch expedition to the East Indies as pilot, sailing from Flushing, returning to Middleburg, and narrowly escaping destruction from treachery at Achin in Sumatra. In 1601-1603 he accompanied Sir James Lancaster as first pilot on his voyage in the service of the East India Company; and in December 1604 he sailed again for the same destination & pilot to Sir Edward Michelborne (or Michelbourn). On this journey he was killed by Japanese pirates off Bintang near Sumatra.

A Traverse Book made by John Davis in 1587, an Account of his Second Voyage in 1586, and a Report of Master John Davis of his three voyages made for the Discovery of the North West Passage were printed in Hakluyt's collection. Davis himself published The Seaman's Secrets, divided into two Parts (London, 1594), The World's Hydrographical Description . . . whereby appears that there is a short and speedy

Passage into the South Seas, to China, Molucca, Philip pina, and India, by Northerly Navigation (London, 1595). Various references to Davis are in the Calendars of State Papers, Domestic (1591–1594), and East Indies (1513–1616). See also Voyages and Works of John Davis, edited by A. H. Markham (London, Hakluyt Society, 1880), and the article " John Davys " by Sir J. K. Laughton in the Dictionary of National Biography. (C. R. B.)*

DAVIS, THOMAS OSBORNE (1814–1845), Irish poet and journalist, was born at Mallow, Co. Cork, on the 14th of October 1814. His father, James Thomas Davis, a surgeon in the royal artillery, who died in the month of his son's birth, belonged to an English family of Welsh extraction, and his mother, Mary Atkins, belonged to a Protestant Anglo-Irish family. Davis graduated B.A. at Trinity College, Dublin, in 1836, and was called to the bar two years later. Brought up in an English and Tory circle, he was led to adopt nationalist views by the study of Irish history, a complicated subject in which text-books and the ordinary guides to knowledge were then lacking. In 1840 he made a speech appealing to Irish sentiment before the college historical society, which had been reorganized in 1839. With a view to indoctrinating the Irish people with the idea of nation- ality he joined John Blake Dillon in editing the Dublin Morning Register. The proprietor very soon dismissed him, and Davis saw that his propaganda would be ineffective if he continued to stand outside the national organization. He therefore announced himself a follower of Daniel O'Connell, and became an energetic worker (1841) on the committee of the repeal association. He helped Dillon and Charles Gavan Duffy to found the weekly newspaper, The Nation, the first number of which appeared on the 1 5th of October 1842. The paper was chiefly written by these three promoters, and its concentrated purpose and vigorous writing soon attracted attention. Davis, who had never written verse, was induced to attempt it for the new undertaking. The "Lament of] Owen Roe O'Neill" was printed in the sixth number, and was followed by a

series of lyrics that take a high place in Irish national poetry — ” The Battle of Fontenoy,” ” The Geraldines,” ” Maire Bhan a- Stoir ” and many others. Davis contemplated a history of Ireland, an edition of the speeches of Irish orators, one volume of which appeared, and

a life of Wolfe Tone. These projects remained incomplete, but Davis’s determination and continuous zeal made their mark on his party. Differences arose between O’Connell and the young writers of The Nation, and as time went on became more pronounced. Davis was accused of being anti-Catholic, and was systematically attacked by O’Connell’s followers. But he differed, said Sir Charles Gavan Duffy, from earlier and later Irish tribunes, ” by a perfectly genuine desire to remain un- known, and reap neither recognition nor reward for his work.” His early death from scarlet fever (September 15th, 1845) de- prived ” Young Ireland ” of its most striking personality.

His Poems and his Literary and Historical Essays were collected in 1846. There is an edition of his prose writings (1889) in the Camelot Classics. See the monograph on Thomas Davis by Sir Charles Gavan Duffy (1890, abridged ed. 1896), and the same writer’s Young Ireland (revised edition, 1896).

DAVISON, WILLIAM (c. 1541-1608), secretary to Queen Elizabeth, was of Scottish descent, and in 1566 acted as secretary to Henry Killigrew (d. 1603), when he was sent into Scotland by Elizabeth on a mission to Mary, queen of Scots. Remaining in that country for about ten years, Davison then went twice to the Netherlands on diplomatic business, returning to England in 1586 to defend the hasty conduct of his friend, Robert Dudley, earl of Leicester. In the same year he became member of parlia- ment for Knaresborough, a privy councillor, and assistant to Elizabeth’s secretary, Thomas Walsingham; but he soon appears to have acted rather as the colleague than the subordinate of Walsingham. He was a member of the commission appointed to try Mary, queen of Scots, although he took no part in its proceedings.

When sentence was passed upon Mary the warrant for her execution was entrusted to Davison, who, after some delay, obtained the queen's signature. On this occasion, and also in subsequent interviews with her secretary, Elizabeth suggested that Mary should be executed in some more secret fashion, and her conversation afforded ample proof that she disliked to take upon herself any responsibility for the death of her rival. Meanwhile, the privy council having been summoned by Lord Burghley, it was decided to carry out the sentence at once, and Mary was beheaded on the 8th of February 1587. When the news of the execution reached Elizabeth she was extremely indignant, and her wrath was chiefly directed against Davison, who, she asserted, had disobeyed her instructions not to part with the warrant. The secretary was arrested and thrown into prison, but, although he defended himself vigorously, he did not say anything about the queen's wish to get rid of Mary by assassination. Charged before the Star Chamber with misprision and contempt, he was acquitted of evil intention, but was sentenced to pay a fine of 10,000 marks, and to imprison- ment during the queen's pleasure; but owing to the exertions of several influential men he was released in 1589. The queen, however, refused to employ him again in her service, and he retired to Stepney, where he died in December 1608. Davison appears to have been an industrious and outspoken man, and was undoubtedly made the scapegoat for the queen's pusillanimous conduct. By his wife, Catherine Spelman, he had a family of four sons and two daughters. Two of his sons, Francis and Walter, obtained some celebrity as poets.

Many state papers written by him, and many of his letters, are extant in various collections of manuscripts. See Sir N. H. Nicolas, Life of W. Davison (London, 1823) ; J. A. Froude, History of England (London, 1881 fol.); Calendar of State Papers i^8o-i6oq; and Corre- spondence of Leicester during his Government of the Low Countries, edited by J. Bruce (London, 1844).

DAVIS STRAIT, the broad strait which separates

Greenland from North America, and connects Baffin Bay with the open Atlantic. At its narrowest point, which occurs just where the Arctic Circle crosses it, it is nearly 200 m. wide. This part is also the shallowest, a sounding of 112 fathoms being found in the centre, whereas the depth increases rapidly both to north and to south. Along the western shore (Baffin Land) a cold current passes southward; but along the east there is a warm north- ward stream, and there are a few Danish settlements on the Greenland coast. The strait takes its name from the explorer John Davis.

DAVITT, MICHAEL (1846–1906), Irish Nationalist politician, son of a peasant farmer in Co. Mayo, was born on the 25th of March 1846. His father was evicted for non-payment of rent in 1851, and migrated to Lancashire, where at the age of ten the boy began work in a cotton mill at Haslingden. In 1857 he lost his right arm by a machinery accident, and he had to get employ- ment as a newsboy and printer's " devil." He drifted into the ranks of the Fenian brotherhood in 1865, and in 1870 he was arrested for treason-felony in arranging for sending fire-arms into Ireland, and was sentenced to fifteen years' penal servitude. After seven years he was released on ticket of leave. He at once rejoined the " Irish Republican Brotherhood," and went to the United States, where his mother, herself of American birth, had settled with the rest of the family, in order to concert plans with the Fenian leaders there. Returning to Ireland he helped C. S. Parnell to start the Land League in 1879, and his violent speeches resulted in his re-arrest and consignment to Portland by Sir William Harcourt, then home secretary. He was released in 1882, but was again prosecuted for seditious speeches in 1883, and suffered three months' imprisonment. He had been elected to parliament for Meath as a Nationalist in 1882, but being a con- vict was disqualified to sit. He was included as one of the respondents before the

Parnell Commission (1888–1890) and spoke for five days in his own defence, but his prominent association with the revolutionary Irish schemes was fully established. (See Parnell.) He took the anti-Parnellite side in 1890, and in 1892 was elected to parliament for North Meath, but was unseated on petition. He was then returned for North-East Cork, but had to vacate his seat through bankruptcy, caused by the costs in the North Meath petition. In 1 895 he was elected for West Mayo, but retired before the dissolution in 1900. He died on the 31st of May 1906, in Dublin. A sincere but embittered Nationalist, anti-English to the backbone, anti-clerical, and sceptical as to the value of the purely parliamentary agitation for Home Rule, Davitt was a notable representative of the survival of the Irish " physical force " party, and a strong link with the extremists in America. In later years his Socialistic Radicalism connected him closely with the Labour party. He wrote constantly in American and colonial journals, and published some books, always with the strongest bias against English methods; but his force of character earned him at least the respect of those who could make calm allowance for an open enemy of the established order, and a higher meed of admiration from those who sympathized with his objects or were not in a position to be threatened by them.

DAVOS (Romonsch Tavau, a name variously explained as meaning a sheep pasture or simply " behind "), a mountain valley in the Swiss canton of the Grisons, lying east of Coire (whence it is 40 m. distant by rail), and north-west of the Lower Engadine (accessible at Siis in 18 m. by road). It contains two main villages, 2 m. from each other, Dorfli and Platz (the chief hamlet), which are 5015 ft. above the sea-level, and had a popu- lation in 1900 of 8089, a figure exceeded in the Grisons only by the capital Coire. Of the population 5391 were Protestants, 2564 Romanists, and 81 Jews; while 6048 were German-speaking and 486 Romonsch-speaking. In i860 the population was only 1 705, rising to 2002 in 1870, to 2865 in 1880, to 3891 in 1888, and to

8089 in 1890. This steady increase'is due to the fact that the valley is now much frequented in winter by consumptive patients, as its position, sheltered from cold winds and exposed to brilliant sunshine in the daytime, has a most beneficial effect on invalids in the first stages of that terrible disease. A local doctor, by name Spengler, first noticed this fact about 1865, and the valley soon became famous. It is now provided with excellent hotels, sanatoria, &c, but as lately as i860 there was only one inn there, housed in the 16th-century Rathhaus (town hall), which is still adorned by the heads of wolves shot in the neighbourhood. At the north end of the valley is the fine lake of Davos, used for skating in the winter, while from Platz the splendidly engineered Landwasserstrasse leads (20 m.) down to the Alvaneubad station on the Albula- railway from Coire to the Engadine.

We first hear of Tavaus br Tavauns in 11 60 and 12 13, as a

mountain pasture or " alp." It was then in the hands of a Romonsch-speaking population, as is shown by many surviving field names. But, some time between 1260 and 1282, a colony of German-speaking persons from the Upper Valais (first mentioned in 1289) was planted there by its lord, Walter von Vaz, so that it has long been a Teutonic island in the midst of a Romonsch-speaking population. Historically it is associated with the Prattigau or Landquart valley to the north, as it was the most important village of the region, and in 1436 became the capital of the League of the Ten Jurisdictions. (See Grisons., v It formerly contained many iron mines, and belonged from 1477 to 1649 to the Austrian Habsburgs. In 1779 Davos was visited and described by Archdeacon W. Coxe. (W. A. B. C.)

DAVOUT, LOUIS NICOLAS, duke of Auerstadt and prince of Eckmuhl (1770-1823), marshal of France, was born at Annoux (Yonne) on the 10th of May 1 7 70. His name is also, less correctly, spelt Davout and Davoust. He entered the French army as a sub-

lieutenant in 1788, and on the outbreak of the Revolution he embraced its principles. He was chef de bataillon in a volunteer corps in the campaign of 1792, and distinguished himself at Neerwinden in the following spring. He had just been promoted general of brigade when he was removed from the active list as being of noble birth. He served, however, in the campaigns of 1794–1797 on the Rhine, and accompanied Desaix in the Egyptian expedition of Bonaparte. On his return he took part in the campaign of Marengo under Napoleon, who placed the greatest confiSence in his abilities, made him a general of division soon after Marengo, and in 1801 gave him a command in the con- sular guard. At the accession of Napoleon as emperor, Davout was one of the generals who were created marshals of France. As commander of the III. corps of the Grande Armie Davout rendered the greatest services. At Austerlitz, after a forced march of forty-eight hours, the III. corps bore the brunt of the allies' attack. In the Jena campaign Davout with a single corps fought and won the brilliant victory of Auerstadt against the main Prussian army. (See Napoleonic Campaigns.) He took part, and added to his renown, in the campaign of Eylau and Friedland. Napoleon left him as governor-general in the grand-duchy of Warsaw when the treaty of Tilsit put an end to the war (1807), and in 1808 created him duke of Auerstadt. In the war of 1809 Davout took a brilliant part in the actions which culminated in the victory of Eckmuhl, and had an important share in the battle of Wagram (q.v.) . He was created prince of Eckmuhl about this time. It was Davout who was entrusted by Napoleon with the task of organizing the " corps of observation of the Elbe," which was in reality the gigantic army with which the emperor invaded Russia in 181 2. In this Davout commanded the I. corps, over 70,000 strong, and defeated the Russians at Mohilev before he joined the main army, with which he continued through- out the campaign and the retreat from Moscow. In 1813 he commanded the Hamburg military district, and defended Hamburg, a city ill fortified and provisioned, and full of dis- affection, through a long siege, only surrendering the place on the

direct order of Louis XVIII. after the fall of Napoleon in 1814.

Davout's military character was on this, as on many other occasions, interpreted as cruel and rapacious, and he had to defend himself against many attacks upon his conduct at Hamburg. He was a stern disciplinarian, almost the only one of the marshals who exacted rigid and precise obedience from his troops, and consequently his corps was more trustworthy and exact in the performance of its duty than any other. Thus, in the earlier days of the Grande Armee, it was always the III. corps which was entrusted with the most difficult part of the work in hand. The same criterion is to be applied to his conduct of civil affairs. His rapacity was in reality Napoleon's, for he gave the same undeviating obedience to superior orders which he enforced in his own subordinates. As for his military talents, he was admitted by his contemporaries and by later judgment to be one of the ablest, perhaps the ablest, of all Napoleon's marshals. On the first restoration he retired into private life, openly displaying his hostility to the Bourbons, and when Na'p'ol'eb'n re'turntetl fr'cta Elba, Davdut at o'nc'e joined him.

DAVY, SIR HUMPHRY

871

Appointed minister of war, he reorganized the French army as far as the limited time available permitted, and he was so far indispensable to the war department that Napoleon kept him at Paris during the Waterloo campaign. To what degree his skill and bravery would have altered the fortunes of the campaign of 181 5 can only be surmised, but it has been made a ground of criticism against Napoleon that he did not avail himself in the field of the services of the best general he then possessed. Davout directed the gallant, but hopeless, defence of Paris after Waterloo, and was deprived of his marshalate and his titles at the second restoration. When some of his subordinate generals were pro-

scribed, he demanded to be held responsible for their acts, as executed under his orders, and he endeavoured to prevent the condemnation of Ney. After a time the hostility of the Bourbons towards Davout died away, and he was reconciled to the monarchy. In 1817 his rank and titles were restored, and in 1819 he became a member of the chamber of peers. He died at Paris on the 1st of June 1823.

See the marquise de Blocqueville, Le Marechal Davout raconte par les siens et lui-mime (Paris, 1870-1880, 1887); Chenier, Davout, due d'Auerstddt (Paris, 1866).

DAVY, SIR HUMPHRY, Bart. (1778-1829), English chemist, was born on the 17th of December 1778 at or near Penzance in Cornwall. During his school days at the grammar schools of Penzance and Truro he showed few signs of a taste for scientific pursuits or indeed of any special zeal for know- ledge or of ability beyond a certain skill in making verse trans- lations from the classics and in story-telling. But when in 1794 his father, Robert Davy, died, leaving a widow and five children in embarrassed circumstances, he awoke to his responsi- bilities as the eldest son, and becoming apprentice to a surgeon- apothecary at Penzance set to work on a systematic and remark- ably wide course of self-instruction which he mapped out for himself in preparation for a career in medicine. Beginning with metaphysics and ethics and passing on to mathematics, he turned to chemistry at the end of 1797, and within a few months of reading Nicholson's and Lavoisier's treatises on that science had produced a new theory of light and heat. About the same time he made the acquaintance of two men of scientific attain- ments — Gregory Watt (1777-1804), a son of James Watt, and Davies Giddy, afterwards Gilbert (1767-1839), who was president of the Royal Society from 1827 to 1831. By the latter he was recommended to Dr Thomas Beddoes, who was in 1798 establish- ing his Medical Pneumatic Institution at Bristol for investigating the medicinal properties of various gases. Here Davy, released from his indentures, was installed as superintendent towards

the end of 1798. Early next year two papers from his pen were published in Beddoes' West Country Contributions — one " On Heat, Light and the Combinations of Light, with a new Theory of Respiration and Observations on the Chemistry of Life," and the other " On the Generation of Phosoxygen (Oxygen gas) and the Causes of the Colours of Organic Beings." These contain an account of the well-known experiment in which he sought to establish the immateriality of heat by showing its generation through the friction of two pieces of ice in an exhausted vessel, and further attempt to prove that light is " matter of a peculiar kind," and that oxygen gas, being a compound of this matter with a simple substance, would more properly be termed phos- oxygen. Founded on faulty experiments and reasoning, the views he expressed were either ignored or ridiculed; and it was long before he bitterly regretted the temerity with which he had published his hasty generalizations.

One of his first discoveries at the Pneumatic Institution on the 9th of April 1799 was that pure nitrous oxide (laughing gas) is perfectly respirable, and he narrates that on the next day he became " absolutely intoxicated " through breathing sixteen quarts of it for " near seven minutes." This discovery brought both him and the Pneumatic Institution into prominence. The gas itself was inhaled by Southey and Coleridge among other distinguished people, and promised to become fashionable, while further research yielded Davy material for his Researches, Chemical and Philosophical, chiefly concerning Nitrous Oxide,

published in 1800, which secured his reputation as a chemist. Soon afterwards, Count Rumford, requiring a lecturer on chemistry for the recently established Royal Institution in London, opened negotiations with him, and on the 16th of February 1801 he was engaged as assistant lecturer in chemistry and director of the laboratory. Ten weeks later, having " given satisfactory proofs of his talents " in a course of lectures on galvanism, he was appointed lecturer, and his promotion to be professor followed

on the 31st of May 1802. One of the first tasks imposed on him by the managers was the delivery of a course of lectures on the chemical principles of tanning, and he was given leave of absence for July, August and September 1801 in order to acquaint himself practically with the subject. The main facts he discovered from his experiments in this connexion were described before the Royal Society in 1803. In 1802 the board of agriculture requested him to direct his attention to agricultural subjects; and in 1803, with the acquiescence of the Royal, Institution, he gave his first course of lectures on agricultural chemistry and continued them for ten successive years, ulti- mately publishing their substance as Elements of Agricultural Chemistry in 1813. But his chief interest at the Royal Institu- tion was with electro-chemistry. Galvanic phenomena had already engaged his attention before he left Bristol, but in London he had at his disposal a large battery which gave him much greater opportunities. His first communication to the Royal Society, read in June 1801, related to galvanic combina- tions formed with single metallic plates and fluids, and showed that an electric cell might be constructed with a single metal and two fluids, provided one of the fluids was capable of oxidizing one surface of the metal; previous piles had consisted of two different metals, or of one plate of metal and the other of char- coal, with an interposed fluid. Five years later he delivered before the Royal Society his first Bakerian lecture, " On some Chemical Agencies of Electricity," which J. J. Berzelius described as one of the most remarkable memoirs in the history of chemical theory. He summed up his results in the general statement that " hydrogen, the alkaline substances, the metals and certain metallic oxides are attracted by negatively electrified metallic surfaces, and repelled by positively electrified metallic surfaces; and contrariwise, that oxygen and acid substances are attracted by positively electrified metallic surfaces and repelled by negatively electrified metallic surfaces; and these attractive and repulsive forces are sufficiently energetic to

destroy or suspend the usual operation of elective affinity." He also sketched a theory of chemical affinity on the facts he had discovered, and concluded by suggesting that the electric decomposition of neutral salts might in some cases admit of economical appli- cations and lead to the isolation of the true elements of bodies. A year after this paper, which gained him from the French Institute the medal offered by Napoleon for the best experiment made each year on galvanism, he described in his second Bakerian lecture the electrolytic preparation of potassium and sodium, effected in October 1807 by the aid of his battery. According to his cousin, Edmund Davy, 1 then his laboratory assistant, he was so delighted with this achievement that he danced about the room in ecstasy. Four days after reading his lecture his health broke down, and severe illness kept him from his professional duties until March 1808. As soon as he was able to work again he attempted to obtain the metals of the alkaline earths by the same methods as he had used for those of the fixed alkalis, but they eluded his efforts and he only succeeded in preparing them as amalgams with mercury, by a process due to Berzelius. His attempts to decompose " alumine, silica, zircone and glucine " were still less fortunate. At the end of 1808 he read his third Bakerian lecture, one of the longest of his papers but not one of the best. In it he disproved the idea advanced by Gay Lussac that potassium was a compound of hydrogen, not an element; but on the other hand he cast doubts on the elementary

1 Edmund Davy (1785–1857) became professor of chemistry at Cork Institution in 1813, and at the Royal Dublin Society in 1826. His son, Edmund William Davy (born in 1826), was appointed professor of medicine in the Royal College, Dublin, in 1870.

character of phosphorus, sulphur and carbon, though on this point he afterwards corrected himself. He

also described the preparation of boron, for which at first he proposed the name boracium, on the impression that it was a metal. . About this time a voluntary subscription among the members of the Royal Institution put him in possession of a new galvanic battery of 2000 double plates, with a surface equal to 128,000 sq. in., to replace the old one, which had become unserviceable. His fourth Bakerian lecture, in November 1809, gave further proofs of the elementary nature of potassium, and described the properties of telluretted hydrogen. Next year, in a paper read in July and in his fifth Bakerian lecture in November, he argued that oxymuriatic acid, contrary to his previous belief, was a simple body, and proposed for it the name " chlorine."

Davy's reputation was now at its zenith. As a lecturer he could command an audience of little less than 1000 in the theatre of the Royal Institution, and his fame had spread far outside London. In 1810, at the invitation of the Dublin Society, he gave a course of lectures on electro-chemical science, and in the following year he again lectured in Dublin, on chemistry and geology, receiving large fees at both visits. During his second visit Trinity College conferred upon him the honorary degree of LL.D., the only university distinction he ever received. On the 8th of April 181 2 he was knighted by the prince regent; on the oth he gave his farewell lecture as professor of chemistry at the Royal Institution; and on the nth he was married to Mrs Apreece, daughter and heiress of Charles Kerr of Kelso, and a distant connexion of Sir Walter Scott. A few months after his marriage he published the first and only volume of his Elements of Chemical Philosophy, with a dedication to his wife, and was also re-elected professor of chemistry at the Royal Institution, though he would not pledge himself to deliver lectures, explain- ing that he wished to be free from the routine of lecturing in order to have more time for original work. Towards the end of the year he began to investigate chloride of nitrogen, which had just been discovered by P. L. Dulong, but was

obliged to suspend his inquiries during the winter on account of injury to his eye caused by an explosion of that substance. In the spring of 18 13 he was engaged on the chemistry of fluorine, and though he failed to isolate the element, he reached accurate conclusions regarding its nature and properties. In October he started with his wife for a continental tour, and with them, as ” assistant in experiments and writing,” went Michael Faraday, who in the previous March had been engaged as assistant “in the Royal Institution laboratory. Having obtained permission from the French emperor to travel in France, he went first to Paris, where during his two months’ stay every honour was accorded him, including election as a corresponding member of the first class of the Institute. He does not, however, seem to have recipro- cated the courtesy of his French hosts, but gave offence by the brusqueness of his manner, though his supercilious bearing, according to his biographer, Dr Paris, was to be ascribed less to any conscious superiority than to an ” ungraceful timidity which he could never conquer.” Nor was his action in regard to iodine calculated to conciliate. That substance, recently discovered in Paris, was attracting the attention of French chemists when he stepped in and, after a short examination with his portable chemical laboratory, detected its resemblance to chlorine and pronounced it an ” undecompounded body.” Towards the end of December he left for Italy. At Genoa he investigated the electricity of the torpedo-fish, and at Florence, by the aid of the great burning-glass in the Accademia del Cimento, he effected the combustion of the diamond in oxygen and decided that, beyond containing a little hydrogen, it consisted of pure carbon. Then he went to Rome and Naples and visited Vesuvius and Pompeii, called on Volta at Milan, spent the summer in Geneva, and returning to Rome occupied the winter with an inquiry into the composition of ancient colours.

A few months after his return, through Germany, to London in 1815, he was induced to take up the

question of constructing a miner's safety lamp. Experiments with samples of fire-damp sent from Newcastle soon taught him that " explosive mixtures

of mine-damp will not pass through small apertures or tubes "; and in a paper read before the Royal Society on the 9th of November he showed that metallic tubes, being better con- ductors of heat, were superior to glass ones, and explained that the heat lost by contact with a large cooling surface brought the temperature of the first portions of gas exploded below that required for the firing of the other portions. Two further papers read in January 1816 explained the employment of wire gauze instead of narrow tubes, and later in the year the safety lamps were brought into use in the mines. A large collection of the different models made by Davy in the course of his inquiries is in the possession of the Royal Institution. He took out no patent for his invention, and in recognition of his disinterested- ness the Newcastle coal-owners in September 181 7 presented him with a dinner-service of silver plate. 1

In 1818, when he was created a baronet, he was commissioned by the British government to examine the papyri of Herculaneum in the Neapolitan museum, and he did not arrive back in England till June 1820. In November of that year the Royal Society, of which he had become a fellow in 1803, and acted as secretary from 1807 to 1812, chose him as their president, but his personal qualities were not such as to make him very successful in that office, especially in comparison with the tact and firmness of his predecessor, Sir Joseph Banks. In 1821 he was busy with electrical experiments and in 1822 with investigations of the fluids contained in the cavities of crystals in rocks. In 1823, when Faraday liquefied chlorine, he read a paper which suggested the application of liquids formed by the condensation of gases as mechanical agents. In the same year the admiralty consulted the Royal Society as to a means of preserving the copper sheath- ing of ships from corrosion and keeping it smooth, and he sug- gested that the copper would be preserved if

it were rendered negatively electrical, as would be done by fixing ” protectors ” of zinc to the sheeting. This method was tried on several ships, but it was found that the bottoms became extremely foul from accumulations of seaweed and shellfish. For this reason the admiralty decided against the plan, much to the inventor’s annoyance, especially as orders to remove the protectors already fitted were issued in June 1825, immediately after he had announced to the Royal Society the full success of his remedy.

In 1826 Davy’s health, which showed signs of failure in 1823, had so declined that he could with difficulty indulge in his favourite sports of fishing and shooting, and early in 1827, after a slight attack of paralysis, he was ordered abroad. After a short stay at Ravenna he removed to Salzburg, whence, his illness continuing, he sent in his resignation as president of the Royal Society. In the autumn he returned to England and spent his time in writing his Salmonia or Days of Flyfishing, an imitation of The Compleat Angler. In the spring of 1828 he again left England for Illyria, and in the winter fixed his residence at Rome, whence he sent to the Royal Society his ” Remarks on the Electricity of the Torpedo, ” written at Trieste in October. This, with the exception of a posthumous work, Consolations in Travel, or the Last Days of a Philosopher (1830), was the final production of his pen. On the 20th of February 1829 he suffered a second attack of paralysis which rendered his right side quite powerless, but under the care of his brother, Dr John Davy (1791–1868), he rallied sufficiently to be removed to Geneva, where he died on the 29th of May.

Of a sanguine, somewhat irritable temperament, Davy dis- played characteristic enthusiasm and energy in all his pursuits. As is shown by his verses and sometimes by his prose, his mind was highly imaginative; the poet Coleridge declared that if he ” had not been the first chemist, he would have been the first poet

1 Davy's will directed that this service, after Lady Davy's death, should pass to his brother, Dr John Davy, on whose decease, if he had no heirs who could make use of it, it was to be melted and sold, the proceeds going to the Royal Society " to found a medal to be given annually for the most important discovery in chemistry any- where made in Europe or Anglo-America." The silver produced £736. and the interest on that sum is expended on the Davy medal, which was awarded for the first time in 1877, to Bunsenand Kirchhoff for their discovery of spectrum analysis.

of his age," and Southey said that " he had all the elements of a poet; he only wanted the art." In spite of his ungainly exterior and peculiar manner, his happy gifts of exposition and illus- tration won him extraordinary popularity as a lecturer, his experiments were ingenious and rapidly performed, and Coleridge went to hear him " to increase his stock of metaphors." The dominating ambition of his life was to achieve fame, but though that sometimes betrayed him into petty jealousy, it did not leave him insensible to the claims on his knowledge of the " cause of humanity," to use a phrase often employed by him in connexion with his invention of the miners' lamp. Of the smaller observances of etiquette he was careless, and his frankness of disposition sometimes exposed him to annoyances whichhe might have avoided by the exercise of ordinary tact.

See Dr J. A. Paris, The Life of Sir Humphry Davy (1831), vol. ii. of which on pp. 450-456 gives a list of his publications. Dr John Davy, Memoirs of Sir Humphry Davy (1836); Collected Works (with shorter memoir, 1839) ; Fragmentary Remains, Literary and Scien- tific (1858). T. E. Thorpe, Humphry Davy, Poet and Philosopher

(1896).

DAWARI, or Dauri, a Pathan tribe on the Waziri border of the North- West Frontier Province of India. The Dawaris inhabit the Tochi Valley (q.v.), otherwise known as Dawar or Daur, and are a homogeneous tribe of considerable size, numbering 5200 fighting men. Though surrounded on all four sides by a Waziri population they bear little resemblance to Waziris. They are an agricultural and the Waziris a pastoral race, and they are much richer than their neighbours. They thrive on a rich sedi- mentary soil copiously irrigated in the midst of a country where cultivable land of any kind is scarce and water in general hardly to be obtained. But they pay a heavy tax in health and well- being for the possession of their fertile acres. Fevers and other ravaging diseases are bred in the wet sodden lands of the Tochi Valley, lying at the bottom of a deep depression exposed to the burning rays of the sun; and the effects of these ailments may be clearly traced in the drawn or bloated features and the shrunken or swollen limbs of nearly every Dawari that has passed middle life. They have an evil name for indolence, drug-eating and unnatural vices, and are morally the lowest of the Afghan races; but in spite of these defects, and of the contempt with which they are regarded by the other Afghan tribes, they have held their own for centuries against the warlike and hardy Waziris. The secret of this is that the Dawaris stand together, and the Waziris do not, while the weaker race is gifted with infinite patience and tenacity of purpose. With the advent of British government, however, the Dawaris are now secured in the possession of their ancestral lands.

See J. G. Lorimer, Grammar and Vocabulary of Waziri Pushtu

(1902).

DAWES, HENRY LAURENS (1816-1903), American lawyer, was born at Cummington, Massachusetts, on the 30th of October 1816. After graduating at Yale in 1839, he taught for a time at Greenfield, Mass., and also edited The Greenfield Gazette. In 1842 he was

admitted to the bar and began the practice of law at North Adams, where for a time he conducted The Transcript. He served in the Massachusetts House of Representatives in 1 848–1 849 and in 1852, in the state Senate in 1850, and in the Massachusetts constitutional convention in 1853. From 1853 to 1857 he was United States district attorney for the western district of Massachusetts; and from 1857–1875 he was a Republican member of the national House of Representatives. In 1875 he succeeded Charles Sumner as senator from Massa- chusetts, serving until 1893. During this long period of legislative activity he served in the House on the committees on elections, ways and means, and appropriations, took a prominent part in the anti-slavery and reconstruction measures during and after the Civil War, in tariff legislation, and in the establishment of a fish commission and the inauguration of daily weather reports. In the Senate he was chairman of the committee on Indian affairs, and gave much attention to the enactment of laws for the benefit of the Indians. • On leaving the Senate, in 1893, he became chairman of the Commission to the Five Civil- ized Tribes (sometimes called the Dawes Indian Commission),

and served in this capacity for ten years, negotiating with the tribes for the extinction of the communal title to their land and for the dissolution of the tribal governments, with the object of making the tribes a constituent part of the United States. 1 Dawes died at Pittsfield, Mass., on the 5th of February 1903.

DAWES, RICHARD (1708–1766), English classical scholar, was born in or near Market Bosworth. He was educated at the town grammar school under Anthony Blackwall, and at Emmanuel College, Cambridge, of which society he was elected fellow in 173 1. His peculiar habits and outspoken language made him unpopular. His health broke down in consequence of his sedentary life, and it is said that he took to bell-ringing at Great St Mary's as a restorative. He was a bitter enemy of Bentley, who he declared knew nothing of Greek except from indexes. In 1738 Dawes

was appointed to the mastership of the grammar school, Newcastle- on-Tyne, combined with that of St Mary's hospital. From all accounts his mind appears to have become unhinged; his eccentricities of conduct and continual disputes with his govern- ing body ruined the school, and finally, in 1749, he resigned his post and retired to Heworth, where he chiefly amused himself with boating. He died on the 21st of March 1766. Dawes was not a prolific writer. The book on which his fame rests is his Miscellanea critica (1745), which gained the commendation of such distinguished continental scholars as L. C. Valckenaer and J. J. Reiske. The Miscellanea, which was re-edited by T. Burgess (1781), G. C. Harles (1800) and T. Kidd (1817), for many years enjoyed a high reputation, and although some of the " canons " have been proved untenable and few can be accepted universally, it will always remain an honourable and enduring monument of English scholarship.

See J. Hodgson, An Account of the Life and Writings of Richard Dawes (1828); H. R. Luard in Diet, of Nat. Biog.; J. E. Sandys, Hist, of Classical Scholarship, ii. 415.

DAWISON, BOGUMIL (1818-1872), German actor, was born at Warsaw, of Jewish parents, and at the age of nineteen went on the stage. In 1839 he received an appointment to the theatre at Lemberg in Galicia. In 1847 he played at Hamburg with marked success, was from 1849 to 1854 a member of the Burg theatre in Vienna, and then became connected with the Dresden court theatre. In 1864 he was given a life engagement, but resigned his appointment, and after starring through Germany visited the United States in 1866. He died in Dresden on the 1st of February 1872. Dawison was considered in Germany an actor of a new type; a leading critic wrote that he and Marie Seebach " swept like fresh gales over dusty tradition, and brushing aside the monotony of declamation gave to their r61es more character and vivacity than had hitherto been known on the German stage." His chief parts were Mephistopheles, Franz Moor, Mark Antony, Hamlet, Charles V., Richard III. and King Lear.

DAWKINS, WILLIAM BOYD (1838-), English geologist and archaeologist, was born at Buttington vicarage near Welshpool, Montgomeryshire, on the 26th of December 1838. Educated at Rossall School and Oxford, he joined the Geological Survey in 1862, and in 1869 became curator of the Manchester museum, a post which he retained till 1890. He was appointed professor of geology and palaeontology in Owens College, Manchester, in 1874. He paid special attention to the question of the existence of coal in Kent, and in 1882 was selected by the Channel tunnel committee to make a special survey of the French and English coasts. He was also employed in the scheme of a tunnel beneath the Humber. His chief distinctions, however, were won in the realms of anthropology by his researches into the lives of the cave-dwellers of prehistoric times, labours which have borne fruit in his books Cave-hunting (1874); Early Man in Britain (1880); British Pleistocene Mammalia (1866-1887). He became a Fellow of the Royal Society in 1867, and acted as president of the anthropological section of the British Association in 1882 and of the geological section in 1888.

1 The commission completed its labours on the 1st of July 1905, after having allotted 20,000,000 acres of land among 90,000 Indians and absorbed the five Indian governments into the national system. The " five tribes " were the Cherokee, Chickasaw, Choctaw, Creek and Seminole Indians.

DAWLISH, a watering-place in the Ashburton parliamentary division of Devonshire, England, on the English Channel, near the outflow of the Exe, 12 m. S. of Exeter by the Great Western railway. Pop. of urban district (1901) 4003. It lies on a cove sheltered by two projecting headlands. A small stream which flows through the town is lined on both sides by pleasure- grounds. Dawlish owes its prosperity to the visitors attracted, in spring and early summer, by the warm climate and excellent

bathing. An annual pleasure fair is held on Easter Monday, and a regatta in August or September. Until its sale in the 19th century, the site of Dawlish belonged to Exeter cathedral, having been given to the chapter by Leofric, bishop of Exeter, in 1050.

DAWN (the 16th-century form of the earlier " dawing " or " dawning," from an old verb " daw," 0. Eng. dagian, to become day; cf. Dutch dagen, and Ger. tagen), the time when light appears (daws) in the sky in the morning. The dawn colours appear in the reverse order of the sunset colours and are due to the same cause. When the sun is lowest in both cases the colour is deep red; this gradually changes through orange to gold and brilliant yellow as the sun approaches the horizon. These colours follow each other in order of refrangibility, repro- ducing all the colours of the spectrum in order except the blue rays which are scattered in the sky. The colours of the dawn are purer and colder than the sunset colours since there is less dust and moisture in the atmosphere and less consequent sifting of light rays.

DAWSON, GEORGE (1821-1876), English nonconformist divine, was born in London on the 24th of February 1821, and was educated at Marischal College, Aberdeen, and at the uni- versity of Glasgow. In 1843 ne accepted the pastorate of the Baptist church at Rickmansworth, and in 1844 a similar charge at Mount Zion, Birmingham, where he attracted large congrega- tions by his eloquence and his unconventional views. Desiring freedom from any definite creed, he left the Baptist church and became minister of the " Church of the Saviour," a building erected for him by his supporters. Here he exercised a stimulat- ing and varied ministry for nearly thirty years, gathering round him a congregation of all types and especially of such as found the dogmas of the age distasteful. He had much sympathy with the Unitarian position, but was not himself a Unitarian. Indeed he had no fixed standpoint, and discussed truths and principles from various aspects. His sermons, though not particularly speculative, were unconventional and

quickening. He was the friend of Carlyle and Emerson, and did much to popularize their teachings, his influence being conspicuous, especially in his demand for a high ethical standard in everyday life and his insistence on the Christianization of citizenship. He was warmly supported by Dr R. W. Dale, and by J. T. Bunce, editor of The Birmingham Daily Post. Both Dawson and Dale were dis- qualified as ministers from seats on the town council, but both served on the Birmingham school board. Dawson also lectured on English literature at the Midland Institute and helped to found the Shakespeare Memorial library in Birmingham. He died suddenly at King's Norton on the 30th of November 1876. Four volumes of Sermons, two of Prayers and two of Biographical Lectures were published after his death.

See Life by H. W. Crosskey (1876) and an article by R. W. Dale in The Nineteenth Century (August 1877).

DAWSON, SIR JOHN WILLIAM (1820–1899), Canadian geologist, was born at Pictou, Nova Scotia, on the 30th of October 1820. • Of Scottish descent, he went to Edinburgh to complete his education, and graduated at the university in 1842, having gained a knowledge of geology and natural history 'from Robert Jameson. On his return to Nova Scotia in 1842 he accompanied Sir Charles Lyell on his first visit to that territory. Subsequently he was appointed to the post of superintendent of education (1850–1853); at the same time he entered zealously into the geology of the country, making a special study of the .fossil forests of the coal-measures. From these strata, in company with Lyell (during his second visit) in 1852, he obtained the first remains of an " air-breathing reptile " named Dendrer- peton. He also described the fossil plants of the Silurian,

Devonian and Carboniferous rocks of Canada, for the Geological Survey of that country (1871–1873). From 1855 to 1893 he was professor of geology and principal of M'Gill University, Montreal, an institution which under his influence attained a high reputation. He was elected F.R.S. in 1862. When

the Royal Society of Canada was constituted he was the first to occupy the presidential chair, and he also acted as president of the British Association at its meeting at Birmingham in 1886, and of the American Association for the Advancement of Science. Sir William Dawson's name is especially associated with the Eozoon canadense, which in 1864 he described as an organism having the structure of a foraminifer. It was found in the Laurentian rocks, regarded as the oldest known geological system. His views on the subject were contested at the time, and have since been disproved, the so-called organism being now regarded as a mineral structure. He was created C.M.G. in 1881, and was knighted in 1 884. In his books on geological subjects he maintained a distinctly theological attitude, declining to admit the descent or evolution of man from brute ancestors, and holding that the human species only made its appearance on this earth within quite recent times. Besides many memoirs in the Transactions of learned societies, he published Acadian Geology: The geological structure, organic remains and mineral resources of Nova Scotia, New Brunswick, and Prince Edward Island (1855; ed. 3, 1878); Air-breathers of the Coal Period (1863); The Story of the Earth and Man (1873; ed. 6, 1880); The Dawn of Life (1875); Fossil Men and their Modem Representatives (1880); Geological History of Plants (1888); The Canadian Ice Age (1894). He died on the 20th of November 1899.

His son, George Mercer Dawson (1849-1901), was born at Pictou on the 1st of August 1849, an d received his education at M'Gill University and the Royal School of Mines, London, where he had a brilliant career. In 1873 he was appointed geologist and naturalist to the North American boundary commission, and two years later he joined the staff of the geological survey of Canada, of which he became assistant director in 1883, and director in 1895. He was in charge of the Canadian government's Yukon expedition in 1887, and his name is permanently written in Dawson City, of gold-bearing fame. As one of the Bering Sea Commissioners he

spent the summer of 189 1 investigating the facts of the seal fisheries on the northern coasts of Asia and America. For his services there, and at the subsequent arbitration in Paris, he was made a C.M.G. He was elected F.R.S. in 1891, and in the same year was awarded the Bigsby medal by the Geological Society of London. He was president of the Royal Society of Canada in 1893. He died on the 2nd of March 1901. He was the author of many scientific papers and reports, especially on the surface geology and glacial phenomena of the northern and western parts of Canada.

DAWSON CITY, or Dawson, the capital of the Yukon terri- tory, Canada, on the right bank of the Yukon river, and in the middle of the Klondyke gold region, of which it is the distributing centre. It is situated in beautiful mountainous country, 1400 ft. above the sea, and 1 500 m. from the mouth of the Yukon river. It is reached by a fleet of river steamers, and has telegraphic communication. Founded in 1896, its population soon reached over 20,000 at the height of the gold rush; in 1901 it was officially returned as 9142, and is now not more than 5000. The tempera- ture varies from 90 F. in summer to 50° below zero in winter. It possesses three opera-houses and numerous hotels, and is a typical mining town, though even at first there was much less lawlessness than is usually the case in such cities.

DAX, a town of south-western France, capital of an arrondisse- ment in the department of Landes, 92 m. S.S.W. of Bordeaux, on the Southern railway between that city and Bayonne. Pop. (1906) 8585. The town lies on the left bank of the Adour, a stone bridge uniting it to its suburb of Le Sablar on the right bank. It has remains of ancient Gallo-Roman fortifications, now converted into a promenade. The most remarkable building in the town is the church of Notre-Dame, once a cathedral; it was rebuilt from, 1656 to 1719, but still preserves a sacristy, a porch and a fine sculptured doorway of the 13th century- The

church of St Vincent, to the south-west of the town, derives its name from the first bishop, whose tomb it contains. ' The church of St Paul-les-Dax, a suburb on the right bank of the Adour, belongs mainly to the 15th century, and has a Romanesque apse adorned with curious bas-reliefs. On a hill to the west of Dax stands a tower built in memory of the sailor and scientist Jean Charles Borda, born there in 1733; a statue was erected to him in the town in 1891 . Dax, which is well known as a winter resort, owes much of its importance to its thermal waters and mud- baths (the deposit of the Adour), which are efficacious in cases of rheumatism, neuralgia and other disorders. The best-known spring is the Fontaine Chaude, which issues into a basin 160 ft. wide in the centre of the town. The principal of numerous bathing establishments are the Grands Thermes, the Bains Sales, adjoin- ing a casino, and the Baignots, which fringe the Adour and are surrounded by gardens. Dax has a sub-prefecture, tribunals of first instance and of commerce, a communal college, a training college and a library. It has salt workings, tanneries, saw- mills, manufactures of soap and corks; commerce is chiefly in the pine wood, resin and cork of the Landes, in mules, cattle, horses and poultry.

Dax (Aquae Tarbellicae, Aquae Augustae, later D'Acqs) was the capital of the Tarbelli under the Roman domination, when its waters were already famous. Later it was the seat of a viscounty, which in the nth century passed to the viscounts of Beam, and in 1177 was annexed by Richard Cceur de Lion to Gascony. The bishopric, founded in the 3rd century, was in 1801 attached to that of Aire.

DAY, JOHN (1574-1640?), English dramatist, was born at Cawston, Norfolk, in 1574, and educated at Ely. He became a sizar of Caius College, Cambridge, in 1592, but was expelled in the next year for stealing a book. He became one of Hens- lowe's playwrights,

collaborating with Henry Chettle, William Haughton, Thomas Dekker, Richard Hathway and Wentworth Smith, but his almost incessant activity seems to have left him poor enough, to judge by the small loans, of five shillings and even two shillings, that he obtained from HensloWe. The first play in which Day appears as part-author is The Conquest of Brute, with the finding of the Bath (1598), which, with most of his journeyman's work, is lost. A drama dealing with the early years of the reign of Henry VI., The Blind Beggar of Bednal Green (acted 1600, printed 1659), written in collaboration with Chettle, is his earliest extant work. It bore the sub-title of The Merry Humor of Tom Strowd, the Norfolk Yeoman, and was so popular that second and third parts, by Day and Haughton, were produced in the next year. The He of Guls (printed 1606), a prose comedy founded upon Sir Philip Sidney's Arcadia, contains in its light dialogue much satire to which the key is now lost, but Mr Swinburne notes in Manasses's burlesque of a Puritan sermon a curious anticipation of the eloquence of Mr Chadband in Bleak House. In 1607 Day produced, in conjunction with William Rowley and George Wilkins, The Travailes of the Three English Brothers, which detailed the adventures of Sir Thomas, Sir Anthony and Robert Shirley.

The Parliament of Bees is the work on which Day's reputation chiefly rests. This exquisite and unique drama, or rather masque, is entirely occupied with " the doings, the births, the wars, the wooings " of bees, expressed in a style at once most singular and most charming. The bees hold a parliament under Prorex, the Master Bee, and various complaints are preferred against the humble-bee, the wasp, the drone and other offenders. This satirical allegory of affairs ends with a royal progress of Oberon, who distributes justice to all. The piece contains much for which parallel passages are found in Dekker's Wonder of a Kingdom (1636) and Samuel Rowley's (or Dekker's) Noble Soldier (printed 1634). There is no earlier known edition of The Parliament of Bees than that in 1641, but a persistent tradition has

assigned the piece to 1607. In 1608 Day published two comedies, Law Trickes, or Who Would have Thought it? and Humour out of Breath. The date of his death is unknown, but an elegy on him by John Tatham, the city poet, was published in 1640. The six dramas by John Day which we possess show

a delicate fancy and dainty inventiveness all his own. He pre- served, in a great measure, the dramatic tradition of John Lyly, and affected a kind of subdued euphuism. The Maydes Metamor- phosis (1600), once supposed to be a posthumous work of Lyly's, may be an early work of Day's. It possesses, at all events, many of his marked characteristics. His prose Peregrinatic Scholastica or Learninges Pilgrimage, dating from his later years, was printed by Mr A. H. Bullen from a MS. of Day's. Considerations partly based on this work have suggested that he had a share in the anonymous Pilgrimage to Parnassus and the Return from Parnassus. The beauty and ingenuity of The Parliament of Bees were noted and warmly extolled by Charles Lamb; and Day's work has since found many admirers.

His works, edited by A. H. Bullen, were printed at the Chiswick Press in 1 88 1. The same editor included The Maydes Metamorphosis in vol. i. of his Collection of Old Plays. The Parliament of Bees and Humour out of Breath were printed in Nero and other Plays (Mermaid Series, 1 888) , with an introduction by Arthur Symons. An apprecia- tion by Mr A. C. Swinburne appeared in The Nineteenth Century (October 1897).

DAY, THOMAS (1748–1789), British author, was born in London on the 22nd of June 1748. He is famous as the writer of Sandford and Merlon (1783–1789), a book for the young, which, though quaintly didactic and often ridiculous, has had consider- able educational value as inculcating manliness and independence. Day was educated at the Charterhouse and at Corpus Christi College, Oxford, and became a great admirer of J. J. Rousseau and his doctrine of the ideal state of nature. Having independent means he devoted

himself to a life of study and philanthropy. His views on marriage were typical of the man. He brought up two foundlings, one of whom he hoped eventually to marry. They were educated on the severest principles, but neither acquired the, high quality of stoicism which he had looked for. After several proposals of marriage to other ladies had been rejected, he married an heiress who agreed with his ascetic programme of life. He finally settled at Ottershaw in Surrey and took to farming on philanthropic principles. He had many curious and impracticable theories, among them one that all animals could be managed by kindness, and while riding an unbroken colt he was thrown near Wargrave and killed on the 28th of September 1789. His poem The Dying Negro, published in 1773, struck the keynote of the anti-slavery movement. It is also obvious from his other works, such as The Devoted Legions (1776) and The Desolation of America (1777), that he strongly sympathized with the Americans during their War of Independence.

DAY (0. Eng. dmg, Ger. Tag; according to the New English Dictionary, ” in no way related to the Lat. dies “), in astronomy, the interval of time in which a revolution of the earth on its axis is performed. Days are distinguished as solar, sidereal or lunar, according as the revolution is taken relatively to the sun, the stars or the moon. The solar day is the fundamental unit of time, not only in daily life but in astronomical practice. In the latter case, being determined by observations of the sun, it is taken to begin with the passage of the mean sun over the meridian of the place, or at mean noon, while the civil day begins at mid- night. A vigorous effort was made during the last fifteen years of the 19th century to bring the two uses into harmony by begin- ning the astronomical day at midnight. In some isolated cases this has been done; but the general consensus of astronomers has been against it, the day as used in astronomy being only a measure of time, and having no relation to the period of daily repose. The time when the day shall begin is purely a matter of convenience. The present practice being

the dominant one from the time of Ptolemy until the present, it was felt that the confusion in the combination of past and present astronomical observations, and the doubts and difficulties in using the astro- nomical ephemerides, formed a decisive argument against any change.

The question of a possible variability in the length of the day is one of fundamental importance. One necessary effect of the tidal retardation of the earth's rotation is gradually to increase this length. It is remarkable that the discussion of

ancient eclipses of the moon, and their comparison with modern observations, show only a small and rather doubtful change, amounting perhaps to less than one-hundredth of a second per century. As this amount seems to be markedly less than that which would be-expected from the cause in question, it is probable that some other cause tends to accelerate the earth's rotation and so to shorten the day. The moon's apparent mean motion in longitude seems also to indicate slow periodic changes in the earth's rotation; but these are not confirmed by transits of Mercury, which ought also to indicate them. (See Moon and Tides.) (S. N.)

Legal Aspects. — In law, a day may be either a dies naturalis or natural day, or a dies artificialis or artificial day. A natural day includes all the twenty-four hours from midnight to midnight. Fractions of the day are disregarded to avoid dispute, though sometimes the law will consider fractions, as where it is necessary to show the first of two acts. In cases where action must be taken for preserving or asserting a right, a day would mean the natural day of twenty-four hours, but on the other hand, as in cases of survivorship, for testamentary or other purposes, it would suffice if a person survived for even the smallest portion of the last day necessary.

When a statute directs any act to be done within so many days, these words mean clear days, i.e. a number of perfect intervening days, not counting the terminal days: if the statute says nothing about Sunday, the days mentioned mean consecutive days and include Sundays. Under some statutes {e.g. the Parlia- mentary Elections Act 1868, the Corrupt and Illegal Practices Prevention Act 1883) Sundays and holidays are excluded in reckoning days, and consequently all the Sundays, &c, of a prescribed sequence of days would be eliminated. So also, by custom, the word ” day ” may be understood in some special sense. In bills of lading and charter parties, when “days ” or ” running days ” are spoken of without qualification, they usually mean consecutive days, and Sundays and holidays are counted, but when there is some qualification, as where a charter party required a cargo ” to be discharged in fourteen days,” ” days ” will mean working days. Working days, again, vary in different ports, and the custom of the port will decide in each case what are working days. In English charter parties, unless the contrary is expressed, Christmas day and other recognized holidays are included as working days. A weather working day, a term sometimes used in charter parties, means a day when work is not prevented by the weather, and unless so provided for, a day on which work was rendered impossible by bad weather would still be counted as a working day. Lay days, which are days given to the charterer in a charter party either to load or unload without paying for the use of the ship, are days of the week, not periods of twenty-four hours.

Days of Grace. — When a bill of exchange is not payable at sight or on demand, certain days (called days of grace, from being originally a gratuitous favour) are added to the time of payment as fixed by the bill, and the bill is then due and payable on the last day of grace. In the United Kingdom, by the Bills of Exchange Act 1882, three days are allowed as days of grace, but when the last day of grace falls on Sunday, Christmas day, Good Friday or a day appointed by royal proclamation as a public fast or

thanksgiving day, the bill is due and payable on the preceding business day. If the lasMay of grace is a bank holiday (other than Christmas day or Good Friday), or when the last day of grace is a Sunday, and the second day of grace is a bank holiday, the bill is due and payable on the succeeding business day. Days of grace (dies non) are in existence practically among English-speaking peoples only. They were abolished by the French Code (Code de Commerce, Liv. i. tit. 8, art. 135), and by most, if not all, of the European codes since framed.

Civil Days. — An artificial or civil day is, to a certain extent, difficult to define; it ” may be regarded as a convenient term to signify all the various kinds of ‘ day ‘ known in legal proceed ings other than the natural day ‘.’ (Ency. English Law, tit. ” Day “). The Jews, Chaldeans and Babylonians began the day at the rising of the sun; the Athenians at the fall; the

Umbri in Italy began at midday; the Egyptians and Romans at midnight ; and in England, the United States and most of the countries of Europe the Roman civil day still prevails, the day usually commencing as soon as the clock begins to strike 12 p.m. of the preceding day.

In England the period of the civil day may also vary under different statutes. In criminal law the day formerly commenced at sunrise and extended to sunset, but by the Larceny Act 1861 the day is that period between six in the morning and nine in the evening. The same period of time comprises a day under the Housing of the Working Classes Act 1885 and the Public Health (London) Act 1891, but under the Public Health (Scotland) Act 1897 “day ” is the period between 9 a.m. and 6 p.m. By an act of 1845, regulating the labour of children in print-works, ” day ” is defined as from 6 a.m. to 10 p.m. Daytime, within which distress for rent must be made, is from sunrise to sunset (Tulton v. Darke, i860, 2 L.T. 361). An obligation to pay money on a certain day is theoretically discharged if the money is paid before midnight of the day on which it falls due, but

custom has so far modified this that the law requires reasonable hours to be observed. If, for instance, payment has to be made at a bank or place of business, it must be within business hours.

When an act of parliament is expressed to come into operation on a certain day, it is to be construed as coming into operation on the expiration of the previous day (Interpretation Act 1889, § 36; Statutes [Definition of Time] Act 1880).

Under the orders of the supreme court the word " day " has two meanings. For purposes of personal service of writs, it means any time of the day or night on week-days, but excludes the time from twelve midnight on Saturday till twelve midnight on Sunday. For purposes of service not required to be personal, it means before six o'clock on any week-day except Saturday, and before 2 p.m. on Saturday.

Closed Days, i.e. Sunday, Christmas day and Good Friday, are excluded from all fixtures of time less than six days: otherwise they are included, unless the last day of the time fixed falls on one of those days (R.S.C., O. lxiv.).

American Practice.- — In the United States a day is the space of time between midnight and midnight. The law pays no regard to fractions of a day except to prevent injustice. A " day's work " is by statute in New York fixed at eight hours for all employees except farm and domestic servants, and for employees on railroads at ten hours (Laws 1897, ch. 415). In the recording acts relating to real property, fractions of a day are of the utmost importance, and all deeds, mortgages and other instruments affecting the property, take precedence in the order in which they were filed for record. Days of grace are abolished in many of the seventeen states in which the Negotiable Instru- ments law has been enacted. Sundays and public holidays are usually excluded in computing time if they are the last day within which the act was to be done. General public holidays throughout the United States are Christmas, Thanksgiving (last Thursday in November) and

Independence (July 4th) days and Washington's birthday (February 22nd). The several states have also certain local public holidays. (See also Month; Time.) (T.A.I.)

DAYLESFORD, a town of Talbot county, Victoria, Australia, 74 m. by rail N.W. of Melbourne. Pop. (1901) 3384. It lies on the flank of the Great Dividing Range, at an elevation of 2030 ft. On Wombat Hill are beautiful public gardens commanding extensive views, and a fine convent of the Presentation Order. Much wheat is grown in the district, and gold-mining, both quartz and alluvial, is carried on. Daylesford has an important mining school. Near the town are the Hepburn mineral springs and a number of beautiful waterfalls, and 6 m. from it is Mount Franklin, an extinct volcano.

DAYTON, a city of Campbell county, Kentucky, U.S.A., on the S. bank of the Ohio river, opposite Cincinnati, and adjoining Bellevue and Newport, Ky. Pop. (1890) 4264; (1900) 6104 in- cluding 655 foreign-born and 63 negroes; (1910) 6979. It is served by the Chesapeake & Ohio railway at Newport, of which it is a suburb, largely residential. It has manufactories of watch-cases

and pianos, and whisky distilleries. In the city is the Speers Memorial hospital. Dayton was settled and incorporated in

1840-

DAYTON, a city and the county-seat of Montgomery county, Ohio, U.S.A., at the confluence of Wolf Creek, Stillwater river and Mad river with the Great Miami, 57 m. N.N.E. of Cincinnati and about 70 m. W.S.W. of Columbus. Pop. (1890) 61,220; (1900) 85,333; (1910) 116,577. In 1900 there were 10,053 foreign-born and 3387 negroes ; of the foreign-born 6820 were Germans and 1253 Irish. Dayton is served

by the Erie, the Cleveland, Cincinnati, Chicago & St Louis, the Pittsburg, Cincinnati, Chicago & St Louis, the Cincinnati, Hamilton & Dayton, and the Dayton & Union railways, by ten interurban electric railways, centring here, and by the Miami & Erie Canal. The city extends more than 5 m. from E. to W., and 35 m. from N. to S., lies for the most part on level ground at an elevation of about 740 ft. above sea-level, and numerous good, hard gravel roads radiate from it in all directions through the surrounding country, a fertile farming region which abounds in limestone, used in the construction of public and private buildings. Among the more prominent buildings are the court-house — the portion first erected being designed after the Parthenon — the Steele high school, St Mary's college, Notre Dame academy, the Memorial Building, the Arcade Building, Reibold Building, the Algonquin Hotel, the post office, the public library (containing about 75,000 volumes), the Young Men's Christian Association building and several churches. At Dayton are the Union Biblical seminary, a theological school of the United Brethren in Christ, and the publishing house of the same denomination. By an agreement made in 1907 the school of theology of Ursinus College (College- ville, Pennsylvania; the theological school since 1898 had been in Philadelphia) and the Heidelberg Theological seminary (Tiffin, Ohio) united to form the Central Theological seminary of the German Reformed Church, which was established in Dayton in 1908. The boulevard and park along the river add attractive-ness to the city. Among the charitable institutions are the Dayton state hospital (for the insane), the Miami Valley and the St Elizabeth hospitals, the Christian Deaconess, the Widows' and the Children's homes, and the Door of Hope (for homeless girls); and 1 m. W. of the city is the central branch of the National Home for disabled volunteer soldiers, with its beautifully ornamented grounds, about 1 sq. m. in extent. The Mad river is made to furnish good water-power by means of a hydraulic canal which takes its water through the city, and Dayton's manu-factures are extensive and varied, the

establishments of the National Cash Register Company employing in 1907 about 4000 wage-earners. This company is widely known for its ” welfare work ” on behalf of its operatives. Baths, lunch-rooms, rest-rooms, clubs, lectures, schools and kindergartens have been supplied, and the company has also cultivated domestic pride by offering prizes for the best-kept gardens, &c. From April to July 1 90 1 there was a strike in the already thoroughly union-ized factories; complaint was made of the hectoring of union men by a certain foreman, the use in toilet-rooms of towels laundered in non-union shops (the company replied by allowing the men to supply towels themselves) , the use on doors of springs not union-made (these were removed by the company), and especially the discharge of four men whom the company refused to reinstate. The company was victorious in the strike, and the factory became an ” open shop.” In addition to cash registers, the city’s manufactured products include agricultural implements, clay-working machinery, cotton-seed and linseed oil machinery, filters, turbines, railway cars (the large Barney-Smith car works employed 1800 men in 1905), carriages and wagons, sewing- machines (the Davis Sewing Machine Co.), automobiles, clothing, flour, malt liquors, paper, furniture, tobacco and soap. The total value of the manufactured product, under the ” factory system,” was $31,015,293 in 1900 and $39,596,773 in 1905. Dayton’s site was purchased in 1795 from John Cleves Symmes by a party of Revolutionary soldiers, and it was. laid out as a town in 1796 by Israel Ludlow (one of the owners) , by whom it was named in honour of Jonathan Dayton (1760-1824), a soldier in the War of

Independence, a member of Congress from New Jersey in 1791- 1799, and a United States senator in 1 790-1805. It was made the county-seat in 1803, was incorporated as a town in 1805, grew rapidly after the opening of the canal in 1828, and in 1841 was chartered as a city.

DEACON (Gr. Siaxovos, minister, servant), the name given to a particular minister or officer of the Christian Church. The status and functions of the office have varied in different ages and in different branches of Christendom.

(a) The Ancient Church. — The office of deacon is almost as old as Christianity itself, though it is impossible to fix the moment at which it came into existence. Tradition connects its origin with the appointment of " the Seven " recorded in Acts vi. This connexion, however, is questioned by a large and increasing number of modern scholars, on the ground that " the Seven " are not called deacons in the New Testament and do not seem to have been identified with them till the time of Irenaeus (a.d. 180). The first definite reference to the diaconate occurs in St Paul's Epistle to the Philippians (i. 1), where the officers of the Church are described as " bishops and deacons " — though it is not unlikely that earlier allusions are to be found in 1 Cor. xii. 28 and Romans xii. 7. In the pastoral epistles the office seems to have become a permanent institution of the Church, and special qualifications are laid down for those who hold it (1 Tim. iii. 8). By the time of Ignatius (a.d. i 10) the " three orders " of the ministry were definitely established, the deacon being the lowest of the three and subordinate to the bishop and the presbyters. The inclusion of deacons in the " three orders " which were regarded as essential to the existence of a true Church sharply distinguished them from the lower ranks of the ministry, and gave them a status and position of importance in the ancient Church.

The functions attaching to the office varied at

different times. In the apostolic age the duties of deacons were naturally vague and undefined. They were ” helpers ” or ” servants ” of the Church in a general way and served in any capacity that was required of them. With the growth of the episcopate, however, the deacons became the immediate ministers of the bishop. Their duties included the supervision of Church property, the management of Church finances, the visitation of the sick, the distribution of alms and the care of widows and orphans. They were also required to watch over the souls of the flock and report to the bishop the cases of those who had sinned or were in need of spiritual help. ” You deacons,” says the Apostolical Constitu- tions (4th century), ” ought to keep watch over all who need watching or are in distress, and let the bishop know.” With the growth of hospitals and other charitable institutions, however, the functions of deacons became considerably curtailed. The social work of the Church was transferred to others, and little by little the deacons sank in importance until at last they came to be regarded merely as subordinate officers of public worship, a position which they hold in the Roman Church to-day, where their duties are confined to such acts as the following: — censing the officiating priest and the choir, laying the corporal on the altar, handing the paten or cup to the priest, receiving from him the pyx and giving it to the subdeacon, putting the mitre on the archbishop’s head (when he is present) and laying his pall upon the altar.

(b) The Church of England. — The traditionary position of the diaconate as one of the ” three orders ” is here maintained. Deacons may conduct any of the ordinary services in the church, but are not permitted to pronounce the absolution or consecrate the elements for the Eucharist. In practice the office has become a stepping-stone to the priesthood, the deacon corresponding to the licentiate in the Presbyterian Church. Candidates for the office must have attained the age of twenty-three and must satisfy the bishop with regard to their intellectual, moral and spiritual fitness. The

functions of the office are defined in the Ordinal — " to assist the priest in divine service and specially when he ministereth the Holy Communion, to read Holy Scriptures and Homilies in the church, to instruct the youth in the catechism, to baptize in the absence of the priest, to preach if he be admitted thereto by the bishop, and furthermore to search

for the sick, poor and impotent people and intimate their estates and names to the curate."

(c) Churches of the Congregational Order. — In these (which of course include Baptists) the diaconate is a body of laymen appointed by the members of the church to act as a management committee and to assist the minister in the work of the church. There is no general rule as to the number of deacons, though the traditionary number of seven is often kept, nor as to the fre- quency of election, each church making its own arrangements in this respect. The deacons superintend the financial affairs of the church, co-operate with the minister in the various branches of his work, assist in the visitation of the sick, attend to the church property and generally supervise the activities of the church.

See Thomassinus, Vetus ac nova disciplina, pars i. lib. i. c. 51 f. and lib. ii. c. 29 f. (Lugdunum, 1706); J. N. Seidl, Der Diakonat in der katholischen Kirche (Regensburg, 1884) ; R. Sohm, Kirchenrecht, i. 121-137 (Leipzig, 1892); F. J. A. Hort, The Christian Ecclesia (London, 1897).

DEACONESS (17 Siclkovos or SiaKoviaaa, servant, minister), the name given to a woman set apart for special service in the Christian Church. The origin and early history of the office are veiled in obscurity. It is quite certain that from the 3rd century onward there existed in the Eastern Church an order of women, known as deaconesses, who filled

a position analogous to that of deacons. They are quite distinct from the somewhat similar orders of " virgins " and " widows," who belonged to a lower plane in the ecclesiastical system. The order is recognized in the canons of the councils of Nicaea (325) and Chalcedon (451), and is frequently mentioned in the writings of Chrysostom (some of whose letters are addressed to deaconesses at Constantinople), Epiphanius, Basil, and indeed most of the more important Fathers of the 4th and 5th centuries. Deaconesses, upon enter- ing their office, were ordained much in the same way as deacons, but the ordination conveyed no sacerdotal powers or authority. Epiphanius says quite distinctly that they were woman-elders and not priestesses in any sense of the term, and that their mission was not to interfere with the functions allotted to priests but simply to perform certain offices in connexion with the care of women. Several specimens of the ordination service for deacon- esses have been preserved (see Cecilia Robinson, The Ministry of Deaconesses, London, 1878, appendix B, p. 197). The functions of the deaconess were as follows: (1) To assist at the baptism of women, especially in connexion with the anointing of the body which in the ancient Church always preceded immersion; (2) to visit the women of the Church in their homes and to minister to the needs of the sick and afflicted; (3) according to the Apos- tolical Constitutions they acted as door-keepers in the church, received women as they entered and conducted them to their allotted seats. In the Western Church, on the other hand, we hear nothing of the order till the 4th century, when an attempt seems to have been made to introduce it into Gaul. Much opposition, however, was encountered, and the movement was condemned by the council of Orange in 441 and the council of Epaone in 517. In spite of the prohibition the institution made some headway, and traces of it are found later in Italy, but it never became as popular in the West as it was in the East. In the middle ages the order fell into abeyance in both divisions of the Church, the abbess taking the place of the deaconess. Whether deaconesses, in the

later sense of the term, existed before 250 is a disputed point. The evidence is scanty and by no means decisive. There are only three passages which bear upon the question at all. (i) Romans xvi. 1 : Phoebe is called r\ Slolkovos, but it is quite uncertain whether the word is used in its technical sense, (ii) 1 Tim. iii. 1 1 : after stating the qualifications neces- sary for deacons the writer adds, ” Women in like manner must be grave— not slanderers,” &c; the Authorized Version took the passage as referring to deacons’ wives, but many scholars think that by ” women ” deaconesses are meant, (iii) In Pliny’s famous letter to Trajan respecting the Christians of Bithynia mention is made of two Christian maidservants ” quae ministrae dicebantur “; whether ministrae is equivalent to Siaicovot., as is often supposed, is dubious. On the whole the evidence does not

seem sufficient to prove the contention that an order of deacon- esses — in the ecclesiastical sense of the term — existed from the apostolic age.

In modern times several attempts have been made to revive the order of deaconesses. In 1833 Pastor Fleidner founded ” an order of deaconesses for the Rhenish provinces of Westphalia ” at Kaiserswerth. The original aim of the institution was to train nurses for hospital work, but its scope was afterwards extended and it trained its members for teaching and parish work as well. Kaiserswerth became the parent of many similar institutions in different parts of the continent. A few years later, in 1847, Miss Sellon formed for the first time a sisterhood at Devonport in connexion with the Church of England. Her example was gradually followed in other parts of the country, and in 1898 there were over two thousand women living together in different sisterhoods. The members of these institutions do not repre- sent the ecclesiastical deaconesses, however, since they are not ministers set apart by the Church; and the sisterhoods are merely voluntary associations of women banded together for spiritual fellowship and common service. In 1861 Bishop Tait set apart Miss Elizabeth Ferard as a deaconess by

the laying on of hands, and she became the first president of the London Deaconess Institution. Other dioceses gradually adopted the innovation. It has received the sanction of Convocation, and the Lambeth Conference in 1897 declared that it " recognized with thankful- ness the revival of the office of deaconess," though at the same time it protested against the indiscriminate use of the title and laid it down emphatically that the name must be restricted to those who had been definitely set apart by the bishop for the position and were working under the direct supervision and control of the ecclesiastical authority in the parish.

In addition to Miss Robinson's book cited above, see Church Quarterly Review, xlvii. 302 ff., art. " On the Early History and Modern Revival of Deaconesses " (London, 1899), and the works there referred to; D. Latas, Xpioticu'ikt) 'ApxaioXoyia, i. 163-171 (Athens, 1883); Testamentum Domini, ed. Rahmani (Mainz, 1899); L. Zscharnack, Der Dienst der Frau in den ersten Jahrhunderten der chr. Kirche (1902).

DEAD SEA, a lake in Palestine occupying the deepest part of the valley running along the line of a great " fault " that has been traced from the Gulf of Akaba (at the head of the Red Sea) to Hermon. This fracture was caused after the end of the Eocene period by the earth-movement which resulted in the raising of the whole region out of the sea. Level for level, the more ancient rocks are on the eastward side of the lake: the cretaceous lime- stones that surmount the older volcanic substrata come down on the western side to the water's edge, while on the eastern side they are raised between 3000 and 4000 feet above it. In the Pleistocene period the whole of this depression was filled with water forming a lake about 200 m. long north to south, whose waters were about the same level as that of the Mediterranean Sea. With the diminishing rainfall and increased temperature that followed that period the effects of evaporation gradually surpassed the precipitation, and the waters of the lake slowly diminished to about the extent which they still display.

The length of the sea is 47 m., and its maximum breadth is about 95 m.; its area is about 340 sq. m. It lies nearly north and south. Its surface being 1 289–1300 ft. below the level of the Mediterranean Sea, it has of course no outlet. It is bounded on the north by the broad valley of the Jordan; on the east by the rapidly rising terraces which culminate in the Moabite plateau, 3100 ft. above the level of the lake; on the south by the desert of the Arabah, which rises to the watershed between the Dead and the Red Sea — 655 m. from the former, 465 from the latter; height 660 ft. — and on the west by the Judean mountains which attain a height of 3300 ft. On the east side a peninsula, El-Lisan (" the tongue "), of white calcareous marl with beds of salt and gypsum, divides the sea into two unequal parts: this peninsula is about 50 ft. high, and is connected by a narrow strip of marsh- land with the shore. Its northern and southern extremities have been named Cape Costigan and Cape Molyneux, in memory of two explorers who were among the first in modern times to navigate the sea and succumbed to the consequent fever and

exhaustion. North of the peninsula the lake has a maximum depth of 1278 ft.; south of it the water is nowhere more than 12 ft., and in some places only 3 ft. The surface level of the lake varies with the season, and recent observations taken on behalf of the Palestine Exploration Fund seem to show that there are probably cyclical variations also (ultimately dependent on the rainfall), the nature and periodicity of which there are as yet no sufficient data to determine. In 1858 there was a small island near the north end rising 10 or 12 ft. above the surface and connected with the shore by a causeway; this has been submerged since 1892; and owing to the gradual rise of level within these years the fords south of the Lisan, and the pathway which formerly rounded the Ras Feshkhah, are now no longer passable.

The slopes on each side of the sea are furrowed with water- courses, some of them perennial, others winter torrents only. The chief affluents of the sea are as follows: — on the north, Jordan and 'Ain es-Suweimeh; on the east Wadis Ghuweir, Zerka Ma'in (Callirrhoe), Mojib (Arnon), Ed-Dera'a, and el-Hesi; on the west, Wadis Muhawat and Seyal, 'Ain Jidi (En-Gedi), Wadi el Merabbah, 'Ain Ghuweir, Wadi el-Nar, 'Ain Feshkhah. The quantity of water poured daily into the sea is not less than 6,000,000 tons, all of which has to be carried off by evaporation. The consequence of the ancient evaporation, by which the great Pleistocene lake was reduced to its present modest dimensions, and of the ceaseless modern daily evapora- tion, is the impregnation of the waters of the lake with salts and other mineral substances to a remarkable degree. Ocean water contains on an average 4-6% of salts: Dead Sea water contains 25%. The following analysis, by Dr Bernays, gives the contents of the water more accurately: —

:ific gravity 1-1528 at

15-5° C.

Calcium carbonate .

70-00 grains

Calcium sulphate .

I63-39

Magnesium nitrate .

175-01

Potassium chloride .

. . .

1089-06

Sodium chloride

5106-00

Calcium chloride

594-46

Magnesium chloride

7388-21

Magnesium bromide

.

345-8o

Iron and aluminium oxides

10-50

Organic matter, water of crystalliza

tion, loss

317-57

Total residue per gallon

1526000

The density of the water averages 1-166. It increases from north to south, and with the depth. The increase is at first rapid, then, after reaching a certain point, becomes more uniform. At 300 metres its density is 1-253. The boiling point is 221 F. To the quantity of solid matter suspended in its water the Dead Sea owes, beside its saltness, its buoyancy and its poisonous properties. The human body floats on the surface without exertion. Owing principally to the large proportion of chloride and bromide of magnesia no animal life can exist in its water. Fish, which abound in the Jordan and in the brackish spring-fed lagoons that exist in one or two places around its shores (such as 'Ain Feshkhah), die in a very short time if introduced into the main waters of the lake. The only animal life reported from the lake has been some tetanus and other bacilli said to have been found in its mud; but this discovery has not been confirmed. To the chloride of calcium is

due the smooth and oily feeling of the water, and to the chloride of magnesia its disagreeable taste. In Roman times curative properties were ascribed to the waters: Mukaddasi (a.d. 985) asserts that people assembled to drink it on a feast day in August. The salt of the Dead Sea is collected and sold in Jerusalem : smuggling of salt (which in Turkey is a government monopoly) is a regular occupation of the Bedouin. The bitumen which floats to shore is also collected. The origin of this bitumen is disputed: it was supposed to be derived from Subaqueous strata of bituminous marl and rose to the surface when loosened by earthquakes. It is, however, now more gener- ally believed that it exists in the breccia of some of the valleys on the west side of the lake, which is washed into the sea and

submerged, till the small stones by which it is sunk are loosened and fall out, when the bitumen rises to the surface.

History. — The earliest references to the sea or its basin are in the patriarchal narratives of Lot and Abraham, the most striking being the destruction of the neighbouring cities of Sodom and Gomorrah. (See Sodom.) The biblical name is the Salt Sea, the Sea of the Arabah (the south end of the Jordan valley), or the East Sea. The name in Josephus is Asphaltites, referring to the bituminous deposits above alluded to. The modern name is Bahr Lut or " Sea of Lot " — a name hardly to be explained as a survival of a vague tradition of the patriarch, but more probably due to the literary influences of the Hebrew Scriptures and the Koran filtering through to the modern inhabitants or their ancestors. The name Dead Sea first appears in late Greek writers, as Pausanias and Galen. At En-Gedi on its western bank David for a while took refuge. South of it is the stronghold of Masada, built by Jonathan Maccabaeus and fortified by Herod in 42 B.C., where the last stand of the Jews was made against the Romans after the fall of Jerusalem, and where the garrison, when the defences were breached, slew themselves rather than fall into Roman hands.

The sea has been but little navigated. Tacitus and Josephus mention boats on the lake, and boats are shown upon it in the Madeba mosaic. The navigation dues formed part of the revenue of the lords of Kerak under the crusaders. In modern times navigation is practically nil. The lake, with the whole Jericho plain, is claimed as the personal property of the sultan.

The medieval travellers brought home many strange legends of the sea and its peculiarities — some absurd, others with a basis of fact. The absence of sea-birds, due to the absence of fish, probably accounts for the story that no birds could fly over it. The absence of vegetation on its shores, due to the scanty rainfall and general want of fresh water — except in the neigh- bourhood of springs- like 'Ain Feshkhah and 'Ain Jidi, where a luxuriant subtropical vegetation is found — accounts for the story that no plant could live in the poisonous air which broods over the sea. The mists, due to the great heat and excessive evaporation, and the noxious miasmata, especially of the southern region, were exaggerated into the noisome vapours that the " black and stinking " waters ever exhaled. The judgment on Sodom and Gomorrah (which of course they believed to be under the waters of the lake, in accordance with the absurd theory first found in Josephus and still often repeated) blinded these good pilgrims to the ever-fresh beauty of this most lovely lake, whose blue and sparkling waters lie deep between rocks and precipices of unsurpassable grandeur. The play of brilliant colours and of ever-changing contrasts of light and shade on those rugged mountain-sides and on the surface of the sea itself might have been expected to appeal to the jnost prosaic. The surface of the sea is generally smooth (seldom "however, absolutely inert as the pilgrims represented it), but is frequently raised by the north winds into waves, which, owing to the weight and density of the water, are often of great force.

The first to navigate the sea in modern times was an Irish traveller, Costigan by name, in August and

September 1835. Owing largely to the folly of his Greek servant, who, without his master's knowledge, threw overboard the drinking-water to lighten the boat, the explorer after circumnavigating the sea reached Jericho in an exhausted condition, and was there attacked by a severe fever. The greatest difficulty was experienced in obtaining assistance for him, but he was ultimately conveyed on camel back to Jerusalem, where he died; his grave is in the Franciscan cemetery there. His fate was shared by his successor, a British naval officer, Lieutenant Molyneux (1847), whose party was attacked and robbed by Bedouins. W. F. Lynch, an American explorer (1848), equipped by the United States government, was more successful, and he may claim to be the first who examined its shores and sounded its depths. Since his time the due de Luynes, Lartet, Wilson, Hull, Blanckenhorn, Gautier, Libbey, Masterman and Schmidt, to name but a few, have made contri butions to our knowledge of this lake;- but still many problems present themselves for solution. Among these may be mentioned

(i) the explanation of a . remarkable line of white foam that extends along the axis of the lake amost every morning — sup- posed by Blanckenhorn to mark the line of a fissure, thermal and asphaltic, under the bed of the lake, but otherwise explained as a consequence of the current of the Jordan, which is not completely expended till it reaches the Lisan, or as a result of the mingling of the salt water with the brackish spring water especially along the western shore; (2) a northward current that has been observed along the east coast; (3) various disturb- ances of level, due possibly to differences of barometric pressure; (4) some apparently electrical phenomena that have been ob- served in the valley. Before we can be said to know all that we might regarding this most interesting of lakes further exten- sive scientific observations are necessary; but these are extremely difficult owing to the

impossibility of maintaining self-registering instruments in a region practically closed to Europeans for nearly half the year by the stifling heat, and inhabited only by Bedouins, who are the worst kind of ignorant, thievish and mischievous savages. (R. A. S. M.)

DEADWOOD, a city and the county-seat of Lawrence county, South Dakota, U.S.A., about 180 m. W. of Pierre. Pop. (1890) 2366; (1900) 3498, of whom 707 were foreign-born; (1905) 4364; (1910) 3653. It is served by the Chicago, Burlington & Quincy and the Chicago & North- Western railways. It lies on hilly ground in the canyon of Whitewood Creek at an elevation of about 4530 ft. Deadwood is the commercial centre of the Black Hills. About it are several gold mines (including the well-known Home-stake mine), characterized by the low grade of their ores (which range from $2 to $8 per ton), by their vast quantity, and by the ease of mining and of extracting the metal. The ore contains free gold, which is extracted by the simple process of stamping and amalgamation, and refractory values, extracted by the cyaniding process. Several hundred tons of ore are treated thus in Deadwood and its environs daily, and its stamp mills are exceeded in size only by those of the Tread well mine in S.E. Alaska, and by those on the Rand in South Africa. The discovery of gold here was made known in June 1875, and in February 1877 the United States government, after having purchased the land from the Sioux Indians, opened the place for legal settle ment.

DEAF AND DUMB. 1 The term " deaf " is frequently applied to those who are deficient in hearing power in any degree, how- ever slight, as well as to people who are unable to detect the loudest sounds by means of the auditory organs. It is impossible to draw a hard and fast line between the deaf and the hearing at any particular point. For the purposes of this article, however, that denotation which is generally accepted by educators of the deaf may be given to the term. This makes it refer to those who are so far handicapped as to be incapable of instruction by the ordinary means of wie ear in a

class of those possessing normal hearing. Paradoxical though it may seem, it is yet true to say that ” dumbness ” in our sense of the word does not, strictly speaking, exist, though the term ” dumb ” may, for all practical purposes, fairly be applied to many of the deaf even after they are supposed to have learnt how to speak. Oral teachers now confess that it is not worth while to try to teach more than a large percentage of the deaf to speak at all. We are not con- cerned with aphasia, stammering or such inability to articulate as may be due to malformation of the vocal organs. In the case of the deaf and dumb, as these words are generally understood, dumbness is merely the result of ignorance in the use of the voice, this ignorance being due to the deafness. The vocal organs are perfect. The deaf man can laugh, shout, and in fact utter any and every sound that the normal person can. But he does not speak English (if that happens to be his nationality) for the same reason that a French child does not, which is that he has never heard it. There is in fact no more a priori reason why an English

1 The two words are common to Teutonic languages, cf . Ger. taub and dumm (only in the sense of ” stupid “), Dutch doof and dom; the original meaning seems to have been dull of perception, stupid, obtuse, and the words may be ultimately related. The Gr. tw£X6s blind, and tBs, smoke, mist, probably show the same base.

baby, born in England, should talk English than that it should talk any other language. English may be correctly described as its ” mother tongue,” but not its natural language; the only reason why one person speaks English and another Russian is that each imitated that particular language which he heard in infancy. This, imitation depends upon the ability to hear. Hence if one has never heard, or has lost hearing in early child- hood, he has never been able to imitate that language which his parents and others used, and the condition of so-called dumbness is added to his deafness. From this it follows that if the sense of hearing be not lost till the child

has learnt to speak fluently, the ability to speak is unaffected by the calamity of deafness, except that after many years the voice is likely to become high-pitched, or too guttural, or peculiar in some other respect, owing to the absence of the control usually exercised by the ear. It also follows that, to a certain extent, the art of speech can be taught the deaf person even though h« were born deaf. Theoretically, he is capable of talking just as well as his hearing brother, for the organs of speech are as perfect in one as in the other, except that they suffer from lack of exercise in the case of the deaf man. Practically, he can never speak perfectly, for even if he were made to attempt articulation as soon as he is discovered to be deaf, the fact that the ear, the natural guide of the voice, is useless, lays upon him a handicap which can never be wiped out. He can never hear the tone of his teacher's voice nor of his own ; he can only see small and, in many instances, scarcely discernible movements of the lips, tongue, nose, cheeks and throat in those who are endeavouring to teach him to speak, and he can never hope to succeed in speech through the instrumentality of such unsatisfactory appeals to his eye as perfectly as the hearing child can with the ideal adaptation of the voice to the ear. Sound appeals to the ear, not the eye, and those who have to rely upon the latter to imitate speech must suffer by comparison.

Deafness then, in our sense, means the incapacity to be instructed by means of the ear in the normal way, and dumb- ness means only that ignorance of how to speak one's mother tongue which is the effect of the deafness.

Of such deaf people many can hear sound to some extent. Dr Kerr Love quotes several authorities (Deaf Mutism, pp. 58 ff.) to show that 50 or 60% are absolutely deaf, while 25 % can detect loud sounds such as shouting close to the ear, and the rest can distinguish vowels or even words. He himself thinks that not more than 15 or 20% are totally deaf — sometimes only 7 or 8%; that ability to hear speech exists in about one in four, while ten or fifteen in

each hundred are only semi-deaf. He rightly warns against the use of tuning forks or other instruments held on the bones of the head as tests of hearing, because the vibration which is felt, not heard, may very often be mistaken for sound.

Dr Edward M. Gallaudet, president of the Columbia Institution for the Deaf in Washington, D.C., suggests the following terms for use in dividing the whole class of the deaf into its main sections, though it is obviously impossible to split them up into perfectly defined subdivisions, where, as a matter of fact, you have each degree of deafness and dumbness shading into the next: — the speaking deaf, the semi-speaking deaf, the mute deaf (or deaf-mute), the speaking semi-deaf, the mute semi-deaf, the hearing mute and the hearing semi-mute. He points out that the last two classes are usually persons of feeble mental power. We should exclude these altogether from the list, since their hearing is, presumably, perfect, and should add the semi-speaking semi-deaf before the mute semi-deaf. This would give two main divisions — those who cannot hear at all, and those who have partial hearing — with three subsections in each main division — those who speak, those who have partial speech and those who do not speak at all. Where the hearing is perfect it is paradoxical to class a person with the deaf, and the dumbness in such a case is due (where there is no malformation of the vocal organs) to inability of the mind to pay attention to, and imitate, what the ear really hears. In such cases this mental weakness is generally shown in other ways besides that of not hearing sounds. Probably no sign will be given of recognizing persons or objects around; there will be

in fact, a general incapacity of the whole body and senses. It is incorrect to designate such persons as deaf and feeble-minded or deaf and idiotic, because in many cases their organs of hearing are as perfect

as are other organs of their body, and they are no moredeaf than blind, though they may pay no attention to what they hear any more than to what they see. They are simply weak in intellect, and this is shown by the disuse of any and all of their senses; hence it is incorrect to classify them according to one, and one only, of the evidences of this mental weakness.

Extent of Deafness. — The following table shows the number of deaf and dumb persons in the United Kingdom at successive censuses: —

Year.

Number of Deaf and Dumb Persons.

United Kingdom.

England & Wales.

Scotland.

Ireland.

1851 1861 1871 1881 1891 ' 1901

17,649 20,224

19,159 20,573 20,781

21,855

10,314 12,236 11,518

13,295 14,192

15,246

2155 2335 2087 2142 2125 2638

5i8o

5653 5554 5136 4464 3971

From this we find that the proportion of deaf and dumb to the population has been as follows: —

Year.

Proportion of Deaf and Dumb to the Population.

United Kingdom.

England & Wales.

Scotland.

Ireland.

1851 1861 1871 1881 1891 1901

1 in 1550 1 in 1430 1 in 1642 1 in 1694 1 in 1814 1 in 1897

1 in 1739 1 in 1639 1 in 1972 1 in 1953 1 in 2040 1 in 2132

1 in 1340 1 in 1310 1 in 1610 1 in 1745 1 in 1893 1 in 1694

1 in 1264 1 in 1025 1 in 974 1 in 1008 1 in 1053 I in 1 122

There has, therefore, been on the whole a steady decrease of those described as ” deaf and dumb ” in proportion to the population in Great Britain and Ireland. But in the census for 1901, in addition to the 15,246 returned as ” deaf and dumb ” in England and Wales, 18,507 were entered as being ” deaf,” 2433 of whom were described as having been ” deaf from childhood.”

Mr B. H. Payne, the principal of the Royal Cambrian Institution, Swansea, makes the following remarks upon these figures : —

” The natural conclusion, of course- is that there has been a large increase, relative as well as absolute, of the class in which we are interested, which we call the deaf, and which includes the deaf and dumb. Indeed, the number, large as it is, cannot be considered as complete, for the schedules did not require persons who were only deaf to state their

infirmity, and, though many did so, it may be presumed that more did not.

" On the other hand, circumstances exist which may reasonably be held to modify the conclusion that there has been a large relative increase of the deaf. The spread of education, the development of local government, and an improved system of registration, may have had the effect of procuring fuller enumeration and more appro- priate classification than heretofore, while 1368 persons described simply as dumb, and who therefore probably belong, not to the deaf, but to the feeble-minded and aphasic classes, are included in the ' deaf and dumb ' total. It is also to be noted that some of those who described themselves as ' deaf ' though not born so may have been educated in the ordinary w^iy before they lost their hearing, and are therefore outside the sphere of the operation of schools for the deaf.

" In connexion with the census of 1891, it has been remarked in the report of the institution that no provision was made in the schedules for distinguishing the congenital from the non-congenital deaf, and that it was desirable to draw such a distinction. To ascertain the relative increase or decrease of one or the other section of the class would contribute to our knowledge of the incidence of known causes of deafness or to the confirmation or discovery of other causes, and so far indicate the appropriate measures of prevention, while such an inquiry as that recommended has, besides, a certain bearing upon educational views.

" The exact number of ' deaf and dumb ' and ' deaf ' children who are of school age cannot be ascertained from the census tables, which give the numbers in quinquennial age-groups, while the school age is seven to sixteen. It is a pity that in this respect the functions of the census department are not co-ordinated with those of the Board qf Education."

Dr John Hitz.the superintendent of the VoltaBureau for thelncrease of Knowledge Relating to the Deaf,

Washington, D.C., U.S.A., gives the number of schools for deaf children, and pupils, in different countries in 1900 as follows: —

Africa.

Country.

Schools.

Teachers.

Pupils.

Algeria Egypt

Cape Colony Natal

1 1

4 1

3

2

9 1 2

37 6

77 7

7

16 >

127

Asia.

Country.

Schools.

Teachers.

Pupils.

China India Japan

3 3 3

10 13

24

43

73

337

9

47

453

Australasia.

Country.

Schools.

Teachers.

Pupils.

Australia . New Zealand

6

1

41

5

282 50

7 .

46

332

Europe.

Country.

Schools.

Teachers.

Pupils.

Austria-Hungary

38

291

2440

Belgium

12

181

1265

Denmark .

5

57

348

France

7i

598

4098

Germany .

99

798

6497

Great Britain

95

462

4222

Italy

47

234

2519

Luxemburg

1

3

22

Netherlands

3

74

473

Norway

5

54

309

Portugal

2

9

64

Rumania

1

3

46

Russia, Finland,

Livonia

34

118

1719

Servia

2

2 1

26 1

Spain

11

60

462

Sweden

9

124

726

Switzerland

14 .

84

650

Turkey

1

450 .

3152

25,886

North America.

Country.

Schools.

Teachers.

Pupils.

Canada United States Mexico Cuba

7

126

1

1

130

1347

13

768

10,946

46

135

1490

11,760

South America.

Country.

Argentine . Brazil Chile Uruguay

Schools.

Teachers.

18 9

7

34

Pupils.

133 35 61

229

Incomplete.

882

DEAF AND DUMB

Summary.

Continent.

Schools.

Teachers.

Pupils.

Africa

7

16

127

Asia .

9

47

453

Australia .

7

46

332

Europe

450

3152

25,886

North America .

135

1490

11,760

South America

7

34

229

6i5

4785

38,787

These figures refer only to deaf children who are actually under instruction, not to the whole deaf population.

While it is gratifying to find that so much is being done in the way of educating this class of the community, the number of schools in most parts of the world is still lamentably inadequate. For instance, taking the school age as from seven to sixteen, which is now made compulsory by Act of Parliament in Great Britain, and assuming that 20% of the deaf population are of that age, as they are in England, there should be 40,000 deaf pupils under instruction in India alone, whereas there are but seventy-three. There are 200,000 deaf of all ages in India. And what an enormous total should be in schools in China instead of forty-three! The whole of the rest of Asia, with the exception of Japan, has apparently not a single school. There must be many thousands of thousands of deaf (hundreds of thousands, if not thousands of thousands of whom are of school age) in that continent, unless indeed they are destroyed, which is not impossible. What are we to say of Africa, where only 100 pupils are being taught; of South America, with its paltry 200, and Australia's 300? To come to Europe itself, Russia should have many times more pupils than her 1700. Even in Great Britain the education of the deaf was not made compulsory till 1893, and there are many still evading the law and growing up uneducated. Mr Payne of Swansea estimated (Institution Report, 1903-1904) from the 1901 census, that there must be approximately 204 deaf of school age in South Wales and Monmouthshire, while only 144 were accounted for in all the schools in that district according to Dr Hitz's statistics.

Dr Kerr Love (Deaf Mutism, p. 217) gives the following table, which shows the number of deaf people, in proportion to the population in the countries named ':— ■

Switzerland .

Austria

Hungary

Sweden

Prussia

Finland

Canada

Norway

Germany (exclusive of Prussia)

Portugal

Ireland

India .

United States

Denmark

Greece

France

Italy

Scotland

Cape Colony

England

Spain

Belgium

Australasia .

Holland

Ceylon

765

792

977

981

981

1003

1052

1074

1333

1398 l

1459

I5H

1538

1548

1600

1862

I8851

1904

2043 l

2178

2247

2692

2985 4328

According to a tabu’ar statement of British and Colonial schools, Tune 1899, the proportion of those

born deaf to those who lost hearing after birth was, at that time and in those countries, 2126 to 1 25 1, as far as returns had been made. Several schools had, however, failed to give statistics. These figures show a proportion of nearly 59 % congenitally deaf persons to over 41 % whose deafness is acquired. Professor Fay, whose monumental work, Marriages of the Deaf in America, deserves particular attention; mentions (p. 38) that of 23,931 persons who attended American schools for the deaf up to the year 1890, 9842, or 41 %, were reported as congenitally deaf, and 14,089, or 59 %, as adventitiously deaf, — figures which exactly reverse those just quoted. The classification of deafness acquired in infancy with congenital deafness by some other authorities (giving rise to the rather absurd term ” toto-congenital ” to describe the latter) is unscientific. There is reason for the opinion that the non- congenital, even when hearing has been lost in early infancy, acquire language better, and it is a mistake from any point of view to include them in the born deaf.

1 The figures for England, Scotland and Ireland, according to the 1901 census, are different and have been given above.

Other statistics vary very much as to the proportion of born deaf, some being as low as a quarter, and some as high as three-quarters, of the whole class. We can only say, speaking of both sides of the Atlantic, and counterbalancing one period with another, that the general average appears to be about 50% for each. Probably the percentage varies in different places for definite reasons, which we shall now briefly consider.

Causes of Deafness. — These may be considered in two divisions, pre-natal and post-natal.

1. Pre-Natal. — A small percentage of these is due,’ it seems, to malformation of some portion of the auditory apparatus. Another percentage is known to represent the children of the intermarriage of blood relations. Dr Kerr Love (Deaf Mutism, p. 117) gives

statistics from thirteen British institutions which show that on a general average at least 8% of the congenitally deaf are the offspring of such marriages. Besides this, little is known. Beyond all doubt a much larger percentage of deaf children are the offspring of marriages in which one or both partners were born deaf than of ordinary marriages. But inquiries into such phenomena have generally been directed towards tracing deafness and not consanguinity, or at least the inquirer has rarely troubled to make sure whether the grand- parents or great T grandparents on either side were relations or not. Such investigations rarely go beyond ascertaining if the parents were related to each other, though we have proof that a certain tendency towards any particular abnormality may not exhibit itself in every generation of the family in question. To give an illustration, suppose that G is a deaf man. Several inquirers may trace back to the preceding generation F, and to the grandparents E, and even to the great-grandparents D, in search of an ancestor who is deaf, and such they may discover in the third generation D." But probably not one of these several inquirers will ask G if any of his grandparents or great- grandparents married a cousin, for instance, though they may ask if his father did. To continue this hypothetical case, the investi- gators will again trace back along the family tree to generations C, B and A in search of an original deaf ancestor, on whose shoulders they seek to lay the blame of both D's and G's deafness. Not finding any such, they will again content themselves with asking if D's parents (generation C) were blood relations or not, and, receiving an answer in the negative, desist from further inquiry in this direction, assuming that D's deafness is the original cause of G's deafness. They do not, we fear, inquire if any grand- parents or great- grandparents (hearing people) were related, with the same persistency as they ask if any were deaf. The search for deafness is pushed through several generations, the search for consanguinity is only extended to one generation. Perhaps if it were carried further, it would be discovered that A

married his niece, and there lay the secret of the deafness in both D and G. In other words, the deafness in D is not the cause of that in G, but the deafness in both D and G are effects of the consanguineous marriage in A. All this is, however, merely by way of suggestion. We submit that if deafness in one generation may be followed by deafness two or even three generations later, while the tendency to deafness exists, but does not appear, in the intermediate generations, it is only logical to inquire if deafness in the first discoverable instance in a family may not be caused by consanguinity, the effect of which is not seen for two or three generations in a similar manner. Moreover it is probable that consanguinity in parents or grandparents may often be denied. An exhaustive investigation along these lines is desirable, for we believe that congenital deafness would be proved to be due to consanguinity in hearing people, if the search were pushed far enough back and the truth were told, in a far greater percentage of cases than is now suspected. This is not disproved by quoting numbers of cases where no deafness follows consanguinity in any generation, for resulting weakness may be shown (where it exists) in many other ways than by deafness.

This theory receives support from the statistics quoted by Dr Kerr Love (Deaf Mutism, p. 132), where the percentage of defective children resulting from the consanguineous marriages of hearing people increases in almost exact proportion to the nearness of affinity of the parents. It is further borne out by

statistics of the duchy of Nassau, and of Berlin, both quoted by Dr Kerr Love (pp. 119, 120). These show 1 deaf person in 1307 Roman Catholics, 1 101 Evangelicals and 508 Jews in the former case, and 1 in 3000 Roman Catholics, 2000 Protestants and 400 Jews in the latter.' When we are told that " Roman

Catholics prohibit marriages between persons who are near blood relations, Protestants view such marriages as permissible, and Jews encourage intermarriage with blood relations," these figures become suggestive. We find the same greater tendency to deaf- ness in thinly-populated and out-of-the-way districts and countries where, owing to the circle of acquaintances being limited, people are more likely to marry relations.

With regard to the question of marriages of the deaf, Professor Edward Allen Fay's work is so complete that the results of his six years' labour are particularly worthy of notice, for, as the introduc- tion states, the book is a " collection of records of marriages of the deaf far larger than all previous collections put together," and it deals in detail with 4471 such marriages. The summary of statistics is as follows (Marriages of the Deaf in America, p. 134) : —

Marriages of the Deaf.

Number of Marriages.

Number of Children.

Percentage.

•- c

Ul'C

c a.

;es re- 1 deaf ing.

a

Total.

3 O

CO

ai g ■0

Total.

Deaf.

Marriag

suiting ii

offspri

One or’ both partners

deaf

3078

300

6782

588

9-7

8-6

Both partners deaf .

2377

220

5072

429

9-2

8-4

One partner deaf, the

other hearing

599

75

1532

151

12–5

9–8

One or both partners

congenitally deaf .

1477

194

3401

413

I3–I

I2–I

One or both partners

adventitiously deaf

2212

124

4701

199

5–6

4–2

Both partners con–

genitally deaf

335

83

779

202

24–7

25–9

One partner congenit-

ally deaf, the other

adventitiously deaf

814

66

1820

119

8–1

6–5

Both partners adven-

titiously deaf

845

30

1720

40

3–5

2–3

One partner congenit-

ally deaf, the other

hearing .

191

28

528

63

14–6

119

One partner adven-

titiously deaf, the

other hearing

310

10

713

16

3–2

2–2

Both partners had

deaf relatives

437

103

1060

222

23–5

20–9

One partner had deaf

relatives, the other

had not

541

36

1210

78

6–6

6–4

Neither partner had

deaf relatives

471

11

1044

13

2–3

1–2

Both partners con-

genitally deaf; both

had deaf relatives

172

49

429

130

28–4

30-3

Both partners con-

genitally deaf; one had deaf relatives,

the other had not .

49

8

105

21

16-3

20-0

Both partners congen-

itally deaf; neither

had deaf relatives

14

I

24

1

7-i

4-1

Both partners ad-

ventitiously deaf ;

both had deaf re-

latives .

57

10

114

11

17–5

96

Both partners adven–

titiously deaf ; one

had deaf relatives, the other had not .

167

7

357

10

4–1

2–8

Both partners ad–

ventitiously deaf;

neither had deaf

relatives

284

2

550

2

0–7

0–3

Partners consanguine-

ous

31

14

100

30

45-1

30'0

One point deserves special attention in the above list. It is that where there are no deaf relatives (i.e. where there has not been a history of deafness in the family) only one child out of twenty-four is deaf, even when the parents were both born deaf themselves. Where there were deaf relatives already in the family on both sides, and the parents were born deaf, the percentage of deaf children is seven and a half times as great. This seems to show that there are causes of congenital deafness which are, comparatively speaking, unlikely to be transmitted to future generations, while other causes of congenital deafness are so liable to be perpetuated that one child in every three is deaf. We conjecture that one original cause of con- genital deafness which reappears in a family is consanguinity — for instance, the intermarriage of first or second cousins (hearing people) in some previous generation. Out of the 2245 deaf persons who were born deaf, 269 had parents who were blood relations, according to Fay. And perhaps many more refrained from acknowledging the fact. Eleven had grandparents who were cousins. This theory calls for investigation, and while the marriage of deaf people is not encouraged, it is fair to ask those who so strenuously oppose such unions whether they may not be spending their energies on trying to check an effect instead of a cause, and if that cause may not

really be consanguinity,' — witness the percentage of deaf people among Roman Catholics, Protestants and Jews before noticed. On the principle that prevention is better than cure it is the intermarriage of cousins and other relations which should be discouraged. The marriage of deaf people is inadvisable where there has been deafness in the family in former generations, but the same warning applies to all the other members of that family, for the hearing members are as likely to transmit the defect of which deafness is a symptom as the deaf members are. We are more concerned to discover the primary cause of the defect, and take steps to prevent the latter from occurring at all. Those who have no dissuasions for hearing people, who might perhaps cause the misery, and only give counsel to those among the transmitters of it who happen to be deaf, are acting in a manner which is hardly logical.

2. Post-Natal. — We have collected and grouped the stated causes of deafness in those partners of the marriages in America noticed by Fay. About a hundred and thirty did not mention how they lost hearing. Any errors in this calculation must be less than 1 % at most, and can make no material difference. In some cases two or more diseases are given as the cause of deafness. In such cases where one is a very common cause of deafness, and the other is unusual, the former is credited with being the reason for the defect. Where both are common, we have divided the cases between them in a rough pro- portion.

Scarlet fever 973 ; scarlatina 3 ; scarlet rash 2 978

Spotted fever 260; meningitis 92; spinal meningitis 76; cerebro-spinal meningitis 70 ; spinal fever 28 ; spinal disease 8 ; congestion of spine 2 536

Brain fever 309; inflammation of brain 62 ; congestion of brain

30 ; disease in brain 3 404

Typhoid 127; ” fever ” (unspecified) 117; typhus 17; inter- mittent fever 14; bilious fever 11 ; other fevers 14 . 300 Gatherings, inflammations, in head ; ulcers, disease, sores, risings, &c, all but 22 being explicitly stated to be’ in head or ears 276

” Sickness ” 167; ” illness ” 49; ” disease ” 8; no definite

specification 12 …..... 236

Measles 191

Colds 101 ; colds in head, &c. 35; catarrh 19; catarrhal fevers

10; chills, &c. 17 …..... 182

Whooping cough 77 ; diphtheria 34 ; lung fever, and various

diseases of lungs and throat 60 171

Falls 143

Fits and convulsions 58; spasms 18; teething 16 . . . "92 Scrofula 35 ; mumps 25 ; swellings on neck 2 . . .62

Many various and unusual causes ….. 60

Smallpox 8; chickenpox 6r, cholera, &c. 7; canker, &c. 11;

erysipelas 13 45

Paralysis, &c. 12; nerve diseases 12; fright 8; palsy 3 . -35

Hydrocephalus 14; dropsy on brain or in head 17; dropsy 2 33

Various accidents, blows, kicks, &c. 31

Quinine 22 ; other medicines 7 …... 29

Total 3804

We have counted a hundred and thirty of those who were returned as having lost hearing who were also stated to be the offspring of consanguineous marriages.

Dr Kerr Love {Deaf Mutism, p. 150) gives the following list com piled from the registers of British institutions Scarlet fever Miscellaneous causes

Teething, convulsions, &c. . Meningitis, brain fever, &c. Measles …. Falls and accidents . Enteric and other fevers . Disease, illness, &c. . Whooping cough Suppurative ear diseases . Syphilis ….

331 175 171 166

138

122

119

37

33

18

2

131 2

Unknown causes …..... 98

The same writer quotes Hartmann's table, compiled in 1880 from continental statistics, as follows : — Cerebral affections, inflammations, convulsions Cerebro-spinal meningitis Typhus . Scarlatina

Measles . Ear disease, proper Lesions of the head

Other diseases .

644

295

260

205

84

77 70

354 1989

There appears to be no cure for deafness that is other than partial; but with the advance of science preventive treatment is expected to be efficacious in scarlet fever, measles, &c.

Condition of the Deaf.

1. In Childhood.— -It is difficult to impress people with two facts in connexion with teaching language to the average child who was born deaf, or lost hearing in early infancy. One is the necessity of the undertaking, and the other is that this necessity is not due to mental deficiency in the pupil. To the born deaf-mute in an English-speaking country English is a foreign language. His inability to speak is due to his never having heard that tongue which his mother uses. The same reason holds good for his entire ignorance of that language. The hearing child does not know a word of English when he is born, and never would learn it if taken away from where it is spoken. He learns English unconsciously by imitating what he hears. The deaf child never hears English, and so he never learns it till he goes to school. Here he has to start learning English — or whatever is the language of his native land — in the same way as a hearing boy learns a foreign language.

But another reason exists which renders his task'much more difficult than that of a normal

English schoolboy learning, say, German. The latter has two channels of information, the eye and the ear • the deaf boy has only one, the eye. The hearing boy learns German by what he hears of it in class as well as by reading it; the deaf boy can only learn by what he sees. It is as if you tried to fill two cisterns of the same capacity with two inlets to one and only one inlet to the other; supposing the inlets to be the same size, the former will fill twice as fast. So it is in the case of the hearing boy as compared with his deaf brother. The cerebral capacity and quality are the same, but in one case one of the avenues to the brain is closed, and consequently the development is less rapid. Moreover, the thoughts are precisely those which would be expected in people who form them only from what they see. We were often asked by our deaf playmates in our childhood such questions (in signs) as " What does the cat say?"—" The dog talks, does he not ? "—"Is the rainbow very hot on the roof of that house? " They have often told us such things as that they used to think someone went to the end of the earth and climbed up the sky to light the stars, and to pour down rain through a sieve.

But there is yet a third disadvantage for the already handi- capped deaf boy. He has no other language to build upon, while the other has his mother tongue with which to compare the foreign language he is learning. The latter already has a general idea of sentences and clauses, of tense and mood, of gender,

number and case, of substantives, verbs and prepositions; and he knows that one language must form some sort of parallel to another. He is already prepared to find a subject, predicate and object, in the sentence of a foreign language, even when he knows not a word of any but his own mother tongue. If he is told that a certain word in German is an adjective, he understands what its function is, even when he has yet to learn the meaning of the word. All this goes for nothing in the case of the deaf pupil. The very elementary fact that certain words denote certain objects — that there is such a class

of word as substan- tives — comes as a revelation to most deaf children.' They have to begin at seven laboriously and artificially to learn what an ordinary baby has unconsciously and naturally discovered at the age of two. English, spoken, written, printed or finger-spelled, is no more natural, comprehensible or easy of acquirement to the deaf than is Chinese. The manual alphabet is simply one way of expressing the vernacular on the fingers; it is no more the deaf- mute's " riatural " language than speech or writing, and if he cannot express himself by the latter modes of communicating, he cannot by spelling on the fingers. The last is simply a case of vicaria linguae manus. None of these are languages in them- selves; whether you use pen or type, hand or voice, you are but adopting one or other method of expressing one and the same tongue — English or whatever it may be, that of a " people of a : strange speech and of a hard language, whose words they cannot understand." The deaf child's natural mode of communication — more natural to him than any verbal language is to hearing people — is the world-wide, natural language of signs.

2. Natural Language of the Deaf. — We have just called signs a natural language. While a purist might properly object to this adjective being applied to all signs, yet it is not an unfair term to' use as regards this method of conversing as a whole, even .in the United States, where signs, being to a great extent the French signs invented by de l'Epee, are more artificial than in England. The old story, by the way, of the pupil of de l'Epee failing to write more than " hand, breast," as describing what an incredu- lous investigator did when he laid his hand on his breast, proves nothing. In all probability he had no idea that he was expected to describe an action, and thought that he was being asked the names of certain parts of the body. The hand was held out to him and he wrote " hand." Then the breast was indicated by placing the hand on it, and he wrote " breast." Moreover, the artificial element is much less pronounced than is

supposed by most of those who are loudest in their condemnation of signs, there being almost invariably an obvious connexion between the sign and idea. : These critics are generally people whose acquaint- ance with the subject is rather limited, and the thermometer of Whose zeal in waging war against gestures generally falls in pro- portion as the photometer of their knowledge about them shows an increasing light. We may go still further and point out that to object to any sign on the ground of artificiality per se, is to strain at the gnat and to swallow the camel, for English itself is one of the most artificial languages in existence, and certainly is more open to such an objection than signs. If we apply. the same test to English that is applied to signs by those who would rule out any which they suppose cannot come under the head of natural gesture or pantomime, what fraction of our so-called natural language should we have left? For a spoken word to be ” natural ” in this sense it must be onomatopoetic, and what infinitesimal percentage of English words are such ? A foreigner, unacquainted with the language, could not glean the drift of a conversation in English, except perhaps a trifle from the tone of the voices and more from the natural signs used — the smiles and frowns, the expressions of the faces, the play of eyes, lips, hands and whole body. The only words he could possibly understand without such aids are some such onomatopoetic words as the cries of animals — ” mew,” ” chirrup,” &c, and a few more like “bang” or “swish.”

The reason why we insist emphatically upon the importance of teaching English in schools for the deaf in English-speaking countries, is, firstly, because that is the language which the pupil will be called upon to use in his intercourse with his fellow-men

after he leaves school, and secondly, because, if

his grasp of that tongue only be sufficient and his interest in books be properly aroused, he can go on educating himself in after-life by means of reading. Time tables are overcrowded with kindergarten, clay modelling, wood-carving, carpentry, and other things which are excellent in themselves. But there is not time for everything, and these are not as important in the case of the deaf pupil as language. Putting aside the question of religion and moral training, we consider the flooding of their minds with general knowledge, and the teaching of English to enable them to express their thoughts to their neighbours, to be of paramount importance, so paramount that all other branches of education in their turn pale into insignificance by comparison with these, while the question of methods of instruction should be subservient to these main ends. Too many make speech in itself an end. This is a mistake. Speech is not in itself English; it is only one way of expressing that language. And we are little concerned to inquire by what means the deaf pupil expresses himself in English so long

" Observations. — People speak of ' manual signs.' Of course there are signs which are made with the hands only, as there are others which are labial, &c. But the sign language is comprehensive, and at times the whole frame is engaged in its use. A late American teacher could and did ' sign ' a story to his pupils with his hands behind him. Facial expression plays an important part in the language. Sympa- thetic gestures are individualistic and spontaneous, and are some- times unconsciously made. The speaker, feeling that words are inadequate, reinforces them with gesture. Arbitrary signs are, e.g., drumming with three separated fingers on the chin for ' uncle.' Grammatical signs are those which are used for inflections, parts of speech, or letters as in the manual alphabet, and some numerical signs, though other numerals may be classed as natural ; also signs for sounds, and even labial signs. Signs, whether natural or arbi- trary, which gain acceptance, especially if they are shortened, are ' conventional.' ' Mimic action '

refers, e.g., to the sign for sawing, the side of one hand being passed to and fro over the side or back of the other._ ‘ Pantomime ‘ means, e.g., when the signer pretends to hang up his hat and coat, roll up his sleeves, kneel on his board, guide the saw with his thumb, saw through, wipe his forehead, &c.”

Illustrations of one style of numerical signs are given below.

10

20

30

40

50

60

70 80

90

100

1

Fig. 1

as he does so express himself, whether by speech or writing, or finger-spelling — for if he can finger-spell he can write. It is not the mere fact that he can make certain sounds or write certain letters or form the alphabet on his hands that should signify. It is the actual language that he uses, whatever be the means, and the thoughts that are enshrined in the language, that should be our criterion when judging of his education.

The importance of English is insisted upon because to place the deaf child in touch with his English-speaking fellow-men we must teach him their language, and also because he can thereby edu- cate

himself by means of books if, and when, he has a sufficient command of that language. The reason is not because the vernacular is actually superior to signs as a means of conversation. . The sign language is quite equal to the vernacular as a means of ex- pression. The former is as much our mother tongue, if we may say so, as the latter; we used one language as soon as the other, in our earliest infancy; and, after a lifelong experience of both, we affirm that signs are a more beautiful language than English, and provide possibilities of a wealth of expression which English does not possess, and which probably no other language possesses.

That others whose knowledge of signs is lifelong hold similar opinions is shown by the following extract from The Deaf and their Possibilities, by Dr Gallaudet: —

" Thinking that the question may arise in the minds of some, ' Does the sign language give the deaf, when used in public ad- dresses, all that speech affords to the hearing? ' I will say that my experience and observation lead me to answer with a decided affirm- ative. On occasions almost without number it has been my privilege to interpret, through signs to the deaf, addresses given in speech; I have addressed hundreds of assemblages of deaf persons in the college, in schools I have visited, and elsewhere, using signs for the original expression of thought ; I have seen many more lectures and public debates given originally in signs; I have seen conventions of deaf-mutes in which no word was spoken, and yet all the forms of parliamentary proceedings were observed, and the most earnest, and even excited, discussions were carried on. I have seen the ordinances of religion administered, and the full service of the Church rendered in signs ; and all this with the assurance growing out of my complete understanding of the language — a knowledge which dates from my earliest childhood— that for all the purposes enumerated gestural expression is in no respect inferior, and is in many respects superior, to oral, verbal utterance as a means of communicating ideas."

The following is an analysis of the sign language given by Mr Payne of the Swansea Institution, together with his explanatory

" Analysis of the Sign Language. I. Facial expression.

*[1. Sympathetic ~) ^ *.- 1*

H. Gestured 2. Representative (= Natural signs) I Conventional V Systematic (a) Arbitrary signs f u^ a V (. \b) Grammatical signsj shortened form -

III. Mimic action.

IV. Pantomime.

Units are signified with the palm turned inwards; tens with the palm turned outwards; hundreds with the fingers downwards; thousands with the left hand to the right shoulder; millions with the hand near the forehead. For 12, sign 10 outwards and 2 inwards, and so on up to 19. 21 = 2 outwards, I inwards, and so on up to 30. 146=1 downwards, 4 outwards, 6 inwards. 207,837 = 2 downwards, 7 inwards (both at shoulder), 8 down- wards, 3 outwards, 7 inwards. 599,126,345 = 5 downwards, 9 outwards, 9 inwards (all near forehead) ; 1 downwards, 2 outwards, 6 inwards (all at shoulder) ; 3 downwards, 4 outwards, 5 inwards (in front of chest).

Only the third, and a few of the second, subdivision of the second section of the above classes of signs can be excluded when talking of signs as being the deaf-mute's natural language. In fact we hesitate to call representative gesture — e.g. the horns and action of milking for " cow," the smelling at something grasped in the hand for " flower," &c. — conventional at all, except when shortened as the usual sign for " cat " is, for instance, from the sign for whiskers plus stroking the fur on back and tail plus the action of a cat licking its paw and washing its face, to the sign for whiskers only.

The deaf child expresses himself in the sign

language of his own accord. The supposition that in manual or combined schools generally they "teach them signs" is incorrect, except that perhaps occasionally a few pupils may be drilled and their signs polished for a dramatic rendering of a poem at a prize distribu- tion or public meeting, which is no more " teaching them signs " than training hearing children to recite the same poem orally and polishing their rendering of it is teaching them English. If the deaf boy meets with some one who will use gesture to him, a new sign will be invented as occasion requires by one or other to express a new idea, and if it be a good one is tacitly adopted to express that idea, and so an entire language is built up. It follows that in different localities signs will differ to a great extent, but one who is accustomed to signing can readily see the connexion and understand what is meant even when the signs are partly novel to him. We are sometimes asked if we can make a deaf child understand abstract ideas by this language. Our answer is that we can, if a hearing child of no greater age and intelligence can understand the same ideas in English. Signs are particularly the best means of conveying religious truths to the deaf. If you wish to appeal to him, to impress him, to reach his heart and his sympathies (and, incidentally, to offer the best possible substitute for music), use his own eloquent language of signs. We have conversed by signs with deaf people from all parts of the British Isles, from France, Norway and Sweden, Poland, Finland, Italy, Russia, Turkey, the United States, and found that they are indeed a world-wide means of communication,

even when we wandered on to most unusual and abstract sub- jects. Deaf people in America converse with Red Indians with ease thereby, which shows how natural the generality of even de l'Epee signs are. The sign language is everybody's natural language, not only the deaf-mute's.

Addison {Deaf Mutism, p. 283) quotes John Bulwer as follows: — ” What though you (the deaf and dumb) cannot express your minds in those verbal contrivances of man’s invention : yet you want not speech who have your whole body for a tongue, having a language which is more natural and significant, which is common to you with us, to wit, gesture, the general and universal language Of human nature.” The same writer says further on (p. 297) : ” The same process of growth goes on alike with the signs of the deaf and dumb as with the spoken words of the hearing. Arnold, than whom no stronger advocate of the oral method exists, recognizes this in his comment on this principle of the German school, for he writes: ‘It is much to be regretted that teachers should indulge in unqualified assertions of the impossibility of deaf-mutes attaining to clear con- ceptions and abstract thinking by signs or mimic gestures. Facts are against them.’ Again, Graham Bell, who is generally considered an opponent of the sign system, says: ‘ I think that if we have the mental condition of the child alone in view without reference to language, no language will reach the mind like the language of signs; it is the method of reaching the mind of the deaf child.’ ”

The opinions of the deaf themselves, from all parts of the world, ‘ are practically unanimous on this question. In the words of Dr Smith, president of the World’s Congress of the Deaf held at St Louis, Missouri, in 1904, under the auspices of the National Associa- tion of the Deaf, U.S.A., ” the educated deaf have a right to be heard in these matters, and they must and shall be heard.” A portion may be quoted of the resolutions passed at that congress of 570 of the best-informed deaf the world has ever seen, at least scores, if not hundreds, of them holding degrees, and being as well educated as the vast majority of teachers of the deaf in England: ” Resolved, that the oral method, which withholds from the congenitally and quasi- congenitally deaf the use of the language of signs outside the school- room, robs the children of their birthright; that those champions of the oral method,

who have been carrying on a warfare, both overt and covert, against the use of the language of signs by the adult deaf, are not friends of the deaf ; and that, in our opinion, it is the duty of every teacher of the deaf, no matter what method he or she uses, to have a working command of the sign language.' '

It is often urged as an objection to the use of signs that those who use them think in them, and that their English (or other vernacular language) suffers in consequence. There is, however, no more objection to thinking in signs than to thinking in any other language, and as to the second objection, facts are against such a statement. The best-educated deaf in the world, as a class, are in America, and the American deaf sign almost to a man. It is true that at first a beginner in school may, when at a loss how to express himself in words, render his thoughts in sign-English, if we may use the expression, just as a schoolboy will sometimes put Latin words in the English order. That is, the deaf pupil puts the word in the natural order of the signs, which is really the logical order, and is much nearer the Latin sequence of words than the English. But, firstly, if he had always been forbidden to use signs he would not express himself in English any better in that particular instance; he would simply not attempt to express himself at all, — so he loses nothing, at least; and secondly, it is perfectly easy to teach him in a very short time that each language has its own idiom and that the thought is expressed in a different order in each.

Of the deaf child's moral condition nothing more need be said than that it is at first exactly that of his hearing brother, and his development therein depends entirely upon whether he is trained to the same degree. The need of this is great. He is quite as capable of religious and moral instruction, and benefits as much by what he receives of it. Happiness is a noticeable feature of the character of the deaf when they are allowed to mix with each other. The charge of bad temper can usually be

sustained only when the fault is on the side of those with whom they live. For instance, the latter often talk in the presence of the deaf person without saying a word to him, and if he then shows irritation, which is not often in any case, it is no more to be wondered at than if a hearing person resents whispering or other secret com- munication in his presence.

3. Social Status, &c. — From -the 1901 census " Summary Tables " we gather the following facts concerning the occupations of the deaf, aged ten and upwards, in England and Wales.

About half of the total number, taking males and females together (13,450), are engaged in occupations— 6665. The rest — 6785 — are retired or unoccupied. Of the former, the follow- ing table given below shows the distribution: —

In general or local government work (clerks, messengers,

&c.) 11

In professional occupations and subordinate services . 87

In domestic offices or services. 788

In commercial occupations. 12

In work connected with conveyance of men, goods or

messages …..... 144

In agriculture …..... 568

In fishing 3

In and about mines and quarries, &c. . . . -151

In work connected with metals, machines, implements, &c. 503 In work connected with precious metals, jewels, games, &c. 46 In building and works of construction 485

In work connected with wood, furniture, fittings and

decorations 470

In work connected with brick, cement, pottery and glass . 153 In work connected with chemicals, oil, soap, &c. . . 46 In work connected with skins, hair and feathers . . I37

In work connected with paper, prints, books, &c. . . 238

In work connected with textile fabrics 407

In work connected with dress ….. 1829

In work connected with food, tobacco, drink and lodging . 194 In work connected with gas, water and electric supply, and

sanitary service 22

Other general and undefined workers and dealers . . 371

Total 6665

Among those in professional occupations are a clergyman, five law clerks, ten schoolmasters, teachers, &c, thirty-seven painters, engravers and sculptors, and seven photographers. Of those not engaged in occupations, 235 have retired from business, and 245 are living on their own means. Probably a very large number of the re- mainder were out of work or engaged in odd jobs at the time of the census; it would certainly be incorrect to take the words " Without specified occupations or unoccupied " to mean that those classified as such were permanently unable to support themselves.

The commonest occupations of men are bootmaking (555), tailor- ing (429), farm-labouring (287), general labouring (257), carpentry (195), cabinet-making (142), painting, decorating and glazing (95), French-polishing (88), harness-making, &c. (80).

The commonest occupations of women are dressmaking (484), domestic service (367), laundry and washing service (230), tailoring (170), shirtmaking, &c. (81), charing (79).

In Munich there are about sixty deaf artists, especially painters and sculptors. In Germany and Austria generally, deaf lithographers, xylographers and photographers are well employed, as are book-binders in Leipzig in particular, and labourers in the provinces.

In France there are several deaf writers, journalists, &c, two principals of schools, an architect, a score or so of painters, several of whom are ladies, nine sculptors, and a few engravers, photographers, proof-readers, &c.

Italy boasts deaf wood-carvers, sculptors, painters, and architects graduating from the universities and academies of fine arts with prizes and medals; also type-setters, pressmen, carvers of coral, ivory and precious stones.

Two gentlemen in the office of the Norwegian government are deaf, as are four in the engraving department of the land survey ; one is a master-lithographer, another a master-printer, a third a civil engineer, and the rest are engaged in the usual trades, as are those in Sweden.

The deaf form societies of their own to guard their interests, for social intercourse and other purposes. In England there is the British Deaf and Dumb Association; in America the National Association of the Deaf and many lesser societies; Germany has no fewer than 150 such associations, some of which are athletic clubs, benefit societies, dramatic clubs, and so forth. The central Federation is the largest German association. France has the National Union of Deaf-Mutes and others, many being benefit clubs. Italy has some societies; Sweden has eight.

In the United States there are no fewer than fifty-

three publi^ cations devoted to the interests of the deaf, most of them being school magazines published in the institutions themselves. Great Britain and Ireland have six, four of them being school magazines. France, Germany, Sweden, Hungary have several,

and Finland, Russia, Norway, Denmark and Austria are repre- sented. Canada has three.

There are many Church and other missions to the deaf in England and abroad, which are much needed owing to the difficulty the average deaf person has in understanding the archaic language of both Bible and Prayer-book. Until they have this explained to them it is useless to place these books in their hands, and even where they are well-educated and can follow the se'vices, they fail to get the sermon. Chaplains and missioners engage in all branches of pastoral work among them, and also try to find them employment, interpret for them where necessary, and interview people on their behalf.

The difficulty of obtaining employment for the deaf has been increased in Great Britain by the Employers' Liability and Workmen's Compensation Acts, for masters are afraid — need- lessly, as facts show — to employ them, under the impression that they are more liable to accidents owing to their affliction.

The new After-Care Committees of the London County Council are a late confession of a need which other bodies have long endeavoured to supply. Education should be a development of the whole nature of the child. The board of education in England provides for intellectual, industrial and physical training, but does not take cognizance of those parts of education which are far more important — the social, moral and spiritual. Some teachers, both oral and manual, do an incalculable amount of good at the

cost of great self-sacrifice and in face of much dis- couragement. They deserve the highest praise for so doing, and such work needs to be carried on after their pupils leave school.

Education.

History. 1 — ” Who hath made man’s mouth ? or who maketh a man dumb, or deaf, or seeing, or blind ? Is it not I the Lord ? ” (Ex. iv. n). Such is the first known reference to the deaf. But the significance of this statement was not realized by the ancients, who mercilessly destroyed all the defective, the deaf among the rest. Greek and Roman custom demanded their death, and they were thrown into the river, or otherwise killed, without causing any comment but that so many encumbrances had been removed. They were regarded as being on a mental level with idiots and utterly incapable of helping themselves. In later times Roman law forbade those who were deaf and dumb from birth to make a will or bequest, placing them under the care of guardians who were responsible for them to the state; though if a deaf person had lost hearing after having been educated, and could either speak or write, he retained his rights. Herodotus refers to a deaf son of Croesus, whom he declares to have suddenly recovered his speech upon seeing his father about to be killed. Gellius makes a similar statement with reference to a certain athlete. Hippocrates was in advance of Aristotle when he realized that deaf-mutes did not speak simply because they did not know how to; for the last-named seems to have considered that some defect of the intellect was the cause of their inability to utter articulate sounds. Pliny the elder and Messalla Corvinus mention deaf- mutes who could paint.

The true mental condition of the deaf was realized, however, by few, if any, before the time of Christ. He, as He opened the ears of the deaf man and loosened his tongue, talked to him in his own language, the language of signs.

St Augustine erred amazingly when he declared that

the deaf could have no faith, since "faith comes by hearing only." The Talmud, on the other hand, recognized that they could be taught, and were therefore not idiotic.

It is, however, with those who attempted to educate the deaf that we are here chiefly concerned. The first to call for notice is St John of Beverley. The Venerable Bede tells how this bishop made a mute speak and was credited with having performed a miracle in so doing. Probably it was nothing more than the first attempt to teach by the oral method, and the greatest credit is due to him for being so far in advance of his times as to try to instruct

1 For our resume of the history we are indebted solely to Arnold (Education of Deaf Mutes, Teachers' Manual) as far as the date of the founding of the Old Kent Road Institution.

his pupil at all. Bede himself invented a system of counting on the hands; and also a " manual speech," as he called it, — using his numerals to indicate the number of the letter of the alphabet; thus, the sign for " seven " would also signify the letter ■" g," and so forth. But we do not know that he intended this alphabet for the use of the deaf.

It is not until the 16th century that we hear much of anybody else who was interested in the deaf, but at this date we find Girolamo Cardan stating that they can be instructed by writing, after they have been shown the signification of words, since their mental power is unaffected by their inability to hear.

Pedro Ponce de Leon (c. 1520-1584), a Spanish Benedictine monk, is more worthy of notice, as he, to use his own words, taught the deaf " to speak, read, write, reckon, pray, serve at the altar, know Christian doctrine, and confess with a loud voice." Some he taught languages and science. That he was successful was proved by other witness than his own, for Panduro, Valles and de Morales all give details of his work, the last-named giving an account by one

of Ponce's pupils of his education. De Morales says further that Ponce de Leon addressed his scholars either by signs or writing, and that the reply came by speech. It appears that this master committed his methods to writing. Though this work is lost it is probable that his system was put into practice by Juan Pablo Bonet. This Spaniard successfully instructed a brother of his master the constable of Castile, who had lost hearing at the age of two. His method corresponded in a great measure to that which is now called the combined system, for, in the work which he wrote, he shows how the deaf can be taught to speak by reducing the letters to their phonetic value, and also urges that finger-spelling and writing should be used. The connexion between all three, he goes on to say, should be shown the pupils, but the manual alphabet should be mastered first. Nouns he taught by pointing to the objects they repre- sented; verbs he expressed by pantomime; while the value of prepositions, adverbs and interjections, as well as the tenses of verbs, he believed could be learnt by repeated use. The pupil should be educated by interrogation, conversation, and care- fully graduated reading. The success of Bonet's endeavours are borne witness to by Sir Kenelm Digby, who met the teacher at Madrid.

Bonifacio's work on signs, in which he uses every part of the body for conversational purposes, may be mentioned before passing to John Bulwer, the first Englishman to treat of teaching the deaf. In his three works, Philocophus, Chirologia and Chironomia, he enlarges upon Sir Kenelm Digby's account, and argues about the possibility of teaching the deaf by speech. But he seems to have had no practical experience of the art.

Dr John Wallls is more important, though it has been disputed whether he was not indebted to his predecessors for some ideas. He taught by writing and articulation. He took the trouble to classify to a certain extent the various sounds, dividing both vowels and "open" consonants into gutturals, palatals and labials. The " closed " consonants he subdivided into mutes, semi-mutes and semi-vowels.

Language, Wallis maintained, should be taught when the pupil had first learned to write, and the written characters should be associated with some sort of manual alphabet. Names of things should be given first, and then the parts of those things, e.g. " body " first, and then, under that, " head," " arm," " foot," &c. Then the singular and plural should be given, then possessives and possessive pronouns, followed by particles, other pronouns and adjectives. These should be followed by the copulative verb; after which should come the intransitive verb and its nominative in the different tenses, and the transitive with its object in the same way. Lastly, prepositions and conjunctions should be taught. All this, Wallis held, ought to be done by writing as well as signing, for he did not lose sight of the fact that " we must learn the pupil's language in order to teach him ours."

Dr William Holder, who read an essay before the Royal Society in 1668-1660 on the "Elements of Speech," added an appendix concerning the deaf and dumb. He describes the organs of speech and their positions in articulation, suggesting

teaching the pupil the sounds in order of simplicity, though he held that he must learn to write first. Afterwards the pupil must associate the letters with a manual alphabet. Holder notices that dumbness is due to the want of hearing, and therefore speech can be acquired through watching the lips, though he admits the task is a laborious one. He also urges the teacher to be patient and to make the work as interesting to the pupil as possible. Command of language, he maintains, will enable the deaf person to read a sentence from the lips if he gets most of the words; for he will be able to supply those he did not see, from his knowledge of English.

Johan Baptist van Helmont treated of the work of the vocal organs. Amman says that Van Helmont had discovered a manual alphabet and used it to instruct the deaf, but had not attained very good results.

George Sibscota published a work in 1670 called the Deaf and Dumb Man's Discourse, in which he contradicts Aristotle's opinion that people are dumb because of defects in the vocal organs; for they are, he believed, dumb because never taught to speak. They can gain knowledge by sight, he maintained; can write, converse by signs, speak and lip-read. Ramirez de Carrion also taught the deaf to speak and write, as did P. Lana Terzi.

About George Dalgarno more is known. He wrote, in 1680, his Didascalocophus, or Deaf-Mute's Preceptor, in which he makes the mistake of saying that the deaf have the advantage over the blind in opportunities for learning language. The deaf can, in his opinion, be taught to speak, and also to read the lips if the letters are very distinct. They ought to read, write arid spell on the fingers constantly, but use no signs. Substantives are to be taught by associating them with the things they represent; then adjectives should be joined to them. Verbs should be taught by suiting the action to the words, and associating the pronouns with them. Other parts of speech should be given as opportunities of explaining them present themselves. Dalgarno invented an alphabet, the letters being on the joints of the fingers and palm of the left hand.

John Conrad Amman published his Dissertatio de Loquela in 1700. In the first chapter he treats, among other things, of the nature of the breath and voice and the organs of speech. In the second chapter he classifies sounds into vowels, semi-vowels and consonants, and a detailed description of each sound is given. The third chapter is devoted to showing how to produce and control the voice, to utter each sound from writing or from the lips, and to combine them into syllables and words. It was only after the pupil had attained to considerable success in articulation and lip-reading that Amman

taught the meaning of words and language; but the name of this teacher will long stand as that of one of the most successful the world has known.

Passing over Camerarius, Schott, Kerger (who began teaching language sooner than Amman did, and depended more on writing and signs), Raphel (who instructed three deaf daughters), Lasius, Arnoldi, Lucas, Vanin, de Fay (himself deaf) and many others, we come to Giacobbo Rodriguez Pereira, the pioneer of deaf-mute education in France, if we except de Fay. Beginning his experi- ence by instructing his deaf sister, he soon attained to consider- able success with two other pupils; his chief aim being, as he said, to make them comprehend the meaning of, and express their thoughts in, language. A commission of the French Academy of Sciences, before whom he appeared, testified to the genuine- ness of his achievements, noticing that he wrote and signed to his pupils, and stating that he hoped to proceed to the instruction of lip-reading. Pereira soon after came under the notice of the due de Chaulnes, whose deaf godson, Saboureaux de Fontenay, became his pupil; and in five years this boy was well able to speak and read the lips. Pereira had several other pupils. Probably kindness and affection were two of the secrets of his success, for the love his scholars showed for him was unbounded. His method is only partly known, but he used a manual alphabet which indicated the pronunciation of the letters and some combinations. He used reading and writing; but signs were only called to his aid when absolutely necessary. Language he

taught by founding it on action where possible, abstract ideas being gradually developed in 'later stages of the education.

We now come to the abbe de l'Epee (q.v.). The all-important features in this teacher's character and method were his intense devotion to his scholars and their class, and the fact that he lived among them and talked to them as one of themselves. Meeting with two girls who were deaf, he started upon the task of instructing them, and soon had a school of

sixty pupils, sup- ported entirely by himself. He spared himself no expense and no trouble in doing his utmost to benefit the deaf, learning Spanish for the sole purpose of reading Bonet's work, and making this book and Amman's Dissertatio de Loquela his guiding lights. But de l'Epee was the first to attach great importance to signs; and he used them, along with writing, until the pupil had some knowledge of language before he passed on to articulation and lip-reading. To the latter method, however, he never paid as much attention as he did to instructing by signs and writing, and finally he abandoned it altogether through lack of time and means. He laboured long on a dictionary of signs, but never completed it. He was attacked by Pereira, who condemned his method as being detrimental, and this was the beginning of the disputes as to the merits of the different methods which have lasted to the present day; but whatever opinions we may hold as to the best means of instructing the deaf we cannot but admire the devoted teacher who spent his life and his all in benefiting this class of the community.

Samuel Heinicke first began his work in 1754 at Dresden, but in 1778 he removed to Leipzig and started on the instruction of nine pupils. His methods he kept secret; but we know that he taught orally, using signs only when he considered them helpful, and spelling only to combine ideas. He wrote two books and several articles on the subject of educating the deaf, but it is from Walther and Fornari that we learn most about his system. At first Heinicke laid stress on written language, starting with the concrete and going on co the abstract; and he only passed to oral instruction when the pupils could express themselves in fairly cor- rect language. Subsequently, however, he expressed the opinion that speech should be the sole method of instruction, and, strange to say, that by speech alone could thoughts be fully expressed.

Henry Baker became tutor to a deaf girl in 1 7 20, and his success led to the establishment of a private school in London. He also kept his system a secret, but recently his Work on lessons for the deaf was discovered, from which we gather that he adopted writing, drawing, speech and lip-reading as his course of instruc- tion. The point to notice is that after the primary stages Baker turned events of every-day life to use in his teaching. His pupils went about with him, and he taught by conversation upon what they saw in the streets, — an excellent method; but it is a pity that such a good teacher had not the philanthropy to make his methods known and to give the poorer deaf the benefit of them, as de l'Epee did.

A school was established in Edinburgh in 1760 by Thomas Braidwood, who taught by the oral method. He taught the sounds first, then syllables, and finally words, teaching their meaning. In 1783 Braidwood came to Hackney, whence he moved to Old Kent Road, and in 1809 there were seventy pupils in what was lately the Old Kent Road Institution. Braidwood's method was practically a development of Wallis's. We must regard him as the founder of the first public school for the deaf in England.

It was only at the beginning of the roth century that a brighter day dawned on the deaf as a class. With the sole exception of de l'Epee no teacher had yet undertaken the instruction of a deaf child who could not pay for it. Now things began to be different. Institutions were founded, and their doors were opened to nearly all.

Dr Watson, the first principal of the Old Kent Road " Asylum," taught' by articulation and lip-reading, reading and writing, explaining by signs to some extent, but using pictures much more, according to Addison, and composing a book of these for the use of his pupils. From Addison {Deaf Mutism, pp. 248 ff.) we learn what developments followed. In Vienna, Prague and Berlin, schools had been founded in rapid succession before

the 19th century dawned, and in 1810 the Edinburgh institution opened its doors. Nine years later the Glasgow school was established and, under the able guidance of Mr Duncan Anderson (after several other headmasters had been tried) from 183 1, taught pupils whose grasp of English was equal to that of the very best educated deaf in England to-day, as has been proved by conversation with the survivors. Mr Anderson's great aim was to teach his pupils language, and we might look almost in vain for a teacher in England to succeed as well with a whole class in the beginning of the 20th century as he did in the middle of the 19th. He wrote a dictionary, used pictures and signs to explain English, and apparently paid little or no attention to most of the numerous subjects attempted to-day in schools for the deaf, which, while excellent in them- selves, generally exclude what is far more important from the curriculum.

Addison further mentions Mr Baker of Doncaster, a con- temporary of Anderson, as having compiled many lesson books for deaf children which came to be used in ordinary schools also, and Mr Scott of Exeter as having, together with Baker, " exercised a profound influence on the course of deaf-mute education in this country." " Written language," explained by signs where necessary, was the watchword of these teachers.

Moritz Hill is credited with being principally responsible for having evolved the German, or " pure," oral method out of the experimental stage to that at which it has arrived at the present day. Arnold of Riehen is also honourably mentioned.

The great " oral revival " now swept all before it. The German method was enthusiastically welcomed in all parts of Europe, and at the Milan conference in 1880 was almost unani- mously adopted by teachers from all countries. Those in high places

countenanced it; educational authorities awoke to the fact that the deaf needed special teaching, and came to the conclusion that the ” pure ” oral method was the panacea that would restore all the deaf to a complete equality with the hearing in any conversation upon any subject that might be broached; many governments suddenly took the deaf under the shelter of their own ample wings, and the ” bottomless pocket of the ratepayer,” instead of the purse of the charitable, became in many cases the fount of supply for what has been a costly and by no means entirely satisfactory experiment in the history of their education. The ” pure ” oral method has had a long and unique trial in England in circumstances which other methods have never enjoyed.

Meanwhile in the United States Dr Thomas Hopkins Gallaudet was elected in 181 5 to go to Europe to inquire into the methods of educating the deaf in vogue there. This was at a meeting held in the house of a physician named Cogswell, in Hartford, Connecticut, and was the result of the latter’s discovery that eighty-four persons in the state besides his own little girl were deaf. Henry Winter Syle, himself deaf, tells how ” four months were spent in learning that the doors of the British schools were ‘ barred with gold, and opened but to golden keys,’ ” and how, disappointed in England, Gallaudet met with a ready response to his inquiries in Paris. With Laurent Clerc, a deaf teacher, he returned to the United States in 1816, and the ” Connecticut Asylum ” was founded a year after with seven pupils. The name was changed to ” The American Asylum ” later, when it was enlarged. This was followed by the Pennsylvania, New York and Kentucky institutions, with the second of which the Peet family were connected. Dr Gallaudet married one of his deaf pupils, Sophia Fowler, and, after a very happy married life, Mrs Gall- audet accompanied her youngest son, Edward Miner Gallaudet, to the Columbia institution for the Deaf and Dumb, Washington, D. C, founded in 1857 by Congress and largely supported by Amos Kendall, and to the

National Deaf Mute College, which was founded in 1864, was renamed the Gallaudet College, in honour of Dr T. H. Gallaudet, in 1893, and with the Kendall School (secondary), now forms the Columbia Institution. This college is supported by Congress.

The following account of the work done at the National Deaf- Mute College at Washington is worth attention, as the results are unique, and are often strangely ignored.

Here is a statement of the course for the B.A. degree: —

First year: Algebra, grammar, punctuation, history of England, composition, Latin grammar, Caesar.

Second year: Algebra (from quadratics), geometry, composition, Caesar (Gallic War), Cicero (Orations), Allen and Greenough's Latin Grammar, Myer's General History, Goodwin's Greek Grammar (optional), Xenophon's A nabasis (optional).

Third year: Olney's or Loomis s Plane and Spherical Trigo- nometry, Loomis's Analytical Geometry (optional), Orton's Zoology, Gray's Botany, Remsen's Chemistry, laboratory practice, Virgil's Aeneid, Homer's Iliad (optional), Meiklejohn's History of English Literature and Language (two books), Maertz's English Literature, Hadley's History, original composition.

Fourth year: Loomis's Calculus (optional), Dana's Mechanics, Gage's Natural Philosophy, Young's Astronomy, laboratory practice, qualitative analysis, Steel's Hygienic Physiology, Edgren's French Grammar, Super's French Reader, Demosthenes on the Crown (optional), Hart's Composition and Rhetoric, original composition, Hill's-Jevon's Elementary Logic.

Fifth year: Arnold's Manual of English Literature, Maertz's English Literature, original composition, Guizot's History of Civiliza- tion, Sheldon's German Grammar, Joynes's German Reader, LeConte's Geology,

Guyot's Earth and Man, Hill's Elements of Psychology, Haven's Moral Philosophy, Butler's Analogy, Bascom s Elements of Beauty, Perry's Political Economy, Gallaudet's International Law.

Even in 1893 we were told that of the graduates of the college " fifty-seven have been engaged in teaching, four have entered the ministry; three have become editors and publishers of newspapers; three others have taken positions connected with journalism ; fifteen have entered the civil service of the government, — one of these, who had risen rapidly to a high and responsible position, resigned to enter upon the practice of law in patent cases, in Cincinnati and Chicago, and has been admitted to practise in the Supreme Court of the United States ; one is the official botanist of a state, who has corre- spondents in several countries of Europe who have repeatedly purchased his collections, and he has written papers upon seed tests and related subjects which have been published and circulated by the agricultural department ; one, while filling a position as instructor in a western institution, has rendered important service to the coast survey as a microscopist, and one is engaged as an engraver in the chief office of the survey; of three who became draughtsmen in architects' offices, one is in successful practice as an architect on his own account, which is also true of another, who completed his pre- paration by a course of study in Europe; one has been repeatedly elected recorder of deeds in a southern city, and two others are recorders' clerks in the west; one was elected and still sits as a city councilman; another has been elected city treasurer and is at present cashier of a national bank; one has become eminent as a practical chemist and assayer; two are members of the faculty of the college, and two others are rendering valuable service as instructors therein ; some have gone into mercantile and other offices; some have under- taken business on their own account; while not a few have chosen agricultural and mechanical pursuits, in which the advantages of thorough mental training will give them a

superiority over those not so well educated. Of those alluded to as having engaged in teaching, one has been the principal of a flourishing institution in Pennsylvania ; one is now in his second year as principal of the Ohio institution ; one has been at the head of a day school in Cincinnati, and later of the Colorado institution; a third has had charge of the Oregon insti- tution; a fourth is at the head of a day school in St Louis; three others have respectively founded and are now at the head of schools in New Mexico, North Dakota, and Evansville, Indiana, and others have done pioneer work in establishing schools in Florida and in Utah."

Later years would unfold a similar tale of subsequent students; in 1907 there were 134 in the college and 59 in the Kendall School.

There is a normal department attached to the college, to which are admitted six hearing young men and women for one year who are recommended as being anxious to study methods of teaching the deaf and likely to profit thereby. Their course of study for 1898-1899 included careful training in the oral method, instruction in Bell's Visible Speech, instruction in the anatomy of the vocal organs, lectures on sound, observation of methods, oral and manual, in Kendall School, lectures on various subjects connected with the deaf and their education, lectures on pedagogy, lessons in the language of signs, practical work with classes in Kendall School under the direc- tion of the teachers, correction of essays of the introductory class, &c. But the greatest advantage of the year's course is that the half- dozen hearing students live in the college, have their meals with the hundred deaf, and mix with them all day long — if they wish it-^-in social intercourse and recreation. We are very far indeed from saying that one such year is sufficient to make a hearing man a qualified teacher of the deaf, but the arrangement is based on the right principle, and it sets his feet on the right path to learn how to teach — so far as this art can be learned. The recent regulation of the board of education in England, prohibiting hearing pupil

teachers in schools for the deaf, is deplorable, retrograde and inimical to the best interests of the deaf. It shows a complete ignorance of their needs. The younger a teacher begins to mix with that class the Better he will teach them.

In 1886 a royal commission investigated the condition and education of the deaf in Great Britain, and in 1889 issued its report. Some of the recommendations most worthy of notice were that deaf children from seven to sixteen years of age should be compelled to attend a day school or institution, part, or the whole, of the expense being borne by the local school authority; that technical instruction should be given, and that all the children should be taught to speak and lip-read on the ” pure ” oral method unless physically or mentally disqualified, those who had partial hearing or remains of speech being entirely educated by that method. To the last mentioned recommendation — concerning the method to be adopted — two of the commissioners took exception, and another stated his recognition of some advantage in the manual method.

As a result of the report of the royal’ commission a bill was passed in 1893 making it compulsory for all deaf children to be educated. This was to be done by the local education authority, either by providing day classes or an institution for them, or by sending them to an already existing institution, parents having the choice, within reasonable limits, of the school to which the child should go. School-board classes came into existence in almost every large town where there was no institution, and sometimes where one existed. Those who uphold the day-school system advance the arguments that the pupils are not, under it, cut off from the influence of home life as they are in institutions; that such influences are of great advantage; that this system permits the deaf to mix freely with their hearing brethren, &c. The objections, however, to this

arrangement outweigh its possible advantages. The latter, indeed, amount to little; for home influences in iriany cases, especially in the poorer parts of the large cities, are not the best, and communication with the hearing children who attend some of the day schools may not be an unmixed blessing, nor is freedom to run wild on the streets between school hours. But it may be urged further that it is difficult, except in very large towns, to obtain a sufficient number of deaf children attending a day school to classify them according to their status, while it is more than one teacher can do to give sufficient attention to several children, each at a different stage of instruction from any other. Moreover, the deaf need more than mere school work; they need training in morals and manners, and receive much less of it from their parents than their hearing brothers and sisters. This can only be given in an institu- tion wherein they board and lodge as well as attend classes. The existing institutions were from 1893 placed, by the act of that date, either partly or wholly under the control of the school board. They were put under the inspection of the government, and as long as they fulfilled the requirements of the inspectors as regards education, manual and physical training, outdoor re- creation and suitable class-room and dormitory accommodation, they might remain in the hands of a committee who collected, or otherwise provided, one-third of the total expenditure, and received two-thirds from public sources. Or else, the institution might be surrendered entirely to the management of the public school authority, and then the whole of the expenditure was to be borne by that body. Extra government grants of five guineas per pupil are nOw given for class work and manual or technical training. Such is the state of things at the present day, except, of course, that the school board has given place to the county council as local authority.

Some teachers have asked for the children to be sent to school at the age of five instead of seven. This savours of another confession that the "pure " oral

method had not done what was expected of it at first. First, the demand was for the method itself ; then came re- quests for more teachers, so that, the classes being smaller, each pupil should receive more attention ; this meant more money, and so this was asked for ; then day schools would remedy the failure by giving the pupils opportunities of talking with the public in general ; then we were told the teachers were unskilful; finally, more time is needed. And yet the language of the pupils is no better to-day than it was in 1881, even though they were at school only four or five years then as opposed to nine or ten now.

To Addison's Report on a Visit to some Continental Schools for the Deaf (1904-1905) we are indebted for the following information. The new school at Frankfort-on-Maine, accommodating forty or fifty children at a cost of £40 to £50 per head, is modelled on the plan of

a family home. The main objects are to obtain good speech and lip- reading and to use these colloquially; the work is very „ . thorough and the teaching very skilful. At Munich those roregn of the hundred pupils who have some hearing are separated sc °° s ' from the others and taught by ear as well as eye. At Vienna (Royal Institution) a small proportion of the pupils are day scholars, as they are at Munich, and the teaching is, of course, carried on by the oral method, as it is all over Germany. Here, however, the teachers " think it impossible to educate fully all deaf-mutes by the oral method only." In the Jews' Home at Vienna the semi-deaf are taught by the acoustic method, and are not allowed to see the teacher's lips at all. At Dresden, a large school of 240 pupils, the director favours smaller institutions than his own, considers the oral method possible for all but the " weak-minded deaf, ' ' and divides his pupils into A, B and C divisions, according to intellect. In the first division good speech is obtained. Saxony boasts a home for deaf homeless women, grants premiums for deaf apprentices, and trains its teachers of the deaf in the institution itself — a

good record and plan. In the royal institution at Berlin Addison saw good lip-reading and thorough work, though the deaf in the city — as in most of the schools — signed The men in Berlin ” like the adult deaf generally, were all in favour of a combination of methods, and condemned the pure oral theory as impracticable.” At Hamburg, again, “hand signs ” were used at least for Sunday service. Schleswig has two schools. Pupils are admitted first to the residential institution, where they are instructed for a year, and are then divided into A, B and C classes, ” according to intellect.” The lowest class © remain at this institution for the rest of the eight years, and a ” certain amount of signing ” is allowed in their instruction. A and B classes are boarded out in the town and attend classes at a day school specially built for them, being taught orally exclusively.*

In Denmark Addison saw what impressed him most. All the children of school age go to Fredericia and remain for a year in the boarding institution. They are then examined and the semi-deaf — 29% of the whole — are sent to Nyborg. The rest — all the totally deaf — remain another year at Fredericia and are then divided into the A, B and C divisions before mentioned, and on the same criterion — intellect. Those in C — the lowest class, 28 % of the totally deaf — are sent to Copenhagen, where they are taught by the manual method, no oral work being attempted. Those in B class, numbering 19% of the deaf, remain in the residential institution in Fredericia and are taught orally, while the best pupils — A class — are boarded out in the town and attend a special day school. These form 26 % of the deaf, and those with whom they live encourage them to speak when out of as well as when in school. The buildings and equipment generally are excellent. ” Hand signs ” are used at Nyborg, indicat- ing the position of the vocal organs when speaking, and, as might be expected, the ” lip “-reading is 90% more correct when these symbols — infinitely more visible than most of the movements of the vocal organs and face when speaking — -are used at the same time. The

idea of these hand signs, by the v/ay, corresponds to that of Graham Bell's Visible Speech, in which a written symbol is used to indicate the position of the vocal organs when uttering each sound ; it is a kind of phonetic writing which is to a slight extent illustrative at the same time. We find natural signs of the utmost value when teaching articulation, to describe the position of the vocal organs. We give these details from Mr Addison's notes because it is to Germany that so many look for guidance to-day, and it is the home of the so-called " pure " oral method; while the system of classifica- tion in Denmark into the four schools which are controlled by one authority, struck him very favourably and so is given rather fully.

In France most of the schools are supported by charity, and the only three government institutions are those at Paris for boys, with 263 pupils lately, at Bordeaux for girls, having 225 inmates, and at Chambery with 86 boys and 38 girls. In the great majority the method of instruction is professedly pure oral. " But," said Henri Gaillard (Report, World's Congress of the Deaf , Missouri, 1904), " this is only in appearance. In reality all of the schools use the combined method ; only they are not willing to admit it, because the oral method is the official method, imposed by the inspectors of the minister of the interior."

In Italy, again, we are told that the teachers sign in most of the schools, which are professedly pure oral.

In Sweden, schools for the deaf have ceased to depend, as they did up to 1 89 1, upon private benevolence. The system is generally the combined, and in schools where the oral method is adopted the

Supils are divided into A, B and C divisions, as in Denmark and •resden, in the two latter divisions of which signs are allowed. In Norway the method is the oral.

Methods of Teaching. — There have always been two

principal methods of teaching the deaf, and all education at the present time is carried on by means of one or other or both of these. Where there is sufficient hearing to be utilized, instruction is sometimes given thereby as well, though this auricular method does not seem to make much headway, and experience is not in favour of believing that the sense of hearing, where a little exists, can be ” cultivated ” to any marked degree. It is really

*impossible to draw hard and fast lines between these means of instruction. One merges into another, and this other into the next; and no two teachers will, or can, adopt exactly the same lines. It is not desirable that they should, for much must be left to individuality. Orders, rules, methods, should not be absolute laws. Observe them generally, but dispense with them as cir- cumstances, the pupil and opportunity may require. Strong individuality, sympathy, enthusiasm, long intercourse with the deaf, are needed in the teacher, and it is surely obvious that every teacher should have a full command of all the primary means of instruction to begin with, and not of one only. * Where deafness is absolute, or practically so, we have to seek*

130 words a minute can be attained when spelling on the fingers. Words are quite readable at this speed.

Although reading and writing are common to both methods, the manual and oral, as a matter of fact they seem to be used considerably more in the former than in the latter.

In the oral method articulation and lip-reading are chiefly relied upon; reading and writing are also adopted. The phonetic values of the letters are taught, not the names of the letters; for instance, the sound of the letter & in ” hat ” ™

is taught instead of the name of the letter (long

a), though of course the latter is taught where such is the proper pronuncia- tion, as in ” hate.”

M

N 0~ „ P , Q R

<^2

The Manual Alphabet. (One-handed.)

Fig. 2. — The Manual Alphabet. (Two-handed.)

for means that will appeal to the eye instead of the ear. Of these, we have the sign language, writing and printing, pictures, manual alphabets and lip-reading. We have to choose which of these is to be used, if not all, and which must be rejected, if any. More- over, we have to decide how much or how little one or another is to be adopted if we employ more than one. Hence it is obvious that there may be many different systems and subdivisions of systems. But the two main methods are the manual, which generally depends upon all the above-mentioned means of appealing to the eye except lip-reading, and the oral, which adopts what the manual method rejects, uses writing and printing and perhaps pictures, but excludes finger-spelling and (theoretically) signs. To these two we must add a third means of instruction — the combined system — which rejects no means of teaching, but uses all in most cases. The dual method need hardly be called a separate method or system, for it implies simply the use of the manual method for some pupils and of the oral for others. Nor need we call the mother’s (= intuitive or natural) a separate method in the sense in which we are using the word here, for it is rather a mode of procedure which can be applied manually or orally indifferently. The same may be said of the grammatical ” method “; also of the ” word method,” which is really the ” mother’s.” The ” eclectic method ” is practically the combined system, or something between that and the dual method, and hardly needs separate classification.

Let us notice the manual method, the oral method, and the combined system, considering with the last the ” dual method.”

The chief elements of the manual method are finger-spelling, reading and writing and signing. These are used, that is to say, as means of teaching English and imparting ideas. Signs are used to awaken the child’s thoughts, finger- spelling and writing are used to express these thoughts in the vernacular. The latter are used to express English, the former to explain English.

We give two manual alphabets, the one-handed being used in America, on the continent of Europe with some variations and additions, in Ireland, and also to some extent in England; the two-handed in Great Britain, Ireland and Australia. A speed of

Manual.

Here is a chart which was lately in use:
Articulation Sheets.

Analysis of the Vowel Sounds.

Long.

Middle.

Short.

Broad.

Diacritic Phonetic mark. spelling.

Diacritic Phonetic mark. spelling.

Diacritic Phonetic mark. spelling.

Diacritic Phonetic mark. spelling.

fat(e) =feit

S mee me =] mi pin(e) =pain no =nou tiib(e) =tiub

far = far

move = muv btill = bul

fat = fat

met = met pin = pin not = not tub = tub

AK-jisr 1 -

Order in which the Vowel Sounds are to be taught.

Diacritic Mark

a wall

Phonetic) , Spelling f wo1

Diacritic Mark

raou eeo 1 a u 6e

path hot blu(e) set see ton(e) pi(e) lat(e) mul(e) boy

e 1 ou ee

Phonetic) path hot blu set si toun pai leit miul boi Spelling 5

(a u i

hat hut hit

II II I.I

The consonants are as follows, though the order of teaching them varies: —

p; f; s; h; sh; v=/; th (thin; moth); th (then; smooth); f; r; t; k; b; d; g (go; egg); z — s; m; n; ch = tsh; j=dzh = g; ph=f; kc = k; cs = s; q=kw; x = ks; ng; w = oo; wh = hw; y=e.

8 9 2

DEAF AND DUMB

The following mode of writing the sounds is now preferred by some as it renders the diacritic marks

unnecessary: — Middle, Broad and Long Vowel Sounds.

or

oo

ee er oa igh ai

ew

oi

ou

aw

ea ir o-e i-e a-e

u-e

oy

ow

au

ur ay

a—

Short Vowel Sounds.

oo

e i u

Consonants. h p j p f h f t s th sh ch i k k j 1 t. m n ng w

b v d z th zhj^j g

• These charts are given as examples of those used, but they vary in different schools, as does the order of teaching the vowel and consonant sounds and the combinations. The exact order is not important. Words are made up by combining vowels and consonants as soon as the pupil can say each sound separately. Here are extracts from the directions on

articulation written by a principal to the teacher of the lowest class, which show the method of procedure: —

" (i) Produce the sound of a letter. Each pupil to reproduce, and write it on the tablet.

(2) Point to the letter on the tablet, and make each pupil say it.

(3) The same with combinations of vowels and consonants.

(4) Instead of tablet, each pupil to use rough exercise-book.

(5) Write on tablet and make each pupil articulate from

teacher's writing.

(6) When a combination is made of which a word may be made

make all write it in their books, thus : — ' te— tea,' ' sho — show,' ' 6v — of,' ' nalz— nails,' &c.

(7) When one pupil produces a combination correctly make

the others lip-read it from him. In this way make them exercise each other.

(8) When they have a good many sounds and combinations

written in their books make them sit down and say them off their books as hearing children do.

(9) Make them say the sounds off the cards, and form combina-

tions on the cards for them to say.

(10) Take each vowel separately and make each pupil use it

before and after each consonant.

(11) Take each consonant and put it before and after each vowel. ” The above will suggest other exercises to the teacher.

” Give breathing exercises. Incite emulation as to deep breathing and slow expiration. Never force the voice. Make the pupil speak out, but do not let him strain either the voice or vocal organs. Do not force the tongue, lips, or any organ into position more than you can help. Do all as gently as possible. Register their progress. ' A ' (as in ' path ' ; ' father '). As ' A ' is the basis of all the vowels, being most like all, it is taken first. It is an open vowel. Do not make grimaces, or exaggerate. If false sound be produced do not let the pupil speak loudly; make him speak quietly. If nasal sound be

Eroduced do not pinch the nose, but first take the back of the child’s and, warmly breathe on it, or get a piece of glass, and let the child breathe on it, or press the back of the tongue down. Show the child that when you are saying ' a ' your tongue lies flat or nearly so, and you do not raise the back of the tongue. Prefix ' h ' to ' a ' and make the pupil say ' ha ' first, then ' a ' alone.

” ‘P.’ If the child does not imitate at the first the teacher should take the back of the hand and let the child feel the puff of air as ' p ' is formed on the lips.

” ' P ' is produced by the volume of air brought into the cavity of the mouth being checked by the perfect closure of the lips, which are then opened, and the accumulated air is propelled. The outburst of this propelled air creates the sound of ' p.’ Take the pupil to see porridge boiling. Pretend to smoke. ' P ' is taken first because it has no vibration and is the most simple. The consonants should first be joined to each vowel separately, and to prevent the pupils making an after-sound the letters should be said with a pause between, viz. ‘A

. . p,' a"nd as they become more familiar with them, lessen the pause until it is pronounced properly: — ' ap.' "

These directions, which are only brief examples of those given for one particular subject in one particular class, will give an idea of the mode of beginning to teach articulation and lip- reading.

The combined system, as before mentioned, makes use of both the manual and oral method, as well as the auricular, without _ .. . any hard and fast rule as regards the amount of instruc- metbod. tion to be given by means of each, but using more of one and less of another, or vice versa, according to the aptitude of the child. It thus follows the sensible, obvious plan

of fitting the method to the child and not the unnatural one of forcing the child to try to fit the method.

The following is the way the same principal would teach language to beginners by the combined system: —

"The letters p, q, b and d of the Roman text are to be taught first. The pupils are to do them 9 in. long on the blackboard or tablet first ; then trace them on the frames; then on slips of paper with pen and ink, or in rough exercise-book with pen and ink.

" The whole of the Roman text is then to be taught in the same manner, also the small and capital script.

" When the English alphabet has been mastered in the above four forms the pupil may proceed to the printing and writing of his own name. Then his teacher's and class-mates' names. Then the names of other persons and the places, things and actions with which he has to do in his daily life. Every direction the teacher has to give in school and out of school should be expressed in speech, writing or finger-spelling, or- by any two or all three means.

Repetition of such directions by the pupil enables him to learn words before he has finished the alphabet.

" All words to be spelled on one hand first ; then two. When a few words have been memorized, they should be written on slips of paper, then in the exercise-books and dated. After this there should be further repetition and exercising. The same course should be taken with phrases and short sentences. Names of persons should be written on cards and slips of paper and pinned to the chest. Names of things to be affixed to them, or written on them. Names of apartments on cards laid in the rooms. Where the object is not available use a picture, or draw the outline and make pupil do the same. Never nod, or point, or jerk the finger, or use any other gesture, without previously giving the word, and when the latter is understood drop the gesture altogether.

' ' Never allow a single mistake to pass uncorrected , and make pupils always learn the corrections.

" Language should be a translation of life. It should proceed all day long, out of school as well as in it. If spoken so much the better, but finger-spelling is not a hindrance but a valuable help to its ac- quisition.

" In most language lessons, especially those exemplifying a parti- cular form of sentence, the pupils should :

" (1) Correct each other's mistakes. Correct 'mistakes' designedly made by the teacher.

" (2) Teacher rubs out a word here and there on the blackboard or tablet ; pupils to supply them.

" (3) Pupils to answer questions, giving the subject, predicate and object of the sentence as required, e.g. ' A farmer ploughs the ground.' ' Who ploughs the ground? ' ' What does a farmer do? ' ' What does he plough? ' Also additional and

illustrative questions; e.g. ' Does the ground plough the farmer? ' ' Does a farmer plough the sea? ' ' Does he eat the ground? ' &c.

" The pupils should learn meanings or synonyms of unfamiliar words before such words are signed.

" (4) Teacher gives a word, and requires pupils to exemplify it in a sentence, e.g. ' sows,' ' He sows the seed.'

" (5) Let them give as many sentences as they can think of in the same form.

" Occurrences, incidents, objects, pictures, reading-books, news- paper cuttings and correspondence should all be used."

The " pure " oral method, as before noticed, came with a bound into popularity in the early seventies. Since then it has had everything in its favour, but the results have been by no means entirely satisfactory, arid there is a marked tendency among advocates of this method to with- draw from the extreme position formerly held. Opinion has gradually veered round till they have come to seek for some sort of via media that shall embrace the good points of both methods. Some now suggest the " dual method " — that those pupils who show no aptitude for oral training shall be taught exclusively by the manual method and the rest by the oral' only. While this is a concession which is positively amazing when compared with the title of the booklet containing utterances of the Abbe Tarra, president of the Milan conference in 1880 — " The Pure Oral Method the Best for All Deaf Children "! — yet we believe that in no case should the instruction be given by the oral method alone, and that the best system is the " combined." That the combined system is detrimental to lip-reading has not much more than a fraction of truth in it, for if the command of language is better the pupils can supply the lacunae in their lip-reading from their better knowledge of English. It is found that they have con- stantly to guess words and letters from

the context. Teach all by and through finger-spelling, reading, writing and signing where necessary to explain the English, and teach those in whose case it is worth it by articulation and lip-reading as well. Signs

The best system.

should be used less and less in class work, and English mofe and more exclusively as the pupil progresses — English in any and every form. A proportion of teachers should be themselves deaf, as in America. They are in perfect understanding and sympathy with their pupils, which is not always the case with hearing teachers. Statistics which we collected in London showed the following results of the education of 403 deaf pupils after they had left school: —

Manual. Combined. Oral. Quite satisfactory result . 65% 51% 20%

Moderate success . . 29 % 41 % 35 %

Unsatisfactory result • 5 % 7 % 44 %

That the combined system should show to slightly less advan- tage than the exclusively manual method is what we might perhaps expect, for the time given to oral instruction means time taken from teaching language speedily, the manual method being, we believe, the best of all for this. But it may be worth while to lose a little in command of language for the sake of gaining another means of expressing that language. Hence we advocate the combined system, regarding speech as merely a means of expressing English, as writing and finger-spelling are, and a good sentence written or finger-spelled as being preferable to a poorer one which is spoken, no matter how distinct the speech may be. It is no answer to point to a few isolated cases where the oral method is considered to have succeeded, for one

success does not counterbalance a failure if by another method you would have had two successes; and, moreover, these oral successes would have been still greater successes — we are taking language in any form as our criterion — had the teacher fully known and judiciously used the manual method as well as the oral.

The exclusive use of the oral method leads, generally speaking, to comparative failure, for the following, among other, reasons: — (1) It is a slow way of teaching English, the learning to speak the elements of sound taking months at least, and seldom being fully mastered for years. The " word method," by the way, starts at once with words without taking their component phonetic elements separately; but it has yet to be proved that any quicker progress is made by this means of teaching speech than by the other. (2) Lip-reading is, to the deaf, sign-reading with the disadvantage of being both microscopic and partially hidden. The deaf hear nothing, they only partly see tiny movements of the vocal organs. Finger-spelling, writing, sign- ing, are incomparably more visible, while 130 words a minute can be attained by finger-spelling, and read at that speed. (3) The signs — as they are to the deaf — made by the vocal organs are entirely arbitrary, and have not even a fraction of the redeeming feature of naturalness which oralists demand in ordinary gestures. (4) Circum- stances, such as light, position of the speaker, &c, must be favour- able for the lip-reading to approach certainty. (5) Styles of speech vary, and it is a constant experience that even pupils who compara- tively easily read their teacher's lips, to whose style of utterance they are accustomed, fail to read other people's lips. (6) There is a great similarity between certain sounds as seen on the lips, e.g. between t and d, f and v, p and b, s and z, k and g. Which is meant has usually to be guessed from the context, and this requires a certain amount of knowledge of language, which is the very thing that is needed to be imparted. (7) The deliberate avoidance by the teacher of the pupil's own language

— signs — as an aid to teaching him English. If a hear- ing boy does not understand the meaning of a French word he looks it up in the dictionary and finds its English equivalent. If the deaf boy does not understand a word in English, the simplest, quickest, best way to explain it is, in most cases, to sign it. (8) The distaste of the pupil for the method. This is common. (9) The mechanical nature of the method. There is nothing to rouse his interest nor to appeal to his imagination in it. (10) The temptation to the teacher to use very simple phrases, owing to the difficulty the pupil has in reading others from his lips. Consequently the pupil comparatively seldom learns advanced language.

Other means of educating the deaf in addition to the oral should have a fair trial in modern conditions for the same length of time that the oral method has been in operation. To consider pupils taught manually in oral schools fair criteria of what can be done by the manual method or combined system, when those pupils have con- fessedly been relegated to the manual class because of " dulness " (as in the case of the C divisions in Denmark and Dresden), is obvi- ously unfair. This division, moreover, assumes that the " pure " oral method is the best for the brightest pupils. The comparing of oral pupils privately taught by a tutor to themselves with manual pupils from an institution crippled and hampered by need of funds, where they had to take their chance in a class of twelve, and the com- parison of oral pupils of twelve years' standing with combined system pupils of four years', are also obviously unfair. Reference may be

made on this subject to Heidsiek's remarkable articles on the question of education, which appeared in the American Annals of the Deaf from April 1899 to January 1900.

The opinions of the deaf themselves as to the relative merits of the methods of teaching also demand particular attention. The ignoring of their expressed sentiments by those in authority is remarkable. In the case of school children it might

fairly be argued that they are too young to know what is good for them, but with the adult deaf who have had to learn the value of their education by bitter experi- ence in the battle of life it is otherwise. In Germany, the home of the " pure " oral method, 800 deaf petitioned the emperor against that method. In 1903 no fewer than 2671 of the adult deaf of Great Britain and Ireland who had passed through the schools signed a petition in favour of the combined system. The figures are re- markable, for children under sixteen were excluded , those who had not been educated in schools for the deaf were excluded, and the education of the deaf has only lately been made compulsory, while many thousands who live scattered about the country in isolation probably never even heard of the petition, and so could not sign it. In America an overwhelming majority favour the combined system, and it is in America that by far the best results of education are to be seen. At the World's Congress of the Deaf at St Louis in 1904 the combined system was upheld, as it was at Liege. From France, Germany, Norway and Sweden, Finland, Italy, Russia, everywhere in fact where they are educated, the deaf crowd upon us with ex- pressions of their emphatic conviction, repeated again and again, that the combined system is what meets their needs best and brings most happiness into their lives. The majority of deaf in every known country which is in favour of this means of education is so great that we venture to say that in no other section of the community could there be shown such an overwhelming preponderance of opinion on one side of any question which affects its well-being. In the case of the rare exceptions, the pupil has almost always been brought up in the strictest ignorance of the manual method, which he has been sedulously taught to regard as clumsy and objectionable.

The Blind Deaf. In the summary tables (p. 283) of the 1901 British census the following numbers are given of those suffering from other afflictions besides deafness: —

1. Blind and deaf and dumb

2. Blind and deaf ….

3. Blind, deaf and dumb and lunatic .

4. Blind, deaf and lunatic .

5. Deaf and dumb and lunatic

6. Deaf and lunatic ….

7. Blind, deaf and dumb and feeble-minded

8. Blind, deaf and feeble-minded

9. Deaf and dumb and feeble-minded . 10. Deaf and feeble-minded .

58

389

S

5

136

Si

5

8

221

100

In. addition to these, 2 are said to be blind, dumb and lunatic; 20 dumb and lunatic; 3 blind, dumb and feeble- minded, and 222 dumb and feeble-minded. These are certainly outside our province, which is the deaf. The ” dumbness ” in these four classes is aphasia, due to some brain defect.

Of those in the list, classes J, 8, 9 and 10 are (we are strongly of opinion) incorrectly described, being, as we think, composed of those who are simply

feeble-minded as well as, in classes 7 and 8, blind. Their so-called " deafness " is merely inability of the brain to notice what the ear does actually hear and to govern the vocal organs to produce articulate sound. Many of classes 9 and 10, however, may not be " feeble-minded " at all, but only rather dull pupils whom their teachers have failed to educate.

It is safe to say that in some instanoes in classes 3, 4, 5 and 6 the persons were only assumed to be deaf. Again, cases of deaf people who to all appearance could not fairly be called insane but who may have had violent temper or some slight eccentricity being relegated to an asylum have come to our notice. A good teacher might accomplish much with some of these described as lunatic in classes 5 and 6. Finally, classes 3 and 4 may have become lunatic owing to the loneliness and brooding inseparable to a great extent from such terrible afflictions as blindness and deafness combined. Probably the isolation became intolerable, and if only they had had some one who understood them to educate them their reason might have been saved.

We are most concerned with the first two classes, and in considering them have to take individual cases separately, as there is no regular institution for them in Great Britain.

Mr W. H. Illingworth, head master of the Blind School at Old Trafford, Manchester, tells how David Maclean, a blind and deaf boy, was taught, in the 1903 report of the conference of teachers of the deaf. The boy lost both sight and hearing, but not before six years of age, which was an advantage, and could still speak or whisper to some extent when admitted to school. His teacher began with kindergarten and attempts at proper voice-production. He gave the sound of " ah " and made David feel his larynx. Then he tickled the boy under his arms, and when he laughed made him feel his own

larynx, so that the boy should notice the similarity of the vibration. Then, acting on the theory that brain-waves are to some extent transmittable, Mr Illingworth procured a hearing boy as companion, and, ordering him to keep his mind fixed on the work and to place one hand on David's shoulder, made him repeat what was articulated. The blind-deaf boy's right hand was placed on Mr Illingworth's larynx and the left on the companion's lips. Thus the pupil felt the sound and the companion's imitation of it, and soon repro- duced it himself. From this syllables and words were formed by degrees. The pupil knew the forms of some letters of the alphabet in the Roman type before he lost sight and hearing, and the connexion between them and the Braille characters and manual alphabet was the next step achieved. This, and all the steps, were aided to a great extent by the hearing and seeing boy companion's sympathetic influence and concentration of mind, in Mr Illingworth's opinion. After this stage his progress was comparatively quick and easy; he read from easy books in Braille, and people spelled to him in the ordinary way by forming the letters with their right hand on his left.

From Mr B. H. Payne of Swansea comes the following account of how four blind-deaf pupils were taught:—

" We have received four pupils who were deaf-njute and blind, one of them being also without the sense of smell. One was born deaf, the others having lost hearing in childhood. There was no essential difference between the methods employed in their education and those of ' sighted ' deaf children. Free-arm writing of ordinary script was taught on the blackboard, the teacher guiding the pupil's hand, or another pupil guiding it over the teacher's pencilling. The script alphabet was cut on a slate, and the pupil's pencil made to run in the grooves. The one-hand alphabet, used with the left hand, was employed to distinguish the letters so written. The script alphabet was also formed in wire for him. The object was to enable the pupil when he had gained language to write to friends and others who were unacquainted with Braille, but the latter notation

was taught to enable the pupil to profit by the literature provided for the blind. Both one- and two-hand alphabets were taught, the teacher forming the letters with one of his own hands upon the pupil's hand. The name of the object presented to the pupil was spelled and written repeatedly until he had memorized it. Qualities were taught by comparison, and actions by performance. The words ' Come with me' were spelled before he was guided to any place, and other sentences were spelled as they would be spoken to a ' hearing ' child in appropriate associations. The blind pupil followed with his hands the signs made by junior pupils who were unacquainted with language, and in this way readily learned to sign himself, the art being of advantage in stimulating and in forming the mind, and explaining language to him. One of the pupils was confirmed, and in preparation for the rite over 800 questions were put to him by finger-spelling. His education was continued in Braille. The deaf-born boy developed a fair voice, and could imitate sounds by placing his hand on a speaker's mouth. Two of them had a keen sense of humour, and would slyly move the finger to the muscles of their companion's face to feel the smile with which a bit of pleasantry was responded to. In connexion with the pupil who was confirmed, the vicar who ex- amined him declared that none of his questions had been answered better even by candidates possessed of all their faculties than they v/ere by this blind-deaf boy."

*Mr W. M. Stone, principal of the Royal Blind School at West Craigmillar, Edinburgh, gives this very interesting information**

" We have five blind-deaf children at this institution, and all are wonderfully clever and intelligent. I n all cases the children possessed hearing for a time and had some knowledge — very slight in some cases — of language. The method of teaching is, first to teach them the names of common objects on their fingers. A well-known object is put in the child's hand and then the word is spelled on the hand, — the child's hand of course. The child

learns to associate these signs — he does not know ;hev are letters — with the object, and so he learns a name. Other names are then given and similar names are associ- ated together, and by noticing-the difference in the names the child

gradually grasps the idea of an alphabet. For instance, if he learns the words cat, bat and mat, he will quickly distinguish that the words are alike except in their initial letters. When in this way language has been acquired he is taught the Braille system of reading for the blind and his progress is now very rapid. This method may appear very complicated and difficult, but in reality it is not so. There are no institutions in Great Britain specially for the blind-deaf, nor are there any in America. I do not know of any on the continent. Our own blind children here are receiving the same education as our other children, and in some ways are more advanced than seeing and hearing children of their own ages. They not only read, write and do arithmetic, but they do typewriting and much manual work."

Mr Addison mentions two deaf and blind pupils who were taught by the late Mr Paterson of Manchester, and a third in the same school later on. Another was taught in the asylum for the blind in Glasgow, though she only lost hearing and became deaf at ten.

Mr William Wade has written a monograph on the blind-deaf of America, in the preface to which he points out, rightly, that the education of the blind-deaf is not such a stupendous task as people imagine it to be.

" It may not be amiss," he says, " to state the methods of teach- ing the first steps to a deaf-blind pupil, that the public may see how exceedingly simple the fundamental principles are, and it should be remembered that those principles are exactly the same in the cases of the deaf and of the deaf-blind, the only difference being in the application — the deaf see, the deaf-blind feel. Some familiar, tangible object — a doll, a cup, or what not — is

given to the pupil, and at the same time the name of the object is spelled into its hand by the manual alphabet." (The one-hand alphabet is in vogue in America.) " By patient persistence, the pupil comes to recognize the manual spelling as a name for a familiar object, when the next step is taken — associating familiar acts with the corresponding manual spelling. A continuation of this simple process gradually leads the pupils to the comprehension of language as a means for communication of thoughts." Mr Wade is right. Given a sympa- thetic, resourceful teacher with strong individuality, common-sense, patience, and the necessary amount of time, anything and every- thing in the way of teaching them is not only possible but certain to be achieved. Language, — give the deaf and the blind-deaf a working command of that and everything else is easy.

In the New York Institution for the Deaf ten blind-deaf pupils were educated, up to the year 1 90 1 . Nearly all of these lost one or both senses after they had been able to acquire some knowledge with their aid. In the Perkins Institution for the Blind, Boston, five were taught. It was here that Laura Bridgman was edu- cated by Dr Samuel G. Howe (g.v.); all honour is due to him for being the pioneer in attempting to teach this class of the community, for she was the first blind-deaf person to be taught. Many other schools for the deaf or blind have admitted one or two pupils suffering from both afflictions. In all, seventy cases are mentioned by Mr Wade of those who are quite blind and deaf, and others of people who are partially so. The most interesting, of course, of all these is Helen Keller, if we except Laura Bridgman, in whose case the initial attempt to teach the blind-deaf was made. Helen Keller was taught primarily by finger-spelling into her hand, and signing (which she, of course, felt with her hands) where necessary. Her first teacher was Miss Sullivan. The pupil " acquired language by practice and habit rather than by study of rules and definitions." Finger- spelling and books were the two great means of educating her

at all times. After her grasp of language had been brought to a high standard, Miss Fuller gave her her first lessons in speech, and Miss Sullivan continued them, the method being that of making the pupil feel the vocal organs of the teacher. She learnt to speak well, and to tell (with some assistance from finger-spelling) what some people say by feeling their mouth. Her literary style became excellent; her studies included French, German, Latin, Greek, arithmetic, algebra, geometry, history, ancient and modern, and poetry and literature of every description. Of course she had many tutors, but Miss Sullivan was ” eyes and ears ” at all times, by acting as interpreter, and this patient teacher had the satisfaction of seeing her pupil pass the entrance examination of Harvard University. To all time the success attained in educating Helen Keller will be a monu- ment of what can be accomplished in the most favourable conditions. (A. H. P.) ,

DEAK, FRANCIS (Ferencz), (1803–1876), Hungarian states- man, was born at Sojtor in the county of Zala, on the 17 th of October 1803. He came of an ancient and distinguished noble family, and was educated for the law at Nagy-Kanizsa,, Papa, Raab and Pest, and practised first as an advocate and ultimately as a notary. His first case was the defence of a notorious robber and murderer. His reputation in his own county was quickly established, and when in 1833 his elder brother Antal, also a man of extraordinary force of character, was obliged by ill-health to relinquish his seat in the Hungarian parliament, the electors chose Ferencz in his stead. He took an active part in the pro- ceedings of the diet at Pressburg and made the acquaintance of Odon Bebthy and the other Liberal leaders. No man owed less to external advantages. He was to all appearance a simple country squire. His true greatness was never exhibited in debate. It was in friendly talk, generally with a pipe in his mouth and an anecdote

on the tip of his tongue, that he exercised his extraordinary influence over his fellows. Convinced from the first of his disinterestedness and sincerity, and impressed by his penetrating shrewdness and his instinctive faculty of always seizing the main point and sticking to it, his hearers soon felt an absolute confidence in the deputy from Zala county. Perhaps there is not another instance in history in which a man who was neither a soldier, nor a diplomatist, nor a writer, who appealed to no passion but patriotism, and who avoided power with almost oriental indolence instead of seeking it, became, in the course of a long life, the leader of a great party by sheer force of intellect and moral superiority.

During the diet of 1830–1840 Deak succeeded in bringing about an understanding between a reactionary government, sadly in want of money, and a Liberal opposition determined that the nation should have its political privileges respected. ” Let us put all jealousy on one side and allow him the pre-eminence,” wrote Szechenyi of Deak (April 30th, 1840). Deak would not go to the diet of 1843–1844, though he had received a mandate, because his election was the occasion of bloodshed in the struggle between the Clericals who would have ousted him and the Liberals who brought him in. In 1848, however, he accepted the post of minister of justice offered to him by Louis Batthyany. He never ceased to urge moderation in those stormy days, hold- ing rather with Eotvos and Batthyany than with Kossuth, and he went more than once to Vienna to endeavour to effect a compromise between the Radicals and the court. But when the ill-will of the Vienna government became patent, and the senti- ments of the king doubtful, he resigned together with Batthyany, but without ceasing to be a member of the diet. He it was who drew up the resolution of the Lower House in reply to the rescript of the Austrian ministry demanding the repeal of the Hungarian constitution. It was he who urged the Hungarian cabinet not to depart a hair’s-breadth from their legitimate position. He was one of the parliamentary

deputation which waited in vain upon Prince Windischgratz in his camp. (See Hungary: History.) He then retired to his estate at Kehida. After the war of in- dependence he was tried by court-martial, but acquitted.

During the years of repression he lived in complete retirement. He rejected Schmerling's proposal that he should take part in the project of judicial reform, but on the other hand he held completely aloof from the widespread, secret revolutionary move- ments. After 1854 he spent the greater part of his time at Pest, and his little room at the " Queen of England " inn became the meeting-place for those patriots who in those dark days looked to the wisdom of Deak for guidance. He used every opportunity of stimulating the moral strength of the nation and keeping its hopes alive. He invited the nation to contribute to the support of the orphans of Vbrosmarty when that great poet died. He drew up the petition of the academy to the government, in which he defended the maintenance of this asylum of the national language against Austrian intervention. He trusted that, as had so often happened in the course of Hungarian history, the weak- ness and blindness of the court would .help Hungary back to her constitutional rights. Armed resistance he considered dangerous, but he was an immutable defender of the continuity of the

Hungarian constitution on the basis of the reforms of 1848. His principles alienated him from the Kossuth faction, which looked for salvation to a second war with Austria, engineered from abroad; but he was equally opposed to the attitude of resignation taken up by the followers of Szechenyi, who, accord- ing to Deak, always regarded the world from a purely provincial point of view.

The war of 1859 convinced the Austrian government, at last, of the necessity of a reconciliation with Hungary; but the ensuing negotiations were conducted not through Deak, but through the Magyar Conservatives. In i860 Deak rejected the October diploma (see Hungary: .History), which was simply a

cast-back to the Maria Theresa system of 1747; but, at the request of the government, he went to Vienna to set forth the national demands. On this occasion he insisted on the re-establishment of the constitution in its integrity as a sine qua non. Meanwhile, it became more and more evident that the Conservative party had no standing in the country. The majority of the deputies returned to the diet of 1861 were in favour of asserting their rights by a resolution of the House, instead of petitioning for them by an address to the crown; hence arose the two parties of the Addressers and the Resolu- tioners. The Patent of the 20th of February 1861 increased the uneasiness and suspicion of the nation; but Deak, now one of the deputies for Pest, was in favour of an address rather than of a resolution, and his great speech on the subject (May 13th, 1861) converted the majority hostile to an address into a majority for it. The object of the Addressers was to make the responsibility for a rupture rest on the Austrian government. Nevertheless, the court found the address so voted inadmissible; whereupon, on Deak's motion, the Hungarian diet drew up a second address vigorously defending the rights of the nation, and solemnly protesting against the usurpations of the Austrian government. The speech which Deak made on this occasion was his finest effort. Hence- forth all Europe identified his name with the cause of Hungary. The Magyar Conservatives hereupon entered into negotiations with Deak, and the' Austrian government, more than ever convinced of the necessity of a reconciliation, was ready to take the first step, if Hungary would take the second and third. Deak now proposed that the sovereign himself should break away from counsellors who had sought to oppress Hungary, and should restore the constitution as a personal act. The worthy response to this loyal invitation was the dismissal of the Schmerling administration, the suspension of the February constitution and the summoning of the coronation diet. Of that diet Deak was the indispensable leader. Under his direction the Addressers and the ResolutioneTS coalesced, and he was entrusted with the difficult and delicate

negotiations with the crown, which aimed at effecting a compromise between the Pragmatic Sanction of 1719, which established the indivisibility of the Habsburg monarchy, and the March decrees of 1848. The committee of which he was president had completed its work, when the war of 1866 broke out and all again became uncertain.

After Koniggratz the extreme parties in Hungary hoped to extort still more favourable terms from the emperor; but Deak remained true to himself and to the constitutional principle. On the 1 8th of July he went to Vienna, to urge the necessity of forming a responsible Magyar ministry without delay. He offered the post of premier to Count Julius Andrassy, but would not himself take any part in the administration. ■ The diet was resummoned on the 17th of November 1866 and, chiefly through the efforts of Deak, the responsible ministry was formed (February 17th, 1867). There was still one fierce parliamentary struggle, in which Deak defended the Composition (Ausgleich) of 1867, both against the Kossuthites and against the Left-centre, which had detached itself from his own party under the leadership of Kalman Tisza (q.v.). He, a simple citizen, from pure patriotism, thus mediated between the crown and the people, as the Hungarian palatines were wont to do in years gone by, and it was the wish of the diet that Deak should exercise the functions of a palatine at the solemn ceremony of the coronation. This honour he refused, as he had refused every other reward and distinction.

" It was beyond the king's power to give him anything but a clasp of the hand." His real recompense was the assurance of the prosperity and the tranquillity of his country in the future, and the reconciliation of the nation and its sovereign. The consciousness of these great services even reconciled him to the loss of much of his popularity; for there can be no doubt that a large

part of the Hungarian nation regarded the Composition of 1867 as a sort of surrender and blamed Deak as the author of it. The Composition was the culminating point of Deak's political activity; but as a party-leader he still exercised considerable influence. He died at midnight of the 28th-2oth of July 1876, after long and painful sufferings. His funeral was celebrated with royal pomp on the 3rd of February, and representatives from every part of Hungary followed the " Sage " to the grave. A mausoleum was erected by national subscription, and in 1887 a statue, overlooking the Danube, was erected to his memory.

See Speeches (Hung.) ed. by Mano Konyi (Budapest, 1882); Z. Ferenczi, Life of Deak (Hung., Budapest, 1894); Memorials of Ferencz Deak (Hung., Budapest, 1889-1890) ; Ferencz Pulszky, Charakterskizze (Leipzig, 1876). (R. N. B.)

DEAL, a market town, seaport and municipal borough in the St Augustine's parliamentary division of Kent, England, 8 m. N.E. by N. of Dover on the South-Eastern & Chatham railway. Pop. (1901) 10,581. It consists of three divisions— Lower Deal, on the coast; Middle Deal; and, about a mile inland, though formerly on the coast, Upper Deal, which is the oldest part. Though frequented as a seaside resort, the town derives its importance mainly from its vicinity to the Downs, a fine anchorage, between the shore and the Goodwin Sands, about 8 m. long and 6 m. wide, in which large fleets of windbound vessels may he in safety. The trade consequently consists largely in the supply of provisions and naval stores, which are conveyed to the ships in need of them by " hovellers," as the boatmen are called all along the Kentish coast; the name is probably a corruption of hobeler, anciently applied to light-horsemen from the hobby or small horse which they rode. The Deal hovellers and pilots are famous for their skill. Boat-building and a few other industries are carried on. Among buildings the most remarkable are St Leonard's church in Upper Deal, which dates from the Norman period; the Baptist chapel in Lower Deal, founded by Captain Taverner,

governor of Deal Castle, in 1663; the military and naval hospital; and the barracks, founded in 1795. The site of the old navy yard is occupied by villas; and the esplanade, nearly four miles long, is provided with a promenade pier. The golf-links is well known. At the south end of the town is Deal Castle, erected by Henry VIII. in 1539, together with the castles of Sandown, Walmer and Sandgate. They were built alike, and consisted of a central keep surrounded by four lunettes. Sandown Castle, which stood about a mile to the east of Deal Castle, was of interest as the prison in which Colonel Hutchinson, the Puritan soldier, was confined, and is said to have died, September 1664. It was removed on becoming endangered by encroachments of the sea. The " captain " of Deal Castle is appointed by the lord warden of the Cinque Ports. The town is governed by a mayor, 6 aldermen and 18 councillors. Area, mi acres.

Deal is one of the possible sites of the landing-place of Julius Caesar in Britain. Later in the period of Roman occupation the site was inhabited, but apparently was not a port. In the Domesday Survey, Deal (Dola, Dale, Dele) is mentioned among the possessions of the canons of St Martin, Dover, as part of the hundreds of Bewsborough and Cornilo; it seems, however, from early times to have been within the liberty of the Cinque Ports as a member of Sandwich, but was not continuously reckoned as a member until Henry VI., on the occasion of a dispute as to its assessment, finally annexed it to their jurisdiction.

In the time of Henry VIII. Deal was merely a fishing village standing half-a-mile from the sea, but the growth of the English navy and the increase of trade brought men-of-war and merchant ships in increased numbers to the Downs. Deal began to grow in importance, and Lower or New Deal was built along the shore. The yrosperity of the town has ever since depended almost

entirely on its shipping trade. In 1699 the inhabitants petitioned for incorporation, since

previously the town had been under the jurisdiction of Sandwich and governed by a deputy appointed by the mayor of that town; William III. by his charter incorpor- ated the town under the title of mayor, jurats and commonalty of Deal, and he also granted a market to be held on Tuesday and Saturday, and fairs on the 25th and 26th of March, and on the 30th of September and 1st of October, with a court of Pie Powder. The Cinque Ports were first represented in the parliament of 1265; the two members returned by Sandwich represented Sandwich, Deal and Walmer, until they were disenfranchized by the act of 1885.

DEAL. (1) (A common Teutonic word for a part or portion, cf. Ger. Teil, and the Eng. variant ” dole “), a division or part, obsolete except in such phrases as ” a great deal ” or ” a good deal,” where it equals quantity or lot. From the verb ‘<■ to deal," meaning primarily to divide into parts, come such uses as for the giving out of cards to the players in a game, or for a business transaction. (2) (Also a Teutonic word, meaning a plank or board, cf. Ger. Diele, Dutch deel), strictly a term in carpentry and joinery for a sawn plank, usually of pine or fir, 9 in. wide and 2 to 4j in. thick. (See Joinery.) The word is also used more loosely of the timber from which such deals are cut, thus " white deal " is used of the wood of the Norway spruce, and " red deal " of the Scotch pine.

DEAN (Lat; decanus, derived from the Gr. bena, ten), the style of a certain functionary, primarily ecclesiastical. Whether the term was first used among the secular clergy to signify the priest who had a charge of inspection and superintendence over two parishes, or among the regular clergy to signify the monk who in a monastery had authority over ten other monks, appears doubtful. ” Decurius ” may be found in early writers used to signify the same thing as ” decanus,” which shows that the word and the idea signified by it were originally borrowed from the old Roman military system.

The earliest mention which occurs of an ” archipresbyter ” seems to be in the fourth epistle

of St Jerome to Rusticus, in which he says that a cathedral church should possess one bishop, one archipresbyter and one archdeacon. Libera tus also (Breviar. c. xiv.) speaks of the office Of archipresbyter in a manner which, as J. Bingham says, enables one to understand what the nature of his duties and position was. And he thinks that those are- right who hold that the archipresbyters were the same as the deans of English cathedral churches. E. Stillingfleet (Irenic. part ii. c. 7) says of the archipresbyters that " the memory of them is preserved still in cathedral churches, in the chapters there, where the: dean was nothing else but the archipresbyter; and both dean and prebendaries were to be assistant to the bishop in the regulating the church affairs belonging to the city, while the churches were contained therein." Bingham, however, following Liberatus, describes the office of the archipresbyter to have been next to that of the bishop, the head of the presbyteral college, and the functions to have consisted in administering all matters pertaining to the church in the absence of the bishop. But this does not describe accurately the office of dean in an English cathedral church. The dean is indeed second to the bishop in rank and dignity, and he is the head of the presbyteral college or chapter; but his functions in no wise consist in administering any affairs in the absence of the bishop. There may be some matters connected with the ordering of the internal arrangements of cathedral. churches, respecting which it may be considered a doubtful point whether the authority of the bishop or that of the dean is supreme. But the consideration of any such question leads at once to the due theoretical distinction between the two. With regard to matters spiritual, properly and strictly so called, the bishop is supreme in the cathedral as far as — and no further than — he is supreme in his diocese generally. With regard to matters material and temporal, as concerning the fabric of the cathedral, the arrangement and conduct of the services, and the management of the property of the chapter, &c, the dean (not excluding the due authority of the other

members of the chapter, but speaking with reference to the bishop) is

supreme. And the cases in which a doubt might arise are those in which the material arrangements of the fabric or of the services may be thought to involve doctrinal considerations.

The Roman Catholic writers on the subject say that there are two sorts of deans in the church — the deans of cathedral churches, and the rural deans — as has continued to be the case in the English Church. And the probability would seem to be that the former were the successors and representatives of the monastic decurions, the latter of the inspectors of " ten " parishes in the primitive secular church. It is thought by some that the rural dean is the lineal successor of the chorepiscopus, who in the early church was the assistant of the bishop, discharging most, if not all, episcopal functions in the rural districts of the diocese. But upon the whole the probability is otherwise. W. Beveridge, W. Cave, Bingham and Basnage all hold that the chorepiscopi were true bishops, though Romanist theologians for the most part have maintained that they were simple priests. But if the chorepis- copus has any representative in the church of the present day, it seems more likely that the archdeacon is such rather than the dean.

The ordinary use of the term dean, as regards secular bodies of persons, would lead to the belief that the oldest member of a chapter had, as a matter of right, or at least of usage, become the dean thereof. But Bingham (lib. ii. chap. 18) very con- clusively shows that such was at no time the case; as is also further indicated by the maxim to the effect that the dean must be selected from the body of the chapter — " Unus de gremio tantum potest eligi et promoveri ad decanatus dignitatem." The duties of the dean in a Roman Catholic cathedral are

to preside over the chapter, to declare the decisions to which the chapter may have in its debates arrived by plurality of voices, to exercise inspection over the choir, over the conduct of the capitular body, and over the discipline and regulations of the church; and to celebrate divine service on occasion of the greater festivals of the church in the absence or inability of the bishop. With the exception of the last clause the same statement may be made as to the duties and functions of the deans of Church of England cathedral churches.

Deans had also a place in the judicial system of the Lombard kings in the 8th, 9th and 10th centuries. But the office indicated by that term, so used, seems to have been a very subordinate one; and the name was in all probability adopted with immediate reference to the etymological meaning of the word, — a person having authority over ten (in this case apparently) families. L. A. Muratori, in his Italian Antiquities, speaks of the resem- blance between the saltarii or sylvani and the decani, and shows that the former had authority in the rural districts, and the latter in towns, or at least in places where the population was sufficiently close for them to have authority over ten families. Nevertheless, a document cited by Muratori from the archives of the canons of Modena, and dated in the year 813, recites the names of several " deaneries" (decania), and thus shows that the authority of the dean extended over a certain circumscription of territory.

In the case of the " dean of the sacred college," the connexion between the application of the term and the etymology of it is not so evident as in the foregoing instances of its use ; nor is it by any means clear how and when the idea of seniority was first attached to the word. This office is held by the oldest cardinal — i.e. he who has been longest in the enjoyment of the purple, not he who is oldest in years,— who is usually, but not necessarily or always, the bishop of Ostia and Velletri. Perhaps the use of the word " dean," as signifying simply the eldest member of any corporation or body of men,

may have been first adopted from its application to that high dignitary. The dean of the sacred college is in the ecclesiastical hierarchy second to the pope alone. His privileges and special functions are very many; a compendious account of the principal of them may be found in the work of G. Moroni, vol. xix. p. 168.

There are four sorts of deans of whom the law of England takes notice. (1) The dean and chapter are a council subordinate to the bishop, assistant to him in matters spiritual relating to religion, vii. 29

and in matters temporal relating to the temporalities of the bishopric. The dean and chapter are a corporation, and the dean himself is a corporation sole. Deans are said to be either of the old or of the new foundation — the latter being those created and regulated after the dissolution of the monasteries by Henry VIII. The deans of the old foundation before the Ecclesiastical Commissioners Act 1841 were elected by the chapter on the king's conge d'elire; and the deans of the new foundation (and, since the act, of the old foundation also) are appointed by the king's letters patent. It was at one time held that a layman might be dean; but since 1662 priest's orders are a necessary qualification. Deaneries are sinecures in the old sense, i.e. they are without cure of souls. The chapter formerly consisted of canons and prebendaries, the dean being the head and an integral part of the corporation. By the Ecclesiastical Commissioners Act 184,1, it is enacted that " all the members of the chapter except the dean, in every collegiate and cathedral church in England, and in the cathedral churches of St David and Llandaff, shall be styled canons." By the same act the dean is required to be in residence eight months, and the canons three months, in every year. The bishop is visitor of the dean and chapter. (2) A dean of peculiars is the chief of certain peculiar churches or chapels. He " hath no chapter, yet is presentative, and hath cure of souls; he hath a peculiar, and is not subject to the visitation of the bishop of the diocese." The only instances of such deaneries are Battle (Sussex), Bocking (Essex)

and Stamford (Rutland). The deans of Jersey and Guernsey have similar status. (3) The third dean " hath no cure of souls, but hath a court and a peculiar, in which he holdeth plea and jurisdiction of all such ecclesiastical matters as come within his peculiar. Such is the dean of the arches, who is the judge of the court of the arches, the chief court and con- sistory of the archbishop of Canterbury, so called of Bow Church, where this court was ever wont to be held." (See Arches, Court of.) The parish of Bow and twelve others were within the peculiar jurisdiction of the archbishop in spiritual causes, and exempted out of the bishop of London's jurisdiction. They were in 1845 made part of the diocese of London. (4) Rural deans are clergymen whose duty is described as being " to execute the bishop's processes and to inspect the lives and manners of the clergy and people within their jurisdiction." (See Phillimore's Ecclesiastical Law.)

In the colleges of the English universities one of the fellows usually holds the office of " dean," and is specially charged with the discipline, as distinguished from the teaching functions of the tutors. In some universities the head of a faculty is called " dean," and in each of these cases the word is used in a non-ecclesiastical and purely titular sense.

DEAN, FOREST OF, a district in the west of Gloucestershire, England, between the Severn and the Wye. It extends north- ward in an oval form from the junction of these rivers, for a distance of 20 m., with an extreme breadth of 10 m., and still retains its true forest character. The surface is agreeably undu- lating, its elevation ranging from 120 to nearly 1000 ft., and its sandy peat soil renders it most suitable for the growth of timber, which is the cause of its having been a royal forest from time immemorial. It is recorded that the commanders of the Armada had orders not to leave in it a tree standing. In the reign of Charles I." the forest contained 105,537 trees, and, straitened for money, the king granted it to Sir John Wyntour for £10,000,

and a fee farm rent of £2000. The grant was cancelled by Cromwell; but at the Restoration only 30,000 trees were left, and Wyntour, the Royalist commander, having got another grant, destroyed all but 200 trees fit for navy timber. In 1680 an act was passed to enclose 1 1 ,000 acres and plant with oak and beech for supply of the dockyards; and the present forest, though not containing, very many gigantic oaks, has six ” walks ” covered with timber in various stages of growth.

The forest is locally governed by two crown-appointed deputy gavellers to superintend the woods and mines, and four verderers elected by the freeholders, whose office, since the extermination of the deer in 1850, is almost purely honorary. From time immemorial all persons born in the hundred of St Briavel’s, who

have worked a year and a day in a coal mine, become ” free miners,” and may work coal in any part of the forest not previ- ously occupied. The forest laws were administered at the Speech- House, a building of the 17th century in the heart of the forest, where the verderers’ court is still held. The district contains coal and iron mines, and quarries of building-stone, which fortun- ately hardly minimize its natural beauty. Near Coleford and Westbury pit workings of the Roman period have been discovered, and the Romans drew large supplies of iron from this district. The scenery is especially fine in the high ground bordering the Wye (.), opposite to Symond’s Yat above Monmouth, and Tintern above Chepstow. St Briavel’s Castle, above Tintern, was the headquarters of the forest officials from an early date and was frequented by King John. It is a moated castle, of which the north-west front remains, standing in a magnificent position high above the Wye.

See H. G. Nicholls, Forest of Dean (London, 1858).

DEANE, RICHARD (1610–1653), British general-at-sea, major- general and regicide, was a younger son of Edward Deane of Temple Guiting or Guyting in Gloucestershire, where he was born, his baptism taking place on the 8th of July 1610. His family seems to have been strongly Puritan and was related to many of those Buckinghamshire families who were prominent in the parliamentary party. His uncle or great-uncle was Sir Richard Deane, lord mayor of London, 1628–1629. Of Deane's early life nothing is accurately known, but he seems to have had some sea training, possibly on a ship-of-war. At the outbreak of the Civil War he joined the parliamentary army as a volunteer in the artillery, a branch of the service with which he was constantly and honourably associated. In 1644 he held a command in the artillery under Essex in Cornwall and took part in the surrender after Lostwithiel. Essex {Letter to Sir Philip Stapleton, Rush- worth Collection) calls him " an honest, judicious and stout man," an estimate of Deane borne out by Clarendon's " bold and excellent officer " (book xiv. cap. 27), and he was one of the few officers concerned in the surrender who were retained at the remodelling of the army. Appointed comptroller of the ordnance, he commanded the artillery at Naseby and during Fairfax's campaign in the west of England in 1645. In 1647 he was promoted colonel and given a regiment. In May of that year Cromwell was made lord-general of the forces in Ireland by the parliament, and Deane, as a supporter of Cromwell who had to be reckoned with, was appointed his lieutenant of artillery. Cromwell refused to be thus put out of the way, and Deane followed his example. When the war broke out afresh in 1648 Deane went with Cromwell to Wales. As brigadier-general his leading of the right wing at Preston contributed greatly to the victory. On the entry of the army into London in 1648, Deane superintended the seizure of treasure at the Guildhall and Weavers' Hall the day after Pride " purged " the House of Commons, and accompanied Cromwell to the consultations as to the " settlement of the Kingdom " with Lenthall and Sir Thomas Widdrington, the keeper of the great seal. He

is rightly called by Sir J. K. Laugh ton (in the Did. of Nat. Biog.) Cromwell's " trusted partisan," a character which he maintained in the active and responsible part taken by him in the events which led up to the trial and execution of the king. He was one of the commissioners for the trial, and a member of the committee which 'examined the witnesses. He signed the death warrant.

Deane's capacities and activities were now required for the navy. In 1649 the office of lord high admiral was put into commission. The first commissioners were Edward Popham, Robert Blake and Deane, with the title of generals-at-sea. His command at sea was interrupted in 1651, when as major- general he was brought back to the army and took part in the battle of Worcester. Later he was made president of the commission for the settlement of Scotland, with supreme com- mand of the military and naval forces. At the end of 1652 Deane returned to his command as general-at-sea, where Monck had succeeded Popham, who had died in 1651. In 1653 Deane was with Blake in command at the battle off Portland and later took the most prominent and active part in the refitting

of the fleet on the reorganization of the naval service. At the outset of the three days' battle off the North Foreland, the 1st, 2nd and 3rd of June 1653, Deane was killed. His body lay in state at Greenwich and after a public funeral was buried in Henry VII. 's chapel at Westminster Abbey, to be disinterred at the Restoration. See J. Bathurst Deane, The Life of Richard Deane (1870).

DEANE, SILAS (1737-1789), American diplomat, was born in Groton, Connecticut, on the 24th of December 1737. He gradu- ated at Yale in 1758 and in 1761 was admitted to the bar, but instead of practising became a merchant at Wethersfield, Conn. He took an active part in the movements in Connecticut preceding the War of Independence, and from 1774 to 1776 was a delegate from Connecticut to the Continental Congress. Early in 1776 he was sent to France by Congress, in a semi-official capacity, as

a secret agent to induce the French government to lend its financial aid to the colonies. Subsequently he became, with Benjamin Franklin and Arthur Lee, one of the regularly accredited commissioners to France from Congress. On arriving in Paris, Deane at once opened negotiations with Vergennes and Beaumarchais, securing through the latter the shipment of many vessel loads of arms and munitions of war to America. He also enlisted the services of a number of Continental soldiers of fortune, among whom were Lafayette, Baron Johann De Kalb and Thomas Conway. His carelessness in keeping account of his receipts and expenditures, and the differences between himself and Arthur Lee regarding the contracts with Beaumarchais, eventually led, in November 1777, to his recall to face charges, of which Lee's complaints formed the basis. Before returning to America, however, he signed on the 6th of February 1778 the treaties of amity and commerce and of alliance which he and the other commissioners had successfully negotiated. In America he was defended by John Jay and John Adams, and after stating his case to Congress was allowed to return to Paris (1 781) to settle his affairs. Differences with various French officials led to his retirement to Holland, where he remained until after the treaty of peace had been signed, when he settled in England. The publication of some " intercepted " letters in Rivington's Royal Gazette in New York (1781), in which Deane declared his belief that the struggle for independence was hopeless and counselled a return to British allegiance, aroused such animosity against him in America that for some years he remained in England. He died on shipboard in Deal harbour, England, on the 23rd of September 1789 after having embarked for America on a Boston packet. No evidence of his dishonesty was ever discovered, and Congress recognized the validity of his claims by voting $37,000 to his heirs in 1842. He published his defence in An Address to the Free and Independent Citizens of the United States of North America (Hartford, Conn., and London, 1784).

The Correspondence of Silas Deane was published in

the Connecticut Historical Society's Collections, vol. ii. ; and The Deane Papers, in 5 vols., in the New York Historical Society's Collections (1887–1890). See also Winsor's Narrative and Critical History, vol. vii. chap, i., and Wharton's Revolutionary Diplomatic Correspondence of the United States (6 vols., Washington, 1889).

DEATH, the permanent cessation of the vital functions in the bodies of animals and plants, the end of life or act of dying. The word is the English representative of the substantive common to Teutonic languages, as " dead " is of the adjective, and " die " of the verb; the ultimate origin is the pre-Teu tonic verbal stem dau-; cf. Ger Tod, Dutch dood, Swed. and Dan. dod.

For the scientific aspects of the processes involved in life and its cessation see Biology, Physiology, Pathology, and allied articles; and for the consideration of the prolongation of life see Longevity. Here it is only necessary to deal with the more primitive views of death and with certain legal aspects.

Ethnology. — To the savage, death from natural causes is inexplicable. At all times and in all lands, if he reflects upon death at all, he fails to understand it as a natural phenomenon; nor in its presence is he awed or curious. Man in a primitive state has for his dead an almost animal indifference. The researches of archaeologists prove that Quaternary Man cared little what became of his fellow-creature's body. And this lack*

of interest is found to-day as a general characteristic of savages. The Goajiros of Venezuela bury their dead, they confess, simply to get rid of them. The Galibis of Guiana, when asked the meaning of their curious funeral ceremony, which consists in dancing on the grave, replied that they did it to

stamp down the earth. Fuegians, Bushmen, Veddahs, show the same lack of concern and interest in the memory of the dead. Even the Eskimos, conspicuous as they are for their intelligence and sociability, save themselves the trouble of caring for their sick and old by walling them up and leaving them to die in a lonely hut; the Chukches stone or strangle them to death; some Indian tribes give them over to tigers, and the Battas of Sumatra eat them. This indifference is not dictated by any realization that death means annihilation of the personality. The savage conception of a future state is one that involves no real break in the continuity of life as he leads it. If a man dies without being wounded he is considered to be the victim of the sorcerers and the evil spirits with which they consort. Throughout Africa the death of anyone is ascribed to the magicians of some hostile tribe or to the malicious act of a neighbour. A culprit is easily discovered either by an appeal to a local diviner or in torturing some one into confession. In Australia it is the same. Mr Andrew Lang says that " whenever a native dies, no matter how evident it may be that death has been the result of natural causes, it is at once set down that the defunct was bewitched." The Bechuanas and all Kaffir tribes believe that death, even at an advanced age, if not from hunger or violence, is due to witchcraft, and blood is required to expiate or avenge it. Similar beliefs are found among the Papuans, and among the Indians of both Americas. The history of witchcraft in Europe and its attendant horrors, so vividly painted in Lecky's Rise of Rationalism, are but echoes of this universal refusal of savage man to accept death as the natural end of life. Even to-day the ignorant peasantry of many European countries, Russia, Galicia and elsewhere, believe that all disease is the work of demons, and that medicinal herbs owe their curative properties to their being the materialized forms of benevolent spirits.

This animistic tendency is a marked characteristic of primitive Man in every land. The savage explains the processes of inani- mate nature by assuming that

living beings or spirits, possessed of capacities similar to his own, are within the inanimate object. The growth of a tree, the spark struck from a flint, the devastat- ing floods of a river, mean to him the natural actions of beings within the tree, stone or water. And thus too he explains to himself the phenomena of human life, believing that each man has within him a mannikin or animal which dictates his actions in life. This miniature man is the savage's conception of the soul; sleep and trance being regarded as the temporary, death as the permanent, absence of the soul. Each individual is thus deemed to have a dual existence. This " subliminal " self (in modern terminology) has many forms. The Hurons thought that it possessed head, body, arms and legs, in fact that it was an exact miniature of a man. The Nootkas of British Columbia regard it as a tiny man, living in the crown of the head. So long as it stands erect, its possessor is well, but if it falls from its position the misfortunes of ill-health and madness at once assail him. The ancient Egyptian believed in the soul or " double." The inhabitants of Nias, an island to the west of Sumatra, have the strange belief that to everyone before birth is given the choice of a long and heavy or short and light soul (a parallel belief may be found in early Greek philosophy), and his choice determines the length of life. Sometimes the soul is conceived as a bird. The Bororos of Brazil fancy that in that shape the soul of a sleeper passes out of the body during night-time, returning to him at his awakening. The Bella Coola Indians say the soul is a bird enclosed in an egg and lives in the nape of the neck. If the shell bursts and the soul flies away, the man must die. If however the bird flies away, egg and all, then he faints or loses his reason. A popular superstition in Bohemia assumes that the soul in the shape of a white bird leaves the body by way of the mouth. Among the Battas of Sumatra rice or grain is sprinkled on the head of a man who returns from a dangerous enterprise, and in

the latter case the grains are called padiruma tondi, " means to make the soul (tondi) stay at

home," In Java the new-bom babe is placed in a hen-coop, and the mother makes a clucking noise, as if she were a hen, to attract the child's soul. It is regarded by many savage peoples as highly dangerous to arouse a sleeper suddenly, as his soul may not have time to return. Still more dangerous is it to move a sleeper, for the soul on its return might not be able to find the body. Flies and butterflies are forms which the souls are believed by some races to take, and the Esthonians of the island of Oesel think that the gusts of wind which whirl tornado-like through the roads are the souls of old women seeking what they can find.

But more widespread perhaps than any belief, from its sim- plicity doubtless, is the idea that the body's shadow or reflexion is the soul. The Basutos think that crocodiles can devour the shadow of a man cast on the surface of water. In many parts of the world sorcerers are credited with supernatural powers over a man by an attack on his shadow. The sick man is considered to have lost his shadow or a part of it. Dante refers to the shadowless spectre of Virgil, and the folklore of many European countries affords examples of the prevalence of the superstition that a man must be as careful of his shadow as of his body. In the same way the reflexion-soul is thought to be subject to a malice of enemies or attacks of beasts and has been the cause of superstitions which in one form or another exist to-day. From the Fijian and Andaman islander who exhibits abject terror at seeing himself in a glass or in water, to the English or European peasant who covers up the mirrors or turns them, to the wall, upon a death occurring, lest an inmate of the house should see his own face and have his own speedy demise thus prognosticated, the idea holds its ground. It was probably the origin of the story of Narcissus, and there is scarcely a race which is free from the haunting dread. Lastly the soul is pictured as being a man's breath (anima), and this again has come down to us in literature, evidenced by the fact that the word " breath " has become a synonym for life itself. The " last breath " has

meant more than a mere metaphor. It expresses the savage belief that there departs from the dying in the final expiration a something tangible, capable of separate existence — the soul. Among the Romans custom imposed a sacred duty on the nearest relative, usually the heir, to inhale the " last breath " of the dying. Moreover the classics bear evidence to the sanctity with which sentiment surrounded the last kiss; Cicero, in his speech against Verres, saying " Matres ab extremo complexu liberum exclusae: quae nihil aliud orabant nisi ut filiorum extremum spiritum ore excipere sibi liceret." Virgil, too, refers in the Aeneid, iv. 684, to the custom, which survives to-day as a ceremonial practice among many savage and semi-civilized people.

From the inability of the savage in all ages and in all lands to comprehend death as a natural phenomenon, there results a tendency to personify death, and myths are invented to account for its origin. Sometimes it is a " taboo " which has been broken and gives Death power over man. In New Zealand Maui, the divine hero of Polynesia, was not properly baptized. In Australia a woman was told not to go near a tree where a bat lived: she infringed the prohibition, the bat fluttered out, and death resulted. The Ningphoos were dismissed from Paradise and became mortal because one of them bathed in water which had been " tabooed " (Dalton, p. 13). Other versions of the Death-myth in Polynesia relate that Maui stole a march on Night as she slept, and would have passed right through her to destroy her, but a little bird which sings at sunset woke her, she destroyed Maui, and men lost immortality. In India Yama, the god of Death, is assumed, like Maui, to have been the first to " spy out the path to the other world," In the Solomon Islands (Jour. Anth. Inst., February 1881) " Koevari was the author of death, by resuming her cast-off skin." The same story is told in the Banks Islands. The Greek myth (Hesio'd, Works and Days, 90) alleged that mortals lived " without ill diseases that give death to men " till the cover was lifted from the box of Pandora.

This personification of Death has had as a consequence the introduction into the folklore of many lands of stories, oftep

humorous, of the tricks played on the Enemy of Mankind. Thus Sisyphus fettered Death, keeping him prisoner till rescued by Ares; in Venetian folklore Beppo ties him up in a bag for eighteen months; while in Sicily an innkeeper corks him up in a bottle, and a monk keeps him in his pouch for forty years. The German parallel is Gambling Hansel, who kept Death up a tree for seven years. Such examples might be multiplied unendingly, but enough has been said to show that the attitude of civilized man towards the sphinx-riddle of his end has been in part dictated and is even still influenced by the savage belief that to die is unnatural.

Law — Registration. — The registration of burials in England goes back to the time of Thomas Cromwell, who in 1 538 instituted the keeping of parish registers. Statutory measures were taken from time to time to ensure the preservation of registers of burials, but it was not until 1836 (the Births and Deaths Registra- tion Act) that the registration of deaths became a national concern. Other acts dealing with death registration were subse- quently passed, and the whole law for England consolidated by the Births and Deaths Registration Act 1874. By that act, the registration of every death and the cause of the death is com- pulsory. When a person dies in a house information of the death and the particulars required to be registered must be given within five days of the death to the registrar to the best of the person's knowledge and belief by one of the following persons: — (1) The nearest relative of the deceased present at the death, or in attendance during the last illness of the deceased. If they fail, then (2) some other relative of the deceased in the same sub- district (registrar's) as the deceased. In default of relatives, (3) some person

present at the death, or the occupier of the house in which, to his knowledge, the death took place. If all the above fail, (4) some inmate of the house, or the person causing the body of the deceased to be buried. The person giving the information must sign the register. Similarly, also, information must be given concerning death where the deceased dies not in a house.

Where written notice of the death, accompanied by a medical certificate of the cause of death, is sent to the registrar, informa- tion must nevertheless be given and the register signed within fourteen days after the death by the person giving the notice or some other person as required by the act. Failure to give information of death, or to comply with the registrar's requisi- tions, entails a penalty not exceeding forty shillings, and making false statements or certificates, or forging or falsifying them, is punishable either summarily within six months, or on indict- ment within three years of the offence. Before burial takes place the clergyman or other person conducting the funeral or religious service must have the registrar's certificate that the death of the deceased person has been duly registered, or else a coroner's order or warrant. Failing the certificate, the clergyman cannot refuse to bury, but he must forthwith give notice in writing to the registrar. Failure to do so within seven days involves a penalty not exceeding ten pounds. Children must not be registered as still-born without a medical certificate or a signed declaration from some one who would have been required, if the child had been born alive, to give information concerning the birth, that the child was still-born and that no medical man was present at the birth, or a coroner's order. The registration of deaths at sea is regulated by the act of 1874 together with the Merchant Shipping Act 1894. See further Birth and Burial and Burial Acts. Registers of death are, in law, evidence of the fact of death, and the entry, or a certified copy of it, will be sufficient evidence without a certificate of burial, although it is desirable that it should also be

produced.

Presumption of Death. — The fact of death may, in English law, be proved not only by direct but by presumptive evidence. When a person disappears, so that no direct proof of his where- abouts or death is obtainable, death may be presumed at the expiration of seven years from the period when the person was last heard of. It is always, however, a matter of fact for the jury, and the onus of proving the death lies on the party who asserts it. In Scotland, by the Presumption of "Life (Scotland) Act 1891, the presumption is statutory. In those cases where people disappear

under circumstances which create a strong probability of death, the court may, for the purpose of probate or administration; presume the death before the lapse of seven years. The question of survivorship, where two or more persons are shown to have perished by the same catastrophe, as in cases of shipwreck, has been much discussed. It was at one time thought that there might be a presumption of survivorship in favour of the younger as against the older, of the male as against the female, &c. But it is now clear that there is no such presumption {In re Alston, 1892, P. 142). This is also the rule in most states of the American Union. The doctrine of survivorship originated in the Roman Law, which had recourse to certain artificial presump- tions, where the particular circumstances connected with deaths were unknown. Some of the systems founded on the civil law, as the French code, have adopted certain rules of survivorship.

Civil Death is an expression used, in law, in contradistinction to natural death. Formerly, a man was said to be dead in law

(1) when he en tered a monastery and became professed in religion ;

(2) when he abjured the realm; (3) when he was attainted of treason or felony. Since the suppression of the monasteries there has been no

legal establishment for professed persons in England, and the first distinction has therefore disappeared, though for long after the original reason had ceased to make it necessary grants of life estates were usually made for the terms of a man's natural life. The act abolishing sanctuaries (1623) did away with civil death by abjuration ; and the Forfeiture Act 1870, that on attainder for treason or felony.

For the tax levied on the estate of deceased persons, and some- times called " death duty," see Succession Duty.

For the statistics of the death-rate of the United Kingdom as com- pared with that of the various European countries see United Kingdom. See also the articles Annuity; Capital Punishment; Cremation; Insurance; Medical Jurisprudence, &c.

DEATH-WARNING, a term used in psychical research for an intimation of the death of another person received by other than the ordinary sensory channels, i.e. by (1) a sensory hallucination or (2) a massive sensation, both being of telepathic origin. (See Telepathy.) Both among civilized and uncivilized peoples there is a widespread belief that the apparition of a living person is an omen of death; but until the Society of Psychical Research undertook the statistical examination of the question, there were no data for estimating the value of the belief. In 1885 a collec- tion of spontaneous cases and a discussion of the evidence was published under the title Phantasms of the Living, and though the standard of evidence was lower than at the present time, a substantial body of testimony, including many striking cases, was there put forward. In 1889 a further inquiry was under- taken, known as the " Census of Hallucinations," which provided information as to the percentage of individuals in the general population who, at some period of their lives, while they were in a normal state of health, had had " a vivid impression of seeing or being touched by a living being or inanimate object, or of hearing a

voice; which impression, so far as they could discover, was not due to any external cause." To the census question about 17,000 answers were received, and after making all deduc- tions it appeared that death coincidences numbered about 30 in 1300 cases of recognized apparitions; or about 1 in 43, whereas if chance alone operated the coincidences would have been in the proportion of 1 to 19,000. As a result of the inquiry the committee held it to be proved that " between deaths and apparitions of the dying person a connexion exists which is not due to chance alone." From an evidential point of view the apparition is the most valuable class of death-warning, inasmuch as recognition is more difficult in the case of an auditory hallucination, even where it takes the form of spoken words; moreover, auditory hallucinations coinciding with deaths may be mere knocks, ringing of bells, &c. ; tactile hallucinations are still more difficult of recognition; and the hallucinations of smell which are sometimes found as death-warnings rarely have anything to associate them specially with the dead person. Occasionally the death-warning is in the form Of an apparition of some other person; it may also take the form of a temporary feeling of intense depression or other massive sensation.

DEATH- WATCH^-DEBENTURES

go i

Bibliography. — Podmore, Gurney and Myers, Phantasms of the Living (1885); for the Census Report see Proceedings of the Society for Psychical Research, part xxvi. ; see also F. Podmore, Apparitions and Thought Transference. For a criticism of the results of the Census see E. Parish, Hallucinations and Illusions and Zur Kritik des telepathischen Beweismaterials, and Mrs Sidgwick's refutation in Proc. S.P.R. part xxxiii. 589-601. The Journal of the S.P.R. contains the most striking spontaneous cases received from time to time by the society. (N. W. T.)

DEATH-WATCH, a popular name applied to insects of

two distinct families, which burrow and live in old furniture and produce the mysterious ” ticking “■ vulgarly supposed to foretell the death of some inmate of the house. The best known, because the largest, is a small beetle, Anobium striattum, belonging to the family Ptinidae. The ” ticking,” in reality a sexual call, like the chirp of a grasshopper, is produced by the beetle rapidly striking its head against the hard and dry woodwork. In the case of the smaller death-watches, some of the so-called book-lice of the family Psocidae, the exact way in which the sound is caused has not been satisfactorily explained. Indeed the ability of such small and soft insects to give rise to audible sounds has been seriously doubted ; but it is impossible to ignore the positive evidence on the point. The names Atropos divinatoria and Clothilla pulsatoria, given to two of the commoner forms, bear witness both to a belief in a causal connexion between these insects and the ticking, and to the superstition regarding the fateful significance of the sound.

DE BARY, HEINRICH ANTON (1831-1888), German botanist, was of Belgian extraction, though his family had long been settled in Germany, and was born on the 26th of January 1831, at Frankfort-on-Main. From 1849 to 1853 he studied medicine at Heidelberg, Marburg and Berlin. In 1853 he settled at Frank- fort as a surgeon. In 1854 he became privat-docent for botany in Tubingen, and professor of botany at Freiburg in 1855. In 1867 he migrated to Halle, and in 1872 to Strassburg, where he was the first rector of the newly constituted university, and where he died on the 19th of January 1888.

Although one of his largest and most important works was on the Comparative Anatomy of Ferns and Phanerogams (1877), and notwithstanding his admirable acquaintance with systematic and field botany generally, de Bary will always be remembered as the founder of modern mycology. This branch of botany he completely revolutionized in 1866 by the publication of his celebrated Morphologie und

Physiologie d. Pilze, &c, a classic which he rewrote in 1884, and which has had a world-wide influence on biology. His clear appreciation of the real significance of symbiosis and the dual nature of lichens is one of his most striking achievements, and in many ways he showed powers of generalizing in regard to the evolution of organisms, which alone would have made him a distinguished man. It was as an investigator of the then mysterious Fungi, however, that de Bary stands out first and foremost among the biologists of the 19th century. He not only laid bare the complex facts of the life-history of many forms, — e.g. the Ustilagineae, Peronosporeae, Uredineae and many Ascomycetes, — treating them from the developmental point of view, in opposition to the then prevailing anatomical method, but he insisted on the necessity of tracing the evolution of each organism from spore to spore, and by his methods of culture and accurate observation brought to light numerous facts previously undreamt of. These his keen percep- tion and insight continually employed as the basis for hypotheses, which in turn he tested with an experimental skill and critical faculty rarely equalled and probably never surpassed. One of his most fruitful discoveries was the true meaning of infection as a morphological and physiological process. He traced this step by step in Phytophthora, Cystopus, Puccinia, and other Fungi, and so placed before the world in a clear light the significance of parasitism. He then showed by numerous examples wherein lay the essential differences between a parasite and a saprophyte; these were by no means clear in 1860-1870, though he himself had recognized them as early as 1853, as is shown by his work, Die Brandpilze.

These researches led to the explanation of epidemic diseases,

and de Bary's contributions, to this subject were fundamental, as witness his classical work on the potato disease in 1861. They also led to his striking discovery of heteroecism (or metoecism) in the Uredineae, the truth of which he demonstrated in wheat rust experimentally, and so clearly that his

classical example (1863) has always been confirmed by subsequent observers, though much more has been discovered as to details. It is difficult to estimate the relative importance of de Bary's astound- ingly accurate work on the sexuality of the Fungi. He not only described the phenomena of sexuality in Peronosporeae and Ascomycetes—Eurotium, Erysiphe, Peziza, &c. — but also established the existence of parthenogenesis and apogamy on so firm a basis that it is doubtful if all the combined workers who have succeeded him, and who have brought forward contending hypotheses in opposition to his views, have succeeded in shaking the doctrine he established before modern cytological methods existed. In one case, at least (Pyronema confluens), the most skilful investigations, with every modern appliance, have shown that de Bary described the sexual organs and process accurately. It is impossible here to mention all the discoveries made by de Bary. He did much work on the Chytridieae, Ustilagineae, Exoasceae and Phalloideae, as well as on that remarkable group the Myxomycetes, or, as he himself termed them, Mycetozoa, almost every step of which was of permanent value, and started lines of investigation which have proved fruitful in the hands of his pupils. Nor must we overlook the important contributions to algology contained in his earlier monograph on the Conjugatae (1858), and investigations on Nostocaceae (1863), Chara (1871), Acetabularia (1869), &c. De Bary seems to have held aloof from the Bacteria" for many years, but it was characteristic of the man that, after working at them in order to include an account of the group in the second edition of his book in 1884, he found opportunity to bring the whole subject of bacteriology under the influence of his genius, the outcome being his brilliant Lectures on Bacteria in 1885. De Bary's personal influence was immense. Every one of his numerous pupils was enthusiastic in admiration of his kind nature and genial criticism, his humorous sarcasm, and his profound insight, knowledge and originality.

Memoirs of de Bary's life will be found in Bot. Centralbl. (1888), xxxiv. 93, by Wilhelm; Ber. d. d. bot. Ges. vol. vi. (1888) p. viii., by Reess, each" with a list of his works; Bot. Zeitung (1889), vol. xlvii. No. 3, by Graf zu Soems-Laubach. (H.M.W.)

DEBENTURES and DEBENTURE STOCK. One of the

many advantages incident to incorporation under the English Companies Acts is found in the facilities which such incorporation affords a trading concern for borrowing on debentures or debenture stock. More than five hundred millions of money are now invested in these forms of security. Borrowing was not specifically dealt with by the Companies Acts prior to the act of 1900 but that it was contemplated by the legislature is evident from the provision in § 43 of the act of 1862 for a company keeping a register of mortgages and charges. The policy of the legislature in this, as in other matters connected with trading companies, was apparently to leave the company to determine whether borrowing should or should not form one of its objects.*

The first principle to be borne in mind is that a company cannot borrow unless it is expressly or impliedly authorized to do so by its memorandum of association. In the case of a trading company borrowing is impliedly authorized as a necessary incident of carrying on the company's business. Thus a company established for the conveyance of passengers and luggage by omnibuses, a company formed to buy and run vessels between England and Australia, and a company whose objects included discounting approved commercial bills, have all been held to be trading companies with an incidental power of borrowing as such to a reasonable amount. A building society, on the other hand, has no inherent power of borrowing (though a limited statutory power was conferred on such societies by the Building Societies Act 1874); nor has a society formed not for gain but to promote art, science, religion, charity or any other useful object. Public companies formed to carry out some undertaking of public utility, such as docks, water works, or gas works,

and

governed by the Companies Clauses Acts, have only limited powers of borrowing.

An implied power of borrowing, even when it attaches, is too inconvenient to be relied on in practice, and an express power is always now inserted in a joint stock company's memorandum of association. This power is in the most general terms. It is left to the articles to define the amount to be borrowed, the nature of the security, and the conditions, if any, — such as the sanction of a general meeting of shareholders, — on which the power is to be exercised. Under the Companies Act 1908, § 87, a com- pany cannot exercise any borrowing power until it has fulfilled the conditions prescribed by the act entitling it to commence business : one of which is that the company must have obtained its " minimum subscription." A person who is proposing to lend money to a company must be careful to acquaint himself with any statutory regulations of this kind, and also to see (1) that the memorandum and articles of association authorize borrow- ing, and (2) that the borrowing limit is not being exceeded, for if it should turn out that the borrowing was in excess of the company's powers and ultra vires, the company cannot be bound, and the borrower's only remedy is against the directors for breach of warranty of authority, or to be surrogated to the rights of any creditors who may have been paid out of the borrowed moneys.

A company proposing to borrow usually issues a prospectus, similar to the ordinary share prospectus, stating the amount of the issue, the dates for payment, the particulars of the property to be comprised in the security, the terms as to redemption, and so on, and inviting the public to subscribe. Underwriting is also resorted to, as in the case of shares, to ensure that the issue is

taken up. There is no objection to a company issuing debentures or debenture stock at a discount, as there is to its issuing its shares at a discount . It must borrow on the best terms its credit will enable it to obtain. A prospectus inviting subscriptions for debentures or debenture stock comes within the terms of the Directors' Liability Act 1890 (re-enacted in Companies Act 1908, § 84), and persons who are parties to it have the onus cast upon them, should the prospectus contain any misstatements, of showing that, at the time when they issued the prospectus, they had reasonable grounds to believe, and did in fact believe, that the statements in question were true ; otherwise they will be liable to pay compensation to any person injured by the misstatements. A debenture prospectus is also within the terms of the Companies Act 1908. It must be filed with the registrar of joint stock companies (§ 80) and must contain all the particulars specified in § 81 of the act. (See Company.)

The usual mode of borrowing by a company is either on debentures or debenture stock. Etymologically, debenture is merely the Latin word debentur, — The first word in a document in common use by the crown in early times admitting indebted- ness to its servants or soldiers. This was the germ of a security which has now, with the expansion of joint stock company enterprise, grown into an instrument of considerable complexity.

Debentures may be classified in various ways. From the point of view of the security they are either (1) debentures (simply) ; (2) mortgage debentures; (3) debenture bonds. In the debenture the security is a floating charge. In the mortgage debenture there is also a floating charge, but the property forming the principal part of the security is conveyed by the company to trustees under a trust deed for the benefit of the debenture- holders. In the debenture bond there is no security proper : only the covenant for payment by the company. For purposes of title and transfer, debentures are either " registered " or " to bearer." For purposes

of payment they are either " terminable " or " perpetual " (see Companies Act 1908, § 103).

The Floating Debenture. — The form of debenture chiefly in use at the present day is that secured by a floating charge. By it the company covenants to pay to the holder thereof the sum secured by the debenture on a specified day (usually ten or fifteen years after the date of issue), or at such earlier date as the principal moneys become due under the provisions of the security, and in the meantime the company covenants to pay interest on the

principal moneys until payment, or until the security becomes enforceable under the conditions ; and the company further charges its undertaking and all its property, including its uncalled capital, with the payment of the amount secured by the deben- tures. Uncalled capital if included must be expressly mentioned, because the word " property " by itself will not cover uncalled capital which is only property potentially, i.e. when called up. This is the body of the instrument; on its back is endorsed a series of conditions, constituting the terms on which the deben- ture is issued. Thus the debenture-holders are to rank pari passu with one another against the security ; the debenture is to be transferable free from equities between the company and the original holder ; the charge is to be a floating charge, and the debenture-holders' moneys are to become immediately repayable and the charges enforceable in certain events: for instance, if the interest is in arrear for (say) two or three months, or if a winding- up order is made against the company, or a resolution for winding up is passed. Other events indicative of insolvency are some- times added in which payment is to be accelerated. The con- ditions also provide for the mode and form of transfer of the debentures, the death or bankruptcy of the holder, the place of payment, &c. The most characteristic feature of the security — thefloating charge — grew naturally out of a charge on a company's undertaking as a going concern. Such a charge could only be made practicable by leaving the company free to deal with

and dispose of its property in the ordinary course of its business— to sell, mortgage, lease, and exchange it as if no charge existed: and this is how the security works. The debenture-holders give the directors an implied licence to deal with and dispose of the property comprised in the security until the happening of any of the events upon which the debenture-holders' money becomes under the debenture conditions immediately repayable. Pending this the charge is dormant. The licence extends, however, only to dealings in the ordinary course of business. Payment by a company of its just debts is always in the ordinary course of business, but satisfaction by execution levied in invitum is not. This floating form of security is found very convenient both to the borrowing company and to the lender. The company is not embarrassed by the charge, while the lender has a security covering the whole assets for the time being, and can intervene at any moment by obtaining a receiver if his security is imperilled, even though none of the events in which the principal moneys are made payable have happened. If any of them has happened, for instance default in payment of interest, or a resolution by the company to wind up, the payment of the principal moneys is accelerated, and a debenture-holder can at once commence an action to obtain payment and to realize his security. At times a proviso is inserted in the conditions endorsed on the debenture, that the company is not to create any mortgage or charge rank- ing in priority to or pari passu with that contained in the deben- tures. Very nice questions of priority have arisen under such a clause. A floating charge created by a company within three months of its being wound up will now be invalid under § 1 2 of the Companies Act 1908 unless the company is shown to have been solvent at the time, but there is a saving clause for cash paid under the security and interest at 5 %.

Trust Deeds. — When the amount borrowed by a company is large, the company commonly executes a trust deed by way of further security. The object of such a trust deed is twofold: (1) it conveys specific

property to the trustees of the deed by way of legal mortgage (the charge contained in the debentures is only an equitable security) , and it further charges all the remain- ing assets in favour of the debenture-holders, with appropriate provisions for enabling them, in certain events similar to those expressed in the debenture conditions, to enforce the security, and for that purpose to enter into possession and carry on the business, or to sell it and distribute the proceeds; (2) it organizes the debenture-holders and constitutes in the trustees of the deed a body of experienced business men who can watch over the interests of the debenture-holders and take steps for their protection if necessary. In particular it provides machinery for the calling of meetings of debenture-holders by the trustees,

and empowers a majority of (say) two-thirds or three-fourths in number and value at such meeting to bind the rest to any compromise or arrangement with the company which such majorities may deem beneficial. This is found a very useful power, and may save recourse to a scheme or arrangement first sanctioned under the machinery of the Joint Stock Companies Arrangement Act 1870 (Companies Act 1908, § 120).

Registration of Mortgages and Charges. — A company is bound, under the Companies Act 1862, to keep a register of mortgages and charges, but the register is only open for the inspection of persons who have actually become creditors of the company, not of persons who may be thinking of giving it credit, and the legis- lature recognizing its inadequacy provided in the Companies Act 1900 (§ 4 of act of 1908) for a public register at Somerset House of all mortgages and charges of certain specified classes by a com- pany. If not registered within twenty-one days from their creation such mortgages and charges are made void — so far as they are securities — against the liquidator and any creditor of the com-

pany, but the debenture-holders retain the rights of unsecured creditors. An extension of the time for registering may be granted by the court, but it will only be without prejudice to the rights of third persons acquired before actual registration. These provisions for registration as amended are contained in the Companies Act 1908 (§ 93).

Debentures Registered and to Bearer. — Debentures are, for purposes of title and transfer, of two kinds — (1) registered deben- tures, and (2) debentures to bearer. Registered debentures are transferable only in the books of the company. Debentures to bearer are negotiable instruments and pass by delivery. Coupons for interest are attached. Sometimes debentures to bearer are made exchangeable for registered debentures and vice versa.

Redemption. — A company generally reserves to itself a right of redeeming the security before the date fixed by the debenture for repayment; and accordingly a power for that purpose is commonly inserted in the conditions. But as debenture-holders, who have got a satisfactory security, do not wish to be paid off, the right of redemption is often qualified so as not to arise till (say) five years after issue, and a premium of 5 % is made payable by way of bonus to the redeemed debenture-holder. Sometimes the number of debentures to be redeemed each year is limited. The selection is made by drawings held in the presence of the directors. A sinking fund is a convenient means frequently resorted to for redemption of a debenture debt, and is especially suitable where the security is of a wasting character, leaseholds, mining property or a patent. Such a fund is formed by the company setting apart a certain sum each year out of the profits of the company after payment of interest on the debentures. Redeemed debentures may in certain cases be reissued; see Companies Act 1908 (§ 104).

Debenture Stock. — Debenture stock bears the same relation to debentures that stock does to shares. ” Debenture stock,” as Lord Lindley states (Companies, 5th ed., 195), ” is merely borrowed capital

consolidated into one mass for the sake of convenience. Instead of each lender having a separate bond or mortgage, he has a certificate entitling him to a certain sum, being a portion of one large loan." This sum is not uniform, as in the case of debentures, but variable. One debenture-stockholder, for instance, may hold £20 of the debenture stock, another £20,000. Debenture stock is usually issued in multiples of £10 or sometimes of £1, and is made transferable in sums of any amount not involving a fraction of £1. It is this divisibility of stock, whether debenture or ordinary stock, into quantities of any amount, which constitutes in fact its chief characteristic, and its convenience from a business point of view. It facilitates dealing with the stock, and also enables investors with only a small amount to invest to become stockholders. The property com- prised in this security is generally the same as in the case of debentures. Debenture stock created by trading companies differs in various particulars from debenture stock created by public companies governed by the Companies Clauses Act. The debenture stock of trading companies is created by a contract made between the company and trustees for the debenture-

stockholders. This contract is known as a debenture-stock- holders' trust deed, and is analogous in its provisions to the trust deed above described as used to secure debentures. By such a deed the company acknowledges its indebtedness to the trustees, as representing the debenture-stockholders, to the amount of the sum advanced, covenants to pay it, and conveys the property by way of security to the trustees with all the requisite powers and provisions for enabling them to enforce the security on default in payment of interest by the company or on the hap- pening of certain specified events evidencing insolvency. The company further, in pursuance of the contract, enters the names of the subsisting stockholders in a register, and issues certificates for the amount of their respective holdings. These certificates have, like debentures, the conditions of the security indorsed on their

back. Debenture stock is also issued to bearer. A deed securing debenture stock requires an ad valorem stamp.

Debenture Scrip. — Debentures and debenture stock are usually made payable in instalments, for example 10 % on application, 10% on allotment and the remainder at intervals of a few months. Until these payments are complete the securities are not issued, but to enable the subscriber to deal with his security pending completion the company issues to him an interim scrip certificate acknowledging his title and exchangeable on payment of the remaining instalments for debentures or debenture stock certificates. If a subscriber for debentures made default in payment the company could not compel him specifically to perform his contract, the theory of law being that the company could get the loan elsewhere, but this inconvenience is now removed (see % 105 of the Companies Act 1908).

Remedies. — When debenture-holders' security becomes enforceable there are a variety of remedies open to them. These fall into two classes — (1) remedies available without the aid of the court; (2) remedies available only with the aid of the court.

1. If there is a trust deed, the trustees may appoint a receiver of the property comprised in the security, and they may also sell under the powers contained in the deed, or under § 25 of the Conveyancing Act 1881. Sometimes, where there is no trust deed, similar powers— to appoint a receiver and to sell — are inserted in the conditions indorsed on the debentures.

2. The remedies with the aid of the court are — (a) an action by one or more debenture-holders on behalf of all for a receiver and to realize the security, (b) an originating summons for sale or other relief, under Rules of Supreme Court, 1883, O. lv. r. 5A;

(c) an action for foreclosure where the security is deficient (all the debenture-holders must be parties to this proceeding) ;

(d) a winding-up petition. Of these modes of proceeding, the first is by far the most common and most convenient. Immedi- ately on the issue of 'the writ in the action the plaintiff applies for the appointment of a receiver to protect the security, or if the security comprises a going business, a receiver and manager. In due course the action comes on for judgment, usually on agreed minutes, when the court directs accounts and inquiries as to who are the holders of the debentures, what is due to them, what property is comprised in the security, and gives leave to any of the parties to apply in chambers for a sale. If the company has gone into liquidation, leave must be obtained to commence or continue the action, but such leave in the case of debenture- holders is ex debito justitiae. A debenture-holder action when the company is in winding up is always now transferred to the judge having the control of the winding-up proceedings. The administration of a company's assets insuchactionsby debenture- holders (debenture-holders' liquidations, as they are called) has of late encroached very much on the ordinary administration of winding up, and it cannot be denied that great hardship is often inflicted by the floating security on the company's unsecured creditors, who find that everything belonging to the company, uncalled capital included, has been pledged to the debenture- holders. The conventional answer is that such creditors might and ought to have inspected the company's register of mortgages and charges. The matter was fully considered by the depart- mental board of trade committee which reported in July 1966,

but the committee, looking at the business convenience of the floating charge, saw no reason for recommending an alteration in the law.

Reconstruction. — When a company reconstructs, as it often does in these days, the rights of debenture-

holders have to be provided for. Reconstructions are mainly of two kinds- — (j) by arrangement, under the Joint Stock Companies Arrangement Act 1870, amended in 1900 and 1907, incorporated in act o£ 1908 (§ 120), and (2) by sale and transfer of assets, either under § 192 of the act of 1908, or under a power in the company's memorandum of association. By the procedure provided under (1) a petition for the sanction of the court to a scheme is presented, and the court thereupon directs meetings of creditors, including debenture-holders, to be held. A three-fourths majority in value of debenture-holders present at the meeting in person or by proxy binds the rest. Debenture- holders claiming to vote must produce their debentures at or before the meeting. Under the other mode of reconstruction — sale and transfer of assets — there is usually a novation, and the debenture-holders accept the security of the new company in the shape of debentures of equivalent value or — occasionally — of fully paid preference shares.

■ *A point in this connexion, which involves some hardship to debenture-holders, may here be adverted to. It is a not uncommon practice for a solvent company to pass a resolution to wind up voluntarily for the purpose of reconstructing. The effect of this is to accelerate payment of the security, and the debenture-holders have to accept their principal and interest only, parting with a good security and perhaps a premium which would have accrued to them in a year or two. The company is thus enabled by its own act to redeem the reluctant debenture- holder on terms most advantageous to itself. To obviate this hardship, it is now a usual thing in a debenture-holders' trust deed to provide — the committee of the London Stock Exchange indeed require it — that a premium shall be paid to the debenture- holders in the event of the security becoming enforceable by a voluntary winding up with a view to reconstruction.*

Public Companies. — Public companies, i.e. companies incorpor- ated by special act of parliament for carrying on undertakings of public utility, form a class distinct from trading companies. The borrowing

powers of these companies, the form of their debenture or debenture stock, and the rights of the debenture- holders or debenture-stockholders, depend on the conjoint operation of the companies' own special act and the Companies Clauses Acts 1845, 1863 and 1869. The provisions of these acts as to borrowing, being express, exclude any implicit power of borrowing. The first two of the above acts relate to mortgages and bonds, the last to debenture stock. The policy of the legis- lature in all these acts is the same, namely, to give the greatest facilities for borrowing, and at the same time to take care that undertakings of public utility which have received legislative sanction shall not be broken up or destroyed, as they would be if the mortgagees or debenture-holders were allowed the ordinary rights of mortgagees for realizing their security by seizure and sale. Hence the legislature has given them only " the fruit of the tree," as Lord Cairns expressed it. The debenture-holders or the debenture-stockholders may take the earnings of the company's undertaking by obtaining the appointment of a receiver, but that is all they can do. They cannot sell the under- taking or disorganize it by levying execution, so long as the company is a going concern; but this protecting principle of public policy will not be a bar to a debenture-holder, in his character of creditor, presenting a petition to wind up the company, if it is no longer able to fulfil its statutory objects. Railway companies have further special legislation, which will be found in the Railway Companies Powers Act 1864, the Railways Construction Facilities Act 1864 and the Railway Securities Act 1866.

Municipal Corporations and County Councils. — These bodies are authorized to borrow for their proper purposes on debentures and debenture stock with the sanction of the Local Government Board. See the Municipal Corporations Act 1882, the Local

Authorities' Loans Act 1875, and the Local Government (England and Wales) Act 1888.

United States. — In the United States there are two

meanings of debenture — (1) a bond hot secured by mortgage; (2) a certifi- cate that the United States is indebted to a certain person or his assigns in a certain sum on an audited account, or that it will refund a certain sum paid for duties on imported goods, in case they are subsequently exported.

Authorities. — E. Manson, Debentures and Debenture Stock (London, 2nd ed., 1908); Simonson, Debentures and Debenture Stock (London, 2nd ed., 1902) ; Palmer, Company Precedents {Debentures) (3rd ed., London, 1907). (E. Ma.)

DEBORAH (Heb. for "bee"), the Israelite heroine in the Bible through whose encouragement the Hebrews defeated the Canaanites under Sisera. The account is preserved in Judges iv.-v., and the ode Of victory (chap, v.), known as the " Song of Deborah," is held to be one of the oldest surviving specimens of Hebrew literature. Although the text of this Te Deum has suffered (especially in vv. 8-15) its value is without an equal for its historical contents. It is not certain that the poem was actually composed by Deborah (v. 1) ; ver. 7,which can be rendered " until thou didst arise, O Deborah," is indecisive. The poem consists of a series of rapidly shifting scenes; the words are often obscure, but the general drift of the whole can be easily followed. After the exordium, the writer describes the approach of Yahweh from his seats in Seir and Edom in the south to the help of his people — the language is reminiscent of Ps. lxviii. 7 sqq., Hab. iii. 3 seq. 1 2 seq. In the days of Shamgar the son of Anath the land had been insecure, the people were disarmed, and neither shield nor spear was to be seen among their forty thousand (cf. 1 Sam. xiii. 19-22, and for the number Josh. iv. 13). Then follows, apparently, a summons to magnify Yahweh. After an apostrophe to Deborah and Barak, the son of Abinoam, the meet- ing of the clans is vividly portrayed. Ephraim, with Benjamin behind him (for the wording, cf. Hos. v. 8), Machir (here the tribe of Manasseh) and Zebulun, Issachar and Naphtali, pour down into the valley of the Kishon. Not all the tribes were represented. Reuben was wavering, Gilead (i.e. Gad)

remained beyond the Jordan, and Dan's interests were apparently with the sea-going Phoenicians (see Dan); their conduct is contrasted with the reckless bravery of Zebulun and Naphtali. Judah is nowhere mentioned; it lay outside the confederation. The Canaanite kings unite at Taanach by Megiddo, an ancient battle- field probably to be identifiediwfah Lejjun. The heavens joined the fight against Sisera (cf. the appeal in Josh. x. 12 seq.), a storm rages, and the enemy are swept away in the flood. Meroz, presumably on the line of flight, is bitterly cursed for its inaction: " they came not to the help of Yahweh." In vivid contrast to this is the conduct of one of the Kenites: " blessed of all women is Jael, of all the nomad women is she blessed." The poem recounts how the fleeing king craves water, she gives him milk, and (as he drinks) she fells him (perhaps with a tent-peg) ; " at her feet he sank down, he fell, he lay, where he sank he lay overcome." The last scene paints the mother of Sisera impatiently awaiting the king. Her attendants confidently picture him dividing the booty — a maiden or two for each man, and richly embroidered cloth for himself. With inimitable strength the poet suddenly drops the curtain — " so perish thine enemies, all of them, Yahweh! But let them that love him be as the sun when it rises in its might."

The historical background of this great event is unknown. The Israelite confederation consists of central Palestine with the (east-Jordanic) Machir, and the northern tribes with the excep- tion of Dan and Asher. This has suggested to some an invasion from the coast, or from the north by way of. the coast, since had Dan and Asher fallen into the hands of the enemy, this would probably have been referred to in some way. Sisera is scarcely a Semitic name ; a " Hittite " origin has been suggested. 1 Shamgar son of Anath seems equally foreign; the latter is the name of a Syrian goddess and the former recalls Sangara, a Hittite chief of Carchemish in the 9th century. The context suggests that

.'The term "Hittite" is here used as a loose but convenient designation for closely related groups of

Shamgar is a foreign oppressor (ver. 6), but he appears to have been converted subsequently into one of the " judges " of Israel (iii. 31), perhaps with the idea of bringing their total up to twelve. The prose version (iv.) contains new and conflicting details. Deborah, whose home is placed under " Deborah's palm " between Ramah and Bethel, summons Barak from Kadesh- Naphtali to collect Naphtali and Zebulun, 10,000 strong, and to meet Sisera (who is here the general of a certain Jabin, king of Hazor) at Mt. Tabor. But Sisera marches south to Kishon', and after his defeat flees north through Israelite territory; past Hazor to the neighbourhood of Kadesh. His death, moreover, is differently described (iv. 21, v. 25-27), and Jael " who with inhospitable guile smote Sisera sleeping " (Milton) is guilty of an act which has possibly originated from a misunderstanding of the poem. In the prose narrative Jabin has nothing to do with the fight, whereas in Josh. xi. he is at the head of an alliance of north Canaanite kings who were defeated by Joshua at the waters of Merom. It would seem that certain elements which are inconsistent with the representation in Judg. v. belonged originally to the other battle. Kadesh, for example, might be a natural meeting-place for an attack upon Hazor, and the designa- tion " Jabin's general," applied to Sisera, is probably due to the attempt to harmonize the two distinct stories. Moreover, Deborah, who is associated with the tribe of Issachar (v. 15), appears to have been confused with Rebekah's nurse, whose tomb lay near Bethel (Gen. xxxv. 5). Some more northerly place seems to be required, and it has been pointed out that the name corresponds with Daberath (modern Dabiirlyeh) at the foot of Tabor, on the border of Zebulun and Issachar. At all events, to represent her as a prophetess, judging the people of Israel (iv. 4 seq.), ill accords with both the older account (v.) and the general

situation reflected in the earlier narratives in the book of Judges.

For fuller details see G. A. Oooke, History and Song of Deborah (1892), the commentaries on Judges and the histories of Israel. Cheyne, Critica Biblica, pp. 446–464, offers many new textualemenda- tions. Paton {Syria and Palestine, p.158 sqq. ^suggests that the battle was against the Hittites (Sisera, a successor of Shamgar). See also L. W. Batten, Journ. Bibl. Lit. (1905) pp. 31–40 (who regards Judg. v. and Josh. xi. as duplicates) ; Winckler, Gesch. Israels, ii. i 2 5– I 35; Keilinschr. u. d. Alte Test. (3) p. 218; and Ed. Meyer, Israeliten, pp. 272 sqq., 487 sqq. (S. A. C.)

DEBRECZEN, a town of Hungary, capital of the county of Hajdu, 138 m. E. of Budapest by rail. Pop. (1900) 72,351. It is the principal Protestant centre in Hungary, and bears the name of ” Calvinistic Rome.” Debreczen is one of the largest towns of Hungary, and is situated in the midst of a sandy but fertile plain. It consists of the inner old town, and several suburbs, which stretch out irregularly into the plain. The walls of the old town have given place to a broad boulevard and several open commons, beautifully laid out. The most prominent of its public buildings is the principal Protestant church, built at the beginning of the 19th century, which ranks as the largest in the country, but has no great architectural pretensions. In its immediate neighbourhood is the Protestant Collegium, for theology and law, which is one of the most frequented institu- tions of its kind in Hungary, being attended by over two thousand students. This, college was founded in 1531, and possesses a rich library and other scientific collections. The town hall, the Franciscan church, the Piarist monastery and college, and the theatre are also worthy of mention. Amongst its educational establishments it includes an agricultural academy. The industries of the town are various, but none is of importance enough to give it the character of a manufacturing centre. Its tobacco-pipes, sausages and soap are widely known. It carries on an active trade in

cattle, horses, corn and honey, while four well-attended fairs are held annually. The municipality of Debreczen owns between three hundred and four hundred square miles of the adjoining country, which possesses all the characteristics of the Hungarian puszta, and on which roam large herds of cattle. . '

The town is of considerable antiquity, but owes its develop- ment to the refugees who flocked from the villages plundered

by the Turks in the 15th century. In 1552 it adopted the Protestant faith, and it had to suffer in consequence, especially when it was captured in 1686 by the imperial forces. In 1693 it was made a royal free city. In 1848-1849 it formed a refuge for the national government and legislature when Budapest fell into the hands of the Austrians; and it was in the great Calvinist church that, on Kossuth's motion (April 14th, 1849) the resolu- tion was passed declaring the house of Habsburg to have forfeited the crown of St Stephen. On the 3rd of July the town was captured by the Russians.

DEBT (Lat. debitum, a thing owed), a definite sum due by one person to another. It may be created by contract, by statute or by judgment!. Putting aside those created by statute, re- coverable by civil process, debts may be divided into three classes, (1) judgment debts; (2) specialty debts, and (3) simple contract debts. As to judgment debts, it is sufficient to say that, when by the judgment of a court of competent jurisdiction an order is made that a sum of money be paid by one of two parties to another, such' a debt is not only enforceable by process of court, but it can be sued upon as if it were an ordinary debt. A specialty debt is created by deed or instrument under seal. Until 1869 specialty debts had preference under English law over simple contract debts in the event of the bankruptcy or death of the debtor, but this was abolished by the Administra- tion of Estates Act of that year. The main difference now is that a specialty debt may, in general, be created without con- sideration, as for example by a bond (a

gratuitous promise under seal), and that a right of action arising out of a specialty debt is not barred if exercised any time within twenty years, whereas a right of action arising out of a simple contract debt is barred unless exercised within six years. (See Limitation, Statutes or.) Any other debt than a judgment or specialty debt, whether evidenced by writing or not, is a simple contract debt. There are also certain liabilities or debts which, for the convenience of the remedy, have been made to appear as though they sprang from contract, and are sometimes termed quasi-contracts. Such would' be an admission by one who is in account with another that there is a balance due from him. Such an admission implies a promise to pay when requested and creates an action- able 'liability ex contractu. Or, when one person is compelled by law to discharge the legal liabilities of another, he becomes the creditor of the person for the money so paid. Again, where a person has received money under circumstances which disentitle him to retain it, such as receiving payment of an account twice over, it can generally be recovered as a debt.

At English common law debts and other choses in action were not assignable (see Chose), but by the Judicature Act 1873 any absolute assignment of any debt or other legal chose in action, of which express notice in writing is given to the debtor, trustee or other person from whom the assignor would have been entitled to receive or claim such debt, is effectual in law. Debts do not, as a general rule, carry interest, but such an obligation may arise either by agreement or by mercantile usage or by statute. The discharge of a debt may take place either by payment of the amount due, by accord and satisfaction, i.e. acceptance of something else in discharge of the liability, by set-off {q.v.), by release or under the law of bankruptcy (q.v.). It is the duty of a debtor to pay a debt without waiting for any demand, and, unless there is a place fixed on either by custom or agreement, he must seek out his creditor for the purpose of paying him unless he is " beyond the seas." Payment by a third person to

the creditor is no discharge of a debt, as a general rule, unless the debtor subsequently ratifies the payment. When a debtor tenders the amount due to his creditor and the creditor refuses to accept, the debt is not discharged, but if the debtor is. subsequently sued for the debt and continues willing and ready to pay, and pays the amount tendered into court, he can recover his costs in the action. A creditor is not bound to give change to the debtor, whose duty it is to make tender in lawful money the whole amount due, or more, without asking for change. (See Payment.) A debtor takes the risk if he makes payment through the post, unless the creditor has requested or authorized that mode of

payment. The payment of a debt is sometimes secured by one person, called a surety, who makes himself collaterally liable for the debt of the principal. (See Guarantee.) The ordinary method of enforcing a debt is by action. Where the debt does not exceed £100 the simplest procedure for its recovery is that of the county court, but if the debt exceeds £100 the creditor must proceed in the high court, unless the cause of action has arisen within the jurisdiction of certain inferior courts, such as the mayor's court of London, the Liverpool court of passage, &c. When judgment has been obtained it may be enforced either by process (under certain conditions) against the person of the debtor, by an execution against the debtor's property, or, with the assistance of the court, by attaching any debt owed to the debtor by a third person. Where a debtor has committed any act of bankruptcy a creditor or creditors whose aggregate claims are not less than £50 may proceed against him in bankruptcy (q.v.). Where the debtor is a company or corporation registered under the companies acts, the creditor may petition to have it wound up. (See Company.)

Imprisonment for debt, the evils of which have been so graphically described by Dickens, was abolished

in England by the Debtors Act 1869, except in cases of default of payment of penalties, default by trustees or solicitors and certain other cases. But in cases where a debt or instalment is in arrear and it is proved to the satisfaction of the court that the person making default either has or has had since the date of the order or judg- ment the means to pay the sum in respect of which he has made default and has refused or neglected to pay, he may be com- mitted to prison at the discretion of the judge for a period of not more than forty-two days. In practice, a period of twenty-one days is usually the maximum period ordered. Such an imprison- ment does not operate as a satisfaction or extinguishment of the debt, and no second order of commitment can be made against him for the same debt, although where the court has made an order or judgment for the payment of the debt by instalments a power of committal arises on default of payment of each instal- ment. In Ireland imprisonment for debt was abolished by the Debtors Act (Ireland) 1872, and in Scotland by the Debtors (Scotland) Act 1880. In France it was abolished in 1867, in Belgium in 1871, in Switzerland and Norway in 1874, and in Italy in 1877. In the United States imprisonment for debt was universal under the common law, but it has been abolished in every state, except in certain cases, as where there is any suspicion of fraud or where the debtor has an intention of removing out of the state to avoid his debts. (See also Contract ; Bankruptcy.)

DEBUSSY, CLAUDE ACHILLE (1862-), French composer, was born at St Germain-en-Laye on the 22nd of August 1862, and educated at the Paris Conservatoire under Marmontel, Lavignac, Massenet and Guiraud. There between 1874 and 1884 he gained many prizes for solfege, pianoforte playing, accompanying, counterpoint and fugue, and, in the last-named year, the coveted Grand Prix de Rome by means of his cantata L' Enfant prodigue. In this composition already were thought to be noticeable the germs of unusual and " new " talent, though in the light of later developments it is not very easy to discern

them, for then Debussy had not come under the influence which ultimately turned his mind to the system he afterwards used, not only with peculiar distinction but also with particular individual and complete success. Nevertheless, the mind had clearly been prepared by nature for the reception of this influence when it should arise; for, in order to fulfil that condition of the Prix de Rome which entails the submitting periodically of compositions to the judges, Debussy sent to them his symphonic suite Printemps, to which the judges took exception on the ground of its formlessness. Following in the wake of Printemps came La damoiselle Slue for solo, female voice and orchestra — a setting of a French version of Rossetti's " The Blessed Damosel "—which in the eyes of the judges was even more unorthodox than its predecessor, though, be it said, fault was found as much with the libretto as with the music. Both works were denied the custom- ary public performance.

The Rome period Over, Debussy returned to Paris, whence

shortly he went to Russia, where he came directly under the influence referred to above. In Russia he absorbed the native music, especially that of Moussorgsky, who, recently dead, had left behind him the reputation of a " musical nihilist," and on his return to Paris Debussy devoted himself to composition, the stream of his muse being even in 1908 as fluent as twenty years before. To him public recognition was slow in coming, but in 1893 the Societe Nationale de Musique performed his Damoiselle Slue, in 1894 the Ysaye Quartet introduced the string. quartet, while in the same year the Prelude & I'apres- midi d'un Faune was heard, and brought Debussy's name into some prominence. As time passed the prominence grew, until the climax of Debussy's creative career was reached by the production at the Opera Comique on the 30th of April 1902 of his masterpiece PellSas et Melisande. Herein lay the whole strength of Debussy's system, the perfection of his appeal to the mind and imagination as well as to the emotions

and senses. Since its production the world has been enriched by La Mer, and by the Ariettes oubliSes, but the lyric drama remains on its own lofty pedestal, a monument of elusive and subtle beauty, of emphatic originality and of charm. In an Apologia Debussy has declared that in composing PellSas he " wanted to dispense with parasitic musical phrases. Melody is, if I may say so, almost anti-lyric, and powerless to express the constant change of emotion or life. Melody is suitable only for the chanson, which confirms a fixed sentiment. I have never been willing that my music should hinder, through technical exigencies, the change of sentiment and passion felt by my characters. It is effaced as soon as it is necessary that these should have perfect liberty in their gestures or in their cries, in their joy, or in their sorrow."

The list of Debussy's works is a lengthy one. Several of them have been referred to already. Among the others, of which the complete list is too long to print here, are the dances for chromatic harp or pianoforte; Images; incidental music to King Lear; the Petite Suite; Trois Nocturnes; innumerable songs, as Proses Lyriques (text by Debussy); two series of Verlaine's Fltes galantes; Cinq Poemes de Baudelaire; many pianoforte pieces.

In 1 89 1 Debussy was appointed critic of the Revue Blanche. In his first notice he expressed his faith thus: " I shall endeavour to trace in a musical work the many different emotions which have helped to give it birth, also to demonstrate its inner life. This, surely, will be accounted of greater interest than the game which consists in dissecting it as if it were a curious timepiece."

As to the theories, so much debated, of this remarkable musician — probably in the whole range of musical history there has not appeared a more difficult theorist to " place." Un- questionably Debussy has introduced a new system of colour into music, which has begun already to exert widespread influence. Roughly, Debussy's system may be summarized thus:

His scale basis is of six whole tones (enharmonic), as (1) middle C,D,E,Gb,Ab,Bb, which are of excellent sound when super- imposed in the form of two augmented unrelated triads. [Bb [A#

\ Gb or enharmonically \ F#

Id [d

[Ab fGft

is . i?

used frequently incomplete {i.e. by the omission of one note) by Debussy.

Now, upon the basis of an augmented triad a tune may be played above it provided that it be based upon the six-tone scale, and a fugue may be written, the re-entry of the subject of which may be made upon any note of the scale, and the harmony will be E I complete. To associate this scale with the ordinary diatonic C scale let a major 9th be taken, e.g. : one may conventionally A f flatten or sharpen the fifth of this (A becoming # or b as F# desired) : if both the flattened and sharpened fifths be taken D J in the one chord this chord is arrived at:

E’ C

Bb

Ab

n

D

(A# enharmonically altered to Bb)

which is composed of the notes of the aforesaid scale (1), and Debussy thereby proves his case to belong to the ” primitifs.” It will be noticed that

chords of the 9th in sequence and in all forms occur in Debussy's music as well as the augmented triad harmonics, where the melodic line is based on the tonal scale. This, in all likelihood, is the outcome of Debussy's instinctive feeling for the association of his so-called discovery with the ordinary scale. The " secret," it may be added, comes not from Annamese music as has been frequently stated, but prob- ably from Russia, where certainly it was used before Debussy's rise. (R. H. L.)

DECADE (from Gr. dkKa, ten), a group or series containing ten members, particularly a period of ten years. In the new calendar made at the time of the French Revolution in 1793, a decade of ten days took the place of the week. The word is also used of the divisions containing ten books or parts into which the history of Livy was divided.

DECAEN, CHARLES MATHIEU ISIDORE, Count (1769- 1832), French soldier, was born at Caen on the 13th of April 1769. He was educated for the bar, but soon showed a strong preference for the military career, in which he quickly made his way during the wars of the French Revolution under Kleber, Marceau and Jourdan, in the Rhenish campaigns. In 1799 he became general of division, and contributed to the success of the famous attack by General Richepanse on the Austrian flank, and rear at Hohenlinden (December 1800). Becoming known for his Anglophobe tendencies, he was selected by Napoleon early in the year 1802 for the command of the French possessions in the East Indies. The secret instructions issued to him bade him prepare the way, so that in due course (September 1804 was hinted at as the suitable time) everything might be ready for an attack on the British power in India. Napoleon held out to him the hope of acquiring lasting glory in that enterprise. Decaen set sail with Admiral Linois early in March 1803 with a small expeditionary force, touched at the Cape of Good Hope (then in Dutch hands), and noted the condition of the fortifications there. On arriving at Pondicherry he found matters in a very critical condition. Though the outbreak of war in Europe had not yet been heard of, the hostile

preparations adopted by the Marquis Wellesley caused Decaen to withdraw promptly to the Isle of France (Mauritius), where, during eight years, he sought to harass British trade and prepare.for plans of alliance with the Mahratta princes of India. They all came to naught. Linois was captured by a British squadron, and ultimately, in 181 1, Mauritius itself fell to the Union Jack. Returning to France on honourable terms, Decaen received the command of the French troops in Catalonia. The rest of his career calls for no special mention. He died of the cholera in 1832.

See M. L. E. Gautier, Biographic du genSral Decaen (Caen, 1850). G- Hl. R.)

DECALOGUE (in patristic Gr. r\ SenaXoyos, sc. /3t/3\os or vofiodtcria) , another name for the biblical Ten Commandments, in Hebrew the Ten Words (Deut. iv. 13, x. 4; Ex. xxxiv. 28), written by God on the two tables of stone (Ex. xxiv. 12, xxxii. 16), the so-called Tables of the Revelation (E.V. " tables of testi- mony," Ex. xxxiv. 29), or Tables of the Covenant (Deut. ix. 9, 11, 1 5). These tables were broken by Moses (Ex. xxxii. 19), and two new ones were hewn (xxxiv. 1), and upon them were written the words of the covenant by Moses (xxxiv. 27 sqq.) or, according to another view, by God himself (Deut. iv. 13, ix. 10). They were deposited in the Ark (Ex. xxv. 21; 1 Kings viii. 9). In Deuter- onomy the inscription on these tables, which is briefly called the covenant (iv. 13), is expressly identified with the words spoken by Jehovah (Yahweh) out of the midst of the fire at Mt. Sinai or Horeb (according to the Deuteronomic tradition), in the ears of the whole people on the " day of the assembly," and rehearsed

in v. 6-21. In the narrative of Exodus the relation of the "ten words " of xxxiv. to the words spoken from Sinai, xx. 2-17, is not so clearly indicated, and it is generally agreed that the Pentateuch presents divergent and irreconcilable views of the Sinaitic covenant.

As regards the Decalogue, as usually understood, and embodied in the parallel passages in Ex. xx. and Deut. v., certain pre- liminary points of detail have to be noticed. The variations in the parallel texts are partly verbal, partly stylistic (e.g. "Remember the Sabbath day," Ex.; but "observe," &c, Deut.), and partly consist of amplifications or divergent explana- tions. Thus the reason assigned for the institution of the Sabbath in Exodus is drawn from the creation, and agrees with Gen. ii. 3. In Deuteronomy the command is based on the duty of humanity to servants and the memory of Egyptian bondage. Again, in the tenth commandment, as given in Exodus, " house " means house and household, including the wife and all the particulars which are enumerated in ver. 17. In Deuteronomy, " Thou shalt not covet thy neighbour's wife," comes first, and " house " following in association with field is to be taken in the literal restricted sense, and another verb (" thou shalt not desire ") is used.

The construction of the second commandment in the Hebrew text is disputed, but the most natural sense seems to be, •" Thou shalt not make unto thee a graven image; (and) to no visible shape in heaven, &c, shalt thou bow down, &c." The third commandment might be rendered, " Thou shalt not utter the name of the Lord thy God vainly," but it is possible that the meaning is that Yahweh's name is not to be used for purposes of sorcery.

The order of the commandments relating to murder, adultery and stealing varies in the Vatican text of the Septuagint, viz. adultery, stealing, murder, in Ex. ; adultery, murder, stealing, in Deut. The latter is supported by several passages in the New Testament (Rom. xiii. 9 ; Mark x. 19, A.V. ; Luke xviii. 20; contrast Matt. xix. 18), and by the " Nash Papyrus." ' It may be added that the double system of accentuation of the Decalogue in the Hebrew Bible seems to preserve traces of the ancient uncertainty concerning the numeration.

Divisions of the Decalogue.— The division current in England and Scotland, and generally among the

Reformed (Calvinistic) churches and in the Orthodox Eastern Church, is known as the Philonic division (Philo, de Decalogo, §12). It is sometimes called by the name of Origen, who adopts it in his Homilies on Exodus. On this scheme the preface, Ex. xx. 2, has been usually taken as part of the first commandment. The Church of Rome and the Lutherans adopt the Augustinian division (Aug., Quaest. super Exod., Ixxi.), combining into one the first and second command^ ments of Philo, and splitting his tenth commandment into two. To gain a clear distinction between the ninth and tenth command- ments On this scheme it has usually been felt to be necessary to follow the Deuteronomic text, and make the ninth commandment, Thou shalt not covet thy neighbour's wife. 2 As few scholars will now claim priority for the text of Deuteronomy, this division may be viewed as exploded. But there is a third scheme (the Talmudic) still current among the Jews, and not unknown to early Christian writers, which is still a rival of the Philonic view, though less satisfactory. Here the preface, Ex. xx. 2, is taken as the first " word," and the second embraces verses 3-6.

See further Nestle, Expository Times (1897), p. 427. The decision between Philo and the Talmud must turn on two questions. Can we take the preface as a separate ” word “? And can we regard the prohibition of polytheism and the prohibition of idolatry as one commandment? Now, though the Hebrew certainly speaks of ten ” words,” not of ten ” precepts,” it is most unlikely that the first word can be different in character from those that follow. But the statement ” I am the Lord thy God ” is either no precept at all, or only enjoins by implication what is expressly commanded in the

1 A Hebrew fragment probably of the 2nd century A.D., in the University Library, Cambridge, containing the Decalogue with several variant readings; see S. A. Cook, Proceed. Soc. Bibl. Archae- ology (1903), pp. 34-56 ; F. C. Burkitt, Jewish Quarterly Review (1903), pp. 392-408; N. Peters, D. alteste Abschrift d. zehn Gebote (1005).

2 So, for example, Augustine, I.e., Thomas, Summa {Prima Secundae, qu. c. art. 4), and recently Sonntag and Kurtz. Purely arbitrary is the idea of Lutheran writers (Gerhard, Loc. xiii. § 46) that the ninth commandment forbids concupiscentia actualis, the tenth cone, originalis.

words ” Thou shalt have no other gods before me.” Thus to take the preface as a distinct word is not reasonable unless there are cogent grounds for uniting the commandments against polytheism and idolatry. But that is far from being the Case. The first precept of the Philonic scheme enjoins monolatry, the second expresses God’s spiritual and transcendental nature. Accordingly Kuenen does not deny that the prohibition of images contains an element additional to the precept of monolatry, but, following De Goeje, regards the words from ” thou shalt not make unto thyself “down to ” the waters

under the earth ” as a later insertion in the original Decalogue. Unless this can be made out, the Philonic scheme is clearly best, and as such it is now accepted by most scholars.

How were the ten words disposed on the two tables ? The natural arrangement (which is assumed by Philo and Josephus) would be five and five. And this, as Philo recognized, is a division appropriate to the sense of the precepts; for antiquity did not look on piety towards parents as a mere precept of probity, part of one’s duty towards one’s neighbour. The authority of parents and rulers is viewed in the Old Testament as a delegated divine authority, and the violation of it is akin to blasphemy (cf. Ex. xxi. 17 and Lev. xx. 9 with Lev. xxiv. 15, 16, and note the formula of treason, 1 Kings xxi. 13).

We have thus five precepts of piety on the first table, and five of probity, in negative form, on the second, an arrangement which is accepted by the best recent writers. But the current view of the Western Church since Augustine has been that the precept to honour parents heads the second table. The only argument of weight in favour of this view is that it makes the amount of writing on the two tables less unequal, while we know that the second table as well as the first was written on both sides (Ex. xxxii. 15). But we shall presently see that there may be another way out of this difficulty.

Date. — It is much disputed what the original compass of the Decalogue was. Did the whole text of Ex. xx. 2–17 stand on the tables of stone ? The answer to this question must start from the reason annexed to the fourth commandment, which is different in Deuteronomy. But the express words ” and he added no more,” in Deut. v. 22, show that there is no conscious omission by the Deuteronomic speaker of part of the original Decalogue, which cannot therefore have included the reason annexed in Exodus. On the other hand the reason annexed in Deuteronomy is rather a parenetic addition than an original element dropped in Exodus. Thus the original fourth com- mandment was simply ” Remember

the Sabbath day to keep it holy." x When this is granted it must appear not improbable that the elucidations of other commandments may not have stood on the tables, and that Nos. 6-9 have survived in their original form. Thus in the second commandment, " Thou shalt not bow down to any visible form," &c, is a sort of explanatory addition to the precept " Thou shalt not make unto thee a graven image." And so the promise attached to the fifth commandment was probably not on the tables, and the tenth commandment may have simply been, "Thou shalt not. covet thy neighbour's house," which includes all that is expressed in the following clauses. Such a view gets over the difficulty arising from the unequal length of the two halves of the Decalogue.

It is quite another question whether there is any idea in the Decalogue which can be as old as Moses. It is urged by many critics that Moses cannot have prohibited the worship of Yahweh by images; for the subsequent history shows us a descendant of Moses as priest in the idolatrous sanctuary of Dan. There were teraphim in David's house, and the worship of Yahweh under the image of a calf was the state religion of the kingdom of Ephraim. Even Moses himself is said to have made a brazen serpent which, down to Hezekiah's time, continued to be worshipped at Jerusalem. It is argued from these facts that image-worship went on unchallenged, and that this would not have been possible had Moses forbidden it. The argument is supported by others of great cogency. Although the literary problems of the chapters which narrate the law-giving on Mt. Sinai are extremely intricate, it is generally agreed that Ex. xx. cannot be ascribed to the

1 It is generally assumed that the_ addition in Exodus is from a hand akin to Gen. ii. 2 sqq. ; Ex. xxxi. 17 (P.).

oldest source, and if, in accordance with ; many critics, this chapter is ascribed to the Elohist or Ephraimite school, its incorporation can scarcely be older than the middle of the 8th century, and is

probably later. With this, the condemnation of adultery in Gen. xx. 1–17 (contrast xii. 10–20, xxvi. 6–n) is in harmony, and the prohibition of the worship of the heavenly bodies is aimed at a form of idolatry which is frequently alluded to in the times of the later kings. The lofty ethics (e.g. tenth commandment) is in itself no sound criterion, whilst the external form of the laws, though characteristic of later codes, need not be taken as evidence of importance. But the general result of a study of the Decalogue as a whole, in connexion with Israelite political history and religion, strongly supports, in fact demands, a post–Mosaic origin, and modern criticism is chiefly divided only as to the approximate date to which it is to be ascribed. The time of Manasseh (cf. especially its contact with Micah vi. 6–8) has found many adherents, but an earlier period, about 750 B.C. (time of Amos and Hosea), is often held to satisfy the main conditions; the former, however, is probably nearer the mark.

The Decalogue of Exodus xxxiv. — In the book of Exodus the words written on the tables of stone are nowhere expressly identified with the ten commandments of chap. xx. In xxv. 16, xxxi. 18, xxxii. 15, we simply read of ” the testimony ” inscribed on the tables, and it seems to be assumed that its contents must be already known to the reader. The expression ” ten words ” first occurs in xxxiv. 28, in a passage which relates the restoration of the tables after they had been broken. But these ” ten words ” are called ” the words of the covenant,” and so can hardly be different from the words mentioned in the preceding verse as those in accordance wherewith the covenant was made with Israel. And again, the words of ver. 27 are necessarily the com- mandments which immediately precede in w. 12–26. Accord- ingly many recent critics have sought to show that Ex. xxxiv. 12–26 contains just ten precepts forming a second decalogue. 2

These consist not of precepts of social morality, but of several laws of religious observance closely

corresponding to the religious and ritual precepts of Ex. xxi.xxiii. The number ten is not clearly made out, and the individual precepts are somewhat variously assigned. They prohibit (1) the worship of other gods, (2) the making of molten images; they ordain (3) the observance of the feast of unleavened bread, (4) the feast of weeks, (5) the feast of ingathering at the end of the year, and (6) the seventh day rest; to Yahweh belong (7) the firstlings, and (8) the first- fruits of the land; they forbid also (9) the offering of the blood of sacrifice with leaven, (10) the leaving-over of the fat of a feast until the morning, and (n) the seething of a kid in its mother's milk. This scheme ignores the command to appear thrice in the year before Yahweh which recapitulates Nos. 3-5, and the decade is obtained by omitting No. 6, which some hold to be out of place. Others include " none shall appear before me empty-handed " (xxxiv. 20), and unite Nos. 4-5, 9 and 10. C. F. Kent (Beginnings of Heb. Hist. pp. 183 sqq.) obtains a decalogue from scattered precepts in Ex. xx.-xxiii., which corresponds with Nos. 2, 7, 6, 3 and 5 (in one), 9 and 10 (in one), n above, and adds (a) the building of an altar of earth (xx. 24), (b) offering from - the harvest and wine-press (xxii. 29), (c) firstlings of animals (xxii. 29 sqq.; cf. No. 7, and xxxiv. 19); (d) prohibition against eating torn flesh (xxii. 31). 3 The so-called Yahwist Decalogue in xxxiv. presupposes a rather more primitive stage in society, partly nomadic and partly agricultural; No. 6 is suitable only for agriculturists and cannot have originated among nomads. The whole may be summed up in a sentence: — " Worship Yahweh and Yahweh alone, without images, let the worship be simple and in accord with the old usage; forbear to introduce the practices of your Canaanitish neighbours" (Harper). It would seem to represent more precisely a Judaean standpoint (cf. the simpler customs of the Rechabites, q.v.).

2 So Hitzig (Ostern und Pfingsten im zweiten Dekalog, Heidelberg, 1838), independently of a previous suggestion of Goethe in 1783, who in turn

appears to have been anticipated by an early Greek writer (Nestle, Zeit. fur alt-test. Wissenschaft (1904), pp. J34 sqq.).

3 See also W. E. Barnes, Journ Theol. Stud. (1905), pp. 557-563.

If such a system of precepts was ever viewed as the basis of the covenant with Israel, it must belong to a far earlier stage of religious development than that of Ex. xx. This is recognized by Wellhausen, who says that our decalogue stands to that of Ex. xxxiv. as Amos stood to his contemporaries, whose whole religion lay in the observance of sacred feasts. To those accustomed to look on the Ten Words written on the tables of stone as the very foundation of the Mosaic law, it is hard to realize that in ancient Israel there were two opinions as to what these ” Words ” were. The hypothesis that Ex. xxxiv. 10-26 origin- ally stood in a different connexion, and was misplaced at some stage in the redaction of the Hexateuch, does not help us, since it would still have to be admitted that the editor to whom we owed the present form of the chapter identified this little code of religious observances with the Ten Words. Were this the case the editor, to quote Wellhausen, ” introduced the most serious internal contradiction found in the Old Testament.” 1

The Decalogue in Christian Theology. — Following the New Testament, in which the ” commandments ” summed up in the law of love are identified with the precepts of the Decalogue (Mark x. 10; Rom. xiii. 9; cf. Mark xii. 28 ff.), the ancient Church emphasized the permanent obligation of the ten com- mandments as a summary of natural in contradistinction to ceremonial precepts, though the observance of .the Sabbath was to be taken in a spiritual sense (Augustine, De spiritu et litera, xiv.; Jerome, De celebratione Paschae). The medieval theo- logians

followed in the same line, recognizing all the precepts of the Decalogue as moral precepts de lege naturae, though the law of the Sabbath is not of the law of nature, in so far as it prescribes a determinate day of rest (Thomas, summa, I ma II dBe , qu. c. art. 3; Duns, Super sententias, lib. iii. dist. 37). The most important medieval exposition of the Decalogue is that of Nicolaus de Lyra; and the 15th century, in which the Decalogue acquired special importance in the confessional, was prolific in treatises on the subject (Antoninus of Florence, Gerson, &c).

Important theological controversies on the Decalogue begin with the Reformation. The question between the Lutheran (Augustiman) and Reformed (Philonic) division of the ten commandments was mixed up with controversy as to the legiti- macy of sacred images not designed to be worshipped. The Reformed theologians took the stricter view. The identity of the Decalogue with the eternal law of nature was maintained in both churches, but it was an open question whether the Decalogue, as such (that is, as a law given by Moses to the Israelites), is of perpetual obligation. The Socinians, on the other hand, regarded the Decalogue as abrogated by the more perfect law of Christ; and this view, especially in the shape that the Decalogue is a civil and not a moral law (J. D. Michaelis), was the current one in the period of 18th-century rationalism. The distinction of a permanent and a transitory element in the law of the Sabbath is found, not only in Luther and Melanchthon, but in Calvin and other theologians of the Reformed church. The main contro- versy which arose on the basis of this distinction was whether the prescription of one day in seven is of permanent obligation. It was admitted that such obligation must be not natural but positive; but it was argued by the stricter Calvinistic divines that the proportion of one in seven is agreeable to nature, based on the order of creation in six days, and in no way specially connected with anything Jewish. Hence it was regarded as a universal positive law of God. But

those who maintained the opposite view were not excluded from the number of the orthodox. The laxer conception found. a place in the Cocceian school.

Literature. — Geftcken, Tiber die verschiedenen Eintheilungen des Dekalogs und den Einfluss derselben auf den Cultus; W. Robertson Smith, Old Test. Jew. Church, pp. 331–345, where his earlier views (1877) in the Ency. Brit, are largely modified (cf. also Eng. Hist. Rev. (1888) p. 352); Montefiore, Hibbert Lectures (1892), Appendix 1; W. R. Harper, Internat. Crit. Comm. on Amos and Hosea, pp. 58–64 (on the position of the Decalogue in early pre-prophetic religion of Israel); C. A. Briggs, Higher Criticism of Hexat. 2 pp. 189–210; see also the references under Exodus. (W. R. S. ; S. A. C.)

1 The last three sentences of this" paragraph are taken almost bodily from Robertson Smith's later views {Old Testament in the Jewish Church, pp. 335 seq.).*

DE CAMP, JOSEPH (1858-), American portrait and figure painter, was born in Cincinnati, Ohio, in 1858. He was a pupil of Frank Duveneck and of the Royal Academy of Munich; became a member of the society of Ten American Painters, and a teacher in the schools of the Pennsylvania Academy of Fine Arts, Philadelphia, and the Boston Museum of Fine Arts; and painted important mural decorations in the Philadelphia city hall.

DECAMPS, ALEXANDRE GABRIEL (1803–1860), French painter, was born in Paris on the 3rd of March 1 803 . In his youth he travelled in the East, and reproduced Oriental life and scenery with a bold fidelity to nature that made his works the puzzle of conventional critics. His powers, however, soon came to be recognized, and he was ranked along with Delacroix and Vernet as one of the leaders of the French school. At the Paris Exhibition of 1855 he received the grand or council medal. Most of his life was passed in the neighbourhood of Paris. He was passionately fond of animals, especially dogs, and indulged in all kinds of field sports. He died

on the 22nd of August i860 in consequence of being thrown from a vicious horse while hunting at Fontainebleau. The style of Decamps was characteristically and intensely French. It was marked by vivid dramatic conception, by a manipulation bold and rapid, sometimes even to roughness, and especially by original and startling use of decided contrasts of colour and of light and shade. His subjects embraced an unusually wide range. He availed himself of his travels in the East in dealing with scenes from Scripture history, which he was probably the first of European painters to represent with their true and natural local background. Of this class were his " Joseph sold by his Brethren," " Moses taken from the Nile," and his scenes from the life of Samson, nine vigorous sketches in charcoal and white. Perhaps the most impressive of his historical pictures is his " Defeat of the Cimbri," representing with wonderful skill the conflict between a horde of barbarians and a disciplined army. Decamps produced a number of genre pictures, chiefly of scenes from French and Algerine domestic life, the most marked feature of which is humour. The same characteristic attaches to most of his numerous animal paintings. He painted dogs, horses, &c, with great fidelity and sympathy; but his favourite subject was monkeys, which he depicted in various studies and sketches with a grotesque humour that could scarcely be surpassed. Probably the best known of all his works is " The Monkey Connoisseurs," a clever satire of the jury of the French Academy of Painting, which had rejected several of his earlier works on account of their divergence from any known standard. The pictures and sketches of Decamps were first made familiar to the English public through the lithographs of Eugene le Rou. See Moreau's Decamps et son ceuvre (Paris, 1869). DECAPOLIS, a league of ten cities (Siica iroXets) with their surrounding district, situated with one exception on the eastern side of the upper Jordan and the Sea of Tiberias. Being essentially a confederation of cities it is impossible precisely to fix Decapolis as a region with definite boundaries. The names of the original ten cities are*

given by Pliny; these are as follows: Damascus, Philadelphia, Raphana, Scythopolis (= Beth-Shan, now Beisan, west of Jordan), Gadara, Hippos, Dion, Pella, Gerasa and Kanatha. Of these Damascus alone retains its importance. Scythopolis (as represented by the village of Beisan) is still inhabited; the ruins of Pella, Gerasa and Kanatha survive, but the other sites are unknown or disputed. Scytho- polis, being in command of the communications with the sea and the Greek cities on the coast, was the most important member of the league. The league subsequently received additions and some of the original ten dropped out. In Ptolemy's enumeration Raphana has no place, and nine, such as Kapitolias, Edrei, Bosra, &c, are added. The purpose of the league was no doubt mutual defence against' the marauding Bedouin tribes that surrounded them. These were hardly if at all checked by the Semitic kinglings to whom the Romans delegated the govern- ment of eastern Palestine. ' It was probably soon after Pompey's campaign in 64-63 B.C. that the Decapolis league took shape. The cities comprising it

were united by the main roads on which they lay, their respective spheres of influence touching, if not overlapping, one another. A constant communication was maintained with the Mediter- ranean ports and with Greece, and there was a vigorous municipal life which found expression in literature, in athletic contests, and in a thriving commerce, thus carrying a, truly Hellenic influence into Perea and Galilee. From Josephus we learn that the cities were severally subject to the governor of Syria and taxed for imperial purposes; some of them afterwards came under Herod's jurisdiction, but reserved the substantial rights granted them by Pompey.

The best account is in G. A. Smith's Historical Geography of the Holy Land, chap, xxviii. (R. A. S.

M.)

DECASTYLE (Gr. 5kna, ten, and otDXoj, column), the archi- tectural term given to a temple where the front portico has ten columns; as in the temple of Apollo Didymaeus at Miletus, and the portico of University College, London. (See Temple.)

DECATUR, STEPHEN (1779–1820), American naval com- mander, was born at Sinnepuxent, Maryland, on the 5th of January 1779, and entered the United States navy as a mid- shipman in 1798. He was promoted lieutenant a year later, and in that rank saw some service in the short war with France. In 1803 he was in command of the " Enterprise," which formed part of Commodore Preble's squadron in the Mediterranean, and in February 1804 led a daring expedition into the harbour of Tripoli for the purpose of burning the U.S. frigate " Philadelphia " which had fallen into Tripolitan hands. He succeeded in his purpose and made his escape under the fire of the batteries with a loss of only one man wounded. This brilliant exploit earned him his captain's commission and a sword of honour from Congress. Decatur was subsequently engaged in all the attacks on Tripoli between 1804 and 1805. In the War of 1812 his ship the " United States " captured H.M.S. " Macedonian " after a desperate fight, and in 1813 he was appointed commodore to command a squadron in New York harbour, which was soon blockaded by the British. In an attempt to break out in February 1815 Decatur's flagship the " President " was cut off and after a spirited fight forced to surrender to a superior force. Subse- quently he commanded in the Mediterranean against the corsairs of Algiers, Tunis and Tripoli with great success. On his return he was made a navy commissioner (November 1815), an office which he held until his death, which took place in a duel with Commodore James Barron at Bladensburg, Md., on the 22nd of March 1820.

See Mackenzie, Life of Decatur (Boston, 1846).

DECATUR, a city and the county-seat of Macon county, Illinois, U.S.A., in the central part of the state,*

near the Sangamon river, about 39 m. E. of Springfield. Pop. (1890) 16,841; (1900) 20,754, of whom 1939 were foreign-born; (1910 census) 31,140. Decatur is served by the Cincinnati, Hamilton & Dayton, the Illinois Central, the Wabash (which maintains car shops here), and the Vandalia railways, and is connected with Danville, Saint Louis, Springfield, Peoria, Bloomington and Champaign by the Illinois Traction System (electric). Decatur has three large parks and a public library; and S.E. of Fairview Park, with a campus of 35 acres, is the James Millikin University (co-educational; Cumberland Presbyterian), founded in 1901 by James Millikin, and opened in 1903. The university com- prises schools of liberal arts, engineering (mechanical, electrical, and civil), domestic economy, fine and applied arts, commerce and finance, library science, pedagogy, music, and a preparatory school; in 1907-1908 it had 936 students, 440 being in the school of music. Among the city's manufactures are iron, brass castings, agricultural implements, flour, Indian corn products, soda fountains, plumbers' supplies, coffins and caskets, bar and store fixtures, gas and electric light fixtures, street cars, and car trucks. The value of the city's factory products'increased from $5,133,677 in 1900 to $8,667,302 in 1905, or 68.8 %. The city is also an important shipping point for agricultural products (especially grain), and for coal taken from the two mines in the city and from mines in the surrounding country. The first settlement in Decatur was made in 1829, and the place was incorporated in 1836. On

the 22nd of February 1856 a convention of Illinois editors met at Decatur to determine upon a policy of opposition to the Kansas-Nebraska Bill. They called a state convention, which met at Bloomington, and which is considered to have taken the first step toward founding the Republican party in Illinois.

DECAZES, El.IE,Duc (1780-1860), French statesman, was born at Saint Martin de Laye in the Gironde. He studied law, became a judge in the tribunal of the Seine in 1806, was attached to the cabinet of Louis

Bonaparte in 1807, and was counsel to the court of appeal at Paris in 181 1. Immediately upon the fall of the empire he declared himself a Royalist, and remained faithful to the Bourbons through the Hundred Days. He made the personal acquaintance of Louis XVIII. during that period through Baron Louis, and the king rewarded his energy and tact by appointing him prefect of police at Paris on the 7th of July 1815. His marked success in that difficult position won for him the ministry of police, in succession to Fouche, on the 24th of September. In the interval he had been elected deputy for the Seine (August 181 5) and both as deputy and as minister he led the moderate Royalists. His formula was " to royalize France and to national- ize the monarchy." The Moderates were in a minority in the chamber ofi8i5,but Decazes persuaded Louis XVIII. to dissolve the house, and the elections of October 18 16 gave them a majority. During the next four years Decazes was called upon to play the leading r61e in the government. At first, as minister of police he had to suppress the insurrections provoked by the ultra- Royalists (the White Terror) ; then, after the resignation of the due de Richelieu, he took the actual direction of the ministry, although the nominal president was General J. J. P. A. Dessolle (1767-1828). He held at the same time the portfolio of the interior. The cabinet, in which Baron Louis was minister of finance, and Marshal Gouvion Saint Cyr remained minister of war, was entirely Liberal; and its first act was to suppress the ministry of police, as Decazes held that it was incompatible with the regime of liberty. His reforms met with the strong hostility of the Chamber of Peers, where the ultra-Royalists were in a majority, and to overcome it he got the king to create sixty new Liberal peers. He then passed the laws on the press, suppressing the censorship. By reorganization of the finances, the protection of industry and the carrying out of great public works, France regained its economic prosperity, and the ministry became popular. But the powers of the Grand Alliance had been watch- ing the growth of Liberalism in France with increasing anxiety. Metternich especially

ascribed this mainly to the " weakness " of the ministry, and when in 1819 the political elections still further illustrated this trend, notably by the election of the celebrated Abb6 Gregoire, it began to be debated whether the time had not come to put in force the terms of the secret treaty of Aix-la-Chapelle. It was this threat of foreign intervention, rather than the clamour of the " Ultras," that forced Louis XVIII. to urge a change in the electoral law that should render such a " scandal " as Gregoire's election impossible for the future. Dessolle and Louis, refusing to embark on this policy, now resigned; and Decazes became head of the new ministry, as president of the council (November 1819). But the exclusion of Gregoire from the chamber and the changes in the franchise embittered the Radicals without conciliating the " Ultras." The news of the revolution in Spain in January 1820 added fuel to their fury; it was the foolish and criminal policy of the royal favourite that had once more unchained the demon of revolution. Decazes was denounced as the new Sejanus, the modern Catiline; and when, on the 13th of February, the duke of Berry was murdered, clamorous tongues loudly accused him of being an accomplice in the crime. Decazes, indeed, foreseeing the storm, at once placed his resignation in the king's hands. Louis at first refused. " They will attack," he' exclaimed, " not your system, my dear son, but mine." But in the end he was forced to yield to the importunity of his family (February 17th); and Decazes, raised to the rank of duke, passed into honourable exile as ambassador to Great Britain.

This ended Decazes's meteoric career of greatness. In December 182 1 he returned to sit in the House of Peers, when

Le continued to maintain his Liberal opinions. After 1830 he adhered to the monarchy of July, but after

1848 he remained in retirement. He had organized in 1826 a society to develop the coal and iron of the Aveyron, and the name of Decazeville was given in 1829 to the principal centre of the industry. He died on the 24th of October i860.

His son, Louis Charles Elie Decazes, due de Glucksberg (1819–1886), was born at Paris, and entered the diplomatic career. He became minister plenipotentiary at Madrid and at Lisbon, but the revolution of 1848 caused him to withdraw into private life, from which he did not emerge until in 1871 he was elected deputy to the National Assembly by the Gironde. There he sat in the right centre among the Orleanists, and was chosen by the due de Broglie as minister of foreign affairs in November 1873. He voted with the Orleanists the ” Constitutional Laws ” of 1875, and approved of MacMahon’s parliamentary coup d’ etat on the 1 6th of May 1877. He was re-elected deputy in October 1877 by the arrondissement of Puget-Theniers, but his election was annulled by the chamber, and he was not re-elected. He died on the 16th of September 1886.

On the Due Decazes see E. Daudet, Louis X VIII. et le due Decazes (1 899) , and his ‘ ‘ L’ambassade du due Decazes ‘ ‘ in the Revue des deux mondes for 1899.

DECAZEVILLE, a town of south-central France, in the department of Aveyron, 34 m. N.W. of Rodez by the Orleans railway. Pop. (1906) 9749. It possesses iron mines and is the centre of the coal-fields of the Aveyron, which supply the iron- works established by the Due Decazes, minister of Louis XVIII. A statue commemorates the founder.

DECCAN (Sans. Dakshina, ” the South “), a name applied, according to Hindu geographers, to the whole of the territories in India situated to the south of the river Nerbudda., In its more modern acceptation, however, it is sometimes understood as comprising only the country lying between that river and the Kistna, the latter having for a long period

formed the southern boundary of the Mahommedan empire of Delhi. Assigning it the more extended of these limits, it comprehends the whole of the Indian peninsula, and in this view the mountainous system, consisting of the Eastern and Western Ghats, constitutes the most striking feature of the Deccan. These two mountain ranges unite at their northern extremities with the Vindhya chain of mountains, and thus is formed a vast triangle supporting at a considerable elevation the expanse of table-land which stretches from Cape Comorin to the valley of the Nerbudda. The surface of this table-land slopes from west to east, as indicated by the direction of the drainage of the country, — the great rivers, the Cauvery, Godavari, Kistna and Pennar, though deriving their sources from the base of the Western Ghats, all finding their way into the Bay of Bengal through fissures in the Eastern Ghats.

History. — The detailed and authentic history of the Deccan only begins with the 13th century a.d. Of the early history the main facts established are the Aryan invasion (c. 700 B.C.), the growth of the Maurya empire (250 B.C.) and the invasion (a.d. 100) of the Scythic tribes known as the Sakas, Pahlavas and Yavanas, which led to the establishment of the power of the Kshaharata satraps in western India. In addition to this, modern study of monuments and inscriptions has recovered the names, and to a certain extent the records, of a succession of dynasties ruling in the Deccan ; of these the most conspicuous are. the Cholas, the Andhras or Satavahanas, the Chalukyas, the Rashtrakutas and the Yadavas of Devagiri (Deogiri). (See India: History; Bombay Presidency: History; Inscriptions: Indian.) In 1294 Ala-ud-Din Khilji, emperor of Delhi, invaded the Deccan, stormed Devagiri, and reduced the Yadava rajas of Maharashtra to the position of tributary princes (see Daulatabad), then proceeding southward overran Telingana and Carnata (1294-1300). With this event the continuous history of the Deccan begins. In 1307, owing to non-payment of tribute, a fresh series of Mussulman incursions began, under Malik Kafur, issuing in the final ruin of the Yadava

power; and in 1338 the reduction of the Deccan was completed

by Mahommed ben Tughlak. The imperial sway was, however, of brief duration. Telingana and Carnata speedily reverted to their former masters ; and this defection on the part of the Hindu states was followed by a general revolt of the Mussulman governors, resulting in the establishment in 1347 of the independ- ent Mahommedan dynasty of Bahmani, and the consequent withdrawal of the power of Delhi from the territory south of the Nerbudda. In the struggles which ensued, the Hindu kingdom of Telingana fell bit by bit to the Bahmani dynasty, who advanced their frontier to Golconda in 1373, to Warangal in 1421, and to the Bay of Bengal in 1472. On the dissolution of the Bahmani empire (1482), its dominions were distributed into the five Mahommedan states of Golconda, Bijapur, Ahmednagar, Bidar and Berar. To the south of these the great Hindu state of Car- nata or Vijayanagar still survived; but this, too, was destroyed, at the battle of Talikota (1565), by a league of the Mahommedan powers. These latter in their turn soon disappeared. Berar had already been annexed by Ahmednagar in 1572, and Bidar was absorbed by Bijapur in 1609. The victories of the Delhi emperors, Akbar, Shah Jahan and Aurangzeb, crushed the rest. Ahmednagar was incorporated in the Mogul empire in 1598, Bijapur in 1686, and Golconda in 1688. The rule of the Delhi emperors in the Deccan did not, however, long survive. In 1706 the Mahrattas acquired the right of levying tribute in southern India, and their principal chief, the Peshwa of Poona, became a practically independent sovereign. A few years later the emperor's viceroy in Ahmednagar, the nizam-al-mulk, threw off his allegiance and established the seat of an independent government at Hyderabad (1724). The remainder of the imperial possessions in the peninsula were held by chieftains acknowledging the supremacy of one or other of these two potentates. In the sequel, Mysore became the prize of the Mahommedan usurper Hyder AH. During the contests for power which ensued about the middle of

the 18th century between the native chiefs, the French and the English took opposite sides. After a brief course of triumph, the interests of France declined, and a new empire in India was established by the British. Mysore formed one of their earliest conquests in the Deccan. Tanjore and the Carnatic were shortly after annexed to their dominions. In 1818 the forfeited possessions of the Peshwa added to their extent ; and these acquisitions, with others which have more recently fallen to the paramount power by cession, conquest or failure of heirs, form a continuous territory stretching from the Nerbudda to Cape Comorin. Its length is upwards of 1000 m., and its extreme breadth exceeds 800. This vast tract comprehends the chief provinces now distributed between the presidencies of Madras and Bombay, together with the native states of Hyderabad and Mysore, and those of Kolhapur, Sawantwari, Travancore, Cochin and the petty possessions of France and Portugal.

See J. D. B. Gribble, History of the Deccan (1896); Prof. Bhand- arkar, " Early History of the Dekkan " (Bombay Gazetteer) ; Vincent A. Smith, Early History of India (2nd ed., Oxford, 1908), chap. xv. " The Kingdoms of the Deccan."

DECELEA (Gr. AtKeXda), an Attic deme, on the pass which led over the east end of Mt. Parnes towards Oropns and Chalcis. From its position it has a commanding view over the Athenian plain. Its eponymous "i

See Peloponnesian War ; also Judeich in Pauly-Wissowa, Realencyclopddie.

DECEMBER (Lat. decern, ten) , the last month of the year. In the Roman calendar, traditionally ascribed to Romulus, the year was divided into ten months, the last of which was called Decem- ber, or the tenth month, and this name, though etymologically

incorrect, was retained for the last or twelfth month of the year as now divided. In the Romulian calendar December had thirty days ; Numa reduced the number to twenty-nine ; Julius Caesar added two days to this, giving the month its present length. The Saturnalia occurred in December, which is therefore styled ” acceptus geniis ” by Ovid {Fasti, iii. 58) ; and this also explains the phrase of Horace ” libertate Decembri utere ” (Sat. ii. 7). Martial applies to the month the epithet canus (hoary), and Ovid styles it gelidus (frosty) and fumosus (smoky). In the reign of Commodus it was temporarily styled Amazonius, in honour of the emperor’s mistress, whom he had had painted as an Amazon. The Saxons called it winter-monath, winter month, and heligh-monath, holy month, from the fact that Christmas fell within it. Thus the modern Germans call it Christmonat. The 22nd of December is the date of the winter solstice, when the sun reaches the tropic of Capricorn.

DECEMVIRI (” the ten men “), the name applied by the Romans to any official commision of ten. The title was often followed by a statement of the purpose for which the commission was appointed, e.g. Xviri legibus scribundis , stlitibus judicandis, sacris faciundis.

I. Apart from such qualification, it signified chiefly the tempo- rary commission which superseded all the ordinary magistrates of the Republic from 451 to 449 B.C., for the purpose of drawing up a code of flaws. In 462 B.C. a tribune proposed that the appointment of a commission to draw up a code expressing the legal ‘principles of the administration was necessary to secure for the plebs a hold over magisterial caprice. Continued agitation to this effect resulted in an agreement in 452 B.C. between patricians and plebeians that decemvirs should be appointed to draw up a code, that during their tenure of office all other magistracies should be in abeyance, that they should not be subject to appeal, but that they should be bound to maintain the laws which guaranteed by religious sanctions the rights of the plebs. The first board of decemvirs (apparently consisting wholly of patricians) was

appointed to hold office during 451 B.C. ; and the chief man among them was Appius Claudius. Livy (iii. 32) says that only patricians were eligible. Mommsen, however, held that plebeians were legally eligible, though none were actually appointed for 451. The decemvirs ruled with singular moderation, and submitted to the Comitia Centuriata a code of laws in ten headings, which was passed. So popular were the decemvirs that another board of ten was appointed for the following year, some of whom, if the extant list of names is correct, were certainly plebeians. These added two more to the ten laws of their predecessors, thus completing the Laws of the Twelve Tables (see Roman Law). But their rule then became violent and tyrannical, and they fell before the fury of the plebs, though for some reason, not easily understood, they continued to have the support of the patricians. They were forced to abdicate (449 B.C.), and the ordinary magistrates were restored.

II. The judicial board of decemvirs (stlitibus judicandis) formed a civil court of ancient origin concerned mainly with questions bearing on the status of individuals. They were originally a body of jurors which gave a verdict under the presidency of the praetor (q.v.), but eventually became annual minor magistrates of the Republic, elected by the Comitia Tributa.

III. The priestly board of decemvirs (sacris faciundis) was an outcome of the claim of the plebs to a share in the administration pf the state religion. Five of the decemvirs were patricians, and five plebeians. They were first appointed in 367 B.C. instead of the patrician duumviri who had hitherto performed these duties. The board was increased to fifteen in the last century of the Republic Its chief function was the care of the Sibylline books, and the celebration of the games of Apollo (Livy x. 8) and the Secular –Games (Tac. Ann. xi. 11).

IV. Decemvirs were also appointed from time to time to control the distribution of the public land

(agris dandis adsi- gnandis; see Agrarian Laws).

' BibLiography. — B. G. Niebuhr, History of Rome (Eng. trans.), & $og»et seq. (Cambridge, 1832) ; Tb. Mommsen, History of Rome ,

bk. ii. c. 2, vol. i. pp. 361 et seq. (Eng. trans., new ed., 1894); Romisches Staatsrecht, ii. 605 et seq., 714 (Leipzig, 1887); A. H. J. Greenidge, Legal Procedure of Cicero's Time, p. 40 et seq., 263 (Oxford, 1901); J. Muirhead, Private Law of Rome, p. 73 et seq. (London, 1899); Pauly-Wissowa, Realencyclopadie, iv. 2256 et seq. (Kubler). (A. M. Cl.)

DECHEN, ERNST HEINRICH KARL VON, German geologist, was born in Berlin on the 25th of March 1800, and was educated in the university in that city. He subsequently studied mining in Bochum and Essen, and was in 1820 placed in the mining department of the Prussian state, serving on the staff until 1864, and becoming director in 1841 when he was stationed at Bonn. In early years he made journeys to study the mining systems of other countries, and with this object he visited England and Scotland in company with Karl von Oeynhausen (1797- 1865). In the course of his work he paid special attention to the coal-formation of Westphalia and northern Europe generally, and he greatly furthered the progress made in mining and metallurgical works in Rhenish Prussia. He made numerous contributions to geological literature; notably the following: — Geognostische Umrisse der Rheinlander zwischen Basel und Mainz mit besonderer Rucksicht auf das Vorkommen des Steinsahes (with von Oeynhausen and La Roche), 2 vols. (Berlin, 1825).; Geognostische Fiihrer in das Siebengebirge am Rhein (Bonn, 1861); Die nutzbaren Miner alien und Gebirgsarten im deutschen Reiche (1873). But his main work was a geological map of Rhenish Prussia and Westphalia in 35 sheets on the scale of 1: 80,000, issued with two volumes of explanatory text (1855-1882). He published also a small geological map of Germany (1869). He died at Bonn on the 15th of February 1889. (H. B. W.)

DECIDUOUS (from Lat. decider e, to fall down), a botanical and zoological term for ” falling in season,” as of petals after flowering, leaves in autumn, the teeth or horns of animals, or the wings of insects.

DECIMAL COINAGE. 1 Any currency in which the various denominations of coin are arranged in multiples or submultiples of ten (Lat. decern), with reference to a standard unit, is a decimal system. Thus if the standard unit be 1 the higher coins will be 10, 100, 1000, &c, the lower -i, -oi, -ooi, &c. In a perfect system there would be no breaks or interpolations, but the actual currencies described as ” decimal ” do not show this rigid symmetry. In France the standard unit — the franc — has the 10 franc and the 100 franc pieces above it; the 10 centime below it; there are also, however, 50 franc, 20 franc, 5 franc, 2 franc pieces as well as 50 and 20 centime ones. Similar irregularities occur in the German and United States coinages, and indeed in all countries in which a decimal system has been established. Popular convenience has compelled this departure from the strict decimal form.

Subject to these practical modifications the leading countries of the world (Great Britain and India are the chief exceptions) have adopted decimal coinage. The United States led the way (1786 and 1792) with the dollar as the unit, and France soon followed (1799 and 1803), her system being extended to the countries of the Latin Union (1865). The German empire (1873), the Scandinavian States(i875),Austria-Hungary (i87o,developed in 1892) and Russia (1839 and 1897) are further adherents to the decimal system. The Latin- American countries and Japan (1871) have also adopted it.

In England proposals for decimalizing the coinage have long been under discussion at intervals. Besides the inconvenience of altering the established currency, the difficulty of choosing between the different schemes propounded has been a consider- able obstacle. One plan took the farthing as a base: then 10 farthings=i doit (2§d.), 10

doits=i florin (2s. id.), 10 florins = 1 pound (20s. iod.). The advantages claimed for this scheme were (1) the preservation of the smaller coins (the penny = 4 farthings); and (2) the avoidance of interference with the smaller retail prices. Its great disadvantage was the destruction of the existing unit of value — the pound — and the consequent disturbance of all accounts. A second proposal would retain the pound as unit and the florin, but would subdivide the latter into 1 For " decimal " in general see Arithmetic.

100 " units " (or farthings reduced 4 %) and introduce a new coin = 10 units (2.4d.). By it the unit of account would remain as at present, and the shilling (as 50 units) would continue in use. The alteration of the bronze and several silver coins, and the need of readjusting all values and prices expressed in pence, formed the principal difficulties. A third scheme, which was connected with the assimilation of English to French and American money, proposed the establishment of an 8s. gold coin as unit, with the tenpenny or franc and the penny (reduced by 4 %) as sub- divisions. The new coin would be equivalent to 10 francs or (by an anticipated reduction of the dollar) 2 dollars. None of these plans has gained any great amount of popular support.

For the general question of monetary scales see Money, and for the decimal system in reference to weights and measures see Metric System and Weights and Measures. (C. F. B.)

DECIUS, GAIUS MESSIUS QUINTUS TRAJANUS (201.251), Roman emperor, the first of the long succession of distinguished men from the Illyrian provinces, was born at Budalia near Sirmium in lower Pannonia in a.d. 201. About 245 the emperor Philip the Arabian entrusted him with an important command on the Danube, and in 249 (or end of 248), having been sent

to put down a revolt of the troops in Moesia and Pannonia, he was forced to assume the imperial dignity. He still protested his loyalty to Philip, but the latter advanced against him and was slain near Verona. During his brief reign Decius was engaged in important operations against the Goths, who crossed the Danube and overran the districts of Moesia and Thrace. The details are obscure, and there is considerable doubt as to the part taken in the campaign by Decius and his son (of the same name) respect ively. • The Goths were surprised by the emperor while besieging Nicopolis on the Danube; at his approach they crossed the Balkans, and attacked Philippopolis. Decius followed them, but a severe defeat near Beroe made it impossible to save Philippopolis, which fell into the hands of the Goths, who treated the conquered with frightful cruelty. Its commander, Priscus, declared himself emperor under Gothic protection. The siege of Philippopolis had so exhausted the numbers and resources of the Goths, that they offered to surrender their booty and prisoners on condition of being allowed to retire unmolested. But Decius, who had succeeded in surrounding them and hoped to cut off their retreat, refused to entertain their proposals. The final engagement, in which the Goths fought with the courage of despair, took place on swampy ground in the Dobrudja near Abritum (Abrittus) or Forum Trebonii and ended in the defeat and death of Decius and his son. Decius was an excellent soldier, a man of amiable disposition, and a capable adminis- trator, worthy of being classed with the best Romans of the ancient type. The chief blot on his reign was the systematic and authorized persecution of the Christians, which had for its object the restoration of the religion and institutions of ancient Rome. Either as a concession to the senate, or perhaps with the idea of improving public morality, Decius endeavoured to revive the separate office and authority of the censor. The choice was left to the senate, who unanimously selected Valerian (afterwards emperor) . But Valerian, well aware of the dangers and difficulties attaching to the office at such a time, declined the

responsibility. The invasion of the Goths and the death of Decius put an end to the abortive attempt.

See Aurelius Victor, De Caesaribus, 29, Epit. 29; Jordanes, De rebus Geticis, 18; fragments of Dexippus, in C. W. Miiller, Frag. Hist. Graec. iii. (1849); Gibbon, Decline and Fall, chap. 10; H. Schiller, Geschichte der rbmischen Kaiserzeit, i. (pt. 2), 1883.

DECIZE, a town of central France, in the department of Nievre, on an island in the Loire, 24 m. S.E. of Nevers by the Paris-Lyon railway. Pop. (1906) 3813. The most important,of its buildings is the church of Saint Are, which dates in part from the nth and 12th centuries; there are also ruins of. a castle of the counts of Nevers. The town has a statue of Guy Coquille, the lawyer and historian, who was born there in 1523. Decize is situated at the starting-point of the Nivernais canal. The coal mine of La Machine, which belongs to the Schneider Company of Le Creusot, lies four miles to the north. The industries of Decize and its suburbs on both banks of the Loire include the working of gypsum

and lime, and. the manufacture of ceramic products and glass. Trade is in horses from the Morvan, cattle, coal, iron, wood and stone.

Under the name of Decetia the place is mentioned by Julius Caesar as a stronghold of the Aedui, and in 52 B.C. was the scene of a meeting of the senate held by him to settle the leadership of the tribe and to reply to his demand for aid against Vercingetorix. In later times it belonged to the counts of Nevers, from whom it obtained a charter of franchise in 1226.

DECKER, SIR MATTHEW, Bart. (1679-1749), English merchant and writer on trade, was born in Amsterdam in 1679. He came to London in 1702 and established himself there as a merchant. He was remarkably successful in his business life, gaining great wealth and having many honours conferred upon him. He was a director of the East India Company, sat in

parliament for' four years as member for Bishops Castle, and was high sheriff of Surrey in 1729. He was created a baronet by George I. in 1716. Decker's fame as a writer on trade rests on two tracts. The first, Serious considerations on the several high duties which the Nation in general, as well as Trade in particular, labours under, with a proposal for preventing the removal of goods, discharging the trader from any search, and raising all the Publick Supplies by one single Tax (1743; name affixed to 7 th edition, 1756), proposed to do away with customs duties and substitute a tax upon houses. He also suggested taking the duty off tea and putting instead a licence duty on households wishing to consume it. The second, an Essay on the Causes of the Decline of the Foreign Trade, consequently of the value of the lands in Britain, and on the means to restore both (1744), has been attributed to W. Richardson, but internal evidence is strongly in favour of Decker's authorship. He advocates the licence plan in an extended form; urges the repeal of import duties and the abolition of bounties, and, in general, shows himself such a strong supporter of the doctrine of free trade as to rank as one of the most important forerunners of Adam Smith. Decker died on the 18th of March 1749.

DECKER, PIERRE DE (1812–1891), Belgian statesman and author, was educated at a Jesuit school, studied law at Paris, and became a journalist on the staff of the Revue de Bruxelles. In 1839 he was elected to the Belgian lower chamber, where he gained a great reputation for oratory. In 1855 he became minister of the interior and prime minister, and attempted, by a combination of the moderate elements of the Catholic and Liberal parties, the impossible task of effecting a settlement of the educational and other questions by which Belgium was distracted. In 1866 he retired from politics and went into business, with disastrous results. He became involved in financial speculations which lost him his good name as well as the greater part of his fortune ; and, though he was never proved to have been more than the victim of clever operators, when in 187 1 he was

appointed by the Catholic cabinet governor of Limburg, the outcry was so great that he resigned the appointment and retired definitively into private life. He died on the 4th of January 1891. Decker, who was a member of the Belgian academy, wrote several historical and other works of value, of which the most notable are Etudes historiques et critiques sur lei monts-de-piiti en Belgique (Brussels, 1844); De I'influence du libre arbitre de I'homme sur les faits sociaux (1848); L' Esprit de parti et V esprit national (1852); Etude politique sur le vicomteCh. Vilain XIIII (1879); Episodes de I'hist. de I'art en Belgique (1883); Biographic -de H. Conscience (1885).

DECLARATION (from La't. declarare, to make fully clear, clarus), formerly, in an action at English law, the first step in pleading— the precise statement of the matter in respect of which the plaintiff sued. It was divided into counts, in each of which a specific cause of action was alleged, in wide and gentral terms, and the same acts or omissions might be stated in several counts as different causes of actions. Under the system of pleading established by the Judicature Act 1875, the declaration has been superseded by a statement of claim setting forth the facts on which the plaintiff relies. Declarations are now in use only in the mayor's court of London and certain local courts of record,

and in those of the United States and the British colonies in which the Common Law system of pleading survives. In the United States a declaration is termed a " complaint," which is the first pleading in an action. It is divided into parts, — the title of the court and term; the venue or county in which the facts are alleged to have occurred; the commencement, which contains a statement of the names of the parties and the char- acter in which they appear; the statement of the cause of action;

and the conclusion or claim for relief. (See Pleading.)

The term is also used in other English legal connexions; e.g. the Declaration of Insolvency which, when filed in the Bankruptcy Court by any person unable to pay his debts, amounts to an act of bankruptcy (see Bankruptcy) ; the Declaration of Title, for which, when a person apprehends an invasion of his title to land, he may, by the Declaration of Title Act 1862, petition the Court of Chancery (see Land Registration) ; or the Declaration of Trust, whereby a person acknowledges that property, the title of which he holds, belongs to another, for whose use he holds it; by the Statute of Frauds, declarations of trust of land must be evidenced in writing and signed by the party declaring the trust. (See Trusts.) By the Statutory Declarations Act 1835 (which was an act to make provision for the abolition of unnecessary oaths, and to repeal a previous act of the same session on the same subject), various cases were specified in which a solemn declaration was, or might be, substituted for an affidavit. In nearly all civilized countries an affirmation is now permitted to those who object to take an oath or upon whose conscience an oath is not binding. (See Affidavit; Oath.)

An exceptional position in law is accorded to a Dying or Death- bed Declaration. As a general rule, hearsay evidence is excluded on a criminal charge, but where the charge is one of homicide it is the practice to admit dying declarations of the deceased with respect to the cause of his death. But before such declara- tions can be admitted in evidence against a prisoner, it must be proved that the deceased when making the declaration had given up all hope of recovery. Unsworn declarations as to family matters, e.g. as to pedigree, may also be admitted as evidence, as well as declarations made by deceased persons in the course of their duty. (See Evidence.)

DECLARATION OF PARIS, a statement of principles of

international law adopted at the conclusion (16th of April 1856) of the negotiations for the treaty of Paris at the suggestion of Count Walewski, the French plenipotentiary. The declaration set out that maritime law in time of war had long been the subject of deplorable disputes, that the uncertainty of the rights and duties in respect of it gave rise to differences of opinion between neutrals and belligerents which might occasion serious difficulties and even conflicts, and that it was consequently desirable to agree upon some fixed uniform rules. The pleni- potentiaries therefore adopted the four following principles: —

I. Privateering is and remains abolished; 2. The neutral flag covers enemy's goods, with the exception of contraband of war; 3. Neutral goods, with the exception of contraband of war, are not liable to capture under the enemy's flag; 4. Blockades, in order to be binding, must be effective, that is to say, maintained by a force sufficient really to prevent access to the coast of the enemy.

They also undertook to bring the declaration to the knowledge of the states which had not taken part in the congress of Paris and to invite them to accede to it. The text of the declaration concluded as follows: — " Convinced that the maxims which they now proclaim cannot but be received with gratitude by the whole world, the undersigned plenipotentiaries doubt not that the efforts of their governments to obtain the general adoption thereof will be crowned with full success."

The declaration is of course binding only on the powers which adopted it or have acceded to it. The majority which adopted it consisted of Great Britain, Austria, France, Prussia, Russia, Sardinia and Turkey. The United States government declined to sign the declaration on the ground that, not possessing a great navy, they would be obliged in time of war to rely largely upon merchant ships commissioned as war vessels, and that therefore the abolition of privateering would be entirely in

favour of European powers, whose large navies rendered them practically

independent of such aid. All other maritime states acceded to the declaration except Spain, Mexico 1 and Venezuela.

Although the United States and Spain were not parties to the declaration, both, during the Spanish-American War, observed its principles. The Spanish government, however, expressly gave notice that it reserved its right to issue letters of marque. At the same time both belligerents organized services of auxiliary cruisers composed of merchant ships under the command of naval officers. In how far this might operate as a veiled revival of the forbidden practice has now ceased to be a matter of much importance, the Hague Conference having adopted a series of rules on the subject which may be said to interpret the first of the four principles of the declaration with such precision as to take its place.

The New Convention on the subject (October 18th, 1907) sets out that, in view of the incorporation in time of war of merchant vessels in combatant fleets, it is desirable to define the conditions under which this can be effected, that, nevertheless, the con- tracting powers, not having been able to come to an understand- ing on the question whether the transformation of a merchant ship into a war vessel may take place on the high sea, 2 are agreed that the question of the place of transformation is in no way affected by the rules adopted, which are as follows : —

Art. i. No merchant ship transformed into a war vessel can have the rights and obligations attaching to this condition unless it is placed under the direct authority, the immediate control and the responsibility of the power whose flag it carries.

Art. ii. Merchant ships transformed into war vessels must bear the distinctive external signs of war vessels of their nationality.

Art. iii. The officer commanding must be in the service of the state, and properly commissioned by the competent authorities. His name must appear in the list of officers of the combatant fleet.

Art. iv. The crew must be subject to the rules of military discipline.

Art. v. Every merchant ship transformed into a war vessel is bound to conform, in its operation, to the laws and customs of war.

Art. vi. The belligerent who transforms a merchant ship into a war vessel must, as soon as possible, mention this transformation on the list of vessels belonging to its combatant fleet.

Art. vii. The provisions of the present convention are only applic- able as among the contracting powers and provided the belligerents are all parties to the convention.

See T. Gibson Bowles, Declaration of Paris (London, 1900) ; Sir T. Barclay, Problems of International Practice and Diplomacy (London, 1907), chap. xv. 2 . (T. Ba.)

DECLARATOR, in Scots law, a form of action by which some right of property, or of servitude, or of status, or some inferior right or interest, is sought to be judicially declared.

DECLINATION (from Lat. declinare, to decline), in magnetism the angle between true north and magnetic north, i.e. the variation between the true meridian and the magnetic meridian. In 1596 at London the angle of declination was 11° E. of N., in 1652 magnetic north was true north, in 1815 the magneti' needle pointed 24!° W. of N., in 1891 18° W., in 1896 17 56' W. and in 1906 17 45'. The angle is gradually diminishing and the declination will in time again be o°, when it will slowly increase in an easterly direction, the north magnetic pole oscillating slowly around the North Pole. Regular daily changes of declination also occur. Magnetic

storms cause irregular variations sometimes of one or two degrees. (See Magnetism, Terrestrial.)

In astronomy the declination is the angular distance, as seen from the earth, of a heavenly body from the celestial equator, thus corresponding with terrestrial latitude.

DECOLOURIZING, in practical chemistry and chemical technology, the removal of coloured impurities from a substance. The agent most frequently used is charcoal, preferably prepared from blood, which when shaken with a coloured solution fre- quently precipitates the coloured substances' leaving the solution clear. Thus the red colour of wines may be removed by filtering the wine through charcoal; the removal of the dark-coloured

'At the 7th plenary sitting of the second Hague Conference (September 7th, 1907) the chiefs of the Spanish and Mexican dele- gations, M. de Villa Urratia and M. de la Barra, announced the determination of their respective governments to accede to the Declaration of Paris.

2 This relates to the incident in the Russo-Japanese War of the transformation of Russian vessels which had passed through the Dardanelles unarmed.

imparities which arise in the manufacture of sugar may be similarly effected. Other " decolourizers " are sulphurous acid, permanganates and manganates, all of which have received application in the sugar industry.

DECORATED PERIOD, in architecture, the term given by Richman to the second pointed or Gothic style, 1307-1377. It is characterized by its window tracery, geometrical at first and flowing in the later period, owing to the omission of the circles in the tracery of windows, which led to the juxtaposition of the foliations and their pronounced

curves of contre-flexure. This flowing or flamboyant tracery was introduced in the first quarter of the century and lasted about fifty years. The arches are generally equilateral, and the mouldings bolder than in the Early English, with less depth in the hollows and with the fillet largely used. The ball flower and a four-leaved flower take the place of the dog-tooth, and the foliage in the capitals is less conventional than in Early English and more flowing, and the diaper patterns in walls are more varied. The principal examples are those of the east end of Lincoln and Carlisle cathedral; the west fronts of York and Lichfield; the crossing of Ely cathedral, including the lantern and three west bays of choir and the Lady Chapel; and Melrose Abbey. (R. P. S.)

DE COSTA, BENJAMIN FRANKLIN (1831-1004), American clergyman and historical writer, was born in Charlestown, Massachusetts, on the 10th of July 1851. He graduated in 1856 at the Biblical Institute at Concord, New Hampshire (now a part of Boston University), became a minister in the Episcopal Church in 1857, and during the next three years was a rector first at North Adams, and then at Newton Lower Falls, Mass. After serving as chaplain in two Massachusetts regiments during the first two years of the Civil War, he became editor (1863) of The Christian Times in New York, and subsequently edited The Episcopalian and The Magazine of American History. He was rector of the church of St John the Evangelist in New York city from 1 88 1 to 1899, when he resigned in consequence of being converted to Roman Catholicism. He was one of the organizers and long the secretary of the Church Temperance Society, and founded and was the first president (1884-1899) of the American branch of the White Cross Society. He became a high authority on early American cartography and the history of the period of exploration. He died in New York city on the 4th of November 1904. In addition to numerous monographs and valuable contributions to Winsor's Narrative and Critical History of America, he published The Pre-Columbian Discovery of America by the Northmen (1868); The Northmen in Maine (1870); The Moabite

Stone (187 1); The Rector of Roxburgh (1871), a novel under the nom de plume of ” William Hickling “; and Verrazano the Explorer; being a Vindication of his Letter and Voyage (1880). DE COSTER, CHARLES THEODORE HENRI (1827–1879), Belgian writer, was born at Munich on the 20th of August 1827. His father, Augustin de Coster, was a native of Liege, who was attached to the household of the papal nuncio at Munich, but soon returned to Belgium. Charles was placed in a Brussels bank, but in 1850 he entered the university of Brussels, where he completed his studies in 1855. He was one of the founders of the Sociele des Joyeux, a small literary club, more than one member of which was to achieve literary distinction. De Coster made his debut as a poet in the Revue trimestrielle, founded in 1854, and his first efforts in prose were contributed to a periodical entitled Uylenspiegel (founded T856). A correspondence cover- ing the years 1850–1858, his Leltres d Elisa, were edited by Ch. Potvin in 1894. He was a keen student of Rabelais and Montaigne, and familiarized himself with 16th-century French. He said that Flemish manners and speech could not be rendered faithfully in modern French, and accordingly wrote his best works in the old tongue. The success of his Legendcs flamandes (1857) was increased by the illustrations of Felicien Rops and other friends. In 1861 he published his Conies brabanqons, in modern French. His masterpiece is his Legende de Thyl Uylen- spiegel et de Lamme Goedzak (1867), a. 16th-century romance, in which Belgian patriotism found its fullest expression. In the preparation for this prose epic of the gueux he spent some ten

years. Uylenspiegel (Eulenspiegel) has been compared to Don Quixote, and even to Panurge. He is the type of the 16th-century Fleming, and the history of his resurrection from the grave itself was accepted as an allegory of the destiny of the race. The exploits of himself and his friend form the thread of a semi-historical narrative, full of racy humour, in spite of the barbar- ities that find a place in it. This book also was illustrated by Rops and others. In

1870 De Coster became professor of general history and of French literature at the military school. His works however were not financially profitable ; in spite of his government employment he was always in difficulties; and he died in much discouragement on the 7th of May 1879 at Ixelles, Brussels. The expensive form in which Uylenspiegel was pro- duced made it open only to a limited class of readers, and when a new and cheap edition in modern French appeared in 1893 it was received practically as a new book in France and Belgium.

DECOY, a contrivance for the capture or enticing of duck and other wild fowl within range of a gun, hence any trap or enticement into a place or situation of danger. Decoys are usually made on the following plan: long tunnels leading from the sea, channel or estuary into a pool or pond are covered with an arched net, which gradually narrows in width; the ducks are enticed into this by a tame trained bird, also known as a " decoy " or " decoy-duck." In America the " decoy " is an artificial bird, placed in the water as if it were feeding, which attracts the wild fowl within range of the concealed sportsman. The word " decoy " has, etymologically, a compli- cated history. It appears in English first in the 17th century in these senses as " coy " and " coy-duck," from the Dutch kooi, a word which is ultimately connected with Latin cavea, hollow place, " cage." 1 The de-, with which the word begins, is either a corruption of " duck-coy," the Dutch article de, or a corrup- tion of the Dutch eende-kooi, eende, duck. The New English Dictionary points out that the word " decoy " is found in the particular sense of a sharper or swindler as a slang term slightly earlier than " coy " or " decoy " in the ordinary sense, and, as the name of a game of cards, as early as 1550, apparently with no connexion in meaning. It is suggested that " coy " may have been adapted to this word.

DECREE (from the past participle, decretus, of Lat. decernere), in earlier form Decreet, an authoritative decision having the force of law; the judgment of a court of justice. In Roman law, a

decree (decretum) was the decision of the emperor, as the supreme judicial officer, settling a case which had been referred to him. In ecclesiastical law the term was given to a decision of an ecclesi- astical council settling a doubtful point of doctrine or discipline (cf. also Decretals). In English law decree was more particu- larly the judgment of a court of equity, but since the Judicature Acts the expression ” judgment ” (q.v.) is employed in reference to the decisions of all the divisions of the supreme court. A ” decree nisi ” is the conditional order for a dissolution of marriage made by the divorce court, and it is made ” absolute ” after six months (which period may, however, be shortened) in the absence of sufficient cause shown to the contrary. (See Divorce.) Decreet arbitral is a Scottish phrase for the award of an arbitrator.

DECRETALS (Epistolae decretales) , the name (see Decree above) , which is given in Canon Law to those letters of the pope which formulate decisions in ecclesiastical law; they are generally given in answer to consultations, but are sometimes due to the initiative of the popes. These furnish, with the canons of the councils, the chief source of the legislation of the church, and form the greater part of the Corpus Juris. In this connexion they are dealt with in the article on Canon Law (q.v.).

The False Decretals. A special interest, however, attaches to the celebrated collection known by this name. This collection, indeed, comprises at least as many canons of councils as decretals, and the decretals contained in it are not all forgeries. It is an amplification and interpolation, by means of spurious decretals, of the canonical collection in use in the Church of Spain in the 8th century, all the documents in which are perfectly authentic.

1 Distinguish ” coy,” affectedly shy or modest, from O. Fr. coi, Lat. quietus, quiet.

With these amplifications, the collection dates from the middle of the 9th century. We shall give a brief account of its contents, its history and its influence on canon law.

The author assumes the name of Isidore, evidently the arch- bishop of Seville, who was credited with a preponderating part in the compilation of the Hispana; he takes in addition the surname of Mercator, perhaps because he has made use of two passages of Marius Mercator. Hence the custom of alluding to the author of the collection under the name of the pseudo- Isidore.

The collection itself is divided into three parts. The first, which is entirely spurious, contains, after the preface and various introductory sections, seventy letters attributed to the popes of the first three centuries, up to the council of Nicaea, i.e. up to but not including St Silvester; all these letters are a fabrication of the pseudo-Isidore, except two spurious letters of Clement, which were already known. The second part is the collection of councils, classified according to their regions, as it figures in the Hispana; the few spurious pieces which are added, and notably the famous Donation of Constantine, were already in existence. In the third part the author continues the series of decretals which he had interrupted at the council of Nicaea. But as the collection of authentic decretals does not begin till Siricius (385), the pseudo-Isidore first forges thirty letters, which he attributes to the popes from Silvester to Damasus; after this he includes the authentic decretals, with the intermixture of thirty-five apocryphal ones, generally given under the name of those popes who were not represented in the authentic collection, but some- times also under the names of the others, for example, Damasus, St Leo, Vigilius and St Gregory; with one or two exceptions he does not interpolate genuine decretals. The series stops at St Gregory the Great (d. 604), except for one letter of Gregory II. (715-731). The forged letters are not, for the most part, entirely composed of fresh material; the author draws his inspiration from the

notices on each of the popes given in the Liber Pontific- alis; he inserts whole passages from ecclesiastical writers; and he antedates the evidences of a discipline which actually existed; so it is by no means all invented.

Thus the authentic elements were calculated to serve as a passport for the forgeries, which were, moreover, quite skilfully composed. In fact, the collection thus blended was passed from hand to hand without meeting with any opposition. At most all that was asked was whether those decretals which did not appear in the Liber canonum (the collection of Dionysius Exiguus, accepted in France) had the force of law, but Pope Nicholas having answered that all the pontifical letters had the same authority (see Deer. Gra. Dist. xix. c. 1), they were henceforward accepted, and passed in turn into the later canonical collections. No doubts found an expression until the 15th century, when Cardinal Nicholas of Cusa (d. 1464) and Juan Torquemada (d. 1468) freely expressed their suspicions. More than one scholar of the 16th century, George Cassander, Erasmus, and the two editors of the Decretum of Gratian, Dumoulin (d. 1568) and Le Conte (d. 1577), decisively rejected the False Decretals. This contention was again upheld, in the form of a violent polemic against the papacy, by the Centuriators of Magdeburg (Ecclesia- stica historia, Basel, 1 559-1 574) J the attempt at refutation by the Jesuit Torres (Adversus Centur. Magdeburg, libri quinque, Florence, 1572) provoked a violent rejoinder from the Protestant minister David Blondel (Pseudo-Isidorus et Turrianus rapulantes, Geneva, 1620). Since then, the conclusion has been accepted, and all researches have been of an almost exclusively historical character. One by one the details are being precisely determined, and the question may now almost be said to be settled.

In the first place, an exact determination of the date of the collection has been arrived at. On the one hand, it cannot go back further than 847, the date of the False Capitularies, with which the author of the ; False Decretals was acquainted. 1 On the other hand, in a letter of Lupus, abbot of

1 The False Capitularies are for civil legislation what the False Decretals are for ecclesiastical legislation : three books of Capitu- laries of the Frankish kings, more of which are spurious than authen-

Date.

Ferrieires, written in 858, and in the syriodical letter of the council of Quierzy in 857 are to be found quotations which are certainly from these false decretals; and further, an undoubted allusion in the statutes given by Hincmar to his diocese on the 1st of November 852. The composition of the collection must then be dated approximately at 850.

The object which the forger had in view is clearly stated in his preface; the reform of the canon laW, : or rather its better application. But, again, in what particular respects he wishes it to be reformed can be best deduced from

Aim of the author.

certain preponderant ideas which make themselves felt in the apocryphal documents. He constantly harps upon accusations brought against bishops and the way they were judged; his wish is to prevent them from being unjustly accused, deposed or deprived of their sees; to this end he multiplies the safeguards of procedure, and secures the right of appeal to the pope and the possibility of restoring bishops to their sees. His object, too, was to protect the property, as well as the persons, of the clergy against the encroachments of the temporal power. In the second place, Isidore wishes to increase the strength and cohesion of the churches; he tries to give absolute stability to the diocese and the ecclesiastical province; he reinforces the rights of the bishop and his comprovincials, while he initiates a determined campaign against the chorepiscopi; finally, as the keystone of the arch he places the papacy. These aims are most laudable, and in no way subversive; but the author must have had some particular reasons

for emphasizing these questions rather than others; and the examination of these reasons may help us to determine the nationality of this collection.

The name of Isidore usurped by the author at first led to the supposition that the False Decretals originated in Spain; this opinion no longer meets with any support; it is enough n a ti on . to point out that there is no Spanish manuscript of the ailty of collection, at least until the 13th century. In the 16th ihe <>**> century the Protestants, who wished to represent the on ' forgeries in the light of an attempt in favour of the papacy, ascribed the origin of the False Decretals to Rome, but neither the manuscript tradition nor the facts confirm this view, which is nowadays entirely abandoned. Everybody is agreed in placing the origin of the False Decretals within the Frankish empire. Within these limits, three different theories have successively arisen: "At first it was thought that Isidore's domicile could be fixed in the province of Mainz, it is now about fifty years ago that the balance of opinion was turned in favour of the province of Reims; and now, after the lapse of about twenty years, several authors have suggested the province of Tours " (P. Fournier, Etude sur les Fausses DScrStales) . In favour of Mainz, especial stress was laid on the fact that it was the country of Benedictus Levita, the compiler of the False Capitularies, to which the False Decretals are closely related. But Benedict, the deacon of Otgar of Mainz, is as much of a hypothetical personage as Isidorus Mercator; moreover, in the middle of the 9th century the condition of the province of Mainz was not disturbed, nor were the chorepiscopi menaced. In favour of Reims, it has been pointed out that it was there that the first judicial use of the False Decretals is recorded, in the trials of Rothad, bishop of Soissons (d. 869), and of Hincmar the younger, bishop of Laon (d. c. 882); and an ppplication of the axiom has been attempted: Is fecit cui prodest. But both these trials took place later than 852, at which date the existence of the collection is an established fact; the texts of it*

were used, but they were in existence before. Between 847 and 852, the province of Reims was disturbed by another affair, that of the clergy ordained by Ebbo at the time of his short restoration to the see of Reims, in 840-841; these clerics, Vulfadus (afterwards archbishop of Bourges), and a few others, had been suspended by Hincmar on his election in 845. But the affair of Ebbo's clergy did not become critical till the council of Soissons in 853 ; up till then these clergy had, so far

tic. The author gives himself out as a certain Benedict, a deacon of the church of Mainz ; hence the name by which he is usually known, Benedictus Levita. The two false collections are closely akin, and are doubtless the fabrication of the same hands.

as we know, produced no documents, and the citations from the False Decretals made in their later writings do not prove that they had forged them. Moreover, Hincmar would not have cited the forged letters of the popes in 852 ; above all, this theory would not explain the chief preoccupation of the forger, which is to protect bishops against unjust judgments and depositions. We must, then, look for conditions in which the bishops were con- cerned. It is precisely this which has suggested the province of Tours. Brittany, which was dependent on the province of Tours, had just for a time recovered its independence, thanks to its duke Nominoe. The struggle between the two nationalities, the Celt and the Frank, found a reflexion in the sphere of religion. The Breton bishops were for the most part abbots of monasteries, who had but little consideration for the territorial limits of the civitates; and many of the religious usages of the Bretons differed profoundly from those of the Franks. Charlemagne had divided up the Breton dioceses and established in them Frankish bishops. Nominoe hastened to depose the four Frankish

bishops, after wringing from them by force confessions of simony; he then established a metropolitan see at Dol. Hence arose incessant complaints on the part of the dispossessed bishops, of the metropolitan of Tours, and his suffragans, notably those of Angers and Le Mans, which were more exposed than the others to the incursions of the Bretons; and this gave rise to numerous papal letters, and all this throughout a period of thirty years. There were requests that the bishops should be judged according to the rules, protests against the interlopers, demands for the re- storation of the bishops to their sees. These circumstances fall in perfectly with the questions about which, as we have pointed out, the pseudo-Isidore was mainly concerned : the judgment of bishops, and the stability of the ecclesiastical organizations.

In the province of Tours, attempts have been made to define more clearly the centre of the forgeries, and the most recent authorities fix upon Le Mans. The sole argument, though a very weighty one, is found in the undeniable relation, revealed in an astonishing similarity both in expressions and composition, which exists between these forgeries and some other documents certainly fabricated at Le Mans, under the episcopate of Aldric (832-856), notably the Actus Pontificum Cenomanis in urbe degentium, in which there is no lack of forged documents. These certainly bear the mark of the same hand.

Though we cannot admit that the False Decretals were com- posed in order to enforce the rights of the papacy, we may at least consider whether the popes did not make use of influence. tne False Decretals to support their rights. It is certain that in 864 Rothad of Soissons took with him to Rome, if not the collection, at least important extracts from the pseudo-Isidore; M. Fournier has pointed out in the letters of the pope of that time, " a literary influence, which is shown in the choice of expressions and metaphors," not- ably in those passages relating to the restitutio spolii; but he concludes by affirming that the ideas and acts of

Nicholas were not modified by the new collection: even before 864 he acted in affairs concerning bishops, e.g. in the case of the Breton bishops or the adversaries of Photius, patriarch of Constantinople, exactly as he acted later; all that can be said is that the False Decretals, though not expressly cited by the pope, " led him to accentuate still further the arguments which he drew from the decrees of his predecessors," notably with regard to the exceptio- spolii. In the papal letters of the end of the 9th and the whole of the 10th century, only two or three insignificant citations of the pseudo-Isidore have been pointed out; the use of the pseudo-Isidorian forged documents did not become prevalent at Rome till about the middle of the nth century, in consequence of the circulation of the canonical collections in which they figured; but nobody then thought of casting any doubts on the authenticity of those documents. One thing only is established, and this may be said to have been the real effect of the False Decretals, namely, the powerful impulse which they gave in the Frankish territories to the move- ment towards centralization round the see of Rome, and the legal

obstacles which they opposed to unjust proceedings against the bishops. • . ;

Bibliography. — The best edition is that of P. Hinschius, Decretales pseudo-Isidorianae et capitula Angilramni (Leipzig, 1863). In it the authentic texts are printed in two columns, the forgeries across the whole width of the page; an important preface of ccxxviii. pages contains, besides the classification of the MSS., a profound study of the sources and other questions bearing on the collection. After the works cited above, the following dissertations should be noted. Placing the origin of the False Decretals at Rome is: A. Theiner, De pseudo-Isidoriana canonum collectione (Breslau, 1827); at Mainz, the brothers Ballerini, De antiquis collectionibus et collectoribus canonum, iii. (S. Leonis opera, t. iii.; Migne, Patro- logia Lat. t. 56) ; Blascus, De coll. canonum Isidori Mercatoris (Naples, 1760); Wasserschleben, Beitrdge

*zur Geschichte der falschen Dekretalen (Breslau, 1844); in the province of Reims: Weizsacker, ” Die pseudoisidorianische Frage,” in the Histor. Zeitschrift of Sybel (i860) ; Hinschius, Preface, p. ccviii. ; A. Tardif, Histoire des sources du droit canonique (Paris, 1887); Schneider, Die Lehre der Kirchen- rechtsquellen (Regensburg, 1892). An excellent resume of the question; seems more favourable to Le Mans in the article of the Kirchenlexicon of Wetzer and Vvelte (2nd ed.) ; F. Lot, Htudes sur le regne de Hugues Capet (Paris, 1903) ; Lesne, La Hierarchie episcopate en Gaule et Gennanie (Paris, 1905) ; for the province of Tours and Le Mans: B. Simson, Die Entstehung der pseudoisidor. Fatschungen in Le Mans (Leipzig, 1886. It is he who pointed out the con- nexion with the forgeries of Le Mans) ; especially Paul Fournier, ” La Question des fausses decretales,” in the Nowoelle Revue histo- rique de droit francais et etranger (1887, 1888) ; in the Congres internat. des savants cathol. t. ii. ; “Etude sur les fausses decretales,” in Revue d’histoire ecclesiastique de Louvain (1906, 1907), to which the above article is greatly indebted. (A. Bo. *)*

DECURIO, a Roman official title, used in three connexions. (1) A member of the senatorial order in the Italian towns under the administration of Rome, and later in provincial towns organized on the Italian model (see Curia 4). The number of decuriones varied in different towns, but was usually 100. The qualifications for the office were fixed in each town by a special law for that community (lex municipalis) . Cicero (in Verr. 2 . 49, 1 20) alludes to an age limit (originally thirty years, until lowered by Augustus to twenty-five), to a property qualification (cf . Pliny, Ep. i. 19. 2), and to certain conditions of rank. The method of appointment varied in different towns and at different periods. In the early municipal constitution ex-magistrates passed auto- matically into the senate of their town; but at a later date this order was reversed, and membership of the senate became a qualification for the magistracy.

Cicero (I.e.) speaks of the senate in the Sicilian towns as appointed by a vote of the township. But in most towns it was the duty of the chief magistrate to draw up a list (album) of the senators every five years. The decuriones held office for life. They were convened by the magistrate, who presided as in the Roman senate. Their powers were extensive. In all matters the magistrates were obliged to act according to their direction, and in some towns they heard cases of appeal against judicial sentences passed by the magistrate. By the time of the municipal law of Julius Caesar (45 B.C.) special privileges were conferred on the decuriones, including the right to appeal to Rome for trial in criminal cases. Under the principate their status underwent a marked decline. The office was no longer coveted, and documents of the 3rd and 4th centuries show that means were devised to compel members of the towns to undertake it. By the time of the jurists it had become hereditary and compulsory. This change was largely due to the heavy financial burdens which the Roman govern- ment laid on the municipal senates. (2) The president of a decuria, a subdivision of the curia (q.v.). (3) An officer in the Roman cavalry, commanding a troop of ten men (decuria).

Bibliography. — C. G Bruns, Pontes juris Romani, c. 3, No. 18, c. 4, Nos. 27, 29, 30 (leges m"' licipales); J.C. Orelli, Inscr. Latinae, No. 3721 (Album of Canusium); Godefroy, Paratitl. ad cod. Theo- dosianam, xii. 1 (vol. iv. pp. 352 et seq., ed. Ritter) ; J. Marquardt, Romische Staatsverwaltung, i. pp. 183 et seq. (Leipzig, 1881); P. Willems, Droit public romain, pp. 535 et seq. (Paris, 1884) ; Pauly- Wissowa, Realencyclopadie, IV. ii. pp. 2319 foil. (Stuttgart, 1901); W. Liebenam, Stadteverwaltung im romischen Kaiserreiche (Leipzig, 1900). (A. M. Cl.)

D^D^AGATCH, a seaport of European Turkey, in the vilayet of Adrianople, 10 m. N.W. of the Maritza estuary, on the Gulf of Enos, an inlet of the Aegean Sea. Pop, (1905) about 3006,

mostly Greeks. Until 1871 D6d6agatch was a mere cluster of fishermen's huts. A new town then began to spring up, settlers being attracted by the prospect of opening up a trade in the products of a vast forest of valonia oaks which grew near. In 1873 it was made the chief town of a Kaza, to which it gave its name, and a Kaimakam was appointed to it. In 1884 it was raised in administrative rank from a Kaza to a Sanjak, and the governor became a Mutessarif. In 1889 the Greek archbishopric of Enos was transferred to Dedeagatch. On the opening, early in 1896, of the Constantinople-Salonica railway, which has a station here, a large proportion of the extensive transit trade which Enos, situated at the mouth of the Maritza, had acquired, was immediately diverted to Dedeagatch, and an era of unprecedented prosperity began; but when the railway connecting Burgas on the Black Sea with the interior was opened, in 1898, Dedeagatch lost all it had won from Enos. Owing to the lack of shelter in its open roadstead, the port has not become the great commercial centre which its position otherwise qualifies it to be. It is, however, one of the chief outlets for the grain trade of the Adrianople, Demotica and Xanthi districts. The valonia trade has also steadily developed, and is supplemented by the export of timber, tobacco and almonds. In 1871, while digging out the foundations of their houses, the settlers found many ancient tombs. Probably these are relics, not of the necropolis of the ancient Zone, but of a monastic community of Dervishes, of the Dede sect, which was established here in the 15th century, shortly after the Turkish conquest, and gave to the place its name.

DEDHAM, a township and the county seat of Norfolk county, Massachusetts, U.S.A., with an area of 23 sq. m. of comparatively level country. Pop. (1890) 7123; (1900) 7457, of whom 2186 were foreign-born; (1910 U.S. census) 9284. The township is traversed by the New York, New Haven & Hartford railway, and

by interurban electric lines. It contains three villages, Dedham, East Dedham and Oakdale. Dedham has a public library (1854; incorporated 1871). The Dedham historical society was organized in 1859 and was incorporated in 1862. The Fairbanks house was erected in part as early as 1654. Carpets, handkerchiefs and woollen goods are manufactured, and a pottery here is reputed to make the only true crackleware outside the East. Dedham was " planted " in 1635 and was incorporated in 1636. It was one of the first two inland settlements of the colony, being coeval with Concord. The original plantation, about 20 m. long and 10 m. wide, extended from Roxbury and Dorchester to the present state line of Rhode Island: from this territory several townships were created, including Westwood (pop. in 1910, 1266), in 1897. A free public school, one of the first in America to be supported by direct taxation, was established in Dedham in 1645. In the Woodward tavern, the birthplace of Fisher Ames, a convention met in September 1774 and adjourned to Milton (q.v.), where it passed the Suffolk Resolves.

DEDICATION (Lat. dedicatio, from dedicate, to proclaim, to announce), properly the setting apart of anything by solemn proclamation. It is thus in Latin the term particularly applied to the consecration of altars, temples and other sacred buildings, and also to the inscription prefixed to a book, &c, and addressed to some particular person. This latter practice, which formerly had the purpose of gaining the patronage and support of the person so addressed, is now only a mark of affection or regard. In law, the word is used of the setting apart by a private owner of a road to public use. (See Highway.)

The Fcasl of Dedication (n^un; to, iynaivia) was a Jewish festival observed for eight days from the 25th of Kislev (i.e. about December 12) in commemoration of the reconse- cration (165 B.C.) of the temple and especially of the altar of burnt offering, after they had been desecrated in the persecution under Antiochus Epiphanes (168 B.C.). The distinguishing features of the festival were the

illumination of houses and synagogues, a custom probably taken over from the feast of tabernacles, and the recitation of Psalm xxx. The biblical references are 1 Mace. i. 41–64, iv. 36–39; 2 Mace. vi. i–n; John x. 22. See also 2 Mace. i. 9, 18; ii. 16; and Josephus,

Antiq. xii. v. 4. J. Wellhausen suggests that the feast was originally connected with the winter solstice, and only afterwards with the events narrated in Maccabees.

Dedication of Churches. — The custom of solemnly dedicating or consecrating buildings as churches or chapels set apart for Christian worship must be almost as old as Christianity itself. If we find no reference to it in the New Testament or in the very earliest apostolic or post-apostolic writings, it is merely due to the fact that Christian churches had not as yet begun to be built. Throughout the ante-Nicene period, until the reign of Constantine, Christian churches were few in number, and any public dedication of them would have been attended with danger in those days of heathen persecution. This is why we are ignorant as to what liturgical forms and what consecration ritual were employed in those primitive times. But when we come to the earlier part of the 4th century allusions to and descriptions of the consecration of churches become plentiful.

Like so much else in the worship and ritual of the Christian church this service is probably of Jewish origin. The hallowing of the tabernacle and of its furniture and ornaments (Exodus xl.); the dedication of Solomon's temple (1 Kings viii.) and of the second temple by Zerubbabel (Ezra vi.), and its rededication by Judas Maccabaeus (see above), and the dedication of the temple of Herod the Great (Josephus, Antiq. of the Jews, bk. xv. c. xi. § 6), and our Lord's recognition of the Feast of Dedication' (St John xi. 22, 23) — all these point to the probability of the Christians deriving their custom from a Jewish origin, quite apart from the intrinsic appropriateness of such a custom in

itself.

Eusebius (Hist. Eccles. lib. x. cap. 3) speaks of the dedication of churches rebuilt after the Diocletian persecution, including the church at Tyre in a.d. 314. The consecrations of the church of the Holy Sepulchre at Jerusalem in a.d. 335, which had been built by Constantine, and of other churches after his time, are described both by Eusebius and by other ecclesiastical historians. From them we gather that every consecration was accompanied by a celebration of the Holy Eucharist and a sermon, and special prayers of a dedicatory character, but there is no trace of the elaborate ritual, to be described presently, of the medieval pontificals dating from the 8th century onwards.

The separate consecration of altars is provided for by canon 14 of the council of Agde in 506, and by canon 26 of the council of Epaone in 517, the latter containing the first known reference to the usage of anointing the altar with chrism. The use of both holy water and of unction is attributed to St Columbanus, who died in 615 (Walafsid Strabo, Vita S. Galli, cap. 6).

There was an annual commemoration of the original dedi- cation of the church, a feast with its octave extending over eight days, during which Gregory the Great encouraged the erection of booths and general feasting on the part of the populace, to compensate them for, and in some way to take the place of, abolished heathen festivities (Sozomen, Hist. Eccles. lib. ii. cap. 26; Bede, Hist. Eccles. lib. i. cap, 30).

At an early date the right to consecrate churches was reserved to bishops, as by canon 37 of the first council of Bracara in 563, and by the 23rd of the Irish collections of canons, once attributed to St Patrick, but hardly to be put earlier than the 8th century (Haddon and Stubbs, Councils, 6Vc, vol. ii. pt. 2, p. 329).

When we come to examine the MS. and printed service-

books of the medieval church, we find a lengthy and elaborate service provided for the consecration of churches. It is contained in the pontifical. The earliest pontifical which has come down to us is that of Egbert, archbishop of York (732–766), which, however, only survives in a 10th-century MS. copy. Later pontificals are numerous; we cannot describe all their variations. A good idea, however, of the general character of the service will be obtained from a skeleton of it as performed in this country before the Reformation according to the use of Sarum. The service in question is taken from an early 15th-century pontifical in the Cambridge University Library as printed by W. Makell in Monumenta ritualia ecclesiae Anglicanae, and ed., vol. i. pp.

195–239–

DEDICATION

919

There is a preliminary office for laying a foundation-stone. On the day of consecration the bishop is to vest in a tent outside the church, thence to proceed to the door of the church on the outside, a single deacon being inside the church, and there to bless holy water, twelve lighted candles being placed outside, and twelve inside the church. He is then to sprinkle the walls all round outside, and to knock at the door ; then to sprinkle the walls all round outside a second time and to knock at the door again ; then to sprinkle the walls all round outside a third time, and a third time to knock at the door, by which he will then enter, all laity being excluded. The bishop is then to fix a cross in the centre of the church, after which the litany is said, including a special clause for the consecration of the church and altar. Next the bishop inscribes the alphabet in Greek letters on one of the limbs of St Andrew's cross from the left east corner to the right west corner on the pavement cindered for the purpose, and the alphabet in Latin on the other limb from the right east corner to the

left west corner. Then he is to genuflect before the altar or cross. Then he blesses water, mingled with salt, ashes and wine, and sprinkles therewith all the walls of the church inside thrice, beginning at the altar; then he sprinkles the centre of the church longwise and crosswise on the pavement, and then goes round the outside of the church sprinkling it thrice. Next re- entering the church and taking up a central position he sprinkles holy water to the four points of the compass, and toward the roof. Next he anoints with chrism the twelve internal and twelve external wall-crosses, afterwards perambulating the church thrice inside and outside, censing it.

Then there follows the consecration of the altar. First, holy water is blessed and mixed with chrism, and with the mixture the bishop makes a cross in the middle of the altar, then on the right and the left, then on the four horns of the altar. Then the altar is sprinkled seven times or three times with water not mixed with chrism, and the altar-table is washed therewith and censed and wiped with a linen cloth. The centre of the altar is next anointed with the oil of the catechumens in the form of a cross; and the altar-stone is next anointed with chrism; and then the whole altar is rubbed over with oil of the catechumens and with chrism. Incense is next blessed, and the altar censed, five grains of incense being placed crosswise in the centre and at the four corners, and upon the grains five slender candle crosses, which are to be lit. Afterwards the altar is scraped and cleansed ; then the altar-cloths and ornaments having been sprinkled with holy water are placed upon the altar, which is then to be censed.

All this is subsidiary to the celebration of mass, with which the whole service is concluded. The transcription and descrip- tion of the various collects, psalms, anthems, benedictions, &c, which make up the order of dedication have been omitted for the sake of brevity.

The Sarum order of dedication described above is

substantially identical with the Roman order, but it would be superfluous to tabulate and describe the lesser variations of language or ritual. There is, however, one very important and significant piece of ritual, not found in the above-described English church order, but always found in the Roman service, and not infrequently found in the earlier and later English uses, in connexion with the presence and use of relics at the consecration of an altar. According to the Roman ritual, after the priest has sprinkled the walls of the church inside thrice all round and then sprinkled the pavement from the altar to the porch, and sideways from wall to wall, and then to the four quarters of the compass, he prepares some cement at the altar. He then goes to the place where the relics are kept, and starts a solemn procession with the relics round the outside of the church. There a sermon is preached, and two decrees of the council of Trent are read, and the founder's deed of gift or endowment. Then the bishop, anointing the door with chrism, enters the church with the relics and deposits them in the cavity or confession in the altar. Having been enclosed they are censed and covered in, and the cover is anointed. Then follows the censing and wiping of. the altar as in the Sarum order.

This use of relics is very ancient and can be traced back to the

time of St Ambrose. There was also a custom, now obsolete, of enclosing a portion of the consecrated Eucharist if relics were not obtainable. This was ordered by cap. 2 of the council of Celchyth (Chelsea) in 816. But though ancient the custom of enclosing relics was not universal, and where found in English church orders, as it frequently is found from the pontifical of Egbert onwards, it is called the " Mos Romanus " as distinguished from the "Mos Anglicanus " {Archaeologia, liv. 416). It is absent from the description of the early Irish form of consecration preserved in the Leabkar Breac, translated and annotated by Rev. T. Olden in the Transactions of the St Paul's Ecclesiolog. Soc. vol. iv. pt. ii. p. 98.

The curious ritual act, technically known as the abecedarium, i.e. the tracing of the alphabet, sometimes in Latin characters, sometimes in Latin and Greek, sometimes, according to Menard, in Latin, Greek and Hebrew, along the limbs of St Andrew's cross on the floor of the church, can be traced back to the 8th century and may be earlier. Its origin and meaning are unknown. Of all explanations we like best the recent one suggested by Rossi and adopted by the bishop of Salisbury. This interprets the St Andrew's cross as the initial Greek letter of Christus, and the whole act as significant of taking possession of the site to be consecrated in the name of Christ, who is the Alpha and Omega, the word of God, combining in himself all letters that lie between them, every element of human speech. The three languages may then have been suggested by the Latin, Greek and Hebrew, in which his title was written on the cross.

The disentangling the Gallican from the Roman elements in the early Western forms of service is a delicate and difficult task, undertaken by Monsignor Louis Duchesne, who shows how the former partook of a funerary and the latter of a baptismal character (Christian Worship (London, 1904), cap. xii.).

The dedication service of the Greek Church is likewise long and elaborate. Relics are to be prepared and guarded on the day previous in some neighbouring sacred building. On the morning following, all ornaments and requisites having been got ready, the laity being excluded, the bishop and clergy vested proceed to fix in its place and consecrate the altar, a long prayer of dedication being said, followed by a litany. The altar is then sprinkled with warm water, then with wine, then anointed with chrism in the form of a cross. The altar, the book of the gospels, and all cloths are then censed, every pillar is crossed with chrism, while various collects are said and psalms recited. One lamp is then filled with oil and lit, and placed on the altar, while clergy bring in other lamps and other ornaments of the church. On the next day — if the service cannot be concluded in one day — the

bishop and clergy go to the building where the relics have been kept and guarded. A procession is formed and advances thence with the relics, which are borne by a priest in a holy vessel (discus) on his head; the church having been entered, the relics are placed by him with much ceremonial in the " confession," the recess pre- pared in or about the altar for their reception, which is then anointed and sealed up. After this the liturgy is celebrated both on the feast of dedication and on seven days afterwards.

There is no authorized form for the dedication of a church in the reformed Church of England. A form was drawn up and approved by both houses of the convocation of Canterbury under Archbishop Tenison in 171 2, and an almost identical form was submitted to convocation in 17 15, but its consideration was not completed by the Lower House, and neither form ever received royal sanction. The consequence has been that Anglican bishops have fallen back on their undefined jus liturgicum, and have drawn up and promulgated forms for use in their various dioceses, some of them being content to borrow from other dioceses for this purpose. There is a general similarity, with a certain amount of difference in detail, in these various forms. In the diocese of London the bishop, attended by clergy and churchwardens, receives at the west door, outside, a petition for consecration; the procession then moves round the whole church outside, while certain psalms are chanted. On again reaching the west door the bishop knocks thrice for admission, and the door being opened the procession advances to the east end of the church.

He there lays the keys on the table " which is to be hallowed." The Veni Creator is then sung kneeling, followed by the litany with special suffrages. The bishop then proceeds to various parts of the church and blesses the font, the chancel, with special references to confirmation and holy matrimony, the lectern, the pulpit, the clergy stalls, the choir

seats, the holy table. The deed of consecration is then read and signed, and the celebration of Holy Communion follows with special collects, epistle and gospel.

The Church of Ireland and the episcopal Church of, Scotland are likewise without any completely authorized form of dedi.- cation, and their archbishops or bishops have at various times issued forms of service on their own authority. (F. E. W.)

DE DONIS CONDITIONALIBUS, a chapter of the statute of Westminster the Second (1285) which originated the law of entail. Strictly speaking, a form of entail was known before the Norman feudal law had been domesticated in England. The common form was a grant " to the feoffee and the heirs of his body," by which limitation it was sought to prevent alienation from the lineage of the first purchaser. These grants were also known as fetida conditionata, because if the donee had no heirs of his body the estate reverted to the donor. This right of reversion was evaded by the interpretation that such a gift was a conditional fee, which enabled the donee, if he had an heir of the body born alive, to alienate the land, and consequently disinherit the issue and defeat the right of the donor. To remedy this the statute De Donis Conditionalibus was passed, which enacted that, in grants to a man and the heirs of his body, the will of the donor according to the form in the deed of gift mani- festly expressed, should be from thenceforth observed; so that they to whom the land was given under such condition, should have no power to alienate the land so given, but that it should remain unto the issue of those to whom it was given after their death, or unto the giver or his heirs, if issue fail. Since the passing of the statute an estate given to a man and the heirs of his body has been known as an estate tail, or an estate in fee tail (feudum talliatum), the word tail being derived from the French tailler, to cut, the inheritance being by the statute cut down and confined to the heirs of the body. The operation of the statute soon produced innumerable evils : " children, it is said,

grew disobedient when they knew they could not be set aside ; farmers were deprived of their leases; creditors were defrauded of their debts; innumerable latent entails were produced to deprive purchasers of the land they had fairly bought; treasons also were encouraged, as estates tail were not liable to forfeiture longer than for the tenant's life " (Williams, Real Property). Accord- ingly, the power of alienation was reintroduced by the judges in Taltarum's case (Year Book, 12 Edward IV., 1472) by means of a fictitious suit or recovery which had originally been devised by the regular clergy for evading the statutes of mortmain. This was abolished by an act passed in 1833. (See Fine.)

DEDUCTION (from Lat. deducere, to take or lead from or out of, derive), a term used in common parlance for the process of taking away from, or subtracting (as in mathematics), and specially for the argumentative process of arriving at a con- clusion from evidence, i.e. for any kind of inference. 1 In this sense it includes both arguments from particular facts and those from general laws to particular cases. In logic it is generally '< used in contradiction to " induction " for a kind of mediate inference, in which a conclusion (often itself called the deduction) is regarded as. folio wing necessarily under certain fixed . laws from premises. This, the most common, form of deduction is the syllogism (q.v. ; see also Logic), which consists in taking a general principle and deriving from it facts which are necessarily ; involved in it. This use of deduction is of comparatively modern origin; it was originally used as the equivalent of Aristotle's kwayuiyi] (see Prior Analytics, B xxv.). The modern use of deduction is practically identical with the Aristotelian XXoyutyi6s.

'Two forms of the verb are used,- " deduce " and "deduct"; originally synonymous, they are now distinguished, " deduce "being confined to arguments, " deduct " to quantities.

DE DONIS^DEE, J.

DEE, JOHN (1527–1608), English mathematician and astrologer,, was born on the i3thsof July 1527, in London, where his father was, according to Wood, a wealthy vintner. In 1542 he was sent to St John's College, Cambridge. After five years Spent in mathematical and astronomical studies, he went to Holland, in order to visit several eminent continental mathe- maticians. Having remained abroad nearly a year, he returned to Cambridge, and was elected a fellow of Trinity College, then first erected by King Henry VIII. In 1548 he took the degree of master of arts; but in the same year he found it necessary to leave England on account of the suspicions entertained of his being a conjurer; these were first excited by a piece of machinery, which, in the Pax of Aristophanes, he exhibited to the university, representing the scarabaeus flying up to Jupiter, with a man and a basket of victuals on its back. He went first to the university of Lduvain, where he resided about two years, and then to the college of Rfoeims ; where he had extraordinary success in his public lectures on Euclid's Elements. On his return to England in 155 j King Edward assigned him a pension of ioo crowns, which he afterwards exchanged for the rectory of Upton-upon- Severn, Worcestershire. Soon after the accession of Mary he was accused of using enchantments against the queen's life; but after a tedious .confinement he obtained his liberty in 1555, by an order of council.

When Elizabeth ascended the throne, Dee was asked by Lord Dudley to name a propitious day for the coronation. On this occasion he was introduced to the queen, who took lessons in the mystical interpretation of his writings, and made him great promises, which, however, were never fulfilled. In 1564 he again visited the continent, in order to present his Monas hieroglyphica to the emperor Maximilian, to whom, he had dedicated it. He returned to England in the same year ; but in 157 1 he was in Lorraine, whither two physicians, were sent by the queen to his relief in a dangerous illness. Returning to his home at Mortlake, in

Surrey, he continued his studies, and made a collection of curious books and manuscripts, and a variety of instruments. In 1578 Dee was sent abroad to consult with German physicians Eind astrologers. in regard to the illness of the queen. On his return to England, he was employed in investigating the title of the crown to the countries recently discovered by British subjects, and in furnishing geographical descriptions. Two large rolls containing the desired information, which he presented to the queen, are still preserved in the Cottonian Library. A learned treatise on the reformation of the calendar, written by him about the same time, is also preserved in the Ashmolean Library at Oxford.

From this period the philosophical researches of Dee were concerned entirely with necromancy. In 1581 he became acquainted with Edward Kelly, an apothecary, who had been convicted of forgery and had lost both ears in the pillory at Lancaster. He professed to have discovered the philosopher's stone, and by his assistance Dee performed various incantations, and / maintained a frequent imaginary intercourse with spirits. Shortly 1 afterwards Kelly, and Dee were introduced by the earl of Leicester to a Polish nobleman, Albert Laski, palatine of Siradz> devoted to the same pursuits, who persuaded them to accompany him to his native country. They embarked for Holland in September 1583, and arrived at Laski's residence in February following. Upon Dee's departure the mob, believing him a wizard, broke into his house, and destroyed a quantity of furniture and books and his chemical apparatus. Dee and Kelly lived for some years in Poland and Bohemia in alternate wealth and poverty, according to the credulity or scepticism of those before :whom they exhibited, , They professed to raise spirits by incantation; and Kelly dictated the utterances to Dee, who wrote them down and interpreted, them.

Dee at length quarrelled with hjs companion, and returned to England in 1589. He was helped over his financial difficulties by the queen and his friends. In May of 1595 he became warden of Manchester

College. In November 1604 he returned to Mortlake, where he died in December 1608, at the age of eighty-one, in the greatest poverty. Aubrey describes him as ” of a very fair,

clear sanguine complexion, with a long beard as white as milk — a very handsome man— tall and slender. He wore a goune like an artist’s- goune with hanging sleeves.” Dee’s Speculum or mirror, a piece of solid pink-tinted glass about the size of an orange, is preserved in the British Museum.

His principal works are — Propaedeumata aphoristica (London, 1558); Monas hieroglyphica (Antwerp, 1564); Epistola ad Frederi- cum Commandinum (Pesaro, 1570) ; Preface Mathematical to the English Euclid (1570); Divers Annotations and Inventions’ added after the tenth book of English Euclid (1570); Epistola praefixa Ephemeridibus Joannis Feldi, a. 1557; Parallaticae commentationis praxeosque nucleus quidam (London, 1573). The catalogue of his printed and published works is to be found in his Compendious Rehearsal, as well as in his letter to Archbishop Whitgift. A manu- script of Dee’s, relating what passed for many years between him and some spirits, was edited by Meric Casaubon and published in 1659. The Private Diary of Dr John Dee, and the Catalogue of his Library of Manuscripts, edited by J. O. Halliwell, was published by the Camden Society in 1842. There is a life of Dee in Thomas Smith’s Vitae illustrium virorum. (1707) ; English translation by W. A. Ayton, the Life of John Dee (1909).

DEE (Welsh, Dyfrdwy; Lat., and in Milton, Deva), a river of Wales and England. It rises in Bala Lake, Merionethshire, which is fed by a number of small streams. Leaving the lake near the town of Bala it follows a north-easterly course to Corwen, turns thence E. by S. past Llangollen to a point near Overton, and then bends nearly north to Chester, and

thereafter north-west through a great estuary opening into the Irish Sea. In the Llangollen district the Dee crosses Denbighshire, and thereafter forms the boundary of that county with Shropshire, a detached part of Flint, and Cheshire. From Bala nearly down to Overton, a distance of 35 m., during which the river falls about 330 ft., its course lies through a narrow and beautiful valley, enclosed on the south by the steep lower slopes of the Berwyn Mountains and on the north by a succession of lesser ranges. The portion known as the Vale of Llangollen is especially famous. Here an aqueduct carrying the Pontcysyllte branch of the Shropshire Union canal bestrides the valley; it is a remarkable engineering work completed by Thomas Telford in 1805. The Dee has a total length of about 70 m. and a fall of 530 ft. Below Overton it debouches upon its plain track. Below Chester it follows a straight artificial channel to the estuary, and this is the only navigable portion. ' The estuary, which is 14 m. long, and si in- wide at its mouth, between Hilbre Point on the English and Point of Air on the Welsh side, is not a commercial highway like the neighbouring mouth of the Mersey, for though in appearance a fine natural harbour at high tide, it becomes at low tide a vast expanse of sand, through which the river meanders in a narrow channel. The navigation, however, is capable of improvement, and schemes have been set on foot to this end. The tide rushes in with great speed over the sands, and their danger is illustrated in the well-known ballad " The Sands of Dee " by Charles Kingsley. The Dee drains an area of 813 sq. m.

DEE, a river in the south of Aberdeenshire, Scotland, pursuing a generally easterly direction from its source in the extreme west of the county till it reaches the North Sea at the city of Aberdeen. It rises in the Wells of Dee, a spring on Ben Braeriach, one of the Cairngorms, at a height of 4061 ft. above the sea. It descends rapidly from this altitude, and by the time that it receives the Geusachan, on its right bank, about 6 m. from its source, it has fallen 2421 ft. From the mountains

flanking its upper reaches it is fed by numerous burns named and unnamed. With its tributaries the river drains an area of 1000 sq. m. Rapid and turbulent during the first half of its course of 90 m., it broadens appreciably below Aboyne and the rate of flow is diminished. The channel towards its mouth was artificially altered in order to provide increased dock accommodation at Aberdeen, but, above, the stream is navigable for only barges and small craft for a few miles. It runs through scenery of transcendent beauty, especially in Braemar. About two miles above Inverey it enters a narrow rocky gorge, 300 yds. long and only a few feet wide at one part, and forms the rapids and cascades of the famous Linn of Dee. One of the finest of Scottish salmon streams, it retains its purity almost to the very end of its run. The principal

places on the Dee, apart from private residences, are Castleton of Braemar, Ballater, Aboyne, Kincardine O'Neil, Banchory, Culter and Cults.

DEED (in 0. Eng. dedd, from the stem of the verb " to do"), that which is done, an act, doing; particularly, in law, a contract in writing, sealed and delivered by the party bound to the party intended' to benefit. Contracts or obligations under seal are called in English law specialties, and down to 1869 they took precedence in payment over simple contracts, whether written or not. Writing, sealing and delivery are all essential to a deed. The signature of the party charged is not material, and the deed is not void for want of a date. Delivery, it is held, may be complete without the actual handing over of the deed; it is sufficient if the act of sealing were accompanied by words or acts signifying that the deed was intended to be presently binding; and delivery to a thirdperson for the use of the party benefited will be sufficient. On the other hand, the deed may be handed over to a third person as an escrow, 1 in which case it will not take effect as a deed until certain , conditions are performed. Such conditional delivery may be inferred from the circumstances attending the transac- tion, although the conditions be not

expressed in words. A deed indented, or indenture (so called because written in counterparts on the same sheet of parchment, separated by cutting a wavy line between them so as to be identified by fitting the parts together), is between two or more parties who contract mutually. The actual indentation is not now necessary to an indenture. The deed-poll (with a polled or smooth-cut edge, not indented) is a deed in which one party binds himself without reference to any corresponding obligations undertaken by another party. See Contract. . . .

DEEMS, CHARLES (ALEXANDER) FORCE (1820-1893), American clergyman, was born in Baltimore, Maryland, on the 4th of December 1820. He was a precocious child and delivered lectures on temperance and on Sunday schools before he was fpurteert years old. He graduated at Dickinson College in 1839, taught and preached in New York city for a few months, in 1840 took charge of the Methodist Episcopal church at Asbury, New Jersey, and removed in the next year to North Carolina, where he was general agent for the American Bible Society. He was professor of logic and rhetoric at the University of North Carolina in 1842-1847, and professor of natural sciences at Randolph- Macon College (then at Boydton, Virginia) in 184 7-1848, and after two years of preaching at Newbern, N. C, he held for four years (1850-1854) the presidency of Greensboro (N.C.) Female College. He continued as a Methodist Episcopal clergy- man at various pastorates in North Carolina from 1854 to 1865, for the last seven years being a presiding elder and in 1859 to 1863 being the proprietor of St Austin's Institute, Wilson. In 1865 he settled in New York City, where in 1866 he began preaching in the chapel of New York University, and in 1868 he established and became the pastor of the undenominational Church of the Strangers, which in 1870 occupied the former Mercer Street Presbyterian church, purchased and given to Dr Deems by Cornelius Vanderbilt; there he remained until his death in New York city on the 18th of November 1893. He was one of the founders (1881) and president of the American Institute of Christian Philosophy and for ten years

was editor of its organ, Christian Thought. Dr Deems was an earnest temperance advo- cate, as early as 1852 worked (unsuccessfully) for a general prohi- bition law in North Carolina, and in his later years allied himself with the Prohibition party. He was influential in securing frorh Cornelius' Vanderbilt the endowment of Vanderbilt University, in Nashville, Tennessee. He was a man of rare personal and literary charm; he edited The Southern Methodist Episcopal Pulpit (1846–1852) and The Annals of Southern Methodism (1855- 1.857); he compiled Devotional Melodies (1842), and, with the assistance of Phoebe Cary, one of his parishioners, Hymns for all Christians (1869; revised, 1881); and he published many books, among which were: The Life of Dr Adam Clarke (1840);

1 An Anglo-French law term meaning a " scroll " or strip of parch- ment, cognate with the English "shred." The modern French Scroue is used for the entry of a name on a prison register.

The Triumph of Peace and other Poems (1840); The Home Altar (1850); Jesus (1872), which ran through many editions and several revisions, the title being changed in 1880 to The Light of the Nations; Sermons (1885); The Gospel of Common Sense (1888); The Gospel of Spiritual Insight (1891) and My Septuagint (1892). The Charles F. Deems Lectureship in Philosophy was founded in his honour in 1895 at New York University by the American Institute of Christian Philosophy.

His Autobiography (New York, 1897) ' s autobiographical only to 1847, the memoir being completed by his two sons.

DEER (O. E. dior, dlor, a common Teutonic word, meaning a wild animal, cf. Ger. Tier, Du. dier, &c, probably from a root dhus-, to breathe), originally the name of one of two British species, the red-deer

or the fallow-deer, but now extended to all the members of the family Cervidae, in the section Pecora of the suborder Artiodactyla of the order Ungulata. (See Pecora; Artiodactyla and Ungulata.) Briefly, deer may be defined as Pecora presenting the following characteristics: — either antlers present in the male, or when these are absent, the upper canines large and sabre-like, and the lateral metacarpal bones represented only by their lower extremities. This definition will include the living and also most of the extinct forms, although in some of the latter the lateral metacarpal bones not only retain their lower ends, but are complete in their entire length.

The leading characters of antlers are described under Pecora, but these structures may be defined somewhat more fully in the following passage from the present writer's Deer of all Lands: —

" Antlers are supported on a pair of solid bony processes, or pedicles, arising from the frontal bones of the skull, of which they form an inseparable portion ; and if in a fully adult deer these pedicles be sawn through, they will generally be found to consist of solid, ivory-like bone, devoid of perceptible channels for the passage of blood-vessels. The pedicles are always covered with skin well supplied with blood-vessels; and in young deer, or those in which the antlers have been comparatively recently shed, the covering of skin extends over their summits, when they appear as longer or shorter projections on the forehead, according to the species. When the first or a new antler is about to be formed, the summits of these pedicles become tender, and bear small velvet-like knobs, which have a high temperature, and are supplied by an extra quantity of blood, which commences to deposit bony matter. This deposition of bony matter progresses very rapidly, and although in young deer and the adults of some species the resulting antler merely forms a simple spike, or a single fork, in full-grown individuals of the majority it assumes a more or less complexly branched structure. All this time the growing antler

is invested with a skin clothed with exceedingly fine short hairs, and is most liberally supplied with blood-vessels; this sensitive skin being called the velvet. Towards the completion of its growth a more or less prominent ring of bone, termed the burr or coronet, is deposited at its base just above the junction with the pedicle; this ring tending to constrict the blood-vessels, and thus cut off the supply of blood from the antlers. . . .

" When the antlers are freed from the velvet — a process usually assisted by the animal rubbing them against tree stems or boughs — they have a more or less rugose surface, owing to the grooves formed in them by the nutrient blood-vessels. Although a few living species have the antlers in the form of simple spikes in the adult male, in the great majority of species they are more or less branched ; while in some, like the elk and fallow-deer, they expand into broad palmated plates, with tines, or snags, on one or both margins. In the antlers of the red-deer group, which form the type of the whole series, the following names have been applied to their different component parts and branches. The main shaft is termed the beam; the first or lowest tine the brow-tine; the second the bez-tine ; the third the trez-tine, or royal ; and the branched portion forming the summit the crown, or surroyals. , But the antlers of all deer by no means conform to this type ; and in certain groups other names have to be adopted for the branches.

" The antlers of young deer are in the form of simple spikes; and this form is retained in the South American brockets, although the simple antlers of these deer appear due to degeneration, and are not primitive types. Indeed, no living deer shows such primitive spike- like antlers in the adult, and it is doubtful whether such a type is dis- played by any known extinct form, although many have a simple fork. In the deer of the sambar group, where the antlers never advance beyond a three-tined type, the shedding is frequently, if not invariably, very irregular; but in the majority at least of the species with complex antlers the replacement is

annual, the new appendages attaining their full development immediately before the pairing^season. In such species there –is a more or less regular annual increase in the complexity of the antlers up to a certain period of life, after which they begin to degenerate.”

The Cervidae are distributed all over Europe, Asia, Northern Africa and America, but are unknown in Africa south of the Sahara. They are undoubtedly a group of European –or Asiatic origin, and obtained an entrance into America at a time when that continent was connected with Asia by way of Bering Strait.

The existing members of the family are classified in the writer’s Deer of all Lands as follows: —

A. Subfamily Cervinae. — Antlers, with one exception, present in the male; liver without a gall-bladder; a face-gland, and a gland-pit in the skull.

I. Reindeer, Genus Rangifer. — Lateral metacarpal bones repre- sented only by their lower extremities ; antlers present in both sexes, complex. Northern part of both hemispheres.

II. Elk, Genus Alces. — Lateral metacarpals as in preceding; antlers (as in the following genera) present only in the male, arising at right angles to the median longitudinal line of the skull, and extending at first in the plane of the forehead, after which, when in their fullest development, they expand into a broad palmation margined with snags. Northern portion of both hemispheres.

III. True Deer, Genus Cervus. — Lateral metacarpals represented only by their upper ends. Antlers arising at acute angles to the median line of the skull (as in the following genera), at first project- ing from the plane of the forehead, and then continued upwards nearly in that plane, supported on short pedicles, and furnished with a brow-tine, never regularly forked at first division,

but generally of large size, and with not less than three tines; the skull without ridges on the frontals forming the bases of the pedicles of the antlers. Upper canine teeth small, or wanting. Europe, Asia and N. America.

1. Red-deer Group, Subgenus Cervus. — Antlers rounded, usually with five or more tines, generally including a bez (second) , and always a trez (third) ; coat of adult generally unspotted, with a large light- coloured disk surrounding the tail; young, spotted. Europe, Northern and Central Asia and North America.

2. Sika Deer, Subgenus Pseudaxis. — Antlers smaller and simpler, four-tined, with a trez (third), but no bez (second); coat of adult spotted, at least in summer, with a white area bordered by black in the region of the tail, which is also black and white. North-Eastern Asia.

3. Fallow-deer, Subgenus Dama. — Antlers without a bez, but with a trez-tine, above which the beam is more or less palmated, and generally furnished with numerous snags; coat of adult spotted in summer, uniform in winter, with black and white markings in the region of the tail similar to those of Pseudaxis; young, spotted. Mediterranean region, but more widely spread in Europe during the Pleistocene epoch, and also introduced into many European countries.

4. Sambar Group, Subgenus Rusa. — Antlers rounded, three- tined, with the bez- and trez-tines wanting, and the beam simply forked at the summit ; coat either uniform or spotted at all seasons. Indo-Malay countries and part of China.

5. Barasingha Group, Subgenus Rucervus. — Antlers flattened or rounded, without bez- or trez-tine, the beam dichotomously forking, and one or both branches again forked, so that the number of tines is at least four; brow-tine forming a right angle or a continuous curve with the beam ; coat of adult generally more or less uniform, of young spotted.

Indo-Malay countries.

IV. Muntjacs, Genus Cervulus.— Lateral metacarpals as in Cervus; antlers small, with a brow-tine and an unbranched beam, supported on long bony pedicles, continued downwards as con- vergent ridges on the forehead ; upper canines of male large and tusk-like. Indo-Malay countries and China.

V. Tufted. Muntjacs, Genus Elaphodus. — Nearly related to the last, but the antlers still smaller, with shorter pedicles and divergent frontal ridges ; upper canines of male not everted at the tips. Tibet and China.

VI. Water-deer, Genus Hydrelaphus. — Lateral metacarpals as in Rangifer; antlers wanting; upper canines of males tusk-like and growing from semi-persistent pulps; cheek-teeth tall-crowned (hypsodont) ; tail moderate. China.

VII. Roe-deer, Genus Capreolus. — Lateral metacarpals as in Rangifer; antlers rather small, without a brow-tine or sub-basal snag, dichotomously forked, with the upper or posterior prong again forking; tail rudimentary; vomer not dividing posterior nasal aperture of skull. Europe and Northern Asia.

VIII. Pere David's Deer, Genus Elaphurus. — Lateral meta- carpals as in Cervus; antlers large, without a brow-tine or sub-basal snag, dichotomously forked, with the upper prong of the fork curving forwards and dividing, and the lower prong long, simple, and projected backwards, the beam making a very marked angle with the plane of the face; tail very long; vomer as in Capreolus. North-East Asia.

IX. American Deer, Genus Mazama. — Lateral metacarpals as in Rangifer ; antlers very variable in size, forming a marked angle with the plane of the face, without a brow-tine ; when consisting of more than a simple prong, dichotomously forked, frequently with a sub- basal snag, and always with the lower prong of the fork projected from the front

edge of the beam, in some cases the lower, in others

the upper, and in others both prongs again dividing; tail long; tarsal gland generally present ; metatarsal gland very variable, both as regards presence and position ; vomer dividing the inner aperture of the nostrils in the skull into two distinct chambers. America.

1. White-tailed Group, Subgenus Dorcelaphus or Odocoileus. — Antlers large and complex, with a sub-basal snag, and the lower prong more or less developed at the expense of the upper one; metatarsal gland usually present; tail long or moderate, and hairy below; face very long and narrow; the face-gland small, and the gland-pit in the skull of moderate extent; no upper canines; size generally large. North America to Northern South America.

2. Marsh-deer Group, Subgenus Blastoceros. — Antlers large and complex, without a sub-basal snag, and the upper prong more developed than the lower one; metatarsal gland absent; tail short; face moderately long; face-gland and gland-pit well developed; upper canines usually present in male. Size large or rather small. South America.

3. Guemals, Subgenus Xenelaphus. — Antlers small and simple, forming a single dichotomous fork; metatarsal gland absent; tail short; face moderately long; face-gland and gland-pit well developed; upper canines present in both sexes. Size medium. South America.

a. Brockets, Subgenus Mazama. — Antlers in the form of simple unbranched spikes; metatarsal, and in one case also the tarsal gland absent; tail very short; face elongated; face-gland small and gland-pit deep and triangular; hair of face radiating from two whorls; upper canines sometimes present in old

males. Size small. Central and South America.

X. Genus Pudua. — Skull and metacarpals generally as in Mazama; size very small; hair coarse and brittle; antlers in the form of short, simple spikes; cannon-bones very short; tail very short or wanting; no whorls in the hair of the face; face-gland moderately large, and gland-pit deep and oval; tarsal and meta- tarsal glands wanting; ectocuneiform bone of tarsus united with the naviculocuboid. South America.

B. Subfamily Moschinae. — Antlers wanting in both sexes; liver furnished with a gall-bladder; no face-gland or gland-pit.

XI. Musk-deer, Genus Moschus. — Hair coarse and brittle; upper canines of male very long; no tarsal or metatarsal glands or tufts; lateral metacarpals represented by their lower extremities; lateral hoofs very large; tail very short; naked portion of muzzle extensive ; male with a large abdominal gland. Central Asia.

Of the above, Reindeer and Elk are dealt with in separate articles (qq.v.).

The first or typical group of the genus Cervus includes the red- deer (Cervus elaphus) of Europe and western Asia, of which there are several local races, such as the large C. elaphus maral of eastern Europe and Persia, which is often partially spotted above and dark-coloured below, the smaller C. e. barbarus of Tunisia and Morocco, and the still smaller C. e. corsicanus of Corsica. The Scandinavian red-deer is the typical form of the species. In all red-deer the antlers are rounded, and show a more or less marked tendency to form a cup at the summit. Wapiti, on the other hand, show a marked tendency to the flattening of the antlers, with a great development of the fourth tine, which is larger than all the others, and the whole of the tines above this in the same plane, or nearly so, this plane being the same as the long axis of the animal. Normally no cup is developed at the summit

of the antler. The tail, too, is shorter than in the red-deer; while in winter the under parts become very dark, and the upper surface often bleaches almost white. The cry of the stags in the breeding season is also different. The typical representative of the group is the North American wapiti C. canadensis, but there are several closely allied races in Central Asia, such as C. cana- densis songaricus and C. c. bactrianus, while in Manchuria the subgroup is represented by C. c. xanthopygus, in which the summer coat is reddish instead of grey. The hangul (C. cash- mirianus) of Kashmir is a distinct dark-coloured species, in which the antlers tend to turn in at the summit; while C. yarcandensis, of the Tarim Valley, Turkestan, is a redder animal, with a wholly rufous tail, and antlers usually terminating in a simple fork placed in a transverse plane. Another Asiatic species is the great shou (C. affinis) of the Chumbi Valley, in which the antlers curve forwards in a remarkable manner. Lastly C. albirostris, of Tibet, is easily recognized by its white muzzle, and smooth, whitish, flattened antlers, which have fewer tines than those of the other members of the group, all placed in one plane.

The second group of the genus Cervus, forming the subgenus Pseudaxis, is typified by the handsome little Japanese deer, or sika, C. (P.) sika, in which the antlers are four-tined, and covered

with red " velvet " when first grown, while the coat is fully spotted in summer, but more or less uniformly brown in winter. The most distinctive feature of the deer of this group is, however, the patch of long erectile white hairs on the buttocks, which, although inconspicuous when the animals are quiescent, is expanded into a large chrysanthemum-like bunch when they start to run or are otherwise excited. The patch then forms a guiding signal for the members of the herd when in flight. On the mainland of Manchuria both the typical sika, and a larger -race (C. sika manchuricus) , occur. A still larger and finer animal is the Pekin sika (C. hortulorum) , of northern Manchuria, which is as

large as a small red-deer; it is represented in the Yang-tse valley by a local race, C. h. kopschi. Formosa possesses a species of its own (C. taevanus), which, in correlation with the perpetual verdure of that island, is spotted at all seasons.

For the fallow-deer, Cervus [Dama] dama, see Fallow-deer.

The rusine or sambar group of Cervus, of which the character- istics are given above, comprises a considerable number of long- tailed species with three-tined antlers from the Indo-Malay countries and some parts of China. The largest and handsomest is the sambar of India {Cervus [Rusa] unicolor), characterized by its massive and rugged antlers. It is represented by a number of local races, mostly of smaller size, such as the Burmese and Malay C. u. equinus, the Formosan C. u. swinhoei, and the Philippine C. u. philippinus and C. u. nigricans, of which the latter is not larger than a roe-buck, while the sambar itself is as large as a red-deer. Whether these local phases of a single variable type are best denominated races or species, must be largely a matter of individual opinion. The rusa, or Javan sambar, C. (R.) hippelaphus, is a lighter-coloured and smaller deer than the Indian sambar, with longer, slenderer and less rugged antlers. Typically from Java, this deer is also represented in the Moluccas and Timor, and has thus the most easterly range of the whole tribe. A black coat with white spots distinguishes the Philippine spotted deer, C. aljredi, which is about the size of a roe-buck; while other members of this group are the Calamianes deer of the Philippines (C culionensis) , the Bavian deer (C. kuhli) from a small island near Java, and the well-known Indian hog-deer or para (C. porcinus), all these three last being small, more or less uniformly coloured, and closely allied species. On the other hand, the larger and handsomer chital, or spotted deer (C. axis), stands apart by its white-spotted fawn-red coat and differently formed antlers.

Nearly allied to the preceding is the barasingha or

rucervine group (subgenus Rucervus), in which the antlers are of a different and generally more complex character. The typical species is the Indian barasingha or swamp-deer, Cervus (Rucervus) duvauceli, a uniformly red animal, widely distributed in the forest districts of India. In Siam it is replaced by C. (R.) schomburgki, in which the antlers are of a still more complex type. Finally, we have the thamin, or Eld's deer, C. (R.) eldi, ranging from Burma to Siam, and characterized by the continuous curve formed by the beam and the brow-tine of the antlers.

For the small eastern deer, respectively known as muntjacs (Cervulus) and tufted muntjacs or tufted deer (Elaphodus), see Muntjac; while unSer Water-deer will be found a notice of the Chinese representative of the genus Hydrelaphus (or Hydropotes). The roe-deer, or roe-buck (Capreolus) , likewise form the subject of a separate article (see Roe-buck), as is also the case with Pere David's deer, the sole representative of the genus Elaphurus.

The American deer include such New World species as are generically distinct from Old World types. All these differ from the members of the genus Cervus in having no brow-tine to the antlers, which, in common with those of the roe-deer, belong to what is called the forked type. Including all these deer except one in the genus Mazama (of which the typical representatives are the South American brockets), the North American species constitute the subgenus Dorcelaphus (also known as Cariacus and Odocoileus). One of the best known of these is the white-tailed deer Mazama {Dorcelaphus) americana, often known as the Vir- ginian deer. It is typically an animal of the size of a fallow-deer,

reddish in summer and greyish in winter, with a long tail, which is coloured like the back above but

white below, and is Carried elevated when the animal is running, so as to form with the white of the inner sides of the buttocks a conspicuous " blaze." A white fetlock-gland with a black centre is also distinctive of this species. The antlers are large and curve forwards, giving off an upright snag near the base, and several vertical tines from the upper surface of the horizontal portion. As we proceed south- wards from the northern United States, deer of the white-tailed type decrease steadily in size, till in Central America, Peru and Guiana they are represented by animals not larger that a roe- buck. The most convenient plan appears to be to regard all these degenerate forms as local races of the white-tail, although here again there is room for difference of opinion, and many naturalists prefer to call them species. The large ears, brown- and-white face, short, black-tipped tail, and antlers without large basal snag serve to distinguish the mule-deer M. (D.) hemionus, of western North America; while the black tail, M . (D.) columbiana, ranging from British Columbia to California, is a smaller animal, recognizable by the larger and longer tail, which is black above and white below.

South America is the home of the. marsh-deer or guazu, M. (Blastoceros) dichotoma, representing a subgenus in which the complex antlers lack a basal snag, while the hair of the back is reversed. This species is about the size of a red-deer, with a foxy red coat with black legs. The pampas-deer, M. (B.) bezoartica, of the Argentine pampas is a much smaller animal, of paler colour, with three-tined antlers. The Chilean and Peruvian Andes and Patagonia are the homes of two peculiar deer locally known as guemals (huemals), and constituting the subgenus: Xenelaphus, or Hippocamelus. They are about the size of fallow- deer, and have simply forked antlers. The Chilian species is M. (B.) bisulca and the Peruvian M . (B.) antisiensis. Brockets, of which there are numerous species, such as if. rufa and M . nemorivaga, are Central and South American deer of the size of roe-bucks or smaller, with simple spike-like antlers, tufted

heads and the hair of the face radiating from two whorls on the forehead so that on the nose the direction is downwards. The smallest of all deer is the Chilian pudu (Pudua pudu), a creature not much larger than a hare, with almost rudimentary antlers.

The musk-deer forms the subject of a separate article;

For deer in general, see R. Lydekker, The Deer of all Lands (London, 1898, 1908). (R. L.)*

DEERFIELD, a township of Franklin county, Massachusetts, U.S.A., on the Connecticut and Deerfield rivers, about 33 m. N. of Springfield. Pop. (1900) 1969; (1910 U.S. census) 2209. Deerfield is served by the Boston & Maine and the New York, New Haven & Hartford railways. The natural beauty and the historic interest of Deerfield attract many visitors. There are several villages and hamlets in the township, the oldest and most interesting of which is that known as ” The Street ” or ” Old Street.” This extends along one wide thoroughfare over a hill and across a plateau or valley that is hemmed in on the E. by a range of highlands known as East Mountain and on the W. by the foothills of Hoosac Mountain. Many of the houses in this village are very old. In Memorial Hall, a building erected in 1797- 1798 for the Deerfield academy, the Pocumtuck Valley memorial association (incorporated in 1870) has gathered an interesting collection of colonial and Indian relics. Deerfield was one of the first places in the United States to enter into the modern ” arts and crafts movement “; in 1896 many of the old household industries were revived and placed upon a business basis. Most of the work is done by women in the homes. The products, includ- ing needlework and embroidery, textiles, rag rugs, netting^ wrought iron, furniture, and metal- work in gold and silver embellished with precious and semi- precious stones, are annually exhibited in an old- fashioned house built in 17 10, and a large portion of them are sold to tourists. There is an arts and crafts society, but the profits from the sales go entirely to the workers.

The territory which originally constituted the township of Deerfield (known as Pocumtuck until 1674) was a tract of 8000 acres granted in 1654 to the town of Dedham in lieu of 2000 acres

previously taken from that town and granted to Rev. John Eliot to ftfrther his mission among the Natick Indians. The rights of the Pocumtuck Indians to the Deerfield tract were purchased at about fourpence per acre, settlement was begun upon it in 1669, and the township was incorporated in 1673. For many yearsDeerfield was the N.W. frontier settlement of New England. It was slightly fortified at the beginning of King Philip's War, and after an attack by the Indians on the 1st of September 1675 it was garrisoned by a small force under Captain Samuel Appleton. A second attack was made on the 12th of September, and six days later, as Captain Thomas Lothrop and his company were guarding teams that were hauling wheat from Deerfield to the English headquarters at Hadley, they were surprised by Indians in ambush at what has since been known as Bloody Brook (in the village of South Deerfield), and Lothrop and more than sixty of his men were slain. From this time until the end of the war Deerfield was abandoned. In the spring of 1677 a few of the old settlers returned, but on the 19th of September some were killed and the others were captured by a party of Indians from Canada. Resettlement was undertaken again in 1682. On the 15th of September 1694 Deerfield narrowly escaped capture by a force of , French and Indians from Canada. In the early morning of the 29th of February 1 703-1 704, Deerfield was surprised by a force of French and Indians (under Hertel de Rouville) , who murdered 49 men, women and children, captured in; burned the town, and on the way back to Canada murdered 20 of the captured. Among the captives was the Rev. John Williams (1664-1729), the first minister of Deerfield, who (with the other captives) was redeemed in 1706 and continued as pastor here until his death; in 1707 he published an account of his experiences as a prisoner The Redeemed Captive Returning to' Zion, which has frequently been

reprinted. From the original township of Deerfield the territory of the following townships has been taken: Greenfield (1753 and 1896), Conway (1767, 1791 and 1811), Shelburne (1768) and a part of Whately (1810).

See George Sheldon, A History of Deerfield (Deerfield, 1895) ; the History and Proceedings of the Pocttmtu-ck Valley Memorial Associa- tion (Deerfield, _ 1890 et seq.); and Pauline C. Bouve, ” The Deerfield Renaissance,” in The New England Magazine for October 1905.

DEER PARK, an enclosure of rough wooded pastureland for the accommodation of red- or fallow-deer. The distinction between a deer ” park ” and a deer ” forest ” is that the former is always enclosed either by a wall or fence, and is relatively small, whereas the forest covers a much larger area, and is not only open but sometimes contains practically no trees at all. Originally, the possession of a deer park in England was a royal prerogative, and no subject could enclose one without a direct grant from the crown— a licence to impark, like a licence to embattle a house, was always necessary. When Domesday Book was compiled, there were already thirty-one deer parks in Eng- land, some of which may have existed in Saxon times; about one-fourth of them belonged to the king. After the Conquest they increased rapidly in number, but from about the middle of the nth century this tendency was reversed. In the middle of the 1 6th century it was conjectured that one-twentieth of England and Wales was given up to deer and rabbits. Upon Saxton’s maps, which were made between 1575 and 1580, over 700 parks are marked, and it is not improbable that the number was understated. Mr Evelyn Philip Shirley enumerated only 334 in his book on English Deer. Parks published in 1867. To these Mr Joseph Whitaker, in A Descriptive List of the Deer Parks of England (1892), has added another fifty, and the total is believed to be ;now about 400. It is a curious circumstance that despite the rather minute detail of Domesday none of the parks there enumerated can now be identified. There is, however,

a plausible case for Bridge Park in Sussex as the Reredf elle of Domesday. The state and consequence of the great barons of the middle ages depended in some measure upon the number of deer parks which they possessed. Most bishops and abbots had one or two, and at one time more than twenty were attached to the archbishopric of Canterbury. When the power of the barons was finally broken and a more settled period began with the accession of the house

of Tudor, the deer park began to fall into decay. By Queen Elizabeth's time a considerable proportion of the ancestral acres of the great houses had passed into the possession of rich merchants and wealthy wool-staplers, and it had become more profitable to breed bullocks than to find pasture for deer, and even where the new men retained, and even in some cases created, deer parks, they reduced their area in order that more land might be available for grazing or for corn. Thus began that decadence of the deer park which has continued down to the present time. More than anything, however, the strife between Charles I. and parliament contributed to reduce both the number and size of English parks containing deer. By the Restoration the majority of the parks in England had for the time being been destroyed, the palings pulled down, the trees felled, and the deer stolen. Of the duke of Newcastle's eight parks seven were ruined, that at Welbeck alone remaining intact. Not a tree was left in Clipston Park, although the timber had been valued at £20,000. One of the results of the Restoration was to empty the parks of the Roundhead squires to replenish those of the Royalists, but this measure helped little, and great numbers of deer had to be brought from Germany to replenish the depleted stocks. A gentleman of the Isle of Ely was indeed given a baronetcy in return for a large present of deer which he made to Charles II. The largest existing deer park in England is that at Savernake (4000 acres), next comes Windsor, which

contains about 2600 acres in addition to the 1450 acres of Windsor Forest. Lord Egerton of Tatton's park at Tatton in Cheshire, and Lord Abergavenny's at Eridge, each contain about 2500 acres. Other parks which are much about the same size are those of Blenheim, Richmond, Eastwell, Duncombe, Grimsthorpe, Thoresby and Knowsley. All these parks are famous either for their size, their beauty, or the number and long descent of the deer which inhabit them. The size of English parks devoted to deer varies from that of these historic examples down to a very few acres. A small proportion of the older enclosures contains red- as well as fallow-deer. In some of the larger ones many hundreds of head browse, whereas those of the smallest size may have only a dozen or two. Although many enclosures were disparked in very recent times, the 19th century saw the making of a considerable number of new ones, usually of small dimensions. The tendency, however, is still towards diminution both in number and extent, cattle taking the place of deer.

DEFAMATION (from the classical Lat. diffamare, to spread abroad an evil report — the English form in de is taken from the Late Lat. defamare), the saying or writing something of another, calculated to injure his reputation or expose him to public hatred, contempt and ridicule. (See Libel and Slander.)

DEFAULT (Fr. defaut, from difailler, to fail, Lat. fallere), in English law, a failure to do some act required by law either as a regular step in procedure or as being a duty imposed. Parties in an action may be in default as to procedure by failure to appear to the writ, or to take some other step, within the prescribed time. In such cases the opposing party gains some advantage by being allowed to sign judgment or otherwise. But as a rule, unless the party is much in default and is under a peremptory order to proceed, the penalty for default is by order to pay the costs occasioned.' When there is default in complying with the terms of a judgment the remedy is by executing it by one of the processes admitted by the law. (See Execution.) In

the case of judgments in criminal or quasi-criminal cases, where a fine is imposed, it is in most cases legal and usual to order im- prisonment if the fine is not paid or if the property of the defendant is insufficient to realize its amount. Default in compliance with a statute renders the defaulter liable to action by the person aggrieved or to indictment if the matter of command is of public concern, subject in either case to the qualification that the statute may limit the remedy for the default to some particular proceeding specifically indicated; and in some instances, e.g. in the case of local authorities, default in the execution of their public duties is dealt with administratively by a department of the government, and only in the last resort, if at all, by recourse to judicial tribunals.

DEFEASANCE, or Defeazance (Fr. defaire, to undo), in law, an instrument which defeats the force or operation of some other deed or estate; as distinguished from condition, that which in the same deed is called a condition is a defeasance in another deed. A defeasance should recite the deed to be defeated and its date, and it must be made between the same parties as are interested in the deed to which it is collateral. It must be of a thing defeasible, and all the conditions must be strictly carried out before the defeasance can be consummated. Defeasance in a bill of sale is the putting an end to the security by realizing the goods for the benefit of the mortgagee. It is not strictly a defeasance, because the stipulation is in the same deed; it is really a condition in the nature of a defeasance.

DEFENCE (Lat. defendere, to defend), in general, a keeping off or defending, a justification, protection or guard. Physical defence of self is the right of every man, even to the employment of force, in warding off an attack. A person attacked may use such force. as he believes to be necessary for the warding off an attack, even to the extent of killing an assailant. The same right of reciprocal defence extends not only to defence of one's own person, but

also to the defence of a husband or wife, parent or child, master or servant. (See Assault; Homicide.) As a legal term in English pleading, ” defence ” means the denial by the party proceeded against of the validity of a charge, or the steps taken by an accused person or his legal advisers for defending himself. In civil actions, a statement of defence is the second step in proceedings, being the answer of the defendant to the plaintiff’s statement of claim. In the statement of defence must be set out every material fact upon which the defendant intends to rely at the trial. Every fact alleged in the statement of claim must be dealt with, and either admitted or denied; further facts may be pleaded in answer to those admitted; the whole pleading of the plaintiff may be objected to as insufficient in law, or a set- off or counter-claim may be advanced. A statement of defence must be delivered within ten days from the delivery of the statement of claim, or appearance if no statement of claim be delivered.

By the Poor Prisoners’ Defence Act 1903, where it appears, having regard to the nature of the defence set up by any poor prisoner, as disclosed in the evidence given or statement made by him before the committing justices, that it is desirable in tht interests of justice that he should have legal aid in the prepara- tion and conduct of his defence, and that his means are insuffi- cient to enable him to obtain such aid, it may be ordered either (1) on committal for trial by the committing justices, or (2) after reading the depositions by the judge or quarter sessions chairman. The defence includes the services of solicitor and counsel and the expenses of witnesses, the cost being payable in the same manner as the expenses of a prosecution for felony. Briefly, the object of the act is, not to give a prisoner legal assistance to find out if he has got a defence, but in order that a prisoner who has a defence may have every inducement to tell the truth about it at the earliest opportunity. Legal assistance under the act is only given where both (1) the nature of the defence as disclosed is such that in the interests of justice the prisoner should

have legal aid to make his defence clear, and (2) where also his means are insufficient for that end (Lord Alverstone, C.J., at Warwick Summer Assizes, The Times, July 26, 1904).

DEFENDANT, in law, a person against whom proceedings are instituted or directed; one who is called upon to answer in any suit. At one time the term ” defendant ” had a narrower meaning, that of a person sued in a personal action only, the corresponding term in a real action being ” tenant,” but the distinction is now practically disregarded, except in a few states of the United States.

DEFENDER OF THE FAITH (Fidei Defensor), a title belonging to the sovereign of England in the same way as Christianissimus belonged to the king of France, and Catholicus belongs to the ruler of Spain. It seems to have been suggested in 1516, and although certain charters have been appealed to in proof of an earlier use of the title, it was first conferred by Pope Leo X. on Henry VIII. The Bull granting the title is dated the nth of October 1521,

and was a reward for the king’s treatise, Assertio, septem sacra- mentorum, against Luther. When Henry broke with the papacy, Pope Paul III. deprived him of this designation, but in 1544 the title of ” Defender of the Faith ” was confirmed to Henry by parliament, and has since been used by all his successors on the English throne.

DEFERENT (Lat. deferens, bearing down), in ancient astronomy, the mean orbit of a planet, which carried the epicycle in which the planet revolved. It is now known to correspond to the actual orbit of the planet round the sun.

DEFFAND, MARIE ANNE DE VICHY-CHAMROND, Marquise du (1697-1780), a celebrated Frenchwoman, was born at the chateau of Chamrond near Charolles (department

of Saone-et- Loire) of a noble family in 1697. Educated at a convent in Paris, she showed, along with great intelligence, a sceptical and cynical turn of mind. The abbess, alarmed at the freedom of her views, arranged that Massillon should visit and reason with her, but he accomplished nothing. Her parents married her at twenty-one years of age to her kinsman, Jean Baptiste de la Lande, marquis du Deffand, without consulting her inclination. The union proved an unhappy one, and resulted in a separation as early as 1722. Madame du Deffand, young and beautiful, is said by Horace Walpole to have been for a short time the mistress of the regent, the duke of Orleans (Walpole to Gray, January 25, 1766). She appeared in her earlier days to be incapable of any strong attachment, but her intelligence, her cynicism and her esprit made her the centre of attraction of a brilliant circle. In 17 21 began her friendship with Voltaire, but their regular correspond- ence dates only from 1736. She spent much time at Sceaux, at the court of the duchesse du Maine, where she contracted a close friendship with the president Henault. In Paris she was in a sense the rival of Madame Geoffrin, but the members of her salon were drawn from aristocratic society more than from literary cliques. There were, however, exceptions. Voltaire, Montesquieu, Fontenelle and Madame de Staal-Delaunay were among the habitues. When Henault introduced D'Alembert, Madame du Deffand was at once captivated by him. With the encyclopaedists she was never in sympathy, and appears to have tolerated them only for his sake. In 1752 she retired from Paris, intending to spend the rest of her days in the country, but she was persuaded by her friends to return. She had taken up her abode in 1747 in apartments in the convent of St Joseph in the rue St Dominique, which had a separate entrance from the street. When she lost her sight in 1754 she engaged Mademoiselle de Lespinasse to help her in entertaining. This lady's wit made some of the guests, D'Alembert among others, prefer her society to that of Madame du Deffand, and she arranged to receive her friends for an hour before the appearance of her patron. When

this state of things was discovered Mademoiselle de Lespinasse was dismissed (1764), but the salon was broken up, for she took with her D'Alembert, Turgot and the literary clique generally. From this time Madame du Deffand very rarely received any literary men. The principal friendships of her later years were with the duchesse de Choiseul and with Horace Walpole. Her affection for the latter, which dated from 1765, was the strongest and most durable of all her attachments, tinder the stress of this tardy passion she developed qualities of style and eloquence of which her earlier writings had given little promise. In the opinion of Sainte-Beuve the prose of her letters ranks with that of Voltaire as the best of that classical epoch without excepting any even of. the great writers. Walpole refused at first to ac- knowledge the closeness of their intimacy from an exaggerated fear of the ridicule attaching to her age, but he paid several visits to Paris expressly for the purpose of enjoying her society, and maintained a close and most interesting correspondence with her for fifteen years. She died on the 23rd of September 1780, leaving her dog Ton ton to the care of Walpole, who was also entrusted with her papers. Of her innumerable witty sayings the best known is her remark on the cardinal de Polignac's account of St Denis's miraculous walk of two miles with his head in his hands, — II n'y a que le premier pas qui coHte.

The Correspondance inedite of Madame du Deffand with D'Alem- bert, Henault, Montesquieu, and others was published in Paris (2 vols.) in 1809. Letters of the marquise du Deffand to the Hon. Horace Walpole, afterwards earl of Orford, from the year 1766 to the year 1780 (4vols.),edited, with a biographical sketch, by Miss Mary Berry, were published in London from the originals at Strawberry Hill in 1810.

The standard edition of her letters is the Correspondance complete de la marquise du Deffand . . . by M. de Lescure (1865) ; the Correspon- dance inSdite with M. and Mme de Choiseul and others was edited in 1859 and again in 1866 by the marquis de Ste-Aulaire. Other papers of Madame du Deffand

obtained at the breaking up of Walpole's collection are in private hands. Madame du Deffand returned many of Walpole's letters at his request, and subsequently destroyed those which she received from him. Those in his posses- sion appear to have been destroyed after his death by Miss Berry, who printed fragments from them as footnotes to the edition of 1810. The correspondence between Walpole and Madame du Deffand thus remains one-sided, but seven of Walpole's letters to her are printed for the first time in the edition (1903) of his correspondence by Mrs Paget Toynbee, who discovered a quantity of her unedited letters. See Sainte-Beuve, Causeries du lundi, vols. i. and xiv. ; and the notice by M. de Lescure in his edition of the correspondence.

DEFIANCE, a city and the county seat of Defiance county, Ohio, U.S.A., at the confluence of the Auglaize and Tiffin rivers with the Maumee, about 50 m. S.W. of Toledo. Pop. (1890) 7694; (1900) 7579 (960 foreign-born); (1910) 7327. It is served by the Baltimore & Ohio and the Wabash railways, and by the Ohio Electric railway to Lima (42 m.) . The city commands a fine view of the rivers and the surrounding country, which is well adapted to agriculture; and has large machine shops and several flour mills, besides manufactories of agricultural implements, waggons, sashes and blinds, and wood-working machinery for the manufacture of artillery wheels. Here, too, is Defiance College, an institution of the Christian Denomination, opened in 1885. Defiance was long the site of an Indian village. In 1794 General Anthony Wayne built a fort here and named it Defiance. In 1 8 2 2 Defiance was laid out as a town; in 1845 it was made the county seat of the newly erected county; and in 188 1 it became a city of the second class.

DEFILE, a military expression for a passage, to march through which troops are compelled to "defile," or narrow their front (from the Fr. defiler, to march in a line, or by " files ") . The word is usually applied to a ravine or gorge in a range of hills, but a causeway over a river, a bridge and even a village may equally be called a

defile. The term is also used to express, without any special reference to military operations, a gorge in mountains. The verb ” to defile ” is used of troops marching on a narrow front, or narrowing their front, under all circumstances, and in this sense is the contrary of ” deploy.”

“Defile,” in the sense of “pollute,” is another form of “defoul”; though spelt alike, the two words are pronounced differently, the accent being on the first syllable for the former and on the second for the latter.

DEFINITION (Lat. definitio, from de-finire, to set limits to, describe) , a logical term used popularly for the process of explain- ing, or giving the meaning of, a word, and also in the concrete for the proposition or statement in which that explanation is expressed. In logic, definition consists in determining the qualities which belong to given concepts or universals; it is not concerned with individuals, which are marked by an infinity of peculiarities, any one or all of which might be predicated of another individual. Individuals can be defined only in so far as they belong to a single kind. According to Aristotle, definition is the statement of the essence of a concept (6p«r/x6s iih> yap tov ri kcm nod ovclas, Posterior Analytics, B iii. 90 b 30); that is, it consists of the genus and the differentia. In other words, ” man ” is defined as ” animal plus rationality,” or ” rational animal,” 1 i.e. the concept is (1) referred to the next higher genus, and (2) distinguished from other modes in which that genus exists, i.e. from other species. It is sometimes argued that, there being no definition of individuals as such, definition is of names (see J. S. Mill, Logic, i. viii. 5), not of things; it is generally, however, maintained that definition is of things, regarded as, or

1 ” Rational animal ” is thus the predicate of the statement constituting the definition. Sometimes the word ” definition ” is used to signify merely the predicate.

in so far as they are, of a kind. Definition of words can be nothing more than the explanation of terms such as is given in a dictionary.

The following rules are generally given as governing accurate definition. (1) The definition must be equivalent or commensurate with that which is defined; it must be applicable to all the individuals included in the concept and to nothing else. Every man, and nothing else, is a rational animal. ” Man is mortal ” is not a definition, for mortality is predicable of irrational animals. (2) The definition must state the essential attributes; a concept cannot be defined by its accidental attributes; those attributes must be given which are essential and primary. (3) The definition must be per genus et differentiam (or diffe- rentias), as we have already seen. These are the important rules. Three minor rules are: (4) The definition must not contain the name of the concept to be defined ; if it does, no information is given. Such a proposition as “an archdeacon is one who performs archidiaconal functions ” is not a defini- tion. Concepts cannot be defined by their correlatives. Such a definition is known as a circulus in definiendo. (5) Obscure and figurative language must be avoided, and (6) Definitions must not be in the negative when they can be in the affirmative.

DEFOE, DANIEL (c. 1650–1731), English author, was born in the parish of St Giles, Cripplegate, London, in the latter part of 1659 or early in 1660, of a nonconformist family. His grand- father, Daniel Foe, lived at Etton, Northamptonshire, appar- ently in comfortable circumstances, for he is said to have kept a pack of hounds. As to the variation of name, Defoe or Foe, its owner signed either indifferently till late in life, and where his initials occur they are sometimes D. F. and sometimes D. D. F. Three autograph letters of his are extant, all addressed in 1705 to the same person, and signed respectively

D. Foe, de Foe and Daniel Defoe. His father, James Foe, was, a butcher and a citizen of London.

Daniel was well educated at a famous dissenting academy, Mr Charles Morton's of Stoke Newington, where many of the best- known nonconformists of the time were his schoolfellows. With few exceptions all the known events of Defoe's life are connected with authorship. In the older catalogues of his works two pamphlets, Speculum Crapegownorum, a satire on the clergy, and A Treatise against the Turks, are attributed to him before the accession of James II., but there seems to be no publication of his which is certainly genuine before The Character of Dr Annesley (1697). He had, however, before this, taken up arms in Monmouth's expedition, and is supposed to have owed his lucky escape from the clutches of the king's troops and the law, to his being a Londoner, and therefore a stranger in the west country. On the 26th of January 1688 he was admitted a liveryman of the city of London, having claimed his freedom by birth. Before his western escapade he had taken up the business of hosiery factor. At the entry of William and Mary into London he is said to have served as a volunteer trooper " gallantly mounted and richly accoutred." In these days he lived at Tooting, and was instru- mental in forming a dissenting congregation there. His business operations at this period appear to have been extensive and various. He seems to have been a sort of commission merchant, especially in Spanish and Portuguese goods, and at some time to have visited Spain on business. In 1692 he failed for £17,000. His misfortunes made him write both feelingly and forcibly on the bankruptcy laws; and although his creditors accepted a composition, he afterwards honourably paid them in full, a fact attested by independent and not very friendly witnesses. Subsequently, he undertook first the secretaryship and then the management and chief ownership of some tile-works at Tilbury, but here also he was unfortunate, and his imprisonment in 1703 brought the works to a standstill, and he lost £3000. From this time forward we hear of no settled business in

which he engaged.

The course of Defoe's life was determined about the middle of the reign of William III. by his introduction to that monarch and other influential persons. He frequently boasts of his personal intimacy with the " glorious and immortal " king, and

in 1695 he was appointed accountant to the commissioners of the glass duty, an office which he held for four years. During this time he produced his Essay on Projects (1698), containing suggestions on banks, road-management, friendly and insurance societies of various kinds, idiot asylums, bankruptcy, academies, military colleges, high schools for women, &c. It displays Defoe's lively and lucid style in full vigour, and abounds with ingenious thoughts and apt illustrations, though it illustrates also the unsystematic character of his mind. In the same year Defoe wrote the first of a long series of pamphlets on the then burning question of occasional conformity. In this, for the first time, he showed the unlucky independence which, in so many other instances, united all parties against him. While he pointed out to the dissenters the scandalous inconsistency of their playing fast and loose with sacred things, yet he denounced the impropriety of requiring tests at all. In support of the government he pub- lished, in 1698, An Argument for a Standing Army, followed in 1700 by a defence of William's war policy called The Two Great Questions considered, and a set of pamphlets on the Partition Treaty. Thus in political matters he had the same fate as in ecclesiastical; for the Whigs were no more prepared than the Tories to support William through thick and thin. He also dealt with the questions of stock-jobbing and of electioneering corrup- tion. But his most remarkable publication at this time was The True-Born Englishman (1701), a satire in rough but extremely vigorous verse on the national objection to William as a foreigner, and on the claim of purity of blood for a nation which Defoe chooses to represent as crossed'and dashed with all the strains and races in

Europe. He also took a prominent part in the proceed- ings which followed the Kentish petition, and was the author, some say the presenter, of the Legion Memorial, which asserted in the strongest terms the supremacy of the electors over the elected, and of which even an irate House of Commons did not dare to take much notice. The theory of the indefeasible supre- macy of the freeholders of England, whose delegates merely, according to this theory, the Commons were, was one of Defoe's favourite political tenets, and he returned to it in a powerfully written tract entitled The Original Power of the Collective Body of the People of England examined and asserted (1701).

At the same time he was occupied in a controversy on the conformity question with John How (or Howe) on the practice of " occasional conformity." Defoe maintained that the dis- senters who attended the services of the English Church on particular occasions to qualify themselves for office were guilty of inconsistency. At the same time he did not argue for the complete abolition of the tests, but desired that they should be so framed as to make it possible for most Protestants conscientiously to subscribe to them. Here again his moderation pleased neither party.

The death of William was a great misfortune to Defoe, and he soon felt the power of his adversaries. After publishing The Mock Mourners, intended to satirize and rebuke the outbreak of Jacobite joy at the king's death, he turned his attention once more to ecclesiastical subjects, and, in an evil hour for himself, wrote the anonymous Shortest Way with the Dissenters (1702), a statement in the most forcible terms of the extreme " high- flying " position, which some high churchmen were un- wary enough to endorse, without any suspicion of the writer's ironical intention. The author was soon discovered; and, as he absconded, an advertisement was issued offering a reward for his apprehension, and giving the only personal description we possess of him, as " a middle-sized spare man about forty years old, of a brown complexion and dark brown-

coloured hair, but wears a wig; a hooked nose, a sharp chin, grey eyes, and a large mole near his mouth." In this conjuncture Defoe had really no friends, for the dissenters were as much alarmed at his book as the high-flyers were irritated. He surrendered, and his defence appears to have been injudiciously conducted; at any rate he was fined 200 marks, and condemned to be pilloried three times, to be imprisoned indefinitely, and to find sureties for his good behaviour during seven years. It was in reference to this incident that Pope, whose Catholic rearing made him detest

the abettor of the Revolution and the champion of William of Orange, wrote in the Dunciad —

"Earless on high stands unabash'd Defoe" — though he knew that the sentence to the pillory had long ceased to entail the loss of ears. Defoe's exposure in the pillory (July 2 9> 3°> 3 1) was > however, rather a triumph than a punish- ment, for the populace took his side ; and his Hymn to the Pillory, which he soon after published, is one of the best of his poetical works. Unluckily for him his condemnation had the indirect effect of destroying his business at Tilbury.

He remained in prison until August 1704, and then owed his release to the intercession of Robert Harley, who represented his case to the queen, and obtained for him not only liberty but pecuniary relief and employment, which, of one kind or another, lasted until the termination of Anne's reign. Defoe was uni- formly grateful to the minister, and his language respecting him is in curious variance with that generally used. There is no doubt that Harley, who understood the influence wielded by Defoe, made some conditions. Defoe says he received no pension, but his subsequent fidelity was at all events indirectly rewarded; moreover, Harley 's moderation in a time of the extremest

party-insanity was no little recommendation to Defoe. During his imprisonment he was by no means idle. A spurious edition of his works having been issued, he himself produced a collection of twenty-two treatises, to which some time afterwards he added a second group of eighteen more. He also wrote in prison many short pamphlets, chiefly controversial, published a curious work on the famous storm of the 26th of November 1703, and started in February 1704 perhaps the most remarkable of all his projects, The Review. This was a paper which was issued during the greater part of its life three times a week. It was entirely written by Defoe, and extends to eight complete volumes and some few score numbers of a second issue. He did not confine himself to news, but wrote something very like finished essays on questions of policy, trade and domestic concerns; he also introduced a " Scandal Club," in which minor questions of manners and morals were treated in a way which undoubtedly suggested the Taller s and Spectators which followed. Only one complete copy of the work is known to exist, and that is in the British Museum. It is probable that if bulk, rapidity of production, variety of matter, originality of design, and excellence of style be taken together, hardly any author can show a work of equal magnitude. After his release Defoe went to Bury St Edmunds, though he did not interrupt either his Review or his occasional pamphlets. One of these, Giving Alms no Charily, and Employing the Poor a Grievance to the Nation (1704), is extraordinarily far-sighted. It denounces both indiscriminate alms-giving and the national workshops proposed by Sir Humphrey Mackworth.

In 1705 appeared The Consolidator, or Memoirs of Sundry Transactions from the World in the Moon, a political satire which is supposed to have given some hints for Swift's Gulliver's Travels; and at the end of the year Defoe performed a secret mission, the first of several of the kind, for Harley. In 1706 appeared the True Relation of the Apparition of one Mrs Veal, long supposed to have been written for a bookseller to help off an

unsaleable translation of Drelincourt,0» Death, but considerable doubt has been cast upon this by William Lee. Defoe's next work was Jure divino, a long poetical argument in (bad) verse; and soon afterwards (1706) he began to be much employed in promoting the union with Scotland. Not only did he write pamphlets as usual on the project, and vigorously recommend it in The Review, but in October 1706 he was sent on a political mission to Scotland by Sidney Godolphin, to whom Harley had recommended him. He resided in Edinburgh for nearly sixteen months, and his services to the government were repaid by a regular salary. He seems to have devoted himself to commercial and literary as well as to political matters, and prepared at this time his elaborate History of the Union, which appeared in 1709. In this year Henry Sacheverell delivered his famous sermons, and Defoe wrote several tracts about them and attacked the preacher in his Review.

In 1 7 10 Harley returned to power, and Defoe was placed in a somewhat awkward position. To Harley himself he was bound by gratitude and by a substantial agreement in principle, but with the rest of the Tory ministry he had no sympathy. He seems, in fact, to have agreed with the foreign policy of the Tories and with the home policy of the Whigs, and naturally incurred the reproach of time-serving and the hearty abuse of both parties. At the end of 1 7 10 he again visited Scotland. In the negotiations concerning the Peace of Utrecht, Defoe strongly supported the ministerial side, to the intense wrath of the Whigs, displayed in an attempted prosecution against some pamphlets of his on the all-important question of the succession. Again the influence of Harley saved him. He continued, however, to take the side of the dissenters in the questions affecting religious liberty, which played such a prominent part towards the close of Anne's reign. He naturally shared Harley's downfall; and, though the loss of his salary might seem a poor reward for his constant support oi the Hanoverian claim, it. .was little more than his ambiguous, not to say trimming,

position must have led him to expect.

Defoe declared that Lord Annesley was preparing the army in; Ireland to join a Jacobite rebellion, and was indicted for libel; and prior to his trial (1715) he published an apologia entitled An Appeal to Honour and Justice? in which he defended his political conduct. Having been convicted of the libel he was liberated later in the year under circumstances that only became clear in 1864, when six letters were discovered in the Record Office from Defoe to a Government official, Charles Delafaye, which, accord- ing to William Lee, established the fact that in 1 7 18 at least Defoe was doing not only political work, but that it was of a somewhat equivocal kind — that he was, in fact, sub-editing the Jacobite Mist's Journal, under a secret agreement with the government that he should tone: down the sentiments and omit objectionable items. He had, in fact, been released on condition of becoming a government agent. He seems to have performed the same not very honourable office in the case of two other journals — Dormer's Letter and the . Mercurius Politicus; and to have written in these and other papers until nearly the end of his life. Before these letters were discovered it was supposed that Defoe's political work had ended in 1715.

Up to that time Defoe had written nothing but occasional literature, and, except the History of the Union and Jure Divino, nothing of any great length. In 17 15 appeared the first volume of The Family Instructor, which was very popular during the 18th century. The first volume of his most famous work, the immortal story — partly adventure, partly moralizing — of The Life and Strange Surprizing Adventures of Robinson Crusoe, was published on the 25th of April 1719. It ran through four editions in as many months, and then in August appeared the second volume. Twelve months afterwards the sequel Serious Reflections, now hardly ever reprinted, appeared. Its connexion with the two former parts is little more than nominal, Crusoe being simply made the mouth-piece of Defoe's sentiments on various points of morals and religion. Meanwhile the first

two parts were reprinted as a feuilleton in Heathcote's Intelligencer , perhaps the earliest instance of the appearance of such a work in such a form. The story was founded on Dempier's Voyage round the World (1607), and still more on Alexander. Selkirk's adventures, as communi- cated by Selkirk himself at a meeting with Defoe at the house of Mrs Damaris Daniel at Bristol. Selkirk afterwards told. Mrs Daniel that he had handed over his papers to Defoe. Robinson Crusoe was immediately popular, and a wild story was set afloat of its having been written by Lord Oxford in the Tower. A curious idea, at one time revived by Henry Kingsley, is that the adventures of Robinson are allegorical and relate to Defoe's own life. This idea was certainly entertained to some extent at the time, and derives some colour of justification from words of Defoe's, but there seems to be no serious foundation for it. Robinson Crusoe (especially the story part, with the philo- sophical and religious moralizings largely cut out) is one of the world's classics in fiction. Crusoe's shipwreck and adventures, his finding the footprint in the sand, his man " Friday," — the whole atmosphere of romance which surrounds the position of

the civilized man fending for himself on a desert island — these have made Defoe's great work an imperishable part of English literature. Contemporaneously appeared The Dumb Philosopher, or Dickory Cronke, who gains the power of speech at the end of his life and uses it to predict the course of European affairs.

In 1720 came The Life and Adventures of Mr Duncan Campbell. This was not entirely a work of imagination, its hero, the fortune- teller, being a real person. There are amusing passages in the story, but it is too desultory to rank with Defoe's best. In the same year appeared two wholly or partially fictitious histories, each of which might

have made a reputation for any man. The first was the Memoirs of a Cavalier, which Lord Chatham believed to be true history, and which William Lee considers the embodi- ment at least of authentic private memoirs. The Cavalier was declared at the time to be Andrew Newport, made Lord Newport in 1642. His elder brother was born in 1620 and the Cavalier gives 1608 as the date of his birth, so that the facts do not fit the dates. It is probable that Defoe, with his extensive acquaintance with English history, and his astonishing power of working up details, was fully equal to the task of inventing it. As a model of historical work of a certain kind it is hardly surpassable, and many separate passages — accounts of battles and skirmishes — have lever been equalled except by Carlyle. Captain Singleton, the last work of the year, has been unjustly depreciated by most of the commentators. The record of the journey across Africa, with its surprising anticipations of subsequent discoveries, yields in interest to no work of the kind known to us; and the semi-piratical Quaker who accompanies Singleton in his buccaneering expeditions is a most life-like character. There is also a Quaker who plays a very creditable part in Roxana (1724), and Defoe seems to have been well affected to the Friends. In estimating this wonderful productiveness on the part of a man sixty years old, it should be remembered that it was a habit of Defoe's to keep his work in manuscript sometimes for long periods.

In 1 72 1 nothing of importance was produced, but in the next twelvemonth three capital works appeared. These were The Fortunes and Misfortunes of Moll Flanders, The Journal of the Plague Year, and The History of Colonel Jack. Moll Flanders and The Fortunate Mistress (Roxana), which followed in 1724, have subjects of a rather more than questionable character, but both display the remarkable art with which Defoe handles such subjects. It is not true, as is sometimes said, that the difference between the two is that between gross and polished vice. The real difference is much more one of morals than of

manners. Moll is by no means of the lowest class. Notwithstanding the greater degradation into which she falls, and her originally dependent position, she has been well educated, and has Con- sorted with persons of gentle birth. She displays throughout much greater real refinement of feeling than the more high- flying Roxana, and is at any rate flesh and blood, if the flesh be somewhat frail and the blood somewhat hot. Neither of the heroines has any but the rudiments of a moral sense; but Roxana, both in her original transgression and in her subsequent conduct, is actuated merely by avarice and selfishness — vices which are peculiarly offensive in connexion with her other failing, and which make her thoroughly repulsive. The art of both stories is great, and that of the episode of the daughter Susannah in Roxana is consummate; but the transitions of the later plot are less natural than those in Moll Flanders. It is only fair to notice that while the latter, according to Defoe's more usual practice, is allowed to repent and end happily, Roxana is brought to complete misery; Defoe's morality, therefore, required more repulsiveness in one case than in the other.

In the Journal of the Plague Year, more usually called, from the title of the second edition, A History of the Plague, the accuracy and apparent veracity of the details is so great that many persons have taken it for an authentic record, while others have contended for the existence of such a record as its basis. But here too the genius of Mrs Veal's creator must, in the absence of all evidence to the contrary, be allowed sufficient for the task. The History of Colonel Jack is an unequal book. There is hardly in Robinson Crusoe a scene equal, and there is consequently not vii. 30

in English literature a scene superior, to that where the youthful pickpocket first exercises his trade, and then for a time loses his ill-gotten gains. But a great part of the book, especially the latter portion, is dull; and in fact it may be generally remarked of Defoe that the conclusions of his tales are not equal to the beginning, perhaps

from the restless indefatigability with which he undertook one work almost before finishing another.

To this period belong his stories of famous criminals, of Jack Sheppard (1724), of Jonathan Wild (1725), of the Highland Rogue i.e. Rob Roy (1723)- The pamphlet on the first of these Defoe maintained to be a transcript of a paper which he persuaded Sheppard to give to a friend at his execution.

In 1724 appeared also the first volume of A Tour through the whole Island of Great Britain, which was completed in the two following years. Much of the information in this was derived from personal experience, for Defoe claims to have made many more tours and visits about England than those of which we have record; but the major part must necessarily have been dexterous compilation. In 1725 appeared A New Voyage round the World, apparently entirely due to the author's own fertile imagination and extensive reading. It is full of his peculiar verisimilitude and has all the interest of Anson's or Dampier's voyages, with a charm of style superior even to that of the latter.

In 1726 Defoe published a curious and amusing little pamphlet entitled Everybody's Business is Nobody's Business, or Private Abuses Public Grievances, exemplified in the Pride, Insolence, and Exorbitant Wages of our Women-Servants, Footmen, &°c. This subject was a favourite one with him, and in the pamphlet he showed the immaturity of his political views by advocating legislative interference in these matters. Towards the end of this same year The Complete English Tradesman, which may be supposed to sum up the experience of his business life, appeared, and its second volume followed two years afterwards. This book has been variously judged. It is generally and traditionally praised, but those who have read it will be more disposed to agree with Charles Lamb, who considers it " of a vile and debas- ing tendency," and thinks it " almost impossible to suppose the author in earnest." The intolerable meanness advocated for the sake of the paltriest gains, the entire ignoring of any pursuit

in life except money-getting, and the representation of the whole duty of man as consisting first in the attainment of a competent fortune, and next, when that fortune has been attained, in spend- ing not more than half of it, are certainly repulsive enough. But there are no reasons for thinking the performance ironical or insincere, and it cannot be doubted that Defoe would have been honestly unable even to understand Lamb's indignation. To 1726 also belongs The Political History of the Devil. This is a curious book, partly explanatory of Defoe's ideas on morality, and partly belonging to a series of demonological works which he wrote, and of which the chief others are A System of Magic (1726), and An Essay on the History of Apparitions (1728), issued the year before under another title. In all these works his treat- ment is on the whole rational and sensible; but in The History of the Devil he is somewhat hampered by an insufficiently worked-out theory as to the nature and personal existence of his hero, and the manner in which he handles the subject is an odd and not altogether satisfactory mixture of irony and earnestness. A Plan of English Commerce, containing very enlightened views on export trade, appeared in 1728.

During the years from 1715 to 1728 Defoe had issued pamphlets and minor works too numerous to mention. The only one of them perhaps which requires notice is Religious Courtship (1722), a curious series of dialogues displaying Defoe's unaffected religiosity, and at the same time the rather meddling intrusive- ness with which he applied his religious notions. This was more flagrantly illustrated in one of his latest works, The Treatise Concerning the Use and Abuse of the Marriage Bed (1727), which was originally issued with a much more offensive name, and has been called " an excellent book with an improper title." The Memoirs of Captain Carleton (1728) were long attributed to Defoe, but the internal evidence is strongly against his authorship. They have been also attributed to Swift, with greater probability

as far as style is concerned. The Life of Mother Ross, reprinted in Bonn's edition, has no claim whatever to be considered Defoe's.

There is little to be said of Defoe's private life during this period. He must in some way or other have obtained a consider- able income. In 1724 he had built himself a large house at Stoke Newington, which had stables and grounds of considerable size. From the negotiations for the marriage of his daughter Sophia it appears that he had landed property in more than one place, and he had obtained on lease in 1722 a considerable estate from the corporation of Colchester, which was settled on his unmarried daughter at his death. Other property was similarly allotted to his widow and remaining children, though some difficulty seems to have arisen from the misconduct of his son, to whom, for some purpose, the property was assigned during his father's lifetime, and who refused to pay what was due. There is a good deal of mystery about the end of Defoe's life; it used to be said that he died insolvent, and that he had been in jail shortly before his death. As a matter of fact, after great suffering from gout and stone, he died in Ropemaker's Alley, Moorfields, on Monday the 26th of April 1 73 1, and was buried in Bunhill Fields. He left no will, all his property having been previously assigned, and letters of administration were taken out by a creditor. How his affairs fell into this condition, why he did not die in his own house, and why in the previous summer he had been in hiding, as we know he was from a letter still extant, are points not clearly explained. He was, however, attacked by Mist, whom he wounded, in prison in 1724. It is most likely that Mist had found out that Defoe was a government agent and quite probable that he communicated his knowledge to other editors, for Defoe's journalistic employ- ment almost ceased about this time, and he began to write anonymously, or as " Andrew Moreton." It is possible

that he had to go into hiding to avoid the danger of being accused as a real Jacobite, when those with whom he had contracted to assume the character were dead and could no longer justify his attitude.

Defoe married, on New Year's Day, 1684, Mary Tuffley, who survived until December 1732. They had seven children. His second son, Bernard or Benjamin Norton, has, like his father, a scandalous niche in the Dunciad. In April 1877 public attention was called to the distress of three maiden ladies, directly descended from Defoe, and bearing his name; and a crown pension of £75 a year was bestowed on each of them. His youngest daughter, Sophia, who married Henry Baker, left a considerable correspondence, now in the hands of her descendants. There are several portraits of Defoe, the principal one being engraved by Vander- gucht.

In his lifetime, Defoe, as not belonging to either of the great parties at a time of the bitterest party strife, was subjected to obloquy on both sides. The great Whig writers leave him unnoticed. Swift and Gay speak slightingly of him, — the former, it is true, at a time when he was only known as a party pamphleteer. Pope, with less excuse, put him in the Dunciad towards the end of his life, but he confessed to Spence in private that Defoe had written many things and none bad. At a later period he was unjustly described as " a scurrilous party writer," which he certainly was not; but, on the other hand, Johnson spoke of his writing " so variously and so well," and put Robinson Crusoe among the only three books that readers wish longer. From Sir Walter Scott downwards the tendency to judge literary work on its own merits to a great extent restored Defoe to his proper place, or, to speak more correctly, set him there for the first time. Lord Macaulay's description of Roxana, Moll Flanders and Colonel Jack as " utterly nauseous and wretched " must be set aside as a freak of criticism.

Scott justly observed that Defoe's style " is the last which should be attempted by a writer of

inferior genius; for though it be possible to disguise mediocrity by fine writing, it appears in all its naked inanity when it assumes the garb of simplicity." The methods by which Defoe attains his result are not difficult to disengage. They are the presentment of all his ideas and scenes in the plainest and most direct language, the frequent employ-

ment of colloquial forms of speech, the constant insertion of little material details and illustrations, often of a more or less digressive form, and, in his historico-fictitious works, as well as in his novels, the most rigid attention to vivacity and consistency of character. Plot he disregards, and he is fond of throwing his dialogues into regular dramatic form, with by-play prescribed and stage directions interspersed. A particular trick of his is also to divide his arguments after the manner of the preachers of his day into heads and subheads, with actual numerical signs affixed to them. These mannerisms undoubtedly help and emphasize the extra- ordinary faithfulness to nature of his fictions, but it would be a great mistake to suppose that they fully explain their charm. Defoe possessed genius, and his secret is at the last as impalpable as the secret of genius always is.

The character of Defoe, both mental and moral, is very clearly indicated in his works. He, the satirist of the true-born English- man, was himself a model, with some notable variations and improvements, of the Englishman of his period. He saw a great many things, and what he did see he saw clearly. But there were also a great many things which he did not see, and there was often no logical connexion whatever between his vision and his blind-ness. The most curious example of this inconsistency, or rather of this indifference to general principle, occurs in his Essay on Projects. He there speaks very briefly and slightingly of life insurance, probably because it was then regarded as impious by religionists of his complexion. But on either side of this refusal are to be found elaborate projects of friendly societies and widows'

funds, which practically cover, in a clumsy and roundabout manner, the whole ground of life insurance. In morals it is evident that he was, according to his lights, a strictly honest and honourable man. But sentiment of any " high-flying " descrip- tion — to use the cant word of his time — was quite incompre- hensible to him, or rather never presented itself as a thing to be comprehended. He tells us with honest and simple pride that when his patron Harley fell out, and Godolphin came in, he for three years held no communication with the former, and seems quite incapable of comprehending the delicacy which would have obliged him to follow Harley's fallen fortunes. His very anomal- ous position in regard to Mist is also indicative of a rather blunt moral perception. One of the most affecting things in his novels is the heroic constancy and fidelity of the maid Amy to her exemplary mistress Roxana. But Amy, scarcely by her own fault, is drawn into certain breaches of definite moral laws which Defoe did understand, and she is therefore condemned, with hardly a word of pity, to a miserable end. Nothing heroic or romantic was within Defoe's view; he could not understand passionate love, ideal loyalty, aesthetic admiration or anything of the kind; and it is probable that many of the little sordid touches which delight us by their apparent satire were, as de- signed, not satire at all, but merely a faithful representation of the feelings and ideas of the classes of which he himself was a unit.

His political and economical pamphlets are almost unmatched as clear presentations of the views of their writer. For driving the nail home no one but Swift excels him, and Swift perhaps only in The Drapier's Letters. There is often a great deal to be said against the view presented in those pamphlets, but Defoe sees nothing of it. He was perfectly fair but perfectly one-sided, being generally happily ignorant of everything which told against his own view.

The same characteristics are curiously illustrated in his moral works. The morality of these is almost

amusing in its down- right positive character. With all the Puritan eagerness to push a clear, uncompromising, Scripture-based distinction of right and wrong into the affairs of every-day life, he has a thoroughly English horror of casuistry, and his clumsy canons consequently make wild work with the infinite intricacies of human nature. He is, in fact, an instance of the tendency, which has so often been remarked by other nations in the English, to drag in moral distinctions at every turn, and to confound everything which is novel to the experience, unpleasant to the taste, and incompre- hensible to the understanding, under the general epithets oi

wrong, wicked and shocking. His works of this class therefore are now the least valuable, though not the least curious, of his books.

The earliest regular life and estimate of Defoe is that of Dr Towers in the Biographia Britannica. George Chalmers's Life, however (1786), added very considerable information. In 1830 Walter Wilson wrote the standard Life (3 vols.) ; it is coloured by political pre- judice, but is a model of painstaking care, and by its abundant citations from works both of Defoe and of others, which are practic- ally inaccessible to the general reader, is invaluable. In 1859 appeared a life of Defoe by_ William Chadwick, an extraordinary rhapsody in a style which is half Cobbett and half Carlyle, but amusing, and by no means devoid of acuteness. In 1864 the dis- covery of the six letters stirred up William Lee to a new investigation, and the results of this were published (London, 1869) in three large volumes. The first of these (well illustrated) contains a new life and particulars of the author's discoveries. The second and third contain fugitive writings assigned by Lee to Defoe for the first time. For most of these, however, we have no authority but Lee's own im- pressions of style, &c.

; and consequently, though the best quali- fied judges will in most cases agree that Defoe may very likely have written them, it cannot positively be stated that he did. There is also a Life by Thomas Wright (1894). The Earlier Life and Chief Earlier Works of Defoe (1890) was included by Henry Morley in the " Carisbrooke Library." Charles Lamb's criticisms were made in three short pieces, two of which were written for Wilson's book, and the third for The Reflector. The volume on Defoe (1879) in the " English Men of Letters " series is by W. Minto.

There is considerable uncertainty about many of Defoe's writings; and even if all contested works be excluded, the number is still enormous. Besides the list in Bohn's Lowndes, which is somewhat of an omnium gatherum, three lists drawn with more or less care were compiled in the 19th century. Wilson's contains 210 distinct works, three or four only of which are marked as doubtful; Hazlitt's enumerates 183 " genuine " and 52 " attributed " pieces, with notes on most of them; Lee's extends to 254, of which 64 claim to be new additions. The reprint (3>ols.) edited for the " Pulteney Library " by Hazlitt in 1840-1843 contains a good and full life mainly de- rived from Wilson, the whole of the novels (including the Serious Reflections now hardly ever published with Robinson Crusoe), Jure Divino, The Use and Abuse of Marriage, and many of the more important tracts and smaller works. There is also an edition, often called Scott's, but really edited by Sir G. C. Lewis, in twenty volumes (London, 1840-1841). This contains the Complete Trades- man, Religious Courtship, The Consolidator and oth-t works not comprised in Hazlitt's. Scott had previously in 1809 edited for Ballantyne some of the novels, in twelve volumes. Bohn's " British Classics " includes the novels (except the third part of Robinson Crusoe), The History of the Devil, The Storm, and a few political pamphlets, also the undoubtedly spurious Mother Ross. In 1870 Nimmo of Edinburgh published in one volume an admirable selection from Defoe. It contains Chalmers's Life, annotated and completed from Wilson and Lee,

Robinson Crusoe, pts. i. and ii., Colonel Jack, The Cavalier, Duncan Campbell, The Plague, Everybody's Business, Mrs Veal, The Shortest Way with Dissenters, Giving Alms no Charity, The True-Born Englishman, Hymn to the Pillory, and very copious extracts from The Complete English Tradesman. An edition of Defoe's Romances and Narratives in sixteen volumes by G. A. Aitken came out in 1895.

If we turn to separate works, the bibliography of Defoe is practic- ally confined (except as far as original editions are concerned) to Robinson Crusoe. Mrs Veal has been to some extent popularized by the work which it helped to sell; Religious Courtship and The Family Instructor had a vogue among the middle class until well into the 19th century, and The History of the Union was republished in 1786. But the reprints and editions of Crusoe have been innumer- able ; it has been often translated ; and the eulogy pronounced on it by Rousseau gave it special currency in France, where imitations (or rather adaptations) have also been common.

In addition to the principal authorities already mentioned see John Forster, Historical and Biographical Essays (1858); G. Saints- bury, " Introduction " to Defoe's Minor Novels; and valuable notes by G. A. Aitken in The Contemporary Review (February 1890), and The Athenaeum (April 30, 1889; August 31, 1890). A facsimile reprint (1883) of Robinson Crusoe has an introduction by Mr Austin Dobson. Dr Karl T. Biilbring edited two unpublished works of Defoe, The Compleat English Gentleman (London, 1890) and Of Royall Educacion (London, 1905), from British Museum Add. MS. 32,555. Further light was thrown on Defoe's work as a political agent by the discovery (1906) of an unpublished paper of his in the British Museum by G. F. Warner. This was printed in the English Historical Review, and afterwards separately.

DEGAS, HILAIRE GERMAIN EDGARD (1834-), French painter, was born in Paris on the 19th of July 1834. Entering in 1855 the Ecole des Beaux Arts, he early developed independ- ence of artistic outlook,

studying under Lamothe. He first exhibited in the Salon of 1865, contributing a ” War in the

middle ages,” a work executed in pastel. To this medium he was ever faithful, using it for some of his best work. In 1866 his ” Steeplechase ” revealed him as a painter of the racecourse and of all the most modern aspects of life and of Parisian society, treated in an extremely original manner. He subsequently exhibited in 1867 ” Family Portraits,” and in 1868 a portrait of a dancer in the ” Ballet of La Source.” In 1869 and 1870 he restricted himself to portraits; but thenceforward he abandoned the Salons and attached himself to the Impressionists. With Manet and Monet he took the lead of the new school at its first exhibition in 1874, and repeatedly contributed to these exhibit tions (in 1876, 1878, 1879 and 1880). In 1868 he had shown his first study of a dancer, and in numerous pastels he proclaimed himself the painter of the ballet, representing its figurantes in every attitude with more constant aim at truth than grace. Several of his works may be seen at the Luxembourg Gallery, to which they were bequeathed, among a collection of impressionist pictures, by M. Caillebotte. In 1880 Degas showed his powers of observation in a set of ” Portraits of Criminals,” and he attempted modelling in a ” Dancer,” in wax. He afterwards returned to his studies of the sporting world, exhibiting in December 1884 at the Petit Gallery two views of ” Races ” which had a great success, proving the increasing vogue of the artist among collectors. He is ranked with Manet as the leader of the ” impressionist school.” At the eighth Impressionist Exhibition, in 1886, Degas continued his realistic studies of modern life, showing drawings of the nude, of workwomen, and of jockeys. Besides his pastels and his paintings of genre and portraits — among these, several likenesses of Manet — Degas also handled his favourite subjects in etching and in aquatint; and executed several lithographs of ” Singers at Cafes-concert,” of ” Ballet- girls,” and indeed of every possible subject of night-life and incidents behind

the scenes. His work is to be seen not only at the Luxembourg but in many of the great private collections in Paris, in England and America. In the Centenary Exhibition of 1900 he exhibited " The Interior of a Cotton-Broker's Office at New Orleans " (belonging to the Museum at Pau) and " The Rehearsal."

See also G. Moore, " Degas, the Painter of Modern Life," Magazine of Art (1890); J. K. Huysmans, Certains (Paris, 1889); G. Geffroy, La Vie Artistique (3° Serie, Paris, 1894).

DE GEER, LOUIS GERHARD, Baron (1818-1896), Swedish statesman and writer, was born on the 18th of July 1818 at Finspang castle. He adopted the legal profession, and in 1855 became president of the Gota Hofret, or lord justice of one of the Swedish supreme courts. From the 7th of April 1858 to the 3rd of June 1870 he was minister of justice. As a member of the Upper House he took part in all the Swedish Riksdags from 1851 onwards, though he seldom spoke. From 1867 to 1878 he was the member for Stockholm in the first chamber, and introduced and passed many useful reformatory statutes; but his greatest achievement, as a statesman, was the reform of the Swedish representative system, whereby he substituted a bi-cameral elective parliament, on modern lines, for the existing cumber- some representation by estates, a survival from the later middle ages. This great measure was accepted by the Riksdag in December 1865, and received the royal sanction on the 22nd of June 1866. For some time after this De Geer was the most popular man in Sweden. He retired from the ministry in 1870, but took office again, as minister of justice, in 1875. In 1876 he became minister of state, which position he retained till April 1880, when the failure of his repeated efforts to settle the arma- ments' question again induced him to resign. From 1881 to 1888 he was chancellor of the universities of Upsala and Lund. Besides several novels and aesthetic essays, De Geer has written a few political memoirs of supreme merit both as to style and matter, the most notable of which are: Minnesteckning ofver A. J. v.

Hopken (Stockholm, 1881); Minnesteckning ofver Hans Jarta (Stockholm, 1874); Minnesteckning ofver B. B. von Platen (Stockholm, 1886); and his own Minnen (Stockholm, 1892), an autobiography, invaluable as a historical document, in which the political experience and the matured judgments of

a lifetime are recorded with singular clearness, sobriety and charm.

See Sveriges historia (Stockholm, 1881, &c), vi. ; Carl Gustaf Malmstrom, Historiska Studier (Stockholm, 1897). (R. N. B.)

DEGGENDORF, or Deckendorf, a town of Germany, in the kingdom of Bavaria, 25 m. N.W. of Passau, on the left bank of the Danube, which is there crossed by two iron bridges. Pop. (1905) 7154. It is situated at the lower end of the beautiful valley of the Perlbach, and in itself it is a well-built and attractive town. It possesses an old town hall dating from 1 566, a hospital, a lunatic asylum, an orphanage, and a large parish church rebuilt in 1756; but the chief interest centres in the church of the Holy Sepulchre, built in 1337, which attracts thousands of pilgrims to its Porta Caeli or Gnadenpforte (Gate of Mercy) opened annually on Michaelmas eve and closed again on the 4th of October. In 1837, on the celebration of the 500th anniversary of this solemnity, the number of pilgrims was reckoned at nearly 100,000. Such importance as the town possesses is now rather commercial than religious, — it being a depot for the timber trade of the Bavarian forest, a station for the Danube steamboat company, and the seat of several mills, breweries, potteries and other industrial establishments. On the bank of the Danube outside the town are the remains of the castle of Findelstein; and on the Geiersberg (1243 ft.), in the immediate vicinity, stands another old pilgrimage church. About 6 m. to the north is the

village of Metten, with a Benedictine monastery founded by Charlemagne in 801, restored as an abbey in 1840 by Louis I. of Bavaria, and well known as an educational institution. The first mention of Deggendorf occurs in 868, and it appears as a town in 1 21 2. Henry (d. 1290) of the Landshut branch of the ruling family of Bavaria made it the seat of a custom-house; and in 1331 it became the residence of Henry III. of Natternberg (d. 1333), so called from a castle in the neighbourhood. In 1337 a wholesale massacre of the Jews, who were accused of having thrown the sacred host of the church of the Holy Sepulchre into a well, took place in the town; and it is probably from about this date that the pilgrimage above mentioned came into vogue. The town was captured by the Swedish forces in 1633, and in the war of the Austrian Succession it was more than once laid in ashes.

See Gruber and Miiller, Der bayerische Wald (Regensburg, 1851) ; Mittermiiller, Die heil. Hostien und die Jiiden in Deggendorf (Land- shut, 1866) ; and Das Kloster Metten (Straubing, 1857).

DE HAAS, MAURITZ FREDERICK HENDRICK (1832-1895), American marine painter, was born on the 12th of December 1832 in Rotterdam, Holland. He studied art in the Rotterdam Academy and at The Hague, under Bosboom and Louis Meyer, and in 1851-1852 in London, following the English water- colourists of the day. In 1857 he received an artist's commission in the Dutch navy, but in 1859, under the' patronage of August Belmont, who had recently been minister of the United States at The Hague, he resigned and removed to New York city. He became an associate of the National Academy in 1863 and an academician in 1867, and exhibited annually in the academy, and in 1866 he was one of the founders of the American Society of Painters in Water Colors. He died on the 23rd of November 1895. His " Farragut Passing the Forts at the Battle of New Orleans " and " The Rapids above Niagara," which were exhibited at the Paris Exposition of 1878, were his best known but not his most typical works, for his favourite subjects were storm and wreck, wind and heavy surf,

and less often moonlight on the coasts of Holland, of Jersey, of New England, and of Long Island, and on the English Channel.

His brother, William Frederick de Haas (1 830-1 880), who emigrated to New York in 1854, was also a marine painter.

DEHRA, a town of British India, headquarters of the Dehra Dun district in the United Provinces. Pop. (1901) 28,095. It lies at an elevation of 2300 ft. Here the Hardwar-Dehra railway terminates. Dehra is the headquarters of the Trigonometrical Survey and of the Forest Department, besides being a canton- ment for a Gurkha force. The Forest School, which trains subordinate forest officials for all parts of India, is a fine building. Attached to it is an institution for the scientific study of sylvi-

culture and the exploitation and administration of forests. The town of Dehra grew up round the temple built in 1699 by the heretical Sikh Guru, Ram Rai, the founder of the Udasi sect of Ascetics. This temple is a remarkable building in Mahommedan style. The central block, in imitation of the emperor Jahangir's tomb, contains the bed on which the Guru, after dying at will and coming back to life several times, ultimately died outright; it is an object of great veneration. At the corners of the central block are smaller monuments commemorating the Guru's wives.

DEHRA DUN, a district of British India, in the Meerut division of the United Provinces. Its area is 1209 sq. m. The district is bounded on the N. by the native state of Tehri or Garhwal, on the E. by British Garhwal, on the S. by the Siwalik hills, which separate it from Saharanpur district, and on the W. by the hill states of Sirmur, Jubbal and Taroch. The valley (the Dun) has an area of about 673 sq. m., and forms a parallelo- gram 45 m. from N.W. to S.E. and 15 m. broad. It is well wooded, undulating and intersected by streams. On the N.E. the horizon is bounded by the Mussoorie or lower range of the Himalayas, and on the S. by the Siwalik

bills. The Himalayas in the north of the district attain a height between 7000 and 8000 ft., one peak reaching an elevation of 8565 ft.; the highest point of the Siwalik range is 3041 ft. above sea-level. The principal passes through the Siwalik hills are the Timli pass, leading to the military station of Chakrata, and the Mohand pass leading to the sanatoriums of Mussoorie and Landaur. The Ganges bounds the Dehra valley on the E.; the Jumna bounds it on the W. From a point about midway between the two rivers, and near the town of Dehra, runs a ridge which forms the watershed of the valley. To the west of this ridge the water collects to form the Asan, a tributary of the Jumna; whilst to the east the Suswa receives the drainage and flows into the Ganges. To the east the valley is characterized by swamps and forests, but to the west the natural depressions freely carry off the surface drainage. Along the central ridge, the water-level lies at a great depth from the surface (228 ft.), but it rises gradually as the country declines towards the great rivers. In 1901 the population was 178,195, showing an increase of 6 % in the decade. A railway to Dehra from Hardwar, on the Oudh and Rohilkhand line (32 m.), was completed in 1900. The district is served by the Dun canals. Tea gardens cover a considerable area, and the valley contains a colony of European tea planters.

History. — Dehra Dun only emerges from the mists of legend into authentic history in the 17th century a.d., when it formed part of the Garhwal kingdom. Towards the end of the century the heretical Sikh Guru, Ram Rai, expelled from the Punjab, sought refuge in the Dun and gathered round him a crowd of devotees. Fateh Sah, raja of Garhwal, endowed the temple which he built, round which grew up the town of Gurudwara or Dehra (q.v.). In the 18th century the fertility of the valley attracted the attention of Najib-ud-daula, governor of Saharan- pur, who invaded it with an army of Rohillas in 1757 and annexed it to his dominion. His rule, which lasted till 1 770, brought great prosperity to the Dun; but on his death it became a prey to the surrounding

tribes, its desolation being completed after its conquest by the Gurkhas in 1803. In 1814 it was taken posses- sion of by the British, and in the following year was annexed to Saharanpur. Under British administration the Dun rapidly recovered its prosperity.

DEIOCES (Arjio/ojs), according to Herodotus (i. 96 ff.) the first king of the Medes. He narrates that, when the Medes had rebelled against the Assyrians and gained their independence about 710 B.C., according to his chronology (cf. Diodor. ii. 32), they lived in villages without any political organization, and therefore the whole country was in a state of anarchy. Then Deioces, son of Phraortes, an illustrious man of upright character, was chosen judge in his village, and the justness of his decisions induced the inhabitants of the other villages to throng to him. At last the Medes resolved to make an end of the intolerable state of their country by erecting a kingdom, and chose Deioces king. He now caused them to build a great capital, Ecbatana, with a royal palace, and introduced the ceremonialof oriental courts;

he surrounded himself with a guard and no longer showed himself to the people, but gave his judgments in writing and controlled the people by officials and spies. He united all the Median tribes, and ruled fifty-three years (c. 699-647 B.C.), though perhaps, as G. Rawlinson supposed, the fifty-three years of his reign are exchanged by mistake with the twenty-two years of his son Phraortes, under whom the Median conquests began.

The narration of Herodotus is only a popular tradition which derives the origin of kingship from its judicial functions, con- sidered as its principal and most beneficent aspect. We know from the Assyrian inscriptions that just at the time which Herodotus assigns to Deioces the Medes were

divided into numerous small principalities and subjected to the great Assyrian conquerors. Among these petty chieftains, Sargon in 715 mentions Dayukku, ” lieutenant of Man ” (he probably was, therefore, a vassal of the neighbouring king of Man in the mountains of south-eastern Armenia), who joined the Urartians and other enemies of Assyria, but was by Sargon transported to Hamath in Syria ” with his clan.” His district is called ” bit-Dayaukki,” ” house of Deioces,” also in 713, when Sargon invaded these regions again. So it seems that the dynasty, which more than half a century later succeeded in throwing off the Assyrian yoke and founded the Median empire, was derived from this Dayukku, and that his name was thus introduced into the Median traditions, which contrary to history considered him as founder of the kingdom. (Ed. M.)

DEIOTARUS, a tetrarch of Galatia (Gallo-Graecia) in Asia Minor, and a faithful ally of the Romans. He is first heard of at the beginning of the third Mithradatic war, when he drove out the troops of Mithradates under Eumachus from Phrygia. His most influential friena was Pompey, who, when settling the affairs of Asia (63 or 62 B.C.), rewarded him with the title of king and an increase of territory (Lesser Armenia). On the outbreak of the civil war, Deiotarus naturally sided with his old patron Pompey, and after the battle of Pharsalus escaped with him to Asia. In the meantime Pharnaces, the son of Mithradates, had seized Lesser Armenia, and defeated Deiiotarus near Nicopolis. Fortunately for Di’otarus, Caesar at that time (47) arrived in Asia from Egypt, and was met by the tetrarch in the dress of a suppliant. Caesar pardoned him for having sided with Pompey, ordered him to resume his royal attire, and hastened against Pharnaces, whom he defeated at Zela. In consequence of the complaints of certain Galalian princes, De’iotarus was deprived of part of his dominions, but allowed to retain the title of king. On the death of Mithradates of Pergamum, tetrarch of the Trocnii, Deiiotarus was a candidate for the vacancy. Other tetrarchs also pressed their claims; and, further, Deiotarus was accused by his

grandson Castor of having attempted to assassinate Caesar when the latter was his guest in Galatia. Cicero, who enter- tained a high opinion of Deiotarus, whose acquaintance he had made when governor of Cilicia, undertook his defence, the case being heard in Caesar's own house at Rome. The matter was allowed to drop for a time, and the assassination of Caesar prevented any final decision being pronounced. In his speech Cicero briefly dismisses the charge of assassination, the main question being the distribution of the provinces, which was the real cause of the quarrels between Deiiotarus and his relatives. After Caesar's death, Mark Antony, for a large monetary consideration, publicly announced that, in accordance with instructions left by Caesar, Deiiotarus was to resume possession of all the territory of which he had been deprived. When civil war again broke out, Deiiotarus was persuaded to support Brutus and Cassius, but after the battle of Philippi went over to the triumvirs. He remained in possession of his kingdom till his death at a very advanced age.

See Cicero, Philippica, ii. 37; Ad jam. viii. 10, ix. 12, xv. I, 2, 4; Ad Alt. xiv. I; De divin. i. 15, ii. 36, 37; De harusp. resp. 13, and above all Pro rege Deiotaro; Appian,- Bell. Mithrid. 75, 114; Bellum Alexandrinum, 34-41, 65-77; Dio Cassius xli. 63, xlii. 45, xlvii. 24, 48, xlviii. 33.

DEIR, or Deir Ez-Zor, a town of Asiatic Turkey, on the right bank of the Euphrates, 27J m. above its junction with the

Khabor, lat. 35° 20' N., long. 40 12' E. Pop. 8000 and upward, about one- tenth Christians; except in the official classes, there are no Turks. It is the capital and the only considerable town of the Zor sanjak, formed in 1857, which includes Ras el-'Ainon the north and Palmyra on the south, with a total area of 32,820 sq. m., chiefly desert, and an estimated population of 100,000, mostly Arab nomads. Deir itself is a thrifty and rising town, having considerable traffic; it is singularly European in appear- ance, with macadamized streets and a public

garden. The name Deir means monastery, but there is no other trace or tradition of the occupation of the site before the 14th century, and until it became the capital of the sanjak it was an insignificant village. It is an important centre for the control of the Bedouin Arabs, and has a garrison of about 1000 troops, including a special corps of mule-riders. It is also a road centre;, the roads from the Mediterranean to Bagdad by way of Aleppo and Damascus respectively meeting here. A road also leads northward, by Sinjar, to Mosul, crossing the river on a stone bridge, built in 1897, the only permanent bridge over the Euphrates south of Asia Minor. (J. P. Pe.)

DEIRA, the southern of the two English kingdoms afterwards united as Northumbria. According to Simeon of Durham it extended from the Humber to the Tyne, but the land was waste north of the Tees. York was the capital of its kings. The date of its first settlement is quite unknown, but the first king of whom we have any record is Ella or ^Elle, the father of Edwin, who is said to have been reigning about 585. After his death Deira was subject to ^Ethelfrith, king of Northumbria, until the accession of Edwin, in 616 or 617, who ruled both kingdoms (see Edwin) till 633. Osric the nephew of Edwin ruled Deira (633- 634), but his son Oswine was put to death by Oswio in 651. For a few years subsequently Deira was governed by ^Ethelwald son of Oswald.

See Bede, •Historia ecclesiastica, ii. 14, iii. 1,6, 14 (ed. C. Plummer, Oxford, 1896) ; Nennius, Historia Brittonum, § 64 (ed. Th. Mommsen, Berlin, 1898); Simeon of Durham, Opera, i. 339 (ed. T. Arnold, London, 1882-1885). (F. G. M. B.)

DEISM (Lat. deus, god), strictly the belief in one supreme God. It is however the received name for a current of rationalistic theological thought which, though not confined to one country, or to any well-defined period, was most conspicuous in England in the last years of the 17th and the first half of the 18th century. The deists, differing widely in

important matters of belief, were yet agreed in seeking above all to establish the certainty and sufficiency of natural religion in opposition to the positive religions, and in tacitly or expressly denying the unique significance of the supernatural revelation in the Old and New Testaments. They either ignored the Scriptures, endeavoured to prove them in the main by a helpful republication of the Evangelium aeternum, or directly impugned their divine char- acter, their infallibility, and the validity of their evidences as a complete manifestation of the will of God. The term " deism " not only is used to signify the main body of the deists' teaching, or the tendency they represent, but has come into use as a technical term for one specific metaphysical doctrine as to the relation of God to the universe, assumed to have been character- istic of the deists, and to have distinguished them from atheists, pantheists and theists, — the belief, namely, that the first cause of the universe is a personal God, who is, however, not only distjnet from the world but apart from it and its concerns.

The words " deism " and " deist " appear first about the middle of the 16th century in France (cf. Bayle's Dictionnaire, s.v. " Viret," note D), though the deistic standpoint had already been foreshadowed to some extent by Averroists, by Italian authors like Boccaccio and Petrarch, in More's Utopia (1515), and by French writers like Montaigne, Charron and Bodin. The first specific attack on deism in English was Bishop Stillingfleet's Leiier to a Deist (1677). By the majority of those historically known as the English deists, from Blount onwards, the name was owned and honoured. They were also occasionally called " rationalists." " Free-thinker " (in Germany, Freidenker) was generally taken to be synonymous with " deist," though obviously

capable of a wider signification, and as coincident

with esprit fort and with libertin in the original and theological sense of the word. 1 ” Naturalists ” was a name frequently used of such as recognized no god but nature, of so-called Spinozists, atheists; but both in England and Germany, in the 18th century, this word was more commonly and aptly in use for those who founded their religion on the lumen naturae alone. It was evidently in common use in the latter half of the 16th century as it is used by De Mornay in De la viritt de la religion chriiienne (1581) and by Montaigne. The same men were not seldom assaulted under the name of “theists”; the later distinction between “theist” and “deist,” which stamped the latter word as excluding the belief in provi- dence or in the immanence of God, was apparently formulated in the end of the 18th century by those rationalists who were aggrieved at being identified with the naturalists. (See also Theism.)

The chief names amongst the deists are those of Lord Herbert of Cherbury (1583-1648), Charles Blount (1654-1693), Matthew Tindal (1657-1733), William Woliaston (1659-1724), Thomas Woolston (1669-1733), Junius Janus (commonly known as John) Toland (1670-1722), the 3rd earl of Shaftesbury (1671-1713), Viscount Bolingbroke (1678-1751), Anthony Collins (1676-1729), Thomas Morgan (?-i743), and Thomas Chubb (1679-1747). 2 Peter Annet (1693-1769), and Henry “Dodwell (the younger; d. 1784), who made his contribution to the controversy in 1742, are of less importance. Of the eleven first named, ten appear to have been born within twenty-five years of one another; and it is noteworthy that by far the greater part of the literary activity of the deists, as well as of their voluminous opponents, falls within the same half century.

The impulses that promoted a vein of thought cognate to deism were active both before and after the time of its greatest notoriety. But there are many reasons to show why, in the 1 7th century, men should have set themselves with a new zeal, in politics, law and theology, to follow the light of nature alone, and to cast aside the fetters of

tradition and prescriptive right, of positive codes, and scholastic systems, and why in England especially there should, amongst numerous free-thinkers, have been not a few free writers. The significance of the Copemican system, as the total overthrow of the traditional conception of the universe, dawned on all educated men. In physics, Descartes had prepared the way for the final triumph of the mechanical explanation of the world in Newton's system. In England the new philosophy had broken with time-honoured beliefs more completely than it had done even in France; Hobbes was more startling than Bacon. Locke's philosophy, as well as his theology, served as a school for the deists. Men had become weary of Protestant scholasticism; religious wars had made peaceful thinkers seek to take the edge off dogmatical rancour; and the multiplicity of religious sects, coupled with the complete failure of various attempts at any substantial reconciliation, provoked distrust of the common basis on which all were founded. There was a school of distinctively latitudinarian thought in the Church of England ; others not unnaturally thought it better to extend the realm of the adiaphora beyond the sphere of Protestant ritual or the details of systematic divinity. Arminianism had revived the rational side of theological method. Semi-Arians and Unitarians, though sufficiently distinguished from the free-thinkers by reverence for the letter of Scripture, might be held to encourage departure from the ancient landmarks. The scholarly labours of P. D. Huet, R. Simon, L. E. Dupin, and Jean Le Clerc (Clericus), of the orientalists John Lightfoot, John Spencer and Humphrey Prideaux, of John Mill, the collator of New Testament readings, and John Fell, furnished new materials for controversy; and the

1 The right of the orthodox party to use this name was asserted by the publication in 1715 of a journal called The Freethinker, con- ducted by anti-deistic clergymen. The term libertin appears to have been used first as a hostile epithet of the Brethren of the Free Spirit, a 13th-century sect which was

accused not only of free- thought but also of licentious living.

2 See the separate biographies of these writers. The three most significant names after Lord Herbert are those of Toland, Woliaston and Tindal.

scope of Spinoza's Tractatus theologico-politicus had naturally been much more fully apprehended than ever his Elhica could be. The success of the English revolution permitted men to turn from the active side of political and theological controversy to specu- lation and theory; and curiosity was more powerful than faith. Much new ferment was working. The toleration and the free press of England gave it scope. Deism was one of the results, and is an important link in the chain of thought from the Reformation to our own day.

Long before England was ripe to welcome deistic thought Lord Herbert of Cherbury earned the name " Father of Deism " by laying down the main line of that religious philosophy which in various forms continued ever after to be the backbone of deistic systems. He based his theology on a comprehensive, if insufficient, survey of the nature, foundation, limits and tests of human knowledge. And amongst the divinely implanted, original, indefeasible notiliae communes of the human mind, he found as foremost his five articles: — that there is one supreme God, that he is to be worshipped, that worship consists chiefly of virtue and piety, that we must repent of our sins and cease from them, and that there are rewards and punishments here and hereafter. Thus Herbert sought to do for the religion of nature what his friend Grotius was doing for natural law, — making a new application of the standard of Vincent of Lerins, Quod semper, quod ubique, quod ab omnibus. It is important to notice that Herbert, as English ambassador at Paris, united in himself the currents of French and English thought, and also that his De Veritate, published in Latin and translated into French, did not appear in an English version.

Herbert had hardly attempted a systematic criticism of the Christian revelation either as a whole or in its details. Blount, a man of a very different spirit, did both, and in so doing may be regarded as having inaugurated the second main line of deistic procedure, that of historico-critical examination of

the Old and New Testaments. Blount adopted and expanded Hobbes's arguments against the Mosaic authorship of the Pentateuch; and, mainly in the words of Burnet's Archeologiae philosophicae, he asserts the total inconsistency of the Mosaic Hexaemeron with the Copernican theory of the heavens, dwelling with emphasis on the impossibility of admitting the view developed in Genesis, that the earth is the most important part of the universe. He assumes that the narrative was meant ethically, not physically, in order to eliminate false and polytheistic notions; and he draws attention to that double narrative in Genesis which was elsewhere to be so fruitfully handled. The examination of the miracles of Apollonius of Tyana, professedly founded on papers of Lord Herbert's, is meant to suggest similar considerations with regard to the miracles of Christ. Naturalistic explanations of some of these are proposed, and a mythical theory is distinctly foreshadowed when Blount dwells on the inevitable tendency of men, especially long after the event, to discover miracles attend- ant on the birth and death of their heroes. Blount assaults the doctrine of a mediator as irreligious. He dwells much more pronouncedly than Herbert on the view, afterwards regarded as a special characteristic of all deists, that much or most error in religion has been invented or knowingly maintained by sagacious men for the easier maintenance of good government, or in the interests of themselves and their class. And when he heaps suspicion, not on Christian dogmas, but on beliefs of which the resemblance to Christian tenets is sufficiently patent, the real aim is so transparent that his method seems to partake rather of the nature of literary eccentricity than of polemical artifice; yet by this disingenuous indirectness he gave his argument that savour of duplicity which ever after clung to the popular conception of deism.

Shaftesbury, dealing with matters for the most part different from those usually handled by the deists, stands almost wholly out of their ranks. But he showed how loosely he held the views he did not go

out of his way to attack, and made it plain how little weight the letter of Scripture had for himself; and, writing with much greater power than any of the deists, he was held to have done more than any one of them to forward the cause

for which they wrought. Founding ethics on the native and cultivable capacity in men to appreciate worth in men and actions, and, like the ancient Greek thinkers whom he followed, associat- ing the apprehension of morality with the apprehension of beauty, he makes morality wholly independent of scriptural enactment, and still more, of theological forecasting of future bliss or agony. He yet insisted on religion as the crown of virtue; and, arguing that religion is inseparable from a high and holy enthusiasm for the divine plan of the universe, he sought the root of religion in feeling, not in accurate beliefs or meritorious good works. He set little store on the theology of those who in a system of dry and barren notions " pay handsome compliments to the Deity," " remove providence," " explode devotion," and leave but " little of zeal, affection, or warmth in what they call rational religion." In the protest against the scheme of " judging truth by counting noses," Shaftesbury recognized the danger of the standard which seemed to satisfy many deists; and in almost every respect he has more in common with those who afterwards, in Germany, annihilated the pretensions of complacent rationalism than with the rationalists themselves.

Toland, writing at first professedly without hostility to any of the received elements of the Christian faith, insisted that Christianity was not mysterious, and that the value of religion could not lie in any unintelligible or self-contradictory elements ; though we cannot know the real essence of God or of any of his creatures, yet our beliefs about God must be thoroughly consistent with reason. Afterwards, Toland discussed, with considerable real

learning and much show of candour, the com- parative evidence for the canonical and apocryphal Scriptures, and demanded a careful and complete historical examination of the grounds on which our acceptance of the New Testament canon rests. He contributed little to the solution of the problem, but forced the investigation of the canon alike on theologians and the reading public. Again, he sketched a view of early church history, further worked out by Johann Salomo Semler (1725-1791), and surprisingly like that which was later elaborated by the Tubingen school. He tried to show, both from Scripture and extra-canonical literature, that the primitive church, so far from being an incorporate body of believers with the same creed and customs, really consisted of two schools, each possessing its " own gospel " — a school of Ebionites or Judaizing Christians, and the more liberal school of Paul. These parties, consciously but amicably differing in their whole relation to the Jewish law and the outside world, were subsequently forced into a non-natural uniformity. The cogency of Toland's arguments was weakened by his manifest love of paradox. Wollaston upheld the " intellectual " theory of morality, and all his reasoning is inde- pendent of any authority or evidence derived from revelation. His system was simplicity itself, all sin being reduced to the one form of lying. He favoured the idea of a future life as being necessary to set right the mistakes and inequalities of the present.

Collins, who had created much excitement by his Discourse of Free-thinking, insisting on the value and necessity of unpreju- diced inquiry, published at a later stage of the deistic controversy the famous argument on the evidences of Christianity. Christian- ity is founded on Judaism ; its main prop is the argument from the fulfilment of prophecy. Yet no interpretation or rearrange- ment of the text of Old Testament prophecies will secure a fair and non-allegorical correspondence between these and their alleged fulfilment in the New Testament. The inference is not expressly drawn, though it becomes

perfectly clear from his refutation of William Whiston's curious counter theory that there were in the original Hebrew scriptures prophecies which were literally fulfilled in the New Testament, but had been expunged at an early date by Jewish scribes. Collins indicates the possible extent to which the Jews may have been indebted to Chaldeans and Egyptians for their theological views, especially as great part of the Old Testament would appear to have been remodelled by Ezra; and, after dwelling on the points in which the prophecies attributed to Daniel differ from all other Old Testament pre- dictions, he states the greater number of the arguments still used

to show that the book of Daniel deals with events past and contemporaneous, and is from the pen of a writer of theMaccabean period, a view now generally accepted. Collins resembles Blount in "attacking specific Christian positions rather than seeking for a foundation on which to build the edifice of Natural Religion." Amongst those who replied to him were Richard Bentley, Edward Chandler, bishop of Lichfield, and Thomas Sherlock, afterwards bishop of London, who also attacked Woolston. They refuted him easily on many specific points, but carefully abstained from discussing the real question at issue, namely the propriety of free inquiry.

Woolston, at first to all appearance working earnestly in behalf of an allegorical but believing interpretation of the New Testa- ment miracles, ended by assaulting, with a yet unknown violence of speech, the absurdity of accepting them as actual historical events, and did his best to overthrow the credibility of Christ's principal miracles. The bitterness of his outspoken invective against the clergy, against all priestcraft and priesthood, was a new feature in deistic literature, and injured the author more than it furthered his cause.

Tindal's aim seems to have been a sober statement of the whole case in favour of natural religion, with copious but moderately worded criticism of such beliefs and usages in the Christian and other

religions as he conceived to be either non-religious or directly immoral and unwholesome. The work in which he endeavoured to prove that true Christianity is as old as the creation, and is really but the republication of the gospel of nature, soon gained the name of the " Deist's Bible." It was against Tindal that the most important of the orthodox replies were directed, e.g. John Conybeare's Defence of Revealed Religion, William Law's Case of Reason and, to a large extent, Butler's Analogy.

Morgan criticized with great freedom the moral character of the persons and events of Old Testament history, developing the theory of conscious " accommodation " on the part of the leaders of the Jewish church. This accommodation of truth, by altering the form and substance of it to meet the views and secure the favour of ignorant and bigoted contemporaries, Morgan attributes also to the apostles and to'Jesus. He likewise expands at great length a theory of the origin of the Catholic Church much like that sketched by Toland, but assumes that Paul and his party, latterly at least, were distinctly hostile to the Judaical party of their fellow-believers in Jesus as the Messias, while the college of the original twelve apostles and their adherents viewed Paul and his followers with suspicion and disfavour. Persecution from without Morgan regards as the influence which mainly forced the antagonistic parties into the oneness of the catholic and orthodox church. Morgan " seems to have discerned the dawning of a truer and better method " than the others. " He saw dimly that things require to be accounted for as well as affirmed or denied," and he was " one of the pioneers of modern historical science as applied to biblical criticism."

Annet made it his special work to invalidate belief in the resurrection of Christ, and to discredit the work of Paul.

Chubb, the least learnedly educated of the deists, did more than any of them, save Herbert, to round his system into a logical whole. From the New

Testament he sought to show that the teaching of Christ substantially coincides with natural religion as he understood it: But his main contention is that Christianity is not a doctrine but a life, not the reception of a system of truths or facts, but a pious effort to live in accordance with God's will here, in the hope of joining him hereafter. Chubb dwells with special emphasis on the fact that Christ preached the gospel to the poor, and argues, as Tindal had done, that the gospel must therefore be accessible to all men without any need for learned study of evidences for miracles, and intelligible to the meanest capacity. He sought to show that even in the New- Testament there are essential contradictions, and instances the unconditional forgiveness preached by Christ in the gospels as compared with Paul's doctrine of forgiveness by the mediation of Christ. Externally Chubb is interesting as representing the deism of the people contrasted with that of Tindal the theologian.

Dod well's ingenious thesis, that Christianity is not founded on argument, was certainly not meant as an aid to faith; and, though its starting-point is different from all other deistical works, it may safely be reckoned amongst their number.

Though himself contemporary with the earlier deists, Boling- broke's principal works were posthumously published after interest in the controversy had declined. His whole strain, in sharp contrast to that of most of his predecessors, is cynical and satirical, and suggests that most of the matters discussed were of small personal concern to himself. He gives fullest scope to the ungenerous view that a vast proportion of professedly revealed truth was ingeniously palmed off by the more cunning on the more ignorant for the convenience of keeping the latter under. But he writes with keenness and wit, and knows well how to use the materials already often taken advantage of by earlier deists.

Before passing on to a summary of the deistie position, it is necessary to say something of the views of Conyers Middleton (q.v.), who, though he never actually severed himself from ortho- doxy, yet advanced theories closely analogous to those of the deists. His most important theological work was that devoted to an exposure of patristic miracles. His attack was based largely on arguments which could be turned with equal force against the miracles of the New Testament, and he even went further than previous rationalists in impugning the credibility of statements as to alleged miracles emanating from martyrs and the fathers of the early church. That Middleton was pre- pared to carry this type of argument into the apostolic period is shown by certain posthumous essays (Miscellaneous Works; ii. pp. 255 ff.), in which he charges the New Testament writers with inconsistency and the apostles with suppressing their cherished beliefs on occasions of difficulty.

In the substance of what they received as natural religion, the deists were for the most part agreed; Herbert's articles con- tinued to contain the fundamentals of their theology. Religion, though not identified with morality, had its most important outcome in a faithful following of the eternal laws of morality, regarded as the will of God. With the virtuous life, was further to be conjoined a humble disposition to adore the Creator, avoiding all factitious forms of worship as worse than useless. The small value they attributed to all outward and special forms of service, and the want of any sympathetic craving for the com- munion of saints, saved the deists from attempting to found a free-thinking church. They seem generally to have inclined to a quietistic accommodation to established forms of faith, till better times came. They steadfastly sought to eliminate the miraculous from theological belief, and to expel from the system of religious truth all debatable, difficult or mysterious articles. They aimed at a rational and intelligible faith, professedly in order to make religion, in all its width and depth, the heritage

of every man. They regarded with as much suspicion the notion of a "peculiar people " of God, as of a unique revelation, and insisted on the possibility of salvation for the heathen. They rejected the doctrine of the Trinity, and protested against mediatorship, atonement and the imputed righteousness of Christ, always laying more stress on the teaching of Christ than on the teaching of the church about him; but they repeatedly laid claim to the name of Christians or of Christian deists. Against superstition, fanaticism and priestcraft they protested unceasingly. They all recognized the soul of man — not regarded as intellectual alone— as the ultimate court of appeal. But they varied much in their attitude towards the Bible. Some were content to argue their own ideas into Scripture, and those they disliked out of it ; to one or two it seemed a satisfaction to discover difficulties in Scripture, to point to historical inaccuracies and moral defects. Probably Chubb 's position on this head is most fairly character- istic of deism. He holds that the narrative, especially of the New Testament, is in the main accurate, but, as written after the events narrated, has left room for misunderstandings and mistakes. The apostles were good men, to whom, after Christ; we are most indebted; but they were fairly entitled to their own private opinions, and naturally introduced these into their writings. The epistles, according to Chubb, contain errors of

fact, false interpretations of the Old Testament, and sometimes disfigurement of religious truth.

The general tendency of the deistical writings is sufficiently self-consistent to justify a common name. But deism is not a compact system nor is it the outcome of any one line of philo- sophical thought. Of matters generally regarded as pertaining to natural religion, that on which they were least agreed was the certainty, philosophical demonstrability and moral significance of the immortality of the soul, so that the deists have sometimes been grouped into " mortal " and " immortal " deists. For some the belief in future

rewards and punishments was ah essential of religion; some seem to have questioned the doctrine as a whole; and, while others made it a basis of morality, Shaftesbury protested against the ordinary theological form of the belief as immoral. No two thinkers could well be more opposed than Shaftesbury and Hobbes; yet sometimes ideas from both were combined by the same writer. Collins was a pronounced necessi- tarian; Morgan regarded the denial of free will as tantamount to atheism. And nothing can be more misleading than to assume that the belief in a Creator, existent wholly apart from the work of his hands, was characteristic of the deists as a body. In none of them is any theory on the subject specially prominent, except that in their denial of miracles, of supernatural revelation, and a special redemptive interposition of God in history, they seem to have thought of providence much as the mass of their opponents did. Herbert starts his chief theological work with the design of vindicating God's providence. Shaftesbury vigorously protests against the notion of a wholly transcendent God. Morgan more than once expresses a theory that would now be pronounced one of immanence. Tolandj the inventor of the name of pantheism, was notoriously, for a great part of his life, in some sort a pantheist. And while as thinkers they diverged in their opinions, so too they differed radically in character, in reverence for their subject and in religious earnestness and moral worth.

The deists were not powerful writers; none of. them was dis- tinguished by wide and accurate scholarship; hardly any was either a deep or comprehensive thinker. But though they gener- ally had the best scholarship of England against them, they were bold, acute, well-informed men; they appreciated more fully than their contemporaries not a few truths now all but univer- sally accepted; and they seemed therefore entitled to leave their mark on subsequent theological thought. Yet while the seed they sowed was taking deep root in France and in Germany, the English deists, the most notable men

of their time, were soon forgotten, or at least ceased to be a prominent factor in the intellectual life of the century. The controversies they had provoked collapsed, and deism became a by-word even amongst those who were in no degree anxious to appear as champions of orthodoxy.

The fault was not wholly in the subjectivism of the movement. But the subjectivism that founded its theology on the " common sense " of the individual was accompanied by a fatal pseudo- universalism which, cutting away all that was peculiar, indi- vidual and most intense in all religions, left in any one of them but a lifeless form. A theology consisting of a few vague gener- alities was sufficient to sustain the piety of the best of the deists; but it had not the concreteness or intensity necessary to take a firm hold on those whom it emancipated from the old beliefs. The negative side of deism came to the front, and, communicated with fatal facility, seems ultimately to have constituted the deism that was commonly professed at the clubs of the wits and the tea-tables of polite society. But the in tenser religious life before which deism fell was also a revolt against the abstract and argumentative orthodoxy of the time.

That the deists appreciated fully the scope of difficulties in Christian theology and the sacred books is not their most noteworthy feature; but that they made a stand, sometimes cautiously, often with outspoken fearlessness, against the pre- supposition that the Bible is the religion of Protestants. They themselves gave way to another presupposition equally fatal to true historical research, though in great measure common to them and their opponents. It was assumed by deists in

debating against the orthodox, that the flood of error in the hostile camp was due to the benevolent cunning or deliberate self-seeking of unscrupulous

men, supported by the ignorant with the obstinacy of prejudice.;

Yet deism deserves to be remembered as a strenuous protest against bibliolatry in every degree and against; all traditionalism in theology. It sought to look not a few facts full in the face, from a new point of view and with a thoroughly modern though unhistorical spirit. It was not a religious movement ; and though, as a defiance of the accepted theology, its character was mainly theological, the deistical crusade belongs, not to the history of the church, or of dogma, but to the history of general culture. It was an attitude of mind, not a body of doctrine; its nearest parallel is probably to be found in the eclectic strivings of the Renaissance philosophy and the modernizing tendencies of cisalpine humanism. The controversy was assumed to be against prejudice, ignorance, obscurantism; what monks were to Erasmus the clergy as such were to Woolston. Yet English deism was in many ways characteristically English. The deists were, as usually happens with the leaders of English thought, no class of professional men, but represented every rank in the community. They made their appeal in the mother tongue to all men who could read and think, and sought to reduce the controversy to its most direct practical issue. And, with but one or two exceptions, they avoided wildness in their language as much as in the general scheme of theology they proposed. If at times they had recourse to ambiguity of speech and veiled polemic, this might be partly excused when we remember the hanging of Thomas Aikenhead in 1697 for ridiculing the Bible, and Woolston's imprisonment in 1729.

French deism, the direct progeny of the English movement, was equally short-lived. Voltaire during his three years' residence in England (1 726-1 729) absorbed an enthusiasm for freedom of thought, and provided himself with the arguments necessary to support the deism which he had learned in his youth; he was to the end a deist of the school of Bolingbroke. Rousseau, though not an active assailant of Christianity, could have claimed

kindred with the nobler deists. Diderot was for a time heartily in sympathy with deistic thought; and the Encyclo- pidie was in its earlier portion an organ of deism. Even in the Roman Catholic Church a large number of the leading divines were frankly deistic, nor were they for that reason regarded as irreligi- ous. But as Locke's philosophy became in France sensationalism, and as Locke's pregnant question, reiterated by Collins, how we know that the divine power might not confer thought on matter, led the way to dogmatic materialism, so deism soon gave way to forms of thought more directly and completely subversive of the traditional theology. None the less it is unquestionable that, in the period preceding the Revolution the bulk of French thinkers were ultimately deists in various degrees, and that deism was a most potent factor not only in speculative but also in social and political development. Many of the leaders of the revolution- ary movement were deists, though it is quite false to say that the extreme methods of the movement were the result of widespread rationalism.

In Germany there was a native free-thinking theology nearly contemporary with that of England, whence it was greatly developed and supplemented. Among the earliest names are those of Georg Schade (1712-1795), J. B. Basedow (1723-1790), the educationist, Johann August Eberhard (q.v.) ; and K. F. Bahrdt, who regarded Christ as merely a noble teacher like Moses, Confucius and Luther. The compact rational philosophy of Wolff nourished a theological rationalism which in H. S. Reimarus was wholly undistinguishable from dogmatic deism, and was undoubtedly to a great extent adopted by Lessing; while, in the case of the historico- critical school to which J. S. Sender belonged,, the distinction is not always easily drawn — although these rationalists professedly recognized in Scripture a real divine revelation, mingled with local and temporary elements. It deserves to be noted here that the former, the theology of the Atifklarung, was, like that of the deists, destined to a short-lived notoriety; whereas the solid,

accurate and scholarly researches

of the rationalist critics of Germany, undertaken with no merely polemical spirit, not only form an epoch in the history of theology, but have taken a permanent place in the body of theological science. Ere ralionalismus vulgaris fell before the combined assault of Schleiermacher's subjective theology and the deeper historical insight of the Hegelians, it had found a refuge successively in the Kantian postulates of the practical reason, and in the vague but earnest faith-philosophy of Jacobi.

Outside France, Germany and England, there were no great schools of thought distinctively deistic, though in most countries there is to be found a rationalistic anti-clerical movement which partakes of the character of deism. It seems probable, for example, that in Portugal the marquis de Pombal was in reality a deist, and both in Italy and in Spain there were signs of the same rationalistic revolt. More certain, and also more striking, is the fact that the leading statesmen in the American War of Independence were emphatically deists; Benjamin Franklin (who attributes his position to the study of Shaftesbury and Collins), Thomas Paine, Washington and Jefferson, although they all had the greatest admiration for the New Testament story, denied that it was based on any supernatural revelation. For various reasons the movement in America did not appear on the surface to any great extent, and after the comparative failure of Elihu Palmer's Principles of Nature it expressed itself chiefly in the spread of Unitarianism.

In England, though the deists were forgotten, their spirit was not wholly dead. For men like Hume and Gibbon the stand- point of deism was long left behind ; yet Gibbon's famous two chapters might well have been written by a deist. Even now many undoubtedly cling to a theology nearly allied to deism. Rejecting miracles and denying the infallibility of Scripture, protesting against Calviriistic views of sovereign grace and having rib interest in evangelical Arminianism, the faith of

such inquirers seems fairly to coincide with that of the deists. Even some cultured theologians, the historical representatives of latitudina- rianism, seem to accept the great body of what was contended for by the deists. Moreover, the influence of the deistic writers had an incalculable influence in the gradual progress towards tolerance, and in the spread of a broader attitude towards intellectual problems, and this too, though, as we have seen, the original deists devoted themselves mainly to a crusade against the doctrine of revelation.

The original deists displayed a singular incapacity to under- stand the true conditions of history; yet amongst them there were some who pointed the way to the truer, more generous interpretation of the past. When Shaftesbury wrote that " religion is still a discipline, and progress of the soul towards perfection," he gave birth to the same thought that was after- wards hailed in Lessing's Erziehung des Menschengeschlechtes as the dawn of a fuller and a purer light on the history of religion and on the development of the spiritual life of mankind.

Authorities. — See John Leland, A View of the Principal Deistical Writers (2 vols., 1754-1756; ed. 1837); G. V. Lechler, Ceschichle des englischen Deismus (2 vols., 1841); L. Noack, Die Freidenker in der Religion (Bern, 1853-1855) ; John Hunt, Religious Thought in England (3 vols., 1870-1872); Leslie Stephen, History of English Thought in the 18th Century (2 vols., 1876); A. S. Farrar, A Critical History of Free Thought (1862, Bampton Lectures); J. H. Overton and F. Relton, The English Church from the Accession of George I. to the end of the iSth Century (1906; especially chap, w., "The Answer to Deism"); A. W. Benn, History of English Rationalism in the 19th Century (1906) ; i. 1 1 1 ff . ; J. M. Robertson, Short History of Free Thought (1906) ; G. Ch. B. Punjer, Geschichte der christlichen Religionsphilosophie seit der Reformation (Brunswick, 1880); M. W. Wiseman, Dynamics of Religion (London, 1897), pt.'ii.; article " Deismus" in Herzog- Hauck, Realencyklopddie (vol. iv., 1898).

DEISTER, a chain of hills in Germany, in the Prussian province of Hanover, about 15 m. S.W. of the city of Hanover. It runs in a north-westerly direction from Springe in the S. to Roden- berg in the N. It has a total length of 14 m., and rises in the Hofeler to a height of 1250 ft. The chain is well- wooded and abounds in game. There are some coal mines and sandstone quarries.

DEJAZET, PAULINE VIRGINIE (1798–1875), French actress, born in Paris on the 30th of Ausust 1798, made her first appear- ance on the stage at the age of five. It was not until 1820, when she began her seven years' connexion with the recently founded Gymnase, that she wonher triumphs in soubrette and " breeches " parts, which came to be known as " Dejazets." From 1828 she played at the Nouveautes for three years, then at the Varietes, and finally became manager, with her son, of the Folies, which was renamed the Theatre Dejazet. Here, even at the age of sixty-five, she had marvellous success in youthful parts, especially in a number of Sardou's earlier plays, previously unacted. She retired in 1868, and died on the 1st of December 1875, leaving a great name in the annals of the French stage.

See Duval's Virginie Dejazet (1876).

DE KALB, a city of De Kalb county, Illinois, U.S.A., in the N. part of the state, about 58 m. W. of Chicago. Pop. (1890) 2579; (1900) 5904 (1520 foreign-born); (1910) 8102. De Kalb is served by the Chicago Great Western, the Chicago & North- Western, and the Illinois, Iowa & Minnesota railways, and by interurban electric lines. It is the seat of the Northern Illinois state normal school (opened in 1899). The principal manu- factures of De Kalb are woven and barbed wire, waggons and agricultural implements, pianos, shoes, gloves, and creamery packages. The city has important dairy interests also. De Kalb was first settled in 1832, was known

as Buena Vista until 1840, was incorporated as a village in 1861, and in 1877 was organized under the general state law as a city.

DE KEYSER, THOMAS (1596 or 1597–1667), Dutch painter, was born at Amsterdam, the son of the architect and sculptor Hendrik de Keyser. We have no definite knowledge of his training, and but scant information as to the course of his life, though it is known that he owned a basalt business between 1640 ‘ and 1654. Aert Pietersz, Corneiis vanider Voort, Werner van Valckert and Nicolas Elias are accredited by different author- ities with having developed his talent; and M. Karl Woermann, who has pronounced in favour of Nicolas Elias is supported by the fact that almost all that master’s pictures were formerly attributed to De Keyser, who, in like fashion, exercised some influence upon Rembrandt when, he first went to Amsterdam in ‘ 1631. De Keyser chiefly excelled as a portrait painter, though he also executed some historical and mythological pictures, such as the ” Theseus ” and ” Ariadne ” in the Amsterdam town hall. His portraiture is full of character and masterly in handling, and often, as in the ” Old Woman ” of the Budapest gallery, is distinguished by a rich golden glow of colour and Rembrandt- esque chiaroscuro. Some of his portraits are life-size, but the artist generally preferred to keep them on a considerably smaller scale, like the famous ” Group of Amsterdam Burgomasters ” assembled to receive Marie de’ Medici in 1638, now at the Hague museum. The sketch for this important painting, together with three other drawings, was sold at the Gallitzin sale in 1783 for the sum of threepence. The German emperor owns an ” Equestrian Portrait of a young Dutchman,” by De Keyser, a late work which in general disposition and in the soft manner of painting recalled the work of Cuyp. Similar pictures are in the Dresden and Frankfort museums, in the Heyl collection at Worms, and the Liechtenstein Gallery in Vienna. The National Gallery, London, owns a characteristic portrait group of a ” Merchant with his Clerk "; the Hague museum, besides the group already referred to,

a magnificent ” Portrait of a Savant,” and the Haarlem museum a fine portrait of ” Claes Fabricius.” At the Ryks Museum in Amsterdam there are no fewer than twelve works from his brush, and other important examples are to be found in Brussels, Munich, Copenhagen and St Petersburg.

DEKKER, EDWARD DOUWES (1820–1887), Dutch writer, commonly known as Multatuli, was born at Amsterdam on the “2nd of March 1820. His father, a ship’s captain, intended his son for trade, but this humdrum prospect disgusted him, and in 1838 he went out to Java, and obtained, a post in the Inland Revenue. He rose from one position to another, until, in 1851, he found himslf assistant-resident at Amboyna, in the Moluccas. In 1857

he was transferred to Lebak, in the Bantam residency of Java. By this time, however, all the secrets of Dutch administration were known to him, and he had begun to protest against the abuses of the colonial system. In consequence he was threatened with dismissal from his office for his openness of speech, and, throwing up his appointment, he returned to Holland in a state of fierce indignation. He determined to expose in detail the scandals he had witnessed, and he began to do so in newspaper articles and pamphlets. Little notice, however, was taken of his protestations until, in i860, he published, under the pseudonym of ” Multatuli,” his romance entitled Max Havelaar. An attempt was made to ignore this brilliant and irregular book, but in vain; it was read all over Europe. The exposure of the abuse of free labour in the Dutch Indies was complete, although there were not wanting apologists who accused Dekker’s terrible picture of being over- coloured. He was now fairly launched on literature, and he lost no time in publishing Love Letters (1861), which, in spite of their mild title, proved to be mordant satires of the most rancorous and unsparing kind. The literary merit of Multatuli’s work was much contested; he received an unexpected and most valuable ally in Vosmaer. He continued to write much, and to faggot his miscellanies in uniform volumes called Ideas, of

which seven appeared between 1862 and 1877. Douwes quitted Holland, shaking off her dust from his feet, and went to live at Wiesbaden. He now made several attempts to gain the stage, and one of his pieces, The School for Princes, 1875 (published in the fourth volume of Ideas), pleased himself so highly that he is said to have styled it the greatest drama ever written. It is a fine poem, written in blank verse, like an English tragedy, and not in Dutch Alexandrines; but it is uhdramatic, and has not held the boards. Douwes Dekker moved his residence to Nieder Ingelheim, on the Rhine, and there he died on the 19th of February 1887.

Towards the end of his career he was the centre of a crowd of disciples and imitators, who did his reputation no service; he is now, again, in danger of being read too little. To under- stand his fame, it is necessary to remember the sensational way in which he broke into the dulness of Dutch literature fifty years ago, like a flame out of the Far East. He was ardent, provo- cative, perhaps a little hysterical, but he made himelf heard all over Europe. He brought an exceedingly severe indictment against the egotism and brutality of the administrators of Dutch India, and he framed it in a literary form which was brilliantly original. Not satisfied with this, he attacked, in a fury that was sometimes blind, everything that seemed to him falsely conventional in Dutch religion, government, society and morals. He respected nothing, he left no institution untouched. Now that it is possible to look back upon Multatuli without passion, we see in him, not what Dutch enthusiasm saw, — ” the second writer of Europe in the nineteenth century ” (Victor Hugo being presumably the first), — but a great man who was a powerful and glowing author, yet hardly an artist, a reckless enthusiast, who was inspired by indignation and a burning sense of justice, who cared little for his means if only he could produce his effect. He is seen to his best and worst in Max Havelaar; his Ideas, hard, fantastic and sardonic, seldom offer any solid satisfaction to the foreign reader. But Multatuli deserves remembrance, if only

on account of the unequalled effect his writing had in rousing Holland from the intellectual and moral lethargy in which she lay half a century ago. (E. G.)

DEKKER, JEREMIAS DE (1610–1666), Dutch poet, was born at Dort in 16 10. His father was a native of Antwerp, who, having embraced the reformed religion, had been compelled to take refuge in Holland. Entering his father's business at an early age, he found leisure to cultivate his taste for literature and especially for poetry, and to acquire without assistance a competent knowledge of English, French, Latin and Italian. His first poem was a paraphrase of the Lamentations of Jeremiah {Klaagliedern van Jeremias), which was followed by translations and imitations of Horace, Juvenal and other Latin poets. The most important of his original poems were a collection of epigrams (Puntdichten) and a satire in praise of avarice (Lof der Geldzucht). The latter is his best-known work. Written in a vein of light and

yet effective irony, it is usually ranked by critics along with Erasmus's Praise of Folly. Dekker died at Amsterdam in

November 1666.

*A complete collection of his poems, edited by Brouerius van Nideck, was published at Amsterdam in 1726 under the title Exercices poHiques (2 vols. 4*0.). Selections from his poems are included in Siegenbeck's Proeven van nederduitsche Dichtkunde (1823), and from his epigrams in Geijsbeek's Epigrammatische Anthologie*

(1827).

DEKKER (or Decker), THOMAS (c. 1570–1641), English dramatist, was born in London. His name occurs frequently in Henslowe's Diary during the last three years of the 16th century; he is mentioned there as

receiving loans and payments for writing plays in conjunction with Ben Jonson, Drayton, Chettle, Haughton, Wilson, Day and others, and he would appear to have been then in the most active employment as a playwright. The titles of the plays on which he was engaged from April 1599 to March 1599/1600 are Troilus and Cressida, Orestes Fures, Agamemnon, The Gentle Craft, The Stepmother's Tragedy, Bear a Brain, Pagge of Plymouth, Robert the Second, The Whole History of Fortunatus, Patient Grissel, Truth's Supplication to Candlelight, The Spanish Moor's Tragedy, The Seven Wise Masters. At that date it is evident that Dekker's services were in great request for the stage. He is first mentioned in the Diary under date 8th of January 1597/1598, as having sold a book, i.e. the manuscript of a play; the payments in 1599 are generally made in advance, in earnest " of work to be done. In the case of three of the above plays, Orestes Fures, Truth's Supplication and The Gentle Craft, Dekker is paid as the sole author. Only The Gentle Craft has been preserved; it was published anonymously in 1600 under the title of The Shoemaker's Holiday. It would be unsafe to argue from the classical subjects of some of these plays that Dekker was then a young man from the university, who had come up like so many others to make a living by writing for the stage. Classical know- ledge was then in the air; playwrights in want of a subject were content with translations, if they did not know the originals. However educated, Dekker was then a young man just out of his teens, if he spoke with any accuracy when he said that he was threescore in 1637. And it was not in scholarly themes that he was destined to find his true vein. The call for the publication of The Gentle Craft, which deals with the life of the city, showed him where his strength lay.

To give a general idea of the substance of Dekker's plays, there is no better way than to call him the Dickens of the Elizabethan period. The two men were as unlike as possible in their habits of work, Dekker having apparently all the thriftlessness and

impecunious shamelessness of Micawber himself. Henslowe's Diary contains two notes of payments made in 1597/1598 and 1 598/1 599 to release Dekker from prison, and he is supposed to have spent the years between 1613 and 1616 in the King's Bench. Dekker's Bohemianism appears in the slightness and hurry of his work, a strong contrast to the thoroughness and rich completeness of every labour to which Dickens applied himself; perhaps also in the exquisite freshness and sweetness of his songs, and the natural charm of stray touches of expression and description in his plays. But he was like Dickens in the bent of his genius towards the representation of the life around him in London, as well as in the humorous kindliness of his way of looking at that life, his vein of sentiment, and his eye for odd characters, though the random pickings of Dekker, hopping here and there in search of a subject, give less complete results than the more systematic labours of Dickens. Dekker's Simon Eyre, the good-hearted, mad shoe- maker, and his Orlando Friscobaldo, are touched with a kindly humour in which Dickens would have delighted; his Infelices, Fiamettas, Tormiellas, even his Bellafront, have a certain likeness in type to the heroines of Dickens; and his roaring blades and their gulls are prototypes of Sir Mulberry Hawk and Lord Frederick Verisopht. Only there is this great difference in the spirit of the two writers, that Dekker wrote without the smallest apparent wish to reform the life that he saw, desiring only to exhibit it; and that on the whole, apart from his dramatist's necessity of finding interesting matter, he cast his eye about rather with a liking for the discovery of good under unpromising

appearances than with any determination to detect and expose vice. The observation must also be made that Dekker's person- ages have much more individual character, more of that mixture of good and evil which we find in real human beings. Hack- writer though Dekker was, and writing often under sore pressure, there is no dramatist whose personages have more of the breath of life in them; drawing

with easy, unconstrained hand, he was a master of those touches by which an imaginary figure is brought home to us as a creature with human interests. A very large part of the motive power in his plays consists in the temporary yielding to an evil passion. The kindly philosophy that the best of natures may be for a time perverted by passionate desires is the chief animating principle of his comedy. He delights in showing women listening to temptation, and apparently yielding, but still retaining sufficient control over themselves to be capable of drawing back when on the verge of the precipice. The wives of the citizens were his heroines, pursued by the unlawful addresses of the gay young courtiers; and on the whole Dekker, from inclination apparently as well as policy, though himself, if Ben Jonson 's satire had any point, a bit of a dandy in his youth, took the part of morality and the city, and either struck the rakes with remorse or made the objects of their machinations clever enough to outwit them. From Dekker's plays we get a very lively impression of all that was picturesque and theatrically interesting in the city life of the time, the interiors of the shops and the houses, the tastes of the citizens and their wives, the tavern and tobacco-shop manners of the youthful aristocracy and their satellites. The social student cannot afford to overlook Dekker; there is no other dramatist of that age, except Thomas Middleton, from whom we can get such a vivid picture of contemporary manners in London. He drew direct from life; in so far as he idealized, he did so not in obedience to scholarly precepts or dogmatic theories, but in the immediate interests of good-natured farce and tender-hearted sentiment.

In all the serious parts of Dekker's plays there is a charming delicacy of touch, and his smallest scraps of song are bewitching; but his plays, as plays, owe much more to the interest of the characters and the incidents than to any excellence of construc- tion. We see what use could be made of his materials by a stronger intellect in Westward Ho

! which he wrote in conjunction with John Webster. The play, somehow, though the parts are more firmly knit together, and it has more unity of purpose, is not so interesting as Dekker's unaided work. Middleton formed a more successful combination with Dekker than Webster; there is some evidence that in The Honest Whore, or The Converted Courtesan, which is generally regarded as the best that bears Dekker's name, he had the assistance of Middleton, although the assistance was so immaterial as not to be worth acknowledging in the title-page. Still that Middleton, a man of little genius but of much practical talent and robust humour, was serviceable to Dekker in determining the form of the play may well be believed. The two wrote another play in concert, The Roaring Girl, for which Middleton probably contributed a good deal of the matter, as well as a more symmetrical form than Dekker seems to have been capable of devising. In The Witch of Edmonton, except in a few scenes, it is difficult to trace the hand of Dekker with any certainty; his collaborators were John Ford and William Rowley; to Ford probably belongs the intense brooding and murderous wrath of the old hag, which are too direct and hard in their energy for Dekker, while Rowley may be supposed to be responsible for the delineation of country life. The Virgin Martyr, one of the best constructed of his plays, was written in conjunction with Massinger, to whom the form is no doubt due. Dekker's plays contain, a few songs which show him to have been possessed of very great lyrical skill, but of this he seems to have made sadly little use. His poem of Canaans Calamitie — if indeed it be his, which is hard to believe — is exceedingly poor stuff, and the verse portion of his Dreame, though containing some good lines, is, as a whole, not much better.

When Gerard Langbaine wrote his Account of the English Dramatic Poets in 1691, he spoke of Dekker as being "more famous for the contention he had with Ben Jonson for the bays,

than for any great reputation he had gained by his own writings." This is an opinion that could not be professed now, when Dekker's work is read. In the contention with Ben Jonson, one of the most celebrated quarrels of authors, the origin of which is matter of dispute, Dekker seems to have had very much the best of it. We can imagine that Jonson's attack was stinging at the time, because it seems to be full of sarcastic personalities, but it is dull enough now when nobody knows what Dekker was like, nor what was the character of his mother. There is nothing in the Poetaster that has any point as applied to Dekker's powers as a dramatist, while, on the contrary, Satiromastix, or the Untrussing of the Humorous Poet is full of pungent ridicule of Jonson's style, and of retorts and insults conceived in the happiest spirit of good- natured mockery. Dekker has been accused of poverty of invention in adopting the character of the Poetaster, but it is of the very pith of the jest that Dekker should have set on Jonson's own foul-mouthed Captain Tucca to abuse Horace himself.

Works. — The Pleasant Comedie of Old Fortunatus (1600) ; The Shomakers Holiday. Or The gentle Craft. With the humorous life of Simon Eyre, skoomaker, and Lord Maior of London (1600) ; Satiro- mastix. Or The untrussing of the Humorous Poet (1602); The Pleasant Comodie of Patient Grissill (1663), with Chettle and Haughton; The Honest Whore. With The Humours of the Patient Man, and the Longing Wife (1604); North-Ward Hoe (1607), with John Webster; West-Ward Hoe (1607), with John Webster; The Whore of Babylon (1607) ; The Famous History of Sir Thomas Wyat., With the Coronation of Queen Mary, and the coming in of King Philip (1607), with John Webster; The Roaring Girle. Or Moll Cut-Purse (161 1), with Thomas Middleton; The Virgin Martir (1622), with Massinger; // It Be Not Good, the Divel is in it (1612); The Second Part of the Honest Whore. With the Humors of the Patient Man, the Impatient Wife; the Honest Whore, perswaded by strong Arguments to turne Curtizan againe; her brave refuting those Arguments. And lastly, the

Comicall Passages of an Italian Bridewell, where the Scaene ends (1630); A Tragi-Comedy: Called, Match mee in London (1631) ; The Wonder of a Kingdome (1636); The Witch of Edmonton. _A known true Story. Composed into a Tragi-Comedy (1658), with William Rowley and John Ford. The Sun's Darling (1656) was possibly written by Ford and Dekker, or may be perhaps more correctly regarded as a recast by Ford of a masque by Dekker, perhaps his lost play of Phaeton. The pageants for the Lord Mayor's shows of 1612 and 1629 were written by Dekker, and both are preserved. His tracts are invaluable for the light which they throw on the London of his time, especially in their descriptions of the circum-stances of the theatre. Their titles,. many of which are necessarily abbreviated, are: Canaans Calamitie, Jerusalems Miserie, and Englands Mirror (1598), in verse; The Wonderfull Yeare 1603. Wherein is shewed the picture of London lying sicke of the Plague (1603); The Batchelars Banquet (1603); a brilliant adaptation of Les Quinze Joyes de mariage; the Seven Deadly Sinnes of London (1606); Newes from Hell, Brought by the Divells Carrier (1606),. reprinted in the next year with some interesting additions as A Knights Conjuring; Jests to make you Merie (1607), with George Wilkins; The Belman of London: Bringing to Light the most notorious villanies that are now practised in the Kingdome (1608); followed by a second part and enlarged editions under other titles; The Dead Tearme (1608) ; The Ravens Almdnacke, foretelling of a Plague, Famine and Civill Warre (1609), ridiculing the almanac makers; The Guls Horne-booke (1609), the most famous of all his tracts, providing a code of manners for the Elizabethan gallant, in the aisle of St Paul's, at the ordinary, at the playhouse, and other resorts; Worke for Armorours, or the Peace is Broken (1609); Foure Birds of Noahs Ark (1609); A Strange Horse-Race (1613); Dekker his Dreame . . . (1620), in verse and prose, illustrated with a wood- cut of the dreamer; and A Rod for Run-awayes (1625). This long list does not exhaust Dekker's work, much of which is lost.

Authorities. — An edition of the collected dramatic works of Dekker by R. H. Shepherd appeared in I873; his prose tracts and poems were included in Dr A. B. Grosart's Huth Library (1884–1886) : both these contain memoirs of him, but by far the most complete account of his life and writings is to be found in the article by A. H. Bullen in the Dictionary of National Biography. See also the elaborate discussion of his plays in Mr Fleay s Biographical Chronicle (1891), i. 115, &c, and, for his quarrel with Ben Jonson, Prof. J. H. Penniman's War of the Theatres (Boston, 1897) and Mr R. A. Small's Stage Quarrel between Ben Jonson^ and the so- called Poetasters (Breslau, 1899). A selection from his plays was edited for the Mermaid Series (1887; new series, 1 904) by Ernest Rhys. An essay on Dekker by A. C. Swinburne appeared in The Nineteenth Century for January 1887. (W. M.; R. B. McK.) :

DE LA BECHE, SIR HENRY THOMAS (1796–1855), English geologist, was born in the year 1796. His father, an officer in the army, possessed landed property in Jamaica, but died while his

son was still young. The boy accordingly spent his youth with his mother at Lyme Regis among the interesting and picturesque coast cliffs of the south-west of England, where he imbibed a love for geological pursuits and cultivated a marked artistic faculty. When fourteen years of age, being destined, like his friend Murchison, for the military profession, he entered the college at Great Marlow, where he distinguished himself by the rapidity and skill with which he executed sketches showing the salient features of a district. The peace of 1815, however, changed his career and he devoted himself with ever-increasing assiduity to the pursuit of geology. When only twenty-one years of age he joined the Geological Society of London, continuing throughout life to be one of its most active, useful and honoured members. He was president in 1848–1849. Possessing a fortune sufficient for the gratification of his tastes, he visited many localities of geological interest, not only in Britain, but also on the continent, in France and

Switzerland. His journeys seldom failed to bear fruit in suggestive papers accompanied by sketches. Early attachment to the south-west of England led him back to that region, where, with enlarged experience, he began the detailed investigation of the rocks of Cornwall and Devon. Thrown much into contact with the mining community of that part of the country, he conceived the idea that the nation ought to compile a geological map of the United Kingdom, and collect and preserve specimens to illustrate, and aid in further developing, its mineral industries. He showed his skilful management of affairs by inducing the government of the day to recognize his work and give him an appointment in connexion with the Ordnance Survey. This formed the starting point of the present Geological Survey of Great Britain, which was officially recognized in 1835, when De la Beche was appointed director. Year by year increasing stores of valuable specimens were transmitted to London; and the building at Craig's Court, where the young Museum of Economic Geology was placed, became too small. But De la Beche, having seen how fruitful his first idea had become, appealed to the authorities not merely to provide a larger structure, but to widen the whole scope of the scientific establishment of which he was the head, so as to impart to -it the character of a great educational institution where practical as well as theoretical instruction should be given in every branch of science necessary for the conduct of mining work. In this endeavour he was again successful. Parliament sanctioned the erection of a museum in Jermyn Street, London, and the organization of a staff of professors with laboratories and other appliances. The establishment, in which were combined the offices of the Geological Survey, the Museum of Practical Geology, The Royal School of Mines and the Mining Record Office, was opened in 1851. Many foreign countries have since formed geological surveys avowedly based upon the organization and experience of that of the United Kingdom. The British colonies, also, have in many instances established similar surveys for the development of their mineral

resources, and have had recourse to the parent survey for advice and for officers to conduct the operations.

De la Beche published numerous memoirs on English geology in the Transactions of the Geological Society of London, as well as in the Memoirs of the Geological Survey, notably the Report on the Geology of Cornwall, Devon and West Somerset (1839). He like- wise wrote A Geological Manual (1831; 3rd ed., 1833); and a work of singular breadth and clearness — Researches in Theoretical Geology (1834) — in which he enunciated a philosophical treat- ment of geological questions much in advance of his time. An early volume, How to Observe Geology (1835 and 1836), was rewritten and enlarged by him late in life, and published under the title of The Geological Observer (1851; 2nd ed., 1853). It was marked by wide practical experience, multifarious knowledge, philosophical insight and a genius for artistic delineation of geological phenomena. He was elected F.R.S. in 1819. He received the honour of knighthood in 1848, and near the close of his life was awarded the Wollaston medal — the highest honour in the gift of the Geological Society of London. After a life of constant activity he began to suffer from partial paralysis, but, though becoming gradually worse, continued able to transact

his official business until a few days before his death, which took place on the 13 th of April 1855.

See Sir A. Geikie's Memoir of Sir A. C. Ramsay (1895), which contains a sketch of the history of the Geological Survey, and of the life of De la Beche (with portrait) ; also Summary of Progress of the Geological Survey for 1897 (1898).

DELABORDE, HENRI FRANCOIS, Count (1764–1833), French soldier, was the son of a baker of Dijon. At the out- break of the French Revolution he joined the "

Volunteers of the Cote-d'Or," and passing rapidly through all the junior grades, was made general of brigade after the combat of Rhein-Zabern (1 793) . As chief of the staff he was present at the siege of Toulon in the same year, and, promoted general of division, he was for a time governor of Corsica. In 1794 Delaborde served on the Spanish frontier, distinguishing himself at the Bidassoa (July 25) and Misquiriz (October 16). His next command was on the Rhine. At the head of a division he took part in the cele- brated campaigns of 1795-97, an d in 1796 covered Moreau's right when that general invaded Bavaria. Delaborde was in constant military employment during the Consulate and the early Empire. Made commander of the Legion of Honour in 1804, he received the dignity of count in 1808. In that year he was serving in Portugal under Junot. Against Sir Arthur Wellesley's English army he fought the skilful and brilliant ^ear-guard action of Rolica. In 181 2 he was one of Mortier's divisional leaders in the Russian War, and in the following year was grand cross and governor of the castle of Compiegne. Joining Napoleon in the Hundred Days, he was marked for punishment by the returning Bourbons, sent before a court- martial, and only escaped condemnation through a technical flaw in the wording of the charge. The rest of his life was spent in retirement.

DELACROIX, FERDINAND VICTOR EUGENE (1 798-1863), French historical painter, leader of the Romantic movement, was born at Charenton-St-Maurice, near Paris, on the 26th of April 1798. His father Charles Delacroix (1741-1805) was a partisan of the most violent faction during the time of the Revolu- tion, and was foreign minister under the Directory. The family affairs seem to have been conducted in the wildest manner, and the accidents that befell the child, well authenticated as they are said to be, make it almost a miracle that he survived. He was first nearly burned to death in the cradle by a nurse falling asleep over a novel and the candle dropping on the coverlet; this left permanent marks on his arms and face. He was next dropped into the

sea by another bonne, who was climbing up a ship's side to see her lover. He was nearly poisoned, and nearly choked, and, to crown all, he tried to hang himself, without any thought of suicide, in imitation of a print exhibiting a man in that position of final ignominy. The prediction of a charlatan founded on his horoscope has been preserved: " Cet enfant deviendra un homme celebre, mais sa vie sera des plus laborieuses, des plus tourmentees, et toujours livree a, la contradiction."

Delacroix the elder (also known as Delacroix de Contaut) died at Bordeaux when Eugene was seven years of age, and his mother returned to Paris and placed him in the Lycee Napoleon. Afterwards, on his determining to be a painter, he entered the atelier of Baron Guerin, who affected to treat him as an amateur. His fellow-pupil was Ary Scheffer, who was alike by tempera- ment and antecedents the opposite of the bizarre Delacroix, and the two remained antagonistic to the end of life. Delacroix's acknowledged power and yet want of success with artists and critics — Thiers being his only advocate — perhaps mainly resulted from his bravura and rude dash in the use of the brush, at a time when smooth roundness of surface was general. His first important picture, " Dante and Virgil, " was painted in his own studio; and when Guerin went to see it he flew into a passion, and told him his picture was absurd, detestable, exaggerated. " Why ask me to come and see this? you knew what I must say." Yet his work was received at the Salon, and produced an enthusiasm of debate (1822). Some said Gericault had worked on it, but all treated it with respect. Still in private his position, even after the larger tragic picture, the " Massacre of Chios," had

been deposited in the Luxembourg by the government (1824), 1 became that of an Ishmaelite. The war for the freedom of Greece then going on moved him deeply, and his next two pictures — " Marino Faliero Decapitated on the Giant's Staircase of the Ducal Palace " (which has always remained a European success), and " Greece Lamenting on the Ruins of

Missolonghi " — with many smaller works, were exhibited for the benefit of the patriots in 1826. This exhibition was much visited by the public, and next year he produced another of his important works, " Sardanapalus," from Byron's drama. After this, he says, " I became the abomination of painting, I was refused water and salt," — but, he adds with singularly happy naivete, " J'etais enchante de moi-meme!" The patrimony he inherited, or perhaps it should be said, what remained of it, was 10,000 limes de rente, and with economy he lived on this, and continued the expensive process of painting large historical pictures. In 1831 he reappeared in the Salon with six works, and immediately after left for Morocco, where he found much congenial matter. Delacroix never went to Italy; he refused to go on principle, lest the old masters, either in spirit or manner, should impair his originality and self-dependence. His greatest admiration in literature was the poetry of Byron; Shakespeare also attracted him for tragic inspirations; and of course classic subjects had their turn of his easel.

He continued his work indefatigably, having his pictures very seldom favourably received at the Salon. These were sometimes very large, full of incidents, with many figures. " Drawing of Lots in the Boat at Sea," from Byron's Don Juan, and the " Taking of Constantinople by the Christians " were of that character, and the former was one of his noblest creations. In 1845 he was employed to decorate the library of the Luxembourg, that of the chamber of deputies in 1847, the ceiling of the gallery of Apollo in the Louvre in 1849 and that of the Salon de la Paix in the hotel de ville in 1853. He died on the 13th of August 1863, and in August 1864 an exhibition of his works was opened on the Boulevard des Italiens. It contained 174 pictures, many of them of large dimensions, and 303 drawings, showing immense perseverance as well as energy and versatility. As a colourist, and a romantic painter, he now ranks among the greatest of French artists.

See also A. Robaut, Delacroix (1885); E. Dargenty,

Delacroix par lui-m&me (1885) ; G. Moreau, Delacroix et son osuvre (1893) ; Dorothy Bussy, Eugene Delacroix (1907).

DE LA GARDIE, MAGNUS GABRIEL, Count (1622-1686), Swedish statesman, the best-known member of an ancient family of French origin (the D'Escouperies of Languedoc) which had been settled in Sweden since the 14th century. After a careful education, completed by the usual grand tour, Magnus learned the art of war under Gustavus Horn, and during the reign of Christina (1644-1654), whose prime favourite he became, though the liaison was innocent enough, he was raised to the highest offices in the state and loaded with distinctions. In 1646 he was sent at the head of an extraordinary mission to France, and on his return married the queen's cousin Marie Euphrosyne of Zwei- bnicken, who, being but a poor princess, benefited greatly by her wedding with the richest of the Swedish magnates. Immediately afterwards, De la Gardie was made a senator, governor-general of Saxony during the last stages of the Thirty Years' War, and, in 1652, lord high treasurer. In 1653 he fell into disgrace and had to withdraw from court. During the reign of Charles X. (1654- 1660) he was employed in the Baltic provinces both as a civilian and a soldier, although in the latter capacity he gave the martial king but little satisfaction. Charles X. nevertheless, in his last will, appointed De la Gardie grand-chancellor and a member of the council of regency which ruled Sweden during the minority of CharlesXI. (1660-1672). During this period De la Gardie was the ruling spirit of the government and represented the party of warlike adventure as opposed to the party of peace and economy led by Counts Bonde and Brahe (qq.v.). After a severe struggle De la Gardie's party finally prevailed, and its triumph was marked by that general decline of personal and political morality which has given to this regency its unenviable reputation.

It was De la Gardie who first made Sweden the obsequious hireling of the foreign power which had the longest purse. The beginning of this shameful ” subsidy policy ” was the treaty of Fontainebleau, 1661, by a secret paragraph of which Sweden, in exchange for a considerable sum of money, undertook to support the French candidate on the first vacancy of the Polish throne. It was not, however, till the 14th of April 1672 that Sweden, by the treaty of Stockholm, became a regular ” mercen- arius Galliae,” pledging herself, in return for 400,000 ‘icus per annum in peace and 600,000 in war time, to attack with 16,000 men those German, princes who might be disposed to assist Holland. The early disasters of the unlucky war of 1675-1679 were rightly attributed to the carelessness, extravagance, pro- crastination and general incompetence of De la Gardie and his high aristocratic colleagues. In 1675 a special commission was appointed to inquire into their conduct, and on the 27th of May 1682 it decided that the regents and the senate were solely responsible for dilapidations of the realm, the compensation due by them to the crown being assessed at 4,000,000 daler or £500,000. De la Gardie was treated with relative leniency, but he ” received permission to retire to his estates for the rest of his life ” and died there in comparative poverty, a mere shadow of his former magnificent self. The best sides of his character were his brilliant social gifts and his intense devotion to literature and art.

See Martin Veibull, Sveriges Storhetstid (Stockholm, 1881); Sv. Hist. iv. ; Robert Nisbet Bain, Scandinavia (Cambridge, 1905).

(R. N. B.)

DELAGOA BAY (Port, for the bay ” of the lagoon "), an inlet of the Indian Ocean on the east coast of South Africa, between 25° 40' and 26 20' S., with a length from north to south of over 70 m. and a breadth of about 20 m. The bay is the northern termination of the series of lagoons which line the coast from Saint Lucia Bay. The opening is toward

the N.E. The southern part of the bay is formed by a peninsula, called the Inyak peninsula, which on its inner or western side affords safe anchorage. At its N.W. point is Port Melville. North of the peninsula is Inyak Island, and beyond it a smaller island known as Elephant’s Island.

In spite of a bar at the entrance and a number of shallows within, Delagoa Bay forms a valuable harbour, accessible to large vessels at all seasons of the year. The surrounding country is low and very unhealthy, but the island of Inyak has a height of 240 ft., and is used as a sanatorium. A river 12 to 18 ft. deep, known as the Manhissa or Komati, enters the bay at its northern end; several smaller streams, the Matolla, the Umbelozi, and the Tembi, from the Lebombo Mountains, meet towards the middle of the bay in the estuary called by the Portuguese the Espirito Santo, but generally known as the English river; and the Maputa, which has its headwaters in the Drakensberg, enters in the south, as also does the Umfusi river. These rivers are the haunts of the hippopotamus and the crocodile.

Tb<3 bay was discovered by the Portuguese navigator Antonio de Campo, one of Vasco da Gama's companions, in 1502, and the Portuguese post of Lourenco Marques was established not long after on the north side of the English river. In 1720 the Dutch East India Company built a fort and " factory " on the spot where Lourenco Marques now stands; but in 1730 the settlement was abandoned. Thereafter the Portuguese had — intermittently — trading stations in the Espirito Santo. These stations were protected by small forts, usually incapable, however, of withstanding attacks by the natives. In 1823 Captain (after- wards Vice-Admiral) W. F. W. Owen, of the British navy, finding that the Portuguese exercised no jurisdiction south of the settlement of Lourenco Marques, concluded treaties of cession with native chiefs, hoisted the British flag, and appropriated the country from the English river southwards ; but when he visited the bay again in 1824 he found that the Portuguese, disregarding the British treaties, had concluded others with the natives, and had

endeavoured (unsuccessfully) to take military possession of the country. Captain Owen rehoisted the British flag, but the sovereignty of either power was left undecided till the claims of the Transvaal Republic rendered a solution of the question

urgent. In the meantime Great Britain had taken no steps to exercise authority on the spot, while the ravages of Zulu hordes confined Portuguese authority to the limits of their fort. In 1835 Boers, under a leader named Orich, had attempted to form a settlement on the bay, which is the natural outlet for the Transvaal; and in 1868 the Transvaal president, Marthinus Pretorius, claimed the country on each side of the Maputa down to the sea. In the following year, however, the Transvaal acknowledged Portugal's sovereignty over the bay. In 1861 Captain Bickford, R.N., had declared Inyak and Elephant islands British territory; an act protested against by the Lisbon authorities. In 1872 the dispute between Great Britain and Portugal was submitted to the arbitration of M. Thiers, the French president; and on the 19th of April 1875 his successor, Marshal MacMahon, declared in favour of the Portuguese. It had been previously agreed by Great Britain and Portugal that the right of pre-emption in case of sale or cession should be given to the unsuccessful claimant to the. bay. Portuguese authority over the interior was not established until some time after the MacMahon award; nominally the country south of the Manhissa river was ceded to them by the Matshangana chief Umzila in 1861. In 1889 another dispute arose between Portugal and Great Britain in consequence of the seizure by the Portuguese of the railway running from the bay to the Transvaal. This dispute was referred to arbitration, and in 1900 Portugal was condemned to pay nearly £1,000,000 in compensation to the shareholders in the railway company. (See Lourenqo Marques and Gazalani5.)

For an account of the Delagoa Bay arbitration proceedings see Sir E. Hertslet, The Map of Africa by Treaty, iii. 991-998 (London, 1909). Consult also the British blue-book, Delagoa Bay, Correspond- ence

respecting the Claims of Her Majesty's Government (London, 1875) ; L. van Deventer, La Hollande et la Baie Delagoa (The Hague, 1883) ; G. McC. Theal, The Portuguese in South Africa (London, 1896), and History of South Africa since September 1795, vol. v. (London, 1908). The Narrative of Voyages to explore the shores of Africa . . . per- formed . . . under direction of Captain W. F. W. Owen, R.N. (London, 1833) contains much interesting information concerning the district in the early part of the 19th century.

DELAMBRE, JEAN BAPTISTE JOSEPH (1749–1822), French astronomer, was born at Amiens on the 19th of September 1749. His college course, begun at Amiens under the abbe Jacques Delille, was finished in Paris, where he took a scholarship at the college of Plessis. Despite extreme penury, he then continued to study indefatigably ancient and modern languages, history and literature, finally turning his attention to mathe- matics and astronomy. In 1771 he became tutor to the son of M. d'Assy, receiver-general of finances; and while acting in this capacity, attended the lectures of J. J. Lalande, who, struck with his remarkable acquirements, induced M. d'Assy in 1 788 to install an observatory for his benefit at his own residence. Here Delambre observed and computed almost uninterruptedly, and in 1790 obtained for his Tables of Uranus the prize offered by the academy of sciences, of which body he was elected a member two years later. He was admitted to the Institute on its organization in 1795, and became, in 1803, perpetual secretary to its mathe- matical section. He, moreover, belonged from 1795 to the bureau of longitudes. From 1792 to 1799 he was occupied with the measurement of the arc of the meridian extending from Dunkirk to Barcelona, and published a detailed account of the operations in Base du systeme metrique (3 vols., 1806, 1807, 1810), for which he was awarded in 181 o the decennial prize of the Institute. The first consul nominated him inspector-general of studies; he succeeded Lalande in 1807 as professor of astronomy at the College de France, and filled the office of

treasurer to the imperial university from 1808 until its suppression in 1815. Delambre died at Paris on the 19th of August 1822. His last years were devoted to researches into the history of science, resulting in the successive publication of: Histoire de I'astronomie ancienne (2 vols., 1817); Histoire de I'astronomie au moyen dge (1819); Histoire de I'astronomie moderne (2 vols., 1821); and Histoire de I'astronomie au XVIII" siecle, issued in 1827 undei the care of C. L. Mathieu. These books show marvellous erudi- tion; but some of the judgments expressed in them are warped by prejudice; they are diffuse in style and overloaded with

computations. He wrote besides: Tables icliptiques des satellites de Jupiter, inserted in the third edition of J. J. Lalande's Astro- nomie (1792), and republished in an improved form by the bureau of longitudes in 1817; Mithodes analytiques pour la determination d'un arc du meridien (1799); Tables du soleil (publiees par le bureau des longitudes) (1806); Rapport historique sur les pr ogres des sciences mathematiques depuis I' an 1789 (1810) ; Abrege d'astronomie (1813); Astronomie theorique et pratique (1814); &c.

See J. B. J. Fourier's " filoge " in Memoires de Vacad. des sciences, t. iv. ; Ch. Dupin, Revue encyclopedique, t. xvi. (1822); Biog. univer- selle, t. lxii. (C. L. Mathieu) ; Max. Marie, Hist, des sciences, x. 31; R. Grant, Hist, of Physical Astr. pp. 96, 142, 165; R. Wolf, Geschichte der Astronomie, p. 779, &c. (A. M. C.)

DELAMERE (or De la Mer), GEORGE BOOTH, 1st Baron (1622–1684), son of William Booth, a member of an ancient family settled at Dunham Massey in Cheshire, and of Vere, daughter and co-heir of Sir Thomas Egerton, was born in August 1622. He took an active part in the Civil War with his grand- father, Sir George Booth, on the parliamentary side. He was

returned for Cheshire to the Long Parliament in 1645 and to Cromwell's parliaments of 1654 and 1656. In 1655 he was appointed military commissioner for Cheshire and treasurer at war. He was one of the excluded members who tried and failed to regain their seats after the fall of Richard Cromwell in 1659. He had for some time been regarded by the royalists as a well- wisher to their cause, and was described to the king in May 1659 as " very considerable in his country, a presbyterian in opinion, yet so moral a man … I think your Majesty may safely [rely] on him and his promises which are considerable and hearty." 1 He now became one of the chief leaders of the new " royalists " who at this time united with the cavaliers to effect the restora- tion. A rising was arranged for the 5th of August in several districts, and Booth took charge of operations in Cheshire, Lancashire and North Wales. He got possession of Chester on the 19th, issued a proclamation declaring that arms had been taken up " in vindication of the freedom of parliament, of the known laws, liberty and property," and marched towards York. The plot, however, was known to Thurloe. It had entirely failed in other parts of the country, and Lambert advancing with his forces defeated Booth's men at Nantwich Bridge. Booth him- self escaped disguised as a woman, but was discovered at Newport Pagnell on the 23rd in the act of shaving, and was imprisoned in the Tower. He was, however, soon liberated, took his seat in the parliament of 1659-1660, and was one of the twelve members deputed to carry the message of the Commons to Charles II. at the Hague. In July 1660 he received a grant of £10,000, having refused the larger sum of £20,000 at first offered to him, and on the 20th of April 1661, on the occasion of the coronation, he was created Baron Delamere, with a licence to create six new knights. The same year he was appointed custos rotulorum of Cheshire. In later years he showed himself strongly antagonistic to the reactionary policy of the government. He died on the 8th of August 1684, and was buried at Bowdon. He married (1) Lady Catherine Clinton, daughter and co-heir of Theophilus, 4th earl of Lincoln, by whom

he had one daughter; and (2) Lady Elizabeth Grey, daughter of Henry, 1st earl of Stamford, by whom, besides five daughters, he had seven sons, the second of whom, Henry, succeeded him in the title and estates and was created earl of Warrington. The earldom became extinct on the death of the latter's son, the 2nd earl, without male issue, in 1758, and the barony of Delamere terminated in the person of the 4th baron in 1770; the title was revived in 1821 in the Cholmondeley family.

DE LAND, a town and the county-seat of Volusia county, Florida, U.S.A., 111 m. by rail S. of Jacksonville, 20 m. from the Atlantic coast and 4 m. from the St John's river. Pop. (1900) 1449; (1910) 2812. De Land is served by the Atlantic Coast Line and by steamboats on the St John's river. It has a fine winter climate, with an average temperature of 6o° F., has sulphur springs, and is a health and winter resort. There is a 1 Clarendon, State Papers, iii. 472. I

starch factory here; and the surrounding country is devoted to fruit-growing. De Land is the seat of the John B. Stetson University (coeducational), an undenominational institution under Baptist control, founded in 1884, as an academy, by Henry A. De Land, a manufacturer of Fairport, New York, and in 1887 incorporated under the name of De Land University, which was changed in 1889 to the present name, in honour of John Batterson Stetson (1 830-1 906), a Philadelphia manu- facturer of hats, who during his life gave nearly $500,000 to the institution. The university includes a college of liberal arts, a department of law, a school of technology, an academy, a normal school, a model school, a business college and a school of music. De Land was founded in 1876 by H. A. DeLand, above mentioned, who built a public school here in 1877 and a high school in 1883.

DELANE, JOHN THADEUS (1817-1879), editor of The Times (London), was born on the nth of October 1817 in London. He was the second son of Mr W. F. A. Delane, a barrister, of an old Irish family, who

about 1832 was appointed by Mr Walter financial manager of The Times. While still a boy he attracted Mr Walter's attention, and it was always intended that he should find work on the paper. He received a good general education at private schools and King's College, London, and also at Magdalen Hall, Oxford; after taking his degree in 1840 he at once began work on the paper, though later he read for the bar, being called in 1847. Ln 3:841 he succeeded Thomas Barnes as editor, a post which he occupied for thirty-six years. He from the first obtained the best introductions into society and the chief political circles, and had a position there such as no journalist had previously enjoyed, us : ng his opportunities with a sure intuition for the way in which events would move. His staff included some of the most brilliant men of the day, who worked together with a common ideal. The result to the paper, which in those days had hardly any real competitor in English journalism, was an excellence of information which gave it great power. (See News-papers.) Delane was a man of many interests and great judg- ment; capable of long application and concentrated attention, with power to seize always on the main point at issue, and rapidly master the essential facts in the most complicated affair. His general policy was to keep the paper a national organ of opinion above party, but with a tendency to sympathize with the Liberal movements of the day. He admired Palmerston and respected Lord Aberdeen, and was of considerable use to both ; and it was Lord Aberdeen himself who, in 1845, told him of the impending repeal of the Corn Laws, an incident round which many incorrect stories have gathered. The history, however, of the events during the thirteen administrations, between 1841 and 1877, in which The Times, and therefore Delane, played an important part cannot here be recapitulated. In 1877 his health gave way, and he retired from the editorship; and on the 22nd of November 1879 he died at Ascot.

A biography by his nephew, Arthur Irwin Dasent, was published in 1908.

DELANY, MARY GRANVILLE (1700-1788), an English-

woman of literary tastes, was born at Coulston, Wilts, on the 14th of May 1700. She was a niece of the 1st Lord Lansdowne. In i7i7or 1718 she was unhappily married to Alexander Pendarves, a rich old Cornish landowner, who died in 1724. During a visit to Ireland she met Dean Swift and his intimate friend, the Irish divine, Patrick Delany, whose second wife she became in 1743. After his death in 1768 she passed all her summers with her bosom friend the dowager duchess of Portland — Prior's " Peggy " — and when the latter died George III. and Queen Charlotte, whose affection for their " dearest Mrs Delany " seems to have been most genuine, gave her a small house at Windsor and a pension of £300 a year. Fanny Burney (Madame D'Arblay) was introduced to her in 1783, and frequently visited her at her London home and at Windsor, and owed to her friendship her court appointment. At this time Mrs Delany was a charming and sweet old lady, with a reputation for cutting out and making the ingenious " paper mosaiks " now in the British Museum; she had known every one worth knowing in her day,

had corresponded with Swift and Young, and left an interesting picture of the polite but commonplace English society of the 1 8th century in her six volumes of Autobiography and Letters. Burke calls her " a real fine lady " — " the model of an accomplished woman of former times." She died on the 15th of April

1788.

DE LA REY, JACOBUS HERCULES (1847-), Boer soldier, was born in the Lichtenburg district, and in his youth and early manhood saw much service in savage warfare. In 1893 he entered the Volksraad of the South African Republic, and was an active supporter of the policy of General Joubert. At the outbreak of the war with Great Britain in 1809 De La Rey was made a general, and he was engaged in the western

campaign against Lord Methuen and Lord Roberts. He won his first great success at Nitral's Nek on the nth of July 1900, where he compelled the surrender of a strong English detachment. In the second or guerrilla stage of the war De La Rey became one of the most conspicuously successful of the Boer leaders. He was assistant to General Louis Botha and a member of the govern- ment, with charge of operations in the western Transvaal. The principal actions in which he was successful (see also Transvaal: History) were Nooitgedacht, Vlakfontein and the defeat and capture of Lord Methuen at Klerksdorp (March 7, 1902). The British general was severely wounded in the action, and De La Rey released him at once, being unable to afford him proper medical assistance. This humanity and courtesy marked De La Rey's conduct throughout the war, and even more than his military skill and daring earned for him the esteem of his enemies. After the conclusion of peace De La Rey, who had borne a prominent part in the negotiations, Visited Europe with the other generals, with the intention of raising funds to enable the Boers to resettle their country. In December 1903 he went on a mission to India, and induced the whole of the Boer prisoners of war detained at Ahmednagar to accept the new order of things and to take the oath of allegiance. In February 1907 General De La Rey was returned unopposed as member for Ventersdorp in the legislative assembly of the first Transvaal parliament under self-government.

DE LA RIVE, AUGUSTE ARTHUR (1801-1873), Swiss physicist, was born at Geneva on the 9th of October 1801. He was the son of Charles Gaspard de la Rive (1770-1834), who studied medicine at Edinburgh, and after practising for a few years in London, became professor of pharmaceutical chemistry at the academy of Geneva in 1802 and rector in 1823. After a brilliant career as a student, he was appointed at the age of twenty-two to the chair of natural philosophy in the academy of Geneva. For some years after his appointment he devoted himself specially, with Francois Marcet (1803-1883), to the

investigation of the specific heat of gases, and to observations for determining the temperature of the earth's crust. Electrical studies, however, engaged most of his attention, especially in connexion with the theory of the voltaic cell and the electric discharge in rarefied gases. His researches on the last-mentioned subject led him to form a new theory of the aurora borealis. In 1840 he described a process for the electro-gilding of silver and brass, for which in the following year he received a prize of 3000 francs from the French Academy of Sciences. Between 1854 and 1858 he published a Traiti de I' electricity theorique et appliquie, which was translated into several languages. De la Rive's birth and fortune gave him considerable social and political influence. He was distinguished for his hospitality to literary and scientific men, and for his interest in the welfare and independence of his native country. In i860, when the annexation of Savoy and Nice had led the Genevese to fear French aggression, de la Rive was sent by his fellow-citizens on a special embassy to England, and succeeded in securing a declaration from the English government, which was communicated privately to that of France, that any attack upon Geneva would be regarded as a casus belli. On the occasion of this visit the university of Oxford conferred upon de la Rive the honorary degree of D.G.L. When on his way to pass the winter at Cannes he died suddenly at Marseilles on the 27th of November 1873.

His son, Lucien de la Rive, born at Geneva on the 3rd of April 1834, published papers on various mathematical and physical subjects, and with Edouard Sarasin carried out investi- gations on the propagation of electric waves.

DELAROCHE, HIPPOLYTE, commonly known as Paul (1 797-1856), French painter, was born in Paris on the 17th of July 1797. His father was an expert who had made a fortune, to some extent, by negotiating and cataloguing, buying and selling. He was proud of his son's talent, and able to forward his artistic education. The master selected was Gros, then painting life-size histories, and surrounded by many

pupils. In no haste to make an appearance in the Salon, his first exhibited picture was a large one, " Josabeth saving Joas " (1822). This picture led to his ac- quaintance with Gericault and Delacroix, with whom he remained on the most friendly terms, the three forming the central group of a numerous body of historical painters, such as perhaps never before lived in one locality and at one time.

From 1822 the record of his life is to be found in the successive works coming from his hand. He visited Italy in 1838 and 1843, when his father-in-law, Horace Vernet, was director of the French Academy. His studio in Paris was in the rue Mazarine, where he never spent a day without some good result, his hand being sure and his knowledge great. His subjects, definitely expressed and popular in their manner of treatment, illustrating certain views of history dear to partisans, yet romantic in their general interest, were painted with a firm, solid, smooth surface, which gave an appearance of the highest finish. This solidity, found also on the canvas of Vernet, Scheffer, Leopold Robert and Ingres, was the manner of the day. It repudiates the technical charm of texture and variety of handling which the English school inherited as a tradition from the time of Reynolds; but it is more easily under- stood by the world at large, since a picture so executed depends for its interest rather on the history, scene in nature or object depicted, than on the executive skill, which may or may not be critically appreciated. We may add that his point of view of the historical characters which he treated is not always just. " Cromwell lifting the Coffin-lid and looking at the Body of Charles " is an incident only to be excused by an improbable tradition; but " The King in the Guard-Room," with villainous roundhead soldiers blowing tobacco smoke in his patient face, is a libel on the Puritans; and " Queen Elizabeth dying on the Ground," like a she-dragon no one dares to touch, is sensational; while the Execution of Lady Jane Grey " is represented as taking place in a dungeon. Nothing can be more incorrect than this last as a reading of

English history, yet we forget the inaccuracy in admiration of the treatment which represents Lady Jane, with bandaged sight, feeling for the block, her maids covering their faces, and none with their eyes visible among the many figures. On the other hand, " Strafford led to Execution," when Laud stretches his lawn-covered arms out of the small high window of his cell to give him a blessing as he passes along the corridor, is perfect; and the splendid scene of Richelieu in his gorgeous barge, preceding the boat containing Cinq-Mars and De Thou carried to execution by their guards, is perhaps the most dramatic semi-historical work ever done. " The Princes in the Tower " must also be mentioned as a very complete creation; and the " Young female Martyr floating dead on the Tiber " is so pathetic that criticism feels hard-hearted and ashamed before it. As a realization of a page of authentic history, again, no picture can surpass the " Assassination of the due de Guise at Blois." The expression of the murdered man stretched out by the side of the bed, the conspirators all massed together towards the door and far from the body, show exact study as well as insight into human nature. This work was exhibited in his meridian time, 1835; and in the same year he exhibited the " Head of an Angel," a study from Horace Vernet's young daughter Louise, his love for Whom was the absorbing passion of his life, and from the shock of whose death, in 1845, it is said he never quite recovered. By far his finest productions after her death are of the most serious character, a sequence of small elaborate pictures of incidents in the Passion. Two of these, the Virgin and the other Maries, with the apostles Peter and John, within a nearly dark apartment,

hearing the crowd as it passes haling Christ to Calvary, and St John conducting the Virgin home again after all is over, are beyond all praise as exhibiting the divine story from a simply human point of view. They are pure and elevated, and also

dramatic and painful. Delaroche was not troubled by ideals, and had no affectation of them. His sound but hard execution allowed no mystery to intervene between him and his motif, which was always intelligible to the million, so that he escaped all the waste of energy that painters who try to be poets on canvas suffer. Thus it is that essentially the same treatment was applied by him to the characters of distant historical times, the founders of the Christian religion, and the real people of his own day, such as " Napoleon at Fontainebleau," or " Napoleon at St Helena," or " Marie Antoinette leaving the Convention " after her sentence.

In 1 83 7 Delaroche received the commission for the great picture, 27 metres long, in the hemicycle of the lecture theatre of the Ecole des Beaux Arts. This represents the great artists of the modern ages assembled in groups on either hand of a Central elevation of white marble steps, on the topmost of which are three thrones filled by the architects and sculptors of the Parthenon. To supply the female element in this vast composition he intro- duced the genii or muses, who symbolize or reign over the arts, leaning against the balustrade of the steps, beautiful and queenly figures with a certain antique perfection of form, but not informed by any wonderful or profound expression. The portrait figures are nearly all unexceptionable and admirable. This great and successful work is on the wall itself, an inner wall however, and is executed in oil. It was finished in 184 1, and considerably injured by a fire which occurred in 1855, which injury he immediately set himself to remedy (finished by Robert-Fleury) ; but he died before he had well begun, on the 4th of November 1856.

Personally Delaroche exercised even a greater influence than by his works. Though short and not powerfully made, he im- pressed every one as rather tall than otherwise; his physiognomy was accentuated and firm, and his fine forehead gave him the air of a minister of state.

See Rees, Delaroche (London, 1880). (W. B. Sc.)

DELARUE, GERVAIS (1751–1835), French historical inves- tigator, formerly regarded as one of the chief authorities on Norman and Anglo-Norman literature, was a native of Caen. He received his education at the university of that town, and was ultimately raised to the rank of professor. His first historical enterprise was interrupted by the French Revolution, which forced him to take refuge in England, where he took the oppor- tunity of examining a vast mass of original documents in the Tower and elsewhere, and received much encouragement, from Sir Walter Scott among others. From England he passed over to Holland, still in prosecution of his favourite task; and there he remained till in 1708 he returned to France. The rest of his life was spent in his native town, where he was chosen principal 'of his university. While in England he had been elected a member of the Royal Society of Antiquaries; and in his own country he was made a corresponding member of the Institute, and was enrolled in the Legion of Honour. Besides numerous articles in the Memoirs of the Royal Society of London, the MSmoires de VInstitut, the Memoires de la Societe d' Agriculture de Caen, and in other periodical collections, he published separately Essais historiques sur les Bardes, les Jongleurs, et les Trouveres normands et anglo-normands (3 vols., 1834), and Recherches historiques sur la Prairie de Caen (1837) ; and after his death appeared MSmoires historiques sur le palinod de Caen (1841), Recherches sur la tapisserie de Bayeux (1841), and Nouveaux Essais historiques sur la ville de Caen (1842). In all his writings he displays a strong partiality for everything Norman, and rates the Norman influence on French and English literature as of the very highest moment.

BE LA RUE, WARREN (1815–1880), British astronomer and chemist, son of Thomas De la Rue, the founder of the large firm of stationers of that name in London, was born in Guernsey on the 18th of January 181 5. Having completed his education in Paris, he entered his father's business, but devoted his leisure

hours to chemical and electrical researches, and

between 1836 and 1848 published several papers on these subjects. Attracted to astronomy by the influence of James Nasmyth, he constructed in 1850 a 13-in. reflecting telescope, mounted first at Canonbury, later at Cranford, Middlesex, and with its aid executed many drawings of the celestial bodies of singular beauty and fidelity. His chief title to fame, however, is his pioneering work in the application of the art of photography to astronomical research. In 185 1 his attention was drawn to a daguerreotype of the moon by G. P. Bond, shown at the great exhibition of that year. Excited to emulation and employing the more rapid wet-collodion process, he succeeded before long in obtaining exquisitely defined lunar pictures, which remained unsurpassed until the appearance of the Rutherfurd photographs in 1865. In 1854 he turned his attention to solar physics, and for the purpose of obtaining a daily photographic representation of the state of the solar surface he devised the photo-heliograph, described in his report to the British Association, " On Celestial Photography in England " (1859), and in his Bakerian Lecture (Phil. Trans, vol. clii. pp. 333-416). Regular work with this instrument, inaugurated at Kew by De la Rue in 1858, was carried on there for fourteen years; and was continued at the Royal Observatory, Greenwich, from 1873 to 1882. The results obtained in the years 1862-1866 were discussed in two memoirs, entitled " Researches on Solar Physics," published by De la Rue, in conjunction with Professor Balfour Stewart and Mr B. Loewy, in the Phil. Trans, (vol. clix. pp. 1-1 10, and vol. clx. pp. 389-496). In i860 De la Rue took the photo- heliograph to Spain for the purpose of photographing the total solar eclipse which occurred on the 18th of July of that year. This expedition formed the subject of the Bakerian Lecture already referred to. The photographs obtained on that occasion proved beyond doubt the solar character of the prominences or red flames, seen around the limb of the moon during a solar eclipse. In 1873 De la Rue gave up active work in astronomy, and presented most of his astronomical instruments to the university observatory, Oxford.

Subsequently, in the year 1887, he provided the same observatory with a 13-in. refractor to enable it to take part in the International Photographic Survey of the Heavens. With Dr Hugo Miiller as his collaborator he published several papers of a chemical character between the years 1856 and 1862, and investigated, 1868-1883, the discharge of electricity through gases by means of a battery of 14,600 chloride of silver cells. He was twice president of the Chemical Society, and also of the Royal Astronomical Society (1864-1866). In 1862 he received the gold medal of the latter society, and in 1864 a Royal medal from the Royal Society, for his observations on the total eclipse of the sun in i860, and for his improvements in astronomical photography. He died in London on the 19th of April 1889.

See Monthly Notices Roy. Astr. Soc. 1. 155; Journ. Chem. Soc. IviL 441; Nature, xl. 26; The Times (April 22, 1889); Royal Society, Catalogue of Scientific Papers.

DELATOR, in Roman history, properly one who gave notice (deferre) to the treasury officials of moneys that had become due to the imperial fisc. This special meaning was extended to those who lodged information as to punishable offences, and further, to those who brought a public accusation (whether true or not) against any person (especially with the object of getting money). Although the word delator itself, for " common informer," is confined to imperial times, the right of public accusation had long been in existence. When exercised from patriotic and dis- interested motives, its effects were beneficial; but the moment the principle of reward was introduced, this was no longer the case. Sometimes the accuser was rewarded with the rights of citizen- ship, a place in the senate, or a share of the property of the accused. At the end of the republican period, Cicero (De Officiis, ii. 14) expresses his opinion that such accusations should be undertaken only in the interests of the state or for other urgent reasons. Under the empire the system degenerated into an abuse, which reached its

height during the reign of Tiberius, although the delators continued to exercise their activity till the reign of Theodosius. They were drawn from all classes of society, —

•m. 60

pa+ricians, knights, freedmen, slaves, philosophers, literary men, and, above all, lawyers. The objects of their attacks were the wealthy, all possible rivals of the emperor, and those whose conduct implied a reproach against the imperial mode of life. Special opportunities were afforded by the law of majestas, which (originally directed against attacks on the ruler by word or deed) came to include all kinds of accusations with which it really had nothing to do; indeed, according to Tacitus, a charge of treason was regularly added to all criminal charges. The chief motive for these accusations was no doubt the desire of amassing wealth, 1 since by the law of majestas one-fourth of the goods of the accused, even if he committed suicide in order to avoid confiscation (which was always carried out in the case of those condemned to capital punishment), was assured to the accuser (who was hence called quadruplator) . Pliny and Martial mention instances of enormous fortunes amassed by those who carried on this hateful calling. But it was not without its dangers. If the delator lost his case or refused to carry it through, he was liable to the same penalties as the accused; he was exposed to, the risk of vengeance at the hands of the proscribed in the event of their return, or of their relatives; while emperors like Tiberius would have no scruples about banishing or putting out of the way those of his creatures for whom he had no further use, and who might have proved dangerous to himself. Under the better emperors a reaction set in, and the severest penalties were inflicted upon the delators. Titus drove into exile or reduced to slavery those who had served Nero, after they had

first been flogged in the amphitheatre. The abuse naturally reappeared under a man like Domitian; the delators, with whom Vespasian had not interfered, although he had abolished trials for majestas, were again banished by Trajan, and threatened with capital punishment in an edict of Constantine; but, as has been said, the evil, which was an almost necessary accompaniment of autocracy, lasted till the end of the 4th century.

See Mayor's note on Juvenal iv. 48 for ancient authorities; C. Merivale, Hist, of the Romans under the Empire, chap. 44; W. Rein, Criminalrecht der Romer (1842); T. Mommsen, Rbmisches Strafrecht (1899) ; Kleinfeller in Pauly-Wissowa's Realencyclopadie.

DELAUNAY, ELIE (1828-1891), French painter, was born at Nantes and studied under Flandrin and at the Ecole des Beaux Arts. He worked in the classicist manner of Ingres until, after winning the Prix de Rome, he went to Italy in 1856, and abandoned the ideal of Raphaelesque perfection for the sincerity and severity of the quattrocentists. As a pure and firm draughtsman he stands second only to Ingres. After his return from Rome he was entrusted with many important commissions for decorative paintings, such as the frescoes in the church of St Nicholas at Nantes; the three panels of " Apollo," " Orpheus " and " Amphion " at the Paris opera-house; and twelve paintings for the great hall of the council of state in the Palais Royal. His " Scenes from the Life of St Genevieve," which he- designed for the Pantheon, remained unfinished at his death. The Luxem- bourg Museum has his famous " Plague in Rome " and a nude figure of " Diana "; and the Nantes Museum, the '.' Lesson on the Flute." In the last decade of his life he achieved great popularity as a portrait painter.

DELAUNAY, LOUIS ARSENE (1826-1903), French actor, was born in Paris, the son of a wine-seller. He studied at the Conservatoire, and made his first formal appearance on the stage in 1845, in Tartufe at the Odeon. After three years at this house he made his debut at the Comedie Francaise as Dorante

in Corneille's Le Menteur, and began a long and brilliant career in young lover parts. He continued to act asjeune premier until he was sixty, his grace, marvellous diction and passion enchanting his audiences. It was especially in the plays of Alfred de Musset that his gifts found their happiest expression. In the thirty-seven years during which he was a member of the Comedie Francaise, Delaunay took or created nearly two hundred parts. He retired in 1887, having been made a chevalier of the Legion of Honour in 1883.

1 " Delatores, genus hominum publico exitio repertum . . . per oraeraia eliciebantur " (Tacitus, Annals, iv. 30).

DELAVIGNE, JEAN FRANCOIS CASIMIR (1793-1843), French poet and dramatist, was born on the 4th of April 1793 at Havre. His father sent him at an early age to Paris, there to be educated at the Lycee Napoleon. Constitutionally of an ardent and sympathetic temperament, he enlarged his outlook by extensive miscellaneous reading. On the 20th of March 181 1 the empress Marie Louise gave birth to a son, named in his very cradle king of Rome. This event was celebrated by Delavigne in a Dithy- rambe sur la naissance du roi de Rome, which secured for him a. sinecure in the revenue office.

About this time he competed twice for an academy prize, but without success. Delavigne, inspired by the catastrophe of 1815, wrote two impassioned poems, the first entitled Waterloo, the second, Devastation du musee, both written in the heat of patriotic enthusiasm, and teeming with popular political allusions. A third, but of inferior merit, Sur le besoin de s'unir apres le depart des etrangers, was afterwards added. These stirring pieces, termed by him Messgniennes, sounded a keynote which found an echo in the hearts of all. Twenty-five thousand copies were sold; Delavigne was famous. He was appointed to an honorary librarianship, with no duties to discharge. In 1819 his play Les vipres Siciliennes was performed at the Odeon, then just rebuilt; it had previously been

refused for the Theatre Francais. On the night of the first representation, which was warmly received, Picard, the manager, threw himself into the arms of his elated friend, exclaiming, ” You have saved us! You are the founder of the second French Theatre.” This success was followed up by the production of the Comidiens (1820), a poor play, with little plot, and the Paria (1821), with still less, but containing some well-written choruses. The latter piece obtained a longer lease of life than its intrinsic literary merits warranted, on account of the popularity of the political opinions freely expressed in it — so freely expressed, indeed, that the displeasure of the king was incurred, and Delavigne lost his post. But Louis Philippe, duke of Orleans, willing to gain the people’s good wishes by complimenting their favourite, wrote to him as follows: ” The thunder has descended on your house; I offer you an apartment in mine.” Accordingly Delavigne became librarian at the Palais Royal, a position retained during the remainder of his life. It was here that he wrote the Ecole des vieillards (1823), his best comedy, which gained his election to the Academy in 1825. To this period also belong La Princesse Aurtiie (1828), and Marino Faliero (1829), a drama in the romantic style.

For his success as a writer Delavigne was in no small measure indebted to the stirring nature of the times in which he lived. The Messeniennes, which first introduced him to universal notice, had their origin in the excitement consequent on the occupation of France by the allies in 18 15. Another crisis in his life and in the history of his country, the revolution of 1830, stimulated him to the production of a second masterpiece, La Parisienne. This song, set to music by Auber, was on the lips of every Frenchman, and rivalled in popularity the Marseillaise. A companion piece, La Varsovienne, was written for the Poles, by whom it was sung on the march to battle. Other works of Delavigne followed each other in rapid succession — Louis XI (1832), Les Enfants d’Edouard (1833), Don Juan d’Autriche (1835), Une Famille au temps du

Luther (1836), La Popularity (1838), La Fille du Cid (1839), Le Conseiller rapporteur (1840), and Charles VI (1843), an opera partly written by his brother. In 1843 he quitted Paris to seek in Italy the health his labours had cost him. At Lyons his strength altogether gave way, and he died on the nth of December.

By many of his own time Delavigne was looked upon as unsurpassed and unsurpassable. Every one bought and read, his works. But the Applause of the moment was gained at the sacrifice of lasting fame. As a writer he had many excellences. He expressed himself in a terse and vigorous style. The poet of reason rather than of imagination, he recognized his own province, and was rarely tempted to flights of fancy beyond his powers. He wrote always as he would have spoken, from sincere con- viction. In private life he was in every way estimable, — upright, amiable, devoid of all jealousy, and generous to a fault.

His Poesies and his Thedlre were published in 1863. His CEuvres completes (new edition, 1855) contains a biographical notice by his brother, Germain Delavigne, who is best known as a librettist in opera. See also Sainte-Beuve, Portraits litteraires, vol. v.; A. Favrot, Etude sur Casimir Delavigne (1894) ; and F. Vuacheux, Casimir Delavigne (1893).

DELAWARE, a South Atlantic state of the United States of America, one of the thirteen original states, situated between 38° 27' and 39 50' N. lat. and between 75 2' and 75 47' W. long. (For map see Maryland.) It is bounded N. and N.W. by Pennsylvania, E. by the Delaware river and Delaware Bay, which separate it from New Jersey, and by the Atlantic Ocean; S. and W. by Maryland. With the exception of Rhode Island it is the smallest state in the Union, its area being 2370 sq. m., of which 405 sq. m. are water surface.

Physical Features.— Delaware lies on the Atlantic coastal plain, and is for the most part level and relatively low, its average elevation above the sea being about 50 ft. It is situated in the eastern part of the peninsula formed by Chesapeake Bay and the estuary of the Delaware river. In the extreme N. the country is rolling, with moderately high hills, moderately deep valleys and rapid streams. West of Wilmington there rises a ridge which crosses the state in a north-westerly direction and forms a water- shed between Christiana and Brandywine creeks, its highest elevation above sea-level being 280 ft. South of the Christiana there begins another elevation, sandy and marshy, which extends almost the entire length of the state from N.W. to S.E., and forms a second water-parting. The streams that drain the state are small and insignificant. Those of the N. flow into Brandywine and Christiana creeks, whose estuary into Delaware river forms Wilmington harbour; those of the S.W. have a common outlet in the Nanticoke river of Maryland; those of the E. empty into Delaware Bay and the Atlantic Ocean. The principal harbours are those of Wilmington, New Castle and Lewes. The shore of the bay is marshy, that of the Atlantic is sandy. In Kent county there are more than 60,000 acres of tidal marshland, some of which has been reclaimed by means of dykes; Cypress Swamp in the extreme S. has an area of 50,000 acres. The soils of the N. are clays, sometimes mixed with loam; those of the central part are mainly loams; while those of the S. are sands.

Minerals are found only in the N. part of the state. Those of economic value are kaolin, mined chiefly in the vicinity of Hockessin, New Castle county, the static kaolin product being exceeded in 1903 only by that of Pennsylvania among the states of the United States; granite, used for road-making and rough construction work, found near Wilmington; and brick and tile clays; but the value of their total product in 1902 was less than $500,000. In 1906 the total mineral product was valued at $814,126, of which $237,768 represented clay products and $146,346

stone. In 1902 only 2-2% of the wage-earners were engaged in mining.

The forests, which once afforded excellent timber, including white oak for shipbuilding, have been greatly reduced by con- stant cutting; in 1900 it was estimated that 700 sq. m. were wooded, but practically none of this stand was of commercial importance. The fisheries, chiefly oyster, sturgeon and shad, yield an annual product valued at about $250,000.

The proximity of the Delaware and Chesapeake bays help to give Delaware a mild and temperate climate. The mean annual temperature is approximately 55° F., ranging from 52 in the S. to 56 in the N., and the extremes of heat and cold are 103° in the summer and — 1 7° in the winter. The annual rainfall, greater on the coast than inland, ranges from 40 to 45 in.

Industry and Trade. — Delaware is pre-eminently an agricul- tural state. In 1900 85% of its total land surface was enclosed in farms — a slight decline since 1880. Seven-tenths of this was improved land, and the expenditure per farm for fertilizers, greater in 1890 than the average of the Atlantic states, approxi- mated $55 per farm in 1900. In 1899 Delaware spent more per acre for fertilizers than any of the other states except New Jersey, Rhode Island and Maryland. The average size of farms, as in the other states, has declined, falling from 124-6 acres in 1880 to iio-i acres in 1900. A large proportion of farms (49-7%)

were operated by the owners, and the prevailing form of tenantry was the share system by which 42-5% of the farms were culti- vated, while 8-24% of the farms were operated by negroes; these represented less than 4% of the total value of farm property, the average value of farms operated by negroes being $17 per acre, that of farms operated by whites, $23 per acre. The total value of farm products in 1900 was $9,190,777, an increase of 30% over that of 1890, while the cultivation of cereals suffered on account of the competition of the western states.

Indian corn and wheat form the two largest crops, their product in 1900 being respectively 24% and 52% greater than in 1890; but these crops when compared with those of other states are relatively unimportant. In 1906 the acreage of Indian corn was 196,472 acres with a yield of 5,894,160 bushels valued at $2,475,547, an d the acreage of wheat was 121,745 acres with a yield of 1,947,920 bushels valued at $1,383,023. The value of the fruit crop, for which Delaware has long been noted, also increased during the same decade, but disease and frost caused a marked decline in the production of peaches, a loss balanced by an increased production of apples, pears and other orchard fruits. Large quantities of small fruits, particularly of strawberries, raspberries and blackberries, are produced, the southern portion of Sussex county being particularly favourable for strawberry culture. The vicissitudes of fruit raising have also caused increasing attention to be paid to market gardening, dairying and stock raising, particularly to market gardening, an industry which is favoured by the proximity of large cities. The same influence also explains, partly at least, the decrease (of 13%) in the value of farm property between 1890 and 1900.

The development of manufacturing in Delaware has not been so extensive as its favourable situation relative to the other states, the facilities for water and railway transportation, and the proximity of the coal and iron fields of Pennsylvania, would seem to warrant. In 1905 the wage-earners engaged in manufacturing (under the factory system) numbered 18,475, an d the total capital invested in manufacturing was $50,925,630; the gross value of products was $41,160,276; the net value (deducting the value of material purchased in partly manufactured form) was $16,276,470. The principal industry was the manufacture of iron and steel products, which, including steel and rolling mills, car, foundry and machine shops, and shipyards, repre- sented more than 30% of the total capital, and approximately 2 5 % of the total gross product

of the manufactures in the state. The tanning, currying and finishing of leather ranks second in importance, with a gross product ($10,250,842) 9% greater than that of 1900, and constituting about one-fourth of the gross factory product of the state in 1905; and the manufacture of food products ranked third, the value of the products of the fruit canning and preserving industry having more than doubled in the decade 1 890-1 900, but falling off a little more than 7% in 1900-1905. The manufacture of paper and wood pulp snowed an increased product in 1905 19-1% greater than in 1900; and flour and grist mill products were valued in 1905 43-6% higher than in 1900. In the grand total of manufactured products, however, the state showed in 1905 a decrease of 4% from 1900. The great manufacturing centre is Wilmington, where in 1905 almost two-thirds of the capital was invested, and nearly three- fourths of the product was turned out. There is much manu- facturing also at New Castle.

Delaware has good facilities for transportation. Its railway mileage in January 1907 was 333-6 m.; the Philadelphia, Baltimore & Washington (Pennsylvania system), the Baltimore & Philadelphia (Baltimore & Ohio system), and the Wilmington & Northern (Philadelphia & Reading system) cross the northern part of the state, while the Delaware railway (leased by the Philadelphia, Baltimore & Washington) runs the length of the state below Wilmington, and another line, the Maryland, Delaware & Virginia (controlled by the Baltimore, Chesapeake & Atlantic railway, which is related to the Pennsylvania system), connects Lewes, Del., with Love Point, Md., on the Chesapeake Bay. There is no state railway commission, and the farmers of southern Delaware have suffered from excessive freight rates.

The Delaware & Chesapeake Canal (135 m. long, 66 ft. wide and 10 ft. deep) crosses the N. part of the state, connecting Delaware river and Chesapeake Bay,

and thus affords trans- portation by water from Baltimore to Philadelphia. The canal was completed in 1829; in 1907 a commission appointed by the president to report on a route for a waterway between Chesapeake and Delaware bays selected the route of this canal. The states of Maryland and Delaware aided in its construction, and in 1828 the national government also made an appropria- tion. Wilmington is a customs district in which New Castle and Lewes are included; but its trade is largely coastwise. Rehoboth and Indian River bays are navigable for vessels of less than 6 ft. draft. Opposite Lewes is the Delaware Breakwater (begun in 1818 and completed in 1869, at a cost of more than $2,000,000), which forms a harbour 16 ft. deep. In 1897–1901 the United States government constructed a harbour of refuge, formed by a second breakwater 2j m. N. of the existing one; its protected anchorage is 552 acres and the cost was more than $2,090,000. The harbour is about equidistant from New York, Philadelphia, and the capes of Chesapeake Bay, and is used chiefly by vessels awaiting orders to ports for discharge or landing. The national government also made appropriations for opening an inland waterway from Lewes to Chincoteague Bay, Virginia, for im- proving Wilmington harbour, and for making navigable several of the larger streams of the sta^e.

Population. — The population in 1880 was 146,608; in 1890, 168,493, an increase of 14-9%; in 1900, 184,735, a further in- crease of 9-6%; in 1910, 202,322. The rate of increase before 1 8 50 was considerably smaller than the rate after that date. Of the population in 1900, 92-5% was native born and 7-$% was foreign-born. The negro population was 30,697, or 16-6 % of the total. In Indian River Hundred, Sussex county, there formerly lived a community of people, — many of whom are of the fair Caucasian type, — called ” Indians ” or ” Moors “; they are now quite generally dispersed throughout the state, especially in Kent and Sussex counties. Their origin is unknown, but accord- ing to local tradition they are the descendants of some Moorish

sailors who were cast ashore many years ago in a shipwreck; their own tradition is that they are descended from the children of an Irish mother and a negro father, these children having intermarried with Indians of the Nanticoke tribe. They have, where practicable, separate churches and schools, the latter receiving state aid. The urban population of Delaware (i.e. of Wilmington, the only city having more than 5000 inhabitants) was, in 1900, 41-4% of the state's population. There were thirty-five incorporated cities and towns. The largest of these was the city of Wilmington, with 76,508 inhabitants. The city next in size, New Castle, had a population of 3380, while the largest town, Dover, the capital of the state, had 3329. The total number of communicants of all denominations in 1906 was 71,251, — 32,402 Methodists, 24,228 Roman Catholics, 5200 Presbyterians, 3796 Protestant Episcopalians, and 2921 Baptists.

Government. — The constitution by which Delaware is governed was adopted in 1897. Like the previous constitutions of 1776, 1792 and 1831, it was promulgated by a constitutional convention without submission to the people for ratification, and amend- ments may be adopted by a two-thirds vote of each house in two consecutive legislatures. Its character is distinctly democratic. The property qualification of state senators and the restriction of suffrage to those who have paid county or poll taxes are abolished; but suffrage is limited to male adults who can read the state constitution in English, and can write their names, unless physically disqualified, and who have registered. In 1907 an amendment to the constitution was adopted, which struck out from the instrument the clause requiring the payment of a registration fee of one dollar by each elector. Important in- novations in the constitution of 1897 are the office of lieutenant- governor, and the veto power of the governor which may extend to parts and clauses of appropriation bills, but a bill may be passed over his veto by a three-fifths vote of each house of the legislature, and a bill becomes a law if not

returned to the legislature within ten days after its reception by the governor,

unless the session of the legislature shall have expired in the meantime. The governor's regular term in office is four years, and he is ineligible for a third term. All his appointments to offices where the salary is more than $500 must be confirmed by the senate; all pardons must be approved by a board of pardons. Representation in the legislature is according to districts, members of the lower house being chosen for two, and members of the upper house for four years. Members of the lower house must be at least twenty-four years of age, members of the senate at least twenty-seven ; members of both houses must at the time of their election have been citizens of the state for at least three years. In November 1906 the people of the state voted (17,248 for; 2162 against) in favour of the provision of a system of advisory initiative and advisory referendum; and in March 1907 the general assembly passed an act providing initiative and refer- endum in the municipal affairs in the city of Wilmington. The organization of the judiciary is similar to that under the old English system. Six judges — a chancellor, a chief justice, and four associate justices — of whom there shall be at least one resident in each of the three counties, and not more than three shall belong to the same political party, are appointed by the governor, with the consent of the senate, for a term of twelve years. A certain number of them hold courts of chancery, general sessions, oyer and terminer, and an orphans' court; the six together constitute the supreme court, but the judge from whose decision appeal is made may not hear the appealed case unless the appeal is made at his own instance. Bribery may be punished by fine, imprisonment and disfranchisement for ten years. Corporations cannot be created by a special act of the legislature, and no corporation may issue stock except foi an equivalent value of money, labour or property. In order to attract capital to the state, the legislature has reduced the taxes on corporations, has forbidden the repeal of charters,

and has given permission for the organization of corporations with both the power and name of trust companies. Legislative divorces are forbidden by the constitution, and a statute of 1901 subjects wife-beaters to corporal punishment. Although punishment by whipping and by standing in the pillory was prohibited by an act of Congress in 1839, in so far as the Federal government had jurisdiction, both these forms of punishment were retained in Delaware, and standing in the pillory was prescribed by statute as a punishment for a number of offences, including various kinds of larceny and forgery, highway robbery, and even pretending " to exercise the art of witchcraft, fortune-telling or dealing with spirits," at least until 1893. In 1905, by a law approved on the 20th of March, the pillory was abolished. The whipping-post was in 1908 still maintained in Delaware, and whipping continued to be prescribed as a punishment for a variety of offences, although in 1889 a law was passed which prescribed that " hereafter no female convicted of any crime in this state shall be whipped or made to stand in the pillory," and a law passed in 1883 prescribed that " in case of conviction of larceny, when the prisoner is of tender years, or is charged for the first time (being shown to have before had a good character), the court may in its discretion omit from the sentence the infliction of lashes." An old law still on the statute-books when the edition of the revised statutes was issued in 1893, prescribes that " the punishment of whipping shall be inflicted publicly by strokes on the bare back, well laid on."

The unit of local government is the " hundred," which corre- sponds to the township of Pennsylvania. The employment of children under fourteen years of age in factories is forbidden by statute. Divorces are granted for adultery, desertion for three years, habitual drunkenness, impotence at the time of marriage, fraud, lack of marriageable age (eighteen for males, sixteen for females), and failure of husband to provide for his wife during three consecutive years. The marriages of whites with

negroes and of insane persons are null; but the children of the married insane are legitimate.

In 1908 the state debt was $816,785, and the assets in bonds, railway mortgages and bank stocks exceeded the liabilities by $7!7>779- Besides the income from interest and dividends

on investments, the state revenues are derived from taxes on licences, on commissions to public officers, on railway, telegraph and telephone, express, and banking companies, and to a slight extent from taxes on collateral inheritance.

Education. — The charitable and penal administration of Delaware is not well developed. There is a state hospital for the insane at Farnhurst. Other dependent citizens are cared for in the institutions of other states at public expense. In 1899 a county workhouse was established in New Castle county, in which persons under sentence must labour eight hours a day, pay being allowed for extra hours, and a diminution of sentence for good behaviour. At Wilmington is the Ferris industrial school for boys, a private reformatory institution to which New Castle county gives $146 for each boy; and the Delaware industrial school for girls, also at Wilmington, receives financial support from both county and state.

The educational system of the state has been considerably improved within recent years. The maintenance of a system of public schools is rendered compulsory by the state constitution, and a new compulsory school law came into effect in 1907. The first public school law, passed in 1829, was based largely on the principle of " local option," each school district being left free to determine the character of its own school or even to decide, if it wished, against having any school at all. The system thus established proved to be very

unsatisfactory, and a new school law in 1875 brought about a greater degree of uniformity and centralization through its provisions for the appointment of a state superintendent of free schools and a state board of education. In 1888, however, the state superintendency was abolished, and county superintendencies were created instead, the legislature thus returning, in a measure, to the old system of local control. Centralization was again secured, in 1898, by the passage of a law reorganizing and increasing the powers of the state board of education. The state school fund, ranging from about $150,000 to $160,000 a year, is apportioned among the school districts, according to the number of teachers employed, and is used exclusively for teachers' salaries and the supplying of free text-books. This fund is supplemented by local taxation. No discrimination is allowed on account of race or colour; but separate schools are provided for white and coloured children. Delaware College (non-sectarian) at Newark, founded in 1833 as Newark College and rechartered, after suspension from 1859 to 1870, under the present name, as a state institution, derives most of its financial support from the United States Land Grant of 1862 and the supplementary appropriation of 1890, and is the seat of an agricultural experiment station, established in 1888 under the so-called " Hatch Bill " of 1887. In 1906-1907 Delaware College had 20 instructors and 130 students. The college is a part of the free school system of Delaware, and tuition is free to all students from the state. There is an agricultural college for negroes at Dover; this college receives one-fifth of the appropriation made by the so-called " new Morrill Bill " of

1890.

History. — Delaware river and bay were first explored on behalf of the Dutch by Henry Hudson in 1609, and more thoroughly in 1615-1616 by Cornelius Hendrikson, whose reports did much to cause the incorporation of the Dutch West India Company. The first settlement on Delaware soil was made under the auspices of members of this company in 1631 near the

site of the present Lewes. The leaders, one of whom was Captain David P. de Vries, wished ” to plant a colony for the cultivation of grain and tobacco as well as to carry on the whale fishery in that region.” The settlement, however, was soon completely destroyed by the Indians. (See Lewes.) A more successful effort at colonization was made under the auspices of the South Company of Sweden, a corporation organized in 1624 as the ” Australian Company,” by William Usselinx, who had also been the chief organizer of the Dutch West India Company, and now secured a charter or manifest from Gustavus Adolphus. The privileges of the company were, extended to Germans in 1633, and about 1640 the Dutch members were bought out. In 1638 Peter Minuit on behalf of this company established a settlement at what is now

Wilmington, naming it, in honour of the infant queen Christina, Christinaham, and naming the entire territory, bought by Minuit from the Minquas Indians and extending indefinitely westward from the Delaware river between Bombay Hook and the mouth of the Schuylkill river, ” New Sweden.” This territory was subsequently considerably enlarged. In 1642 mature plans for colonization were adopted. A new company, officially known as the West India, American, or New Sweden Company, but like its predecessor popularly known as the South Company, was chartered, and a governor, Johan Printz (c. 1600–1663) was sent out by the crown. He arrived early in 1643 and subsequently established settlements on the island of Tinicum, near the present Chester, Pennsylvania, at the mouth of Salem Creek, New Jersey, and near the mouth of the Schuylkill river. Friction had soon arisen with New Netherland, although, owing to their common dislike of the English, the Swedes and the Dutch had maintained a formal friendship. In 1651, however, Peter Stuyvesant, governor of New Netherland, and more aggressive than his pre- decessors, built Fort Casimir, near what is now New Castle. In 1654 Printz’s successor, Johan ‘Claudius Rising, who had arrived from Sweden with a large number of

colonists, expelled the Dutch from Fort Casimir. In retaliation, Stuyvesant, in 1655, with seven vessels and as many hundred men, recaptured the fort and also captured Fort Christina (Wilmington). New Sweden thus passed into the control of the Dutch, and became a dependency of New Netherland. In 1656, however, the Dutch West India Company sold part of what had been New Sweden to the city of Amsterdam, which in the following year established a settlement called " New Amstel " at Fort Casimir (New Castle). This settlement was badly administered and made little progress.

In 1663 the whole of the Delaware country came under the jurisdiction of the city of Amsterdam, but in the following year this territory, with New Netherland, was seized by the English. For a brief interval, in 1673-1674, the Dutch were again in control, but in the latter year, by the treaty of Westminster, the " three counties on the Delaware " again became part of the English possessions in America held by the duke of York, later James II. His formal grant from Charles II. was not received until March 1683. In order that no other settlements should encroach upon his centre of government, New Castle, the northern boundary was determined by drawing an arc of a circle, 12 m. in radius, and with New Castle as the centre. This accounts for the present curved boundary line between Delaware and Pennsylvania. Previously, however, in August 1680, the duke of York had leased this territory for 10,000 years to William Penn, to whom he conveyed it by a deed of feoffment in August 1682; but differences in race and religion, economic rivalry between New Castle and the Pennsylvania towns, and petty political quarrels over representation and office holding, similar to those in the other American colonies, were so intense that Penn in 1691 appointed a special deputy governor for the " lower counties." Although reunited with the " province " of Pennsylvania in 1693, the so-called " territories " or " lower counties " secured a separate legislature in 1704, and a separate executive council in 1 7 10; the governor of Pennsylvania,

however, was the chief executive until 1776. A protracted boundary dispute with Mary- land, which colony at first claimed the whole of Delaware under Lord Baltimore's charter, was not settled until 1767, when the present line separating Delaware and Maryland was adopted. In the War of Independence Delaware furnished only one regiment to the American army, but that was one of the best in the service. One of its companies carried a number of game- cocks said to have been the brood of a blue hen; hence the soldiers, and later the people of the state, have been popularly known as the " Blue Hen's Chickens."

In 1776 a state government was organized, representative of the Delaware state, the term " State of Delaware " being first adopted in the constitution of T792. One of the peculiarities of the government was that in addition to the regular executive, legislative and judicial departments there was a privy council without whose approval the governor's power was little more than nominal. In 1786 Delaware was one of the five states

whose delegates attended the Annapolis Convention (see Anna- polis, Maryland), and it was the first (on the 7th of December 1787) to ratify the Federal constitution. From then until 1850 it was controlled by the Federalist or Whig parties. In 1850 the Democrats, who had before then elected a few governors and United States senators, secured control of the entire administra- tion—a control unarrested, except in 1863, until the last decade of the 19th century. Although it was a slave state, the majority of the people of Delaware opposed secession in 1861, and the legislature promptly answered President Lincoln's call to arms; yet, while 14,000 of the 40,000 males between the ages of fourteen and sixty served in the Union army, there were many sympa- thizers with the Confederacy in the southern part of the state.

In 1866, 1867 and 1869, respectively, the legislature refused to ratify the thirteenth, fourteenth and fifteenth amendments to the Federal constitution. The provision of the state constitution that restricted suffrage to those who had paid county or poll taxes and made the tax lists the basis for the lists of qualified voters, opened the way for the disfranchisement of many negroes by fraudulent means. Consequently the levy court of New Castle county was indicted in the United States circuit court in 1872, and one of its members was convicted. Again in 1880 the circuit court, by virtue of the Federal statute of 1872 on elections, appointed supervisors of elections in Delaware. The negro vote has steadily increased in importance, and in 1900 was approximately one-fifth of the total vote of the state. In 1 901 the legislature ratified the three amendments rejected in former years. Another political problem has been that of representation. According to the constitution of 183 1 the unit of representation in the legislature was the county; inasmuch as the population of New Castle county has exceeded after 1870 that of both Kent and Sussex, the inequality became a cause of discontent. This is partly eradicated by the new constitution of 1897, which reapportioned representation according to electoral districts, so that New Castle has seven senators and fifteen representatives, while each of the other counties has seven senators and ten representatives.

In 1889 the Republicans for the first time since the Civil War secured a majority in the legislature, and elected Anthony J. Higgins to the United States Senate. In that year a capitalist and promoter, J. Edward Addicks (b. 1841, in Pennsylvania), became a citizen of the state, and after securing for himself the control of the Wilmington gas supply, systematically set about building up a personal " machine " that would secure his elec- tion to the national Senate as a Republican. His purpose was thwarted in 1893, when a Democratic majority chose, for a second term, George Gray (b. 1840), who from 1879 to 1885 had been the attorney-general of the

state and subsequently was a member of the Spanish-American Peace Commission at Paris in 1898 and became a judge of the United States circuit court, third judicial circuit, in 1899. Mr Addicks was an avowed candidate in 1895, but the opposition of the Regular Republicans, Who accused him of corruption and who held the balance of power, prevented an election. In 1897, the legislature being again Democratic, Richard R. Kenney (b. 1856) was chosen to fill the vacancy for the remainder of the unexpired term. Meanwhile the two Republican factions continued to oppose one another, and both sent delegates to the national party convention in 1896, the " regular " delegation being seated. The expiration of Senator Gray's term in 1899 left a vacancy, but although the Republicans again had a clear majority the resolution of the Regulars pre- vented the Union Republicans, as the supporters of Addicks called themselves, from seating their patron. Both the Regular and Union factions sent delegations to the national party con- vention in 1900, where the refusal of the Regulars to compromise led to the recognition of the Union delegates. Despite this apparent abandonment of their cause by the national organiza- tion, the Regulars continued their opposition, the state being wholly without representation in the Senate from the expiration of Senator Kenney's term in 1901 until 1903, when a compromise was effected whereby two Republicans, one of each faction, were chosen, one condition being that Addicks should not be the

candidate of the Union Republicans. Both factions were recog- nized by the national convention of 1904, but the legislature of 1905 adjourned without being able to fill a vacancy in the Senate which had again occurred. The deadlock, however, was broken at the special session of the legislature called in 1906, and in June of that year Henry A. Du Pont was elected senator. Governors of Delaware

I. Swedish.

Peter Minuit ….. 1638-1640

Peter Hollander 1640-1643

Johan Printz ….. 1643-1653

Johan Papegoga (acting) . . . 1653-1654

Johan Claudius Rising …. 1654-1655

II. Dutch.

(Same as for New York.)

III. English.

(Same as New York until 1682.)

(Same as Pennsylvania 1682-1776.)

Presidents of Delaware

John McKinley Caesar Rodney . John Dickinson Nicholas Van Dyke Thomas Collins .

*Joshua Clayton Gunning Bedford Daniel Rogers 1 Richard Bassett James Sykes 2 David Hall Nathaniel Mitchell George Truett Joseph Haslett Daniel Rodney John Clarke Henry Malleston 3 Jacob Stout 4 . John Collins Caleb Rodney 6 Joseph Haslett Charles Thomas * Samuel Paynter Charles Polk . David Hazzard Caleb P. Bennett Charles Polk' . Cornelius P. Comegys William B. Cooper Thomas Stockton Joseph Maul 8 . William Temple 9 William Tharp William H. Ross Peter F. Causey William Burton William Cannon Gove Saulsbury 10*

James Ponder ohn P. Cockran John W. Hall . Charles C. Stockley Benjamin T. Biggs Robert J. Reynolds Joshua H. Marvil William T. Watson" Ebe W. Tunnell John Hunn Preston Lea Simeon S. Pennewill

- *1 776-1 778*

. 1778-1781

. 1781-1783

. 1 783-1 786

. 1 786–1 789

Governors

1 789–1 796 Federalist

1796–1797

1797–1799

1 799–1 801

1801–1802 ,.

1 802–1 805 Federalist

1805–1808 „

1808–1811

1811–1814 „

1814–1817

1817–1820 „

1820 ..

1820–1821 ..

1821–1822 Democratic–Republican

1822 ,,

1822–1823 Democratic–Republican

1823–1824 ”

1 824–1 827 Federalist

1827–1830 „

1 830–1 833 American– Republican

1 833–1 836 Democrat

1836–1837 ..

1837–1841 Whig

1841–1845 „

1845–1846 „

1846

I 846–1 847 ”

1 847–1 85 1 Democrat

1851–1855

1855–1859 Whig–Know–Nothing

1 859–1 863 Democrat

1 863–1 865 Republican

1865–1871 Democrat

1871–1875

1875–1879

1879–1883

1883–1887

1887–1891

1891–1895

1895 Republican

1 895–1 897 Democrat

1897–1901 ,,

1901–1905 Republican

1905–1909

1909

Filled unexpired term

of Gunning Filled unexpired term of Richard Bassett,

1 Speaker of the senate. Bedford (d. 1797).

2 Speaker of senate, who resigned 1 801.

8 Died before he was inaugurated.

4 Speaker of the senate.

6 Speaker of the senate, John Collins dying in 1822.

6 Speaker of senate, Haslett dying in 1823.

7 Speaker of senate.

8 Speaker of senate, Stockton dying in 1846.

9 Speaker Qf senate, Maul dying in 1846.

10 As speaker of the senate filled the unexpired term of Cannon (d. 1865), and then became governor in 1867.

11 President of senate, Marvil dying in 1895.

Bibliography. — Information about manufactures, mining and agriculture may be found in the reports of the Twelfth Census of the United States, especially Bulletins 69 and 100. The Agricultural Experiment Station, at Newark, publishes in its Annual Report a record of temperature and rainfall. For law and administration see Constitution of Delaware (Dover, 1899) and the Revised Code of 1852, amended 1893 (Wilmington, 1893). For education see L. B. Powell, History of Education in Delaware (Washington, 1893), and a sketch in the Annual Report for 1902 of the United States Commis- sioner of Education. The most elaborate history is that of John Thomas Scharf, History of the State of Delaware (2 vols., Philadelphia, 1888); the second volume is entirely biographical. Claes T. Odhner's brief sketch, Kolonien Nya Sveriges Crundldggning,

1637–1642 (Stockholm, 1 876 ; English translation in the Pennsylvania Magazine of History and Biography, vol. iii.), and Carl K. S. Sprinchorn's Kolonien Nya Sveriges Historia (1878; English translation in the Pennsylvania Magazine of History and Biography, vols. vii. and viii.) are based, in part, on documents in the Swedish Royal Archives and at the universities of Upsala and Lund, which were unknown to Benjamin Ferris (History of the Original Settlements of the Delaware, Wilmington, 1846) and Francis Vincent {History of the State of Delaware, Philadelphia, 1870), which ends with the English occupa- tion in 1664. In vol. iv. of Justin Winsor's Narrative and Critical History of America (Boston, 1884) there is an excellent chapter by Gregory B. Keen on " New Sweden, or the Swedes on the Dela- ware," to which a bibliographical chapter is appended. The Papers of the Historical Society of Delaware (1879 seq.) contain valuable material. In part ii. of the Report of the Superintendent of the U.S. Coast and Geodetic Survey for 1893 (Washington, 1905) there is " A Historical Account of the Boundary Line between the States of Pennsylvania and Delaware, by W. C. Hodgkins." The colonial records are preserved with those of New York and Pennsylvania; only one volume of the State Records has been published, and Minutes of the Council of Delaware State, 1776–1792 (Dover, 1886). For political conditions since the Civil War see vol. 141 of the North American Review, vol. 32 of the Forum, and vol. 73 of the Outlook — all published in New York.

DELAWARE, a city and the county-seat of Delaware county, Ohio, U.S.A., on the Olentangy (or Whetstone) river, near the centre of the state. Pop. (1890) 8224; (1900) 7940(572 being foreign-born and 43 2 negroes); (1910)9076. Delaware is served by the Pennsylvania, the Cleveland, Cincinnati, Chicago & St Louis (New York Central system), and the Hocking Valley railways, and by two interurban lines. The city is built on rolling ground about 900 ft. above, sea-level. There are many sulphur and iron springs in the vicinity. Delaware is the seat of the Ohio

Wesleyan University (co-educational), founded by the Ohio Conference of the Methodist Episcopal Church in 1841, and opened as a college in 1844; it includes a college of liberal arts (1844), an academic department (1841), a school of music (1877), a school of fine arts (1877), a school of oratory (1894), a business school (1895), and a college of medicine (the Cleveland College of Physicians and Surgeons, at Cleveland, Ohio; founded as the Charity Hospital Medical College in 1863, and the medical depart- ment of the university of Wooster until 1896, when, under its present name, it became a part of Ohio Wesleyan University). In 1877 the Ohio Wesleyan female college, established at Delaware in 1853, was incorporated in the university. In 1907-1908 the university had 122 instructors, 11 78 students and a library of 55, 395 volumes. At Delaware, also, are the state industrial school for girls, a Carnegie library, the Edwards Young Men's Christian Association building and a city hospital. The city has railway shops and foundries, and manufactures furniture, carriages, tile, cigars and gas engines. Delaware was laid out in 1808 and was first incorporated in 1815. It was the birthplace of Rutherford B. Hayes, president of the United States from 1877 to 1881.

DELAWARE INDIANS, the English name for the Leni Lenape; a tribe of North American Indians of Algonquian stock. When first discovered by the whites the tribe was settled on the banks of the Delaware river. The French called them Loups (wolves) from their chief totemic division. Early in the 17th century the Dutch began trading with them. Subsequently William Penn bought large tracts of land from them, and war followed, the Delawares alleging they had been defrauded; but, with the assistance of the Six Nations, the whites forced them back west of the Alleghenies. In 1789 they were placed on a reservation in Ohio and subsequently in 1818 were moved to Missouri. Various removals followed, until in 1866 they accepted lands in the Indian

territory (Oklahoma) and gave up the tribal

relation. They have remained there and now number some 1700.

DELAWARE RIVER, a stream of the Atlantic slope of the United States,' meeting tide-water at Trenton, New Jersey, 130 m. above its mouth. Its total length, from the head of the longest branch to the capes, is 410 m., and above the head of the bay its length is 360 m. It constitutes in part the boundary between Pennsylvania and New York, the boundary between New Jersey and Pennsylvania, and, for a few miles, the boundary between Delaware and New Jersey. The main, west or Mohawk branch rises in Schoharie county, N.Y., about 1886 ft. above the sea, and flows tortuously through the plateau in a deep trough until it emerges from the Catskills. Other branches rise in Greene and Delaware counties. In the upper portion of its course the varied scenery of its hilly and wooded banks is exquisitely beautiful. After leaving the mountains and plateau, the river flows down broad Appalachian valleys, skirts the Kittatinny range, which it crosses at Delaware Water-Gap, between nearly vertical walls of sandstone, and passes through a quiet and charming country of farm and forest,' diversified with plateaus and escarpments, until it crosses the Appalachian plain and enters the hills again at Easton, Pa. From this point it is flanked at intervals by fine hills, and in places by cliffs, of which the finest are the Hockamixon Rocks, 3 m. long and above 200 ft. high. At Trenton there is a fall of 8 ft. Below Trenton the river becomes a broad, sluggish inlet of the sea, with many marshes along its side, widening steadily into its great estuary, Delaware Bay. Its main tributaries in New York are Mongaup and Neversink rivers and Callicoon Creek; from Penn- sylvania, Lackawaxen, Lehigh and Schuylkill rivers; and from New Jersey, Rancocas Creek and Musconetcong and Maurice rivers. Commerce was once important on the upper river, but only before the beginning of railway competition (1857). The Delaware division of the Pennsylvania Canal, running parallel with the river from Easton to Bristol, was opened in 1830. A canal from Trenton to

New Brunswick unites the waters of the Delaware and Raritan rivers; the Morris and the Delaware and Hudson canals connect the Delaware and Hudson rivers; and the Delaware and Chesapeake canal joins the waters of the Delaware with those of the Chesapeake Bay. The mean tides below Philadelphia are about 6 ft. The magnitude of the commerce of Philadelphia has made the improvements of the river below that port of great importance. Small improvements were attempted by Pennsylvania as early as 177 1, but apparently never by New Jersey. The ice floods at Easton are normally 10 to 20 ft., and in 1841 attained a height of 35 ft. These floods constitute a serious difficulty in the improvement of the lower river. In the " project of 1885 " the United States government undertook systematically the formation of a 26-ft. channel 600 ft. wide from Philadelphia to deep water in Delaware Bay; $1,532,688-81 was expended — about $200,000 of that amount for maintenance — before the 1885 project was superseded by a paragraph of the River and Harbor Act of the 3rd of March 1899, which provided for a 30-ft. channel 600 ft. wide from Philadelphia to the deep water of the bay. In 1899 the project of 1885 had been completed except for three shoal stretches, whose total length, measured on the range lines, was 4! m. The project of 1899, estimated to cost $5,810,000, was not completed at the close of the fiscal year (June 30) 1907, when $4,936,550-63 had been expended by the Federal government on the work; in 1905 the state of Pennsylvania appropriated $750,000 for improvement of the river in Pennsylvania, south of Philadelphia.

DELAWARE WATER-GAP, a borough and summer resort of Monroe county, Pennsylvania, U.S.A., on the Delaware river, about 108 m. N. of Philadelphia and about 88 m. W. by N. of New York. Pop. (1890) 467; (1900) 469. It is served directly by the Delaware, Lackawanna & Western, and by the Belvidere division of the Pennsylvania railways; along the river on the opposite side (in New Jersey) runs the New York, Susquehanna & Western railway, and the borough is connected with Strduds- burg, Pa. (about 3 m. W. by

N.\ by an electric line. The borough

was named from the neighbouring gorge, which is noted for the picturesqueness of its scenery, especially in winter, when the ice piles up in the river, sometimes to a height of 20 ft. Here the river cuts through the Kittatinny (Blue) Ridge to its base. On the New Jersey side is Mt. Tammany (about 1600 ft.); on the Pennsylvania side, Mt. Minsi (about 1500 ft.); the elevation of the river here is about 300 ft. The gap (about 2 m. long) through the mountain is the result of erosion by the waters of a great river which flowed northwards acting along a line of fault- ing at right angles to the strike of the tilted rock formations. The scenery and the delightful climate have made the place a popular summer resort. The borough was incorporated in 1889.

See L. W. Brodhead, The Delaware Water-Gap (Philadelphia, 2nd ed., 1870).

DE LA WARR, or Delaware, an English barony, the holders of which are descended from Roger de la Warr of Isfield, Sussex, who was summoned to parliament as a baron in 1299 and the following years. He died about 1320; his great-grandson Roger, to whom the French king John surrendered at the battle of Poitiers, died'in 1370; and the male line of the family became extinct on the death of Thomas, 5th baron, in 1426.

The 5th baron's half-sister Joan married Thomas West, 1st Lord West (d. ^05), and in 1415 her second son Reginald (1394-1451) succeeded his brother Thomas as 3rd Lord West. After the death of his uncle Thomas, 5th Baron De La Warr, whose estates he inherited, Reginald was summoned to parlia- ment as Baron La Warr, and he is thus the second founder of the family. His grandson was Thomas, 3rd (or 8th) baron (d. 1 52 5) , a courtier during the reigns of

Henry VII. and Henry VIII.; and the latter's son was Thomas, 4th (or 9th) baron (c. 1472- 1554). The younger Thomas was a very prominent person during the reigns of Henry VIII. and Edward VI. After serving with the English army in France in 1513 and being present at the Field of the Cloth of Gold, he rebuilt the house at Halnaker in Sussex, which he had obtained by marriage, and here in 1526 he entertained Henry VIII. " with great cheer." He disliked the ecclesiastical changes introduced by the king, and he was one of the peers who tried Anne Boleyn; later he showed some eagerness to stand well with Thomas Cromwell, but this did not prevent his arrest in 1 538. He is said to have denounced " the plucking down of abbeys," and he certainly consorted with many suspected persons. But he was soon released and pardoned, although he was obliged to hand over Halnaker to Henry VIII. , receiving instead the estate of Wherwell in Hampshire. He died without children in September 1554, when his baronies of De La Warr and West fell into abeyance. His monument may still be seen in the church at Broadwater, Sussex.

He had settled his estates on his nephew William West (c. 1 5 1 9- 1 595) , who then tried to bring about his uncle's death by poison ; for this reason he was disabled by act of parliament (1549) from succeeding to his honours. However, in 1563 he was restored, and in 1570 was created by patent Baron De La Warr. This was obviously a new creation, but in 1596 his son Thomas (c. 1556-1602) claimed precedency in the baronage as the holder of the ancient barony of De La Warr. His claim was admitted, and accordingly his son and successor, next mentioned, is called the 3rd or the 12th baron.

Thomas West, 3rd or 12th Baron De La Warr (1577-1618), British soldier and colonial governor in America, was born on the 9th of July 1577, probably at Wherwell, Hampshire, where he was baptized. He was educated at Queen's College, Oxford, where he did not complete his course, but subsequently (1605) received the degree of M.A. In 1597 he was elected member of parliament for

Lymington, and subsequently fought in Holland and in Ireland under the earl of Essex, being knighted for bravery in battle in 1599. He was imprisoned for complicity in Essex's revolt (1600–1601), but was soon released and exonerated. In 1602 he succeeded to his father's title and estates and became a privy councillor. Becoming interested in schemes for the colonization of America, he was chosen a member of the council of the Virginia Company in 1609, and in the same year was appointed governor and captain-general pf Virginia for life.

Sailing in March 1610 with three ships, 150 settlers and supplies, he himself bearing the greater part of the expense of the expedi- tion, he arrived at Jamestown on the 10th of June, in time to inter ept the colonists who had embarked for England and were abandoning the enterprise. Lord De La Warr's rule was strict but just; he constructed two forts near the mouth of the James river, rebuilt Jamestown, and in general brought order out of chaos. InMarch 1611 he returned to London, where he published at the request of the company's council, his Relation of the condition of affairs in Virginia (reprinted 1859 and 1868). He remained in England until 1618, when the news of the tyrannical rule of the deputy, Samuel Argall, led him to start again for Virginia. He embarked in April, but died en route on the 7th of June 1618, and was buried at sea. The Delaware river and the state of Delaware were named in his honour.

A younger brother, Francis (1586–c. 1634), was prominent in the affairs of Virginia, and in 1627–1628 was president of the council, and acting-governor of the colony.

In 1 761 the 3rd or 12th baron's descendant, John, 7th or 16th Baron De La Warr (1693–1766), was created Viscount Cantelupe and 1st Earl De La Warr. He was a prominent figure in the House of Lords, at first as a supporter of Sir Robert Walpole. He also served in the British army and fought at Dettingen, and was made governor of Guernsey in 1 7 5 2 .

George John West, 5th earl (1791–1869), married Elizabeth, sister and heiress of George John Frederick Sackville, 4th duke of Dorset, who was created Baroness Buckhurst in 1864; conse- quently in 1843 he and his sons took the name of Sackville-West. The earl was twice lord chamberlain to Queen Victoria, and he is celebrated as " Fair Euryalus " in the Childish Recollections of his schoolfellow, Lord Byron. His son Charles Richard (1815- 1873), 6th earl, served in the first Sikh war and in the Crimea; and being unmarried was succeeded by his brother Reginald (1817–1896) as 7th Earl De La Warr. Having inherited his mother's barony of Buckhurst on her death in 1870, he retained this title along with the barony and earldom of De La Warr, although the patent had contained a proviso that it should be kept separate from these dignities. In 1896 the 7th earl's son, Gilbert George Reginald Sackville-West (b. 1869), became 8th earl De La Warr.

See G. E. C(okayne), Complete Peerage (1887–1898).

DELBRUCK, HANS (1 848-) , German historian, was born at Bergen on the island of Riigen on the nth of November 1848, and studied at the universities of Heidelberg and Bonn. As a soldier he fought in the Franco-German War, after which he was for some years tutor to one of the princes of the German imperial family. In 1885 he became professor of modern history in the university of Berlin, and he was a member of the German Reichstag from 1884 to 1890. Delbruck's writings are chiefly concerned with the history of the art of war, his most ambitious work being his Geschichte der Kriegskunst im Rahmen der politi- schen Geschichte (first section, Das Altertum, 1900; second, Romer und Germanen, 1902; third, Das Mittelalter, 1907). Among his other works are: Die Perserkriege und die Burgunder kriege (Berlin, 1887); Historische itnd politische Aufsatze (1886); Erinnerungen, Aufsatze und Reden (1902); Die Strategie des Perikles erldutert durch die Strategie Friedrichs des Grossen (1890) ; Die Polenfrage (1894); and Das Leben des Feldmarschalls Graf en Neithardt von Gneisenau (1882 and 1894). Delbrilck began in 1883 to edit the Preussische Jahrbucher, in*

which he has written many articles, including one on " General Wolseley uber Napoleon, Wellington und Gneisenau," and he has contributed to the Europaischer Geschichtskalender of H. Schulthess.

DELBRUCK, MARTIN FRIEDRICH RUDOLF VON, Prussian statesman (1817–1903), was born at Berlin on the 16th of April 181 7. On completing his legal studies he entered the service of the state in r837; and after holding a series of minor posts was transferred in 1848 to the ministry of commerce, which was to be the sphere of his real life's work. Both Germany and Austria had realized the influence of commercial upon political union. Delbriick in 1851 induced Hanover, Oldenburg and Schaumburg-Lippe to join the Zollverein; and the southern states, which had

agreed to admit Austria to the union, found themselves forced in 1853 to renew the old union, from which Austria was excluded. Delbruck now began, with the support of Bismarck, to apply the principles of free trade to Prussian fiscal policy. In 1862 he concluded an important commercial treaty with France. In 1867 he became the first president of the chancery of the North German Confederation, and represented Bismarck on the federal tariff council (Zollbundesrath), a position of political as well as fiscal importance owing to the presence in the council of repre- sentatives of the southern states. In 1868 he became a Prussian minister without portfolio. In October 1870, when the union of Germany under Prussian headship became a practical question, Delbruck was chosen to go on a mission to the South German states, and contributed greatly to the agreements concluded at Versailles in November. In 1871 he became president of the newly constituted Reichskanzleramt. Delbruck, however, began to feel himself uneasy under Bismarck's leanings towards protection and state control. On the introduction of Bismarck's plan for the

acquisition of the railways by the state, Delbruck resigned office, nominally on the ground of ill-health (June 1, 1876). In i87ohe opposed in'the Reichstag the new protectionist tariff, and on the failure of his efforts retired definitely from public life. In 1896 he received from the emperor the order of the Black Eagle. He died at Berlin on the 1st of February 1903. DELCASS6, THEOPHILE (1852-), French statesman, was born at Pamiers, in the department of Ariege, on the 1st of March 1852. He wrote articles on foreign affairs for the Ripubliquc fra.nc.aise and Paris, and in 1888 was elected conseiller general of his native department, standing as " un disciple fidele de Gam- betta." In the following year he entered the chamber as deputy for Foix. He was appointed under-secretary for the colonies in the second Ribot cabinet (January to April 1893), and retained his post in the Dupuy cabinet till its fall in December 1893. It was largely owing to his efforts that the French colonial office was made a separate department with a minister at its head, and to this office he was appointed in the second Dupuy cabinet (May 1894 to January 1895). He gave a great impetus to French colonial enterprise, especially in West Africa, where he organized the newly acquired 1 colony of Dahomey, and despatched the Liotard mission to the Upper Ubangi. • While in opposition he devoted special attention to naval affairs, and in speeches that attracted much notice declared that the function of the French navy was to secure and develop colonial enterprise, deprecated all attempts to rival the British fleet, and advocated the construc- tion of commerce destroyers as France's best reply to England. On the formation of the second Brisson cabinet in June 1898 he succeeded M. Hanotaux at the foreign office, and retained that post under the subsequent premierships of MM. Dupuy, Waldeck- Rousseau, Combes and Rouvier. In 1898 he had to deal with the delicate situation caused by Captain Marchand's occupation of Fashoda, for which, as he admitted in a speech in the chamber on the 23rd of January 1899, he accepted full responsibility, since it arose directly out of the

Liotard expedition, which he had himself organized while minister for the colonies; and in March 1899 he concluded an agreement with Great Britain by .which the difficulty was finally adjusted, and France consolidated her vast colonial empire in North- West Africa. In the same year he acted as mediator between the United States and Spain, and brought the peace negotiations to a successful conclusion. He intro- duced greater cordiality into the relations of France with Italy: at the same time he adhered firmly to the alliance with Russia, and in August 1899 made a visit to St Petersburg, which he repeated in April 1901. In June 1900 he made an arrangement with Spain, fixing the long-disputed boundaries of the French and Spanish possessions in West Africa. Finally he concluded with England the important Agreements of 1904 covering colonial and other questions which had long been a matter of dispute, especially concerning Egypt, Newfoundland and Morocco. Suspicion of the growing entente between France and England soon arose on the part of Germany, and.in 1905 German assertive- ness was shown in a crisis which was forced on in the matter of the French activity in Morocco (q.v.), in which the handling of

French policy by M. Delcasse personally was a sore point with Germany. The situation became acute in April, and was only relieved by M. Delcasse's resignation of office. He retired into private life, but in 1908 was warmly welcomed on a visit to England, where the closest relations now existed with France.

DEL CREDERE (Ital. "of belief" or "trust"). A "del credere agent," in English law, is one who, selling goods for his principal on credit, undertakes for an additional commission to sell only to persons who are absolutely solvent. His position is thus that of a surety who is liable to his principal should the vendee make default. The agreement between him and his principal need not be reduced to or evidenced by writing, for his undertaking is not a guarantee within the Statute of Frauds. See also Broker; Guarantee.

DELESCLUZE, LOUIS CHARLES (1809–1871), French journalist, was born at Dreux on the 2nd of October 1809. Having studied law in Paris, he early developed a strong demo- cratic bent, and played a part in the July revolution of 1830. He became a member of various republican societies, and in 1836 was forced to take refuge in Belgium, where he devoted himself to republican journalism. Returning in 1840 he settled in Valenciennes, and after the revolution of 1848 removed to Paris, where he started a newspaper called La Revolution dSmo- cratique et sociale. His zeal so far outran his discretion that he was twice imprisoned and fined, his paper was suppressed and he himself fled to England, where he continued his journalistic work. He was arrested in Paris in 1853, and deported to French Guiana. Released under the amnesty of 1859, he returned to France with health shattered but energies unimpaired. His next venture was the publication of the Reveil, a radical organ upholding the principles of the Association internationale des travailleurs, known as the " Internationale." This journal, which brought him three condemnations, fine and imprisonment in one year, shared the fate of his Paris sheet, and its founder again fled to Belgium. In 1871 he was elected to the National Assembly, becoming afterwards a member of the Paris commune. At the siege of Paris he fought with reckless courage, and met his death on the last of the barricades (May 1871). He wrote an account of his imprisonment in Guiana, De Paris a Cayenne, Journal d'un transports (Paris, 1869).

DELESSE, ACHILLE ERNEST OSCAR JOSEPH (1817–1881), French geologist and mineralogist, was born at Metz on the 3rd of February 181 7. At the age of twenty he entered the Ecole Polytechnique, and subsequently passed through the ficole des Mines. In 1845 he was appointed to the chair of mineralogy and geology at Besancon; in 1850 to the chair of geology at the Sorbonne in Paris; and in 1864 professor of agriculture at the Ecole des Mines. In 1878 he became inspector-general of mines. In early years as ingSnieur des mines he investigated and described

various new minerals;. he proceeded afterwards to the study of rocks, devising new methods for their determination, and giving particular descriptions of melaphyre, arkose, porphyry, syenite, &c. The igneous rocks of the Vosges, and those of the Alps, Corsica, &c, and the subject of metamorphism occupied his attention. He also prepared in 1858 geological and hydrological maps of Paris — with reference to the underground water, similar maps of the departments of the Seine and Seine-et-Marne, and an agronomic map of the Seine-et-Marne (1880), in which he showed the relation which exists between the physical and chemical characters of the soil and the geological structure. His annual Revue des progres de geologie, undertaken with the assistance (1860-1865) of Auguste Laugel and afterwards (1865-1878) of Albert de Lapparent, was carried on from i860 to 1880. His observations on the lithology of the deposits accumulated beneath the sea were of special interest and importance. His separate publications were: Recherches sur I'origine des roches (Paris, 1865); Etude sur le mUamorphisme des roches (1869); Lithologie des mers de France et des mers principales du globe (2 vols, and atlas, 1871). He died at Paris on the 24th of March 1881.

DELESSERT, JULES PAUL BENJAMIN (I7 73-i847), French banker, was born at Lyons on the 14th of February 1773, the son of Etienne Delessert (1735-1816), the founder of the first

fire insurance company and the first discount bank in France. Young Delessert was travelling in England when the Revolution broke out in France, but he hastened back to join the Paris National Guard in 1790, becoming an officer of artillery in 1793. His father bought him out of the army, however, in 1795 in order to entrust him with the management of his bank. Gifted with remarkable energy, he started many commercial enterprises, founding the first cotton factory at Passy in 1801, and a sugar factory in

1802, for which he was created a baron of the empire. He sat in the chamber of deputies for many years, and was a strong advocate for many humane measures, notably the sup- pression of the " Tours " or revolving box at the foundling hospital, the suppression of the death penalty, and the improve- ment of the penitentiary system. He was made regent of the Bank of France in 1802, and was also member of, and, indeed, founder of many, learned and philanthropic societies. He founded the first savings bank in France, and maintained a keen interest in it until his death in 1847. He was also an ardent botanist and conchologist; his botanical library embraced 30,000 volumes, of which he published a catalogue — Musee botanique de M. Delessert (1845). He also wrote Des avantages de la caisse d'Spargne et de prevoyance (1835), Mfmoire sur un projet de bibliotheque royale (1836), he Guide de bonheur (1839), and Recueil de coquilles dScrites par Lamarck (1841-1842).

DELFICO, MELCHIORRE (1744-1835), Italian economist, was born at Teramo in the Abruzzi on the 1st of August 1744, and was educated at Naples. He devoted himself specially to the study of jurisprudence and political economy, and his numerous publications exercised great practical influence in the correction and extinction of many abuses. Under Joseph Bonaparte Delfico was made a councillor of state, an office which he held until the restoration of Ferdinand IV., when he was appointed president of the commission of archives, from which he retired in 1825. He died at Teramo on the 21 st of June 1835. His more important works were: Saggio filosofico sul matrimonii) (1774); Memoria sul Tribunate delta Grascia e suite leggi economiche nelle provincie confinanti del regno (178,5), which led to the abolition in Naples of the most vexatious and absurd restrictions on the sale and exportation of agricultural produce; Riflessioni su la •oendita dei feudi (1790) and Letter a a Sua Ecc. il sig. Duca di Cantalupo (1795), which brought about the abolition of feudal rights over landed property and their sale; Ricerche sul vero carattere della

giurisprudenza Romana e dei suoi cultori (1791); Pensieri su la storia e su I' incertezza ed inutilitd della medesima (1806), both on the early history of Rome.

See F. Mozzetti, Degli studii, delle opere e delle virtil di Melchiorre Delfico; Tipaldo's Biographia degli Italiani illustri (vol. ii.).

DELFT, a town of Holland in the province of South Holland, on the Schie, 5 m. by rail S.E. by S. of the Hague, with which it is also connected by steam-tramway. Pop. (1900) 31,582. It is a quiet, typically Dutch town, with its old brick houses and tree-bordered canals. The Prinsenhof, previously a monastery, was converted into a residence for the counts of Orange in 1575; it was here that William the Silent was assassinated. It is now used as a William of Orange Museum. The New Church, formerly the church of St Ursula (14th century) , is the burial place of the princes of Orange. It is remarkable for its fine tower and chime of bells, and contains the splendid allegorical monument of William the Silent, executed by Hendrik de Keyser and his son Pieter about 1621, and the tomb of Hugo Grotius, born in Delft in 1583, whose statue, erected in 1886, stands in the market-place outside the church. The Old Church, founded in the nth century, but in its present form dating from 1476, contains the monuments of two famous admirals of the 1,7th century, Martin van Tromp and Piet Hein, as well as the tomb of the naturalist Leeuwenhoek, born at Delft in 1632. In the town hall (1618) are some corporation pictures, portraits of the counts of Orange and Nassau, including several by Michiel van Mierevelt (1 567-1641), one of the earliest Dutch portrait painters, and with his son Pieter (1-595-1623), a native of Delft. There are also a Roman Catholic church (1882) and a synagogue. Two important educational establishments are the Indian

Institute for the education of civil service students for the colonies, to which is attached an ethnographical museum; and the Royal Polytechnic school, which almost ranks as a university, and

teaches, among other sciences, that of diking. A fine collection of mechanical models is connected with the polytechnic school. Among other buildings are the modern " Phoenix " club-house of the students; the hospital, containing some anatomical pictures, including one by the two Mierevelts (1617); a lunatic asylum; the Van Renswoude orphanage, the theatre, a school of design, the powder magazine and the state arsenal, originally a warehouse of the East India Company, and now used as a manufactory of artillery stores.

The name of Delft is most intimately associated with the manu- facture of the beautiful faience pottery for which it was once famous. (See Ceramics.) This industry was imported from Haarlem towards the end of the 16th century, and achieved an unrivalled position in the second half of the following century; but it did not survive the French occupation at the end of the 18th century. It has, however, been revived in modern times under the name of " New Delft." Other branches of industry are carpet-weaving, distilling, oil and oil-cake manufacture, dyeing, cooperage and the manufacture of arms and bullets. There is also an important butter and cheese market.

Delft was founded in 1075 by Godfrey III., duke of Lower Lorraine, after his conquest of Holland, and came subsequently into the hands of the counts of Holland. In 1246 it received a charter from Count William II. (see C. Hegel, StMte und Gilden, ii. 251). In 1536 it was almost totally destroyed by fire, and in 1654 largely ruined by the explosion of a powder magazine.

DELHI, Dehli or Dim, the ancient capital of the Mogul empire in India, and a modern city which gives its name to a district and division of British India. The city of Delhi is situ- ated in 28° 38' N., 77° 13' E., very nearly due north of Cape Comorin, and practically in a latitudinal line with the more ancient cities of Cairo and Canton. It lies in the south-east corner of the province of the Punjab, to which it was added in 1858, and abuts on

the right bank of the river Jumna. Though Lahore, the more ancient city, remains the official capital of the Punjab, Delhi is historically more famous, and is now more important as a commercial and railway centre.

Though the remains of earlier cities are scattered round Delhi over an area estimated to cover some 45 sq. m., modern Delhi dates only from the middle of the 17th century, when Shah Jahan rebuilt the city on its present site, adding the title Shah-jahanabad from his own name. It extends for nearly 2j m. along the right bank of the Jumna from the Water bastion to the Wellesley bastion in the south-east corner, nearly one-third of the frontage being occupied by the river wall of the palace. The northern wall, famous in the siege of Delhi in 1857, extends three-quarters of a mile from the Water bastion to the Shah, commonly known as the Mori, bastion; the length of the west wall from this bastion to the Ajmere gate is ij m. and of the south wall to the Wellesley bastion again almost exactly the same distance, the whole land circuit being thus 3j m. The complete circuit of Delhi is 5J m. In the north wall is situated the famous Kashmir gate, while the Mori or Drain gate, which was built by a Mahratta governor, has now been removed. In the west wall are the Farash Khana and Ajmere gates, while the Kabul and Lahore gates have been removed. In the south wall are the Turkman and Delhi gates. The gates on the river side of the city included the Khairati and Rajghat, the Calcutta and Nigambod — both removed; the Kela gate, and the Badar Rao gate, now closed. The great wall of Delhi, which was constructed by Shah Jahan, was strengthened by the English by the addition of a ditch and glacis, after Delhi was captured by Lord Lake in 1803; and its strength was turned against the British at the time of the Mutiny. The imperial palace (1638-1648), now known as the " Fort," is situated on the east of the city, and abuts directly on the river. It consists at present of bare and ugly British barracks, among which are scattered exquisite gems of oriental architecture. The

two most famous among its buildings are the Diwan-i-Am or Hall of Public Audience, and the Diwan-i-Khas or Hall of Private Audience. The Diwan-i-Am is a splendid building measuring ioo ft. by 60 ft., and was formerly plastered with chunam and overlaid with gold. The most striking effect now lies in its engrailed arches. It was in the recess in the back wall of this hall that the famous Peacock Throne used to stand, " so called from its having the figures of two peacocks standing behind it, their tails being expanded and the whole so inlaid with sapphires, rubies, emeralds, pearls and other precious stones of appropriate colours as to represent life." Tavernier, the French jeweller, who saw Delhi in 1665, describes the throne as of the shape of a bed, 6 ft. by 4 ft., supported by four golden feet, 20 to 25 in. high, from the bars above which rose twelve columns to support the canopy; the bars were decorated with crosses of rubies and emeralds, and also with diamonds and pearls. In all there were 108 large rubies on the throne, and 116 emeralds, but many of the latter had flaws. The twelve columns support- ing the canopy were decorated with rows of splendid pearls, and Tavernier considered these to be the most valuable part of the throne. The whole was valued at £6,000,000. This throne was carried off by the Persian invader Nadir Shah in 1739, and has been rumoured to exist still in the Treasure House of the Shah of Persia; but Lord Curzon, who examined the thrones there, says that nothing now exists of it, except perhaps some portions worked up in a modern Persian throne. The Diwan-i-Khas is smaller than the Diwan-i-Am, and consists of a pavilion of white marble, in the interior of which the art of the Moguls reached the perfection of its jewel-like decoration. On a marble platform rises a marble pavilion, the flat-coned roof of which is supported on a double row of marble pillars. The inner face of the arches, with the spandrils and the pilasters which support them, are covered with flowers and

foliage of delicate design and dainty execution, crusted in green serpentine, blue lapis lazuli and red and purple porphyry. During the lapse of years many of these stones were picked from their setting, and the silver ceiling of flowered patterns was pillaged by the Mahrattas; but the inlaid work was restored as far as possible by Lord Curzon. It is in this hall that the famous inscription ” If a paradise be on the face of the earth, it is this, it is this, it is this,” still exists. It is given in Persian characters twice in the panels over the narrow arches at the ends of the middle hall, beginning from the east on the north side, and from the west at the south side. At the time of the Delhi Durbar held in January 1903 to celebrate the proclamation of Edward VII. as emperor of India these two halls were used as a dancing-room and supper-room, and their full beauty was brought out by the electric light shining through their marble grille-work.

The native city of Delhi is like most other cities in India, a huddle of mean houses in mean streets, diversified with splendid mosques. The Chandni Chauk (” silver street “), the principal street of Delhi, which was once supposed to be the richest street in the world, has fallen from its high estate, though it is still a broad and imposing avenue with a double row of trees running down the centre. D uring the course of its history it was four times sacked, by Nadir Shah, Timur, Ahmad Shah and the Mahrattas, and its roadway has many times run with blood. Now it is the abode of the jewellers and ivory-workers of Delhi, but the jewels are seldom valuable and the carving has lost much of its old delicacy. A short distance south of the Chandni Chauk the Jama Masjid, or Great Mosque, rises boldly from a small rocky eminence. It was erected in 1648-1650, two years after the royal palace, by Shah Jahan. Its front court, 450 ft. square, and surrounded by a cloister open on both sides, is paved with granite inlaid with marble, and commands a fine view of the city. The mosque itself, a splendid structure forming an oblong 261 ft. in length, is approached by a

magnificent flight of stone steps. Three domes of white marble rise from its roof, with two tall minarets at the front corners. The interior of the mosque is paved throughout, and the walls and roof are lined, with white marble. Two other mosques in Delhi itself deserve passing notice, the Kala Masjid or Black Mosque, which was built about 1380 in the reign of

Feroz Shah, and the Moti Masjid or Pearl Mosque, a tiny building added to the palace by Aurangzeb, as the emperor's private place of prayer. It is only 60 ft. square, and the domes alone are seen above the red sandstone walls until the opening of two small fine brass gates.

To the west and north-west of Delhi considerable suburbs cluster beyond the walls. Here are the tombs of the imperial family. That of Humayun, the second of the Mogul dynasty, is a noble building of rose-coloured sandstone inlaid with white marble. It lies about 3 m. from the city, in a terraced garden, the whole surrounded by an embattled wall, with towers and four gateways. In the centre stands a platform about 20 ft. high by 200 ft. square, supported by arches and ascended by four flights of steps. Above, rises the mausoleum, also a square, with a great dome of white marble in the centre. About a mile to the west is another burying-ground, or collection of tombs and small mosques, some of them very beautiful. The most remarkable is perhaps the little chapel in honour of a celebrated Mussul- man saint, Nizam-ud-din, near whose shrine the members of the imperial family, up to the time of the Mutiny, lie buried, each in a small enclosure surrounded by lattice-work of white marble.

Still farther away, some 10 m. south of the modern city, amid the ruins of old Delhi, stands the Kutb Minar, which is supposed to be the most perfect tower in the world, and one of the seven architectural wonders of India. The Minar was begun by Kutb- ud-din Aibak about a.d. i 200. The two top storeys were rebuilt by Feroz Shah. It consists of five storeys of red sandstone and white marble. The

purplish red of the sandstone at the base is finely modulated, through a pale pink in the second storey, to a dark orange at the summit, which harmonizes with the blue of an Indian sky. Dark bands of Arabic writing round the three lower storeys contrast with the red sandstone. The height of the column is 238 ft. The plinth is a polygon of twenty sides. The basement storey has the same number of faces formed into convex flutes which are alternately angular and semicircular. The next has semicircular flutes, and in the third they are all angular. Then rises a plain storey, and above it soars a partially fluted storey, the shaft of which is adorned with bands of marble and red sandstone. A bold projecting balcony, richly ornamented, runs round each storey. After six centuries the column is almost as fresh as on the day it was finished. It stands in the south-east corner of the outer court of the mosque erected by Kutb-ud-din immediately after his capture of Delhi in 1193. The design of this mosque is Mahommedan, but. the wonderfully delicate ornamentation of its western facade and other remaining parts is Hindu. In the inner courtyard of the mosque stands the Iron Pillar, which is probably the most ancient monument in the neighbourhood of Delhi, dating from about a.d. 400. It consists of a solid shaft of wrought iron some 16 in. in diameter and 23 ft. ■8 in. in height, with an inscription eulogizing Chandragupta Vikramaditya. It was brought, probably from Muttra, by Anang Pal, a Rajput chief of the Tomaras, who erected it here in 105 2. 1

Among the modern buildings of Delhi may be mentioned the Residency, now 'occupied by a government high school, and the Protestant church of St James, built at a coast of £10,000 by Colonel Skinner, an officer well known in the history of the East India Company. About half-way down the Chandni Chauk is a high clock-tower. Near it is the town hall, with museum and library. Behind the Chandni Chauk, to the north, lie the Queen's Gardens; beyond them the " city lines " stretch away as far as the well-known rocky ridge, about a mile outside the town. From the summit of this ridge the view of the station and

city is very picturesque. The principal local institution until 1877 was the Delhi College, founded in 1792. It was at first exclusively an oriental school, supported by the voluntary contributions of Mahommedan gentlemen, and managed by a committee of the subscribers. In 1829 an English department was added to it; and in 1855 the institution was placed under the control of the Educational Department. In the Mutiny of 1857 the old

1 See the paper by V. A. Smith in the Journal of the Royal A static Soc. (1897), p. 13.

college was plundered of a very valuable oriental library, and the building completely destroyed. A new college was founded in 1858, and was affiliated to the university of Calcutta in 1864. The old college attained to great celebrity as an educational institution, and produced many excellent scholars, but it was abolished in 1877, in order to concentrate the grant available for higher-class education upon the Punjab University at Lahore.

The Ridge, famous as the British base during the siege of Delhi during the Mutiny, in 1857, is a last outcrop of the Aravalli Hills which rises in a steep escarpment some 60 ft. above the city. At its nearest point on the right of the British position, where the Mutiny Memorial now stands, the Ridge is only 1200 yds. from the walls of Delhi; at the Flagstaff Tower in the centre of the position it is a mile and a half away; and at the left near the river nearly two miles and a half. It was behind the Ridge at this point that the main portion of the British camp was pitched. The Mutiny Memorial, which was erected by the army before Delhi, is a rather poor specimen of a Gothic spire in red sandstone, while the memorial tablets are of inferior marble. Next to the Ridge the point of most interest to every English visitor to Delhi is Nicholson's grave,

which lies surrounded by an iron railing in the Kashmir gate cemetery. The Kashmir gate itself bears a slab recording the gallant deed of the party under Lieutenants D. C. Home and P. Salkeld, who blew in the gate in broad day- light on the day that Delhi was taken by assault.

The population of Delhi according to the census of 1001 was 208, S7S, of whom 88,460 were Mahommedans and 114,417 were Hindus. The city is served by five different railways, the East Indian, the Oudh & Rohilkhand, the Rajputana-Malwa & Bombay-Baroda, the Southern Punjab, and the North-Western, and occupies a central position, being 940 m. from Karachi, 950 from Calcutta, and 960 from Bombay. Owing to the advantages it enjoys as a trade centre, Delhi is recovering much of the prominence which it lost at the time of the Mutiny. It has spinning-mills and other mills worked by steam. The principal manufactures are gold and silver filigree work and embroidery, jewelry, muslins, shawls, glazed pottery and wood-carving.

The District of Delhi has an area of 1 290 sq. m. It consists of a strip of territory on the right or west bank of the Jumna river, 75 m. in length, and varying from 15 to 233 m. in breadth. Most of the district consists of hard and stony soil, depending upon irrigation, which is supplied by the Western Jumna canal, the Ali Mardan canal and the Agra canal. The principal crops are wheat, barley, sugar-cane and cotton.

When Lord Lake broke the Mahratta power in 1803, and the emperor was taken under the protection of the East India Company, the present districts of Delhi and Hissar were assigned for the maintenance of the royal family, and were administered by a British resident. In 1832 the office of resident was abolished, and the tract was annexed to the North-Western Provinces. After the Mutiny in 1858 it was separated from the North-Western Provinces and annexed to the Punjab. The population in 1901 was 689,039.

The Division of Delhi stretches from Simla to Rajputana, and is much broken up by native states. It comprises the seven districts of Hissar, Rohtak, Gurgaon, Delhi, Karnal, Umballa and Simla. Its total area is 15,393 sc l- m -> an d in 1901 the population was 4,587,092.

History. — According to legends, which may or may not have a substantial basis, Delhi or its immediate neighbourhood has from time immemorial been the site of a capital city. The neighbouring village of Indarpat preserves the name of Indra- prashta, the semi-mythical city founded, according to the Sanscrit epic Mahabharata, by Yudisthira and his brothers, the five Pandavas. Whatever its dim predecessors may have been, however, the actual history of Delhi dates no further back than the nth century a.d., when Anangapala (Anang Pal), a chief of the Tomara clan, built the Red Fort, in which the Kutb Minar now stands; in 1052 the same chief removed the famous Iron Pillar from its original position, probably at Muttra, and set it up among a group of temples of which the materials were afterwards used by the Mussulmans for the construction of the great

Kutb Mosque. About the middle of the 1 2th century the Tomara ; dynasty was overthrown by Vigraha-raja (Visala-deva, Bisal Deo), the Chauhan king of Ajmere, who from inscribed records discovered of late years appears to have been a man of considerable culture (see V. A. Smith, Early Hist, of India, ed. 1908, p. 356). His nephew and successor was Prithwi-raja (Prithiraj, or Rai Pithora), lord of Sambhar, Delhi and Ajmere, whose fame as lover and warrior still lives in popular story. He was the last Hindu ruler of Delhi. In 1191 came the invasion of Mahommed of Ghor. Defeated on this occasion, Mahommed returned two years later, overthrew the Hindus, and captured and put to< death Prithwi-raja. Delhi became henceforth the capital of the Mahommedan Indian empire, Kutb-ud-din (the general and slave of Mahommed of Ghor) being left in command. His dynasty is known as that of the slave kings, and it is to them that old Delhi owes its

grandest remains, among them Kutb Mosque and the Kutb Minar. The slave dynasty retained the throne till 1290, when it was subverted by Jalal-ud-din Khilji. The most remarkable monarch of this dynasty was Ala-ud-din, during whose reign Delhi was twice exposed to attack from invading hordes of Moguls. On the first occasion Ala-ud-din defeated them under the walls of his capital; on the second, after encamp- ing for two months in the neighbourhood of the city, they retired without a battle. The house of Khilji came to an end in 1321, and was followed by that of Tughlak. Hitherto the Pathan kings had been content with the ancient Hindu capital, altered and adorned to suit their tastes. But one of the first acts of the founder of the new dynasty, Ghias-ud-din Tughlak, was to erect a new capital about 4 m. farther to the east, which he called Tughlakabad. The ruins of his fort remain, and the eye can still trace the streets and lanes of the long deserted city. Ghias-ud- din was succeeded by his son Mahommed b. Tughlak, who reigned from 1325 to 1351, and is described by Elphinstone as " one of. the most accomplished princes and most furious tyrants that ever adorned or disgraced human nature." Under this monarch the Delhi of the Tughlak dynasty attained its utmost growth. His successor Feroz Shah Tughlak transferred the capital to a new town which he founded some miles off, on the north of the Kutb, and to which he gave his own name, Ferozabad. In 1398, during the reign of Mahmud Tughlak, occurred the Tatar invasion of Timurlane, The king fled to Gujarat, his army was defeated under the walls of Delhi, and the city surrendered. The town, notwithstanding a promise of protection, was plundered and burned; the citizens were massacred. The invaders at last retired, leaving Delhi without a government, and almost without inhabitants. At length Mahmud Tughlak regained a fragment of his former kingdom, but on his death in 141 2 the family became extinct. He was succeeded by the Sayyid dynasty, which held Delhi and a few miles of surrounding territory till 1444, when it gave way to the house of Lodi, during whose rule the capital was removed to Agra. In 1526 Baber, sixth in descent

from Timur- lane, invaded India, defeated and killed Ibrahim Lodi at the battle of Panipat, entered Delhi, was proclaimed emperor, and finally put an end to the Afghan empire. Baber's capital was at Agra, but his son and successor, Humayun, removed it to Delhi. In 1540 Humayun was defeated and expelled by Sher Shah, who entirely rebuilt the city, enclosing and fortifying it with a new wall. In his time Delhi extended from where Humayun's tomb now is to near the southern gate of the modern city. In 1555 Humayun, with the assistance of Persia, regained the throne; but he died within six months, and was succeeded by his son, the illustrious Akbar.

During Akbar's reign and that of his son Jahangir, the capital was either at Agra or at Lahore, and Delhi once more fell into decay. Between 1638 and 1658, however, Shah Jahan rebuilt it almost in its present form; and his city remains substantially the Delhi of the present time. The imperial palace, the Jama Masjid or Great Mosque, and the restoration of what is now the western Jumna canal, are the work of Shah Jahan. The Mogul empire rapidly expanded during the reigns of Akbar and his successors down to Aurungzeb, when it attained its climax. After the death of the latter monarch, in 1707, came the decline. Insurrections

and civil wars on the part of the Hindu tributary chiefs, Sikhs and Mahrattas, broke out. Aurungzeb's successors became the helpless instruments of conflicting chiefs. His grandson, Jahandar Shah, was, in 17 13, deposed and strangled after a reign of one year; and Farrakhsiyyar, the next in succession, met with the same fate in 17 19. He was succeeded by Mahommed Shah, in whose reign the Mahratta forces first made their appearance before the gates of Delhi, in 1736. Three years later the Persian monarch, Nadir Shah, after defeating the Mogul army at Karnal, entered Delhi in triumph. While engaged in levying a heavy contribution, the

Persian troops were attacked by the populace, and many of them were killed. Nadir Shah, after vainly attempt- ing to stay the tumult, at last gave orders for a general massacre of the inhabitants. For fifty-eight days Nadir Shah remained in Delhi, and when he left he carried with him a treasure in money amounting, at the lowest computation, to eight or nine millions sterling, besides jewels of inestimable value, and other property to the amount of several millions more.

From this time (1740) the decline of the empire proceeded unchecked and with increased rapidity. In 177 1 Shah Alam, the son of Alamgir II., was nominally raised to the throne by the Mahrattas, the real sovereignty resting with the Mahratta chief, Sindhia. An attempt of the puppet emperor to shake himself clear of the Mahrattas, in which he was defeated in 1788, led to a permanent Mahratta garrison being stationed at Delhi. From this date, the king remained a cipher in the hands of Sindhia, who treated him with studied neglect, until the 8th of September 1803, when Lord Lake overthrew the Mahrattas under the walls of Delhi, entered the city, and took the king under the protection of the British. Delhi, once more attacked by a Mahratta army under the Mahratta chief Holkar in 1804, was gallantly defended by Colonel Ochterlony, the British resident, who held out against overwhelming odds for eight days, until relieved by Lord Lake. From this date a new era in the history of Delhi began. A pension of £1 20,000 per annum was allowed to the king, with exclusive jurisdiction over the palace, and the titular sovereignty as before; but the city, together with the Delhi territory, passed under British administration.

Fifty-three years of quiet prosperity for Delhi were brought to a close by the Mutiny of 1857. Its capture by the mutineers, its siege, and its subsequent recapture by the British have been often told, and nothing beyond a short notice is called for here. The outbreak at Meerut occurred on the night of the 10th of May 1857. Immediately after the murder of their officers, the rebel soldiery set out

for Delhi, about 35 m. distant, and on the following morning entered the city, where they were joined by the city mob. Mr Fraser, the commissioner, Mr Hutchinson, the collector, Captain Douglas, the commandant of the palace guards, and the Rev. Mr Jennings, the residency chaplain, were at once murdered, as were also most of the civil and non-official residents whose houses were situated within the city walls. The British troops in cantonments consisted of three regiments of native infantry and a battery of artillery. These cast in their lot with the mutineers, and commenced by killing their officers. The Delhi magazine, then the largest in the north-west of India, was in the charge of Lieutenant Willoughby, with whom were two other officers and six non-commissioned officers. The magazine was attacked by the mutineers, but the little band defended to the last the enormous accumulation of munitions of war stored there, and, when further defence was hopeless, fired the magazine. Five of the nine- were killed by the explosion, and Lieutenant Willoughby subsequently died of his injuries; the remaining three succeeded in making their escape. The occupation of Delhi by the rebels was the signal for risings in almost every military station in North- Western India. The revolted soldiery with one accord thronged towards Delhi, and in a short time the city was garrisoned by a rebel army variously estimated at from 50,000 to 70,000 disciplined men. The pensioned king, Bahadur Shah, was proclaimed emperor; his sons were appointed to various military commands. About fifty Europeans and Eurasians, nearly all females, who had been captured in trying to escape from the town on the day of the outbreak, were confined in a stifling chamber

of the palace for fifteen days; they were then brought out and massacred in the court-yard.

The siege which followed forms one of the memorable incidents of the British history of India. On the 8th June, four weeks after the outbreak, Sir H. Barnard, who had succeeded as commander- in-chief on the death of General Anson, routed the mutineers

with a handful of Europeans and Sikhs, after a severe action at Badli- ki-Serai, and encamped upon the Ridge that overlooks the city. The force was too weak to capture the city, and he had no siege train or heavy guns. All that could be done was to hold the position till the arrival of reinforcements and of a siege train. During the next three months the little British force on the Ridge were rather the besieged than the besiegers. Almost daily sallies, which often turned into pitched battles, were made by the rebels upon the over- worked handful of Europeans, Sikhs and Gurkhas. A great struggle took place on the centenary of the battle of Plassey (June 23), and another on the 25th of August; but on both occasions the mutineers were repulsed with heavy loss. General Barnard died of cholera in July, and was succeeded by General Archdale Wilson. Meanwhile reinforcements and siege artillery gradually arrived, and early in September it was resolved to make the assault. The first of the heavy batteries opened fire on the 8th of September, and on the 13th a practicable breach was reported.

On the morning of the 14th Sept. the assault was delivered, the points of attack being the Kashmir bastion, the Water bastion, the Kashmir gate, and the Lahore gate. The assault was thoroughly successful, although the column which was to enter the city by the Lahore gate sustained a temporary check. The whole eastern part of the city was retaken, but at a cost of 66 officers and 1104 men killed and wounded, out of the total strength of 9866. Fighting continued more or less during the next six days, and it was not till the 20th of September that the entire city and palace were occupied, and the reconquest of Delhi was complete. During the siege, the British force sustained a loss of 1012 officers and men killed, and 3837 wounded. Among the killed was General John Nicholson, the leader of one of the storming parties, who was shot through the body in the act of leading his men, in the first day's fighting. He lived, however, to learn that the whole city had been recaptured, and died on the 23rd of September. On the flight of the

mutineers, the king and several members of the royal family took refuge at Humayun's tomb. On receiving a promise that his life would be spared, the last of the house of Timur surrendered to Major Hodson; he was afterwards banished to Rangoon. Delhi, thus reconquered, remained for some months under military authority. Owing to the murder of several European soldiers who strayed from the lines, the native population was expelled the city. Hindus were soon afterwards readmitted, but for some time Mahommedans were rigorously excluded. Delhi was made over to the civil authorities in January 1858, but it was not till 1861 that the civil courts were regularly reopened. The shattered walls of the Kashmir gateway, and the bastions of the northern face of the city, still bear the marks of the cannonade of September 1857. Since that date Delhi has settled down into a prosperous com- mercial town, and a great railway centre. The lines which start from it to the north, south, east and west bring into its bazaars the trade of many districts. But the romance of antiquity still lingers around it, and Delhi was selected for the scene of the Imperial Proclamation on the 1st of January 1877, and for the great Durbar held in January 1903 for the proclamation of King Edward VII. as emperor of India.

Authorities. — The best modern account of the city is Delhi, Past and Present (1901), by H. C. Fanshawe, a former commissioner of Delhi. Other authoritative works are Cities of India (1903) and The Mutiny Papers (1893), both by G. W. Forrest, and Forty-one Yearsin India (1897), by Lord Roberts; while some impressionistic sketches will be found in Enchanted India (1899), by Prince Bojidar Kara- georgevitch. See also the chapter on Delhi in H. G. Keene, Hist, of Hindustan . . . to the fall of the Mughol Empire (1885). For the Delhi Durbar of 1903 see Stephen Wheeler, Hist, of the Delhi Corona- tion _ Durbar, compiled from official papers by order of the viceroy of India (London, 1904), which contains numerous portraits and other illustrations.

DELIA, a festival 01 Apollo held every five years at the great panegyris in Delos (Homeric Hymn to Apollo, 147). It included athletic and musical contests, at which the prize was a branch of the sacred palm. This festival was said to have been established by Theseus on his way back from Crete. Its celebration gradually fell into abeyance and was not revived till 426 B.C., when the Athenians purified the island and took so prominent a part in the maintenance of the Delia that it came to be regarded almost as an Athenian festival v Thucydides iii. 104). Ceremonial embassies (Otcopiai) from all the Greek cities were present.

See G. Gilbert, Deliaca (1869) ; J. A. Lebegue, Recherches sur Delos (1876); A. Mommsen, Feste der Stadt Athen (1898); E. Pfuhl, De Atheniensium pompis sacris (1900) ; G. F. Schomann, Griechische Altertumer (4th ed., 1897–1902); P. Stengel, Die griechischen Kultusaltertumer (1898); T. Homolle in Daremberg and Saglio's Dictionnaire des antiquites.

DELIAN LEAGUE, or Confederacy of Delos, the name given to a confederation of Greek states under the leadership of Athens, with its headquarters at Delos, founded in 478 B.C. shortly after the final repulse of the expedition of the Persians under Xerxes I. This confederacy, which after many modifications and vicissi- tudes was finally broken up by the capture of Athens by Sparta in 404, was revived in 378–7 (the " Second Athenian Confeder- acy ") as a protection against Spartan aggression, and lasted, at least formally, until the victory of Philip II. of Macedon at Chaeronea. These two confederations have an interest quite out of proportion to the significance of the detailed events which form their history. (See Greece: Ancient History.) They are the first two examples of which we have detailed knowledge of a serious attempt at united action on the part of a large number of self- governing states at a relatively high level of conscious political development. The first league, moreover, in its later period affords

the first example in recorded history of self-conscious imperialism in which the subordinate units enjoyed a specified local autonomy with an organized system, financial, military and judicial. The second league is further interesting as the pre- cursor of the Achaean and Aetolian Leagues.

History. — Several causes contributed to the formation of the first Confederacy of Delos. During the 6th century B.C. Sparta had come to be regarded as the chief power, not only in the Pelo- ponnese, but also in Greece as a whole, including the islands of the Aegean. The Persian invasions of Darius and Xerxes, with the consequent importance of maritime strength and the capacity for distant enterprise, as compared with that of purely military superiority in the Greek peninsula, caused a considerable loss of prestige which Sparta was unwilling to recognize. Moreover, it chanced that at the time the Spartan leaders were not men of strong character or general ability. Pausanias, the victor of Plataea, soon showed himself destitute of the high qualities which the situation demanded. Personal cupidity, discourtesy to the allies, and a tendency to adopt the style and manners of oriental princes, combined to alienate from him the sympathies of the Ionian allies, who realized that, had it not been for the Athenians, the battle of Salamis would never have been even fought, and Greece would probably have become a Persian satrapy. The Athenian contingent which was sent to aid Pausanias in the task of driving the Persians finally out of the Thraceward towns was under the command of the Athenians, Aristides and Cimon, men of tact and probity. It is not, there- fore, surprising that when Pausanias was recalled to Sparta on the charge of treasonable overtures to the Persians, the Ionian allies appealed to the Athenians on the grounds of kinship and urgent necessity, and that when Sparta sent out Dorcis to super- sede Pausanias he found Aristides in unquestioned command of the allied fleet. To some extent the Spartans were undoubtedly relieved, in that it no longer fell to them to organize distant expeditions to Asia Minor, and this feeling was

strengthened about the same time by the treacherous conduct of their king Leotychides (q.v.) in Thessaly. In any case the inelastic quality of the Spartan system was unable to adapt itself to the spirit of the new age. To Aristides was mainly due the organization of the new league and the adjustment of the contributions of the various

allies in ships or in money. His assessment, of the details of which we know nothing, was so fair that it remained popular long after the league of autonomous allies had become an Athenian empire. The general affairs of the league were managed by a synod which met periodically in the temple of Apollo and Artemis at Delos, the ancient centre sanctified by the common worship of the Ionians. In this synod the allies met on an equality under the presidency of Athens. Among its first subjects of deliberation must have been the ratification of Aristides' assessment. Thucydides lays emphasis on the fact that in these meetings Athens as- head of the league had no more than presidential . authority, and the other members were called ciijujuaxoi (allies), a word, however, of ambiguous meaning and capable of including both free and subject allies. The only other fact preserved by Thucydides is that Athens appointed a board called the Helleno- tamiae (ra/ itas, steward) to watch over and administer the treasury of the league, which for some twenty years was kept at Delos, and to receive the contributions (4>6pos) of the allies who paid in money.

The league was, therefore, specifically a free confederation of, autonomous Ionian cities founded as a protection against the common danger which threatened the Aegean basin, and led by Athens in virtue of her predominant naval power as exhibited in the war against Xerxes. Its organization, adopted by the common synod, was the product of the new democratic ideal embodied in the Cleisthenic reforms, as interpreted by a just and moderate exponent. It is one of the few examples of free corporate action on the part of the ancient Greek cities, whose centrifugal yearning for independence so often proved fatal to the Hellenic world. It is,

therefore, a profound mistake to regard the history of the league during the first twenty years of its existence as that of an Athenian empire. Thucydides expressly describes the predominance of Athens as riye/jiovia (leadership, headship), not as apxn (empire), and the attempts made by Athenian orators during the second period of the Peloponnesian War to prove that the attitude of Athens had not altered since the time of Aristides are manifestly unsuccessful.

Of the first ten years of the league's history we know practically nothing, save that it was a period of steady, successful activity against the few remaining Persian strongholds in Thrace and the Aegean (Herod, i. 106–107, see Athens, Cimon). In these years the Athenian sailors reached a high pitch of training, and by their successes strengthened that corporate pride which had been born at Salamis. On the other hand, it naturally came to pass that certain of the allies became weary of incessant warfare and looked for a period of commercial prosperity. Athens, as the chosen leader, and supported no doubt by the synod, enforced the contributions of ships and money according to the assess- ment. Gradually the allies began to weary of personal service and persuaded the synod to accept a money commutation. The Ionians were naturally averse from prolonged warfare, and in the prosperity which must have followed the final rout of the Persians and the freeing of the Aegean from the pirates (a very important feature in the league's policy) a money contribution was only a trifling burden. The result was, however, extremely bad for the allies, whose status in the league necessarily became lower in relation to that of Athens, while at the same time their military and naval resources correspondingly diminished. Athens became more and more powerful, and could afford to disregard the authority of the synod. Another new feature appeared in the employment of coercion against cities which desired to secede. Athens might fairly insist that the protection of the Aegean would become impossible if some of the chief islands were liable to be used

as piratical strongholds, and further that it was only right that all should contribute in some way to the security which all enjoyed. ' The result was that, in the cases of Naxos and Thasos, for instance, the league's resources were employed not against the Persians but against recalcitrant Greek islands, and that the Greek ideal of separate autonomy was outraged. Shortly after the capture of Naxos (c. 467 b.c.) Cimon proceeded with a fleet of 300 ships (only 100 from the allies) to the south-western and southern coasts of Asia Minor. Ha nng driven the

Persians out of Greek towns in Lycia and Caria, he met and routed the Persians on land and sea at the mouth of the Eury- medon in Pamphylia. In 463 after a siege of more than two years the Athenians captured Thasos, with which they had quarrelled over mining rights in the Strymon valley. It is said (Thuc. i. 101) that Thasos had appealed for aid to Sparta, and that the latter was prevented from responding only by earthquake and the Helot revolt. But this is both unproved and improbable. Sparta had so far no quarrel with Athens. Athens thus became mistress of the Aegean, while the synod at Delos had become practically, if not theoretically, powerless. It was at this time that Cimon (q.v.), who had striven to maintain a balance between Sparta, the chief military, and Athens, the chief naval power, was successfully attacked by Ephialtes and Pericles. During the ensuing years, apart from a brief return to the Cimonian policy, the resources of the league, or, as it has now become, the Athenian empire, were directed not so much against Persia as against Sparta, Corinth, Aegina and Boeotia. (See Athens; Sparta, &c.) A few points only need be dealt with here. The first years of the land war brought the Athenian empire to its zenith. Apart from Thessaly, it included all Greece outside the Pelo- ponnese. At the same time, however, the Athenian expedition against the Persians in Egypt ended in a disastrous

defeat, and for a time the Athenians returned to a philo-Laconian policy, perhaps under the direction of Cimon (see Cimon and Pericles). Peace was made with Sparta, and, if we are to believe 4th- century orators, a treaty, the Peace of Callias or of Cimon, was concluded between the Great King and Athens in 449 after the death of Cimon before the walls of Citium in Cyprus. The meaning of this so-called Peace of Callias is doubtful. Owing to the silence of Thucydides and other reasons, many scholars regard it as merely a cessation of hostilities (see Cimon and Callias, where authorities are quoted). At all events, it is significant of the success of the main object of the Delian League, the Athenians resigning Cyprus and Egypt, while Persia recog- nized the freedom of the maritime Greeks of Asia Minor.

During this period the power of Athens over her allies had increased, though we do not know anything of the process by which this was brought about. Chios, Lesbos and Samos alone furnished ships; all the rest had commuted for a money pay- ment. This meant that the synod was quite powerless. More- over in 454 (probably) the changed relations were crystallized by the transference (proposed by the Samians) of the treasury to Athens (Corp. Inscr. Attic, i. 260). Thus in 448 B.C. Athens was not only mistress of a maritime empire, but ruled over Megara, : Boeotia, Phocis, Locris, Achaea and Troezen, i.e. over so-called allies who were strangers to the old pan-Ionian assembly and to the policy of the league, and was practically equal to Sparta on land. An important event must be referred probably to the year 451, — the law of Pericles, by which citizenship (including the right to vote in the Ecclesia and to sit on paid juries) was restricted to those who could prove themselves the children of an Athenian father and mother (e£ a.fj. (jxnv cuttolv). This measure must have had a detrimental effect on the allies, who thus saw themselves excluded still further from recognition as equal partners in a league (see Pericles). The natural result of all these causes was that a

feeling of antipathy rose against Athens in the minds of those to whom autonomy was the breath of life, and the fundamental tendency of the Greeks to disruption was soon to prove more powerful than the forces at the disposal of Athens. The first to secede were the land powers of Greece proper, whose subordination Athens had endeavoured to guarantee by supporting the democratic parties in the various states. Gradually the exiled oligarchs combined ; with the defeat of Tolmides at Coroneia, Boeotia was finally lost to the empire, and the loss of Phocis, Locris and Megara was the immediate sequel. Against these losses the retention of Euboea, Nisaea and Pegae was no compensation; the land empire was irre- trievably lost.

The next important event is the revolt of Samos, which had quarrelled with Miletus over the city of Priene. The Samians refused the arbitration of Athens. The island was conquered

with great difficulty by the whole force of the league, and from the fact that the tribute of the Thracian cities and those in Helles- pontine district was increased between 439 and 436 we must probably infer that Athens had to deal with a widespread feeling of discontent about this period. It is, however, equally notice- able on the one hand that the main body of the allies was not affected, and on the other that the Peloponnesian League on the advice of Corinth officially recognized the right of Athens to deal with her rebellious subject allies, and refused to give help to the Samians.

The succeeding events which led to the Peloponnesian War and the final disruption of the league are discussed in other articles. (See Athens: History, and Peloponnesian War.) Two im- portant events alone call for special notice. The first is the raising of the allies' tribute in 425 B.C. by a certain Thudippus, presumably a henchman of Cleon. The fact, though not mentioned by Thucydides, was inferred from Aristophanes (Wasps, 660), Andocides (de Pace, § 9), Plutarch (Aristides, c. 24), and pseudo- Andocides (Alcibiad. 11); it was proved by the

discovery of the assessment list of 425-4 (Hicks and Hill, Inscrip. 64) . The second event belongs to 41 1 , after the failure of the Sicilian expedition. In that year the tribute of the allies was commuted for a 5 % tax on all imports and exports by sea. This tax, which must have tended to equalize the Athenian merchants with those of the allied. cities, probably came into force gradually, for beside the new collectors called iropujTO.i we still find Hellenotamiae (C.I. A. iv. [i.] p. 34).

The Tribute. — Only a few problems can be discussed of the many which are raised by the insufficient and conflicting evidence at our disposal. In the first place there is the question of the tribute. Thucydides is almost certainly wrong in saying that the amount of the original tribute was 460 talents (about £106,000); this figure cannot have been reached for at least twelve, probably twenty years, when new members had been enrolled (Lycia, Caria, Eion, Lampsacus). Similarly he is probably wrong, or at all events includes items of which the tribute lists take no account, when he says that it amounted to 600 talents at the beginning of the Peloponnesian War. The moderation of the assessment is shown not only by the fact that it was paid so long without objection, but also by the individual items. Even in 425 Naxos and Andros paid only 15 talents, while Athens had just raised an eisphora (income tax) from her own citizens of 200 talents. Moreover it would seem that a tribute which yielded less than the 5% tax of 411 could not have been unreasonable.

The number of tributaries is given by Aristophanes as 1000, but this is greatly in excess of those named in the tribute lists. Some authorities give 200; others put it as high as 290. The difficulty is increased by the fact that in some cases several towns were grouped together in -one payment (owreXeis) . These were grouped into five main geographical divisions (from 443 to 436; afterwards four, Caria being merged in Ionia). Each division was represented by two elective assessment commissioners (tolktclL), who assisted the Boule at Athens in the quadrennial division of the tribute.

Each city sent in its own assessment before the raxrat, who presented it to the Boule. If there was any difference of opinion the matter was referred to the Ecclesia for settlement. In the Ecclesia a private citizen might propose another assessment, or the case might be referred to the law courts. The records of the tribute are preserved in the so-called quota lists, which give the names of the cities and the proportion, one-sixtieth, of their several tributes, which was paid to Athens. No tribute was paid by members of a cleruchy (q.v.), as we find from the fact that the tribute of a city always decreased when a cleruchy was planted in it. This highly organized financial system must have been gradually evolved, and no doubt reached its perfection only after the treasury was transferred to Athens.

Government and Jurisdiction. — There is much difference of opinion among scholars regarding the attitude of imperial Athens towards her allies. Grote maintained that on the whole the allies had little ground for complaint ; but in so doing he rather seems to leave out of account the Greek's dislike of external

discipline. The very fact that the hegemony had become an empire was enough to make the new system highly offensive to the allies. No very strong argument can be based on the paucity of actual revolts. The indolent Ionians had seen the result of secession at Naxos and rebellion at Thasos; the Athenian fleet was perpetually on guard in the Aegean. On the other hand among the mainland cities revolt was frequent; they were ready to rebel /cat xapd Svvafuv. Therefore, even though Athenian domination may have been highly salutary in its effects, there can be no doubt that the allies did not regard it with affection.

To judge only by the negative evidence of the decree

of Aristoteles which records the terms of alliance of the second confederacy (below), we gather that in the later period at least of the first league's history the Athenians had interfered with the local autonomy of the allies in various ways — an inference which is confirmed by the terms of " alliance " which Athens imposed on Erythrae, Chalcis and Miletus. Though it appears that Athens made individual agreements with various states, and therefore that we cannot regard as general rules the terms laid down in those which we possess, it is undeniable that the Athenians planted garrisons under permanent Athenian officers (^povpapxoi) in some cities. Moreover the practice among Athenian settlers of acquiring land in the allied districts must have been vexatious to the allies, the more so as all important cases between Athenians and citizens of allied cities were brought to Athens. Even on the assumption that the Athenian dicasteries were scrupulously fair in their awards, it must have been peculiarly galling to the self-respect of the allies and inconvenient to individuals to be compelled to carry cases to Athens and Athenian juries. Furthermore we gather from the Aristoteles inscription and from the 4th-century orators that Athens imposed democratic constitutions on her allies; indeed Isocrates (Paneg., 106) takes credit for Athens on this ground, and the charter of Erythrae confirms the view (cf. Arist. Polit., viii., vi. 9 1307 b 20; Thuc. viii. 21, 48, 64, 65). Even though we admit that Chios, Lesbos and Samos (up to 440) retained their oligarchic governments and that Selymbria, at a time (409 B.C.) when the empire was in extremis, was permitted to choose its own constitution, there can be no doubt that, from whatever motive and with what- ever result, Athens did exercise over many of her allies an authority which extended to the most intimate concerns of local administration.

Thus the great attempt on the part of Athens to lead a harmoni- ous league of free Greek states for the good of Hellas degenerated into an empire which proved intolerable to the autonomous states of

Greece. Her failure was due partly to the commercial jealousy of Corinth working on the dull antipathy of Sparta, partly to the hatred of compromise and discipline which was fatally character- istic of Greece and especially of Ionian Greece, and partly also to the lack of tact and restraint shown by Athens and her repre- sentatives in her relations with the allies.

The Second League. — The conditions which led to the second Athenian or Delian Confederacy were fundamentally different, not only in virtue of the fact that the allies had learned from experience the dangers to which such a league was liable, but because the enemy was no longer an oriental power of whose future action there could be no certain anticipation, but Sparta, whose ambitious projects since the fall of Athens had shown that there could be no safety for the smaller states save in com- bination.

There can be no reasonable doubt that as soon as the Athenians began to recover from the paralysing effect of the victory of Lysander and the internal troubles in which they were involved by the government of the Thirty, their thoughts turned to the possibility of recovering their lost empire. The first step in the direction was the recovery of their sea-power, which was effected by the victory of Conon at Cnidus (August 394 B.C.). Gradually individual cities which had formed part of the Athenian empire returned to their alliance with Athens, until the Spartans had lost Rhodes, Cos, Nisyrus, Teos, Chios, Mytilene, Ephesus, Erythrae, Lemnos, Imbros, Scyros, Eretria, Melos, Cythera,

Carpathus and Delos. Sparta had only Sestos and Abydos of all that she had won by the battle of Aegospotami. At the same time no systematic constructive attempt at a renewal of empire can as yet be detected. Athenian relations were with individual states only, and the terms of alliance were various. Moreover, whereas Persia had been for several years aiding Athens against Sparta, the revolt of the Athenian ally Evagoras (q.v.) of

Cyprus set them at enmity, and with the secession of Ephesus, Cnidus and Samos in 391 and the civil war in Rhodes, the star of Sparta seemed again to be in the ascendant. But the whole position was changed by the successes of Thrasybulus, who brought over the Odrysian king Medocus and Seuthes of the Propontis to the Athenian alliance, set up a democracy in Byzantium and reimposed the old 10% duty on goods from the Black Sea. Many of the island towns subsequently came over, and from inscriptions at Clazomenae (C.I. A. ii. 14&) and Thasos (C.I. A. iv. n&) we learn that Thrasybulus evidently was deliberately aiming at a renewal of the empire, though the circumstances leading to his death at Aspendus when seeking to raise money suggest that he had no general backing in Athens.

The peace of Antalcidas or the King's Peace (see Antalcidas; Sparta) in 386 was a blow to Athens in the interests of Persia and Sparta. Antalcidas compelled the Athenians to give their assent to it only by making himself master of the Hellespont by stratagem with the aid of Dionysius the Elder of Syracuse. By this peace all the Greek cities on the mainland of Asia with the islands of Cyprus and Clazomenae were recognized as Persian, all other cities except Imbros, Lemnos and Scyros as autonomous. Directly, this arrangement prevented an Athenian empire; indirectly, it caused the sacrificed cities and their kinsmen on the islands to look upon Athens as their protector. The gross selfishness of the Spartans, herein exemplified, was emphasized by their capture of the Theban citadel, and, after their expulsion, by the raid upon Attica in time of peace by the Spartan Sphodrias, and his immunity from punishment at Sparta (summer of 378 B.C.). The Athenians at once invited their allies to a conference, and the Second Athenian Confederacy was formed in the archonship of Nausinicus on the basis of the famous decree of Aristoteles. Those who attended the conference were probably Athens, Chios, Mytilene, Methymna, Rhodes, Byzantium, Thebes, the latter of which joined Athens soon after the Sphodrias raid. In the spring of 377 invitations

were sent out to the maritime cities. Some time in that year Tenedos, Chios, Chalcis in Euboea, and probably the Euboean cities Eretria, Carystus and Arethusa gave in their adherence, followed by Perinthus, Peparethus, Sciathus and other maritime cities.

At this point Sparta was roused to a sense of the significance of the new confederacy, and the Athenian corn supply was threatened by a Spartan fleet of sixty triremes. The Athenians immediately fitted out a fleet under Chabrias, who gained a decisive victory over the Spartans between Naxos and Paros (battle of Naxos 376 B.C.), both of which were added to the league. Proceeding northwards in 375 Chabrias brought over a large number of the Thraceward towns, including Abdera, Thasos and Samothrace. It is interesting to notice that a garrison was placed in Abdera in direct contravention of the terms of the new confederacy (Meyer, Gesch. d. Alt., v. 394). About the same time the successes of Timotheus in the west resulted in the addition to the league of Corcyra and the cities of Cephallenia, and his moderation induced the Acarnanians and Alcetas, the Molossian king, to follow their example. Once again Sparta sent out a fleet, but Timotheus in spite of financial embarrassment held his ground. By this time, however, the alliance between Thebes and Athens was growing weaker, and Athens, being short of money, concluded a peace with Sparta (probably in July 374), by which the peace of Antalcidas was confirmed and the two states recognized each other as mistress of sea and land respectively. Trouble, however, soon arose over Zacynthus, and the Spartans not only sent help to the Zacynthian oligarchs but even besieged Corcyra (373). Timotheus was sent to relieve the island, but shortness of money compelled him to search for new allies, and he spent the summer of 373 in persuading Jason of Pherae (if he had not

already joined), and certain towns in Thrace, the Chersonese, the Propontis and the Aegean to enrol themselves. This delay in sending help to Corcyra was rightly or wrongly condemned by the Athenians, who dismissed Timotheus in favour of Iphicrates. The expedition which followed produced negative successes, but the absence of any positive success and the pressure of financial difficulty, coupled with the defection of Jason (probably before 371), and the high-handed action of Thebes in destroying Plataea (373), induced Athens to renew the peace with Sparta which Timotheus had broken. With the support of Persia an agreement was made by a congress at Sparta on the -basis of the autonomy of the cities, Amphipolis and the Chersonese being granted to Athens. The Thebans at first accepted the terms, but on the day after, realizing that they were thus balked of their pan-Boeotian ambition, withdrew and finally severed themselves from the league.

The peace of 3 7 1 may be regarded as the conclusion of the first distinct period in the league's existence. The original purpose of the league — the protection of the allies from the ambitions of Sparta — was achieved. Athens was recognized as mistress of the sea; Sparta as the chief land power. The inherent weakness of the coalition had, however, become apparent. The enthusiasm of the allies (numbering about seventy) waned rapidly before the financial exigencies of successive campaigns, and it is abund- antly clear that Thebes had no interest save the extension of her power in Boeotia. Though her secession, therefore, meant very little loss of strength, there were not wanting signs that the league was not destined to remain a power in the land.

The remaining history may be broken up into two periods, the first from 371 to 357, the second from 357 to 338. Throughout these two periods, which saw the decline and final dissolution of the alliance, there is very little specific evidence for its existence. The events seem to belong to the histories of the several cities, and examples of corporate action are few and uncertain. None the less the known facts justify a large number of inferences as to the significance of events which are on the surface merely a part of the individual foreign policy of Athens.

Period 371-357. — The first event in this period was the battle of Leuctra (July 3 7 1) , in which, no doubt to the surprise'of Athens, Thebes temporarily asserted itself as the chief land power in Greece. To counterbalance the new power Athens very rashly plunged into Peloponnesian politics with the ulterior object of inducing the states which had formerly recognized the hegemony of Sparta to transfer their allegiance to the Delian League. It seems that all the states adopted this policy with the exception of Sparta (probably) and Elis. The policy of Athens was mistaken for two reasons: (1) Sparta was not entirely humiliated, and (2) alliance with the land powers of Peloponnese was incalculably

dangerous, inasmuch as it involved Athens in enterprises which could not awake the enthusiasm of her maritime allies. This new coalition naturally alarmed Sparta, which at once made overtures to Athens on the ground of their common danger from Thebes. The alliance was concluded in 369. About the same time Iphicrates was sent to take possession of Amphipolis according to the treaty of 371. Some success in Macedonia roused the hostility of Thebes, and the subsequent attempts on Amphipolis caused the Chalcidians to declare against the league. It would appear that the old suspicion of the allies was now thoroughly awakened, and we find Athens making great efforts to conciliate Mytilene by honorific decrees (Hicks and Hill, 109). This suspicion, which was due primarily, no doubt, to the agreement with Sparta, would find confirmation in the subsequent exchange of compliments with Dionysius I. of Syracuse, Sparta's ally, who with his sons received the Athenian citizenship. It is not clear that the allies officially approved this new friendship; it is certain that it was actually distasteful to them. The same dislike would be roused by the Athenian alliance with Alexander of Pherae (368-367) . The maritime allies naturally had no desire to be involved in the quarrels of Sicily, Thessaly and the Peloponnese.

In 367 Athens and Thebes sent rival ambassadors to Persia, with the result that Athens was actually ordered to abandon her

claim to Amphipolis, and to remove her navy irom the high sea&. The claim to Amphipolis was subsequently affirmed, but the Greek states declined to obey the order of Persia. In 366 Athens lost Oropus, a blow which she endeavoured to repair by forming an alliance with Arcadia and by an attack on Corinth. At the same time certain of the Peloponnesian states made peace with Thebes, and some hold that Athens joined this peace (Meyer, Gesch. d. Alt. v. 449). Timotheus was sent in 366-365 to make a demonstration against Persia. Finding Samos in the hands of Cyprothemis, a servant of the satrap Tigranes, he laid siege to it, captured it after a

ten months' siege and established a cleruchy. Though Samos was not apparently one of the allies, this latter action could not but remind the allies of the very dangers which the second confederacy had set out to avoid.

The next important event was the serious attempt on the part of Epaminondas to challenge the Athenian naval supremacy. Though Timotheus held his ground the confederacy was un- doubtedly weakened. In 362 Athens joined in the opposition to the Theban expedition which ended in the battle of Mantineia (July) . In the next year the Athenian generals failed in the north in their attempt to control the Hellespont. In Thessaly Alexander of Pherae became hostile and after several successes even attacked the Peiraeus. Chares was ordered to make reprisals, but instead sailed to Corcyra, where he made the mistake of siding with the oligarchs. The last event of the period was a success, the recovery of Euboea (357), which was once more added to the league.

During these fourteen years the policy of Athens towards her maritime allies was, as we have seen, shortsighted and incon- sistent. Alliances with various land powers, and an inability to understand the true relations which alone could unite the league, combined to alienate the allies, who could discover no reason for the expenditure of their contributions on protecting Sparta or Corinth against Thebes. The ~Zvve8ptov of the league is found taking action in several instances, but there is evidence (cf. the expedition of Epaminondas in 363) that there was ground for suspecting disloyalty in many quarters. On the other hand, though the Athenian fleet became stronger and several cities were captured, the league itself did not gain any important voluntary adherents. The generals were compelled to support their forces by plunder or out of their private resources, and, frequently failing, diverted their efforts from the pressing needs of the allies to purely Athenian objects.

Period 357–338. — The latent discontent of the allies was soon fanned into hostility by the

intrigues of Mausolus, prince of Cardia, who was anxious to extend his kingdom. Chios, Rhodes, Cos, Byzantium, Erythrae and probably other cities were in revolt by the spring of 356, and their attacks on loyal members of the confederacy compelled Athens to take the offensive. Chabrias had already been killed in an attack on Chios in the previous autumn, and the fleet was under the command of Timotheus, Iphicrates and Chares, who sailed against Byzantium. The enemy sailed north from Samos and in a battle off Embata (between Erythrae and Chios) defeated Chares, who, without the consent of his colleagues, had ventured to engage them in a storm. The more cautious generals were accused of corrup- tion in not supporting Chares. Iphicrates was acquitted and Timotheus condemned. Chares sought to replenish his resources by aiding the Phrygian satrap Artabazus against Artaxerxes Ochus, but a threat from the Persian court caused the Athenians to recall him, and peace was made by which Athens recognized the independence of the revolted towns. The league was further weakened by the secession of Corcyra, and by 355 was reduced to Athens, Euboea and a few islands. By this time, moreover, Philip II. of Macedon had begun his career of conquest, and had shattered an embryonic alliance between the league and certain princes of Thrace (Cetriporis), Paeonia (Lyppeius) and Illyria (Grabus). In 355 his advance temporarily ceased, but, as we learn from Isocrates and Xenophon, the financial exhaustion of the league was such that its destruction was only a matter of time. Resuming operations in 354, Philip, in spite of temporary checks at the hands of Chares, and the spasmodic opposition of a

few barbarian chiefs, took from the league all its Thracian and Macedonian cities (Abdera, Maronea, Neapolis, Methone.) In 352–351 Philip actually received help from former members of the confederacy. In 351 Charidemus, Chares and Phocion were sent to oppose him, and we find that the

contributions of the Lesbian cities were assigned to them for supplies, but no successes were gained. In 349 Euboea and Olynthus were lost to the league, of which indeed nothing remained but an empty form, in spite of the facts that the expelled Olynthians appealed to it in 348 and that Mytilene rejoined in 347. In 346 the peace of Philo- crates was made between the league and Philip on terms which were accepted by the Athenian Boule. It is very remarkable that, in spite of the powerlessness of the confederacy, the last re- corded event in its history is the steady loyalty of Tenedos, which gave money to Athens about 340 (Hicks and Hill, 146). The victory of Philip at Chaeronea in 338 finally destroyed the league.

In spite of the precautions taken by the allies to prevent the domination of Athens at their expense, the policy of the league was almost throughout directed rather in the interests of Athens. Founded with the specific object of thwarting the ambitious designs of Sparta, it was plunged by Athens into enterprises of an entirely different character which exhausted the resources of the allies without benefiting them in any respect. There is no doubt that, with very few exceptions, the cities were held to their allegiance solely by the superior force of the Athenian navy. The few instances of its action show that the 'ZwkBpiov was practically only a tool in the hands of Athens.

Authorities. — The First League. — The general histories of Greece, especially those of A. Holm (Eng. trans., London, 1894), G. Busolt (2nded.,Gotha, 1893), J. Beloch(Strassburg,1893 foil.), andG.Grote (the one-vol. ed. of 1907 has some further notes on later evi- dence). E. Meyer's Gesch. des Altertunis (Stuttgart, 1892 foil.) and Forschungen (Halle, 1892 foil.) are of the greatest value. For in- scriptions, G. F. Hill, Sources of Greek History, 478-431 (2nd ed., 1907) ; E. L. Hicks and G. F. Hill, Greek Hist. Inscr. (Oxford, 1901). On the tribute see also U. Kohler in Abhandlungen d. Berliner Akademie (1869) and U. Pedroli, " I Tributi degli alleati d' Atene " in Beloch' s Studi di

storia antica. See also articles Aristides; Them- istocles; Pericles; Cimon, &c, and Greece: History, with works quoted. For the last years of the league see also Pelo- ponnesian War.

The Second League. — The chief modern works are G. Busolt, ” Der zweite athenische Bund “in Neue Jahrbiicher fur classische Philologie (supp. vol. vii., 1873-1875, pp. 641-866), and F. H. Marshall, The Second Athenian Confederacy (1905), one of the Cambridge Historical Essays (No. xiii.). The latter is based on Busolt’s monograph and includes subsequent epigraphic evidence, with a full list of authorities. For inscriptions see Hicks and Hill, op. cit., and the Inscriptiones Atticae, vol. ii. pt. 5. The meagre data given by ancient writers are collected by Busolt and Marshall. (J. M. M.)

DELIBES, CLEMENT PHILIBERT LEO (1836-1891), French composer, was born at Saint Germain du Val on the 21st of February 1836. He studied at the Paris Conservatoire under Adolphe Charles Adam, through whose influence he became accompanist at the Theatre Lyrique. His first essay in dramatic composition was his Deux sous de charbon (1853), and during several years he produced a number of operettas. His cantata Alger was heard at the Paris opera in 1865. Having become second chorus master at the Grand Opera, he wrote the music of a ballet entitled La Source for this theatre, in collaboration with Minkous, a Polish composer. La Source was produced with great success in 1866. The composer returned to the operetta style with Malbrouk s’en va-t-en guerre, — written in collaboration with Georges Bizet, Emile Jonas and Legouix, and given at the Theatre de l’Athenee in 1867. Two years later came L’Ecossais de Chatou, a one-act piece, and La Cour du roi Petaud, a three- act opera-bouffe. The ballet Coppelia was produced at the Grand Opera on the 25th of May 1870 with enormous success.

Delibes gave up his post as second chorus master at the Grand Opera in 1872 when he married the daughter of Mademoiselle Denain, formerly an actress at the Comedie Franchise. In this year he published a

collection of graceful melodies including Myrto, Les Filles dc Cadiz, Bonjour, Suzon and others. His first important dramatic work was Le Roi Va dit, a charming comic opera, pro- duced on the 24th of May 1873 at" the Opera Comique. Three years later, on the 14th of June 1876, Sylvia, a ballet in three acts,

one of the composer's most delightful works, was produced at the Grand Opera. This was followed by La Mort d'Orphee, a grand scena produced at the Trocadero concerts in 1878 ; by Jean de Nivelle, a three-act opera brought out at the Opera Comique on the 8th of March 1880; and by LaknU, an opera in three acts produced at the same theatre on the 14th of April 1883. Lakme has remained his most popular opera. The composer died in Paris on the 16th of January 1891, leaving Kassya, a four-act opera, in an unfinished state. This work was completed by E. Guiraud, and produced at the Opera Comique on the 21st of March 1893. In 1877 Delibes became a chevalier of the Legion of Honour; in 1881 he became a professor of advanced com- position at the Conservatoire; in 1884 he took the place of Victor Masse at the Institut de France.

Leo Delibes was a typically French composer. His music is light, graceful and refined. He excelled in ballet music, and Sylvia may well be considered a masterpiece. His operas are constructed on a conventional pattern. The harmonic texture, however, is modern, and the melodic invention abundant, while the orchestral treatment is invariably excellent.

DELILAH, in the Bible, the heroine of Samson's last love-story and the cause of his downfall (Judg. xvi.). She was a Philistine of Sorek (mod. Sunk), west of Zorah, and when her countrymen offered her an enormous bribe to betray him, she set to work to find out the source of his strength. Thrice Samson scoffingly told her how he might be bound, and thrice he readily broke the bonds with which she had fettered him in his sleep; seven green bow-strings, new ropes, and even the braiding of his hair into the frame of the loom failed to secure him. At

length he disclosed the secret of his power. Delilah put him to sleep upon her lap, called in a man to shave off his seven locks, and this time he was easily captured. See Samson.

DELILLE, JACQUES (1738–1813), French poet, was born on the 22nd of June 1738 at Aigue-Perse in Auvergne. He was an illegitimate child, and was descended by his mother from the chancellor De l'Hopital. He was educated at the college of Lisieux in Paris and became an elementary teacher. He gradually acquired a reputation as a poet by his epistles, in which things are not called by their ordinary names but are hinted at by elaborate periphrases. Sugar becomes " le miel americain que du sue des roseaux exprima l'Africain." The publication (1769) of his translation of the Georgics of Virgil made him famous. Voltaire recommended the poet for the next vacant place in the Academy. He was at once elected a member, but was not admitted until 1774 owing to the opposition of the king, who alleged that he was too young. In his Jardins, ou I' art d'embeUir les paysages (1782) he made good his pretensions as an original poet. In 1786 he made a journey to Constantinople in the train of the ambassador M. de Choiseul-Gouffier.

Delille had become professor of Latin poetry at the College de France, and abbot of Saint-Severin, when the outbreak of the Revolution reduced him to poverty. He purchased his personal safety by professing his adherence to revolutionary doctrine, but eventually quitted Paris, and retired to St Die, where he com- pleted his translation of the Aeneid. He emigrated first to Basel and then to Glairesse in Switzerland. Here he finished his Homme des champs, and his poem on the Trois r'egnes de la nature. His next place of refuge was in Germany, where he composed his La Pitie; and finally, he passed some time in London, chiefly employed in translating Paradise Lost. In 1802 he was able to return to Paris, where, although nearly blind, he resumed his professorship and his chair at the Academy, but lived in retirement. He fortunately did not outlive the vogue of the descriptive poems which were his

special province, and died on the 1st of May 1813.

Delille left behind him little prose. His preface to the trans- lation of the Georgics is an able essay, and contains many excellent hints on the art and difficulties of translation. He wrote the article " La Bruyere " in the Biographie universelle. The following is the list of his poetical works :-^-Les Georgiques de Virgile, traduites en vers franqais (Paris, 1769, 1782, 1785, 1809); Les Jardins, en quatre chants (1780; new edition, Paris, 1801);

U Homme des champs, ou les Gtorgiques franqaises (Strassburg, 1802); PoSsies fugitives (1802); Dithyrambe sur I'immortalite de I'dme, suvoi du passage du Saint Gothard, poeme traduit de l'Anglais de Madame la duchesse de Devonshire (1802) ; La Pitie, poeme en quatre chants (Paris, 1802); L'Eneide de Virgile, traduite en vers franqais (4 vols., 1804); Le Paradis perdu (3 vols., 1804); L' Imagination, poeme en huit chants (2 vols., 1806); Les trois regnes de la nature (2 vols., 1808); La Conversa- tion (1812). A collection given under the title of Poisies diverses (1801) was disavowed by Delille.

His CEuvres (16 vols.) were published in 1824. See Sainte-Beuve, Portraits litteraires, vol. ii.

DELIRIUM (a Latin medical term for madness, from delirare, to be mad, literally to wander from the lira, or furrow), a . temporary form of brain disorder, generally occurring in con- nexion with some special form of bodily disease. It may vary in intensity from slight and occasional wandering of the mind and incoherence of expression, to fixed delusions and violent maniacal excitement, and again it may be associated with more or less of coma or insensibility. (See Insanity, and Neuropathology.) Delirium is apt to occur in most diseases of an acute nature, such as fevers or inflammatory

affections, in injuries affecting the brain, in blood diseases, in conditions of exhaustion, and as the result of the action of certain specific poisons, such as opium, Indian hemp, belladonna, chloroform and alcohol.

Delirium tremens is one of a train of symptoms of what is termed in medical nomenclature acute alcoholism, or excessive indulgence in alcohol. It must, however, be observed that this disorder, although arising in this manner, rarely comes on as the result of a single debauch in a person unaccustomed to the abuse of stimulants, but generally occurs in cases where the nervous system has been already subjected for a length of time to the poisonous action of alcohol, so that the complaint might be more properly regarded as acute supervening on chronic alcoholism. It is equally to be borne in mind that many habitual drunkards never suffer from delirium tremens.

It was long supposed, and is indeed still believed by some, that delirium tremens only comes on when the supply of alcohol has been suddenly cut off ; but this view is now generally rejected, and there is abundant evidence to show that the attack comes on while the patient is still continuing to drink. Even in those cases where several days have elapsed between the cessation from . drinking and the seizure, it will be found that in the interval the premonitory symptoms of delirium tremens have shown them- selves, one of which is aversion to drink as well as food — the attack being in most instances preceded by marked derangement of the digestive functions. Occasionally the attack is precipi- tated in persons predisposed to it by the occurrence of some acute disease, such as pneumonia, by accidents, such as burns, also by severe mental strain, and by the deprivation of food, even where the supply of alcohol is less than would have been likely to produce it otherwise. Where, on the other hand, the quantity of alcohol taken has been very large, the attack is sometimes ushered in by fits of an epileptiform character.

One of the earliest indications of the approaching attack of delirium tremens is sleeplessness, any rest the patient may obtain being troubled by unpleasant or terrifying dreams. During the day there is observed a certain restlessness and irritability of manner, with trembling of the hands and a thick or tremulous articulation. The skin is perspiring, the countenance oppressed-looking and flushed, the pulse rapid and feeble, and there is evidence of considerable bodily prostration. These symptoms increase each day and night for a few days, and then the characteristic delirium is superadded. The patient is in a state of mental confusion, talks incessantly and incoherently, has a distressed and agitated or perplexed appearance, and a vague notion that he is pursued by some one seeking to injure him. His delusions are usually of transient character, but he is constantly troubled with visual hallucinations in the form of disagreeable animals or insects which he imagines he sees all about him. He looks suspiciously around him, turns over his pillows, and ransacks his bedclothes for some? fancied object he supposes

to be concealed there. There is constant restlessness, a common form of delusion being that he is not in his own house, but imprisoned in some apartment from which he is anxious to escape to return home. In these circumstances he is ever wishing to get out of bed and out of doors, and, although in general he may be persuaded to return to bed, he is soon desiring to get up again. The trembling of the muscles from which the name of the disease is derived is a prominent but not invariable symptom. It is most marked in the muscles of the hands and arms and in the tongue. The character of the delirium is seldom wild or noisy, but is much more commonly a combination of busy restlessness and indefinite fear. When spoken to, the patient can answer correctly enough, but immediately thereafter relapses into his former condition of incoherence. Occasionally maniacal symp- toms develop themselves, the patient becoming dangerously violent, and the case thus assuming a much graver aspect than one of

simple delirium tremens.

In most cases the symptoms undergo abatement in from three to six days, the cessation of the attack being marked by the occurrence of sound sleep, from which the patient awakes in his right mind, although in a state of great physical prostration, and in great measure if not entirely oblivious of his condition during his illness.

Although generally the termination of an attack of delirium tremens is in recovery, it occasionally proves fatal by the super- vention of coma and convulsions, or acute mania, or by exhaus- tion, more especially when any acute bodily disease is associated with the attack. In certain instances delirium tremens is but the beginning of serious and permanent impairment of intellect, as is not infrequently observed in confirmed drunkards who have suffered from frequent attacks of this disease. The theory once widely accepted, that delirium tremens was the result of the too sudden breaking off from indulgence in alcohol, led to its treatment by regular and often large doses of stimulants, a practice fraught with mischievous results, since however much the delirium appeared to be thus calmed for the time, the con- tinuous supply of the poison which was the original source of the disease inflicted serious damage upon the brain, and led in many instances to the subsequent development of insanity. The former system of prescribing large doses of opium, with the view of procuring sleep at all hazards, was no less pernicious. In addition to these methods of treatment, mechanical restraint of the patient was the common practice.

The views of the disease which now prevail, recognizing the delirium as the effect at once of the poisonous action of alcohol upon the brain and of the want of food, encourage reliance to be placed for its cure upon the entire withdrawal, in most instances, of stimulants, and the liberal administration of light nutriment, in addition to quietness and gentle but firm control, without mechanical restraint. In mild attacks this is

frequently all that is required. In more severe cases, where there is great restless- ness, sedatives have to be resorted to, and many substances have been recommended for the purpose. Opiates administered in small quantity, and preferably by hypodermic injection, are undoubtedly of value ; and chloral, either alone or in conjunc- tion with bromide of potassium, often answers even better. Such remedies, however, should be administered with great caution, and only under medical supervision.

Stimulants may be called for where the delirium assumes the low or adynamic form, and the patient tends to sink from exhaus- tion, or when the attack is complicated with some other disease. Such cases are, however, in the highest degree exceptional, and do not affect the general principle of treatment already referred to, which inculcates the entire withdrawal of stimulants in the treatment of ordinary attacks of delirium tremens.

DELISLE, JOSEPH NICOLAS (1688–1768), French astronomer, was born at Paris On the 4th of April 1688. Attracted to astro- nomy by the solar eclipse of the 12th of May 1706, he obtained permission in 1710 to lodge in the dome of the Luxembourg, procured some instruments, and there observed the total eclipse of the 22nd of May 1724. He proposed in 1715 the " diffraction- theory " of the sun's corona, visited England and was received

into the Royal Society in 1724, and left Paris for St Petersburg on a summons from the empress Catherine, towards the end of 1725. Having founded an observatory there, he returned to Paris in 1747, was appointed geographical astronomer to the naval department with a salary of 3000 livres, and installed an observatory in the Hotel Cluny. Charles Messier and J. J. Lalande were among his pupils. He died of apoplexy at Paris on the 12th of September

1768. Delisle is chiefly remem- bered as the author of a method for observing the transits of Venus and Mercury by instants of contacts. First proposed by him in a letter to J. Cassini in 1743, it was afterwards perfected, and has been extensively employed. As a preliminary to the transit of Mercury in 1743, which he personally observed, he issued a map of the world showing the varied circumstances of its occurrence. Besides many papers communicated to the academy of sciences, of which he became a member in 17 14, he published MSmoires pour servir d I'histoire et au progres de I'astronomie (St Petersburg, 1 738), in which he gave the first methodfor determin- ing the heliocentric co-ordinates of sun-spots; MSmoire sur les nouvelles decouverles au nord de la mer du sud (Paris, i75 2)j & c -

See MSmoires de Vacad. des sciences (Paris, 1768), Histoire, p. 167 (G. de Fouchy) ; J. B. J. Delambre, Hist, de V astronomic au XVIII" Steele, pp. 319, 533 ; Max. Marie, Hist, des sciences, vii. 254; Lalande, Bibl. astr. p. 385; and Le Necrologe des hommes celebres de France (1770). The records of Delisle's observations at St Petersburg are preserved in manuscript at the Pulkowa observatory. A report upon them was presented to the St Petersburg academy of sciences by O. Struve in 1848, and those relating to occultations of the Pleiades were discussed by Carl Linsser in 1864. See also S. Newcomb, Washington Observations for 1875, app. ii. pp. 176-189. (A. M. C.)

DELISLE, LEOPOLD VICTOR (1826-), French bibliophile and historian, was born at Valognes (Manche) on the 24th of October 1826. At the Ecole des Chartes, where his career was remarkably brilliant, his valedictory thesis was an Essai sur les revenus publics en Normandie au XII" siecle (1849), and it was to the history of his native province that he devoted his early works. Of these the £tudes sur la condition de la classe agricole et I' Stat de V agriculture en Normandie au moyen Age (1851), condens- ing an enormous mass of facts drawn from the local archives, was reprinted in 1905 without

change, and remains authoritative. In November 1852 he entered the manuscript department of the Bibliotheque Imperiale (Nationale), of which in 1874 he became the official head in succession to Jules Taschereau. He was already known as the compiler of several invaluable inventories of its manuscripts. When the French government decided on printing a general catalogue of the printed books in the Biblio- theque, Delisle became responsible for this great undertaking and took an active part in the work; in the preface to the first volume (1897) he gave a detailed history of the library and its management. Under his administration the library was enriched with numerous gifts, legacies and acquisitions, notably by the purchase of a part of the Ashburnham MSS. Delisle proved that the bulk of the MSS. of French origin which Lord Ashburnham had bought in France, particularly those bought from the book- seller Barrois, had been purloined by Count Libri, inspector- general of libraries under King Louis Philippe, and he procured the repurchase of the MSS. for the library, afterwards preparing a catalogue of them entitled Catalogue des MSS. des fonds Libri et Barrois (1888), the preface of which gives the history of the whole transaction. He was elected member of the Academie des Inscriptions et Belles Lettres in 1859, and became a member of the staff of the Recueil des historiens de la France, collaborating in vols. xxii. (1865) and xxiii. (1876) and editing vol. xxiv. (1904), which is valuable for the social history of France in the 13th century. The jubilee of his fifty years' association with the Bibliotheque Nationale was celebrated on the 8th of March 1903. After his retirement (February 21, 1905) he brought out in two volumes a catalogue and description of the printed books and MSS. in the Musee Conde at Chantilly, left by the due d'Aumale to the French Institute. He produced many valuable official reports and catalogues and a great number of memoirs and mono- graphs on points connected with palaeography and the study of history and archaeology (see his Melanges de palSographie et de

bibliographic (1880) with atlas; and his articles in the Album paUographique (1887). Of his purely historical works special mention must be made of his MSmoire sur les actes d' Innocent III (1857), and his MSmoire sur les operations financier es des Templlers (1889), a collection of documents of the highest value for economic history. The thirty-second volume of the Histoire litteraire de la France, which was partly his work, is of great importance for the study of 13th and 14th century Latin chronicles. Delisle was undoubtedly the most learned man in Europe with regard to the middle ages; and his knowledge of diplomatics, palaeography and printing was profound. His output of work, in catalogues, &c, was enormous, and his services to the Bibliotheque Nationale in this respect cannot be overestimated. His wife, a daughter of Eugene Burnouf, was for many years his collaborator.

The Bibliographic des travaux de L.Delisle (1902), by Paul Lacombe, may be consulted for a full list of his numerous works.

DELITZSCH, FRANZ (1813-1890), German Lutheran theologian and orientalist, of Jewish descent, was born at Leipzig on the 23rd of February 1813. He studied theology and- oriental languages in the university of his native town, and in 1850 was appointed professor ordinarius of theology at Erlangen, where the school of theologians became almost as famous as that of Tubingen. In 1867 he accepted a call to Leipzig, where he died on the 4th of March 1890. Delitzsch was a strict Lutheran. " By the banner of our Lutheran confession let us stand," he said in 1888; " folding ourselves in it, let us die " (T. K. Cheyne, Founders, p. 160). Greatly interested in the Jews, he longed ardently for their conversion to Christianity; and with a view to this he edited the periodical Saat auf Hqffnung from 1863, revived the " Institutum Judaicum " in 1880, founded a Jewish missionary college for the training of theologians, and translated the New Testament into Hebrew. He acquired such a mastery of post-biblical, rabbinic and talmudic literature that he has been called the " Christian Talmudist." Though never an advanced

critic, his article on Daniel in the second edition of Herzog's Realencyklopadie, his New Commentary on Genesis and the fourth edition of his Isaiah show that as years went on his sympathy with higher criticism increased — so much so indeed that Prof. Cheyne has included him among its founders.

He wrote a number of very valuable commentaries on Habakkuk (1843), Genesis (1852, 4th ed. 1872), Neuer Kom- mentqr iiber die Genesis (1887, Eng. trans. 1888, &c), Psalms (4th ed. 1883, Eng. trans. 1886, &c), Job (2nd ed., 1876), Isaiah (4th ed. 1889, Eng. trans. 1890, &c), Proverbs (1873), Epistle to the Hebrews (1857, Eng. trans. 1865, &c), Song of Songs and Ecclesiastes (4th ed., 1875). Other works are Geschichte der jtid. Poesie (1836); Jesus und Hillel (1867, 3rd ed. 1879); Handwerkerleben zur Zeit Jesu (1868, 3rd ed. 1878, Eng. trans, in the " Unit Library," 1902); Ein Tag in Kapernaum (1871, 3rd ed. 1886); Poesieen aus vormuhammedanischer Zeit (1874); Iris, Farbenstudien und Blumensliicke (1888, Eng. trans. 1889); Messianische Weissagungen in geschichtlicher Folge (1890, 2nd ed. 1898). His Hebrew New Testament reached its eleventh edition in 1891, and his popular devotional work Das Sakrament des wahren Leibes und Blutes Jesu Christi its seventh edition in 1886.

His son, Friedrich Delitzsch (b. 1850), became well known as professor of Assyriology in Berlin, and the author of many books of great research and learning, especially on oriental philology. Among other works of importance he wrote Wo lag das Parodies? (1881), and Babel und Bibel (1902, 1903, Eng. trans. 1903).

DELITZSCH, a town of Germany, in the Prussian province of Saxony, on the Lober, an affluent of the Mulde, 12 m. north of Leipzig at the junction of the railways, Bitterfeld-Leipzig and Halle-Cottbus. Pop. (1905) 10,479. Its public buildings comprise an old castle of the 14th century now used as a female penitentiary, a Roman Catholic and three Protestant churches, a normal college {Schullehrer seminar) established in 1873 and several other educational institutions. Besides Kuhschwanz, a peculiar kind of

beer, it manufactures tobacco, cigars, shoes and hosiery; and coal-mining is carried on in the neighbourhood,

It was the birthplace of the naturalist Christian Gottfried Ehrenberg (1795-1876), and the political economist Hermann Schulze-Delitzsch (1808-1883), to the latter of whom a statue has been erected. Originally a settlement of the Sorbian Wends, and in the 12 th century part of the possessions of the bishops of Merseburg, Delitzsch ultimately passed to the Saxe-Merseburg family, and, on their extinction in 1738, was incorporated with Electoral Saxony.

DELIUS, NIKOLAUS (1813-1888), German philologist and Shakespearean scholar, was born at Bremen on the 19th of September 1813. He was educated at Bonn and Berlin, and took the degree of doctor in philosophy in 1838. After travelling for some time in England, France and Germany, he returned to Bonn in 1846, where in 1855 he was appointed professor of Sanskrit, Provencal and English literature, a post he held until his death, which took place at Bonn on the 18th of November 1888. His greatest literary achievement was his scholarly edition of Shakespeare (1854-1861). He also edited Wace's St Nicholas (1850), a volume of Provencal songs (1853), and published a Shakspere-Lexikon (1852). His original works include: Tiber das englische Theaterwesen zu Shaksperes Zeit (1853), Gedichte (1853) ,Der sardinische Dialekt des dreizehnten Jahrhunderis (1868), and Abhandlungen zu Shakspere (two series, 1878 and 1888). As a critic of Shakespeare's text he stands in the first rank.

See the biographical notice by J. Schipper in Englische Studien, vol. 14.

DELLA BELLA, STEFANO (1610-1664), Italian engraver, was born at Florence. He was apprenticed to a goldsmith; but some prints of Callot having fallen

into his hands, he began to turn his attention entirely towards engraving, and studied the art under Canta Gallina, who had also been the instructor of Callot. By the liberality of Lorenzo de' Medici he was enabled to spend three years in study at Rome. In 1642 he went to Paris, where Cardinal Richelieu engaged him to go to Arras and make drawings of the siege and taking of that town by the royal army. After residing a considerable time at Paris he returned to Florence, where he obtained a pension from the grand duke, whose son, Cosmo, he instructed in drawing. His productions were very numerous, amounting to over 1400 separate pieces.

DELLA CASA, GIOVANNI (1503–1556), Italian poet, was born at Mugillo, in Tuscany, in 1 503. He studied at Bologna, Florence and Rome, and by his learning attracted the patronage of Alexander Farnese, who, as Pope Paul III., made him nuncio to Florence, where he received the honour of being elected a member of the celebrated academy, and then to Naples, where his oratorical ability brought him considerable success. His reward was the archbishopric of Benevento, and it was believed that it was only his openly licentious poem, Capitoli del forno, and the fact that the French court seemed to desire his elevation, which prevented him from being raised to a still higher dignity. He died in 1 5 56 . Casa is chiefly remarkable as the leader of a reaction in lyric poetry against the universal imitation of Petrarch, and as the originator of a style, which, if less soft and elegant, was more nervous and majestic than that which it replaced. His prose writings gained great reputation in their own day, and long afterwards, but are disfigured by apparent straining after effect, and by frequent puerility and circumlocution. The principal are — in Italian, the famous // Galateo (1558), a treatise of manners, which has been translated into several languages, and in Latin, De officiis, and translations from Thucydides, Plato and Aristotle.

A complete edition of his works was published at Florence in. 1707, to which is prefixed a life by

Casotti. The best edition is that of Venice, 1752. .

DELLA COLLE, RAFFAELLINO, Italian painter, was born at Colle, near Borgo San Sepolcro, in Tuscany, about 1490. A pupil of Raphael, whom he is held to have assisted in the Farnesina and the Vatican, Delia Colle, after his master's death, was the assistant of his chief scholar, Giulio Romano, at Rome and afterwards at Mantua. In 1536, on the occasion of the entry of Charles V. into Florence, he took service in that city under Vasari. In his later years Delia Colle resided at Borgo San

Sepolcro, where he kept a school of design ; among his many pupils of note may be mentioned Gherardi and Vecchi. His works, which are to be found at Urbino, at Perugia, at Pesaro and at Gubbio, are fine examples of the Roman school of Raphael. The best are a painting of the Almighty supported by angels, a Resurrection and an Assumption, all preserved in churches at Borgo San Sepolcro.

DELLA GHERARDESCA, UGOLINO (c. 1220–1289), count of Donoratico, was the head of the powerful family of Gherardesca, the chief Ghibelline house of Pisa. His alliance with the Visconti, the leaders of the Guelph faction, through the marriage of his sister with Giovanni Visconti, judge of Gallura, aroused the suspicions of his party, and the Ghibellines being then predomin- ant in Pisa, the disorders in the city caused by Ugolino and Visconti in 1271–1274 led to the arrest of the former and the banishment of the latter. Visconti died soon afterwards, and Ugolino, no longer regarded as dangerous, was liberated and banished. But he immediately began to intrigue with the Guelph towns opposed to Pisa, and with the help of Charles I. of Anjou (q.v.) attacked his native city and forced it to make peace on humiliating terms, pardoning him and all the other Guelph exiles. He lived quietly in Pisa for some years, although working all the time to extend his influence. War having broken out between Pisa and Genoa in 1284, Count Ugolino was given the command

of a division of the Pisan fleet. It was by his flight — usually attributed to treachery — that the fortunes of the day were decided and the Pisans totally defeated at La Meloria (October 1284). But the political ability which he afterwards displayed led to his being appointed podestd for a year and capitano del popolo for ten years. Florence and Lucca took advantage of the Pisan defeat to attack the republic, but Ugolino succeeded in pacifying them by ceding certain castles. He was however less anxious to make peace with Genoa, for the return of the Pisan prisoners, including most of the leading Ghibellines, would have diminished his power. He was now the most influential man in Pisa, and was preparing to establish his absolute sovereignty, when for some reason not clearly understood he was forced to share his power with his nephew Nino Visconti, son of Giovanni. The duumvirate did not last, and the count and Nino soon quarrelled. Then Ugolino tried to consolidate his position by entering into negotiations with the archbishop, Ruggieri degli Ubaldini, the leader of the Ghibellines. But that party having revived once more, the archbishop obliged both Nino and Ugolino to leave the city, and had himself elected podestd, and capitano del popolo. However, he allowed Ugolino to return soon afterwards, and was even ready to divide the government of the city with him, although he refused to admit his armed followers. The count, determined to be sole master, attempted to get his followers into the city by way of the Arno, and Ruggieri, realizing the danger, aroused the citizens, accusing Ugolino of treachery for having ceded the castles, and after a day's street fighting (July 1, 1288), Gherardesca was captured and immured together with his sons Gaddo and Uguccione, and his grandsons Nino (surnamed il Brigata) and Anselmuccio, in the Muda, a tower belonging to the Gualandi family; here they were detained for nine months, and then starved to death.

The historic details of the episode are still involved in some obscurity, and although mentioned by Villani and other writers, it owes its fame

entirely to Dante, who placed Ugolino and Ruggieri in the second ring (Antenora) of the lowest circle of the Inferno (canto xxxii. 124-140 and xxxiii. 1-90). This terrible but magnificent passage, which includes ” thirty lines unequalled by any other thirty lines in the whole dominion of poetry ” (Landor), has been paraphrased by Chaucer in the ” Monk’s Tale ” and more recently by Shelley. But the reason why Dante placed Ugolino among the traitors is not by any means clear, as the flight from La Meloria was not regarded as treachery by any writer earlier than the 16th century, although G. del Noce, in II Conte U . delta Gherardesca (Citta di Castello, 1894), states that that was the only motive; Bartoli, in vol. vi. of his Storia delta Letteratura italidna, suggests Ugolino’s alliance with the Ghibel- lines as the motive. The cession of the castles was not treachery

but an act of necessity, owing to the desperate conditions of Pisa.

Bibliography. — Besides the above-quoted works see P. Tronci, Annali Pisani (2 vols., Pisa, 1868-1871); S. de Sismondi, Histoire des ripubliques italiennes (Brussels, 1838) ; also the various annotated editions of Dante, especially W. W. Vernon’s Readings from the Inferno, vol. ii. (2nd ed., London, 1905). (L. V.)*

DELLA PORTA, GIOVANNI BATTISTA (c. 1538-1615), Italian natural philosopher, was born of a noble and ancient family at Naples about the year 1 538. He travelled extensively not only in Italy but also in France and Spain, and he was still a youth when he published Magia naturalis, sive de miraculis rerum naturalium lib. IV. (1558), the first draft of his Magia naturalis, in twenty books, published in 1589. He founded in Naples the Academia Secretorum

Naturae, otherwise known as the Accademia dei Oziosi; and in 16 10 he became a member of the Accademia dei Lincei at Rome. He died at Naples on the 4th of February

1615.

The following is a list of his principal writings: — De miraculis rerum naturalium, in four books (1558); De furtivis litterarum notis, in five books (1563, and frequently afterwards, entitling him to high rank among the early writers on cryptography) ; Phytognomonica (1583, a bulky treatise on the physiology of plants as then understood); Magia naturalis (1589, and often reprinted); De humana physio gnomonia, in six books (1591); Villa, in twelve books (1592, an interesting practical treatise on farming, gardening and arboriculture, based upon his own obser- vations at his country-seat near Naples); De refractione, optices parte, in nine books (1593); Pneumatica, in three books (1601); De coelesti physio gnomonia, in six books (1601); Elementa curvilinea (1601); De distillatione, in nine books (1604); De munitione, in three books (1608) ; and De aeris transmutationibus, in four books (1609). He also wrote several Italian comedies Olimpia (1589) ; La Fantesca (1592); La Trappolaria (1597); I'Due Fratelli rivali (1601); La Sorella (1607); La Chiappinaria (1609); La Carbonaria (1628); La Cintia (1628). Among all the above-mentioned works the chief interest attaches to the Magia naturalis, in which a strange medley of subjects is dis- cussed, including the reproduction of animals, the transmutation of metals, pyrotechny, domestic economy, statics, hunting, the preparation of perfumes. In book xvii. he describes a number of optical experiments, including a description of the camera obscura (q.v.).

DELLA QUERCIA, or Deixa Fonte, JACOPO (1374-1438), Italian sculptor, was born at Siena. He was the son of a gold- smith of repute, Pietro d'Agnolo, to whom he doubtless owed much of his training. There are no records of his early life until the year 1394, when

he made an equestrian statue of Gian Tedesco. He is next heard of at Florence in 1402, when he was one of six artists who submitted designs for the great gates of the baptistery, in which competition Ghiberti was the victor. From Florence he seems to have gone to Lucca, where in 1406 he executed one of his finest works, the monument of Ilaria del Caretto, wife of Paolo Guinigi. It is uncertain if he visited Ferrara in 1408; but at the end of that year he was engaged in negotiations which resulted in his acceptance of the com- mission for the famous Fonte Gaia, at Siena, early in 1409. This work was not seriously begun by him until 1414, and was only finished in 1419. In 1858 the remains of the fountain were removed to the Opera del Duomo, where they are now preserved; a copy of the original by Sarrocchi being erected on the site. After another visit to Lucca in 1422, he returned to Siena, and in March 1425 undertook the contract for the doors of S. Petronio, Bologna. He is known, in following years, to have been to Milan, Verona, Ferrara and Venice; but the rest of his life was chiefly divided between his native city and Bologna. In 1430 he finished the great font of S. Giovanni at Siena, which he had begun in 1417, contributing himself only one of the bas-reliefs, " Zacharias ;n the Temple," the others being by Ghiberti, Donatello and other sculptors. Among the work" known to have been done by Jacopo, may be mentioned also the reliefs of the predella of the altar of S. Frediano at Lucca (1422); and the Bentivoglio monu-

ment which was unfinished at the time of his death on the 20th of October 1438. Jacopo della Quercia's work exercised a power- ful influence on that of the artists of the later Italian Renaissance. He himself reflects not a little of the Gothic spirit, admirably intermixed with some of the best qualities of neo-classicism. He was an artist whose powers have hardly yet received the recognition they undoubtedly deserve.

See C. Cornelius, Jacopo della Quercia: eine Kunsthistorische Studie (1896), and works relating generally to the arts in Siena.

(E. F. S.)

DELLA ROBBIA, the name of a family of great distinction in the annals of Florentirx art. Its members are enumerated in chronological order below. 1

I. Luca della Robbia (1399 or i40o 2 i482) was the son of a Florentine named Simone di Marco della Robbia. According to Vasari, whose account of Luca's early life is little to be trusted, he was apprenticed to the silversmith Leonardo di Ser Giovanni, who from 1355 to 1371 was working on the grand silver altar frontal for the cathedral at Pistoia {q.v.) ; this, however, appears doubtful from the great age which it would give to Leonardo, and it is more probable that Luca was thepupil of Ghiberti. During the early part of his life Luca executed many important and exceedingly beautiful pieces of sculpture in marble and bronze. In technical skill he was quite the equal of Ghiberti, and, while possessing all Donatello 's vigour, dramatic power and originality, he very frequently excelled him in grace of attitude and soft beauty of expression. No sculptured work of the great 15th century ever surpassed the singing gallery which Luca made for the cathedral at Florence between 1431 and 1440, with its ten magnificent panels of singing angels and dancing boys, far exceed ing in beauty those which Donatello in 1433 sculptured for the opposite gallery in the same choir. This splendid work is now to be found in the Museo del Duomo. The general effect of the whole can also be seen at the Victoria and Albert Museum, where a complete cast is fixed to the wall. The same museum possesses a study in gesso duro for one of the panels, which appears to be the original sketch by Luca's own hand.

In May 1437 Luca received a commission from the signoria of Florence to execute five reliefs for the north side of the campanile, to complete the series begun by Giotto and Andrea Pisano . These panels are so much in the earlier style of Giotto that we must conclude that he had left drawings from which Luca worked. They have representative figures chosen to

typify grammar, logic, philosophy, music, and science, — the last represented by Euclid and Ptolemy. 3 In 1438 Luca in association with Donatello received an order for two marble altars for chapels in the cathedral. The reliefs from one of them — St Peter's Deliverance from Prison and his Crucifixion — are now in the Bargello. It is probable that these altars were never finished. A tabernacle for the host, made by Luca in 1442, is now at Peretola, near Florence, in the church of S. Maria. A document in the archives of S. Maria Nuova at Florence shows that he received for this 700 florins 1 lira 16 soldi (about £1400 of modern money). In 1437 Donatello received a commission to cast a bronze door for one of the sacristies of the cathedral; but, as he delayed to execute this

1 Genealogical tree of Delia Robbia sculptors : — Simone di Marco.

Marco.

Andrea.

(1435–1525).

!

Luca

(1400–1482).

Girolamo Luca Paolo Giovanni Marco

(1488–1566), (1475–1550?), (1470– ?), (1469–1529?), (1468– ?),

worked mostly worked in Dominican worked Dominican

in France. Florence monk. mainly in monk.

and Rome. Florence.

2 Not 1388, as Vasari says. See a document printed by Gaye, Carteggio inedito, i. pp. 182–186.

3 Vasari is not quite right in his account of these

reliefs : he speaks of Euclid and Ptolemy as being in different panels.

order, the work was handed over to Luca on the 28th of February 1446, with Michelozzo and Maso di Bartolomeo as his assistants. Part of this wonderful door was cast in 1448, and the last two panels were finished by Luca in 1467, with bronze which was supplied to him by Verrocchio. 1 The door is divided into ten square panels, with small heads in the style of Ghiberti projecting from the framing. The two top subjects are the Madonna and Child and the Baptist, next come the four Evangelists, and below are the four Latin Doctors, each subject with attendant angels. The whole is modelled with perfect grace and dignified simplicity; the heads throughout are full of life, and the treatment of the

Fig. I. — Bronze Relief of one of the Latin Doctors, from the sacristy door in the cathedral of Florence, by Luca.

drapery in broad simple folds is worthy of a Greek sculptor of the best period of Hellenic art. These exquisite reliefs are perfect models of plastic art, and are quite free from the over-elaboration and too pictorial style of Ghiberti. Fig. 1 shows one of the panels.

The most important existing work in marble by Luca (executed in 1454-1456) is the tomb of Benozzo Federighi, bishop of Fiesole, originally placed in the church of S. Pancrazio at Florence, but removed to S. Francesco di Paola on the Bellosguardo road outside the city in 1783. In 1898 it was again removed to the church of SS. Trinita in Florence. A very beautiful effigy of the bishop in a restful pose lies on a sarcophagus sculptured with graceful reliefs of angels holding a wreath which contains the inscription. Above are three-quarter length figures of Christ between St John and the Virgin, of

conventional type. The whole is surrounded by a rectangular frame formed of painted tiles of exquisite beauty, but out of keeping with the memorial. On each tile is painted, with enamel pigments, a bunch of flowers and fruit in brilliant realistic colours, the loveliness of which is very hard to describe. Though the bunch of flowers on each is painted on one slab, the ground of each tile is formed of separate pieces, fitted together like a kind of mosaic, probably because the pigment of the ground required a different degree of heat in firing from that needed for the enamel painting of the centre. The few other works of this class which exist do not approach the beauty of this early essay in tile painting, on which Luca evidently put forth his utmost skill and patience.

In the latter part of his life Luca was mainly occupied with the production of terra-cotta reliefs covered with enamel, a process which tie improved upon, but did not invent, as Vasari asserts. The rationale of this process was to cover the clay relief with an enamel formed of the ordinary ingredients of glass (marzacotto) , made white and opaque by oxide of tin. (See Ceramics: Italian Majolica.) Though Luca was not the inventor of the process, 1 See Cavallucci, 5. Maria del Fiore, pt. ii. p. 137.

yet he extended its application to fine sculptured work in terra- cotta, so that it is not unnaturally known now as Delia Robbia ware; it must, however, be remembered that by far the majority of these reliefs which in Italy and elsewhere are ascribed to Luca are really the work of some of the younger members of the family or of the atelier which they founded. Comparatively few exist which can with certainty be ascribed to Luca himself. Among the earliest of these are medallions of the four Evangelists in the vault of Brunelleschi's Pazzi chapel in S. Croce. These fine reliefs are coloured with various metallic oxides in different shades of blue, green, purple, yellow and black. It has often been asserted that the very polychromatic reliefs belong to Andrea or his sons, and that Luca's were all in pure white,

or in white and blue; this, however, is not the case; colours were used as freely by Luca as by his successors. A relief in the Victoria and Albert Museum furnishes a striking example of this and is of especial value from its great size, and also because its date is known. This is an enormous medallion containing the arms of Rene of Anjou and other heraldic devices; it is surrounded by a splendidly modelled wreath of fruit and flowers, especially apples, lemons, oranges and fir cones, all of which are brilliantly coloured. This medallion was set up on the facade of the Pazzi Palace to commemorate Rene's visit to Florence in 1442. Other reliefs by Luca, also in glazed terra-cotta, are those of the Ascension and Resurrection in the tympani of the doors of the sacristies in the cathedral, executed in 1443 and 1446. Other existing works of Luca in Florence are the tympanum reliefs of the Madonna between two Angels in the Via dell' Agnolo, a work of exquisite beauty, and another formerly over the door of S. Pierino del Mercato Vecchio, but now removed to the Bargello (No. 29). The only existing statues by Luca are two lovely enamelled figures of kneeling angels holding candlesticks, now in the canons' sacristy. 2 A very fine work by Luca, executed between 1449 and 1452, is the tympanum relief of the Madonna and four Monastic Saints over the door of S. Domenico at Urbino. 3 Luca also made the four coloured medallions of the Virtues set in the vault over the tomb of the young cardinal-prince of Portugal in a side chapel of S. Miniato in Florence (see Rosseixino). By Luca also are various polychromatic medallions outside Or San Michele. 4 One of his chief decorative works which no longer exists was a small library or study for Piero de' Medici, wholly lined with enamelled plaques and reliefs. 6 The Victoria and Albert Museum possesses twelve circular plaques of majolica ware painted in blue and white with the Occupations of the Months; these have been attributed to Luca, under the idea that they formed part of the decoration of this room, but their real origin is doubtful.

In 1471 Luca was elected president of the Florentine Gild of Sculptors, but he refused this great honour on account of his age and infirmity. It shows, however, the very high estimation in which he was held by his contemporaries. He died on the 20th of February 1482, leaving his property to his nephews Andrea and Simone. 6 His chief pupil was his nephew Andrea, and Agostino di Duccio, who executed many pieces of sculpture at Rimini, and the graceful but mannered marble reliefs of angels on the facade of S. Bernardino at Perugia, may have been one of his assistants. 7 Vasari calls this Agostino Luca's brother, but he was not related to him at all.

' II. Andrea della Robbia (1435–1525), the nephew and pupil of Luca, carried on the production of the enamelled reliefs on a much larger scale than his uncle had ever done; he also extended

2 The Victoria and Albert Museum possesses what seem to be fine replicas of these statues.

3 The document in which the order for this and the price paid for it are recorded is published by Yriarte, Gaz. d. beaux arts, xxiv. P– H3–

4 One of these medallions, that of the Physicians, is now removed to the inside of the church.

1 It is_ fully described by Filarete in his Trattato dell' architectura, written in 1464, and therefore was finished before that date; see also Vasari, ed. Milanesi (Florence, 1880), ii. p. 174.

6 His will, dated 19th February 1471, is published by Gaye, Cart, ined. i. p. 185.

7 In the works of Perkins and others on Italian sculpture these Perugian reliefs are wrongly stated to be of enamelled clay.

its application to various architectural uses, such

as friezes and to the making of lavabos (lavatories), fountains and large retables. The result of this was that, though the finest reliefs from the workshop of Andrea were but little if at all inferior to those from the hand of Luca, yet some of them, turned out by pupils and assistants, reached only a lower standard of merit. Only one work in marble by Andrea is known, namely, an altar in S. Maria delle Grazie near Arezzo, mentioned by Vasari (ed. Milanesi, ii. p. 170), and still well preserved.

One variety of method was introduced by Andrea in his enamelled work; sometimes he omitted the enamel on the face and hands (nude parts) of his figures, especially in those cases where he had treated the heads in a realistic manner; as, for example, in the noble tympanum relief of the meeting of St Domenic and St Francis in the loggia of the Florentine hospital of S. Paolo, — a design suggested by a fresco of Fra Angelico's in the cloister of St Mark's. One of the most remarkable works by Andrea is the series of medallions with reliefs of Infants in white on a blue ground set on the front of the foundling hospital at Florence. These lovely child-figures are modelled with wonder- ful skill and variety, no two being alike. Andrea produced, for gilds and private persons, a large number of reliefs of the Madonna and Child varied with much invention, and all of extreme beauty of pose and sweetness of expression. These are frequently framed with realistic yet decorative garlands of fruit

Fig. 2. — Enamelled Clay Relief of Virgin and Child, by Andrea.

and flowers painted with coloured enamels, while the main relief is left white. Fig. 2 shows a good example of these smaller works. The hospital of S. Paolo, near S. Maria Novella, has also a number of fine medallions with reliefs of saints, two of Christ Healing the Sick, and two fine portraits, under which are white plaques inscribed — " dall anno 1451 all anno 1495 "; the first of these dates is the year when the hospital was rebuilt owing to a*

papal brief sent to the archbishop of Florence. Arezzo possesses a number of fine enamelled works by Andrea and his

1 Professor Marquand has discovered, beneath 1451, the inscription Prete Benino, and, under 1495, De Benini; probably the names of the governors of the hospital at these dates.

sons — a retable in the cathedral with God holding the Crucified Christ, surrounded by angels, and below, kneeling figures of S. Donato and S. Bernardino; also in the chapel of the Campo Santo is a fine relief of the Madonna and Child with four saints at the sides. In S. Maria in Grado is a very noble retable with angels holding a crown over a standing figure of the Madonna; a number of small figures of worshippers take refuge in the folds of the Virgin's mantle, a favourite motive for sculpture dedicated by gilds or other corporate bodies. Perhaps the finest collection of works of this class is at La Verna, not far from Arezzo (see Vasari, ed. Milanesi, ii. p. 179). The best of these, three large retables with representations of the Annunciation, the Crucifixion, and the Madonna giving her Girdle to St Thomas, are probably the work of Andrea himself, the others being by his sons. In 1489 Andrea made a beautiful relief of the Virgin and two Angels, now over the archive-room door in the Florentine Opera del Duomo; for this he was paid twenty gold florins (see Cavallucci, S. Maria del Fiore). In the same year he modelled the fine tympanum relief over a door of Prato cathedral, with a half- length figure of the Madonna between St Stephen and St Lawrence, surrounded by a frame of angels' heads.

In 1491 he was still working at Prato, where many of his best reliefs still exist. A fine bust of S. Lino exists over the side door of the cathedral at Volterra, which is attributed to Andrea. Other late works of known date are a magnificent bust of the Protonotary Almadiano, made in 1510 for the church of S. Giovanni de' Fiorentini at Viterbo, now preserved in the Palazzo Communale there, and a

medallion of the Virgin in Glory, sur- rounded by angels, made in 1505 for Pistoia cathedral. 2 The latest work attributed to Andrea, though apparently only a workshop production of 1515, is a relief representing the Adora- tion of the Magi, made for a little church, St Maria, in Pian di Mugnone, near Florence. 3 Portions of this work are still in the church, but some fragments of it are at Oxford.

III., IV. Five of Andrea's seven sons worked with their father, and after his death carried on the Robbia fabrique; the dates of their birth are shown in the table on p. 838 ante. Early in life two of them came under the influence of Savonarola, and took monastic orders at his Dominican convent; these were Marco, who adopted the name of Fra Luca, and Paolo, called Fra Ambrogio. One relief by the latter, a Nativity with four life- sized figures of rather poor work, is in the Cappella degli Spagnuolf in the Sienese convent, of S. Spirito; a MS. in the convent archives records that it was made in 1 504.

V. The chief existing work known to be by the second Luca 4 is the very rich and beautiful tile pavement in the uppermost story of Raphael's loggie at the Vatican, finely designed and painted in harmonious majolica colours. This was made by Luca at Raphael's request and under his supervision in 1518. 6 It is still in very fine preservation.

VI. Giovanni della Robbia (1469–1529?) during a great part of his life worked as assistant to his father, Andrea, and in many cases the enamelled sculpture of the two cannot be dis- tinguished. Some of Giovanni's independent works are of great merit, especially the earlier ones; during the latter part of his life his reliefs deteriorated in style, owing mainly to the universal decadence of the time. A very large number of pieces of Robbia ware which are attributed to Andrea, and even to the elder Luca, were really by the hand of Giovanni. One of his finest works is a large retable at Volterra in the church of S. Girolamo, dated 1501 ; it represents the Last Judgment, and is remarkable for the fine modelling of the figures, especially that of the

archangel Michael, and a nude kneeling figure of a youth who has just risen from his tomb. Quite equal in beauty to anything of his father's, from

2 See Gualandi, Memorie risguardanti le belle arti (Bologna, 1845), vi. pp. 33–35, where original documents are printed recording the dates and prices paid for these and other works of Andrea.

3 See a document printed by Milanesi in his Vasari, ii. p. 180.

4 It appears certain that this Luca was a layman and not the Fra Luca referred to above.

6 It is illustrated by Gruner, Fresco Decorations of Italy (London, 1854), pi. iv. ; see also Miintz, Raphael, sa vie, &c. (Paris, 1881), p. 452, note i., and Vasari, ed. Milanesi, ii. p. 182.

whom the design of the figures was probably taken, is the washing- fountain in the sacristy of S. Maria Novella at Florence, made in 1497. ' It is a large arched recess with a view of the seashore, not very decorative in style, painted on majolica tiles at the back. There are also two very beautiful painted majolica panels of fruit- trees let into the lower part. In the tympanum of the arch is a very lovely white relief of the Madonna between two Adoring Angels (see fig. 3). Long coloured garlands of fruit and flowers are held by nude boys reclining on the top of the arch and others

Fig. 3. — Relief of Madonna and Angels in the tympanum of the lavabo (S. Maria Novella, Florence), by Giovanni.

standing on the cornice. All this part is of enamelled clay, but the basin of the fountain is of white marble. Neither Luca nor Andrea was in the habit of signing his work, but Giovanni often did so, usually adding the date, probably because other

potters had begun to imitate the Robbia ware. 2

Giovanni lacked the original talent of Luca and Andrea, and so he not only copied their work but even reproduced in clay the marble sculpture of Pollaiuolo, Da Settignano, Verrocchio and others. A relief by him, evidently taken from Mino da Fiesole, exists in the Palazzo Castracane Staccoli. Among the very numerous other works of Giovanni are a relief in the wall of a suppressed convent in the Via Nazionale at Florence, and two reliefs in the Bargello dated 1521 and 1522. That dated 1 521 is a many-coloured relief of the Nativity, and was taken from the church of S. Girolamo in Florence; it is a too pictorial work, marred by the use of many different planes. Its predella has a small relief of the Adoration of the Magi, and is inscribed " Hoc opus fecit Ioaes Andee de Robia, ac a posuit hoc in tempore die ultima lulli ano. dni. m.d. xxi." At Pisa in the Campo Santo is a relief in Giovanni's later and poorer manner dated 1520; it is a Madonna surrounded by angels, with saints below — the whole overcrowded with figures and ornaments. Giovanni's largest and perhaps finest work is the polychromatic frieze on the outside of the Del Ceppo hospital at Pistoia, for which he received various sums of money between 1525 and 1 5 29, as is recorded in documents which still exist among the archives of the hospital. 3 The subjects of this frieze are the Seven Work: of Mercy, forming a continuous band of sculpture in high relief, well modelled and designed in a very broad sculpturesque way, but disfigured by the crudeness of some of its colouring. Six of these reliefs are by Giovanni, namely, Clothing the Naked, Washing the Feet of Pilgrims,

1 See a document printed by Milanesi in his Vasari, ii. 193.

s Examples of these imitations are a retable in S. Lucchese near Poggibonsi dated 1514, another of the Madonna and Saints at Monte San Savino of 1525, and a third in the Capuchin church of Arceria near Sinigaglia ; they are all inferior to the best works of the Robbia family, though some of them may have

been made by assistants trained in the Robbia workshops.

3 The hospital itself was begun in 1514.

Visiting the Sick, Visiting Prisoners, Burying the Dead, and Feeding the Hungry. The seventh, Giving drink to the Thirsty, was made by Filippo Paladini of Pistoia in 1585; this last is simply made of painted stucco. The large figures of the virtues placed between the scenes, and the medallions between the pillars, are the work of assistants or imitators.

A large octagonal font of enamelled clay, with pilasters at the angles and panels between them with scenes from the life of the Baptist, in the church of S. Leonardo at Cerreto Guidi, is a work of the school of Giovanni; the reliefs are pictorial in style and coarse in execution. Giovanni's chief pupil was a man named Benedetto Bugliorii (1461-1521), and a pupil of his, one Santi Buglioni (b. 1494), entered the Robbia workshops in 1521, and assisted in the later works of Giovanni.

VII. Girolamo della Robbia (1488-1566), another of Andrea's sons, was an architect and a sculptor in marble and bronze as well as in enamelled clay. During the first part of his life he, like his brothers, worked with his father, but in 1528 he went to France and spent nearly forty years in the service of the French Royal family. Francis I. employed him to build a palace in the Bois de Boulogne called the Chateau de Madrid. This was a large well-designed building, four storeys high, two of them having open loggie in the Italian fashion. Girolamo decorated it richly with terra-cotta medallions, friezes and other architec- tural features. 4 For this purpose he set up kilns at Suresnes. Though the palace itself has been destroyed, drawings of it exist. 6

The best .collections of Robbia ware are in the Florentine Bargello, Accademia and Museo del Duomo; the Victoria and Albert Museum (the finest out of

Italy); the Louvre, the Cluny and the Berlin Museums; while fine examples are to be found in New York, Boston, St Petersburg and Vienna. Many fine specimens exist in private collections in England, France, Germany and the United States. The greater part of the Robbia work still remains in the churches and other buildings of Italy, especially in Florence, Fiesole, Arezzo, La Verna, Volterra, Barga, Montepulciano, Lucca, Pistoia, Prato and Siena.

Literature. — H. Barbet de Jouy, Les della Robbia (Paris, 1855); W. Bode, Die Kiinstlerfamilie della Robbia (Leipzig, 1878); ” Luca della Robbia ed i suoi precursori in Firenze,” Arch. stor. dell’ arte (1899); ” t)ber Luca della Robbia,” Sitzungsbericht von der Berliner kunstgeschichtlichen Gesellschaft (1896); Florentiner Bildhauer der Renaissance (Berlin, 1902) ; G. Carocci, / Dintorni de Firenze (Florence, 1881); ” II Monumento di Benozzo Federighi,” Arte e Storia (1894); ” Opere Robbiane poco noti,” Arte e storia (1898, 1899); Cavallucci et Molinier, Les della Robbia (Paris, 1884); Maud Crutwell, Luca and Andrea della Robbia and their Successors (London, 1902) ; A. du Cerceau, Les plus exCellents bastiments de France (Paris, 1586); G. Milanesi, Le Vile scritte da Vasari (Florence, 1878); M. Reymond, Les della Robbia (Florence, 1897); La Sculpture Florentine (Florence, 1898); I. B. Supino, Catalogo del R. Museo di Firenze (Rome 1898); Vasari (see Milanesi’s edition). (J. H. M.;W. B.)*

DELMEDIGO, a Cretan Jewish family, of whom the following are the most important:

Elijah Delmedigo (1460–1497), philosopher, taught in several Italian centres of learning. He translated some of Averroes’ commentaries into Latin at the instigation of Pico di Mirandola. In the sphere of religion, Delmedigo represents the tendency to depart from the scholastic attitude in which religion and philosophy were identified. His most important work was devoted to this end; it was entitled Behinath ha-Dath (Investi- gation of

Religion).

Joseph Solomon Delmedigo (1591-1655), pupil of Galileo, wrote many books on science and philosophy, and bore a con- siderable part in initiating the critical movement in Judaism. He belonged to the sceptical school, and though his positive contributions to literature were not of lasting worth, Graetz includes him among the important formative influences within the synagogue of the 17th century. (I. A.)

4 The Sevres Museum possesses some fragments of these de- corations.

6 See Laborde, Chateau de Madrid (Paris, 1853), and Comptes des bdtiments du roi (Paris, 1877-1880), in which a full account is given of Girolamo's work in connexion with this palace. .

DELMENHORST, a town of Germany, grand duchy of Olden- burg, on the Delme, 8 m. by rail W. from Bremen, at the junction of a line to Vechta. Pop. (1905) 20,147. It has a Protestant and a Roman Catholic church, and is the seat of considerable industries; notably wool-combing, weaving, jute- spinning and the manufacture of linoleum. Delmenhorst was founded in 1 230, and from 1247 to 1679, when it was destroyed by the French, was protected by a strong castle.

DELOLME, JEAN LOUIS (1 740-1 806), Swiss jurist and con- stitutional writer, was born at Geneva in 1 740. He studied for the bar, and had begun to practise when he was obliged to emigrate on account of a pamphlet entitled Examen de trois parts de droit, which gave offence to the authorities of the town. He took refuge in England, where he lived for several years on the meagre and precarious income derived from occasional contribu- tions to various journals. In 1775 he found himself compelled to

accept aid from a charitable society to enable him to return home. He died at Sewen, a village in the canton of Schwyz, on the 1 6th of July 1806.

During his protracted exile in England Delolme made a care- ful study of the English constitution, the results of which he published in his Constitution de V Angleterre (Amsterdam, 177 1), of which an enlarged and improved edition in English appeared in 1772, and was several times reprinted. The work excited much interest as containing many acute observations on the causes of the excellence of the English constitution as compared with that of other countries. It is, however, wanting in breadth of view, being written before the period when constitutional questions were treated in a scientific manner. Along with a translation of Hume's History of England it supplied the philosophes with most of their ideas about the English con- stitution. It thus was used somewhat as a political pamphlet. Several editions were published after the author's death. Delolme also wrote in English Parallel oetween the EngUsh Government and the former Government of Sweden (1772); A History of the Flagellants (1782), based upon a work of Boileau's; An Essay on the Union of Scotland with England (1787), and one or two smaller works.

DELONEY (or Delone), THOMAS, English ballad- writer and pamphleteer, produced his earliest indisputable work in 1586, and died about 1600. In 1596 Thomas Nashe, in his Have with you to Saffron Walden, wrote: " Thomas Deloney, the ballating silk-weaver, hath rime enough for all myracles, and wit to make a Garland of Good Will more than the premisses . . . and this deare yeare, together with the silencing of his looms, scarce that, he being constrained to betake himself to carded ale; whence it proceedeth that since Candlemas, or his jigge, John for the king, not one merrie dittie will come from him, but, the Thunderbolt against Swearers, — Repent, England, Repent — and, the strange Judgements of God." In 1588 the coming of the Armada inspired him for three broadsides, which were reprinted (i860) by J. O.

Halliwell-Phillipps. They are entitled " The Queenes visiting of the Campe at Tilsburie with her entertainment there," " A Joyful new Ballad, declaring the happie obtaining of the great Galleazzo . . . ," and " A new Ballet of the straunge and Most cruell Whippes which the Spaniards had prepared." A collection of Strange Histories (1607) consists of historical ballads by Deloney, with some poems from other hands. This collection, known in later and enlarged editions as The Royal Garland of Love and Delight and The Garland of Delight, contains the ballad of Fair Rosamond. J. H. Dixon in his preface to The Garland of Good Will (Percy Society, 1851) ascribes to Deloney The Blind Beggar of Bednall Green, and The Pleasant and sweet History of Patient Grissel, in prose, with the whole of the Garland of Good Will, including some poems such as " The Spanish Lady's Love " generally supposed to be by other hands. His other works include The Gentle Craft (1597) in praise of shoemakers, The Pleasant Historie of John Winchecombe (8th ed., 1619), and Thomas of Reading or the Sixe Worthie Yeomen of the West (earliest extant edition, 1612). Kempe, the actor, jeers at these histories in his Nine Dales Wonder, but they were very popular, being reprinted as penny chap-books.

DE LONG, GEORGE WASHINGTON (1844-1881), American explorer, was born in New York city on the 22nd of August 1844. He graduated at the U.S. Naval Academy in 1865, and spent the next fourteen years in naval service in various parts of the world, attaining the rank of lieutenant in 1869, and lieutenant-commander in 1879. - In 1873 he took part in the voyage of the " Juniata," sent to search for and relieve the American Arctic expedition under Hall in the " Polaris," commanding a steam launch which was sent out from Upernivik, Greenland, to make a thorough search of Melville Bay. On his return to New York the same year he proposed to James Gordon Bennett, of The New York Herald, that the latter should fit out a Polar expedition. It was not until 1879 that the final arrangements were made, the " Pandora," a

yacht which had already made two Arctic voyages under Sir Allen Young, being purchased and rechristened the ” Jeannette ” for this voyage. The story of this expedition (see Polar Regions) is chiefly remarkable on account of the long and helpless drifting of the ” Jeannette ” with the polar ice-pack in which she was caught (September 5, 1879) and by which she was finally crushed and sunk on the 13th of June 1881. The members of the expedition set out in three boats, one of which was lost in a gale, while another boat-load under De Long died from starvation after reaching the mouth of the Lena river. He was the last survivor of his party. His journal, in which he made regular entries up to the day on which he died (October 30, 1881) was edited by his wife and published in 1883 under the title Voyage of the ” Jeannette "• and an account of the search which was made for him and his comrades by his heroic com- panion George W. Melville, who was chief engineer of the expedi- tion and commanded the third of the retreating parties, was published a year later under the title of In the Lena Delta. The fate of the ” Jeannette ” was still more remarkable in its sequel. Three years after she had sunk several articles belonging to her crew were found on an ice-floe near Julianshaab on the south-west coast of Greenland; thus adding fresh evidence to the theory of a continuous ocean current passing across the unknown Polar regions, which was to be finally demonstrated by Nansen’s voyage in the ” Fram.” By direction of the United States government, the remains of De Long and his companions were brought home and interred with honour in his native city.

DELORME, MARION (c. 1613-1650), French courtesan, was the daughter of Jean de Lou, sieur de l’Orme, president of the treasurers of France in Champagne, and of Marie Chastelain. She was born at her father’s chateau near Champaubert. Initi- ated into the philosophy of pleasure by the epicurean and atheist Jacques Vallee, sieur Desbarreaux, she soon left him for Cinq Mars, at that time at the height of his popularity, and succeeded, it is said, in

marrying him in secret. From this time Marion Delorme's salon became one of the most brilliant centres of elegant Parisian society. After the execution of Cinq Mars she is said to have numbered among herlovers Charles de St Evremond (1610-1703) the wit and litterateur, Buckingham (Villiers), the great Conde, and even Cardinal Richelieu. Under the Fronde her salon became a meeting place for the disaffected, and Mazarin is said to have sent to arrest her when she suddenly died. Her last years have been adorned with considerable legend (cf . Mere- court, Confessions de Marie Delorme, Paris, 1856). It seems established that she died in 1650. But she was believed to have lived until 1706 or even 17 41, after having had the most fantastic adventures, including marriage with an English lord, and an old age spent in poverty in Paris. Her name has been popularized by various authors, especially by Alfred de Vigny in his novel Cinq Mars, by Victor Hugo in the drama Marion Delorme, and by G. Bottesini in an opera of the same title.

See P. J. Jacob, Marion Delorme et Ninon Lenclos (Paris, 1859); J. Peladan, Histoire et legende de Marion de Lorme (Paris, 1882).

DE L'ORME, PHILIBERT (c. 1510-1570), French architect, one of the great masters of the Renaissance, was born at Lyons, the son of Jehan de L'Orme, who practised the same art and brought his son up to it. At an early age Philibert was sent to Italy to study (1533-1536) and was employed there by Pope Paul III. Returning to France he was patronized by Cardinal du Bellay

at Lyons, and was sent by him about 1 540 to Paris,where he began the Chateau de St Maur, and enjoyed royal favour; in 1545 he was made architect to Francis I. and given the charge of works in Brittany. In 1548 Henry II. gave him the supervision of Fontainebleau, Saint-Germain and the other royal

buildings; but on his death (1559) Philibert fell into disgrace. Under Charles IX., however, he returned to favour, and was employed to construct the Tuileries, in collaboration with Jean Brillant. He died in Paris on the 8th of January 1570. Much of his work has disappeared, but his fame remains. An ardent humanist and student of the antique, he yet vindicated resolutely the French tradition in opposition to Italian tendencies; he was a man of independent mind and a vigorous originality. His masterpiece was the Chateau d' Anet (1552–1559), built for Diane de Poitiers, the plans of which are preserved in Du Cerceau's Plus excellens basti- mens de France, though part of the building alone remains; and his designs for the Tui- leries (also given by Du Cerceau), begun by Catherine de' Medici in 1565, were magnificent. His work is also seen at Chenonceaux and other famous chateaux; and his tomb of Francis I. at St Denis remains a perfect speci- men of his art. He wrote two books on architecture (1561 and 1567).

See Marius Vachon, Philibert de L'Orme (1887) ; Chevalier, Lettres et devis relatifs a la con- struction de Chenonceaux (1864) ; Pfror, Monographic du chateau a" Anet (1867); Herbet, Travaux de P. de L'Orme a Fontainebleau

(1890).

DELOS (mod. Mikra Dili, or Little Delos, to distinguish it from Megali Dili, or Great Delos), an island in the Aegean, the smallest but most famous of the Cyclades, and, according to the ancient be- lief, the spot round which the group arranged itself in a nearly circular form. It is a rugged mass of granite, about 3 m. long and 1 m. to 5 m. broad, about J m. E. of Megali Dili or Rheneia, and 2 m. W. of Myconus. Towards the centre it rises to its greatest height of 350 ft. in the steep and rocky peak of Mount Cynthus, which, though overtopped by several eminences in the neighbouring islands, is very conspicuous from the sur- rounding sea. It is now completely destitute of trees, but it abounds with brushwood of lentisk and cistus, and here and

there affords a patch of corn-land to the occasional sower from Myconus.

I. Archaeology. — Excavations have been made by the French School at Athens upon the island of Delos since 1877, chiefly by Th. Homolle. They have proceeded slowly but systematic- ally, and the method adopted, though scientific and economical, left the site in some apparent confusion, but the debris have more recently been cleared away to a considerable extent. The com- plete plan of the sacred precinct of Apollo has been recovered, as well as those of a considerable portion of the commerical quarter of Hellenistic and Roman times, of the theatre, of the temples of the foreign gods, of the temples on the top of Mount Cynthus, and of several very interesting private houses. Numerous works of sculpture of all periods have been found, and also a very extensive series of inscriptions, some of them throwing much light upon the subject of temple administration in Greece.

The most convenient place for landing is protected by an ancient

mole; it faces the channel between Delos and Rheneia, and is about opposite the most northerly of the two little islands now called '7evfj.aTi6.pl. From this side the sacred precinct of Apollo is approached by an avenue flanked by porticoes, that upon the seaside bearing the name of Philip V. of Macedon, who dedicated it about 200 B.C. This avenue must have formed the usual approach for sacred embassies and processions; but it is probable that the space to the south was not convenient for marshalling them, since Nicias, on the occasion of his famous embassy, built a bridge from the island of Hecate (the Greater Rhevmatiari) to Delos, in order that the imposing Athenian procession might not miss its full effect. Facing the avenue were the propylaea

that formed the chief entrance of the precinct 'of Apollo. They consisted of a gate faced on the outside with a projecting portico of four columns,

on the inside with two columns in anlis. Through this one entered a large open space, filled with votive offerings and containing a large exedra. The sacred road continued its course to the north-east corner of this open space, with the precinct of Artemis on its west side, and, on its east side, a terrace on which stood three temples. The southernmost of these was the temple of Apollo, but only its back was visible from this side. Though there is no evidence to show to whom the other two were dedicated, the fact that they faced west seems to imply that they were either dedicated to heroes or minor deities, or that they were treasuries. Beyond them a road branches to the right, sweeping round in a broad curve to the space in front of the temple of Apollo. The outer side of this curve is bounded by a row of treasuries, similar to those found at Delphi and Olympia, and serving to house the more costly offerings of various islands or cities. The space to the east and south of the temple of Apollo could also be approached directly from the propylaea of entrance, by turning to the right through a passage-like building with a porch at either end. Just to the north of this may be seen the basis of the colossal statue of Apollo dedicated by the Naxians, with its well-known archaic inscription; two large fragments of the statue itself may still be seen a little farther to the north. The temple of Apollo forms the centre of the whole precinct.

which it dominates by the height of its steps as well as of the terrace already mentioned; its position must have been more commanding in ancient times than it is now that heaps of earth and debris cover so much of the level. The temple was of Doric style, with six columns at the front and back and thirteen at the sides; it was built early in the 4th century B.C.; little if any traces have been found of the earlier building which it super- seded. Its sculptural decoration appears to have been but

scanty; the metopes were plain. The groups which ornamented, as acroteria, the two gables of the temple have been in part recovered, and may now be seen in the national museum at Athens; at the one end was Boreas carrying off Oreithyia, at the other Eos and Cephalus, the centre in each case being occupied by the winged figure that stood out against the sky — a variation on the winged Victories that often occupy the same position on temples.

To the east of the space in front of the temple was an oblong building of two chambers, with a colonnade on each side but not in front; this may have been the Prytaneum or some other official building; beyond it is the most interesting and character-istic of all the monuments of Delphi. This is a long narrow hall, running from north to south, and entered by a portico at its south end. At the north end was the famous altar, built out of the horns of the victims, which was sometimes reckoned among the seven wonders of the world. The rest of the room is taken up by a paved space, surrounded by a narrow gangway; and on this it is supposed that the ykpavos or stork-dance took place. The most remarkable architectural feature of the building is the partition that separated the altar from this long gallery; it consists of two columns between antae, with capitals of a very peculiar form, consisting of the fore parts of bulls set back to back ; from these the whole building is sometimes called the sanctuary of the bulls. Beyond it, on the east, was a sacred wood filling the space up to the wall of the precinct; and at the south end of this was a small open space with the altar of Zeus Polieus.

At the north of the precinct was a broad road, flanked with votive offerings and exedrae, and along the boundary were porticoes and chambers intended for the reception of the dtiapiai or sacred embassies; there are two entrances on this side, each of them through extensive propylaea.

At the north-west corner of the precinct is a building of lime- stone, the irwpivos olkos often mentioned in the inventories of the treasures of the

Delian shrine. South of it is the precinct of Artemis, containing within it the old temple of the goddess; her more recent temple was to the south of her precinct, opening not into it but intp the open space entered through the southern propylaea of the precinct of Apollo. The older temple is mentioned in some of the inventories as ” the temple in which were the seven statues “; and close beside it was found a series of archaic draped female statues, which was the most important of its kind until the discovery of the finer and better preserved set from the Athenian Acropolis.

Within the precinct there were found many statues and other works of art, and a very large number of inscriptions, some of them giving inventories of the votive offerings and accounts of the administration of the temple and its property. The latter are of considerable interest, and give full information as to the sources of the revenue and its financial administration.

Outside the precinct of Apollo, on the south, was an open place; between this and the precinct was a house for the priests, and within it, in a kind of court, a set of small structures that may perhaps be identified as the tombs of the Hyperborean maidens. Just to the east was the temple of Dionysus, which is of peculiar plan, and faces the open place; on the other side of it is a large rectangular court, surrounded by colonnades and chambers which served as offices, the whole forming a sort of commercial exchange; in the middle of it was a temple dedicated to Aphrodite and Hermes.

To the north of the precinct of Apollo, between it and the sacred lake, there are very extensive ruins of the commercial town of Delos; these have been only partially cleared, but have

yielded a good many inscriptions and other antiquities. The most extensive building is a very large court surrounded by chambers, a sort of club or exchange. Beyond this, on the way to the east coast, are the remains of the new and the old

palaestra, also partially excavated.

The shore of the channel facing Rheneia is lined with docks and warehouses, and behind them, as well as elsewhere in the island, there have been found several private houses of the 2nd or 3rd century B.C. Each of these consists of a singlecourt surrounded by columns and often paved with mosaic; various chambers open out of the court, including usually one of large proportions, the avdpuv or dining-room for guests.

The theatre, which is set in the lower slope of Mount Cynthus, has the wings of the auditorium supported by massive sub- structures. The most interesting feature is the scena, which is unique in plan; it consisted of an oblong building of two storeys, surrounded on all sides by a low portico or terrace reaching to the level of the first floor. This was supported by pillars, set closer together along the front than at the sides and back. An inscrip- tion found in the theatre showed that this portico, or at least the front portion of it, was called the proscenium or logeum, two terms of which the identity was previously disputed.

On the summit of Mount Cynthus, above the primitive cave- temple which has always been visible, there have been found the remains of a small precinct dedicated to Zeus Cynthius and Athena Cynthia. Some way down the slope of the hill, between the cave- temple and the ravine of the Inopus, is a terrace with the temples of the foreign gods, Isis and Serapis, and a small odeum.

II. History. — Many alternative names for Delos are given by tradition; one of these, Ortygia, is elsewhere also assigned to an island sacred to Artemis. Of the various traditions that were current among the ancient Greeks regarding the origin of Delos, the most popular describes it as drifting through the Aegean till moored by Zeus as a refuge for the wandering Leto. It supplied a birthplace to Apollo and Artemis, who were born beneath a palm tree beside its sacred lake, and became for ever

sacred to these twin deities. The island first appears in history as the seat of a great Ionic festival to which the various Ionic states, including Athens, were accustomed annually to despatch a sacred embassy, or Theoria, at the anniversary of the birth of the god on the 7th of Thargelion (about May). In the 6th century B.C. the influence of the Delian Apollo was at its height; Poly crates of Samos dedicated the neighbouring island of Rheneia to his service and Peisistratus of Athens caused all the area within sight of the temple to be cleared of the tombs by which its sanctity was impaired. After the Persian wars, the predominance of Athens led to the transformation of the Delian amphictyony into the Athenian empire. (See Delian League.) In 426 B.C., in con- nexion with a reorganization of the festival, which henceforth was celebrated in the third year of every Olympiad, the Athenians instituted a more elaborate lustration, caused every tomb to be removed from the island, and established a law that ever after any one who was about to die or to give birth to a child should be at once conveyed from its shores. And even this was not accounted sufficient, for in 422 they expelled all its secular inhabitants, who were, however, permitted to return in the following year. At the close of the Peloponnesian War the Spartans gave to the people of Delos the management of their own affairs; but the Athenian predominance was soon after restored, and survived an appeal to the amphictyony of Delphi in 345 B.C. During Macedonian times, from 322 to 166 B.C., Delos again became independent; during this period the shrine was enriched by offerings from all quarters, and the temple and its possessions were administered by officials called Uporoioi. After 166 B.C. the Romans restored the control of Delian wor- ship to Athens, but granted to the island various commercial privileges which brought it great prosperity. In 87 B.C. Meno- phanes, the general of Mithradates VI. of Pontus, sacked the island, which had remained faithful to Rome. From this blow it never recovered; the Athenian control was resumed in 42 B.C., but Pausanias (viii. 33. 2) mentions Delos as deserted

but for a

few Athenian officials; and several epigrams of the ist or 2nd century a.D. attest the same fact, though the temple and worship were probably kept up until the official extinction of the ancient religion . A museum has now been built to contain the antiquities found in the excavations; otherwise Delos is now uninhabited, though during the summer months a few shepherds cross over with their flocks from Myconus or Rheneia. As a religious centre it is replaced by Tenos and as a commercial centre by the flourishing port of Syra.

See Lebegue, Recherches sur Delos (Paris, 1876). Numerous articles in the Bulletin de correspondance hellenique record the various discoveries at Delos as they were made. See al?o Th. Homolle, Les Archives de V intendance sacree d, Delos (with plan). The best con- secutive account is given in the Guide Joanne, Grece, ii. 443- 464. For history, see Sir R. C. Jebb, Journal of Hellenic Studies, i. (1889), pp. 7-62. For works of art found at Delos see Greek Art. (E. Gr.)

DE LOUTHERBOURG, PHILIP JAMES (1740-1812), English artist, was born at Strassburg on the 31st of October 1740, where his father, the representative of a Polish family, practised miniature painting; but he spent the greater part of his life in London, where he was naturalized, and exerted a considerable influence on the scenery of the English stage, as well as on the artists of the following generation. De Loutherbourg was intended for the Lutheran ministry, and was educated, at the university of Strassburg. As the calling, however, was foreign to his nature, he insisted on being a painter, and placed him- self under Vanloo in Paris. The result was an immediate and precocious development of his powers, and he became a figure in the fashionable society of that day. In 1767 he was elected into the

French Academy below the age required by the law of the institution, and painted landscapes, sea storms, battles, all of which had a celebrity above those of the specialists then working in Paris. His debut was made by the exhibition of twelve pictures, including ” Storm at Sunset,” ” Night,” ” Morning after Rain.” He is next found travelling in Switzerland, Germany and Italy, distinguishing himself as much by mechanical inventions as by painting. One of these, showing quite new effects produced in a model theatre, was the wonder of the day. The exhibition of lights behind canvas representing the moon and stars, the illusory appearance of running water produced by clear blue sheets of metal and gauze, with loose threads of silver, and so on, were his devices. In 1 7 7 1 he came to London, and was employed by Garrick, who offered him £500 a year to apply his inventions to Drury Lane, and to superintend the scene-painting, which he did with complete success, making a new era in the adjuncts of the stage. Garrick’s own piece, the Christmas Tale, and the pantomime, 1781-1782, introduced the novelties to the public, and the delight not only of the masses, but of Reynolds and the artists, was unbounded. The green trees gradually became russet, the moon rose and lit the edges of passing clouds, and all the world was captivated by effects we now take little notice of. A still greater triumph awaited him on his opening an entertain- ment called the ” Eidophusicon,” which showed the rise, progress and result of a storm at sea — that which destroyed the great Indiaman, the ” Halsewell,” — and the Fallen Angels raising the Palace of Pandemonium. De Loutherbourg has been called the inventor of the panorama, but this honour does not belong to him, although it first appeared about the same time as the eidophusicon. The first panorama was painted and exhibited by Robert Barker.

All this mechanism did not prevent De Loutherbourg from painting. ” Lord Howe’s Victory off Ushant ” (1 794) , and other large naval pictures were commissioned for Greenwich Hospital Gallery, where they still remain. His finest work was the ”

Destruction of the Armada." He painted also the Great Fire of London, and several historical works, one of these being the " Attack of the Combined Armies on Valenciennes " (1793). He was made R.A., in addition to other distinctions, in 1781, shortly after which date we find an entirely new mental impulse taking possession of him. He joined Balsamo, comte de Cagliostro, and travelled about with this extraordinary person — leaving him, however, before his condemnation to death. We do not hear

that Mesmer had attracted De Loutherbourg, nor do we find an exact record of his connexion with Cagliostro. A pamphlet published in 1789, A List of a few Cures performed by Mr and Mrs De Loutherbourg without Medicine, shows that he had taken up faith-healing, and there is a story that a successful projection of the philosopher's stone was only spoiled by the breaking of the crucible by a relative. He died on the nth of March 181 2. His publications are few — some sets of etchings, and English Scenery (1805)

DELPHI (the Pytho of Homer and Herodotus; in Boeotian inscriptions BeX#o£, on coins AaX^oQ, a place in ancient Greece in the territory of Phocis, famous as the seat of the most important temple and oracle of Apollo.' It was situated about 6 m. inland from the shores of the Corinthian Gulf, in a rugged and romantic glen, closed on the N. by the steep wall-like under-clifis of Mount Parnassus known as the Phaedriades or Shining Rocks, on the E. and W. by two minor ridges or spurs, and on the S. by the irregular heights of Mount Cirphis. Between the two mountains the Pleistus flowed from east to west, and opposite the town received the brooklet of the Castalian fountain, which rose in a deep gorge in the centre of the Parnassian cliff. About 7 m. to the north, on the side of Mount Parnassus, was the famous Corycian cave, a large grotto in the limestone rock, which afforded the people of Delphi a refuge during the Persian invasion. It is now called in the district the Sarant' Aulai or Forty Courts, and is said to be capable of holding 3000 people.

I. The Site. — The site of Delphi was occupied by the modern village of Castri until it was bought by the French government in 1891, and the peasant proprietors expropriated and transferred to the new village of Castri, a little farther to the west. Excava- tions had been made previously in some parts of the precinct; . for example, the portico of the Athenians was laid bare in i860. The systematic clearing of the site began in the spring of 1892, and it was rapidly cleared of earth by means of a light railway. The plan of the precinct is now easily traced, and with the help of Pausanias many of the buildings have been identified.

The ancient wall running east and west, commonly known as the Hellenico, has been found extant in its whole length, and the two boundary walls running up the hill at each end of it, traced. In the eastern of these was the main entrance by which Pausanias went in along the Sacred Way. This paved road is easily recognized as it zigzags up the hill, with treasuries and the bases of various offerings facing it on both sides. It mounts first west- wards to an open space, then turns eastwards till it reaches the eastern end of the terrace wall that supports the temple, and then: turns again and curves up north and then west towards the temple. Above this, approached by a stair, are the Lesche and the theatre, occupying respectively the north-east and north- west corner of the precinct. On a higher level still, a little to the west, is the stadium. There are several narrow paths and stairs that cut off the zigzags of the Sacred Way.

In describing the monuments discovered by the French excavators, the simplest plan is to follow the route of Pausanias. Outside the entrance is a large paved court of Roman date, flanked by a colonnade. On the north side of the Sacred Way, close to the main entrance, stood the offering dedicated by the Lacedaemonians after the battle of Aegospotami. It was a large quadrangular building of conglomerate, with a back wall faced with stucco, and stood open to the road. On a stepped pedestal facing the open stood the statues of the gods and the admirals,

perhaps in rows above one another.

The statues of the Epigoni stood on a semicircular basis on the south side of the way. Opposite them stood another semi- circular basis which carried the statues of the Argive kings, whose names are cut on the pedestal in archaic characters, reading from right to left. Farther west was the Sicyonian treasury on the south of the way. It was in the form of a small Doric temple in antis, and had its entrance on the east. The present foundations are built of architectural fragments, probably from an earlier building of circular form on the same site. The sculptures from this treasury are in the museum, as are the other sculptures found on the site. These sculptures, which are in

rough limestone, most likely belong to the earlier building, as their surface is in a better state of preservation than could be possible if they had been long exposed to the air. The earlier treasury was probably destroyed either by earthquake or by the percolation of water through the terracing.

The Cnidian treasury stands on the south side of the way farther west. This building was originally surmised by the excavators to be the treasury of Siphnos, but further evidence led them to change their opinion. The treasury was raised on a quadrangular structure, supported on its south side by the Hellenico, and built of tufa. The lower courses are left rough and were most likely hidden. A small Ionic temple of marble with

two caryatids between antae stood on this substructure. The sculpture from this treasury, which ornamented its frieze and pediment, is of great interest in the history of the development of

the art, and the fragments of architectural mouldings are of great delicacy and beauty. The whole work is perhaps the most perfect example we possess of the transitional style of the early 5th century. Standing back somewhat from the path just as it bends round up the hill is the Theban treasury. Farther north, where the path turns again, is the Athenian treasury. This structure, which was in the form of a small Doric temple in antis, appears to have suffered from the building above it having been shaken down by an earthquake. It has now been rebuilt with the original blocks. There can be no doubt about the identity of the building, for the basis on which it stands bears the remains of the dedicatory inscription, stating that it was erected from the spoils of Marathon. Almost all the sculptured metopes are in the museum, and are of the highest interest to the student of archaic art. The famous inscriptions with hymns to Apollo accompanied by musical notation were found on stones belonging to this treasury.

Above the Athenian treasury is an open space, in which is a rock which has been identified as the Sybil's rock. It has steps hewn in it, and has a cleft. The ground round it has been left rough like the space on the Acropolis at Athens identified as the

ancient altar of Athena. Here too was placed the curious column, with many flutes and an Ionic capital, on which stood the colossal sphinx, dedicated by the Naxians, that has been pieced together and placed in the museum.

A little farther on, but below the Sacred Way, is another open space, of circular form, which is perhaps the aXws or sacred threshing-floor on which the drama of the slaying of the Python by Apollo was periodically performed. Opposite this space, and backed against the beautifully jointed polygonal wall which has for some time been known, and which supports the terrace on which the temple stands, is the colonnade of the Athenians. A dedicatory inscription runs along the face of the top step, and

has been the subject

 of much dispute.

Both the forms of the letters and the style of the architec- ture show that the colonnade cannot date, as Pausanias says, from the time of the Peloponne- sian War; Th. Homolle now as- signs it to the end of the 6th century. The polygonal ter- race wall at the back, on being cleared, proves to be covered with inscriptions, most of them. concerning the manumission of slaves.

After rounding the east end of the terrace wall, the Sacred Way turns northward, leaving the Great Altar, dedicated by the Chians, on the left. After passing the altar, it turns to the left again at right angles, and so enters the space in front of the temple. Remains of offerings found in this region include those dedicated by the Cyrenians and by the Corinthians. The site of the temple itself carries the remains of successive struc- tures. Of that built by the Alcmaeonids in the 6th century B.C. considerable remains have been found, some in the foundations of the later temple and some lying where they were thrown by the earthquake. The sculptures found have been assigned to this building, probably to the gables, as they are archaic in character, and show a remarkable resemblance to the sculptures from the pediment of the early temple of Athena at Athens. The existing foundations are these of the temple built in the 4th century. They give no certain information as to the sacred cleft and other matters relating to the oracle. Though there are great hollow spaces in the structure of the foundations, these appear merely to have been intended to save material, and not to have been put to any religious or other use. Up in the north-eastern corner of the precinct, standing at the foot of the cliffs, are the remains of the interesting Cnidian Lesche or Clubhouse. It was a long narrow building accessible only from the south, and the famous paintings were probably disposed around the walls so as to meet in the middle of the north side. Some scanty fragments of the lower part of the

frescoed walls have survived ; but they are not enough to give any information as to the work of Polygnotus. At the north-western comer of the precinct- is the theatre, one

of the best preserved in Greece. The foundations of the stage are extant, as well as the orchestra, and the walls and seats of the auditorium. There are thirty-three tiers of seats in seven sets, and a paved diazoma. The sculptures from the stage front, now in the museum, have the labours of Heracles as their subject. The date of the theatre is probably early 2nd century B.C.

The stadium lies, as Pausanias says, in the highest part of the city to the north-west. It stands on a narrow plateau of ground supported on the south-east by a terrace waJl. The seats have been cleared, and are in a state of extraordinary preservation. A few of those at the east end are hewn in the rock. No trace of the marble seats mentioned by Pausanias has been found, but they have probably been carried off for lime or building, as they could easily be removed. An immense number of inscriptions have been found in the excavations, and many works of art, including a bronze charioteer, which is one of the most admirable statues preserved from ancient times.

II. History. — Our information as to the oracle at Delphi and the manner in which it was consulted is somewhat confused; there probably was considerable variation at different periods. The tale of a hole from which intoxicating ” mephitic ” vapour arose has no early authority, nor is it scientifically probable (see A. P. Oppe in Journal of Hellenic Studies, xxiv. 214). The questions had to be given in writing, and the responses were uttered by the Pythian priestess, in early times a maiden, later a woman over fifty attired as a maiden. After chewing

the sacred bay and drinking of the spring Cassotis, which was conducted into the temple by artificial channels, she took her seat on the sacred tripod in the inner shrine. Her utterances were reduced to verse and edited by the prophets and the ” holy men ” (ocioi). For the influence and history of the oracle see Oracle.

Delphi also contained the ” Omphalos,” a sacred stone bound with fillets, supposed to mark the centre of the earth. It was said Zeus had started two eagles from the opposite extremities and they met there. Other tales said the stone was the one given by Rhea to Cronus as a substitute for Zeus.

For the history of the Delphic Amphictyony see under Amphic- tyony. The oracle at Delphi was asserted by tradition to have existed before the introduction of the Apolline worship and to have belonged to the goddess Earth (Ge or Gaia). The Homeric Hymn to Apollo evidently combines two different versions, one of the approach of Apollo from the north by land, and the other of the introduction of his votaries from Crete. The earliest stone temple was said to have been built by Trophonius and Agamedes. This was destroyed by fire in 548 B.C., and the contract for rebuilding was undertaken by the exiled Alcmaeonidae from Athens, who generously substituted marble on the eastern front for the poros specified (see Cleisthenes, ad init.). Portions of the pediments of this temple have been found in the excavations; but no sign has been found of the pediments mentioned by Pausanias, representing on the east Apollo and the Muses, and on the west Dionysus and the Thyiades (Bacchantes), and designed by Praxias, the pupil of Calanias. The temple which was seen by Pausanias, and of which the foundations were found by the excavators, was the one of which the building is recorded in inscriptions of the 4th century. A raid on Delphi attempted by the Persians in 480 B.C. was said to have been frustrated by the god himself, by means of a storm or earthquake which hurled rocks down on the invaders; a similar tale is told of the raid of the Gauls in 279 B.C. But the sacrilege thus escaped at the hands of foreign

invaders was inflicted by the Phocian defenders of Delphi during the Sacred War, 356–346 B.C., when many of the precious votive offerings were melted down. The Phocians were condemned to replace their value to the amount of 10,000 talents, which they paid in instalments. In 86 B.C. the sanctuary and its treasures were put under contribution by L. Cornelius Sulla for the payment of his soldiers; Nero removed no fewer than 500 bronz° statues from the sacred precincts; Constantine the Great enriched his new city by the sacred tripod and its support of intertwined snakes dedicated by the Greek cities after the battle of Plataea. This still exists, with its inscription, in the Hippodrome at Constanti-

nople. Julian afterwards sent Oribasius to restore the temple; but the oracle responded to the emperor's enthusiasm with nothing but a wail over the glory that had departed.

Provisional accounts of the excavations have appeared during the excavations in the Bulletin de correspondance hellenique. A summary is given in J. G. Frazer, Pausanias, vol. v. The official account is entitled Fouittes de Delphes. For history see Hiller von Gartringen in Pauly–Wissowa, Realencyclopddie, s.v. " Delphi." For cult see L. R. Farnell, Cults of the Greek States, iv. 179–218. For the works of art discovered see Greek Art. (E. Gr.)

DELPHINIA, a festival of Apollo Delphinius held annually on the 6th (or 7th) of the month Munychion (April) at Athens. All that is known of the ceremonies is that a number of girls proceeded to his temple (Delphinium) carrying suppliants' branches and seeking to propitiate Apollo, probably as a god having influence on the sea. It was at this time of year that navigation began again after the storms of winter. According to the story in Plutarch (Theseus, 18), Theseus, before setting out to Crete to slay the Minotaur, repaired to the Delphinium and deposited, on his own behalf and that of his companions on whom the lot had fallen, an offering to Apollo, consisting of a branch of consecrated olive, bound about with white wool; after which he

prayed to the god and set sail. The sending of the maidens to propitiate the god during the Delphinia commemorates this event in the life of Theseus.

See A. Mommsen, Festeder Stadt Athen (1898) ; L. Preller, Griechische Mythologie (4th ed., 1887); P. Stengel, Die griechische Kultus- altertiimer (1898) ; Daremberg and Saglio, Dictionnaire des antiquites; G. F. Schomann, Griechische Altertiimer (4th ed., 1897–1902).

DELPHINUS (" The Dolphin "), in astronomy, a constellation of the northern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.); and catalogued by Ptolemy (10 stars), Tycho Brahe (10 stars), and Hevelius (14 stars). y Delphini is a double star: a yellowish of magnitude 4, and a bluish of magnitude 5.

DELTA (from the shape of the Gr. letter A, delta, originally used of the mouth of the Nile), a tract of land enclosed by the diverging branches of a river's mouth and the seacoast, and traversed by other branches of the stream. This triangular tract is formed from the fine silt brought down in suspension by a muddy river and deposited when the river reaches the sea. When tidal currents are feeble, the delta frequently advances some distance seawards, forming a local prolongation of the coast.

DELUC, JEAN ANDRE" (1727–1817), Swiss geologist and meteorologist, born at Geneva on the 8th of February 1727, was descended from a family which had emigrated from Lucca and settled at Geneva in the 15th century. His father, Francois Deluc, was the author of some publications in refutation of Mandeville and other rationalistic writers, which are best known through Rousseau's humorous account of his ennui in reading them; and he gave his son an excellent education, chiefly in mathematics and natural science. On completing it he engaged in commerce, which principally occupied the first forty-six years of his life, without any other interruption than that which was occasioned by some journeys of business into the neighbouring

countries, and a few scientific excursions among the Alps. During these, however, he collected by degrees, in conjunction with his brother Guillaume Antoine, a splendid museum of miner- alogy and of natural history in general, which was afterwards increased by his nephew J.Andre Deluc (1763-1847), who was also a writer on geology. He at the same time took a prominent part in politics. In 1768 he was sent to Paris on an embassy to the due de Choiseul, whose friendship he succeeded in gaining. In 1770 he was nominated one of the Council of Two Hundred. Three years later unexpected reverses in business made it advis- able for him to quit his native town, which he only revisited once for a few days. The change was welcome in so far as it set him entirely free for scientific pursuits, and it was with little regret that he removed to England in 1773. He was made a fellow of the Royal Society in the same year, and received the appointment of reader to Queen Charlotte, which he continued

to hold for forty-four years, and which afforded him both leisure and a competent income. In the latter part of his life he obtained leave to make several tours in Switzerland, France, Holland and Germany. In Germany he passed the six years from 1798 to 1804; and after his return he undertook a geological tour through England. When he was at Gbttingen, in the begin- ning of his German tour, he received the compliment of being appointed honorary professor of philosophy and geology in that university; but he never entered upon the active duties of a professorship. He was also a correspondent of the Academy of Sciences at Paris, and a member of several other scientific associations. He died at Windsor on the 7th of November 18 17.

His favourite studies were geology and meteorology. The situation of his native country had naturally led him to contem- plate the peculiarities of the earth's structure, and the properties of the

atmosphere, as particularly displayed in mountainous countries, and as subservient to the measurement of heights. According to Cuvier, he ranked among the first geologists of his age. His principal geological work, Lettres physiques et morales sur les montagnes et sur I'histoire de la terre et de I'homme, first published in 1778, and in a more complete form in 1779, was dedicated to Queen Charlotte. It dealt with the appearance of mountains and the antiquity of the human race, explained the six days of the Mosaic creation as so many epochs preceding the actual state of the globe, and attributed the deluge to the filling up of cavities supposed to have been left void in the interior of the earth. He published later an important series of volumes on geological travels in the north of Europe (18 10), in England (1811), and in France, Switzerland and Germany (1813). These were translated into English.

Deluc's original experiments relating to meteorology were valuable to the natural philosopher; and he discovered many facts of considerable importance relating to heat and moisture. He noticed the disappearance of heat in the thawing of ice about the same time that J. Black founded on it his ingenious hypothesis of latent heat. He ascertained that water was more dense about 40 F. (4° C.) than at the temperature of freezing, expanding equally on each side of the maximum; and he was the originator of the theory, afterward readvanced by John Dalton, that the quantity of aqueous vapour contained in any space is inde- pendent of the presence" or density of the air, or of any other elastic fluid.

His Recherches sur les modifications de I' atmosphere (2 vols. 4to, Geneva, 1772; 2nd ed., 4 vols. 8vo, Paris, 1784) contains many accurate and ingenious experiments upon moisture, evaporation and the indications of hygrometers and thermo- meters, applied to the barometer employed in determining heights. In the Phil. Trans., 1773, appeared his account of a new hygrometer, which resembled a mercurial thermometer, with an ivory bulb, which expanded by moisture, and caused the mercury to

descend. The first correct rules ever published for measuring heights by the barometer were those he gave in the Phil. Trans., 1771, p. 158. His Lettres suri'histoire physique de la terre (8vo, Paris, 1798), addressed to Professor Blumenbach, contains an essay on the existence of a General Principle of Morality. It also gives an interesting account of some conver- sations of the author with Voltaire and Rousseau. Deluc was an ardent admirer of Bacon, on whose writings he published two works — Bacon tel qu'il est (8vo, Berlin, 1800), showing the bad faith of the French translator, who had omitted many passages favourable to revealed religion, and Precis de la philosophic de Bacon (2 vols. 8vo, Paris, 1802), giving an interesting view of the progress of natural science. Lettres sur le Christianisme (Berlin and Hanover, 1801, 1803) was a controversial correspondence with Dr Teller of Berlin in regard to the Mosaic cosmogony. His Traiti Mimentairede geologic (8vo, Paris, 1809, also in English, by de la Fite, the same year) was principally intended as a refutation of the Vulcanian system of Hutton and Playfair, who deduced the changes of the earth's structure from the operation of fire, and attributed a higher antiquity to the present state of the continents than is required in the Neptunian system adopted by Deluc after D. Dolomieu. He sent to the Royal Society, in I

1809, a long paper on separating the chemical from the electrical effect of the pile, with a description of the electric column and aerial electroscope, in which he advanced opinions so little in unison with the latest discoveries of the day, that the council deemed it inexpedient to admit them into the Transactions. The paper was afterwards published in Nicholson's Journal (xxvi.), and the dry column described in it was constructed by various experimental philosophers. This dry pile or electric column has been regarded as his chief discovery.

Many other of his papers on subjects kindred to those already mentioned are to be found in the Transactions and in the Philo- sophical Magazine.

See Philosophical Magazine (November 1817).

DELUGE, THE (through the Fr. from Lat. diluvium, flood, diluere, to wash away) , a great flood or submersion of the earth (so far as the earth was known to the narrators), or of heaven and earth, or simply of heaven, by which, according to primitive and semi -primitive races, chaos was restored. It is, of course, not meant that all the current flood stories, as they stand, answer to this description. There are flood stories which, at first sight, may plausibly be held to be only exaggerated accounts of some ancient historical occurrences. The probability of such traditions being handed down is, however, extremely slight. If some flood stories are apparently local, and almost or quite without mythical colouring, it may be because the original myth-makers had a very narrow conception of the earth, and because in the lapse of time the original mythic elements had dwindled or even dis- appeared. The relics of the traditional story may then have been adapted by scribes and priests to a new theory. Many deluge stories may in this way have degenerated. It is at any rate undeniable that flood stories of the type described above, and even with similar minor details, are fairly common. A con- spectus of illustrative flood stories from different parts of the world would throw great light ori the problems before us; see the article Cosmogony, especially for the North American tales, which show clearly enough that the deluge is properly a second creation, and that the serpent is as truly connected with the second chaos as with the first. One of them, too, gives a striking parallel to the Babylonian name Hasis-andra (the Very Wise), whence comes the corrupt form Xisuthrus; the deluge hero of the Hare Indians is called Kunyan, ” the intelligent.” Polynesia also gives us most welcome assistance, for its flood stories still present clear traces of the primitive imagination that the sky was a great blue sea, on which the sun, moon and stars (or constellations) were voyagers. Greece too supplies some stimulus to thought, nor are Iran and Egypt as unproductive as some have supposed. But the

only pauses that we can allow ourselves are in Hindustan, Babylonia and Canaan. The peoples of these three countries, which are religiously so prominent in antiquity, have naturally connected their name equally with thoughts about earth production and earth destruction.

The Indian tradition exists in several forms. 1 The earliest is preserved in the Satapatha Brahmana. It is there related that Manu, the first man, the son of the sun-god Vivasvat, found, in bathing, a small fish, which asked to be frarf/tfon tended, and in reward promised to save him in the coming flood. The fish grew, and at last had to be carried to the sea, where it revealed to Manu the time of the flood, and bade him construct a ship for his deliverance. When the time came, Manu, unaccompanied, went on board; the grateful fish towed the ship through the water to the summit of the northern mountain, where it bade Manu bind the vessel to a tree. Gradu- ally, as the waters fell, Manu descended the mountain; he then sacrificed and prayed. In a year's time his prayer was granted. A woman appeared, who called herself his daughter Ida (goddess of fertility). It is neither stated, nor even hinted, that sin was the cause of the flood. - . . ■

Another version occurs in the great epic, the Mahabharata. The lacunae of the earlier story are here supplied. Manu, for instance, embarks with the seven " rishis " or wise men, and takes with him all kinds of seed. The fish announces himself as the God Brahman, and enables Manu to create both gods and 1 See Muir, Sanscrit Texts, i. 182, 206 ff.

men. A third .account is given, in the Bhagavata Purana. It contains the details of the announcement of the flood seven days beforehand (cf. Gen. vii. 4) and of the taking of pairs of all kinds of animals (cf. Gen. vi. 19), besides the seeds of. plants (as the epic; cf. Gen. vi. 21). This story, however, is

a late composition, not earlier than the 12th century A.D, A first glance at these stories is somewhat bewildering. We shall return, however, to this problem later with a good hope- of mastering it.

The Israelite (Biblical) and the, Babylonian deluge-stories remain to be considered. Neither need be described here in Israelite detail; for the former see Gen. vi. 5-ix. 17, and for the and latter Gilgamesh. As most students are aware, the

Baby- Biblical deluge-story is composite, being made up of two narratives, the few lacunae in which are due to the ancient redactor who worked them together. 1 The narrators are conventionally known as J. (= the Yahwist, from the divine name Yahweh) and P. (= the Priestly Writer) respectively. It is important to notice that P., though chronologically later than J., reproduces certain elements which must be archaic. For instance, while J. speaks only of a rain-storm, P. states that ” all the fountains of the great ocean were broken up, and the windows of heaven opened ” (Gen. vii. n), i.e. the lower and the upper waters met together and produced the deluge. It is also P. who tells the story of the appointment of the rainbow (Genax. 12-17), which is evidently ancient, though only paralleled in a Lithuanian flood-story, and near it we find the divine declaration (Gen. ix. 2-6) that the golden age of universal peace (cf. Gen. i. 29 ■, 30), already sadly tarnished, is over. 2 Surely this too has a touch of the archaic; nor can we err in connecting it with the tradition of man’s first home in Paradise, where no enemy could come, because, in the original form of the tradition, Paradise was the abode of God. (See Paradise.)

The Babylonian tradition exists in two main forms, 3 nor can we affirm that the shorter form, due to Berossus, is superseded by the larger one in the Gilgamesh epic, for it communi- /oor SS ” S ‘ cates f° ur important points: (1) Xisuthrus, the hero points. of the deluge, was also the tenth Babylonian king; cf. Noah, in P., the tenth patriarch as well

as the survivor from the deluge; (2) the destination of Xisuthrus is said to be ” to the gods,” a statement which virtually records his divine character. In accordance with this, the final reward of the hero is declared to be ” living with the gods.” This suggests that Noah (?) may originally have been represented as a supernatural man, a demigod. True, Gen. ix. 20, 21 is not consistent with this, but it is very possible that Noah was substituted by a scribe’s error for Enoch, 4 who, like Xisuthrus, ” walked with God (learning the heavenly wisdom) and disappeared, for God had taken him ” (Gen. v. 22, 24); (3) the birds, when sent out by Xisuthrus the second time, return with mud on their feet. This detail reminds us of points in some archaic North American myths which probably supply the key to its meaning; 5 (4) in the time of Berossus the mountain on which the ark grounded was considered to be in Armenia.

We pass on to the relation of J. and P. to the Babylonian story. (1) The polytheistic colouring of the latter contrasts strongly with D t 11 n t ^ le ^ ar s i m P^ er religious views of J. and P. Note the relation of capricious character of the god Bel who sends the Israelite deluge, while at the end of the story the catastrophe s S°9 rto is represented as a judgment upon human sins. It is the Ionian. latter view which is adopted by J. and P. We cannot, however, infer from this that the narratives which doubtless underlie J. and P. were directly taken from some such

1 Cf. Carpenter and Harford-Battersby, The Hexateuch, ii. 9, where the documents are printed separately in a tabular form.

2 Isa. xi. 6-8 prophesies that one day this idyllic state shall be restored.

3 For a discussion of the Babylonian version of the Deluge Legend, recently discovered among the tablets from Nippur, see Nippur.

4 The genealogy in Gen. v. is hardly in its original

form. Enoch is probably misplaced, and Noah inserted in error.

6 Cf. Cosmogony, and Cheyne's Traditions and Beliefs of Ancient Israel (on deluge-story).

story as that in the Gilgamesh epic. The theory of an indirect and unconscious borrowing on the part of the Israelitish compilers will satisfy .all the conditions of the case. (2) In the general scheme the three accounts very nearly agree, for J. must origin- ally have contained directions as to the building of the vessel, and a notice that the ark grounded on a certain mountain. P.'s omission of the sacrifice at the close seems to be arbitrary. His theory of religious history forbade a reference to an altar so early, but his document must have contained it. J. expressly mentions it (Gen. viii. 20, 21), though not in such an original way as the cuneiform text. (3) As to the directions for building the ship (epic) or chest (J. and P.). Here the Babylonian story and P. have a strong general resemblance ; note, e.g., the mention of bitumen in both. Whether the Hebrew reference to a chest (tebqh) is, or is not, more archaic than the Babylonian reference to a ship (elippu) is a question which admits of different answers. (4) As to the material cause of the deluge. According to P. (see above) the water came both from above and from below; J. only speaks of continuous rain. The Gilgamesh epic, however, mentions besides thunder, lightning and rain, a hurricane which drove the sea upon the land. We can hardly regard this as more original than P.'s representation. (5) As to the extent of the flood. From the opening of the story in the epic we should naturally infer that only a single S. Babylonian city was affected. The sequel, however, implies that the flood extended all over Baby- lonia and the region of Nisir. More than this can hardly be claimed. Similarly the earlier story which underlies J. and P. need only have referred to the region of the myth-framers, i.e. either Canaan or N. Arabia. (6) As to the duration of the flood the traditions differ. P. reckons it at 365 days, i.e. a solar year, which is parallel to the 365

years of the life of Enoch (who, as we have seen, may have been the original hero of the flood). It is probable (see below) that P.'s ultimate authority, far back in the centuries, represented the deluge as a celestial occurrence. The origin of J.'s story is not quite so clear, owing to the lacunae in the narrative. If the text may be followed, this narrator made the flood last forty days and nights, after which two periods of seven days elapse, and then the patriarch leaves the ark. The epic shortens the duration of the flood to seven days, after which the ship remains another seven days (more strictly six full days) on the mountain of the land of Nisir (P., the mountains of Ararat ; J., unrecorded). (7) As to the despatch of the birds. J. begins, the epic closes, with the raven. Clearly the epic is more original. Besides, one of the two missions of the dove is evidently superfluous. Dove, swallow, raven, as in the epic, must be more primitive than raven, dove, dove.

That the Hebrew deluge-story in both its forms has been at least indirectly influenced by the Babylonian is obvious. We cannot indeed reconstruct the form either of the Canaanitish (or N. Arabian) story, which was recast partly at least under the influence of a recast Babylonian myth, nor can we conjecture where the sanctuary was, the priests of which, yielding to a popular impulse, adopted and modified the fascinating story. But the fact of the ultimate Babylonian origin of the Israelitish narratives cannot seriously be questioned. The Canaanites or the N. Arabians handed on at least a portion of their myths to the Israelites, and the creation and deluge stories were among these. That the Israelitish priests gradually recast them is an easy and altogether satisfactory conjecture.

It remains to ask, What is the history and significance of the deluge-myth? The question carries us into far-off times. We have no version of the Babylonian myth which goes Hlstory back to about 2100 B.C., while its text was apparently an a signi- derived from a still older tablet. But even this is not ticance of primitive; behind it there must have

been a much -tzfu' shorter and simpler myth. The recast represented by the existing versions of the myth must have been produced partly by the insertion, partly by the omission or modification, of mythic details, and by the application to the story thus produced of a particular mythic theory respecting the celestial world. The shorter myth referred to may — if we take hints from the very primitive myths of N. America — have run somewhat thus,

omitting minor details: " The earth (a small enough earth, doubtless) arid its inhabitants proved so imperfect that the beneficent superhuman Being, who had created it, or perhaps another such Being, determined to remake it. He, therefore, summoned the serpent or dragon who controlled the cosmic ocean, and had been subjugated at creation, to overwhelm the earth, after which the creator remade it better, 1 and the survivor and his family became the ancestors of a new human race."

This, however, is only one possible representation. It may have been said that the serpent of his own accord, not having been killed by the creator, maliciously flooded the earth (ef. the Algonquian myth), but was again overcome in battle, or that the serpent, after filling the earth with violence and wrong, was at length slain by the Good Being, and that his blood, streaming, out, produced a deluge. 2 In any case it is unnatural to hold that the first flood (that which preceded creation) had a dragon, but not the second. An old cuneiform text, recopied late, how- ever, appears to call the year of the deluge (i.e. of what we here call the second flood) " the year of the raging (or red-shining) serpent," 3 and certainly the N. American myths distinctly connect serpents with the deluges.

Among the probable minor details (omitted above) of the presumed shorter and older myth we may include:

(i) the warning of ” Very- Wise,” 4 either by friendly animals or by a dream; (2) the construction of a chest to contain ” Very- Wise,” his wife and his sons, together with animals; 6 (3) the despatch of three birds with a special object (see below) ; (4) the landing of the survivors on a mountain. As to (1), Berossus suggests that the notice came to Xisuthrus in a dream; in the Indian myth it is the sacred fish which warns Manu. In the archaic N. American myths, however, it is some animal which gives the notice — an eagle or a coyote (a kind of wolf). As to (2), nothing is more common than the story of a divine child cast into the sea in a box. 6 The ship-motive is also found, 7 but it is not too rash to assume that the box-motive is the earlier, and, in accordance with the parallels, that the hero of the deluge was originally a god or a demigod. The translation of the hero to be with the gods is a transparent modification of the original tradition. As to (3) , the original object of sending out the birds was probably not to find out where dry land was, but to use them as helpers in the work of re-creation. Take the story of the Tlatlasik Indians, where the diving-bird (one of three sent out) comes back with a branch of a fir-tree, out of which O’meatl made mountains, earth and heaven; 8 so, too, the Caingangs relate 9 that those who escaped from the flood, as they tarried on a mountain, heard the song of the saracura birds, who came carrying earth in baskets, and threw it into the waters, which slowly subsided. As to (4), the mountain would naturally be thought of as a place of refuge even in the old, simple flood-story. But when Babylonian mythology effected an entrance, the mountain would receive a new and much grander significance. It would then come to re- present the summit of that great and most holy mountain, which, save by the special favour of the gods, no human eye has seen.

That a didactic element entered the deluge^tradition but slowly, may be surmised, not only from the genuinely old N. American stories, but from the inconsistent statements, to which Jastrow has already referred, in the Babylonian story. We may

imagine that between the creation and the deluge some great and wise Being had initiated the early men, not only in the necessary arts of life, but iri the ” ways ” that were pleasing to the heavenly powers. The B abylonians apparently think of neglected sacrifices, the Australians of a desecrated mystery as the cause of the flood. Some such violation of a sacred rule is the origin that naturally occurs to an adapter or expander of primitive myths.

1 Cf. the myths of the Pawnees and the Quiches of Guatemala.

2 See the cuneiform text described in KA T z , pp. 498–499.

3 Zimmern, KA T 3 , p. 554.

4 i.e. Atrahasis (Xisuthrus).

6 To have omitted the animals would have been an offence against primitive views of kinship.

‘ Userter, Die Sintflutsagen, pp. 80–108, 1 15–127.

7 lb. p. 254.

8 Stucken, Astralmythen, pp. 233–234.

• Amer. Journ. of Folklore, xviii. 223 ff.

And now as to the application of the celestial mythic theory to the early deluge-story. In the agricultural stage it was natural that men should take a deeper interest than before in the appearance of the sky, and especially of the sun Cebgtial and moon, and of the constellations, even though an theory. astrological science or quasi-science would very slowly, if at all, grow up. That the Polynesian myths (which show no vestige of science) originally referred to. the supposed celestial ocean, seems to be plain. Schirren 10 regarded the New Zealand cosmogonies as myths of sunrise, and the deluge-stories as myths of sunset. We may at any rate plausibly hold, with the article “Deluge” (byCheyne)

in the ninth edition of this work u (1877), that the deluge-stories of Polynesia and early Babylonia (we may now probably add India) were accommodated to an imaginative conception of the sun and moon as voyagers on the celestial ocean. ” When this story had been told and retold a long time, rationalism suggested that the sea was not in heaven but on earth, and observation of the damage wrought in winter by excessive rains and the inundations of great rivers suggested the introduction of corresponding details into the new earthly deluge-myth.” ” This accounts for the strongly mythological character of Par-napishti (Ut-napishti) in Babylonia and Maui in New Zealand, who are in fact solar personages. Enoch, too, must be classed in this category, his perfect righteousness and super- human wisdom now first become intelligible. Moreover, we now comprehend how the goddess Sabitu (the guardian of the entrance to the sea) can say to Gilgamesh (himself a solar personage), ‘Shamash the mighty (i.e. the sun-god) has crossed the sea; besides (?) Shamash, who can cross it?’ For though the sea in the epic is no doubt the earth-circling ocean, it was hardly this in the myth from which the words were taken.” 12 And, what is still more important, we can understand better how, in the Gilgamesh epic (lines 115-116), the gods, after cowering like dogs, go up to the ” heaven of Ana.” They, too, fear the deluge, and only in the highest heaven can they feel themselves secure.

Such an explanation seems indispensable if the wide influence of the Babylonian form of the deluge-myth is to be accounted for. As Gunkel well remarks, 13 neither the tenacity and self propagat ing character of this myth, nor the solemn utterance of Yahweh (who corresponds to the Babylonian Marduk) in Gen. viii. 216 (J.) andix. 8-17 (P.) can be Understood, if the deluge-story is nothing more than an exaggerated account of a historical, earthly occur- rence. We, therefore, venture to hold that it is an insufficient account to give of the story in the Gilgamesh epic that it is a combination of a local tradition of the destruction of a single city with a

myth of the destruction of mankind — a myth exaggerated in its present form, but based on accurate knowledge of the yearly recurring phenomenon of the overflow of the Euphrates. 14 There are no doubt points in the story as it now stands which indicate a composite origin, but it is probable that even the tradition which apparently limits the destruction to a single city, equally with many other local flood-stories, has a basis in what we may fairly call a celestial myth.

We can now return with some confidence to the Indian deluge- story. It is unlikely that so richly gifted a race as the Aryans of India should not have produced their own flood-story Indian out of the same primeval germs which grew up into the myth earliest Babylonian flood-story, 16 and almost inconceiv- able that in its second form the Indian story should not have become adapted to what may be called the celestial mythic

10 Schirren, Wandersagen der Neuseelander (1856), p. 193.

11 Referring for Polynesia to Gerland in Waitz-Gerland, Anthro- pologie der Naturvblker, vi. 270-273 (1872). After a long interval, this theory has been taken up by Zimmern, KAT Z , p. 355, and by Jensen, Das Gilgamesch-Epos (1906), p. 120; Winckler (AOF, 3rd series, i. 96) also speaks of the deluge as a " celestial occurrence." For other forms of this view see Jeremias, ATAO, pp. 134-136; Usener, p. 239.

12 Cheyne, Ency. Bib. cols. 1063-1064.

13 Genesis, p. 67.

14 Jastrow, Religion of Babylonia and Assyria (1898), pp. 502, 506.

15 The view here adopted is that of Lindner and Usener. , On the opposite side are Zimmern, Tiele, Jensen, Oldenberg, Noldeke, Stucken, Lenormant.

recon- siaered.

theory. The phrase ” the northern mountain ” for the place where the ship grounded may quite well be the name of an earthly substitute (the epic has ” the highest summit of the Himalaya “) for the mythic mountain of heaven. Nor is it unimportant that Manu is the son of the sun-god, and that the phrase ” the seven rishis ” in classical Sanskrit is a designation of the seven stars of the Great Bear. For such problems all that we can hope for is a probable solution. The opposite view 1 that the deluge is a historical occurrence implies a self-propagating power in early tradition which is not justified by critical research, and leaves out of sight many important facts revealed by comparative study. For a conspectus of deluge-stories see Andree, Die Flutsagen, elhnographisch betrachtet (1891), by a competent anthropologist; E. Suess, Face of the Earth, i. 17 (190,1) ; also Elwood Worcester, Genesis in the Light of Modern Knowledge (New York, 1 901), Appendix ii., in tabular form, from Schwarz’s Sintfluth und V blkerwanderungen. Dr Worcester’s work is popular, but based on well-chosen authorities. The article ” Flood ” in Hastings’ D. B. is comprehensive; it repre- sents the difficult view that flood-stories, &c, are generally highly- coloured traditions of genuine facts. (T. K. C.)

DELYANNI, THEODOROS (1826-1905), Greek statesman, was born at Kalavryta, Peloponnesus, in 1826. He studied law at Athens, and in 1843 entered the ministry of the interior, of which department he became permanent secretary in 1859. In 1862, on the deposition of King Otho, he became minister for foreign affairs in the provisional government. In 1867 he was minister at Paris. On his return to Athens he became a member of successive cabinets in various capacities, and rapidly collected a party around him consisting of those who opposed his great rival, Tricoupi. In the so-called ” Oecumenical Ministry ” of 1877 he voted for war with Turkey, and

on its fall he entered the cabinet of Koumoundoros as minister for foreign affairs. He was a representative of Greece at the Berlin Congress in 1878. From this time forward, and particularly after 1882, when Tricoupi again came into power at the head of a strong party, the duel between these two statesmen was the leading feature of Greek politics. (See Greece: History.) Delyanni first formed a cabinet in 1885 ; but his warlike policy, the aim of which was, by threaten- ing Turkey, to force the powers to make concessions in order to avoid the risk of a European war, ended in failure. For the powers, in order to stop his excessive armaments, eventually blockaded the Peiraeus and other ports, and this brought about his downfall. He returned to power in 1890, with a radical programme, but his failure to deal with the financial crisis pro- duced a conflict between him and the king, and his disrespectful attitude resulted in his summary dismissal in 1892. Delyanni, by his demagogic behaviour, evidently expected the public to side with him; but at the elections he was badly beaten. In 1895, however, he again became prime minister, and was at the head of affairs during the Cretan crisis and the opening of the war with Turkey in 1897. The humiliating defeat which ensued — though Delyanni himself had been led into the disastrous war policy to some extent against his will — caused his fall in April 1897, the king again dismissing him from office when he declined to resign. Delyanni kept his own seat at the election of 1899, but his following dwindled to small dimensions. He quickly recovered his influence, however, and he was again president of the council and minister of the interior when, on the 13th of June 1905, he was murdered in revenge for the rigorous measures taken by him against gambling houses.

The main fault of Delyanni as a statesman was that he was unable to grasp the truth that the prosperity of a state depends on its adapting its ambitions to its means. Yet, in his vast projects, which the powers were never likely to endorse, and without their endorsement were vain, he represented the real

wishes and aspirations of his countrymen, and his death was the occasion for an extraordinary demonstration of popular grief. He died in extreme poverty, and a pension was voted to the two nieces who lived with him.

DEMADES (c. 380–318 B.C.), Athenian orator and demagogue. He was originally of humble position, and was employed at one time as a common sailor, but he rose partly by his eloquence and 1 Held by Franz Delitzsch, Dillmann and Lenormant.

partly by his unscrupulous character to a prominent position at Athens. He espoused the cause of Philip in the war against Olynthus, and was thus brought into bitter and life- long enmity with Demosthenes,whom he at first supported. He fought against the Macedonians in the battle of Chaeroneia, and was taken prisoner. Having made a favourable impression upon Philip, he was released together with his fellow-captives, and was instru- mental in bringing about a treaty of peace between Macedonia and Athens. He continued to be a favourite of Alexander, and, prompted by a bribe, saved Demosthenes and the other obnoxious Athenian orators from his vengeance. It was also chiefly owing to him that Alexander, after the destruction of Thebes, treated Athens so leniently. His conduct in supporting the Macedonian cause, yet receiving any bribes that were offered by the opposite party, caused him to be heavily fined more than once ; and he was finally deprived of his civil rights. He was reinstated (322) on the approach of Antipater, to whom he was sent as ambassador. Before setting out he persuaded the citizens to pass sentence of death upon Demosthenes and his followers, who had fled from Athens. The result of his embassy was the con- clusion of a peace greatly to the disadvantage of the Athenians. In 318 (or earlier), having been detected in an intrigue with Perdiccas, Antipater's opponent, he was put to death by Antipater at Pella, when entrusted with another mission by the Athenians. Demades was avaricious and unscrupulous; but he was a highly gifted and practised orator.

A fragment of a speech (ITepl SaSeKaerias), bearing his name, in which he defends his conduct, is to be found in C. Muller's Oratores Attici, ii. 438, but its genuineness is exceedingly doubtful.

DEMAGOGUE (Gr. Srinayuyos, from &ytiv, to lead, and Srjfws, the people), a leader of the popular as opposed to any other party. Being particularly used with an invidious sense of a mob leader or orator, one who for his own political ends panders to the passions and prejudices of the people, the word has come to mean an unprincipled agitator.

DEMANTOID, the name given by Nils Gustaf Nordenskiold to a green garnet, found in the Urals and used as a gem stone. As it possesses high refractive and dispersive power, it presents when properly cut great brilliancy and " fire," and the name has reference to its diamond-like appearance. It is sometimes known as " Uralian emerald," a rather unfortunate name inasmuch as true emerald is found in the Urals, whilst it not infrequently passes in trade as olivine. Demantoid is regarded as a lime-iron garnet, coloured probably by a small proportion of chromium. The colour varies in different specimens from a vivid green to a dull yellowish-green, or even to a brown. The specific gravity of an emerald-green demantoid was found to be 3-849, and that of a greenish-yellow specimen 3-854 (A. H. Church). The hard- ness is only 6-5, or lower even than that of quartz — a character rather adverse to the use of demantoid as a gem. This mineral was originally discovered as pebbles in the gold-washings at Nizhne Tagilsk in the Ural Mountains, and was afterwards found in the stream called Bobrovka, in the Sysertsk dis- trict on the western slope of the Urals. It occurs not only as pebbles but in the form of granular nodules in a serpentine rock, and occasionally, though very rarely, shows traces of crystal faces. (F. W. R.)*

DEMARATUS (Doric Aa/xdparos, Ionic A^apr/ros) , king of Sparta of the Eurypontid line, successor of his father Ariston. He is known chiefly for his opposition to his colleague Cleomenes I. (q.v.) in

his attempts to make Isagoras tyrant in Athens and afterwards to punish Aegina for medizing. He did his utmost to bring Cleomenes into disfavour at home. Thereupon Cleomenes urged Leotychides, a relative and personal enemy of Demaratus, to claim the throne on the ground that the latter was not really the son of Ariston but of Agetus, his mother's first husband. The Delphic oracle, under the influence of Cleomenes' bribes, pro- nounced in favour of Leotychides, who became king (491 B.C.). Soon afterwards Demaratus fled to Darius, who gave him the cities of Pergamum, Teuthrania and Halisarna, where his de- scendants were still ruling at the beginning of the 4th century (Xen. Anabasis, ii. 1. 3, vii. 8. 17; Hellenica, iii. 1. 6); to these

Gambreum should perhaps be added (Athenaeus i. 29 f). He accompanied Xerxes on his expedition to Greece, but the stories told of the warning and advice which on several occasions he addressed to the king are scarcely historical.

See Herodotus v. 75, vi. 50–70, vii.; later writers either repro- duce or embellish his narrative (Pausanias iii. 4, 3^5, 7, 7–8; Diodorus xi. 6; Polyaenus ii. 20; Seneca, De beneficiis, vi. 31, 4–12). The story that he took part in the attack on Argos which was repulsed by Telesilla, the poetess, and the Argive women, can hardly be true (Plutarch, Mul. virt. 4; Polyaenus, Strat. viii. 33; G. Busolt, Griechische Geschichte, ii. 2 563, note 4). (M. N.T.)

DEMERARA, one of the three settlements of British Guiana, taking its name from the river Demerara. See Guiana.

DEMESNE (Demeine, Demain, Domain, &C.), 1 that portion of the lands of a manor not granted out in freehold tenancy, but (a) retained by the lord of the manor for his own use and occupa- tion or (b)

let out as tenemental land to his retainers or " villani." This demesne land, originally held at the will of the lord, in course of time came to acquire fixity of tenure, and developed into the modern copyhold (see Manor). It is from demesne as used in sense (a) that the modern restricted use of the word comes, i.e. land immediately surrounding the mansion or dwelling-house, the park or chase. Demesne of the crown, or royal demesne, was that part of the crown lands not granted out to feudal tenants, but which remained under the management of stewards ap-pointed by the crown. These crown lands, since the accession of George III., have been appropriated by parliament, the sovereign receiving in return a fixed annual sum (see Civil List). Ancient demesne signified lands or manors vested in the king at the time of the Norman Conquest. There were special privileges surrounding tenancies of these lands, such as freedom from tolls and duties, exemption from danegeld and amercement, from sitting on juries, &c. Hence, the phrase " ancient demesne " came to be applied to the tenure by which the lands were held. Land held in ancient demesne is sometimes also called customary freehold. (See Copyhold.)

DEMETER, in Greek mythology, daughter of. Cronus and Rhea and sister of Zeus, goddess of agriculture and civilized life. Her name has been explained as (1) " grain-mother," from Srjtu, the Cretan form of f e«u, " barley," or (2) " earth-mother," or rather " mother earth," da being regarded as the Doric form of \ij. She is rarely mentioned in Homer, nor is she included amongst the Olympian gods.

The central fact of her cult was the story of her daughter Persephone (Proserpine), a favourite subject in classical poetry. According to the Homeric Hymn to Demeter, Persephone, while gathering flowers on the Nysian plain (probably here a purely mythical locality), was carried off by Hades (Pluto), the god of the lower world, with the connivance of Zeus (see also Proserpine). The incident has been assigned to various other localities— Crete, Eleusis, and Enna in Sicily, the last being most generally adopted. This rape is

supposed to point to an original Upds \afws, an annual holy marriage of a god and goddess of vegetation. Wandering over the earth in search of her daughter, Demeter learns from Helios the truth about her disappearance. In the form of an old woman named Deo (= the ” seeker,” or simply a diminutive form), she comes to the house of Celeus at Eleusis, where she is hospitably received. Having revealed herself to the Eleusinians, she departs, in her wrath having visited the earth with a great dearth. At last Zeus appeases her by allowing her daughter to spend two-thirds of the year with her in the upper, world. Demeter then returns to Olympus, but before her final departure from earth, in token of her gratitude, she instructs the rulers of Eleusis in the art of agriculture and in the solemnities and rites whereby she desires in future to be honoured.

1 The form ” demesne ” is an Anglo-French spelling of the Old Fr. demeine or demaine, belonging to a lord, from Med. Lat, domifiicus, dominus, lord; dontinicum in Med. Lat. meant proprietas (see Du Cange). From the later Fr. domaine, which approaches more nearly the original Lat., comes the other Eng. form ” domain,” Which_ is chiefly used in a non-legal sense of any tract of country or district under the rule of any specific sovereign state, &c. _ ” Domain ” is, however, the form kept in the legal phrase ” Eminent Domain ” (8-f.).

Those who were initiated into the mysteries of Eleusis found a d«ep meaning in the myth, which was held to teach the principle of a future life, founded on the return of Persephone to the upper world, or rather on the process of nature by which seed sown in the ground must first die and rot before it . can yield new life (see Mystery). At Eleusis, Demeter was venerated as the introducer of all the blessings which agriculture brings in its train — fixed dwelling-places, civil order, marriage and a peaceful life; hence her name Thesmophoros, ” the bringer of law and order,” and the festival Thesmophoria (q.v.). J. G. Frazer takes the epithet to mean ” bearer of the sacred objects deposited on the altar “; L. R. Farnell (Cults of the Greek

States, iii. 106) suggests ” the bringer of treasure or riches,” as appropriate to the goddess of corn and of the lower world; others refer the name to ” the law of wedlock ” (0ecr/i6s Xkrpoto, Odyssey, xxiii. 296, where, however, D. B. Monro translates ” place, situation “). At Eleusis also, Triptolemus (q.v.), the son of Celeus, who was said to have invented the plough and to have been sent by Demeter round the world to diffuse the knowledge of agriculture, had a temple and threshing-floor.

In the agrarian legends of Iasion and Erysichthon, Demeter also plays an important part. Iasion (or Iasius), a beautiful youth, inspired her with love for him in a thrice-ploughed field in Crete, the fruit of their union being Plutus (wealth). According to Homer (Odyssey, v. 128) he was slain by Zeus with a thunderbolt. The story is compared by Frazer (Golden Bough, 2nd ed., ii. 217) with the west Prussian custom of the mock birth of a child on the harvest-field, the object being to ensure a plentiful crop for the coming year. It seems to point to the supersession of a primitive local Cretan divinity by Demeter, and the adoption of agriculture by the inhabitants, bringing wealth in its train in the form of the fruits of the earth, both vegetable and mineral. Some scholars, identifying Iasion with Jason (q.v.), regard Thessaly as the original home of the legend, and the union with Demeter as the hpos yafXos of mother earth with a health god. Erysichthon (” tearer up of the earth “), son of Triopas or Myrmidon, having cut down the trees in a grove sacred to the goddess, was punished by her with terrible hunger (Callimachus, Hymn to Demeter; Ovid, Metam. viii. 738-878). Perhaps Erysichthon may be explained as the personification of the labourer, who by the systematic cultivation and tilling of the soil endeavours to force the crops, instead of allowing them to mature unmolested as in the good old times. Tearing up the soil with the plough is regarded as an invasion of the domain of the earth-mother, punished by the all-devouring hunger for wealth, that increases with increasing produce. According to

another view, Erysichthon is the destroyer of trees, who wastes away as the plant itself loses its vigour. It is possible that the story may originally have been connected with tree- worship. Here again, as in the case of Iasion, a conflict between an older and a younger cult seems to be alluded to (for the numerous interpretations see O. Crusius s.v. in Roscher's Lexikon).

It is as a corn-goddess that Demeter appears in Homer and Hegibd, and numerous epithets from various sources (see Bruchmann, Epitheta Deorum, supplement to Roscher's Lexikon, i. 2) attest her character as such. The name 'IouXoi (? at Delos), from ToiAos, " corn-sheaf," has been regarded as identifying the goddess with the sheaf, and as proving that the cult of Demeter originated in the worship of the corn-mother or corn-spirit, the last sheaf having a more or less divine character for the primitive husbandman. A ccor ding to this view, the prototypes of Demeter and Persephone are the corn-mother and harvest maiden of northern Europe, the corri-fetishes of the field (Frazer, Golden Bough, 2nd ed., ii. 217, 222; but see Farnell, Cults, iii. 35). The influence of Demeter^ however, was not limited to corn, but extended to vegetation generally and all the fruits of the earth, with the curious exception of the bean, the use of which was forbidden at Eleusis, and for the protection of which a special patron was invented. In this wider sense Demeter is akin to Ge, with whom she has several epithets in common, and is sometimes identified with Rhea-Cybele; thus Pindar speaks of Demeter X<&kokp6tos (" brass-rattling "), an epithet obviously more

suitable to the Asiatic than to the Greek earth-goddess. Although the goddess of agriculture is naturally inclined to peace and averse from war, the memory of the time when her land was won and kept by the sword still lingers in the epithets xpvaaopos

and ^Kjnjcjmpos and in the name Triptolemus, which probably means '•' thrice fighter " rather than " thrice plougher."

Another important aspect of Demeter was that of a divinity of the under- world; as such she is x8°via at Sparta and especi- ally at Hermione in Argolis, where she had a celebrated temple, said to have been founded by Clymenus (one of the names of Hades- Pluto) and his sister Chthonia, the children of Phoroneus, an Argive hero. Here there was said to be a descent into the lower world, and local tradition made it the scene of the rape of Persephone. At the festival Chthonia, a cow (representing, according to Mannhardt, the spirit of vegetation), which volun- tarily presented itself, was sacrificed by three old women. Those joining in the procession wore garlands of hyacinth, which seems to attribute a chthonian character to the ceremony, although it may also have been connected with agriculture (see S. Wide, De Sacris Troezeniorum, Hermionensinm,Epidauriorum, Upsala, The striking use of the term S^ijrpetot in the sense of

" the dead " may be noted in this connexion.

The remarkable epithets, 'Epiviis and MeAcura, as applied to Demeter, were both localized in Arcadia, the first at Thelpusa (or rather Onkeion close by), the second at Phigalia (see W. Immerwahr, Die Kulte und Mythen Arkadiens, i. 1891). According to theThelpusan story, Demeter, during her wanderings in search of Persephone, changed herself into a mare to avoid the persecution of Poseidon. The god, however, assumed the form of a stallion, and the fruit of the union was a daughter of mystic name and the horse Areion (or Erion) . Demeter, at first enraged, afterwards calmed down, and washed herself in the river Ladon by way of purification. Demeter " the angry " (kpiviis) became Demeter " the bather " (Kovala). An almost identical story was current in the neighbourhood of Tilphossa, a Boeotian spring. In the Phigalian legend, no mention is made of the horse Areion, but only of the daughter, who is called Despoina (mistress), a title common to all

divinities connected with the under-world. Demeter, clad in black (hence ixthaxva) in token of mourning for her daughter and wrath with Poseidon, retired into a cave. During that time the earth bore no fruit, and the inhabitants of the world were threatened with starvation. At last Pan, the old god of Arcadia, discovered her hiding-place, and informed Zeus, who sent the Moirae (Fates) to fetch her out. The cave, still called Mavrospelya ("black cave"), was ever afterwards regarded as sacred to Demeter, and in it, according to information given to Pausanias, there had been set up an image of the goddess, a female form seated on a rock, but with a horse's head and mane, to which were attached snakes and other wild animals. It was clothed in a black garment reaching to the feet, and held in one hand a dolphin, in the other a dove. The image was destroyed by fire, replaced by the sculptor Onatas from inspiration in a dream, but disappeared again before the time of Pausanias.

Both fiekaiva and tpivvs, according to Farnell, are epithets of Demeter as an earth-goddess of the under-world. The first has been explained as referring to the gloom of her abode, or the blackness of the withered corn. The second, according to Max Miiller and A. Kuhn, is the etymological equivalent of the Sanskrit Saranyu, who, having turned herself into a mare, is pursued by Vivasvat, and becomes the mother of the two Asvins, the Indian Dioscuri, the Indian and Greek myths being regarded as identical. According to Farnell, the meaning of the epithet is to be looked for in the original conception of Erinys, which was that of an earth-goddess akin to Ge, thus naturally associated with Demeter, rather than that of a wrathful avenging deity.

Various interpretations have been given of the horse-headed form of the Black Demeter: (1) that the horse was one of the forms of the corn-spirit in ancient Greece; (2) that it was an animal " devoted " to the chthonian goddess; (3) that it is totemistic; (4) that the form was adopted from Poseidon Hippios, who is frequently associated with

the earth-goddess and is said to have received the name Hippios first at Thelpusa, in

order that Demeter might figure as the mother of Areion (for a discussion of the whole subject see Farnell, Cults, hi. pp. 50-62). The union of Poseidon and Demeter is thus explained by Mann-hardt. As the waves of the sea are fancifully compared to horses, so a field of corn, waving in the breeze, may be said to represent the wedding of the sea-god and the corn-goddess. In any case the association of Poseidon, representing the fertilizing element of moisture, with Demeter, who causes the plants and seeds to grow, is quite natural, and seems to have been widespread.

Demeter also appears as a goddess of health, of birth and of marriage; and a certain number of political and ethnic titles is assigned to her. Of the latter the most noteworthy are: Havaxaia at Aegium in Achaea, pointing to some connexion with the Achaean league; 'Axala, 1 " the Achaean goddess," unless it refers to the" sorrow " of the goddess for the loss of her daughter (cf. 'Axea in Boeotia); and, most important of all, 'A)j.4>iktvovLs, at Anthela near Thermopylae, as patron-goddess of the Amphic- tyonic league, subsequently so well known in connexion with the temple at Delphi.

The Eleusinia and Thesmophoria are discussed elsewhere, but brief mention may here be made of certain agrarian festivals held in honour of Demeter.

1. Haloa, obviously connected with dXcos (" threshing-floor "); begun at Athens and finished at Eleusis, where there was a threshing-floor of Triptolemus, in the month Poseideon (December). This date, which is confirmed by historical and epigraphical evidence, seems inappropriate, and it is suggested (A. Mommsen, Feste der Stadt Athen, p. 365 foil.) that the festival, originally held in autumn, was subsequently placed later, so as to synchronize with the winter Dionysia. Dionysus, as

the god of vines, and (in a special procession) Poseidon (j>vTa\p.Los (" god of vegetation ") were associated with Demeter. In addition to being a harvest festival, marked by the ordinary popular rejoic- ings, the Haloa had a religious character. The airapxa-i (" first fruits ") were conveyed to Eleusis, where sacrifice was offered by a priestess, men being prohibited from undertaking the duty. A TeXeri7 (" initiatory ceremony ") of women by a woman also took place at Eleusis, characterized by obscene jests and the use of phallic emblems. The sacramental meal on this occasion consisted of the produce of land and sea, certain things (pome- granates, honey, eggs) being forbidden for mystical reasons. Although the offerings at the festival were bloodless, the ceremony of the presentation of the airapxa-l was probably accompanied by animal sacrifice (Farnell, Foucart); Mommsen, however, considers the offerings to have been pastry imitations. Certain games (varptos aycov), of which nothing is known, terminated the proceedings. In Roman imperial times the ephebi had to deliver a speech at the Haloa.

2. Chloeia or Chloia, the -festival of the corn beginning to sprout, held at Eleusis in the early spring (Anthesterion) in honour of Demeter Chloe, " the green," the goddess of growing vegetation. This is to be distinguished from the later sacrifice of a ram to the same goddess on the 6th of the month Thargelion, probably intended as an act of propitiation. It has been identified with the Procharisteria (sometimes called Proschaireleria), another spring festival, but this is doubtful. The scholiast on Pindar (01. ix. 150) mentions an Athenian harvest festival Eucharisteria.

3. Proerosia, at which prayers were offered for an abundant harvest, before the land was ploughed for sowing. It was also called Proarcturia, an indication that it was held before the rising of Arcturus. According to the traditional account, when Greece was threatened with famine, the Delphic oracle ordered first- fruits to be brought to Athens from all parts of the country, which were to be

offered by the Athenians to the goddess Deo on behalf of all the contributors. The most important- part of the festival was the three sacred ploughings — the Athenian inr6 Tiokw,: the Eleusinian on the Rharian plain, the Scirian (a compromise between Athens and Eleusis). The festival itself

1 O. Gruppe (Grieckische Mylhologie, ii. 1177, note 1) considers it ” certain ” that ‘Axala = ‘k\t\aia, although he is unable to explain the form.

took plice, probably some time in September, at Eleusis. In later times the ephebi also took part in the Proerosia.

4. Thalysia, a thanksgiving festival, held in autumn after the harvest in the island of Cos (see Theocritus vii.).

5. The name of Demeter is also associated with the Scirophoria (see Athena). It is considered probable that the festival was originally held in honour of Athena, but that the growing importance of the Eleusinia caused it to be attached to Demeter and Kore.

The attributes of Demeter are chiefly connected with her character as goddess of agriculture and vegetation — ears of corn, the poppy, the mystic basket {calathus) filled with flowers, corn and fruit of all kinds, the pomegranate being especially common. Of animals, the cow and the pig are her favourites, the latter owing to its productivity ancl the cathartic properties of its blood. The crane is associated with her as an indicator of the weather. As a chthonian divinity she is accompanied by a snake; the myrtle, asphodel and narcissus (which Persephone was gathering when carried off by Hades) also are sacred to her.

In Greek art, Demeter is made to resemble Hera, only more matronly and of milder expression; her form is

broader and fuller. She is sometimes riding in a chariot drawn by horses or dragons, sometimes walking, sometimes seated upon a throne, alone or with her daughter. The Demeter of Cnidus in the British Museum, of the school of Praxiteles, apparently shows her mourning for the loss of her daughter. The article Greek Art, fig. 67 (pi. iv.), gives a probable representation of Demeter (or her priestess) from the stone of a vault in a Crimean grave.

The Romans identified Demeter with their own Ceres (q.v.).

See L. Preller, Demeter und Persephone (1837); P. R. Forster, Der Raub und die Ruckkehr der Persephone (1874), in which consider- able space is devoted to the representations of the myth in art; W. Mannhardt, Mythologische Forschungen (1884); J. E. Harrison, Prolegomena to the Study of Greek Religion (1903) ; L. Dyer, The Gods in Greece (1891); J. G. Frazer, The Golden Bough (2nd ed.), ii. 168–222 ; L. Preller, Griechische Mythologie (4th ed., by C. Robert) ; O. Kern in Pauly–Wissowa's Realencyclopddie, iv. pt. 2 (1901) ; L. Bloch in Roscher's Lexikon der Mythologie ; O. Gruppe, Griechische Mythologie und Religionsgeschichte, ii. (1907) ; L. R. Farnell, Cults of the Greek States, iii. (1907) ; article " Ceres " by F. Lenormant in Daremberg and Saglio's Dictionnaire des antiquites. (J. H. F.)

DEMETRIA, a Greek festival in honour of Demeter, held at seed–time, and lasting ten days. Nothing is known of it beyond the fact that the men who took part in it lashed one another with whips of bark (ixoporrov), while the women made obscene jests. It is even doubtful whether it was a particular festival at all or only another name for the Eleusinia or Thesmophoria. The Dionysia also were called Demetria in honour of Demetrius Poliorcetes, upon whom divine honours were conferred by the Athenians.

Hesychius, s.v. hopottov; Poiiux i. 37; Diod. Sic.

v. 4; Plutarch, Demetrius, 12 ; Daremberg and Saglio, Dictionnaire des antiquites.

DEMETRIUS, king of Bactria, was the son of the Graeco- Bactrian king Euthydemus, for whom he negotiated a peace with Antiochus the Great in 206 (Polyb. xi. 34). Soon afterwards he crossed the Hindu Kush and began the invasion of India (Strabo xi. 516); he conquered the Punjab and the valley of the Indus down to the sea and to Gujerat. The town Sangala, a town of the Kathaeans in the Punjab (Arrian v. 22, 2 ff.), he named after his father Euthydemia (Ptol. vii. 1, 46). That his power extended into Arachosia (Afghanistan) is proved by the name of a town Demetrias near Kandahar (Isidor. Charac. 19, cf. Strabo xi. 516). On his coins he wears an elephant's skin with trunk and teeth on his head; on bronze coins, which have also an Indian legend in Kharoshti letters (see Bactrja), he calls himself the unvanquished king (Bcun.X«tos avixrirov Aijjurjrptou) . One of his coins has already the square form used in India instead of the circular. Eventually he was defeated by the usurper Eucratides (q.v.), who meanwhile had risen to great power in Bactria. About his death we know nothing; his young son Euthydemus II. (known only from coins) can have ruled only a short time. (Ed. M.) .

DEMETRIUS, the name of two kings of Macedonia.

1. Demetrius I. (337-283 bx.), surnamed Poliorcetes (" Besieger "), son of Antigonus Cyclops and Stratonice. At

the age of twenty-two he was left by his father to defend Syria against Ptolemy the son of Lagus; he was totally defeated near Gaza (3 1 2) , but soon partially repaired his loss by a victory in the neighbourhood of Myus. After an unsuccessful expedition against Babylon, and several campaigns against Ptolemy on the coasts of Cilicia and Cyprus, Demetrius sailed with a fleet of 250 ships to Athens. He freed the city from the power of Cassander and Ptolemy, expelled the garrison which had been stationed there under Demetrius of

Phalerum, and besieged and took Munychia (307) . After these victories he was worshipped by the Athenians as a tutelary deity under the title of Soter (" Preserver "). In the campaign of 306 against Ptolemy he defeated Menelaus (the brother of Ptolemy) in Cyprus, and completely destroyed the naval power of Egypt. In 305 he endeavoured to punish the Rhodians for having deserted his cause; and his ingenuity in devising new instruments of siege, in his unsuccessful attempt to reduce the capital, gained him the appellation of Poliorcetes. He returned a second time to Greece as liberator. But his licentiousness and extravagance made the Athenians regret the government of Cassander. He soon, however, roused the jealous] of the successors of Alexander; and Seleucus, Cassander and Lysimachus united to destroy Antigonus and his son. The hostile armies met at Ipsus in Phrygia (301). Antigonus was killed ir the battle, and Demetrius, after sustaining a severe loss, retired to Ephesus. This reverse of fortune raised up many enemies against him; and the Athenians refused even to admit him intc their city. But he soon afterwards ravaged the territory of Lysimachus, and effected a reconciliation with Seleucus, to whom he gave his daughter Stratonice in marriage. Athens was at this time oppressed by the tyranny of Lachares; but Demetrius, after a protracted blockade, gained possession of the city (294) and pardoned the inhabitants their former misconduct. In the same year he established himself on the throne of Macedonia by, the murder of Alexander, the son of Cassander. But here he was continually threatened by Pyrrhus, who took advantage of his occasional absence to ravage the defenceless part of his kingdom (Plutarch, Pyrrhus, 7 ff.) ; and at length the combined forces of Pyrrhus, Ptolemy and Lysimachus, assisted by the disaffected among his own subjects, obliged him to leave Macedonia after he had sat on the throne for six years (294–288). He passed into Asia, and attacked some of the provinces of Lysimachus with varying success; but famine and pestilence destroyed the greater part of his army, and he solicited Seleucus for support and assist-

ance. But before he reached Syria hostilities broke out; and after he had gained some advantages over his son-in-law, Demetrius was totally forsaken by his troops on the field of battle, and surrendered his person to Seleucus. His son Antigonus offered all his possessions, and even his person, in order to procure his father's liberty; but all proved unavailing, and Demetrius died in the fifty-fourth year of his age, after a confinement of three years (283). His remains were given to Antigonus, honoured with a splendid funeral at Corinth, and thence conveyed to Demetrias. His posterity remained in possession of the Macedonian throne till the time of Perseus, who was conquered by the Romans.

See Life by Plutarch; Diod. Sic. xix. xx.; Wilamowitz-Moellen- dorff, Antigonos von Karystos; De Sanctis, Contributi alia storia Ateniese in Beloch's Studi di storia antica (1893); Fergusson in Lehmann's Beitrage z. alt. Gesch. (Klio) vol. v. (1905) ; also authori- ties under Macedonian Empire.

2. Demetrius II., son' of Antigonus Gonatas, reigned from 239 to 229 b.c. He had already during his father's lifetime distinguished himself by defeating Alexander of Epirus at Derdia and so saving Macedonia (about 260 ?). On his accession he had to face a coalition which the two great leagues, usually rivals, the Aetolian and Achaean, formed against the Macedonian power. He succeeded in dealing this coalition severe blows, wresting Boeotia from their alliance. The revolution in Epirus, which substituted a republican league for the monarchy, gravely weakened his position. Demetrius had also to defend Macedonia against the wild peoples of the north. A battle with the Dar- danians turned out disastrously, and he died shortly afterwards,

leaving Philip, his son by Chryseis, still a child. Former wives of Demetrius were Stratonice, the

daughter of the Seleucid king Antiochus I., Phthia the daughter of Alexander of Epirus, and Nicaea, the widow of his cousin Alexander. The chronology of these marriages is a matter of dispute.

See Thirlwall, History of Greece, vol. viii. (1847) ; Ad. Holm, Griech. Gesch. vol.iv. (1894); B. Niese, Gesch. d. griech. u. maked. Staaten, vol.ii. (1899) ; J.Beloch,Gn'ecA.Geic^.vol.iii. (1904). (E. R. B.)

DEMETRIUS, the name of three kings of Syria.

Demetrius I. (d. 150 B.C.), surnamed Soter, was sent to Rome as a hostage during the reign of his father, Seleucus IV. Philopator, but after his father's death in 175 B.C. he escaped from confine- ment, and established himself on the Syrian throne (162 B.C.) after overthrowing and murdering King Antiochus V. Eupator. He acquired his surname of Soter, or Saviour, from the Babylonians, whom he delivered from the tyranny of the Median satrap, Timarchus, and is famous in Jewish history for his contests with the Maccabees. Hated for his vices, Demetrius fell in battle against the usurper, Alexander Balas, in 150 B.C.

Demetrius II. (d. 125 B.C.), surnamed Nicator, son of Demetrius I., fled to Crete after the death of his father, but about 147 B.C. he returned to Syria, and with the help of Ptolemy VII. Philometor, king of Egypt, regained his father's throne. In 140 B.C. he marched against Mithradates, king of Parthia, but was taken prisoner by treachery, and remained in captivity for ten years, regaining his throne about 129 B.C. on the death of his brother, Antiochus VII., who had usurped it. His cruelties and vices, however, caused him to be greatly detested, and during another civil war he was defeated in a battle at Damascus, and killed near Tyre, possibly at the instigation of his wife, a daughter of Ptolemy VII., who was indignant at his subsequent marriage with a daughter of the Parthian king, Mithradates. His successor was his son, Antiochus VIII. Grypus.

Demetrius III. (d. 88 B.C.), called Euergetes and

Philometor, was the son of Antiochus VIII. Grypus. By the assistance of Ptolemy X. Lathyrus, king of Egypt, he recovered part of his Syrian dominions from Antiochus X. Eusebes, and held his court at Damascus. In attempting to dethrone his brother, Philip Epiphanes, he was defeated by the Arabs and Parthians, was taken prisoner, and kept in confinement in Parthia by King Mithradates until his death in 88 B.C.

DEMETRIUS, a Greek sculptor of the early part of the 4th century B.C., who is said by ancient critics to have been notable for the life-like realism of his statues. His portrait of Pellichus, a Corinthian general, " with fat paunch and bald head, wearing a cloak which leaves him half exposed, with some of the hairs of his head flowing in the wind, and prominent veins," was admired by Lucian. He was contrasted with Cresilas (q.v.),a.a idealizing sculptor of the generation before. Since however the peculiari- ties mentioned by Lucian do not appear in Greek portraits before the 3rd century B.C., and since the Greek art of the 4th century consistently idealizes, there would seem to be a difficulty to explain. The date of Demetrius above given is confirmed by inscriptions found on the Athenian Acropolis. (P. G.)

DEMETRIUS, a Cynic philosopher, born at Sunium, who lived partly at Corinth and later in Rome during the reigns of Caligula, Nero and Vespasian. He was an intimate friend of Thrasea Paetus and Seneca, and was held in the highest estimation for his consistent disregard of creature comfort in the pursuit of virtue. His contempt for worldly prosperity is shown by his reply to Caligula who, wishing to gain his friendship, sent him a large present. He replied, " If Caligula had intended to bribe me, he should have offered me his crown." Vespasian banished him, but Demetrius laughed at the punishment and mocked the emperor's anger. He reached the logical conclusion of Cynicism in attaching no real importance to scientific data.

DEMETRIUS DONSKOI 1 (1350-1389), grand duke of

Vladimir and Moscow, son of the grand duke Ivan Ivanovich by his second consort Aleksandra, was placed on the grand-ducal throne of Vladimir by the Tatar khan in 1362, and married the princess Eudoxia of Nizhniy Novgorod in 1364. It was now that Moscow 1 Of the Don.

was first fortified by a strong wall, or kreml (citadel), and the grand duke began ” to bring all the other princes under his will.” Michael, prince of Tver, appealed however for help to Olgierd, grand duke of Lithuania, who appeared before Moscow with his army and compelled Demetrius to make restitution to the prince of Tver (1369). The war between Tver and Vladimir continued intermittently for some years, and both the Tatars and the Lithuanians took an active part in it. Demetrius was generally successful in what was really a contention for the supremacy. In 137 1 he won over the khan by a personal visit to the Horde, add in 1372 he defeated the Lithuanians at Lyubutsk. Demetrius then formed a league of all the Russian princes against the Tatars and in 1380 encountered them on the plain of Kulikovo, between the rivers Nepryadvaya and Don, where he completely routed them, the grand khan Mamai perishing in his flight from the field. But now Toktamish, the deputy of Tamerlane, suddenly appeared in the Horde and organized a punitive expedition against Demetrius. Moscow was taken by treachery, and the Russian lands were again subdued by the Tatars (1381). Nevertheless, while compelled to submit to the Horde, Demetrius maintained his hegemony over Tver, Novgorod and the other recalcitrant Russian principalities, and even held his own against the Lithu- anian grand dukes, so that by his last testament he was able to leave not only his ancestral possessions but his grand-dukedom also to his son Basil. Demetrius was one of the greatest of the north Russian grand dukes. He was not merely a cautious and tactful statesman, but also a valiant and capable captain, in striking contrast to most of the princes of his house.

See Sergyei Solovev, History of Russia (Rus.), vols, i.-ii. (St Petersburg, 1857), &c. ; Nikolai Savelev,

Demetrius Ivanovich Donskoi (Rus.), (Moscow, 1837). (R. N. B.)

DEMETRIUS PHALEREUS (c. 345–283 B.C.), Attic orator, statesman and philosopher, born at Phalerum, was a pupil of Theophrastus and an adherent of the Peripatetic school. He governed the city of Athens as representative of Cassander (q.v.) for ten years from 317. It is said that he so won the hearts of the people that 360 statues were erected in his honour; but opinions are divided as to the character of his rule. On the restoration of the old democracy by Demetrius Poliorcetes, he was condemned to death by the fickle Athenians and obliged to leave the city. He escaped to Egypt, where he was protected by Ptolemy Lagus, to whom he is said to have suggested the founda- tion of the Alexandrian library. Having incurred the displeasure of Lagus's successor Philadelphus, Demetrius was banished to Upper Egypt, where he died (according to some, voluntarily) from the bite of an asp. Demetrius composed a large number of works on poetry, history, politics, rhetoric and accounts of embassies, all of which are lost.

The treatise ITepJ 'Ep/njjceitts (on rhetorical expression), which is often ascribed to him, is probably the work of a later Alexandrian (1st century a.d.) of the same name; it has been edited by L. Radermacher (1901) and W. Rhys Roberts (1902), the last-named providing English translation, introduction, notes, glossary and complete bibliography. Fragments in C. Miiller, Frag. Hist. Graec. ii. p. 362. See A. Holm, History of Greece (Eng. trans.), iv. 60.

DEMETRIUS, PSEUDO-(or False), the name by which three Muscovite princes and pretenders, who claimed to be Demetrius, son of Ivan the Terrible, are known in history. The real Demetrius had been murdered, while still a child, in 1591, at Uglich, his widowed mother's appanage.

1. In the reign of Tsar Boris Godunov (1598–1605), the first of these pretenders, whose origin is still

obscure, emigrated to Lithuania and persuaded many of the magnates there of his tsarish birth, and consequently of his right to the Muscovite throne. His real name seems to have been Yury or Gregory, and he was the grandson of Bogdan Otrepev, a Galician boyar, and a tool in the hands of Tsar Boris Godunov's enemies. He first appears in history circa 1600, when his learning and assurance seem to have greatly impressed the Muscovite patriarch Job. Tsar Boris, however, ordered him to be seized and examined, whereupon he fled to Prince Constantine Ostrogsky at Ostrog, and subsequently entered the service of another Lithuanian, Prince Wisniwiecki, who accepted him for what he pretended

to be and tried to enlist the sympathy of the Polish king, Sigismund III., in his favour. The king refused to support him officially, but his cause was taken up, as a speculation, by the Polish magnate YuryMniszek, whose daughter Marina he after- wards wedded and crowned as his tsaritsa. The Jesuits also seem to have believed in the man, who was evidently an unconscious impostor brought up from his youth to believe that he was the real Demetrius; numerous fugitives from Moscow also acknow- ledged him, and finally he set out, at the head of an army of Polish and Lithuanian volunteers, Cossacks and Muscovite fugitives, to drive out the Godunovs, after being received into the Church of Rome. At the beginning of 1604 he was invited to Cracow, where Sigismund presented him to the papal nuncio Rangoni. His public conversion took place on the 1 7th of April. In October the false Demetrius crossed the Russian frontier, and shortly afterwards routed a large Muscovite army beneath the walls of Novgorod-Syeversk. The sudden death of Tsar Boris (April 13, 1605) removed the last barrier to the further progress of the pretender. The principal Russian army, under P. F. Basmanov, at once went over to him (May 7) ; on the 20th of June he made his triumphal entry into Moscow, and on the 21st of July he was

crowned tsar by a new patriarch of his own choosing, the Greek Isidore. He at once proceeded to introduce a whole series of political and economical reforms. From all accounts, he must have been a man of original genius and extraordinary resource. He did his best to relieve the burdens of the peasantry; he formed the project of a grand alliance between the emperor, the pope, Venice, Poland and Muscovy against the Turk; he displayed an amazing toleration in religious matters which made people suspect that he was a crypto- Arian; and far from being, as was expected, the tool of Poland and the pope, he maintained from the first a dignified and independent attitude. But his extravagant opinion of his own authority (he lost no time in styling himself emperor) , and his predilection for Western civilization, alarmed the ultra- conservative boyars (the people were always on his side), and a conspiracy was formed against him, headed by Basil Shuisky, whose life he had saved a few months previously. A favourable opportunity for the conspirators presented itself on the 8th of May 1 606, when Demetrius was married to Marina Mniszek. Taking advantage of the hostility of the Muscovites towards the Polish regiments which had escorted Marina to Moscow and there committed some excesses, the boyars urged the citizens to rise against the Poles, while they themselves attacked and slew Demetrius in the Kreml on the night of the 1 7th of May.

See Sergyei Solovev, History of Russia (Rus.), vol. viii. (St Peters- burg, 1857, &c.) ; Nikolai Kostomarov, Historical Monographs (Rus.) vols, iv.- vi. (St Petersburg, 1863, &c); Orest Levitsky, The First False Demetrius as the Propagandist of Catholicism in Russia (Rus.) (St Petersburg, 1886); Paul Pierling, Rome et Demetrius (Paris, 1878) ; R. N. Bain, Poland and Russia, cap. 10 (Cambridge, 1907).

2. The second pretender, called ” the thief of Tushino,” first appeared on the scene circa 1607 at Starodub. He is supposed to have been either a priest’s son or a converted Jew, and was highly

educated, relatively to the times he lived in, knowing as he did the Russian and Polish languages and being somewhat of an expert in liturgical matters. He pretended at first to be the Muscovite boyarin Nagi; but confessed, under torture, that he was Demetrius Ivanovich, whereupon he was taken at his word and joined by thousands of Cossacks, Poles and Muscovites. He

speedily captured Karachev, Bryansk and other towns; was reinforced by the Poles; and in the spring of 1608 advanced upon Moscow, routing the army of Tsar Basil Shuisky, at Bolkhov, on his way. Liberal promises of the wholesale confiscation of the estates of the boyars drew the common people to him, and he entrenched himself at the village of Tushino, twelve versts from the capital, which he converted into an armed camp, collecting therein 7000 Polish soldiers, 10,000 Cossacks and 10,000 of the rabble. In the course of the year he captured Marina Mniszek, who acknowledged him to be her husband (subsequently quieting her conscience by privately marrying this impostor, who in no way resembled her first husband), and brought him the support of the Lithuanian magnates Mniszek and Sapieha so that his forces soon exceeded 100,000 men. He raised to the rank of patriarch another illustrious captive, Philaret Romanov, and won over the towns of Yaroslavl, Kostroma, Vologda, Kashin and other places to his allegiance. But a series of subsequent disasters, and the arrival of King Sigismund III. at Sinolensk, induced him to fly his camp disguised as a peasant and go to Kostroma, where Marina joined him and he lived once more in regal state. He also made another but unsuccessful attack o\ Moscow, and, supported by the Don Cossacks, recovered a hold over all south-eastern Russia. He was killed, while half drunk, on the nth of December 1610, by a Tatar whom he had flogged. See Sergyei Solovev, History of Russia (Rus..^ vd. viii. (St Peters- burg, 1657, &c).

3. The third, a still more enigmatical person than his pre. decessors, supposed to have been a deacon called Siderka, appeared suddenly, ” from, behind

the river Yanza," in the Ingrian town of Ivangorod (Narva), proclaiming himself the tsarevich Demetrius Ivanovich, on the 28th of March 1611. The Cossacks, ravaging the environs of Moscow, acknowledged him as tsar on the 2nd of March 161 2, and under threat of vengeance in case of non-compliance, the gentry of Pskov also kissed the cross to "the thief of Pskov," as he was usually nick- named. On the 18th of May 1612 he fled from Pskov, was seized and delivered up to the authorities at Moscow, and there executed.

See Sergyei Solovev, History of Russia (Rus.), vol. viii. (St Peters- burg, 1857, &c). (R. N. B.)

DEMIDOV, the name of a famous Russian family, founded by Nikita Demidov (b. c. 1665), who was originally a blacksmith serf. He made his fortune by his skill in the manufacture of weapons, and established an iron foundry for the government. Peter the Great, with whom he was a favourite, ennobled him in 1720. His son, Akinfiy Demidov (d. c. 1740), increased his inherited wealth by the discovery and working of gold, silver and copper mines. The latter's nephew, Paul Grigoryevich Demidov (1738-1821), was a great traveller who was a benefactor of Russian scientific education; he founded an annual prize for Russian literature, awarded by the Academy of Sciences. Paul's nephew, Nikolay Nikitich Demidov (1774-1828), raised and commanded a regiment to oppose Napoleon's invasion, and carried on the accumulation of the family wealth from mining; he contributed liberally to the erection of four bridges in St Petersburg, and to the propagation of scientific culture in Moscow. Paul's son, Anatoli Demidov (181 2-1870), was a well-known traveller and patron of art; he married Princess Mathilde. daughter of Jerome Bonaparte.

PKINTED IN U.S.A.

VOL08_DEMIJOHN-EDWARD-_THE_B

Britannica

THE

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

FIRST edit

on, published in three volumes,

1768— 1771.

SECOND ,

,, ten

»>

1777— 1784.

THIRD ,

,, eighteen

»

1788 — 1797.

FOURTH ,

,, twenty

»

1801 — 1810.

FIFTH ,

„ twenty

>»

1815— 1817.

SIXTH ,

„ twenty

»

1823 — 1824.

SEVENTH ,

„ twenty-one

»

1830 — 1842.

EIGHTH ,

„ twenty-two

»*

1853— 1860.

NINTH ,

„ twenty-five

> >

1875— 1889.

TENTH ,

ninth edition and eleven

supplementary volumes,

1902 — 1903.

ELEVENTH ,

published in twenty-nine volumes,

1910 — 1911.

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the UNIVERSITY OF CAMBRIDGE

All rights reserved

THE

ENCYCLOPEDIA BRITANNICA

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME VIM

DEMIJOHN to EDWARD

New York

Encyclopaedia Britannica, Inc.

342 Madison Avenue

Copyright, in the United States of America, 1910

by

The Encyclopaedia Britannica Company.

INITIALS USED IN VOLUME VIII. TO IDENTIFY INDIVIDUAL

CONTRIBUTORS, 1 WITH THE HEADINGS OF THE

ARTICLES IN THIS VOLUME SO SIGNED,

A. Ca. A. E. G.*

A. E. S.

■I Determinant.

Devil.

Desmoscolecida; Echiuroidea.

A.

Fi

A.

F.

P.

A.

G.

A.

G.

D.

A.

H.

J.

G

A. H. S. A. J. L.

A. J. P. A. L. G.

A. Mw.

A. M. C. A.N,

Arthur Cayley, LL.D.; F.R.S.

See the biographical article : CAyleY, Arthur.

Rev. Alfred Ernest Garvie, M.A., D.D.

Principal of. New College, Hampstead. Member of the Board of Theology and Board of Philosophy, London University. Formerly Professor of Philosophy,

■;> ■ . Theism, Comparative Religion, and Christian Ethicsih Hackney and New Colleges, London. Author of Studies in the Inner Life of Jesus; The Christian Certainly; &c.

■Arthur Everett Shipley, M.A., D.Sc, F.R.S., F.Z.S,. F.L.S.

Fellow, Tutor and Lecturer of Christ's College, Cambridge. University Reader in Zoology. President of the Association of Economic Biologists. Formerly University Lecturer on the Advanced Morphology of the Invertebrata. Author of Zoology of the Invertebrata. Editor of the Pitt Press Natural Science Manuals; &c.

Pierre Marie Auguste Filon.

See the biographical article: Filon, P. M. A.

Albert Frederick Pollard, M.A., F.R.Hist.Soc. f

Fellow of All Souls' College, Oxford, ' Professor of English History in the University J g j war fl yi. of London. Assistant Editor of the Dictionary of National Biography, 1893-1901. | Author of England under the Protector Somerset; Life of Thomas Cranmer; &c. I

Major Arthur George Frederick Griffiths (d. 1908). f

H.M. Inspector of Prisons,' 1 878-1 896. Author of The Chronicles of Newgate ; -j Deportation. Secrets of the Prison House ; &c. I

Arthur George Doughty, C.M.G., M.A., Litt.D., F.R.Hist.S. f

Dominion Archivist of Canada. Member of the Geographical Board of Canada. . Author of The Cradle of New France; &c. Joint Editor of Documents relating to the Constitutional History of Canada.

Abel Hendy Jones Greenidge, M.A., D.Litt. (d. 1905).

Formerly Fellow and Lecturer of Hertford College, Oxford, and of St John's College, Oxford. Author of Infamia in Roman Law; Handbook of Greek Con- stitutional History; Roman Public Life; History of Rome. Joint Editor of Sources of Roman History, 133-70 B.C.

Rev. Archibald Henry Sayce, D.Litt., L.L.D., D.D.

See the biographical article: Sayce, A. H;

Andrew Jackson Lamoureux.

Librarian, College of Agriculture, Cornell University. News, Rio de Janeiro.

Alexander J. Philip.

Borough Librarian of Gravesend.

Andrew Lockhart Gillespie, M.D., F.R.S. (Edin.) (d. 1904).

Formerly Lecturer on Modern Gastric Methods, Edinburgh Post-Graduate School. Author of Manual of Modern Gastric Methods ; &c.

Allen Mawer, M.A.

Professor of Englishˆ Language and Literature, Armstrong College, Newcastle-on- Tyne. Fellow of Gonville and Caius College, Cambridge. Formerly Lecturer in English at the University of Sheffield.

Agnes Mary Clerke.

See the biographical article: Clerke, A. M.

Alfred Newton, F.R.S.

See the biographical article: Newton, Alfred.

1 A complete list, showing all individual contributors, appears in the final vol

v

Drama: French {in pari).

Dorion.

Dictator.

Formerly Editor of the Rio

J Ecbatana. Ecuador (in part).

{

Dene-holes.

J Digestive Organs: Pathology

I [in part).

Denmark: Ancient History; Edgar, King;

Edmund , King of East Anglia; Edmund I.; Edred; Edward (the Elder); Edward (the Martyr).

{

Dick, Thomas; Donati.

f Diver; Dodo (in part) ; \ Dove; Duck; Eagle.

VI

A. R. &

A. S. Wo.

A. Wa.

A. W. H * A, W. R.

A. W. W.

C. A. G.

C. Ch.

c,

c.

H.

c.

E.

•

c.

F.

A.

c.

H.

Rd.

c.

H.

T.*

c.

L.

K.

C. PL C. R. B.

C. S. P.*

C. W. W.

D. B. Ma.

D. C. T. D. G. H.

D.Ho D. Mn.

INITIALS AND HEADINGS OF ARTICLES

,1:

of

Bacon Scholar of Gray's Inn, 1900. Editor of Encyclopaedia of the Laws

De Tabley.

J Derby, Earls of (in part).

} Easement.

I

J Drama.

J Denmark: Geography and ‘\ Statistics (in part)

Earth Currents.

-y Dynamo.

■I Density; Distillation.

‘{

Dutch Wars: Military.

Alexander Ross Clarke, C.B., F.R.S. . .

Colonel, R.E. Royal Medal of Royal Society, 1887. In charge of Trigonometrical 1 Earth, Figure 01 the (m part)- Operations of the Ordnance Survey, 1 854-1 881. L

Arthur Smith Woodward, LL.D., F.R.S. I

Keeper of Geology, Natural History Museum, South Kensington. Secretary of the ~) DiplOdOCUS. Geological Society, London. ˆ

Arthur Waugh, M.A. f

New College, Oxford. Newdigate Prize, 1888. Managing Director of Chapman & . Hall, Ltd. Author of Gordon in Africa; Alfred, Lord Tennyson. Editor Johnson’s Lives of the Poets; editions of Dickens, Tennyson, Arnold, Lamb; &c.

Arthur William Holland.

Formerly Scholar of St John’s College, Oxford.

Alexander Wood Renton, M.A., LL.B.

Puisne Judge of the Supreme Court of Ceylon.

of England.

Adolphus William Ward, LL.D., D.Litt. See the biographical article: Ward, A. W.

Christian Carl August Gosch, M.Sc.

Commander of the Danebrog. Knight of St Anna. Formerly Attache 1 to the – Danish Legation, London. Author of Denmark and Germany

since 1815.

Charles Chree, M.A., LL.D., D.Sc, F.R.S.

Superintendent, Kew Observatory. Formerly Fellow of King's College, Cambridge. . President of Physical Society of London. Watt Medallist, Institute of Civil Engineers', 1905.

Charles Caesar Hawkins, M.A., M.I.E.E.

Author of The Dynamo.

Charles Everitt, M.A., F.C.S., F.G.S., F.R.A.S. Sometime Scholar of Magdalen College, Oxford.

Charles Francis Atkinson.

Formerly Scholar of Queen's College, Oxford. Captain, 1st City of London (Royal – Fusiliers). Author of The Wilderness and Cold Harbour.

Charles Hercules Read, LL.D.

Keeper of British and Medieval Antiquities, British Museum. President of the" Society of Antiquaries of London. Author of Antiquities from Benin ; &c.

Crawford Howell Toy, A.M., LL.D.

See the biographical article: Toy, Crawford Howell.

Charles Lethbridge Kingsford, M.A., F.R.Hist.S., F.S.A.

Assistant Secretary, Board of Education. Author of Life of Henry V. Chronicles of London and Stow's Survey of London.

Christian Pfister, D. es L.

Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour. Author of Titude sur le regne de Robert le Pieux; Le duche merovingien aV Alsace et la legende de Sainte-Odile.

Charles Raymond Beazley, M.A., D.Litt., F.R.G.S., F.R.Hist.S. r

Professor of Modern History in the University of Birmingham. Formerly Fellow Diaz de Novaes; of Merton College, Oxford, and University Lecturer in the History of Geography. < Djcuj]. Lothian

Prizeman, Oxford, 1889. Lowell Lecturer, Boston, 1908. Author of

Henry the Navigator ; The Dawn of Modern Geography ; &c. I

Rev. Charles Stanley Phillips. S Edmund Ironside;

King's College, Cambridge. Gladstone Memorial Prize, 1904. I Edward the Confessor.

Sir Charles William Wilson, K.C.B., K.C.M.G., F.R.S. (1836-1907). c

Major-General, Royal Engineers. Secretary to the North American Boundary Commission, 1858-1862. British Commissioner on the Servian Boundary Com- mission. Director-General of the Ordnance Survey, 1 836-1 894. Director-General of Military Education, 1895-1898. Author of From Korti to Khartoum; Life of Lord Clive; &c.

Duncan Black Macdonald, M.A., D.D. r

Professor of Semitic Languages, Hartford Theological Seminary, U.S.A. Author J Dervish;

of Development of Muslim Theology, Jurisprudence and Constitutional Theory; 1 Divan. Selection from Ibn Khaldum; Religious Attitude and Life in Islam; &c. I

David Croal Thomson.

Formerly Editor of the Art Journal. Author of The Brothers Maris; The Barbizon- School of Painters ; Life of " Phiz " ; Life of Bewick ; &c.

David George Hogarth, M.A.

Keeper of the Ashmolean Museum, Oxford. Fellow of Magdalen College, Oxford. Fellow of the British Academy. Excavated at Paphos, 1888; Naukratis, 1899 – and 1903; Ephesus, 1904-1905; Assiut, I 906-1907. Director, British School at Athens, 1897-1900. Director, Cretan Exploration Fund, 1899.

David Hannay.

Formerly British Vice-Consul at Barcelona. Navy, 1217-1688 ; Life of Emilio Castelar ; &c.

Editor of

; A Drinking Vessels.

4 Ecclesiastes.

J Derby, 1st Earl of; \ Edward IV.

J Ebroin.

Diarbekr (in part).

Author of Short History of Royal ■

Diaz, N. V.

Derna; Didymi; Druses (in part).

Dudley, Sir Robert; Dutch Wars: Naval.

Rev. Dugald Macfadyen, M.A. r

Minister of South Grove Congregational Church, Highgate. Director of the London J. Duff, Alexander. Missionary Society. |_

INITIALS AND HEADINGS OF ARTICLES

m

E.

A.T-

E.

Br.

E.

C. B.

E.

C. B.*

{

Formerly -4

E. C. K.

E. C. Q.

E. Es. E. E. A.

E.6.

E.

Gr.

E.

I. C.

E.

J. D

E.

K.

Ed. M.

E. Ma. E. M. T.

E. O'M.

E. Pr.

P. A. B.

F. E. B.

F. 6. M. B.

Mrs (Ethel) Alec Tweedie.

Author of Porfirio Diaz ; Mexico as I saw it ; &;c.

Ernest Barker, M.A.

Fellow of, and Lecturer in Modern History at, St John's College, Oxford. Fellow and Tutor of Merton College. Craven Scholar, 1895.

Right Rev. Edward Cuthbert Butler, O.S.B., D.Litt. (Dublin). f

Abbot of Downside Abbey, Bath. \

Edward Cresswell Baber, M.A. (d. 1910). f

Formerly Senior Surgeon, Brighton and Sussex Throat and Ear Hospital. Prize- J man and William Brown Scholar, St George's Hospital, London. Author of] numerous papers on Diseases of the Ear, Nose and Throat. L

Edward Cameron Kirk, D.Sc. f

Dean of the Dental Faculty and Professor of Dental Pathology, Therapeutics and J Materia Medica, University of Pennsylvania. Editor of The American Text-Book 1 of Operative Dentistry. I

Edmund Crosby Quiggin, M.A. f

Fellow of Gonville and Caius College, Cambridge ; Lecturer in Modern Languages i and Monro Lecturer in Celtic.

Edmond Esmonin.

Ernest E. Austen. .-

Assistant in Department of Zoology, Natural History Museum, South Kensington, -i

{

Edmund Gosse, LL.D.

See the biographical article: Gosse, Edmund.

{

Diaz, Porfirio. Diet.

Dominic, Saint; Dominicans.

Ear: Diseases.

Dentistry.

Druidism.

Desmarets.

Diptera.

Denmark: Literature; Descriptive Poetry; Dialogue; Diary; Didactic Poetry; Dithyrambic Poetry; Donne; Drachmann; Drayton, Michael;

Dutch Literature; Edda.

Dodona.

Ernest A. Gardner, M.A.

See the biographical article: Gardner, Percy.

Edward Irving Carlyle, MA., F.R.Hist.S. (

Fellow, Lecturer in Modern History, and Tutor of Lincoln College, Oxford. J]) os t Mahommed Khan

Assistant Editor of the Dictionary of National 1

Formerly Fellow of Merton College. Biography, 1 895-1 901.

Edward Joseph Dent, M.A., Mus.Bac.

Formerly Fellow of King's College, Cambridge. and Works.

Author of A. Scarlatti: his Lifei Durante, Francesco

Edmund Knecht, Ph.D., M.Sc.Tech. (Manchester), F.I.C.

Professor of Technological Chemistry, Manchester University. Head of Chemical Department, Municipal School of Technology, Manchester. Examiner in Dyeing, -\ Dyeing. City and Guilds of London Institute. Author of A Manual of Dyeing; &c. Editor of Journal of the Society of Dyers and Colourists.

Eduard Meyer, D.Litt. (Oxon.), LL.D., Ph.D. r

Professor of Ancient History in the University of Berlin. Author of Geschichte J Diodotus des Alterthums; Forschungen zur alten Geschichte; Geschichte des alien Agyptens;} Die Israeliten und ihre Nachbarslamme ; &c. ' [_

Edward Manson. r

Barrister at-Law. Joint Editor of Journal of Comparative Legislation ; Author cf "I Directors. Law of Trading Companies ; Practical Guide to Company Law ; &c. l_

Sir Edward Maunde Thompson, G.C.B., I.S.O., D.C.L., Litt.D., LL.D.

Director and Principal Librarian, British Museum, 1898-1909. Sandars

Reader in Bibliography, Cambridge, 1895-1896. Hon. Fellow of University College, Oxford. Correspondent of the Institute of France and of the Royal Prussian , Academy of Sciences. Author of Handbook of Greek and Latin Palaeography. Editor of Chronicon Angliae. Joint Editor of publications of the Palaeographicai Society, the New Palaeographicai Society, and of the Facsimile of the Laurentian Sophocles.

Rev. Eugene Henry O'Meara, M.A Vicar of Tallaght, County Dublin.

Edgar Prestage.

Special Lecturer in Portuguese Literature in the University of Manchester. Com- J Eca da Oueiroz mendador, Portuguese Order of S. Thiago. Corresponding Member of Lisbon Royal 1 **uoiiu*.

Academy of Sciences, Lisbon Geographical Society, &c. I

Francis Arthur Bather, M.A., D.Sc, F.R.S., F.R.G.S. r

Assistant Keeper of Geology, British Museum. Rolleston Prizeman, Oxford, 1892. J Echinoderma Echinoderma " in A Treatise on Zoology; Triassic Echinoderms of\

Diplomatic.

1 Diatomaceae (in part).

Author of Bakony; &c.

Frank Evers Beddard, M.A., F.R.S. r

Prosector of the Zoological Society, London. Formerly Lecturer in Biology at J Earth-worm Guy's Hospital. Naturalist to " Challenger " Expedition Commission, 1882-1884. 1 Author of Text-Book of Zoogeography; Animal Colouration; &c. I

Frederick George Meeson Beck, M.A.

Fellow and Lecturer in Classics, Clare College, Cambridge.

\ East Anglia.

• p •

INITIALS AND HEADINGS OF ARflClLES 1

F. G. P.

F. G. P.* F. J. H.

F. LI. G.

F

R

H.

F.

R.

M.

F.

S.

F.

T.

M.

F.

V.

T.

F.

W

.R.*

F.

W

. W.

G.

A.

B.

G.

Be

G.

B.

M. C

G.

C.

W.

G.

F.

B.

G.

G.

S.

G.

H.

Br.

G.

H.

C.

G.

S.

W.*

H.

A.

Mi.

H. B. Wo.

H. Ch.

Frederick Gymer Parsons, F.R.C.S., F.Z.S., F.R.Anthrop.Inst. <'

Vice-President, Anatomical Society of Great Britain and Ireland. Lecturer on Anatomy at St Thomas's Hospital and the London School of Medicine for Women. Formerly Examiner in the • Universities of Cambridge, Aberdeen, London and Birmingham ; and Hunterian Professor at the Royal College of Surgeons.

Frank George Pope.

Lecturer. on Chemistry, East London College (University of London).

Francis John Haverfield, M.A., LL.D., F.S.A.

Camden Professor qt Ancient History in the University of Oxford. Fellow of Brasenose College. Fellow of the – British Academy. Author of Monographs on Roman History, especially Roman Britain, &c.

Francis Llewelyn Griffith, M.A., Ph.D., F.S.A.

Reader in Egyptology, Oxford University. Formerly Scholar of Queen's College, . Oxford; Editor of the Archaeological Survey and Archaeological Reports of the Egypt Exploration Fund. Fellow of Imperial Germaii Archaeological .Institute.

Frederick Robert Helmert, Ph.D., D.Ing.

Professor of Geodesy, University of Berlin. .

Francis Richard Maunsell, C.M.G.

Lieutenant-Colonel. Military Vice-Consul, Sivas, Trebizond, Van (Kurdistan),

1897-1898. Military Attache, British Embassy, Constantinople, 1901-1905.

Author of Central Kurdistan ; &c. Francis Storr, M.A. . ■. . ■<.-

Editor of the Journal of Education, London. Officier d'Academie, Paris

Sir Frank Thomas Marzials, K.C.B.

Formerly Accountant General of the Army.

Frederick Vincent Theobald, M.A.

Vice-Principal and Zoologist, S.E. Agricultural College, Wye, Kent (University of . London). Grand Medallist of the Societe Nationale dAcclimatation de France. Author of The Insect and other Allied Pests of Orchard, Bush and Hothouse Fruits ; &c.

Frederick William Rudler, I.S.O., F.G.S.

Curator and Librarian of the Museum of Practical Geology, London, 1879-1902. " President of the Geologists' Association, 1887-18,89.

Diaphragm; Ductless Glands Ear.

Diazo Compounds EburSeum.

Deridera; Edfu.

\ Earth, Figure of the (in part)

Diarbekr (in part).

Duel.

Editor of the " Great Writers " Series. \ Dumas: fi ls –

Economic Entomology.

Earthquake (in part).

Translator of Filon!s English Stage; Schil-i Du Maurier, G.

Dory.

-J Druses (in part).

\ Education:

National System*’

Frederic W. Whyte.

Author of Actors of the Century; &c. ling’s With Flashlight and Rifle; &c.

George A. Boulenger, F.R.S., D.Sc, Ph.D.

In charge of the collections of Reptiles and Fishes, Department of Zoology, British Museum. Vice-President of the Zoological Society of London.

Gertrude Margaret Lothian Bell. Author of The Desert and the Sown ; &c.

George Barnard Milbank Coore.

Assistant Secretary, Board of Education, London.

George Charles Williamson, Litt.D.

Chevalier of the Legion of Honour. Author of Portrait Miniatures ; Life of Richardˆ Cosway, R.A.; George Engleheart; Portrait Drawings’, &c. Editor of new edition of Bryan’s Dictionary of Painters and Engravers. ”-■.■■

G. F. Barwick.

Assistant Keeper of Printed Books and Superintendent of Reading Room, British – Museum. ” ■■■■■’.■■’.•’

George Gregory Smith, M.A.

Professor of English Literature, Queen’s University of Belfast. Author of The – Days of James IV.; The Transition Period; Specimens of ‘Middle Sc0ts; &c.

George Hartley Bryan, M. A., D.Sc, F.R.S. .

Professor of Pure and Applied Mathematics, University College of North Wales. „ Formerly Fellow of Peterhouse, Cambridge. President of Mathematical Association,

1907- . L’

George Herbert Carpenter, B.Sc. f

Professor of Zoology in the Royal College of Science, Dublin. Author of Insects:!. Dragon-fly (in part).

their Structure and Life. [

George Stephen West, M.A., D.Sc, F.L.S. ?

Professor of Botany, University of Birmingham. Associate of Royal Callege of J DiatomaceaG (in part). Science, London. Author of Treatise on British Fresh-water Algae; &c. |_

Henry Alexander Miers, M.A., D.Sc, F.R.S. r

Principal of the University of London. Fellow of Magdalen College, Oxford. Formerly Waynflete Professor of Mineralogy, Oxford. President of Mineralogical – Society since 1904. Editor of the Mineralogical Magazine, 1891-1900. Author of

Mineralogy; &c.

Horace Bolingbroke Woodward, F.R.S., F.G.S.

Formerly Assistant Director of the Geological Survey of England and Wales. – President, Geologists' Association, 1893-1:894. Wollaston Medallist, 1908.

Hugh Chisholm, M.A. r

Formerly Scholarof Corpus Christi College, Oxford. Editor of the nth edition -< of the Encyclopaedia Britannica; Co-editor of the 10th edition.

Downman; Dumont, Francois.

Dhuleep Singh.

Douglas, Gavin; Dunbar, William.

Diffusion.

Diamond.

Desmarest, N.

Devonshire, Earls and)u5-*»s

of; Dufferin and Ava, 1st

Marquess; Edward VII.

H.

De.

H

F.

8a

H.

F.

G.

H.

G.

H.

H.

T.

INITIALS AND HEADINGS OF ARTICLES ix

Rev. Hippolyte Delehaye, S.J. f . .

Bollandist. Joint Author of the Acta Sanctorum. \ Denis, Saint.

Henry Frederick Baker, M.A., D.Sc, F.R.S. C

Fellow and Lecturer of St John's College, Cambridge. Cayley Lecturer in Mathe- -i Differential Equation. matics in the University. Author of Abel's Theory and the Allied Theory; &c. [_

Hans Friedrich Gadow, M.A., F.R.S. , Ph.D. f

Strickland Curator and Lecturer on Zoology in the University of Cambridge. ■< Dodo [in part). Author of Amphibia and Reptiles (Cambridge Natural History). I.

Hugh Godfray, M.A. f

Sometime Fellow of St John's College, Cambridge. Author of an Elementary < Dial and Dialling.

Treatise on the Lunar Theory; A Treatise on Astronomy. L

Herbert Hall Turner, M.A., D.Sc, F.R.S.

Savilian Professor of Astronomy, Oxford University. Fellow of New College. Formerly Fellow of Trinity College, Cambridge, and Chief Assistant at the Royal Observatory, Greenwich. Correspondent, Institut de France. President, Royal Astronomical Society, .1903-1904. Author of Modern Astronomy; Astronomical Discovery.

Eclipse [in part).

H. Lb. Horace Lamb, M.A., LL.D., D.Sc, F.R.S. r

Professor of Mathematics, University of Manchester. Formerly Fellow and I Assistant Tutor of Trinity College, Cambridge. Member of Council of Royal "j Dynamics. Society, 1894-1896. Royal Medallist, 1902. President of London Mathematical Society, 1902-1904. Author of Hydrodynamics ; &c. ˆ

H. N. D. Henry Newton Dickson, M.A., D.Sc, F.R.S. (Edin.), F.R.G.S. f

Professor of Geography at University College, Reading. Formerly Vice-President, J Royal Meteorological Society. Lecturer in Physical Geography, Oxford. Author | of Meteorology ; Elements of Weather and Climate ; &c. I

Desert.

H. 0. T.

Henry Osborn Taylor, LL.B. (Columbia). f „. . ...

Author of The Classical Heritage of the Middle Ages; A ncient Ideals ; &c. \ Dionysius AreopagltlCUS.

H. St. Henry Sturt, M.A. f nflh ,

Author of Idola Theatri; The Idea of a Free Church; and Personal Idealism. \ uuann S-

H. S. S. Harold Spencer Scott, M.A. f

New College, Oxford. Barrister-at-Law, Lincoln's Inn. "ˆ Dower.

H. Ti. Henry Tiedemann. (

London Editor of the Nieuwe Rotterdamsche Courant. Ex-President of the Foreign J Dozy. Press Association. [

H. W. C. D. Henry William Carless Davis, M.A. f riormni iWaniw.,rro„„i, .

Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls' College, Oxford, 4 ˆermoi macmurrougn , 1895-1902. Author of England under the Normans and Angevins; Charlemagne. L Edmund, Saint.

H. W. H. Hope W. Hogg, M.A.

Professor of Semitic Languages and Literatures in the University of Manchester.

Edessa.

I. A. Israel Abrahams, M.A. r Dukes Leopold •

Reader in Talmudic and Rabbinic Literature, University of Cambridge. President, J rj.-iiach • '

Jewish Historical Society of England. Author of A Short History of Jewish Litera- 1 ~ unasn « ture; Jewish Life in the Middle Ages. I Duran.

J. A.* John Aitken, LL.D., F.R.S. r

Investigator of Atmospheric Dust. Inventor of instruments for counting the dust particles in the atmosphere. Author of papers on Dust Fogs and Clouds ; Hazing s Dust. Effects of Atmospheric Dust; Cyclones and Anticyclones; &c, in publications of Royal Society. >

J. A. H. John Allen Howe, B.Sc f Devonian System ;

Curator and Librarian of the Museum of Practical Geology, London. \ Drift.

J. A. P.* Rev. J.,mes Alexander Paterson, M.A., D.D. r

Professor of Hebrew and Old Testament Exegesis, New College, Edinburgh. Author of The Period of the Judges; Book of Leviticus, in" Temple" Bible; Book ofi Deuteronomy. Numbers, in "Polychrome" Bible; &c. Translator of Schultz's Old Testament Theology. L

I. C. M. James Clerk Maxwell, D.C.L., F.R.S. J _.

See the biographical article: Maxwell, James Clerk. \ Diagram.

J. F.-K. James Fitzmaurice-Kelly, Litt.D., F.R.Hist.S. r

Gilmour Professor of Spanish Language and Literature, Liverpool University. DeUS, Joao de ; Norman McColl, Lecturer, Cambridge University. Fellow of the British Academy, i Don Juan; Member of the Royal Spanish Academy. Knight Commander of the Order of Frhpparav v Ei7aimirr« Alphonso XII. Author of A History of Spanish Literature; &c. L *-i<" c S<»

Joseph G. Horner, A.MJ.Mech.E. .,,,,,,, . „ (Drawing: Drawing-Office Work.

Author of Plating and Boiler Making ; Practical Metal Turning ; &c. I.

Johann Hendrik Gallee, Ph.D. f

Professor of Comparative Philology and Teutonic Languages, University of Utrecht. J Dutch Language. President of the Philological Society, Utrecht. Author of Altsachsische Sprach- d&tikfyiHiGT ^-

John Horace Round, M.A., LL.D. (Edin.). J J? om ? sda y Book ;

Author of Feudal England; Studies in Peerage and Family History; Peerage and] ‘

Pedigree ; &c. L Earl Marshal.

Jules Isaac. fD« Bellay, Guillaume and

Professor of History at the Lycee of Lyons. \ Jean.

J. G.

H.

J. H.

G.

J. H.

R.

J.I.

X

J. J. H.

J. J. L* J. L. M.

J. Mi.

INITIALS AND HEADINGS OF ARTICLES

J.

Mo.

J.

M.

M.

J.

M.

M.

D

J.

0.

B.

J.

P.-

■B.

J.

R.

C.

J. R. P.

J. R. Fo. J. S. F.

J. T. Be.

Jno. W.

J. Wn. J. W. He.

K. S.

L. F. V.-H.

L. J. S.

L. V.*

M. A. C.

J. Hummel, F.I.C. (d. 1902). Formerly Professor of Dyeing, University 01 Leeds.

Textile Fabrics.

Author of The Dyeing of-] Dyeing (in part)

{‘

Rev. John James Lias, M.A.

Chancellor of Llandaff Cathedral. Formerly Hulsean Lecturer in Divinity and”| Ddllinger. Lady Margaret Preacher, University of Cambridge.

John Linton Myres, M.A., F.S.A., F.R.G.S. f

Wykeham Professor of Ancient History in the University of Oxford. Formerly J Dorians. Gladstone Professor of Greek and Lecturer in Anoient Geography, University of 1 Liverpool. Lecturer in Classical Archaeology in University of Oxford. ^

John Milne, F.G.S., F.R.S., D.Sc.

Formerly Professor of Mining and Geology, Imperial University of Tokio. Founder of the Seismic Survey of Japan. Designer of seismographs and instruments to ‘ record vibrations on railways, &c.

Author of Earthquakes; Seismology; Crystal- lography; &c.

Viscount Morley of Blackburn.

See the biographical article: Morley, Viscount, of Blackburn.

John Malcolm Mitchell. f Draco*

Sometime Scholar of Queen's College, Oxford. Lecturer in Classics, East London -s r; ee i es jo College (University of London). Joint Editor of Grote's History of Greece. I

{

Earthquake (in part).

Diderot.

J. M. M. Dallas.

Formerly Secretary of the Edinburgh Draughts Club.

i Draughts (in part).

Editor of 2nd 4 Dispersion

John Oliver Borley, M.A.

Gonville and Caius College, Cambridge.

James George Joseph Penderel-Brodhurst. Editor of the Guardian, London.

Joseph Rogerson Cotter, M.A.

Assistant to the Professor of Physics, Trinity College, Dublin, edition of Preston's Theory of Heat.

John Ritchie Findlay.

See the biographical article: Findlay, J. R.

John R. Fothergill. Editor of The Slade.

John Smith Flett, D.Sc, F.G.S.

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in. Edinburgh University. Neill Medallist of the Royal Society of

Edinburgh. Bigsby Medallist of the Geological_Society of London.

j Dredge and Dredging:

I Desk.

Marine.

John T. Bealby.

Joint-author of Stanford's Europe. Formerly Editor of the Scottish Geographical Magazine. Translator of Sven Hedin's Through Asia, Central Asia and Tibet; &c.

-I De Quineey.

-j Drawing.

Diabase; Diorite; Dolerite; Dolomite; Eclogite.

Dnieper (in part);

Dniester (in part);

Don (in part);

Don Cossacks, Territory ol the

(in part); Dvina (in part); Echmiadzin (in pari).

John Westlake, K.C, LL.D., D.C.L.

Professor of International Law, Cambridge, 1888-1908. One of the Members for United Kingdom of International Court of Arbitration under the Hague Conven- tion, 1900-1906. Author of A Treatise on Private International Law; International Law: I. Peace; II. War; &c.

James Welton, M.A.

Professor of Education in the University of Leeds. Author of Logical Bases of Education ; Principles and Methods of Moral Training ; &c.

James Wycliffe Headlam, M.A.

Staff Inspector of Secondary Schools under the Board of Education. Formerly Fellow of King's College, Cambridge. Professor of Greek and Ancient History at Queen's College, London. Author of Bismarck and

the Foundation of the German Empire; &c.

Kathleen Schlesinger.

Author of The Instruments of the Orchestra ; &c.

Leveson Francis Vernon-Harcourt, M.A., M.Inst.C.E. (1839-1907).

Formerly Professor of Civil Engineering at University College, London. Author of Rivers and Canals; Harbours and Docks; Civil Engineering as applied in Con- struction; &c. (_

Leonard James Spencer, M.A., F.G.S. f tv 11 tv

Assistant, Department of Mineralogy, British Museum. Formerly Scholar of Sidney J D j a ” a S e > Uiaspore; Sussex College, Cambridge, and Harkness Scholar. Editor of the Mineralogical j Diopside; Dioptase.

Magazine. I

Luigi Villari.

Italian Foreign Office (Emigration Department). Formerly Newspaper Corre- spondent in East of Europe. Italian Vice-Consul in New Orleans, 1906; Phil- adelphia, 1907; and Boston, U.S.A., 1907-1910. Author of Italian Life in Town and Country ; Fire and Sword in the Caucasus ; &c.

Maurice Arthur Canney, M.A.

Assistant Lecturer in Semitic Languages in the University of Manchester.

Domicile.

Education: Theory.

Droysen, J. 6.

f Double-Bass; Drone; I Drum; Dulcimer.

\ Dock.

Diavolo, Fra; Doria.

Dorner.

M.Br. M.P.

M, G. D.

M. Ha.

M. Ja.

M. 0. B. C

N.M.

N. M. B.

N. W. T.

0. J. R. H.

P.A.K. P. CM.

P. C. Y. P. Gi.

P. G. K.

R.

R.

A

S. M.

R.

C.

J.

R.

D.

H.

R.

H

D.*

R.

I.

P.

R.

J.

R.

J.

M.

Miss Margaret Bryant.

Sir Michael Foster, K.C.B., D C.L., D.Sc, LL.D., F.R.S.

See the biographical article: Foster, Sir M.

Rt. Hon. Sir Mountstuart Elphinstone Grant-Duff, G.C.S.I., F.R.S

(1820-1906).

M.P. for the Elgin Burghs, 1857-1881. Under-Secretary of State for India, 1868- 1874. Under-Secretary of State for the Colonies, 1880-1881. Governor of Madras, 1881-1886. President of the Royal Geographical Society, 1889-1893. President of the Royal Historical Society, 1892-1899. Author of Studies in European Politics; Notes from a Diary ; &c.

Marcus Hartog, M.A., D.Sc, F.L S.

Professor of Zoology, University College, Cork. Author of Protozoa (in Cambridge Natural History) ; and papers for various scientific journals.

Morris Jastrow, Jr., Ph.D.

Professor of Semitic Languages, University of Pennsylvania, U.S.A. Author of Religion of the Babylonians and Assyrians; &c.

Maximilian Otto Bismarck Caspari, M.A.

Reader in Ancient History at London University. Lecturer in Greek at

Birming- ham University, 1905-1908.

Norman McLean, M.A.

Fellow, Lecturer and Librarian of Christ's College, Cambridge. University Lecturer in Aramaic. Examiner for the Oriental Languages Tripos, and the Theological Tripos, at Cambridge.

Nicholas Murray Butler.

See the biographical article: Butler, N. M.

Northcote Whitbridge Thomas, M.A.

Government Anthropologist to Southern Nigeria. Corresponding Member of the Societe d'Anthropologie de Paris. Author of Thought Transference; Kinship and Marriage in Australia; &c.

Osbert John Radcliffe Howarth, M.A.

Christ Church, Oxford. Geographical Scholar, 1901. British Association.

Dryden {in part); Dumas. Du Bois-Reymond.

Derby, 14th Earl of.

Dinoflagellata.

fEa; [Eabani.

Doris.

\ Dionysius Telmaharensis.

J Education: United States.

Assistant Secretary of the ■

Prince Peter Alexeivitch Kropotkin.

See the biographical article : Kropotkin, Prince P. A.

Peter Chalmers Mitchell, F.R.S., M.A., D.Sc, LL.D.

Secretary to the Zoological Society of London. University Demonstrator in Comparative Anatomy and Assistant to Linacre Professor at Oxford, 1888-1891.. Lecturer on Biology at Charing Cross

Hospital, 1892-1894; at London Hospital, 1894. Examiner in Biology to the Royal College of Physicians, 1892-1896, 1901- 1903. Examiner in Zoology to the University of London, 1903.

Philip Chesney Yorke, M.A. Magdalen College, Oxford.

Peter Giles, M.A., LL.D., Litt. D.

Fellow and Classical Lecturer of Emmanuel College, Cambridge, and University Reader in Comparative Philology. Late Secretary of the Cambridge Philological ” Society. Author of Manual of Comparative Philology ; &c. I

Paul George Konody. f

Art Critic of the Observer and the Daily Mail. Formerly Editor of The Artist. \ Donatello. Author of The Art of Walter Crane; Velasquez, Life and Work; &c. I

Lord Rayleigh.

See the biographical article: Rayleigh, 3RD Baron.

Robert Alexander Stewart Macalister, M.A., F.S.A.

St John’s College, Cambridge. Director of Excavations for the Palestine Explora- tion Fund.

Sir Richard Claverhouse Jebb., Litt.D., D.C.L. See the biographical article: Jebb, Sir Richard C.

f Demonology; \ Divination; [Doll; Dreams.

Denmark: Geography and Statistics {in part).

Dnieper (in part); Dniester (in part); Don (in part);

Don Cossacks, Territory of the (in part); Dvina (in part);

Echmiadzin (in part).

Dog (in part).

Derby, 7th Earl of; Digby, Sir Everard; Digby, Sir Kenelm.

E.

-j Diffraction of Light.

Diptych.

j Dietetics (in part).

■I Demosthenes.

R. D. Milner.

Formerly Assistant, U.S. Department of Agriculture.

Robert Henry Davis. f

Managing Director, Siebe, Gorman & Co., Ltd., Submarine Engineers, London. -{ Divers and Diving Apparatus

Author of A Diving Manual ; &c. [_ ‘

Reginald Innes Pocock, F.Z.S.

Superintendent of the Zoological Gardens, London.

Richard Jordan.

Draughts Champion of Scotland, 1896, and of the world, 1896 seq.

Ronald John McNeill, M.A. f n r j vinl ,.

Christ Church, Oxford. Barrister-at-Law. Formerly Editor of the St James’ s\ zi , s ‘ . , _ . . Gazette, London. 1 Durham, 1st Earl of.

\ Earwig.

-j Draughts (in part).

Xll R. L.*

R. Ma.

R. M’L. R. N. B.

R. P. S.

S. A. C.

INITIALS AND HEADINGS OF ARTICLES

stc.

StH.

S. C.

S. D. H. S. K.

S.N. T. As.

T.

A.

I.

T.

F.

T.

T.

K

C.

T.

L.

H.

T. M. F.

T. Se.

T. W. R. D.

Richard Lydekker, F.R.S., F.G.S., F.Z.S.

Member of the Staff of the Geological Survey of India, 1874-1882. .Author of. Catalogues of Fossil Mammals, Reptiles and Birds in British Museum; The Deer of all Lands ; &c.

Dingo; Dolphin; Dormouse; Dugong; Duiker; Edentata.

Rev. Robert Mackintosh, D.D. f

Professor of Christian Ethics and Apologetics, Lancashire Independent College. J Dogma Lecturer on the Philosophy of Religion, University of Manchester. Author of | ” S ma ” Christ and the Jewish Law ; &c. *-

Robert M’Lachlan, F.R.S.

Editor of the Entomologists’ Monthly Magazine.

Robert Nisbet Bain (d. 1909).

Assistant Librarian, British Museum 1883-1909. Author of Scandinavia: the Political History of Denmark, Norway and Sweden, 15 13-1900; The First Romanovs , ■ 1613 to i?2$; Slavonic Europe : the Political History of Poland and Russia from 1460 to 1796 ; &c.

R. Phene Spiers, F.S.A., F.R.I.B.A.

Formerly Master of the Architectural School, Royal Academy, London. Past- President of Architectural Association. Associate and. Fellow of King’s College,’ London. Corresponding Member of the Institute of France. Editor of Fergusson’s History of Architecture. Author of Architecture: East and West; &c.

Stanley Arthur Cook.

Editor for Palestine Exploration Fund. Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904—1908. Council of Royal Asiatic Society, 1904- 1905. Author of Glossary of Aramaic Inscriptions; The Laws of Moses and Code of Hammurabi; Critical Notes on Old Testament History; Religion of Ancient Palestine; &c.

Viscount St Cyres.

See the biographical article: Iddesleigh, ist Earl of.

Dragon-fly {in part).

Denmark: Medieval and

Modern History; Dessewffy; Dlugosz; Dolgoruki; Dozsa.

Dome; Door;

Doorway;

Early English Period.

Edom.

{

Du Vergier de Hauranne.

Lord St Helier (Sir Francis Henry Jeune), P.C, K.C.B., G.CB. (1843-1905). f

President of the Probate, Divorce and Admiralty Division of the High Court of A Divorce. Justice, 1 892-1905. Honorary Fellow of Hertford College, Oxford. [_

Sidney Colvin, LL.D.

See the biographical article: Colvin, S.

S. D. Hopkinson.

i Diirer.

1

f IDividend.

Sten Konow, Ph.D. r

Professor of Indian Philology in the University of Christiania. Officier de l'Academie Franchise. Author of Stamavidhdna brahmana; The Karpuramanjari; volumesˆ Dravidian. on Tibeto-Burman languages; Munda and Dravidian; " Marathi Bhil " in The Linguistic Survey of India. I

Simon Newcomb, LL.D.

See the biographical article: Newcomb, Simon.

f Eclipse (in part); \ Ecliptic.

Thomas Ashby, M.A., D.Litt., F.S.A.

Director of the British School of Archaeology at Rome. Corresponding Member of the Imperial German Archaeological Institute. Formerly

Scholar of Christ – Church, Oxford. Craven Fellow, Oxford, 1897. Author of The Classical Tcpo graphy of the Roman Campagna ; &c.

Eboli.

Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.

Thomas Frederick Tout, M.A.

Professor of Medieval and Modern History in the University of Manchester. Formerly Fellow of Pembroke College, Oxford. Author of Edward I. ; The Empire * and Papacy; &c.

Rev. Thomas Kelly Cheyne, M.A., D.D. See the biographical article: Cheyne, T. K.

Sir Thomas Little Heath, K.C.B., D.Sc.

Assistant Secretary to the Treasury. Formerly Fellow of Trinity College, Cam- _. bridge. Author of Diophantos of Alexandria; Editor of The- Thirteen Books of* Euclid's Elements; &c.

Thomas McCall Fallow, M.A., F.S.A. _ 1

Formerly Editor of the Antiquary. Author of Memorials of Old Yorkshire;* Cathedral Churches of Ireland ; &c.

Thomas Seccombe, M.A.

Balliol College, Oxford. Lecturer in History, East London and Birkbeck Colleges (University of London). Stanhope Prizeman, Oxford, 1887. Assistant Editor of.- Dictionary of National Biography, 1891-1901. Author of The Age of Johnson; Joint Author of The Bookman History of English Literature ; &c.

T. W. Rhys Davids, LL.D., Ph.D.

Professor of Comparative Religion, Manchester. Professor of Pali and Buddhist Literature, University College, London, 1 882-1904. President of the Pali Text Society. Fellowof the British Academy. Secretary and Librarian of Royal Asiatic Society, 1885-1902. Author of Buddhism; Sacred Books of the Buddhists; Early Buddhism; Buddhist India; Dialogues of the Buddha; &c.

< Desertion.

Edward I., II., III.; Edward, The Black Prince.

Eden.

Diophantos.

Easter.

Dickens; Dostoievsky.

Devadatta; Dhammapala.

INITIALS AND HEADINGS OF ARTICLES

XI tl

V.T.

W. A.

TV. A. B. C.

W. A. P. W. A. S. H.

W. B. W. E. B.

Vladimir Tchertkoff.

Editor of The Free Age Press. Literary Representative of Leo Tolstoy. Author of

Christian Martyrdom in Russia; &c. William Archer.

See the biographical article Archer, William.

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D. (Bern). Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880-1881. Author of Guide du Haut Dauphine; The Range of the Todi; Guide to Grindelwald; Guide to Switzerland; The Alps in Nature and in History; &c. Editor of the Alpine Journal, 1880-1889; &c.

Walter Alison Phillips, M.A.

Formerly Exhibitioner of Merton College and Senior Scholar of St John s College, – Oxford. Author of M odern Europe; &c.

William Albert Samuel Hewins, M.A.

Secretary of the Tariff Commission. Formerly Director of the London

School of Economics. Teacher of Modern Economic History in the University of London, 1 902-1903. Tooke Professor of Economic Science and Statistics at King's " College, London, 1897-1903. Author of Imperialism and its Probable Effect on the Commercial Policy of the United Kingdom ; &c.

Doukhobors.

Drama {Recent English).

' Digne;

Dolomites, The; Dornbirn; Durance; Ebel, J. G.

Diplomacy; Dispensation; Donation of Constantine; Dragon; Duke; Eastern Question, The.

Economics.

W. E. D.

W. P. Sh. W. F. W.

W. G. P. P. W. Hy. IV. H.*

W. H. Ma.

W. L. G.

W. M. W. M. R. W. N. S.

Walter Baxendale.

Kennel Editor of the Field.

Rev. William Emery Barnes, M.A., D.D.

Hulsean Professor of Divinity, Cambridge. Fellow and Hon. Chaplain of Peter- house, Cambridge. Examining Chaplain to the Bishop of London. Joint Editor of Journal of Theological Studies, 1899-1901. Formerly Lecturer in Hebrew, Clare College, and Lecturer in Hebrew and Divinity, Peterhouse. Author of The Canonical and Uncanonical Gospels; The Peshitta Text of Chronicles; Tlte Psalms in the Peshitta Version; Genuineness of Isaiah; &c.

William Ernest Dalby, M.A., M.Inst.C.E., M.I.M.E., A.M.Inst.N.A.

Professor of Civil and Mechanical Engineering at the City and Guilds of London Institute Central Technical College, South Kensington. Formerly University Demonstrator in the Engineering Department, Cambridge. Author of The Balanc- ing of Engines ; Valves and Valve Gear Mechanism ; &c.

William Fleetwood Sheppard, M.A.

Senior Examiner to the Board of Education. Cambridge. Senior Wrangler, 1884.

Walter Francis Willcox, LL.B., Ph.D.

Chief Statistician, United States Census Bureau. Professor of Social Science and Statistics, Cornell University. Member of the American Social Science Association ■ end Secretary of the American Economical Association. [Author of The Divorce Problem : A Study in Statistics ; Social Statistics of the United States ; &c.

Sir Walter George Frank Phillimore, Bart., D.C.L., LL.D.

Judge of the King's Bench Division. President of International Law Association, 1905. Author of Book of Church Law. Editor of 2nd edition of Phillimore' 1 s ' Ecclesiastical Law ; 3rd edition of vol. iv. of Phillimore' s International Law ; &c.

J Dog {in part).

Ecclesiasticus.

Dynamometer.

Formerly Fellow of Trinity College, -I Differences, Calculus of.

Divorce: United Slatei.

Ecclesiastical Jurisdiction.

William Henry.

Founder and Chief Secretary to the Royal Life Saving Society. Associate of the Order of St John of Jerusalem. Joint Author of Swimming, (Badminton Library) ; ' &c.

Walter Hunter, M.I.C.E., M.I.M.E., F.G.S.

Consulting Engineer for Waterworks to Crown Agents for the Colonies.

Member of Council of Institute of Civil Engineers. Silver Medallist, Royal Society of Arts. – Originator of Staines Scheme of Storage Reservoirs. Has reported on Waterworks at Accra, Secconder and Lagos; also on Rand Water Supply.

William Henry Maxwell, A.M.I. C.E.

Borough and Waterworks Engineer, Tunbridge Wells. Formerly President of Institute of Sanitary Engineers, London. Author of Refuse Destructors; &c. ‘ Joint Editor of Encyclopaedia of Municipal and Sanitary Engineering. [_

William Lawson Grant, M.A. _ [

Professor at Queen’s University, Kingston, Canada. Formerly Beit Lecturer in J Dorchester 1st Baron. Colonial History at Oxford University. Editor of Acts of the Privy Council, Colonial 1 ‘

series; Canadian Constitutional Development (in collaboration). L

William Minto, M.A.

See the biographical article: Minto, William.

Drowning and Life Saving.

Dredge and Dredging:

Hydraulic Engineering.

Destructors.

William Michael Rossetti.

See the biographical article: Rossetti, Dante Gabriel.

J Dryden {in part).

JDolci; Domenichino; \ Dyce, William; Eastlake.

William Napier Shaw, M.A., LL.D., D.Sc, F.R.S.

Director of the Meteorological Office. Reader in Meteorology in the University of London. President of Permanent International Meteorological Committee. Member of Meteorological Council, 1897-1905. Hon. Fellow of Emmanuel College, Cambridge. Senior Tutor, 1890-1899. Joint Author of Text Book of Practical Physics; &c.

Dew.

XIV

INITIALS AND HEADINGS OF ARTICLES

W. 0. A. W. R. E. H.

W. R. L.

W. S. J. W. W. W. W. R.*

Dietetics (in part).

Dynamite.

Wilbur Olin Atwater, Ph.D. (1844-1907).

Formerly Professor of Chemistry, Wesleyan University, U.S.A. Special Agent of ” the United States Department of Agriculture in charge of Nutrition Investigations.

William Richard Eaton Hodgkinson, Ph.D., F.R.S.

Professor of Chemistry and Physics, Ordnance College, Woolwich. Formerly . Professor of Chemistry and Physics, R.M.A., Woolwich. Part author of Valentin- Hodgkinson’s Practical Chemistry; &c. L

W. R. Lethaby, F.S.A. f

Principal of the Central School of Arts and Crafts under the London County Council, “j Design. Author of Architecture, Mysticism and Myth; &c. I

William Stanley Jevons, LL.D.

See the biographical article: Jevons, William Stanley.

William Wallace.

See the biographical article: Wallace, William (1 844-1 897).

William Walker Rockwell, Lic.Theol. _ _ f D . a vno a f

Assistant Professor of Church History, Union Thedlogical Seminary, New York. \ oynou 01.

■j De Morgan. -j Descartes.

PRINCIPAL UNSIGNED ARTICLES

Democratic Party.

Democritus. •

Derbyshire.

Desmoulins.

Detroit.

Devonshire.

De Witt, John.

Diabetes.

Diamond Necklace.

Dice.

Dictionary.

Didache.

Dietary.

Dietrich of Bern.

Digitalis.

Dijon.

Dionysius.

Diphtheria.

Distress.

Dittersdorf, Karl D. von.

Divining-rod.

Dockyards.

Doge.

Dominoes.

Donatists.

Donegal.

Dorset, Earls, Marquesses

and Dukes of. Dorsetshire. Douglas: Family. Dover. Down.

Dragoman.

Drainage of Land.

Drake, Sir Francis.

Dresden.

Dropsy.

Drummond of Hawthornden.

Drunkenness.

Dualism.

Dublin.

Dunbar.

Dundee, Viscount.

Dundee: City.

Dundonald.

Duns Scotus.

Durban.

Durham.

Dutch East India Company.

Dutch West India Company.

Dwarf.

Dyaks.

Dysentery.

Dyspepsia.

Earth.

Eastern Bengal and Assam.

East India Company.

Ebionites.

Ecarte.

Ecclesiastical Law.

Eclecticism.

Edgeworth.

Edinburgh.

Edinburghshire.

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

VOLUME VIII

DEMIJOHN, a glass bottle or jar with a large round body and narrow neck, encased in wicker-work and provided with handles. The word is also used of an earthenware jar, similarly covered with wicker. The capacity of a demijohn varies from two to twelve gallons, but the common size contains five gallons. According to the New English Dictionary the word is an adapta- tion of a French Dame Jeanne, or Dame Jane, an application of a personal name to an object which is not uncommon; cf. the use of ” Toby ” for a particular form of jug and the many uses of the name ” Jack.”

DEMISE, an Anglo-French legal term (from the Fr. dimettre, Lat. dimittere, to send away) for a transfer of an estate, especially by lease. The word has an operative effect in a lease implying a covenant for ” quiet enjoyment ” (see Landlord and Tenant). The phrase ” demise of the crown ” is used in English law to signify the immediate transfer of

the sovereignty, with all its attributes and prerogatives, to the successor without any inter- regnum in accordance with the maxim ” the king never dies.” At common law the death of the sovereign eo facto dissolved parliament, but this was abolished by the Representation of the People Act 1867, §51. Similarly the common law doctrine that all offices held under the crown determined at its demise has been negatived by the Demise of the Crown Act 1901. ” Demise ” is thus often used loosely for death or decease.

DEMIURGE (Gr. Syniovpyos, from Srinios, of or for the people, and epyov, work) , a handicraftsman or artisan. In Homer the word has a wide application, including not only hand-workers but even heralds and physicians. In Attica the demiurgi formed one of the three classes (with the Eupatridae and the geomori, georgi or agroeci) into which the early population was divided (cf. Arist. Ath. Pol. xiii. 2). They represented either a class of the whole population, or, according to Busolt, a commercial nobility (see Eupatridae). In the sense of ” worker for the people ” the word was used throughout the Peloponnese, with the excep- tion of Sparta, and in many parts of Greece, for a higher magistrate. The demiurgi among other officials represent Elis and Mantineia at the treaty of peace between Athens, Argos, Elis andMantineiain420B.c. (Thuc. v. 47). In the Achaean League (q.v.) the name is given to ten elective officers who presided over the assembly, and Corinth sent ” Epidemiurgi ” every year to Potidaea, officials who apparently answered to the Spartan harmosts. In Plato drjiuovpyos is the name given to the ” creator of the world ” (Timaeus, 40) and the word was so adopted by the Gnostics (see Gnosticism).

DEMMIN, a town of Germany, kingdom of Prussia, on the navigable river Peene (which in the immediate neighbourhood receives the Trebel and the Tollense), 72 m. W.N.W. of Stettin, on the Berlin-Stralsund railway. Pop. (1905) 12,541. It has manufactures of textiles, besides breweries, distilleries and tanneries, and an active trade in corn and timber. vm — 1

The town is of Slavonian origin and of considerable antiquity, and was a place of importance in the time of Charlemagne. It was besieged by a German army in 1 148, and captured by Henry the Lion in 1164. In the Thirty Years’ War Demmin was the object of frequent conflicts, and even after the peace of West- phalia was taken and retaken in the contest between the electoral prince and the Swedes. It passed to Prussia in 1720, and its fortifications were dismantled in 1759. In 1807 several engage- ments took place in the vicinity between the French and Russians.

DEMOCHARES (c. 355-275 B.C.), nephew of Demosthenes, Athenian orator and stateman, was one of the few distinguished Athenians in the period of decline. He is first heard of in 322, when he spoke in vain against the surrender of Demosthenes and the other anti-Macedonian orators demanded by Antipater. During the next fifteen years he probably lived in exile. On the restoration of the democracy by Demetrius Poliorcetes in 307 he occupied a prominent position, but was banished in 303 for having ridiculed the decree of Stratocles, which contained a fulsome eulogy of Demetrius. He was recalled in 298, and during the next four years * fortified and equipped the city with provisions and ammunition. In 296 (or 295) he was again banished for having concluded an alliance with the Boeotians, and did not return until 287 (or 286). In 280 he induced the Athenians to erect a public monument in honour of his uncle with a suitable inscription. After his death (some five years later) the son of Demochares proposed and obtained a decree (Plutarch, Vitae decern oratorum,p. 851) that a statue should be erected in his honour, containing a record of his public services, which seem to have consisted in a reduction of public expenses, a more prudent management of the state finances (after his return in 287) and successful begging missions to the rulers of Egypt and Macedonia. Although a friend of the Stoic Zeno, Demochares regarded all other philosophers as the enemies of freedom, and in 306 supported the proposal of one Sophocles, advocating their expulsion from Attica. According to Cicero (Brutus, 83) Demo- chares was the author of a history of his own times, written in an oratorical rather than a historical style. As a speaker he was noted for his freedom of language (Parrhesiastes, Seneca, De ira, iii. 23). He was violently attacked by Timaeus, but found a strenuous defender in Polybius (xii. 13).

See also Plutarch, Demosthenes, 30, Demetrius, 24, Vitae decern oratorum, p. 847; J. G. Droysen's essay on Demochares in Zeit-schriftfiir die Altertumswissenschaft (1836), Nos. 20, 21.

DEMOCRACY (Gr. Sˆjuo Kpcma, from Sijˆos, the people, i.e. the commons, and updros, rule), in political science, that form of government in which the people rules itself, either directly, as in the small city-states of Greece, or through representatives. According to Aristotle, democracy is the perverted form of the

1 For the " four years' war " and the chronological questions in-volved, see C. W. Muller, Frag. Hist. Craec. ii. 445.

third form of government, which he called irohreia., ” polity ” or ” constitutional government,” the rule of the majority of the free and equal citizens, as opposed to monarchy and aristocracy, the rule respectively of an individual and of a minority consist- ing of the best citizens (see Government and Aristocracy). Aristotle’s restriction of ” democracy ” to bad popular govern- ment, i.e. mob-rule, or, as it has sometimes been called, ” ochlocracy ” (oxXos, mob), was due to, the fact that the Athenian democracy had in his day degenerated far, below the ideals of the 5th century, when it reached its zenith under Pericles. Since Aristotle’s day the word has resumed its natural meaning, but democracy in modern times is a very different thing from what it was in its best days in Greece and Rome. The Greek states were what are known as ” city-states,” the characteristic of which was that all the citizens could assemble together in the city at regular intervals for legislative and other purposes. This sovereign assembly of the people was known at Athens as the Ecclesia (?.».), at Sparta as the Apella (q.v.), at Rome variously as the Comitia Centuriata or the Concilium Plebis (see Comitia). Of representative government in the modern sense there is practically no trace in Athenian history, though certain of the magistrates (see Strategus) had a quasi-representative char- acter. Direct democracy is impossible except in small states. In the second place the qualification for citizenship was rigorous; thus Pericles restricted citizenship to those who were the sons of an Athenian father, himself a citizen, and an Athenian mother (e£ an4 > 6iv Lardiv) . This system excluded not only all the slaves, who were more numerous than the free population, but also resident aliens, subject allies, and those Athenians whose descent did not satisfy this criterion (t ykva. ixij icaJBapol). The Athenian democracy, which was typical in ancient Greece, was a highly exclusive form of government.

With the growth of empire and nation states this narrow parochial type of democracy became impossible. The population became too large and the distance too great for regular assemblies of qualified citizens. The rigid distinction of citizens and non- citizens was progressively more difficult to maintain, and new criteria of citizenship came into force. The first difficulty has been met by various forms of representative government. The second problem has been solved in various ways in different countries; moderate democracies have adopted a low property qualification, while extreme democracy is based on the exten- sion of citizenship to all adult persons with or without dis- tinction of sex. The essence of modern representative govern- ment is that the people does not govern itself,

but periodically elects those who shall govern on its behalf (see Government; Representation).

DEMOCRATIC PARTY, originally Democratic-Republican Party, the oldest of existing political parties in the United States. Its origin lay in the principles of local self-government and repugnance to social and political aristocracy established as cardinal tenets of American colonial democracy, which by the War of Independence, which was essentially a democratic move- ment, became the basis of the political institutions of the nation. The evils of lax government, both central and state, under the Confederation caused, however, a marked anti-democratic reaction, and this united with the temperamental conservatism of the framers of the constitution of 1787 in the shaping of that conservative instrument. The influences and interests for and against its adoption took form in the groupings of Federalists and Anti-Federalists, and these, after the creation of the new government, became respectively, in underlying principles, and, to a large extent, in personnel, the Federalist party (q.v.) and the Democratic-Republican party. 1 The latter, organized by Thomas Jefferson in opposition to the Federalists dominated by Alexander Hamilton, was a real party by 1792. The great service of attaching to the constitution a democratic bill of rights be- longs to the Anti-Federalists or Democratic-Republican party, although this was then amorphous. The Democratic-Republican party gained full control of the government, save the judiciary,

1 The Drefix ” Democratic ” was not used by Jefferson; it became established, however, and official.

in 1801, and controlled it continuously thereafter until 1825. No political ” platforms ” were then known, but the writings of Jefferson, who dominated his party throughout this period, take the place of such. His inaugural address of 180 1 is a famous statement of democratic principles, which to-day are taken for granted only because, through the party organized by him to secure their success, they became universally accepted as the ideal of American institutions. In all the colonies, says John Adams, ” a court and a country party had always contended “; Jefferson’s followers believed sincerely that the Federalists were a new court party, and monarchist. Hence they called themselves ” Republicans ” as against monarchists, — standing also, incident- ally, for States’ rights against the centralization that monarchy (or any approach to it) implied; and ” Democrats ” as against aristocrats, — standing for the ” common rights of Englishmen,” the ” rights of man,” the levelling of social ranks and the widen- ing bf political privileges. In the early years of

its history — and during the period of the French Revolution and afterwards — the Republicans sympathized with the French as against the British, the Federalists with the British as against the French.

Devotion to abstract principles of democracy and liberty, and in practical politics a strict construction of the constitution, in order to prevent an aggrandizement of national power at the expense of the states (which were nearer popular control) or the citizens, have been permanent characteristics of the Democratic party as contrasted with its principal opponents; but neither these nor any other distinctions have been continuously or consistently true throughout its long course. 2 After 1801 the commercial and manufacturing nationalistic 3 elements of the Federalist party, being now dependent on Jefferson for protection, gradually went over to the Republicans, especially after the War of 18.12; moreover, administration of government naturally developed in Republican ranks a group of broad-constructionists. These groups fused, and became an independent party. 4 They called themselves National Republicans, while the Jacksonian Republicans soon came to be known simply as Democrats. 6 Immediately afterward followed the tremendous victory of the Jacksonians in 1828, — a great advance in radical democracy over the victory of 1800. In the interval the Federalist party had disappeared, and practically the entire country, embracing Jeffersonian democracy, had passed through the school of the Republican party. It had established the power of the “people ” in the sense of that word in present-day American politics. Bills of rights in every state constitution protected the citizen; some state judges were already elective; very soon the people came to nominate their presidential candidates in national conven- tions, and draft their party platforms through their convention representatives. 6 After the National Republican scission the Democratic party, weakened thereby in its nationalistic tendencies, and deprived of the leadership of Jackson, fell quickly under the control of its Southern adherents and became virtually sectional in its objects. Its states’ rights doctrine was turned to the defence of slavery. In thus opposing anti-slavery sentiment — inconsistently, alike as regarded the ” rights of man ” and constitutional construction, with its original and permanent

2 Under the rubric of ” strict construction ” fall the greatest struggles in the party’s history: those over the United States Bank, over tariffs — for protection or for ” revenue ” only — over ” internal improvements,” over issues of administrative economy in pro- viding for the ” general welfare,” &c. The course of the party has frequently been inconsistent, and its doctrines have shown, absolutely considered, progressive latitudinarianism.

- ” Nationalistic ” is used here and below, not in the sense of a general nationalistic spirit, such as that of Jackson, but to indicate the centralizing tendency of a broad construction of constitutional powers in behalf of commerce and manufactures.

4 Standing for protective tariffs, internal improvements, &c.

6 It should be borne in mind, however, that the Democratic party of Jackson was not Strictly identical with the Democratic-Republican party of Jefferson, — and some writers date back the origin of the present Democratic party only to 1828— 1829.

- The Democratic national convention of 1832 was preceded by an Anti-Masonic convention of 1830 and by the National-Republican convention of 1831; but the Democratic platform of 1840 was the first of its kind.

principles— it lost morale and power. As a result of the contest over Kansas it became fatally divided, and in i860 put forward two presidential tickets: one representing the doctrine of Jefferson Davis that the constitution recognized slave-property, and therefore the national government must protect slavery in the territories; the other representing Douglas’s doctrine that the inhabitants of a territory might virtually exclude slavery by ” unfriendly legislation.” The combined popular votes for the two tickets exceeded that cast by the new, anti-slavery Republican party (the second of the name) for Lincoln; but the election was lost. During the ensuing Civil War such members of the party as did not become War Democrats antagonized the Lincoln administration, and in 1864 made the great blunder of pronounc- ing the war ” a failure.” Owing to Republican errors in recon- struction and the scandals of President Grant’s administration, the party gradually regained its strength and morale, until, having largely subordinated Southern questions to economic issues, it cast for Tilden for president in 1876 a popular vote greater than that obtained by the Republican candidate, Hayes, and gained control of the House of Representatives. The Electoral Commission, however, made Hayes president, and the quiet acceptance of this decision by the Democratic party did it considerable credit.

Since 1877 the Southern states have been almost solidly Democratic; but, except on the negro question, such unanimity among Southern whites has been, naturally, factitious; and by no means an unmixed good for the party. Apart from the “Solid South,” the period after

1875 is characterized by two other party difficulties. The first was the attempt from 1878 to 1896 to “straddle” the silver issue; 1 the second, an attempt after 1896 to harmonize general elements of conservatism and radicalism within the party. In 1896 the South and West gained control of the organization, and the national campaigns of 1896 and 1900 were fought and lost mainly on the issue of ” free silver,” which, however, was abandoned before 1904. After 1898 ” imperialism,” to which the Democrats were hostile, became another issue. Finally, after 1896, there became very apparent in the party a tendency to attract the radical elements of society in the general re-alignment of parties taking place on industrial-social issues; the Democratic party apparently attracting, in this readjustment, the ” radicals ” and the ” masses ” as in the time of Jefferson and Jackson. In this process , in the years 1 896- 1 900, it took over many of the principles and absorbed, in large part, the members of the radical third- party of the ” Populists,” only to be confronted thereupon by the growing strength of Socialism, challenging it to a farther radical widening of its programme. From i860 to 1908 it elected but a single president (Grover Cleveland, 1885-1889 and 1893-1897). 2 All American parties accepted long ago in theory ” Jeffersonian democracy “; but the Democratic party has been ” the political champion of those elements of the [American] democracy which are most democratic. It stands nearest the people.” 3 It may be noted that the Jeffersonian Republicans did not attempt to democratize the constitution itself. The choice of a president was soon popularized, however, in effect; and the popular election of United States senators is to-day a definite Demo- cratic tenet. 4

Bibliography. — For an exposition of the party’s principles see Thomas Jefferson, Writings, ed. by P. L. Ford (10 vols., New York, 1892-1899); J. P. Foley (ed.), The Jeffersonian Cyclopaedia (New York, 1900) ; and especially the Campaign Text-Books of more recent

‘The attitude of the Republican party was no less inconsistent and evasive.

2 It controlled the House of Representatives from 1874 to 1894 except in 1880-1882 and 1888-1890; but except for a time in Cleveland’s second term, there were never simultaneously a Democratic president and a Democratic majority in Congress.

8 Professor A. D. Morse in International Monthly, October 1900. He adds, ” It has done more to Americanize the foreigner than all other parties.” (It is predominant in the great cities of the country.)

4 In connexion with the prevalent popular tendency to regard the president as a people's tribune, it may be noted that a strong presidential veto is, historically, peculiarly a Democratic contribution, owing to the history of Jackson's (compare Cleveland's) administration.

times, usually' issued by the national Democratic committee in alternate years, and M. Carey, The Democratic Speaker's Hand- book (Cincinnati, 1868). For a hostile criticism of the party, see W.D.Jones, Mirror of Modern Democracy; History of the Democratic Party from 182s to 1861 (New York, 1864)'; Jonathan Norcross,.fl r i.ytory of Democracy Considered as a Party-Name and a Political Organiza- tion (New York, 1883) ; J. H. Patton, The Democratic Party: Its Political History and Influence (New York, 1884). Favourable treatises are R. H. Gillet, Democracy in the United States (New York, 1868); and George Fitch, Political Facts: an Historical Text-Book of the Democratic and Other Parties (Baltimore, 1884). See also, for general political history, Thomas H. Benton, Thirty Years' View (2 vols., New York, 1854-1856, and later editions) ; James G. Blaine, Twenty Years of Congress (2 vols., Norwich, Conn., 1884- 1893); S. S. Cox, Three Decades of Federal Legislation (Providence, 1885); S. P. Orth, Five American Politicians: a Study in the Evolution of American Politics (Cleveland, 1906), containing sketches of four Democratic leaders — Burr, DeWitt Clinton, Van Burenand Douglas;

}. Macy, Party Organization and Machinery (New York, 1904); . H. Hopkins, History of Political Parties in the United States (New York, 1900) ; E. S. Stanwood, History of the Presidency (last ed., Boston, 1904) ; J. P. Gordy, History of Political Parties, 1. (New York, 1900) ; H. J. Ford, Rise and Growth of American Politics (New York, 1898) ; Alexander Johnston, History of American Politics (New York, 1900, and later editions); C. E. Merriam, A History of American Political Theories (New York, 1903), containing chapters on the Jeffersonian and the Jacksonian Democracy; and James A. Woodburn, Political Parties and Party Problems in the United States (New Yprk, 1903).

DEMOCRITUS, probably the greatest of the Greek physical philosophers, was a native of Abdera in Thrace, or as some say — probably wrongly — of Miletus (Diog. Laert. ix. 34). Our knowledge of his life is based almost entirely on tradition of an untrustworthy kind. He seems to have been born about 470 or 460 B.C., and was, therefore, an older contemporary of Socrates. He inherited a considerable property, which enabled him to travel widely in the East in search of information. In Egypt he settled for seven years, during which he studied the mathe- matical and physical systems of the

ancient schools. The extent to which he was influenced by the Magi and the Eastern astrologists is a matter of pure conjecture. He returned from his travels impoverished; one tradition says that he received 500 talents from his fellow-citizens, and that a public funeral was decreed him. Another tradition states that he was regarded as insane by the Abderitans, and that Hippocrates was summoned to cure him. Diodorus Siculus tells us that he died at the age of ninety; others make him as much as twenty years older. His works, according to Diogenes Laertius, numbered seventy- two, and were characterized by a purity of style which com- pares favourably with that of Plato. The absurd epithet, the ” laughing philosopher,” applied to him by some unknown and very superficial thinker, may possibly have contributed in some measure to the fact that his importance was for centuries overlooked. It is interesting, however, to notice that Bacon (De Principiis) assigns to him his true place in the history of thought, and points out that both in his own day and later ” in the times of Roman learning ” he was spoken of in terms of the highest praise. In the variety of his knowledge, and in the importance of his influence on both Greek and modern speculation he was the Aristotle of the 5th century, while the sanity of his metaphysical theory has led many to regard him as the equal, if not the superior, of Plato. His views may be treated under the following heads: — 1. The Atoms and Cosmology (adopted in part at least from the doctrines of Leucippus, though the relations between the two are hopelessly obscure). While agreeing with the Eleatics as to the eternal sameness of Being (nothing can arise out of nothing; nothing can be reduced to nothing), Democritus followed the physicists in denying its oneness and immobility. Movement and plurality being necessary to explain the pheno- mena of the universe and impossible without space (not-Being), he asserted that the latter had an equal right with Being to be considered existent. Being is the Full (irXrjpes, plenum); not-Being is the Void (nev6v, vacuum), the infinite space in which moved the infinite number of atoms into which the single Being of the Eleatics was broken up. These atoms are eternal and invisible; absolutely small, so small that their size cannot be

diminished (hence the name i-roftos, ” indivisible “) ; absolutely full and incompressible, they are without pores and entirely fill the space they occupy; homogeneous, differing only in figure (as A from N), arrangement (as AN from NA), position (as N is Z on its side), magnitude (and consequently in weight, although some authorities dispute this). But while the atoms thus differ in quantity, their differences of quality are only apparent, due to the impressions caused

on our senses by different configurations and combinations of atoms. A thing is only hot or cold, sweet or bitter, hard or soft by convention (vonq); the only things that exist in reality (erej?) are the atoms and the void. Locke's distinction between primary and secondary qualities is here anticipated. Thus, the atoms of water and iron are the same, but those of the former, being smooth and round, and therefore unable to hook on to one another, roll over and over like small globes, whereas the atoms of iron, being rough, jagged and uneven, cling together and form a solid body. Since all phenomena are composed of the same eternal atoms (just as a tragedy and a comedy contain the same letters) it may be said that nothing comes into being or perishes in the absolute sense of the words (cf. the modern "indestructibility of matter " and " conservation of energy ") , although the compounds of the atoms are liable to increase and decrease, appearance and disappearance — in other words, to birth and death. As the atoms are eternal and uncaused, so is motion; it has its origin in a preceding motion, and so on ad infinitum. For the Love and Hate of Empedocles and the Nous (Intelligence) of Anaxagoras, Demo- critus substituted fixed and necessary laws (not chance; that is a misrepresentation due chiefly to Cicero). Everything can be explained by a purely mechanical (but not fortuitous) system, in which there is no room for the idea of a providence or an intelligent cause working with a view to an end. The origin of the universe was explained as follows. An infinite number of atoms was carried downwards through infinite space. The larger (and heavier), falling with greater velocity, overtook and collided with the smaller (and lighter), which were thereby forced upwards. This caused various lateral and contrary movements, resulting in a whirling movement (Slvrj) resembling the rotation of Anaxagoras, whereby similar atoms were brought together (as in the winnowing of grain) and united to form larger bodies and worlds. Atoms and void being infinite in number and extent, and motion having always existed, there must always have been an infinite number of worlds, all consisting of similar atoms, in various stages of growth and decay.

2. The Soul. — Democritus devoted considerable attention to the structure of the human body, the noblest portion of which he considered to be the soul, which everywhere pervades it, a psychic atom being intercalated between two corporeal atoms. Although, in accordance with his principles, Democritus was bound to regard the soul as material (composed of round, smooth, specially mobile atoms, identified with the fire-atoms floating in the air), he admitted a distinction between it and the body, and is even said to have looked upon it as something divine. These all-pervading soul atoms exercise different functions in different organs; the head is the seat of reason,

the heart of anger, the liver of desire. Life is maintained by the inhalation of fresh atoms to replace those lost by exhalation, and when respiration, and consequently the supply of atoms, ceases, the result is death. It follows that the soul perishes with, and in the same sense as, the body.

3. Perception. — Sensations are the changes produced in the soul by external impressions, and are the result of contact, since every action of one body (and all representations are corporeal phenomena) upon another is of the nature of a shock. Certain emanations (ixop/Socu, £7r6ppoicH) or images (eWwXa), consisting of subtle atoms, thrown off from the surface of an object, penetrate the body through the pores. On the principle that like acts upon like, the particular senses are only affected by that which resembles them. We see by means of the eye alone, and hear by means of the ear alone, these organs being best adapted to receive the images or sound currents. The organs are thus merely conduits or passages through which the atoms pour into the soul.

The eye, for example, is damp and porous, and the act of seeing consists in the reflection of the image (Seke\ov) mirrored on the smooth moist surface of the pupil. To the interposition of air is due the fact that all visual images are to some extent blurred. At the same time Democritus distinguished between obscure (0*07 × 17) cognition, resting on sensation alone, and genuine (yvqab)), which is the result of inquiry by reason, and is con- cerned with atoms and void, the only real existences. This knowledge, however, he confessed was exceedingly difficult to attain.

It is in Democritus first that we find a real attempt to explain colour. He regards black, red, white and green as primary. White is characteristically smooth, i.e. casting no shadow, even, flat; black is uneven, rough, shadowy and so on. The other colours result from various mixtures of these four, and are infinite in number. Colour itself is not objective; it is found not in the ultimate plenum and vacuum, but only in derived objects according to their physical qualities and relations.

4. Theology. — The system of Democritus was altogether anti-theistic. But, although he rejected the notion of a deity taking part in the creation or government of the universe, he yielded to popular prejudice so far as to admit the existence of a class of beings, of the same form as men, grander, composed of very subtle atoms, less liable to dissolution, but still mortal, dwelling in the upper regions of air. These beings also manifested them- selves to man by means of images

in dreams, communicated with him, and sometimes gave him an insight into the future. Some of them were benevolent, others malignant. According to Plutarch, Democritus recognized one god under the form of a fiery sphere, the soul of the world, but this idea is probably of later origin. The popular belief in gods was attributed by Democritus to the desire to explain extraordinary phenomena (thunder, lightning, earthquakes) by reference to superhuman agency.

5. Ethics. — Democritus ‘s moral system — the first collection of ethical precepts which deserves the name — strongly resembles the negative side of the system of Epicurus. The summum bonum is the maximum of pleasure with the minimum of pain. But true pleasure is not sensual enjoyment; it has its principle in the soul. It consists not in the possession of wealth or flocks and herds, but in good humour, in the just disposition and con- stant tranquillity of the soul. Hence the necessity of avoiding extremes; too much and too little are alike evils. True happi- ness consists in taking advantage of what one has and being content with it (see Ethics).

Bibliography. — Fragments edited by F. Mullach (1843) with commentary and in his Fragmenta philosophorum Graecorum, 1. (1860). See also H. Ritter and L. Preller, Historia philosophiae (chap. i. ad fin.); P. Lafaist (Lafaye), Dissertation sur la philosophic ato- mistique (1833); L. Liard, De Democrito philosopho (Paris, 1873); H. C. Liepmann, Die Leucipp-Democritischen Atome (Leipzig, 1886) ; F.A.Lange, Geschichte des Materialismus (Eng.trans. by E. C. Thomas, 1877); G. Hart, Zur Seelen- und Erkenntnislehre des Democritus (Leipzig, 1886) ; P. Natorp, Die Elhika des Demokritos (Marburg, 1893); A. Dyroff, Demokntstudien (Leipzig, 1899); among general works C. A. Brandis, Gesch. d. Entwickelungen d. griech. Philosophie (Bonn, 1 862-1 864); Ed. Zeller, Pre-Socratic Philosophy (Eng.trans., London, 1881); for his theory of sense-perception see especially J. I. Beare, Greek Theories of Elementary Cognition (Oxford, 1906).

DEMOGEOT, JACQUES CLAUDE (1808-1894), French man of letters, was born in Paris on the 5th of July 1808. He was professor of rhetoric at the lycee Saint Louis, and subsequently assistant professor at the Sorbonne. He wrifte many detached papers on various literary subjects, and two reports on secondary education in England and Scotland in collaboration with H. Montucci. His reputation rests on his excellent Histoire de la littirature jrancaise depuis ses origines jusqu’A nos jours (1851), which has passed through many subsequent editions. He was also the author of a Tableau de la littirature jrancaise au XVIP sihcle (1859), and of a work (3 vols., 1880-1883) on the influence of foreign literatures on the development of French literature. He died in

Paris in 1894.

DEMOGRAPHY (from Gr. or}/«>s, people, and ypatu>, to write), the science which deals with the statistics of health and

disease, of the physical, intellectual, physiological and economical aspects of births, marriages and mortality. The first to employ the word was Achille Guillard in his Elements de statistique humaine ou dSmographie comparee (1855), but the meaning which he attached to it was merely that of the science which treats of the condition, general movement and progress of population in civilized countries, i.e. little more than what is comprised in the ordinary vital statistics, gleaned from census and registra- tion reports. The word has come to have a much wider meaning and may now be defined as that branch of statistics which deals with the life-conditions of peoples.

DEMOIVRE, ABRAHAM (1667-1754), English mathematician of French extraction, was born at Vitry, in Champagne, on the 26th of May 1667. He belonged to a French Protestant family, and was compelled to take refuge in England at the revocation of the edict of Nantes, in 1685. Having laid the foundation of his mathematical studies in France, he prosecuted them further in London, where he read public lectures on natural philosophy for his support. The Principia mathematica of Sir Isaac Newton, which chance threw in his way, caused him to prosecute his studies with vigour, and he soon became distinguished among first-rate mathematicians. He was among the intimate personal friends of Newton, and his eminence and abilities secured his admission into the Royal Society of London in 1697, and after- wards into the Academies of Berlin and Paris. His merit was so well known and acknowledged by the Royal Society that they judged him a fit person to decide the famous contest between Newton and G. W. Leibnitz (see Infinitesimal Calculus). The life of Demoivre was quiet and uneventful. His old age was spent in obscure poverty, his friends and associates having nearly all passed away before him. He died at London, on the 27th 01 November 1754.

The Philosophical Transactions contain several of his papers. He also published some excellent works, such as Miscellanea analytica de seriebus et quadraturis (1730), in 4to. This contained some elegant and valuable improvements on then existing methods, which nave themselves, however, long been superseded. But he has been more generally known by his Doctrine of Chances, or Method of Calculating the Probabilities of Events at Play. This work was first printed in

1618, in 4to, and dedicated to Sir Isaac Newton. It was reprinted in 1738, with great alterations and improvements; and a third edition was afterwards published with additions in 1756. He also published a Treatise on Annuities (1725), which has passed through several revised and corrected editions.

See C. Hutton, Mathematical and Philosophical Dictionary (1815). For Demoivre' s Theorem see Trigonometry: Analytical.

DEMONETIZATION, a term employed in monetary science in two different senses, (a) The depriving or divesting of a metal of its standard monetary value. From 1663 to 171 7 silver was the standard of value in England and gold coins passed at their market value. The debasement and underrating of the silver coinage insensibly brought about the demonetization of silver in England as a standard of value and the substitution of gold. During the latter half of the 19th century, the tremendous depreciation of silver, owing to its continually increasing pro- duction, and consequently the impossibility of preserving any ratio of stability between it and gold, led to the abandonment or demonetization of the metal as a standard and to its use merely as token money, (b) The withdrawal of coin from circulation, as, for example, in England that of all pre- Victorian gold coins under the provisions of the Coinage Act 1889, and the royal proclama- tion of the 22nd of November 1890.

DEMONOLOGY (Aai/icov, demon, genius, spirit), the branch of the science of religions which relates to superhuman beings which are not gods. It deals both with benevolent beings which have no circle of worshippers or so limited a circle as to be below the rank of gods, and with malevolent beings of all kinds. It may be noted that the original sense of " demon " was a benevolent being; but in English the name now connotes malevolence; in German it has a neutral sense, e.g. Korndamonen. Demons, when they are regarded as spirits, may belong to either of the classes of spirits recognized by primitive animism (q.v.) ; that is to say, they may be human, or non-human, separable souls, or discarnate spirits which have never inhabited a body; a sharp

distinction is often drawn between these two classes, notably by the Melanesians, the West Africans and others; the Arab jinn, for example, are not reducible to modified human souls; at the same time these classes are frequently conceived as pro- ducing identical results, e.g. diseases.

Under the head of demons are classified only such spirits as are believed to enter into relations with the human race; the term

therefore includes (1) human souls regarded as genii or familiars, (2) such as receive a cult (for which see Ancestor Worship), and (3) ghosts or other malevolent revenants; excluded are souls conceived as inhabiting another world. But just as gods are not necessarily spiritual, demons may also be regarded as corporeal; vampires for example are sometimes described as human heads with appended entrails, which issue from the tomb to attack the living during the night watches*. The so-called Spectre Huntsman of the Malay Peninsula is said to be a man who scours the firmament with his dogs, vainly- seeking for what he could not find on earth — a buck mouse-deer pregnant with male offspring; but he seems to be a living man; there is no statement that he ever died, nor yet that he is a spirit. The incubus and succubus of the middle ages are some- times regarded as spiritual beings; but they were held to give very real proof of their bodily existence. It should, however, be remembered that primitive peoples do not distinguish clearly between material and immaterial beings.

Prevalence of Demons. — According to a conception of the world frequently found among peoples of the lower cultures, all the affairs of life are supposed to be under the control of spirits, each ruling a certain element or even object, and them- selves in subjection to a greater spirit. Thus, the Eskimo are said to believe in spirits of the sea, earth and sk./, the winds, the clouds and everything in nature. Every cove of the seashore, every point, every island and prominent rock has its guardian spirit. All are of the malignant type, to be propitiated only by acceptable offerings from persons who desire to visit the locality where it is supposed to reside. A rise in culture often results in an increase in the number of spiritual beings with whom man surrounds himself. Thus, the Koreans go far beyond the Eskimo and number their demons by thousands of billions; they fill the chimney, the shed, the living-room, the kitchen, they are on every shelf and jar; in thousands they waylay the traveller as he leaves his home, beside him, behind him, dancing in front of him, whirring over his head, crying out upon him from air, earth and water.

Especially complicated was the ancient Babylonian demon- ology ; all the petty annoyances of life — a sudden fall, a headache, a quarrel — were set down to the agency of fiends; all the stronger emotions — love, hate, jealousy and so on — were regarded as the work of demons; in fact so numerous were they, that there were special fiends for various parts of the human body — one for the head, another for the neck, and so on. Similarly in Egypt at the present day the jinn are believed to swarm so thickly that it is necessary to ask their permission before pouring water on the ground, lest one should accidentally be soused and vent his anger on the offending human

being. But these beliefs are far from being confined to the uncivilized; Greek philosophers like Porphyry, no less than the fathers of the Church, held that the world was pervaded with spirits; side by side with the belief in witchcraft, we can trace through the middle ages the survival of primitive animistic views; and in our own day even these beliefs subsist in unsuspected vigour among the peasantry of the more uneducated European countries. In fact the ready acceptance of spiritualism testifies to the force with which the primitive animistic way of looking at things appealed to the white races in the middle of the last century.

Character of Spiritual World. — The ascription of malevolence to the world of spirits is by no means universal. In West Africa the Mpongwe believe in local spirits, just as do the Eskimo; but they are regarded as inoffensive in the main; true, the passer- by must make some trifling offering as he nears their place of abode; but it is only occasionally that mischievous acts, such as the throwing down of a tree on a passer-by, are, in the view of the

natives, perpetuated by the Ombuiri. So too, njany of the spirits especially concerned with the operations of nature are conceived as neutral or even benevolent; the European peasant fears the corn-spirit only when he irritates him by trenching on his domain and taking his property by cutting the corn; similarly, there is no reason why the more insignificant personages of the pantheon should be conceived as malevolent, and we find that the Petara of the Dyaks are far from indiscriminating and malignant, though disease and death are laid at their door.

Classification. — Besides the distinctions of human and non- human, hostile and friendly, the demons in which the lower races believe are classified by them according to function, each class with a distinctive name, with extraordinary minuteness, the list in the case of the Malays running to several score. They have, for example, a demon of the waterfall, a demon of wild-beast tracks, a demon which interferes with snares for wild-fowl, a baboon demon, which takes possession of dancers and causes them to perform wonderful feats of climbing, &c. But it is impossible to do more than deal with a few types, which will illustrate the main features of the demonology of savage, barbarous and semiˆ civilized peoples.

(a) Natural causes, either of death or of disease, are hardly, if at all, recognized by the uncivilized; everything is attributed to spirits or

magical influence of some sort. The spirits which cause disease may be human or non-human and their influence is shown in more than one way; they may enter the body of the victim (see Possession), and either dominate his mind as well as his body, inflict specific diseases, or cause pains of various sorts. Thus the Mintra of the Malay Peninsula have a demon corresponding to every kind of disease known to them; the Tasmanian ascribed a gnawing pain to the presence within him of the soul of a dead man, whom he had unwittingly summoned by mentioning his name and who was devouring his liver; the Samoan held that the violation of a food tabu would result in the animal being formed within the body of the offender and cause his death. The demon theory of disease is still attested by some of our medical terms; epilepsy (Gr. «rtXi7ˆw, seizure) points to the belief that the patient is possessed. As a logical conse- quence of this view of disease the mode of treatment among peoples in the lower stages of culture is mainly magical; they endeavour to propitiate the evil spirits by sacrifice, to expel them by spells, &c. (see Exorcism), to drive them away by blowing, &c. ; conversely we find the Khonds attempt to keep away smallpox ; v placing thorns and brushwood in the paths leading to places decimated by that disease, in the hope of making the disease demon retrace his steps. This theory of disease disappeared sooner than did the belief in possession; the energumens (ivepyovpevot) of the early Christian church, who were under the care of a special clerical order of exorcists, testify to a belief in possession; but the demon theory of disease receives no recog- nition; the energumens find their analogues in the converts of missionaries in China, Africa and elsewhere. Another way in which a demon is held to cause disease is by introducing itself into the patient's body and sucking his blood; the Malays believe that a woman who dies in childbirth becomes a langsuir and sucks the blood of children; victims of the lycanthrope are sometimes said to be done to death in the same way; and it is commonly believed in Africa that the wizard has the power of killing people in this way, probably with the aid of a familiar.

(b) One of the primary meanings of balnuv is that of genius or familiar, tutelary spirit; according to Hesiod the men of the golden race became after death guardians or watchers over mortals. The idea is found among the Romans also; they attributed to every man a genius who accompanied him through life. A Norse belief found in Iceland is that the fylgia, a genius in animal form, attends human beings; and these animal guardians may sometimes be seen fighting; in the same way the Siberian shamans send their animal familiars to do battle instead of deciding their quarrels in person. The animal guardian re- appears in the nagual of Central America (see article

Totemism), the yunbeai of some Australian tribes, the manitou of the Red Indian and the bush soul of some West African tribes;

among the latter the link between animal and human being is said to be established by the ceremony of the blood bond. Corresponding to the animal guardian of the ordinary man, we have the familiar of the witch or wizard. All the world over it is held that such people can assume the form of animals; some- times the power of the shaman is held to depend on his being able to summon his familiar; among the Ostiaks the shaman's coat was covered with representations of birds and beasts; two bear's claws were on his hands; his wand was covered with mouse-skin; when he wished to divine he beat his drum till a black bird appeared and perched on his hut; then the shaman swooned, the bird vanished, and the divination could begin. Similarly the Greenland angekok is said to summon his torngak (which may be an ancestral ghost or an animal) by drumming; he is heard by the bystanders to carry on a conversation and obtain advice as to how to treat diseases, the prospects of good weather and other matters of importance. The familiar, who is sometimes replaced by the devil, commonly figured in witchcraft trials; and a statute of James I. enacted that all persons invok- ing an evil spirit or consulting, covenanting with, entertaining, employing, feeding or rewarding any evil spirit should be guilty of felony and suffer death. In modern spiritualism the familiar is represented by the " guide," corresponding to which we have the theosophical " guru."

(c) The familiar is sometimes an ancestral spirit, and here we touch the fringe of the cult of the dead (see also Ancestor Worship). Especially among the lower races the dead are regarded as hostile; the Australian avoids the grave even of a kinsman and elaborate ceremonies of mourning are found amongst most primitive peoples, whose object seems to be to rid the living of the danger they run by association with the ghost of the dead. Among the Zulu the spirits of the dead are held to be friendly or hostile, just as they were in life; on the Congo a man after death joins the good or bad spirits according as his life has been good ot bad. Especially feared among many peoples are the souls of those who have committed suicide or died a violent death; the woman who dies in childbed is held to become a demon of the most dangerous kind; even the unburied, as restless, dis- satisfied spirits, are more feared than ordinary ghosts. Naturally spirits of these latter kinds are more valuable as familiars than ordinary dead men's souls. We find many recipes for securing their aid. In the Malay Peninsula the blood of a murdered man must be put in a bottle and prayers said over; after seven days of this worship a sound is heard and the operator puts his finger into the bottle for the polong, as the

demon is called, to suck; it will fly through the air in the shape of an exceedingly diminutive female figure, and is always preceded by its pet, the pelesit, in the shape of a grasshopper. In Europe a similar demon is said to be obtainable from a cock's egg. In South Africa and India, on the other hand, the magician digs up a dead body, especially of a child, to secure a familiar. The evocation of spirits, especially in the form of necromancy, is an important branch of the demon- ology of many peoples; and the peculiarities of trance medium- ship, which seem sufficiently established by modern research, go far to explain the vogue of this art. It seems to have been common among the Jews, and the case of the witch of Endor is narrated in a way to suggest something beyond fraud; in the book of magic which bears the name of Dr Faustus may be found many of the formulae for raising demons; in England may be mentioned especially Dr Dee as one of the most famous of those who claimed before the days of modern spiritualism (q.v.) to have intercourse with the unseen world and to summon demons at his will. Sometimes the spirits were summoned to appear as did the phantoms of the Greek heroes to Odysseus; some- times they were called to enter a crystal (see Crystai-Gazing) ; sometimes they are merely asked to declare the future or com- municate by moving external objects without taking a visible form; thus among the Karens at the close of the burial cere- monies the ghost of the dead man, which is said to hover round till the rites are completed, is believed to make a ring swing round and snap the string from which it hangs.

(d) The vampire is a particular form of demon which calls for

some notice. In the Malay Peninsula, parts of Polynesia, &c., it is conceived as a head with attached enftails, which issues, it may be from the grave, to suck the blood of living human beings. According to the Malays a penanggalan (vampire) is a living witch, and can be killed if she can be caught; she is especially feared in houses where a birth has taken place and it is the custom to hang up a bunch of thistle in order to catch her; she is said to keep vinegar at home to aid her in re-entering her own body. In Europe the Slavonic area is the principal seat of vampire beliefs, and here too we find, as a natural development, that means of preventing the dead from injuring the living have been evolved by the popular mind. The corpse of the vampire, which may often be recognized by its unnaturally ruddy and fresh appearance, should be staked down in the grave or its head should be cut off; it is interesting to note that the cutting off of heads

of the dead was a neolithic burial rite.

(e) The vampire is frequently blended in popular idea with the Poltergeist (q.v.) or knocking spirit, and also with the werwolf (see Lycanthropy).

(/) As might be expected, dream demons are very common; in fact the word ” nightmare ” (A.S. mcsr, spirit, elf) preserves for us a record of this form of belief, which is found right down to the lowest planes of culture. The Australian, when he suffers from an oppression in his sleep, says that Koin is trying to throttle him; the Caribs say that Maboya beats them in their sleep; and the belief persists to this day in some parts of Europe; horses too are said to be subject to the persecutions of demons, which ride them at night. Another class of nocturnal demons are the incubi and succubi, who are said to consort with human beings in their sleep; in the Antilles these were the ghosts of the dead; in New Zealand likewise ancestral deities formed liaisons with females; in the Samoan Islands the inferior gods were regarded as the fathers of children otherwise unaccounted for; the Hindus have rites prescribed by which a companion nymph may be secured. The question of the real existence of incubi and succubi, whom the Romans identified with the fauns, was gravely discussed by trie fathers of the church ; and in 1418 Innocent VIII. set forth the doctrine of lecherous demons as an indisputable fact; and in the history of the Inquisition and of trials for witch- craft may be found the confessions of many who bore witness to their reality. In the Anatomy of Melancholy Burton assures us that they were never more numerous than in a.d. 1600.

(g) Corresponding to the personal tutelary spirit {supra, b) we have the genii of buildings and places. The Romans celebrated the birthday of a town and of its genius, just as they celebrated that of a man; and a snake was a frequent form for this kind of demon; when we compare with this the South African belief that the snakes which are in the neighbourhood of the kraal are the incarnations, of the ancestors of the residents, it seems probable that some similar idea lay at the bottom of the Roman belief; to this day in European folklore the house snake or toad, which lives in the cellar, is regarded as the ” life index ” or other self of the father of the house; the death of one involves the death of the other, according to popular belief. The assignment of genii to buildings and gates is connected with an important class of sacrifices; in order to provide a tutelary spirit, or to appease chthonic deities, it was often the custom to sacrifice a human being or an animal at the foundation of a building; sometimes we find a similar guardian provided for the frontier of a country or of a tribe. The house

spirit is, however, not necessarily connected with this idea. In Russia the domovoi (house spirit) is an important personage in folk-belief; he may object to certain kinds of animals, or to certain colours in cattle; and must, generally speaking, be propitiated and cared for. Corresponding to him we have the drudging goblin of English folklore.

(h) It has been shown above how the animistic creed postulates the existence of all kinds of local spirits, which are sometimes tied to their habitats, sometimes free to wander. Especially prominent in Europe, classical, medieval and modern, and in East Asia, is the spirit of the lake, river, spring, or well, often conceived as human, but also in the form of a bull or horse ; the term Old Nick may refer to the water-horse Nok. Less specialized

in their functions are many of the figures of modern folklore, some of whom have perhaps replaced some ancient goddess, e.g. Frau Holda; others, like the Welsh Pwck, the Lancashire boggarts or the more widely found Jack-o'-Lantern (Will o' the Wisp), are sprites who do no more harm than leading the wanderer astray. The banshee is perhaps connected with ancestral or house spirits; the Wild Huntsman, the Gabriel hounds, the Seven Whistlers, &c, are traceable to some actual phenomenon; but the great mass of British goblindom cannot now be traced back to savage or barbarous analogues. Among other local sprites may be mentioned the kobolds or spirits of the mines. The fairies (see Fairy), located in the fairy knolls by the inhabitants of the Shetlands, may also be put under this head.

(i) The subject of plant souls is referred to in connexion with animism (q.v.); but certain aspects of this phase of belief demand more detailed treatment. Outside the European area vegetation spirits of all kinds seem to be conceived, as a rule, as anthropomorphic; in classical Europe, and parts of the Slavonic area at the present day, the tree spirit was believed to have the form of a goat, or to have goats' feet.

Of special importance in Europe is the conception of the so-called " corn spirit "; W. Mannhardt collected a mass of information proving that the life of the corn is supposed to exist apart from the corn itself and to take the form, sometimes of an animal, sometimes of a man or woman, sometimes of a child. There is, however, no proof that the belief is animistic in the proper sense. The animal which popular belief identified with the corn demon is sometimes killed in the spring in order to mingle its blood or bones with the seed; at harvest-time it is supposed to sit in the last corn and the animals driven out from it are sometimes killed; at others the reaper who cuts the last ear is said to have killed the " wolf " or the " dog," and sometimes receives the

name of ” wolf ” or ” dog ” and retains it till the next harvest. The corn spirit is also said to be hiding in the barn till the corn is threshed, or it may be said to reappear at midwinter, when the farmer begins to think of his new year of labour and harvest. Side by side with the conception of the corn spirit as an animal is the anthropomorphic view of it; and this element must have predominated in the evolution of the cereal deities like Demeter; at the same time traces of the association of gods and goddesses of corn with animal embodiments of the corn spirit are found.

(j) In many parts of the world, and especially in Africa, is found the conception termed the ” otiose creator “; that is to say, the belief in a great deity, who is the author of all that exists but is too remote from the world and too high above terrestrial things to concern himself with the details of the universe. As a natural result of this belief we find the view that the operations of nature are conducted by a multitude of more or less obedient subordinate deities; thus, in Portuguese West Africa the Kimbunda believe in Suku-Vakange, but hold that he has com- mitted the government of the universe to innumerable kilulu good and bad; the latter kind are held to be far more numerous, but Suku-Vakange is said to keep them in order by occasionally smiting them with his thunderbolts; were it not for this, man’s lot would be insupportable.

Sometimes the gods of an older religion degenerate into the demons of the belief which supersedes it. A conspicuous example of this is found in the attitude of the Hebrew prophets to the gods of the nations, whose power they recognize without admitting their claim to reverence and sacrifice. The same tendency is seen in many early missionary works and is far from being without influence even at the present day. In the folklore of European countries goblindom is peopled by gods and nature-spirits of an earlier heathendom. We may also compare the Persian devs with the Indian devas.

Expulsion of Demons. — In connexion with demonology mention must be made of the custom of expelling ghosts, spirits or evils generally. Primitive peoples from the Australians upwards celebrate, usually at fixed intervals, a driving out of hurtful influences. Sometimes, as among the Australians, it is merely the ghosts of those who have died in the year which are thus

driven out; from this custom must be distinguished another, which consists in dismissing the souls of the dead at the close of the year and sending them on their journey to the other world; this latter custom seems to have an entirely different origin and to be due to love and not fear of the dead. In other cases it is believed that evil spirits generally or even non-personal evils such as sins are believed to be expelled. In these customs originated perhaps the scapegoat, some forms of sacrifice (q.v.) and other cathartic ceremonies.

Bibliography. — Tylor, Primitive Culture; Frazer, Golden Bough; Skeat, Malay Magic; Bastian, Der Mensch in der Geschichte; Callaway, Religion of the Amazulu; Hild, Etude sur les demons; Welcker, Griechische Gotterlehre, i. 731 ; Trans. Am. Phil. Soc. xxvi. 79; Calmet, Dissertation sur les esprits; Maury, La Magie; L. W. King, Babylonian Magie; Lenormant, La Magie chez les Chaldeens; R. C. Thompson, Devils and Evil Spirits of Babylonia; Grimm, Deutsche Mythologie; Roskoff , Geschichte des Teuf els ; Sibly, Illustration of the Occult Sciences; Scott, Demonology; Pitcairn, Scottish Criminal Trials ; Jewish Quarterly Rev. viii. 576, &c. ; Horst, Zauberbibliothek; Jewish Encyclopedia, s.v. ” Demonology.” See also bibliography to Possession, Animism and other articles.

(N. W. T.)

DE MORGAN, AUGUSTUS (1806-1871), English mathema- tician and logician, was born in June 1806, at Madura, in the Madras presidency. His father, Colonel John De Morgan, was employed in the East India Company’s service, and his grand- father and great-grandfather had served under Warren Hastings. On the mother’s side he was descended from JamesDodson,F.R.S., author of the Anti-logarithmic Canon and other mathematical works of merit, and a friend of Abraham Demoivre. Seven months after the birth of Augustus, Colonel De Morgan brought his wife, daughter and infant son to England, where he left them during a subsequent period of service in India, dying in 181 6 on his way home.

Augustus De Morgan received his early education in several private schools, and before the age of fourteen years had learned Latin, Greek and some Hebrew, in addition to acquiring much general knowledge. At the age of sixteen years and a half he entered Trinity College, Cambridge, and studied mathematics, partly under the tuition of Sir G. B. Airy. In 1825 he gained a Trinity scholarship. De Morgan’s love of wide reading some- what interfered with his success in the mathematical tripos, in which he took the fourth place in 1827. He was prevented from taking his M.A. degree, or from obtaining a

fellowship, by his conscientious objection to signing the theological tests then required from masters of arts and fellows at Cambridge.

A career in his own university being closed against him, he entered Lincoln's Inn ; but had hardly done so when the establish- ment, in 1828, of the university of London, in Gower Street, afterwards known as University College, gave him an opportunity of continuing his mathematical pursuits. At the early age of twenty-two he gave his first lecture as professor of mathematics in the college which he served with the utmost zeal and success for a third of a century. His connexion with the college, indeed, was interrupted in 183 1, when a disagreement with the governing body caused De Morgan and some other professors to resign their chairs simultaneously. When, in 1836, his successor was acci- dentally drowned, De Morgan was requested to resume the professorship.

In 1837 he married Sophia Elizabeth," daughter of William Frend, a Unitarian in faith, a mathematician and actuary in occupation, a notice of whose life, written by his son-in-law, will be found in the Monthly Notices of the Royal Astronomical Society (vol. v.). They settled in Chelsea (30 Cheyne Row), where in later years Mrs De Morgan had a large circle of intellectual and artistic friends.

As a teacher of mathematics De Morgan was unrivalled. He gave instruction in the form of continuous lectures delivered extempore from brief notes. The most prolonged mathematical reasoning, and the most intricate formulae, were given with almost infallible accuracy from the resources of his extraordinary memory. De Morgan's writings, however excellent, give little idea of the perspicuity and elegance of his viva voce expositions, which never failed to fix the attention of all who were worthy

of hearing him. Many of his pupils have distinguished them- selves, and, through%saac Todhunter and E. J. Routh, he had an important influence on the later Cambridge school. For thirty years he took an active part in the business of the Royal Astronomical Society, editing its publications, supplying obituary notices of members, and for eighteen years acting as one of the honorary secretaries. He was also frequently employed as con- sulting actuary, a business in which his mathematical powers, combined with sound judgment and business-like habits, fitted him to take the highest place.

De Morgan's mathematical writings contributed powerfully towards the progress of the science. His memoirs on the " Foundation of Algebra," in the 7th and 8th volumes of the Cambridge Philosophical

Transactions, contain some of the most important contributions which haye been made to the philosophy of mathematical method; and Sir W. Rowan Hamilton, in the preface to his Lectures on Quaternions, refers more than once to those papers as having led and encouraged him in the working out of the new system of quaternions. The work on Trigon- ometry and Double Algebra (1849) contains in the latter part a most luminous and philosophical view of existing and possible systems of symbolic calculus. But De Morgan's influence on mathematical science in England can only be estimated by a review of his long series of publications, which commence, in 1828, with a translation of part of Bourdon's Elements of Algebra, prepared for his students. In 1830 appeared the first edition of his well-known Elements of Arithmetic, which did much to raise the character of elementary training. It is distinguished by a simple yet thoroughly philosophical treatment of the ideas of number and magnitude, as well as by the introduction of new abbreviated processes of computation, to which De Morgan always attributed much practical importance. Second and third editions were called for in 1832 and 1835; a sixth edition was issued in 1876. De Morgan's other principal mathematical works were The Elements of 'Algebra (1835), a valuable but some- what dry elementary treatise; the Essay on Probabilities (1838), forming the 107th volume of Lardner's Cyclopaedia, which forms a valuable introduction to the subject; and The Elements of Trigonometry and Trigonometrical Analysis, preliminary to the Differential Calculus (1837). Several of his mathematical works were published by the Society for the Diffusion of Useful Know- ledge, of which De Morgan was at <5ne time an active member. Among these may be mentioned the Treatise on the Differential and Integral Calculus (1842); the Elementary Illustrations of the Differential and Integral Calculus, first published in 1832, but often bound up with the larger treatise; the essay, On the Study and Difficulties of Mathematics (183 1); and a brief treatise on Spherical Trigonometry (1834). By some accident the work on probability in the same series, written by Sir J. W. Lubbock and J. Drinkwater-Bethune, was attributed to De Morgan, an error which seriously annoyed his nice sense of bibliographical accuracy. For fifteen years he did all in his power to correct the mistake, and finally wrote to The Times to disclaim the authorship. (See Monthly Notices of the Royal Astronomical Society, vol. xxvi. p. 118.) Two of his most elaborate treatises are to be found in the Encyclopaedia metropolitana, namely the articles on the Calculus of Functions, and the Theory of Probabilities. De Morgan's minor mathematical writings were scattered over various periodicals. A list of these and other papers will be found in the Royal Society's Catalogue, which contains forty-two entries under the name of De

Morgan.

In spite, however, of the excellence and extent of his mathe- matical writings, it is probably as a logical reformer that De Morgan will be best remembered. In this respect he stands alongside of his great contemporaries Sir W. R. Hamilton and George Boole, as one of several independent discoverers of the all-important principle of the quantification of the predicate. Unlike most mathematicians, De Morgan always laid much stress upon the importance of logical training. In his admirable papers upon the modes of teaching arithmetic and geometry, originally published in the Quarterly Journal of Education (reprinted in The Schoolmaster, vol ii.), he remonstrated against the neglect of

logical doctrine. In 1839 he produced a small work called First Notions of Logic, giving what he had found by experience to be much wanted by students commencing with Euclid. In October 1846 he completed the first of his investigations, in the form of a paper printed in the Transactions of the Cambridge Philosophical Society (vol. viii. No. 29). In this paper the principle of the quantified predicate was referred to, and there immediately ensued a memorable controversy with Sir W. R. Hamilton regard- ing the independence of De Morgan's discovery, some communi- cations having passed between them' in the autumn of 1 846. The details of this dispute will be found in the original pamphlets, in the Athenaeum and in the appendix to De Morgan's Formal Logic. Suffice it to say that the independence of De Morgan's discovery was subsequently recognized by Hamilton. The eight forms of proposition adopted by De Morgan as the basis of his system partially differ from those which Hamilton derived from the quantified predicate. The general character of De Morgan's development of logical forms was wholly peculiar and original on his part.

Late in 1847 De Morgan published his principal logical treatise, called Formal Logic, or the Calculus of Inference, Necessary and Probable. This contains a reprint of the First Notions, an elabor- ate development of his doctrine of the syllogism, and of the numerical definite syllogism, together with chapters of great interest on probability, induction, old logical terms and fallacies. The severity of the treatise is relieved by characteristic touches of humour, and by quaint anecdotes and allusions furnished from his wide reading and perfect memory. There followed at intervals, in the years 1850, 1858, i860 and 1863, a series of four elaborate memoirs on the " Syllogism,"

printed in volumes ix. and x. of the Cambridge Philosophical Transactions. These papers taken together constitute a great treatise on logic, in which he substituted improved systems of notation, and developed a new logic of relations, and a new onymatic system of logical expression. In i860 De Morgan endeavoured to render their contents better known by publishing a Syllabus of a Proposed System of Logic, from which may be obtained a good idea of his symbolic system, but the more readable and interesting discussions contained in the memoirs are of necessity omitted. The article ” Logic ” in the English Cyclopaedia (i860) completes the list of his logical publications.

Throughout his logical writings De Morgan was led by the idea that the followers of the two great branches of exact science, logic and mathematics, had made blunders, — the logicians in neglecting mathematics, and the mathematicians in neglecting logic. He endeavoured to reconcile them, and in the attempt showed how many errors an acute mathematician could detect in logical writings, and how large a field there was for discovery. But it may be doubted whether De Morgan’s own system, ” horrent with mysterious spiculae,” as Hamilton aptly described it, is fitted to exhibit the real analogy between quantitative and qualitative reasoning, which is rather to be sought in the logical works of Boole.

Perhaps the largest part, in volume, of De Morgan’s writings re- mains still to be briefly mentioned ; it consists of detaphed articles contributed to various periodical or composite works. During the years 1 833-1 843 he contributed very largely to the first edition of the Penny Cyclopaedia, writing chiefly on mathematics, astronomy, phyacs and biography. His articles of various length cannot be less in number than 850, and they have been estimated to constitute a sixth part of the whole Cyclopaedia, of which they formed perhaps the most valuable portion. He also wrote biographies of Sir Isaac Newton and Edmund Halley for Knight’s British Worthies, various notices of scientific men for the Gallery of Portraits, and for the un- completed Biographical Dictionary of the Useful Knowledge Society, and at least seven articles in Smith’s Dictionary of Greek and Roman Biography. Some of De Morgan’s most interesting and useful minor writings are to be found in the Companions to the British Almanack, to which he contributed without fail one article each year from 1 83 1 up to 1857 inclusive. In these carefully written papers he treats a great variety of topics relating to astronomy, chronology, decimal coinage, life assurance, bibliography and the history of science. Most of them are as valuable now as when written.

Among De Morgan's miscellaneous writings may be mentioned his Explanation of the Gnomonic Projection of the Sphere, 1836, including a description of the maps of the stars, published by the Useful Know-

ledge Society; his Treatise on the Globes, Celestial and Terrestrial,l %ˆ5, and his remarkable Book of Almanacks (2nd edition, 1871), which contains a series of thirty-five almanacs, so arranged with indices of reference, that the almanac for any year, whether in old style or new, from any epoch, ancient or modern, up to a. d. 2000, may be found without difficulty, means being added for verifying the almanac and also for discovering the days of new and full moon from 2000 b. c. up to A. d. 2000. De Morgan expressly draws attention to the fact that the plan of this book was that of L. B. Francoeur and J. Ferguson, but the plan was developed by one who was an unrivalled master of all the intricacies of chronology. The two best tables of logarithms, the small five-figure tables of the Useful Knowledge Society (1839 and 1857), and Shroen's Seven Figure-Table (5th ed., 1865), were printed under De Morgan's superintendence. Several works edited by him will be found mentioned in the British Museum Catalogue. He made numerous anonymous contributions through a long series of years to the Athenaeum, and to Notes and Queries, and occasionally to The North British Review, Macmillan's Magazine, &c.

Considerable labour was spent by De Morgan upon the subject of decimal coinage. He was a great advocate of the pound and mil scheme. His evidence on this subject was sought by the Royal Commission, and, besides constantly supporting the Decimal Association in periodical publications, he published several separate pamphlets on the subject.

One marked characteristic of De Morgan was his intense and yet reasonable love of books. He was a true bibliophile and loved to surround himself, as far as his means allowed, with curious and rare books. He revelled in all the mysteries of watermarks, title-pages, colophons, catch-words and the like; yet he treated bibliography as an important science. As he himself wrote, " the most worthless book of a bygone day is a record worthy of preservation; like a telescopic star, its obscurity may render it unavailable for most purposes; but it serves, in hands which know how to use it, to de- termine the places of more important bodies." His evidence before the Royal Commission on the British Museum in 1850 (Questions 5704*-58i5,* 6481-6513, and 8966-8967), should be studied by all who would comprehend the principles of bibliography or the art of constructing a catalogue, his views on the latter subject correspond- ing with those carried out by

Panizzi in the British Museum Catalogue. A sample of De Morgan's bibliographical learning is to be found in his account of Arithmetical Books, from the Invention of Printing (1847), and finally in his Budget of Paradoxes. This latter work consists of articles most of which were originally published in the Athenaeum, describing the various attempts which have been made to invent a perpetual motion, to square the circle, or to trisect the angle ; but De Morgan took the opportunity to include many curious bits gathered from his extensive reading, so that the Budget, as re-

Crinted by his widow (1872), with much additional matter prepared y himself, forms a remarkable collection of scientific ana. De Morgan's correspondence with contemporary scientific men was very extensive and full of interest. It remains unpublished, as does also a large mass of mathematical tracts which he prepared for the use of his students, treating all parts of mathematical science, and embodying some of the matter of his lectures. De Morgan's library was purchased by Lord Overstone, and presented to the university of London.

In 1866 his life became clouded by the circumstances which led him to abandon the institution so long the scene of his labours. The refusal of the council to accept the recommendation of the senate, .that they should appoint an eminent Unitarian minister to the professorship of logic and mental philosophy, revived all De Morgan's sensitiveness on the subject of sectarian freedom; and, though his feelings were doubtless excessive, there is no doubt that gloom was thrown over his life, intensified in 1867 by the loss of his son George Campbell De Morgan, a young man of the highest scientific promise, whose name, as De Morgan expressly wished, will long be connected with the London Mathematical Society, of which he was one of the founders. From this time De Morgan rapidly fell into ill-health, previously almost unknown to him, dying on the 18th of March 1871. An interesting and truthful sketch of his life will be found in the Monthly Notices of the Royal Astronomical Society for the 9th of February 1872, vol. xxii. p. 112, written by A. C. Ranyard, who says, " He was the kindliest, as well as the most learned of men — benignant to every one who approached him, never forgetting the claims which weakness has on strength."

De Morgan left no published indications of his opinions on religious questions, in regard to which he was extremely reticent. He seldom or never entered a place of worship, and declared that he could not listen to a sermon, a circumstance perhaps due to the extremely strict religious discipline under which he was brought up. Nevertheless there is reason to believe that he

was of a deeply religious disposition. Like M. Faraday and Sir I. Newton he entertained a confident belief in Provi- dence, founded not on any tenuous inference, but on personal feeling. His hope of a future life also was vivid to the last.

It is impossible to omit a reference to his witty sayings, some specimens of which are preserved in Dr Sadler's most interesting Diary of Henry Crabb Robinson (1869), which also contains a humorous account of H. C. R. by De Morgan. It may be added that De Morgan was a great reader and admirer of Dickens; he was also fond of music, and a fair performer on the flute. (W.S.J.)

His son, William Frend De Morgan (b. 1839), first became known in artistic circles as a potter, the " De Morgan " tiles being remarkable for his rediscovery of the secret of some beauti- ful colours and glazes. But later in life he became even better known to the literary world by his novels, Joseph Vance (1906), Alice for Short (1907), Somehow Good (1908) and It Never Can Happen Again (1909), in which the influence of Dickens and of his own earlier family life were conspicuous.

DEMOSTHENES, the great Attic orator and statesman, was born in 384 (or 383) B.C. His father, who bore the same name, was an Athenian citizen belonging to the deme of Paeania. His mother, Cleobule, was the daughter of Gylon, a citizen who had been active in procuring the protection of the kings of Bosporus for the Athenian colony of Nymphaeon in the Crimea, and whose wife was a native of that region. On these grounds the adversaries of Demosthenes, in after-days, used absurdly to taunt him with a traitorous or barbarian ancestry. The boy had a bitter fore- taste of life. He was seven years old when his father died, leaving property (in a manufactory of swords, and another of upholstery) worth about £3500, which, invested as it seems to have been (20% was not thought exorbitant), would have yielded rather more than £600 a year. £300 a year was a very comfortable income at Athens, and it was possible to live decently on a tenth of it. Nicias, a very rich man, had property equivalent, probably, to not more than £4000 a year. Demosthenes was born then, to a handsome, though not a great fortune. But his guardians — two nephews of his father, Aphobus and Demophon, and one Therippides — abused their trust, and handed over to Demosthenes, when he came of age, rather less than one-seventh of

his patrimony, perhaps between £50 and £60 a year. Demosthenes, after studying with Isaeus (q.v.) — then the great master of forensic eloquence and of Attic law, especially in will cases '—brought an action against Aphobus, and gained a verdict for about £2400. But it does not appear that he got the money; and, after some more fruitless proceedings against Onetor, the brother-in-law of Aphobus, the matter was dropped,— not, however, before his relatives had managed to throw a public burden (the equipment of a ship of war) on their late ward, whereby his resources were yet further straitened. He now became a professional writer of speeches or pleas (Xoyoypa&s) for the law courts, sometimes speaking himself. Biographers have delighted to relate how painfully Demosthenes made him- self a tolerable speaker, — how, with pebbles in his mouth, he tried his lungs against the waves, how he declaimed as he ran up hill, how he shut himself up in a cell, having first guarded himself against a longing for the haunts of men by shaving one side of his head, how he wrote out Thucydides eight times, how he was derided by the Assembly and encouraged by a judicious actor who met him moping about the Peiraeus. He certainly seems to have been the rever.se of athletic (the stalwart Aeschines upbraids him with never having been a sportsman), and he probably had some sort of defect or impediment in his speech as a boy. Perhaps the most interesting fact about his work for the law courts is that he seems to have continued it, in some measure, through the most exciting parts of his great political career. The speech for Phormio belongs to the same year as the plea for Megalopolis. The speech against Boeotus " Concerning the Name " comes between the First Philippic and the First Olynthiac. The speech against Pantaenetus comes between-the speech " On the Peace " and the Second Philippic.

1 See Jebb's Attic Orators from Antiphon to Isaeos, vol. ii. p. 267 f.

The political career of Demosthenes, from his first direct contact with public affairs in 355 B.C. to his death in 322, has an essential unity. It is the assertion, in successive forms adapted to successive moments, of unchanging Po,u,cal principles. Externally, it is divided into the chap- cree a. ter which precedes and the chapter which follows Chaeronea. But its inner meaning, the secret of its indomitable vigour, the law which Harmonizes its apparent contrasts, cannot be understood unless it is regarded as a whole. Still less can it be appreciated in all its large wisdom and sustained self-mastery if it is viewed merely as a duel between the ablest champion and the craftiest enemy of Greek freedom. The time indeed came when Demosthenes and Philip stood face to face as representative antagonists in a mortal conflict. But, for Demosthenes, the special peril represented by Philip, the peril of subjugation to Macedon, was merely a disastrous accident. Philip

happened to become the most prominent and most formidable type of a danger which was already threatening Greece before his baleful star arose. As Demosthenes said to the Athenians, if the Macedonian had not existed, they would have made another Philip tor themselves. Until Athens recovered something of its old spirit, there must ever be a great standing danger, not for Athens only, but for Greece, — the danger that sooner or later, in some' shape, from some quarter — no man could foretell the hour, the manner or the source — barbarian violence would break up the gracious and und'efiled tradition of separate Hellenic life.

What was the true relation of Athens to Greece ? The answer which he gave to this question is the key to the life of Demosthenes. Athens, so Demosthenes held, was the natural head of Greece. Not, however, as an empress holding subject or subordinate cities in a dependence more or less compulsory. Rather as that city which most nobly expressed the noblest attributes of Greek political existence, and which, by her pre-eminent gifts both of intellect and of moral insight, was primarily responsible, everywhere and always, for the maintenance of those attributes in their integrity. Wherever the cry of the oppressed goes up from Greek against Greek, it was the voice of Athens which should first remind the oppressor that Hellene differed from barbarian in postponing the use of force to the persuasions of equal law. Wherever a barbarian hand offered wrong to any city of the Hellenic sisterhood, it was the arm of Athens which should first be stretched forth in the holy strength of Apollo the Averter. Wherever among her own children the ancient loyalty was yielding to love of pleasure or of base gain, there, above all, it was the duty of Athens to see that the central hearth of Hellas was kept pure. Athens must never again seek " empire " in the sense which became odious under the influence of Cleon and Hyperbolus— when, to use the image of Aristophanes, the allies were as Babylonian slaves grinding in the Athenian mill. Athens must never permit, if she could help it, the re-establishment of such a domination as Sparta exercised in Greece from the battle of Aegospotami to the battle of Leuctra. Athens must aim at leading a free confederacy, of which the members should be bound to her by their own truest interests. Athens must seek to deserve the confidence of all Greeks alike.

Such, in the belief of Demosthenes, was the part which Athens must perform if Greece was to be safe. But reforms must be effected before Athens could be capable of such a part. The evils to be cured were different phases of one malady. Athens had long been suffering from the profound decay of public spirit. Since the early years of the Peloponnesian War, the separation of Athenian society from the state

had been growing more and more marked. The old type of the eminent citizen, who was at once statesman and general, had become almost extinct. Politics were now managed by a small circle of politicians. Wars were conducted by professional soldiers whose troops were chiefly mercenaries, and who were usually regarded by the politicians either as instruments or as enemies. The mass of the citizens took no active interest in public affairs. But, fe * e ˆ ” though indifferent to principles, they had quickly sensi- tive partialities for men, and it was necessary to keep them in good humour. Pericles had introduced the practice of giving a

small bounty from the treasury to the poorer citizens, for the pur- pose of enabling them to attend the theatre at the great festivals, —in other words, for the purpose of bringing them under the concentrated influence of the best Attic culture. A provision eminently wise for the age of Pericles easily became a mischief when the once honourable name of ” demagogue ” began to mean a flatterer of the mob. Before the end of the Pelopon- nesian War the festival-money (theoricon) was abolished. A few years after the restoration of the democracy it was again intro- duced. But until 354 B.C. it had never been more than a gratuity, of which the payment depended on the treasury having a surplus. In 354 B.C. Eubulus became steward of the treasury. He was an able man, with a special talent for finance, free from all taint of personal corruption, and sincerely solicitous for the honour of Athens, but enslaved to popularity, and without principles of policy. His first measure was to make the festival-money a permanent item in the budget. Thenceforth this bounty was in reality very much what Demades afterwards called it, — the cement (raXXa) of the democracy.

Years before the danger from Macedon was urgent, Demos- thenes had begun the work of his life, — the effort to lift the spirit Forensic °f Athens, to revive the old civic loyalty, to rouse the speeches city into taking that place and performing that part in Publle w hich her own welfare as well as the safety of Greece causes. prescribed. His formally political speeches must never be considered apart from his forensic speeches in public causes. The Athenian procedure against the proposer of an unconstitu- tional law- — i.e. of a law incompatible with existing laws — had a direct tendency to make the law court, in such cases, a political arena. The same tendency was indirectly exerted by the tolerance of Athenian juries (in the absence of a

presiding expert like a judge) for irrelevant matter, since it was usually easy for a speaker to make capital out of the adversary's political ante- cedents. But the forensic speeches of Demosthenes for public causes are not only political in this general sense. They are documents, as indispensable as the Olynthiacs or Philippics, for his own political career. Only by taking them along with the formally political speeches, and regarding the whole as one unbroken series, can we see clearly the full scope of the task which he set before him, — a task in which his long resistance to Philip was only the most dramatic incident, and in which his real achievement is not' to be measured by the event of Chaeronea.

A forensic speech, composed for a public cause, opens the political career of Demosthenes with a protest against a signal abuse. In 355 B.C., at the age of twenty-nine, he wrote the speech " Against Androtion." This combats on legal grounds a proposal that the out-going senate should receive the honour of a golden crown. In its larger aspect, it is a denunciation of the corrupt system which that senate represented, and especially of the manner in which the treasury had been administered by Aristophon. In 354 B.C. Demosthenes composed and spoke the oration " Against Leptines," who had effected a slender saving for the state by the expedient of revoking those hereditary exemptions from taxation which had at various times been conferred in recognition of distinguished merit. The descendants of Harmodius and Aristogeiton alone had been excepted from the operation of the law. This was the first time that the voice of Demosthenes himself had been heard on the public concerns of Athens, and the utterance was a worthy prelude to the career of a statesman. He answers the advocates of the retrenchment by pointing out that the public interest will not ultimately be served by a wholesale violation of the public faith. In the same year he delivered his first strictly political speech, " On the Navy Boards " (Symmories). The Athenians, irritated by the support which Artaxerxes had lately given to the revolt of their allies, and excited by rumours of his hostile preparations, were feverishly eager for a war with Persia. Demosthenes urges that such an enterprise would at present be useless; that it would fail to unite Greece; that the energies of the city .should be reserved for a real emergency; but that, before the city can successfully cope with any war, there must be a better organization of resources, and,

first of all, a reform of the navy, which he outlines with character-istic lucidity and precision.

Two years later (352 B.C.) he is found dealing with a more definite question of foreign policy. Sparta, favoured by the depression of

Thebes in the Phocian War, was threatening Megalopolis. Both Sparta and Megalopolis sent embassies to Athens. Demosthenes supported Megalopolis. The ruin of Megalopolis would mean, he argued, the return of Spartan domination in the Peloponnesus. Athenians must not favour the tyranny of any one city. They must respect the rights of all the cities, and thus promote unity based on mutual confidence. In the same year Demosthenes wrote the speech " Against Timocrates." to be spoken by the same Diodorus who had before prosecuted Androtion, and who now combated an attempt to screen Androtion and others from the penalties of embezzlement. The speech " Against Aristocrates," also of 352 B.C., reproves that foreign policy of feeble makeshifts which was now popular at Athens. The Athenian tenure of the Thracian Chersonese partly depended for its security on the good-will of the Thracian prince Cersobleptes. Charidemus, a soldier of fortune who had already played Athens false, was now the brother-in-law and the favourite of Cersobleptes. Aristocrates proposed that the person of Charidemus should be invested with a special sanctity, by the enactment that whoever attempted his life should be an outlaw from all dominions of Athens. Demosthenes points out that such adulation is as futile as it is fulsome. Athens can secure the permanence of her foreign possessions only in one way — by being strong enough to hold them.

Thus, between 355 and 352, Demosthenes had laid down the main lines of his policy. Domestic administration must be purified. Statesmen must be made to feel that they are responsible to the state. They must not be allowed JfooUcv S to anticipate judgment on their deserts by voting each other golden crowns. They must not think to screen mis- appropriation of public money by getting partisans to pass new laws about state-debtors. Foreign policy must be guided by a larger and more provident conception of Athenian interests. When public excitement demands a foreign war, Athens must not rush into it without asking whether it is necessary, whether it will have Greek support, and whether she herself is ready for it. When a strong Greek city threatens a weak one, and seeks to purchase Athenian connivance with the bribe of a border-town, Athens must remember that duty and prudence alike command her to respect the independence of all Greeks. When it Jg pro- posed, by way of insurance on Athenian possessions abroad, to flatter the favourite of a doubtful ally, Athens must remember that such devices will not avail a power which has no army except on paper, and no ships fit to leave their moorings.

But the time had gone by when Athenians could have tranquil leisure for domestic reform. A danger, calling for prompt action, had at last come very near. For six years Athens had been at war with Philip on

account of his seizure of gad Amphipolis. Meanwhile he had destroyed Potidaea Philip. and founded Philippi. On the Thracian coasts he had become master of Abdera and Maronea. On the Thessalian coast he had acquired Methone. In a second invasion of Thessaly, he had overthrown the Phocians under Onomarchus, and had advanced to Thermopylae, to find the gates of Greece closed against him by an Athenian force. He had then marched to Heraeon on the Propontis, and had dictated a peace to Cersobleptes. He had formed an alliance with Cardia, Perinthus and Byzantium. Lastly, he had begun to show designs on the great Confederacy of Olynthus, the more warlike Miletus of the North. The First Philippic of Demosthenes was spoken in 351 B.C. The Third Philippic — the latest of the extant political speeches— was spoken in 341 B.C. Between these he delivered eight political orations, of which seven are directly concerned with Philip. The whole series falls into two great divisions. The first division comprises those speeches which were spoken against Philip while he was still a foreign power threatening Greece from without. Such are the First Philippic and the three orations for Olynthus. The second division comprises the speeches

spoken against Philip when, by admission to the Amphictyonic Council, he had now won his way within the circle of the Greek states, and when the issue was no longer between Greece and Macedonia, but between the Greek and Macedonian parties in Greece. Such are the speech ” On the Peace,” the speech ” On the Embassy,” the speech ” On the Chersonese,” the Second and Third Philippics.

The First Philippic, spoken early in 351 B.C., was no sudden note of alarm drawing attention to an unnoticed peril. On the contrary, the Assembly was weary of the subject. For Phui ic. six years the war with Philip had been a theme of barren PP °’ talk. Demosthenes urges that it is time to do some- thing, and to do it with a plan. Athens fighting Philip has fared, he says, like an amateur boxer opposed to a skilled pugilist. The helpless hands have only followed blows which a trained eye should have taught them to parry. An Athenian force must be stationed in the north, at Lemnos or Thasos. Of 2000 infantry and 200 cavalry at least one quarter must be Athenian citizens capable of directing the mercenaries.

Later in the same year Demosthenes did another service to the cause of national freedom. Rhodes, severed by its own act from the Athenian

Confederacy, had since 355 been virtually subject to Mausolus, prince (SueaoTTjs) of Caria, himself a tributary of Persia. Mausolus died in 351, and was succeeded by his widow Artemisia. The democratic party in Rhodes now appealed to Athens for help in throwing off the Carian yoke. Demosthenes supported their application in his speech " For the Rhodians." No act of his life was a truer proof of statesmanship. He failed. But at least he had once more warned Athens that the cause of political freedom was everywhere her own, and that, wherever that cause was forsaken, there a new danger was created both for Athens and for Greece.

Next year (350) an Athenian force under Phocion was sent to Euboea, in support of Plutarchus, tyrant of Eretria, against the faction of Cleitarchus. Demosthenes protested against War"""" spending strength, needed for greater objects, on the local quarrels of a despot. Phocion won a victory at Tamynae. But the " inglorious and costly war " entailed an outlay of more than £12,000 on the ransom of captives alone, and ended in the total destruction of Athenian influence through- out Euboea. That island was now left an open field for the intrigues of Philip. Worst of all, the party of Eubulus not only defeated a proposal, arising from this campaign, for applying the festival-money to the war-fund, but actually carried a law making it high treason to renew the proposal. The degree to which political enmity was exasperated by the Euboean War may be judged from the incident of Midias, an adherent of Eubulus, and a type of opulent rowdyism. Demosthenes was choragus of his tribe, and was wearing the robe of that sacred office at the great festival in the theatre of Dionysus, when Midias struck him on the face. The affair was eventually compromised. The speech " Against Midias " written by Demosthenes for the trial (in 349) was neither spoken nor completed, and remains, as few will regret, a sketch.

It was now three years since, in 352, the Olynthians had sent an embassy to Athens, and had made peace with their only sure ally. In 350 a second Olynthian embassy had sought and obtained Athenian help. The hour of Olynthus had indeed come. In 349 Philip opened war against the Chalcidic towns of the Olynthian League. The First and Second Olynthiacs of Demosthenes were spoken in that year in support of sending one force to defend Olynthus and another to attack Philip. " Better now than later," is the thought of the First Olynthiac. The Second argues that Philip's strength is overrated. The Third — spoken in 348 — carries us into the midst of action. 1 It deals with practical details. The festival-fund must be used for the war. The citizens must serve in person.

1 It is generally agreed that the Third Olynthiac is the latest ; but the question of the order of the First and Second has been much discussed. See Grote (History of Greece, chap. 88, appendix), who prefers the arrangement ii. i. iii., and Blass, Die attische Beredsamkeit, lii. p. 319.

Olyn- thiacs.

A few months later, Olynthus and the thirty-two towns of the confederacy were swept from the earth. Men could walk over their sites, Demosthenes said seven years afterwards, without knowing that such cities had existed. It was now certain that Philip could not be stopped outside of Greece. The question was, What point within Greece shall he be allowed to reach?

Eubulus and his party, with that versatility which is the privilege of political vagueness, now began to call for a congress of the allies to consider the common danger. They found a brilliant interpreter in Aeschines, who, after having been a tragic actor and a clerk to the assembly, had entered political life with the advantages of a splendid gift for eloquence, a fine presence, a happy address, a ready wit and a facile conscience. While his opponents had thus suddenly become warlike, Demosthenes had become pacific. He saw that Athens must have time to collect strength. Nothing could be gained, meanwhile, by going on with the war. Macedonian sympathizers at Athens, of whom Philocrates was the chief, also favoured peace. Eleven envoys, including Philocrates, Aeschines, and Demosthenes, were sent to Philip in February 346 B.C. After a debate at Athens, peace was concluded with Philip in April. Philip on the one p eace hand, Athens and her allies on the other, were to keep between what they respectively held at the time when the peace p f , . i ‘ lp and was ratified. But here the Athenians made a fatal error. Philip was bent on keeping the door of Greece open. Demosthenes was bent on shutting it against him. Philip was now at war with the people of Halus in Thessaly. Thebes had for ten years been at war with Phocis. Here were two distinct chances for Philip’s armed intervention in Greece. But if the Halians and the Phocians were included in the peace, Philip could not bear arms against them without violating the peace. Accordingly Philip insisted that they should not be included. Demosthenes insisted they should be included. They were not included. The result followed speedily. The same envoys were sent a second time to Philip at the end of April 346 for the purpose of receiving his oaths in ratification of the peace. It was late in June before he returned from Thrace to Pella — thus gaining, under the terms, all the towns that he had taken mean- while. He next took the envoys with him through Thessaly to Thermopylae. There — at the invitation of Thessalians and Thebans —

he intervened in the Phocian War. Phalaecus surrendered. Phocis was crushed. Philip took its place in the Amphictyonic Council, and was thus p£ / established as a Greek power in the very centre, at the yˆar. sacred hearth, of Greece. The right of precedence in consultation of the oracle (wpoixavTeia) was transferred from Athens to Philip. While indignant Athenians were clamouring for the revocation of the peace, Demosthenes upheld it in his speech ” On the Peace ” in Septernber. It ought never to have been made on such terms, he said. But, having been made, it had better be kept. ” If we went to war now, where should we find allies? And after losing Oropus, Amphipolis, Cardia, Chios, Cos, Rhodes, Byzantium, shall we fight about the shadow of Delphi?”

During the eight years between the peace of Philocrates and the battle of Chaeronea, the authority of Demosthenes steadily grew, until it became first predominant and then paramount. He had, indeed, a melancholy advantage. Each year his argument was more and more cogently enforced by the logic of facts. In 344 he visited the Peloponnesus for the purpose of counteracting Macedonian intrigue. Mistrust, he told the Peloponnesian cities, is the safeguard of free communities against tyrants. Philip lodged a formal complaint at Athens. Here, as elsewhere, the future master of Greece reminds us of Napoleon on the eve of the first empire. He has the same imperturbable and persuasive effrontery in protesting that he is doing one thing at the moment when his energies are concentrated on doing the opposite. Demosthenes replied in the Second Philippic. ” If,” he said, ” Philip is the friend of Greece, we are doing pjˆfon/c wrong. If he is the enemy of Greece, we are doing right. Which is he? I hold him to be our enemy, because everything that he has hitherto done has benefited himself and hurt us.” The prosecution of Aeschines for malversation on the

embassy (commonly known as De falsa legatione), which was brought to an issue in the following year, marks the moral strength of the position now held by Demosthenes. When the gravity of the charge and the complexity of the evidence are considered, the acquittal of Aeschines by a narrow majority must be deemed his condemnation. The speech ” On the Affairs of the Chersonese ” and the Third Philippic were the crowning efforts of Demosthenes. Spoken in the

same year, 341 B.C., and within a short space of each other, they must be taken together. The speech ” On the Affairs of the Chersonese ” regards the situation chiefly from an Athenian point of view. ” If the peace means,” argues Demosthenes, ” that Philip can seize with impunity one Athenian possession after another, but that Athenians shall not on their peril touch aught that belongs to Philip, where is the line to be drawn? We shall go to war, I am told, when it is necessary. If the necessity has not come yet, when will it come? ” The Third Philippic surveys a wider horizon. It ascends from the Athenian to the Hellenic view. Philip has annihilated Olynthus and the Chalcidic towns. He has ruined Pbocis. He has frightened Thebes. He has divided Thessaly. Euboea and the Pelo- ponnesus are his. His power stretches from the Adriatic to the Hellespont. Where shall be the end? Athens is the last hope of Greece. And, in this final crisis, Demosthenes was the embodied energy of Athens. It was Demosthenes who went to Byzantium, brought the estranged city back to the Athenian alliance, and snatched it from the hands of Philip. It was Demosthenes who, when Philip had already seized Elatea, hurried to Thebes, who by his passionate appeal gained one last chance, the only possible chance, for Greek freedom, who broke down the barrier of an inveterate jealousy, who brought Thebans to fight beside Athenians, and who thus won at the eleventh hour a victory for the spirit of loyal union which took away at least one bitterness from the unspeakable calamity of Chaeronea.

But the work of Demosthenes was not closed by the ruin of his cause. During the last sixteen years of his life (338-322) he rendered services to Athens not less important, and activity? perhaps more difficult, than those which he- had rendered before. He was now, as a matter of course, foremost in the public affairs of Athens. In January 337, at the annual winter Festival of the Dead in the Outer Ceramicus, he spoke the funeral oration over those who had fallen at Chaeronea. He was member of a commission for strengthening the fortifica- tions of the city (reixofoios) . He administered the festival-fund. During a dearth which visited Athens between 330 and 326 he was charged with the organization of public relief. In 324 he was chief (dpxˆewpos) of the sacred embassy to Olympia. Already, in 336, Ctesiphon had proposed that Demosthenes should receive a golden crown from the state, and that his extraordinary merits should be proclaimed in the theatre at the Great Dionysia. The proposal was adopted by the senate as a bill (irpofioiAevna) ; but it must be passed by the Assembly before it could become an act (\prj4ncrna). To prevent this, Aeschines gave notice, in 336, that he intended to proceed against Ctesiphon for having proposed an unconstitutional measure. For six years Aeschines

avoided action on this notice. At last, in 330, the patriotic party felt strong enough to force him to an issue. Aeschines spoke the speech ” Against Ctesiphon,” an attack on the whole public life of Demosthenes. Demosthenes gained an overwhelming victory for himself and for the honour of Athens in the most finished, the most splendid and the most pathetic work of ancient eloquence — the immortal oration ” On the Crown.”

In the winter of 325-324 Harpalus, the receiver-general of Alexander in Asia, fled to Greece, taking with him 8000 mercen- aries, and treasure equivalent to about a million and Harpalus. a quarter sterling. On the motion of Demosthenes he was warned from the harbours of Attica. Having left his troops and part of his treasure at Taenarum, he again presented himself at the Peiraeus, and was now admitted. He spoke fervently of the opportunity which offered itself to those who loved the freedom of Greece. All Asia would rise with Athens

to throw off the hated yoke. Fiery patriots like Hypereides were in raptures. For zeal which could be bought Harpalus had other persuasions. But Demosthenes stood fira . War with Alexander would, he saw, be madness. It could have but one result, — some indefinitely worse doom for Athens. Antipater and Olympias presently demanded the surrender of Harpalus. Demosthenes opposed this. But he reconciled the dignity with the loyalty of Athens by carrying a decree that Harpalus should be arrested, and that his treasure should be deposited in the Parthenon, to be held in trust for Alexander. Harpalus escaped from prison. The amount of the treasure, which Harpalus had stated as 700 talents, proved to be no more than 350. Demosthenes proposed that the Areopagus should inquire what had become of the other 350. Six months, spent in party intrigues, passed before the Areo- pagus gave in their report (air64 > a

Next year (323 B.C.) Alexander died. Then the voice of Demos- thenes, calling Greece to arms, rang out like a trumpet. Early in August 322 the battle of Crannon decided the Lamian War against Greece. Antipater demanded, as f ad ° f the condition on which he would refrain from besieging \y an Athens, the surrender of the leading patriots. De- mades moved the decree of the Assembly by which Demosthenes, Hypereides, and some others were condemned to death as traitors. On the 20th of Boedromion (September 16) Demos- 322, a Macedonian garrison occupied Munychia. It thenea was a day of solemn and happy memories, a day devoted, in the celebration of the Great Mysteries, to sacred joy, — the day on which the glad procession of the Initiated returned from Eleusis to Athens. It happened, however, to have another association, more significant than

any ironical contrast for the present purpose of Antipater. It was the day on which, thirteen years before, Alexander had punished the rebellion of Thebes with annihilation.

The condemned men had fled to Aegina. Parting there from Hypereides and the rest, Demosthenes went on to Calauria, a small island off the coast of Argolis. In Calauria there was an ancient temple of Poseidon, once a centre of cafauria. Minyan and Ionian worship, and surrounded with a peculiar sanctity as having been, from time immemorial, an inviolable refuge for the pursued. Here Demosthenes sought asylum. Archias of Thurii, a man who, like Aeschines, had begun life as a tragic actor, and who was now in the pay of Antipater, soon traced the fugitive, landed in Calauria, and appeared before the temple of Poseidon with a body of Thracian spearmen. Plutarch's picturesque narrative bears the marks of artistic elaboration. Demosthenes had dreamed the night before that he and Archias were competing for a prize as tragic actors; the house applauded Demosthenes; but his chorus was shabbily equipped, and Archias gained the prize. Archias was not the man to stick at sacrilege. In Aegina, Hypereides and the others had been taken from the shrine of Aeacus. But he hesitated to violate an asylum so peculiarly sacred as the Calaurian temple. Standing before its open door, with his Thracian soldiers around him, he endeavoured to prevail on Demosthenes to quit the holy precinct. Antipater would be certain to pardon him. Demos- thenes sat silent, with his eyes fixed on the ground. At last, as the emissary persisted in his bland persuasions, he looked up and said, — " Archias, you never moved me by your acting, and you

con- demned.

Death.

will not move me now by your promises." Archias lost his temper, and began to threaten. " Now," rejoined Demosthenes, " you speak like a real Macedonian oracle; before you were acting. Wait a moment, then, till 1 write to my friends." With these words, Demosthenes withdrew into the inner part of the temple, — still visible, however, from the entrance. He took out a roll of paper, as if he were going to write, put the pen to his mouth, and bit it, as was his habit in composing. Then he threw his head back, and drew his cloak over it. The Thracian spearmen, who were watching him from the door, began to gibe at his

cowardice. Archias went in to him, encouraged him to rise, repeated his old arguments, talked to him of reconcilia- tion with Antipater. By this time Demosthenes felt that the poison which he had sucked from the pen was beginning to work. He drew the cloak from his face, and looked steadily at Archias. ” Now you can play the part of Creon in the tragedy as soon as you like,” he said, ” and cast forth my body unburied. But I, O gracious Poseidon, quit thy temple while I yet live; Antipater and his Macedonians have done what they could to pollute it.” He moved towards the door, calling to them to support his tottering steps. He had just passed the altar of the god, when he fell, and with a groan gave up the ghost (October 322 B.C.).

As a statesman, Demosthenes needs no epitaph but his own words in the speech ” On the Crown,” — / say that, if the event had been manifest to the whole world beforehand, not even then character. ou &ht Athens to have forsaken this course, if Athens had any regard for her glory, or for her past, or for the ages to come. The Persian soldier in Herodotus, following Xerxes to foreseen ruin, confides to his fellow-guest at the banquet that the bitterest pain which man can know is 7roXXd fypovkovra. fj.r]8evds Kpareav, — complete, but helpless, prescience. In the grasp of a more inexorable necessity, the champion of Greek freedom was borne onward to a more tremendous catastrophe than that which strewed the waters of Salamis with Persian wrecks and the field of Plataea with Persian dead; but to him, at least, it was given to proclaim aloud the clear and sure foreboding that filled his soul, to do all that true heart and free hand could do for his cause, and, though not to save, yet to encourage, to console and to ennoble. As the inspiration of his life was larger and higher than the mere courage of resistance, so his merit must be regarded as standing altogether outside and above the struggle with Macedon. The great purpose which he set before him was to revive the public spirit, to restore the political vigour, and to re-establish the Panhellenic influence of Athens, — never for her own advantage merely, but always in the interest of Greece. His glory is, that while he lived he helped Athens to live a higher life. Wherever the noblest expressions of her mind are honoured, wherever the large conceptions of Pericles command the admiration of states- men, wherever the architect and the sculptor love to dwell on the masterpieces of Ictinus and Pheidias, wherever the spell of ideal beauty or of lofty contemplation is exercised by the creations of Sophocles or of Plato, there it will be remembered that the spirit which wrought in all these would have passed sooner from among men, if it had not been recalled from a trance, which others were content to mistake for the last sleep, by the passionate breath of Demosthenes.

The orator in whom artistic genius was united, more perfectly than in any other man, with moral enthusiasm and with intel- lectual grasp, has held in the modern world the same rank which was accorded to him in the old; but he cannot enjoy the same appreciation. Macaulay's ridicule has rescued from oblivion the criticism which pronounced the eloquence of Chatham to be more ornate than that of Demos- thenes, and less diffuse than that of Cicero. Did the critic, asks Macaulay, ever hear any speaking that was less ornamented than that of Demosthenes, or more diffuse than that of Cicero? Yet the critic's remark was not so pointless as Macaulay thought it. Sincerity and intensity are, indeed, to the modern reader, the most obvious characteristics of Demosthenes. His style is, on the whole, singularly free from what we are accustomed to regard as rhetorical embellishment. Where the modern orator would employ a wealth of imagery, or elaborate a picture in

exquisite detail, Demosthenes is content with a phrase or a word. Burke uses, in reference to Hyder Ali, the same image which Demosthenes uses in reference to Philip. " Compounding all the materials of fury, havoc, desolation, into one black cloud, he hung for a while on the declivity of the mountains. Whilst the authors of all these evils were idly and stupidly gazing on this menacing meteor, which darkened all their horizon, it suddenly burst, and poured down the whole of its contents upon the plains of the Carnatic." Demosthenes forbears to amplify. " The people gave their voice, and the danger which hung upon our borders went by like a cloud." To our modern feeling, the eloquence of Demosthenes exhibits everywhere a general stamp of earnest and simple strength. But it is well to remember the charge made against the style of Demosthenes by a contempo- rary Greek orator, and the defence offered by the best Greek critic of oratory. Aeschines reproached the diction of Demos- thenes with excess of elaboration and adornment (Trepupyla). Dionysius, in reply, admits that Demosthenes does at times depart from simplicity, — that his style is sometimes elaborately ornate and remote from the ordinary usage. But, he adds, Demosthenes adopts this manner where it is justified by the elevation of his theme. The remark may serve to remind us of our modern disadvantage for a full appreciation of Demosthenes. The old world felt, as we do, his moral and mental greatness, his fire, his self-devotion, his insight. But it felt also, as we can never feel, the versatile perfection of his skill. This it was that made Demosthenes unique to the ancients. The ardent patriot, the far-seeing statesman, were united in his person with the con- summate and unapproachable artist. Dionysius devoted two

special treatises to Demosthenes, — one on his language and style (KeKTUtds totos) , the other on his treatment of subject-matter (irpcry/xaracite roiros). The latter is lost. The former is one of the best essays in literary criticism which antiquity has bequeathed to us. The idea which it works out is that Demos- thenes has perfected Greek prose by fusing in a glorious harmony the elements which had hitherto belonged to separate types. The austere dignity of Antiphon, the plain elegance of Lysias, the smooth and balanced finish of that middle or normal char- acter which is represented by Isocrates, have come together in Demosthenes. Nor is this all. In each species he excels the specialists. He surpasses the school of Antiphon in perspicuity, the school of Lysias in verve, the school of Isocrates in variety, in felicity, in symmetry, in pathos, in power. Demosthenes has at command all the discursive brilliancy which fascinates a festal audience. He has that power of concise and lucid narration, of terse reasoning, of persuasive appeal, which is required by the forensic speaker. His political eloquence can worthily image the majesty of the state, and enforce weighty counsels with lofty and impassioned fervour. A true artist, he grudged no labour which could make the least part of his work more perfect. Isocrates spent ten years on the Panegyricus. After Plato's death, a manuscript was found among his papers with the first eight words of the Republic arranged in several different orders. What wonder, then, asks the Greek critic, if the diligence of Demosthenes was no less incessant and minute? "Tome," he says, " it seems far more natural that a man engaged in com- posing political discourses, imperishable memorials of his power, should neglect not even the smallest details, than that the veneration of painters and sculptors, who are darkly showing forth their manual tact and toil in a corruptible material, should exhaust the refinements of their art on the veins, on the feathers, on the down of the lip, and the like niceties."

More than half of the sixty-one speeches extant under the name of Demosthenes are certainly or probably spurious. The results to which the preponderance of opinion leans are given in the following table. Those marked a were already rejected or doubted in antiquity; those marked m, first in modern times : x

Works.

1 The dates agree in the main with those given by A. D. Schafer m Demosthenes und seine Zeit (2nd ed., 1 885-1 887), and by F. Blass in Die attiscke Beredsamkeit (1887-1898), who regards thirty-three (or possibly thirty-five) of the speeches as genuine.

DEMOSTHENES

15

I. DELIBERATIVE SPEECHES. Genuine. Or. 14. On the Navy Boards Or. 16. For the People of Megalopolis . Or. 4. First Philippic Or. 15. For the Rhodians Or. I. First Olynthiac Or. 2. Second Olynthiac Or. 3. Third Olynthiac Or. 5. On the Peace Or. 6. Second Philippic Or. 8. On the Affairs of the Chersonese Or. 9. Third Philippic

Spurious.

(a) Or. 7. On Halonnesus (by Hegesippus) Rhetorical Forgeries.

17. On the Treaty with Alexander.

10. Fourth Philippic.

11. Answer to Philip's Letter. 1

12. Philip's Letter.

354 B.C.

352

35i

35i

349

349

348

346

344

341

341

342 B.C.

(a) Or. (a) Or. (w) Or. (m) Or. (m) Or.

13. On the Assessment (aivTˆis).

II. FORENSIC SPEECHES. A. In Public Causes.

Genuine.

Or. 22. In (/card) Androtionem .

Or. 20. Contra {trpbs) Leptinem

Or. 24. In Timocratem

Or. 23. In Aristocratera

Or. 21. In Midiara .

19. On the Embassy

Or. Or.

18. On the Crown

355 354 352 352 349 343 330

B.C.

Spurious. Or. 58. In Theocrinem . .

Or. 25, 26. In Aristogitona I. and II. (Rhetorical forgeries),

B. In Private Causes. Genuine. Or. 27, 28. In Aphobum I. et II.

(m) Or. 30, 31. Contra Onetora I. et II. Or. 41. Contra Spudiam . Or. 55. Contra Calliclem . Or. 54. In Cononem. Or. 36. Pro Phormione Or. 39. Contra Boeotum de Nomine Or. 37. Contra Pantaenetum

(m) Or. 38. Contra Nausimachum et Diopithem Spurious.

(The first eight of the following are given by Schafer to Apollodorus.)

(m) Or. 52. Contra Callippum. .... 369-8 B.C.

Or. 53. Contra Nicostratum . . . after 368 „

Or. 49. Contra Timotheum .... 362 „

Or. 50. Contra Polyclem 357 ,,

Or. 47. In Evergum et Mnesibulum . . . 356 ,,

Or. 45, 46. In Stephanum I. et II. . . . 351 „

Or. 59. In Neaeram ._ _349[343-o. Blass]

(a) (a)

(m)

(m)

339

364 362

?

?

356 352 350 346-5

?

(a) (a) («) (a) (m) (a) (m)

J 360-359

?

Or. 51. On the Trierarchic Crown (by Cephiso- dotus ?) . . . (m) Or. 43. Contra Macartatum

(m) Or. 48. In Olympiodorum. . . . after 343 „

(m) Or. 44. Contra Leocharem. . . . . ?

(a) Or. 35. Contra Lacritum ….. 341 ,, (a) Or. 42. Contra Phaenippum . . . . ?

(m) Or. 32. Contra Zenothemin . . . . ?

(m) Or. 34. Contra Phormionem . . . . ?

(m) Or. 29. Contra Aphobum pro Phano

(a) Or. 40. Contra Boeotum de Dote . . . 347 „

(m) Or. 57. Contra Eubulidem .... 346-5 ,,

(m) Or. 33. Contra Apaturium . . . . ?

(a) Or. 56. In Dionysodorum . . not before 322-1 „

Or. 60 (4xiT&0ios) and Or. 61 (Iputik6s) are works of rhetor- icians. The six epistles are also forgeries; they were used by the composer of the twelve epistles which bear the name of Aeschines. The 56 irpooiiua, exordia or sketches for political speeches, are by various hands and of various dates. 2 They are valuable as being compiled from Demosthenes himself, or from other classical models.

The ancient fame of Demosthenes as an orator can be compared only with the fame of Homer as a poet. Cicero, with generous appreciation, recognizes Demosthenes as the standard of perfec- tion. Dionysius, the closest and most penetrating of his ancient critics, exhausts the language of admiration in showing how

1 Or. 11 and 12 are probably both byAnaximenes of Lampsacus.

2 According to Blass, the second and third epistles and the exordia are genuine.

Demos- thenes.

Demosthenes united and elevated whatever had been best in earlier masters of the Greek idiom. Hermogenes, in his works on rhetoric, refers to Demosthenes as 6 prjrwp, the Literary orator. The writer of the treatise On Sublimity knows history of no heights loftier than those to which Demosthenes has risen. From his own younger contemporaries, Aristotle and Theophrastus, who founded their theory of rhetoric in large part on his practice, down to the latest Byzantines, the consent of theorists, orators, antiquarians, anthologists, lexico- graphers, offered the same unvarying homage to Demosthenes. His work busied commentators such as Xenon, Minucian, Basilicus, Aelius, Theon, Zosimus of Gaza. Arguments to his speeches were drawn up by rhetoricians so distinguished as Numenius and Libanius. Accomplished men of letters, such as Julius Vestinus and Aelius Dionysius, selected from his writings choice passages for declamation or perusal, of which fragments are incorporated in the miscellany of Photius and the lexicons of Harpocration, Pollux and Suidas. It might have been anticipated that the purity of a text so widely read and so renowned would, from the earliest times, have been guarded with jealous care. The works of the three great dramatists had been thus protected, about 340 B.C., by a standard Attic recension. But no such good

fortune befell the works of Demosthenes. Alexandrian criticism was chiefly occupied with poetry. The titular works of Demosthenes were, indeed, registered, with those of the other orators, in the catalogues (prjropiKol irivaKts) of Alexandria and Pergamum. But no thorough attempt was made to separate the authentic works from those spurious works which had even then become mingled with them. Philosophical schools which, like the Stoic, felt the ethical interest of Demos- thenes, cared little for his language. The rhetoricians who imitated or analysed his style cared little for the criticism of his text. Their treatment of it had, indeed, a direct tendency to falsify it. It was customary to indicate by marks those passages which were especially useful for study or imitation. It then became a rhetorical exercise to recast, adapt or interweave such passages. Sopater, the commentator on Hermogenes, wrote on /i€Ta/3oXcu Kai fj,eroiTOLria€t.s tu>v Ar/ fjioadevovs xˆpiuv, ” adap- tations or transcripts of passages in Demosthenes.” Such manipulation could not but lead to interpolations or confusions in the original text. Great, too, as was the attention bestowed on the thought, sentiment and style of Demosthenes, compara- tively little care was bestowed on his subject-matter. He was studied more on the moral and the formal side than on the real side. An incorrect substitution of one name for another, a reading which gave an impossible date, insertions of spurious laws or decrees, were points which few readers would stop to notice. Hence it resulted that, while Plato, Thucydides and Demos- thenes, were the most universally popular of the classical prose- writers, the text of Demosthenes, the most widely used perhaps of all, was also the least pure. His more careful students at length made an effort to arrest the process of corruption. Editions of Demosthenes based on a critical recension, and called ‘ATTiKiava (&.VTlypa4>a), came to be distinguished from the vulgates, or S-qjxuSeLS e/c56<7eis.

Among the extant manuscripts of Demosthenes — upwards of 170 in number — one is far superior, as a whole, to the rest. This is Parisinus 2 2934, of the 10th century. A com- parison of this MS. with the extracts of Aelius, Aristeides and Harpocration from the Third Philippic favours the view that it is derived from an ‘ArTiiaavov, whereas the Srifjuiideis eKdoaeis, used by Hermogenes and by the rhetoricians generally, have been the chief sources of our other manuscripts. The collation of this manuscript by Immanuel Bekker first placed the textual criticism of Demosthenes on a sound footing. Not only is this manuscript nearly free from interpolations, but it is the sole voucher for many excellent readings. Among the other MSS., some of the most important are — Marcianus 416 F, of the 10th (or nth) century, the basis of the Aldine edition; Augustanus I. (N 85),

derived from the last, and containing scholia to the speeches on the Crown and the Embassy, by Ulpian, with some by a younger writer, who was

Manu- scripts.

i6

perhaps Moschopulus; Parisinus T ; Antverpiensis — the last two comparatively free from additions. The fullest authority on the MSS. is J. T. Vomel, Notitia codicum Demosth., and Prolegomena Critica to his edition published at Halle (1856-1857), pp. 175-178. 1

The extant scholia on Demosthenes are for the most part poor. Their staple consists of Byzantine erudition; and their value Scholia. depends chiefly on what they have preserved of older criticism. They are better than usual for the Ilepi cretpavov, Kara. Tt/wKparous; best for the Ilepi ■Kapavpea- (3eias. The Greek commentaries ascribed to Ulpian are especially defective on the historical side, and give little essential aid. Editions: — C. W. Miiller, in Oral. All. ii. (1847-1858); Scholia Graeca in Demosth. ex cod. aucta et emendata (Oxon., 1851; in W. Dindorf's ed.).

Bibliography. — Editio princeps (Aldus, Venice, 1504); J. J. Reiske (with notes of J. Wolf, J. Taylor, j. Markland, &c, 1770- 1775); revised edition of Reiske by G. H. Schafer (1823-1826); I. Bekker, in Oratores Altici (1823-1824), the first edition based on codex 2 (see above); W. S. Dobson (1828); J. G. Baiter and H. Sauppe (1850) ; W. Dindorf (in Teubner series, 1867, 4th ed. by F. Blass, 1885-1889); H. Omont, facsimile edition of codex 2 (1 892-1 893); S. H. Butcher in Oxford Scriplorum Classicorum Bibliotheca (1903 foil.); W. Dindorf (9 vols., Oxford, 1846-1851), with notes of previous commentators and Greek scholia ; R. Whiston (political speeches) with introductions and notes (1859-1868). For a select list of the numerous English and foreign editions and trans- lations of separate speeches see J. B. Mayor, Guide to the Choice of Classical Books (1885, suppt. 1896). Mention may here be made of De corona by W. W. Goodwin (1901, ed. min., 1904) ; W. H. Simcox (1873, with Aeschines In Ctesiphontem) ; and P. E. Matheson (1899); Leptines by J. E. Sandys (1890); De falsa legatione by R. Shilleto (4th ed., 1874) ; Select Private Orations by J. E. Sandys and F. A. Paley (3rd ed., 1898, 1896) ; Midias by W. W. Goodwin (1906). C. R. Kennedy's complete translation is a model of scholarly finish, and the appendices on Attic law, &c, are of great value. There

are indices to Demosthenes by J. Reiske (ed. G. H. Schafer, 1823) ; S. Preuss (1892). Among recent papyrus finds are fragments of a special lexicon to the Aristocralea and a commentary by Didymus (ed. H. Diels and W. Schubart, 1904). Illustrative literature: A. D. Schafer, Demosthenes und seine Zeit (2nd ed., 1885-1887), a masterly and exhaustive historical work; F. Blass, Die altische Beredsamkeit (1887-1898); W. J. Brodribb, ” Demosthenes ” in Ancient Classics for English Readers (1877); S. H. Butcher, Introduction to the Study of Demosthenes (1881); C. G. Bohnecke, Demosthenes, Lykurgos, Hyperides, und ihr Zeitalter (1864) ; A. Bouille, Histoire de Demosthene (2nd ed., 1868) ; J. Girard, Utiides sur I’eloquence attique (1874) ; M. Croiset, Des idSes morales dans V&loqwnce politique de Demos- ihlne (1874);ˆ. Hug, Demosthenes als polilischer Denker (1881); L. Bredit, L’Eloquence politique en Grece (2nd ed., 1886); A. Bougot, Rivalite d’Eschine et Demosthine (1891). For fuller bibliographical information consult R. Nicolai, Griechische Literaturgeschichte (1881); W. Engelmann, Scriptores Graeci (1881); G. Huttner in C. Bursian’s Jahresbericht, li. (1889). (R. C. J.)

DEMOTIC (Gr. drjuonKos, of or belonging to the people), a term, meaning popular, specially applied to that cursive script of the ancient Egyptian language used for business and literary purposes, — for the people. It is opposed to ” hieratic ” (Gr. UpariKos, of or belonging to the priests), the script, an abridged form of the hieroglyphic, used in transcribing the religious texts. (See Writing, and Egypt: II., Ancient,D. Languageand Writing.)

DEMOTICA, or Dimotica, a town of European Turkey, in the vilayet of Adrianople; on the Maritza valley branch of the Constantinople-Salonica railway, about 35 m. S. of Adrianople. Pop. (1905) about 10,000. Demotica is built at the foot of a conical hill on the left bank of the river Kizildeli, near its junction with the Maritza. It was formerly the seat of a Greek arch- bishop, and besides the ancient citadel and palace on the summit of the hill contains several Greek churches, mosques and public baths. In the middle ages, when it was named Didymotichos, it was one of the principal marts of Thrace; in modern times it has regained something of its commercial importance, and exports pottery, linen, silk and grain. These goods are sent to Dedeagatch for shipment. Demotica was the birthplace of the

1 See also H. Usener in Nachrichten von der Konigl. Chsdlschaft der Wissenschaften zu Gbttingen, p. 188 (1892) ; J. H. Lipsius, ” Zur Textcritik des Demosthenes ” in Berichle . . . der Konigl. Sachsischen Gesellschaft der Wissenschaften (1893) with special reference to the papyrus finds at the end of the 19th century; E. Bethe, Demosthenis

scriplorum corpus (1893).

Turkish sultan Bayezid I. (1347); after the battle of Poltava, Charles XII. of Sweden resided here from February 17 13 to October 17 14.

DEMPSTER, THOMAS (1579-1625), Scottish scholar and historian, was born at Cliftbog, Aberdeenshire, the son of Thomas Dempster of Muresk, Auchterless and Killesmont, sheriff of Banff and Buchan. According to his own account, he was the twenty-fourth of twenty-nine children, and was early remarkable for precocious talent. He obtained his early educa- tion in Aberdeenshire, and at ten entered Pembroke Hall, Cambridge; after a short while he went to Paris, and, driven thence by the plague, to Louvain, whence by order of the pope he was transferred with several other Scottish students to the papal seminary at Rome. Being soon forced by ill health to leave, he went to the English college at Douai, where he remained three years and took his M.A. degree. While at Douai he wrote a scurrilous attack on Queen Elizabeth, which caused a riot among the English students. But, if his truculent character was thus early displayed, his abilities were no less conspicuous; and, though still in his teens, he became lecturer on the Humanities at Tournai, whence, after but a short stay, he returned to Paris, to take his degree of doctor of canon law, and become regent of the college of Navarre. He soon left Paris for Toulouse, which in turn he was forced to leave owing to the hostility of the city authorities, aroused by his violent assertion of university rights. He was now elected professor of eloquence at the university or academy of Nimes, but not without a murderous attack upon him by one of the defeated candidates and his supporters, followed by a suit for libel, which, though he ulti- mately won his case, forced him to leave the town. A short engagement in Spain, as tutor to the son of Marshal de Saint Luc, was terminated by another quarrel; and Dempster now returned to Scotland with the intention of asserting a claim to his father's estates. Finding his relatives unsympathetic, and falling into heated controversy with the Presbyterian clergy, he made no long stay, but returned to Paris, where he remained for seven years, becoming professor in several colleges successively. At last, however, his temporary connexion with the college de Beauvais was ended by a feat of arms which proved him as stout a fighter with his sword as with his pen; and, since his victory was won over officers of the king's guard, it again became expedient for him to change his place of residence. The dedica- tion of his edition of Rosinus' Antiquitatum Romanorum corpus absolulissimum to King James I. had won him an invitation to the English court; and in 161 5 he went to London. His reception by the king was flattering enough; but his hopes of preferment were dashed by the opposition of the Anglican clergy to

the promotion of a papist. He left for Rome, where, after a short imprisonment on suspicion of being a spy, he gained the favour of Pope Paul V., through whose influence with Cosimo II., grand duke of Tuscany, he was appointed to the professorship of the Pandects at Pisa. He had married while in London, but ere long had reason to suspect his wife's relations with a certain Englishman. Violent accusations followed, indignantly repudi- ated; a diplomatic correspondence ensued, and a demand was made, and supported by the grand duke, for an apology, which the professor refused to make, preferring rather to lose his chair. He now set out once more for Scotland, but was intercepted by the Florentine cardinal Luigi Capponi, who induced him to remain at Bologna as professor of Humanity. This was the most distinguished post in the most famous of continental universities, and Dempster was now at the height of his fame. Though his Roman Antiquities and Scotia iUustrior had been placed on the Index pending correction, Pope Urban VIII. made him a knight and gave him a pension. He was not, however, to enjoy his honours long. His wife eloped with a student, and Dempster, pursuing the fugitives in the heat of summer, caught a fever, and died at Bologna on the 6th of September 1625.

Dempster owed his great position in the history of scholarship to his extraordinary memory, and to the versatility which made him equally at home in philology, criticism, law, biography and history. His style is, however, often barbarous; and the obvious

defects of his works, are due to his restlessness and impetuosity, and to a patriotic and personal vanity which led him in Scottish questions into absurd exaggerations, and in matters affecting his own life into an incurable habit of romancing. The best known of his works is the Historia ecclesiastica gentis Scotorum (Bologna, 1627). In this book he tries to prove that Bernard (Sapiens), Alcuin, Boniface and Joannes Scotus Erigena were all Scots, and even Boadicea becomes a Scottish author. This criticism is not applicable to his works on antiquarian subjects, and his edition of Benedetto Accolti's De hello a Chris tianis contra barbaros (1623) has great merits.

A portion of his Latin verse is printed in the first volume (pp. 306-354) of Delitiae poetarum Scotorum (Amsterdam, 1637).

DEMURRAGE (from "demur," Fr. demeurer, to delay, derived from

Lat. mora), in the law of merchant shipping, the sum payable by the freighter to the shipowner for detention of the vessel in port beyond the number of days allowed for the purpose of loading or unloading (see Affreightment: under Charter-parties). The word is also used in railway law for the charge on detention of trucks; and in banking for the charge per ounce made by the Bank of England in exchanging coin or notes for bullion.

DEMURRER (from Fr. demeurer, to delay, Lat. morari), in English law, an objection taken to the sufficiency, in point of law, of the pleading or written statement of the other side. In equity pleading a demurrer lay only against the bill, and not against the answer; at common law any part of the pleading could be demurred to. On the passing of the Judicature Act of 1875 the procedure with respect to demurrers in civil cases was amended, and, subsequently, by the Rules of the Supreme Court, Order XXV. demurrers were abolished and a more summary process for getting rid of pleadings which showed no reasonable cause of action or defence was adopted, called proceedings in lieu of demurrer. Demurrer in criminal cases still exists, but is now seldom resorted to. Demurrers are still in constant use in the United States. See Answer; Pleading.

DENAIN, a town of northern France in the department of Nord, 8 m. S.W. of Valenciennes by steam tramway. A mere village in the beginning of the 19th century, it rapidly increased from 1850 onwards, and, according to the censusof 1906, possessed 22,845 inhabitants, mainly engaged in the coal mines and iron- smelting works, to which it owes its development. There are also breweries, manufactories of machinery, sugar and glass. A school of commerce and industry is among the institutions. Denain has a port on the left bank of the Scheldt canal. Its vicinity was the scene of the decisive victory gained in 171 2 by Marshal Villars over the allies commanded by Prince Eugene; and the battlefield is marked by a monolithic monument inscribed with the verses of Voltaire: —

” Regardez dans Denain l’audacieux Villars Disputant le tonnerre k l’aigle des Cesars.”

DENBIGH, WILLIAM FEILDING, ist Earl of (d. 1643), son of Basil Feilding 1 of Newnham Paddox in Warwickshire, and of Elizabeth, daughter of Sir Walter Aston, was educated at Emmanuel College, Cambridge, and knighted in 1603. He married Susan, daughter of Sir George Villiers, sister of the future duke of Buckingham, and on the rise of the favourite received various offices and dignities. He was appointed custos rotulorum of Warwickshire, and master of the great

wardrobe in 1622, and created baron and viscount Feilding in 1620, and earl of Denbigh. on the 14th of September 1622. He attended Prince Charles on the Spanish adventure, served as admiral in the unsuccessful expedition to Cadiz in 1625, and commanded the disastrous attempt upon Rochelle in 1628, becoming the same year a member of the council of war, and in 1633 a member of the council of Wales. In 163 1 Lord Denbigh visited the East. On the outbreak of the Civil War he served under Prince Rupert

1 The descent of the Feildings from the house of Habsburg, through the counts of Laufenburg and Rheinfelden, long considered authentic, and immortalized by Gibbon, has been proved to have been based on forged documents. See J. H. Round, Peerage and Family History

(1901).

and was present at Edgehill. On the 3rd of April 1643 during Rupert's attack on Birmingham he was wounded and died from the effects on the 8th, being buried at Monks Kirby in Warwick- shire. His courage, unselfishness and devotion to duty are much praised by Clarendon.

See E. Lodge, Portraits (1850), iv. 113; J. Nichols, Hist, of Leicestershire (1807), iv. pt. 1, 273; Hist. MSS. Comm Ser. 4th Rep. app. 254 ; Cal. of State Papers, Dom. ; Studies in Peerage and Family History, by J. H. Round (1901), 216.

His eldest son, Basil Feilding, 2nd earl of Denbigh (c. i6o8-> 1675), was educated at Emmanuel College, Cambridge. He was summoned to the House of Lords as Baron Feilding in March 1629. After seeing military service in the Netherlands he was sent in 1634 by Charles I. as ambassador to Venice, where he remained for five years. When the Civil War broke out Feilding, unlike the other members of his family, ranged himself among the Parliamentarians, led a regiment of horse at Edgehill, and, having become earl of Denbigh in April 1643, was made com- mander-in-chief of the Parliamentary army in Warwickshire and the neighbouring counties, and lord-lieutenant of Warwickshire. During the year 1644 he was fairly active in the field, but in some quarters he was distrusted and he resigned his command after the passing of the self-denying ordinance in April 1645. At Uxbridge in 1645 Denbigh was one of the commissioners appointed to treat with the king, and he undertook a similar duty at Carisbrooke in 1647. Clarendon relates how at Uxbridge Denbigh declared privately that he regretted the position in which he found himself, and expressed his willingness to serve Charles I. He supported the army in its dispute with the parliament, but he would take no part in the trial of Charles

I. Under the government of the commonwealth Denbigh was a member of the council of state, but his loyalty to his former associates grew lukewarm, and gradually he came to be regarded as a royalist. In 1664 the earl was created Baron St Liz. Although four times married he .'.eft no issue when he died on the 28th of November 1675.

His titles devolved on his nephew William Feilding (1640- 1685), son and heir of his brother George (created Baron Feilding of Lecaghe, Viscount Callan and earl of Desmond), and the earldom of Desmond has been held by his descendants to the present day in conjunction with the earldom of Denbigh.

DENBIGH (Dinbych), a municipal and (with Holt, Ruthin and Wrexham) contributory parliamentary borough, market town and county town of Denbighshire, N. Wales, on branches of the London & North Western and the Great Western railways. Pop. (1901) 6438. Denbigh Castle, surrounding the hill with a double wall, was built; in Edward I.'s reign, by Henry de Lacy, earl of Lincoln, from whom the town received its first charter. The outer wall is nearly a mile round; over its main gateway is a niche with a figure representing, possibly, Edward L, but more probably, de Lacy. Here, in 1645, after the defeat of Rowton Moor, Charles I. found shelter, the castle long resisting the Parliamentarians, and being reduced to ruins by his successor. The chief buildings are the Carmelite Priory (ruins dating perhaps from the 13th century); a Bluecoat school (1514); a free grammar school (1527); an orphan girl school (funds left by Thomas Howel to the Drapers' Co., in Henry VII. 's reign); the town hall (built in 1572 by Robert Dudley, earl of Leicester, enlarged and restored in 1780); an unfinished church (begun by Leicester); a market hall (with arcades or " rows," such as those of Chester or Yarmouth); and the old parish church of St Marcella. The streams near Denbigh are the Clwyd and Elwy. The inhabitants of Denbigh are chiefly occupied in the timber trade, butter-making, poultry-farming, bootmaking, tanning and quarrying (lime, slate and paving-stones). The borough of Denbigh has a separate commission of the peace, but no separate court of quarter sessions. The town has long been known as a Welsh publishing centre, the vernacular newspaper, Baner, being edited and printed here. Near Denbigh, at Bodelwyddan, &c, coal is worked.

The old British tower and castle were called Castell caled fryn yn Rhds, the " castle of the hard hill in Rh6s." Din in

Dinbych means a fort. There is a goblin well at the castle. Historically, David (Dafydd), brother of the last Llewelyn, was here (aet. Edward I.) perhaps on a foray; also Henry Lacy, who built the castle (aet. Edward I.), given to the Mortimers and to Leicester (under Edward III. and Elizabeth, respectively).

DENBIGHSHIRE (Dinbych), a county of N. Wales, bounded N. by the Irish Sea, N.E. by Flint and Cheshire, S.E. by Flint and Shropshire, S. by Montgomery and Merioneth, and W. by Carnarvon. Area, 662 sq. m. On the N. coast, within the Denbighshire borders and between Old Colwyn and Llandulas, is a wedge of land included in Carnarvonshire, owing to a change in the course of the Conwy stream. (Thus, also, Llandudno is partly in the Bangor, and partly in the St Asaph, diocese.) The surface of Denbighshire is irregular, and physically diversified. In the N.W. are the bleak Hiraethog (" longing ") hills, sloping W. to the Conw}' and E. to the Clwyd. In the N. are Colwyn and Abergele bays, on the S. the Yspytty (Lat. Hospitium) and Llangwm range, between Denbigh and Merioneth. From this watershed flow the Elwy, Aled, Clywedog, Merddwr and Alwen, tributaries of the Clwyd, Conwy and Dee (Dyfrdwy). Some of the valleys contrast agreeably with the bleak hills, e.g. those of the Clwyd and Elwy. The portion lying between Ruabon (Rhiwabon) hills and the Dee is agricultural and rich in minerals; the Berwyn to Offa's Dyke (Wdl Of a) is wild and barren, except the Tanat valley, Llansilin and Ceiriog. One feeder of the Tanat forms the Pistyll Rhaiadr (waterspout fall), another rises in Llyncaws (cheese pool) under Moel Sych (dry bare-hill), the highest point in the county. Aled and Alwen are both lakes and streams.

Geology. — The geology of the county is full of interest, as it develops all the principal strata that intervenes between the Ordovician and the Triassic series. Id the Ordovician district, which extends from the southern boundary to the Ceiriog, the Llandeilo formation of the eastern slopes of the Berwyn and the Bala beds of shelly sandstone are traversed east and west by bands of intrusive felspathic porphyry and ashes. The same formation occurs just within the county border at Cerrig-y-Druidion, Langum, Bettys-y- coed and in the Fairy Glen. Northwards from the Ceiriog to the limestone fringe at Llandrillo the Wenlock shale of the Silurian covers the entire mass of the Hiraethog and Clwydian hills, but verging on its western slopes into the Denbighshire grit, which may be traced southward in a continuous line from the mouth of the Conway as far as Llanddewi Ystrad Enni in Radnorshire, near Pentre-Voelas and Conway they are abundantly fossiliferous. On its eastern slope a narrow broken band of the Old Red, or what may be a conglomeratic basement bed of the

Carboniferous Limestone series, crops up along the Vale of Clwyd and in Eglwyseg. Resting upon this the Carboniferous Limestone extends from Llanymynach, its extreme southern point, to the Cyrnybrain fault, and there forks into two divisions that terminate respectively in the Great Orme's Head and in Talargoch, and are separated from each other by the denuded shales of the Moel Famma range. In the Vale of Clwyd the limestone underlies the New Red Sandstone, and in the eastern division it is itself overlaid by the Millstone Grit of Ruabon and Minera, and by a long reach of the Coal Measures which near Wrexham are 4! m. in breadth. Eastward of these a broad strip of the red marly beds succeeds, formerly considered to be Permian but now regarded as belonging to the Coal Measures, and yet again between this and the Dee the ground is occupied — as in the Vale of Clwyd— by the New Red rocks. As in the other northern counties of Wales, the whole of the lower ground is covered more or less thickly with glacial drift. On the western side of the Vale of Clwyd, at Cefn and Plas Heaton, the caves, which are a common feature in such limestone districts, have yielded the remains of the rhinoceros, mammoth, hippopotamus and other extinct mammals.

Coal is mined from the Coal Measures, and from the limestone below, lead with silver and zinc ores have been obtained. Valuable fireclays and terra-cotta marls are also taken from the Coal Measures about Wrexham.

The uplands being uncongenial for corn, ponies, sheep and black cattle are reared, for fattening in the Midlands of England and sale in London. Oats and turnips, rather than wheat, barley and potatoes, occupy the tilled land. The county is fairly wooded. There are several important farmers' clubs (the Denbighshire and Flintshire, the vale of Conway, the Cerrig y druidion, &c.) . The London & North- Western railway (Holyhead line), with the Conway and Clwyd valleys branches, together with the lines connecting Denbigh with Ruabon (Rhiwabon), via Ruthin and Corwen, Wrexham with Connah's Quay (Great

Central) and Rhosllanerchrhugog with Glyn Ceiriog (for the Great Western and Great Central railways) have opened up the county. Down the valley of Llangollen also runs the Holyhead road from London, well built and passing through fine scenery. At Nantglyn paving flags are raised, at Rhiwfelen (near Llangollen) slabs and slates, and good slates are also obtained at Glyn Ceiriog. There is plenty of limestone, with china stone at Brymbo. Cefn Rhiwabon yields sandstone (for hones) and millstone grit. Chirk, Ruabon and Brymbo have coal mines. The great Minera is the principal lead mine.

There is much brick and pottery clay. The Ceiriog valley has a dynamite factory. Llangollen and Llansantffraid (St Bridgit's) have woollen manufactures.

The area of the ancient county is 423,499 acres, with a popula- tion in 1901 of 129,942. The area of the administrative county is 426,084 acres. The chief towns are: Wrexham, a mining centre and N. Wales military centre, with a fine church; Denbigh; Ruthin, where assizes are held (here are a grammar school, a warden and a 13th-century castle rebuilt); Llangollen and Llanrwst; and Holt, with an old ruined castle. The Denbigh district of parliamentary boroughs is formed of: Denbigh (pop. 6483), Holt (1059), Ruthin (2643), and Wrexham (14,966). The county has two parliamentary divisions. The urban districts are: Abergele and Pensarn (2083), Colwyn Bay and Colwyn (8689), Llangollen (3303), and Llanrwst (2645). Denbighshire is in the N. Wales circuit, assizes being held at Ruthin. Denbigh and Wrexham boroughs have separate commissions of the peace, but no separate quarter-session courts. The ancient county, which is in the diocese of St Asaph, contains seventy-five ecclesiastical parishes and districts and part of a parish.

The county was formed, by an act of Henry VIII., out of the lordships of Denbigh, Ruthin (Rhuthyn), Rhos and Rhyfoniog, which are roughly the Perfeddwlad (midland) between Conway and Clwyd, and the lordships of Bromfield, Yale (Idl, open land) and Chirkland, the old possessions of Gruffydd ap Madoc, arglwydd (lord) of Dinas Bran. Cefn (Elwy Valley) limestone caves hold the prehistoric hippopotamus, elephant, rhinoceros, lion, hyena, bear, reindeer, &c; Plas Heaton cave, the glutton; Pont Newydd, felstone tools and a polished stone axe (like that of Rhosdigre) ; Carnedd Tyddyn Bleiddian, " platycnemic (skeleton) men of Denbighshire " (like those of Perthi Chwareu). Clawdd Coch has traces of the Romans; so also Penygaer and Penbarras. Roman roads ran from Deva (Chester) to Segontium (Carnarvon) and from Deva to Mons Heriri (Tomen y tnur). To their period belong the inscribed Gwytherin and Pentrefoelas (near Bettws-y-coed) stones. The Valle Crucis " Eliseg's pillar " tells of Brochmael and the Cairlegion (Chester) struggle against iEthelfrith's invading Northumbrians, a.d. 613, while Offa's dike goes back to the Mercian advance. Near and parallel to Offa's is the shorter and mysterious Watt's dike. Chirk is the only Denbighshire castle comparatively untouched by time and still occupied. Ruthin has cloisters; Wrexham, the Brynffynnon " nunnery "; and at both are collegiate churches. Llanrwst, Gresford and Derwen boast rood lofts and screens; Whitchurch and Llanrwst, portrait brasses and monuments; Derwen, a churchyard cross; Gresford and Llanrhaiadr

(Dyff ryn Clwyd) , stained glass. Near Abergele, known for its sea baths, is the ogoj (or cave), traditionally the refuge of Richard II. and the scene of his capture by Bolingbroke in 1390.

See J. Williams, Denbigh (1856), and T. F. Tout, Welsh Shires.

DENDERA, a village in Upper Egypt, situated in the angle of the great westward bend of the Nile opposite Kena. Here was the ancient city'of Ten tyra, capital of the Tentyrite nome, the sixth of Upper Egypt, and the principal seat of the worship of Hathor [Aphrodite] the cow-goddess of love and joy. The old Egyptian name of Tentyra was written 'In-t (Ant), but the pro- nunciation of it is unknown: in later days it was 'Imt-t-ntr-t, " ant of the goddess," pronounced Ni-tent6ri, whence Tivrvpa, Tkvrvpis. The temple of Hathor was built in the 1st century B.C., being begun under the later Ptolemies (Ptol. XIII.) and finished by Augustus, but much of the decoration is later. A great

rectangular enclosure of crude bricks, measuring about 900 X 850 ft., contains the sacred buildings: it was entered by two stone gateways, in the north and the east sides, built by Domitian. Another smaller enclosure lies to the east with a gateway also of the Roman period.

The plan of the temple may be supposed to have included a colonnaded court in front of the present facade, and pylon towers at the entrance; but these were never built, probably for lack of funds. The building, which is of sandstone, measures about 300 ft. from front to back, and consists of two oblong rectangles; the foremost, placed transversely to the other, is the great hypostyle hall or pronaos, the broadest and loftiest part of the temple, measuring 135 ft. in width, and comprising about one- third of the whole structure; the facade has six columns with heads of Hathor, and the ceiling is supported by eighteen great columns. The second rectangle contains a small hypostyle hall with six columns, and the sanctuary, with their subsidiary chambers. The sanctuary is surrounded by a corridor into which the chambers open: on the west side is an apartment forming a court and kiosk for the celebration of the feast of the New Year, the principal festival of Dendera. On the roof of the temple, reached by two staircases, are a pavilion and several chambers dedicated to the worship of Osiris. Inside and out, the whole of the temple is covered with scenes and inscriptions in crowded characters, of ceremonial and religious import; the decoration is even carried into a remarkable series of hidden passages and chambers or crypts made in the solid walls for the reception of its most valuable treasures. The architectural

style is dignified and pleasing in design and proportions. The interior of the building has been completely cleared: from the outside, however, its imposing effect is quite lost, owing to the mounds of rubbish amongst which it is sunk. North-east of the entrance is a " Birth House " for the cult of the child Harsemteu, and behind the temple a small temple of Isis, dating from the reign of Augustus. The original foundation of the temple must date back to a remote time: the work of some of the early builders is in fact referred to in the inscriptions on the present structure. Petrie's excavation of the cemetery behind the temple enclosures revealed burials dating from the fourth dynasty onwards, the most important being mastables of the period from the sixth to the eleventh dynasties; many of these exhibited a peculiar degradation of the contemporary style of sculpture.

The zodiacs of the temple of Dendera gave rise to a consider- able literature before their late origin, was established by Champollion in 1822: one of them, from a chamber on the roof, was removed in 1820 to the Bibliotheque Nationale in Paris. Figures of the celebrated Cleopatra VI. occur amongst the sculptures on the exterior of the temple, but they are purely conventional, without a trace of portraiture. Horus of Edfu, the enemy of the crocodiles and hippopotami of Set, appears sometimes as the consort of Hathor of Dendera. The skill displayed by the Tentyrites in capturing the crocodile is referred to by Strabo and other Greek writers. Juvenal, in his seventeenth satire, takes as his text a religious riot between the Tentyrites and the neighbouring Ombites, in the course of which an unlucky Ombite was torn to pieces and devoured by the opposite party. The Ombos in question is not the distant Ombos south of Edfu, where the crocodile was worshipped; Petrie has shown that opposite Coptos, only about 15 m. from Tentyra, there was another Ombos, venerating the hippopotamus sacred to Set.

See A. Marieitte, Denderah (5 vols, atlas and text, 1869-1880) ; W. M. F. Petrie, Denderah (1900) ; Nagada and Ballas (1896).

(F. Ll. G.)

DENDROCOMETES (so named by F. Stein), a genus of suctorian Infusoria, characterized by the repeatedly branched attached body; each of the lobes of the body gives off a few retractile tentacles. It is parasitic on the gills of the so-called freshwater shrimp Gammarus pulex.

For its conjugation see Sydney H. Hickson, in Quarterly Journ. of

Microsc. Science, vol xlv. (1902), p. 32.5.

DENE-HOLES, the name given to certain caves or excavations in England, which have been popularly supposed to be due to the

Danes or some other of the early northern invaders of the country. The common spelling ” Dane hole ” is adduced as evidence of this, and individual names, such as Vortigern’s Caves at Margate, and Canute’s Gold Mine near Bexley, naturally follow the same theory. The word, however, is probably derived from the Anglo- Saxon den, a hole or valley. There are many underground excavations in the south of the country, also found to some extent in the midlands and the north, but true dene-holes are found chiefly in those parts of Kent and Essex along the lower banks of the Thames. With one exception there are no recorded specimens farther east than those of the Grays Thurrock district; situated in Hangman’s Wood, on the north, and one near Rochester on the south side of the river.

The general outline of the formation of these caves is invariably the same. The entrance is a vertical shaft some 3 ft. in diameter falling, on an average, to a depth of 60 ft. The depth is regulated, obviously, by the depth of the chalk from the surface, but, although chalk could have been obtained close at hand within a few feet, or even inches, from the surface, a depth of from 45 to 80 ft., or more, is a characteristic feature. It is believed that dene-holes were also excavated in sand, but as these would be of a perishable nature there are no available data of any value. The shaft, when the chalk is reached, widens out into a domed chamber with a roof of chalk some 3 ft. thick. The walls frequently contract somewhat as they near the floor. As a rule there is only one chamber, from 16 to 18 ft. in height, beneath each shaft. From this excessive height it has been inferred that the caves were not primarily intended for habitations or even hiding-places. In some cases the chamber is extended, the roof being supported by pillars of chalk left standing. A rare specimen of a twin-chamber was discovered at Gravesend. In this case the one entrance served for both caves, although a separate aperture connected them on the floor level. Where galleries are found connecting the chambers, forming a bewildering labyrinth, a careful scrutiny of the walls usually reveals evidence that they are the work of a people of a much later period than that of the chambers, or, as they become in these cases, the halls of the galleries.

Isolated specimens have been discovered in various parts of Kent and Essex, but the most important groups have been found at Grays Thurrock, in the districts of Woolwich, Abbey Wood and Bexley, and

at Gravesend. Those at Bexley and Grays Thurrock are the most valuable still existing.

It is generally found that the tool work on the roof or ceiling is rougher than that on the walls, where an upright position could be maintained. Casts taken of some of the pick-holes near the roof show that, in all probability, they were made by bone or horn picks. And numerous bone picks have been discovered in Essex and Kent. These pick-holes are amongst the most valuable data for the study of dene-holes, and have assisted in fixing the date of their formation to pre-Roman times. Very few relics of antiquarian value have been discovered in any of the known dene-holes which have assisted in fixing the date or determining the uses of these prehistoric excavations. Pliny mentions pits sunk to a depth of a hundred feet, " where they branched out like the veins of mines." This has been used in support of the theory that dene-holes were wells sunk for the extraction of chalk; but no known dene-hole branches out in this way. Chretien de Troyes has a passage on underground caves in Britain which may have reference to dene-holes, and tradition of the 14th century treated the dene-holes of Grays as the fabled gold mines of Cunobeline (or Cymbeline) of the 1st century.

Vortigern's Caves at Margate are possibly dene-holes which have been adapted by later peoples to other purposes; and excellent examples of various pick-holes may be seen on different parts of the walls.

Local tradition in some cases traces the use of these caves to the smugglers, and, when it is remembered that illicit traffic was common not only on the coast but in the Thames as far up the river as Barking Creek, the theory is at least tenable that these ready-made hiding-places, difficult of approach and dangerous to descend, were so utilized-

There are three purposes for which dene-holes may have been originally excavated: (a) as hiding-places or dwellings, (b) draw- wells for the extraction of chalk for agricultural uses, and © store- houses for grain. For several reasons it is unlikely that they were used as habitations, although they may have been used occasion- ally as hiding-places. Other evidence has shown that it is equally improbable that they were used for the extraction of chalk. The chief reasons against this theory are that chalk could have been obtained

outcropping close by, and that every trace of loose chalk has been removed from the vicinity of the holes, while known examples of chalk draw-wells do not descend to so great a depth. The discovery of a shallow dene-hole, about 14 ft. below the surface, at Stone negatives this theory still further. The last of the three possible uses for which these prehistoric excavations were designed is usually accepted as the most probable. Silos, or underground storehouses, are well known in the south of Europe and Morocco. It is supposed that the grain was stored in the ear and carefully protected from damp by straw. A curious smoothness of the roof of one of the chambers of the Gravesend twin-chamber dene-hole has been put forward as additional evidence in support of this theory. One other theory has been advanced, viz. that the excavations were made in order to get flints for implements, but this is quite impossible, as a careful examination of a few examples will show. Further reference may be made to Essex Dene-holes by T.V. Holmes and W. Cole; €0 The Archaeological Journal (1882); the Transac- tions of the Essex Field Club; Archaeologia Cantiana, &c; Dene- holes by F. W. Reader, in Old Essex, ed. A. C. Kelway (1908).

(A. J. P.) DENGUE (pronounced deng-ga), an infectious fever occurring in warm climates. The symptoms are a sudden attack of fever, accompanied by rheumatic pains in the joints and muscles with severe headache and erythema. After a few days a crisis is reached and an interval of two or three days is followed by a slighter return of fever and pain and an eruption resembling measles, the most marked characteristic of the disease. The disease is rarely fatal, death occurring only in cases of extreme weakness caused by old age, infancy or other illness. Little is known of the aetiology of ” dengue.” The virus is probably similar to that of other exanthematous fevers and communicated by an intermediary culex. The disease is nearly always epidemic, though at intervals it appears to be pandemic and in certain districts almost endemic. The area over which the disease ranges may be stated generally to be between 32° 47′ N. and 23 23′ S. Throughout this area ” dengue ” is constantly epidemic. The earliest epidemic of which anything is known occurred in 1779- 1 780 in Egypt and the East Indies. The chief epidemics have been those of 1824-1826 in India, and in the West Indies and the southern states of North America, of 1870-1875, extending practically over the whole of the tropical portions of the East and reaching as far as China. In 1888 and 1889 a great outbreak spread along the shores of the Aegean and over nearly the whole of Asia Minor. Perhaps ” dengue ” is most nearly endemic in equatorial East Africa and in the West Indies. The word has usually been identified with the Spanish dengue, meaning

stiff or prim behaviour, and adopted in the West Indies as a name suitable to the curious cramped movements of a sufferer from the disease, similar to the name ” dandy-fever ” which was given to it by the negroes. According to the New English Dictionary (quoting Dr Christie in The Glasgow Medical Journal, September 1881), both “dengue” and “dandy” are corruptions of the Swahili word dinga or denga, meaning a sudden attack of cramp, the Swahili name for the disease being kadinga pepo.

See Sir Patrick Manson, Tropical Diseases; a Manual of Diseases of Warm Climates (1903).

DENHAM, DIXON (1786-1828ˆ, English traveller in West Central Africa, was born in London on the 1st of January 1786. He was educated at Merchant Taylors’ School, and was articled to a solicitor, but joined the army in 1811. First in the 23rd Royal Welsh Fusiliers, and afterwards in the 54th foot, he served in the campaigns in Portugal, Spain, France and Belgium, and received the Waterloo medal. In 1821 he volunteered to join Dr Oudney and Hugh Clapperton (q.v.), who had been sent by the

British government via Tripoli to the central Sudan. He joined the expedition at Murzuk in Fezzan. Finding the promised escort not forthcoming, Denham, whose energy was boundless, started for England to complain of the ” duplicity ” of the pasha of Tripoli. The pasha, alarmed, sent messengers after him with promises to meet his demands. Denham, who had reached Marseilles, consented to return, the escort was forthcoming, and Murzuk was regained in November 1822. Thence the expedition made its way across the Sahara to Bornu, reached in February 1823. Here Denham, against the wish of Oudney and Clapperton, accompanied a slave-raiding expedition into the Mandara high- lands south of Bornu. The raiders were defeated, and Denham barely escaped with his life. When Oudney and Clapperton set out, December 1823, for the Hausa states, Denham remained behind. He explored the western, south and south-eastern shores of Lake Chad, and the lower courses of the rivers Waube, Logone and Shari. In August 1824, Clapperton having returned and Oudney being dead, Bornu was left on the return journey to Tripoli and England. In December 1826 Denham, promoted lieutenant-colonel, sailed for Sierra Leone as superintendent of liberated Africans. In 1828 he was appointed governor of Sierra Leone, but after administering the colony for five weeks died of fever at Freetown on the 8th of May 1828.

See Narrative of Travels and Discoveries in Northern and Central Africa in the years 1822-1824 (London, 1826), the greater part of

which is written by Denham ; The Story of Africa, vol. i. chap. xiii. (London, 1892), by Dr Robert Brown.

DENHAM, SIR JOHN (1615-1669), English poet, only son of Sir John Denham (iSSg-r'w), lord chief baron of the exchequer in Ireland, was born in Dublin in 161 5. In 161 7 his father became baron of the exchequer in England, and removed to London with his family. In Michaelmas term 1631 the future poet was entered as a gentleman commoner at Trinity College, Oxford. He removed in 1634 to Lincoln's Inn, where he was, says John Aubrey, a good student, but not suspected of being a wit. The reputation he had gained at Oxford of being the " dream- ingest young fellow " gave way to a scandalous reputation for gambling. In 1634 he married Ann Cotton, and seems to have lived with his father at Egham, Surrey. In 1636 he wrote his paraphrase of the second book of the Aeneid (published in 1656 as The Destruction of Troy, with an excellent verse essay on the art of translation). About the same time he wrote a prose tract against gambling, The Anatomy of Play (printed 1651), designed to assure his father of his repentance, but as soon as he came into his fortune he squandered it at play. It was a surprise to every- one when in- 1642 he suddenly, as Edmund Waller said, " broke out like the Irish rebellion, three score thousand strong, when no one was aware, nor in the least expected it," by publishing The Sophy, a tragedy in five acts, the subject of which was drawn from Sir Thomas Herbert's travels. At the beginning of the Civil War Denham was high sheriff for Surrey, and was appointed governor of Farnham Castle. He showed no military ability, and speedily surrendered the castle to the parliament. He was sent as a prisoner to London, but was soon permitted to join the king at Oxford.

In 1642 appeared Cooper's Hill, a poem describing the Thames scenery round his home at Egham. The first edition was anonymous: subsequent editions show numerous alterations, and the poem did not assume its final form until 1655. This famous piece, which was Pope's model for his Windsor Forest, was not new in theme or manner, but the praise which it received was well merited by its ease and grace. Moreover Denham expressed his commonplaces with great dignity and skill. He followed the taste of the time in his frequent use of antithesis and metaphor, but these devices seem to arise out of the matter, and are not of the nature of mere external ornament. At Oxford he wrote many squibs against the roundheads. One of the few serious pieces belonging to this period is the short poem " On the Earl of Strafford's Trial and Death."

From this time Denham was much in Charles I.'s confidence. He was

entrusted with the charge of forwarding letters to and from the king when he was in the custody of the parliament, a

duty which he discharged successfully with Abraham Cowley, but in 1648 he was suspected by the Parliamentary authorities, and thought it wiser to cross the Channel. He helped in the removal of the young duke of York to Holland, and for some time he served Queen Henrietta Maria in Paris, being entrusted by her with despatches for Holland. In 1650 he was sent to Poland in company with Lord Crofts to obtain money for Charles II. They succeeded in raising £10,000. After two years spent at the exiled court in Holland, Denham returned to London and being quite without resources, he was for some time the guest of the earl of Pembroke at Wilton. In 165s an order was given that Denham should restrict himself to some place of residence to be selected by himself at a distance of not less than 20 m. from London; subsequently he obtained from the Protector a licence to live at Bury St Edmunds, and in 1658 a passport to travel abroad with the earl of Pembroke. At the Restoration Denham's services were rewarded by the office of surveyor-general of works. His qualifications as an architect were probably slight, but it is safe to regard as grossly exaggerated the accusations of incompetence and peculation made by Samuel Butler in his brutal " Panegyric upon Sir John Denham's Recovery from his Madness." He eventually secured the services of Christopher Wren as deputy- surveyor. In 1660 he was also made a knight of the Bath.

In 1665 he married for the second time. His wife, Margaret, daughter of Sir William Brooke, was, according to the comte de Gramont, a beautiful girl of eighteen. She soon became known as the mistress of the duke of York, and the scandal, according to common report, shattered the poet's reason. While Denham was recovering, his wife died, poisoned, it was said, by a cup of chocolate. Some suspected the duchess of York of the crime, but the Comte de Gramont says that the general opinion was that Denham himself was guilty. No sign of poison, however, was found in the examination after Lady Denham's death. Denham survived her for two years, dying at his house near Whitehall in March 1669. He was buried on the 23rd in West- minster Abbey. In the last years of his life he wrote the bitter political satires on the shameful conduct of the Dutch War entitled " Directions to a Painter," and " Fresh Directions," continuing Edmund Waller's " Instructions to a Painter." The printer of these poems, with which

were printed one by Andrew Marvell, was sentenced to stand in the pillory. In 1667 Denham wrote his beautiful elegy on Abraham Cowley.

Denham's poems include, beside those already given, a verse paraphrase of Cicero's Cato major, and a metrical version of the Psalms. As a writer of didactic verse, he was perhaps too highly praised by his immediate successors. Dryden called Cooper's Hill " the exact standard of good writing," and Pope in his Windsor Forest called him " majestic Denham." His collected poems with a dedicatory epistle to Charles II. appeared in 1668. Other editions followed, and they are reprinted in Chalmers' (1810) and other col- lections of the English poets. His political satires were printed with some of Rochester's and Marvell's in Bibliotheca curiosa, vol. i. (Edinburgh, 1885).

DfSNIA, a seaport of eastern Spain, in the province of Alicante; on the Mediterranean Sea, at the head of a railway from Car- cagente. Pop. (1900) 12,431. Denia occupies the seaward slopes of a hill surmounted by a ruined castle, and divided by a narrow valley on the south from the limestone ridge of Mongo (2500 ft.), which commands a magnificent view of the Balearic Islands and the Valencian coast. The older houses of Denia are characterized by their flat Moorish roofs (azoteas) and view-turrets (mir adores), while fragments of the Moorish ramparts are also visible near the harbour; owing, however, to the rapid extension of local com- merce, many of the older quarters were modernized at the beginning of the 20th century. Nails, and wbollen, linen and esparto grass fabrics are manufactured here; and there is a brisk export trade in grapes, raisins and onions, mostly consigned to Great Britain or the United States. Baltic timber and British coal are largely imported. The harbour bay, which is well lighted and sheltered by a breakwater, contains only a small space of deep water, shut in by deposits of sand on three sides. In 1904 it accommodated 402 vessels of 175,000 tons; about half of which were small fishing craft, and coasters carrying agricultural produce to Spanish and African ports.

Denia was colonized by Greek merchants from Emporiae (Ampurias in Catalonia), or Massilia (Marseilles), at a very early date; but its Greek name of Hemeroskopeion was soon super- seded by the Roman Dianium. In the 1st century B.C., Sertorius made it the naval headquarters of his resistance to Rome; and, as its name implies, it was already famous for its temple of Diana, built in imitation of that at Ephesus. The site of this temple can be traced at the foot of the castle hill. Denia was captured by the Moors in 713, and from 1031 to

1253 belonged successively to the Moorish kingdoms of Murcia and Valencia. According to an ancient but questionable tradition, its population rose at this period to 50,000, and its commerce proportionately increased. After the city was retaken by the Christians in 1253, its pros- perity dwindled away, and only began to revive in the 19th century. During the War of the Spanish Succession (1701-14), Denia was thrice besieged; and in 1813 the citadel was held for five months by the French against the allied British and Spanish forces, until the garrison was reduced to 100 men, and compelled to surrender, on honourable terms.

DENIKER, JOSEPH (1852-) French naturalist and anthropologist, was born of French parents at Astrakhan, Russia, on the 6th of March 1852. After receiving his education at the university and technical institute of St Petersburg, he adopted engineering as a profession, and in this capacity travelled ex- tensively in the petroleum districts of the Caucasus, in Central Europe, Italy and Dalmatia. Settling at Paris in 1876, he studied at the Sorbonne, where he took his degree in natural science. In 1888 he was appointed chief librarian of the Natural History Museum, Paris. Among his many valuable ethnological works mention may be made of Recherches anatomiques et embryo- logiques sur les singes anthropoUes (1886); Etude sur les Kal- mouks (1883); Les Ghiliaks (1883); and Races et peuples de la terre (1900). He became one of the chief editors of the Diction- naire de g&ographie universelle, and published many papers in the anthropological and zoological journals of France.

DENILIQUIN, a municipal town of Townsend county, New South Wales, Australia, 534 m. direct S.W. of Sydney, and 195 m. by rail N. of Melbourne. Pop. (1901) 2644. The business of the town is chiefly connected with the interests of the sheep and cattle farmers of the Riverina district, a plain country, in the main pastoral, but suited in some parts for cultivation. Deniliquin has a well-known public school.

DENIM (an abbreviation of serge de Nimes), the name origin- ally given to a kind of serge. It is now applied to a stout twilled cloth made in various colours, usually of cotton, and used for overalls, &c.

DENINA, CARLO GIOVANNI MARIA (1731-1813), Italian historian, was born at Revello, Piedmont, in 1731, and was educated at Saluzzo and Turin. In 1753 he was appointed to the chair of humanity at Pignerol, but he was soon compelled by the influence of the Jesuits to retire from it. In 1756 he graduated as doctor in theology, and began authorship with a theological treatise. Promoted to the professorship of humanity and rhetoric in the college of Turin, he published

(1769-1772) his Delle re- volutions d'ltalia, the work on which his reputation is mainly founded. Collegiate honours accompanied the issue of its successive volumes, which, however, at the same time multiplied his foes and stimulated their hatred. In 1782, at Frederick the Great's invitation, he went to Berlin, where he remained for many years, in the course of which he published his Vie et regne de Frederic II (Berlin, 1788) and La Prusse litteraire sous Frideric II (3 vols., Berlin, 1790-1791). His Delle revoluzioni delta Germania was published at Florence in 1804, in which year he went to Paris as the imperial librarian, on the invitation of Napoleon. At Paris he published in 1 805 his Tableau de la Haute Italie, et des Alpes qui I'entourent. He died there on the 5th of December 1813.

DENIS (Dionysius), SAINT, first bishop of Paris, patron saint of France. According to Gregory of Tours (Hist. Franc, i. 30), he was sent into Gaul at the time of the emperor Decius. He suffered martyrdom at the village of Catulliacus, the modern St Denis. His tomb was situated by the side of the Roman road.

where rose the priory of St-Denis-de-l'Estr6e, which existed until the 18th century. In the 5th century the clergy of the diocese of Paris built a basilica over the tomb. About 625 Dagobert, son of Lbthair II., founded in honour of St Denis, at some distance from the basilica, the monastery where the greater number of the kings of France have been buried. The festival of St Denis is celebrated on the 9th of October. With his name are already associated in the Martyrologium Hieronymianum the priest Rusticus and the deacon Eleutherius. Other traditions— of no value — are connected with the name of St Denis. A false interpretation of Gregory of Tours, apparently dating from 724, represented St Denis as having received his mission from Pope Clement, and as having suffered martyrdom under Domitian (81-96). Hilduin, abbot of St-Denis in the first half of the 9th century, identified Denis of Paris with Denis (Dionysius) the Areopagite (mentioned in Acts xviii. 34), bishop of Athens (Eusebius, Hist. Eccl. iii. 4. 10, iv. 23. 3), and naturally attributed to him the celebrated writings of the pseudo-Areopagite. St Denis is generally represented carrying his head in his hands.

See Acta Sanctorum, Octobris, iv. 696-987; Bibliotheca hagiographica graeca, p. 37 (Brussels, 1895); Bibliotheca hagiographica latina, No. 2171-2203 (Brussels, 1899); J. Havet, Les Origines de

Saint-Denis, in his collected works, i. 191-246 (Paris, 1896) ; Cahier, Caracteristiques des saints, p. 761 (Paris, 1867). (H. De.)

DENIS, JOHANN NEPOMUK COSMAS MICHAEL (1729-1800), Austrian poet, was born at Scharding on the Inn, on the 27th of September 1729. He was brought up by the Jesuits, entered their order, and in 1759 was appointed professor in the Theresianum in Vienna, a Jesuit college. In 1784, after the suppression of the college, he was made second custodian of the court library, and seven years later became chief librarian. He died on the 29th of September 1800. A warm admirer of Klopstock, he was one of the leading members of the group of so-called ” bards “; and his original poetry, published under the title Die Lieder Sineds des Barden (1772), shows all the extrava- gances of the ” bardic ” movement. He is best remembered as the translator of Ossian (1 768-1 769; also published together with his own poems in 5 vols, as Ossians und Sineds Lieder, 1784). More important than either his original poetry or his translations were his efforts to familiarize the Austrians with the literature of North Germany; his Sammlung kiirzerer Gedichte aus den neuern Dichtem Deutschlands, 3 vols. (1762-1766), was in this respect invaluable. He has also left a number of bibliographical compilations, Grundriss der Bibliographic und Biicherkunde (1774), Grundriss der Liter aturgeschichte (1776), Einleitung in die Biicherkunde (1777) and Wiens Buchdruckergeschichte bis 1560

(1782).

Ossians und Sineds Lieder have not been reprinted since 1791 ; but a selection of his poetry edited by R. Hamel will be found in vol. 48 (1884) of Kiirschner’s Deutsche Nationalliteratur. His Litera- rischer Nachlass was published by J. F. von Retzer in 1802 (2 vols.). See P. von Hofmann-Wellenhof, Michael Denis (1881).

DENISON, GEORGE ANTHONY (1805-1896), English church- man, brother of John Evelyn Denison (1800-1873; speaker of the House of Commons 1857-1872; Viscount Ossington), was born at Ossington, Notts, on the nth of December 1805, and educated at Eton and Christ Church, Oxford. In 1828 he was elected fellow of Oriel; and after a few years there as a tutor, during which he was ordained and acted as curate at Cuddesdon, he became rector of Broadwindsor, Dorset (1838). He became a prebendary of Sarum in 1841 and of Wells in 1849. In 185 1 he was preferred to the valuable living of East Brent, Somerset, and in the same year was made archdeacon of Taunton. For many years Archdeacon Denison represented the extreme High Tory party not only in politics but in the Church, regarding all ” progressive

” movements in education or theology as abomination, and vehemently repudiating the ” higher criticism ” from the days of Essays and Reviews (i860) to those of Lux Mundi (1890). In 1853 he resigned his position as examining chaplain to the bishop of Bath and Wells owing to his pronounced eucharistic views. A suit on the complaint of a neighbouring clergyman ensued and after various complications Denison was condemned by the archbishops' court at Bath (1856); but on

appeal the court of Arches and the privy council quashed this judgment on a technical plea. The result was to make Denison a keen champion of the ritualistic school. He edited The Church and State Review (186 2-1 86 5). Secular state education and the ” conscience clause ” were anathema to him. Until the end of his life he remained a protagonist in theological controversy and a keen fighter against latitudinarianism and liberalism; but the sharpest religious or political differences never broke his personal friendships and his Christian charity. Among other things for which he will be remembered was his origination of harvest festivals. He died on the 21st of March 1896.

DENISON, GEORGE TAYLOR (1839-), Canadian soldier and publicist, was born in Toronto on the 31st of August 1839. In 1 86 1 he was called to the bar, and was from 186 5- 186 7 a member of the city council. From the first he took a prominent part in the organization of the military forces of Canada, becom- ing a lieutenant-colonel in the active militia in 1866. He saw active service during the Fenian raid of 1866, and during the rebellion of 1885. Owing to his dissatisfaction with the conduct of the Conservative ministry during the Red River Rebellion in 1869-70, he abandoned that party, and in 1872 unsuccessfully contested Algoma in the Liberal interest. Thereafter he remained free from party ties. In 1877 he was appointed police magistrate of Toronto. Colonel Denison was one of the founders of the ” Canada First ” party, which did much to shape the national aspirations from 1870 to 1878, and was a consistent supporter of imperial federation and of preferential trade between Great Britain and her colonies. He became a member of the Royal Society of Canada, and was president of the section dealing with English history and literature. The best known of his military works is his History of Modern Cavalry (London, 1877), which was awarded first prize by the Russian government in an open competition and has been translated into German, Russian and Japanese. In 1900 he published his reminiscences under the title of Soldiering in Canada.

DENISON, a city of Grayson county, Texas, U.S.A., about 25 m. from the S. bank of the Red river, about 70 m. N. of Dallas. Pop. (1890)

10,958; (1900) 11,807, of whom 2251 were negroes; (1910 census) 13,632. It is served by the Houston & Texas Central, the Missouri, Kansas & Texas, the Texas & Pacific, and the St Louis & San Francisco (“Frisco System) railways, and is connected with Sherman, Texas, by an electric line. Denison is the seat of the Gate City business college (generally known as Harshaw Academy), and of St Xavier’s academy (Roman Catholic). It is chiefly important as a railway centre, as a collecting and distributing point for the fruit, vegetables, hogs and poultry, and general farming products of the surrounding region, and as a wholesale and jobbing market for the upper Red river valley. It has railway repair shops, and among its manufactures are cotton-seed oil, cotton, machinery and foundry products, flour, wooden-ware, and dairy products. In 1905 its factory products were valued at $1,234,956, 47-0 % more than in 1900. Denison was settled by Northerners at the time of the construction of the Missouri, Kansas & Texas railway to this point in 1872, and was named in honour of George Denison (1822-1876), a director of the railway; it became a city in 1891, and in 1907 adopted the commission form of government.

DENIZEN (derived through the Fr. from Lat. de intus, ” from within,” i.e. as opposed to “foreign”), an alien who obtains by letters patent {ex donatione regis) certain of the privileges of a British subject. He cannot be a member of the privy council or of parliament, or hold any civil or military office of trust, or take a grant of land from the crown. The Naturalization Act 1870 provides that nothing therein contained shall affect the grant of any letters of denization by the sovereign.

DENIZLI (anc. Laodicea (q.v.) ad Lycum), chief town of a sanjak of the Aidin vilayet of Asia Minor, altitude 1167 ft. Pop. about 17,000. It is beautifully situated at the foot of Baba Dagh (Mt. Salbacus), on a tributary of the Churuk Su (Lycus), and is connected by a branch line with the station of Gonjeli on the Smyrna-Dineir railway. It took the place of Laodicea when that town was deserted during the wars between the

Byzantines and Seljuk Turks, probably between 1158 and 1174. It had become a fine Moslem city in the 14th century, and was then called Ladik, being famous for the woven and embroidered products of its Greek inhabitants. The delightful gardens of Denizli have obtained for it the name of the “ˆDamascus of Anatolia.”

DENMAN, THOMAS, ist Baron (1779-1854), English judge, was born in London, the son of a well-known physician, on the 23rd of July 1779. He was educated at Eton and St John's College, Cambridge, where he graduated in 1800. Soon after leaving Cambridge he married; and in 1806 he was called to the bar at Lincoln's Inn, and at once entered upon practice. His success was rapid, and in a few years he attained a position at the bar second only to that of Brougham and Scarlett (Lord Abinger). He distinguished himself by his eloquent defence of the Luddites; but his most brilliant appearance was as one of the counsel for Queen Caroline. His speech before the Lords was very powerful, and some competent judges even considered it not inferior to Brougham's. It contained one or two daring passages, which made the king his bitter enemy, and retarded his legal promotion. At the general election of 1818 he was returned M.P. for Wareham, and at once took his seat with the Whig opposition. In the following year he was returned for Nottingham, for which place he continued to sit till his elevation to the bench in 1832. His liberal principles had caused his exclusion from office till in 1822 he was appointed common Serjeant by the corporation of London. In 1830 he was made attorney-general under Lord Grey's administration. Two years later he was made lord chief justice of the King's Bench, and in 1834 he was raised to the peerage. As a judge he is most celebrated for his decision in the important privilege case of Stockdale v. Hansard (9 Ad. & El. I.; 11 Ad. & El. 253), but he was never ranked as a profound lawyer. In 1850 he resigned his chief justiceship and retired into private life. He died on the 26th of September 1854, his title continuing in the direct line.

The Hon. George Denman (1819-1896), his fourth son, was also a distinguished lawyer, and a judge of the Queen's Bench from 1872 till his death in 1896.

See Memoir of Thomas, first Lord Denman, by Sir Joseph Arnould (2 vols., 1873); E. Manson, Builders of our Law (1904).

DENMARK (Danmark), a small kingdom of Europe, occupying part of a peninsula and a group of islands dividing the Baltic and North Seas, in the middle latitudes of the eastern coast. The kingdom lies between 54 33′ and 57 45′ N. and between 8° 4′ 54″ and 12 47′ 25″ E., exclusive of the island of Bornholm, which, as will be seen, is not to be included in the Danish archi- pelago. The peninsula is divided between Denmark and Germany (Schleswig- Holstein). The Danish portion is the northern and the greater, and is called Jutland (Dan. Jylland). Its northern part is actually insular, divided from the mainland by the Limfjord or Liimfjord, which communicates with the

North Sea to the west and the Cattegat to the east, but this strait, though broad and possessing lacustrine characteristics to the west, has only very narrow entrances. The connexion with the North Sea dates from 1825. The Skagerrack bounds Jutland to the north and north-west. The Cattegat is divided from the Baltic by the Danish islands, between the east coast of the Cimbric peninsula in the neighbourhood of the German frontier and south-western Sweden.

There is little variety in the surface of Denmark. It is uniformly low, the highest elevation in the whole country, the Himmelbjerg near Aarhus in eastern Jutland, being little more than 500 ft. above the sea. Denmark, however, is nowhere low in the sense in which Holland is; the country is pleasantly diversified, and rises a little at the coast even though it remains flat inland. The landscape of the islands and the south-eastern part of Jutland is rich in beech-woods, corn fields and meadows, and even the minute islets are green and fertile. In the western and northern districts of Jutland this condition gives place to a wide expanse of moorland, covered with heather, and ending towards the sea in low whitish-grey cliffs. There is a certain charm even about these monotonous tracts, and it cannot be

said that Denmark is wanting in natural beauty of a quiet order. Lakes, though small, are numerous; the largest are the Arreso and the Esromso in Zealand, and the chain of lakes in the Himmelbjerg region, which are drained by the largest river in Denmark, the Gudenaa, which, however, has a course not exceeding 80 m. Many of the meres, overhung with thick beech- woods, are extremely beautiful. The coasts are generally low” and sandy; the whole western shore of Jutland is a succession of sand ridges and shallow lagoons, very dangerous to shipping. In many places the sea has encroached; even in the 19th century entire villages were destroyed, but during the last twenty years of the century systematic efforts were made to secure the coast by groynes and embankments. A belt of sand dunes, from 500 yds. to 7 m. wide, stretches along the whole of this coast for about 200 m. Skagen, or the Skaw, a long, low, sandy point, stretches far into the northern sea, dividing the Skagerrack from the Cattegat. On the western side the coast is bolder and less inhospitable; there are several excellent havens, especially on the islands. The coast is nowhere, however, very high, except at one or two points in Jutland, and at the eastern extremity of Moen, where limestone cliffs occur.

Continental Denmark is confined wholly to Jutland, the geographical description of which is given under that heading. Out of the total area of the kingdom, 14,829 sq. m., Jutland, including the small islands adjacent to it, covers 9753 sq. m., and the insular part of the kingdom

(including Bornholm), 5076 sq. m. The islands may be divided into two groups, consisting of the two principal islands Filnen and Zealand, and the lesser islands attendant on each. Fun en (Dan. Fyen), in form roughly an oval with an axis from S.E. to N.W. of 53 m., is separated from Jutland by a channel not half a mile wide in the north, but averaging 10 m. between the island and the Schleswig coast, and known as the Little Belt. Fiinen, geologically a part of southern Jutland, has similar characteristics, a smiling landscape of fertile meadows, the typical beech-forests clothing the low hills and the presence of numerous erratic blocks, are the superficial signs of likeness. Several islands, none of great extent, lie off the west coast of Fiinen in the Little Belt; off the south, how- ever, an archipelago is enclosed by the long narrow islands of Aero (16 m. in length) and Langeland (32 m.), including in a triangular area of shallow sea the islands of Taasinge, Avernako, Dreio, Turo and others. These are generally fertile and well cultivated. Aeroskjobing and Rudkjobing, on Aero and Langeland respectively, are considerable ports. On Langeland is the great castle of Tranekjaer, whose record dates from the 13th century. The chief towns of Fiinen itself are all coastal. Odense is the principal town, lying close to a great inlet behind the peninsula of Hindsholm on the north-east, known as Odense Fjord. Nyborg on the east is the port for the steam-ferry to Korsor in Zealand; Svendborg picturesquely overlooks the southern archipelago; Faaborg on the south-west lies on a fjord of the same name; Assens, on the west, a port for the crossing of the Little Belt into Schleswig, still shows traces of the fortifications which were stormed by John of Ranzau in 1535; Middelfart is a seaside resort near the narrowest reach of the Little Belt; Bogense is a small port on the north coast. All these towns are served by railways radiating from Odense. The strait crossed by the Nyborg- Korsor ferry is the Great Belt which divides the Fiinen from the Zealand group, and is con- tinued south by the Langelands Belt, which washes the straight eastern shore of that island, and north by the Samso Belt, named from an island 15 m. in length, with several large villages, which lies somewhat apart from the main archipelago.

Zealand, or Sealand (Dan. Sjaelland), measuring 82 m. N. to S. by 68 E. to W. (extremes), with its fantastic coast-line indented by fjords and projecting into long spits or promontories may be considered as the nucleus of the kingdom, inasmuch as it contains the capital, Copenhagen, and such important towns as Roskilde, Slagelse, Korsor, Naestved and Elsinore (Helsingor). Its topography is described in detail under Zealand. Its attendant islands lie mainly to the south and are parts of itself, only separated by geologically recent troughs. The

eastern

coast of Moen is rocky and bold. It is recorded that this island formed three separate isles in i ioo, and the village of Borre, now 2 m. inland, was the object of an attack by a fleet from Liibeck in 1510. On Falster is the port of Nykjobing, and from Gjedser, the extreme southern point of Denmark, communication is maintained with Warnemiinde in Germany (29 m.). From Nykjobing a bridge nearly one-third of a mile long crosses to Laaland, at the west of which is the port of Nakskov; the other towns are the county town of Maribo with its fine church of the 14th century, Saxkjobing and Rodby. The island of Bornholm lies 86 m. E. of the nearest point of the archipelago, and as it belongs geologically to Sweden (from which it is distant only 22m.) must be considered to be physically an appendage rather than an internal part of the kingdom of Denmark.

Geology. — The surface in Denmark is almost everywhere formed by the so-called Boulder Clay and what the Danish geologists call the Boulder Sand. The former, as is well known, owes its origin to the action of ice on the mountains of Norway in the Glacial period. It is unstratified; but by the action of water on it, stratified deposits have been formed, some of clay, containing remains of arctic animals, some, and very extensive ones, of sand and gravel. This boulder sand forms almost every- where the highest hills, and besides, in the central part of Jutland, a wide expanse of heath and moorland apparently level, but really sloping gently towards the west. The deposits of the boulder formation rest generally on limestone of the Cretaceous period, which in many places comes near the surface and forms cliffs on the sea-coast. Much of the Danish chalk, including the well- known limestone of Faxe, belongs to the highest or “Danian” subdivision of the Cretaceous period. In the south-western parts a succession of strata, described as the Brown Coal or Lignite formations, intervenes between the chalk and the boulder clay; its name is derived from the deposits of lignite which occur in it. It is only on the island of Bornholm that older formations come to light. This island agrees in geological structure with the southern part of Sweden, and forms, in fact, the southernmost portion of the Scandinavian system. There the boulder clay lies immediately on trjˆe primitive rock, except in the south-western corner of the island, where a series of strata appear

belonging to the Cambrian, Silurian, Jurassic and Cretaceous formations, the true Coal formation, &c, being absent. Some parts of Denmark are supposed to have been finally raised out of the sea towards the close of the Cretaceous period; but as a whole the country did not appear above the water till about the close of the Glacial period. The upheaval of the country, a movement common to a large part of the Scandinavian peninsula, still continues, though slowly, north-east of a line drawn in a south-easterly direction from Nissumfjord on the west coast of Jutland, across the island of Fyen, a little south of the town of Nyborg. Ancient sea- beaches, marked by accumulations of seaweed, rolled stones, &c, have been noticed as much as 20 ft. above the present level. But the upheaval does not seem to affect all parts equally. Even in historic times it has vastly changed the aspect and configuration of the country.

Climate, Flora, Fauna. — The climate of Denmark does not differ materially from that of Great Britain in the same latitude; but whilst the summer is a little warmer, the winter is colder, so that most of the evergreens which adorn an English garden in the winter cannot be grown in the open in Denmark. During thirty years the annual mean temperature varied from 43-88° F. to 4.6-22° in different years and different localities, the mean average for the whole country being 45-14°. The islands have, upon the whole, a somewhat warmer climate than Jutland. The mean temperatures of the four coldest months, December to March, are 33-26°, 31-64°, 31-82°, and 33-98° respectively,, or for the whole winter 32-7°; that of the summer, June to August, 59-2°, but considerable irregularities occur. Frost occurs on an average on twenty days in each of the four winter months, but only on two days in either October or May. A fringe of ice generally lines the greater part of the Danish coasts on the eastern side for some time during the winter, and both the Sound and the Great Bel f are at times impassable on account of ice. In some

winters the latter is sufficiently firm and level to admit of sledges passing between Copenhagen and Malmo. The annual rainfall varies between 21-58 in. and 27-87 in. in different years and different localities. It is highest on the west coast of Jutland; while the small island of Anholt in the Cattegat has an annual rainfall of only 15-78 in. More than half the rainfall occurs from July to November, the wettest month being September, with an average of 2-95 in.; the driest month is April, with an average of 1-14 in. Thunderstorms are frequent in the summer. South-westerly winds prevail from January to March, and from September to the end of the year. In April the east wind, which is particularly searching, is predominant, while westerly winds prevail from May to August. In the district of Aalborg, in the

north of Jutland, a cold and dry N.W. wind called skai prevails in May and June, and is exceedingly destructive to vegetation; while along the west coast of the peninsula similar effects are produced by a salt mist, which carries its influence from 15 to 30 m. inland.

The flora of Denmark presents greater variety than might be anticipated in a country of such simple physical structure. The ordinary forms of the north of Europe grow freely in the mild air and protected soil of the islands and the eastern coast; while on the heaths and along the sandhills on the Atlantic side there flourish a number of distinctive species. The Danish forest h almost exclusively made up of beech, a tree which thrives better in Denmark than in any other country of Europe. The oak and ash are now rare, though in ancient times both were abundant in the Danish islands. The elm is also scarce. The almost universal predominance of the beech is by no means of ancient origin, for in the first half of the 17th century the oak was still the characteristic Danish tree. No conifer grows in Denmark except under careful cultivation, which, however, is largely practised in Jutland (q.v.). But again, abundant traces of ancient extensive forests of fir and pine are found in the numerous peat bogs which supply a large proportion of the fuel locally used. In Bornholm, it should be mentioned, the flora is more like that of Sweden; not the beech, but the pine, birch and ash are the most abundant trees.

The wild animals and birds of Denmark are those of the rest of central Europe. The larger quadrupeds are all extinct; even the red deer, formerly so abundant that in a single hunt in Jutland in 1593 no less than 1600 head of deer were killed, is now only to be met with in preserves. In the prehistoric ” kitchen- middens ” (kj okkenmodding) and elsewhere, however, vestiges are found which prove that the urochs, the wild boar, the beaver, the bear and the wolf all existed subsequently to the arrival of man. The usual domestic animals are abundantly found in Denmark, with the exception of the goat, which is uncommon. The sea fisheries are of importance. Oysters are found in some places, but have disappeared from many localities, where their abundance in ancient times is proved by their shell moulds on the coast. The Gudenaa is the only salmon river in Denmark.

Population. — The population of Denmark in 1901 was 2,449,540. It was 929,001 in 1801, showing an increase during the century in the proportion of 1 to 2-63. In 1901 the average density of the population of Denmark was 165-2 to the square mile, but varied much in the different parts. Jutland showed an average of only 109 inhabitants per square mile, whilst on the islands, which had a total population of 1,385,537, the average stood at 272-95, owing, on the one hand, to

the fact that large tracts in the interior of Jutland are almost uninhabited, and on the other to the fact that the capital of the country, with its pro- portionately large population, is situated on the island of Zealand. The percentages of urban and rural population are respectively about 38 and 62. A notable movement of the population to the towns began about the middle of the 19th century, and increased until very near its end. It was stronger on the islands, where the rural population increased by 5-3 % only in eleven years, whereas in Jutland the increase of the rural population between 1890 and 1901 amounted to 12-0%. Here, however, peculiar circum- stances contributed to the increase, as successful efforts have been made to render the land fruitful by artificial means. The

B

C

DENMARK

Scale, 1:1,800,000

English Miles o 10 20 30 40

Capitals of Counties..

County Boundaries

Railways .** + * + •

Marshes

mmm mgBtmRrmsii

tmˆtJ— fla g*—

D

E

Canals ■

%m.G

0ˆR G ˆSRandeis <*%**- — ,.

BSfflla^

56 ■

, _ , .aaniTW v

o BiSjyi(Bii53»E4biere-.5£’ ; S

~<*? f TJsltJp /Andsagr- ?> ~- * ‘ – JB&TC’*^^

^- – g ⁸ Brcdebro

_] D fiE-ˆN

i ^^§ J(7lˆuˆekjp’bin| ^^

. (ˆjw H…. K ˆ Hanson _ˆ|

■ 4

lle&et

, ˆ JT&Bt

¥

Rbune

BORNHOLM

Same Scale

55

D

Danes are a yellow-haired and blue-eyed Teutonic race of middle stature, bearing traces of their kinship with the northern Scandinavian peoples. Their habits of life resemble those of the North Germans even more than those of the Swedes. The in- dependent tenure of the land by a vast number of small farmers, who are their own masters, gives an air of carelessness, almost of truculence, to the well-to-do Danish peasants. They are gener- ally slow of speech and manner, and somewhat irresolute, but take an eager interest in current politics, and are generally fairly educated men of extreme democratic principles. The result of a fairly equal distribution of wealth is a marked tendency toward* equality in social intercourse. The townspeople show a bias in favour of French habits and fashions. The separation from the duchies of Schleswig and Holstein, which were more than half German, intensified the national character; the Danes are intensely patriotic; and there is no portion of the Danish dominions except perhaps in the West Indian islands, where a Scandinavian language is not spoken. The preponderance of the female population over the male is approximately as 1052 to 1000. The male sex remains in excess until about the twentieth year, from which age the female sex preponderates in increasing ratio with advancing age. The percentage of illegitimacy is high as a whole, although in some of the rural districts it is very low. But in Copenhagen 20 % of the births are illegitimate. Between the middle and the end of the 19th century the rate of mortality decreased most markedly for all ages. During the last decade of the century it ranged between 19-5 per thousand in 1891 and 15-1 in 1898 (17-4 in 1900). Emigration for some time in the 19th century at different periods, both in its early part and towards its close, seriously affected the population of Denmark. But in the last decade it greatly diminished. Thus in 1892 the number of emigrants to Transatlantic places rose to 10,422 but in 1900 it was only 3570. The great bulk of them go to the United States; next in favour is Canada.

Communications. — The roads of Denmark form an extensive and well-maintained system. The railway system is also fairly complete, the state owning about three-fifths of the total mileage, which

amounts to some 2000. Two lines enter Denmark from Schleswig across the frontier. The main Danish lines are as follows. From the frontier a line runs east by Fredericia, across the island of Ftinen by Odense and Nyborg, to Korsor on Zealand, and thence by Roskilde to Copenhagen. The straits between Fredericia and Middelfart and between Nyborg and Korsor are crossed by powerful steam-ferries which are generally capable of conveying a limited number of railway wagons. This system is also in use on the line which runs south fromRoskilde to the island of Falster, from the southernmost point of which, Gjedser, ferry- steamers taking railway cars serve Warnemiinde in Germany. The main lines in Jutland run (a) along the eastern side north from Fredericia by Horsens, Aarhus, Randers, Aalborg and Hjorring, to Frederikshavn, and (b) along the western side from Esbjerg by Skjerne and Vemb, and thence across the peninsula by Viborg to Langaa on the eastern line. The lines are generally of standard gauge (4 ft. 85 in.), but there is also a considerable mileage of light narrow-gauge railways. Besides the numerous steam-ferries which connect island and island, and Jutland with the islands, and the Gjedser-Warnemunde route, a favourite passenger line from Germany is that between Kiel and Korsor, while most of the German Baltic ports have direct connexion with Copenhagen. With Sweden communications are established by ferries across the Sound between Copenhagen and Malmo and Landskrona, and between Elsinore (Helsingor) and Helsingborg. The postal department maintains a telegraph and telephone service.

Industries. — The main source of wealth in Denmark is agri- culture, which employs about two-fifths of the entire population. Most of the land is freehold and cultivated by the owner himself, and comparatively little land is let on lease except very large holdings and glebe farms. The independent small farmer {bonder) maintains a hereditary attachment to his ancestral holding. There is also a class of cottar freeholders (junster). Fully 74 % of the total area of the country is agricultural land.

Of this only about one-twelfth is meadow land. The land under grain crops is not far short of one-half the remainder, the principal crops being oats, followed by barley and rye in about equal quantities, with wheat about one-sixth that of barley and hardly one-tenth that of oats. Beet is extensively grown. During the last forty years of the 19th century dairy-farming was greatly developed in Denmark, and brought to a high degree of perfection by the application of scientific methods and the best machinery, as well as by the establishment of joint dairies. The Danish government has assisted this development by granting money for experiments and by a rigorous system of

inspection for the prevention of adulteration. The co-operative system plays an important part in the industries of butter-making, poultry-farm- ing and the rearing of swine.

Rabbits, which are not found wild in Denmark, are bred for export. Woods cover fully 7 % of the area, and their preserva- tion is considered of so much importance that private owners are under strict control as regards cutting of timber. The woods consist mostly of beech, which is principally used for fuel, but pines were extensively planted during the 1 9th century. Allusion has been made already to the efforts to plant the extensive heaths in Jutland {q.v.) with pine-trees.

Agriculture. — Rates and taxes on land are mostly levied ac- cording to a uniform system of assessment, the unit of which is called a Tonde Hartkorn. The Td. Htk., as it is usually abbrevi- ated, has further subdivision, and is intended to correspond to the same value of land throughout the country. The Danish measure for land is a Tonde Land (Td. L.), which is equal to 1-363 statute acres. Of the best ploughing land a little over 6 Td. L., or about 8 acres, go to a Td. Htk., but of unprofitable land a Td. Htk. may represent 300 acres or more. On the islands and in the more fertile part of Jutland the average is about 10 Td. L., or 135 acres. Woodland, tithes, &c, are also assessed to Td. Htk. for fiscal purposes. In the island of Bornholm, the assessment is somewhat different, though the general state of agricultural holdings is the same as in other parts. The selling value of land has shown a decrease in modern times on account of the agri- cultural depression. A homestead with land assessed less than 1 Td. Htk. is legally called a Huus or Sted, i.e. cottage, whilst a farm assessed at 1 Td. Htk. or more is called Gaard, i.e. farm. Farms of between 1 and 1 2 Td. Htk. are called Bonder gaarde, or peasant farms, and are subject to the restriction that such a hold- ing cannot lawfully be joined to or entirely merged into another. They may be subdivided, and portions may be added to another holding, but the homestead, with a certain amount of land, must be preserved as a separate holding for ever. The seats of the nobility and landed gentry are called Herregaarde. The peasants hold about 73 % of all the land according to its value. As regards their size about 30 % are assessed from 1 to 4 Td. Htk. ; about 33% from 4 to 8 Td. Htk.; the remainder at about 8 Td. Htk. An annual sum is voted by parliament out of which loans are granted to cottagers who desire to purchase small freehold plots.

The fishery along the coasts of Denmark is of some importance both on account of the supply of food obtained thereby for the population of the country, and on account of the export; but the good fishing

grounds, not far from the Danish coast, particularly in the North Sea, are mostly worked by the fishing vessels of other nations, which are so numerous that the Danish government is obliged to keep gun-boats stationed there in order to prevent encroachments on territorial waters.

Other Industries. — The mineral products of Denmark are unimportant. It is one of the poorest countries of Europe in this particular. It is rich, however, in clays, while in the island of Bornholm there are quarries of freestone and marble. The factories of Denmark supply mainly local needs. The largest are those engaged in the construction of engines and iron ships. The manufacture of woollens and cotton, the domestic manufacture of linen in Zealand, sugar refineries, paper mills, breweries, and distilleries may also be mentioned. The most notable manu- facture is that of porcelain. The nucleus of this industry was a factory started in 1772, by F. H. Muller, for the making of china out of Bornholm clay. In 1779 it passed into the hands of the

state, and has remained there ever since, though there are also private factories. Originally the Copenhagen potters imitated the Dresden china made at Meissen, but they later pro- duced graceful original designs. The creations of Thorvaldsen have been largely repeated and imitated in this ware. Trade- unionism flourishes in Denmark, and strikes are of frequent occurrence.

Commerce. — Formerly the commercial legislation of Denmark was to such a degree restrictive that imported manufactures had to be delivered to the customs, where they were sold by public auction, the proceeds of which the importer received from the custom-houses after a deduction was made for the duty. To this restriction, as regards foreign intercourse, was added a no less injurious system of inland duties impeding the commerce of the different provinces with each other. The want of roads also, and many other disadvantages, tended to keep down the develop- ment of both commerce and industry. During the 19th century, however, several commercial treaties were concluded between Denmark and the other powers of Europe, which made the Danish tariff more regular and liberal.

The vexed question, of many centuries' standing, concerning the claim of Denmark to levy dues on vessels passing through the Sound (q.v.), was settled by the abolition of the dues in 1857. The commerce of Denmark is mainly based on home production and home consumption, but a certain quantity of goods is im- ported with a view to re-exportation, for which the free port and bonded 'warehouses at Copenhagen give facilities. In modern times the value of Danish commerce greatly increased, being doubled in the last twenty years of the 19th century, and ex- ceeding a total of fifty millions sterling. The value of export is exceeded as a whole by that of import in the proportion, roughly, of 1 to 1-35. By far the most important articles of export may be classified as articles of food of animal origin, a group which covers the vast export trade in the dairy produce, especially butter, for which Denmark is famous. The value of the butter for export reaches nearly 40% of the total value of Danish exports. A small , proportion of the whole is imported chiefly from Russia (also Siberia) and Sweden and re-exported as of foreign origin. The production of margarine is large, but not much is exported, margarine being largely consumed in Denmark instead of butter, which is exported. Next to butter the most important article of Danish export is bacon, and huge quantities of eggs are also exported. Exports of less value, but worthy of special notice, are vegetables and wool, bones and tallow, also dairy machinery, and finally cement, the production of which is a growing industry. The classes of articles of food of animal origin, and living animals, are the only ones of which the exportation exceeds the importation; with regard to all other goods, the reverse is the case. In the second of these classes the most important export is home-bred horned cattle. The trade in live sheep and swine, which was formerly important, has mostly been converted into a dead-meat trade. A proportionally large importation of timber is caused by the scarcity of native timber suitable for building purposes, the plantations of firs and pines being insufficient to produce the quantity required, and the quality of the wood being inferior beyond the age of about forty years. The large importation of coal, minerals and metals, and goods made from them is likewise caused by the natural poverty of the country in these respects.

Denmark carries on its principal import trade with Germany, Great Britain and the United States of America, in this order, the proportions being about 30, 20 and 16% respectively of the total. Its principal export trade is with Great Britain, Germany and Sweden, the percentage of the whole being 60, 18 and 10. With Russia, Norway and France (in this order) general trade is less important, but still large. A considerable proportion of Denmark's large commercial fleet

is engaged in the carrying trade between foreign, especially British, ports.

Under a law of the 4th of May 1907 it was enacted that the metric system of weights and measures should come into official use in three years from that date, and into general use in five years.

Money and Banking. — The unit of the Danish monetarysystem, as of the Swedish and Norwegian, is the krone (crown), equal to is. ijd., which is divided into 100 ore; consequently 75 ore are equal to one penny. Since 1873 gold has been the standard, and gold pieces of 20 and 10 kroner are coined, but not often met with, as the public prefers bank-notes. The principal bank is the National Bank at Copenhagen, which is the only one authorized to issue notes. These are of the value of 10, 50, 100 and 500 kr. Next in importance are the Danske Landmands Bank, the Handels Bank and the Private Bank, all at Copenhagen. The ˆprovincial banks are very numerous; many of them are at the same time savings banks. Their rate of interest, with few ex- ceptions, is 3I to 4%. There exist, besides, in Denmark several mutual loan associations (Kreditjoreninger) , whose business is the granting of loans on mortgage. Registration of mortgages is compulsory in Denmark, and the system is extremely simple, a fact which has been of the greatest importance for the improve- ment of the country. There are comparatively large institutions for insurance of all kinds in Denmark. The largest office for life insurance is a state institution. By law of the 9th of April 1891 a system of old-age pensions was established for the benefit of persons over sixty years of age.

Government. — Denmark is a limited monarchy, according to the law of 1849, revised in 1866. The king shares his power with the parliament (Rigsdag), which consists of two chambers, the Landsthing and the Folkething, but the constitution contains no indication of any difference in their attributes. The Lands thing, or upper house, however, is evidently intended to form the con- servative element in the constitutional machinery. While the 1 14 members of the Folkething (House of Commons) are elected for three years in the usual way by universal suffrage, 12 out of the 66 members of the Landsthing are life members nominated by the crown. The remaining 54 members of the Landsthing are returned for eight years according to a method of proportionate representation by a body of deputy electors. Of these deputies one-half are elected in the same way as members of the Folke- thing, without any property qualification for the voters; the other half of the deputy electors are chosen in the towns by those who during the last preceding year were assessed on a certain minimum of income, or paid at least a certain amount in rates

and taxes. In the rural districts the deputy electors returned by election are supplemented by an equal number of those who have paid the highest amounts in taxes and county rate – together. In this manner a representation is secured for fairly large minorities, and what is considered a fair share of influence on public affairs given to those who contribute the most to the needs of the state. The franchise is held by every male who has reached his thirtieth year, subject to independence of public charity and certain other circumstances. A candidate for either house of the Rigsdag must have passed the age of twenty-five. Members are paid ten kroner each day of the session and are allowed travelling expenses. The houses meet each year on the first Monday in October. The constitutional theory of the Folkething is that of one member for every 16,000 inhabitants. The Faeroe islands, which form an integral part of the kingdom of Denmark in the wider sense, are represented in the Danish parliament, but not the other dependencies of the Danish crown, namely Iceland, Greenland and the West Indian islands of St Thomas, St John and St Croix. The budget is considered by the Folkething at the beginning of each session. The revenue and expenditure average annually about £4,700,000. The principal items of revenue are customs and excise, land and house tax, stamps, railways, legal fees, the state lottery and death duties. A considerable reserve fund is maintained to meet emergencies. The public debt is about £13,500,000 and is divided into an internal debt, bearing interest generally at 3i%, and a foreign debt (the larger), with interest generally at 3 %. The revenue and expenditure of the Faeroes are included in the budget for Denmark proper, but Iceland and the West Indies have their separate budgets. The Danish treasury receives nothing from these possessions; on the contrary, Iceland receives an annual grant, and the West Indian islands have been heavily subsidized by the Danish finances to

assist the sugar industry. The administration of Greenland (q.v.) entails an annual loss which is posted on the budget of the ministry of finances. The state council (Statsraad) includes the presidency of the council and ministries of war, and marine, foreign affairs, the interior, justice, finance, public institution and ecclesiastical, agriculture and public works.

Local Government. — For administrative purposes the country is

divided into eighteen counties (Amter, singular Ami), as follows. (1) Covering the islands of Zealand and lesser adjacent islands, Copenhagen, Frederiksborg, Holbaek, Soro, Praesto. (2) Cover- ing the islands of Laaland and Falster, Maribo. (3) Covering Fiinen, Langeland and adjacent islets, Svendborg, Odense. (4) On the mainland, Hjorring, Aalborg, Thisted, Ringkjobing, Viborg, Randers, Aarhus, Vejle, Ribe. (5} Bornholm. The principal civil officer in each of these is the Amlmand. Local affairs are managed by the Amstraad and Sogneraad, correspond- ing to the English county council and parish council. These institutions date from 1841, but they have undergone several modifications since. The members of these councils are elected on a system similar to that applied to the elections for the Landsthing. The same is the case with the provincial town councils. That of Copenhagen is elected by those who are rated on an income of at least 400 kroner (£2 2). The burgomasters are appointed by the crown, except at Copenhagen, where they are elected by the town council, subject to royal approbation. The financial position of the municipalities in Denmark is generally good. The ordinary budget of Copenhagen amounts to about £1,100,000 a year.

Justice. — For the administration of justice Denmark is divided into herreds or hundreds; as, however, they are mostly of small extent, several are generally served by one judge (herredsfoged) ; the townships are likewise separate jurisdictions, each with a byfcged. There are 126 such local judges, each of whom deals with all kinds of cases arising in his district, and is also at the head of the police. There are two intermediary Courts of Appeal (Overret), one in Copenhagen, another in Viborg; the Supreme Court of Appeal (Hojesteret) sits at Copen- hagen. In the capital the different functions are more divided. There is also a Court of Commerce and Navigation, on which leading members of the trading community serve as assessors. In the country, Land Commissions similarly constituted deal with many questions affecting agricultural holdings. A peculiarity of the Danish system is that, with few exceptions, no civil cause can be brought before a court until an attempt has been made at effecting an amicable settlement. This is mostly done by so-called Committees of Conciliation, but in some cases by the court itself before commencing formal judicial proceedings. In this manner three-fifths of all the causes are settled, and many which remain unsettled are abandoned by the plaintiffs. Sanitary matters are under the control of a Board of Health. The whole country is divided into districts, in each of which a medical man is appointed with a salary, who is under the obligaˆ- tion to attend to poor sick and assist the authorities in medical matters, inquests, &c. The relief of the poor is well organized, mostly on the

system of out-door relief. Many workhouses have been established for indigent persons capable of work. There are also many almshouses and similar institutions.

Army and Navy. — The active army consists of a life guard battalion and 10 infantry regiments of 3 battalions each, infantry, S cavalry regiments of 3 squadrons each, 12 field batteries (now re-armed with a Krupp Q.F. equipment), 3 battalions of fortress artillery and 6 companies of engineers, with in addition various local troops and details. The peace strength of permanent troops, without the annual contingent of recruits, is about 13,500 officers and men, the annual contingent of men trained two or three years with the colours about 22,500, and the annual contingent of special reservists (men trained for brief periods) about 17,000. Thus the number of men maintained under arms (without calling up the reserves) is as high as 75,000 during certain periods of the year and averages nearly 60,000. Reservists who have definitively left the colours are recalled for short refresher trainings, the number of men so trained in 1907 being

about 80,000. The field army on a war footing, without depot troops, garrison troops and reservists, would be about 50,000 strong, but by constituting new cadres at the outbreak of war and calling up the reserves it could be more than doubled, and as a matter of fact nearly 1 20,000 men were with the colours in the manoeuvre season in 1907. The term of service is eight years in the active army and its reserves and eight years in the second line. The armament of the infantry is the Krag-jorgensen of •314 in. calibre, model 1889, that of the field artillery a 7-5 cm. Krupp Q.F. equipment, model 1902. The navy consists of 6 small battleships, 3 coast defence armour-clads, 5 protected cruisers, 5 gun-boats, and 24 torpedo craft.

Religion. — The national or state church of Denmark is officially styled ” Evangelically Reformed,” but is popularly described as Lutheran. The king must belong to it. There is complete religious toleration, but though most of the important Christian communities are represented their numbers are very small. The Mormon apostles for a considerable time made a special raid upon the Danish peasantry and a few hundreds profess this faith. There are seven dioceses, Fiinen, Laaland and Falster, Aarhus, Aalborg, Viboxg and Ribe, while the primate is the bishop of Zealand, and resides at Copenhagen, but his cathedral is at Roskilde. The bishops have no political function by reason of their office, although they may, and often do, take a prominent part in politics. The greater part of the pastorates comprise more than one parish. The benefices are almost without excep- tion provided with good residences and glebes, and the tithes, &c,

generally afford a comfortable income. The bishops have fixed salaries in lieu of tithes appropriated by the state.

Education and Arts.- — The educational system of Denmark is maintained at a high standard. The instruction in primary schools is gratuitous. Every child is bound to attend the parish school at least from the seventh to the thirteenth year, unless the parents can prove that it receives suitable instruction in other ways. The schools are under the immediate control of school boards appointed by the parish councils, but of which the incumbent of the parish is ex-officio member; superior control is exercised by the Amtmand, the rural dean, and the bishop, under the Minister for church and education. Secondary public schools are provided in towns, in which moderate school fees are paid. There are also public grammar-schools. Nearly all schools are day-schools. There are only two public schools, which, though on a much smaller scale, resemble the great English schools, namely, those of Soro and Herlufsholm, both founded by private munifi- cence. Private schools are generally under a varying measure of public control. The university is at Copenhagen (q.v.). Amongst numerous other institutions for the furtherance of science and training of various kinds may be mentioned the large polytechnic schools; the high school for agriculture and veter- inary art; the royal library; the royal society of sciences; the museum of northern antiquities; the society of northern antiquaries, &c. The art museums of Denmark are not consider- able, except the museum of Thorvaldsen, at Copenhagen, but much is done to provide first-rate training in the fine arts and their application to industry through the Royal Academy of Arts, and its schools. Finally, it may be mentioned that a sum proportionately large is available from public funds and regular parliamentary grants for furthering science and arts by temporary . subventions to students, authors, artists and others of insufficient means, in order to enable them to carry out particular works, to profit by foreign travel, &c. The principal scientific societies and institutions are detailed under Copenhagen. During the earlier part of the 19th century not a few men could be mentioned who enjoyed an exceptional reputation in various departments of science, and Danish scientists continue to contribute their full share to the advancement of knowledge. The society of sciences, that of northern antiquaries, the natural history and the botanic cal societies, &c, publish their transactions and proceedings, but the Naturhistorisk Tidsskrift, of which 14 volumes with 259 plates were published (1861-1884), and which was in the foremost rank in its department, ceased with the death in 1884 of the editor, the distinguished zoologist, I. C. Schiodte.

JHISTORY

Another extremely valuable publication of wide general interest, the Meddelelser om Gronland, is published by the commission for the exploration of Greenland. What may be called the modern ” art ” current, with its virtues and vices, is as strong in Denmark as in England. Danish sculpture will be always famous, if only through the name of Thorvaldsen. In architecture the prevailing fashion is a return to the style of the first half of the 17th century, called the Christian IV. style; but in this branch of art no marked excellence has been obtained.

Authorities. — J. P. Trap, Statistisk Topographisk Beskrivelse af Kongeriget Danmark (Copenhagen, 1859-1860, 3 vols., 2nd ed., 1872-1879) ; V. Falbe-Hansen and W. Scharling, Danmarks Statistik (Copenhagen, 1878-1891, 6 vols.). (Various writers) Vort Folk i det nittende Aarhundrede (Copenhagen, 1899 et seq.), illustrated; J. Carlsen, H. Olrik and C. N. Starcke, Le Danemark (Copenhagen, 1900), 700 pp. ; illustrated, published in connexion with the Paris Exhibition. Statistisk Aarbog (1896, &c). Annual publication, and other publications of Statens Statistiske Bureau, Copenhagen;. Annuaire mtieorologique, Danish Meteorological Institution, Copen- hagen ; E. Loffler, Danemarks Natur and Volk (Copenhagen, 1905) ; Margaret Thomas, Denmark Past and Present (London, 1902). 6 (C. A. G.;0. J. R. H.)

History

Ancient. — Our earliest knowledge of Denmark is derived from Pliny, who speaks of three islands named ” Skandiai,” a name which is also applied to Sweden. He says nothing about the inhabitants of these islands, but tells us more about the Jutish peninsula, or Cimbric Chersonese as he calls it. He places the Saxons on the neck, above them the Sigoulones, Sabaliggoi and Kobandoi, then the Chaloi, then above them the “Phoundousioi, then the Charondes and finally the Kimbroi. He also mentions the three islands called Alokiai, at the northern end of the peninsula. This would point to the fact that the Limfjord was then open at both ends, and agree with Adam of Bremen (iv. 16), who also speaks of three islands called Wendila, Morse and Thud. The Cimbri and Charydes are mentioned in the Monumentum Ancyranum as sending embassies to Augustus in a.d. 5. The Promontorium Cimbrorum is spoken of in Pliny, who says that the Sinus Codanus lies between it and Mons Saevo. The latter place is

probably to be found in the high- lying land on the N.E. coast of Germany, and the Sinus Codanus must be the S.W. corner of the Baltic, and not the whole sea. Pomponius Mela says that the Cimbri and Teutones dwelt on the Sinus Codanus, the latter also in Scandinavia (or Sweden). The Romans believed that these Cimbri and Teutones were the same as those who invaded Gaul and Italy at the end of the 2nd century B.C. The Cimbri may probably be traced in the province of Aalborg, formerly known as Himmerland; the Teutones, with less certainty, may be placed in Thyth or Thyland, north of the Limfjord. No further reference to these districts is found till towards the close of the migration period, about the beginning of the 6th century, when the Heruli (q.v.), a nation dwelling in or near the basin of the Elbe, were overthrown by the Langobardi. According to Procopius (Bellum Gothicum, ii. 15), a part of them made their way across the " desert of the Slavs," through the lands of the Warni and the Danes to Thoule (i.e. Sweden). This is the first recorded use of the name " Danes." It occurs again in Gregory of Tours (Historiae Francorum, iii. 3) in connexion with an irruption of a Gotish (loosely called Danish) fleet into the Netherlands (c. 520). From this time the use of the name is fairly common. The heroic poetry of the Anglo-Saxons may carry the name further back, though probably it is not very ancient, at all events on the mainland.

According to late Danish tradition Denmark now consisted of Vitheslaeth (i.e. Zealand, Moen, Falster and Laaland), Jutland (with Fyen) and Skaane. Jutland was acquired by Dan, the eponymous ancestor of the Danes. He also won Skaane, including the modern provinces of Halland, Kristianstad, Malmohus and Blekinge, and these remained part of Denmark until the middle of the 17th century. These three divisions aiways remained more or less distinct, and the Danish kings had to be recognized at Lund, Ringsted and Viborg, but Zealand was from time immemorial the centre of government, and Lejre was the royal seat and national sanctuary. According to tradition

this dates from the time of Skioldr, the eponymous ancestor of the Danish royal family of Skioldungar. He was a son of Othin and husband of the goddess Gefjon, who created Zealand. Anglo- Saxon tradition also speaks of Scyld (i.e. Skioldr), who was regarded as the ancestor of both the Danish and English royal families, and it represented him as coming as a child of unknown origin in a rudderless boat. There can be little doubt that from a remote antiquity Zealand had been a religious sanctuary, and very probably the god Nerthus was worshipped here by the Angli and other tribes as described in Tacitus (Germania, c. 40). The Lejre sanctuary was still in existence in the time of Thietmar of Merseburg (i. 9), at the beginning

of the nth century.

In Scandinavian tradition the next great figure is Fr65e the peace-king, but it is not before the 5th century that we meet with the names of any kings which can be regarded as definitely historical. In Beowulf we hear of a Danish king Healfdene, who had three sons, Heorogar, Hrothgar and Halga. The hero Beowulf comes to the court of Hrothgar from the land of the Gotar, where Hygelac is king. This Hygelac is undoubtedly to be identified with the Chochilaicus, king of the Danes (really Gotar) who, as mentioned above, made a raid against the Franks c. 520. Beowulf himself won fame in this campaign, and by the aid of this definite chronological datum we can place the reign of Healfdene in the last half of the 5th century, and that of Hrothgar's nephew Hrothwulf, son of Halga, about the middle of the 6th century. Hrothgar and Halga correspond to Saxo's Hroar and Helgi, while Hrothwulf is the famous Rolvo or Hrolfr Kraki of Danish and Norse saga. There is probably some historical truth in the story that Heoroweard or HiorvarSr was responsible for the death of Hrolfr Kraki. Possibly a still earlier king of Denmark was Sigarr or Sigehere, who has won lasting fame from the story of his daughter Signy and her lover HagbaroY.

From the middle of the 6th to the beginning of the 8th century we know practically nothing of Danish history. There are numerous kings mentioned in Saxo, but it is impossible to identify them historically. We have mention at the beginning of the 8th century of a Danish king Ongendus (cf. O. E. Ongenheow) who received a mission led by St Willibrord, and it was probably about this time that there flourished a family of whom tradition records a good deal. The founder of this line was Ivarr ViSfaSmi of Skaane, who became king of Sweden. His daughter AuSr married one Hroerekr and became the mother of Haraldr Hilditonn. The genealogy of Haraldr is given differently in Saxo, but there can be no doubt of his historical existence. In his time it is said that the land was divided into four kingdoms — Skaane, Zealand, Fyen and Jutland. After a reign of great splendour Haraldr met his death in the great battle of Bravalla (Bravik in Ostergotland), where he was opposed by his nephew Ring, king of Sweden.

The battle probably took place about the year 750. Fifty years later the Danes begin to be mentioned with comparative frequency in continental annals. From 777-798 we have mention of a certain Sigifridus as king of the Danes, and then in 804 his name is replaced by that of one Godefridus. This Godefridus is the Godefridus-Guthredus of Saxo, and is to be identified also with GuSroor the Yngling, king in Vestfold in Norway. He came into conflict with

Charlemagne, and was preparing a great expedition against him when he was killed by one of his own followers (c. 810). He was succeeded by his brother Hemmingus, but the latter died in 812 and there was a disputed succession. The two claimants were ” Sigefridus nepos Godefridi regis ” and ” Anulo nepos Herioldi quondam regis ” (i.e. probably Haraldr Hilditonn). A great battle took place in which both claimants were slain, but the party of Anulo (O.N. Ali) were victorious and appointed as kings Anulo’s brothers Herioldus and Reginfridus. They soon paid a visit to Vestfold, ” the extreme district of their realm, whose peoples and chief men were refusing to be made subject to them,” and on their return had trouble with the sons of Godefridus. The latter expelled them from their kingdom, and in 814 Reginfridus fell in a vain attempt to regain it. Herioldus now received the support of the emperor,

and after several unsuccessful attempts a compromise was effected in 819 when the parties agreed to share the realm. In 820 Herioldus was baptized at Mainz and received from the emperor a grant of Riustringen in N.E. Friesland. In 827 he was expelled from his kingdom, but St Anskar, who had been sent with Herioldus to preach Christianity, remained at his post. In 836 we find one Horic as king of the Danes; he was probably a son of Godefridus. During his reign there was trouble with the emperor as to the overlordship of Frisia. In the meantime Herioldus remained on friendly terms with Lothair and received a further grant of Walcheren and the neighbouring districts. In 850 Horic was attacked by his own nephews and compelled to share the kingdom with them, while in 852 Herioldus was charged with treachery and slain by the Franks. In 854 a revo- lution took place in Denmark itself. Horic’s nephew Godwin, returning from exile with a large following of Northmen, over- threw his uncle in a three days’ battle in which all members of the royal house except one boy are said to have perished. This boy now became king as ” Horicus junior.” Of his reign we know practically nothing. The next kings mentioned are Sigafrid and Halfdane, who were sons of the great Viking leader Ragnarr LoSbrok. There is also mention of a third king named Godefridus. The exact chronology and relationship of these kings it is impossible to determine, but we know that Healfdene died in Scotland in 877, while Godefridus was treacherously slain by Henry of Saxony in 885. During these and the next few years there is

mention of more than one king of the names Sigefridus and Godefridus: the most important event associated with their names is that two kings Sigefridus and Godefridus fell in the great battle on the Dyle in 891.

We now have the names of several kings, Heiligo, Olaph (of Swedish origin), and his sons Chnob and Gurth. Then come a Danish ruler Sigeric, followed by Hardegon, son of Swein, coming from Norway. At some date after 916 we find mention of one ” Hardecnuth Urm ” ruling among the Danes. Adam of Bremen, from whom these details come, was himself uncertain whether ” so many kings or rather tyrants of the Danes ruled together or succeeded one another at short intervals.” Hardecnuth Urm is to be identified with the famous Gorm the old, who married Thyra Danmarkarbot: their son was Harold Bluetooth.

(A. Mw.)

Medieval and Modern. — Danish history first becomes authentic at the beginning of the 9th century. The Danes, the southern- most branch of the Scandinavian family, referred to by Alfred (c. 890) as occupying Jutland, the islands and Scania, were, in 777, strong enough to defy the Frank empire by harbouring its fugitives. Five years later we find a Danish king, Sigfrid, among the princes who assembled at I.ippe in 782 to make their submission to Charles the Great. About the same time Willibrord, from his see at Utrecht, made an unsuccessful attempt to convert the ” wild Danes.” These three salient facts are practically the sum of our knowledge of early Danish history previous to the Viking period. That mysterious upheaval, most generally attributed to a love of adventure, stimulated by the pressure of over-population, began with the ravaging of Lindisfarne in 793, and virtually terminated with the establish- ment of Rollo in Normandy (911). There can be little doubt that the earlier of these expeditions were from Denmark, though the ‘term Northmen was originally applied indiscriminately to all these terrible visitants from the unknown north. The rovers who first chastened and finally colonized southern England and Normandy were certainly Danes.

The Viking raids were one of the determining causes of the establishment of the feudal monarchies of western Europe, but the un tameable freebooters were themselves finally Con ” . subdued by the Church. At first sight it seems curious V theDanes. that Christianity should have been so slow to reach Denmark. But we must bear in mind that one very important consequence of the Viking raids was to annihilate the geographical remoteness which had hitherto separated

Denmark from the Christian world. Previously to 793 there lay between Jutland and England a sea which no keel had traversed within

the memory of man. The few and peaceful traders who explored those northern waters were careful never to lose sight of the Saxon, Frisian and Frankish shores during their passage. Nor was communication with the west by land any easier. For genera- tions the obstinately heathen Saxons had lain, a compact and impenetrable mass, between Scandinavia and the Frank empir?, nor were the measures adopted by Charles the Great for the conversion of the Saxons to the true faith very much to the liking of their warlike Danish neighbours on the other side. But by the time that Charles had succeeded in ” converting ” the Saxons, the Viking raids were already at their height, and though generally triumphant, necessity occasionally taught the Northmen the value of concessions. Thus it was the desire to secure his Jutish kingdom which induced Harold Klak, in 826, to sail up the Rhine to Ingelheim, and there accept baptism, with his wife, his son Godfred and 400 of his suite, acknowledging the emperor as his overlord, and taking back with him to Denmark the missionary monk Ansgar. Ansgar preached in Denmark from 826 to 861, but it was not till after the subsidence of the Viking raids that Adaldag, archbishop of Hamburg, could open a new and successful mission, which resulted in the erection of the bishoprics of Schleswig, Ribe and Aarhus (c. 948), though the real conversion of Denmark must be dated from the baptism of King Harold Bluetooth (960).

Meanwhile the Danish monarchy was attempting to aggrandize itself at the expense of the Germans, the Wends who then occupied the Baltic littoral as far as the Vistula, and the other Scandinavian kingdoms. Harold Bluetooth expansion. (940-986) subdued German territory south of the Eider, extended the Danevirke, Denmark’s great line of defensive fortifications, to the south of Schleswig and planted the military colony of Julin or Jomsborg, at the mouth of the Oder. Part of Norway was first seized after the united Danes and Swedes had defeated and slain King Olaf Trygvesson at the battle of Svolde (1000); and between 1028 and 1035 Canute the Great added the whole kingdom to his own; but the union did not long survive him. Equally short-lived was the Danish dominion in England, which originated in a great Viking expedition of King Sweyn I.

The period between the death of Canute the Great and the accession of Valdemar I. was a troublous time for Denmark. The k> gdom was harassed almost incessantly, and consoiida- more than once partitioned.by pretenders to the throne, tion of the who did not

scruple to invoke the interference of the kI “i do ˆl neighbouring monarchs, and even of the heathen vaide- Wends, who established themselves for a time on mars, the southern islands. Yet, throughout this chaos, one 1, ˆ 7m thing made for future stability, and that was the growth and consolidation of a national church, which culmin- ated in the erection of the archbishopric of Lund (c. n 04) and the consequent ecclesiastical independence of Denmark. The third archbishop of Lund was Absalon (n 28-1 201), Denmark’s first great statesman, who so materially assisted Valdemar I. (1157-1182) and Canute VI. (1182-1202) to establish the dominion of Denmark over the Baltic, mainly at the expense of the Wends. The policy of Absalon was continued on a still vaster scale by Valdemar II. (1202-1241), at a time when the German kingdom was too weak and distracted to intervene to save its seaboard; but the treachery of a vassal and the loss of one great battle sufficed to plunge this unwieldy, unsubstantial empire in the dust. (See Valdemar I., II., and Absalon.)

Yet the age of the Valdemars was one of the most glorious in Danish history, and it is of political importance as marking a turning-point. Favourable circumstances had, from the first, given the Danes the lead in Scandinavia. They held the richest and therefore the most populous lands, and geographically they were nearer than their neighbours to western civilization. Under the Valdemars, however, the ancient patriarchal system was merging into a more complicated development, of separate estates. The monarchy, now dominant, and far wealthier than before, rested upon the support of the great nobles, many of whom held their lands by feudal tenure, and constituted the royal Raad, or council. The clergy, fortified by royal privileges,

had also risen to influence; but celibacy and independence of the civil courts tended to make them more and more of a separate caste. Education was spreading. Numerous Danes, lay as well as clerical, regularly frequented the university of Paris. There were signs too of the rise of a vigorous middle class, due to the extraordinary development of the national resources (chiefly the herring fisheries, horse-breeding and cattle-rearing) and the foundation of gilds, the oldest of which, the Edslag of Schleswig, dates from the early 12th century. The bonder, or yeomen, were prosperous and independent, with well-defined rights. Danish territory extended over 60,000 sq.

kilometres, or nearly double its present area; the population was about 700,000; and 160,000 men and 1400 ships were available for national defence.

On the death of Valdemar II. a period of disintegration ensued.

Valdemar's son, Eric Plovpenning, succeeded him as king; but

his near kinsfolk also received huge appanages, and

Period of family discords led to civil wars. Throughout the

tion. tegra " I 3 th and P art of the I4th centurv , tbe struggle raged between the Danish kings and the Schleswig dukes; and of six monarchs no fewer than three died violent deaths. Superadded to these troubles was a prolonged struggle for supremacy between the popes and the crown, and, still more serious, the beginning of a breach between the kings and nobles, which had important constitutional consequences. The prevalent disorder had led to general lawlessness, in consequence of which the royal authority had been widely extended; and a strong opposition gradually arose which protested against the abuses of this authority. In 1282 the nobles extorted from King Eric dipping the first Haandfoestning, or charter, which recognized the Danehof, or national assembly, as a regular branch of the administration and gave guarantees against further usurpations. Christopher II. (1319-1331) was constrained to grant another charter considerably reducing the prerogative, increasing the privileges of the upper classes, and at the same time reducing the burden of taxation. But aristocratic licence proved as mischiev- ous as royal incompetence; and on the death of Christopher II. the whole kingdom was on the verge of dissolution. Eastern Denmark was in the hands of one magnate; another magnate held Jutland and Funen in pawn ; the dukes of Schleswig were practically independent of the Danish crown; the Scandian pro- vinces had (1332) surrendered themselves to Sweden.

It was reserved for another Valdemar (Valdemar IV., q.v.) to reunite and weld together the scattered members of his heritage. Vaide- His long reign (1340-1375) resulted in the re-establish- mariv., ment of Denmark as the great Baltic power. It is also 1340- a verv interesting period of her social and constitutional

1 75 ' development. This great ruler, who had to fight, year

after year, against foreign and domestic foes, could, nevertheless, always find time to promote the internal prosperity of his much

afflicted country. For the dissolution of Denmark, during the long anarchy, had been internal as well as external. The whole social fabric had been convulsed and transformed. The monarchy had been undermined. The privileged orders had aggrandized themselves at the expense of the community. The yeoman class had sunk into semi-serfdom. In a word, the natural cohesion of the Danish nation had been loosened and there was no security for law and justice. To make an end of this universal lawlessness Valdemar IV. was obliged, in the first place, to re-establish the royal authority by providing the crown with a regular and certain income. This he did by recovering the alienated royal demesnes in every direction, and from henceforth the annual landgilde, or rent, paid by the royal tenants, became the monarch's principal source of revenue. Throughout his reign Valdemar laboured incessantly to acquire as much land as possible. Moreover, the old distinction between the king's private estate and crown property henceforth ceases; all such property was henceforth regarded as the hereditary possession of the Danish crown.

The national army was also re-established on its ancient footing. Not only were the magnates sharply reminded that they held their lands on military tenure x but the towns were also made to contribute both men and ships, and peasant levies, especially archers, were recruited from every parish. Everywhere indeed

Valdemar intervened personally. The smallest detail was not beneath his notice. Thus he invented nets for catching wolves and built innumerable water-mills, " for he would not let the waters run into the sea before they had been of use to the community." Under such a ruler law and order were speedily re- established. The popular tribunals regained their authority, and a supreme court of justice, Del Kongelige Retterting, presided over by Valdemar himself, not only punished the unruly and guarded the prerogatives of the crown, but also protected the weak and defenceless from the tyranny of the strong. Nor did Valdemar hesitate to meet his people in public and periodically render an account of his stewardship. He voluntarily resorted to the old practice of summoning national assemblies, the so-called Danehof. At the first of these assemblies held at Nyborg, Midsummer Day 13 14, the bishops and councillors solemnly promised that the commonalty should enjoy all the ancient rights and privileges conceded to them by Valdemar II., and the wise provision that the Danehof should meet annually considerably strengthened its authority. The keystone to the whole constitutional system was " King Valdemar's Charter " issued in May 1360 at the Rigsmbde, or parliament, held at Kalundborg in May 1360. This charter was practically an act of national pacification, the provisions of which king

and people together undertook to enforce for the benefit of the commonweal.

The work of Valdemar was completed and consolidated by his illustrious daughter Margaret (1375-14T2), whose crowning achievement was the Union of Kalmar (1397), whereby she sought to combine the three northern kingdoms Ths Vaioa into a single state dominated by Denmark. In any jrjp 7 _ a ‘ case Denmark was bound to be the only gainer by the Union. Her population was double that of the two other kingdoms combined, and neither Margaret nor her successors observed the stipulations that each country should retain its own laws and customs and be ruled by natives only. In both Norway and Sweden, therefore, the Union was highly unpopular. The Norwegian aristocracy was too weak, however, seriously to endanger the Union at any time, but Sweden was, from the first, decidedly hostile to Margaret’s whole policy. Nevertheless during her lifetime the system worked fairly well; but her pupil and successor, Eric of Pomerania, was unequal to the burden of empire and embroiled himself both with his neighbours and his subjects. The Hanseatic League, whose political ascendancy had been shaken by the Union, enraged by Eric’s efforts to bring in the Dutch as commercial rivals, as well as by the establish- ment of the Sound tolls, materially assisted the Holsteiners in their twenty-five years’ war with Denmark (1410-35), and Eric VII. himself was finally deposed (1439) in favour of his nephew, Christopher of Bavaria.

The deposition of Eric marks another turning-point in Danish history. It was the act not of the people but of the Rigsraad (Senate), which had inherited the authority of the Growth of ancient Danehof and, after the death of Margaret, the power grew steadily in power at the expense of the crown. o/ ‘* e As the government grew more and more aristocratic, the position of the peasantry steadily deteriorated. It is under Christopher that we first hear, for instance, of the Vornedskab, or patriarchal control of the landlords over their tenants, a system which degenerated into rank slavery. In Jutland, too, after the repression, in 144 1, of a peasant rising, something very like serfdom was introduced.

On the death of Christopher III. without heirs, in 1448, the Rigsraad elected his distant cousin, Count Christian of Oldenburg, king; but Sweden preferred Karl Knutsson (Charles ” VIII.”), while Norway finally combined with Den- Break-up mark, at the conference of Halmstad, in a double y a y ˆ election which practically terminated the Union, though an agreement was come to that the survivor of the two kings should reign over all three kingdoms. Norway, subse- quently,

threw in her lot definitively with Denmark. Dissensions resulting in interminable civil wars had, even before the Union, exhausted the resources of the poorest of the three northern realms; and her ruin was completed by the ravages of the Black

Death, which wiped out two-thirds of her population. Unfortu- nately, too, for Norway's independence, the native gentry had gradually died out, and were succeeded by immigrant Danish fortune-hunters; native burgesses there were none, and the peasantry were mostly thralls; so that, excepting the clergy, there was no patriotic class to stand up for the national liberties.

Far otherwise was it in the wealthier kingdom of Sweden. Here the clergy and part of the nobility were favourable to the Union; but the vast majority of the people hated it as a foreign usurpa- tion. Matters were still further complicated by the continual interference of the Hanseatic League; and Christian I. (1448- 1481) and Hans (1481-1513), whose chief merit it is to have founded the Danish fleet, were, during the greater part of their reigns, only nominally kings of Sweden. Hans also received in fief the territory of Dietmarsch from the emperor, but, in attempting to subdue the hardy Dietmarschers, suffered a crushing defeat in which the national banner called " Danebrog " fell into the enemy's hands (1 500) . Moreover, this defeat led to a successful rebellion in Sweden, and a long and ruinous war with Ltibeck, terminated by the peace of Malmo, 1512. It was during this war that a strong Danish fleet dominated the Baltic for the first time since the age of the Valdemars.

On the succession of Hans's son, Christian II. (1513-1523), Margaret's splendid dream of a Scandinavian empire seemed, finally, about to be realized. The young king, a man 11 1513° °^ c ^ aracter an d genius, had wide views and original 1523. ideas. Elected king of Denmark and Norway, he suc-

ceeded in subduing Sweden by force of arms; but he spoiled everything at the culmination of his triumph by the hideous crime and blunder known as the Stockholm massacre, which converted the politically divergent Swedish nation into the irreconcilable foe of the unional government (see Christian II.). Christian's contempt of

nationality in Sweden is the more remarkable as in Denmark proper he sided with the people against the aristocracy, to his own undoing in that age of privilege and prejudice. His intentions, as exhibited to his famous Landelove (National Code*), were progressive and enlightened to an eminent degree; so much so, indeed, that they mystified the people as much as they alienated the patricians; but his actions were often of revolting brutality, and his whole career was vitiated by an incurable double-mindedness which provoked general distrust. Yet there is no doubt that Christian II. was a true patriot, whose ideal it was to weld the three northern kingdoms into a powerful state, independent of all foreign influences, especially of German influence as manifested in the commercial tyranny of the Hansa League. His utter failure was due, partly to the vices of an undisciplined temperament, and partly to the extraordinary difficulties of the most inscrutable period of European history, when the shrewdest heads were at fault and irreparable blunders belonged to the order of the day. That period was the period of the Reformation, which profoundly affected the politics of Scandinavia. Christian II. had always subordinated religion to politics, and was Papist or Lutheran according to circumstances. But, though he treated the Church more like a foe than a friend and was constantly at war with the Curia, he retained the Catholic form of church worship and never seems to have questioned the papal supremacy. On the flight of Christian II. and the election of his uncle, Frederick I. (1523- Fr d rick J 533)> t ˆ le Church resumed her jurisdiction and every- /., 1523- thing was placed on the old footing. The newly 1533. The elected and still insecure German king at first remained Reforms- neu t r al; but in the autumn of 1525 the current of Lutheranism began to run so strongly in Denmark as to threaten to whirl away every opposing obstacle. This novel and disturbing phenomenon was mainly due to the zeal and eloquence of the ex-monk Hans Tausen and his associates, or disciples, Peder Plad and Sadolin; and, in the autumn of 1526, Tausen was appointed one of the royal chaplains. The three ensuing years were especially favourable for the Reformation, as during that time the king had unlooked-for opportunities for filling the vacant episcopal sees with men after his own heart,

and at heart he was a Lutheran. The reformation movement in Denmark was further promoted by Schleswig-Holstein influence. Frederick's eldest son Duke Christian had, since 1527, resided at Haderslev, where he collected round him Lutheran teachers from Germany, and made his court the centre of the propaganda of the new doctrine. On the other hand, the Odense Recess of the 20th of August 1527, which put both confessions on a footing of equality, remained

unrepealed; and so long as it remained in force, the spiritual jurisdiction of the bishops, and, consequently, their authority over the ” free preachers ” (whose ambition convulsed all the important towns of Denmark and aimed at forcibly expelling the Catholic priests from their churches) remained valid, to the great vexation of the reformers. The inevitable ecclesiastical crisis was still further postponed by the superior stress of two urgent political events — Christian II. ‘s invasion of Norway (1531) and the outbreak, in 1533, of ” Grevens fejde,” or “The Count’s War” (1534-36), Th the count in question being Christopher of Oldenburg, count’s great-nephew of King Christian I., whom Liibeck and War, her allies, on the death of Frederick I., raised up ‘ff 3 ‘ against Frederick’s son Christian III. The Catholic party and the lower orders generally took the part of Count Christopher, who acted throughout as the nominee of the captive Christian II., while the Protestant party, aided by the Holstein dukes and Gustavus Vasa of Sweden, sided with Christian III. The war ended with the capture of Copenhagen by the forces of Christian III., on the 29th of July 1536, and the triumph of so devoted a Lutheran sealed the fate of the Roman Catholic Church in Denmark, though even now it was necessary for the victorious king to proceed against the bishops and their friends by a coup d’itat, engineered by his German generals the Rantzaus. The Recess of 1536 enacted that the bishops should forfeit their temporal and spiritual authority, and that all their property should be transferred to the crown for the good of the common-wealth. In the following year a Church ordinance, based upon the canons of Luther, Melanchthon and Bugenhagen, was drawn up, submitted to Luther for his approval, and promulgated on the 2nd of September 1537. On the same day seven ” super- intendents,” including Tausen and Sadolin, all of whom had worked zealously for the cause of the Reformation, were consecrated in place of the dethroned bishops. The position of the superintendents and of the reformed church generally was consolidated by the Articles of Ribe in 1542, and the constitution of the Danish church has practically continued the same to the present day. But Catholicism could not wholly or immediately be dislodged by the teaching of Luther. It had struck deep roots into the habits and feelings of the people, and traces of its survival were distinguishable a whole century after the triumph of the Reformation. Catholicism lingered longest in the cathedral chapters. Here were to be found men of ability proof against the eloquence of Hans Tausen or Peder Plad and quite capable of controverting their theories — men like Povl Helgesen, for instance, indisputably the greatest Danish theologian of his day, a scholar whose voice was drowned amidst the clash of conflicting creeds.

Though the Reformation at first did comparatively little for education, 1 and the whole spiritual life of Denmark was poor and feeble in consequence for at least a generation after- wards, the change of religion was of undeniable, if the n e . temporary, benefit to the state from the political formation. point of view. The enormous increase of the royal revenue consequent upon the confiscation of the property of the Church could not fail to increase the financial stability of the monarchy. In particular the suppression of the monasteries benefited the crown in two ways. The old church had, indeed, frequently rendered the state considerable financial aid, but such voluntary assistance was, from the nature of the case, casual and arbitrary. Now, however, the state derived a fixed and certain revenue from the confiscated lands; and the possession

1 It is true the university was established on the 9th of September 1537, but its influence was of very gradual growth and small at first.

of immense landed property at the same time enabled the crown advantageously to conduct the administration. The gross revenue of the state is estimated to have risen threefold. Before the Reformation the annual revenue from land averaged 400,000 bushels of corn; after the confiscations of Church property it averaged 1,200,000 bushels. The possession of a full purse materially assisted the Danish government in its domestic administration, which was indeed epoch-making. It enabled Christian III. to pay off his German mercenaries immediately after the religious coup d'ttat of 1536. It enabled him to prosecute shipbuilding with such energy that, by, 1550, the royal fleet numbered at least thirty vessels, which were largely employed as a maritime police in the pirate-haunted Baltic and North Seas. It enabled him to create and remunerate adequately a capable official class, which proved its efficiency under the strictest supervision, and ultimately produced a whole series of great statesmen and admirals like Johan Friis, Peder Oxe, Herluf Trolle and Peder Skram. It is not too much to say that the increased revenue derived from the appropriation of Church property, intelligently applied, gave

Denmark the hegemony of the North during the Influence latter P art

°f Christian III.‘s reign, the whole reign 0/ of Frederick II. and the first twenty-five years of the

Denmark, reign of Christian IV., a period embracing, roughly

speaking, eighty years (1544-1626). Within this period

Denmark was indisputably the leading Scandinavian power. While Sweden, even after the advent of Gustavus Vasa, was still of but small account in Europe, Denmark easily held her own in Germany and elsewhere, even against Charles V., and was important enough, in 1553, to mediate a peace between the emperor and Saxony. Twice during this period Denmark and Sweden measured their strength in the open field, on the first occasion in the ” Scandinavian Seven Years’ War” (1562-70), on the second in the ” Kalmar War ” (1611-13), and on both occasions Denmark prevailed, though the temporary advantage she gained was more than neutralized by the intense feeling of hostility which the unnatural wars, between the two kindred peoples of Scandinavia, left behind them. Still, the fact remains that, for a time, Denmark was one of the great powers of Europe. Frederick II., in his later years (1571-1588), aspired to the dominion of all the seas which washed the Scandinavian coasts, and before he died he was able to enforce the rule that all foreign ships should strike their topsails to Danish men-of-war as a token of his right to rule the northern seas. Favourable political circumstances also contributed to this general acknowledgment of Denmark’s maritime greatness. The power of the Hansa had gone; the Dutch were enfeebled by their contest with Spain; England’s sea-power was yet in the making; Spain, still the greatest of the maritime nations, was exhausting her resources in the vain effort to conquer the Dutch. Yet more even than to felicitous circumstances, Denmark owed her short-lived greatness to the great statesmen and administrators whom Frederick II. succeeded in gathering about him. Never before, since the age of Margaret, had Denmark been so well governed, never before had she possessed so many political celebrities nobly emulous for the common good.

Frederick II. was succeeded by his son Christian IV. (April 4, 1588), who attained his majority on the 17th of August 1596, at Denmark t ˆ le a S e °ˆ nineteen. The realm which Christian IV. was at the ac- to govern had undergone great changes within the last cession of two generations. Towards the south the boundaries of ˆyˆfjgg the Danish state remained unchanged. Levensaa and

the Eider still separated Denmark from the Empire. Schleswig was recognized as a Danish fief, in contradistinc- tion to Holstein, which

owed vassalage to the Empire. The ” kingdom ” stretched as far as Kolding and Skedborg, where the ” duchy ” began; and this duchy since its amalgamation with Holstein by means of a common Landtag, and especially since the union of the dual duchy with the kingdom on almost equal terms in 1533, was, in most respects, a semi-independent state. Denmark, moreover, like Europe in general, was, politic- ally, on the threshold of a transitional period. During the whole

course of the 16th century the monarchical form of government was in every large country, with the single exception of Poland, rising on the ruins of feudalism. The great powers of the late 16th and early 17th centuries were to be the strong, highly centralized, hereditary monarchies, like France, Spain and Sweden. There seemed to be no reason why Denmark also should not become a powerful state under the guidance of a powerful monarchy, especially as the sister state of Sweden was developing into a great power under apparently identical conditions. Yet, while Sweden was surely ripening into the dominating power of northern Europe, Denmark had as surely entered upon a period of uninterrupted and apparently incurable decline. What was the cause of this anomaly ? Something of course must be allowed for the superior and altogether extraordinary genius of the great princes of the house of Vasa; yet the causes of the decline of Denmark lay far deeper than this. They may roughly be summed up under two heads: the inherent weakness of an elective monarchy, and the absence of that public spirit which is based on the intimate alliance of ruler and ruled. Whilst Gustavus Vasa had leaned upon the Swedish peasantry, in other words upon the bulk of the Swedish nation, which was and continued to be an integral part of the Swedish body-politic, Christian III. on his accession had crushed the middle and lower classes in Denmark and reduced them to political insignificance. Yet it was not the king who benefited by this blunder. The Danish monarchy since the days of Margaret had continued to be purely elective; and a purely elective monarchy at that stage of the political development of Europe was a mischievous anomaly. It signified in the first place that the crown was not the highest power in the state, but was subject to the aristocratic Rigsraad, or council of state. The Rigsraad was the permanent owner of the realm and the crown-lands; the king was only their temporary administrator. If the king died before the election of his successor, the Rigsraad stepped into the king’s place. Moreover, an elective monarchy implied that, at every fresh succession, the king was liable to be bound by a new Haandfaeslning, or charter. The election itself might, and did, become a mere formality; but the condition precedent of election, the acceptance of the charter, invariably limiting the royal authority, remained a reality. This period

of aristocratic rule, which dates practically from the accession of Frederick I. (1523), and lasted for nearly a century and a half, is known in Danish history as Adelsvaelde, or rule of the nobles.

Again, the king was the ruler of the realm, but over a very large portion of it he had but a slight control. The crown-lands and most of the towns were under his immediate jurisdiction, but by the side of the crown-lands lay the estates of the nobility, which already comprised about one-half of the superficial area of Denmark, and were in many respects independent of the central government both as regards taxation and administration. In a word, the monarchy had to share its dominion with the nobility; and the Danish nobility in the 16th century was one of the most exclusive and selfish aristocracies in Europe, and already far advanced in decadence. Hermetically sealing itself from any intrusion from below, it deteriorated by close and constant inter- marriage; and it was already, both morally and intellectually, below the level of the rest of the nation. Yet this very aristo- cracy, whose claim to consideration was based not upon its own achievements but upon the length of its pedigrees, insisted upon an amplification of its privileges which endangered the economical and political interests of the state and the nation. The time was close at hand when a Danish magnate was to demonstrate that he preferred the utter ruin of his country to any abatement of his own personal dignity.

All below the king and the nobility were generally classified together as " subjects." Of these lower orders the clergy stood first in the social scale. As a spiritual estate, indeed, it had ceased to exist at the Reformation, though still represented in the Rigsdag or diet. Since then too it had become quite detached from the nobility, which ostentatiously despised the teaching profession. The clergy recruited themselves therefore from the class next below them, and looked more and more to the

crown for help and protection as they drew apart from the gentry, who, moreover, as dispensers of patronage, lost no opportunity of appropriating church lands and cutting down tithes.

The burgesses had not yet recovered from the disaster of " Grevens

fejde”; but while the towns had become more dependent on the central power, they had at the same time been released from their former vexatious subjection to the local mag- nates, and could make their voices heard in the Rigsdag, where they were still, though inadequately, represented. Within the Estate of Burgesses itself, too, a levelling process had begun. The old municipal patriciate, which used to form the connecting link between the bourgeoisie and the nobility, had disappeared, and a feeling of common civic fellowship had taken its place. All this tended to enlarge the political views of the burgesses, and was not without its influence on the future. Yet, after all, the prospects of the burgesses depended mainly on economic con- ditions; and in this respect there was a decided improvement, due to the increasing importance of money and commerce all over Europe, especially as the steady decline of the Hanse towns immediately benefited the trade of Denmark-Norway; Norway by this time being completely merged in the Danish state, and ruled from Copenhagen. There can, indeed, be no doubt that the Danish and Norwegian merchants at the end of the 16th century flourished exceedingly, despite the intrusion and competition of the Dutch and the dangers to neutral shipping arising from the frequent wars between England, Spain and the Netherlands.

At the bottom of the social ladder lay the peasants, whose condition had decidedly deteriorated. Only in one respect had they benefited by the peculiar conditions of the 16th century: the rise in the price of corn without any corresponding rise in the land-tax must have largely increased their material prosperity. Yet the number of peasant-proprietors had diminished, while the obligations of the peasantry generally had increased; and, still worse, their obligations were vexatiously indefinite, varying from year to year and even from month to month. They weighed especially heavily on the so-called Ugedasmaend, who were forced to work two or three days a week in the demesne lands. This increase of villenage morally depressed the peasantry, and widened still further the breach between the yeomanry and the gentry. Politically its consequences were disastrous. While in Sweden the free and energetic peasant was a salutary power in the state, which he served with both mind and plough, the Danish peasant was sinking to the level of a bondman. While the Swedish peasants were well represented in the Swedish Riksdag, whose proceedings they sometimes dominated, the Danish peasantry had no political rights or privileges what- ever.

Such then, briefly, was the condition of things in Denmark when, in 1 588, Christian IV. ascended the throne. Where so much was necessarily uncertain and fluctuating, there was IV 1588- room f° r an

almost infinite variety of development. 1648. Much depended on the character and personality of

the young prince who had now taken into his hands the reins of government, and for half a century was to guide the destinies of the nation. In the beginning of his reign the hand of the young monarch, who was nothing if not energetic, made itself felt in every direction. The harbours of Copenhagen, Elsinore and other towns were enlarged; many decaying towns were abolished and many new ones built under more promising conditions, including Christiania, which was founded in August 1624, on the ruins of the ancient city of Oslo. Various attempts were also made to improve trade and industry by abolishing the still remaining privileges of the Hanseatic towns, by promoting a wholesale immigration of skilful and well-to-do Dutch traders and handicraftsmen into Denmark under most favourable conditions, by opening up the rich fisheries of the Arctic seas, and by establishing joint-stock chartered companies both in the East and the West Indies. Copenhagen especially benefited by Christian IV. ‘s commercial policy. He enlarged and embellished it, and provided it with new harbours and fortifications; in short,

did his best to make it the worthy capital of a great empire. But it was in the foreign policy of the government that the royal influence was most perceptible. Unlike Sweden, Denmark had remained outside the great religious-political movements which were the outcome of the Catholic reaction; and the peculiarity of her position made her rather hostile than friendly to the other Protestant states. The possession of the Sound enabled her to close the Baltic against the Western powers; the possession of Norway carried along with it the control of the rich fisheries which were Danish monopolies, and therefore a source of irrita- tion to England and Holland. Denmark, moreover, was above all things a Scandinavian power. While the territorial expansion of Sweden in the near future was a matter of necessity, Denmark had not only attained, but even exceeded, her natural limits. Aggrandizement southwards, at the expense of the German empire, was becoming every year more difficult; and in every other direction she had nothing more to gain. Nay, more, Denmark’s possession of the Scanian provinces deprived Sweden of her proper geographical frontiers. Clearly it was Denmark’s wisest policy to seek a close alliance with Sweden in their common interests, and after the conclusion of the ” Kalmar War ” the two countries did remain at peace for the next thirty-one years. But the antagonistic interests of the two countries in Germany during the Thirty Years’ War precipitated a fourth contest between them (1643-45), in which Denmark would have been utterly ruined but for the heroism of King Christian IV. and his command of

the sea during the crisis of the struggle. Even so, by the peace of Bromsebro (February 8, 1645) Denmark surrendered the islands of Oesel and Gotland /o ˆ es of and the provinces of Jemteland and Herjedal (in territory. Norway) definitively, and Halland for thirty years. The freedom from the Sound tolls was by the same treaty also extended to Sweden's Baltic provinces.

The peace of Bromsebro was the first of the long series of treaties, extending down to our own days, which mark the progressive shrinkage of Danish territory into an irreducible minimum. Sweden's appropriation of Danish soil had begun, and at the same time Denmark's power of resisting the encroach- ments of Sweden was correspondingly reduced. The Danish national debt, too, had risen enormously, while the sources of future income and consequent recuperation had diminished or disappeared. The Sound tolls, for instance, in consequence of the treaties of Bromsebro and Kristianope! (by the latter treaty very considerable concessions were made to the Dutch) had sunk from 400,000 to 140,000 rix-dollars. The political influence of the crown, moreover, had inevitably been weakened, and the conduct of foreign affairs passed from the hands of the king into the hands of the Rigsraad. On the accession of Frederick III. (1648-1670) moreover, the already 7/ " \ˆ s . diminished royal prerogative was still further curtailed 1670. by the Haandfaestning, or charter, which he was compelled to sign. Fear and hatred of Sweden, and the never abandoned hope of recovering the lost provinces, animated king and people alike; but it was Denmark's crowning misfortune that she possessed at this difficult crisis no statesman of the first rank, no one even approximately comparable with such com- petitors as Charles X. of Sweden or the " Great Elector " Frederick William of Brandenburg. From the very beginning of his reign Frederick III. was resolved upon a rupture at the first convenient opportunity, while the nation was, if possible, even more bellicose than the king. The apparently insuperable difficulties of Sweden in Poland was the feather that turned the scale; on the 1st of June 1657, Frederick III. signed the manifesto justifying a war which was never formally declared and brought Denmark to the very verge of ruin. The extraordinary details of this dramatic struggle will be found elsewhere (see Frederick III., king of Denmark, and Charles X., king of Sweden); suffice it to say that by the peace of Roskilde (February 26, 1658), Denmark consented to cede the Roskilde three Scanian provinces, the island of Bornholm and I6S8. the Norwegian provinces of Baahus and Trondhjem; to renounce all anti-Swedish alliances and to exempt all Swedish

llshed,

1660.

vessels, even when carrying foreign goods, from all tolls. These terrible losses were somewhat retrieved by the subsequent treaty of Copenhagen (May 27, 1660) concluded by the Swedish regency with Frederick III. after the failure of Charles X.‘s second war against Denmark, a failure chiefly owing to the heroic defence of the Danish capital (1658-60). By this treaty Treaty of Sweden gave back the province of Trondhjem and the Copen- isle of Bornholm and released Denmark from the most hagen, onerous of the obligations of the treaty of Roskilde. 1660. j n £ ac j. ˆ p eace f Copenhagen came as a welcome

break in an interminable series of disasters and humiliations. Anyhow, it confirmed the independence of the Danish state. On the other hand, if Denmark had emerged from the war with her honour and dignity unimpaired, she had at the same time tacitly surrendered the dominion of the North to her Scandi- navian rival.

But the war just terminated had important political conse- quences, which were to culminate in one of the most curious and Hereditary interesting revolutions of modern history. In the first monarchy place, it marks the termination of the Adelsvaelde, or estab- rule of the nobility. By their cowardice, incapacity, egotism and treachery during the crisis of the struggle, the Danish aristocracy had justly forfeited the respect of every other class of the community, and emerged from the war hopelessly discredited. On the other hand, Copenhagen, proudly conscious of her intrinsic importance and of her inestim- able services to the country, whom she had saved from annihilation by her constancy, now openly claimed to have a voice in public affairs. Still higher had risen the influence of the crown. The courage and resource displayed by Frederick III. in the extremity of the national danger had won for ” the least expansive of monarchs ” an extraordinary popularity.

On the 10th of September 1660, the Rigsdag, which was to repair the ravages of the war and provide for the future, was opened with great ceremony in the Riddersaal of the castle of Copenhagen. The first bill laid before the Estates by the government was to impose an excise tax

on the principal articles of consumption, together with subsidiary taxes on cattle, poultry, &c, in return for which the abolition of all the old direct taxes was promised. The nobility at first claimed exemption from taxation altogether, while the clergy and burgesses insisted upon an absolute equality of taxation. There were sharp encounters between the presidents of the contending orders, but the position of the Lower Estates was considerably prejudiced by the dissen- sions of its various sections. Thus the privileges of the bishops and of Copenhagen profoundly irritated the lower clergy and the unprivileged towns, and made a cordial understanding impossible, till Hans Svane, bishop of Copenhagen, and Hans Nansen the burgomaster, who now openly came forward as the leader of the reform movement, proposed that the privileges which divided the non-noble Estates should be abolished. In accordance with this proposal, the two Lower Estates, on the 16th of September, subscribed a memorandum addressed to the Rigsraad, declaring their willingness to renounce their privileges, provided the nobility did the same; which was tantamount to a declaration that the whole of the clergy and burgesses had made common cause against the nobility. The opposition so formed took the name of the ” Conjoined Estates.” The presentation of the memorial provoked an outburst of indignation. But the nobility soon perceived the necessity of complete surrender. On the 30th of September the First Estate abandoned its former standpoint and renounced its privileges, with one unimportant reservation.

The struggle now seemed to be ended, and the financial question having also been settled, the king, had he been so minded, might have dismissed the Estates. But the still more important question of reform was now raised. On the 17th of September the burgesses introduced a bill proposing a new constitution, which was to include local self-government in the towns, the abolition of serfdom, and the formation of a national army. It fell to the ground for want of adequate support; but another proposition, the fruit of secret discussion between the

king and his confederates, which placed all fiefs under the control of the crown as regards taxation, and provided for selling and letting them to the highest bidder, was accepted by the Estate of burgesses. The significance of this ordinance lay in the fact that it shattered the privileged position of the nobility, by abolishing the exclusive right to the possession of fiefs. What happened next is not quite clear. Our sources fail us, and we are at the mercy of doubtful rumours and more or less unreliable anecdotes. We have a vision of intrigues, mysterious conferences, threats and bribery, dimly discernible through a shifting mirage of tradition.

The first glint of light is a letter, dated the 23rd of September, from Frederick III. to Svane and Nansen, authorizing them to communicate the arrangements already made to reliable men, and act quickly, as ” if the others gain time they may possibly gain more.” The first step was to make sure of the city train- bands: of the garrison of Copenhagen the king had no doubt. The headquarters of the conspirators was the bishop’s palace near Vor Frue church, between which and the court messages were passing continually, and where the document to be adopted by the Conjoined Estates took its final shape. On the 8th of October the two burgomasters, Hans Nansen and Kristoffer Hansen, proposed that the realm of Denmark should be made over to the king as a hereditary kingdom, without prejudice to theprivilegesof theEstates; whereupon theyproceeded to Brewer’s Hall, and informed the Estate of burgesses there assembled of what had been done. A fiery oration from Nansen dissolved some feeble opposition; and simultaneously Bishop Svane carried the clergy along with him. The so-called ” Instrument,” now signed by the Lower Estates, offered the realm to the king and his house as a hereditary monarchy, by way of thank-offering mainly for his courageous deliverance of the kingdom during the war; and the Rigsraad and the nobility were urged to notify the resolution to the king, and desire him to maintain each Estate in its due privileges, and to give a written counter- assurance that the revolution now to be effected was for the sole benefit of the state. Events now moved forward rapidly. On the 10th of October a deputation from the clergy and burgesses proceeded to the Council House where the Rigsraad were de- liberating, to demand an answer to their propositions. After a tumultuous scene, the aristocratic Raad rejected the ” Instru- ment ” altogether, whereupon the deputies of the commons pro- ceeded to the palace and were graciously received by the king, who promised them an answer next day. The same afternoon the guards in the streets and on the ramparts were doubled; on the following morning the gates of the city were closed, powder and bullets were distributed among the city train- bands, who were bidden to be in readiness when the alarm bell called them, and cavalry was massed on the environs of the city. The same afternoon the king sent a message to the Rigsraad urging them to declare their views quickly, as he could no longer hold himself responsible for what might happen. After a feeble attempt at a compromise the Raad gave way. On the 13 th of October it signed a declaration to the effect that it associated itself still with the Lower Estates in the making over of the kingdom, as a hereditary monarchy, to his majesty and his heirs male and female. The same day the king received the official communi- cation of this declaration and the congratulation of the burgo- masters. Thus the ancient constitution

was transformed; and Denmark became a monarchy hereditary in Frederick III. and his posterity.

But although hereditary sovereignty had been introduced, the laws of the land had not been abolished. The monarch was specifically now a sovereign over-lord, but he had not been absolved from his obligations towards his subjects. Hereditary sovereignty per se was not held to signify unlimited dominion, still less absolutism. On the contrary, the magnificent gift of the Danish nation to Frederick III. was made under express conditions. The ” Instrument ” drawn up by the Lower Estates implied the retention of all their rights; and the king, in accepting the gift of a hereditary crown, did not repudi- ate the implied inviolability of the privileges of the donors.

Unfortunately everything had been left so vague, that it was an easy matter for ultra-royalists like Svane and Nansen to ignore the privileges of the Estates, and even the Estates themselves.

On the 14th of October a committee was summoned to the palace to organize the new government. The discussion turned mainly upon two points, (1) whether a new oath of homage should be taken to the king, and (2) what was to be done with the Haandjaestning or royal charter. The first point was speedily decided in the affirmative, and, as to the second, it was ultimately decided that the king should be released from his oath and the charter returned to him; but a rider was added suggesting that he should, at the same time, promulgate a Recess providing for his own and his people’s welfare. Thus Frederick III. was not left absolutely his own master; for the provision regarding a Recess, or new constitution, showed plainly enough that such a constitution was expected, and, once granted, would of course have limited the royal power.

It now only remained to execute the resolutions of the com- mittee. On the 17th of October the charter, which the king had sworn to observe twelve years before, was solemnly handed back to him at the palace, Frederick III. thereupon promising to rule as a Christian king to the satisfaction of all the Estates of the realm. On the following day the king, seated on the topmost step of a lofty tribune surmounted by a baldaquin, erected in the midst of the principal square of

Copenhagen, received the public homage of his subjects of all ranks, in the presence of an immense concourse, on which occasion he again promised to rule ” as a Christian hereditary king and gracious master,” and, ” as soon as possible, to prepare and set up ” such a constitution as should secure to his subjects a Christian and indulgent sway. The ceremony concluded with a grand banquet at the palace. After dinner the queen and the clergy withdrew; but the king remained. An incident now occurred which made a strong impression on all present. With a brimming beaker in his hand, Frederick III. went up to Hans Nansen, drank with him and drew him aside. They communed together in a low voice for some time, till the burgomaster, succumbing to the influence of his potations, fumbled his way to his carriage with the assistance of some of his civic colleagues. Whether Nansen, intoxicated by wine and the royal favour, consented on this occasion to sacrifice the privileges of his order and his city, it is impossible to say; but it is significant that, from henceforth, we hear no more of the Recess which the more liberal of the leaders of the lower orders had hoped for when they released Frederick III. from the obligations of the charter.

We can follow pretty plainly the stages of the progress from a limited to an absolute monarchy. By an act dated the 10th Establish- °^ J anuar y 1661, entitled ” Instrument, or pragmatic mentor sanction,” of the king’s hereditary right to the king- absolute doms of Denmark and Norway, it was declared that “*• all the prerogatives of majesty, and ” all regalia as an

absolute sovereign lord,” had been made over to the king. Yet, even after the issue of the ” Instrument,” there was nothing, strictly speaking, to prevent Frederick III. from voluntarily conceding to his subjects some share in the administration. Unfortunately the king was bent upon still further emphasizing the plenitude of his power. At Copenhagen his advisers were busy framing drafts of a Lex Regia Perpetua ; and the one which finally won the royal favour was the famous Kongelov, or ” King’s Law.”

This document was in every way unique. In the first place it is remarkable for its literary excellence. Compared with the barbarous macaronic jargon of the contemporary official language it shines forth as a masterpiece of pure, pithy and original Danish. Still more remarkable are the tone and tenor of this royal law. The Kongelov has the highly dubious honour of being the one written law in the civilized world which fearlessly carries out absolutism to the last consequences. The monarchy is de- clared to owe its origin to the surrender of the supreme authority by the Estates to the king. The

maintenance of the indivisi- bility of the realm and of the Christian faith according to the |

Augsburg Confession, and the observance of the Kongelov itself, are now the sole obligations binding upon the king. The supreme spiritual authority also is now claimed; and it is expressly stated that it becomes none to crown him; the moment he ascends the throne, crown and sceptre belong to him of right. Moreover, par. 26 declares guilty of lese-majestS whomsoever shall in any way usurp or infringe the king's absolute authority. In the following reign the ultra-royalists went further still. In their eyes the king was not merely autocratic, but sacrosanct. Thus before the anointing of Christian V. on the 7th of June 167 1, a ceremony by way of symbolizing the new autocrat's humble submission to the Almighty, the officiating bishop of Zealand delivered an oration in which he declared that the king was God's immediate creation, His vicegerent on earth, and that it was the bounden duty of all good subjects to serve and honour the celestial majesty as represented by the king's terrestrial majesty. The Kongelov is dated and subscribed the 14th of November 1665, but was kept a profound secret, only two initiated persons knowing of its existence until after the death of Frederick III., one of them being Kristoffer Gabel, the king's chief intermediary during the revolution, and the other the author and custodian of the Kongelov, Secretary Peder Schumacher, better known as Griffenfeldt. It is significant that both these confidential agents were plebeians.

The revolution of 1660 was certainly beneficial to Norway. With the disappearance of the Rigsraad, which, as representing the Danish crown, had hitherto exercised sovereignty Effects Bf over both kingdoms, Norway ceased to be a subject the revola- principality. The sovereign hereditary king stood in tion of exactly the same relations to both kingdoms; and I660 ' thus, constitutionally, Norway was placed on an equality with Denmark, united with but not subordinate to it. It is clear that the majority of the Norwegian people hoped that the revolution would give them an administration independent of the Danish government; but these expectations were not realised. Till the cessation of the Union in 1814, Copenhagen continued to be the headquarters of the Norwegian administra- tion; both kingdoms had common departments of state; and the common chancery continued to be called the Danish chancery. On the other hand the condition of Norway was now greatly improved. In January 1661 a land commission was appointed to investigate the financial and economical conditions of the kingdoms; the fiefs were transformed into counties; the nobles were deprived of their immunity from taxation; and in July 1662 the Norwegian towns received special privileges, including the

monopoly of the lucrative timber trade.

The Enevaelde, or absolute monarchy, also distinctly benefited the whole Danish state by materially increasing its reserve of native talent. Its immediate consequence was to throw open every state appointment to the middle classes; and the middle classes of that period, with very few exceptions, monopolized the intellect and the energy of the nation. New blood of the best quality nourished and stimulated the whole body politic. Ex- pansion and progress were the watchwords at home, and abroad it seemed as if Denmark were about to regain her former position as a great power. This was especially y hr fJlg° the case during the brief but brilliant administration I'^gg. of Chancellor Griffenfeldt. Then, if ever, Denmark had the chance of playing once more a leading part in inter- national politics. But Griffenfeldt's difficulties, always serious, were increased by the instability of the European situation, depending as it did on the ambition of Louis XIV. Resolved to conquer the Netherlands, the French king proceeded, first of all, to isolate her by dissolving the Triple Alliance. (See Sweden and Griffenfeldt.) In April 1672 a treaty was concluded between France and Sweden, on condition that France should not include Denmark in her system of alliances without the consent of Sweden. This treaty showed that Sweden weighed more in the French balances than Denmark. In June 1672 a French army invaded the Netherlands; whereupon the elector of Brandenburg contracted an alliance with the emperor Leopold, to which Denmark was invited to accede; almost simultaneously

the States-General began to negotiate for a renewal of the recently-expired Dano-Dutch alliance.

In these circumstances it was as difficult for Denmark to remain neutral as it was dangerous for her to make a choice. Denmark ^ n a ' uance with France would subordinate her to in the Sweden ; an alliance with the Netnerlands would expose

Oreat her to an attack from Sweden. The Franco-Swedish

Northern a uj ance left Griffenfeldt no choice but to accede to the opposite league, for he saw at once that the ruin of the Netherlands would disturb the balance of power in the north by giving an undue

preponderance to England and Sweden. But Denmark's experience of Dutch promises in the past was not reassuring; so, while negotiating at the Hague for a renewal of the Dutch alliance, he at the same time felt his way at Stockholm towards a commercial treaty with Sweden. His Swedish mission proved abortive, but, as he had anticipated, it effectually acceler- ated the negotiations at the Hague, and frightened the Dutch into unwonted liberality. In May 1673 a treaty of alliance was signed by the ambassador of the States-General at Copenhagen, whereby the Netherlands pledged themselves to pay Denmark large subsidies in return for the services of 10,000 men and twenty warships, which were to be held in readiness in case the United Provinces were attacked by another enemy besides France. Thus, very dexterously, Griffenfeldt had succeeded in gaining his subsidies without sacrificing his neutrality.

His next move was to attempt to detach Sweden from France; but, Sweden showing not the slightest inclination for a rapproche- ment, Denmark was compelled to accede to the anti-French league, which she did by the treaty of Copenhagen, of January 1674, thereby engaging to place an army of 20,000 in the field when required; but here again Griffenfeldt safeguarded himself to some extent by stipulating that this provision was not to be operative till the allies were attacked by a fresh enemy. When, in December 1674, a Swedish army invaded Prussian Pomerania, Denmark was bound to intervene as a belligerent, but Griffen- feldt endeavoured to postpone this intervention as long as possible; and Sweden's anxiety to avoid hostilities with her southern neighbour materially assisted him to postpone the evil day. He only wanted to gain time, and he gained it. To the last he endeavoured to avoid a rupture with France even if he broke with Sweden; but he could not restrain for ever the foolish impetuosity of his own sovereign, Christian V., and his fall in the beginning of 1676 not only, as he had foreseen, involved Denmark in an unprofitable war, but, as his friend and disciple, Jens Juel, well observed, relegated her henceforth to the humiliat- ing position of an international catspaw. Thus at the peace of Fontainebleau (September 2, 1679) Denmark, which had borne the brunt of the struggle in the Baltic, was compelled by the inexorable French king to make full restitution to Sweden, the treaty between the two northern powers being signed at Lund on the 26th of September. Freely had she spent her blood and her treasure, only to emerge from the five years' contest exhausted and empty-handed.

By the peace of Fontainebleau Denmark had been sacrificed to the interests of France and Sweden; forty-one years later she was sacrificed to the interests of Hanover and Prussia by the peace of

Copenhagen (1720), which ended the Northern War so far as the German powers were concerned. But it would not have terminated advantageously for them at all, had not the powerful and highly efficient Danish fleet effectually prevented the Swedish government from succouring its distressed German provinces, and finally swept the Swedish fleets out of the northern waters. Yet all the compensation Denmark received for her inestimable services during a whole decade was 600,000 rix- dollars! The bishoprics of Bremen and Verden, the province of Farther Pomerania and the isle of Riigen which her armies had actually conquered, and which had been guaranteed to her by a whole catena of treaties, went partly to the upstart electorate of Hanover and partly to the upstart kingdom of Prussia, both of which states had been of no political importance whatever at the beginning of the war of spoliation by which they were, ultimately, to profit so largely and so cheaply.

The last ten years of the reign of Christian V.'s successor, Frederick IV. (1699-1730), were devoted to the nursing and development of the resources of the country, which had suffered only less severely than Sweden from the effects ˆfYiw- of the Great Northern War. The court, seriously pious, 1730. did much for education. A wise economy also contri- buted to reduce the national debt within manageable limits, and in the welfare of the peasantry Frederick IV. took a deep interest. In 1722 serfdom was abolished in the case of all peasants in the royal estates born after his accession.

The first act of Frederick's successor, Christian VI. (1730-1746), was to abolish the national militia, which had been an intoler- able burden upon the peasantry; yet the more pressing agrarian difficulties were not thereby surmounted, ˆ! r/ ff as had been hoped. The price of corn continued i 7 ' 6i to fall; the migration of the peasantry assumed alarming proportions; and at last, " to preserve the land " as well as to increase the defensive capacity of the country, the national militia was re-established by the decree of the 4th of February 1733, which at the same time bound to the soil all peasants between the age of nine and forty. Reactionary as the measure was it enabled the agricultural interest, on which the prosperity of Denmark mainly depended, to tide over one of the most dangerous crises in its history; but certainly the position of the Danish peasantry was never worse than during the reign of the religious and benevolent Christian VI.

Under the peaceful reign of Christian's son and successor, Frederick V. (1746-1766), still more was done for commerce, industry and agriculture. To promote Denmark's carrying trade, treaties were made with the Barbary y ,?ˆ. States, Genoa and Naples; and the East Indian

ij”^e. Trading Company flourished exceedingly. On the other hand the condition of the peasantry was even worse under Frederick V. than it had been under Christian VI., the Stavns- baand, or regulation which bound all males to the soil, being made operative from the age of four. Yet signs of a coming amelioration were not wanting. The theory of the physiocrats now found powerful advocates in Denmark; and after 1755, when the press censorship was abolished so far as regarded political economy and agriculture, a thorough discussion of the whole agrarian question became possible. A commission appointed in 1757 worked zealously for the repeal of many agricultural abuses; and several great landed proprietors introduced heredi- tary leaseholds, and abolished the servile tenure.

Foreign affairs during the reigns of Frederick V. and Christian VI. were left in the capable hands of J. H. E. Bernstorff, who aimed at steering clear of all foreign complications and preserving inviolable the neutrality of Denmark. This he succeeded in doing, in spite of the Seven Years’ War and of the difficulties attending the thorny Gottorp question in which Sweden and Russia were equally interested. The same policy was victori- ously pursued by his nephew and pupil Andreas Bernstorff, an even greater man than the elder Bernstorff, who controlled the foreign policy of Denmark from 1773 to 1778, and again from 1784 till his death in 1797. The period of the younger

Bernstorff synchronizes with the greater part of the

Christian

long reign of Christian VII. (1766-1808), one of the jgos. most eventful periods of modern Danish history. The king himself was indeed a semi-idiot, scarce responsible for his actions, yet his was the era of such striking personalities as the brilliant charlatan Struensee, the great philanthropist and reformer C. D. F. Reventlow, the ultra-conservative Ove Hoegh-Guldberg, whose mission it was to repair.tlie damage done by Struensee, and that generation of alert and progressive spirits which surrounded the young crown prince Frederick, whose first act, on taking his seat in the council of state, at the age of sixteen, on the 4th of April 1784, was to dismiss Guldberg.

A fresh and fruitful period of reform now began, lasting till nearly the end of the century, and interrupted only by the brief but costly war with Sweden in 1788. The emancipation of the peasantry was now the burning question of the day, and the whole matter was thoroughly ventilated. Bernstorff and the

crown prince were the most zealous advocates of the peasantry in the council of state; but the honour of bringing the whole peasant question within the range of practical politics un- doubtedly belongs to C. D. F. Reventlow (q.v.). Nor was the reforming principle limited to the abolition of serfdom. In 1788 the corn trade was declared free; the Jews received civil rights; and the negro slave trade was forbidden. In 1796 a special ordinance reformed the whole system of judicial procedure, making it cheaper and more expeditious; while the toll ordinance of the 1st of February 1797 still further extended the principle of free trade. Moreover, until two years after Bernstorff's death in 1797, the Danish press enjoyed a larger freedom of speech than the press of any other absolute monarchy in Europe, so much so that at last Denmark became suspected of favouring Jacobin views. But in September 1799 under strong pressure from the Russian emperor Paul, the Danish government forbade anonymity, and introduced a limited censorship.

It was Denmark's obsequiousness to Russia which led to the first of her unfortunate collisions with Great Britain. In 1800 _ . the Danish government was persuaded by the tsar

and Great to accede to the second Armed Neutrality League, Britain la which Russia had just concluded with Prussia and theNapo' Sweden. Great Britain retaliated by laying an Wars. embargo on the vessels of the three neutral powers, and by sending a considerable fleet to the Baltic under the command of Parker and Nelson. Surprised and unprepared though they were, the Danes, nevertheless, on the 2nd of April 1801, offered a gallant resistance; but their fleet was destroyed, their capital bombarded, and, abandoned by Russia, they were compelled to submit to a disadvantageous peace.

The same vain endeavour of Denmark to preserve her neutrality led to the second breach with England. After the peace of Tilsit there could be no further question of neutrality. Napoleon had determined that if Great Britain refused to accept Russia's mediation, Denmark, Sweden and Portugal were to be forced to close their harbours to her ships and declare war against her. It was the intention of the Danish government to preserve its neutrality to the last, although, on the whole, it preferred an alliance with Great Britain to a league with Napoleon,

and was even prepared for a breach with the French emperor if he pressed her too hardly. The army had therefore been assembled in Holstein, and the crown prince regent was with it. But the British government did not consider Denmark strong enough to resist France, and Canning had private trustworthy information of the designs of Napoleon, upon which he was bound to act. He sent accordingly a fleet, with 30,000 men on board, to the Sound to compel Denmark, by way of security for her future conduct, to unite her fleet with the British fleet. Denmark was offered an alliance, the complete restitution of her fleet after the war, a guarantee of all her possessions, compensation for all expenses, and even territorial aggrandizement.

Dictatorially presented as they were, these terms were liberal and even generous; and if a great statesman like Bernstorfl had been at the head of affairs in Copenhagen, he would, no doubt, have accepted them, even if with a wry face. But the prince regent, if a good patriot, was a poor politician, and invincibly obstinate. When, therefore, in August 1807, Gambier arrived in the Sound, and the English plenipotentiary Francis James Jackson, not perhaps the most tactful person that could have been chosen, hastened to Kiel to place the British demands before the crown prince, Frederick not only refused to negotiate, but ordered the Copenhagen authorities to put. the city in the best state of defence possible. Taking this to be tantamount to a declaration of war, on the 16th of August the British army landed at Vedback; and shortly afterwards the Danish capital was invested. Anything like an adequate defence was hopeless; Loss of a bombardment began which lasted from the 2nd of Norway. September till the 5th of September, and ended with ktT'm/^ ^ e ca Pitulation of the city and the surrender of the fleet intact, the prince regent having neglected to give orders for its destruction. After this Denmark, unwisely, but not unnaturally, threw herself into the arms of Napoleon and

continued to be his faithful ally till the end of the war. She was punished for her obstinacy by being deprived of Norway, which she was compelled to surrender to Sweden by the terms of the treaty of Kiel (1814), on the 14th of January, receiving by way of compensation a sum of money and Swedish Pomerania, with Rttgen, which were subsequently transferred to Prussia in ex- change for the duchy of Lauenburg and 2,000,000 rix-dollars.

On the establishment of the German Confederation in 1815, Frederick VI. acceded thereto as duke of Holstein, but refused to allow Schleswig to enter it, on the ground that Schleswig was an integral part of the Danish realm.

The position of Denmark from 1815 to 1830 was one of great difficulty and distress. The loss of Norway necessitated consider- able reductions of expenditure, but the economies actually practised fell far short of the requirements of atte”%is the diminished kingdom and its depleted exchequer; while the agricultural depression induced by the enormous fall in the price of corn all over Europe caused fresh demands upon the state, and added 10,000,000 rix-dollars to the national debt before 1835. The last two years of the reign of Frederick VI. (1838-1839) were also remarkable for the revival of political life, provincial consultative assemblies being established for Jutland, the Islands, Schleswig and Holstein, by the ordinance of the 28th of May 1831. But these consultative assemblies were regarded as insufficient by the Danish Liberals, and during the last years of Frederick VI. and the whole reign of his successor, Christian VIII. (1839-1848), the agitation for a free constitution, both in Denmark and the duchies, continued to grow ˆ ons ‘#«» in strength, in spite of press prosecutions and other agitation. repressive measures. The rising national feeling in Beginnings Germany also stimulated the separatist tendencies of the of the duchies; and ” Schleswig-Holsteinism,” as ˆ““J*” it now began to be called, evoked in Denmark the Question. counter-movement known as Eiderdansk-politik, i.e. the policy of extending Denmark to the Eider and obliterating German Schleswig, in order to save Schleswig from being absorbed by Germany. This division of national sentiment within the monarchy, complicated by the ap- proaching extinction of the Oldenburg line of the house of Denmark, by which, in the normal course under the Salic law, the succession to Holstein would have passed away from the Danish crown, opened up the whole complicated Schleswig- Holstein Question with all its momentous consequences. (See Schleswig-Holstein Qdestion.) Within the monarchy itself, during the following years, ” Schleswig-Holsteinism ” and ” Eiderdanism ” faced each other as rival, mutually exacerbating forces; and the efforts of succeeding governments to solve the insoluble problem broke down ever on the rock of nationalist passion and the interests of the German powers. The unionist constitution, devised by Christian VIIL, and pro- v . mulgated by his successor, Frederick VII. (1848-1863), Constita- on the 28th of January 1848, led to the armed inter- tionot vention of Prussia, at the instance of the new German ,848, “° d parliament at Frankfort; and, though with the help pruˆi’a. of Russian and British diplomacy, the Danes were ultimately successful, they had to submit, in 1851, to the government of Holstein by an international commission consisting of three members, Prussian, Austrian and Danish respectively.

Denmark, meanwhile, had been engaged in providing herself with a parliament on modern lines. The constitutional rescript of the 28th of January 1848 had been withdrawn in favour of an electoral law for a national assembly, of whose 152 members 38 were to be nominated by the king and to form an Upper House (Landsting) , while the remainder were to be elected by the people and to form a popular chamber (Folketing). The Bondevenlige, or philo-peasant party, which objected to the king's right of nomination and preferred a one-chamber system, now separated from the National Liberals on this point. But the National Liberals triumphed at the general election; fear of reactionary tendencies finally induced the Radicals to accede to the wishes of the majority; and on the 5th of June 1849 the new constitution received the royal sanction.

Danish duchies.

At this stage Denmark's foreign relations prejudicially affected her domestic politics. The Liberal Eiderdansk party was for Germany dividing Schleswig into three distinct administrative and the belts, according as the various nationalities predomin- ated (language rescripts of i85i),but German sentiment

was opposed to any such settlement and, still worse, the great continental powers looked askance on the new Danish constitution as far too democratic. The substance of the notes embodying the exchange of views, in 1851 and 1852, between the German great powers and Denmark, was promulgated, on the 28th of January 1852, in the new constitutional decree which, together with the documents on which it was founded, was known

as the Conventions of 1851 and 1852. Under this Conven- arran gement each part of the monarchy was to have 1852. local autonomy, with a common constitution for

common affairs. Holstein was now restored to Denmark, and Prussia and Austria consented to take part in the conference of London, by which the integrity of Denmark was upheld, and the succession to the whole monarchy settled on Prince Christian, youngest son of Duke William of Schleswig- Holstein-Sonderburg-Gliicksburg, and husband of Louise of Hesse, the niece of King Christian VIII. The " legitimate "

heir to the duchies, under the Salic law, Duke Christian of Sonderburg-Augustenburg, accepted the decision of the London conference in consideration of the purchase by the Danish government of his estates in Schleswig.

On the 2nd of October 1855 was promulgated the new common constitution, which for two years had been the occasion of a

fierce contention between the Conservatives and the Constitu- Radicals. It proved no more final than its predecessors. I85S. The representatives of the duchies in the new common

Rigsraad protested against it, as subversive of the Con- ventions of 1 85 1 and 1852; and their attitude had the support of the German powers. In 1857, Carl Christian Hall (q.v.) became prime minister. After putting off the German powers by seven years of astute diplomacy, he realized the impossibility of carrying out the idea of a common constitution and, on the 30th of March 1862, a royal proclamation was issued detaching Holstein as far as possible from the common monarchy. Later in the year he

introduced into the Rigsraad a common constitution Hon of ‘ f° r Denmark and Schleswig, which was carried through 1863 and and confirmed by the council of state on the 13th of accession November 1863. It had not, however, received the tian IX.’ r °y a l assent when the death of Frederick VII. brought

the ” Protocol King ” Christian IX. to the throne. Placed between the necessity of offending his new subjects or embroiling himself with the German powers, Christian chose the remoter evil and, on the 18th of November, the new constitution became law. This once more opened up the whole question in an acute form. Frederick, son of Christian of Augustenburg, refus- ing to be bound by his father’s engagements, entered Holstein and, supported by the Estates and the German diet, proclaimed himself duke. The events that followed: the occupation of the

duchies by Austria and Prussia, the war of 1864, Danish gallantly fought by the Danes against overwhelming War of odds, and the astute diplomacy by which Bismarck 1864, and succeeded in ultimately gaining for Prussia the seaboard cession of g0 esse ntial for her maritime power, are dealt with duchies. elsewhere (see Schleswig-Holstein Question). For

Denmark the question was settled when, by the peace of Vienna

(October 30, 1864), the duchies were irretrievably lost to her. At the peace of Prague, which terminated the Austro-Prussian War of 1866, Napoleon III. procured the in- sertion in the treaty of paragraph v., by which the northern districts of Schleswig were to be reunited to Denmark when the majority of the population by a free vote should so desire; but when Prussia at last thought fit to negotiate with Denmark on the subject, she laid down conditions which the Danish government could not accept. Finally, in 1878, by a separate agreement between Austria and -Prussia, paragraph v. was rescinded.

The salient feature of Danish politics during subsequent years

was the struggle between the two Tings, the Folketing or Lower House, and the Landsting, or Upper House of the Rigsdag. This contest began in 1872, when a com- ^“a/”” bination of all the Radical parties, known as the struggles ” United Left,” passed a vote of want of confidence ia Dea ‘ against the government and rejected the budget, ^ £* s,ace Nevertheless, the ministry, supported by the Landsting, refused to resign; and the crisis became acute when, in 1875, J. B. Estrup became prime minister. Perceiving that the coming struggle would be essentially a financial one, he retained the ministry of finance in his own hands; and, strong in the support of the king, the Landsting, and a considerable minority in the country itself, he devoted himself to the double task of establish- ing the political parity of the Landsting with the Folketing and strengthening the national armaments, so that, in the event of a war between the European great powers, Denmark might be able to defend her neutrality.

The Left was willing to vote 30,000,000 crowns for extraordinary military expenses, exclusive of the fortifications of Copenhagen, on condition that the amount should be raised by a property and income tax; and, as the elections of 1875 had given them a majority of three-fourths in the popular chamber, they spoke with no uncertain voice. But the Upper House steadily supported Estrup, who was disinclined to accept any such compromise. As an agreement between the two houses on the budget proved impossible, a provisional financial decree was issued on the 12th of April 1877, which the Left stigmatized as a breach of the constitution. But the difficulties of the ministry were somewhat relieved by a split in the Radical party, still further accentuated by the elections of 1879, which enabled Estrup to carry through the army and navy defence bill and the new military penal code by leaning alternately upon one or the other of the divided Radical groups.

After the elections of 188 1, which brought about the reamalga-

mation of the various Radical sections, the opposition presented • a united front to the government, so that, from 1882 onwards, legislation was almost at a standstill. The elections of 1884 showed clearly that the nation was also now on the side of the Radicals, 83 out of the 102 members of the Folketing belonging to the opposition. Still Estrup remained at his post. He had underestimated the force of public opinion, but he was conscienti- ously convinced that a Conservative ministry was necessary to Denmark at this crisis. When therefore the Rigsdag rejected the budget, he advised the king to issue another provisional financial decree. Henceforth, so long as the Folketing refused to vote supplies, the ministry regularly adopted these makeshifts. In 1886 the Left, having no constitutional means of dismissing the Estrup ministry, resorted for the first time to negotiations; but it was not till the 1st of April 1894 that the majority of the Folketing could arrive at an agreement with the government and the Landsting as to a budget which should be retrospective and sanction the employment of the funds so irregularly obtained for military expenditure. The whole question of the provisional financial decrees was ultimately regularized by a special resolution of the Rigsdag; and the retirement of the Estrup ministry in August 1894 was the immediate result of the compromise.

In spite of the composition of 1894, the animosity between Folketing and Landsting continues to characterize Danish politics, and the situation has been complicated by the division of both Right and Left into widely divergent groups. The elections of 1895 resulted in an undeniable victory of the extreme Radicals; and the budget of 1895-1896 was passed only at the last moment by a compromise. The session of 1896-1897 was remarkable for a rapprochement between the ministry and the ” Left Reform Party,” caused by the secessions of the ” Young Right,” which led to an unprecedented event in Danish politics — the voting of the budget by the Radical Folketing and its rejection by the Conserva- tive Landsting in May 1897; whereupon the ministry resigned in favour of the moderate Conservative Horring cabinet, which induced the Upper House to pass the budget. The elections of i8g8 were a fresh defeat for the Conservatives, and in the autumn session of the same year, the Folketing, by a crushing majority of

85 to 12, rejected the military budget. The ministry was saved by a mere accident — the expulsion of Danish agitators from North Schleswig by the German government, which evoked a passion of patriotic protest throughout Denmark, and united all parties, the war minister declaring in the Folketing, during the debate on the military budget (January 1899), that the armaments of Denmark were so far advanced that any great power must think twice before venturing to attack her. The chief event of the year 1899 was the great strike of 40,000 artisans, which cost Denmark 50,000,000 crowns, and brought about a reconstruction of the cabinet in order to bring in, as minister of the interior, Ludwig Ernest Bramsen, the great specialist in industrial matters, who succeeded (September 2-4) in bringing about an understanding between workmen and employers. The session 1900-1901 was remarkable for the further disintegration of the Conservative party still in office (the Sehested cabinet superseded the Horring cabinet on the 27th of April 1900) and the almost total paralysis of parliament, caused by the interminable debates on the question of taxation reform. The crisis came in 1901. Deprived of nearly all its supporters in the Folketing, the Conservative ministry resigned, and King Christian was obliged to assent to the formation of a " cabinet of the Left " under Professor Deuntzer. Various reforms were carried, but the proposal to sell the Danish islands in the West Indies to the United States fell through. During these years the relations between Denmark and the German empire improved, and in the country itself the cause of social democracy made great progress. In January 1906 King Christian ended his long reign, and was succeeded by his son Frederick VIII. At the elections of 1906 the government lost its small absolute majority, but remained in power with support from the Moderates and Conservatives. It was severely shaken, however, when Herr A. Alberti, who had been minister of justice since 1901, and was admitted to be the strongest member of the cabinet, was openly accused of nepotism and abuse of the power of his position. These charges gathered weight until the minister was forced to resign in July 1908, and in September he was arrested on a charge of forgery in his capacity as director of the Zealand Peasants' Savings Bank. The ministry, of which Herr Jens Christian Christensen was head, was compelled to resign in October. The effect of these revelations was profound not only politically, but also economically; the important export trade in Danish butter, especially, was adversely affected, as Herr Alberti had been interested in numerous dairy companies.

Bibliography. — I. General History. Danmarks Riges Historie (Copenhagen, 1897-1905); R. Nisbet Bain, Scandinavia (Cambridge,

1905); H. Weitemeyer, Denmark (London, 1901); Adolf Ditlev Jorgensen, Historishe Afhandlinger (Copenhagen, 1898) ; ib. Fortaellinger af Nordens Historie (Copenhagen, 1892). II. Early and Medieval History. Saxo, Gesta Danorum (Strassburg, 1886) ; Repertorium diplomaticum regni Danici mediaevalis (Copenhagen, 1894); Ludvig Holberg, Konge og Danehof (Copenhagen, 1895); Poul Frederik Barford, Danmarks Historie 1319-1536 (Copenhagen, 1885); ib. 1536-1670 (Copenhagen, 1891). III. i6th to 19TH Century. Philip P. Munch, Kobstadstyrelsen i Danmark (Copen- hagen, 1900) ; Peter Edvard Holm, Danmark Norges indre Historie, 1660-1720 (Copenhagen, 1 885-1 886); ib. Danmark Norges Historie, 1720-1814 (Copenhagen, 1891-1894); Soren Bloch Thrige, Dan- marks Historie i vort Aarhundrede (Copenhagen, 1888) ; Marcus Rubin, Frederick VI.' s Tid fra Kielerfreden (Copenhagen, 1895) ; Christian Frederick von Holten, Erinnerungen; Der deutsch-ddnische Krieg (Stuttgart, 1900) ; Niels Peter Jensen, Den anden slesvigske Krig (Copenhagen, 1900); S. N. Mouritsen, Vor Forfalnings Historic (Copenhagen, 1894) ; Carl Frederik Vilhelm Mathildus Rosenberg, Danmarkf i Aaret 1848 (Copenhagen, 1891). See also the special bibliographies appended to the biographies of the Danish kings and statesmen. (R. N. B.)

Literature The present language of Denmark is derived directly from the same source as that of Sweden, and the parent of both is the old Scandinavian (see Scandinavian Languages). In Iceland this tongue, with some modifications, has remained in use, and until about 1100 it was the literary language of the whole of Scandinavia. The influence of Low German first, and High German afterwards, has had the effect of drawing modern Danish constantly farther from this early type. The difference began to

show itself in the 12th century. R. K. Rask, and after him N. M. Petersen, have distinguished four periods in the develop- ment of the language, The first, which has been called Oldest Danish, dating from about 1100 and 1250, shows a slightly changed character, mainly depending on the system of inflections. In the second period, that of Old Danish, bringing us down to 1400, the change of the system of vowels begins to be settled, and masculine and feminine are mingled in a common gender. An indefinite article has been formed, and in the conjugation of the verb a great simplicity sets in. In the third period, 1400- 1 530, the influence of German upon the language is supreme, and culminates in the Reformation. The fourth period, from 1530 to about 1680, completes the work of development, and leaves the language as we at present find it.

The earliest work known to have been written in Denmark was a Latin

biography of Knud the Saint, written by an English monk ˆElnoth, who was attached to the church of St Alban in Odense where King Knud was murdered. Denmark produced several Latin writers of merit. Anders Sunesen (d. 1228) wrote a long poem in hexameters, Hexaemeron, describing the creation. Under the auspices of Archbishop Absalon the monks of Soro began to compile the annals of Denmark, and at the end of the 1 2 th century Svend Aagesen, a cleric of Lund, compiled from Icelandic sources and oral tradition his Compendiosa histbria regum Daniae. The great Saxo Grammaticus (q.v.) wrote his Historia Danica under the same patronage.

It was not till the 16th century that literature began to be generally practised in the vernacular in Denmark. The oldest laws which are still preserved date from the beginning of the 13th century, and many different collections are in existence. 1 A single work detains us in the 13th century, a treatise en medicine 3 by Henrik Harpestreng, who died in 1244. The first royal edict written in Danish is dated 1386; and the Act of Union at Kalmar, written in 1397, is the most important piece of the vernacular of the 14th century. Between 1300 and 1500, however, it is sup- posed that the Kjaempeviser, or Danish ballads, a large collection of about 500 epical and lyrical poems, were originally composed, and these form the most precious legacy of the Denmark of the middle ages, whether judged historically or poetically. We know nothing of the authors of these poems, which treat of the heroic adventures of the great warriors and lovely ladies of the chivalric age in strains of artless but often exquisite beauty. Some of the subjects are borrowed in altered form from the old mythology, while a few derive from Christian legend, and many deal with national history. The language in which we receive these ballads, however, is as late as the 16th or even the 17th century, but it is believed that they have become gradually modernized in the course of oral tradition. The first attempt to collect the ballads was made in 1591 by Anders Sorensen Vedel (1542-1616), who published 100 of them. Peder Syv printed 100 more in 1695. In i8i2-i8i4an elaborate collection in five volumes appeared at Christiania, edited by W. H. F. Abrahamson, R. Nyerup and K. M. Rahbek. Finally, Svend Grundtvig produced an exhaustive edition, Danmarks gamle Folkeviser (Copenhagen, 1853-1883, 5 vols.), which was supplemented (1891) by A. Olrik.

In 1490, the first printing press was set up at Copenhagen, by Gottfried of Gemen, who had brought it from Westphalia; and five years later the first Danish book was printed. This was the famous Rimkronike 3 ; a history of Denmark in rhymed Danish verse, attributed by its first editor to Niels (d. 1481), a monk of the

monastery of Soro. It extends to the death of Christian I., in 1481, which may be supposed to be approximately the date of the poem. In 1479 the university of Copenhagen had been founded. In 1506 the same Gottfried of Gemen published a famous collection of proverbs, attributed to Peder Laaie. Mikkel, priest of St Alban's Church in Odense, wrote three sacred poems, The Rose-Garland of Maiden Mary, The Creation and

1 Collected as Samling af gamle danske Love (5 vols., Copenhagen.

1821-1827).

2 Henrik Harpestraengs Laegebog (ed. C. Molbech, Copenhagen,,

1826).

3 Ed. C. Molbech (Copenhagen, 1825).

Human Life, which came out together in 1514, shortly before his death. The popular Lucidarius also appeared in the vulgar tongue.

These few productions appeared along with innumerable works in Latin, and dimly heralded a Danish literature. It was the Reformation that first awoke the living spirit in the popular tongue. Christiern Pedersen (q.v.; 1480-1554) was the first man of letters produced in Denmark. He edited and published, at Paris in 15 14, the Latin text of the old chronicler, Saxo Gram- maticus ; he worked up in their present form the beautiful half- mythical stories of Karl Magnus (Charlemagne) and Holger Danske (Ogier the Dane). He further translated the Psalms of David and the New Testament, printed in 1529, and finally — in conjunction with Bishop Peder Palladius — the Bible, which appeared in 1550. Hans Tausen, the bishop of Ribe (1494-1561), continued Pedersen's work, but with far less literary talent. He may, however, be considered as the greatest orator and teacher of the Reformation movement. He wrote a number of popular hymns, partly original, partly translations; translated the Pentateuch from the Hebrew; and published (1536) a collection of sermons embodying the reformed doctrine and destined for the use of clergy and laity.

The Catholic party produced one controversialist of striking ability, Povel Helgesen 1 (b. c. 1480), also known as Paulus Eliae. He had at first been inclined to the party of reform, but when Luther broke definitely with the papal authority he became a bitter opponent. His most important polemical work is an answer (1528) to twelve questions on the religious question propounded by Gustavus I. of Sweden. He is also supposed to be the author of the Skiby Chronicle, 2 in which he does not confine himself to the duties of a mere annalist, but records his personal opinion of people and events. Vedel, by the edition of the Kjaempeviser which is mentioned above, gave an immense stimulus to the progress of literature. He published an excellent translation of Saxo Grammaticus in 1575. The first edition of a Danish Reineke Fuchs, by Herman Weigere, appeared at Liibeck in 1555, and the first authorized Psalter in 1559. Arild Huitfeld wrote Chronicle of the Kingdom of Denmark, printed in ten volumes, between 1595 and 1604.

There are few traces of dramatic effort in Denmark before the Reformation; and many of the plays of that period may be referred to the class of school comedies. Hans Sthen, a lyrical poet, wrote a morality entitled Kortvending (" Change of For- tune "), which is really a collection of monologues to be delivered by students. The anonymous Ludus de Sancto Kanuto 3 (c. 1 530) which in spite of its title, is written in Danish, is the earliest Danish national drama. The burlesque drama assigned to Christian Hansen, The Faithless Wife, is the only one of its kind that has survived. But the best of these old dramatic authors was a priest of Viborg, Justesen Ranch (1 539-1607), who wrote Kong Salomons Hylding (" The Crowning of King Solomon") (1585), Samsons Faengsel ("The Imprisonment of Samson "), which includes lyrical passages which have given it claims to be considered the first Danish opera, and a farce, Karrig Niding (" The Miserly Miscreant "). Beside these works Ranch wrote a famous moralizing poem, entitled " A new song, of the nature and song of certain birds, in which many vices are pun- ished, and many virtues praised." Peder Clausen 4 (1545-1614), a Norwegian by birth and education, wrote a Description of Norway, as well as an admirable translation of Snorri Sturlason's Heimskringla, published ten years after Clausen's death. The father of Danish poetry, Anders Kristensen Arrebo (1587-1637), was bishop of Trondhjem, but was deprived of his see for im- morality. He was a poet of considerable genius, which is most brilliantly shown in an imitation of Du Bartas's Divine Semaine,

1 See Povel EHesens danske Skrifter (Copenhagen, 1855, &c), edited by C. E. Secher.

2 See Monumenta hisloriae Danicae (ed. H. Rordam, vol. i., 1873).

3 Ed. Sophus Birket Smith (Copenhagen, 1868), who also edited the comedies ascribed to Chr. Hansen as De tre aeldste danske Skuespil (1874), and the works of Ranch (1876).

4 His works were edited by Gustav Storm (Christiania, 1877-

1879)-

the Hexaemeron, a poem on the creation, in six books, which did not appear till 1661. He also made a translation of the Psalms.

He was followed by Anders Bording (1619-1677), a cheerful occasional versifier, and by Thoger Reenberg (1656-1742), a poet of somewhat higher gifts, who lived on into a later age. Among prose writers should be mentioned the grammarian Peder Syv, 6 (1631-1702); Bishop Erik Pontoppidan (1616-1678), whose Grammatica Danica, published in 1668, is the first systematic analysis of the language; Birgitta Thott (1610-1662), a lady who translated Seneca (1658); and Leonora Christina Ulfeld, daughter of Christian IV., who has left a touching account of her long imprisonment in her Jammersminde. Ole Worm (1 588- 1654), a learned pedagogue and antiquarian, preserved in his Danicorum monumentorum libri sex (Copenhagen, 1643) the descriptions of many antiquities which have since perished or been lost.

In two spiritual poets the advancement of the literature of Denmark took a further step. Thomas Kingo 6 (1634-1703) was the first who wrote Danish with perfect ease and grace. He was a Scot by descent, and retained the vital energy of his ancestors as a birthright. In 1677 he became bishop in Fiinen, where he died in 1703. His Winter Psalter (1689), and the so-called Kingo's Psalter (1699), contained brilliant examples of lyrical writing, and an employment of language at once original and national. Kingo had a charming fancy, a clear sense of form and great rapidity and variety of utterance. Some of his very best hymns are in the little volume he published in 1681, and hence the old period of semi-articulate Danish may be said to close with this eventful decade, which also witnessed the birth of Holberg. The other great hymn- writer was Hans Adolf Brorson (1694- 1764), who published in 1740 a great psalm-book at the king's command, in which he added his own to the best of Kingo's. Both these men held high posts in the church, one being bishop of Fiinen and the other of Ribe; but Brorson was much inferior to Kingo in genius. With these names the introductory period of Danish literature ends. The language

was now formed, and was being employed for almost all the uses of science and philo- sophy.

Ludvig Holberg (q.v.; 1684-1754) may be called the founder of modern Danish literature. His various works still retain their freshness and vital attraction. As an historian his style was terse and brilliant, his spirit philosophical, and his data singularly accurate. He united two unusual gifts, being at the same time the most cultured man of his day, and also in the highest degree a practical person, who clearly perceived what would most rapidly educate and interest the uncultivated. In his thirty-three dramas, sparkling comedies in prose, more or less in imitation of Moliere, he has left his most important positive legacy to litera- ture. Nor in any series of comedies in existence is decency so rarely sacrificed to a desire for popularity or a false sense of wit.

Holberg founded no school of immediate imitators, but his stimulating influence was rapid and general. The university of Copenhagen, which had been destroyed by fire in 1728, was reopened in 1742, and under the auspices of the historian Hans Gram (1685-1748), who founded the Danish Royal Academy of Sciences, it inspired an active intellectual life. Gram laid the foundation of critical history in Denmark. He brought to bear on the subject a full knowledge of documents and sources. His best work lies in his annotated editions of the older chroniclers. In 1744 Jakob Langebek (17 10-1775) founded the Society for the Improvement of the Danish Language, which opened the field of philology. He began the great collection of Scriptores rerum Danicarum medii aevi (9 vols., Copenhagen, 1772-1878). In jurisprudence Andreas Hoier (1690-1739) represented the new impulse, and in zoology Erik Pontoppidan (q.v.), the younger. This last name represents a lifelong activity in many branches of. literature. From Holberg's college of Soro, two learned professors, Jens Schelderup Sneedorff (1724-1764) and Jens Kraft (1720-1765), disseminated the seeds of a wider culture. All these men were aided by the generous and enlightened patronage

6 See Fr. W. Horn, Peder Syv (Copenhagen, 1878). 6 See A. C. L. Heiberg, Thomas Kingo (Odense, 1852).

of Frederick V. A little later on, the German poet Klopstock Settled in Copenhagen, bringing with him the prestige of his great reputation, and he had a strong influence in Germanizing Denmark. He founded, however, the Society for the Fine Arts, and had it richly endowed. The first prize offered was won by Christian Braumann Tullin (1728-1765) for his beautiful poem of May-day. Tullin, a Norwegian by birth, represents the first accession of a study of external nature in Danish poetry; he was an ardent disciple of the English poet Thomson. Christian Falster (1690-1752) wrote satires of some merit, but most of his work is in Latin. The New Hemic Poems of Jbrgen Sorterup are notable as imitations of the old folk-literature. Ambrosius Stub 1 (1705-1758) was a lyrist of great sweetness, born before his due time, whose poems, not published till 177 1, belong to a later age than their author.

The Lyrical Revival.— Between 1742 and 1749, that is to say, at the very climax of the personal activity of Holberg, several poets were born, who were destined to enrich the language with its first group of lyrical blossoms. Of these the two eldest, Wessel and Ewald, were men of extraordinary genius, and destined to fascinate the attention of posterity, not only by the brilliance of their productions, but by the suffering and brevity of their lives. Johannes Ewald (q.v.; 1 743-1 781) was not only the greatest Danish lyrist of the 18th century, but he had few rivals in the whole of Europe. As a dramatist, pure and simple, his bird-like instinct of song carried him too often into a sphere too exalted for the stage; but he has written nothing that is not stamped with the exquisite quality of distinction. Johan Herman Wessel 2 (1 742-1 785) excited even greater hopes in his contemporaries, but left less that is immortal behind him. After the death of Holberg, the affectation of Gallicism had reappeared in Denmark; and the tragedies of Voltaire, with their stilted rhetoric, were the most popular dramas of the day. Johan Nordahl Brun (1745-1816), a young writer who did better things later on, gave the finishing touch to the exotic absurdity by bringing out a wretched piece called Zarina, which was hailed by the press as the first original Danish tragedy, although Ewald's exquisite RolfKrage, which truly merited that title, had appeared two years before. Wessel, who up to that time had only been known as the president of a club of wits, immediately wrote Love without Stockings (1772), in which a plot of the most abject triviality is worked out in strict accordance with the rules of French tragedy, and in most pompous and pathetic Alexandrines. The effect of this piece was magical; the Royal Theatre ejected its cuckoo-brood of French plays, and even the Italian opera. It was now essential that every performance should be national, and in

the Danish language. To supply the place of the opera, native musicians, and especially J. P. E. Hartmann, set the dramas of Ewald and others, and thus the Danish school of music originated. Johan Nordahl Brun's best work is to be found in his patriotic songs and his hymns. He became bishop of Bergen in 1803.

Of the other poets of the revival the most important were born in Norway. Nordahl Brun, Claus Frimann (1746-1829), Claus Fasting (1746-1791), who edited a brilliant aesthetic journal, The Critical Observer, Christian H. Pram 3 (1756-1821), author of Staerkodder, a romantic epic, based on Scandinavian legend, and Edvb.rd Storm (1749-1794), were associates and mainly fellow- students at Copenhagen, where they introduced a style peculiar to themselves, and distinct from that of the true Danes. Their lyrics celebrated the mountains and rivers of the magnificent country they had left; and, while introducing images and scenery unfamiliar to the inhabitants of monotonous Denmark, they enriched the language with new words and phrases. This group of writers is now claimed by the Norwegians as the founders of a Norwegian literature; but their true place is certainly among the Danes, to whom they primarily appealed. They added

1 His collected works were edited by Fr. Barford (Copenhagen, 5th ed., 1879).

2 Wessel's Digte (3rd ed., 1895) are edited by J. Levin, with a biographical introduction.

3 A biography by his friend, K. L. Rahbek, is prefixed to a selection of his poetry (6 vols., 1824-1829).

nothing to the development of the drama, except in the person of N. K. Bredal (1733-1778), who became director of the Royal Danish Theatre, and the writer of some mediocre plays.

To the same period belong a few prose writers of eminence. Werner Abrahamson (1744-1812) was the first aesthetic critic Denmark produced. Johan Clemens Tode (1736-1806) was eminent in many branches of science, but especially as a medical writer. Ove Mailing (1746-1829) was an untiring collector of historical data, which he annotated in a lively style. Two historians of more definite claim on our attention are Peter Frederik Suhm (1728-1798), whose History of Denmark (n vols., Copenhagen, 1782-1812) contains a mass of original material, and Ove Guldberg (1731-1808). In theology Christian Bastholm (1740-1819) and Nicolai Edinger Balle

(1744-1816), bishop of Zealand, a Norwegian by birth, demand a reference. But the only really great prose-writer of the period was the Norwegian, Niels Treschow (1751-1833), whose philosophical works are composed in an admirably lucid style, and are distinguished for their depth and originality.

The poetical revival sank in the next generation to a more mechanical level. The number of writers of some talent was very great, but genius was wanting. Two intimate friends, Jonas Rein (1760-1821) and Jens Zetlitz (1761-1821), attempted, with indifferent success, to continue the tradition of the Norwegian group. Thomas Thaarup (1749-1821) Was a fluent and eloquent writer of occasional poems, and of homely dramatic idylls. The early death of Ole Samsoe (1759-1796) prevented the develop- ment of a dramatic talent that gave rare promise. But while poetry languished, prose, for the first time, began to flourish in Denmark. Knud Lyne Rahbek (1760-1830) was a pleasing novelist, a dramatist of some merit, a pathetic elegist, and a witty song- writer; he was also a man full of the literary instinct, and through a long life he never ceased to busy himself with editing the works of the older poets, and spreading among the people a knowledge of Danish literature through his magazine, Minerva, edited in conjunction with C. H. Pram. Peter Andreas Heiberg (1758-1841) was a political and aesthetic critic of note. Hewas exiled from Denmark in company with another sympathizer with the principles of the French Revolution, Malte Conrad Brunn (1775-1826), who settled in Paris, and attained a world-wide reputation as a geographer. O. C. Olufsen (1764-1827) was a writer on geography, zoology and political economy. Rasmus Nyerup (1759-1829) expended an immense energy in the compila- tion of admirable works on the history of language and literature. From 1 7 78 to his death he exercised a great power in the statistical and critical departments of letters. The best historian of this period, however, was Engelstoft (1774-1850), and the most brilliant theologian Bishop Mynster (1775-1854). In the annals of modern science Hans Christian Oersted (1777-1851) is a name universally honoured. He explained his inventions and described his discoveries in language so lucid and so characteristic that he claims an honoured place in the literature of the country of whose culture, in other branches, he is one of the most distinguished ornaments.

On the threshold of the romantic movement occurs the name of Jens Baggesen (q.v.; 1764-1826), a man of great genius, whose work was entirely independent of the influences around him. Jens Baggesen is the greatest comic poet that Denmark has produced; and as a satirist and witty lyrist he has no rival among the Danes. In his hands the difficulties of the language disappear; he performs with the utmost

ease extraordinary tours de force of style. His astonishing talents were wasted on trifling themes and in a fruitless resistance to the modern spirit in literature.

Romanticism. — With the beginning of the 19th century the new light in philosophy and poetry, which radiated from Germany through all parts of Europe, found its way into Denmark also- In scarcely any country was the result so rapid or so brilliant. There arose in Denmark a school of poets who created for them- selves a reputation in all parts of Europe, and would have done honour to any nation or any age. The splendid cultivation of metrical art threw other branches into the shade; and the epoch

of which we are about to speak is eminent above all for mastery over verse. The swallow who heralded the summer was a German by birth, Adolph Wilhelm Schack von Staffeldt 1 (1769- 1826), who came over to Copenhagen from Pomerania, and prepared the way for the new movement. Since Ewald no one had written Danish lyrical verse so exquisitely as Schack von Staffeldt, and the depth and scientific precision of his thought won him a title which he has preserved, of being the first philo- sophic poet of Denmark. The writings of this man are the deepest and most serious which Denmark had produced, and at his best he yields to no one in choice and skilful use of expression. This sweet song of Schack von Staffeldt's, however, was early silenced by the louder choir that one by one broke into music around him. It was Adam Gottlob Ohlenschlager (q.v.; 1779- 1850), the greatest poet of Denmark, who was to bring about the new romantic movement. In 1802 he happened to meet the young Norwegian Henrik Steffens (1773-1845), who had just returned from a scientific tour in Germany, full of the doctrines of Schelling. Under the immediate direction of Steffens, Ohlenschlager began an entirely new poetic style, and destroyed all his earlier verses. A new epoch in the language began, and the rapidity and matchless facility of the new poetry was the wonder of Steffens himself. The old Scandinavian mythology lived in the hands of Ohlenschlager exactly as the classical Greek religion was born again in Keats. He aroused in his people the slumbering sense of their Scandinavian nationality.

The retirement of Ohlenschlager comparatively early in life, left the

way open for the development of his younger con- temporaries, among whom several had genius little inferior to his own. Steen Steensen Blicher (1 782-1848) was a Jutlander, and preserved all through life the characteristics of his sterile and sombre fatherland. After a struggling youth of great poverty, he published, in 1807-1809, a translation of Ossian; in 1814 a volume of lyrical poems; and in 181 7 he attracted considerable attention by his descriptive poem of The Tour in Jutland. His real genius, however, did not lie in the direction of verse; and his first signal success was with a story, A Village Sexton's Diary, in 1824, which was rapidly followed by other tales, descriptive of village life in Jutland, for the next twelve years. These were collected in five volumes (1833-1836). His masterpiece is a collec- tion of short stories, called The Spinning Room. He also produced many national lyrics of great beauty. But it was Blicher's use of patois which delighted his countrymen with a sense of freshness and strength. They felt as though they heard Danish for the first time spoken in its fulness. The poet Aarestrup (in 1848) declared that Blicher had raised the Danish language to the dignity of Icelandic. Blicher is a stern realist, in many points akin to Crabbe, and takes a singular position among the romantic idealists of the period, being like them, however, in the love of precise and choice language, and hatred of the mere common- places of imaginative writing. 2

Nikolai Frederik Severin Grundtvig (q.v.; 1 783-1872), like Ohlenschlager, learned the principles of the German romanticism from the lips of Steffens. He adopted the idea of introducing the Old Scandinavian element into art, and even into life, still more earnestly than the older poet. Bernhard Severin Ingemann (q.v.; 1789-1862) contributed to Danish literature historical romances in the style of Sir Walter Scott. Johannes Carsten Hauch (q.v.; 1790-1872) first distinguished himself as a disciple of Ohlenschlager, and fought under him in the strife against the old school and Baggesen. But the master misunderstood the disciple; and the harsh repulse of Ohlenschlager silenced Hauch for many years. He possessed, however, a strong and fluent genius, which eventually made itself heard in a multitude of volumes, poems, dramas and novels. All that Hauch wrote is marked by great qualities, and by distinction; he had a native bias towards the mystical, which, however, he learned to keep in abeyance.

'See F. L. Liebenberg, Schack Staffeldts samlede Digte (2 vols., Copenhagen, 1843), and Samlinger til Schack Staffeldts Levnet (4 vols.,

1846-1851).

2 Blicher's Tales were edited by P. Hansen (3 vols., Copenhagen, 1871), and his Poems in 1870.

Johan Ludvig Heiberg (q.v.; 1701-1860) was a critic who ruled the world of Danish taste for many years. His mother, the Baroness Gyllembourg-Ehrensvard (q.v.; 1 773-1856), wrote a large number of anonymous novels. Her knowledge of life, her sparkling wit and her almost faultless style, make these short stories masterpieces of their kind.

Christian Hviid Bredahl (1 784-1860) produced six volumes of Dramatic Scenes* (1819-1833) which, in spite of their many brilliant qualities, were little appreciated at the time. Bredahl gave up literature in despair to become a peasant farmer, and died in poverty.

Ludvig Adolf Bodtcher (1 793-1874) wrote a single volume of lyrical poems, which he gradually enlarged in succeeding editions. He was a consummate artist in verse, and his impressions are given with the most delicate exactitude of phrase, and in a very fine strain of imagination. He was a quietist and an epicurean, and the closest parallel to Horner in the literature of the North. Most of Bodtcher's poems deal with Italian life, which he learned to know thoroughly during a long residence in Rome. He was secretary to Thorwaldsen for a considerable time.

Christian Winther (q.v.; 1796-1876) made the island of Zealand his loving study, and that province of Denmark belongs to him no less thoroughly than the Cumberland lakes belong to Wordsworth. Between the latter poet and Winther there was much resemblance. He was, without compeer, the greatest pastoral lyrist of Denmark. His exquisite strains, in which pure imagination is blended with most accurate and realistic descrip- tions of scenery and rural life, have an extraordinary charm not easily described.

The youngest of the great poets born during the last twenty years of the 18th century was Henrik Hertz (q.v.; 1797-1870). As a satirist and comic poet he followed Baggesen, and in all branches of the poetic art stood a little aside out of the main current of romanticism. He introduced into the Danish literature of his time inestimable elements of lucidity and purity. In his best pieces Hertz is the most modern and most cosmopolitan of the Danish writers of his time.

It is noticeable that all the great poets of the romantic period lived to an advanced age. Their prolonged literary activity — for some of them, like Grundtvig, were busy to the last — had a slightly damping

influence on their younger contemporaries, but certain names in the next generation have special prominence. Hans Christian Andersen (q.v.; 1805-1875) was the greatest of modern fabulists. In 1835 there appeared the first collection of his Fairy Tales, and won him a world-wide reputation. Almost ‘ every year from this time forward until near his death he published about Christmas time one or two of these unique stories, so delicate in their humour and pathos, and so masterly in their simplicity. Carl Christian Bagger (1807-1846) published volumes in 1834 and 1836 which gave promise of a great future, — a promise broken by his early death. Frederik Paludan-Miiller (q.v.; 1809-1876) developed, as a poet, a magnificent career, which contrasted in its abundance with his solitary and silent life as a man. His mythological or pastoral dramas, his great satiric epos of Adam Homo (1841-1848), his comedies, his lyrics, and above all his noble philosophic tragedy of Kalanus, prove the immense breadth of his compass, and the inexhaustible riches of his imagination. C. L. Emil Aarestrup (1800-1856) published in 1838 a volume of vivid erotic poetry, but its quality was only appreciated after his death. Edvard Lembcke (1815-1897) made himself famous as the admirable translator of Shakespeare, but the incidents of 1864 produced from him some volumes of direct and manly patriotic verse.

The poets completely ruled the literature of Denmark during this period. There were, however, eminent men in other depart- ments of letters, and especially in philology. Rasmus Christian Rask (1 787-1832) was one of the most original and gifted linguists of his age. His grammars of Old Frisian, Icelandic and Anglo- Saxon were unapproached in his own time, and are still admirable. Niels Matthias Petersen (1791-1862), a disciple of Rask, was the author of an admirable History of Denmark in the Heathen

3 Edited (3 vols., 2nd ed., 1855, Copenhagen) by F. L. Liebenberg.

Antiquity, and the translator of many of the sagas. Martin Frederik Arendt (1773-1823), the botanist and archaeologist, did much for the study of old Scandinavian records. Christian Molbech (1783-1857) was a laborious lexicographer, author of the first good Danish dictionary, published in 1833. In Joachim Frederik Schouw (1789-1852), Denmark produced a very eminent botanist, author of an

exhaustive Geography of Plants. In later years he threw himself with zeal into politics. His botanical researches were carried on by Frederik Liebmann (1813-1856). The most famous zoologist contemporary with these men was Salomon Dreier (1813-1842).

The romanticists found their philosopher in a most remarkable man, Soren Aaby Kierkegaard (1813-1855), one of the most subtle thinkers of Scandinavia, and the author of some brilliant philosophical and polemical works. A learned philosophical writer, not to be compared, however, for genius or originality to Kierkegaard, was Frederik Christian Sibbern (1785-1872). He wrote a dissertation On Poetry and Art (3 vols., 1853-1860) and The Contents' of a MS. from the Year 2135 (3 vols., 1858-1872).

Among novelists who were not also poets was Andreas Nikolai de Saint-Aubain (1798-1865), who, under the pseudonym of Carl Bernhard, wrote a series of charming romances. Mention must also be made of two dramatists, Peter Thun Feorsom (1777-181 7) , who produced an excellent translation of Shakespeare (1807-1816), and Thomas Overskou (1 798-1873), author of a long series of successful comedies, and of a history of the Danish theatre (5 vols., Copenhagen, 1854-1864).

Other writers whose names connect the age of romanticism with a later period were Meyer Aron Goldschmidt (1810-1887), author of novels and tales; Herman Frederik Ewald (1821-1908), who wrote a long series of historical novels; Jens Christian Hostrup (1818-1892), a writer of exquisite comedies; and the miscellaneous writer Erik Bogh (1822-1899). In zoology, J. J. S. Steenstrup (1813-1898); in philology, J. N. Madvig (1804-1886) and his disciple V. Thomsen (b. 1842); in anti- quarianism, C. J. Thomsen (1788-1865) and J. J. Asmussen Worsaae (1821-1885); and in philosophy, Rasmus Nielsen (1809-1884) and Hans Brochner (1820-1875), deserve mention.

The development of imaginative literature in Denmark became very closely defined during the latter half of the 19th century. The romantic movement culminated in several poets of great eminence, whose deaths prepared the way for a new school. In 1874 Bodtcher passed away, in 1875 Hans Christian Andersen, in the last week of 1876 Winther, and the greatest of all, Frederik Paludan-Miiller. The field was therefore left open to the successors of those idealists, and in 1877 the reaction began to be felt. The eminent critic, Dr Georg Brandes (q.v.), had long foreseen the decline of pure romanticism, and had advocated a more objective and more exact treatment of literary phenomena. Accordingly, as soon as all the great planets had

disappeared, a new constellation was perceived to have risen, and all the stars in it had been lighted by the enthusiasm of Brandes. The new writers were what he called Naturalists, and their sympathies were with the latest forms of exotic, but particularly of French literature. Among these fresh forces three immediately took place as leaders — Jacobsen, Drachmann and Schandorph. In J. P. Jacobsen (q.v.; 1847-1885) Denmark was now taught to welcome the greatest artist in prose which she has ever pos- sessed; his romance of Marie Grubbe led off the new school with a production of unexampled beauty. But Jacobsen died young, and the work was really carriedout by his two companions. Holger Drachmann (q.v.; 1846-1908) began life as a marine painter; and a first little volume of poems, which he published in 1872, attracted slight attention. In 1877 he came forward again with one volume of verse, another of fiction, a third of travel; in each he displayed great vigour and freshness of touch, and he rose at one leap to the highest position among men of promise. Drach- mann retained his place, without rival, as the leading imaginative writer in Denmark. For many years he made the aspects of life at sea his particular theme, and he contrived to rouse the patriotic enthusiasm of the Danish public as it had never been roused before. His variou? and unceasing productiveness, his

freshness and vigour, and the inexhaustible richness of his lyric versatility, early brought Drachmann to the front and kept him there. Meanwhile prose imaginative literature was ably sup- ported by Sophus Schandorph (1836-1901), who had been entirely out of sympathy with the idealists, and had taken no step while that school was in the ascendant. In 1876, in his fortieth year, he was encouraged by the change in taste to publish a volume of realistic stories, Country Life, and in 1878 a novel, Without a Centre. He has some relation with Guy de Maupassant as a close analyst of modern types of character, but he has more humour. He has been compared with such Dutch painters of low life as Teniers. His talent reached its height in the novel called Little Folk (1880), a most admirable study of lower middle-class life in Copenhagen. He was for a while, without doubt, the leading living novelist, and he went on producing works of great force, in which, however, a certain monotony is apparent. The three leaders had meanwhile been joined by certain younger men who took a prominent position. Among these Karl Gjellerup and Erik Skram were the earliest. Gjellerup (b. 1857), whose first works of importance date from 1878, was long uncertain as to the direction of his powers; he was poet, novelist, moralist and biologist in one; at length he settled down into line with the new realistic school, and produced in 1882 a satirical novel of manners which had a great success, The

Disciple of the Teutons. Erik Skram (b. 1847) had in 1879 written a solitary novel, Gertrude Coldbjornsen, which created a sensation, and was hailed by Brandes as ex- actly representing the ” naturalism ” which he desired to see encouraged; but Skram has written little else of importance. Other writers of reputation in the naturalistic school were Edvard Brandes (b. 1847), and Herman Bang (b. 1858). Peter Nansen (b. 1861) has come into wide notoriety as the author, in particularly beautiful Danish, of a series of stories of a pronouncedly sexual type, among which Maria (1894) has been the most successful. Meanwhile, several of the elder generation, unaffected by the movement of realism, continued to please the public. Three lyrical poets, -H. V. Kaalund (1818-1885), Carl Ploug (1813-1894) and Christian Richardt (1831-1892), of very great talent, were not yet silent, and among the veteran novelists were still active H. F. Ewald and Thomas Lange (1829-1887). Ewald’s son Carl (1856-1908) achieved a great name as a novelist, but did his most characteristic work in a series of books for children, in which he used the fairy tale, in the manner of Hans Andersen, as a vehicle for satire and a theory of morals. During the whole of this period the most popular writer of Denmark was J. C. C. Brosboll (1816-1900), who wrote, under the pseudonym Carit Etlar, a vast number of tales. Another popular novelist was Vilhelm Bergsoe (b. 1835), author of In the Sabine Mountains (187 1), and other romances. Sophus Bauditz (b. 1850) persevered in composing novels which attain a wide general popularity. Mention must be made also of the dramatist Christian Molbech

(1821-1888).

Between 1885 and 1892 there was a transitional period in Danish literature. Up to that time all the leaders had been united in accepting the naturalistic formula, which was combined with an individualist and a radical tendency. In 1885, however, Drachmann, already the recognized first poet of the country, threw off his allegiance to Brandes, denounced the exotic tradition, declared himself a Conservative, and took up a national and patriotic attitude. He was joined a little later by Gjellerup, while Schandorph remained stanchly by the side of Brandes. The camp was thus divided. New writers began to make their appearance, and, while some of these were stanch to Brandes, others were inclined to hold rather with Drachmann. Of the authors who came forward during this period of transition, the strongest novelist proved to be Hendrik Pontoppidan (b. 1857). In some of his books he reminds the reader of Turgeniev. Pontoppidan published in 1898 the first volume of a great novel entitled Lykke-Per, the biography of a typical Jutlander named Per Sidenius, a work

to be completed in eight volumes. From 1893 to 1909 no great features of a fresh kind revealed themselves. The Danish public, grown tired of realism, and satiated with pathological phenomena, returned to a fresh study, of their own national

characteristics. The cultivation of verse, which was greatly discouraged in the eighties, returned. Drachmann was supported by excellent younger poets of his school. J. J. Jorgensen (b. 1866), a Catholic decadent, was very prolific. Otto C. Fonss (b. 1853) published seven little volumes of graceful lyrical poems in praise of gardens and of farm-life. Andreas Dolleris (b. 1850), of Vejle, showed himself an occasional poet of merit. Alfred Ipsen (b. 1852) must also be mentioned as a poet and critic. Valdemar Rordam, whose The Danish Tongue was the lyrical success of 1001, may also be named. Some attempts were made to transplant the theories of the symbolists to Denmark, but without signal success. On the other hand, something of a revival of naturalism is to be observed in the powerful studies of low life admirably written by Karl Larsen (b. i860).

The drama has long flourished in Denmark. The principal theatres are liberally open to fresh dramatic talent of every kind, and the great fondness of the Danes for this form of entertain- ment gives unusual scope for experiments in halls or private theatres; nothing is too eccentric to hope to obtain somewhere a fair hearing. Drachmann produced with very great success several romantic dramas founded on the national legends. Most of the novelists and poets already mentioned also essayed the stage, and to those names should be added these of Einar Christiansen (b. 1861), Ernst von der Recke (b. 1848), Oskar Benzon (b. 1856) and Gustav Wied (b. 1858).

In theology no names were as eminent as in the preceding generation, in which such writers as H. N. Clausen (1793-1877), and still more Hans Lassen Martensen (1808-1884), lifted the prestige of Danish divinity to a high point. But in history the Danes have been very active. Karl Ferdinand Allen (181 1-1871) began a comprehensive history of the Scandinavian kingdoms (5 vols., 1864-1872). Jens Peter Trap (1810-1885) concluded his great statistical account of Denmark in 1879. The 16th century was made the subject of the investigations of Troels Lund (q.v.). About 1880 several of the younger historians formed the plan of combining to investigate and publish the sources of Danish history; in this the indefatigable Johannes Steenstrup (b. 1844)

was prominent. The domestic history of the country began, about 1885, to occupy the attention of Edvard Holm (b. 1833), 0. Nielsen and the veteran P. Frederik Barfod (1811-1896). The naval histories of G. Liitken attracted much notice. Besides the names already mentioned, A. D. Jorgensen (1840-1897), J. Fredericia (b. 1849), Christian Erslev (b. 1852) and Vilhelm Mollerup have all distinguished them- selves in the excellent school of Danish historians. In 1896 an elaborate composite history of Denmark was undertaken by some leading historians (pub. 1897-1905). In philosophy nothing has recently been published of the highest value. Martensen's Jakob Bohme (1881) belongs to an earlier period. H. HSffding (b. 1843) has been the most prominent contributor to psychology. His Problems of Philosophy and his Philosophy of Religion were translated into English in 1906. Alfred Lehmann (b. 1858) has, since 1896, attracted a great deal of attention by his sceptical investigation of psychical phenomena. F. Ronning has written on the history of thought in Denmark. In the criticism of art, Julius Lange (1838-1896), and later Karl Madsen, have done excellent service. In literary criticism Dr Georg Brandes is notable for the long period during which he remained pre- dominant. His was a steady and stimulating presence, ever pointing to the best in art and thought, and his influence on his age was greater than that of any other Dane.

Authorities. — R. Nyerup, Den danske Digtekunsts Historie (1800-1808), and Almindeligt Literaturlexikon (1818-1820); N. M. Petersen, Literaturhistorie (2nd ed., 1867-1871, 5 vols.); Overskou, Den danske Skueplads (1 854-1 866, 5 vols.), with a continuation (2 vols., 1873-1876) by E Collin; Chr. Bruun, Bibliotheca Danica (3 vols., 1872-1896) ; Bricka, Dansk biografisk Lex-ikon (1887-1901) ; J. Paludan, Danmarks Literatur i Middelalderen (Copenhagen, 1896) ; P. Hansen, Illustreret Dansk Literaturhistorie (3 vols., 1901-1902) ; F. W. Horn, History of the Scandinavian North from the most ancient times to the present (English translation by Rasmus B. Anderson (Chicago, 1884), with bibliographical appendix by Thorwald Solberg) ; Ph. Schweitzer, Geschichte der Skandinavischen Litteratur (3 pts., Leipzig, 1886-1889), forming vol. viii. of the Geschichte der Welt-

litteratur. See also Brandes, Kritiker og Portraiter (1870) ; Brandes, Danske Ditgere (1877); Marie Herzfeld, Die Skandinavische Litteratur und ihre Tendenzen (Berlin and Leipzig, 1898) ; Hjalmar Hjorth Boyesen, Essays on Scandinavian Literature (London, 1895); Edmund Gosse, Studies in the Literature of Northern Europe (new ed., London, 1883) ; Vilhelm Andersen, Litteraturbilleder (Copenhagen, 1903) ; A. P. J. Schener, Kortfattet Indledning til Romantikkus Periode i Danmarks Litteratur (Copenhagen, 1894). (E. G.)

DENNERY, or D'Ennery, ADOLPHE (1811-1899), French dramatist and novelist, whose real surname was Philippe, was born in Paris on the 17 th of June 181 1. He obtained his first success in collaboration with Charles Desnoyer in Emile, ou le fils d'un pair de France (183 1), a drama which was the first of a series of some two hundred pieces written alone or in collaboration with other dramatists. Among the best of them may be mentioned Gaspard Hauser (1838) with Anicet Bourgeois; Les Bohemiens de Paris (1842) with Eugene Grange; with Mallian, Marie-Jeanne, ou la femme du peuple (1845), in which Madame Dorval obtained a great success; La Case d'Oncle Tom (1853); Les Deux Orphelines (1875), perhaps his best piece, with Eugene Cormon. He wrote the libretto^ for Gounod's Tribut de Zamora (1881); with Louis Gallet and Edouard Blan he composed the book of Massenet's Cid (1885); and, again in collaboration with Eugene Cormon, the books of Auber's operas, Le Premier Jour de bonheur (1868) and Reve d'amour (1869). He prepared for the stage Balzac's posthumous comedy Mer cadet ou le faiseur, presented at the Gymnase theatre in 1851. Reversing the usual order of procedure, Dennery adapted some of his plays to the form of novels. He died in Paris in 1899.

DENNEWITZ, a village of Germany, in the Prussian province of Brandenburg, near Jiiterbog, 40 m. S.W. from Berlin. It is memorable as the scene of a decisive battle on the 6th of September 1813, in which Marshal Ney, with an army of 58,000 French, Saxons and Poles, was defeated with great loss by 50,000 Prussians under Generals Bulow (afterwards Count Biilow of Dennewitz) and Tauentzien. The site of the battle is marked by an iron obelisk.

DENNIS, JOHN (1657-1734), English critic and dramatist, the son of a saddler, was born in London in 1657. He was educated at Harrow School and Caius College, Cambridge, where he took his B.A. degree in 1679. In the next year he was fined and dis- missed from his college for having wounded a fellow-student with a sword. He was, however, received at Trinity Hall, where he took his M.A. degree in 1683. After travelling in France and Italy, he settled in London, where he became acquainted with Dryden, Wycherley and others; and being made temporarily independent by inheriting a small fortune, he devoted himself to literature. The duke of Marlborough procured him a place as one of the queen's waiters in the customs with a salary of £1 20 a year. This he afterwards disposed of for a small sum, retaining, at the suggestion of Lord Halifax, a yearly charge upon it for a long term of years. Neither the poems nor the plays of Dennis are of any account, although one of his tragedies, a violent attack on the French in harmony with popular prejudice, entitled Liberty Asserted, was

produced with great success at Lincoln's Inn Fields in 1704. His sense of his own importance approached mania, and he is said to have desired the duke of Marlborough to have a special clause inserted in the treaty of Utrecht to secure him from French vengeance. Marlborough pointed out that although he had been a still greater enemy of the French nation, he had no fear for his own security. This tale and others of a similar nature may well be exaggerations prompted by his enemies, but the infirmities of character and temper indicated in them were real. Dennis is best remembered as a critic, and Isaac D'Israeli, who took a by no means favourable view of Dennis, said that some of his criticisms attain classical rank. The earlier ones, which have nothing of the rancour that afterwards gained him the nickname of " Furius," are the best. They are Remarks. . . (1696), on Blackmore's epic of Prince Arthur; Letters upon Several Occasions written by and between Mr Dryden, Mr Wycherley, Mr Moyle, Mr Congreve and Mr Dennis, published by Mr Dennis (1696); two pamphlets in reply to Jeremy Collier's Short View; The Advancement and Reformation of

Modem Poetry (1701), perhaps his most important work ;

The Grounds of Criticism in Poetry (1704), in which he argued that the ancients owed their superiority over the moderns in poetry to their religious attitude; an Essay upon Publick Spirit . . . (1711), in which he inveighs against luxury, and servile imitation of foreign fashions and customs; and Essay on the Genius and Writings of Shakespeare in three Letters (17 12).

Dennis had been offended by a humorous quotation made from his works by Addison, and published in 1713 Remarks upon Cato. Much of this criticism was acute and sensible, and it is quoted at considerable length by Johnson in his Life of Addison, but there is no doubt that Dennis was actuated by personal jealousy of Addison's success. Pope replied in The Narrative of Br Robert Norris, concerning the strange and deplorable frenzy of John Dennis . . . (1713). This pamphlet was full of personal abuse, exposing Dennis's foibles, but offering no defence of Cato. Addison repudiated any connivance in this attack, and in- directly notified Dennis that when he did answer his objections, it would be without personalities. Pope had already assailed Dennis in 171 1 in the Essay on Criticism, as Appius. Dennis retorted by Reflections, Critical and Satirical . . . , a scurrilous

production in which he taunted Pope with his deformity, saying among other things that he was ” as stupid and as venomous as a hunch-backed toad.” He also wrote in 17 17* Remarks upon Mr Pope’s Translation of Homer . . . and A True Character of Mr Pope. He accordingly figures in the Dunciad, and in a scathing note in the edition of 1729 (bk. i. 1. 106) Pope quotes his more outrageous attacks, and adds an insulting epigram attributed to Richard Savage, but now generally ascribed to Pope. More pamphlets followed, but Dennis’s day was over. He outlived his annuity from the customs, and his last years were spent in great poverty. Bishop Atterbury sent him money, and he received a small sum annually from Sir Robert’ Walpole. A benefit performance was organized at the Haymarket (December 18, 1733) on his behalf. Pope wrotefor the occasion an ill-natured prologue which Cibber recited. Dennis died within three weeks of this performance, on the 6th of January 1734.

His other works include several plays, for one of which, Appius and Virginia (1709), he invented a new kind of thunder. He wrote a curious Essay on the Operas after the Italian Manner (1706), maintaining that opera was the outgrowth of effeminate manners, and should, as such, be suppressed. His Works were published in 1702, Select Works . . . (2 vols.) in 17 18, and Miscellaneous Tracts, the first volume only of which appeared, in 1727. For accounts of Dennis see Cibber’s Lives of the Poets, vol. iv. ; Isaac D’Israeli’s essays on Pope and Addison in the Quarrels of Authors, and ” On the Influence of a Bad Temper in Criticism ” in Calamities of Authors; and numerous references in Pope’s Works.

DENOMINATION (Lat. denominare, to give a specific name to), the giving of a specific name to anything, hence the name or designation of a person or thing, and more particularly of a class of persons or things; thus, in arithmetic, it is applied to a unit in a system of weights and measures, currency or numbers. The most general use of ” denomination ” is for a body of persons holding specific opinions and having a common name, especially with reference to the religious opinions of such a body. More particularly the word is used of the various ” sects ” into which members of a common religious faith may be divided. The term ” denominationalism ” is thus given to the principle of emphasiz- ing the distinctions, rather than the common ground, in the faith held by different bodies professing one sort of religious belief. This use is particularly applied to that system of religious education which lays stress on the principle that children belonging to a particular religious sect should be publicly taught in the tenets of their belief by members belonging to it and under the general control of the ministers of the denomination.

DENON, DOMINIQUE VIVANT, Baeon de (i 747-1 8 25), French artist and archaeologist, was born at Chalon-sur-Saone on the 4th of January 1747. He was sent to Paris to study law, but he showed a decided preference for art and literature, and soon gave up his profession. In his twenty-third year he pro- duced a comedy, L.e Bon Pere, which obtained a succes d'estime, as he had already won a position in society by his agreeable manners and exceptional conversational powers. He became a favourite

of Louis XV., who entrusted him with the collection and arrange- ment of a cabinet of medals and antique gems for Madame de Pompadour, and subsequently appointed him attache to the French embassy at St Petersburg. On the accession of Louis XVI. Denon was transferred to Sweden; but he returned, after a brief interval, to Paris with the ambassador M. de Vergennes, who had been appointed foreign minister. In 1775 Denon was sent on a special mission to Switzerland, and took the oppor- tunity of visiting Voltaire at Ferney. He made a portrait of the philosopher, which was engraved and published on his return to Paris. His next diplomatic appointment was to Naples, where he spent seven years, first as secretary to the embassy and after- wards as charge d'affaires. He devoted this period to a careful study of the monuments of ancient art, collecting many specimens and making drawings of others. He also perfected himself in etching and mezzotinto engraving. The death of his patron, M. de Vergennes, in 1787, led to his recall, and the rest of his life was given mainly to artistic pursuits. On his return to Paris he was admitted a member of the Academy of Painting. After a brief interval he returned to Italy, living chiefly at Venice. He also visited Florence arid Bologna, and afterwards went to Switzerland. While there he heard that his property had been confiscated, and his name placed on the list of the proscribed, and with characteristic courage he resolved at once to return to Paris. His situation was critical, but he was spared, thanks to the friendship of the painter David, who obtained for him a com- mission to furnish designs for republican costumes. When the Revolution was over, Denon was one of the band of eminent men who frequented the house of Madame de Beauharnais. Here he met Bonaparte, to whose fortunes he wisely attached himself. At Bonaparte's invitation he joined the expedition to Egypt, and thus found the opportunity of gathering the materials for his most important literary and artistic work. He accompanied General Desaix to Upper Egypt, and made numerous sketches of the monuments of ancient art, sometimes under the very fire of the enemy. The results were published in his Voyage dans la basse el la haute Egypte (2 vols, fol., with 141 plates, Paris, 1802), a work which crowned his

reputation both as an archaeologist and as an artist. In 1804 he was appointed by Napoleon to the important office of director-general of museums, which he filled until the restoration in 181 5, when he had to retire. He was a devoted friend of Napoleon, whom he accompanied in his ex- peditions to Austria, Spain and Poland, taking sketches with his wonted fearlessness on the various battlefields, and advising the conqueror in his choice of spoils of art from the various cities pillaged. After his retirement he began an illustrated history of ancient and modern art, in which he had the co-operation of several skilful engravers. He died at Paris on the 27th of April 1825, leaving the work unfinished. It was published posthu- mously, with an explanatory text by Amaury Duval, under the title Monuments des arts du dessin chez les peuples tant anciens que modernes ,recueillis par Vivant Denon (4 vols, fol., Paris, 1829). Denon was the author of a novel, Point de lendemain (1777), of which further editions were printed in 181 2, 1876 and 1879.

See J. Renouvier, Histoire de Vart pendant la Revolution; A. de la Fizeliere, L'CEuvre originate de Vivant-Denon (2 vols., Paris, 1872-1873); Roger Portallis, Les Dessinateurs a" illustrations au XVIII siecle; D. H. Beraldi, Les Graveurs d' illustrations au XVIII' siecle.

DENOTATION (from Lat. denotare, to mark out, specify), in logic, a technical term used strictly as the correlative of Con- notation, to describe one of the two functions of a concrete term. The concrete term " connotes " attributes and " denotes " all the individuals which, as possessing these attributes, constitute the genus or species described by the term. Thus " cricketer " denotes the individuals who play cricket, and connotes the qualities or characteristics by which these individuals are marked. In this sense, in which it was first used by J. S. Mill, Denotation is equivalent to Extension, and Connotation to Intension. It is clear that when the given term is qualified by a limiting adjective the Denotation or Extension diminishes, while the Connotation or Intension increases; e.g. a generic term like "flower" has a larger Extension, and a smaller Intension than " rose "• " rose "

than " moss-rose." In more general language Denotation is used loosely for that which is meant or indicated by a word, phrase, sentence or even an action. Thus a proper name or even an abstract term is said to have Denotation. (See Connotation.)

DENS, PETER (1690-1775), Belgian Roman Catholic theo- logian, was born at Boom near Antwerp. Most of his life was spent in the archiepiscopal college of Malines, where he was for twelve years reader in theology and for forty president. His great work was the Theologia moralis et dogmatica, a compendium in catechetical form of Roman Catholic doctrine and ethics which has been much used as a students' text-book. Dens died on the 15th of February 1775.

DENSITY (Lat. densus, thick), in physics, the mass or quantity of matter contained in unit volume of any substance: this is the absolute density; the term relative density or specific gravity denotes the ratio of the mass of a certain volume of a substance to the mass of the same volume of some standard substance. Since the weights used in conjunction with a balance are really standard masses, the word " weight " may be substituted for the word " mass " in the preceding definitions; and we may symbolically express the relations thus: — If M be the weight of substance occupying a volume V, then the absolute density A = M/V; and if m, mi be the weights of the substance and of the standard substance which occupy the same volume, the relative density or specific gravity S = mj-mi ; or more generally if oti be the weight of a volume v of the substance, and tn\ the weight of a volume Vi of the standard, then S = mvi/miv. In the numerical expression of absolute densities it is necessary to specify the units of mass and volume employed; while in the case of relative densities, it is only necessary to specify the standard substance, since the result is a mere number. Absolute densities are generally stated in the C.G.S. system, i.e. as grammes per cubic centimetre. In commerce, however, other expressions are met with, as, for example, " pounds per cubic foot " (used for woods, metals, &c), " pounds per gallon," &c. The standard substances employed to determine relative densities are: water for liquids and solids, and hydrogen or atmospheric air for gases; oxygen (as 16) is sometimes used in this last case. Other standards of reference may be used in special connexions; for example, the Earth is the usual unit for expressing the relative density of the other members of the solar system. Reference should be made to the article Gravitation for an account of the methods employed to determine the " mean density of the earth."

In expressing the absolute or relative density of any substance, it is necessary to specify the conditions for which the relation holds: in the case of gases, the temperature and pressure of the experimental gas (and of the standard, in the case of relative density) ; and in the case of solids and liquids, the temperature. The reason for this is readily seen; if a mass M of any gas occupies a volume V at a temperature T (on the absolute scale) and a pressure P, then its absolute density

under these conditions is A = M/V; if now the temperature and pressure be changed to Ti and Pi, the volume Vi under these conditions is VPT/P1T1, and the absolute density is MP1T/VPT1. It is customary to re- duce gases to the so-called ” normal temperature and pressure,” abbreviated to N.T.P., which is o° C. and 760 mm.

The relative densities of gases are usually expressed in terms of the standard gas under the same conditions. The density gives very important information as to the molecular weight, since by the law of Avogadro it is seen that the relative density is the ratio of the molecular weights of the experimental and standard gases. In the case of liquids and solids, comparison with water at 4 C, the temperature of the maximum density of water; at o° C, the zero of the Centigrade scale and the freezing- point of water; at 15° and 18°, ordinary room-temperatures; and at 25°, the temperature at which a thermostat may be conveniently maintained, are common in laboratory practice. The temperature of the experimental substance may or may not be the temperature of the standard. In such cases a bracketed fraction is appended to the specific gravity, of which the numer- ator and denominator are respectively the temperatures of the

M

substance and of the standard; thus 1-093 (o°/4°) means that the ratio of the weight of a definite volume of a substance at o° to the weight of the same volume of water 4 is 1-093. It may be noted that if comparison be made with water at 4°, the relative density is the same as the absolute density, since the unit of mass in the C.G.S. system is the weight of a cubic centimetre of water at this temperature. In British units, especially in connexion with the statement of relative densities of alcoholic liquors for Inland Revenue purposes, comparison is made with water at 62° F, (16-6 C); a reason for this is that the gallon of water is defined by statute as weighing 10 ft> at 62° F., and hence the densities so expressed admit of the ready conversion of volumes to weights. Thus if d be the relative density, then lod represents the weight of a gallon in lb. The brewer has gone a step further in simplifying his expressions by multiplying the density by 1000, and speaking of the difference between the density so expressed and 1000 as ” degrees of gravity ” (see Beer).

Practical Determination of Densities

The methods for determining densities may be divided into two groups according as hydrostatic principles are employed or not. In the group where the principles of hydrostatics are not employed the

method consists in determining the weight and volume of a certain quantity of the substance, or the weights of equal volumes of the smbstance and of the standard. In ”

the case of solids we may determine the volume in some cases by direct measurement — this gives at the best a very rough and ready value ; a better method is to immerse the body in a fluid (in which it must sink and be insoluble) contained in a graduated glass, and to deduce its volume from the height to which the liquid rises. The weight may be directly determined by the balance. The ratio ” weight to volume ” is the absolute density. The separate determination of the volume and mass of such substances as gunpowder, cotton- wool, soluble sub- stances, &c., supplies the only means of determining their densities. The stereometer of Say, which was greatly improved by Regnault and further modified by Kopp, permits an accurate determination of the volume of a given mass of any such substance. In its simplest form the instrument consists of a glass tube PC (fig. 1), of uniform bore, terminating in a cup PE, the mouth of which can be rendered air- tight by the plate of glass E. The substance whose volume is to be determined is placed in the cup PE, and the tube PC is immersed in the vessel of mercury D, until the mercury reaches the mark P. The plate E is then placed on the cup, and the tube PC raised until the surface of the mercury in the tube stands at M, that in the vessel D being at C, and the height MC is measured. Let k denote this height, and let PM be denoted by /. Let u represent the volume of air in the cup before the body was inserted,

v the volume of the body, a the area of the horizontal Pi G- t _ Say’s

section of the tube PC, and h the height of the Stereometer. mercurial barometer. Then, by Boyle’s law (u—v+al) (h — k) — {u—v)h, and therefore v = u—al{h—k)lk.

The volume u may be determined by repeating the experiment when only air is in the cup. In this case v = o, and the equation becomes (u +al l) (h — k 1)=uh, whence u = aP (h — k 1) Ik 1 . Substituting this value in the expression for v, the volume of the body inserted in the cup becomes known. The chief errors to which the stereometer is liable are (1) variation of temperature and atmospheric pressure during the experiment, and (2) the presence of moisture which dis- turbs Boyle’s law.

The method of weighing equal volumes is particularly applicable to the determination of the relative densities of liquids. It consists in weighing a glass vessel (1) empty, (2) filled with the liquid, (3) filled

with the standard substance. Calling the weight of the empty vessel w, when filled with the liquid W, and when filled with the standard substance Wi, it is obvious that W — w, and Wi — to, are the weights of equal volumes of the liquid and standard, and hence the relative density is (W— w)l(Wi— to).

Many forms of vessels have been devised. The com moner type of " specific gravity bottle " consists of a thin glass bottle (fig. 2) of a capacity varying from 10 to 100 cc. fitted with an accurately ground stopper, which is vertically/ perforated by a fine hole. The bottle is carefully cleansed! by washing with soda, hydrochloric acid and distilled water, and then dried by heating in an air bath or by blowing in warm air. It is allowed to cool and then weighed. The bottle is then filled with distilled water, and brought to a definite temperature by immersion in a thermostat, and the stopper inserted. It is removed from the thermostat, and carefully

l£j

Fig. 2.

Fig. 3.

wiped. After cooling it is weighed. The bottle is again cleaned and dried, and the operations repeated with the liquid under examina- tion instead of water. Numerous modifications of this bottle are in use. For volatile liquids, a flask provided with a long neck which carries a graduation and is fitted with a well-ground stopper is recommended. The bringing of the liquid to the mark is effected by removing the excess by means of a capillary. In many forms a thermometer forms part of the apparatus.

Another type of vessel, named the Sprengel tube or pycnometer (Gr. ttvkvos, dense), is shown in fig. 3. It consists of a cylindrical tube of a capacity ranging from 10 to 50 cc, provided at the upper end with a thick-walled capillary bent as shown on the left of the figure. From the bottom there leads another fine tube, bent upwards, and then at right angles so as to be at the same level as the capillary branch. This tube bears a graduation. A loop of plati- num wire passed under these tubes serves to suspend the vessel from the balance arm. The manner of cleansing, &c, is the same as in the ordinary form. The vessel is filled by placing the capillary in a vessel containing the liquid and gently

aspirating. Care must be taken that no air bubbles are enclosed. The liquid is adjusted to the mark by withdrawing any excess from the capillary end by a strip of bibulous paper or by a capillary tube. Many variations of this apparatus are in use; in one of the commonest there are two cylindrical chambers, joined at the bottom, and each provided at the top with fine tubes bent at right angles ; sometimes the inlet and outlet tubes are provided with caps.

The specific gravity bottle may be used to determine the relative density of a solid which is available in small fragments, and is insoluble in the standard liquid. The method involves three operations: — (1) weighing the solid'in air (W), (2) weighing the specific gravity bottle full of liquid (Wi), (3) weighing the bottle containing the solid and filled up with liquid (W 2). It is readily seen that W + W1-W2 is the weight of the liquid displaced by the solid, and therefore is the weight of an equal volume of liquid; hence the relative density is W/(W + W X -W 2).

The determination of the absolute densities of gases can only be effected with any high degree of accuracy by a development of this method. As originated by Regnault, it consisted in filling a large glass globe with the gas by alternately exhausting with an air-pump and admitting the pure and dry gas. The flask was then brought to 0° by immersion in melting ice, the pressure of the gas taken, and the stop-cock closed. The flask is removed from the ice, allowed to attain the temperature of the room, and then weighed. The flask is now partially exhausted, transferred to the cooling bath, and after standing the pressure of the residual gas is taken by a manometer. The flask is again brought to room-temperature, and re-weighed. The difference in the weights corresponds to the volume of gas at a pressure equal to the difference of the recorded pressures. The volume of the flask is determined by weighing empty and filled with water. This method has been refined by many experimenters, among whom we may notice Morley and Lord Rayleigh. Morley determined the densities of hydrogen and oxygen in the course of his classical investigation of the composition of water. The method differed from Regnault's inasmuch as the flask was exhausted to an almost complete vacuum, a performance rendered possible by the high efficiency of the modern air-pump. The actual experiment necessi- tates the most elaborate precautions, for which reference must be made to Morley 's original papers in the Smithsonian Contributions to Knowledge (1895), or to M. Travers, The Study of Gases. Lord Rayleigh has made many investigations of the absolute densities of gases, one of which, namely on atmospheric and artificial nitrogen, undertaken in conjunction with Sir William Ramsay, culminated in the discovery of argon (q.v.). He

pointed out in 1888 (Proc. Roy. Soc. 43, p. 361) an important correction which had been overlooked by previous experimenters with Regnault's method, viz. the change in volume of theexperimental globe duetoshrinkage under diminished pressure; this may be experimentally determined and amounts to between 0-04 and 0-16 % of the volume of the globe.

Related to the determination of the density of a gas is the determination of the density of a vapour, i.e. matter which at ordinary temperatures exists as a solid or liquid. This subject owes its importance in modern chemistry to the fact that the vapour density, when hydrogen is taken as the standard, gives perfectly definite information as to the molecular condition of the compound, since twice the vapour density equals the molecular weight of the compound. Many methods have been devised. In historical order we may briefly enumerate the following: — in 1811, Gay-Lussac volatilized a weighed quantity of liquid, which must be readily volatile, by letting it rise up a short tube containing mercury and standing inverted in a vessel holding the same metal. This method was developed by Hofmann in 1868, who replaced the short tube of Gay-Lussac by an ordinary barometer tube, thus effecting the volatilization in a Torricellian vacuum. In 1826 Dumas devised a method suitable for substances of high boiling-point ; this consisted

A

in its essential point in vaporizing the substance in a flask made of suitable material, sealing it when full of vapour, and weighing. This method is very tedious in detail. H. Sainte-Claire Deville and L. Tro'ost made it available for specially high temperatures by employing porcelain vessels, sealing them with the oxyhydrogen blow-pipe, and maintaining a constant temperature by a vapour bath of mercury (350°), sulphur (440), cadmium (86o°) and zinc (1040). In 1878 Victor Meyer devised his air-expulsion method.

Before discussing the methods now used in detail, a summary of the conclusions reached by Victor Meyer in his classical investiga- tions in this field as to the applicability of the different methods will be given :

(1) For substances which do not boil higher than 260 and have vapours stable for 30° above the boiling-point and which do not react on mercury, use Victor Meyer's "mercury expulsion method."

(2) For substances boiling between 260 and 420 , and which do not react on metals, use Meyer's " Wood's alloy expulsion method."

(3) For substances boiling at higher temperatures, or for any substance which reacts on mercury, Meyer's "air expulsion method " must be used. It is to be noted, however, that this method is applicable to substances of any boiling-point (see below).

(4) For substances which can be vaporized only under diminished pressure, several methods may be used, (a) Hofmann's is the best if the substance volatilizes at below 310°, and does not react on mercury; otherwise (6) Demuth and Meyer's, Eykman's, Schall's, or other methods may be used.

1. Meyer's " Mercury Expulsion " Method. — A small quantity of the substance is weighed into a tube, of the form shown in fig. 4, which has a capacity of about 35 cc, provided with a capillary tube at the top, and a bent tube about 6 mm. in diameter at the bottom. The vessel is completely filled with mercury, the capillary sealed, and the vessel weighed. The vessel is then lowered into a jacket containing vapour at a known temperature which is sufficient to volatilize the substance. Mercury is expelled, and when this expulsion ceases, the vessel is removed, allowed to cool, and weighed. It is necessary to determine the pressure exerted on the vapour by the mercury in the narrow limb; this is effected by opening the capillary and inclining the tube until the mercury just reaches the top of the narrow tube; the difference between Fig. 4. the height of the mercury in the wide tube and the top of

the narrow tube represents the pressure due to the mercury column, and this must be added to the barometric pressure in order to deduce the total pressure on the vapour.

The result is calculated by means of the formula:

n= W(i +0ˆX7,980,000

(P+pi-rSˆmll+ˆt-tˆ-mˆl+yit-tomi+yty in which W = weight of substance taken; t = temperature of vapour bath; a = 0-00366 = temperature coefficient of gases; p = baro- metric pressure; p\= height of mercury column in vessel; 5 = vapour tension of mercury at

t° ; m = weight of mercury contained in the vessel; mi = weight of mercury left in vessel after heating ; /J = coefficient of expansion of glass = -0000303 ; 7 = coefficient of expansion of mercury = o-oooi 8 (0-00019 above 240 °) (see Ber. 1877, 10, p. 2068; 1886, 19, p. 1862).

2. Meyer's Wood's Alloy Expulsion Method. — This method is a modification of the one just described. The alloy used is composed of 15 parts of bismuth, 8 of lead, 4 of tin and 3 of cadmium; it melts at 70 , and can be experimented with as readily as mercury. The cylindrical vessel is replaced by a globular one, and the pressure on the vapour due to the column of alloy in the side tube is readily reduced to millimetres of mercury since the specific gravity of the alloy at the temperature of boiling sulphur, 444° (at which the apparatus is most frequently used), is two-thirds of

that of mercury (see Ber. 1876, 9, p. 1220).

3. Meyer's Air Expulsion Method. — The simplicity, moderate accuracy, and adaptability of this method to every class of substance which can be vaporized entitles it to rank as one of the most potent methods in analytical chemistry; its invention is indissolubly connected with the name of Victor Meyer, being termed " Meyer's method " to the exclusion of his other original methods. It consists in determining the air expelled from a vessel by the vapour of a given quantity of the substance. The apparatus is shown in fig. 5. A long tube (a) terminates at the bottom in a cylindrical chamber of about 100-150 cc. capacity. The top is fitted with a rubber stopper, or in some forms with a stop-cock, while a little way down there is a bent delivery tube (6). To use the apparatus, the long tube is placed in a vapour bath © of the requisite temperature, and after the air within the tube is in equilibrium, the delivery tube is placed beneath the surface of the water in a pneumatic trough, the rubber stopper pushed home, and observation made as to whether any more air is being expelled. If this be not so, a graduated tube (d) is filled with water, and inverted over the delivery tube. The rubber stopper is removed and the experimental substance introduced, and the stopper quickly replaced to the same extent as before. Bubbles are quickly disengaged and collect in the

Fig. 5.

graduated tube. Solids may be directly admitted to the tube from a weighing bottle, while liquids are conveniently introduced by means of small stoppered bottles, or, in the case of exceptionally volatile liquids, by means of a bulb blown on a piece of thin capillary tube, the tube being sealed during the weighing operation, and the capillary broken just before transference to the ap- paratus. To prevent the bottom of the apparatus being knocked out by the impact of the substance, a layer of sand, asbestos or sometimes mercury is placed in the tube. To complete the experi- ment, the graduated tube containing the expelled air is brought to a constant and determinate temperature and pressure, and this volume is the volume which the given weight of the substance would occupy if it were a gas under the same temperature and pressure. The vapour density is calculated by the following formula: ˆ W(i + aQX587,78o

in which W = weight of substance taken, V = volume of air expelled, a = 1/273 = -003665, ‘ an d P = temperature and pressure at which expelled air is measured, and s = vapour pressure of water at t”.

By varying the material of the bulb, this apparatus is rendered available for exceptionally high temperatures. Vapour baths of iron are used in connexion with boiling anthracene (335°), anthraquinone (368 °) .sulphur (444) ,phosphoruspentasulphide(5 1 8°) ; molten lead may also be used. For higher tempera- tures the bulb of the vapour density tube is made of porcelain or platinum, and is heated in a gas furnace.

(4a) Hof matin’s Method. — Both the modus operandi and apparatus employed in this method particularly recommend its use for substances which do not react on mercury and which boil in a vacuum at below 310°. The apparatus (fig. 6) consists of a barometer tube, containing mercury and standing in a bath of the same metal, surrounded by a vapour jacket. The vapour is circulated through the jacket, and the height of the mercury read by a cathetometer or otherwise. The sub- stance is weighed into a small stoppered bottle, which is then placed beneath the mouth of the barometer tube. It ascends the tube, the substance is rapidly volatilized, and the mercury column is depressed; .this depression is read off. It is necessary to know the volume of the tube above the second level ; this may most efficiently be determined by calibrating the tube prior to its use. Sir T. E. Thorpe employed a barometer tube 96 cm. long, and determined the volume from the closed end for a distance of about 35 mm. by weighing in mercury ; below this mark it was calibrated in the ordinary way so that a scale reading gave the volume at once. The calculation is effected by the following formulae : —

76ow(i +0-0036650 o-ooi2934XVXB ;

b= h .-(h h. +s \

1+0-000184 \i+o-oooi8fe 1+0-00018/ ‘ /’ in which w = weight of substance taken; / = temperature of vapour jacket; V = volume of vapour at /; & = height of barometer reduced too”; h = temperature of air; hi = height of mercury column below vapour jacket; fc = temperature of mercury column not heated by vapour; hi = height of mercury column within vapour jacket; 5 = vapour tension of mercury at t°. The vapour tension of mercury need not be taken into account when water is used in the jacket.

(46) Demuth and Meyer’s Method. — The principle of this method is as follows: — In the ordinary air expulsion method, the vapour always mixes to some extent with the air in the tube, and this in- volves a reduction of the pressure of the vapour. It is obvious that this reduction may be increased by accelerating the diffusion of the vapour. This may be accomplished by using a vessel with a some- what wide bottom, and inserting the substance so that it may be volatilized very rapidly, as, for example, in tubes of Wood’s alloy, and by filling the tube with hydrogen. (For further details see Ber. 23, p. 311.)

We may here notice a modification of Meyer’s process in which the increase of pressure due to the volatilization of the substance, and not the volume of the expelled air, is measured. This method has been developed by J. S. Lumsden (Journ. Chetn. Soc. 1903, 83, p. 342), whose apparatus is shown diagrammatically in fig. 7. The vaporizing bulb A has fused about it a jacket B, provided with a condenser c. Two side tubes are fused on to the neck of A : the lower one leads to a mercury mano- meter M, and to the air by means of a cock C ; the upper tube is provided with a rubber stopper through which a glass rod passes — this rod serves to support the tube containing the substance to be experimented upon, and so avoids the objection to the practice of withdrawing the stopper of the tube, dropping the substance in, and reinserting the stopper. To use the apparatus, a liquid of suitable boiling-point is placed in the jacket and brought to the boiling-point. All parts of the apparatus are open to the air, and the mercury in the manometer is adjusted so as to come to a

D =

BD

Fig. 7.

fixed mark a. The substance is now placed on the support already mentioned, and the apparatus closed to the air by inserting the cork at D and turning the cock C. By turning or withdrawing the support the substance enters the bulb ; and during its vapori- zation the free limb of the manometer is raised so as to maintain the mercury at a. When the volatilization is quite complete, the level is accurately adjusted, and the difference of the levels of the mercury gives the pressure exerted by the vapour. To calculate the result it is necessary to know the capacity of the apparatus to the mark o, and the temperature of the jacket.

Methods depending on the Principles of Hydrostatics. — Hydro- statical principles can be applied to density determinations in four typical ways : (1) depending upon the fact that the heights of liquid columns supported by the same pressure vary inversely as the densities of the liquids ; (2) depending upon the fact that a body which sinks in a liquid loses a weight equal to the weight of liquid which it displaces; (3) depending on the fact that a body remains sus- pended, neither floating nor sinking, in a liquid of exactly the same density; (4) depending on the fact that a floating body is immersed to such an extent that the weight of the fluid displaced equals the weight of the body.

1. The method of balancing columns is of limited use. Two forms are recognized. In one, applicable only to liquids which do not mix, the two liquids are poured into the limbs of a U tube. The heights of the columns above the surface of junction of the liquids are in- versely proportional to the densities of the liquids. In the second form, named after Robert Hare (1781-1858), professor of chemistry at the university of Pennsylvania, the liquids are drawn or aspirated up vertical tubes which have their lower ends placed in reservoirs containing the different liquids, and their upper ends connected to a common tube which is in communication with an aspirator for decreasing the pressure within the vertical tubes. The heights to which the liquids rise, measured in each case by the distance between the surfaces in the reservoirs and in the tubes, are inversely pro- portional to the densities.

2. The method of ” hydrostatic weighing*” is one of the most important. The principle may be thus stated : the solid is weighed in air, and then in water. If W be the weight in air, and Wi the weight in water, then Wi is always less than W, the difference W-Wi representing the weight of the water displaced, i.e. the weight of a

volume of water equal to that of the solid. Hence W/(W-Wi) is the relative density or specific gravity of the body. The principle is readily adapted to the determination of the relative densities of two liquids, for it is obvious that if W be the weight of a solid body in air, Wi and W 2 its weights when immersed in the liquids, then W-Wi and W-W 2 are the weights of equal volumes of the liquids, and therefore the relative density is the quotient (W-W 1)/(W-W 2). The determination in the case of solids lighter than water is effected by the introduction of a sinker, i.e. a body which when affixed to the light solid causes it to sink. If W be the weight of the experimental solid in air, w the weight of the sinker in water, and Wi the weight of the solid plus sinker in water, then the relative density is given by W/(W + w-Wi). In practice the solid or plummet is suspended from the balance arm by a fibre — silk, platinum, &c— and carefully weighed. A small stool is then placed over the balance pan, and on this is placed a beaker of distilled water so that the solid is totally immersed. Some balances are provided with a " specific gravity pan," i.e. a pan with short suspending arms, provided with a hook at the bottom to which the fibre may be attached ; when this is so, the stool is unnecessary. Any air bubbles are removed from the surface of the body by brushing with a camel-hair brush; if the solid be of a porous nature it is desirable to boil it for some time in water, thus expelling the air from its interstices. The weighing is conducted in the usual way by vibrations, except when the weight be small ; it is then advisable to bring the pointer to zero, an opera- tion rendered necessary by the damping due to the adhesion of water to the fibre. The temperature and pressure of the air and water must also be taken.

There are several corrections of the formula A = W/(W-Wi) necessary to the accurate expression of the density. Here we can only summarize the points of the investigation. It may be assumed that the weighing is made with brass weights in air at t° and p mm. pressure. To determine the true weight in vacuo at 0°, account must be taken of the different buoyancies, or losses of true weight, due to the different volumes of the solids and weights. Similarly in the case of the weighing in water, account must be taken of the buoyancy of the weights, and also, if absolute densities be required, of the density of water at the temperature of the experiment. In a form of great accuracy the absolute density A(o°/4°) is given by

• _ A(o7 4 °) = (P aW-3W 1)/(W-Wi), in which W is the weight of the body in air at t° and p mm. pressure, Wi the weight in water, atmospheric conditions remaining very nearly the same ; p is the density of the water in which the body is weighed, a is (i + at°) in which a is the coefficient of cubical expansion of the body, and 8 is

the density of the air at t”, p mm. Less accurate formulae are A = p W/(W-Wi), the factor involving the density of the air, and the coefficient of the expansion of the solid being disregarded, and A = W/(W-Wj), in which the density of water is taken as unity. Reference may be made to J. Wade and R. W. Merriman, Journ. Chem. Soc. 1909, 95, p. 2174.

DENTATUS

Fig. 8.

The determination of the density of a liquid by weighing a plummet in air, and in the standard and experimental liquids,

has been put into a very convenient laboratory form by means of the apparatus known as a Westphal balance (fig. 8). It consists of a steel-yard mounted on a fulcrum; one arm carries at its extrem- ity a heavy bob and pointer, the latter moving along a scale affixed to the stand and serv- ing to indicate when the beam is in its standard position. The other arm is graduated in ten divisions and carries riders — bent pieces of wire of determined weights — and at its extremity a hook from which the glass plummet is suspended. To complete the apparatus there is a glass jar which serves to hold the liquid experimented with. The apparatus is so designed that when the plummet is suspended in air, the index of the beam is at the zero of the scale; if this be not so,’ then it is adjusted by a levelling screw. The plummet is now placed in distilled water at 15°, and the beam brought to equilibrium by means of a rider, which we shall call I, hung on a hook; other riders are provided, t\>th and f ˆ 5 th respec- tively of I. To determine the density of any liquid it is only neces- sary to suspend the plummet in the liquid, and to bring the beam to its normal position by means of the riders ; the relative density is read off directly from the riders.

3. Methods depending on the free suspension of the solid in a liquid of the same density have been especially studied by Retgers and Gossner in view of their applicability to density determinations of crystals. Two typical forms are in use; in one a liquid is pre- pared in which the crystal freely swims, the density of the liquid being ascertained by the pycnometer or other methods; in the other a liquid of variable density, the so-called ” diffusion column,” is prepared, and observation is made of the level at which the particle comes to rest. The first type is in commonest use; since both necessitate the use of dense liquids, a

summary of the media of most value, with their essential properties, will be given.

Acetylene tetrabromide, C 2 H 2 Br4, which is very conveniently prepared by passing acetylene into cooled bromine, has a density of 3-001 at 6° C. It is highly convenient, since it is colourless, odourless, very stable and easily mobile. It may be diluted with benzene or toluene.

Methylene iodide, CH 2 I 2 , has a density of 3-33, and may be diluted with benzene. Introduced by Brauns in 1886, it was recommended by Retgers. Its advantages rest on its high density and mobility; its main disadvantages are its liability to decomposition, the originally colourless liquid becoming dark owing to the separation of iodine, and its high coefficient of expansion. Its density may be raised to 3-65 by dissolving iodoform and iodine in it.

Thoulet's solution, an aqueous solution of potassium and mercuric iodides (potassium iodo-mercurate), introduced by Thoulet and subsequently investigated by V. Goldschmidt, has a density of 3-196 at 22-9°. It is almost colourless and has a small coefficient of expansion; its hygroscopic properties, its viscous character, and its action on the skin, however, militate against its use. A. Duboin (Compt. rend., 1905, p. 141) has investigated the solutions of mercuric iodide in other alkaline iodides; sodium iodo-mercurate solution has a density of 3-46 at 26 , and gives with an excess of water a dense precipitate of mercuric iodide, which dissolves without decomposition in alcohol; lithium iodo-mercurate solution has a density of 3-28 at 25-6°; and ammonium iodo-mercurate solution a density of 2-98 at 26 .

Rohrbach's solution, an aqueous solution of barium and mercuric iodides, introduced by Carl Rohrbach, has a density of 3-588.

Klein's solution, an aqueous solution of cadmium borotungstate, 2Cd(OH) 2 -B 2 Gv9WGvi6H 2 0, introduced by D. Klein, has a density up to 3-28. The salt melts in its water of crystallization at 75°, and the liquid thus obtained goes up to a density of 3-6.

Silver-thallium nitrate, TIAg(N0 3) 2 , introduced by Retgers, melts at 75° to form a clear liquid of density 4-8; it may be diluted with water.

The method of using these liquids is in all cases the same; a particle is dropped in ; if it floats a diluent is added and the mixture well stirred. This is continued until the particle freely swims, and then the density of the mixture is determined by the ordinary methods (see

Mineralogy).

In the ” diffusion column ” method, a liquid column uniformly varying in density from about 3-3 to 1 is prepared by pouring a little methylene iodide into a long test tube and adding five times as much benzene. The tube is tightly corked to prevent evaporation, and allowed to stand for some hours. The density of the column at any level is determined by means of the areometrical beads proposed by Alexander Wilson (1714-1786), professor of astronomy at Glasgow University. These are hollow glass beads of variable density;

Fig. 9.

they may be prepared by melting off pieces of very thin capillary tubing, and determining the density in each case by the method just previously described. To use the column, the experimental fragment is introduced, when it takes up a definite position. By successive trials two beads, of known density, say di, di, are obtained, one of which floats above, and the other below, the test crystal; the distances separating the beads from the crystal are determined by means of a scale placed behind the tube. If the bead of density di be at the distance h above the crystal, and that of

Acting on a principle quite different from any previously dis- cussed is the capillary hydrometer or staktometer of Brewster, which is based upon the difference in the surface tension and density of pure water, and of mixtures of alcohol and water in varying proportions.

If a drop of water be allowed to form at the extremity of a fine tube, it will go on increasing until its weight overcomes the surface tension by which it clings to the tube, and then it will fall. _ Hence any impurity which diminishes the surface tension of the water will diminish the size of the drop (unless_ the density is proportionately diminished). According to Quincke, the surface tension of pure water in contact with air at 20° C. is 81 dynes per linear centi- metre, while that of alcohol is only 25-5 dynes; and a small percentage of alcohol produces much more than a proportional decrease in the surface tension when added to pure water. The capillary hydrometer consists simply of a small pipette with a bulb in the middle of the stem, the pipette terminating in a very fine capillary point. The instrument being filled with distilled water, the number of drops required to empty the bulb and portions of the stem between two marks m and n (fig. 9) on the latter is carefully counted, and the experiments repeated at different temperatures. The pipette having been carefully dried, the process is repeated with pure alcohol or with proof spirits, and the strength of

any admixture of water and spirits is determined from the corresponding number of drops, but the formula generally x . given is not based upon sound data. Sir David Brewster Brewster's found with one of these instruments that the number Stakto- of drops of pure water was 734, while of proof spirit, me t er sp. gr. 920, the number was 2 117.

References. — Density and density determinationsarediscussed in all works on practical physics; reference may be made to B. Stewart and W. W. Haldane Gee, Practical Physics, vol. i. (1901); Kohl- rausch, Practical Physics; Ostwald, Physico-Chemical Measure- ments. The density of gases is treated in M. W. Travers, The Ex- perimental Study of Gases (1901) ; and vapour density determinations in Lassar-Cohn's Arbeitsmelhoden fur organisch-chemische Labora- torien (1901), and Manual of Organic Chemistry (1896), and in H. Biltz, Practical Methods for determining Molecular Weights (1899)- ' (C. E.*)

DENTATUS, MANIUS CURIUS, Roman general, conqueror of the Samnites and Pyrrhus, king of Epirus, was born of humble parents, and was possibly of Sabine origin. He is said to have been called Dentatus because he was born with his teeth already grown (Pliny, Nat. Hist. vii. 15). Except that he was tribune of the people, nothing certain is known of him until his first consul- ship in 290 B.C. when, in conjunction with his colleague P. Cornelius Rufinus, he gained a decisive victory over the Samnites, which put an end to a war that had lasted fifty years. He also reduced the revolted Sabines to submission; a large portion of their territory was distributed among the Roman citizens, and the most important towns received the citizenship without the right of voting for magistrates {civitas sine suffragio). With .the proceeds of the spoils of the war Dentatus cut an artificial channel to carry off the waters of Lake Velinus, so as tp drain the valley of Reate. In 275, after Pyrrhus had returned from Sicily to Italy, Dentatus (again consul) took the field against him. The decisive engagement took place near Bene- ventum in the Campi Arusini, and resulted in the total defeat of Pyrrhus. Dentatus celebrated a magnificent triumph, in which for the first time a number of captured elephants were exhibited. Dentatus was consul for the third time in 274, when he finally crushed the Lucanians and Samnites, and censor in 272. In the latter capacity he began to build an aqueduct to carry the waters of the Anio into the city, but died (270) before its completion. Dentatus was looked upon as a model of old Roman simplicity and frugality. According to the well-known anecdote, when the Samnites sent ambassadors with costly presents to induce him to exercise his influence on their behalf in the senate, they found

him sitting on the hearth and preparing his simple meal of roasted turnips. He refused their gifts, saying that earthen dishes were good enough for him, adding that he preferred ruling those who possessed gold to possessing it himself. It is also said that he died so poor that the state was obliged to provide dowries for his daughters. But these and similar anecdotes must be received with caution, and it should be remembered that what was a competence in his day would have been considered poverty by the Romans of later times.

Livy, epitome, 11-14; Polybius ii. 19; Eutropius ii. 9, 14; Florus i. 18 ; Val. Max. iv. 3, 5, vi. 3, 4 ; Cicero, De senectute, 16 ; Juvenal xi. 78 ; Plutarch, Pyrrhus, 25.

DENTIL (from Lat. dens, a tooth), in architecture, a small tooth-shaped block used as a repeating ornament in the bed- mould of a cornice. Vitruvius (iv. 2) states that the dentil represents the end of a rafter {asser) ; and since it occurs in its most pronounced form in the Ionic temples of Asia Minor, the Lycian tombs and the porticoes and tombs of Persia, where it represents distinctly the reproduction in stone of timber construction, there is but little doubt as to its origin. The earliest example is that found on the tomb of Darius, c. 500 B.C., cut in the rock in which the portico of his palace is reproduced. Its first employment in Athens is in the cornice of the caryatid portico or tribune of the Erechtheum (480 B.C.). When subsequently introduced into the bed-mould of the cornice of the choragic monument of Lysicrates it is much smaller in its dimensions. In the later temples of Ionia, as in the temple of Priene, the larger scale of the dentil is still retained. As a general rule the pro- jection of the dentil is equal to its width, and the intervals between to half the width. In some cases the projecting band has never had the sinkings cut into it to divide up the dentils, as in the Pantheon at Rome, and it is then called a dentil-band. The dentil was the chief decorative feature employed in the bed-mould by the Romans and the Italian Revivalists. In the porch of the church of St John Studius at Constantinople, the dentil and the interval between are equal in width, and the interval is splayed back from top to bottom; this is the form it takes in what is known as the" Venetian dentil," which was copied from the Byzantine dentil in Santa Sophia, Constantinople. There, however, it no longer formed part of a bed-mould: its use at Santa Sophia was to decorate the projecting moulding enclosing the encrusted marbles, and the dentils were cut alternately on both sides of the moulding. The Venetian dentil was

also intro- duced as a label round arches and as a string course.

DENTISTRY (from Lat. dens, a tooth), a special department of medical science, embracing the structure, function and

therapeutics of the mouth and its contained organs, sketch. specifically the teeth, together with their surgical and

prosthetic treatment. (For the anatomy of the teeth see Teeth.) As a distinct vocation it is first alluded to by Herodotus (500 B.C.). There are evidences that at an earlier date the Egyptians and Hindus attempted to replace lost teeth by attaching wood or ivory substitutes to adjacent sound teeth by means of threads or wires, but the gold fillings reputed to have been found in the teeth of Egyptian mummies have upon investigation been shown to be superficial applications of gold leaf for ornamental purposes. The impetus given to medical study in the Grecian schools by the followers of Aesculapius and especially Hippocrates (500 to 400 B.C.) developed among the practitioners of medicine and surgery considerable knowledge of dentistry. Galen (a.d. 131) taught that the teeth were true bones existing before birth, and to him is credited the belief that the upper canine teeth receive branches from the nerve which supplies the eye, and hence should be called ” eye-teeth.” Abulcasis (10th cent, a.d.) describes the operation by which artificial crowns are attached to adjacent sound teeth. Vesalius (1514), Ambroise Pare, J. J. Scaliger, T. Kerckring, M. Malpighi, and lesser anatomists of the same period contributed dissertations which threw some small amount of light upon the structure and functions of the teeth. The operation of transplanting teeth is usually attributed to John Hunter (17 28-1 793), who practised it extensively, and gave to it additional prominence by transplanting

a human tooth to the comb of a cock, but the operation was alluded to by Ambroise Pare (1509-1590), and there is evidence to show that it was practised even earlier. A. von Leeuwenhoek in 1678 described with much accuracy the tubular structure of the dentine, thus making the most important contribution to the subject which had appeared up to that time. Until the latter part of the 18th century extraction was practically the only operation for the cure of toothache.

The early contributions of France exerted a controlling influ- ence upon the development of dental practice. Urbain Hemard, surgeon to the cardinal Georges of Armˆgnac, whom Dr Blake (1801) calls an ingenious surgeon and a great man, published in 1582 his Researches upon the Anatomy of the Teeth, their Nature and Properties. Of

H6mard, M. Fauchard says: ” This surgeon had read Greek and Latin authors, whose writings he has judici- ously incorporated in his own works.” In 1728 Fauchard, who has been called the father of modern dentistry, published his celebrated work, entitled Le Chirurgien Dentiste ou traits des dents. The preface contains the following statement as to the existing status of dental art and science in France, which might have been applied with equal truth to any other European country: — ” The most celebrated surgeons having abandoned this branch of surgery, or having but little cultivated it, their negligence gave rise to a class of persons who, without theoretic knowledge or experience, and without being qualified, practised it at hazard, having neither principles nor system. It was only since the year 1700 that the intelligent in Paris opened their eyes to these abuses, when it was provided that those who intended practising dental surgery should submit to an examination by men learned in all the branches of medical science, who should decide upon their merits.” After the publication of Fauchard’s work the practice of dentistry became more specialized and distinctly separated from medical practice, the best exponents of the art being trained as apprentices by practitioners of ability, who had acquired their training in the same way from their predecessors. Fauchard suggested porcelain as an improvement upon bone and ivory for the manufacture of artificial teeth, a suggestion which he obtained from R. A. F. de Reaumur, the French savant and physicist, who was a contributor to the royal porcelain manufactory at Sevres. Later, Duchateau, an apothe- cary of St Germain, made porcelain teeth, and communicated his discovery to the Academy of Surgery in 1 776, but kept the process secret. Du Bois Chemant carried the art to England, and the process was finally made public by M. Du Bois Foucou. M. Fonzi improved the art to such an extent that the Athenaeum of Arts in Paris awarded him a medal and crown (March 14, 1808).

In Great Britain the 19th century brought the dawning of dental science. The work of Dr Blake in 1801 on the anatomy of the teeth was distinctly in advance of anything previously written on the subject. Joseph Fox was one of the first members of the medical profession to devote himself exclusively to dentistry, and his work is a repository of the best practice of his time. The processes described, though comparatively crude, involve principles in use at the present time. Thomas Bell, the successor of Fox as lecturer on the structure and disease of the teeth at Guy’s Hospital, published his well-known work in 1829. About this period numerous publications on dentistry made their appear- ance, notably those of Koecker, Johnson and Waite, followed somewhat later by the admirable work of Alexander

Nasmyth (1839). By this time Cuvier, Serres, Rousseau, Bertin, Herissant and others in France had added to the knowledge of human and comparative dental anatomy, while M. G. Retzius, of Sweden, and E. H. Weber, J. C. Rosenmuller, Schreger, J. E. von Purkinje, B. Fraenkel and J. Miiller in Germany were carrying forward the same lines of research. The sympathetic nervous relationships of the teeth with other parts of the body, and the interaction of diseases of the teeth with general pathological conditions, were clearly established. Thus a scientific foundation was laid, and dentistry came to be practised as a specialty of medicine. Certain minor operations, however, such as the extraction of teeth and the stopping of caries in an imperfect way, were still practised by barbers, and the empirical practice of dentistry, especially of

those operations which were almost wholly mechanical, had developed a considerable body of dental artisans who, though without medical education in many cases, possessed a high degree of manipulative skill. Thus there came to be two classes of practitioners, the first regarding dentistry as a specialty of medicine, the latter as a distinct and separate calling.

In America representatives of both classes of dentists began to arrive from England and France about the time of the Revolu- tion. Among these were John Wooffendale (1766), a student of Robert Berdmore of Liverpool, surgeon-dentist to George III.; James Gardette (1778), a French physician and surgeon; and Joseph Lemaire (1781), a French dentist who went out with the army of Count Rochambeau. During the winter of 1781-1782, while the Continental army was in winter quarters at Providence, Rhode Island, Lemaire found time and opportunity to practise his calling, and also to instruct one or two persons, notably Josiah Flagg, probably the first American dentist. Dental practice was thus established upon American soil, where it has produced such fertile results.

Until well into the 19th century apprenticeship afforded the only means of acquiring a knowledge of dentistry. The profits derived from the* apprenticeship system fostered secrecy and quackery among many of the early practitioners; but the more liberal minded and better educated of the craft developed an increasing opposition to these narrow methods. In 1837 a local association of dentists was formed in New York, and in training J ˆ 4 ° a nat i° na l association,

The American Society of Dental Surgeons, the object of which was ” to advance the science by free communication and interchange of sentiments.” The first dental periodical in the world, The American Journal of Dental Science, was issued in June 1839, and in November 1840 was established the Baltimore College of Dental Surgery, the first college in the world for the systematic education of dentists. Thus the year 1830-1840 marks the birth of the three factors essential to professional growth in dentistry. All this, combined with the refusal of the medical schools to furnish the desired facilities for dental instruction, placed dentistry for the time being upon a footing entirely separate from general medicine. Since then the curriculum of study preparatory to dental practice has been systematically increased both as to its content and length, until in all fundamental principles it is practically equal to that required for the training of medical specialists, and in addition includes the technical subjects peculiar to dentistry. In England, and to some extent upon the continent, the old apprenticeship system is retained as an adjunct to the college course, but it is rapidly dying out, as it has already done in America. Owing to the regulation by law of the educational requirements, the increase of institutions devoted to the professional training of dentists has been rapid in all civilized countries, and during the past twenty years especially so in the United States. Great Britain possesses upwards of twelve institutions for dental instruction, France two, Germany and Switzerland six, all being based upon the conception that dentistry is a department of general medicine. In the United States there were in 1878 twelve dental schools, with about 700 students; in 1907 there were fifty-seven schools, with 6919 students. Of these fifty-seven schools, thirty-seven are depart- ments of universities or of medical institutions, and there is a growing tendency to regard dentistry fromits educational aspect as a special department of the general medical and surgical practice.

Recent studies have shown that besides being an important part of the digestive system, the mouth sustains intimate re- lationship with the general nervous system, and is important as the portal of entrance for the majority of the bacteria that cause specific diseases. This fact has rendered more intimate the relations between dentistry and the general practice of medicine, and has given a powerful impetus to scientific studies in dentistry. Through the researches of Sir J. Tomes, Mummery, Hopewell Smith, Williams and others in England, O. Hertwig, Weil and Rose in Germany, Andrews, Sudduth and Black in America, the minute anatomy and embryology of the dental tissues have been worked out with great fulness and

precision. In particular, it has been demonstrated that certain general

systemic diseases have a distinct oral expression. Through their extensive nervous connexions with the largest of the cranial nerves and with the sympathetic nervous system, the teeth frequently cause irritation resulting in profound reflex nervous phenomena, which are curable only by removal of the local tooth disorder. Gout, lithaemia, scurvy, rickets, lead and mercurial poisoning, and certain forms of chronic nephritis, produce dental and oral lesions which are either pathognomonic or strongly indicative of their several constitutional causes, and are thus of great importance in diagnosis. The most important dental re- search of modern times is that which was carried out by Professor W. D. Miller of Berlin (1884) upon the cause of caries of the teeth, a disease said to affect the human race more extensively than any other. Miller demonstrated that, as previous observers had suspected, caries is of bacterial origin, and that acids play an important r61e in the process. The disease is brought about by a group of bacteria which develop in the mouth, growing natur- ally upon the debris of starchy or carbohydrate food, producing fermentation of the mass, with lactic acid as the end product. The lactic acid dissolves the mineral constituent of the tooth structure, calcium phosphate, leaving the organic matrix of the tooth exposed. Another class of germs, the peptonising and putrefactive bacteria, then convert the organic matter into liquid or gaseous end products. The accuracy of the conclusions ob- tained from his analytic research was synthetically proved, after the manner of Koch, by producing the disease artificially. Caries of the teeth has been shown to bear highly important relation to more remote or systemic diseases. Exposure and death of the dental pulp furnishes an avenue of entrance for disease-producing bacteria, by which invasion of the deeper tissues may readily take place, causing necrosis, tuberculosis, actinomycosis, phlegmon and other destructive inflammations, certain of which, affecting the various sinuses of the head, have been found to cause meningitis, chronic empyema, metastatic abscesses in remote parts of the body, paralysis, epilepsy and insanity.

Operative Dentistry. — The art of dentistry is usually divided arbitrarily into operative dentistry, the purpose of which is to preserve as far as possible the teeth and associated tissues, and prosthetic dentistry, the purpose of which is to supply the loss of teeth by artificial substitutes. The filling of carious cavities was probably first performed with lead, sug- ™ lB S or gested apparently by an operation recorded by Celsus S oppmg ‘ (100 B.C.), who recommended that frail or decayed teeth be stuffed with lead previous to extraction, in order that they might not break under the forceps. The use of lead as a filling was sufficiently prevalent in France during the 17 th century to

bring into use the word plombage, which is still occasionally applied in that country to the operation of filling. Gold as a filling material came into general use about the beginning of the 19th century. 1 The earlier preparations of gold were so impure as to be virtually without cohesion, so that they were of use only in cavities which had sound walls for its retention. In the form of rolls or tape it was forced into the previously cleaned and prepared cavity, con- densed with instruments under heavy hand pressure, smoothed with files, and finally burnished. Tin foil was also used to a limited extent and by the same method. Improvements in the refining of gold for dental use brought the product to a fair degree of purity, and, about 1855, led to the invention by Dr Robert Arthur of Baltimore of a method by which it could be welded firmly within the cavity. The cohesive properties of the foil were developed by passing it through an alcohol flame, which dispelled its surface contaminations. The gold was then welded piece by piece into a homogeneous mass by plugging instruments with serrated points. In this process of cold-welding, the mallet, hitherto in only limited use, was found more efficient than hand pressure, and was rapidly developed. The primitive mallet of wood, ivory, lead or steel, was supplanted by a mallet in which

1 The filling of teeth with gold foil is recorded in the oldest known book on dentistry, Artzney Buchlein, published anonymously in 1530, in which the operation is quoted from Mesue (a.d. 857), physician to the caliph Haroun al-Raschid.

a hammer was released automatically by a spring condensed by pressure of the operator's hand. Then followed mallets operated by pneumatic pressure, by the dental engine, and finally by the electro-magnet, as utilized in 1867 by Bonwill. These devices greatly facilitated the operation, and made possible a partial or entire restoration of the tooth-crown in conformity with anatomical lines.

The dental engine in its several forms is the outgrowth of the simple drill worked by the hand of the operator. It is used in removing decayed structure and for shaping the cavity for inserting the filling. From time to time its usefulness has been extended, so that it is now used for finishing fillings and polishing them, for polishing the teeth, removing deposits from them and changing their shapes. Its latest development, the dento-surgical engine, is of heavier construction and is adapted to operations upon all of the bones, a recent addition to its

equipment being the spiral osteotome of Cryer, by which, with a minimum shock to the patient, fenestrae of any size or shape in the brain-case may be made, from a simple trepanning operation to the more ex- tensive openings reqtiired in intra-cranial operations. The rotary power may be supplied by the foot of the operator, or by hydraulic or electric motors. The rubber dam invented by S. C. Barnum of New York (1864) provided a means for protecting the field of operations from the oral fluids, and extended the scope of operations even to the entire restoration of tooth-crowns with cohesive gold foil. Its value has been found to be even greater than was at first anticipated. In aE operations involving the exposed dental pulp or the pulp-chamber and root-canals, it is the only efficient method of mechanically protecting the field of operation from invasion by disease-producing bacteria.

The difficulty and annoyance attending the insertion of gold, its high thermal conductivity, and its objectionable colour have led to an increasing use of amalgam, guttapercha, and cements of zinc oxide mixed with zinc chloride or phosphoric acid. Recently much attention has been devoted to restorations with porcelain. A piece of platinum foil of ooi inch thickness is burnished and pressed into the cavity, so that a matrix is pro duced exactly fitting the cavity. Into this matrix is placed a mixture of powdered porcelain and water or alcohol, of the colour to match the tooth. The mass is carefully dried and then fused until homogeneous. Shrinkage is counteracted by additions of porcelain powder, which are repeatedly fused until the whole exactly fills the matrix. After cooling, the matrix is stripped away and the porcelain is cemented into the cavity. When the cement has hardened, the surface of the porcelain is ground and polished to proper contour. If successfully made, porcelain fillings are scarcely noticeable. Their durability remains to be tested.

Until recent times the exposure of the dental pulp inevitably led to its death and disintegration, and, by invasion of bacteria via the pulp canal, set up an inflammatory process Dental which eventually caused the loss of the entire tooth. pJutlcs. A rational system of therapeutics, in conjunction with proper antiseptic measures, has made possible both the conservative treatment of the dental pulp when exposed, and the successful treatment of pulp-canals when the pulp has been devitalized either by design or disease. The conservation of the exposed pulp is affected by the operation of capping. In capping a pulp, irritation is allayed by antiseptic and sedative treatment, and a metallic cap, lined with a non-irritant sedative paste, is applied under aseptic conditions immediately over the point of pulp exposure. A filling of cement is superimposed, and this, after it has hardened, is

covered with a metallic or other suitable fiDing. The utility of arsenious acid for devitalizing the dental pulp was discovered by J. R. Spooner of Montreal, and first published in 1836 by his brother Shearjashub in his Guide to Sound Teeth. The painful action of arsenic upon the pulp was avoided by the addition of various sedative drugs, — morphia, atropia, iodoform, &c, — and its use soon became universal. Of late years it is being gradually supplanted by immediate surgical extirpation under the benumbing effect of cocaine salts. By the use of cocaine also the pain incident to excavating and shaping

of cavities in tooth structure may be controlled, especially when the cocaine is driven into the dentine by means of an electric current. To fill the pulp-chamber and canals of teeth after loss of the pulp, all organic remains of pulp tissue should be removed by sterilization, and then, in order to prevent the entrance of bacteria, and consequent infection, the canals should be perfectly filled. Upon the exclusion of infection depends the- future integrity and comfort of the tooth. Numberless methods have been invented for the operation. Pulpless teeth are thus pre- served through long periods of usefulness, and even those remains of teeth in which the crowns have been lost are rendered com- fortable and useful as supports for artificial crowns, and as abutments for assemblages of crowns, known as bridge- work.

The discoloration of the pulpless tooth through putrefactive changes in its organic matter were first overcome by bleaching it with chlorine. Small quantities of calcium hypochlorite are packed into the pulp-chamber and moistened with dilute acetic acid; the decomposition of the calcium salt liberates chlorine in situ, which restores the tooth to normal colour in a short time. The cavity is afterwards washed out, carefully dried, lined with a light-coloured cement and filled. More efficient bleaching agents of recent introduction are hydrogen dioxide in a 25% solution or a saturated solution of sodium peroxide; they are less irritating and much more convenient in application. Unlike chlorine, these do not form soluble metallic salts which may subsequently discolour the tooth. Hydrogen dioxide may be carried into the tooth structure by the electric current. In which case a current of not less than forty volts controlled by a suitable graduated resistance is applied with the patient in circuit, the anode being a platinum-pointed electrode in contact with the dioxide solution in the tooth cavity, and the cathode a sponge or plate electrode in contact with the hand or arm of the patient. The current is gradually turned on until two or three milliamperes are indicated by a suitable ammeter. The operation requires usually twenty to thirty minutes.

Malposed teeth are not only unsightly but prone to disease, and may be the cause of disease in other teeth, or of the associated tissues. The impairment of function which their abnormal position causes has been found to be the primary cause of disturbances of the general bodily health; for example, enlarged tonsils, chronic pharyngitis and nasal catarrh, indigestion and malnutrition. By the use of springs, screws, vulcanized caoutchouc bands, elastic ligatures, &c, as the case may require, practically all forms of dental irregularity may be Corrected, even such protrusions and retrusions of the front teeth as cause great disfigurement of the facial contour.

The extraction of teeth, an operation which until quite recent times was one of the crudest procedures in minor surgery, has been reduced to exactitude by improved instruments, designed with reference to the anatomical relations of the teeth and their alveoli, and therefore adapted to the several classes of teeth. The operation has been rendered painless by the use of anaesthetics. The anaesthetic generally employed is nitrous oxide, or laughing-gas, the use of which was discovered in 1844 by Horace Wells, a dentist of Hartford, Conn., U.S.A. Chloroform and ether, as well as other general anaesthetics, have been employed in extensive operations because of their more pro- longed effect; but chloroform, especially, is dangerous, owing to its effect upon the heart, which in many instances has suddenly failed during the operation. Ether, while less manageable than nitrous oxide, has been found to be practically devoid of danger. The local injection of solutions of cocaine and allied anaesthetics into the gum-tissue is extensively practised ; but is attended with danger, from the toxic effects of an overdose upon the heart, and the local poisonous effect upon the tissues, which lead in numerous cases to necrosis and extensive sloughing.

Dental Prosthesis. — The fastening of natural teeth or carved substitutes to adjoining sound teeth by means of thread or wire preceded their attachment to base-plates of carved wood, bone or ivory, which latter method was practised t ee th. until the introduction of swaged metallic plates. Where the crown only of a tooth or those of several teeth were lost, the

Extrac- tion.

restoration was effected by engrafting upon the prepared root a

suitable crown by means of a wooden or metallic pivot. When possible, the new crown was that of a corresponding sound tooth taken from the mouth of another individual; otherwise an artificial crown carved from bone or ivory, or sometimes from the tooth of an ox, was used. To replace entire dentures a base-plate of carved hippopotamus ivory was constructed, upon which were mounted the crowns of natural teeth, or later those of porcelain. The manufacture of a denture of this character was tedious and uncertain, and required much skill. The denture was kept in place by spiral springs attached to the buccal sides of the appliance above and below, which caused pressure upon both jaws, necessi- tating a constant effort upon the part of the unfortunate wearer to keep it in place. Metallic swaged plates were introduced in the latter part of the 18th century. An impression of the gums was taken in wax, from which a cast was made in plaster of Paris. With this as a model, a metallic die of brass or zinc was prepared, upon which the plate of gold or silver was formed, and then swaged into contact with the die by means of a female die or counter-die of lead. The process is essentially the same to-day, with the addition of numerous improvements in detail, which have brought it to a high degree of perfection. The discovery, by Gardette of Philadelphia in 1800, of the utility of atmospheric pressure in keeping artificial dentures in place led to the abandon- ment of spiral springs. A later device for enhancing the stability is the vacuum chamber, a central depression in the upper surface of the plate, which, when exhausted of air by the wearer, materi- ally increases the adhesion. The metallic base-plate is used also for supporting one or more artificial teeth, being kept in place by metallic clasps fitting to, and' partially surrounding, adjacent sound natural teeth, the plate merely covering the edentulous portion of the alveolar ridge. It may also be kept in place by atmospheric adhesion, in which case the palatal vault is included, and the vacuum chamber is utilized in the palatal portion to increase the adhesion.

In the construction usually practised, porcelain teeth are attached to a gold base-olate by means of stay-pieces of gold, perforated to receive the platinum pins baked in the body of the tooth. The stay-pieces or backings are then soldered to the pins and to the plate by means of high-fusing gold solder. The teeth used may be single or in sections, and may be with or without an extension designed in form and colour to imitate the gum of the aveolar border. Even when skillfully executed, the process is imperfect in that the jointing of the teeth to each other, and their adaptation to the base-plate, leaves crevices and recesses, in which food debris and oral secretions accumulate. To obviate these defects the enamelled platinum denture was devised.

Porcelain teeth are first attached to a swaged base-plate of pure platinum by a stay-piece of the same metal soldered with pure gold, after which the interstices between the teeth are filled, and the entire surface of the plate, excepting that in contact with the palate and alveolar border, is covered with a porcelain paste called the body, which is modelled to the normal contour of the gums, and baked in a muffle furnace until vitrified. It is then enamelled with a vitreous enamel coloured in imitation of the colour of the natural gum, which is applied and fired as before, the result being the most artistic and hygienic denture known. This is commonly known as the continuous gum method. Origin- ating in France in the early part of the 19th century, and variously improved by several experimenters, it was brought to its present perfection by Dr John Allen of New York about 1846-1847. Dentures supported upon cast bases of metallic alloys and of aluminium have been employed as substitutes for the more expensive dentures of gold and platinum, but have had only a limited use, and are less satisfactory.

Metallic bases were used exclusively as supports for artificial dentures until in 1855-1856 Charles Goodyear, jun., patented in England a process for constructing a denture upon vulcanized caoutchouc as a base. Several modifications followed, each the subject of patented improvements. Though the cheapness and simplicity of the vulcanite base has led to its abuse in incom- petent hands, it has on the whole been productive of much

benefit. It has been used with great success as a means of attaching porcelain teeth to metallic bases of gold, silver and aluminium. It is extensively used also in correcting irregular positions of the teeth, and for making interdental splints in the treatment of fractures of the jaws. For the mechanical correction of palatal defects causing imperfection of deglutition and speech, which comes distinctly within the province of the prosthetic dentist, the vulcanite base produces the best-known apparatus. Two classes of palatal mechanism are recognized — the obturator, a palatal plate, the function of which is to close perforations or clefts in the hard palate, and the artificial velum, a movable attachment to the obturator or palatal plate, which closes the opening in the divided natural velum and, moving with it, enables the wearer to close off the nasopharynx from the oral cavity in the production of the guttural sounds. Vulcanite is also used for extensive restorations of the jaws after surgical operations or loss by disease, and in the majority of instances wholly corrects the deformity.

For a time vulcanite almost supplanted gold and silver as a base for artificial denture, and developed a generation of practitioners

deficient in that high degree of skill necessary to the construction of dentures upon metallic bases. The recent development of crown-and-bridge work methods. has brought about a renaissance, so that a thorough training is more than ever necessary to successful practice in mechanical dentistry. The simplest crown is of porcelain, and is engrafted upon a sound natural tooth-root by means of a metallic pin of gold or platinum, extending into the previously enlarged root-canal and cemented in place. In another type of crown the point between the root-end and the abutting crown-surface is encircled with a metallic collar or band, which gives additional security to the attachment and protects the joints from fluids or bacteria. Crowns of this character are constructed with a porcelain facing attached by a stay-piece or backing of gold to a plate and collar, which has been previously fitted to the root-end like a ferrule, and soldered to a pin which projects through the ferrule into the root-canal. The contour of the lingual surface of the crown is made of gold, which is shaped to conform to the anatomical lines of the tooth. The shell-crown consists of a reproduction of the crown entirely of gold plate, filled with cement, and driven over the root-end, which it closely encircles. The two latter kinds of crowns may be used as abutments for the support of intervening crowns in constructing bridge-work. When artificial crowns are supported not by natural tooth-roots but by soldering them to abutments, they are termed dummies. The number of dummies which may be supported upon a given number of roots depends upon the position and character of the abutments, the character of the alveolar tissues, the age, sex and health of the patient, the character of the occlusion or bite, and the force exerted in mastication. In some cases a root will not properly support more than one additional crown; in others an entire bridge denture has been successfully supported upon four well-placed roots. Two general classes of bridge-work are recognized, namely, the fixed and the removable. Removable bridge-work, though more difficult to construct, is preferable, as it can be more thoroughly and easily cleansed. When properly made and applied to judiciously selected cases, the bridge denture is the most artistic and functionally perfect restoration of prosthetic dentistry.

The entire development of modern dentistry dates from the 19th century, and mainly from its latter half. Beginning with a few practitioners and no organized professional basis, educational system or literature, its practitioners are to be found in all civilized communities, those in Great Britain numbering about 5000; in the United States, 27,000; France, 1600, of whom 376 are graduates; German Empire, qualified practitioners {Zahnarzte) , 1400; practitioners without official qualification, 4100. Its educational

institutions are numerous and well equipped. It possesses a large periodical and standard litera- ture in all languages. Its practice is regulated by legislative enactment in all countries the same as is medical practice. The business of manufacturing and selling dentists' supplies

represents an enormous industry, in which millions of capital are invested.

Authorities. — W. F. Litch, American System of Dentistry; Julius Scheff, jun., Handbuch der Zahnheilkunde; Charles J. Essig, American Text-Book of Prosthetic Dentistry; Tomes, Dental Anatomy and Dental Surgery; W. D, Miller, Microorganisms of the Human Mouth; Hopewell Smith, Dental Microscopy; H. H. Burchard, Dental Pathology, Therapeutics and Pharmacology; F. J. S. Gorgas, Dental Medicine; E. H. Angle, Treatment of Malocclusion of the Teeth and Fractures of the Maxillae ; G. Evans, A Practical Treatise on Artificial Crown-and-Bridge Work and Porcelain Dental Art; C. N. Johnson, Principles and Practice of Filling Teeth, American Text-Book of Operative Dentistry (3rd ed., 1905) ; Edward C. Kirk, Principles and Practice of Operative Dentistry (2nd ed., 1905) ; J. S. Marshall, American Text-Book of Prosthetic Dentistry (edited by C. R. Turner; 31-ded., 1907). (E. C. K.)

DENTON, an urban district in the Gorton parliamentary division of Lancashire, England, 45 m. N.E. from Stockport, on the London & North-Western railway. Pop. (1901) 14,934. In the township are reservoirs for the water supply of Manchester, with a capacity of 1,860,000,000 gallons. The manufacture of felt hats is the leading industry. Coal is extensively mined in the district.

DENVER, the capital of Colorado, U.S.A., the county-seat of Denver county, and the largest city between Kansas City, Missouri, and the Pacific coast, sometimes called the " Queen City of the Plains." Pop. (1870) 4759; (1880) 35,629; (1890) 106,713; (1900), 133,859, of whom 25,301 were foreign-born and 3923 were negroes; (1510 census) 213,381. Of the 25,301 foreign-born in 1900, 5114 were Germans; 3485, Irish; 3376, Swedes; 3344, English; 2623, English-Canadian; 1338, Russians; and 1033, Scots. Denver is an important railway centre, being served by nine railways, of which the chief are the Atchison, Topeka & Santa Fe; ' the Chicago, Burlington & Quincy; the Chicago, Rock Island & Pacific; the Denver & Rio Grande; the

Union Pacific; and the Denver, North-Western & Pacific.

Denver lies on the South Platte river, at an altitude exactly 1 m. above the sea, about 15 m. from the E. base of the Rocky mountains, which stretch along the W. horizon from N. to S. in an unbroken chain of some 175 m. Excursions may be made in all directions into the mountains, affording beautiful scenery and interesting views of the mining camps. Various peaks are readily accessible from Denver: Long's Peak (14,271 ft.), Gray's Peak (14,341 ft.), Torrey Peak (14,336ft.), Mt. Evans (14,330 ft.), Pike's Peak (14,108 ft.), and many others of only slightly less altitudes. The streets are excellent, broad and regular. The parks are a fine feature of the city; by its charter a fixed percentage of all expenditures for public improvements must be used to purchase park land. Architectural variety and solidity are favoured in the buildings of the city by a wealth of beautiful building stones of varied colours (limestones, sandstones, lavas, granites and marbles), in addition to which bricks and Roman tiles are employed. The State Capitol, built of native granite and marble (1887-1895, cost $2,500,000), is an imposing building. Noteworthy also are the Denver county court house; the hand- some East Denver high school; the Federal building, containing the United States custom house and post office; the United States mint; the large Auditorium, in which the Democratic National convention met in 1908; a Carnegie library (1908) and the Mining Exchange; and there are various excellent business blocks, theatres, clubs and churches. Denver has an art museum and a zoological museum. The libraries of the city contain an aggregate of some 300,000 volumes. Denver is the seat of the Jesuit college of the Sacred Heart (1888; in the suburbs); and the university of Denver (Methodist, 1889), a co-educational institution, succeeding the Colorado Seminary (founded in 1864 by John Evans), and consisting of a college of liberal arts, a graduate school, Chamberlin astronomical observatory and a preparatory school — these have buildings in University Park — and (near the centre of the city) the Denver and Gross College of Medicine, the Denver law school, a college of music in the building of the old Colorado Seminary, and a Saturday college (with classes specially for professional men).

The prosperity of the city depends on that of the rich mining country about it, on a very extensive wholesale trade, for which its situation and railway facilities admirably fit it, and on its large manufacturing and farming interests. The value of manufactures produced in 1900 was $41,368,698 (increase 1890-1900, 41-5). The value of the factory product for 1905, however, was 3-3 less than that for 1900, though it represented 36-6 % of the product of the state as a whole. The principal industry is the smelting and refining of lead, and the

smelting works are among the most interesting sights of the city. The value of the ore reduced annually is about $10,000,000. Denver has also large foundries and machine shops, flour and grist mills, and slaughtering and meat-packing establishments. Denver is the central live-stock market of the Rocky Mountain states. The beet sugar, fruit and other agricultural products of the sur- rounding and tributary section were valued in 1906 at about $20,000,000. The assessed valuation of property in the city in 1905 was $115,338,920 (about the true value), and the bonded debt $1,079,595.

At Denver the South Platte is joined by Cherry Creek, and here in October 1858 were established on opposite sides of the creek two bitterly rival settlements, St Charles and Auraria; the former was renamed almost immediately Denver, after General J. W. Denver (1818-1892), ex-governor of Kansas (which then included Colorado), and Auraria was absorbed. Denver had already been incorporated by a provisional local (extra legal) ” legislature,” and the Kansas legislature gave a charter to a rival company which the Denver people bought out. A city government was organized in December 1859; and continued under a reincorporation effected by the first territorial legislature of 1861. This body adjourned from Colorado City, nominally the capital, to Denver, and in 1862 Golden was made the seat of government. In 1868 Denver became the capital, but feeling in the southern counties was then so strong against Denver that provision was made for a popular vote on the situation of the capital five years after Colorado should become a state. This popular vote confirmed Denver in 1881. Until 1870, when it secured a branch railway from the Union Pacific line at Cheyenne (Wyoming), the city was on one side of the transcontinental travel- routes. The first road was quickly followed by the Kansas Pacific from Kansas City (1870, now also part of the Union Pacific), the Denver & Rio Grande (1871), the Burlington system (1882), the Atchison, Topeka & Santa Fe (1887), and other roads which have made Denver’s fortune. In April 1859 appeared the first number of The Rocky Mountain News. The same year a postal express to Leavenworth, Kansas (10 days, letters 25 cents an ounce) was established; and telegraph connexion with Boston and New York ($9 for 10 words) in 1863. A private mint was established in i860. In the ‘seventies all the facilities of a modern city — gas, street-cars, water-works, telephones — were intro- duced. Much the same might be said of a score of cities in the new West, but none is a more striking example than Denver of marvellous growth. The city throve on the freighting trade of the mines. In 1864 a tremendous flood almost ruined it, and another flood in 1878, and a famous strike in Denver and Leadville in 1879-1880 were further, but

only momentary, checks to its prosperity. As in every western city, particularly those in mining regions whose sites attained speculative values, Denver had grave problems with ” squatters ” or ” land-jumpers “in her early years; and there was the usual gambling and outlawry, sometimes extra-legally repressed by vigilantes. Settled social conditions, however, soon established themselves. In 1880 there was a memorable election riot under the guise of an anti-Chinese demonstration. In the decade 1870-1880 the population increased 648-7%. The ‘eighties were notable for great real estate activity, and the population of the city increased 199-5% f rom l88 ° to 1890. In 1882-1884 three successive annual exhibits of a National Mining and Industrial Exposition were held. After 1890 growth was slower but continuous. In 1902 a city-and-county of Denver was created with extensive powers of framing its own charter, and in 1904 a charter was adopted. The constitution of the state was

framed by a convention that sat at Denver from December 1875 to March 1876; various territorial conventions met here; and here W. J. Bryan was nominated in 1908 for the presidency.

DEODAND (Lat. Deo dandum, that which is to be given to God), in English law, was a personal chattel (any animal or thing) which, on account of its having caused the death of a human being, was forfeited to the king for pious uses. Blackstone, while tracing in the custom an expiatory design, alludes to analogous Jewish and Greek laws, 1 which required that what occasions a man’s death should be destroyed. In such usages the notion of the punishment of an animal or thing, or of its being morally affected from having caused the death of a man, seems to be implied. The forfeiture of the offending instrument in no way depends on the guilt of the owner. This imputation of guilt to inanimate objects or to the lower animals is not inconsistent with what we know of the ideas of uncivilized races. In English law, deodands came to be regarded as mere forfeitures to the king, and the rules on which they depended were not easily explained by any key in the possession of the old commentators. The law distinguished, for instance, between a thing in motion and a thing standing still. If a horse or other animal in motion killed a person, whether infant or adult, or if a cart ran over him, it was forfeited as a deodand. On the other hand, if death were caused by falling from a cart or a horse at rest, the law made the chattel a deodand if the person killed were an adult, but not if he were below the years of

discretion. Blackstone accounts for the greater severity against things in motion by saying that in such cases the owner is more usually at fault, an explanation which is doubtful in point of fact, and would certainly not account for other instances of the same tendency. Thus, where a man's death is caused by a thing not in motion, that part only which is the immediate cause is forfeited, as " if a man be climbing up the wheel of a cart, and is killed by falling from it, the wheel alone is a deodand"; whereas, if the cart were in motion, not only the wheel but all that moves along with it (as the cart and the loading) are forfeited. A similar distinction is to be found in Britton. Where a man is killed by a vessel at rest the cargo is not deodand; where the vessel is under sail, hull and cargo are both deodand. For the distinction between the death of a child and the death of an adult Blackstone accounts by suggesting that the child " was presumed incapable of actual sin, and therefore needed no deodand to purchase propitiatory masses; but every adult who died in actual sin stood in need of such atonement, according to the humane superstition of the founders of the English law." Sir Matthew Hale's explanation was that the child could not take care of himself, whereon Blackstone asks why the owner should save his forfeiture on account of the imbecility of the child, which ought to have been an additional reason for caution. The finding of a jury was necessary to constitute a deodand, and the investigation of the value of the instrument by which death was caused occupied an important place among the provisions of early English criminal law. It became a necessary part of an indictment to state the nature and value of the weapon employed — as, that the stroke was given by a certain penknife, of the value of sixpence — so that the king might have his deodand. Accidents on the high seas did not cause forfeiture, being beyond the domain of the common law; but it would appear that in the case of ships in fresh water the law held good. The king might grant his right to deodands to another. In later times these forfeitures became extremely unpopular; and juries, with the connivance of judges, found deodands of trifling value, so as to defeat the inequitable claim. At last, by an act of 1846 they were abolished, the date noticeably coinciding with the introduction of railways and modern steam-engines.

DEOGARH, the name of several towns of British India. (1) A town in the Santal Parganas district of Bengal. Pop. (1901) 8838. It is famous for a group of twenty-two temples dedicated to Siva, the resort of numerous pilgrims. It is connected with the East Indian railway by a steam tramway, 5 m. in length.

'"Compare also the rule of the Twelve Tables, by which an animal which had inflicted mischief might be surrendered in lieu of com-

pensation.

(2) The headquarters of the Bamra feudatory state in Bengal; 58 m. by road from the Bamra Road station on the Bengal- Nagpur railway. Pop. (1901) 5702. The town, which is well laid out, with parks and gardens, and pleasantly situated in a hollow among hills, rapidly increased in population under the enlightened administration of the raja, Sir Sudhal Rao, K.C.I.E. (b. i860). It has a state-supported high school affiliated to Calcutta University, with a chemical and physical laboratory.

(3) The chief town of the Deogarh estate in the state of Udaipur, Rajputana, about 68 m. N.N.E. of the city of Udaipur. It is walled, and contains a fine palace. Pop. (1901) 5384. The holder of the estate is styled rawat, and is one of the first-class nobles of Mewar. (4) Deogarh Fort, the ancient Devagiri or Deogiri (see Daulatabad).

DEOLS, a suburb of the French town of Chateauroux, in the department of Indre. Pop. (1906) 2337. Deols lies to the north of Chateauroux, from which it is separated by the Indre. It preserves a fine Romanesque tower and other remains of the church of a famous Benedictine abbey, the most important in Berry, founded in 917 by Ebbes the Noble, lord of Deols. A gateway flanked by towers survives from the old ramparts of the town. The parish church of St Stephen (15th and 16th centuries) has a Romanesque facade and a crypt containing the ancient Christian tomb of St Ludre and his father St Leocade, who according to tradition were lords of the town in the 4th century. There are also interesting old paintings of the 10th century representing the ancient abbey. The pilgrimage to the tomb of St Ludre gave importance to Deols, which under the name of Vicus Dolensis was in existence in the Roman period. In 468 the Visigoths defeated the Gauls there, the victory carrying with it the supremacy over the district of Berry. In the middle ages the head of the family of D6ols enjoyed the title of prince and held sway over nearly all Lower Berry, of which the town itself was the capital. In the 10th century Raoul of Deols gave his ‘ castle to the monks of the abbey and transferred his residence to Chateauroux. For centuries this change did not affect the prosperity of the place, which was maintained by the prestige of its abbey. But the burning of the abbey church by the Protestants during the religious wars and in 1622 the suppression of the abbey by the agency of Henry II., prince of Conde and of Deols, owing to the corruption of the monks, led to its decadence.

DEPARTMENT (Fr. departement, from departir, to separate into parts) , a division. The word is used of the branches of the administration in

a state or municipality; in Great Britain it is applied to the subordinate divisions only of the great offices and boards of state, such as the bankruptcy department of the Board of Trade, but in the United States these subordinate divisions are known as ” bureaus,” while ” department ” is used of the eight chief branches of the executive.

A particular use of the word is that for a territorial division of France, corresponding loosely to an English county. Previous to the French Revolution, the local unit in France was the province, but this division was too closely bound up with the administrative mismanagement of the old regime. Accordingly, at the suggestion of Mirabeau, France was redivided on entirely new lines, the thirty-four provinces being broken up into eighty- three departments (see French Revolution). The idea was to render them as nearly as possible equal to a certain average of size and population, though this was not always adhered to. They derived their names principally from rivers, mountains or other prominent geographical features. Under Napoleon the number was increased to one hundred and thirty, but in 181 5 it was reduced to eighty-six. In i860 three new departments were created out of the newly annexed territory of Savoy and Nice. In 187 1 three departments (Bas-Rhin, Haut-Rhin and Moselle) were lost after the German war. Of the remains of the Haut- Rhin was formed the territory of Belfort, and the fragments of the Moselle were incorporated in the department of Meurthe, which was renamed Meurthe-et-Moselle, making the number at present eighty-seven. For a complete list of the departments see France. Each department is presided over by an officer called a prefect, appointed by the government, and assisted by a

prefectorial council (conseil de prefecture). The departments are subdivided into arrondissements, each in charge of a sub-prefect. Arrondissements are again subdivided into cantons, and these into communes, somewhat equivalent to the English parish (see France: Local Government).

DE PERE, a city of Brown county, Wisconsin, U.S.A., on both sides of the Fox river, 6 m. above its mouth, and 109 m. N. of Milwaukee. Pop. (1890) 3625; (1900) 4038, of whom. 1025 were foreign-born; (1905, state census) 4523. It is served by the Chicago & North-Western and Chicago, Milwaukee & St Paul railways, by interurban electric lines and by lake and river steamboat lines, it being the head of lake

navigation on the Fox river. Two bridges here span the Fox, which is from \ m. to J m. in width. It is a shipping and transfer point and has paper mills, machine shops, flour mills, sash, door and blind factories, a launch and pleasure-boat factory, and knitting works, cheese factories and dairies, brick yards and grain elevators. There is an excellent water-power. De Pere is the seat of St Norbert's college (Roman Catholic, 1902) and has a public library. North of the city is located the state reformatory. On the coming of the first European, Jean Nicolet, who visited the place in 1634-1635, De Pere was the site of a polyglot Indian settlement of several thousand attracted by the fishing at the first rapids of the Fox river. Here in 1670 Father Claude Allouez established the mission of St Francis Xavier, the second in what is now Wisconsin. From the name Rapides des Peres, which the French applied to the place, was derived the name De Pere. Here Nicolas Perrot, the first French commandant in the North- West, established his headquarters, and Father Jacques Marquette wrote the journal of his journey to the Mississippi. A few miles south of the city lived for many years Eleazer Williams {c. 1787-1857), the alleged " lost dauphin " Louis XVII. of France and an authority on Indians, especially Iroquois. De Pere was incorporated as a village in 1857, and was chartered as a city in 1883.

DEPEW, CHAUNCEY MITCHELL (1834-), American lawyer and politician, was born in Peekskill, New York, on the 23rd of April 1834, of a Huguenot family (originally Du Puis or De Puy). He graduated at Yale in 1856, entered politics as a Whig — his father had been a Democrat — was admitted to the bar in 1858, was a member of the New York Assembly in 1861-1862, and was secretary of state of New York state in 1864-1865. He refused a nomination to be United States minister to Japan, and through his friendship with Cornelius and William H. Vanderbilt in 1866 became attorney for the New York & Harlem railway, in 1869 was appointed attorney of the newly consolidated New York Central & Hudson river railway, of which he soon became. a director, and in 1875 was made general counsel for the entire Vanderbilt system of railways. He became second vice-president of the New York Central & Hudson river in 1869 and was its president in 1885-1898, and in 1898 was made chairman of the board of directors of the Vanderbilt system. In 1872 he joined the Liberal-Republican movement, and was nominated and defeated for the office of lieutenant-governor of New York. In 1888 in the National Republican convention he was a candidate for the presidential nomination, but withdrew his name in favour of Benjamin Harrison, whose offer to him in 1889 of the portfolio of state he refused. In 1899 he was elected United States senator from New York state, and

in 1904 was re-elected for the term ending in 191 1. His great personal popularity, augmented by his ability as an orator, suffered considerably after 1905, the inquiry into life insurance company methods by a committee of the state legislature resulting in acute criticism of his actions as a director of the Equitable Life Assurance Society and as counsel to Henry B. Hyde and his son. Among his best-known orations are that delivered at the unveiling of the Bartholdi statue of Liberty enlightening the World (1886), an address at the Washington Centennial in New York (1889), and the Columbian oration at the dedication ceremonies of the Chicago World's Fair (1892).

DEPILATORY (from Lat. depilare, to pull out the pilus or" hair), any substance, preparation or process which will remove

superfluous hair. For this purpose caustic alkalis, alkaline earths and also orpiment (trisulphide of arsenic) are used, the last being somewhat dangerous. No application is permanent in its effect, as the hair always grows again. The only permanent method, which is, however, painful, slow in operation and likely to leave small scars, is by the use of an electric current for the destruction of the follicles by electrolysis.

DEPORTATION, or Transportation, a system of punishment for crime, of which the essential factor is the removal of the criminal to a penal settlement outside his own country. It is to be distinguished from mere expulsion (g.v.) from a country, though the term " deportation " is now used in that sense in English law under the Aliens Act 1905 (see Alien). Strictly, the deportation or transportation system has ceased to exist in England, though the removal or exclusion of undesirable persons from British territory, under various Orders in Council, is possible in places subject to the Foreign Jurisdiction Acts, and in the case of criminals under the Extradition Acts.

Earlier British Transportation System. — At a time when the British statute-book bristled with capital felonies, when the pick- pocket or sheep-stealer was hanged out of hand, when Sir Samuel Romilly, to whose strenuous exertions the amelioration of the penal code is in a great measure due, declared that the laws of England were written in blood, another and less sanguinary penalty came into great favour. The deportation of criminals beyond the seas grew naturally out of the laws which prescribed banishment for certain offences. The Vagrancy Act of Elizabeth's reign contained in it the germ of transportation, by empowering justices in quarter sessions to banish offenders and order them to be conveyed into such parts beyond the seas as should be

assigned by the privy council. Full effect was given to this statute in the next reign, as is proved by a letter of James I. dated 161 9, in which the king directs ” a hundred dissolute persons ” to be sent to Virginia. Another American act of similar tenor was passed in the reign of ti ons . * Charles II., in which the term ” transportation ” appears to have been first used. A further and more systematic development of the system of transportation took place in 161 7, when an act was passed by which offenders who had escaped the death penalty were handed over to contractors, who engaged to transport them to the American colonies. These contractors were vested with a property in the labour of the convicts for a certain term, generally from seven to fourteen years, and this right they frequently sold. Labour in those early days was scarce in the new settlements; and before the general adoption of negro slavery there was a keen competition for felon hands. An organized system of kidnapping prevailed along the British coasts; young lads were seized and sold into what was practically white slavery in the American plantations. These malpractices were checked, but the legitimate traffic in convict labour continued, until it was ended peremptorily by the revolt of the American colonies and the achievement of their independence in 1776. 1

The British legislature, making a virtue of necessity, discovered that transportation to the colonies was bound to be attended by various inconveniences, particularly by depriving the kingdom of many subjects whose labour might be useful to the community; and an act was accordingly passed which provides that convicts sentenced to transportation might be employed at hard labour at home. At the same time the consideration of some scheme for their disposal was entrusted to three eminent public men — Sir William Blackstone, Mr Eden (afterwards Lord Auckland) and John Howard. The result of their labours was an act for the establishment of penitentiary houses, dated 1778. This act is of peculiar importance. It contains the first public enunciation of a general principle of prison treatment, and shows that even at that early date the system since nearly universally adopted was fully understood. The object in view was thus stated. It was hoped ” by sobriety, cleanliness and medical assistance, by a regular series of labour, by solitary confinement during the intervals of work and by due religious instruction to preserve and amend

1 See J. C. Ballagh, wtite Servitude in Virginia (Baltimore, 1895.)

the health of the unhappy offenders, to inure them to habits of

industry, to guard them from pernicious company, to accustom them to serious reflection and to teach them both the principles and practice of every Christian and moral duty." The experience of succeeding years has added little to these the true principles of penal discipline; they form the basis of every species of prison system carried out since the passing of an act of 1779.

No immediate action was taken by the committee appointed. Its members were not in accord as to the choice of site. One was for Islington, another for Limehouse; Howard only stipulated for some healthy place well supplied with water and conveniently situated for supervision. He was strongly of opinion that the penitentiary should be built by convict labour. Howard withdrew from the commission, and new members were appointed, who were on the eve of beginning the first penitentiary when the discoveries of Captain Cook in the South Seas turned the attention of the government towards these new lands. The vast territories Australian °^ Australasia promised an unlimited field for convict penal colonization, and for the moment the scheme for settle- penitentiary houses fell to the ground. Public opinion generally preferred the idea of establishing penal settlements at a distance from home. " There was general confidence," says Merivale in his work on colonization, " in the favourite theory that the best mode of punishing offenders was that which removed them from the scene of offence and tempta- tion, cut them off by a great gulf of space from all their former connexions, and gave them the opportunity of redeeming past crimes by becoming useful members of society." These views so far prevailed that an expedition consisting of nine transports and two men-of-war, the " first fleet " of Australian annals, sailed in March 1787 for New South Wales. This first fleet reached Botany Bay in January 1788, but passed on and landed at Port Jackson, where it entered and occupied Sydney harbour. From that time forward convicts were sent in constantly increasing numbers from England to the Antipodes. Yet the early settle- ment at Sydney had not greatly prospered. The infant colony had had a bitter struggle for existence. It had been hoped that the community would raise its own produce and speedily become self-supporting. But the soil was unfruitful; the convicts knew nothing of farming. All lived upon rations sent out from home; and when convoys with relief lingered by the way famine stared all in the face. The colony was long a penal settlement and nothing more, peopled only by two classes, convicts and their masters; criminal bondsmen on the one hand who had forfeited their independence and were bound to labour without wages for the state, on the other officials to guard and exact the due perform- ance of tasks. A few free families were encouraged to emigrate, but

they were lost in the mass they were intended to leaven, swamped and outnumbered by the convicts, shiploads of whom continued to pour in year after year. When the influx increased, difficulties as to their employment arose. Free settlers were too few to give work to more than a small proportion. Moreover, a new policy was in the ascendant, initiated by Governor Macquarie, who considered the convicts and their rehabilitation his chief care, and steadily discouraged the immigration of any but those who ” came out for their country’s good.” The great bulk of the convict labour thus remained in government hands.

This period marked the first phase in the history of transporta- tion. The penal colony, having triumphed over early dangers and difficulties, was crowded with convicts in a state of semi- freedom, maintained at the public expense and utilized in the development of the latent resources of the country. The methods employed by Governor Macquarie were not, perhaps, invariably the best; the time was hardly ripe as yet for the erection of palatial buildings in Sydney, while the congregation of the work- men in large bodies tended greatly to their demoralization. But some of the works undertaken and carried out were of incalculable service to the young colony; and its early advance in wealth and prosperity was greatly due to the magnificent roads, bridges and other facilities of inter-communication for which it was indebted to Governor Macquarie. As time passed the criminal sewage flowing from the Old World to the New greatly increased in

5ˆ J ;

volume under milder and more humane laws. Many now escaped the gallows, and much of the overcrowding of the gaols at home was caused by the gangs of convicts awaiting transhipment to the Antipodes. They were packed off, however, with all con- venient despatch, and the numbers on government hands in the colonies multiplied exceedingly, causing increasing embarrass- ment as to their disposal. Moreover, the expense of the Australian convict establishments was enormous.

Some change in system was inevitable, and the plan of ” assign- ment” was introduced; in other words, that of freely lending the convicts to any who would relieve the authorities of the burden- some charge. By this time free settlers were arriving in greater number, invited by a different and more Ass te»” liberal policy than that of Governor Macquarie. system. Inducements were especially offered to persons possessed of capital to assist in the development of the country.

Assignment developed rapidly; soon eager competition arose for the convict hands that had been at first so reluctantly taken. Great facilities existed for utilizing them on the wide areas of grazing land and on the new stations in the interior. A pastoral life, without temptations and contaminating influences, was well suited for convicts. As the colony grew richer and more populous, other than agricultural employers became assignees, and numer- ous enterprises were set on foot. The trades and callings which minister to the needs of all civilized communities were more and more largely pursued. There was plenty of work for skilled convicts in the towns, and the services of the more intelligent were highly prized. It was a great boon to secure gratis the assistance of men specially trained as clerks, book-keepers or handicraftsmen. Hence all manner of intrigues and manoeuvres were afoot on the arrival of drafts and there was a scramble for the best hands. Here at once was a palpable flaw in the system of assignment. The lot of the convict was altogether unequal. Some, the dull, unlettered and unskilled, were drafted up country to heavy manual labour at which they remained, while clever expert rogues found pleasant, congenial and often profitable employment in the towns. The contrast was very marked from the first, but it became the more apparent when in due course it was seen that some were still engaged in irksome toil, while others who had come out by the same ship had already attained to affluence and ease. For the latter transportation was no punish- ment, but often the reverse. It meant too often transfer to a new world under conditions more favourable to success, removed from the keener competition of the old. By adroit management, too, convicts often obtained the command of funds, the product of nefarious transactions at home, which wives or near relatives or unconvicted accomplices presently brought out to them. It was easy for the free new-comers to secure the assignment of their convict friends; and the latter, although still nominally servants and in the background, at once assumed the real control. Another system productive of much evil was the employment of convict clerks in positions of trust in various government offices; convicts did much of the legal work of the colony; a convict was clerk to the attorney general; others were schoolmasters and were entrusted with the education of youth.

Under a system so anomalous and uncertain the main object of transportation as a method of penal discipline and repression was in danger of being quite overlooked. Yet the state could not entirely abdicate its functions, although it Evils of surrendered to a great extent the care of criminals to system. private persons. It had established a code of penalties for the coercion of the ill-conducted,

while it kept the worst perforce in its own hands. The master was always at liberty to appeal to the strong arm of the law. A message carried to a neighbouring magistrate, often by the culprit himself, brought down the prompt retribution of the lash. Convicts might be flogged for petty offences, for idleness, drunkenness, turbulence, absconding and so forth. At the out-stations some show of decorum and regularity was observed, although the work done was generally scanty and the convicts were secretly given to all manner of evil courses. The town convicts were worse, because they were far less controlled. They were nominally under the

surveillance and supervision of the police, which amounted to nothing at all. They came and went, and amused themselves after working hours, so that Sydney and all the large towns were hotbeds of vice and immorality. The masters as a rule made no attempt to watch over their charges; many of them were absolutely unfitted to do so, being themselves of low character, ” emancipists ” frequently, old convicts conditionally pardoned or who had finished their terms. No effort was made to prevent the assignment of convicts to improper persons; every applicant got what he wanted, even though his own character would not bear inspection. All whom the masters could not manage — the incorrigible upon whom the lash and bread and water had been tried in vain — were returned to government charge. These, in short, comprised the whole of the refuse of colonial convictdom. Every man who could not agree with his master, or who was to undergo a penalty greater than flogging or less than capital punishment, came back to government and was disposed of in one of three ways, (i) the road parties, (2) the chain gang, or (3) the penal settlements. (1) In the first case, the convicts might be kept in the vicinity of the towns or marched about the country according to the work in hand; the labour was severe, but, owing to inefficient supervision, never intolerable; the diet was ample and there was no great restraint upon independence within certain wide limits. To the slackness of control over the road parties was directly traceable the frequent escape of desperadoes, who, defying recapture, recruited the gangs of bushrangers which were a constant terror to the whole country. In (2) the chain or iron gangs, as they were sometimes styled, discipline was far more rigorous. It was maintained by the constant presence of a military guard, and when most efficiently organized the gang was governed by a military officer who was also a magistrate. The work was really hard, the custody close — in hulk, stockaded barrack or

caravan; the first was at Sydney, the second in the interior, the last when the undertaking required constant change of place. All were locked up from sunset to sunrise; all wore heavy leg irons; and all were liable to immediate flagellation. The convict ” scourger ” was one of the regular officials attached to every chain gang. (3) The third and ultimate receptacle was the penal settlement, to which no offenders were transferred till all other methods of treatment had failed. These were terrible cesspools of iniquity, so bad that it seemed, to use the words of one who knew them well, that ” the heart of a man who went to them was taken from him and he was given that of a beast.” The horrors accumulated at Norfolk Island, Moreton Bay, Port Arthur and Tasman’s Peninsula are almost beyond description. The convicts herded together in them were soon utterly degraded and brutalized; no wonder that reckless despair took possession of them, that death on the gallows for murder purposely com- mitted, or the slow terror from starvation following escape into surrounding wilds was often welcomed as a relief.

The stage which transportation was now reaching and the actual condition of affairs in the Australian colonies about this period do not appear to have been much understood in England. Earnest and thoughtful men might busy themselves with prison discipline at home, and the legislature might watch with peculiar interest the results obtained from the special treatment of a limited number of selected offenders in Millbank penitentiary. But for the great mass of criminality deported to a distant shore no very active concern was shown. The country for a long time seemed satisfied with transportation. Portions of the system might be open to criticism. Thus the Commons committee of 1832 freely condemned the hulks at Woolwich and other arsenals in which a large number of convicts were kept while waiting embarkation. It was reported that the indiscriminate associa- tion of prisoners in them produced more vice, profaneness and demoralization than in the ordinary prisons. After dark the wildest orgies went on unchecked — dancing, fighting, gambling, singing and so forth; it was easy to get drink and tobacco and to see friends from outside. Trie labour hours were short and the tasks light; ” altogether the situation of the convict in the hulks,” says the report, ” cannot be considered penal; it is a state of restriction, but hardly of punishment.”

But no objection was raised to transportation. It was con- sidered by this same committee ” a most valuable expedient in the system of secondary punishment.” They only thought it necessary to suggest that exile should be preceded by a period of severe probationary punishment in England, a proposal which was reiterated later on and

actually adopted. It was in the country most closely affected that dissatisfaction first began to find voice. Already in 1832 the most reputable sections of Australian society were beginning to murmur grievously. Trans- portation had fostered the growth of a strong party — that representing convict views — and these were advocated boldly in unprincipled prints. This party, constantly recruited from the emancipists and ticket-of-leave holders, A “f tra,,an gradually grew very numerous, and threatened soon tioas. to swamp the honest and untainted parts of the community. As years passed the prevalence of crime, and the universally low tone of morality due to the convict element, became more and more in the ascendant. At length in 1835 Judge Burton made a loud protest, and in a charge to the grand jury of Sydney plainly intimated that transportation must cease. While it existed, he said, the colonies could never rise to their proper position; they could not claim free institutions. This bold but forcible language commanded attention. It was speedily echoed in England, and particularly by Archbishop Whately, who argued that transportation failed in all the leading requisites pf any system of secondary punishment. Transportation exercised no salutary terror in offenders; it was no longer exile to an unknown inhospitable region, but to one flowing with milk and honey, whither innumerable friends and associates had gone already. The most glowing descriptions came back of the wealth which any clever fellow might easily amass; stories were told and names mentioned of those who had made ample fortunes in Australia in a few years. As a matter of fact the convicts, or at least large numbers of them, had prospered exceedingly. Some had incomes of twenty, thirty, even forty thousand pounds a year. The deteriorating effects of the system were plainly manifest on the surface from the condition of the colony, — the profligacy of the towns, the scant reprobation of crimes and those who had committed them. Down below, in the openly sanctioned slavery called assignment, in the demoralizing chain gangs and in the inexpressibly horrible penal settlements, were more abundant and more awful proofs of the general wickedness and corruption. Moreover these appalling results were accompanied by colossal expenditure. The cost of the colonial convict establishments, with the passages out, amounted annually to upwards of £300,000; another £100,000 was expended on the military garrisons; and various items brought the whole outlay to about half a million per annum. It may be argued that this was not a heavy price to pay for peopling a continent and laying the founda- tions of a vast Australasian empire. But that empire could never have expanded to its present dimensions if it had depended on convict immigration alone. There was a point, too, at which all development, all progress, would have come to a full stop had it not

been relieved of its stigma as a penal colony.

That point was reached between 1835 and 1840, when a powerful party came into existence in New South Wales, pledged to bring about the abandonment of transportation. A strongly hostile feeling was also gaining ground in England. In 1837 a new committee of the House of Commons had made a patient and searching investigation into the Reform merits and demerits of the system and freely condemned meat. it. The government had no choice but to give way; it could not ignore the protests of the colonists, backed up by such an authoritative expression of opinion. In 1840 orders were issued to suspend the deportation of criminals to New South Wales. But what was to become of the convicts? It was impossible to keep them at home. The hulks which might have served had also failed; the faultiness of their internal manage- ment had been fully proved. The committee had recommended the erection of more penitentiaries. But the costly experiment of Millbank had been barren of results. The model prison at Pentonville, in process of construction under the pressure of a

movement towards prison reform, could offer but limited accom- modation. A proposal was put forward to construct convict barracks in the vicinity of the great arsenals; but this, which contained really the germ of the present British penal system, was premature. The government in this dilemma steered a middle course and resolved to adhere to transportation, but under a greatly modified and it was hoped much improved form. The colony of Van Diemen's Land, younger and less self-reliant than its neighbour, had also endured convict immigration but had made no protest. It was resolved to direct the whole stream of deportation upon Van Diemen's Land, which was thus con- stituted one vast colonial prison. The main principle of the new system was one of probation; hence its name. All convicts were to pass through various stages and degrees of punishment accord- ing to their conduct and character. Some general depot was needed where the necessary observation could be made, and it was found at Millbank penitentiary. Thence boys were sent to the prison for juveniles at Parkhurst; the most promising subjects among the adults were selected to undergo the experi- mental discipline of solitude and separation at Pentonville; less hopeful cases went to the hulks; and all adults alike passed on to the Antipodes. Fresh stages awaited the convict on his arrival at Van Diemen's Land. The first was limited to " lifers " and colonial convicts sentenced a second time. It consisted in

deten- tion at one of the penal stations, either Norfolk Island or Tasman's Peninsula, where the disgraceful conditions already described continued unchanged to the very last. The second stage received the largest number, who were subjected in it to gang labour, working under restraint in various parts of the colony. These probation stations, as they were called, were intended to inculcate habits of industry and subordination; they were provided with supervisors and religious instructors; and had they not been tainted by the vicious virus brought to them by others arriving from the penal stations, they might have answered their purpose for a time. But they became as bad as the worst of the penal settlements and contributed greatly to the breakdown of the whole system. The third stage and the first step towards freedom was the concession of a pass which permitted the convict to be at large under certain conditions to seek work for himself; the fourth was a ticket-of-leave, the possession of which allowed him to come and go much as he pleased; the fifth and last was absolute pardon, with the prospects of rehabilitation.

This scheme seemed admirable on paper; yet it failed com- pletely when put into practice. Colonial resources were quite unable to bear the pressure. Within two or three years Gradual y an Dj emen ' s L an(j was inundated with convicts. abandon- „. , , r ,,

went Sixteen thousand were sent out in four years; the

average annual number in the colony was about 30,000, and this when there were only 37,000 free settlers. Half the whole number of convicts remained in government hands and were kept in the probation gangs, engaged upon public works of great utility; but the other half, pass-holders and ticket-of-leave men in a state of semi-freedom, could get little or no employment. The supply greatly exceeded the demand; there were no hirers of labour. Had the colony been as large and as prosperous as its neighbour it could scarcely have absorbed the glut of workmen; but it was really on the verge of bankruptcy — its finances were embarrassed, its trades and industries at a standstill. But not only were the convicts idle; they were utterly depraved. It was soon found that the system which kept large bodies always together had a most pernicious effect upon their moral condition. " The congregation of criminals in large batches without adequate supervision meant simply wholesale, widespread pollution," as was said at the time. These ever-present and constantly increasing evils forced the government to reconsider its position; and in 1846 transporta- tion to Van Diemen's Land was temporarily suspended for a couple of years, during which it was hoped some relief might be afforded. The formation of a new convict colony in North Australia

had been contemplated; but the project, warmly espoused by Mr Gladstone, then under-secretarv of state for the. colonies, was presently abandoned; and it now became clear

that no resumption of transportation was possible. The measures taken to substitute other methods of secondary punishment are set forth in the article Prison (g.v.).

France. — France adopted deportation for criminals as far back as 1763, when a penal colony was founded in French Guiana and failed disastrously. An expedition was sent there, composed of the most evil elements of the Paris population and numbering 14,000, all of whom died. The practice. attempt was repeated in 1766 and with the same miserable result. Other failures are recorded, the worst being the scheme of the philanthropist Baron Milius, who in 1823 planned to form a community on the banks of the Mana (French Guiana) by the marriage of exiled convicts and degraded women, which resulted in the most ghastly horrors. The principle of deportation was then formally condemned by publicists and government until suddenly in 1854 it was reintroduced into the French penal code with many high-sounding phrases. Splendid results were to be achieved in the creation of rich colonies afar, and the regeneration of the criminal by new openings in a new land. The only outlet available at the moment beyond the sea was French Guiana, and it was again to be utilized despite its pestilential climate. Thousands were exiled, more than half to find certain death; none of the penal settlements prospered. No return was made by agricultural development, farms and plantations proved a dead loss under the unfavourable conditions of labour enforced in a malarious climate and unkindly soil, and it was acknowledged by French officials that the attempt to establish a penal colony on the equator was utterly futile. Deportation to Guiana was not abandoned, but instead of native- born French exiles, convicts of subject races, Arabs, Anamites and Asiatic blacks, were sent exclusively, with no better success as regards colonization.

In 1864, however, it was possible to divert the stream else- where. New Caledonia in the Australian Pacific was annexed to France in 1853. Ten years later it became a new settlement for convict emigrants. A first shipload was disembarked in 1864 at Noumea, and the foundations of the city laid. Prison buildings were the first erected and were planted upon the island of Nou, a small breakwater to the Bay of Noumea. Outwardly all went well under the fostering care of the authorities. The population steadily increased; an average total of 600 in 1867 rose in the following year to 1554. In 1874 the convict population exceeded 5000; in 1880 it had risen to 8000; the total

reached 9608 at the end of December 1883. But from that time forward the numbers transported annually fell, for it was found that this South Pacific island, with its fertile soil and fairly temperate climate, by no means intimidated the dangerous classes; and the French administration therefore resumed deportation of French-born whites to Guiana, which was known as notoriously unhealthy and was likely to act as a more positive deterrent. The authorities divided their exiles between the two outlets, choosing New Caledonia for the convicts who gave some promise of regeneration, and sending criminals with the worst antecedents and presumably incorrigible to the settlements on the equator. This was in effect to hand over a fertile colony entirely to criminals. Free immigration to New Caledonia was checked, and the colony became almost exclusively penal. The natural growth of a prosperous colonial community made no advance, and convict labour did little to stimulate it, the public works, essential for development, and construction of roads were neglected; there was no extensive clearance of lands, no steady development of agriculture. From 1898 simple deportation practically ceased, but the islands were full of convicts already sent, and they still received the product of the latest invention in the criminal code known as ” relegation,” a punishment directed against the recidivist or incorrigible criminal whom no penal retribution had hitherto touched and whom the French law felt justified in banishing for ever to the ” back of beyond.” A certain period of time spent in a hard labour prison preceded relegation, but the convicts on arrival were generally unfitted to assist in , colonization. They were for the most part decadent, morally 1 and physically; their labour was of no substantial value to

colonists or themselves, and there was small hope of profitable result when they gained conditional liberation, with a concession of colonial land and a possibility of rehabilitation by their own efforts abroad, for by their sentence they were forbidden to hope for return to France. The punishment of relegation was not long in favour, the number of sentences to it fell year after year, and it has now been practically abandoned.

Other Countries. — Penal exile has been practised by some other countries as a method of secondary punishment. Russia since 1823 has directed a stream of offenders, mainly political, upon Siberia, and at one time the yearly average sent was 18,000. The Siberian exile

system, the horrors of which cannot be exaggerated, belongs only in part to penitentiary science, but it was very distinctly punitive and aimed at regeneration of the individual and the development of the soil by new settlements. Although the journey was made mostly on foot and not by sea transport, the principle of deportation (or more exactly of removal) was the essence of the system. The later practice, however, has been exactly similar to transportation as originated by England and afterwards followed by France. The penal colonization of the island of Sakhalin reproduced the preceding methods, and the Russian convicts were conveyed by ships through the Suez Canal to the Far East. Sakhalin was hopefully intended as an outlet for released convicts and their rehabilitation by their own efforts, precisely in the manner tried in Australia and New Caledonia. The result repeated previous experiences. There was land to reclaim, forests to cut down, marshes to drain, everything but a temperate climate and a good will of the felon labourers to create a prosperous colony. But the convicts would not work; a few sought to win the right to occupy a concession of soil, but the bulk were pure vagabonds, wandering to and fro in search of food. The agricultural enterprise was a complete failure. The wrong sites for cultivation were chosen, the labourers were unskilled and they handled very indifferent tools. Want amounting to constant starvation was a constant rule; the rations were insufficient and unwholesome, very little meat eked out with salt fish and with entire absence of vegetables. The general tone of morals was inconceivably low, and a universal passion for alcohol and card- playing prevailed. According to one authority the life of the convicts at Sakhalin was a frightful nightmare, ” a mixture of debauchery and innocence mixed with real sufferings and almost inconceivable privations, corrupt in every one of its phases.” The prisons hopelessly ruined all who entered them, all classes were indiscriminately herded together. It is now generally allowed that deportation, as practised, had utterly failed, the chief reasons being the unmanageable numbers sent and the absence of outlets for their employment, even at great cost.

The prisons on Sakhalin have been described as hotbeds of vice; the only classification of prisoners is one based on the length of sentence. Some imperfect attempt is made to separate those waiting trial from the recidivist or hardened offender, but too often the association is indiscriminate. Prison discipline is generally slack and ineffective, the staff of warders, from ill- judged economy, too weak to supervise or control. The officers themselves are of inferior stamp, drunken, untrustworthy, over- bearing, much given to ” trafficking ” with the prisoners, accept- ing bribes to assist escape, quick to misuse and oppress their charges. Crime of the worst description is common.

Italy has practised deportation in planting various agricultural colonies upon the islands to be found on her coast. They were meant to imitate the intermediate prisons of the Irish system, where prisoners might work out their redemption, when provisionally released. Two were established on the islands of Pianoso and Gorgona, and there were settlements made on Monte Christo and Capraia. They were used also to give effect to the system of enforced residence or domicilio coatto.

Portugal also has tried deportation to the African colony of Angola on a small scale with- some success, and combined it with free emigration. The settlers have been represented as well disposed towards the convicts, gladly obtaining their

services or helping them in the matter of security. The convict element is orderly, and, although their treatment is ” peu repressive et relativement debonnaire,” few commit offences.

The Andaman Islands have been utilized by the Indian government since the mutiny (1857) f° r the deportation of heinous criminals (see Andaman Islands).

Authorities. — Captain A. Phillip, R.N., The Voyage of Governor Phillip to New South Wales (1 790) ; David Collins , A ccount of the English Colony of New South Wales (1798); Archbishop Whately, Remarks on Transportation (1834); Herman Merivale, Colonization and Colonies (1841); d’Haussonville, Iitablissements penitentiaires en France et aux colonies (1875) ; George Griffith, In a Prison Land; Cuche, Science et legislation penitentiaire (1905); Hawes, The Utter-most East (1906). (A. G.)

DEPOSIT (Lat. depositum, from deponere, to lay down, to put in the care of), anything laid down or separated; as in geology, any mass of material accumulated by a natural agency (see Bed), and in chemistry, a precipitate or matter settling from a solution or suspension. In banking, a deposit may mean, generally, a sum of money lodged in a bank without regard to the conditions under which it is held, but more specially money lodged with a bank on ” deposit account ” and acknowledged by the banker by a ” deposit receipt ” given to the depositor. It is then not drawn upon by cheque, usually bears interest at a rate varying from time to time, and can only be withdrawn after fixed notice. Deposit is also used in the sense of earnest or security for the performance of a contract. In the law of mortgage the deposit of title-deeds is usual as a security for the repayment of money advanced. Such a deposit operates as an equitable mortgage. In the

law of contract, deposit or simple bailment is delivery or bailment of goods in trust to be kept without recom- pense, and redelivered on demand (see Bailment).

DEPOT (from the Fr. d&pot, Lat. depositum, laid down; the French accent marks are usually dispensed with in English) , a place where things may be stored or deposited, such as a furniture or forage depot, the accumulation of military stores, especially in the theatre of operations. In America the word is used of a railway station, whether for passengers or goods; in Great Britain on railways the word, when in use, is applied to goods stations. A particular military application is to a depot, situated as a rule in the centre of the recruiting district of the regiment or other unit, where recruits are received and undergo the necessary preliminary training before joining the active troops. Such depots are maintained in peace time by all armies which have to supply distant or oversea garrisons; in an army raised by com- pulsory service and quartered in its own country, the regiments are usually stationed in their own districts, and on their taking the field for war leave behind a small nucleus for the formation and training of drafts to be sent out later. These nucleus troops are generally called depot troops.

DEPRETIS, AGOSTINO (1813-1887), Italian statesman, was born at Mezzana Corte, in the province of Stradella on the 31st of January 1813. From early manhood a disciple of Mazzini and affiliated to the Giovane Italia, he took an active part in the Mazzinian conspiracies and was nearly captured by the Austrians while smuggling arms into Milan. Elected deputy in 1848, he joined the Left and founded the journal II Diritto, but held no official position until appointed governor of Brescia in 1859. In i860 he went to Sicily on a mission to reconcile the policy of Cavour (who desired the immediate incorporation of the island in the kingdom of Italy) with that of Garibaldi, who wished to postpone the Sicilian plebiscite until after the liberation of Naples and Rome. Though appointed pro-dictator of Sicily by Garibaldi, he failed in his attempt. Accepting the portfolio of public works in the Rattazzi cabinet, in 1862, he served as intermediary in arranging with Garibaldi the expedition which ended disastrously at Aspromonte. Four years later, on the outbreak of war against Austria, he entered the Ricasoli cabinet as minister of marine, and, by maintaining Admiral Persano in command of the fleet, contributed to the defeat of Lissa. His apologists contend, however, that, as an inexperienced civilian, he could not have made sudden changes in naval arrangements without disorganiz- ing the fleet, and that in view of the impending hostilities he was

obliged to accept the dispositions of his predecessors. Upon the death of Rattazzi in 1873, Depretis became leader of the Left, prepared the advent of his party to power, and was called upon to form the first cabinet of the Left in 1876. Overthrown by Cairoli in March 1878 on the grist-tax question, he succeeded, in the following December, in defeating Cairoli, became again premier, but on the 3rd of July 1879 was once more overturned by Cairoli. In November 1879 he, however, entered the Cairoli cabinet as minister of the interior, and in May 1881 succeeded to the premiership, retaining that office until his death on the 29th of July 1887. During the long interval he recomposed his cabinet four times, first throwing out Zanardelli and Baccarini in order to please the Right, and subsequently bestowing portfolios upon Ricotti, Robilant and other Conservatives, so as to complete the political process known as ” trasformismo.” A few weeks before his death he repented of his transformist policy, and again in- cluded Crispi and Zanardelli in his cabinet. During his long term of office he abolished the grist tax, extended the suffrage, com- pleted the railway system, aided Mancini in forming the Triple Alliance, and initiated colonial policy by the occupation of Massawa; but, at the same time, he vastly increased indirect taxation, corrupted and destroyed the fibre of parliamentary parties, and, by extravagance in public works, impaired the stability of Italian finance.

DEPTFORD, a south-eastern metropolitan borough of London, England, bounded N. by Bermondsey, E. by the river Thames and Greenwich, S. by Lewisham and W. by Camberwell. Pop. (1901) 110,398. The name is connected with a ford over the Ravensbourne, a stream entering the Thames through Deptford Creek. The borough comprises only the parish of Deptford St Paul, that of Deptford St Nicholas being included in the borough of Greenwich. Deptford is a district of poor streets, inhabited by a large industrial population, employed in engineer- ing and other riverside works. On the river front, extending into the borough of Greenwich, are the royal victualling yard and the site of the old Deptford dockyard. The first supplies the navy with provisions, medicines, furniture, &c, manufactured or stored in the large warehouses here. The dockyard ceased to be used in 1869, and was filled up and converted into a foreign cattle market by the City Corporation. Of public buildings the most noteworthy are St Paul’s church (1730), of classic design; the municipal buildings; and the hospital for master mariners, maintained by the corporation of the Trinity House, which was founded at

Deptford, the old hall being pulled down in 1787. Other institutions are the Goldsmiths' Polytechnic Institute, New Cross; and the South-eastern fever hospital. A mansion known as Sayes Court, taken down in 1729, was the residence of the duke of Sussex in the reign of Elizabeth; it was occupied in the following century by John Evelyn, author of Sylva, and by Peter the Great during his residence in England in 1698. The site of its gardens is occupied by Deptford Park of 11 acres. Another open space is Telegraph Hill (9 J acres). The parlia- mentary borough of Deptford returns one member. The borough council consists of a mayor, 6 aldermen, and 36 councillors. Area, 1562-7 acres.

DEPUTY (through the Fr. from a Late Lat. use of deputare, to cut off, allot; putare having the original sense of to trim, prune), one appointed to act or govern instead of another; one who exercises an office in another man's right, a substitute; in representative government a member of an elected chamber. In general, the powers and duties of a deputy are those of his principal (see also Representation), but the extent to which he may exercise them is dependent upon the power delegated to him. He may be authorized to exercise the whole of his principal's office, in which case he is a general deputy, or to act only in some particular matter or service, when he is termed a special deputy. In the United Kingdom various officials are specifically empowered by statute to appoint deputies to act for them under certain circumstances. Thus a clerk of the peace, in case of illness, incapacity or absence, may. appoint a fit person to act as his deputy. While judges of the supreme court cannot act by deputy, county court judges and recorders can, in cases of illness

or unavoidable absence, appoint deputies. So can registrars of county courts and returning officers at elections.

DE QUINCEY, THOMAS (1785-1859), English author, was born at Greenheys, Manchester, on the 15th of August 1785. He was the fifth child in a family of eight (four sons and four daughters') His father, descended from a Norman family, was a merchant, who left his wife and six children a clear income of £1600 a year. Thomas was from infancy a shy, sensitive child, with a constitutional tendency to dreaming by night and by day; and, under the influence of an elder brother, a lad " whose genius for mischief amounted to inspiration," who died in his sixteenth year, he spent much of his boyhood in imaginary worlds of their own creating. The amusements and occupations of the whole family, indeed, seem to have been mainly intellectual; and in De Quincey's case, emphatically, " the child was father to the man." " My life has been," he affirms in the Confessions i " on the whole the life of a philosopher; from my birth I was made an intellectual creature, and intellectual in the highest sense my pursuits and pleasures have been." From boyhood he was more or less in contact with a polished circle; his education, easy to one of such native aptitude, was sedulously attended to. When he was in his twelfth year the family removed to Bath, where he was sent to the grammar school, at which he remained for about two years; and for a year more he attended another public school at Winkfield, Wiltshire. At thirteen he wrote Greek with ease; at fifteen he not only composed Greek verses in lyric measures, but could converse in Greek fluently and without embarrassment; one of his masters said of him, " that boy could harangue an Athenian mob better than you or I could address an English one." Towards the close of his fifteenth year he visited Ireland, with a companion of his own age, Lord Westport, the son of Lord Altamont, an Irish peer, and spent there in residence and travel some months of the summer and autumn of the year 1800, — being a spectator at Dublin of " the final ratification of the bill which united Ireland to Great Britain." On his return to England, his mother having now settled at St John's Priory, a residence near Chester, De Quincey was sent to the Manchester grammar school, mainly in the hope of securing one of the school exhibitions to help his expenses at Oxford.

Discontented with the mode in which his guardians conducted his education, and with some view apparently of forcing them to send him earlier to college, he left this school after less than a year's residence — ran away, in short, to his mother's house. There his mother's brother, Colonel Thomas Penson, made an arrangement for him to have a weekly allowance, on which he might reside at some country place in Wales, and pursue his studies, presumably till he could go to college. From Wales, however, after brief trial, " suffering grievously from' want of books," he went off as he had done from

school, and hid himself from guardians and friends in the world of London. And now, as he says, commenced ” that episode, or impassioned parenthesis of my life, which is comprehended in The Confessions of an English Opium Eater.” This London episode extended over a year or more; his money soon vanished, and he was in the utmost poverty; he obtained shelter for the night in Greek Street, Soho, from a moneylender’s agent, and spent his days wandering in the streets and parks; finally the lad was recon- ciled to his guardians, and in 1803 was sent to Worcester College, Oxford, being by this time about nineteen. It was in the course of his second year at Oxford that he first tasted opium, — having taken it to allay neuralgic pains. De Quincey’s mother had settled at Weston Lea, near Bath, and on one of his visits to Bath, De Quincey made the acquaintance of Coleridge; he took Mrs Coleridge to Grasmere, where he became personally acquainted with Wordsworth.

After finishing his career of five years at college in 1808 he kept terms at the Middle Temple; but in 1809 visited the Wordsworths at Grasmere, and in the autumn returned to Dove Cottage, which he had taken on a lease. His choice was of course influenced partly by neighbourhood to Wordsworth, whom he early appreciated; — having been, he says, the only man

in all Europe who quoted Wordsworth so early as 1802. His friendship with Wordsworth decreased within a few years, and when in 1834 De Quincey published in Tail’s Magazine his reminiscences of the Grasmere circle, the indiscreet references to the Wordsworths contained in the article led to a complete cessation of intercourse. Here also he enjoyed the society and friendship of Coleridge, Southey and especially of Professor Wilson, as in London he had of Charles Lamb and his circle. He continued his classical and other studies, especially exploring the at that time almost unknown region of German literature, and indicating its riches to English readers. Here also, in 1816, he

married Margaret Simpson, the ” dear M ” of whom a

charming glimpse is accorded to the reader of the Confessions; his family came to be five sons and three daughters.

For about a year and a half he edited the Westmoreland Gazette. He

left Grasmere for London in .the early part of 1820. The Lambs received him with great kindness and introduced him to the proprietors of the London Magazine. It was in this journal in 182 1 that the Confessions appeared. De Quincey also con- tributed to Blackwood, to Knight's Quarterly Magazine, and later to Tail's Magazine. His connexion with Blackwood took him to Edinburgh in 1828, and he lived there for twelve years, contribut- ing from time to time to the Edinburgh Literary Gazette. His wife died in 1837, and the family eventually settled at Lasswade, but from this time De Quincey spent his time in lodgings in various places, staying at one place until the accumulation of papers filled the rooms, when he left them in charge of the landlady and wandered elsewhere. After his wife's death he gave way for the fourth time in his life to the opium habit, but in 1844 he reduced his daily quantity by a tremendous effort to six grains, and never again yielded. He died in Edinburgh on the 8th of December 1859, and is buried in the West Churchyard.

During nearly fifty years De Quincey lived mainly by his pen. His patrimony seems never to have been entirely exhausted, and his habits and tastes were simple and inexpensive; but he was reckless in the use of money, and had debts and pecuniary difficulties of all sorts. There was, indeed, his associates affirm, an element of romance even in his impecuniosity, as there was in everything about him; and the diplomatic and other devices by which he contrived to keep clear of clamant creditors, while scrupulously fulfilling many obligations, often disarmed ani- mosity, and converted annoyance into amusement. The famous Confessions of an English Opium Eater was published in a small volume in 1822, and attracted a very remarkable degree of attention, not simply by its personal disclosures, but by the extraordinary power of its dream-painting. No other literary man of his time, it has been remarked, achieved so high and universal a reputation from such merely fugitive efforts. The only works published separately (not in periodicals) were a novel, Klosterheim (1832), and The Logic of Political Economy (1844). After his works were brought together, De Quincey's reputation was not merely maintained, but extended. For range of thought and topic, within the limits of pure literature, no like amount of material of such equality of merit proceeded from any eminent writer of the day. However profuse and discursive, De Quincey is always polished, and generally exact — a scholar, a wit, a man of the world and a philosopher, as well as a genius. He looked upon letters as a noble and responsible calling; in his essay on Oliver Goldsmith he claims for literature the rank not only of a fine art, but of the highest and most potent of fine arts; and as such he himself regarded and practised it. He drew a broad

distinction between ” the literature of knowledge and the literature of power,” asserting that the function of the first is to teach, the function of the second to move, — maintaining that the meanest of authors who moves has pre-eminence over all who merely teach, that the literature of knowledge must perish by supersession, while the literature of power is ” triumphant for ever as long as the language exists in which it speaks.” It is to this class of motive literature that De Quincey’s own works essentially belong; it is by virtue of that vital element of power that .they have emerged from the rapid oblivion of periodicalism, and live in the minds of later generations. But their power is weakened by their volume.

De Quincey fully defined nis own position and claim to dis- tinction in the preface to his collected works. These he divides into three classes: — “first, that class which proposes primarily to amuse the reader,” such as the Narratives, Autobiographic Sketches, &c; ” second, papers which address themselves purely to the understanding as an insulated faculty, or do so primarily,” such as the essays on Essenism, the Caesars, Cicero, &c; and finally, as a third class, ” and, in virtue of their aim, as a far higher class of compositions,” he ranks those ” modes of im- passioned prose ranging under no precedents that I am aware of in any literature,” such as the Confessions and Suspiria de Profundis. The high claim here asserted has been questioned; and short and isolated examples of eloquent apostrophe, and highly wrought imaginative description, have been cited from Rousseau and other masters of style; but De Quincey’s power of sustaining a fascinating and elevated strain of ” impassioned prose ” is allowed to be entirely his own. Nor, in regard to his writings as a whole, will a minor general claim which he makes be disallowed, namely, that he ” does not write without a thoughtful consideration of his subject,” and also with novelty and freshness of view. ” Generally,” he says, ” I claim (not arrogantly, but with firmness) the merit Of rectification applied to absolute errors, or to injurious limitations of the truth.” Another obvious quality of all his genius is its overflowing fulness of allusion and illustration, recalling his own description of a great philosopher or scholar — ” Not one who depends simply on an infinite memory, but also on an infinite and electrical power of combination, bringing together from the four winds, like the angel of the resurrection, what else were dust from dead men’s bones into the unity of breathing life.” It is useless to complain of his having lavished and diffused his talents and acquirements over so vast a variety of often comparatively trivial and passing topics. The world must accept gifts from men of genius as they offer them; circumstance and the hour often rule their form. Those influences, no less than the

idiosyncrasy of the man, determined De Quincey to the illumination of such matter for speculation as seemed to lie before him; he was not careful to search out recondite or occult themes, though these he did not neglect, — a student, a scholar and a recluse, he was yet at the same time a man of the world, keenly interested in the movements of men and in the page of history that unrolled itself before him day by day. To the discussion of things new, as readily as of things old, aided by a capacious, retentive and ready memory, which dispensed with reference to printed pages, he brought also the exquisite keenness and subtlety of his highly analytic and imaginative intellect, the illustrative stores of his vast and varied erudition, and that large infusion of common sense which preserved him from becoming at any time a mere doctrinaire, or visionary. If he did not throw himself into any of the great popular contro- versies or agitations of the day, it was not from any want of sympathy with the struggles of humanity or the progress of the race, but rather because his vocation was to apply to such incidents of his own time, as to like incidents of all history, great philosophical principles and tests of truth and power. In politics, in the party sense of that term, he would probably have been classed as a Liberal Conservative or Conservative Liberal — at one period of his life perhaps the former, and at a later the latter. Originally, as we have seen, his surroundings were aristocratic, in his middle life his associates, notably Wordsworth, Southey and Wilson, were all Tories; but he seems never to have held the extreme and narrow views of that circle. Though a flavour of high breeding runs through his writings, he has no vulgar sneers at the vulgar. As he advanced in years his views became more and more decidedly liberal, but he was always as far removed from Radicalism as from Toryism, and may be described as a philosophical politician, capable of classification under no definite party name or colour. Of political economy he had been an early and earnest student, and projected, if he did not so far proceed with, an elaborate and systematic treatise on the science, of which all that appears, however, are his fragmentary Dialogues on the system of Ricardo, published in the London Magazine in 1824, and The Logic of Political Economy (1844). But political

and economic problems largely exercised his thoughts, and his historical sketches show that he is constantly alive to their interpenetrating influence. The same may be said of his bio- graphies, notably of his remarkable sketch of Dr Parr. Neither politics nor economics, however, exercised an absorbing influence on his mind, —

they were simply provinces in the vast domain of universal speculation through which he ranged ” with unconfined wings.” How wide and varied was the region he traversed a glance at the titles of the papers which make up his collected — or more properly, selected — works (for there was much matter of evanescent interest not reprinted) sufficiently shows. Some things in his own line he has done perfectly; he has written many pages of magnificently mixed argument, irony, humour and eloquence, which, for sustained brilliancy, richness, subtle force and purity of style and effect, have simply no parallels; and he is without peer the prince of dreamers. The use of opium no doubt stimulated this remarkable faculty of reproducing in skilfully selected phrase the grotesque and shifting forms of that ” cloudland, gorgeous land,” which opens to the sleep-closed eye.

To the appreciation of De Quincey the reader must bring an imaginative faculty somewhat akin to his own — a certain general culture, and large knowledge of books, and men and things. Otherwise much of that slight and delicate allusion that gives point and colour and charm to his writings will be missed; and on this account the full enjoyment and comprehension of De Quincey must always remain a luxury of the literary and in- tellectual. But his skill in narration, his rare pathos, his wide sympathies, the pomp of his dream-descriptions, the exquisite playfulness of his lighter dissertations, and his abounding though delicate and subtle humour, commend him to a. larger class. Though far from being a professed humorist — a char- acter he would have shrunk from — there is no more expert worker in a sort of half-veiled and elaborate humour and irony than De Quincey; but he employs those resources for the most part secondarily. Only in one instance has he given himself up to them unreservedly and of set purpose, namely, in the famous ” Essay on Murder considered as one of the Fine Arts,” published in Blackwood, — an effort which, admired and admirable though it be, is also, it must be allowed, somewhat strained. His style, full and flexible, pure and polished, is peculiarly his own; yet it is not the style of a mannerist, — its charm is, so to speak, latent; the form never obtrudes; the secret is only discoverable by analysis and study. It consists simply in the reader’s assurance of the writer’s complete mastery over all the infinite applicability and resources of the English language. Hence involutions and parentheses, ” cycle on epicycle,” evolve themselves into a stately clearness and harmony; and sentences and paragraphs, loaded with suggestion, roll on smoothly and musically, without either fatiguing or cloying — rather, indeed, to the surprise as well as delight of the reader; for De Quincey is always ready to indulge in feats of style, witching the

world with that sort of noble horsemanship which is as graceful as it is daring.

It has been complained that, in spite of the apparently full confidences of the Confessions and Autobiographic Sketches, readers are left in comparative ignorance, biographically speaking, of the man De Quincey. Two passages in his Confessions afford sufficient clues to this mystery. In one he describes himself ” as framed for love and all gentle affections,” and in another confesses to the ” besetting infirmity ” of being ” too much of an eudaemonist.” ” I hanker,” he says, ” too much after a state of happiness, both for myself and others; I cannot face misery, whether my own or not, with an eye of sufficient firmness, and am little capable of surmounting present pain for the sake of any recessionary benefit.” His sensitive disposition dictated the ignoring in his writings of traits merely personal to himself, as well as his ever-recurrent resort to opium as a doorway of escape from present ill; and prompted those habits of seclusion, and that apparently capricious abstraction of himself from the society not only of his friends, but of his own family, in which he from time to” time persisted. He confessed to occasional accesses of an almost irresistible impulse to flee to the labyrinthine shelter

of some great city like London or Paris, — there to dwell solitary amid a multitude, buried by day in the cloister-like recesses of mighty libraries, and stealing away by night to some obscure lodging. Long indulgence in seclusion, and in habits of study the most lawless possible in respect of regular hours or any con- siderations of health or comfort,— the habit of working as pleased himself without regard to the divisions of night or day, of times of sleeping or waking, even of the slow procession of the seasons, had latterly so disinclined him to the restraints, however slight, of ordinary social intercourse, that he very seldom submitted to them. On such rare occasions, however, as he did appear, perhaps at some simple meal with a favoured friend, or in later years in his own small but refined domestic circle, he was the most charming of guests, hosts or companions. A short and fragile, but well-prcportioned frame; a shapely and compact head; a face beaming with intellectual light, with rare, almost feminine beauty of feature and complexion; a fascinating courtesy of manner; and a fulness, swiftness and elegance of silvery speech, — such was the irresistible ” mortal mixture of earth’s mould ” that men named De Quincey. He possessed in a high degree what James Russell Lowell called ” the grace of perfect breeding, everywhere persuasive, and nowhere emphatic “; and his whole aspect and manner exercised an undefinable attraction over every one, gentle or simple, who came within its influence; for shy as he was, he was never rudely shy,

making good his boast that he had always made it his ” pride to converse familiarly more socratico with all human beings— man, woman and child ” — looking on himself as a catholic creature standing in an equal relation to high and low t to educated and uneducated. He would converse with a peasant lad or a servant girl in phrase as choice, and sentences as sweetly turned, as if his interlocutor were his equal both in position and intelligence; yet without a suspicion of pedantry, and with such complete adaptation of style and topic that his talk charmed the humblest as it did the highest that listened to it. His conversation was not a monologue; if he had the larger share, it was simply because his hearers were only too glad that it should be so; he would listen with something like deference to very ordinary talk, as if the mere fact of the speaker being one of the same company entitled him to all consideration and respect. The natural bent of his mind and disposition, and his life-long devotion to letters, to say nothing of his opium eating, rendered him, it must be allowed, regardless of ordinary obligations in life — domestic and pecuniary — to a degree that would have been culpable in any less singularly constituted mind. It was impossible to deal with or judge De Quincey by ordinary standards — not even his publishers did so. Much no doubt was forgiven him, but all that needed forgiveness is covered by the kindly veil of time, while his merits as a master in English literature are still gratefully acknowledged. 1

[Bibliography. — In i‘853 De Quincey began to prepare an edition of his works, Selections Grave and Gay. Writings Published and Un-published (14 vols., Edinburgh, 1853-1860), followed by a second edition (1863-1871) with notes by James Hogg and two additional volumes ; a further supplementary volume appeared in 1878. The first comprehensive edition, however, was printed in America (Boston, 20 vols., 1850-1855); and the “Riverside” edition (Boston and New York, 12 vols., 1877) is still fuller. The standard English edition is The Collected Writings of Thomas De Quincey (14 vols., Edinburgh, 1 889-1 890), edited by David Masson, who also wrote his biography (1881) for the ” English Men of Letters ” series. The Uncollected Writings of Thomas De Quincey (London, 2 vols., 1890) contains a preface and annotations by James Hogg ; The Posthumous Writings of Thomas De Quincey (2 vols., 1891-1893) were edited by A. H. Japp (” H. A. Page “), who wrote the standard biography, Thomas De Quincey: his Life and Writings (London, 2 vols., 2nd ed., 1879), and De Quincey Memorials (2 vols., 1891). See also Arvede Barine, Nevroses (Paris, 1898); Sir L. Stephen, Hours in a Library; H. S. Salt, De Quincey (1904) ; and De Quincey and his Friends (1895), a collection edited by James Hogg, which includes essays by Dr Hill

Burton and Shadworth Hodgson.] (J. R. F.)

1 The above account has been corrected and amplified in some statements of fact for this edition. Its original author, John Ritchie Findlay (1824-1898), proprietor of The Scotsman newspaper, and the donor of the Scottish National Portrait Gallery in Edinburgh, had been intimate with De Quincey, and in 1886 published his Personal Recollections of him.

DERA GHAZI KHAN, a town and district of British India, in the Punjab. In iooi the town had a population of 21,700. There are several handsome mosques in the native quarter. It commands the direct approaches to the Baluch highlands by Sakki Sarwar and Fort Monro. For many years past both the town and cantonment have been threatened by the erosion of the river Indus. The town was founded at the close of the 15th century and named after Ghazi Khan, son of Haji Khan, a Baluch chieftain, who after holding the country for the Langah sultans of Multan had made himself independent. Together with the two other deras (settlements), Dera Ismail Khan and Dera Fateh Khan, it gave its name to the territorial area locally and historically known as Derajat, which after many vicissitudes came into the possession of the B ritish after the Sikh War, in 1 849, and was divided into the two districts of Dera Ghazi Khan and Dera Ismail Khan.

The District of Dera Ghazi Khan contains an area of 5306 sq. m. The district is a long narrow strip of country, 198 m. in length, sloping gradually from the hills which form its western boundary to the river Indus on the east. Below the hills the country is high and arid, generally level, but some- times rolling in sandy undulations, and much intersected by hill torrents, 201 in number. With the exceptions of two, these streams dry up after the rains, and their influence is only felt for a few miles below the hills. The eastern portion of the district is at a level sufficiently low to benefit by the floods of the Indus. A barren tract intervenes between these zones, and is beyond the reach of the hill streams on the one hand and of the Indus on the other. Although liable to great extremes of temperature, and to a very scanty rainfall, the district is not unhealthy. The population in 1901 was 471,149, the great majority being Baluch Mahommedans. The principal exports are wheat and indigo. The only manufactures are for domestic use. There is no railway in the district, and only 29 m. of

metalled road. The Indus, which is nowhere bridged within the district, is navigable by native boats. The geographical boundary between the Pathan and Baluch races in the hills nearly corresponds with the northern limit of the district. The frontier tribes on the Dera Ghazi Khan border include the Kasranis, Bozdars, Khosas, Lagharis, Khetvans, Gurchanis, Mazaris, Mariris and Bugtis. The chief of these are described under their separate names.

DERA ISMAIL KHAN, a town and district in the Derajat division of the North- West Frontier Province of India. The town is situated near the right bank of the Indus, which is here crossed by a bridge of boats during half the year. In 1901 it had a population of 31,737. It takes its name from Ismail Khan, a Baluch chief who settled here towards the end of the 15th century, and whose descendants ruled for 300 years. The old town was swept away by a flood in 1823, and the present town stands 4 m. back from the permanent channel of the river. The native quarters are well laid out, with a large bazaar for Afghan traders. It is the residence of many Mahommedan gentry. The cantonment accom- modates about a brigade of troops. There is considerable through trade with Afghanistan by the Gomal Pass, and there are local manufactures of cotton cloth scarves and inlaid wood-work.

The District of Dera Ismail Khan contains an area of 3403 sq. m. It was formerly divided into two almost equal portions by the Indus, which intersected it from north to south. To the west of the Indus the characteristics of the country resemble those of Dera Ghazi Khan. To the east of the present bed of the river there is a wide tract known as the Kachi, exposed to river action. Beyond this, the country rises abruptly, and a barren, almost desert plain stretches eastwards, sparsely cultivated, and inhabited only by nomadic tribes of herdsmen. In 1901 the trans-Indus tract was allotted to the newly formed North-West Frontier Province, the cis-Indus tract remaining in the Punjab jurisdiction. The cis-Indus portions of the Dera Ismail Khan and Bannu districts now comprise the new Punjab district of Mianiwali. In 1901 the population was 252,379. chiefly Pathan and Baluch Mahommedans. Wheat and wool are exported.

The Indus is navigable by native boats throughout its course of 120 m. within the district, which is the borderland of Pathan

and Baluch tribes, the Pathan element predominating. The chief frontier tribes are the Sheranis and Ustaranas.

DERBENT, or Derbend, a town of Russia, Caucasia, in the province of

Daghestan, on the western shore of the Caspian, 153 m. by rail N.W. of Baku, in 42 4′ N. and 48 15′ E. Pop. (1873) i5>73°; (1897) 14,821. It occupies a narrow strip of land beside the sea, from which it climbs up the steep heights inland to the citadel of Naryn-kaleh, and is on all sides except towards the east surrounded by walls built of porous limestone. Its general aspect is Oriental, owing to the flat roofs of its two- storeyed houses and its numerous mosques. The environs are occupied by vineyards, gardens and orchards, in which madder, saffron and tobacco, as well as figs, peaches, pears and other fruits, are cultivated. Earthenware, weapons and silk and cotton fabrics are the principal products of the manufacturing industry. To the north of the town is the monument of the Kirk-lar, or ” forty heroes,” who fell defending Daghestan against the Arabs in 728; and to the south lies the seaward extremity of the Caucasian wall (50 m. long), otherwise known as Alexander’s wall, blocking the narrow pass of the Iron Gate or Caspian Gates (Portae Albanae or Portae Caspiae). This, when entire, had a height of 29 ft. and a thickness of about 10 ft., and with its iron gates and numerous watch-towers formed a valuable defence of the Persian frontier. Derbent is usually identified with Albana, the capital of the ancient Albania. The modern name, a Persian word meaning ” iron gates,” came into use in the end of the 5th or the beginning of the 6th century, when the city was refounded by Kavadh of the Sassanian dynasty of Persia. The walls and the citadel are believed to belong to the time of Kavadh’s son, Khosrau (Chosroes) Anosharvan. In 728 the Arabs entered into possession, and established a principality in the city, which they called Bab-el-Abwab (” the principal gate “), Bab-el-Khadid (” the iron gate “), and Seraill-el-Dagab (” the golden throne “). The celebrated caliph, Harun-al-Rashid, lived in Derbent at different times, and brought it into great repute as a seat of the arts and commerce. In 1220 it was captured by the Mongols, and in the course of the succeeding centuries it frequently changed masters. In 1722 Peter the Great of Russia wrested the town from the Persians, but in 1736 the supremacy of Nadir Shah was again recognized. In 1 796 Derbent was besieged by the Russians, and in 1813 incorporated with the Russian empire.

DERBY, EARLS OF. The 1st earl of Derby was probably Robert de Ferrers (d. 1139), who is said by John of Hexham to have been made an earl by King Stephen after the battle of the Standard in 1138. Robert and his descendants retained the earldom until 1266, when Robert (c. 1240-c. 1279), probably the 6th earl, having taken a prominent part in the baronial rising against Henry III., was deprived of his lands and practi- cally of bis title. These earlier earls of Derby were also known as Earls Ferrers, or de Ferrers, from their surname; as

earls of Tutbury from their residence; and as earls of Nottingham because this county was a lordship under their rule. The large estates which were taken from Earl Robert in 1266 were given by Henry III. in the same year to his son, Edmund, earl of Lancaster; and- Edmund's son, Thomas, earl of Lancaster, called himself Earl Ferrers. In 1337 Edmund's grandson, Henry (c. 1 290-1361), afterwards duke of Lancaster, was created earl of Derby, and this title was taken by Edward III.'s son, John of Gaunt, who had married Henry's daughter, Blanche. John of Gaunt's son and successor was Henry, earl of Derby, who became king as Henry IV. in 1399.

In October 1485 Thomas, Lord Stanley, was created earl of Derby, and the title has since been retained by the Stanleys, who, however, have little or no connexion with the county of Derby. Thomas also inherited the sovereign lordship of the Isle of Man, which had been granted by the crown in 1406 to his great-grandfather, Sir John Stanley; and this sovereignty remained in possession of the earls of Derby till 1736, when it passed to the duke of Atholl.

The earl of Derby is one of the three " catskin earls," the others being the earls of Shrewsbury and Huntingdon. The term " catskin " is possibly a corruption of quatre-skin, derived from

the fact that in ancient times the robes of an earl (as depicted in some early representations) were decorated with four rows of ermine, as in the robes of a modern duke, instead of the three rows to which they were restricted in later centuries. The three " catskin "earldoms are the only earldoms now in existence which date from creations prior to the 17th century. (A. W. H.*)

Thomas Stanley, 1st earl of Derby (c. 1435-1504), was the son of Thomas Stanley, who was created Baron Stanley in 1456 and died in 1459. His grandfather, Sir John Stanley (d. 1414), had founded the fortunes of his family by marrying Isabel Lathom, the heiress of a great estate in the hundred of West Derby in Lancashire; he was lieutenant of Ireland in 1389-1391, and again in 1399-1401, and in 1405 received a grant of the lordship of Man from Henry IV. The future earl of Derby was a squire to Henry VI. in 1454, but not long afterwards married Eleanor, daughter of the Yorkist leader, Richard Neville, earl of Salisbury. At the battle of Blore Heath in August 1459 Stanley, though close at hand with a large force, did not join the royal

army, whilst his brother William fought openly for York. In 146 1 Stanley was made chief justice of Cheshire by Edward IV., but ten years later he sided with his brother-in-law Warwick in the Lancastrian restoration. Nevertheless, after Warwick's fall, Edward made Stanley steward of his household. Stanley served with the king in the French expedition of 1475, and with Richard of Gloucester in Scotland in 1482. About the latter date he married, as his second wife, Margaret Beaufort, mother of the exiled Henry Tudor. Stanley was one of the executors of Edward IV., and was at first loyal to the young king Edward V. But he acquiesced in Richard's usurpation, and retaining his office as steward avoided any entanglement through his wife's share in Buckingham's rebellion. He was made constable of England in succession to Buckingham, and granted possession of his wife's estates with a charge to keep her in some secret place at home. Richard could not well afford to quarrel with so powerful a noble, but early in 1485 Stanley asked leave to retire to his estates in Lancashire. In the summer Richard, suspicious of his continued absence, required him to send his eldest son, Lord Strange, to court as a hostage. After Henry of Richmond had landed, Stanley made excuses for not joining the king ; for his son's sake he was obliged to temporize, even when his brother William had been publicly proclaimed a traitor. Both the Stanleys took the field; but whilst William was in treaty with Richmond, Thomas professedly supported Richard. On the morning of Bosworth (August 22), Richard summoned Stanley to join him, and when he received an evasive reply ordered Strange to be executed. In the battle it was William Stanley who turned the scale in Henry's favour, but Thomas, who had taken no part in the fighting, was the first to salute the new king. Henry VII. confirmed Stanley in all his offices, and on the 27th of October created him earl of Derby. As husband of the king's mother Derby held a great position, which was not affected by the treason of his brother William in February 1495. In the following July the earl entertained the king and queen with much state at Knowsley. Derby died on the 29th of July 1504. Strange had escaped execution in 1485, through neglect to obey Richard's orders; but he died before his father in 1497, and his son Thomas succeeded as second earl. An old poem called The Song of the Lady Bessy, which was written by a retainer of the Stanleys, gives a romantic story of how Derby was enlisted by Elizabeth of York in the cause of his wife's son.

For fuller narratives see J. Gairdner's Richard III. and J. H. Ramsay's Lancaster and York; also Seacome's Memoirs of the House of Stanley (1741). (C. L. K.)

Edward Stanley, 3rd earl of Derby (1508-1572), was a son of Thomas

Stanley, 2nd earl and grandson of the 1st earl, and succeeded to the earldom on his father's death in May 1521. During his minority Cardinal Wolsey was his guardian, and as soon as he came of age he began to take part in public life, being often in the company of Henry VIII. He helped to quell the rising in the north of England known as the Pilgrimage of Grace in 1536; but remaining true to the Roman Catholic faith he disliked and opposed the religious changes made under Edward vni. — 3

VI. During Mary's reign the earl was more at ease, but under Elizabeth his younger sons, Sir Thomas (d. r576) and Sir Edward Stanley (d. 1609), were concerned in a plot to free Mary, queen of Scots, and he himself was suspected of disloyalty. However, he kept his numerous dignities until his death at Lathom House, near Ormskirk, on the 24th of October 1572.

Derby's first wife was Katherine, daughter of Thomas Howard, duke of Norfolk, by whom he had, with other issue, a son Henry, the 4th earl (c. 1 531-1593), who was a member of the council of the North, and like his father was lord-lieutenant of Lancashire. Henry was one of the commissioners who tried Mary, queen of Scots, and was employed by Elizabeth on other high under- takings both at home and abroad. He died on the 25th of September 1593. His wife Margaret (d. 1596), daughter of Henry Clifford, 2nd earl of Cumberland, was descended through the Brandons from King Henry VII. Two of his sons, Ferdinando (c. 1559-1594), and William (c. 1561-1642), became in turn the 5th and 6th earls of Derby. Ferdinando, the 5th earl (d. 1594), wrote verses, and is eulogized by the poet Spenser under the name of Amyntas. (A. W. H.*)

James Stanley, 7th earl of Derby (1607-1651), sometimes styled the Great Earl of Derby, eldest son of William, 6th earl, and Elizabeth de Vere, daughter of Edward, 17th earl of Oxford, was born at Knowsley on the 31st of January 1607. During his father's life he was known as Lord Strange. After travelling abroad he was chosen member of parliament for Liverpool in 1625, was created knight of the Bath on the occasion of Charles's coronation in 1626, and was joined with his father the same year as lieutenant of Lancashire and Cheshire and chamberlain of Chester, and in the administration of the Isle of Man, being appointed subsequently lord-lieutenant of North Wales. On the 7th of March 1628 he was called up to the House of Lords as Baron Strange. He took no part in the political disputes between king and parliament and preferred country pursuits and the care of his estates to court or public life. Never- theless when the Civil War broke out in 1642, Lord Strange devoted himself to the king's cause. His plan of

securing Lancashire at the beginning and raising troops there, which promised success, was however discouraged by Charles, who was said to be jealous of his power and royal lineage and who com- manded his presence at Nottingham. His subsequent attempts to recover the county were unsuccessful. He was unable to get possession of Manchester, was defeated at Chowbent and Lowton Moor, and in 1643 after gaining Preston failed to take Bolton and Lancaster castles. Finally, after successfully beating off Sir William Brereton's attack on Warrington, he was defeated at Whalley and withdrew to York, Warrington in consequence surrendering to the enemy's forces. In June he left for the Isle of Man to attend to affairs there, and in the summer of 1644 he took part in Prince Rupert's successful campaign in the north, when Lathom House, where Lady Derby had heroically resisted the attacks of the besiegers, was relieved, and Bolton Castle taken. He followed Rupert to Marston Moor, and after the complete defeat of Charles's cause in the north withdrew to the Isle of Man, where he held out for the king and offered an asylum to royalist fugitives. His administration of the island imitated that of Strafford in Ireland. It was strong rather than just. He maintained order, encouraged trade, remedied some abuses, and defended the people from the exactions of the church; but he crushed opposition by imprisoning his antagonists, and aroused a prolonged agitation by abolishing the tenant-right and introduc- ing leaseholds. In July 1649 he refused scornfully terms offered to him by Ireton. By the death of his father on the 29th of September 1642 he had succeeded to the earldom, and on the 12th of January 1650 he obtained the Garter. He was chosen by Charles II. to command the troops of Lancashire and Cheshire, and on the 15th of August 1651 he landed at Wyre Water in Lancashire in support of Charles's invasion, and met the king on the 17th. Proceeding to Warrington he failed to obtain the support of the Presbyterians through his refusal to take the Covenant, and on the 25th was totally defeated at Wigan, being severely wounded and escaping with difficulty. He joined

Charles at Worcester; after the battle on the 3rd of September he accompanied him to Boscobel, and while on his way north alone was captured near Nantwich and given quarter. He was tried by court-martial at Chester on the 29th of September, and on the ground that he was a traitor and not a prisoner of war under the act of parliament

passed in the preceding month, which declared those who corresponded with Charles guilty of treason, his quarter was disallowed and he was condemned to death. When his appeal for pardon to parliament was rejected, though supported by Cromwell, he endeavoured to escape; but was recaptured and executed at Bolton on the 15th of October 1651. He was buried in Ormskirk church. Lord Derby was a man of deep religious feeling and of great nobility of character, who though unsuccessful in the field served the king's cause with single-minded purpose and without expectation of reward. His political usefulness was handicapped in the later stages of the struggle by his dislike of the Scots, whom he regarded as guilty of the king's death and as unfit instruments of the restoration. According to Clarendon he was " a man of great honour and clear courage," and his defects the result of too little knowledge of the world. Lord Derby left in MS. " A Discourse concerning the Government of the Isle of Man " (printed in the Stanley Papers and in F. Peck's Desiderata Curiosa, vol. ii.) and several volumes of historical collections, observations, devotions (Stanley Papers) and a commonplace book. He married on the 26th of June 1626 Charlotte de la Tremoille (1599-1664), daughter of Claude, due de Thouars, and granddaughter of William the Silent, prince of Orange, by whom besides four daughters he had five sons, of whom the eldest, Charles (1628-1672), succeeded him as 8th earl. Charles's two sons, William, the 9th earl (c. 1655-1702), and James, the 10th earl (1664-1736), both died without sons, and consequently, when James died in February 1736, his titles and estates passed to Sir Edward Stanley (1689-1776), a descendant of the 1st earl. From him the later earls were descended, the 12th earl (d. 1834) being his grandson.

Bibliography. — Article in Diet, of Nat. Biog. with authorities and article in same work on Charlotte Stanley, countess of Derby ; the Stanley Papers, with the too laudatory memoir by F. R. Haines (Chetham Soc. publications, vols. 62, 66, 67, 70); Memoires, by De Lloyd (1668), 572; State Trials, v. 293-324; Notes & Queries, viii. Ser. iii. 246; Seacombe's House of Stanley; Clarendon's Hist, of the Rebellion; Gardiner's Hist, of the Civil War and Protectorate; The Land of Home Rule, by Spencer Walpole (1893); Hist, of the Isle of Man, by A. W. Moore (1900); Manx Soc. publications, vols. 3, 25. 27. (P- C Y.)

Edward Geoffrey Smith Stanley, 14th earl of Derby (1799- 1869), the " Rupert of Debate," born at Knowsley in Lanca- shire on the 29th of March 1799, grandson of the 12th earl and eldest son of Lord Stanley, subsequently (1834) 13th earl of Derby (1775-1851). He was educated at Eton and at Christ Church, Oxford, where he distinguished himself as a classical scholar, though he took no degree. In 1819 he obtained

the Chancellor's prize for Latin verse, the subject being " Syracuse." He gave early promise of his future eminence as an orator, and in his youth he used to practise elocution under the instruction of Lady Derby, his grandfather's second wife, the actress, Elizabeth Farren. In 1820 he was returned for Stockbridge in Hampshire, one of the nomination boroughs whose electoral rights were swept away by the Reform Bill of 1832, Stanley being a warm advocate of their destruction.

His maiden speech was delivered early in the session of 1824 in the debate on a private bill for lighting Manchester with gas. On the 6th of May 1824 he delivered a vehement and eloquent speech against Joseph Hume's motion for a reduction of the Irish Church establishment, maintaining in its most conservative form the doctrine that church property is as sacred as private property. From this time his appearances became frequent; and he soon asserted his place as one of the most powerful speakers in the House. Specially noticeable almost from the first was the skill he displayed in reply. Macaulay, in an essay published in 1834, remarked that he seemed to possess intuitively the faculty which \n most men is developed only by long and laborious practice. In the autumn of 1824 Stanley went on an extended tour through

Canada and the United States in company with Mr Labouchere, afterwards Lord Taunton, and Mr Evelyn Denison, afterwards Lord Ossington. In May of the following year he married the second daughter of Edward Bootle-Wilbraham, created Baron Skelmersdale hi 1828, by whom he had a family of two sons and one daughter who survived.

At the general election of 1826 Stanley renounced his connec- tion with Stockbridge, and became the representative of the borough of Preston, where the Derby influence was paramount. The change of seats had this advantage, that it left him free to speak against the system of rotten boroughs, which he did with great force during the Reform Bill debates, without laying himself open to the charge of personal inconsistency as the representative of a place where, according to Gay, cobblers used to " feast three years upon one vote." In 1827 he and several other distinguished Whigs made a coalition with Canning on the defection of the more unyielding Tories, and he commenced his official life as under- secretary for the colonies, but the coalition was broken up by Canning's death in August. Lord Goderich succeeded to the premiership, but he never was really in power, and he resigned his place after the lapse of a few months. During the succeeding administration of the duke of Wellington

(1828-1830), Stanley and those with whom he acted were in opposition. His robust and assertive Liberalism about this period seemed curious after- wards to a younger generation who knew him only as the very embodiment of Conservatism.

By the advent of Lord Grey to power in November 1830, Stanley obtained his first opportunity of showing his capacity for a responsible office. He was appointed to the chief secretary- ship of Ireland, a position in which he found ample scope for both administrative and debating skill. On accepting office he had to vacate his seat for Preston and seek re-election; and he had the mortification of being defeated by the Radical ” orator ” Hunt. The contest was a peculiarly keen one, and turned upon the question of the ballot, which Stanley refused to support. He re-entered the House as one of the members for Windsor, Sir Hussey Vivian having resigned in his favour. In 1 83 2 he again changed his seat, being returned for North Lancashire.

Stanley was one of the most ardent supporters of Lord Grey’s Reform Bill. Of this no other proof is needed than his frequent parliamentary utterances, which were fully in sympathy with the popular cry ” The bill, the whole bill, and nothing but the bill.” Reference may be made especially to the speech he delivered on the 4th of March 1831 on the adjourned debate on the second reading of the bill, which was marked by all the higher qualities of his oratory. Apart from his connexion with the general policy of the government, Stanley had more than enough to have employed all his energies in the management of his own depart- ment. The secretary of Ireland has seldom an easy task; Stanley found it one of peculiar difficulty. The country was in a very unsettled state. The just concession that had been somewhat tardily yielded a short time before in Catholic emancipation had excited the people to make all sorts of demands, reasonable and unreasonable. Undaunted by the fierce denunciations of O’Connell, who styled him Scorpion Stanley, he discharged with determination the ungrateful task of carrying a coercion bill through the House. It was generally felt that O’Connell, powerful though he was, had fairly met his match in Stanley, who, with invective scarcely inferior to his own, evaded no challenge, ignored no argument, and left no taunt unanswered. The title ” Rupert of Debate ” is peculiarly applicable to him in connexion with the fearless if also often reckless method of attack he showed in his parliamentary war with O’Connell. It was first applied to him, however, thirteen years later by Sir Edward Bulwer Lytton in The New Timon : —

” One after one the lords of time advance; Here Stanley meets — here Stanley scorns the glance! The brilliant chief, irregularly great, Frank,

haughty, rash, — the Rupert of debate.”

The best answer, however, which he made to the attacks of the great agitator was not the retorts of debate, effective though these were, but the beneficial legislation he was instrumental in

passing. He introduced and carried the first national education act for Ireland, one result of which was the remarkable and to many almost incredible phenomenon of a board composed of Catholics, Episcopalians and Presbyterians harmoniously administering an efficient education scheme. He was also chiefly responsible for the Irish Church Temporalities Act, though the bill was not introduced into parliament until after he had quitted the Irish secretaryship for another office. By this measure two archbishoprics and eight bishoprics were abolished, and a remedy was provided for various abuses connected with the revenues of the church. As originally introduced, the bill contained- a clause authorizing the appropriation of surplus revenues to non- ecclesiastical purposes. This had, however, been strongly opposed from the first by Stanley and several other members of the cabinet, and it was withdrawn by the government before the measure reached the Lords.

In 1833, just before the introduction of the Irish Church Temporalities Bill, Stanley had been promoted to be secretary for the colonies with a seat in the cabinet. In this position it fell to his lot to carry the emancipation of the slaves to a successful practical issue. The speech which he delivered on introducing the bill for freeing the slaves in the West Indies, on the 14th of May 1833, was one of the finest specimens of his eloquence.

The Irish Church question determined more than one turning- point in his political career. The most important occasion on which it did so was in 1834, when the proposal of the government to appropriate the surplus revenues of the church to educational purposes led to his secession from the cabinet, and, as it proved, his complete and final separation from the Whig party. In the former of these steps he had as his companions Sir James Graham, the earl of Ripon and the duke of Richmond. Soon after it occurred, O’Connell, amid the laughter of the House, described the secession in a couplet from Canning’s Loves of the Triangles: — ” Still down thy steep, romantic Ashbourne, glides The Derby dilly carrying six insides.”

Stanley was not content with marking his disapproval by the simple act of withdrawing from the cabinet. He spoke against the bill to which he objected with a vehemence that showed the strength of his feeling in the matter, and against its authors with a bitterness that he himself is understood to have afterwards admitted to have been unseemly towards those who had so recently been his colleagues. The course followed by the govern- ment was ” marked with all that timidity, that want of dexterity, which led to the failure of the unpractised shoplifter.” His late colleagues were compared to “thimble-riggers at a country fair,” and their plan was “petty larceny, for it had not the redeeming qualities of bold and open robbery.”

In the end of 1834, Lord Stanley, as he was now styled by courtesy, his father having succeeded to the earldom in October, was invited by Sir Robert Peel to join the short-lived Con- servative ministry which he formed after the resignation of Lord Melbourne. Though he declined the offer for reasons stated in a letter published in the Peel memoirs, he acted from that date with the Conservative party, and on its next accession to power, in 1 84 1, he accepted the office of colonial secretary, which he had held under Lord Grey. His position and his temperament alike, however, made him a thoroughly independent supporter of any party to which he attached himself. When, therefore, the injury to health arising from the late hours in the Commons led him in 1844 to seek elevation to the Upper House in the right of his father’s barony, Sir Robert Peel, in acceding to his request, had the satisfaction of at once freeing himself from the possible effects of his ” candid friendship ” in the House, and at the same time greatly strengthening the debating power on the Conservative side in the other. If the premier in taking this step had any presentiment of an approaching difference on a vital question, it was not long in being realized. When Sir Robert Peel accepted the policy of free trade in 1846, the breach between him and Lord Stanley was, as might have been anticipated from the antecedents of the latter, instant and irreparable. Lord Stanley at once asserted himself as the uncompromising opponent of that policy, and he became the recognized leader of the Protectionist party,

having Lord George Bentinck and Disraeli for his lieutenants in the Commons. They did all that could be done in a case in which the logic of events was against them, though Protection was never to become more than their watchword.

It is one of the peculiarities of English politics, however, that a party may come into power because it is the only available one at the time, though it may have no chance of carrying the very principle to which

it owes its organized existence. Such was the case v/hen Lord Derby, who had succeeded to the earldom on the death of his father in June 1851, was called upon to form his first administration in February 1852. He was in a minority, but the circumstances were such that no other than a minority govern- ment was possible, and he resolved to take the only available means of strengthening his position by dissolving parliament and appealing to the country at the earliest opportunity. The appeal was made in autumn, but its result did not materially alter the position of parties. Parliament met in November, and by the middle of the following month the ministry had resigned in consequence of their defeat on Disraeli's budget. For the six following years, during Lord Aberdeen's " ministry of all the talents " and Lord Palmerston's premiership, Lord Derby remained at the head of the opposition, whose policy gradually became more generally Conservative and less distinctively Protectionist as the hopelessness of reversing the measures adopted in 1846 made itself apparent. In 1855 ne was asked to form an administration after the resignation of Lord Aberdeen, but failing to obtain sufficient support, he declined the task. It was in somewhat more hopeful circumstances that, after the defeat of Lord Palmerston on the Conspiracy Bill in February 1858, he assumed for the second time the reins of government. Though he still could not count upon a working majority, there was a possibility of carrying on affairs without sustaining defeat, which was realized for a full session, owing chiefly to the dexterous management of Mr Disraeli in the Commons. The one rock ahead was the question of reform, on which the wishes of the country were being emphatically expressed, but it was not so pressing as to require to be immediately dealt with. During the session of 1858 the government contrived to pass two measures of very considerable importance, one a bill to remove Jewish disabilities, and the other a bill to transfer the government of India from the East India Company to the crown. Next year the question of parliamentary reform had to be faced, and, recognizing the necessity, the government introduced a bill at the opening of the session, which, in spite of, or rather in consequence of, its " fancy franchises," was rejected by the House, and, on a dissolution, rejected also by the country. A vote of no confidence having been passed in the new parliament on the 10th of June, Lord Derby at once resigned.

After resuming the leadership of the Opposition Lord Derby devoted much of the leisure the position afforded him to the classical studies that had always been congenial to him. It was his reputation for scholarship as well as his social position that had led in 1852 to his appointment to the chancellorship of the university of Oxford, in succession to the duke of Wellington ; and perhaps a desire to justify

the possession of the honour on the former ground had something to do with his essays in the field of authorship. His first venture was a poetical version of the ninth ode of the third book of Horace, which appeared in Lord Ravensworth's collection of translations of the Odes. In 1862 he printed and circulated in influential quarters a volume entitled Translations of Poems A ncient and Modern, with a very modest dedicatory letter to Lord Stanhope, and the words " Not published " on the title-page. It contained, besides versions of Latin, Italian, French and German poems, a translation of the first book of the Iliad. The reception of this volume was such as to encourage him to proceed with the task he had chosen as his magnum opus, the translation of the whole of the Iliad, which accordingly appeared in 1864.

During. the seven years that elapsed between Lord Derby's second and third administrations an industrial crisis occurred in his native county, which brought out very conspicuously his public spirit and his philanthropy. The destitution in Lancashire

caused by the. stoppage of the cotton-supply in consequence of the American Civil War, was so great as to threaten to overtax the benevolence of the country. That it did not do so was probably due to Lord Derby more than to any other single man. From the first he was the very life and soul of the movement for relief. His persona] subscription, munificent though it was, represented the least part of his service. His noble speech at the meeting in Manchester in December 1862, where the movement was initiated, and his advice at the subsequent meetings of the committee, which he attended very regularly, were of the very highest value in stimulating and directing public sympathy. His relations with Lancashire had always been of the most cordial description, notwithstanding his early rejection by Preston; but it is not surprising that after the cotton famine period the cordiality passed into a warmer and deeper feeling, and that the name of Lord Derby was long cherished in most grateful remembrance by the factory operatives.

On the rejection of Earl Russell's Reform Bill in 1866, Lord Derby was for the third time entrusted with the formation of a cabinet. Like those he had previously formed it was destined to be short-lived, but it lived long enough to settle on a permanent basis the question that had proved fatal to its predecessor. The " education " of the party that had

so long opposed all reform to the point of granting household suffrage was the work of another; but Lord Derby fully concurred in, if he was not the first to suggest, the statesmanlike policy by which the question was disposed of in such a way as to take it once for all out of the region of controversy and agitation. The passing of the Reform Bill was the main business of the session 1867. The chief debates were, of course, in the Commons, and Lord Derby's failing powers pre- vented him from taking any large share in those which took place in the Lords. His description of the measure as a " leap in the dark " was eagerly caught up, because it exactly represented the common opinion at the time, — the most experienced statesmen, while they admitted the granting of household suffrage to be a political necessity, being utterly unable to foresee what its effect might be on the constitution and government of the country.

Finding himself unable, from declining health, to encounter the fatigues of another session, Lord Derby resigned office early in 1868. The step he had taken was announced in both Houses on the evening of the 25th of February, and warm tributes of admiration and esteem were paid by the leaders of the two great parties. He yielded the entire leadership of the party as well as the premiership to Disraeli. His subsequent appearances in public were few and unimportant. It was noted as a consistent close to his political life that his last speech in the House of Lords should have been a denunciation of Gladstone's Irish Church Bill marked by much of his early fire and vehemence. A few months later, on the 23rd of October 1869, he died at Knowsley.

Sir Archibald Alison, writing of him when he was in the zenith of his powers, styles him " by the admission of all. parties the most perfect orator of his day." Even higher was the opinion of Lord Aberdeen, who is reported by The Times to have said that no one of the giants he had listened to in his youth, Pitt, Fox, Burke or Sheridan, " as a speaker, is to be compared with our own Lord Derby, when Lord Derby is at his best." (W.B.S.)

Edward Henry Stanley, 15th earl of Derby (1826- 1893), eldest son of the 14th earl, was educated at Rugby and Trinity College, Cambridge, where he took a high degree and became a member of the society known as the Apostles. In March 1848 he unsuccessfully contested the borough of Lancaster, and then made a long tour in the West Indies, Canada and the United States. During his absence he was elected member for King's Lynn, which he represented till October 1869, when he succeeded to the peerage. He took his place, as a matter of course, among the Conservatives, and delivered his maiden speech in May 1850 on the sugar duties. Just before, he had made a very brief

tour in Jamaica and South America. In 1852 he went to India, and while travelling in that country he was appointed under-secretary for foreign affairs in his father's first administra- tion. From the outset of his career he was known to be a most Liberal Conservative, and in 1855 Lord Palmerston offered him

the post of colonial secretary. He was much tempted by the proposal, and hurried down to Knowsley to consult his father, who called out when he entered the room, "Hallo, Stanley! what brings you here ? — Has Dizzy cut his throat, or are you going to be married ? " When the object of his sudden appear- ance had been explained, the Conservative chief received the courteous suggestion of the prime minister with anything but favour, and the offer was declined. In his father's second administration Lord Stanley held, at first, the office of secretary for the colonies, but became president of the Board of Control on the resignation of Lord Ellenborough. He had the charge of the India Bill of 1858 in the House of Commons, became the first secretary of state for India, and left behind him in the India Office an excellent reputation as a man of business. After the revolution in Greece and the disappearance of King Otho, the people most earnestly desired to have Queen Victoria's second son, Prince Alfred, for their king. He declined the honour, and they then took up the idea that the next best thing they could do would be to elect some great and wealthy English noble, not concealing the hope that although they might have to offer him a Civil List he would decline to receive it. Lord Stanley was the prime favourite as an occupant of this bed of thorns, and it has been said that he was actually offered the crown. That, however, is not true; the offer was never formally made. After the fall of the Russell government in 1866 he became foreign secretary in his father's third administration. He compared his conduct in that great post to that of a man floating down a river and fending off from his vessel, as well as he could, the various obstacles it encountered. He thought that that should be the normal attitude of an English foreign minister, and probably under the circumstances of the years 1866-1868 it was the right one. He arranged the collective guarantee of the neutrality of Luxemburg in 1867, negotiated a convention about the " Alabama," which, however, was not ratified, and most wisely refused to take any part in the Cretan troubles. In 1874 he again became foreign secretary in Disraeli's government. He acquiesced in the purchase of the Suez Canal shares, a measure then considered dangerous by many people, but ultimately most successful; he accepted the Andrassy Note, but declined to accede to the Berlin Memorandum. His part in the later phases of the Russo-Turkish struggle has never been fully explained, for with equal wisdom and

generosity he declined to gratify public curiosity at the cost of some of his colleagues. A later generation will know better than his contemporaries what were the precise developments of policy which obliged him to resign. He kept himself ready to explain in the House of Lords the course he had taken if those whom he had left challenged him to do so, but from that course they consistentlyrefrained. Already in October 1 8 79 it was clear enough that he had thrown in his lot with the Liberal party, but it was not till March 1880 that he publicly announced this change of allegiance. He did not at first take office in the second Gladstone government, but became secretary for the colonies in December 1882, holding this position till the fall of that govern- ment in the summer of 1885. In 1886 the old Liberal party was run on the rocks and went to pieces. Lord Derby became a Liberal Unionist, and took an active part in the general manage- ment of that party, leading it in the House of Lords till 1891, when Lord Hartington became duke of Devonshire. In 1892 he presided over the Labour Commission, but his health never recovered an attack of influenza which he had in 1891, and he died at Knowsley on the 21st of April 1893.

During a great part of Lord Derby's life he was deflected from his natural course by the accident of his position as the son of the leading Conservative statesman of the day. From first to last he was at heart a moderate Liberal. After making allowance, however, for this deflecting agency, it must be admitted that in the highest quality of the statesman, " aptness to be right," he was surpassed by none of his contemporaries, or — if by anybody — by Sir George Cornewall Lewis alone. He would have been more at home in a state of things which did not demand from its leading statesman great popular power; he had none of those " isms " and " prisms of fancy " which stood in such good stead

some of his rivals. He had another defect besides the want of popular power. He was so anxious to arrive at right con- clusions that he sometimes turned and turned and turned a subject over till the time for action had passed. One of his best lieutenants said of him in a moment of impatience: "Lord Derby is like the God of Hegel: ' Er setzt sich, er verneint sich, er verneint seine Negation.' " His knowledge, acquired both from books and by the ear, was immense, and he took every opportunity of increasing it. He retained his old university habit of taking long walks with a congenial companion, even in London,

and although he cared but little for what is commonly known as society — the society of crowded rooms and fragments of sentences — he very much liked conversation. During the many years in which he was a member of ” The Club ” he was one of its most assiduous frequenters, and his loss was acknow- ledged by a formal resolution. His talk was generally grave, but every now and then was lit up by dry humour. The late Lord Arthur Russell once said to him, after he had been buying some property in southern England: ” So you still believe in land, Lord Derby.” ” Hang it,” he replied, ” a fellow must believe in something! ” He did an immense deal of work outside politics. He was lord rector of the University of Glasgow from 1868 to 187 1, and later held the same office in that of Edinburgh. From 1875 to 1893 be was president of the Royal Literary Fund, and attended most closely to his duties then. He succeeded Lord Granville as chancellor of the University of London in 1891, and remained in that position till his death. He lived much in Lancashire, managed his enormous estates with great skill, and did a great amount of work as a local magnate. He married in 1870 Maria Catharine, daughter of the 5th earl de la Warr, and widow of the 2nd marquess of Salisbury.

The earl left no children and he was succeeded as 16th earl by his brother Frederick Arthur Stanley (1 841-1908), who had been made a peer as Baron Stanley of Preston in 1886. He was secretary of state for war and for the colonies and president of the board of trade; and was governor-general of Canada from 1888 to 1893. He died on the 14th of June 1908, when his eldest son, Edward George Villiers Stanley, became earl of Derby. As Lord Stanley the latter had been member of parliament for the West Houghton division of Lancashire from 1892 to 1906; he was financial secretary to the War Office from 1900 to 1903, and postmaster-general from 1903 to 1905.

The best account of the 15th Lord Derby is that which was prefixed by W. E. H. Lecky, who knew him very intimately, to the edition of his speeches outside parliament, published in 1894. (M. G. D.)

DERBY, a city of New Haven county, Connecticut, U.S.A., coextensive with the township of Derby, about 10 m. W. of New Haven, at the junction of the Housatonic and Naugatuck rivers. Pop. (1900) 7930 (2635 foreign-born); (1910) 8991. It is served by the New York, New Haven & Hartford railway, and by interurban electric railways. In Derby there are an opera house, owned by the city, and a public library. Across the Housatonic is the borough of Shelton (pop. 1910, 4807), which is closely related, socially and industrially, to Derby, the two having a joint board of trade. Adjoining Derby on the N. along the Naugatuck is Ansonia. Derby, Ansonia and Shelton form one of the

most important manufacturing communities in the state; although their total population in 1900 (23,448) was only 2-9% of the state's population, the product of their manufactories was 7 '4 % of the total manufactured product of Connecticut. Among the manufactures of Derby are pianos and organs, woollen goods, pins, keys, dress stays, combs, typewriters, corsets, hosiery, guns and ammunition, and foundry and machine-shop products. Derby was settled in 1642 as an Indian trading post under the name Paugasset, and received its present name in 1675. The date of organization of the township is unknown. Ansonia was formed from a part of Derby in 1889. In 1893 the borough of Birmingham, on the opposite side of the Naugatuck, was annexed to Derby, and Derby was chartered "as a city. In the 18th century Derby was the centre of a thriving commerce with the West Indies. Derby is the birthplace of David Humphreys

(1752-1818), a soldier, diplomatist and writer, General Washington's aide and military secretary from 1780 until the end of the War of Independence, the first minister of the United States to Portugal (1 790-1 797) and minister to Spain in 1797-1802, and one of the "Hartford Wits."

See Samuel Orcutt and Ambrose Beardsley, History of the Old Town of Derby (Springfield, 1880); and the Town Records of Derby front 165$ to 1710 (Derby, 1901).

DERBY, a municipal, county and parliamentary borough, and the county town of Derbyshire, England, i28f m. N.N.W. of London by the Midland railway; it is also served by the Great Northern railway. Pop. (1891) 94,146; (1901) 114,848. Occupying a position almost in the centre of England, the town is situated chiefly on the western bank of the river Derwent, on an undulating site encircled with gentle eminences, from which flow the Markeaton and other brooks. In the second half of the 19th century the prosperity of the town was enhanced by the establish- ment of the head offices and principal workshops of the Midland Railway Company. Derby possesses several handsome public buildings, including the town hall, a spacious range of buildings erected for the postal and inland revenue offices, the county hall, corn exchange and market hall. Among churches may be mentioned St Peter's a fine building principally of Perpendicular date but with earlier portions; St Alkmund's with its lofty spire, Decorated in style; St Andrew's, in the same style, by Sir G. G. Scott; and All Saints', which contains a beautiful choir-screen, good stained glass and monuments by L. F. Roubiliac, Sir Francis Chantrey and others. The body of this church is in classic style (1725), but the tower was built 1509-1527, and is one of the finest in the midland counties,

built, in three tiers, and crowned with battlements and pinnacles, which give it a total height of 210 ft. The Roman Catholic church of St Mary is one of the best examples of the work of A. W. Pugin. The Derby grammar school, one of the most ancient in England, was placed in 1 1 60 under the administration of the chapter of Darley Abbey, which lay a little north of Derby. It occupies St Helen's House, once the town residence of the Strutt family, and has been enlarged in modern times, accommodating about 160 boys. The Derby municipal technical college is administered by the corpora- tion. Other institutions include schools of science and art, public library, museum and art gallery, the Devonshire alms- houses, a remodelled foundation inaugurated by Elizabeth, countess of Shrewsbury, in the 16th century, and the town and county infirmary. The free library and museum buildings, together with a recreation ground, were gifts to the town from M. T. Bass, M.P. (d. 1884), while an arboretum of seventeen acres was presented to the town by Joseph Strutt in 1840.

Derby has been long celebrated for its porcelain, which rivalled that of Saxony and France. This manufacture was introduced about 1750, and although for a time partially abandoned, it has been revived. There are also spar works where the fluor-spar, or Blue John, is wrought into a variety of useful and ornamental articles. The manufacture of silk, hosiery, lace and cotton formerly employed a large portion of the population, and there are still numerous silk mills and elastic web works. Silk " throwing " or spinning was introduced into England in 1 71 7 by John Lombe, who found out the secrets of the craft when visiting Piedmont, and set up machinery in Derby. Other industries include the manufacture of paint, shot, white and red lead and varnish; and there are sawmills and tanneries. The manufacture of hosiery profited greatly by the inventions of Jedediah Strutt about 1750. In the northern suburb of Littlechester, there are chemical and steam boiler works. The Midland railway works employ a large number of hands. Derby is a suffragan bishopric in the diocese of Southwell. The parlia- mentary borough returns two members. The town is governed by a mayor, sixteen aldermen and forty-two councillors. Area, 3449 acres.

Littlechester, as its name indicates, was the site of a Roman fort or village; the site is in great part built over and the remains practically effaced. Derby was known in the time of the heptarchy as Northworthig, and did not receive the name of

Deoraby or Derby until after it was given up to the Danes by the treaty of Wedmore and had become one of their five boroughs, probably ruled in the ordinary way by an earl with twelve ” lawmen ” under him. Being won back among the sweeping conquests of / Ethelflred, lady of the Mercians, in 91 7, it prospered during the 10th century, and by the reign of Edward the Con- fessor there were 243 burgesses in Derby. However, by 1086 this number had decreased to 100, while 103 ” manses ” which used to be assessed were waste. In spite of this the amount rendered by the town to the lord had increased from £24 to £30. The first extant charter granted to Derby is dated 1206 and is a grant of all those privileges which the burgesses of Nottingham had in the time of Henry I. and Henry II., which included freedom from toll, a gild merchant, power to elect a provost at their will, and the privilege of holding the town at the ancient farm with an increase of £10 yearly. The charter also provides that no one shall dye cloth within ten leagues of Derby except in the borough. A second charter, granted by Henry III. in 1 229, limits the power of electing a provost by requiring that he shall be removed if he be displeasing to the king. Henry III. also granted the burgesses two other charters, one in 1225 confirming their privileges and granting that the comitatus of Derby should in fuiure be held on Thursdays in the borough, the other in 1260 granting that no Jew should be allowed to live in the town. In 1337 Edward III. on the petition of the burgesses granted that they might have two bailiffs instead of one. Derby was incorporated by James I. in 161 1 under the name of the bailiffs and burgesses of Derby, but Charles I. in 1637 appointed a mayor, nine aldermen, fourteen brethren and fourteen capital burgesses. In 1680 the burgesses were obliged to resign their charters, and received a new one, which did not, however, alter the government of the town. Derby has been represented in parliament by two members since 1295. In the rebellion of 1745 the young Pretender marched with his army as far south as Derby, where the council was held which decided that he should return to Scotland instead of going on to London.

Among early works on Derby are W. Hutton, History of Derby (London, 1791); R. Simpson, History and Antiquities of Derby (Derby, 1826).

DERBYSHIRE, a north midland county of England, bounded N. and N.E. by Yorkshire, E. by Nottinghamshire, S.E. and S. by Leicestershire, S. and S.W. by Staffordshire, and W. and N.W. by Cheshire. Theareais1029-5sq.nl. The physical aspect is much diversified. The extreme south of the county is lacking in picturesqueness, being for the most part level, with occasional slight undulations. The Peak District of the north, on the other hand, though

inferior in grandeur to the mountainous Lake District, presents some of the finest hill scenery in England, deriving a special beauty from the richly wooded glens and valleys, such as those of Castleton, Glossop, Dovedale and Millersdale. The character of the landscape ranges from the wild moorland of the Cheshire borders or the grey rocks of the Peak, to the park lands and woods of the Chatsworth district. Some of the woods are noted for their fine oaks, those at Kedleston, 3 m. from Derby, ranking among the largest and oldest in the kingdom. From the northern hills the streams of the county radiate. Those of the north-west belong to the Mersey, and those of the north-east to the Don, but all the others to the Trent, which, like the Don, falls into the Humber. The principal river is the Trent, which, rising in the Staffordshire moorlands, intersects the southern part of Derbyshire, and forms part of its boundary with Leicestershire. After the Trent the most important river is the Derwent, one of its tributaries, which, taking its rise in the lofty ridges of the High Peak, flows southward through a beautiful valley, receiving a number of minor streams in its course, includ- ing the Wye, which, rising near Buxton, traverses the fine Millersdale and Monsal Dale. The other principal rivers are the following: The Dane rises at the junction of the three counties, Staffordshire, Cheshire and Derbyshire. The Goyt has its source a little farther north, at the base of the same hill, and, taking a N.N.E. direction, divides Derbyshire from Cheshire, andfallsinto the Mersey. The Dove rises on the southern slope, and flows as

the boundary stream between Derbyshire and Staffordshire for nearly its entire course. It receives several feeders, and falls into the Trent near Repton. The Erewash is the boundary stream between Nottinghamshire and Derbyshire. The Rother rises about Baslow, and flows into Yorkshire, with a northerly course, joining the Don. Besides the attractions of its scenery Derby- shire possesses, in Buxton, Matlock and Bakewell, three health resorts in much favour on account of their medicinal springs.

The whole northward extension of the county is occupied by the plateau of the Peak and other plateau-like summits, the highest of which are of almost exactly similar elevation. Thus in the extreme north Bleaklow Hill reaches 2060 ft., while southward from this point along the axis of main elevation are found Shelf Moss (2046 ft.), and Kinder Scout and other summits of the Peak itself, ranging up to 2088 ft. This plateau-mass is demarcated on the north and west by the vales of the Etherow and Goyt, by the valley of the Derwent on the east, and in part by that of its tributary the Noe on the south. The flanks of the plateau are deeply scored by abrupt ravines, often known as ” doughs

” (an Anglo-Saxon word, cloh) watered by streams which sometimes descend over precipitous ledges in picturesque falls, such as the Kinder Downfall, formed by the brook of that name which rises on Kinder Scout. The most picturesque doughs are found on the south, descending to Edale, and on the west. Edale is the upper part of the Noe valley, and the narrow gorge at its head is exceedingly beautiful, as is the more gentle scenery of the Vale of Plope, the lower part of the valley. In a branch vale is situated Castleton (g.v.), with the ruined Peak Castle, or Castle of the Peak, and the Peak Cavern, Blue John Mine and other caves. The upper Derwent valley, or Derwent Dale, is narrow and well wooded. In it, near the village of Derwent Chapel, is Derwent Hall, a fine old mansion formerly a seat of the Newdigate family. On Derwent Edge, above the village, are various peculiar rock formations, known by such names as the Salt-cellar. Ashopton, another village lower down the dale, is a favourite centre, and here the main valley is joined by Ashop Dale, a bold defile in its upper part, penetrating the heart of the Peak.

The well-known high road crossing the plateau from east to west, between the lower Derwent valley, Bakewell, Buxton and Macclesfield, shows the various types of scenery characteristic of the limestone hill-country of Derbyshire south of the Peak itself. The lower Derwent valley, about Chatsworth, Rowsley, Darley and Matlock, is open, fertile and well wooded. The road leads up the tributary valley of the Wye, which after Bakewell quickly narrows, and in successive portions is known as Monsal Dale, Millersdale (which the main road does not touch), Chee Dale and Wye Dale. On the flanks of these beautiful dales bold cliffs and bastions of limestone stand out among rich woods. Near the mouth of the valley, about Stanton, the fantastic effects of weathering on the limestone are especially well seen, as in Rowtor Rocks and Robin Hood’s Stride, and in the same locality are a remarkable number of tumuli and other early remains, and the Hermitage, a cave containing sacred carvings. From Buxton the road ascends over the high moors, here open and grassy in contrast to the heather of the Peak, and shortly after crossing the county boundary, reaches the head of the pass well known by the name of an inn, the Cat and Fiddle, at its highest point, 1690 ft.

South of Buxton the elevations along the main axis decrease, thus Axe Edge reaches 1600 ft., and this height is nowhere exceeded as the hills sink to the plain valley of the Trent. The dales and ravines which ramify among the limestone heights are characteristic and beautiful, and the valley of the Dove (g.v.) or Dovedale, on the border with Staffordshire, is as famous as any of the northern dales. Swallow-holes or waterworn caverns are common in many parts of the limestone

region. The hills east of the Derwent are nowhere so high as those to the west — Margley Hill reaches 1793 ft., Howden Edge 1787 ft. and Der- went Moors 1505 ft. The plateau type is maintained. The valley of the Derwent provides the most attractive scenery in

the southern part of the county, from Matlock southward by Heage, Belper and Duffield to Derby.

Geology. — Five well-contrasted types of scenery in Derbyshire are clearly traceable to as many varieties of rock ; the bleak dry uplands of the north and east, with deep-cut ravines and swift clear streams, are due to the great mass of Mountain Limestone ; round the lime- stone boundary are the valleys with soft outlines in the Pendleside Shales; these are succeeded by the rugged moorlands, covered with heather and peat, which are due to the Millstone Grit series; east- ward lies the Derbyshire Coalfield with its gently moulded grass- covered hills; southward is the more level tract of red Triassic rocks. The principal structural feature is the broad anticline, its axis running north and south, which has brought up the Carboniferous Limestone ; this uplifted region is the southern extremity of the Pennine Range. The Carboniferous or ” Mountain ” Limestone is the oldest formation in the county; its thickness is not known, but it is certainly over 2000 ft. ; it is well exposed in the numerous narrow gorges cut by the Derwent and its tributaries and by the Dove on the Staffordshire border. Ashwood Dale, Chee Dale, Millersdale, Monsal Dale and the valley at Matlock are all flanked by abrupt sides of this rock. It is usually a pale, thick-bedded rock, sometimes blue and occasionally, as at Ashford, black. In some places, e.g. Thorpe Cloud, it is highly fossiliferous, but it is usually somewhat barren except for abundant crinoids and smaller organisms. It is polished in large slabs at Ashford, where crinoidal, black and ” rosewood ” marbles are pro- duced. Volcanic rocks, locally called ” Toadstone,” are represented in the limestones by intrusive sills and flows of dolerite and by necks of agglomerate, notably near Tideswell, Millersdale and Matlock. Beds and nodules of chert are abundant in the upper parts of the limestone; at Bakewell it is quarried for use in the Potteries. At some points the limestone has been dolomitized ; near Bonsall it has been converted into a granular silicified rock. A series of black shales with nodular limestones, the Pendleside series, rests upon the Mountain Limestone on the east, south and north-west ; much of the upper course of the Derwent has been cut through these soft beds. Mam Tor, or the

Shivering Mountain, is made of these shales. Next in upward sequence is a thick mass of sandstones, grits and shales — the Millstone Grit series. On the west side these extend from Blacklow Hill to Axe Edge; on the east, from Derwent Edge to near Derby ; outlying masses form the rough moorland on Kinder Scout and the picturesque tors near Stanton-by-Youlgreave. A small patch of Millstone Grit and Limestone occurs in the south of the county about Melbourne and Ticknall. The Coal Measures repose upon the Millstone Grit ; the largest area of these rocks lies on the east, where they are conterminous with the coalfields of Yorkshire and Nottingham. A small tract, part of the Leicestershire coalfield, lies in the south-east corner, and in the north-west corner a portion of the Lancashire coalfield appears about New Mills and Whaley Bridge. They yield valuable coals, clays, marls and ganister. East of Bolsover, the Coal Measures are covered unconformably by the Permian breccias and magnesian limestone. Flanking the hills between Ashbourne and Quarndon are red beds of Bunter marl, sandstone and conglomerate; they also appear at Morley, east of the Derwent, and again round the small southern coalfield. Most of the southern part of the county is occupied by Keuper marls and sand- stones, the latter yield good building stone; and at Chellaston the gypsum beds in the former are excavated on a large scale. Much of the Triassic area is covered superficially by glacial drift and alluvium of the Trent. Local boulders as well as northern erratics are found in the valley of the Derwent. The bones of Pleistocene mammals, the rhinoceros, mammoth, bison, hyaena, &c, have been found at numerous places, often in caves and fissures in the limestones, e.g. at Castleton, Wirksworth and Creswell. At Doveholes the Pleiocene Mastodon has been reported. Galena and other lead ores are abundant in veins in the limestone, but they are now only worked on a large scale at Mill Close, near Winster; calamine, zinc, blende, barytes, calcite and fluor-spar are common. Apeculiar variety of the last named, called ” Blue John,” is found only near Castleton; at the same place occurs the remarkable elastic bitumen, ” elaterite.” Limestone is quarried at Buxton, Millersdale and Matlock for lime, fluxing and chemical purposes. Good sandstone is obtained from the Millstone Grit at Stancliffe, Tansley and Whatstandwell. Cal- careous tufa or travertine occurs in the valley of Matlock and else- where, and in some places is still being deposited by springs. Large pits containing deposits of white sand, clay and pebbles are found in the limestone at Longcliff, Newhaven and Carsington.

Climate. — From the elevation which it attains in its northern division the county is colder and is rainier than other midland counties. Even in summer cold and thick fogs are often seen hanging over the rivers,

and clinging to the lower parts of the hills, and hoar-frosts are by no means unknown even in June and July. The winters in the uplands are generally severe, and the rainfall heavy. At Buxton, at an elevation of about 1000 ft., the mean temperature in January is 34-9° F., and in July 57-5°, the mean annual being 45-4°. These conditions contrast with those at Derby, in the southern lowknd, where the figures are

respectively 37-5°, 61-2° and 48-8°, while intermediate conditions are found at Belper, 9 m. higher up the Derwent valley, where the figures are 36-3°, 59-9° and 47-3°. The contrasts shown by the mean annual rainfall are similarly marked. Thus at Wood- head, lying high in the extreme north, it is 52-03 in., at Buxton 49-33 in., at Matlock, in the middle part of the Derwent valley, 35-2 in., and at Derby 24-35 in.

Agriculture. — A little over seven-tenths of the total area of the county is under cultivation. Among the higher altitudes of north Derbyshire, where the soil is poor and the climate harsh, grain is unable to flourish, while even in the more sheltered parts of this region the harvest is usually belated. In such districts sheep farming is chiefly practised, and there is a considerable area of heath pasture. – Farther south, heavy crops of wheat, turnips and other cereals and green crops are not uncommon, while barley is cultivated about Repton and Gresley, and also in the east of the county, in order to supply the Burton breweries. A large part of the Trent valley is under permanent pasture, being devoted to cattle-feeding and dairy-farming. This industry has prospered greatly, and the area of permanent pasture encroaches continually upon that of arable land. Derbyshire cheeses are exported or sent to London in considerable quantities ; and cheese fairs are held in various parts of the county, as at Ashbourne and Derby. A feature of the upland districts is the total absence of hedges, and the substitution of limestone walls, put together without any mortar or cement.

Other Industries. — The manufactures of Derbyshire are both numerous and important, embracing silks, cotton hosiery, iron, woollen manufactures, lace, elastic web and brewing. For many of these this county has long been famous, especially for that of silk, which is carried on to a large extent in Derby, as well as in Belper and Duffield. Derby is also celebrated for its china, and silk-throwing is the principal industry of the town. Elastic web weaving by power looms is carried on to a great extent, and the manufacture of lace and net curtains, gimp trimmings, braids and cords. In the county town and neighbourhood are several important chemical and colour works; and in various parts of the county, as at Belper, Cromford, Matlock, Tutbury, are cotton- spinning mills, as well as hosiery and tape

manufactories. The principal works of the Midland Railway Company are at Derby. The principal mineral is coal. Ironstone is not extensively wrought, but, on account of the abundant supply of coal, large quantities are imported for smelting purposes. There are smelting furnaces in several districts, as at Alfreton, Chesterfield, Derby, Ilkeston. Besides lead, gypsum and zinc are raised, to a small extent; and for the quarrying of limestone Derbyshire is one of the principal English counties. The east and the extreme south-west parts are the principal industrial districts.

Communications. — The chief railway serving the county is the Midland, the south, east and north being served by its main line and branches. In the north-east and north the Great Central system touches the county; in the west the North Staffordshire and a branch of the London & North- Western; while a branch of the Great Northern serves Derby and other places in the south. The Trent & Mersey canal crosses the southern part of the county, and there is a branch canal (the Derby) connecting Derby with this and with the Erewash canal, which runs north from the Trent up the Erewash valley. From it there is a little-used branch (the Cromford canal) to Matlock.

Population and Administration. — The area of the ancient county is 658,885 acres, with a population in 1891 of 528,033, and 1901 of 620,322. The area of the administrative county is 652,272 acres. The county contains six hundreds. The municipal boroughs are Chesterfield (pop. 27,185), Derby, a county borough and the county town (114,848), Glossop (21,526), Ilkeston (2 S,384)- The other urban districts .are Alfreton (17,505), AlvastonandBoulton(i279), Ashbourne (4039), Bakewell(285o), Baslow and Bubnell (797), Belper (10,934), Bolsover (6844) Bonsall (1360), Brampton and Walton (2698), Buxton (10,181), Clay Cross(8358), Dronfield(38o9), Fairfield(2 9 6 9), Heage(2889), Heanor (16,249), Long Eaton (13,045), Matlock (5979), Matlock Bath and Scarthin Nick (i8iq), Newbold and Dunston (5986*).

New Mills (7773), North Darley (2756), Ripley (10,111), South Darley (788), Swadlincote (18,014), Whittington (9416), Wirksworth (3807). Among other towns may be mentioned Ashover (2426), Barlborough (2056), Chapel-en-le-Frith (4626), Clowne (3896) , Crich (3063) , Killamarsh (3644) , Staveley (1 1 ,420) , Whitwell (3380). The county is in the Midland circuit, and assizes are held at Derby. It has one

court of quarter sessions and is divided into fifteen petty sessional divisions. The boroughs of Derby, Chesterfield and Glossop have separate commissions of the peace, and that of Derby has also a separate court of quarter sessions. The total number of civil parishes is 3 14. The county is mainly in the diocese of Southwell, with small portions in the dioceses of Peterborough and Lichfield, and contains 255 ecclesi- astical parishes or districts. The parliamentary divisions of the county are High Peak, North-Eastern, Chesterfield, Mid, Ilkeston, Southern and Western, each returning one member, while the parliamentary borough of Derby returns two members.

History. — The earliest English settlements in the district which is now Derbyshire were those of the West Angles, who in the course of their northern conquests in the 6th century pushed their way up the valleys of the Derwent and the Dove, where they became known as the Pecsaetan. Later the district formed the northern division of Mercia, and in 848 the Mercian witenagemot assembled at Repton. In the 9th century the district suffered frequently from the ravages of the Danes, who in 874 wintered at Repton and destroyed its famous monastery, the burial-place of the kings of Mercia. Derby under Guthrum was one of the five Danish burghs, but in 917 was recovered by ./Ethelfted. In 924 Edward the Elder fortified Bakewell, and in 942 Edmund regained Derby, which had fallen under the Danish yoke. Barrows of the Saxon period are numerous in Wirksworth hundred and the Bakewell district, among the most remarkable being White-low near Winster and Bower's-low near Tissington. There are Saxon cemeteries at Stapenhill and Foremark Hall.

Derbyshire probably originated as a shire in the time of iEthelstan, but for long it maintained a very close connexion with Nottinghamshire, and the Domesday Survey gives a list of local customs affecting the two counties alike. The two shire-courts sat together for the Domesday Inquest, and the counties were united under one sheriff until the time of Elizabeth. The villages of Appleby, Oakthorpe, Donisthorpe, Stretton-en-le-Field, Willesley, Chilcote and Measham were reckoned as part of Derbyshire in 1086, although separated from it by the Leicester- shire parishes of Over and Nether Seat.

The early divisions of the county were known as wapentakes, five being mentioned in Domesday, while 13th-century documents mention seven wapentakes, corresponding with the six present hundreds, except that Repton and Gresley were then reckoned as separate divisions. In the 14th century the divisions were more frequently described as hundreds, and Wirksworth alone retained the designation wapentake until modern times. Ecclesiastically the county

constituted an archdeaconry in the diocese of Lichfield, comprising the six deaneries of Derby, Ashbourne, High Peak, Castillar, Chesterfield and Repington. In 1884 it was transferred to the newly formed diocese of Southwell. The assizes for Nottinghamshire and Derbyshire were held at Nottingham until the reign of Henpy III., when they were held alternately at Nottingham and Derby until 1569, after which the Derbyshire assizes were held at Derby. The court of the Honour of Peverel, held at Basford in Nottinghamshire, which formerly exercised jurisdiction in the hundreds of Scarsdale, the Peak and Wirksworth. was abolished in 1849. The miners of Derbyshire formed an independent community under the jurisdiction of a steward and barmasters, who held two Barmote courts (q.v.) every year. The forests of Peak and Duffield had their separate courts and officers, the justice seat of the former being in an extra-parochial part at equal distances from Castleton, Tideswell and Bowden, while the pleas of Duffield Forest were held at Tutbury. Both were disafforested in the 17th century.

The greatest landholder in Derbyshire at the time of the Domesday Survey was Henry de Ferrers, who owned almost the

whole of the modern hundred of Appletree. The Ferrers estates were forfeited by Robert, earl of Derby, in the reign of Henry III. Another great Domesday landholder was William Peverel, the historic founder of Peak Castle, whose vast possessions were known as the Honour of Peverel. In 1155 the younger Peverel was disinherited for poisoning the earl of Chester, and his estates forfeited to the crown. Few Englishmen retained estates of any importance after the Conquest, but one, Elfin, an under-tenant of Henry de Ferrers, not only held a considerable property but was the ancestor of the Derbyshire family of Brailsford, The families of Shirley and Gresley can also boast an unbroken descent from Domesday tenants.

During the rebellion of Prince Henry against Henry II. the castles of Tutbury and Duffield were held against the king, and in the civil wars of John’s reign Bolsover and Peak Castles were garrisoned by the rebellious barons. In the Barons’ War of the reign of Henry III. the earl of Derby was active in stirring up feeling in the county against the king, and in 1266 assembled a considerable force, which was defeated by the king’s party at Chesterfield. At the time of the Wars of the Roses discontent was rife in Derbyshire, and riots broke out in 1443, but the county did not lend active support to either party. On the outbreak of the Civil War of the 17th century, the county at first inclined to support the king, who received an enthusiastic reception when he visited Derby in 1642, but by the close of 1643 Sir John Gell

of Hopton had secured almost the whole county for the parliament. Derby, however, was always royalist in sym- pathy, and did not finally surrender till 1646; in 1659 it rebelled against Richard Cromwell, and in 1745 entertained the young Pretender.

Derbyshire has always been mainly a mining and manufactur- ing county, though the rich land in the south formerly produced large quantities of corn. The lead mines were worked by the Romans, and the Domesday Survey mentions lead mines at Wirksworth, Matlock, Bakewell, Ashford and Crich. . Iron has also been produced in Derbyshire from an early date, and coal mines were worked at Norton and Alfreton in the beginning of the 14th century. The woollen industry flourished in the county before the reign of John, when an exclusive privilege of dyeing cloth was conceded to the burgesses of Derby. Thomas Fuller writing in 1662 mentions lead, malt and ale as the chief products of the county, and the Buxton waters were already famous in his day. The 18th century saw the rise of numerous manufactures. In 1 7 18 Sir Thomas and John Lombe set up an improved silk- throwing machine at Derby, and in 1758 Jedediah Strutt intro- duced a machine for making ribbed stockings, which became famous as the ” Derby rib.” In 177 1 Sir Richard Arkwright set up one of his first cotton mills in Cromford, and in 1787 there were twenty-two cotton mills in the county. The Derby porcelain or china manufactory was started about 1750.

From 1295 until the Reform Act of 1832 the county and town of Derby each returned two members to parliament. From this latter date the county returned four members in two divisions until the act of 1868, under which it returned six members for three divisions.

Antiquities. — Monastic remains are scanty, but there are interesting portions of a priory incorporated with the school buildings at Repton. The village church of Beauchief Abbey, near Dronfield, is a remnant of an abbey founded c. n 75 by Robert Fitzranulf. It has a stately transitional Norman tower, and three fine Norman arches. Dale Abbey, near Derby, was founded early in the 13th century for the Premonstratensian order. The ruins are scanty, but the east window is preserved, and the present church incorporates remains of the ancient rest- house for pilgrims. The church has a peculiar music gallery, entered from without. The abbey church contained famous stained glass, and some of this is preserved in the neighbouring church at Morley. Derbyshire is rich in ecclesiastical architecture as a whole. The churches are generally of various styles. The chancel of the church at Repton is assigned to the second half of the 10th century, though subsequently altered, and the crypt beneath is supposed to be

earlier still; its roof is supported by

four round pillars, and it is approached by two stairways. Other remains of pre-Conquest date are the chancel arches in the churches of Marston Montgomery and of Sawle}'; and the curiously carved font in Wilne church is attributed to the same period. Examples of Norman work are frequent in doorways, as in the churches of Allestree and Willington near Repton, while a fine tympanum is preserved in the modern church of Findern. There is a triple-recessed doorway, with arcade above, in the west end of Bakewell church, and there is another fine west doorway in Melbourne church, a building principally of the late Norman period, with central and small western towers. In restoring this church curious mural paintings were discovered. At Steetley, near Worksop, is a small Norman chapel, with apse, restored from a ruinous condition; Youlgrave church, a building of much general interest, has Norman nave pillars and a fine font of the same period, and Normanton church has a peculiar Norman corbel table. The Early English style is on the whole less well exemplified in the county, but Ashbourne church, with its central tower and lofty spire, contains beautiful details of this period, notably the lancet windows in the Cockayne chapel.

The parish churches of Dronfield, Hathersage (with some notable stained glass), Sandiacre and Tideswell exemplify the Decorated period; the last is a particularly stately and beautiful building, with a lofty and ornate western tower and some good early brasses. The churches of Dethic, Wirksworth and Chester field are typical of the Perpendicular period; that of Wirksworth contains noteworthy memorial chapels, monuments and brasses, and that of Chesterfield is celebrated for its crooked spire.

The remains of castles are few; the ancient Bolsover Castle is replaced by a castellated mansion of the 17th century; of the Norman Peak Castle near Castleton little is left; of Codnor Castle in the Erewash valley there are picturesque ruins of the 13th century. Among ancient mansions Derbyshire possesses one of the most famous in England in Haddon Hall, of the 15th century. Wingfield manor house is a ruin dating from the same century. Hardwick Hall is a very perfect example of Elizabethan building; ruins of the old Tudor hall stand near by. Other Elizabethan examples are Barlborough and Tissington Halls.

The village of Tissington is noted for the maintenance of an old custom, that of ” well-dressing.” On the Thursday before Easter a special church service is celebrated, and the wells are beautifully ornamented with flowers, prayers being offered at each. The ceremony has been revived also in several other Derbyshire villages.

See Davies, New Historical and Descriptive View of Derbyshire (Belper, 181 1) ; D. Lysons, Magna Britannia, vol. v. (London, 1817) ; Maunder, Derbyshire Miners' Glossary (Bakewell, 1824) ; R. Simpson, Collection of Fragments illustrative of the History of Derbyshire (1826) ; S. Glover, History and Gazetteer of the County of Derby, ed. T. Noble, part 1 of vols. i. and ii. (Derby, 1831-1833); T. Bateman, Vestiges of the Antiquities of Derbyshire (London, 1848); L. Jewitt, Ballads and Songs of Derbyshire (London, 1867); J. C. Cox, Notes on the Churches of Derbyshire (Chester, 1875), and Three Centuries of Derbyshire Annals (2 vols., London, 1890); R. N. Worth, Derby, in “Popular County Histories” (London, 1886); J. P. Yeatman, Feudal History of the County of Derby (3 vols., London, 1886-1895) ; Victoria County History, Derbyshire. See also Notts and Derbyshire Notes and Queries.

DEREHAM (properly East Dereham), a market town in the Mid parliamentary division of Norfolk, England, 122 m. N.N.E. from London by the Great Eastern railway. Pop. of urban district (1901) 5545. The church of St Nicholas is a cruciform Perpendicular structure with a beautiful central tower, and some portions of earlier date. It contains a monument to William Cowper, who came to live here in 1796, and the Congregational chapel stands on the site of the house where the poet spent his last days. Dereham' is an important agricultural centre with works for the manufacture of agricultural implements, iron foundries and a malting industry.

DERELICT (from Lat. derelinquere, to forsake), in law, property thrown away or abandoned by the owner in such a manner as to indicate that he intends to make no further claim to

it. The word is used more particularly with respect to property abandoned at sea (see Wreck), but it is also applied in other senses; for example, land gained from the sea by receding of the water is termed dereliction. Land gained gradually and slowly by dereliction belongs to the owner of the adjoining land, but in the case of sudden or considerable dereliction the land belongs to the Crown. This technical use of the term ” dereliction ” is to be distinguished from the more general modern sense, dere- liction or abandonment of duty, which implies a culpable failure or neglect in moral or legal

obligation.

DERENBOURG, JOSEPH (1811-1895), Franco-German orientalist. He was a considerable force in the educational revival of Jewish education in France. He made great contribu- tions to the knowledge of Saadia, and planned a complete edition of Saadia's works in Arabic and French. A large part of this work appeared during his lifetime. He also wrote an Essai sur I'histoire et la giographie de la Palestine (Paris, 1867). This was an original contribution to the history of the Jews and Judaism in the time of Christ, and has been much used by later writers on the subject (e.g. by Schiirer). He also published in collaboration with his son Hartwig, Opuscules et traites d' Abou-'l-W aiid (with translation, 1 880); Deux Versions hebra'iques du livre de Kalildh et Dimnah (188 1), and a Latin translation of the same story under the title Joannia de Capua directorium vitae humanae (1889); Commenlaire de Maimonide sur la Mischnah Seder Tohorot (Berlin,i886-i8gi); and a second edition of S. de Sacy's Stances de Hariri. He died on the 29th of July 1895, at Ems.

His son, Hartwig Derenbourg (1844-1908), was born in Paris on the 17th of June 1844. He was educated at Gottingen and Leipzig. Subsequently he studied Arabic at the Ecole des Langues Orientales. In 1879 he was appointed professor of Arabic, and in i886_ professor of Mahommedan Religion, at the Ecole des Hautes Etudes in Paris. He collaborated with his father in the great edition of Saadia and the edition of Abu-'l- Walid, and also produced a number of important editions of other Arabic writers. Among these are Le Diwdn de Ndbiqa Dhobyani; Le Livre de Sibawaihi (2 vols., Paris, 1881-1889); Chrestomathie eUmeritaire de I'arabe litteral (in collaboration with Spiro, 1885; 2nded., 1892); Ousdma ibn Mounkidh, un £mir syrien (1889); Ousdma ibn Mounkidh, preface du livre du bdton (with trans., 1887); Al-Fdkhri (1895); Oumdra du Gemen (1897), a catalogue of Arabic MSS. in the Escorial (vol. i.,

1884).

DERG, LOUGH, a lake of Ireland, on the boundary of the counties Galway, Clare and Tipperary. It is an expansion of the Shannon, being the lowest lake on that river, and is 23 m. long and generally from 1 to 3 m. broad. It lies where the Shannon leaves the central plain of Ireland and flows between the hills which border the plain. While the northerly shores of the lake, therefore, are flat, the southern are steep and picturesque, being backed by the Slieve Aughty, Slieve Bernagh and Arra Mountains. Ruined churches and fortresses are numerous on the eastern shore, and on Iniscaltra Island are a round tower and

remains of five churches.

Another Lough Derg, near Pettigo in Donegal, though small, is famous as the traditional scene of St Patrick's purgatory. In the middle ages its pilgrimages had a European reputation, and they are still observed annually by many of the Irish from June 1 to August 15. The hospice, chapels, &c, are on Station Island, and there is a ruined monastery on Saints' Island.

DERHAM, WILLIAM (1657-1735), English divine, was born at Stoulton, near Worcester, on the 26th of November 1657. He was educated at Blockley, in his native county, and at Trinity College, Oxford. In ,1682 he became vicar of Wargrave, in Berkshire; and in 1689 he was preferred to the living of Upminster, in Essex. In 1696 he published his Artificial Clockmaker, which went through several editions. The best known of his subsequent works are Physico-Theology, published in 17 13; Astro-Theology, 1714; and Christo-Theology, 1730. The first two of these books were teleological arguments for the being and attributes of God, and were used by Paley nearly a century later. In 1702 Derham

was elected fellow of the Royal Society, and in 1716 was made a canon of Windsor. He was Boyle lecturer in 1711-1712. His last work, entitled A Defence of the Church's Right in Leasehold Estates, appeared in 173 1. He died on the 5th of April 1735. Besides the works published in his own name, Derham, who was keenly interested in natural history, contributed a variety of papers to the Transactions of the Royal Society, revised the Miscellanea Curiosa, edited the correspondence of John Ray and Eleazar Albin's Natural History, and published some of the MSS. of Robert Hooke, the natural philosopher.

D'ERLON, JEAN BAPTISTE DROUET, Count (1765-1844), marshal of France, was born at Reims on the 29th of July 1765. He entered the army as a private soldier in 1782, was discharged after five years' service, re-entered it in 1792, and rose rapidly to the rank of an officer. From 1794 to 1796 he was aide-de-camp to General Lefebvre. He did good service in the campaigns of the revolutionary wars and in 1799 attained the rank of general of brigade. In the campaign of that year he was engaged in the Swiss operations under Massena. In 1800 he fought under Moreau at Hohenlinden. As a general of division he took part in Napoleon's campaigns of 1805 and 1806, and rendered

excellent service at Jena. He was next engaged under Lefebvre in the siege of Danzig and negotiated the terms of surrender; after this he rejoined the field army and fought at Friedland (1807), receiving a severe wound. After this battle he was made grand officer of the Legion of Honour, was created Count d'Erlon and received a pension. For the next six years d'Erlon was almost continuously engaged as commander of an army corps in the Peninsular War, in which he added greatly to his reputation as a capable general. At the pass of Maya in the Pyrenees he inflicted a defeat upon Lord Hill's troops, and in the subsequent battles of the 1814 campaign he distinguished himself further. After the first Restoration he was named commander of the 16th military division, but he was soon arrested for conspiring with the Orleans party, to which he was secretly devoted. He escaped, however, and gave in his adhesion to Napoleon, who had returned from Elba. The emperor made him a peer of France, and gave him command of the I. army corps, which formed part of the Army of the North. In the Waterloo campaign d'Erlon's corps formed part of Ney's command on the 16th of June, but, in consequence of an extraordinary series of misunderstandings, took part neither at Ligny nor at Quatre Bras (see Waterloo Campaign) . He was not, however, held to account by Napoleon, and as the latter's practice in such matters was severe to the verge of injustice, it may be presumed that the failure was not due to d'Erlon.

He was in command of the right wing of the French army throughout the great battle of the 18th of June, and fought in the closing operations around Paris. At the second Restoration d'Erlon fled into Germany, only returning to France after the amnesty of 1825. He was not restored to the service until the accession of Louis Philippe, in whose interests he had engaged in several plots and intrigues. As commander of the 1 2th military division (Nantes), he suppressed the legitimist agitation in his district and caused the arrest of the duchess of Berry (1832). His last active service was in Algeria, of which country he was made governor-general in 1834 at the age of seventy. He returned to France after two years, and was made marshal of France shortly before his death at Paris on the 25th of January

1844.

DERMOT MAC MURROUGH (d. 1171), Irish king of Leinster, succeeded his father in the principality of the Hui Cinsellaigh (1115) an d eventually in the kingship of Leinster. The early events of his life are obscure; but about 1152 we find him engaged in a feud with O Ruairc, the lord of Breifne (Leitrim and Cavan). Dermot abducted the wife of O Ruairc more with the object of injuring his rival than from

any love of the lady. The injured husband called to his aid Roderic, the high king (aird- righ) of Connaught; and in n 66 Dermot fled before this powerful coalition to invoke the aid of England. Obtaining from Henry II. a licence to enlist allies among the Welsh marchers, Dermot secured the aid of the Clares and Geraldines. To Richard

Strongbow, earl of Pembroke and head of the house of Clare, Dermot gave his daughter Eva in marriage; and on his death was succeeded by the earl in Leinster. The historical importance of Dermot lies in the fact that he was the means of introducing the English into Ireland. Through his aid the towns of Water- ford, Wexford and Dublin had already become English colonies before the arrival of Henry II. in the island.

See The Song of Dermot and the Earl, an old French Poem (by M. Regan?), ed. with trans, by G. H. Orpen, 1892; Kate Norgate, England under the Angevin Kings, vol. ii. (H. W. C. D.)

DERNA (anc. Darnis-Zarine), a town on the north coast of Africa and capital of the eastern half of the Ottoman province of Bengazi or Barca. Situated below the eastern butt of Jebel Akhdar on a small but rich deltaic plain, watered by fine perennial springs, it has a growing population and trade, the latter being mainly in fruits grown in its extensive palm gardens, and in hides and wool brought down by the nomads from the interior. If the port >Were better there would be more rapid expansion. The bay is open from N.W. round to S.E. and often inaccessible in winter and spring, and the steamers of the Nav. Gen. Italiana sometimes have to pass without calling. The population has recovered from the great plague epidemic of 1821 and reached its former figure of about 7000. A proportion of it is of Moorish stock, of Andalusian origin, which emigrated in 1493; the descendants preserve a fine facial type. The sheikhs of the local Bedouin tribes have houses in the place, and a Turkish garrison of about 250 men is stationed in barracks. There is a lighthouse W. of the bay. A British consular agent is resident and the Italians maintain a vice-consul. The names Darnis and Zarine are philologically identical and probably refer to the same place. No traces are left of the ancient town except some rock tombs. Darnis continued to be of some importance in early Moslem times as a station on the Alexandria-Kairawan road, and has served on more than one occasion as a base for Egyptian attacks on Cyrenaica and Tripolitana. In 1805 the government of the United States, having a quarrel with the dey of Tripoli on account of piracies committed on American shipping, landed a force to co-operate in the attack on Derna then being made by Sidi Ahmet, an elder brother of the dey. This force, commanded by William Eaton (q.v.), built a fort, whose

ruins and rusty guns are still to be seen, and began to improve the harbour; but its work quickly came to an end with the conclusion of peace. After 1835 Derna passed under direct Ottoman control, and subsequently served as the point whence the sultan exerted a precarious but increasing control over eastern Cyrenaica and Marmarica. It is now in communication by wireless telegraphy with Rhodes and western Cyrenaica. It is the only town, or even large village, between Bengazi and Alexandria (600 m.) (D. G. H.)

_ DEROULEDE, PAUL (1846-), French author and poli- tician, was born in Paris on the 2nd of September 1846. He made his first appearance as a poet in the pages of the Revue nationale, under the pseudonym of Jean Rebel, and in 1869 pro- duced at the Theatre Francais a one-act drama in verse entitled Juan Strenner. On the outbreak of the Franco-German War he enlisted as a private, was wounded and taken prisoner at Sedan, and sent to Breslau, but effected his escape. He then served under Chanzy and Bourbaki, took part in the latter's disastrous retreat to Switzerland, and fought against the Commune in Paris. After attaining the rank of lieutenant, he was forced by an accident to retire from the army. He published in 187 2 a number of patriotic poems {Chants du soldat), which enjoyed unbounded popularity. This was followed in 1875 by another collection, Nouveaux Chants du soldat. In 1877 he produced a drama in verse called L'Hetman, which derived a passing success from the patriotic fervour of its sentiments. For the exhibition of 1878 he wrote a hymn, Vive la France, which was set to music by Gounod. In 1880 his drama in verse, La Moabite, which had been accepted by the Theatre Francais, was forbidden by the censor on religious grounds. In 1882 M. Deroulede founded the Ligue des patriotes, with the object of furthering France's " revanche " against Germany. He was one of the first advocates of a Franco-Russian alliance, and as early as 1883 undertook a journey to Russia for

the furtherance of that object. On the rise of General Boulanger, M. Deroulede attempted to use the Ligue des patriotes, hitherto a non-political organization, to assist his cause, but was deserted by a great part of the league and forced to resign his presidency. Nevertheless he used the section that remained faithful to him with such effect that the government found it necessary in 1889 to decree its suppression. In the same year he was elected to the chamber as member for Angouleme. He was expelled from the chamber in 1890 for his

disorderly interruptions during debate. He did not stand at the elections of 1803, but was re-elected in 1898, and distinguished himself by his violence as a nationalist and anti-Dreyfusard. After the funeral of President Faure, on the 23rd of February 1899, he endeavoured to persuade General Roget to lead his troops upon the Elys6e. For this he was arrested, but on being tried for treason was acquitted (May 31). On the 1 2th of August he was again arrested and accused, together with Andre Buffet, Jules Guerin and others, of conspiracy against the republic. After a long trial before the high court, he was sentenced, on the 4th of January 1900, to ten years' banishment from France, and retired to San Sebastian. In 1901, he was again brought prominently before the public by a quarrel with his Royalist allies, which resulted in an abortive attempt to arrange a duel with M. Buffet in Switzerland. In November 1905, however, the law of amnesty enabled him to return to France.

Besides the works already mentioned, he published Le Sergent, in the The&tre de campagne (1880) ; De I'educalion naiionale (1882); Monsieur le Uhlan et les trois couleurs (1884); Le Premier grenadier de France; La Tour d'Auvergne (1886); Le Livre de la ligue des patriotes (1887); Refrains milUaires (1888); Histoire d 'amour (1890); a pamphlet entitled Dfsarmement? (1891); Chants du paysan (1894); PoSsies Militaires (1896) and Messire du Guesdin, drame en vers (1895); La mort de Hoche. Cinq actes en prose (1897); La Plus belle fille du monde, conte dialogue en vers litres (1898).

DERRICK, a sort of crane (q.v.); the name is derived from that of a famous early 1 7th-century Tyburn hangman, and was originally applied as a synonym.

DERRING-DO, valour, chivalrous conduct, or " desperate courage," as it is defined by Sir Walter Scott. The word in its present accepted substantival form is a misconstruction of the verbal substantive durryng or durring, daring, and do or don, the present infinitive of " do," the phrase dorryng do thus meaning " daring to do." It is used by Chaucer in Troylus, and by Lydgate in the Chronicles of Troy. Spenser in the Shepherd's Calendar first adapted derring-do as a substantive meaning " manhood and chevalrie," and this use was revived by Scott, through whom it came into vogue with writers of romance.

DE RUYTER, MICHAEL ADRIANZOON (1607-1676), Dutch naval officer, was born at Flushing on the 24th of March 1607. He began his seafaring life at the age of eleven as a cabin boy, and in 1636 was entrusted by the merchants of Flushing with the command of a cruiser against the French pirates. • In 1640 he entered the service of the

States, and, being appointed rear- admiral of a fleet fitted out to assist Portugal against Spain, specially distinguished himself at Cape St Vincent, on the 3rd of November 1641. In the following year he left the service of the States, and, until the outbreak of war with England in 1652, held command of a merchant vessel. In 1653 a squadron of seventy vessels was despatched against the English, under the command of Admiral Tromp. Ruyter, who accompanied the admiral in this expedition, seconded him with great skill and bravery in the three battles which were fought with the English. He was after- wards stationed in the Mediterranean, where he captured several Turkish vessels. In 1659 he received a commission to join the king of Denmark in his war with the Swedes. As a reward of his services, the king of Denmark ennobled him and gave him a pension. In 1661 he grounded a vessel belonging to Tunis, released forty Christian slaves, made a treaty with the Tunisians, and reduced the Algerine corsairs to submission. From his achievements on the west coast of Africa he was recalled in 1665

to take command of a large fleet which had been organized against England, and in May of the following year, after a long contest off the North Foreland, he compelled the English to take refuge in the Thames. On the 7th of Ju-ne 1672 he fought a drawn battle with the combined fleets of England and France, in Southwold or Sole Bay, and after the fight he convoyed safely home a fleet of merchantmen. His valour was displayed to equal advantage in several engagements with the French and English in the folio wing year. In i676he was despatched to the assistance of Spain against France in the Mediterranean, and, receiving a mortal wound in the battle on the 21st of April off Messina, died on the 29th at Syracuse. A patent by the king of Spain, investing him with the dignity of duke, did not reach the fleet till after his death. His body was carried to Amsterdam, where a magnificent monument to his memory was erected by command of the states-general.

See Life of De Ruyter by Brandt (Amsterdam, 1687), and by Klopp (2nd ed., Hanover, 1858).

DERVISH, a Persian word, meaning ” seeking doors,” i.e. ” beggar,” and thus equivalent to the Arabic faqir (fakir). Generally in Islam it indicates a member of a religious fraternity, whether mendicant or not; but in Turkey and Persia it indicates more exactly a wandering, begging religious, called, in Arabic- speaking countries, more specifically a faqir. With important differences, the dervish fraternities may be compared to the regular religious orders of Roman Christendom, while the Ulema (q.v.) are, also with important

differences, like the secular clergy. The origin and history of the mystical life in Islam, which led to the growth of the order of dervishes, are treated under Sufi'ism. It remains to treat here more particularly of (1) the dervish fraternities, and (2) the Sufi hierarchy.

1. The Dervish Fraternities. — In the earlier times, the relation between devotees was that of master and pupil. Those inclined to the spiritual life gathered round a revered sheikh (murshid, "guide," usladh, pir, "teacher"), lived with him, shared his religious practices and were instructed by him. In time of war against the unbelievers, they might accompany him to the threatened frontier, and fight under his eye. Thus murdbil, " one who pickets his horse on a hostile frontier," has become the marabout (q.v.) or dervish of French Algeria; and ribat, " a frontier fort," has come to mean a monastery. The relation, also, might be for a time only. The pupil might at any time return to the world, when his religious education and training were complete. On the death of the master the memory of his life and sayings might go down from generation to generation, and men might boast themselves as pupils of his pupils. Con- tinuous corporations to perpetuate his name were slow in forming. Ghazali himself, though he founded, taught and ruled a Sufi cloister (khanqah) at Tus, left no order behind him. But 'Adi al-Hakkarl, who founded a cloister at Mosul and died about 1 163, was long reverenced by the 'Adawite Fraternity, and in 1166 died 'Abd al-Qadir al-Jilani, from whom the Qadirite order descends, one of the greatest and most influential to this day. The troublous times of the break up of the Seljuk rule may have been a cause in this, as, with St Benedict, the crumbling Roman empire. Many existing fraternities, it is true, trace their origin to saints of the third, second and even first Moslem centuries, but that is legend purely. Similar is the tendency to claim all the early pious Moslems as good Sufis; collections of Sufi biography begin with the ten to whom Mahomet promised Paradise. So, too, the ultimate origin of fraternities is assigned to either Ali or Abu Bekr. and in Egypt all are under the rule of a direct descendant of the latter.

To give a complete list of these fraternities is quite impossible. Commonly, thirty-two are reckoned, but many have vanished or have been suppressed, and there are sub-orders innumerable. Each has a " rule " dating back to its founder, and a ritual which the members perform when they meet together in their convent (khanqah, zawiya, takya). This may consist simply in the repeti- tion of sacred phrases, or it may be an elaborate performance, such as the whirlings of the dancing dervishes, the Mevlevites, an order founded by Jelal ud-Dln ar-Rurnl, the author of the

great Persian mystical poem, the Mesnevi, and always ruled by one of his descendants. Jelal ud-Din was an advanced pantheist, and so are the Mevlevites, but that seems only to earn them the dislike of the Ulema,- and not to affect their standing in Islam. They are the most broad-minded and tolerant of all. There are also the performances of the Rifa'ites or " howling dervishes." In ecstasy they cut themselves with knives; eat live coals and glass, handle red-hot iron and devour serpents. They profess miraculous healing powers, and the head of the Sa'dites, a sub- order, used, in Cairo, to ride over the bodies of his dervishes without hurting them, the so-called Doseh (dausa). These different abilities are strictly regulated. Thus, one sub-order may eat glass and another may eat only serpents. Another division is made by their attitude to the law of Islam. When a dervish is in a state of ecstasy (majdhub), he is supposed to be unconscious of the actions of his body. Reputed saints, therefore, can do practically anything, as their souls will be supposed to be out of their bodies and in the heavenly regions. They may not only commit the vilest of actions, but neglect in general the ceremonial and ritual law. This goes so far that in Persia and Turkey dervish orders are classified as bd-shar', " with law," and bi-shar, " without law." The latter are really antinomians, and the best example of them is the Bakhtashite order, widely spread and influential in Turkey and Albania and connected by legend with the origin of the Janissaries. The Qalandarite order is known to all from the " Calenders " of the Thousand and One Nights. They separated from the Bakhtashites and are under obligation of perpetual travelling. The Senussi (Senussia) were the last order to appear, and are distinguished from the others by a severely puritanic and reforming attitude and strict orthodoxy, without any admixture of mystical slackness in faith or conduct. Each order is distinguished by a peculiar garb. Candidates for admission have to pass through a noviciate, more or less lengthy. First comes the 'ahd, or initial covenant, in which the neophyte or murld, " seeker," repents of his past sins and takes the sheikh of the order he enters as his guide (murskid) for the future. He then enters upon a course of instruction and discipline, called a " path " (tariqa), on which he advances through diverse " stations " (tnaqdmdl) or " passes " {'aqabat) of the spiritual life. There is a striking resemblance here to the gnostic system, with its seven Archon-guarded gates. On another side, it is plain that the sheikh, along with ordinary instruction of the novice, also hypnotizes him and causes him to see a series of visions, marking his penetration of the divine mystery. The part that hypnosis and

autohypnosis, conscious and unconscious, has played here cannot easily be overestimated. The Mevlevites seem to have the most severe noviciate. Their aspirant has to labour as a lay servitor of the lowest rank for iooi days — called the karrd kolak, or ” jackal ” — before he can be received. For one day’s failure he must begin again from the beginning.

But besides these full members there is an enormous number of lay adherents, like the tertiaries of the Franciscans. Thus, nearly every religious man of the Turkish Moslem world is a lay member of one order or another, under the duty of saying certain prayers daily. Certain trades, too, affect certain orders. Most of the Egyptian Qadirites, for example, are fishermen and, on festival days, carry as banners nets of various colours. On this side, the orders bear a striking resemblance to lodges of Freemasons and other friendly societies, and points of direct contact have even been alleged between the more pantheistic and antinomian orders, such as the Bakhtashite, and European Freemasonry. On another side, just as the dhikrs of the early ascetic mystics suggest comparison with the class-meetings of the early Methodists, so these orders are the nearest approach in Islam to the different churches of Protestant Christendom. They are the only ecclesiastical organization that Islam has ever known, but it is a multiform organization, unclassified internally or externally. They differ thus from the Roman monastic orders, in that they are independent and self-developing, each going its own way in faith and practice, limited only by the universal conscience (ijmd’, “agreement”: see Mahommedan Law) of Islam. Strange doctrines and moral defects may develop, but

freedom is saved, and the whole people of Islam can be reached and affected.

2. Saints and the Sufi Hierarchy. — That an elaborate doctrine of wonder-working saints should have grown up in Islam may, at first sight, appear an extreme paradox. It can, however, be conditioned and explained. First, Mahomet left undoubted loop-holes for a minor inspiration, legitimate and illegitimate. Secondly, the Sufis, under various foreign influences, developed these to the fullest. Thirdly, just as the Christian church has absorbed much of the mythology of the supposed exterminated heathen religions into its cult of local saints, so Islam, to an even higher degree, has been overlaid and almost buried by the superstitions of the peoples to which it has gone. Their religious and legal customs have completely overcome the direct commands of the Koran, the traditions from Mahomet and even the ” Agreement ” of the rest of the Moslem world (see Mahommedan Law).

The first step in this, it is true, was taken by Mahomet himself when he accepted the Meccan pilgrimage and the Black Stone. The worship of saints, therefore, has appeared everywhere in Islam, with an absolute belief in their miracles and in the value of their intercession, living or dead.

Further, there appeared very early in Islam a belief that there was always in existence some individual in direct intercourse with God and having the right and duty of teaching and ruling all mankind. This individual might be visible or invisible; his right to rule continued. This is the basis of the Isma'Ilite and Shl'ite positions (see Mahommedan Religion and Mahommedan Institutions). The Sufis applied this idea of divine right to the doctrine of saints, and developed it into the Sufi hierarchy. This is a single, great, invisible organization, forming a saintly board of administration, by which the invisible government of the world is supposed to be carried on. Its head is called the Qutb (Axis); he is presumably the greatest saint of the time, is chosen by God for the office and given greater miraculous powers and rights of intercession than any other saint enjoys. He wanders through the world, often invisible and always unknown, performing the duties of his office. Under him there is an elaborate organization of walls, of different ranks and powers, according to their sanctity and faith. The term wall is applied to a saint because of Kor. x. 63, " Ho! the waits of God; there is no fear upon them, nor do they grieve," where wall means " one who is near ," friend or favourite.

In the fraternities, then," all are dervishes, cloistered or lay; those whose faith is so great that God has given them miraculous powers — and there are many — are walls; begging friars are fakirs. All forms of life — solitary, monastic, secular, celibate, married, wandering, stationary, ascetic, free — are open. Their theology is some form of Sufi'ism.

Authorities. — The bibliography of this subject is very large, and the following only a selection: — (1) On Dervishes. In Egypt, Lane's Modern Egyptians, chaps, x. xx., xxiv., xxv. ; in Turkey, D'Ohsson, Tableau general de I'emp. othoman, ii. (Paris, 1790); Turkey in Europe by " Odysseus " (London, 1900) ; in Persia, E. G. Browne, A Year among the Persians (1893) , in Morocco, T. H. Weir, Sheikhs of Morocco (Edinburgh, 1904) ; B. Meakin, The Moors (London, 1902), chap. xix. ; in Central Asia, all Vambery's books of travel and history. In general, Hughes, Diet, of Islam, s.v. " Faqir "; Depont and Cappolani, Les Confreries religieuses musulmanes (Alger, 1897) I J. P. Brown, The Dervishes, or Oriental Spiritualism (London, 1868). (2) On Saints. I. Goldziher, Muhammedanische Studien, ii. 277 ff., and " De

l'ascetisme aux premiers temps de l'lslam " in Revue de I'histoire des religions, ;vol. xxxvii. pp. 134 ff. ; Lane, Modern Egyptians, chap. x. ; Arabian Nights, chap. iii. note 63; Vollers in Zeitsch. d. morgenland. Gesellsch. xliii. 115 ff. (D. B. Ma.)

DERWENT (Celtic Dwr-gent, clear water), the name of several English rivers. (1) The Yorkshire Derwent collects the greater part of the drainage of the North Yorkshire moors, rising in their eastern part. A southern head-stream, however, rises in the Yorkshire Wolds near Filey, little more than a mile from the North Sea, from which it is separated by a morainic deposit, and thus flows in an inland direction. The early course of the Derwent lies through a flat open valley between the North Yorkshire moors and the Yorkshire Wolds, the upper part of which is known as the Carrs, when the river follows an artificial drainage cut. It receives numerous tributaries from the moors, then breaches the

low hills below Malton in a narrow picturesque ‘ valley, and debouches upon the central plain of Yorkshire. Its direction, hitherto westerly and south-westerly from the Carrs, now becomes southerly, and it flows roughly parallel to the Ouse, which it joins near Barmby-on-the-Marsh, in the level district between Selby and the head of the Humber estuary, after a course, excluding minor sinuosities, of about 70 m. As a tributary of the Ouse it is included in the Humber basin. It is tidal up to Sutton-upon-Derwent, 15 m. from the junction with the Ouse, and is locked up to Malton, but the navigation is little used. A canal leads east from the tidal water to the small market town of Pocklington.

(2) The Derbyshire Derwent rises in Bleaklow Hill north of the Peak and traverses a narrow dale, which, with those of such tributary streams as the Noe, watering Hope Valley, and the Wye, is famous for its beauty (see Derbyshire). The Derwent flows south past Chatsworth, Matlock and Belper and then, passing Derby, debouches upon a low plain, and turns south-eastward, with an extremely sinuous course, to join the Trent near Sawley. Its length is about 60 m. It falls in all some 1 700 ft. (from Matlock 200 ft.), and no part is navigable, save certain reaches at Matlock and elsewhere for pleasure boats.

(3) The Cumberland Derwent rises below Great End in the Lake District, draining Spinkling and Sty Head tarns, and flows through Borrowdale, receiving a considerable tributary from Lang Strath. It then drains the lakes of Derwentwater and Bassenthwaite, after which its course, hitherto N. and N.N.W., turns W. and W. by S. past Cockerrhouth to the Irish Sea at Workington. The length is about 34 m., and the fall about 2000 ft. (from Derwentwater 244 ft.); the waters are usually beautifully clear, and the river is not navigable. At a former period this stream must have formed one large lake covering the whole area which includes Derwentwater and Bassenthwaite; between which a flat alluvial plain is formed of the deposits of the river Greta, which now joins the Derwent from the east immediately below Derwentwater, and the Newlands Beck, which enters Bassenthwaite. In time of high flood this plain is said to have been submerged, and the two lakes thus reunited.

(4) A river Derwent rises in the Pennines near the borders of Northumberland and Durham, and, forming a large part of the boundary between these counties, takes a north-easterly course of 30 m. to the Tyne, which it joins 3 m. above Newcastle.

DERWENTWATER, EARL OF, an English title borne by the family of

Radclyffe, or Radcliffe, from 1688 to 17 16 when the 3rd earl was attainted and beheaded, and claimed by his descendants, adherents of the exiled house of Stewart, from that date until the death of the last male heir in 1814. Sir Francis Radclyffe, 3rd baronet (1625-1697), was the lineal descendant of Sir Nicholas Radclyffe, who acquired the extensive Derwent- water estates in 141 7 through his marriage with the heiress of John de Derwentwater, and of Sir Francis Radclyffe, who was made a baronet in 1619. In 1688 Sir Francis was created Viscount Radclyffe and earl of Derwentwater by James II., and dying in 1697 was succeeded as 2nd earl by his eldest son Edward (1655-1705), who had married Lady Mary Tudor (d. 1726), a natural daughter of Charles II. The 2nd earl died in 1705, and was succeeded by his eldest son James (1689-1716), who was born in London on the 28th of June 1689, and was brought up at the court of the Stewarts in France as companion to Prince James Edward, the old Pretender. In 17 10 he came to reside on his English estates, and in July 171 2 was married to Anna Maria (d. 1723), daughter of Sir John Webb, baronet, of Odstock, Wiltshire. Joining without any hesitation in the Stewart rising of 171 5, Derwentwater escaped arrest owing to the devotion of his tenantry, and in October, with about seventy followers, he joined Thomas Forster at Green-rig. Like Forster the earl was lacking in military experience, and when the rebels capitulated at Preston he was conveyed to London and im- peached. Pleading guilty at his trial he was attainted and condemned to death. Great efforts were made to obtain a mitigation of the sentence, but the government was obdurate, and Derwentwater was beheaded on Tower Hill on the 24th

of February 1716, declaring on the scaffold his devotion to the Roman Catholic religion and to King James III. The earl was very popular among his tenantry and in the neighbourhood of his residence, Dilston Hall. His gallant bearing and his sad fate have been celebrated in song and story, and the aurora borealis, which shone with exceptional brightness on the night of his execution, is known locally as ” Lord Derwentwater’s lights.” He left an only son John, who, in spite of his father’s attainder, assumed the title of earl of Derwentwater, and who died un- married in 1731; and a daughter Alice Mary (d. 1760), who married in 1732 Robert James, 8th Baron Petre (1713-1742).

On the death of John Radclyffe in 1731 his uncle Charles (1693-1746), the only surviving son of the 2nd earl, took the title of earl of Derwentwater. Charles Radclyffe had shared the fate of his brother, the 3rd earl, at Preston in November 1715, and had been condemned to death for high treason; but, more fortunate than James, he had succeeded in escaping from prison, and had joined the Stewarts on the Continent. In 1724 he married Charlotte Maria (d.

1755), in her own right countess of Newburgh, and after spending some time in Rome, he was captured by an English ship in November 1745 whilst proceeding to join Charles Edward, the young Pretender, in Scotland. Condemned to death under his former sentence he was beheaded on the 8th of December 1 746. His eldest son, James Bartholomew (1725-1786), who had shared his father's imprisonment, then claimed the title of earl of Derwentwater, and on his mother's death in 1755 became 3rd earl of Newburgh. His only son and successor, Anthony James (1 757-1814), died without issue in 1 8 14, when the title became extinct de facto as well as de jure. Many of the forfeited estates in Northumberland and Cumberland had been settled upon Greenwich Hospital, and in 1 749 a sum of £30,000 had been raised upon them for the benefit of the earl of Newburgh. The present representative of the Radclyffe family is Lord Petre, and in 1874 the bodies of the first three earls of Derwentwater were reburied in the family vault of the Petres at Thorndon, Essex.

In 1865 a woman appeared in Northumberland who claimed to be a grand-daughter of the 4th earl and, as there were no male heirs, to be countess of Derwentwater and owner of the estates. She said the 4th earl had not died in 1731 but had married and settled in Germany. Her story aroused some interest, and it was necessary to eject her by force from Dilston Hall.

See R. Patten, History of the Late Rebellion (London, 1717) ; W. S. Gibson, Dilston Hall, or Memoirs of James Radcliffe, earl of Derwent-water (London, 1848-1850); G. E. C(okayne), Complete Peerage (Exeter, 1887-1898) ; and Dictionary of National Biography, vol. xlvii. (London, 1896).

DERWENTWATER, a lake of Cumberland, England, in the northern part of the celebrated Lake District (q.v. for the physical relations of the lake with the district at large). It is of irregular figure, approaching to an oval, about 3 m. in length and from \ m. to ij m. in breadth. The greatest depth is 70 ft. The lake is seen at one view, within an amphitheatre of mountains of varied outline, overlooked by others of greater height. Several of the lesser elevations near the lake are especially famous as view-points, such as Castle Head, Walla Crag, Ladder Brow and Cat Bells. The shores are well wooded, and the lake is studded with several islands, of which Lord's Island, Derwent Isle and St Herbert's are the principal. Lord's Island was the residence of the earls of Derwentwater. St Herbert's Isle receives its name from having been the abode of a holy man of that name mentioned by Bede as contemporary with St Cuthbert of Fame Island in the 7th century. Derwent Isle, about six acres in extent, contains a handsome residence

surrounded by lawns, gardens and timber of large growth. The famous Falls of Lodore, at the upper end of the lake, consist of a series of cascades in the small Watendlath Beck, which rushes over an enormous pile of protruding crags from a height of nearly 200 ft. The ” Floating Island ” appears at intervals on the upper portion of the lake near the mouth of the beck. This singular phenomenon is supposed to owe its appearance to an accumulation of gas, formed by the decay oi

vegetable matter, detaching and raising to the surface the matted weeds which cover the floor of the lake at this point. The river Derwent (q.v.) enters the lake from the south and leaves it on the north, draining it through Bassenthwaite lake, to the Irish Sea. To the north-east of the lake lies the town of Keswick.

DES ADRETS, FRANCOIS DE BEAUMONT, Baron (c. 1512- 1587), French Protestant leader, was born in 1512 or 1513 at the chateau of La Frette (Isere) . During the reign of Henry II. of France he served with distinction in the royal army and became colonel of the ” legions ” of Dauphine, Provence and Languedoc. In 1562, however, he joined the Huguenots, not from religious conviction but probably from motives of ambition and personal dislike of the house of Guise. His campaign against the Catholics in 1562 was eminently successful. In June of that year Des Adrets was master of the greater part of Dauphine. But his brilliant military qualities were marred by his revolting atrocities. The reprisals he exacted from the Catholics after their massacres of the Huguenots at Orange have left a dark stain upon his name. The garrisons that resisted him were butchered with every cir- cumstance of brutality, and at Montbrison, in Forez, he forced eighteen prisoners to precipitate themselves from the top of the keep. Having alienated the affections of the Huguenots by his pride and violence, he entered into communication with the Catholics, and declared himself openly in favour of conciliation. On the 10th of January 1563 he was arrested on suspicion by some Huguenot officers and confined in the citadel of Nimes. He was liberated at the edict of Amboise in the following March, and, distrusted alike by Huguenots and Catholics, retired to the chateau of La Frette, where he died, a Catholic, on the 2nd of February 1587.

Authorities. — J. Roman, Documents inSdits sur le baron des Adrets (1878); and memoirs and histories of the time. See also Guy Allard,

Vie de Francois de Beaumont (1675) ; l'abbe J. C. Martin, Histoire politique et militaire de Francois de Beaumont (1803) ; Eugene and Emile Haag, La France protestante (2nd ed., 1877 seq.).

DESAIX DE VEYGOUX, LOUIS CHARLES ANTOINE

(1768-1800), French general, was born of a noble though impoverished family. He received a military education at the school founded by Marshal d'Effiat, and entered the French royal army. During the first six years of his service the young officer devoted himself assiduously to duty and the study of his profession, and at the outbreak of the Revolution threw himself whole-heartedly into the cause of liberty. In spite of the pressure put upon him by his relatives, he refused to " emigrate," and in 1792 is found serving on Broglie's staff. The disgrace of this general nearly cost young Desaix his life, but he escaped the guillotine, and by his conspicuous services soon drew upon himself the favour of the Republican government. Like many other members of the old ruling classes who had accepted the new order of things, the instinct of command, joined to native ability, brought Desaix rapidly to high posts. By 1794 he had attained the rank of general of division. In the campaign of 1795 he commanded Jourdan's right wing, and in Moreau's invasion of Bavaria in the following year he held an equally important command. In the retreat which ensued when the archduke Charles won the battles of Amberg and Wiirzburg (see French Revolutionary Wars) Desaix commanded Moreau's rearguard, and later the fortress of Kehl, with the highest distinction, and his name became a household word, like those of Bonaparte, Jourdan, Hoche, Marceau and Kleber. Next year his initial successes were interrupted by the Preliminaries of Leoben, and he procured for himself a mission into Italy in order to meet General Bonaparte, who spared no pains to captivate the brilliant young general from the almost rival camps of Germany. Provisionally appointed commander of the " Army of England," Desaix was soon transferred by Bonaparte to the expeditionary force intended for Egypt. It was his division which bore the brunt of the Mameluke attack at the battle of the Pyramids, and he crowned his reputation by his victories over Murad Bey in Upper Egypt. Amongst the fellaheen he acquired the significant appellation of the " Just Sultan." When his chief handed over the command to K16ber and prepared to return to France,

Desaix was one of the small party selected to accompany the future emperor. But, from various causes, it was many months before he could join the new Consul. The campaign of 1800 was well on its way to the climax when Desaix at last reported himself for duty in Italy. He

was immediately assigned to the command of a corps of two infantry divisions. Three days later (June 14), detached, with Boudet's division, at Rivalta, he heard the cannon of Marengo on his right. Taking the initiative he marched at once towards the sound, meeting Bonaparte's staff officer, who had come to recall him, half way on the route. He arrived with Boudet's division at the moment when the Austrians were victorious all along the line. Exclaiming, " There is yet time to win another battle! " he led his three regiments straight against the enemy's centre. At the moment of victory Desaix was killed by a musket ball. Napoleon paid a just tribute to the memory of one of the most brilliant soldiers of that brilliant time by erecting the monuments of Desaix on the Place Dauphine and the Place des Victoires in Paris.

See F. Martha-Beker, Comte de Mons, Le General L. C. A. Desaix (Paris, 1852).

DESAUGIERS, MARC ANTOINE MADELEINE (1772-1827), French dramatist and song-writer, son of Marc Antoine D6saugiers, a musical composer, was born at Frejus (Var) on the 17th of November 1772. He studied at the Mazarin college in Paris, where he had for one of his teachers the critic Julien Louis Geoffroy. He entered the seminary Saint Lazare with a view to the priesthood, but soon gave up his intention. In his nineteenth year he produced in collaboration with his father a light opera (1791) adapted from the MSdecin malgri lui of Moliere.

During the Revolution he emigrated to St Domingo, and during the negro revolt he was made prisoner, barely escaping with his life. He took refuge in the United States, where he supported himself by teaching the piano. In 1 797 he returned to his native country, and in a very few years he became famous as a writer of comedies, operas and vaudevilles, which were produced in rapid succession at the Theatre des Varietes and the Vaudeville. He also wrote convivial and satirical songs, which, though different in character, can only worthily be compared with those of Beranger. He was at one time president of the Caveau, a con- vivial society whose members were then chiefly drawn from literary circles. He had the honour of introducing Beranger as a member. In 1815 Desaugiers succeeded Pierre Yves Barre as manager of the Vaudeville, which prospered under his manage- ment until, in 1820, the opposition of the Gymnase proved too strong for him, and he resigned. He died in Paris on the 9th of August 1827.

Among his pieces maybe mentioned Le Valet d'emprunt (1807);

Monsieur Vautour (181 1); and-Le Regne d'un terme et le termed'un regne, aimed at Napoleon.

An edition of Desaugiers' Chansons et Poesies diverses appeared in 1827. A new selection with a notice by Alfred de Bougy appeared in 1858. See also Sainte-Beuve's Portraits contemporains, vol. v.

DESAULT, PIERRE JOSEPH (1744-1795), French anatomist and surgeon, was born at Magny-Vernois (Haute Sa6ne) on the 6th of February 1744. He was destined for the church, but his own inclination was towards the study of medicine; and, after learning something from the barber-surgeon of his native village, he was settled as an apprentice in the military hospital of Belfort, where he acquired some knowledge of anatomy and military surgery. Going to Paris when about twenty years of age, he opened a school of anatomy in the winter of 1766, the success of which excited the jealousy of the established teachers and professors, who endeavoured to make him give up his lectures. In 1776 he was admitted a member of the corporation of surgeons; and in 1782 he was appointed surgeon-major to the hospital De la CharitS. Within a few years he was recognized as one of the leading surgeons of France. The clinical school of surgery which he instituted at the H6tel Dieu attracted great numbers of students, not only from every part of France but also from other countries; and he frequently had an audience of about 600. He introduced many improvements into the practice of surgery, as well as into the construction of various surgical

instruments. In 1791 he established a Journal de chirurgerie, edited by his pupils, which was a record of the most interesting cases that had occurred in his clinical school, with the remarks which he had made upon them in the course of his lectures. But in the midst of his labours he became obnoxious to some of the revolutionists, and he was, on some frivolpus charge, denounced to the popular sections. After being twice examined, he was seized on the 28th of May 1 793 , while delivering a lecture, carried away from his theatre, and committed to prison in the Luxem- bourg. In three days, however, he was liberated, and permitted to resume his functions. He died in Paris on the 1st of June 1795, the story that his death was caused by poison being disproved by the autopsy carried out by his pupil, M. F. X. Bichat. A pension was settled on his widow by the republic. Together with Francois Chopart (1 743-1 795) he published a Traits des

maladies chirurgicales (1779), and Bichat published a digest of his surgical doctrines in (Euvres chirurgicales de Desault

(1 798-1 799).

DES BARREAUX, JACQUES VALLEE, Sieur (1602-1673), French poet, was born in Paris in 1602. His great-uncle, Geoff roy-Va!16e, had been hanged in 1574 for the authorship of a book called Le FISau de la joy. His nephew appears to have inherited his scepticism, which on one occasion nearly cost him his life. The peasants of Touraine attributed to the presence of the unbeliever an untimely frost that damaged the vines, and proposed to stone him. His authorship of the sonnet on " Penitence," by which he is generally known, has been disputed. He had the further distinction of being the first of the lovers of Marion Delorme. He died at Chalon-sur-Saone on the 9th of May 1673.

See Poesies de Des Barreaux (1904), edited by F. Lachevre.

DESBOROUGH, JOHN (1608-1680), English soldier and politician, son of James Desborough of Eltisley, Cambridgeshire, and of Elizabeth Hatley of Over, in the same county, was baptized on the 13th of November 1608. He was educated for the law. On the 23rd of June 1636 he married Eltisley Jane, daughter of Robert Cromwell of Huntingdon, and sister of the future Protector. He took an active part in the Civil War when it broke out, and showed considerable military ability. In 1645 he was present as major in the engagement at Langport on the 10th of July, at Hambleton Hill on the 4th of August, and on the 10th of September he commanded the horse at the storming of Bristol. Later he took part in the operations round Oxford. In 1648 as colonel he commanded the forces at Great Yarmouth. He avoided all participation in the trial of the king in June 1649, being employed in the settlement of the west of England. He fought at Worcester as major-general and nearly captured Charles II. near Salisbury. After the establishment of the Commonwealth he was chosen, on the 17th of January 1652, a member of the committee for legal reforms. In 1653 he became a member of the Protectorate council of state, and a com- missioner of the treasury, and was appointed one of the four generals at sea and a commissioner for the army and navy. In 1654 he was made constable of St Briavel's Castle in Gloucester- shire. Next year he was appointed major-general over the west. He had been nominated a member of Barebones' parliament in 1653, and he was returned to the parliament of 1654 for Cambridgeshire, and to that of 1656 for Somersetshire. In July 1657 he became a member of the privy council, and in 1658 he accepted a seat in Cromwell's House of Lords. In spite of his near relationship to

the Protector's family, he was one of the most violent opponents of the assumption by Cromwell of the royal title, and after the Protector's death, instead of supporting the interests and government of his nephew Richard Cromwell, he was, with Fleetwood, the chief instigator and organizer of the hostility of the army towards his administration, and forced him by threats and menaces to dissolve his parliament in April 1659. He was chosen a member of the council of state by the restored Rump, and made colonel and governor of Plymouth, but pre- senting with other officers a seditious petition from the army council, on the 5th of October, was about a week later dismissed. After the expulsion of the Rump by Fleetwood on the 13 th of

October he was chosen by the officers a member of the new administration and commissary-general of the horse. The new military government, however, rested on no solid foundation, and its leaders quickly found themselves without any influence. Desborough himself became an object of ridicule, his regiment even revolted against him, and on the return of the Rump he was.ordered to quit London. At the restoration he was excluded from the act of indemnity but not included in the clause of pains and penalties extending to life and goods, being therefore only incapacitated from public employment. Soon afterwards he was arrested on suspicion of conspiring to kill the king and queen, but was quickly liberated. Subsequently he escaped to Holland, where he engaged in republican intrigues. Accordingly he was ordered home, in April 1666, on pain of incurring the charge of treason, and obeying was imprisoned in the Tower till February 1667, when he was examined before the council and set free. Desborough died in 1680. By his first wife, Cromwell's sister, he had one daughter and seven sons; he married a second wife in April 1658 whose name is unrecorded. Desborough was a good soldier and nothing more; and his only conception of govern- ment was by force and by the army. His rough person and manners are the constant theme of ridicule in the royalist ballads, and he is caricatured in Butler's Hudibras and in the Parable 0] the Lion and Fox.

DESCARTES, RENE! (1596-1650), French philosopher, was born at La Haye, in Touraine, midway between Tours and Poitiers, on the 31st of March 1596, and died at Stockholm on the nth of February 1650. The house where he was born is still shown, and a mUairie about 3 m. off retains the name of Les Cartes. His family on both sides was of Poitevin .descent. Joachim Descartes, his father, having purchased a commission as counsellor in the parlement of Rennes, introduced the family into that demi-noblesse of the robe which, between the bourgeoisie and the high nobility, maintained a lofty rank in French

society. He had three children, a son who afterwards succeeded to his father in the parlement, a daughter who married a M. du Crevis, and Rene, after whose birth the mother died.

Descartes, known as Du Perron, from a small estate destined for his inheritance, soon showed an inquisitive mind. From 1604 to 1612 he studied at the school of La Fleche, which Henry IV. had lately founded and endowed for ye ˆ s . the Jesuits. He enjoyed exceptional privileges; his feeble health excused him from the morning duties, and thus early he acquired the habit of reflection in bed, which clung to him throughout life. Even then he had begun to distrust the authority of tradition and his teachers. Two years before he left school he was selected as one of the twenty-four who went forth to receive the heart of Henry IV. as it was bome to its resting-place at La Fleche. At the age of sixteen he went home to his father, who was now settled at Rennes, and had married again. During the winter of 1612 he completed his preparations for the world by lessons in horsemanship and fencing; and then started as his own master to taste the pleasures of Parisian life. Fortunately he went to no perilous lengths; the worst we hear of is a passion for gaming. Here, too, he made the acquaintance of Claude Mydorge, one of the foremost mathematicians of France, and renewed an early intimacy with Marin Mersenne (g.v.), now Father Mersenne, of the order of Minim friars. The withdrawal of Mersenne in 1614 to a post in the provinces was the signal for Descartes to abandon social life and shut himself up for nearly two years in a secluded house of the faubourg St Germain. Accident betrayed the secret of his retirement; he was com- pelled to leave his mathematical investigations, and to take part in entertainments, where the only thing that chimed in with his theorizing reveries was the music. French politics were at that time characterized by violence and intrigue to such an extent that Paris was no fit place for a student, and there was little honourable prospect for a soldier. Accordingly, in May 1617, Descartes set out for the Netherlands and took service in the army of Prince Maurice of Orange. At Breda he enlisted as a volunteer, and the first and only pay which he accepted he kept: as a curiosity through life. There was a lull in the war, and the

Netherlands was distracted by the quarrels of Gomarists and Arminians. During the leisure thus arising, Descartes one day had his attention drawn to a placard in the Dutch tongue; as the language, of which he never became perfectly master, was then strange to him, he

asked a bystander to interpret it into either French or Latin. The stranger, Isaac Beeckman, principal of the college of Dort, offered to do so into Latin, if the inquirer would bring him a solution of the problem, — for the advertise- ment was one of those challenges which the mathematicians of the age were accustomed to throw down to all comers, daring them to discover a geometrical mystery known as they fancied to themselves alone. Descartes promised and fulfilled; and a friendship grew up between him and Beeckman — broken only by the dishonesty of the latter, who in later years took credit for the novelty contained in a small essay on music (Compendium Musicae) which Descartes wrote at this period and entrusted to Beeckman. 1

After spending two years in Holland as a soldier in a period of peace, Descartes, in July 1610, attracted by the news of the impending struggle between the house of Austria and the Protestant princes, consequent upon the election of the palatine of the Rhine to the kingdom of Bohemia, set out for upper Germany, and volunteered into the Bavarian service. The winter of 1610, spent in quarters at Neuburg on the Danube, was the critical period in his life. Here, in his warm room {dans un poele), he indulged those meditations which afterwards led to the Discourse of Method. It was here that, on the eve of St Martin's day, he " was filled with enthusiasm, and discovered the founda- tions of a marvellous science." He retired to rest with anxious thoughts of his future career, which haunted him through the night in three dreams that left a deep impression on his mind. The date of his philosophical conversion is thus fixed to a day. But as yet he had only glimpses of a logical method which should invigorate the syllogism by the co-operation of ancient geometry and modern algebra. For during the year that elapsed before he left Swabia (and whilst he sojourned at Neuburg and Ulm), and amidst his geometrical studies, he would fain have gathered some knowledge of the mystical wisdom attributed to the Rosicrucians; but the Invisibles, as they called themselves, kept their secret. He was present at the battle of Weisser Berg (near Prague), where the hopes of the elector palatine were blasted (November 8, 1620), passed the winter with the army in southern Bohemia, and next year served in Hungary under Karl Bonaventura de Longueval, Graf von Buquoy or Boucquoi (1571-1621). On the death of this general Descartes quitted the imperial service, and in July 162 1 began a peaceful tour through Moravia, the borders of Poland, Pomerania, Brandenburg, Holstein and Friesland, from which he reappeared in February 1622 in Belgium, and betook himself directly to his father's home at Rennes in Brittany.

At Rennes Descartes found little to interest him; and, after he had visited the maternal estate of which his father now put him in

possession, he went to Paris, where he found the Rosi- crucians the topic of the hour, and heard himself credited with partnership in their secrets. A short visit to Brittany enabled him, with his father's consent, to arrange for the sale of his property in Poitou. The proceeds were invested in such a way at Paris as to bring him in a yearly income of between 6000 and 7000 francs (equal now to more than £500). Towards the end of the year Descartes was on his way to Italy. The natural phenomena of Switzerland, and the political complications in the Valtellina, where the Catholic inhabitants had thrown off the yoke of the Grisons and called in the Papal and Spanish troops to their assistance, delayed him some time; but he reached Venice in time to see the ceremony of the doge's wedlock with the Adriatic. After paying his vows at Loretto, he came to Rome, which was then on the eve of a year of jubilee — an occasion which Descartes seized to observe the variety of men and manners which the city then embraced within its walls. In the spring of 1625

1 It was only published after the author's death ; and of it, besides the French version, there exists an English translation " by a Person of Quality."

he returned home by Mont Cenis, observing the avalanches,' instead of, as his relatives hoped, securing a post in the French army in Piedmont.

For an instant Descartes seems to have concurred in the plan of purchasing a post at Chatellerault, but he gave up the idea, and settled in Paris (June 1625), in the quarter where he had sought seclusion before. By this time he had ceased to devote himself to pure mathematics, and in company with his friends Mersenne and Mydorge was deeply interested in the theory of the refraction of light, and in the practical work of grinding glasses of the best shape suitable for optical instruments. But all the while he was engaged with reflections on the nature of man, of the soul and of God, and for a while he remained invisible even to his most familiar friends. But their importunity made a hermitage in Paris impossible; a graceless friend even surprised the philosopher in bed at eleven in the morning meditating and taking notes. In disgust, Descartes started for the west to take part in the siege of La Rochelle, and entered the city with the troops (October 1628) . A meeting at which he was present after his return to Paris decided his vocation. He had expressed an opinion that the true art of memory was not to be gained by technical devices, but by a philosophical apprehension of things; and the cardinal de Berulle, the founder of the Congregation of the Oratory, was so struck by the tone of the remarks as to impress upon the speaker the duty of

spending his life in the examination of truth. Descartes accepted the philosophic mission, and in the spring of 1629 he settled in Holland. His financial affairs he had entrusted to the care of the abb6 Picot, and as his literary and scientific representative he adopted Mersenne.

Till 1649 Descartes lived in Holland. Thrice only did he revisit France — in 1644, 1647 and 1648. The first of these occasions was in order to settle family affairs after the death of his father in 1640. The second brief visit, in 1647, partly on literary, partly on family business, was signalized by the award of a pension of 3000 francs, obtained from the royal bounty by Cardinal Mazarin. The last visit in 1648 was less fortunate. A royal order summoned him to France for new honours — an additional pension and a permanent post — for his fame had by this time gone abroad, and it was the age when princes sought to attract genius and learning to their courts. But when Descartes arrived, he found Paris rent asunder by the civil war of the Fronde. He paid the costs of his royal parchment, and left without a word of reproach. The only other occasions on which he was out of the Netherlands were in 1630, when he made a flying visit to England to observe for himself some alleged magnetic phenomena, and in 1634, when he took an excursion to Denmark.

During his residence in Holland he lived at thirteen different places, and changed his abode twenty-four times. In the choice of these spots two motives seem to have influenced him — the neighbourhood of a university or college, and the amenities of the situation. Among these towns were Franeker in Friesland, Harderwyk, Deventer, Utrecht, Leiden, Amersfoort, Amster- dam, Leeuwarden in Friesland. His favourite residences were Endegeest, Egmond op den Hoef and Egmond the Abbey (west of Zaandam).

The time thus spent seems to have been on the whole happy, even allowing for warm discussions with the mathematicians and metaphysicians of France, and for harassing controversies in the Netherlands. Friendly agents — chiefly Catholic priests — were the intermediaries who forwarded his correspondence from Dort, Haarlem, Amsterdam and Leiden to his proper address, which he kept completely secret; and Father Mersenne sent him objections and questions. His health, which in his youth had been bad, improved. ” I sleep here ten hours every night,” he writes from Amsterdam, ” and no care ever shortens my slumber.” ” I take my walk every day through the confusion of a great multitude with as much freedom and quiet as you could find in your rural avenues.” 3 At his first coming to Franeker he arranged to get a cook acquainted with French cookery; but, 2 (Euvres, v. 255. * lb. vi. 199.

to prevent misunderstanding, it may be added that his diet was mainly vegetarian, and that he rarely drank wine. New friends gathered round him who took, a keen interest in his researches. Once only do we find him taking an interest in the affairs of his neighbours, — to ask pardon from the government for a homicide. 1 He continued the profession of his religion. Sometimes from curiosity he went to the ministrations of anabaptists, 2 to hear the preaching of peasants and artisans. He carried few books to Holland with him, but a Bible and the Summa of Thomas Aquinas were amongst them. 3 One of the recommendations of Egmond the Abbey was the free exercise there allowed to the Catholic religion. At Franeker his house was a small chateau, ” separated by a moat from the rest of the town, where the mass could be said in safety.” * And one motive in favour of accepting an invitation to England lay in the alleged leanings of Charles I. to the older church.

The best account of Descartes’s mental history during his life in Holland is contained in his letters, which extend over the whole period, and are particularly frequent in the latter half. The majority of them are addressed to Mersenne, and deal with problems of physics, musical theory (in which he took a special interest), and mathematics. Several letters between 1643 and 1649 are addressed to the princess Elizabeth, the eldest daughter of the ejected elector palatine, who lived at The Hague, where her mother maintained the semblance of a royal court. The princess was obliged to quit Holland, but kept up a philosophical corre- spondence with Descartes. It is to her that the Principles of Philosophy were dedicated; and in her alone, according to Descartes, were united those generally separated talents for metaphysics and for mathematics which are so characteristically co-operative in the Cartesian system. Two Dutch friends, Constantijn Huygens (von Zuylichem), father of the more celebrated Huygens, and Hoogheland, figure amongst the correspondents, not to mention various savants, professors and churchmen (particularly Jesuits).

His residence in the Netherlands fell in the most prosperous and brilliant days of the Dutch state, under the stadtholdership of Frederick Henry (1625-1647). Abroad its navigators mono- polized the commerce of the world, and explored unknown seas; at home the Dutch school of painting reached its acme in Rembrandt (1607-1669); and the philological reputation of the country was sustained by Grotius, Vossius and the elder Heinsius. And yet, though Rembrandt’s

” Nightwatch ” is dated the very year after the publication of the Meditations, not a word in Descartes breathes of any work of art or historical learning. The contempt of aesthetics and erudition is characteristic of the most typical members of what is known as the Cartesian school, especially Malebranche. Descartes was not in any strict sense a reader. His wisdom grew mainly out of his own reflections and experiments. The story of his disgust when he found that Queen Christina devoted some time every day to the study of Greek under the tuition of Vossius is at least true in substance. 6 It gives no evidence of science, he remarks, to possess a tolerable knowledge of the Roman tongue, such as once was possessed by the populace of Rome. 6 In all his travels he studied only the phenomena of nature and human life. He was a spectator rather than an actor on the stage of the world. He entered the army, merely because the position gave a vantage-ground from which to make his observations. In the political interests which these contests involved he took no part; his favourite disciple, the princess Elizabeth, was the daughter of the banished king, against whom he had served in Bohemia; and Queen Christina, his second royal follower, was the daughter of Gustavus Adolphus.

Thus Descartes is a type of that spirit of science to which erudition and all the heritage of the past seem but elegant trifling. The science of Descartes was physics in all its branches, but especially as applied to physiology. Science, he says, may be compared to a tree; metaphysics is the root, physics is the trunk, and the three chief branches are mechanics, medicine and

1 CEuvres, viii. 59. 4 lb. vi. 123.

2 76. viii. 173. 5 76. x. 375.

3 lb. viii. 181.

• lb. ix. 6.

morals, — the three applications of our knowledge to the outward world, to the human body, and to the conduct of life. 7

Such then was the work that Descartes had in view in Holland. His residence was generally divided into two parts — one his workshop for science, the other his reception-room for society. ” Here are my books,” he is reported to have told a visitor, as he pointed to the animals he had dissected. He worked hard at his book on refraction, and dissected the heads of animals in order to explain imagination and

memory, which he considered physical processes. 8 But he was not a laborious student. ” I can say with truth,” he writes to the princess Elizabeth, 9 ” that the principle which I have always observed in my studies, and which I believe has helped me most to gain what knowledge I have, has been never to spend beyond a very few hours daily in thoughts which occupy the imagination, and a very few hours yearly in those which occupy the understanding, and to give all the rest of my time to the relaxation of the senses and the repose of the mind.” But his expectations from the study of anatomy and physiology went a long way. ” The conservation of health,” he writes in 1646, ” has always been the principal end of my studies.” 10 In 1629 he asks Mersenne to take care of himself ” till I find out if there is any means of getting a medical theory based on infallible demonstrations, which is what I am now inquiring.” 11 Astronomical inquiries in connexion with optics, meteorological phenomena, and, in a word, the whole field of natural laws, excited his desire to explain them. His own observation, and the reports of Mersenne, furnished his data. Of Bacon’s demand for observation and collection of facts he is an imitator; and he wishes (in a letter of 1632) that ” some one would undertake to give a history of celestial phenomena after the method of Bacon, and describe the sky exactly as it appears at present, without introducing a single hypothesis.” 12

He had several writings in hand during the early years of his residence in Holland, but the main work of this period was a physical doctrine of the universe which he termed The World. Shortly after his arrival he writes to Mersenne that it will prob- ably be finished in 1633, but meanwhile asks him not to disclose the secret to his Parisian friends. Already anxieties appear as to the theological verdict upon two of his fundamental views— the infinitude of the universe, and the earth’s rotation round the sun. 13 But towards the end of year 1633 we find him writing as follows: — ” I had intended sending you my World as a New Year’s gift, and a fortnight ago I was still minded to send you a fragment of the work, if the whole of it could not be transcribed in time. But I have just been at Leyden and Amsterdam to ask after Galileo’s cosmical system as I imagined I had heard of its being printed last year in Italy. I was told that it had been printed, but that every copy had been at the same time burnt at Rome, and that Galileo had been himself condemned to some penalty.” 14 He has also seen a copy of Galileo’s condemnation at Liege (September 20, 1633), with the words “although he professes that the [Copernican] theory was only adopted by him as a hypothesis.” His friend Beeckman lent him a copy of Galileo’s work, which he glanced through in his usual manner with other men’s books; he found it good, and ” failing more in the

points where it follows received opinions than where it diverges from them.” 15 The consequence of these reports of the hostility of the church led him to abandon all thoughts of publishing. The World was consigned to his desk; and although doctrines in all essential respects the same constitute the physical portion of his Principia, it was not till after the death of Descartes that fragments of the work, including Le Monde, or ? treatise on light, and the physiological tracts L’ Homme and La Formation du foetus, were given to the world by his admirer Claude Clerselier (1614-1684) in 1664. Descartes was not disposed to be a martyr; he had a sincere respect for the church, and had no wish to begin an open conflict with established doctrines.

In 1636 Descartes had resolved to publish some specimens of the fruits of his method, and some general observations on its

7 76. iii. 24. 10 lb. ix. 341. 13 lb. vi. 73.

- lb. vi. 234. 11 lb. vi. 89. 14 lb. vi. 239,

9 lb. ix. 131. 12 76. vi. 210. i 6 76, vi. 248,

nature which, under an appearance of simplicity, might sow the good seed of more adequate ideas on the world and man. ” I should be glad,” he says, when talking of a publisher, 1 ” if the whole book were printed in good type, on good paper, and I should like to have at least 200 copies for distribution. The book will contain four essays, all in French, with the general title of ‘ Project of a Universal science, capable of raising our nature to its highest perfection; also Dioptrics, Meteors and Geometry, wherein the most curious matters which the author could select as a proof of the universal science which he proposes are explained in such a way that even the unlearned may understand them.’ ” The work appeared anonymously at Leiden (published by Jean Maire) in 1637, under the modest title of Essais philosophiques; and the project of a universal science becomes the Diseours de la methode pour Men conduire sa raison et chercher la virile” dans les sciences. In 1644 it appeared in a Latin version, revised by Descartes, as Specimina philosophica. A work so widely circu- lated by the author naturally attracted attention, but in France it was principally the mathematicians who took it up, and their criticisms were more pungent than complimentary. Fermat, Roberval and Desargues took exception in their various ways to the methods

employed in the geometry, and to the demonstra- tions of the laws of refraction given in the Dioptrics and Meteors. The dispute on the latter point between Fermat and Descartes was continued, even after the philosopher's death, as late as 1662. In the youthful Dutch universities the effect of the essays was greater.

The first public teacher of Cartesian views was Henri Renery, a Belgian, who at Deventer and afterwards at Utrecht had introduced the new philosophy which he had learned Spread of f rom personal intercourse with Descartes. Renery slanism. on ty survived five years at Utrecht, and it was reserved for Heinrich Regius (van Roy) — who in 1638 had been appointed to the new chair of botany and theoretical medicine at Utrecht, and who visited Descartes at Egmond in order more thoroughly to learn his views — to throw down the gauntlet to the adherents of the old methods. With more eloquence than judgment, he propounded theses bringing into relief the points in which the new doctrines clashed with the old. The attack was opened by Gisbert Voet, foremost among the orthodox theo- logical professors and clergy of Utrecht. In 1639 he published a series of arguments against atheism, in which the Cartesian views were not obscurely indicated as perilous for the faith, though no name was mentioned. Next year he persuaded the magistracy to issue an order forbidding Regius to travel beyond the received doctrine. The magisterial views seem to have prevailed in the professoriate, which formally in March 1642 expressed its dis- approbation of the new philosophy as well as of its expositors. As yet Descartes was not directly attacked. Voet now issued, under the name of Martin Schoock, one of his pupils, a pamphlet with the title of Methodus novae philosophiae Renati Descartes, in which atheism and infidelity were openly declared to be the effect of the new teaching. Descartes replied to Voet directly in a letter, published at Amsterdam in 1643. He was summoned before the magistrates of Utrecht to defend himself against charges of irreligion and slander. What might have happened we cannot tell; but Descartes threw himself on the protection of the French ambassador and the prince of Orange, and the city magistrates, from whom he vainly demanded satisfaction in a dignified letter, 2 were snubbed by their superiors. About the same time (April 1645) Schoock was summoned before the university of Groningen, of which he was a member, and forthwith disavowed the more abusive passages in his book. So did the effects of the odium theologicum, for the meanwhile at least, die away.

In the Discourse of Method Descartes had sketched the main points in his new views, with a mental autobiography which Discourse m isht explain their origin, and with some suggestions of Method, as to their

applications. His second great work,. aadMedl- Meditations on the First Philosophy, which had been tatiocs. begun soon after his settlement in the Netherlands, expounded in more detail the foundations of his system, 1 CEuvres, vi. 276. 2 lb. ix. 250.

laying especial emphasis on the priority of mind to body, and on the absolute and ultimate dependence of mind as well as body on the existence of God. In 1640 a copy of the work in manuscript was despatched to Paris, and Mersenne was requested to lay it before as many thinkers and scholars as he deemed desirable, with a view to getting their views upon its argument and doctrine. Descartes soon had a formidable list of objections to reply to. Accordingly, when the work was published at Paris in August 1 64 1, under the title of Meditationes de prima philosophia ubi de Dei existentia et animae immortalitate (though it was in fact not the immortality but the immateriality of the mind, or, as the second edition described it, animae humanae a cor pore distinctio, which was maintained), the title went on to describe the larger part of the book as containing various objections of learned men, with the replies of the author. These objections in the first edition are arranged under six heads: the first came from Caterus, a theologian of Louvain; the second and sixth are anonymous criticisms from various hands; whilst the third, fourth and fifth belong respectively to Hobbes, Arnauld and Gassendi. In the second edition appeared the seventh — objec- tions from Pere Bourdin, a Jesuit teacher of mathematics in Paris; and subsequently another set of objections, known as those of Hyperaspistes, was included in the collection of Descartes's letters. The anonymous objections are very much the statement of common-sense against philosophy; those of Caterus criticize the Cartesian argument from the traditional theology of the church; those of Arnauld are an appreciative inquiry into the bearings and consequences of the meditations for religion and morality; while those of Hobbes (q.v.) and Gassendi — both somewhat senior to Descartes and with a dogmatic system of their own already formed— are a keen assault upon the spiritualism of the Cartesian position from a generally " sensational " standpoint. The criticisms of the last two are the criticisms of a hostile school of thought; those of Arnauld are the difficulties of a possible disciple.

In 1644 the third great work of Descartes, the Principia philosophiae, appeared at Amsterdam. Passing briefly over the conclusions arrived at in the Meditations, it deals in its second, third and fourth parts with the general It*™"' principles of physical science, especially the laws of motion, with the theory of vortices, and with the phenomena of heat, light, gravity, magnetism, electricity, &c, upon the earth. This work

exhibits some curious marks of caution. Undoubtedly, says Descartes, the world was in the beginning created in all its perfection. “But yet as it is best, if we wish to understand the nature of plants or of men, to consider how they may by degrees proceed from seeds, rather than how they were created by God in the beginning of the world, so, if we can excogitate some extremely simple and comprehensible principles, out of which, as if they were seeds, we can prove that stars, and earth and all this visible scene could have originated, although we know full well that they never did originate in such a way, we shall in that way expound their nature far better than if we merely described them as they exist at present.” 3 The Copernican theory is rejected in name, but retained in substance. The earth, or other planet, does not actually move round the sun; yet it is carried round the sun in the subtle matter of the great vortex, where it lies in equilibrium, — carried like the passenger in a boat, who may cross the sea and yet not rise from his berth.

In 1647 the difficulties that had arisen at Utrecht were repeated on a smaller scale at Leiden. There the Cartesian innovations had found a patron in Adrian Heerebord, and were openly discussed in theses and lectures. The theological professors took the alarm at passages in the Meditations; an attempt to prove the existence of God savoured, as they thought, of atheism anc heresy. When Descartes complained to the authorities of this unfair treatment, 4 the only reply was an order by which all mention of the name of Cartesianism, whether favourable or adverse, was forbidden in the university. This was scarcely what Descartes wanted, and again he had to apply to the prince of Orange, whereupon the theologians were asked to behave with 3 Princip. L. iii. S. 45. * CEuvres, x. 26.

civility, and the name of Descartes was no longer proscribed. But other annoyances were not wanting from unfaithful disciples and unsympathetic critics. The Instantiae of Gassendi appeared at Amsterdam in 1644 as a reply to the reply which Descartes had published of his previous objections; and the publication by Heinrich Regius of his work on physical philosophy (Fundamenta physices, 1646) gave the world to understand that he had ceased to be a thorough adherent of the philosophy which he had so enthusiastically adopted.

It was about 1648 that Descartes lost his friends Mersenne and

Mydorge by death. The place of Mersenne as his Parisian representative was in the main taken by Claude Clerselier (the French translator of the Objections and Responses), whom he had become acquainted with in Paris. Through Clerselier he came to know Pierre Chanut, who in 1645 was sent as French ambassador to the court of Sweden. Queen Christina was not yet twenty, and took a lively if a somewhat whimsical interest in literary and philosophical culture. Through Chanut, with whom she was on terms of familiarity, she came to hear of Descartes, and a correspondence which the latter nominally carried on with the ambassador was in reality intended for the eyes of the queen. The correspondence took an ethical tone. It began with a long letter on love in all its aspects (February 1647) >' a topic suggested by Chanut, who had been discussing it with the queen; and this was soon followed by another to Christina herself on the chief good. An essay on the passions of the mind (Passions de I'ame), which had been written originally for the princess Elizabeth, in development of some ethical views suggested by the De vita beata of Seneca, was enclosed at the same time for Chanut. It was a draft of the work published in 1650 under the same title. Philosophy, particularly that of Descartes, was becoming a fashionable divertissement for the queen and her courtiers, and it was felt that the presence of the sage himself was necessary to complete the good work of education. An invitation to the Swedish court was urged upon Descartes, and after much hesitation accepted; a vessel of the royal navy was ordered to wait upon him, and in September 1649 he left Egmond for the north.

The position on which he entered at Stockholm was unsuited for a man who wished to be his own master. The young queen wanted Descartes to draw up a code for a proposed ea ' academy of the sciences, and to give her an hour of philosophic instruction every morning at five. She had already determined to create him a noble, and begun to look out an estate in the lately annexed possessions of Sweden on the Pomeranian coast. But these things were not to be. His friend Chanut fell dangerously ill; and Descartes, who devoted himself to attend in the sick-roonij was obliged to issue from it every morning in the chill northern air of January, and spend an hour in the palace library. The ambassador recovered, but Descartes fell a victim to the same disease, inflammation of the lungs. The last time he saw the queen was on the 1st of February 1650, when he handed to her the statutes he had drawn up for the proposed academy. On the 1 ith of February he died. The queen wished to bury him at the feet of the Swedish kings, and to raise a costly mausoleum in his honour; but' these plans were overruled, and a plain monument in the Catholic cemetery was all that marked the place of his rest. Sixteen years after

his death the French treasurer d'Alibert made arrangements for the conveyance of the ashes to his native land; and in 1667 they were interred in the church of Ste Genevieve du Mont, the modern Pantheon. In 1819, after being temporarily deposited in a stone sarcophagus in the court of the Louvre during the Revolutionary epoch, they were transferred to St Germain-des-Pres, where they now repose between Montfaucon and Mabillon. A monument was raised to his memory at Stockholm by Gustavus III.; and a modern statue has been erected to him at Tours, with an inscription on the pedestal: " Je pense, done je suis."

Descartes never married, and had little of the amorous in his temperament. He has alluded to a. childish fancy for a young girl with a slight obliquity of vision; but he only mentions it 1 CEuvres, x. 3.

a propos of the consequent weakness which led him ta associate such a defect with beauty. 2 In person he was small, with large head, projecting brow, prominent nose, and eyes wide apart, with black hair coming down almost to his eyebrows. His voice was feeble. He usually dressed in black, with unobtrusive propriety.

Philosophy. — The end of all study, says Descartes, in one of his earliest writings, ought to be to guide the mind to form true and sound judgments on every thing that may be presented to it. 3 The sciences in their totality are but the intelligence of man; and all the details of knowledge have no value save as they strengthen the understanding. The mind is not for the sake of knowledge, but knowledge for the sake of the mind. This is the reassertion of a principle which the middle ages had lost sight of — that knowledge, if it is to have any value, must be intelligence, and not erudition.

But how is intelligence, as opposed to erudition, possible? The answer to that question is the method of Descartes. That idea of a method grew up with his study of geometry _

and arithmetic, — the only branches of knowledge mattes. which he would allow to be " made sciences." But they did not satisfy his demand for intelligence. " I found in them," he says, " different propositions on numbers of which, after a calculation, I perceived the truth; as for the figures, I had, so to speak, many truths put before my eyes, and many others concluded from them by analogy; but it did not seem to me that they told my mind with sufficient clearness why the things were as I was shown, and by what means their discovery was attained." 4 The mathematics of which he thus speaks included the geometry of the ancients, as it had been handed down to the modern

world, and arithmetic with the developments it had received in the direction of algebra. The ancient geometry, as we know it, is a wonderful monument of ingenuity — a series of tours de force, in which each problem to all appearance stands alone, and, if solved, is solved by methods and principles peculiar to itself. Here and there particular curves, for example, had been obliged to yield the secret of their tangent; but the ancient geometers apparently had no consciousness of the general bearings of the methods which they so successfully applied. Each problem was something unique; the elements of transition from one to another were.Jvanting; and the next step which mathematics had to make was to find some method of reducing, for instance, all curves to a common notation. When that was found, the solution of one problem would immediately entail the solution of all others which belonged to the same series as itself.

The arithmetical half of mathematics, which had been gradually growing into algebra, and had decidedly established itself as such in the Ad logisticen speciosam notae prior es of Francois Vieta (1540-1603), supplied to some extent the means of generalizing geometry." And the algebraists or arithmeticians of the 16th century, such as Luca Pacioli (Lucas de Borgo), Geronimo or Girolamo Cardano (1501-1576), and Niccola Tartaglia (1506- 1559), had used geometrical constructions to throw light on the solution of particular equations. But progress was made difficult, in consequence of the clumsy and irregular nomenclature employed. With Descartes the use of exponents as now employed for denoting the powers of a quantity becomes systematic; and without some such step by which the homogeneity of successive powers is at once recognized, the binomial theorem could scarcely have been detected. The restriction of the early letters of the alphabet to known, and of the late letters to unknown, quantities is also his work. In this and other details he crowns and com- pletes, in a form henceforth to be dominant for the language of algebra, the work of numerous obscure predecessors, such as Etienne de la Roche, Michael Stifel or Stiefel (1487-1567), and others.

Having thus perfected the instrument, his next step was to apply it in such a way as to bring uniformity of method into the isolated and independent operations of geometry. " I had no intention," 6 he says in the Method., " of attempting to master all

1 Regulae, CEuvres, xi. 202. 6 Disc, de methode, part ii.

2 lb. x. 53.

4 CEuvres, id. 219.

the particular sciences commonly called mathematics; but as I observed that, with all differences in their objects, they agreed in considering merely the various relations or proportions subsisting among these objects, I thought it best for my purpose to consider these relations in the most general form possible, without refer- ring them to any objects in particular except such as would most facilitate the knowledge of them. Perceiving further, that in order to understand these relations I should sometimes have to consider them one by one, and sometimes only to bear them in mind or embrace them in the aggregate, I thought that, in order the better to consider them individually, I should view them as subsisting between straight lines, than which I could find no objects more simple, or capable of being more distinctly repre- sented to my imagination and senses; and on the other hand that, in order to retain them in the memory or embrace an aggregate of many, I should express them by certain characters, the briefest possible." Such is the basis of the algebraical or modern analytical geometry. The problem of the curves is solved by their reduction to a problem of straight lines; and the locus of any point is determined by its distance from two given straight lines — the axes of co-ordinates. Thus Descartes gave to modern geometry that abstract and general character in which consists its superiority to the geometry of the ancients. In another question connected with this, the problem of drawing tangents to any curve, Descartes was drawn into a controversy with Pierre (de) Fermat (1601-1663), Gilles Persone de Roberval (1602-1675), and Girard Desargues (1593-1661). Fermat and Descartes agreed in regarding the tangent to a curve as a secant of that curve with the two points of intersection coinciding, while Roberval regarded it as the direction of the composite movement by which the curve can be described. Both these methods, differing from that now employed, are interesting as preliminary steps towards the method of fluxions and the differential calculus. In pure algebra Descartes expounded and illustrated the general methods of solving equations up to those of the fourth degree (and believed that his method could go beyond), stated the law which connects the positive and negative roots of an equation with the changes of sign in the consecutive terms, and introduced the method of indeterminate coefficients for the solution of equations. 1 These innovations have been attributed on in- adequate evidence to other algebraists, e.g. William Oughtred (1575-1660) and Thomas Harriot (1560-1621).

The Geometry of Descartes, unlike the other parts of his essays, is not easy reading. It dashes at once into the middle of the subjects with the examination of a problem which had baffled the ancients, and seems as if it were tossed at the heads of the French geometers as a challenge. An edition of it ap- peared subsequently, with notes by his friend Florimond de Beaune (1601-1652), calculated to smooth the difficulties of the work. All along mathematics was regarded by' Descartes rather as the envelope than the foundation of his method; and the " universal mathematical science " which he sought after was only the prelude of a universal science of all-embracing character. 2

The method of Descartes rests upon the proposition that all the objects of our knowledge fall into series, of which the members (are more or less known by means of one another. In method. every such series or group there is a dominant element, simple and irresoluble, the standard on which the rest of the series depends, and hence, so far as that group or series is concerned, absolute. The other members of the group are relative and dependent, and only to be understood as in various degrees subordinate to the primitive conception. The characteristic by which we recognize the fundamental element in a series is its intuitive or self-evident character; it is given by " the evident conception of a healthy and attentive mind so clear and distinct that no doubt is left." 3 Having discovered this prime or absolute member of the group, we proceed to consider the degrees in which the other members enter into relation with it. Here deduction comes into play to show the dependence of one term upon the others; and, in the case of a long chain of intervening links, the

1 Geomitr ie, book iii. ' (Euvres, xi. 224. * lb. xi. 212.

problem for intelligence is so to enunciate every element, and sc to repeat the connexion that we may finally grasp all the links of the chain in one. In this way we, as it were, bring the causal or primal term and its remotest dependent immediately together, and raise a derivative knowledge into one which is primary and intuitive. Such are the four points of Cartesian method: — (1) Truth requires a clear and distinct conception of its object, excluding all doubt; (2) the objects of knowledge naturally fall into series or groups; (3) in these groups investigation must begin with a simple and indecomposable element, and pass from it to the more complex and relative elements; (4) an exhaustive and immediate grasp of the relations and interconnexion of these elements is necessary for knowledge in the fullest sense of that word. 4

" There is no question," he says in anticipation of Locke and Kant, "

more important to solve than that of knowing what human knowledge is and how far it extends." " This is a question which ought to be asked at least once in their lives by all who seriously wish to gain wisdom. The inquirer will find that the first thing to know is intellect, because on it depends the knowledge of all other things. Examining next what immediately follows the knowledge of pure intellect, he will pass in review all the other means of knowledge, and will find that they are two (or three) , the imagination and the senses (and the memory) . He will therefore devote all his care to examine and distinguish these three means of knowledge; and seeing that truth and error can, properly speaking, be only in the intellect, and that the two other modes of knowledge are only occasions, he will carefully avoid whatever can lead him astray." 6 This separation of intellect from sense, imagination and memory is the cardinal precept of the Cartesian logic; it marks off clear and distinct (i.e. adequate and vivid) from obscure, fragmentary and incoherent conceptions.

The Discourse of Method and the Meditations apply what the Rules for the Direction of the Mind had regarded in particular instances to our conceptions of the world as a whole. p ua(/ a . They propose, that is, to find a simple and indecom- mental posable point, or absolute element, which gives to the principles world and thought their order and systematization. 0/ P* /to ' The grandeur of this attempt is perhaps unequalled in sophy ' the annals of philosophy. The three main steps in the argument are the veracity of our thought when that thought is true to itself, the inevitable uprising of thought from its fragmentary aspects in our habitual consciousness to the infinite and perfect existence which God is, and the ultimate reduction of the material universe to extension and local movement. There are the central dogmas of logic, metaphysics and physics, from which start the subsequent inquiries of Locke, Leibnitz and Newton. They are also the direct antitheses to the scepticism of Montaigne and Pascal, to the materiaiism of Gassendi and Hobbes, and to the superstitious anthropomorphism which defaced the reawakening sciences of nature. Descartes laid down the lines on which modern philosophy and science were to build. But himself no trained metaphysician, and unsusceptible to the lessons of history, he gives but fragments of a system which are held together, not by their intrinsic consistency, but by the Vigour of his personal conviction transcending the weaknesses and collisions of his several arguments. " All my opinions," he says, " are so conjoined, and depend so closely upon one another, that it would be impossible to appropriate one without knowing them all." 6 Yet every disciple of Cartesianism seems to disprove the dictum by his example.

The very moment when we begin to think, says Descartes, when we cease to be merely receptive, when we draw back and fix our attention on any point whatever of our belief, — that moment doubt begins. If we even stop for an instant to ask ourselves how a word ought to be spelled, the deeper we ponder that one word by itself the more hopeless grows the hesitation. The doubts thus awakened must not be stifled, but pressed systematically on to the point, if such a point there be, where ■doubt confutes itself. The doubt as to the details is natural; it

*Disc. de mithode, part. ii. 6 CEuv res, xi. 243. ‘lb. vii. 381.

Cogtto ergo sum.

is no less natural to have recourse to authority to silence the doubt. The remedy proposed by Descartes is (while not neglect- ing our duties to others, ourselves and God) to let doubt range unchecked through the whole fabric of our customary convictions. One by one they refuse to render any reasonable account of themselves; each seems a mere chance, and the whole tends to elude us like a mirage which some malignant power creates for our illusion. Attacked in detail, they vanish one after another into as many teasing spectra of uncertainty. We are seeking from them what they cannot give. But when we have done our worst in unsettling them, we come to an ultimate point in the fact that it is we who are doubting, we who are thinking. We may doubt that we have hands or feet, that we sleep or wake, and that there is a world of material things around us; but we cannot

doubt that we are doubting. We are certain that we

are thinking, and in so far as we are thinking we are.

Je pense, done je suis. In other words, the criterion of truth is a clear and distinct conception, excluding all pos- sibility of doubt.

The fundamental point thus established is the veracity of consciousness when it does not go beyond itself, or does not postulate something which is external to itself. At this point Gassendi arrested Descartes and addressed his objections to him as pure intelligence,— O mens! But even this mens, or mind, is but a point — we have found no guarantee as yet for its continuous existence. The analysis must be

carried deeper, if we are to gain any further conclusions.

Amongst the elements of our thought there are some which we can make and unmake at our pleasure; there are others which come and go without our wish; there is also a third class which is of the very essence of our thinking, and which dominates our conceptions. We find that all our ideas of limits, sorrows and weaknesses presuppose an infinite, perfect and ever-blessed something beyond them and including them, — that all our ideas, in all their series, converge to one central idea, in which they find their explanation. The formal fact of thinking is what constitutes our being; but this thought leads us back, when we consider its concrete contents, to the necessary pre-supposition on which our ideas depend, the permanent cause on which they and we as conscious beings depend. We have therefore the idea of an in- finite, perfect and all-powerful being — an idea which cannot be the creation of ourselves, and must be given by some being who really possesses all that we in idea attribute to him. Such a being he identifies with God. But the ordinary idea of God can scarcely be identified with such a conception. ” The majority of men,” he says himself, ” do not think of God as an infinite and incomprehensible being, and as the sole author from whom all things depend; they go no further than the letters of his name.” 1

” The vulgar almost imagine him as a finite thing.” ofaod. The God of Descartes is not merely the creator of

the material universe; he is also the father of all truth in the intellectual world. ” The metaphysical truths,” he says, ” styled eternal have been established by God, and, like the rest of his creatures, depend entirely upon him. To say that these truths are independent of him is to speak of God as a Jupiter or a Saturn, — to subject him to Styx and the Fates.” 2 The laws of thought, the truths of number, are the decrees of God. The expression is anthropomorphic, no less than the dogma of material creation; but it is an attempt to affirm the unity of the intellectual and the material world. Descartes establishes a philosophic monotheism, — by which the medieval polytheism of substantial forms, essences and eternal truths fades away before God, who is the ruler of the intellectual world no less than of the kingdom of nature and of grace.

To attach a clear and definite meaning to the Cartesian doctrine of God, to show how much of it comes from the Christian theology and how much from the logic of idealism, how far the conception of a personal being as creator and preserver mingles with the pantheistic conception of an infinite and perfect some- thing which is all in all,

would be to go beyond Descartes and to ask for a solution of difficulties of which he was 1 (Euvres, vi. 132. ! lb. vi. 109.

scarcely aware. It seems impossible to deny that the tendency of his principles and his arguments is mainly in the line of a metaphysical absolute, as the necessary completion and founda- tion of all being and knowledge. Through the truthfulness of that God as the author of all truth he derives a guarantee for our perceptions in so far as these are clear and distinct. And it is in guaranteeing the veracity of our clear and distinct conceptions that the value of his deduction of God seems in his own estimate to rest. All conceptions which do not possess these two attri- butes—of being vivid in themselves and discriminated from all others — cannot be true. But the larger part of our conceptions are in such a predicament. We think of things not in the abstract elements of the things themselves, but in connexion with, and in language which presupposes, other things. Our idea of body, e.g., involves colour and weight, and yet when we try to think carefully, and without assuming anything, we find that we cannot attach any distinct idea to these terms when applied to body. In truth therefore these attributes do not belong to body at all; and if we go on in the same way testing the received qualities of matter, we shall find that in the last resort we understand nothing by it but extension, with the secondary and derivative characters of divisibility and mobility.

But it would again be useless to ask how extension as the characteristic attribute of matter is related to mind which thinks, and how God is to be regarded in reference to extension. The force of the universe is swept up and gathered in God, who com- municates motion to the parts of extension, and sustains that motion from moment to moment; and in the same way the force of mind has really been concentrated in God. Every moment one expects to find Descartes saying with Hobbes that man's thought has created God, or with Spinoza and Malebranche that it is God who really thinks in the apparent thought of man. After all, the metaphysical theology of Descartes, however essential in his own eyes, serves chiefly as the ground for constructing his theory of man and of the universe. His fundamental hypothesis relegates to God all forces in their ultimate origin. Hence the world is left open for the free play of mechanics and geometry. The dis- turbing conditions of will, life and organic forces are eliminated from the problem; he starts with the clear and distinct idea of extension, figured and moved, and thence by mathematical laws he gives a hypothetical explanation of all things. Such ex- planationof physical phenomena is themain problemof Descartes, and it goes on encroaching upon territories once supposed proper to the mind. Descartes began with the certainty that we are thinking beings;

that region remains untouched; but up to its very borders the mechanical explanation of nature reigns unchecked.

The physical theory, in its earlier form in The World, and later in the Principles of Philosophy (which the present account follows), rests upon the metaphysical conclusions of the Meditations. It proposes to set forth the genesis of the theory! existing universe from principles which can be plainly understood, and according to the acknowledged laws of the trans- mission of movement. The idea of force is one of those obscure conceptions which originate in an obscure region, in the sense of muscular power. The true physical conception is motion, the ultimate ground of which is to be sought in God's infinite power. Accordingly the quantity of movement in the universe, like its mover, can neither increase nor diminish. The only circum- stance which physics has to consider is the transference of move- ment from one particle to another, and the change of its direction. Man himself cannot increase the sum of motion; he can only alter its direction. The whole conception of force may disappear from a theory of the universe; and we can adopt a geometrical definition of motion as the shifting of one body from the neigh- bourhood of those bodies which immediately touch it, and which are assumed to be at rest, to the neighbourhood of other bodies. Motion, in short, is strictly locomotion, and nothing else:

Descartes has laid down three laws of nature, and seven secondary laws regarding impact. The latter are to a large extent incorrect. The first law affirms that every body, so far as it is altogether unaffected by extraneous causes, always

perseveres in the same state of motion or of rest; and the second law that simple or elementary motion is always in a straight line. 1 These doctrines of inertia, and of the composite character of curvilinear motion, were scarcely apprehended even by Kepler or Galileo; but they follow naturally from the geometrical analysis of Descartes.

Extended body has no limits to its extent, though the power of God has divided it in lines discriminating its parts in endless ways. The infinite universe is infinitely full of matter. Empty space, as distinguished from material extension, is a fictitious abstraction. There is no such thing really as a vacuum, any more than there are atoms or ultimate indivisible particles. In both these doctrines of d, priori

science Descartes has not been subverted, but, if anything, corroborated by the results of experimental physics; for the so-called atoms of chemical theory already presuppose, from the Cartesian point of view, certain aggregations of the primitive particles of matter. Descartes regards matter as uniform in character throughout the universe; he anticipates, as it were, from his own transcendental ground, the revelations of spectrum analysis as applied to the sun and stars. We have then to think of a full universe of matter (and matter = extension) divided and figured with endless variety, and set (and kept) in motion by God; and any sort of division, figure and motion will serve the purposes of our supposition as well as another. ” Scarcely any supposition,” 2 he says, ” can be made from which the same result, though possibly with greater difficulty, might not be deduced by the same laws of nature; for since, in virtue of these laws, matter successively assumes all the forms of which it is capable, if we consider these forms in order, we shall at one point or other reach the existing form of the world, so that no error need here be feared from a false supposition.” As the movement of one particle in a closely packed universe is only possible if all other parts move simultaneously, so that the last in the series steps into the place of the first; and as the figure and division of the particles varies in each point in the universe, there will inevitably at the same instant result through out the universe an innumerable host of more or less circular movements, and of vortices or whirlpools of material particles varying in size and velocity. Taking for convenience a limited

portion of the universe, we observe that in consequence vortices °f t ‘ ie circular movement, the particles of matter have

their corners pared off by rubbing against each other; and two species of matter thus arise, — one consisting of small globules which continue their circular motion with a (centrifugal) tendency to fly off from the centre as they swing round the axis of rotation, while the other, consisting of the fine dust—the filings and parings of the original particles — gradually becoming finer and finer, and losing its velocity, tends (centripetally) to accumulate in the centre of the vortex, which has been gradually left free by the receding particles of globular matter. This finer matter which collects in the centre of each vortex is the first matter of Descartes — it constitutes the sun or star. The spherical particles are the second matter of Descartes, and their tendency to propel one another from the centre in straight lines towards the circumference of each vortex is what gives rise to the phenomenon of light radiating from the central star. This second matter is atmosphere or firmament, which envelops and revolves around the central accumulation of first matter.

A third form of matter is produced from the original particles. As the small filings produced by friction seek to pass through the interstices between the rapidly revolving spherical particles in the vortex, they are detained and become twisted and chan- nelled in their passage, and when they reach the edge of the inner ocean of solar dust they settle upon it as the froth and foam produced by the agitation of water gathers upon its surface. These form what we term spots in the sun. In some cases they come and go, or dissolve into an aether round the sun; but in other cases they gradually increase until they form a dense crust round the central nucleus. In course of time the star, with its expansive force diminished, suffers encroachments from the neighbouring vortices, and at length they catch it up. If the 1 Princip. part ii. 37. 2 lb. part iii. 47.

I velocity of the decaying star be greater than that of any part of the vortex which has swept it up, it will ere long pass out of the range of that vortex, and continue its movement from one to another. Such a star is a comet. But in other cases the en- crusted star settles in that portion of the revolving vortex which has a velocity equivalent to its own, and so continues to revolve in the vortex, wrapped in its own firmament. Such a reduced and impoverished star is a planet; and the several planets of our solar system are the several vortices which from time to time have been swept up by the central sun-vortex. The same considera- tions serve to explain the moon and other satellites. They too were once vortices, swallowed up by some other, which at a later day fell a victim to the sweep of our sun.

Such in mere outline is the celebrated theory of vortices, which for about twenty years after its promulgation reigned supreme in science, and for much longer time opposed a tenacious resist- ance to rival doctrines. It is one of the grandest hypotheses which ever have been formed to account by mechanical processes for the movements of the universe. While chemistry rests in the acceptance of ultimate heterogeneous elements, the vortex-theory assumed uniform matter through the universe, and reduced cosmical physics to the same principles as regulate terrestrial phenomena. It ended the old Aristotelian distinction between the sphere beneath the moon and the starry spaces beyond. It banished the spirits and genii, to which even Kepler had assigned the guardianship of the planetary movements; and, if it supposes the globular particles of the envelope to be the active force in carrying the earth round the sun, we may remember that Newton himself assumed an aether for somewhat similar purposes. The great argument on which the Cartesians founded their opposition to the Newtonian doctrine was that attraction was an occult quality, not wholly intelligible by the aid of mere mechanics.

The Newtonian theory is an analysis of the elementary movements which in their combination determine the planetary orbits, and gives the formula of the proportions according to which they act. But the Cartesian theory, like the later speculations of Kant and Laplace, proposes to give a hypothetical explanation of the circumstances and motions which in the normal course of things led to the state of things required by the law of attraction. In the judgment of D'Alembert the Cartesan theory was the best that the observations of the age admitted; and " its explanation of gravity was one of the most ingenious hypotheses which philosophy ever imagined." That the explanation fails in detail is undoubted: it does not account for the ellipticity of the planets; it would place the sun, not in one focus, but in the centre of the ellipse; and it would make gravity directed towards the centre only under the equator. But these defects need not blind us to the fact that this hypothesis made the mathematical progress of Hooke, Borelli and Newton much more easy and certain. Descartes professedly assumed a simplicity in the phenomena which they did not present. But such a hypothetical simplicity is the necessary step for solving the more complex problems of nature. The danger lies not in forming such hypotheses, but in regarding them as final, or as more than an attempt to throw light upon our observation of the phenomena. In doing what he did, Descartes actually exemplified that reduction of the processes of nature to mere transposition of the particles of matter, which in different ways was a leading idea in the minds of Bacon, Hobbes and Gassendi. The defects of Descartes lie rather in his apparently imperfect apprehension of the principle of movements uniformly acceler- ated which his contemporary Galileo had illustrated and insisted upon, and in the indistinctness which attaches to his views of the transmission of motion in cases of impact. It should be added that the modern theory of vortex-atoms (Lord Kelvin's) to explain the constitution of matter has but slight analogy with Cartesian doctrine, and finds a parellel, if anywhere, in a modification of that doctrine by Malebranche.

Besides the last two parts of the Principles of Philosophy, the physical writings of Descartes include the Dioptrics and Meteors, as well as passages in the letters. His optical investigations are perhaps the subject in which he most contributed to the progress

of science; and the lucidity of exposition which marks his Dioptrics stands conspicuous even amid the generally luminous style of his

works. Its object is a practical one, to theories, determine by scientific considerations the shape of lens best adapted to improve the capabilities of the tele- scope, which had been invented not long before. The conclusions at which he arrives have not been so useful as he imagined, in consequence of the mechanical difficulties. But the investiga- tion by which he reaches them has the merit of first prominently publishing and establishing the law of the refraction of light. Attempts have been made, principally founded on some remarks of Huygens, to show that Descartes had learned the principles of refraction from the manuscript of a treatise by Willebrord Snell, but the facts are uncertain; and, so far as Descartes founds his optics on any one, it is probably on the researches of Kepler. In any case the discovery is to some extent his own, for his proof of the law is founded upon the theory that light is the propagation of the aether in straight fines from the sun or luminous body to the eye (see Light). Thus he approximates to the wave theory of light, though he supposed that the transmission of light was instantaneous. The chief of his other contributions to optics was the explanation of the rainbow — an explanation far from com- plete, since the unequal refrangibility of the rays of light was yet undiscovered — but a decided advance upon his predecessors, notablv on the De radiis visus et lucis (1611) of Marc-Antonio de Dominis, archbishop of Spalato.

If Descartes had contented himself with thus explaining the phenomena of gravity, heat, magnetism, fight and similar forces by means of the molecular movements of his vortices, even such a theory would have excited admiration. But he did not stop short in the region of what is usually termed physics. Chemistry and biology are alike swallowed up in the one science of physics, and reduced to a problem of mechanism. This theory, he believed, would afford an explanation of every phenomenon whatever, and in nearly every department of knowledge he has given specimens of its power. But the most remarkable and daring application of the theory was to account for the phenomena of organic life, especially in animals and man. ” If we possessed a thorough knowledge,” he says, 1 ” of all the parts of the seed of any species of animal {e.g. man), we could from that alone, by reasons entirely mathematical and certain, deduce the whole figure and conforma- tion of each of its members, and, conversely, if we knew several peculiarities of this conformation, we could from these deduce the nature of its seed.” The organism in this way is regarded as a machine, constructed from the particles of the seed, which in virtue of the laws of motion have arranged themselves (always under the governing power of God) in the particular animal shape in which we see them. The doctrine of the circulation of the blood, which Descartes

adopted from Harvey, supplied additional arguments in favour of his mechanical theory, and he probably did much to popularize the discovery. A fire without light, compared to the heat which gathers in a haystack when the hay has been stored before it was properly dry— heat, in short, as an agitation of the particles — is the motive cause of the contraction and dilatations of the heart. Those finer particles of the blood which become extremely rarefied during this process pass off in two directions — one portion, and the least important in the theory, to the organs of generation, the other portion to the cavities of the brain. There not merely do they serve to nourish the organ, they also give rise to a fine ethereal flame or wind through the action of the brain upon them, and thus form the so-called ” animal ” spirits. From the brain these spirits are conveyed through the body by means of the nerves, regarded by Descartes as tubular vessels, resembling the pipes conveying the water of a spring to act upon the mechanical appliances in an artificial fountain. The nerves conduct the animal spirits to act upon the muscles, and in their turn convey the impressions of the organs to the brain.

Man and the animals as thus described are compared to automata, and termed machines. The vegetative and sensitive souls which the Aristotelians had introduced to break the leap 1 CEuvres, iv. 494.

between inanimate matter and man are ruthlessly swept away; only one soul, the rational, remains, and that is restricted to man. One hypothesis supplants the various principles of life; the rule of absolute mechanism is as complete in maOsm. the animal as in the cosmos. Reason and thought, the essential quality of the soul, do not belong to the brutes; there is an impassable gulf fixed between man and the lower animals. The only sure sign of reason is the power of language — i.e. of giving expression to general ideas; and language in that sense is not found save in man. The cries of animals are but the working of the curiously-contrived machine, in which, when one portion is touched in a certain way, the wheels and springs concealed in the interior perform their work, and, it may be, a note supposed to express joy or pain is evolved; but there is no consciousness or feeling. ” The animals act naturally and by springs, like a watch.” 2 ” The greatest of all the prejudices we have retained from our infancy is that of believing that the beasts think.” 3 If the beasts can properly be said to see at all, ” they see as we do when our mind is distracted and keenly applied else- where; the images of outward objects paint themselves on the retina, and possibly even the impressions made in the optic nerves determine our limbs to different movements, but we feel nothing of it all, and move as if we were automata.” 4 The sentience of the animal to the lash of his tyrant is not other than the

sensi- tivity of the plant to the influences of fight and heat. It is not much comfort to learn further from Descartes that ” he denies life to no animal, but makes it consist in the mere heat of the heart. Nor does he deny them feeling in so far as it depends on the bodily organs.” 5

Descartes, with an unusual fondness for the letter of Scripture, quotes oftener than once in support of this monstrous doctrine the dictum, ” the blood is the life “; and he remarks, with some sarcasm possibly, that it is a comfortable theory for the eaters of animal flesh. And the doctrine found acceptance among some whom it enabled to get rid of the difficulties raised by Montaigne and those who allowed more difference between animal and animal than between the higher animals and man. It also encouraged vivisection — a practice common with Descartes himself. 8 The recluses of Port Royal seized it eagerly, discussed automatism, dissected living animals in order to show to a morbid curiosity the circulation of the blood, were careless of the cries of tortured dogs, and finally embalmed the doctrine in a syllogism of their logic, — No matter thinks; every soul of beast is matter: there- fore no soul of beast thinks.

But whilst all the organic processes in man go on mechani- cally, and though by reflex action he may repel attack uncon- sciously, still the first affirmation of the system was that man was essentially a thinking being; and, while we retain this original dictum, it must not be supposed that the mind is a mere spectator, or like the boatman in the boat. Of course a unity of nature is impossible between mind and body so described. And yet there is a unity of composition, a unity so o/„/ nd close that the compound is ” really one and in a sense and body. indivisible.” You cannot in the actual man cut soul and body asunder; they interpenetrate in every member. But there is one point in the human frame — a point midway in the brain, single and free, which may in a special sense be called the seat of the mind. This is the so- called c narion, or pineal gland, where in a minimized point the mind on one hand and the vital spirits on the other meet and communicate. In that gland the mystery of creation is concentrated; thought meets extension and directs it; extension moves towards thought and is per- ceived. Two clear and distinct ideas, it seems, produce an absolute mystery. Mind, driven from the field of extension, erects its last fortress in the pineal gland. In such a state of despair and destitution there is no hope for spiritualism, save in God; and Clauberg, Geulincx and Malebranche all take refuge under the shadow of his wings to escape the tyranny of extended matter.

In the psychology of Descartes there are two fundamental

2 75. ix. 426. 3 lb. x. 204. 4 lb. vi. 339.

6 lb. x. 208. 6 lb. iv. 452 and 454.

modes of thought, — perception and volition. ” It seems to me,” he says, ” that in receiving such and such an idea the mind is

passive, and that it is active only in volition; that its tow!”” ideas are put in it partly by the objects which touch the

senses, partly by the impressions in the brain, and partly also by the dispositions which have preceded in the mind itself and by the movements of its will.” 1 The will, therefore, as being more originative, has more to do with true or false judgments than the understanding. Unfortunately, Descartes is too lordly a philosopher to explain distinctly what either under- standing or will may mean. But we gather that in two directions our reason is bound up with bodily conditions, which make or mar it, according as the will, or central energy of thought, is true to itself or not. In the range of perception, intellect is subjected to the material conditions of sense, memory and imagination; and in infancy, when the will has allowed itself to assent precipitately to the conjunctions presented to it by these material processes, thought has become filled with obscure ideas. In the moral sphere the passions or emotions (which Descartes reduces to the six primitive forms of admiration, love, hatred, desire, joy and sadness) are the perceptions or sentiments of the mind, caused and maintained by some movement of the vital spirits, but specially referring to the mind only. The presentation of some object of dread, for example, to the eye has or may have a double effect. On one hand the animal spirits “reflected” 2 from the image formed on the pineal gland proceed through the nervous tubes to make the muscles turn the back and lift the feet, so as to escape the cause of the terror. Such is the reflex and mechanical movement independent of the mind. But, on the other hand, the vital spirits cause a movement in the gland by which the mind perceives the affection of the organs, learns that something is to be loved or hated, admired or shunned. Such perceptions dispose the mind to pursue what nature dictates as useful. But the estimate of goods and evils which they give is indistinct and unsatisfactory. The office cf reason is to give a true and distinct appreciation of the values of goods and evils; or firm and determinate judgments touching the knowledge of good and evil are our proper arms against the influence

of the passions. 3 We are free, therefore, through knowledge: ex magna luce in intellectu sequitur magna propensio in voluntate, and omnis peccans est ignorans. ” If we clearly see that what we are doing is wrong, it would be impossible for us to sin, so long as we saw it in that light.” 4 Thus the highest liberty, as distinguished from mere indifference, proceeds from clear and distinct knowledge, and such knowledge can only be attained by firmness and resolution, i.e. by the continued exercise of the will. Thus in the perfection of man, as in the nature of God, will and intellect must be united. For thought, will is as necessary as understanding. And innate ideas therefore are mere capacities or tendencies, — possibilities which apart from the will to think may be regarded as nothing at all.

The Cartesian School.— The philosophy of Descartes fought its first battles and gained its first triumphs in the country of his adoption. In his lifetime his views had been taught in Utrecht and Leiden. In the universities of the Netherlands and of lower Germany, as yet free from the conservatism of the old-established seats of learning, the new system gained an easy victory over Aristotelianism, and, as it was adapted for lectures and exam- inations, soon became almost as scholastic as the doctrines it had supplanted. At Leiden, Utrecht, Groningen, Franeker, Breda, Nimeguen, Harderwyk, Duisburg and Herborn, and at the Catholic university of Louvain, Cartesianism was warmly expounded and defended in seats of learning, of which many are now left desolate, and by adherents whose writings have for the most part long lost interest for any but the antiquary.

The Cartesianism of Holland was a child of the universities, and its literature is mainly composed of commentaries upon

the original texts, of theses discussed in the schools,

and of systematic expositions of Cartesian philosophy for the benefit of the student. Three names stand out in this

2 Passions de I’dme, 36.

Holland.

1 (Euvres, ix. 166. 3 lb. 48.

4 CEuvres, ix. 170.

Cartesian professoriate, — Wittich, Claubergand Geulincx. Chris- toph Wittich (1625-1687), professor at Duisburg and Leiden, is a representative of the moderate followers who professed to reconcile

the doctrines of their school with the faith of Christendom and to refute the theology of Spinoza. Johann Clauberg (q.v.) commented clause by clause upon the Meditations of Descartes; but he specially claims notice for his work De corporis et animae in homine conjunctione, where he maintains that the bodily movements are merely procatarctic causes {i.e. antecedents, but not strictly causes) of the mental action, and sacrifices the independence of man to the omnipotence of God. The same tendency is still more pronounced in Arnold Geulincx (q.v.). With him the reciprocal action of mind and body is altogether denied; they resemble two clocks, so made by the artificer as to strike the same hour together. The mind can act only upon itself; beyond that limit, the power of God must intervene to make any seeming interaction possible between body and soul. Such are the half-hearted attempts at consistency in Cartesian thought, which eventually culminate in the pantheism of Spinoza (see Cartesianism).

Descartes occasionally had not scrupled to interpret the Scriptures according to his own tenets, while still maintaining, when their letter contradicted him, that the Bible was not meant to teach the sciences. Similar tendencies are found amongst his followers. Whilst Protestant opponents put him in the list of atheists like Vanini, and the Catholics held him as dangerous as Luther or Calvin, there were zealous adherents who ventured to prove the theory of vortices in harmony with the book of Genesis. It was this rationalistic treatment of the sacred writings which helped to confound the Cartesians with the allegorical school of John Cocceius, as their liberal doctrines in theology justified the vulgar identification of them with the heresies of Socinian and Arminian. The chief names in this advanced theology connected with Cartesian doctrines are Ludwig Meyer, the friend and editor of Spinoza, author of a work termed Philosophia scripturae interpres (1666); Balthasar Bekker, whose World Bewitched helped to discredit the superstitious fancies about the devil; and Spinoza, whose Tractatus theologico-politicus is in some respects the classical type of rational criticism up to the present day. Against this work and the Ethics of Spinoza the orthodox Cartesians (who were in the majority), no less than sceptical hangers-on like Bayle, raised an all but universal howl of repro- bation, scarcely broken for about a century.

In France Cartesianism won society and literature before it penetrated into the universities. Clerselier (the friend of Descartes and his literary executor), his son-in-law p Rohault (who achieved that relationship through his Cartesianism), and others, opened their houses for readings to which the intellectual world of Paris — its learned professors not more than the courtiers and the fair sex, — flocked to

hear the new doctrines explained, and possibly discuss their value. Grand seigneurs, like the prince of Conde, the due de Nevers and the marquis de Vardes, were glad to vary the monotony of their feudal castles by listening to the eloquent rehearsals of Male- branche or Regis. And the salons of Mme de Sevigne, of her daughter Mme de Grignan, and of the duchesse de Maine for a while gave the questions of philosophy a place among the topics of polite society, and furnished to Moliere the occasion of his Femmes savantes. The Chateau of the due de Luynes, the trans- lator of the Meditations, was the home of a Cartesian club, that discussed the questions of automatism and of the comDosition of the sun from filings and parings, and rivalled Port Royal in its vivisections. The cardinal de Retz in his leisurely age at Commercy found amusement in presiding at disputations between the more moderate Cartesians and Don Robert Desgabets, who interpreted Descartes in an original way of his own. Though rejected by the Jesuits, who found peripatetic formulae a faithful weapon against the enemies of the church, Cartesianism was warmly adopted by the Oratory, which saw in Descartes some- thing of St Augustine, by Port Royal, which discovered a connexion between the new system and Jansenism, and by some amongst the Benedictines and the order of Ste Genevieve-

The popularity which Cartesianism thus gained in the social and literary circles of the capital was largely increased by the labours of Pierre-Sylvain Regis (1632-1707). On his visit to Toulouse in 1665, with a mission from the Cartesian chiefs, his lectures excited boundless interest; ladies threw themselves with zeal and ability into the study of philosophy; and Regis himself was made the guest of the civic corporation. In 167 1 scarcely, less enthusiasm was roused in Montpellier; and in 1680 he opened a course of lectures at Paris, with such acceptance that hearers had to take their seats in advance. Regis, by removing the paradoxes and adjusting the metaphysics to the popular powers of apprehension, made Cartesianism popular, and reduced it to a regular system.

But a check was at hand. Descartes, in his correspondence with the Jesuits, had shown an almost cringing eagerness to have their powerful organization on his side. Especially he had written to Pere Mesland, one of the order $ to show how the Catholic doctrine of the eucharist might be made compatible with his theories of matter. But his undue haste to arrange matters with the church only served to

compromise him more deeply. Unwise admirers and malicious opponents exaggerated the theological bearings of his system in this detail; and the efforts of the Jesuits succeeded in getting the works of Descartes, in November 1663, placed upon the index of prohibited books, — donee corrigantur. Thereupon the power of church and state enforced by positive enactments the passive resistance of old institutions to the novel theories. In 1667, the oration at the interment was forbidden by royal order. In 1669, when the chair of philosophy at the College Royal fell vacant, one of the four selected candidates had to sustain a thesis against ” the pretended new philosophy of Descartes.” In 167 1 the archbishop of Paris, by the king’s order, summoned the heads of the university to his presence, and enjoined them to take stricter measures against philosophical novelties dangerous to the faith. In 1673 a decree of the parlement against Cartesian and other unlicensed theories was on the point of being issued, and was only checked in[time by the appearance of a burlesque mandamus against the intruder Reason, composed by Boileau and some of his brother-poets. Yet in 1675 the university of Angers was empowered to repress all Cartesian teaching within its domain, and actually appointed a commission charged to look for such heresies in the theses and the students’ note-books of the college of Anjou belonging to the Oratory. In 1677 the university of Caen adopted not less stringent measures against Cartesianism. And so great was the influence of the Jesuits, that the congregation of St Maur, the canons of Ste Genevieve, and the Oratory laid their official ban on the obnoxious doctrines. From the real or fancied rapproche- ments between Cartesianism and Jansenism, it became for a while impolitic, if not dangerous, to avow too loudly a preference for Cartesian theories. Regis was constrained to hold back for ten years his System of Philosophy; and when it did appear, in i6go, the name of Descartes was absent from the title-page. There were other obstacles besides the mild persecutions of the church. Pascal and other members of Port Royal openly expressed their doubts about the place allowed to God in the system; the adherents of Gassendi met it by resuscitating atoms; and the Aristotelians maintained their substantial forms as of old; the Jesuits argued against the arguments for the being of God, and against the theory of innate ideas; whilst Pierre Daniel Huet (1630-1721), bishop of Avranches, once aCartesian himself, made a vigorous onslaught on the contempt in which his former comrades held literature and history, and enlarged on the vanity of ail human aspirations after rational truth.

The greatest and most original of the French Cartesians was Malebranche (q.v.). His Recherche de la vSriti, in 1674, was the

baptism of the system into a theistic religion which borrowed its imagery from Augustine; it brought into prominence the metaphysical base which Louis Delaforge, Jacques Rohault and Regis had neither cared for nor understood. But this doctrine was a criticism and a divergence, no less than a consequence, from the principles in Descartes; and it brought upon Malebranche the opposition, not merely of the Cartesian

physicists, but also of Arnauld, Fenelon and Bossuet, who found, or hoped to find, in the Meditations, as properly understood, an ally for theology. Popular enthusiasm, however, was with Malebranche, as twenty years before it had been with Descartes; he was the fashion of the day; and his disciples rapidly increased both in France and abroad.

In 1705 Cartesianism was still subject to prohibitions from the authorities; but in a project of new statutes, drawn up for the faculty of arts at Paris in 1720, the Method and Meditations of Descartes were placed beside the Organon and the Metaphysics of Aristotle as text-books for philosophical study. And before 1725, readings, both public and private, were given from Cartesian texts in some of the Parisian colleges. But when this happened, Cartesianism was no longer either interesting or dangerous; its theories, taught as ascertained and verified truths, were as worthless as the systematic verbiage which preceded them. Already antiquated, it could not resist the wit and raillery with which Voltaire, in his Lettres sur les Anglais (1728), brought against it the principles and results of Locke and Newton. The old Cartesians, Jean Jacques Dortous de Mairan (1678-1771) and especially Fontenelle, with his Thiorie des tourbillons (1752), struggled in vain to refute Newton by styling attraction an occult quality. Fortunately the Cartesian method had already done its service, even where the theories were rejected. The Port Royalists, Pierre Nicole (1625-1695) and Antoine Arnauld (161 2-1694), na d applied it to grammar and logic; Jean Domat or Daumat (1625-1696) and Henri Francois Daugesseau (1668-1751) to jurisprudence; Fontenelle, Charles Perrault (1628-1703) and Jean Terrasson (1670-1750) to literary criticism, and a worthier estimate of modern literature. Though it never ceased to influence individual thinkers, it had handed on to Condillac its popularity with the masses. A Latin abridgment of philosophy, dated 1784, tells us that the innate ideas of Descartes are founded on no arguments, and are now universally abandoned. The ghost of innate ideas seems to be all that it had left. ˆ

In Germany a few Cartesian lecturers taught at Leipzig and Halle, but the system took no root, any more than in Switzerland, where it had a brief reign at Geneva after 1669. In „ Italy the effects were more

permanent. What is termed the iatro-mechanical school of medicine, with G. A. Borelli (1608-1679) as its most notable name, entered in a way on the mechanical study of anatomy suggested by Descartes, but was probably much more dependent upon the positive researches of Galileo. At Naples there grew up a Cartesian school, of which the best known members are Michel Angelo Fardella (1650-1708) and Cardinal Gerdil (1718-1802), both of whom, however, attached themselves to the characteristic views of Malebranche.

In England Cartesianism took but slight hold. Henry More, who had given it a modified sympathy in the lifetime of the author, became its opponent in later years; and Eazland Cudworth differed from it in most essential points. Antony Legrand, from Douai, attempted to introduce it into Oxford, but failed. He is the author of several works, amongst others a system of Cartesian philosophy, where a chapter on ” Angels ” revives the methods of the schoolmen. His chief opponent was Samuel Parker (1640-1688) , bishop of Oxford, who, in his attack on the irreligious novelties of the Cartesian, treats Descartes as a fellow-criminal in infidelity with Hobbes and Gassendi. Rohault’s version of the Cartesian physics was translated into English; and Malebranche found an ardent follower in John Norris (1667-1711). Of Cartesianism towards the close of the 17th century the only remnants were an over- grown theory of vortices, which received its death-blow from Newton, and a dubious phraseology anent innate ideas, which found a witty executioner in Locke.

For an account of the metaphysical doctrines of Descartes, in their connexions with Malebranche and Spinoza, see Cartesianism.

BibLioGRaphV.— I. Editions and Translations.— -The collected works of Descartes were published in Latin in 8 vols, at Amsterdam (1670-1683), in 7 vols, at Frankfort (1697) and in 9 vols, by Elzevir

(1713); in French in 13 vols. (Paris, 1724-1729), republished by Victor Cousin (Paris, 1824-1826) in 11 vols., and again under the authority of the minister of public instruction by C. Adam and P. Tannery (1897 foil.). These-include his so-called posthumous works. The Rules for the Direction of the Mind, The Search for Truth by the Light of Nature, and other unimportant fragments, published (in Latin) in 1701. In 1859-1860 Foucher de Careil published in two

Earts some unedited writings of Descartes from copies taken by eibnitz from the original .papers. Six editions of the Opera philo- sophica appeared at Amsterdam between 1650 and 1678; a two- volume edition at Leipzig in 1843; there are also French editions, CEuvres philosophiques, by A. Gamier, 3 vols. (1834-1835), and L. Aime-Martin (1838) and CEuvres morales et philosophiques by Aime-Martin with an introduction on life and works by Amedee Prevost (Paris, 1855); CEuvres choisies (1850) by Jules Simon. A complete French edition of the collected works was begun in the Romance Library (1907 foil.). German translations by J. H. von Kirchmann under the title Philosophische Werke (with biography, &c, Berlin, 1868; 2nd ed , 1882-1891), by Kuno Fischer, Die Hauptschriften zur Grundlegung seiner Philosophie (1863), with introduction by Ludwig Fischer (1892). There are also numerous editions and trans- lations of separate works, especially the Method, in French, German, Italian, Spanish and Hungarian. There are English translations by J. Veitch, Method, Meditations and Selections from the Principles (1850-1853; nthed., 1897; New York, 1899); by H. A. P. Torrey (New York, 1892).

II. Biographical. — A. Baillet, La Vie de M. Des Cartes (Paris, 1691 ; Eng. trans., 1692), exhaustive but uncritical; notices in the editions of Gamier and Aime-Martin; A. Hoffmann, Rene Descartes (1905); Elizabeth S. Haldane, Descartes, his Life and Times (1905), contain- ing full bibliography ; A. Barbier, Rene Descartes, sa famille, son lieu de naissance, &c. (1901); Richard Lowndes, Rene Descartes, his Life and Meditations (London, 1878) ; J. P. Mahaffy, Descartes (1902), with an appendix on Descartes ‘s mathematical work by Frederick Purser; Victor de Swarte, Descartes directeur spirituel (Paris, 1904), correspondence with the Princess Palatine; C. J. Jeannel, Descartes et la princesse palatine (Paris, 1869); Lettres de M. Descartes, ed Claude Clerselier (1657). A useful sketch of recent biographies is to be found in The Edinburgh Review (July 1906).

III. Philosophy.— Beside the histories of philosophy, the article Cartesianism, and the above works, consult J. B. Bordas-Demoulini Le Cartesianisme (2nd ed., Paris, 1874); J. P. Damiron, Histoire de la philosophie du X VII’ siecle (Paris, 1846) ; C. B. Renouvier, Manuel de philosophie moderne (Paris, 1842); V. Cousin, Fragments philo- sophiques, vol. ii. (3rd ed., Paris, 1838), Fragments de philosophie cartesienne (Paris, 1845), and in the Journal des savants (1860-1861) ; F. Bouiliier, Hist, de la philosophie cartesienne (Paris, 1854), 2 vols., and Hist, el critique de la revolution cartesienne (Paris, 1842) ; J. Millet, Descartes, sa vie, ses travaux, ses decouvertes avant 1637 (Paris, 1867), and Hist, de Descartes depuis 1637 (Paris, 1870); L. Liard, Descartes (Paris, 1882); A. Fouillee, Descartes (Paris, 1893);

Revue de metaphysique et de morale (July, 1896, Descartes number) ; Norman Smith, Studies in the Cartesian Philosophy (1902); R. Keussen, Bewusstsein und Erkenntnis bei Descartes (1906) ; A. Kayserling, Die Idee der Kausalitat in den Lehren der Occasionalisten (1896); J. Iverach, Descartes, Spinoza and the New Philosophy (1904); R. Joerges, Die Lehre von den Empfindungen bei Descartes (1901); Kuno Fischer, Hist, of Mod. Phil. Descartes a,nd his School (Eng. trans ., 1887) ; B. Christiansen, Das Urteil bei Descartes (1902) ; E. Boutroux, " Descartes and Cartesianism " in Cambridge Modern History, vol. iv. (1906), cbap. 27, with a very full bibliography, pp. 950-953; P. Natorp, Descartes' Erkenntnisstkeorie (Marburg, 1882) ; L. A. Prevost-Paradol, Les Moralistes francais (Paris, 1865); C. Schaar-schmidt, Descartes und Spinoza (Bonn, 1850); R. Adamson, The Development of Modern Philosophy (Edinburgh, 1903); J. Miiller, Der Begriff der siltlichen Unvollkomrnenheit bei Descartes und Spinoza (1890); J. H. von Kirchmann, R. Descartes' Prinzipien der Philos. (1863); G. Touchard, La Morale de Descartes (1898); Lucien Levy-Bruhl, Hist, of Mod. Philos. in France (Eng. trans., 1899), pp. 1-76.

IV. Science and Mathematics. — F. Cajori, History of Mathematics (London, 1894); M. Cantor, Vorlesungen uber die Geschichte der Malhemalik (Leipzig, 1 894-1901); Sir Michael Foster, Hist, of Physiol, during the Sixteenth, Seventeenth and Eighteenth Centuries (1901); Duboux, La Physique de Descartes (Lausanne, 1881); G, H. Zeuthen, Geschichte der Mathematik im 16. und 17. Jahrhundert (1903); Chasles, j4ˆerf« historique sur Vorigine et le developpement des methodes en geometrie (3rd ed., 1889). (W. W. ; X.)

DESCHAMPS, EMILE (1791-1871), French poet and man of letters, was born at Bourges on the 20th of February 1791. The son of a civil servant, he adopted his father's career, but as early as 1812 he distinguished himself by an ode, La Paix conquise, which won the praise of Napoleon. In 1818 he collaborated with Henri de Latouche in two verse comedies, Selmours de Florian and Le Tour defaveur. He and his brother were among the most enthusiastic disciples of the cenacle gathered round Victor Hugo, and in July 1823 Emile founded with' his master the Muse irancaise, which during the year of its existence was the special

organ of the romantic party. His iLtudes francaises et Uranglres (1&28) were preceded by a preface which may be regarded as one of the manifestos of the romanticists. The versions ol Shakespeare's Romeo and Juliet (1839) and of Macbeth (1844), important as they were in the history of the romantic movement, were never staged. He was the author of several libretti, among which may be mentioned the

Romeo et Juliette of Berlioz. The list of his more important works is completed by his two volumes of stories, Contes physiologiques (1854) and Rialit&s fantastiques (1854). He died at Versailles in April 1871. His CEuvres completes were published in 1872-1874 (6 vols.).

His brother, Antoine Francois Marie, known as Antony Deschamps, was born in Paris on the 12th of March 1800 and died at Passy on the 29th of October 1869. Like his brother, he was an ardent romanticist, but his production was limited by a nervous disorder, which has left its mark on his melancholy work. He translated the Divina Commedia in 1829, and his poems, Dernieres Paroles and Resignation, were republished with his brother's in 1 84 1.

DESCHAMPS, EUSTACHE, called Morel (1346 ?i 4 o6 ?), French poet, was born at Vertus in Champagne about 1346. He studied at Reims, where he is said to have received some lessons in the art of versification from Guillaume de Machaut, who is stated to have been his uncle. From Reims he proceeded about 1360 to the university of Orleans to study law and the seven liberal arts. He entered the king's service as royal messenger about 1367, and was sent on missions to Bohemia, Hungary and Moravia. In 1372 he was made huissier d'armes to Charles V. He received many other important offices, was bailli of Valois, and afterwards of Senlis, squire to the Dauphin, and governor of Fismes. In 1380 his patron, Charles V., died, and in the same year the English burnt down his house at Vertus. In his child hood he had been an eye-witness of the English invasion of 1358; he had been present at the siege of Reims and seen the march on Chartres; he had witnessed the signing of the treaty of Bretigny; he was now himself a victim of the English fury. His violent hatred of the English found vent in numerous appeals to carry the war into England, and in the famous prophecy 1 that England would be destroyed so thoroughly that no one should be able to point to her ruins. His own misfortunes and the miseries of France embittered his temper. He complained continually of poverty, railed against women and lamented the woes of his country. His last years were spent on his Miroir de mariage, a satire of 13,000 lines against women, which contains some real comedy. The mother-in-law of French farce has her prototype in the Miroir.

The historical and patriotic poems of Deschamps are of much greater value. He does not, like Froissart, cast a glamour over the miserable wars of the time but gives a faithful picture of the anarchy of France, and inveighs ceaselessly against the heavy taxes, the vices of the clergy and especially against those who enrich themselves at the expense of the people. The terrible ballad with the refrain " Sa, de V

argent; sa, de V argent ” is typical of his work. Deschamps excelled in the use of the ballade and the chant royal. In each of these forms he was the greatest master of his time. In ballade form he expressed his regret for the death of Du Guesclin, who seems to have been the only man except his patron, Charles V., for whom he ever felt any admiration. One of his ballades (No. 285) was sent with a copy of his works to Geoffrey Chaucer, whom he addresses with the words: —

” Tues d’amours mondains dieux en Albie Et de la Rose en la terre Angelique.”

Deschamps was the author of an Art poetique, with the title of V Art de dictier et de fere chancons, balades, virelais et rondeaulx. Besides giving rules for the composition of the kinds of verse mentioned in the title he enunciates some curious theories on poetry. He divides music into music proper and poetry. Music proper he calls artificial on the ground that everyone could by dint of study become a musician; poetry he calls natural because

1 ” De la prophetie Merlin sur la destruction d’Angleterre qui doit brief advenir ” {CEuvres, No. 211).

he say? it is not an art that can be acquired but a gift. He lays immense stress on the harmony of verse, because, as was the fashion of his day, he practically took it for granted that all poetry was to be sung.

The work of Deschamps marks an important stage in the history of French poetry. With him and his contemporaries the long, formless narrations of the trjuveres give place to complicated and exacting kinds of verse. He was perhaps by nature a moralist and satirist rather than a poet, and the force and truth of his historical pictures gives him a unique place in 14th-century poetry. M. Raynaud fixes the date of his death in 1406, or at latest, 1407. Two years earlier he had been relieved of his charge as bailli of Senlis, his plain-spoken satires having made him many enemies at court.

His CEuvres completes were edited (10 vols., 1878-1901) for the Societe des anciens textes francais by Queux de Saint-Hilaire and Gaston Raynaud. A supplementary volume consists of an Introduction by G. Raynaud. See also Dr E. Hoeppner, Eustache Deschamps (Strassburg, 1904).

DESCHANEL, PAUL EUGENE LOUIS (1856-), French statesman, son of Emile Deschanel (1819-1904), professor at the College de France and senator, was born at Brussels, where his father was living in exile (1851-1859), owing to his opposition to Napoleon III. Paul Deschanel studied law, and began his career as secretary to Deshayes de Marcere (1876), and to Jules Simon (1876-1877). In October 1885 he was elected deputy for Eure and Loire. From the first he took an important place in the chamber, as one of the most notable orators of the Progressist Republican group. In January 1896 he was elected vice-president of the chamber, and henceforth devoted himself to the struggle against the Left, not only in parliament, but also in public meetings throughout France. His addresses at Marseilles on the 26th of October 1896, at Carmaux on the 27th of December 1896, and at Roubaix on the 10th of April 1897, were triumphs of clear and eloquent exposition of the political and social aims of the Progressist party. In June 1898 he was elected president of the chamber, and was re-elected in 1901, but rejected in 1902. Nevertheless he came forward brilliantly in 1904 and 1905 as a supporter of the law on the separation of church and state. He was elected a member of the French Academy in 1899, his most notable works being Orateurs et hommes d'Uat (1888), Figures de femm-es (1889), La Decentralization (1895), La Question sociale

(1898).

DES CLOIZEAUX, ALFRED LOUIS OLIVIER LEGRAND (1817-1897), French mineralogist, was born at Beauvais, in the department of Oise, on the 17th of October 1817. He became professor of mineralogy at the Ecole Normale Superieure and afterwards at the Musee d'Histoire Naturelle in Paris. He studied the geysers of Iceland, and wrote also on the classification of some of the eruptive rocks; but his main work consisted in the systematic examination of the crystals of numerous minerals, in researches on their optical properties and on the subject of polar- ization. He wrote specially on the means of determining the different felspars. He was awarded the Wollaston medal by the Geological Society of London in 1886. He died in May 1897. His best-known books are Lecons de cristallographie (1861); Manuel de miniralogie (2 vols., Paris, 1862, 1874 and 1893).

DESCLOIZITE, a rare mineral species consisting of basic lead and zinc vanadate, (Pb, Zn) 2 (OH)VOi, crystallizing in the ortho- rhombic system and isomorphous with olivenite. It was dis- covered by A. Damour in 1854, and named by him in honour of the French mineralogist Des Cloizeaux. It occurs as small prismatic or pyramidal crystals, usually forming drusy crusts and stalactitic aggregates ; also

as fibrous encrusting masses with a mammillary surface. The colour is deep cherry-red to brown or black, and the crystals are transparent or translucent with a greasy lustre; the streak is orange-yellow to brown; specific gravity 5-9 to 6-2; hardness 3J. A variety known as cupro-descloizite is dull green in colour; it contains a considerable amount of copper replacing zinc and some arsenic replacing Vanadium. Descloizite occurs in veins of lead ores in association with pyromorphite, vanadinite, wulfenite, &c. Localities are

the Sierra de Cordoba in Argentina, Lake Valley in Sierra county, New Mexico, Arizona, Phoenixville in Pennsylvania, and Kappel (Eisen-Kappel) near Klagenfurt in Carinthia.

Other names which have been applied to this species are vanadite, tritochorite and ramirite; the uncertain vanadates eusynchite, araeoxene and dechenite are possibly identical with it.

DESCRIPTIVE POETRY, the name given to a class of literature, which may be defined as belonging mainly to the 16th, 17th and 1 8th centuries in Europe. From the earliest times, all poetry which was not subjectively lyrical was apt to indulge in ornament which might be named descriptive. But the critics of the 17th century formed a distinction between the representations of the ancients and those of the moderns. We find Boileau emphasizing the statement that, while Virgil paints, Tasso describes. This may be a useful indication for us in defining not what should, but what in practice has been called ” descriptive poetry.” It is poetry in which it is not imaginative passion which prevails, but a didactic purpose, or even something of the instinct of a sublimated auctioneer. In other words, the land- scape, or architecture, or still life, or whatever may be the object of the poet’s attention, is not used as an accessory, but is itself the centre of interest. It is, in this sense, not correct to call poetry in which description is only the occasional ornament of a poem, and not its central subject, descriptive poetry. The land- scape or still life must fill the canvas, or, if human interest is introduced, that must be treated as an accessory. Thus, in the Hero and Leander of Marlowe and in the Alastor of Shelley, description of a very brilliant kind is largely introduced, yet these are not examples of what is technically called ” descriptive poetry,” because it is not the strait between Sestos and Abydos, and it is not the flora of a tropical glen, which concentrates the attention of the one poet or of the other, but it is an example of physical passion in the one case and of intellectual passion in the other, which is diagnosed and dilated on. On the other hand Thomson’s Seasons, in which landscape takes the central place, and Drayton’s Polyolbion, where everything is sacrificed to a

topographical progress through Britain, are strictly descriptive.

It will be obvious from this definition that the danger ahead of all purely descriptive poetry is that it will lack intensity, that it will be frigid, if not dead. Description for description's sake, especially in studied verse, is rarely a vitalized form of literature. It is threatened, from its very conception, with languor and coldness; it must exercise an extreme art or be condemned to immediate sterility. Boileau, with his customary intelligence, was the first to see this, and he thought that the danger might be avoided by care in technical execution. His advice to the poets of his time was: —

and:-

Soyez riches et pompeux dans vos descriptions ; C'est-la qu'i! faUt des vers etaler l'elegance,"

" De figure sans nombre egayez votre ouvrage ; Que toute y fasse aux yeux une riante image,"

and in verses of brilliant humour he mocked the writer who, too full of his subject, and describing for description's sake, will never quit his theme until he has exhausted it : — " Fuyez de ces auteurs l'abondarfce sterile Et ne vous chargez point d'un detail inutile."

This is excellent advice, but Boileau's humorous sallies do not quite meet the question whether such purely descriptive poetry as he criticizes is legitimate at all.

In England had appeared the famous translation (1592-1611), by Josuah Sylvester, of the Divine Weeks and Works of Du Bartas, containing such lines as those which the juvenile Dryden admired so much: —

" But when winter's keener breath began To crystallize the Baltic ocean, To glaze the lakes, and bridle up the floods, And perriwig with wool the bald-pate woods."

There was also the curious physiological epic of Phineas Fletcher, The Purple Island (1633). But on the whole it was not until French influences had made themselves felt on English poetry,

that description, as Boileau conceived it, was cultivated as a distinct art. The Cooper's Hill (1642) of Sir John Denham may be contrasted with the less ambitious Penshurst of Ben Jonson, and the one represents the new no less completely than the other dees the old generation. If, however, we exa mine Cooper's Hill carefully, we perceive that its aim is after all rather philosophical than topographical. The Thames is described indeed, but not very minutely, and the poet is mainly absorbed in moral reflec- tions. Marvell's long poem on the beauties of Nunappletoncomes nearer to the type. But it is hardly until we reach the 18th century that we arrive, in English literature, at what is properly known as descriptive poetry. This was the age in which poets, often of no mean capacity, began to take such definite themes as a small country estate (Pomfret's Choice, 1700), the cultivation of the grape (Gay's Wine, 1708), a landscape (Pope's Windsor Forest, 17 13), a military manoeuvre (Addison's Campaign, 1704), the industry of an apple-orchard (Philip's Cyder, 1708) or a piece of topography (Tickell's Kensington Gardens, 1722), as the sole subject of a lengthy poem, generally written in heroic or blank verse. These tours de force were supported by minute efforts in miniature-painting, by touch applied to touch, and were often monuments of industry, but they were apt to lack personal interest, and to suffer from a general and deplorable frigidity. They were infected with the faults which accompany an artificial style; they were monotonous, rhetorical and symmetrical, while the uniformity of treatment which was inevitable to their plan rendered them hopelessly tedious, if they were prolonged to any great extent.

This species of writing had been cultivated to a considerable degree through the preceding century, in Italy and (as the remarks of Boileau testify) in France, but it was in England that it reached its highest importance. The classic of descriptive poetry, in fact, the specimen which the literature of the world presents which must be considered as the most important and the most successful, is The Seasons (1726-1730) of James Thomson (q.v.). In Thomson, for the first time, a poet of considerable eminence appeared, to whom external nature was all sufficient, and who succeeded in conducting a long poem to its close by a single appeal to landscape, and to the emotions which it directly evokes. Coleridge, somewhat severely, described The Seasons as the work of a good rather than of a great poet, and it is an in- disputable fact that, at its very best, descriptive poetry fails to awaken the highest powers of the imagination. A great part of Thomson's poem is nothing more nor less than a skilfully varied catalogue of natural phenomena. The famous description of twi- light in " the fading many-coloured woods " of autumn may be taken as an example

of the highest art to which purely descriptive poetry has ever attained. It is obvious, even here, that the effect of these rich and sonorous lines, in spite of the splendid effort of the artist, is monotonous, and leads us up to no final crisis of passion or rapture. Yet Thomson succeeds, as few other poets of his class have succeeded, in producing nobly-massed effects and comprehensive beauties such as were utterly unknown to his predecessors. He was widely imitated in England, especially by Armstrong, by Akenside, by Shenstone (in The Schoolmistress, 1742), by the anonymous author of Albania, 1737, and by Goldsmith (in The Deserted Village, 1770). No better example of the more pedestrian class of descriptive poetry could be found than the last-mentioned poem, with its minute and Dutch-like painting: —

” How often have I paused on every charm : The sheltered cot, the cultivated farm ; The never-failing brook, the busy mill, The decent church that topped the neighbouring hill: The hawthorn-bush, with seats beneath the shade. For talking age and whispering lovers made.”

On the continent of Europe the example of Thomson was almost immediately fruitful. Four several translations of The Seasons into French contended for the suffrages of the public, and J. F. de Saint-Lambert (1716-1803) imitated Thomson in Les Saisons (1769), a poem which enjoyed popularity for half a century, and of which Voltaire said that it was the only one of its generation

which would reach posterity. Nevertheless, as Madame du Deffand told Walpole, Saint-Lambert is ” froid, fade et faux,” and the same may be said of J. A. Roucher (1745-1704), who wrote Les Mois in 1779, a descriptive poem famous in its day. The Abbe Jacques Delille (1738-1813), perhaps the most ambitious descriptive poet who has ever lived, was treated as a Virgil by his contemporaries; he published Les GSorgiques in 1769, Les Jardins in 1782, and L’Homme des champs in 1803, but he went furthest in his brilliant, though artificial, Trois regnes de la nature (1809), which French critics have called the masterpiece of this whole school of descriptive poetry. Delille, however, like Thomson before him, was unable to avoid mono- tony and want of coherency. Picture follows picture, and no progress is made. The satire of Marie Joseph Ch6nier, in his famous and witty Discours sur les polmes descriptifs, brought the vogue of this species of poetry to an end.

In England, again, Wordsworth, who treated the genius of Thomson with unmerited severity, revived descriptive poetry in a form which owed more than Wordsworth realized to the model of The Seasons. In The Excursion and The Prelude, as well as in many of his minor

pieces, Wordsworth's philosophical and moral intentions cannot prevent us from perceiving the large part which pure description takes; and the same may be said of much of the early blank verse of S. T. Coleridge. Since their day, however, purely descriptive poetry has gone more and more completely out of fashion, and its place has been taken by the richer and directer effects of such prose as that of Ruskin in English, or of Fromentin and Pierre Loti in French. It is almost impossible in descriptive verse to obtain those vivid and impassioned appeals to the imagination which are of the very essence of genuine poetry, and it is unlikely that descrip- tive poetry, as such, will again take a prominent place in living literature. (E. G.)

DESERT, a term somewhat loosely employed to describe those parts of the land surface of the earth which do not produce sufficient vegetation to support a human population. Few areas of large extent in any part of the world are absolutely devoid of vegetation, and the transition from typical desert conditions is often very gradual and ill-defined. (" Desert " comes from Lat. deserere, to abandon; distinguish " desert," merit, and " dessert," fruit eaten after dinner, from de and servier, to serve.)

Deserts are conveniently divided into two classes according to the causes which give rise to the desert conditions. In " cold deserts " the want of vegetation is wholly due to the prevailing low temperature, while in " hot deserts " the surface is uroro- ductive because, on account of high temperature and deficient rainfall, evaporation is largely in excess of precipitation. Cold deserts accordingly occur in high latitudes (see Tundra and Polar Regions). Hot desert conditions are primarily found along the tropical belts of high atmospheric pressure in which the conditions of warmth and dryness are most fully realized, and on their, equatorial sides, but the zonal arrangement is considerably modified in some regions by the monsoonal influence of elevated land. Thus we have in the northern hemisphere the Sahara desert, the deserts of Arabia, Iran, Turan, Takla Makan and Gobi, and the desert regions of the Great Basin in North America; and in the southern hemisphere the Kalahari desert in Africa, the desert of Australia, and the desert of Atacama in South America. Where the line of elevated land runs east and west, as in Asia, the desert belt tends to be displaced into higher latitudes, and where the line runs north and south, as in Africa, America and Australia, the desert zone is cut through on the windward side of the elevation and the arid conditions intensified on the lee side. Desert conditions also arise from local causes, as in the case of the Indian desert situated in a region inaccessible to either of the two main branches of the south-west monsoon.

Although rivers rising in more favoured regions may traverse deserts on their way to the sea, as in the case of the Nile and the Colorado, the fundamental physical condition of an arid area is that it contributes nothing to the waters of the ocean. The rain- fall chiefly occurs in violent cloudbursts, and the soluble matter in the soil is carried down by intermittent streams to salt lakes

around which deposits are formed as evaporation takes place. The land form* of a desert are exceedingly characteristic. Surface erosion is chiefly due to rapid changes of temperature through a wide range, and to the action of wind transferring sand and dust, often in the form of ” dunes ” resembling the waves of the sea. Dry valleys, narrow and of great depth, with precipitous sides, and ending in ” cirques,” are probably formed by the intense action of the occasional cloud-bursts.

When water can be obtained and distributed over an arid region by irrigation, the surface as a rule becomes extremely productive. Natural springs give rise to oases at intervals and make the crossing of large deserts possible. Where a river crosses a desert at a level near that of the general surface, irrigation can be carried on with extremely profitable results, as has been done in the valley of the Nile and in parts of the Great Basin of North America; in cases, however, where the river has cut deeply and flows far below the general surface, irrigation is too expensive. Much has been done in parts of Australia by means of artesian wells.

For a general account of deserts see Professor Johannes Walther, Das Gesetz der Wiistenbildung (Berlin, 1900), in which many references to other original authorities will be found. (H. N. D.)

DESERTION, the act of forsaking or abandoning; more particularly, the wilful abandonment of an employment or of duty, in violation of a legal or moral obligation.

The offence of naval or military desertion is constituted when a man absents himself with the intention either of not returning or of escaping some important service, such as embarkation for foreign service, or service in aid of the civil power. In the United Kingdom desertion has always been recognized by the civil law, and until 1827 (7 & 8 Geo. IV. c. 28) was a felony punishable by death. It was subsequently dealt with by the various Mutiny Acts, which were

replaced by the Army Act 1881, renewed annually by the Army (Annual) Act. By § 12 of the act every person subject to military law who deserts or attempts to desert, or who persuades or procures any person to desert, shall, on conviction by court martial, if he committed the offence when on active service or under orders for active service, be liable to suffer death, or such less punishment as is mentioned in the act. When the offence is committed under any other circumstances, the punishment for the first offence is imprison- ment, and for the second or'any subsequent offence penal servi- tude or such less punishment as is mentioned in the act. § 44 contains a scale of punishments, and §§ 175-184 an enumeration of persons subject to military law. By § 153 any person who persuades a soldier to desert or aids or assists him or conceals him is liable, on conviction, to be imprisoned, with or without hard labour, for not more than six months. § 154 makes provision for the apprehension of deserters. § 161 lays down that where a soldier has served continuously in an exemplary manner for not less than three years in any corps of regular forces he is not to be tried or punished for desertion which has occurred before the commencement of the three years. Desertion from the regular forces can only be tried by a military court, but in the case of the militia and reserve forces desertion can be tried by a civil court. The Army Act of 1881 made a welcome distinction between actual desertion, as defined at the commencement of this article, and the quitting one regiment in order to enlist in another. This offence is now separately dealt with as fraudulent enlistment; formerly, it was termed "desertion and fraudulent enlistment," and the statistics of desertion proper were consequently and erroneously magnified. The gross total of desertions in the British Army in an average year (1903-1904) was nearly 4000, or 1*4% of the average strength of the army, but owing to men rejoining from desertion, fraudulent enlistment, &c, the net loss was no more than 1286, i.e. less than -5%. The army of the United States suffers very severely from desertion, and very few deserters rejoin or are recaptured (see Journal of the Roy. United Service Inst., December 1905, p. 1469). In the year 1900-1901, 3 1 10 men deserted (4-3% of average strength); in 1901-1902, 4667 (or 5-9%); in 1904-1905, 6553 (or 6-8%); and in 190 5-1906, 6258 out of Jess than 60,000 men, or 7-4%.

In all armies desertion while on active service is punishable by death; on the continent of Europe, owing to the system of compulsory service, desertion is infrequent, and takes place usually when the deserter wishes to leave his country altogether. It was formerly the practice in the English army to punish a man convicted of desertion by tattooing on him the letter " D " to prevent his re-enlistment, but this

has been long abandoned in deference to public opinion, which erroneously adopted the idea that the ” marking ” was effected by red-hot irons or in some other manner involving torture. The Navy Discipline Act 1866, and the Naval Deserters Act 1847, contain similar provisions to the Army Act of 1881 for dealing with desertions from the navy. In the United States navy the term ” straggling ” is applied to absence without leave, where the probability is that the person does not intend to desert. The United States government offers a monetary reward of between $20 and $30 for the arrest and delivery of deserters from the army and navy.

In the British merchant service the offence of desertion is defined as the abandonment of duty by quitting the ship before the termination of the engagement, without justification, and with the intention of not returning.

Desertion is also the term applied to the act by which a man abandons his wife and children, or either of them. Desertion of a wife is a matrimonial offence; under the Matrimonial Causes Act 1857, a decree of judicial separation may be obtained in England by either husband or wife on the ground of desertion, without cause, for two years and upwards (see also Divorce).

For the desertion of children see Children, Law relating to; Infant. (T. A. I.)

DES ESSARTS, EMMANUEL ADOLPHE (1839-), French poet and man of letters, was born at Paris on the 5th of Febru- ary 1839. His father, Alfred Stanislas Langlois des Essarts (d. 1893), was a poet and novelist of considerable reputation. The son was educated at the ficole Normale Superieure, and became a teacher of rhetoric and finally professor of literature at Dijon and at Clermont. His works are: PoSsies parisiennes (1862), a volume of light verse on trifling subjects ; Les Elevations (1864), philosophical poems; Origines de la poSsie lyrique en France au XV I’ siecle (187 3); Du genie de Chateaubriand (187 6); Pobmes de la Revolution (1879); Pallas AtMne” (1887); Portraits de maitres (1888), &c.

DESFONTAINES, REN6 LOUICHE (1750-1833), French botanist, was born at Tremblay (lle-et-Vilaine) on the 14th of February 1750. After graduating in medicine at Paris, he was elected a member of the Academy of Sciences in 1783. In the same year he set out for North Africa, on a scientific exploring expedition, and on his return two years afterwards brought with him a large collection of plants, animals, &c, comprising, it is said, 1600 species of plants, of which

about 300 were described for the first time. In 1786 he was nominated to the post of professor at the Jardin des Plantes, vacated in his favour by his friend, L. G. Lemonnier. His great work, Flora Atlanlica sive historia plantarum quae in Atlante, agro Tunetano el Algeriensi crescunt,wns published in 2 vols. 4to in 1798, and he produced in 1804 a Tableau de V&cole botanique du museum d'histoire naturelle de Paris, of which a third edition appeared in 1831, under the new title Catalogus plantarum horti regii Parisiensis. He was also the author of many memoirs on vegetable anatomy and physiology, descriptions of new genera and species, &c, one of the most important being a " Memoir on the Organization of the Monocotyledons." He died at Paris on the 16th of November 1833. His Barbary collection was bequeathed to the Museum d'Histoire Naturelle, and his general collection passed into the hands of the English botanist, Philip Barker Webb.

DESFORGES, PIERRE JEAN BAPTISTE CHOUDARD (1746- (1806), French dramatist and man of letters, natural son of Dr Antoine Petit, was born in Paris on the 15th of September 1746. He was educated at the College Mazarin and the College de Beauvais, and at his father's desire began the study of medicine. Dr Petit's death left him dependent on his own resources, and after appearing on the stage of the Comedie Italienne in Paris he joined a troupe of wandering actors, whom he served in the

capacity of playwright. He married an actress, and the two spent three years in St Petersburg, where they were well received. In 1782 he produced at the Comedie Italienne an adaptation of Fielding's novel with the title Tom Jones d Londres. His first great success was achieved with L'Epreuve villageoise (1785) to the music of Gretry. La Femme jalouse, a five-act comedy in verse (1785), Joconde (1790) for the music of Louis Jaden, Les Epoux divorcSs (1799), a comedy, and other pieces followed. Desforges was one of the first to avail himself of the new facilities afforded under the Revolution for divorce and re-marriage. The curious record of his Own early indiscretions in Le Poete, ou mimoires d'un homme de lettres icrits par lui-meme (4 vols., 1798) is said to have been undertaken at the request of Madame Desforges. He died in Paris on the 13 th of August 1806.

DESGARCINS, MAGDELEINE MARIE [Louise] (1760-1797), French actress, was born at Mont Dauphin (Hautes Alpes). In her short career

she became one of the greatest of French tragedi- ennes, the associate of Talma, with whom she nearly always played. Her debut at the Comedie Frangaise occurred on the 24th of May 1788, in Bajazet, with such success that she was at once made societaire. She was one of the actresses who left the Comedie Frangaise in 1791 for the house in the rue Richelieu, soon to become the Theatre de la Republique, and there her triumphs were no less — in King Lear, Othello, La Harpe's Milanie et Virginie, &c. Her health, however, failed, and she died insane, in Paris, on the 27th of October 1797.

DESHAYES, GERARD PAUL (1795-1875), French geologist and conchologist, was born at Nancy on the 13th of May 1797, his father at that time being professor of experimental physics in the ficole Centrale of the department of la Meurthe. He studied medicine at Strassburg, and afterwards took the degree of bachelier es lettres in Paris in 182 1; but he abandoned the medical profession in order to devote himself to natural history. For some time he gave private lessons on geology, and subse- quently became professor of natural history in the Museum d'Histoire Naturelle. He was distinguished for his researches on the fossil mollusca of the Paris Basin and of other Tertiary areas. His studies on the relations of the fossil to the recent species led him as early as 1829 to conclusions somewhat similar to those arrived at by Lyell, to whom Deshayes rendered much assistance in connexion with the classification of the Tertiary system into Eocene, Miocene and Pliocene. He was one of the founders of the Society G6ologique de France. In 1839 he began the publica- tion of his Traite elementaire de conchyliologie, the last part of which was not issued until 1858. In the same year (1839) he went to Algeria for the French Government, and spent three years in explorations in that country. His principal work, which resulted from the collections he made, Mollusques de I Algirie, was issued (incomplete) in 1848. In 1870 the Wollaston medal of the Geological Society of London was awarded to him. He died at Boran on the 9th of June 1875. His publications included Description des coquilles fossiles des environs de Paris (2 vols, and atlas, 1824-1837); Description des animaux sans vertebres dScouverts dans le bassin de Paris (3 vols, and atlas, 1856-1866); Catalogue des mollusques de I'Uede la Riunion (1863).

DESHOULIERES, ANTOINETTE DU LIGIER DE LA GARDE (1638-1694), French poet, was born in Paris on the 1st of January 1638. She was the daughter of Melchior du Ligier, sieur de la Garde, mattre d'hoiel to the queens Marie de' Medici and Anne of Austria. She received a careful and very complete education, acquiring a knowledge of Latin, Spanish and Italian, and study- ing prosody under the direction of the poet Jean Hesnault. At the age of thirteen she

married Guillaume de Boisguerin, seigneur Deshoulieres, who followed the prince of Conde as lieutenant-colonel of one of his regiments to Flanders about a year after the marriage. Madame Deshoulieres returned for a time to the house of her parents, where she gave herself to writing poetry and studying the philosophy of Gassendi. She rejoined her husband at Rocroi, near Brussels, where, being distinguished for her personal beauty, she became the object of embarrassing attentions on the part of the prince of Conde. Having made herself obnoxious to the government by her urgent demand for

the arrears of her husband's pay, she was imprisoned in the chateau of Wilworden. After a few months she was freed by her husband, who attacked the chateau at the head of a small band of soldiers. An amnesty having been proclaimed, they returned to France, where Madame Deshoulieres soon became a conspicu- ous personage at the court of Louis XIV. and in literary society. She won the friendship and admiration of the most eminent literary men of the age — some of her more zealous flatterers even going so far as to style her the tenth muse and the French Calliope. Her poems were very numerous, and included specimens of nearly all the minor forms, odes, eclogues, idylls, elegies, chansons, ballads, madrigals, &c. Of these the idylls alone, and only some of them, have stood the test of time, the others being entirely forgotten. She wrote several dramatic works, the best of which do not rise to mediocrity. Her friend- ship for Corneille made her take sides for the Ph'edre of Pradon against that of Racine. Voltaire pronounced her the best of women French poets; and her reputation with her contempor- aries is indicated by her election as a member of the Academy of the Ricovrati of Padua and of the Academy of Aries. In 1688 a pension of 2000 livres was bestowed upon her by the king, and she was thus relieved from the poverty in which she had long lived. She died in Paris on the 17th February 1694. Complete editions of her works were published at Paris in 1695, J 747> & c – These include a few poems by her daughter, Antoine Therese Deshoulieres (1656-1718), who inherited her talent.

DESICCATION (from the Lat. desiccare, to dry up), the operation of drying or removing water from a substance. It is of particular importance in practical chemistry. If a substance admits of being heated to say 100°, the drying may be effected by means of an air-bath, which is simply an oven heated by gas or by steam. Otherwise a desiccator must be employed; this is essentially a closed vessel in which a hygroscopic substance is placed together with the substance to be dried. The process may be accelerated by exhausting the desiccator; this so-called vacuum desiccation is especially suitable for the concentration of aqueous solutions of readily decomposable

substances. Of the hygroscopic substances in common use, phosphoric anhydride, concentrated sulphuric acid, and dry potassium hydrate are almost equal in power; sodium hydrate and calcium chloride are not much behind.

Two common types of desiccatoP are in use. In one the absorbent is placed at the bottom, and the substance to be dried above. Hempel pointed out that the efficiency would be increased by inverting this arrangement, since water vapour is lighter than air and consequently rises. Liquids are dried either by means of the desiccator, or, as is more usual, by shaking with a substance which removes the water. Fused calcium chloride is the commonest absorbent; but it must not be used with alcohols and several other compounds, since it forms compounds with these substances. Quicklime, barium oxide, and dehy- drated copper sulphate are especially applicable to alcohol and ether; the last traces of water may be removed by adding metallic sodium and distilling. Gases are dried by leading them through towers or tubes containing an appropriate drying material. The experiments of H. B. Baker on the influence of moisture on chemical combination have shown the difficulty of removing the last traces of water.

In chemical technology, apparatus on the principle of the laboratory air-bath are mainly used. Crystals and precipitates, deprived of as much water as possible by centrifugal machines or filter-presses, are transported by means of a belt, screw, or other form of conveyer, on to trays staged in brick chambers heated directly by flue gases or steam pipes; the latter are easily controlled, and if the steam be superheated a temperature of 300 and over may be maintained. In some cases the material traverses the chamber from the coolest to the hottest part on a conveyer or in wagons. Rotating cylinders are also used; the material to be dried being placed inside, and the cylinder heated by a steam jacket or otherwise.

DESIDERIO DA SETTIGNANO (1428-1464), Italian sculptor, was born at Settignano, a village on the southern slope of the hill

of Fiesole, still surrounded by the quarries of sandstone of which the hill is formed, and inhabited by a race of ” stone-cutters.” Desiderio was for a short time a pupil of Donatello, whom, according to Vasari, he assisted in the work on the pedestal of David, and he seems to have worked also with Mino da Fiesole, with the delicate and refined style

of whose works those of Desiderio seem to have a closer affinity than with the perhaps more masculine tone of Donatello. Vasari particularly extols the sculptor's treatment of the figures of . women and children. It does not appear that Desiderio ever worked elsewhere than at Florence; and it is there that those who are interested in the Italian sculpture of the Renaissance must seek his few surviving decorative and monumental works, though a number of his delicately carved marble busts of women and children are to be found in the museums and private collections of Germany and France. The most prominent of his works are the tomb of the secretary of state, Marsuppini, in Santa Croce, and the great marble tabernacle of the Annunciation in San Lorenzo, both of which belong to the latter period of Desiderio's activity; and the cherubs' heads which form the exterior frieze of the Pazzi Chapel. Vasari mentions a marble bust by Desiderio of Marietta degli Strozzi, which for many years was held to be identical with a very beautiful bust bought in 1878 from the Strozzi family for the Berlin Museum. This bust is now, however, generally acknowledged to be the work of Francesco Laurana; whilst Desiderio's bust of Marietta has been recognized in another marble portrait acquired by the Berlin Museum in 1842. The Berlin Museum also owns a coloured plaster bust of an Urbino lady by Desiderio, the model for which is in the possession of the earl of Wemyss. Other important busts by the master are in the Bargello, Florence, the Louvre in Paris, the collections of M. Figdor and M. Benda in Vienna, and of M. Dreyfus in Paris. Like most of Donatello's pupils, Desiderio worked chiefly in marble, and not a single work in bronze has been traced to his hand.

See Wilhelm Bode, Die iialienische Plastik (Berlin, 1893).

DESIDERIUS, the last king of the Lombards, is chiefly known through his connexion with Charlemagne. He was duke of Tuscany and became king of the Lombards after the death of Aistulf in 756. Seeking, like his predecessors, to extend the Lombard power in Italy, he came into collision with the papacy, and about 772 the new pope, Adrian I., implored the aid of Charlemagne against him. Other causes of quarrel already existed between the Frankish and the Lombard kings. In 770 Charlemagne had married a daughter of Desiderius; but he soon put this lady away, and sent her back to her father. Moreover, Gerberga, the widow of Charlemagne's brother Carloman, had sought the protection of the Lombard king after her husband's death in 771 ; and in return for the slight cast upon his daughter, Desiderius had recognized Gerberga's sons as the lawful Frankish kings, and had attacked Adrian for refusing to crown them. Such was the position when Charlemagne led his troops across the Alps in 773, took the

Lombard capital, Ticinum, the modern Pa via, in June 774, and added the kingdom of Lombardy to his own dominions. Desiderius was carried to France, where he died, and his son, Adalgis, spent his life in futile attempts to recover his father's kingdom. The name of Desiderius appears in the romances of the Carolingian period.

See S. Abel, Untergang des Langobardenreichs (Gottingen, 1859) ; and Jahrbucher des frdnkischen Retches unter Karl dent Grossen (Leipzig, 1865); L. M. Hartmann, Geschichte Italiens im Mittelalter (Gotha, 1903) ; and Paulus Diaconus, Historia Langobardorum, edited by L. Bethmana and G. Waitz (Hanover, 1878).

DESIGN (Fr. dessin, drawing; Lat. designate, to mark out), in the arts, a drawing, more especially when made as a guide for the execution of work; that side of drawing which deals with arrangement rather than representation; and generally, by analogy, a deliberate planning, scheming or purpose. Modern use has tended to associate design with the word " original " in the sense of new or abnormal. The end of design, however, is properly utility, fitness and delight. If a discovery, it should be a discovery of what seems inevitable, an inspiration arising out of the conditions, and parallel to invention in the sciences. The laculty of design has best flourished when an almost spontaneous

development was taking place in the arts, and while certain classes of arts, more or less noble, were generally demanded and the demand copiously satisfied, as in the production of Greek vases, Byzantine mosaics, Gothic cathedrals, and Renaissance paintings. Thus where a " school of design " arises there is much general likeness in the products but also a general progress. The common experience — " tradition " — is a part of each artist's stock in trade; and all are carried along in a stream of continuous exploration. Some of the arts, writing, for instance, have been little touched by conscious originality in design, all has been progress, or, at least, change, in response to conditions. Under such a system, in a time of progress, the proper limitations react as intensity; when limitations are removed the designer has less and less upon which to react, and unconditioned liberty gives him nothing at all to lean on. Design is response to needs, conditions and aspirations. The Greeks so well understood this that they appear to have consciously restrained themselves to the development of selected types, not only in architecture and literature, but in domestic arts, like pottery. Design with them was less the new than the true.

For the production of a school of design it is necessary that there should be a considerable body of artists working together, and a large demand from a sympathetic public. A process of continuous

development is thus brought into being which sustains the individual effort. It is necessary for the designer to know familiarly the processes, the materials and the skilful use of the tools involved in the productions of a given art, and properly only one who practises a craft can design for it. It is necessary to enter into the traditions of the art, that is, to know past achievements. It is necessary, further, to be in relation with nature, the great reservoir of ideas, for it is from it that fresh thought will flow into all forms of art. These conditions being granted, the best and most useful meaning we can give to the word design i« exploration, experiment, consideration of possibilities. Putting too high a value on originality other than this is to restrict natural growth from vital roots, in which true originality consists. To take design in architecture as an example, we have rested too much on definite precedent (a different thing from living tradition) and, on the other hand, hoped too much from newness. Exploration of the possibilities in arches, vaults, domes and the like, as a chemist or a mathematician explores, is little accepted as a method in architecture at this time, although in antiquity it was by such means that the great master-works were produced: the Pantheon, Santa Sophia, Durham and Amiens cathedrals. The same is true of all forms of design. Of course the genius and inspiration of the individual artist is not here ignored, but assumed. What we are concerned with is a mode of thought which shall make it most fruitful. (W. R. L.)

DESIRE, in popular usage, a term for a wishing or longing for something which one has not got. For its technical use see Psychology. The word is derived through the French from Lat. desiderare, to long or wish for, to miss. The substantive desiderium has the special meaning of desire for something one has once possessed but lost, hence regret or grief. The usual explanation of the word is to connect it with sidus, star, as in considerare, to examine the stars with attention, hence, to look closely at. If this is so, the history of the transition in meaning is unknown. J. B. Greenough (Harvard Studies in Classical Philology, i. 96) has suggested that the word is a military slang term. According to this theory desiderare meant originally to miss a soldier from the ranks at roll-call, the root being that seen in sedere, to sit, sedes, seat, place, &c.

DESK (from Lat. discus, quoit, in med. sense of ” table,” cf. ” dish ” and Ger. Tisch, table, from same source), any kind of flat or sloping table for writing or reading. Its earliest shape was probably that with which we are familiar in pictures of the monastic scriptorium— rather high and narrow with a sloping slab. The primitive desk had little accommodation for writing materials, and no storage room for papers; drawers, cupboards and pigeon-holes were the evolution of periods

when writing grew common, and when letters and other documents requiring preservation became numerous. It

was long the custom to secure papers in chests or cabinets, whereas the modern desk serves the double purpose of a writing-table and a storehouse for documents. The first development from the early stall-like desk consisted of the addition of a drawer; then the table came to be supported upon legs or columns, which, as in the many beautiful examples constructed by Boulle and his school, were often of elaborate grace. Eventually the legs were replaced by a series of superimposed drawers forming pedestals — hence the familiar pedestal writing-table.

For a long period there were two distinct contemporary forms of desk — the table and the bureau or escritoire. The latter shape attained a popularity so great that, especially in England and America, it was found even in houses in which there was little occasion for writing. The English-speaking people of the 18th century were amazingly fond of pieces of furniture which served a double or triple purpose. The bureau — the word is the French generic appellation for a desk — derives its name from the material with which it was originally covered (Fr. bure, woollen cloth). It consists of an upright carcass sloping inward at the top, and provided with long drawers below. The upper part is fitted with small drawers and pigeon-holes, and often with secret places, and the writing space is formed by a hinged slab supported on runners; when not in use this slab closes up the sloping top. During the 18th century innumerable thousands of these bureaux were made on both sides of the Atlantic — indeed, if we except tables and chairs, no piece of old furniture is more common. In the first part of that period they were usually of oak, but when mahogany was introduced into Europe it speedily ousted the heavier-looking wood. Its deep rich colour and the high polish of which it was capable added appreciably to its ornamental appearance. While the pigeon-holes and small drawers were used for papers, the long drawers were often employed for purposes other than literary. In time the bureau-secretaire became a bureau-bookcase, the glazed shelves, which were often a separate erection, resting upon the top of the bureau. The cabinetmakers of the second half of the 18th century, the period of the greatest floraison of this combination, competed with each other in devising elegant frets for the glass fronts. Solid and satisfying to the eye, if somewhat severe in form, the mahogany bureau was usually an

exceedingly presentable piece of furniture. Occasionally it had a bombi front which mitigated its severity; this was especially the case in the Dutch varieties, which were in a measure free adaptations of the French Louis Quinze commode. These Dutch bureaux, and the English ones made in imitation of them, were usually elaborately inlaid with floral designs in coloured woods; but whereas the Batavian marquetry was often rough and crude, the English work was usually of considerable excellence. Side by side with this form of writing apparatus was one variety or another of the writing-table proper. In so far as it is possible to generalize upon such a detail it would appear that the bureau was the desk of the yeoman and what we now call the lower middle class, and that the slighter and more table-like forms were preferred by those higher in the social scale. This probably means no more than that while the one class preserved the old English affection for the solid and heavy furniture which would last for generations, those who were more free to follow the fashions and fancies of their time were, as the pecuniarily easy classes always have been, ready to abandon the old for the new.

Just about the time when the flat table with its drawers in a single row, or in nests serving as pedestals, was finally assuming its familiar modern shape, an invention was introduced which was destined eventually, so far as numbers and convenience go, to supersede all other forms of desk. This was the cylinder-top writing-table. Nothing is known of the originator of this device, but it is certain that if not French himself he worked in France. The historians of French furniture agree in fixing its introduction about the year 1750, and we know that a desk worked on this principle was in the possession of the French crown in the year 1760. Even in its early days the cylinder took more than one form. It sometimes consisted of a solid piece of curved wood, and sometimes of a tambour frame — that is to say, of a series of

narrow jointed strips of wood mounted on canvas; the revolving shutters of a shop-front are an adaptation of the idea. For a long period, however, the cylinder was most often solid, and remained so until the latter part of the 10th century, when the ” American roll-top desk ” began to be made in large numbers. This is indeed the old French form with a tambour cylinder, and it is now the desk that is most frequently met with all over the world for commercial purposes. Its popularity is due to its large accommodation, and to the facility with which the closing of the cylinder conceals all papers, and automatically locks every drawer. To France we owe not only the invention of this ubiquitous form, but the construction of many of the finest and most historic desks that have survived — the characteristic

marquetry writing-tables of the Boulle period, and the gilded splendours of that of Louis Quinze have never been surpassed in the history of furniture. Indeed, the ” Bureau du roi ” which was made for Louis XV. is the most famous and magnificent piece of furniture that, so far as we know, was ever constructed. This desk, which is now one of the treasures of the Louvre, was the work of several artist-artificers, chief among whom were Oeben and Riesener — Oeben, it may be added here as a matter of artistic interest, became the grand- father of Eugene Delacroix. The bureau is signed ” Riesener fa. 1769 a l’Arsenal de Paris,” but it has been established that, however great may have been the share of its construction which fell to him, the conception was that of Oeben. The work was ordered in 1760; it would thus appear that nine years were consumed in perfecting it, which is not surprising when we learn from the detailed account of its construction that the work began with making a perfect miniature model followed by one of full size. The ” bureau du roi ” is a large cylinder desk elaborately inlaid in marquetry of woods, and decorated with a wonderful and ornate scries of mounts consisting of mouldings, plaques, vases and statuettes of gilt bronze cast and chased. These bronzes are the work of Duplessis, Winant and Hervieux. The desk, which shows plainly the transition between the Louis Quinze and Louis Seize styles, is as remarkable fqr the boldness of its conception as for the magnificent finish of its details. Its lines are large, flowing and harmonious, and although it is no longer exactly as it left the hands of its makers (Oeben died before it was finished) the alterations that have been made have hardly interfered with the general effect. For the head of the king for whom it was made that of Minerva in a helmet was substituted under his successor. The ciphers of Louis XV. have been removed and replaced by Sevres plaques, and even the key which bore the king’s initial crowned with laurels and palm leaves, with his portrait on the one side, and the fleur de lys on the other, has been interfered with by an austere republicanism. Yet no tampering with details can spoil the monumental nobility of this great conception. (J. P.-B.)

DESLONGCHAMPS, JACQUES AMAND EUDES- (1794-1867), French naturalist and palaeontologist, was born at Caen in Normandy on the 17th of January 1794. His parents, though poor, contrived to give him a good education, and he studied medicine in his native town to such good effect that in 1812 he was appointed assistant-surgeon in the navy, and in 1815 surgeon assistant major to the military hospital of Caen. Soon after- wards he proceeded to Paris to qualify for the degree of doctor of surgery, and there the researches and teachings of Cuvier attracted his attention to subjects of natural history and

palaeontology. In 1822 he was elected surgeon to the board of relief at Caen, and while he never ceased to devote his energies to the duties of this post, he sought relaxation in geological studies. Soon he discovered remains of Teleosaurus in one of the Caen quarries, and he became an ardent palaeontologist. He was one of the founders of the museum of natural history at Caen, and acted as honorary curator; he was likewise one of the founders of the Societi HnnSenne de Normandie (1823), to the transactions of which society he communicated papers on Teleosaurus, Poekilopleuron (Megalosaurus), on Jurassic mollusca and brachiopoda. In 1825 he became professor of zoology to the faculty of sciences, and in 1847, dean. He died on the 17th of January 1867.

His son Eugene Eudes-Deslongchamps (1830-1889), French

palaeontologist, was born in 1830. He succeeded his father about the year 1856 as professor of zoology at the faculty of sciences at Caen, and in 1861 he became also professor of geology and dean. After the death of his father in 1867, he devoted himself to the completion of a memoir on the Teleosaurs: the joint labours being embodied in his Prodrome des Tileosauriens du Calvados. To the Societe Linn6enne de Normandie he contributed memoirs on Jurassic brachiopods, on the geology of the department of La Manche (1856), of Calvados (1856-1863), on the Terrain callovien (1859), on Nouvelle-Caltdonie (1864), and Htudes sur les Mages jurassiques infirieurs de la Normandie (1864). His work Le Jura normand was issued in 1877-1878 (incomplete). He died at Chateau Matthieu, Calvados, on the 21st of December 1889.

DESMAISEAUX, PIERRE (1673-1745); French writer, was born at Saillat, probably in 1673. His father, a minister of the reformed church, had to leave France on the revocation of the edict of Nantes, and took refuge in Geneva, where Pierre was educated. Bayle gave him an introduction to the 3rd Lord Shaftesbury, with whom, in 1699, he came to England, where he engaged in literary work. He remained in close touch with the religious refugees in England and Holland, and constantly in correspondence with the leading continental savants and writers, who were in the habit of employing him to conduct such business as they might have in England. In 1720 he was elected a fellow of the Royal Society. Among his works are Vie de St Evremond (1711), Vie de Boileau-Despriaux (1712), Vie de Bayle (1730). He also

took an active part in preparing the Bibliothbque raisonnee des ouvrages de l'Europe (1728-1753), and the Bibliotheque britannique (1733-1747), and edited a selection of St Evremond's writings (1706). Part of Desmaiseaux's correspondence is pre- served in the British Museum, and other letters are in the royal library at Copenhagen. He died on the nth of July 1745.

DESMAREST, NICOLAS (1725-1815), French geologist, was born at Soulaines, in the department of Aube, on the 16th of September 1725. Of humble parentage, he was educated at the college of the Oratorians of Troyes and Paris. Taking full advantage of the instruction he received, he was able to support himself by teaching, and to continue his studies independently. Buffon's Theory of the Earth interested him, and in 1753 he successfully competed for a prize by writing an essay on the ancient connexion between England and France. This attracted much attention, and ultimately led to his being employed in studying and reporting on manufactures in different countries, and in 1788 to his appointment as inspector-general of the manufactures of France. He utilized his journeys, travelling on foot, so as to add to his knowledge of the earth's structure. In 1763 he made observations in Auvergne, recognizing that the prismatic basalts were old lava streams, comparing them with the columns of the Giant's Causeway in Ireland, and referring them to the operations of extinct volcanoes. It was not, however, until 1774 that he published an essay on the subject, accompanied by a geological map, having meanwhile on several occasions revisited the district. He then pointed out the succession of volcanic outbursts and the changes the rocks had undergone through weathering and erosion. As remarked by Sir A. Geikie, the doctrine of the origin of valleys by the erosive action of the streams which flow through them was first clearly taught by Desmarest. An enlarged and improved edition of his map of the volcanic region of Auvergne was published after his death, in 1823, by his son Anselme Gaetan Desmarest (1 784-1838), who was distinguished as a zoologist, and author of memoirs on recent and fossil Crustacea. He died in Paris on the 20th of September

1815.

See The Founders of Geology, by Sir A. Geikie (1897), pp. 48-78.

(H. B. Wo.)

DESMARETS (or Desmaretz), JEAN, Sieur de Saint- Sorlin (1595-1676), French dramatist and miscellaneous writer, was born in Paris in 1595. When he was about thirty he was introduced to

Richelieu, and became one of the band of writers who carried out the cardinal's literary ideas. Desmarets's own inclination was to novel-writing, and the success of his romance Ariane in 163 1 led to his formal admission to the circle that met <-in. — 4

at the house of Valentine Conrart and later developed into the Academie Francaise. Desmarets was its first chancellor. It was at Richelieu's request that he began to write for the theatre. In this kind he produced a comedy long regarded as a masterpiece, Les Visionnaires (1637); a prose- tragedy, £rigone (1638); and Scipion (1639), a tragedy in verse. His success led to official preferment, and he was made conseiller du roi, contrdleur-gSnhal de V extraordinaire des guerres, and secretary-general of the fleet of the Levant. His long epic Clovis (1657) is noteworthy because Desmarets rejected the traditional pagan background, and maintained that Christian imagery should supplant it. With this standpoint he contributed several works in defence of the moderns in the famous quarrel between the Ancients and Moderns. In his later years Desmarets devoted himself chiefly to producing a quantity of religious poems, of which the best- known is perhaps his verse translation of the Office de la Vierge (1645). He was a violent opponent of the Jansenists, against whom he wrote a Reponse d I'insolente apologie de Port-Royal . . . (1666). He died in Paris on the 28th of October 1676.

See also H. Rigault, Histoire de la querelle des anciens et des modernes (1856), pp. 80-103.

DESMARETS, NICOLAS, Sieur de Maillebois (1648-1721), French statesman, was born in Paris on the 10th of September 1648. His mother was the sister of J. B. Colbert, who took him into his offices as a clerk. He became counsellor to the parlement in 1672, master of requests in 1674 and intendant of finances in 1678. In these last functions he had to treat with the financiers for the coinage of new silver pieces of four sous. After Colbert's death he was involved in the legal proceedings taken against those financiers who had manufactured coins of bad alloy. The prosecution, conducted by the members of the family of Le Tellier, rivals of the Colberts, presented no proof against Desmarets. Nevertheless he was stripped of his offices and exiled to his estates by the king, on the 23rd of December 1683. In March 1686 he was authorized to return to Paris, and again entered into relations with the controllers-general of finance, to whom he furnished for more than ten years remarkable memoirs on the economic situation in France. As early as 1687 he showed the necessity for radical reforms in the system of taxation, insisting on the ruin of the people and the excessive expenses of the king. By these

memoirs he established his claim to a place among the great economists of the time, Vauban, Boisguilbert and the comte de Boulainvilliers. When in September 1699 Chamillart was named controller-general of finances, he took Desmarets for counsellor; and when he created the two offices of directors of finances, he gave one to Desmarets (October 22, 1703). Henceforth Desmarets was veritable minister of finance. Louis XIV. had long conversations with him. Madame de Maintenon protected him. The economists Vauban and Boisguilbert ex- changed long conversations with him. When Chamillart found his double functions too heavy, and retaining the ministry of war resigned that of finance in 1708, Desmarets succeeded him. The situation was exceedingly grave. The ordinary revenues of the year 1708 amounted to 81,977,007 livres, of which 57,833,233 livres had already been spent by anticipation, and the expenses to meet were 200,251,447 livres. In 1709 a famine reduced still more the returns from taxes. Yet Desmarets's reputation re- newed the credit of the state, and financiers consented to advance money they had refused to the king. The emission of paper money, and a reform in the collection of taxes, enabled him to tide over the years 1 709 and 1 7 10. Then Desmarets decided upon an " extreme and violent remedy," to use his own expression, — an income tax. His " tenth " was based on Vauban's plan; but the privileged classes managed to avoid it, and it proved no better than other expedients. Nevertheless Louis XIV. managed to meet the most urgent expenses, and the deficit of 1715, about 350,000,000 livres, was much less than it would have been had it not been for Desmarets's reforms. The honourable peace which Louis was enabled to conclude at Utrecht with his enemies was cer- tainly due to the resources which Desmarets procured for him.

After the death of Louis XIV. Desmarets was dismissed by the regent along with all the other ministers. He withdrew to

his estates. To justify his ministry he addressed to the regent a Compie rendu, which showed clearly the difficulties he had to meet. His enemies even, like Saint Simon, had to recognize his honesty and his talent. He was certainly, after Colbert, the greatest finance minister of Louis XIV.

See Forbonnais, Recherches et considerations sur les finances de la

France (2 vols., Basel, 1758); Montyon, Particula rites et observations sur les ministres des finances de la France (Paris, 1812) ; De Boislisle, Correspondanr.e des controleurs-gineraux des finances (3 vols., Paris, 1873-1897) ; and the same author's " Desmarets et l'affaire des pieces de quatre sols " in the appendix to the seventh volume of his edition of the Memoires de Saint-Simon. (E. Es.)

DES MOINES, the capital and the largest city of Iowa, U.S.A., and the county-seat of Polk county, in the south central part of the state, at the confluence of the Raccoon with the Des Moines river. Pop. (1890) 50,093; (1900) 62,139, ˚f whom 7946 were foreign-born, including 1907 from Sweden and 1432 from Germany; (1910 census) 86,368. Des Moines is served by the Chicago, Burlington & Quincy, the Chicago & North-Western, the Chicago Great Western, the Chicago, Milwaukee & St Paul, the Chicago, Rock Island & Pacific, the Wabash, the Minneapolis & St Louis, and the Des Moines, Iowa Falls & Northern railways; also by several interurban electric lines. The chief building in Des Moines is the State Capitol, erected at a cost of about $3,000,000; other important buildings are the public library (containing, in 1908, 40,415 volumes), the court house, the post office, the Iowa State Historical building, a large auditorium and two hospitals. As a manufacturing centre the city has considerable importance. Among the leading products are those of the furnaces, foundries and machine shops, flour and grist mills, planing mills, creameries, bridge and iron works, publishing houses and a packing house; and brick, tile, pottery, patent medicines, furniture, caskets, tombstones, carriages, f a rm machinery, Portland cement, glue, gloves and' hosiery. The value of the factory product in 1905 was $15ˆ084,958, an increase of 79″ 7 % in nve years. The city is in one of the most productive coal regions of the state, has a large jobbing trade, and is an important centre for the insurance business. The Iowa state fair is held here annually. In 1908 this city had a park system of 750 acres. Des Moines is the seat of Des Moines College, a Baptist institution, co-educational, founded in 1865 (enrolment, 1907-1908, 214); of Drake University (co-educational; founded in 188 1 by the Disciples of Christ; now non-sectarian), with colleges of liberal arts, law, medicine, dental surgery and of the Bible, a conservatory of music, and a normal school, in which are departments of oratory and commercial training, and having in 1007-1908 1764 students, of whom 520 were in the summer school only; of the Highland Park College, founded in 1890; of Grand View College (Danish Lutheran), founded in 1895; and of the Capital City commercial college (founded 1884). A new city charter, embodying what has become known as the " Des Moines Plan " of municipal government, was adopted in 1907. It

centralizes power in a council of five (mayor and four council- men), nominated at a non-partisan primary and voted for on a non-partisan ticket by the electors of the entire city, ward divisions having been abolished. Elections are biennial. Other city officers are chosen by the council, and city employees are selected by a civil service commission of three members, ap- pointed by the council. The mayor is superintendent of the department of public affairs, and each of the other adminis- trative departments (accounts and finances, public safety, streets and public improvements, and parks and public property) is under the charge of one of the councilmen. • After petition sighed by a number of voters not less than 25% of the number voting at the preceding municipal election, any member of the council may be removed by popular vote, to which all public franchises must be submitted, and by which the council may be compelled to pass any law or ordinance.

A fort called Fort Des Moines was established on the site of the city in 1843 to protect the rights of the Sacs and Foxes. In 1843 the site was opened to settlement by the whites; in 1851 Des Moines was incorporated as a town; in 1857 it was first chartered as a city, and, for the purpose of a more central location, the seat

of government .was removed hither from Iowa City. A fort was re-established here by act of Congress in 1900 and named Fort Des Moines. It is occupied by a full regiment of cavalry. The name of the city was taken from that of the river, which in turn is supposed to represent a corruption by the French of the original Indian name, Moingona,— the French at first using the abbreviation ” moin,” and calling the river ” la riviere des moins ” and then, the name haying become associated with the Tfappist monks, changing it into ” la riviere des moines.”

DESMOND, GERALD FITZGERALD, 15TH Earl of (d. 1583), Irish leader, was son of James, 14th earl, by his second wife More O’ Carroll. His father had agreed in January 1 541, as one of the terms of his submission to Henry VIII. , to send young Gerald to be educated in England. At the accession of Edward VI. proposals to this effect were renewed; Gerald was to be the companion of the young king. Unfortunately for the subsequent peace of Munster these projects were not carried out. The Desmond estates were held by a doubtful title, and claims on them were made by the Butlers, the hereditary enemies of the Geraldines, the 9th earl pf Ormonde having married Lady Joan Fitzgerald, daughter and heiress-general of the nth earl of Desmond. On Ormonde’s death she proposed to marry Gerald Fitzgerald, and eventually did so, after the death of her second husband, Sir Francis

Bryan. The effect of this marriage was a temporary cessation of open hostility between the Desmonds and her son, Thomas Butler, 10th earl of Ormonde.

Gerald succeeded to the earldom in 1558; he was knighted by the lord deputy Sussex, and did homage at Waterford. He soon established close relations with his namesake Gerald Fitzgerald, nth earl of Kildare (1525-1585), and with Shane O'Neill. In spite of an award made by Sussex in August 1560 regulating the matters in dispute between Ormonde and the Fitzgeralds, the Geraldine outlaws were still plundering their neighbours. Desmond neglected a summons to appear at Elizabeth's court for some time on the plea that he was at war with his uncle Maurice. When. he did appear in London in May 1562 his insolent conduct before the privy council resulted in a short imprisonment in the Tower. He was detained in England until 1 564, and soon after his return his wife's death set him free from sUch restraint as was provided by her Butler connexion. He now raided Thomond, and in Waterford he sought to enforce his feudal rights on Sir Maurice Fitzgerald of Decies, who invoked the help of Ormonde. The two nobles thereupon resorted to open war, fighting a battle at Affane on the Blackwater, where Desmond was defeated and taken prisoner. Ormonde and Desmond were bound over in London to keep the peace, being allowed to return early in 1566 to Ireland, where a royal commission was appointed to settle the matters in dispute between them. Desmond and his brother Sir John of Desmond were sent over to England, where they surrendered their lands to the queen after a short experienca of the Tower. In the meanwhile Desmond's cousin, James Fitzmaurice Fitzgerald, caused himself to be acclaimed captain of Desmond in defiance of Sidney, and in the evident expectation of usurping the earldom. He sought to give the movement an ultra-Catholic character, with the idea of gaining foreign assistance, and allied himself with John Burke, son of the earl of Clanricarde, with Connor O'Brien, earl of Thomond, aad even secured Ormonde's brother, Sir Edmund Butler, whom Sidney had offended. Piers and Edward Butler also joined the rebellion, but the appearance of Sidney and Qrnionde in the south-west was rapidly followed by the submission of the Butlers. Most of the Geraldines were subjugated by Humphrey Gilbert, but Fitzmaurice remained in arms, and in 1571 Sir John Perrot undertook to reduce him. Perrot hunted him down, and at last on the 23rd of February 1573 he made formal submission at Kilmallock, lying prostrate on the floor of the church by way of proving his sincerity.

Against the advice of the queen's Irish counsellors Desmond was allowed to return to Ireland in 1573, the earl promising not to

exercise palatinate jurisdiction in Kerry until his rights to it were proved. He was detained for six months in Dublin, but in November slipped through the hands of the government, and

within a very short time had reduced to a state of anarchy the province which Perrot thought to have pacified by his severities. Edward Fitzgerald, brother of the earl of Kildare, and lieutenant of the queen's pensioners in London, was sent to remonstrate with Desmond, but accomplished nothing. Desmond asserted that none but Brehon law should be observed between Geraldines; and Fitzmaurice seized Captain George Bourchier, one of Elizabeth's officers in the west. Essex met the earl near Water- ford in July, and Bourchier was surrendered, but Desmond refused the other demands made in the queen's name. A document offering £500 for his head, and £1000 to any one who would take him alive, was drawn up but was vetoed by two members of the council. On the 18th of July 1 574 the Geraldine chiefs signed the " Combination " promising to support the. earl unconditionally; shortly afterwards Ormonde and the lord deputy, Sir William Fitzwilliam, marched on Munster, and put Desmond's garrison at Derrinlaur Castle to the sword. Desmond submitted at Cork on the 2nd of September, handing over his estates to trustees. Sir Henry Sidney visited Munster in 1575, and affairs seemed to promise an early restoration of order. But Fitzmaurice had fled to Brittany in company with other leading Geraldines, John' Fitzgerald, seneschal of Imokilly, who had held Ballymartyr against Sidney in 1567, and Edmund Fitzgibbon, the son of the White Knight who had been attainted in 1571. He intrigued at the French and Spanish courts for a foreign invasion of Ireland, and at Rome met the adventurer Stucley, with whom he projected an expedition which was to make a nephew of Gregory XIII. king of Ireland. In 1579 he landed in Smerwick Bay, where he was joined later by some Spanish soldiers at the Fort del Ore. His ships were captured on the 29th of July and he himself was slain in a skirmish while on his way to Tipperary. Nicholas Sanders, the papal legate who had accompanied Fitzmaurice, worked on Desmond's weakness, and sought to draw him into open rebellion: Desmond had perhaps been restrained before by jealousy of Fitzmaurice; his inde- cisions ceased when on the 1st of November Sir William; Pelham proclaimed him a traitor. The sack of Youghal and Kinsale by the Geraldines was speedily followed by the successes of Ormonde and Pelham acting in concert with Admiral Winter. In June 1581 Desmond had to take to the woods, but he maintained a

considerable following for some time, which, however, in June 1583, when Ormonde set a price on his head; was reduced to four persons. Five months later, on the nth of November, he was seized and murdered by a small party of soldiers. His brother Sir John of Desmond had been caught and killed in December 1 58 1, and the seneschal of Imokilly had surrendered on the 14th of June 1583. After his submission the seneschal acted loyally, but his lands excited envy; he was arrested in 1587, and died in Dublin Castle two days later.

By his second marriage with Eleanor Butler, the 15th earl left two sons, the elder of whom, James, 16th earl (1570-1601), spent most of his life in prison. After an unsuccessful attempt in 1600-1601 to recover his inheritance he returned to England, where he died, the title becoming extinct.

See G. E. C(okayne,) Complete Peerage; R. Bagwell, Ireland under the Tudors (1885-1890); Annals of Ireland by the Four Masters (ed. J. O'Donovan, 1851) ; and the article Fitzgerald.

DESMOND (Des-Mumha) , an ancient territorial division of Ireland, covering the eastern part of the modern Co. Kerry and the western part of Co. Cork. Its creation as a kingdom is placed in the year 248,. when Oliol Olum, king of Munster, divided his territory between his two sons, giving Desmond to Eoghan, and Thomond or North Munster to Cormac. In 1329 Maurice Fitzthomas or Fitzgerald (d. 1356), lord of Decies and Desmond, was created 1st earl of Desmond by Edward III.; like other earls created about that time he ruled his territory as a palatinate, and his family acquired enormous powers and a large measure of independence. Meanwhile native kings continued to reign in a restricted territory until 1596. In 1583 came the attainder of Gerald Fitzgerald, 1 5th earl of Desmond (q.v.) , and in 1 $86 an act of parliament declared the forfeiture of the Desmond estates to the crown. In 1571 a commission provided for the formation of

Desmond into a county, and it was regarded as such for a few years, but by the beginning of the 17th century it was joined to Co. Kerry.

In 1619 the title of earl of Desmond was conferred on Richard Preston, Lord Dingwall, at whose death in 1628 it again became extinct. It was then bestowed on George Feilding, second son of William, earl of Denbigh, who had held the reversion of the earldom from 1622. His son William Feilding succeeded as earl of Denbigh in 1675, and thenceforward the title of Desmond was held in conjunction with that honour.

DESMOSCOLECIDA, a group of minute marine worm-like creatures. The body tapers towards each end and is marked by a number of well-defined ridges. These ridges resemble on a small scale those which surround the body of a Poro- cephalus (Linguatulida) , and like them have no segmental significance. Their number varies in the different species. The head bears four setae, and some of the ridges bear a pair either dorsally or ventrally. The setae are movable. Two pigment spots between the fourth and fifth ridges are regarded as eyes. The Desmoscolecida move by looping their bodies like geometrid caterpillars or leeches, as well as by creeping on their setae. The mouth is terminal, and leads into a muscular oesophagus which opens into a straight intestine terminat- ing in an anus, which is said to be dorsal in position. The sexes are dis- tinct. The testis is single, and its duct opens into the intestine and is provided with two chitinous spicules. The ovary is also single, opening independently and anterior to the anus. The nervous system is as yet unknown.

There are several species. D. minutus Clap, has been met with in the English Channel. Others are D. nematoides Greef , D. adelphus Greef, D. chaetogaster Greef, D. elongatus Panceri, D. lanugi- nosa Panceri. Trichoderma oxycaudatum Greef is 0-3 mm. long, and is also a ” ringed creature with long hair-like bristles.” The male has two spicules, and there is some doubt as to whether it should be placed with the Desmos- colecida or with the Nematoda. With regard to the systematic position of the group, it certainly comes nearest — especially in the structure of its reproductive organs — to the Nematoda. We still, however, are very ignorant of the internal anatomy of these forms, and until we know more it is impossible to arrive at a very definite conclusion as to their position in the animal kingdom.

See Panceri, Atti Ace, Napoli. vii. (1878); Greef, Arch. Naturg. 35 (i.) (1869), p. 112. (A. E. S.)

DESMOULINS, LUCIE SIMPLICE CAMILLE BENOIST (1760- 1794), French journalist and politician, who played an important part in the French Revolution, was born at Guise, in Picardy, on the 2nd of March 1760. His father was lieutenant-general of the bailliage of Guise, and through the efforts of a friend obtained a bourse for his son, who at the age of fourteen left home for Paris, and entered the college of Louis le Grand. In this school, in which Robespierre was also a bursar and a distinguished student, Camille Desmoulins laid the solid foundation of his learning. Destined by his father for the law, at the completion of his legal studies he was admitted an advocate of the parlement of Paris in 1785. His professional success was not great; his

manner was violent, his appearance unattractive, and his speech impaired by a painful stammer. He indulged, however, his love for litera- ture, was closely observant of public affairs, and thus gradually

Natural

Worms,”

Mac-

millan & Co.

Female Desmoscolex elongatus Panceri, vent- ral view. a, Ovary. (From Panceri.)

prepared himself for the main duties of his life — those of a political litterateur.

In March 1789 Desmoulins began his political career. Having been nominated deputy from the bailliage of Guise, he appeared at Laon as one of the commissioners for the election of deputies to the States-General summoned by royal edict of January 24th. Camille heralded its meeting by his Ode to the States-General. It is, moreover, highly probable that he was the author of a radical pamphlet entitled La Philosophie au peuple fratiQais, published in 1788, the text of which is not known. His hopes of pro- fessional success were now scattered, and he was living in Paris in extreme poverty. He, however, shared to the full the excite- ment which attended the meeting of the States-General. As appears from his letters to his father, he watched with exultation the procession of deputies at Versailles, and with violent indigna- tion the events of the latter part of June which followed the closing of the Salle des Menus to the deputies who had named themselves the National Assembly. It is further evident that Desmoulins was already sympathizing, not only with the enthusi- asm, but also with the fury and cruelty, of the Parisian crowds.

The sudden dismissal of Necker by Louis XVI. was the event which brought Desmoulins to fame. On the 12th of July 1789 Camille, leaping upon a table outside one of the cafes in the garden of the Palais Royal, announced to the crowd the dismissal of their favourite. Losing, in his violent excite- ment, his stammer, he inflamed the passions of the mob by his burning words and his call ” To arms! ” ”

This dismissal," he said, " is the tocsin of the St Bartholomew of the patriots." Drawing, at last, two pistols from under his coat, he declared that he would not fall alive into the hands of the police who were watching his movements. He descended amid the embraces of the crowd, and his cry " To arms! " resounded on all sides. This scene was the beginning of the actual events of the Revolution. Following Desmoulins the crowd surged through Paris, procuring arms by force; and on the 13th it was partly organized as the Parisian militia which was afterwards to be the National Guard. On the 14th the Bastille was taken.

Desmoulins may be said to have begun on the following day that public literary career which lasted till his death. In May and June 1789 he had written La France libre, which, to his chagrin, his publisher refused to print. The taking of the Bastille, however, and the events by which it was preceded, were a sign that the times had changed; and on the 18th of July Desmoulins's work was issued. Considerably in advance of public opinion, it already pronounced in favour of a republic. By its erudite, brilliant and courageous examination of the rights of king, of nobles, of clergy and of people, it attained a wide and sudden popularity; it secured for the author the friendship and pro- tection of Mirabeau, and the studied abuse of numerous royalist pamphleteers. Shortly afterwards, with his vanity and love of popularity inflamed, he pandered to the passions of the lower orders by the publication of his Discours de la lanterne aux Parisiens which, with an almost fiendish reference to the excesses of the mob, he headed by a quotation from St John, Qui male agit odit lucem. Camille was dubbed " Procureur-general de la lanterne."

In November 1789 Desmoulins began his career as a journalist by the issue of the first number of a weekly publication, Les Revolutions de France et de Brabant. The title of the publication changed after the 73rd number. It ceased to appear at the end of July 1791. 1

Success attended the Revolutions from its first to its last number, Camille was everywhere famous, and his poverty was relieved. These numbers are valuable as an exhibition not so much of events as of the feelings of the Parisian people; they are adorned, moreover, by the erudition, the wit and the genius of the author, but they are disfigured, not only by the most biting personalities and the defence and even advocacy of the excesses of the mob, but by the entire absence of the forgiveness and pity for which the writer was afterwards so eloquently to plead.

1 In April 1792 Desmoulins founded with Stanislas Freron a new

journal, La Tribune des patriotes, but only four numbers appeared.

Desmoulins was powerfully swayed by the influence of more vigorous minds; and for some time before the death of Mirabeau, in April 1791, he had begun to be led by Danton, with whom he remained associated during the rest of his fife. In July 1791 Camille appeared before the municipality of Paris as head of a deputation of petitioners for the deposition of the king. In that month, however, such a request was dangerous; there was excitement in the city over the presentation of the petition, and the private attacks to which Desmoulins had often been subject were now followed by a warrant for the arrest of himself and Danton. Danton left Paris for a little; Desmoulins, however, remained there, appearing occasionally at the Jacobin club. Upon the failure of this attempt of his opponents, Desmoulins published a pamphlet, Jean Pierre Brissot dimasque, which abounded in the most violent personalities. This pamphlet, which had its origin in a petty squabble, was followed in 1793 by a Fragment de I'histoire secrete de la Revolution, in which the party of the Gironde, and specially Brissot, were most mercilessly attacked. Desmoulins took an active part on the 10th of August and became secretary to Danton, when the latter became minister of justice. On the 8th of September he was elected one of the deputies for Paris to the National Convention, where, however, ' he was not successful as an orator. He was of the party of the " Mountain," and voted for the abolition of royalty and the death of the king. With Robespierre he was now more than ever associated, and the Histoire des Brissotins, the fragment above alluded to, was inspired by the arch-revolutionist. The success of the brochure, so terrible as to send the leaders of the Gironde to the guillotine, alarmed Danton and the author. Yet the r6le of Desmoulins during the Convention was of but secondary importance.

In December 1793 was issued the first number of the Vieux Cordelier, which was at first directed against the Hebertists and approved of by Robespierre, but which soon formulated Danton's idea of a committee of clemency. Then Robespierre turned against Desmoulins and took advantage of the popular indigna- tion roused against the Hebertists to send them to death. The time had come, however, when Saint Just and he were to turn their attention not only to les enrages, but to les indulgents — the powerful faction of the Dantonists. On the 7th of January 1 794 Robespierre, who on a former occasion had defended Camille when in danger at the hands of the National Convention, in addressing the Jacobin club counselled not the expulsion of Desmoulins, but the burning of certain numbers of the Vieux Cordelier. Camille sharply replied that he would answer with Rousseau, — " burning is not answering," and a bitter quarrel

thereupon ensued. By the end of March not only were Hebert and the leaders of the extreme party guillotined, but their opponents, Danton, Desmoulins and the best of the moderates, were arrested. On the 31st the warrant of arrest was signed and executed, and on the 3rd, 4th and 5th of April the trial took place befqre the Revolutionary Tribunal. It was a scene of terror not only to the accused but to judges and to jury. The retorts of the prisoners were notable. Camille on being asked his age, replied, ” I am thirty-three, the age of the sans-culotte Jesus, a critical age for every patriot.” This was false; he was thirty-four. 2 The accused were prevented from defending themselves; a decree of the Convention denied them the right of speech. Armed with this and the false report of a spy, who charged the wife of Desmoulins with conspiring for the escape of her husband and the ruin of the republic, Fouquier-Tinville by threats and entreaties obtained from the jury a sentence of death. It was passed in absence of the accused, and their execution was appointed for the same day.

Since his arrest the courage of Camille had miserably failed. He had exhibited in the numbers of the Vieux Cordelier almost a disregard of the death which he must have known hovered over him. He had with consummate ability exposed the terrors of

2 This is borne out by the register of his birth and baptism, and by words in his last letter to his wife, — ” I die at thirty-four.” The dates (1762-1794) given in so many biographies of Desmoulins ara certainly inaccurate.

the Revolution, and had adorned his pages with illustrations from Tacitus, the force of which the commonest reader could feel. In his last number, the seventh, which his publisher refused to print, he had dared to attack even Robespierre, but at his trial it was found that he was devoid of physical courage. He had to be torn from his seat ere he was removed to prison, and as he sat next to Danton in the tumbrel which conveyed them to the guillotine, the calmness of the great leader failed to impress him.. In his violence, bound as he was, he tore his clothes into shreds, and his bare shoulders and breast were exposed to the gaze of the surging crowd. Of the fifteen guillotined together, including among them Marie Jean Herault de Sechelles, Francois Joseph Westeirmann and Pierre Philippeaux, Desmoulins died third; Danton, the greatest, died last.

On the 29th of December 1790 Camille had married Lucile Duplessis, and among the witnesses of the ceremony are observed the names of Brissot, Petion and Robespierre. The only child of the marriage, Horace Camille, was born on the 6th of July 1792. Two days afterwards Desmoulins brought it into notice by appearing with it before the municipality of Paris to demand ” the formal statement of the civil estate of his son.” The boy was afterwards pensioned by the French government, and died in Haiti in 1825. Lucile, Desmoulins’s accomplished and affec- tionate wife, was, a. few days after her husband; and on a false charge, condemned to the guillotine. She astonished allonlookers by the calmness with which she braved death (April 13, 1794).

See J. Claretie, (Euvres de Camille Desmoulins avec une etude biographique . . . &c. (Paris, 1874), and Camille Desmoulins, Lucile Desmoulins, etude sur les Dantonistes (Paris, 1875; Eng. trans., London, 1876); F. A. Aulard, Les Orateurs de la Legislative et dela Convention (Paris, 1905, 2nd ed.) : G. Lenfitre, ” La Maisonde Camille Desmoulins ” (Le Temps, March 25, 1899).

DESNOYERS, JULES PIERRE FRANCOIS STANISLAS (1800- 1887), French geologist and archaeologist, was born at Nogent-le- Rotrou, in the department of Eure-et-Loir, on the 8th of October 1800. Becoming interested in geology at an early age, he was one of the founders of the Societe Geologique de France in 1830. In 1834 he was appointed librarian of the Museum of Natural History in Paris. His contributions to geological science com- prise memoirs on the Jurassic, Cretaceous and Tertiary Strata of the Paris Basin and of Northern France, and other papers relating to the antiquity of man, and to the question of his co-existence with extinct mammalia. His separate books were Sur la Crate et sur les terrains tertiaires du Cptenttn (1825), Recherches giologiques et historiques sur les cavernes (1845). He died in 1887.

DESOR, PIERRE JEAN EDOUARD (1811-1882), Swiss geologist, was born at Friedrichsdorf, near Frankfort-on-Main, on .the 13th of February 1811. Associated in early years with Agassiz he studied palaeontology and glacial phenomena, and in company with J. D. Forbes ascended the Jungfrau in 1841. Desor afterwards became professor of geology in the academy at Neuchatel, continued his studies on the structure of glaciers, but gave special attention to the study of Jurassic Echinoderms. He also investigated the old lake-habitations of Switzerland, and made important observations on the physical features of the Sahara. Having inherited considerable property he retired to Combe Varin in Val Travers. He died at Nizza on the 23rd of February 1882. His chief publications were: Synopsis

des Achinides fossiles (1858), Aus Sahara (1865), Der Gebirgsbau der Alpen (1865), Die Pfahlbauten des Neuenburger Sees (1866), Echinologie hehetique (2 vols., 1868-1873, with P. de Loriol).

DE SOTO, a city of Jefferson county, Missouri, U.S.A., on Joachim Creek, 42 m. S.S.W. of St Louis. Pop. (1890) 3960; (1900) 5611 (33 2 being foreign-born and 364 negroes); (1910)4721. It is served by the St. Louis, Iron Mountain & Southern railway, which has extensive repair shops here. About 25 m, from De Soto is the Bochert mineral spring. In De Soto are Mount St Clement's College (Roman Catholic, 1900), a theological seminary of the Congregation of the Most Holy Redeemer under the charge of the Redemptorist Fathers, and a Young Men's Christian Associa- tion building. De Soto is in a good agricultural and fruit-growing

region, which produces Indian corn, apples, plums, pears and small fruit. Lead and zinc are mined in the vicinity and shipped from the city in considerable quantities; and among the city's manufactures are shoes, flour and agricultural implements. The municipality owns the water- works, the water supply of- which is furnished by artesian wells. De Soto was laid out in 1855 and was incorporated in 1869.

DESPARD, EDWARD MARCUS (1751-1803), Irish conspirator, was born in Queen's Co., Ireland, in 1751. In 1766 he entered the British navy, was promoted lieutenant in 1772, and stationed at Jamaica, where he soon proved himself to have considerable engineering talent. He served in the West Indies with credit, being promoted captain after the San Juan expedition (1779), then made governor of the Mosquito Shore and the Bay of Honduras, and in 1782 commander of a successful expedition against the Spanish possessions on the Black river. In 1784 he took over the administration of Yucatan. Upon frivolous charges he was suspended by Lord Grenville, and recalled to England. From 1790 to 1792 these charges were held over him, and when dismissed no compensation was forthcoming. His complaints caused him to be arrested in 1798; and with a short interval he remained in gaol until 1800. By that time Despard was desperate, and engaged in a plot to seize the Tower of London and Bank of England and assassinate George III. The whole idea was patently preposterous, but Despard was arrested, tried before a special commission, found guilty of high treason, and, with six of his fellow-conspirators, sentenced in 1803 to be hanged, drawn and quartered. These were the last men to be so sentenced in England. Despard was executed on the 21st of February 1803.

His eldest brother, John Despard (1745-1829), had a long and

distinguished career in the British army; gazetted an ensign in 1760, he was promoted through the various intermediate grades and became general in 1814. His most active service was in the American War of Independence, during which he was twice made prisoner.

DESPENSER, HUGH LE (d. 1265), chief justiciar of England, first plays an important part in 1258, when he was prominent on the baronial side in the Mad Parliament of Oxford. In 1260 the barons chose him to succeed Hugh Bigod as justiciar, and in 1 263 the king was further compelled to put the Tower of London in his hands. On the outbreak of civil war he joined the party of Simon de Montfort, earl of Leicester, and led the Londoners when they sacked the manor-house of Isleworth, belonging to Richard, earl of Cornwall, king of the Romans. Having fought at Lewes (1264) he was made governor of six castles after the battle, and was then appointed one of the four arbitrators to mediate between Simon de Montfort and Gilbert de Clare, earl of Gloucester. He was summoned to Simon de Montfort's parlia- ment in 1264, and acted as justiciar throughout the earl's dictatorship. Despenser was killed at Evesham in August 1265.

See C. Bemont, Simon de Montfort (Paris, 1884); T. F. Tout in Owens College Historical Essays, pp. 76 ff. (Manchester, 1902).

DESPENSER, HUGH LE (1262-1326), English courtier, was a son of the English justiciar who died at Evesham. He fought for Edward I. in Wales, France and Scotland, and in 1295 was summoned to parliament as a baron. Ten years later he was sent by the king to Pope Clement V. to secure Edward's release from the oaths he had taken to observe the charters in 1297. Almost alone Hugh spoke out for Edward II. 's favourite, Piers Gaveston, in 1308; but after Gaveston's death in 13 12 he himself became the king's chief adviser, holding power and influence until Edward's defeat at Bannockburn in 13 14. Then, hated by the barons, and especially by Earl Thomas of Lancaster, as a deserter from their party, he was driven from the council, but was quickly restored to favour and loaded with lands and honours, being made earl of Winchester in 1322. Before this time Hugh's son, the younger Hugh le Despenser, had become associated with his father, and having been appointed the king's chamberlain was enjoying a still larger share of the royal favour. About 1306 this baron had married Eleanor (d. 1337), one of the sisters and heiresses of Gilbert de Clare, earl of Gloucester, who was slain at

Bannockburn; and after a division of the immense Clare lands had been made in 13 17 violent quarrels broke out between the Despensers and the husbands of the other heiresses, Roger of Amory and Hugh of Audley. Interwoven with this dispute was another between the younger Despenser and the Mowbrays, who were supported by Humphrey Bohun, earl of Hereford, about some lands in Glamorganshire. Fighting having begun in Wales and on the Welsh borders, the English barons showed themselves decidedly hostile to the Despensers, and in 1321 Edward II. was obliged to consent to their banishment. While the elder Hugh left England the younger one remained; soon the king persuaded the clergy to annul the sentence against them, and father and son were again at court. They fought against the rebellious barons at Boroughbridge, and after Lancaster's death in 1322 they were practically responsible for the government of the country, which they attempted to rule in a moderate and constitutional fashion. But their next enemy, Queen Isabella, was more formidable, or more fortunate, than Lancaster. Returning to England after a sojourn in France in 1326 the queen directed her arms against her husband's favourites. The elder Despenser was seized at Bristol, where he was hanged on the 27th of October 1326, and the younger was taken with the king at Llantrisant and hanged at Hereford on the 24th of November following. The attainder against the Despensers was reversed in 1398. The intense hatred with which the barons regarded the Despensers was due to the enormous wealth which had passed into their hands, and to the arrogance and rapacity of the younger Hugh.

The younger Despenser left two sons, Hugh (1308-1349), and Edward, who was killed at Vannes in 1342.

The latter's son Edward le Despenser (d. 1375) fought at the battle of Poitiers, and then in Italy for Pope Urban V.; he was a patron of Froissart, who calls him le grand sire Despensier. His son, Thomas le Despenser (1373-1400), the husband of Constance (d. 1416), daughter of Edmund of Langley, duke of York, supported Richard II. against Thomas of Woodstock, duke of Gloucester, and the other lords appellant in 1397, when he himself was created earl of Gloucester, but he deserted the king in 1399. Then, degraded from his earldom for participating in Gloucester's death, Despenser joined the conspiracy against Henry IV., but he was seized and was executed by a mob at Bristol in January 1400.

The elder Edward le Despenser left another son, Henry (c. 1341-1406), who became bishop of Norwich in 1370. In early life Henry had been a soldier, and when the peasants revolted in 1381 he

took readily to the field, defeated the insur- gents at North Walsham, and suppressed the rising in Norfolk with some severity. More famous, however, was the militant bishop's enterprise on behalf of Pope Urban VI., who in 1382 employed him to lead a crusade in Flanders against the supporters of the anti-pope Clement VII. He was very successful in captur- ing towns until he came before Ypres, where he was checked, his humiliation being completed when his army was defeated by the French and decimated by a pestilence. Having returned to England the bishop was impeached in parliament and was deprived of his lands; Richard II., however, stood by him, and he soon regained an influential place in the royal council, and was employed to defend his country on the seas. Almost alone among his peers Henry remained true to Richard in 1399; he was then imprisoned, but was quickly released and reconciled with the new king, Henry IV. He died on the 23rd of August 1406. Despenser was an active enemy of the Lollards, whose leader, John Wycliffe, had fiercely denounced his crusade in Flanders.

The barony of Despenser, called out of abeyance in 1604, was held by the Fanes, earls of Westmorland, from 1626 to 1762; by the notorious Sir Francis Dashwood from 1763 to 1781; and by the Stapletons from 1788 to 1891. In 1891 it was inherited, through his mother, by the 7th Viscount Falmouth.

DES PERIERS, BONAVENTURE (c. 1500-1544), French author, was born of a noble family at Arnay-le-duc in Burgundy at the end of the 15th century. The circumstances of his educa- tion are uncertain, but he became a good classical scholar, and

was' attached to various noble houses in the capacity of tutor. In 1533 or 1534 Des Periers visited Lyons, then the most en- lightened town of France, and a refuge for many liberal scholars who might elsewhere have had to suffer for their opinions. He gave some assistance to Robert Olivetan and Lef&vre d'Etaples in the preparation of the vernacular version of the Old Testament, and to Etienne Dolet in the Commentarii linguae latinae. In 1536 he put himself under the protection of Marguerite d'Angoul6me, queen of Navarre, who made him her valet-de- chambre. He acted as the queen's secretary, and transcribed the Heptam&ron for her. It is probable that his duties extended beyond those of a mere copyist, and some writers have gone so far as to say that the Heptameron was his work. The free discussions permitted at Marguerite's court encouraged a licence of thought as displeasing to the Calvinists as to the Catholics. This free inquiry became scepticism in Bonaventure's Cymbalum Mundi . . . (1537), and the queen of Navarre thought it prudent to disavow the

author, though she continued to help him privately until 1541. The book consisted of four dialogues in imitation of Lucian. Its allegorical form did not conceal its real meaning, and, when it was printed by Morin, probably early in 1538, the Sorbonne secured the suppression of the edition before it was offered for sale. The dedication provides a key to the author's intention: Thomas duClevier {or Clenier) a son ami Pierre Tryocan was recognized by 19th-century editors to be an anagram for Thomas I'Incridule a son ami Pierre Croyant. The book was reprinted in Paris in the same year. It made many bitter enemies for the author. Henri Estienne called it detestable, and Etienne Pasquier said it deserved to be thrown into the fire with its author if he were still living. Des Periers prudently left Paris, and after some wanderings settled at Lyons, where he lived in poverty, until in 1544 he put an end to his existence by falling on his sword. In 1544 his collected works were printed at Lyons. The volume, Recueil des ceuvres de feu Bonaventure des Periers, included his poems, which are of small merit, the Traill des quatre vertus cardinales apres SSneque, and a translation of the Lysis of Plato. In 1558 appeared at Lyons the collection of stories and fables entitled the Nouvelles rScrialions etjoyeux devis. It is on this work that the claim put forward for Des Periers as one of the early masters of French prose rests. Some of the tales are attributed to the editors, Nicholas Denisot and Jacques Pelletier, but their share is certainly limited to the later ones. The book leaves something to be desired on the score of morality, but the stories never lack point and are models of simple, direct narration in the vigorous and picturesque French of the 16th century.

His CEuvres francaises were published by Louis Lacour (Paris, 2 vols., 1856). See also the preface to the Cymbalum Mundi . . . ,(ed. F. Franck, 1874); A. Cheneviere, Bonaventure Desperiers, savie, ses poesies (1885) ; and P. Toldo, Contributo alio studio della novella francese del XV. e XVI. secolo (Rome, 1895).

DESPORTES, PHILIPPE (1546-1606), French poet, was born at Chartres in 1546. As secretary to the bishop of Le Puy he visited Italy, where he gained a knowledge of Italian poetry afterwards turned to good account. On his return to France he attached himself to the duke of Anjou, and followed him to Warsaw on his election as king of Poland. Nine months in Poland satisfied the civilized Desportes, but in 1574 his patron became king of France as Henry III. He showered favours on the poet, who received, in reward for the skill with which he wrote occasional poems at the royal request, the abbey of Tiron and four other valuable benefices. A good example of the light and dainty verse in which Desportes excelled is furnished by the -well-known villanelle with the refrain " Qui premier s'en repentira," which

was on the lips of Henry, duke of Guise, just before his tragic death. Desportes was above all an imitator. He imitated Petrarch, Ariosto, Sannazaro, and still more closely the minor Italian poets, and in T604 a number of his plagiarisms were exposed in the Rencontres des Muses de France et d'ltalie. As a sonneteer he showed much grace and sweetness, and English poets borrowed freely from him. In his old age Desportes acknowledged his ecclesiastical preferment by a translation of

the Psalms remembered chiefly for the brutal mot of Malherbe: " Votre potage vaut mreux que vos psaumes. " Desportes died on the 5th of October 1606. He had published in 1573 an edition of his works including Diane, Les Amours d'Hippolyte, Elegies, Bergeries, (Euvres chretiennes, &c.

An edition of his (Euvres, by Alfred Michiels, appeared in 1858.

DESPOT (Gr. htairorrfs, lord or master; the origin of the first part of the Gr. word is unknown, the second part is cognate with irixris, husband, Lat. potens, powerful), in Greek usage the master of a household, hence the ruler of slaves. It was also used by the Greeks of their gods, as was the feminine form deo-iroiva. It was, however, principally applied by the Greeks to the absolute monarchs of the eastern empires with which they came in contact; and it is in this sense that the word, like its equivalent ” tyrant,” is in current usage for an absolute sovereign whose rule is not restricted by any constitution. In the Roman empire of the East ” despot ” was early used as a title of honour or address of the emperor, and was given by Alexius I. (1081-1118) to the sons, brothers and sons-in-law of the emperor (Gibbon, Decline and Fall, ed. Bury, vol. vi. 80). It does not seem that the title was confined to the heir-apparent by Alexius II. (see Selden, Titles of Honour, part ii. chap. i. s. vi.). Later still it was adopted by the vassal princes of the empire. This gave rise to the name ” despotats ” as applied to these tributary states, which survived the break-up of the empire in the independent ” despotats ” of Epirus, Cyprus, Trebizond, &c. Under Ottoman rule the title was preserved by the despots of Servia and of the Morea, &c. The early use of the term as a title of address for ecclesiastical dignitaries survives in its use in the Greek Church as the formal mode of addressing a bishop.

DES PRES, JOSQUIN (c. 1445-1521), also called Depres or Desprez, and by a latinized form of his name, Jodocus Pratensis or A Prato, French musical composer, was born, probably in Conde in the Hennegau, about 1445. He was a pupil of Ockenheim, and himself one of the most learned musicians of his time. In spite of his great fame, the accounts of his life are vague and the dates contradictory. Fetis contributed greatly towards elucidating the doubtful points in his Biographie universelle. In his early youth Josquin seems to have been a member of the choir of the collegiate church at St Quentin; when his voice changed he went (about 1455) to Ockenheim to take lessons in counterpoint; afterwards he again lived at his birth- place for some years, till Pope Sixtus IV. invited him to Rome to teach his art to the musicians of Italy, where musical know- ledge at that time was at a low ebb. In Rome Des Pres lived till the death of his protector (1484), and it was there that many of his works were written. His reputation grew rapidly, and he was considered by his contemporaries to be the greatest master of his age. Luther, who was a good judge, is credited with the saying that ” other musicians do with notes what they can, Josquin what he likes. ” The composer’s journey to Rome marks in a

manner the transference of the art from its Gallo-Belgian birthplace to Italy, which for the next two centuries remained the centre of the musical world. To Des Pres and his pupils Arcadelt, Mouton and others, much that is characteristic in modern music owes its rise, particularly in their influence upon Italian developments under Palestrina. After leaving Rome Des Pres went for a time to Ferrara, where the duke Hercules I. offered him a home; but before long he accepted an invitation of King Louis XII. of France to become the chief singer of the royal chapel. According to another account, he was for a time at least in the service of the emperor Maximilian I. The date of his death has by some writers been placed as early as 1501. But this is sufficiently disproved by the fact of one of his finest compositions, A Dirge (Deploralion) for Five Voices, being written to commemorate the death of his master Ockenheim, which took place after 1512. The real date of Josquin's decease has since been settled as the 27th of August 1521. He was at that time a canon of the cathedral of Conde (see Victor Delzant's Sepultures de Flandre, No. 118).

The most complete list of his compositions — consisting of masses, motets, psalms and other pieces of sacred music — will be found in

Fetis. The largest collection of his MS. works, containing no less than twenty masses, is in the possession of the papal chapel in Rome. In his lifetime Des Pres was honoured as an eminent composer, and the musicians of the 16th century are loud in his praise. During the 17th and 18th centuries his value was ignored, nor does his work appear in the collections of Martini and Paolucci. Burney was the first to recover him from oblivion, and Forkel continued the task of rehabilitation. Ambros furnishes the most exhaustive account of his achievements. An admirable account of Josquin's art, from the rare point of view of a modern critic who knows how to allow for modern difficulties, will be found in the article " Josquin," in Grove's Dictionary of Music and Musicians, new ed. vol. ii. The Repertoire des chanteurs de St Gervais contains an excellent modern edition of Josquin's Miserere.

DESPRES, SUZANNE (1875-), French actress, was born at Verdun, and trained at the Paris Conservatoire, where in 1897 she obtained the first prize for comedy, and the second for tragedy. She then became associated with, and subsequently married, Aurelien Lugne-Poe (b. 1870), the actor-manager, who had founded a new school of modern drama, L'CEuvre, and she had a brilliant success in several plays produced by him. ' In succeeding years she played at the Gymnase and at the Porte Saint-Martin, and in 1902 made her debut at the Comedie Frangaise, appearing in Fhedre and other important parts.

DESRUES, ANTOINE FRANQOIS (1744 1777), French poisoner, was born at Chartres in 1744, of humble parents. He went to Paris to seek his fortune, and started in business as a grocer. He was known as a man of great piety and devotion, and his business was reputed to be a flourishing one, but when, in 1773, h<* gave up his shop, his finances, owing to personal extravagance, were in a deplorable condition. Nevertheless he entered into negotiations with a Madame de la Mothe for the purchase from her of a country estate, and, when the time came for the payment of the purchase money, invited her to stay with him in Paris pending the transfer. While she was still his guest, he poisoned first her and then her son, a youth of sixteen. Then, having forged a receipt for the purchase money, he endeavoured to obtain possession of the property. But by this time the dis appearance of Madame de la Mothe and her son had aroused suspicion. Desrues was arrested, the bodies of his victims were discovered, and the crime was brought home to him. He was tried, found guilty and condemned to be torn asunder alive and burned. The sentence was carried out (1777), Desrues repeating hypocritical protestations of his innocence to the last. The whole affair created a great sensation at the time, and as late as 1828 a dramatic version of it was performed in Paris.

DESSAIX, JOSEPH MARIE, Count (1764-1834), French general, was born at Thonon in Savoy on the 24th of September 1764. He studied medicine, took his degree at Turin, and then went to Paris, where in 1789 he joined the National Guard. In 1 791 he tried without success to raise an tmeute in Savoy, in 1792 he organized the ” Legion of the Allobroges,” and in the follow- ing years he served at the siege of Toulon, in the Army of the Eastern Pyrenees, and in the Army of Italy. He was captured at Rivoli, but was soon exchanged. In the spring of 1 798 Dessaix was elected a member of the Council of Five Hundred. He was one of the few in that body who opposed the coup d’etat of the 18th Brumaire (November 9, 1799). In 1803 he was promoted general of brigade, and soon afterwards commander of the Legion of Honour. He distinguished himself greatly at the battle of Wagram (1809), and was about this time promoted general of division and named grand officer of the Legion of Honour, and in 1810 was made a count. He took part in the expedition to Russia, and was twice wounded. For several months he was commandant of Berlin, and afterwards delivered the department of Mont Blanc from the Austrians. After the first restoration Dessaix held a command under the Bourbons. He nevertheless joined Napoleon in the Hundred Days, and in 1816 he was imprisoned for five months. The rest of his life was spent in retirement. He died on the 26th of October 1834.

See Le Gineral Dessaix, sa vie politique et militaire, by his nephew

Joseph Dessaix (Paris, 1879).

DESSAU, a town of Germany, capital of the duchy of Anhalf, on the left bank of the Mulde, 2 m. from its confluence with the

Elbe, 67 m. S.W. from Berlin and at the junction of lines to Cothen and Zerbst. Pop. (1905) 55,134. Apart from the old quarter lying on the Mulde, the town is well built, is surrounded by pleasant gardens and contains many handsome streets and spacious squares. Among the latter is the Grosse Markt with a statue of Prince Leopold I. of Anhalt-Dessau, ” the old Dessauer.” Of the six churches, the Schlosskirche, adorned with paintings by Lucas Cranach, in one of which (” The Last Supper “) are portraits of several reformers, is the most interesting. The ducal palace, standing in extensive grounds, contains a collection of historical curiosities and a gallery of pictures, which includes works by Cimabue, Lippi,Rubens,Titian and Van Dyck. Among other buildings are the town hall (built 1 899-1 900), the palace of the hereditary prince, the theatre, the administration offices, the law courts, the Amalienstift, with a picture gallery, several high-grade schools, a library of 30,000 volumes and an excellently appointed hospital. There are monuments to the philosopher Moses Mendelssohn (born here in 1729), to the poet Wilhelm Miiller, father of Professor Max Mtiller, also a native of the place, to the emperor William I., and an obelisk commemorating the war of 1870-71. The industries of Dessau include the pro- duction of sugar, which is the chief manufacture, woollen, linen and cotton goods, carpets, hats, leather, tobacco and musical instruments. There is also a considerable trade in corn and garden produce. In the environs are the ducal villas of Georgium and Luisium, the gardens of which, as well as those of the neighbouring town of WQrlitz, are much admired.

Dessau was probably founded by Albert the Bear; it had attained civic rights as early as 1213. It first began to grow into importance at the close of the 17th century, in consequence of the religious emancipation of the Jews in 1686, and of the Lutherans in 1697.

See Wurdig, Chronik der Stadt Dessau (Dessau, 1876).

DESSEWFFY, AUREL, Count (1808 -1842), Hungarian journalist and politician, eldest son of Count Jozsef Dessewffy and Eleonora Sztaray, was born at Nagy-Mihaly, county Zemplen, Hungary. Carefully

educated at his father's house, he was accustomed to the best society of his day. While still a child he could declaim most of the Iliad in Greek without a book, and read and quoted Tacitus with enthusiasm. Under the noble influence of Ferencz Kazinczy he became acquainted with the chief masterpieces of European literature in their original tongues. He was particularly fond of the English, and one of his early idols was Jeremy Bentham. He regularly accompanied his father to the diets of which he was a member, followed the course of the debates, of which he kept a journal, and made the acquaint- ance of the great Szechenyi, who encouraged his aspirations. On leaving college, he entered the royal aulic chancellery, and in 1832 was appointed secretary of the royal stadtholder at Buda. The same year he turned his attention to politics and was regarded as one of the most promising young orators of the day, especially during the sessions of the diet of 1832-1836, when he had the courage to oppose Kossuth. At the Pressburg diet in 1840 Dessewffy was already the leading orator of the more enlightened and progressive Conservatives, but incurred great unpopularity for not going far enough, with the result that he was twice defeated at the polls. But his reputation in court circles was increasing; he was appointed a member of the com- mittee for the reform of the criminal law in 1840; and, the same year with a letter of recommendation from Metternich in his pocket, visited England and France, Holland and Belgium, made the acquaintance of Thiers and Heine in Paris, and returned home with an immense and precious store of practical information. He at once proceeded to put fresh life into the despondent and irresolute Conservative party, and the Magyar aristocracy, by gallantly combating in the Vildg the opinions of Kossuth's paper, the Pesti Hirlap. But the multiplicity of his labours was too much for his feeble physique, and he died on the 9th of February 1842, at the very time when his talents seemed most indispensable.

See Aus den Papieren des Graf en Aurel Dessewffy (Pest, 1843); Memorial Wreath to Count Aurel Dessewffy (Hung.), (Budapest, 1857); Collected Works of Count Dessewffy , with a Biography (Hung.) , (Budapest, 1887). (R. N. B.)

DESSOIR, LUDWIG (1810-1874), German actor, whose name was originally Leopold Dessauer, was born on the 15th of December 1810 at Posen, the son of a Jewish tradesman. He made his first appearance on the stage there in 1824 in a small part. After some experience at the theatre in Posen and on tour, he was engaged at Leipzig from 1834 to 1836. Then he was attached to the municipal theatre of Breslau, and in 1837 appeared at Prague, Briinn, Vienna and Budapest, where he accepted an engagement which lasted until 1839.

He succeeded Karl Devrient at Karlsruhe, and went in 1847 to Berlin, where he acted Othello and Hamlet with such extraordinary success that he received a permanent engagement at the Hof-theater. From 1849 to 1872, when he retired on a pension, he played no parts, frequently on tour, and in 1853 acting in London. He died on the 30th of December 1874 in Berlin. Dessoir was twice married; his first wife, Theresa, a popular actress (1810-1866), was separated from him a year after marriage; his second wife went mad on the death of her child. By his first wife Dessoir had one son, the actor Ferdinand Dessoir (1836-1892). In spite of certain physical disabilities Ludwig Dessoir's genius raised him to the first rank of actors, especially as interpreter of Shakespeare's characters. G. H. Lewes placed Dessoir's Othello above that of Kean, and the Athenaeum preferred him in this part to Brooks or Macready.

DESTOUCHES, PHILIPPE (1680-1754), French dramatist, whose real name was Nericault, was born at Tours in April 1680. When he was nineteen years of age he became secretary to M. de Puysieux, the French ambassador in Switzerland. In 1716 he was attached to the French embassy in London, where he remained for six years under the abbe Dubois. He contracted with a Lancashire lady, Dorothea Johnston, a marriage which was not avowed for some years. He drew a picture later of his own domestic circumstances in Le Philosophe maris (1726). On his return to France (1723) he was elected to the Academy, and in 1727 he acquired considerable estates, the possession of which conferred the privileges of nobility. He spent his later years at his chateau of Fortoiseau near Melun, dying on the 4th of July 1754. His early comedies were: Le Curieux Impertinent (1710), L'Ingrat (1712), L'Irresolu (1713) and Le MSdisant (1715). The best 1 of these is L'IrrSsolu, in which Dorante, after hesitating throughout the play between Julie and Celimene, marries Julie, but concludes the play with the reflection: —

" J'aurais mieux fait, je crois, d'epouser Celimene."

After eleven years of diplomatic service Destouches returned to the stage with the Philosophe maris (1727), followed in 1732 by his masterpiece Le Glorieux, a picture of the struggle then beginning between the old nobility and the wealthy parvenus who found their opportunity in the poverty of France. Destouches wished to revive the comedy of character as understood by Moliere, but he thought it desirable that the moral should be directly expressed. This moralizing tendency spoilt his later comedies. Among them may be mentioned: Le Tambour nocturne (1736), La Force du nalurel (1750) and Le Dissipateur

(i736).

His works were issued in collected form in 1755, 1757, 1811 and, in a limited edition (6 vols.), 1822.

DESTRUCTORS. The name destructors is applied by English municipal engineers to furnaces, or combinations of furnaces, commonly called ” garbage furnaces ” in the United States, con- structed for the purpose of disposing by burning of town refuse, which is a heterogeneous mass of material, including, besides general household and ash-bin refuse, small quantities of garden refuse, trade refuse, market refuse and often street sweepings. The mere disposal of this material is not, however, by any means the only consideration in dealing with it upon the destructor system. For many years past scientific experts, municipal engineers and public authorities have been directing careful attention to the utilization of refuse as fuel for steam production, and such progress in this direction has been made that in many towns its calorific value is now being utilized daily for motive- power purposes. On the other hand, that proper degree of caution which is obtained only by actual experience must be

exercised in the application of refuse fuel to steam-raising. When its value as a low-class fuel was first recognized, the idea was disseminated that the refuse of a given population was of itself sufficient to develop the necessary steam-power for supply- ing that population with the electric light. The economical importance of a combined destructor and electric undertaking of this character naturally presented a somewhat fascinating stimulus to public authorities, and possibly had much to do with the development both of the adoption of the principle of dealing with refuse by fire, and of lighting towns by electricity. However true this phase of the question may be as the statement of a theoretical scientific fact, experience so far does not show it to be a basis upon which engineers may venture to calculate, although, as will be seen later, under certain circumstances of equalized load, which must be considered upon their merits in each case, a well-designed destructor plant can be made to perform valuable commercial service to an electric or other power-using undertaking. Further, when a system, thermal or otherwise, for the storage of energy can be introduced and applied in a trustworthy and economical manner, the degree of advantage to be derived from the utilization of the waste heat from destructors will be materially

enhanced.

The composition of house refuse, which must obviously affect its calorific value, varies considerably in different localities, Compost' according to the condition, habits and pursuits of the tioaaad people. Towns situated in coal-producing districts quantity invariably yield a refuse richer in unconsumed carbon of refuse, ftan those remote therefrom. It is also often found that the refuse from different parts of the same town varies considerably — that from the poorest quarters frequently proving of greater calorific value than that from those parts occupied by the rich and middle classes. This has been attributed to the more extravagant habits of the working classes in neglecting to sift the ashes from their fires before disposing of them in the ash-bin. In Bermondsey, for example, the refuse has been found to possess an unusually high calorific value, and this experience is confirmed in other parts of the metropolis. Average refuse consists of breeze (cinder and ashes), coal and coke, fine dust, vegetable and animal matters, straw, shavings, cardboard, bottles, tins, iron, bones, broken crockery and other matters in very variable pro- portions according to the character of the district from which it is collected. In London the quantity of house refuse amounts approximately to ij million tons per annum, which is equivalent to from 4 cwt. to 5 cwt. per head per annum, or to from 200 to 250 tons per 1000 of the population per annum. Statistics, however, vary widely in different districts. In the vicinity of the metropolis the amount varies from 2-5 cwt. per head per annum at Ley ton to 3-5 cwt. at Hornsey, and to as much as 7 cwt. at Ealing. In the north of England the total house refuse collected, exclusive of street sweepings, amounts on the average to 8 cwt. per head per annum. Speaking generally, throughout the country an amount of from s cwt. to 10 cwt. per head per annum should be allowed for. A cubic yard of ordinary house refuse weighs from 12 J to 15 cwt. Shop refuse is lighter, frequently containing a large pro- portion of paper, straw and other light wastes. It sometimes weighs as little as 71 cwt. per cubic yard. A load, by which refuse is often estimated, varies in weight from 15 cwt. to if tons.

The question how a town's refuse shall be disposed of must be considered both from a commercial and a sanitary point of view. Various methods have been practised. Sometimes the household ashes, &c, are mixed with pail excreta, or with sludge from a sewage farm, or with lime, and disposed of for agricultural purposes, and sometimes they are conveyed in carts or by canal to outlying and country districts, where they are shot on waste ground or used to fill up hollows and raise the level of marshland. Such plans are economical when suitable outlets are available. To take the refuse out to sea in

hopper barges and sink it in deep water is usually expensive and frequently unsatisfactory. At Bermondsey, for instance, the cost of barging is about 2s. od. a ton, while the material may be destroyed by fire at a cost of from iod. to is. a ton, exclusive of interest and sinking fund on the cost of the works. In other

cases, as at Chelsea and various dust contractors' yards, the refuse is sorted and its ingredients are sold; the fine dust may be utilized in connexion with manure manufactories, the pots and pans employed in forming the foundations of roads, and the cinders and vegetable refuse burnt to generate steam. In the Arnold system, carried out in Philadelphia and other American towns, the refuse is sterilized by steam under pressure, the grease and fertilizing substances being extracted at the same time; while in other systems, such as those of Weil and Porno, and of Defosse, distillation in closed vessels is practised. But the destructor system, in which the refuse is burned to an innocuous clinker in specially constructed furnaces, is that which must finally be resorted to, especially in districts which have become well built up and thickly populated.

Various types of furnaces and apparatus have from time to time been designed, and the subject has been one of much experiment and many failures. The principal towns in England which took the lead in the adoption of the destruv- refuse destructor system were Manchester, Birming- tors. ham, Leeds, Heckmondwike, Warrington, Blackburn, Bradford, Bury, Bolton, Hull, Nottingham, Salford, Ealing and London. Ordinary furnaces, built mostly by dust contractors, began to come into use in London and in the north of England in the second half of the 19th century, but they were not scientific- ally adapted to the purpose, and necessitated the admixture of coal or other fuel with the refuse to ensure its cremation. The Manchester corporation erected a furnace of this description about the year 1873, and Messrs Mead & Co. made an unsatis- factory attempt in 1870 to burn house refuse in closed furnaces at Paddington. In 1876 Alfred Fryer erected his destructor at Manchester, and several other towns adopted this furnace shortly afterwards. Other furnaces were from time to time brought before the public, among which may be mentioned those of Pearce and Lupton, Pickard, Healey, Thwaite, Young, Wilkinson, Burton, Hardie, Jacobs and Odgen. In addition to these the " Beehive " and the " Nelson " destructors became well known. The former was introduced by Stafford and Pearson

Fig. 1. — Fryer's Destruccor.

of Burnley, and one was erected in 1884 in the parish yard at Richmond, Surrey, but the results being unsatisfactory, it was closed during the following year. The ” Nelson ” furnace, patented in 1885 by Messrs Richmond and Birtwistle, was erected at Nelson-in-Marsden, Lancashire, but being very costly in working was abandoned. The principal types of destructors now in use are those of Fryer, Whiley, Horsfall, Warner, Meldrum, Beaman and Deas, Heenan and Froude, and the ” Sterling ” destructor erected by Messrs Hughes and Stirling. The general arrangement of the destructor patented l by Alfred Fryer in 1876 is illustrated in fig. I. An installation upon this principle consists of a number of furnaces or cells, usu- Fryer’s. ally arranged in pairs back to back, and enclosed in a rectangular block of brickwork having a flat top, upon which the house refuse is tipped from the carts.

1 Patent No. 3125 (1876).

io6

DESTRUCTORS

A large main flue, which also forms the dust chamber, is placed underneath the furnace hearths. The Fryer furnace ordinarily burns from 4 to 6 tons of refuse per cell per 24 hours. It will be observed that the outlets for the products of combustion are placed at the back near the refuse feed opening, an arrangement \yhich is imperfect in design, inasmuch as while a charge of refuse is burning upon the furnace bars the charge which is to follow lies on the dead hearth near the outlet flue. Here it undergoes drying and partial decomposition, giving off offensive empyreumatic vapours which pass into theflue without being exposed to sufficient heat to render them entirely

f”/mo Hole

feetJinp floor

teˆgj P

Fig. 2. — Horsfall’s improved Destructor.

inoffensive. The serious nuisances thus produced in some instances led to the introduction of a second furnace, or ” cremator,” patented by C. Jones of Ealing in 1885, which was placed in the main flue leading to the chimney-shaft, for the purpose of resolving the organic matters present in the vapour, but the greatly increased cost of burning due to this device led to its abandonment in many cases. This type of cell was

largely used during the early period of the history of destructors, but has to a considerable extent given place to furnaces of more modern design.

A furnace 1 patented in 1891 by Mr Henry Whiley, superintendent of the scavenging department of the Manchester corporation, is t automatic in its action and was designed primarily with a Whiley s. v j ew t saving labour — the cells being fed, stoked and clinkered automatically. There is no drying hearth, and the refuse carts tip direct into a shoot or hopper at the back which conducts the material directly on to movable eccentric grate bars. These auto- matically traverse the material forward into the furnace, and finally push it against a flap-door which opens and allows it to fall out. This apparatus is adapted for dealing with screened rather than unscreened refuse, since it suffers from the objection that the motion of the bars tends to allow fine particles to drop through unburnt. Some difficulty has been experienced from the refuse sticking in the

ripping platform

:

Retaining Mall

Steam Boiler

Ground line

Refuse is shovelled from this opening into furnace -> –

Fig. 3. — Meldrum's Destructor at Darwen hopper, and exception may also be taken to the continual flapping of the door when the clinker passes out, as cold air is thereby admitted into the furnace. As in the Fryer cell, the outlet for the products of combustion into the main flue is close to the point where the crude refuse is fed into the furnace, and the escape of unburnt vapours is thus facilitated. Forced draught is applied by means of a Roots blower. The Manchester corporation has 28 cells of this type in use, and the approximate amount of refuse burnt per cell per 24 hours is from 6 to 8 tons at a cost per ton for labour of 3-47 pence.

Horsfall's destructor* (fig. 2) is a high-temperature furnace of modern type which has been adopted largely in Great Britain and on the continent of Europe. In it some of the general features Horsfall's. Q f ˆ.j, e Fryer cell are retained, but the details differ con- siderably from those of the furnaces already described. Important

1 Patent No. 8271 (1891). 2 Patents No. 8999 (1887) ; No. 14,709 (1888) ; No. 22,531 (1891).

points in the design are the arrangement of the flues and flue outlets for the products of combustion, and the introduction of a blast duct through which air is forced into a closed ash-pit. The feeding-hole is situated at the back of and above the furnace, while the flue opening for the emission of the gaseous products is placed at the front of the furnace over the dead plate; thus the gases distilled from the raw refuse are caused to pass on their way to the main flue over the hottest part of the furnace and through the flue opening in the red-hot reverberatory arch. The steam jet, which plays an important part in the Horsfall furnace, forces air into the closed ash-pit at a pressure of about f to 1 in. of water, and in this way a temperature varying from 1500 to 2000″ F., as tested by a thermo-electric pyrometer, is maintained in the main flue. In a battery of cells the gases from each are delivered into one main flue, so that a uniform temperature is maintained therein sufficiently high to prevent noxious vapours from reaching the chimney. The cells being charged and clinkered in rotation, when the fire in one is green, in the others it is at its hottest, and the products of combustion do not reach the boiler surfaces until after they have been mixed in the main flue. The cast iron boxes which are provided at the sides of the furnaces, and through which the blast air is conveyed on its way to the grate, prevent the adhesion of clinker to the side walls of the cells, and very materially preserve the brickwork, which otherwise becomes damaged by the tools used to remove the clinker. The wide clinkering doors are suspended by counterbalance weights and open vertically. The rate of working of these cells varies from 8 tons per cell per 24 hours at Oldham to 10 tons per cell at Bradford, where the furnaces are of a later type. The cost of labour in stoking and clinkering is about 6d. per ton of the refuse treated at Bradford, and gd. per ton at Oldham, where the rate of wages is higher. Weil-constructed and properly- worked plants of this type should give rise to no nuisance, and may be located in populous neighbourhoods without danger to the public health or comfort. Installations were put down at Fulham (1901), Hammerton Street, Bradford (1900), West Hartlepool (1904), and other places, and the surplus power generated is employed in the pro- duction of electric energy.

Warner's destructor, 3 known as the " Perfectus," is, in general arrangement, similar to Fryer's, but differs in being provided with special charging hoppers, dampers in flues, dust-catching arrangements, rocking grate bars and other improvements, "^tier's. The refuse is tipped into feeding-hoppers, consisting of rectangular

cast iron boxes over which plates are placed to prevent the escape of smoke and fumes. At the lower portion of the feeding-hopper is a flap-door working on an axis and controlled by an iron lever from the tipping platform. When refuse is to be fed into the furnace the lever is thrown over, the contents of the hopper drop on to the sloping firebrick hearth beneath, and the door is at once closed again. The door should be kept open as short a time as possible in order to prevent the admission of cold air into the furnace at the back end, since this

leads to the lowering of the temperature of the cells and main flue, and also to paper and other light refuse being carried into the flues and chim- ney. The flues of each furnace are provided with dampers, which are closed during the process of clinkering in order to keep up the heat. The cells are each 5 ft. wide and 1 1 ft. deep, the rearmost portion consisting of a firebrick drying hearth, and the front of rocking grate bars upon which the combus- tion takes place. The crown of each cell is formed of a rever- beratory firebrick arch having openings for the emission of the products of combustion. The flap dampers which are fitted to these openings are operated by horizontal spindles passing through the brickwork to the

front of the cell, where they are provided with levers or handles; thus each cell can be worked independently of the others. With the view of increasing the steam-raising capabilities of the furnace, forced draught is sometimes applied and a tubular boiler is placed close to the cells. The amount of refuse consumed varies from 5 tons to 8 tons per cell per 24 hours. At Hornsey, where 12 cells of this type are in use, the cost of labour for burning the refuse is 9Jd. per ton.

The Meldurm ” Simplex ” destructor (fig. 3), a type of furnace which yields good steam-raising results, is in successful operation at Rochdale, Hereford, Darwen, Nelson, Plumstead and lHmm’s Woolwich, at each of which towns the production of steam is an important consideration. Cells have also been laid down at Burton, Hunstanton, Blackburn and Shipley, and more recently at Burnley, Cleckheaton, Lancaster, Nelson, Shcerness and Weymouth. In general arrangement the destructor differs considerably from

8 Patent No. 18.719 (1

those previously described. The grates are placed side by side without separation except by dead plates, but, in order to localize the forced draught, the ash-pit is divided into parts corresponding with the different grate areas. Each ash-pit is closed air-tight by a cast iron plate, and is provided with an air-tight door for removing the fine ash. Two patent Meldrum steam-jet blowers are provided for each furnace, supplying any required pressure of blast up to 6 in. water column, though that usually employed does not exceed I j in. The furnaces are designed for hand-feeding from the front, but hopper-feeding can be applied if desirable. The products of combustion either pass away from the back of each fire-grate into a common flue leading to boilers and the chimney-shaft, or are con- veyed sideways over the various grates and a common fire-bridge to the boilers or chimney. The heat in the gases, after passing the boilers, is still further utilized to heat the air supplied to the furnaces, the gases being passed through an air heater or continuous regenerator consisting of a number of cast iron pipes from which the air is delivered through the Meldrum ” blowers ” at a temperature of about 300° F. That a high percentage (15 to 18 %) of C0 2 isobtained in the furnaces proves a small excess of free oxygen, and no doubt explains the high fuel efficiency obtained by this type of destructor. High-pressure Boilers of ample capacity are provided for the accumu- lation during periods of light load of a reserve of steam, the storage being obtained by utilizing the difference between the highest and lowest water-levels and the difference between the maximum and working steam-pressure. Patent locking fire-bars, to prevent lifting when clinkering, are used in the furnace and have a good life. At Rochdale the Meldrum furnaces consume from 53R) to 66 lb of refuse per square foot of grate area per hour, as compared with 22-4 lb per square foot in a low-temperature destructor burning 6 tons per cell per 24 hours with a grate area of 25 sq. ft. The evaporative efficiency of the Rochdale furnaces varies from 1-39 lb to 1-87 lb of water (actual) per I lb of refuse burned, and an average steam-pressure of about 1 14 lb per square inch is maintained. The cost of labour and

Fig. 4. — Beaman and Deas Destructor at Leyton.

supervision amounts to iod. per ton of refuse dealt with. A Lancashire boiler (22 ft. by 6 ft. 6 in.) at the Sewage Outfall Works, Hereford, evaporates with refuse fuel 2980 lb of water per hour, equal to 149 indicated horse-power. About 54 lb of refuse are burnt per square foot of grate area per hour with an evaporation of 1-82 lb of water per pound of refuse.

The Beaman and Deas destructor 1 (fig. 4) has attracted much

attention from public authorities, and successful installations are in operation at Warrington, Dewsbury, Leyton, Bea J t n” Canterbury, Llandudno, Colne, Streatham, Rotherhithe, and Deas. w; m b[et] oni Bolton and elsewhere. Its essential features include a level-fire grate with ordinary type bars, a high-temperature combustion chamber at the back of the cells, a closed ash-pit with forced draught, provision for the admission of a secondary air-supply at the fire-bridge, and a firebrick hearth sloping at an angle of about 52 °. From the refuse storage platform the material is fed into a hopper mouth about 18 in. square, and slides down the firebrick hearth, supported by T-irons, to the grate bars, over which it is raked and spread with the assistance of long rods manipulated through clinkering doors placed at the sides of the cells. A secondary door in the rear of the cell facilitates the operation. The fire-bars, spaced only fa in. apart, are of the ordinary stationary type. Vertically, under the fire-bridge, is an air-conduit, from the top of which lead air blast pipes 12 in. in diameter discharging into a hermetically closed ash-pit under the grate area. The air is supplied from fans (Schiele’s patent) at a pressure of from 1 f to 2 in. of water, and is con- trolled by means of baffle valves worked by handles on either side of the furnace, conveniently placed for the attendant. The forced draught tends to keep the bars cool and lessen wear and tear. The fumes from the charge drying on the hearth pass through the fire and over the red-hot fire-bridge, which is perforated longitudinally with air-passages connected with a small flue leading from a grated opening on the face of the brickwork outside; in this way an auxiliary supply of heated oxygen is fed into the combustion chamber. This

1 Patents No. 15,598 (1893) and 23,712 (1893); also Beaman and Deas Sludge Furnace, Patent No. 13,029 (1894).

chamber, in which a temperature approaching 2000° F. is attained, is fitted with large iron doors, sliding with balance weights, which allow the introduction of infected articles, bad meat, &c, and also- give access for the periodical removal of fine ash f om the flues. The high temperatures attained are utilized by install ng one boiler, preferably of the Babcock & Wilcox water-tube type, for each pair of cells, so that the gases, on their way from the combustion chamber to the main flue, pass three times between the boiler tubes. A secondary furnace is provided under the boiler for raising steam by coal, if required, when the cells are out of use. The grate area of each cell is 25 sq. ft., and the consumption varies from 16 up to 20 tons of refuse per cell per 24 hours. In a 24-hours’ test made by the super- intendent of the cleansing department, Leeds, at the Warrington installation, the quantity of water evaporated per pound of refuse was 1-14 lb, the

average temperature in the combustion chamber 2000 ‘ F. by copper-wire test, and the average air pressure with forced draught 2J in. (water-gauge). At Leyton, which has a population of over 100,000, an 8-cell plant of this type is successfully dealing with house refuse and filter press cakes of sewage sludge from the sewage disposal works adjoining, and even with materialof this low calorific value the total steam-power produced is considerable. Each cell burns about 16 tons of the mixture in 24 hours and develops about 35 indicated horse-power continuously, at an average steam- pressure in the boilers of 105 lb. The cost of labour at Leyton for burning the mixed refuse is about is. 7d. per ton; at Llandudno, where four cells were laid down in connexion with the electric-light station in 1898, it is is. 3id., and at Warrington 9§d. per ton of refuse consumed. Combustion is complete, and the destructor may be installed in populous districts without nuisance to the inhabitants. Further patents (Wilkie’s improvements) have been obtained by Meldrum Brothers (Manchester) in connexion with this destructor.

The Heenan furnaces are in operation at Farn worth, Gloucester, Barrow-in-Furness, Northampton, Mansfield, Wakefield, Blackburn, Levenshulme, Kings Norton, Worthing, Birmingham and H eeaaB other places, and are now dealing with over 1200 tons of refuse per day. The general arrangement of this destructor some- what resembles that of the Meldrum type. The cells intercommuni- cate, and the mechanical mixture of the gases arising from the furnace grates of the various cells is sought by the introduction of a special design of reverberatory arch overlying the grates. The standard arrangement of this destructor embodies all modern arrangements for high-temperature refuse destruction and steam- power generation.

Destructors of the ” Sterling ” type, combined with electric- power generating stations, are installed at Hackney (1901), Bermondsey (1902) and Frederiksberg (1903) — the first- sterllnr named plant being probably the most powerful com- *’

bined destructor and electricity station yet erected. In these modern stations the recognized requirements of an up-to-date refuse-destruction plant have been well considered and good calorific results are also obtained.

In addition to the above-described destructors, other forms have been introduced from time to time, but adopted to a less degree ; amongst these may be mentioned Baker’s destructor, Willshear’s, Hanson’s Utilizer, Mason’s Gasifier, the Bennett-Phythian, Cracknell’s (Melbourne, Victoria), Coltman’s (Loughborough), Willoughby’s, and

Healey's improved destructors. On the continent of Europe systems for the treatment of refuse have also been devised. Among these may be mentioned those of M. Defosse and M. Helouis. The former has endeavoured to burn the refuse in large quantities by using a forced draught and only washing the smoke. 2 Helouis has extended the operation by using the heat from the combustion of the refuse for drying and distilling the material which is brought gradu- ally on to the grate.

Boulnois and Brodie's improved charging tank is a labour-saving apparatus consisting of a wrought iron truck, 5 ft. wide by 3 ft. deep, and of sufficient length to hold not less than 12 hours' D es tructor supply for the two cells which it serves. The truck, acces . which moves along a pair of rails across the top of the sor i es . destructor, may be worked by one man. It is divided into compartments holding a charge of refuse in each, and is provided with a pair of doors in the bottom, opening downwards, which are supported by a series of small wheels running on a central rail. A special feeding opening in the reverberatory arch of the cell of the width of the truck, situated over the drying hearth, is formed by a firebrick arch fitted into a frame capable of being moved backwards and forwards by means of a lever. The charging truck, when empty, is brought under the tipping platform, and the carts tip directly into it. When one of the cells has to be fed, the truck is moved along, so that one of the divisions is immediately over the feeding opening, and the wheel holding up the bottom doors rests upon the central rail, which is continued over the movable covering arch. Then the movable arch is rolled back, the doors are released, and the contents are discharged into the cell, so that no handling of the refuse is required from tipping to feeding. This apparatus is in operation at Liverpool, Shoreditch, Cambridge and elsewhere.

Various forms of patent movable fire-bars have been employed

2 Compte Rendu des Trmiaux de la Societi des Ingenieurs Civils de France, folio 775 (June 1897).

in destructor furnaces. Among these may be mentioned Settle's, 1 Vicar's, 2 Riddle's rocking bars, 3 Horsfall's self-feeding apparatus, 4 and Healey's movable bars ; 5 but complicated movable arrangements are not to be recommended, and experience greatly favours the use of

a simple stationary type of fire-bar.

A dust-catching apparatus has been designed and erected at Edinburgh, by the Horsfall Furnace Syndicate, in order to over- come difficulties in regard to the escape of flue dust, &c, from the destructor chimney. Externally, it appears a large circular block of brickwork, 18 ft. in diameter and 13 ft. 7 in. high, connected with the main flue, and situated between the destructor cells and the boiler. Internally it consists of a spiral flue traversing the entire circumference and winding upwards to the top of the chamber. There is an interior well or chamber 6 ft. diameter by 12 ft. high, having a domed top, and communicating with the outer spiral flue by four ports at the top of the chamber. Dust traps, baffle walls

Other accessory plant in use at most modern destructor stations includes machinery for the removal, crushing and various means of utilization of the residual clinker, stoking tools, air heaters or regenerators for the production of hot-air blast to the furnaces, superheaters and thermal storage arrangements for equalizing the output of power from the station during the 24-hours' day.

The general arrangement of a battery of refuse cells at a destructor station is illustrated by fig. 5. The cells are arranged either side by side, with a common main flue in the rear, or back to back with the main flue placed in the ^"f^f"* centre and leading to a tall chimney-shaft. The heated structors. gases on leaving the cells pass through the combustion chamber into the main flue, and thence go forward to the boilers, where their heat is absorbed and utilized. Forced draught, or

Fig. 5. — Leyton Destructor. Block Plan, and cleaning doors are also provided for the retention and subsequent weekly removal of the flue dust. The apparatus forms a large reservoir of heat maintained at a steady temperature of from 1500 to 1800 F., and is useful in keeping up steam in the boiler at an equable pressure for a long period. It requires no attention, and has proved successful for its purpose.

Travelling cranes for transporting refuse and feeding cells are sometimes employed at destructor stations, as, for example, at Hamburg. Here the transportation of the refuse is effected by means of specially constructed water-tight iron wagons, containing detachable boxes provided with two double-flap doors at the top for loading, and one flap-door at the back for unloading. There are thirty-six_ furnaces of the Horsfall type placed in two ranks, each arranged in three blocks of six in the large furnace hall. An electric crane running above each rank lifts the boxes off the wagons and carries them to the feeding-

hole of each well. Here the box is tipped up by an electric pulley and emptied on to the furnace platform. When the travelling crane is used, the carts (four-wheeled) bringing the refuse may be constructed so that the body of the carriage can be taken off the wheels, lifted up and tipped direct over the furnace as required, and returned again to its frame. The adoption of the travelling crane admits of the reduction in size of the main building, as less platform space for unloading refuse carts is required; the inclined roadway may also be dispensed with. Where a destructor site will not admit of an inclined roadway and platform, the refuse may be discharged from the collecting carts into a lift; and thence elevated into the feeding-bins.

1 Patent No. 15,482 (1885).

2 Patents No. 1955 (1867) and No. 378 (1879).

3 Patent No. 4896 (189 1).

- Patent No. 20,207 (!892).

6 Patents No. 18,398 (1892) and No. 12,990 (1892).

showing general arrangement of the Works, in many cases, hot blast, is supplied from fans through a conduit commanding the whole of the cells. An inclined roadway, of as easy gradient as circumstances will admit, is provided for the conveyance of the refuse to the tipping platform, from which it is fed through feed-holes into the furnaces. In the installation of a destructor, the choice of suitable plant and the general design of the works must be largely dependent upon local refluirements, and should be entrusted to an engineer experienced in these matters. The following primary considerations, however, may be enumerated as materially affecting the design of such works: —

(a) The plant must be simple, easily worked without stoppages, and without mechanical complications upon which stokers may lay the blame for bad results, (b) It must be strong, must withstand variations of temperature, must not be liable to get out of order, and should admit of being readily repaired, (c) It must be such as can be easily understood by stokers or firemen of average intelligence, so that the continuous working of the plant may not be disorganized by change of workmen, (d) A sufficiently high temperature must be attained in the cells to reduce the refuse to an entirely innocuous clinker, and all fumes or gases should pass either through an adjoining red-hot cell or through a chamber whose temperature is maintained by the ordinary working of the destructor itself at a degree sufficient to exclude the

possibility of the escape of any unconsumed gases, vapours or particles. The temperature may vary between 1 500 a nd 2000 . (e) The plant must be so worked that while some of the cells are being recharged, others are at a glowing red heat, in order that a high temperature may be uniformly maintained. (/) The design of the furnaces must admit of clinkering and recharging being easily and quickly performed, the furnace doors being open for a minimum of time so as to obviate the inrush of cold air to lower the temperature

rot)

in main flues, &c. (g) The chimney draught must be assisted with forced draught from fans or steam jet to a pressure of i§ in. to 2 in. under grates by water-gauge, (h) Where a destructor is required to work without risk of nuisance to the neighbouring inhabitants, its efficiency as a refuse destructor plant must be primarily kept in view in designing the works, steam-raising being regarded as a secondary consideration. Boilers should not be placed immediately over a furnace so as to present a large cooling surface, whereby the temperature of the gases is reduced before the organic matter has been thoroughly burned, (i) Where steam-power and a high fuel efficiency are desired a large percentage of C0 2 should be sought in the furnaces with as little excess of air as possible, and the flue gases should be utilized in heating the air-supply to the grates, and the feed-water to the boilers, (j) Ample boiler capacity and hot-water storage feed-tanks should be included in the design where steam- power is required.

As to the initial cost of the erection of refuse destructors, few trustworthy data can be given. The outlay necessarily depends, amongst other things, upon the difficulty of preparing tost j-jjg s j|- ej U p on tjj e nature of the foundations required, the

height of the chimney-shaft, the length of the inclined or approach roadway, and the varying prices of labour and materials in different localities. As an example may be mentioned the case of Bristol, where, in 1892, the total cost of constructing a 16-cell Fryer de- structor was £1 1,418, of which £2909 was expended on foundations, and £1689 on the chimney-shaft; the cost of the destructor proper, buildings and approach road was therefore £6820, or about £426 per cell. The cost per ton of burning refuse in destructors depends mainly upon — (a) The price of labour in the locality, and the number of ” shifts ” or changes of workmen per day; (b) the type of furnace adopted; (c) the

nature of the material to be consumed; (d) the interest on and repayment of capital outlay. The cost of burning ton for ton consumed, in high-temperature furnaces, including labour and repairs, is not greater than in slow-combustion destructors. The average cost of burning refuse at twenty-four different towns through- out England, exclusive of interest on the cost of the works, is Is. ijd. per ton burned ; the minimum cost is 6d. per ton at Bradford, and the maximum cost 2s. iod. per ton at Battersea. At Shoreditch the cost per ton for the year ending on the 25th of March 1899, including labour, supervision, stores, repairs, &c. (but exclusive of interest on cost of works), was 2s. 6-9d. The quantity of refuse burned per cell per day of 24 hours varies from about 4 tons up to 20 tons. The ordinary low-temperature destructor, with 25 sq. ft. grate area, burns about 2oH> of refuse per square foot of grate area per hour, or between S and 6 tons per cell per 24 hours. The Meldrum destructor furnaces at Rochdale burn as much as 66 lb per square foot of grate area per hour, and the Beaman and Deas destructor at Llandudno 71-7 lb per square foot per hour. The amount, however, always depends materially on the care observed in stoking, the nature of the material, the frequency of removal of clinker, and on the question whether the whole of the refuse passed into the furnace is thoroughly cremated.

The amount of residue in the shape of clinker and fine ash varies from 22 to 37 % of the bulk dealt with. From 25 to 30 % is a very _ usual amount. At Shoreditch, where the refuse consists Residues.- Q f about 8 % of straw, paper, shavings, &c, the residue contains about 29% clinker, 2-7% fine ash, -5% flue dust, and -6% old tins, making a total residue of 32-8%. As the residuum amounts to from one-fourth to one-third of the total bulk of the refuse dealt with, it is a question of the utmost importance that some profitable, or at least inexpensive, means should be devised for its regular disposal. Among other purposes, it has been used for bottoming for macadam- ized roads, for the manufacture of concrete, for making paving slabs, for forming suburban footpaths or cinder footwalks, and for the manu- facture of mortar. The last is a very general, and in many places profitable, mode of disposal. An entirely new outlet has also arisen for the disposal of good well-vitrified destructor clinker in connexion with the construction of bacteria beds for sewage disposal, and in many districts its value has, by this means, become greatly enhanced.

Through defects in the design and management of many of the early destructors complaints of nuisance frequently arose, and these have, to some extent, brought destructor installations into disrepute. Although some of the older furnaces were decided offenders in this respect, that is by no means the case with the modern improved type

of high-temperature furnace; and often, were it not for the great prominence in the landscape of a tall chimney-shaft, the existence of a refuse destructor in a neighbourhood would not be generally known to the inhabitants. A modern furnace, properly designed and worked, will give rise to no nuisance, and may be safely erected in the midst of a populous neighbourhood. To ensure the perfect crema- tion of the refuse and of the gases given off, forced draught is essential. This is supplied either as air draught delivered from a Forced raoidly revolving fan, or as steam blast, as in the Horsfall draught. s te a m jet or the Meldrum blower. With a forced blast less air is required to obtain complete combustion than by chimney draught. The forced draught grate requires little more than the quantity theoretically necessary, while with chimney draught more than double the theoretical amount of air must be supplied. With forced draught, too, a much higher temperature is attained, and if it is properly worked, little or no cold air will enter the furnaces during stoking operations. As far as possible a balance of pressure in the

cells during clinkering should be maintained just sufficient to pre- vent an inrush of cold air through the flues. The forced draught pressure should not exceed 2 in. water-gauge. The efficiency of the combustion in the furnace is conveniently measured by the " Econometer," which registers continuously and automatically the proportion of C0 2 passing away in the waste gases; the higher the percentage of CO2 the more efficient the furnace, provided there is no formation of CO, the presence of which would indicate incomplete combustion. The theoretical maximum of C0 2 for refuse burning is about 20 % ; and, by maintaining an even clean fire, by admitting secondary air over the fire, and by regulating the dampers or the air- pressure in the ash-pit, an amount approximating to this percentage may be attained in a well-designed furnace if properly worked. If the proportion of free oxygen {i.e. excess of air) is large, more air is passed through the furnace than is required for complete combustion, and the heating of this excess is clearly a waste of heat. The position of the econometer in testing should be as near the furnace as possible, as there may be considerable air leakage through the brickwork of the flues.

The air supply to modern furnaces is usually delivered hot, the inlet air being first passed through an air-heater the temperature of which is maintained by the waste gases in the main flue.

The modern high-temperature destructor, to render the refuse and gases perfectly innocuous and harmless, is worked at a temperature varying from 1250 to 2000° F., and the maintenance of such

temperatures has very naturally suggested the possi- Calorific bility of utilizing this heat-energy for the production of v “tu*- steam-power. Experience shows that a considerable amount of energy may be derived from steam-raising destructor stations, amply justifying a reasonable increase of expenditure on plant and labour. The actual calorific value of the refuse material necessarily varies, but, as a general average, with suitably designed and properly managed plant, an evaporation of 1 lb of water per pound of refuse burned is a result which may be readily attained, and affords a basis of calculation which engineers may safely adopt in practice. Many destructor steam-raising plants, however, give considerably higher results, evaporations approaching 2 lb of water per pound of refuse being often met with under favourable conditions.

From actual experience it may be accepted, therefore, that the calorific value of unscreened house refuse varies from 1 to 2 lb of water evaporated per pound of refuse burned, the exact proportion depending upon the quality and condition of the material dealt with. Taking the evaporative power of coal at 10 lb of water per pound of coal, this gives for domestic house refuse a value of from ˆ to i that of coal; or, with coal at 20s. per ton, refuse has a commercial value of from 2s. to 4s. per ton. In London the quantity of house refuse amounts to about I J million tons per annum, which is equivalent to from 4 cwt. to 5 cwt. per head per annum. If it be burned in furnaces giving an evaporation of 1 ft) of water per pound of refuse, it would yield a total power annually of about 138 million brake horse-power hours, and equivalent cost of coal at 20s. per ton for this amount of power even when calculated upon the very low estimate of 2 lb J of coal per brake horse-power hour, works out at over £123,000. On the same basis, the refuse of a medium-sized town, with, say, a population of 70,000 yielding refuse at the rate of 5 cwt. per head per annum, would afford 112 indicated horse-power per ton burned, and the total indicated horse-power hours per annum would be

70,000X5 P wt : xi 12 = 1,960,000 I.H.P. hours annually.

If this were applied to the production of electric energy, the electrical horse-power hours would be (with a dynamo efficiency of 90 %)

1,960 000X90 = I|764|OO0 E .h.P. hours per annum ;

100

and the watt-hours per annum at the central station would be

1,764,000X746 = 1,315.944,000. Allowing for a loss of 10% in distribution, this would give 1,184,349,600 watt-hours available in lamps, or with 8-candle-power lamps taking 30 watts of current per lamp, we should have I ,i84,349,6oowatt-hours = 39478)320 g . c p Iamp . hours per annum;

that is, 39.47 .3 — =563 8-c.p.' lamp-hours per annum per

70,000 population "» ˆ £ popula P tion .

Taking the loss due to the storage which would be necessary at 20 % on three-quarters of the total or 15% upon the whole, there would be 478 8-c.p. lamp-hours per annum per head of the population: i.e. if the power developed from the refuse were fully utilized, it would supply electric light at the rate of one 8-c.p. lamp per head of the population for about ij hours for every night of the year.

In actual practice, when the electric energy is for the purposes of lighting only, difficulty has been experienced in fully utilizing the thermal energy from a destructor plant owing to the want of adequate means of storage either of the thermal or of J5;

the electric energy. A destructor station usually yields a cutties. fairly definite amount of thermal energy uniformly throughout the 24 hours, while the consumption of electric-lighting current is extremely

1 With medium-sized, steam plants, a consumption of 4 lb of coal per brake horse-power per'hour is a very usual performance.

irregular, the maximum demand being about four times the mean .demand. The period during which the demand exceeds the mean is comparatively short, and does not exceed about 6 hours out of the 24, while for a portion of the time the demand may not exceed 2 Vth of the maximum. This difficulty, at first regarded as somewhat grave, is substantially minimized by the provision of ample boiler capacity, or by the introduction of feed thermal storage vessels in which hot feed-water may be stored during the hours of light load (say 18 out of the 24), so that at the time of maximum load the boiler may be filled directly from these vessels, which work at the same pressure and temperature as the boiler. Further, the difficulty above mentioned will disappear entirely at stations where there is a fair day load which practically ceases at about the hour when the illuminating load comes

on, thus equalizing the demand upon both destructor and electric plant throughout the 24 hours. This arises in cases where current is consumed during the day for motors, fans, lifts, electric tramways, and other like purposes, and, as the employ- ment of electric energy for these services is rapidly becoming general, no difficulty need be anticipated in the successful working of com- bined destructor and electric plants where these conditions prevail. The more uniform the electrical demand becomes, the more fully may the power from a destructor station be utilized.

In addition to combination with electric-lighting works, refuse destructors are now very commonly installed in conjunction with various other classes of power-using undertakings, including tram- ways, water-works, sewage-pumping, artificial slab-making and clinker-crushing works ana others; and the increasingly large sums which are being yearly expended in combined undertakings of this character is perhaps the strongest evidence of the practical value of such combinations where these several classes of work must be carried on.

For further information on the subject, reference should be made to William H. Maxwell, Removal and Disposal of Town Refuse, with an exhaustive treatment of Refuse Destructor Plants (London, 1899), with a special Supplement embodying later results (London, 1905).

See also the Proceedings of the Incorporated Association of Municipal and County Engineers, vols. xiii. p. 216, xxii. p. 211, xxiv. p. 214 and xxv. p. 138; also the Proceedings of the Institution of Civil Engineers, vols, cxxii. p. 443, cxxiv. p. 469, cxxxi. p. 413, cxxxviii. p. 508, cxxix. p. 434, cxxx. pp. 213 and 347, cxxiii. pp. 369 and 498, cxxviii. p. 293 and cxxxv. p. 300. (W. H. Ma.)

DE TABLEY, JOHN BYRNE LEICESTER WARREN, 3RD Baron (1835-1895), English poet, eldest son of George Fleming Leicester (afterwards Warren) , 2nd Baron De Tabley, was born on the 26thof April 1835. HewaseducatedatEtonand Christ Church, Oxford, where he took his degree in 1856 with second classes in classics and in law and modern history. In the autumn of 1858 he went to Turkey as unpaid attache to Lord Stratford de Redcliffe, and two years later was called to the bar. He became an officer in theCheshireYeomanry,andunsuccessfullycontestedMid-Cheshire in 1868 as a Liberal. After his father’s second marriage in 187 1 he remoyed to London, where he became a close friend of Tennyson for several years. From 1877 till his succession to the title in 1887 he was lost to his friends, assuming the life of a recluse. It was not till 1892

that he returned to London life, and enjoyed a sort of renaissance of reputation and friendship. During the later years of his life Lord De Tabley made many new friends, besides reopening old associations, and he almost seemed to be gathering around him a small literary company when his health broke, and he died on the 22nd of November 1895 at Ryde, in his sixty-first year. He was buried at Little Peover in Cheshire. Although his reputation will live almost exclusively as that of a poet, De Tabley was a man of many studious tastes. He was at one time an authority on numismatics; he wrote two novels; published A Guide to the Study of Book Plates (1880); and the fruit of his careful researches in botany was printed posthumously in his elaborate Flora of Cheshire (1899). Poetry, however, was his first and last passion, and to that he devoted the best energies of his life. De Tabley's first impulse towards poetry came from his friend George Fortescue, with whom he shared a close com- panionship during his Oxford days, and whom he lost, as Tennyson lost Hallam, within a few years of their taking their degrees. Fortescue was killed by falling from the mast of Lord Drogheda's yacht in November 1859, and this gloomy event plunged De Tabley into deep depression. Between 1859 and 1862 De Tabley issued four little volumes of pseudonymous verse (by G. F. Preston), in the production of which he had been greatly stimu- lated by the sympathy of Fortescue. Once more he assumed a pseudonym— his Praelerita (1863) bearing the name of William Lancaster. In the next year he published Eclogues and Mono-

dramas, followed in 1865 by Studies in Verse. These volumes all displayed technical grace and much natural beauty; but it was not till the publication of Philoctetes in 1866 that De Tabley met with any wide recognition. Philoctetes bore the initials " M.A.," which, to the author's dismay, were interpreted as meaning Matthew Arnold. He at once disclosed his identity, and received the congratulations of his friends, among whom were Tennyson, Browning and Gladstone. In 1867 he published Orestes, in 1870 Rehearsals and in 1873 Searching the Net. These last two bore his own name, John Leicester Warren. He was somewhat disappointed by their lukewarm reception, and when in 1876 The Soldier of Fortune, a drama on which he had bestowed much careful labour, proved a complete failure, he retired altogether from the literary arena. It was not until 1893, that he was persuaded to return, and the immediate success in that year of his Poems, Dramatic and Lyrical, encouraged him to publish a second series in 1895, the year of his death. The genuine interest with which these volumes were welcomed did much to lighten the last years of a somewhat sombre and solitary life. His posthumous poems were collected in 1902. The characteristics of De Tabley's poetry are pre-

eminently magnificence of style, derived from close study of Milton, sonority, dignity, weight and colour. His passion for detail was both a strength and a weak- ness: it lent a loving fidelity to his description of natural objects, but it sometimes involved him in a loss of simple effect from over-elaboration of treatment. He was always a student of the classic poets, and drew much of his inspiration directly from them. He was a true and a whole-hearted artist, who, as a brother poet well said, ” still climbed the clear cold altitudes of song.” His ambition was always for the heights, a region naturally ice-bound at periods, but always a country of clear atmosphere and bright, vivid outlines.

See an excellent sketch by E. Gosse in his Critical Kit-Kats (1896).

(A. Wa.)

DETAILLE, JEAN BAPTISTE EDOUARD (1848-),

French painter, was born in Paris on the 5th of October 1848. After Working as a pupil of Meissonier’s, he first exhibited, in the Salon of 1867, a picture representing ” A Corner of Meissonier’s Studio.” Military life was from the first a principal attraction to the young painter, and he gained hˆs reputation by depicting the scenes of a soldier’s life with every detail truthfully rendered. He exhibited “A Halt ” (1868); ” Soldiers at rest, during the Manoeuvres at the Camp of Saint Maur ” (1869); ” Engagement between Cossacks and the Imperial Guard, 1814 ” (1870). The war of 1870-71 furnished him with a series of subjects which gained him repeated successes. Among his more important pictures may be named “The Conquerors” (1872); “The Retreat ” (1873); ” The Charge of the 9th Regiment of Cuirassiers in the Village of Morsbronn, 6th August 1870 ” (1874); ” The Marching Regiment, Paris, December 1874″ (1875); “A Reconnaissance” (1876); “Hail to the Wounded!” (1877); ” Bonaparte in Egypt ” (1878); the ” Inauguration of the New Opera House ” — a water-colour; the ” Defence of Champigny by Faron’s Division ” (1879). He also worked with Alphohse de Neuville on the panorama of Rezonville. In 1884 he exhibited at the Salon the ” Evening at Rezonville,” a panoramic study, and ” The Dream ” (1888), now in the Luxemburg. Detaille recorded other events in the military history of his country: the ” Sortie of the Garrison of Huningue ” (now in the Luxem- burg), the ” Vincendon Brigade,” and ” Bizerte,” reminiscences of the expedition to Tunis. After a visit to Russia, Detaille exhibited ” The Cossacks of the Ataman ” and ” The Hereditary Grand Duke at the Head of the Hussars of the Guard.” Other important works are: ” Victims to Duty,” ” The Prince of Wales and the Duke of Connaught ” and ” Pasteur’s Funeral.” In his picture of” Chalons, 9th October

1896," exhibited in the Salon, 1898, Detaille painted the emperor and empress of Russia at a review, with M. Felix Faure. Detaille became a member of the French Institute in 1898. •

See Marius Vachon, Detaille (Paris, 1898); ~ Frederic Masson, Edouard Detaille and his work (Paris and London, 1891) ; J. Claretie, Peintres et sculpteurs eontemporains (Paris, 1876); G. Goetschy. Les Jeunes peintres militaires (Paris, 1878).

in

DETAINER (horn detain, Lat. detinere), in law, the act of keeping a person against his will, or the wrongful keeping of a person's goods, or other real or personal property. A writ of detainer was a form for the beginning of a personal action against a person already lodged within the walls of a prison; it was superseded by the Judgment Act 1838.

DETERMINANT, in mathematics, a function which presents itself in the solution of a system of simple equations.

1. Considering the equations

$ax + by + cz = d$, $a'x + b'y + c'z = d'$, $a''x + b''y + c''z = d''$,

and proceeding to solve them by the so-called method of cross multiplication, we multiply the equations by factors selected in such a manner that upon adding the results the whole coefficient of y becomes = o, and the whole coefficient of z becomes = o; the factors in question are $b'c'' — b''c'$, $b''c— be''$, $be'— b'c$. (values which, as at once seen, have the desired property); we thus obtain an equation which contains on the left-hand side only a multiple of *, and on the right-hand side a constant term; the coefficient of x has the value

$a(b'c'' - b''c') + a'(b''c - bc'') + a''(bc' - b'c)$, and this function, represented in the form

a ,

b

c

a'

b'

c’

a”,

b”,

c”

is said to be a determinant; or, the number of elements being 3 2 , it is called a determinant of the third order. It is to be noticed that the resulting equation is

a , b , c x = d , b , c

a’,b’,c’ d’,b’,c’

a”, b”, c” d”, b”, c”

where the expression on the right-hand side is the like function with d, d’, d” in place of a, a’, a” respectively, and is of course also a determinant. Moreover, the functions b’c” — b”c’, b”e.— bc”, be’ — b’c used in the process are themselves the determinants of the second order

\b’,c’ \b”,c”

We have herein the suggestion of the rule for the derivation of the determinants of the orders 1, 2, 3, 4, &c, each from the preceding one, viz. we have

= a,

= #’!

b’,c’ b”, c”

a%” , c”\ +a”\b , \b ,c\ \b’,

b ,c ,d

b’,c’,d’ b”,c”,d”

W

k b I =#’| -aˆ.

b ,c =ab’ , c’\ +

V ,c’

b”,c”

,b ,c ,d =a(6′ ,c’ ,d’ -a’b” ,c” ,d” +a”\b”,c”,d” ,b’ ,c’ ,d’ b” ,c” ,d” b”,c”,d’” \b ,c ,d ,b” ,c’\d” b’”,c”,d’” b ,c ,d \b’ ,c’ ,d’

,b’”,c’”,d”i

and so on, the terms being all + for a determinant of an odd order, but alternately + and — for a determinant of an even order. 2. It is easy, by induction, to arrive at the general results: — A determinant of the order n is the sum of the i.2.3…« pro- ducts which can be formed with n elements out of n 2 elements arranged in the form of a square, no two of the n elements being in the same line or in the same column, and each such product having the coefficient =*= unity.

The products in question may be obtained by permuting in every possible manner the columns (or the lines) of the determin- ant, and then taking for the factors the n elements in the dexter diagonal. And we thence derive the rule for the signs, viz. con- sidering the primitive arrangement of the columns as positive, then an arrangement obtained therefrom by a single interchange (inversion, or derangement) of two columns is regarded as nega- tive; and so in general an arrangement is positive or negative according as it is derived from the primitive arrangement by an even or an odd number of interchanges. iThis implies the theorem that a given arrangement can be derived from the primitive arrangement only by an odd number, or else only by an even

number of interchanges,— a theorem the verification of which may be easily obtained from the theorem (in fact a particular case of the general one), an arrangement can be derived from itself only by an even number of interchanges.] And this being so, each product has the sign belonging to the corresponding arrange ment of the columns; in particular, a determinant contains with the sign -f the product of the elements in its dexter diagonal. It is to be observed that the rule gives as many positive as negative arrangements, the number of each being = 5 1. 2…».

The rule of signs may be expressed in a different form. Giving to the columns in the primitive arrangement the numbers 1, 2,3. . . n, to obtain the sign belonging to any other arrangement we take, as often as a lower number succeeds a higher one, the sign — , and, compounding together all these minus signs, obtain the proper sign,

+ or — as the case may be.

Thus, for three columns, it appears by either rule that 123, 231, 312 are positive; 213, 321, 132 are negative; and the developed expression of the foregoing determinant of the third order is

= ab'c"-ab"c' + a'b"c-a'bc"-a"bc'-a"b'c.

3. It further appears that a determinant is a linear function 1 of the elements of each column, thereof, and also a linear function of the elements of each line thereof; moreover, that the de- terminant retains the same value, only its sign being altered, when any two columns are interchanged, or when any two lines are interchanged; more generally, when the columns are permuted in any manner, or when the lines are permuted in any manner, the determinant retains its original value", with the sign + or — according as the new arrangement (considered as derived from the primitive arrangement) is positive or negative according to the foregoing rule of signs. It at once follows that, if two columns are identical, or if two lines are identical, the value of the determinant is = o. It may be added, that if the lines are converted into columns, and the columns into lines, in such a way as to leave the dexter diagonal unaltered, the value of the determinant is unaltered; the determinant is in this case said to be transposed.

4. By what precedes it appears that there exists a function of the » 2 elements, linear as regards the terms of each column (or say, for shortness, linear as to each column), and such that only the sign is altered when any two columns are interchanged; these properties completely determine the function, except as to a common factor which may multiply all the terms. If, to get rid of this arbitrary common factor, we assume that the product of the elements in the dexter diagonal has the coefficient + 1, we have a complete definition of the determinant, and it is interesting to show .how from these properties, assumed for the definition of the determinant, it at once appears that the determinant is a function serving for the solution of a system of linear equations. Observe that the properties show at once that if any column is = (that is, if the elements in the column are each = o), then the determinant is = o; and further, that if any two columns ate identical, then the determinant is = o.

5. Reverting to the system of linear equations written down at the beginning of this article, consider the determinant

ax + by --cz —d , b , c a'x + b'y + c'z-d ', b' , c' a"x + b"y + c"z-d", b", c"

it appears that this is

+y

b , c b',c' b", c"

b , b , c b',b',c' b", b", c"

+4c

b ,c

b',c' b", c"

d , b , c d', b',c' d", b", c"

viz. the second and third terms each vanishing, it is

a , b , c a', b',c' a", b", c"

d , b , c d', b';C'

d", b", c"

But if the linear equations hold good, then the first column of the

1 The expression, a linear function , is here > used in its narrowest sense, a linear function without constant term; what is meant is that the determinant is in regard to the elements a, a', a", . . of any column or line thereof, a function of the form Ao+^4'o'.+A*a*-l- .... without any term independent of a, a', a" . -. ."

original determinant is = o, and therefore the determinant itself is ■= o; that is, the linear equations give

a ,b , c a',b',c' a', b", c"

d t b , c

d', b', c' d", b', c"

=o;

which is the result obtained above.

We might in a similar way find the values of y and z, but there is a more symmetrical process. Join to the original equations the new equation

ax + Py + yz = S;

a like process shows that, the equations being satisfied, we have

= o;

« , 0,7

■ *

a , b , c

d

a',b',c'

d'

a", b", c"

d"

or, as this may be written,

a ,0,7

-i

a , b , c

a , b , c , d

a l ,b',c'

a',b',c',d'

a", b", c"

a", b", c", d"

which, considering S as standing herein for its value ax + fiy + yz, is a consequence of the original equations only: we have thus an expression for ax + Py + yz, an arbitrary linear function of the unknown quantities x, y, z; and by comparing the coefficients of a, /3,

y on the two sides respectively, we have the values of x,y,z; in fact, these quantities, each multiplied by

I a , 6l , c a’,b’,c” a’, b’, c”

are in the first instance obtained in the forms

i

a , b , c , d a’. b’,c’,d l a”, b”, c”, d”

i

a , b , c , d a’,b’,c’,d’ a’.b’.c’d’

a , b , c , d a’,b’,c’,d’ a”,b”,c”,d”

but these are

b , c , d

—

c , d , o

t

d a , b

b’,c’,d’

c’,d’,a’

d’ a’, b’

b”, c”, d”

c”, d”, a”

d” a’, b’

or, what is the same thing,

b ,c ,d

c , a , d

t

a ,b ,d

b’,c’,d’

c’,a’,d’

a’,b’ d’

b”, c”, d”

c”,a”,d”

a’.b’d”

respectively.

6. Multiplication of two Determinants of the same Order. — The theorem is obtained very easily from the last preceding definition of a determinant. It is most simply expressed thus —

(a.a’,a’),(,f},f>’,e”),(y,y’,y”)

a , b , c

a’, ,7

a’, b’,c’

a’,0’,7′

a”, b”, c”

a’, 0”, y”

(a ,b ,c) (a’,b’,c’) (a\ b”, c”)

where the expression on the left side stands for a determinant, the terms of the first line being {a, b, c)(o, a’, a”), that is, aa+ba’+ ca”, (a, b, c)(j3, 0’, /3”), that is, ap+bp’+cp”, (a, b, c){y,y’,y”), that is ay +by’+cy”; and similarly the terms in the second and third lines are the life functions with (a’, b’, c’) and (a”, b”, c”) respectively.

There is an apparently arbitrary transposition of lines and columns; the result would hold good if on the left-hand side we had written (a, /3, 7), (a’, /?’, 7’), (a*, P”, 7”), or what is the same thing, if on the right-hand side we had transposed the second determinant; and either of these changes would, it might be thought, increase the elegance of

the form, but, for a reason which need not be explained, 1 the form actually adopted is the pre- ferable one.

To indicate the method of proof, observe that the determinant on the left-hand side, qua linear function of its columns, may be

1 The reason is the connexion with the corresponding theorem for the multiplication of two matrices.

broken up into a sum of (3* =») 27 determinants, each of which is either of some such form as

±0/87′

a

b

a’

a’

b’

a”

a”

b”

where the term ajSy’ is not a term of the aj87-determinant, and its coefficients a determinant with two identical columns)vanishes; or else it is of a form such as

= a/3V

a , b , c a’,b’,c’ a”, b”, c”

that is, every term which does not vanish contains as a factor the oJc-determinarit last written down; the sum of all other factors ±a(i’y” is the a/37-determinant of the formula; and the final result then is, that the determinant on the left-hand side is equal to the product on the right-hand side of the formula.

7. Decomposition of a Determinant into complementary Deter-minants.— Consider, for simplicity, a determinant of the fifth order, 5 = 2+3, and let the top two lines be

a , b , c , d , a’, V, c’, d’,

then, if we consider how these elements enter into the deter- minant, it is at once seen that they enter only through the

determinants of the second order “/’ ˆ , &c, which can be

formed by selecting any two columns at pleasure. Moreover, representing the remaining three lines by

a” , b” , c” , d” , e” a”, b” , c” , d” , e” ■ a””, b”\ c”, d””, e”

it is further seen that the factor which multiplies the determinant formed with any two columns of the first set is the determinant of the third order formed with the complementary three columns of the second set; and it thus appears that the determinant of the fifth order is a sum of all the products of the form

a

h 1

c”

d” ,

e”

a’

b”\

c”

d”’,

e”

-fftt

d”,

e”

the sign =•= being in each case such that the sign of the term * ±ab’.c*d“e”” obtained from the diagonal elements of the com- ponent determinants may be the actual sign of this term in the

determinant of the fifth order; for the product written down the sign is obviously +.

Observe that for a determinant of the »-th order, taking the decomposition to be 1 + in— 1), we fallback upon the equations given at the commencement, in order to show the genesis of a determinant.

8. Any determinant ^' j» formed out of the elements of

the original determinant, by selecting the lines and columns at pleasure, is termed a minor of the original determinant; and when the number of lines and columns, or order of the deter- minant, is n— 1, then such determinant is called a, first minor; the number of the first minors is = « 2 , the first minors, in fact, corre- sponding to the several elements of the determinant — that is, the coefficient therein of any term whatever is the corresponding first minor. The first minors, each divided by the determinant itself, form a system of elements inverse to the elements of the determinant.

A determinant is symmetrical when every two elements symmetrically situated in regard to the dexter diagonal are equal to each other; if they are equal and opposite (that is, if the sum of the two elements be = o), this relation not extending to the diagonal elements themselves, which remain arbitrary, then the determinant is skew; but if the relation does extend to the diagonal terms (that is, if these are each = o), then the deter- minant is skew symmetrical; thus the determinants

a, h, g

;

0, V, — n

j

0, v, — M

h, b,f

-v, b, X

— v, 0, X

g< /. c

li, — X, c

n, — X,

are respectively symmetrical, skew and skew symmetrical:

IJ 3

The theory admits of very extensive algebraic developments, and applications in algebraical geometry and other parts of mathematics. For further developments of the theory of deter- minants see Algebraic Forms. (.A. Ca.)

9. History. — These functions were originally known as “re- sultants,” a name applied to them by Pierre Simon Laplace, but now replaced by the title ” determinants,” a name first applied to certain forms of them by Carl Friedrich Gauss. The germ of the theory of determinants is to be found in the writings of Gottfried Wilhelm Leibnitz (1693), who incidentally discovered certain properties when reducing the eliminant of a system of linear equa- tions. Gabriel Cramer, in a note to his Analyse des lignes courbes algebriques (1 750) , gave the rule which establishes the sign of a product as plus or minus according as the number of displacements from the typical form has been even or odd. Determinants were also em- ployed by Etienne Bezout in 1764, but the first connected account of these functions was published in 1772 by Charles Auguste Vander- monde. Laplace developed a theorem of Vandermonde for the expansion of a determinant, and in 1773 Joseph Louis Lagrange, in his memoir on Pyramids, used determinants of the third order, and proved that the square of a determinant was also a determinant. Although he obtained results now identified with determinants, Lagrange did not discuss these functions systematically. In 1801 Gauss published his Disquisitiones arithmeticae, which, although written in an obscure form, gave a new impetus to investigations on this and kindred subjects. To Gauss is due the establishment of the important theorem, that the product of two determinants both of the second and third orders is a determinant. The formulation of the general theory is due to Augustin Louis Cauchy, whose work was the forerunner of the brilliant discoveries made in the following decades by Hoene-Wronski and J. Binet in France, Carl Gustav Jacobi in Germany, and James Joseph Sylvester and Arthur Cayley in England. Jacobi’s researches were published in Crelle’s Journal (1826-1841). In these papers the subject was recast and enriched by new and important theorems, through which the name of Jacobi is indissolubly associated with this branch of science. The far- reaching discoveries of Sylvester and’Cayley rank as one of

the most important developments of pure mathematics. Numerous new fields were opened up, and have been diligently explored by many mathematicians. Skew-determinants were studied by Cayley; axisymmetric-determinants by Jacobi, V. A. Lebesque, Sylvester and O. Hesse, and centro-symmetric determinants by W. R. F. Scott and G. Zehfuss. Continuants have been discussed by Sylvester; alternants by Cauchy, Jacobi, N. Trudi, H. Nagelbach and G. Garbieri; circulants by E. Catalan, W. Spottiswoode and J. W. L. Glaisher, and Wronskians by E. B. Christoffel and G. Frobenius. Determinants composed of binomial coefficients have been studied by V. von Zeipel ; the expression of definite integrals as determinants by A. Tissot and A. Enneper, and the expression of continued fractions as determinants by Jacobi, V. Nachreiner, S. Giinther and E. Fiirstenau. (See T. Muir, Theory of Determinants, 1906).

DETERMINISM (Lat. determinate, to prescribe or limit), in ethics, the name given to the theory that all moral choice, so called, is the determined or necessary result of psychological and other conditions. It is opposed to the various doctrines of Free- will, known as voluntarism, libertarianism, indeterminism, and is from the ethical standpoint more or less akin to necessitarianism and fatalism. There are various degrees of determinism. It may be held that every action is causally connected not only externally with the sum of the agent's environment, but also internally with his motives and impulses. In other words, if we could know exactly all these conditions, we should be able to forecast with mathematical certainty the course which the agent would pursue. In this theory the agent cannot be held responsible for his action in any sense. It is the extreme antithesis of Indeterminism or Indifferentism, the doctrine that a man is absolutely free to choose between alternative courses (the liberum arbitrium indifferentiae) . Since, however, the evidence of ordinary consciousness almost always goes to prove that the individual, especially in relation to future acts, regards himself as being free within certain limitations to make his own choice of alternatives, many determinists go so far as to admit that there may be in any action which is neither reflex nor determined by external causes solely an element of freedom. This view is corroborated by the phenomenon of remorse, in which the agent feels that he ought to, and could, have chosen a different course of action. These two kinds of determinism are sometimes distinguished as " hard " and " soft " determinism. The con- troversy between determinism and libertarianism hinges largely on the significance of the word " motive "; indeed in no other philosophical controversy has so much difficulty been caused

by purely verbal disputation and ambiguity of expression. How far,

and in what sense, can action which is determined by motives be said to be free? For a long time the advocates of free-will, in their eagerness to preserve moral responsibility, went so far as to deny all motives as influencing moral action. Such a contention, however, clearly defeats its own object by reducing all action to chance. On the other hand, the scientific doctrine of evolution has gone far towards obliterating the distinction between external and internal compulsion, e.g. motives, character and the like. In so far as man can be shown to be the product of, and a link in, a long chain of causal development, so far does it become impossible to regard him as self-determined. Even in his motives and his impulses, in his mental attitude towards outward surroundings, in his appetites and aversions, inherited tendency and environment have been found to play a very large part; indeed many thinkers hold that the whole of a man's development, mental as well as physical, is determined by external conditions.

In the Bible the philosophical-religious problem is nowhere discussed, but Christian ethics as set forth in the New Testament assumes throughout the freedom of the human will. It has been argued by theologians that the doctrine of divine fore-knowledge, coupled with that of the divine origin of all things, necessarily implies that all human action was fore-ordained from the beginning of the world. Such an inference is, however, clearly at variance with the whole doctrine of -in, repentance and the atonement, as also with that of eternal reward and punishment, which postulates a real measure of human responsibility.

For the history of the free-will controversy see the articles, Will, Predestination (for the theological problems), Ethics.

DETINUE (O. Fr. detenue, from detenir, to hold back), in law, an action whereby one who has an absolute or a special property in goods seeks to recover from another who is in actual possession and refuses to redel'ver them. If the plaintiff succeeds in an action of detinue, the judgment is that he recover the chattel or, if it cannot be had, its value, which is assessed by the judge and jury, and also certain damages for detaining the same. An order for the restitution of the specific goods may be enforced by a special writ of execution, called a writ of delivery. (See Contract; Trover.)

DETMOLD, a town of Germany, capital of the principality of Lippe-Detmold, beautifully situated on the east slope of the Teutoburger Wald, 25 m. S. of Minden, on the Herford-Alten- beken line of the Prussian state railways. Pop. (1905) 13,164. The residential chateau of the princes of Lippe-Detmold (1550), in the Renaissance style, is an

imposing building, lying with its pretty gardens nearly in the centre of the town; whilst at the entrance to the large park on the south is the New Palace (1708-1718), enlarged in 1850, used as the dower-house. Detmold possesses a natural history museum theatre, high school, library, the house in which the poet Ferdinand Freiligrath (1810-1876) was born, and that in which the dramatist Christian Dietrich Grabbe (1 801-1 836) , also a native, died. The leading industries are linen- weaving, tanning, brewing, horse-dealing and the quarrying of marble and gypsum. About 3 m. to the south-west of the town is the Grotenburg, with Ernst von BandePs colossal statue of Hermann or Arminius, the leader of the Cherusci. Detmold (Thiatmelli) was in 783 the scene of a conflict between the Saxons and the troops of Charlemagne.

DETROIT, the largest city of Michigan, U.S.A., and the county-seat of Wayne county, on the Detroit river opposite Windsor, Canada, about 4 m. W. from the outlet of Lake St Clair and 18 m. above Lake Erie. Pop. (1880) 116,340; (1890) 205,876; (1900) 285,704, of whom 96,503 were foreign-born and 41 1 1 were negroes; (1910 census) 465,766. 01 the foreign- born in 1900, 32,027 were Germans and 10,703 were German Poles, 25,403 were English Canadians and 3541 French Canadians, 6347 were English and 6412 were Irish. Detroit is served by the Michigan Central, the Lake Shore & Michigan Southern, the Wabash, the Grand Trunk, the Pere Marquette, the Detroit & Toledo Shore Line, the Detroit, Toledo & Ironton and the Canadian Pacific railways. Two belt lines, one 2 m. to 3 m., and

the other 6 m. from the centre of the city, connect the factory-districts with the main railway lines. Trains are ferried across the river to Windsor, and steamboats make daily trips to Cleveland, Wyandotte, Mount Clemens, Port Huron, to less important places between, and to several Canadian ports. Detroit is also the S. terminus for several lines to more remote lake ports, and electric lines extend from here to Port Huron, Flint, Pontiac, Jackson, Toledo and Grand Rapids.

The city extended in 1907 over about 41 sq. m., an increase from 29 sq. m. in 1900 and 36 sq. m. in 1905. Its area in pro- portion to its population is much greater than that of most of the larger cities of the United States. Baltimore, for example, had in 1904 nearly 70% more inhabitants (estimated), while its area at that time was a little less and in 1907 was nearly one-quarter less than that of Detroit. The ground

within the city limits as well as that for several miles farther back is quite level, but rises gradually from the river bank, which is only a few feet in height. The Detroit river, along which the city extends for about 10 m., is here 5 m. wide and 30 ft. to 40 ft. deep; its current is quite rapid; its water, a beautiful clear blue; at its mouth it has a width of about 10 m., and in the river there are a number of islands, which during the summer are popular resorts. The city has a 3 m. frontage on the river Rouge, an estuary of the Detroit, with a 16 ft. channel. Before the fire by which the city was destroyed in 1805, the streets were only 12 ft. wide and were unpaved and extremely dirty. But when the rebuilding began, several avenues from 100 ft. to 200 ft. wide were — through the influence of Augustus B. Woodward (c. 1775-1827), one of the territorial judges at the time and an admirer of the plan of the city of Washington — made to radiate from two central points. From a half circle called the Grand Circus there radiate avenues 120 ft. and 200 ft. wide. About J m. toward the river from this was established another focal point called the Campus Martius, 600 ft. long and 400 ft. wide, at which commence radiating or cross streets 80 ft. and 100 ft. wide. Running north from the river through the Campus Martius and the Grand Circus is Woodward Avenue, 120 ft. -wide, dividing the present city, as it did the old town, into nearly equal parts. Parallel with the river is Jefferson Avenue, also 120 ft. wide. The first of these avenues is the principal retail street along its lower portion, and is a residence avenue for 4 m. beyond this. Jefferson is the principal wholesale street at the lower end, and a fine residence avenue E. of this. Many of the other residence streets are 80 ft. wide. The setting of shade trees was early encouraged, and large elms and maples abound. The intersections of the diagonal streets left a number of small, triangular parks, which, as well as the larger ones, are well shaded. The streets are paved mostly with asphalt and brick, though cedar and stone have been much used, and kreodone block to some extent. In few, if any, other American cities of equal size are the streets and avenues kept so clean. The Grand Boulevard, 1 50 ft. to 200 ft. in width and 12 m. in length, has been constructed around the city except along the river front. A very large proportion of the inhabitants of Detroit own their homes: there are no large congested tenement-house districts; and many streets in various parts of the city are faced with rows of low and humble cottages often having a garden plot in front.

Of the public buildings the city hall (erected 1868-1871), overlooking the Campus Martius, is in Renaissance style, in three storeys; the flagstaff from the top of the tower reaches a height of 200 ft. On the four corners above the first section of the tower are four figures, each

14 ft. in height, to represent Justice, Industry, Art and Commerce, and on the same level with these is a clock weighing 7670 lb — one of the largest in the world. In front of the building stands the Soldiers' and Sailors' monument, 60 ft. high, designed by Randolph Rogers (1825-1892) and unveiled in 1872. At each of the four corners in each of three sections rising one above the other are bronze eagles and figures representing the United States Infantry, Marine, Cavalry and Artillery, also Victory, Union, Emancipation and History; the figure by which the monument is surmounted was designed to symbolize Michigan. A larger and more massive and stately

building than the city hall is the county court house, facing Cadillac Square, with a lofty tower surmounted by a gilded dome. The Federal building is a massive granite structure, finely decorated in the interior. Among the churches of greatest architectural beauty are the First Congregational, with a fine Byzantine interior, St John's Episcopal, the Woodward Avenue Baptist and the First Presbyterian, all on Woodward Avenue, and St. Anne's and Sacred Heart of Mary, both Roman Catholic. The municipal museum of art, in Jefferson Avenue, contains some unusually interesting Egyptian and Japanese collections, the Scripps' collection of old masters, other valuable paintings, and a small library: free lectures on art are given here through the winter. The public library had 228,500 volumes in 1908, includ- ing one of the best collections of state and town histories in the country. A large private collection, owned by C. M. Burton and relating principally to the history of Detroit, is also open to the public. The city is not rich in outdoor works of art. The principal ones are the Merrill fountain and the soldiers' monu- ment on the Campus Martius, and a statue of Mayor Pingree in West Grand Circus Park.

The parks of Detroit are numerous and their total area is about 1200 acres. By far the most attractive is Belle Isle, an island in the river at the E. end of the city, purchased in 1879 and having an area of more than 700 acres. The Grand Circus Park of 45 acres, with its trees, flowers and fountains, affords a pleasant resting place in the busiest quarter of the city. Six miles farther, out on Woodward Avenue is Palmer Park of about 140 acres, given to the city in 1894 and named in honour of the donor. Clark Park (28 acres) is in the W. part of the city, and there are various smaller parks. The principal cemeteries are Elmwood (Protestant) and Mount Elliott (Catholic), which lie adjoining in the E. part of the city; Woodmere in the W. and Woodlawn in the N. part of the city.

Charity and Education. — Among the charitable institutions are the general hospitals (Harper, Grace and St Mary's) ; the Detroit

Emergency, the Children's Free and the United States Marine hospitals; St Luke's hospital, church home, and orphanage; the House of Providence (a maternity hospital and infant asylum); the Woman's hospital and foundling's home; the Home for convalescent children, &c. In 1894 the mayor, Hazen Senter Pingree (1842-1901), instituted the practice of preparing, through municipal aid and supervision, large tracts of vacant land in and about the city for the growing of potatoes and other vegetables and then, in conjunction with the board of poor commissioners, assigning it in small lots to families of the unemployed, and furnishing them with seed for planting. This plan served an admirable purpose through three years of industrial depression, and was copied in other cities; it was abandoned when, with the renewal of industrial activity, the necessity for it ceased. The leading penal institution of the city is the Detroit House of Correction, noted for its efficient reformatory work; the inmates are employed ten hours a day, chiefly in making furniture. The house of correction pays the city a profit of $35,000 to $40,000 a year. The educational institutions, in addition to those of the general public school system, include several parochial schools, schools of art and of music, and commercial colleges; Detroit College (Catholic), opened in 1877; the Detroit College of Medicine, opened in 1885; the Michigan College of Medicine and Surgery, opened in 1888; the Detroit College of law, founded in 1891, and a city normal school.

Commerce. — Detroit's location gives to the city's shipping and shipbuilding interests a high importance. All the enormous traffic between the upper and lower lakes passes through the Detroit river. In 1907 the number of vessels recorded was 34,149, with registered tonnage of 53,959,769, carrying 71,226,895 tons of freight, valued at $697,311,302. This includes vessels which delivered part or all of their cargo at Detroit. The largest item in the freights is iron ore on vessels bound down. The next is coal on vessels up bound. Grain and lumber are the next largest items.- Detroit is a port of entry, and its foreign commerce, chiefly with Canada, is of growing importance. The city's exports increased from $11,325,807 in 1896 to $37,085,027 m

1909. The imports were $3,153,609 in 1896 and $7,160,659 in

1909. !

As a manufacturing city, Detroit holds high rank. The total number of manufacturing establishments in 1890 was 1746, with a product for the year valued a't $77,351,546; in 1900 there were 2847 establishments with a product for the year valued at $106,892,838) or an increase of 30-4% in the decade. In 1900 the establishments under the factory system, omitting the hand trades and neighbourhood industries, numbered 1259 and pro- duced goods valued at $88,365,924; in 1904 establishments under the factory system numbered 1363 and the product had increased 45-7% to $128,761,658. In the district subsequently annexed the product in 1904 was about $12,000,000, making a total of $140,000,000. The output for 1906 was estimated at $180,000,000. The state factory inspectors in 1905 visited 1721 factories having 83,231 employees. In 1906 they inspected 1790 factories with 93,071 employees. Detroit is the leading city in the country in the manufacture of automobiles. In 1904 the value of its product was one-fifth that for the whole country. In 1906 the city had twenty automobile factories, with an out- put of 11,000 cars, valued at $12,000,000. Detroit is probably the largest manufacturer in the country of freight cars, stoves, pharmaceutical preparations, varnish, soda ash and similar alkaline products. Other important manufactures are ships, paints, foundry and machine shop products, brass goods, furniture, boots and shoes, clothing, matches, cigars, malt liquors and fur goods; and slaughtering and meat packing is an important industry.

The Detroit Board of Commerce, organized in 1903, brought into one association the members of three former bodies, making a compact organization with Civic as well as commercial aims. The board has brought into active co-operation nearly all the leading business men of the city and many of the professional men. Their united efforts have brought many new industries to the city, have improved industrial conditions, and have exerted a beneficial influence upon the municipal administration. Other business organizations are the Board of Trade, devoted to the grain trade and kindred lines, the Employers' Association, which seeks to maintain satisfactory relations between employer and employed, the Builders' & Traders' Exchange, and the Credit Men's Association.

Administration. — Although the city received its first charter in 1806, and another in 181 5, the real power rested in the hands of the

governor and judges of the territory until 1824; the charters of 1824 and 1827 centred the government in a council and made the list of elective officers long; the charter of 1827 was revised in 1857 and again in 1859 and the present charter dates from 1883. Under this charter only three administrative officers are elected, — the mayor, the city clerk and the city treasurer, — elections being biennial. The administration of the city depart- ments is largely in the hands of commissions. There is one commissioner each, appointed by the mayor, for the parks and boulevards, police and public works departments. The four members of the health board are nominated by the governor and confirmed by the state senate. The school board is an independent body, consisting of one elected member from each ward holding office for four years, but the mayor has the veto power over its proceedings as well as those of the common council. In each case a two-thirds vote overrules his veto. The other principal officers and commissions, appointed by the mayor and confirmed by the council, are controller, corporation counsel, board of three assessors, fire commission (four members), public lighting commission (six members), water commission (five members), poor commission (four members), and inspectors of the house of correction (four in number) . The members of the public library commission, six in number, are elected by the board of education. Itemized estimates of expenses for the next fiscal year are furnished by the different departments to the controller in February. He transmits them to the common council with his recommendations. The council has four weeks in which to consider them. It may reduce or increase the amounts asked, and may add new items. The budget then goes to the board of

estimates, which has a month for its consideration. This body consists of two members elected from each ward and five elected at large. The mayor and heads of departments are advisory members, and may speak but not vote. The members of the board of estimates can hold no other office and they have no appointing power, the intention being to keep them as free as possible from all political motives and influences. They may reduce or cut out any estimates submitted, but cannot increase any or add new ones. No bonds can be issued without the assent of the board of estimates. The budget is apportioned among twelve committees which have almost invariably given close and conscientious examination to the actual needs of the departments. A reduction of $1,000,000 to $1, 500,000, without impairing the service, has been a not unusual result of their deliberations. Prudent management under this system has placed the city in the highest rank financially. Its debt limit is 2 % on the assessed valuation, and even that low maximum is not often reached. The debt in 1907 was only

about $5,500,000, a smaller per capita debt than that of any other city of over 100,000 inhabitants in the Country; the assessed valuation was $330,000,000; the city tax, $14.70 on the thousand dollars of ‘ assessed valuation. Both the council and the estimators are hampered in their work by legislative interference. Nearly all the large salaries and many of those of the second grade are made mandatory by the legislature, which has also determined many affairs of a purely administrative character.

■ Detroit has made three experiments with municipal ownership. On account of inadequate and unsatisfactory service by a private company, the city bought the water- works as long ago as 1836. The works have been twice moved and enlargements have been made in advance of the needs of the city. In 1907 there were six engines in the works with a pumping capacity of 152,000,000 gallons daily. The daily average of water used during the pre- cede year was 6ˆ357,000 gallons. The water is pumped from Lake’ St Clair and is of exceptional purity. The city began its own public lighting in April 1895, having a large plant on the river near the centre of the city. It lights the streets and public buildings, but makes no provision for commercial business. The lighting is excellent, and the cost is probably less than could be obtained from a private company. The street lighting is done partly from pole and arm lights, but largely from steel towers from 100 ft. to 180 ft. in height, with strong reflected lights at the top. The city also owns two portable asphalt plants, and thus makes a saving in the cost of street repairing and resurfacing. With a view of effecting the reduction of street car fares to three cents, the state legislature in 1899 passed an act for purchasing or leasing the street railways of the city, but the Supreme Court pronounced this act unconstitutional on the ground that, as the constitution prohibited the state from engaging in a work of internal improvement, the state could not empower a munici- pality to do so. Certain test votes indicated an almost even division on the question of municipal ownership of the railways.
History.— Detroit was founded in 1701 by Antoine Laumet de la Mothe Cadillac (c. 1661-1730), who had pointed out the importance of the place as a strategic point for determining the control of the fur trade and the possession of the North-west and had received assistance from the French government soon after Robert Livingston (1654-1725), the secretary of the Board of Indian Commissioners in New York, had urged the Eaglish government to establish a fort at the same place. Cadillac arrived on the 24th of July with about 100 followers. They at once built a palisade fort about 200 ft. square S. of what is now Jefferson Avenue and between Griswold and Shelby streets, and named it Fort Pontchartrain in honour of the French

colonial minister. Indians at once came to the place in large numbers, but they soon complained of the high price of French goods; there was serious contention between Cadillac and the French Canadian Fur Company, to which a monopoly of the trade had been granted, as well as bitter rivalry between him and the Jesuits. After the several parties had begun to complain to the home government the monopoly of the fur trade was transferred to Cadillac and he was exhorted to cease quarrelling with the

Jesuits. Although the inhabitants then increased to ,200 or more, dissatisfaction with the paternal rule of the founder increased until 17 10, when he was made governor of Louisiana. The year before, the soldiers had been withdrawn; by the second year after there was serious trouble with the Indians, and for several years following the population was greatly reduced and the post threatened with extinction. But in 1722, when the Mississippi country was opened, the population once more in- creased, and again in 1748, when the settlement of the Ohio Valley began, the governor-general of Canada offered special inducements to Frenchmen to settle at Detroit, with the result that the population was soon more than 1000 and the culti- vation of farms in the vicinity was begun. In 1760, however, the place was taken by the British under Colonel Robert Rogers and an English element was introduced into the population which up to this time had been almost exclusively French. Three years later, during the conspiracy of Pontiac, the fort first narrowly escaped capture and then suffered from a siege lasting from the 9th of May until the 12th of October. Under English rule it continued from this time on as a military post with its population usually reduced to less than 500. In 1778 a new fort was built and named Fort Lernault, and during the War of Independence the British sent forth from here several Indian expeditions to ravage the frontiers. With the ratification of the treaty which concluded that war the title to the post passed to the United States in 1783, but the post itself was not surrendered until the nth of January 1796, in accordance with Jay's Treaty of 1794. It was then named Fort Shelby; but in 1802 it was incorporated as a town and received its present name. In 1805 all except one or two buildings were destroyed by fire. General William Hull (1753-1825), a veteran of the War of American Independence, governor of Michigan territory in 1805-1812, as commander of the north-western army in 1812 occupied the city. Failing to hear immediately of the declaration of war between the United States and Great Britain, he was cut off from

his supplies shipped by Lake Erie. He made from Detroit on the 12th of July an awkwardandfutile advance into Canada, which, if more vigorous, might have resulted in the capture of Maiden and the establishment of American troops in Canada, and then retired to his fortifications. On the 16th of August 1812, without any resistance and without consulting his officers, he surrendered the city to General Brock, for reasons of humanity, and afterwards attempted to justify himself by criticism of the War Department in general and in particular of General Henry Dearborn's armistice with Prevost, which had not included in its terms Hull, whom Dearborn had been sent out to reinforce. l After Perry's victory on the 14th of September on Lake Erie, Detroit on the 29th of September was again occupied by the forces of the United States. Its growth was rather slow until 1830, but since then its progress has been unimpeded. Detroit was the capital of Michigan from 1805 to 1847.

Authorities. — Silas Farmer, The History of Detroit and Michigan (Detroit, 1884 and 1889), and " Detroit, the Queen City," in L. P. Powell's Historic Towns of the Western Slates (New York and London, 1901); D. F. Wilcox, "Municipal Government in Michigan and Ohio," in Columbia University Studies (New York, 1896); C. M. Burton, " Cadillac's Village ' or Detroit under Cadillac (Detroit, 1896) ; Francis Parkman, A Half Century of Conflict (Boston, 1897) ; and The Conspiracy of Pontiac (Boston, 1898); and the annual Reports of the Detroit Board of Commerce (1904 sqq.).

DETTINGEN, a village of Germany in the kingdom of Bavaria, on the Main, and on the Frankfort-on-Main-Aschaffenburg rail- way, 10 m. N.W. of Aschaffenburg. It is memorable as the scene of a decisive battle on the 27th of June 1743, when the English, Hanoverians and Austrians (the " Pragmatic army "), 42,000 men under the command of George II. of England, routed the numerically superior French forces under' the due de Noailles. It was in memory of tbis victory that Handel composed his Dettingen Te Deunt.

1 Hull was tried at Albany in 1 8 1 4 by court martial, General Dearborn presiding, was found guilty of treason, cowardice, neglect of duty and unofficerlike conduct, and was sentenced to be shot; the president remitted the sentence because of Hull's services in the Revolution.

DEUCALION, in Greek legend, son of Prometheus, king ol Phthia in Thessaly, husband of Pyrrha, and father of Hellen, the mythical ancestor of the Hellenic race. When Zeus had resolved to destroy ajl mankind by a flood, Deucalion constructed a boat or ark, in which,

after drifting nine days and nights, he landed on Mount Parnassus (according to others, Othrys, Aetna or Athos) with his wife. Having offered sacrifice and inquired how to renew the human race, they were ordered to cast behind them the ” bones of the great mother,” that is, the stones from the hill- side. The stones thrown by Deucalion became men, those thrown by Pyrrha, women.

See Apollodorus i. 7, 2; Ovid, Metam. i. 243-415; Apollonius Rhodius iii. 1085 ff. ; H. Usener, Die Sintflutsagen (1899).

DEUCE (a corruption of the Fr. deux, two), a term applied to the ” two “■ of any suit of cards, or of dice. It is also a term used in tennis when both sides have each scored three points in a game, or five games in a set; to win the game or set two points or games must then be won consecutively. The earliest instances in English of the use of the slang expression ” the deuce,” in exclamations and the like, date from the middle of the 17th century. The meaning was similar to that of ” plague ” or ” mischief ” in such phrases as ” plague on you,” ” mischief take you ” and the like. The use of the word as an euphemism for ” the devil ” is later. According to the New English Dictionary the most probable derivation is from a Low German das daus, i.e. the ” deuce ” in dice, the lowest and therefore the most unlucky throw. The personification, with a consequent change of gender, to der daus, came later. The word has also been identified with the name of a giant or goblin in Teutonic mythology.

DEUS, JOAO DE (1830-1896), the greatest Portuguese poet of his generation, was born at San Bartholomeu de Messines in the province of Algarve on the 8th of March 1830. Matriculating in the faculty of law at the university of Coimbra, he did not proceed to his degree but settled in the city, dedicating himself wholly to the composition of verses, which circulated among professors and undergraduates in manuscript copies. In the volume of his art, as in the conduct of life, he practised a rigorous self-control. He printed nothing previous to 1855, and the first of his poems to appear in a separate form was La Lata, in i860. In 1862 he left Coimbra for Beja, where he was appointed editor of Bejense, the chief newspaper in the province of Alemtejo, and four years later he edited the Folha do Sul. As the pungent satirical verses entitled Eleicfies prove, he was not an ardent politician, and, though he was returned as Liberal deputy for the constituency of Silves in 1869, he acted independently of all political parties and promptly resigned his mandate. The renunciation implied in the act, which cut him off from all advancement, is in accord with nearly all that is known of his lofty character. In the year of his election as deputy, his friend Jose Antonio Garcia Blanco collected

from local journals the series of poems, Flores do campo, which is supplemented by the Ramo de flores (1869). This is Joao de Deus's masterpiece. Pires de Marmalada (1869) is an improvisation of no great merit. The four theatrical pieces — Amemos nosso proximo, Ser apresentado, Ensaio de Casamento, and A Viuva inconsolavel — are prose translations from Mery, cleverly done, but not worth the doing. Horacio e Lydia (1872), a translation from Ronsard, is a good example of artifice in manipulating that dangerously monotonous measure, the Portuguese couplet. As an indication of a strong spiritual reaction three prose fragments (1873) — Anna, Mae de Maria, A Virgem Maria and A Mulher do Levita de Ephrain — translated from Darboy's Femmes de la Bible, are full of signific- ance. The Folhas soltas (1876) is a collection of verse in the manner of Flores do campo, brilliantly effective and exquisitely refined. Within the next few years the writer turned his atten- tion to educational problems, and in his Cartilha maternal (1876) first expressed the conclusions to which his study of Pestalozzj and Frobel had led him. This patriotic, pedagogical apostolate was a misfortune for Portuguese literature; his educational mission absorbed Joao de Deus completely, and is responsible for numerous controversial letters, for a translation of Theodore- Henri Barrau's treatise, Des devoirs des enfants envers lews

parents, for a prosodic dictionary and for many other publications of no literary value. A copy of verses in Antonio Vieira's Grinalda de Maria (1877), the Loas a Virgem (1878) and the Proverbios de Salomao are evidence of a complete return to orthodoxy during the poet's last years. By a lamentable error of judgment some worthless pornographic verses entitled Cryptinas have been inserted in the completest edition of Joao de Deus's poems — Campo de Flores (Lisbon, 1893). He died at Lisbon on the 1 1 th of January 1 896, was accorded a public funeral and was buried in the National Pantheon, the Jeronymite church at Belem, where repose the remains of Camoens, Herculano and Garrett. His scattered minor prose writings and correspondence have been posthumously published by Dr Theophilo Braga (Lisbon, 1898).

Next to Camoens and perhaps Garrett, no Portuguese poet has been more widely read, more profoundly admired than Joao de Deus; yet no poet in any country has been more indifferent to public opinion and more deliberately careless of personal fame. He is not responsible for any single edition of his poems, which were put together by pious

but ill-informed enthusiasts, who ascribed to him verses that he had not written; he kept no copies of his compositions, seldom troubled to write them himself, and was content for the most part to dictate them to others. He has no great intellectual force, no philosophic doctrine, is limited in theme as in outlook, is curiously uncertain in his touch, often marring a fine poem with a slovenly rhyme or with a misplaced accent; and, on the only occasion when he was induced to revise a set of proofs, his alterations were nearly all for the worse. And yet, though he never appealed to the patriotic spirit, though he wrote nothing at all comparable in force or majesty to the restrained splendour of Os Lusiadas, the popular instinct which links his name with that of his great predecessor is eminently just. For Camoens was his model; not the Camoens of the epic, but the Camoens of the lyrics and the sonnets, where the passion of tenderness finds its supreme utterance. Braga has noted five stages of development in Joao d*e Deus's artistic life — the imita- tive, the idyllic, the lyric, the pessimistic and the devout phases. Under each of these divisions is included much that is of extreme interest, especially to contemporaries who have passed through the same succession of emotional experience, and it is highly probable that Caturras and Gaspar, pieces as witty as anything in Bocage but free from Bocage's coarse impiety, will always interest literary students. But it is as the singeroflove that Joao de Deus will delight posterity as he delighted his own generation. The elegiac music of Rachel and of M&ina, the melancholy of Adeus and of Remoinho, the tenderr8» and sincerity of Meu casto lirio, of Lagrima celeste, of Descaloa} and a score more songs are distinguished by the large, vital simplicity which withstands time. It is precisely in the quality of unstudied simplicity that Joao de Deus is incomparably strong. The temptations to a dis- play of virtuosity are almost irresistible for a Portuguese poet; he has the tradition of virtuosity in his blood, he has before him the example of all contemporaries, and he has at hand an in- strument of wonderful sonority and compass. Yet not once is Joao de Deus clamorous or rhetorical, not once does he indulge in idle ornament. His prevailing note is that of exquisite sweet- ness and of reverent purity; yet with all his caressing softness he is never sentimental, and, though he has not the strength for a long fight, emotion has seldom been set to more delicate music. Had he included among his other gifts the gift of selection, had he continued the poetic discipline of his youth instead of dedicating his powers to a task which, well as he performed it, might have been done no less well by a much lesser man, there is scarcely any height to which he might not have risen.

See also Maxime Formont, Le Mouvement poetique conlemporain en

Portugal (Lyon, 1892). (J. F.-K.)

DEUTERONOMY, the name of one of the books of the Old Testament. This book was long the storm-centre of Pentateuchal criticism, orthodox scholars boldly asserting that any who questioned its Mosaic authorship reduced it to the level of a pious fraud. But Biblical facts have at last triumphed over tradition, and the non-Mosaic authorship of Deuteronomy is now

a commonplace of criticism. It is still instructive, however, to note the successive phases through which scholarly opinion regarding the composition and date of his book has passed.

In the 17 th century the characteristics which so clearly mark off Deuteronomy from the other four books of the Pentateuch were frankly recognized, but the most advanced critics of that age were inclined to pronounce it the earliest and most authentic of the five. In the beginning of the 19th century de Wette startled the religious world by declaring that Deuteronomy, so far from being Mosaic, was not known till the time of Josiah. This theory he founded on 2 Kings xxii.; and ever since, this chapter has been one of the recognized foci of Biblical criticism. The only other single chapter of the Bible which is responsible for having brought about a somewhat similar revolution in critical opinion is Ezek. xliv. From this chapter, some seventy years after de Wette's discovery, Wellhausen with equal acumen inferred that Leviticus was not known to Ezekiel, the priest, and therefore could not have been in existence in his day; for had Leviticus been the recognized Law-book of his nation Ezekiel could not have represented as a degradation the very position which that Law-book described as a special honour conferred on the Levites by Yahweh himself. Hence Leviticus, so far from belonging to an earlier stratum of the Pentateuch than Deuteronomy, as de Wette thought, must belong to a much later stratum, and be at least exilic, if not post-exilic.

The title " Deuteronomy " is due to a mistranslation by the Septuagint of the clause in chap. xvii. 18, rendered " and he shall write out for himself this Deuteronomy." The Hebrew really means " and he [the king] shall write out for himself a copy of this law," where there is not the slightest suggestion that the author intended to describe " this law " delivered on the plains of Moab as a second code in contradistinction to the first code given on Sinai thirty-eight years earlier. Moreover the phrase " this law " is so ambiguous as to raise a much greater diffi- culty than that caused by the Greek mistranslation of the Hebrew word for " copy." How much does " this law " include? It was long supposed to mean the whole of our present Deuteronomy;

indeed, it is on that supposition that the traditional view of the Mosaic authorship is based. But the context alone can determine the question; and that is often so ambiguous that a sure infer- ence is impossible. We may safely assert, however, that nowhere need ” this law ” mean the whole book. In fact, it invariably means very much less, and sometimes, as in xxvii. 3, 8, so little that it could all be engraved in large letters on a few plastered stones set up beside an altar.

Deuteronomy is not the work of any single writer but the result of a long process of development. The fact that it is legislative as well as hortatory is enough to prove this, for most of the laws it contains are found elsewhere in the Pentateuch, sometimes in less developed, sometimes in more developed forms, a fact which is conclusive proof of prolonged historical develop- ment. According to the all-pervading law of evolution, the less complex form must have preceded the more complex. Still, the book does bear the stamp of one master-mind. Its style is as easily recognized as that of Deutero-Isaiah, being as remarkable for its copious diction as. for its depths of moral and religious feeling.

The original Deuteronomy, D, read to King Josiah, cannot have been so large as our present book, for not only could it be read at a single sitting, but it could be easily read twice in one day. On the day it was found, Shaphan first read it himself, and then went to the king and read it aloud to him. But perhaps the most conclusive proof of its brevity is that it was read publicly to the assembled people immediately before they, as well as their king, pledged themselves to obey it; and not a word is said as to the task of reading it aloud, so as to be heard by such a great multitude, being long or difficult.

The legislative part of D consists of fifteen chapters (xii.-xxvi.), which, however, contain many later insertions. But the impression made upon Josiah by what he heard was far too deep to have been produced by the legislative part alone. The king must have listened. to the curses as well as the blessings in chap, xxviii.; and

no doubt also to the exhortations in chaps., v.xi. Hence we may conclude that the original book consisted of a central mass of religious, civil and social laws, preceded by a hortatory intro duction and followed by an effective peroration. The book read to Josiah must therefore have comprised most of what is found in Deut. v.-xxvi.,

xxvii. 9, 10 and xxviii. But something like two centuries elapsed before the book reached its present form, for in the closing chapter, as well as elsewhere, e.g. i. 41-43 (where the joining is not so deftly done as usual) and xxxii. 48-52, there are undoubted traces of the Priestly Code, P, which is generally acknowledged to be post-exilic,

The following is an analysis of the main divisions of the book as we now have it. There are two introductions, the first i.-iv. 44, . more historical than hortatory; the. second v.xi., more hortatory than historical. These may at first have been prefixed to separate editions of the legislative portion, but were eventu ally combined. Then, before D was united to P, five appendices of very various dates and embracing poetry as well as prose, were added so as to give a fuller account of the last days of Moses and thus lead up to the narrative of his death with which the book closes. (1) Chap, xocvii., where the elders of Israel are introduced for the first time as acting along with Moses (xxvii. 1) and then the priests, the Levites (xxvii. 9). Some of the curses refer to laws given not in D but in Lev. xxx., so that the date of this chapter must be later than Leviticus or at any rate than the laws codified in the Law of Holiness (Lev. xvii-xxvi.)* (2) The second appendix, chaps, xxix.-xxxi. 29, xxxii. 45-47, gives us the farewell address of Moses and is certainly : later than D. Moses is represented as speaking not with any hope of preventing Israel's apostasy but because he knows that the people will eventually prove apostate (xxxi. 29), a point of view very different from D's. (3) The Song of Moses, chap, xxxii. That this didactic poem must have been written late in the nation's history, and not at its very beginning, is evident from v. 7: " Remember the days of old, Consider the years of many genera- tions." Such words cannot be interpreted so as to fit the lips of Moses. It must have been composed in a time of natural gloom and depression, after Yahweh's anger had been provoked by "a very froward generation," certainly not before the Assyrian Empire had loomed up against the political horizon, aggressive and menacing. Some critics bring the date down even to the time of Jeremiah and Ezekiel. (4) The Blessing of Moses, chap, xxxiii. The first line proves that this poem is not by D, who speaks invariably of Horeb, never of Sinai. The situation depicted is in striking contrast with that of the Song. Everything is bright because of promises fulfilled, and the future bids fair to be brighter still. Bruston maintains with reason that the Blessing, strictly so called, consists only of vv. 6-25, and has been inserted in a Psalm celebrating the goodness of Jehovah to his people on their entrance into Canaan (vv. 1-5, 26ˆ29). The special prominence given to Joseph (Ephraim and Manasseh) in vv. 13-17 has led many critics to assign this poem to the time of the greatest

warrior-king of Northern Israel, Jeroboam II. (5) The account of Moses' death, chap, xxxiv. This appendix, containing, as it does, manifest traces of P, proves that even Deuteronomy was not put into its present form until after the exile.

From the many coincidences between D and the Book of the Covenant (Ex. xx.-xxiii.) it is clear that D was acquainted with E, the prophetic narrative of the Northern kingdom; but it is not quite clear whether D knew E as an independent work, or after its combination with J, the somewhat earlier prophetic narrative of the Southern kingdom, the combined form of which is now indicated by the symbol JE. Kittel certainly puts it too strongly when he asserts that D quotes always from E and never from J, for some of the passages alluded to in D may just as readily be ascribed to J as to E, cf . Deut. i. 7 and Gen. xv. 18; Deut. x. 14 and Ex. xxxiv. 1-4. Consequently D must have been written certainly after E and possibly after E was combined with J. ■

In Amos, Hosea and Isaiah there are no traces of D's ideas, whereas in Jeremiah and Ezekiel their influence is everywhere manifest. Hence this school of thought arose between the age of

Isaiah and that of Jeremiah; but how long D itself may have been in existence before it was read in 622 to Josiah cannot be determined with certainty. Many argue that D was written immediately before it was found and that, in fact, it was put into the temple for the purpose of being " found." This theory gives Some plausibility to the charge that the book is a pious fraud. But the narrative in 2 Kings xxii. warrants no such inference. The more natural explanation is that it was written not in the early years of Josiah's reign, and with the cognizance of the temple priests then in office, but some time during the long reign of Manasseh, probably when his policy was most reactionary and when he favoured the worship of the " host of heaven " and set up altars to strange gods in Jerusalem itself. This explains why the author did not publish his work immediately, but placed it where he hoped it would be safely preserved till opportunity should arise for its publication. One need not suppose that he actually foresaw how favourable that Opportunity would prove, and that, as soon as discovered, his work would be promulgated as law by the king and willingly accepted by the people. The author believed that everything he wrote was in full accordance with the mind of Moses, and would contribute to the national weal of Yahweh's covenant people, and therefore he did not scruple to represent Moses as the speaker. It is not to be expected, that modern scholars should be able to fix the exact year or even decade in which such a book was written. It is enough to determine with something like probability the century

or half -century which best fits its historical data; and these appear to point to the reign of Manasseh.

Between D and P there are no verbal parallels; but in the historical r6sumes JE is followed closely, whole clauses and even verses being copied practically verbatim. As Dr Driver points out in his careful analysis, there are only three facts in D which are not also found in JE, viz. the number of the spies, the number of souls that went down into Egypt with Jacob, and the ark being made of acacia wood. But even these may have been in J or E originally, and left out when JE was combined with P. Steuernagel divides the legal as well as the hortatory parts of D between two authors, one of whom uses the 2nd person plural when addressing Israel, and the other the 2nd person singular; but as a similar alternation is constantly found in writings universally acknowledged to be by the same author, this clue seems anything but trustworthy, depending as it does on the presence or absence of a single Hebrew letter, and resulting, as it frequently does, in the division of verses which otherwise seem to be from the same penjfcf. xx. 2). The inference as to diversity of authorship is much wtk conclusive when difference of stand- point can be proved, cffv. 3, xi. 2 ff. with viii. 2. The first two passages represent Moses as addressing the generation that was alive at Horeb, whereas the last represents him as speaking to those who were about to pass over Jordan a full generation later; and it may well be that the one author may, in the historical and hortatory parts, have preferred the 2nd plural and the other the 2nd singular; without the further inference being justified that every law in which the 2nd singular is used must be assigned to the latter, and every law in which the 2nd plural occurs must be due to the former.

The law of the Single Sanctuary, one of D's outstanding characteristics, is, for him, an innovation, but an innovation towards which events had long been tending. 2 Kings xxiii. 9 shows that even the zeal of Josiah could not carry out the instructions laid down in D xviii. 6-8. Josiah's acceptance of D made it the first canonical book of scripture. Thus the religion of Judah betame henceforward a religion which enabled its adherents to learn from a book exactly what was required of them. D requires the destruction not only of the high places and the idols, but of the Asheras (wooden posts) and the Mazzebas (stone pillars) often set up beside the altar of Jehovah (xvi. 21). These reforms made too heavy demands upon the people, as was proved by the reaction which set in at Josiah's death. Indeed the country people would look on the destruction of the high places with their Asheras and Mazzebas as sacrilege and would consider Josiah's death in battle as a divine punishment for his

sacrilegious deeds. On the other hand, the destruction of Jerusalem and the exile of the people would appear to those who had obeyed D's instructions as a well-merited punishment for national apostasy.

Moreover, D regarded religion as of the utmost moment to each individual Israelite; and it is certainly not by accident that the declaration of the individual's duty towards God immediately follows the emphatic intimation to Israel of Yahweh's unity. " Hear, O Israel, Yahweh is our God, Yahweh is one: and thou shalt love Yahweh thy God with all thine heart and with all thy soul and with all thy strength " (vi. 4, 5).

In estimating the religious value of Deuteronomy it should never be forgotten that upon this passage the greatest eulogy ever pronounced on any scripture was pronounced by Christ himself, when he said " on these words hang all the law and the prophets," and it is also well to remember that when tempted in the wilderness he repelled each suggestion of the Tempter by a quotation from Deuteronomy.

Nevertheless even such a writer as D could not escape the influence of the age and atmosphere in which he lived; and despite the spirit of love which breathes so strongly throughout the book, especially for the poor, the widow and the fatherless, the stranger and the homeless Levite (xxiv. 10-22), and the humanity shown towards both beasts and birds (xxii. 1,4, 6 f., xxv. 4), there are elements in D which go far to explain the intense exclusiveness and the religious intolerance characteristic of Judaism. Should a man's son or friend dear to him as his own soul seek to tempt him from the faith of his fathers, D's pitiless order to that man is " Thou shalt surely kill him; thine hand shall be first upon him to put him to death." From this single instance we see not only how far mankind has travelled along the path of religious toleration since Deuteronomy was written, but also how very far the criticism implied in Christ's method of dealing with what " was said to them of old time " may be legitimately carried. (J- A. p *)

DEUTSCH, IMMANUEL OSCAR MENAHEM (1820-1873), German oriental scholar, was born on the 28th of October 1829, at Neisse in Prussian Silesia, of Jewish extraction. On reaching his sixteenth year he began his studies at the university of Berlin, paying special attention to theology and the Talmud. He also mastered the English language and studied English literature. In 1855 Deutsch was

appointed assistant in the library of the British Museum. He worked intensely on the Talmud and contributed no less than 190 papers to Chambers's Encyclopaedia, in addition to essays in Kitto's and Smith's Biblical Dictionaries, and articles in periodicals. In October 1867 his article on" The Talmud," published in the Quarterly Review, made him known. It was translated into French, German, Russian, Swedish, Dutch and Danish. He died at Alexandria on the 12th of May 1873.

His Literary Remains, edited by Lady Strangford, were published in 1874, consisting of nineteen papers on such subjects as "The Talmud," " Islam,"' " Semitic Culture," " Egypt, Ancient and Modern," " Semitic Languages," " The Targums," " The Samaritan Pentateuch," and " Arabic Poetry."

DEUTSCHKRONE, a town of Germany, kingdom of Prussia, between the two lakes of Arens and Radau, 15 m. N.W. of Schneidemuhl, a railway junction 60 m. north of Posen. Pop. (1905) 7282. It is the seat of the public offices for the district, possesses an Evangelical and a Roman Catholic church, a synagogue, and a gymnasium established in the old Jesuit college, and has manufactures of machinery, woollens, tiles, brandy and been

DEUTZ (anc. Divitio), formerly an independent town of Germany, in the Prussian Rhine Province, on the right bank of the Rhine, opposite to Cologne, with which it has been incorpor- ated since 1888. It contains the church of St Heribert, built in the 17th century, cavalry barracks, artillery magazines, and gas, porcelain, machine and carriage factories. It has a handsome railway station on the banks of the Rhine, negotiating the local traffic with Elberfeld and KSnigswinter. The fortifications of the town form part of the defences of Cologne. To the east is the manufacturing suburb of Kalk.

The old castle in Deutz was in T002 made a Benedictine monastery by Heribert, archbishop of C logne. Permission tc fortify the town was in 1 230 granted to the citizens by the arch- bishop of Cologne, between whom and the counts of Berg it was in 1240 divided. It was burnt in 1376, 1445 and 1583; and in 1678, after the peace of Nijmwegen, the fortifications were dismantled; rebuilt in 1816, they were again razed in 1888.

DEUX-SEVRES, an inland department of western France, formed in 1 790 mainly of the three districts of Poitou, Thouarsais, Gatine and Niortais, added to a small portion of Saintonge and a still smaller portion of Aunis. Area, 2337 sq. m. Pop. (1906) 339,466. It is bounded N. by Maine-et-Loire, E. by Vienne, S.E. by Charente, S. by

Charente-Inferieure and W. by Vendee. The department takes its name from two rivers — the Sevre of Niort which traverses the southern portion, and the Sevre of Nantes (an affluent of the Loire) which drains the north-west. There are three regions — the Gatine, occupying the north and centre of the department, the Plaine in the south and the Marais, — distinguished by their geological character and their general physical appearance. The Gatine, formed of primitive rocks (granite and schists), is the continuation of the " Socage " of Vendee and Maine-et-Loire. Its surface is irregular and covered with hedges and clumps of wood or forests. The systematic application of lime has much improved the soil, which is naturally poor. The Plaine, resting on oolite limestone, is treeless but fertile. The Marais, a low-lying district in the extreme south- west, consists of alluvial clays which also are extremely pro- ductive when properly drained. The highest points, several of which exceed 700 ft., are found in a line of hills which begins in the centre of the department, to the south of Parthenay, and stretches north-west into the neighbouring department of Vendee. It divides the region drained by the Sevre Nantaise and the Thouet (both affluents of the Loire) in the north from the basins of the Sevre Niortaise and the Charente in the south. The climate is mild, the annual temperature at Niort being 54° Fahr., and the rainfall nearly 25 in. The winters are colder in the Gatine, the summers warmer in the Plaine.

Three-quarters of the entire area of Deux-Sevres, which is primarily an agricultural department, consists of arable land. Wheat and oats are the main cereals. Potatoes and mangold- wurzels are the chief root-crops. Niort is a centre for the growing of vegetables (onions, asparagus, artichokes, &c.) and of angelica. Considerable quantities of beetroot are raised to supply the distilleries of Melle. Colza, hemp, rape and flax are also culti- vated. Vineyards are numerous in the neighbourhood of Bressuire in the north, and of Niort and Melle in the south. The department is well known for the Parthenay breed of cattle and the Poitou breed of horses; and the mules reared in the southern arrondissements are much sought after both in France and in Spain. The system of co-operative dairying is practised in some localities. The apple-trees of the Gatine and the walnut-trees of the Plaine bring a good return. Coal is mined, and the depart- ment produces building-stone and lime. A leading industry is themanufactureof textiles (serges, druggets, linen, handkerchiefs, flannels, swan-skins and knitted goods). Tanning and leather- dressing are carried on at Niort and other places, and gloves are made at Niort. Wool and cotton spinning, hat and shoe making, distilling, brewing, flour-milling and oil-refining are also main industries. The department exports cattle

and sheep to Paris and Poitiers; also cereals, oils, wines, vegetables and its industrial products.

The Sevre Niortaise and its tributary the Mignon furnish 19 m. of navigable waterway. The department is served by the Ouest- Etat railway. It contains a large proportion of Protestants, especially in the south-east. The four arrondissements are Niort, Bressuire, Melle and Parthenay; the cantons number 31, and the communes 356. Deux-Sevres is part of the region of the IX. army corps, and of the diocese and the academie (educational circumscription) of Poitiers, where also is its court of appeal.

Niort (the capital), Bressuire, Melle, Parthenay, St Maixent, Thouars and Oiron are the principal places. in, the department. Several other towns contain features of interest. Among these

are Airvault, where there is a church of the 12th and 14th centuries which once belonged to the abbey of St Pierre, and an ancient bridge built by the monks; Celles-sur-Belle, where there is an old church rebuilt by Louis XI., and again in the 17th century; and St Jouin-de-Marnes, with a fine Romanesque church with Gothic restoration, which belonged to one of the most ancient abbeys of Gaul..

DEVA (Sanskrit ” heavenly “), in Hindu and Buddhist mythology, spirits of the light and air, and minor deities generally beneficent. In Persian mythology, however, the word is used for evil spirits or demons. According to Zoroaster the devas were created by Ahriman.

DEVA (mod. Chester), a Roman legionary fortress in Britain on the Dee. It was occupied by Roman troops about A.D. 48 and held probably till the end of the Roman dominion. Its garrison was the Legio XX. Valeria Victrix, with which another legion (II. Adjutrix) was associated for a few years, about a.d. 75-85. It never developed, like many Roman legionary fortresses, into a town, but remained military throughout. Parts of its north and east walls (from Morgan’s Mount to Peppergate) and numerous inscriptions remain to indicate its character and area.

See F. J. Haverfield, Catalogue of the Grosvenor Museum, Chester (Chester, 1900), Introduction.

DEVADATTA, the son of Suklodana, who was younger brother to the

father of the Buddha (Mahdvastu, iii. 76). Both he and his brother Ananda, who were considerably younger than the Buddha, joined the brotherhood in the twentieth year of the Buddha's ministry. Four other cousins of theirs, chiefs of the Sakiya clan, and a barber named Upali, were admitted to the order at the same time; and at their own request the barber was admitted first, so that as their senior in the order he should take precedence of them (Vinaya Texts, iii. 228). All the others continued loyal disciples, but Devadatta, fifteen years afterwards, having gained over the crown prince of Magadha, Ajatasattu, to his side, made a formal proposition, at the meeting of the order, that the Buddha should retire, and hand over the leadership to him, Devadatta (Vinaya Texts, iii. 238; Jataka, i. 142). This proposal was rejected, and Devadatta is said in the tradition to have successfully instigated the prince to the execution of his aged father and to have made three abortive attempts to bring about the death of the Buddha {Vinaya Texts, iii. 241-250; Jaiaka, vi. 131), shortly afterwards, relying upon the feeling of the people in favour of asceticism, he brought forward f6ur propositions for ascetic rules to be imposed on the order. These being refused, he appealed to the people, started an order of his own, and gained over 500 of the Buddha's community to join in the secession. We hear nothing further about the success or otherwise of the new order, but it may possibly be referred to under the name of the Gotamakas, in the Anguttara (see Dialogues of the Buddha i. 222), for Devadatta's family name was Gotama. But his community was certainly still in existence in the 4th century a.d., for it is especially mentioned by Fa Hien, the Chinese pilgrim (Legge's translation, p. 62). And it possibly lasted till the 7th century, for Hsiian Tsang mentions that in a monastery in Bengal the monks then followed a certain regulation of Devadatta's (T. Watters, On Yuan Chwang, ii, 191). There is no mention in the canon as to how or when Devadatta died; but the commentary on the Jataka, written in the 5th century a.d., has preserved a tradition that he was swallowed up by the earth near Savatthi, when on his way to ask pardon of the Buddha (Jataka, iv. 158). The spot where this occurred was shown to both the pilgrims just mentioned (Fa Hien, loc. cit. p. 60; and T. Watters, On Yuan Chwang, i. 390). It is a striking example of the way in which such legends grow, that it is only the latest of these authorities, Hsiian Tsang, who says that, though ostensibly approaching the Buddha with a view to reconciliation, Devadatta had concealed poison in his nail with the object of murdering the Buddha.

Authorities. — Vinaya Texts, translated by Rhys Davids and H. Oldenberg (3 vols., Oxford, 1881-1885); The Jataka, edited by V. Fausboll (7 vols., London, 1877-1897); T. Watters, On Yuan Chwang

(ed. Rhys Davids and Bushell, 2 vols., London, 1904-1905) ;

Fa Hian, translated by J. Legge (Oxford, 1886) ; Mahdvastu (ed. Tenant, 3 vols., Paris, 1882-1897). (T. W. R. D.)

DEVAPRAYAG (Deoprayag), a village in Tehri State of the United Provinces, India. It is situated at the spot where the rivers Alaknanda and Bhagirathi unite and form the Ganges, and as one of the five sacred confluences in the hills is a great place of pilgrimage for devout Hindus. Devaprayag stands at an elevation of 2265 ft. on the side of a hill which rises above it 800 ft. On a terrace in the upper part of the village is the temple of Raghunath, built of huge uncemented stones, pyramidical in form and capped by a white cupola.

DEVENS, CHARLES (1820-1891), American lawyer and jurist, was born in Charlestown, Massachusetts, on the 4th of April 1820. He graduated at Harvard College in 1838, and at the Harvard law school in 1840, and was admitted to the bar in Franklin county, Mass., where he practised from 1841 to 1849. In the year 1848 he was a Whig member of the state senate, and from 1849 t° 1853 was United States marshal for Massachusetts, in which capacity he was called upon in 1851 to remand the fugitive slave, Thomas Sims, to slavery. This he felt constrained to do, much against his personal desire; and subsequently he attempted in vain to purchase Sims's freedom, and many years later appointed him to a position in the department of justice at Washington. Devens practised law at Worcester from 1853 until 1 86 1, and throughout the Civil War served in the Federal army, becoming colonel of volunteers in July 1861 and brigadier- general of volunteers in April 1862. At the battle of Ball's Bluff (1861) he was severely wounded; he was again wounded at Fair Oaks (1862) and at Chancellorsville (1863), where he com- manded a division. He later distinguished himself at Cold Harbor, and commanded a division in Grant's final campaign in Virginia (1864-65), his troops being the first to occupy Richmond after its fall. Breveted major-general in 1865, he remained in the army for a year as commander of the military district of Charleston, South Carolina. He was a judge of the Massachusetts superior court from 1867 to 1873, and was an associate justice of the supreme court of the state from 1873 to 1877, an< i again from 1881 to 1891. From 1877 to 1881 he was attorney-general of the United States in the cabinet of President Hayes. He died at Boston, Mass., on the 7th of January 1891.

See his Orations and Addresses, with a memoir by John Codman Ropes (Boston, 1891).

DEVENTER, a town in the province of Overysel, Holland, on the right bank of the Ysel, at the confluence of the Schipbeek, and a junction station 10 m. N. of Zutphen by rail. It is also connected by steam tramway S.E. with Brokulo. Pop. (1900) 26,212. Deventer is a neat and prosperous town situated in the midst of prettily wooded environs, and containing many curious old buildings. There are three churches of special interest: the Groote Kerk (St Lebuinus), which dates from 1334, and occupies the site of an older structure of which the nth-century crypt remains; the Roman Catholic Broederkerk, or Brothers' Church, containing among its relics three ancient gospels said to have been written by St Lebuinus (Lebwin), the English apostle of the Frisians and Westphalians (d. c. 773); and the Bergkerk, dedicated in 1206, which has two late Romanesque towers. The town hall (1693) contains a remarkable painting of the town council by Terburg. In the fine square called the Brink is the old weigh-house, now a school (gymnasium), built in 1 528, with a large external staircase (1644). The gymnasium is descended from the Latin school of which the celebrated Alexander Hegius was master in the third quarter of the 15th century, when the young Erasmus was sent to it, and at which Adrian Floreizoon, after- wards Pope Adrian VI., is said to have been a pupil about the same time. Another famous educational institution was the " Athenaeum " or high school, founded in 1630, at which Henri Renery (d. 1639) taught philosophy, while Johann Friedrich Gronov (Gronovius) (1611-1671) taught rhetoric and history in the middle of the same century. The " Athenaeum " disap- pered in 1876. In modern. times Deventer possessed a famous teacher in Dr Burgersdyk (d. 1900), the Dutch translator of Shakespeare. The town library, also called the library of the

Athenaeum, includes many MSS. and incunabula, and a 13th- century copy of Reynard the Fox. The archives of the town are of considerable value. Besides a considerable agricultural trade, Deventer has important iron foundries and carpet factories (the royal manufactory of Smyrna carpets being especially famous) ; while cotton-printing, rope-making and the weaving of woollens and silks are also carried on. A public official is appointed to supervise the proper making of a form of gingerbread known as " Deventer Koek," which has a reputation throughout Holland. In the church of Bathmen, a village 5 m. E. of Deventer, some 14th-century frescoes were discovered in 1870.

In the 14th century Deventer was the centre of the famous religious and educational movement associated with the name of Gerhard Groot (q.v.), who was a native of the town (see Brothers or Common Life).

DE VERE, AUBREY THOMAS (1814-1902), Irish poet and critic, was born at Curragh Chase, Co. Limerick, on the 10th of January 18 14, being the third son of Sir Aubrey de Vere Hunt (1788-1846). In 1832 his father dropped the final name by royal licence. Sir Aubrey was himself a poet. Wordsworth called his sonnets the ” most perfect of the age.” These and his drama, Mary Tudor, were published by his son in i87sand 1884. Aubrey de Vere was educated at Trinity College, Dublin, and in his twenty-eighth year published The Waldenses, which he followed up in the next year by The Search after Proserpine. Thence- forward he was continually engaged, till his death on the 20th of January 1902, in the production of poetry and criticism. His best-known works are: in verse, The Sisters (1861); The Infant Bridal (1864); Irish Odes (i860); Legends of St Patrick (1872); and Legends of the Saxon Saints (1879); and in prose, Essays chiefly on Poetry (1887); and Essays chiefly Literary and Ethical (1889). He also wrote a picturesque volume of travel-sketches, and two dramas in verse, Alexander the Great (1874); and St Thomas of Canterbury (1876); both of which, though they contain fine passages, suffer from diffuseness and a lack of dramatic spirit. The characteristics of Aubrey de Vere’s poetry are ” high seriousness ” and a fine religious enthusiasm. His research in questions of faith led him to the Roman Church; and in many of his poems, notably in the volume of sonnets called St Peter’s Chains (1888), he made rich additions to devotional verse. He was a disciple of Wordsworth, whose calm meditative serenity he often echoed with great felicity; and his affection for Greek poetry, truly felt and understood, gave dignity and weight to his own versions of mythological idylls. But perhaps he will be chiefly remembered for the impulse which he gave to the study of Celtic legend and literature. In this direction he has had many followers, who have sometimes assumed the appearance of pioneers; but after Matthew Arnold’s fine lecture on ” Celtic Literature,” nothing perhaps did more to help the Celtic revival than Aubrey de Vere’s tender insight into the Irish character, and his stirring reproductions of the early Irish epic poetry.

A volume of Selections from his poems was edited in 1894 (New York and London) by G. E. Woodberry.

DEVICE, a scheme, plan, simple mechanical contrivance; also a pattern or design, particularly an heraldic design or emblem, often combined with a motto or legend. ” Device ” and its doublet ” devise ”

come from the two Old French forms devis and devise of the Latin divisa, things divided, from dividere, to separate, used in the sense of to arrange, set out, apportion. ” Devise,” as a substantive, is now only used as a legal term for a disposition of property by will, by a modern convention restricted to a disposition of real property, the term ” bequest ” being used of personalty (see Will). This use is directly due to the Medieval Latin meaning of dividere = testamento disponere. In its verbal form, ” devise ” is used not only in the legal sense, but also in the sense of to plan, arrange, scheme.

DEVIL (Gr. &d|SoXos, ” slanderer,” from 8i.al3a.WeLv, to slander), the generic name for a spirit of evil, especially the supreme spirit of evil, the foe of God and man. The word is used for minor evil spirits in much the same sense as ” demon.” From the various characteristics associated with this idea, the term has come to be applied by analogy in many different senses. From

the idea of evil as degraded, contemptible and doomed to failure, the term is applied to persons in evil plight, or of slight considera- tion. In English legal phraseology ” devil ” and ” devilling ” are used of barristers who act as substitutes for others. Any remuneration which the legal ” devil ” may receive is purely a matter of private arrangement between them. In the chancery division such remuneration is generally in the proportion of one half of the fee which the client pays; ” in the king’s bench division remuneration for ‘ devilling ‘ of briefs or assisting in drafting and opinions is not common ” (see Annual Practice, 1907, p. 717). In a similar sense an author may have his materials collected and arranged by a literary hack or ” devil.” The term ” printer’s devil ” for the errand boy in a printing office probably combines this idea with that of his being black with ink. The common notions of the devil as black, ill-favoured, malicious, destructive and the like, have occasioned the application of the term to certain animals (the Tasmanian devil, the devil-fish, the coot), to mechanical contrivances (for tearing up cloth or separat- ing wool), to pungent, highly seasoned dishes, broiled or fried. In this article we are concerned with the primary sense of the word, as used in mythology and religion.

The primitive philosophy of animism involves the ascription of all phenomena to personal agencies. As phenomena are good or evil, produce pleasure or pain, cause weal or woe, a distinction in the character of these agencies is gradually recognized; the agents of good become gods, those of evil, demons. A tendency towards the simplification and organization of the evil as of the good forces, leads towards belief in outstanding leaders among the forces of evil. When

the divine is most completely conceived as unity, the demonic is also so conceived; and over against God stands Satan, or the devil.

Although it is in connexion with Hebrew and Christian mono- theism that this belief in the devil has been most fully developed, yet there are approaches to the doctrine in other religions. In Babylonian mythology " the old serpent goddess ' the lady Nina ' was transformed into the embodiment of all that was hostile to the powers of heaven " (Sayce's Hibbert Lectures, p. 283) , and was confounded with the dragon Tiamat, " a terrible monster, reap- pearing in the Old Testament writings as Rahab and Leviathan, the principle of chaos, the enemy of God and man " (Tennaht's The Fall and Original Sin, p. 43), and according to Gunkel (Schopfung und Chaos, p. 383) " the original of the ' old serpent ' of Rev. xii. 9." In Egyptian mythology the serpent Apap with an army of monsters strives daily to arrest the course of the boat of the luminous gods. While the Greek mythology described the Titans as " enchained once for all in their dark dungeons " yet Prometheus' threat remained to disturb the tranquillity of the Olympian Zeus. In the German mythology the army of darkness is led by Hel, the personification of twilight, sunk to the goddess who enchains the dead and terrifies the living, and Loki, originally the god of fire, but afterwards " looked upon as the father of the evil powers, who strips the goddess of earth of her adornments, who robs Thor of his fertilizing hammer, and causes the death of Balder the beneficent sun." In Hindu mythology the Maruts, Indra, Agni and Vishnu wage war with the serpent Ahi to deliver the celestial cows or spouses, the waters held captive in the caverns of the clouds. In the Trimurti, Brahma (the impersonal) is manifested as Brahma (the personal creator), Vishnu (the preserver), and Siva (the destroyer). In Siva is perpetuated the belief in the god of Vedic times Rtidra, who is represented as " the wild hunter who storms over the earth with his bands, and lays low with arrows the men who displease him " (Chantepie de la Saussaye's Religions geschichte, 2nd ed., vol. ii. p. 25). The evil character of Siva is reflected in his wife, who as Kali (the black) is the wild and cruel goddess of destruction and death. The opposition of good and evil is most fully carried out in Zoroastrianism. Opposed to Ormuzd, the author of all good, is Ahriman, the source of all evil; and the opposition runs through the whole universe (D'Alviella's Hibbert Lectures, pp. 158- 164).

The conception of Satan (Heb. 195?, the adversary, Gr. 'Eara.vas, or Xarav, 2 Cor. xii. 7) belongs to the post -exilic period of Hebrew development, and probably shows traces of the

influence of Persian on Jewish thought, but it has also its roots in much older beliefs. An ” evil spirit ” possesses Saul (i Sam. xvi. 14), but it is ” from the Lord.” The same agency produces discord between Abimelech and the Shechemites (Judges ix. 23). ” A lying spirit in the mouth of all his prophets ” as Yahweh’s messenger entices Ahab to his doom (1 Kings xxii. 22). Growing human corruption is traced to the fleshy union of angels and women (Gen. vi. 1-4). But generally evil, whether as misfortune or as sin, is assigned to divine causality (1 Sam. xviii. 10; 2 Sam. xxiv. 1; 1 Kings xxii. 20: Isa. vi. 10, Ixiii. 17). After the Exile there is a tendency to protect the divine transcendence by the introduction of mediating angelic agency, and to separate all evil from God by ascribing its origin to Satan, the enemy of God and man. In the prophecy of Zechariah (iii. 1-2) he stands as the adversary of Joshua, the high priest, and is rebuked by Yahweh for desiring that Jerusalem should be further punished. In the book of Job he presents himself before the Lord among the sons of God (ii. 1), yet he is represented both as accuser and tempter. He disbelieves in Job’s integrity, and desires him to be so tried that he may fall into sin. While, according to 2 Sam. xxiv. 1, God himself tests David in regard to the numbering of the people, according to 1 Chron. xxi, 1 it is Satan who tempts him.

The development of the conception continued in later Judaism, which was probably more strongly influenced by Persian dualism. It is doubtful, however, whether the Asmodeus (q.v.) of the book of Tobit is the same as the Aeshma Dagwa of the Bundahesh. He is the evil spirit who slew the seven husbands of Sara (iii. 8), and the name probably means ” Destroyer.” In the book of Enoch Satan is represented as the ruler of a rival kingdom of evil, but here are also mentioned Satans, who are distinguished from the fallen angels and who have a threefold function, to tempt, to accuse and to punish. Satan possesses the ungodly (Ecclesi- asticus xxi. 27), is identified with the serpent of Gen. iii. (Wisdom ii. 24), and is probably also represented by Asmodeus, to whom lustful qualities are assigned (Tobit vi. 14) ; Gen. iii. is probably referred to in Psalms of Solomon xvii. 49, ” a serpent speaking with the words of transgressors, words of deceit to pervert wisdom.” The Book of the Secrets of Enoch not only identifies Satan with the Serpent, but also describes his revolt against God, and expulsion from heaven. In the Jewish Targums Sammael, ” the highest angel that stands before God’s throne, caused the serpent to seduce the woman “; he coalesces with Satan, and has inferior Satans as his servants. The birth of Cain is ascribed to a union of Satan with Eve. As accuser affecting man’s standing before God he is greatly

feared.

This doctrine, stripped of much of its grossness, is reproduced in the New Testament. Satan is the &d|3oAos (Matt. xiii. 39; John xiii. 2; Eph. iv. 27; Heb. ii. 14; Rev. ii. 10), slanderer or accuser, the 7retpdf coi> (Matt. iv. 3; iThess. iii. 5), the tempter, the Trovqpbs (Matt. v. 37; John xvii. 15; Eph. vi. 16), the evil one, and the exdpbs (Matt. xiii. 39), the enemy. He is apparently identified with Beelzebub (or Beelzebul) in Matt. xii. 26, 27. Jesus appears to recognize the existence of demons belonging to a kingdom of evil under the leadership of Satan " the prince of demons " (Matt. xii. 24, 26, 27), whose works in demonic posses- sions it is his function to destroy (Mark i. 34, iii. n, vi. 7; Luke x. 17-20). But he himself conquers Satan in resisting his tempta- tions (Matt. iv. 1-11). Simon is warned against him, and Judas yields to him as tempter (Luke xxii. 31; John xiii. 27). Jesus's cures are represented as a triumph over Satan (Luke x. 18). This Jewish doctrine is found in Paul's letters also. Satan rules over a world of evil, supernatural agencies, whose dwelling is in the lower heavens (Eph. vi. 12): hence he is the "prince of the power of the air " (ii. 2). He is the tempter (1 Thess. iii. 5; 1 Cor. vii. 5), the destroyer (x. 10), to whom the offender is to be handed over for bodily destruction (v. 5), identified with the serpent (Rom. xvi. 20; 2 Cor. xi. 3), and probably with Beliar or Belial (vi. 15); and the surrender of man to him brought death into the world (Rom. v. 17). Paul's own " stake in the flesh " is Satan's messenger (2 Cor. xii. 7). According to Hebrews Satan's power over death Jesus destroys by dying (ii. 14) . Revela-

tion describes the war in heaven between God with his angels and Satan or the dragon, the " old serpent," the deceiver of the whole world (xii. 9), with his hosts of darkness. After the over- throw of the Beast and the kings of the earth, Satan is imprisoned in the bottomless pit a thousand years (xx. 2),. Again loosed to deceive the nations, he is finally cast into the lake of fire and brimstone (xx. 10; cf. Enoch liv. 5, 6; 2 Peter ii. 4). In John's Gospel and Epistles Satan is opposed to Christ. Sinner and murderer from the beginning (1 John iii. 8) and liar by nature (John viii. 44), he enslaves men to sin (viii. 34), causes death (verse 44), rules the present world (xiv. 30), but has no power over Christ or those who are his (xiv. 30, xvi. n; 1 John v. 18). He will be destroyed by Christ with all his works (John xvi. 33; 1 John iii. 8).

In the common faith of the Gentile churches after the Apostolic Age " the present dominion of evil demons, or of one evil demon, was just as generally presupposed as man's need of redemption, which was regarded as a result of that dominion. The tenacity of this belief may be explained among other things by the living impression of the

polytheism that surrounded the communities on every side. By means of this assumption too, humanity seemed to be unburdened, and the presupposed capacity for redemption could, therefore, be justified in its widest range ” (Harnack’s History of Dogma, i. p. 181). While Christ’s First Advent delivered believers from Satan’s bondage, his overthrow would be completed only by the Second Advent. The Gnostics held that ” the present world sprang from a fall of man, or from an undertaking hostile to God, and is, therefore, the product of an evil or intermediate being ” (p. 257). Some taught that while the future had been assigned by God to Christ, the devil had received the present age (p. 309). The fathers traced all doctrines not held by the Catholic Church to the devil, and the virtues of heretics were regarded as an instance of the devil transforming himself into an angel of light (ii. 91). Irenaeus ascribes Satan’s fall to ” pride and arrogance and envy of God’s creation “; and traces man’s deliverance from Satan to Christ’s victory in re- sisting his temptations; but also, guided by certain Pauline passages, represents the death of Christ ” as a ransom paid to the ‘ apostasy ‘ for men who had fallen into captivity ” (ii. 290). He does not admit that Satan has any lawful claim on man, or that God practised a deceit on him, as later fathers taught. This theory of the atonement was formulated by Origen. ” By his successful temptation the devil acquired a right over men. God offered Christ’s soul for that of men. But the devil was duped, as Christ overcame both him and death ” (p. 367). It’was held by Gregory of Nyssa, Ambrose, who uses the phrase pia fraus, Augustine, Leo I., and Gregory I., who expresses it in its worst form. ” The humanity of Christ was the bait; the fish, the devil, snapped at it, and was left hanging on the invisible hook, Christ’s divinity ” (iii. 307). In Athanasius the relation of the work of Christ to Satan retires into the background, Gregory of Nazianzus and John of Damascus felt scruples about this view. It is expressly repudiated by Anselm and Abelard. Peter the Lombard asserted it, disregarding these objections. Bernard represents man’s bondage to Satan ” as righteously permitted as a just retribution for sin,” he being ” the executioner of the divine justice.” ˆAnother theory of Origen’s found less accept- ance. The devil, as a being resulting from God’s will, cannot always remain a devil. The possibility of his redemption, however, was in the 5th century branded as a heresy. Persian dualism was brought into contact with Christian thought in the doctrine of Mani; and it is permissible to believe that the gloomy views of Augustine regarding man’s condition are due in some measure to this influence. Mani taught that Satan with his demons, sprung from the kingdom of darkness, attacked the realm of light, the earth, defeated man sent against him by the God of light, but was overthrown by the God of light, who then delivered the primeval man

(iii. 324). ” During the middle ages,” says Tulloch, ” the belief in the devil was absorbing- saints conceived themselves and others to be in constant conflict with him.” This superstition, perhaps at its strongest in the 13th to the 15th century, passed into Protestantism. Luther

was always conscious of the presence and opposition of Satan. ” As I found he was about to begin again,” says Luther, “I gathered together my books, and got into bed. Another time in the night I heard him above my cell walking on the cloister, but as I knew it was the devil I paid no attention to him and went to sleep.” He held that this world will pass away with its pleasures, as there can be no real improvement in it, for the devil continues in it to ply his daring and seductive devices (vii. 191). I. A. Dorner (Christian Doctrine, iii. p. 93) sums up Protestant doctrine as follows: — ” He is brought into relation with natural sinfulness, and the impulse to evil thoughts and deeds is ascribed to him. The dominion of evil over men is also represented as a slavery to Satan, and this as punishment. He has his full power in the extra- Christian world. But his power is broken by Christ, and by his word victory over him is to be won. The power of creating anything is also denied the devil, and only the power of corrupting substances is conceded to him. But it is only at the Last Judg- ment that his power is wholly annihilated; he is himself delivered up to eternal punishment.” This belief in the devil was specially strong in Scotland among both clergy and laity in the 17th century. ” The devil was always and literally at hand,” says Buckle, ” he was haunting them, speaking to them, and tempting them. Go where they would he was there.”

In more recent times a great variety of opinions has been expressed on this subject. J. S. Semler denied the reality of demonic possession, and held that Christ in his language accom- modated himself to the views of the sick whom he was seeking to cure. Kant regarded the devil as a personification of the radical evil in man. Daub in his Judas Ishcarioth argued that a finite evil presupposes an absolute evil, and the absolute evil as real must be in a person. Schelling regarded the devil as, not a person, but a real principle, a spirit let loose by the freedom of man. Schleiermacher was an uncompromising opponent of the common belief. ” The problem remains to seek evil rather in self than in Satan, Satan only showing the limits of our self- knowledge.” Dorner has formulated a theory which explains the development of the conception of Satan in the Holy Scriptures as in correspondence with

an evolution in the character of Satan. ” Satan appears in Scripture under four leading char- acters: — first as the tempter of freedom, who desires to bring to decision, secondly as the accuser, who by virtue of the law retorts criminality on man; thirdly as the instrument of the Divine, which brings evil and death upon men; fourthly and lastly he is described, especially in the New Testament, as the enemy of God and man.” He supposes ” a change in Satan in the course of the history of the divine revelation, in conflict with which he came step by step to be a sworn enemy of God and man, especially in the New Testament times, in which, on the other hand, his power is broken at the root by Christ.” He argues that ” the world-order, being in process as a moral order, permits breaches everywhere into which Satan can obtain entrance ” (pp. 99, 102). H. L. Martensen gives even freer rein to speculation. ” The evil principle,” he says, ” has in itself no personality, but attains a progressively universal personality in its kingdom; it has no individual personality, save only in individual creatures, who in an especial manner make themselves its organs; but among these is one creature in whom the principle is so hypostasized that he has become the centre and head of the kingdom of evil ” {Dogmatics, p. 199). A. Ritschl gives no place in his construc- tive doctrine to the belief in the devil; but recognizes that the mutual action of individual sinners on one another constitutes a kingdom of sin, opposed to the Kingdom of God (A. E. Garvie, The Ritschlian Theology, p. 304). Kaftan affirms that a ” doctrine about Satan can as little be established as about angels, as faith can say nothing about it, and nothing is gained by it for the dogmatic explanation of evil. This whole province must be left to the immediate world-view of the pious. The idea of Satan will on account of the Scriptures not disappear from it, and it would be arrogant to wish to set it aside. Only let everyone keep the thought that Satan also stands under the commission of the Almighty God, and that no one must suppose that by leading back his sins to a Satanic temptation he can get rid of his own

guilt. To transgress these limits is to assail faith ” (Dogmatik, p. 348). In the book entitled Evil and Evolution there is ” an attempt to turn the light of modern science on to the ancient mystery of evil.” The author contends that the existence of evil is best explained by assuming that God is confronted with Satan, who in the process of evolution interferes with the divine designs, an interference which the instability of such an evolving process makes not incredible. Satan is, however, held to be a creature who has by abuse of his freedom been estranged from, and opposed to his Creator, and who at last will be conquered by moral means. W. M. Alexander in his book on demonic possession maintains that ” the confession of Jesus as the Messiah or

Son of God is the classical criterion of genuine demonic possession ” (p. 150), and argues that as ” the Incarnation indicated the establishment of the kingdom of heaven upon earth,” there took place ” a : counter movement among the powers of darkness,” of which ” genuine demonic possession was one of the manifesta* tions ” (p. 249).

Interesting as these speculations are, it may be confidently affirmed that belief in Satan is not now generally regarded as an essential article of the Christian faith, nor is it found to be an indispensable element of Christian experience. On the one hand science has so explained many of the processes of outer nature and of the inner life of man as to leave no room for Satanic agency. On the other hand the modern view of the inspiration of the Scriptures does not necessitate the acceptance of the doctrine of the Scriptures on this subject as finally and absolutely authori- tative. The teaching of Jesus even in this matter may be ac- counted for as either an accommodation to the views of those with whom he was dealing, or more probably as a proof of the limitation of knowledge which was a necessary condition of the Incarnation, for it cannot be contended that as revealer of God and redeemer of men it was imperative that he should either correct or confirm men’s beliefs in this respect. The possibility of the existence of evil spirits, organized under one leader Satan , to tempt man and oppose God, cannot be denied; the sufficiency of the evidence for such evil agency may, however, be doubted ; the necessity of any such belief for Christian thought and life cannot, therefore, be affirmed. (See also Demonology; Possession.) (A. E. G.*)

DEVIZES, a market town and municipal borough in the Devizes parliamentary division of Wiltshire, England, 86 m. W. by S. of London by the Great Western railway. Pop. (1901) 6532. Its castle was built on a tongue of land flanked by two deep ravines, and behind this the town grew up in a semicircle on a stretch of bare and exposed tableland. Its main streets, in which a few ancient timbered houses are left, radiate from the market place, where stands a Gothic cross, the gift of Lord Sidmouth in 1814. The Kennet and Avon Canal skirts the town on the N., passing over the high ground through a chain of thirty- nine locks. St John’s church, one of the most interesting in Wiltshire, is cruciform, with a massive central tower, based upon two round and two pointed arches. It was originally Norman of the 12th century, and the chancel arch and low vaulted chancel, in this style, are very fine. In the interior several ancient monuments of the Suttons and Heathcotes are preserved, besides some beautiful carved stone work, and two rich ceilings of oak over the chapels. St Mary’s, a smaller church, is partly Norman, but was rebuilt in the 15th and

again in the 19th cen- tury. Its lofty clerestoried nave has an elaborately carved timber roof, and the south porch, though repaired in 161 2, preserves its Norman mouldings. The woollen industries of Devizes have lost their prosperity; but there is a large grain trade, with engineering works, breweries, and manufactures of silk, snuff, tobacco and agricultural implements. The town is governed by a mayor, six aldermen and eighteen councillors. Area, 906 acres.

Devizes (Divisis, la Devise, De Vies) does not appear in any historical document prior to the reign of Henry I., when the construction of a castle of exceptional magnificence by Roger, bishop of Salisbury, at once constituted the town an important political centre, and led to its speedy development. After thfe.

disgrace of Roger in 1139 the castle was seized by the Crown; in the 14th century it formed part of the dowry of the queens of England, and figured prominently in history until its capture and demolition by Cromwell in the Civil War of the 17th century. Devizes became a borough by prescription, and the first charter from Matilda, confirmed by successive later sovereigns, merely grants exemption from certain tolls and the enjoyment of un- disturbed peace. Edward III. added a clause conferring on the town the liberties of Marlborough, and Richard II. instituted a coroner. A gild merchant was granted by Edward I., Edward II. and Edward III., and in 1614 was divided into thethree companies of drapers, mercers and leathersellers. The present governing charters were issued by James I. and Charles I., the latter being little more than a confirmation of the former, which instituted a common council consisting of a mayor, a town clerk and thirty-six capital burgesses. These charters were surrendered to Charles II. , and a new one was conferred by James IL, but abandoned three years later in favour of the original grant. Devizes returned two members to parliament from 1295, until deprived of one member by the Representation of the People Act of 1867, and of the other by the Redistribution Act of 1885. The woollen manufacture was the staple industry of the town from the reign of Edward III. until the middle of the 18th century, when complaints as to the decay of trade began to be prevalent. In the reign of Elizabeth the market was held on Monday, and there were two annual fairs at the feasts of the Purification of the Virgin and the Decollation of John the Baptist. The market was transferred to Thursday in the next reign, and the fairs in the 18th century had become seven in number.

See Victoria County History, Wiltshire; History of Devizes (Devizes, 1859).

DEVOLUTION, WAR OF (1667-68), the name applied to the war which arose out of Louis XIV. ‘s claims to certain Spanish territories in right of his wife Maria Theresa, upon whom the ownership was alleged to have ” devolved.” (See, for the military operations, Dutch Wars.) The war was ended by the treaty of Aix-la-Chapelle in 1668.

DEVON, EARLS OF. From the family of De Redvers (De Ripuariis; Riviers), who had been earls of Devon from about 1100, this title passed to Hugh de Courtenay (c. 1275-1340), the representative of a prominent family in the county (see Gibbon’s ” digression ” in chap. lxi. of the. Decline and Fall, ed. Bury), but was subsequently forfeited by Thomas Courtenay (1432-1462), a Lancastrian who was beheaded after the battle of Towton. It was revived in 1485 in favour of Edward Courtenay (d. 1509), whose son Sir William (d. 1511) married Catherine, daughter of Edward IV. Too great proximity to the throne led to his attainder, but his son Henry (c. 1498-1539) was restored in blood in 1517 as earl of Devon, and in 1525 was created marquess of Exeter; his second wife was a daughter of William Blount, 4th Lord Mountjoy. The title again suffered forfeiture on Henry’s execution, but in 1553 it was recreated for his son Edward (1526-1556). At the latter’s death it became dormant in the Courtenay family, till in 183 1 a claim by a collateral branch was allowed by the House of Lords, and the earldom of Devon was restored to the peerage, still being held by the head of the Courtenays. The earlier earls of Devon were referred to occasionally as earls of Devonshire, but the former variant has prevailed, and the latter is now solely used for the earldom and dukedom held by the Cavendishes (see Devonshire, Earls and Dukes or, and also the article Courtenay).

DEVONIAN SYSTEM, in geology, the name applied to series of stratified fossiliferous and igneous rocks that were formed during the Devonian period, that is, in the interval of time between the close of the Silurian period and the beginning of the Carboniferous; it includes the marine Devonian and an estuarine Old Red Sandstone series of strata. The name ” Devonian ” was introduced in 1829 by Sir R. Murchison and A. Sedgwick to describe the older rocks of Cornwall and Devon which W. Lonsdale had shown, from an examination of the fossils, to be intermediate between the Silurian and Carboniferous. The same two workers also carried on further researches upon the same rocks of the

European continent, where already several others, F. Roemer, H. E*

Beyrich, &c, were endeavouring to elucidate the succession of strata in this portion of the ” Transition Series.” The labours of these earlier workers, including in addition to those already mentioned, the brothers F. and G. von Sandberger, A. Dumont, J. Gosselet, E.J. A. d’Archiac, E. P. de Verneuil and H. von

Distribution of „ #•

Devonian Rocks ,■” V

H Areas in u/hlch the Earlier Devonianjtocks are found H Additional areas In which Mid. Devonian Rooks lire found

fUgS „ „ „ „ Later „ „ „ tt

I \Deoonlan flocks abient ar unknown

Suggested limits of Land & Sea in Earlier Devonian time

-— ‘ Modifications introduced about the middle of Devonian time —•-•Later Modifications _ e.w.m.

Dechen, although somewhat modified by later students, formed the foundation upon which the modern classification of the Devonian rocks is based.

Stratigraphy of the Devonian Fades.

Notwithstanding the fact that it was in Devonshire and Cornwall that the Devonian rocks were first distinguished, it is in central Europe that the succession of strata is most clearly made out, and here, too, their geological position was first indicated by the founders of the system, Sedgwick and Murchison.

Continental Europe. — Devonian rocks occupy a large area in the centre of Europe, extending from the Ardennes through the south of Belgium across Rhenish Prussia to Darmstadt. They are best known from the picturesque gorges which have been cut through them by the Rhine below Bingen and by the Moselle below Treves. They reappear from under younger formations in Brittany, in the Harz and Thuringia, and are exposed in Franconia, Saxony, Silesia, North Moravia and eastern Galicia. The principal subdivisions of the system in the more typical areas are indicated in Table I.

This threefold subdivision, with a central mass of calcareous strata, is traceable westwards through Belgium (where the Calcaire de Givet

represents the Stringocephalus limestone of the Eifel) and eastwards into the Harz. The rocks reappear with local petrographical modifications, but with a remarkable persistence of general palaeontological characters, in Eastern Thuringia, Franconia, Saxony, Silesia, the north of Moravia and East Galicia. Devonian rocks have been detected among the crumpled rocks of the Styrian Alps by means of the evidence of abundant corals, cephalopods, gasteropods, lamellibranchs and other organic remains. Perhaps in other tracts of the Alps, as well as in the Carpathian range, similar shales, limestones and dolomites, though as yet unfossiliferous, but containing ores of silver, lead, mercury, zinc, cobalt and other metals, may be referable to the Devonian system.

In the centre of Europe, therefore, the Devonian rocks consist of a vast thickness of dark-grey sandy and shaly rocks, with occasional seams of limestone, and in particular with one thick central calcareous zone. These rocks are characterized in the lower zones by numerous broad-winged spirifers and by peculiar trilobites (Phacops, Homa- lonotus, &c.) which, though generically like those of the Silurian system, are specifically distinct. The central calcareous zone abounds in corals and crinoids as well as in numerous brachiopods. In the highest bands a profusion of coiled cephalopods (Clymenia) occurs in some of the limestones, while the shales are crowded with a small but characteristic ostracod crustacean (Cypridina). Here and there traces of fishes have been found, more especially in the Eifel, but seldom in such a state of preservation as to warrant their being assigned to any definite place in the zoological scale. Subsequently, however, £, Beyrich has described from Gerolstein in the Eifel an undoubted species of Pterichthys, which, as it cannot be certainly- identified with any known form, he names P. Rhenanus. A Coccosteus has been described by F. A. Roemer from the Harz, and still later one has been cited from Bicken near Herborn by V. Koenen ; but, as Beyrich points out, there may be some doubt as to whether the latter is not a Pterichthys. A Ctenacanlhus, seemingly undistinguish- able from the C. Bohemicus of Barrande's Etage G, has also been

obtained from the Lower Devonian " Nereitenschichten " : of Thuringia. The characteristic Holoptychius nobilissimus has been : detected in the Psammite de Condroz, which in Belgium forms a characteristic sandy portion of the Upper Devonian rocks. These are interesting facts, as helping to link the Devonian and Old Red

Sandstone types together. But they are as yet too few.and unsupported to warrant any large deduction as to the correlations between these types.

It is in the north-east of Europe that the Devonian and Old Red Sandstone appear to be united into one system, where the limestones and marine organisms of the one are interstratified with the fish-bearing sandstones and shales of the other. In Russia, as was

of the Silurian rocks on which they rest, for they are found gradually to overlap Upper and Lower Silurian formations.

The chief interest of the Russian rocks of this age lies in the fact, first signalized by Murchison and his associates, that they unite within themselves the characters of the Devonian and the Old Red Sandstone types. In some districts they consist largely of lime- stones, in others of red sandstones and marls. In the former they present molluscs and other marine organisms of known Devonian species; in the latter they afford remains of fishes, some of which are specifically identical with those of the Old Red Sandstone of Scotland. The distribution of these two palaeontological types in Russia is traced by Murchison to the lithological characters of the

Table I.

Stages.

Ardennes.

Rhineland.

Brittany and Normandy.

Bohemia.

Harz.

Famennien (Clymenia beds).

Limestone of Etrceungt. Psammites of Condroz

(sandy series). Slates of Famenne

(shaly series).

Cypridina slates.

Pon sandstone (Sauerland).

Crumbly limestone (Kramen-

zelkalk) with Clymenia. Neheim slates in Sauerland,

and diabases, tuffs, &c, in

Dillmulde, &c.

Slates of Rostellec.

Cypridina slates. Clymenia limestone

and limestone of

Altenau.

Frasnien (Intumes- cens beds).

Slates of Matagne.

Limestones, marls and shale of Frasne, and red marble of Flan- ders.

Adorf limestone of Waldeck and shales with Goniatites (Eifel and AixJ = Budes- heimer shales.

Marls, limestone and dolomite with Rhynchonella cuboides (Flinz in part).

Iberg limestone of Dillmulde.

Limestone of Cop- Choux and green slates of Travuliors.

Iberg limestone and Winterberg lime- stone ; also Adorf limestone and shales (Budesheim).

Givetien (Stringo- cephalus beds).

Limestone of Givet.

Stringocephalus limestone, ironstone of Brilon and Lahnmulde. Upper Lenne shales, crinoidal limestone of Eifel, red sand- stones of Aix.

Tuffs and diabases of Brilon and Lahnmulde.

Red conglomerate of Aix.

Limestones of Cha- lonnes, Montjean and l'Ecochere.

H 2 (ofBarrande) dark plant- bearing shales.

Stringocephalus shales with Flaser and Knollenkalk.

Wissenbach slates.

Eifclien (Calceola beds).

Calceola slates and limestones of Couvin.

Greywacke with Spir- ifer cultrijugatus.

Calceola beds, Wissenbach slates, Lower Lenne beds, Guntroder limestone and clay slate of Lahnmulde, Dillmulde, Wildungen, Grie- fenstein limestone, Ballers- bach limestone.

Slates of Porsguen, greywacke of Fret.

G3 Cephalopod limestone.

G2 Tentaculite limestone.

Gi Knollenkalk and mottled Mnenian lime- stone.

Calceola beds.

Nereite slates, slates of Wieda and lime- stones of Hasselfeld.

Coblentzien.

Greywacke of Hierges.

Shales and conglomer- ate of Burnot with quartzite, of Bierl6 and red slates of Vireux, greywacke of Vireux, greywacke of Montigny, sand- stone of Anor.

Upper Coblentz slates.

Red sandstone of Eifel, Cob- lentz quartzite, lower Cob- lentz slates.

Hunsruck and Siegener grey- wacke and slates.

Taunus quartzite and grey- wacke.

Limestones of Er- bray, Brulon, Vir6 and Nehou, grey- wacke of Faou, sandstone of Ga- hard.

F 2 of Barrande.

White Konje- prus limestone with Hercyn- ian fauna.

Haupt quartzite (of Lossen) = Rammels- berg slates, Schalker slates = Kahleberg sandstone.

Hercynian slates and limestones.

G&linnien.

Slates of St Hubert and Fooz, slates of Mon- drepuits, arkose of Weismes, conglomer- ate of Fepin.

Slates of G6dinne.

Slates and quartzites of Plbugastel.

shown in the great workRussiaandtheUral Mountainsby Murchison, De Verneuil and Keyserling, rocks intermediate between the Upper Silurian and Carboniferous Limestone formations cover an extent of surface larger than the British Islands. This wide development arises not from the thickness but from the undisturbed horizontal character of the strata. Like the Silurian formations described else- where, they remain to this day nearly as flat and unaltered as they were originally laid down. Judged by mere vertical depth, they present but a meagre representative of the massive Devonian grey- wacke and limestone of Germany, or of the Old Red Sandstone of Britain. Yet vast though the area is over which they form the surface rock, it is probably only a small portion of their total extent ; for they are found turned up from under the newer formations along the flank of the Ural chain. It would thus seem that they spread continuously across the whole breadth of-Russia in Europe. Though almost everywhere undisturbed, they afford evidence of some terrestrial oscillation between the time of their formation and that

rocks, and consequent original diversities of physical conditions, rather than to differences of age. Indeed cases occur where in the same band of rock Devonian shells and Old Red Sandstone fishes lie commingled. In the belt of the formation which extends south- wards from Archangel and the White Sea, the strata consist of sands and marls, and contain only fish remains. Traced through the Baltic provinces, they are found to pass into red and green marls, clays, thin limestones and sandstones, with beds of gypsum. ‘ In some of the calcareous bands such fossils occur ‘as Orthis striatula, Spiriferina prisca, Leptaena productoides , Spirifer calcaratus, Spirorbis

omphaloides and Orthoceras subfusiforme. In the higher beds Holoptychius and other well-known fishes of the Old Red Sandstone occur. Followed still farther to the south, as far as the watershed between Orel and Voronezh, the Devonian rocks lose their red colour and sandy character, and become thin-bedded yellow lime- stones, and dolomites with soft green and blue marls. Traces of salt deposits are indicated by occasional saline springs. It is evident

that the geographical conditions of the Russian area during the Devonian period must have closely resembled those, of the Rhine basin and central England during the Triassic period. The Russian Devonian rocks have been classified in Table II. There is an unquestionable passage of the uppermost Devonian rocks of Russia into the base of the Carboniferous system.

The Lower Devonian of the Harz contains a fauna which is very different from that of the Rhenish region; to this facies the name

The fossil evidence clearly shows the close agreement of the Rhenish and south Devonshire areas. In north Devonshire the Devonian rocks pass upward without break into the Culm.

North America. — In North America the Devonian rocks are extensively developed ; they have been studied most closely in the New York region, where they are classified according to Table IV.

The classification below is not capable of application over the states generally and further details are required from many of the

Table II.

North-West Russia.

Central Russia.

Petchoraland.

Ural Region.

Red sandstone (Old

Limestones with Spir-

Limestones with Area

Domanik slates and

Cypridina slates, Cly-

Red).

ifer Verneuili and

oreliana.

limestones with Sp.

menia limestones (Fa-

1

Sp. Archiaci.

Limestones with Sp. Verneuili and Sp. Archiaci.

Verneuili.

mennien). Limestones with Gephy- oceras intumescens and

*-

Rhynchonella cuboides (Frasnien).

Dolomites and limestones

Marl with

Limestones and slates

with

Spirifer Anossofi

with Sp. Anossofi (Giv-

Spirifer Anossofi.

and corals.

etien).

Limestones and slates

with Pentamerus basch-

Lower sandstone (Old Red).

kiricus (Eifelien).

r

Limestones and slates of the Yuresan and Ufa

Absent.

rivers, slate and quartz- ite, marble of Byelaya and of Bogoslovsk, phyllitic schists and

L

quartzite.

” Hercynian ” has been applied, and the correlation of the strata has been a source of prolonged discussion among continental geologists. A similar fauna appears in Lower Devonian of Bohemia, in Brittany (limestone of Erbray) and in the Urals. The Upper Devonian of the Harz passes up into the Culm.

In the eastern Thuringian Fichtelgebirge the upper division is represented by Clymenia limestone and Cypridina slates with Adorf limestone, diabase and Planschwitzer tuff in the lower part. The middle division has diabases and tuffs at the top with Tentaciilite and Nereite shales and limestones below. The upper part of the Lower Devonian, the sandy shale of Steinach, rests unconformably upon Silurian rocks. In the Carnic Alps’are coral reef limestones, the equivalents of the Iberg limestone, which attain an enormous thickness; these are underlain by coral limestones with fossils similar to those of the Konjeprus limestone of Bohemia; below these are shales and nodular limestones with goniatites. The Devonian rocks of Poland are sandy in the lower, and more calcareous in the upper parts. They are of interest because while the upper portions agree closely with the Rhenish facies, from the top of the Coblentzien upwards, in the sandy beds near the base Old Red Sandstone fishes {Coccosteus, &c.) are found. In France Devonian rocks are found well developed in Brittany, as indicated in the table, also in Normandy and Maine; in the Boulonnais district only the middle and upper divisions are known. In south France in the neighbourhood of Cabrieres, about

Montpellier and in the Montagne Noire, all three divisions are found in a highly calcareous condition. Devonian rocks are recognized, though frequently much meta- morphosed, on both the northern and southern flanks of the Pyrenees; while on the Spanish peninsula they are extensively developed. In Asturias they are no less than 3280 ft. thick, all three divisions and most of the central European subdivisions are present. In general, the Lower Devonian fossils of Spain bear a marked resemblance to those of Brittany.

Asia. — From the Ural Mountains eastward, Devonian rocks have been traced from point to point right across Asia. In the Altai Mountains they are represented by limestones of Coblentzien age with a fauna possessing Hercynian features. The same features are observed in the Devonian of the Kougnetsk basin, and in Turkestan. Well-developed quartzites with slates and diabases are found south of Yarkand and Khotan. Middle and Upper Devonian strata are widespread in China. Upper Devonian rocks are recorded from Persia, and from the Hindu Kush on the right bank of the Chitral river.

England. — In England the original Devonian rocks are developed in Devon and Cornwall and west Somerset. In north Devonshire these rocks consist of sandstones, grits and slates, while in south Devon there are, in addition, thick beds of massive limestone, and intercalations of lavas and tuffs. The interpretation of the strati- graphy in this region is a difficult matter, partly on account of the absence of good exposures with fossils, and partly through the disturbed condition of the rocks. The system has been subdivided as shown in Table III.

regions where Devonian rocks have been recognized, but every- where the broad threefold division seems to obtain. In Maryland the following arrangement has been adopted — (1) Helderberg = Coeymans; (2) Oriskany; (3) Romney = Erian; (4) Jennings = Genesee and Portage; (5) Hampshire = Catskill in part. In the

Table III.

North Devon and West Somerset.

South Devon.

Pilton group. Grits, slates

and thin limestones. Baggy group. Sandstones

and slates. Pickwell Down group. Dark

slates and grits. Morte slates (?).

Ashburton slates.

Livaton slates.

Red and green Entomis slates

(Famennien). Red and grey slates with

tuffs. Chudleigh goniatite limestone

Petherwyn beds (Frasnien).

Ilfracombe slates with len-

ticles of limestone. Combe Martin grits and

slates.

Torquay and Plymouth lime- stones and Ashprington volcanic series. (Givetien and Eifelien.)

Slates and limestones of Hope's Nose.

Hangman grits and slates. Lynton group, grits and cal- careous slates. Foreland grits and slates.

Looe beds (Cornwall).

Meadfoot, Cockington and Warberry series of slates and greywackes. (Coblent- zien and Gedinnien.)

interior the Helderbergian is missing and the system commences with (1) Oriskany, (2) Onondaga, (3) Hamilton, (4) Portage (and Genesee), (5) Chemung.

The Helderbergian series is mainly confined to the eastern part of the continent; there is a northern development in Maine, and in Canada (Gaspe, New Brunswick, Nova Scotia and Montreal); an Appalachian belt, and a lower Mississippian region. The series as a whole is mainly calcareous (2000 ft. in Gaspe), and thins out towards the west. The fauna has Hercynian affinities. The Oriskany formation consists largely of coarse sandstones; it is thin in New York, but in Maryland and Virginia it is several hundred feet thick. It is more widespread than the underlying Helderbergian. The Lower Devonian appears to be thick in northern Maine and in Gasp6, New Brunswick and Nova

Scotia, but neither the palaeon- tology nor the stratigraphy has been completely worked out.

DEVONIAN SYSTEM

In the Middle Devonian the thin clastic deposits at the base, Esopus and Schoharie grits, have not been differentiated west of the Appalachian region; but the Onondaga limestones are much more extensive. The Erian series is often described as the Hamilton series outside the New York district, where the Marcellus shales are grouped together with the Hamilton shales, and numerous local subdivisions are included, as in Ohio, Kentucky and Tennessee. The rocks are mostly shales or slates, but limestones predominate in the western development. In Pennsylvania the Hamilton series is from 1500 ft. to 5000 ft. thick, but in the more calcareous western extension it is much thinner. The Marcellus shales are bituminous in places.

The Senecan series is composed of shallow- water_ deposits; the Tully limestone, a local bed in New York, thins out in places into a layer of pyrites which contains a remarkable dwarfed fauna. The bituminous Genesee shales are thickest in Pennsylvania (300 ft.) ; 25 ft. on Lake Erie. The shales and sandstones of the Portage formation reach 1000 ft. to 1400 ft. in western New York. In the Chautauquan series the Chemung formation is not always clearly separable from the Portage beds, it is a sandstone and conglomerate

Table IV.

ˆ

H

o

Groups.

Formations.

Probable

European

Equivalent.

Chautauquan.

s— j

Chemung beds with Catskill

as a local facies. Portage beds (Naples, Ithaca and Oneonta shales as local facies). Genesee shales. Tully limestone.

Famennien. Frasnien.

Erian. $ Ulsterian. 1

Hamilton shale. Marcellus shale. Onondaga (Corniferous)

limestone. Schoharie grit. Esopus grit (Caudagalligrit).

Giv&ien. Eifelien.

Oriskanian.

r

Helderbergian 1

Oriskany sandstone. Kingston beds. Becraft limestone. New Scotland beds. Coeymans limestone.

Coblentzien. G6dinnien.

formation which reaches its maximum thickness (8000 ft.) in Pennsylvania, but thins rapidly towards the west. In the Catskill region the Upper Devonian has an Old Red facies — red shales and sandstones with a freshwater and brackish fauna.

Although the correlation of the strata has only advanced a short distance, there is no doubt as to the presence of undifferentiated Devonian rocks in many parts of the continent. In the Great Plains this system appears to be absent, but it is represented in Colorado, Utah, Nevada, Wyoming, Montana, California and Arizona ; Devon- ian rocks occur between the Sierras and the Rocky Mountains, in the Arbuckle Mountains of Oklahoma and in Texas. In the western interior limestones predominate; 6000 ft. of limestone are found at Eureka, Nevada, beneath 2000 ft. of shale. On the Pacific coast metamorphism of the rocks is common, and lava-flows and tuffs occur in them.

In Canada, besides the occurrences previously mentioned in the eastern region, Devonian strata are found in considerable force along the course of the Mackenzie river and the Canadian Rockies, whence

they stretch out into Alaska. It is probable, however, that much that is now classed as Devonian in Canada will prove on fossil evidence to be Carboniferous.

South America, Africa, Australia, &c. — In South America the Devonian is well developed ; in Argentina, Bolivia, Brazil, Peru and the Falkland Islands, the palaeontological horizon is about the junction of the Lower and Middle divisions, and the fauna has affinities with the Hamilton shales of North America. Nearly allied to the South American Devonian is that of South Africa, where they are represented by the Bokkeveld beds in the Cape system. In Australia we find Lower Devonian consisting of coarse littoral deposits with volcanic rocks; and a Middle division with coral limestones in Victoria, New South Wales and Queensland ; an Upper division has also been observed. In New Zealand the Devonian is well exposed in the Reefton mining field ; and it has been suggested that much of the highly metamorphosed rock may belong to this system.

Stratigraphy of the Old Red Sandstone Facies.

The Old Red Sandstone of Britain, according to Sir Archibald Geikie, ” consists of two subdivisions, the lower of which passes down conformably into the Upper Silurian deposits, the upper shading off

in the same manner into the base of the Carboniferous system, while they are separated from each other by an unconformability.” The Old Red strata appear to have been deposited in a number of elongated lakes or lagoons, approximately parallel to one another, with a general alignment in a N.E.-S.W. direction. To these areas of deposit Sir A. Geikie has assigned convenient distinctive names.

In Scotland the two divisions of the system are sharply separated by a pronounced unconformability which is probably indicative of a prolonged interval of erosion. In the central valley between the base of the Highlands and the southern uplands lay “Lake Caledonia.” Here the lower division is made up of some 20,000 ft. of shallow-water deposits, reddish-brown, yellow and grey sand- stones and conglomerates, with occasional ” cornstones,” and thin limestones. The grey flagstones with shales are almost confined to Forfarshire, and are known as the ” Arbroath flags.” Interbedded volcanic rocks, andesites, dacites, diabases, with agglomerates and tuffs constitute an important feature, and attain a thickness of 6000 ft. in the Pentland and Ochil hills. A line of old volcanic vents may be traced in a direction roughly parallel to the trend of the great central valley. On the northern side of the Highlands was ” Lake Orcadie,” presumably

much larger than the foregoing lake, though its boundaries are not determinable. It lay over Moray • Firth and the east of Ross and Sutherland, and extended from Caithness to the Orkney Islands and S. Shetlands. It may even have stretched across to Norway, where similar rocks are found in Sognef jord and Dalsf jord, and may have had communications with some parts of northern Russia. Very characteristic of this area are the Caithness flags, dark grey and bituminous, which, with the red sandstones and conglomerates at their base, probably attain a thickness of 16,000 ft. The somewhat peculiar fauna of this series led Murchison to class the flags as Middle Devonian. In the Shetland Islands contempo- raneous volcanic rocks have been observed. Over the west of Argyll- shire lay " Lake Lome " ; here the volcanic rocks predominate, they are intercalated with shallow-water deposits. A similar set of rocks occupy the Cheviot district.

The upper division of the Old Red Sandstone is represented in Shropshire and South Wales by a great series of red rocks, shales, sandstones and marls, some 10,000 ft. thick. They contain few fossils, and no break has yet been found in the series. In Scotland this series was deposited in basins which correspond only partially with those of the earlier period. They are well developed in central Scotland over the lowlands bordering the Moray Firth. Inter- bedded lavas and tuffs are found in the island of Hoy. An interesting feature of this series is the occurrence of great crowds of fossil fishes in some localities, notably at Dura Den in Fife. In the north of England this series rests unconformably upon the Lower Old Red and the Silurian.

Flanking the Silurian high ground of Cumberland and Westmor- land, and also in the Lammermuir hills and in Flint and Anglesey, a brecciated conglomerate, presenting many of the characters of a glacial deposit in places, has often been classed with the Old Red Sandstone, but in parts, at least, it is more likely to belong to the base of the Carboniferous system. In Ireland the lower division appears to be represented by the Dingle beds and Glengariff grits, while the Kerry rocks and the Kiltorcan beds of Cork are the equivalents of the upper division. Rocks of Old Red type, both lower and upper, are found in Spitzbergen and in Bear Island. In New Brunswick and Nova Scotia the Old Red facies is extensively developed. The Gasp6 sandstones have been estimated at 7036 ft. thick. In parts of western Russia Old Red Sandstone fossils are found in beds intercalated with others containing marine fauna of the Devonian facies.

Devonian and Old Red Sandstone Faunas.

The two types of sediment formed during this period— the marine Devonian and the lagoonal Old Red Sandstone — representing as they do two different but essentially contemporaneous phases of physical condition, are occupied by two strikingly dissimilar faunas. Doubtless at all times there were regions of the earth that were marked off no less clearly from the normal marine conditions of which we have records; but this period is the earliest in which these variations of environment are made obvious. In some respects the faunal break between the older Silurian below and the younger Carboniferous above is not strongly marked; and in certain areas a very close relationship can be shown to exist between the older Devonian and the former, and the younger Devonian and the latter. Nevertheless, taken as a whole, the life of this period bears a distinct stamp of individuality.

The two most prominent features of the Devonian seas are pre- sented by corals and brachiopods. The corals were abundant individually and varied in form ; and they are so distinctive of the period that no Devonian species has yet been found either in the Silurian or in the Carboniferous. They built reefs, as in the present day, and contributed to the formation of limestone masses in Devonshire, on the continent of Europe and in North America. Rugose and tabulate forms prevailed; among the former the cyathophyllids (Cyathophyllum) were important, Phillipsastraea, Zaphrentis, Acervularia and the curious Calceola (sanaalina), an operculate genus which has given palaeontologists much trouble in its diagnosis, for it has been regarded as a pelecypod (hippurite) and

a brachiopod. The tabulate corals were represented by Favosites, Michelinia, Pleurodictyum, Fistulipora, Pachypora and others. Heliolites and Plasmopora represent the aleyonarians. Stromatoporoids were important reef builders. A well-known fossil is Receptaculites, a genus to which it has been difficult to assign a definite place; it has been thought to be a. sponge, it may be a calcareous alga, or a curious represeatative of the foraminifera.

In the Devonian period the brachiopods reached the climax of their development : they compose three-quarters of the known fauna, and more than noo species have been described. Changes were taking place from the beginning of the period in the relative importance of genera; several Silurian forms dropped out, and new types were

coming in. A noticeable feature was the development of broad-winged shells in the genus Spirifer, other spiriferids were Ambocoelia, Uncites, Vemeuilia. Orthids and pentamerids were waning in importance, while the productids (Productella, Chonetes, Strophalosia) were increasing. The stroph- omenids were still flourishing, represented by the genera Leptaena, Stropheodonta, Kayserella, and others. The ancient Lingula, along with Crania and Orbiculoidea, occur among the inarticulate forms. Another long-lived and wide-ranging species is A try pa reticularis. The athyrids were very numerous (Athyns, Retzia, Merista, Meristella, Kayserina, &c); and the rhynchonellids were well represented by Pugnax, Hypothyris, and several other genera. The important, group of terebratulids appears in this system; amongst them Stringocephalus is an eminently characteristic Devonian brachiopod ; others are Dielasma, Cryptonella, Rensselaeria and Orishania.

The pelecypod molluscs were represented by Pterinea, abundant in the lower members along with other large-winged forms, and by Cucullella, Buchiola and Curtonotus in the upper members of the

%stem. Other genera are A ctinodesma, Cardiola, Nucula, Megalodcm, liculopecUn, &c. Gasteropods were becoming more important, but the simple capulid forms prevailed: Platyceras {Capuliis), Strapar- ottus, Pleurotomaria, Murchisonia, Macrocheilina, Euomphalus. Among the pteropods, Tentaculites was very abundant in some quarters; others were Conularia and Styliolina. In the Devonian period the cephalopods began to make a distinct advance in numbers, and in development. The goniatites appear with the genera Anarcestes, A goniatites, Tornoceras, Bactrites and others; and in the upper strata the clymenoids, forerunners of the later ammonoids, began to take definite shape. While several new nautiloids (Homa- loceras, Ryticeras, &c.) made their appearance several of the older genera still lived on (Orthocetas, Poterioceras , Actinoceras) .

Crinoids were very abundant in some parts of the Devonian sea, though they were relatively scarce in others; they include the genera Melocrinus, Haplocrinus, Cupressocrinus, Calceocrinus and Eleuthrocrinus. The cystideans were falling off (Proteocystis, Tiaracrinus), but blastoids were in the ascendant {Nucleocrinus, Codaster, &c). Both brittle-stars, Ophiura, Palaeophiura, Eugaster, and true starfishes, Palaeaster, Aspidosoma, were present, as well as urchins (Lepidocentrus).

When we turn to the crustaceans we have to deal with two distinct assemblages, one purely marine, trilobitic, the other mainly lacustrine

or lagoonal with a eurypteridian facies. The trilobites had already begun to decline in importance, and as happens not infrequently with degenerating races of beasts and men, they began to develop strange eccentricities of ornamentation in some of their genera. A number of Silurian genera lived on into the Devonian period, and some gradually developed into new and distinctive forms; such were Proetus, Harpes, Cheirurus, Bronteus and others. Distinct species of Phacops mark the Lower and Upper Devonian respectively, while the genus Dalmania {Odontochile) was represented by species with an almost world-wide range. The Ostracod Entomis (Cypridina) was extremely abundant in places — Cypridinen-Schiefer — while the true Cypridina was also present along with Beyrichia, Leperditia, &c. The Phyllocarids, Echinocaris, Eleuthrocaris, Tropidocaris, are common in the United States. It is in the Old Red Sandstone that the eurypterids are best preserved; foremost among these was Pterygotus; P. anglicus has been found in Scotland with a length of nearly 6 ft. ; Eurypttrus, Slimonia, Stylonurus were other genera.

Insects appear well developed, including both orthopterous and neuropterous forms, in the New Brunswick rocks. Mr Scudder believed he had obtained a specimen of Orthoptera in which a stridulating organ was present. A species of Ephemera, allied to the modern may-fly, had a spread of wing extending to 5 in. In the Scottish Old Red Sandstone myriapods, Kampecaris andArchidesmus, have been described; they are somewhat simpler than more recent forms, each segment being separate, and supplied with only one pair of walking legs. Spiders and scorpions also lived upon the land.

The great number of fish remains in the Devonian and Old Red strata, coupled with the truly remarkable characters possessed by some of the forms, has caused the period to be described as the “age of fishes.” As in the case of the crustaceans, referred to above,we find one assemblage more or less peculiar to the freshwater orbrackish conditions of the Old Red, and another characteristic of the marine Devonian; on the whole the former is the richer in variety, but there seems little doubt that quite a number of genera were capable of living in either environment, whatever may have been the real condition of the Old Red waters. Foremost in interest are the curious ostracoderms, a remarkable group of creatures possessing many of

the characteristics of fishes, but more probably belonging to a distinct class of organisms, which appears to link the vertebrates with the arthropods. They had come into existence late in Silurian times ; but it is in the Old Red strata that their remains are most fully preserved. They were abundant in the fresh or brackish waters of Scotland,

England, Wales, Russia and Canada, and are represented by such forms as Pteraspis, Cephalaspis, Cyathaspis, Trematastpis, Bothriolepis and Pterichthys.

In the lower members of the Old Red series Dipterus, and in the upper members Phaneropleuron, represented the dipnoid lung-fishes; and it is of extreme interest to note that a few of these curious forms still survive in the African Protopterus, the Australian Ceratodus and the South American Lepidosiren, — all freshwater fishes. Distantly related to the lung-fishes were the singular arthrodirans, a group possessing the unusual faculty of moving the head in a vertical plane. These comprise the wide-ranging Coccosteus with Homosteus and Dinichthys, the largest fish of the period. The latter probably reached 20 ft. in length; it was armed with exceedingly powerful jaws provided with turtle-like beaks. Sharks were fairly prominent denizens of the sea ; some were armed with cutting teeth, others with crushing dental plates ; and although they were on the whole marine fishes, they were evidently able to live in fresher waters, like some of their modern representatives, for their remains, mostly teeth and large dermal spines, are found both in the Devonian and Old Red rocks. _ Mesacanthus, Diplacanthus, Climatius, Cheiracanthus are characteristic genera. The crossopterygians, ganoids with a scaly lobe in the centre of the fins, were represented by Holoptychius and Glypwpomus in the Upper Old Red, and by such genera asDiplopterus, Osteolepis, Gyroptychius in the lower division. The Polypterus of the Nile and Calamoichthys of South Africa are the modern exemplars of this group. Cheirolepis, found in the Old Red of Scotland and Canada, is the only Devonian representative of the actinopterygian fishes. The cyclostome fishes have, so far, been discovered only in Scotland, in the tiny Palaeospondylus. Amphibian remains have been found in the Devonian of Belgium ; and footprints supposed to belong to a creature of the same class (Thinopus antiquus) have been described by Professor Marsh from the Chemung formation of Pennsylvania.

Plant Life. — In the lacustrine deposits of the Old Red Sandstone we find the earliest well-defined assemblage of terrestrial plants. In some regions so abundant are the vegetable remains that in places they form thin seams of veritable coal. These plants evidently flourished around the shores of the lakes and lagoons in which their remains were buried along with the other forms of life. Lycopods and ferns were the predominant types ; and it is important to notice that both groups were already highly developed. The ferns include the genera Sphenopteris, Megalopteris, Archaeopleris, Neuropteris. Among the Lycopods are Lycopodites, Psilophyton, Lepidodendron. Modern horsetails are represented by Calamocladus, Aslerocalamites,

Annularia. Of great interest are the genera Cordaites, Araucari-oxylon, &c, which were synthetic types, uniting in some degree the Coniferae and the Cycadofilicales. With the exception of obscure markings, aquatic plants are not so well represented as might have been expected; Parka, a common fossil, has been regarded as a water plant with a creeping stem and two kinds of sporangia in sessile sporocarps.

Physical Conditions, &“c. — Perhaps the most striking fact that is brought out by a study of the Devonian rocks and their fossils is the gradual transgression of the sea over the land, which took place quietly in every quarter of the globe shortly after the beginning of the period. While in most places the Lower Devonian sediments succeed the Silurian formations in a perfectly conformable manner, the Middle and Upper divisions, on account of this encroachment of the sea, rest unconformably upon the older rocks, the Lower division being unrepresented. This is true over the greater part of South America, so far as our limited knowledge goes, in much of the western side of North America, in western Russia, in Thuringia and other parts of central Europe. Of the distribution of land and sea and the position of the coast lines in Devonian times we can state nothing with precision. The known deposits all point to shallow waters of epicontinental seas; no abyssal formations have been recognized. E. Kayser has pointed out the probability of a Eurasian sea province extending through Europe towards the east, across north and central Asia towards Manitoba in Canada, and an American sea province embracing the United States, South America and South Africa. At the same time there existed a great North Atlantic land area caused partly by the uplift of the Caledonian range just before the beginning of the period, which stretched across north Europe to eastern Canada; on the fringe of this land the Old Red Sandstone was formed.

In the European area C. Barrois has indicated the existence of three zones of deposition: (1) A northern, Old Red, region,

including Great Britain, Scandinavia, European Russia and Spitzbergen; here the land was close at hand; great brackish lagoons prevailed, which communicated more or less directly with the open sea. In European Russia, during its general advance, the sea occasionally gained access to wide areas, only to be driven off again, during pauses in the relative subsidence of the land, when the

continued terrigenous sedimentation once more established the lagoonal conditions. These alternating phases were frequently repeated. (2) A middle region, covering Devonshire and Cornwall, the Ardennes, the northern part of the lower Rhenish mountains, and the upper Harz to the Polish Mittelgebirge; here we find evidence of a shallow sea, clastic deposits and a sublittoral fauna. (3) A southern region reaching from Brittany to the south of the Rhenish mountains, lower Harz, Thuringia and Bohemia; here was a deeper sea with a more pelagic fauna. It must be borne in mind that the above-mentioned regions are intended to refer to the time when the extension of the Devonian sea was near its maximum. In the case of North America it has been shown that in early and middle Devonian time more or less distinct faunas invaded the continent from five different centres, viz. the Helderberg, the Oriskany, the Onondaga, the southern Hamilton and the north-western Hamilton; these reached the interior approxi- mately in the order given.

Towards the close of the period, when the various local faunas had mingled one with another and a more generalized life assemblage had been evolved, we find many forms with a very wide range, indicating great uniformity of conditions. Thus we find identical species of brachiopods inhabiting the Devonian seas of England, France, Belgium, Germany, Russia, southern Asia and China; such are, Hypothyris (Rhynchonella) cuboides, Spirifer disjunctus and others. The fauna of the Calceola shales can be traced from western Europe to Armenia and Siberia; the Stringocephalus limestones are represented in Belgium, England, the Urals and Canada; and the (Gephyroceras) intumescens shales are found in western Europe and in Manitoba.

The Devonian period was one of comparative quietude; no violent crustal movements seem to have taken place, and while some changes of level occurred towards its close in Great Britain, Bohemia and Russia, generally the passage from Devonian to Carboniferous conditions was quite gradual. In later periods these rocks have suffered considerable movement and meta- morphism, as in the Harz, Devonshire and Cornwall, and in the Belgian coalfields, where they have frequently been thrust over the younger Carboniferous rocks. Volcanic activity was fairly widespread, particularly during the middle portion of the period. In the Old Red rocks of Scotland there is a great thickness (6000 ft.) of igneous rocks, including diabases and andesitic lavas with agglomerates and tuffs. In Devonshire diabases and tuffs are found in the middle division. In west central Europe volcanic rocks are found at many horizons, the most common rocks are diabases and diabase tuffs, schalstein. Felsitic lavas and tuffs occur in the Middle Devonian of Australia. Contemporaneous igneous rocks are generally

absent in the American Devonian, but in Nova Scotia and New Brunswick there appear to be some.

There is little evidence as to the climate of this period, but it is interesting to observe that local glacial conditions may have existed in places, as is suggested by the coarse conglomerate with striated boulders in the upper Old Red of Scotland. On the other hand, the prevalence of reef-building corals points to moderately warm temperatures in the Middle Devonian seas.

The economic products of Devonian rocks are of some import- ance: in many of the metamorphosed regions veins of tin, lead, copper, iron are exploited, as in Cornwall, Devon, the Harz; in New Zealand, gold veins occur. Anthracite of Devonian age is found in China and a little coal in Germany, while the Upper Devonian is the chief source of oil and gas of western Pennsylvania and south-western New York. In Ontario the middle division is oil-bearing. Black phosphates are worked in central Tennessee, and in England the marls of the ” Old Red ” are employed for brick-making. vm.— 5

References. — The literature of the Devonian rocks and fossils is very extensive; important papers have been contributed by the following geologists: J. Barrande, C. Barrois, F. Beclard, E. W. Benecke, L. Beushausen, A. Champernowne, J. M. Clarke, Sir J. W. Dawson, A. Denckmann, J. S. Diller, E. Dupont, F. Freeh, J. Fournet, Sir A. Geikie, G. Giirich, R. Hoemes, E. Kayser, C. and M. Koch, A. von Koenen, Hugh Miller, D. P. Oehlert, C. S. Prosser, P. de Rouville, C. Schuchert, T. Tschernyschew, E. O. Ulrich, W. A. E. Ussher, P. N. Wenjukoff, G. F. Whidborne, J. F. Whiteaves and H. S. Williams. Sedgwick and Murchison’s original description appeared in the Trans. Geol. Soc. (2nd series, vol. v., 1839). Good general accounts will be found in Sir A. Geikie ‘s Text-Book of Geology (vol. ii., 4th ed., 1903), in E. Kayser’s Lehrbuch der Geologie (vol. ii., 2nd ed. , 1902) , and, for North America, in Chamberlin and Salisburv’s Geology (vol. ii., 1906). See the Index to the Geological Magazine (1864-1903), and insubsequent annual volumes ; Geological Literature added to the Geological Society’s Library (London), annually since 1893; and the Neues Jahrbuch fur Min., Geologie und Palaonlologie (Stuttgart, 2 annual volumes). The U.S. Geological Survey publishes at intervals a Bibliography and Index of North American Geology, &c, and this (e.g: Bulletin 301, — the Bibliog. and Index for 1901-1905) contains numerous references for the Devonian system in North America. (J. A. H.)

DEVONPORT, a municipal, county and parliamentary borough of

Devonshire, England, contiguous to East Stonehouse and Plymouth, the seat of one of the royal dockyards, and an im- portant naval and military station. Pop. (1901) 70,437. It is situated immediately above the N.W. angle of Plymouth Sound, occupying a triangular peninsula formed by Stonehouse Pool on the E. and the Hamoaze on the W. It is served by the Great Western and the London & South Western railways. The town proper was formerly enclosed by a line of ramparts and a ditch excavated out of the limestone, but these are in great part demolished. Adjoining Devonport are East Stonehouse (an urban district, pop. 15,111), Stoke and Morice Town, the two last being suburbs of Devonport. The town hall, erected in 1821-1822 partly after the design of the Parthenon, is distinguished by a Doric portico; while near it are the public library, in Egyptian style, and a conspicuous Doric column built of Devonshire granite. This monument, which is 100 ft. high, was raised in commemoration of the naming of the town in 1824. Other institutions are the Naval Engineering College, Keyham (1880); the municipal technical schools, opened in 1899, the majority of the students being connected with the dockyard; the naval barracks, Keyham (1885); the Raglan barracks and the naval and military hospitals. On Mount Wise, which was formerly defended by a battery (now a naval signalling station), stands the military residence, or Government House, occupied by the commander of the Plymouth Coast Defences; and near at hand is the principal naval residence, the naval commander-in- chief ‘s house. The prospect from Mount Wise over the Hamoaze to Mount Edgecumbe on the opposite shore is one of the finest in the south of England. The most noteworthy feature of Devon- port, however, is the royal dockyard, originally established by William III. in 1689 and until 1824 known as Plymouth Dock. It is situated within the old town boundary and contains four docks. To this in 1853 was added Keyham steamyard, situated higher up the Hamoaze beyond the old boundary and connected with the Devonport yard by a tunnel. In 1 896 further extensions were begun at the Keyham yard, which became known as Devonport North yard. Before these were begun the yard comprised two basins, the northern one being 9 acres and the southern 7 acres in area, and three docks, having floor-lengths of 2 95> 347 and 413 ft., together with iron and brass foundries, machinery shops, engineer students’ shop, &c. The new ex- tensions, opened by the Prince of Wales on the 21st of February 1907, cover a total area of 118 acres lying to the northward in front of the Naval Barracks, and involved the reclamation of 77 acres of mudflats lying below high-water mark. The scheme presented three leading features->-a tidal basin, a group of three graving docks with entrance lock, and a large enclosed basin with a coaling dep6t at the north end. The tidal basin, close to the old

Keyham north basin, is 740 ft. long with a mean width of 590 ft., and has an area of 10 acres, the depth being 32 ft. at low water of spring tides. It affords access to two graving docks, one with a floor-length of 745 ft. and 20§ ft. of water over the sill, and

the other with a length of 741 ft. and 32 ft. of water over the sill. Each of these can be subdivided by means of an intermediate caisson, and (when unoccupied) may serve as an entrance to the closed basin. The lock which leads from the tidal to the closed basin is 730 ft. long, and if necessary can be used as a dock. The closed basin, out of which opens a third graving dock, 660 ft. long, measures 155° ft. by 1000 ft. and has an area of 35ˆ acres, with a depth of 32 ft. at low- water springs; it has a direct entrance from the Hamoaze, closed by a caisson. The founda- tions of the walls are carried down to the rock, which in some places lies covered with mud 100 ft. or more below coping level. Compressed air is used to work the sliding caissons which close the entrances of the docks and closed basin. A ropery at Devonport produces half the hempen ropes used in the navy.

By the Reform Act of 1832 Devonport was erected into a parliamentary borough including East Stonehouse and returning two members. The ground on which it stands is for the most part the property of the St Aubyn family (Barons St Levan), whose steward holds a court leet and a court baron annually. The town is governed by a mayor, sixteen aldermen and forty- eight councillors. Area, 3044 acres.

DEVONPORT, EAST and WEST, a town of Devon county, Tasmania, situated on both sides of the mouth of the river Mersey, 193 m. by rail N.W. of Hobart. Pop. (1001), East Devonport, 673, West Devonport, 2101. There is regular com- munication from this port to Melbourne and Sydney, and it ranks as the third port in Tasmania. A celebrated regatta is held on the Mersey annually on New Year's day.

DEVONSHIRE, EARLS AND DUKES OF. The Devonshire title, now in the Cavendish family, had previously been held by Charles Blount (1563-1606), 8th Lord Mountjoy, great-grandson of the 4th Lord Mountjoy (d. 1534), the pupil of Erasmus; he was created earl of Devonshire in 1603 for his services in Ireland, where he became

famous in subduing the rebellion between 1600 and 1603; but the title became extinct at his death. In the Cavendish line the 1st earl of Devonshire was William (d. 1626), second son of Sir William Cavendish (q.v.), and of Elizabeth Hardwick, who afterwards married the 6th earl of Shrewsbury. He was created earl of Devonshire in 1618 by James I., and was succeeded by William, 2nd earl (1591-1628), and the latter by his son William (1617-1684), a prominent royalist, and one of the original members of the Royal Society, who married a daughter of the 2nd earl of Salisbury.

William Cavendish, 1st duke of Devonshire (1640-1707), English statesman, eldest son of the earl of Devonshire last mentioned, was born on the 25th of January 1640. After com- pleting his education he made the tour of Europe according to the custom of young men of his rank, being accompanied on his travels by Dr Killigrew. On his return he obtained, in 1661, a seat in parliament for Derbyshire, and soon became conspicuous as one of the most determined and daring opponents of the general policy of the court. In 1678 he was one of the committee appointed to draw up articles of impeachment against the lord treasurer Danby. In 1679 he was re-elected for Derby, and made a privy councillor by Charles II.; but he soon withdrew from the board with his friend Lord Russell, when he found that the Roman Catholic interest uniformly prevailed. He carried up to the House of Lords the articles of impeachment against Lord Chief- Justice Scroggs, for his arbitrary and illegal proceedings in the court of King's bench; and when the king declared his resolution not to sign the bill for excluding the duke of York, afterwards James II., he moved in the House of Commons that a bill might be brought in for the association of all his majesty's Protestant subjects. He also openly denounced the king's counsellors, and voted for an address to remove them. He appeared in defence of Lord Russell at his trial, at a time when it was scarcely more criminal to be an accomplice than a witness. After the condemnation he gave the utmost possible proof of his attachment by offering to exchange clothes with Lord Russell in the prison, remain in his place, and so allow him to effect his escape. In Novembr 1684 he succeeded to the earldom on the death of his father. He opposed arbitrary government under

James II. with the same consistency and high spirit as during the previous reign. He was withdrawn from public life for a time, however, in consequence of a hasty and imprudent act of which his enemies knew how to avail themselves. Fancying that he had received an insulting look in the presence chamber from Colonel Colepepper, a swaggerer whose attendance at court the king encouraged, he immediately avenged the affront by challeng- ing the colonel, and, on the challenge being refused, striking him with his cane. This offence was punished by a fine of £30,000, which was an enormous sum even to one of the earl's princely fortune. Not being able to pay he was imprisoned in the king's bench, from which he was released only on signing a bond for the whole amount. This was afterwards cancelled by King William. After his discharge the earl went for a time to Chatsworth, where he occupied himself with the erection of a new mansion, designed by William Talman, with decorations by Verrio, Thornhill and Grinling Gibbons. The Revolution again brought him

into prominence. He was one of the seven who signed the original paper inviting the prince of Orange from Holland, and was the first nobleman who appeared in arms to receive him at his landing. He received the order of the Garter on the occasion of the coronation, and was made lord high steward of the new court. In 1690 he accompanied King William on his visit to Holland. He was created marquis of Hartington and duke of Devonshire in 1694 by William and Mary, on the same day on which the head of the house of Russell was created duke of Bedford. Thus, to quote Macaulay, ” the two great houses of Russell and Cavendish, which had long been closely connected by friendship and by marriage, by common opinions, common sufferings and common triumphs, received on the same day the highest honour which it is in the power of the crown to confer.” His last public service was assisting to conclude the union with Scotland, for negotiating which he and his eldest son, the marquis of Hartington, had been appointed among the commissioners by Queen Anne. He died on the 18th of August 1707, and ordered the following inscription to be put on his monument: —

Willielmus Dux Devon, Bonorum Principum Fidelis Subditus, Inimicus et Invisus Tyrannis.

He had married in 1661 the daughter of James, duke of Ormonde, and he was succeeded by his eldest son William as 2nd duke, and by the latter’s son William as 3rd duke (viceroy of Ireland, 1737-1744). The latter’s son William (1720-1764) succeeded in 1755 as 4th duke; he married the daughter and heiress of Richard Boyle, earl of Burlington and Cork, who brought Lismore Castle and the Irish estates into the family; and from November 1756 to May 1757 he was prime minister, mainly in order that Pitt, who would not then serve under the duke of Newcastle, should be in power. His son William (1748-1811), 5 th duke, is memorable as the husband of the beautiful Georgiana Spencer, duchess of Devonshire (1757-1806), and of the intellec- tual Elizabeth Foster, duchess of Devonshire (1758-1824), both of whom Gainsborough painted. His son William, 6th duke (1790-1858), who died unmarried, was sent on a special mission to the coronation of the tsar Nicholas at Moscow in 1826, and became famous for his expenditure on that occasion; and it was he who employed Sir Joseph Paxton at Chatsworth. The title passed in 1858 to his cousin William (1808-1891), 2nd earl of Burlington, as 7th duke, a man who, without playing a prominent part in public affairs, exercised great influence, not only by his position but by his distinguished abilities. At Cambridge in 1829 he was second wrangler, first Smith’s prizeman, and eighth classic, and subsequently he became chancellor of the university.

Spencer Compton Cavendish, 8th duke (1833-1908), born on the 23rd of July 1833, was the son of the 7th duke (then earl of Burlington) and his wife Lady Blanche Howard (sister of the earl of Carlisle). In 1854 Lord Cavendish, as he then was, took his degree at Trinity College, Cambridge; in 1856 he was attached to the special mission to Russia for the new tsar's accession; and in 1857 he was returned to parliament as Liberal member for North Lancashire. At the opening of the new parliament of 1859 the

marquis of Hartington (as he had now become) moved the amendment to the address which overthrew the government of Lord Derby. In 1863 he became first a lord of the admiralty, and then under-secretary for war, and on the formation of the Russell- Gladstone administration at the death of Lord Palmerston he entered it as war secretary. He retired with his colleagues in July 1866; but upon Mr Gladstone's return to power in 1868 he became postmaster-general, an office which he exchanged in 187 1 for that of secretary for Ireland. When Mr Gladstone, after his defeat and resignation in 1874, temporarily withdrew from the leadership of the Liberal party in January 1875, Lord Hartington was chosen Liberal leader in the House of Commons, Lord Granville being leader in the Lords. Mr W. E. Forster, who had taken a much more prominent part in public life, was the only o.ther possible nominee, but he declined to stand. Lord Hartington's rank no doubt told in his favour, and Mr Forster's education bill had offended the Nonconformist members, who would probably have withheld their support. Lord Hartington's prudent management in difficult circumstances laid his followers under great obligations, since not only was the opposite party in the ascendant, but his own former chief was indulging in the freedom of independence. After the complete defeat of the Conservatives in the general election of 1880, a large pro- portion of the party would have rejoiced if Lord Hartington could have taken the Premiership instead of Mr Gladstone, and the queen, ,in strict conformity with constitutional usage (though Gladstone himself thought Lord Granville should have had the preference), sent for him as leader of the Opposition. Mr Gladstone, however, was clearly master of the situation: no cabinet could be formed without him, nor could he reasonably be expected to accept a subordinate post. Lord Hartington, there- fore, gracefully abdicated the leadership, and became secretary of state for India, from which office, in December 1882, he passed to the war office. His administration was memorable for the expeditions

of General Gordon and Lord Wolseley to Khartum, and a considerable number of the Conservative party long held him chiefly responsible for the “betrayal of Gordon.” His lethargic manner, apart from his position as war minister, helped to associate him in their minds with a disaster which emphasized the fact that the ‘government acted ” too late ” ; but Gladstone and Lord Granville were no less responsible than he. In June 1885 he resigned along with his colleagues, and in December was elected for the Rossendale Division of Lancashire, created by the new reform bill. Immediately afterwards the great political oppor- tunity of Lord Hartington’s life came to him in Mr Gladstone’s conversion to home rule for Ireland. Lord Hartington’s refusal to follow his leader in this course inevitably made him the chief of the new Liberal Unionist party, composed of a large and influential section of the old Liberals. In this capacity he moved the first resolution at the famous public meeting at the opera house, and also, in the House of Commons, moved the rejection of Mr Gladstone’s Bill on the second reading. D uring the memorable electoral contest which followed, no election excited more interest than Lord Hartington’s for the Rossendale division, where he was returned by a majority of nearly 1500 votes. In the new parliament he held a position much resembling that which Sir Robert Peel had occupied after his fall from power, the leader of a small, compact party, the standing and ability of whose members were out of all proportion to their numbers, generally esteemed and trusted beyond any other man in the country, yet in his own opinion forbidden to think of office. Lord Salisbury’s offers to serve under him as prime minister (both after the general election, and again when Lord Randolph Churchill resigned) were declined, and Lord Hartington continued to discharge the delicate duties of the leader of a middle party with no less judgment than he had shown when leading the Liberals during the interregnum of 1875-1880. It was not until 1895, when the differences between Conservatives and Liberal Unionists had become almost obliterated by changed circumstances, and the habit of acting together, that the duke of Devonshire, as he had become by the death of his father in 1891, consented to enter Lord Salisbury’s third ministry as president of the council. The duke thus was

the nominal representative of education in the cabinet at a time when educational questions were rapidly becoming of great importance; and his own technical knowledge of this difficult and intricate question being admittedly superficial, a good deal of criticism from time to time resulted. He had however by thi£ time an established position in public life, and a reputation for weight of character, which procured for him universal respect and confidence, and exemoted him from

bitter attack, even from his most determined political opponents. Wealth and rank combined with character to place him in a measure above party; and his succession to his father as chancellor of the university of Cambridge in 1892 indicated his eminence in the life of the country. In the same year he had married the widow of the 7 th duke of Manchester.

He continued to hold the office of lord president of the council till the 3rd of October 1903, when he resigned on account of differences with Mr Balfour (q.v.) over the latter's attitude towards free trade. As Mr Chamberlain had retired from the cabinet, and the duke had not thought it necessary to join Lord George Hamilton and Mr Ritchie in resigning a fortnight earlier, the defection was unanticipated and was sharply criticized by Mr Balfour, who, in the rearrangement of his ministry, had only just appointed the duke's nephew and heir, Mr Victor Cavendish, to be secretary to the treasury. But the duke had come to the conclusion that while he himself was substantially a free-trader, 1 Mr Balfour did not mean the same thing by the term. He necessarily became the leader of the Free Trade Unionists who were neither Balfourites nor Chamberlainites, and his weight was thrown into the scale against any association of Unionism with the constructive policy of tariff reform, which he identified with sheei Protection. A struggle at once began within the Liberal Unionist organization between those who followed the duke and those who followed Mr Chamberlain (q.v.); but the latter were in the majority and a reorganization in the Liberal Unionist Association took place, the Unionist free-traders seceding and becoming a separate body. The duke then- became president of the new organizations, the Unionist Free Food League and the Unionist Free Trade Club. In the subsequent developments the duke played a dignified but somewhat silent part, and the Unionist rout in 1906 was not unaffected by his open hostility to any taint of compromise with the tariff reform movement. But in the autumn of 1907 his health gave way, and grave symptoms of cardiac weakness necessitated his abstaining from public effort and spending the winter abroad. He died, rather suddenly, at Cannes on the 24th of March 1908.

The head of an old and powerful family, a wealthy territorial magnate, and an Englishman with thoroughly national tastes for sport, his weighty and disinterested character made him a statesman of the first rank in his time, in spite of the absence of showy or brilliant qualities. He had no self-seeking ambitions, and on three occasions preferred not to become prime minister. Though his speeches were direct and forcible, he was not an orator, nor " clever "; and he lacked all subtlety of intellect; but he was conspicuous for solidity of mind

and straightforwardness of action, and for conscientious application as an administrator, whether in his public or private life. The fact that he once yawned in the middle of a speech of his own was commonly quoted as characteristic; but he combined a great fund of common sense and knowledge of the average opinion with a patriotic sense of duty towards the state. Throughout his career he remained an old-fashioned Liberal, or rather Whig, of a type which in his later years was becoming gradually more and more rare.

There was no issue of his marriage, and he was succeeded as 9th duke by his nephew Victor Christian Cavendish (b. 1868), who had been Liberal Unionist member for West Derbyshire since 1891, and was treasurer of the household (1900 to 1903) and

1 His own words to Mr Balfour at the time were: ” I believe that our present system of free imports is on the whole the most advantageous to the country, though I do not contend that the principles on which it rests possess any such authority or sanctity as to forbid any departure from it, for sufficient reasons.”

financial secretary to the treasury (1963 to 1905); in 1892 he married a daughter of the marquess of Lansdowne, by whom he had two sons. (H. Ch.)

DEVONSHIRE (Devon), a south-western county of England, bounded N.W. and N. by the Bristol Channel, N.E. by Somerset and Dorset, S.E. and S. by the English Channel, and W. by Cornwall. The area, 2604-9 S Q- m -> i s exceeded only by those of Yorkshire and Lincolnshire among the English counties. Nearly the whole of the surface is uneven and hilly. The county contains the highest landin England south of Derbyshire (excepting points on the south Welsh border) ; and the scenery, much varied, is in most parts striking and picturesque. The heather-clad uplands of Exmoor, though chiefly within the borders of Somerset, extend into North Devon, and are still the haunt of red deer, and of the small hardy ponies called after the district. Here, as on Dart- moor, the streams are rich in trout. Dartmoor, the principal physical feature of the county, is a broad and lofty expanse of moorland which rises in the southern part. Its highest point, 2039 ft., is found in the north-western portion. Its rough wastes contrast finely with the wild but wooded region which immediately surrounds the granite of which it is composed, and with the rich cultivated country

lying beyond. Especially noteworthy in this fertile tract are the South Hams, a fruitful district of apple orchards, lying between the Erme and the Dart; the rich meadow-land around Crediton, in the vale of Exeter; and the red rocks near Sidmouth. Two features which lend a character- istic charm to the Devonshire landscape are the number of picturesque old cottages roofed with thatch; and the deep lanes, sunk below the common level of the ground, bordered by tall ‘■ hedges, and overshadowed by an arch of boughs. The north and south coasts of the county differ much in character, but both have grand cliff and rock scenery, not surpassed by any in England or Wales, resembling the Mediterranean seaboard in its range of colour. As a rule the long combes or glens down which the rivers flow seaward are densely wooded, and the country immediately inland is of great beauty. Apart from the Tamar, which consti- tutes the boundary between Devon and Cornwall, and flows into the English Channel, after forming in its estuary the harbours of Devonport and Plymouth, the principal rivers rise on Dartmoor. These include the Teign, Dart, Plym and Tavy, falling into the English Channel, and the Taw flowing north towards Bideford Bay. The river Torridge, also discharging northward, receives part of its waters from Dartmoor through the Okement, but itself rises in the angle of high land near Hartland point on the north coast, and makes a wide sweep southward. The lesser Dartmoor streams are the Avon, the Erme and the Vealm, all running south. The Exe rises on Exmoor in Somersetshire; but the main part of its course is through Devonshire (where it gives name to Exeter), and it is joined on its way to the English Channel by the lesser streams of the Culm, the Creedy and the Clyst. The Otter, rising on the Blackdown Hills, also runs south, and the Axe, for part of its course, divides the counties of Devon and Dorset. These eastern streams are comparatively slow; while the rivers of Dartmoor have a shorter and more rapid course.

Geology. — The greatest area occupied by any one group of rocks in Devonshire is that covered by the Culm, a series of slates, grits and greywackes, with some impure limestones and occasional radioiarian cherts as at Codden Hill; beds of ” culm,” an impure variety of coal, are found at Bideford and elsewhere. This series of rocks occurs at Bampton, Exeter and Chudleigh and extends thence to the western boundary. North and south of the Culm an older series of slates, grits and limestones appears; it was considered so characteristic of the county that it was called the Devonian system (q.v.), the marine equivalent of the Old Red Sandstone of Hereford and Scotland. It lies in the form of a trough with its axis running east and west. In the central hollow the Culm reposes, while the northern and southern rims rise to the surface respectively north of the latitude of Barn-

staple and South Molton and south of the latitude of Tavistock. These Devonian rocks have been subdivided into upper, middle and lower divisions, but the stratigraphy is difficult to follow as the beds have suffered much crumpling; fine examples of contorted strata may be seen almost anywhere on the north coast, and in the south, at Bolt Head and Start Point they have undergone severe meta- . moronism. Limestones are only poorly developed in the north, but in the south important masses occur, in the middle and at the base

of the upper subdivisions, about Plymouth, Torquay, Brixham and between Newton Abbot and Totnes. Fossil corals abound in these limestones, which are largely quarried and when polished are known as Devonshire marbles.

On the eastern side of the county is found an entirely different set of rocks which cover the older series and dip away from them gently towards the east. The lower and most westerly situated members of the younger rocks is a series of breccias, conglomerates, sandstones and marls which are probably of lower Bunter age, but by some geologists have been classed as Permian. These red rocks are beautifully exposed on the coast by Dawlish and Teignmouth, and they extend inland, producing a red soil, past Exeter and Tiverton. A long narrow strip of the same formation reaches out westward on the top of the Culm as far as Jacobstow. Farther east, the Bunter pebble beds are represented by the well-known pebble deposit of Budleigh Salterton, whence they are traceable inland towards Rockbeare. These are succeeded by the Keuper marls and sand- stones, well exposed at Sidmouth, where the upper Greensand plateau is clearly seen to overlie them. The Greensand • covers all the high ground northward from Sidmouth as far as the Black- down Hills. At Beer Head and Axmouth the Chalk is seen, and at the latter place is a famous landslip on the coast, caused by the springs which issue from the Greensand below the Chalk. The Lower Chalk at Beer has been mined for building stone and was formerly in considerable demand. At the extreme east of the county, Rhaetic and Lias beds make their appearance, the former with a ” bone ” bed bearing the remains of saurians and fish.

Dartmoor is a mass of granite that was intruded into the Culm and Devonian strata in post-Carboniferous times and subsequently exposed by denudation. Evidences of Devonian volcanic activity are abundant in the masses of diabase, dolerite, &c., at Bradford and Trusham, south of Exeter, around Plymouth and at Ashprington. Perhaps the most interesting is the Carboniferous volcano of Brent Tor near Tavistock. An Eocene deposit, the product of the denuda- tion of the Dartmoor

Hills, lies in a small basin at Bovey Tracey (see Bovey Beds) ; it yields beds of lignite and valuable clays.

Raised beaches occur at Hope's Nose and the Thatcher Stone near Torquay and at other points, and a submerged forest lies in the bay south of the same place. The caves and fissures in the Devonian limestone at Kent's Hole near Torquay, Brixham and Oreston are famous for the remains of extinct mammals ; bones of the elephant, rhinoceros, bear and hyaena have been found as well as flint implements of early man.

Minerals. — Silver-lead was formerly worked at Combe Martin near the north coast, and elsewhere. Tin has been worked on Dartmoor (in stream works) from an unknown period. Copper was not much worked before the end of the 18th century. Tin occurs in the granite of Dartmoor, and along its borders, but rather where the Devonian than where the Carboniferous rocks border the granite. It is found most plentifully in the district which surrounds Tavistock, which, for tin and other ores, is in effect the great mining district of the county. Here, about 4 m. from Tavistock, are the Devon Great Consols mines, which from 1843 to 187 1 were among the richest copper mines in the world, and by far the largest and most profitable in the kingdom. The divided profits during this period amounted to £1,192,960. But the mining interests of Devonshire are affected by the same causes, and in the same way, as those of Cornwall. The quantity of ore has greatly diminished, and the cost of raising it from the deep mines prevents competition with foreign markets. In many mines tin underlies the general depth of the copper, and is worked when the latter has been exhausted. The mineral products of the Tavistock district are various, and besides tin and copper, ores of zinc and iron are largely distributed. Great quantities of refined arsenic have been produced at the Devon Great Consols mine, by elimination from the iron pyrites contained in the various lodes. Manganese occurs in the neighbourhood of Exeter, in the valley of the Teign and in N. Devon ; but the most profitable mines, which are shallow, are, like those of tin and copper, in the Tavistock district.

The other mineral productions of the county consist of marbles, building stones, slates and potters' clay. Among building stones, the granite of Dartmoor holds the foremost place. It is much quarried near Princetown, near Moreton Hampstead on the N.E. of Dartmoor and elsewhere. The annual export is considerable. Hard traps, which occur in many places, are also much used, as are the lime- stones of Buckfastleigh and of Plymouth. The Roborough stone, used from an early period in Devonshire churches, is found near Tavistock, and is a

hard, porphyritic elvan, taking a fine polish. Excellent roofing slates occur in the Devonian series round the southern part of Dartmoor. The chief quarries are near Ashburton and Plymouth (Cann quarry). Potters clay is worked at King's Teignton, whence it is largely exported; at Bovey Tracey; and at Watcombe near Torquay. The Watcombe clay is of the finest quality. China clay or kaolin is found on the southern side of Dartmoor, at Lee Moor, and near Trowlesworthy. There is a large deposit of umber close to Ashburton.

Climate and Agriculture.— The climate varies greatly in different parts of the county, but everywhere it is more humid

than that of the eastern or south-eastern parts of England. The mean annual temperature somewhat exceeds that cf the mid- lands, but the average summer heat is rather less than that of the southern counties to the east. The air of the Dartmoor highlands is sharp and bracing. Mists are frequent, and snow often lies long. On the south coast frost is little known, and many half hardy plants, such as hydrangeas, myrtles, geraniums and helio- tropes, live through the winter without protection. The climate of Sidmouth, Teignmouth, Torquay and other watering places on this coast is very equable, the mean temperature in January being 43-6° at Plymouth. The north coast, exposed to the storms and swell of the Atlantic, is more bracing; although there also, in the more sheltered nooks (as at Combe Martin), myrtles of great size and age flower freely, and produce their annual crop of berries.

Rather less than three-quarters of the total area of the county is under cultivation; the cultivated area falling a little below the average of the English counties. There are, however, about 160,000 acres of hill pasture in addition to the area in permanent pasture, which is more than one-half that of the cultivated area. The Devon breed of cattle is well adapted both for fattening and for dairy purposes; while sheep are kept in great numbers on the hill pastures. Devonshire is one of the chief cattle-farming and sheep-farming counties. It is specially famous for two products of the dairy — the clotted cream to which it gives its name, and junket. Of the area under grain crops, oats occupy about three times the acreage under wheat or barley. The bulk of the acreage under green crops is occupied by turnips, swedes and mangold. Orchards occupy a large acreage, and consist chiefly of apple-trees, nearly every farm maintaining one for the manufacture of cider.

Fisheries. — Though the fisheries of Devon are less valuable than those of Cornwall, large quantities of the pilchard and herrings caught in Cornish waters are landed at Plymouth. Much of the fishing is carried on within the three-mile limit; and it may be asserted that trawling is the main feature of the Devon- shire industry, whereas seining and driving characterize that of Cornwall. Pilchard, cod, sprats, brill, plaice, soles, turbot, shrimps, lobsters, oysters and mussels are met with, besides herring and mackerel, which are fairly plentiful. After Ply- mouth, the principal fishing station is at Brixham, but there are lesser stations in every bay and estuary.

Other Industries. — The principal industrial works in the county are the various Government establishments at Plymouth and Devonport. Among other industries may be noted the lace- works at Tiverton; the manufacture of pillow-lace for which Honiton and its neighbourhood has long been famous; and the potteries and terra-cotta works of Bovey Tracey and Watcombe. Woollen goods and serges are made at Buckfastleigh and Ashburton, and boots and shoes at Crediton. Convict labour is employed in the direction of agriculture, quarrying, &c, in the great prison of Dartmoor.

Communications. — The main line of the Great Western railway, entering the county in the east from Taunton, runs to Exeter, skirts the coast as far as Teignmouth, and continues a short distance inland by Newton Abbot to Plymouth, after which it crosses the estuary of the Tamar by a great bridge to Saltash in Cornwall. Branches serve Torquay and other seaside resorts of the south coast; and among other branches are those from Taunton to Barnstaple and from Plymouth northward to Tavistock and Launceston. The main line of the London & South- Western railway between Exeter and Plymouth skirts the north and west of Dartmoor by Okehampton and Tavistock. A branch from Yeoford serves Barnstaple, Ilfracombe, Bideford and Torrington, while the Lynton & Barnstaple and the Bideford, Westward Ho & Appledore lines serve the districts indicated by their names. The branch line to Princetown from the Plymouth-Tavistock line of the Great Western company in part follows the line of a very early railway — that constructed to connect Plymouth with the Dartmoor prison in 1819-1825, which was worked with horse cars. The only waterways of any importance are the Tamar, which is navigable up to Gunnislake

(3 m. S.W. of Tavistock), and the Exeter ship canal, noteworthy as one of the oldest in England, for it was originally cut in the reign of Elizabeth.

Population and Administration. — Theareaof theancient county is

1,667,154 acres, with a population in 1891 of 631,808, and 1901 of 661,314. The area of the administrative county is 1,671,168 acres. The county contains 33 hundreds. The municipal boroughs are Barnstaple (pop. 14,137), Bideford (8754), Dart- mouth (6579), Devonport, a county borough (70,437), Exeter, a city and county borough (47,185), Torrington, officially Great Torrington(3 241), Honiton(327i),Okehampton(2569), Plymouth, a county borough (107,636), South Molton (2848), Tiverton (10,382), Torquay (33,625), Totnes (403-5). The other urban districts are Ashburton (2628), Bampton (1657), Brixham (8092), Buckfastleigh (2520), Budleigh Sal terton (1883), Crediton (3974), Dawlish (4003), East Stonehouse (15,111), Exmouth (10,485), Heavitree (7529), Holsworthy (1371), Ilfracombe (8557), Ivy- bridge (1575), Kingsbridge (3025), Lynton (1641), Newton Abbot (12,517), Northam (5355), Ottery St Mary (3495), Paignton (8385), Salcombe (1710), Seaton (1325), Sidmouth (4201), Tavistock (4728), Teignmouth (8636). The county is in the western circuit, and assizes are held at Exeter. It has one court of quarter sessions, and is divided into twenty-four petty sessional divisions. The boroughs of Barnstaple, Bideford, Devonport, Exeter, Plymouth, South Molton, and Tiverton have separate commissions of the peace and courts of quarter sessions, and those of Dartmouth, Great Torrington, Torquay and Totnes have commissions of the peace only. There are 46 1 civil parishes. Devonshire is in the diocese of Exeter, with the exception of small parts in those of Salisbury and Truro; and there are 516 ecclesiastical parishes or districts wholly or in part within the county. The parliamentary divisions are the Eastern or Honiton, North-eastern or Tiverton, Northern or South Molton, North- western or Barnstaple, Western or Tavistock, Southern or Totnes, Torquay, and Mid or Ashburton, each returning one member; and the county also contains the parliamentary boroughs of Devonport and Plymouth, each returning two members, and that of Exeter, returning one member.

History.— The Saxon conquest of Devonshire must have begun some time before the 8th century, for in 700 there existed at Exeter a famous Saxon school. By this time, however, the Saxons had become Christians, and established their supremacy, not by destructive inroads, but by a gradual process of coloniza- tion, settling among the native Welsh and allowing them to hold lands under equal laws. The final incorporation of the district which is now Devonshire with the kingdom of Wessex must have taken place about 766, but the county, and even Exeter, remained partly Welsh until the time of /Ethelstan. At the beginning of the 9th century Wessex was divided into definite pagi, probably corresponding to the later shires, and the Saxon

Chronicle mentions Devonshire by name in 823, when a battle was fought between the Welsh in Cornwall and the people of Devonshire at Camelford. During the Danish invasions of the 9th century aldermen of Devon are frequently mentioned. In 851 the invaders were defeated by the fyrd and aldermen of Devon, and in 878, when the Danes under Hubba were harrying the coast with a squadron of twenty-three ships, they were again defeated with great slaughter by the fyrd. The modern hundreds of Devonshire correspond in position very nearly with those given in the Domesday Survey, though the names have in many cases been changed, owing generally to alterations in their places of meeting. The hundred of Bampton formerly included estates west of the Exe, now transferred to the hundred of Witheridge. Ten of the modern hundreds have been formed by the union of two or more Domesday hundreds, while the Domesday hundred of Liston has had the new hundred of Tavistock severed from it since 11 14. Many of the hundreds were separated by tracts of waste and forest land, of which Devonshire contained a vast extent, until in 1204 the inhabitants paid 5000 marks to have the county disafforested, with the exception only of Dartmoor and Exmoor;

Devonshire in the 7th century formed part of the vast bishopric

of Dorchester-on-Thames. In 705 it was attached to the newly created diocese of Sherborne, and in 910 Archbishop Plegmund constituted Devonshire a separate diocese, and placed the see at Crediton. About 1030 the dioceses of Devonshire and Cornwall were united, and in 1049 the see was fixed at Exeter. The arch- deaconries of Exeter, Barnstaple and Totnes are all mentioned in the 12th century and formerly comprised twenty-four deaneries. The deaneries of Three Towns, Collumpton and Ottery have been created since the 16th century, while those of Tamerton, Dunkeswell, Dunsford and Plymptre have been abolished, bring- ing the present number to twenty-three.

At the time of the Norman invasion Devonshire showed an active hostility to Harold, and the easy submission which it rendered to the Conqueror accounts for the exceptionally large number of Englishmen who are found retaining lands after the Conquest. The many vast fiefs held by Norman barons were known as honours, chief among them being Plympton, Oke- hampton, Barnstaple, Harberton and Totnes. The honour of Plympton was bestowed in the 12th century on the

Redvers family, together with the earldom of Devon; in the 13th century it passed to the Courtenay family, who had already become possessed of the honour of Okehamoton, and who in 1335 obtained the earldom. The dukedom of Exeter was bestowed in the 14th century on the Holland family, which became extinct in the reign of Edward IV. The ancestors of Sir Walter Raleigh, who was born at Budleigh, had long held considerable estates in the county.

Devonshire had an independent sheriff, the appointment being at first hereditary, but afterwards held for one year only. In 1 3 20 complaint was made that all the hundreds of Devonshire were in the hands of the great lords, who did not appoint a sufficiency of bailiffs for their proper government. The miners of Devon had independent courts, known as stannary courts, for the regulation of mining affairs, the four stannary towns being Tavistock, Ashburton, Chagford, and Plympton. The ancient miners' parliament was held in the open air at Crockern's Tor.

The castles of Exeter and Plympton were held against Stephen by Baldwin de Redvers, and in the 14th and 15th centuries the French made frequent attacks on the Devonshire coast, being repulsed in 1404 by the people of Dartmouth. In the Wars of the Roses the county was much divided, and frequent skirmishes took place between the earl of Devon and Lord Bonville, the respective champions of the Lancastrian and Yorkist parties. Great dis- turbances in the county followed the Reformation of the 16th century and in 1549 a priest was compelled to say mass at Sampford Courtney. On the outbreak of the Civil War the county as a whole favoured the parliament, but the prevailing desire was for peace, and in 1643 a treaty for the cessation of hostilities in Devonshire and Cornwall was agreed upon. Skirmishes, however, continued until the capture of Dartmouth and Exeter in 1S46 put an end to the struggle. In 1688 the prince of Orange landed at To bay and was entertained for several days at Ford and at Exeter.

The tin mines of Devon have been worked from time im- memorial, and in the 14th century mines of tin, copper, lead, gold and silver are mentioned. Agriculturally the county was always poor, and before the disafforestation rendered especially so through the ravages committed by the herds of wild deer. At the time of the Domesday Survey the salt industry was important, and there were ninety-nine mills in the county and thirteen fisheries. From an early period the chief manufacture was that of woollen cloth, and a statute 4 Ed. IV. permitted the manu- facture of cloths of a distinct make in certain parts of Devonshire. About 1505 Anthony Bonvis, an Italian,

introduced an improved method of spinning into the county, and cider-making is mentioned in the 16th century. In 1680 the lace industry was already flourishing at Colyton and Ottery St Mary, and flax, hemp and malt were largely produced in the 17th and 18th centuries.

Devonshire returned two members to parliament in 1290, and in 1 295 Barnstaple, Exeter, Plympton, Tavistock, Torrington and Totnes were also represented. In 1831 the county with its

boroughs returned a total of twenty-six members, but under the Reform Act of 1832 it returned four members in two divisions, and with ten boroughs was represented by a total of eighteen members. Under the act of 1868 the county returned six members in three divisions, and four of the boroughs were dis- franchised, making a total of seventeen members.

Antiquities. — In primeval antiquities Devonshire is not so rich as Cornwall; but Dartmoor abounds in remains of the highest interest, the most peculiar of which are the long parallel align- ments of upright stones, which, on a small scale, resemble those of Carnac in Brittany. On Dartmoor the lines are invariably straight, and are found in direct connexion with cairns, and with circles which are probably sepulchral. These stone avenues are very numerous. Of the so-called sacred circles the best examples are the ” Longstones ” on Scorhill Down, and the ” Grey Wethers ” under Sittaford Tor. By far the finest cromlech is the ” Spinster’s Rock ” at Drewsteignton, a three- pillared cromlech which may well be compared with those of Cornwall. There are numerous menhirs or single upright stones; a large dolmen or holed stone lies in the bed of the Teign, near the Scorhill circle; and rock basins occur on the summit of nearly every tor on Dartmoor (the largest are on Kestor, and on Heltor, above the Teign). It is, however, tolerably evident that these have been produced by the gradual disintegration of the granite, and that the dolmen in the Teign is due to the action of the river. Clusters of hut foundations, circular, and formed of rude granite blocks, are frequent; the best example of such a primitive village is at Batworthy, near Chagford; the type resembles that of East Cornwall. Walled enclosures, or pounds, occur in many places; Grimspound is the most remarkable. Boundary lines, also called trackways, run across Dartmoor in many directions; and the rude bridges, formed of great slabs of granite, deserve notice. All these remains are on Dartmoor. Scattered over the county are numerous large hill castles and camps,— all earthworks, and all apparently of the British period. Roman relics have been found from time to time at Exeter (Isca Damnoniorum), the only large Roman station in the

county.

The churches are for the most part of the Perpendicular period, dating from the middle of the 14th to the end of the 1 5th century. Exeter cathedral is of course an exception, the whole (except the Norman towers) being very beautiful Decorated work. The special features of Devonshire churches, however, are the richly carved pulpits and chancel screens of wood, in which this county exceeded every other in England, with the exception of Norfolk and Suffolk. The designs are rich and varied, and the skill dis- played often very great. Granite crosses are frequent, the finest and earliest being that of Coplestone, near Crediton. Monastic remains are scanty; the principal are those at Tor, Buckfast, Tavistock and Buckland Abbeys. Among domestic buildings the houses of Wear Gifford, Bradley and Dartington of the 15th century; Bradfield and Holcombe Rogus (Elizabethan), and Forde (Jacobean), deserve notice. The ruined castles of Okehampton (Edward I.), Exeter, with its vast British earth- works, Berry Pomeroy (Henry III., with ruins of a large Tudor mansion), Totnes (Henry III.) and Compton (early 15th century), are all interesting and picturesque.

Authorities. — T. Westcote, Survey of Devon, written about 1630, and first printed in 1845; J. Prince, Worthies of Devon (Exeter, 1701); Sir W. Pole, Collections towards a History of the County of Devon (London, 1 791); R. Polwhele, History of Devonshire (3 vols. Exeter, 1797, 1 798-1 800); T. Moore, History of Devon from the Earliest Period to the Present Time (vols, i., ii., London, 1829-1831) ; G. Oliver, Historic Collections relating to the Monasteries in Devon (Exeter, 1820); D. and S. Lysons, Magna Britannia (vol. vi., London, 1822); Ecclesiastical Antiquities in Devon (Exeter, 1844); Mrs Bray, Traditions of Devonshire, in a series of “letters to Robert Southey (London, 1838) ; G. C. Boase, Devonshire Bibliography (London, 1883); Sir W. R. Drake, Devonshire Notes and Notelets (London, 1888) ; S. Hewett, Peasant Speech of Devon (London, 1892) ; R. N. Worth, History of Devonshire (London, 1886, new edition, 1895); C. Worthy, Devonshire Parishes (Exeter, 1887); Devonshire Wills (London, 1896); Victoria County History, Devonshire.

DEVRIENT, the name of a family of German actors.

Ludwig Devrient (1784-1832), born in Berlin on the 15th of December 1784, was the son of a silk merchant. He was

apprenticed to an upholsterer, but, suddenly leaving his employment, joined a travelling theatrical company, and made his first appearance on the stage at Gera in 1804 as the messenger in Schiller's Braut von Messina. By the interest of Count Brtihl, he appeared at Rudolstadt as Franz Moor in Schiller's Rduber, so successfully that he obtained a permanent engagement at the ducal theatre in Dessau, where he played until 1809. He then received a call to Breslau, where he remained for six years. So brilliant was his success in the title-parts of several of Shake- speare's plays, that Iffland began to fear for his own reputation; yet that great artist was generous enough to recommend the young actor as his only possible successor. On Inland's death Devrient was summoned to Berlin, where he was for fifteen years the popular idol. He died there on the 30th of December 1832. Ludwig Devrient was equally great in comedy and tragedy. Falstaff, Franz Moor, Shylock, King Lear and Richard II. were among his best parts. Karl von Holtei in his Reminiscences has given a graphic picture of him and the " demoniac fascination " of his acting.

See Z. Funck, Aus dent Leben zweier Schauspieler, Ifflands und Devrients (Leipzig, 1838); H. Smidt in Devrient- Novellen (3rd ed., Berlin, 1882); R. Springer in the novel Devrient und Hoffmann (Berlin, 1873), and Eduard Devrient's Geschichte der deutschen Schauspielkunst (Leipzig, 1861).

Three of the nephews of Ludwig Devrient, sons of his brother, a merchant, were also connected with the stage. Karl August Devrient (1797-1872) was born at Berlin on the 5th of April 1797. After being for a short time in business, he entered a cavalry regiment as volunteer and fought at Waterloo. He then joined the stage, making his first appearance on the stage in 1819 at Brunswick. In 182 1 he received an engagement at the court theatre in Dresden, where, in 1823, he married Wilhelmine Schroder (see Schroder-Devrient). In 1835 he joined the company at Karlsruhe, and in 1839 that at Hanover. His best parts were Wallenstein and King Lear. He died on the 5th of April 1872. His brother Philipp Eduard Devrient (1801-1877), born at Berlin on the nth of August 1801, was for a time an opera singer. Turning his attention to theatrical management, he was from 1844 to 1846 director of the court theatre in Dresden. Appointed to Karlsruhe in 1852, he began a thorough reorganization of the theatre, and in the course of seventeen years of assiduous labour, not only raised it to a high position, but enriched its repertory by many noteworthy librettos, among which Die Gunst des Augenblicks and Verirrungen are the best known. But his chief work is his history of the German stage — Geschichte der deutschen Schauspielkunst (Leipzig, 1848- 1874). He died on the 4th of October

1877. A complete edition of his works — Dramatische und dramaturgische Schriften — was published in ten volumes (Leipzig, 1846-1873).

The youngest and the most famous of the three nephews of Ludwig Devrient was Gustav Emil Devrient (1803-1872), born in Berlin on the 4th of September 1803 . He made his first appear- ance on the stage in 1821, at Brunswick, as Raoul in Schiller's Jungfrau von Orleans. After a short engagement in Leipzig, he received in 1829 a call to Hamburg, but after two years accepted a permanent appointment at the court theatre in Dresden, to which he belonged until his retirement in 1868. His chief characters were Hamlet, Uriel Acosta (in Karl Gutzkow's play), Marquis Posa (in Schiller's Don Carlos), and Goethe's Torquato Tasso. He acted several times in London, where his Hamlet was considered finer than Kemble's or Edmund Kean's. He died on the 7th of August 1872.

Otto Devrient (1838-1894), another actor, born in Berlin on the 3rd of October 1838, was the son of Philipp Eduard Devrient. He joined the stage in 1856 at Karlsruhe, and acted successively in Stuttgart, Berlin and Leipzig, until he received a fixed appointment at Karlsruhe, in 1863. In 1873 he became stage manager at Weimar, where he gained great praise for his mise en scene of Goethe's Faust. After being manager of the theatres in Mannheim and Frankfort he retired to Jena, where in 1883 he was given the honorary degree of doctor of philosophy. In 1884 he was appointed director of the court theatre in Oldenburg, and

in 1889 director of dramatic plays in Berlin. He died at Stettin on the 23rd of June 1894.

DEW. The word "dew" (O.E. deaw ; cf. Ger. Tau) is a very ancient one and its meaning must therefore be defined on historical principles. According to the New English Dictionary, it means " the moisture deposited in minute drops upon any cool surface by condensation of the vapour of the atmosphere; formed after a hot day, during or towards night and plentiful in the early morning." Huxley in his Physiography makes the addition " without production of mist." The formation of mist is not necessary for the formation of dew, nor does it necessarily prevent it. If the deposit of moisture is in the form of ice instead of water it is called hoarfrost. The researches of Aitken suggest that the words " by condensation of the vapour in the atmo- sphere " might be omitted from the definition. He has given reasons for believing that the large dewdrops on the leaves of plants, the most characteristic of all the phenomena of dew, are to be accounted for, in

large measure at least, by the exuding of drops of water from the plant through the pores of the leaves themselves. The formation of dewdrops in such cases is the con- tinuation of the irrigation process of the plant for supplying the leaves with water from the soil. The process is set up in full vigour in the daytime to maintain tolerable thermal conditions at the surface of the leaf in the hot sun, and continued after the sun has gone.

On the other hand, the most typical physical experiment illus- trating the formation of dew is the production of a deposit oi moisture, in minute drops, upon the exterior surface of a glass or polished metal vessel by the cooling of a liquid contained in the vessel. If the liquid is water, it can be cooled by pieces of ice; if volatile like ether, by bubbling air through it. No deposit is formed by this process until the temperature is reduced to a point which, from that circumstance, has received a special name, although it depends upon the state of the air round the vessel. So generally accepted is the physical analogy between the natural formation of dew and its artificial production in the manner described, that the point below which the temperature of a surface must be reduced in order to obtain the deposit is known as the ” dew-point.”

In the view of physicists the dew-point is the temperature at which, by being cooled without change of pressure, the air becomes saturated with water vapour, not on account of any increase of supply of that compound, but by the diminution of the capacity of th” air for holding it in the gaseous condition. Thus, when the dew-point temperature has been determined, the pressure of water vapour in the atmosphere at the time of the deposit is given by reference to a taole of saturation pressures of water vapour at different temperatures. As it is a well-established proposition that the pressure of the water vapour in the air does not vary while the air is being cooled without change of its total external pressure, the saturation pressure at the dew-point gives the pressure of water vapour in the air when the cooling commenced. Thus the artificial formation of dew and consequent determination of the dew-point is a recognized method of measuring the pressure, and thence the amount of water vapour in the atmosphere. The dew-point method is indeed in some ways a fundamental method of hygrometry.

The dew-point is a matter of really vital consequence in the question of the oppressiveness of the atmosphere or its reverse. So long as the dew-point is low, high temperature does not matter, but when the dew-point begins to approach the normal tempera- ture of the human body the atmosphere becomes insupportable.

The physical explanation of the formation of dew consists practically in determining the process or processes by which leaves, blades of grass, stones, and other objects in the open air upon which dew may be observed, become cooled ” below the dew-point.”

Formerly, from the time of Aristotle a I least, dew was supposed to ” fall.” That view of the process was not extinct at the time of Wordsworth and poets might ever now use the figure without reproach. To Dr Charles Wells of London belongs ttte credit of bringing to a focus the ideas which originated with the study of

radiation at the beginning of the 19th century, and which are expressed by saying that the cooling necessary to produce dew on exposed surfaces is to be attributed to the radiation from the surfaces to a clear sky. He gave an account of the theory of automatic cooling by radiation, which has found a place in all text-books of physics, in his first Essay on Dew published in 1818. The theory is supported in that and in a second essay by a number of well-planned observations, and the essays are indeed models of scientific method. The process of the formation of dew as represented by Wells is a simple one. It starts from the point of view that all bodies are constantly radiating heat, and cool automatically unless they receive a corresponding amount of heat from other bodies by radiation or conduction. Good radiators, which are at the same time bad conductors of heat, such as blades of grass, lose heat rapidly on a clear night by radiation to the sky and become cooled below the dew-point of the atmosphere.

The question was very fully studied by Melloni and others, but little more was added to the explanation given by Wells until 1885, when John Aitken of Falkirk called attention to the question whether the water of dewdrops on plants or stones came from the air or the earth, and described a number of experiments to show that under the conditions of observation in Scotland, it was the earth from which the moisture was probably obtained, either by the operation of the vascular system of plants in the formation of exuded dewdrops, or by evaporation and subsequent condensa- tion in the lowest layer of the atmosphere. Some controversy was excited by the publication of Aitken’s views, and it is inter- esting to revert to it because it illustrates a proposition which is of general application in meteorological questions, namely, that the physical processes operative in the evolution of meteorological phenomena are generally

complex. It is not radiation alone that is necessary to produce dew, nor even radiation from a body which does not conduct heat. The body must be surrounded by an atmosphere so fully supplied with moisture that the dew- point can be passed by the cooling due to radiation. Thus the conditions favourable for the formation of dew are (1) a good radiating surf ace, (2) a still atmosphere, (3) aclearsky, (4) thermal insulation of the radiating surface, (5) warm moist ground or some other provision to produce a supply of moisture in the surface layers of air.

Aitken's contribution to the theory of dew shows that in considering the supply of moisture we must take into con- sideration the ground as well as the air and concern ourselves with the temperature of both. Of the five conditions mentioned, the first four may be considered necessary, but the fifth is very important for securing a copious deposit. It can hardly be maintained that no dew could form unless there were a supply of water by evaporation from warm ground, but, when such a supply is forthcoming, it is evident that in place of the limited process of condensation which deprives the air of its moisture and is therefore soon terminable, we have the process of distillation which goes on as long as conditions are maintained. This distinction is of some practical importance for it indicates the protecting power of wet soil in favour of young plants as against night frost. If distillation between the ground and the leaves is set up, the temperature of the leaves cannot fall much below the original dew-point because the supply of water for condensation is kept up; but if the compensation for loss of heat by radiation is dependent simply on the condensation of water from the atmosphere, without renewal of the supply, the dew-point will gradually get lower as the moisture is deposited and the process of cooling will go on.

In these questions we have to deal with comparatively large changes taking place within a small range of level. It is with the layer a few inches thick on either side of the surface that we are principally concerned, and for an adequate comprehension of the conditions close consideration is required. To illustrate this point reference may be made to figs. 1 and 2, which represent the condition of affairs at 10-40 p.m. on about the 20th of October 1885, according to observations by Aitken. Vertical distances represent heights in feet, while the temperatures of the air and

a’

i I i / « /

S’

a

I

i I

C> 1*3

M 1

I

4

‘ 1

u

3

X Groun

d’\

level

Earth 1 emperat

ureV

Grass

the dew-point are represented by horizontal distances and their variations with height by the curved lines of the diagram. The line marked o is the ground level itself, a rather indefinite quantity when the surface is grass. The whole vertical distance represented is from 4 ft. above ground to 1 ft. below ground, and the special phenomena which we are consider- ing take place in the layer which represents the rapid transition be- tween the temperature of the ground 3 in. below the surface and that of the air a few inches above ground.

The point of interest is to determine where the dew-point curve and

dry-bulb curve will cut. If they cut above the

40° Fig. 1.

-S’ 13 Q,j 1

v. h

EartiV Temper iturei

Fig. 2.

surface, mist will result; if they cut at the surface, dew will be formed. Below the surface, it may be assumed that the air is saturated with moisture and any difference in temperature of the dew-point is accompanied by distillation. It may be remarked, by the way, that such distillation between soil layers of different temperatures must be productive of the transference of large quantities of water between different levels in the soil either upward or downward according to the time of year.

These diagrams illustrate the importance of the warmth and moisture of the ground in the phenomena which have been con- sidered. From the surface there is a continual loss of heat going on by radiation and a continual supply of warmth and moisture from below. But while the heat can escape, the moisture cannot. Thus the dry-bulb line is deflected to the left as it approaches the surface, the dew-point line to the right. Thus the effect of the moisture of the ground is to cause the lines to approach. In the case of grass, fig; 2, the deviation of the dry-bulb line to the left to form a sharp minimum of temperature at the surface is well shown. The dew-point line is also shown diverted to the left to the same point as the dry-bulb; but that could only happen if there were so copious a condensation from the atmosphere’ as actually to make the air drier at the surface than up above. In diagram 1, for soil, the effect on air temperature and moisture is shown; the two lines converge to cut at the surface where a dew deposit will be formed. Along the underground line there must be a gradual creeping of heat and moisture towards the surface by distillation, the more rapid the greater the temperature gradient.

The amount of dew deposited is considerable, and, in tropical countries, is sometimes sufficiently heavy to be collected by gutters and spouts, but it is not generally regarded as a large percentage of the total rainfall. Loesche estimates the amount of dew for a single night on the Loango coast at 3 mm., but the estimate seems a high one. Measurements go to show that the depth of water corresponding

with the aggregate annual deposit of dew is 1 in. to 1-5 in. near London (G. Dines), 1-2 in. at Munich (Wollny), 0-3 in. at Montpellier (Crova), i-6 in. at Tenbury, Worcestershire (Badgley).

With the question of the amount of water collected as dew, that of the maintenance of ” dew ponds ” is intimately associated. The name is given to certain isolated ponds on the upper levels of the chalk downs of the south of England and elsewhere. Some of these ponds are very ancient, as the title of a work on Neolithic Dewponds by A. J. and G. Hubbard indicates. Their name seems to imply the hypothesis that they depend upon dew and not entirely upon rain for their maintenance as a source of water supply for cattle, for which they are used. The question has been discussed a good deal, but not settled; the balance of evidence seems to be against the view that dew deposits make any important contribution to the supply of water. The construction of dew ponds is, however, still practised on traditional lines, and it is said that a new dew pond has first to be filled artificially.

It does not come into existence by the gradual accumulation of water in an impervious basin.

Authorities. — For Dew, see the two essays by Dr Charles Wells (London, 1818), also ” An Essay on Dew,” edited by Casella (London, 1866), Longmans’, with additions by Strachan; Melloni, Pogg. Ann. Ixxi. pp. 416, 424 and lxxiii. p. 467; Jamin, ” Comple- ments a la theorie de la rosee,” Journal de physique, viii. p. 41; J. Aitken, on ” Dew,” Trans. Roy. Soc. of Edinburgh, xxxiii., part i. 2, and ” Nature,” vol. xxxiii. p. 256; C. Tomlinson, ” Remarks on a new Theory of Dew,” Phil. Mag. (1886), 5th series, vol. 21, p. 483 and vol. 22, p. 270; Russell, Nature, voL 47, p. 210; also Met. Zeit. (1893), p. 390; Homen, Bodenphysikalische und meteoro- logische Beobachtungen (Berlin, 1894), iii. ; Taubildung, p. 88, &c. ; Rubenson, ” Die Temperatur- und Feuchtigkeitsverhaltnisse in den unteren Luftschichten bei der Taubildung,” Met. Zeit. xi. (1876), p. 65; H. E. Hamberg, ” Temperature et humidite de l’air k differ- entes hauteurs a Upsal,” Soc. R. des sciences d’Upsal (1876); review in Met. Zeit. xii. (1877), p. 105.

For Dew Ponds, see Stephen Hales, Statical Essays, vol. i., experi- ment xix., pp. 52-57 (2nd ed., London, 1731) ; Gilbert White, Natural History and Antiquities of Selborne, letter xxix. (London, 1789) ; Dr C.

Wells, An Essay on Dew (London, 1818, 1821 and 1866); Rev. J. C. Clutterbuck, ” Prize Essay on Water Supply,” Journ. Roy. Agric. Soc, 2nd series, vol. i. pp. 271-287 (1865); Field and Symons, ” Evaporation from the Surface of Water,” Brit. Assoc. Rep. (1869), sect., pp. 25, 26; J. Lucas, ” Hydrogeology : One of the Develop- ments of Modern Practical Geology,” Trans. Inst. Surveyors, vol. ix. pp. 153-232 (1877); H. P. Slade, ” A Short Practical Treatise on Dew Ponds” (London, 1877); Clement Reid, “The Natural History of Isolated Ponds,” Trans. Norfolk and Norwich Naturalists’ Society, vol. v. pp. 272-286 (1892) ; Professor G. S. Brady, On the Nature and Origin of Freshwater Faunas (1899) ; Professor L. C. Miall, ” Dew Ponds,” Reports of the British Association (Bradford Meeting, 1900), pp. 579-585; A. J. and G. Hubbard, ” Neolithic Dewponds and Cattle-Ways ” (London, 1904, 1907). (W. N. S.)

DEWAN or Diwan, an Oriental term for finance minister. The-word is derived from the Arabian diwan, and is commonly used in India to denote a minister of the Mogul government, or in modern days the prime minister of a native state. It was in the former sense that the grant of the dewanny to the East India Company in 1765 became the foundation of the British empire in India.

DEWAR, SIR JAMES (1842-), British chemist and physicist, was born at Kincardine-on-Forth, Scotland, on the 20th of September 1842. He was educated at Dollar Academy and Edinburgh University, being at the latter first a pupil, and afterwards the assistant, of Lord Playfair, then professor of chemistry; he also studied under Kekule at Ghent. In 1875 he was elected Jacksonian professor of natural experimental philosophy at Cambridge, becoming a fellow of Peterhouse, and in 1877 he succeeded Dr J. H. Gladstone as Fullerian professor of chemistry in the Royal Institution, London. He was president of the Chemical Society in 1897, and of the British Association in 1902, served on the Balfour Commission on London Water Supply (1893-1894), and as a member of the Committee on Explosives (1888-1891) invented cordite jointly with Sir Frederick Abel. His scientific work covers a wide field. Of his earlier papers, some deal with questions of organic chemistry, others with Graham’s hydrogenium and its physical constants, others with high temperatures, e.g. the temperature of the sun and of the electric spark, others again with electro-photometry and the chemistry of the electric arc. With Professor J. G. M’Kendrick, of Glasgow, he investigated the physiological action of light, and examined the changes which take place in the electrical condition of the retina under its influence. With Professor G. D. Liveing, one of his colleagues at Cambridge, he began in 1878 a long series of spectroscopic observations, the later of which

were devoted to the spectroscopic examination of various gaseous constituents separated from atmospheric air by the aid of low temperatures; and he was joined by Professor J. A. Fleming, of University College, London, in the investigation of the electrical behaviour of substances cooled to very low temperatures. His name is most widely known in connexion with his work on the liquefaction of the so-called permanent gases and his researches at temperatures approaching the zero of absolute temperature. His interest in this branch of inquiry dates back at least as far as 1874, when he discussed the ” Latent Heat of Liquid Gases ” before the British Association. In 1878

he devoted a Friday evening lecture at the Royal Institution to the then recent work of L. P. Cailletet and R. P. Pictet, and exhibited for the first time in Great Britain the working of the Cailletet apparatus. Six years later, in the same place, he described the researches of Z. F. Wroblewski and K. S. Olszewski, and illustrated for the first time in public the liquefaction of oxygen and air, by means of apparatus specially designed for optical projection so that the actions taking place might be visible to the audience. Soon afterwards he constructed a machine from which the liquefied gas could be drawn off through a valve for use as a cooling agent, and he showed its employment for this purpose in connexion with some researches on meteorites ; about the same time he also obtained oxygen in the solid state. By 1891 he had designed and erected at the Royal Institution an apparatus which yielded liquid oxygen by the pint, and towards the end of that year he showed that both liquid oxygen and liquid ozone are strongly attracted by a magnet. About 1892 the idea occurred to him of using vacuum-jacketed vessels for the storage of liquid gases, and so efficient did this device prove in preventing the influx of external heat that it is found possible not only to preserve the liquids for comparatively long periods, but also to keep them so free from ebullition that examination of their optical properties becomes possible. He next experimented with a high- pressure hydrogen jet by which low temperatures were realized through the Thomson-Joule effect, and the successful results thus obtained led him to build at the Royal Institution the large refrigerating machine by which in 1898 hydrogen was for the first time collected in the liquid state, its solidification following in 1899. Later he investigated the gas-absorbing powers of charcoal when cooled to low temperatures, and applied them to the production of high vacua and to gas analysis (see Liquid Gases). The Royal Society in 1894 bestowed the Rumford medal upon him for his work in the production of low tempera- tures, and in 1899 he became the first recipient of the Hodgkins gold medal

of the Smithsonian Institution, Washington, for his contributions to our knowledge of the nature and properties of atmospheric air. In 1904 he was the first British subject to receive the Lavoisier medal of the French Academy of Sciences, and in 1906 he was the first to be awarded the Matteucci medal of the Italian Society of Sciences. He was knighted in 1904, and in 1908 he was awarded the Albert medal of the Society of Arts.

DEWAS, two native states of India, in the Malwa Political Charge of Central India, founded in the first half of the 18th century by two brothers, Punwar Mahrattas, who came into Malwa with the peshwa, Baji Rao, in 1728. Their descendants are known as the senior and junior branches of the family, and since 1841 each has ruled his own portion as a separate state, though the lands belonging to each are so intimately entangled, that even in Dewas, the capital town, the two sides of the main street are under different administrations and have different arrangements for water supply and lighting. The senior branch has an area of 446 sq. m. and a population of 62,312, while the area of the junior branch is 440 sq. m. and its population 54,904.

DEWBERRY, Rubus caesius, a trailing plant, allied to the bramble, of the natural order Rosaceae. It is common in woods, hedges and the borders of fields in England and other countries of Europe. The leaves have three leaflets, are hairy beneath, and of a dusky green; the flowers which appear in June and July are white, or pale rose-coloured. The fruit is large, and closely embraced by the calyx, and consists of a few drupules, which are black, with a glaucous bloom; it has an agreeable acid taste.

DEW-CLAW, the rudimentary toes, two in number, or the “false hoof” of the deer, sometimes also called the “nails.” In dogs the dew-claw is the rudimentary toe or hallux (corre- sponding to the big toe in man) hanging loosely attached to the skin, low down on the hinder part of the leg. The origin of the word is unknown, but it has been fancifully suggested that, while the other toes touch the ground in walking, the dew-claw merely brushes the dew from the grass.

D’EWES, SIR SIMONDS, Bart. (1602- 1650), English anti- quarian, eldest son of Paul D’Ewes of Miiden, Suffolk, and of

Cecilia, daughter and heir of Richard Simonds, of Coaxdon or Coxden,

Dorsetshire, was bora on the 18th of December 1602, and educated at the grammar school of Bury St Edmunds, and at St John's College, Cambridge. He had been admitted to the Middle Temple in 1611, and was called to the bar in 1623, when he immediately began his collections of material and his studies in history and antiquities. In 1626 he married Anne, daughter and heir of Sir William Clopton, of Luton's Hall in Suffolk, through whom he obtained a large addition to his already considerable fortune. On the 6th of December he was knighted. He took an active part as a strong Puritan and member of the moderate party in the opposition to the king's arbitrary government in the Long Parliament of 1640, in which he sat as member for Sudbury. On the 15th of July he was created a baronet by the king, but nevertheless adhered to the parliamentary party when war broke out, and in 1643 took the Covenant. He was one of the members expelled by Pride's Purge in 1648, and died on the 18th of April 1650. He had married secondly Elizabeth, daughter of Sir Henry Willoughby, Bart., of Risley in Derbyshire, by whom he had a son, who succeeded to his estates and title, the latter becoming extinct on the failure of male issue in 1731. D'Ewes appears to have projected a work of very ambitious scope, no less than the whole history of England based on original documents. But though excelling as a collector of materials, and as a laborious, conscientious and accurate transcriber, he had little power of generalization or construction, and died without publishing anything except an uninteresting tract, The Primitive Practice for Preserving Truth (1645), ar[d some speeches. His Journals of all the Parliaments during the Reign of Queen Elizabeth, however, a valuable work, was published in 1682. His large collections, including transcripts from ancient records, many of the originals of which are now dispersed or destroyed, are in the Harleian collection in the British Museum. His unprinted Diaries from 1621-ˆ1624 and from 1643-1647, the latter valuable for the notes of proceedings in parliament, aˆe often the only authority for incidents and speeches during that period, and are amusing from the glimpses the diarist affords of his own character, his good estimation of himself and his little jealousies; some are in a cipher and some in Latin.

Extracts from his Autobiography and Correspondence from the MSS. in the British Museum were published by J. O. Halliwell- Phillips in 1845, by Hearne in the appendix to his Historia vitae et regni Ricardi II. (1729), and in the Bibliotheca topographica Britan- nica, No. xv. vol. vi. (1783) ; and from a Diary of later date, College Life in the Time of James I. (1 85 1) . His Diaries have been extensively drawn upon by Forster, Gardiner, and by Sanford in his Studies of the Great Rebellion. Some of his speeches have been reprinted in the Harleian

Miscellany and in the Somers Tracts.

DE WET, CHRISTIAN (1854-), Boer general and poli- tician, was born on the 7th of October 1854 at Leeuwkop, Smithfield district (Orange Free State), and later resided at Dewetsdorp. He served in the first Anglo-Boer War of 1880-81 as a field cornet, and from 1881 to 1896 he lived on his farm, becoming in 1897 member of the Volksraad. He took part in the earlier battles of the Boer War of 1899 in Natal as a commandant and later, as a general, he went to serve under Cronje in the west. His first successful action was the surprise of Sanna's Post near Bloemfontein, which was followed by the victory of Reddersburg a little later. Thenceforward he came to be regarded more and more as the most formidable leader of the Boers in their guerrilla warfare. Sometimes severely handled by the British, sometimes escaping only by the narrowest margin of safety from the columns which attempted to surround him, and falling upon and annihilat- ing isolated British posts, De Wet continued to the end of the war his successful career, striking heavily where he could do so and skilfully evading every attempt to bring him to bay. He took an active part in the peace negotiations of 1902, and at the conclusion of the war he visited Europe with the other Boer generals. While in England the generals sought, unavailingly, a modification of the terms of peace concluded at Pretoria. De Wet wrote an account of his campaigns, an English version of which appeared in November 1902 under the title Three Years' War. In November, 1907 he was elected a member of the first parliament of the

Orange River Colony and was appointed minister' of agriculture. In 1908-9 he was a delegate to the Closer Union Convention.

DE WETTE, WILHELM MARTIN LEBERECHT (1780-1849), German theologian, was born on the 12th of January 1780, at Ulla, near Weimar, where his father was pastor. He was sent to the gymnasium at Weimar, then at the height of its literary glory. Here he was much influenced by intercourse with Johann Gottfried Herder, who frequently examined at the school. In 1799 he entered on his theological studies at Jena, his principal teachers being J. J. Griesbach and H. E. G. Paulus, from the latter of whom he derived his tendency to free critical inquiry. Both in methods and in results, however, he occupied an almost solitary position among German theologians. Having taken his doctor's degree, he became privat-docent at Jena; in 1807 professor of theology at Heidelberg, where he came under the influence of J. F. Fries (1773-1843); and in 1810 was transferred to a similar chair in the newly founded university of Berlin, where he enjoyed the friendship of Schleiermacher. He was, however, dismissed

from Berlin in 1819 on account of his having written a letter of consolation to the mother of Karl Ludwig Sand, the murderer of Kotzebue. A petition in his favour presented by the senate of the university was unsuccessful, and a decree was issued not only depriving him of the chair, but banishing him from the Prussian kingdom. He retired for a time to Weimar, where he occupied his leisure in the preparation of his edition of Luther, and in writing the romance Theodor oder die Weihe des Zweiflers (Berlin, 1822), in which he describes the education of an evan- gelical pastor. During this period he made his first essay in preaching, and proved himself to be possessed of very popular gifts. But in 1822 he accepted the chair of theology in the university of Basel, which had been reorganized four years before . Though his appointment had been strongly opposed by the orthodox party, De Wette soon won for himself great influence both in the university and among the people generally. He was admitted a citizen, and became rector of the university, which owed to him much of its recovered strength, particularly in the theological faculty. He died on the 16th of June 1849.

De Wette has been described by Julius Wellhausen as ” the epoch-making opener of the historical criticism of the Penta- teuch.” He prepared the way for the Supplement-theory. But he also made valuable contributions to other branches of theology. He had, moreover, considerable poetic faculty, and wrote a drama in three acts, entitled Die Entsagung (Berlin, 1823). He had an intelligent interest in art, and studied ecclesiastical music and architecture. As a Biblical critic he is sometimes classed with the destructive school, but, as Otto Pfleiderer says {Development of Theology, p. 102), he ” occupied as free a position as the Rationalists with regard to the literal authority of the creeds of the church, but that he sought to give their due value to the religious feelings, which the Rationalists had not done, and, with a more unfettered mind towards history, to maintain the con- nexion of the present life of the church with the past.” His works are marked by exegetical skill, unusual power of condensation and uniform fairness. Accordingly they possess value which is little affected by the progress of criticism.

The most important of his works are: — Beitrage zur Einleitung in das Alte Testament (2 vols., 1806-1807); Kommentar iiber die Psalmen (181 1), which has passed through several editions, and is still regarded as of high authority ; Lehrbuch der hebrdisch-judischen Archaologie (1814); Ober Religion und Theologie (18 15); a work of great importance as showing its author’s general theological position ; Lehrbuch der christlichen Dogmatik (1813-1816); Lehrbuch der hislorisch-krilischen Einleitung in die Bibel (1817); Christliche

Sittenlehre (1819-1821); Einleitung in das Neue Testament (1826); Religion, ihr Wesen, ihre Erscheinungsform, und ihr Einfiuss auf das Leben (1827); Das Wesen des christlichen Glaubens (1846); and Kurzgefasstes exegetisches Handbuch zum Neuen Testament (1836-1848). De Wette also edited Luther's works (5 vols., 1825-1828).

See K. R. Hagenbach in Herzog's Realencyklopadie; G. C. F. Lucke's W. M. L. De Wette, zur freundschaftlicher Erinnerung (1850) ; and D. Schenkel's W. M. L. De Wette und die Bedeutung seiner Theologie ftir unsere Zeit (1849). Rudolf Stahelin, De Wette nach seiner theol. Wirksamkeit und Bedeutung (1880); F. Lichtenberger, History of German Theology in the Nineteenth Century (1889); Otto Pfleiderer, Development of Theology (1890), pp. 97 ff. ; T. K. Cheyne, Founders of the Old Testament Criticism, pp. 31 ff.

DEWEY— DE WINTER

J 39

DEWEY, DAVIS RICH (1858-.), American economist and statistician, was born at Burlington, Vermont,' U.S.A., on the 7th of April 1858. He was. educated at the university of Vermont and at Johns Hopkins University, and afterwards became professor of economics and statistics at the Massachusetts Institute of Technology. He was chairman of the state board on the question of the unemployed (1895), member of the Massachusetts com- mission on public, charitable and reformatory interests (1897), special expert agent on wages for the 12th census, and member of a state commission (1904) on industrial relations. He wrote an excellent Syllabus on Political History since 1815 (1887), a Financial History oftheU.S. (1902), and National Problems (1907) .

DEWEY, GEGRGE (1837-), American naval officer, was born at Montpelier, Vermont, on the 26th of December 1837. He studied at Norwich University, then at Norwich, Vermont, and graduated at the United States Naval Academy in 1858. He was commissioned lieutenant in April 1861, and in the Civil War served on the steamsloop " Mississippi " (1861-1863) during Farragut's passage of the forts below New Orleans in April 1862, and at Port Hudson in March 1863; took part in the fighting below Donaldsonyille, Louisiana, in July 1863; and in 1864-1865 served on the steam-gunboat " Agawam " with the North Atlantic blockading squadron and took part in the attacks on Fort Fisher in December 1864 and January 1865. In March 1865 he became a lieutenant-commander. He was with the European squadron in 1866-1867; was an instructor in the

United States Naval Academy in 1868-1869; was in command of the ” Nar- ragansett ” in 1870-1871 and 1872-1875, being commissioned commander in 1872; was light-house inspector in 1876-1877; and was secretary of the light-house board in 1877-1882. In 1884 he became a captain; in 1889-1893 was chief of the bureau of equipment and recruiting; in 1 893-1 895 was a member of the light-house board; and in 1895-1897 was president of the board of inspection and survey, being promoted to the rank of com- modore in February 1896. In November 1897 he was assigned, at his own request, to sea service, and sent to Asiatic waters. In April 1898, while with his fleet at Hong Kong, he was notified by cable that war had begun between the United States and Spain, and was ordered to ” capture or destroy the Spanish fleet ” then in Philippine waters. On the 1st of May he overwhelmingly defeated the Spanish fleet under Admiral Montojo in Manila Bay, a victory won without the loss of a man on the American ships (see Spanish-American War). Congress, in a joint resolution, tendered its thanks to Commodore Dewey, and to the officers and men under his command, and authorized ” the secretary of the navy to present a sword of honor to Commodore George Dewey, and cause to be struck bronze medals commemorating the battle of Manila Bay, and to distribute such medals to the officers and men of the ships of the Asiatic squadron of the United States.” He was promoted rear-admiral on the 10th of May 1898. On the 1 8th of August his squadron assisted in the capture of the city of Manila. After remaining in the Philippines under orders from his government to maintain control, Dewey received the rank of admiral (March 3, 1899) — that title, formerly borne only by Farragut and Porter, having been revived by act of Congress (March 2, 1899), — and returned home, arriving in New York City, where, on the 3rd of October 1899, he received a great ovation. He was a member (1899) of the Schurman Philippine Commission, and in 1899 and 1900 was spoken of as a possible Democratic candidate for the presidency. He acted as president of the Schley court of inquiry in 1901, and submitted a minority report on a few details. , . ‘

DEWEY, MELVIL (1851-), American librarian, was born at Adams Center, New York, on the 10th of December 1851. He graduated in 1874 at Amherst College, where he was assistant librarian from 1874 to 1877. In 1877 he removed to Boston, where he founded and became editor of The Library Journal, which became an influential factor in the development of libraries in America, and in the reform of their administration. He was also one of the founders of the American Library Associa- tion, of which he was secretary from 1876 to 1891, and president in 1891 and 1893. In 1883 he became librarian of

Columbia

College, and in the following year founded there the School of Library Economy, the first institution for the instruction of librarians ever organized. This school, which was very successful, was removed to Albany in 1890, where it was re-established as the State Library School under his direction; from 1888 to 1906 he was director of the New York State Library and from 1888 to 1900 was secretary of the University of the State of New York, completely reorganizing the state library, which he made one of the most efficient in America, and establishing the system of state travelling libraries and picture collections. His ” Decimal System of Classification ” for library cataloguing, first proposed in 1876, is extensively used.

DEWING, THOMAS WILMER (1851-), American figure painter, was born in Boston, Massachusetts, on the 4th of May 1851. He was a pupil of Jules Lefebvre in Paris from 1876 to 1879; was elected a full member of the National Academy of Design in 1888; was a member of the society of Ten American Painters, New York; and received medals at the Paris Exhibition (1889), at Chicago (1893), at Buffalo (1901) and at St Louis (1904). His decorative genre pictures are notable for delicacy and finish. Among his portraits are those of Mrs Stanford White and of his own wife. Mrs Dewing (b, 1855), nee Maria Oakey, a figure and flower painter, was a pupil of John La Farge in New York, and of Couture in Paris.

DE WINT, PETER (1784-1849), English landscape painter, of Dutch extraction, son of an English physician, was born at Stone, Staffordshire, on the 21st of January 1784. He studied art in London, and in 1809 entered the Academy schools. In 18 1 2 he became a member of the Society of Painters in Water- colours, where he exhibited largely for many years, as well as at the Academy. He married in 1810 the sister of William Hilton, R.A. He died in London on the 30th of January 1849. De Wint’s life was devoted to art; he painted admirably in oils, and he ranks as one of the chief English water-colourists. A number of his pictures are in the National Gallery and the Victoria and Albert Museum.

DE WINTER, JAN WILLEM (1750-1812), Dutch admiral, was born at Kampen, and in 1761 entered the naval service at the age of twelve years. He distinguished himself by his zeal and courage, and at the revolution of 1787 he had reached the rank of lieutenant. The overthrow of the ” patriot ” party forced him to fly for his safety to France. Here he threw himself heart and soul into the cause of the Revolution, and took part under Dumouriez and Pichegru in the

campaigns of 1792 and 1 793, and was soon promoted to the rank of brigadier-general. When Pichegru in 1795 overran Holland, De Winter returned with the French army to his native country. The states-general now uti- lized the experience he had gained as a naval officer by giving him the post of adjunct-general for the reorganization of the Dutch navy. In 1796 he was appointed vice-admiral and commander-in-chief of the fleet. He spared no efforts to strengthen it and improve its condition, and on the nth of October 1797 he ventured upon an encounter off Camperdown with the British fleet under Admiral Duncan. After an obstinate struggle the Dutch were defeated, and De Winter himself was taken prisoner. He remained in England until December, when he was liberated by exchange. His conduct in the battle of Camperdown was declared by a court-martial to have nobly maintained the honour of the Dutch flag.

From 1798 to 1802 De Winter filled the post of ambassador to the French republic, and was then once more appointed com- mander of the fleet. lie was sent with a strong squadron to the Mediterranean to repress the Tripoli piracies, and negotiated a treaty of peace with the Tripolitan government. He enjoyed the confidence of Louis Bonaparte, when king of Holland, and, after the incorporation of the Netherlands in the French empire, in an equal degree of the emperor Napoleon. By the former he was created marshal and count of Huessen, and giver> the command of the armed forces both by sea and land. Napoleon gave him the grand cross of the Legion of Honour and appointed him inspector- general of the northern coasts, and in 181 1 he placed him at the head of the fleet he had collected at the Texel. Soon afterwards

De Winter was seized with illness and compelled to betake himself to Paris, where he died on the 2nd of June 1812. He had a splendid public funeral and was buried in the Pantheon. His heart was enclosed in an urn and placed in the Nicolaas Kerk at Kampen.

DE WITT, CORNELIUS (1623-1672), brother of John de Witt (q.v.), was born at Dort in 1623. In- 1650 he became burgo- master of Dort and member of the states of Holland and West Friesland. He was afterwards appointed to the important post of ruwaard or governor of the land of Putten and bailiff of Beierland. He associated himself closely with his greater brother, the grand pensionary, and supported him throughout his career with great ability and vigour. In 1667 he was the deputy chosen by the states of Holland to accompany Admiral

de Ruyter in his famous expedition to Chatham. Cornelius de Witt on this occasion distinguished himself greatly by his coolness and intrepidity. He again accompanied De Ruyter in 1672 and took an honourable part in the great naval fight at Sole Bay against the united English and French fleets. Compelled by illness to leave the fleet, he found on his return to Dort that the Orange party were in the ascendant, and he and his brother were the objects of popular suspicion and hatred. An account of his imprisonment, trial and death, is given below.

DE WITT, JOHN (1625-1672), Dutch statesman, was born at Dort, on the 24th of September 1625. He was a member of one of the old burgher-regent families of his native town. His father, Jacob de Witt, was six times burgomaster of Dort, and for many years sat as a representative of the town in the states of Holland. He was a strenuous adherent of the republican or oligarchical states-right party in opposition to the princes of the house of Orange, who represented the federal principle and had the support of the masses of the people. John was educated at Leiden, and early displayed remarkable talents, more especially in mathe- matics and jurisprudence. In 1645 he and his elder brother Cornelius visited France, Italy, Switzerland and England, and on his return he took up his residence at the Hague, as an advocate. In 1650 he was appointed pensionary of Dort, an office which made him the leader and spokesman of the town's deputation in the state of Holland. In this same year the states of Holland found themselves engaged in a struggle for provincial supremacy, on the question of the disbanding of troops, with the youthful prince of Orange, William II. William, with the support of the states-general and the army, seized five of the leaders of the states-right party and imprisoned them in Loevestein castle; among these was Jacob de Witt. The sudden death of William, at the moment when he had crushed opposition, led to a reaction. He left only a posthumous child, afterwards William III. of Orange, and the principles advocated by Jacob de Witt triumphed, and the authority of the states of Holland became predominant in the republic.

At this time of constitutional crisis such were the eloquence, sagacity and business talents exhibited by the youthful pensionary of Dort that on the 23rd of July 1653 he was appointed to the office of grand pensionary (Raadpensionaris) of Holland at the age of twenty-eight. He was re-elected in 1658, 1663 and 1668, and held office until his death in 1672. During this period of nineteen years the general conduct of public affairs and administration, and especially of foreign affairs, such was the confidence inspired by his talents and industry, was largely placed in his hands. He found in 1653 his country brought

to the brink of ruin through the war with England, which had been caused by the keen commercial rivalry of the two maritime states. The Dutch were unprepared, and suffered severely through the loss of their carrying trade, and De Witt resolved to bring about peace as soon as possible. The first demands of Cromwell were impossible, for they aimed at the absorption of the two republics into a single state, but at last in the autumn of 1654 peace was concluded, by which the Dutch made large concessions and agreed to the striking of the flag to English ships in the narrow seas. The treaty included a secret article, which the states-general refused to entertain, but which De Witt succeeded in inducing the states of Holland to accept, by which the provinces of Holland pledged

themselves not to elect a stadtholder or a captain-general of the union. This Act of Seclusion, as it was called, was aimed at the young prince of Orange, whose close relationship to the Stuarts made him an object of suspicion to the Protector. De Witt was personally favourable to this exclusion of William III. from his ancestral dignities, but there is no truth in the suggestion that he prompted the action of Cromwell in this matter.

The policy of De Witt after the peace of 1654 was eminently successful. He restored the finances of the state, and extended its commercial supremacy in the East Indies. In 1658-59 he sustained Denmark against Sweden, and in 1662 concluded an advantageous peace with Portugal. The accession of Charles II. to the English throne led to the rescinding of the Act of Seclusion; nevertheless De Witt steadily refused to allow the prince of Orange to be appointed stadtholder or captain-general. This led to ill-will between the English and Dutch governments, and to a renewal of the old grievances about maritime and commercial rights, and war broke out in 1665. The zeal, industry and courage displayed by the grand pensionary during the course of this fiercely contested naval struggle could scarcely have been surpassed. He himself on more than one occasion went to sea with the fleet, and inspired all with whom he came in contact by the example he set of calmness in danger, energy in action and inflexible strength of will. It was due to his exertions as an organizer and a diplomatist quite as much as to the brilliant seamanship of Admiral de Ruyter, that the terms of the treaty of peace signed at Breda (July 31, 1667), on the principle of uti possidetis, were so honourable to the United Provinces. A still greater triumph of diplomatic skill was the conclusion of the Triple Alliance (January 17, 1668) between the Dutch Republic, England and Sweden, which checked the attempt of Louis XIV. to take possession of the Spanish Netherlands in the name of his wife, the infanta Maria Theresa. The check, however, was but

temporary, and the French king only bided his time to take vengeance for the rebuff he had suffered. Meanwhile William III. was growing to manhood, and his numerous adherents throughout the country spared no efforts to undermine the authority of De Witt, and secure for the young prince of Orange the dignities and authority of his ancestors.

In 1672 Louis XIV. suddenly declared war, and invaded the United Provinces at the head of a splendid army. Practically no resistance was possible. The unanimous voice of the people called William III. to the head of affairs, and there were violent demonstrations against John de Witt. His brother Cornelius was (July 24) arrested on a charge of conspiring against the prince. On the 4th of August John de Witt resigned the post of grand pensionary that he had held so long and with such distinction. Cornelius was put to the torture, and on the 19th of August he was sentenced to deprivation of his offices and banish- ment. He was confined in the Gevangenpoort, and his brother came to visit him in the prison. A vast crowd on hearing this collected outside, and finally burst into the prison, seized the two brothers and literally tore them to pieces. Their mangled remains were hung up by the feet to a lamp-post. Thus perished, by the savage act of an infuriated mob, one of the greatest statesmen of his age.

John de Witt married Wendela Bicker, daughter of an influ- ential burgomaster of Amsterdam, in 1655, by whom he had two sons and three daughters.

Bibliography. — J. Geddes, History of the Administration of John de Witt, (vol. i. only, London, 1879) ; A. Lefevre-Pontalis, Jean de Witt, grand pensionnaire de Hollande (2 vols., Paris, 1884) ; P. Simons, Johan de Witt en zijn tijd (3 vols., Amsterdam, 1832-1842); W. C. Knottenbelt, Geschiedenis der Staatkunde van J. de Witt (Amsterdam, 1862); J. de Witt, Brieven . . . gewisselt tusschen den Heer Johan de Witt . . . ende de gevolgmaghtigden v. d. staedt d. Vereen. Neder- landen so in Vranckryck, Engelandt, Sweden, Denemarken, Poolen, enz. 16ˆ2-69 (6 vols., The Hague, 1723-1725); Brieven . . . 1650- l657 (1658) eerste deel bewerkt den R. Fruin uitgegeven d., C. W. Kernkamp (Amsterdam, 1906).

DEWLAP (from the O.E. Imppa, a lappet, or hanging fold; the first syllable is of doubtful origin and the popular explana- tion that the word means ” the fold which brushes the dew ” is not borne out, according to the New English Dictionary, by the

equivalent words such as the Danish doglaeb, in Scandinavian languages), the loose fold of skin hanging from the neck of cattle, also applied to similar folds in the necks of other animals and fowls, as the dog, turkey, &c. The American practice of branding cattle by making a cut in the neck is known as a ” dewlap brand.” The skin of the neck in human beings often becomes pendulous with age, and is sometimes referred to humorously by the same name.

DEWSBURY, a market town and municipal and parliamentary borough in the West Riding of Yorkshire, England, on the river Calder, 8 m. S.S.W. of Leeds, on the Great Northern, London & North- Western, and Lancashire & Yorkshire railways. Pop. (iqoi) 28,060. . The parish church of All Saints was for the most part rebuilt in the latter half of the 18th century; the portions still preserved of the original structure are mainly Early English. The chief industries are the making of blankets, carpets, druggets and worsted yarn ; and there are iron foundries and machinery works. Coal is worked in the neighbourhood. The parliamentary borough includes the adjacent municipal borough of Batley, and returns one member. The municipal borough, incorporated in 1862, is under a mayor, 6 aldermen and 18 councillors. Area, 1471 acres. Paulinus, first archbishop of York, about the year 627 preached in the district of Dewsbury, where Edwin, king of Northumbria, whom he converted to Christianity, had a royal mansion. At Kirklees, in the parish, are remains of a Cistercian convent of the 12th century, in an extensive park, where tradition relates that Robin Hood died and was buried.

DEXIPPUS, PUBLIDS HERENNIUS (c. a.d. 210-273), Greek historian, statesman and general, was an hereditary priest of the Eleusinian family of the Kerykes, and held the offices of archon basileus and eponymus in Athens. When the Heruli overran Greece and captured Athens (269), Dexippus showed great personal courage and revived the spirit of patriotism among his degenerate fellow-countrymen. A statue was set up in his honour, the base of which, with an inscription recording his services, has been preserved (Corpus Inscrr. Atticarum, iii. No. 716). It is remarkable that the inscription is silent as to his military achievements. Photius (cod. 82) mentions three historical works by Dexippus, of which considerable fragments remain: (1) Td fier ‘A\fˆav8pov, an epitome of a similarly named work by Arrian; (2) Skuˆiko., a history of the wars of Rome with the Goths (or Scythians) in the 3rd century; (3) Xpovucrj laTOpla, a chronological history from the earliest times to the emperor Claudius Gothicus (270), frequently referred to by the writers of the Augustan history. The work was

continued by Eunapius of Sardis down to 404. Photius speaks very highly of the style of Dexippus, whom he places on a level with Thucydides, an opinion by no means confirmed by the fragments (C. W.‘Miiller, F.H.G. iii. 666-687).

DEXTER, HENRY MARTYN (1821-1890), American clergy- man and author, was born in Plympton, Massachusetts, on the 13th of August 1821. He graduated at Yale in 1840 and at the Andover Theological Seminary in 1844; was pastor of a Congregational church in Manchester, New Hampshire, in 1844-1849, and of the Berkeley Street Congregational church, Boston, in 1849-1867; was an editor of the Congregationalist in 1851-1866, of the Congregational Quarterly in 1859-1866, and of the Congregationalist, with which the Recorder was merged, from 1867 until his death in New Bedford, Mass., on the 13th of November 1890. He was an authority on the history of Congregationalism and was lecturer on that subject at the Andover Theological Seminary in 1877-1879 ; he left his fine library on the Puritans in America to Yale University. Among his works are: Congregationalism, What it is, Whence it is, How it works, Why it is better than any other Form of Church Government, and its consequent Demands (1865), The Church Polity of the Puritans the Polity of the New Testament (1870), As to Roger Williams and His ” Banishment ” from the Massa- chusetts Colony (1876), Congregationalism of the Last Three Hundred Years, as seen in its Literature (1880), his most important work, A Handbook of Congregationalism (1880), The True Story of John Smyth, the “Se-Baptist ” (1881), Common Sense

as to Woman Suffrage (1885), and many reprints of pamphlets bearing on early church history in New England, especially Baptist controversies. His The England and Holland of the Pilgrims was completed by his son, Morton Dexter (b. 1846), and published in 1905.

DEXTER, TIMOTHY (1 747-1806), American merchant, re- markable for his eccen tri cities, wasborn at Maiden , Massachusett s, on the 22nd of February 1747. He acquired considerable wealth by buying up quantities of the depreciated continental currency, which was ultimately redeemed by the Federal government at par. He assumed the title of Lord Dexter and built extraordinary houses at Newburyport, Mass., and Chester, New Hampshire. He maintained a poet laureate and collected inferior pictures, besides erecting in one of his gardens some forty colossal statues carved in wood to represent famous men. A statue of him- self was included in the collection, and had for an inscription ” I am the first in the East, the first in the West, and the greatest philosopher in the Western World.” He wrote a book

entitled Pickle for the Knowing Ones. It was wholly without punctuation marks, and as this aroused comment, he published a second edition, at the end of which was a page displaying nothing but commas and stops, from which the readers were invited to ” peper and solt it as they plese.” He beat his wife for not weeping enough at the rehearsal of his funeral, which he himself carried out in a very elaborate manner. He died at Newburyport on the 26th of October 1806.

DEXTRINE (British Gum, Starch Gum, Leiocome), (QHioOs)*, a substance produced from starch by the action of dilute acids, or by roasting it at a temperature between 170 and 240 C. It is manufactured by spraying starch with 2 % nitric acid, drying in air, and then heating to about 110°. Different modifications are known, e.g. amylodextrine, erythrodextrine and achroodextrine. Its name has reference to its powerful dextro- rotatory action on polarized light. Pure dextrine is an insipid, odourless, white substance; commercial dextrine is sometimes yellowish, and contains burnt or unchanged starch. It dissolves in water and dilute alcohol; by strong alcohol it is precipitated from its solutions as the hydrated compound, C6H 10 O5-H 2 O. Diastase converts it eventually into maltose, C12H22OH; and by boiling with dilute acids (sulphuric, hydrochloric, acetic) it is transformed into dextrose, or ordinary glucose, C 6 Hi 2 6 . It does not ferment in contact with yeast, and does not reduce Fehling’s solution. If heated with strong nitric acid it gives oxalic, and not mucic acid. Dextrine much resembles gum arabic, for which it is generally substituted. It is employed for sizing paper, for stiffening cotton goods, and for thickening colours in calico printing, also in the making of lozenges, adhesive stamps and labels, and surgical bandages.

See Otto Lueger, Lexikon der gesamten Technik.

DEY (an adaptation of the Turk, dai, a maternal uncle), an honorary title formerly bestowed by the Turks on elderly men, and appropriated by the janissaries as the designation of their commanding officers. In Algeria the deys of the janissaries became in the 17th century rulers of that country (see Algeria: History). From the middle of the 16th century to the end of the 17th century the ruler of Tunisia was also called dey, a title frequently used during the same period by the sovereigns of Tripoli.

DHAMMAPALA, the name of one of the early disciples of the Buddha, and therefore constantly chosen as their name in religion by Buddhist novices on their entering the brotherhood. The most famous of the Bhikshus so named was the great commentator who lived in the latter

half of the 5th century a.d. at the Badara Tittha Vihara, near the east coast of India, just a little south of where Madras now stands. It is to him we owe the commentaries on seven of the shorter canonical books, consisting almost entirely of verses, and also the commentary on the Netti, perhaps the oldest Pali work outside the canon. Extracts from the latter work, and the whole of three out of the seven others, have been published by the Pali Text Society. These works show great learning, exegetical skill and sound judgment. But as Dhammapala confines himself rigidly either to questions of

the meaning of words, or to discussions of the ethical import of his texts, very little can be gathered from his writings of value for the social history of his time. For the right interpretation of the difficult texts on which he comments, they are indispensable. Though in all probability a Tamil by birth, he declares, in the opening lines of those of his works that have been edited, that he followed the tradition of the Great Minster at Anuradhapura in Ceylon, and the works themselves confirm this in every respect. Hsiian Tsang, the famous Chinese pilgrim, tells a quaint story of a Dhammapala of Kanchipura (the modern Konjevaram). He was a son of a high official, and betrothed to a daughter of the king, but escaped on the eve of the wedding feast, entered the order, and attained to reverence and distinction. It is most likely that this story, whether legendary or not (and Hsiian Tsang heard the story at Kanchipura nearly two centuries after the date of Dhammapala), referred to this author. But it may also refer, as Hsiian Tsang refers it, to another author of the same name. Other unpublished works, besides those mentioned above, have been ascribed to Dhammapala, but it is very doubtful whether they are really by him.

Authorities. — T.Watters, On Yuan Chwang (ed. Rhys Davidsand Bushell, London, 1905), ii. 169, 228; Edmund Hardy in Zeitschrift der deutschen morgenldndischen Gesellschaft (1898), pp. 97 foil.; Netti (ed. E. Hardy, London, Pali Text Society, 1902), especially the Introduction, passim', Theri Gaiha Commentary, Peta Vatthu Commentary, and Vimana Vatthu Commentary, all three published by the Pali Text Society. (T. W. R. D.)

DHANIS, FRANCIS, Baron (1861-1909), Belgian adminis- trator, was born in London in 1861 and passed the first fourteen years of his life at Greenock, where he received his early educa- tion. He was the son

of a Belgian merchant and of an Irish lady named Maher. The name Dhanis is supposed to be a varia- tion of D' An vers. Having completed his education at the ficole Militaire he entered the Belgian army, joining the regiment of grenadiers, in which he rose to the rank of major. As soon as he reached the rank of lieutenant he volunteered for service on the Congo, and in 1887 he went out for a first term. He did so well in founding new stations north of the Congo that, when the government decided to put an end to the Arab domination on the Upper Congo, he was selected to command the chief expedition sent against the slave dealers. The campaign began in April 1892, and it was not brought to a successful conclusion till January 1894. The story of this war has been told in detail by Dr Sydney Hinde, who took part in it, in his book The Fall of the Congo Arabs. The principal achievements of the campaign were the captures in succession of the three Arab strongholds at Nyangwe, Kassongo and Kabambari. For his services Dhanis was raised to the rank of baron, and in 1895 was made vice- governor of the Congo State. In 1896 he took command of an expedition to the Upper Nile. His troops, largely composed of the Batetela tribes who had only been recently enlisted, and who had been irritated by the execution of some of their chiefs for indulging their cannibal proclivities, mutinied and murdered many of their white officers. Dhanis found himself confronted with a more formidable adversary than even the Arabs in these well-armed and half-disciplined mercenaries. During two years (1897-1898) he was constantly engaged in a life-and- death struggle with them. Eventually he succeeded in breaking up the several bands formed out of his mutinous soldiers. Although the incidents of the Batetela operations were less striking than those of the Arab war, many students of both think that the Belgian leader displayed the greater ability and fortitude in bringing them to a successful issue. In 1899 Baron Dhanis returned to Belgium with the honorary rank of vice governor-general. He died on the 14th of November 1909.

DHAR, a native state of India, in the Bhopawar agency, Central India. It includes many Rajput and Bhil feudatories, and has an area of 1775 sq. m. The raja is a Punwar Mahratta. The founder of the present ruling family was Anand Rao Punwar, a descendant of the great Paramara clan of Rajputs who from the 9th to the 13 th century, when they were driven out by the Mahommedans, had ruled over Malwa from their capital at Dhar. In 1742 Anand Rao received Dhar as a fief from Baji Rao, the

peshwa, the victory of the Mahrattas thus restoring the sovereign power to the family whkh seven centuries before had been expelled from this very city and country. Towards the close of the 1 8th and in

the early part of the 19th century, the state was subject to a series of spoliations by Sindia and Holkar, and was only preserved from destruction by the talents and courage of the adoptive mother of the fifth raja. By a treaty of 18 19 Dhar passed under British protection, and bound itself to act in sub- ordinate co-operation. The state was confiscated for rebellion in 1857, but in i860 was restored to Raja Anand Rao Punwar, then a minor, with the exception of the detached district of Bairusia, which was granted to the begum of Bhopal. Anand Rao, who received the personal title Maharaja and the K. C.S.I, in 1877, died in 1898, and was succeeded by Udaji Rao Punwar. In 1901 the population was 142,115. The state includes the ruins of Mandu, or Mandogarh, the Mahommedan capital of Malwa.

The Town of Dhar is 33 m. W. of Mhow, 908 ft. above the sea. Pop. (1901) 17,792. It is picturesquely situated among lakes and trees surrounded by barren hills, and possesses, besides its old walls, many interesting buildings, Hindu and Mahommedan, some of them containing records of a great historical importance. The Lat Masjid, or Pillar Mosque, was built by Dilawar Khan in 1405 out of the remains of Jain temples. It derives its name from an iron pillar, supposed to have been originally set up at the beginning of the 13th century in commemoration of a victory, and bearing a later inscription recording the seven days' visit to the town of the emperor Akbar in 1598. The pillar, which was 43 ft. high, is now overthrown and broken. The Kamal Maula is an enclosure containing four tombs, the most notable being that of Shaikh Kamal Maulvi (Kamal-ud-din), a follower of the famous 13th-century Mussulman saint Nizam-ud-din Auliya. 1 The mosque known as Raja Bhoj's school was built out of Hindu remains in the 14th or 15th century: its name is derived from the slabs, covered with inscriptions giving rules of Sanskrit grammar, with which it is paved. On a small hill to the north of the town stands the fort, a conspicuous pile of red sandstone, said to have been built by Mahommed ben Tughlak of Delhi in the 14th century. It contains the palace of the raja. Of modern institutions may be mentioned the high school, public library, hospital, and the chapel, school and hospital of the Canadian Presbyterian mission. There is also a government opium depot for the payment of duty, the town being a considerable centre for the trade in opium as well as in grain.

The town, the name of which is usually derived from Dhara Nagari (the city of sword blades), is of great antiquity, and was made the capital of the Paramara chiefs of Malwa by Vairisinha II., who transferred his headquarters hither from Ujjain at the close of the 9th century. Duringthe rule of the Paramara dynasty Dhar was famous throughout India as a centre of culture and learning; but, after

suffering various vicissitudes, it was finally conquered by the Mussulmans at. the beginning of the 14th century. At the close of the century Dilawar Khan, the builder of the Lat Masjid, who had been appointed governor in 1399, practically established his independence, his son Hoshang Shah being the first Mahommedan king of Malwa. Under this dynasty Dhar was second in importance to the capital Mandu. Subsequently, in the time of Akbar, Dhar fell under the dominion of the Moguls, in whose hands it remained till 1730, when it was conquered by the Mahrattas.

See Imperial Gazetteer of India (Oxford, 1908).

DHARAMPUR, a native state of India, in the Surat political agency division of Bombay, with an area of 704 sq. m. The population in 1901 was 100,430, being a decrease of 17% during the decade ; the estimated gross revenue is £25,412 ; and the tribute £600. Its chief is a Sesodia Rajput. The state has been surveyed for land revenue on the Bombay system. It contains one town, Dharampur (pop. in 1901, 63,449), and 272 villages. Only a small part of the state, the climate of which is very unhealthy, is capable of cultivation ; the rest is covered with rocky hills, forest and brushwood.

1 Nizam-ud-din, whose beautiful marble tomb is at Indarpat near Delhi, was, according to some authorities, an assassin of the secret society of Khorasan. By some modern authorities he is supposed to have been the founder of Thuggism, the Thugs having a special reverence for his memory.

DHARMSALA, a hill-station and sanatorium of the Punjab, India, situated on a spur of the Dhaola Dhar, 16 m. N”.E. of Kangra town, at an elevation of some 6000 ft. Pop. (1901) 6971. The scenery of Dharmsala is of peculiar grandeur. The spur on which it stands is thickly wooded with oak and other trees; behind it the pine-clad slopes of the mountain tower towards the jagged peaks of the higher range, snow-clad for half the year; while below stretches the luxuriant cultivation of the Kangra valley. In 1855 Dharmsala was made the headquarters of the Kangra district of the Punjab in place of Kangra, and became the centre of a European settlement and cantonment, largely occupied by Gurkha regiments. The station was destroyed by the earth- quake of April 1905, in which 1625 persons, including 25 Europeans and 112 of the Gurkha garrison, perished {Imperial

Gazetteer of India, 1908).

DHARWAR, a town and district of British India, in the southern division of Bombay. The town has a station on the Southern Mahratta railway. The population in 1901 was 31,279. It has several ginning factories and a cotton-mill; two high schools, one maintained by the Government and the other by the Basel German Mission.

The District of Dharwar has an area of 4602 sq. m. In the north and north-east are great plains of black soil, favourable to cotton-growing; in the south and west are successive ranges of low hills, with flat fertile valleys between them. The whole district lies high and has no' large rivers.

In 1901 the population was 1,113,298, showing an increase of 6 % in the decade. The most influential classes of the community are Brahmans and Lingayats. The Lingayats number 436,968, or 46% of the Hindu population; they worship the symbol of Siva, and males and females both carry this emblem about their person in a silver case. The principal crops are millets, pulse and cotton. The centres of the cotton trade are Hubli and Gadag, junctions on the Southern Mahratta railway, which traverses the district in several directions.

The early history of the territory comprised within the district of Dharwar has been to a certain extent reconstructed from the inscription slabs and memorial stones which abound there. From these it is clear that the country fell in turn under the sway of the various dynasties that ruled in the Deccan, memorials of the Chalukyan dynasty, whether temples or inscriptions, being especially abundant. In the 14th century the district was first overrun by the Mahommedans, after which it was annexed to the newly established Hindu kingdom of Vijayanagar, an official of which named Dhar Rao, according to local tradition, built the fort at Dharwar town in 1403. After the defeat of the king of Vijayanagar at Talikot (1565), Dharwar was for a few years practically independent under its Hindu governor; but in 1573 the fort was captured by the sultan of Bijapur, and Dharwar was annexed to his dominions. In 1685 the fort was taken by the emperor Aurangzeb, and Dharwar, on the break-up of the Mogul empire, fell under the sway of the peshwa of Poona. In 1764 the province was overrun by Hyder Ali of Mysore, who in 1778 captured the fort of Dharwar. This was retaken in 1791 by the Mahrattas. On the final overthrow of the peshwa in 1817, Dharwar was incorporated with the territory of the East India Company.

DHOLPUR, a native state of India, in the Rajputana agency, with an

area of 11 55 sq. m. It is a crop-producing country, without any special manufactures. All along the bank of the river Chambal the country is deeply intersected by ravines; low ranges of hills in the western portion of the state supply inexhaustible quarries of fine-grained and easily-worked red sandstone. In 1901 the population of Dholpur was 270,973, showing a decrease of 3 % in the decade. The estimated revenue is £83,000. The state is crossed by the Indian Midland railway from Jhansi to Agra. In recent years it has suffered severely from drought. In 1896-1897 the expenditure on famine relief amounted to £8190.

The town of Dholpur is 34 m. S. of Agra by rail. Pop. (1901) 19,310. The present town, which dates from the 16th century, stands somewhat to the north of the site of the older Hindu town

built, it is supposed, in the nth century by the Tonwar Rajput Raja Dholan (or Dhawal) Deo, and named after him Dholdera or Dhawalpuri. Among the objects of interest in the town may be mentioned the fortified sarai built in the reign of Akbar, within which is the fine tomb of Sadik Mahommed Khan (d. 1595), one of his generals. The town, from its position on the railway, is growing in importance as a centre of trade.

Little is known of the early history of the country forming the state of Dholpur. Local tradition affirms that it was ruled by the Tonwar Rajputs, who had their seat at Delhi from the 8th to the 12th century. In 1450 it had a raja of its own; but in 1 501 the fort of Dholpur was taken by the Mahommedans under Sikandar Lodi and in 1504 was transferred to a Mussulman governor. In 1527, after a strenuous resistance, the fort was captured by Baber and with the surrounding country passed under the sway of the Moguls, being included by Akbar in the province of Agra. During the dissensions which followed the death of Aurangzeb in 1707, Raja Kalyan Singh Bhadauria obtained possession of Dholpur, and his family retained it till 1 761, after which it was taken successively by the Jat raja, Suraj Mai of Bharatpur, by Mirza Najaf Khan in 1775, by Sindhia in 1782, and in 1803 by the British. It was restored to Sindhia by the treaty of Sarji Anjangaon, but in consequence of new arrangements was again occupied by the British. Finally, in 1806, the territories of Dholpur, Bari and Rajakhera were handed over to the maharaj rana Kirat Singh, ancestor of the present chiefs of Dholpur, in exchange for his state of Gohad, which was ceded to Sindhia.

The maharaj rana of Dholpur belongs to the clan of Bamraolia Jats, who are believed to have formed a portion of the Indo- Scythian wave

of invasion which swept over northern India about a.d. 100. An ancestor of the family appears to have held certain territories at Bamraoli near Agra c. 1195. His descendant in 1505, Singhan Deo, having distinguished himself in an expedi- tion against the freebooters of the Deccan, was rewarded by the sovereignty of the small territory of Gohad, with the title of rana. In 1779 the rana of Gohad joined the British forces against Sindhia, under a treaty which stipulated that, at the conclusion of peace between the English and Mahrattas, all the territories then in his possession should be guaranteed to him, and protected from invasion by Sindhia. This protection was subsequently withdrawn, the rana having been guilty of treachery, and in 1783 Sindhia succeeded in recapturing the fortress of Gwalior, and crushed his Jat opponent by seizing the whole of Gohad. In 1804, however, the family were restored to Gohad by the British government; but, owing to the opposition of Sindhia, the rana agreed in 1805 to exchange Gohad for his present territory of Dholpur, which was taken under British protection, the chief binding himself to act in subordinate co-operation with the para- mount power, and to refer all disputes with neighbouring princes to the British government. Kirat Singh, the first maharaj rana of Dholpur, was succeeded in 1836 by his son Bhagwant Singh, who showed great loyalty during the Mutiny of 1857, was created a K.C.S.I., and G. C.S.I, in 1869. He was succeeded in 1873 by his grandson Nihal Singh, who received the C.B. and frontier medal for services in the Tirah campaign. He died in 1901, and was succeeded by his eldest son Ram Singh (b. 1883).

See Imperial Gazetteer of India (Oxford, 1908) and authorities there given.

DHOW, the name given to a type of vessel used throughout the Arabian Sea. The language to which the word belongs is unknown. According to the New English Dictionary the place of origin may be the Persian Gulf, assuming that the word is identical with the tava mentioned by Athanasius Nikitin (India in the 15th Century, Hakluyt Society, 1858). Though the word is used generally of any craft along the East African coast, it is usually applied to the vessel of about 150 to 200 tons burden with a stem rising with a long slope from the water; dhows generally have one mast with a lateen sail, the yard being of enormous length. Much of the coasting trade of the Red Sea and Persian Gulf is carried on by these vessels. They were the regular vessels employed in the slave trade from the east coast of Africa.

DHRANGADRA, a native state of India, in the Gujarat division of Bombay, situated in the north of the peninsula of Kathiawar. Its area is 1156 sq. m. Pop. (1901) 70,880. The estimated gross revenue is £38,000 and the tribute £3000. A state railway on the metre gauge from Wadhwan to the town of Dhrangadra, a distance of 21 m., was opened for traffic in 1898. Some cotton is grown, although the soil is as a whole poor; the manufactures include salt, metal vessels and stone hand- mills. The chief town, Dhrangadra, has a population (1901) of

14,770.

The chief of Dhrangadra, who bears the title of Raj Sahib, with the predicate of His Highness, is head of the ancient clan of Jhala Rajputs, who are said to have entered Kathiawar from Sind in the 8th century. Raj Sahib Sir Mansinghji Ranmalsinghji (b. 1837), who succeeded his father in 1869, was distinguished for the enlightened character of his administration, especially in the matter of establishing schools and internal communications. He, was created a K. C.S.I, in 1877. He died in 1900, and was succeeded by his grandson Ajitsinghji Jaswatsinghji (b. 1872).

DHULEEP SINGH (1837-1893), maharaja of Lahore, was born in February 1837, and was proclaimed maharaja on the 18th of September 1843, under the regency of his mother the rani Jindan, a woman of great capacity and strong will, but extremely inimical to the British. He was acknowledged by Ranjit Singh and recognized by the British government. After six years of peace the Sikhs invaded British territory in 1845, but were defeated in four battles, and terms were imposed upon them at Lahore, the capital of the Punjab. Dhuleep Singh retained his territory, but it was administered to a great extent by the British government in his name. This arrangement increased the regent's dislike of the British, and a fresh outbreak occurred in 1848-49. In spite of the valour of the Sikhs, they were utterly routed at Gujarat, and in March 1849 Dhuleep Singh was deposed, a pension of £40,000 a year being granted to him and his dependants. He became a Christian and elected to live in England. On coming of age he made an arrangement with the British government by which his income was reduced to £25,000 in consideration of advances for the purchase of an estate, and he finally settled at Elvedon in Suffolk. While passing through Alexandria in 1864 he met Miss Bamba Miiller, the daughter of a German merchant who had married an Abyssinian. The maharaja had been interested in mission work by Sir John Login, and he met Miss Miiller at one of the missionary schools where she was teaching. She became his wife on the 7th of June 1864, and six

children were the issue of the marriage. In the year after her death in 1890 the maharaja married at Paris, as his second wife, an English lady, Miss Ada Douglas Wetherill, who survived him. The maharaja was passionately fond of sport, and his shooting parties were celebrated, while he himself became a persona grata in English society. The result, however, was financial difficulty, and in 1882 he appealed to the government for assistance, making various claims based upon the alleged possession of private estates in the Punjab, and upon the surrender of the Koh-i-nor diamond to the British Crown. His demand was rejected, where- upon he started for India, after drawing up a proclamation to his former subjects. But as it was deemed inadvisable to allow him to visit the Punjab, he remained for some time as a guest at the residency at Aden, and was allowed to receive some of his relatives to witness his abjuration of Christianity, which actually took place within the residency itself. As the climate began to affect his health, the maharaja at length left Aden and returned to Europe. He stayed for some time in Russia, hoping that his claim against England would be taken up by the Russians; but when that expectation proved futile he proceeded to Paris, where he lived for the rest of his life on the pension allowed him by the Indian government. His death from an attack of apoplexy took place at Paris on the 22nd of October 1893. The maharaja's eldest son, Prince Victor Albert Jay Dhuleep Singh (b. 1866), was educated at Trinity and Downing Colleges, Cambridge. In 1888 he obtained a commission in the 1st Royal Dragoon Guards. In 1898 he married Lady Anne Coventry, youngest daughter of the earl of Coventry. (G. F. B.)

DHULIA, a town of British India, administrative headquarters of West Khandesh district in Bombay, on the right bank of the Panjhra river. Pop. (1901) 24,726. Considerable trade is done in cotton and oil-seeds, and weaving of cotton. A railway connects Dhulia with Chalisgaon, on the main line of the Great Indian Peninsula railway.

DIABASE, in petrology, a rock which is a weathered form of dolerite. It was long widely accepted that the pre-Tertiary rocks of this group differed from their Tertiary and Recent representa- tives in certain essential respects, but this is now admitted to be untenable, and the differences are known to be merely the result of the longer exposure to decomposition, pressure and shearing, which the older rocks have experienced. Their olivine tends to become serpentinized; their augite changes to chlorite and uralite; their felspars are clouded by formation of zeolites, calcite, sericite and epidote. The rocks acquire a green colour (from the development of chlorite, uralite and epidote); hence the older name of " greenstones," which is now little used. Many of them become somewhat schistose from pressure (" greenstone-

schists," meta-diabase, &c). Although the original definition of the group can no longer be justified, the name is so well established in current usage that it can hardly be discarded. The terms diabase and dolerite are employed really to designate distinct facies of the same set of rocks.

The minerals of diabase are the same as those of dolerite, viz. olivine, augite, and plagioclase felspar, with subordinate quantities of hornblende, biotite, iron oxides and apatite.

There are olivine-diabases and diabases without olivine; quartz-diabases, analcite-diabases (or teschenites) and hornblende diabases (or proterobases). Hypersthene (or bronzite) is characteristic of another group. Many of them are ophitic, especially those which contain olivine, but others are intersertal, like the intersertal dolerites. The last include most quartz-diabases, hypersthene- diabases and the rocks which have been described as tholeites. Porphyritic structure appears in the diabase-porphyrites, some of which are highly vesicular and contain remains of an abundant fine-grained or partly glassy ground-mass (diabas-mandelstein, amygdaloidal diabase). The somewhat ill-defined spilites are re- garded by many as modifications of diabase-porphyrite. In the intersertal and porphyrite diabases, fresh or devitrified glassy base is not infrequent. It is especially conspicuous in some tholeites (hyalo-tholeites) and in weisselbergites. These rocks consist of augite and plagioclase, with little or no olivine, on a brown, vitreous, interstitial matrix. Devitrified forms of tachylyte (sor-dawilite, &c.) occur at the rapidly chilled margins of dolerite sills and dikes, and fine-grained spotted rocks with large spherulites of grey or greenish felspar, and branching growths of brownish-green augite (variolites).

To nearly every variety in composition and structure presented by the diabases, a counterpart can be found among the Tertiary dolerites. In the older rocks, however, certain minerals are more common than in the newer. Hornblende, mostly of pale green colours and somewhat fibrous habit, is very frequent in diabase; it is in most cases secondary after pyroxene, and is then known as uralite ; often it forms pseudomorphs which retain the shape of the original augite. Where diabases have been crushed or sheared, hornblende readily develops at the expense of pyroxene, sometimes replacing it completely. In the later stages of alteration the amphibole becomes compact and well crystallized; the rocks consist of green horn- blende and plagioclase felspar, and are then generally known as epidiorites or amphibolites. At the same time a schistose structure is produced. But transition forms are very common, having more or less of the augite remaining,

surrounded by newly formed horn- blende which at first is rather fibrous and tends to spread outwards through the surrounding felspar. Chlorite also is abundant both in sheared and unsheared diabases, and with it calcite may make its appearance, or the lime set free from the augite may combine with the titanium of the iron oxide and with silica to form incrustations or borders of sphene around the original crystals of ilmenite. Epidote is another secondary lime-bearing mineral which results from the decomposition of the soda lime felspars and the pyroxenes. Many diabases, especially those of the teschenite sub-group, are filled with zeolites.

Diabases are exceedingly abundant among the older rocks of all parts of the globe. Popular names for them are ” whinstone,” ” greenstone,” ” toadstone ” and ” trap.” They form excellent road- mending stones and are much quarried for this purpose, being tough, durable and resistant to wear, so long as they are not extremely decomposed. Many of them are to be preferred to the fresher dolerites as being less brittle. The]quality of the Cornish greenstones appears to have been distinctly improved by a smaller amount of recrystallization where they have been heated by contact with intrusive masses of granite. (J. S. F.)

DIABETES

HS

DIABETES (from Gr. Sia, through, and ffalvew, to pass), a constitutional disease characterized by a habitually excessive discharge of urine. Two forms of this complaint are described, viz. Diabetes Mellitus, or Glycosuria, where the urine is not only increased in quantity, but persistently contains a greater or less amount of sugar, and Diabetes Insipidus, or Polyuria, where the urine is simply increased in quantity, and contains no abnormal ingredient. This latter, however, must be distinguished from the polyuria due to chronic granular kidney, lardaceous disease of the kidney, and also occurring in certain cases of hysteria.

Diabetes mellitus is the disease to which the term is most commonly applied, and is by far the more serious and important ailment. It is one of the diseases due to altered metabolism (see Metabolic Diseases) . It is markedly hereditary, much more prevalent in towns and especially modern city life than in more primitive rustic communities, and most common among the Jews. The excessive use of sugar as a food is usually considered one cause of the disease, and obesity is supposed to favour its occurrence, but many observers consider that the obesity so

often met with among diabetics is due to the same cause as the disease itself. No age is exempt, but it occurs most commonly in the fifth decade of life. It attacks males twice as frequently as females, a,nd fair more frequently than dark people.

The symptoms are usually gradual in their onset, and the patient may suffer for a length of time before he thinks it necessary to apply for medical aid. The first symptoms which attract attention are failure of strength, and emaciation, along with great thirst and an increased amount and frequent passage of urine. From the normal quantity of from 2 to 3 pints in the 24 hours it may be increased to 10, 20 or 30 pints, or even more. It is usually of pale colour, and of thicker consistence than normal urine, possesses a decidedly sweet taste, and is of high specific gravity (1030 to 1050). It frequently gives rise to considerable irritation of the urinary passages.

By simple evaporation crystals of sugar may be obtained from diabetic urine, which also yields the characteristic chemical tests of sugar, while the amount of this substance can be accurately estimated by certain analytical processes. The quantity of sugar passed may vary from a few ounces to two or more pounds per diem, and it is found to be markedly increased after saccharine or starchy food has been taken. Sugar may also be found in the blood, saliva, tears, and in almost all the excretions of persons suffering from this disease. One of the most distressing symptoms is intense thirst, which the patient is constantly seeking to allay, the quantity of liquid consumed being in general enormous, and there is usually, but not invariably, a voracious appetite. The mouth is always parched, and a faint, sweetish odour may be evolved from the breath. The effect of the disease upon the general health is very marked, and the patient becomes more and more emaciated. He suffers from increasing muscular weakness, the temperature of his body is lowered, and the skin is dry and harsh. There is often a peculiar flush on the face, not limited to the malar eminences, but extending up to the roots of the hair. The teeth are loosened or decay, there is a tendency to bleeding from the gums, while dyspeptic symptoms, constipation and loss of sexual power are common accompaniments. There is in general great mental depression or irritability.

Diabetes as a rule advances comparatively slowly except in the case of young persons, in whom its progress is apt to be rapid. The complications of the disease are many and serious. It may cause impaired vision by weakening the muscles of accommodation, or by lessening the sensitiveness of the retina to light. Also cataract is very common. Skin affections of all kinds may occur and prove very

intractable. Boils, carbuncles, cellulitis and gangrene are all apt to occur as life advances, though gangrene is much more frequent in men than in women. Diabetics are especially liable to phthisis and pneumonia, and gangrene of the lungs may set in if the patient survives the crisis in the latter disease. Digestive troubles of all kinds, kidney diseases and heart failure due to fatty heart are all of common occurrence. Also patients seem curiously susceptible to the poison of enteric fever, though the attack usually runs a mild

course. The sugar temporarily disappears during the fever. But the most serious complication of all is known as diabetic coma, which is very commonly the final cause of death. The onset is often insidious, but may be indicated by loss of appetite, a rapid fall in the quantity of both urine and sugar, and by either consti- pation or diarrhoea. More rarely there is most acute abdominal pain. At first the condition is rather that of collapse than true coma, though later the patient is absolutely comatose. The patient suffers from a peculiar kind of dyspnoea, and the breath and skin have a sweet ethereal odour. The condition may last from twenty-four hours to three days, but is almost invariably the precursor of death.

Diabetes is a very fatal form of disease, recovery being ex- ceedingly rare. Over 50% die of coma, another 25% of phthisis or pneumonia, and the remainder of Bright's disease, cerebral haemorrhage, gangrene, &c. The most favourable cases are those in which the patient is advanced in years, those in which it is associated with obesity or gout, and where the social conditions are favourable. A few cures have been recorded in which the disease supervened after some acute illness. The unfavourable cases are those in which there is a family history of the disease and in which the patient is young. Nevertheless much may be done by appropriate treatment to mitigate the severity of the symptoms and to prolong life.

There are two distinct lines of treatment, that of diet and that of drugs, but each must be modified and determined entirely by the idiosyncrasy of the patient, which varies in this condition between very wide limits. That of diet is of primary importance inasmuch as it has been proved beyond question that certain kinds of food have a powerful influence in aggravating the disease, more particularly those consisting largely of saccharine and starchy matter; and it may be stated generally that the various methods of treatment proposed aim at the elimination as far as possible of these constituents from the diet. Hence it is recom- mended that such articles as bread, potatoes and all farinaceous foods, turnips, carrots, parsnips and most fruits should be avoided; while animal food and soups, green vegetables, cream,

cheese, eggs, butter, and tea and coffee without sugar, may be taken with advantage. As a substitute for ordinary bread, which most persons find it difficult to do without for any length of time, bran bread, gluten bread and almond biscuits. A patient must never pass suddenly from an ordinary to a carbohydrate- free diet. Any such sudden transition is extremely liable to bring on diabetic coma, and the change must be made quite gradually, one form of carbohydrate after another being taken out of the diet, whilst the effect on the quantity of sugar passed is being carefully noted meanwhile. The treatment may be begun by excluding potatoes, sugar and fruit, and only after several days is the bread to be replaced by some diabetic substi- tute. When the sugar excretion has been reduced to its lowest point, and maintained there for some time, a certain amount of carbohydrate may be cautiously allowed, the consequent effect on the glycosuria being estimated. The best diet can only be worked out experimentally for each individual patient. But in every case, if drowsiness or any symptom suggesting coma supervene, all restrictions must be withdrawn, and carbohydrate freely allowed. The question of alcohol is one which must be largely determined by the previous history of the patient, but a small quantity will help to make up the deficiencies of a diet poor in carbohydrate. Scotch and Irish whisky, and Hollands gin, are usually free from sugar, and some of the light Bordeaux wines contain very little. Fat is beneficial, and can be given as cream, fat of meat and cod-liver oil. Green vegetables are harmless, but the white stalks of cabbages and lettuces and also celery and endive yield sugar. Laevulose can be assimilated up to ij ozs. daily without increasing the glycosuria, and hence apples, cooked or raw, are allowable, as the sugar they contain is in this form. The question of milk is somewhat disputed; but it is usual to exclude it from the rigid diet, allowing a certain quantity when the diet is being extended. Thirst is relieved by anything that relieves the polyuria. But hypodermic injections of pilocarpine stimulate the flow of saliva, and thus relieve the dryness of the

mouth. Constipation appears to increase the thirst, and must always be carefully guarded against. The best remedies are the aperient mineral waters.

Numerous medicinal substances have been employed in diabetes, but few of them are worthy of mention as possessed of any efficacy. Opium is often found of great service, its ad- ministration being

followed by marked amelioration in all the symptoms. Morphia and codeia have a similar action. In the severest cases, however, these drugs appear to be of little or no use, and they certainly increase the constipation. Heroin hydro- chloride has been tried in their place, but this seems to have more power over slight than over severe cases. Salicylate of sodium and aspirin are both very beneficial, causing a diminution in the sugar excretion without counterbalancing bad effects.

In diabetes insipidus there is constant thirst and an excessive flow of urine, which, however, is not found to contain any abnormal constituent. Its effects upon the system are often similar to those of diabetes mellitus, except that they are much less marked, the disease being in general very slow in its progress. In some cases the health appears to suffer very slightly. It is rarely a direct cause of death, but from its debilitating effects may predispose to serious and fatal complications. It is best treated by tonics and generous diet. Valerian has been found beneficial, the powdered root being given in 5-grain doses.

DIABOLO, a game played with a sort of top in the shape of two cones joined at their apices, which is spun, thrown, andcaught by means of a cord strung to two sticks. The idea of the game appears originally to have come from China, where a top (Kouen- gen), made of two hollow pierced cylinders of metal or wood, joined by a rod — and often of immense size, — was made by rotation to hum with a loud noise, and was used by pedlars to attract customers. From China it was introduced by missionaries to Europe; and a form of the game, known as ” the devil on two sticks,” appears to have been known in England towards the end of the 18th century, and Lord Macartney is credited with improvements in it. But its principal vogue was in France in 1812, where the top was called ” le diable.” Amusing old prints exist (see Fry’s Magazine, March and December 1907), depicting examples of the popular craze in France at the time. The diable of those days resembled a globular wooden dumb-bell with a short waist, and the sonorous hum when spinning — the bruit du diable — was a pronounced feature. At intervals during the century occasional attempts to revive the game of spinning a top of this sort on a string were made, but it was not till 1906 that the sensation of 1812 began to be repeated. A French engineer, Gustave Phillipart, discovering some old implements of the game, had experimented for some time with new forms of top with a view to bringing it again into popularity; and having devised the double-cone shape, and added a miniature bicycle tire of rubber round the rims of the two ends of the double-cone, with other improvements, he named it ” diabolo.” The use of

celluloid in preference to metal or wood as its material appears to have been due to a suggestion of Mr C. B. Fry, who was consulted by the inventor on the subject. The game of spinning, throwing and catching the diabolo was rapidly elaborated in various directions, both as an exercise of skill in doing tricks, and in ” diabolo tennis ” and other ways as an athletic pastime. From Paris, Ostend and the chief French seaside resorts, where it became popular in 1906, its vogue spread in 1907 so that in France and England it became the fashionable ” rage ” among both children and adults.

The mechanics of the diabolo were worked out by Professor C. V. Boys in the Proc. Phys. Soc. (London), Nov. 1907.

DIACONICON, in the Greek Church, the name given to a cham- ber on the south side of the central apse, where the sacred utensils, vessels, &c, of the church were kept. In the reign of Justin II. (565-574), owing to a change in the liturgy, the diaconicon and protheses were located in apses at the east end of the aisles. Before that time there was only one apse. In the churches in cen- tral Syria of slightly earlier date, the diaconicon is rectangular, the side apses at Kalat-Seman having been added at a later date.

DiADOCHI (Gr. 5iaSex«cSat, to receive from another), i.e. ” Successors,” the name given to the Macedonian generals who

fought for the empire of Alexander after his death in 323 B.C. The name includes Antigonus and his son Demetrius Poliorcetes, Antipater and his son Cassander, Seleucus, Ptolemy, Eumenes and Lysimachus. The kingdoms into which the Macedonian empire was divided under these rulers are known as Hellenistic. The chief were Asia Minor and Syria under the Seleucid Dynasty (q.v.‘j, Egypt under the Ptolemies (q.v.), Macedonia under the successors of Antigonus Gonatas, Pergamum (q v.) under the Attalid dynasty. Gradually these kingdoms were merged in the Roman empire. (See Macedonian Empire.)

DIAGONAL (Gr.&d,through,7coi’ta, a corner), in geometry, aline joining the intersections of two pairs of sides of a rectilinear figure.

DIAGORAS, of Melos, surnamed the Atheist, poet and sophist, flourished in the second half of the 5th century B.C. Religious in his youth and a writer of hymns and dithyrambs, he became an atheist because a great wrong done to him was left unpunished by the gods. In consequence of his blasphemous speeches, and especially his criticism of the Mysteries, he was condemned to death at Athens, and a price set upon his head (Aristoph. Clouds, 830; Birds, 1073 and

Schol.). He fled to Corinth, where he is said to have died. His work on the Mysteries was called $pvyioi X6701 or ‘ATrcnrvpyiˆovTes, in which he probably attacked the Phrygian divinities.

DIAGRAM (Gr. Siaypafipa, from haypkˆav, to mark out by lines, a figure drawn in such a manner that the geometrical relations between the parts of the figure illustrate relations between other objects. They may be classed according to the manner in which they are intended to be used, and also according to the kind of analogy which we recognize between the diagram and the thing represented. The diagrams in mathematical treatises are intended to help the reader to follow the mathe- matical reasoning. The construction of the figure is defined in words so that even if no figure were drawn the reader could draw one for himself. The diagram is a good one if those features which form the subject of the proposition are clearly represented.

Diagrams are also employed in an entirely different way — namely, for purposes of measurement. The plans and designs drawn by architects and engineers are used to determine the value of certain real magnitudes by measuring certain distances on the diagram. For such purposes it is essential that the drawing be as accurate as possible. We therefore class diagrams as diagrams of illustration, which merely suggest certain relations to the mind of the spectator, and diagrams drawn to scale, from which measurements are intended to be made. There are some dia- grams or schemes, however, in which the form of the parts is of no importance, provided their connexions are oroperly shown. Of this kind are the diagrams of electrical connexions, and those belonging to that department of geometry which treats of the degrees of cyclosis, periphraxy, linkedness and knottedness.

Diagrams purely Graphic and mixed Symbolic and Graphic. — Diagrams may also be classed either as purely graphical diagrams, in which no symbols are employed except letters or other marks to distinguish particular points of the diagrams, and mixed diagrams, in which certain magnitudes are represented, not by the magnitudes of parts of the diagram, but by symbols, such as numbers written on the diagram. Thus in a map the height of places above the level of the sea is often indicated by marking the number of feet above the sea at the corresponding places on the map. There is another method in which a line called a contour line is drawn through all the places in the map whose height above the sea is a certain number of feet, and the number of feet is written at some point or points of this line. By the use of a series of contour lines, the height of a great number of places can be indicated on a map by means of a small number of written

symbols. Still this method is not a purely graphical method, but a partly symbolical method of expressing the third dimension of objects on a diagram in two dimensions.

In order to express completely by a purely graphical method the relations of magnitudes involving more than two variables, we must use more than one diagram. Thus in the arts of con- struction we use plans and elevations and sections through different planes, to specify the form of objects having three

dimensions. In such systems of diagrams we have to indicate that a point in one diagram corresponds to a point in another diagram. This is generally done by marking the corresponding points in the different diagrams with the same letter. If the diagrams are drawn on the same piece of paper we may indicate corresponding points by drawing a line from one to the other, taking care that this line of correspondence is so drawn that it cannot be mistaken for a real line in either diagram. (See Geometry: Descriptive.)

In the stereoscope the two diagrams, by the combined use of which the form of bodies in three dimensions is recognized, are projections of the bodies taken from two points so near each other that, by viewing the two diagrams simultaneously, one with each eye, we identify the corresponding points intuitively. The method in which we simultaneously contemplate two figures, and recognize a correspondence between certain points in the one figure and certain points in the other, is one of the most powerful and fertile methods hitherto known in science. Thus in pure geometry the theories of similar, reciprocal and inverse figures have led to many extensions of the science. It is sometimes spoken of as the method or principle of Duality. (See Geometry Projective.)

Diagrams in Mechanics

The study of the motion of a material system is much assisted by the use of a series of diagrams representing the configuration, dis- placement and acceleration of the parts of the system.

Diagram of Configuration. — In considering a material system it is often convenient to suppose that we have a record of its position at any given instant in the form of a diagram of configuration. The position of any particle of the system is defined by drawing a straight

line or vector from the origin, or point of reference, to the given particle. The position of the particle with respect to the origin is determined by the magnitude and direction of this vector. If in the diagram we draw from the origin (which need not be the same point of space as the origin for the material sj'stem) a vector equal and parallel to the vector which determines the position of the particle, the end of this vector will indicate the position of the particle in the diagram of configuration. If this is done for all the particles we shall have a system of points in the diagram of configuration, each of which corresponds to a particle of the material system, and the relative positions of any pair of these points will be the same as the relative positions of the material particles which correspond to them.

We have hitherto spoken of two origins or points from which the vectors are supposed to be drawn — one for the material system, the other for the diagram. These points, however, and the vectors drawn from them, may now be omitted, so that we have on the one hand the material system and on the other a set of points, each point corresponding to a particle of the system, and the whole representing the configuration of the system at a given instant.

This is called a diagram of configuration.

Diagram of Displacement. — Let us next consider two diagrams of configuration of the same system, corresponding to two different instants. We call the first the initial configuration and the second the final configuration, and the passage from the one configuration to the other we call the displacement of the system. We do not at present consider the length of time during which the displacement was effected, nor the intermediate stages through which it passed, but only the final result — a change of configuration. To study this change we construct a diagram of displacement.

Let A, B, C be the points in the initial diagram of configuration, and A', B', C be the corresponding points in the final diagram of configuration. From 0, the origin of the diagram of displacement, draw a vector oa equal and parallel to AA', 00 equal and parallel to BB', oc to CC, and so on. The points a, b, c, &c, will be such that the vector ab indicates the displacement of B relative to A, and so on. The diagram containing the points a, b, c, &c, is therefore called the diagram of displacement.

In constructing the diagram of displacement we have hitherto assumed that we know the absolute displacements of the points of the system. For we are required to draw a line equal and parallel to AA',

which we cannot do unless we know the absolute final position of A, with respect to its initial position. In this diagram of displace- ment there is therefore, besides the points o, 6, c, &c, an origin, 0, which represents a point absolutely fixed in space. This is necessary because the two configurations do not exist at the same time ; and therefore to express their relative position we require to know a point which remains the same at the beginning and end of the time.

But we may construct the diagram in another way which does not assume a knowledge of absolute displacement or of a point fixed in space. Assuming any point and calling it a, draw ak parallel and equal to BA in the initial configuration, and from k draw kb parallel and equal to A'B' in the final configuration. It is easy to see that the position of the point b relative to a will be the same by this construction as by the former construction, only we must observe that in this

second construction we use only vectors such as AB, A'B', which represent the relative position of points both of which exist simultaneously, instead of vectors such as AA', BB', which express the position of a point at one instant relative to its position at a former instant, and which therefore cannot be determined by observation, because the two ends of the vector do not exist simultaneously.

It appears therefore that the diagram of displacements, when drawn by the first construction, includes an origin 0, which indicates that we have assumed a knowledge of absolute displacements. But no such point occurs in the second construction, because we use such vectors only as we can actually observe. Hence the diagram of displacements without an origin represents neither more nor less than all we can ever know about the displacement of the material system.

Diagram of Velocity. — If the relative velocities of the points of the system are constant, then the diagram of displacement corresponding to an interval of a unit of time between the initial and the final configuration is called a diagram of relative velocity. If the relative velocities are not constant, we suppose another system in which the velocities are equal to the velocities of the given system at the given instant and continue constant for a unit of time. The diagram of displacements for this imaginary system is the required diagram of relative velocities of the actual system at the given instant. It is easy to see that the diagram gives the velocity of any one point relative to any other, but cannot give the absolute velocity of any of them.

Diagram of Acceleration. — By the same process by which we formed the diagram of displacements from the two diagrams of initial and

final configuration, we may form a diagram of changes of relative velocity from the two diagrams of initial and final velocities. This diagram may be called that of total accelerations in a finite interval of time. And by the same process by which we deduced the diagram of velocities from that of displacements we may deduce the diagram of rates of acceleration from that of total acceleration.

We have mentioned this system of diagrams in elementary kinematics because they are found to be of use epsecially when we have to deal with material systems containing a great number of parts, as in the kinetic theory of gases. The diagram of configuration then appears as a region of space swarming with points representing molecules, and the only way in which we can investigate it is by considering the number of such points in unit of volume in different parts of that regionf and calling this the density of the gas.

In like manner the diagram of velocities appears as a region containing points equal in number but distributed in a. different manner, and the number of points in any given portion of the region expresses the number of molecules whose velocities lie within given limits. We may speak of this as the velocity-density.

Diagrams of Stress. — Graphical methods are peculiarly applicable to statical questions, because the state of the system is constant, so that we do not need to construct a series of diagrams corre- sponding to the successive states of the system. The most useful of these applications, collectively termed Graphic Statics, relates to the equilibrium of plane framed structures familiarly represented in bridges and roof-trusses. Two diagrams are used, one called the diagram of the frame and the other called the diagram of stress. The structure itself consists of a number of separable pieces or links jointed together at their extremities. In practice these joints have friction, or may be made purposely stiff, so that the force acting at the extremity of a piece may not pass exactly through the axis of the joint ; but as it is unsafe to make the stability of the structure depend in any degree upon the stiffness of joints, we assume in our calculations that all the joints are perfectly smooth, and therefore that the force acting on the end of any link passes through the axis of the joint.

The axes of the joints of the structure are represented by points in the diagram of the frame. The link which connects two joints in the actual structure may be of any shape, but in the diagram of the frame it is represented by a straight line joining the points repre- senting the two joints. If no force acts on the link except the two forces acting through the centres of the joints, these two forces must be equal and opposite,

and their direction must coincide with the straight line joining the centres of the joints. If the force acting on either extremity of the link is directed towards the other extremity, the stress on the link is called pressure and the link is called a ” strut.” If it is directed away from the other extremity, the stress on the link is called tension and the link is called a ” tie.” In this case, there- fore, the only stress acting in a link is a pressure or a tension in the direction of the straight line which represents it in the diagram of the frame, and all that we have to do is to find the magnitude of this stress. In the actual structure gravity acts on every part of the link, but in the diagram we substitute for the actual weight ot the different parts of the link two weights which have the same resultant acting at the extremities of the link.

We may now treat the diagram of the frame as composed of links without we.ight, but loaded at each joint with a weight made up of portions of the weights of all the links which meet in that joint. If any link has more than two joints we may substitute for it in the diagram an imaginary stiff frame, consisting of links, each of which has only two joints. The diagram of the frame is now reduced to a system of points, certain pairs of which are joined by straight lines, and each point is in general acted on by a weight or other force acting between it and some point external to the system. To complete

the diagram we may represent these external forces as links, that is to say, straight lines joining the points of the frame to points external to the frame. Thus each weight may be represented by a link joining the point of application of the weight with the centre of the earth.

But we can always construct an imaginary frame having its joints in the lines of action of these external forces, and this frame, together with the real frame and the links representing external forces, which join points in the one frame to points in the other frame, make up together a complete self-strained system in equilibrium, consisting of points connected by links acting by pressure or tension. We may in this way reduce any real structure to the case of a system of points with attractive or repulsive forces acting between certain pairs of these points, and keeping them in equilibrium. The direction of each of these forces is sufficiently indicated by that of the line joining the points, so that we have only to determine its magnitude. We might do this by calculation, and then write down on each link the pressure or the tension which acts in it.

We should in this way obtain a mixed diagram in which the stresses are represented graphically as regards direction and position, but symbolically as regards magnitude. But we know that a force may be represented in a purely graphical manner by a straight line in the direction of the force containing as many units of length as there are units of force in the force. The end of this line is marked with an arrow head to show in which direction the force acts. According to this method each force is drawn in its proper position in the diagram of configuration of the frame. Such a diagram might be useful as a record of the result of calculation of the magnitude of the forces, but it would be of no use in enabling us to test the correctness of the calculation.

But we have a graphical method of testing the equilibrium of any set of forces acting at a point. We draw in series a set of lines parallel and proportional to these forces. If these lines form a closed polygon the forces are in equilibrium. (See Mechanics.) We might in this way form a series of polygons of forces, one for each joint of the frame. But in so doing we give up the principle of drawing the line represent- ing a force from the point of application of the force, for all the sides of the polygon cannot pass through the same point, as the forces do. We also represent every stress twice over, for it appears as a side of both the polygons corresponding to the two joints between which it acts. But if we can arrange the polygons in such a way that the sides of any two polygons which represent the same stress coincide with each other, we may form a diagram in which every stress is represented in direction and magnitude, though not in position, by a single line which is the common boundary of the two polygons which represent the joints at the extremities of the corresponding piece of the frame.

We have th us obtained a pure diagram of stress in which no attempt is made to represent the configuration of the material system, and in which every force is not only represented in direction and magnitude by a straight line, but the equilibrium of the forces at any joint is manifest by inspection, for we have only to examine whether the corresponding polygon is closed or not.

The relations between the diagram of the frame and the diagram of stress are as follows: — To every link in the frame corresponds a straight line in the diagram of stress which represents in magnitude and direction the stress acting in that link; and to every joint of the frame corresponds a closed polygon in the diagram, and the forces acting at that joint are represented by the sides of the polygon taken in a certain cyclical order, the cyclical order of the sides of the two adjacent polygons being such that their common side is traced in

opposite directions in going round the two polygons.

The direction in which any side of a polygon is traced is the direction of the force acting on that joint of the frame which corresponds to the polygon, and due to that link of the frame which corresponds to the side. This determines whether the stress of the link is a pressure or a tension. If we know whether the stress of any one link is a pressure or a tension, this determines the cyclical order of the sides of the two polygons corresponding to the ends of the links, and therefore the cyclical order of all the polygons, and the nature of the stress in every link of the frame.

Reciprocal Diagrams. — When to every point of concourse of the lines in the diagram of stress corresponds a closed polygon in the skeleton of the frame, the two diagrams are said to be reciprocal.

The first extensions of the method of diagrams of forces to other cases than that of the funicular polygon were given by Rankine in his Applied Mechanics (1857). The method was independently applied to a large number of cases by W. P. Taylor, a practical draughtsman in the office of J. B. Cochrane, and by Professor Clerk Maxwell in his lectures in King's College, London. In the Phil. Mag. for 1864 the latter pointed out the reciprocal properties of the two diagrams, and in a paper on " Reciprocal Figures, Frames and Diagrams of Forces," Trans. R.S. Edin. vol. xxvi., 1870, he showed the relation of the method to Airy's function of stress and to other mathematical methods. Professor Fleeming Jenkin has given a number of applications of the method to practice {Trans. R.S. Edin. vol. xxv.).

L. Cremona (Le Figure reciproche nella statica grafica, 1872) deduced the construction of reciprocal figures from the theory of the two components of a wrench as developed by Mobius. Karl Culmann, in his Graphische Statik (isted. 1864-1866, 2nd ed. 1875), made great use

of diagrams of forces, some of which, however, are not reciprocal. Maurice Levy in his Statique graphique (1874) has treated the whole subject in an elementary but copious manner, and R. H. Bow, in his The Economics of Construction in Relation to Framed Structures (1873), materially simplified the process of drawing a diagram of stress reciprocal to a given frame acted on by a system of equilibrating external forces.

Instead of lettering the joints of the frame, as is usually done, or the links of the frame, as was the custom of Clerk Maxwell, Bow places a

letter in each of the polygonal areas enclosed by the links of the frame, and also in each of the divisions of surrounding space ai

Fig. 1. — Diagram of Configuration.

separated by the lines of action of the external forces. When one link of the frame crosses another, the point of apparent intersection of the links is treated as if it were a real joint, and the stresses of each of the intersecting links are represented twice in the diagram of stress, as the opposite sides of the parallelogram which corresponds to the point of intersection.

This method is followed in the lettering of the diagram of configuration (fig. 1), and the diagram of stress (fig. 2) of the linkwork which Professor Sylvester has called a quadruplane.

In fig. I the real joints are distinguished from the places where one link appears to cross another by the little circles O, P, Q, R, S, T, V. The four links RSTV form a ” contraparallelogram ” in which RS = TV and RV = ST. The triangles ROS, RPV, TQS are similar :o each other. A fourth triangle (TNV), not drawn in the figure, would complete the quadruplane. The four points O, P, N, Q form a parallelogram whose angle POQ is constant and equal to ir — SOR. The product of the distances OP and OQ is constant. The linkwork may be fixed at O. If any figure is traced by P, Q will trace the

Fig. 2. — Diagram of Stress.

inverse figu;ie, but turned round O through the constant angle POQ. In the diagram forces Pp, Qq are balanced by the force Co at the fixed point. The forces Pp and Qq are necessarily inversely as OP and OQ, and make equal angles with those lines.

Every closed area formed by the links or the external forces in the diagram of configuration is marked by a letter which corresponds to a point of concourse of lines in the diagram of stress. The stress in the link which is the common boundary of two areas is represented in the diagram of stress by the line joining the points corresponding to those areas. When a link is divided into two or more parts by lines crossing it, the stress in each part is represented by a different line for each part, but as the stress is the same throughout the link these lines are all equal and parallel. Thus in the figure the stress in RV is represented by the four equal and parallel lines HI, FG, DE and AB. If two areas have no part of their boundary in common the letters corresponding to them in the diagram of stress are not joined by a

straight line. If, however, a straight line were drawn between them, it would represent in direction and magnitude the resultant of all the stresses in the links which are cut by any line, straight or curved, joining the two areas. For instance the areas F and C in fig. I have no common boundary, and the points F and C in fig. 2 are not joined by a straight line. But every path from the area F to the area C in fig. I passes through a series of other areas, and each passage from one area into a contiguous area corresponds to a line drawn in the diagram of stress. Hence the whole path from F

to C in fig. i corresponds to a path formed of lines in fig. 2 and extending from F to C, and the resultant of all the stresses in the links cut by the path is represented by FC in fig. 2.

Many examples of stress diagrams are given in the article on bridges (q.v.).

Automatic Description of Diagrams.

There are many other kinds of diagrams in which the two co-ordinates of a point in a plane are employed to indicate the simultaneous values of two related quantities. If a sheet of paper is made to move, say horizontally, with a constant known velocity, while a tracing point is made to move in a vertical straight line, the height varying as the value of any given physical quantity, the point will trace out a curve on the paper from which the value of that quantity at any given time may be determined. This principle is applied to the automatic registration of phenomena of all kinds, from those of meteorology and terrestrial magnetism to the velocity of cannon- shot, the vibrations of sounding bodies, the – motions of animals, voluntary and involuntary, and the currents in electric telegraphs.

In Watt's indicator for steam engines the paper does not move with a constant velocity, but its displacement is proportional to that of the piston of the engine, while that of the tracing point is proportional to the pressure of the steam. Hence the co-ordinates of a point of the curve traced on the diagram represent the volume and the pressure of the steam in the cylinder. The indicator-diagram not only supplies a record of the pressure of the steam at each stage of the stroke of the engine, but indicates the work done by the steam in each stroke by the area enclosed by the curve traced on the diagram. (J. C. M .)

DIAL and DIALLING. Dialling, sometimes called gnomonics, is a branch of applied mathematics which treats of the construc- tion of sun-dials, that is, of those instruments, either fixed or portable, which determine the divisions of the day (Lat. dies) by the motion of the shadow of some object on which the sun's rays fall. It must have been one of the earliest applications of a knowledge of the apparent motion of the sun; though for a long time men would probably be satisfied with the division into morning and afternoon as marked by sun-rise, sun-set and the greatest elevation.

History. — The earliest mention of a sun-dial is found in Isaiah xxxviii. 8: " Behold, I will bring again the shadow of the degrees which is gone down in the sun-dial of Ahaz ten degrees backward." The date of this would be about 700 years before the Christian era, but we know nothing of the character or con- struction of the instrument. The earliest of all sun-dials of which we have any certain knowledge was the hemicycle, or hemisphere, of the Chaldaean astronomer Berossus, who probably lived about 300 B.C. It consisted of a hollow hemisphere placed with its rim perfectly horizontal, and having a bead, or globule, fixed in any way at the centre. So long as the sun remained above the horizon the shadow of the bead would fall on the inside of the hemisphere, and the path of the shadow during the day would be approximately a circular arc. This arc, divided into twelve equal parts, determined twelve equal intervals of time for that day. Now, supposing this were done at the time of the solstices and equinoxes, and on as many intermediate days as might be considered sufficient, and then curve lines drawn through the corresponding points of division of the different arcs, the shadow of the bead falling on one of these curve lines would mark a division of time for that day, and thus we should have a sun-dial which would divide each period of daylight into twelve equal parts. These equal parts were called temporary hours; and, since the duration of daylight varies from day to day, the temporary hours of one day would differ from those of another ; but this inequality would probably be disregarded at that time, and especially in countries where the vaiiation between the longest summer day and the shortest winter day is much less than in our climates.

The dial of Berossus remained in use for centuries. The Arabians, as appears from the work of Albategnius, still followed the same construction about the year a.d. 900. Four of these dials have in modern times been found in Italy. One, discovered at Tivoli in 1746, is supposed to have belonged to Cicero, who, in one of his letters, says that he had sent a dial of this kind to his villa near Tusculum. The second and third were found in 1751 — one at Castel-Nuovo and the

other at Rignano; and a fourth was found in 1762 at Pompeii. G. H. Martini in his Abhandlungen von den Sonnenuhren der Alten (Leipzig, 1777), says that this

dial was made for the latitude of Memphis; it may therefore be the work of Egyptians, perhaps constructed in the school of Alexandria. (

Herodotus recorded that the Greeks derived from the Baby- lonians the use of the gnomon, but the great progress made by the Greeks in geometry enabled them in later times to construct dials of great complexity, some of which remain to us, and are proof not only of extensive knowledge but also of great ingenuity.

Ptolemy's Almagest treats of the construction of dials by means of his analemma, an instrument which solved a variety of astronomical problems. The constructions given by him were sufficient for regular dials, that is, horizontal dials, or vertical dials facing east, west, north or south, and these are theonly ones he treats of. It is certain, however, that the ancients were able to construct declining dials, as is shown by that most interesting monument of ancient gnomics — the Tower of the Winds at Athens. This is a regular octagon, on the faces of which the eight principal winds are represented, and over them eight different dials — four facing the cardinal points and the other four facing the intermediate directions. The date of the dials is long subse- quent to that of the tower; for Vitruvius, who describes the tower in the sixth chapter of his first book, says nothing about the dials, and as he has described all the dials known in his time, we must believe that the dials of the tower did not then exist. The hours are still the temporary hours or, as the Greeks called them, hectemoria.

The first sun-dial erected at Rome was in the year 290 B.C., and this Papirius Cursor had taken from the Samnites. A dial which Valerius Messalla had brought from Catania, the latitude of which is five degrees less than that of Rome, was placed in the forum in the year 261 B.C. The first dial actually constructed at Rome was in the year 164 B.C., by order of Q. Marcius Philippus, but as no other Roman has written on gnomonics, this was perhaps the work of a foreign artist. If, too, we remember that the dial found at Pompeii was made for the latitude of Memphis, and consequently less adapted to its position than that of Catania to Rome, we may infer that mathematical knowledge was not cultivated in Italy.

The Arabians were much more successful. They attached great importance to gnomonics, the principles of which they had learned from the Greeks, but they greatly simplified and diversified the Greek

constructions. One of their writers, Abu'l Hassan, who lived about the beginning of the 13th century, taught them how to trace dials on cylindrical, conical and other surfaces. He even introduced equal or equinoctial hours, but the idea was not supported, and the temporary hours alone continued in use.

Where or when the great and important step already conceived by Abu'l Hassan, and perhaps by others, of reckoning by equal hours was generally adopted cannot now be determined. The history of gnomonics from the 13th to the beginning of the 16th century is almost a blank, and during that time the change took place. We can see, however, that the change would neces- sarily follow the introduction of clocks and other mechanical methods of measuring time; for, however imperfect these were, the hours they marked would be of the same length in summer and in winter, and the discrepancy between these equal hours and the temporary hours of the sun-dial would soon be too important to be overlooked. Now, we know that a balance clock was put up in the palace of Charles V. of France about the year 1370, and we may reasonably suppose that the new sun-dials came into general use during the 14th and 15th centuries.

Among the earliest of the modern writers on gnomonics was Sebastian Minister (q.v.), who published his Horologiographia at Basel in 153 1. He gives a number of correct rules, but with- out demonstrations. Among his inventions was a moon-dial, 1 but this does not admit of much accuracy.

During the 17th century dialling was discussed at great length by many writers on astronomy. Clavius devotes a quarto

1 In one of the courts of Queens' College, Cambridge, there is an elaborate sun-dial dating from the end of the 17th or beginning of the 1 8th century, and around it a series of numbers which make it available as a moon-dial when the moon's age is known.

volume of 800 pages entirely to the subject. This was published in 1612, and may be considered to contain all that was known at that time.

In the 1 8th century clocks and watches began to supersede sun-dials, and these have gradually fallen into disuse except as an additional ornament to a garden, cr in remote country districts where the old dial

on the church tower still serves as an occasional check on the modern clock by its side. The art of constructing dials may now be looked upon as little more than a mathematical

recreation.

General Principles. — The diurnal and the annual motions of the earth are the elementary astronomical facts on which dialling is founded. That the earth turns upon its axis uniformly from west to east in twenty-four hours, and that it is carried round the sun in one year at a nearly uniform rate, is the correct way of expressing these facts. But the effect will be precisely the same, and it will suit our purpose better, and make our explanations easier, if we adopt the ideas of the ancients, of which our senses furnish apparent confirma- tion, and assume the earth to be fixed. Then, the sun and stars revolve round the earth's axis uniformly from east towest once a day — the sun lagging a little behind the stars, making its day some four minutes longer — so that at the end of the year it finds itself again in the same place, having made a complete revolution of the heavens relatively to the stars from west to east.

The fixed axis about which all these bodies revolve daily is a line through the "earth's centre; but the radius of the earth is so small, compared with the enormous distance of the sun, that, if we draw a parallel axis through any point of the earth's surface, we may safely look on that as being the axis of the celestial motions. The error in the case of the sun would not, at its maximum, that is, at 6 A.M. and 6 P.M., exceed half a second of time, and at noon would vanish. An axis so drawn is in the plane of the meridian, and points to the.pole, its elevation being equal to tL

The diurnal motion of the stars is strictly uniform, and so would that of the sun be if the daily retardation of about four minutes, spoken of above, were always the same. But this is constantly alter- ing, so that the time, as measured by the sun's motion, and also consequently as measured by a sun-dial, does not move on at a strictly uniform pace. This irregularity, which is slight, would be of little consequence in the ordinary affairs of life, but clocks and watches being mechanical measures of time could not, except by extreme complication, be made to follow this irregularity, even if desirable.

The clock is constructed to mark uniform time in such wise that the length of the clock day shall be the average of all the solar days in the year. Four times a year the clock and the sun-dial agree exactly ; but the sun-dial, now going a little slower, now a little faster, will be

sometimes behind, sometimes before the clock — the greatest accumulated difference being about sixteen minutes for a few days in November, but on the average much less. The four days on which the two agree are April 15, June 15, September I and December 24.

Clock-time is called mean time, that marked by the sun-dial is called apparent time, and the difference between them is the equation of time. It is given in most calendars and almanacs, frequently under the heading " clock slow," " clock fast." When the time by the sun- dial is known, the equation of time will at once enable us to obtain the corresponding clock-time, or vice versa.

Atmospheric refraction introduces another error by altering the apparent position of the sun; but the effect is too small to need consideration in the construction of an instrument which, with the best workmanship, does not after all admit of very great accuracy.

The general principles of dialling will now be readily understood. The problem before us is the following: — A rod, or style, as it is called, being firmly fixed in a direction parallel to the earth's axis, we have to find how and where points or lines of reference must be traced on some fixed surface behind the style, so that when the shadow of the style falls on a certain one of these lines, we may know that at that moment it is solar noon, — that is, that the plane through the style and through the sun then coincides with the meridian; again, that when the shadow reaches the next line of reference, it is I o'clock by solar time, or, which comes to the same thing, that the above plane through the style and through the sun has just turned through the twenty-fourth part of a complete revolution ; and so on for the subsequent hours, — the hours before noon being indicated in a similar manner. The style and the surface on which these lines are traced together constitute the dial.

The position of an intended sun-dial having been selected — whether on church tower, south front of farmstead or garden wall — the surface must be prepared, if necessary, to receive the hour-lines.

The chief, and in fact the only practical difficulty will be the accurate fixing of the style, for on its accuracy the value of the instru- ment depends. It must be in the meridian plane, and must make an angle with the horizon equal to the latitude of the place. The latter condition will offer no difficulty, but the exact determination of the meridian plane which passes through the point where the style is fixed to the surface is not so simple. At present we shall assume that the style has been fixed in its true position. The style itself will be

usually a stout metal wire, and when we speak of the shadow cast by the style it must always be understood that the middle line of the thin band of shade is meant.

The point where the style meets the dial is called the centre of the dial. It is the centre from which all the hour-lines radiate.

The position of the XII o'clock line is the most important to determine accurately, since all the others are usually made to depend on this one. We cannot trace it correctly on the dial until the style has been itself accurately fixed in its proper place. When that is done the XII o'clock line will be found by the intersection of the dial surface with the vertical plane which contains the style ; and the most simple way of drawing it on the dial will be by suspending a plummet from some point of the style whence it may hang freely, and waiting until the shadows of both style and plumb-line coincide on the dial. This single shadow will be the XII o'clock line.

In one class of dials, namely, all the vertical ones, the XII o'clock line is simply the vertical line from the centre; it can, therefore, at once be traced on the dial face by using a fine plumb-line.

The XII o'clock line being traced, the easiest and most accurate method of tracing the other hour-lines would, at the present day when good watches are common, be by marking where the shadow of the style falls when I, 2, 3, &c, hours have elapsed since noon, and the next morning by the same means the forenoon hour-lines could be traced ; and in the same manner the hours might be subdivided into halves and quarters, or even into minutes.

But formerly, when watches did not exist, the tracing of the I, II, III, &c, o'clock lines was done by calculating the angle which each of these lines would make with the XII o'clock line. Now_, except in the simple cases of a horizontal dial or of a vertical dial facing a cardinal point, this would require long and intricate calculations, or elabo- rate geometrical constructions, implying considerable mathematical knowledge, but also introducing increased chances of error. The chief source of error would lie in the uncertainty of the data ; for the position of the dial-plane would have to be found before the calcula- tions began,— that is, it would be necessary to know exactly by how many degrees it declined from the south towards the east or west, and by how many degrees it inclined from the vertical. The ancients, with the means at their disposal, could obtain these results only very roughly.

Dials received different names according to their position: —

Horizontal dials, when traced on a horizontal plane ;

Vertical dials, when on a vertical plane facing one of the cardinal points;

Vertical declining dials, on a vertical plane not facing a cardinal point;

Inclining dials, when traced on planes neither vertical nor hori- zontal (these were further distinguished as reclining when leaning backwards from an observer, proclining when leaning forwards) ;

Equinoctial dials, when the plane is at right angles to the earth's axis, &c. &c.

Dial Construction. — A very correct view of the problem of dial construction may be obtained as follows : —

Fig. 1.

Conceive a transparent cylinder (fig. I) having an axis AB parallel to the axis of the earth. On the surface of the cylinder let equidistant generating lines be traced 15 apart, one of them XII . . .XII being in the meridian plane through AB, and the others I. ..I, II. ..II, &c, following in the order of the sun's motion.

Then the shadow of the line AB will obviously fall on the line XII . . . XII at apparent noon, on the line I . . . I at one hour after noon, on II . . . II at two hours after noon, and so on. If now the cylinder be cut by any plane MN representing the plane on which the dial is to be traced, the shadow of AB will be intercepted by this plane and fall on the lines AXII AI, All, &c.

The construction of the dial consists in determining the angles madfc

by AI, All, &c. with AXII ; the line AXII itself, being in the vertical plane through AB, may be supposed known.

For the purposes of actual calculation, perhaps a transparent sphere will, with advantage, replace the cylinder, and we shall here apply it to calculate the angles made by the hour-line with the XI I o'clock line in the two cases of a horizontal dial and of a vertical south dial.

Horizontal Dial. — Let PEp (fig. 2), the axis of the supposed trans-

Earent sphere, be directed towards the north and south poles of the eavens. Draw the two great circles, HMA, QMa, the former

Fig. 2.

horizontal, the other perpendicular to the axis Pp, and therefore coinciding with the plane of the equator. Let EZ be vertical, then the circle QZP will be the meridian, and by its intersection A with the horizontal circle will determine the XII o'clock line EA. Next divide the equatorial circle QMa into 24 equal parts ab, be, cd, &c. . . . of 15° each, beginning from the meridian Pa, and through the various points of division and the poles draw the great circles Pbp, Pep, &c. . . . These will exactly correspond to the equidistant generating lines on the cylinder in the previous construction, and the shadow of the style will fall on these circles after successive intervals of 1,2, 3, &c, hours from noon. If they meet the horizontal circle in the points B, C, D, &c, then EB, EC, ED, &c. . . . will be the I, II, III, &c, hour-lines required ; and the problem of the horizontal dial consists in calculating the angles which these lines make with the XII o'clock line EA, whose position is known. The spherical triangles PAB, PAC, &c, enable us to do this readily. They are all right-angled at A, the side PA is the latitude of the place, and the angles APB, APC, &c, are respectively 15 , 30°, &c, then tan AB = tan 15° sin latitude, tan AC = tan 30 sin latitude, &c. &c. These determine the sides AB, AC, &c.,that is, the angles AEB, AEC, &c, required.

The I o'clock hour-line EB must make an angle with the meridian EA of ii° 51′ on a London dial, of 12° 31′ at Edinburgh, of ll c 23′ at Paris, 12° o' at Berlin, 9° 55′ at New York and 9° 19′ at San Francisco. In the same way may be found the angles made by the other hour-lines.

The calculations of these angles must extend throughout one quadrant from noon to VI o'clock, but need not be carried further, because all the other hour-lines can at once be deduced from these. In the first place the dial is symmetrically divided by the meridian, and therefore two times equidistant from noon will have their hour- lines equidistant from the meridian ; thus the XI o'clock line and the I o'clock line must make the same angles with it, the X o'clock the same as the II o'clock, and so on. And next, the 24 great circles, which were drawn to determine these lines, are in reality only 12; for clearly the great circle which gives I o'clock after midnight, and that which gives I o'clock after noon, are one and the same, and so also for the other hours. Therefore the hour-lines between VI in the evening and VI the

next morning are the prolongations of the remaining twelve.

Let us now remove the imaginary sphere with all its circles, and retain only the style EP and the plane HMA with the lines traced on it, and we shall have the horizontal dial.

On the longest day in London the sun rises a little before 4 o'clock, and sets a little after 8 o'clock; there is therefore no necessity for extending a London dial beyond those hours. At Edinburgh the limits will be a little longer, while at Hammerfest, which is within the Arctic circle, the whole circuit will be required.

Instead of a wire style it is often more convenient to use a metal plate from one quarter to half an inch in thickness. This plate, which is sometimes in the form of a right-angled triangle, must have an acute angle equal to the latitude of the place, and, when properly fixed in a vertical position on the dial, its two faces must coincide with the meridian plane, and the sloping edges formed by the thick- ness of the plate must point to the pole and form two parallel styles.

Since there are two styles, there must be two dials, or rather two half dials, because a little consideration will show that, owing to the thickness of the plate, these styles will only one at a time cast a shadow. Thus the eastern edge will give the shadow for all hours before 6 o'clock in the morning. From 6 o'clock until noon the western edge will be used. At noon it will change again to the eastern edge until 6 o'clock in the evening, and finally the western edge for the remaining hours of daylight.

The centres of the two dials will be at the points where the styles meet the dial face; but, in drawing the hour-lines, we must be careful to draw only those lines for which the corre- sponding style is able to give a shadow as explained above. The dial will thus have the appearance of a single dial plate, and there will be no confusion (see fig. 3).

The line of demarcation between the shadow and the light will be better defined than when a wire style is used ; but the indications by this double dial will always be one minute too fast in the morning and one minute too slow in the afternoon. This is owing to the magnitude of the sun, whose angular breadth is half a degree. The well-defined shadows are given, not by the centre of the sun, as we should require them, but by the forward limb in the morning and by the backward one in the afternoon; and the sun takes just about a minute to advance through a space equal to its half-breadth.

Dials of this description are frequently met with. The dial plate is of metal as well as the vertical piece upon it, and they may be purchased ready for placing on the pedestal, — the dial with all the hour-lines traced on it and the style plate firmly fastened in its proper position, if not even cast in the same piece with the dial plate.

When placing it on the pedestal care must be taken that the dial be perfectly horizontal and accurately oriented. The levelling will be done with a spirit-level, and the orientation will be best effected either in the forenoon or in the afternoon, by turning the dial plate till the time given by the shadow (making the one minute correction mentioned above) agrees with a good watch whose error on solar time is known. It is, however, important to bear in mind that a dial, so built up beforehand, will have the angle at the base equal to the latitude of some selected place, such as London, and the hour-lines will be drawn in directions calculated for the same latitude. Such a dial can therefore not be used near Edinburgh or Glasgow, although it would, without appreciable error, be adapted to any place whose latitude did not differ more than 20 or 30 m. from that of London, and it would be safe to employ it in Essex, Kent or Wiltshire.

If a series of such dials were constructed, differing by 30 m. in latitude, then an intending purchaser could select one adapted to a place whose latitude was within 15 m. of his own, and the error of time would never exceed a small fraction of a minute. The following table will enable us to check the accuracy of the hour-lines and of the angle of the style, — all angles on the dial being readily measured with an ordinary protractor. It extends from 50 lat. to 59§° lat., and therefore includes the whole of Great Britain and Ireland : —

Lat.

XI.

A.M.

X. A.M.

IX.

A.M.

VIII.

A.M.

VII.

A.M.

VI. A. M.

I. P.M.

II.

P.M.

in.

P.M.

mi.

P.M.

V.

P.M.

VI. P.M

50 0′

11°

36′

23°

51′

37°

27′

53°

O’

70 c

43′

90 0′

50 30

II

41

24

I

37

39

53

12

70

5i

90

5i

II

46

24

10

37

51

53

23

70

59

90

51 30

II

51

24

19

3«

3

53

35

7i

b

90

52

II

55

24

28

3«

14

53

4b

71

13

90

52 30

12

24

37

38

25

53

57

7i

20

90

53

12

5

24

45

38

37

54

8

71

27

90

53 30

12

9

24

54

38

48

54

19

71

34

90

54

12

14

25

2

38

58

54

29

71

40

90

54 30

12

18

25

10

39

9

54

39

71

47

90

55

12

23

25

19

39

19

54

49

7i

53

90

55 3°

12

27

25

27

39

30

54

59

71

59

90

56

12

31

25

35

39

40

55

9

72

5

90

56 3°

12

3b

25

43

39

5°

55

18

72

11

90

57

12

40

25

50

39

59

55

27

72

17

90

57 30

12

44

25

5»

40

9

55

3°

72

22

90

58

12

48

26

5

40

18

55

45

72

28

90

58 30

12

52

2b

13

40

27

55

54

72

33

90

59

12

5°

26

20

40

3b

56

2

72

39

90

59 3°

13

2b

27

45

45

5* >

11

72

44

90

Vertical South Dial. — Let us take again our imaginary transparent sphere QZPA (fig. 4), whose axis PEp is parallel to the earth's axis. Let Z be the zenith, and, consequently, the great circle QZP the

meridian. Through E, the centre of the sphere, draw a vertical plane facing south. This will cut the sphere in the great circle ZMA, which, being vertical, will pass through the zenith, and, facing south, will be at right angles to the meridian. Let QMa be the equatorial circle, obtained by drawing a plane through E at right angles to the axis PEp. The lower portion Ep of the axis will be the style, the vertical line EA in the meridian plane will be the XII o'clock line, and the line EM, which is obviously horizontal, since M is the inter- section of two great circles ZM,QM,eachat right angles to the vertical plane QZP, will be the VI o'clock line. Now, as in the previous problem, divide the equatorial circle into 24 equal arcs of 15 each, beginning at a, viz. ab, be, &c, — each quadrant aM, MQ, &c, con- taining 6, — then through each point of division and through the

7.

Fig. 4.

axis Pp draw a plane cutting the sphere in 24 equidistant great circles. As the sun revolves round the axis the shadow of the axis will suc- cessively fall on these circles at intervals of one hour, and if these circles cross the vertical circle ZMA in the points A, 6, C, &c, the shadow of the lower portion Ep of the axis will fall on the lines EA,

EB, EC, &c, which will therefore be the required hour-lines on the vertical dial, Ep being the style.

There is no necessity for going beyond the VI o'clock hour-line on each side of noon ; for, in the winter months.the sun sets earlier than 6 o'clock, and in the summer months it passes behind the plane of the dial before that time, and is no longer available.

It remains to show how the angles AEB, AEC, &c, may be calcu- lated.

The spherical triangles pAB, pAC, &c, will give us a simple rule. These triangles are all right-angled at A, the side pA, equal to ZP, is the co-latitude of the place, that is, the difference between the latitude and 90 ; and the successive angles ApB, ApC, &c, are 15 , 30°, &c, respectively. Then

tan AB = tan 15 sin co-latitude; or more simply,

tan AB = tan 15° cos latitude, tan AC = tan 30 cos latitude, &c. &c. and the arcs AB, AC so found are the measure of the angles AEB, AEC, &c, required.

In this case the angles diminish as the latitudes increase, the opposite result to that of the horizontal dial.

Inclining, Reclining, fife, Dials. — We shall not enter into the calculation of these cases. Our imaginary sphere being, as before supposed, constructed with its centre at the centre of the dial, and all the hour-circles traced upon it, the intersection of these hour- circles with the plane of the dial will determine the hour-lines just as in the previous cases ; but the triangles will no longer be right-angled, and the simplicity of the calculation will be lost, the chances of error being greatly increased by the difficulty of drawing the dial plane in its true position on the sphere, since that true position will have to be found from observations which can be only roughly performed.

In all these cases, and in cases where the dial surface is not a plane, and the hour-lines, consequently, are not straight lines, the only safe practical way is to mark rapidly on the dial a few points (one is sufficient when the dial face is plane) of the shadow at the moment when a good watch shows that the hour has arrived, and afterwards connect these points with the centre by a continuous line. Of course the style must have been accurately fixed in its true position before we begin.

Equatorial Dial. — The name equatorial dial is given to one whose

plane is at right angles to the style, and therefore parallel to the equator. It is the simplest of all dials. A circle (fig. 5) divided into 24 equal arcs is placed at right angles to the style, and hour divisions are marked upon it. Then if care be taken that the style point accurately to the pole, and that the noon division coincide with the meridian plane, the shadow of the style will fall on the other divisions, each at its proper time. The divisions must be marked

Fig. 5.

on both sides of the dial, because the sun will shine on opposite sides in the summer and in the winter months, changing at each equinox.

To find the Meridian Plane. — We have, so far, assumed the meridian plane to be accurately known ; we shall proceed to describe some of the methods by which it may be found.

The mariner's compass may be employed as a first rough approximation. It is well known that the needle of the compass, when free to move horizontally, oscillates upon its pivot and settles in a direction termed the magnetic meridian. This does not coincide with the true north and south line, but the difference between them is generally known with tolerable accur- acy, and is called the variation of the compass. The variation differs widely at different parts of the surface of the earth, and is not stationary at any particular place, though the change is slow; and there is even a small daily oscillation which takes place about the mean position, but too small to need notice here (see Magnetism, Terres- trial).

With all these elements of uncertainty, it is obvious that the compass can only give a rough approximation to the position of the meridian, but it will serve to fix the style so that only a small further alteration will be necessary when a more perfect determination has been made.

A very simple practical method is the following : —

Place a table (fig. 6), or other plane surface, in such a position that it may receive the sun's rays both in the morning and in the afternoon. Then carefully level the surface by means of a spirit-level. This must be done very accurately, and the table in that position made perfectly secure, so that there be no danger of its shifting during the day.

Next, suspend a plummet SH from a point S, which must be rigidly fixed. The extremity H, where the plummet just meets the surface, should be somewhere near the middle of one end of the table. With H for centre, describe any number of concentric arcs of circles, AB, CD,

EF, &c.

A bead P, kept in its place by friction, is threaded on the plummet line at some convenient height above H.

Everything being thus prepared, let us follow the shadow of the bead P as it moves along the surface of the table during the day. It will be found to describe a curve ACE . . . FDB, approaching the point H as the sun advances towards noon, and reced – ing from it afterwards. (The curve is a conic section — an hyperbola in these regions.) At the moment when it crosses the arc AB, mark the point A; AP is then the direction of the sun, and, as AH is horizontal, the angle PAH is the alti- tude of the sun. In the afternoon mark the point B where it crosses the same arc; then the angle PBH is the alti- tude. But the right- angled triangles PHA, PHB are obviously equal; and the sun has therefore the same alti- tudes at those two instants, the one before, the other after noon. It follows that, if the sun has not changed its declination during the interval, the two positions will be symmetrically placed one on each side of the meridian. Therefore, drawing the chord AB, and bisecting it in M, HM will be the meridian line.

Each of the other concentric arcs, CD, EF, &c, will furnish its meridian line. Of course these should all coincide, but if not, the mean of the positions thus found must be taken.

The proviso mentioned above, that the sun has not changed its declination, is scarcely ever realized; but the change is slight, and may be neglected, except perhaps about the time of the equinoxes, at the end of March and at the end of September. Throughout the remainder of the year the change of declination is so slow that we may safely neglect it. The most favourable times are at the end of June and at the end of December, when the sun's declination is almost stationary. If the line HM be produced both ways to the edges of the table, then the two points on the ground vertically below those on the edges may be found by a plummet, and, if permanent marks be made there, the meridian plane, which is the vertical plane passing through these two points, will have its position perfectly secured.

Fig. 6.

To place the Style of a Dial in its True Position. — Before giving any

other method of finding the meridian plane, we shall complete the construction of the dial, by showing how the style may now be accurately placed in its true position. The angle which thefetyle makes with a hanging plumb-line, being the co-latitude of the place, is known, and the north and south direction is also roughly given by the mariner's compass. The style may therefore be already adjusted approximately — correctly, indeed, as to its inclination — but probably requiring a little horizontal motion east or west. Suspend a fine plumb-line from some point of the style, then the style will be properly adjusted if, at the very instant of noon, its shadow falls exactly on the plumb-line, — or, which is the same thing, if both shadows coincide on the dial.

This instant of noon will be given very simply, by the meridian plane, whose position we have secured by the two permanent marks on the ground. Stretch a cord from the one mark to the other. This will not generally be horizontal, but the cord will be wholly in the meridian plane, and that is the only necessary condition. Next, suspend a plummet over the mark which is nearer to the sun, and, when the shadow of the plumb-line falls on the stretched cord, it is noon. • A signal from the observer there to the observer at the dial enables the latter to adjust the style as directed above.

Other Methods of finding the Meridian Plane. — We have dwelt at some length on these practical operations because they are simple and tolerably accurate, and because they want neither watch, nor sextant, nor telescope — nothing more, in fact, than the careful observation of shadow lines.

The Pole star, or Ursae Minoris, may also be employed for finding the meridian plane without other apparatus than plumb-lines. This star is now only about 1° 14′ from the pole; if therefore a plumb-line be suspended at a few feet from the observer, and if he shift his position till the star is exactly hidden by the line, then the plane through his eye and the plumb-line will never be far from the meridian plane. Twice in the course of the twenty-four hours the planes would be strictly coincident. This would be when the star crosses the meridian above the pole, and again when it crosses it below. If we wished to employ the method of determining the meridian, the times of the stars crossing would have to be calculated from the data in the Nautical Almanac, and a watch would be necessary to know when the instant arrived. The watch need not, however, be very accurate, because the motion of the star is so slow that an error of ten minutes in the time would not give an error of one-eighth of a degree in the azimuth.

The following accidental circumstance enables us to dispense with both calculation and watch. The right ascension of the star 17 Ursae Majoris, that star in the tail of the Great Bear which is farthest from the ” pointers,” happens to differ by a little more than 12 hours from the right ascension of the Pole star. The great circle which joins the two stars passes therefore close to the pole. When the Pole star, at a distance of about I ° 1 4′ from the pole, is crossing the meridian above the pole, the star tj Ursae Majoris, whose polar distance is about 40°, has not yet reached the meridian below the pole.

When 7; Ursae Majoris reaches the meridian, which will be within half an hour later, the Pole star will have left the meridian ; but its slow motion will have carried it only a very little distance away. Now at some instant between these two times — much nearer the latter than the former — the great circle joining the two stars will be exactly vertical; and at this instant, which the observer determines by seeing that the plumb-line hides the two stars simultaneously, neither of the stars is strictly in the meridian ; but the deviation from it is so small that it may be neglected, and the plane through the eye and the plumb-line taken for meridian plane.

In all these cases it will be convenient, instead of fixing the plane by means of the eye and one fixed plummet, to have a second plummet at a short distance in front of the eye ; this second plummet, being suspended so as to allow of lateral shifting, must be moved so as always to be between the eye and the fixed plummet. The meridian plane will be secured by placing two permanent marks on the ground, one under each plummet.

This method, by means of the two stars, is only available for the upper transit of Polaris; for, at the lower transit, the other star 17 Ursae Majoris would pass close to or beyond the zenith, and the observation could not be made. Also the stars will not be visible when the urjper transit takes place in the daytime, so that one-half of the year is lost to this method.

Neither could it be employed in lower latitudes than 40 N., for there the star would be below the horizon at its lower transit ; — we may even say not lower than 45 ° N., for the star must be at least 5 above the horizon before it becomes distinctly visible.

There are other pairs of stars which could be similarly employed, but none so convenient as these two, on account of Polaris with its very slow motion being one of the pair.

To place the Style in its True Position without previous Determination of the Meridian Plane. — The various methods given above for finding the meridian plane have for ultimate object the determination of the plane, not on its own account, but as an element for fixing the instant of noon, whereby the style may be properly placed.

We shall dispense, therefore, with all this preliminary work if we determine noon by astronomical observation. For this we shall want a good watch, or pocket chronometer, and a sextant or other instru-

ment for taking altitudes. The local time at any moment may be determined in a variety of ways by observation of the celestial bodies. The simplest and most practically useful methods will be found described and investigated in any work on astronomy.

For our present purpose a single altitude of the sun taken in the forenoon will be most suitable. At some time in the morning, when the sun is high enough to be free from the mists and uncertain refractions of the horizon — but to ensure accuracy, while the rate of increase of the altitude is still tolerably rapid, and, therefore, not later than 10 o'clock — take an altitude of the sun, an assistant, at the same moment, marking the time shown by the watch. The altitude so observed being properly corrected for refraction, parallax, &c, will, together with the latitude of the place, and the sun's declination, taken from the Nautical Almanac, enable us to calculate the time. This will be the solar or apparent time, that is, the very time we require. Comparing the time so found with the time shown by the watch, we see at once by how much the watch is fast or slow of solar time ; we know, therefore, exactly what time the watch must mark when solar noon arrives, and waiting for that instant we can fix the style in its proper position as explained before.

We can dispense with the sextant and with all calculation and observation if, by means of the pocket chronometer, we bring the time from some observatory where the work is done; and, allowing for the change of longitude, and also for the equation of time, if the time we have brought is clock time, we shall have the exact instant of solar noon as in the previous case.

In former times the fancy of dialists seems to have run riot in devising elaborate surfaces on which the dial was to be traced. Some- times the shadow was received on a cone, sometimes on a cylinder, or on a sphere, or on a combination of these. A universal dial was constructed of a figure in the shape of a cross ; another universal dial showed the hours by a globe and by several gnomons. These universal dials

required adjusting before use, and for this a mariner's compass and a spirit-level were necessary. But it would be tedious and useless to enumerate the various forms designed, and, as a rule, the more complex the less accurate.

Another class of useless dials consisted of those with variable centres. They were drawn on fixed horizontal planes, and each day the style had to be shifted to a new position. Instead of hour-lines they had hour-points ; and the style, instead of being parallel to the axis of the earth, might make any chosen angle with the horizon. There was no practical advantage in their use, but rather the reverse ; and they can only be considered as furnishing material for new mathematical problems.

Portable Dials. — The dials so far described have been fixed dials, for even the fanciful ones to which reference was just now made were to be fixed before using. There were, however, other dials, made generally of a small size, so as to be carried in the pocket; and these, so long as the sun shone, roughly answered the purpose of a watch.

The description of the portable dial has generally been mixed up with that of the fixed dial, as if it had been merely a special case, and the same principle had been the basis of both; whereas there are essential points of difference between them, besides those which are at once apparent.

In the fixed dial the result depends on the uniform angular motion of the sun round the fixed style; and a small error in the assumed position of the sun, whether due to the imperfection of the instrument, or to some small neglected correction, has only a trifling effect on the time. This is owing to the angular displacement of the sun being so rapid— a quarter of a degree every minute — that for the ordinary affairs of life greater accuracy is not required, as a displacement of a quarter of a degree, or at any rate of one degree, can be readily seen by nearly every person. But with a portable dial this is no longer the case. The uniform angular motion is not now avail- able, because we have no determined fixed plane to which we may refer it. In the new position, to which the observer has gone, the zenith is the only point of the heavens he can at once practically find ; and the basis for the determination of the time is the constantly but very irregularly varying zenith distance of the sun.

At sea the observation of the altitude of a celestial body is the only method available for finding local time ; but the perfection which has been attained in the construction of the sextant enables the sailor to

reckon on an accuracy of seconds. Certain precautions have, however, to be taken. The observations must not be made within a couple of hours of noon, on account of the slow rate of change at that time, nor too near the horizon, on account of the uncertain refracticrcs there ; and the same restrictions must be observed in using a portah

To compare roughly the accuracy of the fixed and the portable dials, let us take a mean position in Great Britain, say 54 lat., and a mean declination when the sun is in the equator. It will rise at 6 o'clock, and at noon have an altitude of 36°, — that is, the portable dial will indicate an average change of one-tenth of a degree in each minute, or two and a half times slower than the fixed dial. The vertical motion of the sun increases, however, nearer the horizon, but even there it will be only one-eighth of a degree each minute, or half the rate of the fixed dial, which goes on at nearly the same speed throughout the day.

Portable dials are also much more restricted in the range of latitude

for wliich they are available, and they should not be used more than 4 or 5 m. north or south of the place for which they were constructed. We shall briefly describe two portable dials which were in actual use.

Dial on a Cylinder. — A hollow cylinder of metal (fig. 7), 4 or 5 in. high, and about an inch in diameter, has a lid which admits of tolerably easy rotation. A hole in the lid receives the style shaped somewhat like a bayonet; and the straight part of the style, which, on account of the two bends, is lower than the lid, projects horizontally out from the cylinder to a distance of I or 1 1 in. When not in use the style would be taken out and placed inside the cylinder.

A horizontal circle is traced on the cylinder opposite the projecting style, and this circle is divided into 36 approximately equidistant intervals. 1 These intervals represent spaces of time, and to each division is assigned a date, so that each month has three dates marked as follows: — January 10, 20, 31; February 10, 20, 28; March 10, 20, 31; April io, 20, 30, and so on, — always P _ • the 10th, the 20th, and the

' ' ' last day of each month.

Through each point of division a vertical line parallel to the axis of the

cylinder is drawn from top to bottom. Now it will be readily understood that if, upon one of these days, the lid be turned, so as to bring the style exactly opposite the date, and if the dial be then placed on a horizontal table so as to receive sunlight, and turned round bodily until the shadow of the style falls exactly on the vertical line below it, the shadow will terminate at some definite point of this line, the position of which point will depend on the length of the style — that is, the distance of its end from the surface of the cylinder — and on the altitude of the sun at that instant. Suppose that the observations are continued all day, the cylinder being very gradually turned so that the style may always face the sun, and suppose that marks are made on the vertical line to show the extremity of the shadow at each exact hour from sunrise to sunset — these times being taken from a good fixed sun-dial, — then it is obvious that the next year, on the same date, the sun's declination being about the same, and the observer in about the same latitude, the marks made the previous year will serve to tell the time all that day.

What we have said above was merely to make the principle of the instrument clear, for it is evident that this mode of marking, which would require a whole year's sunshine and hourly observation, cannot be the method employed.

The positions of the marks are, in fact, obtained by calculation. Corresponding to a given date, the declination of the sun is taken from the almanac, and this, together with the latitude of the place and the length of the style, will constitute the necessary data for computing the length of the shadow, that is, the distance of the mark below the style for each successive hour.

We have assumed above that the declination of the sun is the same at the same date in different years. This is not quite correct, but, if the dates be taken for the second year after leap year, the results will be sufficiently approximate.

When all the hour-marks have been placed opposite to their respective dates, then a continuous curve, joining the corresponding hour-points, will serve to find the time for a day intermediate to those set down, the lid being turned till the style occupy a proper position between the two divisions. The horizontality of the surface on which the instrument rests is a very necessary condition, especially in summer, when, the shadow of the style being long, the extreme end will shift rapidly for a small deviation from the vertical, and render the reading uncertain. The dial can also be used by holding it up by a small ring in the top of the lid, and probably the verticality is better ensured in that

way.

Portable Dial on a Card. — This neat and very ingenious dial is attributed by Ozanam to a Jesuit Father, De Saint Rigaud, and probably dates from the early part of the 17th century. Ozanam says that it was sometimes called the capuchin, from some fancied resemblance to a cowl thrown back.

Const ruction. — Draw a straight line ACB parallel to the top of the

1 Strict equality is not necessary, as the observations made are on the vertical line through each division-point, without reference to the others. It is not even requisite that the divisions should go completely and exactly round the cylinder, although they were always so drawn, and both these conditions were insisted upon in the directions for the construction.

card (fig. 8) and another DCE at right angles to it ; with C as centre, and any convenient radius CA, describe the semicircle AEB below the horizontal. Divide the whole arc AEB into 12 equal parts at the points r, s, t, &c, and through these points draw perpendiculars to the diameter ACB; these lines will be the hour-lines, viz. the line through r will be the XI . . . I line, the line through s the X … II line, and so on; the hour-line of noon will be the point A itself; by subdivision of the small arcs Ar, rs, st, &c, we may draw the hour- lines corresponding to halves and quarters, but this only where it can be done without confusion.

Draw ASD making with AC an angle equal to the latitude of the place, and let it meet EC in D, through which point draw FDG at right angles to AD.

With centre A, and any convenient radius AS, describe an arc of circle RST, and graduate this arc by marking degree divisions on

it, extending from 0° at S to 23J on each side at R and T. Next determine the points on the straight line FDG where radii drawn from A to the degree divisions on the arc would cross it, and carefully mark these crossings.

The divisions of RST are to correspond to the sun’s declination, south declinations on RS and north declinations on ST. In the other hemisphere of the earth this would be reversed; the north declinations would be on the upper half.

Now, taking a second year after leap year (because the declinations of

that year are about the mean of each set of four years), find the days of the month when the sun has these different declinations, and place these dates, or so many of them as can be shown without confusion, opposite the corresponding marks on FDG. Draw the sun-line at the top of the card parallel to the line ACB ; and, near the extremity, to the right, draw any small figure intended to form, as it were, a door of which a b shall be the hinge. Care must be taken that this hinge is exactly at right angles to the sun-line. Make a fine open slit c d right through the carr 1 i.nd extending from the hinge to a short distance on the door, — the centre line of this slit coinciding accurately with the sun-line. Now, cut the door completely through the card; except, of course, along the hinge, which, when the card is thick, should be partly cut through at the back, to facilitate the opening. Cut the card right through along the line FDG, and pass a thread carrying a little plummet W and a very small bead P ; the bead having sufficient friction with the thread to retain any position when acted on only by its own weight, but sliding easily along the thread when moved by the hand. At the back of the card the thread terminates in a knot to hinder it from being drawn through; or better, because giving more friction and a better hold, it passes through the centre of a small disk of card — a fraction of an inch in diameter — and, by a knot, is made fast at the back of the disk.

To complete the construction, — with the centres F and G, and

radii FA and GA, draw the two arcs AY and AZ which will limit the hour-lines; for in an observation the bead will always be found between them. The forenoon and afternoon hours may then be marked as indicated in the figure. The dial does not of itself discriminate between forenoon and afternoon; but extraneous circumstances, as, for instance, whether the sun is rising or falling, will settle that point, except when close to noon, where it will always be uncertain. ....

To rectify the dial (using the old expression, which means to prepare the dial for an observation) ,— open the small door, by turning it about its hinge, till it stands well out in front. Next, set the thread in the line FG opposite the day of the month, and stretching it over the point A, slide the bead P along till it exactly coincide with A.

To find the hour of the day,— hold the dial in a vertical position in such a way that its plane may pass through the sun. The vertically is

ensured by seeing that the bead rests against the card without pressing. Now gradually tilt the dial (without altering its vertical

Fig. 9.

plane), until the central line of sunshine, passing through the open slit of the door, just falls along the sun-line. The hour-line against which the bead P then rests indicates the time.

The sun-line drawn above has always, so far as we know, been used as a shadow-line. The upper edge of the rectangular door was the prolongation of the line, and, the door being opened, the dial was gradually tilted until the shadow cast by the upper edge exactly coincided with it. But this shadow tilts the card one-quarter of a degree more than the sun-line, because it is given by that portion of the sun which just appears above the edge, that is, by the upper limb of the sun, which is one-quartec of a degree higher than the centre. Now, even at some distance from noon, the sun will sometimes take a considerable time to rise one-quarter of a degree, and by so much time will the indication of the dial be in error.

The central line of light which comes through the open slit will be free from this error, because it is given by light from the centre of the sun.

The card-dial deserves to be looked upon as something more than a mere toy. Its ingenuity and scientific accuracy give it an educa- tional value which is not to be measured by the roughness of the results obtained.

The theory of this instrument is as follows: — Let H (fig. 9) be the point of suspension of the plummet at the time of observation, so that the angle DAHis the north declination of the sun, — P, the bead, resting against the hour-line VX. Join CX, then the angle ACX is the hour- angle from noon given by the bead, and we have to prove that this hour-angle is the correct one corresponding to a north latitude D AC, a north declination DAH and an altitude equal to the angle which the sun-line, or its parallel AC, makes with the horizontal. The angle PHQ will be equal to the altitude, if HQ be drawn parallel to DC, for the pair of lines HQ, HP will be respectively at right angles to the sun-line and the horizontal.

Draw PQ and HM parallel to AC, and let them meet DCE in M and N respectively.

Let HP and its equal HA be represented by a. Then the following values will be readily deduced from the figure : —

AD = a cos decl. DH = a sin decl. PQ = a sin alt. CX= AC=AD cos lat. = a cos decl. cos lat. PN= CV = CXcos ACX = ocosdecZ. cos lat. cos ACX. NQ = MH = DH sin MDH=a sin decl. sin lat. ?.-. the angle MDH ■= DAC = latitude.) And since . PQ = NQ+PN,

we have, by simple substitution,

a sin alt. = o sin decl. sin lat. +a cos decl. cos lat. cos ACX ; or, dividing by a throughout,

sin a/£r=sin decl. sin lat.+cos decl. cos lat. cos ACX . . . (1) which equation determines the hour-angle ACX shown by the bead.

To determine the hour-angle of the sun at the same moment, let fig. 10 represent the celestial sphere, HR the horizon, P the pole, Z the zenith and S the sun.

From the spherical triangle PZS, we have

cos ZS = cos PS cos ZP-f sin PS sin ZP cos ZPS but ZS = zenith distance = 90 “-altitude ZP=90°-PR =90°-latitude_

PS = polar distance =90°- declination, therefore, by substitution

sin alt. = sin decl. sin lat.--cos decl. cos lat. cos ZPS . . . (3) and ZPS is the hour-angle of the sun.

A comparison of the two formulae (1) and (2) shows that the hour-angle given by the bead will be the same as that given by the sun, and proves the theoretical accuracy of the card-dial. Just at sun-rise or at sun-set the amount of refraction slightly exceeds half a degree. If, then, a little cross m (see fig. 8) be made just below the sun-line, at a distance from it which would subtend half a degree at c, the time of sun-set would be found corrected for refraction, if the central line of light were made to fall on cm.

Literature. — The following list includes the principal writers on dialling whose works have come down’to us, and to these we must

refer for descriptions of z_

the various constructions, some simple and direct, others fanciful and intricate, which have been at different times employed: Ptolemy, Analemma, restored by Commandine; Vitruvius, Architecture ; Sebastian Munster, Horologiographia ; Orontius Fineus, De horo- logiis solaribus; Mutio Oddi da Urbino, Horologi solari; Dryander, De horo-

logiorum compositione ; Conrad Gesner, Pandectae; Andreas Sch8ner, Gnomo- nicae ; F. Commandine, Horologiorum descriptio ; Joan. Bapt. Benedictus, De gnomonum usu; Georgius Schomberg, Exegesis fundamentorum gnomonicorum ; Joan. Solomon de Caus, Horologes solaires; Joan. Bapt. Trolta, Praxis horologiorum; Desargues, Maniere universelle pour poser I'essieu, &c. ; Ath. Kircher, Ars magna lucis et Umbrae; Hallum, Explicatio horologii in horto regio Londini; Joan. Mark, Tractatus horologiorum ; Clavius, Gnomonices de horologiis. Also among more modern writers, Deschales, Ozanam, Schottus, Wolfius, Picard, Lahire, Walper; in German, Paterson, Michael, Muller ; in English, Foster, Wells, Collins, Leadbetter, Jones, Leybourn, Emerson and Ferguson. See also Hans Loschner, tiber Sonnenuhren (2nd ed., Graz,ii9o6). (H. G.)

DIALECT (from Gr. SiaXturos, conversation, manner of speaking, SiaXiyeo-Qcu, to converse), a particular or characteristic manner of speech, and hence any variety of a language. In its widest sense languages which are branches of a common or parent language may be said to be " dialects " of that language; thus Attic, Ionic, Aeolic and Doric are dialects of Greek, though there may never have at any time been a separate language of which they were variations; so the various Romance languages, Italian, French, Spanish, &c, were dialects of Latin. Again, where there have existed side by side, as in England, various branches of a language, such as the languages of the Angles, the Jutes or the Saxons, and the descendant of one particular language, from many causes, has obtained the predominance, the traces of the other languages remain in the " dialects " of the districts where once the original language prevailed. Thus it may be incorrect, from the historical point of view, to say that " dialect " varieties of a language represent degradations of the standard language. A "literary "accepted language, such as modern English, repre- sents the original language spoken in the Midlands, with accretions

of Norman, French, and later literary and scientific additions from classical and other sources, while the present-day " dialects " preserve, in inflections, pronunciation and particular words, traces of the original variety of the language not incorporated in the standard language of the country. See the various articles on languages (English, French, &c).

DIALECTIC, or Dialectics (from Gr. Si&XecTps, discourse, debate; 17

5ia\eKTUcfi, sc. rkxvri, tne art of debate), a logical term, generally used in common parlance in a contemptuous sense for verbal or purely abstract disputation devoid of practical value. According to Aristotle, Zeno of Elea ” invented ” dialectic, the art of disputation by question and answer, while Plato developed it metaphysically in connexion with his doctrine of ” Ideas ” as the art of analysing ideas in themselves and in relation to the ultimate idea of the Good {Repub. vii.). The special function of the so-called ” Socratic dialectic ” was to show the inadequacy of popular beliefs. Aristotle himself used ” dialectic,” as opposed to ” science,” for that department of mental activity which examines the presuppositions lying at the back of all the particular sciences. Each particular science has its own subject matter and special principles (i&eu dpxcu) on which the superstructure of its special discoveries is based. The Aristotelian dialectic, however, deals with the universal laws (kolvo.1 apxp-L) of reasoning, which can be applied to the particular arguments of all the sciences. The sciences, for example, all seek to define their own species; dialectic, on the other hand, sets forth the conditions which all definitions must satisfy whatever their subject matter. Again, the sciences all seek to educe general laws ; dialectic investigates the nature of such laws, and the kind and degree of necessity to which they can attain. To this general subject matter Aristotle gives the name “Topics” (toitoi, loci, communes loci). “Dia- lectic ” in this sense is the equivalent of ” logic.” Aristotle also uses the term for the science of probable reasoning as opposed to demonstrative reasoning (awodeiKTucrj) . The Stoics divided X07007 (logic) into rhetoric and dialectic, and from their time till the end of the middle ages dialectic was either synonymous with, Or a part of, logic.

In modern philosophy the word has received certain special meanings. In Kantian terminology Dialektik is the name of that portion of the Krilik d. reinen Vernunft in which Kant discusses the impossibility of applying to ” things-in-themselves ” the principles which are found to govern phenomena. In the system of Hegel the word resumes its original Socratic sense, as the name of that intellectual process whereby the inadequacy of popular conceptions is exposed. Throughout its history, therefore, ” dialectic ” has been connected with that which is remote from, or alien to, unsystematic thought, with the a priori, or transcendental, rather than with the facts of common experience and material things.

DI ALL AGE, an important mineral of the pyroxene group, dis- tinguished by its thin foliated structure and bronzy lustre. The chemical composition is the same as diopside, Ca Mg (Si0 3) 2 , but it sometimes contains the molecules (Mg, Fe”) (Al, Fe”’^ Si0 6 and Na

Fe"' (Si0 3) 2 in addition, when it approaches to augite in composition. Diallage is in fact an altered form of these varieties of pyroxene; the particular kind of alteration which they have undergone being known as "schillerization." This, as described by Prof. J. W. Judd, consists in the develop- ment of a fine lamellar structure or parting due to secondary twinning and the separation of secondary products along these and other planes of chemical weakness (" solution planes ") in the crystal. The secondary products consist of mixtures of vari- ous hydrated oxides — opal, gothite, limonite, &c. — and appear as microscopic inclusions filling or partly filling cavities, which have definite outlines with respect to the enclosing crystal and are known as negative crystals. It is to the reflection and inter- ference of light from these minute inclusions that the peculiar bronzy sheen or " schiller " of the mineral is due. The most pronounced lamination is that parallel to the orthopinacoid; another, less distinct, is parallel to the basal plane, and a third parallel to the plane of symmetry; these planes of secondary parting are in addition to the ordinary prismatic cleavage of all

pyroxenes. Frequently the material is interlaminated with a rhombic pyroxene (bronzite) or with an amphibole (smaragdite or uralite), the latter being an alteration product of the diallage.

Diallage is usually greyish-green or dark green, sometimes brown, in colour, and has a pearly to metallic lustre or schiller on the laminated surfaces. The hardness is 4, and the specific gravity 3-2 to 3-35. It does not occur in distinct crystals with definite outlines, but only as lamellar masses in deep-seated igneous rocks, principally gabbro, of which it is an essential con- stituent. It occurs also in some peridotites and serpentines, and rarely in volcanic rocks (basalt) and crystalline schists. Masses of considerable size are found in the coarse-grained gabbros of the Island of Skye, Le Prese near Bornio in Valtellina, Lombardy, Prato near Florence, and many other localities.

The name diallage, from SidKKayr], " difference," in allusion to the dissimilar cleavages and planes of fracture, as originally applied by R. J. Haiiy in 1801, included other minerals (the orthorhombic pyroxenes hypersthene, bronzite and bastite, and the smaragdite variety of hornblende) which exhibit the same peculiarities of schiller structure; it is now limited to the monoclinic pyroxenes with this structure. Like the minerals of similar appearance just mentioned, it is sometimes cut and polished for ornamental purposes. (L. J. S.)

DIALOGUE, properly the conversation between two or more persons, reported in writing, a form of literature invented by the Greeks for

purposes of rhetorical entertainment and instruction, and scarcely modified since the days of its invention. A dialogue is in reality a little drama without a theatre, and with scarcely any change of scene. It should be illuminated with those qualities which La Fontaine applauded in the dialogue of Plato, namely vivacity, fidelity of tone, and accuracy in the opposition of opinions. It has always been a favourite with those writers who have something to censure or to impart, but who love to stand outside the pulpit, and to encourage others to pursue a train of thought which the author does not seem to do more than indicate. The dialogue is so spontaneous a mode of expressing and noting down the undulations of human thought that it almost escapes analysis. All that is recorded, in any literature, of what pretend to be the actual words spoken by living or imaginary people is of the nature of dialogue. One branch of letters, the drama, is entirely founded upon it. But in its technical sense the word is used to describe what the Greek philosophers invented, and what the noblest of them lifted to the extreme refinement of an art.

The systematic use of dialogue as an independent literary form is commonly supposed to have been introduced by Plato, whose earliest experiment in it is believed to survive in the Laches. The Platonic dialogue, however, was founded on the mime, which had been cultivated half a century earlier by the Sicilian poets , Sophron and Epicharmus. The works of these writers, which Plato admired and imitated, are lost, but it is believed that they were little plays, usually with only two performers. The recently discovered mimes of Herodas (Herondas) give us some idea of their scope. Plato further simplified the form, and reduced it to pure argumentative conversation, while leaving intact the amusing element of character-drawing. He must have begun this about the year 405, and by 399 he had brought the dialogue to its highest perfection, especially in the cycle directly inspired by the death of Socrates. AH his philosophical writings, except the Apology, are cast in this form. As the greatest of all masters of Greek prose style, Plato lifted his favourite instrument, the dialogue, to its highest splendour, and to this day he remains by far its most distinguished proficient. In the 2nd century a.d ; Lucian of Samosata achieved a brilliant success with his ironic dialogues ” Of the Gods,” ” Of the Dead,” ” Of Love ” and ” Of the Courtesans.” In some of them he attacks superstition and philosophical error with the sharpness of his wit; in others he merely paints scenes of modern life. The title of Lucian’s most famous collection was borrowed in the 17th century by two French writers of eminence, each of whom prepared Dialogues des morts. These were Fontenelle (1683) and Fdnelon (1712). In English non-dramatic literature the dialogue had not been

extensively

employed until Berkeley used it, in 1713, for his Platonic treatise, Hylas and Philonous. Landor's Imaginary Conversations (182 1- 1828) is the most famous example of it in the 19th century, although the dialogues of Sir Arthur Helps claim attention. In Germany, Wieland adopted this form for several important satirical works published between 1780 and 1799. In Spanish literature, the Dialogues of Valdes (1528) and those on Painting (1633) by Vincenzo Carducci, are celebrated. In Italian, collec- tions of dialogues, on the model of Plato, have been composed by Torquato Tasso (1586), by Galileo (1632), by Galiani (1770), by Leopardi (1825), and by a host of lesser writers. In our own day, the French have returned to the original application of dialogue, and the inventions of " Gyp," of Henri Lavedan and of others, in which a mundane anecdote is wittily and maliciously told in conversation, would probably present a close analogy to the lost mimes of the early Sicilian poets, if we could meet with them. This kind of dialogue has been employed in English, and with conspicuous cleverness by Mr Anstey Guthrie, but it does not seem so easily appreciated by English as by French readers. (E.G.)

DIALYSIS (from the Gr. 5id, through, Xieie, to loosen), in chemistry, a process invented by Thomas Graham for separating colloidal and crystalline substances. He found that solutions could be divided into two classes according to their action upon a porous diaphragm such as parchment. If a solution, say of salt, be placed in a drum provided with a parchment bottom, termed a " dialyser," and the drum and its contents placed in a larger vessel of water, the salt will pass through the membrane. If the salt solution be replaced by one of glue, gelatin or gum, it will be found that the membrane is impermeable to these solutes. To the first class Graham gave the name " crystalloids," and to the second " colloids." This method is particularly effective in the preparation of silicic acid. By adding hydrochloric acid to a dilute solution of an alkaline silicate, no precipitate will fall and the solution will contain hydrochloric acid, an alkaline chloride, and silicic acid. If the solution be transferred to a dialyser, the hydrochloric acid and alkaline chloride will pass through the parchment, while the silicic acid will be retained.

DIAMAGNETISM. Substances which, like iron, are attracted by the pole of an ordinary magnet are commonly spoken of as magnetic, all

others being regarded as non-magnetic. It was noticed by A. C. Becquerel in 1827 that a number of so-called non-magnetic bodies, such as wood and gum lac, were influenced by a very powerful magnet, and he appears to have formed the opinion that the influence was of the same nature as that exerted upon iron, though much feebler, and that all matter was more or less magnetic. Faraday showed in 1845 (Experimental Re- searches, vol. iii.) that while practically all natural substances are indeed acted upon by a sufficiently strong magnetic pole, it is only a comparatively small number that are attracted like iron, the great majority being repelled. Bodies of the latter class were termed by Faraday diamagnelics. The strongest diamagnetic substance known is bismuth, its susceptibility being — 0-000014, and its permeability 0-9998. The diamagnetic quality of this metal can be detected by means of a good permanent magnet, and its repulsion by a magnetic pole had been more than once recognized before the date of Faraday's experiments. The metals gold, silver, copper, lead, zinc, antimony and mercury are all diamagnetic; tin, aluminium and platinum are attracted by a very strong pole. (See Magnetism.)

DIAMANTE, FRA, Italian fresco painter, was born at Prato about 1400. He was a Carmelite friar, a member of the Florentine community of that order, and was the friend and assistant of Filippo Lippi. The Carmelite convent of Prato which he adorned with many works in fresco has been suppressed, and the buildings have been altered to a degree involving the destruction of the paintings. He was the principal assistant of Fra Filippo in the grand frescoes which may still be seen at the east end of the cathedral of Prato. In the midst of the work he was recalled to Florence by his conventual superior, and a minute of proceedings of the commune of Prato is still extant, in which it is determined to petition the metropolitan of Florence to obtain his return to

Prato, — a proof that his share in the work was so important that his recall involved the suspension of it. Subsequently he assisted Fra Filippo in the execution of the frescoes still to be seen in the cathedral of Spoleto, which Fra Diamante completed in 1470 after his master's death in 1469. Fra Filippo left a son ten years old to the care of Diamante, who, having received 200 ducats from the commune of Spoleto, as the balance due for the work done in the cathedral, returned with the child to Florence, and, as Vasari says, bought land for himself with the money, giving but a small portion to the child. The accusation of wrong-doing, however, would depend upon the share of the work executed by Fra Diamante, and the terms of his agreement with Fra Filippo. Fra Diamante must have been nearly

seventy when he com- pleted the frescoes at Spoleto, but the exact year of his death is not known.

DIAMANTE, JUAN BAUTISTA (i640?i68 4 ?), Spanish dramatist, was born at Castillo about 1640, entered the army, and began writing for the stage in 1657. He became a knight of Santiago in 1660; the date of his death is unknown, but no reference to him as a living author occurs after 1684. Like many other Spanish dramatists of his time, Diamante is deficient in originality, and his style is riddled with affectations; La Des graciada Raquel, which was long considered to be his best play, is really Mira de Amescua's Judia de Toledo under another title; and the earliest of Diamante's surviving pieces, El Honrador de su padre (1658), is little more than a free translation of Corneille's Cid. Diamante is historically interesting as the introducer of French dramatic methods into Spain.

DIAMANTINA (formerly called Tejuco), a mining town of the state of Minas Geraes, Brazil, in the N.E. part of the state, 3710 ft. above sea-level. Pop. (1890) 17,980. Diamantina is built partly on a steep hillside overlooking a small tributary of the Rio Jequitinhonha (where diamond- washing was once carried on), and partly on the level plain above. The town is roughly but substantially built, with broad streets and large squares. It is the seat of a bishopric, with an episcopal seminary, and has many churches. Its public buildings are inconspicuous; they include a theatre, military barracks, hospitals, a lunatic asylum and a secondary school. There are several small manufactures, including cotton-weaving, and diamond-cutting is carried on. The surrounding region, lying on the eastern slopes of one of the lateral ranges of the Serra do Espinhaco, is rough and barren, but rich in minerals, principally gold and diamonds. Diamantina is the commercial centre of an extensive region, and has long been noted for its wealth. The date of the discovery of diamonds, upon which its wealth and importance chiefly depend, is uncertain, but the official announcement was made in 1729, and in the following year the mines were declared crown property, with a crown reservation, known as the " forbidden district," 42 leagues in circumference and 8 to 16 leagues in diameter. Gold-mining was forbidden within its limits and diamond-washing was placed under severe restrictions. There are no trustworthy returns of the value of the output, but in 1849 the total was estimated up to that date at 300,000,000 francs (see Diamond) . The present name of the town was assumed (instead of Tejuco) in 1838, when it was made a cidade.

DIAMANTINO, a small town of the state of Matto Grosso, Brazil, near the Diamantino river, about 6 m. above its junction with the

Paraguay, in 14 24′ 33″ S., 56° 8′ 30′ W. Pop. (1890) of the municipality 2147, mostly Indians. It stands in a broken sterile region 1837 ft. above sea-level and at the foot of the great Matto Grosso plateau. The first mining settlement dates from 1730, when gold was found in the vicinity. On the discovery of diamonds in 1746 the settlement drew a large population and for a time was very prosperous. The mines failed to meet expectations, however, and the population has steadily declined. Ipecacuanha and vanilla beans are now the principal articles of export.

DIAMETER (from the Gr. 5id, through, iikrpov, measure), in geometry, a line passing through the centre of a circle or conic section and terminated by the curve; the “principal diameters” of the ellipse and hyperbola coincide with the “axes” and are at

right angles; ” conjugate diameters ” are such that each bisects chords parallel to the other. The diameter of a quadric surface is a line at the extremities of which the tangent planes are parallel, Newton defined the diameter of a curve of any order as the locus of the centres of the mean distances of the points of intersection of a system of parallel chords with the curve; this locus may be shown to be a straight line. The word is also used as a unit of linear measurement of the magnifying power of a lens or microscope.

In architecture, the term is used to express the measure of the lower part of the shaft of a column. It is employed by Vitruvius (iii. 2) to determine the height of a column, which should vary from eight to ten diameters according to the intercolumniation: and it is generally the custom to fix the lower diameter of the shaft by the height required and the Order employed. Thus the diameter of the Roman Doric should be about one-eighth of the height, that of the Ionic one-ninth, and of the Corinthian one-tenth (see Order).

DIAMOND, a mineral universally recognized as chief among precious stones; it is the hardest, the most imperishable, and also the most brilliant of minerals. 1 These qualities alone have made it supreme as a jewel since early times, and yet the real brilliancy of the stone is not displayed until it has been faceted by the art of the lapidary (q.v.); and this was scarcely developed before the year 1746. The consummate hardness of the diamond, in spite of its high price, has made it most useful for purposes of grinding, polishing and drilling.

Numerous attempts have been made to manufacture the diamond by arti- ficial means, and these attempts have a high scientific interest on account of the mystery which surrounds the natural origin of this remarkable mineral. Its physical and chemical properties have been the subject of much study, and have a special interest in view of the extraordinary difference between the physical characters of the diamond and those of graphite (blacklead) or charcoal, with which it is chemically identical, and into which it can be converted by the action of heat or electricity. Again, on account of the great value of the diamond, much of the romance of precious stones has centred round this mineral; and the history of some of the great diamonds of historic times has been traced through many extraordinary vicissitudes.

The name ‘ASd/xas, ” the invincible,” was probably applied by the Greeks to hard metals, and thence to corundum (emery) and other hard stones. According to Charles William King, the first undoubted application of the name to the diamond is found in Manilius (a.d. 16), — Sic Adamas, punctumlapidis, pretiosior auro, — and Pliny (a.d. 100) speaks of the rarity of the stone, ” the most valuable of gems, known only to kings.” Pliny de- scribed six varieties, among which the Indian, having six pointed angles, and also resembling two pyramids {turbines, whip-tops) placed base to base, may probably be identified as the ordinary octahedral crystal (fig. 1). The ” diamond ” (Yahalom) in the breastplate of the high priest (Ex. xxxix. n) was certainly some other stone, for it bore the name of a tribe, and methods of engraving the true diamond cannot have been known so early. The stone can hardly have become familiar to the Romans until introduced from India, where it was probably mined at a very early period. But one or other of the remaining varieties mentioned by Pliny (the Macedonian, the Arabian, the Cyprian, &c.) may be the true diamond, which was in great request for the tool of the gem-engraver. Later Roman authors mentioned various rivers in India as yielding the Adamas among their sands. The name Adamas became corrupted into the forms adamant, diamaunt, diamant, diamond; but the same word, owing to a medieval misinterpretation which derived it from adamare (compare the French word aimant), was also applied to the lodestone.

Like all the precious stones, the diamond was credited with many marvellous virtues; among others the power of averting insanity, and of rendering poison harmless; and in the middle

1 Diamonds are invariably weighed in carats and in J, \, \, t*j, fa, ˆi of a carat. One (English) carat = 3-17 grains = -2054 gram. One ounce = 151 § carats. (See Carat.)

ages it was known as the ” pietra della reconciliazione,” as th(j ‘ peacemaker between husband and wife.

Scientific Characters. — The majority of minerals are found most commonly in masses which can with difficulty be recognized as aggregates of crystalline grains, and occur comparatively seldom as distinct crystals; but the diamond is almost always found in single crystals, which show no signs of previous attachment to any matrix; the stones were, until the discovery of the South African mines, almost entirely derived from sands or gravels, but owing to the hardness of the mineral it is rarely, if ever, water-worn, and the crystals are often very perfect. The crystals belong to the cubic system, generally assuming the form of the octahedron (fig. 1), but they may, in accordance with the prin- ciples of crystallography, also occur in other forms symmetric- ally derived from the octahedron, — for example, the cube, the 12-faced figure known as the rhombic dodecahedron (fig. 2), or the 48-faced figure known as the hexakis-octahedron (fig. 3), or in combinations of these. The octahedron faces are usually smooth; most of the other faces are rounded (fig. 4). The cube

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

faces are rough with protruding points. The cube is sometimes found in Brazil, but is very rare among the S. African stones; and the dodecahedron is perhaps more common in Brazil than elsewhere. There is often a furrow running along the edges of the octahedron, or across the edges of the cube, and this indicates that the apparently simple crystal may really consist of eight individuals meet- ing at the centre; or, what comes to the same thing, of two individuals inter- penetrating and projecting through each other. If this be so the form of the diamond is really the tetrahedron (and the various figures derived symmetrically from it) and not the octadehron. Fig. 5 shows how the octahedron with furrowed edge may be constructed from two interpene- trating tetrahedra (shown in dotted lines). If the grooves be left out of account, the large faces which have replaced each tetra- hedron corner then make up a figure which has the aspect of a simple octahedron. Such regular interpenetrations are known in

crystallography as ” twins.” There are also twins of dia- mond in which two octahedra (fig. 6) are united by contact along a surface parallel to an octahedron face without interpenetra- tion. On account of their resemblance to the twins of the mineral spinel (which crystallizes in octahedra) these are known as ” spinel twins.” They are gen- erally flattened along the plane of union. The crystals often display triangular . markings, either elevations or pits, upon the octahedron faces; the latter are particularly well defined and have the form of equilateral triangles (fig. 7). They are similar to the ” etched figures ” produced by moistening an octahedron of alum, and have probably been produced, like them, by the action of some solvent. Similar, but somewhat different markings are produced by the combustion of diamond in oxygen, unaccompanied by any rounding of the edges.

Diamond possesses a brilliant ” adamantine” lustre, but this tends to be greasy on the surface of the natural stones and gives

Fig. 6.

Fig. 7.

the rounded crystals somewhat the appearance of drops of gum. Absolutely colourless stones are not so common as cloudy and faintly coloured specimens; the usual tints are grey, brown, yellow or white; and as rarities, red, green, blue and black stones have been found. The colour can sometimes be removed or changed at a high temperature, but generally returns on cooling. It is therefore more probably due to metallic oxides than to hydrocarbons. Sir William Crookes has, however, changed a pale yellow diamond to a bluish-green colour by keeping it embedded in radium bromide for eleven weeks. The black coloration upon the surface produced by this process, as also by the electric bombardment in a vacuum tube, appears to be due to a conversion of the surface film into graphite. Diamond may break with a conchoidal fracture, but the crystals always cleave readily along planes parallel to the octahedron faces: of this property the diamond cutters avail themselves when reducing the stone to the most convenient form for cutting; a sawing process, has, however, now been introduced, which is preferable to that of cleavage. It is the hardest known substance (though tantalum, or an alloy of tantalum now competes with it) and is chosen as 10 in the mineralogist’s scale

of hardness; but the difference in hardness between diamond (10) and corundum (9) is really greater than that between corundum (9) and talc (1); there is a difference in the hardness of the different faces; the Borneo stones are also said to be harder than those of Australia, and the Australian harder than the African, but this is by no means certain. The specific gravity ranges from 3-56 to 3-50, generally about 3-52. The coefficient of expansion increases very rapidly above 750°, and diminishes very rapidly at low temper- atures; the maximum density is attained about -42 C.

The very high refractive power (index = 2 -41 7 for sodium light) gives the stone its extraordinary brilliancy; for light incident within a diamond at a greater angle than 24I is reflected back into the stone instead of passing through it; the corresponding angle for glass is 40J . The very high dispersion (index for red light = 2-402, for blue light =2-460) givesit the wonderful" fire " or display of spectral colours. Certain absorption bands at the blue end of the spectrum are supposed to be due to rare elements such as samarium. Unlike other cubic crystals, diamond experiences a diminution of refractive index with increase of temperature. It is very transparent for Rontgen rays, whereas paste imitations are opaque. It is a good conductor of heat, and therefore feels colder to the touch than glass and imitation stones. The diamond has also a somewhat greasy feel. The specific heat increases rapidly with rising temperature up to 6o° C, and then more slowly. Crystals belonging to the cubic system should not be birefringent unless strained; diamond often displays double refraction particularly in the neighbourhood of inclusions, both liquid and solid; this is probably due to strain, and the spontaneous explosion of diamonds has often been observed. Diamond differs from graphite in being a bad conductor of electricity: it becomes positively electrified by friction. The electrical resistance is about that of ordinary glass, and is diminished by one-half during exposure by Rontgen rays; the dielectric constant (16) is greater than that which should correspond to the specific gravity.

The phosphorescence produced by friction has been known since the time of Robert Boyle (1663); the diamond becomes luminous in a dark room after exposure to sunlight or in the presence of radium; and many stones phosphoresce beautifully (generally with a pale green light) when subjected to the electric discharge in a vacuum tube. Some diamonds are more phosphor- escent than others, and different faces of a crystal may display different tints. The combustibility of the diamond was pre- dicted by Sir Isaac Newton on account of its high refractive power; it was first established experimentally by the Florentine Academicians in 1694. In oxygen or air diamond burns at

about 850 , and only continues to do so if maintained at a high temper- ature; but in the absence of oxidising agents it may be raised to a much higher temperature. It -is, however, infusible at the temperature of the electric arc, but becomes converted superficially into graphite. Experiments on the combustion of

diamond were made by Smithson Tennant (1797) and Sir Humphry Davy (1816), with the object of proving that it is pure carbon; they showed that burnt in oxygen it yields exactly the same amount of carbon dioxide as that produced by burning the same weight of carbon. Still more convincing experiments were made by A. Krause in 1890. Similarly Guy ton de Morveau showed that, like charcoal, diamond converts soft iron into steel. Diamond is insoluble in acid and alkalis, but is oxidised on heating with potassium bichromate and sulphuric acid.

Bort (or Boart) is the name given to impure crystals or frag- ments useless for jewels; it is also applied to the rounded crystalline aggregates, which generally have a grey colour, a rough surface, often a radial structure, and are devoid of good cleavage. They are sometimes spherical (" shot bort "). Carbonado or " black diamond," found in Bahia (also recently in Minas Geraes), is a black material with a minutely crystalline structure somewhat porous, opaque, resembling charcoal in appearance, devoid of cleavage, rather harder than diamond, but of less specific gravity; it sometimes "displays a rude cubic crystalline form. The largest specimen found (1895) weighed 3078 carats. Both bort and carbonado seem to be really aggre- gates of crystallized diamond, but the carbonado is so nearly structureless that it was till recently regarded as an amorphous modification of carbon.

Uses of the Diamond. — The use of the diamond for other purposes than jewelry depends upon its extreme hardness: it has always been the only material used for cutting or engraving the diamond itself. The employment of powdered bort and the lapidary's wheel for faceting diamonds was introduced by L. von Berquen of Bruges in 1476. Diamonds are now employed not only for faceting precious stones, but also for cutting and drilling glass, porcelain, &c,; for fine engraving such as scales; in dentistry for drilling; as a turning tool for electric-light carbons, hard rubber, &c. ; and occasionally for finishing accurate turning work such as the axle of a transit instrument. For these tools the stone is actually shaped to the best form: it is now electroplated before being set in its metal mount in order to secure a firm fastening. It is also used for bearings in watches and electric meters. The best glaziers' diamonds are chosen from crystals such that

a natural curved edge can be used. For rock drills, and revolving saws for stone cutting, either diamond, bort or carbonado is employed, set in steel tubes, disks or bands. Rock drilling is the most important industrial application; and for this, owing to its freedom from cleavage, the carbonado is more highly prized than diamond; it is broken into fragments about 3 carats in weight; and in 1905 the value of carbonado was no less than from £10 to £14 a carat. It has been found that the " carbons " in drills can safely be subjected to a pressure of over 60 kilograms per square millimetre, and a speed of 25 metres per second. A recent application of the diamond is for wire drawing; a hole tapering towards the centre is drilled through a diamond, and the metal is drawn through this. No other tool is so endurable, or gives such uniform thickness of wire.

Distribution and Mining. — The most important localities for diamonds have been: (1) India, where they were mined from the earliest times till the close of the 19th century; (2) South America, where they have been mined since the middle of the 18th century; and (3) South Africa, to which almost the whole of the diamond-mining industry has been transferred since 1870.

India. — The diamond is here found in ancient sandstones and conglomerates, and in the river gravels and sands derived from them. The sandstones and conglomerates belong to the Vindhyan formation and overlie the old crystalline rocks: the diamantiferous beds are well defined, often not more than I ft. in thickness, and contain pebbles of quartzite, jasper, sandstone, slate, &c. The mines fall into five groups situated on the eastern side of the Deccan plateau about the following places (beginning from the south), the first three being in Madras. (1) Chennur near Cuddapah on the river Pennar. (2) Kurnool near Baneganapalle between the rivers Pennar and Kistna. (3) Kollar near Bezwada on the river Kistna. (4) Sambalpur on the river Mahanadi in the Central Provinces. (5) Panna near Allahabad, in Bundelkhand. The mining has always been carried on by natives of low caste, and by primitive methods which do not differ much from those described by the French merchant Jean Baptiste Tavernier (1605-1689), who paid a prolonged visit to most

of the mines between 1638 and 1665 as a dealer in precious stones. According to his description shallow pits were sunk, and the gravel excavated was gathered into a walled enclosure where it was crushed

and water was pouYed over it, and it was finally sifted in baskets and sorted by hand. The buying and selling was at that period conducted by young children. In more modern times there has been the same excavation of shallow pits, and sluicing, sifting and sorting, by hand labour, the only machinery used being chain pumps made of earthen bowls to remove the water from the deeper pits.

At some of the Indian localities spasmodic mining has been carried on at different periods for centuries, at some the work which had been long abandoned was revived in recent times, at others it has long been abandoned altogether. Many of the large stones of antiquity were probably found in the Kollar group, where Tavernier found 60,000 workers in 1645 (?), the mines having, according to native accounts, been discovered about 100 years previously. Golconda was the fortress and the market for the diamond industry at this group of mines, and so gave its name to them. The old mines have now been completely abandoned, but in 1891 about 1000 carats were being raised annually in the neighbourhood of Hyderabad. The Sambalpur group appear to have been the most ancient mines of all, but they were not worked later than 1850. The Panna group were the most productive during the 19th century. India was no doubt the source of all the large stones of antiquity; a stone of 67! carats was found at Wajra Karur in the Chennur group in 1881, and one of 210J carats at Hira Khund in 1809. Other Indian localities besides those mentioned above are Simla, in the N.W. Provinces, where a few stones have been found, and a district on the Gouel and the Sunk rivers in Bengal, which V. Ball has identified with the Soumelpour mentioned by Tavernier. The mines of Golconda and Kurnool were described as early as 1677 in the twelfth volume of the Philosophical Transactions of the Royal Society. At the present time very few Indian diamonds find their way out of the country, and, so far as the world's supply is concerned, Indian mining of diamonds may be considered extinct. The first blow to this industry was the discovery of the Brazilian mines in Minas Geraes and Bahia.

Brazil. — Diamonds were found about 1725 at Tejuco (now Diamantina)' in Minas Geraes, and the mining became important about 1740. The chief districts in Minas Geraes are (1) Bagagem on the W. side of the Serra da Mata da Corda ; (2) Rio Abaete on the E. side of the same range; these two districts being among the head waters of the Rio de San Francisco and its tributaries ; (3) Diamantina, on and about the watershed separating the Rio de San Francisco from the Rio Jequitinhonha; and (4) Grao Mogul, nearly 200 m. to the N.E. of Diamantina on the latter river.

The Rio Abaete district was worked on a considerable scale between 1785 and 1807, but is now abandoned. Diamantina is at present the most important district; it occupies a mountainous plateau, and the diamonds are found both on the plateau and in the river valleys below it. The mountains consist here of an ancient laminated micaceous quartzite, which is in parts a flexible sandstone known as itacblumite, and in parts a conglomerate; it is interbedded with clay-slate, mica-schist, hornblende-schist and haematite-schist, and intersected by veins of quartz. This series is overlain unconformably by a younger quartzite of similar character, and itself rests upon the crystalline schists. The diamond is found under three conditions: (1) in the'gravels of the present rivers, embedded in a ferruginous clay-cemented conglomerate known as cascalho ; (2) in terraces (gupiarras) in a similar conglomerate occupying higher levels in the present valleys; (3) in plateau deposits in a coarse surface conglomerate known as gurgulho, the diamond and other heavy minerals being embedded in the red clay which cements the larger blocks. Under all these three conditions the diamond is associated with fragments of the rocks of the country and the minerals derived from them, especially quartz, hornstone, jasper, the polymorphous oxide of titanium (rutile, anatase and brookite), oxides and hydrates of iron (magnetite, ilmenite, haematite, limonite), oxide of tin, iron pyrites, tourmaline, garnet, xenotime, monazite, kyanite, diaspore, sphene, topaz, and several phosphates, and also gold. Since the heavy minerals of the cascalho in the river beds are more worn than those of the terraces, it is highly probable that they have been derived by the cutting down of the older river gravels represented by the terraces ; and since in both deposits the heavy minerals are more abundant near the heads of the valleys in the plateau, it is also highly probable that both have really been derived from the plateau deposit. In the latter, especially at Sao Joao da Chapada, the minerals accompany- ing the diamond are scarcely worn at all ; in the terraces and the river beds they are more worn and more abundant ; the terraces, therefore, are to be regarded as a first concentration of the plateau material by the old rivers; and the cascalho as a second concentration by the modern rivers. The mining is carried on by negroes under the super- vision of overseers; the cascalho is dug out in the dry season and removed to a higher level, and is afterwards washed out by hand in running water in shallow wooden basins (bateas). The terraces can be worked at all seasons, and the material is partly washed out by leading streams on to it. The washing of the plateau material is effected in reservoirs of rain water.

It is difficult to obtain an estimate of the actual production of the

Minas Geraes mines, for no official returns have been published, but in recent years it has certainly been rivalled by the yield in Bahia.

The diamond here occurs in river gravels and sands associated with the same minerals as in Minas Geraes; since 1844 the richest mines have been worked in the Serra de Cincora, where the mountains are intersected by the river Paraguassu and its tributaries; it is said that there were as many as 20,000 miners working here in 1845, and it was estimated that 54,000 carats were produced in Bahia in 1858. The earlier workings were in the Serra de Chapada to the N.W. of the mines just mentioned. In 1901 there were about 5000 negroes employed in the Bahia mines; methods were still primitive; the cascalho was dug out from the river beds or tunnelled out from the valley side, and washed once a week in sluices of running water, where it was turned over with the hoe, and finally washed in wooden basins and picked over by hand ; sometimes also the diamantiferous material is scooped out of the bed of the shallow rivers by divers, and by men working under water in caissons. It is almost exclusively in the mines of Bahia, and in particular in the Cincora district, that the valuable carbonado is found. The carbonado and the diamond have been traced to an extensive hard conglomerate which occurs in the middle of the sandstone formation. Diamonds are also mined at Salobro on the river Pardo not far inland from the port of Canavieras in the S.E. corner of Bahia. The enormous development of the South Africanmines,whichsuppliedin 1906, about90%of the world'sproduce, has thrown into the shade the Brazilian production ; but the Bulletin for Feb. 1909 of the International Bureau of American Republics gave a very confident account of its future, under improved methods.

South Africa. — The first discovery was made in 1867 by Dr W. G. Atherstone, who identified as diamond a pebble obtained from a child in a farm on the banks of the Orange river and brought by a trader to Grahamstown ; it was bought for £500 and displayed in the Paris Exhibition of that year. In 1869 a stone weighing 835 carats was found near the Orange river; this was purchased by the earl of Dudley for £25,000 and became famous as the " Star of South Africa." A rush of prospectors at once took place to the banks of the Orange and Vaal rivers, and resulted in considerable discoveries, so that in 1870 there was a mining camp of no less than 10,000 persons on the " River Diggings." In the River Diggings the mining was carried on in the coarse river gravels, and by the methods of the Brazilian negroes and of gold placer-miners. A diggers' committee limited the size of claims to 30 ft. square, with free access to the river bank; the gravel and sand were washed in cradles provided with screens of perforated metal, and the concentrates were sorted by hand on tables by means of an iron

scraper.

But towards the close of 1870 stones were found at Jagersfontein and at Dutoitspan, far from the Vaal river, and led to a second great rush of prospectors, especially to Dutoitspan, and in 1871 to what is now the Kimberley mine in the neighbourhood of the latter. At each of these spots the diamantiferous area was a roughly circular patch of considerable size, and in some occupied the position of one of those depressions or ” pans ” so frequent in S. Africa. These ‘ ‘ dry diggings ‘ ‘ were therefore at first supposed to be alluvial in origin like the river gravels; but it was soon discovered that, below the red surface soil and the underlying calcareous deposit, diamonds were also found in a layer of yellowish clay about 50 ft. thick known as ” yellow ground. ‘ ‘ Below this again was a hard bluish-green serpentinous rock which was at first supposed to be barren bed-rock ; but this also contained the precious stone, and has become famous, under the name of ” blue ground,” as the matrix of the S. African diamonds. The yellow ground is merely decomposed blue ground. In the Kimberley district five of these round patches of blue ground were found within an area little more than 3 m. in diameter; that at Kimberley occupying 10 acres, that at Dutoitspan 23 acres. There were soon 50,000 workers on this field, the canvas camp was replaced by a town of brick and iron surrounded by the wooden huts of the natives, and Kimberley became an important centre.

It was soon found that each mine was in reality a huge vertical funnel or crater descending to an unknown’ depth, and filled with diamantiferous blue ground. At first each claim was an independent pit 31 ft. square sunk into the blue ground; the diamantiferous rock was hoisted by bucket and windlass, and roadways were left across the pit to provide access to the claims. But the roadways soon fell in, and ultimately haulage from the claims could only be provided by means of a vast system of wire ropes extending from a triple staging of windlasses erected round the entire edge of the mine, which had by this time become a huge open pit ; the ropes from the upper wind-lasses extended to the centre, and those from the lower tier to the sides of the pit; covering the whole mass like a gigantic cobweb. (See Plate II. fig. 12.) The buckets of blue ground were hauled up these ropes by means of horse whims, and in 1875 steam winding engines began to be employed. By this time also improved methods in the treatment of the blue ground were introduced. It was carried off in carts to open spaces, where an exposure of some weeks to the air was found to pulverize the hard rock far more efficiently than the old method of crushing with mallets. The placer-miner’s cradle and rocking-trough were replaced by puddling troughs stirred by a

revolving comb worked by horse power ; reservoirs were constructed for the scanty water-supply, bucket elevators were introduced to carry away the tailings ; and the natives were confined in compounds. For these improvements co-operation was necessary; the better claims, which in 1872 had risen from £100 to more than £4000 in value, began to be consolidated, and a Mining Board was introduced.

DIAMOND

Fi .. 9.— DE BEERS MINE, 1874.

Fig. 10— KIMBERLEY MINE, 1874.

Fig, ii— DE BEERS MINE, 1873. (From photographs by C, Evans.)

Plate II.

DIAMOND

Fig. 12. -KIMBERLEY MINE, 1874.

Fig. 13.— KIMBERLEY MINE, 1902. (From Photographs by C. Evans.)

DIAMOND

In a very few years, however, the open pit mining was rendered impossible by the mud rushes, by the falls of the masses of barren rock known as ” reef,” which were left standing in the mine, and by landslips from the sides, so that in 1883, when the pit had reached a depth of about 400 ft., mining in the Kimberley crater had become almost impossible. By 1889, in the whole group of mines, Kimberley, Dutoitspan, De Beers and Bultfontein, open pit working was practically abandoned. Meanwhile mining below the bottom of the pits by means of shafts and underground tunnels had been commenced ; but the full development of modern methods dates from the year 1889 when Cecil Rhodes and Alfred Beit, who had already secured control of the De Beers mine, acquired also the control of the Kimberley mine, and shortly afterwards consolidated the entire group in the hands of the De Beers Company. (See Kimberley.)

The scene of native mining was now transferred from the open pit to underground tunnels; the vast network of wire ropes (Plate II. fig. 12) with their ascending and descending buckets disappeared, and with it the cosmopolitan crowd of busy miners working like ants at the

bottom of the pit. In place of all this, the visitor to Kimberley encounters at the edge of the town only a huge crater, silent and apparently deserted, with no visible sign of the great mining operations which are conducted nearly half a mile below the surface. The aspect of the Kimberley pit in 1906 is shown in fig. 13 of Plate II., which may be compared with the section of fig. 8.

In fig.13, Plate II., thesequenceof thebasalt, shale and melaphyre is clearly visible on the sides of the pit ; and fig. 8 shows how the crater or" pipe " of blue ground has penetrated these rocks and also the underlyingquartzite. The workings at De Beers had extended into the still more deeply seated granite in 1906. Figure 9, Plate I., shows the top of the De Beers' crater with basalt over- lying the shale. Figure 8 also explains the_ modern system of mining introduced by Gardner Williams. A vertical shaft is sunk in the vicinity of the mine, and from this horizontal tunnels are driven into the pipe at dif- ferent levels separated by intervals of4oft. Throughthe blue ground itself on each level a series of parallel tunnels about 120 ft. apart are driven to the opposite side of the pipe, and at right angles to these, and 36 ft. apart, another series of tunnels. When the tunnels reach the side of the mine they are opened upwards and sideways so as to form a large chamber, and the overlying mass of blue ground and debris is allowed to settle down and fill up the gallery. On each level this process is carried somewhat farther back than on the level below (fig. 8) ; material is thus continually withdrawn from one side of the mine and extracted by means of the rock shaft on the opposite side, while the superincumbent debris is contin- ually sinking, and is allowed to fall deeper on the side farthest from the shaft as the blue ground is withdrawn from beneath it. In 1905 the main shaft had been sunk to a depth of 2600 ft. at the Kimberley mine.

For the extraction and treatment of the blue ground the De Beers Company in its great winding and washing plant em- ploys labour-saving machinery on a gigantic scale. The ground is transferred in trucks to the shaft where it is automatically tipped into skips holding 96 cubic ft. (six truck loads) ; these are rapidly hoisted to the surface, where their contents are automatically dumped_ into side-tipping trucks, and these in turn are drawn away in a continual procession by an endless wire rope along the tram lines leading to the vast " distributing floors." These are open tracts upon which the blue ground is spread out and left exposed to sun and rain until it crumbles and disintegrates, the process being hastened by harrowing with steam ploughs; this may require a period of three or six months, or even a year. The stock of blue ground on the floors at one time in 1905 was nearly 4,500,000 loads. The disintegrated ground is then brought back

in the trucks and fed through perforated cylinders into the washing pans ; the hard blue which has resisted disintegration on the floors, and the lumps which are too big to pass the cylindrical sieves, are crushed before going to the pans. These are shallow cylindrical troughs containing muddy water in which the diamonds and other heavy minerals (concentrates) are swept to the rim by revolving toothed arms, while the lighter stuff escapes near the centre of the pan. The concentrates are then passed over sloping tables (pulsator) and shaken to and fro under a stream of water which effects a second concentration of the heaviest material.

Until recently the final separation of the diamond from the concentrates was made by hand picking, but even this has now been replaced by machinery, owing to the remarkable discovery that a greased surface will hold a diamond while allowing the other heavy minerals to pass over it. The concentrates are washed down a_ sloping table of corrugated iron which is smeared with grease, and it is found that practically all the diamonds adhere to the table, and the other minerals are washed away. At the large and important Premier mine in the Transvaal the Elmore process, used in British Columbia and in Wales for the separation of metallic ores, has been also introduced. In the Elmore process oil is employed to' float off the materials which adhere to it. while the other materials remain in the water, the oil being separated from the water by centrifugal action. The other

minerals found in the concentrates are pebbles and fragments of pyrope, zircon, cyanite, chrome-diopside, enstatite, a green pyroxene, mica, ilmenite, magnetite, chromite, hornblende, olivine, barytes, calcite and pyrites.

In all the S. African mines the diamonds are not only crystals of various weights from fractions of a carat to 150 carats, but also oqcur as microscopic crystals disseminated through the blue ground. In spite of this, however, the average yield in the profitable mines is only from 0-2 carat to 0-6 carat per load of 1600 lb, or on an average about ij grs. per ton. The annual output of diamonds from the De Beers mines was valued in 1906 at nearly £5,000,000; the value per carat ranging from about 35s. to 70s.

Pipes similar to those which surround Kimberley have been found in other parts of S. Africa. One of the best known is that of Jagersfontein, which was really the first of the dry diggings (discovered in 1870). This large mine is near Fauresmith and 80 m. to the south of

Kimberley. In 1905 the year's production from the Orange River Colony mines was more than 320,000 carats, valued at £938,000. But by far the largest of all the pipes hitherto discovered is the Premier

SECTION OF KIMBERLEY MINE

LOOKING EAST Mp so o too eoo soo 400 600 FT. ' 6CALE

From Gardner Williams's Diamond Mines of South Africa.

Fig. 8.

mine in the Transvaal, about 300 m. to the east of Kimberley. This, was discovered in 1902 and occupies an area of about 75 acres. In 1906 it was being worked as a shallow open mine; but the description of the Kimberley methods given above is applicable to the washing plant at that time being introduced into the Premier mine upona very large scale. Comparatively few of the pipes which have been discovered are at all rich in diamonds, and many are quite barren ; some are filled with " hard blue " which even if diamantiferous may be too expensive to work.

The most competent S. African geologists believe all these remarkable pipes to be connected with volcanic outbursts which occurred over the whole of S. Africa during the Cretaceous period (after the deposition of the Stormberg beds), and drilled these enormous craters through all the later formations. With the true pipes are associated dykes and fissures also filled with diamantiferous blue ground. It is only in the more northerly part of the country that the pipes are filled with blue ground (or " kimberlite "), and that they are diamantiferous; but over a great part of Cape Colony have been discovered what are probably similar pipes filled with agglomerates, breccias and tuffs, and some with basic lavas; one, in particular, in the Riversdale Division near the southern coast, being occupied by a melilite-basalt. It is quite clear that the occurrence of the diamond in the S. African pipes is quite different from the occurrences in alluvial deposits which have been described above. The question of the origin of the diamond in S. Africa and elsewhere is discussed below.

The River Diggings on the Vaal river are still worked upon a small scale, but the production from this source is so limited that they are of little account in comparison with the mines in the blue ground. The stones, however, are good ; since they differ somewhat from the Kimberley crystals it is probable that they were not derived from the present pipes. Another S. African locality must be mentioned;

considerable finds were reported in 1905 and 1906 from gravels at Somabula near Gwelo in Rhodesia where the diamond is associ- ated with chrysoberyl, corundum (both sapphire and ruby), topaz, garnet, ilmenite, staurolite, rutile, with pebbles of quartz, granite,

chlorite-schist, &c. Diamond has also been reported from kimberlite " pipes " in Rhodesia.

Other Localities. — In addition to the South American localities mentioned above, small diamonds have also been mined since their discovery in 1890 on the river Mazaruni in British Guiana, and fincjs have been reported in the gold washings of Dutch Guiana. Borneo has possessed a diamond industry since the island was first settled by the Malays ; the references in the works of Garcia de Orta, Linschoten, De Boot, De Laet and others, to Malacca as a locality relate to Borneo. The large Borneo stone, over 360 carats in weight, known as the Matan, is in all probability not a diamond. The chief mines are situated on the river Kapuas in the west and near Bandjarmassin in the south-east of the island, and the alluvial deposits in which they occur are worked by a small number of Chinese and Malays. Australia has yielded diamonds in alluvial deposits near Bathurst (where the first discovery was made in 1851) and Mudgee in New South Wales, and also near Bingara and Inverell in the north of the colony. At Mount Werong a stone weighing 29 carats was found in 1905. At Ruby Hill near Bingara they were found in a breccia filling a volcanic pipe. At Ballina, in New England, diamonds have been found in the sea sand. Other Australian localities are Echunga in South Australia; Beechworth, Arena and Melbourne in Victoria; Freemantle and Nullagine in Western Australia ; the Palmer and Gilbert rivers in Queensland. These have been for the most part discoveries in alluvial deposits of the gold- fields, and the stones were small. In Tasmania also diamonds have been found in the Corinna goldfields. Europe has produced few diamonds. Humboldt searched for them in the Urals on account of the similarity of the gold and platinum deposits to those of Brazil, and small diamonds were ultimately found (1 829) in the gold washings of Bissersk, and later at Ekaterinburg and other spots in the Urals. In Lapland they have been found in the sands of the Pasevig river. Siberia has yielded isolated diamonds from the gold washings of Yenisei. In North America a few small stones have been found in

alluvial deposits, mostly auriferous, in Georgia, N. and S. Carolina, Kentucky, Virginia, Tennessee, Wisconsin, California, Oregon and Indiana. A crystal weighing 23 1 carats was found in Virginia in 1855, and one of 2i| carats in Wisconsin in 1886. In 1906 a number of small diamonds were discovered in an altered peridotite some- what resembling the S. African blue ground, at Murfreesboro, Pike county, Arkansas. Considerable interest attaches to the diamonds found in Wisconsin, Michigan and Ohio near the Great Lakes, for they are here found in the terminal moraines of the great glacial sheet which is supposed to have spread southwards from the region of Hudson Bay; several of the drift minerals of the diamantiferous region of Indiana have been identified as probably of Canadian origin; no diamonds have however yet been found in the intervening country of Ontario. A rock similar to the blue ground of Kimberley has been found in the states of Kentucky and New York. The occurrence of diamond in meteorites is described below.

Origin of the Diamond in Nature. — It appears from the foregoing account that at most localities the diamond is found in alluvial de- posits probably far from the place where it originated. The minerals associated with it do not afford much clue to the original conditions ; they are mostly heavy minerals derived from the neighbouring rocks, in which the diamond itself has not been observed. Among the commonest associates of the diamond are quartz, topaz, tourmaline, rutile, zircon, magnetite, garnet, spinel and other minerals which are common accessory constituents of granite, gneiss and the crystalline schists. Gold (also platinum) is a not infrequent associate, but this may only mean that the sands in which the diamond is found have been searched because they were known to be auriferous ; also that both gold and diamond are among the most durable of minerals and may have survived from ancient rocks of which other traces have been lost.

The localities at which the diamond has been supposed to occur in its original matrix are the following: — at Wajra Karur, in the Cuddapah district, India, M. Chaper found diamond with corundum in a decomposed red pegmatite vein in gneiss. At Sao Joao da Chapada, in Minas Geraes, diamonds occur in a clay interstratified with the itacolumite, and are accompanied by sharp crystals of rutile and haematite in the neighbourhood of decomposed quartz veins which intersect the itacolumite. It has been suggested that these three minerals were originally formed in the quartz veins. In both these occurrences the evidence is certainly not sufficient to establish the presence of ah original matrix. At Inverell in New South Wales a diamond (1906) has been found embedded in a hornblende diabase which is described as a dyke intersecting the granite. Finally there is

the remarkable occurrence in the blue ground of the African pipes.

There has been much controversy concerning the nature and origin of the blue ground itself ; and even granted that (as is generally believed) the blue ground is a much serpentinized volcanic breccia consisting originally of an olivine-bronzite-biotite rock (the so-called kimberlite), it contains so many rounded and angular fragments of various rocks and minerals that it is difficult to say which of them may have belonged to the original rock, and whether any were formed in situ, or were brought up from below as inclusions. Carvill Lewis believed the blue ground to be true eruptive rock, and the carbon to have been derived from the bituminous shales of which it contains fragments. The Kimberley shales, which are penetrated by the De

Beers group of pipes, were, however, certainly not the source of the carbon at the Premier (Transvaal) mine, for at this locality the shales do not exist. The view that the diamond may have crystallized out from solution in its present matrix receives some support from the experiments of W. Luzi, who found that it can be corroded by the solvent action of fused blue ground; from the experiments of J. Friedlander, who obtained diamond by dissolving graphite in fused olivine; and still more from the experiments of R. von Hasslinger and J. Wolff, who have obtained it by dissolving graphite in a fused mixture of silicates having approximately the composition of the blue ground. E. Cohen, who regarded the pipes as of the nature df a mud volcano, and the blue ground as a kimberlite breccia altered by hydrothermal action, thought that the diamond and accompanying minerals had been brought up from deep-seated crystalline schists. Other authors have sought the origin of the diamond in the action of the hydrated magnesian silicates on hydrocarbons derived from bituminous schists, or in the decomposition of metallic carbides.

Of great scientific interest in this connexion is the discovery of small diamonds in certain meteorites, both stones and irons; ” for example, in the stone which fell at Novo-Uiei in Penza, Russia, in 1886, in a stone found at Carcote in Chile, and in the iron found at Canon Diablo in Arizona. Graphitic carbon in cubic torm (cliftonite) has also been found in certain meteoric ” irons,” for example in those from Magura in Szepes county, Hungary, and Youndegin near York in Western Australia. The latter is now generally believed to be altered diamond. The fact that H. Moissan has produced the diamond artificially, by allowing dissolved carbon to crystallize out at a hign temperature and pressure from molten iron, coupled with the occurrence in meteoric iron, has led Sir William Crookes and others to conclude that the mineral may have been derived from deep-seated iron containing

carbon in solution (see the article Gem, Artificial). Adolf Knop suggested that this may have first yielded hydrocarbons by contact with water, and that from thesf. the crystalline diamond has been formed. The meteoric occurrence has even suggested the fanciful notion that all diamonds wen; originally derived from meteorites. The meteoric iron of Arizo/ia, some of which contains diamond, is actually found in and about a huge crater which is supposed by some to have been formed by an immense meteorite penetrating the earth's crust.

It is, at any rate, established that carbon can crystallize as diamond from solution in iron, and other metals; and it seems that high temperature and pressure and the absence of oxidizing agents are necessary conditions. The presence of sulphur, nickel, &c, in the iron appears to favour the production of the diamond. On the other hand, the occurrence in meteoric stones, and the experiments mentioned above, show that the diamond may also crystallize from a basic magma, capable of yielding some of the metallic oxides and ferro-magnesian silicates; a magma, therefore, which is not devoid of oxygen. This is still more forcibly suggested by the remarkable eclogite boulder found in the blue ground of the Newlands mine, not far from the Vaal river, and described by T. G. Bonney. The boulder is a crystalline rock consisting of pyroxene (chrome-diopside), garnet, and a little olivine, and is studded with diamond crystals ; a portion of it is preserved in the British Museum (Natural History). In another eclogite boulder, diamond was found partly embedded in pyrope. Similar boulders have also been found in the blue ground elsewhere. Specimens of pyrope with attached or embedded diamond had previously been found in the blue ground of the De Beers mines. In the Newlands boulder the diamonds have the appearance of being an original constituent of the eclogite. It seems therefore that a holo-crystalline pyroxene-garnet rock maybe one source of the diamond found in blue ground. On the other hand many tons of the somewhat similar eclogite in the De Beers mine have been crushed and have not yielded diamond. Further, the ilmenite, which is the most character-istic associate of the diamond in blue ground, and other of the accompanying minerals, may have come from basic rocks of a different nature.

The Inverell occurrence may prove to be another example of diamond crystallized from a basic rock.

In both occurrences, however, there is still the possibility that the eclogite or the basalt is not the original matrix, but may have caught up the already formed diamond from some other matrix. Some regard the eclogite boulders as derived from deep-seated crystalline rocks,

others as concretions in the blue ground.

_ None of the inclusions in the diamond gives any clue to its origin ; diamond itself has been found as an inclusion, as have also black specks of some carbonaceous materials. Other black specks have been identified as haematite and ilmenite; gold has also been found; other included minerals recorded are rutile, topaz, quartz, pyrites, apophyllite, and green scales of chlorite (?). Some of these are of very doubtful identification; others {e.g. apophyllite and chlorite) may have been introduced along cracks. Some of the fibrous inclusions were identified by H. R. Goppert as vegetable structures and were supposed to point to an organic origin, but this view is no longer held. Liquid inclusions, some of which are certainly carbon dioxide, have also been observed.

Finally, then, both experiment and the natural occurrence in rocks and meteorites suggestthat diamond may crystallize not only from iron but also from a basic silicate magma, possibly from various rocks consisting of basic silicates. The blue ground of S. Africa may be

the result of the serpentinization of several such rocks, and although now both brecciated and serpentinized some of these may have been the original matrix. A circumstance often mentioned in support of this view is the fact that the diamonds in one pipe generally differ somewhat in character from those of another, even though they be near neighbours.

History. — All the famous diamonds of antiquity must have been Indian stones. The first author who described the Indian mines at all fully was the Portuguese, Garcia de Orta (1565), who was physician to the viceroy of Goa. Before that time there 1 were only legendary accounts like that of Sindbad's "Valley of the Diamonds," or the tale of the stones found in the brains of serpents. V. Ball thinks that the former legend originated in the Indian practice of sacrificing cattle to the evil spirits when a new mine is opened; birds of prey would naturally carry off the flesh, and might give rise to the tale of the eagles carrying diamonds adhering to the meat.

The following are some of the most famous diamonds of the world :—

A large stone found in the Golconda mines and said to have weighed 787 carats in the rough, before being cut by a Venetian lapidary, was

seen in the treasury of Aurangzeb in 1665 by Tavernier, who estimated its weight after cutting as 280 (?) carats, and described it as a rounded tose-cut-stone, tall on one side. The name Great Mogul has been frequently applied to this stone. Tavernier states that it was the famous stone given to Shah Jahan by the emir Jumla. The Orloff, stolen by a French soldier from the eye of an idol in a Brahmin temple, stolen again from him by a ship's captain, was bought by Prince Orloff for £90,000, and given to the empress Catharine II. It weighs 104! carats, is of a somewhat yellow tinge, and is among the Russian crown jewels. The Koh-i-nor, which was in 1739 in the possession of Nadir Shah, the Persian conqueror, and in 1813 in that of the raja of Lahore, passed into the hands of the East India Company and was by them presented to Queen Victoria in 1850. It then weighed 1863V carats, but was recut in London by Amsterdam workmen, and now weighs 106 T V carats. There has been much discussion concerning the possibility of this stone and the Orloff being both fragments of the Great Mogul. The Mogul Baber in his memoirs (1526) relates how in his conquest of India he captured at Agra the great stone weighing 8 mishkals, or 320 ratis, which may be equivalent to about 187 carats. The Koh-i-nor has been identified by some authors with this stone and by others with the stone seen by Tavernier. Tavernier, however, subsequently described and sketched the diamond which he saw as shaped like a bisected egg, quite different therefore from the Koh-i-nor. Nevil Story Maskelyne has shown reason for believ- ing that the stone which Tavernier saw was really the Koh-i-nor and that it is identical with the great diamond of Baber; and that the 280 carats of Tavernier is a misinterpretation on his part of the Indian weights. He suggests that the other and larger diamond of antiquity which was given to Shah Jahan may be one which is now in the treasury of Teheran, and that this is the true Great Mogul which was confused by Tavernier with the one he saw. (See Ball, Appendix I. to Ta vernier's Travels (1889) j and Maskelyne, Nature, 1891, 44, p. 555.).

The Regent or Pitt diamond is a magnificent stone found in either India or Borneo; it weighed 410 carats and was bought for £20,400 by Pitt, the governor of Madras; it was subsequently, in 1717, bought for £80,000 (or, according to some authorities, £135,000) by the duke of Orleans, regent of France; it was re- duced by cutting to 136ˆ carats; was stolen with the other crown jewels during the Revolution, but was recovered and is still in France. The A kbar Shah was originally a stone of 1 16 carats with Arabic inscriptions engraved upon it; after being cut down to 71 carats it was bought by the gaikwar of Baroda for £35,000. The Nizam, now in the possession of the nizam of

Hyderabad, is supposed to weigh 277 carats; but it is only a portion of a stone which is said to have weighed 440 carats before it was broken. The Great Table, a rectangular stone seen by Tavernier in 1642 at Golconda, was found by him to weigh 242y 8 g- carats; Maskelyne regards it as identical with the Darya-i-nur, which is also a rectangular stone weighing about 186 carats in the possession of

the shah of Persia. Another stone, the Taj-e-mah. belonging to the shah, is a pale rose pear-shaped stone and is said to weigh 146 carats.

Other famous Indian diamonds are the following: — The Sancy, weighing 53 \% carats, which is said to have been successively the property of Charles the Bold, de Sancy, Queen Elizabeth, Henrietta Maria, Cardinal Mazarin, Louis XIV.; to have been stolen with the Pitt during the French Revolution; and subse- quently to have been the property of the king of Spain, Prince Demidoff and an Indian prr.n . The Nassak, 78I carats, the property of the duke of Westminster. The Empress Euginie, 51 carats, the property of the gaikwar of Baroda. The Pigott, 49 carats (?), which cannot now be traced. The Pasha, 40 carats. The White Saxon, 48! carats. The Star of Este, 25ˆ-f carats.

Coloured Indian diamonds of large size are rare; the most famous are : — a beautiful blue brilliant, 67xV carats, cut from a stone weighing 112-ˆ carats brought to Europe by Tavernier. It was stolen from the French crown jewels with the Regent and was never recovered. The Hope, 44J carats, has the same colour and is probably a portion of the missing stone: it was so-called as forming part of the collection of H. T. Hope bought for £18,000), and was sold again in 1906 (resold 1909). Two other blue diamonds are known, weighing 13 J and if carats, which may also be portions of the French diamond. The Dresden Green, one of the Saxon crown jewels, 40 carats, has a fine apple-green colour. The Florentine, 133ˆ carats, one of the Austrian crown jewels, is a very pale yellow.

The most famous Brazilian stones are: — The Star of the South, found in 1853, when it weighed 254ˆ- carats and was sold for £40,000; when cut it weighed 125 carats and was bought by the gaikwar of Baroda for £80,000. Also a diamond belonging to Mr Dresden, 119 carats before, and 76 J carats after cutting.

Many large stones have been found in South Africa; some are yellow but some are as colourless as the best Indian or Brazilian stones. The most famous are the following: — the Star of South Africa, or Dudley, mentioned above, 83ˆ carats rough, 46ˆ carats cut. The Stewart, 288f carats rough, 1 20 carats cut. Both these were found in the river

diggings. The Porter Rhodes from Kimberley, of the finest water, weighed about 150 carats. The Victoria, 180 carats, was cut from an octahedron weighing 457! carats, and was sold to the nizam of Hyderabad for £400,000. The Tiffany, a magnificent orange-yellow stone, weighs 125ˆ carats cut. A yellowish octahedron found at De Beers weighed 4285 carats, and yielded a brilliant of 2885 carats. Some of the finest and largest stones have come from the Jagersfontein mine; one, the Jubilee, found in 1895, weighed 640 carats in the rough and 239 carats when cut. Until 1905 the largest known diamond in the world was the Excelsior, found in 1893 at Jagersfontein by a native while loading a truck. It weighed 971 carats, and was ultimately cut into ten stones weighing from 68 to 13 carats. But all previous records were surpassed in 1905 by a magnificent stone more than three times the size of any known diamond, which was found in the yellow ground at the newly discovered Premier mine in the Transvaal. This extraordinary diamond weighed 3025J carats (i £ib) and was clear and water white; the largest of its surfaces appeared to be a cleavage plane, so that it might be only a portion of a much larger stone. It was known as the Cullinan Diamond. This stone was purchased by the Transvaal government in 1907 and presented to King Edward VII. It was sent to Amsterdam to be cut, and in 1908 was divided into nine large stones and a number of small brilliants. The four largest stones weigh 516J carats, 309ˆ carats, 92 carats and 62 carats respectively. Of these the first and second are the largest brilliants in existence. All the stones are flawless and of the finest quality.

Bibliography. — Boetius de Boot, Gemmarum et lapidum historia (1609); D. Jeffries, A Treatise on Diamonds and Pearls (1-757) ; J-Mawe, Travels in the Interior of Brazil (1812) ; Treatise on Diamonds and Precious Stones (1813): Pinder, De adamante (1829); Murray, Memoir on the Nature of the Diamond (1831) ; C. Zerenner, De adamante dissertatio (1850); H. Emanuel, Diamonds and Precious Stones (1865) ; A. Schrauf, Edelsteinkunde (1869) ; N. Jacobs and N. Chatrian, Monographic du diamant (1880); V. Ball, Geology of India (1881) ; C. W. King, The Natural History of Precious Stones

and Precious Metals (1883); M. E. Boutan, Le Diamant (1886); S. M. Burnham, Precious Stones in Nature, Art and Literature (1887) ; P. Groth, Grundriss der Edelsteinkunde (1887); A. Liversidge, The Minerals of New South Wales (1888) ; Tavernier's Travels in India,

translated by V. Ball (1889); E. W. Streeter, The Great Diamonds of the World (1896); H. C. Lewis, The Genesis and Matrix of the Diamond (1897); L. de Launay, Les Diamants du Cap (1897); C. Hintze, Handbuch der Mineralogie (1898); E. W. Streeter, Precious Stones and Gems (6th ed., 1898); Dana, System of Miner- alogy (1899) ! Kunz and others, The Production of Precious Stones (in annual, Mineral Resources of the United States); M. Bauer, Precious Stones (trans. L. J. Spencer, .1904) ; A. W. Rogers, An Introduction to the Geology of Cape Colony (1905) ; Gardner F. Williams, The Diamond Mines of South Africa (revised edition, 1906) ; George F. Kunz, " Diamonds, a study of their occurrence in the United States, with descriptions and comparisons of those from all known localities" (U.S. Geol. Survey, 1909) ; P. A, Wagner, Die Diamantfuhrenden Gesteine Siidafrikas (1909).

Among papers in scientific periodicals may be mentioned articles by Adler, Ball, Baumhauer, Beck, Bonney, Brewster, Chaper, Cohen, Crookes, Daubree, Derby, Des Cloizeaux, Doelter, Dunn, Flight, Friedel, Gorceix, Giirich, Goeppert, Harger, Hudleston, Hussak, Jannettaz, Jeremejew, de Launay, Lewis, Maskelyne, Meunier, Moissan, Molengraaff, Moulle, Rose, Sadebeck, Scheibe, Stelzner, Stow. See generally Hintze's Handbuch der Mineralogie.

(H. A. Mi.)

DIAMOND NECKLACE, THE AFFAIR OF THE, a mysterious incident at the court of Louis XVI. of France, which involved the queen Marie Antoinette. The Parisian jewellers Boehmer and Bassenge had spent some years collecting stones for a necklace which they hoped to sell to Madame Du Barry, the favourite of Louis XV., and after his death to Marie Antoinette. In 1778 Louis XVI. proposed to the queen to make her a present of the necklage, which cost 1,600,000 livres. But the queen is said to have refused it, saying that the money would be better spent equipping a man-of-war. According to others, Louis XVI. himself changed his mind. After having vainly tried to place the necklace outside of France, the jewellers attempted again in 1781 to sell it to Marie Antoinette after the birth of the dauphin. It was again refused, but it was evident that the queen regretted not being able to acquire it.

At that time there was a personage at the court whom Marie Antoinette particularly detested. It was the cardinal Louis de Rohan, formerly ambassador at Vienna, whence he had been recalled in 1774, having incurred the queen's displeasure by revealing to the empress Maria Theresa the frivolous actions of her daughter, a disclosure

which brought a maternal reprimand, and for having spoken lightly of Maria Theresa in a letter of which Marie Antoinette learned the contents. After his return to France the cardinal was anxious to regain the favour of the queen in order to obtain the position of prime minister. In March 1784 he entered into relations with a certain Jeanne de St Remy de Valois, a descendant of a bastard of Henry II., who after many adventures had married a soi-disant comte de Lamotte, and lived on a small pension which the king granted her. This adventuress soon gained the greatest ascendancy over the cardinal, with whom she had intimate relations. She persuaded him that she had been received by the queen and enjoyed her favour; and Rohan resolved to use her to regain the queen's good will. The comtesse de Lamotte assured the cardinal that she was making efforts on his behalf, and soon announced to him that he might send his justification to Marie Antoinette. This was the beginning of a pretended correspondence between Rohan and the queen, the adventuress duly returning replies to Rohan's notes, which she affirmed to come from the queen. The tone of the letters became very warm, and the cardinal, convinced that Marie Antoinette was in love with him, became ardently enamoured of her. He begged the countess to obtain a secret interview for him with the queen, and a meeting took place in August 1784 in a grove in the garden at Versailles between him and a lady whom the cardinal believed to be the queen herself. Rohan offered her a rose, and she promised him that she would forget the past. Later a certain Marie Lejay (renamed by the comtesse " Baronne Gay d'Oliva," the last word being apparently an anagram of Valoi), who resembled Marie Antoinette, stated that she had been engaged to play the role of queen in this comedy. In any case the countess profited by the cardinal's conviction to borrow

from him sums of money destined ostensibly for the queen's works of charity. Enriched by these, the countess was able to take an honourable place in society, and many persons believed her relations with Marie Antoinette, of which she boasted openly and unreservedly, to be genuine. It is still an unsettled question whether she simply mystified people, or whether she was really employed by the queen for some unknown purpose, perhaps to ruin the cardinal. In any case the jewellers believed in the relations of the countess with the queen, and they resolved to use her to sell their necklace. She at first refused their commission, then accepted it. On the 21st of January 1785 she announced that the queen would buy the necklace, but that not wishing to treat directly, she left the affair to a high personage. A little while later Rohan came to negotiate the purchase of the famous necklace for the 1,600,000 livres, payable in instalments. He said that

he was authorized by the queen, and showed the jewellers the conditions of the bargain approved in the handwriting of Marie Antoinette. The necklace was given up. Rohan to'ok it to the countess's house, where a man, in whom Rohan believed he recognized a valet of the queen, came to fetch it. Madame de Lamotte had told the cardinal that Marie Antoinette would make him a sign to indicate her thanks, and Rohan believed that she did make him a sign. Whether it was so, or merely chance or illusion, no one knows. But it is certain that the cardinal, convinced that he was acting for the queen, had engaged the jewellers to thank her; that Boehmer and Bassenge, before the sale, in order to be doubly sure, had sent word to the queen of the negotiations in her name; that Marie Antoinette had allowed the bargain to be concluded, and that after she had received a letter of thanks from Boehmer, she had burned it. Meanwhile the " comte de Lamotte " appears to have started at once for London, it is said with the necklace, which he broke up in order to sell the stones.

When the time came to pay, the comtesse de Lamotte pre- sented the cardinal's notes; but these were insufficient, and Boehmer complained to the queen, who told him that she had received no necklace and had never ordered it. She had the story of the negotiations repeated for her. Then followed a coup de theatre. On the 15th of August 1785, Assumption day, when the whole court was awaiting the king and queen in order to go to the chapel, the cardinal de Rohan, who was preparing to officiate, was arrested and taken to the Bastille. He was able, however, to destroy the correspondence exchanged, as he thought, with the queen, and it is not known whether there was any connivance of the officials, who did not prevent this, or not. The comtesse de Lamotte was not arrested until the 18th of August, after having destroyed her papers. The police set to work to find all her accomplices, and arrested the girl Oliva and a certain Reteaux de Villette, a friend of the countess, who confessed that he had written the letters given to Rohan in the queen's name, and had imitated her signature on the conditions of the bargain. The famous charlatan Cagliostro was also arrested, but it was recog nized that he had taken no part in the affair. The cardinal de Rohan accepted the parlement of Paris as judges. A sensational trial resulted (May 31, 1786) in the acquittal of the cardinal, of the girl Oliva and of Cagliostro. The comtesse de Lamotte was condemned to be whipped, branded and shut up in the Salpetriere. Her husband was condemned, in his absence, to the galleys for life. Villette was banished.

Public opinion was much excited by this trial. It is generally believed that Marie Antoinette was stainless in the matter, that Rohan was an innocent dupe, and that the Lamottes deceived both for their own

ends. People, however, persisted in the belief that the queen had used the countess as an instrument to satisfy her hatred of the cardinal de Rohan. Various circumstances fortified this belief, which contributed to render Marie Antoinette very unpopular — her disappointment at Rohan's acquittal, the fact that he was deprived of his charges and exiled to the abbey of la Chaise-Dieu, and finally the escape of the comtesse de Lamotte from the Salpetriere, with the connivance, as people believed, of the court. The adventuress, having taken refuge abroad, published Memoires in which she accused the queen. Her

husband also wrote MSmoires, and lived until 1831, after having, it is said, received subsidies from Louis XVIII.

See M. Tourneux, Marie Antoinette devant I'histoire: Essai bibliographique (2nded., Paris, 1901); Emile Campardon, Marie Antoinette et le prods du collier (Paris, 1863) ; P. Audebert, V Affaire du collier de la reine, d'apres la correspondance inedite du chevalier de Pujol (Rouen, 1901) ; F. d'Albini, Marie Antoinette and the Diamond Necklace from another Point of View (London, 1900) ; Funck-Brentano, L' Affaire du collier (1903); A. Lang, Historical Mysteries (1904). Carlyle's essay on The Diamond Necklace (first published in 1837 in Fraser's Magazine) is of historical literary interest.

DIANA, in Roman mythology, an old Italian goddess, in later times identified with the Greek Artemis (q.v.). That she was originally an independent Italian deity is shown by her name, which is the feminine form of Janus (= Dianus) . She is essentially the goddess of the moon and light generally, and presides over wood, plain and water, the chase and war. As the goddess of childbirth, she was known, like Juno, by the name of Lucina, the " bringer to light." As the moon-goddess she was also identified with Hecate, and invoked as " three-formed " in reference to the phases of the moon. Her most celebrated shrine was in a grove at Aricia (whence her title of Nemorensis) near the modern lake of Nemi. Here she was worshipped side by side with a male deity Virbius, a god of the forest and the chase. This Virbius was subsequently identified with Hippoly tus, the favourite of Artemis, who was said to have been brought to life by Aesculapius and conducted by Diana to Aricia (Ovid, Fasti, iii. 263, vi. 731, Metam. xv. 497; Virgil, Aeneid, vii. 761). A barbarous custom, perhaps reminiscent of human sacrifice once offered to her, prevailed in connexion with her ritual here ; her priest, called Rex Nemorensis,

who was a runaway slave, was obliged to qualify for office by slaying his predecessor in single combat (Strabo v. p. 239 ; Suetonius, Caligula, 35). This led to the identification of Diana with the Tauric Artemis, whose image was said to have been removed by Orestes to the grove of Aricia (see Aricini).

After the destruction of Alba Longa this grove was for a long time the united sanctuary of the neighbouringLatin andRutulian cities, until at last it was extinguished beneath the supremacy of Rome. The festival of the goddess was on the ides (13th) of August/the full moon of the hot season. She was worshipped with torches, her aid was sought by women seeking a happy deliverance in childbirth, and many votive offerings have been found on the site. The worship of Diana was brought to Rome by Latin plebeians, and hence she was regarded as the protectress of the lower classes, and especially of slaves. In accordance with this, her most important temple was that on the Aventine, the chief seat of the plebeians, founded by Servius Tullius, originally as a sanctuary of the Latin league (Dion. Ha'ic. iv. 26). No man was allowed to enter the temple, and on the day of its dedication (August 13) the slaves kept holiday (Plutarch, Quaest. Rom. 100). This Diana was identified with the sister of Apollo, and at the secular games she was worshipped simply as Artemis. Another celebrated sanctuary of Diana was that on the slopes of Mount Tifata near Capua (where she was worshipped under the name of Tif atina) , a sanctuary specially favoured by Sulla and Vespasian. As Noctiluca (" giving light by night ") she had a sanctuary on the Palatine which was kept illuminated throughout the night (Varro, L.L. v. 68). On the Nemi priesthood see J. .G. Frazer, Golden Bough.

DIANA MONKEY, a West African representative of the guenon monkeys taking its name, Cercopilhecus diana, from the presence of a white crescent on the forehead; another character- istic feature being the pointed white beard. The general colour of the fur is greyish, with a deep tinge of chestnut from the middle of the back to the root of the tail. Together with C. neglectus of East and Central Africa, C. Ignitus of Liberia, and C. roloway of the Gold Coast, the diana represents the special subgenus of guenons known as Pogonocebus. Although the diana monkey is commonly seen in menageries, little is known of its habits in the wild state.

DIANE DE FRANCE (1538-1619), duchess of Montmorency and Angouleme, was the natural daughter of Henry II. of France and a young Piedmontese, Filippe Due. The constable de

Montmorency went so far as to assert that of all the children of Henry

II. Diane was the only one who resembled him. Catherine de' Medici was greatly incensed at this affront, and took her revenge by having the constable disgraced on the death of Henry II. Bran tome is loud in praise of Diane. She was a perfect horse- woman and dancer, played several musical instruments, knew Spanish and Italian, and " estoit tres belle de visage et de taille." Legitimated in 1547, she was married in 1553 to Horace Farnese, second son of the duke of Parma, but her husband was killed soon afterwards at the siege of Hesdin. In order to assure his position, the constable de Montmorency wished to marry her to his eldest son, Francis. This was a romantic adventure, for Francis had clandestinely married Mademoiselle de Piennes. The constable dissolved this union, and after lengthy negotiations obtained the dispensation of the pope. On the 3rd of May 1559 Francis married Diane. A wise and moderate woman, Diane undoubtedly helped to make Francis de Montmorency one of the leaders of the party of the politiques. Again a widow in 1579, she had some influence at the court of Henry III., and negotiated his recon- ciliation with Henry of Navarre (1 588) . She retained her influence in the reign of Henry IV., conveyed the bodies of Catherine de' Medici and Henry III. to St Denis, and died in 1619 at her hotel of Angouleme.

See Brant6me, ed. by Lalanne, in the Coll de la societe d'histoire de France, vol. viii. (1875); J. de Thou, Historia sui temporis . . . (i733); Matthieu de Morgues, Oraison funebre de Diane de France (Paris, 1619).

DIANE DE POITIERS (1499-1566), duchess of Valentinois, and mistress of Henry II. of France, was the daughter of Jean de Poitiers, seigneur de St Vallier, who came of an old family of Dauphine. In 1515 she married Louis de Breze, grand seneschal of Normandy,- by whom she had two daughters. She became a widow in 1533, but soon replaced her husband by a more illustri- ous lover, the king's second son, Henry, who became dauphin in 1536. Although he was ten years younger than Diane, she inspired the young prince with a profound passion, which lasted until his death. The accession of Henry II. in 1547 was also the accession of Diane : she was virtual queen, while Henry's lawful wife, Catherine de' Medici, lived in comparative obscurity. The part Diane played, however, must not be exaggerated. More rapacious than ambitious, she concerned herself little with government, but devoted her energies chiefly to augmenting her income, and providing for her family and friends. Henry was the most prodigal of lovers, and gave her all rights over the duchy of Valentinois. Although she showed great tact in her dealings with the queen, Catherine drove her from the court after Henry's death, and forced her to restore the crown jewels and to accept Chaumont in

exchange for Chenonceaux. Diane retired to her chateau at Anet, where she died in 1566.

Several historians relate that she had been the mistress of Francis I. before she became the dauphin's mistress, and that she gave herself to the king in order to obtain the pardon of her father, who had been condemned to death as an accomplice of the constable de Bourbon. This rumour, however, has no serious foundation. Men vied with each other in celebrating Diane's beauty, which, if we may judge from her portraits, has been slightly exaggerated. She was a healthy, vigorous woman, and, by dint of great pains, succeeded in retaining her beauty late into life. It is said that even on the coldest mornings she would wash her face with well water. Diane was a patroness of the arts. She entrusted to Philibert de l'Orme the building of her chateau at Anet, and it was for her that Jean Goujon executed his master- piece, the statue of Diana, now in the Louvre.

See G. Guiffrey, Lettres inedites de Diane de Poytiers (Paris, 1866) and Proces criminel de Jehan de Poytiers (Paris, 1867); Capefigue, Diane de Poitiers (Paris, i860) ; Hay, Madame Dianne de Poytiers (London, 1900).

DIAPASON (Gr. 5td iraewv, through all), a term in music, originally for an interval of an octave. The Greek is an abbrevia- tion of 17 8lcl Ttacr&v xopb&v crvfjupcovia, a consonance through all the tones of the scale. In this sense it is only used now, loosely, for the compass of an instrument or voice, or for a harmonious melody. The name is given to the two

foundation stops of an organ, the open and the stopped diapason (see Organ), and to a standard of musical pitch, as in the French diapason normal (see Pitch, Musical).

DIAPER (derived through the Fr. from the Gr. 5id, through, and cunrpos, white; the derivation from the town of Ypres, " d'Ypres," in Belgium is unhistorical, as diapers were known for centuries before its existence), the name given to a textile fabric, formerly of a rich and costly nature with embroidered ornament, but now of linen or cotton, with a simple woven pattern; and particularly restricted to small napkins. In architecture, the term " diaper " is given to any small pattern of a conventional nature repeated continuously and uniformly

over a surface; the designs may be purely geometrical, or based

A

6

on floral forms, and in early examples were regulated by the pro- cess of their textile origin. Subsequently, similar patterns were employed in the middle ages for the surface decoration of stone, as in Westminster Abbey and Bayeux cathedral in the spandrils of the arcades of the choir and nave; also in mural painting, stained glass, incised brasses, encaustic tiles, &c. Probably in most cases the pattern was copied, so far as the general design is concerned, from the tissues and stuffs of Byzantine manu- facture, which came over to Europe and were highly prized as ecclesiastical vestments.

in its textile use, the term diaper was originally applied to silk patterns of a geometrical pattern; it is now almost exclusively used for diamond patterns made from linen or cotton yarns. An illustra- tion of two patterns of this nature is shown in the figure. The floats of the warp and the weft are mostly in three; indeed the patterns are made from a base weave which is composed entirely of floats of this number. It will be seen that both designs are formed of what may be termed concentric figures — alternately black and white. Pattern B differs from pattern A only in that more of these concentric figures are used for the complete figure. If pattern B, which shows only one unit, were extended, the effect would be similar to A, except for the size of the unit. In A there are four complete units, and hence the pattern appears more striking. Again, the repeating of B would cause the four corner pieces to join and to form a diamond similar to the one in the centre. The two diamonds in B would then alternate diagonally to left and right. Special names are given to certain kinds of diapers, e.g. ” bird’s-eye,” ” pheasant’s- eye”; these terms indicate, to a certain extent, the size of the complete diamond in the cloth — the smaller kind taking the name ” bird’s-eye.” The size of the pattern on paper has little connexion with the size of the pattern in the cloth, for it is clearly the number of threads and picks per inch which determine the size of the pattern in the cloth from any given design. Although A is larger than what is usually termed the ” bird’s-eye ” pattern, it is evident that it may be made to appear as such, provided that the cloth is fine enough. These designs, although adapted mostly for cloths such as nursery- diapers, for pinafores, &c, are sometimes used in the production of towels and table-cloths. In the figure, the first pick in A is identical with the first pick in B, and the part C shows how each interweaves with the twenty-four threads.

DIAPHORETICS (from Gr. Siacfroptiv, to carry through), the name given to those remedies which promote perspiration. In health there is constantly taking place an exhalation of watery vapour from the skin, by which not only are many of the effete products of nutrition eliminated, but the body is kept cool. Under exertion or in a heated atmosphere this natural function of the skin is increased, sweating more or less profuse follows, and, evaporation going on rapidly over the whole surface, little or no rise in the temperature of the body takes place. In many forms of disease, such as fevers and inflammatory affections, the

action of the skin is arrested, and the surface of the body feels harsh and dry, while the temperature is greatly elevated. The occurrence of perspiration not unfrequently marks a crisis in such diseases, and is in general regarded as a favourable event. In some chronic diseases, such as diabetes and some cases of Bright's disease, the absence of perspiration is a marked feature; while, on the other hand, in many wasting diseases, such as phthisis, the action of the skin is increased, and copious exhaust- ing sweating occurs. Many means can be used to induce perspira- tion, among the best known being baths, either in the form of hot vapour or hot water baths, or in that part of the process of the Turkish bath which consists in exposing the body to a dry and hot atmosphere. Such measures, particularly if followed by the drinking of hot liquids and the wrapping of the body in warm clothing, seldom fail to excite copious perspiration. Numerous medicinal substances have the same effect.

DIAPHRAGM (Gr. 8iapay/xa, a partition). The dia- phragm or midriff (Anglo-Saxon, mid, middle, hrif, belly) in human anatomy is a large fibro-muscular partition between the cavities of the thorax and abdomen; it is convex toward the thorax, concave toward the abdomen, and consists of a central tendon and a muscular margin. The central tendon{q, fig. i) is trefoil in shape, its leaflets being right, left and anterior; of these the right is the largest and the left the smallest. The fleshy fibres rise, in front from the back of the xiphoid cartilage of the sternum (d), laterally by six serrations, from the inner surfaces of the lower six ribs, interdigitating with the transversalis, posteriorly from the arcuate ligaments, of which there are five, a pair of external, a pair of internal, and a single median one. The external arcuate ligament (h) stretches from the tip of the twelfth rib (6) to the costal process of the first lumbar vertebra in front of the quad- ratus lumborum muscle (o), the internal and middle are continua- tions of the crura which rise from the ventro-lateral aspects of the bodies of the lumbar vertebrae, the right (e) coming from three, the left (/) from two. On reaching the level of the twelfth thoracic vertebra each

crus spreads out into a fan-shaped mass of fibres, of which the innermost join their fellows from the opposite crus, in front of the aortic opening (k), to form the middle arcuate

Fig. I. — Abdominal Surface of the Diaphragm. ligament; the outer ones (g) arch in front of the psoas muscle («) to the tip of the costal process of the first lumbar vertebra to form the internal arcuate ligament, while the intermediate ones pass to the central tendon. There are three large openings in the diaphragm; the aortic (k) is behind the middle arcuate ligament and transmits the aorta, the vena azygos major, and the thoracic duct. In the right leaflet is an opening (sometimes called the hiatus quadratus) for the inferior vena cava and a branch of the right phrenic nerve (m), while in front and a little to the left of the aortic opening is one for the oesophagus and the two pneumo- gastric nerves (/), the left being in front and the right behind.

The fleshy fibres on each side of this opening act as a sphincter. Passing between the xiphoid and costal origins in front are the superior epigastric arteries, while the other terminal branches of the internal mammaries, the musculo-phrenics, pass through between two costal origins.

Through the crura pass the splanchnic nerves, and in addition to these the left crus is pierced by the vena azygos minor. The sympathetic nerves usually enter the abdomen behind the internal arcuate ligaments. The phrenic nerves, which are the main supply of the diaphragm, divide before reaching the muscle and pierce it in a number of places to enter its abdominal surface, but some of the lower intercostal nerves assist in the supply. The last thoracic or subcostal nerves pass behind the external arcuate ligament.

For the action of the diaphragm see Respiratory System.

Embryology. — The diaphragm is at first developed intheneckregion of the embryo, and this accounts for the phrenic nerves, which supply it, rising from the fourth and fifth cervical. From the mesoderm on the caudal side of the pericardium is developed the septumtransversum, and in this the central tendon is formed. The fleshy portion is developed on each side in two parts, an anterior or sterno-costal which is derived from the longitudinal neck musculature, probably the

same layer from which the sternothyroid comes, and a spinal part which is a derivative of the transversalis sheet of the trunk. Between these two parts is at one time a gap, the spino-costal hiatus, and this is obliterated by the growth of the pleuro-peritoneal membrane, which may occasionally fail to close and so may form the site of a phrenic hernia. With the growth of the body and the development of the lungs the diaphragm shifts its position until it becomes the septum between the thoracic and abdominal cavities. (See A. Keith, “On the Development of the Diaphragm,” Jour, of Anat. and Phys. vol. 39.) A. Paterson has recorded cases in which the left half of the diaphragm is wanting (Proceedings of the Anatomical Society of Gt. Britain, June 1900; Jour, of Anat. and Phys. vol. 34), and occasionally deficiencies are found elsewhere, especially in the sternal portion. For further details see Quain’s Anatomy, vol. i. (London, 1908).

Comparative Anatomy. — A complete diaphragm, separating the thoracic from the abdominal parts of the coelom, is characteristic of the Mammalia; it usually has the human structure and relations exceptthat belowthe Anthropoids it is separated from the pericardium by the azygous lobe of the lung. In some Mammals, e.g. Echidna and Phocoena, it is entirely muscular. In theCetacea it is remarkable for its obliquity; its vertebral attachment is much nearer the tail than its sternal or ventral one ; this allows a much larger lung space in the dorsal than in the ventral part of the thorax, and may be concerned with the equipoise of the animal. (Otto Muller, ” Unter- suchungen iiber die Veranderung, welche die Respirationsorgane der Saugetiere durch die Anpassung an das Leben im Wasser erlitten haben,” Jen. Zeitschr. f. Naturwiss., 1898, p. 93.) In the Ungulata only one crus is found (Windle and Parsons, ” Muscles of the Ungulata,” Proc. Zool. Soc, 1903, p. 287). Below the Mammals incomplete partitions between the pleural and peritoneal cavities are found in Chelonians, Crocodiles and Birds, and also in Amphibians (Xenopus and Pipa). (F. G. P.)

DIARBEKR 1 {Kara Amid or Black Amid; the Roman Amida), the chief town of a vilayet of Asiatic Turkey, situated on a basaltic plateau on the right bank of the Tigris, which here flows in a deep open valley. The town is still surrounded by the masonry walls of black basalt which give it the name of Kara or Black Amid; they are well built and imposing on the west facing the open country, but almost in ruins where they overlook the river. A mass of gardens and orchards cover the slope down to the river on the S.W., but there are no suburbs outside the walls. The houses are rather crowded but only partially fill the walled area. The population numbers 38,000, nearly half being Christian, comprising Turks, Kurds, Arabs, Turkomans, Armenians, Chaldeans, Jacobites and a few Greeks. The streets are 10 ft to 15 ft.

wide, badly paved and dirty; the houses and shops are low, mostly of stone, and some of stone and mud. The bazaar is a good one, and gold and silver filigree work is made, peculiar in character and design. , The cotton industry is declining, but manufacture of silk is increasing. Fruit is good and abundant as the rich volcanic soil is well watered from the town springs. The size of the melons is specially famous. To the south, the walls are some 40 ft. high, faced with large cut stone blocks of very solid construction, with towers and square bastions rising to 500 ft. There are four gates: on the north the Kharput gate, on the west the Rum, on the south the Mardin, and on the 1 From Diar, land, and Bekr (i.e. Abu Bekr, the caliph).

east the Yeni Kapu or new gate. A citadel enclosure stands at the N. E. corner and is now partly in ruins, but the interior space is occupied by the government konak. The summer climate in the confined space within the town is excessively hot and unhealthy. Epidemics of typhus are not unknown, as well as ophthalmia. The Diarbekr boil is like the ” Aleppo button,” lasting a long time and leaving a deep scar. Winters are fre- quently severe but do not last long. Snow sometimes lies, and ice is stored for summer use. Scorpions noted for the virulence of their poison abound as well as horse leeches in the tanks. The town is supplied with water both by springs inside the town and by aqueducts from fountains at Ali Punar and Hamervat. The principal exports are wool, mohair and copper ore, and imports are cotton and woollen goods, indigo, coffee, sugar, petroleum, &c.

The Great Mosque, Ulu Jami, formerly a Christian church, occupies the site of a Sassanian palace and was built with materials from an older palace, probably that of Tigranes II. The remains consist of the facades of two palaces 400 ft. apart, each formed by a row of Corinthian columns surmounted by an equal number of a Byzantine type. Kufic inscriptions run across the fronts under the entablature. The court of the mosque is entered by a gateway on which lions and other animals are sculptured. The churches of greatest interest are those of SS. Cosmas and Damian (Jacobite) and the church of St James (Greek). In the 19th century Diarbekr was one of the largest and most flourishing cities of Asia, and as a commercial centre it now stands at the meeting-point of several important routes. It is at the head of the navigation of the Tigris, which is traversed down stream by keleks or rafts supported by inflated skins. There is a good road to Aleppo and Alexandretta on the Mediter- ranean, and to Samsun on the Black Sea by Kharput, Malatia and Sivas. There are also routes to Mosul and Bitlis.

Diarbekr became a Roman colony in a.d. 230 under the name of

Amida, and received a Christian bishop in a.d. 325. It was enlarged and strengthened by Constantius II., in whose reign it was taken after a long siege by Shapur (Sapor) II., king of Persia. The historian Ammianus Marcellinus, who took part in the defence, gives a detailed account of it. In the later wars between the Persians and Romans it more than once changed hands. Though ceded by Jovian to the Persians it again became annexed to the Roman empire, and in the reign of Anastasius (a.d. 502) was once more taken by the Persians, when 80,000 of its in- habitants were slain. It was taken c. 638 by the Arabs, and afterwards passed into the hands of the Seljuks and Persians, from whom it was finally captured by Selim I. in 1515; a nd since that date it has remained under Ottoman rule. About 2 m. below the town is a masonry bridge over the Tigris; the older portion being probably Roman, and the western part, which bears a Kufic inscription, being Arab.

The vilayet of Diarbekr extends south from Palu on the Euphrates toMardin and Nisibin on the edge of the Mesopotamian plain, and is divided into three sanjaks — Arghana, Diarbekr and Mardin. The headwaters of the main arm of the Tigris have their source in the vilayet.

Cereals, cotton, tobacco, rice and silk are produced, but most of the fertile lands have been abandoned to semi-nomads, who raise large quantities of live stock. The richest portion of the vilayet lies east of the capital in the rolling plains watered by tributaries of the Tigris. An exceptionally rich copper mine exists at Arghana Maden, but it is very imperfectly worked; galena mineral oil and silicious sand are also found.

(C. W. W.; F. R. M.)

DIARRHOEA (from Gr. 81a, through, peco, flow), an exces- sive looseness of the bowels, a symptom of irritation which may be due to various causes, or may be associated with some specific disease. The treatment in such latter cases necessarily varies, since the symptom itself may be remedial, but in ordinary cases depends on the removal of the cause of irritation by the use of aperients, various sedatives being also prescribed. In chronic diarrhoea careful attention to the diet is necessary.

DIARY, the Lat. diarium (from dies, a day), the book in which are preserved the daily memoranda regarding events and actions which come under the writer's personal observation, or are related to him by others. The person who keeps this record is called a diarist. It is not necessary that the entries in a diary should be made each day, since every life, however full, must contain absolutely empty intervals. But it is essential that the entry should be made during the course of the day to which it refers. When this has evidently not been done, as in the case of Evelyn's diary, there is nevertheless an effort made to give the memoranda the effect of being so recorded, and in point of fact, even in a case like that of Evelyn, it is probable that what we now read is an enlargement of brief notes jotted down on the day cited. When this is not approximately the case, the diary is a fraud, for its whole value depends on its instantaneous transcript of impressions.

In its primitive form, the diary must always have existed; as soon as writing was invented, men and women must have wished to note down, in some almanac or journal, memoranda respect- ing their business, their engagements or their adventures. But the literary value of these would be extremely insignificant until the spirit of individualism had crept in, and human beings began to be interesting to other human beings for their own sake. It is not, therefore, until the close of the Renaissance that we find diaries beginning to have literary value, although, as the study of sociology extends, every scrap of genuine and unaffected record of early history possesses an ethical interest. In the 1 7th century, diaries began to be largly written in England, although in most cases without any idea of even eventual publication. Sjr William Dugdale (1605-1686) had certainly no expectation that his slight diary would ever see the light. There is no surviving record of a journal kept by Clarendon, Richard Baxter, Lucy Hutchinson and other autobiographical writers of the middle of the century, but we may take it for granted that they possessed some such record, kept from day to day. Bulstrode Whitelocke (1605- 1675), whose Memorials of the English Affairs covers the ground from 1625 to 1660, was agenuine diarist. So was the elder George Fox (1624-1600), who kept not merely " a great journal," but " the little journal books," and whose work was published in 1694. The famous diary of John Evelyn (1620-1706) professes to be the record of seventy years, and, although large tracts of it are covered in a very perfunctory manner, while in others many of the entries have the air of having been written in long after the event, this is a very interesting and amusing work; it was not published until 1818. In spite of all its imperfections there is a great charm about the diary of Evelyn, and it would hold a still higher position in the history of literature than it

does if it were not overshadowed by what is unquestionably the most illustrious of the diaries of the world, that of Samuel Pepys (1633-1703). This was begun on the 1st of January 1660 and was carried on until the 29th of May 1669. The extraordinary value of Pepys' diary consists in its fidelity to the portraiture of its author's character. He feigns nothing, conceals nothing, sets nothing down in malice or insincerity. He wrote in a form of shorthand intelligible to no one but himself, and not a phrase betrays the smallest expectation that any eye but his own would ever investigate the pages of his confession. The importance of this wonderful document, in fact, lay unsuspected until 1819, when the Rev. John Smith of Baldock began to decipher the MS. in Magdalene College, Cambridge. It was not until 1825 that Lord Braybrooke published part of what was only fully edited, under the care of Mr Wheatley, in 1893-1896. In the age which suc- ceeded that of Pepys, a diary of extraordinary emotional interest was kept by Swift from i7ioto 171 3, and was sent to Ireland in the form of a " Journal to Stella "; it is a surprising amalgam of ambition, affection, wit and freakishness. John Byrom (1692-1763), the Manchester poet, kept a journal, which was published in 1854. The diary of the celebrated dissenting divine, Philip Doddridge (1702-1751), was printed in 1829. Of far greater interest are the admirably composed and vigorously written journals of John Wesley (1703-1791). But the most celebrated work of this kind produced in the latter half of the 18th

century was the diary of Fanny Burney (Madame D'Arblay), published in 1 842-1 846. It will be perceived that, without exception, these works were posthumously published, and the whole conception of the diary has been that it should be written for the writer alone, or, if for the public, for the public when all prejudice shall have passed away and all passion cooled down. Thus, and thus only, can the diary be written so as to impress upon its eventual readers a sense of its author's perfect sincerity and courage.

Many of the diaries described above were first published in the opening years of the 19th century, and it is unquestionable that the interest which they awakened in the public led to their imitation. Diaries ceased to be rare, but as a rule the specimens which have hitherto appeared have not presented much literary interest. Exception must be made in favour of the journals of two minor politicians, Charles Greville (1794-1865) and Thomas Creevey (1 768-1838), whose indiscretions have added much to the gaiety of nations; the papers of the former appeared in 1874- 1887, those of the latter in 1903. The diary of Henry Crabb Robinson (1775-1867), printed in 1869, contains excellent biographical material. Tom

Moore's journal, published in 1856 by Lord John Russell, disappointed its rea'ders. But it is probable, if we reason by the analogy of the past, that the most curious and original diaries of the 19th century are still unknown to us, and lie jealously guarded under lock and key by the descendants of those who compiled them.

It was natural that the form of the diary should appeal to a people so sensitive to social peculiarities and so keen in the observation of them as the French. A medieval document of immense value is the diary kept by an anonymous curl during the reigns of Charles VI. and Charles VII. This Journal d'un bourgeois de Paris was kept from 1409 to 143 1 , and was continued by another hand down to 1449. The marquis de Dangeau (1638-1720) kept a diary from 1684 till the year of his death; this although dull, and as Saint-Simon said " of an insipidity to make you sick," is an inexhaustible storehouse of facts about the reign of Louis XIV. Saint-Simon's own brilliant memoirs, written from 1691 to 1723, may be considered as a sort of diary. The lawyer, Edmond Barbier (1689-1771), wrote a journal of the anecdotes and little facts which came to his knowledge from i7i8to 1762. The studious care which he took to bt correct, and his manifest candour, give a singular value to Barbier's record; his diary was not printed at all until 1847, nor, in its entirety, until 1857. The song-writer, Charles Colle (1709-1783), kept a journal historique from 1758 to i782;it is full of vivacity, but very scandalous and spiteful. It saw the light in 1805, and surprised those to whom Colle, in his lifetime, had seemed the most placid and good-natured of men. Petit de Bachaumont (1690-1770) had access to remarkable sources of information, and his MSmoires secrets (a diary the publication of which began in 1762 and was continued after Bachaumont's death, until 1787, by other persons) contains a valuable mass of documents. The marquis d'Argenson (1694-1757)* kept a diary, of which a comparatively full textwas first published in 1859. In recent times the posthumous publication of the diaries of the Russian artist, Marie Bashkirtseff (1860-1884), produced a great sensation in 1887, and revealed a most remarkable temperament. The brothers Jules and Edmond de Goncourt kept a very minute diary of all that occurred around them in artistic and literary Paris; after the death of Jules, in 1870, this was continued by Edmond, who published the three first volumes in 1 888. The publication of this work was continued, and it produced no little scandal. It is excessively ill-natured in parts, but of its vivid picturesqueness, and of its general accuracy as a transcript of conversation, there can be no two opinions. (E. G.)

DIASPORE, a native aluminium hydroxide, AIO, crystal- lizing in the orthorhombic system and isomorphous with gothite and manganite. It

occurs sometimes as flattened crystals, but usually as lamellar or scaly masses, the flattened surface being a direction of perfect cleavage on which the lustre is markedly pearly in character. It is colourless or greyish-white, yellowish, sometimes violet in colour, and varies from translucent to

transparent. It may be readily distinguished from other colour- less transparent minerals, with a perfect cleavage and pearly lustre — mica, talc, brucite, gypsum — by its greater hardness of 65-7. The specific gravity is 3-4. When heated before the blowpipe it decrepitates violently, breaking up into white pearly scales; it was because of this property that the mineral was named diaspora by R. J. Haiiy in 1801, from diacnrdptiv, ” to scatter.” The mineral occurs as an alteration product of corundum or emery, and is found in granular limestone and other crystalline rocks. Well-developed crystals are found in the emery deposits of the Urals and at Chester, Massachusetts, and in kaolin at Schemnitz in Hungary. If obtainable in large quantity it would be of economic importance as a source of alumina. (L. J. S.)

DIASTYLE (from Gr. 5ta, through, and ctvKos, column), in architecture, a term used to designate an intercolumniation of three or four diameters.

DIATOMACEAE. For the knowledge we possess of these beautiful plants, so minute as to be undiscernible by our unaided vision, we are indebted to the assistance of the microscope. It was not till towards the close of the 18th century that the first known forms of this group were discovered by O. F. M tiller. And so slow was the process of discovery in this field of scientific re- search that in the course of half a century, when Agardh published his Syslema algarum in 1824, only forty-nine species included under eight genera had been described. Since that time, however, with modern microscopes and microscopic methods, eminent botanists in all parts of the civilized world have studied these minute plants, with the result that the number of known genera and species has been greatly increased. Over 10,000 species of diatoms have been described, and about 1200 species and numerous varieties occur in the fresh waters and on the coasts of Great Britain and Ireland. Rabenhorst, in the index to his Flora Europaea algarum (1864) enumerated about 4000 forms which had up to that time been discovered throughout the continent of Europe.

The diatoms are more commonly known among systematic botanists as the Bacillarieae, particularly on the continent of Europe, and although such an immense number of very diverse forms are included in it, the group as a whole exhibits a remark- able uniformity of structure. The Bacillarieae is one of the large groups of Algae, placed by some in close proximity to the

Fig. 1. A and B, Melosira arenaria. E, showing formation of auxospore.

C-E, Melosira varians.

Conjugatae and by others as an order of the Brown Algae (or Phaeophyceae) ; but their characters are so distinctive and their structure is so uniform as to warrant the separation of the diatoms as a distinct class. The affinities of the group are doubtful.

The diatoms exhibit great

variety of form. While some

Fig. 2.—Synedra Ulna. species are circular and more

or less disk-shaped, others are oval in outline. Some are

linear, as Synedra Ulna (fig. 2) ; others more or less cres-

Fig. 3. — Podo- sphenia Lyngbyii.

centic; others again are cuneate, as Podosphenia Lyngbyii (fig. 3); some few have a sigmoid outline, as Pleuro- sigma balticum (fig. 4); but the prevailing forms are naviculoid, as in the large family Naviculaceae, of which the genus Navicula embraces upwards of 1000 species. They vary also in their modes of growth, — some being free-floating, others attached to foreign bodies by simple or branched gelatinous stalks, which in some species are short and thick, while in others they are long and slender. In some genera the forms are simple, while in others the frustules are connected together in ribbon-like filaments, or form, as in other cases, zigzag chains. In some genera the individuals are naked, while in many others they are enclosed in a more or less definite gelatinous investment. The conditions necessary to their growth are moisture and light. Wherever these circum- stances coexist, _ „, . , , . diatomaceous FlG ‘ ^-P^urosrgma balticum.

forms will almost invariably be found. They occur mixed with other organisms on the surface of moist rocks; in streamlets and pools, they form a brownish stratum on the surface of the mud, or cover the stems

and leaves of water plants or floating twigs with a furry investment. Marine forms are usually attached to various sea-weeds, and many are found in the stomachs of molluscs, holothurians, ascidians and other denizens of the ocean. The fresh-water forms are specifically distinct from those incidental to salt or brackish water, — fresh-water species, however, are sometimes

got

ps|

iF 1 –

=A

lˆ

lit;

ESj

t—

£5

fc=

pla£r;

r — jlpˆ

Us

gapS

jrjflr

i&fll

fl cy i-ifnnry

tfOOT

■p-y Slfe

:”” j’l

[’” lly -.

ˆ3

‘•m’-tHF 8 ””

ˆ1

z™ˆ!ˆ

al

i ■ 1 ffi~— •

ˆ|r

r = MKrˆ ”

” — ~~ If!!’

iinfll

t n ri’Knri

Fig. 5. A-C, Tetracyclics lacustris. D and E, Tabellaria fenestraia.

F and G, Tabellaria flocculosa.

carried some distance into the sea by the force of the current, and in tidal rivers marine forms are carried up by the force of the tide. Some notion may be formed of the extreme minuteness of these forms from the fact that one the length of which is -jˆth of an inch may be considered as beyond the medium size. Some few, indeed, are much larger, but by far the greater proportion are of very much smaller dimensions.

Diatoms are unicellular plants distinguished from kindred forms by the fact of having their soft vegetative part covered by a siliceous case. Each individual is known as a frustule, and the cell-wall consists of two similar valves nearly parallel to each other, each valve being furnished with a rim (or connecting-band) projecting from it at a right angle.

One of these valves with its rim is slightly smaller than the

other, the smaller fitting into the larger pretty much as a pill-box fits into its cover. This peculiarity of structure affords ample scope for the growthof the protoplasmic cell-contents, for as the latter increase in volume the siliceous valves are pushed out, and their corresponding siliceous rims become broader. The con- necting-bands although closely fitting their respective valves are distinct from them, and together the two bands form the girdle.

An individual diatom is usually described from two aspects, one in which the surface of the valve is exposed to view — the valve view, and one in which the girdle side is exposed — the girdle view. The valves are thin and transparent, convex on the outside, and generally ornamented with a variety of sculptured markings. These sculptures often present the aspect of striae across the face of the valve, and the best lenses have shown them to consist of a series of small cavities within the siliceous wall of the cell. The valves of some of the marine genera exhibit a beautiful areolated structure due to the presence of larger chambers within the siliceous cell-wall. Many diatoms possess thickenings of the cell-wall, visible in the valve view, in the centre of the valve and at each extremity. These thickenings are known as the nodules, and they are generally connected by a long median line, the raphe, which is a cleft in the siliceous valve, extending at least some part of its length.

The protoplasmic contents of this siliceous box-like unicell are very similar to the contents of many other algal cells. There is a living protoplasmic layer or primordial utricle, connected either by two broad bands or by a number of anastomosing threads with a central mass of protoplasm in which the nucleus is embedded. The greater part of the cavity of the cell is occupied by one or several fluid vacuoles. The characteristic brown colour of diatoms is due to the presence of chromatophores embedded in the lining layer of protoplasm. In number and form these chromatophores are variable. They contain chlorophyll, but the green colour is masked by the presence of diatomin, a brown pigment which resembles that which occurs in the Brown Algae or Phaeophyceae. The chromatophores contain a variable number of pyrenoids, colourless proteid bodies of a crystalloidal character.

One of the first phenomena which comes under the notice of the observer is the extraordinary power of motion with which the frustules are endowed. Some species move slowly backwards and forwards in pretty much the same line, but in the case of Bacillaria paradoxa the motion is very rapid, the frustules darting through the water in a zigzag course. To account for this motion various theories

have been suggested, none of which appear to be altogether satisfactory. There is little doubt that the movements are connected with the raphe, and in some diatoms there is much evidence to prove that they are due to an exudation of mucilage.

Classification.— The most natural system of classification of the Bacillarieae is the one put forward by Schiitt (1896), and since generally followed by systematists. He separates them into two primary divisions, the ‘ Centricae ‘ and the ‘ Pennatae.’ The former includes all those diatoms which in the valve view possess a radial symmetry around a central point, and which are destitute of a raphe (or a pseudoraphe). The latter includes those which are zygomorphic or otherwise irregular, and in which the valve view is generally boat-shaped or needle-shaped, with the mark- ings arranged in a sagittal manner on each side of a raphe or pseudoraphe.

Reproduction. — In the Diatomaceae, as well as in the Desmidieae, the ordinary mode of increase is by simple cell-division. The cell-contents within the enclosure of the siliceous case separate into two distinct masses. As these two daughter-masses become more and more developed, the valves of the mother-cell are pushed more and more widely apart. A new siliceous valve is secreted by each of the two masses on the side opposite to the original valve, the new Valves being situated within the girdle of the original frustule. When this process has been completed the girdle of the mother frustule gives way, and two distinct frustules are formed, the siliceous valves in each of these new frustules being one of the valves of the mother-cell, and a newly formed valve similar and more or less parallel to it.

During the life of the plant this process of self-division is continued with an almost incredible rapidity. On this subject the observation of Professor William Smith, writing in 1853, is worthy of special notice: — ■” I have been unable to ascertain the time occupied in a single act of self-division, but supposing it to be completed in twenty-four hours we should have, as the progeny of a single frustule, the amazing number of 1,000,000,000 in a single month, a circumstance which will in some degree explain the sudden, or at least rapid, appearance of these organisms in localities where they were a short time previously either unrecognized or sparingly dif- fused ” (British Diatomaceae, vol. i. p. 25).

Individual diatoms when once produced by cell-division are incapable of any increase in size owing to the rigidity of their siliceous cell-walls, and since the new valves are always formed within the girdle of the old ones, it would follow that every succeeding generation is

reduced in size by the thickness of the girdle. In some diatoms, however, this is not strictly true as daughter-cells are some- times produced of larger size than the parent-cells. Thus, the reduction in size of the individuals is not always proportionate to the number of cell-divisions.

On the diminution in size having reached a limit in any species, the maximum size is regained by the formation of an auxospore. There are five

known methods of reproduction by auxospores, but it is unneces- sary here to enter into details of these methods. Suffice it to say that a normal auxospore is produced by the conjugation of two parent-cells, its distinguishing feature being a rejuven- escence accompanied by a marked increase in size. These auxospores formed without conjugation are parthenogenetic.

Mode of Preparation. — The Diatomaceae are usually gathered in small bottles, and special care should be taken to collect them as free as possible from extraneous matter. A small portion having been examined under the microscope, should the gathering be thought worthy of preservation, some of the material is boiled in acid for the purpose of cleaning it. The acids usually employed are hydrochloric, nitric or sulphuric, according as circumstances require. When the operator considers that by this process all foreign matter has been eliminated, the residuum is put into a precipitating jar of a conical shape, broader at the bottom than at the top, and covered to the brim with filtered or distilled water. When the diatoms have settled in the bottom of the jar, the supernatant fluid is carefully removed by a syringe or some similar instrument, so that the sediment be not disturbed. The jar is again filled with water, and the process repeated till the acid has been completely removed. It is, desirable afterwards to boil the sediment for a short time with supercarbonate of soda, the alkali being removed in the same manner as the acid. A small portion may then be placed with a pipette upon a slip of glass, and, when the moisture has been thoroughly evaporated, the film that remains should be covered with dilute Canada balsam, and, a thin glass cover having been gently laid over the balsam, the preparation should be laid aside for a short time to harden, and then is ready for observation.

General Remarks. — Diatoms are most abundant in cold latitudes, having a general preference for cold water. In the pelagic waters of lakes and of the oceans they are often very abundant, and in the cold waters of the Arctic and Antarctic

Fig. 6. — Formation of Auxospores.

A. Navicula limosa.

B. Achnanthes flexella

C. Navicula Amphisbaena.

D. Navicula viridis.

Oceans they exist in prodigious ˆnumbers. They thus form a large proportion of both the marine and the fresh-water plankton.

Large numbers of fossil diatoms are known. Not only are these minute plants assisting at the present time in the accumula- tion of oceanic and lake deposits, but in former ages they have been sufficiently active to give rise to considerable deposits of diatomaceous earths. When the plant has fulfilled its natural course the siliceous covering sinks to the bottom of the water in which it had lived, and there forms part of the sediment. When in the process of ages, as it has often happened, the accumulated sediment has been hardened into solid rock, the siliceous frustules of the diatoms remain unaltered, and, if the rock be disintegrated by natural or artificial means, may be removed from the enveloping matrix and subjected to examination under the microscope. The forms found may from their character help in some degree to illustrate the conditions under which the stratum of rock had been originally deposited. These earths are generally of a white or grey colour. Some of them are hard, but most are soft and friable. Many of them are of economic importance, being used as polishing powders (” Tripoli “), as absorbents for nitroglycerin in the manufacture of dynamite (” Kieselguhr “), as a dentifrice, and more recently they have been used to a large extent in the manufacture of non-conducting and sound-proof materials. Most of these diatomaceous earths are associated with rocks of Tertiary formations, although it is generally regarded that the earliest appearance of diatoms is in the Upper Cretaceous (chalk).

Vast deposits of Diatomaceous earths have been discovered in various parts of the world, — some the deposit of fresh, others of salt wa’ter. Of these deposits the most remarkable for extent, as well as for the number and beauty of the species contained in it, is that of Richmond, in Virginia, one of the United States of America. It extends for many

miles, and is in some places at least 40 ft. deep. It is a remarkable fact that though the genera- tions of a diatom in the space of a few months far exceed in number the generation of man during the period usually assigned to the existence of the race, the fossil genera and species are in most respects to the most minute details identical with the numerous living representatives of their class.

(E.O'M.jG.S.W.*)

DIAULOS (from Gr. Si., double, and auXos, pipe), in archi tecture, the peristyle round the great court of the palaestra, described by Vitruvius (v. 11), which measured two stadia (1200 ft.) in length; on the south side this peristyle had two rows of columns, so that in stormy weather the rain might not be driven into the inner part. The word was also used in ancient Greece for a foot-race of twice the usual length.

DIAVOLO, FRA (1771-1806), the popular name given to a famous Italian brigand associated with the political revolutions of southern Italy at the time of the French invasion. His real name was Michele Pezza, and he was born of low parentage at Itri; he had committed many murders and robberies in the Terra di Lavoro, but by good luck combined with audacity he always escaped capture, whence his name of Fra Diavolo, popular superstition having invested him with the characters of a monk and a demon, and it seems that at one time he actually was a monk. When the kingdom of Naples was overrun by the French and the Parthenopaean Republic established (1799), Cardinal Ruffo, acting on behalf of the Bourbon king Ferdinand IV., who had fled to Sicily, undertook the reconquest of the country, and for this purpose he raised bands of peasants, gaol-birds, brigands, &c, under the name of Sanfedisti or bande della Santa Fede (" bands of the Holy Faith "). Fra Diavolo was made leader of one of them, and waged untiring war against the French troops, cutting off isolated detachments and murdering stragglers and couriers. Owing to his unrivalled knowledge of the country, he succeeded in interrupting the enemy's communications between Rome and Naples. But although, like his fellow-brigands under Ruffo, he styled himself " the faithful servant and subject of His Sicilian Majesty," wore a military uniform and held military rank, and was even created duke of Cassano, his atrocities were worthy of a bandit chief. On one occasion he threw some of his prisoners,

men, women and children, over a precipice, and on another he had a party of seventy shot. His excesses while at Albano were such that the Neapolitan general Naselli had- him arrested and imprisoned in the castle of St Angelo, but he was liberated soon after. When Joseph

Bonaparte was made king of Naples, extra- ordinary tribunals were established to suppress brigandage, and a price was put on Fra Diavolo's head. After spreading terror through Calabria, he crossed over to Sicily, where he concerted further attacks on the French. He returned to the mainland at the head of 200 convicts, and committed further excesses in the Terra di Lavoro; but the French troops were everywhere on the alert to capture him and he had to take refuge in the woods of Lenola. For two months he evaded his pursuers, but at length, hungry and ill, he went in disguise to the village of Baronissi, where he was recognized and arrested, tried by an extraordinary tribunal, condemned to death and shot. In his last moments he cursed both the Bourbons and Admiral Sir Sidney Smith for having induced him to engage in this reckless adventure (1806). Although his cruelty was abominable, he was not altogether without generosity, and by his courage and audacity he acquired a certain romantic popularity. His name has gained a world-wide celebrity as the title of a famous opera by Auber.

The best known account of Fra Diavolo is in Pietro Colletta's Storia del reame di Napoli (2nd ed., Florence, 1848); B. Amante's Fra Diavolo e il suo tempo (Florence, 1904) is an attempted rehabili- tation; but A. Luzio, whose account in Profili e bozzetti storici (Milan, 1906) gives the latest information on the subject, has de- molished Amante's arguments. (U. V.*)

DIAZ, NARCISSE VIRGILIO (1808-1876), French painter, was born in Bordeaux of Spanish parents, on the 25th of August 1808. At first a figure-painter who indulged in strong colour, in his later life Diaz became a painter of the forest and a " tone artist " of the first order. He spent much time at Barbizon; and although he is the least exalted of the half-dozen great artists who are usually grouped round that name, he sometimes produced works of the highest quality. At the age of ten Diaz became an orphan, and misfortune dogged his earlier years. His foot was bitten by „ reptile in Meudon wood, near Sevres, where he had been taken to live with some friends of his mother. The bite was badly dressed, and ultimately it cost him his leg. Afterwards his wooden stump became famous. At fifteen he entered the studios at Sevres, where the decoration of porcelain occupied him; but tiring of the restraint of fixed hours, he took to painting Eastern figures dressed in richly coloured garments. Turks and Oriental scenes attracted him, and many brilliant gems remain of this period. About 1 83 1 Diaz encountered Theodore Rousseau, for whom he entertained a great veneration, although Rousseau was four years his junior; but it was not until ten years later that the remark- able incident took place of Rousseau teaching Diaz to paint treesi At Fontainebleau Diaz found

Rousseau painting his wonderful forest pictures, and determined to paint in the same way if possible. Rousseau, then in poor health, worried at home, and embittered against the world, was difficult to approach. Diaz followed him surreptitiously to the forest, — wooden leg not hindering, — and he dodged round after the painter, trying to observe his method of work. After a time Diaz found a way to become friendly with Rousseau, and revealed his anxiety to understand his painting. Rousseau was touched with the passionate words of admiration, and finally taught Diaz all he knew. Diaz exhibited many pictures at the Paris Salon, and was decorated in 1851. During the Franco-German War he went to Brussels. After 1871 he became fashionable, his works gradually rose in the estimation of collectors, and he worked constantly and successfully. In 1876 he caught cold at his son's grave, and on the 1 8th of November of that year he died at Mentone, whither he had gone to recruit his health. Diaz's finest pictures are his forest scenes and storms, and it is on these, and not on his pretty figures, that his fame is likely to rest. There are several fairly good examples of the master in the Louvre, and three small figure pictures in the Wallace collection, Hertford House. Perhaps the most notable of Diaz's works are " La Fee aux Perles " (1857), in the Louvre; " Sunset in the Forest " (1868); ." The Storm,"

and " The Forest of Fontainebleau " (1870) at Leeds. Diaz had no well-known pupils, but Leon Richet followed markedly his methods of tree-painting, and J. F. Millet at one period painted small figures in avowed imitation of Diaz's then popular subjects.

See A. Hustin, Les Artistes celebres: Diaz (Paris); D. Croal Thomson, The Barbizon School of Painters (London, 1890) ; J. W. Mollett, Diaz (London, 1890) ; J. Claretie, Peintres et sculpteurs conlemporains : Diaz (Paris, 1882); Albert Wolff, La Capitate de I' art: Narcisse Diaz (Paris, 1886); Ph. Burty, Maitres et petit- maitres: N. Diaz (Paris, 1877). (D.C.T.)

DIAZ, PORFIRIO (1830-), president of the republic of Mexico (q.v.), was born in the southern state of Oaxaca, on the 1 5 th of September 1 830. His father was an innkeeper in the little capital of that province, and died three years after the birth of Porfirio, leaving a family of seven children. The boy, who had Indian blood in his veins, was educated for the Catholic Church, a body having immense influence in the country at that time and ordering and controlling revolutions by

the strength of their filled coffers. Arrived at the age of sixteen Porfirio Diaz threw off the authority of the priests. Fired with enthusiasm by stories told by the revolutionary soldiers continually passing through Oaxaca, and hearing about the war with the United States, a year later he determined to set out for Mexico city and join the National Guard. There being no trains, and he being too poor to ride, he walked the greater part of the 250 m., but arrived there too late, as the treaty of Guadalupe-Hidalgo (1848) had been already signed, and Texas finally ceded to the United States. Thus his entering the army was for the time defeated. Thereupon he returned to his native town and began studying law. He took pupils in order to pay his own fees at the Law Institute, and help his mother. At this time he came under the notice and influence of Don Marcos Perez and Benito Juarez, the first a judge, the second a governor of the state of Oaxaca, and soon to become famous as the deliverer of Mexico from the priesthood (War of Reform). Diaz continued in his native town until 1854, when, refusing to vote for the dictator, Santa Anna, he was stung by a taunt of cowardice, and hastily pushing his way to the voting place, he recorded his vote in favour of Alvarez and the revolutionists. Orders were given for his arrest, but seizing a rifle and mounting a horse he placed himself at the head of a few revolting peasants, and from that moment became one of the leading spirits in that long struggle for reform, known as the War of Reform, which, under the leadership of Juarez, followed the over- throw of Santa Anna. Promotion succeeded promotion, as Diaz led his troops from victory to victory, amid great privations and difficulties. He was made captain (1856), lieutenant-colonel and colonel (1859), brigadier-general (1861), and general of division for the army (1863). Closely following on civil war, political strife, open rebellion and the great War of Reform, came the French invasion of 1862, and the landing of the emperor Maximilian in 1864. From the moment the French disclosed their intentions of settling in Mexico in 1862, Diaz took a prominent part against the foreign invasion. He was twice seriously wounded, imprisoned on three different occasions, had two hairbreadth escapes, and took part in many daring engagements. So important a personage did he become that both Marshal Bazaine and theemperorMaximilian made overtures to him. At the time of Maximilian's death (with which Diaz personally had nothing to do) he was carrying on the siege of Mexico city, which ended in the surrender of the town two days after the emperor was shot at Queretaro between his two leading generals. Diaz at once set to work to pay up arrears due to his soldiers, proclaimed death as the penalty of plunder and theft, and in the few weeks that followed showed his great administrative powers, the officers as well as the rank and file

receiving arrears of pay. On the very day that he occupied Mexico city, the great commander of the army of the east, to everyone's surprise, sent in his resignation. He was, indeed, appointed to the command of the second division of the army by President Juarez in his military reorganization, but Diaz, seeing men who had given great and loyal service to the state dismissed from their positions in the government, and disgusted at this course, retired to the little city of Oaxaca; there he lived, helping

in the reorganization of the army but taking no active part in the government until 187 1.

On Juarez* death Lerdo succeeded as president, in 1872. His term of office again brought discord, and when it was known that he was attempting to be re-elected in 1876, the storm broke. Diaz came from retirement, took up the leadership against Lerdo, and after desperate struggles and a daring escape finally made a triumphal entry into Mexico city on the 24th of November 1876, as provisional president, quickly followed by the full president- ship. His term of office marks a prominent change in the history of Mexico; from that date he at once forged ahead with financial and political reform, the scrupulous settlement of all national debts, the welding together of the peoples and tribes (there are 150 different Indian tribes) of his country, the establishment of railroads and telegraphs, and all this in a land which had been upheaved for a century with revolutions and bloodshed, and which had had fifty-two dictators, presidents and rulers in fifty-nine years. In 1880 Diaz was succeeded by Gonzalez, the former minister of war, for four years (owing to the limit of the presidential office), but in 1884 he was unanimously re-elected. The government having set aside the above- mentioned limitation, Diaz was continually re-elected to the presidency. He married twice and had a son and two daughters. His gifted second wife (Carmelita), very popular in Mexico, was many years younger than himself. King Edward VII. made him an honorary grand commander of the Bath in June 1906, in recognition of his wonderful administration as perpetual presi- dent for over a quarter of a century.

See also Mrs Alec Tweedie, Porfirio Diaz, Seven Times President of Mexico (1906), and Mexico as I saw it (1901) ; Dr Noll, From Empire to Republic (1890); Lieut. Seaton Schroeder, Fall of Maximilian's Empire (New York, 1887); R. de Z. Enriquez, P. Diaz (1908); and an article by Percy Martin in Quarterly Review for October 1909. (E. A. T.)

DIAZ DE NOVAES, BARTHOLOMEU (fl. 1481-1500), Portuguese

explorer, discoverer of the Cape of Good Hope, was probably a kinsman of Joao Diaz, one of the first Portuguese to round Cape Bojador (1434), and of Diniz Diaz, the discoverer of Cape Verde (1445)- In 1478 a Bartholomeu Diaz, probably identical with the discoverer, was exempted from certain customary payments on ivory brought from the Guinea coast. In 1481 he commanded one of the vessels sent by King John II. under Diogo d'Azambuja to the Gold Coast. In i486 he seems to have been a cavalier of the king's household, and superintendent of the royal warehouses; on the 10th of October in this year he received an annuity of 6000 reis from King John for " services to come "; and some time after this (probably about July or August 1487, rather than July i486, the traditional date) he left Lisbon with three ships to carry on the work of African exploration so greatly advanced by Diogo Cao (1482-1486). Passing Cao's farthest point near Cape Cross (in the modern German South-west Africa and) in 21 50′ S., he erected a pillar on what is now known as Diaz Point, south of Angra Pequena or Luderitz Bay, in 26° 38′ S.; of this fragments still exist. From this point (according to De Barros) Diaz ran thirteen days southwards before strong winds, which freshened to dangerous stormy weather, in a comparatively high southern latitude, considerably south of the Cape. When the storm subsided the Portuguese stood east; and failing, after several days' search, to find land, turned north, and so struck the south coast of Cape Colony at Mossel Bay (Diaz' Bahia dos Vaqueiros), half way between the Capeof Good Hope and Port Elizabeth (February 3 , 1488) . Thence they coasted eastward, passing Algoa Bay (Diaz' Bahia da Roca), erecting pillars (or perhaps wooden crosses) , it is said, on one of the islands in this bay and at or near Cape Padrone farther east; of these no traces remain. The officers and men now began to insist on return, and Diaz could only persuade them to go as far as the estuary of the Great Fish River (Diaz' Rio do Iffante, so named from his colleague, Captain Joao Iffante) . Here, howeyer, half way between Port Elizabeth and East London (and indeed from Cape Padrone), the north-easterly trend of the coast became unmistakable: the way round Africa had been laid open. On his return Diaz perhaps named Cape Agulhas after St Brandan;

while on the southernmost projection of the modern Cape peninsula, who3e remarkable highlands (Table Mountain, &c.) doubtless impressed him as the practical termination of the continent, he bestowed, says De Barros, the name of Cape of Storms (Cabo

Tormentoso) in memory of the storms he had experienced in these far southern waters; this name (in the ordinary tradition) was changed by King John to that of Good Hope (Cabo da Boa Esperanto). Some excellent authorities, however, make Diaz himself give the Cape its present name. Hard by this ” so many ages unknown promontory ” the ex- plorer probably erected his last pillar. After touching at the Ilha do Principe (Prince’s Island, south-west of the Cameroons) as well as at the Gold Coast, he appeared at Lisbon in December 1488. He had discovered 1260 m. of hitherto unknown coast; and his voyage, taken with the letters soon afterwards received from Pero de Covilhao (who by way of Cairo and Aden had reached Malabar on one side and the ” Zanzibar coast ” on the other as far south as Sofala, in 1487-1488) was rightly considered to have solved the question of an ocean route round Africa to the Indies and other lands of South and East Asia.

No record has yet been found of any adequate reward for Diaz: on the contrary, when the great Indian expedition was being prepared (for Vasco da Gama’s future leadership) Bartolomeu only superintended the building and outfit of the ships; when the fleet sailed in 1497, he only accompanied da Gama to the Cape Verde Islands, and after this was ordered to El Mina on the Gold Coast. On Cabral’s voyage of 1500 he was indeed permitted to take part in the discovery of Brazil (April 22), and thence should have helped to guide the fleet to India; but he perished in a great storm off his own Cabo Tormentoso. Like Moses, as Galvano says, he was allowed to see the Promised Land, but not to enter in.

See Joao de Barros, Asia, Dec. I. bk. iii. ch. 4; Duarte Pacheco Pereira, Esmeraldo de situ orbis, esp. pp. 15, 90, 92, 94 and Raphael Bastos’s introduction to the edition of 1892 (Pacheco met Diaz, returning from his great voyage, at the Ilha do Principe) ; a marginal note, probably by Christopher Columbus himself, on fol. 13 of a copy of Pierre d’Ailly’s Imago mundi, now in the Colombina at Seville (the writer of this note fixes Diaz’s return to Lisbon, December 1488, and says he was present at Diaz’s interview with the king of Portugal, when the explorer described his voyage and showed his route upon the chart he had kept) ; a similar but briefer note in a copy of Pope Pius II. ‘s Historia rerum ubique gestarum, from the same hand; the Roteiro of Vasco da Gama’s First Voyage (Journal of the First Voyage of . . . Da Gama, Hakluyt Soc, ed. E. G. Ravenstein (1898), pp. 9, 14); Ramusio, Navigation! (3rd ed.), vol. i. fol. 144; Castanheda, Historia, bk. i. ch. I ; Galvano, Descobrimentos (Discoveries of tfie World), Hakluyt Soc. (1862), p. 77 ; E. G. Ravenstein, ” Voyages of . . . Cao and . . . Dias,” in Geog. Journ. (London, December 1900), vol. xvi. pp. 638-655), an excellent critical summary in the light of the most recent

investigations of all the material. The fragments of Diaz's only remaining pillar (from Diaz Point) are now partly at the Cape Museum, partly at Lisbon: the latter are photographed in Ravenstein's paper in Geog. Journ. (December 1900, p. 642). (C. R. B.)

DIAZO COMPOUNDS, in organic chemistry, compounds of the type R-N-2-X (where R = a hydrocarbon radical, and X = an acid radical or a hydroxyl group). These compounds may be divided into two classes, namely, the true diazo compounds, characterized by the grouping — N = N — , and the diazonium compounds, characterized by the grouping N:N<.

The diazonium compounds were first discovered by P. Griess (Ann., 1858, 106, pp. 123 et seq.), and may be prepared by the action of nitrous fumes on a well-cooled solution of a salt of a primary amine,

C 6 H 5 NH 2 -HN0 3 + HN0 2 = C 6 H 5 N 2 .N0 3 + 2H 2 0, or, as is more usually the case (since the diazonium salts themselves are generally used only in aqueous solution) by the addition of a well-cooled solution of potassium or sodium nitrite to a well-cooled dilute acid solution of the primary amine. In order to isolate the anhydrous diazonium salts, the method of E. Knoevenagel (Ber., 1890, 23, p. 2094) may be employed. In this process the amine salt is dissolved in absolute alcohol and diazo tized by the addition of amyl nitrite; a crystalline pre- cipitate of the diazonium salt is formed on standing, or on the addition of a small quantity of ether! The diazonium salts are also formed by the action of zinc-dust and acids on the nitrates

of primary amines (R. Mohlau,^^., 1883, 16, p. 3080), and by the action of hydroxylamine on nitrosobenzenes. They are colourless crystalline solids which turn brown on exposure. They dissolve easily in water, but only to a slight extent in alcohol and ether. They are very unstable, exploding violently when heated or rubbed. Benzene diazonium nitrate, C 6 H 5 N(N03) :N, crystal- lizes in long silky needles. The sulphate and chloride are similar, but they are not quite so unstable as the nitrate. The bromide may be prepared by the addition of bromine to an ethereal solution of diazo-amino-benzene (tribromaniline remaining in solution). By the addition of potassium bromide and bromine water to diazonium salts they are converted into a perbromide, e.g. C 6 H 6 N 2 Br 3 , which crystallizes in yellow plates.

The diazonium salts are characterized by their great reactivity and consequently are important reagents in synthetical processes, since by their agency the amino group in a primary amine may be exchanged

for other elements or radicals. The chief reactions are as follows :—

1. Replacement of-NH?. by -OH: — The amine is diazotized and the aqueous solution of the diazonium salt is heated, nitrogen being eliminated and a phenol formed.

2. Replacement of- N Hz by halogens and by the -CN and -CNO groups : — The diazonium salt is warmed with an acid solution of the corresponding cuprous salt (T. Sandmeyer, Ber., 1884, 17, p. 2650), or with copper powder (L. Gattermann, Ber., 1890, 23, p. 1218; 1892, 25, p. 1074). In the case of iodine, the substitution is effected by adding a warm solution of potassium iodide to the diazonium solution, no copper or cuprous salt being necessary; whilst for the production of nitrites a solution of potassium cuprous cyanide is used. This reaction (the so-called ” Sandmeyer ” reaction) has been investigated by A. Hantzsch and J. W. Blagden (Ber., 1900,33ˆ.2544), who consider that three simultaneous reactions occur, namely, the formation of labile double salts which decompose in such a fashion that the radical attached to the copper atom wanders to the aromatic nucleus; a catalytic action, in which nitrogen is eliminated and the acid radical attaches itself to the aromatic nucleus; and finally, the formation of azo compounds.

3. Replacement of – NH2 by -NO2: — A well cooled concen trated solution of potassium mercuric nitrate is added to a cooled solution of benzene diazonium nitrate, when the crystalline salt 2C 6 H 5 N2-N0 3 , Hg(N0 2) 2 is precipitated. On warming this with copper powder, it gives a quantitative yield of nitrobenzene (A. Hantzsch, Ber., 1900, 33, p. 2551).

4. Replacement of NHt by hydrogen: — This exchange is brought about, in some cases, by boiling the diazonium salt with alcohol; but I. Remsen and his pupils (Amer. Chem. Journ., 1888, 9, pp. 389 et seq.) have shown that the main product of this reaction is usually a phenolic ether. This reaction has also been investigated by A. Hantzsch and E. Jochem (Ber., 1901, 34, p. 3337), who arrived at the conclusion that the norma! decomposition of diazonium salts by alcohols results in the formation of phenolic ethers, but that an increase in the molecular weight of the alcohol, or the accumulation of negative groups in the aromatic nucleus, diminishes the yield of the ether and increases the amount of the hydrocarbon formed. The replacement is more readily brought about by the use of sodium stannite (P. Friedlander, Ber., 1889, 22, p. 587), or by the use of a concentrated solution of hypophosphorous acid (J. Mai, Ber., 1902, 35, p. 1 62). A. Hantzsch (Ber., 1896,29ˆ.94751898,31ˆ. 1253) has

shown that the chlor and brom- diazoniumthiocyanates, when dissolved in alcohol containing a trace of hydrochloric acid, become converted into the isomeric thiocyanbenzene diazonium chlorides and bromides. This change only occurs when the halogen atom is in the ortho- or para- position to the – Nj- group.

Metallic Diazo Derivatives. — Benzene diazonium chloride is decomposed by silver oxide in aqueous solution, with the formation of benzene diazonium hydroxide, C6H 5 -N(OH); N. This hydroxide, although possessing powerful basic properties, is unstable in the presence of alkalis and neutralizes them, being converted first into the isomeric benzene-diazotic acid, the potassium salt of which is obtained when the diazonium chloride is added to an excess of cold concentrated potash (A. Hantzsch and W. B. Davidson, Ber., 1898, 31, p. 1612). Potassium benzene diazotate, CeH 6 N 2 OK, crystallizes in colourless silky needles. The free acid is not known ; by the addition of the potassium salt to 50% acetic acid at — 20 C, the acid anhydride, benzene diazo oxide, (C6HsN 2) 2 0, is obtained as a very unstable, yellow, insoluble compound, exploding spontaneously at o° C. Strong acids convert it into a diazonium salt, and potash converts it into the diazotate. On the constitution, of these anhy drides see E. Bamberger, Ber., 1896, 29, p. 446, and A. Hantzsch, Ber., 1896, 29, p. 1067; 1898, 31, p. 636. By the addition of the diazonium salts to a hot concentrated solution of a caustic alkali, C. Schraube and C. Schmidt(Ber., 1894, 27, p. 52o)obtained an isomer of potassium benzene diazotate. These wo-diazotates are formed much more readily when the aromatic nucleus in the diazonium salt contains negative radicals. Potassium benzene iso-diazotate resembles the normal salt, but is more stable, and is more highly ionized. Car- bon dioxide converts it into phenyl nitrosamine, CeHsNH-NO

(A. Hantzsch). The potassium salt of the iso-diazo hydroxide yields on methylation a nitrogen ether, R-N(CH 3)-NO, whilst the silver salt yields an oxygen ether, R-N:N-OCH 3 . These results point to the conclusion that the iso-diazo hydroxide is a tautomeric substance. The same oxygen ether is formed by the methylation of the silver salt of the normal diazo hydroxide ; this points to the conclusion that the isomeric hydroxides, corresponding with the silver derivatives, have the same structural formulae, namely, R-N: N-OH. These oxygen ethers contain the grouping – N : N – , since they couple very readily with the phenols in alkaline solution to form azo compounds {q.v.) (E.

Bamberger, Ber., 1895, 28, p. 225) ; they are also explosive.

By oxidizing potassium benzene iso-diazotate with alkaline potassium ferricyanide, E. Bamberger {Ber., 1894, 27, p. 914) obtained the diazoic acids, R-NH-N0 2 , substances which he had previously prepared by similarly oxidizing the diazonium salts, by dehydrating the nitrates of primary amines with acetic anhydride, and by the action of nitric anhydride on the primary amines. Concentrated acids convert them into the isomeric nitro-amines, the – N0 2 group going into the nucleus in the ortho- or para- position to the amine nitrogen; this appears to indicate that the compounds are nitra- mines. They behave, however, as tautomeric substances, since their alkali salts on methylation give nitrogen ethers, whilst their silver salts yield oxygen ethers :

-a potassium salt — } R'N(CH 3).N0 2 nitramine. R-NH-N0 2 ˆ

"ˆsilver salt -> R"N:N-0-OCH 3 diazoate.

Phenyl nitramine, CeHsNH NO2, is a colourless crystalline solid, which melts at 46 C. Sodium amalgam in alkaline solution reduces it to phenylhydrazine.

Constitution of the Diazo Compounds. — P. Griess {Ann., 1866, 137, p. 39) considered thatthediazocompoundswereformed by theaddition of complex groupings of the type C6H4N2 – to the inorganic acids ; whilst A. Kekul6 {Zeit.f. Chemie, 1866, 2, p. 308), on account of their ready condensation to form azo compounds and their easy reduction to hydrazines, assumed that they were substances of the type R-N: N-Cl. The constitution of the diazonium group- Na-X, may be inferred from the following facts:— The group C6rI 6 N2-behaves in many respects similarly to an alkali metal, and even more so to the ammonium group, since it is capable of forming colourless neutral salts with mineral acids, which in dilute aqueous solution are strongly ionized, but do not show any trace of hydrolytic dissociation (A. Hantzsch, Ber., 1895, 28, p. 1734). Again, the diazonium chlorides combine with platinic chloride to form difficultly soluble double platinum salts, such as (CjHjNiCOs-PtCU; similar gold salts, C 6 H 6 N2Cl-AuCl 3 , are known. Determinations of the electrical con- ductivity of the diazonium chloride and nitrate also show that the diazonium radical is strictly comparable with other quaternary ammonium ions. For these reasons, one must assume the existence of pentavalent nitrogen in the diazonium salts, in order to account for their basic properties.

The constitution of the isomeric diazo hydroxides has given rise to much discussion. E. Bamberger {Ber., 1895, 28, pp. 444 et seq.) and C. W. Blomstrand {Journ. prakt.Chem., 1896, 53, pp. i69etseq.) hold that the compounds are structurally different, the normal diazo-hydroxide being a diazonium derivative of the type R-N(:N)-OH. The recent work of A. Hantzsch and hispupils seems to invalidate this view {Ber., 1894, 27, pp. 1702 et seq. ; see also A. Hantzsch, DieDiazo-verbindungen). According to Hantzsch the isomeric diazo hydroxides are structurally identical, and the differences in behaviour are due to stereo-chemica 1 relations, the isomerism being comparable with that of the oximes {q.v.). On such a hypothesis, the relatively unstable normal diazo hydroxides would be the iyn-compounds, since here the nitrogen atoms would be more easily eliminated, whilst the stable iso-diazo derivatives would be the awta'-compounds, thus : R-N R-N

HON N-OH

Normal hydroxide Iso hydroxide

(Syn-compound) (Anti-compound)

In support of this theory, Hantzsch has succeeded in isolating a series of syn- and anti-diazo-cyanidesand-sulphonates (Ber., 1 895,28, p.666; 1900, 33, p. 2 161 ; 1901,34, p. 4166). By diazotizingpara-chloraniline and adding a cold solution of potassium cyanide, a salt (melting at 29° C.) is obtained, which readily loses nitrogen, and forms para- chlorbenzonitrile on the addition of copper powder. By dissolving this diazocyanide in alcohol and reprecipitating it by water, it is converted into the isomeric diazocyanide (melting at 105-106° C), which does not yield para-chlorbenzonitrile when treated with copper powder. Similar results have been obtained by using diazotized para-anisidine, a syn- and an anti- compound being formed, as well as a third isomeric cyanide, obtained by evaporating para-methoxy-benzenediazonium hydroxide in the presence of an excess of hydro-cyanic acid at ordinary temperatures. This salt is a colourless crystalline substance of composition CH 3 0-C6H4-N 2 -CN-HCN-2H20, and has the properties of a metallic salt ; it is very soluble in water and its solution is an electrolyte, whereas the solutions of the syn- and anti- compounds are not electrolytes. The isolation of these compounds is a powerful argument in favour of the Hantzsch hypothesis which requires the existence of these three different types, whilst the Bamberger-Blomstrand view only accounts for the forma-

tion of two isomeric cyanides, namely, one of the normal diazonium type and one of the iso-diazocyanide type.

Benzene diazonium hydroxide, although a strong base, reacts with the alkaline hydroxides to form salts with the evolution of heat, and generally behaves as a weak acid. On mixing dilute solutions of the diazonium hydroxide and the alkali together, it is found that the molecular conductivity of the mixture is much less than the sum of the two electrical conductivities of the solutions separately, from which it follows that a portion of the ions present have changed to the non-ionized condition. This behaviour is explained by consider- ing the non-ionized part of the diazonium hydroxide to exist in solution in a hydrated form, the equation of equilibrium being:

C 6 H 6 N v C 6 H 6 -N-OH

H 2 0+ fi + OH’ 7» I

iN ˆ HO-N-H

On adding the alkaline hydroxide to the solution, this hydrate is supposed to lose water, yielding the syn-diazo hydroxide, which then gives rise to a certain amount of the sodium salt (A. Hantzsch, Ber., 1898, 31, p. 1612),

C 6 H 5 N;OH] -> C 6 H 6 -N -» C 6 H 6 -N

I • El H

HO-N-JH J <- HO-N N-OH.

Hantzsch explains the characteristic reactions of the diazonium compounds by the assumption that an addition compound is first formed, which breaks down with the elimination of the hydride of the acid radical, and the formation of an unstable syn-diazo com- pound, which, in its. turn, decomposes with evolution of nitrogen {Ber., 1897, 30, p. 2548; 1898, 31, p. 2053).

R X R X R X

>N,N+|^ >N;N< -M |+HC1 -^R-X+N 2 . CI H CI ^H N = N

J. Cain {Jour. Chem. Soc., 1907, 91, p. 1049) suggested a quinonoid formula for diazonium salts, which has been combated by Hantzsch {Ber., 1908, 41, pp. 3532 et seq.). G. T. Morgan and F. M. G. Mickle- thwaite {Jour. Chem. Soc, 1908, 93, p. 617; 1909, 95, p. 1319) have pointed out that the salts may possess a dynamic formula, Cain's representing the middle stage, thus:

Diazoamines. — The diazoamines, R-N2-NHR, maybe prepared by the action of the primary and secondary amines on the diazonium salts, or bythe action of nitrousacid onthe free primary amine. In the latter reaction it is assumed that the isodiazohydroxide first formed is immediately attacked by a second molecule of the amine. They are yellow crystalline solids, which do not unite with acids. Nitrous acid converts them, in acid solution, into diazonium salts. C 6 H 6 N 2 – NHCH J+2HC1 +HN0 2 = 2C 6 H 6 N 2 C1 +2H 2 0.

They are readily converted into the isomeric aminoazo compounds, either by standing in alcoholic solution, or by warming with a mixture of the parent base and its hydrochloride; the diazo group preferably going into the para-position to the amino group. When the para- position is occupied, the diazo group takes the ortho- position. H. Goldschmidt and R. U. Reinders {Ber., 1896, 29, p. 1369, 1899) have shown that the transformation is a monomolecular reaction, the

velocity of transformation in moderately dilute solution being independent of the concentration, but proportional to the amount of the catalyst present (amine hydrochloride) and to the temperature. It has also been shown that when different salts of the amine are used, their catalytic influence varies in amount and is almost proportional to their degree of ionization in aqueous solution. Diazoaminobenzene, CeHeNrNHCeHs, crystallizes in golden yellow laminae, which meltat 96°C.and explode at a slightly higher tempera- ture. It is readily soluble in alcohol, ether and benzene. Concen- trated hydrochloric acid converts it into chlorbenzene, aniline and nitrogen. Zinc dust and alcoholic acetic acid reduce it to aniline and phenylhydrazine.

Diazoimino compounds, R-N 3 , may be regarded as derivatives of azoimide {q.v.) ; they are formed by the action of ammonia on the diazoperbromides,or by the action of hydroxylamine on the diazonium sulphates (J. Mai,' Ber., 1892, 25, p. 372; T. Curtius, Ber., 1893, 26, p. 1271). Diazobenzeneimide,CeH 6 N 3 , is a yellowish oil of stupefying odour. It boils at 59 C. (12 mm.), and explodes when heated. Concentrated hydrochloric acid decomposes it with formation of

chloranilines and elimination of nitrogen, whilst on boiling with sulphuric acid it is converted into aminophenols.

Aliphatic Diazo Compounds. — The esters of the aliphatic amino acids may be diazotized in a manner similar to the primary aromatic amines, a fact discovered by T. Curtius {Ber., 1833, 16, p. 2230). The first aliphatic diazo compound to be isolated was diazoacetic ester, CH-N2-C02C2Hs, which is prepared by the action of potassium nitrite on the ethyl ester of glycocoll hydrochloride, HC1-NH 2 -CH 2 -C02C 2 H 6 +KNO2 = CHN 2 -C0 2 C 2 H 6 + KC1+2H20. It is a yellowish oil which melts at — 24° C; it boils at 143-144° C, but cannot be distilled safely as it decomposes violently, giving nitrogen and ethyl fumarate. It explodes in contact with concentrated sulphuric acid. On reduction it yields ammonia and glycocoll (aminoacetic acid). When heated with water it forms ethyl hydroxy-acetate ; with alcohol it yields ethyl ethoxyacetate. Halogen acids convert it into monohalogen fatty acids, and the halogens themselves convert it into dihalogen fatty acids. It unites with aldehydes to form esters of ketonic acids, and with aniline yields anilido-acetic acid. It forms an addition product with acrylic ester, which on heating loses nitrogen and leaves trimethylene dicarboxylic ester. Concentrated ammonia

converts it into diazoacetamide, CHN2-CONH2, which crystallizes in golden yellow plates which melt at 114 C. For other reactions see Hydrazine. The constitution of the diazo fatty esters is inferred from the fact that the two nitrogen atoms, when split off, are replaced by two monovalent elements or groups, thus leading to

N the formula v > CH-C02C 2 H6, for diazoacetic ester.

Diazo succinic ester, N 2 -C(C02C2H 6)2, is similarly prepared by the action of nitrous acid on the hydrochloride of aspartic ester. It is decomposed by boiling water and yields fumaric ester.

Diazomethane, CH2N2, was first obtained in 1894 by H. v. Pechmann (Ber., 1894,27, p. 1888; 1895,28, p. 855). It is prepared by the action of aqueous or alcoholic solutions of the caustic alkalis on the nitroso-acidyl derivatives of methylamine (such, for example, as nitrosomethyl urethane, NON-C02C2H 6 , which is formed on passing nitrous fumes into an ethereal solution of methyl urethane). E. Bamberger (Ber., 1895, 28, p. 1682) regards it as the anhydride of iso-diazomethane, CH3-N:N-OH, and has prepared it by a method similar to that used for the preparation of iso-diazobenzene. By the action of bleaching powder on methylamine hydrochloride, there is obtained a volatile liquid (methyldichloramine, CH 3 -N-Cl2), boil- ing at 58-60° C, which explodes violently when heated with water, yielding hydrocyanic acid _ (CHsNCl 2 = *HCN + 2HCl). Well-dried hydroxylamine hydrochloride is dissolved in methyl alcohol and mixed with sodium methylate; a solution of methyldichloramine in absolute ether is then added and an ethereal solution of diazomethane distils over. Diazomethane is a yellow inodorous gas, very poisonous and corrosive. It may be condensed to a liquid, which boils at about 0° C. It isapowerful methylating agent, reacting with water to form methyl alcohol, and converting acetic acid into methylacetate, hydrochloric acid into methyl chloride, hydrocyanic acid into acetonitrile, and phenol into anisol, nitrogen being eliminated in each case. It is reduced by sodium amalgam (in alcoholic solution) to methylhydrazine, CH 3 -NH-NH 2 . It unites directly with acetylene to form pyrazole (H. v. Pechmann, Ber., 1898, 31, p. 2950) and with fumaric methyl ester it forms pyrazolin dicarboxylic ester. (F. G. P.*)

See G. T.Morgan, B.A.Rep., 1902; J. Cain, Diazo Compounds, 1908. ■ DIAZOMATA (Gr. diafafia, a girdle), in architecture, the landing places and passages which were carried round the semi- circle and separated the upper and lower tiers in a Greek theatre.

DIBDIN, CHARLES (1745-1814), British musician, dramatist, novelist,

actor and song- writer, the son of a parish clerk, was born at Southampton on or before the 4th of March 1745, and was the youngest of a family of eighteen. His parents designing him for the church, he was sent to Winchester; but his love of music early diverted his thoughts from the clerical profession. After receiving some instruction from the organist of Winchester cathedral, where he was a chorister from 1756 to 1759, he went to London at the age of fifteen. Here he was placed in a music warehouse in Cheapside, but he soon abandoned this employment to become a singing actor at Covent Garden. On the 2 1st of May 1762 his first work, an operetta entitled The Shepherd's Artifice, with words and music by himself, was produced at this theatre. Other works followed, his reputation being firmly established by the music to the play of The Padlock, produced at Drury Lane under Garrick's management in 1768, the composer himself taking the part of Mungo with conspicuous success. He continued for some years to be connected with Drury Lane, both as composer and as actor, and produced during this period two of his best known works, The Waterman (1774) and The Quaker (1775). A quarrel with Garrick led to the termination of his engagement. In The Comic Mirror he ridiculed prominent contemporary figures through the medium of a puppet show. In 1782 he became joint

manager of the Royal circus, afterwards known as the Surrey theatre. In three years he lost this position owing to a quarrel with his partner. His opera Liberty Hall, containing the suc- cessful songs " Jock Ratlin," " The Highmettled Racer," and " The Bells of Aberdovey," was produced at Drury Lane theatre on the 8th of February 1785. In 1788 he sailed for the East Indies, but the vessel having put in to Torbay in stress of weather, he changed his mind and returned to London. In a musical variety entertainment called The Oddities, he succeeded in win- ning marked popularity with a number of songs that included " 'Twas in the good ship 'Rover'," " Saturday Night at Sea," "I sailed from the Downs in the ' Nancy,' " and the immortal " Tom Bowling," written on the death of his eldest brother, Captain Thomas Dibdin, at whose invitation he had planned his visit to India. A series of monodramatic entertainments which he gave at his theatre, Sans Souci, in Leicester Square, brought his songs, music and recitations more prominently into notice, and permanently established his fame as a lyric poet. It was at these entertainments that he first introduced many of those sea-songs which so powerfully influenced the national spirit. The words breathe the simple loyalty and dauntless courage that are the cardinal virtues of the British sailor, and the music was ap- propriate and naturally melodious. Their effect in stimulating and ennobling the spirit of the navy during the war with France was so

marked as to call for special acknowledgment. In 1803 Dibdin was rewarded by government with a pension of £200 a year, of which he was only for a time deprived under the ad- ministration of Lord Grenville. During this period he opened a music shop in the Strand, but the venture was a failure. Dibdin died of paralysis in London on the 25th of July 1814. Besides his Musical Tour through England (1788), his Professional Life, an autobiography published in 1 803 , a History of the Stage (179s), and several smaller works, he wrote upwards of 1400 songs and about thirty dramatic pieces. He also wrote the following novels: — The Devil (1785); Hannah Hewitt (1792); The Younger Brother (1793). An edition of his songs by G. Hogarth (1843) contains a memoir of his life. His two sons, Charles and Thomas John Dibdin (q.v.), whose works are often confused with those of their father, were also popular dramatists in their day.

DIBDIN, THOMAS FROGNALL (1776-1847), English biblio- grapher, born at Calcutta in 1776, was the son of Thomas Dibdin, the sailor brother of Charles Dibdin. His father and mother both died on the way home to England in 1780, and Thomas was brought up by a maternal uncle. He was educated at St John's College, Oxford, and studied for a time at Lincoln's Inn. After an unsuccessful attempt to obtain practice as a provincial counsel at Worcester, he was ordained a clergyman at the close of 1804, being appointed to a curacy at Kensington. It was not until 1823 that he received the living of Exning in Sussex. Soon after- wards he was appointed by Lord Liverpool to the rectory of St Mary's, Bryanston Square, which he held until his death on the 1 8th of November 1847. The first of his numerous bibliographical works was his Introduction to the Knowledge of Editions of the Classics (1802), which brought him under the notice of the third Earl Spencer, to whom he owed much important aid in his bibliographical pursuits. The rich library at Althorp was thrown open to him; he spent much of his time in it, and in 1814-1815 published his Bibliotheca Spenceriana. As the library was not open to the general public, the information given in the Bibliotheca was found very useful, but since its author was unable even to read the characters in which the books he described were written, the work was marred by the errors which more or less characterize all his productions. This fault of inaccuracy how- ever was less obtrusive in his series of playful, discursive works in the form of dialogues on his favourite subject, the first of which, Bibliomania (1809), was republished with large additions in 181 1, and was very popular, passing through numerous editions. To the same class belonged the Bibliographical Decameron, a larger work, which appeared in 1817. In 1810 he began the publication of a new and much extended edition of Ames's Typographical A ntiquities. The

first volume was a great success , but the publica- tion was checked by the failure of the fourth volume, and was

never completed. In 1818 Dibdin was commissioned by Earl Spencer to purchase books for him on the continent, an expedi- tion described in his sumptuous Bibliographical, Antiquarian and Picturesque Tour in France and Germany (1821). In 1824 he made an ambitious venture in his Library Companion, or the Young Man's Guide and Old Man's Comfort in the Choice of a Library, intended to point out the best works in all departments of literature. His culture was not broad enough, however, to render him competent for the task, and the work was severely criticized. For some years Dibdin gave himself up chiefly to religious literature. He returned to bibliography in his Bibliophobia, or Remarks on the Present Depression in the State of Literature and the Book Trade (1832), and the same subject furnishes the main interest of his Reminiscences of a Literary Life (1836), and his Bibliographical, Antiquarian and Picturesque Tour in the Northern Counties of England and Scotland (1838). Dibdin was the originator and vice-president, Lord Spencer being the president, of the Roxburghe Club, founded in 18 12, — the first of the numerous book clubs which have done such service to literature.

DIBDIN, THOMAS JOHN (1771-1841), English dramatist and song-writer, son of Charles Dibdin, the song-writer, and of Mrs Davenet, an actress whose real name was Harriet Pitt, was born on the 21st of March 17 71. He was apprenticed to his maternal uncle, a London upholsterer, and later to William Rawlins, afterwards sheriff of London. He summoned his second master unsuccessfully for rough treatment; and after a few years of service he ran away to join a company of country players. From 1789 to 1795 he played in all sorts of parts; he acted as scene painter at Liverpool in 1791; and during this period he com- posed more than 1000 songs. He made his first attempt as a dramatic writer in Something New, followed by The Mad Guardian in 1795. He returned to London in 1795, having married two years before; and in the winter of 1 798-1 799 his Jew and the Doctor was produced at Covent Garden. From this time he contributed a very large number of comedies, operas, farces, &c, to the public entertainment. Some of these brought immense popularity to the writer and immense profits to the theatres. It is stated that the pantomime of Mother Goose (1807) produced more than £20,000 for the management at Covent Garden theatre, and the High-mettled

Racer, adapted as a pantomime from his father's play, £18,000 at Astley's. Dibdin was prompter and pantomime writer at Drury Lane until 1816, when he took the Surrey theatre. This venture proved disastrous and he became bankrupt. After this he was manager of the Haymarket, but without his old success, and his last years were passed in comparative poverty. In 1827 he published two volumes of Reminiscences; and at the time of his death he was preparing an edition of his father's sea songs, for which a small sum was allowed him weekly by the lords of the admiralty. Of his own songs " The Oak Table " and " The Snug Little Island " are well-known examples. He died in London on the 16th of September 1841.

DIBRA (Slav. Debra), the capital of a sanjak bearing the same name, in the vilayet of Monastir, eastern Albania, Turkey. Pop. (1900) about 15,000. Dibra occupies a valley enclosed by mountains, and watered by the Tsrni Drin and Radika rivers, which meet 3 m. S. It is a fortified city, and the only episcopal see of the Bulgarian exarchate in Albania; most of the inhabit- ants are Albanians, but there is a strong Bulgarian colony. The local trade is almost entirely agricultural.

DIBRUGARH, a town of British India, in the Lakhimpur district of eastern Bengal and Assam, of which it is the head- quarters, situated on the Dibru river about 4 m. above its confluence with the Brahmaputra. Pop. (1901) 11,227. It is the terminus of steamer navigation on the Brahmaputra, and also of a railway running to important coal-mines and petroleum wells, which connects with the Assam-Bengal system. Large quantities of coal and tea are exported. There are a military cantonment, the headquarters of the volunteer corps known as the Assam Valley Light Horse; a government high school, a training school for masters; and an aided school for girls. In 1900 a medical school for the province was established, out of a bequest left

by Brigade-Surgeon J. Berry-White, which is maintained by the government, to train hospital assistants for the tea gardens. The Williamson artisan school is entirely supported by an endowment.

DICAEARCHUS, of Messene in Sicily, Peripatetic philosopher and pupil of Aristotle, historian, and geographer, flourished about 320 B.C. He was a friend of Theophrastus, to whom he dedicated the majority of his works. Of his writings, which comprised treatises on a great variety of subjects, only the titles and a few fragments survive. The most important of them was his fi'uos rrjs 'EXXdSos (Life in Greece), in which the moral, political and social condition of the people was very fully discussed. In his Tripoliticos he described the best form of

government as a mixture of monarchy, aristocracy and democracy, and illustrated it by the example of Sparta. Among the philosophical works of Dicaearchus may be mentioned the Lesbiaci, a dialogue in three books, in which the author endeavours to prove that the soul is mortal, to which he added a supplement called Corinthiaci. He also wrote a Description of the World illustrated by maps, in which was probably included his Measurements of Mountains. A description of Greece (150 iambics, in C. Miiller, Frag. hist. Graec. i. 238-243) was formerly attributed to him, but, as the initial letters of the first twenty-three lines show, was really the work of Dionysius, son of Calliphon. Three considerable fragments of a prose description of Greece (Miiller, i. 97-110) are now assigned to an unknown author named Heracleides. The De re publica of Cicero is supposed to be founded on one of Dicaearchus's works.

The best edition of the fragments is by M. Fuhr (1841), a work of great learning ; see also a dissertation by F. G. Osann, Beitrdge zur rom. und griech. Litteratur, ii. pp. 1-117 (1839); Pauly-Wissowa, Realencyclopddie der Mass. Altertumswiss. v. pt. 1 (1905).

DICE (plural of die, O. Fr. de, derived from Lat. dare, to give), small cubes of ivory, bone, wood or metal, used in gaming. The six sides of a die are each marked with a different number of incised dots in such a manner that the sum of the dots on any two opposite sides shall be 7. Dice seem always to have been employed, as is the case to-day, for gambling purposes, and they are also used in such games as backgammon. There are many methods of playing, from one to five dice being used, although two or three are the ordinary numbers employed in Great Britain and America. The dice are thrown upon a table or other smooth surface either from the hand or from a receptacle called a dice-box, the latter method having been in common use in Greece, Rome and the Orient in ancient times. Dice-boxes have been made in many shapes and of various materials, such as wood, leather, agate, crystal, metal or paper. Many contain bars within to ensure a proper agitation of the dice, and thus defeat trickery. Some, formerly used in England, were employed with unmarked dice, and allowed the cubes to fall through a kind of funnel upon a board marked off into six equal parts numbered from 1 to 6. It is a remarkable fact, that, wherever dice have been found, whether in the tombs of ancient Egypt, of classic Greece, or of the far East, they differ in no material respect from those in use to-day, the elongated ones with rounded ends found in Roman graves having been, not dice but tali, or knucklebones. Eight- sided dice have comparatively lately been introduced in France as aids to children in learning the multiplication table. The teetotum, or spinning die, used in many

modern games, was known in ancient times in China and Japan. The increased popularity of the more elaborate forms of gaming has resulted in the decline of dicing. The usual method is to throw three times with three dice. If one or more sixes or fives are thrown the first time they may be reserved, the other throws being made with the dice that are left. The object is to throw three sixes = 18 or as near that number as possible, the highest throw winning, or, when drinks are to be paid for, the lowest throw losing. (For other' methods of throwing consult the Encyclopaedia of Indoor Games, by R. F. Foster, 1903 .) The most popular form of pure gambling with dice at the present day, particularly with the lower classes in America, is Craps, or Crap-Shooting, a simple form of Hazard, of French origin. Two dice are used. Each player puts up a stake

and the first caster may cover any or all of the bets. He then shoots, i.e. throws the dice from his open hand upon the table. If the sum of the dice is 7 or 1 1 the throw is a nick, or natural, and the caster wins all stakes. If the throw is either 2, 3 or 12 it is a crap, and the caster loses all. If any other number is thrown it is a point, and the caster continues until he throws the same number again, in which case he wins, or a 7, in which case he loses. The now practically obsolete game of Hazard was much more complicated than Craps. (Consult The Game of Hazard Investigated, by George Lowbut.) Poker dice are marked with ace, king, queen, jack and ten-spot. Five are used and the object is, in three throws, to make pairs, triplets, full hands or fours and fives of a kind, five aces being the highest hand. Straights do not count. In throwing to decide the payment of drinks the usual method is called horse and horse, in which the highest throws retire, leaving the two lowest to decide the loser by the best two in three throws. Should each player win one throw both are said to be horse and horse, and the next throw determines the loser. The two last casters may also agree to sudden death, i.e. a single throw. Loaded dice, i.e. dice weighted slightly on the side of the lowest number, have been used by swindlers from the very earliest times to the present day, a fact proved by countless literary allusions. Modern dice are often rounded at the corners, which are otherwise apt to wear off irregularly.

History. — Dice were probably evolved from knucklebones. The antiquary Thomas Hyde, in his Syntagma, records his opinion that the game of " odd or even," played with pebbles, is nearly coeval with the creation of man. It is almost impossible to trace clearly the

development of dice as distinguished from knucklebones, on account of the confusing of the two games by the ancient writers. It is certain, however, that both were played in times antecedent to those of which we possess any written records. Sophocles, in a fragment, ascribed their in- vention to Palamedes, a Greek, who taught them to his country- men during the siege of Troy, and who, according to Pausanias (on Corinth, xx.), made an offering of them on the altar of the temple of Fortune. Herodotus (Clio) relates that the Lydians, during a period of famine in the days of King Atys, invented dice, knucklebones and indeed all other games except chess. The fact that dice have been used throughout the Orient from time immemorial, as has been proved by excavations from ancient tombs, seems to point clearly to an Asiatic origin. Dicing is mentioned as an Indian game in the Rig-veda. In its primitive form knucklebones was essentially a game of skill, played by women and children, while dice were used for gambling, and it was doubtless the gambling spirit of the age which was responsible for the derivative form of knucklebones, in which four sides of the bones received different values, which were then counted, like dice. Gambling with three, sometimes two, dice (ku/Soi) was a very popular form of amusement in Greece, especially with the upper classes, and was an almost invariable accompani- ment to the symposium, or drinking banquet. The dice were cast from conical beakers, and the highest throw was three sixes, called Aphrodite, while the lowest, three aces, was called the dog. Both in Greece and Rome different modes of counting were in vogue. Roman dice were called tesserae from the Greek word for four, indicative of the four sides. The Romans were passionate gamblers, especially in the luxurious days of the Empire, and dicing was a favourite form, though it was forbidden except during the Saturnalia. The emperor Augustus wrote in a letter to Suetonius concerning a game that he had played with his friends: ” Whoever threw a dog or a six paid a denarius to the bank for every die, and whoever threw a Venus (the highest) won everything.” In the houses of the rich the dice-beakers were of carved ivory and the dice of crystal inlaid with gold. Mark Antony wasted his time at Alexandria with dicing, while, accord- ing to Suetonius, the emperors Augustus, Nero and Claudius were passionately fond of it, the last named having written a book on the game. Caligula notoriously cheated at the game; Domitian played it, and Commodus set apart special rooms in his palace for it. The emperor Verus, adopted son of Antonine, is known to have thrown dice whole nights together. Fashionable society

followed the lead of its emperors, and, in spite of the severity of the laws, fortunes were squandered at the dicing-table. Horace derided

the youth of the period, who wasted his time amid the dangers of dicing instead of taming his charger and giving him- self up to the hardships of the chase. Throwing dice for money was the cause of many special laws in Rome, according to one of which no suit could be brought by a person who allowed gambling in his house, even if he had been cheated or assaulted. Pro- fessional gamblers were common, and some of their loaded dice are preserved in museums. The common public-houses were the resorts of gamblers, and a fresco is extant showing two quarrelling dicers being ejected by the indignant host. Virgil, in the Copa generally ascribed to him, characterizes the spirit of that age in verse, which has been Englished as follows: —

” What ho ! Bring dice and good wine !

Who cares for the morrow? Live — so calls grinning Death —

Live, for I come to you soon!”

That the barbarians were also given to gaming, whether or not they learned it from their Roman conquerors, is proved by Tacitus, who states that the Germans were passionately fond of dicing, so much so, indeed, that, having lost everything, they would even stake their personal liberty. Centuries later, during the middle ages, dicing became the favourite pastime of the knights, and both dicing schools (scholae deciorum) and gilds of dicers existed. After the downfall of feudalism the famous German mercenaries called landsknechls established a reputation as the most notorious dicing gamblers of their time. Many of the dice of the period were curiously carved in the images of men and beasts. In France both knights and ladies were given to dicing, which repeated legislation, including interdictions on the part of St Louis in 1254 and 1256, did not abolish. In Japan, China, Korea, India and other Asiatic countries dice have always been popular and are so still.

See Foster’s Encyclopaedia of Indoor Games (1903) ; Raymond’s Illustriertes Knobelbrevier (Oramenburg, 1888) ; Les Jeux des Anciens, by L. Becq de Fouquieres (Paris, 1869) ; Das Knochelspiel der Alten, by Bolle (Wismar, 1886); Die Spiele der Griechen und Romer, by W. Richter (Leipzig, 1887); Raymond’s Alte und neue Wiirfelspiele; Chinese Games with Dice, by Stewart Culin (Philadelphia, 1889); Korean Games, by Stewart Culin (Philadelphia, 1895).

DICETO, RALPH DE (d. c. 1202), dean of St Paul’s, London, and chronicler, is first mentioned in 1152, when he received the archdeaconry of Middlesex. He was probably born between 1120 and

1130; of his parentage and nationality we know nothing. The common statement that he derived his surname from Diss in Norfolk is a mere conjecture; Dicetum may equally well be a Latinized form of Dissai, or Dicy, or Dizy, place-names which are found in Maine, Picardy, Burgundy and Champagne. In 1152 Diceto was already a master of arts; presumably he had studied at Paris. His reputation for learning and integrity stood high; he was regarded with respect and favour by Arnulf of Lisieux and Gilbert Foliot of Hereford (afterwards of London), two of the most eminent bishops of their time. Quite naturally, the archdeacon took in the Becket question the same side as his friends. Although his narrative is colourless, and although he was one of those who showed some sympathy for Becket at the council of Northampton (n 64), the correspondence of Diceto shows that he regarded the archbishop's conduct as ill-considered, and that he gave advice to those whom Becket regarded as his chief enemies. Diceto was selected, in 1166, as the envoy of the English bishops when they protested against the excommunica- tions launched by Becket. But, apart from this episode, which he characteristically omits to record, he remained in the background. The natural impartiality of his intellect was accentuated by a certain timidity, which is apparent in his writings no less than in his life. About 1180 he became dean of St Paul's. In this office he distinguished himself by careful management of the estates, by restoring the discipline of the chapter, and by building at his own expense a deanery-house. A scholar and a man of considerable erudition, he showed a strong preference for his- torical studies; and about the time when he was preferred to the deanery he began to collect materials for the history of his

own times. His friendships with Richard Fitz Nigel, who suc- ceeded Foliot in the see of London, with William Longchamp, the chancellor of Richard I., and with Walter of Coutances, the arch- bishop of Rouen, gave him excellent opportunities of collecting information. His two chief works, the Abbreviationes Chronico- rum and the Ymagines Historiarum, cover the history of the world from the birth of Christ to the year 1202. The former, which ends in 1147, is a work of learning and industry, but almost entirely based upon extant sources. The latter, begin- ning as a compilation from Robert de Monte and the letters of Foliot, becomes an original authority about 1172, and a contem- porary record about 1181. In precision and fulness of detail the Ymagines are inferior to the chronicles of the so-called Benedict and of Hoveden. Though an annalist, Diceto is careless in his

chronology; and the documents which he incorporates, while often important, are selected on no principle. He has little sense of style; but displays considerable insight when he ventures to discuss a political situation. For this reason, and on account of the details with which they supplement the more important chronicles of the period, the Ymagines are a valuable though a secondary source.

See W. Stubbs' edition of the Historical Works of Diceto (Rolls ed. 1876, 2 vols.), and especially the introduction. The second volume contains minor works which are the barest compendia of facts taken from well-known sources. Diceto's fragmentary Domesday of the capitular estates has beenedited by Archdeacon Halein The Domesday of St Paul's, pp. 109 ff. (Camden Society, 1858).

DICEY, EDWARD (1832-), English writer, son of T. E. Dicey of Claybrook Hall, Leicestershire, was born in 1832. Edu- cated at Trinity College, Cambridge, where he took mathematical and classical honours, he became an active journalist, contribut- ing largely to the principal reviews. He was called to the bar in 1875, became a bencher of Gray's Inn in 1896, and was treasurer in 1903-1904. He was connected with the Daily Telegraph as leader writer and then as special correspondent, and after a short spell in 1870 as editor of the Daily News he became editor of the Observer, a position which he held until 1889. Of his many books on foreign affairs perhaps the most important are his England and Egypt (1884), Bulgaria, the Peasant State (1895), The Story of the Khedivate (1902), and The Egypt of the Future (1907). He was created C.B. in 1886.

His brother Albert Venn Dicey (b. 1835), English jurist, was educated at Balliol College, Oxford, where he took a first class in the classical schools in 1858. He was called to the bar at the Inner Temple in 1863. He held fellowships successively at Balliol, Trinity and All Souls', and from 1882 to 1909 was Vinerian professor of law. He became Q.C. in 1890. His chief works are the Introduction to the Study of the Law of the Constitu- tion (1885, 6th ed. 1902), which ranks as a standard work on the subject; England's Case against Home Rule (1886); A Digest of the Law of England with Reference to the Conflict of Laws (1896), and Lectures on the Relation between Law and Public Opinion in England during the 19th century (1905).

DICHOTOMY (Gr. 5i%a, apart, re/xveiv, to cut), literally a cutting asunder, the technical term for a form of logical division, consisting in the separation of a genus into two species, one of which has and the other has not, a certain quality or attribute. Thus men may be thus divided into white men, and men who are not white; each of these

may be subdivided similarly. On the principle of contradiction this division is both exhaustive and exclusive; there can be no overlapping, and no members of the original genus or the lower groups are omitted. This method of classification, though formally accurate, has slight value in the exact sciences, partly because at every step one of the two groups is merely negatively characterized and therefore incapable of real subdivision; it is useful, however, in setting forth clearly the gradual descent from the most inclusive genus {summum genus) through species to the lowest class (infima species), which is divisible only into individual persons or things. (See further Division.) In astronomy the term is used for the aspect of the moon or of a planet when apparently half illuminated, so that its disk has the form of a semicircle.

DICK, ROBERT (1811-1866), Scottish geologist and botanist> was born at Tullibody, in Clackmannanshire, in January 181 1. His father was an officer of excise. At the age of thirteen, after receiving a good elementary education at the parish school, Robert Dick was apprenticed to a baker, and served for three years. In these early days he became interested in wild flowers — he made a collection of plants and gradually acquired some knowledge of their names from an old encyclopaedia. When his time was out he left Tullibody and gained employment as a journeyman baker at Leith, Glasgow and Greenock. Meanwhile his father, who in 1826 had been removed to Thurso, as super- visor of excise, advised his son to set up a baker's shop in that town. Thither Robert Dick went in 1830, he started in business as a baker and worked laboriously until he died on the 24th of December 1866. Throughout this period he zealously devoted himself to studying and collecting the plants, mollusca and insects of a wide area of Caithness, and his attention was directed soon after he settled in Thurso to the rocks and fossils. In 1 83 5 he first found remains of fossil fishes; but it was not till some years later that his interest became greatly stirred. Then he obtained a copy of Hugh Miller's Old Red Sandstone (published in 1841), and he began systematically to collect with hammer and chisel the fossils from the Caithness flags. In 1845 he found remains of Holoplychius and forwarded specimens to Hugh Miller, and he continued to send the best of his fossil fishes to that geologist, and to others after the death of Miller. In this way he largely contri- buted to the progress of geological knowledge, although he him- self published nothing and was ever averse from publicity. His herbarium, which consisted of about 200 folios of mosses, ferns and flowering plants " almost unique in its completeness," is now stored, with many of his fossils, in the museum at Thurso. Dick had a hard struggle for existence, especially through

competition during his late years, when he was reduced almost to beggary: but of this few, if any, of his friends were aware until it was too late. A monument erected in the new cemetery at Thurso testifies to the respect which his life-work created, when the merits of this enthusiastic naturalist came to be appreciated.

See Robert Dick, Baker of Thurso, Geologist and Botanist, by Samuel Smiles (1878).

DICK, THOMAS (1774-1857), Scottish writer on astronomy, was born at Dundee on the 24th of November 1774. The appearance of a brilliant meteor inspired him, when in his ninth year, with a passion for astronomy; and at the age of sixteen he forsook the loom, and supported himself by teaching. In 1794 he entered the university of Edinburgh, and set up a school on the termination of his course; then, in 1801, took out a licence to preach, and officiated for some years as probationer in the United Presbyterian church. From about 1807 to 181 7 he taught in the secession school at Methven in Perthshire, and during the ensuing decade in that of Perth, where he composed his first substantive book, The Christian Philosopher (1823, 8th ed. 1842). Its success determined his vocation as an author; he built himself, in 1827, a cottage at Broughty Ferry, near Dundee, and devoted himself wholly to literary and scientific pursuits. They proved, however, owing to his unpractical turn of mind, but slightly remunerative, and he was in 1847 relieved from actual poverty by a crown pension of £50 a year, eked out by a local subscription. He died on the 29th of July 1857. His best-known works are: Celestial Scenery (1837), The Sidereal Heavens (1840), and The Practical Astronomer (1845), in which is con- tained (p. 204) a remarkable forecast of the powers and uses of celestial photography. Written with competent knowledge, and in an agreeable style, they obtained deserved and widespread popularity.

See R. Chambers's Eminent Scotsmen (ed. 1868) ; Monthly Notices Roy. Astr. Society, xviii. 98; Athenaeum (1857), p. 1008.

(A. M. C.)

DICKENS, CHARLES JOHN HUFFAM (1812-1870), English novelist, was born on the 7th of February 181 2 at a house in the Mile End Terrace, Commercial Road, Landport (Portsea) — a house which was opened as a Dickens Museum on 22nd July 1904. His father John Dickens (d. 1851), a clerk in the navy-pay office

on a salary of £80 a year, and stationed for the time being at Portsmouth, had married in 1809 Elizabeth, daughter of Thomas Barrow, and she bore him a family of eight children, Charles being the second. In the winter of 1814 the family moved from Portsea in the snow, as he remembered, to London, and lodged for a time near the Middlesex hospital. The country of the novelist's childhood, however, was the kingdom of Kent, where the family was established in proximity to the dockyard at Chatham from i8i6toi82i. He looked upon himself in later years as a man of Kent, and his capital abode as that in Ordnance Terrace, or 18 St Mary's Place, Chatham, amid surroundings classified in Mr Pickwick's notes as " appearing " to be soldiers, sailors, Jews, chalk, shrimps, officers and dockyard men. He fell into a family the general tendency of which was to go down in the world, during one of its easier periods (John Dickens was now fifth clerk on £250 a year), and he always regarded himself as belonging by right to a comfortable, genteel, lower middle- class stratum of society. His mother taught him to read; to his father he appeared very early in the light of a young prodigy, and by him Charles was made to sit on a tall chair and warble popular ballads, or even to tell stories and anecdotes for the benefit of fellow-clerks in the office. John Dickens, however, had a small collection of books which were kept in a little room upstairs that led out of Charles's own, and in this attic the boy found his true literary instructors in Roderick Random, Peregrine Pickle, Humphry Clinker, Tom Jones, The Vicar of Wakefield, Don Quixote, Gil Bias and Robinson Crusoe. The story of how he played at the characters in these books and sustained his idea of Roderick Random for a month at a stretch is picturesquely told in David Copperfield. Here as well as in his first and last books and in what many regard as his best, Great Expectations, Dickens returns with unabated fondness and mastery to the surround- ings of his childhood. From seven to nine years he was at a school kept in Clover Lane, Chatham, by a Baptist minister named William Giles, who gave him Goldsmith's Bee as a keep- sake when the call to Somerset House necessitated the removal of the family from Rochester to a shabby house in Bayham Street, Camden Town. At the very moment when a consciousness of capacity was beginning to plump his youthful ambitions, the whole flattering dream vanished and left not a rack behind. Happiness and Chatham had been left behind together, and Charles was about to enter a school far sterner and also far more instructive than that in Clover Lane. The family income had been first decreased and then mortgaged; the creditors of the " prodigal father " would not give him time; John Dickens was consigned to the

Marshalsea; Mrs Dickens started an ” Educational Establishment ” as a forlorn hope in Upper Gower Street; and Charles, who had helped his mother with the children, blacked the boots, carried things to the pawnshop and done other menial work, was now sent out to earn his own living as a young hand in a blacking warehouse, at Old Hungerford Stairs, on a salary of six shillings a week. He tied, trimmed and labelled blacking pots for over a year, dining off a saveloy and a slice of pudding, consorting with two very rough boys, Bob Fagin and Pol Green, and sleeping in an attic in Little College Street, Camden Town, in the house of Mrs Roylance (Pipchin), while on Sunday he spent the day with his parents in their comfortable prison, where they had the services of a ” marchioness ” imported from the Chatham workhouse.

Already consumed by ambition, proud, sensitive and on his dignity to an extent not uncommon among boys of talent, he felt his position keenly, and in later years worked himself up into a passion of self-pity in connexion with the ” degradation ” and “humiliation” of this episode. The two years of childish hard- ship which ate like iron into his soul were obviously of supreme importance in the growth of the novelist. Recollections of the streets and the prison and its purlieus supplied him with a store of literary material upon which he drew through all the years of his best activity. And the bitterness of such an experience was not prolonged sufficiently to become sour. From 1824 to 1826, having been rescued by a family quarrel and by a windfall in the shape of a legacy to his father, from the warehouse, he spent two

years at an academy known as Wellington House, at the corner of Granby Street and the Hampstead Road (the lighter traits of which are reproduced in Salem House), and was there known as a merry and rather mischievous boy. Fortunately he learned nothing there to compromise the results of previous instruction. His father had now emerged from the Marshalsea and was seeking employment as a parliamentary reporter. A Gray’s Inn solicitor with whom he had had dealings was attracted by the bright, clever look of Charles, and took him into his office as a boy at a salary of thirteen and sixpence (rising to fifteen shillings) a week. He remained in Mr Blackmore’s office from May 1827 to November 1828, but he had lost none of his eager thirst for dis- tinction, and spent all his spare time mastering Gurney’s short- . hand and reading early and late at the British Museum. A more industrious apprentice in the lower grades of the literary profession has never been known, and the consciousness of opportunities used to the most splendid advantage can hardly have been absent from the man who was shortly to take his place at the head of it as if to the manner born. Lowten and Guppy, and Swiveller

had been observed from this office lad's stool; he was now greatly to widen his area of study as a reporter in Doctors' Commons and various police courts, including Bow Street, working all day at law and much of the night at shorthand. Some one asked John Dickens, during the first eager period of curiosity as to the man behind " Pickwick," where his son Charles was educated. " Well really," said the prodigal father, " he may be said — haw— haw — to have educated himself." He was one of the most rapid and accurate reporters in London when, at nineteen years of age, in 1831, he realized his immediate ambition and "entered the gallery" as parliamentary reporter to the True Sun. Later he was reporter to the Mirror of Parliament and then to the Morning Chronicle. Several of his earliest letters are concerned with his exploits as a reporter, and allude to the experiences he had, travelling fifteen miles an hour and being upset in almost every description of known vehicle in various parts of Britain between 1831 and 1836. The family was now living in Bentwick Street, Manchester Square, but John Dickens was still no infrequent inmate of the sponging-houses. With all the accessories of these places of entertainment his son had grown to be excessively familiar. Writing about 1832 to his school friend Tom Mitton, Dickens tells him that his father has been arrested at the suit of a wine firm, and begs him go over to Cursitor Street and see what can be done. On another occasion of a paternal disappearance he observes: " I own that his absence does not give me any great uneasiness, knowing how apt he is to get out of the way when anything goes wrong." In yet another letter he asks for a loan of four shillings.

In the meanwhile, however, he had commenced author in a more creative sense by penning some sketches of contemporary London life, such as he had attempted in his school days in imita- tion of the sketches published in the London and other magazines of that day. The first of these appeared in the December number of the Old Monthly Magazine for 1833. By tjie following August, when the signature " Boz " was first given, five of these sketches had appeared. By the end of 1834 we find him settled in rooms in Furnival's Inn, and a little later his salary on the Morning Chronicle was raised, owing to the intervention of one of its chiefs, George Hogarth, the father of (in addition to six sons) eight charming daughters, to one of whom, Catherine, Charles was engaged to be married before the year was out. Clearly as his career now seemed designated, he was at this time or a little before it coquetting very seriously with the stage: but circumstances were rapidly to determine another stage in his career. A year before Queen Victoria's accession appeared in two volumes Sketches by Boz, Illustrative of Everyday Life and Everyday People.

The book came from a prentice hand, but like the little tract on the Puritan abuse of the Sabbath entitled ” Sunday under three Heads ” which appeared a few months later, it contains in germ all, or almost all, the future Dickens. Glance at the headings of the pages. Here we have the Beadle and all connected with him, London streets, theatres, shows, the pawn- shop, Doctors’ Commons, Christmas, Newgate, coaching, the

river. Here comes a satirical picture of parliament, fun made of cheap snobbery, a rap on the knuckles of sectarianism. And what could be more prophetic than the title of the opening chapter — Our Parish? With the Parish — a large one indeed — Dickens to the end concerned himself; he began with a rapid survey of his whole field, hinting at all he might accomplish, indicating the limits he was not to pass. This year was to be still more momentous to Dickens, for, on the 2nd of April 1836, he was married to George Hogarth’s eldest daughter Catherine. He seems to have fallen in love with the daughters collectively, and, judging by subsequent events, it has been suggested that perhaps he married the wrong one. His wife’s sister Mary was the romance of his early married life, and another sister, Georgina, was the dearest friend of his last ten years.

A few days before the marriage, just two months after the appearance of the Sketches, the first part of The Posthumous Papers of the Pickwick Club was announced. One of the chief vogues of the day was the issue of humorous, sporting or anecdotal novels in parts, with plates, and some of the best talent of the day, repre- sented by Ainsworth, Bulwer, Marryat, Maxwell, Egan, Hook and Surtees, had been pressed into this kind of enterprise. The publishers of the day had not been slow to perceive Dickens’s aptitude for this species of ” letterpress.” A member of the firm of Chapman & Hall called upon him at Furnival’s Inn in December 1835 with a proposal that he should write about a Nimrod Club of amateur sportsmen, foredoomed to perpetual ignominies, while the comic illustrations were to be etched by Seymour, a well-known rival of Cruikshank (the illustrator of Boz). The offer was too tempting for Dickens to refuse, but he changed the idea from a club of Cockney sportsmen to that of a club of eccentric peripatetics, on the sensible grounds, first that sporting sketches were stale, and, secondly, that he knew nothing worth speaking of about sport. The first seven pictures appeared with the signature of Seymour and the letterpress of Dickens. Before the eighth

picture appeared Seymour had blown his brains Out. After a brief interval of Buss, Dickens obtained the services of Hablot K. Browne, known to all as ” Phiz.” Author and illustrator were as well suited to one another and to the common creation of a unique thing as Gilbert and Sullivan. Having early got rid of the sporting element, Dickens found himself at once. The subject exactly suited his knowledge, his skill in arranging incidents — nay, his very limitations too. No modern book is so incalculable. We commence laughing heartily at Pickwick and his troupe. The laugh becomes kindlier. We are led on through a tangle of adventure, never dreaming what is before us. The landscape changes: Pickwick becomes the symbol of kind- heartedness, simplicity and innocent levity. Suddenly in the Fleet Prison a deeper note is struck. The medley of human relation- ships, the loneliness, the mystery and sadness of human destinies are fathomed. The tragedy of human life is revealed to us amid its most farcical elements. The droll and laughable figure of the hero is transfigured by the kindliness of human sympathy into a beneficent and bespectacled angel in shorts and gaiters. By defying accepted rules, Dickens had transcended the limited sphere hitherto allotted to his art: he had produced a book to be enshrined henceforth in the inmost hearts of all sorts and conditions of his countrymen, and had definitely enlarged the boundaries of English humour and English fiction. As for Mr Pickwick, he is a fairy like Puck or Santa Claus, while his creator is ” the last of the mythologists and perhaps the greatest.”

When The Pickwick Papers appeared in book form at the close of 1837 Dickens’s popular reputation was made. From the appearance of Sam Weller in part v. the universal hunger for the monthly parts had risen to a furore. The book was promptly translated into French and German. The author had received little assistance from press or critics, he had no influential con- nexions, his class of subjects was such as to ” expose him at the outset to the fatal objections of vulgarity,” yet in less than six months from the appearance of the first number, as the Quarterly Review almost ruefully admits, the whole reading world was talking about the Pickwickians. The names of Winkle, Wardle, Weller, Jingle, Snodgrass, Dodson & Fogg, were as familiar as

household words. Pickwick chintzes figured in the linendrapers’ windows, and Pickwick cigars in every tobacconist’s; Weller corduroys became the stock-in-trade of every breeches-maker; Boz cabs might be seen rattling through the streets, and the portrait of the author of Pelham and Crichton was scraped down to make way for that pf the new popular favourite on the omni- buses. A new and original genius had suddenly sprung up, there was no denying it, even though, as the Quarterly concluded, ” it required no gift of prophecy to foretell his

fate — he has risen like a rocket and he will come down like the stick." It would have needed a very emphatic gift of prophecy indeed to foretell that Dickens's reputation would have gone on rising until at the present day (after one sharp fall, which reached an extreme about 1887) it stands higher than it has ever stood before.

Dickens's assumption of the literary purple was as amazing as anything else about him. Accepting the homage of the luminaries of the literary, artistic and polite worlds as if it had been his natural due, he arranges for the settlement of his family, decrees, like another Edmund Kean, that his son is to go to Eton, carries on the most complicated negotiations with his publishers and editors, presides and orates with incomparable force at innumer- able banquets, public and private, arranges elaborate villegiatures in the country, at the seaside, in France or in Italy, arbitrates in public on every topic, political, ethical, artistic, social or literary, entertains and legislates for an increasingly large domestic circle, both juvenile and adult, rules himself and his time-table with a rod of iron. In his letter-writing alone, Dickens did a life's literary work. Nowadays no one thinks of writing such letters; that is to say, letters of such length and detail, for the quality is Dickens's own. He evidently enjoyed this use of the pen. Page after page of Forster's Life (750 pages in the Letters edited by his daughter and sister-in-law) is occupied with transcription from private correspondence, and never a line of this but is thoroughly worthy of print and preservation. If he makes a tour in any part of the British Isles, he writes a full description of all he sees, of everything that happens, and writes it with such gusto, such mirth, such strokes of fine picturing, as appear in no other private letters ever given to the public. Naturally buoyant in all circumstances, a holiday gave him the exhilaration of a school- boy. See how he writes from Cornwall, when on a trip with two or three friends, in 1843. " Heavens ! if you could have seen the necks of bottles, distracting in their immense variety of shape, peering out of the carriage pockets ! If you could have witnessed the deep devotion of the post-boys, the maniac glee of the waiters ! If you could have followed us into the earthy old churches we visited, and into the strange caverns on the gloomy seashore, and down into the depths of mines, and up to the tops of giddy heights, where the unspeakably green water was roaring, I don't know how many hundred feet below. ... I never laughed in my life as I did on this journey. It would have done you good to hear me. I was choking and gasping and bursting the buckles off the back of my stock, all the way. And Stanfield " — the painter — " got into such apoplectic entanglements that we were obliged to beat him on the back with portmanteaus before we could recover him."

The animation of Dickens's look would attract the attention of any one, anywhere. His figure was not that of an Adonis, but his brightness made him the centre and pivot of every society he was in. The keenness and vivacity of his eye combined with his inordinate appetite for life to give the unique quality to all that he wrote. His instrument is that of the direct, sinewy English of Smollett, combined with much of the humorous grace of Goldsmith (his two favourite authors), but modernized to a certain extent under the influence of Washington Irving, Sydney Smith, Jeffrey, Lamb, and other writers of the London Magazine. He taught himself to speak French and Italian, but he could have read little in any language. His ideas were those of the inchoate and insular liberalism of the 'thirties. His unique force in literature he was to owe to no supreme artistic or intellectual quality, but almost entirely to his inordinate gift of observation, his sympathy with the humble, his power over the emotions and his incomparable endowment of unalloyed human fun. To

contemporaries he was not so much a man as an institution, at the very mention of whose name faces were puckered with grins or wreathed in smiles. To many his work was a revelation, the revelation of a new world and one far better than their own. And his influence went further than this in the direction of revolution or revival. It gave what were then universally referred to as " the lower orders " a new sense of self-respect, a new feeling of citizenship. Like the defiance of another Luther, or the Declaration of a new Independence, it emitted a fresh ray of hope across the firmament. He did for the whole English-speaking race what Burns had done for Scotland — he gave it a new conceit of itself. He knew what a people wanted and he told what he knew. He could do this better than anybody else because his mind was theirs. He shared many of their " great useless virtues," among which generosity ranks before justice, and sympathy before truth, even though, true to his middle-class vein, he exalts piety, chastity and honesty in a manner somewhat alien to the mind of the low-bred man. This is what makes Dickens such a demigod and his public success such a marvel, and this also is why any exclusively literary criticism of his work is bound to be so inadequate. It should also help us to make the necessary allowances for the man. Dickens, even the Dickens of legend that we know, is far from perfect. The Dickens of reality to which Time may furnish a nearer approximation is far less perfect. But when we consider the corroding influence of adula- tion, and the intoxication of unbridled success, we cannot but wonder at the

relatively high level of moderation and self-control that Dickens almost invariably observed. Mr G. K. Chesterton remarks suggestively that Dickens had all his life the faults of the little boy who is kept up too late at night. He is overwrought by happiness to the verge of exasperation, and yet as a matter of fact he does keep on the right side of the breaking point. The specific and curative in his case was the work in which he took such anxious* pride, and such unmitigated delight. He revelled in punctual and regular work; at his desk he was often in the highest spirits. Behold how he pictured himself, one day at Broadstairs, where he was writing Chuzzlewit. ” In a bay- window in a one-pair sits, from nine o’clock to one, a gentleman with rather long hair and no neckcloth, who writes and grins, as if he thought he was very funny indeed. At one he disappears, presently emerges from a bathing-machine, and may be seen, a kind of salmon-colour porpoise, splashing about in the ocean. After that, he may be viewed in another bay-window on the’ ground-floor eating a strong lunch; and after that, walking a dozen miles or so, or lying on his back on the sand reading a book. Nobody bothers him, unless they know he is disposed to be talked to, and I am told he is very comfortable indeed. He’s as brown as a berry, and they do say he is as good as a small fortune to the innkeeper, who sells beer and cold punch.” Here is the secret of such work as that of Dickens; it is done with delight — done (in a sense) easily, done with the mechanism of mind and body in splendid order. Even so did Scott write ; though more rapidly and with less conscious care: his chapter finished before the world had got up to breakfast. Later, Dickens produced novels less excellent with much more of mental strain. The effects of age could not have shown themselves so soon, but for the unfortunate loss of energy involved in his non-literary labours.

While the public were still rejoicing in the first sprightly runnings of the ” new humour,” the humorist set to work desperately on the grim scenes of Oliver Twist, the story of a parish orphan, the nucleus of which had already seen the light in his Sketches. The early scenes are of a harrowing reality, despite the germ of forced pathos which the observant reader may detect in the pitiful parting between Oliver and little Dick; but what will strike every reader at once in this book is the direct- ness and power of the English style, so nervous and unadorned: from its unmistakable clearness and vigour Dickens was to travel far as time went on. But the full effect of the old simplicity is felt in such masterpieces of description as the drive of Oliver and Sikes to Chertsey, the condemned-cell ecstasy of Fagin, or the unforgettable first encounter between Oliver and the Artful

Dodger. Before November 1837 had ended, Charles Dickens entered

on an engagement to write a successor to Pickwick on similar lines of publication. Oliver Twist was then in mid-career; a Life of Grimaldi and Barnaby Rudge were already covenanted for. Dickens forged ahead with the new tale of Nicholas Nickleby and was justified by the results, for its sale far surpassed even that of Pickwick. As a conception it is one of his weakest. An unmistakably 18th-century character pervades it. Some of the vignettes are among the most piquant and besetting ever written. Large parts of it are totally unobserved conventional melo- drama; but the Portsmouth Theatre and Dotheboys Hall and Mrs Nickleby (based to some extent, it is thought, upon Miss Bates in Emma, but also upon the author's Mamma) live for ever as Dickens conceived them in the pages of Nicholas Nickleby.

Having got rid of Nicholas Nickleby and resigned his editor- ship of Bentley's Miscellany, in which Oliver Twist originally appeared, Dickens conceived the idea of a weekly periodical to be issued as Master Humphrey's Clock, to comprise short stories, essays and miscellaneous papers, after the model of Addison's Spectator. To make the weekly numbers " go," he introduced Mr Pickwick, Sam Weller and his father in friendly intercourse. But the public requisitioned " a story," and in No. 4 he had to brace himself up to give them one. Thus was commenced The Old Curiosity Shop, which was continued with slight inter- ruptions, and followed by Barnaby Rudge. For the first time we find Dickens obsessed by a highly complicated plot. The tonality achieved in The Old Curiosity Shop surpassed anything he had attempted in this difficult vein, while the rich humour of Dick Swiveller and the Marchioness, and the vivid portraiture of the wandering Bohemians, attain the very highest level of Dickensian drollery; but in the lamentable tale of Little Nell (though Landor and Jeffrey thought the character-drawing of this infant comparable with that of Cordelia), it is generally admitted that he committed an indecent assault upon the emotions by exhibiting a veritable monster of piety and long- suffering in a child of tender years. In Barnaby Rudge he was manifestly affected by the influence of Scott, whose achievements he always regarded with a touching veneration. The plot, again, is of the utmost complexity, and Edgar Allan Poe (who predicted the conclusion) must be one of the few persons who ever really mastered it. But few of Dickens's books are written in a more admirable style.

Master Humphrey's Clock concluded, Dickens started in 1842 on his first visit to America — an episode hitherto without parallel in English literary history, for he was received everywhere with popular acclamation as the representative of a grand triumph of the English

language and imagination, without regard to distinctions of nationality. He offended the American public grievously by a few words of frank description and a few quotations of the advertisement columns of American papers illustrating the essential barbarity of the old slave system (American Notes). Dickens was soon pining for home — no English writer is more essentially and insularly English in inspiration and aspiration than he is. He still brooded over the perverseness of America on the copyright question, and in his next book he took the opportunity of uttering a few of his impressions about the objectionable sides of American democracy, the result being that ” all Yankee-doodle-dom blazed up like one universal soda bottle,” as Carlyle said. Martin Chuzzlewit (1843-1844) is import- ant as closing his great character period. His seve originate, as the French would say, was by this time to a considerable extent exhausted, and he had to depend more upon artistic elaboration, upon satires, upon tours de force of description, upon romantic and ingenious contrivances. But all these resources combined proved unequal to his powers as an original observer of popular types, until he reinforced himself by autobiographic reminiscence, as in David Copperfield and Great Expectations, the two great books remaining to his later career.

After these two masterpieces and the three wonderful books with which he made his debut, we are inclined to rank Chuzzlewit. Nothing in Dickens is more admirably seen and presented than Todgers’s, a bit of London particular cut out with a knife. Mr

Pecksniff and Mrs Gamp, Betsy Prig and ” Mrs Harris ” have passed into the national language and life. The coach journey, the windy autumn night, the stealthy trail of Jonas, the under- tone of tragedy in the Charity and Mercy and Chuffey episodes suggest a blending of imaginative vision and physical penetration hardly seen elsewhere. Two things are specially notable about this novel — the exceptional care taken over it (as shown by the interlineations in the MS.) and the caprice or nonchalance of the purchasing public, its sales being far lower than those of any of its monthly predecessors.

At the close of 1843, to pay outstanding debts of his now lavish housekeeping, he wrote that pioneer of Christmas numbers, that national benefit as Thackeray called it, A Christmas Carol. It failed to realize his pecuniary anticipations, and Dickens resolved upon a drastic policy of retrenchment and reform. He would save expense by

living abroad and would punish his publishers by withdrawing his custom from them, at least for a time. Like everything else upon which he ever determined, this resolution was carried out with the greatest possible precision and despatch. In June 1844 he set out for Marseilles with his now rapidly increasing family (the journey cost him £200). In a villa on the outskirts of Genoa he wrote The Chimes, which, during a brief excursion to London before Christmas, he read to a select circle of friends (the germ of his subsequent lecture-audiences), including Forster, Carlyle, Stanfield, Dyce, Maclise and Jerrold. He was again in London in 1845, enjoying his favourite diversion of private theatricals; and in January 1846 he experimented briefly as the editor of a London morning paper — the Daily News. By early spring he was back at Lausanne, writing his customary vivid letters to his friends, craving as usual for London streets, commencing Dombey and Son, and walking his fourteen miles daily. The success of Dombey and Son completely rehabilitated the master's finances, enabled him to return to England, send his son to Eton and to begin to save money. Artistically it is less satisfactory; it contains some of Dickens's prime curios, such as Cuttle, Bunsby, Toots, Blimber, Pipchin, Mrs MacStinger and young Biler; it contains also that master-piece of sentimentality which trembles upon the borderland of the sublime and the ridiculous, the death of Paul Dombey (" that sweet Paul," as Jeffrey, the " critic laureate," called him), and some grievous and unquestionable blemishes. As a narrative, moreover, it tails off into a highly complicated and exacting plot. It was followed by a long rest at Broadstairs before Dickens returned to the native home of his genius, and early in 1849 " began to prepare for David Copperfield. "

" Of all my books," Dickens wrote, " I like this the best; like many fond parents I have my favourite child, and his name is David Copperfield." In some respects it stands to Dickens in something of the same relation in which the contemporary Pendennis stands to Thackeray. As in that book, too, the earlier portions are the best. They gained in intensity by the auto- biographical form into which they are thrown; as Thackeray observed, there was no writing against such power. The tragedy of Emily and the character of Rosa Dartle are stagey and unreal; Uriah Heep is bad art; Agnes, again, is far less convincing as a consolation than Dickens would have us believe; but these are more than compensated by the wonderful realization of early boyhood in the book, by the picture of Mr Creakle's school, the Peggottys, the inimitable Mr Micawber, Betsy Trot- wood and that monument of selfish misery, Mrs Gummidge.

At the end of March 1850 commenced the new twopenny weekly called Household Words, which Dickens planned to form a direct

means of communication between himself and his readers, and as a means of collecting around him and encouraging the talents of the younger generation. No one was better quali- fied than he for this work, whether we consider his complete freedom from literary jealousy or his magical gift of inspiring young authors. Following the somewhat dreary and incoherent Bleak House of 1852, Hard Times (1854) — an anti-Manchester School tract, which Ruskin regarded as' Dickens's best work — was the first long story written for Household Words. About this time Dickens made his final home at Gad's Hill, near Rochester,

and put the finishing touch to another long novel published upon the old plan, Little Dorrit (1855-1857). In spite of the exquisite comedy of the master of the Marshalsea and the final tragedy of the central figure, Little Dorrit is sadly deficient in the old vitality, the humour is often a mock reality, and the repetition of comic catch-words and overstrung similes and metaphors is such as to affect the reader with nervous irritation. The plot and characters ruin each other in this amorphous production. The Tale of Two Cities, commenced in All the Year Round (the successor of Household Words) in 1859, is much better: the main characters are powerful, the story genuinely tragic, and the atmosphere lurid; but enormous labour was everywhere ex- pended upon the construction of stylistic ornament.

The Tale of Two Cities was followed by two finer efforts at atmospheric delineation, the best things he ever did of this kind: Great Expectations (1861), over which there broods the mournful impression of the foggy marshes of the Lower Thames; and Our Mutual Friend (1864-1865), in which the ooze and mud and slime of Rotherhithe, its boatmen and loafers, are made to per- vade the whole book with cumulative effect. The general effect produced by the stories is, however, very different. In the first case, the foreground was supplied by autobiographical material of the most vivid interest, and the lucidity of the creative impulse impelled Mm to write upon this occasion with the old simplicity, though with an added power. Nothing therefore, in the whole range of Dickens surpassed the early chapters of Great Expecta- tions in perfection of technique or in mastery of all the resources of the novelist's art. To have created Abel Magwitch alone is to be a god indeed, says Mr Swinburne, among the creators of death- less men. Pumblechook is actually better and droller and truer to imaginative life than Pecksniff; Joe Gargery is worthy to have been praised and loved at once by Fielding and by Sterne : Mr Jaggers and his clients, Mr Wemmick and his parent and his bride, are such figures as Shakespeare, when dropping out of poetry, might have created, if his lot had been cast in a later century. " Can as much be

said," Mr Swinburne boldly asks, " for the creatures of any other man or god ? "

In November 1867 Dickens made a second expedition to America, leaving all the writing that he was ever to complete be- hind him. He was to make a round sum of money, enough to free him from all embarrassments, by a long series of exhausting read- ings, commencing at the Tremont Temple, Boston, on the 2nd of December. The strain of Dickens's ordinary life was so tense and so continuous that it is, perhaps, rash to assume that he broke down eventually under this particular stress; for other reasons, however, his persistence in these readings, subsequent to his return, was strongly deprecated by his literary friends, led by the arbitrary and relentless Forster. It is a long testimony to Dickens's self-restraint, even in his most capricious and despotic moments, that he never broke the cord of obligation which bound him to his literary mentor, though sparring matches between them were latterly of frequent occurrence. His farewell reading was given on the 15th of March 1870, at St James's Hall. He then vanished from " those garish lights," as he called them, " for evermore." Of the three brief months that remained to him, his last book, The Mystery of Edwin Drood, was the chief occupa- tion. It hardly promised to become a masterpiece (Longfellow's opinion) as did Thackeray's Denis Duval, but contained much fine descriptive technique, grouped round a scene of which Dickens had an unrivalled sympathetic knowledge.

In March and April 1870 Dickens, as was his wont, was mixing in the best society; he dined with the prince at Lord Houghton's and was twice at court, once at a long deferred private interview with the queen, who had given him a presentation copy of her Leaves from a Journal of our Life in the Highlands with the inscription " From one of the humblest of authors to one of the greatest "; and who now begged him on his persistent refusal of any other title to accept the nominal distinction of a privy councillor. He took for four months the Milner Gibsons' house at 5 Hyde Park Place, opposite the Marble Arch, where he gave a brilliant reception on the 7th of April. His last public appear- ance was made at the Royal Academy banquet early in May.

He returned to his regular methodical routine of work at Gad's Hill on the 30th of May, and one of the last instalments he wrote of Edwin Brood, contained an ominous speculation as to the next two people to

die at Cloisterham: ” Curious to make a guess at the two, or say at one of the two.” Two letters bearing the well- known superscription ” Gad’s Hill Place, Higham by Rochester, Kent ” are dated the 8th of June, and, on the same Thursday, after a long spell of writing in the Chalet where he habitually wrote, he collapsed suddenly at dinner. Startled by the sudden change in the colour and expression of his face, his sister-in-law (Miss Hogarth) asked him if he was ill; he said ” Yes, very ill,” but added that he would finish dinner and go on afterwards to London. ” Come and lie down,” she entreated; ” Yes, on the ground,” he said, very distinctly; these were the last words he spoke, and he slid from her arms and fell upon the floor. He died at 6-10 p.m. on Friday, the 9th of June, and was buried privately in Poets’ Corner, Westminster Abbey, in the early morning of the 14th of June. One of the most appealing memorials was the drawing by his ” new illustrator ” Luke Fildes in the Graphic of ” The Empty Chair; Gad’s Hill: ninth of June, 1870.” ” Statesmen, men of science, philanthropists, the acknowledged benefactors of their race, might pass away, and yet not leave the void which will be caused by the death of Charles Dickens ” (The Times). In his will he enjoined his friends to erect no monument in his honour, and directed his name and dates only to be inscribed on his tomb, adding this proud provision, ” I rest my claim to the remembrance of my country on my published works.”

Dickens had no artistic ideals worth speaking about. The sympathy of his readers was the one thing he cared about and, like Cobbett, he went straight for it through the avenue of the emotions. In personality, intensity and range of creative genius he can hardly be said to have any modern rival. His creations live, move and have their being about us constantly, like those of Homer, Virgil, Chaucer, Rabelais, Cervantes, Shakespeare, Bunyan, Moliere and Sir Walter Scott. As to the books them- selves, the backgrounds on which these mighty figures are pro- jected, they are manifestly too vast, too chaotic and too unequal ever to become classics. Like most of the novels constructed upon the unreformed model of Smollett and Fielding, those of Dickens are enormous stock-pots into which the author casts every kind of autobiographical experience, emotion, pleasantry, anecdote, adage or apophthegm. The fusion is necessarily very incomplete and the hotch-potch is bound to fall to pieces with time. Dickens’s plots, it must be admitted, are strangely unintelligible, the repetitions and stylistic decorations of his work exceed all bounds, the form is unmanageable and insignificant. The diffuseness of the English novel, in short, and its extravagant didacticism cannot fail to be most prejudicial to its perpetuation. In these circumstances there is

very little fiction that will stand concentration and condensation so well as that of Dickens.

For these reasons among others our interest in Dickens's novels as integers has diminished and is diminishing. But, on the other hand, our interest and pride in him as a man and as a repre- sentative author of his age and nation has been steadily augmented and is still mounting. Much of the old criticism of his work, that it was not up to a sufficiently high level of art, scholarship or gentility, that as an author he is given to caricature, redundancy and a shameless subservience to popular caprice, must now be discarded as irrelevant.

As regards formal excellence it is plain that Dickens labours under the double disadvantage of writing in the least disciplined of all literary genres in the most lawless literary milieu of the modern world, that of Victorian England. In spite of these defects, which are those of masters such as Rabelais, Hugo and Tolstoy, the work of Dickens is more and more instinctively felt to be true, original and ennobling. It is already beginning to undergo a process of automatic sifting, segregation and crystalliza- tion, at the conclusion of which it will probably occupy a larger segment in the literary consciousness of the English-spoken race than ever before.

Portraits of Dickens, from the gay and alert " Boz " of Samuel Lawrence, and the self-conscious, rather foppish portrait by

Maclise which served as frontispiece to Nicholas Nickleby, to the sketch of him as Bobadil by C. R. Leslie, the Drummond and Ary Scheffer portraits of middle age and the haggard and drawn representations of him from- photographs after his shattering experiences as a public entertainer from 1856 (the year of his separation from his wife) onwards, are reproduced in Kitton, in Forster and Gissing and in the other biographies. Sketches are also given in most of the books of his successive dwelling places at Ordnance Terrace and 18 St Mary's Place, Chatham; Bayham Street, Camden Town; 15 Furnival's Inn; 48 Doughty Street; 1 Devonshire Terrace, Regent's Park; Tavistock House, Tavistock Square; and Gad's Hill Place. The manuscripts of all the novels, with the exception of the Tale of Two Cities and Edwin Brood, were given to Forster, and are now preserved in the Dyce and Forster Museum at South Kensington. The work of Dickens was a prize for which publishers naturally contended both before and after his death. The first collective edition of his works was begun in April 1847, and their number is now very great. The most complete is still that of Messrs Chapman & Hall, the original publishers of Pickwick; others of special interest are the

Harrap edition, originally edited by F. G. Kitton; Macmillan's edition with original illustrations and introduction by Charles Dickens the younger; and the edition in the World's Classics with introductions by G. K. Chesterton. Of the transla- tions the best known is that done into French by Lorain, Pichot and others, with B. H. Gausseron's excellent Pages Choisies (1903).

Bibliography. — During his lifetime Dickens's biographer was clearly indicated in his guide, philosopher and friend, John Forster, who had known the novelist intimately since the days of his first triumph with Pickwick, who had constituted himself a veritable encyclopaedia of information about Dickens, and had clung to his subject (in spite of many rebuffs which his peremptory temper found it hard to digest) as tightly as ever Boswell had enveloped Johnson. Two volumes of Forster's Life of Charles Dickens appeared in 1872 and a third in 1874. He relied much on Dickens's letters to himself and produced what must always remain the authoritative work. The first two volumes are put together with much art, the portrait as a whole has been regarded as truthful, and the immediate success was extraordinary. In the opinion of Carlyle, Forster's book was not unworthy to be named after that of Boswell. A useful abridgment was carried out in 1903 by the novelist George Gissing. Gissing also wrote Charles Dickens: A Critical Study (1898), which ranks with G.K.Chesterton's Charles Dickens(igo6)&s a commentary inspired by deep insight and adorned by great literary talent upon the genius of the master-novelist. The names of other lives, sketches, articles and estimates of Dickens and his works would occupy a large volume in the mere enumeration. See R. H. Shepherd, The Bibliography of Dickens (1880) ; James Cooke's Bibliography of the Writings of Charles Dickens (1879); Dickensiana, by F. G. Kitton (1886); and Biblio- graphy by J. P. Anderson, appended to Sir F. T. Marzials's Life of Charles Dickens (1887). Among the earlier sketches may be specially cited the lives by J. C. Hotten and G. A. Sala (1870), the Anecdote- Biography edited by the American R. H. Stoddard (1874), Dr A. W. Ward in the Engjish Men of Letters Series (1878), that by Sir Leslie Stephen in the Dictionary of National Biography, and that by Pro- fessor Minto in the eighth edition of the Encyclopaedia Britannica. The Letters were first issued in two volumes edited by his daughter and sister-in-law in 1880; For Dickens's connexion with Kent the following books are specially valuable : — Robert Langton's Childhood and Youth of Charles Dickens (1883); Langton's Dickens and Rochester (1880); Thomas Frost's In Kent with Charles Dickens (1880); F. G. Kitton's The Dickens Country (1905); H. S. Ward's The Real Dickens Land (1904) ; R. Allbut's Rambles in Dickens Land (1899 and 1903). For Dickens's

reading tours see G. Dolby's Charles Dickens as I knew him (1884) ; J. T. Fields's In and Out of Doors with Charles Dickens (1876); Charles Kent's Dickens as a Reader (1872). And for other aspects of his life see M. Dickens's My Father as I recall him (1897) ; P. H. Fitzgerald's Life of C. Dickens as revealed in his Writings (1905), and Bozland (1895) ; F. G. Kitton's Charles Dickens, his Life, Writings and Personality, a useful compen- dium (1902) ; T. E. Pemberton's Charles Dickens and the Stage, and Dickens's London (1876) ; F. Miltoun's Dickens's London (1904) ; Kitton's Dickens and his Illustrators; W. Teignmouth Shore's Charles Dickens and his Friends (1904 and 1909) ; B. W. Matz, Story of Dickens's Life and Work (1904), and review of solutions to Edwin Drood in The Bookman for March 1908 ; the recollections of Edmund Yates, Trollope, James Payn, Lehmann, R. H. Home, Lockwood and many others. The Dickensian, a magazine devoted to Dickensian subjects, was started in 1905; it is the organ of the Dickens Fellow- ship, and in a sense of the Boz Club. A Dickens Dictionary (by G. A. Pierce) appeared in 1872 and 1878 ; another (by A. J. Philip) in 1909; and a Dickens Concordance by Mary Williams in 1907. (T. Se.)

DICKINSON, ANNA ELIZABETH (1842-), American author and lecturer, was born, of Quaker parentage, at Philadelphia, Pennsylvania, on the 28th of October 1842. She was educated at the Friends' Free School in Philadelphia, and was for a time a teacher. In 1861 she obtained a clerkship in the United States mint, but was removed for criticizing General McClellan at a public meeting. She had gradually become widely known as an eloquent and persuasive public speaker, one of the first of her sex to mount the platform to discuss the burning questions of the hour. Before the Civil War she lectured on anti-slavery topics, during the war she toured the country on behalf of the Sanitary Commission, and also lectured on reconstruction, temperance and woman's rights. She wrote several plays, in- cluding The Crown of Thorns (1876) ; Mary Tudor (1878), in which she appeared in the title role; Aurelian (1878) ; and An American Girl (1880), successfully acted by Fanny Davenport. She also published a novel, Which Answer? (1868); A Paying Investment, a Plea for Education (1876); and A Ragged Register of People, Places and Opinions (1879).

DICKINSON, JOHN (1732-1808), American statesman and pamphleteer, was born in Talbot county, Maryland, on the 8th of November 1732. He removed with his father to Kent county,

Delaware, in 1740, studied under private tutors, read law, and in 1 7 53 entered the Middle Temple, London. Returning to America in 1757, he began the practice of law in Philadelphia, was speaker of the Delaware assembly in 1760, and was a member of the Pennsylvania assembly in 1762-1765 and again in 1770-1776. 1 He represented Pennsylvania in the Stamp Act Congress (1765) and in the Continental Congress from 1774 to 1776, when he was defeated owing to his opposition to the Declaration of Independence. He then retired to Delaware, served for a time as private and later as brigader-general in the state militia, and was again a member of the Continental Congress (from Delaware) in 1779-1780. He was president of the executive councilor chief executive officer, of Delaware in 1781-1782, and of Pennsylvania in 1782-1785, and was a delegate from Delaware to the Annapolis convention of 1786 and the Federal Constitutional convention of 1787. Dickinson has aptly been called the "Penman of the Revolution." No other writer of the day presented arguments so numerous, so timely and so popular. He drafted the " Declara- tion of Rights " of the Stamp Act Congress, the " Petition to the King " and the " Address to the Inhabitants of Quebec " of the Congress of 1774, and the second " Petition to the King" 2 and the " Articles of Confederation " of the second Congress. Most influential of all, however, were The Letters of a Farmer in Pennsylvania, written in 1 767-1 768 in condemnation of the Townshend Acts of 1767, in which he rejected speculative natural rights theories and appealed to the common sense of the people through simple legal arguments. By opposing the Declaration of Independence, he lost his popularity and was never able entirely to regain it. As the representative of a small state, he championed the principle of state equality in the constitu- tional convention, but was one of the first to advocate the compromise, which was finally adopted, providing for equal representation, in one house and proportional representation in the other. He was probably influenced by Delaware prejudice against Pennsylvania when he drafted the clause which forbids the creation of a new state by the junction of two or more states or parts of states without the consent of the states concerned as well as of congress. After the adjournment of the convention he defended its work in a series of letters signed " Fabius," which will bear comparison with the best of the Federalist productions. It was largely through his influence that Delaware and Pennsylvania were the first two states to ratify the Constitution. Dickinson's interests were not exclusively political. He helped to found Dickinson College (named in his honour) at Carlisle, Pennsylvania, in 1783, was the first president of its board of

1 Being under the same proprietor and the same governor,

Pennsylvania and Delaware were so closely connected before the Revolution that there was an interchange of public men.

2 The ” Declaration of the United Colonies of North America . . . setting forth the Causes and the Necessity of their Taking up Arms ” (often erroneously attributed to Thomas Jefferson).

trustees, and was for many years its chief benefactor. He died on the 14th of February 1808 and was buried in the Friends’ burial ground in Wilmington, Del.

See C. J. Stille, Life and Times of John Dickinson, and P. L. Ford (editor), The Writings of John Dickinson, in vols. xiii. and xiv. respectively of the Memoirs of the Historical Society of Pennsylvania (Philadelphia, 1891 and 1895).

DICKSON, SIR ALEXANDER (1777-1840), British artillerist, entered the Royal Military Academy in 1793, passing out as second lieutenant in the Royal Artillery in the following year. As a subaltern he saw service in Minorca in 1798 and at Malta in 1800. As a captain he took part in the unfortunate Montevideo Expedition of 1806-07, an d in 1809 he accompanied- Ho worth to the Peninsular War as brigade-major of the artillery. He soon obtained a command in the Portuguese artillery, and as a lieutenant-colonel of the Portuguese service took part in the various battles of 1810-n. At the two sieges of Budazoz, Ciudad Rodrigo, the Salamanca forts and Burgos, he was entrusted by Wellington (who had the highest opinion of him) with most of the detailed artillery work, and at Salamanca battle he commanded the reserve artillery. In the end he became commander of the whole of the artillery of the allied army, and though still only a substantive captain in the British service he had under his orders some 8000 men. At Vitoria, the Pyrenees battles and Toulouse he directed the movements of the artillery engaged, and at the end of the war received handsome presents from the officers who had served under him, many of whom were his seniors in the army list. He was at the disastrous affair of New Orleans, but returned to Europe in time for the Waterloo campaign. He was present at Quatre Bras and Waterloo on the artillery staff of Wellington’s army, and subsequently commanded the British battering train at the sieges of the French fortresses left behind the advancing allies. For the rest of his life he was on home service, principally as a staff officer of artillery. He died, a major-general and G.C.B., in 1840. A.memorial was erected at Woolwich in 1847. Dickson was one of the earliest fellows of the Royal Geographical Society.

His diaries kept in the Peninsula were the main source of information used in Duncan's History of the Royal Artillery.

DICKSON, SIR JAMES ROBERT (1832-1901), Australian statesman, was born in Plymouth on the 30th of November 1832. He was brought up in Glasgow, receiving his education at the high school, and became a clerk in the City of Glasgow Bank. In 1854 he emigrated to Victoria, but after some years spent in that colony and in New South Wales, he settled in 1862 in Queensland, where he was connected with many important business enterprises, among them the Royal Bank of Queensland. He entered the Queensland House of Assembly in 1872, and became minister of works (1876), treasurer (1876-1879, and 1883- 1887), acting premier (1884), but resigned in 1887 on the question of taxing land. In 1889 he retired from business, and spent three years in Europe before resuming political life. He fought for the introduction of Polynesian labour on the Queensland sugar plantations at the general election of 1892, and was elected to the House of Assembly in that year and again at the elections of 1893 and 1896. He became secretary for railways in 1897, minister for home affairs in 1898, represented Queensland in the federal council of Australia in 1896 and at the postal conference at Hobart in 1898, and in 1898 became premier. His energies were now devoted to the formation of an Australian commonwealth. He secured the reference of the question to a plebiscite, the result of which justified his anticipations. He resigned the premiership in November 1899, but in the ministry of Robert Philp, formed in the next month, he was reappointed to the offices of chief secretary and vice-president of the executive council which he had combined with the office of premier. He represented Queensland in 1900 at the conference held in London to consider the question of Australian unity, and on his return was appointed minister of defence in the first government of the Australian Commonwealth. He did not long survive the accomplishment of his political aims, dying at Sydney on the 10th of January 1901, in the midst of the festivities attending the inauguration of the new state.

DICOTYLEDONS, in botany, the larger of the two great classes of angiosperms, embracing most of the common flower-bearing plants. The name expresses the most universal character of the class, the importance of which was first noticed by John Ray, namely, the presence of a pair of seed-leaves or cotyledons, in the plantlet or embryo contained in the seed. The embryo is generally surrounded by

a larger or smaller amount of foodstuff (endosperm) which serves to nourish it in its development to form a seedling when the seed germinates; frequently, however, as in pea or bean and their allies, the whole of the nourishment for future use is stored up in the cotyledons themselves, which then become thick and fleshy. In germination of the seed the root of the embryo (radicle) grows out to get a holdfast for the plant; this is generally followed by the growth of the short stem immediately above the root, the so-called ” hypocotyl,” which carries up the cotyledons above the ground, where they spread to the light and become the first green leaves of the plant. Protected between the cotyledons and terminating the axis of the plant is the first stem-bud (the plumule of the embryo), by the further growth and development of which the aerial portion of the plant, consisting of stem, leaves and branches, is formed, while the development of the radicle forms the root-system. The size and manner of growth of the adult plant show a great variety, from the small herb lasting for one season only, to the forest tree living for centuries. The arrangement of the conduct- ing tissue in the stem is characteristic; a transverse section of the very young stem shows a nunber of distinct conducting strands — vascular bundles — arranged in a ring round the pith; these soon become united to form a closed ring of bast and wood, separated by a layer of formative tissue (cambium). In perennials the stem shows a regular increase in thickness each year by the addition- of a new ring of wood outside the old one — for details of structure see Plants : A natomy. A similar growth occurs in the root. This increase in the diameter of stem and root is correlated with the increase in leaf -area each season, due to the continued production of new leaf bearing branches. A character istic of the class is afforded by the complicated network formed by the leaf -veins, — well seen in a skeleton leaf, from which the soft parts have been removed by maceration. The parts of the flower are most frequently arranged in fives, or multiples of fives; for instance, a common arrangement is as follows, — five sepals, succeeded by five petals, ten stamens in two sets of five, and five or fewer carpels; an arrangement in fours is less frequent, while the arrangement in threes, so common in monocotyledons, is rare in dicotyledons. In some orders the parts are numerous, chiefly in the case of the stamens and the carpels, as in the buttercup and other members of the order Ranunculaceae. There is a very wide range in the general structure and arrangement of the parts of the flower, associated with the means for ensuring the transference of pollen; in the simplest cases the flower consists only of a few stamens or carpels, with no enveloping sepals or petals, as in the willow, while ih the more elaborate type each series is represented, the whole forming a complicated structure closely correlated with the size, form and habits

of the pollinating agent (see Flower). The characters of the fruit and seed and the means for ensuring the dispersal of the seeds are also very varied (see Fruit).

DICTATOR (from the Lat. dictare, frequentative of dicere, to speak). In modern usage this term is loosely used for a personal ruler enjoying extraordinary and extra-constitutional power. The etymological sense of one who ” dictates ” — i.e. one whose word (dictum) is law (from which that of one who ” dictates,” i.e. speaks for some writer to record, is to be distinguished) — has been assisted by the historical use of the term, in ancient times, for an extraordinary magistrate in the Roman commonwealth. It is unknown precisely how the Roman word came into use, though an explanation of the earlier official title, magister populi, throws some light on the subject. That designation may mean ” head of the (infantry) host ” as opposed to his subordinate, the magister equitum, who was ” head of the cavalry. ” If this explana- tion be accepted, emphasis was thus laid in early times on the military aspect of the dictatorship, and in fact the office seems to

have been instituted for the purpose of meeting a military crisis such as might have proved too serious for the annual consuls with their divided command. Later constitutional theory held that the repression of civil discord was also one of the motives for the institution of a dictatorship. Such is the view expressed by Cicero in the De legibus (iii. 3, 9) and by the emperor Claudius in his extant Oratio (i. 28). This function of the office, although it may not have been contemplated at first, is attested by the internal history of Rome. In the crisis of the agitation that gathered round the Licinian laws (367 B.C.) a dictator was ap- pointed, and in 314 B.C. we have the notice of a dictator created for purposes of criminal jurisdiction (quaestionibus exercendis). The dictator appointed to meet the dangers of war, sedition or crime was technically described as ” the administrative dictator ” (rei gerundae causa). Minor, or merely formal, needs of the state might lead to the creation of other types of this office. Thus we find dictators destined to hold the elections, to make out the list of the senate, to celebrate games, to establish festivals, and to drive the nail into the temple of Jupiter — an act of natural magic which was believed to avert pestilence. These dictators appointed for minor purposes were expected to retire from office as soon as their function was completed. The ” administrative dictator ” held office for at least six months.

The powers of a dictator were a temporary revival of those of the kings; but there were some limitations to his authority. He was never

concerned with civil jurisdiction, and was dependent on the senate for supplies of money. His military authority was confined to Italy; and his power of life and death over the citizens was at an early period limited by law. It was probably the lex Valeria of 300 b.c. that made him subject to the right of criminal appeal (provocatio) within the limits of the city. But during his tenure of power all the magistrates of the people were regarded as his subordinates; and it was even held that the right of assistance (auxilium) , furnished by the tribunes of the plebs to members of the citizen body, should not be effectively exercised when the state was under this type of martial law. The dictator was nominated by one of the consuls. But here as else- where the senate asserted its authority over the magistrates, and the view was finally held that the senate should not only suggest the need of nomination but also the name of the nominee. After the nomination, the imperium of the dictator was confirmed by a lex curiata (see Comitia). To emphasize the superiority of this imperium over that of the consuls, the dictator might be preceded by twenty-four lictors, not by the usual twelve; and, at least in the earlier period of the office, these lictors bore the axes, the symbols of life and death, within the city walls.

Tradition represents the dictatorship as having a life of three centuries in the history of the Roman state. The first dictator is said to have been created in 501 B.C.; the last of the ” administrative ” dictators belongs to the year 216 B.C. It was an office that was incompatible both with the growing spirit of constitutionalism and with the greater security of the city; and the epoch of the Second Punic War was marked by experiments with the office, such as the election of Q. Fabius Maximus by the people, and the co-dictatorship of M. Minucius with Fabius, which heralded its disuse (see Punic Wars). The emergency office of the early and middle Republic has few points of contact, except those of the extraordinary position and almost unfettered authority of its holder, with the dictatorship as revised by Sulla and by Caesar. Sulla’s dictatorship was the form taken by a provisional government. He was created ” for the establishment of the Republic.” It is less certain whether the dictatorships held by Caesar were of a consciously provisional character. Since the office represented the only supreme Imperium in Rome, it was the natural resort of the founder of a monarchy (see Sulla and Caesar) . Ostensibly to prevent its further use for such a purpose, M. Antonius in 44 b.c. carried a law abolishing the dictatorship as a part of the constitution.

Bibliography. — Mommsen, Romisches Staalsrecht, ii. 141 foil. (3rd ed., Leipzig, 1887); Herzog, Geschichte und System der romi- schen Staalsverfassung, i. 718 foil. (Leipzig, 1884); Pauly-Wissowa,

Realencyclopadie, v. 370 foil, (new edition, Stuttgart. 1893, &c.);

and history.

Lange, Romische Alterthiimer, i. 54.2 foil. (Berlin, 1856, &c.) ; Daremberg-Saglio, Dictionnaire des antiquites grecques et romaines, ii. 161 foil. (1875, &c); Haverfield, ” The Abolition of the Dictatorship,” in Classical Review, iii. 77. (A. H. J. G.)

DICTIONARY. In its proper and most usual meaning a dictionary is a book containing a collection of the words of a language, dialect or subject, arranged alphabetically or ˆ e Jl aHlon in some other definite order,and with explanations in the same or some other language. When the words are few in number, being only a small part of those belonging to the subject, or when they are given without explanation, or some only are explained, or the explanations are partial, the work is called a vocabulary; and when there is merely a list of explanations of the technical words and expressions in some particular subject, a glossary. An alphabetical arrangement of the words of some book or author with references to the places where they occur is called an index (q.v.). When under each word the phrases containing it are added to the references, the work is called a concordance. Sometimes, however, these names are given to true dictionaries; thus the great Italian dictionary of the Accademia della Crusca, in six volumes folio, is called Vocabolario, and Ernesti’s dictionary to Cicero is called Index. When the words are arranged according to a definite system of classification under heads and subdivisions, according to their nature or their meaning, the book is usually called a classed vocabulary; but when sufficient explanations are given it is often accepted as a dictionary, like the Onomasticon of Julius Pollux, or the native dictionaries of Sanskrit, Manchu and many other languages.

Dictionaries were originally books of reference explaining the words of a language or of some part of it. As the names of things, as well as those of persons and places, are words, and often require explanation even more than other classes of words, they were necessarily included in dictionaries, and often to a very great extent. In time, books were devoted to them alone, and were limited to special subjects, and these have so multiplied, that dictionaries of things now rival in number and variety those of words or of languages, while they often far surpass them in bulk. There are dictionaries of biography and history,

real and fictitious, general and special, relating to men of all countries, characters and professions; the English Dictionary of National Biography (see Biography) is a great instance of one form of these; dictionaries of bibliography, relating to all books, or to those of some particular kind or country; dictionaries of geography (sometimes called gazetteers) of the whole world, of particular countries, or of small districts, of towns and of villages, of castles, monasteries and other buildings. There are dictionaries of philosophy; of the Bible; of mathematics; of natural history, zoology, botany; of birds, trees, plants and flowers; of chemistry, geology and mineralogy; of architecture, painting and music; of medicine, surgery, anatomy, pathology and physiology; of diplomacy; of law, canon, civil, statutory and criminal; of political and social sciences; of agriculture, rural economy and gardening; of commerce, navigation, horse- manship and the military arts; of mechanics, machines and the manual arts. There are dictionaries of antiquities, of chronology, of dates, of genealogy, of heraldry, of diplomatics, of abbreviations, of useful receipts, of monograms, of adulterations and of very many other subjects. These works are separately referred to in the bibliographies attached to the articles on the separate subjects. And lastly, there are dictionaries of the arts and sciences, and their comprehensive offspring, encyclopaedias (q.v.), which include in themselves every branch of knowledge. Neither under the heading of dictionary nor under that of encyclopaedia do we propose to include a mention of every work of its class, but many of these will be referred to in the separate articles on the subjects to which they pertain. And in this article we confine ourselves to an account of those dictionaries which are primarily word-books. This is practically the most convenient distinction from the subject-book or encyclopaedia; though the two characters are often combined in one work. Thus the Century Dictionary has encyclopaedic features, while the present edition of the Encyclopaedia Britannica, restoring its

earlier tradition but carrying out the idea more systematically, also embodies dictionary features.

Dictionarium is a word of low or modern Latinity; 1 dictio, from which it was formed, was used in medieval Latin to mean a word. Lexicon is a corresponding word of Greek origin, meaning a book of or for words — a dictionary. A glossary is properly a collection of unusual or foreign words requiring explanation. It is the name frequently given to English dictionaries of dialects, which the Germans usually call idiolicon, and the Italians vocabolario. W orterbuch, a book of words, was first used among the Germans, according to Grimm, by Kramer (1 719), imitated from the Dutch woordenboek.

From the Germans the Swedes and Danes adopted ordbok, ordbog. The Icelandic ordabdk, like the German, contains the genitive plural. The Slavonic nations use slovar, slovnik, and the southern Slavs ryetshnik, from slovo, ryetsh, a word, formed, like dictionary and lexicon, without composition. Many other names have been given to dictionaries, as thesaurus, Sprachschalz, cornucopia, gazophylacium, comprehensorium, catholicon, to indicate their completeness ; manipulus predicantium, promptorium puerorum, liber memorialis, hortus vocabulorum, ionia (a violet bed), alveary (a beehive), kamoos (the sea), haft kulzum (the seven seas), tsze tienˆ(sL standard of character), onomasticon, nomenclator, biblio- theca, elucidario, Mundart-sammlung, clavis, scala, pharetra? La Crusca from the great Italian dictionary, and Calepino (in Spanish and Italian) from the Latin dictionary of Calepinus.

The tendency of great dictionaries is to unite in themselves all the peculiar features of special dictionaries. A large dictionary is most useful when a word is to be thoroughly studied, or when there is difficulty in making out the meaning of a word or phrase. Special dictionaries are more useful for special purposes; for instance, synonyms are best studied in a dictionary of synonyms. And small dictionaries are more convenient for frequent use, as in translating from an unfamiliar language, for words may be found more quickly, and they present the words and their meanings in a concentrated and compact form, instead of being scattered over a large space, and separated by other matter. Dictionaries of several languages, called polyglots, are of different kinds. Some are polyglot in the vocabulary, but not in the explanation, like Johnson's dictionary of Persian and Arabic explained in English ; some in the interpretation, but not in the vocabulary or explanation, like Calepini octoglotton, a Latin dictionary of Latin, with the meanings in seven languages. Many great dictionaries are now polyglot in this sense. Some are polyglot in the vocabulary and interpretation, but are explained in one language, like Jal's Glossaire nautique, a glossary of sea terms in many languages, giving the equivalents of each word in the other languages, but the explanation in French. Pauthier's Annamese Dictionary is polyglot in a peculiar way. It gives the Chinese characters with their pronunciation in Chinese and Annamese. Special dictionaries are of many kinds. There &n'. technical dictionaries of etymology, foreign words, dialects, secret languages, slang, neology, barbarous words, faults of ex- pression, choice words, prosody, pronunciation, spelling, orators, poets, law, music, proper names, particular authors, nouns, verbs, participles, particles, double forms, difficulties and many others. Fick's dictionary (Gottingen, 1868, 8vo; 1874-1876, 8vo, 4 vols.) is a

remarkable attempt to ascertain the common language of the Indo-European nations before each of their great separations. In the second edition of his Etymologische Forschungen (Lemgo and Detmoldt, 1859-1873, 8vo, 7217 pages) Pott gives a comparative lexicon of Indo-European roots, 2226 in number, occupying 5140 pages.

‘Joannes de Garlandia (John Garland; fl. 1202-1252) gives the following explanation in his Dictionarius, which is a classed vocabulary: — ” Dictionarius dicitur libellus iste a dictionibus magis necessariis, quas tenetur quilibet scolaris, non tantum in scrinio de lignis facto, sed in cordis armariolo firmiter retinere.” This has been supposed to be the first use of the word.

2 An excellent dictionary of quotations, perhaps the first of the kind; a large folio volume printed in Strassburg about 1475 is entitled ” Pharetra auctoritates et dicta doctorum, philosophorum, et poetarum continens.”

At no time was progress in the making of generaldictionaries so rapid as during the second half of the 19th century. It is to be seen in three things: in the perfecting of the theory of what Methods. a S enera l dictionary should be; in the elaboration of methods of collecting and editing lexicographic materials; and in the magnitude and improved quality of the work which has been accomplished or planned. Each of these can best be illustrated from English lexicography, in which the process of development has in all directions been carried farthest. The advance that has been made in theory began with a radical change of opinion with regard to the chief end of the general dictionary of a language. The older view of the matter was that the lexicographer should furnish a standard of usage — should register only those words which are, or at some period of the language have been, ” good ” from a literary point of view, with their ” proper ” senses and uses, or should at least furnish the means of determining what these are. In other words, his chief duty was conceived to be to sift and refine, to decide authori- tatively questions with regard to good usage, and thus to fix the language as completely as might be possible within the limits determined by the literary taste of his time. Thus the Accademia della Crusca, founded near the close of the 16th century, was established for the purpose of purifying in this way the Italian tongue, and in 1612 the Vocabolario degli Accademici della Crusca, long the standard of that language, was published. The Academie Francaise,

the first edition of whose dictionary appeared in 1694, had a similar origin. In England the idea of constructing a dictionary upon this principle arose during the second quarter of the 18th century. It was imagined by men of letters — among them Alexander Pope — that the English language had then attained such perfection that further improvement was hardly possible, and it was feared that if it were not fixed by lexicographic authority deterioration would soon begin. Since there was no English ” Academy,” it was necessary that the task should fall to some one whose judgment would command respect, and the man who undertook it was Samuel Johnson. His dic- tionary, the first edition of which, in two folio volumes, appeared in 1755, was in many respects admirable, but it was inade- quate even as a standard of the then existing literary usage. Johnson himself did not long entertain the belief that the natural development of a language can be arrested in that or in any other way. His work was, however, generally accepted as a final authority, and the ideas upon which it was founded dominated English lexicography for more than a century. The first effective protest in England against the supremacy of this literary view was made by Dean (later Archbishop) Trench, in a paper on ” Some Deficiencies in Existing English Dictionaries ” read before the Philological Society in 1857. ” A dictionary,” he said, ” accord- ing to that idea of it which seems to me alone capable of being logically maintained, is an inventory of the language; much more, but this primarily. ... It is no task of the maker of it to select the good words of the language. . . . The business which he has undertaken is to collect and arrange all words, whether good or bad, whether they commend themselves to his judgment or other- wise. . . . He is an historian of [the language], not a critic.” That is, for the literary view of the chief end of the general dictionary should be substituted the philological or scientific. In Germany this substitution had already been effected by Jacob and Wilhelm Grimm in their dictionary of the German language, the first volume of which appeared in 1854. In brief, then, the modern view is that the general dictionary of a language should be a record of all the words — current or obsolete — of that language, with all their meanings and uses, but should not attempt to be, except secondarily or indirectly, a guide to ” good ” usage. A ” standard ” dictionary has, in fact, been recognized to be an impossibility, if not an absurdity.

This theoretical requirement must, of course, be modified considerably in practice. The date at which a modern language is to be regarded by the lexicographer as ” beginning ” must, as a rule, be somewhat arbitrarily chosen; while considerable portions of its earlier vocabulary cannot be recovered because of the incompleteness of the

literary record. Moreover, not even

the most complete dictionary can include all the words which the records — earlier and later— actually contain. Many words, that is to say, which are found in the literature of a language cannot be regarded as, for lexicographic purposes, belonging to that language; while many more may or may not be held to belong to it, according to the judgment — almost the whim— of the individual lexicographer. This is especially true of the English tongue. ” That vast aggregate of words and phrases which constitutes the vocabulary of English-speaking men presents, to the mind that endeavours to grasp it as a definite whole, the aspect of one of those nebulous masses familiar to the astronomer, in which a clear and unmistakable nucleus shades off on all sides, through zones of decreasing brightness, to a dim marginal film that seems to end nowhere, but to lose itself imperceptibly in the surrounding darkness ” (Dr J. A. H. Murray, Oxford Diet. General Explanations, p. xvii). This ” marginal film ” of words with more or less doubtful claims to recognition includes thousands of the terms of the natural sciences (the New-Latin classificatory names of zoology and botany, names of chemical compounds and of minerals, and the like); half-naturalized foreign words; dialectal words; slang terms; trade names (many of which have passed or are passing into common use) ; proper names and many more. Many of these even the most complete dictionary should exclude; others it should include; but where the line shall be drawn will always remain a vexed question.

Another important principle upon which Trench insisted, and which also expresses a requirement of modern scientific philology, is that the dictionary shall be not merely a record, but also an historical record of words and their uses. From the literary point of view the most important thing is present usage. To that alone the idea of a ” standard ” has any application. Dictionaries of the older type, therefore, usually make the common, or ” proper ” or ” root ” meaning of a word the starting point of its definition, and arrange its other senses in a logical or accidental order commonly ignoring the historical order in which the various meanings arose. Still less do they attempt to give data from which the vocabulary of the language at any previous period may be determined. The philologist, however, for whom the growth, or progressive alteration, of a language is a fact of central importance, regards no record of a language as complete which does not exhibit this growth in its successive stages. He desires to know when and where each word, and each form and sense of it, are first found in the language; if the word or sense is obsolete, when it died; and any other fact that throws light upon its history. He requires, accordingly, of the lexicographer that, having ascertained

these data, he shall make them the foundation of his exposition — in particular, of the division and arrangement of his definitions, that sense being placed first which appeared first in order of time. In other words, each article in the dictionary should furnish an orderly biography of the word of which it treats, each word and sense being so dated that the exact time of its appearance and the duration of its use may as nearly as possible be determined. This, in principle, is the method of the new lexicography. In practice it is subject to limitations similar to those of the vocabulary mentioned above. Incompleteness of the early record is here an even greater obstacle; and there are many words whose history is, for one reason or another, so unimportant that to treat it elaborately would be a waste of labour and space.

The adoption of the historical principle involves a further note-worthy modification of older methods, namely, an important extension of the use of quotations. To Dr Johnson belongs the credit of showing how useful, when properly chosen, they may be, not only in corroborating the lexicographer's statements, but also in revealing special shades of meaning or variations of use which his definitions cannot well express. No part of Johnson's work is more valuable than this. This idea was more fully developed and applied by Dr Charles Richardson, whose New Dictionary of the English Language . . . Illustrated by Quotations from the Best Authors (1835-1836) still remains a most valuable collection of literary illustrations. Lexicographers, however, have, with

few exceptions, until a recent date, employed quotations chiefly for the ends just mentioned — as instances of use or as illustra- tions of correct usage — with scarcely any recognition of their value as historical evidence; andHhey have taken them almost exclusively from the works of the " best " authors. But since all the data upon which conclusions with regard to the history of a word can be based must be collected from the literature of the language, it is evident that, in so far as the lexicographer is required to furnish evidence for an historical inference, a quotation is the best form in which he can give it. In fact, extracts, properly selected and grouped, are generally sufficient to show the entire meaning and biography of a word without the aid of elaborate definitions. The latter simply save the reader the trouble of drawing the proper conclusions for himself. A further rule of the new lexicography, accordingly, is that quotations should be used, primarily, as historical evidence, and that the history

of words and meanings should be exhibited by means of them. The earliest/instance of use that can be found, and (if the word or sense is obsolete) the latest, are as a rule to be given; while in the case of an important word or sense, instances taken from successive periods of its currency also should be cited. Moreover, a quotation which contains an important bit of historical evidence must be used, whether its source is "good," from the literary point of view, or not — whether it is a classic of the language or from a daily newspaper; though where choice is possible, preference should, of course, be given to quotations extracted from the works of the best writers. This rule does not do away with the illustrative use of quotations, which is still recognized as highly important, but it subordinates it to their historical use. It is necessary to add that it implies that the extracts must be given exactly, and in the original spelling and capitalization, accurately dated, and furnished with a precise reference to author, book, volume, page and edition; for insistence upon these requirements — which are obviously im- portant, whatever the use of the quotation may be — is one of the most noteworthy of modern innovations. Johnson usually gave simply the author's name, and often quoted from memory and inaccurately; and many of his successors to this day have followed — altogether or to some extent — his example.

The chief difficulty in the way of this use of quotations — after the difficulty of collection — is that of finding space for them in a dictionary of reasonable size. Preference must be given to those which are essential, the number of those which are cited merely on methodical grounds being made as small as possible. It is hardly necessary to'add that the negative evidence furnished by quotations is generally of little value; one can seldom, that is, be certain that the lexicographer has actually found the earliest or the latest use, or that the word or sense has not been current during some intermediate period from which he has no quotations.

Lastly, a much more important place in the scheme of the ideal dictionary is now assigned to the etymology of words. This may be attributed, in part, to the recent rapid development of ety- mology as a science, and to the greater abundance of trustworthy data; but it is chiefly due to the fact that from the historical point of view the connexion between that section of the biography of a word which lies within the language — subsequent, that is, to the time when the language may, for lexicographical purposes, be assumed to have begun, or to the time when the word was adopted or invented — and its antecedent history [has become more vital and interesting. Etymology, in other words, is essentially the history of the form of a word up to the time when it became a part of the language, and is, in

a measure, an extension of the history of the development of the word in the language. More- over, it is the only means by which the exact relations of allied words can be ascertained, and the separation of words of the same form but of diverse origin (homonyms) can be effected, and is thus, for the dictionary, the foundation of all family history and correct genealogy. In fact, the attention that has been paid to these two points in the best recent, lexicography is one of its distinguishing and most important characteristics. Related to the etymology of words are the changes in their form which may have occurred while they have been in use as parts of the language

— modifications of their pronunciation, corruptions by popular etymology or false associations, and the like. The facts with regard to these things which the wide research necessitated by the historical method furnishes abundantly to the modern lexicographer are often among the most novel and interesting of his acquisitions.

It should be added that even approximate conformity to the theoretical requirements of modern lexicography as above out- lined is possible only under conditions similar to those under which the Oxford New English Dictionary was undertaken (see below). The labour demanded is too vast, and the necessary bulk of the dictionary too great. When, however, a language is recorded in one such dictionary, those of smaller size and more modest pretensions can rest upon it as an authority and conform to it as a model so far as their special limitations permit.

The ideal thus developed is primarily that of the general dictionary of the purely philological type, but it applies also to the encyclopaedic dictionary. In so far as the latter is strictly lexicographic — deals with words as words, and not with the things they denote — it should be made after the model of the former, and is defective to the extent in which it deviates from it. The addition of encyclopaedic matter to the philological in no way affects the general principles involved. It may, however, for practical reasons, modify their application in various ways. For example, the number of obsolete and dialectal words included may be much diminished and the number of scientific terms (for instance, new Latin botanical and zoological names) be increased; and the relative amount of space devoted to etymologies and quotations may be lessened. In general, since books of this kind are designed to serve more or less as works of general reference, the making of them must be governed by considerations of practical utility which the compilers of a purely philological dictionary are not obliged to regard. The encyclopaedic type itself, although it has often been criticized as hybrid — as a mixture of two things which should

be kept distinct — is entirely defensible. Between the dictionary and the encyclopaedia the dividing line cannot sharply be drawn. There are words the meaning of which cannot be explained fully without some description of things, and, on the other hand, the description of things and processes often involves the definition of names. To the combination of the two objection cannot justly be made, so long as it is effected in a way — with a selection of material — that leaves the dictionary essentially a dictionary and not an encyclopaedia. Moreover, the large vocabulary of the general dictionary makes it possible to present certain kinds of encyclopaedic matter with a degree of fulness and a convenience of arrangement which are possible in no single work of any other class. In fact, it may be said that if the encyclopaedic dictionary did not exist it would have to be invented; that its justification is its indispensableness. Not the least of its advantages is that it makes legitimate the use of diagrams and pictorial illustrations, which, if properly selected and executed, are often valuable aids to definition.

On its practical side the advance in lexicography has consisted in the elaboration of methods long in use rather than in the in- vention of new ones. The only way to collect the data upon which the vocabulary, the definitions and the history are to be based is, of course, to search for them in the written monuments of the language, as all lexicographers who have not merely borrowed from their predecessors have done. But the wider scope and special aims of the new lexicography demand that the investigation shall be vastly more comprehensive, systematic and precise. It is necessary, in brief, that, as far as may be possible, the literature (of all kinds) of every period of the language shall be examined systematically, in order that all the words, and senses and forms of words, which have existed during any period may be found, and that enough excerpts (carefully verified, credited and dated) to cover all the essential facts shall be made. The books, pamphlets, journals, newspapers, and so on which must thus be searched will be numbered by thousands, and the quotations selected may (as in the. case of the Oxford New English Dictionary) be counted by millions. This task is beyond the powers of any one man, even though he be a Johnson, or a Littre or a Grimm, and it is now

assigned to a corps of readers whose number is limited only by the ability of the editor to obtain such assistance. The modern method of editing the material thus accumulated — the actual work of

compilation — also is characterized by the application of the principle of the division of labour. Johnson boasted that his dictionary was written with but little assistance from the learned, and the same was in large measure true of that of Littre. Such attempts on the part of one man to write practically the whole of a general dictionary are no longer possible, not merely because of the vast labour and philological research necessitated by modern aims, but more especially because the immense development of the vocabulary of the special sciences renders indispensable the assistance, in the work of definition, of persons who are expert in those sciences. The tendency, accordingly, has been to enlarge greatly the editorial staff of the dictionary, scores of sub-editors and contributors being now employed where a dozen or fewer were formerly deemed sufficient. In other words, the making of a ” complete ” dictionary has become a co-operative enterprise, to the success of which workers in all the fields of literature and science contribute.

The most complete exemplification of these principles and methods is the Oxford New English Dictionary, on historical principles, founded mainly on materials collected by the Philo- logical Society. This monumental work originated in the sug- gestion of Trench that an attempt should be made, under the direction of the Philological Society, to complete the vocabulary of existing dictionaries and to supply the historical information which they lacked. The suggestion was adopted, considerable material was collected, and Mr Herbert Coleridge was appointed general editor. He died in 1861, and was succeeded by Dr F. J. Furnivall. Little, however, was done, beyond the collection of quotations — about 2,000,000 of which were gathered — until in 1878 the expense of printing and publishing the proposed dictionary was assumed by the Delegates of the University Press, and the editorship was entrusted to Dr (afterwards Sir) J. A. H. Murray. As the historical point of beginning, the middle of the 1 2th century was selected, all words that were obsolete at that date being excluded, though the history of words ‘that were current both before and after that date is given in its entirety; and it was decided that the search for quotations — which, accord- ing to the original design, was to cover the entire literature down to the beginning of the 16th century and as much of the subse- quent literature (especially the works of the more important writers and works on special subjects) as might be possible — should be “made more thorough. More than 800 readers, in all parts of the world, offered their aid; and when the preface to the first volume appeared in 1888, the editor was able to announce that the readers had increased to 1300, and that 3,500,000 of quotations, taken from the writings of more than 5000 authors, had already been

amassed. The whole work was planned to be completed in ten large volumes, each issued first in smaller parts. The first part was issued in 1884, and by the beginning of 1910 the first part of the letter S had been reached.

The historical method of exposition, particularly by quota- tions, is applied in the New English Dictionary, if not in all cases with entire success, yet, on the whole, with a regularity and a precision which leave little to be desired. A minor fault is that excerpts from second or third rate authors have occasionally been used where better ones from writers of the first class either must have been at hand or could have been found. As was said above, the literary quality of the question is highly important even in historical lexicography, and should not be neglected un- necessarily. Other special features of the book are the complete- ness with which variations of pronunciation and orthography (with dates) are given; the fulness and scientific excellence of the etymologies, which abound in new information and corrections of old errors; the phonetic precision with which the present (British) pronunciation is indicated; and the elaborate sub-division of meanings. The definitions as a whole are marked by a high degree of accuracy, though in a certain number of cases (not explicable by the date of the volumes) the lists of meanings are not so good as one would expect, as compared (say) with

the Century Dictionary. Work of such magnitude and quality is possible, practically, only when the editor of the dictionary can com- mand not merely the aid of a very large number of scholars and men of science, but their gratuitous aid. In this the New English Dictionary has been singularly fortunate. The conditions under which it originated, and its aim, have interested scholars every- where, and led them to contribute to the perfecting of it their knowledge and time. The long list of names of such helpers in Sir J. A. H. Murray's preface is in curious contrast with their absence from Dr Johnson's and the few which are given in that of Littre. The editor's principal assistants were Dr Henry Bradley and Dr W. A. Craigie. Of the dictionary as a whole it may be said that it is one of the greatest achievements, whether in literature or science, of modern English scholarship and research.

The New English Dictionary furnishes for the first time data from which the extent of the English word-store at any given period, and the direction and rapidity of its growth, can fairly be estimated. For this purpose the materials furnished by the older dictionaries are quite insufficient, on account of their incompleteness and unhistorical character. For example 100 pages of the New English Dictionary (from

the letter H) contain 1002 words, of which, as the dated quota- tions show, 585 were current in 1750 (though some, of course, were very rare, some dialectal, and so on), 191 were obsolete at that date, and 226 have since come into use. But of the more than 700 words — ■ current or obsolete — which Johnson might thus have recorded, he actually did record only about 300. Later dictionaries give more of them, but they in no way show their status at the date in question. It is worth noting that the figures given seem to indicate that not very many more words have been added to the vocabulary of the language during the past 150 years than had been lost by 1750. The pages selected, however, contain comparatively few recent scientific terms. A broader comparison would probably show that the gain has been more than twice as great as the loss. •

In the Deutsches Worterbuch of Jacob and Wilhelm Grimm the scientific spirit, as was said above, first found expression in general lexicography. The desirability of a complete inventory and investigation of German words was recognized by Leibnitz and by various 18th-century scholars, but the plan and methods of the Grimms were the direct product of the then new scientific philology. Their design, in brief, was to give an exhaustive account of the words of the literary language (New High German) from about the end of the 15th century, including their earlier etymological and later history, with references to important dialectal words and forms; and to illustrate their use and history abundantly by quotations. The first volume appeared in ˆ854. Jacob Grimm (died 1863) edited the first, second (with his brother, who died in 1859), third and a part of the fourth volumes; the others have been edited by various distinguished scholars. The scope and methods of this dictionary have been broadened somewhat as the work has advanced. In general it may be said that it differs from the New English Dictionary chiefly in its omission of pronunciations and other pedagogic matter; its irregular treatment of dates; its much less systematic and less lucid statement of etymologies; its less systematic and less fruitful use of quotations; and its less convenient and less intelligible arrangement of material and typography.

These general principles lie also at the foundation of the scholarly Dictionnaire de la langue francaise of E. Littre, though they are there carried out less systematically and less completely. In the arrangement of the definitions the first place is given to the most primitive meaning of the word instead of to the most common one, as in the dictionary of the Academy; but the other meanings follow in an order that is often logical rather than historical. Quotations also are frequently used merely as literary illustrations, or are entirely omitted; in the special

paragraphs on the history of words before the 16th century, however, they are put to a strictly historical use. This dictionary — perhaps the greatest ever compiled by one man — was published 1863-1872. (Supplement, 1878.)

The Thesaurus Linguae Latinae, prepared under the auspices of the German Academies of Berlin, Gottingen, Leipzig, Munich and Vienna, is a notable application of the principles and practical co-operative method of modern lexicography to the classical tongues. The plan of the work is to collect quotations I which shall register, with its full context, every word (except

the most familiar particles) in the text of each Latin author down to the middle of the 2nd century a,d., and to extract all important passages from all writers of the following centuries down to the 7 th: and upon these materials to found a complete historical dictionary of the Latin language. The work of collecting quotations was begun in 1894, and the first part of the first volume has been published.

In the making of all these great dictionaries (except, of course, the last) the needs of the general public as well as those of scholars have been kept in view. But the type to which the general dictionary designed for popular use has tended more and more to conform is the encyclopaedic. This combination of lexicon and encyclopaedia is exhibited in an extreme — and theoretically objectionable — form in the Grand diciionnaire universel du XIX” Steele of Pierre Larousse. Besides common words and their definitions, it contains a great many proper names, with a correspondingly large number of biographical, geographical, historical and other articles, the connexion of which with the strictly lexicographical part is purely mechanical. Its utility, which — notwithstanding its many defects — is very great, makes it, however, a model in many respects. Fifteen volumes were published (1866-1876), and supplements were brought out later (1878-1890). The Nouveau Larousse illustri started publication in iqoi, and was completed in 1904 (7 vols.). This is not an abridgment or a fresh edition of the Grand Diciionnaire of Pierre Larousse, but a new and distinct publication.

The most notable, work of this class, in English, is the Century Dictionary, an American product, edited by Professor W. D. Whitney, and published 1889-1891 in six volumes, containing 7046 pages

(large quarto). It conforms to the philological mode in giving with great fulness the older as well as the present vocabulary of the language, and in the completeness of its etymologies; but it does not attempt to give the full history of every word within the language. Among its other more note- worthy characteristics are the inclusion of a great number of modern scientific and technical words, and the abundance of its quotations. The quotations are for the most part provided with references, but they are not dated. Even when compared with the much larger New English Dictionary, the Century's great merit is the excellent enumeration of meanings, and the accuracy of its explanations; in this respect it is often better and fuller than the New English. In the application of the encyclo- paedic method this dictionary is conservative, excluding, with a few exceptions, proper names, and restricting, for the most part, the encyclopaedic matter to descriptive and other details which may legitimately be added to the definitions. Its pictorial illustrations are very numerous and well executed. In the manner of its compilation it is a good example of modern co- operative dictionary-making, being the joint product of a large number of specialists. Next to the New English Dictionary it is the most complete and scholarly of English lexicons.

Bibliography. — The following list of dictionaries (from the 9th edition of this work, with occasional corrections) is given for its historical interest, but in recent years dictionary-making has been so abundant that no attempt is made to be completely inclusive of later works; the various articles on languages may be consulted for these. The list is arranged geographically by families of languages, or by regions. In each group the order, when not alphabetical, is usually from north to south, extinct languages generally coming first, and dialects being placed under their language. Dictionaries forming parts of other works, such as travels, histories, transactions, periodicals, reading-books, &c, are generally excluded. The system here adopted was chosen as on the whole the one best calculated to keep together dictionaries naturally associated. The languages to be considered are too many for an alphabetical arrangement, which ignores all relations both natural and geographical, and too few to require a strict classification by affinities, by which the European languages, which for many reasons should be kept together, would be dispersed. Under either system, Arabic, Persian and Turkish, whose dictionaries are so closely connected, would be widely separated. A wholly geographical arrangement would be in-

convenient, especially in Europe. Any system, however, which attempts to arrange in a consecutive series the great network of

languages by which the whole world is enclosed, must be open to some objections; and the arrangement adopted in this list has produced some anomalies and dispersions which might cause inconvenience if not pointed out. The old Italic languages are placed under Latin, all dialects of France under French (but Provencal as a distinct language), and Wallachian among Romanic languages. Low German and its dialects are not separated from High German. Basque is placed after Celtic; Albanian, Gipsy and Turkish at the end of Europe, the last being thus separated from its dialects and congeners in Northern and Central Asia, among which are placed the Kazan dialect of Tatar, Samoyed and Ostiak. Accadian is placed after Assyrian among the Semitic languages, and Maltese as a dialect of Arabic; while the Ethiopic is among African languages as it seemed undesirable to separate it from the other Abyssinian languages, or these from their neighbours to the north and south. Circassian and Ossetic are joined to the first group of Aryan languages lying to the north-west of Persia, and containing Armenian, Georgian and Kurd. The following is the order of the groups, some of the more important languages, that is, of those best provided with dictionaries, standing alone: —

Europe: Greek, Latin, French, Romance, Teutonic (Scandi- navian and German), Celtic, Basque, Baltic, Slavonic, Ugrian, Gipsy, Albanian.

Asia: Semitic, Armenian, Persian, Sanskrit, Indian, Indo- Chinese, Malay Archipelago, Philippines, Chinese, Japanese, Northern and Central Asia.

Africa: Egypt and Abyssinia, Eastern Africa, Southern, Western, Central, Berber.

Australia and Polynesia.

America: North, Central (with Mexico), South.

EUROPE

Greek. — Athenaeus quotes 35 writers of works, known or sup- posed to be dictionaries, for, as they are all lost, it is often difficult to decide on their nature. Of these, Anticlides, who lived after the reign of Alexander the Great, wrote ‘KˆyririKSs, which seems to have been a sort of dictionary,perhaps explaining the words and phrases occurring in ancient stories. Zenodotus, the first superintendent of the great library of Alexandria, who lived in the reigns of Ptolemy I. andPtolemy II., wrote rx&io-om, and alsoAef«r Wvucai, a dictionary of

barbarous or foreign phrases. Aristophanesof Byzantium, son of Apelles the painter, who lived in the reigns of Ptolemy II. and Ptolemy III., and had the supreme management of the Alexandrian library, wrote a number of works, as ‘Arrucai Aeifets, Ka.Kavi.Kai TXSxraai. which, from the titles, should be dictionaries, but a fragment of his Ae|ets printed by Boissonade, in his edition of Herodian (London, 1869, 8vo, pp. 181-189), is not alphabetical. Artemidorus. a pupil of Aristophanes, wrote a dictionary of technical terms used in cookery. Nicander Colophonius, hereditary priest of Apollo Clarius, born at Claros, near Colophon in Ionia, in reputation for 50 years, from 181 to 135, wrote VKSxraax in at least three books. Parthenius, a pupil of the Alexandrian grammarian Dionysius (who lived in the 1st century before Christ), wrote on choice words used by historians. Didymus, called xahKivrtpos , who, according to Athenaeus, wrote 3500 books, and, according to Seneca, 4000, wrote lexicons of the tragic poets (of which book 28 is quoted), of the comic poets, of ambiguous words and of corrupt expressions. Glossaries of Attic words were written by Crates, Philemon, Philetas and Theodorus; of Cretan, by Hermon or Hermonax; of Phrygian, by Neoptolemus; of Rhodian, by Moschus; of Italian, by Diodorus of Tarsus; of foreign words, by Silenus; of synonyms, by Simaristus; of cookery, by Heracleon; and of drinking vessels, by Apollodorus of Cyrene. According to Suidas, the most ancient Greek lexicographer was Apollonius the sophist, son of Archibius. According to the common opinion, he lived in the time of Augustus at Alexandria. He com- posed a lexicon of words used by Homer, Ae£eis ‘Oix-qpiKal , a very valuable and useful work, though much interpolated, edited by Villoison, from a MS. of the 10th century, Paris, 1773, 4to, 2 vols.; and by Tollius, Leiden, 1788, 8vo; ed. Bekker, Berlin, 1833, 8vo. Erotian or Herodian, physician to Nero, wrote a lexicon on Hippo- crates, arranged in alphabetical order, probably by some copyist, whom Klein calls ” homo sciolus.” It was first published in Greek in H. Stephani Dictionarium Medicum, Paris, 1564, 8vo; ed. Klein, Lipsiae, 1865, 8vo, with additional fragments. Timaeus the sophist, who, according to Ruhnken, lived in the 3rd century, wrote a very short lexicon to Plato, which, though much interpolated,. is of great value, 1st ed. Ruhnken, Leiden, 1754; ed. locupletior, Lugd. Bat. 1789, 8vo. Aelius Moeris, called the Atticist, lived about 190

A.D., and wrote an Attic lexicon, 1st ed. Hudson, Oxf. 1712, Bekker, 1833. Julius Pollux (‘IouXios UoXvdeiiKTis) of Naucratis, in Egypt, died, aged fifty-eight, in the reign of Commodus (180-192), who made him professor of rhetoric at Athens. He wrote, besides other lost works, an Onomasticon in ten books, being a classed vocabulary, intended to supply all the words required by each subject with the usage of the best authors. It is of the greatest value for the knowledge both of language and of antiquities. First printed by Aldus, Venice, 1500, fol.; of ten afterwards ; ed. Lederlinus and Hemsterhuis, Amst. 1706, 2 vols.; Dindorf, 1824, 5 vols., Bethe (1900 f.). Harpocration of Alexandria, probably of the 2nd century, wrote a lexicon on the ten Attic orators, first printed by Aldus, Ven. 1503, fol.; ed. Dindorf, Oxford, 1853, 8vo, 2 vols, from 14 MSS. Orion, a grammarian of Thebes, in Egypt, who lived between 390 and 460, wrote an etymological dictionary, printed by Sturz, Leipzig, 1820, 4to. Helladius a priest of Jupiter at Alexandria, when the heathen temples there were destroyed by Theophilus in 389 or 391 escaped to Constantinople, where he was living in 408. He wrote an alphabetical lexicon, now lost, chiefly of prose, called by Photius the largest (iro\vMSS. vary so much that they look like the works of different authors. To Eudocia Augusta of Makrembolis, wife of the emperors Constantine XL and Romanus IV. (1059 to 1071), was ascribed a dictionary of history and mythology, loivid (bed of violets), first printed by D’Ansse de Villoison, Anecdota Graeca, Venetiis, 1781, 4to, vol. i. pp. 1-442. It was supposed to have been of much value before it was published. Thomas, Magister Officiorum under Andronicus Palaeologus, afterward called as a monk Theodulus, wrote ‘EkXo7

Music. — Drieberg, Berlin, 1855. Etymology. — Curtius, Leipzig. 1858-1862 : Lancelot, Paris,i863, 8vo. Synonyms. — Peucer, Dresden’ 1766, 8vo: Pillon, Paris, 1847, 8vo. Proper Names. — Pape, ed Sengebusch, 1866, 8vo, 969 pages. Verbs. — Veitch, 2nd ed. Oxf- 1866. Terminations. — Hoogeveen, Cantab. 1810, 4to: Pape, Berlin, 1836, 8vo. Particular Authors. — Aeschylus: Wellauer, 2 vols. Lips. 1830-1831, 8vo. Aristophanes: Caravella, Oxonii, 1822, 8vo. Demosthenes: Reiske, Lips. 1775, 8vo. Euripides: Beck, Cantab. 1829, 8vo. Herodotus: Schweighauser, Strassburg, 1824, 8vo, 2 vols. Hesiod: Osoruis, Neapol. 1791, 8vo. Homer: Apollonius Sophista, ed. Tollius, Lugd. Bat., 1788, Cvo: Schaufelberger, Zurich, 1761-1768, 8vo, 8 vols.: Crusius, Hanover, 1836, 8vo: Wittich, London, 1843, 8vo:

Doderlein, Erlangen, 8vo, 3 vols.: Eberling, Lipsiae, 1875, 8vo: Autenrieth, Leipzig, 1873, 8vo; London, 1877, 8vo. Isocrates: Mitchell, Oxon. 1828, 8vo. Pindar: Portus, Hanov. 1606, 8vo. Plato: Timaeus, ed. Koch, Lips. 1828, 8vo: Mitchell, Oxon. 1832, 8vo: Ast, Lips. 1835-1838, 8vo, 3 vols. Plutarch: Wyttenbach, Lips. 1835, 8vo, 2 vols. Sophocles: Ellendt, Regiomonti, 1834-1835, 8vo ed. ; Genthe, Berlin, 1872, 8vo. Thucy- dides: Betant, Geneva, 1843-1847, 8vo, 2 vols. Xenophon: Sturtz, Lips. 1801-1804, 8vo, 4 vols. : Cannesin (Anabas.j, Gr.Finnish), Hel sirgissa, 1868, 8vo: Sauppe, Lipsiae, 1869, 8vo. Septuagint: Hutter, Noribergae, 1598, 4to: Biel, Hagae, 1779-1780, 8vo. New Testament: Lithocomus, Colon, 1552, 8vo: Parkhurst, ed. Major, London, 1845, 8vo: Schleusner (juxta ed. Lips, quartam), Glasguae, 1824, 4to.

Medieval and Modern Greek. — Meursius, Lugd. Bat. 1614, 4to: Critopulos, Stendaliae, 1787, 8vo: Portius, Par. 1635, 4_t° : Du Cange, Paris, 1682, fol., 2 vols.; Ludg. 1688, fol. English. — Polymera, Hermopolis, 1854, 8vo: Sophocles, Cambr. Mass. 1860-1887: Contopoulos, Athens, 1867, 8vo; Smyrna, 1868-1870, 8vo, 2 parts, 1042 pages. French. — Skarlatos, Athens, 1852, 4to: Byzantius, ib. 1856, 8vo, 2 vols.: Varvati, 4th ed. ib., i860, 8vo. Italian. — Germano, Romae, 1622, 8vo: Somavera, Parigi, 1709, fol., 2 vols.: Pericles, Hermopolis, 1857, 8vo. German.— Schmidt, Lips. 1825-1827, i2mo, 2 vols. : Petraris, Leipz. 1897. Polyglots. — Koniaz (Russian and Fr.), Moscow, 1811, 4to; Schmidt (Fr.-Germ.), Leipzig, 1837-1840, i2mo, 3 vols.: Theocharopulas de Patras (Fr.- Eng.), Munich, 1840, l2mo.

Latin. — Johannes de Janua, Catholicon or Summa, finished in 1286, printed Moguntise 1460, fol.; Venice, 1487; and about 20 editions before 1500: Johannes, Comprehensorium, Valentia, 1475, fol. : Nestor Dionysius, Onomasticon, Milan, 1477, fol. : Stephanus, Paris, 1531, fol., 2 vols. : Gesner, Lips. 1749, fol., 4 vols. : Forcellini, Patavii, 1771, fol., 4 vols. Polyglot. — Calepinus, Reggio, 1502, fol. (Aldus printed 16 editions, with the Greek equivalents of the Latin words; Venetiis, 1575, fol., added Italian, French and Spanish; Basileae, 1590, fol., is in 11 languages; several editions, from 1609, are called Octolingue; many of the latter 2 vol. editions were edited by John Facciolati) : Verantius (Ital., Germ. .Dalmatian, Hungarian), Venetiis, 1595, 4to: Lodereckerus (Ital., Germ., Dalm., Hungar., Bohem., Polish), Pragae, 1605, 4to. English. — Promptorium parvulorum, compiled in i440byGalfridusGrammaticus, a Dominican monk of Lynn Episcopi, in Norfolk, was printed by Pynson, 1499; 8 editions, 1508-1528, ed. Way, Camden Society, 1843-1865, 3 vols. 4to ; Medulla grammaticis, probably by the same author, MS. written 1483;

printed as Ortus vocabulorum, by Wynkyn de Worde, 1500; 13 editions 1509-1523; Sir Thomas Elyot, London, 1538, fol. ; 2nd ed. 1543; Bibliotheca Eliotae, ed. Cooper, ib. 1545, fol.: Huloet, Abecedarium, London, 1552, fol.; Dictionarie, 1572, fol.: Cooper, London, 1565, fol.; 4th edition, 1584, fol.: Baret, Alvearie, ib. 1575, fol.; 1580, fol.: Fleming, ib. 1583, fol.: Ainsworth, London, 1736, 4to; ed. Morell, London, 1796, 4to, 2 vols.; ed. Beatson and Ellis, ib. i860, 8vo: Scheller, translated by Riddle, Oxford, 1835, f°'- : Smith, London, 1855, 8vo; 1870: Lewis and Short, Oxford^ 1879. Eng.Latin. — Levins, Manipulus puerorum, Lond. 1570,410: Riddle, ib. 1838, 8vo: Smith, ib. 1855, 8vo. French. — Catholicon parvum, Geneva, 1487: Estienne, Dictionnaire, Paris, 1539, fol. 675 pages; enlarged 1549; ed. Huggins, Lond. 1572: Id. Dictionarium Latino Gallicum, Lutetiae, 1546, fol.; Paris, 1552; 1560: Id., Dictionariolum puerorum, Paris, 1542, 4to: Les Mots francais, Paris, 1544, 4to; the copy in the British Museum has the autograph of Queen Catherine Parr: Thierry (Fr.-Lat.), Paris, 1564, fol.: Danet, Ad usum Delphini, Paris, 1700, 4to, 2 vols.; and frequently: Quicherat, 9th ed. Paris, 1857, 8vo: Theil, 3rd ed. Paris, 1863, 8vo: Freund, ib. 1835-1865, 4to, 3 vols. German. — Joh. Melber, of Gerolzhofen, Vocabularius praedicantium, of which 26 editions are described by Hain (Repertorium, No. 11,022, &c), 15 undated. 7 dated 1480-1495, 4to, and 3 after 1504: Vocabularius gemma gemmarum, Antwerp, 1484, 4to; 1487; 12 editions, 1505-1518: Herman Torentinus, Eluci- darius carminum, Daventri, 1501 , 4to ; 22 editions, 1 504-1536 : Binnart, Ant. 1649, 8vo: Id., Biglotton, ib. 1661 ; 4th ed. 1688: Faber, ed. Gesner, Hagae Com. 1735, fol., 2 vols.: Hederick, Lips. 1766, 8vo, 2 vols. : Ingerslev, Braunschweig, 1835-1855, 8vo, 2 vols. : Thesaurus linguae Latinae, Leipzig, 1900: Walde, Lateinisches etymologisches Worterbuch, 1906. Italian. — Seebar (Sicilian translation of Lebrixa), Venet. 1525, 8vo: Venuti, 1589, 8vo: Galesini, Venez. 1605, 8vo: Bazzarini and Bellini, Torino, 1864, 4to, 2 vols. 3100 pages. Spanish. — Salmanticae, 1494, fol. ; Antonio de Lebrixa, Nebrissenis, Compluti, 1520, fol., 2 vols.: Sanchez de la Ballesta, Salamanca, 1587, 4to: Valbuena, Madrid, 1826, fol. Portuguese. —

Bluteau, Lisbon, 1712-1728, fol., 10 vols: Fonseca, ib. 1771, fol. : Ferreira, Paris, 1834, 4to; 1852. Romansch. — Promptuario di voci volgari, Valgrisii, 1565, 4to. Vlach. — Divalitu, Bucuresci, 1852, 8vo.

Swedish. — Vocabula, Rostock, 1574, 8vo; Stockholm, 1579: Lindblom, Upsala, 1790, 4to. Dutch. — Binnart, Antw. 1649, 8vo: Scheller, Lugd. Bat. 1799, 4to, 2 vols. Flemish. — Paludanus, Gandavi, 1544, 4to. Polish. — Macinius, Konigsberg, 1564, fol.: Garszynski, Breslau, 1823, 8vo, 2 vols. Bohemian. — Johannes Aquensis, Pilsnae, i5li,4to: Reschel, Olmucii, 1 560-1562, 4to, 2 vols. : Cnapius, Cracovia, 1661, fol., 3 vols. Illyrian. — Bellosztenecz, Zagrab, 1740, 4to: Jambresich (also Germ, and Hungar.), Zagrab, 1742, 4to. Servian. — Swotlik, Budae, 1721, 8vo. Hungarian. — Molnar, Frankf. a. M. 1645, 8vo: Pariz-Papai, Leutschen, 1708, 8vo; 1767. Finnish. — Rothsen, Helsingissa, 1864, 8vo. Poetic. — ■ Epithetorum et synonymorum thesaurus, Paris, 1662, 8vo, attributed to Chatillon; reprinted by Paul Aler, a German Jesuit, as Gradus ad Parnassum, Paris, 1687, 8vo; many subsequent editions: Schirach, Hal. 1768, 8vo: Noel, Paris, 1810, 8vo; 1826: Quicherat, Paris, 1852, 8vo: Young, London, 1856, 8vo. Erotic. — Rambach, Stuttgart, 1836, 8vo. Rhetorical. — Ernesti, Lips. 1797, 8vo. Civil Law. — Dirksen, Berolini, 1837, 4to. Synonyms. — Hill, Edinb. 1804, 4to: Doderlein, Lips. 1826-1828, 8vo, 6 vols. Etymology. — Danet, Paris, 1677, 8vo: Vossius, Neap. 1762, fol., 2 vols.: Salmon, London, 1796, 8vo, 2 vols.: Nagel, Berlin, 1869, 8vo; Latin roots, with their French and English derivatives, explained in German: Zehetmayr, Vindobonae, 1873, 8vo: Vanicek, Leipz. 1874, 8vo. Barbarous. — Marchellus, Mediol. 1753, 4to; Krebs, Frankf. a. M. 1834, 8vo; 1837. Particular Authors. — Caesar: Crusius, Hanov.

1838, 8vo. Cicero: Nizzoli, Brescia, 1535, fol.; ed. Facciolati, Patavii, 1734, fol.; London, 1820, 8vo, 3 vols.: Ernesti, Lips. 1739, 8vo; Halle, 1831. Cornelius Nepos: Schmieder, Halle, 1798, 8vo; 1816: Billerbeck, Hanover, 1825, 8vo. Curtius Rufus:. Crusius, Hanov. 1844, 8 vo. Horace: Ernesti, Berlin, 1802-1804, 8vo, 3 vols. : Doring, Leipz. 1829, 8vo. Justin: Meinecke, Lemgo, 1793, 8vo; 2nd ed. 1818. Livy: Ernesti, Lips. 1784, 8vo; ed Schafer, 1804. Ovid: Gierig, Leipz. 18 14: (Metamorphoses) Meinecke, 2nd ed., Lemgo, 1825, 8vo: Billerbeck (Do.), Hanover, 1831, 8vo. Phaedrus: Oertel, Niirnberg, 1798, 8vo: Horstel, Leipz. 1803, 8vo: Billerbeck Hanover, 1828, 8vo. Plautus: Paraeus, Frankf. 1614, 8vo. Pliny: Denso, Rostock, 1766, 8vo. Pliny, jun.: Wensch, Wittenberg, 1837-

1839, 4to. Quintilian: Bonnellus, Leipz. 1834, 8vo. Sallust: Schneider, Leipz. 1834, 8vo: Crusius, Hanover, 1840, 8vo. Tacitus: Botticher, Berlin, 1830, 8vo. Velleius Paterculus: Koch, Leipz: 1857, 8vo. Virgil: Clavis, London, 1742, 8vo: Braunhard, Coburg, 1834, 8vo. Vitruvius: Rode, Leipz. • 1679, 4to, 2 vols.: Orsini, Perugia, 1801, 8vo.

Old Italian Languages. — Fabretti, Torini, 1858, 4to. • Umbrian : Huschke, Leipz. i860, 8vo. Oscan and Sabellian: Id. Elberfeld, 1856, 8vo.

Medieval Latin.- — Du Cange, Glossanum, Paris, 1733-1736, fol.,

6 vols.; Carpentier, Suppl., Paris, 1766, fol., 4 vols.; ed. Adelung, Halae, 1772-1784, 8vo, 6 vols.; ed. Henschel, Paris, 1840-1850, 4to,

7 vols. (vol. vii. contains a glossary of Old French) : Brinckmeier, Gotha, 1850-1863, 8vo, 2 vols.: Hildebrand (Glossarium saec. ix.), Gotting. 1854, 4to: Diefenbach, Glossarium, Frankf. 1857, 4to: Id. Gloss, novum, ib. 1867, 4to. Ecclesiastical.— Magri, Messina, 1644, 4to; 8th ed. Venezia, 1732; Latin translation, Magri Hierolexicon, Romae, 1677, fol.; 6th ed. Bologna, 1765, 4to, 2 vols.

Romance Languages.

Romance Languages generally. — Diez, Bonn, i853,'8vo; 2nd ed. ib. 1861-1862, 8vo, 2 vols.; 3rd ed. ib. 1869-1870, 8vo, 2 vols.; transl. by Donkin, 1864, 8vo.

French. — Ranconet, Thresor, ed. Nicot, Paris, 1606, fol. ; ib. 1618, 4to: Richelet, Geneve, 1680, fol., 2 vols.; ed. Gattel, Paris,

1840, 8vo, 2 vols.

The French Academy, after five years' consideration, began their dictionary, on the 7th of February 1639, by examining the letter A, which took them nine months to go through. The word Academie was for some time omitted by oversight. They decided, on the 8th of March 1638, not to cite authorities, and they have since always claimed the right of making their own examples. Olivier justifies them by saying that for eighty years all the best writers belonged to their body, and they could not be expected to cite each other. Their design was to raise the language to its last perfection, and to open a road to reach the highest eloquence. Antoine Furetiere, one of their members, compiled a dictionary which he says cost him forty years' labour for ten hours a day, and the manuscript filled fifteen chests. He gave words of all kinds, especially technical, names of persons and places, and phrases. As a specimen, he published his Essai, Paris, 1684, 4to; Amst. 1685, i2mo. The Academy charged him with using the materials they had prepared for their dictionary, and expelled him, on the 22nd of January 1685, for plagiarism. He died on the 14th of May 1688, in the midst of the consequent controversy and law suit. His complete work was published, with a preface by Bayle, La Haye and Rotterdam,

1690, fol., 3 vols.; again edited by Basnage de Beauval, 1701; La Haye, 1707, fol., 4 vols. From the edition of 1701 the very popular so-called Dictionnaire de Trevoux, Trevoux, 1704, fol., 2 vols., was made by the Jesuits, who excluded everything that seemed to favour the Calvinism of Basnage. The last of its many

editions is Paris, 1771, fol., 8 vols. The Academy's dictionary was first printed Paris, 1694, fol., 2 vols. They began the revision in 1700 ; second edition 1718, fol., 2 vols.; 3rd, 1740, fol., 2 vols.; 6th, 1835, 2 vols. 4to, reprinted 1855; Supplement, by F. Raymond, 1836, 4to; Complement, 1842, 4to, reprinted 1856; Dictionnaire historique, Paris, 1858-1865, 4to, 2 parts (A to Actu), 795 pages, published by the Institut: Dochez, Paris, i859,4to: Bescherelle, 46.1844, 4to, 2 vols.; 5th ed. Paris, 1857, 4to, 2 vols. ; 1865; 1887: Landais, Paris, 1835; 12th ed. ib. 1854, 4to, 2 vols. : Littre, Paris, 1863-1873, 4to, 4 vols. 71 18 pages: Supplement, Paris, 1877, 4to: Godefroy (with dialects from 9th to 15th cent.), Paris, 1 881-1895, an d Complement: Hatzfield, Darmesteter, and Thomas, Paris, 1890-1900: Larive and Fleury, (mots et choses, illustre), Paris, 1884-1891. English. — Palsgrave, Lesclaircissement de la langue francoyse, London, 1530, 4to, 2 parts; 1852: Hollyband, London, 1533, 4to: Cotgrave, ib. 161 1, fol.: Boyer, La Haye, 1702, 4to, 2 vols. ; 37th ed. Paris, 1851, 8vo, 2 vols. : Fleming and Tibbins, Paris, 1846-1849, 4to, 2 vols.; ib. 1854, 4to,

2 vols.; ib. 1870-1872, 4to, 2 vols.: Tarver, London, 1853-1854, 8vo, 2 vols.; 1867-1872: Bellows, Gloucester, 1873, i6mo; ib. 1876. Ideological, or Analogical. — Robertson, Paris, 1859, 8vo: Boissiere, Paris, 1862, 8vo. Etymology. — Lebon, Paris, 1571, 8vo: Menage, ib. 1650, 4to. Pougens projected a Tresor des origines, his extracts for which, filling nearly 100 volumes folio, are in the library of the Institut. He published a specimen, Paris, 1819, 4to. After his death, Archeologie francaise, Paris, 1821, 8vo, 2 vols., was com- piled from his MSS., which were much used by Littre: Scheler, Bruxelles, 1862, 8vo; 1873: Brachet, 2nd ed. Paris, 1870, i2mo; English trans. Kitchin, Oxf. 1866, 8vo. Greek Words.' — Trippault, Orleans, 1580, 8vo: Morin, Paris, 1809, 8vo. German Words. — Atzler, Cothen, 1867, 8vo. Oriental Words. — Pihan, Paris, 1847, 8vo; 1866: Devic, ib. 1876, 8vo. Neology.- — Desfontaines, 3rd ed. Amst. 1728, l2mo: Mercier, Paris, 1801, 8vo, 2 vols.: Richard, ib. 1842, 8vo; 2nd ed. 1845. Poetic. — Diet, des rimes (by La Noue), Geneve, 1596, 8vo; Cologny, 1624, 8vo: Carpentier, Le Gradus francais, Paris, 1825, 8vo, 2 vols. Erotic— De Landes, Bruxelles, 1861, i2mo. Oratory. — Demandre and Fontenai, Paris, 1802, 8vo: Planche, ib. 1819-1820, 8vo, 3 vols. Pronunciation.- — Feline, ib.

1857, 8vo. Double Forms. — Brachet,*. 1871, 8vo. Epithets.- — • Daire, ib. 1817, 8vo. Verbs. — Bescherelle, ib. 1855, 8vo, 2 vols.: 3rd ed. 1858. Participles. — Id., ib. 1861, i2mo. Difficulties. — • Boiste, London, 1828, i2mo: Laveaux, Paris, 1872, 8vo, 843 pages. Synonyms. — Boinvilliers, Paris, 1826,. 8vo: Lafaye, ib. 1858, 8vo; 1861; 1869: Guizot, ib. 1809, 8vo; 6th ed. 1863; 1873. Homonyms. — Zlatagorski (Germ., Russian, Eng.), Leipzig, 1862, 8vo, 664 pages. Imitative Words. — Nodier, Onomatopees, ib. 1828, 8vo. Technology. — D'Hautel, ib. 1808, 8vo, 2vols. :. Desgranges, ib. 1821, 8vo: Tolhausen (Fr., Eng., Germ.), Leipz. 1873, 8vo, 3 vols. Faults of Expression. — Roland, Gap, 1823, 8vo: Blondin, Paris, 1823, 8vo. Particular Authors. — Corneille: Godefroy, ib. 1862, 8vo, 2 vols.: Marty-Laveaux, ib. 1868, 8vo, 2 vols. La Fontaine: Lorin, ib. 1852, 8vo. Malherbe: Regnier, ib. 1869, 8vo. Moliere: Genin, ib. 1846, 8vo: Marty-Laveaux, ib. 8vo. Racine: Marty- Laveaux, ib. 1873, 8vo, 2 vols. M me de Sevigne: Sommer, ib. 1867, 8vo, 2 vols. Old French. — La Curne de St Palaye prepared a dictionary, of which he only published Projet d'un glossaire, Paris, 1756, 4to. His MSS. in many volumes are in the National Library, and were much used by Littre. They were printed by L. Favre, and fasciculi 21-30 (torn, iii.), Niort, 4to, 484 pages, were published in February 1877. Lacombe (vieux langage), Paris, 1766, 2 vols. 4to: Kelham (Norman and Old French), London, 1779, 8vo: Roquefort (langue romane), Paris, 1808, 8vo; Supplement, ib. 1820, 8vo: Pougens, Archeologie, ib. 1821, 8vo, 2 vols.: Burguy, Berlin, 1851- 1856, 8vo, 3 vols. : Laborde (Notice des emaux . . . du Louvre, part ii.), Paris, 1853, 8vo, 564 pages: 1 Gachet (rhymed chronicles), Bruxelles, 1859, 4to: Le Hericher (Norman, English and French), Paris, 1862,

3 vols. 8vo: Hippeau (12th and 13th centuries), Paris, 1875, 8vo. Dialects. — Jaubert (central), Paris, 1856-1857, 8vo, 2 vols. : Baumgarten (north and centre), Coblentz, 1870, 8vo: Azais, Idiomes romans du midi, Montpellier, 1877. Austrasian: Francois. Metz, 1773, 8vo. Auvergne: Mege, Riom, 1861, i2mo. Beam: Lespi, Pau,

1858, 8vo. Beaucaire: Bonnet (Bouguiren), Nismes, 1840, 8vo. Pays de Bray: Decorde, Neufchatel, 1852, 8vo. Burgundy: Mignard, Dijon, 1870, 8vo. Pays de Castres: Couzinie, Castres, 1850, 4to. Dauphine: Champollion-Figeac, Paris, 1809, 8vo: Jules, Valence, 1835, 8vo; Paris, 1840, 4to. Dep. of Doubs: Tissot (Patois des Fourg, arr. de Pontarlier) Besancon, 1865, 8vo. Forez: Gras, Paris, 1864, 8vo; Neolas, Lyon, 1865, 8vo. Franche Comte: Maisonforte, 2nd ed. Besancon, 1753, 8vo. Gascony: Des- grouais (Gasconismes corriges), Toulouse, 1766, 8vo; 1769; 1812, i2mo, 2 vols. ; 1825, 8vo, 2 vols. Dep.ofGers: Cenac-Montaut, Paris, 1863, 8vo. Geneva: Humbert, Geneve, 1820,

8vo. Languedoc: Odde, Tolose, 1578, 8vo: Doujat, Toulouse, 1638, 8vo: De S.[auvages], Nismes, 1756, 2 vols.; 1785; Alais, 1820: Azais, Beziers, 1876, &c, 8vo: Hombres, Alais, 1872, 4to: Thomas (Greek words) Mont- pellier, 1843, 4to. Liege: Forir, Liege, 1866, 8vo, vol i. 455 pages. Lille: Vermesse, Lille, 1861, i2mo: Debuire du Buc ib., 1867, 8vo. Limousin: Beronie, ed. Vialle (Correze), Tulle, 1823, 4to.

1 This volume was issued with a new title-page as Glossaire du moyen Age, Paris, 1872.

Lyonnais, Forez, Beaujolais: Onofrio, Lyon, 1864, 8 vo. Haul Maine: R [aoul] de M. [ontesson], Paris, 1857; 1859, 503 pages. Mentone: Andrews, Nice, 1877, l2mo. Dep. de la Meuse: Cordier, Paris, 1853, 8vo. Norman: Edelestand and Alfred Dumeril, Caen, 1849, 8vo: Dubois, ib. 1857, 8vo: Le Hericher (Philologie topo- graphique), Caen, 1863, 4to: Id. (elements scandinaves), Avranches, 1 86 1, i2mo: Metivier (Guernsey), London, 1870, 8vo: Vasnier (arrond de Pont Audemer), Rouen, 1861, 8vo: Delboulle (Vallee d'Yeres), Le Havre, 1876. Picardy: Corblet, Amiens, 1851, 8vo. Poitou, Saintonge, Aunis: Favre, Niort, 1867, 8vo. Poitou: Beauchet-Filleau, Paris, 1864, 8vo: Levrier, Niort, 1867, 8vo: Lalanne, Poitiers, 1868, 8vo. Saintonge: Boucherie, AngoulSme, 1865, 8vo: Jonain, Royan, 1867, 8vo. Savoy: Pont (Terratzu de la Tarantaise), Chambery, 1869, 8vo. La Suisse Romande: Bridel, Lausanne, 1866, 8vo. Dep. of Tarn: Gary, Castre, 1845, 8vo. Dep. of Vaucluse: Barjavel, Carpentras, 1849, 8vo. Walloon (Rouchi): Cambresier, Liege, 1787, 8vo: Grandgagnage, ib. 1845-1850, 8vo. 2 vols.: Chavee, Paris, 1857, l8mo: Vermesse, Doudi, 1867, 8vo. Sigart (Montois), Bruxelles, 1870, 8vo. Slang. — Oudin, Curiositez Francaises, Paris, 1640, 8vo: Baudeau de Saumaise (Precieuses, Langue de Ruelles), Paris, 1660, i2mo; ed. Livet, ib. 1856: Le Roux, Diet. Comique, Amst. 1788, and 6 other editions: Cargme Prenant [i.e. Taumaise], (argot reforme), Paris, 1829, 8vo: Larchey (excentricitees du langage), Paris, i860, l2mo; 5th ed. 1865: Delvau (langue verte, Parisian), Paris, 1867, 8vo: Larchey, Paris, 1873, 4to, 236 pages.

Provencal. — Pallas, Avignon, 1723, 4to: Bastero, La Crusca Pro- venzale, Roma, 1724, fol. vol. i. only: Raynouard, Paris, 1 836-1 844, 8vo, 6 vols.: Garcin, Draguignand, 1841, 8vo, 2 vols. : Honnorat, Digne, 1846-1849, 410, 4 vols. 107,201 words: Id., Vocab.fr. prov., ib. 1848, l2mo, 1 174 pages.

Spanish. — Covarruvias Orosco, Madrid, 161 1, fol.; ib. 1673-1674, fol. 2 vols. ; Acadsmia Espanola, Madrid, 1 726-1 739, fol. 6 vols. ; 8th ed. 1837 : Caballero, Madrid, 1849, fol. ; 8th ed. ib. i860, 4to, 2 vols. : Cuesta, ib. 1872, fol. 2 vols. : Campano, Paris, 1876, i8mo, 1015 pages. Cuervo, 1886-1894; Monlau, 1881 ; Zerola, Toro y Gomes, and Isaza, 1895; Serrano (encyclopaedic) 1876-1881. English. — Percivall, London, 1591, 4to: Pineda, London, 1740, fol.: Connelly and Higgins, Madrid, 1 797-1 798, 4to, 4 vols. : Neuman and Baretti, 9th ed. London, 1831, 8vo, 2 vols. ; 1874. French. — Oudin, Paris, 1607, 4to, 1660; Gattel, Lyon, 1803, 4to, 2 vols.: Dominguez, Madrid, 1846, 8vo, 6 vols.: Blanc, Paris, 1862, 8vo, 2 vols. German. — Wagener, Hamb. 1801-1805, 8vo, 4 vols.: Seckendorp, ib. 1823, 8vo, 3 vols.: Franceson, 3rd ed. Leipzig, 1862, 8vo, 2 vols. Italian. — Franciosini, Venezia, 1735, 8vo, 2 vols.; Cormon y Manni, Leon, 1843, i6mo, 2 vols.: Romero, Madrid, 1844, 4to. Synonyms. — Diccionario de Sinonimos, Paris, 1853, 4to. Etymology. — Aldrete, Madrid, 1682, fol.: Monlau y Roca, ib. 1856, i2mo; Barcia, 1881-1883. Arabic Words. — Hammer Purgstall, Wien, 1855, 8vo: Dozy and Engel- mann, 2d ed. Leiden, 1869, 8vo. Ancient. — Sanchez, Paris, 1842, 8vo. Rhyming. — Garcia de Rengifo (consonancias) Sajmantica, 1592, 4to; 1876. Don Quixote. — Beneke (German), Leipzig, 1800, i6mo; 4th ed. Berlin, 1841, i6mo. Dialects. — Aragonese: Peralta, Zaragoza, 1836, 8vo: Borao, ib. 1859, 4to. Catalan: Rocha de Girona (Latin), Barcinone, 1561, fol.: Dictionari Catala (Lat. Fr. Span.), Barcelona, 1642, 8vo: Lacavalleria (Cat.-Lat.), ib. 1696, fol. : Esteve, ed. Belvitges, &c. (Catal.-Sp. Lat.), Barcelona, 1805-1835, fol. 2 vols. : Saura (Cat. -Span.), ib. 1851, i6mo; 2nd ed. (Span.-Cat.), ib. 1854; 3rd ed. (id.) ib. 1862, 8vo: Labernia, ib. 1844-1848, 8vo, 2 vols. 1864. Gallegan : Rodriguez, Corufia, 1863, 4to : Cuveira y Pinol, Madrid, 1877, 8vo. Majorca: Figuera, Palma, 1840, 4to: Amengual, ib. 1845, 4to. Minorca: Diccionario, Madrid, 1848, 8vo. Valencian: Palmyreno, Valentiae, 1569: Ros, Valencia, 1764, 8vo: Fuster, ib. 1827, 8vo: Lamarca, 2nd ed. ib. 1842, iomo. Cuba: Glossary of Creole Words. London, 1840, 8vo: Pichardo, 1836; 2nd ed. Havana, 1849, 8vo; 3rd ed. ib. 1862, 8vo; Madrid, i860, 4to.

Portuguese. — Lima, Lisbon, 1783, 4to: Moraes da Silva, ib. 1789, 4to, 2 vols.; 6th ed. 1858: Academia real das Sciencas, ib. 1793, torn, i., ccvi. and 544 pages (A to Azurrar) ; Faria, ib. 1849, fol. 2 vols. ; 3rd ed. ib. 1 850-1 857, fol. 2 vols. 2220 pages. English. — • Vieyra, London, 1773, 2 vols. 4to: Lacerda, Lisboa, 1866-1871, 4to, 2 vols. French. — Marquez, Lisboa, 1756-1761,101. 2 vols.: Roquette, Paris, 1 841, 8vo, 2 vols.; 4th ed. i860: Marques, Lisbonne, 1875, fol. 2 vols.: Souza Pinto, Paris, 1877, 32mo, 1024 pages. German. — Wagener,

Leipzig, 1811-1812, 8vo, 2 vols.: Wollheim, ib. 1844, l2mo, 2 vols. : Bosche, Hamburg, 1858, 8vo, 2 vols. 1660 pages. Italian. — Costa e Sa, Lisboa, 1773-1774, fol. 2 vols. 1652 pages: Prefumo, Lisboa, 1853, 8vo, 1162 pages. Ancient.— Toaquim de Sancta Rosa de Viterbo, ib. 1798, fol. 2 vols. ; 1824, 8vo. Arabic Words. — Souza, ib. 1789, 4to; 2nd ed. by S. Antonio Moura, ib. 1830, 224 pages. Oriental and African Words, not Arabic. — Sao Luiz, ib. 1837, 4to, 123 pages. French Words. — Id., ib. 1827, 4to; 2nd ed. Rio de Janeiro, 1835, 8vo. Synonyms. — Id., ib. 1821, 4to; 2nd ed. ib. 1 824-1 828, 8vo. Fonseca, Paris, 1833, 8vo; 1859, i8mo, 863 pages. Homonyms. — De Couto, Lisboa, 1842, fol. Poetic. — Luzitano (i.e. Freire), ib. 1765, 8vo, 2 vols. ; 3rd ed. ib. 1820, 4to, 2 vols. Rhyming. — Couto Guerreiro, Lisboa, 1763, 4to. N-aval. — Tiberghien, Rio de Janeiro, 1870, 8vo. Ceylon-Portuguese. — Fox, Colombo, 1819, 8vo: Callaway, ib. 1823, 8vo.

Italian. — Accarigi, Vocabulario, Cento, 1543, 4to: Alunno, La VIII. 7

fabrica del mundo, Vinezia, 1548, fol. : Porccachi, Venetia, 1588, fol. : Accademici della Crusca, Vocabulario, Venez. 161 2, fol.; 4th ed. Firenze, 1729-1738, fol. 6 vols. : Costa and Cardinali, Bologna, 1819-1826, 4to, 7 vols.: Tommaseo and Bellini, Torino, 1861, &c, 4to, 4 vols.: Petrocchi, 1884-1891. English. — Thomas, London, 1598, 4to: Florio, London, 1598, 4to, 1611: Baretti, London, 1794, 2 vols.; 1854, 8vo, 2 vols. : Petronj and Davenport, Londra, 1828, 8vo, 3 vols. : Grassi, Leipz. 1854, i2mo: Millhouse, Lond., 1868, 8vo, 2 vols. 1348 pages. French. — Alberti, Paris, 1771, 4to, 2 vols.; Milan, 1862: Barberi, Paris, 1838. 4to, 2 vols. : Renzi, Paris, 1850, 8vo. German. — Libro utilissimo, Venetiis, 1499, 4to: Valentini, Leipzig, 1834-1836, 4to, 4 vols. Etymology. — Menage, Geneva, 1685, fol.: Bolza, Vienna, 1852, 4to. Provencal Words. — Nannucci, Firenze, 1840, 8vo. Synonyms. — Rabbi, Venezia, 1774, 4to; 10th ed. 1817; Tommaseo, Firenze, 1839-1840, 4to, 2 vols.: Milano, 1856, 8vo; 1867. Verbs. — Mastrofini, Roma, 1814, 4to, 2 vols. Select Words and Phrases. — Redi, Brescia, 1769, 8vo. Incorrect Words and Phrases. — Molassi, Parma, 1830-1841, 8vo, 854 pages. Supposed Gallicisms. — Viani, Firenze, 1858-1860, 8vo, 2 vols. Additions to the Diction- aries. — Gherardini, Milano, 1819-1821, 8vo, 2 vols.; ib. 1852-1857, 8vo, 6 vols. Rhyming. — Falco, Napoli, 1535, 4to: Ruscelli, Venetia, 1563, 8vo; 1827: Stigliani, Roma, 1658, 8vo: Rosasco, Padova, 1763, 4to; Palermo, 1840, 8vo. Technical. — Bonavilla-Aquilino, Mil. i8i9-i82i,8vo, 5 vols. ; 2nded. 1829-1831,410, 2 vols. :Vogtberg (Germ.), Wein, 1831, 8vo. Particular Authors. — Boccaccio: Aluno, Le ricchezze della lingua volgare, Vinegia, 1543, fol. Dante: Blanc, Leipzig, 1852, 8vo; Firenze, 1859, 8vo. Dialects. — Bergamo:

Gasparini, Mediol. 1565: Zappetini, Bergamo, 1859, 8vo: Tiraboschi (anc. and mod.), Turin, 1873, 8vo. Bologna: Bumaldi, Bologna, 1660, l2mo: Ferrari, ib. 1820, 8vo; 1838, 4to. Brescia: Gagliardi, Brescia, 1759, 8vo: Melchiori, ib. 1817-1820, 8vo: Vocabu- larietto, ib. 1872, 4to. Como: Monti, Milano, 1845, 8vo. Ferrara: Manini, Ferrara, 1805, 8vo: Azzi, ib. 1857, 8vo. Friuli: Scala, Pordenone, 1870, 8vo. Genoa: Casaccia, Gen. 1842-1851, 8vo; 1873, &c: Paganini, ib. 1857, 8vo. Lombardy: Margharini, Tuderti, 1870, 8vo. Mantua: Cherubini, Milano, 1827, 4to. Milan: Varon, ib. 1606, 8vo: Cherubini, ib. 1814, 8vo, 2 vols.; 1841-1844, 8vo, 4 vols.; 1851-1861, 8vo, 5 vols.: Banfi, ib. 1857, 8vo: 1870, 8vo. Modena: Galvani, Modena, 1868, 8vo. Naples: Galiani, Napoli, 1789, l2mo, 2 vols. Parma: Peschieri, Parma, 1828-1831, 8vo, 3 vols. 1840; Malespina, ib. 1856, 8vo, 2 vols. Pavia: Dizionario domes- tico pavese, Pavia, 1829, 8vo: Gambini, ib. 1850, 4to, 346 pages. Piacenza: Nicolli, Piacenza, 1832: Foresti, ib. 1837-1838, 8vo, 2 pts. Piedmont: Pino, Torino, 1784, 4to: Capello (Fr.), Turin, 1814, 8vo, 2 pts. : Zalli (Ital. Lat. Fr.), Carmagnola, 1815, 8vo, 2 vols: Sant' Albino, Torino, i860, 4to. Reggio: Vocabulario Reggiano, 1832. Romagna: Morri, Fienza, 1840. Rome: Raccolto di voci Romani e Marchiani, Osimo, 1769, 8vo. Roveretano and Trenlino: Azzolini, Venezia, 1856, 8 vo. Sardinia: Porru, Casteddu, 1832, fol. : Spano, Cagliari, 1851-1852, fol. 3 vols. Sicily: Bono (It. Lat.), Palermo, I75l-I754i 4to, 3 vols. ; 1 783-1 785, 4to, 5 vols. : Pasqualino, ib. 1785- 1795, 4to, 5 vols. : Mortillaro, 16.1853, 4to, 956 pages: Biundi, ˆ.1857, l2mo, 578 pages: Traina, ib. 1870, 8vo. Siena: Barbagli, Siena, 1602, 4to. Taranto: Vincentiis, Taranto, 1872, 8vo. Turin: Somis di Chavrie, Torino, 1843, 8vo. Tuscany: Luna, Napoli, 1536, 4to: Politi, Roma, 1604, 8vo; Venezia, 1615; 1628; 1665; Paulo, ib. 1740, 4to. Vaudois: Callet, Lausanne, 1862, i2mo. Venetian: Patriarchi (Veneziano e padevano), Padova, 1755, 4to; 1796, 1821: Boerio, Venezia, 1829, 4to; 1858-1859; 1861. Verona: Angeli, Verona, 1 821, 8vo. Vicenza: Conti, Vicenza, 1 87 1, 8vo. Lingua Franca. — Dictionnaire de la langue Franque, ou Petit Mauresque, Marseille, 1830, i6mo, 107 pages. Slang.— Sabio (lingua Zerga), Venetia, 1556, 8vo; 1575: Trattato degli bianti, Pisa, 1828, 8vo.

Romansh. — Promptuario de voci volgari e Latine, Valgrisii, I5 6 5. 4 to: Der, die, das, oder Nomenclatura (German nouns explained in Rom.), Seoul, 1744, 8vo: Conradi, Zurich, 1820, 8vo; 1826, i2mo, 2 vols.: Carisch, Chur, 1821, 8vo; 1852, i6mo.

Vlach. — Lesicon Rumanese (Lat. Hung. Germ.), Budae, 1825, 4to: Bobb (Lat. Hung.), Clus, 1822-1823, 4to, 2 vols. French — Vaillant, Boucoureshti, 1840, 8vo: Poyenar, Aaron and Hill, Boucourest, 1840-1841, 4to, 2 vols.; Jassi, 1852, i6mo, 2 vols. : De Pontbriant,

Bucuresci, 1862, 8vo: Cihac, Frankf. 1870, 8vo: Costinescu, Bucuresci, 1870, 8vo, 724 pages: Antonescu, Bucharest, 1874, i6mo, 2 vols. 919 pages. German. — Clemens, Hermanstadt, 1823, 8vo: Isser, Kronstadt, 1850: Polyzu, ib. 1857, 8vo.

Teutonic : (1) Scandinavian.

Icelandic. — Latin. — Andreae, Havniae, 1683, 8vo: Halderson (Lat. Danish), ib. 1814, 4to, 2 vols. English. — Cleasby-Vigfusson, Oxford, 1874, 4to. German. — Dieterich, Stockholm, 1844, 8vo: Mobius, Leipzig, 1866, 8vo. Danish. — Jonssen, Kjobenhavn, 1863, 8vo. Norwegian.— Kraft, Christiania, 1863, 8vo: Fritzner, Kristiania, 1867, 8vo. Poetic. — Egilsson (Latin), Hafniae, i860, 8vo; 1864.

Swedish. — Kindblad, Stockholm, 1840, 4to: Almqvist, Orebro, 1842-1844, 8vo: Dalin, Ordbog. Stockholm, 1850-1 853, 8vo, 2 vols. 1668 pages; 1867, &c. 4to (vol. i. ii., A to Fjermare, 928 pages): Id., Handordbag, ib. 1868, i2mo, 804 pages: Svenska Academien. Stockholm, 1870, 4to (A) pp. 187. Latin.— Stjernhjelm, Holm, 1643, 4to: Verelius, Upsala, 1691, 8vo: Ibre (Sueo-Gothicum),

Upsala, 1769, foi. 2 vols. English. — Serenius, Nykoping, 1757, 4to: Brisnon, Upsala, 1784, 4to: Widegren, Stockholm, 1788, 4*0; Brisman, Upsala, 1801, 4to; 3rd ed. 1815, 2 vols.: Deleen Orebro, 1829, 8vo: Granberg, ib. 1832, i2mo: Nilssen, Widmark, &c, Stockholm, 1875, 8vo. French. — Moller, Stockholm, 1745, 4to: Biorkengren, ib. 1795, 2 vols.: Nordforss, ib. 1805, 8vo, 2 vols.: 2nd ed. Orebro, 1827, l2mo: West, Stockh. 1807, 8vo: Dalin, ib. 1842- 1843, 4to, 2 vols.; 1872. German. — Dahnert, Holmiae, 1746, 4to: Heinrich, Christiansund, 1814, 4to, 2 vols.; 4th ed. Orebro, 1841, i2mo: Helms, Leipzig, 1858, 8vo; 1872. Danish.— Host, Kjobenhavn, 1799, 4to: Welander, Stockholm, 1844, 8vo: Dalin, ib. 1869, i6mo: Kaper, Kjobenhavn, 1876, i6mo. Etymology. — Tamm, Upsala, 1874, &c, 8vo (A and B), 200 pages. Foreign Words. — Sahlstedt, Wasteras, 1769, 8vo: Andersson (20,000), Stockholm, 1857, l6mo: Tullberg, ib. 1868, 8vo: Ekbohrn, ib. 1870, i2mo: Dalin, ib. 1870, &c, 8vo. Synonyms. — Id., ib. 1870, i2mo. Naval. — Ramsten, ib. 1866, 8vo. Technical. — Jungberg, ib. 1873, 8vo. Dialects. — Ihre, Upsala, 1766, 4to: Rietz, Lund, 1 862-1 867, 4to, 859 pages. Bohusldn: Idioticon Bohusiense,

Gotaborg, 1776, ito. Dalecarlia: Arborelius, Upsala, 1813, 4to. Gothland: Hof (Sven), Stockholmiae, 1772, 8vo: Raaf (Ydre), Orebro, 1859, 8vo. Holland: Moller, Lund, 158, 8vo. Helsingland: Lenstrom, ib. 1841, 8vo: Fornminnessallskap, Hudikswall, 1870, 8vo.

Norwegian. — Jenssen, Kjobenhavn, 1646, 8vo: Pontoppidan, Bergen, 1749, 8vo: Hanson (German), Christiania, 1840, 8vo: Aasen, ib. 1873, 8vo, 992 pages.

Danish.— Aphelen, Kopenh, 1764, 4to, 2 vols.; 1775, 4to, 3 vols.: Molbech, Kjobenhavn, 1833, 8vo, 2 vols.: ib. 1859, 2 vols.: Videns-kabernes Selskab, ib. 1 793-1 865, Kalkar. English. — Berthelson (Eng. Dan.), 1754, 4to: Wolff, London, 1779, 4to. Bay, ib. 1807, 8vo,2vols.; 1824, 8vo: Hornbeck, ib. 1863, 8vo: Ferrall and Repp, ib. 1814, i6mo; 1873, 8vo: Rosing, Copenhagen, 1869, 8vo: Ancker, ib. 1874, 8vo. French. — Aphelen, ib. 1754, 8vo: Id., ib. 1759, 4to, 2 vols.; 2nd ed. 1772-1777, vol. i. ii. German. — Id., ib. 1764, 4to, 2 vols.: Gronberg, 2nd ed. Kopenh. 1836-1839, i2mo, 2 vols.; 1851, Helms, Leipzig, 1858, 8vo. Synonyms. — Muller, Kjobenhavn, 1853, 8vo. Foreign Words. — Hansen, Christiania, 1842, i2mo. Naval. — Wilsoet, Copenhagen, 1830, 8vo: Fisker (French), Kjobenhavn, 1839, 8vo. Old Danish. — Molbech, ib. 1 857-1 868, 8vo, 2 vols. Dialects. — Id., ib. 1841, 8vo. Bornholm: Adler, ib. 1856, 8vo. South Jutland: Kok, 1867, 8vo. Slang. — Kristiansen (Gadesproget), ib. 1866, 8vo. p. 452.

(2) Germanic.

Teutonic. — Comparative. — Meidinger, Frankf. a. M. 1833, 8vo, 2nd ed. 1836, 8vo.

Gothic. — Junius, Dortrecht, 1665, 4to: 1671 ; 1684, Dief en- bach (comparative), Franckf. a. M. 1846-1851, 2 vols. 8vo: Schulze, Magdeburg, 1848, 4to: ‘ 1867, 8vo: Skeat, London, 1868, 4to: Balg (Comparative Glossary), Magvike, Wisconsin, 1887-1889. Ulphilas (editions with dictionaries) . — Castilionaeus, Mediol, 1829, 4to : Gabelentz and Lobe, Altenburg, 1 836-1 843, 4to, 2 vols. : Gaugen-gigl, Passau, 1848, 8vo: Stamm, Paderborn, 1857: Stamm and Heyne, ib. 1866, 8vo.

Anglo-Saxon. — Latin. — Somner (Lat. Eng.), Oxonii, 1659, fol. : Benson, ib. 1701, 8vo: Lye (A.-S. and Gothic), London, 1772, fol. 2 vols. : Ettmuller, Quedlinburg, 1851, 8vo. 838 pages. English. — Bosworth, London, 1838, 8vo, 721 pages: Id. {Compendious), 1848, 278 pages. Corson (A.-S. and Early English), New York, 1871, 8vo, 587 pages; Toller (based on Bosworth), Oxford, 1 882-1 898. German.

— Bouterwek, Gfltersloh, 1850, 8vo, 418 pages: Grein (Poets), Gottingen, 1861-1863, 8vo, 2 vols.: Leo, Halle, 1872, 8vo.

English. — Cockeram, London, 1623, 8vo: 9th ed. 1650: Blount, ib. 1656, 8vo : Philips, The new World of Words, London, 1658, fol. : Bailey, London, 1721, 8vo; 2nd ed. ib. 1736, fol.; 24th ed. ib. 1782, 8vo: Johnson, ib. 1755, fol. 2 vols.; ed. Todd, London, 1818, 4to, 4 vols.; ib. 1827. 4to, 3 vols.; ed. Latham, ib. 1 866-1 874, 4to, 4 vols. (2 in 4 parts): Barclay, London, 1774, 4to; ed. Woodward, \b. 1848: Sheridan, ib. 1780, 4to, 2 vols.: Webster, New York, 1828, 4to, 2 vols.; London, 1832, 4to, 2 vols.; ed. Goodrich and Porter, 1865, 4to: Richardson, ib. 1836, 4to, 2 vols.; Supplement, 1856: Ogilvie, Imperial Dictionary, Glasgow, 1850-1855, 8vo, 3 vols, (the new edition of Ogilvie by Charles Annandale, 4 vols., 1882, was an encyclopaedic dictionary, which served to some extent as the founda- tion of the Century Dictionary); Boag, Do., Edinburgh, 1852-1853, 8vo, 2 vols.: Craik, ib. 1856, 8vo: Worcester, Boston, 1863, 4to. Stormouth and Bayne, 1885; Murray and Bradley, The Oxford English Dictionary, 1884- ; Whitney, The Century Diet., New York, 1889-1891; Porter, Webster's Internal. Diet., Springfield, Massachusetts, 1890; Funk, Standard Diet., New York, 1894; Hunter, The Encyclopaedic Diet., 1879-1888. Etymology. — Skinner,Londini, 1671, fol.: Junius, Oxonii, 1743, fol.: Wedgewood, London, 1859- 1865, 3 vols. ; ib. 1872, 8vo. Skeat, Oxford, 1881 ; Fennell (Anglicized words), Camb. 1892. Pronouncing. — Walker, London, 1774, 4to: by Smart, 2nd ed. ib. 1846, 8vo. Pronouncing in German.— Hausner, Frankf. 1793, 8vo; 3rd ed. 1807 ; Winkelmann, Berlin, 1818, 8vo: Voigtmann, Coburg, 1835, 8vo: "Albert, Leipz. 1839, 8vo: Bassler, ib. 1840, i6mo. Analytical. — Booth, Bath, 1836, 4to: Roget, Thesaurus, London, 1852, 8vo; 6th ed. 1857; Boston, 1874. Synonyms. — Piozzi, London, 1794, 8vo, 2 vols.: L. [abarthe], Paris,

1803, 8vo, 2 vols.: Crabb, London, 1823, 8vo; nth ed. 1859: C. J. Smith, ib. 1871, 8vo, 610 pages. Reduplicated Words. — Wheatley, ib. 1866, 8vo. Surnames. — Arthur, New York, 1857, i2mo, about 2600 names: Lower, ib. i860, 4J0. Particles. — Le Febure de Villebrune, Paris, 1774, 8vo. Rhyming. — Levins, Manipulus Puerorum, London, 1570, 4to; ed. Wheatley, ib. 1867, 8vo: Walker, London, 1775, 8vo; 1865, 8vo. Shakespeare.— Nares, Berlin, 1822, 4to; ed. Halliwell and Wright, London, 1859, 8vo: Schmidt, Berlin, 1 874. Old English. — Spelman, London [1626], fol. (A to I only); 1664 (completed); 1687 (best ed.) : Coleridge (1250-1300), ib. 1859, 8vo: Stratmann (Early Eng.), Krefeld, 1867, 8vo; 2nd ed. 1873, 4to: Bradley (new edition of Stratman), Oxford, 1891; Matzner and Bieling, Berlin, 1878- Old and Provincial. — Halliwell, London, 1844-1846, 8vo; 2nd ed. ib. 1850, 2

vols.: 6th ed. 1904: Wright, ib. 1857, 8vo, 2 vols-; 1862. Dialects. — Ray, ib. 1674, i2mo: Grose, ib. 1787, 8vo; 1790: Holloway, Lewes, 1840, 8vo; Wright, Eng. Dialect Diet., London, 1898-1905, 28 vols. Scotch: Jamieson, Edin. 1806, 4to, 2 vols.; Supplement, 1826, 2 vols.; abridged by Johnstone, ib. 1846, 8vo: Brown,Edin,i845,8vo: Motherby (German), Konigsberg, 1826-1828, 8vo: (Shetland and Orkney), Edmonston, London, 1866, 8vo: (Banffshire), Gregor, ib. 1866, 8vo. North Country: Brockett, London, 1839, 8vo, 2 vols. Berkshire: [Lousley] ib. 1852, 8vo, Cheshire: Wilbraham, ib. 1817, 4to; 1826, i2mo: Leigh, Chester, 1877, 8vo. Cumberland: Glossary, ib. 1851, i2mo: Dickenson, Whitehaven, 1854, i2mo; Supplement, 1867: Ferguson (Scandin- avian Words), London, 1856, 8vo. Derbyshire: Hooson (mining), Wrexham, 1747, 8vo: Sleigh, London, 1865, 8vo. Dorset: Barnes, Berlin, 1863, 8vo. Durham: [Dinsdale] (Teesdale), London, 1849, i2mo. Gloucestershire: Huntley (Cotswold), ib. 1868, 8vo. Hereford- shire: [Sir George Cornewall Lewis,] London, 1839, l2mo. Lanca- shire: Nodal and Milner, Manchester Literary Club, 1875, 8vo, Morris (Furness), London, 1869, 8vo: R. B. Peacock (Lonsdale, North and South of the Sands), ib. 1869, 8vo. Leicestershire: A. B. Evans, ib. 1848, 8vo. Lincolnshire: Brogden, ib. 1866, l2mo: Peacock (Manley & Corringham), ib. 1877, 8vo. Norfolk and Suffolk 1 Forby, London, 1830, 8vo, 2 vols. Northamptonshire: Sternberg, ib. 1851, 8vo: Miss Anne E. Baker, ib. 1866, 8vo, 2 vols. 868 pages. Somersetshire: Jennings, ib. 1869, 8vo: W. P. Williams and W. A. Jones, Taunton, 1873, 8vo. Suffolk: Moor, Woodbridge, 1823, l2mo: Bowditch (Surnames), Boston, U.S., 1851, 8vo; 1858; 3rd ed. London, 1861, 8vo, 784 pages. Sussex: Cooper, Brighton, 1836, 8vo: Parish, Farncombe, 1875, 8vo. Wiltshire: Akerman, London, 1842, i2mo. Yorkshire (North and East), Toone, ib. 1832, 8vo: (Craven), Carr, 2nd ed. London, 1828, 8vo, 2 vols.: (Swaledale), Harland, ib. 1873, 8vo: (Cleveland), Atkinson, ib. 1868, 4to, 653 pages: (Whitby) [F. K. Robinson], ib. 1876, 8vo: (Mid-Yorkshire and Lower Niddersdale), C. Clough Robinson, ib. 1876, 8vo: (Leeds), ld.,.ib. 1861, i2mo: (Wakefield), Banks, ib. 1865, i6mo: (Hallam- shire), Hunter, London, 1829, 8vo. Ireland: (Forth and Bargy, Co. Wexford), Poole, London, 1867, 8vo. America: Pickering, Boston, 1816, 8vo: Bartlett, New York, 1848, 8vo; 3rd ed. Boston, i860. 8vo; I Dutch transl. by Keijzer, Gorinchen, 1854, i2mo; Germ, transl. by Kohler, Leipz. 1868, 8vo. Elwyn, Philadelphia, 1859. 8vo. Negro English: Kingos, St Croix, 1770, 8vo: Focke (Dutch), Leiden, 1855, 8vo: Wullschlaegel, Lobau, 1856, 8vo. 350 pages. Slang.— -Grose, London, 1785, 8vo; 1796: Hotten, ib. 1864, 8vo; 1866; Farmer & Henley (7 vols., 1890-1904).

Frisic. — Wassenbergh, Leeuwarden, 1802, 8vo: Franeker, 1806, 8vo:

Outzen, Kopenh. 1837, 4to: Hettema (Dutch), Leuwarden, 1832, 8vo; 1874, 8vo, 607 pages: Winkler (Nederdeutsch en Friesch Dialectikon), ‘s Gravenhage, 1874, 8vo, 2 vols. 1025 pages. Old Frisic. — Wiarda (Germ.), Aurich, 1786, 8vo: Richthofen, Gottingen, 1840, 4to. North Frisic. — Bendson (Germ.), Leiden, i860, 8vo: Johansen (Fohringer und Amrumer Mundart), Kiel, 1862, 8vo. East Frisic. — Stiirenburg, Aurich, 1857, 8vo. Heligoland. — Oelrichs, s. I., 1836, l6mo.

Dutch. — Kok, 2nd ed. Amst. 1785-1798, 8vo, 38 vols.: Weiland, Amst. 1790-1811, 8vo, 11 vols.: Harrebomee, Utrecht, 1857, 4to; 1862-1870, 8vo, 3 vols. : De Vries and Te Winkel, Gravenh. 1864, &c, 4to (new ed. 1882-); Dale, ib. 4th ed. 1898; English. — Hex- ham, ed. Manley, Rotterdam, 1 675-1678, 4to: Holtrop, Dortrecht, 1 823-1824, 8vo, 2 vols.: Bomhoff, Nimeguen, 1859, 8vo, 2 vols. 2323 pages: Jaeger, Gouda, 1862, i6mo: Calisch, Tiel, 1871, &c, 8vo. French. — Halma, Amst. 1710, 4to; 4th ed. 1761 : Marin, ib. 1793, 4to, 2 vols.: Winkelman, ib. 1793, 4to, 2 vols.: Mook, Zutphen, l824-l825,8vo,4vols.; Gouda, 1857, 8vo, 2 vols. 2818 pages: Kramers, ib. 1859-1862, 2 vols. i6mo. German. — -Kramer, Niirnb. 1719, fol.; 1759, 4to, 2 vols.; ed. Titius, 1784, Weiland, Haag, 1812, 8vo: Terwen, Amst. 1844, 8vo. Etymology. — Franck, 1884-1892. Oriental Words. — Dozy, ‘s Gravenhage, 1867, 8vo. Genders of Nouns. — Bilderdijk, Amst. 1822, 8vo, 2 vols. Spelling. — Id., ‘s Gravenhage, 1829, 8vo. Frequentatives. — De Jager, Gouda, 1875, 8vo, vol. i. Old Dutch. — Suringer, Leyden, 1865, 8vo. Middle Dutch. — De Vries, ‘s Gravenhage, 1864, &c, 4to. Verwijs and Verdam, ib. 1885-

Flemish. — Kilian, Antw. 1511, 8vo; ed. Hasselt, Utrecht, 1777, 4to, 2 vols. French. — Berlemont, Anvers, 151 1, 4to: Meurier, ib. 1557, 8vo: Rouxell and Halma, Amst. 1708, 4to; 6th ed. 1821: Van de Velde and Sleeckx, Brux. 1848-1851, 8vo, 2440 pages; ib

i860, 8vo, 2 vols. Ancient Names of Places. — Grandgagnage (East Belgium), Bruxelles, 1859, 8vo.

German. — Josua Pictorius (Maaler), Die teutsch Spraach, Tiguri, 1561, 8vo; Stieler, Niirnb. 1691, 4to: Adelung, Leipz. 1774-1786, 4to, 5 vols.; 1793-1818, 5 vols.: Campe, Braunschweig, 1807-1811, 4to, 5 vols.: Grimm, Leipzig, 1854, & c > 4 to: Sanders, ib. 1860 1865, 4to, 3 vols. 1885: Diefenbach and Wiilcker (High and Low German, to supplement Grimm), Frankf. a. M. 1874, 1885, 8vo. ; Kluge,

Strassburg, 1883; Heine, Leipzig, 1 890-1 895; Weigand, Giessen, 1873. English. — Adelung, 1783-1796, 8vo, 3 vols. : Hilpert, Karlsruhe, 1828-1829, 8vo, 2 vols.; 1845-1846, 4to, 2 vols.: Flugel, Leipz. 1830, 8vo, 2 vols.; London, 1857, 8vo; Leipzig, 1870: Miiller, Cothen, 1867, 8vo, 2 vols. French. — Laveaux, Strassburg, 1812, 4to: Mozin, Stuttgard, 1811-1812, 4to, 4 vols. ; 1842-1846, 8vo, 4 vols., 3rd ed. 1 850-1 85 1, 8vo: Schuster, Strasb. 1859, 8vo: Daniel, Paris, 1877, i6mo. Old High German. — Haltaeus, Lipsiae, 1758, fol. 2 vols.: Graff, Berlin, 1 834-1 846, ato, 7 vols.: Brinckmeier, Gotha, 1850-1863, 4to, 2 vols. : Kehrein (from Latin records), Nord- hausen, 1863, 8vo. Schade, Halle, 1872-1882. Middle High German. — Ziemann, Quedlinburg, 1838, 8vo: Benecke, Miiller and Zarnche, Leipz. 1854-1866, 8vo, 3 vols.: Lexer, Leipzig, 1870, 8vo. Middle Low German. — Schilier and Liibben, Bremen, 1872, &c, 8vo, in progress. Low German. — Vollbeding, Zerbst, 1806, 8vo: Kose- garten, Griefswald, 1839, 4to; 1856, &c, 4to. Etymology. — Helvigius, Hanov. 1620, 8vo: Wachter, Lipsiae, 1737, fol. 2 vols.: Kaindl, Salzbach, 1815-1830, 8vo, 7 vols.: Heyse, Magdeburg, 1843- 1849, 8vo, 3 vols. : Kehrein, Wiesbaden, 1 847-1852, 2 vols. Synonyms. — Eberhard, Maas, and Griiber, 4th ed. Leipzig, 1 852-1 863, 8vo, 4 vols.: Aue (Engl.), Edinb. 1836, 8vo: Eberhard, uthed. Berlin, 1854, l2mo: Sanders, Hamburg, 1872, 8vo, 743 pages. Foreign Words. — Campe, Braunschweig, 1 813, 4to: Heyse, Fremdwdrterbuch, Hannover, 1848, 8vo. Names. — Pott. Leipz. 1853, 8vo: Michaelis (Taufnamen), Berlin, 1856, 8vo: Forstemann (Old Germ.) Nord- hausen, 1856-1859, 4to, 2 vols. 1573 pages, 12,000 names: Steub (Oberdeutschen), Munchen, 1871, 8vo. Luther. — Dietz, Leipzig, 1869-1872, 8vo, 2 vols. Dialects. — Popowitsch, Wien, 1780, 8vo: Fulda, Berlin, 1788, 8vo: Klein, Frankf. 1792, 8vo, 2 vols.: Kalt- schmidt, Nordlingen, 1851, 4to; 1854, 5th ed. 1865. Aix-la- Chapelle, Miiller and Weitz, Aachen, 1836, i2mo. Appenzell: Tobler, Zurich, 1837, 8vo. Austria: Hofer, Linz, 1815, 8vo; Castelli, Wien, 1847, i2mo: Scheuchensttil (mining), ib. 1856, 8vo. Bavaria: Zaupser, Munchen, 1789, 8vo: Deling, ib. 1820, 2 vols.: Schmeller, Stuttg. 1827-1837, 8vo, 4 vols. ; 2nd ed. Munchen, 1872, 4to, vol. i. 1799 pages. Berlin: Trachsel. Berlin, 1873, 8vo. Bremen: Bremisch Deutsch Gesellschaft, Bremen, 1767-1771, 1869, 8vo, 6 vols. Oelrich (anc. statutes), Frankf. a. M. 1767, 8vo. Carinthia: Ueber-felder, Klagenfurt, 1862, 8vo: Lexe, Leipzig, 1862, 8vo. Cleves: De Schueren, Teuthonista, Colon, 1477, fol.; Leiden, 1804, 4to. Gottingen: Schambach, Hannover, 1838, 8vo. Hamburg: Richey, Hamb. 1873, 4to; 1755, 8vo. Henneberg: Reinwold, Berlin and Stettin, 1793, 1801, 8vo, 2 vols.: Bruckner, Meiningen, 1843, 4to. Hesse: Vilmar, Marburg, 1868, 8vo, 488 pages. Holstein: Schiitz Hamb. 1800-1806, 8vo, 4 vols. Hungary: Schoer, Wien, 1858. Livonia:

Bergmann, Salisburg, 1785, 8vo: Gutzeit, Riga, 1859-1864, 8vo, 2 parts. Upper Lusatia: Anton, Gorlitz, 1 825-1 839, 13 parts. Luxembourg: Gangler, Lux. 1847, 8vo, 406 pages. Mecklenburg and Western Pomerania: M., Leipzig, 1876, 8vo, 114 pages. Nassau: Kehrein, Weilburg, i860, 8vo. Osnaburg: Strodtmann, Leipz. 1756, 8vo. Pomerania and Riigen: Dahnert, Stralsund, 1781, 4to. Posen: Bernd, Bonn, 1820, 8vo. Prussia: Bock, Konigsb. 1759, 8vo: Hennig, ib. 1785, 8vo. Saxony- Schmeller (from Heliand, &c), Stuttg. 1840, 4to. Silesia: Berndt, Stendal, 1787, 8vo. Swabia: Schmid, Berlin, 1795, 8vo; Stuttg. 1831, 8vo. Switzerland: Stalder, Aarau, 1807-1813, 8vo, 2 vols. Thuringia: Keller, Jena, 1819, 8vo. Transylvania: Schuller, Prag, 1865, 8vo. Tirol: Schopf, Innspruck, 1866, 8vo. Venetian Alps: Schmeller, Wien, 1854, 8vo. Vienna: Hugel, ib. 1873, 8vo. Hunting. — Westerwald: Schmidt, Hadamar, 1800, 8vo; Kehrein, Wiesbaden, 1871, l2mo. Slang. — Gauner Sprache: Schott, Erlangen, 1821, 8vo: Grolmann, Giessen, 1822, 8vo: Train, Meissen, 1833, 8vo: Anton, 2nd ed. Magdeburg, 1843, 8vo; 1859: Ave-Lallemant, Das Deutsche Gaunerthun, Leipzig, 1858-1862, 8vo, vol. iv. pp. 515-628. Student Slang: Vollmann (Burschicoses), Ragaz, 1846, l6mo, 562 pages.

Celtic.

Celtic generally.: — Lluyd, Archaeologia Britannica, Oxford, 1707, folio: Bullet, Besangon, 1754-1860, fol. 2 vols.

Irish. — Cormac, bishop of Cashel, born 831, slain in battle 903, wrote a Glossary, Sanas Cormaic, printed by Dr Whitley Stokes, London, 1862, 8vo, with another, finished in 1569, by O'Davoren, a schoolmaster at Burren Castle, Co. Clare: O'Clery, Lovanii, 1643, 8\»o: Mac Cuirtin (Eng.-Irish), Paris, 1732, 4to: O'Brien, ib. 1768, 4to; Dublin, 1832, 8vo: O'Reilly, 1817, 4to: 1821; ed. O'Donovan, it. 1864, 4to, 725 pages: Foley (Eng.-Irish), ib. 1855, 8vo: Connellan (do.), 1863, 8vo.

Gaelic. — Macdonald, Edin. 1741, 8vo: Shaw, London, 1780, 4to, 2 vols.: Allan, Edin. 1804, 4to: Armstrong, London, 1825, dto: Highland Society, ib. 1828, 4to, 2 vols.: Macleod and Dewar, Glasgow, 1853, 8vo.

Manx. — Cregeen, Douglas, 1835, 8vo: Kelly, ib. 1866, 8vo, 2 vols.

Welsh.— Latin. — Davies, London, 1632, fol.: Boxhornius, Amstelodami, 1654, 4to. English. — Salesbury, London, 1547, 4to: 1551: Richards, Bristol, 1759, 8vo: Owen (W.), London, 1793-1794, 8vo, 2 vols.; 1803, 4to, 3 vols.: Walters, ib. 1794, 4to: Owen- Pughe,

Denbigh, 1832, 8vo; 3rd ed. Pryse, ib. 1866, 8vo: D. S. Evans (Eng. - Welsh), ib. 1852-1853, 8vo; 1887.

Cornish. — Pryce, Archaeologia, Sherborne, 1770, 4to: Williams, Llandovery, 1862-1865, 4to. Names. — Bannister (20,000), Truro, 1869-1871, 8vo.

Breton. — Legadeuc, Le Catholicon breton, finished 1464, printed at Lantrequier, 1499, fol. 210 pages; 1501, 4to; L'Orient, 1868, 8vo: Quicquer de Roskoff, Morlaix, 1633, 8vo: Rostrenen, Rennes, 1732, 4to, 978 pages; ed. Jolivet, Gumgamps, 1834, 8vo, 2 vols.: l'A. [rmerie], Leyde, 1744, 8 vo; La Haye, 1756: Lepelletier, Paris, 1752, fol.: Legonidec, Angouleme,,l82i, 8vo; St Brieuc, 1847-1850, 4to, 924 pages. Dialect of Leon. — Troude (Fr.-Bret.), Brest, 1870, 8vo; Id. (Bret.-Fr.), ib. 1876, 8vo, 845 pages. Diocese of Vannes. — Armerie, Leyde, 1774, 8vo.

Basque. Basque. — Larramendi, St Sebastian, 1745, fol. 2 vols.; ed-Zuazua, ib. 1854, fol-; Chaho, Bayonne, 1856, 4to, 1867: Fabre, ib. 1870, 8vo: Van Eys, Paris, 1873, 8vo: Egiiren, Madrid, 1877.

Baltic.

Lithuanian. — Szyrwid, 3rd ed., Vilnae, 1642, 8vo; 5th ed. 1713: Schleicher, Prag, 1 856-1 857, 8vo, 2 vols. : Kurmin, Wilno, 1858, 8vo: Kurschat, Halle, 1870, &c, 8vo.

Lettic. — Mancelius, Riga, 1638, 4to: Elvers, ib. 1748, 8vo: Lange, Mitau, 1777, 4to: Sjogren, Petersburg, 1861, 4to: Ulmann, ed. Bielenstein, Riga, 1872, &c, 8vo.

Prussian. — Bock, Konigsberg, 1759, 8vo: Hennig, ib. 1785, 8vo: Nesselmann, Berlin, 1873, 8vo; Pierson, ib. 1875, 8vo –

Slavonic.

Slavonic generally. — Franta-Sumavski (Russ. Bulg. Old Slav. Boh. Polish), Praga, 1857, 8vo, Miklosich, Wien, 1886.

Old Slavonic. — Beruinda, Kiev, 1627, 8vo; Kuteinsk, 1653, 4to: Polycarpi (Slav. Greek, Latin), Mosque, 1704, 4to: Alexyeev, St Petersb. 1773, 8vo; 4th ed. ib. 1817-1819, 8vo, 5 vols.: Russian Imp. Academy, ib. 1847, 4to, 4 vols. : Miklosich, Vindobonae, 1850: 4to ; 1862-1865, 8vo, Mikhailovski, St Petersb. 1875, 8vo : Charkovski, Warschaw, 1873, 8vo.

Russian. — Russian Academy, St Petersburg, 1789-1794, 4to, 6 vols.; 1806-1822, ib. 1869, 8vo, 3 vols. : Dahl, Moskva, 1862-1866, fol. 4 vols. ; d., ib. 1873, &c, 4to; a 3rd edition, 1903, &c. French- Germ.-Eng. — Reiff, ib. 1852-1854, 4to. German, Latin. — Holterhof, Moskva, i778,8vo,2vols.;3rded. 1 853-1 855, 8vo, 2 vols. :Weismann, ib. i73i,4to; 1782, and frequently. French, German. — Nordstet, ib. 1780-1782, 4to, 2 vols. : Heym, Moskau, 1796-1805, 4to, 4 vols. : Booch-Arkossi and Frey, Leipzig, 1871, &c, 8vo. English. — Nordstet, London, 1780, 4to: Grammatin and Parenogo, Moskva, 1 808-1817, 4to, 4 voIs.French. — Tatischeff, 2nded. St Petersb. 1798, 8vo, 2 vols. ; Moskau, 1816, 4to, 2 vols. : Reiff, St Petersb. 1835-1836, 8vo, 2 vols.: Makaroff, ib. 1872, 8vo, 2 vols, mo pages; 1873-1874, i2mo, 2 vols. German. — Pawlowski, Riga, 1859, 8vo: Lenstrom, Mitau, 1871, 8vo. Swedish. — Geitlin, Helsingfors, 1833, i2mo: Meurmann, ib. 1846, Svo. Polish. — Jakubowicz, Warsza\va, 1825- 1828, 8vo, 2 vols. : Amszejewicz, ib. 1866, 8vo : Szlezigier,i6. 1867, 8vo. Technical. — Grakov (Germ.), St Petersb. 1872, 8vo. Naval. — Butakov, ib. 1837. Dialects. — North-west Russia: Gorbachevski (old language, in Russian), Vilna, 1874, 8vo, 418 pages. White Russia: Nosovich (Russian), St Petersburg, 1870, 4to, 760 pages. Red Russia: Patritzkii (German), Lemberg, 1867, 8vo, 2 vols. 842 pages. Ukraine: Piskanov (Russian), Odessa, 1873, 4to, 156 pages.

Polish.— Linde (explained in Lat. Germ, and 13 Slav dialects), Warszawie, 1807-1814, 4to, 6 vols. 4574 pages. English. — [Rykaczewski], Complete Dictionary, Berlin, 1849-1851, 8vo, 2 vols. : Rykaczewski, Berlin, 1866, i6mo, 1161 pages. French and German. — Troc, Leipz. 1742-1764, 8vo, 4vols. ;4thed. ib. 1 806-1822, 4to, 4vols. : Bandtke, Breslau, 1806, 8vo, 2 vols.; 1833-1839, 8vo. French. — Schmidt, Leipzig, 1870, i6mo. Russian and German. — Schmidt (J. A. E.), Breslau, 1834, 8vo. German. — Mrongovius, Konigsberg, 1765; 183S- 4to; 1837: Troianski, Berlin, 1 835-1 838, 8vo, 2 vols.: Booch-Arkossi, Leipzig, 1864-1868, 8vo, 2 vols.: Jordan, ib. 1866, 8vo. Italian. — Plazowski, Warszawa, i860. 8vo. 2 vols. 730 pages. , Russian. — Potocki, Lipsk, 1873, &c, i2mo.

Wendish. — Matthai, Budissen, 1721, 8vo: Bose, Grimma, 1840, 8vo: Pfuhl, w Budzsinje, 1866, 8vo, 1210 pages. Upper Lusatian. — Pfuhl and Jordan, Leipz. 1844, 8vo. Lower Lusatian. — Zwahr, Spremberg, 1847, 8vo.

Czech. — Rohn (Germ. Lat.), Prag, 1780, 4to, 4 vols. : Dobrowski and Hanka, ib. 1802-1821, 4to, 2 vols. Lat. Germ. Hungar. — Jungmann, Praze, 1835-1839, 6 vols. 4to, 5316 pages. German. — Tham, Prag. 1805-1807, 8vo, 2 vols. : Sumavski, ib. 1844- 1846, 8vo, 2 vols.:

Koneney, ib. 1855, l8mo, 2 vols.: Rank (Germ. Boh.), ib. i860, i6mo, 775 pages. Technical. — Spatny, ib. 1864, 8vo: Kheil (names of goods, Germ. Boh.), ib. 1864, 8vo, 432 pages. Hunting. — Spatny, ib. 1870, 8vo, 137 pages.

South Slavic— Richter and Ballman.Wien, 1839-1840, 8vo, 2 vols. Servian— Karaiic (Germ. Lat.), ib. 1818, 8vo; 1852: Lavrovski (Russian), St Petersb. 1870, 8vo, 814 pages. Bosnian — Micalia, Laureti, 1649, 8vo. Slovak. — Bernolak (Lat. Germ. Hung.), Budae, 1825-1827, 8vo, 6 vols.: Loos (Hung, and Germ.), Pest, 1869, &c, 3 vols. Slovene. — Gutsmann, Klagenfurt, 1789, 4to: Relkovich, Wien, 1796, 4to, 2 vols.: Murko, Gratz, 1838, 8vo, 2 vols.: Janezic, Klagenfurt, 1851, i2mo. Dalmatian. — Ardelio della Bella, Venezia, 1728, 8vo; 2nd ed. Ragusae, 1785,410: Stulli, ib. 1801-1810, 4to, 2 vols. Croatian. — Habdelich, Gratz, 1670, 8vo: Sulek, Agram, 1854-1860, 8vo, 2 vols. 1716 pages. Carinthian. — Lexer, Leipzig, 1862, 8vo. Old Servian. — Danitziye (Servian), Belgrad, 1864, 8vo, 3 vols.

Bulgarian. — Daniel (Romaic, Albanian, Rumanian, and Bulgarian) , Moschopolis, 1770; Venice, 1802, 4to. English. — Morse and Vassiliev, Constantinople, i860, 8vo. Russian.— Borogoff, Vienna, 1872, &c, 8vo.

Ugrian.

Ugrian, Comparative. — Donner, Helsingfors, 1874, 8vo, in pro- gress: Budenz (Ugrian-Magyar), Budapest, 1872-1875, 8vo.

Lappish.— Manuals, Holmiae, 1648, 8vo: Fjellstrom, ib. 1738, 8vo: Leem and Sandberg, Havn. 1768-1781, 4to, 2 parts: Lindahl and Oehrling, Holm. 1780, 8vo. North Lappish.— Stockfleht, Christiania, 1852, 8vo.

Finnish.— Juslenius, Holmiae, 1745, 4to, 567 pages: Renvall, Aboae, 1826, 4to, 2 vols. : Europaeus, Helsingissa, 1852-1853, l6mo, 2 vols. 742 pages: Lunin, Derpt, 1853, 8vo: Euren, Tavashuus, i860, 8vo: Ahlman, ib. 1864, 8vo: Wiedemann, St Petersb. 1869, 4to: Godenhjelm (Germ.), Helsingfors, 1871: Lonnrot, Helsingissa, 1874. Naval. — Stjerncreutz, ib. 1863, 8vo.

Esthonian. — Hupel, Mitau, 1818, 8vo, 832 pages: Korber, Dorpat,

i860, 8vo: Wiedemann, St Petersb. 1869, 4to, 1002 pages: Aminoff (Esth. -Finnish), Helsingissa, 1869, 8vo: Meves (Russian), Riga, 1876, i2mo.

Permian.— Rogord (Russian), St Petersb. 1869, 8vo, 420 pages.

Votiak. — Wiedemann, Reval, 1847, 8vo : Ahlquist, Helsingfors, 1856, 4to.

Cheremiss. — Budenz, Pest, 1866, 8vo.

Ersa-Mordvine.— Wiedemann, St Petersb. 1865, 4to. Moksha-Mordvine. — Ahlquist, ib. 1862, 8vo.

Magyar. — Szabo, Kassan, 1792, 8vo: Guczor and Fogarazi (Hung. Academy), Pesth, 1862, 8vo, in progress. English.— Dallos, Pesth, i860, 8vo. French. — Kiss, ib. 1844, i2mo, 2 vols. : Karady, Leipz. 1848, i2mo : Mole, Pest, 1865, 8vo, 2 vols. German. — Schuster, Wien, 1838, 8vo: Bloch, Pesth, 1857, 4to, 2 vols. : Ballagi, ib. 1857, 8vo; 6th ed. 1905, 8vo, 2 vols. : Loos, ib. 1870, 8vo, 914 pages. Etymological. — Dankovsky (Lat.-Germ.), Pressburg, 1853, 8vo: Kresznerics (under roots, in Hung.), Budan, 1831-1832, 4to, 2 vols. : Podhorsky (from Chinese roots, in Germ.), Budapest, 1877, 8vo. New Words. — Kunoss, Pesth, 1836, 8vo; 1844.

Turkish.— Arab. Pers. — Esaad Effendi, Constantinople, 1802, fol. Romaic— Alexandrides, Vienna, 1812, 4to. Polyglotts.— Pianzola (Ital. Grec. volgare, e Turca), Padova, 1789, 4to: Ciakciak (Ital. Armeno, Turco), Venice, 1804, 4to; 2nd ed. 1829: Azarian (Ellenico, Ital. Arm. Turco), Vienna, 1848, 8vo: Mechitarist Congregation (Ital. Francese, Arm. Turco), ib. 1846, 8vo. Latin. — Mesgnien-Meninski, Viennae, 1680, fol. 3 vols.; ed. Jenisch and Klezl, ib. 1780-1802, fol. 4 vols. English. — Sauerwein, London, 1855, l2tno: Redhouse, ib. 1856, 8vo, 1176 pages: Id., Eng. Turkish, ib. 860, 8vo. French. — Kieffer and Bianchi (Turk.-Fr.), Pans, 1835-1837, 2 vols. 2118 pages: Bianchi (Fr.-Turk.) Paris, 1843-1846, 8vo, 2 vols. 2287 pages; 1850, 8vo, 2 vols.: Mallouf, ib. 1863-1867, 8vo, 2 vols. French and German. — Zenker (Arab. Pers.), Leipz, 1862-1876, 4to, 2 vols, 982 pages. German. — Korabinsky, Pressburg, 1788, 8vo: Vambery, Constantinople, 1858, 8vo. Italian. — Molina, Roma, 1641, 8vo: Masais, Firenze, 1677, 8vo: Ciadyrgy, Milano, 1832-1834, 4to, 2 vols. Russian. — Budagov (Comparative lexicon of the Turkish-Tartar dialects), St Petersburg, 1869, 8vo, 2 vols.

Gipsy. — Bischoff, Ilmenau, 1827, 8vo: Truxillo, Madrid, 1844, 8vo:

Jimenes, Sevilla, 1846, i6mo: Baudrimont, Bordeaux, 1862, 8vo: Vaillant, Paris, 1868, 8vo: Paspatf; Constantinople, 1870, 4to: Borrow, Romany Lavo Lil, London, 1874, 8vo: Smart and Crofton, London, 1875, 8vo.

Albanian. — Blanchus, Romae, 1635, 8vo: Kaballioti (Romaic, Wallach. Alb.), Venice, 1770, 8vo: Xylander, Frankfurt a. M. 1835, 8vo: Hahn, Jena, 1854, 4to: Rossi da Montalto, Roma, 1866, 8vo.

ASIA

Semitic. — Polyglotts. — Thurneissius, Berolini, 1585, fol. : Thorndike, London, 1635, fol.: Schindler, Pentaglotton, Frankf, i-,d M. 1653, fol. : Hottinger, Heptaglotton, ib. 1661, fol. : Castellus, London, 1669, fol. 2 vols. (Hebrew, Chaldaic, Syriac, Samaritan, Aethiopic and Arabic in one alphabet; Persian separately. It occupied him for seventeen years, during which he worked sixteen to eighteen hours a day) : Otho, Frankf. a. M. 1702, 4to (the same languages with Rabbinical) i

Hebrew. — About 875, Zemali, head of the school of Pum- beditha, wrote a Talmudical dictionary of words and things, arranged in alphabetical order, which is lost. About 880, Jehudah ben ‘Alan, of Tiberias, and Jehudah ibnKoreish, ofTahurt, in Morocco wrote Hebrew dictionaries. Saadia ben Joseph (born 892, died 942), of Fayum, in Upper Egypt, wrote [hax idd, probably a Hebrew- Arabic dictionary. Menahem ben Jacob Ibn Saruq (born 910, died about 970), of Tortosa and Cordova, wrote a copious Hebrew dictionary, first printed by Herschell F. Filipowski, Edinburgh, 1855, 8vo, from five MSS. David ben Abraham, of Fas, wrote, in Arabic, a large Hebrew dictionary, the MS. of which, a quarto of 313 leaves on cotton paper, was found about 1830 by A. Firkowitz, of fiupatoria, in the cellar of a Qaraite synagogue in Jerusalem. The age of this work cannot be ascertained. About 1050, Ali ben Suleiman wrote a dictionary in Arabic, on the plan of that of David ben Abraham. The MS. of 429 leaves belongs to Firkowitz. Haja ben Sherira, the famous teacher of the Academy of Pumbeditha, wrote a Hebrew dictionary in Arabic, called at Havi (The Gathering), arranged alphabetically in the order of the last radical letter. This dictionary is lost, as well as that of the Spaniard Isaac ben Saul, of Lucena. Iona ibn Ganah, of Cordova, born about 985, wrote a Hebrew dictionary in Arabic called Kitab al Azul (Book of Roots). This, as well as a Hebrew translation by Samuel ibn Tabon, is extant in MS., and was used by Gesenius in his Thesaurus. Rabbi David ben Joseph Kimhi died soon after 1232. His lexicon of roots, called wtnv, was printed at Naples 1490, fol.; Constantinople,

1513, fol.; Naples, 1491, 8vo; Venice, 1552; Berolini, 1838, 4to. Tishbi (The Tishbite), by Elijah ben Asher, the Levite, so called because it con- tained 712 roots, was printed at Isny 1541, 8vo and 4to, and often afterwards. Latin. — Miinster, Basileae, 1523, 8vo; 5 editions to 1564: Zamora, Compluti, 1526, fol.: Pellicanus, Argentorati, 1540, fol.: Reuchlin, Basil, 1556,' fol. : Avenarius, Wittebergae, 1568, fol.; auctus, 1589: Pagnini, Lugd. Bat. 1575, fol.; 1577; Genevae, 1614; Buxtorf, Basil. 1607, 8vo; 1 61 5, and many other editions: Frey (Lat.-Eng.), 2nd ed. London, 1815, 8vo: Gesenius, Thesaurus, Leipz. 1829-1858, 4to, 3 vols. English. — Bale, London, 1767, 4to: Park- hurst, ib. 1792, 4to: Lee, ib. 1840, 8vo: Gesenius, translated by Robinson, ib. 1844, 8vo; by Tregelles, ib. 1846, 4to: Fuerst, 4th ed. transl. by Davidson, ib. 1866, 8vo: 1871, 8vo, 1547 pages. French. — Leigh, Amst. 1703, 4to: Glaire, Paris, 1830, 8vo; 1843. German. — Gesenius, Leipzig, 1810-1812, 8vo, 2 vols. : Fuerst, ib. 1842, i6mo: ib. 1876, 8vo, 2 vols. Italian. — Modena, Venetia, 1612, 4to; 1640; Coen, Reggio, 1811, 8vo: Fontanella, Venezia, 1824, 8vo. Dutch. — Waterman, Rotterdam, 1859, &c, 8vo. Hungarian. — Ehrentheil (Pentateuch), Pest, 1868, 8vo. Romaic. — Loundes, Melite. 1845, 8vo, 987 pages.

Rabbinical and Chaldee. — Nathan ben Yeljiel of Rome wrote in the beginning of the 12th century a Talmudic dictionary, Aruch, printed 1480 (?), s. I., fol.; Pesaro, 1517, fol.; Venice, 1531; and often: Isaiah ben Loeb, Berlin, wrote a supplement to Aruch, vol. i. Breslau, 1830, 8vo; vol. ii. ("? to n), Wien, 1859, 8vo: Miinster, Basil. 1527, 4to, 1530, fol.: Elijah ben Asher, the Levite, transi. by Fagius, Isnae, 1 541, fol.; Venet. 1560: David ben Isaac de Pomis, Zama% David, Venet. 1587, fol. : Buxtorf, Basileae, 1639, fol. : ed. Fischer, Leipz. 1866-1875, 4to: Otho, Geneva, 1675, 8vo; Altona, 1757, 8vo: Zanolini, Patavii, 1747, 8vo: Hornheim, Halle, 1807, 8vo: Landau, Prag, 1819-1824, 8vo, 5 vols.: Dessauer, Erlangen, 1838, 8vo: Nork (i.e. Korn), Grimma, 1842, 4to: Schonhak, Warschau, 1858, 8vo, 2 vols. Targums. — Levy, Leipzig, 1866-68 4to, 2 vols.; 1875: Id. (Eng.), London, 1869, 8vo, 2 vols. Talmud. — Lowy (in Heb.), Wien, 1863, 8vo: Levy, Leipzig, 1876, &c, 4to. Prayer-Book. — Hecht, Kreuznach, i860, 8vo: Nathan, Berlin, 1854, l2mo. Synonyms. — Pantavitius, Lodevae, 1640, fol. Foreign Words — Rabeini, Lemberg, 1857, 8vo, &c. Jewish-German.— Callenberg, Halle, 1736, 8vo: Vollbeding, Hamburg, 1808, 8vo: Stern, Munchen, 1833, 8vo, 2 vols. : Theile, Berlin, 1842-1843, 8vo, 2 vols. : Ave-Lallemant, Das deutsche Gaunerthum, Leipzig, 1858, 8vo, 4 vols. ; vol. iv. pp. 321-512.

Phoenician. — M. A. Levy, Breslau, 1864, 8vo.

Samaritan. — Crinesius, Altdorphi, 1613, 4to: Morini, Parisiis, 1657, l2mo: Hilligerus, Wittebergae, 1679, 4to: Cellarius, Cizae, 1682, 4to; Frankof. 1705: Uhlemann, Leipsiae, 1837, 8vo: Nicholls, London, 1859, 8vo.

Assyrian.— Norris, London, 1868, 8vo, 3 vols. Proper Names.— Menant, Paris, 1861, 8vo.

Accadian. — Lenormant, Paris, 1875, 8vo.

Syriac. — Joshua ben Ali, a physician, who lived about 885, made a Syro-Arabic lexicon, of which there is a MS. in the Vatican. Hoffmann printed this lexicon from Alif to Mim, from a Gotha MS., Kiel, 1874, 4to. Joshua bar Bahlul, living 963, wrote another, great part of which Castelli put into his lexicon. His MS. is now at Cambridge, and, with those at Florence and Oxford, was used b? Bernstein. Elias bar Shinaya, born 975, metropolitan of Nisibis, 1009, wrote a Syriac and Arabic lexicon, entitled Kitab ut Tarjuman fi Taalem Loghat es Surian (Book called the Interpreter for teaching the Language of the Syrians), of which there is a MS. in the British Museum. It was translated into Latin by Thomas a Novaria, a

1612, 4to: Buxforf, Basileae, 1622, 4to: Ferrarius, Romae, 1622, 4to: Trost, Cothenis Anhaltor, 1643, 4to: Gutbir, Hamburg], 1667, 8vo: Schaaf, Lugd. Bat, 1708, 4to: Zanolini, Patavii, 1742, 4to: Castellus, ed. Michaelis, Gottingen, 1788, Ato, 2 vols.: Bernstein, Berlin, 1857, &c. fol. : Smith (Robt. Paine), Dean of Canterbury, Oxonii, 1868, &c. fol.: fasc. 1-3 contain 538 pages: Zingerle, Romae, 1873, 8vo, 148 pages.

Arabic. — The native lexicons are very many, voluminous and copious. In the preface to his great Arabic-English lexicon, Lane describes 33, the most remarkable of which are — the ‘Ain, so called from the letter which begins its alphabet, commonly ascribed to al Khalil (who died before a.h. 175 [a.d. 791], aged seventy-four) : the Sihah of Jauhari (died 398 [1003]) : the Mohkam of Ibn Sidah the Andalusian, who was blind, and died A.H. 458 [a.d. 1066], aged about sixty: the Asas of Zamakhshari (born 467 [1075], died 538 [1144]), ” a most excellent repertory of choice words and phrases “: the Lisanel ‘Arab of Ibn Mukarram (born 630 [1232], died 711 [131 1]); Lane’s copy is in 28 vols. 4to : the Kamus (The Sea) of Fairuzabadi

(born 729 [1328], died 816 [14.13], : the Taj el Arus, by Murtada Ez Zebadi (born a.d. 1732, died 1791) — the copy made for Lane is in 24 vols, thick 4to. The Sihah was printed Hardervici Getorum, 1774, 4to; Bulak, 1865, fol. 2 vols.: Kamus, Calcutta, 1817, fol.

2 vols.; Bombay, 1855, fol. 920 pages: Sirr el Lagal, by Farish esh Shidiac, Tunis, fol. 609 pages : Muhit al Muhit, by Beitrus Al Bustani Beirut, 1 867-1 870, 2 vols. 4to, 2358 pages (abridged as Katr Al Muhit, ib. 1 867-1 869, 2 vols. 8vo, 2352 pages), is excellent for spoken Arabic. Persian. — The Surah, by Jumal, Calcutta, 1812- 1815, 2 vols. 4to: Samachsharii Lexicon, ed. Wetzstein, Leipz. 1845, 4to; 1850: Muntakhal al Loghat, Calcutta, 1808; 16.1836; Lucknow, 1845; Bombay, 1862, 8vo, 2 vols.: Muntaha V Arabi, 4 vols. fol. 1840: Shams al Loghat, Bombay, i860, fol. 2 vols. 509 pages. Turkish. — Achteri Kabir, Constantinople. 1827, fol.: El Kamus, ib. 1816, fol. 3 vols.; translated by Acan Effendi, Bulak, fol.

3 vols.; El Sihah, translated by Al Vani, Constantinople, 1728, fol. 2 vols. : 1755-1756; Scutari, 1802, fol. 2 vols. Latin. — Raphelengius, Leiden, 1613, fol.: Giggeius, Mediolani, 1632, fol. 4 vols.: Golius Lugd. Bat. 1653, fol. (the best before Lane's): Jahn, Vindobonae, 1802, 8vo: Freytag, Halle, 1830-1838, 4 vols. 4to; abridged, ib. 1837, 4to. English. — Catafago (Arab. -Eng. and Eng.-Arab.), London, 1858, 8vo, 2 vols.; 2nd ed. 1873, 8vo: Lane, London, 1863-1893 (edited after Lane's death, from 1876, by his grandnephew, Stanley Lane-Poole. The Arabic title is Medd el Kamoos, meaning either the Flow of the Sea, or The Extension of the Kamus. It was under- taken in 1842, at the suggestion and at the cost of the 6th duke of Northumberland, then Lord Prudhoe, by Mr Lane, who returned to Egypt for the purpose, and lived in Cairo for seven years to study, and obtain copies of, the great MS. lexicons in the libraries of the mosques, few of which had ever been seen by a European, and which were so quickly disappearing through decay, carelessness and theft, that the means of composing such a work would not long have existed). Newman (modern), ib. 1872, 8vo, 2 vols. 856 pages. French. — ■ Ruphy (Fr.-Ar.), Paris, 1802, 4to: Bochtor (do.), Paris, 1828, 4to, 2 vols. ; 2nd ed. ib. 1850: Roland de Bussy (Algiers, Fr.-Ar.), Alger, (835, i6mo: Id., 1836, 8vo; 1839: Berggren (Fr.-vulg. Ar., Syria and Egypt.), Upsala, 1844, 4to: Farhat (Germanos), revu par Rochaid ed Dahdah, Marseille, 1849, 4to: Biberstein Kasimirski, Paris, 1846, 8vo,2vols. ; 1853-1856; i860, 2 vols. 3032 pages: Marcel (vulgar dialects of Africa), Paris, 1830; 1835, 8vo; 1837; enlarged, 1869, 8vo; Paulmier (Algeria), 2nd ed. Paris, i860, 8vo, 931 pages; 1872: Bernard (Egypt), Lyon, 1864, i8mo: Cuche, Beirut, 1862, 8vo; 1867: Nar Bey (A. Calfa), 2nd ed. Paris, 1872, i2mo, 1042 pages: Cherbonneau (written language),

Paris, 1876, 2 vols. 8vo: Id. (Fr.-Ar.), Paris, 1872, 8vo: Beausier (Algiers, Tunis, legal, epistolary), Alger, 1871, 4to, 764 pages; 1873. German. — Seyfarth (Algeria), Grimma, 1849, i6mo: YVolff (Mod. Ar.), Leipzig, 1867, 8vo: Wahrmund (do.), Giessen, 1870-1875, 8vo, 4 vols. Italian. — Germano, Roma, 1636, 8vo; (Ar. Lat. It.), Romae, 1639, fol.: Dizionario, Bulak. 1824, 4to: Schiaparelli, Firenze, 1871, 4to, '641 pages. Spanish. — Alcala, Grenada, 1505, 4to: Canes, Madrid,

1787, fol. 3 vols. Sufi Technical Terms. — Abd Errahin, ed. Sprenger, Calcutta, 1845, 8vo. Technical Terms of the Mussul- man Sciences. — Abd al Hagg and Gholam Kadir, Calcutta, 1853- 1862, 4to, 1593 pages. Medical Terms. — PharaonandBertherand, Paris, 1S60, i2mo. Materia Medica. — Muhammed Abd Allah Shirazi, Ulfaz Udwiyeh, translated by Gladwin (Eng. Pers. Hindi), Calcutta, 1793, 4to,ˆ 1441 words. Noms des Vetements. — Dozy, Amst. 1845, 8vo. Worter in entgegengesetzten Bedeutungen. — Redslob, Gottingen, 1873, 8vo. – Koran. — Willmet (also in Haririum et vitam Timuri), Lugd. Bat. 1784, 4to; Amst. 1790: Fluegel, Concordantia, Leipz. 1842, 4to: Penrice, Dictionary and Glossary, London, 1873, 4to. El Tabrizi's Logic. — Mir Abufeth (French), Bulak, 1842, 8vo. Maltese. — Vassali, Romae, 1796, 4to: Falzon (Malt. Ital. Eng.), Malta, s.a. 8vo: Vella, Livorno, 1843, 8vo.

Armenian. — Mechitar, Venice, 1 749-1 769, 4to, 2 vols.: Avedi-chiam, Siirmelian and Aucher (Aukerian), ib. 1836-1837, 4to, 2 vols. : Aucher, ib. 1846, 4to. Polyglot. — Villa (Arm.-vulg., litteralis, Lat. Indicae et Gallicae), Romae, 1780. Greek and Latin. — Lazarists, Venice, 1 836-1 837, 4to, 2 vols. 2217 pages. Latin. — Rivola, Medio-lani, 1621, fol.: Nierszesovicz, Romae, 1695, 4to; Villotte, ib. 1714,

fol.: Mechitar, Venetiae, 1 747-1 763, 4to, 2 vols. English. — Aucher, Venice, 1821-1 825, 4to, 2 vols. French. — Aucher, Venise, 18I2-1817, 8vo, 2 vols.; (Fr.Arm. Turc.),*. 1840,410: Eminian, Vienna, 1853, 4to: Calfa, Paris, 1861, 8vo, 1016 pages; 1872. Italian. — Ciakciak, Venezia, 1837, 4to. Russian. — Khudobashev [Khuta pashian], Moskva, 1838, 8vo, 2 vols. Russ. Arm. — Adamdarov, ib. 1821, 8vo: Popov, ib. 1841, 8vo, 2 vols. Modern Words. — Riggs, Smyrna, 1847, 8vo.

Georgian. — Paolini (Ital.), Roma, 1629, 4to: Klaproth (Fr.), Paris, 1827, 8vo: Tshubinov (Russian, French), St Petersburg, 1840, 4to; 1846, 8vo, 2 vols. 1 187 pages.

Circassian. — Loewe, London, 1854, 8vo.

Ossetic. — Sjorgen, St Petersb. 1844, 4to.

Kurd. — Garzoni, Roma, 1787, 8vo: Lerch (German), St Peters- burg, 1857, 8vo: Id. (Russian), ib. 1856-1858, 8vo.

Persian. — Burhani Qatiu, arranged by J. Roebuck, Calcutta, 1818, 4to: Burhan i Kati, Bulak, 1836, fol.: Muhammed Kazim, Tabriz, 1844, fol- : Haft Kulzum (The Seven Seas), by Ghazi ed din Haidar, King of Oude, Lucknow, 1822, fol. 7 vols. Arabic. — Shums ul Loghat, Calcutta, 1806, 4to, 2 vols. Turkish. — Ibrahim Effendi, Farhangi Shu'uri, ib. 1742, fol. 2 vols. 22,530 words, and 22,450 poetical quotations: Burhan Kati, by Ibn Kalif, translated by Ahmed Asin Aintabi, ib. 1799, fol.; Bulak, 1836, fol.: Hayret Effendi, ib. 1826, 8vo. Armenian. — Douzean. Constantinople, 1826, fol. Bengali. — Jay Gopal, Serampore, 1818, 8vo. Latin. — Vullers (Zend appendix), Bonnae ad Rhen, 1855-1868, 4to, 2 vols. 2544 pages; Supplement of Roots, 1867, 142 pages. English. — Gladwin, Malda in Bengal, 1780, 4to; Calcutta, 1797: Kirkpatrick, London, 1785, 4to: Moises, Newcastle, 1794, 4to: Rousseau, London, 1802, 8vo; 1810: Richardson (Arab, and Pers.), ib. 1780- 1800, fol. 2 vols. ; ed. Wilkins, ib. 1806-1810, 4to, 2 vols. ; ed Johnson, ib. 1829, 4to: Ramdhen Sen, Calcutta, 1829, 8vo; 1831 : Tucker (Eng.-Pers.), London, 1850, 4to: Johnson (Pers. and Arab.), ib. 1852, 4to: Palmer, ib. 1876, 8vo, 726 pages. French. — Handjeri (Pers. Arab, and Turkish), Moscou, 1841, 4to, 3 vols. 2764 pages: Berge, Leipzig, 1869, i2mo. German. — Richardson, translated by Wahl as Orientalische Bibliotheque, Lemg, 1 788-1 792, 8vo, 3 vols. Italian. — Angelusa S. Josepho [i.e. Labrosse] (Ital. Lat. Fr.), Amst. 1684, fol.

Old Persian. — (Cuneiform), Benfey (German), Leipzig, 1847, 8vo: Spiegel (id.), ib. 1862, 8vo: Kossovich (Latin), Petropoli, 1872, 8vo.

Zend. — Justi, Leipzig, 1864, 4to: Vullers, Persian Lexicon, Appendix: Lagarde, Leipzig, 1868, 8vo.

Pahlavi. — An old Pahlavi and Pazend Glossary, translated by Destur Hoshengi Jamaspji, ed. Haug, London, 1867, 8vo; 1870, 8vo: West, Bombay, 1874, 8vo.

Indian Terms. — The Indian Vocabulary, London, 1788, i6mo: Gladwin, Calcutta, 1797, 4to: Roberts, London, 1800, 8vo: Rous- seau, ib. 1802, 8vo: Roebuck (naval), ib. 1813, i2mo: C. P. Brown, Zillah Diet., Madras, 1852, 8vo: Robinson (Bengal Courts), Calcutta, 1854, 8vo; i860: Wilson, London, 1855, 4to: Fallon, Calcutta, 1858, 8vo.

Sanskrit. — Amarasimha (lived before a.d. 1000), Amarakosha Calcutta, 1807, 8vo; ib. 1834, 4to; Bombay, i860, 4to; Lucknow, 1863, 4to; Madras, 1870, 8vo, in Grantha characters; Cottayam, 1873, 8vo, in Malaylim characters; Benares, 1867, fol. with Amaraviveka, a commentary by Mahesvara: Rajah Radhakanta Deva, Sabdakalpadruma, Calcutta, l82i-i857,4to, 8 vols. 8730 pages: 2nd ed. 1874, &c. : Bhattachdrya, Sabdastoma Mahanidhi, Calcutta, 1869-1870, 8vo, parts i.-vii, 528 pages: Abhidhanaratnamala, by Halayudha, ed. Aufrecht, London. 1861, 8vo: Vachaspatya, by Taranatha Tarkavachaspati, Calcutta, 1873, &c., 4to (parts i.-vii., 1680 pages). Bengali. — Sabdasindhu, Calcutta, 1808: Amarakosa, translated by Ramodoyu Bidjalunker, Calcutta, 1831, 4to: Mathurana Tarkaratna, Sabdasandarbhasindhu, Calcutta, 1863, 4to. Marathi. — Ananta Sastri Talekar, Poona, 1853, 8vo, 495 pages: Madhava Chandora, Bombay, 1870, 4to, 695 pages. Telugu. — Amarakosha, Madras, i86l,ed. Kala, with Gurubalala prabodhika, a commentary, ib. 1861, 4to; with the same, ib. 1875, 4to, 516 pages; with Amarapadaparijata (Sans, and Tel.), by Vavilla Ramasvani Sastri, ib. 1862, 4to; ib. 1863, 8vo; 3rd ed. by Jaganmohana Tarkalankara and Khetramohana, 1872, &c, parts i.-iv. 600 pages: Suria Pracasa Row, Sarva-Sabda-Sambodhini, ib. 1875, 4to, 1064 pages. Tibetan and Mongol. — Schiefner, Buddhistische Triglotte, St Petersburg, 1859, fol., the Vyupatti or Mahavyupatti from the Tanguir, vol. 123 of the Sutra. Latin. — Paulinus a Sancto Bartholomeo, Amarasinha, sectio i. de coelo, Romae, 1798, 4to: Bopp. Berlin, 1828-1830, 4to; 2nd ed. 1840-1844; 3rd, 1866, 4to. English. — Amarakosha, trans, by Colebrooke, Serampore, 1808, 4to; 1845, 8vo: Rousseau, London, 1812, 4to: Wilson, Calcutta, 1819, 4to; 2nd ed. 1832: ed. Goldstiicker, Berlin, 1862, &c, folio, to be in 20 parts: Yates, Calcutta, 1846, 4to: Benfey, London, 1865, 8vo: Ram Jasen, Benares, 1871, 8vo, 713 pages: Williams, Oxlord, 1872, 4to. English-Sanskrit. — Williams, London, 1851, 4to. French. — Amarakosha, transl. by Loiseleur Deslongchamps, Paris, 1839-1845, 8vo, 2 vols. 796 pages: Burnouf and Leupol, Nancy, 1863-1864, 8vo. German. — Bohtlingk and Roth, St Petersb. 1853, &c, 4to, 7 vols, to 1875. Italian. — Gubernatis, Torino, 1856, &c 8vo, unfinished, 2 parts. Russian. — Kossovich, St Petersburg, 185

8vo. Roots.— Wilkins, London, 1815, 4to: Rosen, Berolini, 1827, 8vo: Westergaard, Bonnae, 1840-1841, 8vo: Vishnu Parasurama Sastri Pandita (Sans, and Marathi), Bombay, 1865, 8vo : Taranatha

Tarkavachaspati, Dhatupadarsa, Calcutta, 1869, 8vo: Leupol, Pans, 1870, 8vo. Synonyms. — Abhidhanacintamani, by Hemachadra, ed. Colebrooke, Calcutta, 1807, 8vo; translated by Bohtlingk and Rieu (German), St Petersburg, 1847, 8vo. Homonyms.— Medinikara, Medinikosha, Benares, 1865, 4to; Calcutta, 1869, 8vo; tb. 1872, 8vo. Derivatives. — Hirochand and Rooji Rangit, Dhatumanjari, Bombay, 1865, 8vo. Technical Terms of the Nyaya Philo- sophy. — Nydyakosa, by Bhimacharya Jhalakikar (Sanskrit), Bombay, 1875, 8vo, 183 pages. Rig Veda. — Grassmann, Leipzig, 1873-1875, 8vo.

Bengali. — Manoel.Lisboa, i743,8vo:Forster,Calcutta, 1799-1802, 4to, 2 vols. 893 pages: Carey, Serampore, 1815-1825, 4to, 2 vols.; ed. Marshman, ib. 1827-1828, 8vo, 2 vols.; 3rd ed. ib. 1864-1867, 8 vo; abridged by Marshman, ib. 1865, 8vo; ib. 1871, 8vo, 2 vols. 936 pages: Morton, Calcutta, 1828, 8vo: Houghton, London, 1S33, 4to: Adea, Shabdabudhi, Calcutta, 1854, 604 pages. English.— Ram Comul Sen, ib. 1834, 4to, 2 vols.; London, 1835, 4to: D'Rozario, Calcutta, 1837, 8vo: Adea, Abhidan, Calcutta, 1854, 761 pages. English Lat. — Ramkissen Sen, ib. 1821, 4to. Eng.- Beng. and Manipuri. — [Gordon], Calcutta, 1837, 8vo.

Canarese. — Reeve, Madras, 1824-1832, 4to,2 vols. ; ed. Sanderson, Bangalore, 1858, 8vo, 1040 pages; abridged by the same, 1858, 8vo, 276 pages: Dictionarium Canarense, Bengalori, 1855, 8vo: School Dictionary, Mangalore, 1876, 8vo, 575 pages.

Dardic Languages. — Leitner (Astori,Ghilghiti, Chilasi, and dialects of Shina, viz. Arnyia, Khajuna and Kalasha), Lahore, 1868, 4to.

Guzarati. — (English) Mirza Mohammed Cauzim, Bombay, 1846, 4to; Shapurji Edalji, ib. 1868, 8vo, 896 pages: Karsandas Mulji, ib. 1868, 8vo, 643 pages.

Hindi. — Rousseau, London, 1812, 4to: Adam, Calcutta, 1829, 8vo: Thompson, ib. 1846, 8vo: J. D. Bate, London, 1876, 8vo, 809 pages. English.— Adam, Calcutta, 1833, 8vo. English, Urdu and Hindi. — Mathuraprasada Mirsa, Benares, 1865, 8vo, 1345 pages.

Hindustani. — Ferguson, London, 1773, 4to: Gilchrist, Calcutta, 1800, 8vo; ed. Hunter, Edinb. 1810; Lond. 1825: Taylor, Calcutta, 1808, 4to, 2 vols.: Gladwin (Persian and Hind.), Calcutta, 1809, 8vo, 2 vols.: Shakesoeare, London, 181 7, 4to; 1820; 1834; 1849: Forbes, London, 1847, 8vo; 1857: Bertrand (French), Paris, 1858, 8vo: Brice, London, 1864, l2mo: Fallon, Banaras, 1876,- &c, to be in about 25 parts and 1200 pages. English. — Gilchrist, 1787- 1780, 4to, 2 parts: Thompson,

Serampore, 1838, 8vo.

Kashmiri. — Elmslie, London, 1872, l2mo.

Khassia. — Roberts, Calcutta, 1875, i2mo.

Malayalim. — Fabricius and Breithaupt, Weperg, 1779, 4to: Bailey, Cottayam, 1846, 8vo: Gundert, Mangalore, 1871, 8vo, 1171 pages.

Marathi. — Carey, Serampore, 1810, 8vo: Kennedy, Bombay, 1824, fol. : Jugunnauth Shastri Kramavant, Bombay, 1829-1831, 4to, 3 vols. : Molesworth, ib. 1831, 4to; 2nd ed. 1847, 4to; ed. Candy, Bombay, 1857, 4to, 957 pages; abridged by Baba Padmanji, ib. 1863, 8vo; 2nd ed. (abridged), London, 1876, 8vo, 644 pages. English. — Molesworth, Bombay, 1847, 4to.

Oriya. — Mohunpersaud Takoor, Serampore, 1811, 8vo: Sutton, Cuttack, 1841-1848, 8vo, 3 vols. 856 pages.

Pali. — Clough, Colombo, 1824, 8vo: Moggallana Thero (a Sin- halese priest of the 12th century), Abhidhanappika (Pali, Eng. Sinhalese), ed. Waskeduwe Subheti, Colombo, 1865, 8vo: Childers, London, 1872-1875, 8vo, 658 pages. Roots. — Silavansa, Dhatuman- jusa (Pali Sing, and Eng.), Colombo, 1872, 8vo.

Prakrit. — Delius, Radices, Bonnae ad Rh., 1839, 8vo.

Punjabi. — Starkey, 1850, 8vo; Lodiana Mission, Lodiana, 1 854-1 860, 444 pages.

Pushtu or Afghan. — Dorn, St Petersb. 184s, 4to: Raverty, London, i860, 4to; 2nd ed. ib. 1867, 4to: Bellew, 1867, 8vo.

Sindhi. — Eastwick, Bombay, 1843, fol. 73 pages: Stack, ib. 1855, 8vo,2 vols.

Sinhalese.— Clough, Colombo, 1821-1830, 8vo, 2 vols.: Calla- way (Eng., Portuguese and Sinhalese), ib. 1818, 8vo: Id., School Dictionary, ib. 1821, 8vo: Bridgenell (Sinh.-Eng.), ib. 1847, l8mo: Nicholson (Eng.-Sinh.), 1864, 32mo, 646 pages.

Tamil. — Provenza (Portug.), Ambalacotae, 1679, 8vo: Sadur Agurardi, written by Beschi in 1732, Madras, 1827, fol. ; Pondicherry, 1875, 8vo: Blin (French), Paris, 1834, 8vo: Rottler, Madras, 1834-1841, 4to, 4 vols.: Jaffna Book Society (Tamil), Jaffna, 1842, 8vo, about 58,500 words: Knight and Spaulding (Eng. Tarn.), ib. 1844, 8vo;

Dictionary, ib. 1852, 4to: Pope, 2nd ed. ib. 1859, 8vo: Winslow, Madras, 1862, 4to, 992 pages, 67,452 words.

Telugu. — Campbell, Madras, 1821, 4to: C. P. Brown, Madras (Eng.-Tel.), 1852, 8vo, 1429 pages: Id. (Tel.-Eng.), ib. 1852, 8vo, 13 1 9 pages. Mixed Telugu. — Id., ib. 1854, 8vo.

Thuggee. — Sleeman, Calcutta, 1830, 8vo, 680 Ramasi words.

Indo-Chinese Languages. — Leyden, Comparative Vocabulary of Barma, Malaya and Thai, Serampore, 1810, 8vo. Annamese: Rhodes (Portug. and Lat.), Romae, 1651, 4to: Pigneaux and Taberd, Fredericinagori, 1838, 4to; Legrand de la Liraye, Paris, 1874, 8vo: Pauthier (Chin. Ann.-Fr. Lat.), Paris, 1867, &c, 8vo. Assamese: Mrs Cutter, Saipur, 1840, 12 mo; Bronson, London, 1876, 8vo, 617

pages. Burmese: Hough (Eng.Burm.), Serampore, 1825, Moul main, 1845, 8vo, 2 vols. 955 pages: Judson, Calcutta, 1826, 8vo; (Eng. Burm.), Moulmain, 1849, 4to; (Burm. Eng.), ib. 1852, 8vo; 2nd ed., Rangoon, 1866, 8vo, 2 vols. 968 pages: Lane, Calcutta, 1841, Ato. Cambodian: Aymonier (Fr.-Camb.), Saigon, 1874, 4to; Id. (Camb.-Fr.), ib. 1875, fol. Karen: Sau-kau Too (Karen), Tavoy, 1847, l2mo, 4 vols. : Mason, Tavoy, 1840, 4to. Sgau-Karen: Wade, ib. 1849, 8vo. Siamese {Thai): Pallegoix (Lat. French, Eng.), Paris, 1854, 4to: Dictionarium Latinum Thai, Bangkok, 1850, 4to, 498 pages.

Malay. — Latin. — Haex, Romae, 1631, 4to; Batavia, 1707. Dutch. — Houtmann (Malay and Malagasy), Amst. 1603, 4to; 1673; 1680; 1687; 1703; Batavia, 1707: Wiltens and Dankaarts, Gravenhage, 1623, 4to; Amst. 1650; 1677; Batavia, 1708, 4to: Heurnius, Amst. 1640, 4to: Gueynier, Batavia, 1677, 4to; 1708: Loder, ib. 1707-1708, 4to : Van der Worm, ib. 1708, 4to : Roorda van Eysinga (Low), ib. 1824-1825, 8vo, 2 vols.; 12th ed, ‘s Gravenhage, 1863, 8vo; Id. (Hof, Volks en Lagen Taal), ib. 1855, 8vo: Dispel and Lucardie (High Malay), Leiden, i860, l2mo: Pijnappel, Amst. 1863, 8vo: Badings, Schoonhoven, 1873, 8vo. English. — Hout- mann (Malay and Malagasy), translated by A. Spaulding, London, 1614, 4to: Bowrey, ib. 1701, 4to: Howison, ib. 1801, 4to: Mars- den, ib. 1812, 4to: Thomsen, Malacca, 1820, 8vo; 1827: Crawford, London, 1851, 8vo, 2 vols. French. — Boze, Paris, 1825, i6mo: Elout (Dutch-Malay and French-Malay), Harlem, 1826, 4to: Bougourd, Le Havre, 1856, 8vo: Richard, Paris, 1873, 8vo, 2 vols.: Favre, Vienna, 1875, 8vo, 2 vols.

Malay Archipelago. — Batak: Van der Tuuk, Amsterdam, 1861, 8vo, 564 pages. Bugis: Mathes, Gravenh. 1874, 8vo, 1188 pages: Thomsen

(Eng.Bugis and Malay), Singapore, 1833, 8vo. Dyak: Hardeland (German), Amst. 1859, 8vo, 646 pages. Javanese: Sener pont Domis, Samarang, 1827, 4to, 2 vols.: Roorda van Eysinga, Kampen, 1834-1835, 8vo, 2 vols.: Gericke, Amst. 1847, 8vo; ed. Taco Roorda, ib. 1871, &c. parts i.-v., 880 pages: Jansz and Klinkert, Samarang, 1851, 8vo; 1865: Favre (French), Vienne, 1870, 8vo. Macassar: Matthes, Amst. 1859, 8vo, 951 pages. Sunda: De Wilde (Dutch, Malay and Sunda), Amsterdam, 1841, 8vo: Rigg (Eng.), Batavia, 1862, 4to, 573 pages. Formosa: Happart (Favorlang dialect, written about 1650), Parrapattan,

1840, i2mo.

Philippines. — Bicol: Marcos, Sampaloc, 1754, fol. Bisaya: San- chez, Manila, 1711, fol.: Bergafio, ib. 1735, fol.: Noceda, ib. 1841: Mentrida (also Hiliguena and Haraya) ib. 1637, 4T.0; 1841, fol. 827 pages: Felis de la Encarnacion, ib. 1851, 4to, 2 vols. 1217 pages. Ibanac: Bugarin, ib. 1854, d.to. Ilocana, Carro, ib. 1849, fol. Pampanga: Bergafio, ib. 1732, fol. Tagala: Santos, Toyabas, 1703, fol. ; ib. 1835, 4to, 857 pages: Noceda and San Lucar, Manila, 1754, fol.; 1832.

Chinese. — Native Dictionaries are very numerous. Many are very copious and voluminous, and have passed through many editions. Shwo wan, by Hu Shin, is a collection of the ancient char- acters, about 10,000 in number, arranged under 540 radicals, published 150 B.C., usually in 12 vols.: Yu pien, by Ku Ye Wang, published A.D. 530, arranged under 542 radicals, is the basis of the Chinese Japanese Dictionaries used in Japan: Ping tseu lout pien, Peking, 1726, 8vo, 130 vols.: Peiwanyunfu (Thesaurus of Literary Phrases), 1711, 131 vols. 8vo, prepared by 66 doctors of the Han lin Academy in seven years. It contains 10,362 characters, and countless combina- tions of two, three or four characters, forming compound words and idioms, with numerous and copious quotations. According to Williams (On the word Shin, p. 79), an English translation would fill 140 volumes octavo of 1000 pages each. Kanghi tsze tien (Kanghi's Standard or Canon of the Character), the dictionary of Kanghi, the first emperor of the present dynasty, was composed by 30 members of the Han lin, and published in 1716, 40 vols. 4to, with a preface by the emperor. It contains 49,030 characters, arranged under the 214 radicals. It is generally in 12 vols., and is universally used in China, being the standard authority among native scholars for the readings as well as the meanings of characters. Latin. — De Guignes (French, Lat.), Paris, 1813, fol.; Klaproth, Supplement, 1819; ed. Bazil (Latin), Hong-Kong, 1853, 4to: Gongalves (Lat.-Chin.), Macao,

1841, fol.: Callery, Sy sterna phoneticum, Macao, 1841, 8vo: Schott, Vocabularium, Berlin, 1844, 4to. English. — Raper, London, 1807, fol. 4 vols.: Morrison, Macao, 1815-1823, 4to, 3 parts in 6 vols.: Medhurst, Batavia, 1842-1843, 8vo, 2 vols.: Thorn, Canton, 1843, 8vo: Lobscheid, Hong-Kong, 1871, 4to: Williams, Shanghai, 1874, 4to. Eng. Chinese. — Morrison, part iii. : Williams, Macao, 1844, 8vo: Medhurst, Shanghai, 1847-1848, 8vo, 2 vols.: Hung Maou, Tung yungfan hwa (Common words of the Red-haired Foreigners), 1850, 8vo. Doolittle, Foochow, 1872, 4to, vol. i. 550 pages. French, — Callery, Diet, encyclopidique, Macao and Paris, 1845 (radicals 1-20 only): M. A. H., 1876, 8vo, autographi6, 1730 pages. French- Chin. — Perny (Fr.-Latin, Spoken Mandarin), Paris, 1869, 4to; Appendice, 1770; Lemaire and Giguel, Shanghai, 1874, l6mo. Portuguese. — Gongalves (Port. -Chin.), Macao, 1830, 8vo, 2 vols.: Id. (Chin.-Port.), ib. 1833, 8vo. Idioms.— Giles, Shanghai, 1873, 4to. Phrases. — Yaou Pei-keen, Luy yih, 1742-1765, 8vo, 55 vols.: TseenTa-hin, Shingluy, 1853, 8vo, 4 vols. Classical Expressions. — Keang Yang and 30 others, Sze Shoo teen Lin, 1795, 8vo, 30 vols. Elegant Expressions. — Chang ting yuh, Fun luy tsze kin, 1722,

8vo, 64 vols. Phrases of Three Words. — Julien (Latin), Paris, 1864, 8vo. Poetical. — Pei wan she yun, 1800, 8vo, 5 vois. Proper Names. — F. Porter Smith (China, Japan, Corea, Annam, &c, Chinese-Eng.), Shanghai, 1870, 8vo. Topography. — Williams, Canton, 1841, 8vo. Names of Towns. — Biot, Paris, 1842, 8vo. Ancient Characters. — Foo Lwantseang, Luh shoo fun luy, 1800, 8vo, 12 vols. Seal Character. — Heu Shin, Shwo wan, ed. Seu Heuen, 1527, 8vo, 12 vols. Running Hand. — St Aulaire and Groeneveld (Square Characters, Running Hand; Running, Square), Amst. 1861, 4to, 117 pages. Technical Terms (in Buddhist trans- lations from Sanskrit) — Yuen Ying, Yih ‘see king pin e, 1848, 8vo. Dialects. — Amoy: Douglas, London, 1873, 4to, 632 pages: Macgowan, Hong-Kong, 1869, 8vo. Canton; Yu Heo-poo and Wan ke-shih, Keang hoo chih tuhfun yun (so yaou ho tseih, Canton, 1772, 8vo, 4 vols.; 1803, 8vo, 4 vols.; Fuh-shan, 1833, 8vo, 4 vols.: Morrison, Macao, 1828, 8vo: Wan ke shih, Canton, 1856, 8vo: Williams (tonic, Eng.Chinese), Canton, 1856, 8vo: Chalmers, Hong Kong, 1859, i2mo; 3rd ed. 1873, 8vo. Changchow in Fuhkeen: Seay Sew-lin, Ya suh tung shih woo yin, 1818, 8vo, 8 vols.; 1820. Foo-chow : Tseih (a Japanese general) and Lin Peih shan, Pa yin ho ting, ed. Tsin Gan, 1841, 8vo: Maclay and Baldwin, Foochow, 1870, 8vo, 1 123 pages. Hok-keen: Medhurst, Macao, 183c, 4to: Peking, Stent,

Shanghai, 1871, 8vo.

Corean. — Chinese, Corean and Japanese. — Cham Seen Wo Kwo tsze mei, translated by Medhurst, Batavia, 1835, 8vo. Russian. — Putzillo, St Petersburg, 1874, l2mo, 746 pages.

Japanese. — SioKen Zi Ko (Examination of Words and Characters) , 1608, 8vo, 10 vols. : Wa Kan Won Se Ki Sio Gen Zi Ko, lithographed by Siebold, Lugd. Bat., 1835, fol. Jap.Chinese. — Faga biki set yo siu. Chinese Jap. — Kanghi Tse Tein, 30 vols. i2mo : Zi rin gioku ben. Dutch Dictionaries printed by Japanese. — Nieeuverzameld Japansch en Hollandsch Woordenbock, by the interpreter, B. Sadayok, 1810: Minamoto Masataka, Prince of Nakats (Jap. Chinese-Dutch), 5 vols. 4to, printed at Kakats by his servants: Jedo-Halma (Dutch- Jap.), Jedo, 4to, 20 vols.: Nederduitsche taal, Dutch Chinese, for the use of interpreters. Latin and Portuguese. — Calepinus, Dic- tionarium, Amacusa, 1595, 4to. Latin. — Collado, Compendium, Romae, 1632, 4to: Lexicon, Romae, 1870, 4to, from Calepinus. English. — Medhurst, Batavia, 1830, 8vo: Hepburn, Shanghai, 1867, 8vo; 1872. Eng.-Jap. — Hori Tatnoskoy, Yedo, 1862, 8vo; 2nd ed. Yeddo, 1866, 8vo: Satow and Ishibashi Masakata (spoken language), London, 1876, 8vo. French. — Rosny (Jap. Fr. Eng.), Paris, 1857, 4to, vol. i. : Pages, Paris, 1869, 4to, translated from Calepinus. Fr.-Jap. — Soutcovey, Paris, 1864, 8vo. Fr. Eng. Jap. — Mermet de Cachon, Paris, 1866, 8vo, unfinished. German. — Pfizmaier (Jap.-Ger., Eng.), Wien, 1851, 4to, unfinished. Spanish. — Vocabulario del Japon, Manila, 1630, 4to, translated from the next. Portuguese. — Vocabulario da Lingua de Japam, Nagasaki, 1603, ito. Russian. — Goshkevich, St Petersburg, 1857, 8vo, 487 pages. Chinese Characters with Japanese Pronunciation. — Rosny, Paris, 1867, 8vo. Chinese and Japanese Names of Plants. — Hoffmann, Leyde, 1864, 8vo.

Aino.— Pfizmaier, Wien, 1854, 4to.

Northern and Central Asia. — Buriat: Castren, St Petersburg, 1857, 8vo. Calmuck: Zwick, Villingen, 1853, 4to: Smirnov, Kazan, 1857, l2mo: Jiigl, Siddhi Kpr, Leipzig, 1866, 8vo. Chuvash: Clergy of the school of the Kazan Eparchia, Kazan, 1836, 8vo, 2481 words: Lyule (Russ.-Chuv. French), Odessa, 1846, 8vo, 244 pages: Zolotnitski, Kazan, 1875, 8vo, 287 pages. Jagatai: Mir Ali Shir, Abuska, ed. Vambery, with Hungarian translation, Pesth, 1862, 8vo: Vambery, Leipzig, 1867, 8vo: Pa vet de Courteille, Paris, 1870, 8vo. Koibal and Karagas: Castren, St Petersburg, 1857, 8vo. Manchu: Yulchi tseng ting t.sing wen kian (Manchu Chinese), 177 1, 4to, 6 vols. : Sze li hoh pik wen kian (Manchu-Mongol, Tibetan, Chinese) 10 vols. 4to, the

Chinese pronunciation represented in Manchu: San hoh pien Ian (Manchu-Chinese, Mongol), 1792, 8vo, 12 vols.; — all three classed vocabularies: Langles (French), Paris, 1789-1790, 4to, 3 vols. : Gabelentz (German), Leipzig, 1864, 8vo: Zakharov (Russian), St Petersburg, 1875, 8vo, 1235 pages: Mongol: I. J. Schmidt (German, Russian), St Petersburg, 1835, 4to: Scher.gin, Kazan, 1841, 8vo: Kovalevski, Kasan, 1844-1849, 4to, 3 vols. 2703 pages. Ostiak: Castren, St Petersb. 1858, 8vo. Samoyed: Castren, St Petersb. 1855, 8vo, 308 pages. Tartar: Giganov (Tobolsk), St Petersburg, 1804, 4to; (Russ.-Tartar), ib. 1840, 4to: Troyanski (Karan), Kasan, 1835-1855, 4to. Tibetan: Minggi djamtoo (Tibet-Mongol) : Bodschi dijig togpar lama : Kad shi schand scharwi melonggi jige (Manchu- Mongol-Tibetan-Chinese), Kanghi's Dictionary with the Tibetan added in the reign of Khian lung (1 736—1 795) ; Csoma de Koros (Eng.) , Calcutta, 1834, 4to: I. J. Schmidt (German), St Petersburg, 1 841, 4to: Id. (Russian), ib. 1843, 4to: Jaeschke (Eng.), London, 1870, 8vo, 160 pages: Id. (Germ.), Gnadau, 1 87 1, 658 pages: (Bhotanta), Schroeter, Serampore, 1826, 4to. Tungusian: Castren, St Peters- burg, 1856, 8vo, 632 pages. Uigur: Vambery, Innspruck, 1870, 4to. Yakut: Bohtlingk, ib. 1854, 4to, 2 vols. Yenissei Ostiak: Castren, ib. 1849, 8vo.

AFRICA

Egyptian. — Young (enchorial), London, 1830-1831, 8vo: Sharpe, London, 1837, 4to: Birch, London. 1838, 4to: Champollion (died March 4, 1832), Dictionnaire loyptien, Paris, 1841, 4to: Brugsch,

Hieroglyphisch-Demotisches Worterbuch, Leipzig, 1867-1868, 4to, 4 vols. 1775 pages, nearly 4700 words, arranged according to the hieroglyphic alphabet of 28 letters : Pierret, Vocabulaire hierog., Paris, 1875, 8vo, containing also names of persons and places: Birch, in vol. v. pp. 337-580 of Bunsen's Egypt's Place, 2nd ed. London, 1867, &c. 8vo, 5010 words. Proper Names. — Brugsch, Berlin, 1851, 8vo, 726 names: Parthey, ib. 1864, 8vo, about 1500 names: Lieblein, Christiania, 1871, 8vo, about 3200 from hieroglyphic texts. Book of the Dead. — Id., Paris, 1875, i2mo.

Coptic. — Veyssiere de la Croze, Oxon. 1775, 8vo: Rossi, Romae, 1807, 4to: Tattam, Oxon. 1855, 8vo: Peyron, 1835, 4to (the standard) : Parthey, Berolini, 1844, 8vo.

Ethiopia. — Wemmer, Romae, 1638, 4to: Ludolf, London, 1661, 4to: Francof. ad M., 1699, fol.: Dillmann (Tigre appendix), Leipzig, 1863-1865, 4to, 828 pages.

Amharic. — Ludolphus, Franc, ad Maenum, 1698, fol. : Isenberg, London, 1841, 4to, 442 pages. Tigre: Munzinger, Leipzig, 1865, 8vo: Beurmann, ib. 1868, 8vo.

East Coast. — Dankali: Isenberg, London, 1840, i2mo. Calla: Krapf, London, 1842, 8vo: Tutschek, Miinchen, 1844, 8vo. Engu- tuk Iloigob: Erhardt, Ludwigsberg, 1857, 8vo. Kisuaheli: Vocabu- lary of the Soahili, Cambridge, U.S. 1845, 8vo: Steere, London, 1870, 8vo, about 5800 words. Kisuaheli, Kinika, Kikamba, Kipokono, Kikian, Kigalla: Krapf, Tubingen, 1850, 8vo.

Malagasy.— Houtmann (Malaysche en Madagask Talen), Amst. 1603, 2nd ed. Matthysz, ib. 1680, 8vo: Huet de Froberville, Isle de France, fol. 2 vols.: Flacourt, Paris, 1658, 8vo: Challand (Southern), Isle de France, 1773, 4to: Freeman and Johns, London, 1835, 8vo, 2 vols.: Dalmont (Malgache, Salalave, et Betsimara), 1842, 8vo: Kessler, London, 1870, 8vo.

Southern Africa, — Bleek, The Languages of Mozambique, London, 1856, 8vo. Kaffre: Bennie, Lovedale, 1826, i6mo: Aylifle, Graham's Town, 1846, i2mo: Appleyard, 1850, 8vo: Bleek, Bonn, 1853, 4to, 646 pages. Zulu-Kaffre: Perrin (Kaffre-Eng.), London, 1855, 24mo, 172 pages: Id. (Eng.-Kaffre), Pietermaritzburg, 1855, 241110, 227 pages: Id. (Eng.Zulu), ib. 1865, l2mo, 226 pages: Dohne, Cape Town, 1857, 8vo, 428 pages: Colenso, Pietermaritz burg, 1861, 8vo, 560 pages, about 8000 words. Hottentot: Bleek, Cape Town, 1857, 4to, 261 pages. Namaqua: Tindall, ib. 1852, 8vo: Vocabulary, Barmen, 1854, 8vo: Hahn, Leipzig, 1870, i2rr.o. Sechuana: Casalis, Paris, 1841, 8vo. Herero: Hahn, Berlin, 1857, 8vo, 207 pages, 4300 words.

Western Africa. — Akra or Ga: Zimmermann, Stuttgart, 1858, 8vo, 690 pages. Ashanlee: Christaller (also Akra), Basel, 1874, 8vo, 299 pages. Bullom: Nylander, London, 1814, l2mo. Bunda or Angola: Cannecatim, Lisboa, 1804, 4to, 722 pages. Dualla Grammatical Elements, &c, Cameroons, 1855, 8vo. Efik or Old Calabar: Waddell, Old Calabar, 1846, i6mo, 126 pages; Edinb, 1849, 8vo, 95 pages. Eyo: Raban, London, 1830-1831, i2mo, 2 parts. Grebo: Vocabulary, Cape Palmas, 1837, 8vo; Dictionary, ib. 1839, 8vo, 119 pages. If a: Schlegel, Stuttgart, 1857, 8vo. Mpongue: De Lorme (Franc.Pongoue), Paris, 1876, i2mo, 354 pages. Oji: Riis, Basel, 1854, 8v °> 28 4 pages.

Sherbro': Schon, .s. a. et I. 8vo, written in 1839, 42 pages. Susu: Brunton, Edinburgh, 1802, 8vo, 145 pages. Vei: Koelle, London, 1854, 8vo, 266 pages. Wolof and Bambarra: Dard, Paris, 1825, 8vo. Wolof: Roger, ib. 1829, 8vo: Missionnaires de S. Esprit, Dakar, 1855, &c. l6mo. Faidherbe (French Wolof, Poula and Soninke), St Louis, Sene-gambia, i860, l2mo. Ycruba: Crowther, London, 1843, 8vo; 1852, 298 pages: Vidal, ib. 1852, 8vo: Bowen, Washington, 1858, 4to.

Central Africa. — Barth, Vocabularies. Gotha, i862-i866,4to. Bari: Mitterreutzner, Brixen, 1867, 8vo: Reinisch, Vienna, 1874, 8vo. Dinka; Mitterreutzner, Brixen, t 866, 8 vo. Haussa: Schon (Eng.), London, 1843, 8vo.

Berber. — Venture de Paradis, Paris, 1844, 8vo: Brosselard, ib. 1844, 8yo: Delaporte, ib. 1844, 4to, by order of the Minister of War: Creusat, Frang.-Kabyle (Zouaoua), Alger, 1873, 8vo. Siwah: Minutoli, Berlin, 1827, 4to.

AUSTRALIA AND POLYNESIA Australia. — New South Wales: Threlkeld (Lake Macquarie Language), Sydney, 1834, 8vo. Victoria: Bunce, Melbourne, 1856, l2mo, about 2200 words. South Australia: Williams, South Australia, 1839, 8vo: Teichelmann and Schiirmann, Adelaide, 1840, 8vo: Meyer, ib. 1843, 8vo. Murray River: Moorhouse, ib. 1846, 8vo. Parnkalla: Schiirmann, Adelaide, 1844, 8vo. Woolner District: Vocabulary, ib. 1869, i2mo. Western Australia: Sir George Grey, Perth, 1839, 4to; London, 1840, 8vo: Moore, ib. 1843 : Brady, Roma, 1845, 24mo, 8vo, 187 pages. Tasmania: Millegan, Tasmania, 1857.

Polynesia. — Hale, Grammars and Vocabularies of all the Poly- nesian Languages, Philadelphia, 1846, 4to. Marquesas, Sandwich Gambier: Mosblech, Paris, 1843, 8vo. Hawaiian: Andrews, Vocabulary, Lahainaluna, 1636, 8vo: Id., Dictionary, Honolulu, 1865, 8vo, 575 pages, about 15,500 words. Marquesas: Pierquin, de Gembloux, Bourges, 1843, 8vo: Buschmann, Berlin, 1843, 8vo. Samoan: Dictionary, Samoa, 1862, 8vo. Tahitian: A Tahilian and English Dictionary, Tahiti, 1851, 8vo, 314 pages. Tonga: Rabone, Vavau, 1845, 8vo. Fijian: Hazlewood (Fiji-Eng.), Vewa.. 1ˆ50,

i2mo: Id. (Eng.-Fiji), ib. 1852, l2mo: Id., London, 1872, 8vo. Maori: Kendall, 1820, i2mo: Williams, Paihia, 1844, 8vo; 3rded. London,

1871, 8vo: Taylor, Auckland, 1870, i2mo.

AMERICA

North America.— Eskimo : Washington, London, 1850, 8vo: Petitot (Mackenzie and Anderson Rivers), Paris, 1876, 4to. Kinai: Radloff, St Petersburg, 1874, 4to. Greenland: Egede (Gr. Dan. Lat., 3 parts), Hafn, 1750, 8vo; 1760, Fabricius, Kjobenhavn, 1804, 4to. Hudson's Bay Indians: Bowrey, London, 1701, fol. Abnaki: Rasles, Cambridge, U.S., 1833, 4to. Chippewa: Baraga, Cincinnati, 1853, l2mo, 622 pages: Petitot, Paris, 1876, 4to, 455 pages. Massachusetts or Natick: Cotton, Cambridge, U.S. 1829, 8vo. Onondaga: Shea (French-Onon.), from a MS. (of 17th century), London, i860, 4to, 109 pages. Dacota: Riggs, New York, 1851, 4to, 424 pages:] Williamson (Eng. Dae), Santos Agency, Nebraska, l2mo, 139 pages. Mohawk: Bruyas, New York, 1863, 8vo. Hidatsa (Minnetarees, Cros Ventres of the Missouri): Matthews, ib. 1874, 8vo. Choctaw: Byington, ib. 1852, i6mo. Clallam and Lummi: Gibbs, ib. 1863, 8vo. Yakatna: Pandosy, translated by Gibbs and Shea, ib. 1862, 8vo. Chinook: Gibbs, New York, 1863, 4to. Chinook Jargon, the trade language of Oregon: Id., ib. 1863, 8vo. Tatche or Telame: Sitjar, ib. 1841, ovo.

Mexico and Central America. — Tepehuan: Rinaldini, Mexico, 1743, 4to. Cora- Ortega, Mexico, 1732, 4to. Tarahumara: Steffel, Briinn, 1791, 8vo. Otomi: Carochi, Mexico, 1645, 4-to: Neve y Molina, ib. 1767, 8vo: Yepes, ib. 1826, 4to: Piccolomini, Roma, 1841, 8vo. Mexican or Aztec: Molina, Mexico, 1555, 4to; 1571, fol. 2 vols.: Arenas, ib. 1583; 1611, 8vo; 1683; 1725; 1793, i2mo: Biondelli, Milan, 1869, fol. Mexican, Tontonacan, and Huastecan: Olmos, Mexico, 1555-1560, 4to, 2 vols. Huastecan: Tapia Zenteno, ib. 1767, 4to, 128 pages. Opata or Tequima: Lombardo, ib. 1702, 4to. Tarasca: Gilbert!, ib. 1559, 4to: Lagunas, ib. 1574, 8vo. Mixtecan: Alvarado, Mexico, 1593, 4to. Zapoteca: Cordova, ib. 1578, Ato. Maya: Beltran de Santa Rosa Maria, ib. 1746, 4to; Merida de Yucatan, 1859, 4to, 250 pages: Brasseur de Bourbourg, Paris, 1874, 8vo, 745 pages. Qmche: Id. (also Cak- chiquel and Trutuhil dialects), ib. 1862, 8vo.

South America. — Chibcha: Uricoechea, Paris, 1871, 8vo. Chayma: Tauste, Madrid, 1680, 4to: Yanguas, Burgos, 1683, 4to. Carib: Raymond, Auxerre, 1665-1666, 8vo. Galibi: D.[e]. L.[a] S.[auvage], Paris, 1763, 8vo. Tupi: Costa Rubim, Rio de Janeiro, 1853, 8vo: Silva Guimaraes, Bahia, 1854, 8vo: Diaz, Lipsia, 1858, l6mo. Guarani: Ruiz de Montoyo, Madrid, 1639, 4*0 ; 1640; 1722, 4to; ed. Platzmann, Leipzig, 1876, &c., 8vo, to be in 4 vols. 1850 pages. Moxa: Marban, Lima, 1701, 8vo. Lule: Machoni de Corderia, Madrid, 1732, i2mo.

Quichua: Santo Thomas, Ciudad de los Reyes, 1586, 8vo: Torres Rubio, Sevilla, 1603, 8vo; Lima, 1609, 8vo; ed. Figueredo, Lima, 1754, 8vo; Holguin, Ciudad de los Reyes, 1608, 8vo : Tschudi, Wien, 1853, 8vo, 2 vols. : Markham, London, 1 864, 8vo : Lopez, Les Races A ryennes de Perou, Paris, 1 87 1 , 8vo, comparative vocabulary, pp. 345-421. Aymara: Bertonio, Chicuyto, 1612, 4to, 2 vols. Chileno: Valdivia (also Allentiac and Milcocayac), Lima, 1607, 8vo: Febres, ib. 1765, l2mo; ed. Hernandez y Caluza, Santiago, 1 846, 8vo, 2 vols. Tsonecan (Patagonian) : Schmid, Bristol, i860, l2mo.

The above article incorporates the salient features of the 9th- edition article by the Rev. Ponsonby A. Lyons, and the ioth-edition article by Benjamin E. Smith.

DICTYOGENS (Gr. blurvov, a net, and the termination -ytvr\s, produced), a botanical name proposed by John Lindley for a class including certain families of Monocotyledons which have net-veined leaves. The class was not generally recognized.

DICTYS CRETENSIS, of Cnossus in Crete, the supposed com- panion of Idomeneus during the Trojan War, and author of a diary of its events. The MS. of this work, written in Phoenician characters, was said to have been found in his tomb (enclosed in a leaden box) at the time of an earthquake during the reign of Nero, by whose order it was translated into Greek. In the 4 th century a.d. a certain Lucius Septimius brought out Dictys Cretensis Ephemeris belli Trojani, which professed to be a Latin translation of the Greek version. Scholars were not agreed whether any Greek original really existed; but all doubt on the point was removed by the discovery of a fragment in Greek amongst the papyri found by B. P. Grenfell and A. S. Hunt in 1905-1906. Possibly the Latin Ephemeris was the work of Septimius himself. Its chief interest lies in the fact that (together with Dares Phrygius's De excidio Trojae) it was the source from which the Homeric legends were introduced into the romantic literature of the middle ages.

Best edition by F. Meister (1873), with short but useful introduc- tion and index of Latinity; see also G. Korting, Diktys und Dares

(1874), with concise bibliography; H. Dunger, Die Sage vom tro- janischen Kriege in den Bearbeitungen des Mittelalters und ihren antiken Quellen (1869, with a literary genealogical table) ; E. Collilieux, tLtude sur Dictys de Crete et Dares de Phrygie (1887), with biblio- graphy; W. Greif, " Die mittelalterlichen Bearbeitungen der Tro- janersage," in E. M. Stengel's Ausgaben und Abhandlungen aus

dem Gebiete der romanischen Philologie, No. 61 (1886, esp. sections 82, 83, 168-172); F. Colagrosso, ” Ditte Cretese ” in Atti della r : Accademia di Archeologia (Naples, 1897, vo ‘- ‘8, pt. ii. 2); F. Noack, ” Der griechische Dictys,” in Philologus, supp. vi. 403 ff . ; N. E. Griffin, Dares and Dictys, Introduction to the Study of the Medieval Versions of the Story of Troy (1907),

DICUIL (fl. 825), Irish monastic scholar, grammarian and geographer. He was the author of the De mensura orbis terrae, finished in 825, which contains the earliest clear notice of a European discovery of and settlement in Iceland and the most definite Western reference to the old freshwater canal between the Nile and the Red Sea, finally blocked up in 767. In 795 (February 1 -August 1) Irish hermits had visited Iceland; on their return they reported the marvel of the perpetual day at midsummer in ” Thule,” where there was then ” no darkness to hinder one from doing what one would.” These eremites also navigated the sea north of Iceland on their first arrival, and found it ice-free for one day’s sail, after which they came to the ice-wall. Relics of this, and perhaps of other Irish religious settlements, were found by the permanent Scandinavian colonists of Iceland in the 9th century. Of the old Egyptian freshwater canal Dicuil learnt from one ” brother Fidelis,” probably another Irish monk, who, on his way to Jerusalem, sailed along the ” Nile ” into the Red Sea — passing on his way the ” Barns of Joseph ” or Pyramids of Giza, which are well described. Dicuil’s knowledge of the islands north and west of Britain is evidently intimate; his references to Irish exploration and colonization, and to (more recent) Scandinavian devastation of the same, as far as the Faeroes, are noteworthy, like his notice of the elephant sent by Harun al-Rashid (in 801) to Charles the Great, the most curious item in a political and diplomatic intercourse of high importance. Dicuil’s reading was wide; he quotes from, or refers to, thirty Greek and Latin writers, including the classical Homer, Hecataeus, Herodotus, Thucydides, Virgil, Pliny and King Juba, the sub-classical Solinus, the patristic St Isidore and Orosius, and his contemporary the Irish poet Sedulius; — in particular, he professes to utilize the alleged surveys of the Roman world executed by order of Julius Caesar, Augustus and Theodosius (whether Theodosius the Great or Theodosius II. is uncertain). He probably did not know Greek; his references to Greek authors do not imply this. Though certainly Irish by birth, it has been conjectured (from his references to Sedulius and the caliph’s elephant) that he was in later life in an Irish monastery in the Frankish empire. Letronne in- clines to identify him with Dicuil or Dichull, abbot of Pahlacht, born about 760.

There are seven chief MSS. of the De mensura (Dicuil’s tract on

grammar is lost); of these the earliest and best are (1) Paris, National Library, Lat. 4806; (2) Dresden, Regius D. 182; both are of the 10th century. Three editions exist : (1) C. A. Walckenaer's, Paris, 1807; (2) A. Letronne's, Paris, 1814, best as to commentary; (3) G. Parthey's, Berlin, 1870, best as to text. See also C. R. Beazley, Dawn of Modern Geography (London, 1897), i. 317-327, 522-523, 529; T. Wright, Biographia Britannica literaria, Anglo-Saxon Period (London, 1842), pp. 372-376. (C. R. B.)

DIDACHE, THE, or Teaching of the {twelve) Apostles ,— the most important of the recent recoveries in the region of early Christian literature (see Apocryphal Literature). It was previously known by name from lists of canonical and extra- canonical books compiled by Eusebius and other writers. More- over, it had come to be suspected by several scholars that a lost book, variously entitled The Two Ways or The Judgment of Peter, had been freely used in a number of works, of which mention must presently be made. In 1882 a critical reconstruction of this book was made by Adam Krawutzcky with marvellous accuracy, as was shown when in the very next year the Greek bishop and metropolitan, Philotheus Bryennius, published The Teaching of the Twelve Apostles from the same manuscript from

which he had previously published the complete form of the Epistle of Clement. 1

TheDidache, as we now have it in the Greek, falls into two marked divisions: (a) a book of moral precepts, opening with the words, " There are two ways"; (b) a manual of church ordin- ances, linked on to the foregoing by the words, "Having first said all these things, baptize, &c." Each of these must be considered separately before we approach the question of the locality and date of the whole book in its present form.

i. The Two Ways. — The author of the complete work, as we now have it, has modified the original Two Ways by inserting near the beginning a considerable section containing, among other matter, passages from the Sermon on the Mount, in which the language of St Matthew's Gospel is blended with that of St Luke's. He has also added at the close a few sentences, begin- ning, " If thou canst not bear (the whole yoke of the Lord), bear what thou canst " (vi. 2) ; and among minor changes he has introduced, in dealing with confession,

reference to ” the church ” (iv. 14). No part of this matter is to be found in the following documents, which present us in varying degrees of accuracy with The Two Ways: (i.) the Epistle of Barnabas, chaps, xix., xx. (in which the order of the book has been much broken up, and a good deal has been omitted) ; (ii.) the Ecclesiastical Canons of the Holy Apostles, usually called the Apostolic Church Order, a book which presents a parallel to the Teaching, in so far as it consists first of a form of The Two Ways, and secondly of a number of church ordinances (here, however, as in the Syriac Didascalia, which gives about the same amount of The Two Ways, various sections are ascribed to individual apostles, e.g. ” John said, There are two ways,” &c); (iii.) a discourse of the Egyptian monk Schnudi (d. 451), preserved in Arabic (see Iselin, Texte u. Unters., 1895); (iv.) a Latin version, of which a fragment was published by 0. von Gebhardt in 1884, and the whole by J. Schlecht in 1900. When by the aid of this evidence The Two Ways is restored to us free of glosses, it has the appearance of being a Jewish manual which has been carried over into the use of the Christian church. This is of course only a probable inference; there is no prototype extant in Jewish literature, and, comparing the moral (non-doctrinal) instruction for Christian catechumens in Hermas, Shepherd (Mand. i.-ix.), no real need to assume one. There was a danger of admitting Gentile converts to the church on too easy moral terms; hence the need of such insistence on the ideal as in The Two Ways and the Mandates. The recent recovery of the Latin version is of singular interest, as showing that, even without the distinctively Christian additions and interpolations which our full form of the Teaching presents, it was circulating under the title Doctrina apostolorum. 2

2. The second part of our Teaching might be -called a church directory. It consists of precepts relating to church life, which are couched in the second person plural; whereas The Two Ways uses throughout the second person singular. It appears to be a composite work. First (vii. i-xi. 2) is a short sacramental manual intended for the use of local elders or presbyters, though such are not named, for they were not yet a distinctive order or clergy. This section was probably added to The Two Ways before the addition of the remainder. It orders baptism in the three- fold name, making a distinction as to waters which has Jewish parallels, and permitting a threefold pouring on the head, if sufficient water for immersion cannot be had. It prescribes a fast before baptism for the baptizer as well as the candidate. Fasts are to be kept on Wednesday and Friday, not Monday and Thursday, which are the fast days of ” the hypocrites,” i.e. by a perversion of the Lord’s words, the Jews. ” Neither pray ye as

1 The MS. was found in the Library of the Jerusalem Monastery of the Most Holy Sepulchre, in Phanar, the Greek quarter of Constantinople. It is a small octavo volume of 120 parchment leaves, written throughout by Leo, ” notary and sinner,” who finished his task on the I Ith of June 1 156. Besides The Didache and the Epistles of Clement it contains several spurious Ignatian epistles.

2 The word twelve had no place in the original title and was inserted when the original Didache or Teaching {e.g. The Two Ways) was combined with the church manual which mentions apostles outside of the twelve. It may be noted that the division of the Didache into

thapters is due to Bryennius, that into verses to A. Harnack.

the hypocrites; but as the Lord commanded in His Gospel.” Then follows the Lord’s Prayer, almost exactly as in St Matthew, with a brief doxology — ” for Thine is the power and the glory forever.” This is to be said three times a day. Next come three eucharistic prayers, the language of which is clearly marked off from that of the rest of the book, and shows parallels with the diction of St John’s Gospel. They are probably founded on Jewish thanksgivings, and it is of interest to note that a portion of them is prescribed as a grace before meat in (pseudo-) Athanasius’ De virginitate. A trace of them is found in one of the liturgical prayers of Serapion, bishop of Thmui, in Egypt, but they have left little mark on the liturgies of the church. As in Ignatius and other early writers, the eucharist, a real meal (x. 1) of a family character, is regarded as producing immortality (cf. ” spiritual food and drink and eternal life “). None are to partake of it save those who have been ” baptized in the name of the Lord ” (an expression which is of interest in a document which prescribes the threefold formula). The prophets are not to be confined to these forms, but may ” give thanks as much as they will.” This appears to show that a prophet, if present, would naturally preside over the eucharist. The next section (xi. 3-xiii.) deals with the ministry of spiritual gifts as exercised by apostles, prophets and teachers. An apostle is to be ” re- ceived as the Lord “; but he must follow the Gospel precepts, stay but one or two days, and take no money, but only bread enough for a day’s journey. Here we have that wider use of the term ” apostle ” to which Lightfoot had already drawn attention. A prophet, on the contrary, may settle if he chooses, and in that case he is to receive tithes and first-fruits; ” for they are your high priests.” If he be once approved as a true prophet, his words and acts are not to be criticized; for this is the sin that shall not be forgiven. Next comes a section (xiv., xv.) reflecting a somewhat later development concerning fixed services and ministry; the desire for a stated service, and the need of regular provision for it, is leading

to a new order of things. The eucharist is to be celebrated every Lord's Day, and preceded by confession of sins, " that your sacrifice may be pure … for this is that sacrifice which was spoken of by the Lord, In every place and time to offer unto Me a pure sacrifice. Appoint therefore unto yourselves bishops and deacons, worthy of the Lord, men meek and uncovetous, and true and approved; for they also minister unto you the ministration of the prophets and teachers. Therefore despise them not; for they are your honoured ones, together with the prophets and teachers." This is an arrange- ment recommended by one who has tried it, and he reassures the old-fashioned believer who clings to the less formal regime (and whose protest was voiced in the Montanist movement) , that there will be no spiritual loss under the new system. The book closes (chap, xvi.) with exhortations to steadfastness in the last days, and to the coming of the " world-deceiver " or Antichrist, which will precede the coming of the Lord. This section is perhaps the actual utterance of a Christian prophet, and may be of earlier origin than the two preceding sections.

3. It will now be clear that indications of the locality and date of our present Teaching must be sought for only in the second part, and in the Christian interpolations in the first part. We have no ground for thinking that the second part ever existed independently as a separate book. The whole work was in the hands of the writer of the seventh book of the Apostolic Consti- tutions, who embodies almost every sentence of it, interspersing it with passages of Scripture, and modifying the precepts of the second part to suit a later (4th-century) stage of church develop- ment; this writer was also the interpolator of the Epistles of Ignatius, and belonged to the Syrian Church. Whether the second part was known to the writer of the Apostolic Church Order is not clear, as his only quotation of it comes from one of the eucharistic prayers. The allusions of early writers seem to point to Egypt, but their references are mostly to the first part, so that we must be careful how we argue from them as to the provenance of the book as a whole. Against Egypt has been urged the allusion in one of the eucharistic prayers to " corn upon the mountains." . This is found in the Prayer-book of Serapion

(c. 350) but omitted in a later Egyptian prayer; the form as we have it in The Didache may have passed into Egypt with the authority of tradition which was afterwards weakened. The anti- Jewish tone of the second part suggests the neighbourhood of Jews, from whom the

Christians were to be sharply dis- tinguished. Either Egypt or Syria would satisfy this condition, and in favour of Syria is the fact that the presbyterate there was to a late date regarded as a rank rather than an office. If we can connect the injunctions(vi. 3)concerning (abstinence from certain) food and that which is offered to idols with the old trouble that arose at Antioch (Acts xv. 1) and was legislated for by the Jerusalem council, we have additional support for the Syrian claim. But all that we can safely say as to locality is that the community here represented seems to have been isolated, and out of touch with the larger centres of Christian life.

This last consideration helps us in discussing the question of date. For such an isolated community may have preserved primitive customs for some time after they had generally dis- appeared. Certainly the stage of development is an early one, as is shown, e.g., by the prominence of prophets, and the need that was felt for the vindication of the position of the bishops and deacons (there is no mention at all of presbyters); moreover, there is no reference to a canon of Scripture (though the written Gospel is expressly mentioned) or to a creed. On the other hand the ” apostles ” of the second part are obviously not ” the twelve apostles ” of the title; and the prophets seem in some instances to have proved unworthy of their high position. The ministry of enthusiasm which they represent is about to give way to the ministry of office, a transition which is reflected in the New Testament in the 3rd Epistle of John. Three of the Gospels have clearly been for some time in circulation; St Matthew’s is used several times, and there are phrases which occur only in St Luke’s, while St John’s Gospel lies behind the eucharistic prayers which the writer has embodied in his work. There are no indications of any form of doctrinal heresy as needing rebuke; the warnings against false teaching are quite general. While the first part must be dated before the Epistle of Barnabas, i.e. before a.d. 90, it seems wisest not to place the complete work much earlier than a.d. 120, and there are passages which may well be later.

A large literature has sprung up round The Didache since 1884. Harnack’s edition in Texte u. Unters. vol. ii. (1884) is indispensable to the student; and his discussions in Altchristl. Litteratur and Chronologie give clear summaries of his work. Other editions of the text are those of F. X. Funk, Patres Apostolici, vol. i. (Tubingen, 1901); H. Lietzmann (Bonn, 1903; with Latin version). Dr J. E. Odgers has published an English translation with introduction and notes (London, 1906). Dr C. Taylor in 1886 drew attention to some important parallels in Jewish literature; his edition contains an English translation. Dr Rendel Harris published in 1887 a complete facsimile,

and gathered a great store of patristic illustration. Text and translation will also be found in Lightfoot's Apostolic Fathers (ed. min.) The fullest critical treatment in English is by Dr Vernon Bartlet in the extra volume of Hastings's Dictionary of the Bible; the most complete commentary on the text is by P. Drews in Hennecke's Handbuch zu den N.T. Apocryphen (1904). Other references to the literature may be found by consulting Harnack's Altchristl. Litteratur.

DIDACTIC POETRY, that form of verse the aim of which is, less to excite the hearer by passion or move him by pathos, than to instruct his mind and improve his morals. The Greek word 8i8o.k.tik6s signifies a teacher, from the verb hibkantiv, and poetry of the class under discussion approaches us with the arts and graces of a schoolmaster. At no time was it found convenient to combine lyrical verse with instruction, and there- fore from the beginning of literature the didactic poets have chosen a form approaching the epical. Modern criticism, which discourages the epic, and is increasingly anxious to limit the word " poetry " to lyric, is inclined to exclude the term " didactic poetry " from our nomenclature, as a phrase absurd in itself. It is indeed more than probable that didactic verse is hopelessly obsolete. Definite information is now to be found in a thousand shapes, directly and boldly presented in clear and technical prose. No farmer, however elegant, will- any longer choose to study agriculture in hexameters, or even in Tusser's shambling metre. The sciences and the professions will not waste their time on

methods of instruction which must, from their very nature, be artless, inexact and vague. But in the morning of the world, those who taught with authority might well believe that verse was the proper, nay, the only serious vehicle of their instruction. What they knew was extremely limited, and in its nature it was simple and straightforward; it had little technical subtlety; it constantly lapsed into the fabulous and the conjectural. Not only could what early sages knew, or guessed, about astronomy and medicine and geography be conveniently put into rolling verse, but, in the absence of all written books, this was the easiest way in which information could be made attractive to the ear and be retained by the memory. '

In the prehistoric dawn of Greek civilization there appear to have been three classes of poetry, to which the literature of Europe looks back as to its triple fountain-head. There were romantic epics, dealing with the adventures of gods and heroes; these Homer represents. There were mystic chants and religious odes, purely lyrical in character, of which the best Orphic Hymns must have been the type. And lastly there was a great body of verse occupied entirely with

increasing the knowledge of citizens in useful branches of art and observation; these were the beginnings of didactic poetry, and we class them together under the dim name of Hesiod. It is impossible to date these earliest didactic poems, which nevertheless set the fashion of form which has been preserved ever since. The Works and Days, which passes as the direct masterpiece of Hesiod (q.v.), is the type of all the poetry which has had education as its aim. Hesiod is supposed to have been a tiller of the ground in a Boeotian village, who determined to enrich his neighbours' minds by putting his own ripe stores of useful information into sonorous metre. Historically examined, the legend of Hesiod becomes a shadow, but the substance of the poems attributed to him remains. The genuine parts of the Works and Days, which Professor Gilbert Murray has called " a slow, lowly, simple poem," deal with rules for agriculture. The Theogony is an annotated catalogue of the gods. Other poems attributed to Hesiod, but now lost, were on astronomy, on auguries by birds, on the character of the physical world ; still others seem to have been genealogies of famous women. All this mass of Boeotian verse was composed for educational purposes, in an age when even preposterous information was better than no knowledge at all. In slightly later times, as the Greek nation became better supplied with intellectual appliances, the stream of didactic poetry flowed more and more closely in one, and that a theological, channel. The great poem of Parmenides On Nature and those of Empedocles exist only in fragments, but enough remains to show that these poets carried on the didactic method in mythology. Cleostratus of Tenedos wrote an astronomical poem in the 6th century, and Periander a medical one in the 4th, but didactic poetry did not flourish again in Greece until the 3rd century, when Aratus, in the Alexandrian age, wrote his famous Phenomena, a poem about things seen in the heavens. Other later Greek didactic poets were Nicander, and perhaps Euphorion.

It was from the hands of these Alexandrian writers that the genius of didactic poetry passed over to Rome, since, although it is possible that some of the lost works of the early republic, and in particular those of Ennius, may have possessed an educational character, the first and by far the greatest didactic Latin poet known to us is Lucretius. A highly finished translation by Cicero into Latin hexameters of the principal works of Aratus is believed to have drawn the attention of Lucretius to this school of Greek poetry, and it was not without reference to the Greeks, although in a more archaic and far purer taste, that he composed, in the 1st century before Christ, his magnificent De rerum natura. By universal consent, this is the noblest didactic poem in the literature of the world. It was intended to instruct man- kind in the

interpretation and in the working of the system of philosophy revealed by Epicurus, which at that time was exciting the sympathetic attention of all classes of Roman society. What gave the poem of Lucretius its extraordinary interest, and what has prolonged and even increased its vitality, vas the imaginative and illustrative insight of the author, piercing and lighting up the

recesses of human experience. On a lower intellectual level, but of a still greater technical excellence, was the Georgics of Virgil, a poem on the processes of agriculture, published about 30 B.C. The brilliant execution of this famous work has justly made it the type and unapproachable standard of all poetry which desires to impart useful information in the guise of exquisite literature. Himself once a farmer on the banks of the Mincio, Virgil, at the apex of his genius, set himself in his Campanian villa to recall whatever had been essential in the agricultural life of his boyish home, and the result, in spite of the ardours of the subject, was what J. W. Mackail has called ” the most splendid literary pro- duction of the Empire.” In the rest of surviving Latin didactic poetry, the influence and the imitation of Virgil and Lucretius are manifest. Manilius, turning again to Alexandria, produced a fine Astronomica towards the close of the reign of Augustus. Columella, regretting that Virgil had omitted to sing of gardens, composed a smooth poem on horticulture. Natural philosophy inspired Lucilius junior, of whom a didactic poem on Etna survives. Long afterwards, under Diocletian, a poet of Carthage, Nemesianus, wrote in the manner of Virgil the Cynegetica, a poem on hunting with dogs, which has had numerous imitations in later European literatures. These are the most important specimens of didactic poetry which ancient Rome has handed down to us.

In Anglo-Saxon and early English poetic literature, and especially in the religious part of it, an element of didacticism is not to be overlooked. But it would be difficult to say that any- thing of importance was written in verse with the sole purpose of imparting information, until we reach the 16th century. Some of the later medieval allegories are didactic or nothing. The first poem, however, which we can in any reasonable way compare with the classic works of which we have been speaking is the Hundreth Pointes of Good Husbandrie, published in 1557 by Thomas Tusser; these humble Georgics aimed at a practical description of the whole art of English farming. Throughout the early part of the 17 th century, when our

national poetry was in its most vivid and brilliant condition, the last thing a poet thought of doing was the setting down of scientific facts in rhyme. We come across, however, one or two writers who were as didactic as the age would permit them to be, Samuel Daniel with his philosophy, Fulke Greville, Lord Brooke with his ” treatises ” of war and monarchy. After the Restoration, as the lyrical element rapidly died out of English poetry, there was more and more room left for educational rhetoric in verse. The poems about prosody, founded upon Horace, and signed by John Sheffield, 3rd earl of Mulgrave (1648-1721), and Lord Roscommon, were among the earliest purely didactic verse-studies in English. John Philips deserves a certain pre-eminence, as his poem called Cyder, in 1706, set the fashion which lasted all down the 18th century, of writing precisely in verse about definite branches of industry or employment. None of the greater poets of the age of Anne quite succumbed to the practiceˆ but there is a very distinct flavour of the purely didactic about a great deal of the verse of Pope and Gay. In such productions as Gilbert West’s (1703-1756) Education, Dyer’s Fleece, and Somerville’s Chase, we see technical information put forward as the central aim of the poet. Instead of a passionate pleasure, or at least an uplifted enthusi- asm, being the poet’s object, he frankly admits that, first and foremost, he has some facts about wool or dogs or schoolmasters which he wishes to bring home to his readers, and that, secondly, he consents to use verse, as brilliantly as he can, for the purpose of gilding the pill and attracting an unwilling attention. As we descend the 18th century, these works become more and more numerous, and more dry, especially when opposed by the de- scriptive and rural poets of the school of Thomson, the poet of The Seasons. But Thomson himself wrote a huge poem of Liberty (1732), for which we have no name if we must not call it didactic. Even Gray began, though he failed to finish, a work of this class, on The Alliance of Education and Government. These poems were discredited by the publication of The Sugar-Cane (1764), a long verse-treatise about the’ cultivation of sugar by iegroes in the West Indies, by James Grainger (17 21- 1766), but,

though liable to ridicule, such versified treatises continued to appear. Whether so great a writer as Cowper is to be counted among the didactic poets is a question on which readers of The Task may be divided; this poem belongs rather to the class of. descriptive poetry, but a strong didactic tendency is visible in parts of it. Perhaps the latest frankly educational poem which enjoyed a great popularity was The Course of Time by Robert Pollok (1798-1827), in which a system of Calvinistic divinity is laid down with severity and in the pomp of

blank verse. This kind of literature had already been exposed, and discouraged, by the teaching of Wordsworth, who had insisted on the imperative necessity of charging all poetry with imagination and passion. Oddly enough, The Excursion of Wordsworth himself is perhaps the most didactic poem of the 19th century, but it must be acknowledged that his influence, in this direction, was saner than his practice. Since the days of Coleridge and Shelley it has been almost impossible to conceive a poet of any value com- posing in verse a work written with the purpose of inculcating useful information.

The history of didactic poetry in France repeats, in great measure, but in drearier language, that of England. Boileau, like Pope, but with a more definite purpose as a teacher, offered instruction in his Art pottique and in his Epistles. But his doctrine was always literary, not purely educational. At the beginning of the 18th century, the younger Racine (1692-1763) wrote sermons in verse, and at the close of it the Abbe Delille (1738-1813) tried to imitate Virgil in poems about horticulture. Between these two there lies a vast mass of verse written for the indulgence of intellect rather than at the dictates of the heart; wherever this aims at increasing knowledge, it at once becomes – basely and flatly didactic. There is nothing in French literature of the transitional class that deserves mention beside The Task or The Excursion.

During the century which preceded the Romantic revival of poetry in Germany, didactic verse was cultivated in that country on the lines of imitation of the French, but with a greater dryness and oh a lower level of utility. Modern German literature began with Martin Opitz (1507-1639) and the Silesian School, who were in their essence rhetorical and educational, and who gave their tone to German verse. Albrechtvon Haller (1708- 1777) brought a very considerable intellectual force to bear on his huge poems, The Origin of Evil, which was theological, and The Alps (1729), botanical and topographical. Johann Peter Uz (1720-1796) wrote a TheodicSe, which was very popular, and not without dignity. Johann Jacob Dusch (1725-1787) undertook to put The Sciences into the eight books of a great didactic poem. Tiedge (175 2-1840) was the last of the school; in a once-famous Urania, he sang of God and Immortality and Liberty. These German pieces were the most unswervingly didactic that any modern European literature has produced. There was hardly the pretence of introducing into them descriptions of natural beauty, as the English poets did, or of grace and wit like the French. The German poets simply poured into a lumbering mould of verse as much solid information and direct instruction as the form would hold.

Didactic poetry has, in modern times, been antipathetic to the spirit of the Latin peoples, and neither Italian nor Spanish literature has produced a really notable work in this class. An examination of the poems, ancient and modern, which have been mentioned above, will show that from primitive times there have been two classes of poetic work to which the epithet didactic has been given. It is desirable to distinguish these a little more exactly. One is the pure instrument of teaching, the poetry which desires to impart all that it knows about the growing of cabbages or the prevention of disasters at sea, the revolution of the planets or the blessings of inoculation. This is didactic poetry proper, and this, it is almost certain, became irrevocably obsolete at the close of the 18th century. No future Virgil will give the world a second Georgics. But there is another species which it is very improbable that criticism has entirely dislodged; that is the poetry which combines, with philosophical instruction, an impetus of imaginative movement, and a certain definite cultivation

of, fire and beauty. In hands so noble as those of Lucretius and Goethe this species of didactic poetry has enriched the world with durable masterpieces, and, although the circle of readers which will endure scientific disquisition in the bonds of verse grows narrower and narrower, it is probable that the great poet who is also a great thinker will now and again insist on being heard. In Sully-Prudhomme France has possessed an eminent writer whose methods are directly instructive, and both La Justice (1878) and Le Bonkeur (1888) are typically didactic poems. Perhaps future historians may name these as the latest of their class. , (E. G.)

DIDEROT, DENIS (1713-1784), French man of letters and encyclopaedist, was born at Langres on the 5th of October 17 13. He was educated by the Jesuits, like most of those who after- wards became the bitterest enemies of Catholicism; and, when his education was at an end, he vexed his brave and worthy father's heart by turning away from respectable callings, like law or medicine, and throwing himself into the vagabond life of a bookseller's hack in Paris. An imprudent marriage (1743) did not better his position. His wife, Anne Toinette Champion, was a devout Catholic, but her piety did not restrain a narrow and fretful temper, and Diderot's domestic life was irregular and unhappy. He sought consolation for chagrins at home in attach- ments abroad, first with a Madame Puisieux, a fifth-rate female scribbler, and then with Sophie Voland, to whom he was constant for

the rest of her life. His letters to her are among the most graphic of all the pictures that we have of the daily life of the philosophic circle in Paris. An interesting contrast may be made between the Bohemianism of the famous English literary set who supped at the Turk's Head with the Tory Johnson and the Conservative Burke for their oracles, and the Bohemianism of the French set who about the same time dined once a week at the baron D'Holbach's, to listen to the wild sallies and the inspiring declamations of Diderot. For Diderot was not a great writer; he stands out as a fertile, suggestive and daring thinker, and a prodigious and most eloquent talker.

Diderot's earliest writings were of as little importance as Goldsmith's Enquiry into the State of Polite Learning or Burke's Abridgement of English History. He earned 100 crowns by translating Stanyan's History of Greece (1743); with two colleagues he produced a translation of James's Dictionary of Medicine (1 746-1 748) and about the same date he published a free rendering of Shaftesbury's Inquiry Concerning Virtue and Merit (1745), with some original notes of his own. With strange and characteristic versatility, he turned from ethical speculation to the composition of a volume of stories, the Bijoux indiscrets (1748), gross without liveliness, and impure without wit. In later years he repented of this shameless work, just as Boccaccio is said in the day of his grey hairs to have thought of the sprightli- ness of the Decameron with strong remorse. From tales Diderot went back to the more congenial region of philosophy. Between the morning of Good Friday and the evening of Easter Monday he wrote the Pensies philosophiques (1746), and he presently added to this a short complementary essay on the sufficiency of natural religion. The gist of these performances is to press the ordinary rationalistic objections to a supernatural revelation; but though Diderot did not at this time pass out into the wilderness beyond natural religion, yet there are signs that he accepted that less as a positive doctrine, resting on grounds of its own, than as a convenient point of attack against Christianity. In 1747 he wrote the Promenade du sceptique, a rather poor allegory — point- ing first to the extravagances of Catholicism; second, to the vanity of the pleasures of that world which is the rival of the church; and third, to the desperate and unfathomable- uncertainty of the philosophy which professes to be so high above both church and world.

Diderot's next piece was what first introduced him to the world as an original thinker, his famous Lettre sur les aveugles (1749). The immediate object of this short but pithy writing was to show the dependence of men's ideas on their five senses. It considers the case of the intellect deprived of the aid of one of the senses; and in a second

piece, published afterwards, Diderot considered

the case of a similar deprivation in the deaf and dumb. The Lettre sur les sourds et muels, however, is substantially a digressive examination of some points in aesthetics. The philosophic significance of the two essays is in the advance they make towards the principle of Relativity. But what interested the militant philosophers of that day was an episodic application of the principle of relativity to the master-conception of God. What makes the Lettre sur les aveugles interesting is its presenta- tion, in a distinct though undigested form, of the modern theory of variability, and of survival by superior adaptation. It is worth noticing, too, as an illustration of the comprehensive freedom with which Diderot felt his way round any subject that he approached, that in this theoretic essay he suggests the possibility of teaching the blind to read through the sense of touch. If the Lettre sur les aveugles introduced Diderot into the worshipful company of the philosophers, it also introduced him to the penalties of philosophy. His speculation was too hardy for the authorities, and he was thrown into the prison of Vincennes. Here he remained for three months; then he was released, to enter upon the gigantic undertaking of his life.

The bookseller Lebreton had applied to him with a project for the publication of a translation into French of Ephraim Chambers's Cyclopaedia, undertaken in the first instance by an Englishman, John Mills, and a German, Gottfried Sellius (for particulars see Encyclopaedia) . Diderot accepted the proposal, but in his busy and pregnant intelligence the scheme became transformed. Instead of a mere reproduction of Chambers, he persuaded the bookseller to enter upon a new work, which should collect under one roof all the active writers, all the new ideas, all the new knowledge, that were then moving the cultivated class to its depths, but still were comparatively ineffectual by reason of their dispersion. His enthusiasm infected the publishers; they collected a sufficient capital for a vaster enterprise than they had at first planned; D'Alembert was persuaded to become Diderot's colleague; the requisite permission was procured from the government; in 1750 an elaborate prospectus announced the project to a delighted public; and in 1751 the first volume was given to the world. The last of the letterpress was issued in 1765, but it was 1772 before the subscribers received the final volumes of the plates. These twenty years were to Diderot years not merely of incessant drudgery, but of harassing persecution, of sufferings from the cabals of enemies, and of injury from the desertion of friends. The ecclesiastical party detested the Encyclopaedia, in which they saw a rising stronghold for their philosophic enemies. By 1757 they could endure the sight no longer. The subscribers had grown from 2000 to 4000, and this was a

right measure of the growth of the work in popular influence and power. To any one who turns over the pages of these re- doubtable volumes now, it seems surprising that their doctrines should have stirred such portentous alarm. There is no atheism, no overt attack on any of the cardinal mysteries of the faith, no direct denunciation even of the notorious abuses of the church. Yet we feel that the atmosphere of the book may well have been displeasing to authorities who had not yet learnt to encounter the modern spirit on equal terms. The Encyclopaedia takes for granted the justice of religious tolerance and speculative freedom. It asserts in distinct tones the democratic doctrine that it is the common people in a nation whose lot ought to be the main concern of the nation's government. From beginning to end it is one unbroken process of exaltation of scientific knowledge on the one hand, and pacific industry on the other. All these things were odious to the old governing classes of France; their spirit was absolutist, ecclesiastical and military. Perhaps the most alarming thought of all was the current belief that the Encyclo- paedia was the work of an organized band of conspirators against society, and that a pestilent doctrine was now made truly formidable by the confederation of its preachers into an open league. When the seventh volume appeared, it contained an article on " Geneva," written by D'Alembert. The writer contrived a panegyric on the pastors of Geneva, of which every word was a stinging reproach to the abbes and prelates of Versailles. At the same moment Helv&tius's book, L' Esprit,

appeared, and gave a still more profound and, let us add, a more reasonable shock to the ecclesiastical party. Authority could brook no more, and in 1759 the Encyclopaedia was formally suppressed.

The decree, however, did not arrest the continuance of the work. The connivance of the authorities at the breach of their own official orders was common in those times of distracted government. The work went on, but with its difficulties in- creased by the necessity of being clandestine. And a worse thing than troublesome interference by the police now befell Diderot. D'Alembert, wearied of shifts and indignities, withdrew from the enterprise. Other powerful colleagues, Turgot among them, declined to contribute further to a book which had acquired an evil fame. Diderot was left to bring the task to an end as he best could. For seven years he laboured like a slave at the oar. He wrote several hundred articles, some of them very slight, but many of them most laborious, comprehensive and ample. He wore out his

eyesight in correcting proofs, and he wearied his soul in bringing the manuscript of less competent contributors into decent shape. He spent his days in the workshops, mastering the processes of manufactures, and his nights in reproducing on paper what he had learnt during the day. And he was incessantly harassed all the time by alarms of a descent from the police. At the last moment, when his immense work was just drawing to an end, he encountered one last and crowning mortification: he discovered that the bookseller, fearing the displeasure of the government, had struck out from the proof sheets, after they had left Diderot's hands, all passages that he chose to think too hardy. The monument to which Diderot had given the labour of twenty long and oppressive years was irreparably mutilated and defaced. It is calculated that the average annual salary received by Diderot for his share in the Encyclopaedia was about £120 sterling. " And then to think," said Voltaire, " that an army contractor makes £800 in a day! "

Although the Encyclopaedia was Diderot's monumental work, he is the author of a shower of dispersed pieces that sowed nearly every field of intellectual interest with new and fruitful ideas. We find no masterpiece, but only thoughts for masterpieces; no creation, but a criticism with the quality to inspire and direct creation. He wrote plays — Le Fils naturel (1757) and Le P'ere de famille (1758) — and they are very insipid performances in the sen- timental vein. But he accompanied them by essays on dramatic poetry, including especially the Paradoxe sur le comSdien, in which he announced the principles of a new drama, — the serious, domestic, bourgeois drama of real life, in opposition to the stilted conventions of the classic French stage. It was Diderot's lessons and example that gave a decisive bias to the dramatic taste of Lessing, whose plays, and his Hamburgische Dramaturgic (1768), mark so important an epoch in the history of the modern theatre. In the pictorial art, Diderot's criticisms are no less rich, fertile and wide in their ideas. His article on " Beauty " in the Encyclopaedia shows that he had mastered and passed beyond the metaphysical theories on the subject, and the Essai sur la peinlure was justly described by Goethe, who thought it worth translating, as " a magnificent work, which speaks even more helpfully to the poet than to the painter, though to the painter too it is as a blazing torch." Diderot's most intimate friend was Grimm, one of the conspicuous figures of the philosophic body. Grimm wrote news-letters to various high personages in Germany, reporting what was going on in the world of art and literature in Paris, then without a rival as the capital of the intellectual activity of Europe. Diderot helped his friend at one time and another between 1759 and 1779, by writing for him an

account of the annual exhibitions of paintings. These Salons are among the most readable of all pieces of art criticism. They have a freshness, a reality, a life, which take their readers into a different world from the dry and conceited pedantries of the ordinary virtuoso. As has been said by Sainte-Beuve, they initiated the French into a new sentiment, and introduced people to the mystery and purport of colour by ideas. ” Before Diderot,” Madame Necker said, ” I had never seen anything in pictures except dull and lifeless colours; it was his imagination that gave

them relief and life, and it is almost a new sense for which I am indebted to his genius.”

Greuze was Diderot’s favourite among contemporary artists, and it is easy to see why. Greuze’s most characteristic pictures were the rendering in colour of the same sentiment of domestic virtue and the pathos of common life, which Diderot attempted with inferior success to represent upon the stage. For Diderot was above all things interested in the life of men, — not the abstract life of the race, but the incidents of individual character, the fortunes of a particular family, the relations of real and concrete motives in this or that special case. He delighted with the enthusiasm of a born casuist in curious puzzles of right and wrong, and in devising a conflict between the generalities of ethics and the conditions of an ingeniously contrived practical dilemma. Mostly his interest expressed itself in didactic and sympathetic form; in two, however, of the most remarkable of all his pieces, it is not sympathetic, but ironical. Jacques le fataliste (written in 1773, but not published until 1796) is in manner an imitation of Tristram Shandy and The Sentimental Journey. Few modern readers will find in it any true diversion. In spite of some excellent criticisms dispersed here and there, and in spite of one or two stories that are not without a certain effective realism, it must as a whole be pronounced savourless, forced, and as leaving unmoved those springs of laughter and of tears which are the common fountain of humour. Le Neveu de Rameau is a far superior performance. If there were any in- evitable compulsion to name a masterpiece for Diderot, one must select this singular ” farce-tragedy.” Its intention has been matter of dispute; whether it was designed to be merely a satire on contemporary manners, or a reduction of the theory of self- interest to an absurdity, or the application of an ironical clincher to the ethics of ordinary convention, or a mere setting for a discussion about music, or a vigorous dramatic sketch of a parasite and a human original. There is no dispute as to its curious literary flavour, its mixed qualities of pungency, bitter- ness, pity and, in places, unflinching shamelessness.

Goethe's translation (1805) was the first introduction of Le Neveu de Rameau to the European public. After executing it, he gave back the original French manuscript to Schiller, from whom he had it. No authentic French copy of it appeared until the writer had been nearly forty years in his grave (1823).

It would take several pages merely to contain the list of Diderot's miscellaneous pieces, from an infinitely graceful trifle like the Regrets sur ma vieille robe de chambre up to Le Reve de D' Alembert, where he plunges into the depths of the controversy as to the ultimate constitution of matter and the meaning of life. It is a mistake to set down Diderot for a coherent and systematic materialist. We ought to look upon him " as a philosopher in whom all the contradictions of the time strugglewith one another" (Rosenkranz). That is to say, he is critical and not dogmatic. There is no unity in Diderot, as there was in Voltaire or in Rousseau. Just as in cases of conduct he loves to make new ethical assumptions and argue them out as a professional sophist might have done, so in the speculative problems as to the organization of matter, the origin of life, the compatibility between physiological machinery and free will, he takes a certain stand- point, and follows it out more or less digressively to its conse- quences. He seizes a hypothesis and works it to its end, and this made him the inspirer in others of materialist doctrines which they held more definitely than he did. Just as Diderot could not attain to the concentration, the positiveness, the finality of aim needed for a masterpiece of literature, so he could not attain to those qualities in the way of dogma and system. Yet he drew at last to the conclusions of materialism, and con- tributed many of its most declamatory pages to the Systeme de la nature of his friend D'Holbach, — the very Bible of atheism, as some one styled it. All that he saw, if we reduce his opinions to formulae, was motion in space: "attraction and repulsion, the only truth." If matter produces life by spontaneous generation, and if man has no alternative but to obey the compulsion of nature, what remains for God to do?

In proportion as these conclusions deepened in him, the more

did Diderot turn for the hope of the race to virtue; in other words, to such a regulation of conduct and motive as shall make us tender, pitiful, simple, contented. Hence his one great literary- passion, his enthusiasm for Richardson, the English novelist. Hence, also, his

deepening aversion for the political system of France, which makes the realization of a natural and con- tented domestic life so hard. Diderot had almost as much to say against society as even Rousseau himself. The difference between them was that Rousseau was a fervent theist. The atheism of the Holbachians, as he called Diderot's group, was intolerable to him; and this feeling, aided by certain private perversities of humour, led to a breach of what had once been an intimate friendship between Rousseau and Diderot (1757). Diderot was still alive when Rousseau's Confessions appeared, and he was so exasperated by Rousseau's stories about Grimm, then and always Diderot's intimate, that in 1782 he transformed a life of Seneca, thathe had written four years earlier, into an Essai sur les rtgnes de Claude et de Ntr'on (1778-1782), which is much less an account of Seneca than a vindication of Diderot and Grimm, and is one of the most rambling and inept productions in literature. As for the merits of the old quarrel between Rousseau and Diderot, we may agree with the latter, that too many sensible people would be in the wrong if Jean Jacques was in the right.

Varied and incessant as was Diderot's mental activity, it was not of a kind to bring him riches. He secured none of the posts that were occasionally given to needy men of letters; he could not even obtain that bare official recognition of merit which was implied by being chosen a member of the Academy. The time came for him to provide a dower for his daughter, and he saw no other alternative than to sell his library. When the empress Catherine of Russia heard of his straits, she commissioned an agent in Paris to buy the library at a price equal to about £1000 of English money,and then handsomely requested the philosopher to retain the books in Paris until she required them, and to constitute himself her librarian, with a yearly salary. In 1773 Diderot started on an expedition to thank his imperial bene- factress in person, and he passed some months at St Petersburg.. The empress received him cordially. The strange pair passed their afternoons in disputes on a thousand points of high philosophy, and they debated with a vivacity and freedom not usual in courts. " Fi, done," said Catherine one day, when Diderot hinted that he argued with her at a disadvantage, " is there any difference among men?" Diderot returned home in 1774. Ten years remained to him, and he spent them in the industrious acquisition of new knowledge, in the composition of a host of fragmentary pieces, some of them mentioned above, and in luminous declamations with his friends. All accounts agree that Diderot was seen at his best in conversation. " He who only knows Diderot in his writings," says Marmontel, " does not know him at all. When he grew animated in talk, and allowed his thoughts to flow in

all their abundance, then he became truly ravishing. In his writings he had not the art of ensemble; the first operation which orders and places everything was too slow and too painful to him.” Diderot himself was conscious of the want of literary merit in his pieces. In truth he set no high value on what he had done. It is doubtful whether he was ever alive to the waste that circumstance and temperament together made of an intelligence from which, if it had been free to work system- atically, the world of thought had so much to hope. He was one of those simple, disinterested and intellectually sterling workers to whom their own personality is as nothing in presence of the vast subjects that engage the thoughts of their lives. He wrote what he found to write, and left the piece, as Carlyle has said, ” on the waste of accident, with an ostrich-like indifference.” When he heard one day that a collected edition of his works was in the press at Amsterdam, he greeted the news with ” peals of laughter,” so well did he know the haste and the little heed with which those works had been dashed off.

Diderot died on the 30th of July 1784, six years after Voltaire and Rousseau, one year after his old colleague D’Alembert, and five years before D’Holbach, his host and intimate for a lifetime. Notwithstanding Diderot’s peals of laughter at the thought, an

elaborate and exhaustive collection of his writings in twenty stout volumes, edited by MM. Assezat and Tourneux, was com- pleted in 1875-1877.

Authorities. — Studies on Diderot by Scherer (1880); by

E. Faguet (1890); by Sainte-Beuve in the Causeries du lundi; by

F. Brunetiere in the Etudes critiques, 2nd series, may be consulted. In English, Diderot has been the subject of a biography by John Morley [Viscount Morley of Blackburn] (1878). See also Karl Rosenkranz, Diderots Leben und Werke. (1866). For a discussion of the authenticity of the posthumous works of Diderot see R. Dominic in the Revue des deux mondes (October 15, 1902). (J. Mo.)

DIDIUS SALVIUS JULIANUS, MARCUS, Roman emperor for two months (March 28-June 2) during the year a.d. 193. He was the grandson of the famous jurist Salvius Julianus (under Hadrian and the Antonines), and the son of a distinguished general, who might have ascended the throne after the death of Antoninus Pius, had not his loyalty to the ruling house prevented him. Didius filled several civil and military offices with dis- tinguished success, but subsequently

abandoned himself to dissipation. On the death of Pertinax, the praetorian guards offered the throne to the highest bidder. Flavius Sulpicianus, the father-in-law of Pertinax and praefect of the city, had already made an offer; Didius, urged on by the members of his family, his freedmen and parasites, hurried to the praetorian camp to contend for the prize. He and Sulpicianus bid against each other, and finally the throne was knocked down to Didius. The senate and nobles professed their loyalty; but the people made no attempt to conceal their indignation at this insult to the state, and the armies of Britain, Syria and Illyricum broke out into open revolt. Septimius Severus, the commander of the Pannonian legions, was declared emperor and hastened by forced marches to Italy. Didius, abandoned by the praetorians, was condemned and executed by order of the senate, which at once acknowledged Severus.

Authorities. — Dio Cassius lxxiii. 11-17, who was actually in Rome at the time; Aelius Spartianus, Didius Julianus; Julius Capitolinus, Pertinax; Herodian ii. ; Aurelius Victor, De Caesaribus, 19; Zosimus i. 7; Gibbon, Decline and Fall, chap. 5.

DIDO, or Elissa, the reputed founder of Carthage (q.v.), in Africa, daughter of the Tyrian king Metten (Mutto, Methres, Belus), wife of Acerbas (more correctly Sicharbas; Sychaeus in Virgil), a priest of Hercules. Her husband having been slain by her brother Pygmalion, Dido fled to Cyprus, and thence to the coast of Africa, where she purchased from a local chieftain Iarbas a piece of land on which she built Carthage. The city soon began to prosper and Iarbas sought Dido's hand in marriage, threatening her with war in case of refusal. To escape from him, Dido constructed a funeral pile, on which she stabbed herself before the people (Justin xviii. 4-7). Virgil, in defiance of the usually accepted chronology, makes Dido a contemporary of Aeneas, with whom she fell in love after his landing in Africa, and attributes her suicide to her abandonment by him at the command of Jupiter (Aeneid, iv.). Dido was worshipped at Carthage as a divinity under the name of Caelestis, the Roman counterpart of Tanit, the tutelary goddess of Carthage. According to Timaeus, the oldest authority for the story, her name was Theiosso, in Phoenician Helissa, and she was called Dido from her wanderings, Dido being the Phoenician equivalent of TrKavTJTLS (Etymo- logicum Magnum, s.v.); some modern scholars, however, translate the name by " beloved." Timaeus makes no mention of Aeneas, who seems to have been introduced by Naevius in his Bellum Poenicum, followed by Ennius in his Annates.

For the variations of the legend in earlier and later Latin authors, see

O. Rossbach in Pauly-Wissowa's Realencyclopddie, v. pt. 1 (1905) ; O. Meltzer's Geschichte der Karthager, i. (1879), and his article in Roscher's Lexikon der Mythologie.

DIDON, HENRI (1840-1900), French Dominican, was born at Trouvet, Isere, on the 17 th of March 1840. He joined the Dominicans, under the influence of Lacordaire, in 1858, and completed his theological studies at the Minerva convent at Rome. The influence of Lacordaire was shown in the zeal dis- played by Didon in favour of a reconciliation between philosophy and science. In 1871 his fame had so much grown that he was chosen to deliver the funeral oration over the murdered arch- bishop of Paris, Monseigneur G. Darboy. He also delivered some

discourses at the church of St Jean de Beauvais in Paris on the relations between science and religion; but his utterances, especially on the question of divorce, were deemed suspicious by his superiors, and his intimacy with Claude Bernard the physi- ologist was disapproved. He was interdicted from preaching and sent into retirement at the convent of Corbara in Corsica. After eighteen months he emerged, and travelled in Germany, publish- ing an interesting work upon that country, entitled Les Allemands (English translation by R. Ledos de Beaufort, London, 1884). On his return to France in 1890 he produced his best known work, Jesus-Christ (2 vols., Paris), for which he had qualified himself by travel in the Holy Land. In the same year he became director of the College Albert-le- Grand at Arcueil, and founded three auxiliary institutions, Ecole Lacordaire, Ecole Laplace and Ecole St Dominique. He wrote, in addition, several works on educational questions, and augmented his fame as an eloquent preacher by discourses preached during Lent and Advent. He died at Toulouse on the 13 th of March 1900.

See the biographies by J. de Romano (1891), and A. de Coulanges (Paris, 1900) ; and especially the work of Stanislas Reynaud, entitled Le Pere Didon, sa vie et son ceuvre (Paris, 1904).

DIDOT, the name of a family of learned French printers and publishers. Francois Didot (1689-1757), founder of the family, was born at Paris. He began business as a bookseller and printer in 17 13, and among his undertakings was a collection of the travels of his friend the Abbe Prevost, in twenty volumes (1747). It was remarkable

for its typographical perfection, and was adorned with many engravings and maps. Francois Ambroise Didot (1730-1804), son of Francois, made important improvements in type-founding, and was the first to attempt printing on vellum paper. Among the works which he published was the famous collection of French classics prepared by order of Louis XVI. for the education of the Dauphin, and the folio edition of L' Art de verifier les dates. Pierre Francois Didot (1732-1795), his brother, devoted much attention to the art of type-founding and to paper-making. Among the works which issued from his press was an edition in folio of the Imitatio Christi (1788). Henri Didot (1765-1852), son of Pierre Francois, is celebrated for his " microscopic " editions of various standard works, for which he engraved the type when nearly seventy years of age. He was also the engraver of the assignats issued by the Constituent and Legislative Assemblies and the Convention. Didot Saint-Leger, second son of Pierre Francois, was the inventor of the paper-making machine known in England as the Didot machine. Pierre Didot (1760-1853), eldest son of Francois Ambroise, is celebrated as the publisher of the beautiful " Louvre " editions of Virgil, Horace and Racine. The Racine, in three volumes folio, was pronounced in 1801 to be " the most perfect typographical production of all ages." Firmin Didot (1 764-1836), his brother, second son of; Francois Ambroise, sustained the reputation of the family both as printer and type- founder. He revived (if he did not invent — a distinction which in order of time belongs to William Ged) the process of stereotyp- ing, and coined its name, and he first used the process in his edition of Callet's Tables of Logarithms (1795), in which he secured an accuracy till then unattainable. He published stereotyped editions of French, English and Italian classics at a very low price. He was the author of two tragedies — La Reine de Portugal and La Mortd' Annibal; and he wrote metrical transla- tions from Virgil, Tyrtaeus and Theocritus. Ambroise Firmin Didot (1 790-1876) was his eldest son. After receiving a classical education, he spent three years in Greece and in the East; and on the retirement of his father in 1827 he undertook, in conjunction with his brother Hyacinthe, the direction of the publishing business. Their greatest undertaking was a new edition of the Thesaurus Graecae linguae of Henri Estienne, under the editorial care of the brothers Dindorf and M. Hase (9 vols., 1855-1859). Among the numerous important works published by the brothers, the 200 volumes forming the Bibliotheque des auteurs grecs, Biblioth'eque laline, and Bibliotheque .francaise deserve special mention. Ambroise Firmin Didot was the first to propose (1823) a subscription in favour of the Greeks, then in insurrection

against Turkish tyranny. Besides a translation of Thucydides (1833),

he wrote the articles “Estienne ” in the Nouvelle Bio- graphie gitUrale, and ” Typographic ” in the Ency. mod., as well as Observations sur I’orthographie francaise (1867), &c. In 1875 he published a very learned and elaborate monograph on Aldus Manutius. His collection of MSS., the richest in France, was said to have been worth, at the time of his death, not less than 2,000,000 francs.

DIDRON, ADOLPHE NAPOLEON (1806-1867), French archaeologist, was born at Hautvillers, in the department of Marne, on the 13th of March 1806. At first a student of law, he began in 1830, by the advice of Victor Hugo, a study of the Christian archaeology of the middle ages. After visiting and examining the principal churches, first of Normandy, then of central and southern France, he was on his return appointed by Guizot secretary to the Historical Committee of Arts and Monu- ments (1835); and in the following years he delivered several courses of lectures on Christian iconography at the Bibliotheque Royale. In 1839 he visited Greece for the purpose of examining the art of the Eastern Church, both in its buildings and its manuscripts. In 1844 he originated the Annates archeologiques, a periodical devoted to his favourite subject, which he edited until his death. In 1845 he established at Paris a special archaeo- logical library, and at the same time a manufactory of painted glass. In the same year he was admitted to the Legion of Honour. His most important work is the Iconographie chritienne, of which, however, the first portion only, Histoirede Dieu (1843), was published. It was translated into English by E. J. Millington. Among his other works may be mentioned the Manuel d’icono- graphie chritienne grecque et latine (1845), the Iconographie des chapiteaux du palais ducal de Venise (1857), and the Manuel des objets de bronze et d’orfhrerie (1859). He died on the 13th of November 1867.

DIDYMI, or Didyma (mod. Hieronta), an ancient sanctuary of Apollo in Asia Minor situated in the territory of Miletus, from which it was distant about 10 m. S. and on the promontory Poseideion. It was sometimes called Branchidae from the name of its priestly caste which claimed descent from Branchus, a youth beloved by Apollo. As the seat of a famous oracle, the original temple attracted offerings from Pharaoh Necho (in whose army there was a contingent of Milesian mercenaries), and the Lydian Croesus, and was plundered by Darius of Persia. Xerxes finally sacked and burnt it (481 B.C.) and exiled the Branchidae to the far north-east of his empire. This exile was believed to be voluntary, the priests having betrayed their treasures to the Persian; and on this belief Alexander the Great acted 150 years- later, when, finding the descendants of the Branchidae established in a city beyond the Oxus, he ordered them to be exterminated for the sin of

their fathers (328). The celebrated cult-statue of Apollo by Canachus, familiar to us from reproductions on Milesian coins, was also carried to Persia, there to remain till restored by Seleucus I. in 295, and the oracle ceased to speak for a century and a half. The Milesians were not able to undertake the re- building till about 332 B.C., when the oracle revived at the bidding of Alexander. The work proved too costly, and despite a special effort made by the Asian province nearly 400 years later, at the bidding of the emperor Caligula, the structure was never quite finished: but even as it was, Strabo ranked the Didymeum the greatest of Greek temples and Pliny placed it among the four most splendid and second only to the Artemisium at Ephesus. In point of fact it was a little smaller than the Samian Heraeum and the temple of Cybele at Sardis, and almost exactly the same- size as the Artemisium. The area covered by the platform measures roughly 360X160 ft.

When Cyriac of Ancona visited the spot in 1446, it seems that the temple was still standing in great part, although the cella had been converted into a fortress by the Byzantines: but when the next European visitor, the Englishman Dr Pickering, arrived in 1673, it had collapsed. It is conjectured that the cause was the great earthquake of 1493. The Society of Dilettanti sent two expeditions to explore the ruins, the first in 1764 under Richard Chandler, the second in 181 2 under Sir Wm. Gell; and the French

” Rothschild Expedition ” of 1873 under MM. 0. Rayet and A. Thomas sent a certain amount of architectural sculpture to the Louvre. But no excavation was attempted till MM. E. Pontremoli and B. Haussoullier were sent out by the French Schools of Rome and Athens in 1895. They cleared the western facade and the prodomos, and discovered inscriptions giving information about other parts which they left still buried. Finally the site was purchased by, and the French rights were ceded to, Dr Th. Wiegand, the German explorer of Miletus, who in 1905 began a thorough clearance of what is incomparably the finest temple ruin in Asia Minor.

The temple was a decastyle peripteral structure of the Ionic order, standing on seven steps and possessing double rows of outer columns 60 ft. high, twenty-one in each row on the flanks. It is remarkable not only for its great size, but (inter alia) for (1) the rich ornament of its column bases, which show great variety of design; (2) its various

developments of the Ionic capital, e.g. heads of gods, probably of Pergamene art, spring from the ” eyes ” of the volutes with bulls’ heads between them; (3) the massive building two storeys high at least, which served below for prodomos, and above for a dispensary of oracles (xp > ?ffM07pa(£ia mentioned in the inscriptions) and a treasury; two flights of stairs called ” labyrinths ” in the inscriptions, led up to these chambers; (4) the pylon and staircase at the west; (5) the frieze of Medusa heads and foliage. Two outer columns are still erect on the north-east flank, carrying their entablature, and one of the inner order stands on the south-west. The fact that the temple was never finished is evident from the state in which some bases still remain at the west. There were probably no pedi- mental sculptures. A sacred way led from the temple to the sea at Panormus, which was flanked with rows of archaic statues, ten of which were excavated and sent to the British Museum in 1858 by C. T. Newton. Fragments of architectural monuments, which once adorned this road, have also been found. Modern Hieronta is a large and growing Greek village, the only settlement within a radius of several miles. Its harbour is Kovella, distant about 2% m., and on the N. of the promontory.

See Dilettanti Society, Ionian Antiquities, ii. (1821); C. T. Newton, Hist, of Discoveries, &c. (1862) and Travels in the Levant, ii. (1865); O. Rayet and A. Thomas, Milet et le Golfe Latmique (1877) ; E. Pontremoli and B. Haussoullier, Didymes (1904).

(D. G. H.)

DIDYMIUM (from the Gr. SlSvfios, twin), the name given to the supposed element isolated by C. G. Mosander from cerite (1839-1841). In 1879, however, Lecoq de Boisbaudran showed that Mosander’s “didymium” contained samarium; while the residual ” didymium,” after removal of samarium, was split by Auer v. Welsbach (Monats. f. Chemie, 1885, 6, 477) into two components (known respectively as neodymium and praseodymium) by repeated fractional crystallization of the double nitrate of ammonium and didymium in nitric acid. Neodymium (Nd) forms the chief portion of the old ” didymium. ” Its salts are reddish violet in colour, and give a characteristic absorption spectrum. It forms oxides of composition Nd 2 C < 3 and Nd 2 05, the latter being obtained by ignition of the nitrate (B. Brauner). The atomic weight of neodymium is 143-6 (B. Brauner, Proc. Chem. Soc, 1897-1898, p. 70). Praseody- mium (Pr) forms oxides of composition Pr 2 03, Pr 2 06,xH 2 (B. Brauner), and Pri07. The peroxide, Pr-iOv, forms a dark brown powder, and is obtained by ignition of the oxalate or nitrate. The sesquioxide, Pr 2 C > 3, is obtained as a greenish white mass by the reduction of the peroxide. The salts of praseodymium are

green in colour, and give a characteristic spark spectrum. The atomic weight of praseodymium is 140-5.

DIDYMUS (?309-?394), surnamed ” the Blind,” ecclesiastical writer of Alexandria, was born about the year 309. Although he became blind at the age of four, before he had learned to read; he succeeded in mastering the whole circle of the sciences then known; and on entering the service of the Church he was placed at the head of the Catechetical school in Alexandria, where he lived and worked till almost the close of the century. Among his pupils were Jerome and Rufinus. He was a loyal follower of

Origen, though stoutly opposed to Arian and Macedonian teach- ing. Such of his writings as survive show a remarkable knowledge of scripture, and have distinct value as theological literature. Among them are the De Trinitale, De Spiritu Sancto (Jerome’s Latin translation), Adversus MarJchaeos, and notes and exposi- tions of various books, especially the Psalms and the Catholic Epistles.

See Migne, Patrol. Graec. xxxix.; O. Bardenhewer, Patrologie, pp. 290-293 (Freiburg, 1894).

DIDYMUS CHALCENTERUS (c. 63 b.c.-a.d. 10), Greek scholar and grammarian, flourished in the time of Cicero and Augustus. His surname (Gr. XaKnivTtpos, brazen-bowelled) came from his indefatigable industry; he was said to have written so many books (more than 3500) that he was unable to recollect their names (/3i/3XtoXdSos). He lived and taught in Alexandria and Rome, where he became the friend of Varro. He is chiefly important as having introduced Alexandrian learning to the Romans. He was’ a follower of the school of Aristarchus, upon whose recension of Homer he wrote a treatise, fragments of which have been preserved in the Venetian Scholia. He also wrote commentaries on many other Greek poets and prose authors. In his work on the lyric poets he treated of the various classes of poetry and their chief representatives, and his lists of words and phrases (used in tragedy and comedy and by orators and historians), of words of doubtful meaning, and of corrupt expressions, furnished the later grammarians with valuable material. His activity extended to all kinds of subjects : grammar (orthography, inflexions), proverbs, wonderful stories, the law-tablets (amoves) of Solon, stones, and different kinds of wood. His polemic against Cicero’s De republica (Ammianus Marcellinus xxii. 16) provoked a reply from Suetonius. In spite of his stupendous industry, Didymus was little more than a compiler, of little critical judgment and doubtful accuracy, but he deserves recognition for having incorporated in his numerous writings

the works of earlier critics and commentators.

See M. W. Schmidt, De Didymo Chalcentero (1853) and Didymi Chalcenteri fragmenta (1854); a ‘ so F. Susemihl, Geschichte der griech. Literatur in der Alexandrinerzeit, ii. (1891); J. E. Sandys, History oj Classical Scholarship, i. (1906).

DIE, a town of south-eastern France, capital of an arrondisse- ment in the department of Dr6me, 43 m. E.S.E. of Valence on the Paris-Lyon railway. Pop. (1906) 3090. The town is situated in a plain enclosed by mountains on the right bank of the Dr6me below its confluence with the Meyrosse, which supplies power to some of the industries. The most interesting structures of Die are the old cathedral, with a porch of the nth century supported on granite columns from an ancient temple of Cybele; and the Porte St Marcel, a Roman gateway flanked by massive towers. The Roman remains also include the ruins of aqueducts and altars. Die is the seat of a sub-prefect, and of a tribunal of first instance. The manufactures are silk, furniture, cloth, lime and cement, and there are flour and saw mills. Trade is in timber, especially walnut, and in white wine known as clairette de Die. The mulberry is largely grown for the rearing of silkworms. Under the Romans, Die (Dea Augusta Vocontiorum) was an important colony. It was formerly the seat of a bishopric, united to that of Valence from 1276 to 1687 and suppressed in 1790. Previous to the revocation of the edict of Nantes in 1685 it had a Calvinistic university.

DIE (Fr. dS, from Lat. datum, given), a word used in various senses, for a small cube of ivory, &c. (see Dice), for the engraved stamps used in coining money, &c, and various mechanical appliances in engineering. In architecture a ” die ” is the term used for the square base of a column, and it is applied also to the vertical face of a pedestal or podium.

The fabrics known as ” dice ” take their name from the rectangular form of the figure. The original figures would probably be perfectly square, but to-day the same principle of weaving is applied, and the name dice is given to all figures of rectangular form. The different effects in the adjacent squares or rectangles are due to precisely the same reasons as those explained in connexion with the ground and the figure of damasks. Tht same weaves are used in both damasks and dices, but simpler

weaves are generally employed for the commoner classes of the latter. The effect is, in every case, obtained by what are technic- ally called warp and weft float weaves. The illustration B shows

the two double damask weaves arranged t© form a dice pat- tern, while A shows a similar pattern made from two four- thread twill weaves. C and D represent respectively the dis- position of the threads in A and B with the first pick, and the solid marks represent the floats of warp. The four squares, which are almost as pronounced in the cloth as those of a chess-board, may be made of any size by repeat- ’” ing each weave for the amount

of surface required. It is only in the finest cloths that the double damask weaves B are used for dice patterns, the single damask weaves and the twill weaves being employed to a greater extent. This class of pattern is largely employed for the production of table-cloths of lower and medium qualities. The term damask is also often applied to cloths of this character, and especially so when the figure is formed by rectangles of different sizes.

DIEBITSCH, HANS KARL FRIEDRICH ANTON, count von Diebitsch and Narden, called by the Russians Ivan Ivanovich, Count Diebich-Zabalkansky (1785-1831), Russian field-marshal, was born in Silesia on the 13th of May 1785. He was educated at the Berlin cadet school, but by the desire of his father, a Prussian officer who had passed into the service of Russia, he also did the same in 1801. He served in the campaign of 1805, and was wounded at Austerlitz, fought at Eylau and Friedland, and after Friedland was promoted captain. During the next five years of peace he devoted himself to the study of military science, engaging once more in active service in the War of 181 2. He distinguished himself very greatly in Wittgenstein’s campaign, and in particular at Polotzk (October 18 and 19), after which combat he was raised to the rank of major-general. In the latter part of the campaign he served against the Prussian contingent of General Yorck (von Wartenburg), with whom, through Clause witz, he negotiated the celebrated convention of Tauroggen, serving thereafter with Yorck in the early part of the War of Liberation. After the battle of Liitzen he served in Silesia and took part in negotiating the secret treaty of Reichenbach. Having distinguished himself at the battles of Dresden and Leipzig he was promoted lieutenant-general. At the crisis of the campaign of 1 814 he strongly urged the march of the allies on Paris; and after their entry the emperor Alexander conferred on him the order of St Alexander Nevsky. In 181 5 he attended the congress of

Vienna, and was afterwards made adjutant-general to the emperor, with whom, as also with his successor Nicholas, he had great influence. By Nicholas he was created baron, and later count. In 1820 he had become chief of the general staff, and in 1825 he assisted in suppressing the St Petersburg imeutt. His greatest exploits were in the Russo-Turkish War of 1828- 1829, which, after a period of doubtful contest, was decided by Diebitsch's brilliant campaign of Adrianople; this won him the rank of field-marshal and the honorary title of Zabalkanski to commemorate his crossing of the Balkans. In 1830 he was appointed to command the great army destined to suppress the insurrection in Poland. He won the terrible battle of Grochow on the 25th of February, and was again victorious at Ostrolenka on the 26th of May, but soon afterwards he died of cholera (or by his own hand) at Klecksewo near Pultusk, on the 10th of June 1831.

See Belmont (Schtimberg), Graf Diebitsch (Dresden, 1830); Sturmer, Der Tod des Grafen Diebitsch (Berlin, 1832); Bantych- Kamenski, Biographies of Russian Field-Marshals (in Russian, St Petersburg, 1841).

DIEDENHOFEN (Fr. Thionville), a fortified town of Germany, in Alsace-Lorrcˆie, dist. Lorraine, on the Mosel, 22 m. N. from Metz by rail. Pop. (1905) 6047. It is a railway junction of

some consequence, with cultivation of vines, fruit and vegetables, brewing, tanning, &c. Diedenhofen is an ancient Frank town (Theudonevilla, To tonis villa), in which imperial diets were held in the 8th century; was captured by Condein 1643 and fortified by Vauban; capitulated to the Prussians, after a severe bom- bardment, on the 25th of November 1870.

DIEKIRCH, a small town in the grand duchy of Luxemburg, charmingly situated on the banks of the Sure. Pop. (1905) 3705. Its name is said to be derived from Dide or Dido, grand- daughter of Odin and niece of Thor. The mountain at the foot of which the town lies, now called Herrenberg, was formerly known as Thorenberg, or Thor's mountain. On the summit of this rock rises a perennial stream which flows down into the town under the name of Bellenflesschen. Diekirch was an important Roman station, and in the 14th century John of Luxemburg, the blind king of Bohemia, fortified it, surrounding the place with a castellated wall and a ditch supplied by the stream mentioned. It remained more for less fortified until the beginning of the 19th century when the French during their occupation levelled the old walls, and substituted the avenues of trees that now encircle the town. Diekirch is the administrative centre of one of the three

provincial divisions of the grand duchy. It is visited during the summer by many thousand tourists and travellers from Holland, Belgium and Germany.

DIELECTRIC, in electricity, a non-conductor of electricity; it is the same as insulator. The ” dielectric constant ” of a medium is its specific inductive capacity, and on the electromagnetic theory of light it equals the square of its refractive index for light of infinite wave length (see Electrostatics; Magneto-Optics).

DIELMANN, FREDERICK (1847-), American portrait and figure painter, was born at Hanover, Germany, on the 25th of December 1847. He was taken to the United States in early childhood; studied under Diez at the Royal Academy at Munich; was first an illustrator, and became a distinguished draughtsman and painter of genre pictures. His mural decora- tions and mosaic panels for the Congressional library, Washington , are notable. He was elected in 1899 president of the National Academy of Design.

DIEMEN, ANTHONY VAN (1593-1645), Dutch admiral and governor-general of the East Indian settlements, was born at Kuilenburg in 1593. He was educated in commerce, and on entering the service of the East India Company speedily attained high rank. In 1631 he led a Dutch fleet from the Indies to Holland, and in 1636 he was raised to the governor-generalship. He came into conflict with the Portuguese, and took their possessions in Ceylon and Malacca from them. He greatly extended the commercial relationships of the Dutch, opening up trade with Tong-king, China and Japan. As an administrator also he showed ability, and the foundation of a Latin school and several churches in Batavia is to be ascribed to him. Exploring expeditions were sent to Australia under his auspices in 1636 and 1642, and Abel Tasman named after him (Van Diemen’s Land) the island now called Tasmania. Van Diemen died at Batavia on the 19th of April 1645.

DIEPENBECK, ABRAHAM VAN (1599-1675), Flemish painter, was born at Herzogenbusch, and studied painting at Antwerp, where he became one of Rubens’s ” hundred pupils.” But he was not one of the cleverest of Rubens’s followers, and he succeeded, at the best, in imitating the style and aping the peculiarities of his master. We see this in his earliest pictures — a portrait dated 1629 in the Munich Pinakothek, and a ” Distribu- tion of Alms ” of the same period in the same collection. Yet even at this time there were moments when Diepenbeck probably fancied that he might take another path. A solitary copperplate executed with his own hand in 1630 represents a peasant sitting under a tree holding the bridle of an ass, and this is a

minute and finished specimen of the engraver's art which shows that the master might at one time have hoped to rival the animal draughts- men who flourished in the schools of Holland. However, large commissions now poured in upon him; he was asked for altar- pieces, subject-pieces and pagan allegories. He was tempted to try the profession of a glass-painter, and at last he gave up every

other occupation for the lucrative business of a draughtsman and designer for engravings. Most of Diepenbeck's important can- vases are in continental galleries. The best are the " Marriage of St Catherine " at Berlin and " Mary with Angels Wailing over the Dead Body of Christ " in the Belvedere at Vienna, the first a very fair specimen of the artist's skill, the second a picture of more energy and feeling than might be expected from one who knew more of the outer form than of the spirit of Rubens. Then we have thefine "Entombment" at Brunswick, and "St Francis Ador- ing the Sacrament " at the museum at Brussels, " Clelia and her Nymphs Flying from the Presence and Pursuit of Porsenna " in two examples at Berlin and Paris, and " Neptune and Amphitrite" at Dresden. In all these compositions the drawing and execution are after the fashion of Rubens, though inferior to Rubens in harmony of tone and force of contrasted light and shade. Occa- sionally a tendency may be observed to imitate the style of Van- dyck, for whom, in respect of pictures, Diepenbeck in his lifetime was frequently taken. But Diepenbeck spent much less of his leisure on canvases than on glass-painting. Though he failed to master the secrets of gorgeous tinting, which were lost, apparently for ever in the 16th century, he was constantly employed during the best years of his life in that branch of his profession. In 163 5 he finished forty scenes from the life of St Francis of Paula in the church of the Minimes at Antwerp. In 1644 he received payment for four windows in St Jacques of Antwerp, two of which are still preserved, and represent Virgins to whom Christ appears after the Resurrection. The windows ascribed to him at St Gudule of Brussels were executed from the cartoons of Theodore van Thulden. On the occasion of his matriculation at Antwerp in 1638-1639, Diepenbeck was registered in the guild of St Luke as a glass-painter. He resigned his membership in the Artist Club of the Violette in 1542, apparently because he felt hurt by a valua- tion then made of drawings furnished for copperplates to the engraver Pieter de Jode. The earliest record of his residence at Antwerp is that of his election to the brotherhood (Sodalitat) " of the Bachelors " in 1634. It is probable that before this

time he had visited Rome and London, as noted in the work of Houbraken. In 1636 he was made a burgess of Antwerp. He married twice, ini637 and 1652. He died in December 1675, and was buried at St Jacques of Antwerp.

DIEPPE, a seaport of northern France, capital of an arrondisse- ment in the department of Seine -Inferieure, on the English Channel, 38 m. N. of Rouen, and 105 m. N.W. of Paris by the Western railway. Pop. (1906) 22,120. It is situated at the mouth of the river Arques in a valley bordered on each side by steep white cliffs . The main part of the town lies to the west, and the fishing suburb of Le Pollet to the east of the river and harbour. The sea-front of Dieppe, which in summer attracts large numbers of visitors, consists of a pebbly beach backed by a handsome marine promenade. Dieppe has a modern aspect ; its streets are wide and its houses, in most cases, are built of brick. Two squares side by side and immediately to the west of the outer harbour form the nucleus of the town, the Place Nationale, over-looked by the statue of Admiral A. Duquesne, and the Place St Jacques, named after the beautiful Gothic church which stands in its centre. The Grande Rue, the busiest and handsomest street, leads westward from the Place Nationale. The church of St Jacques was founded in the 13th century, but consists in large measure of later workmanship and was in some portions restored in the 19th century. The castle, overlooking the beach from the summit of the western cliff, was erected in 1435- The church of Notre-Dame de Bon Secours on the opposite cliff, and the church of St Remy, of the 16th and 17th centuries, are other noteworthy buildings. A well-equipped casino stands at the west end of the sea-front. The public institutions include the sub- prefecture, tribunals of first instance and commerce, a chamber of -commerce, a communal college and a school of navigation.

Dieppe has one of the safest and deepest harbours on the English Channel. A curved passage cut in .the bed of the Arques and protected by an eastern and a western jetty gives access to the outer harbour, which communicates at the east end by a lock- gate with the Bassin Duquesne and the Bassin Berigny, and at

the west end by the New Channel, with an inner tidal harbour and two other basins. Vessels drawing 20 ft. can enter the new docks at neap tide. A dry-dock and a gridiron are included among the repairing facilities of the port. The harbour railway station is on the north-west quay of the outer harbour alongside which the steamers from Newhaven lie. The distance of Dieppe from Newhaven, with which there has long been daily communica- tion, is 64 m. The imports

include silk and cotton goods, thread, oil- seeds, timber, coal and mineral oil; leading exports are wine, silk, woollen and cotton fabrics, vegetables and fruit and flint- pebbles. The average annual value of imports for the five years 1901-1905 was £4,916,000 (£4,301,000 for the years 1896-1900); the exports were valued at £9,206,000 (£7,023,000 for years 1896-1900). The industries comprise shipbuilding, cotton- spinning, steam-sawing, the manufacture of machinery, porcelain, briquettes, lace, and articles in ivory and bone, the production of which dates from the 15th century. There is also a tobacco factory of some importance. The fishermen of Le Pollet, to whom tradition ascribes a Venetian origin, are among the main providers of the Parisian market. The sea-bathing attracts many visitors in the summer. Two miles to the north-east of the town is the ancient camp known as the Cite de Limes, which perhaps furnished the nucleus of the population of Dieppe.

It is suggested on the authority of its name, that Dieppe owed its origin to a band of Norman adventurers, who found its ” diep ” or inlet suitable for their ships, but it was unimportant till the latter half of the 1 2th century. Its first castle was probably built in 1 1 88 by Henry II. of England, and it was counted a place of some consideration when Philip Augustus attacked it in 1195. By Richard I. of England it was bestowed in n 97 on the arch- bishop of Rouen in return for certain territory in the neighbour- hood of the episcopal city. In 1339 it was plundered by the English, but it soon recovered from the blow, and in spite of the opposition of the lords of Hantot managed to surround itself with fortifications. Its commercial activity was already great, and it is believed that its seamen visited the coast of Guinea in 1339, and founded there a Petit Dieppe in 1365. The town was occupied by the English from 1420 to 1435. A siege undertaken in 1442 by John Talbot, first earl of Shrewsbury, was raised by the dauphin, afterwards Louis XL, and the day of the deliverance continued for centuries to be celebrated by a great procession and miracle plays. In the beginning of the 16th century Jean Parmentier, a native of the town, made voyages to Brazil and Sumatra; and a little later its merchant prince, Jacques Ango, was able to blockade the Portuguese fleet in the Tagus. Francis I. began improvements which were continued under his successor; Its inhabitants in great number embraced the reformed religion; and they were among the first to acknowledge Henry IV., who fought one of his great battles at the neighbouring village of Arques. Few of the cities of France suffered more from the revocation of the edict of Nantes in 1685; and this blow was followed in 1694 by a terrible bombardment on the part of the English and Dutch. The town was rebuilt after the peace of Ryswick,

but the decrease of its population and the deterioration of its port prevented the restoration of its commercial prosperity. During the 10th century it made rapid advances, partly owing to Marie Caroline, duchess of Berry, who brought it into fashion as a watering-place; and also because the establishment of railway communication with Paris gave an impetus to its trade. During the Franco-German War the town was occupied by the Germans from December 1870 till July 1871.

See L. Vitet, Histoire de Dieppe (Paris, 1844) ; D. Asseline, Les Antiquites et chroniques de la ville de Dieppe, a 17th-century account published at Paris in 1874.

DIERX, LEON (1838-), French poet, was born in the island of Reunion in 1838. He came to Paris to study at the Central School of Arts and Manufactures, and subsequently settled there, taking up a post in the education office. He became a disciple of Leconte de Lisle and one of the most distinguished of the Parnassians. In the death of Stephane Mallarme in 1898 he was acclaimed “prince of poets” by ” les jeunes.” His works include: Poemes et poisies (1864);

Levres closes (1867); Paroles d’unvaincu (1871) ; La Rencontre, a dramatic scene (1875) and Les Amants (1879). His Poisies completes (1872) were crowned by the French Academy. A com- plete edition of his -works, was published in 2 vols., 1894-1896.

DIES, CHRISTOPH ALBERT (1755-1822), German painter, was born at Hanover, and learned the rudiments of art in his native place. For one year he studied in the academy of Dussel- dorf , and then he started at the age of twenty with thirty ducats in his pocket for Rome. There he lived a frugal life till 1796. Copying pictures, chiefly by Salvator Rosa, for a livelihood, his taste led him to draw and paint from nature in Tivoli, Albano and other picturesque places in. the vicinity of Rome. Naples, the birthplace of his favourite master, he visited more than once c or the same reasons. In this way he became a bold executant in water-colours and in oil, though he failed to acquire any origin- ality of his own. Lord Bristol, who encouraged him as a copyist, predicted that he would be a second Salvator Rosa. But Dies was not of the wood which makes original artists. Besides other disqualifications, he had necessities which forced him to give up the great career of an independent painter. David, then composing his Horatii at Rome, wished to take him to Paris. But Dies had reasons for not accepting the

offer. He was courting a young Roman whom he subsequently married. Meanwhile he had made the acquaintance of Volpato, for whom he executed numerous drawings, and this no doubt suggested the plan, which he afterwards carried out, of publishing, in partnership with M6chan, Reinhardt and Frauenholz, the series of plates known as the Collection de vues piltoresques de I'ltalie, published in seventy-two sheets at Nuremberg in 1799. With so many irons in the fire Dies naturally lost the power of concentration. Other causes combined to affect his talent. In 1787 he swallowed by mistake three-quarters of an ounce of sugar of lead. His re- covery from this poison was slow and incomplete. He settled at Vienna, and lived vhere on the produce of his brush as a landscape painter, and on that of his pencil or graver as a draughtsman and etcher. But instead of getting better, his condition became worse, and he even lost the use of one of his hands. In this condition he turned from painting to music, and spent his leisure hours in the pleasures of authorship. He did not long survive, dying at Vienna in 1822, after long years of chronic suffering. From two pictures now in the Belvedere gallery, and from numerous engraved drawings from the neighbourhood of Tivoli, we gather that Dies was never destined to rise above a respectable mediocrity. He followed Salvator Rosa's example in imitating the manner of Claude Lorraine. But Salvator adapted the style of Claude, whilst Dies did no more than copy it.

DIEST, a small town in the province of Brabant, Belgium, situated on the Demer at its junction with the Bever. Pop. (1904) 8383. It lies about half-way between Hasselt and Louvain, and is still one of the five fortified places in Belgium. It contains many breweries, and is famous for the excellence of its beer.

DIESTERWEG, FRIEDRICH ADOLF WILHELM (1790-1866), German educationist, was born at Siegen on the 29th of October 1 790. Educated at Herborn and Tubingen universities, he took to the profession of teaching in 1811. In 1820 he was appointed director of the new school at Mors, where he put in practice the methods of Pestalozzi. In 1832 he was summoned to Berlin to direct the new state-schools seminary in that city. Here he proved himself a strong supporter of unsectarian religious teach- ing. In 1846 he established the Pestalozzi institution at Pankow, and the Pestalozzi societies for the support of teachers' widows and orphans. In 1850 he retired on a pension, but continued vigorously to advocate his educational views. In 1858 he was elected to the chamber of deputies as member for the city of Berlin, and voted with the Liberal opposition. He died in Berlin on the 7th of July 1866. Diesterweg was a voluminous writer on educational subjects, and was the author of various school text-books.

DIET, a term used in two senses, (1) food or the regulation of feeding (see Dietary and Dietetics), (2) an assembly or council (Fr. diete; It. dieta; Low Lat. diaeta; Ger. Tag).

We are here concerned only with this second sense. In modern usage, though in Scotland the term is still sometimes applied to any assembly or session, it is practically confined to the sense of an assembly of estates or of national or federal representatives. The origin of the word in this connotation is somewhat complicated. It is undoubtedly ultimately derived from the Greek diatTa (Lat. diaeta), which meant “mode of life ” and thence ” prescribed mode of life,” the English ” diet ” or ” regimen.” This was connected with the verb Siacrav, in the sense of ” to rule,” ” to regulate ” ; compare the office of htMTr\ri\s at Athens, and dieteta, ” umpire,” in Late Latin. In both Greek and Latin, too, the word meant ” a room,” from which the transition to ” a place of assembly ” and so to ” an assembly ” would be easy. In the latter sense the word, however, actually occurs only in Low Latin, Du Cange (Glossarium,s.v.) deriving it from the late sense of ” meal ” or ” feast,” the Germans being accustomed to combine their political assemblies with feasting. It is clear, too, that the word diaeta early became confused with Lat. dies, ” day ” (Ger. Tag), ” especially a set day, a day appointed for public business; whence, by extension, meeting for business, an assembly ” (Skeat). Instances of this confusion are given by Du Cange, e.g. diaeta for dieta, ” a day’s journey ” (also an obsolete sense of ” diet ” in English), and dieta for ” the ordinary course of the church,” i.e. ” the daily office,” which suggests the original sense of diaeta as ” a pre- scribed mode of life.”

The word ” diet ” is now used in English for the Reichstag, ” imperial diet ” of the old Holy Roman Empire; for the Bundestag ,” federal diet,” of the former Germanic confederation; sometimes for the Reichstag of the modern German empire; for the Landtage, ” territorial diets ” of the constituent states of the German and Austrian empires; as well as for the former or existing federal or national assemblies of Switzerland, Hungary, Poland, &c. Although, however, the word is still sometimes used of all the above, the tendency is to confine it, so far as con- temporary assemblies are concerned, to those of subordinate importance. Thus ” parliament ” is often used of the German Reichstag or of the Russian Landtag, while the Landtag, e.g. of Styria, would always be rendered ” diet.” In what follows we confine ourselves to the diet of the Holy Roman Empire and its relation to its successors in modern Germany.

The origin of the diet, or deliberative assembly, of the Holy Roman Empire must be sought in the placitum of the Frankish empire. This

represented the tribal assembly of the Franks, meeting (originally in March, but after 755 in May, whence it is called the Campus Maii) partly for a military review on the eve of the summer campaign, partly for deliberation on important matters of politics and justice. By the side of this larger assembly, however, which contained in theory, if not in practice, the whole body of Franks available for war, there had developed, even before Carolingian times, a smaller body composed of the magnates of the Empire, both lay and ecclesiastical. The germ of this smaller body is to be found in the episcopal synods, which, afforced by the attendance of lay magnates, came to be used by the king for the settlement of national affairs. Under the Carolingians it was usual to combine the assembly of magnates with the generalis conventus of the " field of May," and it was in this inner assembly, rather than in the general body (whose approval was merely formal, and confined to matters momentous enough to be referred to a general vote), that the centre of power really lay. It is from the assembly of magnates that the diet of medieval Germany springs. The general assembly became meaningless and unnecessary, as the feudal array gradually superseded the old levy en masse, in which each freeman had been liable to service; and after the close of the 10th century it no longer existed.

The imperial diet (Reichstag) of the middle ages might some- times contain representatives of Italy, the regnum Italicum; but it was practically always confined to the magnates of Germany, the regnum Teutonicum. Upon occasion a summons to the diet might be sent even to the knights, but the regular members were the princes (Furs ten), both lay and ecclesiastical. In the 13th

century the seven electors began to disengage themselves from the prince as a separate element, and the Golden Bull (1356) made their separation complete; from the 14th century onwards the nobles (both counts and other lords) are regarded as regular members; while after 1250 the imperial and episcopal towns often appear through their representatives. By the 14th century, therefore, the originally homogeneous diet of princes is already, at any rate practically if not yet in legal form, divided into three colleges — the electors, the princes and nobles, and the repre- sentatives of the towns (though, as we shall see, the latter can hardly be reckoned as regular members until the century of the Reformation). Under the Hohenstaufen it is still the rule that every member of the diet must attend personally, or

lose his vote; at a later date the principle of representation by proxy, which eventually made the diet into a mere congress of envoys, was introduced. By the end of the 13th century the vote of the majority had come to be regarded as decisive; but in accordance with the strong sense of social distinctions which marks German history, the quality as well as the quantity of votes was weighed, and if the most powerful of the princes were agreed, the opinion of the lesser magnates was not consulted. The powers of the medieval diet extended to matters like legislation, the decision upon expeditions (especially the expeditio Romano), taxation and changes in the constitution of the principalities or the Empire. The election of the king, which was originally regarded as one of the powers of the diet, had passed to the electors by the middle of the 13th century.

A new era in the history of the diet begins with the Reforma- tion. The division of the diet into three colleges becomes definite and precise; the right of the electors, for instance, to constitute a separate college is explicitly recognized as a matter of established custom in 1 544. The representatives of the towns now become regular members. In the 15th century they had only attended when special business, such as imperial reform or taxation, fell under discussion; in 1500, however, they were recognized as a separate and regular estate, though it was not until 1648 that they were recognized as equal to the other estates of the diet. The estate of the towns, or college of municipal representatives, was divided into two benches, the Rhenish and the Swabian. The estate of the princes and counts, which stood midway between the electors and the towns, also attained, in the years that followed the Reformation, its final organization. The vote of the great princes ceased to be personal, and began to be territorial. This had two results. The division of a single territory among the different sons of a family no longer, as of old, multiplied the voting power of the family; while in the opposite case, the union of various territories in the hands of a single person no longer meant the extinction of several votes, since the new owner was now allowed to give a vote for each of his terri- tories. The position of the counts and other lords, who joined with the princes in forming the middle estate, was finally fixed by the middle of the 17th century. While each of the princes enjoyed an individual vote, the counts and other lords were arranged in groups, each of which voted as a whole, though the whole of its vote (Kurialslimme) only counted as equal to the vote of a single prince (Virilstimme). There were six of these groups; but as the votes of the whole college of princes and counts (at any rate in the 18th century) numbered 100, they could exercise but little weight.

The last era in the history of the diet may be said to open with the

treaty of Westphalia (1648). The treaty acknowledged that Germany was no longer a unitary state, but a loose confederation of sovereign princes; and the diet accordingly ceased to bear the character of a national assembly, and became a mere congress of envoys. The ” last diet ” which issued a regular recess (Reichs- abschied — the term applied to the acta of the diet, as formally compiled and enunciated at its dissolution) was that of Regens- burg in 1654. The next diet, which met at Regensburg in 1663, never issued a recess, and was never dissolved; it continued in permanent session, as it were, till the dissolution of the Empire in 1806. This result was achieved by the process of turning the diet from an assembly of principals into a congress of envoys.

The emperor was represented by two commissarii; the electors, princes and towns were similarly represented by their accredited agents. Some legislation was occasionally done by this body; a condusum imperii (so called in distinction from the old recessus imperii of the period before 1663) might slowly (very slowly — for the agents, imperfectly instructed, had constantly to refer matters back to their principals) be achieved; but it rested with the various princes to promulgate and enforce the conclusum in their territories, and they were sufficiently occupied in issuing and enforcing their own decrees. In practice the diet had nothing to do; and its members occupied themselves in ” wrangling about chairs ” — that is to say, in unending disputes about degrees and precedences.

In the Germanic Confederation, which occupies the interval between the death of the Holy Roman Empire and the forma- tion of the North German Confederation (1815-1866), a diet {Bundestag) existed, which was modelled on the old diet of the 18th century. It was a standing congress of envoys at Frankfort-on- Main. Austria presided in the diet, which, in the earlier years of its history, served, under the influence of Metternich, as an organ for the suppression of Liberal opinion. In the North German Confederation (1867-1870) a new departure was made, which has been followed in the constitution of the present German empire. Two bodies were instituted — a Bundesrat, which resembles the old diet in being a congress of envoys sent by the sovereigns of the different states of the confederation, and a Reichstag, which bears the name of the old diet, but differs entirely in composition. The new Reichstag is a popular representative assembly, based on wide suffrage and elected by ballot; and, above all, it is an assembly representing, not the several states, but the whole Empire, which is divided for this purpose into electoral districts. Both as a popular assembly, and as an assembly which represents the whole of a united Germany, the new Reichstag goes back, one may almost say, beyond the diet even of the

middle ages, to the days of the old Teutonic folk-moot.

See R. Schroder, Lehrbuch der deutschen Rechtsgeschichte (1902), pp. 149, 508, 820, 880. Schroder gives a bibliography of monographs bearing on the history of the medieval diet. (E. Br.)

DIETARY, in a general sense, a system or course of diet, in the sense of food; more particularly, such an allowance and regula- tion of food as that supplied to workhouses, the army and navy, prisons, &c. Lowest in the scale of such dietaries comes what is termed ” bare existence ” diet, administered to certain classes of the community who have a claim on their fellow-countrymen that their lives and health shall be preserved in statu quo { but nothing further. This applies particularly to the members of a temporarily famine-stricken community. Before the days of prison reform, too, the dietary scale of many prisons was to a certain extent penal, in that the food supplied to prisoners was barely sufficient for existence. Nowadays more humane principles apply; there is no longer the obvious injustice of applying the same scale of quantity and quality to all prisoners under varying circumstances of constitution and surroundings, and whether serving long or short periods of imprisonment.

The system of dietary in force in the local and convictprisons of England and Wales is that recommended by the Home Office on the advice of a departmental committee. As to the local prison dietary, its application is based on (1) the principle of variation of diet with length of sentence; (2) the system of progressive dietary; (3) the distinction between hard labour diets and non-hard labour diets; (4) the differentiation of diet according to age and sex. There are three classes of diet, classes A, B and C. Class A diet is given to prisoners undergoing not more than seven days’ imprisonment. The food is good and wholesome, but sufficiently plain and un- attractive, so as not to offer temptation to the loafer or mendicant. It is given in quantity sufficient to maintain health and strength during the single week. Prisoners sentenced to more than seven days and not more than fourteen days are given class A diet for the first seven days and class B for the remainder of the sentence. In most of the local prisons in England and Wales prisoners sentenced to hard labour received hard labour diet, although quite 60% were unable to perform the hardest forms of prison labour either through physical defect, age or infirmity. The departmental committee of 1899 in their report recommended that no distinction should be made between hard labour and non-hard labour diets. Class A diet is as follows: — Breakfast, Bread, 8 oz. daily (6 oz. for women and iuveniles) with 1 pint of gruel. Juveniles (males and females under

sixteen years of age) get, in addition, J pint of milk. Dinner, 8 oz. of bread daily, with I pint of porridge on three days of the week, 8 oz. of potatoes (representing the vegetable element) on two other days,

Table I.

Men.

Women.

Juveniles.

Breakfast.

Daily :— Bread Gruel Milk ….

8 oz. ipt.

6 oz. ipt.

6 oz. ipt. ipt.

Dinner.

Sunday : —

Bread . . . Potatoes . Cooked meat, pre- served by heat

6 oz.

8 „

4 .,

6 oz.

8 „

3 –

Monday : —

Bread . . . Potatoes . Beans Fat bacon

6 oz. 8 „ 10 „ 2 „

6 oz.

8 „ 8 „ i „

Tuesday : —

Bread . . Potatoes . Soup ….

6 oz. 8 „ ipt.

6 oz. & „ I Pt-.

Wednesday :— • Bread Potatoes . Suet pudding

6 oz.

8 „ 10 „

6 oz. 8 „

8 „

Thursday : — Bread Potatoes . Cooked beef,

without bone

6 oz.

8 „

4 ..

6 oz. 8 „

3 ..

Friday : — Bread Potatoes . Soup ….

6 oz.

8 „ i pt.

6 oz. 8 „ i pt.

Supper.

.

Saturday: — . Bread Potatoes . Suet pudding

Daily:—

Bread . . Porridge . Gruel Cocoa . ■ .

6 oz. 8 „ 10 „

8 oz. ipt.

6 oz. 8 „ 8 „

6 oz. ipt.

6 oz. ipt.

and 8 oz. of suet pudding (representing the fatty element) on the other two days. Supper, the breakfast fare repeated.

Class B diet, which is also given to (i) prisoners on remand or awaiting trial, (2) offenders of the 1st division who do not maintain themselves, (3) offenders of the 2nd division and (4) debtors, is as shown in Table I.

Class C diet is class B amplified, and is given to those prisoners serving sentences of three months and over.

The dietary of convict prisons, in which prisoners are all under long sentence, is divided into a diet for convicts employed at hard labour and a diet for convicts employed at sedentary, indoor and light labour. It will be found set forth in the Blue-book mentioned above. The sparest of all prison diets is called ” punishment diet,” and is administered for offences against the internal discipline of the prison. It is limited to a period of three days. It consists of 1 lb of bread and as much water as the prisoner chooses to drink.

In French prisons the dietary is nearly two pounds weight of bread, with two meals of thin soup (breakfast and dinner) made from potatoes, beans or other vegetables, and on two days a week made from meat. In France the canteen system is in vogue, additional food, such as sausages, cheese, fruit, &c, may be obtained by the prisoner, according to the wages he receives for his labours. The dietary of Austrian prisons is I j lb of bread daily, a dinner of soup on four days of the week, and of meat on the other three days, with a supper of

soup or vegetable stew. Additional food can be purchased by the prisoner out of his earnings.

These dietaries may be taken as more or less typical of the ordinary prison fare in most civilized countries, though in some countries it may err on the side of severity, as in Sweden, prisoners being given only two meals a day, one at mid-day and one at seven p.m., porridge or gruel being the principal element in both meals. On the other hand, the prison dietaries of many of the United States prisons go to the other extreme, fresh fish, green vegetables, even coffee and fruit, figuring in the dietary.

Another class of dietary is that given to paupers. In England, until 1900, almost every individual workhouse had its own special dietary, with the consequence that many erred on the side of scanti- ness and unsuitability, while others were too lavish. By an order of the Local Government Board of that year, acting on a report of a committee, all inmates of workhouses, with the exception of the sick, children under three years of age, and certain other special cases, are dieted in accordance with certain dietary tables as framed and settled by the board. The order contained a great number of different rations, it being left to the discretion of the guardians as to the final settlement of the tables. For adult inmates the dietary tables are for each sex respectively, two in number, one termed ” plain diet ” and the other ” infirm diet.” All male inmates certified as healthy able-bodied persons receive plain diet only. All inmates, however, in workhouses are kept employed according to their capacity and ability, and this is taken into consideration in giving allowances of food. For instance, for work with sustained exertion, such as stone- breaking, digging, &c, more food is given than for work without sustained exertion, such as wood-chopping, weeding or sewing. Table II. shows an example of a workhouse dietary.

In the casual wards of workhouses the dietary is plainer, consisting of 8 oz. of bread, or 6 oz. of bread and one pint of gruel or broth for breakfast; the same for supper; for dinner 8 oz. of bread and i| oz. of cheese or 6 oz. of bread and one pint of soup. The American poor law system is based broadly on that of England, and the methods of relief are much the same. Each state, however, makes its own regulations, and there is considerable diversity in workhouse dietaries in consequence. The German system of poor relief is more methodical than those of England and America. The really deserving are treated

Table

II.

Breakfast.

Dinner.

Supper.

s

oa

be

12

“C u

•6

8

u

CO

CO

«

bO

>

I*

Oh

CO

8

oa

J3

E

6

m

%

u

＋J O

is

■9’-

U

•0

3

oa

V

3

O

J3

O u

oa

si en

4)

u

oz.

pt.

oz.

oz.

oz.

P t.

oz.

oz.

oz.

oz.

pt.

pt.

oz.

oz.

pt.

Pt-

pt.

oz.

Sunday

8

•

4

4i

12

8

i

I

Monday .

4

Ii

6

^

6

ii

Tuesday .

4

I*

4i

12

6

ii

Wednesday

4

I*

4

12

10

6

ii

Thursday .

4

ii

4

4i

12

8

1

2

Friday

4

ij

8

3

1

6

ii

Saturday .

4

ii

6

1

6

••

ii

”

On Sundays 1 pint of tea and 2i oz. of butter are given instead of porridge

with more commiseration, and a larger amount of outdoor relief is given than in England. There is no casual ward, tramps and beggars being liable to penal treatment; but there are ” relief stations,” somewhat corresponding to casual wards, where destitute persons tramping from one place to another can obtain food and lodging in return for work done.

In the British navy certain staple articles of diet are supplied to the men to the value approximately of 6d. per diem — the standard government ration — and, in addition, a messing allowance cf 4d. per diem, which may either be expended on luxuries in the canteen, or in taking up government provisions on board ship, in addition to the standard ration.- The standard ration as recommended in 1907 by a committee appointed to inquire into the question of victualling in the navy is as follows : —

Service Afloat. 1 lb bread (or f fl> bread and | lb trade flour).

3 lb fresh meat.

I lb fresh vegetables. I pint spirit.

4 oz. sugar.

3 oz. tea (or 1 oz. coffee for every J oz. tea).

J oz, ordinary or soluble chocolate (or 1 oz. coffee), j oz. condensed

milk. I oz. jam or marmalade.

4 oz. preserved meat on one day of the week in harbour, or on two days at sea.

Mustard, pepper, vinegar, and salt as required. Substitute for soft bread when the latter is not available —

3 lb biscuit (new type) or 1 lb flour. Substitutes for fresh meat when the latter is not available : —

(1) Salt pork day: —

J lb salt pork. J lb split peas. Celery seed, J oz. to every 8 lb of split peas put

into the coppers. 3 lb potatoes (or 1 oz. compressed vegetables).

(2) Preserved meat day: —

6 oz. preserved meat.

8 oz. trade flour. \

f oz. refined suet > or 4 oz. rice.

2 oz. raisins)

I lb potatoes (or 1 oz. compressed vegetables). On shore establishments and depot ships J pt. fresh milk is issued in lieu of the f oz. of condensed milk.

In the United States navy there is more liberality and variety of diet, the approximate daily cost of the rations supplied being is. 3d. per head. In the American mercantile marine, too, according to the scale sanctioned by act of Congress (December 21, 1898) for American ships, the seaman is better off than in the British merchant service. The scale is shown in Table III.

Table III.

On

alternate days.

Weekly Scale.

Articles.

Weekly Scale.

Articles.

3i»

Biscuits.

f oz.

Tea.

3* .-

Salt beef.

21 ,,

Sugar.

3 -,

,, pork.

i|lb

Molasses.

ii .,

Flour.

9 oz.

Fruits, dried.

2 „

Meats, preserved.

!pt.

Pickles.

IOj „

Bread, fresh (8 lb flour

I M

Vinegar.

in lieu).

8 oz.

Corn Meal.

1 ,,

Fish, dried.

12 ,,

Onions.

7 ..

Potatoes or yams.

7 ..

Lard.

1 ,,

Tomatoes, preserved.

7 .,

Butter.

2

Peas.

i „

Mustard.

3

1 1,

Calavances.

1

Pepper.

5 if

Rice.

1

Salt.

5i oz.

Coffee, green.

In the British mercantile marine there is no scale of provisions prescribed by the Board of Trade ; there is, however, a traditional scale very generally adopted, having the sanction of custom only and seldom adhered to. The following dietary scale for steerage passengers, laid down in the 12th schedule of the Merchant Shipping Act 1894, is of interest. See Table IV.

Certain substitutions may be made in this scale at the option of the master of any emigrant ship, provided that the substituted articles are set forth in the contract tickets of the steerage passengers.

In the British army the soldier is fed partly by a system of co-operation. He gets a free ration from government of 1 lb of bread and f lb of meat; in addition there is a messing allowance of 33d. per man per day. He is able to supplement his food by purchases from the canteen. Much depends on the individual management-in each

regiment as to the satisfactory expenditure of the messing allowance: In some regiments an allowance is made from the canteen funds towards messing in addition to that granted by the government. The ordinary field ration of the British soldier is I \ lb of bread or 1 lb of biscuit; I lb of fresh, salt or preserved meat; 3 oz. of coffee; foz. of tea; 2 oz. of sugar; J oz. of. salt, *V oz. of pepper, the whole weighing something over 2 fb 3 oz. This cannot be looked On as a fixed ration, as it varies in different campaigns, according to the country into which the troops may be sent. The Prussian soldier during peace gets weekly from his canteen 11 lb I oz. of rye bread and not quite 2 § lb of meat. This is obviously insufficient, but under

Table IV.—

Weekly, per SloMte Adult.

Scale A.

Scale B.

For voyages not ex-

For voyages ex-

ceeding 84 days

ceeding 84 days

for sailing ships

for sailing ships

or 50 days for

or 50 days for

steamships.

steamships.

lb oz.

R> oz.

Bread or biscuit, not in-

ferior to navy biscuit

3 8

3 8

Wheaten flour

1

2

Oatmeal

1 8

1

Rice .

1 8

8

Peas .

1 8

1 8

Beef .

14

1 4

Pork

1

1

Butter

4

Potatoes

2

2

Sugar

1

1

Tea

2

2

Salt .

2

2

Pepper (white or black),

ground

oj

o|

Vinegar

1 gill

1 gill

Preserved meat

1

Suet .

6

Raisins

8

Lime juice .

6

the conscription system it is reckoned that he will be able to make up the deficiency out of his own private means, or obtain charitable: contributions from his friends. In the French infantry of the line; each man during peace gets weekly 15 lb of bread, 3ˆ lb of meat, 2 § lb of haricot beans or other vegetables, with salt and pepper, and if oz. of brandy. .

An Austrian under the same circumstances receives 13-9 lb of bread, 3 lb of flour and 3-3 lb of meat.

The Russian conscript is allowed weekly : — Black bread …. 7 lb.

Meat . Kvass (beer) Sour cabbage Barley Salts . Horse-radish Pepper Vinegar

7 lb.

7-7 quarts.

243 gills = I22J oz.

243 gills =1223 oz.

10J oz.

28 grains.

28 grains.

Si gills = 263 oz.

DIETEflCS, the science of diet, i.e. the food and nutrition of man in health and disease (see Nutrition). This article deals mainly with that part of the subject which has to do with the composition and nutritive values of foods and their adaptation to the use of people in health. The principal topics considered are: (1) Food and its functions; (2) Metabolism of matter and energy; (3) Composition of food materials; (4) Digestibility of food; (5) Fuel value of food; (6) Food consumption; (7) Quan- tities of nutrients needed; (8) Hygienic economy of food; (9) Pecuniary economy of food.

1. Food and its Functions.— For practical purposes, food may be denned as that which, when taken into the body, may be utilized for the formation and repair of body tissue, and the production of energy. More specifically, food meets the requirements of the body in several ways. It is used for the formation of the tissues and fluids of the body, and for the restoration of losses of sub- stance due to bodily activity. The potential energy of the food is converted into heat or muscular work or other forms of energy. In being thus utilized, food protects body substance or previously acquired nutritive material from consumption. When the amount

of food taken into the body is in excess of immediate needs, the

surplus may be stored for future consumption.

Ordinary food materials, such as meat, fish, eggs, vegetables, &c, consist of inedible materials, or refuse, e.g. bone of meat and fish, shell of eggs, rind and seed of vegetables; and edible material, as flesh of meat and fish, white and yolk of eggs, wheat flour, &c. The edible material is by no means a simple sub- stance, but consists of water, and some or ail of the compounds variously designated as food stuffs, proximate principles, nutritive ingredients or nutrients, which are classified as protein, fats, carbohydrates and mineral matters. These have various functions in the nourishment of the body.

The refuse commonly contains compounds similar to those in the food from which it is derived, but since it cannot be eaten, it is usually considered as a non-nutrient. It is of importance chiefly in a consideration of the pecuniary economy of food. Water is also considered as a non-nutrient, because although it is a constituent of all the tissues and fluids of the body, the body may obtain the water it needs from that drunk; hence, that contained in the food materials is of no special significance as a nutrient.

Mineral matters, such as sulphates, chlorides, phosphates and carbonates of sodium, potassium, calcium, &c, are found in different combinations and quantities in most food materials. These are used by the body in the formation of the various tissues, especially the skeletal and protective tissues, in digestion, and in metabolic processes within the body. They yield little or no energy, unless perhaps the very small amount involved in their chemical transformation.

Protein l is a term used to designate the whole group of nitrogenous compounds of food except the nitrogenous fats. It includes the albuminoids, as albumin of egg-white, and of blood serum, myosin of meat (muscle), casein of milk, globulin of blood and of egg yolk, fibrin of blood, gluten of flour; the gelatinoids, as gelatin and allied substances of connective tissue, collagen of tendon, ossein of bone and the so-called extractives (e.g. creatin) of meats; and the amids (e.g. asparagin) and allied compounds of vegetables and fruits.

The albuminoids and gelatinoids, classed together as proteids, are the most important constituents of food, because they alone can supply the nitrogenous material necessary for the formation of the body tissues. For this purpose, the albuminoids are most valuable. Both groups of compounds, however, supply the body with energy, and the gelatinoids in being thus utilized protect the albuminoids from consumption for this purpose. When their supply in the food is in

excess of the needs of the body, the surplus proteids may be converted into body fat and stored.

The so-called extractives, which are the principal constituents of meat extract, beef tea and the like, act'principally as stimulants and appetizers. It has been believed that they serve neither to build tissue nor to yield energy, but recent investigations 2 indicate that creatin may be metabolized in the body.

The fats of food include both the animal fats and the vegetable oils. The carbohydrates include such compounds as starches, sugars and the fibre of plants or cellulose, though the latter has but little value as food for man. The more important function of both these classes of nutrients is to supply energy to the body to meet its requirements above that which it may obtain from the proteids. It is not improbable that the atoms of their molecules as well as those from the proteids are built up into the proto- plasmic substance of the tissues. In this sense, these nutrients may be considered as being utilized also for the formation of tissue ; but they are rather the accessory ingredients, whereas the proteids are the essential ingredients for this purpose. The fats in the food in excess of the body requirements may be stored as body fat, and the surplus carbohydrates may also be converted into fat and stored.

1 The terms applied by different writers to these nitrogenous compounds are conflicting. For instance, the term " proteid " is sometimes used as protein is here used, and sometimes to designate the group here called albuminoids. The classification and terminology here followed are those tentatively recommended by the Association of American Agricultural Colleges and Experiment Stations.

1 Folin, Festschrift fur Olaf Hammarsten, iii. (Upsala, 1906).

To a certain extent, then, the nutrients of the food may substitute each other. All may be incorporated into the proto- plasmic structure of body tissue, though only the proteids can supply the essential nitrogenous ingredients; and apart from the portion of the proteid material that is indispensable for this purpose, all the nutrients are used as a source of energy. If the supply of energy in the food is not sufficient, the body will use its own proteid and fat for this purpose. The gelatinoids, fats and carbohydrates in being utilized for energy protect the body proteids from consumption. The fat stored in the body from the excess of food is a reserve of energy material, on which the body may draw when the quantity of energy in the food is insufficient for its immediate needs.

What compounds are especially concerned in intellectual activity is not known. The belief that fish is especially rich in phosphorus and valuable as a brain food has no foundation in observed fact.

2. Metabolism of Matter and Energy. — The processes of nutri- tion thus consist largely of the transformation of food into body material and the conversion of the potential energy of both food and body material into the kinetic energy of heat and muscular work and other forms of energy. These various processes are generally designated by the term metabolism. The metabolism of matter in the body is governed largely by the needs of the body for energy. The science of nutrition, of which the present subject forms a part, is based on the principle that the transformations of matter and energy in the body occur in accordance with the laws of the conservation of matter and of energy. That the body can neither create nor destroy matter has long been universally accepted. It would seem that the transformation of energy must likewise be governed by the law of the conservation of energy; indeed there is every reason a priori to believe that it must; but the experimental difficulties in the way of absolute demonstration of the principle are considerable. For such demonstration it is necessary to prove that the income and expenditure of energy are equal. Apparatus and methods of inquiry devised in recent years, however, afford means for a comparison of the amounts of both matter and energy received and expended by the body, and from the results obtained in a large amount of such research, it seems probable that the law obtains in the living organism in general.

The first attempt at such demonstration was made by M. Rubner 3 in 1894, experimenting with dogs doing no external muscular work. The income of energy (as heat) was computed, but the heat eliminated was measured. In the average of eight experiments continuing forty-five days, the two quantities agreed within 0-47 %, thus demonstrating what it was desired to prove — that the heat given off by the body came solely from the oxidation of food within it. Results in accordance with these were reported by Studenski 4 in 1897, and by Laulanie 5 in 1898.

The most extensive and complete data yet available on the subject have been obtained by W. O. Atwater, F. G. Benedict and associates 6 in experiments with men in the respiration calori- meter, in which a subject may remain for several consecutive days and nights. These experiments involve actual weighing and analyses of the food and drink, and of the gaseous, liquid and solid excretory products; determinations of potential energy (heat of oxidation) of the oxid{zable material received and given off by the body (including

estimation of the energy of the material gained or lost by the body) ; and measurements of the amounts of energy expended as heat and as external muscular work. By October 1906 eighty-eight experiments with fifteen different sub- jects had been completed. The separate experiments continued from two to thirteen days, making a total of over 270 days.

5 Ztschr. Biol. 30, 73.

4 In Russian. Cited in United States Department of Agriculture, Office of Experiment Stations, Bui. No. 45, A Digest of Metabolism Experiments, by W. O. Atwater and C. F. Langworthy.

6 Arch, physxol. norm, et path. (1894) 4.

6 U.S. Department of Agriculture, Office of Experiment Stations, Bulletins Nos. 63, 69, 109, 136, 175. For a description of the respiration calorimeter here mentioned see also publication No. 42 of the Carnegie Institution of Washington.

In some cases the subjects were at rest; in others they per- formed varying amounts of external muscular work on an apparatus by means of which the amount of work done was measured. In some cases they fasted, and in others they received

body. The variations for individual days, and in the average for individual experiments as well, were in some cases appreciable, amounting to as much as 6 %, which is not strange in view of the uncertainties in physiological experimenting; but in the average

Table .— Percentage Composition of some Common Food Materials.

Food Material.

Refuse.

Water.

Protein.

Fat.

Carbo- hydrates.

Mineral Matter.

Fuel Value per lb.

%

%

%

%

%

%

Calories.

Beef, fresh (medium fat) —

Chuck

i6- 3

52-6

15-5

15-0

o-8

910

Loin

13-3

52-5

• 16-1

17-5

09

1025

Ribs

20-8

43-8

13-9

21-2

0-7

H35

Round .

7-2

60-7

19-0

12-8

1-0

890

Shoulder

i6-4

56-8

16-4

9-8

09

715

Beef, dried and smoked

4-7

537

26-4

6-9

8-9

790

Veal-

Leg

14-2

6o-i

15-5

7.9

09

625

Loin

16-5

57-6

16-6

9-0

09

685

Breast

21-3

52-0

15-4

II-O

0-8

745

Mutton —

Leg

18-4

5i-2

I5-I

147

o-8

890

Loin

i6‘0

42-0

13-5

28-3

07

1415

Flank .

9-9

39-0

13-8

36-9

06

1770

Pork-

Loin

19-7

41-8

13-4

24-2

o-8

1245

Ham, fresh

io-7

48-0

13-5

259

o-8

1320

Ham, smoked and s

alted

13-6

34-8

14-2

33-4

4-2

1635

Fat, salt

7.9

1-9

86-2

3-9

3555

Bacon

7-7

17-4

91

62-2

4-1

2715

Lard, refined

IOO-O

4100

Chicken

25-9

47-1

13-7

12-3

07

765

Turkey

22-7

42-4

1 6- 1

18-4

o-8

1060

Goose

i 7 -6

38-5

13-4

29-8

07

1475

Eggs

II-2

65-5

I3-I

9-3

0-9

635

Cod, fresh

2Q-Q

58-5

n-i

0-2

o-8

220

Cod, salted

24-9

40-2

16-0

0-4

18-5

325

Mackerel, fresh

447

40-4

10-2

4-2

07

37°

Herring, smoked

44-4

19-2

20-5

8-8

7-4

755

Salmon, tinned

63-5

21-8

I2-I

2-6

9i5

Ovsters, shelled

88-3

6-0

1-3

3-3

i-i

225

Butter

II-O

1-0

85-0

30

34i°

Cheese

34-2

25-9

33-7

2-4

3-8

1885

Milk, whole

87-0

3-3

4-0

5-0

07

310

Milk, skimmed

905

3-4

o-3

5-1

07

165

Oatmeal .

7-7

16-7

7-3

66-2

2:1

1800

Corn (maize) meal

125

9-2

1-9

75-4

1-0

1635

Rye flour .

12-9

6-8

09

78-7

07

1620

Buckwheat flour

13-6

6-4

1-2

77-9

0-9

1 605

Rice

12-3

8-0

03

79-o

0-4

1620

Wheat flour, white

J2-0

u-4

1-0

75-1

o-5

1635

Wheat flour, graham

“•3

13-3

2-2

71-4

1-8

1645

Wheat, breakfast food

96

I2-I

1-8

75-2

i-3

1680

Wheat bread, white .

35-3

92

1-3

53-1

i-i

1200

Wheat bread, graham

35-7

8-9

i-8

52-i

1-5

“95

Rye bread

35-7

90

06

53-2

1-5

1170

Biscuit (crackers)

6-8

9.7

I2-I

69-7

i-7

1925

Macaroni .

10-3

13-4

0-9

74-i

1-3

1645

Sugar

IOO-O

1750

Starch (corn starch)

90-0

1680

Beans, dried

12-6

22-5

i’-8

59-6

3-5 .

1520

Peas, dried

95

24-6

1-0

62-0

29

1565

Beets

20-0

70-0

i-3

0-1

77

0-9

160

Cabbage .

i5-o

77-7

1-4

0-2

4-8

0-9

“5

Squash

500

44-2

o-7

0-2

4-5

0-4

100

Potatoes .

20-0

62-6

1-8

0-1

14-7

o-8

295

Sweet potatoes

200

55-2

1-4

o-6

21-9

09

440

Tomatoes .

94-3

09

0-4

39

o-5

100

Apples

25-0

63-3

o-3

0-3

io-8

o-3

190

Bananas

35-0

48-9

o-8

0-4

14-3

06

260

Grapes .

25-0

58-o

1-0

1-2

14-4

04

295

Oranges . • .

27-0

63-4

o-6

0-1

8-5

0-4

150

Strawberries

5-o

85-9

09

06

7-0

0-6

150

Almonds .

45-0

2-7

n-5

30-2

9-5

i-i

1515

Brazil nuts

49-6

2-6

8-6

33-7

3-5

2-0

1485

Chestnuts . .

i6‘0

37-8

5-2

4-5

35-4

I-I

915

Walnuts …..

58-1

1.0

69

26-6

6-8

0-6

1250

diets generally not far from sufficient to maintain nitrogen, and usually carbon, equilibrium in the body. In these experiments the amount of energy expended by the body as heat and as external muscular work measured in terms of heat agreed on the average very closely with the amount of heat that would be produced by the oxidation of all the matter metabolized in the

of all the experiments the energy of the expenditure was above 99-9% of the energy of the income, — an agreement within one part in 1000. While these results do not absolutely prove the application of the law of the conservation of energy in the human body, they certainly approximate very closely to such demonstra- tion. It is of course possible that energy may have given off

from the body in other forms than heat and external muscular work. It is conceivable, for example, that intellectual activity may involve the transformation of physical energy, and that the energy involved may be eliminated in some form now unknown. But if the body did give off energy which was not measured in these experiments, the quantity must have been extremely small. It seems fair to infer from the results obtained that the meta- bolism of energy in the body occurred in conformity with the law of the conservation of energy.

3. Composition of Food Materials. — The composition of food is determined by chemical analyses, the results of which are conventionally expressed in terms of the nutritive ingredients previously described. As a result of an enormous amount of such investigation in recent years, the kinds and proportions of nutrients in our common sorts of food are well known. Average

actually digested and absorbed. Thus, two foods may contain equal

amounts of the same nutrient, but the one most easily digested will really be of most value to the body, because less effort is necessary to utilize it. Considerable study of this factor is being made, and much valuable information is accumulating, but it is of more especial importance in cases of disordered digestion.

The digestibility of food in the sense of thoroughness of digestion, however, is of particular importance in the present discussion. Only that portion of the food that is digested and absorbed is available to the body for the building of tissue and the production of energy. Not all the food eaten is thus actually digested; undigested material is excreted in the faeces. The thoroughness of digestion is determined experimentally by weighing and analysing the food eaten and the faeces pertaining

Table 11.— Coefficients of Digestibility (or Availability) of Nutrients in Different Classes of Food Materials.

Kind of Food.

Protein.

Fat.

Carbo- hydrates.

Kind of Food.

Protein.

Fat.

Carbo- hydrates.

Meats

% 98

% 98

%

Corn meal

% 80

%

% 99

Fish ….

96

97

Wheat meals without bran

83

93

Poultry ….

96

97

Wheat meals with bran

75

92

EggS . . :

97

98

White bread

88

98

Dairy products

97

96

98

Entire wheat bread

82

94

Total animal food of

Graham bread

76

90

mixed diet . . .

97

97

98

Rice ….

76

9i

Potatoes . . .

73

98

Fruits and nuts

80

86

96

Beets, carrots, &c. .

72

97

Sugars and starches

98

Cabbage, lettuce, &c.

83

Total vegetable food of

Legumes …

78

90

95

mixed diet

85

90

97

Oatmeal ….

78

90

97

Total food of mixed diet .

92

95

97

values for percentage composition of some ordinary food materials are shown in Table I. (Table I. also includes figures for fuel value.)

It will be observed that different kinds of food materials vary widely in their proportions of nutrients. In general the animal foods contain the most protein and fats, and vegetable foods are rich in carbohydrates. The chief nutrient of lean meat and fish is protein ; but in medium fat meats the proportion of fat is as large as that of protein,

and in the fatter meats it is larger. Cheese is rich in both protein and fat. Among the vegetable foods, dried beans and peas are especially rich in protein. The proportion in oatmeal is also fairly large, in wheat it is moderate, and in maize meal and rice it is rather small. Gats contain more oil than any of the common cereals, but in none of them is the proportion especially large. The most abundant nutrient in all the cereals is starch, which comprises from two-thirds to three-fourths or more of their total nutritive substance. Cotton-seed is rich in edible oil, and so are olives. Some of the nuts contain fairly large proportions of both protein and fat. The nutrient of potatoes is starch, present in fair proportion. Fruits contain considerable carbohydrates, chiefly sugar. Green vegetables are not of much account as sources of any of the nutrients or energy.

Similar food materials from different sources may also differ considerably in composition. This is especially true of meats. Thus, the leaner portions from a fat animal may contain nearly as much fat as the fatter portions from a lean animal. The data here presented are largely those for American food products, but the available analyses of English food materials indicate that the latter differ but little from the former in composition. The analyses of meats produced in Europe imply that they commonly contain somewhat less fat and more water, and often more protein, than American meats. The meats of English production compare with the American more than with the European meats. Similar vegetable foods from the different countries do not differ so much in composition.

4. Digestibility or Availability of Food Materials. — The value of any food material for nutriment depends not merely upon the kinds and amounts of nutrients it contains, but also upon the ease and convenience with which the nutrients may be digested, and especially upon the proportion of the nutrients that will be

to it. The difference between the corresponding ingredients of the two is commonly considered to represent the amounts of the ingredients digested. Expressed in percentages, these are called coefficients of digestibility. See Table II.

Such a method is not strictly accurate, because the faeces do not consist entirely of undigested food but contain in addition to this the so-called metabolic products, which include the resi- duum of digestive juices not resorbed, fragments of intestinal epithelium, &c. Since there is as yet no satisfactory method of separating these constituents of the excreta, the actual digesti- bility of the food is not determined. It has been suggested that since these materials must

originally come from food, they represent, when expressed in terms of food ingredients, the cost of digestion; hence that the values determined as above explained represent the portion of food available to the body for the build- ing of tissue and the yielding of energy, and what is commonly designated as digestibility should be called availability. Other writers retain the term ” digestibility,” but express the results as ” apparent digestibility,” until more knowledge regarding the metabolic products of the excreta is available and the actual digestibility may be ascertained.

Experimental inquiry of this nature has been very active in recent years, especially in Europe, the United States and Japan; and the results of considerably over 1000 digestion experiments with single foods or combinations of food materials are available. These were mostly with men, but some were with women and with children. The larger part of these have been taken into account in the following estimations of the digestibility of the nutrients in different classes of food materials. The figures here shown are subject to revision as experimental data accumulate. They are not to be taken as exact measures of the digestibility (or availability) of every kind of food in each given class, but they probably represent fairly well the average digestibility of the classes of. food materials as ordinarily utilized in the mixed diet.

5. Fuel Value of Food. — The potential energy of food is commonly measured as the amount of heat evolved when the food is completely oxidized. In the laboratory this is determined by, burning the food in oxygen in a calorimeter. The results;, which are known as the heat of combustion of the food, are

expressed in calories, one calory being the amount of heat necessary to raise the temperature of one kilogram of water one degree centigrade. But it is to be observed that this unit is

Table III. — Estimates of Heats of Combustion and of Fuel Value of Nutrients in Ordinary Mixed Viet.

Nutrients.

Heat of Combustion.

Fuel Value.

One gram of protein One gram of fats . . One gram of carbohydrates

Calories.

5-65 9.40

4-15

Calories.

4-°5

8-93 4-03

employed simply from convenience, and without implication as to what extent the energy of food is converted into heat in the body. The unit employed in the measurement of some other

greater than that which the body will actually derive from it. In the first place, as previously shown, part of the food will not be digested and absorbed. In the second place, the nitrogenous compounds absorbed are not completely oxidized in the body, the residuum being excreted in the urine as urea and other bodies that are capable of further oxidation in the calorimeter. The total heat of combustion of the food eaten must therefore be diminished by the heat of combustion of the oxidizable material rejected by the body, to find what amount of energy is actually available to the organism for the production of work and heat. The amount thus determined is commonly known as the fuel value of food.

Rubner's 1 commonly quoted estimates for the fuel value of the nutrients of mixed diet are, — for protein and carbohydrates 4-1, and for fats 9-3 calories per gram. According to the method of deduction, however, these factors were more applicable to digested than to total nutrients. Atwater 2 and associates have deduced,

Table IV. — Quantities of Available Nutrients and Energy in Daily Food Consumption of Persons in

Different Circumstances.

Nutrients and Energy per Man per

Day.

Number of Studies.

4

Protein.

Fat.

Carbo- hydrates.

Fuel Value.

Persons with Active Work.

Grams.

Grams.

Grams.

Calories.

English royal engineers ….

1

132

79

612

3835

Prussian machinists …..

1

129

107

657

4265

Swedish mechanics …..

5

174

105

693

459°

Bavarian lumbermen . .

3

120

277

702

6015

American lumbermen ….

5

155

327

804

6745

Japanese rice cleaner ….

1

103

11

917

4415

Japanese jinrikshaw runner

1

137

22

1010

5050

Chinese farm labourers in California .

1

132

90

621

3980

American athletes .

19

178

192

525

4740

American working-men’s families

13

156

226

694

5650

Persons with Ordinary Work.

Bavarian mechanics …..

11

112

32

553

3060

Bavarian farm labourers .

5

126

52

526

3200

Russian peasants …..

119

3i

57i

3155

Prussian prisoners …..

1

“7

28

620

332o

Swedish mechanics …..

6

123

75

507

3325

American working-men’s families

69

105

135

426

3480

Persons with Light Work.

American artisans’ families . .

21

93

107

358

2880

English tailors (prisoners)

1

121

37

509

2970

German shoemakers ….

1

99

73

367

2629

Japanese prisoners …..

1

43

6

444

2110

Professional and Business Men.

Japanese professional men.

13

75

15

408

2190

Japanese students …..

8

85

18

537

2800

Japanese military cadets ….

11

98

20

611

3185

German physicians …..

2

121

90

317

2685

Swedish medical students ….

5

117

108

291

2725

Danish physicians …..

1

124

133

242

2790

American professional and business men and

students .....

51

98

125

411

3285

Persons with Little or no Exercise.

Prussian prisoners .....

2

90

27

427

2400

Japanese prisoners .....

1

36

6

360

1725

Inmates of home for aged — Germany

1

85

43

322

2097

Inmates of hospitals for insane — America .

49

80

86

353

2590

Persons in Destitute Circumstances.

Prussian working people ....

13

63

43

372

2215

Italian mechanics . . .

5

70

36

384

2225

American working-men's families

11

69

form of energy might be used instead, as, for example, the foot- ton, which represents the amount of energy necessary to raise one ton through one foot.

The amount of energy which a given quantity of food will produce on complete oxidation outside the body, however, is

from data much more extensive than those available to Rubner, factors for total nutrients somewhat lower than these, as shown

1 Ztschr. Biol. 21 (1885), p. 377.

- Connecticut (Storrs) Agricultural Experiment Station Report

(1899). 73-

in Table III. These estimates seem to represent the best average factors at present available, but are subject to revision as knowledge is extended.

The heats of combustion of all the fats in an ordinary mixed diet would average about 9-40 calories per gram, but as only 05% of the fat would be available to the body, the fuel value per gram would be (9-40X0-95 =) 8-93 calories. Similarly, the average heat of combustion of carbohydrates of the diet would be about 4-15 calories per gram, and as 97% of the total quantity is available to the body, the fuel value per gram would be 4-03. (It is commonly assumed that the resorbed fats and carbo- hydrates are completely oxidized in the body.) The heats of combustion of all the kinds of protein in the diet would average about 5-65 calories per gram. Since about 92% of the total protein would be available to the body, the potential energy of the available protein would be equivalent to (5-65X0-92 =) 5-20 calories; but as the available protein is not completely oxidized allowance must be made for the potential energy of the incom- pletely oxidized residue. This is estimated as equivalent to 1 • 1 5 calories for the 0-92 gram of available protein; hence, the fuel value of the total

protein is (5-20-1-15 =) 4-05 calories per gram. Nutrients of the same class, but from different food materials, vary both in digestibility and in heat of combustion, and hence in fuel value. These factors are therefore not so applicable to the nutrients of the separate articles in a diet as to those of the diet as a whole.

6. Food Consumption. — Much information regarding the food consumption of people in various circumstances in different parts of the world has accumulated during the past twenty years, as a result of studies of actual dietaries in England, Germany, Italy, Russia, Sweden and elsewhere in Europe, in Japan and other oriental countries, and especially in the United States. These studies commonly consist in ascertaining the kinds, amounts and composition of the different food materials consumed by a group of persons during a given period and the number of meals taken by each member of the group, and computing the quantities of the different nutrients in the food on the basis of one man for one day. When the members of the group are of different age, sex, occupation, &c, account must be taken of the effect of these factors on consumption in estimating the value " per man." Men as a rule eat more than women under similar conditions, women more than children, and persons at active work more than those at sedentary occupation. The navvy, for example, who is constantly using up more nutritive material or body tissue to supply the energy required for his muscular work needs more protein and energy in his food than a bookkeeper who sits at his desk all day.

In making allowance for these differences, the various indi- viduals are commonly compared with a man at moderately active muscular work, who is taken as unity. A man at hard muscular work is reckoned at 1-2 times such an individual; a man with light muscular work or a boy 15-16 years old, -9; a man at sedentary occupation, woman at moderately active muscular work, boy 13-14 or girl 15-16 years old, -8; woman at light work, boy 12 or girl 13-14 years old, -7; boy io-n or girl 10-12 years old, -6; child 6-9 years old, -5; child 2-5 years old, -4; child under 2 years, -3. These factors are by no means absolute or final, but are based in part upon experimental data and in part upon arbitrary assumption.

The total number of dietary studies on record is very large, but not all of them are complete enough to furnish reliable data. Upwards of 1000 are sufficiently accurate to be included in statistical averages of food consumed by people in different circumstances, nearly half of which have been made in the United States in the past decade. The number of persons in the indi- vidual studies has ranged from one to several hundred. Some typical results are shown in Table IV.

7. Quantities of Nutrients needed. — For the proper nourish- ment of the body, the important problem is how much protein, fats and carbohydrates, or more simply, what amounts of protein and potential energy are needed under varying circumstances, to build and repair muscular and other tissues and to supply

energy for muscular work, heat and other forms of energy. The answer to the problem is sought in the data obtained in dietary studies with considerable numbers of people, and in metabolism experiments with individuals in which the income and expenditure of the body are measured. From the informa tion thus derived,ˆdifferent investigators have proposed so-called dietary standards, such as are shown in the table below, but unfortunately the experimental data are still insufficient for entirely trustworthy figures of this sort; hence the term ” standard ” as here used is misleading. The figures given are not to be considered as exact and final as that would suggest; they are merely tentative estimates of the average daily amounts of nutrients and energy required. (It is to be especially noted that these are available nutrients and fuel value rather than; total nutrients and energy.) Some of the values proposed by other investigators are slightly larger than these, and others are decidedly smaller, but these are the ones that have hitherto been most commonly accepted in Europe and America.

Table V. — Standards for Dietaries. Available Nutrients and ‘ Energy per Man per Day.

Carbo-

Fuel

Protein.

Fat.

hydrates.

Value.

Voit’s Standards.

Grams. 1

Grams.

Grams.

Calories.

Man at hard work

133

95

437

3270

Man at moderate work

109

53

485

2965

Atwater’s Standards.

Man at very hard

muscular work

161

2

2

5500

Man at hard muscular

work . . .

138

4150

Man at moderately

active muscular work

“5

3400

Man at light to

moderate muscular

work

103

3050

Man at ” sedentary ” or woman at moder-

ately active work

92

2700

Woman at light mus-

cular work, or man

without muscular

exercise

83

2450

8. Hygienic Economy of Food. — For people in good health, there are two important rules to be observed in the regulation of the diet. One is to choose the foods that ” agree ” with them, and to avoid those which they cannot digest and assimilate without harm; and the other is to use such sorts and quantities of foods as will supply the kinds and amounts of nutrients needed by the body and yet to avoid burdening it with superfluous material to be disposed of at the cost of health and strength.

As for the first-mentioned rule, it is practically impossible to give information that may be of more than general application. There are people who, because of some individual peculiarity, cannot use foods which for people in general are wholesome and nutritious. Some

persons cannot endure milk, others suffer if they eat eggs, others have to eschew certain kinds of meat, or are made uncomfortable by fruit; but such cases are exceptions. Very little is known regarding the cause of these conditions. It is possible that in the metabolic processes to which the ingredients of the food are subjected in the body, or even during digestion before the substances are actually taken into the body, com- pounds may be formed that are in one way or another injurious. Whatever the cause may be, it is literally true in this sense that “what is one man’s meat is another man’s poison,” and each must learn for himself what foods ” agree ” with him and what ones do not. But for the great majority of people in health,

1 One ounce equals 28-35 grams.

2 As the chief function of both fats and carbohydrates is to furnish energy, their exact proportion in the diet is of small account. The amount of either may vary largely according to taste, available supply, or other condition, as long as the total amount of both is sufficient, together with the protein to furnish the required energy.

suitable combinations of the ordinary sorts of wholesome food materials make a healthful diet. On the other hand, some foods are of particular value at times, aside from their use for nourish- ment. Fruits and green vegetables often benefit people greatly, not as nutriment merely, for they may have very little actual nutritive material, but because of fruit or vegetable acids or

other substances which they contain, and which sometimes serve a most useful purpose.

The proper observance of the second rule mentioned requires information regarding the demands of the body for food under different circumstances. To supply this information is one purpose of the effort to determine the so-called dietary standards

Table VI. — Amounts of Nutrients and Energy Furnished for One Shilling in Food Materials at Ordinary Prices.

Food Materials as Purchased.

Prices per lb.

One Shilling will buy

Total Food Materials.

Available Nutrients.

Fuel Value.

Protein.

Fat.

Carbo- hydrates.

s. d.

ft.

lb.

ft.

lb.

Calories.

Beef, round .....

10

8|

5

1-20

1-41 2-40

•22 •26 •44

■14

•17 •29

1,155 1,235 2,105

Beef, sirloin .....

10 9 8 5

1-20

1-33 1-50 2-40

•19

•21

•20 •22

1,225 1,360

Beef, rib …..

9

7l

4ˆ

1-33

i-6o

2-67

•19

•19

;:

1,200

Mutton, leg . . . ...

9 5

i-33

2-40

•20 •37

•20 ■35

1,245 2,245

Pork, spare-rib ….

9

7

i-33

171

•17 •22

•31 ■39

1,645 2,110

Pork, salt, fat ….

7 5

1-71 2-40

•03 ■04

1-40 1-97

• •

6,025 8,460

Pork, smoked ham . .

8

4i

1-50 2-67

•20 •36

•48 •85

2,435 4,330

Fresh cod …..

4 3

3-00 4-00

•34

•45

•01 •01

710 945

Salt cod ……

3i

10

3-43

I ‘20

■54 •07

•07 •01

•04

1,370 275

Milk, whole, 4d. a qt.

3d. a qt.

,, 2d a qt.

2

if

1

6-oo 8-oo

12-00

•19 •26

•38

•23 •30 •46

•30 •40 •60

1,915 2,550

3,825

Milk, skimmed, 2d. a qt. .

1

I2-O0

•40

•03

■61

2,085

Butter

1 6

1 3 1

•67

■80

I -00

•01 •01 •01

•54 ■64 •81

2,320 2,770

3,46o

Margarine …..

4

3-00

2-37

10,080

Eggs, 2s. a dozen …. ,, 15s. a dozen …. ,, is. a dozen ….

1 4 1

8

■75

I-OO

1-50

•10

•13 •19

•07 •09 •13

475 635 950

Cheese ……

8 7 5

1-50 171 2-40

•38 •43 •60

•48 •55

•77

•04 •04 •06

2,865 3,265 4,585

Wheat bread …..

if

1067

•76

•13

5-57

12,421

Wheat flour …..

If ij

7-64

8-i6

•67 •72

•07 ■07

5-63

6-oi

12,110 12,935

Oatmeal …..

If

l|

8-39

8-i6

i-ii

1-08

•54 •53

5-54 5-39

14.835

H,430

Rice

if

6-86

•45

•02

5-27

10,795

Potatoes …..

of o\

18-00 24-00

•25 •34

•02 •02

270 3 60

5,605 7,470

Beans ……

O 2

6-oo

1-05

■10

3-47

8,960

Sugar

I 1

1 6-86

mentioned above. It should be observed, however, that these are generally more applicable to the proper feeding of a group or class of people as a whole than for particular individuals in this class. The needs of individuals will vary largely from the average in accordance with the activity and individuality. Moreover, it is neither necessary nor desirable for the individual to follow any standard exactly from day to day. It is requisite only that the average supply shall be sufficient to meet the demands of the body during a given period.

The cooking of food and other modes of preparing it for consumption have much to do with its nutritive value. Many materials which, owing to their mechanical condition or to some other cause, are not particularly desirable food materials in their natural state, are quite nutritious when cooked or other- wise prepared for consumption. It is also a matter of common experience that well-cooked food is wholesome and appetizing, whereas the same material poorly prepared is unpalatable. There are three chief purposes of cooking; the first is to change the mechanical condition of the food. Heating changes the structure of many food materials very materially, so that they may be more easily chewed and brought into a condition in which the digestive juices can act upon them more freely, and in this way probably influencing the ease and thoroughness of digestion. The second is to make the food more appetizing by improving the appearance or flavour or both. Food which is attractive to the eye and pleasing to the palate quickens the flow of saliva and other digestive juices and thus aids digestion. The third is to kill, by heat, disease germs, parasites or other dangerous organisms that may be contained in food. This is often a very important matter and applies to both animal and vegetable foods. Scrupulous neatness should always be observed in storing, handling and serving food. If ever cleanliness is desirable it must be in the things we eat, and every care should be taken to ensure it for the sake of health as well as of decency. Cleanliness in this connexion means not only absence of visible dirt, but freedom from undesirable bacteria and other minute organisms and from worms and other parasites. If food, raw or cooked, is kept in dirty places, peddled from dirty carts, prepared in dirty rooms and in dirty dishes, or exposed to foul air, disease germs and other offensive

and dangerous substances may easily enter it.

9. Pecuniary Economy of Food. — Statistics of economy and of cost of living in Great Britain, Germany and the United States show that at least half, and commonly more, of the income of wage-earners and other people in moderate circumstances is expended for subsistence. The relatively large cost of food, and the important influence of diet upon health and strength, make a more widespread understanding of the subject of dietetics very desirable. The maxim that ” the best is the cheapest ” does not apply to food. The ” best ” food, in the sense of that which is the finest in appearance and flavour and which is sold at the highest price, is not generally the most economical.

The price of food is not regulated largely by its value for nutriment. Its agreeableness to the palate or to the buyer’s fancy is a large factor in determining the current demand and market price. There is no more nutriment in an ounce of protein or fat from the tender-loin of beef than from the round or shoulder. The protein of animal food has, however, some advantage over that of vegetable foods in that it is more thoroughly, and perhaps more easily, digested, for which reason it would be economical to pay somewhat more for the same quantity of nutritive material in the animal food. Furthermore, animal foods such as meats, fish and the like, gratify the palate as most vegetable foods do not. For persons in good health, foods in which the nutrients are the most expensive are like costly articles of adornment. People who can well afford them may be justified in buying them, but they are not economical. The most economical food is that which is at the same time most healthful and cheapest.

The variations in the cost of the actual nutriment in different food materials may be illustrated by comparison of the amounts of nutrients obtained for a given sum in the materials as bought at ordinary market prices. This is done in Table VI., which show? the amounts of available nutrients contained in the quan-

tities of different food materials that may be purchased for one shilling at prices common in England.

When proper attention is given to the needs of the body for food and the relation between cost and nutritive value of food materials, it will be found that with care in the purchase and skill in the preparation of food, considerable control may be had over the expensiveness of a palatable, nutritious and healthful diet.

Authorities. — Composition of Foods: — Konig, Chemie der

menschlichen Nahrungs- und Genussmitiel; Atwater and Bryant, ” Composition of American Food Materials,” Bui. 28, Office of Experiment Stations, U.S. Department of Agriculture. Nutrition and Dietetics: — Armsby, Principles of Animal Nutrition; Lusk, The Science of Nutrition; Burney Yeo, Food in Health and Disease; Munk and Uffelmann, Die Ernahrung des gesunden und kranken Menschen ; Von Leyden, Erndhrungstherapie und Diatetik ; Dujardin- Beaumetz, Hygiene alimentaire; Hutchison, Food and Dietetics; R. H. Chittenden, Physiological Economy in Nutrition(igoˆ) , Nutrition of Man (1907) ; Atwater, ” Chemistry and Economy of Food,” Bui. 21, Office of Experiment Stations, U.S. Department of Agriculture. See also other Bulletins of the same office on composition of food, results of dietary studies, metabolism experiments, &c, in the United States. General Metabolism: — Voit, Physiologie des allgemeinen Stojf- wechsels und der Ernahrung; Hermann, Handbuch der Physiologie, Bd. vi. ; Von Noorden, Pathologie des Stoffwechsels; Schafer, Text- Book of Physiology, vol. i. ; Atwater and Langworthy, ” Digest of Metabolism Experiments,” Bull. 45, Office of Experiment Stations, U.S. Department of Agriculture. (W. O. A.; R. D. M.)

DIETRICH, CHRISTIAN WILHELM ERNST (171 2-1 774), German painter, was born at Weimar, where he was brought up early to the profession of art by his father Johann George, then painter of miniatures to the court of the duke. Having been sent to Dresden to perfect himself under the care of Alexander Thiele, he had the good fortune to finish in two hours, at the age of eighteen, a picture which attracted the attention of the king of Saxony. Augustus II. was so pleased with Dietrich’s readiness of hand that he gave him means to study abroad, and visit in succession the chief cities of Italy and the Netherlands. There he learnt to copy and to imitate masters of the previous century with a versatility truly surprising. Winckelmann, to whom he had been recommended, did not hesitate to call him the Raphael of landscape. Yet in this branch of his practice he merely imitated Salvator Rosa and Eveidingen. He was more successful in aping the style of Rembrandt, and numerous examples of this habit may be found in the galleries of St Petersburg, Vienna and Dresden. At Dresden, indeed, there are pictures acknowledged to be his, bearing the fictitious dates of 1636 and 1638, and the name of Rembrandt. Among Dietrich’s cleverest reproductions we may account that of Ostade’s manner in the ” Itinerant Singers ” at the National Gallery. His skill, in catching the character of the later masters of Holland is shown in candle- light scenes, such as the ” Squirrel and the Peep-Show ” at St Petersburg, where we are easily reminded of Godfried Schalcken. Dietrich tried every branch of art except portraits, painting

Italian and Dutch views alternately with Scripture scenes and still life. In 1 741 he was appointed court painter to Augustus III. at Dresden, with an annual salary of 400 thalers (£60) , conditional on the production of four cabinet pictures a year. This condition, no doubt, accounts for the presence of fifty-two of the master's panels and canvases in one of the rooms at the Dresden museum. Dietrich, though popular and probably the busiest artist of his time, never produced anything of his own; and his imitations are necessarily inferior to the originals which he affected to copy. His best work is certainly that which he gave to engravings. A collection of these at the British Museum, produced on the general lines of earlier men, such as Ostade and Rembrandt, reveal both spirit and skill. Dietrich, after his return from the Peninsula, generally signed himself " Dietericij," and with this signature most of his extant pictures are inscribed. He died at Dresden, after he had successively filled the important appoint- ments of director of the school of painting at the Meissen porcelain factory and professor of the Dresden academy of arts.

DIETRICH OF BERN, the name given in German popular poetry to Theodoric the Great. The legendary history of Dietrich differs so widely from the life of Theodoric that it has been suggested that the two were originally unconnected. Medieval

chroniclers, however, repeatedly asserted the identity of Dietrich and Theodoric, although the more critical noted the anachronisms involved in making Ermanaric (d. 376) and Attila (d. 453) con- temporary with Theodoric (b. 455). That the legend is based on vague historical reminiscences is proved by the retention of the names of Theodoric (Thiuda-reiks, Dietrich) and his father Theudemir (Dietmar), by Dietrich's connexion with Bern (Verona) and Raben (Ravenna) . Something of the Gothic king's character descended to Dietrich, familiarly called the Bemer, the favourite of German medieval saga heroes, although his story did not leave the same mark on later German literature as did that of the Nibelungs. The cycle of songs connected with his name in South Germany is partially preserved in the Heldenbuch (q.v.) in Dietrich's Flucht, the Rabenschlacht and Alpharts Tod; but it was reserved for an Icelandic author, writing in Norway in the 13th century, to compile, with many romantic additions, a consecutive account of Dietrich. In this Norse prose redaction, known as the Vilkina Saga, or more correctly the Thidrekssaga, is incorporated much extraneous matter from the

Nibelungen and Wayland legends, in fact practically the whole of south German heroic tradition.

There are traces of a form of the Dietrich legend in which he was represented as starting out from Byzantium, in accordance with historical tradition, for his conquest of Italy. But this early disappeared, and was superseded by the existing legend, in which, perhaps by an " epic fusion " with his father Theudemir, he was associated with Attila, and then by an easy transition with Ermanaric. Dietrich was driven from his kingdom of Bern by his uncle Ermanaric. After years of exile at the court of Attila he returned with a Hunnish army to Italy, and defeated Ermanaric in the Rabenschlacht, or battle of Ravenna. Attila's two sons, with Dietrich's brother, fell in the fight, and Dietrich returned to Attila's court to answer for the death of the young princes. This very improbable renunciation of the advantages of his victory suggests that in the original version of the story the Rabenschlacht was a defeat. In the poem of Ermenrichs Tod he is represented as slaying Ermanaric, as in fact Theodoric slew Odoacer. ' ' Otacher " replaces Ermanaric as his adversary in the Hildebrandslied; which relates how thirty years after the earlier attempt he reconquered his Lombard kingdom. Dietrich's long residence at Attila's court represents the youth and early man- hood of Theodoric spent at the imperial court and fighting in the Balkan peninsula, and, in accordance with epic custom, the period of exile was adorned with war-like exploits, with fights with dragons and giants, most of which had no essential connexion with the cycle. The romantic poems of Konig Laurin, Sigenot, Eckenlied and Virginal are based largely on local traditions originally independent of Dietrich. The court of Attila (Etzel) was a ready bridge to the Nibelungen legend. In the final catas- trophe he was at length compelled, after steadily holding aloof from the combat, to avenge the slaughter of his Amelungs by the Burgundians, and delivered Hagen bound into the hands of Kriemhild. The flame breath which anger induced from him shows the influence of pure myth, but the tales of his demonic origin and of his being carried off by the devil in the shape of a black horse may safely be put down to the clerical hostility to Theodoric's Arianism.

Generally speaking, Dietrich of Bern was the wise and just monarch as opposed to Ermanaric, the typical tyrant of Germanic legend. He was invariably represented as slow of provocation and a friend of peace, but once roused to battle not even Siegfried could withstand his onslaught. But probably Dietrich's fight with Siegfried in Kriemhild's rose garden at Worms is a late addition to the Rosengarten myth. The chief heroes of the Dietrich cycle are his tutor and companion in arms, Hildebrand (see Hildebrand, Lay of), with his nephews the Wolfings

Alphart and Wolf hart; Wittich, who renounced his allegiance to Dietrich and slew the sons of Attila; Heime and Biterolf.

The contents of the poems dealing with the Dietrich cycle are summarized by Uhland in Schriften zur Geschichte der Dichtung und Sage (Stuttgart, 1873). The Thidrekssaga (ed. C. Unger, Christiania, 1853) is translated into German by F. H. v. der Hagen in Altdeutsche und altnordische Heldensagen (vols. i. and ii. 3rd ed., Breslau, 1872).

A summary of it forms the concluding chapter of T. Hodgkin's Theodoric the Goth (1891). The variations in the Dietrich legend in the Latin historians, in Old and Middle High German literature, and in the northern saga, can be studied in W. Grimm's Deutsche Heldensage (2 nd ed. , Berlin, 1867). There is a good account in English in F. E. Sandbach's Heroic Saga-cycle of Dietrich of Bern (1906), forming No. 15 of Alfred Nutt's Popular Studies in Mythology, and another in M. Bentinck Smith's translation of Dr O. L. Jinczek's Deutsche Heldensage (Northern Legends, London, 1902). For modern German authorities and commentators see B. Symons, " Deutsche Heldensage " in H. Paul's Grd. d. german. Phil. (Strassburg, new ed,, I 9°S) I also Goedeke, Geschichte der deutschen Dichtung (i. 241-246).

DIEZ, FRIEDRICH CHRISTIAN (1794-1876), German philologist, was born at Giessen, in Hesse-Darmstadt, on the 15th of March 1794. He was educated first at the gymnasium and then at the university of his native town. There he studied classics under Friedrich Gottlieb Welcker (1784-1868) who had just returned from a two years' residence in Italy to fill the chair of archaeology and Greek literature. It was Welcker who kindled in him a iove of Italian poetry, and thus gave the first bent to his genius. In 18 13 he joined the Hesse corps as a volunteer and served in the French campaign. Next year he returned to his books, and this short taste of military service was the only break in a long and uneventful life of literary labours. By his parents' desire he applied himself for a short time to law, but a visit to Goethe in 1818 gave a new direction to his studies, and determined his future career. Goethe had been reading Raynouard's Selections from the. Romance Poets, and advised the young scholar to explore the rich mine of Provencal literature which the French savant had opened up. This advice was eagerly followed, and henceforth Diezdevoted himself to Romance literature. He thus became the founder of Romance philology. After supporting himself for some years by private teaching, he removed in 1822 to Bonn, where he held the position of privat-docent. In 1823 he published his first work, An Introduction to Romance Poetry; in the following year appeared The Poetry of the Troubadours, and in 1829 The Lives and Works of the Troubadours. In

1830 he was called to the chair of modern literature. The rest of his life was mainly occupied with the composition of the two great works on which his fame rests, the Grammar of the Romance Languages (1836-1844), and the Lexicon of the Romance Languages — Italian, Spanish and French (1853); in these two works Diez did for the Romance group of languages what Jacob Grimm did for the Teutonic family. He died at Bonn on the 29th of May 1876.

The earliest French philologists, such as Perion and Henri Estienne, had sought to discover the origin of French in Greek and even in Hebrew. For more than a century Menage's Etymological Dictionary held the field without a rival. Considering the time at which it was written (1650), it was a meritorious work, but philology was then in the empirical stage, and many of Menage's derivations (such as that of " rat " from the Latin " mus," or of " haricot " from " faba ") have since become bywords among philologists. A great advance was made by Raynouard, who by his critical editions of the works of the Troubadours, published in the first years of the 19th century, laid the foundations on which Diez afterwards built. The difference between Diez's method and that of his predecessors is well stated by him in the preface to his dictionary. In sum it is the difference between science and guess-work. The scientific method is to follow implicitly the discovered principles and rules of phonology, and not to swerve a foot's breadth from tlrem unless plain, actual exceptions shall justify it; to follow the genius of the language, and by cross- questioning to elicit its secrets; to gauge each letter and estimate the value which attaches to it in each position ; and lastly to possess the true philosophic spirit which is prepared to welcome any new fact, though it may modify or upset the most cherished theory. Such is the historical method which Diez pursues in his grammar and dictionary. To collect and arrange facts is, as he tells us, the sole secret of his success, and he adds in other words the famous apophthegm of Newton, " hypotheses non fingo." The introduction to the grammar consists of two parts : — the first discusses the Latin, Greek and Teutonic elements common to the Romance languages; the second treats of the six dialects separately, their origin and the elements peculiar to each. The grammar itself is divided into four books, on phonology, on flexion, on the formation of words by composition and derivation, and on syntax.

His dictionary is divided into two parts. The first contains words common to two at least of the three principal groups of Romance: — Italian, Spanish and Portuguese, and Provencal and French. The Italian, as nearest the original, is placed at the head of each article.

The second part treats of words peculiar to one group. There is no separate glossary of Wallachian.

Of the introduction to the grammar there is an English translation by C. B. Cayley. The dictionary has been published in a remodelled form for English readers by T. C. Donkin.

DIEZ, a town of Germany, in the Prussian province of Hesse- Nassau, romantically situated in the deep valley of the Lahn, here crossed by an old bridge, 30 m. E. from Coblenz on the railway to Wetzlar. Pop. 4500. It is overlooked by a former castle of the counts of Nassau-Dillenburg, now a prison. Close by, on an eminence above the river, lies the castle of Oranien- stein, formerly a Benedictine nunnery and now a cadet school, with beautiful gardens. There are a Roman Catholic and two Evangelical churches. The new part of the town is well built and contains numerous pretty villa residences. In addition to extensive iron-works there are sawmills and tanneries. In the vicinity are Fachingen, celebrated for its mineral waters, and the majestic castle of Schaumburg belonging to the prince of WaldeckrPyrmont.

DIFFERENCES, CALCULUS OF {Theory of Finite Differences), that branch of mathematics which deals with the successive differences of the terms of a series.

1. The most important of the cases to which mathematical methods can be applied are those in which the terms of the series are the values, taken at stated intervals (regular or irregular), of a continuously varying quantity. In these cases the formulae of finite differences enable certain quantities, whose exact value depends on the law of variation {i.e. the law which governs the relative magnitude of these terms) to be calculated, often with great accuracy, from the given terms of the series, without explicit reference to the law of variation itself. The methods used may be extended to cases where the series is a double series (series of double entry), i.e. where the value of each term depends on the values of a pair of other quantities,

2. The first differences of a series are obtained by subtracting from each term the term immediately preceding it. If these are treated as terms of a new series, the first differences of this series are the second differences of the original series; and so on. The successive differences are also called differences of the first, second, . . . order. The

differences of successive orders are most conveniently arranged in successive columns of a table thus: —

Term.

1st Diff.

2nd Diff.

3rd Diff.

4th Diff.

a b c d e

b—a c-b d—c e—d

c — 2b--a d — 2c--b e—2d--c

& — & + $ > — a e-^d + y-b

e— $d--6c — 46 + a

Algebra of Differences and Sums. 3. The formal relations between the terms of the series and the differences may be seen by comparing the arrangements (A) and (B) in fig. 1. In (A) the various terms and differences are the same as in

§2, but placed differently. In (B) (^ we take a new series of terms a, ft 7, S, commencing with the same term a, and take the successive sums of pairs of terms, instead of the successive I- differences, but place them to the left instead of to the right. It will be seen, in the first F IG – !• place, thit the successive terms

in (A), reading downwards to the right, and the successive terms in (B), reading downwards to the left, consist each of a series of terms whose coefficients follow the binomial law ; i. e. the coefficients in b — a, c — 2b + a, d—y + ^b—a, . . . and in a + ft 0 + 2/3 + 7, a + 3/3 + 37 + 5, ■ • • a re respectively the same as in y—x, (y—x) 2 , (y —x) 3 , . . . and in x + y, (x + y) 2 , {x + y) 3 , . . . In the second place, it will be seen that the relations between the various terms in (A) are identical with the relations between the similarly placed terms in (B); e.g. 0 + y is the difference of a + 2/3 + 7 and a + ft just as c — b is the difference of c and b: and d—c is the sum of c — b and d— 2C + b, just as /3 + 27 + S is the sum of /S + 7 and 7 + S. Hence if we take ft y, S, ... of (B) as being the same as b — a, c — 26 + 0, d— 3c + 36— a, .

. . of (A), all corresponding terms in the two diagrams will be the same.

Thus we obtain the two principal formulae connecting terms and differences. If we provisionally describe 6— a, c— 2&+a, . . . as the

7), then

first, second, . . . differences of the particular term a (L) the reth difference of a is

that this series is . . . S«n_i, 2«„, 2a n+ i .... The suffixes are chosen so that we may have AXu„ = u n , whatever n may be; and therefore (§4) 2w„ may be regarded as being the sum of the terms of the series up to and including w„_i. Thus if we write 2«„_i = C+tt„_2, where C is any constant, we shall have

2tt„ =ZM„_i+A2tt„_i =C+U n -2+U n -l, . , 2M„ + i = C +W„_2+«„_i + « n ,

and so on. This is true whatever C may be, so that the knowledge of . . . tt„_i, «„,... gives us no knowledge of the exact value of 2m»; in other words, C is an arbitrary constant, the value of which must be supposed to be the same throughout any operations in which we are concerned with values of 2m corresponding to different suffixes.

There is another symbol E, used in conjunction with u to denote the next term in the series. Thus Ew„ means u„+i, so that Ett„ = tt„+Att„.

10. Corresponding to the advancing-difference notation there is a receding-difference notation, in which m„ + i-m„ is regarded as a difference of w„+i, and may be denoted by A'w„+i, and similarly Un +i— 2tt„+tt„_i may be denoted by A' 2 tt„ + i. This notation is only required for certain special purposes, and the usage is not settled

(§I9(H.)). . ' . ,

11. The central -difference notation depends on treating u n+ i— 2u„— m„_i as the second dfference of u n , and therefore as corresponding to the value x n ; but there is no settled system of notation. The following seems to be the most convenient. Since u„ is a

function of x n , and the second difference Un+z-2U n+i +u„ is a func- tion of ac+i, the first difference u„+i-u„ must be regarded as a func- tion of *„+$, i.e. of i(x n +x„ l). We therefore write u n i-u„ = Su n+ i, and each difference in the table in § 9 will have the same suffix as the value of x in the same horizontal line; or, if the difference is of an odd order, its suffix will be the means of those of the two nearest values of x. This is shown in the table below.

In this notation, instead of using the symbol E, we use a symbol m to denote the mean of two consecutive values of u, or of two consecu- tive differences of the same order, the suffixes being assigned on the same principle as in the case of the differences. Thus

iM n+ i = i(u n u n i), n&u n = i(5uˆ-i+du n+ i), &c.

If we take the means of the differences of odd order immediately above and below the horizontal line through any value of x, these means, with the differences of even order in that line, constitute the central differences of the corresponding value of u. Thus the table of central differences is as follows, the values obtained as means being placed in brackets to distinguish them from the actual differences : —

X

U

1st Diff.

2nd Diff.

3rd Diff.

4th Diff.

X„-2

U n -2

(m8w„_2)

5 2 M„_2

(m5 3 w„-2

S 3 W„_?

S'Un-l . . .

X n -\

«n-l

(m«m„-i)

S 2 W»-1

(m« 3 m»-i)

8%„_i . . .

Xn

M„

(m5k»)

S*u n

(fS’Un) S 3 «n + 5

«%„ . . .

Xn + l

Mrn-l

(lidUn + l)

« 2 «„ + l

(liS 3 U n + 1)

S 3 «» + i

S’Un + 1 . . .

Xn + Z

«» + !

(/x5tt„ + 2)

« 2 ttn + 2

(m« 3 M„ + 2)

5%„ + 2 . . .

Similarly, by taking the means of consecutive values of u and also of consecutive differences of even order, we should get a series of terms and differences central to the intervals xˆ-z to x„-i, tf»_i to

Kn, • ■ •

The terms of the series of which the values of u are the first differences are denoted by

then

0« n *i* = *C* + «*n-2* + *Kn-l, !*+«„, &*C,*

,nd also

fJLZ-U n -i + *u n* , &*C,*

C being an arbitrary constant which must remain the same through- out any series of operations.

Operators and Symbolic Methods.

12. There are two further stages in the use of the symbols A, 2, i,

*(i.) Instead of treating Au as a func'tion of x, so that Au„ means (Am),,, we may regard A as denoting an operation performed on u, and take iitf., *s meaning A.u„. This applies to the other symbols*

E, 6, &c, whether taken simply or in combination. Thus AE«n means that we first replace u n by u„+i, and then replace this by

: Wn+2 _ "n+l-

(ii.) The operations A, E, 6, and /, whether performed separately or in combination, or in combination also with numerical multipliers and with the operation of differentiation denoted by D(sd/ix), follow the ordinary rules of algebra: e.g. A(u n +v„)=Au„+Av n , ADm„ = DA«„, &c. Hence the symbols can be separated from the functions on which the operations are performed, and treated as if they were algebraical quantities. For instance, we have*

E.M„ = M M . 1 = M„+A« B =I.tt„+A.«„,

so that we may write E = i-fA\ or A = E-i. The first of these is nothing

more than a statement, in concise form, that if we take two quantities, subtract the first from the second, and add the result to the first, we get the second. This seems almost a truism. But, tf we deduce E" = (i+A) n , A" = (E-i) n , and expand by the binomial theorem and then operate on uo, we get the general formulae

Un = tto+nAKo+ˆ— -A i u +

+A n «o,

A n «o = u„ – nuˆ + –

-M„-2 + ... + (- l) n «o,

1.2

which are identical with the formulae in (ii.) and (i.) of § 3.

(iii.) What has been said under (ii.) applies, withcertain reservations, to the operations 2 and

Applications to Algebraical Series.

13. Summation of Series. — If « r denotes the (r-|-i)th term of a series, and if iv is a function of r such that Av r = u r for all integral values of r, then the sum of the terms u m , « m+ i, ...«„ is t'n+i-i'm. Thus the sum of a number of terms of a series may often be found by inspection, in the same kind of way that an integral is found.

14. Rational Integral Functions. — (i.) If u, is a rational integral function of r of degree p, then Aw, is a rational integral function of r of degree p-i.

(ii.) A particular case is that of a factorial, i.e. a product of the form (r+a +i) (r+a+2) . . . (r+b), each factor exceeding the pre- ceding factor by 1. We have

A. (.r+a+i) (r+a+2) . . . (r+b) = (b-a).(r+a+2) . . . (r+b), whence, changing a into a-i,

Z(r+a+i) (r+a+2) . . . (r+b)=const. + (r+a)(r+a+i) . . .'

(r+b)/(b-a + i).

A similar method can be applied to the series whose (r-fi)th term is of the form i/(f-+a + i) (r+a+2) . . . (r+b).

(iii.) Any rational integral function can be converted into the sum of a

number of factorials; and thus the sum of a series of which such a function is the general term can be found. For example, it may be shown in this way that the sum of the pth powers of the first » natural numbers is a rational integral function of n of degree p+i, the coefficient of n p+1 being l/(p + l).

15. Difference -equations. — The summation of the series . . . u n 2+u„-i +u„ is a solution of the difference-equation A»„ = «„ + i, which may also be written (E-i)n„ = w„ + i. This is a simple form of difference-equation. There are several forms which have been investigated; a simple form, more general than the above, is the linear equation with constant coefficients —

Vn+m+aiV„+m-l+a2V n m-i ■ ■ ■ +a m v„ = N,

where «i, a a m are constants, and N is a given function of n.

This may be written

(E m +a 1 E"- i + . . . +a„K = N or

(E-/>i) (E-p 2) . . . (E-p m) i/ n = N. The solution, if p u pi, ... p m are all different, is »„ = Ci^>i"+ C t p 2 n + ^. . . C m p m n _'Vn, where Ci, C2 . . . are constants, and v„ = V„ is any one solution of the equation. The method of finding a value for V„ depends on the form of N. Certain modifications are required when two or more of the p's are equal.

It should be observed, in all cases of this kind, that, in describing Ci, C2 as " constants," it is meant that the value of any one, as Ci, is the same for all values of n occurring in the series. A " constant " may, however, be a periodic function of n.

Applications to Continuous Functions.

16. The cases of greatest practical importance are those in which u is a continuous function of x. The terms u\, Ut . . . of the series then represent the successive values of u corresponding to x = x t , Xi . . . The important applications of the theory in these cases are to (i.) relations between differences and differential coefficients, (ii.)

interpolation, or the determination of intermediate values of w, and (iii.) relations between sums and integrals.

17 Starting from any pair of values x and «o, we may suppose the interval h from x„ to xi to be divided into q equal portions It we suppose the corresponding values of w to be obtained, and their differences taken, the successive advancing differences ot wo being denoted by duo, d'uo . . ., we have (§ 3 (11.))

Ui = Uo+qdui> + q '^~ d%o + ...

When is made indefinitely great, this (writing /(*) for u) becomes Taylor s Theorem (Infinitesimal Calculus)

., . h? f(x+h) " * ■ 1 "' s '

which, expressed in terms of operators, is

■f(x)+hf(x y+£-r(.x)+

E-i+ *D+ ^D'+ T ^D'+

This gives the relation between A and D.

= e* D . Also we have

u 1 = tH+2qdu,+ 2 ^ 2(l I 3'«o+

1.2

ia s « +

and, if p is any integer,

u P U=uo+pdu + ££^ld* Uo + ...

From these equations u P U could be expressed in terms of « , «i, m, . . . ; this is a particular case of interpolation (g.t).).

18. Differences and Differential Coefficients. — The various formulae are most quickly obtained by symbolical methods; i.e. by dealing with the operators A, E, D, . . . as if they were algebraical quantities. Thus the relation E = e*o (§ I7) gi ves

H> = log.(l +A)=A-§A« + JA».

h (-fa) =Awo-iA 2 «c + 3A 3 M .

The formulae connecting central differences with differential coefficients are based on the relations f» = coshpD = J(eS AD +e-i hD), 8 = 2 sinh

ˆAD = e4 AD — e~i hD , and may be grouped as follows: —

1*0 = Mo

nSu = (hD + ih 3 D 3 + T hh 6 D 5 + . . .)«„ Pu < 1 = (h*D i hk*D* Ji Uh > D < i + . . .)«o tf > uo = (h°D 3 + lh*D ! > + • • -)«o

„„. = (i + lˆD s + s hˆD < + «kˆ 6 D 6 + • tajˆAD + jfcfc'D' + f ˆ'0' + • • .)«} ˆ 2 «j = (/t 2 D 2 AˆD* If H ( )ˆD 8 + . . .)«}

«'«. = (/!»D'P 6 D*. . .)«! M« 4 «i = (A 4 D 1 + 2 7 ˆ 6 D« + . . .)«■

1*0 = 1*0

ftDMo = (M«-|/"« 3 + s , l)J«S 5 – • • •)«o ft'D J «o = (8 , – J 1 8 * 4 + iiS«'- . . .)«o

fc 3 D 3 Mo = (ˆ»-ˆS 6 + . . .)«o

ft«D**o = (a 4 -i*' + . . .)«o

)«5

fcDttj = (8-5 1 4 S 3 + (.i S 6 – . . .)«J

ft'D s «t = G*« 2 – A/ˆ + sVeVS 5 – • . .)«J A 3 D 3 «j = (a 3 i8 5 + . . .)«j . A < D 4 »J = (jU««-ftMS , + ■ •■)«}

)«1

When w is a rational integral function of x, each of the above series is a terminating series. In other cases the series will be an infinite one, and may be divergent; but it may be used for purposes of approximation up to a certain point, and there will be a " remainder," the limits of whose magnitude will be determinate.

19. Sums and Integrals.— The relation between a sum and an integral is usually expressed by the Euler-Maclaurin formula. The principle of this formula is that, if u m and « m + i, are ordinates of a curve, distant h from one another, then for a first approximation to the area of the curve between u m and «m + i we have p(tt m w m i),

VIII. 8

r

J X

and the difference between this and the true value of the area can be expressed as the difference of two expressions, one of which is a function of x m , and the other is the same function of Xm+L Denoting these by (x m) and

udx = ih(u m +Um+i) +{x m+1)~(x m) .

Xm

Adding a series of similar expressions, we find

*/" udx = h{hu m +Um+l+Um+i+ ■ . • +««-l+KI+ *W" {*m)- Xm*

The function i>{x) can be expressed in terms either of differential coefficients of u or of advancing or central differences; thus there are three formulae.

(i.) The Euler-Maclaurin formula, properly so called, (due inde- pendently to Euler and Maclaurin) is

/

udx-

dx

dUn –

*dx**

= h.un—\h- + Ti

B

6! n dx' T

Bi , dunj_ B 2 , , d 3 u„ ~2\ lh dx + 4\ n dx°~ where Bi, B 2 , B 3 . . . are Bernoulli's numbers.

(ii.) If we express differential coefficients in terms of advancing, differences, we get a theorem which is due to Laplace : —

1 f.*

udx =iiUo)^i (Am„-Awo) +j\ (A 2 tt„-A 2 tto) xo – tV (A 3 m„ – A 3 a) + t! j (A 4 «» – A 4 tt„)

For practical calculations this may more conveniently be written

1 f Xn

r 1 «JSA 3 Mi)- . . .)

- *J Xo +J 5 (A'«„-|A' 2 «, l + ˆA' 3 «„- . . .),*

where accented differences denote that the values of « are read back- wards from u n ; i.e. A'u„ denotes «„_i-«„, not (as in § io)m„-m,i_i. (iii.) Expressed in terms of central differences this becomes

1 C Xn

t I udx=n

){u„-Ud).

(iv.) There are variants of these formulae, due to taking hu m+ i as the first approximation to the area of the curve between u m and m„+i; the formulae involve the sum «5+«3+ ■•• +«n-Jsa-(«n-«o) (see Mensuration).

20. The formulae in the last section can be obtained by symbolical methods from the relation

-Uo) – iˆli&Un + ˆliˆUn-. . .

f 1 i 5 ju8Mo-?yoM5 3 Mo+ •••. = /x(

jif udx =T D ~ lu =m' u –

Thus for central differences, if we write = %hD, we' have /= cosh 0, 8 = 2 sinh 0,*

sinh 0=0 cosh fl/(l+J sinh V-,!j sinh 4 6+fiiˆ sinh 6 0- . . .).

References. — There is no recent English work on the theory of finite differences as a whole. G. Boole's Finite Differences (1st ed., i860, 2nd ed., edited by J. F. Moulton, 1872) is a comprehensive treatise, in which symbolical methods are employed very early. A. A. Markoff's Differenzenrechnung (German trans., 1896) contains general formulae. (Both these works ignore central differences.) Encycl. der math. Wiss. vol. i. pt. 2, pp. 919-935, may also be con- sulted. An elementary treatment of the subject will be found in many text-books, e.g. G. Chrystal's Algebra (pt. 2, ch. xxxi.). A. W. Sunderland, Notes on Finite Differences (1885), is intended for. actuarial students. Various central-difference formulae with

refer- ences are given in Proc. Lond. Math. Soc. xxxi. pp. 449-488. For other references see Interpolation. (W. F. Sh.)

DIFFERENTIAL EQUATION, in mathematics, a relation be- tween one or more functions and their differential coefficients. The subject is treated here in two parts: (1) an elementary introduction dealing with the more commonly recognized types of differential equations which can be solved by rule; and (2) the general theory.

Part I. — Elementary Introduction.

Of equations involving only one independent variable, x (known as ordinary differential equations), and one dependent variable, y, and containing only the first differential coefficient dy/dx (and there- fore said to be of the first order), the simplest form is that reducible to the type

dyldx=f{x)IF(y), leading to the result fF{y)dy—ff{x)dx = A, where A is an arbitrary constant; this result is said to solve the differential equation, the problem of evaluating the integrals belonging to the integral calculus.

11

Another simple form is

dy/dx+yP=Q, where P, Q are functions of x only; this is known as the linear equaˆ ition, since it contains y and dyjdx only to the first degree. If fPdx = u, we clearly have

|(X<)=«(g+Py)=e«Q,*

so that y = e~~ u (fe u Qdx+A) solves the equation, and istheonly possible solution, A being an arbitrary constant. The rule for the solution of the linear equation is thus to multiply the equation by e", where u=fPdx.

A third simple and important form is that denoted by

where p is an abbreviation for dy/dx; this is known as Clairaut's form. By differentiation in regard to x it gives

where

thus, either, (i.) dpldx = o, that is, p is constant on the curve satis- fying the differential equation, which curve is thus any one of the straight lines y

= ex +/(c), where c is an arbitrary constant, or else, (ii.) x+f'(p) =o; if this latter hypothesis be taken, and p be eliminated between x--f(p) =o and y = px+f(p), a relation connecting x and y, not containing an arbitrary constant, will be found, which obviously represents the envelope of the straight lines y — ex +/(c).

In general if a differential equation (x, y, dyjdx) =o be satisfied by any one of the curves F(x, y, e) = o, where e is an arbitrary constant, it is clear that the envelope of these curves, when existent, must also satisfy the differential equation; for this equation prescribes a relation connecting only the co-ordinates Xt y and the differential coefficient dy/dx, and these three quantities a_re the same at any point of the envelope for the envelope and for the particular curve of the family which there touches the envelope. The relation ex- pressing the equation of the envelope is called a singular solution of the differential equation, meaning an isolated solution, as not being one of a family of curves depending upon an arbitrary parameter.

An extended form of Clairaut's equation expressed by • y = xF(p)+f(p)

may be similarly solved by first differentiating in regard to p, when it reduces to a linear equation of which x is the dependent and p the independent variable ; from the integral of this linear equation, and the original differential equation, the quantity p is then to be eliminated. Other types of solvable differential equations of the first order are (i)

Udy/dx = N,

where M, N are homogeneous polynomials in x and y, of the same order; by putting v — y/x and eliminating y, the equation becomes of the first type considered above, in v and x. An equation (aB^6A)

(ax + by + c) d y [dx = Ax + By + C may be reduced to this rule by first putting x+h, y+k for a; and y, and determining h, k so that ah--bk +c — o, A&+B&-j-C=o.

(2) An equation in which y does not explicitly occur,

/(*, dy/dx) =0, may, theoretically, be reduced to the type dy/dx = F(x); similarly an equation F(y, dy/dx) =0.

(3) An equation

f (dy/dx, x, y) =0,

which is an integral polynomial in dy/dx, may, theoretically, be 6olved for dy/dx, as an algebraic equation; to any root dy/dx = Fi(x,y) corresponds,

suppose, a solution i(x, y, c) —o, where c is an arbi- trary constant; the product equation i(x, y, c)4 > %(x,y,c) . ... =0, consisting of as many factors as there were values of dy/dx, is effectively as general as if we wrote i(x, y; Ci)2(x, y, a) . , . =0; for, to evaluate the first form, we must necessarily consider the factors separately, and nothing is then gained by the multiple notation for the various arbitrary constants. The equation \(x,y, c)

In all these cases there is, except for cases of singular solutions, one and only one arbitrary constant in the most general solution of the differential equation ; that this must necessarily be so we may take as obvious, the differential equation being supposed to arise by elimination of this constant from the equation expressing its solution and the equation obtainable from this by differentiation in regard to x.

A further type of differential equation of the first order, of the form dy/dx = A + By + Cy' i in which A, B, C are functions of x, will be briefly considered below under differential equations of the second order.

*When we pass to ordinary differential equations of the second order, that is, those expressing a relation between x, y, dy/dx and d*y/dx 2 ,*

the number of types for which the solution can be found by a known procedure is very considerably reduced. Consider the general linear equation

S + pg + Q^R, ■;■'■;

where P, Q, R are functions of x only. There is no method always effective; the main general result for such a linear equation is that if any particular function of x, say yi, can be discovered, for which

- *a + pfS + Q»-o.*

*dx**

then the substitution y = ytti in the original equation, with R on the right side, reduces this to a linear equation of the first order with the dependent variable dy/dx. In fact, if y = yin we have

yi 3F + 2 dx dx^ v dx 2

3x = - Vl 2 + ";& and 3**

and thus

S + p g + *-y& + (* £ WS + & + p fe +Q») «

if then

gr+p£+Q*-o.

2+ **)'

= R.

and z denote dn/dx, the original differential equation becomes dz I dy v

y^Tx+ i 2 -s

From this equation z can be found by the rule given above for the linear equation of the first order, and will involve one arbi- trary constant; thence y = yi i=yi 1 zdx+Ay\, where A is another

arbitrary constant, will be the general solution of the original equation, and, as was to be expected, involves two arbitrary constants. .

The case of most frequent occurrence is that in which the co- efficients P, Q are constants; we consider this case in some detail. If 8 be a root of the quadratic equation 8 2 +8P+Q = o, it can be at once seen that a particular integral of the differential equation with zero on the right side is yi=e ex . Supposing first the roots of the quadratic equation to be different, and to be the other root, so that +8 = – P, the auxiliary differential equation for z, referred to above,

becomes p + (8 –

where B is an arbitrary constant, and hence to

y = Aef+e 81 fBeWdx+e?* (e^ e) x (v^r^dxdx,

or say to y = Ae M +Ce* a '+U, where A, C are arbitrary constants and U is a function of x, not present at all when R = o. If the quadratic equation 2 +P0+Q=o has equal roots, so that 28=— P, the

auxiliary equationinzbecomes dz/dx = Re -6 **, givingz = B + I Re~** x dx,

where B is an arbitrary constant, and hence

y = (A+Bx)e ! "+e ex ff'Re- e 'dxdx,

or, say, y = (A+Bx)e ex +X], where A, B are arbitrary constants, and U

is a function of x not present at all when R = o. The portion Aeˆ+Be 1 or (A+Bx)e l)x of the solution, which is known as the com- plementary function, can clearly be written down at , once by inspec- tion of the given differential equation. The remaining portion U may, by taking the constants in the complementary function properly, be replaced by any particular solution whatever of the differential equation*

d 2 y_L_T>dv , ,-. t,

5ˆ+Pˆ+Qy=R;

for if u be any particular solution, this has a form

*«=A e l?t +Boe**+U, or a form*

« = (A +B x)« eJ: +U; thus the general solution can be written

(A-Ao)e° I +(B-B)e<«+M, or {A-Ao.+ (B-Bo))e»+«, where A— Ao, B— Bo, like A, B, are arbitrary constants.*

A similar result holds for a linear differential equation of any order, say

d» +Fl 2JFˆ + ••• + p »:y = R .*

where Pi, P 2 , . . . P n are constants, and R is a function of x. If we form the algebraic equation 9 n +Pi0 n – 1 + . . . +Pn = o, and all the roots of this equation be different, say they are 0i, 8%, . . . 8„, the general solution of the differential equation is

*y=Ai«V+A*V+ • '•• +A„eV+«, where Ai, A%, . . . A» are arbitrary constants, and ,« is any*

particular solution whatever; but if there be one root 0i re- peated 7 times, the terms Aie 1 + . . . -f A,e r must be replaced by

(Ai+A 2 j;+ . . . +A,x?~ 1)e l where Ai, . . . A» are arbitrary con- stants; the remaining terms in the complementary function will similarly need alteration of form if there be other repeated roots.

To complete the solution of the differential equation we need some method of determining a particular iritegral«; we explain a pro- cedure which is effective for this purpose in the cases in which R is a sum of terms of the form e ax (j>(x), where (x) is an integral poly- nomial in x; this includes

cases in which R contains terms of the form cos bx.4 > {x) or sin bx.(x). Denote d/dx by D ; it is clear that if « be any function of*, T > {e ax u) = e ax Du--ae ax u, or say, D{e ax u) =

d 2 e"(D + a)w; hence D 2 (e"*w), i.e.j^{e ax u), being equal to D(e ax v),

where v = (D + a)u, is equal to e ax (D + a)u, that is to e 01 (D-(a) l «. In this way we find D*(e oa! w) = e OI (D-a)"K, where n is any positive integer. Hence if V'(D) be any polynomial in D with constant co- efficients, ^(D) (e M w) = e M ^(D + a)«. Next, denoting j udx by

dz t > ~ l u, and any solution of the differential equation j- --az = u by

2 = (D + o)- 1 m, we have D[e ax (D + a)- 1 u] = D(e ax z) = e ax (D + a)z = e ax u, so that we may write D~ l (e ax u) = e ax (D + a)~ l u, where the meaning is that one value of the left side is equal to one value of the right side; from this, the expression D" 2 («' ,I «), which means D-'ID -1 ^ 01 ")]. is equal to T > ~ i {e ax z) and hence to e^iD + af^z, which we write e ax (D + a)^u; proceeding thus we obtain

D-"(e™«) = e ax (D + a}~ n u, where n is any positive integer, and the meaning, as before, is that one value of the first expression is equal to one value of the second. More generally, if > ^(D) be any polynomial in D with constant co- efficients, and we agree to denote by j,(t\ U any solution z of the

differential equation ^(D)z = u, we have, if v = ,,-q , „\ U, the identity 4 > (D) (e ax v) = e ax ^(D + a)v = e'" : a, which we write in the form

This gives us the first step in the method we are explaining, namely that a solution of the differential equation

e "m + aj u + ^m + br + ■■••

It is now to be shown how to obtain one value of »■ > , . «', when u

is a polynomial in x, namely one solution of the differential equation ^(D + o)z = m. Let the highest power of x entering in u be x m ; if /

were a variable quantity, the rational fraction in t, ,/, , > , by first

writing it as a sum of partial fractions, or otherwise, could be identic- ally written in the form

K r r* + K P _,/—«+.. . + K 1 r 1 H-|-H 1 f. . . + H m r + t" > + 1 (l,(t)!4 / (t + a), where (f) is a polynomial in t; this shows that there exists an

identity of the form

1 =i(t+a)(Kt- r + . . . +Kir»+H+H 1 t+ . . . rW»)$(0r+i, and hence an identity «=ˆ(D+o)[K r D-+ . . . -r-KiD-'+H+rˆD-l- . . . +H m D»]«

KD)D™%; in this, since u contains no power of x higher than x m , the second term on the right may be omitted. We thus reach the conclusion that a solution of the differential equation ˆ(D+a)z = « is given by

z= (K,D-+ . . . +K 1 b-i-|-H+H 1 D+ . . . + H„D-)«,*

of which the operator on the right is obtained simply by expanding l/ˆ(D +a) in ascending powers of D, as if D were a numerical quantity, the expansion being carried as far as the highest power of D which, operating upon u, does not give zero. In this form every term in z is capable of immediate calculation. Example. — For the equation

dP +2 dx +y ~ x3 cos * or (D i -t-i) 2 y=* 3 cos *,*

the roots of the associated algebraic equation (0 2 + i) 2 = o arefl= ==i°, each repeated ; the complementary function is thus*

(A + Bx)e ix + (C + Dx)e-", where A, B, C, D are arbitrary constants ; this is the same as

*(H+KJc) cos *+(M+Nx) sin x, where H, K, M, N are arbitrary constants. To obtain a particular integral we must find a value of (i+D 2) -2 * 3 cos x; this is the real*

part of (1 +D 2)- 2 e ix x 3 and hence of e ix [i +(D+i) 1]- J ***x s or e****[2tD(i-|*D)]-»x',*

or ie'**D 2 (i-HT>-fD 2 -|tD 3 -|-AD 4 -hVD s . ■ •)'*,

or — lc f!, (ˆr 5 + i** 4 — f "* **– 1*** *8 + V* +|*') ;*

the real part of this is

-KA 8 -!** + ¥*) cos jc+KI* 4 -!* 2 +1) sin x. This expression added to the complementary function found above gives the complete integral; and no generality is lost by omitting from the particular integral the terms -\% x cos x+fe sin x, which are of the types of terms already occurring in the complementary function.*

The symbolical method which has been explained has wider appli- cations than that to which we have, for simplicity of explanation, restricted it. For example, if ˆ(x) be any function of x, and fli, 02, . . .a n be different

constants, and [(< +o m) _1 , a par ticular integral of the differential equation (D-i-aOCD+Oa) . . . (D+a n)y =

y = Sc m (D+a m)- 1

The particular integral is thus expressed as a sum of n integrals. A linear differential equation of which the left side has the form

where Pi, . . . P„ are constants, can be reduced to the case considered above. Writing x = e' We have the identity

d m u x m £p;=O(0-l){e-2)...($-m + l) u, where 6=d/dt.

When the linear differential equation, which we take to be of the second order, has variable coefficients, though there is no general rule for obtaining a solution in finite terms, there are some results which it is of advantage to have in mind. We have seen that if one solution of the equation obtained by putting the right side zero, say y lt be known, the equation can be solved. If yi be another solution of

there being no relation of the form myi+nyi = k, where m, n, k are constants, it is easy to see that

ˆ(yi'yr-yiyj') = P(yi'yr-yiy»').

so that we have yi'yr-yiyi = A exp. (j Pdx J ,

where A is a suitably chosen constant, and exp. z denotes e. In terms of the two solutions y x , y 2 of the differential equation having zero on the right side, the general solution of the equation with R = (#) on the right side can at once be verified to be Ayj+Byj+yiM-jati, where u, v respectively denote the integrals*

u = jyvt>(.x) (yi'yi-yt'yˆ-Hx, v = j yi(x)(y 1 'y 2 y 2 'y l)- l dx. The equation

ai? +p di + Qy-'

o,

by writing y = v exp. (-ijl?dx), is at once seen to be reduced to

•jjj +111 = becomes

3ˆ+I» = o, where I = Q-fˆ-iP 2 . If 1, = ~-% the equation

dti

gj = l+1 2 , a non-linear equation of the first

order.

More generally the equation

*g =A +B„ + C„ 2 , where A, B, C are functions of *, is, by the substitution*

r dy Cy dx' reduced to the linear equation

#y_(vt _ l _idC\d2

v-

*dx**

The equation

-(+£*

■dx)dx +AC y =o –

known as Riccati's equation, is transformed into ?.n equation of the same form by a substitution of the form ■ n = (a Y+b)/(cY+d), where o, b, c, d are any functions of x, and this fact may be utilized to obtain a solution when A, B, C have special forms; in particular if any particular solution of the equation be known, say ijo, the

substitution i)=r|o-i/Y enables us at once to obtain the general solution ; for instance, when

2B

*-a£ lo *(c)'*

a particular solution is ijo = V (— A/C). This is a case of the remark, often useful in practice, that the linear equation

*♦wg+ *22+ *-o.*

- *= x+Xy, that is dz/dt=(a+)>a')x+(b+\b')y+c+'kc', thi X being so chosen that 6+X6′ = X(a+Xa), so that*

where jiisa constant, is reducible to a standard form by taking a new independent variable z = j &[<£(»;)]~s.

*We pass to other types of equations of which the solution can be obtained by rule. We may have cases in which there are two dependent variables, * and y, and one independent variable /, the differential coefficients dx/dt, dy/dt being given as functionsof *, y and t, Of such equations a simple case is expressed by the pair*

■£ = ax+by+c, ^ = a'x+b'y+c',

wherein the coefficients a, b, c, a', b', c', are constants. To integrate these, form with the constant X the differential coefficient of

" ' the quantity

*we have dz/dt = (a+'Ka')z+c+\c'; this last equation is at once integrable in the form z{a--~ba')+c--Xc' = A.d- a+ **"'>', where A is an arbitrary constant. In general, the condition 6+X6′ = X(a+Xa') is satisfied by two different values of X, say Xi, X 2 ; the solutions corresponding to these give the values of x+\iy and x-{-~kiy, from which * and y can be found as functions of t, involving two arbitrary constants. If, however, the two roots of the quadratic equation for X are equal, that is, if (a-b')' i \^a'b = o, the method described gives only one equation, expressing x+\y in terms of t; by means of this equation y can be eliminated from dxjdt = ax--by--c, leading to an equation of the form < £*;/«, where P, Q, R are constants. The integration of this gives x, and thence y can be found.*

A similar process is applicable when we have three or more dependent variables whose differential coefficients in regard to the single independent variables are given as linear functions of the dependent variables with constant coefficients.

Another method of solution of the equations

dx/dt = ax+by+c, dy/dt — a'x+b'y+c', consists in differentiating the first equation, thereby obtaining

d 2 x dx . ,dy

di?- a dt +l> Tx' from the two given equations, by elimination of y, we can express dy/dt as a linear function of x and dx/dt; we can thus form an Equation of the shape d 2 x/dt i = P+Qx+Rdx/dt, where P, Q, R are constants; this can be integrated by methods previously^ ex-

Elained, and the integral, involving two arbitrary constants, gives, y the equation dx/dt = ax+by+c, the corresponding value of y. Conversely it should be noticed that any single linear differential equation

d 2 x , , dx w =u+vx+w Tr

where u, v, w are functions of t, by writing y for dx/dt, is equivalent with the two equations dx/dt =y, dy/dt = u+vx+wy. In fact a similar reduction is possible for any system of differential equations with one independent variable.

Equations occur to be integrated of the form

Xdx+Ydy+Zdz = o, where X, Y, Z are functions of x, y, z. We consider only the case in which there exists an equation {x, y, z)=C whose differential

is equivalent with the given differential equation; that is, / being a proper function of *, y, z, we assume that there exist equations*

d v &

" Y '6i" = " Z;

these equations require

dz

and hence

(M Y)=£>Z),&c.,

v /az 3Y\ , v /ax az\ , 7 /aY ax\ „. x {ay-to) +Y \to-ai) +z \te~W =0;

conversely it can be proved that this is sufficient in order that ji may exist to render fi(Xdx+Ydy+Zdz) a perfect differential; in particular it may be satisfied in virtue of the three equations such as

*az_aY_*

dy dz 0i «n which case we may take /=i. Assuming the condition in*

its general form, take in the given differential equation a plane section of the surface = C parallel to the plane z, viz. put z con- stant, and consider the resulting differential equation in the two variables x, y, namely Xdx--Ydy = o\ let

d, .d$, rfdf df\ Tx dx + ^dy + {^- Tz)dz = o;

there exists a function

because ^< = constant, is the integral of Xdx-\-Ydy* = o; we des» r e to prove that / can be chosen so that also, in virtue of 4/{x, y, z) = /(z), we have

d+ df „ , df df ~

ai-dz = a1 ‘ name ‘y dz = dz~- aZ >

if this can be proved the relation ^(x, y, z)-f(z) = constant, will be the integral of the given differential equation. To prove this it is enough, to show that, in virtue of ^(x, y, z) = /(z), the function

■^—trZ can be expressed in terms of z only. Now in consequence

of the originally assumed relations,

d± dx”

we have

dx/ dx~fi~dyf dy’ and hence

d\p d<(> d^a#_

dxdy dy dx~ ‘ this shows that, as functions of * and y, ^ is a function of 4> (see the note at the end of part i. of this article, on Jacobian determinants), so that we may write ^ = F(z,), from which

£ aF.aFa* aF ,

in virtue of ip(x, y, z) = f(z), and ^ = F(z, #), the function 4> can be written in terms of z only , thus 3F/az can be written in terms of z only, and what we required to prove is proved.

Consider lastly a simple type of differential equation containing two independent variables, say x and y, and one dependent variable z, namely the equation

where P, Q, R are functions of x, y, z. This is known as Lagrange’s linear partial differential equation of the first order. To integrate this, consider first the ordinary differential equations dx/dz = P/K, dy/dz = Q/R, and suppose that two functions u, v, of x, y, z can be determined, independent of one another, such that the equations u = a, v — b, where a, b are

arbitrary constants, lead to these ordinary differential equations, namely such that

p al+Qa5+% =0 and P dx + Qdy +R dz =0 –

Then if F(#, y, z) =0 be a relation satisfying the original differential equations, this relation giving rise to

aF.aFaz .aF.aFaz , D aF ,-aF „aF

a7+az- ai= oand a7i + ai a5 =0 – we have P a7+Pa7 +R 5-

■\te

It follows that the determinant of three rows and columns vanishes whose first row consists of the three quantities dF/dx, dF/dy, dF/dz, whose second row consists of the three quantities du/dx, du/dy, du/dz, whose third row consists similarly of the partial derivatives of v. The vanishing of this so-called Jacobian determinant is known to imply that F is expressible as a function of u and v, unless these are themselves functionally related, which is contrary to hypothesis (see the note below on Jacobian determinants). Conversely, any relation tj>{u, v)=o can easily be proved, in virtue of the equations satisfied by u and v, to lead to

The solution of this partial equation is thus reduced to the solu- tion of the two ordinary differential equations expressed by dx/P = dy/Q = dz/R. In regard to this problem one remark may be made which is often of use in practice: when one equation u=a has been found to satisfy the differential equations, we may utilize this to obtain the second equation v = b; for instance, we may, by means of u = a, eliminate z — when then from the resulting equations in x and y a relation f = 6 has been found containing x and y and o, the substitution a = u will give a relation involving x, y, z.

Note on Jacobian Determinants. — The fact assumed above that the vanishing of the Jacobian determinant whose elements are the partial derivatives of three functions F, u, v, of three variables x, y, z.

involves that there exists a functional relation connecting the three functions F, u, v, may be proved somewhat roughly as follows: —

The corresponding theorem is true for any number of variables. Consider first the case of two functions p, q, of two variables x, y. The function p.

not being constant, must contain one of the variables, say x ; we can then suppose x expressed in terms of y and the function p ; thus the function q can be expressed in terms of y and the function p, say q = Q(p, y). This is clear enough in the simplest cases which arise, when the functions are rational. Hence we have

dx dpdx ana dy dpdyˆdy' these give

dxdy dydx dxdy '

by hypothesis dpjdx is not identically zero ; therefore if the Jacobian determinant of p and q in regard to x and y is zero identically, so is dQ/ dy, or Q does not contain y, so that q is expressible as a function of p only. Conversely, such an expression can be seen at once to make the Jacobian of p and q vanish identically.

Passing now to the case of three variables, suppose that the Jacobian determinant of the three functions F, «, v in regard to x, y, z is identically zero. We prove that if u, v are not themselves functionally connected, F is expressible as a function of « and v. Suppose first that the minors of the elements of dF/dx, dF/dy, dF/dz in the determinant are all identically zero, namely the three deter- minants such as

dudv_dudv

dy dz dz dy ' then by the case of two variables considered above there exist three functional relations if/i(u,v,x) =o,'p i {u,v,y)—o,4't{u,v,z)=o, of which the first, for example, follows from the vanishing of

dudv dudv

*dy dz dz dy' We cannot assume that * is absent from &, or y from ˆ2, or z from*

dudv dudv

dy dz az dy isnotzero. ThenfromtheequationswO;, y, z)=u,v(x,y,z) =»wecan express y and z in terms of u, v, and x (the attempt to do this could only fail by leading to a relation connecting u, v and x, and the existence of such a relation would involve that the determinant*

dudv dudv

dydz dz dy was zero), and so write F in the form F(, y- z) =(«, v, x). We then have

9 du , 3*a»*

dudz~~dv dz”*

*aF = a*aw a*a» ,a* aF = a*3w .ajaw aF*

dx dudx’dv dx + dx’ dy dudy + dv dy’ dz thereby the Jacobian determinant of F, u, v is reduced to

a /du dv _du dv*

dx \dydz dz dy) ‘ by hypothesis the second factor of this does not vanish identically ; hence a/ax = o identically, and * does not contain x; so that F is expressible in terms of u, v only ; as was to be proved.*

Part II. — General Theory.

Differential equations arise in the expression of the relations between quantities by the elimination of details, either unknown or regarded as unessential to the formulation of the relations in question. They give rise, therefore, to the two closely connected problems of determining what arrangement of details is consistent with them, and of developing, apart from these details, the general properties expressed by them. Very roughly, two methods of study can be distinguished, with the names Transformation-theories, Function-theories; the former is concerned with the reduction of the algebraical relations to the fewest and simplest forms, eventually with the hope of obtaining explicit expressions of the dependent variables in terms of the independent variables; the latter is concerned with the determination of the general descriptive relations among the quantities which are involved by the differential equations, with as little use of algebraical calcula- tions as may be possible. Under the former heading we may, with the assumption of a few theorems belonging to the latter,

arrange the theory of partial differential equations and Pfaff’s problem, with their geometrical interpretations, as at present developed, and the applications of Lie’s theory of transforma- tion-groups to partial and to ordinary equations; under the latter, the study of linear differential equations in the manner initiated by Riemann, the applications of discontinuous groups, the theory of the singularities of integrals, and the study of potential equations with existence-theorems arising therefrom. In order to be clear we shall enter into some detail in regard to partial differential equations of the first order, both those which are linear in any number of variables, and those not linear in two independent variables, and also in regard to the function-theory of linear differential equations of the second order. Space renders impossible anything further than the briefest account of many other matters; in particular, the theories of partial

equations of higher than the first order, the function- theory of the singularities of ordinary equations not linear and the applications to differential geometry, are taken account of only in the bibliography. It is believed that on the whole the article will be more useful to the reader than if explanations of method had been further curtailed to include more facts.

When we speak of a function without qualification, it is to be understood that in the immediate neighbourhood of a particular set x , y , . . of values of the independent variables x, y, . . . of the function, at whatever point of the range of values for x, y, . . . under consideration x , y , . . may be chosen, the function can be expressed as a series of positive integral powers of the differences x—x , y—y , ■ . ., convergent when these are sufficiently small (see Function: Functions of Complex Vari- ables). Without this condition, which we express by saying that the function is developable about x ot y m . . . , many results provisionally stated in the transformation theories would be unmeaning or incorrect. If, then, we have a set of k functions, fi . . . fk of n independent variables X\ . . . x K , we say that they are independent when n>fi and not every determinant of k rows and columns vanishes of the matrix of k rows and n columns whose r-th row has the constituents dfjdxi, . . .df r [dx„; the justification being in the theorem, which we assume, that if the determinant involving, for instance, the first k columns be not zero for Xi=x° . . . x n =Xn , and the functions be developable about this point, then from the equations /i = Ci, . . -fk=Ck we can express x h . . . Xh by convergent power series in the differences Xk+i~Xk°+\, ■ ■ . x n —x„°, and so regard X\, . . . xt, as functions of the remaining variables. This we often express by saying that the equations fi = C\, . . .fk=Ck can be solved for #1, . . . xic. The explanation is given as a type of explanation often understood in what follows.

We may conveniently begin by stating the theorem : If each of the n functions 0i, . . . n of the (» + 1) variables xi, . . .x„t be develop- able about the values Xi°, . . . x n t°, the n differential equations of the form dxildt = i{txi, . . . x n) are satisfied ;_„"f^*„ by convergent power series

*Xr =xf + (t – 1°) Ki + (t – t o y\n +... reducing respectively to x\°, . . .Xn" when 2 = /°; and the only functions satisfying the equations and reducing respectively to Xi", . . . Xn" when t = t", are those determined by continuation of these series. If the result of solving these n equations for Xi °, . . . Xn" be written in the form wi(*i, . . .x„t) =xi°,...w„(xi,.. .x„t) =x n °, it is at once evident that the differential equation Single*

df/dt+

possesses n integrals, namely, the functions on, ... oi n , P™« which are*

developable about the values (xi°. . . . x„°t”) and eq f ” t tj’%’ rs i reduce respectively to #i, . . ,x n when/ = i”. And in fact it ° der has no other integrals so reducing. Thus this equation also possesses a unique integral reducing when t = t° to an arbitrary function ip(xi, . . . jc„), this integral being iKcoi, . . ; «»)• Conversely the existence of these principal integrals a>i, . . . «„ of the partial equation establishes the existence of the specified solutions of the ordinary equations dxi/dt = i.- The following sketch of the proof of the existence of these principal integrals for the case n = 2 will show the character of more general investigations. Put xtorx—x°, &c, and consider the equation a(xyt)df/dx+b(.xyf)df/dy = df/dt, wherein the functions a, b are developable about x — o, y = o, t — o; say

a(xyt) =a tai(i a2l2\+..., b{xyl)=b --tb i t i b 2 l2\..., so that

ad/dx+bd’dy = S +tSi+ifiSi+ ..., where i =a r dldx--brdjdy. In order that

f=p, +tpi+fp2l2\+ ... . ;■■

equations of the first order.

existence of Inte- grals.

*wherein p„ pi . . . are power series in *, y, should satisfy the equa- tion, it is necessary, as we find by equating like terms,; that*

. Pl=5opo,p2 = $

***°° and in general*

*° ttne p*u = &op, +S l d l pˆi+SiS 2 p,- i + . . . +$,p„*

*where * = (*!)/(r!) (s-r)l*

Now compare with the given equation another equation A{xyt)dFldx +B(xyt)dF/dy = dF/dt, ‘_

wherein each coefficient in the expansion of either A or B is real and positive, and not less than the absolute value of the corresponding coefficient in the expansion of a or b. In the second equation let us substitute a series

F = Po+(P 1 fiP 2 l2l ...,

wherein the coefficients in P are real and positive, and each not less than the absolute value of the corresponding coefficient in p„ ; then putting A r = Ard/dx+Brdldy we obtain necessary equations of the same form as before, namely,

P^AoPo, P 2 =A Pi+A I P„, . . . and in general P, +i=A<,P 8 iiAiP,_i. . . +A.P,,. These give for every coefficient in P,, + i an integral aggregate with real positive coefficients of the coefficients in P„, P,_i, . . . , P„ and the coefficients in A and B ; and they are the same aggregates as would be given by the previously obtained equations for the corresponding coefficients in p^.\ in terms of the coefficients in p„ £ s _i, . . . p and the coefficients in o and b. Hence as the coefficients in P„ and also in A, B are real and positive, it follows that the values obtained in succession for the coefficients in Pi, P2, . . . are real and positive; and further, taking account of the fact that the absolute value of a sum of terms is not greater than the sum of the absolute values of the terms, it follows, for each value of s, that every coefficient in p 3+ i is, in absolute value, not greater than the corresponding coefficient in P, + i. Thus if the series for F be convergent, the series for/ will also be ; and we are thus reduced to (1), specifying functions A, B with real positive coefficients, each in absolute value not less than the corresponding ctiefficient in a, b ; (2) proving that the equation

AdFldx+BdFldy = dF(dt possesses an integral Po-HPi+ ^Ps^l-i- ... in which the coefficients in P« are real and positive, and each not less than the absolute value of the corresponding coefficient in p . If a, b be developable for x, y both in absolute value less than r and for t less in absolute value than R, and for such values a, b be both less in absolute value than the real positive constant M, it is not difficult to verify that we may

take A = B = M (1 -^±2) ”’ (1 —g) ~\ and obtain

. F . r _ (f . x _ y) [I _ i M5(1 _£±^- l0g (x-4)- 1],*

and that this solves the problem when x, y, t are sufficiently small for the two cases p = x, po — y. One obvious application of the general theorem is to the proof of the existence of an integral of an ordinary linear differential equation given by the n equations dyldx = yi, dyi/dx=y 2 . . ,

dy„- 1 ldx = p-p i y n i- ■ pny, but in fact any simultaneous system of ordinary equations is re ducible to a system of the form

dxildt = (j>i{txi, . . . x„).

Suppose we have k homogeneous linear partial equations of the first order in « independent variables, the general equation being a n dfldxi+. . . +a.

(r n dfldx n = o, where Po(Pp/) = o. We immediately find, however, that this is also a linear equation, namely, ZHidf/dxi = owhere Hi = P P air— P

]T. e f to xi . . . x, ; also that the coefficients are all developable Pa "j«ozi about the values 3Ci = *i°, . . . x n = x n °, and that for these equa ons. va j ues t jj e determinant just spoken of is not zero. Then the main theorem is that the complete system of r equa- tions, and therefore the originally given set of k equations,

have in common n~r solutions, say {wr+\, . . . co„). It is seen at once that this result is a generalization of the theorem for r — i, and its proof is conveniently given by induction from that case. It can be verified without difficulty (1) that if from the r equations of the complete system we form r independent linear aggregates, with coefficients not necessarily constants* the new system is also a com- plete system; (2) that if in place of the independent variables *i, . . . x n we introduce any other variables which are independent functions of the former, the new equations also form a complete system. It is convenient, then, from the complete system of r equations to form r new equations by solving separately for df/dxi, . . , dfldx r ; suppose the general equation of the new system to be

Q

Then it is easily obvious that the equation QpQo/-rQt / in regard to Xr+i . . . x n ; as it is at most a linear function of Qi/, . . . Q r /, it must be identically zero, So reduced the. system is called a Jacobian system. Of this system Qi/ = o has n-i principal solutions reducing re- spectively to *»,..,. x n when Jacobian , Xl = Xl o t systems.

and its form shows that of these the first r-ri are exactly x 2 . . . x,. Let these re-i functions- together with xi be introduced as n new independent variables in all the r equations. Since the first equation is satisfied by »-i of the new independent variables, it will contain no differential coefficients in regard to them, and will reduce therefore simply to df/dxi = o, expressing that any common solution of the r equations is a function only of the h-l remaining variables. Thereby the investigation of the common solutions is reduced to the same problem for r-i equations in n-i variables. Proceeding thus, we reach at length one equation in n-r+i variables, from which, by retracing the analysis, the proposition stated is seen to follow.

The analogy with the case of one equation is, however, still closer. With the coefficients coj of the equations Q the r(n-r) equations dxjldxa = caj. That consistent ~ f/, with them we may be able to regard x r +i, . . . x n as teren *j aI functions of Xi, . . . x„ these being regarded as independent

stations, variables, it is clearly necessary that when we differentiate c

dfldxf> + Cf,„ + idfldXr + i + . . . + cp„df/dx n , namely, is Qp/. Thus the consistence of the n-r total equations requires the conditions QpCaj – QaCpj = o, which are, however, verified in virtue of Qp(Qo/) — Q

A practical method of reducing the solution of the r equations of a Jacobian system to that of a single equation in n-r + i variables may be explained in connexion with a geometrical inter- pretation which will perhaps be clearer in a particular case, say n = 3, r = 2. There is then only one total equation, say dz = adz + bdy; if we do not take account of the condition of integrability, which is in this case daldy + bda/dz = dbldx + adbldz, this equation may be re- garded as defining through an arbitrary point {x„ y , z») of three- dimensioned space (about which a, b are developable) a plane, namely, z-z„ = a (x— x) + bo{y — yd), and therefore, through this arbitrary point 00 2 directions, namely, all those in the plane. If now there be a surface z = <[>(x, y), satisfying dz = adz + bdy and passing through (x , 3V, Zo), this plane will touch the surface, and the operations of passing along the surface from (x„, y , z) to '

(Xo + dx , y , z + dZo) and then to (xo + dx,,, y + dy , z„--d l z), ought to lead to the same value of d>z as do the operations of passing along the surface from (x<„ y», z„) to („, y„ + dy„, z„ + 8zo)> and then to*

(x o + dx , y o + dy , z + S%), namely, S'z,, ought to be equal to d l z„. But we find d 1 z = a l> dxo + b{xo + dx , y , z + a dxo)dy<, = ~db , db

Geometri- cal inter- pretation and solution.

adxo + bdyo + dxdyo(^ + a°fa-j • and so at once reach the condition of integrability. If now we put

DIFFERENTIAL EQUATION

231

x = x --t, y = y„ + mt, and regard nt as constant, we shall in fact be considering the section of the surface by a fixed plane y-y = m{x-x„) ; along this section dz = dt{a + bm) ; if we then integrate the equation dx/dt = a + bm, where a, b are expressed as functions of m and t, with m kept constant, finding the solution which reduces to z„ for t = o, and in the result again replace m by (y~yo)l(x-x), we shall have the surface in question. In the general case the equations

dXj = CijdXi + . X T jdx r

Mayer's similarly determine through an arbitrary point Xi", . . . x n ° method of a planar manifold of r dimensions in space of n dimensions, Integra- and when the conditions of integrability are satisfied , (too. every direction in this manifold through this point is

tangent to the manifold of r dimensions, expressed by a r+ i=x r ° + i, . . . w„=x n °, which satisfies the equations and passes through this point. If we put Xi-xi" = t, xtx£ = m4, ■ ■ ■ x r -x r ° = m r t, and regard m 2 , . . . «,as fixed, the (n-r) total equations take the form dxj/dt = Cij +nt2C2j+. . . + WV7, and their integration is equivalent to that of the single partial equation

n

df]dt+ S(ci,m 2 C2,'. . . +m r c r j)dfldxj = o

j-r+l

in the n-r + i variables t, av+i, . . . x n . Determining the solutions a+i,. . . .a. which reduce to respectively x r+ i,. . .x n when / = o, and sub- stituting t = xi—xi", nH = {xi-X2°)l(xi-Xi°), . . . m r = (x r -x r °)[(xi-Xi°), we obtain the solutions of the original system of partial equa- tions previously denoted by wr+i, . . . w n . It is to be remarked, however, that the presence of the fixed parameters urn, . . . m, in the single integration may frequently render it more difficult than if they were assigned numerical quantities.

We have above considered the integration of an equation dz = adz--bdy on the hypothesis that the condition

daldy--bda[dz = db/dz--adb/dz. Ptatflan ^ ' s na t ura l to inquire what relations among x, y, z, if any, B ores- are ' m P" e d by, or are consistent with, a differential relation 1 ' adx+bdy+cdx = o, when a, b, c are unrestricted functions s oas. Q j x ^ y^ z This problem leads to the consideration of the

*so-called Pfaffian Expression adx+bdy+cdz. It can be shown (i) if each of the quantities db/dz-dc/dy, dc[dx-da/dz : da/dy-db/dz, which we shall denote respectively by u is , Un, «i2, be identically zero, the expression is the differential of a function of x, y, z, equal to dt say ; (2) that if the quantity au2s+bu 3 i+cuii is identically zero, the ex- pression is of the form udt, i.e. it can be made a perfect differential by multiplication by the factor l/u; (3) that in general the ex- pression is of the form dt+Uidti. Consider the matrix of four rows and three columns, in which the elements of the first row are a, b, c, and the elements of the (r+i)-th row, for r = i, 2, 3, are the quantities u,i, u,i, u,i, where Un = 2*22 = W33 = o. Then*

it is easily seen that the cases (1), (2), (3) above correspond respectively to the cases when (1) every determinant of this matrix of two rows and columns is zero, (2) every determinant of three rows and columns is zero, (3) when no condition is assumed. This result can be general- ized as follows: if ai, . . . a n be any functions of xi, . . . x n , the so- called Pfaffian expression aidxi+. . . +a n dx n can be reduced to one or other of the two forms

Uidh+. . .--Uidtk, dt+Uidh+. . . +Uk-idtk-i, wherein t, «i, . . ., h, . . . are independent functions of xi, . . . x n , and k is such that in these two cases respectively 2k or zk-l is the rank of a certain matrix of n + i rows and n columns, that is, the greatest number of rows and columns in a non-vanishing determinant of the matrix; the matrix is that whose first row is constituted by the quantities Oi, . . . a„, whose s-th element in the (7-+l)-th row is the quantity da,\dx,da,\dx,. The proof of such a reduced form can be obtained from the two results: (1) If t be any given function of the 2w independent variables ui, . . . u m , h, . . . t m , the expression dt-Uidh--. . . +u m dt m can be put into the form u\dt--. . .u' m dt' m . (2) If the quantities Mi, ... , u m , ti,... t m be connected by a relation, theexpression nidh. . . +u m dt m can be put into the form dt'+u'idt'i +. . , +u'm-idt'm-i ; and if the relation connecting «i, . . . u m , h,. . . t m be homogeneous in ui, . . . u m , then /' can be taken to be zero. These two results are deductions from the theory of contact transformations (see below), and their demonstration requires, beside elementary algebraical considerations, only the theory of complete systems of linear homogeneous partial differential equations of the first order. When the existence of the reduced form of the Pfaffian expression containing only independent quantities is thus once assured, the identification of the number k with that defined by the specified matrix may, with some difficulty, be made a posteriori.

In all cases of a single Pfaffian equation we are thus led to consider what is implied by a relation dt-uidh-. . .-u m dt m = o, in which Slarfe t ' Uu ' " " Um < tl ■ ■ ■ > tm are, except for this equation, linear independent variables. This is to be satisfied in virtue of

Pfaffl one or severa l relations connecting the variables; these

V must involve relations connecting /, ti, . . . t m only, and equ on. j n Qne Q f t jj ese at i east 1 mus t actually enter. We can*

then suppose that in one actual system of relations in virtue of which the Pfaffian equation is satisfied, all the relations connecting t,h . . . i n only are given by

t = ˆ(t, + i. . .tm), /l=lˆl(/« + l. . .t m), . . . t, = \l/,(tn.l . . . t m);

so that the equation

drp-Uidˆi- • ■ • U a dtp,rUa + ldt a+ i. . .-U m dt m =0

is identically true in regard to «i, . . . u m , t, + i . . , t m ; equating to zero the coefficients of the differentials of these variables, we thus obtain m-s relations of the form

dij/ldtj-Uidˆildt— . . . ~Usdif/ s ldtj-Uj = o ; these m-s relations, with the previous s+i relations, constitute a set of m + i relations connecting the 2m -fi variables in virtue of which the Pfaffian equation is satisfied independently of the form of the functions \f>, \fo, . . . i/v There is clearly such a set for each of the values s=o, s = i, . . ., s=m-i, s = m. And for any value of i there may exist relations additional to the specified m + i relations, pro- vided they do not involve any relation connecting t, ti, . . . « m only, and are consistent with the m-s relations connecting ui, . . . u m . It is now evident that, essentially, the integration of a Pfaffian equation

aidxi+ . . . +a„dxn=o, wherein a u . . . a n are functions of x it . . . x„, is effected by the processes necessary to bring it to its reduced form, involving only independent variables. And it is easy to see that if we suppose this reduction to be carried out in all possible ways, there is no need to distinguish the classes of integrals corresponding to the various values of s; for it can be verified without difficulty that by putting

t'ˆt-Uit,-. . .-uj,„ t\=u\, . . . t' a = u„ u\=-h u',= —t„

t » + i = i« + i, . . . t m = t m , «'a+i = w, + i, . . . u' m = u m , the reduced equation becomes changed to dt'u\dt\. . -u' m dt' m =o, and the general relations changed to

t'=W nl , . . . t'ˆ-t'diit'. +i, . . . t' m)-. . .-t',M('»+i, ■ ■ ■ t' m),~, say, together with u\=dldt' 1 , . . ., u' m =d/dt' m ,which contain only one relation connecting the variables t', t' u . . . t' m only.

*This method for a single Pfaffian equation can, strictly speaking, be generalized to a simultaneous system of (n-r) Pfaffian equations dxj = djdxi+. . . +c r jdxr only in the case already treated, when this system is satisfied by regarding Xr +U . . . x„ as *'" n " 1 ' suitable functions of the independent variables xi, . . . x r ; "" Ieous in that case the integral manifolds are of r dimensions. ptattian When these are non-existent, there may be integral mani- e Q uatlon& folds of higher dimensions ; for if*

d4> = r dx T +r+l(Cl„ + ldXi+ . . .+c r „ + idx r)+ r+2 ( ) + . .. be identically zero, then (r+CtT, r+ i r+ i+. . . +c

It seems desirable to add here certain results, largely of algebraic character, which naturally arise in connexion with the theory of contact transformations. For any two functions of the 2n independent variables xi, . . . x n , pi, ...p n we denote by ($) Coatact

the sum of the n terms such as ^^ – j^. For two matlolZ

functions of the (2n + i) independent variables z,x u . . . x n ,pi,...p n we denote by [M] the sum of the n terms such as

§± fd±,^ dt\ di, (d d\ dpi \dxi^ pi dz) dpt {dx~i + ^Tz) ■

It can at once be verified that for any three functions[/[(^]] +[<£[#]]

W]] = £[‘P]W] + [f4’}, which when/, 0, ^donot containz

*becomes theidentity(/()) + ((/)) + ((/ (il))=o.Then,ifX 1 ,...X„, Pi, ... P„ be such functions of x u . . . x„, pi . . . p n that PiiXi + . . . PnrfX„ is identically equal to pidxi . . . p„dx n , it can be shown by elementary algebra, after equating coefficients of inde- pendent differentials, (1) that the functions X : , . . . P„are independ- ent functions of the 2ra variables x u . . . p n , so that the equations x * = X<, p i = Pi,]can be solved for* ***i, . . . x n , pi, . . . p„,and represent therefore a transformation, which we call a homogeneous contact transformation ; (2) that the X x , . . . X„ are homogeneous functions of pi,. . . p n of zero dimensions the Pi,... P„ are homogeneous functions of pi, . . . p n of dimension one, and the \n(n-\) relations (X;X<) =0 are verified. So also are the « 2 relations (P;X,) = i, (PiX,)=o, (PiP,) =0. Conversely, if Xi, . . . X„ be independent functions, each homogeneous of zero dimension in pi,... p n satisfying the \n{n-i) relations (X. . .P„<2X„ — pidxi. . , +pndxn. If now we put m+i for n, put z for x n +i, Z for X.n+i, Qi for-Pi/Pn+i, lor i = l, ... n, put q t {or-pi/pn+i and PidXi. . -P„dXn is identically equal to a(dz-p x dxi-. . .p„dx n), and o not zero, then (1) the functions Z, Xi, . . . X„, Pi, . . . P„ are independent functions of z, x%, . . . x„, pi, . . . p n , so that the equations z’ = Z, x’i =X,, p\ = Pi can be solved for z,x u ... x n , pi,., p*** *and determine a transformation which we call a (non-homogeneous) contact transformation; (2) the Z, Xi, . . . ^ verify che J«(w+i)*

[Za] = ff ^-„2 1 [X i

identities [ZXi] = o, [XiX,] = o. And the further identities [PiXi] = P, = o, dXi rD i dPi

'ST' i p "i-'-ar

are also verified. Conversely, if Z, Xi, . . . X„ be independent func- tions satisfying the identities [ZX,] = o, [X»X,] = o, then a, other than zero, and Pi, . . . P» can be uniquely determined, by solution of algebraic equations, such that

dZ-PidXi- . . .-P„dX n =

d\J+P l dxi+ . . . +P n dX n =p 1 dx 1 + . . . +p n dx n , then the 2» functions Pi, . . . P„, Xi, . . . X„ are independent, and we have

(X i X /) = o, (X i U) = SX i , (P,X i) = i, (PiX J) = o > (P i P,)o, = (P i U) + P i = SP i , where 8 denotes the operator p l d/dpi+ . . . +p„d/dp n ; (2) If Xi, . . . X» be independent functions of Xi, . . . x n , p\, . . . p n , such that (XiX,) = 0, then U can be found by a quadrature, such that

*(X i U) = SX i ; and when X,, . . . X„, U satisfy these §n(«+i) conditions, then Pi, . . . P„ can be found, by solution of linear algebraic equations, to render true the identity d\J+PidXi+...P n dX n '=pidxi...+pndx„; (3) Functions Xi, . . . X„, Pi, . . . P„ can be found to satisfy this differential identity when U is an arbitrary given function of *i, . • • *»> Pu • ■ ■ pn', but this requires integrations. In order to see what integrations, it is only necessary to verify the statement that if U be an arbitrary given function of Xi, . . . x n , pi, . . . p n , and, for r ables, such that (XirU) = SX(r, (XpXir) = o, for p,*

We pass on now to consider the solution of any partial differential equation of the first order; we attempt to explain Partial certain ideas relatively to a single equation with any differeo- number of independent variables (in particular, an tialequa- ordinary equation of the first order with one inde- tion oftht pendent variable) by speaking of a single equation with two independent variables x, y, and one dependent variable z. It will be seen that we are naturally led to consider systems of such simultaneous equations, which we consider below. The central discovery of the transformation theory of the solution of an equation F(x, y, z, dz/dx, dz/dy) — o is that its solution can always be reduced to the solution of partial equations which are linear. For this, however, we must regard dz/dx, dz/dy, during the process of integration, not as the differential coefficients of a function 2 in regard to x and y, but as variables independent of x, y, z, the too great indefiniteness that might thus appear to be introduced being

provided for in another way. We notice that if z = \[/(x, y) be a solution of the differ- ential equation, then dz=dxdipjdx--dyd\l//dy; thus if we denote the equation by F(x, y, z, p, q,)=o, and prescribe the condition dz=pdx+qdy for every solution, any solution such as z=\{/(x, y) will necessarily be associated with the equations p= dz/dx, q = dz/dy, and 2 will satisfy the equation in its original form. We have previously seen (under Pfaffian Expressions) that if five variables x, y, z, p, q, otherwise independent, be subject to dz—pdx—qdy = o, they must in fact be subject to at least three mutual relations. If we associate with a point (, y, z) the plane*

Z-z=p(X-x)+q(Y-y) passing through it, where X, Y, Z are current co-ordinates, and call this association a surface-element; and if two consecutive elements of which the pomt(x+dx, y--dy, 3+

first orier.

relations G = o, H = o connecting x,y,z,p, q and independent of F = o, so that the three relations together may involve

*dz = pdx+qdy. Such a set of three relations may, for example, be of the form z = \f/(x, y), p=d\f//dx, q = d\j//dy; but it may also, as another case, involve two relations z = ˆ(y), x=\(/i(y) connecting *, y, 2, the third relation being*

the connectivity consisting in that case, geometrically, of a curve in space taken with 00 1 of its tangent planes; or, finally, a connectivity is constituted by a fixed point and all the planes passing through that point. This generalized view of the mean- ing of a solution of F = o is of advantage, moreover, in view of anomalies otherwise arising from special forms of the equation itself. For instance, we may include the case, some-Meaning times arising when the equation to be solved is obtained of a sola- by transformation from another equation, in which F "<"» of the does not contain either p or q. Then the equation has «««" rf/ <"»- 00 2 solutions, each consisting of an arbitrary point of the surface F = o and all the 00 2 planes passing through this point; it also has 00 2 solutions, each consisting of a curve drawn on the surface F = o and all the tangent planes of this curve, the whole consisting of 00 2 elements; finally, it has also an isolated (or singular) solution consisting of the points of the surface, each associated with the tangent plane of the surface thereat, also 00 2 elements in all. Or again, a linear equation F = Pp+Qq— R = o, wherein P, Q, R are functions of x, y, z only, has so 2 solutions, each consisting of one of the curves defined by dx/P=dy/Q=dz/R taken with all the tangent planes of this curve; and the same equation has 00 2 solutions, each consisting of the points of a surface containing 00 l of these curves and the tangent

*planes of this surface. And for the case of n variables there is similarly the possibility of n+i kinds of solution of an equation F(*i, . . . x n , a, pi, . . . p n)—o; these can, however, by a simple contact transformation be reduced to one kind, in which there is only one relation z'=^{x\, . . . x' n) connecting the new variables x\, . . . x'n, 2′ (see under Pfaffian Expressions) ; just as in the case of the solution*

z=My), x=My), V(y)=p}'i(y)+q

of the equation Pp+Qq = R the transformation z'=z-px, x' — p, p'= — x,y' = y,q' = q gives the solution

z' = +x'(y'), p' = dz'/dx', q' = dz'/dy' of the transformed equation. These explanations take no account of the possibility of p and q being infinite; this can be dealt with by writing p=—u/w, q=—v/w, and considering homogeneous equations in «, v, w, with udx+ vdy+wdz=o as the differential relation necessary for a connectivity; in practice we use the ideas associated with such a procedure more often without the appropriate notation.

*In utilizing these general notions we shall first consider the theory of characteristic chains, initiated by Cauchy, which shows well the nature of the relations implied by the given differential equation; the alternative ways of carrying out the necessary integrations are suggested by con- J^TT ”' sidering the method of Jacobi and Mayer, while a good * ea& summary is obtained by the formulation in terms of a Pfaffian expression.*

Consider a solution of F = o expressed by the three independent equations F=o, G = o, H=o. If it be a solution in which there is more than one relation connecting x,y,z, let new variables x' ,y' ,z' ,p' ,q' be introduced, as before explained under Pfaffian Ex- Charac- pressions, in which z' is of the form terlstk

z' = z-p i x 1 -. . . -pjc a {s = l or 2), chains.

so that the solution becomes of a form z' = ldx', q'=d^/dy', which then will identically satisfy the trans- formed equations F' = o, G' = o, H' = o. The equation F' = o, if x',y,'z' be regarded as fixed , states that the plane Z -/ =p'(X-x')+q'(Y~y') is tangent to a certain cone whose vertex is (x', y, z'), the consecutive point (x'+dx', y'+dz', z'+dz') of the generator of contact being such that

Passing in this direction on the surface z' = \j/(x', y') the tangent

DIFFERENTIAL EQUATION

plane of the sdrface at this consecutive point is (p'+dp' t q'+dq'), where, since F'(x', y', <(/, d^ldx',

are satisfied along a connectivity of 00 1 elements consisting of a curve on z' = ^(x', y') and the tangent planes of the surface along this curve. The equation F' = o, when ***', q' are fixed, represents a curve in the plane 7.-'*** *= p'(X-x')+q'(Y-y') passing through (*', y', z'); if (x'+ix', y' = iy', z'+iz') t>e a consecutive point of this curve, we And at once*

, , IdF' , ^dF'X , . ,/dF' ,dF'

thus the equations above give Sx'dp' +Sy'dq' = 0, or the tangent line of the plane curve, is, on the surface z' = ^(z', y'), in a direction con- jugate to that of the generator of the cone. Putting each of the fractions in the characteristic equations equal to dt, the equations enable us, starting from an arbitrary element x' , y',,, z',,, p'c, q\, about which all the quantities F', dF'/dp', &c, occurring in the denominators, are developable, to define, from the differential equation F' = o alone, a connectivity of 00 l elements, which we call a characteristic chain ; and it is remarkable that when we transform again to the original variables {x, y, z, p, q) , the form of the differential equations for the chain is unaltered, so that they can be written down at once from the equation F = o. Thus we have proved that the characteristic chain starting from any ordinary element of any integral of this equation F = o consists only of elements belonging to this integral. For instance, if the equation do not contain p, q, the characteristic chain, starting from an arbitrary plane through an arbitrary point of the surface F = o, consists of a pencil of planes whose axis is a tangent line of the surface F = o. Or if F = o be of the form P/> +Q

" e _ is everywhere zero on this chain ; further, suppose that

"trusted eac ^ ^' ^F/dp, . . . , dF/dx+pdF/dz is developable 'uh about each element of this chain T, and that T is not a

W J~ characteristic chain. Then consider the aggregate of the

character- characteristic chains issuing from all the elements of T.

- */ The 00 2 elements, consisting of the aggregate of these*

chains. characteristic chains, satisfy F=o, provided the chain connectivity T consists of elements satisfying F = o; for each characteristic chain satisfies dF = o. It can be shown that these chains are connected; in other words, that if x, y, z, p, q, be any element of one of these characteristic

chains, not only is

dz/dt — pdx/dt — qdy/dt = o , as we know, but also U =dzldu—pdxfdu —qdy/du is also zero. For , dV d (dz dx dy\ d (dz dx dy\

we have -5— Jt \dH-tdH-m) -35 \drfidt-9dt)

dp dx dpdx . dq dy dq dy — 3m dt dl

dpdF . dx/dF , JF\ ,dqdF,dy(dF, dF\ _ dF TT dtd~p + dH\lx +p Tz) + duTq + du\dy' +q Tz) ~~Tz' V –

As 7- is a developable function of t, this, giving

V=V.exp(-Jlf 2 dt),

shows that U is everywhere zero. Thus integrals of F = o are obtainable by considering the aggregate of characteristic chains issuing from arbitrary chain connectivities T satisfying F = o; and such connectivities T are, it is seen at once, determinable without integration. Conversely, as such a chain connectivity T can be taken out from the elements of any given integral all possible integrals are obtainable in this way. For instance, an arbitrary curve in space, given by x„=8(u), y = 4>{u),z c = -4'{u), determines by the two equations F(x , y«, z„, p„, g ,)=o, i£'(k) = pja'(u)+q '{u), su ch a . chain connectivity T, through which there passes a perfectly definite integral of the equation F = o. By taking 00 2 initial chain connectivities T, as for instance by taking the curves x„=6, y = f, 2» = ^ to be the 00 * curves upon an arbitrary surface, we thus obtain 00 * integrals, and so 00 * elements satisfying F = o. In general, if functions G, H, independent of F, be obtained, such that the equations F = o, G = 6, H=c represent an integral for all values of the constants b, c, these equations are said to constitute a complete

integral. Then 00 « elements satisfying F=o are known, and in fact every other form of integral can be obtained without further integra- tions.

In the foregoing discussion of the differential equations of a characteristic chain, the denominators dF/dp, . . . may be supposed to be modified in form by means of F = o in any way conducive to a simple integration. In the immediately following explanation of ideas, however, we consider indifferently all equations F = constant; when a function of x, y, z, p, q is said to be zero, it is meant that this is so identically, not in virtue of F=o; in other words, we consider the integration of F = a, where a is an arbitrary constant. In the theory of linear partial equations we have seen that the integration of the equations of the characteristic chains, from which, ooerathna as has just been seen, that of the equation F=a follows t

ˆ estary at once, would be involved in completely integrating – the single linear homogeneous partial differential equation j° .' explained above under Contact Transformations. One " ottoT obvious integral is=F. Putting F = a, where a is arbi- F=a * trary , and eliminating one of the independent variables, we can reduce this equation [Ff] = o to one in four variables ; and so,on. Calling, then, the determination of a single integral of a single homogeneous partial differential equation of the first order in n independent variables, an operation of order n-i, the characteristic chains, and therefore the most general integral of F = o, can be obtained by successive opera- tions of orders 3, 2, 1. If, however, an integral of F = a be repre- sented by F = a, G = &, H=c, where b and c are arbitrary constants, the expression of the fact that a characteristic chain of F = satisfies

theidentity \AH>lb+Mm+W*]l-$.Hi+ˆM+%f4>r before remarked, by putting <*>=F, f=G, andthen(F/]=A(/), [G/] = B(/), that AB(/)-BA(/) = £b (/)ˆA(/), so that the two linear equations

[F/]=o, [G/]=o form a complete system; as two integrals F, G are known, they have a common integral H, independent of F, G, deter- minable by an operation of order one only. The three functions F, G, H thus identically satisfy the relations (FG] = [GH] = [FH] = o. The 00 2 elements satisfying F = a, G = b, H=c, wherein a, b, c are assigned constants, can then be seen to constitute an integralpf F = a. For the conditions that a characteristic chain of G = b issuing from an element satisfying F = a, G = b, H=c should consist only of elements satisfying these three equations are simply[FG] = o,[GH] = o. Thus, starting from an arbitrary element of (F = a, G = 6, H=c),we can single out a connectivity of elements of (F = o, G = b, H=c) forming a characteristic chain of G = b; then the aggregate of the characteristic chains of F=a issuing from the elements of this characteristic chain of G = 6 will be a connectivity consisting only of elements of

(F=a, G = 6, H = c),

and will therefore constitute an integral of F = a; further, it will include all elements of (F =a, G = b, H =c). This result follows also from a theorem given under Contact Transformations, which shows, moreover, that though the characteristic chains of F = a are not determined by the three equations F = a, G = 6, H = c, no further integration is now necessary to find them. By this theorem, since identically [FG] = [GH] = [FH] =0, we can find, by the solution of linear algebraic equations only, a non-vanishing function a and two functions A, C, such that

dG-AdF-CdH =

thus all the elements satisfying F = o,G =• b,H = c, satisfy dz = pdx + qdy and constitute a connectivity, which is therefore an integral of F = o. While, further, from the associated theorems, F, G, H, A, C are independent functions and [FC] = o. Thus C may be taken to be the remaining integral independent of G, H, of the equation [F/] = o, whereby the characteristic chains are entirely determined.

*When we consider the particular equation F = o, neglecting the case when neither p nor q enters, and supposing p to enter, we may express p from F = o in terms of x, y, 2, q, and then eliminate it from all other equations. Then instead of the equation [F/] = o, we have, if F = o give p = *\p(x, y, z, q), the equation*

*moreover obtainable by omitting the term in df/dp in {p-ip, f] = o. Let x c , y , z , q , be values about which the coefficients in The slagte this equation are developable, and let f, tj, u be the equation principal solutions reducing respectively to z, y and q p mQ and when * = #,,. Then the equations £ = ˆ, f" = z , ») = ;y., <•> = ?<, pfˆtiian represent a characteristic chain issuing from the element *„_„... Xo, y», z„, \p , q ; we have seen that the aggregate of .. such chains issuing from the elements of an arbitrary chain satisfying*

dz — podx t — q„dy„ = o constitute an integral of the equation p = 4'- Let this arbitrary

chain be taken, so that x is constant; then the condition for initial values is only

dz„—qody„ = o, and the elements t)f the integral constituted by the characteristic chains issuing therefrom satisfy

d£ — oidˆ — o. Hence this equation involves dz — \f'dx—qdy = o, or we have

dz~ˆdx—qdy = a{dˆ—o > di)), where a is not zero. Conversely, the integration o(p = ˆ is, essentially, the problem of writing the expression dz — \[> dx — qdy in the form aifLt—oid-q), as must be possible (from what was said under Pfaffian Expressions).

To integrate a system of simultaneous equations of the first ordeV Xi = ai, . . . X r = Or in n independent variables Xi, . . . x n

”’ ‘ ” ‘ and one dependent variable z, we write pi for dz/dxi, &c, System of an(j attempt to find n+\ —r further functions Z, X r+ i TfJSL ••• X„, such that the equations Z = ffl, X< = a, (i = i , ... n) of the first j nvo i ve dz ˆp ldxi — _ _ ,—p„dx n = o. By an argument order. already given, the common integral, if existent, must be sat-

isfied by the equations of the characteristic chains of any one equation Xi = tti ; thus each of the expressions [X.X, must vanish in virtue of the equations expressing the integral, and we may without loss of generality assume that each of the corresponding §r(r— i) expressions formed from the r given differential equations vanishes in virtue of these equations. The determination of the remaining n+l—r functions may, as before, be made to depend on characteristic chains, which in this case, however, are manifolds of r dimensions obtained by integrating the equations [Xi/]=o, . . . [X r /]=o; or having obtained one integral of this system other than Xi, . . . X r , say X, + i, we may consider the system [Xi/] = o, . . . [X r+ i/]=o, for which, again, we have a choice ; and at any stage we may use Mayer’s method and reduce the simultaneous linear equations to one equation involving parameters; while if at any stage of the process we find some but not all of the integrals of the simultaneous system, they can be used to simplify the remaining work; this can only be clearly explained in connexion with the theory of so-called function groups for which we have no space. One result arising is that the simul- taneous system pi = u . pr = r, wherein p u . p r are not involved in r, if it satisfies the |r(r — i) relations [pi— i, pj — j]=o, has a solution z = vK*i. • • • x„), piˆd-ˆldxi, . . . p„ — d4’ldx n , reducing to an arbitrary function of x r+ i, . . . x n only, when Xi = Xi°, . . . x r ‘■= x r ° under certain conditions as to developability ; a generalization of the theorem for linear equations. The problem of integration of this system is, as before, to put

dz — fadXi — ... — tj> r dX r — p r+1 dXr+i •—’...— £n dXn

into the form

If L be a function of / and of the 2« quantities x\, . . . x n , xi, . . . x„, where Xi denotes dXildt, &c, and if in the.n equations

d /dh\ ˆ dh

dt \dxi) dxi

x n in terms of t, x>, . . .

. . . p n , assuming that the determinant of the quantities

, j. is not zero ; if, further, H denote the function of t, Xi, . . .

Xn, : pi, ■ • ■ pn, numerically equal to PA+. . . +p n x n —L, it is easy to prove that dpi/dl= —dH/dxi, dXi/dt-dH/dpi. These Equations s0 . ca n e(j canonical equations form part of those for ot , the characteristic chains of the single partial equation dynamics. dz j dt+ii (ti Xu . . . x „, dz/dx u . , ., dz/dx n) =0, to which then the solution of the original equations for Xi . . . x„ can be reduced. It may be shown (i) that if z = ^(i, x u . . . x n , Ci, . . c n)--c be a complete integral of this equation, then pi=d\j/l is a complete integral of the partial equation.

A system of differential equations is said to allow a certain continuous group of transformations (see Groups, Theory of) when the introduction for the variables in the differen- tial equations of the new variables given by the equations of the group leads, for all values of the parameters of the group, to the same differential equa- ous groups tions in the new variables. It would be interesting 'theories 3 ! to verif y in examples that this is the case in at least •the majority of the differential equations which are known to be integrable in finite terms. We give a theorem of very general application for the case of a simultaneous complete

we put pi = rr_ , and so express xi,

x„, pi

Applica- tion ot theory of continu-

system of linear partial homogeneous differential equations of the first order, to the solution of which the various differential equa- tions discussed have been reduced. It will be enough to consider whether the given differential equations allow the infinitesimal transformations of the group.

It can be shown easily that sufficient conditions in order that a complete system 11!/ = o. . .n/ = o, in n independent variables, should allow the infinitesimal transformation P/=o are expressed by k equations II;P/—Pn,/=XiiIIi/-|-. . . +X,iIIj;/. Suppose now a complete system of n—f equations in n variables to allow a group of r infinitesimal transformations (Pi/, . . ., P r /) which has an invariant subgroup of r— I parameters (Pi/, . . .,' P r i/), it being supposed that the n quantities IIi/, . . ., n„ r /, Pi.f, . . ., P r / are not connected by an identical linear equation (with co- efficients even depending on the independent variables). Then it can be shown that one solution of the complete system is deter- minable by a quadrature. For each of n.Po-/— Pa linear function of H/, . . . , IIn_r/ and the simultaneous system of inde pendent equations IIi/=0, . . . n„_ r /=o, Pj/=o, . . . P r _i/=o is therefore a complete system, allowing the infinitesimal trans- formation P r f. This complete system of n — i equations has there- fore one common solution u, and P r (w) is a function*

of 01. By choosing w suitably, we can then make P,(cu). = i. From this equation and the n — 1 equations IIi« = o, Pdfldx-t)dfldy, the integral curves u(x, y)=y°, wherein o>(x, y) is

the solution of lz J r'l / (x ,y) d Z = reducing to y for x = x°, are

interchanged among themselves by the infinitesimal transformation, or w(x, y) can be chosen to make S-duldx--ridaldy = l; this, with daldx--\l/doildy = o, determines co as the integral of the complete differential {dy — dx)! — ^). This result itself shows that every ordinary differential equation of the first order is subject to an infinite number of infinitesimal transformations. But every infinit- esimal transformation £df/dx+ridf/dy can by change of variables (after integration) be brought to the form df/dy, and all differential equations of the first order allowing this group can then be reduced to the form F(x, dy/dx)=o. (2) In an ordinary equation of the second order y" = ^(x,y, /)>equivalent tody/dx = yi,dyi/dx = ^{x,y,yi), if H,Hi be the solutions for y and yi chosen to reduce to y° and yi" when x = x°, and the equations H=y, Hi = yi be equivalent to a = y °, wi=yi°, then a, wi are the principal solutions of nf=df/dx+yidfldy-{-'l'dfldyi=o. If the original equation allow an infinitesimal transformation whose first extended form (see G ROU ps) is P/ = £df/dx +rjdfjdy +vidf/dyi , where tiiSt is the increment of dy/dx when %bt, t]U are the increments of x, y, and is to 1 be expressed in terms of x, y, yi, then each of P« and P«i must be functions of 01 and on, or the partial differential equation Ilf must allow the group P/. Thus by our general theorem, if the differential equation allow a group of two parameters (and such a group is always integrable), it can be solved by quadratures, our explanation sufficing, however, only provided the form n/ and the two infinitesimal transformations are not linearly connected. It can be shown, from the fact that 771 is a quadratic polynomial in y u that no differential equation of the second order can allow more than 8 really independent infinitesimal transformations, and that every homogeneous linear differential equation of the second order allows just 8, being in fact reducible to d 2 y/dx' 2 = o. Since every group of more than two parameters has subgroups of two para- meters, a differential equation of trie second order allowing a group of more than two parameters can, as a rule, be solved by quadratures. By transforming the group we see that if a differential equation of the second order allows a single infinitesimal transformation, it can be transformed to the form F(x,dy/dx, d?y/dx 2) ; this is not the case for every differential equation of the second order. (3) For an ordinary differential equation of the third order, allowing an integ- rable group of three parameters whose infinitesimal transformations are not linearly connected with the partial equation to which 'the solution of the given ordinary equation is reducible, the similar result follows that it can be integrated by quadratures. But if the group of three parameters be simple, this result must be replaced by the*

statement that the integration is reducible to quadratures and that of a so-called Riccati equation of the first order, of the ‘ iorm dyfdx = A+By +Cy 2 , where A, B, C are functions of x. (4) Simi- larly for the integration by quadratures of an ordinary equation y n = 4>{x, y, yi, . . . y n i) of any order. Moreover, the group allowed by the equation may quite well consist of extended Contact transfor mations. An important application is to the case where the differ- ential equation is the resolvent equation defining the group of

transformations or rationality group of another differential equation (see below) ; in particular, when the rationality group of an ordinary linear differential equation is integrable, the equation can be solved by quadratures.

Following the practical and provisional division of theories of differential equations, to which we alluded at starting, into

transformation theories and function theories, we pass ttoaof ‘ now to give some account of the latter. These are both function a necessary logical complement of the former, and the theories of on]y remaining resource when the expedients of the differea- f orm er have been exhausted. While in the former equations, investigations we have dealt only with values of the

independent variables about which the functions are developable, the leading idea now becomes, as was long ago remarked by G. Green, the consideration of the neighbourhood of the values of the variables for which this developable character ceases. Beginning, as before, with existence theorems applicable for ordinary values of the variables, we are to consider the cases of failure of such theorems. •

When in a given set of differential equations the number of equations is greater than the number of dependent variables, the equations cannot be expected to have common solutions unless certain conditions of compatibility, obtainable by equating different forms of the same differential coefficients deducible from the equations, are satisfied. We have had examples in systems of linear equations, and in the case of a set of equations pi = e t>h ■ ■ ■ iPr = &• For the case when the number of equations is the same as that of dependent variables, the following is a general theorem which should be referred to: Let there be r equations in r dependent variables Z\, . . . z, and n independent

variables x\, . . . x„; let the differential coefficient of

A general Za f highest order which enters be of order h a . and

existence ° .

theorem, suppose d h <'Z

written A^Zaldx^" = €> ff , where in the general differen- tial coefficient of z p which enters in $<,, say

d k l + ... +k nZ p /dXi k l . . . dXn k n,

we have h

and of the differential coefficients entering in $i, ... <£, are developable. Corresponding to each dependent variable z a , we take now a set of h a functions of

Xi, . . .x„, say (r, 0 p reduces to b , and the differential coefficient

*+ *,*

*^W/dxf**

dx n k »

d k 2+ . .

reduces to b 9 ^ ...„• Then the theorem is that there exists one, and only one, set of functions Si, . . . z r of x 2 , . . . x n developable about*

z a =4> a , dz c jdx=^\ . . . d»°-h a ld°-H=°-*. And, moreover, if the arbitrary functions <$>„, . . . contain a certain number of arbitrary variables h, ■ • ■ t m , and be de- velopable about the values t°, . . . t m ° of these variables, the solutions Zi, . . . z, will contain h, . . . t m , and be developable about t °, . . . C*

The proof of this theorem may be given by showing that if ordinary power series in Xi — 01, . . . x»— a„, t\ — tf, . . . t m — t m ° be substituted in the equations wherein in z a the coefficients of (xi — ai) , xi — ai, . . ., (xi — 0 • • • < t>a h ~ 1) > divided respectively by I, 1!, 2!, &c, then the differential equations determine uniquely all the other coefficients, and that the resulting series are convergent. We rely, in fact, upon the theory of monogenic analytical functions (see Function), a function being determined entirely by its development in the neighbourhood of one set of values of the independent variables, from which all its other values arise by continuation; it being of course understood that the coefficients rn the differential equations are to be continued at the same time. But it is to be

remarked that there is no ground for believing, if this method of continuation be

utilized, that the function is single- valued ; we may quite well return to the same values of the independent variables with a different value of the function, belonging, as we say, to a different branch of the function; and there is even no reason for s ‘ a gu> ar assuming that the number of branches is finite, or that P oln j s °’ different branches have the same singular points and solatloas – regions of existence. Moreover, and this is the most difficult con- sideration of all, all these circumstances may be dependent upon the values supposed given to the arbitrary constants of the integral; in other words, the singular points may be either fixed, being deter- mined by the differential equations themselves, or they may be movable with the variation of the arbitrary constants of integration. Such difficulties arise even in establishing the reversion of an elliptic integral, in solving the equation

= (x-a{)(x-a i)(x-a s){x-a i);

*about an ordinary value the right side is developable; if we put x—ai = h i , the right side becomes developable about h= =o; if we put x = i/t, the right side of the changed equation is developable about t = o; it is quite easy to show that the integral reducing to a definite value x for a value s„ is obtainable by a series in integral powers; this, however, must be supplemented by showing that for no value of s does the value of * become entirely undetermined.*

These remarks will show the place of the theory now to be sketched of a particular class of ordinary linear homogeneous differential equations whose importance arises from the completeness and generality with which they can Linear be discussed. We have seen that if in the equations dlfferen- dyldx = yi,dy 1 /dx = y 1 , . . ., dyn-z/ dx = y n-u tlalequa-

dyˆldx = a n y+aˆ yi + . . : +a 1 y„_ 1 , %%£%.

where ai, a 2 , . . . , a„ are now to be taken to be rational efficients. functions of x, the value x =x° be one for which no one of these rational functions is infinite, and y°, y°\, . . .,y°n_i be quite arbitrary finite values, then the equations are satisfied by

y = y°u+y°iUi + . . . y»-i« Wl where «, «i, . . ., «n-i are functions of x, independent of y, . .’. y°n-i, developable about x = x°; this value of y is such that for x = x° the functions y, yi . . y„_i reduce respectively to y, yf, . . . y°„-i; it can be proved that the region of existence of these series extends within a circle centre x° and radius equal to the distance from x° of

the nearest point at which one of 01, . . . a„ becomes infinite. Now consider a region enclosing a; , and only one of the places, say S, at which one of 01, . . . a„ becomes infinite. When x is made to describe a closed curve in this region, including this point S in its interior, it may well happen that the continuations of the functions «, «i, . . . , «n-i give, when we have returned to the point x, values v,vi,. . ., Vn-i, so that the integral under consideration becomes changed to y°v--yi°vi . . . +y c »-i»»_i. At x° let this branch and the corresponding values of yi, . . . j»„_i be ri°, jj°i, . . . i)°»_i; then, as there is only one series satisfying the equation and reducing to (ij°, i)°i, ._ . . ?j n-i) for x = x°, and the coefficients in the differential equation are single-valued functions, we must have T)°u+r\i'ui+ . ._. +Tj°n-iWn_i=;y D-|-:yVi-)- . . . + y°n-iVn-i ; as this holds for arbitrary values of y°, . . . y°„_i, upon which «, . . . «„_i and v, . . . z

y°v+. . . y" n -iv n – l = (7: i Aiiy i a) «. . . +(2 i A in y° i)u n – 1 ;

this is equal to n(y°u+ . . . +y n-i«n-i) if 2°r-i; eliminating y°, . . . y°„_i from these linear equations, we have a determinantal equation of order n for n; let jm be one of its roots; determining the ratios of y°, yi°, . . . y°„_i to satisfy the linear equations, we have thus proved that there exists an integral, H, of the equation, which when continued round the point S and back to the starting-point, becomes changed to Hi=ˆiH. Let now I be the value of x at S and n one of the values of (1/277-i) logˆi ; con- sider the function (— £)~ r iH; when x makes a circuit round * = £, this becomes changed to*

exp(-27riri) (jf-Q-vH, that is, is unchanged; thus we may put H = (— {) r i<£i, n- In general we obtain as many integrals of this form as there are really different roots; and the problem arises to discover, in case a root be k times repeated, k — 1 equations of as simple a form as possible to replace the k — 1 equations of the form y°v+ . . . + y n_iDn_i=(u(y°M-(- • . • +y p n_iM„_i) which would have existed had the roots been different. The most natural method of obtaining a suggestion lies probably in remarking that if r% = r--h, there is.an integral [(* — £) r i + V2~ (*— 0′ s i]lh, where the coefficients in*

the same functions of n--h as are the coefficients in fa of n; when h vanishes, this integral takes the form

(/strong>)'»[a£+*' I <* (>]■

or say (x-£) r i[fa+fa log (*-£)];

denoting this by 2-riˆK, and (— £) r i*

J changes K into

K'= ; ⁱ[e 2 ' r '(?) r ˆi+e 2 " ,v '(-{)"ˆi(27rJ+log(-y)]=MiK+H.

A similar artifice suggests itself when three of the roots of the determinantal equation are the same, and so on. We are thus led to the result, which is justified by an examination of the algebraic conditions, that whatever may be the circumstances as to the roots of the determinantal equation, n integrals exist, breaking up into batches, the values of the constituents Hi, H, ... of a batch after circuit about * = £ being; Hi'=/iiHi, H 2 '=miH2+Hi, Hs'=ju x H 3 +H2, and so on. And this is found to lead to the forms (as — £) r i<£i, (*-«)'ii+0i log (x-m, (-£Mxi+x»log (* r f)+ *i (log(x-£)) 2], and so on. Here each of fa, fa, xu xt, ■ ■ ■ is a series of positive and negative integral powers of x — £ in which the number of negative powers may be infinite.*

It appears natural enough now to inquire whether, under proper conditions for the forms of the rational functions 01, . . . a,,, it may be possible to ensure that in each of the series fa, fa, xi, ■ ■ ■ Regular fo e number of negative powers shall be finite. Herein equations. jj eSj j n f acti t jj e limitation which experience has shown to be justified by the completeness of the results obtained. Assum- ing n integrals in which in each of fa, fa, Xi • ■ • the number of negative powers is finite, there is a definite homogeneous linear differential equation having these integrals; this is found by forming it to have the form

y' » = (– 1) »&,/(» n + (x-{) iJuy'C"!) ...(- f) -"&,,y, where 61, . . . b n are finite for x = £. Conversely, assume the equation to have this form. Then on substituting a series of the form (— £) r [i+Ai(x — t)+A 2 (x — £) 2 + . . .] and equating the coefficients of like powers of * — f, it is found that r must be a root of an algebraic equation of order n ; this equation, which we shall call the index equation, can be obtained at once by substituting for y only (* — £)' and replacing each of 61, ... b n by their values at*

1. *= £; arrange the roots r\, r 2 , ... of this equation so that the real part of n is equal to, or greater than, the real part of n+u and take r equal to n; it is found that the coefficients Ai, Ai . . . are uniquely determinate, and that the series converges within a circle about £ = £ which includes no other of the points at which the rational functions 01, . . . a,, become*

infinite. We have thus a solution Hi = (x — £) r i<£i of the differential equation. If we now substitute in the equation y = Hi fridx, it is found to reduce to an equation of order n — 1 for -q of the form

,'(—1) = (_a-l Cl ,,'C»-»+ . . . +(_£)«-!«;_,,,

where ci, . . . Cn-i are not infinite at x = £. To this equation precisely similar reasoning can chen be applied; its index equation has in fact the roots r 2 — n — 1, . . . , r,, — n — 1; if r% — n be zero, the integral (x — Q^fa of the rj equation will give an integral of the original equation containing log (x — £); if r 2 — r\ be an integer, and therefore a negative integer, the same will be true, unless in fa the term in (x — £) r i _r 2 be absent; if neither of these arise, the original equation will have an integral (— {) r 2$2. The tj equation can now, by means of the one integral of it belonging to the index r% — n — I, be similarly reduced to one of order n — 2, and so on. The result will be that stated above. We shall say that an equation of the form in' question is regular about x = J.*

We may examine in this way the behaviour of the integrals at all the points at which any one of the rational functions a\ . . . a,, becomes infinite; in general we must expect that beside Fuchsian fagge j ne value x = oo will be a singular point for the equations. so i ut ; ons f t h e differential equation. To test this we put x — l/t throughout, and examine as before at t = o. For instance, the ordinary linear equation with constant coefficients has no singular point for finite values of x ; at x = 00 it has a singular point and is not regular; or again, Bessel's equation x 2 y"+xy' + (x 2 — n 2)y = o is regular about x = o, but not about x = 00 . An equation regular at all the finite singularities and also at x — ao is called a Fuchsian equation. We proceed to examine particularly the case of an equation of the second order

y"+ay'+by = o. Putting x = i/<, it becomes

dtyjdP + (2" 1 – af*)dy/dt + bt~*y = 0, which is not regular about t = o unless 2 — at~ x and bf 2 , that is, unless ax and 6× 2 are finite at x = 00 ; which we thus assume ; putting y = < r (i Ai< .. .),we find for the index equation at x = 00 „t1"i the equation r(r-i)+r(2-aa;)o+(^ 2)o = o. If there be*

finite singular points at &, . . . {,,, where we assume m>\, the cases m — o, m = i being easily dealt with, and if <£(x) = (x — £1) . . . (x — £ m), we must have a.$(x) and b.[(j>(x)f finite for all finite

values" of x, equal say to the re- spective polynomials \f/(x) and 6{x), of which by the conditions at

- *= oothe highest respective orders possible are m — l and 2(m — i).*

of the

second

order.

TheindexequationatK = |,isr(r-l)+r^(?i)/^>'({i)-|-9(£),/[0'(£i)] 8 = o, and if m, ft be its roots, we have ai+ft = i — ^fo)/<£'(£i) and aift=0(ti)/[<£'(£i)] 2 . Thus by an elementary theorem of algebra, the sum S(l — at — ft)/(x — {,•), extended to the m finite singular points, is equal to ip(x) l{x) , and the sum S(l — a< — ft) is equal to the ratio of the coefficients of the highest powers of x in 4>(x) and 4>(x), and therefore equal to i+a+ft where a, j3 are the indices at # = ao. Further, if (x, i)m_2 denote the integral part of the quotient 8{x)l{x), we haveZaift0'(£,-)/(x-£,-) equal to – Oc, l) m ^+8(x)/(x), and the coefficient of »™~ 2 in (x, i)m_2 is oft Thus the differential equation has the form

y'+/2(l-a,—/SO/(-{ i)+M(.l)»-»+2a < ft'(&)/(-&)]/(*)=0. If, however, we make a change in the dependent variable, putting y = (x — £i)"i . . . (x — { m) a mi), it is easy to see that the equation changes into one having the same singular points about each of which it is regular, and that the indices at x — & become o and Pi — at, which we shall denote by X;, for (x — £j)"j can be developed in positive integral powers of x — & about x = {i; by this transformation the indices at x = 00 are changed to*

a+ai-1-...+a™, /3+ft+...+ftn which we shall denote by X, p. If we suppose this change to have been introduced, and still denote the independent variable by y, the equation has the form

y'+y^(i-X0/(-fc)+y(,iW(*).-o 1*

while X+/H+X1+ . . . +X m = ?w — I. Conversely, it is easy to verify that if Xjt be the coefficient of x m_2 in (x, i) m _ 2 , this equation has the specified singular points and indices whatever be the other coefficients in (x, l) m _ 2 .

Thus we see that (beside the cases m = o, m = i) the " Fuchsian equation " of the second order with two finite singular points is

distinguished by the fact that it has a definite form when the singular points and the indices are assigned. "yP e Ve° m In that case, putting (-&)/(*—&) =//(/ — 1), the singular met ™ points are transformed to o, 1, 00 , and, as is clear, without e 1 uatloa – change of indices. Still denoting the independent variable by x, the equation then has the form*

x(i -x)y"+y'[i -Xi -x(l X /j.)} -Xm? = 0, which is the ordinary hypergeometric equation. Provided none of Xt, X2, X— jti be zero or integral about x — o, it has the solutions

F(X, m, 1— Xi, 3c),# 1 F(X-|-Xi, M+A lt 1+X1,*); about x = 1 it has the solutions*

F(X, fi, 1— X 2 , 1— x), (1— x)VF(X-r-\ 2 , m+^2, 1+X2, i—), where X+m+Xi+X 2 = i; about 3c = oo it has the solutions*

**-xp(x, x + x i> x m+i, x 1), «-cF(m, m+Xi, m-X+i, x' 1), where F(a, ft 7, x) is the series*

aftc a(a + l)/3(ff+l)s 2 r 7 "I" 1.2.7(7 + 1) •••' which converges when || — 1 algebraically.*

In accordance with our general theory, logarithms are to be expected in the solution when one of Xi, X 2 , X— 11 is zero or integral. Indeed when Xi is a negative integer, not zero, the second solution about x = o would contain vanishing factors in the denominators of its coefficients; in case X or m be one of the positive integers I, 2, . . . (— Xi), vanishing factors occur also in the numerators; and then, in fact, the. second solution about x = o becomes x K i times an integral polynomial of degree (— Xi) — X or of degree (— Xi) — ju. But when Xi is a negative integer including zero, and neither X nor n is one of the positive integers 1,2... (— Xi), the second solution about oc = o involves a term having the factor log x. When Xi is a positive integer, not zero, the second solution about x = o persists as a solution, in accordance with the order of arrangement of the roots of the index equation in our theory; the first solution is then replaced by an integral polynomial of degree — X or— /i, when Xor/i

is one of the negative integers o, — I , — 2 1— Xi, but otherwise

contains a logarithm. Similarly for the solutions about x = I or x = 00; it will be seen below how the results are deducible from those for x = o.

Denote now the solutions about x = o by «i, u%; those about x = l

by vi, v 2 ; and those about x = by v>i, w%; in the region (S<,Si)

common to the circles S , Si of radius I whose centres

are the points x = o, x = i, all the first four are valid, fT?

and there exist equations «i=A»i+Bt' 2 , M2 = Cdi + Dd 2 ?l5f ,*

where A, B, C, D are constants; in the region (SiS) "> ""»•*

lying inside the circle Si and outside the circle S a those that are

valid are Vi, v 2 , w u w 2 , and there exist equations Vi = Pwi+Qw 2 ,

V2 = Rw!+Tw2, where P, Q, R, T are constants; thus considering

any integral whose expression within the circle S is atii+bu 2 , where

a, b are constants, the same integral will be represented within the

circle Si by (aA+bC)'>i + (aB+bD)v 2 , and outside these circles will be

represented by

[(aA+&C)P + (aB+&D)R]wi+[(aA+&C)Q-r-(aB+&D)T]w,. ^

A single-valued branch of such integral can be obtained by making a barrier in the plane joining 00 to o and I to 00 ; for instance, by excluding the consideration of real negative values of x and of real

DIFFERENTIAL EQUATION

237

*positive values greater than I, and denning the phase of * and x-i for real values between o and 1 as respectively o and %.*

We can form the Fuchsian equation of the second order with three arbitrary singular points &, £ 2 , &>,. and no singular point at x = 00 , and with respective indices 01, (Si, a 2 , /3 2 , 03, fosuch Transfer- that

„ ., £1, fc, which are to be transformed respectively into

*o and I, by (£i)/(&) = *(*-i); and then there are four possible transformations of the dependent variable which will reduce one of the indices at t = o to zero and one of the indices at t = \ also to zero, namely, we may reduce either 01 or 0i at t=o, and simultaneously either 02 or ft at t = i. Thus the hypergeo- metric equation itself can be transformed into itself in 24 ways, and from the expression F(X, m, i-*i. 0 which satisfies it follow 23 other forms of solution; they involve four series in each of the argu- ments, x, x-i, i/x, 1/(1-), (x-i)/x, x/(x-i). Five of the 23 solutions agree with the fundamental solutions already described about x = o, x=l, x = oo ; and from the principles by which these were obtained it is immediately clear that the 24 forms are, in value, equal in fours. , „. . ,*

The quarter periods K, K' of Jacobi s theory of elliptic functions,

*of which K = j*P(i-h sin 2 9)"*i9, and K' is the same function of i-h, can easily be proved to be the solutions of a hypergeometric equation of which h is the independent variable. When K, K' are*

regarded as defined in terms of h by the differential MHir' equation, the ratio K'/K is an infinitely many valued ZnJtlons function of h. But it is remarkable that Jacobi's own

theory of theta functions leads to an expression for h in terms of K'/ K (see Function) in terms of single-valued functions. We may then attempt to investigate, in general, in what cases the independent variable x of a hypergeometric equation is a single- valued function of the ratio s of two independent integrals of the equation. The same inquiry is suggested by the problem of ascertaining in what cases the hypergeometric series F(a, (3, 7, x) is the expansion of an algebraic (irrational) function of x. In order to explain the meaning of the question, suppose that the plane of x is divided along the real axis from -co to o and from 1 to +a> , and, supposing logarithms not to enter about x = o, choose two quite definite integrals yi, y 2 of the equation, say

*yi = F(X, it, 1-X1, *), y 2 = * A iF(X+Xi, M+Xi, 1 + x i. *)> with the condition that the phase of x is zero when x is real and between o and I. Then the value of s = y 2 /yi is definite for all values of x in the divided plane, j being a single-valued monogenic branch of an analytical function existing and without singularities all over this region. If, now, the values of $ that so arise be plotted on to another*

*plane, a value p+iq of s being represented by a point {p, q) of this s-plane, and the value of x from which it arose being mentally associated with this point of the s-plane, these points will fill a connected region therein, with a continuous boundary formed of four portions corresponding to the two sides of the two barriers of the x-pla*ie. The question is then, firstly, whether the same value of s can arise for two different values of x, that is, whether the same point (p, q) of the s-plane can arise twice, or in other words, whether the region of the s-plane overlaps itself or not. Supposing this is not so, a second part of the question presents itself. If in the x-plane the barrier joining – 00 to o be momentarily removed, and x describe a small circle with centre at x = o starting from a point x= -h-4k, where h, k are small, real, and positive and coming back to this point, the original value s at this point will be changed to a value*

*s = x*iF(X4-Xi,j*-r-Xi, i+Xi,*)/F(X, ji, 1-X1, *)*

is changed to

Li = i/a. If this be so, the branch l will be represented by a region having the angle at the common point common with the region For the branch s; (but not altogether coinciding with this last region unless Xi be real, and therefore = ±i/a; then there is only a finite number, a, of branches obtainable in this way by crossing the barrier (-» ,0). In precisely the same way, if we had begun by taking the quotient

s' = (x-l)«F(X+X 2 , M+X2, 1 +Xj,'i-x) fF(X, /, l-X 2 , l-x)*

of the two solutions about x = 1 , we should have found that x is not a single-valued function of s' unless X 2 is the inverse of an integer, or is zero; as s' is of the form (As + B)/(Cs-f-D), A, B, C, D constants, the same is true in our case; equally, by considering the integrals about x = we find, as a third condition necessary in order that x may be a single-valued function of s, that X-m must be the inverse of an integer or be zero. These three differences of the indices, namely, Xi, X 2 , X-/x, are the quantities which enter in the differential equation satisfied by x as a function of s, which is easily found to be

*_*iu+2?£» ˆ(h-fo-hJx-Hx-iri+hhsrt+hlhix-i)-*,*

*Xi 3 2Xi **

where x\ — dx\ds, &c; and fei = i-yi 2 , & 2 = i-X 2 2 , A 3 =i-(X-m) 2 – Into the converse question whether the three conditions are

sufficient to ensure (1) that the s region corresponding to any branch does not overlap itself, (2) that no two such regions overlap, we have no space to enter. The second question clearly requires the inquiry whether the group (that is, the monodromy group) of the differential equation is properly discontinuous. (See Groups, Theory of.)

The foregoing account will give an idea of the nature of the function theories of differential equations; it appears essential not to exclude some explanation of a theory intimately related both to such theories and to transformation theories, which is a generalization of Galois's theory of algebraic equations. We deal only with the application to homogeneous linear differential equations.

In general a function of variables Xi, Xi . . . is said to be rational when it can be formed from them and the integers 1, 2, 3, . . . by a finite number of additions, subtractions, multiplications # a , this poly- nomial is not the product of other polynomials in y^ h > also irreduct- of rational form ; and, secondly, the equation has no bllity of a solution satisfying also a rational equation of lower order, rational From this it follows that if an irreducible equation P =0 equation. have one solution satisfying another rational equation Q = o of the same or higher order, then all the solutions of P =0 also satisfy Q = o. For from the equation P = o we can by differentiation express jf(+i> i y(k+2) t ... in terms of x, y, y (1) , . . . , y 1 * 5 , and so put the function Q rationally in terms of these quantities only. It is sufficient, then, to prove the result when the equation Q = is of the same order as P = o. Let both the equations be arranged as integral polynomials in y<*> ; their algebraic eliminant in regard to jrW must then vanish identically, for they are known to have one common solution not satisfying an equation of lower order; thus the equation P =0 involves Q = for all solutions of P =0.*

Now let 31C") = ai/" -1 ' + . . . --a n y be a given rational homo- geneous linear differential equation; let yi, . . . y,, be n particular functions of x, unconnected by any equation with constant co- efficients of the form c,yi + . . . +c,,y,,=o, all satisfying The the differential equation; let iji, . . . i),, be linear functions of yi, . . . y,,,say JK=Aj) =A(y), these being the equations of a general linear homogeneous group whose transformations

may be denoted by A, B We desire to form a

rational function (v), or say (A(y)), of 171, . . . rj, in which the 7j 2 constants A,, shall all be essential, and not. reduce effectively to a fewer number, as they would, for instance, if the yi,. . . . y,, were

connected by a linear equation with constant coefficients. Such a function is in fact given, if the solutions y it . . . y n be developable

variant function for a linear equation.

*in positive integral powers about * = a : , by <£(?;) = ij l j(#-a) B 7j2+ . . . + (x — a)*”- 1 ’”^. Such a function, V, we call a variant.*

Then differentiating V in regard to x, and replacing ij;(“> by its value aii)”- 1 ‘ +. . . +a n y, we can arrange dV/dx, and similarly each of cPV/dx* . . . dˆy/dx®, where N=ra 2 , as a linear function of There- the N quantities tji, . . . v „, . . . iji c ‘ l – 1, > • • • tjˆ-ˆ.and ” thence by elimination obtain a linear differential equation solvent £ or y Q £ or(j er jyj w ; t j 1 ra t; ona i coefficients. This we equation, denote by F=o. Further, each of %, . . .7j„ is expressible as a linear function of V, dV/dx, . . . dˆ-W/dxˆ- 1 , w ith rational co efficients not involving any of the n* coefficients An, since otherwise V would satisfy a linear equation of order less than N, which is impossible, as it involves (linearly) the n? arbitrary coefficients A*,-, which would not enter into the coefficients of the supposed equation. In particular, y lt . . . y„ are expressible rationally as linear functions of {y). Any solution W of the equation F = o is derivable from functions fi,. . . f„, which are linear functions of yi, . . . y n , just as V was derived from 771, . . .»;„; but it does not follow that these functions fi, ■ • fnare obtained from y lf . . . y„ by a transforma- tion of the linear group A, B, . . . ; for it may happen that the determinant – 1 ; we shall write, simply, V = r(u). Consider now the rational irreducible equation of lowest order, not necessarily a linear equation, which is satisfied by w; as yi, . . . y„ are particular functions, it may quite well be of order less than N ; we call it the resolvent equation, suppose it of order p, and denote it by y(v). Upon it the whole theory turns. In the first place, as y(v) =0 is satisfied by the solution a> of F = 0, all the solutions of y(v) are solutions F=o, and are therefore rationally expressible by a; any one may then be denoted by r(a). If this solution of F=o be not singular, it corresponds to a transformation A of the linear group (A, B, . . .), effected upon yi, . . . y„. The coefficients Ac,- of this transformation follow from the expressions before mentioned for 171. . .7j„in terms of V, dV/dx, d 2 V/dx 2 , ... by substituting V = r(u); thus they depend on the p arbitrary para- meters which enter into the general expression for the integral of the equation 7(11) =0. Without going*

into further details, it is then clear enough that the resolvent equation, being irreducible and such that any solution is expressible rationally, with p parameters, in terms of the solution «, enables us to define a linear homogeneous group of transformations of yi . . . y„ depending on p parameters ; and every operation of this (continuous) group corresponds to a rational transformation of the solution of the resolvent equation. This is the group called the rationality group, or the group of trans- formations of the original homogeneous linear differential equation. The group must not be confounded with a subgroup of itself, the monodromy group of the equation, often called simply the group of the equation, which is a set of transformations, not depend- ing on arbitrary variable parameters, arising for one particular fundamental set of solutions of the linear equation (|see Groups, Theory of).

The importance of the rationality group consists in three proposi- tions. (1) Any rational function of yi, . . . y„ which is unaltered in value by the transformations of the group can be written in rational form. (2) If any rational function be changed in form, becoming a rational function of yi, . . . y„, a transformation of the group applied to its new form will leave its value unaltered. (3) Any homogeneous linear transformation leaving unaltered the value of every rational function of y u . . . y n which has a rational value, belongs to the group. It follows from these that any group of linear homogeneous transformations having the properties (1) (2) is identical with the group in question. It is clear that with these properties the group must be of the greatest import- ance in attempting to discover what functions of x must be regarded as rational in order that the values of yi . . . y„ may be expressed. And this is the problem of solving the equation from another point of view.

Literature. — (a) Formal or Transformation Theories for Equations of the First Order: — E. Goursat, Legons sur I'integration des equa- tions aux derivies partielles du premier ordre (Paris, 1891) ; E. v. Weber, Vorlesungen ilber das Pfaff'sche Problem und die Theorie der partiellen Differentialgleichungen erster Ordnung (Leipzig, 1900); S. Lie und G. Scheffers, Geometrie der Beruhrungstransformationen, Bd. i. (Leipzig, 1896); Forsyth, Theory of Differential Equations, Part »., Exact Equations and Pfaff's Problem (Cambridge, 1890); S. Lie, "Allgemeine Untersuchungen fiber Differentialgleichungen, die eine continuirliche endliche Gruppe gestatten " (Memoir), Mathem. Annal. xxv. (1885), pp. 71-151 ; S. Lie und G. Scheffers, Vorlesungen iiber Differentialgleichungen mit bekannten infinitesimalen Transforma- lionen (Leipzig, 1891). A very full bibliography is given in the book of E. v. Weber referred to ; those

here named are perhaps sufficiently representative of modern works. Of classical works may be named : Jacobi, Vorlesungen ilber Dynamik (von A. Clebsch, Berlin, 1866) ; Werke, Supplementband; G Monge, Application de V analyse & la giometrie (par M. Liouville, Paris, 1850); J. L. Lagrange, Lecons

The fun' damental theorem In regard to the ration- ality group.

sur le calcul des fonctions (Paris, 1806), and ThSorie des fonctions analytiqu.es (Paris, Prairial, an V) ; G. Boole, A Treatise on Differ- ential Equations (London, 1859); and Supplementary Volume (London, 1865); Darboux, Lecons sur la thkorie g&ne'rale des surfaces, tt. i.-iv. (Paris, 1887-1896); S. Lie, Theorie der transforma- tionsgruppen ii. (on Contact Transformations) (Leipzig, 1890).

(0) Quantitative or Function Theories for Linear Equations: — C. Jordan, Cours d'analyse, t. iii. (Paris, 1896); E. Picard, TraitS d'analyse, tt. ii. and iii. (Paris, 1893, 1896); Fuchs, Various Memoirs, beginning with that in Crelle's Journal, Bd. lxvi. p. 121; Riemann, Werke, 2 r Aufl. (1892); Schlesinger, Handbuch der Theorie der linearen Differentialgleichungen, Bde. i.-ii. (Leipzig, 1895-1898); Heffter, Einleitung in die Theorie der linearen Differen- tialgleichungen mit einer unabhdngigen Variablen (Leipzig, 1894); Klein, Vorlesungen iiber lineare Differentialgleichungen der zweiten Ordnung (Autographed, Gottingen, 1894); and Vorlesungen iiber die hyper geometrische Function (Autographed, Gottingen, 1894); Forsyth, Theory of Differential Equations, Linear Equations.

(7) Rationality Group (of Linear Differential Equations): — Picard, Traite d' Analyse, as above, t. iii.; Vessiot, Annates de I'Ecole Normale, serie III. t. ix. p. 199 (Memoir); S. Lie, Transformationsgruppen, as above, iii. A connected account is given in Schlesinger, as above, Bd. ii., erstes Theil.

(5) Function Theories of Non-Linear Ordinary Equations: — Painlev6, Lecons sur la theorie analytique des equations differentielles (Paris, 1897, Autographed) ; Forsyth, Theory of Differential Equa- tions, Part ii., Ordinary Equations not Linear (two volumes, ii. and iii.) : (Cambridge, 1900) ; Konigsberger, Lehrbuch der Theorie der Differen- tialgleichungen (Leipzig, 1889); Painlev6, Lecons sur I'integration des Equations differentielles de la mecanique et applications (Paris, i8?5)-

(e) Formal Theories of Partial Equations of the Second and Higher

Orders: — E. Goursat, Lecons sur I'integration des Equations aux derivies partielles du second ordre, tt. i. and ii. (Paris, 1896, 1898); Forsyth, Treatise on Differential Equations (London, 1889); and Phil. Trans. Roy. Soc. (A.), vol. cxci. (1898), pp. 1-86.

(f) See also the six extensive articles in the second volume of the German Encyclopaedia of Mathematics. (H. F. Ba.)

DIFFLUGIA (L. Leclerc), a genus of lobose Rhizopoda, characterized by a shell formed of sand granules cemented together; these are swallowed by the animal, and during the process of bud-fission they pass to the surface of the daughter-bud and are cemented there. Centropyxis (Steia) and Lecqueureuxia (Schlumberg) differ only in minor points.

DIFFRACTION OF LIGHT— 1. When light proceeding from a small source falls upon an opaque object, a shadow is cast upon a screen situated behind the obstacle, and this shadow is found to be bordered by alternations of brightness and darkness, known as " diffraction bands." The phenomena thus presented were described by Grimaldi and by Newton. Subsequently T. Young showed that in their formation interference plays an important part, but the complete explanation was reserved for A. J. Fresnel. Later investigations by Fraunhofer, Airy and others have greatly widened the field, and under the head of " diffraction " are now usually treated all the effects dependent upon the limitation of a beam of light, as well as those which arise from irregularities of any kind at surfaces through which it is trans- mitted, or at which it is reflected.

2. Shadows. — In the infancy of the undulatory theory the objection most frequently urged against it was the difficulty of explaining the very existence of shadows. Thanks to Fresnel and his followers, this department of optics is now precisely the one in which the theory has gained its greatest triumphs. The principle employed in these investigations is due to C. Huygens, and may be thus formulated. If round the origin of waves an ideal closed surface be drawn, the whole action of the waves in the region beyond may be regarded as due to the motion continually propagated across the various elements of this surface. The wave motion due to any element of the surface is called a secondary wave, and in estimating the total effect regard must be paid to the phases as well as the amplitudes of the components. It is usually convenient to choose as the surface of resolution a wave-front, i.e. a surface at which the primary vibrations are in one phase. Any obscurity that may hang over Huygens's principle is due mainly to the indefiniteness of thought

and expression which we must be content to put up with if we wish to avoid pledging ourselves as to the character of the vibrations. In the application to sound, where we know what we are dealing with, the matter is simple enough in principle, although mathematical difficulties would often stand in the way of the calculations we might wish to make.

Fig. 1.

The ideal surface of resolution may be there regarded as a flexible lamina; and we know that, if by forces locally applied every element of the lamina be made to move normally to itself exactly as the air at that place does, the external aerial motion is fully determined. By the principle of superposition the whole effect may be found by integration of the partial effects due to each element of the surface, the other elements remaining at rest.

We will now consider in detail the important case in which uniform plane waves are resolved at a surface coincident with a wave-front (OQ). We imagine a wave-front divided , into elementary rings or zones — often named after Huygens, but better after Fresnel — by spheres described round P (the point at which the aggregate effect is to be estimated), the first sphere, touching the plane at O, with a radius equal to PO, and the succeeding spheres with radii increasing at each step by §X. There are thus marked out a series of circles, whose radii x are given by x? j r 2 = (r | inX) 2 , or x 2 = rihr nearly ; so that the rings are at first of nearly equal area. Now the effect upon P of each element of the plane is proportional to its area; but it depends also upon the distance from P, and possibly upon the inclination of the secondary ray to the direction of vibration and to the wave-front.

The latter question can only be treated in connexion with the dynamical theory (see below, § 11); but under all ordinary circumstances the result is independent of the precise answer that may be given. All that it is necessary to assume is that the effects of the successive zones gradually diminish, whether from the increasing obliquity of the secondary ray or because (on account of the limitation of the region of integration) the zones become at last more and more incomplete. The component vibrations at P due to the successive zones are thus nearly equal in amplitude, and opposite in

phase (the phase of each corresponding to that of the infinitesimal circle midway between the boundaries), and the series which we have to sum is one in which the terms are alternately opposite in sign and, while at first nearly constant in numerical magnitude, gradually diminish to zero. In such a series each term may be regarded as very nearly indeed destroyed by the halves of its immediate neighbours, and thus the sum of the whole series is represented by half the first term, which stands over uncompensated. The question is thus reduced to that of finding the effect of the first zone, or central circle, of which the area is v\r.

We have seen that the problem before us is independent of the law of the secondary wave as regards obliquity; but the result of the integration necessarily involves the law of the intensity and phase of a secondary wave as a function of r, the distance from the origin. And we may in fact, as was done by A. Smith (Camb. Math. Journ., 1843, 3, p. 46), determine the law of the secondary wave, by comparing the result of the integration with that obtained by sup- posing the primary wave to pass on to P without resolution.

Now as to the phase of the secondary wave, it might appear natural to suppose that it starts from any point Q with the phase of the primary wave, so that on arrival at P, it is retarded by the amount corresponding to QP. But a little consideration will prove that in that case the series of secondary waves could not reconstitute the primary wave. For the aggregate effect of the secondary waves is the half of that of the first Fresnel zone, and it is the central element only of that zone for which the distance to be travelled is equal to r. Let us conceive the zone in question to be divided into infinitesimal rings of equal area. The effects due to each of these rings are equal in amplitude and of phase ranging uniformly over half a complete period. The phase of the resultant is midway between those of the extreme elements, that is to say, a quarter of a period behind that due to the element at the centre of the circle. It is accordingly necessary to suppose that the secondary waves start with a phase one-quarter of a period in advance of that of the primary wave at the surface of resolution.

Further, it is evident that account must be taken of the variation of phase in estimating the magnitude of the effect at P of the first zone. The middle element alone contributes without deduction; the effect of every other must be found by. introduction of a resolv- ing factor, equal to cos 0, if 6 represent the difference of phase between this element and the resultant. Accordingly, the amplitude of the resultant will be less than if all its components had the same

phase, in the ratio

/

+h

cos 8d6 : ir,

or 2: jr. Now 2 area /V = 2Xr; so that, in order to reconcile the amplitude of the primary wave (taken as unity) with the half effect of the first zone, the amplitude, at distance r, of the secondary wave emitted from the element of area dS must be taken to be

dS/\r (1).

By this expression, in conjunction with the quarter-period acceleration of phase, the law of the secondary wave is determined.

That the amplitude of the secondary wave should vary as r -1 was to be expected from considerations respecting energy; but the occurrence of the factor X -1 , and the acceleration of phase, have sometimes been regarded as mysterious. It may be well therefore to remember^ that precisely these laws apply to a secondary wave of sound, which can be investigated upon the strictest mechanical principles.

The recomposition of the secondary waves may also be treated analytically. If the primary wave at O be cos kat, the effect of the secondary wave proceeding from the element dS at Q is

r- cos k(at— p+JX) = — r- sin k(at—p).

IfdS—

2irxdx, we have for the whole effect

2x f"° sink(at—p)xdx "xjo P '

or, since xdx = pdp, k = 2irl

— kC"- sin h{at—p)dp= \— cos £(a< — p)j~

In order to obtain the. effect of the primary wave, as retarded by traversing the distance r, viz. cos k{al-r), it is necessary to suppose that the integrated term vanishes at the upper limit. And it is important to notice that without some further understanding the integral is really ambiguous. According to the assumed law of the secondary wave, the result must actually depend upon the precise radius of the outer boundary of the region of integration, supposed to be exactly circular. This case is, however, at most very special and exceptional. We may usually suppose that a large number of the outer rings are incomplete, so that the integrated term at the upper limit may properly be taken to vanish. If a formal proof be desired, it

may be obtained by introducing into the integral a factor such as e~ hl> , in which h is ultimately made to diminish without limit.

When the primary wave is plane, the area of the first Fresnel zone is tt>&, and, since the secondary waves vary as r~ l , the intensity is independent of r, as of course it should be. If, however, the primary wave be spherical, and of radius a at the wave-front of resolution, then we know that at a distance r further on the amplitude of the primary wave will be diminished in the ratio a:(r--a). This may be regarded as a consequence of the altered area of the first Fresnel zone. For, if x be its radius, we have (C+fX) 2 - 2 } +V |a 2 -* 2 | =r+a,*

so that

• *x* = \ar/(a+r) nearly.*

Since the distance to be travelled by the secondary waves is still r, we see how the effect of the first zone, and therefore of the whole series is proportional to a/(a+r). In like manner may be treated other cases, such as that of a primary wave-front of unequal principal curvatures.

The general explanation of the formation of shadows may also be conveniently based upon Fresnel's zones. If the point under consideration be so far away from the geometrical shadow that, a large number of the earlier zones are complete, then the illumination, determined sensibly by the first zone, is the same as if there were no obstruction at all. If, on the other hand, the point be well immersed in the geometrical shadow, the earlier zones are altogether missing, and, instead of a series of terms beginning with finite numerical magnitude and gradually diminishing to zero, we have now to deal with one of which the terms diminish to zero at both ends. The sum of such a series is very approximately zero, each term being neutralized by the halves of its immediate neighbours, which are of the opposite sign. The question of light or darkness then depends upon whether the series begins or ends abruptly. With few exceptions, abruptness can occur only in the presence of the first term, viz. when the secondary wave of least retardation is unobstructed, or when a ray passes through the point under consideration. According to the undulatory theory the light cannot be regarded strictly as travelling along a ray ; but the existence of an unobstructed ray implies that the system of Fresnel's zones can be commenced, and, if a large number of these zones are fully developed and do not terminate abruptly, the illumination is

unaffected by the neighbour- hood of obstacles. Intermediate cases in whicha few zones only are formed belong especially to the province of diffraction.

An interesting exception to the general rule that full brightness requires the existence of the first zone occurs when the obstacle assumes the form of a small circular disk parallel to the plane of the incident waves. In the earlier half of the 1 8th century R. Delisle found, that the centre of the circular shadow was occupied by a bright point of light, but the observation passed into oblivion until S. D. Poisson brought forward as an objection to Fresnel's theory that it required at the centre of a circular shadow a point as bright as if no obstacle were intervening, If we conceive the primary wave to be broken up at the plane of the disk, a system of Fresnel's zones can be constructed which begin from the circumference; and the first zone external to the disk plays the part ordinarily taken by the centre of the entire system. The whole effect is the

half of that of the first existing zone, and this is sensibly the same as if there were no obstruction.

When light passes through a small circular or annular aperture, the illumination at any point along the axis depends upon the precise relation between the aperture and the distance from it at which the point is taken. If, as in the last paragraph, we imagine a system of zones to be drawn commencing from the inner circular boundary of the aperture, the question turns upon the manner in which the series terminates at the outer boundary. If the aperture be such as to fit exactly an integral number of zones, the aggregate effect may be regarded as the half of those due to the first and last zones. If the number of zones be even, the action of the first and last zones are antagonistic, and there is complete darkness at the point. If on the other hand the number of zones be odd, the effects con- spire ; and the illumination (proportional to the square of the ampli- tude) is four times as great as if there were no obstruction at all.*

The process of augmenting the resultant illumination at a par- ticular point by stopping some of the secondary rays may be carried much further (Soret, Pogg. Ann., 1875, 156, p. 99). By the aid of photography it is easy to prepare a plate, transparent where the zones of odd order fall, and opaque where those of even order fall.

Such a plate has the power of a condensing lens, and gives an illumination out of all proportion to what could be obtained without it. An even greater effect (fourfold) can be attained by providing that the stoppage of the light from the alternate zones is replaced by a phase-reversal without loss of amplitude. R. W. Wood {Phil. Mag., 1898, 45, p 513) has succeeded in constructing zone plates upon this principle.

In such experiments the narrowness of the zones renders necessary a pretty close approximation to the geometrical conditions. Thus in the case of the circular disk, equidistant (/) from the source of light and from the screen upon which the shadow is observed, the width of the first exterior zone is given by

2x being the diameter of the disk. If 2r = iooo cm., 2 = i cm., A = 6Xio~ 6 cm., then dx = ooi5 cm. Hence, in order that this zone may be perfectly formed, there should be no error in the circum ference of the order of -ooi cm. (It is easy to see that the radius of the bright spot is of the same order of magnitude.) The experiment succeeds in a dark room of the length above mentioned, with a threepenny bit (supported by three threads) as obstacle, the origin of light being a small needle hole in a plate of tin, through which the sun's rays shine horizontally after reflection from an external mirror. In the absence of a heliostat it is more convenient to obtain a point of light with the aid of a lens of short focus.*

The amplitude of the light at any point in the axis, when plane waves are incident perpendicularly upon an annular aperture, is, as above,

cos k(at-ri)-cos k(at-r 2) = 2 sin kat sin k(/r-ri) >

r»,ri being the distances of the outer and inner boundaries from the point in question. It is scarcely necessary to remark that in all such cases the calculation applies in the first instance to homogeneous light, and that, in accordance with Fourier's theorem, each homogeneous component of a mixture may be treated separately. When the original light is white, the presence of some components and the absence of others will usually give rise to coloured effects, variable with the precise circumstances of the case.

Although the matter can be fully treated only upon the basis of a dynamical theory, it is proper to point out at once that there is an element of assumption in the application of Huygens's principle to the calculation of the effects produced by opaque screens of limited extent. Properly applied, the principle could not fail; but, as may

readily be proved in the case of sonorous waves, it is not in strictness sufficient to assume the expression for a secondary wave suitable when the primary wave is undisturbed, with mere limitation of the integration to the transparent parts of the screen. _ But, except perhaps in the case of very fine gratings, it is probable that the error thus caused is insignificant; for the incorrect estimation of the secondary waves will be limited to distances of a few wave-lengths only from the boundary of opaque and transparent parts.

3. Fraunhofer's Diffraction Phenomena. — A very general problem in diffraction is the investigation of the distribution of light over a screen upon which impinge divergent or con- vergent spherical waves after passage through various diffracting apertures. When the waves are convergent and the recipient screen is placed so as to contain the centre of convergency — the image of the original radiant point, the calculation assumes a less complicated form. This class of phenomena was investigated by J. von Fraunhofer (upon principles laid down by Fresnel), and are sometimes called after his name. We may conveniently

commence with them on account of their simplicity and great importance in respect to the theory of optical instruments.

If / be the radius of the spherical wave at the place of resolution, where the vibration is represented by cos kat, then at any point M (fig. 2) in the recipient screen the vibration due to an element

— r— sink(at — p) ,

p being the distance between M and the element dS.

Taking co-ordinates in the plane of the screen with the centre of the wave as origin, let us represent M by £, jj, and P (where d$> is situated) by x, y, z. Then

Fig. 2.

so that

p^ = { x -^+{y-r,Y+z\ f> =x+y*+z*; P*=f-2xl;-2yr, +l?+r,*

In the applications with which we are concerned, {, 1; are very small quantities; and we may take

xj+yy P

At the same time dS > may be identified with dxdy, and in the denominator p may be treated as constant and equal to /. Thus the expression for the vibration at M becomes

P = / 1-

l f jy % si ak \at-f + ˆ ± ˆ\dxd y . . . (1);

\f.

and for the intensity, represented by the square of the amplitude, ˆˆ[//ˆkˆdxdy]'

+ ■

w[ff c

cos£

I

12

(2).

This expression for the intensity becomes rigorously applicable when / is indefinitely great, so that ordinary optical aberration disappears. The incident waves are thus plane, and are limited to a plane aperture coincident with a wave-front. The integrals are then properly functions of the direction in which the light is to be estimated.

In experiment under ordinary circumstances it makes no differ- ence whether the collecting lens is in front of or behind the diffract- ing aperture. It is usually most convenient to employ a telescope focused upon the radiant point, and to place the diffracting apertures immediately in front of the object-glass. What is seen through the eye-piece in any case is the same as would be depicted upon a screen in the focal plane.

Before proceeding to special cases it may be well to call attention to some general properties of the solution expressed by (2) (see Bridge, Phil. Mag., 1858).

If when the aperture is given, the wave-length (proportional to tr 1) varies, the composition of the integrals is unaltered, provided £ and rj are taken universely proportional to X. A diminution of X thus leads to a simple proportional shrinkage of the diffraction pattern,

attended by an augmentation of brilliancy in proportion to A- 2 .

If the wave-length remains unchanged, similar effects are pro- duced by an increase in the scale of the aperture. The linear dimension of the diffraction pattern is inversely as that of the aperture, and the brightness at corresponding points is as the square of the area of aperture.

If the aperture and wave-length increase in the same proportion, the size and shape of the diffraction pattern undergo no change.

We will now apply the integrals (2) to the case of a rectangular aperture of width a parallel to x and of width b parallel to y. The limits of integration for x may thus be taken to be -\a and +i

JK.

1 A

(3),

***a*P Ti-gfty*

as representing the distribution of light in the image of a mathe- matical point when the aperture is rectangular, as is often the case in spectroscopes.

The second and third factors of (3) being each of the form sin 2 w/u 2 , we have to examine the character of this function. It vanishes when u = mlt, m being any whole number other than zero. When « = o, it takes the value unity. The maxima occur when

and then

w = tan u, sin 2 «/tt 2 = cos 2 w

(4), (5).

To calculate the roots of (5) we may assume

u .=» (m+ \)T-y = U-y,

where y is a positive quantity which is small when u is large. Substi-

tuting this, we find cot y = U-y, whence

This equation is to be solved by successive approximation. It will readily be found that

«=U-

13,

146 T

. y==U _ U – 1 _ gU – 3 ˆ U 5 U -,_.

(6).

In the first quadrant there is no root after zero, since tan «>«, and in the second quadrant there is none because the signs of u and tan u are opposite. The first root after zero is thus in the third quadrant, corresponding to m = l. Even in this case the series converges sufficiently to give the value of the root with considerable accuracy, while for higher values of m it is all that could be desired. The actual values of «/x (calculated in another manner by F. M. Schwerd) are l-43°3. 2 '459°. 3 – 47°9. 4 – 4747, 5-4818, 6-4844, &c.

Since the maxima occur when u — (m+ˆ)ir nearly, the successive values are not very different from

4 4 4 &c ff»" 25V 357'*

The application of these results to (3) shows that the field is brightest at the centre l = o, ij = o, viz. at the geometrical image of the radiant point. It is traversed by dark lines whose equations are

£ = mf\/a, 7) = mf\/b. Within the rectangle formed by pairs of consecutive dark lines, and not far from its centre, the brightness rises to a maximum; but these subsequent maxima are in all cases much inferior to the brightness at the centre of the entire pattern (£ = 0, ij = o).

By the principle of energy the illumination over the entire focal plane must be equal to that over the diffracting area ; and thus, in accordance with the suppositions by which (3) was obtained, its value when integrated from { = 00 to £=+00, and from j;= — 00 to »j=+co should be equal to ab. This integration, employed originally by P. Kelland (Edin. Trans. 15, p. 315) to determine the absolute intensity of a secondary wave, may be at once effected by

means of the known formula

It will be observed that, while the total intensity is proportional to ab, the intensity at the focal point is proportional to a?b. If the aperture be increased, not only is the total brightness over the focal plane increased with it, but there is also a concentration of the diffraction pattern. The form of (3) shows immediately that, if a and b be altered, the co-ordinates of any characteristic point in the pattern vary as a- 1 and b- 1 .*

The contraction of the diffraction pattern with increase of aperture is of fundamental importance in connexion with the resolving power of optical instruments. According to common optics, where images are absolute, the diffraction pattern is supposed to be infinitely small, and two radiant points, however near together, form separated images. This is tantamount to an assumption that X is infinitely small. The actual finiteness of X imposes a limit upon the separating or resolving power of an optical instrument.

This indefiniteness of images is sometimes said to be due to diffraction by the edge of the aperture, and proposals have even been made for curing it by causing the transition between the interrupted and transmitted parts of the primary wave to be less abrupt. Such a view of the matter is altogether misleading. What requires explanation is not the imperfection of actual images so much as the possibility of their being as good as we find them.

At the focal point (£ = 0, »;=o) all the secondary waves agree in phase, and the intensity is easily expressed, whatever be the form of the aperture. From the general formula (2), if A be the area of aperture,

Io»=AVX»/» (7). '

The formation of a sharp image of the radiant point requires that the illumination become insignificant when £, ij attain small values, and this insignificance can only arise as a consequence of discrepancies of phase among the secondary waves from various parts of the aperture. So long as there is no sensible discrepancy of phase there can be no sensible diminution of brightness as com- pared with that to be found at the focal point itself. We may go further, and lay it down that there can be no considerable loss of brightness until the difference of phase of the waves proceeding from the nearest and farthest parts of the aperture amounts to JX.

When the difference of phase amounts to X, we may expect the resultant illumination to be very much reduced. In the particular case of a rectangular aperture the course of things can be readily followed, especially if we conceive / to be infinite. In the direction (suppose horizontal) for which i; = o, |//=sin B, the phases of the secondary waves range over a complete period when sin = X/a, and, since all parts of the horizontal aperture are equally effective, there is in this direction a complete compensation and consequent absence of illumination. When sin = fX/a, the phases range one and a half

periods, and there is revival of illumination. We may compare the brightness with that in the direction = o. The phase of the resultant amplitude is the same as that due to the central secondary wave, and the discrepancies of phase among the components reduce the amplitude in the proportion

**/-*

*+f**

■tr

cos d: 1 ,

or — 2/3-:i; so that the brightness in this direction is 4/91ˆ of the maximum at = o. In like manner we may find the illumination in any other direction, and it is obvious that it vanishes when sin is any multiple of X/a.*

The reason of the augmentation of resolving power with aperture will now be evident. The larger the aperture the smaller are the angles through which it is necessary to deviate from the principal direction in order to bring in specified discrepancies of phase — the more concentrated is the image.

In many cases the subject of examination is a luminous line of uniform intensity, the various points of which are to be treated as independent sources of light. If the image of the line be £ = 0, the intensity at any point £ , 17 of the diffraction pattern may be represented by

x:

*,*qt*

9 J. °i" — r7

x 2 / 2

(8),

Fig. 3.

the same law as obtains for a luminous point when horizontal directions are alone considered. The definition of a fine vertical line, and consequently the resolving power for contiguous vertical lines, is thus independent of the vertical aperture of the instrument, a law of great importance in the theory of the spectroscope. H The distribution of illumination in the image of a luminous line is shown by the curve ABC (fig. 3), representing the value of the function sin 2 «/« 2 from w = o to u — 2w. The part corresponding to negative values of« is similar, OA being a line of symmetry.

Let us now consider the distribution of brightness in the image of a double line whose components are of equal strength, and at such an angular interval that the central line in the image of one coincides with the first zero of brightness in the image of the other. In fig. 3 the curve of brightness for one component is ABC, and for the other OA'C ; and the curve representing half the combined brightnesses is E'BE. The brightness (cor- responding to B) midway between the two central points AA' is 8 106 of the bright ness at the central points themselves. We may consider this to be about the limit of closeness at which there could be any decided appearance of resolution, though doubtless an observer accustomed to his instrument would recognize the duplicity with certainty. The obliquity, corre- sponding to u = w, is such that the phases of the secondary Waves range over a com- plete period, i.e. such that the projection of the horizontal aperture upon this direction is one wave-length. We conclude that a double line cannot be fairly resolved unless Us components subtend an angle exceeding that subtended by the wave-length of light at a distance equal to the horizontal aperture. This rule is convenient on account of its simplicity ; and it is sufficiently accurate in view of the necessary uncertainty as to what exactly is meant by resolution.

If the angular interval between the components of a double line be half as great again as that supposed in the figure, the brightness midway between is -1802 as against 1-0450 at the central lines of each image. Such a falling off in the middle must be more than sufficient for resolution. If the angle subtended by the components of a double line be twice that subtended by the wave-length at a distance equal to the horizontal aperture, the central bands are just clear of one another, and there is a line of absolute blackness in the

middle of the combined images.

The resolving power of a telescope with circular or rectangular aperture is easily investigated experimentally. The best object for examination is a grating of fine wires, about fifty to the inch, backed by a sodium flame. The object-glass is provided with diaphragms pierced with round holes or slits. One of these, of width equal, say, to one-tenth of an inch, is inserted in front of the object-glass, and the telescope, carefully focused all the while, is drawn gradually back from the grating until the lines are no longer seen. From a measure- ment of the maximum distance the least angle between consecutive lines consistent with resolution may be deduced, and a comparison made with the rule stated above.

Merely to show the dependence of resolving power on aperture it is not necessary to use a telescope at all. It is sufficient to look at wire gauze backed by the sky or by a flame, through a piece of blackened cardboard, pierced by a needle and held close to the eye. By varying the distance the point is easily found at which resolution ceases; and the observation is as sharp as with a telescope. The

function of the telescope is in fact to allow the use of a wider, and therefore more easily measurable, aperture. An interesting modi- fication of the experiment may be made by using light of various wave-lengths.

Since the limitation of the width of the central band in the image of a luminous line depends upon discrepancies of phase among the secondary waves, and since the discrepancy is greatest for the waves which come from the edges of the aperture, the question arises how far the operation of the central parts of the aperture is ad- vantageous. If we imagine the aperture reduced to, two equal narrow slits bordering its edges, compensation will evidently be complete when the projection on an oblique direction is equal to \, instead of X as for the complete aperture. By this procedure the width of the central band in the diffraction pattern is halved, and so far an advantage is attained. But, as will be evident, the bright bands bordering the central band are now not inferior to it in brightness; in fact, a band similar to the central band is repro- duced an indefinite number of times, so long as there is no sensible discrepancy of phase in the secondary waves proceeding. from the various parts of the

same slit. Under these circumstances the narrowing of the band is paid for at a ruinous price, and the arrange- ment must be condemned altogether.

A more moderate suppression of the central parts is, however, sometimes advantageous. Theory and experiment alike prove that a double line, of which the components are equally strong, is better resolved when, for example, one-sixth of the horizontal aperture is blocked off by a central screen ; or the rays quite at the centre may be allowed to pass, while others a little farther removed are blocked off. Stops, each occupying one-eighth of the width, and with centres situated at the points of trisection, answer Well the required purpose.

It has already been suggested that the principle of energy requires that the general expression for P in (2) when integrated over the whole of the plane ?, 17 should be equal to A, where A is the area of the aperture. A general analytical verification has been given by Sir G. G. Stokes (Edin. Trans., 1853, 20, p. 317). Analytically expressed —

*fJ + £¥d\dn = *ffdxdy = A*

(9).

We have seen that I§ (the intensity at the focal point) was equal to A 2 /X 2 / 2 . If A' be the area over which the intensity must be I§ in order to give the actual total intensity in accordance with

W^ffiyatdn,

the relation between A and A' is AA' = X 2 / J . Since A' is in some sense the area of the diffraction pattern, it may be considered to be a rough criterion of the definition, and we infer that the definition of a point depends principally upon the area of the aperture, and only in a very secondary degree upon the shape when the area is maintained constant.

4. Theory of Circular Aperture. — We will now consider the important case where the form of the aperture is circular. Writing for brevity

H!f = p, k v lf = q, ... (1), we have for the general expression (§ 11) of the intensity

X 2 /2p = S s + C 2 – : ...",- • (2),

where S=ffsin{px+qy)dxdy, . . . (3),

C=ffcos(px : -qy)dxdy, . . . (4).

When, as in the application to rectangular or circular apertures, the form is symmetrical with respect to the axes both of x and y,. S = o, and C reduces to

C=Jjcospx cos qydxdy, . . . (5).

In the case of the circular aperture the distribution of light is of course symmetrical with respect to the focal point p = o, g = o; and C is a function of p and q only through V (P'+q 1). It is thus sufficient to determine the intensity along the axis of p. Putting q — o, we get

*C *=ffcos px d x dy = 2/1 s cos px V (R 2 — a 2) dx,*

R being the radius of the aperture. This integral is the Bessel's function of order unity, defined by

Ji(z)=- J x cos(zcos0)sin 2 0i0 . . . (6).

Thus, if s = R cos <£,

*C = *°R 2 Mm. .... (7); pR.*

and the illumination at distance r from the focal point is

vr«, 4 m /x ; (8)

1 X 2 / 2 / 2irRA 2 W •

I n !

The ascending series for Ji(z). used by Sir G. B. Airy (Camb. Trans.,

1834) in his original investigation of the diffraction of a circular object-glass, and readily obtained from (6), is

.(«)=!•*

2?.4 T 2 2 .4 2 .6

r+

2 2 .4 2 .6 2 .8

When z is great, we may employ the semi-convergent series

3.5. 7.9.1.3. 5 /l)*

8.16.24.32 W + ”” 5

*J- * / f 2 \ 1 , aS 3 * 3.5. 7.1.3 /l\ s + V .(«) C0S (2 -W \ § • 7 ~ 8.16.24 (z)*

(9).

+

3.5.7.9.11.1.3.5

**©’-■••!■*

(io).

8.16.24:32.40

A table of the values- of 2z -l J 1 (z) has been given by E. C. J. Lommel (Schlomilch, 1870, 15, p. 166), to whom is due the first systematic application of Bessel’s functions to the diffraction integrals.

The illumination vanishes in correspondence with the roots of the equation Ji(z) =0. If these be called zi,‘z 2 , z 3 , . . . the radii of the dark rings in the diffraction pattern are

*/Xzi /Xz 2 2ˆR‘2*R’---*

being thus inversely proportional to R.

The integrations may also be effected by means of polar co-ordinates, taking first the integration with respect to <£ so as to obtain the result for an infinitely thin annular aperture. Thus, if

x = p cos ,~y = p sin , C =JJ cos px dx dy = /” R Jq” cos {pp Cos 0) pdp d$. Now by definition

J0C2) = ˆJo ” c o s (z cos e) ˆ = 1- 2ˆ+2T42 _ 2 2 ~4 2 ~6 2 ” 1 “- • • (11)-

The value of C for an annular aperture of radius r and width dr is thus

For the complete circle,

„ 2tt f pB. t , . .

2-^ 2 R a p'R 1 ? 8 R' {*

*~p*l 2 ■ 2 2 .4 + 2 2 .4 2 .6 •'•%*

..'■■'... = T R 2 .?^^ as before.

In these expressions we are to replace p by &£//, or rather, since the diffraction pattern is symmetrical, by kr/f, where r is the distance of any point in the focal plane from the centre of the system.

The foots of Jo(z) after the first may be found from

i-25 + and those of Ji(z) from

050661

•053041 '262051

3 + 7

4j_1 (4t-l) 3 ^(4i-l) 4

z _ •_!_ ok '151982 , -015399 "245835

(13).

(14),

(4i-|-l) 6 '

formulae derived by Stokes (Camb. Trans., 1850, vol. ix.) from the descending series. 1 The following table gives the actual values : —

i

*fforj (*) = *0*

jforj^zj-u

i

|fOrJ„(z) = 0

|forJ,(«) = 0

1 2 3

4 5

•7655

1-7571 27546 37534 4-7527

.1-2197 22330 32383 42411 52428

6

7

8

9

10

57522 67519 77516 87514 97513

6 2439 72448 8 2454 92459 102463

In both cases the image of a mathematical point is thus a symmetrical ring system. The greatest brightness is at the centre, where

dC=2Trpdp, C = ttR 2 .

For a certain distance outwards this remains sensibly unimpaired and then gradually diminishes to zero, as the secondary waves become discrepant in phase. The subsequent revivals of brightness forming the bright rings are necessarily of inferior brilliancy as compared with the central disk.

The first dark ring in the diffraction pattern of the complete circular aperture occurs when

r//=i-2i97XX/2R . . . ■'. . . (15).

1 The descending series for Jo(z) appears to have been first given by Sir W. Hamilton in a memoir on " Fluctuating Functions," Roy, Irish Trans., 184a

We may compare this with the corresponding result for a rectangular aperture of width a,

and it appears that in consequence of the preponderance of the central parts, the compensation in the case of the circle does not set in at so small an obliquity as when the circle is replaced by a rectangular aperture, whose side is equal to the diameter of the circle.

Again, if we compare the complete circle with a narrow annular aperture of the same radius, we see that in the letter case the first dark ring occurs at a much smaller obliquity, viz. »7/ = 7655XX/2R.

It has been found by Sir William Herschel and others that the definition of a telescope is often improved by stopping off a part of the central area of the object-glass; but the advantage to be obtained in this way is in no case great, and anything like a reduction of the aperture to a narrow annulus is attended by a development of the external luminous rings sufficient to outweigh any improvement due to the diminished diameter of the central area. 1

The maximum brightnesses and the places at which they occur are easily determined with the aid of certain properties of the Bessel's functions. It is known (see Spherical Harmonics) that

Jo'(z) — Ji(«). •

j,M-Jj 1 («Hi'(»)

Jo(«) + J.(*)-jJi(«)

(16); (17); (18).

The maxima of C occur when

< * /Ji(«)\ Ji'(«) Ji(«) . dz\ z) z z 2 '

or by (17 when]%(z) = o. When z has one of the values thus

determined,

|J.W =

■JoM.

The accompanying table is given by Lommel, in which the first column gives the roots of]i(z) =0, and the second and third columns the corresponding values of the functions specified. If appears that the maximum brightness in the first ring is only about 6 V of the brightness at the centre.

z

2 2 – 1 J,(2)

4ˆ 2 Ji J (z)

•oooooo

5-135630

8-417236

11-619857

14-795938

17-959820

+ 1 -OOOOOO

— -132279

+ -064482

— -040008

+ -027919

— -020905

I -oooooo •017498 •004158 •001601 ■000779 •000437

We will now investigate the total illumination distributed over the area of the circle of radius r. We have

z = 2irRrl\f (20).

*= _*21 fvzdz = TrR\ 2 jViJi 2 (z)dz. r*Ji(«)-Jo(»)-Ji'(«);*

where Thus

Now by (17), (18) so that

'J™"££

and

2 / r*M«)«fa-i-J^(«)-Ji*(«) .*

• • (21).

If r, or z, be infinite, Jo(z), Ji(z) vanish, and the whole illumination is expressed by irR\ in accordance with the general principle. In any case the proportion of the whole illumination to be found outside the circle of radius r is given by

Jo 2 W+Jl 2 (2).

For the dark rings Ji(z) = o; so that the fraction of illumination outside any dark ring is simply Jo 2 (z). Thus for the first, second, third and fourth dark rings we get respectively -161, -090, -062, -047, showing that more than A tns °f the whole light is concentrated within the area of the second dark ring (Phil. Mag., 1881). When z is great, the descending series (10) gives

*2 JiW * /fi) sinCs-Jr) . . . .',,;*

*Z Z \ \7TZ/ **

so that the places of maxima and minima occur at equal intervals.

1 Airy, loc. cit. "Thus the magnitude of the central spot is diminished, and the brightness of the rings increased, by covering the central parts of the object-glass."

The mean brightness varies as z -8 (or as r~ 3), and the integral found by multiplying it by zdz and integrating between o and 00 converges.

It may be instructive to contrast this with the case of an infinitely narrow annular aperture, where the brightness is proportional to Jo 2 (z). When z is great,

rjx).

*J'W-Vfe) 008 ^**

and the integral J Jo 2 (s) 2 dz

The mean brightness varies as is not convergent.

5. Resolving Power of Telescopes.- — The efficiency of a tele- scope is of course intimately connected with the size of the disk by which it represents a mathematical point. In estimating theoretically the resolving power oil a double star we have to consider the illumination of the field due to the superposition of the two independent images. If the angular interval between the components of a double star were equal to twice that expressed inequation (15) above, the central disks of the diffraction patterns would be just in contact. Under these conditions there is no doubt that the star would appear to be fairly resolved, since the brightness of its external ring system is too small to produce any material confusion, unless indeed the components are of very unequal magnitude. The diminution of the star disks with increasing aperture was observed by Sir William Herschel, and in 1823 Fraunhofer formulated the law of inverse proportionality. In investigations extending over a long series of years, the advantage of a large aperture in separating the components of close double stars was fully examined by W. R. Dawes.

The resolving power of telescopes was investigated also by J. B. L. Foucault, who employed a scale of equal bright and dark alternate parts; it was found to be proportional to the aperture and independent of the focal length. In telescopes of the best construction and of moderate aperture the performance is not sensibly prejudiced by outstanding aberration, and the limit imposed by the finiteness of the waves of light is practically reached. M. E. Verdet has compared Foucault's results with theory, and has drawn the conclusion that the radius of the visible part of the image of a luminous point was equal to half the radius of the first dark ring.

The application, unaccountably long delayed, of this principle to the microscope by H. L. F. Helmholtz in 1871 is the foundation of the important doctrine of the microscopic limit. It is true that in 1823 Fraunhofer, inspired by his observations upon gratings, had very nearly hit the mark. 2 And a little before Helmholtz, E. Abbe published a somewhat more complete investigation, also founded upon the phenomena presented by gratings. But although the argument from gratings is instructive and convenient in some respects, its use has tended to obscure the essential unity of the principle of the limit of resolution whether applied to telescopes or microscopes.

In fig. 4, AB represents the axis of an optical instrument (tele- scope or microscope), A being a point of the object and B a point of the image. By the operation of the object-glass LL' all the rays issuing

from A arrive in the same phase at B. Thus if A be self-‘ luminous, the illumination is a maximum at B, where all the secondary waves agree in phase. B is in fact the centre of the diffraction disk which constitutes the image of A. At neighbouring points the illumination is less, in conse- quence of the discrepancies of phase which there enter. In like manner if we take a neigh- bouring point P, also self-

^

Fig. 4.

luminous, in the plane of the object, the waves which issue from it will arrive at B with phases no longer absolutely concordant, and the discrepancy of phase will increase as the interval AP

2 . ” Man kann daraus schliessen, was moglicher Weise durch Mikro- skope noch zu sehen ist. Ein mikroskvpischer Gegenstand z. B, dessen Durchmesser = °{\) ist, und der aus zwei Theilen bestekt, kann nicht mehr als aus zwei Theilen bestehend erkannt werden. Dieses zeigt uns eine Grenze des Sehvermogens durch Mikroskope” (Gilbert’s Ann. 74 > 337)- Lord Rayleigh has recorded that he was himself convinced by Fraunhofer’s reasoning at a date antecedent to the writings of Helmholtz and Abbe. ■■■..■:■:

increases. When the interval is very small the discrepancy, though mathematically existent, produces no practical effect; and the illumination at B due to P is as important as that due to A, the intensities of the two luminous sources being supposed equal. Under these conditions it is clear that A and P are not separated in the image. The question is to what amount must the distance AP be increased in order that the difference of situation may make itself felt in the image. This is necessarily a question of degree; but it does not require detailed calculations in order to show that the discrepancy first becomes conspicuous when the phases corresponding to the various secondary waves which travel from P to B range over a complete period. The illumination at B due to P then becomes comparatively small, indeed for some forms of aperture evanescent. The extreme discrepancy is that between the waves which travel through the outermost parts of the object-glass at L and L’; so that if we adopt the above standard of resolution, the question is where must P be situated in order that the relative retardation of

the rays PL and PL' may on their arrival at B amount to a wave-length (X). In virtue of the general law that the reduced optical path is stationary in value, this retardation may be calculated without allowance for the different paths pursued on the farther side of L, L', so that the value is simply PL — PL'. Now since AP is very small, AL' — PL' = AP sin o, where a is the angular semi-aperture L'AB. In like manner PL— AL has the same value, so that

PL-PL' = 2APsin a.

According to the standard adopted, the condition of resolution is therefore that AP, or e, should exceed JX/sin a. It e be less than this, the images overlap too much; while if e greatly exceed the above value the images become unnecessarily separated.

In the above argument the whole space between the object and the lens is supposed to be occupied by matter of one refractive index, and X represents the wave-length in this medium of the kind of light employed. If the restriction as to uniformity be violated, what we have ultimately to deal with is the wave-length in the medium immediately surrounding the object.

Calling the refractive index n, we have as the critical value of e,

e = |VMsin a, (1) ,

Xo being the wave-length in vacuo. The denominator m sin a is the quantity well known (after Abbe) as the " numerical aperture."

The extreme value possible for o is a right angle, so that for the microscopic limit we have

e = lXo/M ..... (2).

The limit can be depressed only by a diminution in Xo, such as photography makes possible, or by an increase in p, the refractive index of the medium in which the object is situated.

The statement of the law of resolving power has been made in a form appropriate to the microscope, but it admits also of immediate application to the telescope. If 2 R be the diameter of the object-glass and D the distance of the object, the angle subtended by AP is e/D, and the angular resolving power is given by

X/2Dsina= X/2R (3).

This method of derivation (substantially due to Helmholtz) makes it obvious that there is no essential difference of principle between the two cases, although the results are conveniently stated in different forms. In the case of the telescope we have to deal with a linear measure of aperture and an angular limit of resolution, whereas in the case of the microscope the limit of resolution is linear, and it is expressed in terms of angular aperture.

It must be understood that the above argument distinctly assumes that the different parts of the object are self-luminous, or at least that the light proceeding from the various points is without phase relations. As has been emphasized by G. J. Stoney, the restriction is often, perhaps usually, violated in the microscope. A different treatment is then necessary, and for some of the problems which arise under this head the method of Abbe is convenient.

The importance of the general conclusions above formulated, as imposing a limit upon our powers of direct observation, can hardly be overestimated; but there has been in some quarters a tendency to ascribe to it a more precise character than it can bear, or even to mistake its meaning altogether. A few words of further explanation may therefore be desirable. The first point to be emphasized is that nothing whatever is said as to the smallness of a single object that may be made visible. The eye, unaided or armed with a telescope, is able to see, as points of light, stars subtending no sensible angle. The visibility of a star is a question of brightness simply, and has nothing to do with resolving power. The latter element enters only when it is a question of recognizing the duplicity of a double star, or of distinguishing detail upon the surface of a planet. So in the microscope there is nothing except lack of light to hinder the visibility of an object however small. But if its dimensions be much less than the half wave-length, it can only be seen as a whole, and its parts cannot be distinctly separated, although in cases near the border line some inference maybe possible, founded upon experience of what appearances are presented in various cases. Interesting observa- tions upon particles, ultra-microscopic in the above sense, have been recorded by H. F. W. Siedentopf and R. A. Zsigmondy (Drude's Ann., 1903, io, p. 1).

In a somewhat similar way a dark linear interruption in a bright ground may be visible, although its actual width is much inferior to the half wave-length. In illustration of this fact a simple experi- ment may be mentioned. In front of the naked eye was held a piece of copper foil perforated by a fine needle hole. Observed through this the structure of some wire gauze just disappeared at a distance from

the eye equal to 17 in., the gauze containing 46 meshes to the inch. On the other hand, a single wire 0-034 m – m diameter remained fairly visible up to a distance of 20 ft. The ratio between the limiting angles subtended by the periodic structure of the gauze and the diameter of the wire was (•022/-034) X (240/17) = 9-1. For further information upon this subject reference may be made to Phil. Mag., 1896, 42, p. 167; Journ. R. Micr. Soc, 1903, p. 447.

6. Coronas or Glories.— The results of the theory of the diffrac- tion patterns due to circular apertures admit of an interesting application to coronas, such as are often seen encircling the sun and moon. They are due to the interposition of small spherules of water, which act the part of diffracting obstacles. In order to the formation of a well-defined corona it is essential that the particles be exclusively, or preponderatingly, of one size.

If the origin of light be treated as infinitely small, and be seen in focus, whether with the naked eye or with the aid of a telescope, the whole of the light in the absence of obstacles would be concen- trated in the immediate neighbourhood of the focus. At other parts of the field the effect is the same, in accordance with the principle known as Babinet's, whether the imaginary screen in front of the object-glass is generally transparent but studded with a number of opaque circular disks, or is generally opaque but perforated with corresponding apertures. Since at these points the resultant due to the whole aperture is zero, any two portions into which the whole may be divided must give equal and opposite resultants. Consider now the light diffracted in a direction many times more oblique than any with which we should be concerned, were the whole aperture uninterrupted, and take first the effect of a single small aperture. The light in the proposed direction is that determined by the size of the small aperture in accordance with the laws already investigated, and its phase depends upon the position of the aperture. If we take a direction such that the light (of given wave-length) from a single aperture vanishes, the evanescence continues even when the whole series of apertures is brought into contemplation. Hence, whatever else may happen, there must be a system of dark rings formed, the same as from a single small aperture. In directions other than these it is a more delicate question how the partial effects should be compounded. If we make the extreme suppositions of an infinitely small source and absolutely homogeneous light, there is no escape from the conclusion that the light in a definite direction is arbitrary, that is, dependent upon the chance distribution of apertures. If, however, as in practice, the light be heterogeneous, the source of finite area, the obstacles in motion, and the discrimination of*

different directions imperfect, we are concerned merely with the mean bright- ness found by varying the arbitrary phase- relations, and this is obtained by simply multiplying the brightness due to a single aperture by the number of apertures (re) (see Interference of Light, § 4). The diffraction pattern is therefore that due to a single aperture, merely brightened n times.

In his experiments upon this subject Fraunhofer employed plates of glass dusted over with lycopodium, or studded with small metallic disks of uniform size; and he found that the diameters of the rings were proportional to the length of the waves and inversely as the diameter of the disks.

In another respect the observations of Fraunhofer appear at first sight to be in disaccord with theory; for his measures of the diameters of the red rings, visible when white light was employed, correspond with the law applicable to dark rings, and not to the different law applicable to the luminous maxima. Verdet has, however, pointed out that the observation in this form is essentially different from that in which homogeneous red light is employed, and that the position of the red rings would correspond to the absence of blue-green light rather than to the greatest abundance of red light. Verdet's own observations, conducted with great care, fully confirm this view, and exhibit a complete agreement with theory.

By measurements of coronas it is possible to infer the size of the particles to which they are due, an application of considerable interest in the case of natural coronas — the general rule being the larger the corona the smaller the water spherules. Young employed this method not only to determine the diameters of cloud particles (e- g- isWin.), but also those of fibrous material, for which the theory is analogous. His instrument was called the eriometer (see " Chromatics," vol. iii. of supp. to Ency. Brit., 18 17).

7. Influence of Aberration. Optical Power of Instruments. — Our investigations and estimates of resolving power have thus far proceeded upon the supposition that there are no optical imperfections, whether of the nature of a regular aberration or dependent upon irregularities of material and workmanship. In

practice there will always be a certain aberration or error of phase,

which we may also regard as the deviation of the actual wave-surface from its intended position. In general, we may say that aberration is unimportant when it nowhere (or at any rate over a relatively small area only) exceeds a small fraction of the wave-length (X). Thus in estimating the intensity at a focal point, where, in the absence of aberration, all the secondary waves would have exactly the same phase, we see that an aberration nowhere exceeding jX can have but little effect.

The only case in which the influence of small aberration upon the entire image has been calculated (Phil. Mag., 1879) is that of a rectangular aperture, traversed by a cylindrical wave with aberration equal to ex 3 . The aberration is here unsymmetrical, the wave being in advance of its proper place in one half of the aperture, but behind in the other half. No terms in x or x 2 need be considered. The first would correspond to a general turning of the beam; and the second would imply imperfect focusing of the central parts. The effect of aberration may be considered in two ways. We may suppose the aperture (a) constant, and inquire into the operation of an increasing aberration; or we may take a given value of c (i.e. a given wave-surface) and examine the effect of a varying aperture. The results in the second case show that an increase of aperture up to that corresponding to an extreme aberration of half a period has no ill effect upon the central band (§ 3), but it increases unduly the intensity of one of the neighbouring lateral bands; and the practical conclusion is that the best results will be obtained from an aperture giving an extreme aberration of from a quarter to half a period, and that with an increased aperture aberration is not so much a direct cause of deterioration as an obstacle to the attainment of that improved definition which should accompany the increase of aperture.

If, on the other hand, we suppose the aperture given, we find that aberration begins to be distinctly mischievous when it amounts to about a quarter period, i.e. when the wave-surface deviates at each end by a quarter wave-length from the true plane.

As an application of this result, let us investigate what amount of temperature disturbance in the tube of a telescope may be ex- pected to impair definition. According to J. B. Biot and F. J. D. Arago, the index n for air at t° C. and at atmospheric pressure is given by

•00029 ” 1- 1 + U037/

If we take 0° C. as standard temperature, Sm = -i-i tXicnt.

Thus, on the supposition that the irregularity of temperature t extends through a length /, and produces an acceleration of a quarter of a wave-length,

J\ = i-i WXio- 6 ;

or, if we take X = 5-3 X io -6 ,

It = 12,

the unit of length being the centimetre.

We may infer that, in the case of a telescope tube 12 cm. long, a stratum of air heated i"C. lying along the top of the tube, and occupying a moderate fraction of the whole volume, would produce a not insensible effect. If the change of temperature progressed uniformly from one side to the other, the result would be a lateral displacement of the image without loss of definition ; but in general both effects would be observable. In longer tubes a similar disturbance would be caused by a proportionally less difference of temperature. S. P. Langley has proposed to obviate such ill-effects by stirring the air included within a telescope tube. It has long been known that the definition of a carbon bisulphide prism may be much improved by a vigorous shaking.

We will now consider the application of the principle to the formation of images, unassisted by reflection or refraction (Phil. Mag., 1881). The function of a lens in forming an image is to compensate by its variable thickness the differences of phase which would other- wise exist between secondary waves arriving at the focal point from various parts of the aperture. If we suppose the diameter of the lens to be given (2R), and its focal length / gradually to increase, the original differences of phase at the image of an infinitely distant luminous point diminish without limit. When / attains a certain value, say /j, the extreme error of phase to be compensated falls to JX. But, as we have seen, such an error of phase causes no sensible deterioration in the definition; so that from this point onwards the lens is useless, as only improving an image already sensibly as perfect as the aperture admits of. Throughout the operation of increasing the focal length, the resolving power of the instrument, which depends only upon the aperture, remains unchanged; and we thus arrive at the rather startling conclusion that a telescope of any degree of resolving power might be constructed without an object-glass, if only there were no limit to the admissible focal length. This last proviso, however, as we shall see, takes away

almost all practical importance from the proposition.

To get an idea of the magnitudes of the quantities involved, let us take the case of an aperture of \ in., about that of the pupil of the eye. The distance /1, which the actual focal length must exceed, is given by

V(/i 2 +R 2)-y 1 =Jx;

so that

/1-2RVX (1).

Thus, if X = j Tr iˆ,, R=A, we find

/1 = 800 inches.

The image of the sun thrown upon a screen at a distance exceeding 66 ft., through a hole \ in. in diameter, is therefore at least as well defined as that seen direct.

As the minimum focal length increases with the square of the aperture, a quite impracticable distance would be required to rival the resolving power of a modern telescope. Even for an aperture of 4 in., _/i would have to be 5 miles.

A similar argument may be applied to find at what point an achromatic lens becomes sensibly superior to a single one. The question is whether, when the adjustment of focus is correct for the central rays of the spectrum, the error of phase for the most extreme rays (which it is necessary to consider) amounts to a quarter of a wave-length. If not, the substitution of an achromatic lens will be of no advantage. Calculation shows that, if the aperture be i in., an achromatic lens has no sensible advantage if the focal length be greater than about 11 in. If we suppose the focal length to be 66 ft., a single lens is practically perfect up to an aperture of l-7in.

Another obvious inference from the necessary imperfection of optical images is the uselessness of attempting anything like an absolute destruction of spherical aberration. An admissible error of phase of JX will correspond to an error of |X in a reflecting and jX in a (glass) refracting surface, the incidence in both cases being perpendicular. If we inquire what is the greatest admissible longitudinal aberration (df) in an object-glass according to the above rule, we find

5/ = Xa-«

(2),

a being the angular semi-aperture.

In the case of a single lens of glass with the most favourable curvatures, 8/ is about equal to a 2 /, so that a 4 must not exceed X//. For a lens of 3 ft. focus this condition is satisfied if the aperture does not exceed 2 in.

When parallel rays fall directly upon a spherical mirror the longitudinal aberration is only about one-eighth as great as for the most favourably shaped single lens of equal focal length and aperture. Hence a spherical mirror of 3 ft. focus might have an aperture of 2$ in., and the image would not suffer materially from aberration.

On the same principle we may estimate the least visible displacement of the eve-piece of a telescope focused upon a distant object, a question of interest in connexion with range-finders. It appears (Phil. Mag., 1885, 20, p. 354) that a displacement Sf from the true focus will not sensibly impair definition, provided

S/X/R3 (3),

2R being the diameter of aperture. The linear accuracy required is thus a function of the ratio of aperture to focal length. The formula agrees well with experiment.

The principle gives an instantaneous solution of the question of the ultimate optical efficiency in the method of " mirror-reading," as commonly practised in various physical observations. A rotation by which one edge of the mirror advances i\ (while the other edge retreats to a like amount) introduces a phase-discrepancy of a whole period where before the rotation there was complete agreement. A rotation of this amount should therefore be easily visible, but the limits of resolving power are being approached ; and the conclusion is independent of the focal length of the mirror, and of the employment of a telescope, provided of course that the reflected image is seen in focus, and that the full width of the mirror is utilized.

A comparison with the method of a material pointer, attached to the parts whose rotation is under observation, and viewed through a microscope, is of interest. The limiting efficiency of the microscope is attained when the angular aperture amounts to 180 ; and it is evident that a lateral displacement of the point under observation

through §X entails (at the old image) a phase-discrepancy of a whole period, one extreme ray being accelerated and the other re- tarded by half that amount. We may infer that the limits of efficiency in the two methods are the same when the length of the pointer is equal to the width of the mirror.

We have seen that in perpendicular reflection a surface error not exceeding fX may be admissible. In the case of oblique reflection at an angle <£, the error of retardation due to an elevation BD (fig. 5) is

QQ'- QS – BD sec (i – cos SQQ') = BD sec <#>(i +cos 2) = 2BD cos*

from -which it follows that an error of given magnitude in the figure of a surface is less important in oblique than in perpendicular reflection. It must, however, be borne in mind that errors can sometimes be compensated by altering adjustments. If a surface intended to be flat is affected with a slight general curvature, a remedy may be found in an alteration of focus, and the remedy is the less complete as the reflection is more oblique.

The formula expressing the optical power of prismatic spectro- scopes may readily be investigated upon the principles of the wave theory. Let AoB be a plane wave-surface of the light before it falls upon the prisms, AB the corresponding wave-surface for a particular

Eart of the, spectrum after the light has passed the prisms, or after it as passed the eye-piece of the observing telescope. The path of a ray from the wave-surface A B to A or B is determined by the con- dition that the optical distance, jiids, is a minimum; and, as AB is by supposition a wave-surface, this optical distance 1 is the same for both points. Thus

fuds (for A) =fnds (for B) .... (4).

We have now to consider the beliaviour of light belonging to a neighbouring part of the spectrum. The path of a ray from the wave-surface A B to the point A is changed ; but in virtue of the minimum property the change may be neglected in calculating the optical distance,as it influences the result by quantities of the second order only in the changes of refrangibility. Accordingly, the optical

distance from A0B0 to A is represented by j(n+SiJ.)ds, the integration being along the original path Ao . . . A; and similarly the optical distance between AoB and B is represented by J(n+5/i)ds, the integration being along B . . . B. In virtue of (4) the difference of the optical distances to A and B is

fdfids (along B . . . B)-/W (along Ao ... A) (5).*

The new wave-surface is formed in such a position that the optical distance is constant; and therefore the dispersion, or the angle through which the wave-surface is turned by the change of refrangibility, is found simply by dividing (5) by the distance AB. If, as in common flint-glass spectroscopes, there is only one dispersing substance, f&iids = dn.s, where s is simply the thickness traversed by the ray. If k and h be the thicknesses traversed by the extreme rays, and a denote the width of the emergent beam, the dispersion 6 is given by

6 = Sfi(t2-h)la, or, if h be negligible,

6=Siit/a (6).

The condition of resolution of a double line whose components subtend an angle is that must exceed X/o. Hence, in order that a double line may be resolved whose components have indices 11 and ii+S/jl, it is necessary that t should exceed the value given by the following equation: —

t = M5v ■ (7).

8. Diffraction Gratings. — Under the heading " Colours of Striated Surfaces," Thomas Young (Phil. Trans., 1802) in his usual summary fashion gave a general explanation of these colours, including the law of sines, the striations being supposed to be straight, parallel and equidistant. Later, in his article " Chromatics " in the supplement to the 5th edition of this encyclopaedia, he shows that the colours " lose the mixed character of periodical colours, and resemble much more the ordinary prismatic spectrum, with intervals completely dark interposed," and explains it by the consideration that any phase-difference which may arise at neighbouring striae is multiplied in proportion to the total number of striae.

The theory was further developed by A. J. Fresnel (1815), who gave a formula equivalent to (5) below. But it is to J. von Fraunhofer that we owe most of our knowledge upon this subject. His recent discovery of the " fixed lines " allowed a precision of observation

previously impossible. He constructed gratings up to 340 periods to the inch by straining fine wire over screws. Subsequently he ruled gratings on a layer of gold-leaf attached to glass, or on a layer of grease similarly supported, and again by attacking the glass itself with a diamond point. The best gratings were obtained by the last method, but a suitable diamond point was hard to find, and to preserve. Observing through a telescope with light perpendicularly incident, he showed that the position of any ray was dependent only upon the grating interval, viz. the distance from the centre of one wire or line to the centre of the

next, and not otherwise, upon the thickness of the wife and the magnitude of the interspace. In different gratings the, lengths of the spectra and their distances from the axis were inversely proportional to the grating interval, while with a given grating the distances of the various spectra from the axis were as 1, 2, 3, &c. To Fraunhofer we owe the first accurate measurements of wave-lengths, and the method of separating the overlapping spectra by a prism dispersing in the perpendicular direction. He described also the complicated patterns seen when a point of light is viewed through two superposed gratings, whose lines cross one another perpendicularly or obliquely. The above observa- tions relate to transmitted light, but Fraunhofer extended his inquiry to the light reflected. To eliminate the light returned from the hinder surf ace of an engraved grating, he covered it with a black varnish. , It then appeared that under certain angles of incidence parts of the resulting spectra were completely polarized. These remarkable researches of Fraunhofer, carried out in the years 18 17-1823, are republished in his Collected Writings (Munich, 1888).

The principle underlying the action of gratings is identical with that discussed in § 2, and exemplified in J. L. Soret's " zone plates." The alternate Fresnel's zones are blocked out or otherwise modified ; in this way the original compensation is upset and a revival of light occurs in unusual directions. If the source be a point or a line, and a collimating lens be used, the incident waves may be regarded as plane. If, further, on leaving the grating the light be received by a focusing lens, e.g. the object-glass of a telescope the Fresnel's zones are reduced to parallel and equidistant straight strips, which at certain angles coincide with the ruling. The directions of the lateral spectra are such that the passage from one element of the grating to the corresponding point of the next implies a retardation of an integral number of wave-lengths. If the grating be composed of alternate transparent and opaque parts, the question may be treated by means of the general integrals (§ 3) by merely limiting the*

integration to the transparent parts of the aperture. For an investigation upon these lines the reader is referred to Airy's Tracts, to Verdet's Lecons, or to R. W. Wood's Physical Optics. If, however, we assume the theory of a simple rectangular aperture (§ 3) ; the results of the ruling can be inferred by elementary methods, which are perhaps more instructive.

Apart from the ruling, we know that the image of a mathematical line will be a series of narrow bands, of which the central one is by far the brightest. At ˆhe middle of this band there is complete agreement of phase among the secondary waves. The dark lines which separate the bands are the places at which the phases of the secondary wave range over an integral number of periods. If now we suppose the aperture AB to be covered by a great number of opaque strips or bars of width d, separated by transparent intervals of width a, the condition of things in the directions just spoken of is not materially changed. At the central point there is still complete agreement of phase ; but the amplitude is diminished in the ratio of a: a + d. In another direction, making a small angle with the last, such that the projection of AB upon it amounts to a few wave-lengths, it is easy to see that the mode of interference is the same as if there were no ruling. For example, when the direction is such that the projection of AB upon it amounts to one wave-length, the elementary components neutralize one another, because their phases are distributed symmetrically, though discontinuously, round the entire period. The only effect of the ruling is to diminish the amplitude in the ratio a: a + d; and, except for the difference in illumination, the appearance of a line of light is the same as if the aperture were perfectly free.

The lateral (spectral) images occur in such directions that the projection of the element (a + d). of the grating upon them is an exact multiple of X. The effect of each of the n elements of the grating is then the same ; and, unless this vanishes on account of a particular adjustment of the ratio a: d, the resultant amplitude becomes com-

Earatively very great. These directions, in which the retardation etween A and B is exactly mnX, may be called the principal directions. On either side of any one of them the illumination is distributed according to the same law as for the central image (rh = o), vanishing, for example, when the retardation amounts to (m» ± j)X. In considering the relative brightnesses of the different spectra, it is therefore sufficient to attend merely to the principal directions, provided that the whole deviation be not so great that its cosine

differs considerably from unity.

*We have now to consider the amplitude due to a single element, which we may conveniently regard as composed of a transparent part a bounded by two opaque parts of width Jd. The phase of the resultant effect is by symmetry that of the component which comes from the middle of a. The fact that the other components have phases differing from this by amounts ranging between *=amT/(a+d) causes the resultant amplitude to be less than for the central image (where there is complete phase agreement).*

If B„ denote the brightness of the J» th lateral image, and B that of the central image, we have

B m : Bo =

- U-.

am’”’

, 2amrl 2 cdx +aTd

/a+d\ 2 . .annr — ! — sin 2 1 i • \am-K I a+a

(1).

If B denotes the brightness of the central image when the whole of the space occupied by the grating is transparent, we have

B :B=a 2 :(a+

B m :B = LsinS • • • • (2).

The sine of an angle can never be greater than unity ; and consequently under the most favourable circumstances only i/mV of the original light can be obtained in the m th spectrum. We con- clude that, with a grating composed of transparent and opaque parts, the utmost light obtainable in any one spectrum is in the first, and there amounts to 1/r 2 , or about 3V, and that for this purpose a and d must be equal. When d = a the general formula becomes r . p . sin 2 imv- (o-.

showing that, when m is even, B m vanishes, and that, when m is

odd, B m :B = i/w 2 7r 2 .

The third spectrum has thus only £ of the brilliancy of the first.

Another particular case of interest is obtained by supposing a small relatively to (a+d). Unless the spectrum be of very high order, we have simply

B m :B = (o/(a+

The light stopped by the opaque parts of the grating, together with that distributed in the central image and lateral spectra, ought to make up the brightness that would be found in the central image, were all the apertures transparent. Thus, if a = d, we should have

which is true by a known theorem. In the general case

a – (a V_i_ 2m ?"i • 2 (mva\ a+dZ\a+d) Ir'ˆiffi' 5111 \a+dj •

a formula which may be verified by Fourier's theorem.

According to a general principle formulated by J. Babinet, the brightness of a lateral spectrum is not affected by an interchange of the transparent and opaque parts of the grating. The vibrations corresponding to the two parts are precisely antagonistic, since if both were operative the resultant would be zero. So far as the application to gratings is concerned, the same conclusion may be derived from (2).

From the value of B m : B we see that no lateral spectrum can surpass the central image in brightness ; but this result depends upon the hypothesis that the ruling acts by opacity, which is generally very far from being the case in practice. In an engraved glass grating there is no opaque material present by which light could be absorbed, and the effect depends upon a difference of retardation in passing the alternate parts. It is possible to prepare gratings which give a lateral spectrum brighter than the central image, and the ex- planation is easy. For if the alternate parts were equal and alike transparent, but so constituted as to give a relative retardation of ˆX, it is evident that the central image would be entirety extinguished, while the first spectrum would be four times as bright as if the alternate parts were opaque. If it were possible to introduce at every part of the aperture of the grating an arbitrary retardation, all the light might be concentrated in any desired spectrum. By supposing the retardation to vary uniformly and continuously we f fall upon the case of an ordinary prism : but there is then no diffraction spectrum in the

usual sense. To obtain such it would be necessary that the retardation should gradually alter by a wave- length in passing over any element of the grating, and then fall back to its previous value, thus springing suddenly over a wave-length (Phil. Mag., 1874, 47 > P- !93)- It is not likely that such a result will ever be fully attained in practice ; but the case is worth stating, in order to show that there is no theoretical limit to the concentration of light of assigned wave-length in one spectrum, and as illustrating the frequently observed un- symmetrical character of the spectra on the two sides of the central image. 1

We have hitherto supposed that the light is incident perpen-

Fig,

1 The last sentence is repeated from the writer's article " Wave Theory " in the 9th edition of this work, but A. A. Michelson's ingenious echelon grating constitutes a" realization in an unexpected manner of what was thought to be impracticable. — [R.]

Fig. 7.

dicularly upon the grating; but the theory is easily extended. If the incident rays make an angle 6 with the normal (fig. 6), and the diffracted rays make an angle) ; and this is the quantity which is to be equated to m. Thus

sinfl+sin = 2 sin i(6+) cos i(8 — 4>) = m\j(a+d) (5).

The " deviation " is (8+), and is therefore a minimum when 9 = tj>, i.e. when the grating is so situated that the angles of incidence and diffraction are equal.

In the case of a reflection grating the same method applies. If 6 and denote the angles with the normal made by the incident and diffracted rays, the formula (5) still holds, and, if the deviation be reckoned from the direction of the regularly reflected rays, it is _ expressed as before [by (9+), and is a mini- ' mum when 8 = , that is, when the diffracted rays return upon the course of the incident rays.

In either case (as also with a prism) the position of minimum deviation leaves the width of the beam unaltered, i.e. neither magnifies nor diminishes the angular width of the object under view.

From (5) we see that, when the light falls perpendicularly upon a

grating (8 = 0), there is no spectrum formed (the image corre-sponding to m = o not being counted as a spectrum), if the grating interval

We will now consider the important subject of the resolving power of gratings, as dependent upon the number of Tines (n) and the order of the spec- Q \ p

trum observed (m). Let BP (fig. 8) be the \ \ \ direction of the principal maximum (middle \ \ of central band) for the wave-length X in the ˆo > m th spectrum. Then the relative retardation ˆ

of the extreme rays (corresponding to the a.- 1*

edges A, B of the grating) is mnh. If BQ a a

be the direction for the first minimum (the pi G , 8.

darkness between the central and first lateral band), the relative retardation of the extreme rays is (mn+i). Suppose now that X+SX is the wave-length for which BQ gives the principal maximum, then

(mn + 1) X = mn (X + SX) ; whence

S\/\=i/mn (6).

According to our former standard, this gives the smallest difference of wave-lengths in a double line which can be just resolved; and we conclude that the resolving power of a grating depends only upon the total number of lines, and upon the order of the spectrum, without regard to any other considerations. It is here of course assumed that the n lines are really utilized.

In the case of the D lines the value of 6X/X is about 1/1000; so that to resolve this double line in the first spectrum requires 1000 lines, in the second spectrum 500, and so on.

It is especially to be noticed that the resolving power does not depend directly upon the closeness of the ruling. Let us take the case of a grating I in. broad, and containing 1000 lines, and consider the effect of interpolating an additional 1000 lines, so as to bisect the former intervals. There will be destruction by interference of the first, third and odd spectra generally; while the advantage gained in the spectra of even order is not in dispersion, nor in resolving power, but simply in brilliancy, which is increased four times. If we now suppose half the grating cut away, so as to leave 1000 lines in half

an inch, the dispersion will not be altered, while the brightness and resolving power are halved.

There is clearly no theoretical limit to the resolving power of gratings, even in spectra of given order. But it is possible that, as suggested by Rowland, 2 the structure of natural spectra may be too coarse to give opportunity for resolving powers much higher than those now in use. However this may be, it would always be possible, with the aid of a grating of given resolving power, to construct artificially from white light mixtures of slightly different wave-length whose resolution or otherwise would discriminate between powers inferior and superior to the given one. 3

2 Compare also F. F. Lippich, Pogg. Ann. cxxxix. p. 465, 1870; Rayleigh, Nature (October 2, 1873).

3 The power of a grating to construct light of nearly definite wave-length is well illustrated by Young's comparison with the production of a musical note by reflection of a sudden sound from a row of palings. The objection raised by Herschel (Light, § 703) to this comparison depends on a misconception.

If we define as the " dispersion " in a particular part of the spectrum the ratio of the angular interval do to the corresponding increment of wave-length d\, we may express it by a very simple formula. For the alteration of wave-length entails, at the two limits of a diffracted wave-front, a relative retardation equal to mnd. Hence, if a be the width of the diffracted beam, and do the angle through which the wave-front is turned,

ad9 = mnd\ dispersion = mn/a

(7).

The resolving power and the width of the emergent beam fix the optical character of the instrument. The latter element must eventually be decreased until less than the diameter of the pupil of the eye. Hence a wide beam demands treatment with further apparatus (usually a telescope) of high magnifying power.

In the above discussion it has been supposed that the ruling is accurate, and we have seen that by increase of m a high resolving

power is attainable with a moderate number of lines. But this procedure (apart from the question of illumination) is open to the objection that it makes excessive demands upon accuracy. According to the principle already laid down it can make but little difference in the principal direction corresponding to the first spectrum, provided each line lie within a quarter of an interval (a + d) from its theoretical position. But, to obtain an equally good result in the m th spectrum, the error must be less than \jm of the above amount. 1

There are certain errors of a systematic character which demand special consideration. The spacing is usually effected by means of a screw, to each revolution of which corresponds a large number (e:g. one hundred) of lines. In this way it may happen that although there is almost perfect periodicity with each revolution of the screw after (say) ioo lines, yet the ioo lines themselves are not equally spaced. The " ghosts " thus arising were first described by G. H. Quincke (Pogg. Ann., 1872, 146, p. 1) and have been elaborately investigated by C. S. Peirce {Ann. Journ. Math., 1879, 2, p. 330), both theoretically and experimentally. The general nature of the effects to be expected in such a case may be made clear by means of an illus- tration already employed for another purpose. Suppose two similar and accurately ruled transparent gratings to be superposed in such a manner that the lines are parallel. If the one set of lines exactly bisect the intervals between the others, the grating interval is practically halved, and the previously existing spectra of odd order vanish. But a very slight relative displacement will cause the apparition of the odd spectra. In this case there is approximate periodicity in the half interval, but complete periodicity only after the whole interval. The advantage of approximate bisection lies in the superior brilliancy of the surviving spectra ; but in any case the compound grating may be considered to be perfect in the longer interval, and the definition is as good as if the bisection were accurate.*

The effect of a gradual increase in the interval (fig. 9) as we pass across, the grating has been investigated by M. A. Cornu (C.R., 1875, 80, p. 655), who thus explains an anomaly observed by

/

III

Fig. 9. — x 2 . Fig. 10. — y. Fig. ii. — x 3 . Fig. 12. — xy 2 .*

E. E. N. Mascart. The latter found that certain gratings exercised a converging power upon the spectra formed upon one side, and a corresponding diverging power upon the spectra on the other side. Let us suppose that the light is incident perpendicularly, and that the grating interval increases from the centre towards that edge which lies nearest to the spectrum under observation, and decreases towards the hinder edge. It is evident that the waves from both

*halves of the grating are ac- celerated in an increasing degree, as we pass from the centre out- Fig. 13.— xy. FlG. 14. — X*y. FlG. 15.— / f. wards, as com- pared with the phase they would possess. were the central value of the grating interval maintained throughout. The irregularity of spacing has thus the effect of a convex lens, which accelerates the marginal relatively to the central rays. On the other side the effect is reversed. This kind of irregularity may clearly be present in a*

1 It must not be supposed that errors of this order of magnitude are unobjectionable in all cases. The position of the middle of the bright band representative of a mathematical line can be fixed with a spider-line micrometer within a small fraction of the width of the band, just as the accuracy of astronomical observations far transcends the separating power of the instrument.

degree surpassing the usual limits, without loss of definition, when the telescope is focused so as to secure the best effect.

It may be worth while to examine further the other variations from correct ruling which correspond to the various terms expressing the deviation of the wave-surface from a perfect plane. If x and y be co-ordinates in the plane of the wave-surface, the axis of y being parallel to the lines of the grating, and the origin corresponding to the centre of the beam, we may take as an approximate equation to the wave-surface

x 2 y 2

*z = T Bxy ~- i +ax 3 +Px*y+yxy*+Sy> + .*

“2 P

2p<

(8);

and, as we have just seen, the term in a 2 corresponds to a linear

error in the spacing. In like manner, the term in y 2 corresponds to a general curvature of the lines (fig. 10), and does not influence the definition at the (primary) focus, although it may introduce astigmatism. 2 If we suppose that everything is symmetrical on the two sides of the primary plane y = o, the coefficients B, {), S vanish. In spite of any inequality between p and p', the definition will be good to this order of approximation, provided a and y vanish. The former measures the thickness of the primary focal line, and the latter measures its curvature. The error of ruling giving rise to o is one in which the intervals increase or decrease in both directions from the centre outwards (fig. Ii), and it may often be compensated by a slight rotation in azimuth of the object-glass of the observing telescope. The term in y corresponds to a variation of curvature in crossing the grating (fig. 12).

*When the plane zx is not a plane of symmetry, we have to consider the terms in xy , x 2 y, and y 3 . _ The first of these corresponds to a devia- tion from parallelism, causing the interval to alter gradually as we pass along the lines (fig. 13). _ The error thus arising may be compensated by a rotation of the object-glass about one of the diameters y— *=x. The term in x 2 y corresponds to a deviation from parallelism in the same direction on both sides of the central line (fig. 14) ; and that in y 3 would be caused by a curvature such that there is a point of inflection at the middle of each line (fig. 15).*

All the errors, except that depending on a, and especially those depending on y and 5, can be diminished, without loss of resolving power, by contracting the vertical aperture. A linear error in the spacing, and a general curvature of the lines, are eliminated in the ordinary use of a grating.

The explanation of the difference of focus upon the two sides as due to unequal spacing was verified by Cornu upon gratings purposely constructed with an increasing interval. He has also shown how to rule a plane surface with lines so disposed that the grating shall of itself give well-focused spectra.

A similar idea appears to have guided H. A. Rowland to his brilliant invention of concave gratings, by which spectra can be photographed without any further optical appliance. In these instruments the lines are ruled upon a spherical surface of speculum metal, and mark the intersections of the surface by a system of parallel and equidistant planes, o|~

of which the middle member passes through the centre of the sphere.

If we consider for the present only the primary plane of sym- metry, the figure is reduced to two dimen- sions. Let AP (fig. 16) represent the surface of the grating, O being the centre of the circle. Then, if Q be any radiant point and Q' its image (primary focus) in the spherical mirror AP,

1_ , l_ = 2cos0 v\u a '

we have

where Vi —AQ', u — AQ, a = OA, = angle of incidence QAO, equal to the angle of reflection Q'AO. If Q be on the circle described upon OA as diameter, so that u — a cos , then Q' lies also upon the same circle; and in this case it follows from the symmetry that the unsymmetrical aberration (depending upon a) vanishes.

This disposition is adopted in Rowland's instrument; only, in addition to the central image formed at the angle ' = , there are a series of spectra with various values of f', but all disposed upon the same circle. Rowland's investigation is contained in the paper already referred to ; but the following account of the theory is in the form adopted by R. T. Glazebrook (Phil. Mag., 1883).

In order to find the difference of optical distances between the courses QAQ', QPQ', we have to express QP-QA, PQ'-AQ'. To find the former, we have, if OAQ=°=, AOP = «,

QP 2 = M 2 +4a 2 sin 2 \a-$au sin j« sin (j«-<#>) = (u--a sin sin u) 2 -a 2 sin 2 sin 2 u+4a sin 2 \a(a-u cos $).

2 " In the same way we may conclude that in flat gratings any departure from a' straight line has the effect of causing the dust in the slit and the spectrum to have different, foci — a fact sometimes observed " (Rowland, " On Concave Gratings for Optical Purposes," Phil. Mag., September 1883).

DIFFRACTION OF LIGHT

249

*Now as far as u**

4 sin 2 §w = siiAo+jsin 4 ci>,

and thus to the same order

QP 2 = (u+a sin sin w) 2

—a cos) sin 2 w+jo(a— « cos 0) sin 4 w.

But if we now suppose that Q lies on the circle « = a cos 0, the

middle term vanishes, and we get, correct as far as a 4 ,

*~~ , , . . s IS 1 1 a 2 sin 2 0sin 4 w) . QP = (w+asin<£sin a) *M l-\j-^j 5 .*

so that

QP — M = asin0sin&> + !asin<£tan$sin 4 w . . (9), in which it is to be noticed that the adjustment necessary to secure the disappearance of sin 2 o> is sufficient also to destroy the term in sin 3 w.

A similar expression can be found for Q'P — Q'A; and thus, if Q'A = i>, Q'AO = ' , where v-a cos ', we get

QP + PQ'-QA-AQ' = asin u(sin -sin ')

+ |a sin 4 w(sin<#>tan0 + sin0'tan0') . . . (10).

If ' = , the term of the first order vanishes, and the reduction of the difference of path via P and via A to a term of the fourth order proves not only that Q and Q' are conjugate foci, but also that the foci are exempt from the most important term in the aberration. In the present application ' is not necessarily equal to 0; but if P correspond to a line upon the grating, the difference of retarda- tions for consecutive positions of P, so far as expressed by the term of the first order, will be equal to =f»jX (m integral), and therefore without influence, provided

where a denotes the constant interval between the planes contain- ing the lines. This is the ordinary formula for a reflecting plane grating, and it shows that the spectra are formed in the usual directions. They are here focused (so far as the rays in the primary plane are concerned) upon the circle OQ'A, and the outstanding aberration is of the fourth order.

In order that a large part of the field of view may be in focus at once, it is desirable that the locus of the focused spectrum should be nearly perpendicular to the line of vision. For this purpose Rowland places

the eye-piece at O, so that <£ = o, and then by (11) the value of ‘ in the mˆ spectrum is

asin

If w now relate to the edge of the grating, on which there are altogether n lines,

n

*and the value of the last term in (10) becomes 5*8 na sin 3 u sin 0’tan ‘ , or*

i»5 mn\ sin 3 w tan ‘ (13).

This expresses the retardation of the extreme relatively to the central ray, and is to be reckoned positive, whatever may be the signs of a, and ‘ . If the semi-angular aperture (o>) be r 3 , and tan ‘ = i, mn might be as great as four millions before the error of phase would reach j. If it were desired to use an angular aperture so large that the aberration according to (13) would be injurious, Rowland points out that on his machine there would be no difficulty in applying a remedy by making

It may be remarked that these calculations apply to the rays in the primary plane only. The image is greatly affected with astig- matism ; but this is of little consequence, if y in (8) be small enough. Curvature of the primary focal line having a very injurious effect upon definition, it may be inferred from the excellent performance of these gratings that y is in fact small. Its value does not appear to have been calculated. The other coefficients in (8) vanish in virtue of the symmetry.

The mechanical arrangements for maintaining the focus are of great simplicity. The grating at A and the eye-piece at O are rigidly attached to a bar AO, whose ends rest on carriages, moving on rails OQ, AQ at right angles to each other. A tie between the middle point of the rod OA and Q can be used if thought desirable.

The absence of chromatic aberration gives a great advantage in the comparison of overlapping spectra, which Rowland has turned to excellent account in his determinations of the relative wave- lengths of lines in the solar spectrum {Phil. Mag., 1887).

For absolute determinations of wave-lengths plane gratings are used. It is found (Bell, Phil. Mag., 1887) that the angular measurements

present less difficulty than the comparison of the grating interval with the standard metre. There is also some uncertainty as to the actual temperature of the grating when in use. In order to minimize the heating action of the light, it might be submitted to a preliminary prismatic analysis before it reaches the slit of the spectrometer, after the manner of Helmholtz.

In spite of the many improvements introduced by Rowland and

of the care with which his observations were made, recent workers have come to the conclusion that errors of unexpected amount have crept into his measurements of wave-lengths, and there is even a disposition to discard the grating altogether for funda- mental work in favour of the so-called " interference methods," as developed by A. A. Michelson, and by C. Fabry and J. B. P6rot. The grating would in any case retain its utility for the reference of new lines to standards otherwise fixed. For such standards a relative accuracy of at least one part in a million seems now to be attainable.

Since the time of Fraunhofer many skilled mechanicians have given their attention to the ruling of gratings. Those of Nobert were employed by A. J. Angstrom in his celebrated researches upon wave-lengths. L. M. Rutherfurd introduced into common use the reflection grating, finding that speculum metal was less trying than glass to the diamond point, upon the permanence of which so much depends. In Rowland's dividing engine the screws were prepared by a special process devised by him, and the resulting gratings, plane and concave, have supplied the means for much of the best modern optical work. It would seem, however, that further improvements are not excluded.

There are various copying processes by which it is possible to reproduce an original ruling in more or less perfection. The earliest is that of Quincke, who coated a glass grating with a chemical silver deposit, subsequently thickened with copper in an electrolytic bath. The metallic plate thus produced formed, when stripped from its support, a reflection grating reproducing many of the characteristics of the original. It is best to com- mence the electrolytic thickening in a silver acetate bath. At the present time excellent reproductions of Rowland's speculum gratings are on the market (Thorp, Ives, Wallace) , prepared, after a suggestion of Sir David Brewster, by coating the original with a varnish, e.g. of celluloid. Much skill is required to secure that the film when stripped shall remain undeformed.

A much easier method, applicable to glass originals, is that of photographic reproduction by contact printing. In several papers dating from 1872, Lord Rayleigh (see Collected Papers, i. 157, 160, 199, 504; iv. 226) has shown that success may be attained by a variety of processes, including bichromated gelatin and the old bitumen process, and has investigated the effect of imperfect approximation during the exposure between the prepared plate and the original. For many purposes the copies, containing lines up to 10,000 to the inch, are not inferior. It is to be desired that transparent gratings should be obtained from first-class ruling machines. To save the diamond point it might be possible to use something softer than ordinary glass as the material of the plate.

9. Talbot's Bands. — These very remarkable bands are seen under certain conditions when a tolerably pure spectrum is re- garded with the naked eye, or with a telescope, half the aperture being covered by a thin plate, e.g. of glass or mica. The view of the matter taken by the discoverer {Phil. Mag., 1837, 10, p. 364) was that any ray which suffered in traversing the plate a retardation of an odd number of half wave-lengths would be extinguished, and that thus the spectrum would be seen interrupted by a number of dark bars. But this explanation cannot be accepted as it stands, being open to the same objection as Arago's theory of stellar scintillation. 1 It is as far as possible from being true that a body emitting homogeneous light would disappear on merely covering half the aperture of vision with a half-wave plate. Such a conclusion would be in the face of the principle of energy, which teaches plainly that the retardation in question leaves the aggregate brightness unaltered. The actual formation of

1 On account of inequalities in the atmosphere giving a variable refraction, the light from a star would be irregularly distributed over a screen. The experiment is easily made on a laboratory scale, with a small source of light, the rays from which, in their course towards a rather distant screen, are disturbed by the neighbourhood of a heated body. At a moment when the eye, or object-glass of a telescope, occupies a dark position, the star vanishes. A fraction of a second later the aperture occupies a bright place, and the star reappears. According to this view the chromatic effects depend entirely upon atmospheric dispersion.

the bands comes about in a very curious way, as is shown by a circumstance first observed by Brewster. When the retarding plate is held on the side towards the red of the spectrum, the bands are not seen. Even in the contrary case , the thickness of the plate must not exceed a certain limit, dependent upon the purity of the spectrum. A satisfactory explanation of these bands was first given by Airy {Phil. Trans., 1840, 225; 1841, 1), but we shall here follow the investigation of Sir G. G. Stokes {Phil. Trans., 1848, 227), limiting ourselves, however, to the case where the retarded and unretarded beams are contiguous and of equal width.

The aperture of the unretarded beam may thus be taken to be limited by x — — h, x = o, y = —I, y — +1; and that of the beam retarded by R to be given by x = o, x = h, y——l, y = +l. For the former (1) § 3 gives

~ X/ • k-ql '

on integration and reduction.

For the retarded stream the only difference is that we must sub- tract R from at, and that the limits of x are o and +h. We thus get for the disturbance at £, ?;, due to this stream

-Tj ■hfi s{nb f-m sin w ■ sin k \ at f+Tf \ • ■<*>■*

If we put for shortness w for the quantity under the last circular function in (1), the expressions (1), (2) may be put under the forms u sin t, v sin (r — a) respectively; and, if I be the intensity, I will be measured by the sum of the squares of the coefficients of sin t and cos t in the expression

u sin t+v sin (t — a), so that

I =U i --V i --2UV COS a,

which becomes on putting for u, v, and a their values, and putting

k-ql 2/ . kkh . , (, , Oh) ,,.

I=Q

4P . ,

f . Wi

ˆi sm T-

=Q

(3),

j 2+ 2cos(ˆ-?f)|. . (4).

If the subject of examination be a luminous line parallel to rj, we shall obtain what we require by integrating (4) with respect to q from — 00 to + 00. The constant multiplier is of no especial interest so that we may take as applicable to the image of a line

*t 2 • JˆMl-L / 2 *" R 2 *&\ I /z*

1 -? sin at \ 1 + cos (— — xr; \ ■ ■ ■ ©•

If R = JX, I vanishes at { = o ; but the whole illumination, repre- by I I d£, is independent of the value of R. If R=o,

J — 00

sented T 1 .

■ˆ"" X/

in agreement with § 3, where a has the meaning

here attached to ih.

The expression (5) gives the illumination at { due to that part of the complete image whose geometrical focus is at £ = 0, the retardation for this component being R. Since we have now to integrate for the whole illumination at a particular point O due to all the components which have their foci in its neighbourhood, we may conveniently regard O as origin. | is then the co-ordinate relatively to O of any focal point O' for which the retardation is R; and the required result is obtained by simply integrating (5) with respect to { from —00 to +06. To each value of £ corresponds a different value of X, and (in consequence of the dispersing power of the plate) of R. The variation of X may, however, be neglected in the integration, except in 2irR/X, where a small variation of X "■ntails a comparatively large alteration of phase. If we write

p = 2 lr R/X ..... (6),

we must regard p as a function of £, and we may take with sufficient approximation under any ordinary circumstances

P=p'+vZ (7),

where p denotes the value of p at O, and m is a constant, which is

Eositive when the retarding plate is held at the side on which the lue of the spectrum is seen. The possibility of dark bands depends upon o being positive. Only in this case can

COs!p'+(3J-2Wj/X/){)

retain the constant value — 1 throughout the integration, and then only when

CT=27rft/X/ (8)

and

cosp'=-i ..... (9).

The first of these equations is the condition for the formation of

dark bands, and the second marks their situation, which is the same as that determined by the imperfect theory.

The integration can be effected without much difficulty. For the first term in (5) the evaluation is effected at once by a known formula. In the second term if we observe that

cos {p'+(a- 2wh/\f) Q = cos |/ – gi?) = cos p' cos gi J +sin p' sin gi J,

we see that the second part vanishes when integrated, and that the remaining integral is of the form

X+» fit

sin%^cosgiJ|>,

where

Ai=-ft/X/, &=er-2irft/X/ . . . (10). By differentiation with respect to gi it may be proved that*

w=0 fromgi = — 00 tog! = —2fei,

Z0 = i7r(2/!i+gi) from gi=—2fe tog! =0,

w = \ir{2hi— gi) fromgi= togi=2fe,

b> = fromgi = 2fti togi = oo.

The integrated intensity, I', or

2rhi+2 COS pW, is thus

I' = 27rfci ..... (11),

when gi numerically exceeds 2/tr, and, when gi lies between ±2ki,

I=7r{2ft 1 |(2^ 1 -Vgi 2)COSp') . . . (12).

It appears therefore that there are no bands at all unless vs lies between o and +4A1, and that within these limits the best bands are formed at the middle of the range when vs = 2ht. The formation of bands thus requires that the retarding plate be held upon the side already specified, so that ra be positive; and that the thickness of the plate (to which sr is proportional) do not exceed a certain limit, which we may call 2T0. At the best thickness T the bands are black, and not otherwise.

The linear width of the band (?) is the increment of { which alters p by 2x, so that

e = 2x/ra (13).

With the best thickness

, . ,. sr = 2irftA/ (14).

so that in this case

« = X//A (15).

The bands are thus of the same width as those due to two infinitely narrow apertures coincident with the central lines of the retarded and unretarded streams, the subject of examination being itself a fine luminous line.

If it be desired to see a given number of bands in the whole or in any part of the spectrum, the thickness of the retarding plate is thereby determined, independently of all other considerations. But in order that the bands may be really visible, and still more in order that they may be black, another condition must be satisfied. It is necessary that the aperture of the pupil be accommodated to the angular extent

of the spectrum, or reciprocally. Black bands will be too fine to be well seen unless the aperture (2k) of the pupil be somewhat contracted. One-twentieth to one-fiftieth of an inch is suitable.ˆ The aperture and the number of bands being both fixed, the condition of blackness determines the angular magni- tude of a band and of the spectrum. The use of a grating is very convenient, for not only are there several spectra in view at the same time, but the dispersion can be varied continuously by sloping the grating. The slits may be cut out of tin-plate, and half covered by mica or " microscopic glass," held in position by a little cement.

If a telescope be employed there is a distinction to be observed, according as the half-covered aperture is between the eye and the ocular, or in front of the object-glass. In the former case the function of_ the telescope is simply to increase the dispersion, and the formation of the bands is of course independent of the par- ticular manner in which the dispersion arises. If, however, the half -covered aperture be in front of the object-glass, the pheno- menon is magnified as a whole, and the desirable relation between the (unmagnified) dispersion and the aperture is the same as with- out the telescope. There appears to be no further advantage in the use of a telescope than the increased facility of accommodation, and for this of course a very low power suffices.

The original investigation of Stokes, here briefly sketched, extends also to the case where the streams are of unequal width h, k, and are separated by an interval 2g. In the case of unequal width the bands cannot be black; but if h = k, the finiteness of 2g does not preclude the formation of black bands.

The theory of Talbot's bands with a half-covered circular aperture has been considered by H. Struve (St Peters. Trans., 1883, 31, No. 1).

The subject of "Talbot's bands" has been treated in a very instructive manner by A. Schuster (Phil. Mag., 1904), whose point of view offers the great advantage of affording an instantaneous explanation of the peculiarity noticed by Brewster. A plane pulse, i.e. a disturbance limited to an infinitely thin slice of the medium, is supposed to fall upon a parallel grating, which again may

be regarded as formed of infinitely thin wires, or infinitely narrow lines traced upon glass. The secondary pulses diverted by the ruling fall upon an object-glass as usual, and on arrival at the focus constitute a procession equally spaced in time, the interval between consecutive members depending upon the obliquity. If a retarding plate be now inserted so as to operate upon the pulses which come from one side of the grating, while leaving the remainder unaffected, we have to consider what happens at the focal point chosen. A full discussion would call for the formal application of Fourier's theorem, but some conclusions of importance are almost obvious.

Previously to the introduction of the plate we have an effect corresponding to wave-lengths closely grouped around the principal wave-length, viz. a sin (j>, where a is the grating-interval and the obliquity, the closeness of the grouping increasing with the number of intervals. In addition to these wave-lengths there are other groups centred round the wave-lengths which are submultiples of the principal one — the overlapping spectra of the second and higher orders. Suppose now that the plate is introduced so as to cover naif the aperture and that it retards those pulses which would otherwise arrive first. The consequences must depend upon the amount of the retardation. As this increases from zero, the two processions which correspond to the two halves of the aperture begin to overlap, and the overlapping gradually increases until there is almost complete superposition. The stage upon which we will fix our attention is that where the one procession bisects the intervals between the other, so that a new simple procession is constituted, containing the same number of members as before the insertion of the plate, but now spaced at intervals only half as great. It is evident that the effect at the focal point is the obliteration of the first and other spectra of odd order, so that as regards the spectrum of the first order we may consider that the two beams interfere. The formation of black bands is thus explained, and it requires that the plate be introduced upon one particular side, and that the amount of the retardation be adjusted to a particular value. If the retardation be too little, the overlapping of the processions is incomplete, so that besides the procession of half period there are residues of the original

C recessions of full period. The same thing occurs if the retardation e too great. If it exceed the double of the value necessary for black bands, there is again no overlapping and consequently no interference. If the plate be introduced upon the other side, so as to retard the procession originally in arrear, there is no overlapping, whatever may be the amount of retardation. In this way the principal features of the phenomenon are accounted for, and Schuster has

shown further how to extend the results to spectra having their origin in prisms instead of gratings.

10. Diffraction when the Source of Light is not seen in Focus. — The phenomena to be considered under this head are of less importance than those investigated by Fraunhofer, and will be treated in less detail; but in view of their historical interest and of the ease with which many of the experiments may be tried, some account of their theory cannot be omitted. One or two examples have already attracted our attention when considering Fresnel's zones, viz. the shadow of a circular disk and of a screen circularly perforated.

Fresnel commenced his researches with an examination of the fringes, external and internal, which accompany the shadow of a narrow opaque strip, such as a wire. As a source of light he used sunshine passing through a very small hole perforated in a metal plate, or condensed by a lens of short focus. In the absence of a heliostat the latter was the more convenient. Following, un- known to himself, in the footsteps of Young, he deduced the principle of interference from the circumstance that the darkness of the interior bands requires the co-operation of light from both sides of the obstacle. At first, too, he followed Young in the view that the exterior bands are the result of interference between the direct light and that reflected from the edge of the obstacle, but he soon discovered that the character of the edge — e.g. whether it was the cutting edge or the back of a razor — made no material difference, and was thus led to the conclusion that the explanation of these phenomena requires nothing more than the application of Huygens's principle to the unobstructed parts of the wave. In observing the bands he received them at first upon a screen of finely ground glass, upon which a magnifying lens was focused; but it soon appeared that the ground glass could be dispensed with, the diffraction pattern being viewed in the same way as the image formed by the object-glass of a telescope is viewed through the eye -piece. This simplification was attended by a great saving of light, allowing measures to be taken such as would otherwise have presented great difficulties.

In theoretical investigations these problems are usually treated as of two dimensions only, everything being referred to the plane

passing through the luminous point and perpendicular to the diffract- ing edges, supposed to be straight and parallel. In strictness this idea is appropriate only when the source is a luminous line, emitting cylindrical waves, such as might be obtained from a luminous point with the aid of a cylindrical lens. When, in order to apply Huygens's

principle, the wave is supposed to be broken up, the phase is the same at every element of the surface of resolution which lies upon a line perpendicular to the plane of reference, and thus the effect of the whole line, or rather infinitesimal strip, is related in a constant manner to that of the element which lies in the plane of reference, and may be considered to be represented thereby. The same method of representation is applicable to spherical waves, issuing from a point, if the radius of curvature be large; for, al- though there is variation of phase along the length of the infinitesimal strip, the whole effect depends practically upon that of the central parts where the phase is sensibly constant. 1

In fig. 17 APQ is the arc of the circle representative of the wave-front of resolution, the centre being at O, and the radius OA being equal to o. B is the point at which the effect is required, distant a+b from O, so that AB=6, AP = s, PQ-ds.

Taking as the standard phase that of the secondary wave from A, we may represent the effect of PQ by

Fig. 17.

cos 2:

-‘

where S = BP— AP is the retardation at B of the wave from P

relatively to that from A.

Now

d = (a+b)s/2ab . (1),*

so that, if we write

the effect at B is ab

2ttS _ ir(a+b)s 2 _tt 2 X ab\ 2 V ■

(2),

1 2”FFF) 1 l \ cos? r/ cos h^-dv+sin Hli CsinlTv\dv I (3),

the limits of integration depending upon the disposition of the diffracting edges. When a, b, X are regarded as constant, the first factor may be omitted, — as indeed should be done for consistency’s

sake, inasmuch as other factors of the same nature have been omitted already.

The intensity I 2 , the quantity with which we are principally concerned, may thus be expressed

I 2

*= { fcosimiKdv £ 2 + 1 fsm$*v*.dv } 2*

(4).

These integrals, taken from »=o, are known as Fresnel's integrals; we will denote them by C and S, so that

•-£

cos Jjri>'.

>=/o"

sin %irv.dv*

(5).

When the upper limit is infinity, so that the limits correspond to the inclusion of half the primary wave, C and S are both equal to \, by a known formula; and on account of the rapid fluctuation of sign the parts of the range beyond very moderate values of v contribute but little to the result.

Ascending series for C and S were given by K. W. Knockenhauer, and are readily investigated. Integrating by parts, we find

*K ' +t "~J e dv = e .v-$i*J e dv*; and, by continuing this process,*

C+iS = e

i.lirv'-

' 2 j „_H v 3 +~ ^. V i-% i I iir

3 5" 3

By separation of real and imaginary parts,

C = M cos i«> 2 +N sin %wv) S = M sin iirtfi-N cos Jim 2)*

where

5 7

•»+...[.

M-j-

3.5 + 3X7.9

N=ˆL :

1.3 1.3.5.7

+1

(6),

(7), .(8).

*1.3.5.7.9.11— – * These series are convergent for all values of tr, but are practically useful only when v is small .*

Expressions suitable for discussion when v is large were obtained

1 In experiment a line of light is sometimes substituted for a point in order to increase the illumination. The various parts of the line are here independent sources, and should be treated accordingly. To assume a cylindrical form of primary wave would be justifiable only when there is synchronism among the secondary waves issuing from the various centres.

byL. P. Gilbert {Mem. cow. de V Acad, de Bruxelles,ˆ!, p. i). Taking

i« 2 = «. . . ... . (9),

we may write

rjL-c 1 f V"

c+tS= T&oh~nr • • • • < 10 >-

Again, by a known formula,

-L = Lf”

/

V « V IT Jo V x ‘ ” ‘ ‘ ”

Substituting this in (io), and inverting the order of integration, we

get

*C+tS=— 775 1 7- e d**

L C”dx <;"(»)!

_ xV2jo V ‘/strong> • • • • ˆ Thus, if we take*

r 1 f eˆ’ˆJx.dx „_ 1 f e-»*dx ,*

L,_ W2jo $_{T+F}$‘ w_ W2j V.(l+ * 2)’ u ; ‘*

C = j-Gcos«+H sinw, S = f-G sin tt-H cos u . (14).

The constant parts in (14), viz. i, may be determined by direct integration of (12), or from the observation that by their constitution G and H vanish when m = oo , coupled with the fact that C and S then assume the value j.

Comparing the expressions for C, S in terms of M, N, and in terms of G, H, we find that

G = !(costt+sin«)-M, H = §(cosw-sin«)-f-N . (15),

formulae which may be utilized for the calculation of G, H when u (or ») is small. For example, when u = o, M=0, N = o, and consequently G = H = J.

Descending series of the semi-convergent class, available for numerical calculation when u is moderately large, can be obtained from (12) by writing x = uy, and expanding the denominator in powers of y. The integration of the several terms may then be effected by the formula

f

y ■ , ˆ-r(a+j)-(2 -»(a-l)-

and we get in terms of v

■*Hx;*

G _; 1.3.5 1.3.5.7.9

H =

1

ttV 1

1.3 1.3.5.7

“■n-3„5+ irˆ

. . . (16),

. . . (17).

The corresponding values of C and S were originally derived by A. L. Cauchy, without the use of Gilbert’s integrals, by direct integration by parts.

From the series for G and H just obtained it is easy to verify that

m

dv

— wvG,

dv

(18).

We now proceed to consider more particularly the distribution of light upon a screen PBQ near the shadow of a straight edge A. At a point P within the geometrical shadow of the obstacle, the half of the wave to the right of C (fig. 18), the nearest point on the wave-front, is wholly intercepted, and on the left the integration is to be taken from s = CA to s = °o. If V be the value of v corre- sponding to CA, viz.

we may write

I= (| cos hirv 2 .dv j +((sin iwv 2 .dvj*

or, according to our previous notation,

I 2 = (i – C v) 2 + Q – Sv) 2 = G 2 +H 2

(19),

(20),

(21).

- *Now in the integrals represented by G and H every element diminishes as V increases from zero. Hence, as CA increases, viz. as the point P is more °-;C and more deeply immersed in the shadow,*

the illumination continuously decreases, and that without limit. It has long been known from observation that there are no bands on the interior side of the shadow of the

'O edge.

The law of diminution when V is moder- ately large is easily expressed with the aid of the series (16), (17) for G, H. We have ultimately G=o, H = (-V) _l , so that . l 2 = i/x 2 V 2 , . _ '*

or the illumination is inversely as the square of the distance from the shadow of the edge.

For a point Q outside the shadow the integration extends over

more than half the primary wave. The intensity may be expressed by

I 2 = Q+C v) 2 +(RSv) 2 . . . . (22); and the maxima and minima occur when

(l+C ¥)2y+(l+S v)^| = 0,

whence

sini7rV 2 +cos|7rV 2 = G .... (23).

When V = o, viz. at the edge of the shadow, I 2 = i; when V= 00, I 2 = 2, on the scale adopted. The latter is the intensity due to the uninterrupted wave. The quadrupling of the intensity in passing outwards from the edge of the shadow is, however, accompanied by fluctuations giving rise to bright and dark bands. The position of these bands determined by (23) may be very simply expressed when V is large, for then sensibly G =0, and

%TV = y+mr (24),*

« being an integer. In terms of 8, we have from (2)

S=(| + |n)X (25).

The first maximum in fact occurs when 5 = |X— 0046X, and the first minimum when 4=|X~ 0016X, the corrections being readily obtainable from a table of G by substitution of the approximate value of V.

The position of Q corresponding to a given value of V, that is, to a band of given order, is by (19)

£±»AD-vV{^±a

By means of this expression we may trace the locus of a band of given order as b varies. With sufficient approximation we may regard BQ and 6 as rectangular co-ordinates of Q. Denoting them by x, y, so that AB is axis of y and a perpendicular through A the axis of x, and rationalizing (26), we have

. 2ax 2 -V 2 Xy 2 -V 2 aXy = o,

which represents a hyperbola with vertices at O and A.

From (24), (26) we see that the width of the bands is of the order V \b\(a--b)la}. From this we may infer the limitation upon the width of the source of light, in order that the bands may be properly formed. If w be the apparent magnitude of the source seen from A, tab should be much smaller than the above quantity, or

w

If a be very great in relation to b, the condition becomes

«

so that if 6 is to be moderately great (1 metre), the apparent magnitude of the sun must be greatly reduced before it can be used as a source. The values of V for the maxima and minima of intensity, and the magnitudes of the latter, were calculated by Fresnel. An extract from his results is given in the accompanying table.

BQ =

(26).

V

I 2

First maximum .

1-2172

2-7413

First minimum

1-8726

1-5570

Second maximum

2-3449

2-3990

Second minimum

2-7392

1-6867

Third maximum . .

3-0820

2-3022

Third minimum .

3-3913

1-7440

A very thorough investigation of this and other related questions, accompanied by fully worked-out tables of the functions concerned, will be found in a paper by E. Lommel (Abh. bayer. Akad. d. Wiss. II. CI., 15, Bd., iii. Abth., 1886).

When the functions C and S have once been calculated, the discussion of various diffraction problems is much facilitated by the idea, due to M. A. Cornu (Journ. de Phys., 1874, 3, p. 1 ; a similar suggestion was made independently by G. F. Fitzgerald), of exhibiting as a curve the relationship between C and S, considered as the rectangular co-ordinates (x, y) of a point. Such a curve is shown in fig. 19, where, according to the definition (5) of C, S,

■r

=£•

cos \TnP.dv, y =) sin iirv'.dv

(29).

The origin of co-ordinates corresponds to v =0; and the asymptotic points J, J', round which the curve revolves in an ever-closing spiral, correspond to v = == 00 .*

The intrinsic equation, expressing the relation between the arc of the tangent at any points to the axis of x, assumes a very simple form. For

dx=cos%irtP.dv, dy = sm ImP.dv; so that

o-=/y (dx+df)=v, (30),*

■■ ■ ‘ $ = t

Accordingly,

and for the curvature,

= ix

(32); (33).

1

Cornu remarks that this equation suffices to determine the general character of the curve. For the osculating circle at any point

includes the whole of the curve which lies beyond; and the successive con- volutions envelop one an- other without intersection. The utility, of the curve depends upon the fact that the elements of arc repre- sent, in amplitude and Chase, the component vi- rations due to the corre- sponding portions of the primary wave-front. For by (.30) dcr = dv, and by (2) dv is proportional to ds. Moreover by (2) and (31) the retardation of phase of the elementary vibration from PQ (fig. 17) is 2irS/X, or 4>. Hence, in accordance

Fig. 19.

with the rule for compounding vector quantities, the resultant vibration at B, due to any finite part of the primary wave, is represented in amplitude and phase by the chord joining the ex- tremities of the corresponding arc (o-j-oi).

In applying the curve in special cases of diffraction to exhibit the effect at any point P (fig. 18) the centre of the curve O is to be considered to correspond to that point C of the primary wave-front which lies nearest to P. The operative part, or parts, of the curve are of course those which represent the unobstructed portions of the primary wave.

Let us reconsider, following Cornu, the diffraction of a screen unlimited on one side, and on the other terminated by a straight edge. On the illuminated side, at a distance from the shadow, the vibration is represented by]]’. The co-ordinates of J, j’ being (hih), (

— h — i) > I 2 is 2; and the phase is | period in arrear of that of the element at O. As the point under contemplation is supposed to approach the shadow, the vibration is represented by the chord drawn from J to a point on the other half of the curve, which travels inwards from J' towards O. The amplitude is thus subject to fluctuations, which increase as the shadow is approached. At the point O the intensity is one-quarter of that of the entire wave, and after this point is passed, that is, when we have entered the geometrical shadow, the intensity falls off gradually to zero, without fluctuations. The whole progress of the phenomenon is thus exhibited to the eye in a very instructive manner.

We will next suppose that the light is transmitted by a slit, and inquire what is the effect of varying the width of the slit upon the illumination at the projection of its centre. Under these circumstances the arc to be considered is bisected at O, and its length is proportional to the width of the slit. It is easy to see that the length of the chord (which passes in all cases through O) increases to a maximum near the place where the phase-retardation is f of a period, then diminishes to a minimum when the retardation is about I of a period, and so on.

If the slit is of constant width and we require the illumination at various points on the screen behind it, we must regard the arc of the curve as of constant length. The intensity is then, as always, represented by the square of the length of the chord. If the slit be narrow, so that the arc is short, the intensity is constant over a wide range, and does not fall off to an important extent until the discrepancy of the extreme phases reaches about a quarter of a period.

We have hitherto supposed that the shadow of a diffracting obstacle is received upon a diffusing screen, or, which comes to nearly the same thing, is observed with an eye-piece. If the eye, provided if necessary with a perforated plate in order to reduce the aperture, be situated inside the shadow at a place where the illumina- tion is still sensible, and be focused upon the diffracting edge, the light which it receives will appear to come from the neighbourhood of the sdge, and will present the effect of a silver lining. This is doubtless the explanation of a " pretty optical phenomenon, seen in Switzerland, when the sun rises from behind distant trees stand- ing on the summit of a mountain." 1

11. Dynamical Theory of Diffraction. — The explanation of diffraction phenomena given by Fresnel and his followers is

1 H. Necker {Phil. Mag., November 1832) ; Fox Talbot (Phil.Mag., June 1833). " When the sun is about to emerge .... every branch and leaf is lighted up with a silvery lustre of indescribable beauty. . . . The birds, as Mr Necker very truly describes, appear like flying brilliant sparks." Talbot ascribes the appearance to diffraction; and he recommends the use of a telescope.

independent of special views as to the nature of the aether, at least in its main features; for in the absence of a more complete foundation it is impossible to treat rigorously the mode of action of a solid obstacle such as a screen. But; without entering upon matters of this kind, we may inquire in what manner a primary wave may be resolved into elementary secondary waves, and in particular as to the law of intensity and polarization in a secondary wave as dependent upon its direction of propagation, and upon the character as regards polarization of the primary wave. This question was treated by Stokes in his " Dynamical Theory of Diffraction " {Camb. Phil. Trans., 1849) on the basis of the elastic solid theory.

Let x, y, z be the co-ordinates of any particle of the medium in its natural state, and {, tj, f the displacements of the same particle at the end of time t, measured in the directions of the three axes respectively. Then the first of the equations of motion may be put under the form

*dP -** Kd0 + d? + d*J +(0 ¥ >lx \T X + dy + Tz) '*

where o 2 and b 1 denote the two arbitrary constants. Put for shortness

di , dij.d? dx + dy + Tz~ b

(1),

and represent by v 2 ? the quantity multiplied by b 1 . According to this notation, the three equations of motion are

(2).

It is to be observed that S denotes the dilatation of volume of the element situated at (x, y, 2). In the limiting case in which the medium is regarded as absolutely incompressible S vanishes; but, in order that equations (2) may preserve their generality, we must suppose a at the same time to become infinite, and replace a 2 8 by a new function of the co-ordinates.

These equations simplify very much in their application to plane waves. If the ray be parallel to OX, and the direction of vibration parallel to OZ, we have £ = 0, tj = o, while f is a function of x and t only. Equation (1) and the first pair of equations (2) are thus satisfied identically. The third equation gives

dp ~

(3),

of which the solution is

i=f{bt-x) (4),

where / is an arbitrary function.

The question as to the law of the secondary waves is thus an- swered by Stokes. " Let £ = 0, ij =0, f =f(bt—x) be the displacements corresponding to the incident light ; let Oi be any point in the plane P (of the wave-front), dS an element of that plane adjacent to Or, and consider the disturbance due to that portion only of the incident disturbance which passes continually across dS. Let O be any point in the medium situated at a distance from the point Oi which is large in comparison with the length of a wave ; let OiO = r, and let this line make an angle with the direction of propagation of the incident light, or the axis of x, and with the direction of vibration, or axis of z. Then the displacement at O will take place in a direction perpendicular to OiO, and lying in the plane ZOiO; and, if f be the displacement at O, reckoned positive in the direction nearest to that in which the incident vibrations are reckoned positive,

f' = 4§:(l+cos0) sin f'(bt-r).*

In particular, if

f(bt-x)=csin y (&/-) .... (5),*

we shall have

r'=ˆf(l+cos0)sintf>cos 2 f{bt-r) . . . (6)."

It is then verified that, after integration with respect to dS, (6) gives the same disturbance as if the primary wave had been supposed to pass on unbroken.

The occurrence of sin

of polarized light are executed in a direction perpendicular to the plane of polarization.

The factor (i + cos 0) shows in what manner the secondary disturbance depends upon the direction in which it is propagated with respect to the front of the primary wave.

If, as suffices for all practical purposes, we limit the application of the formulae to points in advance of the plane at which the wave is supposed to be broken up, we may use simpler methods of resolution than that above considered. It appears indeed that the purely mathematical question has no definite answer. In illustration of this the analogous problem for sound may be referred to. Imagine a flexible lamina to be introduced so as to coincide with the plane at which resolution is to be effected. The introduction of the lamina (supposed to be devoid of inertia) will make no difference to the propagation of plane parallel sonorous waves through the position which it occupies. At every point the motion of the lamina will be the same as would have occurred in its absence, the pressure of the waves impinging from behind being just what is required to generate the waves in front. {"low it is evident that the aerial motion in front of the lamina is determined by what happens at the lamina without regard to the cause of the motion there existing. Whether the necessary farces are due to aerial pressures acting on the rear, or to forces directly impressed from without, is a matter of indifference. The conception of the lamina leads immediately to two schemes, according to which a primary wave may be supposed to be broken up. In the first of these the element <2S, the effect of which is to be estimated, is supposed to execute its actual motion, while every other element of the plane lamina is maintained at rest. The resulting aerial motion in front is readily calculated (see Rayleigh, Theory of Sound, § 278) ; it is symmetrical with respect to the origin, i.e. independent of 6. When the secondary disturbance thus obtained is integrated with respect to dS over the entire plane of the lamina, the result is necessarily the same as would have been obtained had the primary wave been supposed to pass on without resolution, for this is precisely the motion generated when every element of the lamina vibrates with a common motion, equal to that attributed to dS. The only assumption here involved is the evidently legitimate one that, when two systems of variously distributed motion at the lamina are superposed, the corresponding motions in front are superposed also.

The method of resolution just described is the simplest, but it is only one of an indefinite number that might be proposed, and which are all equally legitimate, so long as the question is regarded as a merely mathematical one, without reference to the physical pro- perties of actual screens. If, instead of supposing the motion at dS to be that of the primary wave, and to be zero elsewhere, we suppose the force operative over the element dS of the lamina to be that corresponding to the primary wave, and to vanish elsewhere, we obtain a secondary wave following quite a different law. In this case the motion in different directions varies as cos0, vanishing at right angles to the direction of propagation of the primary wave. Here again, on integration over the entire lamina, the aggregate effect of the secondary waves is necessarily the same as that of the primary.

In order to apply these ideas to the investigation of the secondary wave of light, we require the solution of a problem, first treated by Stokes, viz. the determination of the motion in an infinitely extended elastic solid due to a locally applied periodic force. If we suppose that the force impressed upon the element of mass D dx dy dz is

DZ dx dy dz,

being everywhere parallel to the axis of Z, the only change required in our equations (1), (2) is the addition of the term Z to the second member of the third equation (2). In the forced vibration, now under consideration, Z, and the quantities £, 17, f, 6 expressing the resulting motion, are to be supposed proportional to «"', where i' = V(— 1), and « = 2it/t, t being the periodic time. Under these circumstances the double differentiation with respect to / of any quantity is equivalent to multiplication by the factor — n 2 , and thus our equations take the form*

(6V+n')£+(a»-6»)g=0

(6»V 5 n')n(6 2)ˆ = (&V+n 4)r+(a#);§=-Z*

• • (7).

It will now be convenient to introduce the quantities cri, cr 2 , cr 3 , which express the rotations of the elements of the medium round axes parallel to those of co-ordinates, in accordance with the equations

§_7 dT,d? d_f .

*• dy dx' * Tz Ty J 3£ dz ■ • {H >*

In terms of these we obtain from (7), by differentiation and subtraction,

(JV+nV3 = • 1

(W +n')"i = dZ/dy V .... (9).

{b i v t +n')" i =-dZ/dx]

The first of equations (9) gives

For eti we have

», =

(10).

i= -4ˆffJ§ e -r dxd y dz ■ ■ ■ c").

where r is the distance between the element dx dy dz and the point where &i is estimated, and

k=nlb=2xj.

(12),

X being the wave-length.

(This solution may be verified in the same manner as Poisson's theorem, in which k = o.)

We will now introduce the supposition that the force Z acts only within a small space of volume T, situated at (x, y, 2), and for simplicity suppose that it is at the origin of co-ordinates that the rotations are to be estimated. Integrating by parts in (11), we get

in which the integrated terms at the limits vanish, Z being finite only within the region T. Thus

" i =4ˆ»ffS z T y (Ft) dx d y dz –

*Since the dimensions of T are supposed to be very small in comparison with X, the factor j- (——) is- sensibly constant ; so that, if Z stand for the mean value of Z over the volume T, we may write TZ _ A /f – *ˆ*

*~~ ± *W r -Tr*

In like manner we find

!)

TZ

“47T& 2 ‘

x d /g-”””^ 7-dr\ r)

(13).

[(14).

From (10), (13), (14) we see that, as might have been expected, the rotation at any point is about an axis perpendicular both to the direction of the force and to the line joining the point to the source of disturbance. If the resultant rotation be » , we have

„_TL_ V (a +y) _ (e’ ihr \ _ TZsin,ft rf /e-‘^X 4vb* ■ r ■ dr\ r) ~ 4ir6 2 dr \~T) •*

denoting the angle between r and z. In differentiating g-f^/r with respect to r, we may neglect the term divided by r 2 as altogether insensible, kr being an exceedingly great quantity at any moderate distance from the origin of disturbance. Thus

_ — t’fe.TZsinift e~ iwb ■ ~*

(15),

which completely determines the rotation at any point. For a disturbing force of given integral magnitude it is seen to be everywhere about an axis perpendicular to r and the direction of the force, and in magnitude dependent only upon the angle (<£) between these two directions and upon the distance ®.

The intensity of light is, however, more usually expressed in terms of the actual displacement in the plane of the wave. This displacement, which we may denote by f ‘, is in the plane containing z and r, and perpendicular to the latter. Its connexion with ct is expressed by n=dj;’/dr; so that

,, _ TZsin.fr e’^’fa)

.r=

ivW

(16),

where the factor e int is restored.

Retaining only the real part of (16), we find, as the result of a local application of force equal to

DTZcosn (17),*

the disturbance expressed by

*, _ TZsin0 cos(nt — kr) ‘ ~ 4*1? • r*

(18).

The occurrence of sin shows that there is no disturbance radiated in the direction of the force, a feature which might have been anticipated from considerations of symmetry.

We will now apply (18) to the investigation of a law of secondary disturbance, when a primary wave

f = sin(n/-iSi) . . . . . (19)*

*is supposed to be broken up in passing the plane x = o. The first step is to calculate the force which represents the reaction between the parts of the medium separated by * = o. The force operative upon the positive half is parallel to OZ, and of amount per unit of area equal to*

-TO dtldxˆPkV cos nt

and to this force acting over the whole of the plane the actual motion on the positive side may be conceived to be due. The

secondary disturbance corresponding to the element dS of the plane may be supposed to be that caused by a force of the above magnitude acting over dS and vanishing elsewhere ; and it only remains to examine what the result of such a force would be.

Now it is evident that the force in question, supposed to act upon the

positive half only of the medium, produces just double of the effect that would be caused by the same force if the medium were undivided, and on the latter supposition (being also localized at a point) it comes under the head already considered. According to (18), the effect of the force acting at dS parallel to OZ, and of amount equal to

2b 2 kJ) dS cos nt, will be a disturbance

v/ dS sin

(20),

regard being had to (12). This therefore expresses the secondary disturbance at a distance r and in a direction making an angle with OZ (the direction of primary vibration) due to the element dS of the wave-front.

The proportionality of the secondary disturbance to sin is common to the present law and to that given by Stokes, but here there is no dependence upon the angle 9 between the primary and secondary rays. The occurrence of the factor (Xr) _1 , and the necessity of supposing the phase of the secondary wave accelerated by a quarter of an undulation, were first established by Archibald Smith, as the result of a comparison between the primary wave, supposed to pass on without resolution, and the integrated effect of all the secondary waves (§ 2). The occurrence of factors such as sin , or £(i+cos 8), in the expression of the secondary wave has no influence upon the result of the integration, the effects of all the elements for which the factors differ appreciably from unity being destroyed by mutual interference.

The' choice between various methods of resolution, all mathematically admissible, would be guided by physical considerations respecting the mode of action of obstacles. Thus, to refer again to the acoustical analogue in which plane waves are incident upon a perforated rigid screen, the circumstances of the case are best represented by the first method of resolution, leading to symmetrical secondary waves, in which the normal motion is supposed to be zero over the unperforated parts. Indeed, if the aperture is very small, this method gives the correct result, save as to a constant factor. In like manner our present law (20) would apply to the kind of obstruc- tion that would be caused by an actual physical division of the elastic medium, extending over the whole of the area supposed to be occupied by the intercepting screen, but of course not extending to

the parts supposed to be perforated.

On the electromagnetic theory, the problem of diffraction becomes definite when the properties of the obstacle are laid down. The simplest supposition is that the material composing the obstacle is perfectly conducting, i.e. perfectly reflecting. On this basis A. J. W. Sommerfeld {Math. Ann., 1895, 47, p. 317), with great mathematical skill, has solved the problem of the shadow thrown by a semi-infinite plane screen. A simplified exposition has been given by Horace Lamb (Proc. Lond. Math. Soc, 1906, 4, p. 190). It appears that Fresnel's results, although based on an imperfect theory, require only insignificant corrections. Problems not limited to two dimensions, such for example as the shadow of a circular disk, present great difficulties, and have not hitherto been treated by a rigorous method ; but there is no reason to suppose that Fresnel's results would be departed from materially. (R.)

DIFFUSION (from the Lat. diffundere; dis-, asunder, and fundere, to pour out), in general, a spreading out, scattering or circulation; in physics the term is applied to a special phenomenon, treated below.

1. General Description. — When two different substances are placed in contact with each other they sometimes remain separate, but in many cases a gradual mixing takes place. In the case where both the substances are gases the process of mixing continues until the result is a uniform mixture. In other cases the proportions in which two different substances can mix lie between certain fixed limits, but the mixture is distinguished from a chemical compound by the fact that between these limits the composition of the mixture is capable of continuous variation, while in chemical compounds, the proportions of the different constituents can only have a discrete series of numerical values, each different ratio representing a different compound. If we take, for example, air and water in the presence of each other, air will become dissolved in the water, and water will evaporate into the air, and the proportions of either constituent absorbed by the other will vary continuously. But a limit will come when the air will absorb no more water, and the water will absorb no more air, and throughout the change a definite surface of separation will exist between the liquid and the gaseous parts. When no surface

of separation ever exists between two substances they must necessarily be capable of mixing in all proportions. If they are not capable of mixing in all proportions a discontinuous change must occur somewhere between the regions where the substances are still unmixed, thus giving rise to a surface of separation.

The phenomena of mixing thus involves the following pro- cesses: — (1) A motion of the substances relative to one another throughout a definite region of space in which mixing is taking place. This relative motion is called " diffusion." (2) The pas- sage of portions of the mixing substances across the surface of separation when such a surface exists. These surface actions are described under various terms such as solution, evaporation, condensation and so forth. For example, when a soluble salt is placed in a liquid, the process which occurs at the surface of the salt is called " solution," but the salt which enters the liquid by solution is transported from the surface into the interior of the liquid by " diffusion."

Diffusion may take place in solids, that is, in regions occupied by matter which continues to exhibit the properties of the solid state. Thus if two liquids which can mix are separated by a membrane or partition, the mixing may take place through the membrane. If a solution of salt is separated from pure water by a sheet of parchment, part of the salt will pass through the parch- ment into the water. If water and glycerin are separated in this way most of the water will pass into the glycerin and a little glycerin will pass through in the opposite direction, a property frequently used by microscopists for the purpose of gradually transferring minute algae from water into glycerin. A still more interesting series of examples is afforded by the passage of gases through partitions of metal, notably the passage of hydrogen through platinum and palladium at high temperatures. When the process is considered with reference to a membrane or partition taken as a whole, the passage of a substance from one side to the other is commonly known as " osmosis " or " transpiration " (see Solution), but what occurs in the material of the membrane itself is correctly described as diffusion.

Simple cases of diffusion are easily observed qualitatively. If a solution of a coloured salt is carefully introduced by a funnel intc the bottom of a jar containing water, the two portions will at first be fairly well defined, but if the mixture can exist in all propor- tions, the surface of separation will gradually disappear; and the rise of the colour into the upper part and its gradual weakening in the lower part, may be watched for days, weeks or even longer intervals. The diffusion of a strong aniline colouring matter into the interior of gelatine is easily observed, and is commonly seen in copying apparatus. Diffusion of gases may be shown to exist by taking glass jars containing vapours of hydrochloric acid and ammonia, and placing them in communication with the heavier gas downmost. The precipitation of ammonium chloride shows that diffusion exists, though the chemical action prevents this example from forming a

typical case of diffusion. Again, when a film of Canada balsam is enclosed between glass plates, the disappearance during a few weeks of small air bubbles enclosed in the balsam can be watched under the microscope.

In fluid media, whether liquids or gases, the process of mixing is greatly accelerated by stirring or agitating the fluids, and liquids which might take years to mix if left to themselves can thus be mixed in a few seconds. It is necessary to carefully distinguish the effects of agitation from those of diffusion proper. By shaking up two liquids which do not mix we split them up into a large number of different portions, and so greatly increase the area of the surface of separation, besides decreasing the thicknesses of the various portions. But even when we produce the appearance of a uniform turbid mixture, the small portions remain quite distinct. If however the fluids can really mix, the final process must in every case depend on diffusion, and all we do by shaking is to increase the sectional area, and decrease the thickness of the diffusing portions, thus rendering the completion of the operation more rapid. If a gas is shaken up in a liquid the process of absorption of the bubbles is also accelerated by capillary action, as occurs in an ordinary sparklet bottle. To state the matter precisely, however finely two fluids have beeD

subdivided by agitation, the molecular constitution of the different portions remains unchanged. The ultimate process by which the individual molecules of two different substances become mixed, producing finally a homogeneous mixture, is in every case diffusion. In other words, diffusion is that relative motion of the molecules of two different substances by which the proportions of the molecules in any region containing a finite number of molecules are changed.

In order, therefore, to make accurate observations of diffusion in fluids it is necessary to guard against any cause which may set up currents; and in some cases this is exceedingly difficult. Thus, if gas is absorbed at the upper surface of a liquid, and if the gaseous solution is heavier than the pure liquid, currents may be set up, and a steady state of diffusion may cease to exist. This has been tested experimentally by C. G. von Hiifner and W. E. Adney. The same thing may happen when a gas is evolved into a liquid at the surface of a solid even if no bubbles are formed ; thus if pieces of aluminium

are placed in caUstic soda, the currents set up by the evolution of hydrogen are sufficient to set the aluminium pieces in motion, and it is probable that the motions of the Diatomaceae are similarly caused by the evolution of oxygen. In some pairs of substances diffusion may take place more rapidly than in others. Of course the progress of events in any experiment necessarily depends on various causes, such as the size of the containing vessels, but it is easy to see that when experiments with different substances are carried out under similar conditions, however these " similar conditions " be defined, the rates of diffusion must be capable of numerical comparison, and the results must be expressible in terms of at least one physical quantity, which for any two substances can be called their co- efficient of diffusion. How to select this quantity we shall see later.

2 Quantitative Methods of observing Diffusions — The simplest plan of determining the progress of diffusion between two liquids would be to draw off and examine portions from different strata at some stage in the process; the disturbance produced would, however, interfere with the subsequent process of diffusion, and the observations could not be continued. By placing in the liquid column hollow glass beads of different average densities, and observing at what height they remain suspended, it is possible to trace the variations of density of the liquid column at different depths, and different times. In this method, which was originally introduced by Lord Kelvin, difficulties were caused by the adherence of small air bubbles to the beads.

In general, optical methods are the most capable of giving exact results, and the following may be distinguished, (a) By refraction in a horizontal plane. If the containing vessel is in the form of a prism, the deviation of a horizontal ray of light in passing through the prism determines the index of refraction, and consequently the density of the stratum through which the ray passes, (b) By refraction in a vertical plane. Owing to the density varying with the depth, a horizontal ray entering the liquid also undergoes a small vertical deviation, being bent downwards towards the layers of greater density. The observa- tion of this vertical deviation determines not the actual density, but its rate of variation with the depth, i.e. the "density gradient" at any point, (c) By the saccharimeter. In the cases of solutions of sugar, which cause rotation of the plane of polarized light, the density of the sugar at any depth may be determined by observing the corresponding angle of rotation, this was done originally by W. Voigt.

3. Elementary Definitions of Coefficient of Diffusion. — The simplest case of diffusion is that of a substance, say a gas, diffusing in the

interior of a homogeneous solid medium, which remains at rest, when no external forces act on the system. We may regard it as the result of experience that: (1) if the density of the diffus- ing substance is everywhere the same no diffusion takes place, and (2) if the density of the diffusing substance is different at different points, diffusion will take place from places of greater to those of lesser density, and will not cease until the density is everywhere the same. It follows that the rate of flow of the diffusing sub- stance at any point in any direction must depend on the density gradient at that point in that direction, i.e. on the rate at which the density of the diffusing substance decreases as we move in that direction. We may define the coefficient of diffusion as the ratio of the total mass per unit area which flows across any small section, to the rate of decrease of the density per unit distance in a direction perpendicular to that section.

*In the case of steady diffusion parallel to the axis of *, if p be the density of the diffusing substance, and q the mass which flows across a unit of area in a plane perpendicular to the axis of *, then the density gradient is —dp/dx and the ratio of q to this is called the " coefficient of diffusion." By what has been said this ratio remains finite, how- ever small the actual gradient and flow may be; and it is natural to assume, at any rate as a first approximation, that it is constant as far as the quantities in question are concerned. Thus if the coefficient of diffusion be denoted by K we have q = —K{dp/ dx).*

Further, the rate at which the quantity of substance is increasing in an element between the distances x and x--dx is equal to the difference of the rates of flow in and out of the two faces, whence as in hydrodynamics, we have dpldt = —dq/dx.

It follows that the equation of diffusion in this case assumes the form

dp _ d (y.dp\ dt dx\ dxj' which is identical with the equations representing conduction of heat, flow of electricity and other physical phenomena. For motion in three dimensions we have in like manner

*< *£_ d lvdp\ , d f v dp\ , (d v dp\. dt ~ dx K^dH) ~% *d}) + \dzdl)'*

and the corresponding equations in electricity and heat for aniso- tropic substances would be available to account for any parallel phenomena, which may arise, or might be conceived, to exist in

connexion with diffusion through a crystalline solid.

In the case of a very dilute solution, the coefficient of diffusion of the dissolved substance can be defined in the same way as when the diffusion takes place in a solid, because the effects of diffusion will not have any perceptible influence on the solvent, and the latter may therefore be regarded as remaining practically at rest. But in most cases of diffusion between two fluids, both of the fluids are in motion, and hence there is far greater difficulty in determining the motion, and even in defining the coefficient of diffusion. It is important to notice in the first instance, that it is only the relative motion of the two substances which consti- tutes diffusion. Thus when a current of air is blowing, under ordinary circumstances the changes which take place are purely mechanical, and do not depend on the separate diffusions of the oxygen and nitrogen of which the air is mainly composed. It is only when two gases are flowing with unequal velocity, that is, when they have a relative motion, that these changes of relative distribution, which are called diffusion, take place. The best way out of the difficulty is to investigate the separate motions of the two fluids, taking account of the mechanical actions exerted on them, and supposing that the mutual action of the fluids causes either fluid to resist the relative motion of the other.

4. The Coefficient of Resistance. — Let us call the two diffusing fluids A and B. If B were absent, the motion of the fluid A would be determined entirely by the variations of pressure of the fluid A, and by the external forces, such as that due to gravity acting on A. Similarly if A were absent, the motion of B would be determined entirely by the variations of pressure due to the fluid B, and by the external forces acting on B. When both fluids are mixed together, each fluid tends to resist the relative motion of the other, and by the law of equality of action and reaction, the resistance which A experiences from B is every where equal and opposite to the resistance which B experiences from A. If the amount of this resistance per unit volume be divided by the relative velocity of the two fluids, and also by the product of their densities, the quotient is called the "coefficient of resistance." If then pi, p 2 are the densities cf the two fluids, Mi, W2 their velocities, C the coefficient of resistance, then the portion of the fluid A contained in a small element of volume v will experience from the fluid B a resistance Cpip 2 »(«i— w 2), and the fluid B contained in the same volume element will experience from the fluid A an equal and opposite resistance, Cp 2 piii(tt 2 — «j).

This definition implies the following laws of resistance to diffusion,

which must be regarded as based on experience, and not as self-evident truths: (1) each fluid tends to assume, so far as diffusion is concerned, the same equilibrium distribution that it would assume if its motion were unresisted by the presence of the other fluid. (Of course, the mutual attraction of gravitation of the two fluids might affect the final distribution, but this is practically negligible. Leaving such actions as this out of

*account the following statement is correct.) In a state of equilibrium, the density of each fluid at any point thus depends only on the partial pressure of that fluid alone, and is the same as if the other fluids were absent. It does not depend on the partial pressures of the other fluids. If this were not the case, the resistance to diffusion would be analogous to friction, and would contain terms which were independent of the relative velocity u 2 —U. (2) For slow motions the resistance to diffusion is (approximately at any rate) proportional to the relative velocity. (3) The coefficient of resistance C is not necessarily always constant; it may, for example, and, in general, does, depend on the temperature. ***»*

If we form the equations of hydrodynamics for the different fluids occurring in any mixture, taking account of diffusion, but neglecting viscosity, and using suffixes 1, 2 to denote the separate fluids, these assume the form given by James Clerk Maxwell (" Diffusion," in Ency. Brit., 9th ed.) :—

Pr

where

*Dili dpi „ „ , * T57 ~T~dx~ -*iPJ + (-iM) i«(M i"*

■« 2) + &c. = 0,

*D«i dui , dui . dux . du\ ~ = -dT + Ul te + v ˆ + w *Tz'*

Dt

and these equations imply that when diffusion and other motions cease, the fluids satisfy the separate conditions of equilibrium dpi/dx — Xipi = o. The assumption made in the following account is that terms such as Dui/Dt may be neglected in the cases considered.

A further property based on experience is that the motions set up in a mixture by diffusion are very slow compared with those set up by mechanical actions, such as differences of pressure. Thus, if two gases at equal temperature and pressure be allowed to mix by diffusion, the heavier gas being below the lighter, the process will take a long time; on the other hand, if two gases, or parts of the same gas, at different pressures be connected, equalization of pressure will take place almost immediately. It follows from this property that the forces required to overcome the " inertia " of the fluids in the motions due to diffusion are quite imperceptible. At any stage of the process, therefore, any one of the diffusing fluids may be regarded as in equilibrium under the action of its own partial pressure, the external forces to which it is subjected and the resistance to diffusion of the other fluids.

5. Slow Diffusion of two Gases. Relation between the Co- efficients of Resistance and of Diffusion. — We now suppose the diffusing substances to be two gases which obey Boyle's law, and that diffusion takes place in a closed cylinder or tube of unit sectional area at constant temperature, the surfaces of equal density being perpendicular to the axis of the cylinder, so that the direction of diffusion is along the length of the cylinder, and we suppose no external forces, such as gravity, to act on the system.

The densities of the gases are denoted by pi, P2, their velocities of diffusion by U\, u-i, and if their partial pressures are pi, pi, we have by Boyle's law pi = kipi, p2 = k 2 pi, where ki, fe are constants for the two gases, the temperature being constant. The axis of the cylinder is taken as the axis of x.

From the considerations of the preceding section, the effects of inertia of the diffusing gases may be neglected, and at any instant of the process either of the gases is to be treated as kept in equilibrium by its partial pressure and the resistance to diffusion produced by the other gas. Calling this resistance per unit volume R, and putting R = CpiP2(«i — u 2), where C is the coefficient of resistance, the equations of equilibrium give

■ˆ + Cpip 2 («i-«2) = o, and -ˆr + Cp2Pi(w2-Mi) -o . (1).

These involve

g + g-oorft + fr-P • ■ • • (2).

where P is the total pressure of the mixture, and is everywhere

constant, consistently with the conditions of mechanical equilibrium. Now dpildx is the pressure-gradient of the first gas, and is, by Boyle's law, equal to ki times the corresponding density-gradient. Again pith is the mass of gas flowing across any section per unit time, and kipiUi or piUi can be regarded as representing the flux of partial pressure produced by the motion of the gas. Since the total pressure is everywhere constant, and the ends of the cylinder are supposed fixed, the fluxes of partial pressure due to the two gases are equal and opposite, so that

piUi J rp 2 u 2 — o or kipiiii+.k 2 p 2 u 2 =o ... (3).

From (2) (3) we find by elementary algebra ˆ

«l//>2= -uzlpi= (ui—ui)ltpi+pi) = {ui-u 2)/P, VIII. Q

and therefore

p 2 Ul = — p 2 U 2 =plp 2 (Ul—U 2)IP=klk 2 pip 2 (lh—U 2)/P

Hence equations (1) (2) gives

dpi.CP,ˆ. ,dp 2 ,CP r ,_ .

,; lE+kikˆ =°> Md di- + Z$ˆ =°;

whence also substituting pi = kipi, p 2 —k 2 p 2 , and by transposing

kik 2 dpi

kikj dp 2

«=-KXˆ.

Pi% = -Qp -fa, and P2 M2 = -ˆjr s .

We may now define the " coefficient of diffusion " of either gas as the ratio of the rate of flow of that gas to its density -gradient. With this definition, the coefficients of diffusion of both the gases in a mixture are equal, each being equal to fcfe/CP. The ratios of the fluxes of partial pressure to the corresponding pressure-gradients are also equal to the same coefficient. Calling this coefficient K, we also observe that the equations of continuity for the two gases are

dpi , d(piUi) „ , dpi d(p 2 u 2)

dt + dx -0 ' and ~dT + dx ~ '

leading to the equations of diffusion

Pi_A./ir Pl \ o« 1 dp 2 _ d fjrdpi} dt ~dx \ˆdx) ‘ ana dt ~dx yˆdx}’ exactly as in the case of diffusion through a solid.

If we attempt to treat diffusion in liquids by a similar method, it is, in the first place, necessary to define the ” partial pressure ” of the components occurring in a liquid mixture. This leads to the conception of ” osmotic pressure,” which is dealt with in the article Solution. For dilute solutions at constant temperature, the assumption that the osmotic pressure is proportional to the density, leads to results agreeing fairly closely with experience, and this fact may be represented by the statement that a sub- stance occurring in a dilute solution behaves like a perfect gas.

6. Relation of the Coefficient of Diffusion to the Units of Length and Time. — We may write the equation defining K in the form

L 4? p

Here —dp/pdx represents the ” percentage rate ” at which the density decreases with the distance x; and we thus see that the coefficient of diffusion represents the ratio of the velocity of flow to the percentage rate at which the density decreases with the distance measured in the direction of flow. This percentage rate being of the nature of a number divided by a length, and the velocity being of the nature of a length divided by a time, we may state that K is of two dimensions in length and — 1 in time, i.e. dimensions L 2 /T.

Example 1. Taking K =6-1423 for carbon dioxide and air (at temperature 0° C. and pressure 76 cm. of mercury) referred to a centimetre and a second as units, we may interpret the result as follows: — Supposing in a mixture of carbon dioxide and air, the density of the carbon dioxide decreases by, say, 1, 2 or 3% of itself in a distance of 1 cm., then the corresponding velocities of the diffusing carbon dioxide will be respectively o-oi, o-02 and 0-03 times 0-1423, that is, 0-001423, 0-002846 and 0-004269 cm. per second in the three cases.

Example 2. If we wished to take a foot and a second as our units, we should have to divide the value of the coefficient of diffusion in Example I by the square of the number of centimetres in 1 ft., that is, roughly speaking, by 900, giving the new value of K = 000016 roughly.

7. Numerical Values of the Coefficient of Diffusion. — The table on

p. 258 gives the values of the coefficient of diffusion of several of the principal pairs of gases at a pressure of 76 cm. of mercury, and also of a number of other substances. In the gases the centimetre and second are taken as fundamental units, in other cases the centimetre and day.

8. Irreversible Changes accompanying Diffusion. — The diffusion of two gases at constant pressure and temperature is a good example of an " irreversible process." The gases always tend to mix, never to separate. In order to separate the gases a change must be effected in the external conditions to which the mixture is subjected, either by liquefying one of the gases, or by separating them by diffusion through a membrane, or by bringing other out- side influences to bear on them. In the case of liquids, electrolysis affords a means of separating the constituents of a mixture. Every such method involves some change taking place outside the mixture, and this change may be regarded as a " compensating

transformation." We thus have an instance of the property that every irreveisible change leaves an indelible imprint some- where or other on the progress of events in the universe. That the process of diffusion obeys the laws of irreversible thermo- dynamics (if these laws are properly stated) is proved by the fact that the compensating transformations required to separate mixed gases do not essentially involve anything but transforma- tion of energy. The process of allowing gases to mix by diffusion, and then separating them by a compensating transformation, thus constitutes an irreversible cycle, the outside effects of which

Substances.

Temp.

K.

Author.

Carbon dioxide and air .

o°C.

0-1423 cm 2 /sec.

J. Loschmidt.

,, „ hydrogen .

o°C.

0-5558

it

» „ oxygen

o°C.

0-1409 „

,

„ „ carbon monoxide

o°C.

0-1406 ,,

,

,, ,, marsh gas (methane)

o°C.

0-1586

)

,, „ nitrous oxide

o°C.

0-0983

,

Hydrogen and oxygen ....

o°C.

0-7214

J

,, „ carbon monoxide

o°C.

0-6422

,

,, ,, sulphur dioxide

o°C.

0-4800 ,,

,

Oxygen and carbon monoxide . . .

o°C.

0-1802 „

,

Water and ammonia ....

20° C.

1-250

G. Hufner.

■

5°C.

0-822 ,,

,,

„ common salt (density 1-0269)

0-355 cm'/hour.

J. Graham.

If tt 1) ft

14-33° C.

1-020, 0-996, 0-972,

0-932 cm 2 /day.

F. Heimbrodt.

„ zinc sulphate (0-312 gm/cm 3) .

0-1162 ,,

W. Seitz.

„ zinc sulphate (normal)

0-2355

tt

„ zinc acetate (double normal)

o-ii95

,,

„ zinc formate (half normal)

0-4654

11

„ cadmium sulphate (double

normal) .... „ glycerin (fn, fn, fn, 1-511)

0-2456

,,

io-I4°C.

0-356, 0-350, 0-342,

0-315 cm 2 /day.

F. Heimbrodt.

tt urea „ „

14-83° C.

0-973, 0-946, 0-926,

0-883 cm 2 /day.

„ hydrochloric acid .

14-30° c.

2-208, 2-331,

2-480 cm 2 /day.

Gelatin 20 % and ammonia

I7°C.

127-1 ,,

A. Hagenbach.

■ *,, ,, carbon dioxide*

0-845

,,

„ „ nitrous oxide.

0509

)

>t „ oxygen

0-230

” 1

„ ,, hydrogen

0-0565

*are that energy somewhere or other must be less capable of transformation than it was before the change. We express this fact by stating that an irreversible process essentially implies a loss of availability. To measure this loss we make use of the law:, of thermodynamics, and in particular of Lord Kelvin's statement that " It is impossible by means of inanimate material agency to derive mechanical effect from any portion of mat*ir by cooling it below the temperature of the coldest of the surrounding objects."*

Let us now assume that we have any '.ystem such as the gases above considered, and that it is in the presence of an indefinitely extended medium which we shall call the " auxiliary medium." If heat be taken from any part of the iystem, only part of this heat can be converted into work by means of thermodynamic engines; and the rest will be given to the auxiliary medium, and will constitute unavailable energy or waste. To understand what this means, we may consider the case of a condensing steam engine. Only part of the energy liberated by the- cr:nbustion of the coal is available for driving the engine, the rest takes the form of heat imparted to the condenser. The colder the condenser the more efficient is the engine, and the smaller i -, the quantity of waste.

The amount of unavailable energy associated with any given transformation is proportional to the abso ute temperature of the auxiliary medium. When divided by that temperature the quotient is called the change of " entropy " associated with the given change (see Thermodynamics). Thus if a body at temperature T receives a quantity of heat Q, and if T» is the temperature of the auxiliary medium, the quantity of work which could be obtained from Q by means of ideal thermodynamic engines would be Q(l— T>/T), and the balance, which is QT>/T, would take the form of unavailable or waste energy given to the medium. The quotient of this, when divided by T«, is Q/T, and this represents the quantity of entropy associated with Q units of heat at temperature T.

Any irreversible change for which a compensating transformation of energy exists represents, therefore, an increase of unavailable energy, which is measurable in terms of entropy. The increase of entropy is independent of the temperature of the auxiliary medium.

It thus affords a measure of the extent to which energy has run to waste during the change. Moreover, when a body is heated, the increase of entropy is the factor which determines how much of the

energy imparted to the body is unavailable for conversion into work under given conditions. In all cases we have

increase of unavailable energy . .

temperature of auxiliary medium ” mCrease of entro Py- When diffusion takes place between two gases inside a closed vessel at uniform pressure and temperature no energy in the form of heat or work is received from without, and hence the entropy gained by the gases from without is zero. But the irreversible processes inside the vessel may involve a gain of entropy, and this

can only be estimated by ex- amining by what means mixed gases can be separated, and, in particular, under what con- ditions the process of mixing and separating the gases could (theoretically) be made revers- ible.

9. Evidence derived from Liquefaction of one or both of the Gases. — The gases in a mixture can often be separated by liquefying, or even solidify- ing, one or both of the com- ponents. In connexion with this property we have the important law according to which ” The pressure of a vapour in equilibrium with its liquid depends only on the temperature and is indepen- dent of the pressures of any other gases or vapours which may be mixed with it.” Thus if two closed vessels be taken contemning some water and one be exhausted, the other containing air, and if the tem- / peratures be equal, evapora- tion will go on until the pressure of the vapour in the exhausted vessel is equal to its partial pressure in the other vessel, notwithstanding the fact that the total pressure in the latter vessel is greater by the pressure of the air.

To separate mixed gases by liquefaction, they must be compressed and cooled till one separates in the form of a liquid. If no changes are to take place outside the system, the separate components must be allowed to expand until the work of expansion is equal to the work of compression, and the heat given out in compression is reabsorbed in expansion. The process may be made as nearly reversible as we like by performing the operations so slowly that the substances are practically in a state of equilibrium at every stage. This is a consequence of an important axiom in thermodynamics according to which “any small change in the neighbourhood of a state of equilibrium is to a first approximation reversible.”

Suppose now that at any stage of the compression the partial pressures of the two gases are pi and p%, and that the volume is

changed from V to V—dV. The work of compression is (pi--pi)dV, and this work will be restored at the corresponding stage if each of the separated gases increases in volume from V — 2V to V. The ultimate state of the separated gases will thus be one in which each gas occupies the volume V originally occupied by the mixture.

We may now obtain an estimate of the amount of energy rendered unavailable by diffusion. We suppose two gases occupying volumes Vi and V2 at equal pressure p to mix by diffusion, so that the final volume is Vi + V 2 – Then if before mixing each gas had been allowed to expand till its volume was V1 + V2, work would have been done in the expansion, and the gases could still have been mixed by a reversal of the process above described. In the actual diffusion this work of expansion is lost, and represents energy rendered unavailable at the temperature at which diffusion takes place. When divided by that temperature the quotient gives the increase of entropy. Thus the irreversible processes, and, in particular, the entropy changes associated with diffusion of two gases at uniform pressure, are the same as would take place if each of the gases in turn were to expand by rushing into a vacuum, till it occupied the whole volume of the mixture. A more rigorous proof involves considerations of the thermodynamic potentials, following the methods of J. Willard Gibbs (see Energetics).

Another way in which two or more mixed gases can be separated is by placing them in the presence of a liquid which can freely absorb one of the gases, but in which the other gas or gases are insoluble. Here again it is found by experience that when equilibrium exists at a given temperature between the dissolved and undissolved portions of the first gas, the partial pressure of that gas in the mixture depends on the temperature alone, and is independent of the partial pressures of the insoluble gases with which it is mixed, so that the conclusions are the same as before.

10. Diffusion through a Membrane or Partition. Theory of the semi-permeable Membrane. — It has been pointed out that diffusion of gases frequently takes place in the interior of solids; moreover, different gases behave differently with respect to the same solid at the same temperature. A membrane or partition formed of such a solid can therefore be used to effect a moie or less complete separation of gases from a mixture. This method is employed

commercially for extracting oxygen from the atmosphere, in particular for use in projection lanterns where a high degree of purity is not required. A similar method is often applied to liquids and solutions and is known as " dialysis."

In such cases as can be tested experimentally it has been found that a gas always tends to pass through a membrane from the side where its density, and therefore its partial pressure, is greater to the side where it is less; so that for equilibrium the partial pressures on the two sides must be equal. This result is un- affected by the presence of other gases on one or both sides of the membrane. For example, if different gases at the same pressure are separated by a partition through which one gas can pass more rapidly than the other, the diffusion will give rise to a difference of pressure on the two sides, which is capable of doing mechanical work in moving the partition. In evidence of this conclusion Max Planck quotes a test experiment made by him in the Physical Institute of the university of Munich in 1883, depending on the fact that platinum foil at white heat is permeable to hydrogen but impermeable to air, so that if a platinum tube filled with hydrogen be heated the hydrogen will diffuse out, leaving a vacuum.

The details of the experiment may be quoted here: — " A glass tube of about 5 mm. internal diameter, blown out to a bulb at the middle, was provided with a stop-cock at one end. To the other a platinum tube 10 cm. long was fastened, and closed at the end. The whole tube was exhausted by a mercury pump, filled with hydrogen at ordinary atmospheric pressure, and then closed. The closed end of the platinum portion was then heated in a horizontal position by a Bunsen burner. The connexion between the glass and platinum tubes, having been made by means of sealing-wax, had to be kept cool by a continuous current of water to prevent the softening of the wax. After four hours the tube was taken from the flame, cooled to the temperature of the room, and the stop-cock opened under mercury. The mercury rose rapidly, almost completely filling the tube, proving that the tube had been very nearly exhausted."

*In order that diffusion through a membrane may be reversible so far as a particular gas is concerned, the process must take place so slowly that equilibrium is set up at every stage (see § 9 above). _ _ r s * n orc ler to separate one*

BB

**m*

m

t^ML

Gas A Gases A&B Gas B

gas from another con- sistently with this con- dition it is necessary that no diffusion of the latter gas should ac- company the process. The name " semi-per- meable " is applied to an ideal membrane or partition through which one gas can pass, and which offers an insuperable barrier to any diffusion whatever of a second gas. By means of two semi-permeable partitions acting oppositely with respect to two different gases A and B these gases could be mixed or separated by reversible methods. The annexed figure shows a diagrammatic representa- tion of the process.

We suppose the gases contained in a cylindrical tube; P, Q, R, S are four pistons, of which P and R are joined to one connecting rod, Q and S to another. P, S are impermeable to both gases ; Q is semi-permeable, allowing the gas A to pass through but not B, simi- larly R allows the gas B to pass through but not A. The distance PR is equal to the distance QS, so that if the rods are pushed towards each other as far as they will go, P and Q will be in contact, as also R and S. Imagine the space RQ filled with a mixture of the two gases

under these conditions. Then by slowly drawing the connecting rods apart until R, Q touch, the gas A will pass into the space PQ, and B will pass into the space RS, and the gases will finally be com- pletely separated ; similarly, by pushing the connecting rods together, the two gases will be remixed in the space RQ. By performing the operations slowly enough we may make the processes as nearly reversible as we please, se that no available energy is lost in either change. The gas A being at every instant in equilibrium on the two sides of the piston Q, its density, and therefore its partial pressure, is the same on both sides, and the same is true regarding the gas B on the two sides of R. Also no work is done in moving the pistons, for the partial pressures of B on the two sides of R balance each other, consequently, the resultant thrust on R is due to the gas A alone, and is equal and opposite to its resultant thrust on P, so that the connecting rods are at every instant in a state of mechanical equili- brium so far as the pressures of the gases A and B are concerned. We conclude that in the reversible separation of the gases by this method at constant temperature without the production or absorption of mechanical work, the densities and the partial pressures of the two separated gases are the same as they were in the mixture. These

conclusions are in entire agreement with those of the preceding section. If this agreement did not exist it would be possible, theoretically, to obtain perpetual motion from the gases in a way that would be inconsistent with the second law of thermodynamics.

Most physicists admit, as Planck does, that it is impossible to obtain an ideal semi-permeable substance; indeed such a sub- stance would necessarily have to possess an infinitely great resist- ance to diffusion for such gases as could not penetrate it. But in an experiment performed under actual conditions the losses of available energy arising from this cause would be attributable to the imperfect efficiency of the partitions and not to the gases themselves; moreover, these losses are, in every case, found to be completely in accordance with the laws of irreversible thermo- dynamics. The reasoning in this article being somewhat con- densed the reader must necessarily be referred to treatises on thermodynamics for further information on points of detail connected with the argument. Even when he consults these treatises he may find some points omitted which have been examined in full detail at some time or other, but are not suffi- ciently often raised to require mention in print.

11. Kinetic Models of Diffusion.ˆ Imagine in the first instance that a very large number of red balls are distributed over one half of a billiard table, and an equal number of white balls over the other half. If the balls are set in motion with different velocities in various directions, diffusion will take place, the red balls find- ing their way among the white ones, and vice versa; and the process will be retarded by collisions between the balls. The simplest model of a perfect gas studied in the kinetic theory of gases (see Molecule) differs from the above illustration in that the bodies representing the molecules move in space instead of in a plane, and, unlike billiard balls, their motion is unresisted, and they are perfectly elastic, so that no kinetic energy is lost either during their free motions, or at a collision.

The mathematical analysis connected with the application of the kinetic theory to diffusion is very long and cumbersome. We shall therefore confine our attention to regarding a medium formed of elastic spheres as a mechanical model, by which the most important features of diffusion can be illustrated. We shall assume the results of the kinetic theory, according to which: — (1) In a dynamical model of a perfect gas the mean kinetic energy of translation of the molecules represents the absolute temperature of the gas. (2) The pressure at any, point is proportional to the product of the number of molecules in unit volume about that point into the mean square of

the velocity. (The mean square of the velocity is different from but proportional to the square of the mean velocity, and in the subsequent arguments either of these two quantities can generally be taken.) (3) In a gas mixture represented by a mixture of mole- cules of unequal masses, the mean kinetic energies of the different kinds are equal.

Consider now the problem of diffusion in a region containing two kinds of molecules A and B of unequal mass. The molecules of A in the neighbourhood of any point will, by their motion, spread out in every direction until they come into collision with other molecules of either kind, and this spreading out from every point of the medium will give rise to diffusion. If we imagine the velocities of the A molecules to be equally distributed in all directions, as they would be in a homogeneous mixture, it is obvious that the process of diffusion will be greater, ceteris paribus, the greater the velocity of th : mole- cules, and the greater the length of the free path before a collision takes place. If we assume consistently with this, that the co- efficient of diffusion of the gas A is proportional to the mean value of Wala, where w a is the velocity and U is the length of the path of a

molecule of A, this expression for the coefficient of diffusion is of the right dimensions in length and time. If, moreover, we observe that when diffusion takes place in a fixed direction, say that of the axis of x, it depends only on the resolved part of the velocity and length of path in that direction : this hypothesis readily leads to our taking the mean value of IwJa as the coefficient of diffusion for the gas A. This value was obtained by O. E. Meyer and others.

Unfortunately, however, it makes the coefficients of diffusion unequal for the two gases, a result inconsistent with that obtained above from considerations of the coefficient of resistance, and leading to the consequence that differences of pressure would be set up in different parts of the gas. To equalize these differences of pressure, Meyer assumed that a counter current is set up, this current being, of course, very slow in practice; and J. Stefan assumed that the diffusion of one gas was not affected by collisions between mole- cules of the same gas. When the molecules are mixed in equal proportions both hypotheses lead to the value l([wala] + [wblb]), (square brackets denoting mean values). When one gas preponder- ates largely over the other, the phenomena of diffusion are too

difficult of observation to allow of accurate experimental tests being made. Moreover, in this case no difference exists unless the molecules are different in size or mass.

Instead of supposing a velocity of translation added after the mathematical calculations have been performed, a better plan is to assume from the outset that the molecules of the two gases have small velocities of translation in opposite directions, superposed on the distribution of velocity, which would occur in a medium representing a gas at rest. When a collision occurs between molecules of different gases a transference of momentum takes place between them, and the quantitj' of momentum so transferred in one second in a unit of volume gives a dynamical measure of the resistance to diffusion. It is to be observed that, however small the relative velocity of the gases A and B, it plays an all-important part in determining the coefficient of resistance; for without such relative motion, and with the velocities evenly distributed in all directions, no transference of momentum could take place. The coefficient of resistance being found, the motion of each of the two gases may be discussed separately.

•One of the most important consequences of the kinetic theory is that if the volume be kept constant the coefficient of diffusion varies as the square root of the absolute temperature. To prove this, we merely have to imagine the velocity of each molecule to be suddenly increased n fold; the subsequent processes, includ- ing diffusion, will then go on n times as fast; and the temperature T, being proportional to the kinetic energy, and therefore to the square of the velocity, will be increased n 2 fold. Thus K, the coefficient of diffusion, varies as VT.

The relation of K to the density when the temperature remains constant is more difficult to discuss, but it may be sufficient to notice that if the number of molecules is increased n fold, the chances of a collision are n times as great, and the distance traversed between collisions is (not therefore but as the result of more detailed reasoning) on the average i/n of what it was before. Thus the free path, and therefore the coefficient of diffusion, varies inversely as the density, or directly as the volume. If the pressure p and temperature T be taken as variables, K varies inversely as p and directly as VT 3 .

Now according to the experiments first made by J. C. Maxwell and J. Loschmidt, it appeared that with constant density K was proportional to T more nearly than to VT. The inference is that in this respect a

medium formed of colliding spheres fails to give a correct mechanical model of gases. It has been found by L. Boltzmann, Maxwell and others that a system of particles whose mutual actions vary according to the inverse fifth power of the distance between them represents more correctly the relation between the coefficient of diffusion and temperature in actual gases. Other recent theories of diffusion have been advanced by M. Thiesen, P. Langevin and W. Sutherland. On the other hand, J. Thovert finds experimental evidence that the coefficient of diffusion is proportional to molecular velocity in the cases examined of non-electrolytes dissolved in water at i8° at 2-5 grams per litre.

Bibliography. — The best introduction to the study of theories of diffusion is afforded by O. E. Meyer's Kinetic Theory of Gases, translated by Robert E. Baynes (London, 1899). The mathematical portion, though sufficient for ordinary purposes, is mostly of the simplest possible character. Another useful treatise is R. Ruhlmann's Handbuch der mechanischen Warmetheorie (Brunswick, 1885). For a shorter sketch the reader may refer to J. C. Maxwell's Theory of Heat, chaps, xix. and xxii., or numerous other treatises on physics. The theory of the semi-permeable membrane is discussed by

M. Planck in his Treatise on Thermodynamics, English translation by A. Ogg (1903), also in treatises on thermodynamics by W. Voigt and other writers. For a more detailed study of diffusion in general the following papers may be consulted: — L. Boltzmann, " Zur Integration der Diffusionsgleichung," Sitzung.derk.bayer.Akadmath.-phys. Klasse (May 1894); T. des Coudres, " Diffusionsvorgange in einem Zylinder," Wied. Ann. lv. (1895), P- 213; J- Loschmidt, " Experimentaiuntersuchungen iiber Diffusion," Wien. Sitz. lxi., lxii. (1870) ; J. Stefan, " Gleichgewicht und . . . Diffusion von Gas-mengen," Wien. Sitz. lxiii., " Dynamische Theorie der Diffusion," Wien. Sitz. lxv. (April 1872); M. Toepler, "Gas-diffusion," Wied. Ann. lviii. (1896), p. 599; A. Wretschko, "Experimentaiunter-suchungen iiber die Diffusion von Gasmengen," Wien. Sitz. lxii. The mathematical theory of diffusion, according to the kinetic theory of gases, has been treated by a number of different methods, and for the study of these the reader may consult L. Boltzmann, Vorlesungen iiber Gastheorie (Leipzig, 1 896-1 898); S. H. Burbury, Kinetic Theory of Gases (Cambridge, 1899), and papers by L. Boltz- mann in Wien. Sitz. lxxxvi. (1882), Ixxxvii. (1883); P. G. Tait, " Foundations of the Kinetic Theory of Gases," Trans. R.S.E. xxxiii., xxxv., xxvi., or Scientific Papers, ii. (Cambridge, 1900). For recent work reference should be made to the current issues of Science Abstracts (London), and entries under the heading " Diffusion " will

be found in the general index at the end of each volume. (G. H. Br.)

DIGBY, SIR EVERARD (1578-1606), English conspirator, son of Everard Digby of Stoke Dry, Rutland, was born on the 16th of May 1578. He inherited a large estate at his father's death in 1592, and acquired a considerable increase by his marriage in 1596 to Mary, daughter and heir of William Mulsho of Gothurst (now Gayhurst), in Buckinghamshire. He obtained a place in Queen Elizabeth's household and as a ward of the crown was brought up a Protestant; but about 1599 he came under the influence of the Jesuit, John Gerard, and soon afterwards joined the Roman Catholics. He supported James's accession and was knighted by the latter on the 23rd of April 1603. In a letter to Salisbury, the date of which has been ascribed to May 1605, Digby offered to go on a mission to the pope to obtain from the latter a promise to prevent Romanist attempts against the government in return for concessions to the Roman Catholics; adding that if severe measures were again taken against them " within brief there will be massacres, rebellions and desperate attempts against the king and state." Digby had suffered no personal injury or persecution on account of his religion, but he sympathized with his co-religionists; and when at Michaelmas, 1605, the government had fully decided to return to the policy of repression, the authors of the Gunpowder Plot (q.v.) sought his financial support, and he joined eagerly in the conspiracy. His particular share in the plan was the organization of a rising in the Midlands; and on the pretence of a hunting party he assembled a body of gentlemen together at Danchurch in Warwickshire on the 5 th of November, who were to take action immediately the news arrived from London of the successful destruction of the king and the House of Lords, and to seize the person of the princess Elizabeth, who was residing in the neighbourhood. The con- spirators arrived late on the evening of the 6th to tell their story of failure and disaster, and Digby, who possibly might have escaped the more serious charge of high treason, was persuaded by Catesby, with a false tale that the king and Salisbury were dead, to further implicate himself in the plot and join the small band of conspirators in their hopeless endeavour to raise the country. He accompanied them, the same day, to Huddington in Worcester- shire and on the 7th to Holbeche in Staffordshire. The following morning, however, he abandoned his companions, dismissed his servants except two, who declared " they would never leave him but against their will," and attempted with these to conceal him- self in a pit. He was, however, soon discovered and surrounded. He made a last effort to break through his captors on horseback, but was taken and conveyed a

prisoner to the Tower. His trial took place in Westminster Hall, on the 27th of January 1606, and alone among the conspirators he pleaded guilty, declaring that the motives of his crime had been his friendship for Catesby and his devotion to his religion. He was condemned to death, and his execution, which took place on the 31st, in St Paul's Churchyard, was accompanied by all the brutalities exacted by the law. Digby was a handsome man, of fine presence. Father Gerard

extols his skill in sport, his " riding of great horses," as well as his skill in music, his gifts of mind and his religious devotion, and concludes " he was as complete a man in all things, that deserved estimation or might win affection as one should see in a kingdom." Some of Digby's letters and papers, which include a poem before his execution, a last letter to his infant sons and corre- spondence with his wife from the Tower, were published in The Gunpowder Treason by Thomas Barlow, bishop of Lincoln, in 1679. He left two sons, of whom the elder, Sir Kenelm Digby, was the well-known author and diplomatist.

See works on the Gunpowder Plot; Narrative of Father Gerard, in Condition of the Catholics under James I. by J. Morris (1872), &c. ,A life of Digby under the title of A ILife of a Conspirator, by a Romish Recusant (Thomas Longueville), was published in 1895. (P-C. Y.)

DIGBY, SIR KENELM (1603-1665), English author, diplom- atist and naval commander, son of Sir Everard Digby (q.v.), was born on the 1 ith of July 1603, and after his father's execution in 1606 resided with his mother at Gay hurst, being brought up apparently as a Roman Catholic. In 1617 he accompanied his cousin, Sir John Digby, afterwards 1st earl of Bristol, and then ambassador in Spain, to Madrid. On his return in April 1618 he entered Gloucester Hall (now Worcester College), Oxford, and studied under Thomas Allen (1542-1632), the celebrated mathe- matician, who was much impressed with his abilities and called him the Mirandula, i.e. the infant prodigy, of his age. 1 He left the university without taking a degree in 1620, and travelled in France, where, according to his own account, he inspired an uncontrollable passion in the queen-mother, Marie de' Medici, now a lady of more than mature age and charms; he visited Florence, and in March 1623 joined Sir John Digby again

at Madrid, at the time when Prince Charles and Buckingham arrived on their adventurous expedition. He joined the prince's house- hold and returned with him to England on the 5th of October 1623, being knighted by James I. on the 23rd of October and receiving the appointment of gentleman of the privy chamber to Prince Charles. In 1625 he married secretly Venetia, daughter of Sir. Edward Hanley of Tonge Castle, Shropshire, a lady of extra- ordinary beauty and intellectual attainments, but of doubtful virtue. Digby was a man of great stature and bodily strength. Edward Hyde, afterwards earl of Clarendon, who with Ben Jonson was included among his most intimate friends, describes him as " a man of very extraordinary person and presence which drew the eyes of all men upon him, a wonderful graceful behaviour, a flowing courtesy and civility, and such a volubility of language as surprised and delighted." 2 Digby for sometime was excluded from public employment by Buckingham's jealousy of his cousin, Lord Bristol. At length in 1627, on the latter's advice, Digby determined to attempt " some generous action," and on the 22nd of December, with the approval of the king, embarked as a privateer with two ships, with the object of attack- ing the French ships in the Venetian harbour of Scanderoon. On the 1 8th of January he arrived off Gibraltar and captured several Spanish and Flemish vessels. From the 15th of February to the 27 th of March he remained at anchor off Algiers on account of the sickness of his men, and extracted a promise from the authorities of better treatment of the English ships. He seized a rich Dutch vessel near Majorca, and after other adventures gained a complete victory over the French and Venetian ships in the harbour of Scanderoon on the 1 ith of June. His successes, however, brought upon the English merchants the risk of reprisals, and he was urged to depart. He returned home in triumph in February 1629, and was well received by the king, and was made a commissioner of the navy in October 1630, but his proceedings were disavowed on account of the complaints of the Venetian ambassador. In 1633 Lady Digby died, and her memory was celebrated by Ben Jonson in a series of poems entitled Eupheme, and by other poets of the day. Digby retired to Gresham College, and exhibited ex- travagant grief, maintaining a seclusion for two years. About this time Digby professed himself a Protestant, but by October 1635, while in France, he had already returned to the Roman

1 Letters by Eminent Persons (Aubrey's Lives), ii. 324. 2 Life and Continuation.

Catholic faith. 3 In a letter dated the 27th of March 1636 Laud remonstrates with him, but assures him of the continuance of his friendship. 4 In 1638 he published A Conference with a Lady about

*choice of a Religion, in which he argues that the Roman Church, possessing alone the qualifications of universality, unity of doctrine and uninterrupted apostolic succession, is the only true church, and that the intrusion of error into it is impossible. The same subject is treated in letters to George Digby, afterwards 2nd earl of Bristol, dated the 2nd of November 1638 and the 29th of November 1639, which were published in 1651, as well as in a further Discourse concerning Infallibility in Religion in 1652. Returning to England he associated himself with the queen and her Roman Catholic friends, and joined in the appeal to the English Romanists for money to support the king's Scottish expedition. 6 In consequence he was summoned to the bar of the House of Commons on the 27th of January 1641, and the king was petitioned to remove him with other recusants from his councils. He left England, and while at Paris killed in a duel a French lord who had insulted Charles I. in his presence. Louis XIII. took his part, and furnished him with a military escort into Flanders. Returning home he was imprisoned, by order of the House of Commons, early in 1642, successively in the " Three Tobacco Pipes nigh Charing Cross," where his delightful conversation is said to have transformed the prison into " a place of delight," * and at Winchester House. He was finally released and allowed to go to France on the 30th of July 1643, through the intervention of the queen of France, Anne of Austria, on condition that he would neither promote nor conceal any plots abroad against the English government.*

Before leaving England an attempt was made to draw from him an admission that Laud, with whom he had been intimate, had desired to be made a cardinal, but Digby denied that the archbishop had any leanings towards Rome. On the 1st of November 1643 it was resolved by the Commons to confiscate his property. He published in London the same year Observations on the 22nd stanza in the gth canto of the 2nd book of Spenser's " Faerie Queene," the MS. of which is in the Egerton collection (British Museum, No. 2725 f. 117 b), and Observations on a surreptitious and unauthorized edition of the Religio Medici, by Sir Thomas Browne, from the Roman Catholic point of view, which drew a severe rebuke from the author. After his arrival in Paris he published his chief philosophical works, Of Bodies and Of the Immortality of Man's Soul (1644), autograph MSS. of which are in the Bibliotheque Ste Genevieve at Paris, and made the acquaintance of Descartes. He was appointed by Queen Henrietta Maria her chancellor, and in the summer of 1645 ne was despatched by her to Rome to obtain assistance. Digby promised the conversion of Charles and of his chief supporters. At first his eloquence made a

great impression. Pope Innocent X. declared that he spoke not merely as a Catholic but as an ecclesiastic. But the absence of any warrant from Charles himself roused suspicions as to the solidity of his assurances, and he obtained nothing but a grant of 20,000 crowns. A violent quarrel with the pope followed, and he returned in 1646, having consented in the queen's name to complete religious freedom for the Roman Catholics, both in England and Ireland, to an independent parlia- ment in Ireland, and to the surrender of Dublin and all the Irish fortresses into the hands of the Roman Catholics, the king's troops to be employed in enforcing the articles and the pope granting about £36,000 with a promise of further payments in obtaining direct assistance. In February 1649 Digby was invited to come to England to arrange a proposed toleration of the Roman Catholics, but on his arrival in May the scheme had already been abandoned. He was again banished on the 31st of August, and it was not till 1654 that he was allowed by the council of state to return. He now entered into close relations with Cromwell, from whom he hoped to obtain toleration for the Roman Catholics, and whose alliance he desired to secure for France rather than for

s Strafford's Letters, i. 474.

4 Laud's Works, vi. 447.

6 Thotnason Tracts, Brit. Mus. E 164 (15).

6 Archaeologia Cantiana, ii. 190.

Spain, and was engaged by Cromwell, much to the scandal of both Royalists and Roundheads, in negotiations abroad, of which the aim was probably to prevent a union between those two foreign powers. He visited Germany, in 1660 was in Paris, and at the Restoration returned to England. He was well received in spite of his former relations with Cromwell, and was confirmed in his post as Queen Henrietta Maria's chancellor. In January 166 1 he delivered a lecture, which was published the same month, at Gresham College, on the vegetation of plants, and became an original member of the Royal Society in 1663. In January 1664 he was forbidden to appear at court, the cause assigned being that he had interposed too far in favour of the 2nd earl of Bristol, disgraced by the king on account of the charge of high treason brought by him against Clarendon into the

House of Lords. The rest of his life was spent in the enjoyment of literary and scientific society at his house in Covent Garden. He died on the nth of June 1665. He had five children, of whom two, a son and one daughter, survived him.

Digby, though he possessed for the time a considerable know- ledge of natural science, and is said to have been the first to explain the necessity of oxygen to the existence of plants, bears no high place in the history of science. He was a firm believer in astrology and alchemy, and the extraordinary fables which he circulated on the subject of his discoveries are evidence of any- thing rather than of the scientific spirit. In 1656 he made public a marvellous account of a city in Tripoli, petrified in a few hours, which he printed in the Mercurius Politicus. Malicious reports had been current that his wife had been poisoned by one of his prescriptions, viper wine, taken to preserve her beauty. Evelyn, who visited him in Paris in 165 1, describes him as an " errant mountebank." Henry Stubbes characterizes him as "the very Pliny of our age for lying," and Lady Fanshawe refers to the same " infirmity." 1 His famous " powder of sympathy," which seems to have been only powder of " vitriol," healed without any contact, by being merely applied to a rag or bandage taken from the wound, and Digby records a miraculous cure by this means in a lecture given by him at Montpellier on this subject in 1658, published in French and English the same year, in German in 1660 and in Dutch in 1663; but Digby's claim to its original discovery is doubtful, Nathaniel Highmore in his History of Generation (1651, p. 113) calling the powder " Talbot's powder," and ascribing its invention to Sir Gilbert Talbot. Some of Digby's pills and preparations, however, described in The Closet of the Eminently Learned Sir Kenelm Digby Knt. Opened (publ. 1677), are said to make less demand upon the faith of patients, and his injunction on the subject of the making of tea, to let the water " remain upon it no longer than you can say the Miserere Psalm very leisurely," is one by no means to be ridiculed. As a philo- sopher and an Aristotelian Digby shows little originality and followed the methods of the schoolmen. His Roman Catholic orthodoxy mixed with rationalism, and his political opinions, according to which any existing authority should receive support, were evidently derived from Thomas White (1582-1676), the Roman Catholic philosopher, who lived with' him in France. White published in 1651 Inslitutionum Peripateticorum libri quinque, purporting to expound Digby's "peripatetic philo- sophy," but going far beyond Digby's published treatises. Digby's Memoirs are composed in the high-flown Jantastic manner then usual when recounting incidents of love and adventure, but the style

of his more sober works is excellent. In 1632 he presented to the Bodleian library a collection of 236 MSS., be- queathed to him by his former tutor Thomas Allen, and described in Catalogi codicum manuscriptorum bibliothecae Bodleianae, by W. D. Macray, part ix. Besides the works already mentioned Digby translated A Treatise of adhering to God written by Albert the Great, Bishop of Ratisbon (1653); and he was the author of Private Memoirs, published by Sir N. H. Nicholas from Harleian MS. 6758 with introduction (1827); Journal of the Scanderoon Voyage in 1628, printed by J. Bruce with preface (Camden Society, 1868); Poems from Sir Kenelm Digby's Papers . . . with

1 Diet, of Nat. Biog. sub " Digby." See also Robert Boyle's Works (1744), v. 302.

preface and notes (Roxburghe Club, 1877); in the Add. MSSi 34,362 f. 66 is a poem Of Ike Miserys of Man, probably by Digby; Choice of Experimental Receipts in Physick and Chirurgery . . . collected by Sir K. Digby (1668), and Chymical Secrets and Rare Experiments (1683), were published by G. Hartman, who describes himself as Digby's steward and laboratory assistant.

See the Life of Sir Kenelm Digby by one of his Descendants (T. Longueville), 1896. (P. C. Y.)

DIGBY, KENELM HENRY (1800-1880), English writer, youngest son of William Digby, dean of Clonfert, was born at Clonfert, Ireland, in 1800. He was educated at Trinity College, Cambridge, and soon after taking his B.A. degree there in 181 9 became a Roman Catholic. He spent most of his life, which was mainly devoted to literary pursuits, in London, where he died on the 22nd of March 1880. Digby's reputation rests chiefly on his earliest publication, The Broadstone of Honour, or Rules for the Gentlemen of England (1822), which contains an exhaustive survey of medieval customs, full of quotations from varied sources. The work was subsequently enlarged and issued (1826-1827) in four volumes entitled: Godefridus, Tancredus, Morus and Orlandus (numerous re-impressions, the best of which is the editior brought out by B. Quaritch in five volumes, 1876-1877).

Among Digby's other works are: Mores Catholici, or Ages of Faith (n vols., London, 1831-1840); Compitum; or the Meeting of the Ways at the Catholic Church (7 vols., London, 1848-1854); The Lovers' Seat, KathemSrina ; or Common Things in relation to Beauty, Virtue and Faith (2 vols., London, 1856). A complete list is given in J.

Gillow's Bibliographical Dictionary of English Catholics, ii.

81-83.

DIGENES ACRITAS, BASILIUS, Byzantine national hero, probably lived in the 10th century. He is named Digenes (of double birth) as the son of a Moslem father and a Christian mother; Acritas (ckpa, frontier, boundary), as one of the fron- tier guards of the empire, corresponding to the Roman tnililes limitanei. The chief duty of these acritae consisted in repelling Moslem inroads and the raids of the apelalae (cattle-lifters), brigands who may be compared with the more modern Klephts. The original Digenes epic is lost, but four poems are extant, in which the different incidents of the legend have been worked up by different hands. The first of these consists of about 4000 lines, written in the so-called " political " metre, and was dis- covered in the latter part of the 19th century, in a 16th-century MS., at Trebizond; the other three MSS. were found at Grotta Ferrata, Andros and Oxford. The poem, which has been compared with the Chanson de Roland and the Romance of the Cid, undoubtedly contains a kernel of fact, although it cannot be regarded as in any sense an historical record. The scene of action is laid in Cappadocia and the district of the Euphrates.

Editions of the Trebizond MS. by C. Sathas and E. Legrand in the Collection des monuments pour servir d. Vetude de la langue neo-hellenique, new series, vi. (1875), and by S. Joannides (Constantinople, 1887). See monographs by A. Luber (Salzburg, 1885) and G. Wartenberg (Berlin, 1897). Full information will be found in C. Krumbacher's Geschichte der byzantinischen ■ Litter atur, p. 827 (2nd ed., 1897); see also G. Schlumberger, L'Epopee Byzantine a la fin du dixieme siecle (1897).

DIGEST, a term used generally of any digested or carefully arranged collection or compendium of written matter, but more particularly in law of a compilation in condensed form of a body of law digested in a systematical method; e.g. the Digest (Digesta) or Pandects (HavdeKrai.) of Justinian, a collection of extracts from the earlier jurists compiled by order of the emperor Justinian. The word is also given to the compilations of the main points (marginal or hand-notes) of decided cases, usually arranged in alphabetical and subject order, and published under such titles as " Common Law Digest," " Annual Digest," &c.

DIGESTIVE ORGANS (Pathology). Several facts of im- portance have to be borne in mind for a proper appreciation of the pathology of the

organs concerned in digestive processes (for the anatomy see Alimentary Canal and allied articles). In the first place, more than all other systems, the digestive comprises greater range of structure and exhibits wider diversity of function within its domain. Each separate structure and each different function presents special pathological signs and symptoms. Again, the duties imposed upon the system .have to be performed

notwithstanding constant variations in the work set them. The crude articles of diet offered them vary immensely in nature, bulk and utility, from which they must elaborate simple food-elements for absorption, incorporate them after absorption into complex organic substances properly designed to supply the constant needs of cellular activity, of growth and repair, and fitly harmonized to fulfil the many requirements of very divergent processes and functions. Any form of unphysiological diet, each failure to cater for the wants of any special tissue engaged in, or of any processes of, metabolism, carry with them pathological signs. Perhaps in greater degree than elsewhere are the individual sections of the digestive system dependent upon, and closely correlated with, one another. The lungs can only yield oxygen to the blood when the oxygen is uncombined; no compounds are of use. The digestive organs have to deal with an enormous variety of compound bodies, from which to obtain the elements necessary for protoplasmic upkeep and activity. Morbid lesions of the respiratory and circulatory systems are frequently capable of compensation through increased activity elsewhere, and the symptoms they give rise to follow chiefly along one line; diseases of the digestive organs are more liable to occasion disorders elsewhere than to excite compensatory actions. The digestive system includes every organ, function and process concerned with the utilization of food-stuffs, from the moment of their entrance into the mouth, their preparation in the canal, assimi- lation with the tissues, their employment therein, up to their excretion or expulsion in the form of waste. Each portion resembles a link of a continuous chain; each link depends upon the integrity of the others, the weakening or breaking of one straining or making impotent the chain as a whole.

The mucous membrane lining the alimentary tract is the part most subject to pathological alterations, and in this connexion it should be remembered that this membrane differs both in structure and functions throughout the tract. Chiefly protective from the mouth to

the cardia, it is secretory and absorbent in the stomach and bowel; while the glandular cells forming part of it secrete both acid and alkaline fluids, several ferments or mucus. Over the dorsum of the tongue its modified cells subserve the sense of taste. Without, connected with it by the submucous connective tissue, is placed the muscular coat, and externally over the greater portion of its length the peritoneal serous membrane. All parts are supplied with blood-vessels, lymph-ducts and nerves, the last belonging either to local or to central circuits. Associated with the tract are the salivary glands, the liver and the pancreas; while, in addition, lymphoid tissue is met with diffusely scattered throughout the lining membranes in the tonsils, appendix, solitary glands and Peyer's patches, and the mesenteric glands. The functions of the various parts of the system in whose lesions we are here interested are many in number, and can only be summarized here. (For the physiology of digestion see Nutrition.) Broadly, they maybe given as: (1) Ingestion and swallowing of food, transmission of it through the tract, and expulsion of the waste material; (2) secretion of acids and alkalis for the performance of digestive processes, aided by (3) elaboration and addition of complex bodies, termed enzymes or ferments; (4) secretion of mucus; (5) protection of the body against organismal infection, and against toxic products; (6) absorption of food elements and reconstitution of them into complex substances fitted for metabolic application; and (7) excretion of the waste products of protoplasmic action. ■ These ˆunctions may oe altered by disease, singly or in conjunction; it '% rare, however, to find but one affected, while an apparently identical disturbance of function may often arise from totally different organic lesions. Another point of importance is =esn in the close interdependence which exists between the secretions of acid and those of alkaline reaction. The difference in reaction seems to act mutatis mutandis as a stimulant in each instance.

General Diseases. In all sections of the alimentary canal actively engaged in the ingestion of food, a well-marked local engorgement of the blood- vessels supplying the walls occurs. The hyperaemia abates soon

after completion of the special duties of the individual sections. This normal condition ma,y be abnormally exaggerated by over-stimulation from irritant poisons introduced into the canal; from too rich, too copious or indigestible XtSSmf articles of diet; or from too prolonged an experience of some unvaried kind of food-stuff, especially if large quantities of it are necessary for metabolic needs; entering into the first stage of inflammation, acute hyperaemia. More

important, because productive of less tractable lesions, is passive congestion of the digestive organs. Whenever the flow of blood into the right side of the heart is hindered, whether it arise from disease of the heart itself, or of the lungs, or proceed from obstruction in some part of the portal system, the damming-back of the venous circulation speedily produces a more or less pronounced stasis of the blood in the walls of the alimentary canal and in the associated abdominal glands. The lack of a sufficiently vigorous flow of blood is followed by deficient secretion of digestive agents from the glandular elements involved, by decreased motility of the muscular coats of the stomach and bowel, and lessened adapt- ability throughout for dealing with even slight irregular demands on their powers. The mucous membrane of the stomach and bowel, less able to withstand the effects of irritation, even of a minor character, readily passes into a condition of chronic catarrh, while it frequently is the seat of small abrasions, haemorrhagic erosions, which may cause vomiting of blood and the appearance of blood in the stools. Obstruction to the flow of blood from the liver leads to dilatation of its blood-vessels, consequent pressure upon the hepatic cells adjoining them, and their gradual loss of function, or even atrophy and degeneration. In addition to the results of such passive congestion exhibited by the stomach and bowel as noted above, passive congestion of the liver is often accompanied by varicose enlargement of the abdominal veins, in particular of those which surround the lower end of the oesophagus, the lowest part of the rectum and anus. In the latter position these dilated veins constitute what are known as haemorrhoids or piles, internal or external as their site lies within or outside the anal aperture.

The mucous and serous membranes of the canal and the glandular elements of the associated organs are the parts most subject to inflammatory affections. Among the several sections of the digestive tract itself, the oesophagus and jejunum are singularly exempt from inflammatory processes; the fauces, stomach, caecum and appendix, ileum, mouth and duodenum (including the opening of the common bile-duct), are more commonly involved. Stomatitis, or inflammation of the mouth, has many predisposing factors, but it has now been definitely determined that its exciting cause is always Inflam- some form of micro-organism. Any condition favouring kthuu. oral sepsis, as carious teeth, pyorrhoea alveolaris (a dis- charge of pus due to inflamed granulations round carious teeth), granulations beneath thick crusts of tartar, or an irritating tooth plate, favours the growth of pyogenic organisms and hence of stomatitis. Many varieties of this disease have been described, but all are forms of " pyogenic " or "

septic stomatitis." This in its mildest form is catarrhal or erythematous, and is attended only by slight swelling tenderness and salivation. In its next stage of acuteness it is known as "membranous," as a false membrane is produced somewhat resembling that due to diphtheria, though caused by a staphylococcus only. A still more acute form is " ulcerative," which may go on to the forma- tion of an abscess beneath the tongue. Scarlet fever usually gives rise to a slight inflammation of the mouth followed by desauamation, but more rarely it is accompanied by a most severe oedematous stomatitis with glossitis and tonsillitis. Erysipelas on the face may infect the mouth, and an acute stomatitis due to the diphtheria bacillus, Klebs-Loeffler bacillus, has been described. A distinct and very dangerous form of stomatitis in infants and young children is known as " aphthous stomatitis " or " thrush." This is caused by the growth of Oidium albicans. It is always preceded by a gastro-enteritis and dry mouth, and if this is not attended to, soon attracts attention by the little white raised patches surrounded by a dusky red zone

scattered on tongue and cheeks. Epidemics have occurred in hospitals and orphanages. Mouth breathing is the cause of many ills. As a result of this, the mucous membrane of the tongue, &c, becomes dry, micro-organisms multiply and the mouth becomes foul. Also from disease of the nose, the upper jaw, palate and teeth do not make proper progress in development. There is overgrowth of tonsils, and adenoids, with resulting deafness, and the child's mental development suffers. An ordinary " sore throat " usually signifies acute catarrh of the fauces, and is of purely organismal origin, " catching cold " being only a secondary ' and minor cause. In " relaxed throats " there is a chronic catarrhal state of the lining membrane, with some passive con- gestion. The tonsils are peculiarly liable to catarrhal attacks, as might a priori be expected by reason of their Cerberus-like function with regard to bacterial intruders. Still, acute attacks of tonsillitis appear on good evidence to be more common among individuals predisposed constitutionally to rheumatic manifesta- tions. Cases of acute tonsillitis may or may not go on to suppura- tion or quinsy; in all there is great congestion of the glands, increased mucus secretion, and often secondary involvement of the lymphatic glands of the neck. Repeated acute attacks often lead to chronic inflammation, in which the glands are enlarged, and often hypertrophied in the true sense of the term. The

oesophagus is the seat of inflammation but seldom. In infants and young children thrush due to Oidium albicans may spread from the mouth, and also a diphtheritic inflammation spreads from the fauces into the oesophagus. A catarrhal oesophagitis is rarely seen, but the commonest form is traumatic, due to the swallowing of boiling water, corrosive or irritant substances, &c. A non-malignant ulceration may result which later leads on to an oesophageal stricture. The physical changes presented by the coats of the stomach and the intestine, the subjects of catarrhal attacks, closely resemble one another, but differ symptomatic- ally. Acute catarrh of the stomach is associated with intense hyperaemia of its lining coats, with visible engorgement and swelling of the mucous membrane, and an excessive secretion of mucus. The formation of active gastric juice is arrested, digestion ceases, peristaltic movements are sluggish or absent, unless so over-stimulated that they act in a direction the reverse of the normal, and induce expulsion of the gastric contents by vomiting. The gastric contents, in whatever degree of dilution or concentra- tion they may have been ingested, when ejected are of porridge- thick consistency, and often but slightly digested. Such conditions may succeed a severe alcoholic bout, be caused by irritant substances taken in by the mouth or arise from fer- mentative processes in the stomach contents themselves. Should the irritating material succeed in passing from the stomach into the bowel, similar physical signs are present; but as the quickest path offered for the expulsion of the offending substances from the body is downwards, peristalsis is increased, the flow of fluid from the intestinal glands is larger in bulk, though of less potency as regards its normal actions, than in health, and diarrhoea, with removal of the irritant, follows. As a general rule, the more marked the involvement of the large bowel, the severer and more fluid is the resultant diarrhoea. Inflammation of the stomach may be due to mechanical injury, thermal or chemical irritants or invasion by micro-organisms. Also all the symptoms of gastric catarrh may be brought on by any acute emotion. The commonest mechanical injury is that due to an excess of food, especially when following on a fast; poisons act as irritants, and also the weevils of cheese and the larvae of insects. . Inflammatory affections of the caecum and its attached appendix vermiformis are very common, and give rise to several special symptoms and signs. Acute inflammatory appendicitis appears to be increasing in frequency, and is associated by many with the modern deterioration in the teeth. Constipation certainly predisposes to it, and it appears to be more prevalent among medical men, commercial travellers, or any engaged in arduous callings, subjected to irregular meals, fatigue and exposure. A foreign body is the exciting cause in many cases, though less commonly so than was

formerly imagined. The inflammation in the appendix varies in intensity from a very

slight catarrhal or simple form to an ulcerative variety, and much more rarely to the acute fulminating appendicitis in which necrosis of the appendix with abscess formation occurs. It is always accompanied by more or less peritonitis, which is pro- tective in nature, shutting in the inflammatory process. Very similar symptomatically is the condition termed perityphlitis, doubtless in former days frequently due to the appendix, an acute or chronic inflammation of the walls of the caecum often leading to abscess formation outside the gut, with or without direct communication with the canal. The colon is subject to three main forms of inflammation. In simple colitis the mucous membrane of the colon is intensely injected, bright red in colour, and secreting a thick mucus, but there is no accompanying ulceration. It is often found in association with some constitu- tional disease, as Bright's disease, and also with cancer of the bowel. But when it has no association with other trouble it is probably bacterial in origin, the Bacillus enteritidis spirogenes having been isolated in many cases. The motions always contain large quantities of mucus and more or less blood. A second very severe form of inflammation of the colon is known as " membran- ous colitis," and this may be either dyspeptic, or secondary to other diseases. In this trouble membranes are passed per anum, accompanied by a pain so intense as often to cause fainting. In severe cases complete tubular casts of the intestine have been found. Often the motions contain very little faecal matter, but consist only of membranes, mucus and a little blood. A third form is that known as " ulcerative colitis." Any part of the large intestine may be affected, and the ulceration shows no special distribution. In severe cases the muscular coat is exposed, and perforation may ensue. The number of ulcers varies from a few to many dozen, and in size from a pea to a five-shilling piece. Like all chronic intestinal ulcers they show a tendency to become transverse.

Chronic catarrhal affections of the stomach are very common, and often follow upon repeated acute attacks. In them the connective tissue increases at the expense of the glandular elements; the mucous membrane becomes thickened and less active in function. Should the muscular coat be involved, the elasticity and contractility of the organ suffer; peristaltic move- ment is weakened; expulsion of the contents through the pylorus hindered; and, aggravated by these effects, the condition becomes worse, atonic dyspepsia in its most pronounced form results, with or without dilatation. Chronic vascular congestion may occasion in process of time similar signs

and symptoms.

Duodenal catarrh is constantly associated with jaundice, indeed is most probably the commonest cause of catarrhal jaundice; often it is accompanied by catarrh of the common bile-duct. Chronic inflammation of the small intestine gives rise to less prominent symptoms than in the stomach. It generally arises from more than one cause; or rather secondary causes rapidly become as import- ant as the primary in its incidence. Chronic congestion and pro- longed irritation lead to deficient secretion and sluggish peristalsis; these effects encourage intestinal putrefaction and autointoxi- cation; and these latter, in turn, increase the local unrest.

The intestinal mucous membrane, the peritoneum and the mesenteric glands are the chief sites of tubercular infection in the digestive organs. Rarely met with in the gullet and stomach, and comparatively seldom in the mouth and ˆJsitas" lips, tubercular inflammation of the small intestine and peritoneum is common. Tubercular enteritis is a frequent accompaniment of phthisis, but may occur apart from tubercle of other organs. Children are especially subject to the primary form. Tubercular peritonitis often is present also. The in- flammatory process readily tends towards ulcer formation, with haemorrhage and sometimes perforation. If in the large bowel, the symptoms are usually less acute than those characterizing tubercular inflammation of the small intestine. The appendix has been found to be the seat of tubercular processes; in the rectum they form the general cause of the fistulae and abscesses so commonly met with here. Tubercular peritonitis may be primary or secondary, acute or chronic; occasionally very acute cases are seen running a rapid course; the majority are chronic in type.

The tubercles spread over the surface of the serous membrane, and if small and not very numerous may give rise in chronic cases to few symptoms; if larger, and especially when they involve and obstruct the lymph- and blood-vessels, ascites follows. It is hardly possible that tubercular invasion of the mesenteric glands can ever occur unaccompanied by peritoneal infection; but when the infection of the glands constitutes the most pro- minent sign, the term tabes mesenterica is sometimes employed. Here the glands, enlarged, forma doughy mass in the abdomen, leading to marked protrusion of the abdominal walls, with wasting elsewhere and diarrhoea.

The liver is seldom attacked by tubercle, unless in cases of general miliary tuberculosis. Now and then it contains large caseous tubercular masses in its substance.

An important fact with regard to the tubercular processes in the digestive organs lies in the ready response to treatment shown by many cases of peritoneal or mesenteric invasion, particularly in the young.

The later sequelae of syphilis display a predilection for the rectam and the liver, usually leading to the development of a stricture in the former, to a diffuse hepatitis or the formation of gumma ta in the second. In inherited syphilis the temporary teeth usually appear early, are discoloured and soon crumble away. The permanent teeth may be sound and healthy, but are often—especially the upper incisors — notched and stunted, when they are known as " Hutchinson's teeth." As the result both of syphilis and of tubercle, the tissues of the liver and bowel may present a peculiar alteration; they become amyloid, or lard- aceous, a condition in which they appear " waxy," are coloured dark mahogany brown with dilute iodine solutions, and show degenerative changes ir> the connective tissue.

The Bacillus typhosus discovered by Eberth is the causal agent of typhoid fever, and has its chief seat of activity in the small intestine, more especially in the lower half of the ileum. Attack- ing the lymphoid follicles in the mucous membrane, it causes first inflammatory enlargement, then necrosis and ulceration. The adjacent portions of the mucous membrane show acute catarrhal changes. Diarrhoea, of a special " pea-soup " type, may or may not be present; while haemorrhage from the bowel, if ulcers have formed, is common. As the ulcers frequently extend down to the peritoneal coat of the bowel, perforation of this membrane and extravasation into the peritoneal cavity is easily induced .by irritants introduced into or elaborated in the bowel, acting physically or by the excitation of hyper-peristalsis.

True Asiatic cholera is due to the comma-bacillus or spirillum of cholera, which is found in the rice-water evacuations, in the contents of the intestine after death, and in the mucous membrane of the intestine just beneath the epithelium. It has not been found in the blood. It produces an intense irritation of the bowel, seldom of the stomach, without giving rise locally to any marked physical change; it causes violent diarrhoea and copious dis- charges of " rice-water " stools, consisting largely of serum swarming with the organism.

Dysentery gives rise to an inflammation of the large intestine and sometimes of the lower part of the ileum, resulting in exten- sive ulceration and accompanied by faecal discharges of mucus, muco-pus or blood. In some forms a protozoan, the Amoeba dysenteriae, is found in the stools — this is the amoebic dysentery; in other cases a bacillus, Bacillus dysenteriae, is found — the bacillary dysentery.

Acute parotitis, or mumps, is an infectious disease of the parotid glands, chiefly interesting because of the association between it and the testes in males, inflammation of these glands occasionally following or replacing the affection of the parotids. The causal agent is probably organismal, but has as yet escaped detection.

The relative frequency with which malignant growths occur in the different organs of the digestive system may be gathered from the tabular analysis, on p. 266, of 1768 cases recorded in the books of the Edinburgh Royal Infirmary as having been treated in the medical and surgical wards between the years 1892 and 1899 inclusive. Of these, 1263, or 71-44 , were males; 505, or 28-56, females. (See Table I. p. 266-)

New growths.

If the figures there given be classified upon broader lines, the results are as given in Table II. p. 266, and speak for them- selves.

The digestive organs are peculiarly subject to malignant disease, a result of the incessant changes from passive to active conditions, and vice versa, called for by repeated introduction of food; while the comparative frequency with which different parts are attacked depends, in part, upon the degree of irritation or changes of function imposed upon them. Scirrhous, en- cephaloid and colloid forms of carcinoma occur. In the stomach and oesophagus the scirrhous form is most common, the soft encephaloid form coming next. The most common situation for cancerous growth in the stomach is the pyloric region. Walsh out of 1300 cases found 6o-8 % near the pylorus, 11-4 % over the lesser curvature, and 4-7 % more or less over the whole organ. The small intestine is rarely attacked by cancer; the large intestine frequently. The rectum, sigmoid flexure, caecum and colon are affected, and in this order, the cylindrical-celled form; being the most common. Carcinoma of the peritoneum' is generally colloid in character, and is often secondary to growths in other organs. Cancer of the liver follows cancer of the stomach 1 and rectum in frequency of Occurrence, and is relatively more common in females than males. Secondary invasion of the liver is a frequent

sequel to gastric cancer. The pancreas occasionally is the seat of cancerous growth.

Sarcomata are not so often met with in the digestive organs. When present, they generally involve the peritoneum or the mesenteric glands. The liver is sometimes attacked, the stomach rarely.

Benign tumours are not of common occurrence in the digestive organs. Simple growths of the salivary glands, cysts of the pancreas and polypoid tumours of the rectum are the most frequent.

The intestinal canal is the habitat of the majority of animal parasites found in man. Frequently their presence leads to no morbid symptoms, local or general; nor are the symptoms, when they do arise, always characteristic of the presence of parasites alone.- Discovery of their bodies, or of their parasites. eggs, in the stools is in most instances the only satis- factory proof of their presence. The parasites found in the bowel belong principally to two natural groups, Protozoa and Metazoa. The great class of the Protozoa furnish amoebae, members of Sporozoa and Infusoria. The amoebae are almost invariably found in the large intestine; one species, indeed, is termed Amoeba coli. The frequently observed relation between attacks of dysentery and the presence of amoebae in the stools has led to the proposition that an Amoeba dysenterica exists, causing the disease — a theory supported by the detection of amoebae in the contents of dysenteric abscesses of the liver. No symptoms of injury to health appear to accompany the presence of Sporozoa in the. bowel, while the species of Infusoria found in it, the Cercomonas, and Trichomonas intestinalis, and the Balantidium coli, may or: may not be guilty of prolonging conditions within the bowel as have previously set up diarrhoea.

The Metazoa supply examples of intestinal parasites from the classes Annuloida and Nematoidea. To the former class belong the various tapeworms found in the small intestine of man. They, like other intestinal parasites, are destitute of any power of active digestion, simply absorbing the nutritious proceeds of the digestive processes of their hosts. Nematode worms infest both the small and large intestine; Ascaris lumbricoides, the common round worm, and the male Oxyuris vermicularis are found in the small bowel, the adult female Oxyuris vermicularis and the Tricocephalus dispar in the large.

The eggs of the Trichina spiralis, when introduced with the food, develop in the bowel into larval forms which invade the tissues of the

body, to find in the muscles congenial spots wherein to reach maturity. Similarly, the eggs of the Echinococcus are hatched in the bowel, and the embryos proceed to take up their abode in the tissues of the body, developing into cysts capable of growth into mature worms after their ingestion by dogs.

DIGESTIVE ORGANS

Numbers of bacterial forms habitually infest the alimentary canal. Many of them are non-pathogenic; some develop patho- genic characters only under provocation or when a plflsltes. suitable environment induces them to act in such a manner; others may form the materies morbi of special lesions, or be casual visitors capable of originating disease if opportunity occurs. Apart from those organisms associated with acute infective diseases, disturbances of function and physical

Table I.

Males.

Females.

Both Sexes.

Organ or Tissue in

Per-

Organ or Tissue in

Per-

Organ or Tissue in

Per-

Order of Frequency.

centage.

Order of Frequency.

centage.

Order of Frequency.

centage.

i Stomach

22-56

1 Stomach

22-37

1 Stomach

22-49

2 Lip ....

12-94

2 Rectum

17-24

2 Rectum

13-12

3″ Rectum .

n-57

3 Liver

15-5°

3 Liver

10-02

4 Tongue .

11-36

4 Peritoneum

7-86

4 Lip . . .

9-8 9

5 Oesophagus

10-90

5 Oesophagus

5-33

5 Oesophagus

9-29

6 Liver

7-80

6 Sigmoid

4-53

6 Tongue .

8-96

7 Jaw ....

8 Mouth . . .

6-38

7 Pancreas

3-52

7 Jaw . . . .

5-65

2-88

8 Tongue .

3-12

8 Peritoneum

2-94

9 Tonsils .

2-09

9 Omentum

2 98

9 Sigmoid . . IQ Mouth .

2-56

io Sigmoid flexure

1-77

10 Lip .

2-57

2-40

11 Parotid . . 1

12 Pancreas . J

11 Jaw .

1-97

II Pancreas

i-8o

I-IO

12 Colon

:1

1-84

12 Tonsils .

1-35

13 Caecum . .)

14 Peritoneum. .)

13 Abdomen

13 Omentum .

1-25

094

14 Intestine

1-56

14 Parotid . . /

15 Colon .)

15 Colon .

089

15 Caecum

1-37

*I * 12*

16 Pharynx . . ~|

16 Mouth .

■:l

1-18

16 Caecum

1-08

17 Intestine (site V

0-79

17 Parotid

17 Intestine . .)

18 Abdomen . .]

unknown) . . J

18 Splenic flexure

0-98

I-O0

18 Abdomen

0-71

19 Jejunum and

19 Pharynx

0-62

19 Mesentery . .)

*20 Omentum . . *

o-55

ileum .

0-78

20 Mesentery .

0-52

20 Tonsils .

o-68

21 Jejunum and “)

21 Hepatic flexure

o-39

21 Pharynx . “|

ileum . . .1

0-44

22 Submaxillary . ~|

22 Hepatic flexure >

0-40

22 Hepatic flexure f

gland . . .1

23 Mesentery . . J

24 Submaxillary .)

25 Duodenum . .)

23 Splenic flexure J

23 Jejunum and t

0-31

24 Submaxillary .

0-28

ileum . . .J

0-20

25 Duodenum

0-22

24 Duodenum .

0-23

25 Splenic flexure

015

Note. — The figures where several organs are bracketed apply to each organ separately

lesions may be the result of abnormal bacterial activity in the canal; and these disturbances may be both local and general. Many of the bacteria commonly present produce putrefactive changes in the contents of the tract by their metabolic processes. They render the medium they grow in alkaline, produce different gases and elaborate more or less virulent toxins. Other species set up an acid fermentation, seldom accompanied by gas or toxin formation. The products of either class are inimical to the free

Table II.

Per-

Per-

Per-

Males.

centage.

Females.

centage.

Total.

centage.

1 Mouth and

1 Intestines

28-9

1 Oesophagus and

pharynx

37-85

2 Oesophagus and

stomach

31-78

2 Oesophagus and

stomach

27-7

2Mouth and

stomach

33-46 .

3 Liver

15-5

pharynx

30-27

3 Intestines

17-04

4 Peritoneum .

I3-I

3 Intestines

20-42

4 Liver ...

7-8

5 M u t h and

•

4 Liver

10-02

5 Peritoneum .

2-75

pharynx

n-3

5 Peritoneum .

5-7i

6 Pancreas

i-i

6 Pancreas

3-5

6 Pancreas

i-8o

growth of members of the other. The specieswhichproduceacids are more resistant to the action of acids. Thus, when the contents of the stomach possess a normal or excessive proportion of free hydrochloric acid, a much larger number of putrefactive and pathogenic organisms in the food are destroyed or inhibited than of the bacteria of acid fermentation. Diminished gastric acidity allows of the entry of a greater number of putrefactive (and pathogenic) types, with, as a consequence, increased facilities for their growth and activity, and the appearance of intestinal derangements.

In a healthy new-born infant the mouth is free from micro-organisms, and very few are found in a breast-fed baby, but

Bacillus lactis may be found where the child is bottle fed. If there is trouble with the first dentition and food is allowed to collect, staphylococci, streptococci, pneumococci and colon bacilli may be present. Even in healthy babies Oidium albicans may be present, and in older children the pseudo-diphtheria bacillus. From carious teeth may be isolated streptothrix, leptothrix, spirilla and fusiform bacilli. Under conditions of health these micro-organisms live in the mouth as saprophytes,

and show no virulence when culti-

vated and injected into animals.

The two common pyogenetic organ- isms, Staphylococcus albus and brevis, show no virulence. Also the pneumococcus, though often present, must be raised in virulence before it can produce untoward results. The foulness of the mouth is supposed to be due to the colon bacillus and its allies, but those obtained from the mouth are in- nocuous. Also to enable the Oidium albicans to attack the mucous mem- brane there must be some slight inflammation or injury. The micro- organisms found in the stomach gain access to that organ in the food or by regurgitation from the small intestine. Most are relatively inert, but some have a special fer- mentative action on the food (see Nutrition). Abelous isolated six- teen distinct species of organism from a healthy stomach, including Sarcinae, B. lactis, pyocyaneus, subtilis, la.ctis erythrogenes, amy- lobacter, megatherium, and Vibrio rugula.

*Hare-lip, cleft palate, hernia and imperforate anus are physical abnormalities which are interesting to the surgeon rather than to the pathologist. The oesophagus may be the seat of a diverti- culum, or blind pouch, usually situated in its lower half, which in most instances is probably partly acquired and partly congenital; a local weakness succumbing to pressure. p *^ sfca ^ Hypertrophy of the muscular coat of the pyloric region aitties. is an infrequent congenital gastric anomaly in infants, preventing the passage of food into the bowel, and causing death*

in a short time. Incomplete closure of the vitelline duct results in the presence of a diverticulum — Meckel's— generally connected with the ileum, mainly important by reason of the readiness with which it occasions intestinal obstruction. Idiopathic congenital dilatation of the colon has been described.

Traction diverticula of the oeso- phagus not uncommonly occur as sequels to suppurative inflamma- tion of cervical lymphatic glands. More frequently dilatation of a section is met with, due as a rule to the presence of a stricture. The stomach often diverges from the normal in size, shape and position. Normally capable in the adult of containing from fifty to sixty ounces, either by reason of organic disease, or as the result of functional disturb- ance, its capacity may vary enormously. The writer has seen post mortem a stomach which held a gallon (160 ounces), and again one holding only two ounces. Cancer spread over a large area and cirrhosis of the stomach wall cause diminution in capacity; pyloric obstruction, weakness of the muscular coat, and nervous influences are associated with dilatation. A peculiar distortion of the shape of the stomach follows cicatrization of

ulcers of greater or lesser curvature; the gastric cavity becomes " hour-glass " in shape. In addition, the stomach may be dis- placed downwards as a whole, a condition known as gastroptosis: if the pyloric portion only be displaced, the lesion is termed pyloroptosis. Ptoses of other abdominal organs are described; the liver, transverse colon, spleen and kidneys may be involved. Displacements downwards of the stomach and transverse colon, along with a movable right kidney and associated with dyspepsia and neurasthenia, form the malady termed by G16nard entero- ptosis. A general visceroptosis often occurs in those patients who have some tuberculous lesion of the lungs or elsewhere, this disease causing a general weakening and subsequent stretching of all ligaments. Displacements of the abdominal viscera aie almost invariably accompanied by symptoms of dyspepsia of a neurotic type. The rectum is liable to prolapse, consequent upon constipation and straining at stool, or following local injuries of the perineal floor.

Every pathological lesion shown by digestive organs is closely associated with the state of the nervous system, general or local; influence s0 s ^°PP a g e °f active gastric digestive processes after ofthe profound nervous shock, and occurrence of nervous nervous diarrhoea from the same cause. Gastric dyspepsia system. f nervous origin presents most varied and contra- dictory symptoms: diminished acidity of the gastric juice, hyper-acidity, over-production, arrest of secretion, lessened or increased movements, greater sensitiveness to the presence of contents, dilatation or spasm. Often the nervous cause can be traced back farther, — in females, frequently to the pelvic organs; in both sexes, to the condition of the blood, the brain or the bowel. Unhealthy conditions related to evacuation of the bowel-contents commonly induce reflex nervous manifestations of abnormal character referred to the stomach and liver. Gastric disturbances similarly react upon the proper conduct of intestinal functions.

Local Diseases.

The, Mouth. — The lining membrane of the cheeks inside the mouth, of the gums and the under-surfaee and edges of the tongue, is often the seat of small irritable ulcers, usually associated with some digestive derangement. A crop of minute vesicles known as Koplik's spots over these parts has been lately stated by Koplik to be an early

symptom of measles. Xerostomia, or dry mouth, is a rare condition, connected with lack of salivary secretion. Gangrenous stomatitis, cancrum oris, or noma, occasionally attacks debilitated children, or patients convalescing from acute fevers, more especially after measles. It commences in the gums or cheeks, and causes widespread sloughing of the adjacent soft parts — it may be of the bones.

The Stomach. — It were futile to attempt to enumerate all the protean manifestations of disturbance which proceed from a dis-ordered stomach. The possible permutations and combinations of the causes of gastric vagaries almost reach infinity. Idio- syncrasy, past and present gastric education, penury or plethora, actual digestive power, motility, bodily requirements and condi- tions, environment, mental influences, local or adjacent organic lesions, and, not least, reflex impressions from other organs, all contribute to the variance.

Ulcer of the stomach, however — the perforating gastric ulcer — occupies a unique position among diseases of this organ. Gastric ulcers are circumscribed, punched out, rarely larger than a sixpenny-bit, funnel-shaped, the narrower end towards the peritoneal coat, and distributed in those regions of the stomach wall which are most exposed to the action of the gastric contents. They occur most frequently in females, especially if anaemic, and are usually accompanied by excess of acid, actual or relative to the state of the blood, in the stomach contents. Local pain, dorsal pain, generally to the left of the eighth or ninth dorsal spinous process, and haematemesis and melaena, are symptom- atic of it. The amount of blood lost varies with the rapidity of ulcer formation and the size of vessel opened into. Fatal results arise from ulceration into large blood-vessels, followed by copious haemorrhage, or by perforation of the ulcer into the peritoneal

cavity. Scars of such ulcers may be found post mortem, although no symptoms of gastric disease have been exhibited during life; gastric ulcers, therefore, may be latent.

Irritation of the sensory nerve-endings in the stomach wall from the presence of an increased proportion of acid, organic or mineral, in the stomach contents is accountable for the well- known symptom heartburn. Water-brash is a term applied to eructation of a colourless, almost tasteless fluid, probably saliva, which has collected in the lower part of the oesophagus from failure of the cardiac, sphincter of the stomach to relax; reversed oesophageal peristalsis causing regurgitation. A similar reverted action serves in merycism, or rumination, occasionally found in man, to raise part of the food, lately ingested, from thestomach to the mouth. Vomiting also is aided by reversed peristaltic action, both of the stomach and the oesophagus, with the help of the diaphragm and the muscles of the anterior abdominal wall. Emesis may be caused both by local nervous influence, and through the central nervous mechanism either reflexly or from the direct action of substances circulating in the blood. Further, the causal agent acting on the central nervous apparatus may be organic or functional, as well as medicinal. Vomiting without any apparent cause suggests nervous lesions, organic or reflex. The obstinate vomiting of pregnancy is a case in point. Here the primary cause proceeds reflexly from the pelvis. In females the pelvic organs are often the true source of emesis. Haematemesis accompanies gastric ulcer, cancer, chronic congestion with haemorrhagic erosion, congestion of the liver, or may follow violent acts of vomiting. In cases of ulcer the blood is usually bright and in considerable amount; in cancer, darker, like coffee- grounds; and in cases of erosion, in smaller quantity and of bright colour. The reaction of the stomach contents, if the cause be doubtful, yields valuable aid towards a diagnosis. Of increased acidity in gastric ulcer, normal in hepatic congestion, it is diminished in cancer; but as the acid present in cancer is largely lactic, analysis of the gastric contents must often be a sine qua non, because hyperacidity from lactic may obscure hypoacidity of hydrochloric acid.

Flatulence usually results from fermentative processes in the stomach and bowel, as the outcome of bacterial activity. A different form of flatulence is common in neurotic individuals: in such the gas evolved consists simply in carbonic acid liberated from the blood, and its evolution is generally characterized by rapid development and by lack of all fermentative signs.

The Liver. — The liver is an organ frequently libelled for the delinquencies of other organs, and regarded as a common source of ill. In catarrhal jaundice it is in most cases the bowel that is at fault, the liver acting properly, but unable to get rid of all the bile

prqduced. The liver suffers, however, from several diseases of its own. Its fibrous or connective tissue is very apt to increase at the expense of the cellular elements, destroying their functions. This cirrhotic process usually follows long-continued irritation, such as is produced by too much alcohol absorbed from the bowel habitually, the organ gradually becoming harder in texture and smaller in bulk. Hypertrophic cirrhosis of the liver is not un- commonly met with, in which the liver is much increased in size, the " unilobular " form, also of alcoholic origin. In still-born children and in some infants a form of hypertrophic cirrhosis is occasionally seen, probably of hereditary syphilitic origin. Acute congestion of the liver forms an important symptom of malarial fever, and often leads in time to establishment of cirrhotic changes; here the liver is generally enlarged, but not invariably so, and the part played by alcohol in its causation has still to be investigated. Acute yellow atrophy of the liver is a disease sui generis. Of rare occurrence, possibly of toxic origin, it is marked by jaundice, at first of usual type, later becoming most intense; by vomiting; haemorrhages widely distributed; rapid diminution in the size of the liver; the appearance of leucin and tyrosin in the urine, with lessened urea; and in two or three days, death. The liver after death is soft, of a reddish colour dotted with yellow patches, and weighs only about a third part of the normal — about 1$ lb in place of 3 1 lb. A closely analogous affection of the liver, known as Weil's disease, is of infectious type, and has been noted in

epidemic form. In this the spleen and liver are commonly but not always swollen, and the liver is often tender on pressure. As a large proportion of the sufferers from this disease have been butchers, and the epidemics have occurred in the hot season of the year, it probably arises from contact with decomposing animal matter. Hepatic abscess may follow on an attack of amoebic dysentery, and is produced either by infection through the portal vein, or by direct infection from the adjacent colon. In general pyaemia multiple small abscesses may occur in the liver.

The Gall- Bladder. — The formation of biliary calculi in the gall-bladder is the chief point of interest here. At least 75% of such cases occur in women, especially in those who have borne children. Tight-lacing has been stated to act as an exciting cause, owing to the consequent retardation of the flow of bile. Gall-stones may number

from one to many thousands. They are largely com- posed of cholesterin, combined with small amounts of bile- pigments and acids, lime and magnesium salts. Their presence may give rise to no symptoms, or may cause violent biliary colic, and, if the bile-stream be obstructed, to jaundice. Inflammatory processes may be initiated in the gall-bladder or the bile-ducts, catarrhal or suppurative in character.

The Pancreas. — Haemorrhages into the body of the pancreas, acute and chronic inflammation, calculi, cysts and tumours, among which cancer is by far the most common, are recognized as occurring in this organ; the point of greatest interest regarding them lies in the relations established between pancreatic disease and diabetes mellitus, affections of the gland frequently being complicated by, and probably causing, the appearance of sugar in the urine.

The Small Intestine. — Little remains to be added to the account of inflammatory lesions in connexion with the small intestine. It offers but few conditions peculiar to itself, save in typhoid fever, and the ease with which it contrives to become kinked, or intus- suscepted, producing obstruction, or to take part in hernial protrusions. The first section, the duodenum, is subject to development of ulcers very similar to those of the gastric mucous membrane. For long duodenal ulceration has been regarded as a complication of extensive burns of the skin, but the relationship between them has not yet been quite satisfactorily explained. The condition of colic in the bowel usually arises from over- distension of some part of the small gut with gas, the frequent sharp turns of the gut facilitating temporary closure of its lumen by pressure of the dilated gut near a curve against the part beyond. In the large bowel accumulations of gas seldom cause such acute symptoms, having a readier exit.

The Large Intestine. — The colon, especially the ascending portion, may become immensely dilated, usually after prolonged constipation and paralysis of the gut; occasionally the condition is congenital. Straining efforts made in defaecation may often account for prolapse of the lower end of the rectum through the anus. Haemorrhage from the bowel is usually a sign of disease situated in the large intestine: if bright in colour, the source is probably low down; if dark, from the caecum or from above the ileo-caecal valve. Blood after a short stay in any section of the alimentary canal darkens, and eventually becomes almost black in colour. (A. L. G.; M. F.)*

DIGGES, WEST (1720-1786), English actor, made his first stage appearance in Dublin in 1749 as Jaffier in Venice Preserved; and

both there and in Edinburgh until 1764 he acted in many tragic roles with success. He was the original " young Norval " in Home's Douglas (1756). His first London appearance was as Cato in the Haymarket in 1777, and he afterwards played Lear, Macbeth, Shylock and Wolsey. In 1881 he returned to Dublin and retired in 1784.

DIGIT (Lat. digitus, finger), literally a finger or toe, and so used to mean, from counting on the fingers, a single numeral, or, from measuring, a finger's breadth. In astronomy a digit is the twelfth part of the diameter of the sun or moon; it is used to express the magnitude of an eclipse.

DIGITALIS. The leaves of the foxglove (q.v.), gathered from wild plants when about two-thirds of their flowers are expanded,

deprived usually of the petiole and the thicker part of the midrib, and dried, constitute the drug digitalis or digitalis folia of the Pharmacopoeia. The prepared leaves have a faint odour and bitter taste; and to preserve their properties they must be kept excluded from light in stoppered bottles. They are occasionally adulterated with the leaves of' Inula Conyza, ploughman's spikenard, which may be distinguished by their greater rough- ness, their less divided margins, and their odour when rubbed; also with the leaves of Symphytum officinale, comfrey, and of Verbascum Thapsus, great mullein, which unlike those of the foxglove have woolly upper and under surfaces. The earliest known descriptions of the foxglove are those given by Leonhard Fuchs and Tragus about the middle of the 16th century, but its virtues were doubtless known to herbalists at a much remoter period. J. Gerarde, in his Herbal (1597), advocates the use of foxglove for a variety of complaints; and John Parkinson, in the Theatrum Botanicum, or Theater of Plants (1640)/ and later W. Salmon, in The New London Dispensatory, similarly praised the remedy. Digitalis was first brought prominently under the notice of the medical profession by Dr W. Withering, who, in his Account of the Foxglove (1785), gave details of upwards of 200 cases chiefly dropsical, in which it was used.

Digitalis contains four important glucosides, of which three are cardiac stimulants. The most powerful is digitoxin C34H54O11, an extremely poisonous and cumulative drug, insoluble in water. Digilalin, C3 5 H 56 0i4, is crystalline and is also insoluble in water. Digitalein is amorphous but readily soluble in water. It can therefore be administered subcutaneously, in doses of about one- hundredth of a grain. Digitonin, on the other hand, is a cardiac depressant, and

has been found to be identical with saponin, the chief constituent of senega root. There are numerous pre- parations, patent and pharmacopeial, their composition being extremely varied, so that, unless one has reason to be certain of any particular preparation, it is almost better to use only the dried leaves themselves in the form of a powder (dose §- 2 grains). The pharmacopeial tincture may be given in doses of five to fifteen minims, and the infusion has the unusually small dose of two to four drachms — the dose of other infusions being an ounce or more. The tincture contains a fair proportion of both digitalin and digitoxin.

Digitalis leaves have no definite external action. Taken by the mouth, the drug is apt to cause considerable digestive disturbance, varying in different cases and sometimes so severe as to cause serious difficulty. This action is probably due to the digitonin, which is thus a constituent in every way undesirable. The all- important property of the drug is its action on the circulation. Its first action on any of the body-tissues is upon unstriped muscle, so that the first consequence of its absorption is a con- traction of the arteries and arterioles. No other known drug has an equally marked action in contracting the arterioles. As the vaso-motor centre in the medulla oblongata is also stimulated, as well as the contractions of the heart, there is thus trebly caused a very great rise in the blood-pressure.

The clinical influence of digitalis upon the heart is very well defined. After the taking of a moderate dose the pulse is markedly slowed. This is due to a very definite influence upon the different portions of the cardiac cycle. The systole is not altered in length, but the diastole is very much prolonged, and since this is the period not only of cardiac rest but also of cardiac " feeding " — the coronary vessels being compressed and occluded during systole — the result is greatly to benefit the nutrition of the cardiac muscle. So definite is this that, despite a great increase in the force of the contractions and despite experimental proof that the heart does more work in a given time under the influence of digitalis, the organ subsequently displays all the signs of having rested, its improved vigour being really due to its obtaining a larger supply of the nutrient blood. Almost equally striking is the fact that digitalis causes an irregular pulse to become regular. Added to the greater force of cardiac contraction is a permanent tonic contraction of the organ, so that its internal capacity is reduced. The bearing of this fact on cases of cardiac dilatation is evident. In larger doses a remarkable sequel to these actions

may be observed. The cardiac contractions become irregular, the ventricle assumes curious shapes — " hour-glass," &c. — becomes very pale and bloodless, and finally the heart stops in a state of spasm, which shortly afterwards becomes rigor-mortis. Before this final change the heart may be started again by the applica- tion of a soluble potassium salt, or by raising the fluid pressure within it. Clinically it is to be observed that the drug is cumu- lative, being very slowly excreted, and that after it has been taken for some time the pulse may become irregular, the blood-pressure low, and the cardiac pulsations rapid and feeble. These symptoms with more or less gastro-intestinal irritation and decrease in the quantity of urine passed indicate digitalis poison- ing. The initial action of digitalis is a stimulation of the cardiac terminals of the vagus nerves, so that the heart's action is slowed. Thereafter follows the most important effect of the drug, which is a direct stimulation of the cardiac muscle. This can be proved to occur in a heart so embryonic that no nerves can be recognized in it, and in portions of cardiac muscle that contain neither nerve- cells nor nerve-fibres.

The action of this drug on the kidney is of importance only second to its action on the circulation. In small or moderate doses it is a powerful diuretic. Though Heidenhain asserts that rise in the renal blood-pressure has not a diuretic action per se, it seems probable that this influence of the drug is due to a rise in the general blood-pressure associated with a relatively dilated condition of the renal vessels. In large doses, on the other hand, the renal vessels also are constricted and the amount of urine falls. It is probable that digitalis increases the amount of water rather than that of the urinary solids. In large doses the action of digitalis on the circulation causes various cerebral symptoms, such as seeing all objects blue, and various other disturbances of the special senses. There appears also to be a specific action of lowering the reflex excitability of the spinal cord.

Digitalis is used in therapeutics exclusively for its action on the circulation. In prescribing this drug it must be remembered that fully three days elapse before it gets into the system, and thus it must always be combined with other remedies to tide the patient over this period. It must never be prescribed in large doses to begin with, as some patients are quite unable to take it, intractable vomiting being caused. The three days that must pass before any clinical effect is obtained renders it useless in an emergency. A certain consequence of its use is to cause or increase cardiac hypertrophy — a condition which has its own dangers and ultimately disastrous consequences,

and must never be provoked beyond the positive needs of the case. But digitalis is indicated whenever the heart shows itself unequal to the work it has to perform. This formula includes the vast majority of cardiac cases. The drug is contra-indicated in all cases where the heart is already beating too slowly; in aortic incompetence — where the prolongation of diastole increases the amount of the blood that regurgitates through the incompetent valve; in chronic Bright's disease and in fatty degeneration of the heart — since nothing can cause fat to become contractile.

DIGNE, the chief town of the department of the Basses Alpes, in S.E. France, 14 m. by a branch line from the main railway line between Grenoble and Avignon. Pop. (1906), town, 4628; commune, 7456. The Ville Haute is built on a mountain spur running down to the left bank of the Bleone river, and is composed of a labyrinth of narrow winding streets, above which towers the present cathedral church, dating from the end of the 15th century, but largely reconstructed in modern times, and the former bishop's palace (now the prison). The fine Boulevard Gassendi separates the Ville Haute from the Ville Basse, which is of modern date. The old cathedral (Notre Dame du Bourg) is a building of the 13th century, but is now disused except for funerals: it stands at the east end of the Ville Basse. The neighbourhood of Digne is rich in orchards, which have long made the town famous in France for its preserved fruits and confections. It is the Dinia of the Romans, and was the capital of the Bodiontii. From the early 6th century at least it has been an episcopal see, which till 1790 was in the ecclesiastical province of Embrun, but since 1802 in that of Aix en Provence. The history of Digne in the middle

ages is bound up with that of its bishops, under whom it prospered greatly. But it suffered much during the religious wars of the 1 6th and 17th centuries, when it was sacked several times. A little way off, above the right bank of the Bleone, is Champtercier, the birthplace of the astronomer Gassendi (1592-1655), whose name has been given to the principal thoroughfare of the little town.

See F. Guichard, Souvenirs Mstoriques sur la ville de Digne et ses environs (Digne, 1847). (W. A. B. C.)

DIGOIN, a town of east-central France, in the department of Saone-et-Loire, on the right bank of the Loire, 55 m. W.N.W. of Macon on the Paris-Lyon railway. Pop. (1906) 5321. It is situated at the meeting places of the Loire, the Lateral canal of the Loire and the Canal du Centre, which here crosses the Loire by a fine aqueduct.

The town carries on considerable manufactures of faience, pottery and porcelain. The port on the Canal du Centre has considerable traffic in timber, sand, iron, coal and stone.

DIJON, a town of eastern France, capital of the department of C&te d'Or and formerly capital of the province of Burgundy, 195 m. S.E. of Paris on the Paris-Lyon railway. Pop. (1906) 65,516. It is situated on the western border of the fertile plain of Burgundy, at the foot of Mont Afrique, the north-eastern summit of the C6te d'Or range, and at the confluence of the Ouche and the Suzon; it also has a port on the canal of Burgundy. The great strategic importance of Dijon as a centre of railways and roads, and its position with reference to an invasion of France from the Rhine, have led to the creation of a fortress forming part of the Langres group. There is no enceinte, but on the east side detached forts, 3 to 4 m. distant from the centre, command all the great roads, while the hilly ground to the west is protected by Fort Hauteville to the N.W. and the "groups" of Motte Giron and Mont Afrique to the S.W., these latter being very formidable works. Including a fort near Saussy (about 8 m. to the N.W.) protecting the water-supply of Dijon, there are eight forts, besides the groups above mentioned. The fortifications which partly surrounded the eld and central portion of the city have disappeared to make way for tree-lined boulevards with fine squares at intervals. The old churches and historic buildings of Dijon are to be found in the irregular streets of the old town, but industrial and commercial activity has been transferred to the new quarters beyond its limits. A fine park more than 80 acres in extent lies to the south of the city, which is rich in open spaces and promenades, the latter including the botanical garden and the Promenade de l'Arquebuse, in which there is a black poplar famous for its size and age.

The cathedral of St Benigne, originally an abbey church, was built in the latter half of the 13th century on the site of a Romanesque basilica, of which the crypt remains. The west front is flanked by two towers and the crossing is surmounted by a slender timber spire. The plan consists of three naves, short transepts and a small choir, without ambulatory, terminating in three apses. In the interior there is a fine organ and a quantity of statuary, and the vaults contain the remains of Philip the Bold, duke of Burgundy, and Anne of Burgundy, daughter of John the Fearless. The site of the abbey buildings is occupied by the bishop's palace and an ecclesiastical seminary. The church of Notre-Dame, typical of the Gothic style of Burgundy, was erected from 1252 to 1334, and is distinguished for the grace of its interior and the beauty of the western facade. The portal consists of three arched openings, above which are two stages

of arcades, open to the light and supported on slender columns. A row of gargoyles surmounts each storey of the facade, which is also ornamented by sculptured friezes. A turret to the right of the portal carries a clock called the Jaquemart, on which the hours are struck by two figures. The church of St Michel belongs to the 1 5th century. The west facade, the most remarkable feature of the church, is, however, of the Renaissance period. The vaulting of the three portals is of exceptional depth owing to the projection of the lower storey of the facade. Above this storey rise two towers of five stages, the fifth stage being formed by an octagonal cupola. The columns decorating the facade represent al] the four orders. The design of this facade is wrongly attributed to Hugues

Sambin (fl. c. 1540), a native of Dijon, and pupil of Leonardo da Vinci, but the sculpture of the portals, including " The Last Judgment " on the tympanum of the main portal, is probably from his hand. St Jean (15th century) and St Etienne (15th, 16th and 1 7th centuries), now used as the exchange, are the other chief churches. Of the ancient palace of the dukes of Burgundy there remain two towers, the Tour de la Terrasse and the Tour de Bar, the guard-room and the kitchens; these now form part of the hotel de ville, the rest of which belongs to the 17 th and 18th centuries. This building contains an archaeological museum with a collection of Roman stone monuments; the archives of the town; and the principal museum, which, besides valuable paintings and other works of art, contains the magnificent tombs of Philip the Bold and John the Fearless, dukes of Burgundy. These were transferred from the Chartreuse of Dijon (or of Champmol), built by Philip the Bold as a mausoleum, now re- placed by a lunatic asylum. Relics of it survive in the old Gothic entrance, the portal of the church, a tower and the well of Moses, which is adorned with statues of Moses and the prophets by Claux Sluter (fl. end of 14th century), the Dutch sculptor, who also designed the tomb of Philip the Bold. The Palais de Justice, which belongs to the reign of Louis XII., is of interest as the former seat of the parlement of Burgundy. Dijon possesses several houses of the 15th, 16th and 17th centuries, notably the Maison Richard in the Gothic, and the Hotel Vogue in the Renaissance style. St Bernard, the composer J. P. Rameau and the sculptor Francois Rude have statues in the town, of which they were natives. There are also monuments to those inr habitants of Dijon who fell in the engagement before the town in 1870, and to President Carnot and Garibaldi.

The town is important as the seat of a prefecture, a bishopric, a court of appeal and a court of assizes, and as centre of an academie (educational district) . There are tribunals of first instance and of commerce, a board of trade-arbitrators, a chamber of commerce, an exchange (occupying the former cathedral of St fitienne), and an important branch of the Bank of France. Its educational establishments include faculties of law, of science and of letters, a preparatory school of medicine and pharmacy, a higher school of commerce, a school of fine art, a conservatoire of music, lycees and training colleges, and there is a public library with about 100,000 volumes.

Dijon is well known for its mustard, and for the black currant liqueur called cassis de Dijon; its industries include the manufacture of machinery, automobiles, bicycles, soap, biscuits, brandy, leather, boots and shoes, candles and hosiery. There are also flour mills, breweries, important printing works, vinegar works and, in the vicinity, nursery gardens. The state has a large tobacco manufactory in the town. Dijon has considerable trade in cereals and wool, and is the second market for the wines of Burgundy.

Under the Romans Dijon (Divonense castrum) was a vicus in the civitas of Langres. In the 2nd century it was the scene of the martyrdom of St Benignus (Benigne, vulg. Berin, Berain), the apostle of Burgundy. About 274 the emperor Aurelian surrounded it with ramparts. Gregory of Tours, in the 6th century, comments on the strength and pleasant situation of the place, expressing surprise that it does not rank as a civitas. During the middle ages the fortunes of Dijon followed those of Burgundy, the dukes of which acquired it early in the nth century. The communal privileges, conferred on the town in 1182 by Hugh III., duke of Burgundy, were confirmed by Philip Augustus in 1183, and in the 13th century the dukes took up their residence there. For the decoration of the palace and other monuments built by them, eminent artists were gathered from northern France and Flanders, and during this period the town became one of the great intellectual centres of France. The union of the duchy with the crown in 1477 deprived Dijon of the splendour of the ducal court; but to cbunterbalance this loss it was made the capital of the province and seat of a parlement. Its fidelity to the monarchy was tested in 1513, when the citizens were besieged by 50,000 Swiss and Germans, and forced to agree to a treaty so disadvantageous that Louis XII.

refused to ratify it. In the wars of religion Dijon sided with the League, and only opened its gates to Henry IV. in IS95- The 18th

century was a brilliant period for the city; it became the seat of a bishopric, its streets were improved, its commerce developed, and an academy of science and 1 letters founded; while its literary salons were hardly less celebrated than those of Paris. The neighbourhood was the scene of considerable fighting during the Franco-German War, which was, however, indirectly of some advantage to the city owing to the impetus given to its industries by the immigrants from Alsace.

See H. Chabeuf, Dijon a travers les Ages (Dijon, 1897), and Dijon, monuments et souvenirs (Dijon, 1894).

DIKE, or Dyke (Old Eng. die, a word which appears in various forms in many Teutonic languages, cf. Dutch dijk, German Teich, Danish dige, and in French, derived from Teutonic, digue; it is the same word as " ditch " and is ultimately connected with the root of " dig "), properly a trench dug out of the earth for de- fensive and other purposes. Water naturally collects in such trenches, and hence the word is applied to natural and artificial channels filled with water, as appears in the proverbial expression " February fill-dyke," and in the names of many narrow water- ways in East Anglia. " Dike " also is naturally used of the bank of earth thrown up out of the ditch, and so of any embankment, dam or causeway, particularly the defensive works in Holland, the Fen district of England, and other low-lying districts which are liable to flooding by the sea or rivers (see Holland and Fens). In Scotland any wall, fence or even hedge, used as a boundary is called a dyke. In geology the term is applied to wall-like masses «r rock (sometimes projecting beyond the surrounding surface) which fill up vertical or highly inclined fissures in the strata.

DIKKA, a term in Mahommedan architecture for the tribune raised upon columns, from which the Koran is recited and the prayers intoned by the Imam of the mosque.

DILAPIDATION (Lat. for " scattering the stones," lapides, of a building), a term meaning in general a falling into decay, but more particularly used in the plural in English law for (1) the waste committed by the incumbent of an ecclesiastical living; (2) the disrepair for which a tenant is usually liable when he has agreed to give up his premises in good repair (see Easement; Flat; Landlord and Tenant). By the general law a tenant for life has no power to cut down timber, destroy buildings, &c, (voluntary waste), or to let buildings fall into disrepair (per- missive waste) . In the eye of the law an incumbent of a living is a tenant for life of his benefice, and any waste, voluntary or per- missive, on his part must be made good

by his administrators to his successor in office. The principles on which such dilapidations are to be ascertained, and the application of the money payable in respect thereof, depend partly on old ecclesiastical law and partly on acts of parliament. Questions as to ecclesiastical dilapidations usually arise in respect of the residence house and other buildings belonging to the living. Inclosures, hedges, ditches and the like are included in things " of which the beneficed person hath the burden and charge of reparation." In a leading case (Ross v. Adcock, 1868, L.R. 3 C.P. 657) it was said that the court was acquainted with no precedent or decision extending the liability of the executors of a deceased incumbent to any species of waste beyond dilapidation of the house, chancel or other buildings or fences of the benefice. And it has been held that the mere mis-management or miscultivation of the ecclesiastical lands will not give rise to an action for dilapidations. To place the law relating to dilapidations on a more satisfactory footing, the Ecclesiastical Dilapidations Act 1871 was passed. The buildings to which the act applies are defined to be such houses of residence, chancels, walls, fences and other buildings and things as the incumbent of the benefice is by law and custom bound to maintain in repair. In each diocese a surveyor is appointed by the archdeacons and rural deans subject to the approval of the bishop; and such surveyor shall by the direction of the bishop examine the build- ings on the following occasions — -viz. (1) when the benefice is sequestrated; (2) when it is vacant; (3) at the request of the incumbent or on complaint by the archdeacon, rural dean or patron. The surveyor specifies the works required, and gives an

estimate of their probable cost. In the case of a vacant benefice, the new incumbent and the old incumbent or his representatives may lodge objections to the surveyor's report on any grounds of fact or law, and the bishop, after consideration, may make an order for the repairs and their cost, for which the late incumbent or his representatives are liable. The sum so stated becomes a debt due from the late incumbent or his representatives to the new incumbent, who shall pay over the money when recovered to the governors of Queen Anne's Bounty. The governors pay for the works on execution on receipt of a certificate from the surveyor; and the surveyor, when the works have been completed to his satisfaction, gives a certificate to that effect, the effect of which, so far as regards the incumbent, is to protect him from liability for dilapidations for the next five years.

Unnecessary buildings belonging to a residence house may, by the authority of the bishop and with the consent of the patron, be removed. An amending statute of 1872 (Ecclesiastical Dilapidations Act (1871) Amendment) relates chiefly to advances by the governors of Queen Anne's Bounty for the purposes of the act.

DILATATION (from Lat. dis-, distributive, and latus, wide), a widening or enlarging; a term used in physiology, &c.

DILATORY (from Lat. dilatus, from differre, to put off or delay), delaying, or slow; in law a " dilatory plea " is one made merely for delaying the suit.

DILEMMA (Gr. SiXruina, a double proposition, from Si- and "KanPavav) , a term used technically in logic, and popularly in common parlance and rhetoric. (1) The latter use has no exact definition, but in general it describes a situation wherein from either of two (or more) possible alternatives an unsatis- factory conclusion results. The alternatives are called the " horns " of the dilemma. Thus a nation which has to choose between bankruptcy and the repudiation of its debts is on the horns of a dilemma. (2) In logic there is considerable divergence of opinion as to the best definition. Whately defined it as " a conditional syllogism with two or more antecedents in the major and a disjunctive minor." Aulus Gellius gives an example as follows: — " Women are either fair or ugly; if you marry a fair woman, she will attract other men; if an ugly woman she will not please you; therefore marriage is absurd." From either alternative, an unpleasant result follows. Four kinds of dilemma are admitted: — (a) Simple Constructive: If A, then C; if B, then C, but either B or A; therefore C. (b) Simple Destructive: If A is true, B is true; if A is true, C is true; B and C are not both true; therefore A is not true, (c) Complex Constructive: If A, then B; if C, then D; but either A or C; therefore either B or D. (d) Complex Destructive: If A is true, B is true; if C is true, D is true; but B and D are not both true; hence A and C are not both true. The soundness of the dilemmatic argument in general depends on the alternative possibilities. Unless the alternatives produced exhaust the possibilities of the case, the conclusion is invalid. The logical form of the argument makes it especially valuable in public speaking, before uncritical audiences. It is, in fact, important rather as a rhetorcial subtlety than as a serious argument.

Dilemmist is also a term used to translate Vaibhashikas, the name of a Buddhist school of philosophy.

DILETTANTE, an Italian word for one who delights in the fine arts, especially in music and painting, so a lover of the fine arts in general. The Ital. dilettare is from Lat. delectare, to delight. Properly the word refers to an " amateur " as opposed to a " professional " cultivation of the arts, but like " amateur " it is often used in a depreciatory sense for one who is only a dabbler, or who only has a superficial knowledge or interest in art. The Dilettanti Society founded in 1 733-1 734 still exists in England. A history of the society, by Lionel Cust, was published in 1898.

DILIGENCE, in law, the care which a person is bound to exercise in his relations with others. The possible degrees of diligence are of course numerous, and the same degree is not required in all cases. Thus a mere depositary would not be held bound to the same degree of diligence as a person borrowing an article for his own use and benefit. Jurists, following the divisions of the civil law, have concurred in fixing three approximate

standards of diligence — viz. ordinary (diligentia), less than ordinary (levissima diligentia) and more than ordinary (exactissima diligentia) . Ordinary or common diligence is defined by Story (On Bailments) as " that degree of diligence which men in general exert in respect of their own concerns." So Sir William Jones: — " This care, which every person of common prudence and capable of governing a family takes of his own concerns, is a proper measure of that which would uniformly be required in performing every contract, if there were not strong reasons for exacting in some of them a greater and permitting in others a less degree of attention" (Essay on Bailments) . The highest degree of diligence would be that which only very prudent persons bestow on their own concerns; the lowest, that which even careless persons bestow on their own concerns. The want of these various degrees of diligence is negligence in corresponding degrees. These approximations indicate roughly the greater or less severity with which the law will judge the performance of different classes of contracts; but English judges have been inclined to repudiate the distinction as a useless refinement of the jurists. Thus Baron Rolfe could see no difference between negligence and gross negligence; it was the same thing with the addition of a vituper- ative epithet. See Negligence.

Diligence, in Scots law, is a general term for the process by which persons, lands or effects are attached on execution, or in security for debt.

DILKE, SIR CHARLES WENTWORTH, Bart. (1810-1869), English

politician, son of Charles Wentworth Dilke, proprietor and editor of The Athenaeum, was born in London on the 18th of February 18 10, and was educated at Westminster school and Trinity Hall, Cambridge. He studied law, and in 1834 took his degree of LL.B., but did not practise. He assisted his father in his literary work, and was for some years chairman of the council of the Society of Arts, besides taking a prominent part in the affairs of the Royal Horticultural Society and other bodies. He was one of the most zealous promoters of the Great Exhibition (1851), and a member of the executive committee. At the close of the exhibition he was honoured by foreign sovereigns, and the queen offered him knighthood, which, however, he did not accept; he also declined a large remuneration offered by the royal com- mission. In 1853 Dilke was one of the English commissioners at the New York Industrial Exhibition, and prepared a report on it. He again declined to receive any money reward for his services. He was appointed one of the five royal commissioners for the Great Exhibition of 1862; and soon after the death of the prince consort he was created a baronet. In 1865 he entered parliament as member for Wallingford. In 1869 he was sent to Russia as representative of England at the horticultural exhibition held at St Petersburg. His health, however, had been for some time failing, and he died suddenly in that city, on the 10th of May 1869. A selection from his writings, Papers of a Critic (2 vols., 1875), contains a biographical sketch by his son.

His son, Sir Charles Wentworth Dilke, Bart. (1843-), became a prominent Liberal politician, as M.P. for Chelsea (1S68-1886), under-secretary for foreign affairs (1880-1882), and president of the local government board. (1882-1885); and he was then marked out as one of the best-informed and ablest of the advanced Radicals. He was chairman of the royal commission on the housing of the working classes in 1884-1885. But his sensational appearance as co-respondent in a divorce case of a peculiarly unpleasant character in 1885 cast a cloud over his career. He was defeated in Chelsea in 1886, and did not return to parliament till 1892, when he was elected for the Forest of Dean; and though his knowledge of foreign affairs and his powers as a critic and writer on military and naval questions were admittedly of the highest order, his official position in public life could not again be recovered. His military writings are The British Army (1888); Army Reform (1898) and, with Mr Spenser Wilkinson, Imperial Defence (1892). On colonial questions he wrote with equal authority. His Greater Britain (2 vols., 1866-1867) reached a fourth edition in 1868, and was followed by Problems of Greater Britain (2 vols., 1890) and The British Empire

(1899). He was twice married, his second wife (nit

Dill (Anelhum or Peucedanum graveolens) , leaf and inflorescence.

Emilia Frances Strong), the widow of Mark Pattison, being an accomplished art critic and collector. She died in 1904. The most important of her books were the studies on French Painters of Ike Eighteenth Century (1890) and three subsequent volumes on the architects and sculptors, furniture and decoration, engravers and draughtsmen of the same period, the last of which appeared in 1902. A posthumous volume, The Book of the Spiritual Life (1905), contains a memoir of her by Sir Charles Dilke.

DILL (Anethum or Peucedanum graveolens) , a member of the natural botanical order Umbelliferae, indigenous to the south of Europe, Egypt and the Cape of Good Hope. It resembles fennel in appearance. Its root is long and fusiform; the stem is round, jointed and about a yard high; the leaves have fragrant leaflets;

and the fruits are brown, oval and concavo-con- vex. The piant flowers from June till August in England. The seeds are sown, preferably as soon as ripe, either broad- cast or in drills between 6 and 12 in. asunder. The young plants should be thinned when 3 or 4 weeks old, so as to be at distances of about 10 in. A sheltered spot and dry soil are needed for the production of the seed in the climate of England. The leaves of the dill are used in soups and sauces, and, as well as the umbels, for flavouring pickles. The seeds are employed for the preparation of dill- water and oil of dill; they are largely consumed in the manufacture of gin, and, when ground, are eaten in the East as a condiment. The British Pharmacopoeia contains the Aqua Anethi or dill- water (dose 1-2 oz.), and the Oleum Anethi, almost identical in composition with caraway oil, and given in doses of 5-3 minims. Dill- water is largely used as a carminative for children, and as a vehicle for the exhibition of nauseous drugs.

DILLEN [Dillenius], JOHANN JAKOB (1684-1747), English botanist, was born at Darmstadt in 1684, and was educated at the university of Giessen, where he wrote several botanical papers for the Ephemerides naturae curiosorum, and printed, in 1719, his Catalogus plantarum sponte circa Gissam nascentium, illustrated with figures drawn and engraved by his own hand, and containing

descriptions of many new species. In 1 7 2 1 , at the instance of the botanist William- Sherard (1659-1728), he came to England, and in 1724 he published a new edition of Ray's Synopsis stirpium Britannicarum. In 1732 he published Hortus Elthamensis, a catalogue of the rare plants growing at Eltham, Kent, in the collection of Sherard's younger brother, James (1666-1738), who, after making a fortune as an apothecary, devoted himself to gardening and music. For this work Dillen himself executed 324 plates, and it was described by Linnaeus, who spent a month with him at Oxford in 1736, and afterwards dedicated his Critica botanica to him, as " opus botanicum quo absolutius mundus non vidit." In 1 734 he was appointed Sherardian professor of botany at Oxford, in accordance with the will of W. Sherard, who at his death in 1728 left the university £3000 for the endowment of the chair, as well as his library and herbarium. Dillen, who was also the author of an Historia muscorum (1741), died at Oxford, of apoplexy, on the 2nd of April 1747. His manuscripts, books and collections of dried plants, with many drawings, were bought by his successor at Oxford, Dr Humphry Sibthorp (1713-1797), and ultimately passed into the possession of the university.

For an account of his collections preserved at Oxford, see The Dillenian Herbaria, by G. Claridge Druce (Oxford, 1907).

DILLENBURG, a town of Germany, in the Prussian province of Hesse-Nassau, delightfully situated in the midst of a well- wooded country, on the Dill, 25 m. N.W. from- Giessen on the railway to Troisdorf. Pop. 4500. On an eminence above it lie the ruins of the castle of Dillenburg, founded by Count Henry the Rich

of Nassau, about the year 1255, and the birthplace of Prince William of Orange (1533). It has an Evangelical church, with the vault of the princes of Nassau-Dillenburg, a Roman Catholic church, a classical school, a teachers' seminary and a chamber of commerce. Its industries embrace iron- works, tanneies and the manufacture of cigars. Owing to its beautiful surroundings Dillenburg has become a favourite summer resort.

DILLENS, J U LI EN (1849-1904), Belgian sculptor, was born at Antwerp on the 8th of June 1849, son of a painter. He studied under Eugene Simonis at the Brussels Academy of Fine Arts. In 1877 he received- the prix de Rome f or " A Gaulish Chief taken Prisoner by the Romans." At Brussels, in 1881, he executed the groups entitled " Justice " and " Herkenbald, the Brussels Brutus." For the pediment of the orphanage at Uccle, " Figure Kneeling" (Brussels Gallery), and

the statue of the lawyer Metdepenningen in front of the Palais de Justice at Ghent, he was awarded the medal of honour in 1889 at the Paris Universal Exhibition, where, in 1900, his " Two Statues of the Anspach Monument" gained him a similar distinction. For the town of Brussels he executed " The Four Continents " (Maison du Renard, Grand' Place), " The Lansquenets " crowning the lucarnes of the Maison de Roi, and the " Monument t' Serclaes " under the arcades of the Maison de l'Etoile, and, for the Belgian govern- ment, " Flemish Art," " German Art," " Classic Art " and " Art applied to Industry " (all in the Palais des Beaux Arts, Brussels), " The Laurel " (Botanic Garden, Brussels), and the statue of " Bernard van Orley " (Place du petit Sablon, Brussels) . Mention must also be made of " An Enigma " (1876), the bronze busts of " Rogier de la Pasture" and " P. P. Rubens " (1879) , " Etruria " (1880), " The Painter Leon Frederic " (1888), " Madame Leon Herbo," " Hermes," a scheme of decoration for the ogival facade of the hdtel de ville at Ghent (1893), " The Genius of the Funeral Monument of the Moselli Family," " The Silence of Death " (for the entrance of the cemetery of St Gilles), two caryatides for the town hall of St Gilles, presentation plaquette to Dr Heger, medals of MM. Godefroid and Vanderkindere and of " The Three Burgomasters of Brussels," and the ivories " Allegretto," "Minerva" and the " Jamaer Memorial." Dillens died at Brussels in November 1904.

DILLINGEN, a town of Germany, in the kingdom of Bavaria, on the left bank of the Danube, 25 m. N.E. from Ulm, on the railway to Ingolstadt. Pop. (1905) 6078. Its principal buildings are an old palace, formerly the residence of the bishops of Augsburg and now government offices, a royal gymnasium, a Latin school with a library of 75,000 volumes, seven churches (six Roman Catholic), two episcopal seminaries, a Capuchin monastery, a Franciscan convent and a deaf and dumb asylum. The university, founded in 1549, was abolished in 1804, being converted into a lyceum. The inhabitants are engaged in cattle- rearing, the cultivation of corn, hops and fruit, shipbuilding and the shipping trade, and the manufacture of cloth, paper and cutlery. In the vicinity is the Karolinen canal, which cuts off a bend in the Danube between Lauingen and Dillingen. In 1488 Dillingen became the residence of the bishops of Augsburg; was taken by the Swedes in 1632 and 1648, by the Austrians in 1702, and on the 17th of June 1800 by the French. In 1803 it passed to Bavaria.

DILLMANN, CHRISTIAN FRIEDRICH AUGUST (1823-1894), German orientalist and biblical scholar, the son of a Wurttemberg schoolmaster, was born at Illingen on the 25th of April 1823. He was educated at Tubingen, where he became a pupil and friend of

Heinrich Ewald, and studied under F. C. Baur, though he did not join the new Tubingen school. For a short time he worked as pastor at Gersheim, near his native place, but he soon came to feel that his studies demanded his whole time. He devoted him- self to the study of Ethiopic MSS. in the libraries of Paris, London and Oxford, and this work caused a revival of Ethiopic study in the 19th century. In 1847 and 1848 he prepared catalogues of the Ethiopic MSS. in the British Museum and the Bodleian library at Oxford. He then set to work upon an edition of the Ethiopic bible. Returning to Tubingen in 1848, in 1853 he was appointed professor extraordinarius. Subsequently he became

professor of philosophy at Kiel (1854), and of theology at Giessen (1864) and Berlin (1869). He died on the 4th of July 1894.

In 1851 he had published the Book of Enoch in Ethiopian (German, 1853), and at Kiel he completed the first part of the Ethiopic bible, Octateuchus Aethiopicus (1853-1855). In 1857 appeared his Grammatik der dthiopischen Sprache (2nd ed. by C. Bezold, 1899); in 1859 the Book of Jubilees; in 1861 and 1871 another part of the Ethiopic bible, Libri Regum ; in 1865 his great Lexicon linguae aethiopicae; in 1866 his Chrestomathia aethiopica. Always a theologian at heart, however, he returned to theology in 1864. His Giessen lectures were published under the titles, Ur sprung der alttestamentlichen Religion (1865) and Die Propheten des alien Bundes nach ihrer politischen Wirksamkeit (1868). In 1869 appeared his Commentar zum Hiob (4th ed. 1891) which stamped him as one of the foremost Old Testament exegetes. His renown as a theologian, however, was mainly founded by the series of commentaries, based on those of August Wilhelm Knobels' Genesis (Leipzig, 1875; 6th ed. 1892; Eng. trans, by W. B. Stevenson, Edinburgh, 1897); Exodus und Leviticus, 1880, revised edition by V. Ryssel, 1897; Numeri, Deuleronomium und Josua, with a dissertation on the origin of the Hexateuch, 1886; Jesaja, 1890 (revised edition by Rudolf Kittel in 1898). In 1877 he published the Ascension of Isaiah in Ethiopian and Latin. He. was also a contributor to D. Schenkel's Bibellexikon, Brockhaus's Conversationslexikon, and Herzog's Realencyklopddie. His lectures on Old Testament theology, Vorlesungen iiber Theologie des Allen Teslamenles, were published by Kittel in 1895.

See the articles in Herzog-Hauck, Realencyklopddie, and the Allgemeine deutsche Biographie; F. Lichtenberger, History of German Theology in the Nineteenth Century (1889); Wolf Baudissin, A. Dillmann (Leipzig, 1895).

DILLON, ARTHUR RICHARD (1721-1807), French arch- bishop, was the son of Arthur Dillon (1670-1733), an Irish gentleman who became general in the French service. He was born at St Germain, entered the priesthood and was successively cure of Elan near Mezieres, vicar-general of Pontoise (1747), bishop of Evreux (1753) and archbishop of Toulouse (1758), archDishop of Narbonne in 1763, and in that capacity, president of the estates of Languedoc. He devoted himself much less to the spiritual direction of his diocese than to its temporal welfare, carrying out many works of public utility, bridges, canals, roads, harbours, &c. ; had chairs of chemistry and of physics created at Montpellier and at Toulouse, and tried to reduce the poverty, especially in Narbonne. In 1 787 and in 1 788 he was a member of the Assembly of Notables called together by Louis XVI. , and in 1788 presided over the assembly of the clergy. Having refused to accept the civil constitution of the clergy, Dillon had to leave Narbonne in 1790, then to emigrate to Coblenz in 1791. Soon afterwards he went to London, where he lived until his death in 1807, never accepting the Concordat, which had suppressed his archiepiscopal see.

See L. Audibret, Le Dernier President des Utats du Languedoc, Mgr. Arthur Richard Dillon, archevique de Narbonne (Bordeaux, 1868); L. de Lavergne, Les Assemblies provinciales sous Louis XVI (Paris, 1864).

DILLON, JOHN (1851-), Irish nationalist politician, was the son of John Blake Dillon (1816-1866), who sat in parliament for Tipperary, and was one of the leaders of " Young Ireland." John Dillon was educated at the Roman Catholic university of Dublin, and afterwards studied medicine. He entered parliament in 1880 as member for Tipperary, and was at first an ardent supporter of C. S. Parnell. In August he delivered a speech on the Land League at Kildare which was characterized as " wicked and cowardly " by W. E. Forster; he advocated boycotting, and was arrested in May 1881 under the Coercion Act, and again after two months of freedom in October. In 1883 he resigned his seat for reasons of health, but was returned unopposed in 1885 for East Mayo, which he continued to represent. He was one of the prime movers in the famous " plan of campaign," which provided that the tenant should pay his rent to the National League instead of the landlord, and in case of eviction be

supported by the general fund. Mr Dillon was compelled by the court of queen's bench on

the 14th of December 1886 to find securities for good behaviour, but two days later he was arrested while receiving rents on Lord Clanricarde's estates. In this instance the jury disagreed, but in June 1888 under the provisions of the new Criminal Law Procedure Bill he was condemned to six months' imprisonment. He was, however, released in September, and in the spring of 1889 sailed for Australia and New Zealand, where he collected funds for the Nationalist party. On his return to Ireland he was again arrested, but, being allowed bail, sailed to America, and failed to appear at the trial. He returned to Ireland by way of Boulogne, where he and Mr W. O'Brien held long and indecisive conferences with Parnell. They surrendered to the police in February, and on their release from Galway gaol in July declared their opposition to Parnell. After the expulsion of Mr T. M. Healy and others from the Irish National Federation, Mr Dillon became the chair- man (February 1896). His early friendship with Mr O'Brien gave place to considerable hostility, but the various sections of the party were ostensibly reconciled in 1900 under the leadership of Mr Redmond. In the autumn of 1896 he arranged a conven- tion of the Irish race, which included 2000 delegates from various parts of the world. In 1897 Mr Dillon opposed in the House the Address to Queen Victoria on the occasion of the Diamond Jubilee, on the ground that her reign had not been a blessing to Ireland, and he showed the same uncompromising attitude in 1 90 1 when a grant to Lord Roberts was under discussion, accusing him of " systematized inhumanity." He was suspended on the 20th of March for violent language addressed to Mr Chamberlain. He married in 1895 Elizabeth (d. 1907), daughter of Lord Justice J. C. Mathew.

DILUVIUM (Lat. for "deluge," from diluere, to wash away), a term in geology for superficial deposits formed by flood-like operations of water, and so contrasted with alluvium (q.v.) or alluvial deposits formed by slow and steady aqueous agencies. The term was formerly given to the " boulder clay " deposits, supposed to have been caused by the Noachian deluge.

DIME (from the Lat. decima, a tenth, through the O. Fr. disme), the tenth part, the tithe paid as church dues, or as tribute to a temporal power. In this sense it is obsolete, but is found in Wycliffe's translation of the Bible — " He gave him dymes of alle thingis " (Gen. xiv. 20). A dime is a silver coin of the United States, in value 10 cents (English equivalent about sd.) or one- tenth of a dollar; hence " dime-novel," a cheap sensational novel, a "penny dreadful";

also "dime-museum."

DIMENSION (from Lat. dimensio, a measuring), in geometry, a magnitude measured in a specified direction, i.e. length, breadth and thickness; thus a line has only length and is said to be of one dimension, a surface has length and breadth, and has two dimensions, a solid has length, breadth and thickness, and has three dimensions. This concept is extended to algebra: since a line, surface and solid are represented by linear, quadratic and cubic equations, and are of one, two and three dimensions; a biquadratic equation has its highest terms of four dimensions, and, in general, an equation in any number of variables which has the greatest sum of the indices of any term equal to n is said to have n dimensions. The " fourth dimension " is a type of non- Euclidean geometry, in which it is conceived that a " solid " has one dimension more than the solids of experience. For the dimensions of units see Units, Dimensions op.

DIMITY, derived from the Gr. 51/uros " double thread," through the Ital. dimito, " a kind of course linzie-wolzie " (Florio, 161 1); a cloth commonly employed for bed upholstery and curtains, and usually white, though sometimes a pattern is printed on it in colours. It is stout in texture, and woven in raised patterns.

DINAJPUR, a town (with a population in 1901 of 13,430) and district of Britsh India, in the Rajshahi division of Eastern Bengal and Assam. The earthquake of the 12th of June 1897 caused serious damage to most of the public buildings of the town. There is a railway station and a government high school. The district comprises an area of 3946 sq. m. It is traversed in every direction by a network of channels and water courses. Along the banks of the Kulik river, the undulating ridges and long lines of

mango-trees give the landscape a beauty which is not found elsewhere. Dinajpur forms part of the rich arable tract lying between the Ganges and the southern slopes of the Himalayas. Although essentially a fluvial district, it does not possess any river navigable throughout the year by boats of 4 tons burden. Rice forms the staple agricultural product. The climate of the district, although cooler than that of Calcutta, is very unhealthy, and the people have a sickly appearance. The worst part of the year is at the close of the rains in September and October, during which months few of the natives

escape fever. The average maximum tempera- ture is 92-3° F., and the minimum 74-8°. The average rainfall is 85-54 in. In 1901 the population was 1,567,080, showing an increase of 6 % in the decade. The district is partly traversed by the main line of the Eastern Bengal railway and by two branch lines. Save between 1404 and 1442, when it was the seat of an independent raj, founded by Raja Ganesh, a Hindu turned Mussulman, Dinajpur has no separate history. Pillars and copper-plate inscriptions have yielded numerous records of the Pal kings who ruled the country from the 9th century onwards, and the district is famous for many other antiquities, some of which are connected by legend with an immemorial past (see Reports, Arch. Survey of India, xv.; Epigraphia Indica, ii.).

DINAN, a town of north-western France, capital of an arrondissement in the department of C6tes-du-Nord, 37 rh. E. of St Brieuc on the Western railway. Pop. (1906) 8588. Dinan is situated on a height on the left bank of the Ranee (here canalized) , some 17 m. above its mouth at St Malo, with which it com- municates by means of small steamers. It is united to the village of Lanvallay on the right bank of the river by a granite viaduct 130 ft. in height. The town is almost entirely encircled by the ramparts of the middle ages, strengthened at intervals by towers and defended on the south by a castle of the late 14th century, which now serves as prison. ‘ Three old gateways are also pre- served. Dinan has two interesting churches; that of St Malo, of late Gothic architecture, and St Sauveur, in which the Roman- esque and Gothic styles are intermingled. In the latter church a granite 1 monument contains the heart of Bertrand Du Guesclin, whose connexion with the town is also commemorated by an equestrian statue. The quaint winding streets of Dinan are often bordered by medieval houses. Its picturesqueness attracts large numbers of visitors and there are many English residents in the town and its vicinity. About three-quarters of a mile from the town are the ruins of the chateau and the Benedictine abbey at Lehon; near the neighbouring village of St Esprit stands the large lunatic asylum of Les Bas Foins, founded in 1836; and at no great distance is the now dismantled chateau of La Garaye, which was rendered famous in the 18th century by the philan- thropic devotion of the count and countess whose story is told in Mrs Norton’s Lady of La Garaye. Dinan is the seat of a sub-prefect and has a tribunal of first instance, and a communal college. There is trade in grain, cider, wax, butter and other agricultural products. The industries include the manufacture of leather, farm-implements and canvas.

The principal event in the history of Dinan, which was a strong- hold

of the dukes of Brittany, is the siege by the English under the duke of Lancaster in 1359, during which Du Guesclin and an English knight called Thomas of Canterbury engaged in single combat.

DINANT, an ancient town on the right bank of the Meuse in the province of Namur, Belgium, connected by a bridge with the left bank, on which are the station and the suburb of St Medard. Pop. (1904) 7674. The name is supposed to be derived from Diana, and as early as the 7th century it was named as one of the dependencies of the bishopric of Tongres. In the 10th century it passed under the titular sway of Liege, and remained the fief of the prince-bishopric till the French revolution put an end to that survival of feudalism. In the middle of the 1 5th century Dinant reached the height of its prosperity. With a population of 60,000, and 8000 workers in copper, it was one of the most flourishing cities in Walloon Belgium- until it incurred the wrath of Charles the Bold. Belief in the strength of its walls and of the castle that occupied the centre bridge, thus effectually command-

ing navigation by the river, engendered arrogance and over-confidence, and the people of Dinant thought they could defy the full power of Burgundy. Perhaps they also expected aid from France or Liege. In 1466 Charles, in his father's name, laid siege to Dinant, and on the 27th of August carried the place by storm. He razed the walls and allowed the women, children and priests to retire in safety to Liege, but the male prisoners he either hanged or drowned in the river by causing them to be cast from the projecting cliff of Bouvignes. In 1675 the capture of Dinant: formed one of the early military achievements of Louis XIV., and it remained in the hands of the French for nearly thirty years after that date. The citadel on the cliff, 300 ft. or 408 steps above the town, was fortified by the Dutch in 1818. It is now dis- mantled, but forms the chief curiosity of the place. The views of the river valley from this eminence are exceedingly fine. Half way up the cliff, but some distance south of the citadel, is the grotto of Montfat, alleged to be the site of Diana's shrine. The church of Notre Dame, dating from the 13th century, stands immediately under the citadel and flanking the bridge. It has been restored, and is considered by some authorities, although others make the same claim on behalf of Huy, the most complete specimen in Belgium of pointed Gothic architecture. The baptismal fonts date from the 12th century, and the curious spire in the form of an elongated pumpkin and covered with slates gives a fantastic and original appearance to the whole edifice. The present prosperity of Dinant is chiefly derived from its being a favourite summer resort for Belgians as well as foreigners. It has facilities for beating and

bathing as well as for trips by steamer up and down the river Meuse. It is also a convenient central point for excursions into the Ardennes. Although there are some indications of increased industrial activity in recent years, the population of Dinant is not one-eighth of what it was at the time of the Burgundians.

DINAPUR, a town and military station of British India, in the Patna district of Bengal, on the right bank of the Ganges, 12 m. W. of Patna city by rail. Pop. (1901) 33,699. It is the largest military cantonment in Bengal, with accommodation for two batteries of artillery, a European and a native infantry regiment. In 1857 the sepoy garrison of the place initiated the mutiny of that year in Patna district, but after a conflict with the European troops were forced to retire from the town, and subsequently laid siege to Arrah.

DINARCHUS, last of the " ten " Attic orators, son of Sostratus (or, according to Suidas, Socrates), born at Corinth about 361 ' B.C. He settled at Athens early in life, and when not more than twenty-five was already active as a writer of speeches for the law courts. As an alien, he was unable to take part in the debates. He had been the pupil both of Theophrastus and of Demetrius Phalereus, and had early acquired a certain fluency and versa- tility of style. In 324 the Areopagus, after inquiry, reported that nine men had taken bribes from Harpalus, the fugitive treasurer of Alexander. Ten public prosecutors were appointed. Dinarchus wrote, for one or more of these prosecutors, the three speeches which are still extant — Against Demosthenes, Against Aristogeiton, Against Philocles. The sympathies of Dinarchus were in favour of an Athenian oligarchy under Macedonian control; but it should be remembered that he was not an Athenian citizen. Aeschines and Demades had no such excuse. In the Harpalus affair, Demosthenes was doubtless innocent, and so, probably, were others of the accused. Yet Hypereides, the most fiery of the patriots, was on the same side as Dinarchus.

Under the regency of his old master, Demetrius Phalereus, Dinarchus exercised much political influence. The years 3 1 7-307 were the most prosperous of his life. On the fall of Demetrius Phalereus and the restoration of the democracy by Demetrius Poliorcetes, Dinarchus was condemned to death and withdrew into exile at Chalcis in Euboea. About 292, thanks to his friend Theophrastus, he was able to return to Attica, and took up his abode in the country with a former associate, Proxenus. He afterwards brought an action against Proxenus on the ground that he had robbed him of some money and plate. Dinarchus died at Athens about 291.

According to Suidas, Dinarchus wrote 160 speeches; and Dionysius held that, out of 85 extant speeches bearing his name, 58 were genuine, — 28 relating to public, 30 to private causes. Although the authenticity of the three speeches mentioned above is generally admitted, Demetrius of Magnesia doubted that of the speech Against Demosthenes, while A. Westermann rejected all three. Dinarchus had little individual style and imitated by turns Lysias, Hypereides and Demosthenes. He is called by Hermogenes d KpiBwos kqiuxjdkirris, a metaphor taken from barley compared with wheat, or beer compared with wine, — a Demosthenes whose strength is rougher, without flavour or sparkle.

Editions: (text and exhaustive commentary) E. Matzner (1842); (text) T. Thalheim (1887), F. Blass (1888); see L. L. Forman, Index Andocideus, Lycurgeus, Dinarcheus (1897); and, in general, F. Blass, Attische Beredsamkeit, iii. There is a valuable treatise on the life and speeches of Dinarchus by Dionysius of Halicarnassus.

DINARD, a seaside town of north-western France, in the department of Ille-et-Vilaine. The town, which is the chief watering-place of Brittany, is situated on a rocky promontory at the mouth of the Kance opposite St Malo, which is about 1 m. distant. It is a favourite resort of English and Americans as well as of the French, its attractions being the beauty of its situation, the mildness of the climate and the good bathing. It has two casinos and numerous luxurious hotels and elegant villas. Together with the adjoining watering-place of St Enogat, Dinard has a population of 4882 (1906).

DINDIGUL, a town of British India, in the Madura district of Madras, 880 ft. above the sea, 40 m. from Madura by rail. Pop. (1901) 25,182. Dindigul has risen into importance as the centre of a trade in tobacco and manufacture of cigars, which are exported to England. There are two large European cigar factories here. The town has manufactures of silk, muslin and blankets, and an export trade in hides and cardamoms; and there is a large native Christian population, with two churches. The ancient fort, well preserved, stands on a rock rising 350 ft. above the town; this was formerly a position of great strategic importance, commanding passes into Madura from Coimbatore, and figured prominently in the military operations of the Mahrattas in the 17th and 18th centuries, and of

Hyder Ali in 1755 seq., being thrice captured by the British (1767, 1783, 1790). After the two first captures it was restored to Hyder Ali under treaty; after the third it was ceded to the East India Company.

DINDORF, KARL WILHELM (1802-1883), German classical scholar, was born at Leipzig on the 2nd of January 1802. From his earliest years he showed a strong taste for classical studies, and after completing F. Invernizi's edition of Aristophanes at an early age, and editing several grammarians and rhetoricians, was in 1828 appointed extraordinary professor of literary history in his native city. Disappointed at not obtaining the ordinary professorship when it became vacant in 1833, he resigned his post in the same year, and devoted himself entirely to study and literary work. His attention had at first been chiefly given to Athenaeus, whom he edited in 1827, and to the Greek dramatists, all of whom he edited separately and combined in his Poetae scenici Graeci (1830 and later editions). He also wrote a work on the metres of the Greek dramatic poets, and compiled special lexicons to Aeschylus and Sophocles. He edited Procopius for Niebuhr's Corpus of the Byzantine writers, and between 1846 and 1851 brought out at Oxford an important edition of Demosthenes; he also edited Lucian and Josephus for the Didot classics. His last important editorial labour was his Eusebius of Caesarea (1867-1871). Much of his attention was occupied by the re- publication of Stephanus's Thesaurus (Paris, 1831-1865), chiefly executed by him and his brother Ludwig, a work of prodigious labour and utility. His reputation suffered somewhat through the imposture practised upon him by the Greek Constantine Simonides, who succeeded in deceiving him by a fabricated fragment of the Greek historian Uranius. The book was printed, and a few copies had been circulated, when the forgery was discovered, just in time to prevent its being given to the world under the auspices of the university of Oxford. Shortly after the

death of his brother, he lost all his property and his library by rash speculations. He died on the 1st of August 1883.

His brother Ludwig (1805-1871) was born at Leipzig on the 3rd of January 1805, and died thereon the 6th of September 187 1. He never held any academical position, and led so secluded a life that many doubted his existence, and declared that he was a mere pseudonym. The important share which he took in the edition of the Thesaurus is nevertheless authenticated by his own signature to his contributions. He also published valuable editions of Polybius, Dio Cassius and other Greek historians.

D'INDY, PAUL-MARIE-THEODORE-VINCENT (1851-), French musical composer, was born in Paris, on the 27th of March 1 8 5 1 . He studied composition and the organ at the Paris Conser- vatoire under Cesar Franck, and obtained the grand prize offered by the city of Paris in 1885 with Le Chant de la Cloche, a dramatic legend after Schiller. His principal works, beside the above, are the symphonic trilogy Wallenslein, the symphonic works entitled Saugefleurie, La Forlt enchantee, Istar, Symphonie sur un air montagnard franqais; overture to Anthony and Cleopatra; Ste Marie Magdeleine, a cantata; Attendez-moi sous I'orme, a one-act opera; Fervaal, a musical drama in three acts. Vincent dTndy is perhaps the most prominent among the disciples of Cesar Franck. Imbued with very high aims, he was always guided by a lofty ideal, and few musicians have attained so complete a mastery over the art of instrumentation. His music, however, lacks simplicity, and can never become popular in the widest sense. His opera Fervaal, which is styled " action musicale," is constructed upon the system of Leit-motifs. Its legendary subject recalls both Parsifal and Tristan, and the music is also suggestive of Wagnerian influence. DTndy can scarcely be considered so typical a representative of modern French music as his juniors Alfred Bruneau, the composer of Le R&oe, L'Attaque du moulin, Messidor, or Gustave Charpentier, the author of Louise, who chose subjects of modern life for their operatic works.

DINEIR, a small town in Asia Minor, built amidst the ruins of Celaenae-Apamea, near the sources of the Maeander (Menderes). It is the terminus of the Smyrna-Aidin-Dineir railway. Pop. 1400. (See Apamea.)

DINGELSTEDT, FRANZ VON (1814-1881), German poet and dramatist, was born at Halsdorf , in Hesse Cassel, on the 30th of June 1814. Having studied at the university of Marburg, he became in 1836 a master at the Lyceum in Cassel; from which he was transferred to Fulda in 1838. In 1839 he produced a novel, Unter der Erde, which obtained considerable success, and in 1841 published the book by which he is best remembered, the Lieder eines kosmopolitischen Nachtwiichters. These poems, animated as they are by a spirit of bitter opposition to everything that savours of despotism, were an effective contribution to the political poetry of the day. The popularity of this book determined Dingelstedt to take up a literary career, and in 1841 he obtained an appointment on the staff of the Augsburger allgemeine Zeitung. In 1843, however, the satirist of German princes accepted, to the general surprise, the appointment of private librarian to the king of Wurttemberg, and in the same year he married the celebrated Bohemian opera singer,

Jenny Lutzer. In 1845 he published a volume of poems, some of which, treating of modern life, possessed great literary rather than strictly poetical merit. A subsequent collection, published in 1852, attracted little attention. The success of his tragedy Das Haus der Barneveldt (1850) obtained for him the position of intendant at the court theatre at Munich, where he soon became the centre of literary society. He incurred, however, the animosity of the Jesuit clique at the court, and in 1856 was suddenly dismissed on the most frivolous charges. A similar position was offered to him at Weimar through the influence of Liszt, and he remained there until 1867. His administration was most successful, and he especially distinguished himself by presenting all Shakespeare's historical plays upon the stage in an.unbroken cycle. In 1867 he became director of the court opera house in Vienna, and in 1872 of the Hofburgtheater, a position he held until his death on the 15th of May 1881. Among his other works may be noticed an autobiographical sketch of his Munich career, entitled Miinchener

Bilderbogen (1879), Die Amazone, an art novel of considerable merit (1869), translations of several of Shakespeare's comedies, and several writings dealing with questions of practical drama- turgy. He was ennobled in 1867 by the king of Bavaria and in 1876 was created Freiherr by the emperor of Austria.

Dingelstedt's Samtliche Werke appeared in 12 vols. (1877-1878), but this edition is far from complete. On his life see, besides the autobiography mentioned above, J. Rodenberg, Heimaterinnerungen an F. Dingelstedt (Berlin, 1882), and by the same author, F. Dingel- sledt, Blatter aus seinem Nachlass (2 vols., 1891). Also an essay by A. Stern in Zur Literatur der Gegenwart (Leipzig, 1880).

DINGHY, or Dingey (from the Hindu dengi a small boat, the diminutive of denga, a sloop or coasting vessel), a boat of greatly varying size and shape, used on the rivers of India; the term is applied also, in certain districts, to a larger boat used for coasting purposes. The name was adopted by the merchantmen trading with India, and is now generally used to designate the small extra boat kept for general purposes on a man-of-war or merchant vessel, and also, on the Thames, for small pleasure boats built for one or two pairs of sculls.

DINGLE, a seaport and market town of county Kerry, Ireland, in the west parliamentary division, the terminus of the Tralee and Dingle railway. Pop. (1901) 1786. This may be considered the most westerly town in the United Kingdom unless Knightstown at Valencia Island be excepted: it lies on the south side of the northernmost of the great promontories which pro- trude into the Atlantic on the south-western coast of Ireland, on the fine natural harbour of Dingle Bay, in a wild hilly district abundant in relics of antiquity. The town, which is the centre of a considerable fishing industry, especially in mackerel, was in the 1 6th century of no little importance as a seaport; it had also a noted manufacture of linen. It was incorporated by Queen Elizabeth, and returned two members to the Irish parliament until the Union.

DINGO, a name applied apparently by Europeans to the warrigal, cr native Australian dog. the Canis dingo of J. F. Blumenbach. The dingo is a stoutly-built, rather short-legged, sandy-coloured dog, intermediate in size between a jackal and a wolf, and measuring about 51 in. in total length, of which the tail takes up about eleven. In general appearance it is very like some of the pariah dogs of India and Egypt; and, except on distributional grounds, there is no reason for regarding it as specifically distinct from such breeds. Dingos, which are found both wild and tame, interbreed freely with European dogs in- troduced into the country, and it may be that the large amount of black on the back of many specimens may be the result of crossing of this nature.

The main point of interest connected with the dingo relates to its origin ; that is to say, whether it is a member of the indigenous Australian fauna (among which it is the only large placental mammal), or whether it has been introduced into the country by man. There seems to be no doubt that fossilized remains of the dingo occur intermingled with those of the extinct Australian mammals, such as giant kangaroos, giant wombats and the still more gigantic Diprotodon. And since remains of man have apparently not yet been detected in these deposits, it has been thought by some naturalists that the dingo must be an indigenous species. This was the opinion of Sir Frederick McCoy, by whom the deposits in question were regarded as probably of Pliocene age. A similar view is adopted by D . Ogilvy in a Catalogue of A ustralian Mammals, published at Sydney in 1892; the writer going how- ever one step further and expressing the belief that the dingo is the ancestor of all domesticated dogs. The latter contention cannot for a moment be sustained; and there are also strong arguments against the indigenous origin of the dingo. That the animal now occurs in a wild state is no argument whatever

as to its being indigenous, seeing that a domesticated breed introduced by man into a new country abounding in game would almost certainly revert to the wild state. The apparent absence of human remains in the beds yielding dingo teeth and bones (which are almost certainly not older than the Pleistocene) is of only negative value, and liable to be upset by new discoveries. Then, again (as has been pointed out by R. I. Pocock in the first part of

the Kennel Encyclopaedia, 1907), the absence of any really wild species of the typical group of the genus Canis between Burma and Siam on the one hand and Australia on the other is a very strong argument against the dingo being indigenous, seeing that, whether brought by man or having travelled thither of its own accord, the dingo must have reached its present habitat by way of the Austro-Malay archipelago. If it had followed that route in the course of nature, it is inconceivable that it would not still be found on some portions of the route. On the supposition that the dingo was introduced by man, we have now fairly decisive evidence that the native Australian, in place of being (as formerly supposed) a member of the negro stock, is a low type of Caucasian allied to the Veddahs of Ceylon and the Toalas of Celebes. Consequently the Australian natives must be presumed to have reached the island-continent by way of Malaya; and if this be admitted, nothing is more likely than that they should have been accompanied by pariah dogs of the Indian type. Confirmation of this is afforded by the occurrence in the mountains of Java of a pariah-like dog which has reverted to an almost completely wild condition; and likewise by the fact that the old voyagers met with dogs more or less similar to the dingo in New Guinea, New Zealand and the Solomon and certain other of the smaller Pacific islands. On the whole, then, the most probable explanation of the case is that the dingo is an introduced species closely allied to the Indian pariah dog. Whether the latter represents a truly wild type now extinct, cannot be determined. If so, all pariahs should be classed with the Australian warrigal under the name of Canis dingo. If, on the other hand, pariahs, and consequently the dingo, cannot be separated specifically from the domesticated dogs of western Europe, then the dingo should be designated Canis familiaris dingo. (R. L.)*

DINGWALL, a royal and police burgh and county town of the shire of Ross and Cromarty, Scotland. Pop. (1901) 2519. It is situated near the head of Cromarty Firth where the valley of the Peffery unites with the alluvial lands at the mouth of the Conon, i8| m. N.W. of Inverness by the Highland railway. Its name, derived from the Scandinavian Thingvollr, " field or meeting- place of the thing," or

local assembly, preserves the Norse origin of the town; its Gaelic designation is Inverpefferon," the mouth of the Peffery." The 18th-century town house, and some remains of the ancient mansion of the once powerful earls of Ross still exist. There is also a public park. An obelisk, 57 ft. high, was erected over the grave of the 1st earl of Cromarty. The town belongs to the Wick district group of parliamentary burghs. It is a flourishing distributing centre and has an important corn market and auction marts. Some shipping is carried on at the harbour at the mouth of the Peffery, about a mile below the burgh. Branch lines of the Highland railway run to Strathpeffer and to Strome Ferry and Kyle of Lochalsh (for Skye). Alexander II. created Dingwall^a royal borough in 1226, and its charter was renewed by James IV. On the top of Knockfarrel (Gaelic, cnoc, hill; faire, watch, or guard), a hill about 3 m. to the west, is a large and very complete vitrified fort with ramparts.

DINKA (called by the Arabs Jange), a widely spread negro people dwelling on the right bank of the White Nile to about 12° N., around the mouth of the Babr-el-Ghazal, along the right bank of that river and on the banks of the lower Sobat. Like the Shilluk, they were greatly harried from the north by Nuba- Arabic tribes, but remained comparatively free owing to the vast extent of their country, estimated to cover 40,000 sq. m., and their energy in defending themselves. They are a tall race with skins of almost blue black. The men wear practically no clothes, married women having a short apron, and unmarried girls a fringe of iron cones round the waist. They tattoo themselves with tribal marks, and extract the lower incisors; they also pierce the ears and lip for the attachment of ornaments, and wear a variety of feather, iron, ivory and brass ornaments. Nearly all shave the head, but some give the hair a reddish colour by moistening it with animal matter. Polygamy is general; some headmen have as many as thirty or more wives; but six is the average number. They are great cattle and sheep breeders; the men tend their beasts with great devotion, despising agriculture,

which is left to the women; the cattle are called by means of drums. Save under stress of famine cattle are never killed for food, the people subsisting largely on durra. The Dinkas reverence the cow, and snakes, which they call " brothers." Their folklore recognizes a good and evil deity; one of the two wives of the good deity created man, and the dead go to live with him in a great park filled with

animals of enormous size. The evil deity created cripples. The Dinka came, in 1899, under the control of the Sudan government, justice being administered as far as possible in accord with tribal custom. A compendium of Dinka laws was compiled by Captain H. D. E. O'Sullivan.

See G. A. Schweinfurth, The Heart of Africa (1874); W. Junker, Travels in Africa, Eng. edit. (London, 1890-1892); The Anglo-Egyptian Sudan, edited by Count Gleichen (London, 1905).

DINKELSBUHL, a town of German}', in the kingdom of Bavaria, on the Wornitz, 16 m. N.from Nordlingen, on the rail- way to Dombuhl. Pop. 5000. It is an interesting medieval town, still surrounded by old walls and towers, and has an Evangelical and two Roman Catholic churches. Notable is the so-called Deutsches Haus, the ancestral home of the counts of Drechsel- Deufstetten, a fine specimen of the German renaissance style of wooden architecture. There are a Latin and industrial school, several benevolent institutions, and a monument to Christoph von Schmid (1768-1854), a writer of stories for the young. The inhabitants carry on the manufacture of brushes, gloves, stock- ings and gingerbread, and deal largely in cattle.

Fortified by the emperor Henry I., Dinkelsbiihl received in 1305 the same municipal rights as Ulm, and obtained in 1351 the position of a free imperial city, which it retained till 1802, when it passed to Bavaria. Its municipal code, the Dinkelsbuhler Recht, published in 1536, and revised in 1738, contained a very extensive collection of public and private laws.

DINNER, the chief meal of the day, eaten either in the middle of the day, as was formerly the universal custom, or in the evening. The word " dine " comes through Fr. from Med. Lat. disnare, for disjejunare, to break one's fast (jejunium); it is, therefore, the same word as Fr. dejeuner, to breakfast, in modern France, to take the midday meal, diner being used for the later repast. The term " dinner-wagon," originally

a movable table to hold dishes, is now used of a two-tier side- board.

DINOCRATES, a great and original Greek architect, of the age of Alexander the Great. He tried to captivate the ambitious fancy of that king with a design for carving Mount Athos into a gigantic seated statue. This plan was not carried out, but Dino- crates designed for Alexander the plan of the new city of Alex- andria, and constructed the vast funeral pyre of Hephaestion. Alexandria was,

like Peiraeus and Rhodes (see Hippodamus), built on a regular plan ; the streets of most earlier towns being narrow and confused.

DINOFLAGELLATA, so called by O. Butschli (= the Cilio- flagellata of E. Claparide and . . H. Lachmann), a group of Pro- large "sack pusule" discharging tozoa> characterized as Mastigo-

" c r onfctfve U pusui y e P dTscharging Ph° ra > Provided with two flagella, at 0, and surrounded by a ring the one anterior extended in loco- of formative " or " daughter motion, the other coiled round pusules"; n, nucleus. j ts b ase> or lyj n g j n a transverse

groove. The body is bounded by a firm pellicle, often supple- mented by an armour (" lorica ") of cuticular cellulose plates, with usually a marked longitudinal groove from which the anterior flagellum springs, and an oblique or spiral transverse

After F. Schiitt in Engler and Prantl's Pflanzcnfatniiien, by permission of Wm. Engelmann.

Fig. 1 . — Peridinium divergens showing longitudinal and trans- verse grooves in which lie the respective flagella l.f., t.f.; s.p.,

groove for the second flagellum. In Polykrikos (fig. 2, 9) there are eight transverse grooves each with its flagellum. The armour-plates are often exquisitely sculptured, and may be produced into spines or perpendicular plates to give greater surface extension, as we find in other plankton organisms. The cortical plasma may protrude pseudopodia in the longi- tudinal groove; it contains trichocysts in several species, true nematocysts in Polykrikos. It contains chromatophores in many species, coloured by a mixed lipochrome pigment which

Fig. 2.

*From Delate and Herouard*s Traits de zoologie concrHe, by permission of Schleicher Freres.*

1. Modified from Schiitt, Ornitho-

ceras.

2. Diagram of transverse fission

of a Dinoflagellate.

3. After Schiitt, Exuviaeella.

4. After Stein, Prorocentrum.

5, 6. Ceralium, single and series.

7. Pouchetia fusus (Schiitt).

8. Citharistes.

9. After Butschli, Polykrikos.

appears to be distinct from diatomin. The endoplasm is ramified between alveoli; it contains a large nucleus (in Polykrikos there are eight nuclei, accompanied by smaller, more numerous bodies regarded by O. Butschli as micro- nuclei). Besides the other spaces are definite rounded or oval vacuoles with a permanent pellicular wall termed by Schiitt " pusules "; these open by a duct or ducts into the longitudinal groove. They enlarge and diminish, and are possibly excretory like the " contractile vacuoles " of other Protista; though it has been suggested that by their communication with the medium they subserve nutrition. Nutrition is of course holozoic or

saprophytic in the colourless forms, holophytic in the coloured; but these divergent methods are exhibited by different species of the same genus, or even by individuals of one and the same species under different conditions. Binary fission has been widely observed, both in the active condition or after loss of the flagella: it differs from that of true Flagellates in not being longitudinal, but transverse or oblique (fig. 2, 2). Re- peated fission (brood-formation) within a cyst has also been observed, as in Pyrocystis and Ceratium; and possibly the chains of Ceratium and other (fig. 2, 5 and 6) genera are due to the non- separation of the brood-cells. Conjugation of adults has been observed in several species, the most complete account being that of Zederbauer on Ceratium hirundinella (marine): either mate puts forth a tube which meets and opens into that of the other (as in some species of Chlamydomonas and Desmids) ; the two cell-bodies fuse in this tube, and encyst to form a rest- ing zygospore. The Dinoflagellates are relatively large for Mastigophora, many attaining 50 fi (xh>") in length. The majority are marine; but some genera (Ceratium, Peridinium) include fresh-water species. Many are highly phosphorescent and some by their abundance colour the water of the

sea or pool which they dwell in. Like so many coloured Protista, they frequently possess a pigmented " eye-spot " in which may be sunk a spheroidal refractive body ("lens").

The affinities of the Dinoflagellata are certainly with those Cryptomonadine Flagellates which possess two unequal flagella; the zoospores or young of the Cystoflagellates are practically colourless Dinoflagellates.

1. Gymnodiniaceae; body naked, or with a simple cellulose or gelatinous envelope; both grooves present. Pyrocystis (Murray), often encysted, spherical or crescentic, becoming free within cyst wall, and escaping whole or after brood-divisions as a form like Gymnodinium; Gymnodinium (Stein); Hemidinium (Stein); Pouchetia (Schutt) (fig. 2, 7) with complex eye-spot; to this group we may refer Polykrikos (Biitschli) (fig. 2, 9), with its metameric transverse grooves and flagella.

2. Prorocentraceae (Schutt) (=the Adinida of Bergh); body surrounded by a firm shell of two valves without a girdle band ; transverse groove absent; transverse flagellum coiled round base of longitudinal. Exuviaeella (Cienk.) (fig. 2, 3); Prorocentrum (Ehrb.) (fig. 2, 4).

3. Peridiniaceae (Schutt) ; body with a shell of plates, a girdle band along the transverse groove, in which the transverse flagellum lies. Genera, Peridinium (Ehrb.) (fig. i), fresh-water and marine; Ceratium (Schrank) (fig. 2, 5, 6), fresh-water and marine; Citharistes (Stein); Ornithoceras (Claparede and Lachmann) (fig. 2, 1).

Literature.— R. S. Bergh, "DerOrganismusder Cilioflagellaten," Morphol. Jahrbuch, vii. (1881); F. von Stein, Organismus der Infusionsthiere, Abth. 3, 2. Halfte; Die Naturgeschichte der arthrodelen Flagellaten (1883); Biitschli, "Mastigophora" (in Bronn's Thierreich, i. Abth. 2), 1881-1887; G. Pouchet, various observations on Dinoflagellates, Journal de I'anatomie et de la physiologie (1885, 1887, 1891); F. Schutt, " Die Peridineen der Plankton Expedition " (Ergebnisse d. PI. Exed. i. Th. vol. iv. 1895); and " Peridiniales " in Engler and Prantl's Pflanzenfamilien, vol. i. Abt. 2 b. (1896); Zederbauer, Berichte d. deutschen botanischen Gesellsckaft, vol. xx. (1900) ; Delage and Herouard, TraitS de zoologie concrete, vol. i. La Cellule et les protozoaires (1896). (M. Ha.)

DINOTHERIUM, an extinct mammal, fossil remains of which occur

in the Miocene beds of France, Germany, Greece and Northern India. These consist chiefly of teeth and the bones of the head. An entire skull, obtained from the Lower Pliocene beds of Eppelsheim, Hesse-Darmstadt, in 1836, measured 43 ft. in length and 3 ft. in breadth, and indicates an animal exceeding the elephant in size. The upper jaw is apparently destitute of incisor and canine teeth, but possesses five molars on each side, with a corresponding number in the jaw beneath. The most remarkable feature, however, consists in the front part of the lower jaw being bent downwards and bearing two tusk-like incisors also directed downwards and backwards. Dinotherium is a member of the group Proboscidea, of the line of descent of the elephants.

DINWIDDIE, ROBERT (1 693-1 770), English colonial governor of Virginia, was born near Glasgow, Scotland, in 1693. From the position of customs clerk in Bermuda, which he held in 1727-1738, he was promoted to be surveyor-general of the customs " of the southern ports 01 the continent of America," as a reward

for having exposed the corruption in the West Indian customs service. In 1743 he was commissioned to examine into the customs service in the Barbadoes and exposed similar corruption there. In 1751-1758 he was lieutenant-governor of Virginia, first as the deputy of Lord Albemarle and then, from July 1756 to January 1758, as deputy for Lord Loudon. He was energetic in the discharge of his duties, but aroused much animosity among the colonists by his zeal in looking after the royal quit-rents, and by exacting heavy fees for the issue of land-patents. It was his chief concern to prevent the French from building in the Ohio Valley a chain of forts connecting their settlements in the north with those on the Gulf of Mexico; and in the autumn of 1753 he sent George Washington to Fort Le Bceuf, a newly established French post at what is now Waterford, Pennsylvania, with a message demanding the withdrawal of the French from English territory. As the French refused to comply, Dinwiddie secured from the reluctant Virginia assembly a grant of £1 0.000 and in the spring of 1754 he sent Washington with an armed force toward the forks of the Ohio river " to prevent the intentions of the French in settling those lands." In the latter part of May Washington encountered a French force at a spot called Great Meadows, near the Youghiogheny river, in what is now south- 1 western Pennsylvania, and a skirmish followed which precipitated the French and Indian War. Dinwiddie was especially active at this time in urging the co-operation of the colonies against the French in the Ohio Valley; but none of the other governors, except William Shirley of Massachusetts, was then much con- cerned about the

western frontier, and he could accomplish very little. His appeals to the home government, however, resulted in the sending of General Edward Braddock to Virginia with two regiments of regular troops; and at Braddock's call Dinwiddie and the governors of Massachusetts, New York, Pennsylvania and Maryland met at Alexandria, Virginia, in April 1755, arid ; planned the initial operations of the war. Dinwiddie's administra- tion was marked by a constant wrangle with the assembly over money matters; and its obstinate resistance to military appro- priations caused him in 1754 and 1755 to urge the home govern- ment to secure an act of parliament compelling the colonies to raise money for their protection. In January 1758 he left Virginia and lived in England until his death on the 27th of July 1770 at Clifton, Bristol.

The Official Records of Robert Dinwiddie, Lieutenant-Governor of Virginia (1751-1758), published in two volumes, at Richmond, Va., in 1 883-1884, by the Virginia Historical Society, and edited by R. A. Brock, are of great value for the political history of the colonies in this period.

DIO CASSIUS (more correctly Cassius Dio), Cocceianus (c. a.d. 150-235), Roman historian, was born at Nicaea in Bithynia. His father was Cassius Apronianus, governor of Dalmatia and Cilicia under Marcus Aurelius, and on his mother's side he was the grandson of Dio Chrysostom, who had assumed the surname of Cocceianus in honour of his patron the emperor Cocceius Nerva. After his father's death, Dio Cassius left Cilicia for Rome (180) and became a member of the senate. During the reign of Commodus, Dio practised as an' advocate at the Roman bar, and held the offices of aedile and quaestor. He was raised to the praetorship by Pertinax (193), but did not assume office till the reign of Septimius Severus, with whom he was for a long time on the most intimate footing. By Maqrinus he was entrusted with the administration of Pergamum and Smyrna; and on his return to Rome he was raised to the consulship about 220. After this he obtained the proconsulship of Africa, and again on his return was sent as legate successively to Dalmatia and Pannonia. He was raised a second time to the consulship by Alexander Severus, in 229; but on the plea of ill health soon afterwards retired to Nicaea, where he died. Before writing his history of Rome ('Vuiiauci. or 'Pajjuauti) 'Icrropia), Dio Cassius had dedicated to the emperor Severus an account of various dreams and prodigies which had presaged his elevation to the throne (perhaps the 'EvoSto attributed to Dio by Suidas), and had also written a biography I of his fellow-countryman Arrian. The history of Rome, which

consisted of eighty books, — and, after the example of Livy, was divided into decades, — began with the landing of Aeneas in Italy, and was continued as far as the reign of Alexander Severus (222-235). Of this great work we possess books 36-60, contain- ing the history of events from 68 b.c.-a.d. 47; books 36 and 55-60 are imperfect. We also have part of 35 and 36-80 in the epitome of John Xiphilinus, an 11th-century Byzantine monk. For the earlier period the loss of Dio's work is partly supplied by the history of Zonaras, who followed him closely. Numerous fragments are also contained in the excerpts of Constantine Porphyrogenitus. Dio's work is a most important authority for the history of the last years of the republic and the early empire. His industry was great and the various important offices he held afforded him ample opportunities for historical investigation. His style, though marred by Latinisms, is clearer than that of his model Thucydides, and his narrative shows the hand of the practised soldier and politician; the language is correct and free from affectation. But he displays a superstitious regard for miracles and prophecies; he has nothing to say against the arbitrary acts of the emperors, which he seems to take as a matter of course; and his work, although far more than a mere compila- tion, is not remarkable for impartiality, vigour of judgment or critical historical faculty.

The best edition with notes is that of H. S. Reimar (1750-1752), new ed. by F. G. Sturz (1824-1836); text by I. Melber (1890 foil.), with account of previous editions, and U. P. Boissevain (1895-1901) ; translation by H. B. Foster (Troy, New York, 1905 foil.), with full hibliography ; see also W. Christ, Geschichte der griechischen Litteratur (1898), p. 675; E. Schwartz in Pauly-Wissowa's Realencyclopddie, iii. pt. 2 (1899) ; C. Wachsmuth, Einleitung in das Studium der alien Geschichte (1895).

DIOCESE (formed on Fr. diocese, in place of the Eng. form diocess — current until the 19th century — from Lat. dioecesis, med. Lat. variant diocesis, from Gr. Sioiicqcns, " house- keeping," " administration," Siouctlv, " to keep house," " to govern "), the sphere of a bishop's jurisdiction. In this, its sole modern sense, the word diocese (dioecesis) has only been regularly used since the 9th century, though isolated instances of such use occur so early as the 3rd, what is now known as a diocese having been till then usually called a parochia (parish). The Greek word Sto'uaicns, from

meaning " administration," came to be applied to the territorial circumscription in which ad- ministration was exercised. It was thus first applied e.g. to the three districts of Cibyra, Apamea and Synnada, which were added to Cilicia in Cicero's time (between 56 and 50 B.C.). The word is here equivalent to " assize-districts " (Tyrrell and Purser's edition of Cicero Epist. ad jam. iii. 8. 4; xiii. 67; cf. Strabo xiii. 628-629). But in the reorganization of the empire, begun by Diocletian and completed by Constantine, the word " diocese" acquired a more important meaning, the empire being divided into twelve dioceses, of which the largest — Oriens — embraced sixteen provinces, and the smallest — Britain — four (see Rome: Ancient History; and W. T. Arnold, Roman Provincial Adminis- tration, pp. 187, 194-196, which gives a list of the dioceses and their subdivisions) . The organization of the Christian church in the Roman empire following very closely the lines of the civil administration (see Church History), the word diocese, in its ecclesiastical sense, was at first applied to the sphere of jurisdic- tion, not of a bishop, but of a metropolitan. 1 Thus Anastasius Bibliothecarius (d. c. 886), in his life of Pope Dionysius, says that he assigned churches to the presbyters, and established dioceses (parochiae) and provinces (dioeceses). The word, however, sur- vived in its general sense of " office " or " administration," and it was even used during the middle ages for " parish " (see Du Cange, Glossarium, s. " Dioecesis " 2).

The practice, under the Roman empire, of making the areas of ecclesiastical administration very exactly coincide with those of the civil administration, was continued in the organization of the church beyond the borders of the empire, and many dioceses to this day preserve the limits of long vanished political divisions. The process is well illustrated in the case of English bishoprics. But this practice was based on convenience, not principle; and 1 For exceptions see Hinschius ii. p. 39, note I.

the limits of the dioceses, once fixed, did not usually change with the changing political boundaries. Thus Hincmar, archbishop of Reims, complains that not only his metropolitanate (dioecesis) but his bishopric (parochia) is divided between two realms under two kings; and this inconvenient overlapping of jurisdictions remained, in fact, very common in Europe until the readjust- ments of national boundaries by the territorial settlements of the 19th century. In principle, however, the subdivision of a diocese, in the event of the work becoming too heavy for one bishop, was very early admitted, e.g. by the first council at Lugo in Spain (569), which erected Lugo into a metropolitanate, the consequent division of diocese being

confirmed by the king of the second council, held in 572. Another reason for dividing a diocese, and establishing a new see, has been recognized by the church as duly existing " if the sovereign should think fit to endow some principal village or town with the rank and privileges of a city" (Bingham, lib. xvii. c. 5). But there are canons for the punishment of such as might induce the sovereign so to erect any town into a city, solely with the view of becoming bishop thereof. Nor could any diocese be divided without the consent of the primate.

In England an act of parliament is necessary for the creation of new dioceses. In the reign of Henry VIII. six new dioceses were thus cheated (under an act of 1539); but from that time onward until the 19th century they remained practically unchanged. The Ecclesiastical Commissioners Act 1836, which created two new dioceses (Ripon and Manchester), remodelled the state of the old dioceses by an entirely new adjustment of the revenues and patronage of each see, and also extended or curtailed the parishes and counties in the various jurisdictions.

By the ancient custom of the church the bishop takes his title, not from his diocese, but from his see, i.e. the place where his cathedral is established. Thus the old episcopal titles are all derived from cities. This tradition has been broken, however, by the modern practice of bishops in the United States and the British colonies, e.g. archbishop of the West Indies, bishop of Pennsylvania, Wyoming, &c. (see Bishop).

See Hinschius, Kirchenrecht, ii. 38, &c. ; Joseph Bingham, Origines ecclesiasticae, 9 vols. (1840); Du Cange, Glossarium, s. " Dioecesis "; New English Dictionary (Oxford, 1897), s. " Diocese."

DIO CHRYSOSTOM (c. a.d. 40-115), Greek sophist and rhetorician, was born at Piusa (mod. Brusa), a town at the foot of Mount Olympus in Bithynia. He was called Chrysostom (" golden-mouthed ") from his eloquence, and also to distinguish him from his grandson, the historian Dio Cassius; his surname Cocceianus was derived from his patron, the emperor Cocceius Nerva. Although he did much to promote the welfare of his native place, he became so unpopular there that he migrated to Rome, but, having incurred the suspicion of Domitian, he was banished from Italy. With nothing in his pocket but Plato's Phaedo and Demosthenes' De falsa legatione, he wandered about in Thrace, Mysia, Scythia and the land of the Getae. He returned to Rome on the accession of Nerva, with whom and his successor Trajan he was on intimate terms. During this period he paid a visit to Prusa, but, disgusted at his reception, he went back to

Rome. The place and date of his death are unknown; it is certain, however, that he was alive in 112, when the younger Pliny was governor of Bithynia.

Eighty orations, or rather essays on political, moral and philosophical subjects, have come down to us under his name; the Corinthiaca, however, is generally regarded as spurious, and is probably the work of Favorinus of Arelate. Of the extant orations the following are the most important: — Borysthenitica (xxxvi.), on the advantages of monarchy, addressed to the inhabitants of 01bia,and containing interesting information on the history of the Greek colonies on the shores of the Black Sea; Olympica (xii.), in which Pheidias is represented as setting forth the principles which he had followed in his statue of Zeus, one passage being supposed by some to have suggested Lessing's Laocoon; Rhodiaca (xxxi.), an attack on the Rhodians for alter- ing the names on their statues, and thus converting them into memorials of famous men of theday (an imitation of Demosthenes'

„ Leptines); De regno (i.iv.), addressed to Trajan, a eulogy of the monarchical form of government, under which the emperor is the representative of Zeus upon earth; De Aeschyio et Sophocle et Euripide (Hi.), a comparison of the treatment of the story of Philoctetes by the three great Greek tragedians; and Philoctetes (lix.), a summary of the prologue to the lost play by Euripides. In his later life, Dio, who had originally attacked the philosophers, himself became a convert to Stoicism. To this period belong the essays on moral subjects, such as the denunciation of various cities (Tarsus, Alexandria) for their immorality. Most pleasing of all is the Euboica (vii.), a description of the simple life of the herdsmen and huntsmen of Euboea as contrasted with that of the inhabitants of the towns. Troica (xi.), an attempt to prove to the inhabitants of Ilium that Homer was a liar and that Troy was never taken, is a good example of a sophistical rhetorical exercise. Amongst his lost works were attacks on philosophers and Domitian, and Getica (wrongly attributed to Dio Cassius by Suidas), an account of the manners and customs of the Getae, for which he had collected material on the spot during his banish ment. The style of Dio, who took Plato and Xenophon especially as his models, is pure and refined, and on the whole free from rhetorical exaggeration. With Plutarch he played an important part in the revival of Greek literature at the end of the ist

century of the Christian era. •

Editions: J. J. Reiske (Leipzig, 1784); A. Emperius (Bruns- wick, 1844); L. Dindorf (Leipzig, 1857) ; H. von Arnim (Berlin, 1893-1896). The ancient authorities for his life are Philostratus, Vit. Soph. i. 7 ; Photius, Bibliotheca, cod. 209 ; Suidas, s.v. ; Synesius, Atuv. On Dio generally see H. von Arnim, Leben und Werke dcs Dion von Prusa (Berlin, 1898) ; C. Martha, Les Moralistes sous V empire romain (1865); W. Christ, Geschichte der griechischen Litteratur (1898), § 520; J. E. Sandys, History of Classical Scholarship (2nd ed., 1906) ; W. Schmid in Pauly-Wissowa's Realencyclopadie, v. pt. 1 (1905). The Euboica has been abridged by J. P. Mahaffy in The Greek World under Roman Sway (1890), and there is a translation of Select Essays by Gilbert Wakefield (1800).

DIOCLETIAN (Gaius Atjrelitjs Valerius Diocletiantjs) (a.d. 245-313), Roman emperor 284-305, is said to have been born at Dioclea, near Salona, in Dalmatia. His original name was Diodes. Of humble origin, he served with high distinction and held important military commands under the emperors Probus and Aurelian, and accompanied Carus to the Persian War. After the death of Numerianus he was chosen emperor by the troops at Chalcedon, on the 17th of September 284, and slew with his own hands Arrius Aper, the praefect of the praetorians. He thus fulfilled the prediction of a druidess of Gaul, that he would mount a throne as soon as he had slain a wild boar (aper) . Having been installed at Nicomedia, he received general acknowledg- ment after the murder of Carinus. In consequence of the rising of the Bagaudae in Gaul, and the threatening attitude of the German peoples on the Rhine, he appointed Maximian Augustus in 286; and, in view of further dangers and disturbances in the empire, proclaimed ConstantiusChlorus and Galerius Caesars in 293. Each of the four rulers was placed at a separate capital — Nicomedia, Mediolanum (Milan), Augusta Trevirorum (Trier), Sirmium. This amounted to an entirely new organization of the empire, on a plan commensurate with the work of government which it now had to carry on. At the age of fifty-nine, exhausted with labour, Diocletian abdicated his sovereignty on the ist of May 305, and retired to Salona, where he died eight years afterwards (others give 316 as the year of his death). The end of his reign was memorable for the persecution of the Christians. In defence of this it may be urged that he hoped to strengthen the empire by reviving the old religion, and that the church as an independent state over whose inner life at least he possessed no influence, appeared to be a standing menace to his authority. Under Diocletian the senate became a political nonentity,

the last traces of republican institutions disappeared, and were replaced by an absolute monarchy approaching to despotism. He wore the royal diadem, assumed the title of lord, and introduced a com- plicated system of ceremonial and etiquette, borrowed from the East, in order to surround the monarchy and its representative with mysterious sanctity. But at the same time he devoted his energies to the improvement of the administration of the

empire; he reformed the standard of coinage, fixed the price of provisions and other necessaries of daily life, remitted the tax upon inheritances and manumissions, abolished various monopolies, repressed corruption and encouraged trade. In addition, he adorned the city with numerous buildings, such as the thermae, of which extensive remains are still standing (Aurelius Victor, De Caesaribus, 39; Eutropius ix. 13; Zonaras xii. 31).

See A. Vogel, Der Kaiser Diocletian (Gotha, 1857), a short sketch, with notes on the authorities ; T. Preuss, Kaiser Diocletian und seine Zeit (Leipzig, 1869); V. Casagrandi, Diocleziano (Faenza, 1876); H. Schiller, Gesch. der romischen Kaiserzeit, ii. (1887) ; T. Bernhardt, Geschichte Roms von Valerian bis zu Diocletians Tod (1867); A. J. Mason, The Persecution of Diocletian (1 876) ; P. Allard, La Persecution de Diocletien (1890); V. Schultze in Herzog-Hauck's Realency- klopddie fur protestantische Theologie, iv. (1898); Gibbon, Decline and Fall, chaps. 13 and 16; A. W. Hunzinger, Die Diocletianische Staatsreform (1899); O. Seeck, "Die Schatzungsordnung Dio- cletians" in Zeitschrift filr Social- und Wirthschaftsgeschichte (1896), a valuable paper with notes containing references to sources; and O. Seeck, Geschichte des Untergangs der antiken Welt, vol. i. cap. I. On his military reforms see T. Mommsen in Hermes, xxiv., and on his tariff system,

Diocletian, Edict of.

DIOCLETIAN, EDICT OF (De pretiis rerum venalium), an im- perial edict promulgated in a.d. 301, fixing a maximum price for provisions and other articles of commerce, and a maximum rate of wages. Incomplete copies of it have been discovered at various times in various places, the first (in Greek and Latin) in 1709, at Stratonicea in Caria, by W. Sherard, British consul at Smyrna, containing the preamble and the beginning of the tables down to No. 403. This partial copy was completed by W. Bankes in 181 7. A second fragment (now in the museum at Aix in Provence) was brought from Egypt in 1809; it supplements the preamble by specifying the titles of the emperors and Caesars and the number of times they had held them, whereby the date of publication can be accurately determined.

For other fragments and their localities see Corpus Inscriptionum Latinarum (iii., 1873, pp. 801 and 1055; and supplement L, 1893, p. 1909); special mention may be made of those of Elatea, Plataea and Megalopolis. Latin being the official language all over the empire, there was no official Greek translation (except for Greece proper), as is shown by the varia- tions in those portions of the text of which more than one Greek version is extant. Further, all the fragments come from the provinces which were under the jurisdiction of Diocletian, from which it is argued that the edict was only published in the eastern portion of the empire; certainly the phrase universo orbi in the preamble is against this, but the words may merely be an exaggerated description of Diocletian's special provinces, and if it had been published in the western portion as well, it is curious that no traces have been found of it. The articles mentioned in the edict, which is chiefly interesting as giving their relative values at the time, include cereals, wine, oil, meat, vegetables, fruits, skins, leather, furs, foot-gear, timber, carpets, articles of dress, and the wages range from the ordinary labourer to the professional advocate. The unit of money was the denarius, not the silver, but a copper coin introduced by Diocletian, of which the value has been fixed approximately at £th of a penny. The punishment for exceeding the prices fixed was death or deporta- tion. The edict was a well-intended but abortive attempt, in great measure in the interests of the soldiers, to meet the distress caused by several bad harvests and commercial speculation. The actual effect was disastrous; the restrictions thus placed upon commercial freedom brought about a disturbance of the food supply in non-productive countries, many traders were ruined, and the edict soon fell into abeyance.

See Lactantius, De mortibus persecutorum, vii.; a contemporary who, as a Christian, writes with natural bias against Diocletian ; T. Mommsen, Das Edict Diocletians (1851) ; W. M. Leake, An Edict of Diocletian (1826) ; W. H. Waddington, L'Edit de Diocletien (1864), and E. Lepaulle, L'Edit de maximum (1886), both containing intro- ductions and ample notes; J. C. Rolfe and F. B. Tarbell in Papers of the American School of Classical Studies at Athens, v. (1892) (Plataea); W. Loring in Journal of Hellenic Studies, xi. (1890) (Megalopolis) ; P. Paris in Bulletin de correspondance hellenique, ix. (1885) (Elatea). There is an edition of the whole by Mommsen, with notes by H. Bliimner (1893).

DIODATI— DIOGENES, THE CYNIC

DIODATI, GIOVANNI (1576-1649), Swiss Protestant divine, was born at Geneva on the 6th of June 1576, of a noble family originally belonging to Lucca, which had been expatriated on account of its Protestantism. At the age of twenty-one he was nominated professor of Hebrew at Geneva on the recommendation of Theodor Beza. In 1606 he became professor of theology, in 1608 pastor, or parish minister, at Geneva, and in the following year he succeeded Beza as professor of theology. As a preacher he was eloquent, bold and fearless. He held a high place among the reformers of Geneva, by whom he was sent on a mission to France in 1614. He had previously visited Italy, and made the acquaintance of Paolo Sarpi, whom he endeavoured unsuccess- fully to engage in a reformation movement. In 1618-1619 he attended the synod of Dort, and took a prominent part in its deliberations, being one of the six divines appointed to draw up the account of its proceedings. He was a thorough Calvinist, and entirely sympathized with the condemnation of the Arminians. In 1645 he resigned his professorship, and died at Geneva on the 3rd of October 1649. Diodati is chiefly famous as the author of the translation of the Bible into Italian (1603, edited with notes, 1607). He also undertook a translation of the Bible into French, which appeared with notes in 1644. Among his other works are his Annotationes in Biblia (1607), of which an English translation {Pious and Learned Annotations upon the Holy Bible) was published in London in 1648, and various polemical treatises, such as De fictitio Pentificiorum Purgatorio (1619); De justa secessione Refortnatorum ab Ecclesia Romana (1628) ; De Antichristo, &c. He also published French translations of Sarpi's History of the Council of Trent, and of Edwin Sandys's Account of the State of Religion in the West.

DIODORUS CRONUS (4th century B.C.), Greek philosopher of the Megarian school. Practically nothing is known of his life. Diogenes Laertius (ii. in) tells a story that, while staying at the court of Ptolemy Soter, Diodorus was asked to solve a dialectical subtlety by Stilpo. Not being able to answer on the spur of the moment, he was nicknamed 6 Kpovos (the God, equivalent to " slowcoach ") by Ptolemy. The story goes that he died of shame at his failure. Strabo, however, says (xiv. 658; xvii. 838) that he took the name from Apollonius, his master. Like the rest of the Megarian school he revelled in verbal quibbles, proving that motion and existence are impossible. His was the famous sophism known as the Kvpievuv. The impossible cannot result from the possible; a past event cannot become other than it is; but if an event, at a given moment, had been possible, from this possible would result something impossible;

therefore the original event was impossible. This problem was taken up by Chrysippus, who admitted that he could not solve it. Apart from these verbal gymnastics, Diodorus did not differ from the Megarian school. From his great dialectical skill he earned the title 6 SiaXeKrucos, or StaXejcTixcbraTOS, a title which was borne by his five daughters, who inherited his ability.

See Cicero, De Fato, 6, 7, 9; Aristotle, Metaphysial, 8 3; Sext. Empiric, adv. Math. x. 85; Ritter and Pseller, Hist, philos. Gr. et Rom. chap. v. §§ 234-236 (ed. 1869); and bibliography appended to article Megarian School.

DIODORUS SICULUS, Greek historian, born at Agyrium in Sicily, lived in the times of Julius Caesar and Augustus. From his own statements we learn that he travelled in Egypt between 60-57 B.C. and that he spent several years in Rome. The latest event mentioned by him belongs to the year 21 B.C. He asserts that he devoted thirty years to the composition of his history, and that he undertook frequent and dangerous journeys in prosecu- tion of his historical researches. These assertions, however, find little credit with recent critics. The history, to which Diodorus gave the name j3t.f}\iodT]icri tcrropiKii (Bibliotheca historica, " Historical Library "), consisted of forty books, and was divided into three parts. The first treats of the mythic history of the non- Hellenic, and afterwards of the Hellenic tribes, to the destruction of Troy; the second section ends with Alexander's death; and the third continues the history as far as the beginning of Caesar's Gallic War. Of this extensive work there are still extant only the first five books, treating of the mythic history of the Egyptians,

Assyrians, Ethiopians and Greeks; and also the nth to the 20th books inclusive, beginning with the second Persian War, and end- ing with the history of the successors of Alexander, previous to the partition of the Macedonian empire (302). The rest exists only in fragments preserved in Photius and the excerpts of Constantine Porphyrogenitus. The faults of Diodorus arise partly from the nature of the undertaking, and the awkward form of annals into which he has thrown the historical portion of his narrative. He shows none of the critical faculties of the historian, merely setting down a number of unconnected details. His narrative contains frequent repetitions and contradictions, is without colouring, and monotonous; and his simple diction, which stands intermediate between pure Attic and the colloquial Greek of his time, enables us to detect in the narrative the undigested fragments of the materials which he employed. In spite of its defects, however, the Bibliotheca is of considerable value as to

some extent supplying the loss of the works of older authors, from which it is compiled. Unfortunately, Diodorus does not always quote his authorities, but his general sources of information were — in history and chronology, Castor, Ephorus and Apollodorus; in geography, Agatharchides and Artemidorus. In special sections he followed special authorities — e.g. in the history of his native Sicily, Philistus and Timaeus.

Edilio princeps, by H. Stephanus (1559); of other editions the best are: P. Wesseling (1746), not yet superseded; L. Dindorf (1828-1831); (text) L. Dindorf (1866-1868, revised by F. Vogel, 1888-1893 and C. T. Fischer, 1905-1906). The standard works on the sources of Diodorus are C. G. Heyne, De fontibus et auctoribus historiarum Diodori, printed in Dindorf's edition, and C. A. Volquardsen, Die Quellen der griechischen und sicilischen Geschichten bei Diodor (1868); A. von Mess, Rheinisches Museum (1906); see also L. O. Brocker, Untersuchungen uber Diodor (1879), short, but containing much information; O. Maass, Kleitarch und Diodor (1894-); G. J. Schneider, De Diodori fontibus, i.-iv. (1880); C. Wachsmuth, Einleitung in das Studium der alien Geschichte (1895) ; Greece: Ancient History, "Authorities."

DIODOTUS, Seleucid satrap of Bactria, who rebelled against Antiochus II. (about 255) and became the founder of the Graeco-Bactrian kingdom (Trogus, Prol. 41; Justin xli. 4, 5, where he is wrongly called Theodotus; Strabo xi. 515). His power seems to have extended over the neighbouring provinces. Arsaces, the chieftain of the nomadic (Dahan) tribe of the Parni, fled before him into Parthia and here became the founder of the Parthian kingdom (Strabo I.e.). When Seleucus II. in 239 attempted to subjugate the rebels in the east he seems to have united with him against the Parthians (Justin xli. 4, 9). Soon afterwards he died and was succeeded by his son Diodotus II., who concluded a peace with the Parthians (Justin I.e.). Diodotus II. was killed by another usurper, Euthydemus (Polyb. xi. 34, 2). Of Diodotus I. we possess gold and silver coins, which imitate the coins of Antiochus II.; on these he sometimes calls himself Soter, " the saviour." As the power of the Seleucids was weak and continually attacked by Ptolemy II., the eastern provinces and their Greek cities were exposed to the invasion of the nomadic barbarians and threatened with destruction (Polyb. xi. 34, 5); thus the erection of an independent kingdom may have been a necessity and indeed an advantage to the Greeks, and this epithet well deserved. Diodotus Soter appears also on coins struck in his memory by the later Graeco-Bactrian kings Agathocles and Antimachus. Cf. A. v. Sallet, Die Nachfolger Alexanders d. Gr. in Baktrien und Indien ; Percy

Gardner, Calal. of the Coins of the Greek and Scythian Kings of Bactria and India (Brit. Mus.) ; see also Bactria. (Ed. M.)

DIOGENES, " the Cynic," Greek philosopher, was born at Sinope about 412 B.C., and died in 323 at Corinth, according to Diogenes Laertius, on the day on which Alexander the Great died at Babylon. His father, Icesias, a money-changer, was imprisoned or exiled on the charge of adulterating the coinage. Diogenes was included in the charge, and went to Athens with one attendant, whom he dismissed, saying, " If Manes can live without Diogenes, why not Diogenes without Manes ? " Attracted by the ascetic teaching of Antisthenes, be became his pupil, despite the brutality with which he was received, and rapidly excelled his master both in reputation and in the austerity of his life. The stories which

are told of him are probably true; in any case, they serve to illustrate the logical consistency of his character. He inured himself to the vicissitudes of weather by living in a tub belonging to the temple of Cybele. The single wooden bowl he possessed he destroyed on seeing a peasant boy drink from the hollow of his hands. On a voyage to Aegina he was captured by pirates and sold as a slave in Crete to a Corinthian named Xeniades. Being asked his trade, he replied that he knew no trade but that of governing men, and that he wished to be sold to a man who needed a master. As tutor to the two sons of Xeniades, he lived in Corinth for the rest of his life, which he devoted entirely to preaching the doctrines of virtuous self-control. At the Isthmian games he lectured to large audiences who turned to him from Antisthenes. It was, probably, at one of these festivals that he craved from Alexander the single boon that he would not stand between him and the sun, to which Alexander replied " If I were not Alexander, I would be Diogenes." On his death, about which there exist several accounts, the Corinthians erected to his memory a pillar on which there rested a dog of Parian marble. His ethical teaching will be found in the article Cynics (q.v.). It may suffice to say here that virtue, for him, consisted in the avoidance of all physical pleasure; that pain and hunger were positively helpful in the pursuit of goodness; that all the artificial growths of society appeared to him incompatible with truth and goodness; that moralization implies a return to nature and simplicity. He has been credited with going to extremes of impropriety in pursuance of these ideas; probably, however, his reputation has suffered from the undoubted immorality

of some of his successors. Both in ancient and in modern times, his person- ality has appealed strongly to sculptors and to painters. Ancient busts exist in the museums of the Vatican, the Louvre and the Capitol. The interview between Diogenes and Alexander is repre- sented in an ancient marble bas-relief found in the Villa Albani. Rubens, Jordaens, Steen, Van der Werff, Jeaurat, Salvator Rosa and Karel Dujardin have painted various episodes in his life.

The chief ancient authority for his life is Diogenes Laertius vi. 20; see also Mayor's notes on Juvenal, Satires, xiv. 308-314; and article Cynics.

DIOGENES APOLLONIATES (c. 460 B.C.), Greek natural philosopher, was a native of Apollonia in Crete. Although of Dorian stock, he wrote in the Ionic dialect, like all the physiologi (physical philosophers) . There seems no doubt that he lived some time at Athens, where it is said that he became so unpopular (probably owing to his supposed atheistical opinions) that his life was in danger. The views of Diogenes are transferred in the Clouds (264 if.) of Aristophanes to Socrates. Like Anaximenes, he believed air to be the one source of all being, and all other substances to be derived from it by condensation and rarefaction. His chief advance upon the doctrines of Anaximenes is that hp asserted air, the primal force, to be possessed of intelligence — " the air which stirred within him not only prompted, but in- structed. The air as the origin of all things is necessarily an eternal, imperishable substance, but as soul it is also necessarily endowed with consciousness." In fact, he belonged to the old Ionian school, whose doctrines he modified by the theories of his contemporary Anaxagoras, although he avoided his dualism. His most important work was Hepi 4>bcrews (De natura), of which considerable fragments are extant (chiefly in Simplicius) ; it is possible that he wrote also Against the Sophists and On the Nature of Man, to which the well-known fragment about the veins would belong; possibly these discussions were subdivisions of his great work.

Fragments in F. Mullach, Fragmenta philosophorum Graecorum, i. (i860); F. Panzerbieter, Diogenes Apolloniates (1830), with philosophical dissertation; J. Burnet, Early Greek Philosophy (1892) ; H. Ritter and L. Preller, Hisloria philosophiae (4th ed., 1869), §§ 59-68; E. Krause, Diogenes von Apollonia (1909). See Ionian School.

DIOGENES LAERTIUS (or" Laertius Diogenes), the biographer of the Greek philosophers, is supposed by some to have received his

surname from the town of Laerte in Cilicia, and by others from the Roman family of the Laertii. Of the circum- stances of bis life we know nothing. He must have lived after I

Sextus Empiricus (c. a.d. 200), whom he mentions, and before Stephanus of Byzantium (c. a.d. 500), who quotes him. It is probable that he flourished during the reign of Alexander Severus (a.d. 222-235) and his successors. His own opinions are equally uncertain. By some he was regarded as a Christian; but it seems more probable that he was an Epicurean. The work by which he is known professes to give an account of the lives and sayings of the Greek philosophers. Although it is at best an uncritical and unphilosophical compilation, its value, as giving us an insight into the private life of the Greek sages, justly led Montaigne to exclaim that he wished that instead of one Laertius there had been a dozen. He treats his subject in two divisions which he describes as the Ionian and the Italian schools; the division is quite unscientific. The biographies of the former begin with Anaximander, and end with Clitomachus, Theophrastus and Chrysippus; the latter begins with Pythagoras, and ends with Epicurus. The Socratic school, with its various branches, is classed with the Ionic; while the Eleatics and sceptics are treated under the Italic. The whole of the last book is devoted to Epicurus, and contains three most interesting letters addressed to Herodotus, Pythocles and Menoeceus. His chief authorities were Diodes of Magnesia's Cursory Notice ('EmSpo/xri) of Philo- sophers and Favorinus's Miscellaneous History and Memoirs. From the statements of Burlaeus (Walter Burley, a 14th-century monk) in his De vita et moribus philosophorum the text of Diogenes seems to have been much fuller than that which we now possess. In addition to the Lives, Diogenes was the author of a work in verse on famous men, in various metres.

Bibliography. — Editio princeps (1533); H. Hiibner and C. Jacobitz with commentary (1828-1833); C. G. Cobet (1850), text only. See F. Nietzsche, " De Diogenis Laertii fontibus " in Rheinisches Museum, xxiii., xxiv. (1868-1869); J. Freudenthal, " Zu Quellenkunde Diog. Laert.," in Hellenislische Studien, iii. (1879); O. Maass, De biographis Graecis (1880); V. Egger, De fontibus Diog. Laert. (1881). There is an English translation by C. D. Yonge in Bohn's Classical Library.

DIOGENIANUS, of Heraclea on the Pontus (or in Caria), Greek grammarian, flourished during the reign of Hadrian. He was the author of an alphabetical lexicon, chiefly of poetical words, abridged from the great lexicon (ILepl yX&xrow) of Pamphilus of Alexandria

(fl. a.d. 50) and other similar works. It was also known by the title HepiepyoTrev^res (for the use of "industrious poor students "). It formed the basis of the lexicon, or rather glossary, of Hesychius of Alexandria, which is described in the preface as a new edition of the work of Diogenianus. We still possess a collection of proverbs under his name, probably an abridgment of the collection made by himself from his lexicon (ed. by E. Leutsch and F. W. Schneidewin in Paroemiographi Graeci, i. 1839) . Diogenianus was also the author of an Anthology of epigrams, of treatises on rivers, lakes, fountains and pro- montories; and of a list (with map) of all the towns in the world.

DIOGNETUS, EPISTLE TO, one of the early Christian apolo- gies. Diognetus, of whom nothing is really known, has expressed a desire to know what Christianity really means — " What is this new race " of men who are neither pagans nor Jews? " What is this new interest which has entered into men's lives now and not before?" The anonymous answer begins with a refutation of the folly of worshipping idols, fashioned by human hands and needing to be guarded if of precious material. The repulsive smell of animal sacrifices is enough to show their monstrous absurdity. Next Judaism is attacked. Jews abstain from idolatry and worship one God, but they fall into the same error of repulsive sacrifice, and have absurd superstitions about meats and sabbaths, circumcision and new moons. So far the task is easy; but the mystery of the Christian religion " think not to learn from man." A passage of great eloquence follows, showing that Christians have no obvious peculiarities that mark them off as a separate race. In spite of blameless lives they are hated. Their home is in heaven, while they live on earth. " In a word, what the soul is in a body, this the Christians are in the world. . . . The soul is enclosed in the body, and yet itself holdeth the body together: so Christians are kept in the world as in a prison-house, and yet they themselves hold the world

together." This strange life is inspired in them by the almighty and invisible God, who sent jio angel or subordinate messenger to teach them, but His own Son by whom He created the universe. No man could have known God, had He not thus declared Himself. " If thou too wouldst have this faith, learn first the knowledge of the Father. For God loved men, for whose sake He made the world. . . . Knowing Him, thou wilt love Him and imi- tate His goodness; and marvel not

if a man can imitate God: he can, if God will." By kindness to the needy, by giving them what God has given to him, a man can become " a god of them that receive, an imitator of God." " Tl :n shalt thou on earth behold God's life in heaven; then shalt thou begin to speak the mysteries of God." A few lines after this the letter suddenly breaks off.

Even this rapid summary may show that the writer was a man of no ordinary power, and there is no other early Christian writing outside the New Testament which appeals so strongly to modern readers. The letter has been often classed with the writings of the Apostolic Fathers, and in some ways it seems to mark the transition from the sub-apostolic age to that of the Apologists. Bishop Lightfoot, who speaks of the letter as " one of the noblest and most impressive of early Christian apologies," places it c. a.d. 150, and inclines to identify Diognetus with the tutor of Marcus Aurelius. Harnack and others would place it later, perhaps in the 3rd century. There are some striking parallels in method and language to the Apology of Aristides (q.v.), and also to the early " Preaching of Peter."

The one manuscript which contained this letter perished by fire at Strassburg in 1870, but happily it had been accurately collated by Reuss nine years before. It formed part of a collection of works supposed to be by Justin Martyr, and to this mistaken attribution its preservation is no doubt due. Both thought and language mark the author off entirely from Justin. The end of the letter is lost, but there followed in the codex the end of a homily, 1 which was attached without a break to the epistle: this points to the loss in some earlier codex of pages containing the end of the letter and the beginning of the homily.

The Epistle may be read in J. B. Lightfoot's Apostolic Fathers (ed. min.), where there is also a translation into English. (J. A. R.)

DIOMEDES, in Greek legend, son of Tydeus, one of the bravest of the heroes of the Trojan War. In the Iliad he is the favourite of Athena, by whose aid he not only overcomes all mortals who venture to oppose him, but is even enabled to attack the gods. In the post-Homeric story, he made his way with Odysseus by an underground passage into the citadel of Troy and carried off the Palladium, the presence of which within the walls secured Troy against capture (Virgil, Aeneid, ii. 164). On his return to Argos, finding that his wife had been unfaithful, he removed to Aetolia, and thence to Daunia (Apulia), where he married the daughter of King Daunus. He was buried or mysteriously disappeared on one of the islands in the

Adriatic called after him Diomedeae, his sorrowing companions being changed into birds by the gods out of compassion (Ovid, Melam. xiv. 457 ff.). He was the reputed founder of Argyrippa (Arpi) and other Italian cities {Aeneid, xi. 243 ff.). He was worshipped as a hero not only in Greece, but on the coast of the Adriatic, as at Thurii and Metapontum. At Argos, his native place, during the festival of Athena, his shield was carried through the streets as a relic, together with the Palladium, and his statue was washed in the river Inachus.

DIOMEDES, Latin grammarian, flourished at the end of the 4th century a.d. He was the author of an extant Ars grammatica in three books, dedicated to a certain Atha.nasius. The third book is the most important, as containing extracts from Suetonius's De po'etis. Diomedes wrote about the same time as Charisius (q.v.) and used the same sources independently. The works of both grammarians are valuable, but whereas much cf Charisius has been lost, the Ars of Diomedes has come down to us complete. In book i. he treats of the eight parts of speech; in ii. of the elemen- tary ideas of grammar and of style; in iii. of quantity and metres.

The best edition is in H. Keil's Grammatici Latini, i. ; see also C. von Paucker, Kleinere Studien, i. (1883), on the Latinity of Diomedes.

1 Chapters xi. and xii., which Lightfoot suggested might be the •vork of Pantaenus.

DION, tyrant of Syracuse (408-353 B.C.), the son of Hipparinus, and brother-in-law of Dionysius the Elder. In his youth he was an admirer and pupil of Plato, whom Dionysius had invited to Syracuse; and he used every effort to inculcate the maxims of his master in the mind of the tyrant. The stern morality of Dion was distasteful to the younger Dionysius, and the historian' Philistus, a faithful supporter of despotic power, succeeded in procuring his banishment on account of alleged intrigues with the Carthaginians. The exiled philosopher retired to Athens, where he was at first permitted to enjoy his revenues in peace; but the intercession of Plato (who had again visited Syracuse to procure Dion's recall) only served to exasperate the tyrant, and at length provoked him to confiscate the property of Dion, and give his wife to another. This last outrage roused Dion. Assembling a small force at Zacynthus, he sailed to Sicily (357) and was received with demonstrations of joy. Dionysius, who was in Italy, returned to Sicily, but was defeated and obliged to flee. Dion himself was soon after supplanted by the intrigues of Heracleides, and again banished. The incompetency of the new leader and the

cruelties of Apollocrates, the son of Dionysius, soon led to his recall. He had, however, scarcely made himself master of Sicily when the people began to express their discontent with his tyrannical conduct, and he was assassinated by Callippus, an Athenian who had accompanied him in his expedition.

See Lives by Plutarch and Cornelius Nepos (cf. Diod. Sic. xvi. 6-20) and in modern times by T. Lau (i860) ; see also Syracuse and Sicily: History.

DIONE, in the earliest Greek mythology, the wife of Zeus. As such she is associated with Zeus Naiius (the god of fertilizing moisture) at Dodona (Strabo vii. p. 329), by whose side she sits, adorned with a bridal veil and garland and holding a sceptre. As the oracle declined in importance, her place as the wife of Zeus was taken by Hera. It is probable that in very early times the cult of Dione existed in Athens, where she had an altar before the Erechtheum. After her admission to the general religious system of the Greeks, Dione was variously described. In the Iliad (v. 370) she is the mother by Zeus of Aphrodite, who is herself in later times called Dione (the epithet Dionaeus was given to Julius Caesar as claiming descent from Venus) . In Hesiod (Theog. 353) she is one of the daughters of Oceanus; in Pherecydes (ap. schol. Iliad, xviii. 486), one of the nymphs of Dodona, the nurses of Dionysus; in Euripides (frag. 177), the mother of Dionysus; in Hyginus (fab. 9. 82), the daughter of Atlas, wife of Tantalus and mother of Pelops and Niobe. Others make her a Titanid, the daughter of Uranus and Gaea (Apollodorus i. 1). Speaking generally, Dione may be regarded as the female embodiment of the attributes of Zeus, to whose name her own is related as Juno (= Jovino) to Jupiter.

DIONYSIA, festivals in honour of the god Dionysus generally, but in particular the festivals celebrated in Attica and by the branches of the Attic-Ionic race in the islands and in Asia Minor. In Attica there were two festivals annually. (1) The lesser Dionysia, or ra kojt aypovs, was held in the country places for four days (about the 19th to the 22nd of December) at the first tasting of the new wine. It was accompanied by songs, dance, phallic processions and the impromptu performances of itinerant players, who with others from the city thronged to take part in the excitement of the rustic sports. A favourite amusement was the Ascoliasmus, or dancing on one leg upon a leathern bag (davcos), which had been smeared with oil. (2) The greater Dionysia, or to. iv Hurra, was held in the city of Athens for six days (about the 28th of March to the 2nd of April). This was a festival of joy at the departure of winter and the promise of

summer, Dionysus being regarded as having delivered the people from the wants and troubles of winter. The religious act of the festival was the conveying of the ancient image of the god, which had been brought from Eleutherae to Athens, from the ancient sanctuary of the Lenaeum to a small temple near the Acropolis and back again, with a chorus of boys and a procession carrying masks and singing the dithyrambus. The festival culminated in the production of tragedies, comedies and satyric dramas in the great theatre of Dionysus. Other festivals in honour of Dionysus were the

Anthesteria (g.v.) ; the Lenaea (about the 28th to the 31st of January), or festival of vats, at which, after a great public banquet, the citizens went through the city in procession to attend the dramatic representations; the Oschophoria (October-November), a vintage festival, so called from the branches of vine with grapes carried by twenty youths from the ephebi, two from each tribe, in a race from the temple of Dionysus in Athens to the temple of Athena Sciras in Phalerum.

See A. Mommsen, Feste der Stadt Athen (1898); L. Preller, Griechische Mythologie; L. C. Purser in Smith's Dictionary of Antiquities (3rd ed., 1890); article Dionysos in W. H. Roscher's Lexikon der Mythologie; and the exhaustive account with bibliography by J. Girard in Daremberg and Saglio's Dictionnaire des antiquites.

DIONYSIUS, pope from 259 t0 268. To Dionysius, who was elected pope in 259 after the persecution of Valerian, fell the task of reorganizing the Roman church, which had fallen into great disorder. At the protest of some of the faithful at Alexandria, he demanded from the bishop of Alexandria, also called Dionysius, explanations touching his doctrine. He died on the 26th of December 268.

DIONYSIUS (c. 432-367 B.C.), tyrant of Syracuse, began life as a clerk in a public office, but by courage and diplomacy succeeded in making himself supreme (see Syracuse). He carried on war with Carthage with varying success; his attempts to drive the Carthaginians entirely out of the island failed, and at his death they were masters of at least a third of it. He also carried on an expedition against Rhegium and its allied cities in Magna Graecia. In one campaign, in which he was joined by the Lucanians, he devastated the territories of Thurii, Croton and Locri. After a protracted siege he took Rhegium (386), and sold the inhabitants as

slaves. He joined the Illyrians in an attempt to plunder the temple of Delphi, pillaged the temple of Caere on the Etruscan coast, and founded several military colonies on the Adriatic. In the Peloponnesian War he espoused the side of the Spartans, and assisted them with mercenaries. He also posed as an author and patron of literature; his poems, severely criticized by Philoxenus, were hissed at the Olympic games; but having gained a prize for a tragedy on the Ransom of Hector at the Lenaea at Athens, he was so elated that he engaged in a debauch which proved fatal. According to others, he was poisoned by his physicians at the instigation of his son. His life was written by Philistus, but the work is not extant. Dionysius was regarded by the ancients as a type of the worst kind of despot — cruel, suspicious and vin- dictive. Like Peisistratus, he was fond of having distinguished literary men about him, such as the historian Philistus, the poet Philoxenus, and the philosopher Plato, but treated them in a most arbitrary manner.

See Diod. Sic. xiii., xiv., xv. ; J. Bass, Dionysius I, von Syrakus (Vienna, 1881), with full references to authorities in footnotes; articles Sicjly and Syracuse.

His son Dionysius, known as " the Younger," succeeded in 367 B.C. He was driven from the kingdom by Dion (356) and fled to Locri; but during the commotions which followed Dion's assassination, he managed to make himself master of Syracuse. On the arrival of Timoleon he was compelled to surrender and retire to Corinth (343), where he spent the rest of his days in poverty (Diodorus Siculus xvi.; Plutarch, Timoleon).

See Syracuse and Timoleon; and, on both the Dionysii, articles by B. Niese in Pauly-Wissowa's Realencyclopddie, v. pt. I (1905).

DIONYSIUS AREOPAGITICUS (or " the Areopagite "), named in Acts xvii. 34 as one of those Athenians who believed when they had heard Paul preach on Mars Hill. Beyond this mention our only knowledge of him is the statement of Dionysius, bishop of Corinth (ft. a.d. 171), recorded by Eusebius {Church Hist. iii. 4; iv. 23), that this same Dionysius the Areopagite was the first "bishop" of Athens. Some hundreds of years after the Areopagite's death, his name was attached by the Pseudo- Areopagite to certain theological writings composed by the latter. These were destined to exert enormous influence upon medieval thought, and their fame led to the extension of the personal legend of the real Dionysius. Hilduin, abbot of St Denys (814-840), identified him with St Denys, martyr and patron-saint of France.

In Hilduin's Areopagitica, the Life and Passion of the most holy Dionysius (Migne, Patrol. Lat. tome t i 06), the Areopagite is sent to France by Clement of Rome, and suffers martyrdom upon the hill where the monastery called St Denys was to rise in his honbur. There is no earlier trace of this identification, and Gregory of Tours (d. 594.) says (Hist. Francorum, i. 18) that St Denys came to France in the reign of Decius (a.d. 250), which falls about midway between the presumptive death of the real Areopagite and the probable date of the writings to which he owed his adventitious fame.

Traces of the influence of these writings appear in the works of Eastern theologians in the early part of the 6th century. They also were cited at the council held in Constantinople in 533, which is the first certain dated reference to them. In the West, Gregory the Great (d. 604) refers to them in his thirty-fourth sermon on the gospels (Migne, Pat. Lai. tome 76, col. 1254). They did not, however, become generally known in the Western church till after the year 827, when the Byzantine emperor Michael the Stammerer sent a copy to Louis the Pious. It was given over to the care of the above-mentioned abbot Hilduin. In the next generation the scholar and philosopher Joannes Scotus Erigena (q.v.) translated the Dionysian writings into Latin. This appears to have been the only Latin translation until the 12th century when another was made, followed by several others.

Thus, the author, date and place of composition of these writings are unknown. External evidence precludes a date later than the year 500, and the internal evidence from the writings themselves precludes any date prior to 4th-century phases of Neo-platonism. The extant writings of the Pseudo-Areopagite are: (a) Uepl rrjs oupavias tepopxtas, Concerning the Celestial Hierarchy, in fifteen chapters, (b) Uepl rfjs eK/cXr/omcrTucJJs lepapxias, Concerning the Ecclesiastical Hierarchy, in seven chapters, (c) Uepl deioiv bvonwrwv, Concerning Divine Names, in thirteen chapters, (d) Uepl juuotucijs 6ed\oyias, Concerning Mystic Theology, in five chapters, (e) Ten letters addressed to various worthies of the apostolic period.

Although these writings seem complete, they contain refer- ences to others of the same author. But of the latter nothing is known, and they may never have existed.

The writings of the Pseudo-Areopagite are of great interest, first as a striking presentation of the heterogeneous elements that might unite in the mind of a gifted man in the 5th century, and secondly, because of their enormous influence upon subsequent Christian theology and

art. Their ingredients — Christian, Greek, Oriental and Jewish — are not crudely mingled, but are united into an organic system. Perhaps theological philosophic fantasy has never constructed anything more remarkable. The system of Dionysius was a proper product of its time, — lofty, apparently complete, comparable to the Enneads of Plotinus which formed part of its materials. But its materials abounded everywhere, and offered themselves temptingly to the hand strong enough to build with them. There was what had entered into Neo- platonism, both in its dialectic form as established by Plotinus, and in its magic-mystic modes devised by Iamblichus (d. c. 333). There was Jewish angel lore and Eastern mood and fancy; and there was Christianity so variously understood and heterogene- ously constituted among Syro-Judaic Hellenic communities. Such Christianity held materials for formula and creed; also principles of liturgic and sacramental doctrine and priestly function; also a mass of popular beliefs as to intermediate superhuman beings who seemed nearer to men than any member of the Trinity.

Out of this vast spiritual conglomerate, Pseudo-Dionysius formed his system. It was not juristic, — not Roman, Pauline or Augustinian. Rather he borrowed his constructive principles from Hellenism in its last great creation, Neo-platonism. That had been able to gather and arrange within itself the various elements of latter-day paganism. The Neo-platonic categories might be altered in name and import, and yet the scheme remain a scheme; since the general principle of the transmission of life from the ultimate Source downward through orders of mediating beings unto men, might readily be adapted to the Christian God

and his ministering angels. Pseudo-Dionysius had lofty thoughts of the sublime transcendence of the ultimate divine Source. That source was not remote or inert ; but a veritable Source from which life streamed to all lower orders of existence, — in part directly, and in part indirectly as power and guidance through the higher orders to the lower. Life, creation, every good gift, is from God directly; but his flaming ministers also intervene to guide and aid the life of man; and the life which through love floods forth from God has its counterflow wherebv it draws its own creations to itself. God is at once absolutely transcendent and universally immanent. To live is to be united with God; evil is the non- existent, that is, severance from God. Whatever is, is part of the forth-flowing divine life which ever purifies, enlightens and perfects, and so draws all back to the Source.

The transcendent Source, as well as the universal immanence, is the Triune God. Between that and men are ranged the three triads of the Celestial Hierarchy: Seraphim, Cherubim and Thrones; Dominations, Virtues, Powers; Principalities, Archangels, Angels. Collectively their general office is to raise mankind to God through purification, illumination and perfec- tion; and to all may be applied the term angel. The highest triad, which is nearest God, contemplates the divine effulgence, and reflects it onward to the second; the third, and more specifically angelic triad, immediately ministers to men. The sources of these names are evident: seraphim and cherubim are from the Old Testament; later Jewish writings gave names to archangels and angels, who also fill important functions in the New Testament. The other names are from Paul (Eph. i. 2 1 ; Col. i. 1 6) .

Such is the system of Pseudo-Dionysius, as presented mainly in The Celestial Hierarchy. That work is followed by The Ecclesi- astical Hierarchy, its counterpart on earth. What the primal triune Godhead is to the former, Jesus is to the latter. The Ecclesiastical Hierarchy likewise is composed of Triads. The first includes the symbolic sacraments: Baptism, Communion, Consecration of the Holy Chrism. Baptism signifies purification; Communion signifies enlightening; the Holy Chrism signifies perfecting. The second triad is made up of the three orders of Bishops, Presbyters and Deacons, or rather, as the Areopagite names them: Hierarchs, Light-bearers, Servitors. The third triad consists of monks, who are in a state of perfection, the initiated laity, who are in a state of illumination, and the catechumens, in a state of purification. All worship, in this treatise, is a celebration of mysteries, and the pagan mysteries are continually suggested by the terms employed.

The work Concerning the Divine Names is a noble discussion of the qualities which may be predicated of God, according to the warrant of the terms applied to him in Scripture. The work Concerning Mystic Theology explains the function of symbols, and shows that he who would know God truly must rise above them and above the conceptions of God drawn from sensible things.

The works of Pseudo-Dionysius began to influence theological thought in the West from the time of their translation into Latin by Erigena. Their use may be followed through the writings of scholastic philosophers, e.g. Peter Lombard, Albertus Magnus, Thomas Aquinas and many others. In poetry we find their influence in Dante, Spenser, Milton. The fifteenth chapter of The Celestial Hierarchy constituted the canon of symbolical angelic lore for the literature and art of the middle ages. Therein the author explains in what respect theology

ascribes to angels the qualities of fire, why the thrones are said to be fiery (irvpivovs) ; why the seraphim are burning (hfnrpqffTas) as their name indicates. The fiery form signifies, with Celestial Intelligences, likeness to God. Dionysius explains the significance of the parts of the human body when given to celestial beings: feet are ascribed to angels to denote their unceasing movement on the divine business, and their feet are winged to denote their celerity. He likewise explains the symbolism of wands and axes, of brass and precious stones, when joined to celestial beings; and what wheels and a chariot denote when furnished to them, — and much more besides.

Bibliography. — There is an enormous literature on Pseudo-Dionysius. The reader may be first referred to the articles in

Smith's Dictionary of Christian Biography and Hauck's Realencyklo-pddiefiir protestantisclie Theologie (Leipzig, 1898). The bibliography in the latter is very full. Some other references, especially upon the later influence of these works, are given in H. O. Taylor's Classical Heritage of the Middle Ages (Macmillan, 1903). The works themselves are in Migne's Patrologia Graeca, tomes 3 and 4, with a Latin version. Erigena's version is in Migne, Patrol. Lat. t. 122. Vita Dionysii by Hilduin is in Migne, Pat. Lat. 106. There is an English version by Parker (London, 1894 and 1897). (H. O. T.)

DIONYSIUS EXIGUUS, one of the most learned men of the 6th century, and especially distinguished as a chronologist, was, according to the statement of his friend Cassiodorus, a Scythian by birth, " Scytha natione." This may mean only that he was a native of the region bordering on the Black Sea, and does not necessarily imply that he was not of Greek origin. Such origin is indicated by his name and by his thorough familiarity with the Greek language. His surname " Exiguus " is usually translated " the Little," but he probably assumed it out of hum lity. He was living at Rome in the first half of the 6th century, and is usually spoken of as abbot of a Roman monastery. Cassiodorus, however, calls him simply " monk," while Bede calls him " abbot." But as itwas not unusual to apply the latter term to distinguished monks who were not heads of their houses, it is uncertain whether Dionysius was abbot in fact or only by courtesy. He was in high repute as a learned theologian, was profoundly versed in the Holy Scriptures and in canon law, and was also an accomplished mathematician and astronomer. We owe to him a collection of 401 ecclesiastical canons, including the apostolical canons and the decrees of the councils of Nicaea, Constantinople, Chalcedon and Sardis, and also a collection of the decretals of the popes from Siricius (385) to Anastasius II. (498).

These collections, which had great authority in the West (see Canon Law) , were published by Justel in 1628. Dionysius did good service to his contempor- aries by his translations of many Greek works into Latin; and by these translations some works, the originals of which have perished, have been handed down to us. His name, however, is now perhaps chiefly remembered for his chronological labours. It was Dionysius who introduced the method of reckoning the Christian era which we now use (see Chronology). His friend Cassiodorus depicts in glowing terms the character of Dionysius as a saintly ascetic, and praises his wisdom and simplicity, his accomplishments and his lowly-mindedness, his power of eloquent speech and his capacity of silence. He died at Rome, some time before a.d. 550.

His works have been published in Migne, Patrologia Latina, tome 67; see especially A. Tardif, Hisloire des sources du droit canonique (Paris, 1887), and D. Pitra, Analecta povissima, Spicilegii Solesmensis continuatio, vol. i. p. 36 (Paris, 1885).

DIONYSIUS HALICARNASSENSIS ("of Halicarnassus "), Greek historian and teacher of rhetoric, flourished during the reign of Augustus. He went to Rome after the termination of the civil wars, and spent twenty-two years in studying the Latin language and literature and preparing materials for his history. During this period he gave lessons in rhetoric, and enjoyed the society of many distinguished men. The date of his death is unknown. His great work, entitled 'Poj/wukij a.px

Dionysius was also the author of several rhetorical treatises, in which he shows that he has thoroughly studied the best Attic models: — The Art of Rhetoric (which is rather a collection of

essays on the theory of rhetoric), incomplete, and certainly not all his work; The Arrangement of Words (Hepl avvQkaeois dvofiaroiv) , treating of the combination of words according to the different styles of oratory; On Imitation (Ilepi HL/iriceus), on the best models in the different kinds of literature and the way in which they are to be imitated — a fragmentary work; Commentaries on the Attic Orators (TLepl t&v apxaiuv prjTopwv monvr)p.anaixo'C) , which, however, only deal with Lysias, Isaeus, Isocrates and (by way of supplement) Dinarchus ; On the admirable Style of Demosthenes (Htpl rrjs XeKTUcijs Atjjuo- cdevovs 8eu>6rr]TOs) ; and On the Character of

Thucydides (Ilepi tov OovkvSLSov xapaKTrjpos), a detailed but on the whole an unfair estimate. These two treatises are supplemented by letters to Cn. Pompeius and Ammaeus (two).

Complete edition by J. J. Reiske (1774-1777) ; of the Archaeologia by A. Kiessling and V. Prou (1886) and C. Jacoby (1885-1891); Opuscula by Usener and Radermacher (1899); Eng. translation by E. Spelman (1758). A full bibliography of the rhetorical works is given in W. Rhys Roberts's edition of the Three Literary Letters (1901) ; the same author published an edition of the De compositione verborum (1910, with trans.) ; see also M. Egger, Denys d ' Hahcarnasse (1902), a very useful treatise. On the sources of Dionysius see O. Bocksch, " De fontibus Dion. Halicarnassensis " inLeipziger Studien, xvii. (1895). Cf. also J. E. Sandys, Hist, of Class. Schol. i. (1906).

DIONYSIUS PERIEGETES, author of a nepufrijtns rrjs oiKovpkvqs, a description of the habitable world in Greek hexameter verse, written in a terse and elegant style. Nothing certain is known of the date or nationality of the writer, but there is some reason for believing that he was an Alexandrian, who wrote in the time of Hadrian (some put him as late as the end of the 3rd century). The work enjoyed a high degree of popularity in ancient times as a school-book; it was translated into Latin by Ruf us Festus Avienus, and by the grammarian Priscian. The commentary of Eustathius is valuable.

The best editions are by G. Bernhardy (1828) and C. Muller (1861) in their Geographici Graeci minores; see also E. H. Bunbury, Ancient Geography (ii. p. 480), who regards the author as flourishing from the reign of Nero to that of Trajan, and U. Bernays, Studien zu Dion. Perieg. (1905). There are two old English translations: T. Twine (1572, black letter), J. Free (1789, blank verse).

DIONYSIUS TELMAHARENSIS (" of Tell-Mahre "), patriarch or supreme head of the Syrian Jacobite Church during the years 818-848, was born at Tell-Mahre near Rakka (ar-Rakkah) on the Ballkh. He was the author of an important historical work, which has seemingly perished except for some passages quoted by Barhebraeus and an extract found by Assemani in Cod. Vat. 144 and published by him in the Bibliotheca orientalis (ii. 72-77). He spent his earlier years as a monk at the convent of I£en-neshre on the upper Euphrates; and when this monastery was destroyed by fire in 815, he migrated northwards to that of Kaistim in the district of Samosata. At the death of the Jacobite patriarch Cyriacus in 817, the church was agitated by a dispute about the use of the phrase "

heavenly bread " in connexion with the Eucharist. An anti-patriarch had been appointed in the person of Abraham of Kurtamln, who insisted on the use of the phrase in opposition to the recognized authorities of the church. The council of bishops who met at Rakka in the summer of 818 to choose a successor to Cyriacus had great difficulty in finding a worthy occupant of the patriarchal chair, but finally agreed on the election of Dionysius, hitherto known only as an honest monk who devoted himself to historical studies. Sorely against his will he was brought to Rakka, ordained deacon and priest on two successive days, and raised to the supreme ecclesiastical dignity on the istof August. From this time he showed the utmost zeal in fulfilling the duties of his office, and undertook many journeys both within and without his province. The ecclesiastical schism continued unhealed during the thirty years of his patriarchate. The details of this contest, of his relations with the caliph Ma'mun, and of his many travels— including a journey to Egypt, on which he viewed with admiration the great Egyptian monuments, — are to be found in the Ecclesiastical Chronicle of B arhebraeus } He died in 848, his last days having been especially

1 Ed. Abbeloos and Lamy,. i. 343-386; cf. Wright, Syriac Literature, 196-200, and Chabot's introduction to his translation of the fourth part of the Chronicle of (pseudo) Dionysius.

embittered by Mahommedan oppression. We learn from Michael the Syrian that his Annals consisted of two parts each divided into eight chapters, and covered a period of 260 years, viz. from the accession of the emperor Maurice (582-583) to the death of Theophilus (842-843).

In addition to the lost Annals, Dionysius was from the time of Assemani until 1896 credited with the authorship of another important historical work — a Chronicle, which in four parts narrates the history of the world from the creation to the year a.d. 774-775 and is preserved entire in Cod. Vat. 162. The first part (edited by Tullberg, Upsala, 1850) reaches to the epoch of Constantine the Great, and is in the main an epitome of the Eusebian Chronicle. 2 The second part reaches to Theodosius II. and follows closely the Ecclesiastical History of Socrates; while the third, extending to Justin II., reproduces the second part of the History of John of Asia or Ephesus, and also contains the well-known chronicle attributed to Joshua the Stylite. The fourth part 3 is not like the others a compilation, but the original work of the author, and reaches to the year 774-775 — apparently the date when he was writing. On the publication of this fourth part by M. Chabot, it was discovered and

clearly proved by Noldeke (Vienna Oriental Journal, x. 160-170), and Nau {Bulletin critique, xvii. 321-327), who independently reached the same conclusion, that Assemani's opinion was a mistake, and that the chronicle in question was the work not of Dionysius of Tell-Mahre but of an earlier writer, a monk of the convent of Zuknin near Amid (Diarbekr) on the upper Tigris. Though the author was a man of limited intelligence and destitute of historical skill, yet the last part of his work at least has considerable value as a contemporary account of events during the middle period of the 8th century. (N. M)

DIONYSIUS THRAX (so called because his father was a Thracian) , the author of the first Greek grammar, flourished about 100 B.C. He was a native of Alexandria, where he attended the lectures of Aristarchus, and afterwards taught rhetoric in Rhodes and Rome. His Tkxvy ypap.p.aTud\, which we possess (though probably not in its original form), begins with the defini- tion of grammar and its functions. Dealing next with accent, punctuation marks, sounds and syllables, it goes on to the different parts of speech (eight in number) and their inflections. No rules of syntax are given, and nothing is said about style. The authorship of Dionysius was doubted by many of the early middle- age commentators and grammarians, and in modern times its origin has been attributed to the oecumenical college founded by Constantine the Great, which continued in existence till 730. But there seems no reason for doubt; the great grammarians of imperial times (Apollonius Dyscolus and Herodian) were acquainted with the work in its present form, although, as was natural considering its popularity, additions and alterations may have been made later. The rexvri was first edited by J. A. Fabricius from a Hamburg MS. and published in his Bibliotheca Graeca, vi. (ed. Harles). An Armenian translation, belonging to the 4th or 5th century, containing five additional chapters, was published with the Greek text and a French version, by M. Cirbied (1 830) . Dionysius also contributed much to the criticism and elucidation of Homer, and was the author of various other works — amongst them an account of Rhodes, and a collection of MeXerai (literary studies) , to which the considerable fragment in the Stromata (v. 8) of Clement of Alexandria probably belongs.

Editions, with scholia, by I. Bekker in Anecdota Graeca, ii. and G. Uhlig (1884), reviewed exhaustively by P. Egenolff in Bursian's Jahresbericht, vol. xlvi. (1888); Scholia, ed. A. Hilgard (1901); see also W. Horschelmann, De Dionysii Thracis interpretibus veteribus (1874) ; J. E. Sandys, Hist, of Classical Scholarship, i. (1906).

DIONYSUS (probably = " son of Zeus," from At6s and vvoos, a Thracian word for " son "), in Greek mythology, originally a nature god of fruitfulness and vegetation, especially of the vine; hence, distinctively, the god of wine. The names Bacchus (Bcucxos, in use among the Greeks from the 5th

2 See the studies by Siegfried and Gelzer, Eusebii canonum epitome ex Dionysii Telmaha,rensis chronico petita (Leipzig, 1884), and von Gutschmid, Untersuchungen ilber die syrische Epitome del Eusebischen Canones (Stuttgart, 1886).

3 Text and translation by J.-B. Chabot (Paris, 1895).

century), Sabazius, and Bassareus, are also Thracian names of the god. The two first (like Iacchus, Bromius and Euios) have been connected with the loud "shout" (craj3&f uv = /3df tiv = eva^ew) of his worshippers, Bassareus with fiaacapai., the fox-skin garments of the Thracian Bacchanals. It has been suggested (J. E. Harrison Prolegomena to Greek Religion) that Sabazius and Bromias= " beer-god," " god of a cereal intoxicant " (cf. Illyrian sabaia and modern Greek /3pw/ii, " oats "), while W. Ridgewap {Classical Review, January 1896), comparing Apollo Smintheus, interprets Bassareus as " he who keeps away the foxes from the vineyards " (for various interpreta- tions of these and other cult-titles, see O. Gruppe, Griechische Mythologie, ii. pp. 1408, 1532, especially the notes).

In Homer, notwithstanding the frequent mention of the use of wine, Dionysus is never mentioned as its inventor or introducer, nor does he appear in Olympus; Hesiod is the first who calls wine the gift of Dionysus. On the other hand, he is spoken of in the Iliad (vi. 130 foil., a passage belonging to the latest period of epic), as " raging," an epithet that indicates that in those comparatively early times the orgiastic character of his worship was recognized. In fact, Dionysus may be regarded under two distinct aspects: that of a popular national Greek god of wine and cheerfulness, and that of a foreign deity, worshipped with ecstatic and mysterious rites introduced from Thrace. Accord- ing to the usual tradition, he was born at Thebes— originally the local centre of his worship in Greece — and was the son of Zeus, the fertilizing rain god, and Semele, the daughter of Cadmus, a personification of earth. Before the child was mature, Zeus appeared to Semele at her request in his majesty as god of

lightning, by which she was killed, but the infant was saved from the flames by Zeus (or Hermes). The epithet irepuaovios, originally referring to an ivy-crowned, pillar-shaped fetish of the god, afterwards gave rise to the legend of a miraculous growth of ivy " round the pillars " of the royal palace, whereby the infant Dionysus was preserved from the flames. Zeus took him up, enclosed him within his own thigh till he came to maturity, and then brought him to the light, so that he was twice born; it was to celebrate this double birth that the dithyrambus (also used as an epithet of the god) was sung (see Etym. Mag. s.v.). It has been suggested that this is an allusion to the couvade of certain barbarous tribes, amongst whom it is customary, when a child is born, for the husband to take to his bed and receive medical treat- ment, as if he shared the pains of maternity (see Couvade, and references there). Dionysus was then conveyed by Hermes to be brought up by the nymphs of Nysa, a purely imaginary spot, afterwards localized in different parts of the world, which claimed the honour of having been the birthplace of the god. As soon as Dionysus was grown up, he started on a journey through the world, to teach the cultivation of the vine and spread his worship among men. While so engaged he met with opposition, even in his own country, as in the case of Pentheus, king of Thebes, who opposed the orgiastic rites introduced by Dionysus among the women of Thebes, and, having been discovered watch- ing one of these ceremonies, was mistaken for some animal of the chase, and slain by his own mother (see A. G. Bather, Journ. Hell. Studies, xiv. 1804). A similar instance is that of Lycurgus, a Thracian king, from whose attack Dionysus saved himself by leaping into the sea, where he was kindly received by Thetis. Lycurgus was blinded by Zeus and soon died, or became frantic and hewed down his own son, mistaking him for a vine. At Orchomenus, the three daughters of Minyas refused to join the other women in their nocturnal orgies, and for this were trans- formed into birds (see Agrionia) . These and similar stories point to the vigorous resistance offered to the introduction of the mystic rites of Dionysus, in places where an established religion already existed. On the other hand, when the god was received hospitably he repaid the kindness by the gift of the vine, as in the case of Icarius of Attica (see Erigone).

The worship of Dionysus was actively conducted in Asia Minor, particularly in Phrygia and Lydia. Here, as Sabazius, he was associated with the.Phrygian goddess Cybele, and was followed in his expeditions by a thiasos (retinue) of centauraand satyrs, with

Pan and Silenus. In Lydia his triumphant return from India was celebrated by an annual festival on Mount Tmolus; in Lydia he

assumed the long beard and long robe which were after- wards given him in his character of the " Indian Bacchus," the conqueror of the East, who, after the campaigns of Alexander, was reported to have advanced as far as the Ganges. The other incidents in which he appears in a purely triumphal character are his transforming into dolphins the Tyrrhene pirates who attacked him, as told in the Homeric hymn to Dionysus and represented on the monument of Lysicrates at Athens, and his part in the war of the gods against the giants. The former story has been connected with the sailors' custom of hanging vine leaves, ivy and bunches of grapes round the masts of vessels in honour of vintage festivals. The adventure with the pirates occurred on his voyage to Naxos, where he found Ariadne abandoned by Theseus. At Naxos Ariadne (probably a Cretan goddess akin to Aphrodite) was associated with Dionysus as his wife, by whom he was the father of Oenopion (wine-drinker), Staphylus (grape), and Euanthes (blooming), and their marriage was annually celebrated by a festival. Having compelled all the world to recognize his divinity, he descended to the underworld to bring up his mother, who was afterwards worshipped with him under the name of Thycne ("the raging"), he himself being called after her Thyoneus.

Another phase in the myth of Dionysus originated in observing the decay of vegetation in winter, to suit which he was supposed to be slain and to join the deities of the lower world. This phase of his character was developed by the Orphic poets, he having here the name of Zagreus (" torn in pieces "), and being no longer the Theban god, but a son of Zeus and Persephone. The child was brought up secretly, watched over by Curetes; but the jealous Hera discovered where he was, and sent Titans to the spot, who, finding him at play, tore him to pieces, and cooked and ate his lirnbs, while Hera gave his heart to Zeus. The tearing in pieces is referred by some to the torture experienced by the grape (Naturschmerz) when crushed for making into wine (cf. Burns's John Barleycorn) ; but it is better to refer it to the tearing of the flesh of the victim at sacrifices at which the deity or the sacred animal was slain, and sacramentally eaten raw (cf. the title wnwrfc given to Dionysus in certain places, probably point- ing to human sacrifice.) To connect this with the myth of the Theban birth of Dionysus, it is said that Zeus gave the child's heart to Semele, or himself swallowed it and gave birth to the new Dionysus (called Iacchus from his worshippers' cry of rejoicing), who was cradled and swung in a winnowing fan (Xkws; see J. E. Harrison, Journ. Hellenic Studies, xxiii.), the swinging being supposed to act as a charm in awakening vegetation from its winter sleep. The conception of Zagreus, or the winter Dionysus, appears to have

originated in Crete, but it was accepted also in Delphi, where his grave was shown, and sacrifice was secretly offered at it annually on the shortest day. The story is in many respects similar to that of Osiris. According to others, Zagreus was originally a god of the chase, who became a hunter of men and a god of the underworld, more akin to Hades than to Dionysus (see also Titans).

Dionysus further possessed the prophetic gift, and his oracle at Delphi was as important as that of Apollo. Like Hermes, Dionysus was a god of the productiveness of nature, and hence Priapus was one of his regular companions, while not only in the mysteries but in the rural festivals his symbol, the phallus, was carried about ostentatiously. His symbols from the animal kingdom were the bull (perhaps a totemistic attribute and identified with him), the panther, the lion, the tiger, the ass, the goat, and sometimes also the dolphin and the snake. His personal attributes are an ivy wreath, the thyrsus (a staff with pine cone at the end), the laurel, the pine, a drinking cup, and sometimes the horn of a bull on his forehead. Artistically he was represented mostly either as a youth of soft, nearly feminine form, or as a bearded and draped man, but frequently also as an infant, with reference to his birth or to his bringing up in " Nysa." His earliest images were of wood with the branches still attached in parts, whence he was called Dionysus Dendrites, an allusion to his

protection of trees generally (according to Pherecydes in C. W. Miiller, Frag. Hist. Graec. iv. p. 637, the word vvcra signified " tree ")• It is suggested that the cult of Dionysus absorbed that of an old tree-spirit. He was figured also, like Hermes, in the form of a pillar or term surmounted by his head. For the connexion of Dionysus with Greek tragedy see Drama.

See Farnell, Cults of the Greek States, v. (1910) ; also O. Rapp, Beziehungen des Dionysuskultus zu Thrahien (1882) ; O. Ribbeck, Anfdnge und Entwickelung des Dionysuskultes in Attica (1869); A. Lang, Myth, Ritual and Religion, ii. p. 241 ; L. Dyer, The Gods in Greece (1891); J. E. Harrison, Prolegomena to the Study of Greek Religion (1903) ; J. G. Frazer, The Golden Bough, ii (1900), pp. 160, 291, who regards the bull and goat form of Dionysus as expressions of his proper character as a deity of vegetation; F. A. Voigt in Roscher's Lexikon der Mythologie ; L. Preller, Griechische Mythologie (4th ed. by C. Robert) ; F. Lenormant (s.v. " Bacchus ")

in Darem- berg and Saglio's Dictionnaire des antiquitis ; O. Kern in Pauly- Wissowa's Realencyclopadie (with list of cult titles) ; W. Pater, Greek Studies (1895); E. Rohde, Psyche, ii., who finds the origin of the Hellenic belief in the immortality of the soul in the " enthusi- astic " rites of the Thracian Dionysus, which lifted persons out of themselves, and exalted them to a fancied equality with the gods; O. Gruppe, Griechische Mythologie und Religions geschichte, ii. (1907), who considers Boeotia, not Thrace, to have been the original home of Dionysus; P. Foucart, " Le Culte de Dionysos en Attique " in Memoires de I'Institut national de France, xxxvii. (1906), who finds the prototype of Dionysus in Egypt. The Great Dionysiak Myth (1877-1878) by R. Brown contains a wealth of material, but is weak in scholarship. For a striking survival of Dionysiac rites in Thrace (Bizye), see Dawkins, in J.H.S. (1906), p. 191.

DIOPHANTUS, of Alexandria, Greek algebraist, probably flourished about the middle of the 3rd century. Not that this date rests on positive evidence. But it seems a fair inference from a passage of Michael Psellus (Diophantus, ed. P. Tannery, ii. p. 38) that he was not later than Anatolius, bishop of Laodicea from a.d. 270, while he is not quoted by Nicomachus (fl. c. a.d. 100), nor by Theon of Smyrna (c. a.d. 130), nor does Greek arithmetic as represented by these authors and by Iamblichus (end of 3rd century) show any trace of his influence, facts which can only be accounted for by his being later than those arith- meticians at least who would have been capable of understanding him fully. On the other hand he is quoted by Theon of Alexandria (who observed an eclipse at Alexandria in a.d. 365); and his work was the subject of a commentary by Theon 's daughter Hypatia (d. 41 5). The Arithmetica, the greatest treatise on which the fame of Diophantus rests, purports to be in thirteen Books, but none of the Greek MSS. which have survived contain more than six (though one has the same text in seven Books). They contain, however, a fragment of a separate tract on Polygonal Numbers. The missing books were apparently lost early, for there is no reason to suppose that the Arabs who translated or commented on Diophantus ever had access to more of the work than we now have. The difference in form and content suggests that the Polygonal Numbers was not part of the larger work. On the other hand the Porisms, to which Diophantus makes three references (" we have it in the Porisms that . . . "), were probably not a separate book but were embodied in the Arithmetica itself, whether placed all together or, as Tannery thinks, spread over the work in appropriate places. The " Porisms " quoted are interesting propositions in the theory of numbers, one of which was clearly that the difference between two

cubes can be resolved into the sum of two cubes. Tannery thinks that the solution of a complete quadratic promised by Diophantus himself (I. def. n), and really assumed later, was one of the Porisms.

Among the great variety of problems solved are problems leading to determinate equations of the first degree in one, two, three or four variables, to determinate quadratic equations, and to inde- terminate equations of the first degree in one or more variables, which are, however, transformed into determinate equations by arbitrarily assuming a value for one of the required numbers, Diophantus being always satisfied with a rational, even if fractional, result and not re- quiring a solution in integers. But the bulk of the work consists of problems leading to indeterminate equations of the second degree, and these universally take the form that one or two (and never more) linear or quadratic functions of one variable x are to be made rational square numbers by finding a suitable value for x. A few problems lead to indeterminate equations of the third and fourth degrees, an easy indeterminate equation of the sixth degree being

*also found. The general type of problem is to find two, three or four numbers such that different expressions involving them in the first and second, and sometimes the third, degree are squares, cubes, partly squares and partly cubes, &c. E.g. To find three numbers such that the product of any two added to the sum of those two gives a square (III. 15, ed. Tannery) ; To find four numbers such that, if we take the square of their sum = *= any one of them singly, all the resulting numbers are squares (III. 22) ; To find two numbers such thai their product = > = their sum gives a cube (IV. 29) ; To find three squ-cres such that their continued product added to any one of them gives a square (V. 21). Book VI. contains problems of finding rational right-angled triangles such that different functions of their parts (the sides and the area) are squares. A word is necessary on Diophantus' notation. He has only one symbol (written somewhat like a final sigma) for an unknown quantity, which he calls apiSubs (defined as " an undefined number of units ") ; the symbol may be a contraction of the initial letters ap, as A v , K K , A K A, &c, are for the powers of the unknown (Siit/a/iis, square; ku/Jos, cube; 8vvaiioiiii>a.uus, fourth power, &c). The only other algebraical symbol is /f> for minus ; plus being expressed by merely writing terms one after another. With one symbol for an unknown, it will easily be understood what scope there is foradroitassumptions, for the required numbers, of expressions in the one unknown which are at once seen to satisfy some of the conditions, leaving only one or two to be satisfied by the particular value of x to be determined. Often assumptions are made which lead to equations in x which*

cannot be solved " rationally," i.e. would give negative, surd or imaginary values; Diophantus then traces how each element of the equation has arisen, and formulates the auxiliary problem of determining how the assumptions must be corrected so as to lead to an equation (in place of the " impossible " one) which can be solved rationally. Sometimes his x has to do duty twice, for different unknowns, in one problem. In general his object is to reduce the final equation to a simple one by making such an assumption for the side of the square or cube to which the expression in x is to be equal as will make the necessary number of coefficients vanish. The book is valuable also for the propositions in the theory of numbers, other than the "porisms," stated or assumed in it. Thus Diophantus knew that no number of the form 8n+7 can be the sum of three squares. He also says that, if 2»+i is to be the sum of two squares, n must not be odd " (i.e. no number of the form 4n+3, or 4n — 1, can be the sum of two squares), and goes on to add, practically, the condition stated by Fermat, " and the double of it [n] increased by one, when divided by the greatest square which measures it, must not be divisible by a prime number of the form 471 — I," except for the omission of the words " when divided . . . measures it."

Authorities. — The first to publish anything on Diophantus in Europe was Rafael Bombelli, who embodied in his Algebra (1572) all the problems of Books I.— IV. and some of Book V., interspersing them with his own problems. Next Xylander (Wilhelm Holzmann) published a Latin translation (Basel, 1575), an altogether meritorious work, especially having regard to the difficulties he had with the text of his MS. The Greek text was first edited by C. G. Bachet (Diophanti Alexandrini arilhmeticorum libri sex, et de numeris multangulis liber unus, nunc primum graece et latine editi atque absolulissimis commentariis illustrati . . . Lutetiae Parisiorum . . . MDCXXL). A reprint of 1670 is only valuable because it contains P. de Fermat's notes; as far as the Greek text is concerned it is much inferior to the 6ther. There are two German translations, one by Otto Schulz (1822) and the other by G. Wertheim (Leipzig, 1890), and an English edition in modern notation (T. L. Heath, Diophantos of Alexandria: A Study in the History of Greek Algebra (Cambridge, 1885). The Greek text has now been definitively edited (with Latin translation, Scholia, &c.) by P. Tannery (Teubner, voi. i., 1893; vol. ii., 1895). General accounts of Diophantus' work are to be found in H. Hankel and M. Cantor's histories of mathematics, and more elaborate analyses are those of Nesselmann (Die Algebra der Griechen, Berlin, 1842) and G. Loria (Le Scienze esalte nell' antica Grecia, libro v., Modena, 1902, pp. 95-158). (T. L. H.)

DIOPSIDE, an important member of the pyroxene group of rock-forming minerals. It is a calcium-magnesium metasilicate, CaMg (Si0 3) 2 , and crystallizes in the monoclinic system. Usually some iron is present replacing magnesium, and when this pre- dominates there is a passage to hedenbergite, CaFe(Si0 3) 2 , a closely allied variety of monoclinic pyroxene. These are distin- guished from augite by containing little or no aluminium. Diopside is colourless, white, pale green to dark green or nearly black in colour, the depth of the colour depending on the amount of iron present. The specific gravity and optical constants also vary with the chemical composition; the sp. gr. of diopside is 3-2, increasing to 3-6 in hedenbergite, and the angle of optical extinction in the plane of symmetry varies between 38 and 47° in the two extremes of the series. Crystals are usually prismatic in habit with a rectangular cross-section as shown in the figure: the angle between the prism faces m, parallel to which there are perfect cleavages, is 92 50'.

Several varieties, depending on differences in structure and chemical composition, have been distinguished, viz. coccolite (from kokkos, a grain), a granular variety; salite or sahlite, from Sala in Sweden; malacolite; diallage; violane, a lamellar variety of a dark violet-blue colour; chrome-diopside, a bright green variety containing a small amount of chromium; and many others. Belonging to the same series with diopside and hedenbergite is & , manganese pyroxene, known as schefierite, which has the composition (Ca, Mg) (Fe, Mn) (Si0 3) 2 .

Diopside is the characteristic pyroxene of metamorphic rocks, occurring especially in crystalline limestones, and often in association with garnet and epidote. It is also an essential constituent of some pyroxene-granites, diorites and a few other igneous rocks, but the characteristic pyroxene of this class of rocks is augite. Fine transparent crystals of a pale green colour occur, with crystals of yellowish-red garnet (hessonite) and chlorite, in veins traversing serpentine in the Ala valley near Turin in Piedmont: a crystal of this variety (" alalite ") is represented in the accompanying figure. These, as well as the long, transparent, bottle-green crystals from the Zillerthal in the Tyrol, have occasionally been cut as gem-stones. Good crystals have been found also at Achmatovsk near Zlatoust in the Urals, Traversella near Ivrea in Piedmont (" traversellite "), Nordmark in Sweden, Monroe in New York, Burgess in Lanark county, Ontario, and several other places:

at Nordmark the large, rectangular black crystals occur with magnetite in the iron mines. (L. J. S.)

DIOPTASE, a rare mineral species consisting of acid copper orthosilicate, H 2 CuSi0 4 , crystallizing in the parallel-faced hemi-hedral class of the rhombohedral system. The degree of sym- metry is the same as in the mineral phenacite, there being orly an axis of triad symmetry and a centre of symmetry. The crystals have the form of a hexagonal prism m terminated by a rhombohedron r, the alter-nate edges between these being sometimes re- placed by the faces of a rhombohedron s. The faces are striated parallel to the edges between r, s and m. There are perfect cleavages parallel to the faces of a rhombohedron which truncate the polar edges of r: from the cleav-age cracks internal reflections are often to be seen in the crystal, and it was on account of this that the mineral was named dioptase, by R. J. Haiiy in 1797, from dioirreveiv, " to see into." The crystals vary from transparent to translucent with a vitreous lustre, and are bright emerald-green in colour; they thus have a certain resemblance to emerald, hence the early name emerald-copper (German, Kupjer-Smaragd) . Hardness 5; sp. gr. 3-3. The mineral is decomposed by hydrochloric acid with separation of gelatinous silica. At a red heat it blackens and gives off water. The fine crystals from Mount Altyn-Tiibe on the western slopes of the Altai Mountains in the Kirghiz Steppes, Asiatic Russia, line cavities in a compact limestone; they were first sent to Europe in 1785 by Achir Mahmed, a Bucharian merchant, after whom the mineral has been named archirite. More recently, in 1890, good crystals of similar habit, but rather darker in colour, have been found with quartz and malachite near Komba in the French Congo. As drusy crystalline crusts it has} been found at Copiapo in Chile and in Arizona.

Dioptase has occasionally been used as a gem-stone, especially in Russia and Persia; it has a fine colour, but a low degree of hardness and the transparency is imperfect. (L. J. S.)

DIORITE (from the Gr. Siopifeie to distinguish, from

5td through, opos, a boundary), in petrology, the name given

by Haiiy to a family of rocks of granitic texture, composed of

plagioclase felspar and hornblende. As they are richer in the dark

via. 10

coloured ferromagnesian minerals they are usually grey or dark grey,

and have a higher specific gravity than granite. They also rarely show visible quartz. But there are diorites of many kinds, as the name applies rather to a family of rocks than to a single species. Some contain biotite, others augite or hypersthene; many have a small amount of quartz. Orthoclase is rarely entirely absent, and when it is fairly common the rock becomes a tonalite; in this way a transition is furnished between diorites and granites. It is rare to find the pure types of " hornblende- diorite," " augite-diorite," &c, but in most cases the rocks contain two or more ferromagnesian silicates, and such combina- tions as " hornblende-biotite-diorite " are commonest in nature.

The felspar of the diorites ranges in composition from oligoclase to labradorite, and is often remarkably zonal, the external layers being more alkaline than the internal. Small fluid enclosures and blacb grains, probably iron oxides, often occur in it in great numbers. Weathering produces epidote, calcite, sericite and kaolin. The biotite is always brown or yellow; the hornblende usually green, but sometimes brown or yellowish brown in those diorites which have affinities to lamprophyres. The augite is nearly always green but sometimes has a reddish tinge; bronzite and hypersthene have their usual green and brown shades. Apatite, iron oxides and zircon are almost invariably present; sphene, garnet and orthite are occasionally observed; calcite, chlorite, muscovite, kaolin, epidote and bastite are secondary. The structure is not essentially different from that of granite. The ferromagnesian minerals crystallize comparatively early and have some idiomorphism; the felspar usually follows and only in part shows good crystalline outlines. Orthoclase and quartz, if present, are last to separate out, and fill the spaces between the other minerals; often they interpenetrate to form micropegmatite. In many diorites the plagioclase felspar has crystallized before the hornblende, which consequently has less perfect outlines and forms irregular plates which enclose sharply formed individuals of felspar. This produces the ophitic structure (very common also in the dolerites). More rarely biotite and augite exhibit the same relations to the plagioclase. Orbicular structure also occasionally appears in these rocks; in fact the orbicular diorite of Corsica (also called " Napoleonite " or " Corsite ") was for a long time the best-known example of this structure. The rock seems composed of spheroids, about an inch in diameter, surrounded by a smaller amount of dark-coloured dioritic matrix. The spheroids have a radiate structure and often show concentric dark and pale shells. These consist of hornblende (dark green) and basic plagioclase felspar, labradorite and bytownite (grey or nearly white).

Occasionally diorites have a parallel banded or foliated structure, but these must not be confounded with the epidiorites, which are metamorphic rocks and also have a conspicuous foliation.

Diorites must also be distinguished from hornblendic gabbros, which contain more basic felspars, rarely quartz and occasionally olivine; but the boundary lines between diorites and gabbros are admittedly somewhat vague, e.g. some authors would call rocks gabbro which others would regard as augite-diorite. The horn- blendites differ from the diorites in containing little felspar, and consist principally of hornblende. Among varietal designations given to rocks of the diorite family are " banatite " for an augite- diorite with or without quartz (from the Schemnitz district), " granodiorite " for a quartz-hornblende-diorite (essentially the same as tonalite) from California, &c, " adamellite " for the quartz-mica-diorite or tonalite of Monte Adamello (Alps), " ornite " for a hornblende-diorite rich in felspar, from Sweden.

(J. S. F.)

DIP (Old Eng. dyppan, connected with the common Teutonic root seen in " deep "), the angle which the magnetic needle makes with the horizon. A freely suspended magnetic needle will not maintain a horizontal position except at the magnetic equator. Over the N. magnetic pole the north-seeking end of the needle points directly downwards and dips at an intermediate angle at intermediate distances between the magnetic poles and equator. There are secular progressive variations of dip as well as of declination and the maxima are independent of each other. In

1576 the dip at London was 71° 50', in 1720 (max.) 74 42', in 1000 67 9'. (For Dip Circle see Inclinometer.)

DIPHENYL (phenyl benzene), CeHs.CeHs, a hydrocarbon found in that fraction of the coal-tar distillate boiling between 240-300 C, from which it may be obtained by warming with sulphuric acid, separating the acid layer and strongly cooling the undissolved oil. It may be artificially prepared by passing benzene vapour through a red-hot tube; by the action of sodium on brombenzene dissolved in ether; by the action of stannous chloride on phenyldiazonium

chloride; or by the addition of solid phenyldiazonium sulphate to warm benzene (R. Mohlau, Berichte,

1893, 26, 1997) C 6 H5N2-HS04 + C6H 6 = H2S04 + N2 + C6H5-C6H5.

L. Gattermann {Berichte, 1890, 23, 1226) has also prepared it by the decomposition of a solution of phenyldiazonium sulphate with alcohol and copper powder. It crystallizes in plates (from alcohol) melting at 70-7 i°C. and boiling at 2 S4°C. It is oxidized by chromic acid in glacial acetic acid solution to benzoic acid, dilute nitric acid and chromic acid mixture being without effect. It is not reduced by hydriodic acid and phosphorus, but sodium in the presence of amyl alcohol reduces it to tetrahydrodiphenyl C12H14.

Many substitution derivatives are known: the monosubstitution derivatives being capable of existing in three isomeric forms. Of the disubstitution derivatives the most important are those derived from diparadiaminodiphenyl or benzidine (q.v.).

NH 2

*_ l_*

Orthoaminodiphenyl, <^> — <^>, is prepared by the action of

bromine and caustic soda on orthophenylbenzamide (R. Hirsch, Berichte, 1892, 2$, 1974); when its vapour is passed over heated lime, carbazol {q.v.) is formed.

NH 2 NH 2

J L

Diorthodiaminodiphenyl, <^> — <^>,isobtainedbythereduc-

tion of the corresponding nitro compound (obtained by the action of ethyl nitrite at 0° C. on metadinitrobenzidine hydrochloride). Its tetrazo compound on reduction gives a hydrazine which, on warming with hydrochloric acid at 150 C, decomposes into ammonium N = N

l J

chloride and phenazone, <^_^>— <^_^> (Ci 2 H 8 N 2). One of the

most important derivatives of diphenyl, from the theoretical point of view, is diphenic acid or diorthodiphenyl carboxylic acid, which can

be obtained from_ diparadiaminodiphenyldiorthocarboxylic acid, HjN<'— < ˆ> NH 2 ,orfrom phenanthrene {q.v.), the consti- .

HOOC COOH

tution of which it determines. See Benzidine for diparadiamino-diphenyl.

DIPHILUS, of Sinope, poet of the new Attic comedy and contemporary of Menander (342-291 B.C.). Most of his plays were written and acted at Athens, but he led a wandering life, and died at Smyrna. He was on intimate terms with the famous courtesan Gnathaena (Athenaeus xiii. pp. 579, 583). He is said to have written 100 comedies, the titles of fifty of which are preserved. He sometimes acted himself. To judge from the imitations of Plautus. {Casina from the Kkˆpov/javoi, Asinaria from the 'Ojˆos, Rudens from some other play), he was very skilful in the construction of his plots. Terence also tells us that he introduced into the Adelphi (ii. 1) a scene from the Xvvairodvr)- cKovrts, which had been omitted by Plautus in his adaptation {Commorientes) of the same play. The style of Diphilus was simple and natural, and his language on the whole good Attic; he paid great attention to versification, and was supposed to have invented a peculiar kind of metre. The ancients were undecided whether to class him among the writers of the New or Middle comedy. In his fondness for mythological subjects {Hercules, Theseus) and his introduction on the stage (by a bold ana- chronism) of the poets Archilochus and Hipponax as rivals of Sappho, he approximates to the spirit of the latter.

Fragments in H. Koch, Comicorum Atticorunj. fragmenta, ii. ; see J. Denis, La Comedie grecque (1886), ii. p. 414; R. W. Bond in Classical Review (Feb. 1910, with trans, of Emporos fragm.).

DIPHTHERIA (from Siˆepa, a skin or membrane), the term applied to an acute infectious disease, which is accompanied by

a membranous exudation on a mucous surface, generally on the tonsils and back of the throat or pharynx.

In general the symptoms at the commencement of an attack of diphtheria are comparatively slight, being those commonly accompanying a cold, viz. ohilliness and depression. Sometimes more severe phenomena usher in the attack, such as vomiting and diarrhoea. : A slight feeling of uneasiness in the throat is ex- perienced along with some stiffness of the back of the neck. When

looked at the throat appears reddened and somewhat swollen, particularly in the neighbourhood of the tonsils, the soft palate and upper part of pharynx, while along with 'this there is tender- ness and swelling of the glands at the angles of the jaws. The affection of the throat spreads rapidly, and soon the character- istic exudation appears on the inflamed surface in the form of greyish-white specks or patches, increasing in extent and thickness untilayellowish-looking false membrane isformed. This deposit is firmly adherent to the mucous membrane beneath or in- corporated with it, and if removed leaves a raw, bleeding, ulcerated surface, upon which it is reproduced in a short period. The appearance of the exudation has been compared to wet parchment or washed leather, and it is more or less dense in texture. It may cover the whole of the back of the throat, the cavity of the mouth, and the posterior nares, and spread down- wards into the air-passages on the one hand and into the ali- mentary canal on the other, while anywound on the surface of the body is liable to become covered with it. This membrane is apt to be detached spontaneously, and as it loosens it becomes decomposed, giving a most offensive and characteristic odour to the breath. There is pain and difficulty in swallowing, but unless the disease has affected the larynx no affection of the breathing. The voice acquires a snuffling character. When the disease invades the posterior nares an acrid, fetid discharge, and some- times also copious bleeding, takes place from the nostrils. Along with these local phenomena there is evidence of constitutional disturbance of the most severe character. There may be no great amount of fever, but there is marked depression and loss of strength. The pulse becomes small and frequent, the countenance pale, the swelling of the glands of the neck increases, which, along with the presence of albumen in the urine, testifies to a condition of blood poisoning. Unless favourable symptoms emerge death takes place within three or four days or sooner, either from the rapid extension of the false membrane into the air-passage, giving rise to asphyxia, or from a condition of general collapse, which is sometimes remarkably sudden. In cases of recovery the change for the better is marked by an arrest in the extension of the false membrane, the detachment and expectoration of that already formed, and the healing of the ulcerated mucous membrane beneath. Along with this there is a general improvement in the symptoms, the power of swallowing returns, and the strength gradually increases, while the glandular enlargement of the neck diminishes, and the albumen disappears from the urine. Recovery, however, is generally slow, and it is many weeks before full convalescence is established. Even, however, where diphtheria ends thus favourably, the peculiar sequelae already mentioned are apt to

follow, generally within a period of two or three weeks after all the local evidence of the disease has dis- appeared. These secondary affections may occur after mild as well as after severe attacks, and they are principally in the form of paralysis affecting the soft palate and pharynx, causing difficulty in swallowing with regurgitation of food through the nose, and giving a peculiar nasal character to the voice. There are, how- ever, other forms of paralysis occurring after diphtheria,especially that affecting the muscles of the eye, which produces a loss of the power of accommodation and consequent impairment of vision. There may be, besides, paralysis of both legs, and occasionally also of one side of the body (hemiplegia). These symptoms, however, after continuing for a variable length of time, almost always ultimately disappear.

Under the name of the Malum Egyptiacum, Aretaeus in the 2nd century gives a minute description of a disease which in all its essential characteristics corresponds to diphtheria. In the i6th, 17 th and 1 8th centuries epidemics of diphtheria appear to have-

frequently prevailed in many parts of Europe, particularly in Holland, Spain, Italy, France, as well as in England, and were described by physicians belonging to those countries under various titles; but it is probable that other diseases of a similar nature were included in their descriptions, and no accurate account of this affection had been published till M. Bretonneau of Tours in 1821 laid his celebrated treatise on the subject before the French Academy of Medicine. By him the term La Diphtherite was first given to the disease.

Great attention has been paid to diphtheria in recent years, with some striking results. Its cause and nature have been definitely ascertained, the conditions which influence its pre- valence have been elucidated, and a specific " cure " has been found. In the last respect it occupies a unique position at the present time. In the case of several other zymotic diseases much has been done by way of prevention, little or nothing for treat- ment ; in the case of diphtheria prevention has failed, but treat- ment has been revolutionized by the introduction of antitoxin, which constitutes the most important contribution to practical medicine as yet, made by bacteriology.

The exciting cause of diphtheria is a micro-organism, identified by

Klebs and Loffler in 1883 (see Parasitic Diseases). It Causation. ˆ as Deen shown by experiment that the symptoms of diphtheria, including the after-effects, are produced by a toxin derived from the micro-organisms which lodge in the air- passages and multiply in a susceptible subject. The natural history of the organism outside the body is not well understood, but there is some reason to believe that it lives in a dormant condition in suitable soils. Recent research does not favour the theory that it is derived from defective drains or " sewer gas," but these things, like damp and want of sunlight, probably promote its spread, by lowering the health of persons exposed to them, and particularly by causing an unhealthy condition of the throat, rendering it susceptible to the contagion. Defective drainage, or want of drainage, may also act, by polluting the ground, and so providing a favourable soil for the germ, though it is to be noted that " the steady increase in the diphtheria mortality has coincided, in point of time, with steady improve- ment in regard of such sanitary circumstances as water supply, sewerage, and drainage " (Thome Thome). Cats and cows are susceptible to the diphtheritic bacillus, and fowls, turkeys and other birds have been known to suffer from a disease like diphtheria, but Other domestic animals appear to be more or less resistant or immune. In human beings the mere presence of the germ is not sufficient to cause disease; there must also be susceptibility, but it is not known in what that consists. Indi- viduals exhibit all degrees of resistance up to complete immunity. Children are far more susceptible than adults, but. even children may have the Klebs-Loffler bacillus in their throats without showing any symptoms of illness. Altogether there are many obscure points about this micro-organism, which is. apt to assume a puzzling variety of forms. Nevertheless its identification has greatly facilitated the diagnosis of the disease, which was previ- ously, a very difficult matter, often determined in an arbitrary fashion on no particular principles.

Diphtheria, as at present understood, may be defined as sore throat in which the bacillus is found; if it cannot be found, the illness is regarded as something else, unless the clinical symptoms are quite unmistakable. One result of this is a large transference of registered mortality from Other throat affections, and particti- ' larly from croup, to diphtheria. Croup, which never had a well- defined application, and is not recognized by the College of Physicians as a synonym for diphtheria, appears to be dying out from the medical vocabulary in Great Britain. In France the distinction has never been recognized.

Diphtheria is endemic in all European and American countries, and

is apparently increasing, but the incidence varies greatly. It is far more prevalent on the continent than; in England, and still more so in the United States and Canada. The following table, compiled from figures collected by Dr Nev/sholme, shows – how London compares with some foreign cities. The figures give the mean death-rate from

New York

. 161.0

Munich .

Chicago

. 1400

Milan .

Buenos Aires •• . . 1360

Florence.

Trieste

. 1300

Vienna .

Dresden

. 1290

Stockholm

Berlin

. 1 190

St Petersburg

Boston

. 1 160

Moscow .

Marseilles

. 1 130

Paris

Christiania

. 1090

Hamburg

Budapest

. . . 1880

London .

Preva^ lence.

diphtheria and croup for the term of years during which records have been kept. The period varies in different cases, and there- fore the comparison is only a rough one.

Mean Death-Rales from Diphtheria and Croup per Million living.

990 990 830 770 720 650 640 630 490 386

There is comparatively little diphtheria in India and Japan, but in Egypt, the Cape and Australasia it prevails very extensively among the urban populations. The mortality varies greatly from year to year in all countries and cities. In Berlin, for instance, it has oscillated between a maximum of 2420 in 1883 and a minimum of 340 in 1896; in New York between 2760 in 1877 and 680 in 1868; in Christiania between 3290 in 1887 and 170 in 1871. In some American cities still higher maxima have been recorded. In other

words, diphtheria, though always endemic, exhibits at times a great increase of activity, and becomes epidemic or even pandemic. The following table for 1859-99 shows fairly well the periodical rise and fall in England and Wales. Diphtheria and croup are given both separately and together, showing the increasing transference from one to the other of late years. Diphtheria was first entered separately in the year 1859.

Deaths from Diphtheria and Croup per Million living in England and Wales.

Years.

Diphtheria.

Croup.

Diphtheria and Croup.

1859

517

286

803

i860

261

220

481

1861-70 . . .

185

246

431

1871-80 .

121

168

289

1881-90 .

163

144

3°7

1891-95 .

254

70

324

1896-97 .

269

43

312

1898

244

27

271

1899

293

32

j 325

The combined figures for diphtheria and croup in later years are : —

(1900) 316; (1901) 296; (.1902) 255; (1903) 195; (1904) 184; (1905) 174; (1906) 190; (1907) 175; (1908) 166.

Several facts are roughly indicated by the table. It begins with an

extremely severe epidemic, which has not been ap- proached since. Then follows a fall extending over twenty years. On the whole this diminution was progressive, though not in reality so steady as the decennial grouping makes it appear, being interrupted by smaller oscillations in single years and groups of years. Still the main fact holds good. After 1880 an opposite movement began, likewise interrupted by minor oscillations, but on the whole progressive, and culminating in the year 1893 with a death-rate of 389, the highest recorded since 1865. After 1896 a marked fall again took place. This is partly accounted for by the use of antitoxin, which only began on a considerable scale in 1895, and did not become general until a year or two later at least. Its effects were only then fully felt. The registrar- general's returns record mortality, not prevalence — that is to say, the number of • deaths, not of cases.

On the whole, we get clear evidence of an epidemic rise and fall, which may serve to dispose of some erroneous conceptions. The belief, held until recently, that diphtheria is steadily increasing in Great Britain was obviously premature; it did rise over a series of years, but has now ebbed again. Moreover, the general prevalence during the last thirty years has been notably less than in the previous twelve years. Yet it is during years since 1870 that compulsory education has been in existence and main drainage chiefly carried out. It follows that neither school attendance nor sewer gas exercises such an important influence over the epidemicity of diphtheria as some other conditions.

What are those conditions ? " Dr Newsholme has advanced the theory, based on an elaborate examination of statistics in various countries, that the activity of diphtheria is connected with the rainfall, and he lays down the following general induction from the facts: " Diphtheria only becomes epidemic in years in which the rainfall is deficient, and the epidemics are on the largest scale when three or more years of deficient rainfall fqllow each other." He points out that the comparative rarity of diphtheria in tropical climates, which are characterized by excessive rainfall, and its greater prevalence in continental than in insular countries, confirm his theory. His observations seem quite contrary to the view laid down by various authorities, and hitherto accepted, that wet weather favours diphtheria. The two, however, are not irreconcilable. The key to the problem — and possibly to many other epidemiological

problems — may perhaps be found in the movements of the subsoil water. It has been suggested by different observers, and particularly by Mr M. A. Adams, who has for some years made a study of the subsoil water at Maidstone, that there is a definite connexion between it and diphtheria. In England the underground water normally reaches its lowest level at the end of the summer; then it gradually rises, fed by percola- tion from the winter rains, reaching a maximum level about the end of March, after which it gradually sinks. This maximum level Mr Adams calls the annual spring cleaning of the soil, and his observations go to show that when the normal movement is arrested or disturbed, diphtheria becomes active. Now that is what happens in periods of drought. The underground water does not rise to its usual level, and there is no spring 1 cleaning. The hypothesis, then, is this: The diphtheria bacillus lives in the soil, but is " drowned out " in wet periods by the subsoil water. In droughty ones it lives and flourishes in the warm, dry soil; then when rain comes, it is driven out with the ground air into the houses. This process will continue for some time, so that epidemic outbreaks may well seem to be associated with wet. But they begin in drought, and are stopped by long-continued periods of copious rainfall. This is quite in keeping with the observed fact that diphtheria is a seasonal disease, always most prevalent in the last quarter of the year. The summer develops the poison in the soil, the autumnal rains bring it out. The fact that the same cause does not produce the same effect in tropical countries may perhaps be explained by the extreme violence of the alternations, which are too great to suit this particular micro-organism, or possibly the regularity of the rainfall prevents its development.

The foregoing hypothesis is supported by a good deal of evidence, and notably by the concurrence of the great epidemic or pandemic prevalence in Great Britain, culminating in 1859, witha prolonged period of exceptionally deficient rainfall. Again, the highest death-rate registered since 1865 was in 1893, a year of similarly exceptional drought. But it is no more than an hypothesis, and the fate of former theories is a warning against drawing conclusions from statistics and records extending over too short a period of time. The warning is particularly necessary in connexion with meteorological conditions, which are apt to upset all calculations. As it happens, a period of deficient rain- fall even greater than that of 1854-1858 has recently been experienced. It began in 1893 and culminated in the extra- ordinary season of 1899. The dry years were 1893, 1895, 1896, 1898 and 1899, an(l the deficiency of rainfall was not made good by any considerable excess in 1894 and

1897. It surpassed all records at Greenwich; streams and wells ran dry all over the country, and the flow of the Thames and Lea was reduced to the lowest point ever recorded. There should be, according to the theory, at least a very large increase in the prevalence of diphtheria. To a certain extent it has held good. There was a marked rise in 1893-1896 over the preceding period, though not so large as might have been expected, but it was followed by a decided fall in 1897-1898. The experience of 1898 contradicts, that of 1899 supports, the theory. Further light is therefore required; but perhaps the failure of the recent drought to produce results at all comparable with the epidemic of the 'fifties may be due to variations in the resistance of the disease, which differs widelv in different years. It may also be due in part to improved

sanitation, to the notification of infectious diseases, the use of isolation hospitals, which have greatly developed in quite recent years, and, lastly, to the beneficial effects of antitoxin. If these be the real explanations, then scientific and administrative work has not been thrown away after all in combating this very painful and fatal enemy of the young.

The conditions governing the general prevalence of diphtheria, and its epidemic rise and fall, which have just been discussed, do not touch the question of actual dissemination. The contagion is spread by means which are in constant tattoo" operation, whether the general amount of disease is great or small. Water, so important in some epidemic diseases, is believed not to be one of them, though a negative proof based on absence of evidence cannot be accepted as conclusive. Cn the other hand, milk is undoubtedly a means of dissemination. Several outbreaks of an almost explosive character, besides minor extensions of disease from one place to another, have been traced to this cause. Milk may be contaminated in various ways — at the dairy, for instance, or on the way to customers, — but several cases, investigated by the officers of the Local Government Board and others, have been thought to point to infection from cows suffering from a diphtheritic affection of the udder. The part played by aerial convection is undetermined, but there is no reason to suppose that the infecting material is conveyed any distance by wind or air currents. Instances which seem to point to the contrary may be explained in other ways, and particularly by the fact, now fully demonstrated, that persons suffering from minor sore throats, not recognized as diphtheria, may carry the disease about and introduce it into other localities. Human intercourse is the most important means of dissemination, the contagion passing from person to person either by actual contact, as in kissing, or by the use of the same

utensils and articles, or by mere proximity. In the last case the germs must be supposed to be air-borne for short distances, and to enter with the breath. Rooms appear liable to become infected by the presence of diphtheritic cases, and so spread the disease among other persons using them. At a small outbreak which occurred at Darenth Asylum in 1898 the infection clung obstinately to a particular ward, in spite of the prompt removal of all cases, and fresh ones continued to occur until it had been thoroughly disinfected, after which there were no more. The part played by human inter- course in fostering the spread of the disease suggests that it would naturally be more prevalent in urban communities, where people congregate together more, than in rural ones. This is at variance with the conclusion laid down by some authorities, that in this country diphtheria used to affect chiefly the sparsely populated districts, and though tending to become more urban, is still rather a rural disease. That view is based upon an analysis of the distribution by counties in England and Wales from 1855 to 1880, and it has been generally accepted and repeated until it has become a sort of axiom. Of course the facts of distribution are facts, but the general inference drawn from them, that diphtheria peculiarly affects the country and is changing its habitat, may be erroneous. Dr Newsholme, by taking a wider basis of experience, has arrived at the opposite conclusion, and finds that diphtheria does not, in fact, flourish more in sparsely-peopled districts. " When a sufficiently long series of years is taken," he says, " it appears clear that there is more diphtheria in urban than in rural communities." The rate for London has always been in excess of that for the whole of England and Wales. Its distribution at any given time is determined by a number of circumstances, and by their incidental co-operation, not by any property or predilection for town or country inherent in the disease. There are the epidemic conditions of soil and rainfall, previously discussed, which vary widely in different localities at different times; there is the steady influence of regular intercourse, and the accidental element of special distribution by various means. These things may combine to alter the incidence. In short, accident plays too great a part to permit any general conclusion to be drawn from distribution, except from a very wide basis of experience. The variations are very great and sometimes very sudden. For instance, the county of London for some years headed the list,

having a far higher death-rate than any other. In 1 898 it dropped to

the fifth place, and was surpassed by Rutland, a purely rural county, which had the lowest mortality of all in the previous year and very nearly the lowest for the previous ten years. Again, South Wales, which had had a low mortality for some years, suddenly came into prominence as a diphtheria district, and in 1898 had the highest death-rate in the country. Staffordshire and Bedfordshire show a similar rise, the one an urban, the other a rural, county. All the northern counties, both rural and urban, —namely, Northumberland, Durham, Cumberland, Westmorland, Lancashire, Yorkshire, Cheshire and Lincolnshire,— had a very high rate in 1861-1870, and a low one in 1896-1898. It is obviously unsafe to draw general conclusions from distribution data on a small scale. Diphtheria appears to creep about very slowly, as a rule, from place to place, and from one part of a large town to another; it forsakes one district and appears in another; occasionally it attacks a fresh locality with great energy, pre- sumably because the local conditions are exceptionally favourable, which may be due to the soil or, possibly, to the susceptibility of the inhabitants, who are, so to speak, virgin ground. But through it all personal infection is the chief means of spread.

The acceptance of this doctrine has directed great attention to the practical question of school influence. There is no doubt whatever that it plays a very considerable part in spreading diphtheria. The incidence of the disease is chiefly on children, and nothing so often and regularly brings large numbers together in close contact under the same roof as school attendance. Nothing, in fact, furnishes such constant and extensive oppor- tunities for personal infection. Many outbreaks have definitely been traced to schools. In London the subject has been very fully investigated by Sir Shirley Murphy, the medical officer of health to the London County Council, and by Dr W. R. Smith, formerly medical officer of health to the London School Board. Sir Shirley Murphy has shown that a special incidence on children of school age began to manifest itself after the adoption of compulsory education, and that the summer holidays are marked by a distinct diminution of cases, which is succeeded by an increase on the return to school. Dr W. R. Smith's observations are directed rather to minimizing the effect of school influence, and to showing that it is less important than other factors; which is doubtless true, as has been already remarked. It appears that the heaviest incidence falls upon infants under school age, and that liability diminishes progressively after school age is reached. But this by no means disposes of the importance of school influence, as the younger children at home may be infected by older ones, who have picked up

the contagion at school, but, being less susceptible, are less severely affected and exhibit no worse symptoms than a sore throat. From a practical point of view the problem is a difficult one to deal with, as it is virtually impossible to ensure the exclusion of all infection, on account of the deceptively mild forms it may assume; but considering how very often outbreaks of diphtheria necessitate the closing of schools, it would probably be to the advantage of the authorities to discourage, rather than to compel, the attendance of children with sore throats. A fact of some interest revealed by statistics is that in the earliest years of life the incidence of diphtheria is greater upon male than upon female children, but from three years onwards the position is reversed, and with every succeeding year the relative female liability becomes greater. This is prob- ably due to the habit of kissing maintained among females, but more and more abandoned by boys from babyhood onwards.

All these considerations suggest the importance of segregating the sick in isolation hospitals. Of late years this preventive measure has been carried out with increasing efficiency, owing to the better provision of such hospitals and the greater willingness of the public to make use of them; and probably the improve- ment so effected has had some share in keeping down the prevalence of the disease to comparatively moderate proportions. Unfortunately, the complete segregation of infected persons is hardly possible, because of the mild symptoms, and even absence of symptoms, exhibited by some individuals. A further difficulty arises with reference to the discharge of patients. It has been

proved that the bacillus may persist almost indefinitely in the air-passages in certain cases, and in a considerable proportion it does persist for several weeks after convalescence. On returning home such cases may, and often do, infect others.

Since the antitoxin treatment was introduced in 1894 it has overshadowed all other methods. We owe this drug originally to the Berlin school of bacteriologists, and particularly Treatment. to Dr Behring. The idea of making use of serum arose about 1890, out of researches made in connexion with Mechnikov's theory of phagocytosis, by which is meant the action of the phagocytes or white corpuscles of the blood in destroying the bacteria of disease. It was shown by the German bacteriologists that the serum or liquid part of the blood plays an equally or more important part in resisting disease, and the idea of combating the toxins produced by pathogenic bacteria with resistant serum injected into the blood presented itself to several workers. The idea was followed up and worked out

independently in France and Germany, so successfully that by the year 1894 the serum treat- ment had been tried on a considerable scale with most encourag- ing results. Some of these were published in Germany in the earlier part of that year, and at the International Hygienic Congress, held in Budapest a little later, Dr Roux, of the Institut Pasteur, whose experience was somewhat more extensive than that of his German colleagues, read a paper giving the result of several hundred cases treated in Paris. When all allowance for errors had been made, they showed a remarkable and even astonishing reduction of mortality, fully confirming the con- clusions drawn from the German experiments. This consensus of independent opinion proved a great stimulus to further trial, and before long one clinique after another told the same tale. The evidence was so favourable that Professor Virchow — the last man to be carried away by a novelty — declared it " the imperative duty of medical men to use the new remedy " {The Times, 19th October 1894). Since then an enormous mass of facts has accumulated from all quarters of the globe, all testifying to the value of antitoxin in the treatment of diphtheria. The experience of the hospitals of the London Metropolitan Asylums Board for five years before and after antitoxin may be given as a particularly instructive illustration; but the subsequent reduction in the rate of mortality (12 in 1900, 11-3 in 1901, io-8 in 1902, 9-3 in 1903, and an average of 9 in 1904-1908) added further confirmation.

Annual Case Mortality in Metropolitan Asylums Board's Hospitals.

Before Antitoxin.

Mortality Year. per cent.

1800 . . . 33-55

1891 . . . 30-61

1892 . . . 29-51

1893 . . . 30-42

1894 . . . 29-29

After Antitoxin.

' Mortality Year. per cent.

1895 • • 22-85

1896 . . . 21-20

1897 . . . 17-79

1898 . . . 15-37

1899 ■ ■ • 13-95

The number of cases dealt with in these five antitoxin years was 32,835, or an average of 6567 a year, and the broad result is a reduction of mortality by more than one-half. It is a fair inference that the treatment saves the lives of about 1000 children every year in London alone. This refers to all cases. Those which occur in the hospitals as a sequel to scarlet fever, and consequently come under treatment from the commencement, show very much more striking results. The case mortality, which was 46-8% in 1892 and 58-8% in 1893, has been reduced to 3-6% since the introduction of antitoxin. But the evidence is not from statistics alone. The beneficial effect of the treatment is equally attested by clinical observation. Dr Roux's original account has been confirmed by a cloud of witnesses year after year. " One may say," he wrote, " that the appearance of most of the patients is totally different from what it used to be. The pale and leaden faces are scarcely seen in the wards; the expression of the children is brighter and more lively." Adult patients have described the relief afforded by inoculation; it acts like a charm, and lifts the deadly feeling of oppression off like a cloud in the course of a few hours. Finally, the counteracting effect of antitoxin in preventing the disintegrating action of the

CO

•v a

VO O

3

U «

diphtheritic toxin on the nervous tissues has been demonstrated pathologically. There are some who still affect scepticism as to the value of this drug. They cannot be ac- quainted with the evi- dence,

for if the efficacy of antitoxin in the treat- ment of diphtheria has not been proved, then neither can the efficacy of • any treatment for anything be said to be proved. Prophylactic properties are also claimed for the serum; but protection is neces- sarily more difficult to demonstrate than cure,: and though there is some evidence to sup- port the claim, it has not been fully made out.

*Authoritie s.— * Adams, Public Health, vol. vii. ; Thome Thorne, Milroy Lectures (1891); Newsholme, Epidemic Diphtherial . R. Smith, Harben Lectures (1899); M urphy , Report toLondon County Council (1894); Sims Woodhead, Report to Metropolitan Asylums Board (1901).*

DIPLODOCUS, a gigantic extinct land reptile discovered in rocks of Upper Jurassic age in western North America, the best- known example of a Sauropodous Dinosaur. The first scattered re- mains of a skeleton were found in 1877 by Prof. S. W. Williston near Canon City, Colorado; and the tail and hind- limb of this specimen were described in the following year by Prof. O. C. Marsh. He noticed that in the part ofthetail which dragged on the ground, each chevron bone below the vertebral column con- sisted of a pair of bars; and as so peculiar an arrangement for the protection of the artery and vein beneath the tail had not previously been observed in any animal, he proposed the name Diplodocus (" double beam " or " double bar ") for the new reptile, adding the

specific name longus in allusion to the elongated shape of the tail vertebrae. In 1884 Prof. Marsh described the head, vertebrae and pelvis of the same skeleton, which is now in the National . Museum, Washington. In 1897 the next important specimen, a tail associated with other fragments, apparently of Diplodocus longus, was obtained by the American Museum of Natural History, New York, from Como Bluffs, Wyoming. In 1899-1900 large parts of two skeletons of another species, in a remarkable state of preservation, were disinterred by Messrs J. L. Wortman,Q. A. Peterson and J. B. Hatcher in Sheep Creek, Albany county, Wyo., and these are now exhibited with tainor discoveries in the Carnegie Museum, Pittsburg. There are also other specimens in New York, Chicago and the Uni- versity of Wyoming. In 1901 Mr J. B. Hatcher studied the new species at Pittsburg, named it Diplodocus carnegii, and published the first restored sketch of a complete skeleton. Shortly after- wards plaster casts of the finest specimens were prepared under the direction of Mr J. B. Hatcher and Dr W. J. Holland, and these were skilfully combined to form the cast of a completely reconstructed skeleton, which was presented to. the British Museum by Andrew

Carnegie in 1905. This reconstruction is based primarily on a well-preserved chain of vertebrae, extending from the second cervical to' the twelfth caudal, associated with the ribs, pelvis and several limb-bones. The tail is completed from two other specimens in the Carnegie Museum, having caudals 13 to 36 and 37 to 73 respectively in apparently unbroken series. Prof. Marsh's specimen in Washington supplied the greater part of the skull; and the fore-foot is copied from a specimen in New York.

The cast of the reconstructed skeleton of Diplodocus carnegii measures 84 ft. in length and 12 ft. 9 in. in maximum height at the hind-limbs. It displays the elongated neck and tail and the relatively small head so characteristic of the Sauropodous Dinosaurs. The skull is inclined to the axis of the neck, denot- ing a browsing animal; while the feeble blunt teeth and flat expanded snout suggest feeding among succulent water- weeds. The large narial opening at the highest point of the head probably indicates an aquatic mode of life, and there seems to have been a soft valve to close the nostrils when under water. The diminutive brain-cavity, scarcely large enough to contain a walnut, is noteworthy. There are 104 vertebrae, namely, 15 in the neck, 1 1 in the back, 5 in the sacrum and 73 in the tail. The presacral vertebrae are of remarkably light construction, the plates and struts of bone being arranged to give the greatest strength with the least weight. The end of the tail is a flexible lash; which would probably be used as a weapon, like the tail of some existing lizards. The feet, notwithstanding the weight they had to support, are as unsymmetrical as those of a crocodile, with claws only on the three inner toes. There is no external armour.

See O. C. Marsh, Amer. Journ. Sci. ser. 3, vol. xvi. (1878), p. 414, pi. viii., and loc. cit. vol. xxvii. (1884), p. 161, pis. ih., iv.; H. F. Osborn, Mem. Amer. Mus. Nat. Hist. vol. i. pt. v. (1899); J. B. Hatcher, Mem. Carnegie Mus. vol. i. No. 1 (1901), and vol. ii. No. 1 (1903) ; W. J. Holland, Mem. Carnegie Mus. vol. ii. No. 6 (1906). (A. S. Wo.)'

DIPLOMACY (Fr. diplomatic), the art of conducting inter- national negotiations. The word, borrowed from the French, has the same derivation as Diplomatic (q.v.), and, according to the New English Dictionary, was first used in England so late as 1796 by Burke. Yet there is no other word in the English language that could supply its exact sense. The need for such a term was indeed not felt; for what we know as diplomacy was long regarded, partly as falling under the Jus gentium or international law, partly as a kind of activity morally somewhat suspect and incapable of being brought under any system.

Moreover, though in a certain sense it is as old as history, diplomacy as a uniform system, based upon generally recognized rules and directed by a diplomatic hierarchy having a fixed international status, is of quite modern growth even in Europe. It was finally established only at the congresses of Vienna (1815) and Aix-la-Chapelle (1 8 1 8) , while its effective extension to the great monarchies of the East, beyond the bounds of European civilization, was comparatively an affair of yesterday. So late as 1876 it was possible for the

writer on this subject in the 9th edition of the Encyclopaedia Britannica to say that " it would be an historical absurdity to suppose diplomatic relations connecting together China, Burma and Japan, as they connect the great European powers."

Principles. — Though diplomacy has been usually treated under the head of international law, it would perhaps be more consonant with the facts to place international law under diplomacy. The principles and rules governing the intercourse of states, defined by a long succession of international lawyers, have no sanction save the consensus of the powers, established and maintained by diplomacy (see Balance of Power) ; in so far as they have become, by international agreement, more than mere pious opinions of theorists, they are working rules established for mutual convenience, which it is the function of diplomacy to safeguard or to use for its own ends. In any case they by no means cover the whole field of diplomatic activity; and, were they swept away, the art of diplomacy, developed through long ages of experience, would survive.

This experience may perhaps be called the science, as distinct from the art, of diplomacy. It covers not only the province of international law, but the vast field of recorded experience which we know as history, of which indeed international law is but a part; for, as Bielfeld in his Institutions politiques (La Haye, 1760, 1. 1, ch. ii. § 13) points out, " public law is founded on facts. To know it we must know history, which is the soul of this science as of politics in general." The broad outlook on human affairs implied in " historical sense " is more necessary to the diplomatist under modern conditions than in the 18th century, when inter- national policy was still wholly under the control of princes and their immediate advisers. Diplomacy was then a game of wits played in a narrow circle. Its objects too

were narrower; for states were practically regarded as the property of their sovereigns, which it was the main function of their " agents " to enlarge or to protect, while scarcely less important than the preservation or rearrangement of territorial boundaries was that of precedence and etiquette generally, over which an incredible amount of time was wasted. The haute diplomatie thus resolved itself into a process of exalted haggling, conducted with an utter disregard of the ordinary standards of morality, but with the most exquisite politeness and in accordance with ever more and more elaborate rules. Much of the outcome of these dead debates has become stereotyped in the conventions of the diplomatic service; but the character of diplomacy itself has undergone a great change. This change is threefold: firstly, as. the result of the greater sense of the community of interests among nations, which was one of the outcomes of the French Revolution; secondly, owing to the rise of democracy, with its expression in parliamentary assemblies and in the press; thirdly, through the alteration in the position of the diplomatic agent, due to modern means of communication.

The first of these changes may be dated to the circular of Count Kaunitz of the 17th of July 1701, in which, in face of the Revolution, he impressed upon the powers the duty of making common cause for the purpose of preserving " public peace, the tran- quillity of states, the inviolability of possessions, and the faith of treaties." The duty of watching over the common interests of Europe, or of the world, was thus for the first time officially recognized as a function of diplomacy, since common action could only be taken as the result of diplomatic negotiations. It would be easy to exaggerate the effective results of this idea, even when it had crystallized in the Grand Alliance of 1814 and been pro- claimed to the world in the Holy Alliance of the 26th of September 181 sand the declaration of Aix-la-Chapelle. The cynical picture given by La Bruyere of the diplomatist of the 18th century still remained largely true : " His talk is only of peace, of alliances, of the public tranquillity, and of the public interests; in reality he is thinking only of his own, that is to say, of those of his master or of his republic." x The proceedings of the congress of Vienna proved how little the common good weighed unless reinforced by particular interests; but the conception of " Europe " as a political entity none the less survived. The congresses, notably

•La Bruyere, Caracleres, ii. 77 (ed. P. Jouast, Paris, 1881).

the congress of Aix-la-Chapelle (q.v.) in 1818, were in a certain sense European parliaments, and their ostensible object was the

furtherance of common interests. Had the imperial dreamer Alexander I. of Russia had his way, they would have been permanently established on the broad basis of the Holy Alliance, and would have included, not the great powers only, but re- presentatives of every state (see Alexander I. and Europe: History). Whatever the effective value of that "Concert of Europe " which was the outcome of the period of the congresses, it certainly produced a great effect on the spirit and the practice of diplomacy. In the congresses and conferences diplomacy assumes international functions both legislative and admini- strative. The diplomat is responsible, not only to his own government, but to " Europe." Thus Castlereagh was accused of subordinating the interests of Great Britain to those of Europe; and the same charge was brought, perhaps with greater justice, against Metternich in respect of Austria. Canning's principle, of, " Every nation for itself and God for us all!" prevailed, it is true, over that of Alexander's " Confederation of Europe "; yet, as one outcome of the congresses, every diplomatic agent, though he represents the interests of his own state, has behind him the whole body of the treaties which constitute the public law of the world, of which he is in some sort the interpreter and the guardian.

Parallel with this development runs the second process making for change: the increasing responsibility of diplomacy to public opinion. To discuss all the momentous issues involved in this is impossible; but the subject is too important to be altogether passed over, since it is one of the main problems of modern international intercourse, and concerns every one who by his vote may influence the policy of the state to which he belongs. The question, broadly speaking, is: how far has the public discussion of international affairs affected the legitimate functions of diplomacy for better or for worse? To. the diplomatist of the old school the answer seems clear. For him diplomacy was too delicate and too personal an art to survive the glare and confusion of publicity. Metternich, the last representative of the old haute diplomatie, lived to moralize over the ruin caused by the first manifestations of the " new diplomacy," the outcome of the rise of the power of public opinion. He had early, from his own point of view, unfavourably contrasted the " limited " constitutional monarchies of the west with the " free " autocracies of the east of Europe, free because they were under no obligation to give a' public account of their actions. He himself was a master of the old diplomatic art, of intrigue, of veiling his purpose under a cloud of magniloquence, above all, of the art of personal fascination. But public opinion was for him only a dangerous force to be kept under control; and, even had he realized the necessity for appeal- ing to it,

he had none of the qualities that would have, made the appeal successful. In direct antagonism to him was George Canning, who may be called the great prototype of the " new diplomacy," and to Metternich was a " malevolent meteor hujrled by divine providence upon Europe." Canning saw clearly the immense force that would be added to his diplomatic action if he had behind him the force of public opinion. In answer to Metternich's complaint of the tone of speeches in parliament and of the popular support given in England to revolutionary move- ments, he wrote, " Our influence, if it is to be maintained abroad, must be secure in its sources of strength at home : and the sources of that strength are in the sympathy between the people and the government; in the union of the public sentiment with the public counsels; in the reciprocal confidence of the House of Commons and the crown." a

It would be a mistake to jump to the conclusion that Canning was wholly right and Metternich wholly wrong. The conditions of the Habsburg monarchy were not those of Great Britain, 3 and even if it had been possible to speak of a public opinion in the Austrian empire at all, it certainly possessed no such organ as the British parliament. But the argument may be carried yet

2 To Wellesley, in Stapleton's Canning, i. 374. 8 For the motives of Metternich's foreign policy see AuSTRIA- Hungary: History (iii. 332-333).

further. In the abstract the success of the policy of a minister in a democratic state must ultimately rest upon the support of public opinion; yet the necessity for this support has in the conduct of foreign affairs its peculiar dangers. In the difficult game of diplomacy a certain reticence is always necessary. Secret sources of information would be dried up were they to be lightly revealed; a plain exposition of policy would often give an undue advantage to the other party to a negotiation. Thus, even in Great Britain, the diplomatic correspondence laid before parlia- ment is carefully edited, and all governments are jealous of granting access to their modern archives. Yet a representative assembly is apt to be resentful of such reservations. Its members know little or nothing of the conditions under which foreign affairs are conducted, and they are not unnaturally irritated by explanations which seem to lack candour or completeness. Canning himself had experience of this in

the affair of the capture of the Danish fleet at Copenhagen; and Castlereagh's diplomacy was hampered by the bitter attacks of an opposition which accused him, with little justice, of pursuing a policy which he dared not reveal in its full scope to parliament. Moreover, the appeal to public opinion may be used as a diplomatic weapon for ends no less " selfish " than any aimed at by the old diplomacy. Bismarck, whose statesmanship was at least as cynical as that of Metternich, was a master of the art of taking the world into bis confidence — when it suited him to do so; and the " reptile press," hired to give a seemingly independent support to his policy, was one of his most potent weapons. So far the only necessary consequence of the growth of the power of public opinion on the art of diplomacy has been to extend the sphere of its application; it is but one more factor to be dealt with; and experience has proved that it is subject to the wiles of a skilful diplomatist no less than were the princes and statesmen with whom the old diplomacy was solely concerned.

The third factor making for change — the revolution in the means of communication which has brought all the world into closer touch — remains to be discussed. It is obvious that before the invention of the telegraph, the diplomatic agent was in a far more responsible position than he is now, when he can, in most cases, receive immediate instructions from his government on difficult questions as they arise. When communication was still slow there was often no time to await instructions, or the instruc- tions when they arrived were not seldom already out of date and had to be set aside on the minister's own responsibility. It would, however, be easy to exaggerate the importance of this change as affecting the character and status of diplomatic agents. It is true that the tendency has been for ministers of foreign affairs to hold the threads of diplomacy in their own hands to a far greater extent than was formerly the case; but they must still depend for information and advice on the " man on the spot," and the success of their policy largely depends upon his qualities of discretion and judgment. The growth of democracy, moreover, has given to the ambassador a new and peculiar importance; for he represents not only the sovereign to the sovereign, but the nation to the nation; and, as a succession of notable American ambassadors to Great Britain has proved, he may by his personal qualities do a large amount to remove the prejudices and ignorances which stand as a barrier between the nations. It marks an immense advance in the comity of international intercourse when the representatives of friendly powers are no longer regarded as " spies rather than ambassadors," to be " quickly heard and dismissed," as Philippe de Commines would have them, but as agreeable guests to be

parted from with regret.

As to the qualifications for an ambassador, it is clearly im- possible to lay down a general rule, for the same qualities are obviously not required in Washington as in Vienna, nor in Paris as in Pekin. Yet the effort to depict the ideal ambassador bulks largely in the works of the earlier theorists, and the demands they make are sufficiently alarming. Ottaviano Maggi, himself a diplomatist of the brilliant age of the Renaissance, has left us in his De legato (Hanoviae, 1506) his idea of what an ambassador should be. He must not only be a good Christian but a learned theologian; he must be a philosopher, well versed in Aristotle

I and Plato, and able at a moment's notice to solve in correct dialectical form the most abstruse problems; he must be well read in the classics, and an expert in mathematics, architecture, music, physics and civil and canon law. He must not only know how to write and speak Latin with classical refinement, but he must be a master of Greek, Spanish, French, German and Turkish. He must have a sound knowledge of history, geography and the science of war; but at the same time is not to neglect the poets, and never to be without his Homer. Add to this that he must be well born, rich and of a handsome presence, and we have a portrait of a diplomatist whose original can hardly have existed even in that age of brilliant versatility. The Dutchman Frederikus de Marselaer, in his Ktipunuov sive legationum insigne (Antwerp, 1618), is scarcely less exacting than the Venetian. His ideal ambassador is a nobleman of fine presence and in the prime of life, famous, rich, munificent, abstemious, not violent, nor quarrelsome, nor morose, no flatterer, learned, eloquent, witty without being talkative, a good linguist, widely read, prudent and cautious, but brave and — as he adds somewhat superfluously — many-sided.

With these theoretical perfections one or two instances of the qualifications demanded by the exigencies of practical politics may be cited by way of illuminating contrast. At the court of the empress Elizabeth of Russia good looks were a surer means of diplomatic success than all the talents and virtues, and the princess of Zerbst (mother of the empress Catherine II.) wrote to Frederick of Prussia advising him to replace his elderly am- bassador by a handsome young man with a good complexion; and the essential qualification for an ambassador to Switzerland, Germany, Poland, Denmark and Russia used to be that he should be able to drink the native diplomatists, seasoned from babyhood to strong liquors, under the table.

History. — In its widest sense the history of diplomacy is that of the intercourse between nations, in so far as this has not been a mere brute struggle for the mastery; 1 in a narrower sense, with which the present article is alone concerned, it is that of the methods and spirit of diplomatic intercourse and of the character and status of diplomatic agents. Earlier writers on the office and functions of ambassadors, such as Gentilis or Archbishop Germonius, conscientiously trace their origin to God himself, who created the angels to be his legates; and they fortify their arguments by copious examples drawn from ancient history, sacred and profane. But, whatever the influence upon it of earlier practice, modern diplomacy really dates from the rise of permanent missions, and the consequent development of the diplomatic hierarchy as an international institution. Of this the first beginnings are traceable to the 15th century and to Italy. There had, of course, during the middle ages been embassies and negotiations; but the embassies had been no more than tem- porary missions directed to a particular end and conducted by ecclesiastics or nobles of a dignity appropriate to each occasion; there were neither permanent diplomatic agents nor a professional diplomatic class. To the evolution of such a class the Italy of the Renaissance, the nursing-ground of modern statecraft, gave the first impetus. This was but natural; for Italy, with its numerous independent states, between which there existed a lively inter- course and a yet livelier rivalry, anticipated in miniature the modern states' system of Europe. In feudal Europe there had been little room for diplomacy; but in northern and central Italy feudalism had never taken root, and in the struggles of the peninsula diplomacy had early played a part as great as, or greater than, war. Where all were struggling for the mastery, the existence of each depended upon alliances and counter-alliances, of which the object was the maintenance of the balance of power. In this school there was trained a notable succession of men of affairs. Thus, in the 13th and 14th centuries Florence counted among her envoys Dante, Petrarch and Boccaccio, and later on could boast of agents such as Capponi, Vettori, Guicciardini and Machiavelli. Papal Rome, too, as was to be expected, had always been a fruitful nursing-mother of diplomatists; and some

1 e.g. A History of Diplomacy in the International Development of Europe, by D. J. Hill (London and New York, 1905).

authorities have traced the beginnings of modern diplomacy to a conscious imitation of her legatine system. 1

It is, however, in Venice, that the origins of modern diplomacy are to be sought. 2 So early as the 13 th century the republic, with a view to safeguarding the public interests, began to lay down a series of rules for the conduct of its ambassadors. Thus, in 1 236, envoys to the court of Rome are forbidden to procure a benefice for anyone without leave of the doge and little council ; in 1268 ambassadors are commanded to surrender on their return any gifts they may have received, and by another decree they are compelled to take an oath to conduct affairs to the honour and advantage of the republic. About the same time it was decided that diplomatic agents were to hand in, on their return, a written account of their mission ; in 1 288 this was somewhat expanded by a law decreeing that ambassadors were to deposit, within fifteen days of their return, a written account of the replies made to them during their mission, together with anything they might have seen or heard to the honour or in the interests of the republic. These provisions, which were several times renewed, notably in 1296, £425 and 1533, are the origin of the famous reports of the Venetian ambassadors to the senate, which are at once a monu- ment to the political genius of Venetian statesmen and a mine of invaluable historical material. 3

These are but a few examples of a long series of regulations, many others also dating to the 13th century, by which the Venetian government sought to systematize its diplomatic service. That permanent diplomatic agencies were not estab- lished by it earlier than was the case is probably due to the distrust of its agents by which most of this legislation of the republic is inspired. In the 13th century two or three months was considered over-long a period for an ambassador to reside at a foreign court; in the 15th century the period of residence was extended to two years, and in the 16th century to three. This latter rule continued till the end of the republic; the embassy had become permanent, but the ambassador was changed every three years.

The origin of the change from temporary to permanent missions has been the subject of much debate and controversy. The theory that it was due, in the first instance, to the evolution of the Venetian consulates (bajulats) in the Levant into permanent diplomatic posts, and that the idea was thence transferred to the West, is disproved by the fact that Venice had established other permanent embassies before the baylo (q.v.) at Constantinople was transformed into a diplomatic agent of the first rank. Nor is the first known instance of

the appointment of a permanent ambassador Venetian. The earliest record 4 is contained in the announcement by Francesco Sforza, duke of Milan, in 1455, of his intention to maintain a permanent embassy at Genoa 5 ; and in 1460 the duke of Savoy sent Eusebio Margaria, archdeacon of Vercelli, as his permanent representative to the Curia. 6 Though, however, the early records of such appointments are rare, the practice was probably common among the Italian states. Its extension to countries outside Italy was a somewhat later develop- ment. In 1494 Milan is already represented in France by a permanent ambassador. In 1495 Zacharia Contarini, Venetian ambassador to the emperor Maximilian, is described by Sanuto (Diarii, i. 294) as stato ambasciatore; and from the time of

1 For this see Hinschius, Kirchenreckt, i. p. 498.

2 The Venetians, however, in their turn, doubtless learned their diplomacy originally from the Byzantines, with whom their trade expansion in the Levant early brought them into close contact. For Byzantine diplomacy see Roman Empire, Later: Diplomacy.

3 See Eugenio Alberi, Le Relazioni degli ambasciatori Veneti al senato, 15 vols. (Florence, 1 839-1 863).

- *The apocrisiarii {inroKpiaiapioij or responsales should perhaps be mentioned, though they certainly did not set the precedent for the modern permanent missions. They were resident agents, practically legates, of the popes at the court of Constantinople. They were established by Pope Leo I., and continued until the Iconoclastic controversy broke the intimate ties between East and West. . See Luxardo, Das vordekretalische Gesandtschaftsrecht der Papste (Inns- bruck, 1878); also Hinschius, Kirchenreckt, i. 501.*

5 N. Bianchi, Le Materie politiche relative all' estero degli archivi di . stato piemontese (Bologna, Modena, 1875), p. 29.

6 lb. Note 2, teneamus et deputemus ibidem continue mansurum.

Charles V. onwards the succession of ambassadors of the republic at the imperial court is fairly traceable. In 1496 " as the way to the British Isles is very long and very dangerous," two merchants resident in London, Pietro Contarini and Luca Valaressa, were appointed by the republic subambasciatores; and in June of the same year Andrea Trevisano arrived in London as permanent ambassador

at the court of Henry VII. 7 Florence, too, from 1498 onwards, was represented at the courts of Charles V. and of France by permanent ambassadors.

During the same period the practice had been growing up among the other European powers. Spain led the way in 1487 by the appointment of Dr Roderigo Gondesalvi de Puebla as ambassador in England. As he was still there in 1500, the Spanish embassy in London may be regarded as the oldest still surviving post of the new permanent diplomacy. Other states followed suit, but only fitfully; it was not till late in the 16th century that permanent embassies were regarded as the norm. The precarious relations between the European powers during the 16th century, indeed, naturally retarded the development of the system. Thus it was not till after good relations had been established with France by the treaty of London that, in 1519, Sir Thomas Boleyn and Dr West were sent to Paris as resident English ambassadors, and, after the' renewed breach between the two countries, no others were appointed till the reign of Elizabeth. Nine years before, Sir Robert Wingfield, whose simplicity earned him the nickname of " Summer-shail-be-green," had been sent as ambassador to the court of Charles V., where he remained from 1510 to 1517; and in 1520 the mutual appointment of resident ambassadors was made a condition of the treaty between Henry VIII. and Charles V. In 1517 Thomas Spinelly, who had for some years represented England at the court of the Netherlands, was appointed " resident ambassador to the court of Spain," where he remained till his death on the 22nd of August 1522. These are the most important early instances of the new system. Alone of the great powers, the emperor remained permanently unrepresented at foreign courts. In theory this was the result of his unique dignity, which made him superior to all other potentates; actually it was because, as emperor, he could not speak for the practically independent princes nominally his vassals. It served all practical purposes if he were represented abroad by his agents as king of Spain or archduke of Austria.

All the evidence now available goes to prove that the establish- ment of permanent diplomatic agencies was not an unconscious and accidental development of previous conditions, but de- liberately adopted as an obvious convenience. But, while all the powers were agreed as to the convenience of maintaining such agencies abroad, all were equally agreed in viewing the repre- sentatives accredited to them by foreign states with extreme suspicion. This attitude was abundantly justified by the peculiar ethics of the new diplomacy. The old " orators " of the Summer-shall-be-green type could not long hold their own against the new men who had studied in the school of

Italian statecraft, for whom the end justified the means. Machiavelli had gathered in The Prince and The Discourses on Livy the principles which underlay the practice of his day in Italy; Francis I., the first monarch to establish a completely organized diplomatic machinery, did most to give these principles a European extension. By the close of the 16th century diplomacy had become frankly " Machiavellian," and the ordinary rules of morality were held not to apply to the intercourse between nations. This was admitted in theory as well as in practice. Germonius, after a vigorous denunciation of lying in general, argues that it is permissible for the safety or convenience (commodo) of princes, since solus populi suprema lex, and quod non permittit naturalis ratio, admittit civilis; and he adduces in support of this principle the answer given by Ulysses to Neoptolemus, in the Ajax of Sophocles, and the examples of Abraham, Jacob and David. Paschalius, while affirming that an ambassador must study to speak the truth, adds that he is not

7 The first ambassador of Venice to visit England was Zuanne da Lezze, who came in 1319 to demand compensation for the plundering of Venetian ships by English pirates.

sudh a " rustic boor " as to say that an " official lie " (officiosum mendacium) is never to be employed, or to deny that an ambassador should be, on occasion, splendide mendax. 1 The situation is summed up in the famous definition of Sir Henry Wotton, which, though excused by himself as a jest, was held to be an indiscreet revelation of the truth: " An ambassador is an honest man sent to lie abroad for the good of his country." 2 The most successful liar, in fact, was esteemed the most successful diplomatist. " A prime article of the catechism of ambassadors," says Bayle in his Dictionnaire critique (1699), " whatever their religion, is to invent falsehoods and to go about making society believe them." So universally was this principle adopted that, in' the end, no diplomatist even expected to be believed; and the best way to deceive was — as Bismarck cynically avowed — to tell the truth.

But, in addition to being a' liar ex officio, the ambassador was also " an honourable spy." " The principal functions of an envoy," says Francois de Callieres, himself an ex-ambassador of Louis XIV., " are two; the first is to look after the affairs of his own prince; the second is to discover the affairs of the other." A clever minister, he

maintains, will know how to keep himself informed of all that goes on in the mind of the sovereign, in the councils of ministers or in the country; and for this end " good cheer and the warming effect of wine " are excellent allies. 3 This being so, it is hardly to be wondered at that foreign ambassadors were commonly regarded as perhaps necessary, but certainly very unwelcome, guests. The views of Philippe de Commines have already been quoted above, and they were shared by a long series of theoretical writers as well as by men of affairs. Gentilis is all but alone in his protest against the view that all ambassadors were exploratores magis quam oratores, and to be treated as such. So early as 148 1 the government of Venice had decreed the penalty of banishment and a heavy fine for any one who should talk of affairs of state with a foreign envoy, and though the more civilized princes did not follow the example of the sultan, who by way of precaution locked the ambassador of Ferdinand II., Jerome Laski, into " a dark and stinking place without windows," they took the most minute precautions to prevent the ambassadors of friendly powers from penetrating into their secrets. Charles V. thought it safest to keep them as far away as possible from his court. So did Francis I. ; and, when affairs were critical, he made his frequent changes of residence and his hunting expeditions the excuse for escaping from their presence. Henry VII. forbade his subjects to hold any intercourse with them, and, later on, set spies upon them and examined their correspondence — a practice by no means confined to England. If the system of permanent embassies survived, it is clear that this was mainly due to the belief of the sovereigns that they gained more by maintaining " honourable spies " at foreign courts than they lost by the presence of those of foreign courts at their own. It was purely a question of the balance of advantage. Neither among statesmen nor among theorists was there any premonition of the great part to be played by the permanent diplomatic body in the development and maintenance of the concert of Europe. To Paschalius the permanent embassies were " a miserable outgrowth of a miserable age." 4 Grotius himself condemned them as not only harmful,

1 Germonius, De legatis principum et populorum libri tres (Rome, 1627), chap. vi. p. 164; Paschalius, Legatus (Rouen, 1598), p. 302. Etienne Dolet, who had been secretary to Cardinal Jean du Bellay, and was burned for atheism in 1546, in his De officio legati (1541) advises ambassadors, to surround themselves with taciturn servants, to employ vigilant spies, and to set afoot all manner of fictions, especially when negotiating with the court of Rome or with the Italian princes.

2 See Pearsall Smith, Sir Henry Wotton, pp. 49, 126 et seq.

3 Francois de Callieres, De la maniere de nSgocier avec les souverains (Brussels, 17 16). See also A. Sorel, Recueil des instructions donnees aux ambdssadeurs et ministres de France (Paris, 1884), e.g. vol. Autriche, pp. 77, 88, 102, 112.

4 " Nova res est, quod sciam, et infelicis hujus aetatis infelix partus. . . . Hinc oriri securitatem universorum, hinc stabiliri pacem gentium. Quae utinam tarn vere dicerentur, quam speciose. Ego ; quidem, ne quid dissimulem, ab istis seorsum sentio. Nimirum, effoeta virtutis, foecunda fraudis haec saecula video peperisse

but useless, the proof of the latter being that they were unknown to antiquity. 6

Development of the Diplomatic Hierarchy.— The history of the diplomatic bod> 6 is, like that of other bodies, that of the progressive differentiation of functions. The middle ages knew no classification of diplomatic agents; the person sent on mission is described indifferently as legatus, orator, nuntius, ablegatus, commissarius, procurator, mandatarius, agens or ambaxator (ambassator, &c). In Gundissalvus, De legato (1485), the oldest printed work oh the subject, the word ambasiator, first found in a Venetian decree of 1268, is applied to any diplomat. Florence was the first to make distinction; the orator was appointed by the council of the republic; the mandatorio, with inferior powers, by the Council of Ten. In 1500 Machiavelli, who held only the latter rank, wrote from France urging the Signoria to send ambasiadori. This was, however, rather a question of powers than of dignity. But the causes which ultimately led to the elaborate differentiation of diplomatic ranks were rather ques tions of dignity than of functions. 7 The breakdown of feudalism, with the consequent rise of a series of sovereign states or of states claiming to be sovereign, of very various size and importance, led to a certain confusion in the ceremonial relation between them, which had been unknown to the comparatively clearly defined system of the middle ages. The smaller states were eager to assert the dignity of their actual or practical independence; the greater powers were equally bent on " keeping them in their place." If the emperor, as has been stated above, was too exalted to send ambassadors, certain of the lesser states were soon esteemed too humble to be represented at the courts of the great powers save by agents of an inferior rank. By the second half of the 16th century, then, there are two classes of diplomatists, ambassadors and residents or agents, the latter being accounted

ambassadors of the second class. 8 At first the difference of rank was determined by the status of the sovereign by whom or to whom the diplomatic agent was accredited; but early in the 16th century it became fairly common for powers of the first rank to send agents of the second class to represent them at courts of an equal status. The reasons were various, and not unamusing. First and foremost came the question of expense. The am- bassador, as representing the person of his sovereign, was bound by the sentiment of the age to display an exaggerated magnifi- cence. His journeys were like royal progresses, his state entries surrounded with every circumstance of pomp, and it was held to be his duty to advertise the munificence of his prince by boundless largesses. Had this munificence been as unlimited in fact as in theory, all might have been well, but, in that age of vaulting ambitions, depleted exchequers were the rule rather than the exception in Europe; the records are full of pitiful appeals from ambassadors for arrears of pay, and appointment to an embassy often meant ruin, even to a man of substance. To give but one example, Sir Richard Morison, Edward VI. 's ambassador in Germany, had to borrow money to pay his debts before he could leave Augsburg (Cal. State Pap. Edw. VI., No. 467), and later on he writes from Hamburg (April 9, 1552) that he could buy nothing, because everyone believed that he had packed up in

spissata haec imperia, sive summas potestates, unde, ut e vomitariis, hae legationes undatim se fundunt." Paschalius, Legatus (1598), p. 447. So too Felix de la Mothe Le Vayer (1547-1625), in his Legatus (Paris, 1579), says " Legatos tunc primum aut non multum post institutes fuisse cum Pandora malorum omnium semina in hunc mundum . . . demisit."

6 De jure belli et pads (Amsterdam, 1621), ii. c. 18, § 3, n. 2.

6 The term corps diplomatique originated about the middle of the 18th century. " The Chancellor Furst," says Ranke (xxx. 47, note), " does not use it as yet in his report (1754) but he knows it," and it would appear that it had just been invented at Vienna. " Corps diplomatique, nom qu'une dame donna un jour a ce corps nombreux de ministres etrangers a Vienne."

7 So too Pradier-Fodere, vol. i. p. 262.

8 Thus Charles V. would not allow the representatives of the duke of Mantua, Ferrara, &c, to style themselves " ambassadors," on the ground that this title could be borne only by the agents of kings and of the republic of Venice, and not by those of states whose

sovereignty was impaired by any feudal relation to a superior power. (See Krausbr p. 155.)

readiness to flit secretly, for " How must they buy things, where men know their stuff is ready trussed up, and they fleeting every day?" (ib. No. 544). But the dignity of ambassador carried another drawback besides expense; his function of " honourable spy " was seriously hampered by the trammels of his position. He was unable to move freely in society, but lived a ceremonial existence in the midst of a crowd of retainers, through whom alone it was proper for him to communicate with the world outside. It followed that, though the office of ambassador was more dignified, that of agent was more generally useful.

Yet a third cause, possibly the most immediately potent, encouraged the growth of the lesser diplomatic ranks: the question of precedence among powers theoretically equal. Modern diplomacy has settled a difficulty which caused at one time much heart-burning and even bloodshed by a simple appeal to the alphabet. Qreat Britain feels no humiliation in signing after France, if the reason be that her name begins with G; had she not been Great, she would sign before. The vexed question of the precedence of ambassadors, too, has been settled by the rule, already referred to above, as to seniority of appointment. But while the question remained unsettled it was obviously best to evade it; and this was most easily done by sending an agent of inferior rank to a court where the precedence claimed for an ambassador would have been refused.

Thus set in motion, the process of differentiation continues until the system is stereotyped in the 19th century. It is un- necessary to trace this evolution here in any detail. It is mainly a question of names, and diplomatic titles are no exception to the general rule by which all titles tend to become cheapened and therefore, from time to time, need to be reinforced by fresh verbal devices. The method was the familiar one of applying terms that had once implied a particular quality in a fashion that implied actually nothing. The ambassador extraordinary had originally been one sent on an extraordinary mission; for the time and purpose of this mission his authority superseded that of the resident ambassador. But by the middle of the 17th century the custom had grown up of calling all ambassadors " extraordinary," in order to place them on an equality with the

others. The same process was extended to diplomatists of the second rank; and envoys (envoy e for ablegatus) were always " extraordinary," and as such claimed and received precedence over mere " residents," who in their day had asserted the same claim against the agents — all three terms having at one time been synonymous. Similarly a " minister plenipotentiary " had originally meant an agent armed with full powers (plein-pouvoir) ; but, by a like process, the combination came to mean as little as " envoy extraordinary " — though a plenipotentiary tout simple is still an agent, of no ceremonially defined dignity, despatched with full powers to treat and conclude. Finally, the evolution of the title of a diplomatist of the second rank is crowned by the high- sounding combination, now almost exclusively used, of " envoy extraordinary and minister plenipotentiary." The ultimate fate of the simple title " resident " was the same as that of " agent." Both had been freely sold by needy sovereigns to all and sundry who were prepared to pay for what gave them a certain social status. The " agent " fell thus into utter discredit, and those "residents" who were still actual diplomatic agents became " ministers resident " to distinguish them from the common herd.

The classification of diplomatic agents was for the first time definitively included in the general body of international law by the Reglement of the 19th of March 1815 at Vienna 1 ; and the whole question was finally settled at the congress of Aix-la- Chapelle (November 21, 1818) when, the proposal to establish precedence by the status of the accrediting powers having wisely been rejected, diplomatic agents were divided into four classes: (1) Ambassadors, legates, nuncios; (2) Envoys extraordinary and ministers, plenipotentiary, and other ministers accredited direct to the sovereign; (3) Ministers resident; (4) Charges d'affaires. With a few exceptions (e.g. Turkey), this settlement was accepted by all states, including the United States of America.

1 See Pradier-Fodere, i. 265.

Rights and Privileges of , Diplomatic Agents. — These are partly founded upon immemorial custom, partly the result of negotia- tions embodied in international law. The most important, as it is the most ancient, is the right of personal inviolability extended to the diplomatic agent and the members of his suite. This inviolability is maintained after a rupture between the two governments concerned, and even after the outbreak of war. The habit of the Ottoman government of imprisoning in the Seven Towers the ambassador of a power with which it quarrelled was but an exception which proved

the rule. The second im- portant right is that of exterritoriality (q.v.), a convenient fiction by which the house and equipages of the diplomatic agent are regarded as the territory of the power by whom he is ac- credited. This involves the further principle that the agent is in no way subject to the receiving government. He is exempt from taxation and from the payment at least of certain local rates. He also enjoys immunity (1) from civil jurisdiction, e.g. he cannot be sued, nor can his goods be seized, for debt; (2) from criminal jurisdiction, e.g. he cannot be arrested and tried for a criminal offence. For a crime of violence, however, or for plotting against the state, he can be placed under the necessary restraint and expelled the country. 2 These immunities extend to all the members of an envoy's suite. The difficulties that might be supposed to arise from such exemptions have not in practice been found very serious; for though, in the case of crimes committed by servants of agents of the first or second class the procedure is not clearly defined, each case would easily be made the subject of arrangement. In certain cases, e.g. embassies in Turkey, the exterritoriality of ambassadors implies a fairly extensive criminal jurisdiction; in other cases the dismissal of the servant would deprive him of his diplomatic immunity and bring him under the law of the land. The right of granting asylum claimed by diplomatic agents in virtue of that of exterritoriality, at one time much abused, is now strictly limited. A political or criminal offender may seek asylum in a foreign embassy; but if, after a request has been formally made for his surrender, the ambassador refuses to deliver him up, the authorities may take the measures necessary to effect his arrest, and even force an entrance into the embassy for the purpose. The " right of chapel " (droit de chapelle, or droit de culte), enjoyed by envoys in reference to their exterritoriality, i.e. the right of free exercise of religious worship within their house, formerly of great importance, has been rendered superfluous by the spread of religious toleration. (See L. Oppenheim, Internat. Law (London, 1905), i. p. 441, &c; A. W. Haffter, Das europaische Volkerrecht (Berlin, 1888), p. 435, &c.)

The Personnel of the " Corps diplomatique." — The establishment of diplomacy as a regular branch of the civil service is of modern growth, and even now by no means universal. From old time states naturally chose as their agents those who would best serve their interests in the matter in hand. In the middle ages diplomacy was practically a monopoly of the clergy, who as a class alone possessed the necessary qualifications: and in later times, when learning had spread to the laity as well, there were still potent reasons why the clergy should continue to be employed as diplomatic agents. Of these

reasons the most practical was that of expense; for the wealth of the church formed an in- exhaustible reserve which was used without scruple for secular purposes. Francis I. of France, who by the Concordat with Rome had in his hands the patronage of all the sees and abbeys in France, used this partly to reward his clerical ministers, partly as a great secret service fund for bribing the ambassadors of other powers, partly for the payment of those high-placed spies at foreign courts maintained by the elaborately organized system

2 Gentilis, who had been consulted by the government in the case of the Spanish ambassador, Don Bernardino de Mendoza, expelled for intriguing against Queen Elizabeth, lays this down definitely. An ambassador, he says, need not be received, and he may be ex- pelled. In actual practice a diplomatic agent who has made himself objectionable is withdrawn by his government on the representations of that to which he is accredited, and it is customary, before an ambassador is despatched, to find out whether he is a persona grata to the power to which he is accredited.

known as the Secret du Roi. 1 ‘ None the less, in the 16th century, laymen as diplomats are already well in evidence. They are usually lawyers, rarely soldiers, occasionally even simple merchants. Not uncommonly they were foreigners, like the Italian Thomas Spinelly mentioned above, drawn from that cosmopolitan class of diplomats who were ready to serve any master. Though nobles were often employed as ambassadors by all the powers, Venice alone made nobility a condition of diplomatic service. They were professional in the sense that, for the most part, diplomacy was the main occupation of their lives; there was, however, no graded diplomatic service in which, as at present, it was possible to rise on a fixed system from the position of simple attacks to that of minister and ambassador. The “attache to the embassy” existed 2 ; but he was not, as is now the case, a young diplomat learning his profession, but an experienced man of affairs, often a foreigner employed by the ambassador as adviser, secret service agent and general go- between, and he was without diplomatic status. 3 The 18th century saw the rise of the diplomatic service in the modern sense. The elaboration of court ceremonial, for which Versailles had set the fashion, made it desirable that diplomatic agents should be courtiers, and young men of rank about the court began to be attached to missions for the

express purpose of teaching them the art of diplomacy. Thus arose that aristocratic diplomatic class, distinguished by the exquisite refinement of its manners, which survived from the 1 8th century into the i gth. Modern democracy has tended to break with this tradition, but it still widely prevails. Even in Great Britain, where the rest of the public services have been thrown open to all classes, a certain social position is still demanded for candidates for the diplomatic service and the foreign office, and in addition to passing a competitive examina- tion, they must be nominated by someone of recognized station prepared to vouch for their social qualifications. In America, where no regular diplomatic service exists, all diplomatic agents are nominated by the president.

The existence of an official diplomatic service, however, by no means excludes the appointment of outsiders to diplomatic posts. It is, in fact, one of the main grievances of the regular diplomatic body that the great rewards of their profession, the embassies, are so often assigned to politicians or others who have not passed through the drudgery of the service. But though this practice has, doubtless, sometimes been abused, it is impossible to criticize the wisdom of its occasional application.

A word may be added as to the part played by women in diplomacy. So far as their unofficial influence upon it is con- cerned, it would be impossible to exaggerate its importance; it would suffice to mention three names taken at random from the annals of the 19th century, Madame de Stael, Baroness von Kriidener, and Princess Lieven. Gentz comments on the " feminine intrigues " that darkened the counsels of the con- gresses of Vienna and Aix-la-ChapeUe, and from which the powers so happily escaped in the bachelor seclusion of Troppau. Nor is it to be supposed that statesmen will ever renounce a diplomatic weapon so easy of disguise and so potent for use. A brilliant salon presided over by a woman of charm may be a most valuable centre of a political propaganda; and ladies are still widely employed in the secret diplomacy of the powers. Their employ- ment as regularly accredited diplomatic agents, however, though not unknown, has been extremely rare. An interesting instance is the appointment of Catherine of Aragon, when princessof Wales, as representative of her father, Ferdinand the Catholic, at the court of Henry VII. (G. A. Bergenroth, Calendar of State Papers . . . England and Spain — in the Archives at Simancas, &c, i. pp. xxxiii, cxix).

Literature. — Besides general works on international law (q.v.) which necessarily deal with the subject of diplomacy, a vast mass of treatises on diplomatic agents exists. The earliest printed work is the

Tractatus de legato (Rome, 1485) of Gundissalvus (Gonsalvo de Villadiego), professor of law at Salamanca, auditor for Spain at the

1 See Zeller. 2 A. O. Meyer, p. 22.

3 See the amusing account of the methods of these agents in Morysine to Cecil (January 23, 1551-1552), Cat. State Pap. Edw. VI., No. 530.

Roman court of the Rota, and bishop of Oviedo ; but the first really systematic writer on the subject was Albericus Gentilis,Z?e legationibus hbriiii. (London, 1583, 1585, Hanover, 1596, 1607, 1612). For a full bibliography of works on ambassadors see Baron Diedrich H. L.von Ompteda, Litteratur des gesammten sowohl natiirlichen als positiven Volkerrechts (Regensburg, 1785), p. 534, &c, which was completed and continued by the Prussian minister Karl Albert von Kamptz, in Neue Literatur des Volkerrechts seit dem Jahre 1784 (Berlin, 181 7), p. 231. A list of writers, with critical and biographical remarks, is also given in Ernest Nys's " Les Commencements de la diplomatic et le droit d'ambassade jusqu'a Grotius," in the Revue de droit inter- national, vol. xvi. p. 167. Other useful modern works on the history of diplomacy are : E. C. Grenville-Murray, Embassies and Foreign Courts, a History of Diplomacy (2nd ed., 1856); J. Zeller, La Diplo- malie franqaise vers le milieu du XVI" siecle (Paris, 1881); A. O. Meyer, Die englische Diplomatie in Deutschland zur Zeit Eduards VI. und Mariens (Breslau, 1900) ; and, above all, Otto Krauske, Die Entwickelung der standgien Diplomatie vom fiinfzehnten Jahrhundett bis zu den Beschliissen von 1815 und 1818, in Gustav Schmoller's Staats- und socialwissenschaftliche Forschungen, vol. v. (Leipzig, 1885). To these may be added, as admirably illustrating in detail the early developments of modern diplomacy, Logan Pearsall Smith's Life and Letters of Sir Henry Wotton (Oxford, 1907). Of works on modern diplomacy the most important are the Guide diplomatique of Baron Charles de Martens, new edition revised by F. H. Geffcken, 2 vols. (Leipzig, 1866), and P. Pradier-Fodere, Cours de droit diplomatique, 2 vols. (Paris, 1881). (W. A. P.)

DIPLOMATIC, the science of diplomas, founded on the critical study of the " diplomatic " ' sources of history: diplomas, charters, acts, treaties, contracts, judicial records, rolls, chartu- laries, registers, &c. The employment of the word " diploma," as a general term to designate an historical document, is of com- paratively recent date. The Roman diploma, so called because it was formed of two sheets of metal which were shut together (Gr. diTKovv, to double) like the

leaves of a book, was the pass- port or licence to travel by the public post; also, the certificate of discharge, conferring privileges of citizenship and marriage on soldiers who had served their time; and, later, any imperial grant of privileges. The word was adopted, rather pedantically, by the humanists of the Renaissance and applied by them to important deeds and to acts of sovereign authority, to privileges granted by kings and by great personages; and by degrees the term became extended and embraced generally the documents of the middle ages.

History of the Study. — The term " diplomatic," the French diplomatique, is a modern adaptation of the Latin phrase res diplomatica employed in early works upon the subject, and more especially in the first great text-book, the De re diplomatica, issued in 1681 by the learned Benedictine, Dom Jean Mabillon, of the abbey of St Germain-des-Pres. Mabillon's treatise was called forth by an earlier work of Daniel van Papenbroeck, the editor of the Acta Sanctorum of the Bollandists, who, with no great knowledge or experience of archives, undertook to criticize the historical value of ancient records and monastic documents, and raised wholesale suspicions as to their authenticity in his Propylaeum antiquarium circa veri ac falsi discrimen in vetustis membranis, which he printed in 1675. This was a rash challenge to the Benedictines, and especially to the congregation of St Maur, or confraternity of the Benedictine abbeys of France, whose combined efforts produced great literary works which still remain as monuments of profound learning. Mabillon was at that time engaged in collecting material for a great history of his order. He worked silently for six years before producing the work above referred to. His refutation of Papenbroeck's criticisms was complete, and his rival himself accepted Mabillon's system of the study of diplomatic as the true one. The De re diplomatica established the science on a secure basis; and it has been the foundation of all subsequent works on the subject, although the immediate result of its publication was a flood of controversial writings between the Jesuits and the Benedictines, which, how- ever, did not affect its stability.

In Spain, the Benedictine Perez published, in 1688, a series of dissertations following the line of Mabillon's work. In Eng- land, Madox's Formulare Anglicanum, with a dissertation con- cerning ancient charters and instruments, appeared in 1702, and in 1705 Hickes followed with his Linguarum septentrionalium thesaurus, both accepting the principles laid down by the learned

Benedictine. In Italy, Maffei appeared with his Istoria diplo- matica in 1727, and Muratori, in 1740, introduced dissertations on diplomatic into his great work, the Antiquitales Italicae. In Germany, the first diplomatic work of importance was that by Bessel, entitled Chronicon Qotwicense and issued in 1732; and this was followed closely by similar works of Baring, Eckhard and Heumann.

France, however, had been the cradle of the science, and that country continued to be the home of its development. Mabillon had not taken cognizance of documents later than the 13th century. Arising out of a discussion relative to the origin of the abbey of St Victor en Caux and the authenticity of its archives, a more comprehensive work than Mabillon's was compiled by the two Benedictines, Dom Toustain and Dom Tassin, viz. the Nouveau Traits de diplomatique, in six volumes, 1 750-1 765, which embraced more than diplomatic proper and extended to all branches of Latin palaeography. With great industry the compilers gathered together a mass of details; but their arrange- ment is faulty, and the text is broken up into such a multitude of divisions and subdivisions that it is tediously minute. However, its more extended scope has given the Nouveau Traite an ad- vantage over Mabillon's work, and modern compilations have drawn largely upon it.

As a result of the Revolution, the archives of the middle ages lost in France their juridical and legal value; but this rather tended to enhance their historical importance. The taste for historical literature revived. The Academie des Inscriptions fostered it. In 1821 the ficole des Chartes was founded; and, after a few years of incipient inactivity, it received a further impetus, in 1829, by the issue of a royal ordinance re-establishing it. Thenceforth it has been an active centre for the teaching and for the encouragement of the study ot diplomatic throughout the country, and has produced results which other nations may envy. Next to France, Germany and Austria are distinguished as countries where activity has been displayed in the systematic study of diplomatic archives, more or less with the support of the state. In Italy, too, diplomatic science has not been neglected. In England, after a long period of regrettable indifference to the study of the national and municipal archives of the country, some effort has been made in recent years to remove the reproach. The publications of the Public Record Office and of the department of MSS. in the British Museum are more numerous and are issued more regularly than in former times; and an awakened interest is manifested by the foundation in the universities of a few lectureships

in diplomatic and palaeography, and by the attention which those subjects receive in such an institution as the London School of Economics, and in the publications of private literary societies. But such efforts can never show the systematic results which are to be attained by a special institution of the character of the French ficole des Chartes.

Extent of the Science. — The field covered by the study of diplomatic is so extensive and the different kinds of documents which it takes into its purview are so numerous and various, that it is impossible to do more than give a few general indications of their nature. No nation can have advanced far on the path of civilization before discovering the necessity for documentary evidence both in public and in private life. The laws, the constitutions, the decrees of government, on the one hand, and private contracts between man and man, on the other, must be embodied in formal documents, in order to ensure permanent record. In the case of a nation advancing independently from a primitive to a later stage of civilization we should have to trace the origin of its documentary records and examine their develop- ment from a rudimentary condition. But in an inquiry into the history of the documents of the middle ages in Europe we do not begin with primitive forms. Those ages inherited the docu- mentary system which had been created and developed by the Romans; and, imperfect and limited in number as are the earliest surviving charters and diplomas of European medieval history, they present themselves to us fully developed and cast in the mould and employing the methods and formulae of the earlier tradition. Based on this foundation the chanceries of the several

countries of Europe, as they came into existence and were organized, reduced to method and rule on one general system the various documents which the exigencies of public and of private life from time to time called into existence, each individual chancery at the same time following its own line of practice in detail, and evolving and confirming particular formulas which have become characteristic of it.

Classification of Documents. — If we classify these documents under the two main heads of public and private deeds, we shall have to place in the former category the legislative, adminis- trative, judicial, diplomatic documents emanating from public authority in public form: laws, constitutions, ordinances, privileges, grants and concessions, proclamations, decrees, judicial records, pleas, treaties; in a word, every kind of deed necessary for the orderly government of a civilized state. In early times many of these were comprised

under the general term of " letters," litterae, and to the large number of them which were issued in open form and addressed to the community the specific title of " letters patent," litterae patentes, was given. In contradistinction those public documents which were issued in closed form under seal were known as " close letters," litterae ciausae.

Such public documents belong to the state archives of their several countries, and are the monuments of administrative and political and domestic history of a nation from one generation to another. In no country has so perfect a series been preserved as in our own. Into the Public Record Office in London have been brought together all the collections of state archives which were formerly stored in different official repositories of the kingdom. Beginning with the great survey of Domesday, long series of enrolments of state documents, in many instances extending from the times of the Angevin kings to our own day in almost unbroken sequence, besides thousands of separate deeds of all descriptions, are therein preserved (see Record).

Under the category of private documents must be included, not only the deeds of individuals, but also those of corporate bodies representing private interests and standing in the position of individual units in relation to the state, such as municipal bodies and monastic foundations. The largest class of documents of this character is composed of those numerous conveyances of real property and other title deeds of many descriptions and dating from early periods which are commonly described by the generic name of " charters," and which are to be found in thousands, not only in such public repositories as the Public Record Office and the British Museum, but also in the archives of municipal and other corporate bodies throughout the country and in the muniment-rooms of old families. There are also the records of the manorial courts preserved in countless court-rolls and registers; also the scattered muniments of the dissolved monasteries represented by the many collections of charters and the valuable chartularies, or registers of charters, which have fortunately survived and exist both in public and in private keeping.

It will be noticed that in this enumeration of public and private documents in England reference is made to rolls. The practice of entering records on rolls has been in favour in England from a very early date subsequent to the Norman Conquest; and while in other countries the comprehensive term of " charters " (literally " papers ": Gr. xˆPˆs) is employed as a general description of documents of the

middle ages, in England the fuller phrase " charters and rolls " is required. The master of the rolls, the Magister Rotulorum, is the official keeper of the public records.

From the great body of records, both public and private, many fall easily and naturally into the class in which the text takes a simpler narrative form; such as judicial records, laws, decrees, proclamations, registers, &c, which tell their own story in formulae and phraseology early developed and requiring little change. These we may leave on one side. For fuller description we select those deeds which, conferring grants and favours and privileges, conform more nearly to the idea of the Roman diploma and have received the special attention of the chanceries in the

development and arrangement of their formulae and in their methods of execution.

All such medieval deeds are composed of certain recognized members or sections, some essential, others special arid peculiar to the most elaborate and solemn documents. A deed of Structure tne more elaborate character is made up of two principal of mettle- di v i s j ons: j. the Text, in which is set out the object of val , the deed, the statement of the considerations and circum-

dlplomaa. stances wn ; c h have led to it, and the declaration of the will and intention of the person executing the deed, together with such protecting clauses as the particular circumstances of the case may require; 2. the Protocol (originally, the first sheet of a papyrus roll; Gr. Trpwros, first, and icoXXae, to glue), consisting of the introductory and of the concluding formulae: superscription, address, salutation, &c, at the beginning, and date, formulae of execution, &c, at the end, of the deed. The latter portion of the protocol is sometimes styled the eschatocol (Gr. io-xaros, last, and / coXX Sv, to glue) . While the text followed certain formulae which had become fixed by common usage, the protocol was always special and varied with the practices of the several chanceries, changing in a sovereign chancery with each successive reign.

The different sections of a full deed, taking them in order under the heads of Initial Protocol, Text and Final Protocol or Eschatocol, are as follows : — The initial protocol consists of the Invocation, the _. ,

Superscription, the Address and the Salutation. . I. The

The Invo- j NVOCATIO n, lending a character of sanctity to the pro-cation – ceedings, might be either verbal or symbolic. The verbal invocation consisted usually of some pious ejaculation, such as In nomine Dei, In nomine domini noslri Jesu Christi; from the 8th century, In nomine Sanctae et individuae Trinitatis ; and later, In nomine Patris et Filii et Spiritus Sancti. The symbolic form was usually the chrismon, or monogram composed of the Greek initials XP of the name of Christ. In the course of the ioth and nth centuries this symbol came to be so scrawled that it had probably lost all meaning with the scribes. From the 9th century the letter C (initial of Christus) came gradually into use, and in German imperial diplomas it superseded the chrismon. Stenographic signs of the system known as Tironian notes were also sometimes added to this symbol down to the end of the ioth century, expressing such a phrase as Ante omnia Christus, or Christus, or Amen. From the Merovingian period, too, a cross was often used. The symbol gradually died out after the I2th century for general use, surviving only in notarial instruments and wills. 2.The Superscription {superscript™, intitulatio) expressed the name and titles of the grantor or person mcrloti issuing the deed. 3. The Address. As diplomas were scnpaoa. or ;g ma lly ; n epistolary form the address was then a necessity. While in Merovingian deeds the old pattern was adhered _ to, in the Carolingian period the address was sometimes

™J omitted. From the 8th century it was not considered neces-

Address. ^^ an(j a di stmc tion arose in the case of royal acts, those having the address being styled letters, and those omitting it, charters. The general form of address ran in phrase as Omnibus (or Universis) Christi fidelibus presentes litterasinspecturis. The Sam- -pˆ e salutation was expressed in such words as tailon. Salutem; Salutem et dilectionem; Salutem et apostolicam benedictionem, but it was not essential.

Then follows the text in five sections : the Preamble, the Notification, the Exposition, the Disposition and the Final Clauses. 5. The _. Preamble {prologus,arenga)\ an ornamental introduction

V te generally composed of pious or moral sentiments, a

Preamble. p re j at i a d captandam benevolentiam which facit ad ornamentum, degenerating into tiresome platitudes. It became stereotyped at an early age: in the ioth and nth centuries it was a

most ornate performance ; in the i .V° 1 2th century it was cut short; in the 13th century it ticama. ciied out- 6. The Notification (nptificatio, promulgatio) was the publication of the purport of the deed introduced by such a phrase as notum sit, &c. 7. The Exposition The Bx" set out (he motives influencing the issue of the deed. 8. The position. Disposition described the object of the deed and the will THe ^' and intention of the grantor. 9. The Final Clauses en nm"' 1 sured the fulfilment of the terms of the deed ; guarded The hiaai a g a ; nst infringement, by comminatory anathemas and im- ciauses. p reca ti onSi n ot infrequently of a vehement description, or by penalties ; guaranteed the validity of the deed ; enumerated the formalities of subscription and execution ; reserved rights, &c.

Next comes the final protocol or eschatocol comprising : the Date, the Appreciation, the Authentication. It was particularly in this portion of the deed that the varying practices of the several n chanceries led to minute and intricate distinctions at

The Date, different periods. 10. The Date. By the Roman law every act must be dated by the day and the year of execution. Yet in the middle ages, from the 9th to the 12th century, a large proportion of deeds bears no date. In the most ancient charters the date clause was frequently separated from the body of the deed and placed " in an isolated position at the foot of the sheet. From the 12th century it commonly followed the text immediately. Certain classes of documents, such as decrees of councils, notarial deeds, &c, began with

The Super-

The Au- thentica- tion.

the date. The usual formula was data, datum, actum, factum, scrip- turn. In the Carolingian period a distinction grew up between datum and actum, the former applying to the time, the latter to the place, of date. In the papal chancery from an early period down to the 12th century the use of a double date prevailed, the first following the text and being inserted by the scribe when the deed was written (scriptum), the second b£ing added at the foot of the deed on its execution (actum), by the chancellor or other high functionary. From the Roman custom of dating by the consular year arose the medieval practice of dating by the regnal year of emperor, king or pope. Special dates were sometimes employed, such as the year of some great historical event, battle,; siege, pesti- lence, &c. 11. The Appreciation. The feliciter of the . . " Romans became the medieval

feliciter in Domino, or ‘ la fj „ In Dei nomine feliciter, or the more simple Deo gratias or the still more simple Amen, for the auspicious closing of a deed. In Merovingian and Carolingian diplomas it follows the date; in other cases it closes the text. In the greater papal bulls it appears in the form of a triple Amen. Benevalete was also employed as the appreciation in early deeds; but in Merovingian diplomas and in papal bulls this valedictory salutation becomes a mark of authentica- tion, as will be noticed below. 12. The Authentication was a solemn proceeding which was discharged by more than one act. The most important was the subscription or subscriptions of the person or persons from whom the deed emanated. The laws of the late Roman empire required the subscriptions and the impressions of the signet seals of the parties and of the witnesses to the deed. The subscription (subscriptio) comprised the name, signature and description of the person signing. The impression of the signet (not the signature) was the signum, sometimes signaculum, rarely sigillum. The practice of subscribing with the autograph signature obtained in the early middle ages, as appears from early documents such as those of Ravenna. But from the 7th century it began to decline, and by the 12th century it had practically ceased. In Roman deeds an illiterate person affixed his. mark, or signum manuale, which was attested. The cross being an easy form for a mark, it was very commonly used and naturally became connected with the Christian symbol. Hence, in course of time, it came to be attached very generally to subscriptions, autograph or otherwise. Great personages who were illiterate required something more elaborate than a common mark. Hence arose the use of the monogram, the caracter nominis, composed of the letters of the name. The emperor Justin, who could not write, made use of a monogram, as did also Theodoric, king of the Ostrogoths. Those Merovingian kings, likewise, who were illiterate, had their individual monograms ; and at length Charlemagne adopted the monogram as his regular form of signature. From his reign down to that of Philip the Fair the monogram was the recognized sign manual of the sovereigns of France (see Autographs). It was employed by the German emperors down to the reign of Maximilian I. The royal use of the monogram was naturally imitated by great officers and ecclesiastics. But another form of sign manual also arose out of the subscription. The closing word (usually subscripsi), written or abbreviated as sub., or iJ. or s., was often finished off with flourishes and interlacings, sometimes accompanied with Tironian notes, the whole taking the shape of a domed structure to which the French have given the name of ruche or bee-hive. Thus in the early middle ages we have deeds authenticated by the subscription, usually

autograph, giving the name and titles of the person executing, and stating the part taken by him in the- deed, and closing with the subscripsi, often in shape of the ruche and constituting the signum manuale. If not autograph, the subscription might be impersonal in such form as signum (or signum manus) + N. In the Carolingian period, while phrases were constantly used in the body of the deed implying that it was executed by autograph subscription, it did not necessarily follow that such subscription was actually written in person. The ruche was also adopted by chancellors, notaries and scribes as their official mark. While autograph subscriptions continued to be employed, chiefly by ecclesiastics, down to the beginning of the 12th century, the monogram was perpetuated from the ioth century by the notaries. Their marks, simple at first, became so elaborate from the end of the 13th century that they found it necessary to add their names in ordinary writing, or also to employ a le.ss complicated design. This was the commencement of the modern practice of writing the signature which first came into vogue in the 14th century.'

To lend further weight and authority to the subscription, certain symbols and forms were added at different periods. Imitating, the corroborative Legi of the Byzantine quaestor and the Legimus , of the Eastern emperors, the Frankish chancery in the West made use of the same form, notably in the reign of Charles the Bald, in some of whose diplomas the Legimus appears written in larger letters in red. The valedictory Benevalete, employed in early deeds as a form of appreciation (see above), appears in Merovingian and in fheBene- early Carolingian royal diplomas, and also in papal bulls, valete% as an authenticating addition to the subscription. In the diplomas it was written in cursive letters in two lines, Bene valete, just to the right of the incision cut in the sheet to hold fast the seal, which sometimes even covered part of the word. In the mostancient papal bulls it was written by the pope himself at the foot of the deed.

in two lines, generally in larger capital or uncial characters, placed between two crosses. From the beginning of the nth century it became the fashion to link the letters; and, dating from the time of Leo IX., a.d. 1048-1054, the Benevalete was inscribed in form of a monogram. During Leo's pontificate it was also accompanied with a flourish called the Komma, which was only an exaggeration of the mark of punctuation (periodus) which from the 9th to the nth

century closed the subscription and generally resembled the modern semicolon. Leo's successors abandoned the Komma, but the monogrammatic Benevalete continued, invariable in form, but from time to time varying in size. In Leo IX. 's pontificate also was introduced the Rota. This sign, when it had received its final shape in the The Rota. XI th century, was in form of a wheel, composed of two concentric circles, in the space between which was written the motto Or device of the pope (signum papae), usually a short sentence from one of the Psalms or some other portion of Scripture; preceded by a small cross, which the pontiff himself sometimes inscribed. The central space within the wheel was divided (by cross lines) into four quarters, the two upper ones being occupied by the names of the apostles St Peter and St Paul, and the two lower ones by the name of the pope. The Rota was placed on the left of the subscription, the rnonogrammatic Benevalete on the right. The two signs were likewise adopted by certain ecclesiastical chanceries and by feudal lords, particularly in the 12th century. From the same period also the Spanish and Portuguese monarchs adopted the Rota, the signo rodado, which is so conspicuous in the royal charters of the Peninsula.

Besides the subscription, an early auxiliary method of authentication was by the impression of the seal which, as noticed above, was Sealing. required by the Roman law. But the general use of the signet gradually failed, and by the 7th century it had ceased. Still it survived in the royal chanceries, and the sovereigns both of the Merovingian and of the Carolingian lines had their seals ; and, in the 8th century, the mayors of the palace like- wise. It is interesting to find instances of the use of antique intaglios for the purpose by some of them. In England too there is proof that the Mercian kings Offa and Coenwulf used seals, in imitation of the Frankish monarchs. In the 7th century, and still more so in the 8th and 9th centuries, the royal seals were of exaggerated size : the precursors of the great seals of the later sovereigns of western Europe. The waxen seals of the early diplomas were in all cases en placard: that is, they were attached to the face of the document and not sus- pended from it, being held in position by a cross-cut incision in the material, through which the wax was pressed and then flattened at the back. On the cessation of autograph signatures in subscriptions, the general use of seals revived, beginning in the 10th century and becoming the ordinary method of authentication from the 12th to the 15th century inclusive. Even when signatures had once again become universal, the seal continued to hold its place; and thus sealing is, to the present day, required for the legal execution of a deed. The attachment en

placard was discontinued, as a general practice, in the middle of the nth century; and seals thenceforward were, for the most part, suspended, leathern thongs being used at first, and afterwards silken and hempen cords or parchment labels. In documents of minor importance it was sometimes the custom to impress the seal or seals on one or more strips of the parchment of the deed itself, cut, but not entirely detached, from the lower margin, and left to hang loose. Besides waxen impressions of seals, im- pressions in metal, bearing a device on both faces, after the fashion of a coin, and suspended, were employed from an early period. The most widely known instances are the bullae attached to papal docu- ments, generally of lead. The earliest surviving papal bulla is one of Pope Zacharias, a.d. 746, but earlier examples are known from drawings. The papal bulla was a disk of metal stamped on both sides. From the time of Boniface V. to Leo IV., a.d. 617-855, the name of the pontiff, in the genitive case, was impressed on the obverse, and his title as pope on the reverse, e.g. Bonifati/ papae. After that period, for some time, the name was inscribed in a circle round a central ornament. Other variations followed; but at length in the pontificate of Paschal II., A.D. 1099, the bulla took the form which it afterwards retained: on the obverse, the heads of the apostles St Peter and St Paul; on the reverse, the pope's name, title and number in succession. In the period of time betwreen his election and consecration, the pope made use of the half-bull, that is, the obverse only was impressed. It should be mentioned that, in order to conform to modern conditions and for convenience of despatch through the post, Leo XIII., in 1878, substituted for the leaden bulla a red ink stamp bearing the heads of the two apostles with the name of the pope inscribed as a legend.

The Carolingian monarchs also used metal bullae. None of Charlemagne's have survived, but there are still extant leaden ex- amples of Charles the Bald. The use of lead was not persisted in either in the chancery of France or in that of Germany. Golden bullae were employed on special occasions by both popes and temporal monarchs; for example, they were attached to the confirmations of the elections of the emperors in the 12th and 13th centuries; the bull of Leo X. conferring the title of Defender of the Faith on Henry VIII. in 1524, and the deed of alliance between Henry and Francis I. in 1527, had golden bullae; and other examples could be cited. But lead has always been the common metal to be thus

employed. In the southern countries of Europe, where the warmth of the climate renders wax an undesirable material, leaden bullae have been in ordinary use, not only in Italy but also in the Peninsula, in

southern France, and in the Latin East (see Seals).

The necessity of conforming to exact phraseology in diplomas and of observing regularity in expressing formulas naturally led to the compilation of formularies. From the early middle ages p orma . the art of composition, not only of charters but also of larles general correspondence, was commonly taught in the monasteries. The teacher was the dictator, his method of teaching was described by the verb dictare, and his teaching was dictamen or the ars dictaminis. ■ For the use of these monastic schools, formularies and manuals comprising formulas and models for the composition of the various acts and documents soon became indispensable. At a later stage such formularies developed into the models and treatises for epistolary style which have had their imitations even in modern times._ The widespread use of the formularies had the advantage of imposing a certain degree of uniformity on the phrasing of documents of the western nations of Europe. Those compilations which are of an earlier period than the nth century have been systematically examined and are published ; those of more recent date still remain to be thoroughly edited. The early formularies are of the simpler kind, being collections of formulas without dissertation. The Formulae Marculfi, compiled by the monk Marculf about the year 650, was the most important work of this nature of the Merovingian period and became the official formulary of the time ; and it continued in use in a revised edition in the early Carolingian chancery. Of the same period there are extant formularies compiled at various centres, such as Angers, Tours, Bourges, Sens, Reichenau, St Gall, Salzburg, Passau, Regensburg, Cordova, &c. (see Giry, Manuel de diplomatique, pp. 482-488). The Liber diurnus Romanorum Pontificum was compiled in the 7th and 8th centuries, and was employed in the papal chancery to the end of the I Ith century. Of the more developed treatises and manuals of epistolary rhetoric which succeeded, and which originated in Italy, the earliest example was the Breviarium de dictamine of the monk Alberic of Monte Cassiro, compiled about the year 1075. Another well-known work, the Rationes dictandi, is also attributed to the same author. Of later date was the Ars dictaminis of Bernard of Chartres ot the 12th century. (Among special works on formularies are: E. de Roziere, Recueil general des formules usitees dans V empire des Francs (3 vols., Paris, 1861-1871); K. Zeumer, Formulae Merovingici et Karolini aevi (Hanover, 1886) ; and L. Rockinger, Briefsteller und Formelbiicher des II bis. 14 Jahrhunderts (Munich, 1863-1864).

Organization. — The formalities observed by the different chanceries of medieval Europe, which are to be learned from a study of the

documents issued by them, are so varied and often so minute, that it is impossible to give a full account of them within the limits of the present article. We can only state some of the results of the investigations of students of diplomatic.

The chancery which stands first, and foremost is the papal chancery. On account of its antiquity and of its steady develop- ment, it has served as a model for the other chanceries of Europe. Organized in remote times, it adopted for ˆnce the structure of its letters a number of formulas and rules which developed and became more and more fixed and precise from century to century. The Apostolic court being organized from the first on the model of the Roman imperial court, the early pontiffs would naturally have collected their archives, as the emperors had done, into scrinia. Pope Julius I., A.d. 337-3S3, reorganized the papal archives under an official schola notariorum, at the head of which was a primicerius notariorum. Pope Damasus, a.d. .366-384, built a record office at the Lateran, archivium sanctae Romanae ecclesiae, where the archives were kept and registers of them compiled. The collec- tion and orderly arrangement of the archives provided material for the establishment of regular diplomatic usages, and the science of formulae naturally followed.

For the study of papal documents four 'periods have been defined, each successive period being distinguished from its predecessor by some particular development of forms and procedure. The first period is reckoned from the earliest times to the accession of Leo IX., a.d. 1048. For almost the whole of the first eight centuries no original papal documents have survived. But copies are found in canonical works and registers, many of them false, and others probably not transcribed in full or in the original words; but still of use, as showing the growth of formulas. The earliest original document is a fragment of a letter of Adrian I., a.d. 788. From that date there is a series, but the documents are rare to the beginning of the nth century, all down to that period beirig written on papyrus. The latest existing

papyrus document in France is one of Sergius IV., a.d. ioii; in Germany, one of Eenedict VIII., a.d. 1022. The earliest docu- ment on vellum is one of John XVIII., a.d. 1005. The nomencla- ture of papal documents even at an early period is rather wide. In their earliest form they are Letters, called in the documents themselves,

litterae, epistola, pagina, scriptum, sometimes decretum. A classification, generally accepted, divides them into: 1. Letters or Epistles: the ordinary acts of correspondence with persons of all ranks and orders; including constitutions (a later term) or decisions in matters of faith and discipline, and encyclicals giving directions to bishops of the whole church or of individual countries. 2. Decrees, being letters promulgated by the popes of their own motion. 3. Decretals, decisions on points of ecclesiastical administration or discipline. 4. Rescripts (called in the originals preceptum, auctoritas, privilegium) , granting requests to petitioners. But writers differ in their terms, and such sub- divisions must be more or less arbitrary. The comprehensive term " bull " (the name of the leaden papal seal, bulla, being transferred to the document) did not come into use until the 13 th century.

Copies of papal deeds were collected into registers or bullaria. Lists showing the chronological sequence of documents are catalogues of acts. When into such lists indications from narrative sources are introduced they become regesta {res gestae) : a term not to be confused with " register."

Clearness and conciseness have been recognized as attributes of early papal letters; but even in those of the 4th century certain rhythmical periods have been detected in their composition which became more marked under Leo the Great, a.d. 440-461, and which developed into the cursus or prose rhythm of the pontifical chancery of the nth and 12th centuries.

In the most ancient deeds the pope styles himself Episcopus, sometimes Episcopus Catholicae Ecclesiae, or Episcopus Romanae Ecclesiae, rarely Papa. Gregory I., a.d. 590, was the first to adopt the form Episcopus, servus servorum Dei, which became general in the 9th century, and thenceforth was invariable.

The second period of papal documents extends from Leo IX. to the accession of Innocent III., a.d. 1048-1198. At the beginning of the period formulae tended to take more definite shape and to become fixed. In the superscription of bulls a distinction arose : those which conferred lasting privileges employing the words in perpetuum to close this clause; those whose benefaction was of a transitory character using the form of salutation, salutem el apostolicam benedictionem. But it was under Urban II., a.d. 1088-1099, that the principal formulae became stereotyped. Then the distinction between documents of lasting, and those of transitory, value became more exactly defined; the former class being known as greater bulls, bullae

majores (also called privilegia), the latter lesser bulls, bullae minores. The leading characteristics of the greater bulls were these: The first line containing the superscription and closing with the words in perpetuum (or, some- times, ad perpetuam, or aeternam, rei memoriam) was written in tall and slender ornamental letters, close packed; the final clauses of the text develop with tendency to fixity; the pope's subscription is accompanied with the rota on the left and the benevalete monogram on the right; and certain elaborate forms of dating are punctiliously observed. The introduction of subscriptions of cardinals as witnesses had gradually become a practice. Under Victor II., a.d. 1055-1057, the practice became more confirmed, and after the time of Innocent II., a.d. 1130- 1145, the subscriptions of the three orders were arranged accord- ing to rank, those of the cardinal bishops being placed in the centre under the papal subscription, those of the priests under the rota on the left, and those of the deacons under the benevalete on the right. In the lesser bulls simpler forms were employed; there was no introductory line of stilted letters; the salutation, salutem et apostolicam benedictionem, closed the superscription; the final clauses were shortened; there was neither papal sub- scription, nor rota, nor benevalete; the date was simple.

From the time of Adrian I., a.d. 772-795, the system of double dating was followed in the larger bulls. • The first date was written by the scribe of the document, scriptum per manum N. with the month (rarely the day of the month) and year of the indiction.

The second, the actual date of the execution of the deed, was entered (ostensibly) by some high official, data, or datum, per manum N., and contained the day of the month (according to the Roman calendar), the year of indiction, the year of pontificate (in some early deeds, also th= year of the empire and the post- consulate year), and the year of the Incarnation, which, however, was gradually introduced and only became more common in the course of the 1 1 th century. For example, a common form of a full date would run thus: Datum Later ani, per manum N., sanctae Romanae ecclesiae diaconi cardinalis, xiiii. hi. Maii, indictione V ., anno dominicae Incarnationis mxcvii., pontificatus autem domini papae Urbani secundi X°. The simpler form of the date of a lesser bull might be: Datum Later ani, Hi. non. Jan., pontificatus nostri anno iiii.

By degrees the use of the lesser bulls almost entirely superseded that of the greater bulls, which became exceptional in the 13th century and almost ceased after the migration to Avignon in 1309. In modern times the greater bulls occasionally reappear for very solemn

acts, as bullae consistoriales, executed in the consistory.

The third period of papal documents extends from Innocent III. to Eugenius IV., a.d. 1198-1431. The pontificate of Innocent III. was a most important epoch in the history of the development of the papal chancery. Formulas became more exactly fixed, definitions more precise, the observation of rules and precedents more constant. The staff of the chancery was reorganized. The existing series of registers of papal documents was then com- menced. The growing use of lesser bulls for the business of the papal court led to a further development in the 13th century. They were now divided into two classes : Tituli and Mandamenta. The former conferred favours, promulgated precepts, judgments, decisions, &c. The latter comprised ordinances, commissions, &c, and were executive documents. There are certain features which distinguish the two classes. In the tituli, the initial letter of the pope's name is ornamented with openwork and the other letters are stilted. In the mandamenta, the initial is filled in solid and the other letters are of the same size as the rest of the text. In the tituli, enlarged letters mark the beginnings of the text and of certain clauses; but not in the mandamenta. In the former the mark of abbreviation is a looped sign; in the latter it is a horizontal stroke. In the former the old practice of leaving a gap between the letters s and t, and c and /, whenever they occur together in a word {e.g. is te, sane tus), and linking them by a coupling stroke above the line is continued; in the latter it disappears. The leaden bulla attached to a titulus (as a permanent deed) is suspended by cords of red and yellow silks; while that of a mandamentum (a temporary deed) hangs from a hempen cord.

In the fourth period, extending from 143 1 to the present time, the tituli and mandamenta have continued to be the ordinary documents in use; but certain other kinds have also arisen. Briefs {brevia), or apostolic letters, concerning the personal affairs of the pope or the administration of the temporal dominion, or conceding indulgences, came into general use in the 13th century in the pontificate of Eugenius IV. They are written in the italic hand on thin white vellum; and the name of the pope with his style as papa is written at the head of the sheet, e.g. Eugenius papa iiii. They are closed and sealed with Seal of the Fisher- man, sub anulo Piscatoris. Briefs have almost superseded the mandamenta. The documents known as Signatures of the court of Rome or Latin letters, and used principally for the expedition of indulgences, were first introduced in the 1 5th century They were drawn in the form of a petition to the pope, which he granted by the words fiat ut petatur written across the top. They were not sealed; and only the pontifical year appears in the date.

Lastly, the documents to which the name of Motu proprio is given are also without seal and are used in the administration of the papal court, the formula placet et ita motu proprio mandamus being signed by the pope.

The character of the handwriting employed by the papal chancery is discussed in the article Palaeography. Here it will be enough to state that the early style was derived from the Lombardic hand, and that it continued in use down to the beginning of the 12th century; but that, from the 10th century,

owing to the general adoption of the Caroline minuscule writing, it began to fail and gradually became so unfamiliar to the un- initiated, that, whileit still continued in use for papal bulls, it was found necessary to accompany them with copies written in the more intelligible Caroline script. The intricate, fanciful character, known as the Liter a sancti Petri, was invented in the time of Clement VIII., a.d. 1592-1605, was fully developed under Alexander VIII., 1689-1691, and was only abolished at the end of the year 1878 by Leo XIII.

Of the chancery of the Merovingian line of kings as many as ninety authentic diplomas are known, and, of these, thirty-seven

are originals, the earliest being of the year 625. The vingiaa most anc i ent examples were written on papyrus, vellum chancery, superseding that material towards the end of the 7th

century. All these diplomas are technically letters, having the superscription and address and, at the foot, close to the seal, the valedictory benevalete. They commence with a monogrammatic invocation, which, together with the superscrip- tion and address written in fanciful elongated letters, occupies the first line. The superscription always runs in the form, N. rex Francorum. The most complete kinds of diplomas were authenticated by the king's subscription, that of the referendarius (the official charged with the custody of the royal seal), the impression of the seal, and exceptionally by subscriptions of prelates and great personages. The royal subscription was usually autograph; but, if the sovereign were too young or too illiterate to write, a monogram was traced by the scribe. The referendary, if he countersigned the royal subscription,

added the word optulit to his own signature; if he subscribed independently, he wrote recognovit et subscripsit, the end of the last word being usually lost in flourishes forming a ruche. The date gave the place, day, month and year of the reign. The Merovingian royal diplomas are of two classes: (1) Precepts, conferring gifts, favours, immunities and confirmations, entitled in the documents themselves as praeceplum, praeceptio, auctorilas; some drawn up in full form, with preamble and ample final clauses; others less precise and formal. (2) Judgments (judicia), which required no preamble or final clauses as they were records of the sovereign's judicial decisions; they were subscribed by the referendary and were sealed with the royal seal. Other classes of documents were the cartae de mundeburde, taking persons under the royal pro- tection, and indiculi or letters transmitting orders or notifying decisions; but no examples have survived.

The diplomas of the early Carolingians differed, as was natural, but little from those of their predecessors. As mayors of the

palace, Charles Martel and Pippin took the style of lagiaa ˆ r i n ˆ us ˆ er – On becoming king, Pippin retained it; chancery. Pippinus, vir Muster, rex Francorum, and it continued

to be part of the royal title till Charlemagne became emperor. The royal subscription was in form of a sign-manual or mark; but Charlemagne elaborated this into a monogram of the letters of his name built up on a cross. In 775 the royal title of Charlemagne became Carolus, gratia Dei rex Francorum et Langobardorum, ac patricius Romanorum, the last words being assumed on his visit to Rome in 774. On becoming emperor in 800, he was styled Imperator, Romanum gubernans imperium, rex Francorum et Langobardorum. It is to be noticed that thenceforth his name was spelt with initial K (as it was on the monogram), having previously been written with C in the deeds. Most of his diplomas were authenticated by the subscription of the chancellor and impression of the seal. A novelty in the form of dating was also introduced, two words, datum (for time) and actum (for place), being now employed. The character of the writing of the diplomas, founded on the Roman cursive hand, which had become very intricate under the Merovingians, improved under their successors, yet the reform which was introduced into the literary script hardly affected the cursive writing of diplomatic until the latter part of Charlemagne's reign. The archaic style was particularly maintained in judgments, which were issued by the private chancery of the palace, a department more con- servative in its methods than the imperial chancery. It was in the reign of Louis

Debonair, a.d. 814-840, that the Carolingian

diploma took its final shape. A variation now appears in the monogram, that monarch's sign-manual being built up, not on a cross as previously, but on the letter H., the initial of his name Hludovicus, and serving as the pattern for successive monarchs of the name of Louis.

In the Carolingian chancery the staff was exclusively ecclesi- astical; at its head was the chancellor, whose title is traced back to the cancellarius, or petty officer under the Roman empire, stationed at the bar or lattice (cancelli) of the basilica or other law court and serving as usher. As keeper of the royal archives his subscription was indispensable for royal acts. The diplomas were drawn up by the notaries, an important body, upon whom devolved the duty of maintaining the formulae and traditions of the office. It has been observed that in the 9th century the documents were drawn carefully, but that in the 10th century there was a great degeneration in this respect. Under the early Capetian kings there was great confusion and want of uniformity in their diplomas; and it was not until the reign of Louis VI., a.d. 1 108, that the formulae were again reduced to rules.

The acts of the imperial chancery of Germany followed the patterns of the Carolingian diplomas, with little variation down to the reign of Frederick Barbarossa, a.d. 11 52-1 190. The sovereign's style was N. divina favente dementia a e %, a " n rex; after coronation at Rome he became imperator chancery. augustus. At the end of the 10th century, Otto III. developed the latter title into Romanorum imperator augustus. Under Henry III., and regularly from the time of Henry V., a.d. 1106-1125, the title before coronation has been Romanorum rex. The royal monogram did not necessarily contain all the letters of the name; but, on the other hand, from the year 976, it became more complicated and combined the imperial title with the name. For example, the monogram of Henry II. combines the words Henricus Romanorum imperator augustus. The flourished ruches also, as in the Frankish chanceries, were in vogue. Eventually they were used by certain of the chancellors as a sign-manual, and took fanciful shapes, such as a building with a cupola, or even a diptych. They disappear early in the 12th century, the period when in other respects the chancery of the Holy Roman Empire largely adopted a more simple style in its diplomas. Lists of witnesses, in support of the royal and official subscriptions, were sometimes added in the course of the nth century, and they appear regularly in documents a hundred years later.

For the study of diplomatic in England, material exists in two distinct series of documents, those of the Anglo-Saxon period, and those subsequent to the Norman Conquest. The Anglo- Saxon kings appear to have borrowed, partially, the m aUcin style of their diplomas from the chanceries of their England. Frankish neighbours, introducing at the same time modifications which give those documents a particular character marking their nationality. In some of the earlier examples we find that the lines of the foreign style are followed more or les? closely; but very soon a simpler model was adopted which, while it varied in formulas from reign to reign, lasted in general construction down to the time of the Norman Conquest. The royal charters were usually drawn up in Latin, sometimes in Anglo- Saxon, and began with a preamble or exordium (in some instances preceded by an invocation headed with the chrismon or with a cross), in the early times of a simple character, but, later, drawn out not infrequently to great length in involved and bombastic periods. Then immediately followed the disposing or granting clause, often accompanied with a few words explaining the motive, such as, for the good of the soul of the grantor; and the text was closed with final clauses of varying extent, protecting the deed against infringement, &c. In early examples the dating clause gave the day and month (often according to the Roman calendar) and the year of the indiction; but the year of the Incarnation was also immediately adopted; and, later, the regnal year also. The position of this clause in the charter was subject to variation. The subscriptions of the king and of the personages witnessing the deed, each preceded by a cross, but all written by the hand of the scribe, usually closed the charter. A peculiarity was the introduction, in many instances, either in the body of the charter,

or in a separate paragraph at the end of the boundaries of the land granted, written in the native tongue. The sovereigns of the several kingdoms, of the Heptarchy, as well as those of the United Kingdom, usually styled themselves rex. But from the time of jEthelstan, a.d. 825-840, they also assumed fantastic titles in the text of their charters, such as: rex et primicerius, rex et rector, gubernator et rector, monarchus, and particularly the Greek basileus, and basileus industrius. At the same time the name of Albion was also frequently used for Britain.*

A large number of documents of the Anglo-Saxon period, dating from

the 7th century, has survived, both original and copies entered in chartularies. Of distinct documents there are nearly two hundred; but a large proportion of these must be set aside as copies (both contemporary and later) or as spurious deeds.

Although there is evidence, as above stated, of the use of seals by certain of the Mercian kings, the method of authentication of diplomas by seal impression was practically unknown to the Anglo-Saxon sovereigns, save only to Edward the Confessor, who, copying the custom which obtained upon the continent, adopted the use of a great seal.

With the Norman Conquest the old tradition of the Anglo- Saxons disappeared. The Conqueror brought with him the practice of the Roman chancery, which naturally followed the Capetian model; and his diplomas of English origin differed only from those of Normandy by the addition of his new style, rex Anglorum, in the superscription. But even from the first there was a. tendency to simplicity in the new English chancery, not improbably suggested by the brief formalities of Anglo-Saxon charters, and, side by side with the more formal royal diplomas, others of shorter form and less ceremony were issued, which by the reign of Henry II. quite superseded the more solemn docu- ments. These simpler charters began with the royal superscrip- tion, the address, and the salutation, e.g. Willelmus, Dei gratia rex Anglorum, N. episcopo et omnibus baronibus et fidelibus suis ■Francis et Anglis salutem. Then followed the notification and the grant, e.g. Sciatis me concessisse, &c, generally without final clauses, or, if any, brief clauses of protection and warranty; and, at the end, the list of witnesses and the date. The regnal year was usually cited; but the year of the Incarnation was also sometimes given. The great seal was appended. To some of the Conqueror's charters his subscription and those of his queen and sons are attached, written by the scribe, but accompanied with crosses which may or may not be autograph. By the reign of John the simpler form of royal charters had taken final shape, and from this time the acts of the kings of England have been classified under three heads: viz. (1) Charters, generally of the pattern described above; (2) Letters patent, in which the address is general, Universis presentes litteras inspecturis, &c; the cor- roborative clause describes the character of the document, In cujus rei testimonium has literas nostras fieri iecimus patentes; the king himself is his own witness, Teste me ipso; and the great seal is appended; (3) Close letters, administrative documents convey- ing orders, the king witnessing, Teste me ipso.

The style of the English kings down to John was, with few exceptions,

Rex Anglorum; thenceforward, Rex Angliae. Henry II. added the feudal titles, dux Normannorum et Aquitanorum et comes A ndegavorum, which Henry III. curtailed to dux A quitaniae. John added the title dominus Hiberniae; Edward III., on claim- ing the crown of France, styled himself rex Angliae et Franciae, the same title being borne by successive kings down to the year 1 801; and Henry VIII., in 1321, assumed the title of fidei defensor. The formula Dei gratia does not consistently accompany the royal title until the reign of Henry II., who adopted it in 11 73 (see L. Delisle, Mimoire sur la chronologie des chartes de Henri II., in the Bibl. de V Ecole des Charles, lxvii. 361-401).

The forms adopted in the royal chanceries were naturally imitated in the composition of private deeds which in all countries form the mass of material for historical and diplomatic research. The student of English diplomatic will soon remark how readily the private charters, especially conveyances of real property, fall into classes, ■ and how stereotyped the phraseology and formulae of each class become,

Private deeds.

only modified from time to time by particular acts of legislation. The brevity of the early conveyances is maintained through successive generations, with only moderate growth as time progresses through the 12th, 13th and 14th centuries. The different kinds of deeds which the requirements of society have from time to time called into existence must be learned by the student from the text-books. But a particular form of document which was especially in favour in England should be mentioned. This was the chirograph (Gr. %elp, a hand, ypafaw, to write), which is found even in the Anglo-Saxon period, and which got its name from the word chirographum, cirographum or cyrographum being written in large letters at the head of the deed. At first the word was written, presumably, at the head of each of the two authentic copies which the two parties to a transaction would require. Then it became the habit to use the word thus written as a tally, the two copies of the deed being written on one sheet, head to head, with the word between them, which was then cut through longitudinally in a straight, or more commonly waved or indented (in modum dentium) line, each of the two copies thus having half of the word at the head. Any other word, or a series of letters, might thus be employed; and more than two copies of a deed could thus be made to tally. The chirograph was the precursor of the modern indenture, the commonest form of English deeds, though no longer a tally. In other countries, the notarial instrument has performed the functions which the chirograph and indenture

have discharged for us.

Authorities. — General treatises, handbooks, &c, are J. Mabillon, De re diplomatica (1709); Tassin and Toustain, Nouveau Traite de diplomatique (1750-1765) ; T. Madox, Formulare Anglicanum (1702) ; G. Hickes, Linguarum septentrionalium thesaurus (1 703-1 705);

F. S.Maffei, Istoria diplomatica (1727); G. Marini, I Papiri diplomatici (1805); G. Bessel, Chronicon Gotwicense (De diplomatibus imperatorum ac regum Germaniae) (1732); A. Fumagalli, Delle istituzioni diplomatiche (1802); M. F. Kopp, Palaeographia crilica

.(18 1 7-1829); K. T. G. Schdnemann, Versuch eines vollstandigen Systems der Diplomatik (18 1 8); T. Sickel, Lehre von den Urkunden der erstew Karolinger ■'(1867); J. Ficker, Beitrage zur Urkundenlehre (1877-1878); A. Gloria, Compendio delle lezioni di paleografia e diplomatica (1870) ; C. Paoli, Programma scolastico di paleografia Latina e di diplomatica (1888-1890); H. Bresslau, Handbuch der Urkundenlehre fur Deutschland und Italien (1889); A. Giry, Manuel de diplomatique (1894); F. Leist, Urkundenlehre (1893); E. M. Thompson, Handbook of Greek and Latin Palaeography, cap. xix. (1906); J. M. Kemble, Codex diplomaticus aevi Saxonici (1839- 1848) ; W. G. Birch, Cartularium Saxonicum (1885-1893) ; J. Mufioz y Rivero, Manuel de paleografia diplomatica Espanola (1890); M. Russi, Paleografia e diplomatica de' documenti delle provincie Napolitane (1883). Facsimiles are given in J. B. Silvestre, Paleo- graphie universale (English edition, 1850); and in the Facsimiles, &c, published by the Palaeographical Society (1873-1894) and the New Palaeographical Society (1903, &c.) ; and also in the following works: — A. Champollion-Figeac, Chartes et manuscrits sur papyrus (1840); J. A. Letronne, Diplomes et chartes de I'Spoque mero- vingienne (1845-1866); J. Tardif, Archives de I'Empire: Facsimileˆ de chartes et diplomes merovingiens et carlovingiens (1866);

G. H. Pettz, Schrifttafeln zum Gebrauch bei diplomatischen Vorlesungen (1844-1869); H. von Sybel and T. Sickel, Kaiser-urkunden in Abbildungen (1880-1891); J. von Pflugk-Harttung, Specimina selecta chartarum Pontificum Romanorum (1885ˆ1887); Specimina palaeographica regestorum Romanorum pontificum (1888); Recueil de facsimiles & V usage de V Ecole des Chartes' (not published) (1880, &c); J. Mufioz y Rivero, Chrestomathia palaeographica: scripturae Hispanae veteris specimina (1890) ; E. A. Bond, Fac- similes of Ancient Charters xn the British Museum

"(1873-1878): W. B. Sanders, Facsimiles of Anglo-Saxon Manuscripts (charters) (1878-1884); G. F. Warner and H. J. Ellis, Facsimiles of Royal and other Charters in the British Museum (1903). (E. M. T.)

DIPOENUS and SCYLLIS, early Greek sculptors, who worked together, and are said to have been pupils of Daedalus. Pliny assigns to them the date 580 B.C., and says that they worked at Sicyon, which city from their time onwards became one of the great schools of sculpture. They also made statues for Cleonae' and Argos. They worked in wood, ebony and, ivory, and apparently also in marble. It is curious that no inscription bearing their names has come to light.

DIPPEL, JOHANN KONRAD (1673-1734), German theologian and alchemist, son of a Lutheran pastor, was born at the castle of Frankenstein, near Darmstadt, on the 10th of August 1673. He studied theology at Giessen. After a short visit to Wittenberg-

he went to Strassburg, where he lectured on alchemy and chiromancy, and occasionally preached. He gained considerable popularity, but was obliged after a time to quit the city, owing to his irregular manner of living. He had up to this time espoused the cause of the orthodox as against the pietists; but in his two first works, published under the name " Christianus Democritus," Orthodoxia Orthodoxorum (1697) and Papismus vapulans Pro- les'lanlium (1698), he assailed the fundamental positions of the Lutheran theology. He held that religion consisted not in dogma but exclusively in love and self-sacrifice. To avoid persecution he was compelled to wander from place to place in Germany, Holland, Denmark and Sweden. He took the degree of doctor of medicine at Leiden in 1711. He discovered Prussian blue, and by the destructive distillation of bones prepared the evil- smelling product known as Dippel's animal oil. He died near Berleburg on the 25th of April 1734.

An enlarged edition of Dippel's collected works was published at Berleburg in 1 743. See the biographies by J. C. G. Ackermann (Leipzig, 1781), H. V. Hoffmann (Darmstadt, 1783), K. Henning (1881) and W. Bender (Bonn, 1882) ; also a memoir by K. Bucher in the Hislorisches Taschenbuch for 1858.

DIPSOMANIA (from Gr. 8L\pa, thirst, and navia, madness), a term

formerly applied to the attacks of delirium (q.v.) caused by alcoholic poisoning. It is now sometimes loosely used as equivalent to the condition of incurable inebriates, but strictly should be confined to the pathological and insatiable desire for alcohol, sometimes occurring in paroxysms.

DIPTERA (5is, double, irrepa, wings), a term (first em- ployed in its modern sense by Linnaeus, Fauna Suecica, 1st ed., 1 746, p. 306) used in zoological classification for one of the Orders into which the Hexapoda, or Insecta, are divided. The relation of the Diptera (two-winged flies, or flies proper) to the other Orders is dealt with under Hexapoda (q.v.).

The chief characteristic of the Diptera is expressed in the name of the Order, since, with the exception of certain aberrant and apterous forms, flies possess but a single pair of membranous wings, which are attached to the meso-thorax. Wing-covers and hind-wings are alike absent, and the latter are represented by a pair of little knobbed organs, the halteres or balancers, which have a controlling and directing function in flight. The other structural characters of the Order may be briefly summarized as: — mouth-parts adapted for piercing and sucking, or for suction alone, and consisting of a proboscis formed of the labium, and enclosing modifications of the other usual parts of the mouth, some of which, however, may be wanting; a thorax fused into a single mass; and legs with five-jointed tarsi. The wings, which are not capable of being folded, are usually transparent, but occasionally pigmented and adorned with coloured spots, blotches or bands; the wing-membrane, though sometimes clothed with minute hairs, seldom bears scales; the wing-veins, which are of great importance in the classification of Diptera, are usually few in number and chiefly longitudinal, there being a marked paucity of cross-veins. In a large number of Diptera an incision in the posterior margin of the wing, near the base, marks off a small lobe, the posterior lobe or alula, while connected with this but situated on the thorax itself there is a pair of membranous scales, or squamae, which when present serve to conceal the halteres. The antennae of Diptera, which are also extremely important in classification, are thread-like in the more primitive families, such as the Tipulidae (daddy-long-legs), where they consist of a considerable number of joints, all of which except the first two, and sometimes also trie last two, are similar in shape; in the more specialized families, such as the Tabanidae (horse-flies), Syrphidae (hover- flies) or Muscidae (house-flies, blue-bottles and their allies), the number of antennal joints is greatly reduced by coalescence, so that the antennae appear to consist of only three joints. In these forms, however, the third joint

is really a complex, which in many families bears in addition a jointed bristle (arista) or style, representing the terminal joints of the primitive antenna. Although in the case of the majority of Diptera the body is more or less clothed with hair, the hairy covering is usually so short that to the unaided eye the insects appear almost bare; some forms, however, such as the bee-flies

(Bombylius) and certain robber-flies (Asilidae) are conspicuously hairy. Bristles are usually present on the legs, and in the case of many families on the body also; those on the head and thorax are of great importance in classification.

Between 40,000 and 50,000 species of Diptera are at present known, but these are only a fraction of those actually in existence. The species recognized as British number some 2706, but to this total additions are constantly being made. As a rule flies are of small or moderate size, and many, such as certain blood-sucking midges of the genus Ceratopogon, are even minute; as extremes of size may be mentioned a common British midge, Ceratopogon varius, the female of which measures only i\ millimetre, and the gigantic Mydaidae of Central and South America as well as certain Australian robber-flies, which have a body 1% in. long, with a wing-expanse of 3ˆ in. In bodily form Diptera present two main types, either, as in the case of the more primitive and generalized families, they are gnat- or midge-like in shape, with slender bodies and long, delicate legs, or else they exhibit a more or less distinct resemblance to the common house-fly, having compact and Stoutly built bodies and legs of moderate length. Diptera in general are not remarkable for brilliancy of coloration; as a rule they are dull and inconspicuous in hue, the prevailing body-tints being browns and greys; occasionally, however, more especially in species (Syrphidae) that mimic Hymenoptera, the body is conspicuously banded with yellow; a few are metallic, such as the species of Formosia, found in the islands of the East Indian Archipelago, which are among the most brilliant of all insects. The sexes in Diptera are usually alike, though in a number of families with short antennae the males are distinguished by the fact that their eyes meet together (or nearly so) on the forehead. Metamorphosis in Diptera is complete; the larvae are utterly different from the perfect insects in appearance, and, although varying greatly in outward form, are usually footless grubs; those of the Muscidae are generally known as maggots. The pupa either shows the appendages of the perfect insect, though these are encased in a sheath and adherent to the body, or else it is entirely concealed within the hardened and contracted larval integument, which forms a barrel-shaped protecting capsule or puparium.

Diptera are divided into some sixty families, the exact classi- fication of which has not yet been finally settled. The majority of authors, however, follow Brauer in dividing the order into two sections, Orthorrhapha and Cyclorrhapha, according to the manner in which the pupa-case splits to admit of the escape of the perfect insect. The general characteristics of the pupae in these two sections have already been described.

In the Orthorrhapha, in the pupae of which the appendages of the perfect insect are usually visible, the pupa-case generally splits in a straight line down the back near the cephalic end ; in front of this longitudinal cleft there may be a small transverse one, the two together forming a T-shaped fissure. In the Cyclorrhapha on the other hand, in which the actual pupa is concealed within the hardened larval skin, the imago escapes through a circular orifice formed by pushing off or through the head end of the puparium. The Diptera Orthorrhapha include the more primitive and less specialized families such as the Tipulidae (daddy-long-legs), Culicidae (gnats or mosquitoes), Chironomidae (midges), Mycetophilidae (fungus-midges), Tab- anidae (horse-flies), Asilidae (robber-flies), &c. The Diptera Cyclorrhapha on the other hand consist, of the most highly specialized families, such as the Syrphidae (hover-flies) , Oestridat (bot and warble flies), and Muscidae (sensu latiore — the house-fly and its allies, including tsetse-flies, flesh-flies, Tachininae, or flies the larvae of which are internal parasites of caterpillars, &c). It is customary to divide the Orthorrhapha into the two divisions Nematocera and Brachycera, in the former of which the antennae are elongate and in a more or less primitive condition, as described above, while in the latter these organs are short, and, as already explained, apparently composed of only three joints.

Within the divisions named— Orthorrhapha Nematocera, Orthorrhapha Brachycera and Cyclorrhapha — the constituent families are usually grouped into a series of " superfamilies,"

distinguished by features of structure or habit. Certain extremely aberrant Diptera, which, in consequence of the adoption of a parasitic mode of life, have undergone great structural modifica- tion, are further remarkable for their peculiar mode of reproduc- tion, on account of which the families composing the group are often termed Pupipara. In these forms the pregnant female, instead of

laying eggs, as Diptera usually do, or even producing a number of minute living larvae, gives birth at one time but to a single larva, which is retained within the oviduct of the mother until adult, and assumes the pupal state immediately on extrusion. The Pupipara are also termed Eproboscidea (although they actually possess a well-developed and functional proboscis), and by some dipterists the Eproboscidea are regarded as a suborder and contrasted as such with the rest of the Diptera, which are styled the suborder Proboscidea. By other writers Proboscidea and Eproboscidea are treated as primary divisions of the Cyclorrhapha. In reality, however, the families designated Eproboscidea {Hippoboscidae, Braulidae, Nycteribiidae and Slreblidae), are not entitled to be considered as constituting either a suborder, or even a main division of the Cyclorrhapha; they are simply Cyclorrhapha much modified owing to parasitism, and in view of the closely similiar mode of reproduction in the tsetse- flies the special designation Pupipara should be abandoned. Before leaving the subject of classification it may be noted in passing that in 1906 Professor Lameere, of Brussels, proposed a scheme for the classification of Diptera which as regards both the limits of the families and their grouping into higher categories differs considerably from that in current use.

Little light on the relationship and evolution of the various families of Diptera is afforded by fossil forms, since as a rule the latter are readily referable to existing families. With the excep- tion of a few species from the Solenhofen lithographic Oolite, fossil Diptera belong to the Tertiary Period, during which the members of this order attained a high degree of development. In amber, as proved by the deposits on the shores of the Baltic, the proverbial " fly " is more numerous than any other crea- tures, and with very few exceptions representatives of all the existing families have been found. The famous Tertiary beds at Florissant, Colorado, have yielded a considerable number or remarkably well-preserved Tipulidae (in which family are included the most primitive of existing Diptera), as also species belonging to other families, such as Mycetophilidae and even Oeslridae.

Diptera as an order are probably more widely distributed over the earth's surface than are the representatives of any similar division of the animal kingdom. Flies seem capable of adapting themselves to extremes of cold equally as well as to those of heat, and species belonging to the order are almost invariably included in the collections brought back by members of Arctic expeditions. Others are met with in the most isolated localities; thus the Rev. A. E. Eaton discovered on the desolate shores of Kerguelen's Island apterous and

semi-apterous Diptera {Tipulidae and Ephydridae) of a degraded type adapted to the climatic peculi- arities of the locality. Many bird parasites belonging to the Hippoboscidae have naturally been carried about the world by their hosts, while other species, such as the house-fly, blow-fly and drone-fly, have in like manner been disseminated by human agency. Most families and a large proportion of genera are represented throughout the world, but in some cases {e.g. Glossina — see Tsetse-Fly) the distribution of a genus is limited to a continent. As a rule the general fades as well as dimensions are remarkably uniform throughout a family, so that tropical species often differ little in appearance from those inhabiting temperate regions. Many instances of exaggerated and apparently un- natural structure nevertheless occur, as in the case of the genera Pangonia, Nemestrina, Achias, Diopsis and the family Celyphidae, and, as might be expected, it is chiefly in tropical species that these peculiarities are found. To a geographical distribution of the widest extent, Diptera add a range of habits of the most diversified nature; they are both animal and vegetable feeders, an enormous number of species acting, especially in the larval state, as scavengers in consuming putrescent or decomposing

matter of both kinds. The phytophagous species are attached tc various parts of plants, dead or alive; and the carnivorous in like manner feed on dead or living flesh, or its products, many larvae being parasitic on living animals of various classes (in Australia the larva of a species of Muscidae is even a parasite of frogs), especially the caterpillars of Lepidoptera, which are destroyed in great numbers by Tachininae. The recent discovery of a blood- sucking maggot, which is found in native huts throughout the greater part of tropical and subtropical Africa, and attacks the inmates when asleep, is of great interest.

It may confidently be asserted that, of insects which directly or indirectly affect the welfare of man, Diptera form the vast majority, and it is a moot point whether the good effected by many species in the rapid clearing away of animal and vegetable impurities, and in keeping other insect enemies in check, counter- balances the evil and annoyance wrought by a large section of the Order. The part played by certain blood-sucking Diptera in the dissemination of disease is now well known (see Mosquito and Tsetse-Fly), and under the term myiasis medical literature includes a lengthy recital of instances of the presence of Dipterous larvae in various parts of the living human body, and the injuries caused thereby. That Diptera of the type of the common house-fly are often in large measure responsible for the spread of such diseases as cholera and enteric fever is undeniable,

and as regards blood-sucking forms, in addition to those to which reference has already been made, it is sufficient to mention the vast army of pests constituted by the midges, sand-flies, horse- flies, &c, from the attacks of which domestic animals suffer equally with man, in addition to being frequently infested with the larvae of the bot and warble flies {Gastrophilus, Oestrus and Hypoderma). Lastly, as regards the phytophagous forms, there can be no doubt that the destruction of grass-lands by " leather- jackets " (the larvae of crane-flies, or daddy-long-legs, — Tipula oleracea and T. paludosa), of divers fruits by Ceratitis capitata and species of Dacus, and of wheat and other crops by the Hessian-fly {Mayeliola destructor) and species of Oscinis, Chlorops, &c, is of very serious consequence.

With many writers it is customary to treat the fleas as a sub- order of Diptera, under the title Aphaniptera or Siphonaptera. Since, however, although undoubtedly allied to the Diptera, they must have diverged from the ancestral stem at an early period, before the existing forms of Diptera became so extremely specialized, it seems better to regard the fleas as constituting an independent order (see Flea). (E. E. A.)

DIPTERAL (Gr. for " double- winged "), the architectural term applied to those temples which have a double range of columns in the peristyle, as in the temple of Diana at Ephesus.

DIPTYCH (Gr. Siwrjxos, two-folding), (1) A tablet made with a hinge to open and shut, used in the Roman empire for letters (especially love-letters), and official tokens of the com- mencement of a consul's, praetor's or aedile's term of office. The latter variety of diptych was inscribed with the magistrate's name and bore his portrait, and was issued to his friends and the public generally. They were made of boxwood or maple. More costly examples were in cedar, ivory {q.v.), silver or sometimes gold. They were often sent as New Year gifts.

(2)In the primitive church when the worshippers brought their own offerings of bread and wine, from which were taken the Communion elements, the names of the contributors were recorded on diptychs and read aloud. To these names were early added those of deceased members of the community whom it was desired to commemorate. This custom rapidly developed into a kind of commemoration of saints and benefactors, living and dead; especially, in each church, were the names of those who had been its bishops recorded. The custom was maintained until the lists became so long that it was impossible to read them through, and the observance in this form had

to be abandoned. The insertion of a name on the diptych, thereby securing the prayers of the church, was a privilege from which a person could be excluded on account of suspicion of heresy or by the intrigues of enemies. His name could, if written, be expunged under similar circumstances. The names thus written were read from

ihe ambo, in which the diptych was kept. The reading of these names during the canon of the mass gave rise to the term canoniza- tion. By various councils it was ordained that the name of the pope should always be inserted in the diptych list.

The addition of dates resulted from the custom of recording baptisms and deaths; and thus the diptych developed into a calendar and formed the germ of the elaborate system of festologies, martyrologies and calendars which developed in the church.

The diptych went by various names in the early church — mystical tablets, anniversary books, ecclesiastical matriculation registers or books of the living. According to the names in- scribed, bishops, the dead or the living, a diptych might be a diptycha episcoporum, diptycha mortuorum or diptycha vivorum.

In course of time the list of the names swelled to such propor- tions that the space afforded by the diptych was insufficient. A third fold was consequently provided, and the tablet became a triptych (though the name diptych was retained as a general term for the object). Further room was afforded by the insertion of leaves of parchment or wood between the folds. The custom of reading names from the diptychs died out about the 8th century. The diptychs, however, were retained as altar ornaments. From the original consular documents onwards, the outsides of the folds had always been richly ornamented, and when they ceased to be of immediate practical use they became merely decora- tive. Instead of the list of names the inside was ornamented like the outer, and in the middle ages the best painters of the day would often paint them. When folded, the portraits of the donor and his wife might be shown; when open there would be three paintings, one on each fold, of a religious character. (R. A. S. M.)

DIR, an independent state in the North- West Frontier Province of India, lying to the north-east of Swat. Its importance chiefly arises

from the fact that it commands the greater part of the route between Chitral and the Peshawar frontier. The quarrels and intrigues between the khan of Dir and Umra Khan of Jandol were among the chief events that led up to the Chitral Campaign of 1895. During that expedition the khan made an agreement with the British Government to keep the road to Chitral open in return for a subsidy. Including the Bashkars, an aboriginal tribe allied to the Torwals and Garhuis, who inhabit Panjkora Kohistan, the population is estimated at about 100,000.

DIRCE, in Greek legend, daughter of Helios the sun-god, the second wife of Lycus, king of Thebes. She sorely persecuted Antiope, his first wife, who escaped to Mount Cithaeron, where her twin sons Amphion and Zethus were being brought up by a herdsman who was ignorant of their parentage. Having recog- nized their mother, the sons avenged her by tying Dirce to the horns of a wild bull, which dragged her about till she died. Her body was cast into a spring near Thebes, which was ever after- wards called by her name. Her punishment is the subject of the famous group called " The Farnese Bull," by Apollonius and Tauriscus of Tralles, in the Naples museum (see Greek Art, Plate I. fig. 51).

DIRECT MOTION, in astronomy, the apparent motion of a body of the solar system on the celestial sphere in the direction from west to east; so called because this is the usual direction of revolution and rotation of the heavenly bodies.

DIRECTORS, in company law, the agents by whom a trading or public company acts, the company itself being a legal ab- straction and unable to do anything. As joint-stock companies have multiplied and their enterprise has extended, the position of directors has become one of increasing influence and importance. It is they who control the colossal funds now invested in trading companies, and who direct their policy (for shareholders are seldom more than dividend-drawers). Upon their uprightness, vigilance and sound judgment depends the welfare of the greater part of the trade of the country concerned. It is not to be wondered at that in view of this influence and independence of action the law courts have held directors to a strict standard of duty, and that the parliament of the United Kingdom has singled out directors from other agents for special legislation in

the Directors Liability Act 1890, the Larceny Act 1861, the Companies Act 1867 and the Winding-up Act 1890.

The first directors of a company are generally appointed by the articles of association. Their consent to act must now, under the Companies Act 1908, be filed with the registrar of joint-stock companies. Directors other than the first are elected at the annual general meeting, a certain proportion of the acting directors — usually one-third — retiring under the articles by rotation each year, and their places being filled up by election. A share qualifi- cation is nearly always required, on the well-recognized principle that a substantial stake in the undertaking is the best guarantee of fidelity to the company's interests. A director once appointed cannot be removed during his term of office by the shareholders, unless there is a special provision for that purpose in the articles of association; but a company may dismiss a director if the articles — as is usually the case — authorize dismissal. The authority and powers of directors are prima facie those necessary for carrying on the ordinary business of the company, but it is usual to define the more important of such powers in the articles of association. For instance, it is commonly prescribed how and when the directors may make calls, to what amount they may borrow, how they may invest the funds of the company, in what circumstances they may forfeit shares, or veto transfers, in what manner they shall conduct their proceedings, and what shall constitute a quorum of the board. Whenever, indeed, specific directions are desirable they may properly be given by the articles. But superadded to and supplementing these specific powers there is usually inserted in the articles a general power of management in terms similar to those of clause 55 of the model regulations for a company, known as Table A (clause 71 of the revised Table). The powers, whether general or specific, thus confided to directors are in the nature of a trust, and the directors must exercise them with a single eye to the benefit of the company. For instance, in allotting shares they must consult the interests of the company, not favour their friends. So in forfeiting shares they must not use the power collusively for the purpose of relieving the shareholder from liability. To do so is an abuse of the power and a fraud on the other shareholders.

It would give a very erroneous idea of the position and functions of directors to speak of them — as is sometimes done — as trustees. They are only trustees in the sense that every agent is. They are " commercial men managing a trading concern for the benefit of themselves and the other shareholders." They have to carry on the company's business, to extend and consolidate it, and to do this they must have a free hand and a large discretion to deal with the exigencies of the commerical situation. This large discretion the law

allows them so long as they keep within the limits set by the company's memorandum and articles. They are not to be held liable for mere errors of judgment, still less for being de- frauded. That would make their position intolerable. All that the law requires of them is that they should be faithful to their duties as agents — " diligent and honest," to use the words of Sir George Jessel , formerly master of the rolls. Thus in the matter of diligence it is a director's duty to attend as far as possible all meetings of the board; at the same time non-attendance, unless gross, will not amount to negligence such as to render a director liable for irregularities committed by his co-directors in his absence. A director again must not sign cheques without inform- ing himself of the purpose for which they are given. A director, on the same principle, must not delegate his duties to others unless expressly authorized to do so, as where the company's articles empower the directors to appoint a committee. Directors may, it is true, employ skilled persons, such as engineers, valuers or accountants, to assist them, but they must still exercise their judgment as business men on the materials before them. Then in the matter of honesty, a director must net accept a present in cash or shares or in any other form whatever from the company's vendor, because such a present is neither more nor less than a bribe to betray the interests of the company, nor must he make any profit in the matter of his agency without the knowledge and consent of his principal, the company. He must not, in other words, put himself in a position in which his duty to the company

and his own. interest conflict or even may conflict. This rule often, comes into play in the case of contracts between a company and a director. There is nothing in itself invalid in such a contract, but the onus is on the director if he would keep such a contract to show that the company assented to his making a profit out of the; contract, and for that purpose he must show that he made full and fair disclosure to the company of the nature and extent of his interest under the contract. It is for this reason that when a company's vendor is also a director he does not join the board until his co-directors have exercised an independent judgment on the propriety of the purchase.

A director must also bear in mind — what is a fundamental principle of company management^-tha't the funds of the company are entrusted to the directors for the objects of the company as defined by the company's memorandum of associa- tion and authorized by

the general law, and that they must not be diverted from those objects or applied to purposes which are out- side the objects of the company, ultra vires, as it is commonly called, or outside the powers of management given by the share- holders to the directors. This does not abridge the large discre- tion allowed to directors in carrying on the business of the company. The funds embarked in a trading company are intended to be employed for the acquisition of gain, and risk, greater or less according to circumstances, is necessarily incidental to such employment; but it is quite another matter, when directors pay dividends out of capital, or return capital to the shareholders, or spend money of the company in " rigging " the market, or in buying the company's shares or paying commission for underwriting the shares of the company except where such commission is authorized under acts of 1900 and 1907, incorpor- ated in the Companies Act 1908. Directors who in these or any other ways misapply the funds of the company are guilty of what is technically known as "misfeasance" or breach of trust, and all who join in the misapplication are jointly and severally liable to replace the sums so misapplied. The remedy of the company for misfeasance, if the company is a going concern, is by action against the delinquent directors; but where a company is being wound up, the legislature has, under the Winding-up Act 1890, provided a summary mode of proceeding, by which the official receiver or liquidator, or any creditor or contributory of the company, may take out what is known as a misfeasance summons, to compel the delinquent director or officer ,to repay the misapplied moneys or make compensation. The departmental committee of the Board of Trade in its report (July 1906) recommended that the court should be given a discretionary power, analogous to that it already possesses in the case of trustees under the Judicial Trustees Act 1896, s. 3, to relieve a director (or a promoter) in certain cases from liability. This recommendation has been given effect to by s. 279 of the Companies Act 1908, which provides that, " If in any proceeding against a director of a company for negligence or breach of trust it appears to a court that the director is or may be liable in respect of the negligence or breach of trust, but has acted honestly and reasonably and ought. fairly to be excused for the negligence or breach of trust, the court may relieve him either wholly or partly from his liability on such terms as the court may think proper."

Directors who circulate a prospectus containing statements which they know to be false, with intent to induce any person to become a shareholder, may be prosecuted under § 84 of the Larceny Act 1861. They arealso liable criminally for falsification of the company's

books, and for this or any other criminal offence the court in winding up may, on the application of the liquidator, direct a prosecution. As to the liability of directors for state- ments or omissions in a prospectus see Company.

In managing the affairs of the company directors must meet together and act as a body, for the company is ehtitled to their collective wisdom in council assembled. Board meetings are held at such intervals as the directors think expedient. Notice of the meeting must be given to all directors who are within reach, Out the notice need not specify the particular business to be trans- acted. The articles usually fix, or give the directors power to fix,

what number shall constitute a quorum "for a board meeting. They also empower the directors to elect a chairman of the board. The directors exercise their powers by a resolution of the board which is recorded in the directors' minute-book.

The court will not as a rule interfere with the discretion of directors honestly exercised in the management of the affairs of the company. The directors have prima facie the confidence of the shareholders, and it is not for the court to say that such con- fidence is misplaced. If the stockholders are dissatisfied witb the management' the remedy is in their own hands — they can call a meeting and elect a new board.

■ *A company's articles usually provide for the payment of a certain sum to each director for his services during the year. When this is the case it is an authority to the directors to pay themselves the amount of such remuneration. The remuneration, unless otherwise expressly provided, covers all expenses incidental to the directors' duties. A director, for instance, cannot claim to be paid in addition to his fixed remuneration his travelling expenses for attending board meetings.*

When a company winds up, the directors' powers of manage- ment come to an end. Their agency is superseded in favour of that of the liquidator. (E. Ma.)

DIRECTORY, a term meaning literally that which guides or directs, and so applied to a book or set of rules giving directions for public worship, The directorium or ordo of the Roman Church contains regulations as to the Mass and office to be used on each day throughout the year, and the word is found in the Directory for the Publick Worship of God drawn up in 1644 at the West- minster

Assembly. The term now usually signifies a book contain- ing the names, addresses and occupations, &c. of the inhabitants of a town or district, or of a similar list of the users of a telephone supply, or of the members of a particular profession or trade. The name Directoire or Directory was given to the body which held the executive power in France from October 1795 until November 1799 (see French Revolution).

DIRGE, a song or hymn of mourning, particularly one sung at funerals or at a Service in commemoration of the dead. It is derived from the first word of the antiphon " Dirige, Domine, Deus meus, in conspectu tuo viam meant " (Guide, O Lord, my God, my way in Thy sight), of the opening psalm in the office for the dead in the Roman Church. The antiphon is adapted from verse 8 of Psalm v.

DIRK, a dagger, particularly the heavy dagger carried by the Highlanders of Scotland. The dirk as worn in full Highland costume is an elaborately ornamented weapon, with cairngorms or other stones set in the head of the handle, which has no guard. Inserted in the sheath there may be two small knives. The dirk, in the shape of a straight blade, with a small guard, some 18 in. long, is worn by midshipmen in the British navy. The origin of the word is doubtful. The earlier forms were dork and durk, and the spelling dirk, adopted by Johnson, represents the pronuncia- tion of the second form. The name seems to have been early applied to the daggers of the Highlanders, but the Gaelic word is biodag, and the Irish duirc, often stated to be the origin, is only an adaptation of the English word. It may be a corruption of the German Dokh, a dagger. The suggestion that it is an application of the Christian name " Dirk," the short form of " Dieterich," is not borne out, according to the New English Dictionary, by any use of this name for a dagger, and is further disproved by the earlier English spelling.

DIRSCHAU, a town of Germany, in the kingdom of Prussia, province of West Prussia, on the left bank of the Vistula, 20 m. S. from Danzig and at the junction of the important lines of railway Berlin-Konigsberg and Danzig-Bromberg. Pop. (1905) 14,18$. It has a Roman Catholic and a Protestant church and several schools. The river is here crossed by two fine iron bridges. The older structure dating from the year 1857, originally used for the railway, is now given up to road traffic, and the railway carried by a new bridge completed in 189 1. Dirschau has railway work- shops and manufactories of sugar, agricultural implements and cement. During the war with Poland, Gustavus Adolphus made it his headquarters for many months after its capture in 1626.

DISABILITY, a term meaning, in genera], want of ability, and used in law to denote an incapacity in certain persons or classes of persons for the full enjoyment of duties or privileges, which, but for their disqualification, would be open to them; hence, legal disqualification. Thus, married women, persons under age, insane persons, convicted felons are under disability to do certain legal acts. This disability may be absolute, wholly disabling the person so long as it continues, or partial, ceasing on discontinua- tion of the disabling state, as attainment of full age.

DISCHARGE (adapted from the O. Fr. descharge, modern dicharge, from a med. Lat. discargare, to unload, dis- and carricare, to load, cf. " charge "), a word meaning relief from a load or burden, hence applied to the unloading of a ship, the firing of a weapon, the passage of electricity from an electrified body, the issue from a wound, &c. From the sense of relief from an obligation, " discharge " is also applied to the release of a soldier or sailor from military or naval service, or of the crew of a merchant vessel, or to the dismissal from an office or situation. In law, it is used of a document or other evidence that can be accepted as proof of the release from an obligation, as of a receipt, on payment of money due. Similarly it is applied to the release in accordance with law of a person in custody on a criminal charge, and to the legal release of a bankrupt from further liability for debts provable in the bankruptcy except those incurred by fraud or debts to the crown. It is also applied to the reversal of an order of a court. In the case of divorce, where the rule nisi is not made absolute, the rule is said to be discharged.

DISCHARGING ARCH, in architecture, an arch built over a lintel or architrave to take off the superincumbent weight. The earliest example is found in the Great Pyramid, over the lintels of the entrance passage to the tomb: it consisted of two stones only, resting one against the other. The same object was attained in the Lion Gate and the tomb of Agamemnon, both in Mycenae, and in other examples in Greece, where the stones laid in horizontal courses, one projecting over the other, left a triangular hollow space above the lintel of the door, which was subsequently filled in by vertical sculptured stone panels. The Romans frequently employed the discharging arch, and inside the portico of the Pantheon the architraves have such arches over them. In the Golden Gateway of the palace of Diocletian at Spalato the discharging arches,

semicircular in form, were adopted as archi- tectural features and decorated with mouldings. The same is found in the synagogues in Palestine of the 2nd century; and later, in Byzantine architecture, these moulded archivolts above an architrave constitute one of the characteristics of the style. In the early Christian churches in Rome, where a colonnade divided off the nave and aisles, discharging arches are turned in the frieze just above the architraves.

DISCIPLE, properly a pupil, scholar (Lat. discipulus, from discere, to learn, and root seen in pupillus), but chiefly used of the personal followers of Jesus Christ, including the inner circle of the Apostles (q.v.).

DISCIPLES OF CHRIST, or Christians, an American Pro- testant denomination, founded by Thomas Campbell, his son Alexander Campbell (q.v.) and Barton Warren Stone (i 772-1844). Stone had been a Presbyterian minister prominent in the Kentucky revival of 1801, but had been turned against sectarian- ism and ecclesiastical authority because the synod had condemned Richard McNemar, one of his colleagues in the revival, for preaching (as Stone himself had done) counter to the Westminster Confession, on faith and the work of the Holy Spirit in conversion. He had organized the Springfield Presbytery, but in 1804 with his five fellow ministers signed " The Last Will and Testament of the Springfield Presbytery," giving up that name and calling them- selves "Christians." Like Stone, Alexander Campbell had adopted (in 1812) immersion, and, like him, his two great desires were for Christian unity and the restoration of the ancient order of things. But the Campbellite doctrines differed widely from the hyper-Calvinism of the Baptists whom they had joined in 1813, especially on the points on which Stone had quarrelled with the Presbyterians; and after various local breaks in 1825-1830, when there were large additions to the Restorationists from

the Baptist ranks, especially under the apostolic fervour and simplicity of the preaching of Walter Scott (1796-1861L in 1832 the Reformers were practically all ruled out of the Baptist com- munion. The Campbells gradually lost sight of Christian unity, owing to the unfortunate experience with the Baptists and to the tone taken by those clergymen who had met them in debates; and for the sake of Christian union it was peculiarly fortunate that in January 1832 at Lexington, Kentucky, the followers of the Campbells and those of Stone (who had stressed union more than primitive Christianity) united. Campbell objected to the name " Christians " as sectarianized by Stone, but " Disciples " never drove out of use the name "

Christians."

During the Civil War the denomination escaped an actual scission by following the neutral views of Campbell, who opposed slavery, war and abolition. In 1849 the American Christian Missionary Society was formed; it was immediately attacked as a " human innovation," unwarranted by the New Testament, by literalists led in lateryearsby Benjamin Franklin (secretary of the missionary society in 1857), who opposed all church music also. Isaac Errett (1820-1888) was the most prominent leader of the progressive party, which was considered corrupt and worldly by the literalists, many of whom, in spite of his efforts, broke off from the main body, especially in Indiana, Kentucky, Tennessee, Arkansas and Texas.

The main body appointed in 1890 a standing committee on Christian union; their aim in this respect is not for absorption, as was clearly shown by their answer in 1887 to overtures from the Protestant Episcopal Church regarding Christian unity. The credal position of the Disciples is simple: great stress is put upon the phrase " the Christ, the Son of the living God," and upon the recognition by Jesus of this confession as the foundation of His church; as to baptism, agreement with Baptists is only as to the mode, immersion; this is considered " the primitive confession of Christ and a gracious token of salvation," and as being " for the remission of sins "; the Disciples generally deny the authority over Christians of the Old Covenant, and Alexander Campbell in particular held this view so forcibly that he was accused by Baptists of " throwing away the Old Testament." The Lord's Supper is celebrated every Sunday, the bread being broken by the communicants. The Disciples are not Unitarian in fact or tendency, but they urge the use of simple New Testament phraseology as to the Godhead. Their church government is congregational.

The growth of the denomination has been greatest in the states along the Ohio river, whence they have spread throughout the Union. In 1908 there were 6673 ministers and 1,285,123 communicants in the United States. There are churches in Canada, in Great Britain and in Australia. Bethany College, at Bethany, West Virginia, was chartered in 1840, and Alexander Campbell, who had founded it as Buffalo Seminary, was its president until his death in 1866; other colleges founded by the sect are : Kentucky University, Lexington, Ky. ; Hiram College, Hiram, Ohio (1850, until 1867 known as Western Reserve Eclectic Institute) ; Butler College, Indianapolis, Indiana (1855); Christian University, Canton, Missouri (1851; coeducational) ; Eureka College, in Woodford county, Illinois (1855;

coeducational); Union Christian College, Merom, Ind. (1859); Texas Christian University, Waco, Texas (1873, founded as Add Ran College at Thorpe's Springs, removing to Waco in 1895) ; Drake University, Des Moines, Iowa (1881); Milligan College, Milligan, Tennessee (1882); Defiance College, Defiance, O. (1885); Cotner University, Lincoln, Nebraska (1889) ; Elon College, Elon, North Carolina (1890); American University, Harriman, Tenn. (1893); the Virginia Christian College, Lynchburg, Virginia (1903), and for negroes, the Southern Christian Institute, Edwards, Mississippi (1877), and the Christian Bible College, Newcastle, Henry County, Ky. Theological seminaries are the Berkeley Bible Seminary, Berkeley, California (1896) ; the Disciples' Divinity House, Chicago, 111. (1894); and the Eugene Divinity School, Eugene, Oregon (1895). Bible chairs " were established in state universities and elsewhere by the Disciples,- — at the University of Michigan (1893), at the University of Virginia (1899), at the University of Calcutta (1900) and at the University of Kansas (1901). The denomination has publishing houses in Cincinnati, St Louis, Louisville and Nashville.

See Errett Gates's History of the Disciples of Christ (New York, 1905), in " The Story of the Churches " series, and his Early Relation and Separation of Baptists and Disciples (Chicago, 1904), a University of Chicago doctoral thesis; and B. B. Tyler's History of the Disciples of Christ in vol. xii. of " The American Church History Series " (New York, 1894).

DISCLAIMER, a renunciation, denial or refusal; a disavowal of claims. In law the term is used more particularly in the following senses : — (i) In the law of landlord and tenant, the direct repudiation of that relation by some act on the part of the tenant. A disclaimer may be verbal or written, but in such case it must be something more than a mere renunciation of the tenant's title, or it may be an act which is wholly inconsistent with the existence of such relation, as the setting up by the tenant of a distinct title either in himself or some third party. (2) In the law of bank- ruptcy, where any part of the property of a bankrupt consists of land of any tenure burdened with onerous covenants, of stocks or shares in companies, of unprofitable contracts, or of any property that is unsaleable, or not readily saleable, by reason of its binding the possessor to the performance of any onerous act, the trustee, notwithstanding that he

has endeavoured to sell or has taken possession of the property, or exercised any act of ownership in relation to it, may, subject to certain provisions, by writing signed by him, at any time within twelve months after the first appoint- ment of a trustee, " disclaim " the property (see Bankruptcy). (3) In the law of trusts, disclaimer is the refusal or renunciation of the office or duties of a trustee. It is an undisputed rule that no one is compellable to undertake a trust, so that as soon as a person knows he has been appointed a trustee under some instrument, he should determine whether he will accept the office or not. Dis- claimer of trust should be by deed, as admitting of no ambiguity, but it may be by conveyance to other accepting trustees, or orally, or by written declaration, or even by conduct. (4) In the law of patents, disclaimer is the renunciation, by amendment of specifica- tions, of the portion of an- inventor's claim to protection.

DISCOUNT. (1) A money-market term for the price paid in order to obtain immediate realization of a bill not yet due. If a bill for £100 due six months hence is discounted at the rate of 3 % per annum, its holder will obtain £98, 10s. in cash for it. (2) A Stock-Exchange term applied to a security, not fully paid, which has fallen below its issue price, and so is said to stand at so much discount. See Premium.

DISCOVERY, in law, the revealing or disclosing of any matter. The English common law courts were originally unable to compel a litigant before a trial to disclose the facts and documents on which he relied. In equity, however, a different rule prevailed, there being an absolute right to discovery of all material facts on which a case was founded. Now the practice is regulated by the Rules of the Supreme Court, 1 883 , Order 3 1 . Discovery is of two kinds, namely, by interrogatories and by affidavit of documents, provision being also made for the production and inspection of documents. Where a party to a suit can make an affidavit stating that in his belief certain specified documents are or have been in the possession of some other party, the court may make an order that such party state on affidavit whether he has or ever had any of those documents in his possession, or if he has parted with them or what has become of them, A further application may then be made by notice to the party who has admitted possession of the documents for production and inspection. Copies also may be taken of the more important documents. There is also dis- covery of facts obtained by means of interrogatories, i.e. written questions addressed on behalf of one party, before trial, to the other party, who is bound to answer them in writing upon oath. In order to prevent needless expense the party

seeking discovery must first secure the cost of it by paying into court a sum of money, generally not less than five pounds. See also Evidence.

DISCUS (Gr. 51ck6s, disk), a circular plate of stone, later of metal, which was used by the ancient Greeks for throwing to a distance as a gymnastic exercise. Judging from specimens found by excavators, the ancient discus was about 8 or 9 in. in diameter and weighed from 4 to 5 lb, although one of bronze, preserved in the British Museum, weighs over 8 lb. Sometimes a kind of quoit, spherical in form, was used, through a hole in which a thong was passed to assist the athlete in throwing it. The sport of throwing the discus was common in the time of Homer, who mentions it repeatedly. It formed a part of the pentathlon, or quintuple games, in the ancient Olympic Games. Statius, in Thebais, 646-721, fully describes the use of the discus. In the

British Museum there is a restored copy of a statue by Myron (see Greek Art, Plate IV. fig. 68) of a discus-thrower (discobolus) in the act of hurling the missile; but the investigations of N. E. Norman Gardiner show that a wrong attitude has been adopted by the restorer.

Throwing the discus was introduced as an event in modern athletics at the revived Olympic Games, first held at Athens in 1896, and since that time it has become a recognized event in the athletic championship meetings of several European nations, as well as in the United States, where it has become very popular. According to the American rules the discus must be of a smooth, hard-wood body without finger-holes, weighted in the centre with lead disks and capped with polished brass disks, with a steel ring on the outside. Its weight must be 45 lb, its outside diameter 8 in. and its thickness at the centre 2 in. It must be thrown from a 7-ft. circle, which may not be overstepped in throwing, and the throw is measured from the spot where the discus first strikes the ground to the point in the circumference of the circle on a line between the centre and the point of striking.

DISINFECTANTS, substances employed to neutralize the action of pathogenic organisms, and prevent the spread of contagious or infectious disease. The efficiency of any disinfectant is due to its power of destroying, or of rendering inert, specific poisons or disease germs. Therefore antiseptic substances generally are to this extent disinfectants. So also the deodorizers, which act by oxidizing or otherwise changing the chemical constitution of volatile substances disseminated in the air, or which prevent noxious exhalations from organic substances, are in virtue of these properties effective disinfectants in certain diseases. A knowledge of the value of disinfectants, and the use of some of the most valuable agents, can be traced to very remote times ; and much of the Levitical law of cleansing, as well as the origin of numerous heathen ceremonial practices, are clearly based on a perception of the value of disinfection. The means of disinfection, and the substances employed, are very numerous, as are the classes and conditions of disease and contagion they are designed to meet. . Nature, in the oxidizing influence of freely circulating atmospheric air, in the purifying effect of water, and in the powerful deodorizing properties of common earth, has provided the most potent ever-present and acting disinfecting media. Of the artificial disinfectants employed or available three classes may be recognized: — 1st, volatile or vaporizabie substances, which attack impurities in the air; 2nd, chemical agents, for acting on the diseased body or on the infectious discharges therefrom; and 3rd, the physical agencies of heat and cold. In some of these cases the destruction of the contagium is effected by the formation of new chemical compounds, by oxidation, deoxidation or other reaction, and in others the conditions favourable to life are removed or life is destroyed by high temperature. Among the first class, aerial or gaseous disinfectants, formic aldehyde has of late years taken foremost place. The vapour is a powerful disinfectant and deodorant, and for the surface disinfection of rooms, fulfils all requirements when used in sufficient amount. It acts more rapidly than equal quantities of sulphurous acid, and it does not affect colours. It is non-poisonous, though irritating to the eyes and throat. With the exception of iron and steel it does not attack metals. It can be obtained in paraform tabloids, and with a specially constructed spirit lamp disinfection can be carried out by any one. Twenty tabloids must be employed for every 1000 cubic ft. of space. Disinfection by sulphurous acid fumes is of great antiquity, and is still in very general use; for the purpose of destroying vermin it is more powerful than formic aldehyde. Camphor and some volatile oils have also been employed as air

disinfectants, but their virtues lie chiefly in masking, not destroying, noxious effluvia. In the 2nd class — non-gaseous disinfecting compounds — all the numerous antiseptic substances may be reckoned; but the substances principally em- ployed in practice are oxidizing agents, as potassium manganates and permanganates, " Condy's fluid," and solutions of the so- called " chlorides of lime," soda and potash, with the chlorides of aluminium and zinc, soluble sulphates and sulphites, solutions of sulphurous acid, and the tar products — carbolic, cresylic and

salicylic acids; Of the physical agents heat and cold, the latter, though a powerful natural disinfectant, is not practically available by artificial means; heat is a power chiefly relied on for purifying and disinfecting clothes, bedding and textile substances generally. Different degrees of temperature are required for the destruction of the virus of various diseases; but as clothing, &c, can be exposed to a heat of about 250 Fahr. without injury, provision is made for submitting articles to nearly that temperature. For the thorough disinfection of a sick-room the employment of all three classes of disinfectants, for purifying the air, for destroying the virus at its point of origin, and for cleansing clothing, &c, may be required.

DISMAL, an adjective meaning dreary, gloomy, and so a name given to stretches of swampy land on the east coast of the United States, as the Dismal Swamp in Virginia and North Carolina. The derivation has been much discussed. In the early examples of the use the word is a substantive, especially in the expres- sion " in the dismal," i.e. in the dismal time or days. Later it became adjectival, especially in combination with " days." It has been connected with " decimal," med. Latin decimalis, belonging to a tithe or tenth, and thus the " dismal days " are the unpleasant days connected with the extortion and oppression of exacting payment of tithes. According to the New English Dictionary, quoting Professor W. W. Skeat, " dismal " is derived, through an Anglo-Fr. dis mal, from the Lat. dies mali, evil or unpropitious days. This Anglo-French expression, explained as les mal jours, is found in a MS. of Rauf de Linham's Art de Kalender, 1256. These days of evil omen were known as Dies Aegyptiaci (Du Cange, Glossarium, s.v.) or Egyptian days, either as having been instituted by Egyptian astrologers or with refer- ence to the " ten plagues "; so Chaucer, " I trowe hit was in the dismal, That were the ten woundes of Egipte " (Book of the Duchesse, 1206). There were

two such days in each month.

See Skeat, Trans. Philol. Soc. (1888), p. 2, and note on the line in the " Book of the Duchesse," The Complete Works of Geoffrey Chaucer, vol. i. (1894).

DISORDERLY HOUSE, in law, a house in which the conduct of its inmates is such as to become a public nuisance, or a house where persons congregate to the probable disturbance of the public peace or other commission of crime. In England, by the Dis- orderly Houses Act 1751, the term includes common bawdy houses or brothels, 1 common gaming houses, common betting houses and disorderly places of entertainment. The keeping of such is a misdemeanour punishable by fine or imprisonment, and in the case of a brothel also punishable on summary conviction by the Criminal Law Amendment Act 1885; the letting out for gain for indiscriminate prostitution of a room or rooms in a house will make it as much a brothel in law as if the whole house were let out for the purpose. Where, however, a woman occupies a house or room which is frequented by men for the purpose of committing fornication with her, she cannot be convicted of keeping a dis- orderly house. See also Prostitution.

DISPATCH, or Despatch, to send off immediately, or by express; particularly in the case of the sending of official messages, or of the immediate sending of troops to their destina- tion, or the like. The word is thus used as a substantive of written official reports of events, battles and the like, sent by ambassadors, generals, &c, by means of a special messenger, or of express correspondence generally. From the primary meaning of the prompt sending of a message, &c, the word is used of the quick disposal of business, or of the disposal of a person by violence; hence the word means to execute or murder. The etymology of the word has been obscured by the connexion with the Fr. depecher, and deplche, which are in meaning the equivalents of

1 The etymology of this word has been confufed by the early adoption into English usage of the O. Fr. bordel. The two words are in origin quite distinct. Brothel is an O. Eng. word for a person, not a place. It meant an abandoned vagabond, one who had gone to ruin (abreolhan). Bordel, on the contrary, is a place, literally a small hut or shelter, especially for fornication, Med. Lat. bordellum, diminutive of the Late Lat. borda, board. The words were early confused, and brothel-house, bordel-house, bordel or brothel, are all used for a disorderly house, while bordel was similarly misused, and, like brothel in its proper meaning, was applied to a disorderly

person.

the Eng. verb and substantive. The Fr. word is made up of the prefix de-, Lat. dis-, and the root which appears in empecher, to embarrass, and means literally to disentangle. The Lat. origin of dSpicher and emptcher is a Low Lat. pedicare, pedica, a fetter. The Fr. word came into Eng. as depeach, which was in use from the 15th century until " despatch " was introduced. This word is certainly direct from the Ital. dispacciare, or Span, despackar, which must be derived from the Lat. root appearing in pactus, fixed, fastened, from pangere. The New English Dictionary finds the earliest instance of " dispatch " in a letter to Henry VIII. from Bishop Tunstall, commissioner to Spain in 1516-1517.

DISPENSATION, a term with two main applications, (1) to the action of administering, arranging or dealing out, and (2) to the action of allowing certain things, rules, &c, to be done away with, relaxed. Of these two meanings the first is to be derived from the classical Latin use of dispensare, literally, to weigh out, hence to distribute, especially of the orderly arrangement of a household by a steward; thus dispensatio was, in theology, the word chosen to translate the Greek oUovo/xla, economy, i.e. divine or religious systems, as in the Jewish, Mosaic, Christian dispensa- tions. Dispensation in law is, strictly speaking, the suspension by competent authority of general rules of law in particular cases. Its object is to modify the hardships often arising from the rigorous application of general laws to particular cases, and its essence is to preserve the law by suspending its operation, i.e. making it non-existent, in such cases. It follows, then, that dis- pensation, in its strict sense, is anticipative, i.e. it does not absolve from the consequences of a legal obligation already contracted, but avoids a breach of the law by suspending the obligation to conform to it, e.g. a dispensation or licence to marry within the prohibited degrees, or to hold benefices in plurality. The term is, however, frequently used of the power claimed and exercised by the supreme legislative authority of altering or abrogating in particular cases conditions established under the existing law and of releasing individuals from obligations incurred under it, e.g. dispensations granted by the pope ex plenitudine potestatis from the obligation of celibacy, from religious and other vows, from matrimonium ratum, non consummatum, &c.

1. Ecclesiastical Law. — -In the theory of the canon law the dispensing power is the corollary of the legislative, the authority that makes laws, and no other, having power to suspend them. It follows that the law of nature (jus naturae) and a fortiori the law of God

(jus divinum) are not subject to dispensation of any earthly authority, and that it is only the disciplinary laws made by the Church that the Church is empowered to suspend or to abrogate. Thus, not even the pope could grant a dispensation for a marriage between persons related in the direct line Of ascent or descent, e.g. father and daughter, or between brother and sister, while dispensations are granted for marriages within other prohibited degrees, e.g. uncle and niece.

The dispensing power, like the legislative authority, was formerly invested in general councils and even in provincial synods; but in the West, with the gradual centralization of authority at Rome, it became ultimately vested in the pope as the supreme lawgiver of the Church. Subject, however, to the supreme jurisdiction of the pope, the power of dispensation con- tinued to reside in the other organs of the Church in exact proportion to their legislative capacities, i.e. in provincial synods in respect of regional rules laid down by them, and in bishops in respect of rules laid down by them for their dioceses. According to Du Cange, the earliest record of the use of the word dispensatio in this connexion is in the letter of Pope Gelasius I. of the nth of March 494, to the bishops of Lucania (in Jaff6, Reg. Pont. Rom., ed. 2, torn. i. no. 636): necessaria rerum Dispensatione con- stringimur, ... sic canonum paternorum decreta librare, . . . ut quae praesentium necessitas temporum restaurandis Ecclesiis relaxanda deposcit, adhibita consideratione diligenti, quantum fieri potest temperemus. 2 Dispensations from the observance

2 In this quotation the word dispensatio still has its meaning of " economy " : "we are bound by the necessary economy of things." Possibly its use by the pope in this connexion may have led to the technical meaning of the word dispensatio in the medieval canon law.

of traditional rules were, however, during the early centuries exceedingly rare, and there are more instances of the popes repudiating than of their exercising the power to grant them. Thus Celestine I. (d; 432) wrote: " The rules govern us, not we the rules: we are subject to the canons, since we are the servants of the precepts of the canons " (Epist. 3 ad Episcopos Illyrici) ; and Pope Zozimus wrote even more strongly: " This see possesses no authority to make any concession or change; for with us abides antiquity

firmly rooted (inconvulsis radicibus), reverence for which the decrees of the Fathers enjoined." As time went on, however, and the Church expanded, this rigidly con servative attitude proved impossible to maintain, and the principle of " tempering " the law when forced to do so " by the exigencies of affairs or of the times " fyerum vel temporum angustia), as laid down by Gelasius, was adopted into the canon law itself. The principle was, of course, singularly open to abuse. In theory it was laid down from the first that dispensations were only to be granted in cases of urgent necessity and in the highest interests of the Church; in practice, from the nth century onwards, the power of dispensation was used by the popes as one of the most potent instruments for extending their influence. Dispensations to hold benefices in plurality formed, with pro- visions and the papal claim to the right of direct appointment, a powerful means for extending the patronage of the Holy See and therefore its hold over the clergy, and from the 13th century onwards this abuse assumed vast proportions (Hinschius iii. p. 250). Even more scandalous was the almost unrestrained traffic in licences and dispensations at Rome, which grew up, at least as early as the 14th century , owing to the fees charged for such dispensations having come to be regarded by the Curia as a regular source of revenue (Woker, Das kirchliche Finanzwesen der Pdpste, Nordlingen, 1878, pp. 75, 160). Loud complaints of these abuses were raised in the reforming councils of Constance and- Basel in the 15th century, but nothing was done effectually to check them.

The actual practice'of the Roman Catholic Church is based upon the decisions of the council of Trent, which left the medieval theory intact while endeavouring to guard against its abuses. The proposal put forward by the Gallican and Spanish bishops to subordinate the papal power of dispensation to the consent of the Church in general council was rejected, and even the canons of the council of Trent itself, in so far as they affected reformation of morals or ecclesiastical discipline, were decreed " saving the authority of the Holy See " (Sess. xxv. cap. 21, de ref.). At the same time it was laid down in respect of all dispensations, whether papal or other, that they were to be granted only for just and urgent causes, or in view of some decided benefit to the Church (urgens justaque causa et major quandoque utilitas), and in all cases gratis. The payment of money for a dispensation was ipso facto to make the dispensation void (Sess. xxv. cap. 18, de ref.).

Though verbal dispensations are valid, papal dispensations are given in writing. Before the constitution Sapienti of Pius X. (190S) all dispensations in foro externo, especially in matrimonial causes, were

dealt with by the Dataria Apostolica, those in foro interna by the Penitentiary, which latter also possessed in foro externo the right to grant dispensations in matrimonial causes to poor people. Since 1908 the Dataria only deals with dispensa- tions in matters concerning benefices, dispensations in matri- monial matters having been transferred to the new Congregation on the discipline of the sacraments (see Curia Romana).

The regular form of dispensation is the forma commissaria (Trid. Sess. xxii. cap. 5, de ref.), i.e. a mandate to the bishop to grant the dispensation, after due inquiry, in the pope's name. In exceptional cases, e.g. sovereigns or bishops, the dispensation is sent direct to the petitioner (forma gratiosa). Dispensations are nominally gratuitous; but the officials are entitled to fees for drawing them up, and there are customary " compositions " (compositiones) which are destined for charitable objects in Rome. These fees were and are regulated according to the capacity of the petitioners to pay, the result being that the abuses which the council of Trent had sought to abolish continued to flourish. In the 17th century a specially privileged class of bankers (banquiers

expSditionnaires) existed at Rome whose sole business was obtaining dispensations on commission, and one of these, named Pelletier, published at Paris in 1677, under the royal imprimatur > a regular tariff of the sums for which in any given case a dis- pensation might be obtained. That the " urgent and just cause " was, in the circumstances, a very minor consideration was to be expected, and the enlightened pope Benedict XIV., himself a canon lawyer of eminence, complained " Dispensationem non raro eoncedi in Dataria, sine causa, nempe ob eleemosynam quae praestatur " (Inst. 87, No. 26). It may be added that the worst abuses of this system have long since disappeared. The bishops have their own correspondents at Rome, and one of the duties of the diplomatic representatives of foreign states at the Curia' is to see that their nationals receive their dispensations without overcharge.

Bishops are by right (jure ordinario) competent to dispense in all cases expressly reserved to them by the canon law, e.g. in the matter of publication of banns of marriage. They possess besides special powers delegated to them by the pope and renewed every five years (facultates quinquennales) , or by virtue of faculties granted to them personally > (facultates extraordinariae), e.g. to dispense from rules of abstinence, from simple vows, and with some exceptions from the prohibition of marriage within pro- hibited degrees.

Church of England. — By 25 Henry VIII. cap. 21. sec. 2 (1534), it was enacted that neither the king, his successors, nor any of his subjects should henceforth sue for licences, dispensations, &c, to the see of Rome, and that the power to issue such licences, dispensations, &c, " for causes not being contrary or repugnant to the Holy Scriptures and laws of God," should be vested in the archbishop of Canterbury for the time being, who at his own discretion was to issue such dispensations, &c, under his seal, to the king -and his subjects. The power of dispensation thus vested in the archbishops partly fell obsolete, partly has been curtailed by subsequent statutes, e.g. the Pluralities Act of 1838. It is now confined to granting dispensations for holding two benefices at once, to issuing licences for non-residence, and in matrimonial cases to the issuing of special licences. The dispens- ing power of bishops in the Church of England survives only in the right to grant marriage licences, i.e. dispensations from the obligation to publish the banns. Though, however, these licences and dispensations are given under the archiepiscopal and episcopal seals, they are actually issued by the commissaries of faculties and vicars-general (chancellors) , independently, in virtue of the powers conferred on them by their patents. This has led, since the pass- ing of the Divorce Acts and the Marriage with a Deceased Wife's Sister Act, to a curiously anomalous position, licences for the remarriage of divorced persons having been issued under the bishop's seal, while the bishop himself publicly protested that such marriages were contrary to " the law of God," but that he himself had no power to prevent his chancellor licensing them.

See Hinschius, Kirchenrecht (Berlin, 1883), iii. 250, &c; article " Dispensation" by Hinschius in Herzog-Hauck, Rsalencyklopddie (Leipzig, 1898); article "Dispensation" in Wetzer and Welte's Kirchenlexikon (2nd ed. Freiburg im Breisgau, 1882-1901); F. Lichtenberger, Encycloptdie des sciences religieuses (Paris, 1878), s.v. " Dispense "; Phihimore, Eccl. Law.

2. Constitutional Law. — The power of dispensation from the operation of the ordinary law in particular cases is, of course, everywhere inherent in the supreme legislative authority, how- ever rarely it may be exercised. Divorce (in Ireland) by act of parliament may be taken as an example which still actually occurs. On the other hand, the dispensing power once vested in the crown in England is now merely of historical interest, though of great importance in the constitutional struggles of the past. This power possessed by the crown of dispensing with the statute law is said to have been copied from the dispensations or non obstante clauses granted by the popes in matters of canon law; the parallel between them is certainly very

striking, and there can be no doubt that the principles of the canon law influenced the decisions of the courts in the matter. It was, for instance, very generally laid down that the king could by dispensation make it lawful to do what was malum prohibitum but not to do what was

malum in se, a principle of the canon law, but one difficult to reconcile with English legal principles, since no act is legally malum unless forbidden by law. This was pointed out by Chief Justice Vaughan in the celebrated judgment in the case of Thomas v. Sorrell, when he rejected the distinction between mala in se and mala prohibita as confusing, and attempted to define the dispens- ing power of the crown by limiting it to cases of individual breaches of penal statutes where no third party loses a right of action, and where the breach is not continuous, at the same time denying the power of the crown to dispense with any general penallaw. This judgment, as Sir William Anson points out, only snowed the extreme, difficulty of limiting the power ascribed to the crown, a standing grievance from the time that parliament had risen to be a constituent part of the state. So long as the legal principle by which the law was " the king's law " survived there was in fact no theoretical basis for such limitation, and the matter resolved itself into one of the great constitutional questions between crown and parliament which issued in the Revolution of 1688. The supreme crisis came owing to the use made by James II. of the dispensing power. His action in dispensing with the Test Act, in order to enable Roman Catholics to hold office under the crown, was supported by the courts in the test case of Godden v. Hales, but it made the Revolution inevitable. By the Bill of Rights the exercise of the dispensing power was forbidden, except as might be permitted by statute. At the same time the legality of its exercise in the past was admitted by the clause maintaining the validity of dispensations granted in a certain form before the 23rd of October 1689.

See Anson, Law and Custom of the Constitution, part i. " Parliament," 3rd ed. pp. 311-319; F. W. Maitland, Const. Hist, of England (Cambridge, 1908), pp. 302, &c. ; Stubbs, Const. Hist. ss. 290, 291. (W. A. P.)

DISPERSION (from Lat. dispergere, to scatter), the act or process of separation and distribution. Apart from the technical use of the term,

especially in optics (see below), the expression particularly applied to the settlements of Jews in foreign countries outside Palestine. These were either voluntary, for purposes of trade and commerce, or the results of conquest, such as the captivities of Assyria and Babylonia. The word diaspora (Gr. SiaoTropd) is also used of these scattered communities, but is usually confined to the dispersion among the Hellenic and Roman peoples, or to the body of Christian Jews outside Palestine (see Jews).

Dispersion, in Optics. When a beam of light which is not homogeneous in character, i.e. which does not consist of simple vibrations of a definite wave-length, undergoes refraction at the surface of any transparent medium, the different colours corre- sponding to the different wave-lengths become separated or dispersed. Thus, if a ray of white light AO (fig. 1) enters obliquely

into the surface of a block of glass at O, it gives rise to the divergent system of rays ORV, varying con- tinuously in colour from red to violet, the red ray OR being least refracted and the violet ray OV most so. The order of the successive colours in all colourless transparent media is red, orange, yellow, green, blue, indigo and violet. Dispersion is therefore due to the fact that rays of different colours possess dif- ferent refrangibilities. The simplest way of showing dispersion is to refract a narrow beam of sunlight through a prism of glass or prismatic vessel containing water or other clear liquid. As the light is twice refracted, the dispersion is increased, and the rays, after trans- mission through the prism, form a divergent system, which may be allowed to fall on a sheet of white paper, forming the well- known solar spectrum. This method was employed by Sir Isaac Newton, whose experiments constitute the earliest systematic investigation of the phenomenon. Let O (fig. 2) represent a small hole in the shutter of a darkened room, and OS a narrow

Fig. 1.

Fig. 2.

beam of sunlight which is allowed to fall on a white screen so as to form an image of the sun at S. If now the prism P be interposed as in the figure, the whole beam is not only refracted up- ward, but also spread out into the spectrum RV, the horizontal breadth of the band of colours being the same as that of the original image S. In an experiment similar to that here represented, Newton made a small hole in the screen and another small hole in a second screen placed behind the first. By slightly turning the prism P, the position of the

spectrum on the first screen could be shifted sufficiently to cause light of any desired colour to pass through. Some of this light also passed through the second hole, and thus he obtained a narrow beam of practically homogeneous light in a fixed direction (the line joining the apertures in the two screens) . Operating on this beam with a second prism, he found that the homogeneous light was not dispersed, and also that it was more refracted the nearer the point from which it was taken approached to the violet end of the spectrum R V. This confirmed his previous conclusion that the rays increase in refrangibility from red to violet.

Newton also made use of the method of crossed prisms, which has been found of great use in studying dispersion. The prism P (fig. 3) refracts upwards, while the prism Q, which has its refract- ing edge perpendicular to that of P, refracts towards the right. The combined effect of the two is to pro- duce a spectrum sloping up from left to right. The spectrum will be straight if the twoprismsaresimilar in dispersive property, but if one of them is con- FlG – 3-— Method of Crossed Prisms, structed of a material which possesses any peculiarity in this respect it will be revealed by the curvature of the spectrum.

The coloured borders seen in the images produced by simple lenses are due to dispersion. The explanation of the colours of the rainbow, which are also due to dispersion, was given by Newton, although it was known previously to be due to refraction in the drops of rain (see Rainbow).

According to the wave-theory of light, refraction (q.v.) is due to a change of velocity when light passes from one medium to another. The phenomenon of dispersion shows that in dispersive media the velocity is different for lights of different wave-lengths. In free space, lightof all wave-lengths is propagated with the same velocity, as is shown by the fact that stars, when occulted by the moon or planets, preserve their white colour up to the last moment of disappearance, which would not be the case if one colour reached the eye later than another. The absence of colour changes in variable stars or in the appearance of new stars is further evidence of the same fact. All material media, however, are more or less dispersive. In air and other gases, at ordinary pressures, the dispersion is very small, because the refractivity is small. The dispersive powers of gases are, however, generally comparable with those of liquids and solids.

Dispersive Power. — In order to find the amount of dispersion caused by any given prism, the deviations produced by it on two rays of any

definite pure colours may be measured. The angle of difference between these deviations is called the dispersion for those rays. For this purpose the C and F lines in the spark-spectrum of hydrogen, situated in the red and blue respectively, are usually employed. If Sr and 5c are the angular deviations of these rays, then 5f — Sc is called the mean dispersion of the prism. If the refracting angle of the prism is small, then the ratio of the dispersion to the mean deviation of the two rays is the dispersive power of the material of the prism. Instead of the mean deviation, | (S F +8c), it is more usual to take the deviation of some intermediate ray. The exact position of the selected ray does not matter much, but the yellow D line of sodium

is the most convenient. If we denote its deviation by Sd, then we may put

Dispersive power = (Sf-dc) I Sd ■ ■ ■ (1).

This quantity may readily be expressed in terms of the refractive indices for the three colours, for if A is the angle of the prism (supposed small)

«c = (Mc-i)A, «d = (md-i)A, S f = (mf-i)A, where mc, md. Mf are the respective indices of refraction. This gives at once –

*Dispersive power = (/*f~mc) I (m> _ i) ■ ■ • (2).*

The second of these two expressions is generally given as the definition of dispersive power. It is more useful than (i), as the refractive indices may be measured with a prism of any convenient angle.

By studying the dispersion of colours in water, turpentine and crown glass Newton was led to suppose that dispersion is pro- portional to refraction. He concluded that there could be no refraction without dispersion, and hence that achromatism was impossible of attainment (see Aberration). This conclusion was proved to be erroneous when Chester M. Hall in 1733 constructed achromatic lenses. Glasses can now be made differing considerably both in refractivity and dispersive power.

Irrationality of Dispersion. — If we compare the spectrum produced by refraction in a glass prism with that of a diffraction grating, we

find not only that the order of colours is reversed, but also that the same colours do not occupy corresponding lengths on the two spectra, the blue and violet being much more extended in the refraction spectrum. The refraction spectra for different media also differ amongst themselves. This shows that the connexion between the refrangibility of light and its wave-length does not obey any simple law, but depends on the nature of the refracting medium. This property is referred to as the "irrationality of dispersion." In a diffraction spectrum the diffraction is proportional to the wave-length, and the spectrum is said to be " normal." If the increase of the angle of refraction were proportional to the diminution of wave-length for a prism of any material, the resulting spectrum would also be normal. This, however, is not the case with ordinary refracting media, the refrangibility generally increasing more and more rapidly as the wave-length diminishes.

The irrationality of dispersion is well illustrated by C.Christiansen's experiments on the dispersive properties of white powders. If the powder of a transparent substance is immersed in a liquid of the same refractive index, the mixture becomes transparent and a measure- ment of the refractive index of the liquid gives the refractivity of the powder. Christiansen found, in an investigation of this kind, that the refractivity of the liquid could only be got to match that of the powder for mono-chromatic light, and that, if white light were used, brilliant colour effects were obtained, which varied in a remarkable manner when small changes occurred in the refractive index of the liquid. These effects are due to the difference in dis- persive power of the powder and the liquid. If the refractive index is, for instance, the same for both in the case of green light, and a source of white light is viewed through the mixture, the green com- ponent will be completely transmitted, while the other colours are more or less scattered by multiple reflections and refractions at the surfaces of the powdered substance. Very striking colour changes are observed, according to R. W. Wood, when white light is trans- mitted through a paste made of powdered quartz and a mixture of carbon bisulphide with benzol having the same refractive index as the quartz for yellow light. In this case small temperature changes alter the refractivity of the liquid without appreciably affecting the quartz. R. W. Wood has studied the iridescent colours seen when a precipitate of potassium silicofluoride is produced by adding silico-fluoric acid to a solution of potassium chloride, and found that they are due to the same cause, the refractive index of the minute crystals precipitated being about the same as that of the solution, which latter can be varied by dilution.

Anomalous Dispersion. — In some media the usual order of the colours is changed. This curious phenomenon was noticed by W. H. Fox Talbot about 1840, but does not seem to have become generally known. In i860 F. P. Leroux discovered that iodine vapour refracted the red rays more than the violet, the intermediate colours not being transmitted; and in 1870 Christiansen found that an alcoholic solution of fuchsine refracted the violet less than the red, the order of the successive colours being violet, red, orange, yellow; the green being absorbed and a dark interval occurring between the violet and red. A. Kundt found that similar effects occur with a large number of substances, in particular with all those which

f>ossess the property of " surface colour," i.e., which strongly reflect ight of a definite colour, as do many of the aniline dyes. Such bodies show strong absorption bands in those colours which they reflect, while of the transmitted light that which is of a slightly greater wave-length than the absorbed light has an abnormally great refrangibility, and that of a slightly shorter wave-length an abnormally small refrangibility. The name given to this pheno- menon, — ' anomalous dispersion " — is an unfortunate one, as it has been found to obey a regular law.

In studying the dispersion of the aniline dyes, a prism with a very small refracting angle is made of two glass plates slightly inclined

to each other and enclosing a very thin wedge of the dye, which is either melted between the plates, or is in the form of a solution retained in position by surface-tension. Only very thin layers are sufficiently transparent to show the dispersion near or within an absorption band, and a large refracting angle is not required, the dispersion usually being very considerable. Another method, which has been used by R. W. Wood and C. E. Magnusson, is to introduce a thin film of the dye into one of the optical paths of a Michelson interferometer, and to determine the consequent displace- ment of the fringes. E. Mach and J. Arbes have used a method depending on total reflection (Drude's Theory of Optics, p. 394).

A very remarkable example of anomalous dispersion, which was first observed by A. Kundt, is that exhibited by the vapour of sodium. It has not been found practicable to make a prism of this vapour in the ordinary way by enclosing it in a glass vessel of the required shape, as sodium vapour attacks glass, quickly rendering it opaque. A. E. Becquerel, however, investigated the character of the dis- persion by using prism-shaped flames strongly coloured with sodium. But the best way of exhibiting the effect is by making use of a remarkable

property of sodium vapour discovered by R. W. Wood and employed for this purpose in a very ingenious manner. He found that when sodium is heated in a hard glass tube, the vapour which is formed is extraordinarily cohesive, only slowly spreading out in a cloud with well-defined borders, which can be rendered visible by placing the tube in front of a sodium flame, against which the cloud appears black. If a long glass tube with plane ends, and containing some pellets of sodium is heated in the middle by a row of burners, the cool ends remain practically vacuous and do not become obscured. The sodium vapour in the middle is very dense on the heated side, the density diminishing rapidly towards the upper part of the tube, so that, although not prismatic in form, it refracts like a prism owing to the variation in density. Thus if a horizontal slit is illuminated by an arc lamp, and the light — rendered parallel by a collimating lens 1 — is transmitted through the sodium tube and focused on the vertical slit of a spectroscope, the effect of the sodium vapour is to produce its refraction spec- .

*trum vertically on the slit. *

The image of this

through the glass prism of Jfjy the spectroscope will appear as in fig. 4. The whole of the light, with the exception of a small part in the neigh- bourhood of the D lines, is

r

"TitM

Fig. 4. — Anomalous Dispersion of Sodium Vapour.

practically undeviated, so that it illuminates only a very short piece of the slit and is spread out into the ordinary spectrum. But the light of slightly greater wave-length than the D lines, being refracted strongly downward by the sodium vapour, illuminates the bottom of the slit ; while that of slightly shorter wave-length is refracted upward and illuminates the top of the slit. Fig. 4 represents the in- verted image seen in the telescope. The light corre- sponding to the D lines and the space between

*them is absorbed, as evi- j *> *j . n.*

denced by the dark inter- l \r — ~_ •-

*val. If the sodium is only D i" D **

gently heated, so as to

produce a comparatively

rarefied vapour, and a grat- Fig. c

ing spectroscope employed,

the spectrum obtained is like that shown in fig. 5, which was

the effect noticed by Becquerel with the sodium flame. Here the

light corresponding to the space between the D lines is transmitted,

being strongly refracted upward near Di, and downward near D 2 .

The theory of anomalous dispersion has been applied in a very interesting way by W. H. Julius to explain the " flash spectrum " seen during a solar eclipse at the moment at which totality occurs. The conditions of this phenomenon have been imitated in the laboratory by Wood, and the corresponding effect obtained.

Theories of Dispersion. — The first attempt at a mathematical theory of dispersion was made by A. Cauchy and published in 1835. This was based on the assumption that the medium in which the light is propagated is discontinuous and molecular in character, the molecules being subject to a mutual attraction. Thus, if one molecule is disturbed from its mean position, it communicates the disturbance to its neighbours, and so a wave is propagated. The formula arrived at by Cauchy was

n = A-h§+£+....

A2 A4

n being the refractive index, X the wave-length, and A, B, C, &c, constants depending on the material, which diminish so rapidly that only the first three as here written need be taken into account. If suitable values are chosen for these constants, the formula can be made to represent the dispersion of ordinary transparent media within the visible spectrum very well, but when extended to the infra-red region it often departs considerably from the truth, and it fails altogether in cases of anomalous dispersion. There are also grave theoretical objections to Cauchy's formula.

DISRAELI

The modern theory of dispersion, the foundation of which was laid by W. Sellmeier, is based upon the assumption that an interaction takes place between ether and matter. Sellmeier adopted the elastic-solid theory of the ether, and imagined the molecules to be attached to the ether surrounding them, but free to vibrate about their mean positions within a limited range. Thus the ether within the dispersive medium is loaded with molecules which are forced to perform oscillations of the same period as that of the transmitted wave. It can be shown mathematically that the velocity of propa- gation will be greatly increased if the frequency of the light-wave is slightly greater, and greatly diminished if it is slightly less than the natural frequency of the molecules ; also that these effects become less and less marked as the difference in the two frequencies increases. This is exactly in accordance with the observed facts in the case of substances showing anomalous dispersion. Sellmeier's theory did not take account of absorption, and cannot be applied to calculate the dispersion within a broad absorption band. H. von Helmholtz, working on a similar hypothesis, but with a frictional term intro- duced into his equations, obtained formulae which are applicable to cases of absorption. A modified form of Helmholtz's equation, due to E. Ketteler and known as the Ketteler-Helmholtz formula, has been much used in calculating dispersion, and expresses the facts with remarkable accuracy. P. Drude has obtained a similar formula based on the electromagnetic theory, thus placing the theory of dispersion on a much more satisfactory basis. The fundamental assumption is that the medium contains positively and negatively charged ions or electrons which are acted on by the periodic electric forces which occur in wave propagation on Maxwell's theory. The equations finally arrived at are

nil k) i +z^o^-\ i m y+z^

nK zL/(x 2 -x 2 m) 2 +g 2 × 2

where X is the wave-length in free ether of light whose refractive index is n, and X m the wave-length of light of the same period as the electron, k is a coefficient of absorption, and D and g are constants. The sign of summation S is used in cases where there are several absorption bands, and consequently several similar terms on the right-hand side, each with a different value of X„. This would occur if there were several kinds of ions, each with its own natural period. In a region where there is no absorption, we have k = o and therefore g = o, and we have only one equation, namely,

which is identical with Sellmeier's result. As X„ is a wave-length corresponding to an absorption band, this formula can be used to find values of X m which satisfy the observed values of » within the region of transparency, and so to determine where the absorption bands are situated. In this way the existence of bands in the infra-red part of the spectrum has been predicted in the case of quartz and detected by experiments on the selective reflection of the material.

References. — For the theory of dispersion see P. Drude, Theory of Optics (Eng. trans.) ; R. W. Wood, Physical Optics; and A. Schuster, Theory of Optics. For descriptive accounts, see Wood's Physical Optics, T. Preston's Theory of Light, E. Edser's Light. The last work contains an elementary treatment of Sellmeier's theory. (J. R. C.)

D'ISRAELI (or Disraeli), ISAAC (1766-1848), English man of letters, father of the earl of Beaconsfield (q.v.) , was born at Enfield in May 1 766. He belonged to a Jewish family which, having been driven by the Inquisition from Spain, towards the end of the 1 5th century, settled as merchants at Venice, and assumed the name which has become famous; it was generally spelt D 'Israeli until the middle of the 19th century. In 1748 his father, Benjamin D'Israeli, then only about eighteen years of age, removed to England, where, before passing the prime of life, he amassed a competent fortune, and retired from business. He belonged to the London congregation of Spanish and Portuguese Jews, of which his son also remained a nominal member until after Benjamin D'Israeli died at the end of 1816.

The strongly marked characteristics which determined Isaac D'Israeli's career were displayed to a singular degree even in his boyhood. He spent his time over books and in long day- dreams, and evinced the strongest distaste for business and all the more bustling pursuits of life. These idiosyncrasies met with no sympathy from either of his parents, whose ambitious plans for bis future career they threatened to disappoint. When he was about fourteen, in the hope of changing the bent of his mind, his father sent him to live with his agent at Amsterdam, where he worked under a tutor for four or five years. Here he studied Bayle and Voltaire, and became an ardent disciple of Rousseau. Here also he wrote a long poem against commerce, which he produced as an exposition of his opinions when, on his return to

England, his father announced his intention of placing him in a commercial house at Bordeaux. Against such a destiny D'Israeli's mind strongly revolted; and he carried his poem, with a letter

earnestly appealing for advice and assistance, to Samuel Johnson ; but when he called again a week after to receive an answer, the packet was returned unopened — the great Doctor was on his death-bed. He also addressed a letter to Dr Vicesimus Knox, master of Tonbridge Grammar School, begging to be received into his family, that he might enjoy the benefit of his learning and experience. How this application was answered we do not know. The evident firmness of his resolve, however, was not without effect. His parents gave up their purpose for a time. He was sent to travel in France, and allowed to occupy himself as he- wished; and he had the happiness of spending some months in Paris, in the society of literary men, and devoted to the literary pursuits in which he delighted.

In the beginning of 1 788 he returned home, and in the next year he attacked Peter Pindar (John Wolcot) in The Gentleman's Magazine in a poem in the manner of Pope, " On the Abuse of Satire." The authorship of the poem was much debated, and it was attributed by some to William Hayley, upon whom it was actually avenged, with characteristic savageness, by its victim. It is greatly to Wolcot's credit that, on learning his mistake, he sought the acquaintance of his young opponent, whose friend he remained to the end of his life. Through the success of this satire D'Israeli made the acquaintance of Henry James Pye, who helped to persuade his father that it would be a mistake to force him into a business career, and introduced him into literary circles. D'Israeli dedicated his first book, A Defence of Poetry, to Pye in 1 790. Henceforth his life was passed in the way he best liked — in quiet and almost uninterrupted study. In 1802 he married Maria Basevi, by whom he had five children, of whom Benjamin (after- wards Lord Beaconsfield and Prime Minister of England) was the second. He was able to maintain his strenuous habits of study till he reached the advanced age of seventy-two, when he was forced, by paralysis of the optic nerve, to give up work almost entirely. He lived ten years longer, and died at his seat at Braden-ham House, Buckinghamshire, on the 19th of January 1848.

Isaac D'Israeli is most celebrated as the author of the Curiosities of Literature (1791, subsequent volumes in 1793, 1817, 1823 and 1834). It is a miscellany of literary and historical anecdotes, of original critical remarks, and of interesting and curious information of all kinds, animated by genuine literary feeling, taste and enthusiasm. With the Curiosities of Literature may be classed D'Israeli's Miscellanies, or Literary Recreations (1796), the Calamities of Authors (1812-181$), and theQuarrels of A uthors (1 8 1 4) . Towards the close of his life D 'Israeli projected a continuous history of English literature, three volumes of which appeared in

1841 under the title of the Amenities of Literature. But of all his works the most delightful is his Essay on the Literary Character (1795), which, like most of his writings, abounds in illustrative anecdotes. In the famous " Pope controversy " he supported Byron and Campbell against Bowles and Hazlitt by a defence of Pope in the form of a criticism of Joseph Spence's Anecdotes contributed to the Quarterly Review (July 1820). In 1797 D'Israeli published three novels; one of these, Mejnoun and Leila, the Arabian Petrarch and Laura, was said to be the first oriental romance in English. His last novel, Despotism, or the Fall of the Jesuits, appeared in 1811, but none of his romances was popular. He also published a slight sketch of Jewish history, and especially of the growth of the Talmud, entitled the Genius of Judaism (1833).

He was the author of two historical works — a brief defence of the literary merit and personal and political character of James I. (18 16), and a learned Commentary on the Life and Reign of King Charles I. (1828-1831). This was recognized by the University of Oxford, which conferred upon the author the honorary degree of D.C.L. As an historian D'Israeli is distinguished by two characteristics. In the first place, he had small interest in politics, and no sympathy with the passionate fervour, or adequate appreciation of the importance, of political struggles. And, secondly, with a laborious zeal then less common than now among

historians, he sought to bring to light fresh historical material by patient search for letters, diaries and other manuscripts of value which had escaped the notice of previous students, indeed, the honour has been claimed for him of being one of the founders of the modern school of historical research.

Of the amiable personal character and the placid life of Isaac D'Israeli a charming picture is to be found in the brief memoir Prefixed to the 1849 edition of Curiosities of Literature, by his son iˆord Beaconsfield.

DISS, a market town in the southern parliamentary division of Norfolk, England; near the river Waveney (the boundary with Suffolk), 95 m. N.E. by N. from London by the Great Eastern railway. Pop. of urban district (1901) 3745. The town lies pleasantly upon a hill rising above a mere, which drains to the

Waveney, having its banks laid out as public gardens. The church of St Mary exhibits Decorated and Perpendicular stone and flint work. There is a corn exchange and the agricultural trade is con- siderable; brushes and matting are manufactured. The poet and satirist, John Skelton (d. 1529), was rector here in the later part of his life, and is doubtfully considered a native.

DISSECTION (from Lat. dissecare, to cut apart), the separation into parts by cutting, particularly the cutting of an animal or plant into parts for the purpose of examination or display of its structure.

DISSENTER (Lat. dis-sentire, to disagree), one who dissents or disagrees in matters of opinion, belief, &c. The term " dis- senter " is, however, practically restricted to the special sense of a member of a religious body in England which has, for one reason or another, separated from the Established Church. Strictly, the term includes the English Roman Catholics, who in the original draft of the Relief Act of 1791 were styled " Protest- ing Catholic Dissenters." It is in practice, however, restricted to the " Protestant Dissenters " referred to in sec. ii. of the Toleration Act of 1688. The term is not applied to those bodies who dissent from the Established Church of Scotland ; and in speaking of members of religious bodies which have seceded from established churches abroad it is usual to employ the term "dissidents" (Lat. dissidere, to dissent). In this connotation the terms "dissenter" and " dissenting," which had acquired a somewhat contemptuous flavour, have tended since the middle of the 19th century to be replaced by " nonconformist," a term which did not originally imply secession, but only refusal to conform in certain particulars (e.g. the wearing of the surplice) with the authorized usages of the Established Church. Still more recently the term " nonconformist " has in its turn, as the political attack on the principle of a state establishment of religion developed, tended to give place to the style of " Free Churches " and " Free Churchman." All three terms are now in use, "nonconformist" being the most usual, as it is the most colourless. (See Congregationalism, &c.)

DISSOCIATION, a separation or dispersal, the opposite of association. In chemistry the term is given to chemical reactions in which a substance decomposes into two or more substances, and particularly to cases in which associated mole- cules break down into simpler molecules. Thus the reactions NHXlˆNHs + HCl.andPCleˆPCls + Clzareinstancesofthe first type; N 2 4 ˆ± 2N0 2 , of the second (see Chemical Action). Electrolytic or ionic dissociation is the separation of a substance in solution into ions (see Electrolysis; Solution).

DISSOLUTION (from Lat. dissolvere, to break up into parts), the act of dissolving or reducing to constituent parts, especially of the bringing to an end an association such as a partnership or building society, and particularly of the termination of an assembly. A dissolution of parliament in England is thus the end of its existence, brought about by the efflux of time in accordance with the Septennial Act 1716, or by an exercise of the royal prerogative. This is done either in person, or by commission, if parliament is sitting; if prorogued, then by proclamation. The word is used as a synonym for end or death.

DISTAFF, in the early forms of spinning, the " rock " or short stick round one end of which the flax, cotton or wool is loosely wound, and from which it is spun off by the spindle. The word is derived from the Old English distaef, the first part of which is

connected with dizen, in modern English seen in " bedizen," to deck out or embellish, originally " to equip the distaff with flax, &c," cf. the German dialectal word Diesse, flax. The last part of the word is " staff." " Distaff " from early times has been used to symbolize woman's work (cf. the use of " spinster " for an unmarried woman) ; thus the " distaff " or " spindle " side of a family refers to the female branch, as opposed to the " spear " or male branch. The 7th of January, the day after Epiphany, was formerly known as St Distaff's day, as women then began work again after the Christmas holiday.

DISTILLATION (from the Lat. distillare, more correctly destiUare, to drop or trickle down), an operation consisting in the conversion of a substance or mixture of substances into vapours which are afterwards condensed to the liquid form; it has for its object the separation or purification of substances by taking advantage of differences in volatility. The apparatus consists of three parts: — the " retort " or " still," in which the substance is heated; the " condenser," in which the vapours are condensed; and the " receiver," in which the condensed vapours are collected. Generally the components of a mixture will be vaporized in the order of their boiling-points; consequently if the condensates or " fractions " corresponding to definite ranges of temperature be separately collected, it is obvious that a more or less partial separation of the components will be effected. If the substance operated upon be practically pure to start with, or the product 'of distillation be nearly of constant composition, the operation is termed " purification by distillation " or " rectification "; the latter term is particularly used in the spirit industry. If a complex mixture be operated upon, and a separation effected by collect- ing the distillates in several portions,

the operation is termed "fractional distillation." Since many substances decompose ieitherat, or below, their boiling-points underordinary atmospheric pressure, it is necessary to lower the boiling-point by reducing the pressure if it be desired to distil them. This variation is termed "distillation under reduced pressure or in a vacuum." The vaporization of a substance below its normal boiling-point can also be effected by blowing in steam or some other vapour; this operation is termed "distillation with steam." "Dry distilla- tion" is the term used when solid substances which do not liquefy on heating are operated upon; "sublimation" is the term used when a solid distils without the intervention of a liquid phase.

Distillation appears to have been practised at very remote times. The Alexandrians prepared oil of turpentine by distilling pine-resin; Zosimus of Panopolis, a voluminous writer of the 5th century A.D., speaks of the distillation of a " divine water " or " panacea " (probably from the complex mixture of calcium polysulphides, thiosulphate, &c, and free sulphur, which is obtained by boiling sulphur with lime and water) and advises " the efficient luting of the apparatus, for otherwise the valuable properties would be lost." The Arabians greatly improved the earlier apparatus, naming one form the alembic (q.v.); they discovered many ethereal oils by distilling plants and plant juices, alcohol by the distillation of wine, and also distilled water. The alchemists gave great attention to the method, as is shown by the many discoveries made. Nitric, hydrochloric and sulphuric acids, all more or less impure, were better studied; and many ethereal oils were discovered. Prior to about the 18th century three forms of distillation were practised: (1) destillatio per ascensum, in which the retort was heated from the bottom, and the vapours escaped from the top; (2) destillatio per latus, in which the vapours escaped from the side; (3) destillatio per descensum, in which the retort was heated at the top, and the vapours led off by a pipe passing through the bottom. According to K. B. Hoffmann the earliest mention of destillatio per descensum occurs in the writings of Aetius, a Greek physician who flourished at about the end of the 5th century.

In modern times the laboratory practice of distillation was greatly facilitated by the introduction of the condenser named after Justus von Liebig; A. Kolbe and E. Frankland introduced the "reflux condenser," i.e. a condenser so placed that the condensed vapours return to the distilling flask, a device per- mitting the continued boiling Of a substance with little loss; W.

DISTILLATION

Dittmar and R. Anschutz, independently of one another, intro- duced "distillation under reduced pressure "; and "fractional distillation " was greatly aided by the columns of Wurtz (1855), E. Linnemann (1871), and of J. A. Le Bel and A. Henninger (1874). In chemical technology enormous strides have been made, as is apparent from the coal-gas, coal-tar, mineral oil, spirits and mineral acids industries.

The subject is here treated under the following subdivisions: (1) ordinary distillation, (2) distillation under reduced pressure, (3) fractional distillation, (4) distillation with steam, (5) theory of distillation, (6) dry distillation, (7) distillation in chemical technology and (8) commercial distillation of water.

1. Ordinary Distillation. — The apparatus generally used is shown in fig. 1. The substance is heated in a retort a, which consists of a large bulb drawn out at the top to form a long neck; it may also

Fig. 1.

be provided with a tubulure, or opening, which permits the charging of the retort, and also the insertion of a thermometer b. The retort may be replaced by a distilling flask, which is a round-bottomed flask (generally with a lengthened neck) provided with an inclined side tube. The neck of the retort, or side tube of the flask, is con- nected to the condenser c by an ordinary or rubber cork, according to the nature of the substance distilled ; ordinary corks soaked in paraffin wax are very effective when ordinary or rubber corks cannot be used. Sometimes an " adapter " is used ; this is simply a tapering tube, the side tube being corked into the wider end, and the condenser on to the narrower end. The thermometer is placed so that the bulb is near the neck of the retort or the side tube of the distilling flask. It generally happens that much of the mercury column is outside the flask and consequently at a lower temperature than the bulb, hence a correction of the observed temperature is necessary. If N be the length of the unheated mercury column in degrees, / the temperature of this column (generally determined by a small thermometer placed with its bulb at the middle of the column), and T the temperature recorded by the thermometer, then the corrected temperature of the vapour is T +0-000143 (T-t) N (T. E. Thorpe, Journ. Chem. Soc, 1880, p. 150).

The mode of heating varies with the substance to be distilled. For highly volatile liquids, e.g. ether, Hgroin, &c, immersion of the flask

in warm water suffices; for less volatile liquids a directly heated water or sand bath is used; for other liquids the flask is heated through wire gauze or asbestos board, or directly by a Bunsen. The condensing apparatus must also be conditioned by the volatility. With difficulty volatile substances, e.g. nitrobenzene, air cooling of the retort neck or of a straight tube connected with the distilling flask will suffice; or wet blotting-paper placed on the tube and the receiver immersed in water may be used. For less volatile liquids the Liebig condenser is most frequently used. In its original form, this consists of a long tube surrounded by an outer tube so arranged that cold water circulates in the annular space between the two. The vapours pass through the inner tube, and the cold water enters at the end farthest from the distilling flask. For more efficient condensation — and also for shortening the apparatus — the central tube may be flattened, bent into a succession of V's, or twisted into a spiral form, the object in each case being to increase the condensing surface. Of other common types of condenser, we may notice the " spiral " or " worm " type, which con- sists of a glass, copper or tin worm enclosed in a vessel in which water circulates; and the ball condenser, which consists of two concentric spheres, the vapour passing through the inner sphere and water circulating in the space between this and the outer (in another form the vapour circulates in a shell, on the outside and inside of which water circulates). A very effective type is shown in fig. 2. The condensing water enters at the top and is conducted to the bottom of the inner tube, which it fills and then flows over the outside of the outer tube; it collects in the bottom funnel and is then led off. The vapours pass between the inner and outer tubes.

Practically any vessel may serve as a receiver — test tube, flask, beaker, &c. If noxious vapours come over, it is necessary to have an air-tight connexion between the condenser and receiver, and to pro-

Fig. 2.

vide the latter with an outlet tube leading to an absorption column or other contrivance in which the vapours are taken up. If the substances operated upon decompose when heated in air, as, for example, the zinc alkyls which inflame, the air within the apparatus is replaced by some inert gas, e.g. nitrogen, carbon dioxide, &c, which is led in at the distilling flask before the process is started, and a slow current maintained during the operation.

2. Distillation under Reduced Pressure. — This method is adopted for substances which decompose at their boiling-points under ordinary pressure, and, generally, when it is desirable to work at a lower

*temperature. The apparatus differs very slightly from that employed in ordinary distillation. The " receiver must be con- nected on the one side to the condenser, and on the other to the exhaust pump. A safety vessel and a manometer are generally interposed between the pump and receiver. For the purpose of collecting the distillates in fractions, many forms of receivers have been devised. Bruhl's is one of the simplest. It consists of a number of tubes mounted vertically on a horizontal circular disk which rotates about a vertical axis in a cylindrical vessel. This vessel has two tubulures: through one the end of the condenser projects so as to be over one of the receiving tubes ; the other leads to the pump. By rotating the disk the tubes may be successively brought under the end of the condenser. Boiling under reduced pressure has one very serious drawbaek, viz. the liquid boils ir- regularly or " bumps." W. Dittmar showed that this may be avoided by leading a fine, steady stream of dry gas — air, carbon dioxide, hydrogen, &c, according to the substance operated upon — through the liquid by means of a fine capillary tube, the lower end of which reaches to nearly the bottom of the flask. " Bumping " is common in open boiling when the liquid is free from air bubbles and the interior of the vessel is very smooth. It may be diminished by introducing clippings of platinum foil, pieces of porcelain, glass beads or garnets into the liquid. " Frothing " is another objection able feature with many liquids. When cold, froth can be immediately dissipated by adding a few drops of ether. In boiling liquids its formation may be prevented by adding paraffin wax ; the wax melts and forms a ring on the surface of the liquid, which boils tranquilly in the centre. **

3. Fractional Distillation. — By fractional distillation is meant the separation of a mixture having components which boil at neighbour- ing temperatures. The distilling flask has an elongated neck so that

Young.

Kreusler.

Wurtz. Linnemann. Le Bel-Henninger. Glynsky.

Fig. 3.

the less volatile vapours are condensed and return to the flask, while the more volatile component passes over. The success of the operation depends upon two factors : (1) that the heating be careful,

slow and steady, and (2) that the column attached to the flask be efficient to sort out, as it were, the irtost volatile vapour. Three types of columns are employed : (1) the elongation is simply a straight or bulb tube; (2) the column, properly termed a " dephlegmator," is so constructed that the vapours have to traverse a column of previously condensed vapour ; (3) the column is encircled by a jacket through which a liquid circulates at the same temperature as the boiling-point of the most volatile component. To the first type belongs the simple straight tube, and the Wurtz tube (see fig. 3), which is simply a series of bulbs blown on a tube. These forms are not of much value. Several forms of the second type are in use. In the Linnemann column the condensed vapours temporarily collect on platinum gauzes (a) placed at the constrictions of a bulbed tube. In the Le Bel-Henninger form a series of bulbs are connected con- secutively by means of syphon tubes (b) and having platinum gauzes (o) at the constrictions, so that when a certain amount of liquid collects in any one bulb it syphons over into the next lower bulb. The Glynsky form is simpler, having only one syphon tube ; at the constrictions it Is usual to have a glass bead. The " rod-and-disk " form of Sidney Young is a series of disks mounted on a central spindle and surrounded by a slightly wider tube. The " pear- shaped " form of the same author consists of a series of pear-shaped bulbs, the narrow end of one adjoining the wider end of the next lower one. In this class may also be placed the Hempel tube, which is simply a straight tube filled with glass beads. Of the third type is the Warren column consisting of a spiral kept at a constant temperature by a liquid bath. Improved forms were devised by

F. D. Brown. Kreusler's form is easily made and manipulated. A tube closed at the bottom is traversed by an open narrower tube, and the arrangement is fitted in the neck of the distilling flask. Water is led in by the inner tube, and leaves by a side tube fused on the wider tube. Many comparisons of the effectiveness of dephlegmating columns have been made (see Sidney Young, Fractional Distillation, 1903). The pear-shaped form is the most effective, second in order is the Le Bel-Henninger, which, in turn, is better than the Glynsky. The main objection to the Hempel is the retention of liquid in the beads, and the consequent inapplicability to the distillation of small quantities.

4. Distillation with Steam.— In this process a current of steam,

which is generated in a separate boiler and superheated, if necessary, by circulation through a heated copper worm, is led into the distilling vessel, and the mixed vapours condensed as in the ordinary processes. This method is particularly successful in the case of substances which cannot be distilled at their ordinary boiling-points (it will be seen in the following , section that distilling with steam implies a lowering of boiling-point), and which can be readily separated from water. Instances of its application are found in the separation of ortho-and para-nitrophenol, the o-compound distilling and the p- remaining behind ; in the separation of aniline from the mixture obtained by reducing nitrobenzene ; of the naphthols from the melts produced by fusing the naphthalene monosulphonic acids with potash; and of quinoline from the reaction between aniline, nitrobenzene, glycerin, and sulphuric acid (the product being first steam distilled to remove any aniline, nitrobenzene, or. glycerin, then treated with alkali, and again steam distilled when quinoline comes over). With substances prone to discolorization, as, for example, certain amino compounds, the operation may be conducted in an atmosphere of carbon dioxide, or the water may be saturated with sulphuretted hydrogen. Liquids other than water may be used : thus alcohol separates o-pipecoline and ether nitropropylene.

5. Theory of Distillation.— The general observation that under a constant pressure a pure substance boils at a constant temperature leads to the conclusion that the distillate which comes over while the thermometer records only a small variation is of practically constant composition. On this fact depends " rectification or purification by distillation." A liquid boils when its vapour pressure equals the superincumbent pressure (see Vaporization); con- sequently any process which diminishes the external pressure must also lower the boiling-point. In this we have the theory of " dis- tillation under reduced pressure." The theory of fractional distilla- tion, or the behaviour of liquid mixtures when heated to their boiling-points, is more complex. For simplicity we confine ourselves to mixtures of two components, in which experience shows that three cases are to be recognized according as the components are (1) completely immiscible, (2) partially miscible, (3) miscible in all proportions. . . ,
.

When the components are completely immiscible, the vapour pressure of the one is not influenced by the presence of the other. The mixture consequently distils at the temperature at which the sum of the partial pressures equals that of the atmosphere. Both components come over in a constant proportion until one disap- pears; it is then necessary to raise the temperature in order to distil the residue. The

composition of the distillate is determinate (by Avogadro's law) if the molecular weights and vapour pressure of the components at the temperature of distillation be known. If Mi, M 2 , and Pi, P 2 be the molecular weights and vapour pressures of the components A and B, then the ratio of A to B in the distillate is MiPi/M 2 P 2 . Although, as is generally the case, one liquid (say A) is more volatile than the other (say B), i.e. Pi greater than P 2 , if the molecukr weight of A be much less than that of B, then it is obvious that the ratio M]Pi/M 2 P 2 need not be very great, and hence the less volatile liquid B would come over in fair amount. These con- ditions pertain in cases where distillation with steam is successfully practised, the relatively high volatility of water being counter- balanced by the relatively high molecular weight of the other component; for example, in the case of nitrobenzene and water the ratio is 1 to 5. In general, when the substance to be distilled has a vapour pressure of only 10 mm. at ioo° C, distillation with steam can be adopted, if the product can be subsequently separated from the water.

When distilling a mixture of partially miscible components a distillate of constant composition is obtained so long as two layers are present, i.e. A dissolved in B and B dissolved in A, since both of these solutions emit vapours of the same composition (this follows since the same vapour must be in equilibrium with both solutions, for if it were not so a cyclic system contradicting the second law of thermodynamics would be realizable). The composition of the vapour, however, would not be the same as that of either layer. As the distillation proceeded one layer would diminish more rapidly than the other until only the latter Would remain; this would then distil as a completely miscible mixture.

The distillation of completely miscible mixtures is the most common practically and the most complex theoretically. A co- ordination of the results obtained on the distillation of mixtures of this nature with the introduction of certain theoretical considerations led to the formation of three groups distinguished by the relative solubilities of the vapours in the liquid components.

(i.) If the vapour of A be readily soluble in the liquid B, and the vapour of B readily soluble in the liquid A, there will exist a mixture of A and B which will have a lower vapour pressure than any other mixture. The vapour pressure composition curve will be convex to the axis of compositions, the maximum vapour pressures corre- sponding to pure A and pure B, and the minimum to some mixture of A and B. On distilling such a mixture under constant pressure, a mixture of the two components (of variable composition) will come over until

there remains in the distilling flask the mixture of minimum vapour pressure. This will then distil at a constant temperature. Thus nitric acid, boiling-point 68°, forms a mixture with water, boiling point ioo °, which boils at a constant temperature of 126°, and contains 68% of acid. Hydrochloric acid forms a similar mixture which boils at no" and contains 20-2% of acid. Another mixture of this type is formic acid and water.

(ii.) If the vapours be sparingly soluble in the liquids there will exist a mixture having a greater vapour pressure than that of any other mixture. The vapour pressure-composition curve will now be concave to the axis of composition, the minima corresponding to the pure components. On distilling such a mixture, a mixture of constant composition will distil first, leaving in the distilling flask one or other of the components according to the composition of the mixture. An example is propyl alcohol and water. At one time it was thought that these mixtures of constant boiling-point (an ex- tended list is given in Young's Fractional Distillation) were definite compounds. The above theory, coupled with such facts as the variation of the composition of the constant boiling-point fraction with the pressure under which the mixture is distilled, the pro- portionality of the density of all mixtures to their composition, &c, shows this to be erroneous.

(iii.) If the vapour of A be readily soluble in liquid B, and the vapour of B sparingly soluble in liquid A, and if the vapour pressure' of A be greater than that of B, then the vapour pressures of mixtures of A and B will continually diminish as one passes from 100% A to 100% B. The vapour tension may approximate to a linear function of the composition, and the curve will then be practically a straight line. On distilling such a mixture pure A will come over first, followed by mixtures in which the quantity of B continually increases; consequently by a sufficient number of distillations A and B can be completely separated. Examples are water and methyl or ethyl alcohol.

Van't Hoff {Theoretical and Physical Chemistry, vol. i. p. 51) illustrates the five cases on one diagram. In fig. 4 let AB be the axis of composition, AP be the vapour pressure of pure A, BQ the vapour pressure of pure B. For immiscible liquids the vapour pressure curve is the hori- zontal line ab, described so that aP = QB and 6Q = AP. For partially miscible liquids the curve is Pai&iQ. The hori- zontal line di 61 corresponds to the two layers of liquid, and the inclined lines P01 Q61 to solutions of B in A and of A in B. The curves Pa t Q, having a minimum at a,, Po 3 Q, having a maximum at a 3 , and Pa 6 Q, with neither a maximum nor minimum, correspond to the

types 1., ii., iii. of completely miscible mixtures.

6. Dry Distillation. — In this process the substance operated upon is invariably a solid, the vapours being condensed and collected as in the other methods. When the substance operated upon is of uncertain composition, as, for example, coal, wood, coal-tar, &c, the term destructive distillation is employed. A more general designa- tion is " pyrogenic processes," which also includes such operations as leading vapours through red-hot tubes and condensing the products. We may also consider here cases of sublimation wherein a solid vaporizes and the vapour condenses without the occurrence of the liquid phase.

Dry distillation is extremely wasteful even when definite sub- stances or mixtures, such as calcium acetate which yields acetone, are dealt with, valueless by-products being obtained and the condensate usually requiring much purification. Prior to 1830, little was known of the process other than that organic compounds generally yielded tarry and solid matters, but the discoveries of Liebig and Dumas (of acetone from acetates), of Mitscherlich (of benzene from benzoates) and of Persoz (of methane from acetates and lime) brought the opera- tion into common laboratory practice. For efficiency the operation must be conducted with small quantities; caking may be prevented by mixing the substance with sand or powdered pumice, or, better, with iron filings, which also renders the decomposition more regular by increasing the conductivity of the mass. The most favourable retort is a shallow iron pan heated in a sand bath, and provided with a screwed-down lid bearing the delivery tube. Sidney Young has suggested conducting the operation in a current of carbon dioxide which sweeps out the vapours as they are evolved, and also heating in a vapour bath, e.g. of sulphur.

One of the earliest red-hot tube syntheses of importance wae the formation of naphthalene from a mixture of alcohol and ether vapours. Such condensations were especially studied by M. P. E. Berthelot, and shown to be very fruitful in forming hydrocarbons.

Sometimes reagents are placed in the combustion tube, for example lead oxide (litharge), which takes up bromine and sulphur. In its simplest form the apparatus consists of a straight tube, made of glass, pdrcelain or iron according to the temperature required and the nature of the reacting substances, heated in an ordinary com-

bustion furnace, the mixture entering at one end and the vapours being condensed at the other. Apparatus can also be constructed in which the unchanged vapours are continually circulated through the tube. Operating in a current of catbon dioxide facilitates the process by preventing overheating.

7. Distillation in Chemical Technology. — In laboratory . practice use is made of a fairly constant type of apparatus, only trifling modifications being generally necessary to adapt the apparatus for any distillation or fractionation; in technology, on the other hand, many questions have to be considered which generally demand the adoption of special constructions for the economic distillation of different substances. The modes of distillation enumerated above all occur in manufacturing practice. Distillation in a vacuum is practised in two forms: — if the pump draws off steam as well as air it is termed a " wet " air-pump; if it only draws off air, it is a " dry " air-pump. In the glycerin industry the lyes obtained by saponifying the fats are first evaporated with " wet vacuum " and finally distilled with closed and live steam and a " dry vacuum." Two forms of steam distillation may be distinguished : — in one the still is simply heated by a steam coil wound inside or outside the still — this is terrned heating by dry steam; in the other steam is injected into the mass within the still — this is the distillation with live steam of laboratory practice. The details of the plant — the material and fittings of the still, the manner of heating, the form of the condensing plant, receivers, &c. — have to be determined for each substance to be distilled in order to work with the maximum economy.

For the distillation of liquids the retort is usually a cylindrical pot placed vertically; cast iron is generally employed, in which case the bottom is frequently incurved and thicker than the sides in order to take up the additional wear and tear. Sometimes linings of enamelled iron or other material are employed, which when worn can be replaced at a far lower cost than that of a new still. Glass stills heated by a sand bath are sometimes employed in the final distillation of sulphuric acid; platinum, and an alloy of platinum and iridium with a lining of gold rolled on (a discovery due to Heraeus), are used for the same purpose. Cast iron stills are pro- vided with a hemispherical head or dome, generally attached to the body of the still by bolts, and of sufficient size to allow for any frothing. It is invariably provided with an opening to carry off the vapours produced. In its more complete form a still has in addition the following fittings: — The dome is provided with openings to admit (1) the axis of the stirring gear (in some stills the stirring gear rotates on a horizontal axis which traverses the side and not the

head of the still), (2) the inlet and outlet tubes of a closed steam coil, (3) a tube reaching to nearly the bottom of the still to carry live steam, (4) a tube to carry a thermometer, (5) one or more manholes for charging purposes, (6) sight-holes through which the operation can be watched, and (7) a safety valve. The body of the still is provided with one or more openings at different heights to serve for the discharge of the residue in the still, and sometimes with a glass gauge to record the quantity of matter in the still. For dry distillations the retorts are generally horizontal cylinders, the bottom or lower surface being sometimes flattened. Iron and fireclay are the materials commonly employed; wrought iron is used in the manufacture of wood-spirit, fireclay for coal-gas (see Gas: Manufacture), phosphorus, zinc, &c. The vertical type, however, is employed in the manufacture of acetone and of iodine.

Several modes of heating are adopted. In some cases, especially in dry distillations, the furnace flames play directly on the retorts, in others, such as in the case of nitric acid, the whole still comes under the action of the furnace gases to prevent condensation on the upper part of the still, while in others the furnace gases do not play directly on the base or upper portion of the still but are conducted around it by a system of flues (see Coal-Tar). Steam heating, dry or live, is employed alone and also as an auxiliary to direct firing.

The condensing plant varies with the volatility of the distillate. Air cooling is adopted whenever possible. For example, in the less modern methods for manufacturing nitric acid the vapours were conducted directly into double-necked bottles (bombonnes) immersed in water. A more efficient arrangement consists of a stack of vertical pipes standing, up from a main or collecting trough and connected at the top in consecutive pairs by a cross tube. By an arrangement of diaphragm-; in the lower trough the vapours are circulated through the system. As an auxiliary to air cooling the stack may be cooled by a slow stream of water trickling down the outside of the pipes, or, in certain cases, cold water may be injected into the condenser in the form of a spray, where it meets the ascend- ing vapours. Horizontal air-cooling arrangements are also employed. A common type of condenser consists of a copper worm placed in a water bath; but more generally straight tubes of copper or cast iron ■vhich cross and recross a rectangular tank are employed, since this form is more readily repaired and cleansed. Wood-spirit, petroleum and coal-tar distillates are condensed in plant of the latter type. In cases where the condenser is likely to become plugged there is a

pipe by means of which live steam can be injected into the condenser. The supply of water to the condenser is regulated according to the volatility of the condensate. When the vapours readily condense to a solid form the condensing plant may take the form of large chambers ; such conditions prevail in the manufacture of arsenic, sulphur and lampblack: in the latter case (which, however, is not properly one of distillation) the chamber is hung with sheets on which the pigment collects. Large chambers are also used in the condensation of mercury.

Dephlegmation of the vapours arising from such mixtures as coal- tar fractions, petroleum and the " wash " of the spirit industry, is very important, and many types of apparatus are employed in order to effect a separation of the vapours. The earliest form, invented by C. B. Mansfield to facilitate the fractionation of paraffin and coal- tar distillates, consisted in having a pipe leading from the inclined delivery tube of the still to the still again, so that any vapour which condensed in the delivery tube was returned to the still. Of really effective columns Coupler's was one of the earliest. The vapours rising from the still traverse a tall vertical column, and are then conveyed through a series of bulbs placed in a bath kept at the boiling-point of the most volatile constituent. The more volatile vapours pass over to the condensing plant, while the less volatile ones condense in the bulbs and are returned to the column at varying heights by means of connecting tubes. The French column is similar in action. The Coffey still is one of the most effective and is employed in the spirit, ammonia, coal-tar and other industries. It consists of a vertical column divided into a number of sections by horizontal plates, which are perforated so that the ascending vapours have to traverse a layer of liquid. Above this " separator " is a reflux Condenser, termed the " cooler," maintained at the correct temperature so that only the more volatile component passes to the receiver. The success of the operation chiefly depends upon the proper management of the cooler.

8. Commercial Distillation of Water. — Distilled water, i.e. water free from salts and to some extent of the dissolved gases which are always present in natural waters, is of indispensable value in many operations both of scientific and industrial chemistry. The apparatus and process for distilling ordinary water are very simple. The body of the still is made of copper, with a head and worm, or condensing apparatus, either of copper or tin. The still is usually fed continuously by the heated water from the condenser. The first portion of the distillate brings over the gase9 dissolved in the water, ammonia and other volatile impurities, and is consequently rejected ;

scarcely two-fifths of the entire quantity of water can be safely used as pure distilled water.

Apparatus for the economic production of a potable water from sea-water is of vital importance in the equipment of ships. The simple distillation of sea-water, and the production thereby of a certain proportion of chemically fresh water, is a very simple problem ; but it is found that water which is merely evaporated and recondensed has a very disagreeable flat taste, and it is only after long exposure to pure atmospheric air, with continued agitation, or repeated pouring from one vessel to another, that it becomes sufficiently aerated to lose its unpleasant taste and smell and become drinkable. The water, moreover, till it is saturated with gases, readily absorbs noxious vapours to which it may be exposed. For the successful preparation of potable water from sea-water, the following conditions are essential: — 1st, aeration of the distilled product so that it may be immediately available for drinking pur- poses; 2nd, economy of coal to obtain the maximum of water with the minimum expenditure of fuel; and 3rd, simplicity of working parts, to secure the apparatus from breaking down, and enable unskilled attendants to work it with safety. The problem is a com- paratively old one, for we find that R. Fitzgerald patented a process in 1683 having for its purpose the " sweetening of sea-water." A history of early attempts is given in S. Hales s Philosophical Ex- periments, published in 1739. Among the earlier of the modern forms of apparatus which came into practical adoption are the inventions of Dr Normandy and of Chaplin of Glasgow, the apparatus of Rocher of Nantes, and that patented by Galle and Mazeline of Havre. Normandy's apparatus, although economical and producing water of good quality, is very complex in its structure, consisting of very numerous v/orking parts, with elaborate arrangements of pipes, cocks and other fittings. It is consequently expensive and requires careful attention for its working. It was extensively adopted in the British navy, the Cunard line and many other important emigrant and mercantile lines. Chaplin's apparatus, which was invented and patented later, has also since 1865 been sanctioned for use on emigrant, troop and passenger vessels. The apparatus possesses the great merit of simplicity and compactness, in consequence of which it is comparatively cheap and not liable to derangement. It was adopted by many important British and continental shipping companies, among others by the Peninsular & Oriental, the Inman, the North German Lloyd and the Hamburg American companies.

The modern distilling plant consists of two main parts termed the evaporator and condenser; in addition there must be a boiler

(sometimes steam is run off the main boilers, but this practice has several disadvantages), pumps for circulating cold water in the condenser and for supplying salt water to the evaporator, and a filter through which the aerated water passes. The evaporator

consists of a cylindrical vessel having in its lower half a horizontal copper coil connected to the steam supply. The cylindrical vessel is filled to a certain level with salt water and the steam turned on. The water vaporizes and is led from the dome of the evaporator to the head of the condenser. The water level is maintained in the evaporator until it contains a certain amount of salt. It is then run off, and replaced by fresh sea-water. The condenser consists of a vertical cylinder having manifolds at the head and foot and through which a number of tubes pass. In some types, e.g. the Weir, the condensing water circulates upwards through the tubes; in others, e.g. the Quiggins, the water circulates around the tubes. Various forms of the tubes have been adopted. In the Pape-Henneberg condenser, which has been adopted in the German navy, they are oval in section and tend to become circular under the pressure of the steam ; this alteration in shape makes the tubes self-scaling. In the Quiggins condenser, which has been widely adopted, e.g. in the " Lusitania," the steam traverses vertical copper coils tinned inside and outside ; the coils are crescent-shaped, a form which gives a greater condensing surface and makes the coils self-scaling. The aeration of the water is effected by blowing air into the steam before it is condensed; as an auxiliary, the storage tanks have a false bottom perforated by fine holes so that if air be injected below it, the water is efficiently aerated by the air which traverses it in fine streams. After condensation the water is filtered through charcoal. The filter is either a separate piece of plant, or, as in the Quiggins form, it may be placed below the coils in the same outer vessel. In this plant the aeration is conducted by blowing in air at the base of the condenser. After filtration the water is pumped to the storage tanks. Many types of distilling plant are in use in addition to those mentioned above, for example the Rayner, Kirkaldy, Merlees, Normand ; the United States navy has adopted a form designed by the Bureau of Engineering.

Bibliography. — The general practice of laboratory distillation is .

discussed in all treatises on practical organic chemistry; reference may be made to Lassar-Cohn, Manual of Organic Chemistry (1896), and Arbeitsmethoden fur organisch-chemische Laboratorien (1901); Hans Meyer, Analyse und Konstilutionermittlung orgamscher Verbindungen (1909). The theory of distillation finds a place in all treatises on physical chemistry. Of especial importance is Sidney Young, Fractional Distillation (1903). The history of distillation is to be studied in E. Gildemeister and F. Hoffmann, Die atherischen Ole (Berlin, 1899; Eng. tr. by E. Kremers, Milwaukee Press, 1900). The technology of distillation is best studied in relation to the several industries in which it is employed; reference should be made to the articles Coal-Tar, Gas, Petroleum, Spirits, Nitric Acid, &c. (C. E.)*

DISTRACTION (from Lat. distrahere, to pull asunder), a draw- ing away or apart; a word now used generally of a state of mind, to mean a diversion of attention, or a violent emotion amounting almost to madness.

DISTRESS (from the O. Fr. deslrece, deslresse, from the past participle of the Lat. distringere, to pull apart, used in Late Lat. in the sense of to punish, hence to distrain), pressure, especially of sorrow, pain or ill-fortune. As a legal term, the action of distraining or distraint, the right which a landlord has of seizing the personal chattels of his tenant for non-payment of rent. Cattle damage feasant (doing damage or trespassing upon a neigh- bour's land) may also be distrained, i.e. may be detained until satisfaction be rendered for injury they have done. The cattle or other animals thus distrained are a mere pledge in the hands of the injured person, who has only power to retain them until the owner appear to make satisfaction for the mischief they have done. " Distress damage feasant " is also applicable to inanimate things on the land if doing damage thereto or to its produce; things in actual use, however, are exempt. Such distress must be made during the actual trespass, and by whoever is aggrieved by the damage. Distress for rent was also at one time regarded as a mere pledge or security; but the remedy, having been found to be speedy and efficacious, was rendered more perfect by enact- ments allowing the thing taken to be sold. Blackstone notes that the lawof distresses in this respect " has been greatly altered within a few years last past." The legislature, in fact, converted an ancient right of personal redress into a powerful remedy for the exclusive benefit of a single class of creditors, viz. landlords. Now that the relation of landlord and tenant in England has come to be regarded as purely a matter of contract, the language of the law-books seems to be singularly inappropriate. The defaulting tenant is a " wrong-doer," the landlord is the " injured party,"; any attempt to

defeat the landlord's remedy by carry- ing off distrainable goods is denounced as " fraudulent and knavish." The operation of the law has, as we shall point out,

been mitigated in some important respects, but it still remains an almost unique specimen of one-sided legislation.

At common law distress was said to be incident to rent service, and by particular reservation to rent charges; but by 4 Geo. it. c. 23 it was extended to rent seek, rents of assize and chief rents (see Rent). It is therefore a general remedy for rent certain in arrear. All personal chattels are distrainable with the following exceptions: — (1) things in which there can be no property, as animals ferae naturae; (2) ledgers, daybooks, title-deeds, &c; (3) things delivered to a person following a public trade, as a horse sent to be shod, &c; (4) things already in the custody of the law; (5) things which cannot be restored in as good a plight as when distrained, that is, perishable articles; (6) fixtures; (7) beasts of the plough and instruments of husbandry while there is other sufficient distress to be found; (8) instruments of a man's trade or profession in actual use at the time the distress is made. If not in actual use they are only privileged in case there is other sufficient distress upon the premises. These exceptions, it will be seen, imply that the thing distrained is to be held as a pledge merely — not to be sold. They also imply that in general any chattels found on the land in question are to be available for the benefit of the landlord, whether they belong to the tenant or not. This principle worked with peculiar harshness in the case of lodgers, whose goods might be seized and sold for the payment of the rent due by their landlord to his superior landlord. By the Lodgers' Goods Protection Act 187 1, however, where a lodger's goods have been seized by the superior landlord the lodger may serve him with a notice stating that the intermediate landlord has no interest in the property seized, but that it is the property or in the lawful possession of the lodger, and setting forth the amount of the rent due by the lodger to his immediate landlord. On pay- ment or tender of such rent the landlord cannot proceed with the distress against the goods in question. By the Law of Distress Amendment Act 1908 this protection was extended to under tenants liable to pay rent by equal quarterly instalments, as well as to any person whatsoever who is not a tenant of the premises or any part thereof nor has any beneficial interest therein. The act, however, excludes certain goods, particularly goods belonging to the husband or wife of the tenant whose rent is. in arrear, goods comprised in any bill of sale, hire purchase agreement or settle- ment made by the tenant, goods in the possession or disposition of a tenant by the consent and permission

of the true owner under such circumstances as to make the tenant reputed owner, goods of the partner of an immediate tenant, and goods (not being goods of a lodger) upon premises where any trade or business is carried on in which both the immediate tenant and the under tenant have an interest. The act does not apply where an under tenancy has been created in breach of a covenant or agreement between the landlord and his immediate tenant. The Law of Distress Amendment Act 1888 also absolutely exempted from distress the tools and implements of trade and wearing apparel and bedding of a tenant and his family to the value of five pounds, and the Law of Distress Amendment Act 1895 gave power to a court of summary jurisdiction to direct that such goods, when distrained upon, should be restored if not sold, or, if sold, to order their value to be paid by the persons who levied the distress or directed it to be levied. Originally the landlord could only seize things actually on the premises, so that the remedy might be defeated by the things being taken away. But by an act of 17 10 , and by the Distress for Rent Act 1737, he may follow things fraudulently 01 clandestinely removed off the premises within thirty days after their removal, unless they have been in the meantime bona fide sold for a valuable consideration. The sixth exception mentioned above was held to extend to sheaves of corn; but by an act of 1690 corn, when reaped, as well as hay, was made subject to distress. That act was modified by the Landlord and Tenant Act 1851, under which growing crops seized by the sheriff and sold under an execution are liable to distress for rent which becomes due after the seizure and sale, if there is no other sufficient distress on the premises.

Excessive or disproportionate distress exposes the distrainer to an action, and any irregularity formerly made the proceedings

void ab initio, so that the remedy was attended with considerable risk. The Distress for Rent Act 1737, before alluded to, in the interests of landlords, protected distresses for rent from the consequences of irregularity. In all cases of distress for rent, if the owner do not within five days (by the Law of Distress Amend- ment Act 1888, fifteen days, if the tenant make a request in writing to the person levying the distress and also give security for any additional cost that may be occasioned by such extension of time) replevy the same with sufficient security, the thing dis- trained may be sold towards satisfaction of the rent and charges, and the surplus, if any,

must be returned to the owner. To " replevy " is when the person distrained upon applies to the proper authority (the registrar of the county court) to have the thing returned to his own possession, on giving security to try the right of taking it in an action of replevin.

Duties and penalties imposed by act of parliament (e.g. pay- ment of rates and taxes) are sometimes enforced by distress.

DISTRIBUTION (Lat. distribuere, to deal out), a term used in various connexions with the general meaning of spreading out. In law, the word is used for the division of the personal estate of an intestate among the next-of-kin (see Intestacy). The important scientific question as to the distribution of plants and animals on the earth is treated under Plants: Distribution, and Zoological Distribution. In economics the word is used generally for the transference of commodities from person to person or from place to place, or the dividing up of large quantities of commodities into smaller quantities; and in a more technical sense, for the division of the product of industry amongst the various members or classes of the community. The theory of economic distribution, i.e. the causes which determine rent, wages, profits and interest, forms an important subject-matter in all text-books. Among recent works, see E. Cannan's History of Theories of Production and Distribution, 1776-1848 (1893), J. R. Common's Distribution of Wealth (1893), and H. J. Davenport's Value and Distribution (Chicago, 1908).

DISTRICT, a word denoting in its more general sense, a tract or extent of a country, town, &c, marked off for administrative or other purposes, or having some special and distinguishing characteristics. The medieval Latin districtus (from distringere, to distrain) is defined by Du Cange as Territorium feudi, seu tr actus, in quo Dominus vassallos et tenentes suos distringere potest; and as justiliae exercendae in eo traclu facultas. It was also used of the territory over which the feudal lord exercised his juris- diction generally. It may be noted that distringere had a wider significance than " to distrain " in the English legal sense (see Distress). It is defined by Du Cange as compellere ad aliquid faciendum per mulctam, poenam, vel capto pignore. In English usage, apart from its general application in such forms as postal district, registration district and the like, " district " has specific usages for ecclesiastical and local government purposes. It is thus applied to a division of a parish under the Church Building Acts, originally called a " perpetual curacy," and the church serving such a division is properly a " district chapel." Under the Local Government Act of 1894 counties are divided for the purposes of the act into urban stnd rural districts. In British India the

word is used to represent the zillah, an administrative subdivision of a province or presidency. In the United States of America the word has many administrative, judicial and other applications. In South Carolina it was used instead of " county " for the chief division of the state other than in the coast region. In the Virginias, Tennessee, Georgia, Kentucky and Maryland it answers to " township " or precinct, elsewhere the principal subdivision of a county. It is used for an electoral "division," each state be- ing divided into Congressional and senatorial districts; and also for a political subdivision ranking between an unorganized and an jrganized Territory — e.g., thj District of Columbia and Alaska.

DISTYLE (from Gr. &-, two, and

DITHMARSCHEN, or Ditmarsh (in the oldest form of the name Thiatmaresgaho, Dietmar's Gaul, a territory between the Eider, the Elbe and the North Sea, forming the western part of

the old duchy of Holstein, and now included in the Prussian province of Schleswig-Holstein. It contains about 550 sq. m. with 90,000 inhabitants. The territory consists to the extent of one half of good pasture land, which is preserved from inroads of the sea by banks and dams, the other half being mostly waste. It was originally colonized mainly from Friesland and Saxony. The district was subjugated and Christianized by Charlemagne in 804, and ranked as a separate Gau, included perhaps in the countship of Stade, or Comitatus utriusque ripae. From the same century, according to one opinion, or from the year n 82, when the countship was incorporated with their see, according to another, the archbishops of Bremen claimed supremacy over the land; but the inhabitants, who had developed and consolidated a systematic organism for self-government, made obstinate resistance, and rather attached themselves to the bishop of Schleswig. Ditmarsken, to use the Scandinavian form of the name, continued part of the Danish dominions till the disastrous battle of Bornhoved in 1227, when its former independence was regained. The claims of the archbishop of Bremen were now so far recognized that he exercised the royal rights of Heerbann and Blutbann, 1 enjoyed the consequent emoluments, and was repre- sented first by a single advocatus, or Vogt, and afterwards by one for each of the five Doffts, or marks, into which the land was divided after the establishment of Meldorf . The community was governed by a Landrath of forty-eight elective Consuls, or twelve from each of the four marks; and even in the 14th century the power of the episcopal advocati was so slight that a chronicler quoted by Conrad von Maurer says, De Ditmarschen leven*

sunder Heren und Hovedt unde dohn wadt se willen, " the Ditmarschen live without lord and head, and do what they will." In 1319 and in 1404 they succeeded in defeating the invasions of the Holstein nobles; and though in 1474 the land was nominally incorporated with the duchy by the emperor Frederick III., the attempt of the Danish king Hans and the duke of Gottorp to enforce the decree in 1 500 resulted only in their complete rout in the marshes of the Dussend-Duwels-Warf. During the early part of the century which began with such prestige for Ditmarsh, it was the scene of violent internal conflict in regard to the religious questions of the time; and, thus weakened, it was obliged in 1559 to submit to partition among its three conquerors — King Frederick II. of Denmark and Dukes John and Adolphus. A new division took place on Duke John's death in 1 581, by which Frederick obtained South Ditmarsh, with its chief town of Meldorf, and Adolphus obtained North Ditmarsh, with its chief town of Heide; and this arrangement continued till 1773, when all the Gottorp possessions were incorporate with the Danish crown.*

See Dahlmann's edition of Neocorus, Chronik von Dithmarschen (Kiel, 1827), and Geschichte Danemarks (1840-1844); Michelsen, Urkundenbuch zur Geschichte des Landes Dithmarschen (1834), Sammlung altdithmarscher Rechtsquellen (1842), and Dithmarschen tm Verhaltniss zum bremischen Erzstift; Kolster, Geschichte Dilh-marschens, nach F. R. Dahlmanns Vorlesungen (1873/.

DITHYRAMBIC POETRY, the description of poetry in which the character of the dithyramb is preserved. It remains quite uncertain what the derivation or even the primitive meaning of the Greek word btBvpaiifios is, although many conjectures have been attempted. It was, however, connected from earliest times with the choral worship of Dionysus. A dithyramb is defined by Grote as a round choric dance and song in honour of the wine-god. The earliest dithyrambic poetry was probably improvised by priests of Bacchus at solemn feasts, and expressed, in disordered numbers, the excitement and frenzy felt by the worshippers. This element of unrestrained and intoxicated vehemence is prominent in all poetry of this class. The dithy- ramb was traditionally first practised in Naxos; it spread to other islands, to Boeotia and finally to Athens. Arion is said to have introduced it at Corinth, and to have allied it to the worship of Pan. It was thus " merged," as Professor G. G. Murray says, " into the Satyr-choir of wild mountain-goats" outof which sprang the earliest form of tragedy. But when tragic drama had so fai developed as to be quite independent, the dithyramb did not, on

1 That is, the right of claiming military service, and the right of bringing capital offenders to justice.

that account, disappear. It flourished in Athens until after the age of Aristotle. So far as we can distinguish the form of the ancient Greek dithyramb, it must have been a kind of irregular wild poetry, not divided into strophes or constructed with any evolution of the theme, but imitative of the enthusiasm created by the use of wine, by what passed as the Dionysiac delirium. It was accompanied on some occasions by flutes, on others by the lyre, but we do not know enough to conjecture the reasons of the choice of instrument. Pindar, in whose hands the ode took such magnificent completeness, is said to have been trained in the elements of dithyrambic poetry by a certain Lasus of Hermione. Ion, having carried off the prize in a dithyrambic contest, distributed to every Athenian citizen a cup of Chian wine. In the opinion of antiquity, pure dithyrambic poetry reached its climax in a lost poem, The Cyclops, by Philoxenus of Cythera, a poet of the 4th century B.C. After this time, the composition of dithy- rambs, although not abandoned, rapidly declined in merit. It was essentially a Greek form, and was little cultivated, and always without success, by the Latins. The dithyramb had a spectacular character, combining verse with music. In modern literature, although the adjective " dithyrambic " is often used to describe an enthusiastic movement in lyric language, and particularly in the ode, pure dithyrambs have been extremely rare. There are, however, some very notable examples. The Baccho in Toscana of Francesco Redi (1626-1698), which was translated from the Italian, with admirable skill, by Leigh Hunt, is a piece of genuine dithyrambic poetry. Alexander's Feast (1698), by Dryden, is the best example in English. But perhaps more remarkable, and more genuinely dithyrambic than either, are the astonish- ing improvisations of Karl Mikael Bellman (1740-1795), whose Bacchic songs were collected in 1791 and form one of the most remarkable bodies of lyrical poetry in the literature of Sweden. (E. G.)

DITTERSBACH, a town of Germany, in the Prussian province of Silesia, 3 m. by rail S.E. from Waldenburg and 50 m. S.W. from Breslau. It has coal-mines, bleach-fields and match factories. Population (1905) 9371.

DITTERSDORF, KARL DITTERS VON (1 739-1 799), Austrian

composer and violinist, was born in Vienna on the 2nd of November 1 739, his father's name being Ditters. Having shown as a child marked talent for the violin, he was allowed to play in the orchestras of St Stephen's and the Schottenkirche, where he attracted the attention of a notable patron of music, Prince Joseph Frederick of Hildburghausen (1702-1787), who is also remembered as a soldier for his disastrous leading of the forces of the Empire at Rossbach. The prince gave th#boy, now eleven years old, a place in his private orchestra — the first of the kind established in Vienna, — and also saw to it that he received an excellent general education. The Seven Years' War proved disastrous to both music and morals; and young Ditters, who had fallen into evil ways, fled from Hildburghausen, whither he had gone with the prince, to avoid the payment of his gambling debts. His patron generously forgave and recalled him, but soon afterwards gave up his orchestra at Vienna. Ditters now obtained a place in the Vienna operaj but he was not satisfied, and in 1761 eagerly accepted an invitation to accompany Gluck, whose acquaintance, as well as that of Haydn, he had made while in the service of the prince, on a professional journey to Italy. His success as a violinist on this occasion was equal to that of Gluck as composer; and on his return to Vienna he was recognized as the superior of Antonio Lolli, who as virtuoso had hitherto held the palm. In 1764 he was again associated with Gluck in the musical part of the ceremonies at Frankfort, attending the coronation of the archduke Joseph as King of the Romans. His next appointment was that of conductor of the orchestra of the bishop of Grosswardein, a Hungarian magnate, at Pressburg. He set up a private stage in the episcopal palace, and wrote for it his first " opera buffa," Amore in musica. His first oratorio, Isacco figura del Redenlore, was also written during this time; but the scandal of performances of light opera by the bishop's company, even on fast days and during Advent, out- weighed this pious effort; the empress Maria Theresa sharply

called the worldly prelate to order ; and he, in a huff, dismissed his orchestra (1769). After a short interlude, Ditters was again in the service of an ecclesiastical patron, count von Schafgotsch, prince bishop of Breslau, at his estate of Johannesberg in Silesia. Here he displayed so much skill as a sportsman, that the bishop procured for him the office of forester (Forstmeister) of the principality of Neisse. He had already, by the same influence, been made knight of the Golden Spur (1770). At Johannesberg Ditters also produced a comic opera, II Viaggiatore americano, and an oratorio, Davide. The title rdle of the latter was taken by a pretty Italian singer, Signora Nicolini, whom Ditters married. In 1773 he was ennobled as Karl

von Dittersdorf, and at the same time was appointed administrator (Amtshauptmann) of Freyenwaldau, an office which he performed by deputy. In the same year his oratorio Ester was produced in Vienna. During the War of Bavarian Succession the prince bishop's orchestra was dissolved, and Dittersdorf employed himself in his office at Freyenwaldau ; but after the peace of Tetschen (1779) he again became conductor of the reconstituted orchestra. From this time forward his output was enormous. In 1780 ten months sufficed for the production of his Giobbe (Job) and four operas, three of which were successful ; and besides these he wrote a large number of " characterized symphonies," founded on the Metamorphoses of Ovid. He was now at the height of his fame, and spent the fortune which it brought him in much luxury. But after a time his patron fell on evil days, the famous orchestra had to be reduced, and when the bishop died in 1795 his successor dismissed the composer with a small money gift. Poor and broken in health, he accepted the asylum offered to him by Ignaz Freiherr von Stillfried, on his estate near Neuhaus in Bohemia, where he spent what strength was left him in a feverish effort to make money by the composition of operas, symphonies and pianoforte pieces. He died on the 1st of October 1799, praying " God's reward " for whoever should save his family from starvation. On his death-bed he dictated to his son his Lebensbeschreibung (autobiography) .

Dittersdorf 's chief talent was for comic opera and instrumental music in the sonata forms. In both of these branches his work still shows signs of life, and it is of great historical interest, since he was not only an excellent musician and a friend of Haydn but also a thoroughly popular writer, with a lively enough musical wit and sense of effect to embody in an amusing and fairly artistic form exactly what the best popular intelligence of the times saw in the new artistic developments of Haydn. Thus, while in the amiable monotony and diffuseness of Boccherini we may trace Haydn as a force tending to disintegrate the polyphonic suite- forms of instrumental music, in Dittersdorf on the other hand we see the popular conception of the modern sonata and dramatic style. Yet, with all his popularity, the reality of his progressive outlook may be gauged from the fact that, though he was at least as famous a violinist as Boccherini was a violoncellist, there is in his string quartets no trace of that tendency to sacrifice the ensemble to an exhibition of his own playing which in Boccherini's chamber music puts the violoncello into the same position as the first violin in the chamber music of Spohr. In Dittersdorf 's quartets (at least six of which are worthy of their survival at the present day) the first violin

leads indeed, but not more than is inevitable in such unsophisticated music where the normal place for melody is at the top. The appearance of greater vitality in the texture of Boccherini's quintets is produced merely by the fact that, his special instrument being the violoncello, his displays of brilliance inevitably occur in the inner parts. Six of Dittersdorf's symphonies on the Metamorphoses of Ovid were republished in 1899, the centenary of his death. In them we have an amusing and sometimes charming illustration of the way in which at transitional periods music, as at the present day, is ready to make crutches of literature. The end of the representation of the conversion of the Lycian peasants into frogs is prophetically and ridiculously Wagnerian in its ingenious expansion of rhythm and eminently expert orchestration. Every external feature of Dittersdorf's style seems admirably apt for success in German comic opera on a small scale ; and an occasional experimental

performance at the present day of his Doktor und Apotheker is not less his due than the survival of his best quartets.

See his Lebensbeschreibung, published at Leipzig, 1 801 (English translation by A. D. Coleridge, 1896); an article in the Rivista musicale, vi. 727; and the article " Dittersdorf " in Grove's Dictionary of Music and Musicians.

DITTO (from the Lat. dictum, something said, Ital. detto, aforesaid) , that which has been said before, the same thing. The word is frequently abbreviated into " do." In accounts, " ditto " is indicated by two dots or a dash under the word or figure that would otherwise be repeated. A " suit of dittos," a trade or slang phrase, is a suit in which coat, trousers and waistcoat are all of the same material.

DITTON, HUMPHRY (1675-1715), English mathematician, was born at Salisbury on the 29th of May 1675. He studied theology, and was for some years a dissenting minister at Tonbridge, but on the death of his father he devoted himself to the congenial study of mathematics. Through the influence of Sir Isaac Newton he was elected mathematical master in Christ's hospital. He was author of the following memoirs and treatises: — " Of the Tangents of Curves, &c," Phil. Trans, vol. xxiii.; " A Treatise on Spherical Catoptrics," published in the Phil. Trans, vol. xxiv., from which it was copied and reprinted in the Acta Eruditorum (1707), and also in the Memoirs of

the Academy of Sciences at Paris; General Laws of Nature and Motion (1 705) , a work which is commended by Wolfius as illustrating and rendering easy the writings of Galileo and Huygens, and the Principia of Newton; An Institution of Fluxions, containing the First Principles, Operations, and Applications of that admirable Method, as invented by Sir Isaac Newton (1706). In 1709 he published the Synopsis Algebraica of John Alexander, with many additions and corrections. In his Treatise on Perspective (1712) he explained the mathematical principles of that art; and anticipated the method afterwards elaborated by Brook Taylor. In 17 14 Ditton published his Discourse on the Resurrection of Jesus Christ; and The New Law of Fluids, or a Discourse concern- ing the Ascent of Liquids in exact Geometrical Figures, between two nearly contiguous Surfaces. To this was annexed a tract (' ' Matter not a Cogitative Substance ") to demonstrate the impossibility of thinking or perception being the result of any combination of the parts of matter and motion. There was also added an advertise- ment from him and William Whiston concerning a method for discovering the longitude, which it seems they had published about half a year before. Although the method had been ap- | proved by Sir Isaac Newton before being presented to the Board of Longitude, and successfully practised in finding the longitude between Paris and Vienna, the board determined against it. This disappointment, aggravated as it was by certain lines written by Dean Swift, affected Ditton's health to such a degree that he died in the following year, on the 15th of October 1715.

DIU, an island and town of India, belonging to Portugal, and situated at the southern extremity of the peninsula of Kathiawar. Area of district, 20 sq. m. Pop. (1900) 14,614. The anchorage is fairly protected from the sea, but the depth of water is only 3 to 4 fathoms. The channel between the island on Diu and the main- land is navigable only by fishing boats and small craft. The town is well fortified on the old system, being surrounded by a wall with towers at regular intervals. Many of the inhabitants are the well-known Banyan merchants of the east coast of Africa and Arabia. Native spirits are distilled from the palm, salt is made and fish caught; The trade of the town, however, is decayed. There are remains of several fine ancient buildings. The cathedral or Se Matriz, dating from 1601, was formerly a Jesuit college. The mint, the arsenal and several convents (now ruined or converted to other uses) are also noteworthy. The Portuguese, under treaty with Bahadur Shah of Gujarat, built a fort here in 1535, but soon quarrelled with the natives and were besieged in 1538 and 1545. The second siege is one of the most famous in Indo-Portuguese history, and is the subject of

an epic by Jeronymo Corte Real (g.v.).

See R. S. Whiteway, Rise of the Portuguese Power in India (1898).

DIURETICS (from Gr. Std, through, and obpiiv, pass urine),

the name given to remedies which, under certain conditions, stimulate an increased flow of urine. Their mode of action is various. Some are absorbed into the blood, carried to the secretory organs (the kidneys), and stimulate them directly, causing an increased flow of blood; others act as stimulants through the nervous system. A second class act in congested conditions of the kidneys by diminishing the congestion. Another class, such as the saline diuretics, are effectual by virtue of their osmotic action. A fourth class are diuretic by increasing the blood pressure within the vessels in general, and the Malpighian tufts in particular, — some, as digitalis, by increasing the strength of the heart's contractions, and others, as water, by increasing the amount of fluid circulating in the vessels. Some remedies, as mercury, although not diuretic themselves, when prescribed along with those which have this action, increase their effect. The same remedy may act in more than one way, e.g. alcohol, besides stimulating the secretory organs directly, is a stimulant to the circulation, and thus increases the pressure within the vessels. Diuretics are prescribed when the quantity of urine is much diminished, or when, although the quantity may be normal, it is wished to relieve some other organ or set of organs of part of their ordinary work, or to aid in carrying off some morbid product circulating in the blood, or to hasten the removal of inflammatory serous exudations, or of dropsical collections of fluid. Caffeine, which is far the best true .diuretic, acts in nearly every way mentioned above. Together with digitalis it is the most efficient remedy for cardiac dropsy. A famous diuretic pill, known as Guy's pill, consists of a grain each of mercurial pill, digitalis leaves and squill, made up with extract of henbane. Digitalis, producing its diuretic effect by its combined action on heart, vessels and kidneys, is much used in the oedema of mitral disease, but must be avoided in chronic Bright's disease, as it increases the tension of the pulse, already often dangerously high. Turpentine and cantharides are not now recommended as diuretics, as they are too irritating to the kidneys.

DIURNAL MOTION, the relative motion of the earth and the heavens, which results f rom the rotation of our globe on its axis in a direction from west toward east. The actual motion consists in this rotation. But the term is commonly applied to the resultant apparent

revolution of the heavens from east to west, the axis of which passes through the celestial poles, and is coincident in direction with the axis of the earth.

DIVAN (Arabic dlwan), a Persian word, derived probably from Aramaic, meaning a " counting-house, office, bureau, tribunal "; thence, on one side, the " account-books and registers " of such an office, and, on another, the " room where the office or tribunal sits "; thence, again, from " account-book, register," a " book containing the poems of an author," arranged in a definite order (alphabetical according to the rhyme- words), perhaps because of the saying, " Poetry is the register (dlwan) of the Arabs," and from " bureau, tribunal," " a long seat, formed of a mattress laid against the side of the room, upon the floor or upon a raised structure or frame, with cushions to lean against " (Lane, Lexicon, 930 f .) . All these meanings existed and exist, especially " bureau, tribunal," "book of poems" and "seat" 1 ; but the order of derivation may have been slightly different. The word first appears under the caliphate of Omar (a.d. 634-644). Great wealth, gained from the Moslem conquests, was pouring into Medina, and a system of business management and administration became necessary. This was copied from the Persians and given the Persian name, " divan." Later, as the state became more complicated, the term was extended over all the government bureaus. The divan of the Sublime Porte was for long the council of the empire, presided over by the grand vizier.

See Von Kremer, Culturgeschichte des Orients, i. 64, 198.

(D. B. Ma.)

1 The divan in this sense has been known in Europe certainly since about the middle of the 18th century. It was fashionable, roughly speaking, from 1820 to 1850, wherever the romantic movement in literature penetrated. All the boudoirs of that generation were garnished with divans; they even spread to coffee-houses, which were sometimes known as ' divans " or " Turkish divans "'; and a " cigar divan " remains a familiar expression.

DIVER, a name that when applied to a bird is commonly used in a sense even more vague than that of loom, several of the sea ducks or Fuligulinae and mergansers being frequently so called, to say nothing

of certain of the auks or Alcidae and grebes; but in English ornithological works the term diver is generally restricted to the Family known as Colymbidae, a very well-marked group of aquatic birds, possessing great, though not exceptional, powers of submergence, and consisting of a single genus Colymbus which is composed of three, or at most four, species, all confined to the northern hemisphere. This Family belongs to the Cecomorphae of T. H. Huxley, and is usually supposed to occupy a place between the Alcidae and Podicipedidae; but to which of these groups it is most closely related is undecided. Professor Brandtin 1837 (Beitr. Naturgesch. Vogel, pp. 124-132) pointedout the osteologies! differences of the grebes and the divers, urging the affinity of the latter to the auks; while, thirty years later, Professor Alph. Milne-Edwards (Ois.foss. France, i. pp. 279-283) inclined to the opposite view, chiefly relying on the similarity of a peculiar formation of the tibia in the grebes and divers, 1 which indeed is very remarkable, and, in the latter group, attracted the attention of Willughby more than 230 years ago. On the other hand Professor Brandt, and Rudolph Wagner shortly after (Naumann's Vogel DetUschlands, ix. p. 683, xii. p. 395), had already shown that the structure of the knee-joint in the grebes and divers differs in that the former have a distinct and singularly formed patella (which is undeveloped in the latter) in addition to the prolonged, pyramidally formed, procnemial process — which last may, from its exaggeration, be regarded as a character almost peculiar to these two groups. 2 The evidence furnished by oology and the newly-hatched young seems to favour Brandt's views. The abortion of the rectrices in the gerbes, while these feathers are fairly developed in the divers, is another point that helps to separate the two Families.

The commonest species of Colymbus is C. septentrionalis, known as the red-throated diver from an elongated patch of dark bay which distinguishes the throat of the adult in summer dress. Immature birds want the bay patch, and have the back so much more spotted that they are commonly known as " speckled divers." Next in size is the black-throated diver, C. arcticus, having a light grey head and a gular patch of purplish-black, above which is a semicollar of white striped vertically with black. Still bigger is the great northern diver, C. glacialis or torquatus, with a glossy black head and neck, two semicollars of white and black vertical stripes, and nearly the whole of the black back arid upper surface of the wings beautifully marked with white spots, varying in size and arranged in belts. 3 Closely resembling this bird, so as to be most easily distinguished from it by its yellow bill, is C. adamsi. The divers live chiefly on fish, and are of

eminently marine habit, though invariably resorting for the purpose of breeding to freshwater lakes, where they lay two dark brown eggs on the very brink; but they are not unfrequently found far from the sea, being either driven inland by stress of weather, or exhausted in their migrations. Like most birds of their build, they chiefly trust to swimming, whether submerged or on the surface, as a means of progress, but once on the wing their flight is strong and they can mount to a great height. In winter their range is too extensive and varied to be here defined, though it is believed never to pass, and in few directions to approach, the northern tropic; but the geographical distribution of the several forms in summer requires mention. While C. septentrionalis inhabits the north temperate zone of both hemispheres, C. arcticus breeds in suitable places from the Hebrides to Scan-

1 The remains of Colymboides minutus, from the Miocene of Langy, described by this naturalist in the work just cited, seem to show it to have been a generalized form. Unfortunately its tibia is unknown.

2 A. H. Garrod, in his tentative and chiefly myological arrange- ment of Birds (Proc Zool. Society, 1874, P- 117), placed the Colym- bidae and Podicipedidae in one order (Anseriformes) and the Alcidae in another (Ckaradriiformes) ; but the artificial nature of this assignment may be realized by the fact of his considering the other Families of the former order to be Anatidae and Spheniscidce.

s The osteology and myology of this species are described by Dr Coues {Mem. Boston Soc. Nat. History, i. pp. 131-172, pi. 5).

dinavia, and across the Russian empire, it would seem, to Japan, reappearing in the north-west of North America, 4 though its eastern limit on that continent cannot be definitely laid down; but it is not found in Greenland, Iceland, Shetland or Orkney. C. glacialis, on the contrary, breeds throughout the north- eastern part of Canada, in Greenland and in Iceland. It has been said to do so in Scotland as well as in Norway, but the assertion seems to lack positive proof, and it may be doubted whether, with the exception of Iceland, it is indigenous to the Old World, 6 since the form observed in North-eastern Asia is evidently that which has been called C. adamsi, and is also found in North-western America; but it may be remarked that one example of this form has been taken in England (Proc. Zool. Society, 1859, p. 206) and at least one in Norway (Nyt Mag. for Naturvidenskaberne, 1877, p. 134). (A. N.)

DIVERS and DIVING APPARATUS. To " dive " (Old Eng. dtifan,

dyfan; cf. " dip ") is to plunge under water, and in the ordinary procedure of swimmers is distinguished from simple plunging in that it involves remaining under the water for an interval of more or less duration before coming to the surface. In the article Swimming the sport of diving in this sense is considered. Here we are only concerned with diving as the function of a " diver," whose business it is to go under water (in modern times, assisted by specially devised apparatus) in order to work.

Unassisted or Natural Diving. — The earliest reference to the practice of the art of diving for a purpose of utility occurs in the Iliad, 16, 745-750, where Patroclus compares the fall of Hector's charioteer to the action of a diver diving for oysters. Thus it would seem that the art was known about 1000 years before the Christian era. Thucydides is the first to mention the employ- ment of divers for mechanical work under water. He relates that divers were employed during the siege of Syracuse to saw down the barriers which had been constructed below the surface of the water with the object of obstructing and damaging any Grecian war vessels which might attempt to enter the harbour. At the siege of Tyre, divers were ordered by Alexander the Great to impede or destroy the submarine defences of the besieged as they were erected. The purpose of these obstructions was analogous to that of the submarine mine of to-day.

The employment of divers for the salvage of sunken property is first mentioned by Livy, who records that in the reign of Perseus considerable treasure was recovered from the sea. By a law of the Rhodians, their divers were allowed a proportion of the value recovered, varying with the risk incurred, or the depth from which the treasure was salved. For instance, if the diver raised it from a depth of eight cubits (12 ft.) he received one-third for himself; if from sixteen cubits (24 ft.) one half; but upon goods lost near the shore, and recovered from a depth of two cubits (36 in.), his share was only one tenth.

These are examples of unassisted diving as practised by the Ancients. Their primitive method, however, is still in vogue in some parts of the world — notably in the Ceylon pearl fisheries and in the Mediterranean sponge fisheries, and it may, therefore, be as well to mention the system adopted by the natural, or naked, diver of to-day.

The volume and power of respiration of the lungs vary in different individuals, some persons being able to hold their breath longer than others, so that it naturally follows that one man may be able to stay

longer under water than another. The longest time that a natural diver has been known to remain beneath the surface is about two minutes. Some pearl and sponge divers rub

4 Lawrence's C. pacificus seems hardly to deserve specific recognition.

6 In this connexion should be mentioned the remarkable occurrence in Europe of two birds of this species which had been previously wounded by a weapon presumably of transatlantic origin. One had " an arrow headed with copper sticking through its neck," and was shot on the Irish coast, as recorded by J. Vaughan Thompson (Nat. Hist. Ireland, iii. p. 201); the other, says Herr H. C. Miiller (Vid. Medd. nat. Forening, 1862, p. 35), was found dead. in Kal-baksfjord in the Faeroes with an iron-tipped bone dart fast under its wing.

their bodies with oil, and put wool, saturated with oil, in their ears. Others hold in their mouth a piece of sponge soaked in oil, which they renew every time they descend. It is doubtful, however, whether these expedients are beneficial. The men who dive in this primitive fashion take with them a flat stone with a hole in the centre; to this is attached a rope, which is secured to the diving boat and serves to guide them to particular spots below. When the diver reaches the sea bottom he tears off as much sponge within reach as possible, or picks up pearl shells, as the case may be, and then pulls the rope to indicate to the man in the boat that he wishes to be hauled up. But so exhausting is the work, and so severe the strain on the system, that, after a number of dives in deep water, the men often become insensible, and blood some- time bursts from nose, ears and mouth.

Early Diving Appliances. — The earliest mention of any appliance for assisting divers is by Aristotle, who says that divers are sometimes provided with instruments for respiration through which they can draw air from above the water and which thus enable them to remain a long time under the sea (De Part. Anim. 2, 16), and also that divers breathe by letting down a metallic vessel which does not get filled with water but retains the air within it {Problem. 32, 5). It is also recorded that Alexander the Great made a descent into the sea in a machine called a colimpha, which had the power of keeping a man dry, and at the same time of admitting light. Pliny also speaks

of divers engaged in the strategy of ancient warfare, who drew air through a tube, one end of which they carried in their mouths, whilst the other end was made to float on the surface of the water. Roger Bacon in 1 240, too, is supposed to have invented a contrivance for enabling men to work under water; and in Vegetius's De Re Militari (editions of 1511 and 1532, the latter in the British Museum) is an engraving representing a diver wearing a tight-fitting helmet to which is attached a long leathern pipe leading to the surface, where its open end is kept afloat by means of a bladder. This method of obtaining air during subaqueous operations was probably suggested by the action of the elephant when swim- ming; the animal instinctively elevates its trunk so that the end is above the surface of the water, and thus is enabled to take in fresh air at every inspiration.

A certain Repton invented " water armour " in the year 1617, but when tried it was found to be useless. G. A. Borelli in the year 1679 invented an apparatus which enabled persons to go to a certain depth under water, and he is credited with being the first to introduce means of forcing air down to the diver. For this purpose he used a large pair of bellows. John Lethbridge, a Devonshire man, in the year 1 71 s contrived" a watertight leather case for enclosing the person." This leatheV case held about half a hogshead of air, and was so adapted as to give free play to arms and legs, so that the wearer could walk on the sea bottom, examine a sunken vessel and salve her cargo, returning to the surface when his supply of air was getting exhausted. It is said that Lethbridge made a considerable fortune by his invention. The next contrivance worthy of mention, and most nearly resembling the modern diving-dress, was an apparatus invented by Kleingert, of Breslau, in 1 798. This consisted of an egg-ended metallic cylinder enveloping the head and the body to the hips. The diver was encased first of all in a leather jacket having tight-fitting arms, and in leather drawers with tight-fitting legs. To these the cylinder was fastened in such a way as to render the whole equipment airtight. The air supply was drawn through a pipe which was connected with the mouth of the diver by an ivory mouthpiece, the surface end being held above water after the manner mentioned in Vegetius, viz. by means of a floating bladder attached to it. The foul air escaped through another pipe held in a similar manner above the surface of the water, inhalation being performed by the mouth and exhalation by the nose, the act of inhalation causing the chest to expand and so to expel the vitiated air through the escape pipe. The diver was weighted when going under water, and when he wished to ascend he released one of his weights, and attached it to a rope which he held, and it was afterwards hauled up.

Modern Apparatus. — This, or equally cumbersome apparatus,

was the only diving gear in use up till 1819, in which year Augustus Siebe (the founder of the firm of Siebe, Gorman & Co.), invented his " open " dress, worked in conjunction with an air force pump. This dress consisted of a metal helmet and shoulder- plate attached to a watertight jacket, under which, fitting more closely to the body, were worn trousers, or rather a combination suit reaching to the armpits. The helmet was fitted with an air inlet valve, to which one end of a flexible tube was attached, the other end being connected at the surface with a pump which supplied the diver with a constant stream of fresh air. The air, which kept the water well down, forced its way between the jacket and the under-garment, and escaped to the surface on exactly the same principle as that of the diving bell; hence the term " open " as applied to this dress.

Although most excellent work was accomplished with this dress — work which could not be attempted before its introduction — it was still far from perfect. It was absolutely necessary for the diver to maintain an upright, or but very slightly stooping, position whilst under water; if he stumbled and fell, the water filled his dress, and, unless quickly brought to the surface, he was in danger of being drowned. To overcome this and other defects, Siebe carried out a large number of experiments extending over several years, which culminated, in the year 1830, in the intro- duction of his " close " dress in combination with a helmet fitted with air inlet and regulating outlet valves.

Though, of course, vast improvements have been introduced since Siebe's death, in 1872, the fact remains that his principle is in universal use to this day. The submarine work which it has been instrumental in accomplishing is incalculable. But some idea of the importance of the invention may be gathered from the fact that diving apparatus on Siebe's principle is universally used to-day in harbour, dock, pier and breakwater construction, in the pearl and sponge fisheries, in recovering sunken ships, cargo and treasure, and that every ship in the British navy and in most foreign navies carries one set or more of diving apparatus.

A modern set of diving apparatus Consists essentially of six parts: — (i) an air pump, (2) a helmet with breastplate, (3) a diving dress, (4) a pair of heavily weighted boots, (5) a pair of back and chest weights, (6) a flexible non-col- lapsible air tube.

Air Pumps. — The type of air pump varies with the depth of water to

which the diver has to descend; it will be readily un- derstood that the greater the depth the greater the quantity of air required by the diver. The pat- tern most gener- ally in favour amongst divers of all classes is a three – cylinder singl e-ac t i ng

pump, which is Fig. 1— Pump out of chest,

suitable for almost Two-cylinder, Double-action Air Pump for Two every description Divers

° f . w p f Zˆf ˆt A, Air-distributing ar- D, ‘ cX/ upon “to W-ent.fi one I.

dˆep ˆ Ihalloˆ B, Water jacket

*water. Another C ‘ Su , ctlon * nd*

most useful type charge valves.

is a two-cylinder double-acting pump (figs. 1 and 2), which is

designed to supply two divers working simultaneously in moderate

depths of water, or one diver only in deep water. An air-distributing

arrangement is fitted, whereby, when it is desired to send two men

diver or two divers. F, and dis-

Cylinders. Pressure gauges. Nozzles to which

divers’ air pipes

are attached.

down together, each cylinder supplies air independently of the other ; and when it is required to send one diver into deep water, the two cylinders are connected and the full volume of air from both is delivered to the one man. The same duty is also performed by a four-cylinder single-acting pump. Smaller pumps, having one double-acting or two single-acting cylinders, are also used for shallow water work.

In most cases these air pumps are worked by manual power; this method of working is rendered necessary by the_ fact that the machines are usually placed in small boats from which the divers work and on which other motive power is not available. In cases, however, where steam or electric power is available the pumps are sometimes worked by their means — more particularly on harbour and dock works. In such instances the air is not delivered direct from the pump to the diver, but is delivered into an intermediate steel receiver to which the diver's air pipe is connected, the object

-8 t

. t

f

olio

■ *IIIJJˆIU**

6

i-

J l U S~

Fig. 2. — Pump in chest, ready for work.

being to ensure a reserve supply of air in case of a breakdown of the pump. Some of these combinations of pumps and motors are so arranged that, in the event of an accident to the motor, the pump can be thrown out of gear with it, and be immediately worked by hand power. Each pump is fitted with a gauge (or gauges), indi- cating not only the pressure of air which the pump is supplying, but also the depth of water at which the diver is working. The cylinders are water- jacketed to ensure the air delivered to the diver being cool, the water being drawn in and circulated round the cylinders by means of a small metal pump worked from an eccentric on the main crank-shaft. Filters are sometimes attached to the suction and delivery sides of the pumps to ensure the inlet of air being free from dirt, and the discharge of air free from dirt and oil.

Helmet. — The helmet and breastplate (fig. 3) are made from highly planished tinned copper, with gun-metal valves and other fittings. The helmet is provided with a non-return air inlet valve to which the diver's air pipe is connected; the air when it lifts the inlet valve

passes through three conduits — one having its outlet over the front glass, the others their outlets over the side glasses. In this way the diver gets the air fresh as it enters the helmet, and at the same time it prevents condensation of his breath on the glasses and keeps them clear. There is a regulating air outlet valve by which the diver adj usts his supply of air according to his requirements in different depths of water; the valve is usually made to be adjusted by hand, but sometimes it is so constructed as to be operated by the diver knocking his head against it, the spindle being extended through to the inside of the helmet and fitted at its inner extremity with a button or disk. By unscrewing the valve, the diver allows air to escape, and thus the dress is deflated; by screwing it up the air is retained and the dress inflated. Thus the diver can control his specific gravity and rise or sink at will. In case by any chance the diver should inflate the dress inadvertently, and wish to get rid of the superfluous air quickly, he can do so by opening an emergency cock, which is fitted on the helmet. Plate glasses in gun-metal frames are also fitted to the helmet, two, one on each side, being permanently fixed, while one in front is made either to screw in and out, or to work on a hinged joint like a ship's scuttle; the side glasses are usually protected by metal cross-bars, as is also sometimes the front glass. Some divers prefer unprotected glasses at the side of the helmet, instead of protected oval ones.

The breastplate is fitted on its outer edge with metal screws and bands. The disposition of the screws corresponds with that of the holes in the india-rubber collar of the diving dress described below. There are other methods of making a watertight joint between the diver's breastplate and the diving dress, but, as these are only mechanical differences, it will suffice to describe the Siebe-Gorman apparatus, as exclusively adopted by the British government.

Whatever the shape or design of the helmet or dress, Siebe's principle is the one in universal use to-day.

The metal tabs are for carrying the diver's lead weights, which are fitted with suitable clips ; the hooks — one on each side of the helmet — are for keeping the ropes attached to the back weight in position. The helmet and breastplate are fitted at their lower and upper parts respectively with gun-metal segmental neck rings, which make it possible to connect these two main parts together by one-eighth of a turn, a catch at the back of the helmet preventing any chance of unscrewing. The small eyes at the top of the helmet are for securing the diver's air pipe and life line in position and preventing them from swaying.

Front view of Helmet.

A, Helmet.

B, Breastplate.

F, Emergency cock.

G, Glasses in frames.

H, Metal screws and bands. I, Metal tabs.

Hooks for keeping weight

ropes in position. Eyes to which air pipe and life line are secured.

Side sectional view of Helmet. K, Segmental neck rings. D, Air conduits. M, Telephone receiver. N, Transmitter. O, Contact piece to ring bell.

J.

Back view of Helmet.

C, E, G,

L,

P,

Plan of Helmet. Air inlet valve. Regulating outlet valve. Glasses in frames. Eyes to which air pipe and

life line are secured. Connexion for telephone

cable.

Fig.

The Diving Dress is a combination suit which envelops the whole body from feet to neck. It is made of two layers of tanned twill with pure rubber between, and is fitted at the neck with a vulcanized india-rubber collar, or band, with holes punched in it corresponding to the screws in the breastplate. This collar, when clamped tightly between the bands and the breastplate by means of the nuts, ensures a watertight joint. The sleeves of the dress are fitted with vulcanized india-rubber_ cuffs, which,, fitting tightly round the diver's wrists,

prevent the ingress of water at these parts also.

Boots. — These are generally made with leather uppers, beechwood inner soles and leaden outer soles, the latter being secured to the others by copper rivets. Heavy leather straps with brass buckles secure the boot to the foot. Each boot weighs about 16 lb. Sometimes the main part of the boot-golosh, toe and heel, are in one brass casting, with leather upper part, heavy straps and brass buckles.

Lead Weights. — These weigh 40 lb each, and the diver wears one on his back, another on his chest. These weights and the heavy boots ensure the diver's equilibrium when under water.

Belt and Knife and Small Tools.— Every diver wears a heavy waist-belt in which he carries a strong knife in metal case, and some- times other small tools.

Air Pipe. — The diver's air pipe is of a flexible, non-collapsible description, being made of alternate layers of strong canvas arid vulcanized india-rubber, with steel or hard drawn metal wire em-bedded. At the ends are fitted gun-metal couplings, for connecting the pipe with the diver's pump and helmet.

Signal line. — The diver's signal line (sometimes called life line) consists of a length of reverse laid Manila rope. In cases where the telephone apparatus is not used, the diver gives his.signals by means of a series of pulls on the signal line in accordance with a prearranged code.

Telephonic Apparatus. — Without doubt one of the most useful adjuncts to the modern diving apparatus is the loud-sounding telephone (fig. 4), introduced by Siebe, Gorman & Co., which enables the diver to communicate viva voce with his attendant, and vice versa. In the British navy the type of submarine telephonic apparatus used is the Graham-Davis system. This is made on two plans, (1) a single set of instruments, for communication between one diver and his attendant direct, (2) an intercommunication set which is used where two divers are employed. With this type the attendant can speak to No. 1 or No. 2 diver separately, or with both at the same time, and vice versa ; and No. 1 can be put in communi- cation with No. 2 whilst they are under water, the attendant at the surface being able to hear what the men are saying. The advantages of such a

system are obvious. It is more particularly useful where two divers are working one either side of a ship, or where the divers may be engaged upon the same piece of work, but out of sight of one another, or out of touch. It would prove its utility in a marked degree in cases where a diver got into difficulties; a second diver sent down to his assistance could receive and give verbal directions and thus greatly expedite the work of rescue.

The telephone instruments in the helmet consist of one or more loud-sounding receivers placed either in the crown of the helmet, or one on each side in close proximity to the diver's ears. A trans- mitter of a special watertight pattern is placed between the front glass and one of the side glasses, and a contact piece, which, when the diver presses his chin against it, rings a bell at the surface, is fitted immediately below the front glass. A buzzer is sometimes fixed in the helmet to call the diver's attention when the attendant wishes to speak, but as a rule the voice is transmitted so loudly that this device is unnecessary. A connexion, through which the insulated wires connecting the instruments pass, terminates in contact pieces,

and the telephone cable, embedded in the diver's signal line, is connected with it. The other end of the signal line is connected to a battery box at the surface. This box contains, besides the cells, a receiver and transmitter for the attendant, an electric bell, a ter-minal box, and a special switch, by means of which vari- ous communications q between diver, or divers, and attend- ant are made. If, as is sometimes the case, the diver hap- pens to be somewhat deaf, he can, whilst he is taking a mes- sage, stop the vibra- tion of the outlet valve and the noise made by the escaping air, by merely pressing his finger on a spindle which passes through the disk of the valve, and thus momentarily ensure absolute silence.

Speaking Tube. — The rubber speaking tube which was the fore-runner of the telephonic apparatus is now practically obsolete, though it is still used in isolated cases.

Submarine Electric Lamps. — Various forms of submarine lamps are used, from a powerful arc light to a self-contained hand lamp, the former giving about 2000 or 3000 candle-power, and requiring a steam-driven dynamo to supply the necessary current, the latter (fig. 5) giving a light of about 10 candle-power and having its own batteries, so that the diver carries both the light and its source in his hand. These submarine lamps are all constructed on the same principle, having the incandescent lamps, or carbons as the case may be, enclosed in a strong glass globe, the mechanism and con- nexions

being fitted in a metal case above the globe, which is flanged and secured watertightly to the case.

Self-contained Diving Dress. — The object of the self-contained diving dress is to make the diver independent of air supply from the surface. The dress, helmet, boots and weights are of the ordinary pattern already described, but instead of obtaining his air supply by means of pumps and pipes, the diver is equipped with a knapsack consisting of a steel cylinder containing oxygen compressed to a pressure of 120 atmospheres (= about 1800 ft)) to the square inch, and chambers containing caustic soda or caustic potash. The helmet is connected to the chambers by tubes, and the oxygen

Fig. 4. — Diver's Telephone Communication

with the Surface. Q, Battery, with switch and bell in case. R, Attendant's receiver and transmitter.

cylinder is similarly connected to the chambers. The breath exhaled by the diver passes through a valve into the caustic soda, which absorbs the carbonic acid, and it is then again inhaled through another valve. This process of regeneration goes on automatically, the requisite amount of oxygen being restored to the breathed air in its passage through the chambers. This type of apparatus has been used for shallow water work, but the great majority of divers prefer the apparatus using pumps as the source of the air supply.

An emergency dress, using this self-contained system for breathing, has been designed by Messrs Fleuss and Davis, of the firm of Siebe, Gorman & Co., primarily as a life-saving apparatus, for enabling men to escape from disabled submarine boats.

The helmet diver is indispensable in connexion with harbour and dock construction, bridge-building, pearl and sponge fishing, wreck

Fig. 5. — Submarine Electric Lamp, with and without Reflector.

A, Metal case containing C, Stand, which also pro-

electrical fittings. tects the globe.

B, Glass globe and incan- D, Ring for suspending lamp.

descent lamp. E, Reflector.

raising and the recovery of sunken cargo and treasure. Every ship in

the British navy carries one set or more of diving apparatus, for use in case of emergency, for clearing fouled propellers, cleaning valves or ship's hull below the water line, repairing hulls if necessary, and recovering lost anchors, chains, torpedoes, &c.

Greatest Depths attained. — The greatest depth at which useful work has been performed by a diver is 182 ft. From this depth a Spanish diver, Angel Erostarbe, recovered £9000 in silver bars from the wreck of the steamer " Skyro," sunk off Cape Finisterre; Alexander Lambert succeeded in salving £70,000 from the Spanish mail steamer " Alphonso XII," sunk in 162 ft. of water off Las Palmas, Grand Canary; W. Ridyard recovered £50,000 in silver dollars from the " Hamilton Mitchell," sunk off Leuconna Reef, China, in 1 50 ft. There are individual cases where much larger sums have been recovered, but those mentioned are particularly notable by reason of the great depth involved and stand out as the greatest depths at which good work has been done. The sponge fishers of the Mediterranean work at a maximum depth of about 150 ft., and the pearl divers of Australia at 120 ft. But submarine operations on the great majority of the harbour and dock works of the world are conducted at a depth of from 30 to 60 ft.

The weighted tools employed by divers differ very little from those used by the workmen on terra firma. Pneumatic tools, worked by compressed air conveyed from the surface through flexible tubes, are great aids, particularly in rock removal work. With the rock drill the diver bores a number of holes to a given depth, inserts in these the charges of dynamite or other explosive used, attaches one end of a wire to a detonator which is inserted in the charge, and then comes to the surface. The boat from which he works is then moved away from the scene of operations, paying out the wire attached to the detonators, and when at a safe distance the free end of the wire is connected to a magneto exploding machine, which is then set in motion.

A complete set of diving apparatus costs from £75 to £200, varying with the depth of water for which it is required.

The pay of a diver depends upon the nature of the work upon which he is engaged, and also upon the depth of the water. On harbour and dock work the average wage is 2s. to 2s. 6d. per hour; on wreck work from 3s. to 5s. an hour, according to depth; on treasure and cargo recovery so much per day, with a percentage on the value recovered, generally about 5 %. The pearl fishers of Australia get so much per ton of shell, and the sponge fishers arc also paid by results.

DIVERS AND DIVING APPARATUS

A problem which has been exercising the minds of those engaged in submarine work is the greatest depth at which it is possible to work, for, as is well known, many a fine vessel with valuable cargo and treasure is lying out of reach of the diver owing to the pressure which he would have to sustain were he to attempt to reach her. Mr Leonard Hill, and Drs Greenwood and J. J. R. Macleod conducted experiments in conjunction with Messrs Siebe, Gorman & Co., with a view to solving this problem, »and their efforts have been attended with some considerable success. Dr J. S. Haldane has also carried out practical experiments for the British Admiralty, and under his supervision two naval officers have succeeded in reaching the unprecedented depth of 210 ft., at which depth the pressure is about 90 lb to the square inch.

Diving Bells. — Every one is familiar with the experiment of placing an inverted tumbler in a bowl of water, and seeing the water excluded from the tumbler by the air inside it. Perhaps it was to some such experiment as this that the conception of the diving bell was due. As is well known, the pressure of water increases with the depth, and for all practical purposes this pressure can be taken at 45 ft) to every 10 ft. The following table shows the pressure at different depths below the surface of the water: —

Depth. Pressure.

20 ft. . . . 8§ lb to the sq. in.

40 „ . . . 171

80 „ . . . 34i ,, ,,

120 „ 521 .. .»

160 „ . . . 69! „ „

200 „ ... 87 „ „

If a diving bell be sunk to a depth of, say, 33 ft., the air inside it will be compressed to about half its original volume, and the bell itself will be about half filled with water. B ut if a supply of air be maintained at a pressure equal to the depth of water at which the bell is submerged, not only will the water be kept down to the cutting

edge, but the bell will be ventilated and it will be possible for its occupants to work for hours at a stretch.

Tradition gives Roger Bacon, in 1250, the credit for being the originator of the diving bell, but actual records are lost in antiquity. Of the records preserved to us, probably one of the most trustworthy is an account given in Kaspar Schott's work, Technica curiosa, published in the year 1664, which quoted from one John Taisnier, who was in the service of Charles V. This account describes an experiment which took place at Toledo, Spain, in the year 1538, before the emperor and some thousands of spectators, when two Greeks descended into the water in a large " kettle," suspended by ropes, with its mouth downwards. The "kettle" was equipoised by lead fixed round its mouth. The men came up dry, and a lighted candle, which they had taken down with them, was still burning.

Francis Bacon, in the Novum Organum, lib. ii., makes the following reference to a machine, or reservoir, of air to which labourers upon wrecks might resort whenever they required to take breath: —

" A hollow vessel, made of metal, was let down equally to the surface of the water, and thus carried with it to the bottom of the sea the whole of the air which it contained. It stood upon three feet — like a tripod — which were in length something less than the height of a man, so that the diver, when he was no longer able to contain his breath, could put his head into the vessel, and having filled his lungs again, return to his work." But it was to Dr Edmund Halley, secretary of the Royal Society, that undoubtedly the honour is due of having invented the first really practical diving bell. This is described in the Philosophical Transactions, 1717, in a paper on "The Art of Living Under Water by means of furnishing air at the bottom of the sea in any ordinary depth." Halley's bell was constructed of wood, and was covered with lead, which gave it the necessary sinking weight, and was so distributed as to ensure that it kept a perpendicular position when in the water. It was in the form of a truncated cone, 3 ft. in diameter at the top, 5 ft. at the bottom and 8 ft. high. In the roof a lens was introduced for admitting light, and also a tap to let out the vitiated air. Fresh air was supplied to the bell by means of two lead-lined barrels,

each having a bung-hole in the top and bottom. To the hole in the top was fixed a leathern tube, weighted in such a manner that it always fell below the level of the bottom of the barrel so that no air could escape. When, however, the tube was turned up by the attendant in the bell, the pressure of the water rising through the hole in the

bottom of the barrel, forced the air through the tube at the top and into the diving bell. These barrels were raised and lowered alternately, with such success that Halley says that he, with four others, remained at the bottom of the sea, at a depth of 9 to ro fathoms, for an hour and a half at a time without inconvenience of any sort.

This type of bell was used by John Smeaton in repairing the foundations of Hexham Bridge in 1778, but instead of weighted

Fig. 6. — Ordinary Diving Bell.

barrels, he introduced a force pump for supplying the necessary air. To Smeaton too we are indebted for the first diving bell plant in the form with which we are familiar to-day, that cele- brated engineer having designed a square bell of iron, for use on the Ramsgate harbour works, in 1 788. This bell, which measured 4! ft. in length, 3 ft. in width and 4I ft. in height, and weighed 2 1 tons, was made sufficiently heavy to sink by its own weight. It afforded room enough for two men to work, and was supplied with air by a force pump worked from a boat at the surface.

Though the diving bell has been largely superseded by the modern diving apparatus, it is still used on certain classes of work the magnitude of which justifies the expense entailed, for it is not only a question of the cost of the bell, but of the powerful steam-driven crane which is needed to lower and raise it, and also of the gantry on which the crane travels. Sometimes a barge or other vessel is used for working the bell.

At the present day, two types of diving bell are employed— the ordinary bell, and the air-lock bell, which, however, is not so largely used.

On the new national harbour works at Dover, four large diving bells of the ordinary type (fig. 6) were employed. These bells, in each of which from four to six men descended at a time, consisted of steel chambers, open at the bottom, measuring 17 ft. long by lOj ft. wide by 7 ft. high, and each weighed 35 tons. The ballast, which at once gives the necessary sinking weight to the bell and maintains its equilibrium,. consisted of slabs of cast iron bolted to the walls of the bell, inside. Each bell was fitted with loud-sounding telephonic apparatus, by means of which the occupants could com- municate either with the men attending the crane or the men looking after the air compressors at the surface. Electric lamps, supplied with current

by a dynamo in the compressor room, gave the neces- sary light inside the bell. Seats and foot rails were provided for the men, and there were racks and hooks for the various tools. Sus- pended from the roof was an iron skip into which the men threw the

excavated material, which was emptied out when the bell was brought to, the surface. Air was supplied to the bells by means of steam- driven compressors worked in a house erected on the gantry. The air was delivered into a steel air receiver, and thence it passed through a flexible tube connected to a gun-metal inlet valve in the roof of the diving bell ; the pressure of air was regulated according to the depth at which the bell happened to be working. The maximum depth on the Dover works was between 60 and 70 ft., = about 25-30 lb to the square inch. A bell was lowered by means of powerful steam- driven cranes, travelling on a gantry, to within a few feet of the water, and the men entered it from a boat. The bell then continued its descent to the bottom, where the men, with pick and. shovel, levelled the sea bed ready to receive the large concrete blocks, weighing from

\

1

1

H

±1

\ — x –

\ KG

jr 11 _s

-u — -Xi

1 A |

ˆ1 njxrrrrrn

niA'r -'l

Fig. 7. — Air-lock Diving Bell.

A, Working chamber. E, Tackles suspended from roof

B, Air-lock. for raising and lowering

C, Pulleys and wire ropes for objects.

lowering and raising bell. F, Air supply pipe.

D, Iron ladder.

30 to 42 tons apiece. Having completed one section, the bell was moved along to another. The concrete blocks were then lowered and placed in position by helmet divers. The bell divers, clad in thick woollen suits and watertight thigh boots, worked in shifts of about three hours each, and were paid at the rate of from is. to 15c!. per hour.

The cost of an ordinary diving bell, including air compressor, telephonic apparatus and electric light, is from £600 to £1500, according to size.

The Air-lock Diving Bell (fig. 7) comprises an iron or steel working chamber similar to the ordinary diving bell, but with the addition of a shaft attached to its roof. At the upper end of the shaft is an air-tight door, and about 8 ft. below this is another similar door. When the bell divers wish to enter the bell, they pass through the first door and close it after them, and then open a cock or. valve and gradually let into the space between the two doors compressed air from the working chamber in order to equalize the pressure ; they then open the second door and pass down into the working chamber,

closing the door after them. When returning to the surface they reverse the operation. It can readily be imagined that, owing to its unwieldy character, the employment of the air-lock bell is resorted to only in those cases where the nature of the sea bed necessitates its remaining on a given spot for some considerable time, as for instance in the excavation of hard rock to a given depth.

An air-lock bell supplied to the British Admiralty, for use in connexion with the laying of moorings at Gibraltar, has a- working chamber measuring 15 ft. long by io| ft. wide, by 7I ft. high, and a shaft 37 i ft. high by 3 ft. in diameter. It is built of steel plates, with cast-iron ballast, and its total weight is about 46 tons. , The bell is electrically lighted, and is fitted with telephonic apparatus communicating with the air-compressor room and lifting-winch room. It is worked through a well in the centre of a specially constructed steel barge 85 ft. long by 40 ft. beam, having a draught of 7 ft. 6 in. The wire ropes, for lowering and raising the bell, work over pulleys which are carried on a superstructure erected over the well. Two sets of air compressors are fitted on the barge — one set for supplying air to the bell, the other set for working a pneumatic rock drill inside the bell. The greatest depth at which this particular bell will work is 40 ft. The cost of the whole plant, including barge, was about £14,000.

The diving dress has, however, to a great extent supplanted the diving bell. This is due not only to the heavier cost of the latter, but more particularly to the greater mobility of the helmet diver. Bell divers are naturally limited to the area which their bell for the time being covers, whereas helmet divers can be distributed over different parts of a contract and work entirely independently of one another. The use of the diving bell is, therefore, practically limited to the work of levelling the sea bed, and the removal of rock.

See also the article Caisson Disease as regards the physiological effects of compressed air. (R. H. D.)*

DIVES-SUR-MER, a small port and seaside resort of north- western France on the coast of the department of Calvados, on the Dives, ism. N.E. of Caen by road. Pop. (1966) 3286. Dives is celebrated as the harbour whence William the Conqueror sailed to England in 1066. In the porch of its church (14th and 15th centuries) a tablet records the names of some of his companions. The town has a picturesque inn, adapted from a building dating partly from the 16th century, and market buildings dating from the 14th to the 16th centuries. The coast in the vicinity of Dives is fringed with small watering-places, those of Cabourg (to the west) and of Beuzeval and

Houlgate (to the east) being practically united with it. There are large metallurgical works with electric motive power close to the town.

DIVIDE, a word used technically as a noun in America and the British colonies for any high ridge between two valleys, forming a water-parting; a dividing range. For special senses of the verb " to divide " (Lat. di-videre, the latter part of the word coming from a root seen in Lat. vidua, Eng. " widow "), meaning generally to split up in two or more parts, see Division. In a parliamentary sense, to divide (involving a separation into two sides, Aye and No) is to take the sense of the House by voting on the subject before it.

DIVIDEND (Lat. dividendum, a thing to be divided), the net profit periodically divisible among the proprietors of a joint- stock company in proportion to their respective holdings of its capital. Dividend is not interest, although the word dividend is frequently applied to payments of interest; and a failure to pay dividends to shareholders does not, like a failure to pay interest on borrowed money, lay a company open to being declared bankrupt. In bankruptcy a dividend is the proportionate share of the proceeds of the debtor's estate received by a creditor. In England, the Companies Act 1862 provided that no dividend should be payable except out of the profits arising from the busi- ness of the company, but, in the case of companies incorporated by special act of parliament for the construction of railways and other public works which cannot be completed for a considerable time, it is sometimes provided that interest may during construc- tion be paid to the subscribers for shares out of capital. Dividends (excluding occasional distributions in the form of shares) are ordinarily payable in cash. Most companies divide their capital into at least two classes, called " preference " shares and " ordinary " shares, of which the former are entitled out of the profits of the company to a preferential dividend at a fixed rate, and the latter to whatever remains after payment of the preferential dividend and any fixed charges. Before, however, a dividend is paid, a part of the profits is often carried to a " reserve

fund." The dividend on preference shares is either " cumulative " or contingent on the profits of each separate year or half year. When cumulative, if the profits of any one year are insufficient to pay it in full, the deficiency has to be made good out of subse- quent profits. A

cumulative preferential dividend is sometimes said to be " guaranteed," and preferential dividends payable by all English companies registered under the Companies Acts 1862 to 1908 are cumulative unless stipulated to be otherwise. Certain public companies are forbidden by parliament to pay dividends in excess of a prescribed maximum rate, but this restriction has been happily modified in some instances, notably in the case of gas companies, by the institution of a sliding scale, under which a gas company may so regulate the price of gas to be charged to consumers that any reduction of an authorized standard price entitles the company to make a proportionate increase of the authorized dividend, and any increase above the standard price involves a proportionate decrease of dividend. Dividends are usually declared yearly or half-yearly; and before any dividend can be paid it is, as a rule, necessary for the directors to submit to the shareholders, at a general meeting called for the purpose, the accounts of the company, with a report by the directors on its position and their recommendation as to the rate of the proposed dividend. The articles of association of a company usually provide that the shareholders may accept the director's recom- mendation as to dividend or may declare a lower one, but may not declare a higher one than the directors recommend. Directors frequently have power to pay on account of the dividend for the year, without consulting the shareholders, an "interim dividend," which on ordinary shares is generally at a much lower rate than the final or regular dividend. An exceptionally high dividend is often distributed in the shape of a dividend at the usual rate supplemented by an additional dividend or " bonus." Payment of dividends is made by means of cheques sent by post, called " dividend warrants." All dividends are subject to income-tax, and by most companies dividends are paid " less income-tax," in which case the tax is deducted from the amount of dividend payable to each proprietor. When paid without such deduction a dividend is said to be " free of income-tax." In the latter case, however, the company has to make provision for payment of the tax before declaring the dividend, and the amount of its divisible profits and the rate of dividend which it is able to declare are consequently to that extent reduced. In respect of consols and certain other securities, holders of amounts of less than £1000 may instruct the Bank of England or Bank of Ireland to receive and invest their dividends. With few exceptions, the prices of securities dealt in on the London Stock Exchange include any accruing dividend not paid up to the date of purchase. At a certain day, after the dividend is declared, the stock or share is dealt in on the Stock Exchange, as ex dividend (or " x. d."), which means that the current dividend is paid not to the buyer

but to the previous holder, and the price of the stock is lower to that extent. The expression " cum dividend " is used to signify that the price of the security dealt in includes a dividend which, in the absence of any stipulation, might be supposed to belong to the seller of the security. On the New York Stock Exchange the invariable practice is to sell stock with the " dividend on " until the company's books are closed, after which it is usually sold " ex dividend." (S. D. H.)

DIVIDIVI, the native and commercial name for the astringent pods of Caesalpinia coriaria, a leguminous shrub of the suborder Caesalpinieae, which grows in low marshy tracts in the West Indies and the north of South America. The plant is between 20 and 30 ft. in height, and bears white flowers. The pods are flattened, and curl up in drying; they are about f in. broad, from 2 to 3 in. long and of a rich brown colour. Dividivi was first brought to Europe from Caracas in 1768. It contains about 30% of ellagitannic acid, whence its value in leather manufacture.

DIVINATION, the process of obtaining knowledge of secret or future things by means of oracles, omens or astrology. The root of the word, deus (god) or divus, indicates the supposed source of the soothsayer's information, just as the equivalent Greek term, tiavTucr], indicates the spiritual source of the utterances of the seer,

liavTis. In classical times the view was, in fact, general, as may be seen by Cicero's De divinatione, that not only oracles but also omens were signs sent by the gods; even the astrologer held that he gained his information, in the last resort, from the same source. On the side of the Stoics it was argued that if divination was a real art, there must be gods who gave it to mankind; against this it was argued that signs of future events may be given without any god.

Divination is practised in all grades of culture; its votaries range from the Australian black to the American medium. There is no general agreement as to the source of the information; commonly it is held that it comes from the gods directly or indirectly. In the Bornean cult of the hawk it seems that the divine bird itself was regarded as having a foreknowledge of the future. Later it is regarded as no more than a messenger. Among the Australian blacks, divination is largely employed to discover the cause of death, where it is assumed to be due to magic; in some cases the spirit of the dead man is held to give the information, in others the living magician is the source of the knowledge. We find moreover as emi-scientific conception of the basis of divination; the whole of nature is linked

together; just as the variations in the height of a column of mercury. serve to foretell the weather, so the flight of birds or behaviour of cattle may help to prognosticate its changes; for the uncultured it is •merely a step to the assumption that animals know things which are hidden from man. Haruspication, or the inspection of entrails, was justified on similar grounds, and in the case of omens from birds or animals, no less than in astrology, it was held that the facts from which inferences were drawn were themselves in part the causes of the events which they foretold, thus fortifying the belief in the possibility of divination.

From a psychological point of view divinatory methods may be classified under two main heads: (A) autoscopic, which depend simply on some change in the consciousness of the soothsayer; (B) heteroscopic, in which he looks outside himself for guidance and perhaps infers rather than divines in the proper sense.

(A) Autoscopic methods depend on (i.) sensory or (ii.) motor automatisms, or (iii.) mental impressions, for their results, (i.) Crystal-gazing (q.v.) is a world-wide method of divining, which is analogous to dreams, save that the vision is voluntarily initiated, though little, if at all, under the control of the scryer. Corresponding to crystal-gazing we have shell-hearing and similar methods, which are, however, less common; in these the information is gained by hearing a voice, (ii.) The divining rod (q.v.) is the best-known example of this class; divination depending on automatic movements of this sort is found at all stages of culture; in Australia it is used to detect the magician who has caused the death of a native; in medieval and modern times water-divining or dowsing has been largely and successfully used. Similar in principle is coscinomancy, or divining by a sieve held suspended, which gives indications by turning; and the equally common divination by a suspended ring, both of which are found from Europe in the west to China and Japan in the east. The ordeal by the Bible and key is equally popular; the book is suspended by a key tied in with its wards between the leaves and supported on two persons' fingers, and the whole turns round when the name of the guilty person is mentioned. Confined to higher cultures on the other hand, for obvious reasons, is divination by automatic writing, which is practised in China more especially. The sand divination so widely spread in Africa seems to be of a different nature. Trance speaking, on the other hand, may be found in any stage of culture and there is no doubt that in many cases the procedure of the magician or shaman induces a state of auto-hypnotism; at a higher stage these utterances are termed oracles and are believed to be the result of inspiration (q.v.). (iii.) An- other

method of divination is by the aid of mental impressions; observation seems to show that by some process of this sort, akin to clairvoyance (q.v.), fortunes are told successfully by means of palmistry or by laying the cards; for the same " lie " of the cards may be diversely interpreted to meet different cases. In other cases the impression is involuntary or less consciously sought, as in dreams (q.v.), which, however, are sometimes induced, for

purposes of divination, by the process known as incubation or temple sleep. Dreams are sometimes regarded as visits to or from gods or the souls of the dead, sometimes as signs to be interpreted symbolically by means of dream-books, which are found not only in Europe but in less cultured countries like Siam.

(B) In heteroscopic divination the process is rather one of inference from external facts. The methods are very various, (i.) The casting of lots, sortilege, was common in classical antiquity; the Homeric heroes prayed to the gods when they cast lots in Agamemnon's leather cap, and Mopsus divined with sacred lots when the Argonauts embarked. Similarly dice are thrown for purposes of sortilege; the astragali or knucklebones, used in children's games at the present day, were implements of divination in the first instance. In Polynesia the coco-nut is spun like a teetotum to discover a thief. Somewhat different are the omens drawn from books; in ancient times the poets were often consulted, more especially Virgil, whence the name sortes virgilianae, just as the Bible is used for drawing texts in our own day, especially in Germany, (ii.) In haruspicaiion, or the inspec- tion of entrails, in scapulomancy or divination by the speal-bone or shoulder-blade, in divination by footprints in ashes, found in Australia, Peru and Scotland, the voluntary element is prominent, for the diviner must take active steps to secure the conditions necessary to divination, (iii.) In the case of augury and omens, on the other hand, that is not necessary. The behaviour and cries of birds, and angang or meeting with ominous animals, &c, may be voluntarily observed, and opportunities for observation made; but this is not necessary for success, (iv.) In astrology we have a method which still finds believers among people of good education. The stars are held, not only to prog- nosticate the future but also to influence it; the child born when Mars is in the ascendant will be war-like; Venus has to do with love; the sign of the Lion presides over places where wild beasts are found, (v.) In other cases the tie that binds the

subject of divination with the omen-giving object is sympathy. The name of the life-index is given to a tree, animal or other object believed to be so closely united by sympathetic ties to a human being that the fate of the latter is reflected in the condition of the former. The Polynesians set up sticks to see if the warriors they stood for were to fall in battle; on Hallowe'en in our own country the behaviour of nuts and other objects thrown into the fire is held to prognosticate the lot of the person to whom they have been assigned. Where, as in the last two cases, the sympathetic bond is less strong, we find symbolical interpretation playing an important part.

Sympathy and symbolism, association of ideas and analogy, together with a certain amount of observation, are the explana- tion of the great mass of heteroscopic divinatory formulae. But where autoscopic phenomena play the chief part the question of the origin of divination is less simple. The investigations of the Society for Psychical Research show that premonitions, though rare in our own day, are not absolutely unknown. Pseudo- premonitions, due to hallucinatory memory, are not unknown; there is also some ground for holding that crystal-gazers are able to perceive incidents which are happening at a distance from them. Divination of this sort, therefore, may be due to observa- tion and experiment of a rude sort, rather than to the unchecked play of fancy which resulted in heteroscopic divination.

See also the articles Augurs, Oracle, Astrology, Omen, &c.

Authorities. — Bouche Leclercq, Histoire de la divination dans Vantiquite; Tylor, Primitive Culture, passim; Maury, " La Magie et l'astrologie," Journ. Anlh. Inst. i. 163, v. 436; Folklore, iii. 193; Ellis, Tshi-speaking Peoples, p. 202; Dictionnaire encyclopedique des sciences medicates, xxx. 24-96; Journ. of Philology, xiii. 273, xiv. 113; Deubner, De incubatione: Lenormant, La Divination, et la science de presages chez les Chaldeens; Skeat, Malay Magic; J. Johnson, Yoruba Heathenism (1899). (N. W. T.)

DIVINING – ROD. As indicated in the article Magic, Rhabdomancy, or the art of using a divining-rod for discovering something hidden, is apparently of immemorial antiquity, and the Roman virgula divina, as used in taking auguries by means of casting bits of stick, is described by Cicero and Tacitus (see also DivrNATiON) ; but the special form of virgula furcata, or forked

twig of hazel or willow (see also Hazel), described by G. Agricola (De re metallica, 1546), and in Sebastian Munster's Cosmography in

the early part of the 16th century, used specially for discovering metallic lodes or water beneath the earth, must be distinguished from the general superstition. The" dowsing " or divining-rod, in this sense, has a modern interest, dating from its use by prospectors for minerals in the German (Harz Mountains) mining districts; the French chemist M. E. Chevreul 1 assigns its first mention to Basil Valentine, the alchemist of the late 1 5th century. On account of its supposed magical powers, it may be taken perhaps as an historical analogue to such fairy wands as the caduceus of Mercury, the golden arrow of Herodotus's " Abaris the Hyperborean," or the medieval witch's broomstick. But the existence of the modern water-finder or dowser makes the divining-rod a matter of more than mythological or superstitious interest. The Schlagrulhe (striking-rod), or forked twig of the German miners, was brought to England by those engaged in the Cornish mines by the merchant venturers of Queen Elizabeth's day. Professor W. F. Barrett, F.R.S., the chief modern in- vestigator of this subject, regards its employment, dating as it does from the revival of learning, as based on the medieval doctrine of " sympathy," the drooping of trees and character of the vegetation being considered to give indications of mineral lodes beneath the earth's surface, by means of a sort of attrac- tion; and such critical works as Robert Boyle's (1663), or the Mineralogia Cornubiensis of Pryce (1778), admitted its value in discovering metals. But as mining declined in Cornwall, the use of the dowser for searching for lodes almost disappeared, and was transferred to water-finding. The divining-rod has, however, also been used for searching for any buried objects. In the south of France, in the 17th century, it was employed in tracking criminals and heretics. Its abuse led to a decree of the Inquisition in 1 701, forbidding its employment for purposes of justice.

In modern times the professional dowser is a " water-finder," and there has been a good deal of investigation into the possibility of a scientific explanation of his claims to be able to locate under- ground water, where it is not known to exist, by the use of a forked hazel-twig which, twisting in his hands, leads him by its directing-power to the place where a boring should be made. Whether justified or not, a widespread faith exists, based no doubt on frequent success, in the dowser's power; and Professor Barrett (The Times, January 21, 1905) states that "making a liberal allowance for failures of which I have not heard, I have no hesitation in saying that where fissure water exists and the discovery of underground water sufficient for a domestic supply is a matter of the utmost difficulty, the chances of success with a good dowser far exceed mere lucky hits, or the success

obtained by the most skilful observer, even with full knowledge of the local geology." Is this due to any special faculty in the dowser, or has the twig itself anything to do with it ? Held in balanced equilibrium, the forked twig, in the dowser's hands, moves with a sudden and often violent motion, and the appearance of actual life in the twig itself, though regarded as mere stage-play by some, is popularly associated with the cause of the water- finder's success. The theory that there is any direct connexion (" sympathy " or electrical influence) between the divining-rod and the water or metal, is however repudiated by modern science. Professor Barrett, who with Professor Janet and others is satisfied that the rod twists without any intention or voluntary deception on the part of the dowser, ascribes the phenomenon to " motor- automatism " on the part of the dowser (see Automatism), a reflex action excited by some stimulus upon his mind, which may be either a subconscious suggestion or an actual impression (obscure in its nature) from an external object or an external mind; both sorts of stimulus are possible, so that the dowser himself may make false inferences (and fail) by supposing that the stimulus is an external object (like water). The divining-rod being thus " an indicator of any sub-conscious suggestion or impression," its indications, no doubt, may be fallacious; but Professor Barrett, basing his conclusions upon observed successes and their greater proportion to failures than anything that 1 La Baguette divinatoire (Paris, 1845).

chance could produce, advances the hypothesis that some persons (like the professional dowsers) possess " a genuine super-normal perceptive faculty," and that the mind of a good dowser, possess- ing the idiosyncrasy of motor-automatism, becomes a blank or tabula rasa, so that " the faintest impression made by the object searched for creates an involuntary or automatic motion of the indicator, whatever it may be." Like the " homing instinct " of certain birds and animals, the dowser's power lies beneath the level of any conscious perception; and the function of the forked twig is to act as an index of some material or other mental disturbance within him, which otherwise he could not interpret.

It should be added that dowsers do not always use any rod. Some again use a willow rod, or withy, others a hazel-twig (the traditional material), others a beech or holly twig, or one from any other tree; others even a piece of wire or watch-spring. The best dowsers are

said to have been generally more or less illiterate men, usually engaged in some humble vocation.

Sir W. H. Preece (The Times, January 16, 1005), repudiating as an electrician the theory that any electric force is involved, has recorded his opinion that water-finding by a dowser is due to " mechanical vibration, set up by the friction of moving water, acting upon the sensitive ventral diaphragm of certain exception- ally delicately framed persons." Another theory is that water- finders are "' exceptionally sensitive to hygrometric influences." In any case, modern science approaches the problem as one concerning which the facts have to be accepted, and explained by some natural, though obscure, cause.

See for further details Professor Barrett's longer discussion in parts 32 (1897) and 38 (1900) of the Proceedings of the Society for Psychical Research.

DIVISION (from Lat. dividere, to break up into parts, separate) , a general term for the action of breaking up a whole into parts. Thus, in political economy, the phrase " division of labour " implies the assignment to particular workmen of the various portions of a whole piece of work; in mathematics division – is the process of finding how many times one number or quantity, the " divisor," is contained in another, the " dividend " (see Arithmetic and Algebra); in the musical terminology of the 17 th and 1 8th centuries, the term was used for rapid passages consisting of a few slow notes amplified into a florid passage, i.e. into a larger number of quick ones. The word is used also in concrete senses for the parts into which a thing is divided, e.g. a division of an army, an administrative or electoral division; similarly, a "division" is taken in a legislative body when votes are recorded for and against a proposed measure.

In logic, division is a technical term for the process by which a genus is broken up into its species. Thus the genus " animal " may be divided, according to the habitat of the various kinds, into animals which live on land, those which live in water, those which live in the air. Each of these may be subdivided according to whether their constituent members do or do not possess certain other qualities. The basis of each of these divisions is called the fundamenlum divisionis. It is clear that there can be no division in respect of those qualities which make the genus what it is. The various species are all alike in the possession of the generic attributes, but differ in other respects; they are " variations on the same theme " (Joseph, Introduction to Logic, 1906); each one has the generic, and also certain peculiar,

qualities {differentiae), which latter distinguish them from other species of the same genus. The process of division is thus the obverse of classification (q.v.); it proceeds from genus to species, whereas classification begins with the particulars and rises through species to genus. In the exact sciences, and indeed in all argument both practical and theoretical, accurate division is of great importance. It is governed by the following rules. (1) Division must be exhaustive; all the members of the genus must find a place in one or other of the species; a captain who selects for his team skilful batsmen and bowlers only is guilty of an incomplete division of the whole function of a cricket team by omitting to provide himself with good fielders. Rectilinear figures cannot be divided into triangles and quadrilaterals because there are rectilinear figures which have more than four sides. On the other hand, triangles can be

divided into equilateral, isosceles and scalene, since no other kind of triangle can exist. (2) Division must be exclusive, that is, each species must be complete in itself and not contain members of another species. No member of a genus must be included in more than one of the species. (3) In every division there must be but one principle (fundamentum divisionis). The members of a genus may differ from one another in many respects, e.g. books may be divided according to external form into quarto, octavo, &c, or according to binding into calf, cloth, paper-backed and so on. They cannot, however, be divided logically into quarto, paper- backed, novels and remainders. When more than one principle is Used in a division it is called " cross division." (4) Division must proceed gradually (" Divisio non facit saltum "), i.e. the genus must be resolved into the next highest .(" proximate ") species. To go straight from a summum genus to very small species is of no scientific value.

It is to be observed that logical division is concerned exclusively with universals or concepts; division is of genus and species, not of particulars. Two other kinds of division are recognized:— metaphysical division, the separation in thought o£ the various qualities possessed by an individual thing (a piece of lead has weight, colour, &c), and physical division or partition, the breaking up of an object into its parts (a watch is thought of as being composed of case, dial, works, &c). Logical division is closely allied with logical definition (q.v.).

DIVORCE (Lat. divortium, derived from dis-, apart, and vertere, to turn), the dissolution, in whole or in part, of the tie of marriage; It includes both the complete abrogation of the marriage relation known as a divorce a vinculo matrimonii, which carries with it a

power on the part of both parties to the marriage to remarry other persons or each other, and also that incomplete severance not involving powers to remarry, which was formerly known as divorce a mensa et thoro, and.has in England been termed "judicial separation." Less strictly, divorce is commonly under- stood to include judicial declarations of nullity of marriage, whLh, while practically terminating the marriage relation, proceed in law on the basis of the marriage never having been legally established.

The conditions under which, in different communities, divorce has at different times been permitted, vary with the aspects in which the relation of marriage (q.v.) has been regarded. When marriage has been deemed to be the acquisition by the husband of property in the wife, or when it has been regarded as a mere agreement between persons capable both to form and to dissolve that contract, we find that marriage has been dissoluble at the will of the husband, or by agreement of the husband and wife. Yet even in these cases the interest of the whole community in the purity of marriage relations, in the pecuniary bearings of this particular contract, and the condition of children, has led to the imposition of restrictions on, and the attachment of conditions to, the termination of the obligations consequent on a marriage legally contracted. But the main restrictions on liberty of divorce have arisen from the conception of marriage entertained by religions, and especially by one religion. Christianity has had no greater practical effect on the life of mankind than in its belief that marriage is no mere civil contract, but a vow in the sight of God binding the parties by obligations of conscience above and beyond those of civil law. Translating this conception into practice, Christianity not only profoundly modified the legal conditions of divorce as formulated in the Roman civil law, but in its own canon law defined its own rule of divorce, going so far as in the Western (at least in its unreformed condition), though not the Eastern, branch of Christendom to forbid all comple'te divorces, that is to say, all dissolutions of marriage carrying with them the right to remarry.

History

The Roman Law of Divorce before Justinian. — The history of divorce, therefore, practically begins with the law of Rome. It took its earliest colour from that conception of the patria polestas, or the power of the head of the family over its members, which enters so deeply into the jurisprudence of ancient Rome. The

HISTORY]

wife was transferred at marriage to the authority of her husband, in manus, and consequently became so far subject to him that he could, at his will, renounce his rule over her, and terminate his companionship, subject at least to an adjustment of the pecuniary rights which were disturbed by such action. So clearly was the power of the husband derived from that of the father, that for a long period a father, in the exercise of his potestas, could take his daughter from her husband against the wishes of both. It may be presumed that this power, anomalous as it appears, was not unexercised, as we find that a constitution of Antoninus Pius prohibited a father from disturbing a harmonious union, and Marcus Aurelius afterwards limited this prohibition by allowing the interference of a father for strong and just cause — magna et justa causa interveniente. Except in so far as it was restrained by special legislation, the authority of a husband in the matter of divorce was absolute. As early indeed, however, as the time of Romulus, it is said that the state asserted its interest in the permanence of marriage by forbidding the repudiation of wives unless they were guilty of adultery or of drinking wine, on pain of forfeiture of the whole of an offender's property, one-half of which went to the wife, the other to Ceres. But the law of the XII. Tables, in turn, allowed freedom of divorce. It would appear, however, that the sense of the community was so far shocked by the inhumanity of treating a wife as mere property, or the risk of regarding marriage as a mere terminable contract, that, without crystallizing into positive enactment, it operated to prevent the exercise of so harsh and dangerous a power. It is said that for 500 years no husband took advantage of his power, and it was then only by an order of a censor, however obtained, that Spurius Carvilius Ruga repudiated his wife for barrenness. We may, however, be permitted to doubt the genuineness of this censorial order, or at least to conjecture the influence under which the censor was induced to intervene, when we find that in another instance, that of L. Antonius, a censor punished an unjust divorce by expulsion from the senate, and that the exercise of their power by husbands increased to a great and alarming extent. Probably few of the admirers of the greatest of Ronmn orators have not regretted his summary and wholly informal repudiation of Terentia. At last the lex Julia de adulteriis, while recognizing a power of divorce both in the husband and in the wife, imposed on it, in the public interest, serious restrictions and consequences. It required a written bill of divorce (libellus repudii) to be given in the presence of seven witnesses, who must be Roman

citizens of age, and the divorce must be publicly registered. The act was, however, purely an act of the party performing it, and no idea of judicial interference or contract seems to have been entertained. It was not necessary for either husband or wife giving the bill to acquaint the other with it before its execution, though it was considered proper to deliver the bill, when made, to the other party. In this way a wife could divorce a lunatic husband, or the paterfamilias of a lunatic wife could divorce her from her husband. But the lex Julia was also the first of a series of enactments by which pecuniary consequences were imposed on divorce both by husbands and wives, whether the intention was to restrain divorce by penalties of this nature, or to readjust pecuniary relations settled on the basis of marriage and disturbed by its rupture. It was provided that if the wife was guilty of adultery, her husband in divorcing her could retain one-sixth of her dos, but if she had committed a less serious offence, one-eighth. If the husband was guilty of adultery, he had to make immediate restitution of her dowry, or if it consisted of land, the annual proceeds for three years; if he was guilty of a less serious offence, he had six months within which to restore the dos. If both parties were in fault, no penalty fell on either. The lex Julia was followed by a series of acts of legislation extending and modifying its provisions. The legislation of Constantine, a.d. 331, specified certain causes for which alone a divorce could take place without the imposition of pecuniary penalties. There were three causes for which a wife could divorce her husband with impunity: (1) murder, (2) preparation of poisons, (3) violation of tombs; but if she divorced him for any other cause, such as drunkenness, or gambling or immoral society, she forfeited her dowry and incurred the further

penalty of deportation. There were also three causes for which a husband could divorce his wife without incurring any penalty:

(1) adultery, (2) preparation of poisons, (3) acting as a procuress. If he divorced her for any other cause, he forfeited all interest in her dowry; and if he married again, the first wife could take the dowry of the second.

In a.d. 421 the emperors Honorius and Theodosius enacted a law of divorce which introduced limitations on the power of remarriage as an additional penalty in certain cases. As regards a wife: (1) if she divorced her husband for grave reasons or crime, she retained her dowry and could remarry after five years;

(2) if she divorced him for criminal conduct or moderate faults, she forfeited her dowry, became incapable of remarriage, and liable to

deportation, nor could the emperor's prerogative of pardon be exerted in her favour. As regards a husband: if he divorced his wife (1) for serious crime, he retained the dowry and could re- marry immediately; (2) for criminal conduct, he did not retain the dowry, but could remarry; (3) for mere dislike, he for- feited the property brought into the marriage and could not remarry.

In a.d. 449 the law of divorce was rendered simpler and certainly more facile by Theodosius and Valentinian. It was provided that a wife could divorce her husband without incurring any penalty if he was convicted of any one of twelve offences: (1) treason, (2) adultery, (3) homicide, (4) poisoning, (5) forgery, (6) violating tombs, (7) stealing from a church, (8) robbery, (9) cattle-stealing, (10) attempting his wife's life, (n) beating his wife, (12) introducing immoral women to his house. If the wife divorced her husband for any other cause, she forfeited her dowry, and could not marry again for five years. A husband could divorce his wife without incurring a penalty for any of these reasons except the last, and also for the following reasons: (1) going to dine with men other than her relations without the knowledge or against the wish of her husband; (2) going from home at night against his wish without reasonable cause; (3) frequenting the circus, theatre or amphitheatre after being forbidden by her husband. If a husband divorced his wife for any other reason, he forfeited all interest in his wife's dowry, and also any property he brought into the marriage.

The above sketch of the legislation prior to the time of Justinian, while it indicates a desire to place the husband and wife on something like terms of equality as regards divorce, indicates also, by its forbidding remarriage and by its pecuniary provisions in certain cases, a sense in the community of the importance in the public interest of restraining the violation of the contract of marriage. But to the Roman marriage was primarily a contract, and therefore side by side with this legislation there always existed a power of divorce by mutual consent. We must now turn to those principles of the Christian religion which, in combination with the legislation above described, produced the law formulated by Justinian.

The Christian View of Divorce. — The Christian law of divorce as enunciated by its Founder was expressed in a few words, but these, unfortunately, by no means of agreed interpretation. To appreciate them it is necessary to consider the enactment of the Mosaic law, which also was expressed in few words, but of a meaning involved in much doubt. The phrase in Deut. xxiv. 1-4, which is translated in the

Authorized Version " some unclean- ness," but in the Revised Version, " some unseemly thing," and which is the only cause stated to justify the giving of a " bill of divorcement," was limited by the school of Shanmai to moral delinquency, but was extended by the rival school of Hillel to causes of trifling importance or even to motives of caprice. The wider interpretation would seem to be supported by the words of Christ (Matt. v. 31), who, in indicating His own doctrine in contradistinction to the law of Moses, said, " Whosoever shall put away his wife, saving for the cause of fornication (iropvelas), causeth her to commit adultery; and whosoever shall marry her that is divorced committeth adultery." The meaning of these words of Christ Himself has been involved in controversy, which perhaps was nowhere carried on with greater acuteness or under

more critical conditions than within the walls of the British parliament during the passage of the Divorce Act of 1857. That they justify divorce of a complete kind for moral delinquency of some nature is supported by the opinion probably of every competent scholar. But scholars of eminence have sought to restrict the meaning of the X670S iroppdas to antenuptial incontinence concealed from the husband, and to exclude adultery. The effect of this view commends itself to theadherents of the Church of Rome, because it places the right to separation between husband and wife, not on a cause supervening after a marriage, which that Church seeks to regard as absolutely indissoluble, but on invalidity in the contract of marriage itself, and which may therefore render the marriage liable to be declared void without impugning its indissoluble character when rightly contracted. The narrower view of the meaning of iropveias has been maintained by, among others, Dr Dollinger (First Ages of the Church, ii. 226); but those who will consider the arguments of Professor Conington in reply to Dr Dollinger (Contemp. Review, May 1869) will probably assign the palm to the English scholar. A more general view points in the same direction. It is quite true that under the Mosaic law antenuptial incontinence was, as was also adultery, punishable with death. But when we consider the effect of adultery not only as a moral fault, but as violating the solemn contract of marriage and vitiating its objects, it is inconceivable that Christ, in employing a term of general import, intended to limit it to

one kind, and that the less serious, of incontinence.

Effect of Christianity on the Law of Rome. — The modification in the civil law of Rome effected by Justinian under the joint influence of the previous law of Rome and that of Christianity was remarkable. Gibbon has summed up the change effected in the law of Rome with characteristic accuracy: " The Christian princes were the first who specified the just causes of a private divorce; their institutions from Constantine to Justinian appear to fluctuate between the customs of the empire and the wishes of the Church; and the author of the Novels too frequently reforms the jurisprudence of the Code and Pandects. " Divorce by mutual consent, hitherto, as we have seen, absolutely free, was prohibited (Nov. 117) except in three cases: (1) when the husband was impotent; (2) when either husband or wife desired to enter a monastery; and (3) when either of them was in captivity for a certain length of time. It is obvious that the two first of these exceptions might well commend themselves to the mind of the Church, the former as being rather a matter of nullity of marriage than of divorce, the latter as admitting the paramount claims of the Church on its adherents, and not inconsistent with the spirit of the words of St Paul himself, who clearly contemplated a separation between husband and wife as allowable in case either of them did not hold the Christian faith (1 Cor.vii.12). Atalater period Justinian placed a further restriction or even prohibition on divorce by consent by enacting that spouses dissolving a marriage by mutual consent should forfeit all their property, and be confined for life in a monastery, which was to receive one-third of the forfeited property, the remaining two-thirds going to the children of the marriage. The cause stated for this remarkable alteration of the law, and the abandonment of the conception of marriage as a civil contract ut non Dei judicium contemnatur (Nov. 134), indicates the influence of the Christian idea of marriage. That influence, however, did not long continue in its full force. The prohibitions of Justinian on divorce by consent were repealed by Justin (Nov. 140), his successor. " He yielded," says Gibbon, " to the prayers of his unhappy subjects, and restored the liberty of divorce by mutual consent; the civilians were unanimous, the theologians were divided, and the ambiguous word which contains the precept of Christ is flexible to any inter- pretation that the wisdom of a legislature can demand." It was difficult, the enactment stated, " to reconcile those who once came to hate each other, and who, if compelled to live together, frequently attempted each other's lives."

Justinian further re-enacted, with . some modifications, the power of divorce by a husband or wife against the will of the other. Divorce by

a wife was allowed in five cases (Nov. 117): (1) the

husband being party or privy to conspiracy against the state;

(2) attempting his wife's fife, or failing to disclose to her plots against it; (3) attempting to induce his wife to commit adultery;

(4) accusing his wife falsely of adultery; (5) taking a woman, to live in the house with his wife, or, after warning, frequenting a house in the same town with any woman other than his wife. If a wife divorced her husband for one of these reasons, she recovered her dowry and any property brought into the marriage by her husband for life with reversion to her children, or if there were no children, absolutely. But if she divorced him for any other reason, the provisions of the enactment of Theodosius and Valentinian were to apply. A husband was allowed to divorce his wife for any one of seven reasons: (1) failure to disclose to her husband plots against the state; (2) adultery; (3) attempting or failing to disclose plots against her husband's life; (4) frequenting dinners or balls with other men against her husband's wishes;

(5) remaining from home against the wishes of her husband except with her parents; (6) going to the circus, theatre or amphitheatre without the knowledge or contrary to the pro- hibition of her husband; (7) procuring abortion. If the husband divorced his wife for any one of these reasons he retained the dowry absolutely, or if there were children, with reversion to them. If he divorced her for any other reason, the enact- ments of Theodosius and Valentinian applied. In any case of a divorce, if the father or mother of either spouse had advanced the dowry and it would be forfeited by an unreasonable divorce, the consent of the father or mother was necessary to render the divorce valid.

Effect of Divorce on Children in the Law of Rome. — The custody of the children of divorced parents was dealt with by the Roman law in a liberal manner. A constitution of Diocletian and Maximian left it to the judge to determine in his discretion to which of the parents the children should go. Justinian enacted that divorce should not impair the rights of children either as to inheritance or maintenance. If a wife divorced her husband for good cause, and she remained unmarried, the children were to be in her custody, but to be maintained by the father; but if the mother was in fault, the father obtained the custody. If he was unable, from want of means, to support them, but she was able to do so, she was obliged to take them and support them. It is interesting to compare these provisions as to

childern with the practice at present under English law, which in this respect reflects so closely the spirit of the law of Rome.

The Canon Law of Divorce. — The canon law of Rome was based on two main principles: (1) That there could be no divorce a vinculo matrimonii, but only a mensa et thoro. The rule was stated in the most absolute terms: " Quamdiu vivit vir licet adulter sit, licet sodomita, licet flagitiis omnibus coopertus, et ab uxore propter haec scelera derelictus, maritus ejus reputatur, cui alterum vivum accipere non licet " (Caus. 32, Quaest. 7, c. 7). (2) That no divorce could be had at the will of the parties, but only by the sentence of a competent, that is to say, an ecclesiastical, court. In this negation of a right to divorce a vinculo matrimonii lies the broad difference between the doctrines of the Eastern and Western Churches of Christendom. The Greek Church, under- standing the words of Christ in thebroadersenseabovementioned, has always allowed complete divorce with a right to remarry for the cause of adultery. And it is said that the form at least of an anathema of the council of Trent was modified out of respect to difference on the part of the Greek Church (see Pothier 5. 6. 21). The papal canon law allowed a divorce a mensa et thoro for six causes: (1) adultery or unnatural offences; (2) impotency;

(3) cruelty; (4) infidelity; (s) entering into religion; (6) con- sanguinity. The Church, however, always assumed to itself the right to grant licences for an absolute divorce; and further, by claiming the power to declare marriages null and void, though professedly this could be done only in cases where the original contract could be said to be void, it was, and is to this day, undoubtedly extended in practice to cases in which it is impossible to suppose the original contract really void, but in which a complete divorce is on other grounds, desirable.

ENGLAND]

DIVORCE

337

Divorce in England

In England the law of divorce, originally based on the canon law of Rome, underwent some, though little, permanent change at the Reformation, but was profoundly modified by the exercise of the power of the state through legislation. From the canon law was

derived the principle that divorce could legally take place only by sentence of the court, and never at the will of the parties. Complete divorce has never been governed by any other principle than this; and in so far as an incomplete divorce has become practicable at the will of the parties, it has been by the intervention of civil tribunals and contrary to the law of the ecclesiastical courts. Those courts adopted as ground for divorce a mensa et thoro the main grounds allowed by Roman canon law, adultery and cruejty (Ayliffe, 22; Co. Lit. 102; 1 Salk. 162; Godolphin Abridg. 495). The causes of heresy and of entering into religion, if ever they were recognized in England, ceased to exist at the Reformation.

The principles upon which the English ecclesiastical courts proceeded in divorce a mensa et thoro are those which are still in force, and which (with some modification by statutory enactment) have been administered by judicial tribunals down to the present day. The courts by which the ecclesiastical law, and therefore the law of divorce, was administered were, until 1857, the courts of the various dioceses, including that of the archbishop of Canterbury, known as the Court of Arches, and that of the arch- bishop of York, known as the Conststory Court of York; but by statute a suitor was prevented from taking proceedings in any court except that determined by the residence of the person against whom proceedings were taken (23 Hen. VIII. c. 9) . From these courts an appeal lay to delegates appointed in each case by the crown, until the establishment of the judicial committee of the privy council in 1836, when the appeal was given to the crown as advised by that body.

The proof of adultery (to which Isidore in his Book of Ety- mologies gives the fanciful derivation of " ad alterius thorum ") was not by the canon law as received in England restricted by the operation of arbitrary rules. It was never, for example, required, as by the law of Mahomet, that the act should have been actually seen by competent witnesses, nor even that the case should be based on any particular kind of proof. It was recognized that the nature of the offence almost inevitably precluded direct evidence. One rule, however, appears to have commended itself to the framers of the canon law as too general in its application not to be regarded as a principle. The mere confession of the parties was not regarded as a safe ground of conviction; and this rule was formulated by a decretal epistle of Pope Celestine III., and, following it, by the 105th of the Canons of 1604. This rule has now been abrogated; and no doubt it is wiser not to fetter the discretion of the tribunal charged with the responsibility of decid- ing particular cases, but experience of divorce proceedings tends to confirm the belief that this rule of the canon law was

founded on an accurate appreciation of human nature.

Although, therefore, with the above exception, no strict rules of the evidence necessary to establish adultery have ever been established in the English courts, experience has indicated, and in former days judges of the ecclesiastical courts often expressed, the lines upon which such proof may be expected to proceed. It is necessary and sufficient, in general, to prove two things — first the guilty affection towards each other of the persons accused, and, secondly, an opportunity or opportunities of which, if so minded, their passion may have been gratified. It is obvious that any strong proof on either of these points renders strict proof on the other less needful; but when proof on both is afforded, the common sense of a tribunal, acting with a knowledge of human nature, may be trusted to draw the inevitable conclusion.

The definition of cruelty accepted by the ecclesiastical courts as that of the canon law is the same as that which prevails at the present time; and the view of the law taken by the House of Lords in Russell v. Russell (1897 App. Cas. 39s) was expressly based on the view of cruelty taken by the authorities of the ecclesiastical law. The best definition by older English writers

is probably to be found in Clarke's Praxis (p. 144) : " Si maritus fuerit erga uxorem crudelis et ferax ac mortem comminatus et machinatus fuerit, vel earn inhumaniter verbis et verberibus tractaverit, et aliquando venenum loco potus paraverit vel aliquod simile commiserit, propter quod sine periculo vitae cum marito cohabitare aut obsequia conjugalia impendere non audeat . . . consimili etiam causa competit viro contra mulierem." Lord Stowell, probably the greatest master of the civil and canon law who ever sat in an English court of justice, has in one of his most famous judgments (Evans v. Evans, 1790, 1 Hagg. Consist. 35) echoed the above language in words often quoted, which have constituted the standard exposition of the law to the present day. " In the older cases," he said, " of this sort which I have had the opportunity of looking into, I have observed that the danger of life, limb or health is usually insisted as the ground upon which the court has proceeded to a separation. This doctrine has been repeatedly applied by the court in the cases which have been cited. The court has never been driven off this ground. It has always been jealous of the inconvenience of departing from it, and I have heard no one case cited in which the court has granted a divorce without proof given of a reason- able apprehension of bodily hurt. I say an apprehension, because assuredly the court is not to wait till the hurt is actually done; but

the apprehension must be reasonable: it must not be an apprehension arising from an exquisite and diseased sensibility of mind. Petty vexations applied to such a constitution of mind may certainly in time wear out the animal machine, but still they are not cases of legal relief; people must relieve themselves as well as they can by prudent resistance, by calling in the succours of religion and the consolation of friends; but the aid of courts is not to be resorted to in such cases with any effect." The risk of personal danger in cohabitation constituted, therefore, the foundation of legal cruelty. But this does not exclude such conduct as a course of persistent ill-treatment, though not amounting to personal violence, especially if such ill-treatment has in fact caused injury to health. But the person complaining must not be the author of his or her own wrong. If, accordingly, one of the spouses by his or her conduct is really the cause of the conduct complained of, recourse to the court would be had in vain, the true remedy lying in a reformation of the real cause of the disagreement.

In addition to a denial of the charge or charges, the canon law allowed three grounds of answer: (1) Compensatio criminis, a set-off of equal guilt or recrimination. This principle is no doubt derived from the Roman law and it had the effect of refusing to one guilty spouse the remedy of divorce against the other although equally guilty. It was always accepted in England, although not in other countries, such as France and Scotland, which also followed the canon or civil law. In strictness, recrimination applied to a similar offence having been committed by the party charging that offence. But a decision (1888) of the English courts shows that a wife who had committed adultery could not bring a suit against her husband for cruelty (Otway v. Otway 13 P. D. 141). (2) Condonation. If the complaining spouse has, in fact, forgiven the offence complained of, that constitutes a conditional bar to any proceedings. The main and usual evidence of such forgiveness is constituted by a renewal of marital intercourse, and it is difficult— perhaps impossible — to imagine any case in which such intercourse would not be held to establish condonation. But condonation may be proved by other acts, or by words, having regard to the circumstances of each case. Condonation is, however, always presumed to be conditional on future good behaviour, and misconduct even of a different kind revives the former offence. (3) Connivance constitutes a complete answer to any charge. Nor need the husband be the active agent of the misconduct of the wife. Indifference or neglect imputable to a corrupt intention are sufficient. It will be seen presently that modern statute law has gone further in this direction. It is to be added that

the connivance need not be of the very act complained of, but may be of an act of a similar kirM. A learned judge, recalling the classical anecdote of Maecenas and Galba, said, " A husband is not permitted to say non omnibus dormio." The

ecclesiastical courts also considered themselves bound to refuse relief if there was shown to be collusion between the parties. In its primary and most general sense collusion was understood to be an agreement between the parties for the purpose of deceiving the court by false or fictitious evidence; for example, an agreement to commit, or appear to commit, an act of adultery. Collusion, however, is not limited to the imposing of other than genuine evidence on the court. It extends to an agreement to withhold any material evidence; and indeed is carried further, and held to extend to any agreement which may have the effect of concealing the real and complete truth from the court (see Churchward v. Churchward, 1894, p. 161). This doctrine was of considerable importance even in the days when only divorces a mensa et thoro were granted, because at that time the parties were not permitted to separate by consent. At the present day it has become, with regard to divorce a vinculo matrimonii, a rule of greater and of more far-reaching importance.

The canon law as accepted in England, while allowing divorces of the nature and for the causes above mentioned, actively inter- fered to prevent separation between husband and wife in any other manner. A suit known as a suit for restitution of conjugal rights could be brought to compel cohabitation; and on evidence of the desertion of either spouse, the court ordered a return to the matrimonial home, though it carried no further its authority as to the matrimonial relations within the home. To this suit an agreement between the parties constituted no answer. But an answer was afforded by any conduct which would have supported a decree of divorce a mensa et thoro. It is a question whether, indeed, the ecclesiastical courts would not have gone further, and refused a decree of restitution of conjugal rights on grounds which might appear adequate to justify such refusal, though not sufficient on which to ground a decree of divorce. The view of the court of appeal and the House of Lords has given some colour to this opinion, and certainly the court of appeal has held, although perhaps somewhat hastily, that the effect of a

modern statute has been to allow the court to refuse restitution of conjugal rights for causes falling short of what would constitute ground for divorce {Russell v. Russell, 1895, p. 315).

The ecclesiastical courts provided for the pecuniary rights of the wife by granting to her alimony during the progress of the suit, and a proper allowance after its termination in cases in which she was successful. Such payments were dependent on the pecuniary means, ox faculties, as they were termed, of the husband, and were subject to subsequent increase or diminution in proper cases. But the ecclesiastical courts did not deal with the custody of the children of the marriage, it being probably considered that that matter could be determined by the common law rights of the father, or by the intervention of the court of chancery.

The canon law fixed no period of limitation, either in respect of a suit for divorce or for restitution of conjugal rights; but, as regards at least suits for divorce, any substantial delay might lead to the imputation of acquiescence or even condonation. To that extent, at least, the maxim vigilantibu-s non dormientibus jura subveniunt applied.

It is remarkable that desertion by either party to a marriage, except as giving rise to a suit for restitution, was not treated as an offence by canon law in England. It formed no ground for a suit for divorce, and constituted no answer to such a suit by way of recrimination. It might indeed deprive a husband of his remedy if it amounted to connivance, or perhaps even if it amounted only to culpable neglect.

The canon law, as administered in England, has kept clear the logical distinction which exists between dissolving a marriage and declaring it null and void. The result has been that, in England at least, the two proceedings have never been allowed to pass into one another, and a complete divorce has not been granted on pretence of a cause really one for declaring the marriage void ab initio. But for certain causes the courts were prepared to declare a marriage null and void on the suit of either party. There is, indeed, a distinction #0 be drawn between a marriage void or only voidable, though in both cases it became the subject of a similar declaration. It was void in the cases of incapacity of the parties

to contract it, arising from want of proper age, or consanguinity, or from a previous marriage, or from absence of consent, a state of things which would arise if the marriage were compelled by force or induced by fraud as to the nature of the contract entered into or the

personality of the parties. It is to be remarked that, in England at least, the idea of fraud as connected with the solemnization of marriage has been kept within these narrow limits. Fraud of a different kind, such as deception as to the property or position of the husband or wife, or antecedent impurity of the wife, even if resulting in a concealed pregnancy, has not in England (though the last-mentioned cause has in other countries) been held a ground for the vitiation of a marriage contract. A marriage was voidable, and could be declared void, on the ground of physical incapacity of either spouse, the absence of intercourse between the parties after a sufficient period of opportunity being almost, if not quite, conclusive on this subject.

With regard to one cause of nullity the legislation interfered from consideration, it is said, of a case of special hardship. Before the Marriage Act of 1835 marriages within the prohibited degrees of consanguinity and affinity were only voidable by a decree of the court, and remained valid unless challenged during the lifetime of both the parties. But this act, while providing that no previous marriage between persons within the pro- hibited degrees should be annulled by a decree of the ecclesiastical court pronounced in a suit depending at the time of the passing of the act, went on to render all such marriages thereafter con- tracted in England " absolutely null and void to all intents and purposes whatever."

Another suit was allowed by the ecclesiastical courts which should be mentioned, although its bearing on divorce is indirect. This was the suit for jactitation of marriage, which in the case of any person falsely asserting his or her marriage to another, allowed such person to be put to perpetual silence by an order of the court. This suit, which has been of rare occurrence (though there was an instance, Thompson v. Rourke, in 1892), does not appear to have been used for the purpose of determining the validity of a marriage. The legislature, has, however, in the Legitimacy Declaration Act of 1858, provided a ready means by which the validity of marriages and the legitimacy of children can be determined, and the procedure provided has repeatedly been utilised.

It should be added, as a matter closely akin to the proceedings in the ecclesiastical courts, that the common law took cognizance of one phase of matrimonial relations by allowing an action by the husband against a paramour, known as an action for criminal conversation. In such an action a husband could recover damages estimated according to the loss he was supposed to have sustained by the seduction and loss of his wife, the punishment of the seducer not

being altogether excluded from consideration. Although this action was not unfrequently (and indeed, for the purposes of a divorce, necessarily) brought, it was one which naturally was regarded with disfavour.

Effect of the Reformation. — Great as was the indirect effect of the Reformation upon the law of divorce in England, the direct effect was small. It might, indeed, have been supposed that the disappearance of the sacramental idea of marriage entertained by the Roman Church would have ushered in the greater freedom of divorce which had been associated with marriage regarded as a civil contract. And to some extent this was the case. It was for some time supposed that the sentences of divorce pronounced by the ecclesiastical courts acquired the effect of allowing remarriage, and such divorces were in some cases granted. In Lord Northampton's case in the reign of Edward VI. the delegates pronounced in favour of a second marriage after a divorce a mensa et thoro. It was, however, finally decided in Foljambe's case, in the 44th year of Elizabeth, that a marriage validly contracted could not be dissolved for any cause. But the growing sense of the right to a complete divorce for adequate cause, when no longer any religious law to the contrary could be validly asserted, in time compelled the discovery of a remedy. The commission appointed by Henry VIII. and Edward VI. to reform the ecclesiastical law drew up the elaborate report known

as the Reformatio Legum, and in this they recommended that divorces a mensa et thoro should be abolished, and in their place complete divorce allowed for the causes of adultery, desertion and cruelty. These proposals, however, never became law. In 1669 a private act of parliament was granted in the case of Lord de Roos, and this was followed by another in the case of the duke of Norfolk in 1692. Such acts were, however, rare until the accession of the House of Hanover, only five acts passing before that period. Afterwards their number considerably increased. Between 1715 and 1775 there were sixty such acts, in the next twenty-five years there were seventy-four, and between 1800 and 1850 there were ninety. In 1829 alone there were seven, and in 1830 nine.

The jurisdiction thus assumed by parliament to grant absolute

divorces was exercised with great care. The case was fully investigated before a committee of the House of Lords, and not only was the substance of justice so secured, but the House of Lords further required that application to parliament should be preceded by a successful suit in the ecclesiastical courts resulting in a decree of divorce a mensa et thoro, and in the case of a husband being the applicant, a successful action at common law and the recovery of damages against the paramour. In this way, and also, if needful, on its own initiative, the House of Lords provided that there should be no connivance or collusion. Care was also taken that a proper allowance was secured to the wife in cases in which she was not the offending party. This procedure is still pursued in the case of Irish divorces.

It is obvious, however, that the necessity for costly proceedings before the Houses of Parliament imposed great hardship on the mass of the population, and there can be little doubt that this hardship was deeply felt. Repeated proposals were made to parliament with a view to reform of the law, and more than one commission reported on the subject. It is said that the final impetus was given by an address to a prisoner by Mr Justice Maule. The prisoner's wife had deserted him with her paramour, and he married again during her lifetime. He was indicted for bigamy, and convicted, and Mr Justice Maule sentenced him in the following words: — " Prisoner at the bar: You have been convicted of the offence of bigamy, that is to say, of marrying a woman while you had a wife still alive, though it is true she has deserted you and is living in adultery with another man. You have, therefore, committed a crime against the laws of your country, and you have also acted under a very serious misappre- hension of the course which you ought to have pursued. You should have gone to the ecclesiastical court and there obtained against your wife a decree a mensa et thoro. You should then have brought an action in the courts of common law and re- covered, as no doubt you would have recovered, damages against your wife's paramour. Armed with these decrees, you should have approached the legislature and obtained an act of parliament which would have rendered you free and legally competent to marry the person whom you have taken on yourself to marry with no such sanction. It is quite true that these proceedings would have cost you many hundreds of pounds, whereas you probably have not as many pence. But the law knows no dis- tinction between rich and poor. The sentence of the court upon you, therefore, is that you be imprisoned for one day, which period has already been exceeded, as you have been in custody since the commencement of the assizes." The grave irony of the learned judge

was felt to represent truly a state of things well- nigh intolerable, and a reform in the law of divorce was felt to be inevitable. The hour and the man came in 1857, the man in the person of Sir Richard Bethell (afterwards Lord Westbury), then attorney-general.

The Act of 1857. — Probably few measures have been conceived with such consummate skill and knowledge, and few conducted through parliament with such dexterity and determination. The leading opponent of the measure was Mr Gladstone, backed by the zeal of the High Church party and inspired by his own matchless subtlety and resource. But the contest proved to be unequal, and after debates in which every line, almost every word, of the measure was hotly contested, especially in the House of

Commons, the measure emerged substantially as it had been introduced. Not the least part of the merit and success of the act of 1857 is due to the skill which, while effecting a great social change, did so with the smallest possible amount of innovation. The act (which came into operation on the 1st of January 1858) embodied two main principles: 1. The constitution of a lay court for the administration of all matters connected with divorce. 2. The transfer to that court, with as little change as possible, of the powers exercised in matrimonial matters by (a) the House of Lords, (b) the ecclesiastical courts, (c) the courts of ˆcommon law.

The Constitution of the Court. — The new court, termed " The Court for Divorce and Matrimonial Causes," was constituted by the lord chancellor, the chiefs and the senior puisne judges of the three courts of common law, and the judge of the court of probate (which was also established in 1857), but the functions of the court were practically entrusted to the judge of the court of probate, termed the "Judge Ordinary," who thus in matters of probate and divorce became the representative of the former ecclesiastical jurisdiction. The judge ordinary was empowered either to sit alone or with one or more of the other judges to constitute a full court. The parties to a suit obtained the right of trial by jury of all disputed questions of fact; and the rules of evidence of the common law courts were made to apply. An appeal to the full court was given in all matters, which the judge ordinary was enabled to hear sitting alone.

1. To this court were transferred all the powers of the ecclesi- astical courts with regard to suits for divorce a mensa et thoro, to which the name was given of suits for " judicial separation," nullity, restitution of conjugal rights, and jactitation of marriage, and in all such proceedings it was expressly enacted (sec. 22) that the court should

act on principles and rules as nearly as possible conformable to the principles and rules of the ecclesiastical courts. Judicial separation could be obtained by either husband or wife for adultery, or cruelty, or desertion continued for two or more years.

2. There were also transferred to the court powers equivalent to those exercised by the legislature in granting absolute divorce. The husband could obtain a divorce for adultery, the wife could obtain a divorce for adultery coupled with cruelty or desertion for two or more years, and also for incestuous or bigamous adultery, or rape, or unnatural offences. The same conditions as had been required by the legislature were insisted on. A petition for dissolution (sec. 30) was to be dismissed in case of connivance, condonation or collusion; and further, the court had power, though it was not compelled, to dismiss such petition if the petitioner had been guilty of adultery, or if there had been unreasonable delay in presenting or prosecuting the petition, or if the petitioner had been guilty of cruelty or desertion without reasonable excuse, ot of wilful neglect or misconduct conducing to the adultery. The exercise of these discretionary powers of the court, just and valuable as they undoubtedly are, has been attended with some difficulty. But the view of the legislature has on the whole been understood to be that the adultery of a petitioner should not constitute a bar to his or her proceeding, if it has been caused by the misconduct of the respondent, and that cruelty should not constitute such a bar unless it has caused or contributed to the misconduct of the respondent. But the court, while regarding its powers as those of a judicial and not an arbitrary discretion, has declined to fetter itself by any fixed rule of interpretation or practice.

It is to be observed that this act assigned a new force to desertion. The ecclesiastical law regarded it only as suggestive of connivance or culpable neglect. But the act of 1857 made it

(1) a ground of judicial separation if continued for two years,

(2) a ground in part of dissolution of marriage if continued for the same period, (3) a bar, in the discretion of the court, to a petition for dissolution, though it was not made in a similar way any bar to a suit for judicial separation. It is also to be observed that the act was confined to causes of divorce recognized by the ecclesiastical law as administered in England. It did not either extend the causes of a suit for nullity by adding such grounds as

antenuptial incontinence, even if accompanied with pregnancy, nor did it borrow from the civil law of Rome either lunacy or crime as grounds for divorce.

Much comment has been made on the different grounds on which divorce is allowed to a husband and to a wife,— it being necessary to prove infidelity in both cases, but a wife being compelled to show either an aggravation of that offence or an addition to it. Opinions probably will always differ whether the two sexes should be placed on an equality in this respect, abstract justice being invoked, and the idea of marriage as a mere contract pointing in one direction, and social considerations in the other. But the reason of the legislature for making the distinction is clear. It is that the wife is entitled to an absolute divorce only if her reconciliation with her husband is neither to be expected nor desired. This was no doubt the view taken by the House of Lords. In 1801 a Mrs Addison claimed an absolute divorce on the ground of her husband's incest with her sister. The matter was long debated, but Lord Thurlow, who appeared in the House of Lords for the last time in order to support the bill, turned the scale by arguing that it was improper that the wife should under such circumstances return to her husband (see Campbell, Lives of the Chancellors, vii. 145). " Why do you," he said, " grant to the husband a divorce for the adultery of the wife? Because he ought not to forgive her, and separation is inevitable. Where the wife cannot forgive, and separation is inevitable by reason of the crime of the husband, the wife is entitled to the like remedy."

The act (sec. 32) provided, in case of dissolution, for mainten- ance of the wife by the husband on principles similar to those recognized by the ecclesiastical courts, and (sec. 45) for the settle- ment of the property of a guilty wife on her husband or children; but this enactment was imperfect, as provision was made only for a settlement and not for payment of an allowance, and none was made for altering settlements made in view or in consequence of a marriage. The act (sec. 35) provides also in all divorce proceedings, and also in those of nullity, for provision for the custody, maintenance and education of children by the court: provisions of great value, which were unfortunately for some time limited by an erroneous view of the court that the age of the children to which such provisions applied should be considered limited to sixteen. The act of 1857 also transferred to the new court the powers exercised by the

common law courts in the action for criminal conversation. It was made obligatory to join an alleged adulterer in the suit, and damages (sec. 33) might be claimed against him, and he might be ordered to pay the cost of the proceedings (sec. 34), the extent depending upon the circumstances of each case. 1

The act of 1857 in one respect went beyond a transfer of the powers exercised by the ecclesiastical courts or the legislature. It provided (sec. 21) that a wife deserted by her husband might apply to a magistrate in petty sessions and obtain an order which had the effect of protecting her earnings and property, and during the currency of such order of protection a wife was to be in the same position as if she had obtained an order for judicial separation. The effect of this section appears to have been small; but the Summary Jurisdiction (Married Women) Act 1895 has afforded a cheap and speedy remedy to all classes.

The framers of the act of 1857 were careful to avoid offending the scruples of clergymen who disapproved of the complete dissolution of marriage by a lay court. It was provided (sees.

1 In Constantinidi v. Constantinidi and Lance (1903), in which both parties were guilty of misconduct, it was held by Sir Francis Jeune (Lord St Helier) that where a wife has by her misconduct broken up the home (the husband's misconduct not having conduced to the wife's adultery) the court would exercise its discretion in favour of the husband petitioner, and, further, the wife being a rich woman, it was justifiable to give her husband a portion of her income, in order to preserve to him the position he would have occupied as her husband, the broad principle being that a guilty respondent should not be allowed to profit by divorce. But further litigation concerning this case occurred as to the variation of the marriage settlements in favour of the husband, and the decision of the court of appeal in July 1905 considerably modified the decision of Sir Francis Jeune. —Ed. E. B.

57 and 58) that no clergyman should be compelled to solemnize the marriage of any person whose former marriage had been dissolved on the ground of his or her adultery, but should permit any other clergyman to solemnize the marriage in any church or chapel in which the parties were entitled to be married. It is to be feared that this concession, ample as it appears, has not allayed conscientious objections, which are perhaps from their nature insuperable. The act made no provision as to the name to be borne by a wife after a divorce; and this omission led to litigation in the case of a peer's

wife, in Cowley v. Cowley, in which Lady Cowley was allowed to retain her status.

Modifications of the Act of 1857. — Subsequent legislation has made good many of the defects of the act of 1857. In 1859 power was given to the court, after a decree of dissolution or of nullity of marriage, to inquire into the existence of ante- and post-nuptial settlements, and to make orders with respect to the property settled either for the benefit of children of the marriage or their parents; and a subsequent act (41 & 42 Vict. c. 19, s. 3) removed a doubt which was entertained whether these powers could be exercised if there were no children of the marriage. In i860 a very important change was made, having for its object a practical mode of preventing divorces in cases of connivance and collusion or of misconduct of the petitioner. It was provided that a claim of dissolution (a provision afterwards extended to decrees of nullity) should in the first instance be a decree nisi, which should not be made absolute until the expiration of a period then fixed at not less than three, but by subsequent legislation enlarged to not less than six, months. During the interval which elapsed between the decree nisi and such decree being made absolute, power was given to any person to intervene in the suit and show cause why the decree should not be made absolute, by reason of the same having been obtained by collusion, or by reason of material facts not brought before the court; and it was also provided that, at any time before the decree was made absolute, the queen's proctor, if led to suspect that the parties were acting in collusion for the purpose of obtaining a divorce contrary to the justice of the case, might under the direction of the attorney-general intervene and allege such case of collusion. This enactment (extended in the year 1873 to suits for nullity) was ill drawn and unskilfully conceived. The power given to any person whomsoever to intervene is no doubt too wide, and practically has had little or no useful effect as employed by friends or enemies of parties to a suit. The limitation in terms of the express power of the queen's proctor to intervene in cases of collusion was undoubtedly too narrow. But the queen's proctor, or the official by whom that officer was afterwards represented, has in practice availed himself of the general authority given to any person to show cause why a decree nisi should not be made absolute, and has thus been enabled to render such important service to the administration of justice that it is difficult to imagine the due execution of the law of divorce by a court with- out such assistance. By the Matrimonial Causes Act 1866 power was given to the court to order an allowance to be paid by a guilty husband to a wife on a dissolution of marriage. This act also can hardly be

considered to have been drawn with sufficient care, inasmuch as while it provides that if the husband's means diminish, the allowance may be diminished or suspended, it makes no corresponding provision for increase of the allowance if the husband's means increase; nor, apparently, does it permit of an allowance in addition to, but only in substitution for, a settlement. The act makes no provision for allowance to a guilty wife, and it certainly is a serious defect that the power to grant an allowance does not extend to cases of nullity. In 1868 an appeal to the House of Lords was given in cases of decree for dissolution or nullity of marriage.

The great changes effected by the Judicature Acts included the court for divorce and matrimonial causes. Under their operation a division of the high court of justice was constituted, under the designation of the probate division and admiralty division, to which was assigned that class of legal administration governed mainly by the principles and practice of the canon and civil law. The division consists of a president, and a justice of the high

court, with registrars representing each branch of the juris- diction. Appeals lie to the court of appeal, and thence to the House of Lords.

In 1884 the legislature interfered to prevent imprisonment being the result of disobedience to an order for restitution of conjugal rights. That mode of enforcing the order of the court was abolished, and the matter was left to a proper adjustment of the pecuniary relations of the husband and wife; and a respondent disobeying such an order was held to be guilty of desertion without reasonable cause, such desertion having further given to it a similar effect to that assigned to desertion for two years or upwards. The effect of this provision has been that the suit for restitution of conjugal rights is most frequently brought for the purpose of shortening the time within which a wife can obtain a decree for dissolution of marriage.

Proceedings in the divorce court have shown the improvement in the law of evidence which has been effected with regard to other legal proceedings. The act of 1857 made an inroad on the former law, which prohibited evidence being given by parties interested in the proceedings, by allowing a petitioner (sec. 43) to be called and examined by order of the court, absolving such petitioner, however, from the necessity of answering any question tending to show that he

or she had been guilty of adultery. In the next year power was given to the court to dismiss any person, with whom a party to the suit was alleged to have committed adultery, from the suit if there should not appear to be sufficient evidence against him or her, the object being to allow such person to give evidence; and in 1859 it was provided that, on a petition by a wife for a divorce on the grounds of cruelty or desertion with adultery, the husband and wife could be competent and compellable witnesses as to the cruelty or desertions A few years later, however, in 1869, the subject was finally dealt with by repealing all previous rules which limited the powers to give evidence on questions of adultery with the safeguard that no witness in any proceeding can be asked or bound to answer any question tending to show that he or she has been guilty of adultery, unless in the same proceeding such witness shall have given evidence in disproof of his or her alleged adultery. It has been held that the principles of these enactments apply to interrogatories as well as to evidence given in court.

It is a most remarkable omission in the act of 1857, especially when we remember the high legal authority from whom it pro- ceeded, that the act nowhere defines the class of persons with regard to whom the jurisdiction of the court should be exercised. This omission has given rise to a misapprehension of the law which, though now set at rest, prevailed for a considerable period, and has undoubtedly led to the granting of divorce in several cases in which it could not legally be given. It was supposed that the court could grant a dissolution of marriage to all persons who had anything more than a casual and fleeting residence within the jurisdiction of the court; and this view, although its correctness was doubted by Lord Penzance, the judge of the divorce court, was upheld by a majority of the judges of the court of appeal in the case of Niboyet v. Niboyet (4 P. D. 1). It was supposed that such residence gave what was termed a matri- monial domicile. But this view was undoubtedly erroneous as regards dissolution of marriage, although probably correct as regards judicial separation, and the true view is no doubt that indicated with great learning and ability by Lord Watson in a judgment given by him in the privy council in the case of Le Mesurier v. Le Mesurier (189s, App. Cas. 517), that the only true test of jurisdiction for a decree of divorce altering the status of the parties to a marriage is to be found in the domicile of the spouses— that is to say, of the husband, as the domicile of a wife follows that of her husband— at the time of the divorce. Domicile means a person's permanent home, the place at which he resides with no intention of making his home elsewhere, and, if he leaves it, with the intention of returning to it.

It is now also clearly recognized as the law of England that the English courts will not recognize a divorce purporting to be made by a foreign tribunal with regard to persons domiciled in England. For a considerable time doubt appears to have clouded the law

on this subject. In a famous case known as Lolley's case, decided in 181 2, the judges of England (the point arose in connexion with a criminal charge) unanimously held " that no sentence or act of any foreign country or any state could dissolve an English marriage a vinculo matrimonii for grounds on which it was not liable to be dissolved a vinculo matrimonii in England." This case has been frequently understood as deciding that a marriage celebrated in England cannot be dissolved elsewhere, and on this point the courts of Scotland differ from the view supposed to be taken by the English judges. But the matter has been fully explained in one of the most masterly of Lord Hannen's judg- ments (Harvey v. Fairnie, 5. P. D. 154), afterwards upheld by the House of Lords in 1882 (8 App. Cas. 43) ; and it is now clear that while the parties are domiciled in this country no decree of any foreign court dissolving their marriage will be recognized here, unless it proceed on the grounds on which a divorce may be obtained in this country, and even the exception just mentioned appears to rest rather on reasoning and principle than on the authority of any decided case. This principle received the highest sanction in the prosecution of Earl Russell for bigamy before the House of Lords (1901), in which it was held that, where a divorce had been refused him in England, an American divorce would not relieve a man from the guilt of marrying again. Summary Proceedings for Separation. — The legislature has sought to extend the relief afforded by the courts in matrimonial causes by a procedure fairly to be considered within the reach of all classes. In 1895 an act was passed which re-enacted in an improved form the provisions of an act of 1878 of similar effect. By the act of 1895 power was given to a married woman whose husband (1) has been guilty of an aggravated assault upon her within the Offences against the Person Act 1861, or (2) convicted on indictment of an assault on her and sentenced to pay a fine of more than £5 or to imprisonment for more than two months, or (3) shall have deserted her, or (4) been guilty of persistent cruelty to her or wilful neglect to maintain her or her infant children, and by such cruelty or neglect shall have caused her to leave and live apart from him, to apply to a court of summary jurisdiction and to obtain an order containing all or any of the following provisions: — (1) that the applicant be not forced to cohabit with her husband, (2) that the applicant have the custody of

*any children under sixteen years of age, (3) that the husband pay to her an allowance not exceeding £2 a week. The act pro- vides that no married woman guilty of adultery should be granted relief, but with the very important proviso, altering as it does the rule of the common law, that the husband has not conduced or connived at, or by wilful neglect or misconduct conduced to, such adultery. The provisions of this act * have been largely put in force, and no doubt to the great advantage of the poorer classes of the community. It will be observed that the act is unilateral, and affords no relief to a husband against a wife; and the complaint is often heard that no misconduct of the wife, except adultery, relieves the husband from the necessity of maintaining her and allowing her to share his home, unless he can obtain access to the high court. 2*

Separation Deeds. — Although nothing in the development of the law of divorce has tended to give to married persons the right absolutely to dissolve their marriage by consent, and, on the contrary, any such agreement would be held to be strong evidence of collusion, the view of the Church expressed in the ecclesiastical law has been entirely departed from as regards agreements for separation. Such agreements were embodied in deeds, and usually contained mutual covenants not to sue in the ecclesi- astical courts for restitution of conjugal rights. The ecclesiastical

1 It is to be noted that by a decision of the court of appeal in Harriman v. Harriman in 1909, where a wife has been deserted by her husband and has obtained a separation order within two years from the time when the desertion commenced, she loses her right to plead desertion under the Matrimonial Causes Act 1857, and is therefore not entitled to a divorce after two years' desertion, upon proof of adultery. See also Dodd v. Dodd, 1906, 22 T. L. R. 484. _

2 In 1909 a Royal Commission was appointed to inquire into the law of divorce, with special reference to the position of the poorer classes.

courts, however, wholly disregarded such agreements, and considered them as affording no answer to a suit for restitution of conjugal rights. For a considerable period the court of chancery

refused to enforce the covenant in such deeds by re- straining the parties from proceeding to the ecclesiastical courts. But at last a memorable judgment of Lord Westbury (1861) asserted the right (Hunt v. Hunt, 4 De G. F. & J. 221; see also Marshall v. Marshall, 5 P. D. 19) of the court of chancery to maintain the claim of good faith in this as in other cases, and restrained a petitioner from suing in the ecclesiastical court con- trary to his covenant. Thereafter these deeds became common, and no doubt often afford a solution of matrimonial difficulties of very great value. When the courts of the country became united under the Judicature Acts, it became practicable to set up in the divorce division a separation deed in answer to a suit for restitution of conjugal rights without the necessity of recourse to any other tribunal.

Statistics. — The statistics of divorce in England have for some years been regularly published in the volumes of judicial statistics published annually by the Home Office.

The number of petitions for divorce (including in the term both divorce a mensa et thoro and divorce a vinculo) for the years from 1858 to 1905 inclusive are as follows: — •

469 451 536 551 632

555 615 589 481

561 647

541 708 662 680 654

It is probably impossible to account for the variations which the above table discloses. It was no doubt natural that the year im- mediately succeeding the passing of the act which originated facilities for divorces a vinculo should exhibit a larger number of divorces than its successors for a considerable period. But there does not appear to be any adequate cause for the comparative increase which seems to have prevailed in the decade between 1878 and 1888, unless it be found in the increase of marriages which culminated in 1873 an d 1883, falling after each of those years. The number of marriages again rose high in 1891 and 1892, and this may account for the increased number of divorces in 1896 and the following years. But it may certainly be said with confidence that as compared with the growth of population the number of divorces in England has shown no alarming increase.

The total number of petitions in matrimonial causes presented by

husbands exceed those presented by wives, but in no marked degree. This excess would seem to be due to the fact that the larger number of petitions for dissolution presented by husbands, owing no doubt to the difference in the law affecting the two sexes, is not entirely counterbalanced by the much larger number of petitions for judicial separation presented by wives. The following figures for various years may be taken as typical : —

1858

. 326

1874

1859

. 291

1875

i860

. 272

1876

1861

■ *236*

1877

1862

. 248

1878

1863

. 298

1879

1864

• *297*

1880

1865

. 284

1881

1866

■ *279*

1882

1867

• *294*

1883

1868

• *303*

1884

1869

• *351*

1885

1870

• *351*

1886

1871

• *384*

1887

1872

• *374*

1888

1873

. 416

1889

1890 .

644

1891 .

632

1892 .

629

1893 •

645

1894 .

652

1895 •

683

1896 .

772

1897 •

781

1898 .

75°

1899 .

727

1900 .

698

1901 .

848

1902 .

987

1903 .

914

1904 .

822

1905 •

844

1895

1896

1897

1898

1899

1905

Petitions for Dissolution —

Presented by husbands .

353

393

414

401

383

429

Presented by wives .

220

280

269

243

262

323

Petitions for Judicial Separa-

tion —

Presented by husbands .

4

3

2

4

4

5

Presented by wives .

106

96

96

102

78

87

Totals —

Presented by husbands .

357

396

416

4°5

387

434

Presented by wives

326

376

365

345

340

410

Speaking generally, it may be said that about 70 % of the petitions presented are successful and result in decrees. This percentage has a tendency, however, to rise.

Attempts have been made to ascertain the classes which supply the petitioners for divorce, but this cannot be done with such certainty as to warrant any but the most general conclusions. It may, however, safely be said that while all classes, professions and occupations are represented, it is certainly not those highest in the

scale that are the largest contributors. The principles of the act ol 1857 have beyond question been justified by the relief required by and afforded to the general community.

Other European Countries

We may now turn to the law of divorce as administered in the other countries of the modern world. On the main question whether marriage is to be considered indissoluble they will be found to range themselves on one side or the other according to the influence upon them of the Church of Rome and its canon law.

In Scotland it has long been the law that marriage can be dis- solved at the instance of either party by judicial sentence on the grounds of adultery or of desertion, termed non-adherence, and the spouses could in such case remarry, except with the paramour, — at all events if the paramour was named in the decree (and the name is sometimes omitted for that reason). A divorce a mensa et thoro could also be granted for cruelty. By the Court of Session Act 1830, the jurisdiction in divorce was transferred from a body of commissaries to the court of session.

By the law of Holland complete divorce could be granted by judicial sentence on the grounds of adultery or of wilful and malicious desertion, to which were added unnatural offences and imprisonment for life, and such divorce gave the power of re- marriage, except with the person with whom adultery was proved to have been committed, but there would seem to be a doubt whether this power extended to the guilty party (Voet, De divortiis, lit. 24, tit. 2). Divorce a mensa et thoro could be granted on the grounds allowed by the canon law.

The Code of Prussia of 1794 contained elaborate provisions which gave great facility of divorce. A complete divorce could be obtained by judicial sentence for the following causes: — (1) Adultery or unnatural offences; and adultery by a husband formed no bar to his obtaining a divorce against his wife for adultery; and even an illicit intimacy, from which a presumption of adultery might arise, was held sufficient for a divorce. (2) Wil- ful desertion. (3) Obstinate refusal of the rights of marriage, which was considered as equivalent to desertion. (4) Incapacity to perform the duties of marriage, even if arising subsequent to the marriage; and the same effect was assigned to other incur- able bodily defects that excited disgust and horror. (5) Lunacy, if after a year there was no reasonable hope of recovery. (6) An attempt on the life of one spouse by the other, or gross and unlawful attack on the honour or personal liberty. (7) Incom- patibility of temper and quarrelsome disposition, if rising to the height of endangering life or health. (8) Opprobrious crime for which either spouse has suffered imprisonment, or a knowingly false accusation of such crime by one spouse of the other. (9) If either spouse by unlawful transactions endangers the life, honour, office or trade of the other, or commences an ignominious em- ployment. (10)

Change of religion. In addition to these causes, marriages, when there were no children, could be dissolved by mutual consent if there be no reason to suspect levity, precipita- tion or compulsion; and a judge had also power to dissolve a marriage in cases in which a strongly rooted dislike appeared to him to exist. In all cases of divorce, but sometimes subject to the necessity of obtaining a licence, remarriage was permissible (see Burge, Commentaries on Colonial and Foreign Law, vol. i.

649).

Before 1876 only a divorce a vinculo could be obtained in some of the German states, especially if the petitioner were a Roman Catholic. The only relief afforded was a " perpetual separation." By the Personal Status Act 1875 perpetual separa- tion orders were abolished and divorce decrees allowed in cases where the petitioners would, under the former law, have been entitled to a perpetual separation order. However, two Drafting Commissions under the act declined to alter the new rule, but under pressure from the Roman Catholic party the Reichstag passed a law introducing a modified separation order, termed " dissolution of the conjugal community " (Aufhebung der ehelichen Gemeinschafi) . This order can be converted into a dissolution of the marriage at the option of either party. Under the Civil Code of 1900 a petitioner can obtain a divorce or judicial

separation on "absolute" or "relative" grounds. In the former case if the facts are established the petitioner is entitled to the relief prayed for; in the latter case, it is left to judicial discretion. The absolute grounds are adultery, bigamy, sodomy, an attempt against the petitioner's life or wilful desertion. The relative grounds are (a) such grave breach of marital duty or dishonourable or immoral conduct as would disturb the marital relation to such an extent that the marriage could not reasonably be expected to continue; (b) insanity, continued f of more than three years during the marriage, and of so severe a nature that intellectual community between the parties has ceased and is not likely to be re-established. A divorced wife, if not exclusively the guilty party, may retain her husband's name; but if ex- clusively guilty, her former husband may compel her to resume

her maiden name.

By the law of Denmark, according to the Code of King Christian the Fifth, complete divorce could be obtained for incest; for leprosy, whether contracted before or after marriage; for trans- portation for crime or flight from justice, after three years, though not for crime itself; and for exile not arising from crime, after seven years.

In Sweden complete divorce is granted by judicial sentence for adultery, and in Russia for that cause and also for incompati- bility of temper (Ayliffe, Par. 49). On the other hand, in Spain marriage is indissoluble, and the ecclesiastical courts have retained their exclusive cognizance of matrimonial causes. In Italy certain articles of the Civil Code deal with separation, voluntary and judicial, but divorce is not allowed in any form.

In France the law of divorce has had a chequered history. Before the Revolution the Roman canon law prevailed, marriage was considered indissoluble, and only divorce a mensa et thoro, known as la separation d' habitation, was permitted; though it would appear that in the earliest age of the monarchy divorce a vinculo matrimonii was allowed. La separation d'habitation was granted at the instance of a-wife for cruelty by her husband or false accusation of a capital crime, or for habitual treatment with contempt before the inmates of the house; but a wife could not obtain a separation for adultery by her husband, although he had his remedy in case of adultery by his wife. In every case the sentence of a judicial tribunal, which took precautions against collusion, was necessary. But the Revolution may be said to have swept away marriage among the institutions which it over- whelmed, andbiy the law of the 20th of September 1792 so great facility was given for divorce a vinculo matrimonii as practically to terminate the obligations of marriage. A reaction came with the Code Napoleon, yet even under that system of law divorce remained comparatively easy. Mutual consent, expressed in the manner and continued for a period specified by the law, was cause for a divorce (the principle of the Roman law being adopted on this point), but such consent could not take place unless the husband was twenty-five years of age and the wife twenty-one, unless they had been married for two years, nor after twenty years of marriage, nor after the wife had completed her forty-fifth year; and further, the approval of the parents of both parties was required. In case of divorce by consent, the law required that a proper agreement should be made for the maintenance of the wife and the custody of the children. A husband could obtain a divorce a vinculo matrimonii for adultery, but the wife had no such power unless the husband had

brought his mistress to the home. Both husband and wife could claim divorce on the ground of outrage, or grievous bodily injury, or condemnation for an infamous crime. If the divorce was for adultery, the erring party could not marry the partner of his or her guilt. A divorce a mensa et thoro could be obtained on the same grounds as a divorce a vinculo, but not by mutual consent; and if the divorce a mensa et thoro continued in force for three years, the defendant party could claim a divorce a vinculo. On the restoration of royalty in 1816 divorce a vinculo was abolished, and pending suits for divorce a vinculo were converted into suits for separation only.

Divorce in France, after the repeal of'the provisions respecting it in the Code Napoleon in 1816, was re-enacted by a law of the 27th of July 1884, the provisions of which were simplified by

laws of 1886 and 1907. But a wide departure was made by these laws from the terms of the Code Napol6on. Divorce by consent disappeared, and the following became the causes for which divorce was allowed: (1) Adultery by either party to the marriage at the suit of the other, without, in the case of adultery by the husband, the aggravation of introduction of the concubine into the home required by the Code; (2) violence (exces) or cruelty (sevices); (3) injures graves; and (4) peine afflictive et infamante. Exces is defined by Locie as " a generic expression comprising all acts tending to compromise the safety of the person, without distinction as to their object or motive, pre- meditation as well as furious anger, attempts upon life as well as serious woundings." Sevices are acts of ill-treatment less grave in character, which, while not endangering life, render existence in common intolerable (Kelly's French Law of Marriage, p. 122). Injures graves, as to which the courts have considered themselves entitled to exercise a wide discretion, have been defined as acts, writings or words which reflect upon the honour or the reputation of the party against whom they are directed. The courts have held that retraction at the trial does not relieve the party from the consequences of an injure grave, and that publicity is an aggra- vating but not a necessary element. A letter from one spouse to the other may constitute an injure and the courts have further held themselves at liberty to consider letters written after divorce proceedings have been commenced. Injures graves have also been considered to include material injuries, and among these have been classed habitual and groundless refusal of matrimonial rights, communication of disease and refusal to consent to a religious ceremony of marriage. Habitual but not occasional drunkenness has also been held to fall within the definition of an injure grave. Peine

afflictive et infamante signifies a legal punishment involving corporal confinement and moral degradation. 1

In addition to its recognition of full divorce, the French law recognizes separation of two kinds, one separation de Mens and the other separation de corps. The effect of separation de Hens is merely to put an end to the community of goods between the spouses. It necessarily follows, but may be decreed independently' of separation de corps. The grounds of separation de corps are the same as those for a divorce; and if a separation de corps has existed for three years, it may be turned into a divorce upon the application of either party to the court.

Until 1893 a wife siparee de corps obtained only the capacity attaching to a concomitant separation de biens; that is to say, she recovered the enjoyment and management of her separate property, but could not deal with real property, nor take legal proceedings, without the sanction of her husband or of the court. But by a law of the 6th of February 1893 a wife separ6e de corps obtains "the full exercise of her civil capacity, so that she shall not need to resort to the authority of her husband or of the court." In case of reconciliation, the wife returns to the limited capacity of a wife separee de biens, and after the prescribed notification of such change of status it becomes binding on third persons.

The provisions of French law with regard to the custody of the children of a dissolved marriage, and with regard to property, do not differ materially from those prescribed by the English acts. The custody of children is given to the party who has obtained the divorce, unless the court, on the application of the family, or the ministere public, consider it better, in the interests of the children, that custody should be given to the other party or a third person; but in every case the right of both father and mother to supervise the maintenance and education of the children, and their liability to contribute to their support, are continued.

1 It is interesting to observe how, according to the latest decisions of the House of Lords, cruelty, according to English law, includes some but not others of the forms of injury for which, under the term of injures graves, the French law affords a remedy. It may well be doubted whether the view taken by the minority of the peers in Russell v. Russell, which would have included in the definition of cruelty all, or nearly all, of that which the French law deems either sevices or injures graves, would not have better satisfied both the principles of English jurisprudence and the feelings of modern life.

The law in France as to property on a divorce has been accurately stated as follows : —

" Divorce in France effects a dissolution of the matrimonial regime of property as well as of the marriage itself. The decree appoints a notary, who is charged with the settlement of the pecuniary interests of the parties. By a stereotyped form of procedure the appointment is made invariably for the purpose of liquidating la communauti ayant existe entre les epoux, irrespective of whether the regime really was that of community or another. In the case of aliens, therefore, married under the rule of separate property, it is necessary carefully to set this out in the notarial deed of liquidation, in order to defeat the presumption which might be raised by the wording of the decree that a community really did exist. The party against whom the divorce has been pronounced loses the benefit of all settlements made upon him or her by the other party, either by the marriage contract or since the marriage. On the other hand, the party in whose favour the divorce has been pronounced preserves the benefit of all settlements made in his or her favour by the unsuccessful party. If no such settlements were made, or if those made appear inadequate to ensure the subsistence of the successful party, the court may grant him or her permanent alimony out of the property of the other party, not to exceed one-third of the income, and revocable in case it ceases to be necessary " (Kelly, p. 130).

On a divorce both parties are at liberty to remarry. The husband could remarry at once; but the wife (art. 296 of the Code) was only allowed to remarry after an interval of ten months. By the act of 1907, this article was abolished, and the wife allowed to remarry as soon as the judgment or decree granting the divorce has been entered, providing 300 days have elapsed since the first judgment was pronounced. A divorced husband may remarry his divorced wife, but if he does so, he cannot be again divorced, except on the ground of a sentence to a peine afflictive el infamante passed on one of them since their remarriage. There is, however, this limitation on the power of remarriage of divorced persons, that the party to the marriage against whom the decree has been pronounced is not allowed to marry the person with whom his or her guilt has been established. Such person, however, has no such rights as are

recognized in him or her according to English law, and cannot take any part in the proceedings. But his or her name is referred to in the proceed- ings only by an initial; and French law goes even further in the avoidance of publicity, inasmuch as the publication of divorce proceedings in the press is forbidden, under heavy penalties.

By a law of the 6th of February 1893 French jurisprudence, more complete at least, and perhaps wiser, than English, dealt with a matter previously in controversy, and decided that after a divorce the wife shall resume her maiden name, and may not continue to use the name of her divorced husband; nor may the husband, for business or other purposes, continue to use the name of his wife.

By the law of 1886 the special procedure in divorce previously in force under the Code and under the law of 1884 was abolished, and it was provided that matrimonial causes should be tried according to the ordinary rules of procedure. The action there- fore, when brought, follows the methods of procedure common to other civil proceedings. But there still remain certain neces- sary preliminaries to an action of divorce. A petition must be presented by a petitioner in person to the president of the court sitting in chambers, with the object of a reconciliation being effected. This is known as the premiere comparation. If the petitioner still determines to proceed, there follows the seconde comparation, on which occasion both parties appear before the president. If the president fails to effect a reconciliation, he makes an order permitting the petitioner to proceed, and deals with the matters necessary to be dealt with pendente lite, such matters being (1) separate residence, (2) alimony, (3) possession of personal effects, (4) custody of children. As regards residence, the wife is compelled to adhere during the proceedings to the residence assigned to her, but no similar restriction is placed on the husband. 'Alimony pendente lite is in the discretion of the court, having regard to the means of the parties, and includes a proper provision for costs. As regards the custody of children, the Code and the law of 1884 gave it to the husband, unless the court otherwise orders, but the law of 1886 leaves the matter wholly in the discretion of the court.

There are certain technical rules of evidence on the trial of

a divorce action. It is a general principle of the French law of evidence that documentary evidence is the best evidence, and oral testimony only secondary. In divorce cases adultery flagrante delicto can be proved by the official certificate of the commissary of police. Letters between the husband and wife are admissible in evidence. As

to letters between the parties and third persons, the law, which has been doubtful, now appears to be that the wife may produce only such letters from third parties to her husband as have come into her possession accidentally, and without any ruse or artifice on her part; but the husband may put in evidence any letters written to or by his wife which he has obtained by any, short of criminal, means. If the documents put in evidence are not sufficient to satisfy the court, there follows an investigation by means of witnesses, termed an enquete. A schedule of allega- tions is drawn up, and a judge, termed a juge-commissaire, is specially appointed to conduct the inquiry. Relatives and ser- vants, though not competent witnesses in ordinary civil actions, are so in divorce proceedings. Cross petitions may be entered; the substantiation of a cross petition, however, does not have the effect, in some cases given to it by English law, of barring a divorce, but a divorce may be, and often is, granted in favour of and against both parties pour torts riciproques. When a case comes on for trial, it is in the power of the court to order an adjournment for a period not exceeding six months, which is termed a temps d'&preuve, in order to afford an opportunity for reconcilia- tion. It is said, however, that this power is seldom exercised. An appeal may be brought against a decree of divorce within two months; and a decree made on appeal is subject to revision by the court of cassation within two months. Both references to the court of appeal and the court of cassation operate as a stay of execution. A decree must, by the law of 1886, be transcribed on the register of marriages within two months from its date, and failing this transcription, the decree is void. The transcription must be made at the place of celebration of the marriage, or, if the parties are married abroad, at the place where the parties were last domiciled in France. If the parties, after having married abroad, return to France, it has been provided, by a circular of the Procureur de la RSpublique in 1887, that the transcription may be made at the place of their actual domicile at the time of action brought, a rule which has been held to apply to the divorce of aliens in France. The effect of transcription does not relate back to the date of the decree.

Opinions may differ as to the relative merits of the English and French law relating to divorce. But it cannot be denied that the French law presents a singularly complete and well-considered system, and one which, obviously with the English system in view, has endeavoured to graft on it provisions supplementing its omissions, and modifying certain of its terms in accordance with the light afforded by experience and the changed feelings of the modern world. The effect of the laws of 1884 and 1886 in France has been

great. The act of 1907 dealing with divorce, coupled with that of the 21st of July of the same year dealing with marriage, may also be said to mark an epoch in the laws relating to women. During the five years from 1884 to 1888 the courts granted divorces in 21,064 cases, rejecting applications for divorce in 1524. In addition, there were 12,242 applications for judicial separation, of which 10,739 were granted. A distinguished French writer, the author of a work of singular completeness and accuracy on the judicial system of Great Britain has compared these figures with the corresponding result of the English act of 1857. His conclusion is expressed in these words: " On voit qu'en cinq annees nos tribunaux ont prononce trois fois plus de divorces que la haute cour d'Angleterre n'en a prononce en trente ans. Je n'insiste pas sur les conclusions morales a tirer de ce rapprochement " (Comte de Franqueville, Le Systeme judiciaire de la Grande-Bretagne, ii. p. 171). It is, however, practically impossible to compare the number of divorces in France and in England with exact justice, because, as will have been seen above, the causes of divorce in France materially exceed those recognized by English law; and the absence in France of any official performing the functions assigned to the king's proctor in England cannot but have great influence on the number of applications for divorce, as well as on their results. (St H.)

United States

According to American practice, divorce is the termination by proper legal authority, sometimes legislatively but usually judicially, of a marriage which up to the time of the decree was legal and binding. It is to be distinguished from a decree of

nullity of marriage, which is simply a legal determination that no legal marriage has ever existed between the two parties. It is also to be distinguished from a decree of separation, which permits or commands the parties to live apart, but does not completely and for all purposes sever the marriage tie. The matrimonial law of England, as at the time of the declaration of independence, forms part of the common law of the United States. But as no ecclesiastical courts have ever existed there, the law must be considered to have been inoperative. There is no Federal jurisdiction in divorce, and it is a

question for the law of each separate state; and though it is competent to Congress to authorize divorces in the Territories, still it appears that this subject like others is usually left to the territorial legislature. In the different states, and in England, divorces were at first granted by the legislatures, whether directly or by granting special authority to the tribunals to deal with particular cases. This practice fell into general disrepute, and by the constitution of some states such divorces are expressly prohibited.

Upon the subject of divorce in the United States, and, to some extent, in foreign countries, a careful investigation was made by the American Bureau of Labour, and its report covered the years 1867 to 1886; a further report for the period 1887 to 1906 has also been published by the Federal Census Bureau. The number of divorces was in 1886 over 25,000, and in 1906 was over 72,000, about double the number reported for that year from all the rest of the Christian world. As divorce presupposes a legal marriage, the amount of divorce, or the divorce-rate, is best stated as the ratio between the number of divorces decreed during a year and the number of subsisting marriages or married couples. The usual basis is 100,000 married couples. In 1898-1902 the divorce- rate was 200 divorces (400 people) to 100,000 married couples. This is equivalent to more than one divorce annually to each 1400 people. The several states differ in divorce-rate, from South Carolina, with no provision for legal divorce, to Montana and Washington, where the rate is two and a half times the average for the country. In general the rate is about the same in the North as in the South, but greater in the Central states than in the East, and in the Western than in the Central states; but to this rule the New England states, Louisiana, New Mexico and Arizona are exceptions. The New England states have a higher rate than their geographical position would lead one to expect, and the other three, owing doubtless, in part at least, to the influence of the Roman Catholic Church, have a lower rate than the states about them. The several state groups had in 1900 the following divorce-rates per 100,000: South Atlantic, 196; North Atlantic, 200; South Central, 558; North Central, 510; Western, 712. The divorce-rate in the United States increased rapidly and steadily in forty years from 27 m 1867 to 86 in 1906. But distinct tendencies are traceable in different regions. In the North Atlantic group the rate rose by 58 %, in the North Central by 158 %, in the Western by 2 23 %, in the South Atlantic by 43 7 %, and in the South Central by 685 %. The great increase in the South was mainly due to the spread of divorce among the emancipated negroes. Each state determines for itself the causes for which divorce may be granted, and no general statement

is therefore possible.

The ground pleaded for a divorce is seldom an index to the motives which caused the suit to be brought. This is determined by the character of the law rather than by the state of mind of the parties; and so far as the individuals are concerned, the ground alleged is 'lius a cloak rather than a clue or revelation. Still those causes which have been enacted into law by the various state legislatures do indicate the pleas which have been endorsed by the social judgment of the respective communities. In the United States exclusive of Alaska and the recent insular accessions there are forty-nine different jurisdictions in the matter of divorce. Six out of every seven allow divorce for desertion, adultery or cruelty; and of the 945,625 divorces reported with their causes during the twenty years 1887-1906 nearly 78% were granted for some one of these three causes, viz. 39 % for desertion, 22% for adultery, and 16% for cruelty. Probably nearly 9 % more were for some combination of these causes. Three other grounds for divorce are admitted as legal in many or most American states, viz.

imprisonment in 39, habitual drunkenness in 38, and neglect to provide in 22. About 98% of American divorces are granted on some one or more of these six grounds. In general the legislation on the subject of the causes allowed for divorce is most restrictive in the states on the Atlantic coast, from New York to South Caro- lina inclusive, and is least so in the Western states. The slight expense of obtaining a divorce in many of the states, and the lack of publicity which is given to the suit, are also important reasons for the great number of decrees issued. The importance of the former consideration is reflected in the fact that the divorce-rate for the United States as a whole shows clearly, in its fluctuations, the influences of good and bad times. When times are good and the income of the working and industrial classes likely to be assured, the divorce-rate rises. In periods of industrial depression it falls, fluctuating thus in the same way and probably for the same reason that the marriage-rate in industrial communities fluctuates. In two-thirds of the divorce suits the wife is the plaintiff, and the proportion slightly increased in the forty years. In the Northern states the percentage issued to wives (1887-1906) was 71, while in the Southern states it was only 56. But where both parties desire a decree, and each has a legal ground to urge, a jury will usually listen more favourably to a woman's suit.

Divorce is probably especially frequent among the native population of the United States, and among these probably more common in the

city than in the country. This statement cannot be established absolutely, since statistics afford no means of distinguishing the native from the foreign-born applicants. It is, however, the most obvious reason for explaining the fact that, while in Europe the city divorce-rate is from three to five times as great as that of the surrounding country, the difference in the United States between the two regions is very much less. In other words, the great number of foreigners in American cities probably tends to obscure by a low divorce-rate the high rate of the native population. Divorce is certainly more common in the New England states than in any others on the Atlantic coast north of Florida, and it is not unlikely that wherever the New England families have gone divorce is more frequent than else- where. For example, it is much more common in the northern counties of Ohio settled largely from New England than in the southern counties settled largely from the Middle Atlantic states.

There are two statements frequently made regarding divorce in the United States which do not find warrant in the statistics on the subject. The first is, that the real motive for divorce with one or both parties is the desire for marriage to a third person. The second is, that a very large proportion of divorces are granted to persons who move from one jurisdiction to another in order to avail themselves of lax divorce laws. On the first point the American statistics are practically silent, since, in issuing a marriage licence to parties one or both of whom have been previously divorced, no record is generally made of the fact. In Connecticut, however, for a number of years this information was required; and, if the statements were trustworthy, the number of persons remarrying each year was about one-third the total number of persons divorcing, which is probably a rate not widely different from that of widows and widowers of the same age. Foreign figures for Switzerland, Holland and Berlin indicate that in those regions the proportion of the divorced who remarry speedily is about the same as that of widows and widowers. What statistical evidence there is on the subject therefore tends to discredit this popular opinion. The evidence on the second point is more conclusive, and has gone far towards decreasing the demand for a constitutional amendment allowing a federal marriage and divorce law. About four-fifths of all the divorces granted in the United States were issued to parties who were married in the state in which the decree of divorce was later made; and when from the remaining one-fifth are deducted those in which the parties migrated for other reasons than a desire to obtain an easy divorce, the remainder would constitute a very small, almost a negligible,

fraction of the total number.

It is difficult, perhaps impossible, to say how far the frequency of divorce in the United States has been or is a social injury; how far it has weakened or undermined the ideal of marriage as a lifelong

union between man and woman. In this respect the question is very like that of illegitimacy; and as the most careful students of the latter subject agree that almost no trustworthy inference regarding the moral condition of a community can be derived from the proportion of illegitimate children born, so one may say regarding the prevalence of divorce that from this fact almost no inferences are warranted regarding the moral or social condition of the population. It is by no means impossible, for example, that the spread of divorce among the negro population in the South marks a step in advance from the condition of largely unregulated and illegal unions characteristic of the race im- mediately after the war. The prevalence of divorce in the United States among the native population, in urban communities, among the New England element, in the middle classes of society, and among those of the Protestant faith, indicates how closely this social phenomenon is interlaced with much that is character- istic and valuable in American civilization. In this respect, too, the United States perhaps represent the outcome of a tendency which has been at work in Europe at least since the Reformation. Certainly the divorce-rate is increasing in nearly every civilized country. Decrees of nullity of marriage and decrees of separation not absolutely terminating the marriage relation are relatively far less prevalent than they were in the medieval and early modern period, and many persons who under former conditions would have obtained relief from unsatisfactory unions through one or the other of these avenues now resort to divorce. The increasing proportion of the community who have an income sufficient to pay the requisite legal fees is also a factor of great importance. The belief in the family as an institution ordained of God, decreed to continue " till death us do part," and in its relations typifying and perpetuating many holy religious ideas, probably became weakened in the United States during the 19th century, along with a weakening of other religious conceptions; and it is yet to be determined whether a substitute for these ideas can be developed under the guidance of the motive of social utility or individual desire. In this respect the United States is, ' as Mr Gladstone once wrote, a tribus praerogativa, but one who knows anything of the family and home life of America will not

readily despond of the outcome.

The great source of American statistical information is the governmental report of over 1000 pages, A Report on Marriage and Divorce in the United States 1867 to 1886, including an Appendix relating to Marriage and Divorce in Certain Countries of Europe, by Carroll D. Wright, Commissioner of Labour; together with the further report for 1887 to 1906. The statistics contained in the former volume have been analysed and interpreted in W. F. Willcox's The Divorce Problem: A Study in Statistics (Columbia University, New York, 1891, 1897). Further interpretations are contained in an article in the Political Science Quarterly for March 1893, entitled " A Study. in Vital Statistics." The best legal treatise is probably Bishop on Marriage, Divorce, and Judicial Separation. See also T. P. Lichtettberger, Divorce: A Study in Social Causation (New York, 1909). (W. F. W.)

DIWANIEH, a small town in Turkish Asia, about 40 m. below Hillah, on both banks of the Euphrates (31 58′ 47″ N., 44° 58′ 18″ E.), which is here spanned by a floating bridge. Formerly a military post for the control of the Affech territory, and a telegraph station, it was in 1893 made the capital of the sanjak, instead of Hillah, on account of its more strategical position. This transfer of the seat of government represented a step in the development of Turkish control over the central regions of Irak.

DIX, DOROTHEA LYNDE (1802-1887), American philan- thropist, was born at Hampden, Maine, on the 4th of April 1802. Her parents were poor and shiftless, and at an early age she was taken into the home in Boston of her grandmother, Dorothea Lynde, wife of Dr Elijah Dix. Here she was reared in a dis- tinctly Puritanical atmosphere. About 182 1 she opened a school in Boston, which was patronized by the well-to-do families; and soon afterwards she also began teaching poor and neglected children at home. But her health broke down, and from 1824 to 1830 she was chiefly occupied with the writing of books of devotion and stories for children. Her Conversations on Common things (1824) had reached its sixtieth edition by 1869. In 1831 she established in Boston a model school for girls, and conducted

this successfully until 1836, when her health again failed. In 1 841 she became interested in the condition of gaols and alms- houses, and spent two years in visiting every such institution in Massachusetts, investigating especially the treatment of the pauper insane. Her memorial to the state legislature dealing with the abuses

she discovered resulted in more adequate provision being made for the care and treatment of the insane, and she then extended her work into many other states. By 1847 she had travelled from Nova Scotia to the Gulf of Mexico, and had visited 18 state penitentiaries, 300 county gaols arid houses of correction, and over 500 almshouses. Her labours resulted in the establishment of insane asylums in twenty states and in Nova Scotia and Newfoundland, and in the founding of many additional gaols and almshouses conducted on a reformed plan. In 1853 she secured more adequate equipment for the life-saving service on Sable Island, then rightly called " the graveyard of ships." In 1854 she secured the passage by Congress of a bill granting to the states 12,250,000 acres of public lands, to be utilized for the benefit of the insane, deaf, dumb and blind; but the measure was vetoed by President Pierce. After this dis- appointment she went to England for rest, but at once became interested in the condition of the insane in Scotland, and her report to the home secretary opened the way for sweeping reforms. She extended her work into the Channel Islands, and then to France, Italy, Austria, Greece, Turkey, Russia, Sweden, Norway, Denmark, Holland, Belgium and a part of Germany. Her influence over Arinori Mori, the Japanese char gi d'affaires at Washington, led eventually to the establishment of two asylums for, the insane in Japan. At the outbreak of the Civil War she offered her services to the Federal government and was appointed superintendent of women nurses. In this capacity she served throughout the war, without a day's furlough; and her labours on behalf of defectives were continued after the war. Afte.r a lingering illness of six years she died at Trenton, New Jersey, on the 17th of July 1887.

See Francis Tiffany, Life of Dorothea Lynde Dix (Boston, 1892).

DIX, JOHN; ADAMS (1798- 1879), American soldier and political leader, was born at Boscawen, New Hampshire, on the 24th of July 1798. He studied at Phillips Exeter Academy in 1810-1811 and.at the College of Montreal in 1811-1812, and as a boy took part in the War of 181 2, becoming a second lieutenant in March 1814. In July 1828, having attained the rank of cap- tain, he resigned from the army, and for two years practised law at Cooperstown, New York. In 1830-1833 he was adjutant- general of New York. He soon became prominent as one of the leaders of the Democratic party in the state, and for many years was a member of the so-called " Albany Regency," a group of Democrats who between about 1820 and 1850 exercised a virtual control over their party in New York, dictating nomina- tions and appointments and distributing patronage. From 1833 to 1839 ne wa s secretary of state and superintendent of

schools in New York, and in this capacity made valuable reports concerning the public schools of the state, and a report (1836) which led to the publication of the Natural History of the State of New York (1842-1866). In 1842 he was a member of the New York assembly. In 1841-1843 he was editor of The Northern Light, a literary and scientific journal published in Albany. From 1845 to 1849 he was a United States senator from New York; and as chairman of the committee on commerce was author of the warehouse bill passed by Congress in 1846 to relieve merchants from immediate payment of duties on imported goods. In 1848 he was nominated for governor of New York by the Free Soil party, but was defeated by Hamilton Fish. His acceptance of the nomination, however, earned him the enmity of the southern Democrats, who prevented his appointment by Pierce as secretary of state and as minister to France in 1853. In this year Dix was for a few weeks assistant U.S. treasurer in New York city. In May i860 he became postmaster of New York city, and from January until March 1861 he was secretary of the treasury of the United States, in which capacity he issued (January 29, 1861) to a revenue officer at New Orleans a famous order containing the words, "if any one attempts to haul down the American flag,

3hoot him on the spot." He rendered important services iii hurrying forward troops in 1861, was appointed major-general ' of volunteers in Jun!e 1861, and during the Civil War commanded successively the department of Maryland (July 1861-May 1862), Fortress Monroe (May 1862- July 1863), and the department of the East (July 1863-July 1865). He was minister to France from 1866 to 1869, and in 1872 was elected by the Republicans governor of New York, but was defeated two years later. He]had great energy and administrative ability, was for a time president of the Chicago & Rock Island and of the Mississippi & Missouri railways, first president of the Union Pacific in 1 863-1 868, and for a short time in 1872 president of the Erie. He died in New York city on the 21st of April 1879. Among his publications are A Winter in Madeira and a Summer in Spain and Florence (1850), and Speeches and Occasional Addresses (1864). He wrote excellent English versions of the Dies irae and the Stabat mater..

His son, Morgan Dix (1827-1908), graduated at Columbia in 1848 and at the General Theological Seminary in 1852, and was ordained deacon (1852) and priest (1853) in the Protestant Episcopalian

church. In 1855—1859 he was assistant minister, and in 1859-1862 assistant rector, of Trinity Church, New York city, of which he was rector from 1862 until his death. He published sermons and lectures; A History of the Parish of Trinity Church, New York City (4 vols., 1898-1905); and a biography of his father, Memoirs of John Adams Dix (2 vols., New York, 1883).

DIXON, GEORGE (1755 ?-i8oo), English navigator. He served under Captain Cook in his'third expedition, during which he had an opportunity of learning the commercial capabilities of the north-west coast of North America. After his return from Cook's expedition he became a captain in the royal navy. In the autumn of 1785 he sailed in the " Queen Charlotte," in the service of the King George's Sound Company of London, to explore the shores of the present British Columbia, with the special object of developing the fur trade. His chief discoveries were those of Queen Charlotte's Islands and Sound (the latter only partial), Port Mulgrave, Norfolk Bay, and Dixon's Entrance and Archi- pelago. After visiting China, where he disposed of his cargo, he returned to England (1788), and published (1799) A Voyage round the World, but more particularly to the North-West Coast of America, the, bulk of which consists of descriptive letters by William Beresford, his supercargo. His own contribution to the work included valuable charts and appendices. He is usually, though not with absolute certainty, identified with the George Dixon who was author of The Navigatotis Assistant (1791) and teacher of navigation at Gosport.

DIXON, HENRY HALL (1822-1870), English sporting writer over the nom de plume " The Druid," was born at Warwick Bridge, Cumberland, on the 16th of May 1822, and was educated at Rugby and at Trinity College, Cambridge, where he graduated in 1846. He took up the profession of the law, but, though called to the bar in 1853, soon returned to sporting journalism, in which he had already made a name for himself, and began to write regularly for the Sporting Magazine, in the pages of which appeared three of his novels, Post and Paddock (1856), Silk and Scarlet (1859), and Scott and Sebright (1862). He also published a legal compendium entitled The Law of the Farm (1858), which ran through several editions. His other more important works were Field and Fern (1865), giving an account of the herds and flocks of Scotland, and Saddle and Sirloin (1870), treating in the same manner those of England. He died at Kensington on the 1 6th of March 1870.

See Hon. Francis Lawley, Life and Times of" The Druid" (London,

1895)-,

DIXON, RICHARD WATSON (1833-1000), English poet and divine, son of Dr James Dixon, a Wesleyan minister, was born on the 5th of May 1833. He was educated at King Edward's school, Birmingham, and on proceeding to Pembroke College, Oxford, became one of the famous " Birmingham group " there who shared with William Morris and Burne- Jones in the Pre- Raphaelite movement, He took oiily a second class in modera- tions in 1854, and a third in Literae Humaniores in 1856; but in

1858 he won the Arnold prize for an historical essay, and in 1863 the English Sacred Poem prize. He was ordained in 1858, was second master of Carlisle high school, i863—i868,andsuccessively vicar of Hayton, Cumberland, and Warkworth, Northumberland. He became minor canon and honorary librarian of Carlisle in 1868, and honorary canon in 1874, he was proctor in convocation (1890-1894), and received the honorary degree of D.D. from Oxford in 1899. He died at Warkworth on the 23rd of January 1900. Canon Dixon's first two volumes of verse, Christ's Company 'and Historical Odes, were published in 1861 and 1863 respectively; but it was not until 1883 that he attracted conspicuous notice with Mano, an historical poem in terza rima, which was enthusiastically praised by Mr Swinburne. This success he followed up by three privately printed volumes, Odes and Eclogues (1884), Lyrical Poems (1886), and The Story of Eudocia (1888). Dixon's poems were during the last fifteen years of his life recognized as scholarly and refined exercises, touched with both dignity and a certain severe beauty, but he never attained any general popularity as a poet, the appeal of his poetry being directly to the scholar. A great student of history, his studies in that direction colour much of his poetry. The romantic atmosphere is remarkably preserved in Mano, a successful metrical exercise in the difficult terza rima. His typical poems have charm and melody, without introducing any new note or variety of rhythm. He is contemplative, sober and finished in literary workmanship, a typical example of the Oxford school. Pleasant as his poetry is, however, he will probably be longest remembered by the work to which he gave the best years of his life, his History of the Church of England from the Abolition of the Roman Jurisdiction (1878-1902). At the time of his death he had completed six volumes, two of which were published posthumously. This fine work, covering the period from 1529 to 1570, is built upon elaborate research, and presents a trustworthy and unprejudiced survey of its subject.

Dixon's Selected Poems were published in 1909 with a memoir of the

author by Robert Bridges.

DIXON, WILLIAM HEPWORTH (1821-1879), English author and traveller, was born at Great Ancoats, Manchester, on the 30th of June 1821, a member of an old Lancashire family. Beginning life as a clerk at Manchester, he decided, in 1846, to take up literature as a career. After gaining some journalistic experience at Cheltenham he settled in London, on the recom- mendation of Douglas Jerrold, and contributed to the Athenaeum and Daily News. His series of papers — " The Literature of the Lower Orders " — in the last-named journal, and a further series, " London Prisons," were widely noticed. In 1849 appeared his John Howard and the Prison World of Europe, which proved a great popular success. These were followed by a Life of William Penn (185 1), in which he replied to Macaulay's attack on Penn; Life of Blake (1852) ; and Personal History of Lord Bacon (186 1), supplemented by The Story of Lord Bacon's Life (1862). From 1853 to 1869 he was editor of the Athenaeum. In 1803 he visited the East, and on his return helped to found the Palestine Exploration Fund, and published (1865) The Holy Land. In 1866 he travelled through the United States, publishing, in 1867, New America, and, the following year, Spiritual Wives, two supple- mentary volumes. In the autumn of 1867 he journeyed through the Baltic Provinces, publishing an account of his trip in Free Russia (1870). In 1871 he was in Switzerland, and in 1872 in Spain, where he wrote the greater part of his History of Two Queens. In 1874 he revisited the United States, giving the impressions of his tour in The White Conquest (1875). His other works, besides some fiction, were British Cyprus (1879) and Royal Windsor. He died on the 26th of December 1879. His daughter, Ella N. Hepworth Dixon, became known as a journalist and novelist.

DIXON, a city and the county seat of Lee county, Illinois, U.S.A., on the Rock river, in the N.W. part of the state. Pop. (1890) 5161; (1900) 7917 (879 foreign-born); (1910) 7216. It is served by the Chicago & North-Western and the Illinois Central railways, and is connected with Sterling by an electric line; freight is shipped over the Hennepin Canal. The city

has two parks of 159 and 6 acres respectively, and there is a Chautauqua Park, where an annual Chautauqua Assembly is held. Dixon is the seat of the Northern Illinois normal school

(incorporated in 1884), and of the Rock River military academy. The river furnishes water power for the street railways, electric lighting and a number of manufacturing establishments. Among the manufactures are condensed milk, boxes, wire screens and wire cloth, lawn mowers, gas engines, cement, agricultural implements, shoes and wagons. The place was laid out in 1835 by John Dixon (1784-1876), the first white settler of Lee county. A bronze tablet in the Howells Building, at the inter- section of First and Peoria Streets, marks the site of his cabin, and in the city cemetery a granite shaft has been erected to his memory. Dixon was chartered as a city in 1859.

DIZFUL, or Diz-Pul (" fort-bridge "), a town of Persia, in the province of Arabistan, 36 m. N.W. of Shush ter, in 32 25′ N., 48 28′ E. Pop. about 25,000. It has post and telegraph offices. It is situated on the left bank of the Dizful river, a tributary of the Karun, crossed by a fine bridge of twenty-two arches, 430 yds. in length, constructed on ancient foundations. Dizful is the chief place of a small district of the same name and the residence of the governor of Arabistan during the winter months. The district has twelve villages and a population of about 35,000 (5000 Arabs of the Ali i Kethir tribe), and pays a yearly tribute of about £6000. The city was formerly known as Andamish, and in its vicinity are many remains of ancient canals and buildings which afford conclusive proof of former importance. 16 m. S.W. are the ruins of Susa, and east of them and half-way between Dizful and Shushter stood the old city of Junday Shapur.

DJAKOVO (sometimes written Djakovar, Hungarian Diakovdr), a city of Croatia-Slavonia, Hungary; in the county of Virovitica, 100 m. E. by S. of Agram. Pop. (1900) 6824. Djakovo is a Roman Catholic episcopal see, whose occupant bears the title " Bishop of Bosnia, Slavonia and Sirmium." During the life of Bishop Strossmayer (1815-1905) it was one of the chief centres of religious and political activity among the Croats. The cathedral, a vast basilica built of brick and white stone, with a central dome and two lofty spires above the north entrance, was founded in 1866 and consecrated in 1882. Its style is Romanesque, chosen by Strossmayer as symbolical of the position of his country midway between east and west. The interior is magnificently decorated with mosaics, mural paintings and statuary, chiefly the work of local artists. Other noteworthy buildings are the nunnery, ecclesiastical seminary and episcopal palace. Djakovo has a thriving trade in agricultural produce. Many Roman remains have been discovered in the neighbourhood, but the earliest mention of the city is in 1244, when B61a IV. of Hungary confirmed the title-deeds of its owners, the

bishops of Bosnia.

For a full description of the cathedral, in Serbo-Croatian and French, see the finely illustrated folio Stolna Crkva u Djakovu, pub- lished by the South Slavonic Academy (Agram, 1900).

DLUGOSZ, JAN [Johannes Longinus] (1415-1480), Polish statesman and historian, was the son of Jan Dlugosz, burgrave of Bozeznica. Born in 141 5, he graduated at the university of Cracow and in 143 1 entered the service of Bishop Zbygniew Olesnicki (1389-1455), the statesman and diplomatist. He speedily won the favour of his master, who induced him to take orders and made him his secretary. His preferment was rapid. In 1436 we find him one of the canons of Cracow and the ad- ministrator of Olesnicki's vast estates. In 1440, on returning from Hungary, whither his master had escorted King Wladislaus II., Dlugosz saved the life of Olesnicki from robbers. The prelate now employed Dlugosz on the most delicate and important political missions. Dlugosz brought Olesnicki the red hat from Rome in 1449, and shortly afterwards was despatched to Hungary to mediate between Hunyadi and the Bohemian condottiere Giszkra, a difficult mission which he most successfully ac- complished. Both these embassies were undertaken contrary to the wishes of King Casimir IV., who was altogether opposed to Olesnicki's ecclesiastical policy. B ut though he thus sacrificed his own prospects to the cardinal's good pleasure, Dlugosz was far too sagacious to approve of the provocative attitude of Olesnicki, and

frequently and fearlessly remonstrated with him on his conduct. In his account, however, of the quarrel between Casimir and Olesnicki concerning the question of priority between the cardinal and the primate of Poland he warmly embraced the cause of the former, and even pronounced Casimir worthy of dethronement. Such outbursts against Casimir IV. are not infrequent in Dlugosz's Hisloria Polonica, and his strong personal bias must certainly be taken into consideration in any critical estimate of that famous work. Yet as a high-minded patriot Dlugosz had no sympathy whatever with Olesnicki's opposition to Casimir's Prussian policy, and steadily supported the king during the whole course of the war with the Teutonic knights. When Olesnicki died in 1455 he left Dlugosz his principal executor. The office of administering the cardinal's estate was a very ungrateful one, for the family resented the liberal benefactions of their kinsman to the Church and the univesity, and accused Dlugosz of exercising undue influence, from which charge he triumphantly vindicated himself. It was in the year of his patron's death that he began to write his Historia Polonica. This great book,

the first and still one of the best historical works on Poland in the modern sense of the word, was only undertaken after mature consideration and an exhaustive study of all the original sources then available, some of which are now lost. The principal archives of Poland and Hungary were ransacked for the purpose, and in his account of his own times Dlugosz's intimate acquaintance with the leading scholars and statesmen of his day stood him in good stead. The style is modelled on that of Livy, of whom Dlugosz was a warm admirer. As a proof of the thoroughness and conscientiousness of Dlugosz it may be mentioned that he learned the Cyrillic alphabet and took up the study of Ruthenian, " in order that this our history may be as plain and perfect as possible." The first of the numerous imprints of the Historia Polonica appeared in 16 14, the first complete edition in 171 1.

Dlugosz's literary labours did not interfere with his political activity. In 1467 the generous and discerning Casimir IV. entrusted Dlugosz with the education of his sons, the eldest of whom, Wladislaus, at the urgent request of the king, he ac- companied to Prague when in 147 1 the young prince was elected king of Bohemia. Dlugosz refused the archbishopric of Prague because of his strong dislike of the land of the Hussites; but seven years later he accepted the archbishopric of Lemberg. His last years were devoted to his history, which he completed in 1479. He died on the 19th of May 1480, at Piatek.

See Aleksander Semkowicz, Critical Considerations of the Polish Works of Dlugosz (P0I4 Cracow, 1874); Michael Bobrzynski and Stanislaw Smolka, Life of Dlugosz and his Position in Literature (Pol. ; Cracow, 1893). (R. N. B.)

DMITRIEV, IVAN IVANOVICH (1760-1837), Russian states- man and poet, was born at his father's estate in the government of Simbirsk. In consequence of the revolt of Pugachev the family had to flee to St Petersburg, and there Ivan was entered at the school of the Semenov Guards, and afterwards obtained a post in the military service. On the accession of Paul to the imperial throne he quitted the army with the title of colonel; and his appointment as procurator for the senate was soon after renounced for the position of privy councillor. During the four years from 1810 to 1814 he served as minister of justice under the emperor Alexander; but at the close of this period he retired into private life, and though he lived more than twenty years, he never again took office, but occupied himself with his literary labours and the collection of books and works of art. In the matter of language he sided with Karamsin, and did good service by his own pen against the Old Slavonic party. His poems include

songs, odes, satires, tales, epistles, &c, as well as the fables — partly original and partly translated from Fontaine, Florian and Arnault — on which his fame chiefly rests. Several of his lyrics have become thoroughly popular from the readiness with which they can be sung; and a short dramatico-epic poem on Yermak, the Cossack conqueror of Siberia, is well known.

His writings occupy three volumes in the first five editions; in the 6th (St Petersburg, 1823) there are only two. His memoirs, to which he devoted the last years of his life, were published at Moscow in 1866.

DNIEPER, one of the most important rivers of Europe (the Borysthenes of the Greeks, Danaprisoi the Romans, Uzi or Uzuoi the Turks, Eksi of the Tatars, ELice of Visconti's map (1381), Lerene of Contarini (1437), Luosen of Baptista of Genoa (1514), and Lussem in the same century). It belongs entirely to Russia, and rises in the government of Smolensk, in a swampy district (alt. 930 ft.) at the. foot of the Valdai Hills, not far from the sources of the Volga and the Dvina, in 55° 52′ N. and 33° 41′ E. Its length is about 1410 m. and it drains an area of 202, 140 sq. m. In the first part of its course, which may be said to end at Dorogobuzh, it flows through an undulating country of Carbon- iferous formation; in the second it passes west to Orsha, south through the fertile plain of Chernigov and Kiev, and then south- east across the rocky steppe of the Ukraine to Ekaterinoslav. About 45 m. S. of this town it has to force its way across the same granitic offshoot of the Carpathian mountains which interrupts the course of the Dniester and the Bug, and for a distance of about 25 m. rapid succeeds rapid. The fall of the river in that distance is 155 ft. The Dnieper, having got clear of the rocks, continues south-west through the grassy plains of Kherson and Taurida, and enters the Black Sea, or rather a liman or bay of the Black Sea, by a considerable estuary in 46 30′ N. and 3 2° 20'' E. On this ramifying liman, into which the Bug also pours its waters, stand Nikolaiev and the fortified town of Ochakov. Navigation extends as far up as Dorogobuzh, where the depth is about 12 ft., and rafts are floated down from the higher reaches. The banks are generally high, more particularly the left bank. About the town of Smolensk the breadth is 455 ft., at the confluence of the Pripet 1400, and in some parts of the Ekaterinoslav district more than i\ m. In the course above the rapids the channel varies very greatly in nature and depth, and it is not infrequently interrupted by shallows. The rapids,

or porogs, form a serious obstacle to navigation; it is only for a few weeks when the river is in flood that they are passable, and even then the venture is not without risk and can only be undertaken with the assistance of special pilots. It is from these falls that the Cossacks of the Ukraine came to be known as Zaporogian Cossacks. As early as 1732 an attempt was made to improve the channel. A canal, which ultimately proved too small for use, was constructed at Nenasitets in 1780 at private expense; blastings were carried out in 1798 and 1799 at various parts; in 1805 a canal was formed at Kaindatski, and the channel straightened at Sursk; by 1807 a new canal was completed at Nenasitets; in 1833 a passage was cleared through the Staro-kaindatski porog; and in the period 1843 to" 1853 numerous ameliorations were effected. The result has been not only to diminish greatly the dangers of the natural channel, but also to furnish a series of artificial canals by which vessels can make their way when the river is low. Of the tributaries of the Dnieper the following are navigable, — the Berezina and the Pripet from the right, and the Sozh and the Desna from the left. By means of the Dnieper-Bug (King's) canal, and the Berezina and Oginski canals, this river has a sort of water connexion witli the Baltic Sea. In the estuary the fisheries give employment to large numbers of people. At Kiev the river is free from ice on an average of 234 days in the year, at Ekaterinoslav 270 and at Kherson 277. (P. A. K.; J. T. Be.)

DNIESTER (Tyras and Danaster or Danastris of classical authors, Nistrul of the Rumanians, and Turla of the Turks), a river of south-eastern Europe belonging to the basin of the Black Sea. It rises on the northern slope of the Carpathian mountains in Austrian Galicia, and belongs for the first 350 m. of its course to Austrian, for the remaining 515 m. to Russian, territory. It drains an area of 29,670 sq. m., of which 16,500 sq. m. belong to Russia. It is excessively meandering, and the current in most parts even during low water is decidedly rapid as compared with Russian rivers generally, the mean rate being calculated at ii 7 ! 111 – per hour. The average width of the channel is from 500 to 7 50 ft. , but in some places it attains as much as 1400 ft.; the depth is various and changeable. The principal interruption in the navigable portion of the river, besides a sprinkling of rocks in the bed and the somewhat extensive shallows, is occasioned by a granitic spur from the Carpathians, which gives rise to the Yampol

Rapids. For ordinary river craft the passage of these rapids is rendered possible, but not free from danger, by a natural channel on the left side, and by a larger and deeper artificial channel on the right; for steamboats they form an insuperable barrier. The river falls

into the sea by several arms, passing through a shallow liman or lagoon, a few miles S.W. of Odessa. There are two periodical floods, — the earlier and larger caused by the breaking up of the ice, and occurring in the latter part of February or in March; and the later due to the melting of the snows in the Carpathians, and taking place about June. The spring flood raises the level of the water 20 ft., and towards the mouth of the river submerges the gardens and vineyards of the adjacent country. In some years the general state of the water is so low that navigation is possible only for three or four weeks, while in other years it is so high that navigation continues without interruption; but in recent years considerable improvements have been effected at government expense. In consequence the traffic has increased, the Dniester tapping regions of great productiveness, especially in cereals and timber, namely, Galicia, Podolia and Bessarabia. Steamboat traffic was introduced in the lower reaches in 1840. The fisheries of the lower course and of the estuary are of considerable importance; and these, together with those of the lakes which are formed by the inundations, furnish a valuable addition to the diet of the people in the shape of carp, pike, tench, salmon, sturgeon and eels. Its tributaries are numerous, but not of individual importance, except perhaps the Sereth in Galicia. (P. A. K.; J. T. Be.)

DOAB, Duab or Dooab, a name, like the Greek Mesopotamia, applied in India, according to its derivation {do, two, and ab, river), to the stretch of country lying between any two rivers, as the Bari Doab between the Sutlej and the Ravi, the Rechna Doab between the Ravi and the Chenab, the Jech Doab between the Chenab and Jhelum, and the Sind Sagar Doab between the Jhelum and the Indus, but frequently employed, without any distinctive adjunct, as the proper name for the region between the Ganges and its great tributary the Jumna. In like manner the designation of Doab canal is given to the artificial channel which breaks off from the Jumna near Fyzabad, and flows almost parallel with the river till it reunites with it at Delhi.

DOANE, GEORGE WASHINGTON (1799-1859), American churchman, Protestant Episcopal bishop of New Jersey, was born in Trenton, New Jersey, on the 27th of May 1799. He graduated at Union College, Schenectady, New York, in 1818, studied theology and, in 1821, was ordained deacon and in 1823 priest by Bishop Hobart, whom he assisted in Trinity church, New York. With George Upfold (1796-1872), bishop of Indiana from 1849 to 1872, Doane founded St Luke's in New York City. In 1824- 1828 he was professor of belles-lettres in Washington (now Trinity) College, Hartford, Connecticut, and at this time he was one of the editors of the

Episcopal Watchman. He was assistant in 1828-1830 and rector in 1830-1832 of Christ church, Boston, and was bishop of New Jersey from October 1832 to his death at Burlington, New Jersey, on the 27th of April 1859. The diocese of New Jersey was an unpromising field, but he took up his work there with characteristic vigour, especially in the foundation of St Mary's Hall (1837, for girls) and Burlington College (1846) as demonstrations of his theory of education under church control. His business management of these schools got him heavily into debt, and in the autumn of 1852 a charge of lax administration came before a court of bishops, who dismissed it. The schools showed him an able and wise disciplinarian, and his patriotic orations and sermons prove him a speaker of great power. He belonged to the High Church party and was a brilliant controversialist. He published Songs by the Way (1824), a volume of poems; and his hymns beginning " Softly now the light of day " and " Thou art the Way " are well known.

See Life and Writings of George Washington Doane (4 vols., New York, 1860-1861), edited by his son, William Croswell Doane (b. 1832), first bishop of Albany.

DOBBS FERRY, a village of Westchester county, New York,

on the E. bank of the Hudson river 2 m. N. of Yonkers. Pop.

I (1890) 2083; (1900) 2888; (1910 U. S. census) 3455. Dobbs

35°

DOBELL— DOBEREINER

Ferry is served by the Hudson River division of the New York Central railway. There are many fine country places, two private schools — the Mackenzie school for boys and the Misses Masters' school for girls — and the children's village (with about thirty cottages) of the New York juvenile asylum. The name of the village was derived from a Swede, Jeremiah Dobbs, whose family probably moved hither from Delaware, and who at the begin- ning of the last quarter of the i 8th century had a skiff ferry, which was kept up by his family for a century afterwards. Because Dobbs Ferry had been a part of Philipse Manor all lands in it were declared forfeit at trie time of the War of American Independence (see Yonkers), and new titles were derived from the commissioners of forfeitures. The position of the village opposite the northernmost end of the Palisades gave it importance during the war. The region was repeatedly raided by camp followers

of each army; earthworks and a fort, commanding the Hudson ferry and the ferry to Paramus, New Jersey, were built; the British army made Dobbs Ferry a rendezvous, after the battle of White Plains, in November 1776, and the conti- nental division under General Benjamin Lincoln was here at the end of January 1777. The American army under Washington encamped near Dobbs Ferry on the 4th of July 1 781, and started thence for Yorktown in the following month. In the Van Brugh Livingston house on the 6th of May 1783, Washington and Governor George Clinton met General Sir Guy Carleton, after- wards Lord Dorchester, to negotiate for the evacuation by the British troops of the posts they still held in the United States. In 1873 the village was incorporated as Greenburgh, from the township of the same name which in 1788 had been set apart from the manor of Phillipsburgh; but the name Dobbs Ferry was soon resumed.

DOBELL, SYDNEY THOMPSON (1824-1874), English poet and critic, was born on the 5th of April 1824 at Cranbrook, Kent. His father was a wine merchant, his mother a daughter of Samuel Thompson (1766-1837), a London political reformer. The family moved to Cheltenham when Dobell was twelve years old. He was educated privately, and never attended either school or university. He refers to this in some lines on Cheltenham College in imitation of Chaucer, written in his eighteenth year, After a five years' engagement he married, in 1844, Emily Fordham, a lady of good family. An acquaintance with Mr (subsequently Sir James) Stansfeld and with the Birmingham preacher-politician, George Dawson (1821-1876), which afterwards led to the foundation of the Society of the Friends of Italy, fed the young enthusiast's ardour for the liberalism of the day. Meanwhile, Dobell wrote a number of minor poems, instinct with a passionate desire for political reform. The Roman appeared in 1850, under the nom de plume of " Sydney Yendys." Nextyear hetravelled through Switzerland with his wife; and after his return he formed friendships with Robert Browning, Philip Bailey, George MacDonald, Emanuel Deutsch, Lord Houghton, Ruskin, Holman Hunt, Mazzini, Tennyson and Carlyle. His second long poem, Balder, appeared in 1854. The three following years were spent in Scotland. Perhaps his closest friend at this time was Alexander Smith, in company with whom he published, in 1855, a number of sonnets on the Crimean War, which were followed by a volume on England in Time oj War. Although by no means a rich man he was always ready to help needy men of letters, and it was through his exertions that David Gray's poems were published. In 1869 a horse, which he was riding, fell and rolled over with him. His

health, which had for several years necessitated his wintering abroad, was seriously affected by this accident, and he was from this time more or less of an invalid, until his death on the 22nd of August 1874.

As a poet Dobell belongs to the " spasmodic school," as it was named by Professor Aytoun, who parodied its style in Firmilian. The epithet, however, was first applied by Carlyle to Byron. The school includes George Gilfillan, Philip James Bailey, John Stanyan Bigg (1826-1865), Dobell, Alexander Smith, and, according to some critics, Gerald Massey. It was characterized by an undercurrent Of discontent with the mystery of existence, by vain effort, unrewarded struggle, sceptical unrest, and an

uneasy straining after the unattainable. It thus ,faitniully reflected a certain phase of 10th century thought. The pro- ductions of the school are marked by an excess of metaphor and a general extravagance of language. On the other hand, they exhibit freshness and originality often lacking in more, conventional writings. Dobell's poem, The Roman, dedicated to the interests of political liberty in Italy, is marked by pathos, energy and passionate love of freedom, but it is over- laid with monologue, which is carried to a dreary excess in Balder, relieved though the latter is by fine descriptive passages, and by some touching songs. Dobell's suggestive, but too ornate prose writings were collected and edited with an intro- ductory note by Professor J. Nichol (Thoughts on Art, Philosophy and Religion) in 1876, In his religious views Dobell was a Christian of the Broad Church type; and socially he was one of the most amiable and true-hearted of men. His early interest in the cause of oppressed nationalities, shown in his friendship with Kossuth, Emanuel Deutsch and others, never lessened, although his views of home politics underwent some change from the radical opinions of his youth. In Gloucestershire Dobell was well known as an advocate of social reform, and he was a pioneer in the application of the co- operative system to private enterprise.

The standard edition of his poems (1875) by Professor Nichol includes a memoir.

DOBELN, a town of Germany, in the kingdom of SaxOny, on the (Freiberg) Mulde, two arms of which embrace the town as an island, 35 m. S.E. from Leipzig by rail, and at the junction of lines to Dresden, Chemnitz, Riesa and Oschatz. Pop. (1905) including the garrison, r8,907. It has two Evangelical churches, of which.the Nikolai-kirche, dating in its present form from 1485, is a handsome

edifice; a medieval town hall, a former Benedictine nunnery and a monument to Luther. There are an agricultural and a commercial school. The industries include wool-spinning, iron-founding, carriage, agricultural implement, and metal- printing and stamping works.

DOBERAN, or Dobberan, a town of Germany, in the grand- duchy of Mecklenburg-Schwerin, about 2 m. from the shores of the Baltic and 7 W. of Rostock by rail. Pop. 5000. Besides the ruins of a Cistercian abbey founded by Pribislaus, prince of Mecklenburg, in 1173, and secularized in 1552, it possesses an Evangelical Gothic church of the 14th century, one of the finest in north Germany, a grand-ducal palace, a theatre, an exchange and a concert hall. Owing to its delightful situation amid beech forests and to its chalybeate waters, Doberan has become a favourite summer resort. Numerous villa residences have been erected and promenades and groves laid out. In 1793 Duke Frederick Francis caused the first seaside watering-place in Germany to be established on the neighbouring coast, 4 m. distant, at the spot where the Heiligen-Damm, a great bank of rocks about 1000 ft. broad and 15 ft. high, stretches out into the sea and forms an excellent bathing ground. Though no longer so popular as in the early part of the 19th century, it is still frequented, and is connected with Doberan by a tramway. •

DOBEREINER, JOHANN WOLFGANG (1 780-1849), German chemist, was born near Hof in Bavaria on the 15th of December 1780. After studying pharmacy at Munchberg, he started a chemical manufactory in 1803, and in 1810 was appointed professor of chemistry, pharmacy and technology at Jena, where he died on the 24th of March 1849. The Royal Society's Catalogue enumerates 171 papers by him on various chemical topics, but his name is best known for his experiments on platinum in a minute state of division and on the oxidation products of alcohol. In 1822 he showed that when a mass of platinum black, supplied with alcohol by a wick is enclosed in a jar to which the air has limited access, acetic acid and water are produced; this experiment formed the basis of the Schiit- zenbach Quick Vinegar Process. A year later he noticed that spongy platinum in presence of oxygen canbringaboutthe ignition of hydrogen, and utilized this fact to construct his " hydrogen lamp," the prototype of numerous devices for the self-ignition of coal-gas burners. He studied the formation of aldehyde from

alcohol by various methods, also obtaining its crystalline com- pound

with ammonia, and he was the discoverer Of furfurol. An early observation of the diffusion of gases was recorded by him in 1823 when he noticed the escape of hydrogen from a cracked jar, attributing it to the capillary action of fissures. His works included treatises on pneumatic chemistry (1821-1825) and the chemistry of fermentation (1822).

A correspondence which he carried on with Goethe and Charles August, grand-duke of Saxe-Weimar, was collected and published at Weimar by Schade in 1856.

DOBREE, PETER PAUL (1782- 1825), English classical scholar and critic, was born in Guernsey. He was educated at Reading school under Richard Valpy and at Trinity College, Cambridge, where he was elected fellow. He was appointed regius professor of Greek in 1823, and died in Cambridge on the 24th of September 1825. He was an intimate friend of Porson, whom he took as his model in textual criticism, although he showed less caution in conjectural emendation. After Porson's death (1808) Dobree was commissioned with Monk and Blomfield to edit his literary remains, which had been bequeathed to Trinity College. Illness and a subsequent journey to Spain delayed the work until 1820, when Dobree brought out the Plutus of Aristophanes (with his own and Porson's notes) and all Porson's Aristophanica. Two years later he published the Lexicon of Photius from Porson's transcript of the Gale MS. in Trinity College library, to which he appended a Lexicon rhetoricum from the margin of a Cambridge MS. of Harpocratipn. James ' Scholefield, his successor in the Greek professorship, brought out selections from his notes , (Adversaria, 1831-1833) on Greek and Latin authors (especially : the orators), and a reprint of the Lexicon rhetoricum, together with notes on inscriptions (1834-1835). The latest edition of the Adversaria is by William Wagner (in Bonn's Collegiate Series, 1883). ■ _; .

An appreciative estimate of Dobree as a scholar will be found in J. Bake's Scholica hypomnemata, ii. (1839) and in the Philological Museum, i. (1832) by J. C. Hare.

DOBRENTEI, GABOR [Gabriel] (1786-1851), Hungarian philologist and antiquary, was born at Nagyszollos in 1786. He completed his studies at the universities of Wittenberg and Leipzig, and was afterwards engaged as a tutor in Transylvania. At this period he originated and edited the Erdelyi Muzeum, which, notwithstanding its important influence on the develop- ment of the Magyar language and literature, soon failed for want of support. In 1820 Dobrentei

settled at Pest, and there he spent the rest of his life. He held various official posts, but continued zealously to pursue the studies for which he had early shown a strong preference. His great work is the Ancient Monuments of the Magyar Language {Regi Magyar Nyelverrdekek), the editing of which was entrusted to him by the Hungarian Academy. The first volume was published in 1838 and the fifth was in course of preparation at the time of his death. Dobrentei was one of the twenty-two scholars appointed in 1825 to plan and organize, >mder the presidency of Count Teleki, the Hungarian Academy. In addition to his great work he wrote many valuable papers on historical and philological subjects, and many biographical notices of eminent Hungarians. These appeared in the Hungarian translation of Brockhaus's Conversations-Lexikon. He translated into Hungarian Macbeth and other plays of Shakespeare, Sterne's letters from Yorick to Eliza (1828), several of Schiller's tragedies, and Moliere's Avare, and wrote several original poems. Dobrentei does not appear to have taken any part in the revolutionary movement of 1848. He died at his country house, near Pest, on the 28th of March 1851.

DOBRITCH, or Hajiolupazarjik, the principal town in the Bulgarian Dobrudja. Pop. (1901) 13,436. The town is noted for its panair or great fair, chiefly for horses and cattle, held annually in the summer, which formerly attracted a large concourse from all parts of eastern Europe, but has declined in importance.

DOBRIZHOFFER, MARTIN (171 7-1 791), Austrian Roman Catholic missionary, was born at Gratz, in Styria. He joined the Society of Jesus in 1736, and in 1749 proceeded to Paraguay,

where for eighteen years he worked devotedly first among the Guaranis, and then among the Abipones. Returning to Europe on the expulsion of the Jesuits from South America, he settled at Vienna, obtained the friendship of Maria Theresa, survived the extinction of his order, composed the history of his mission, and died on the 1 7th of July 1791. The lively if rather garrulous book on which his title tp remembrance rests, appeared at Vienna in 1784, in the author's own Latin, and in a German translation by Professor Krail of the university of Pest. Of its contents some idea may be obtained from its extended title : — Historia de A biponibus, Equestri Bellicosaque Paraguariae Natione, locupletata Copiosis Barbararum Gentium, Urbium, Fluminum, Ferarum, Amphibi- orum, Insectorum, Serpentium praecipuorum, Piscium, Avium, Arborum, Plantarum

aliarumque ejusdem Provincial Proprietatum Observationibus. In 1822 there appeared in London an anony- mous translation sometimes ascribed to Southey, but really the work of Sara Coleridge, who had undertaken the task to defray the college expenses of one of her brothers. A delicate compli- ment was paid to the translator by Southey in the third canto of his Tale of Paraguay, the story of which was derived from the pages of Dobrizhoffer's narrative : —

" And if he could in Merlin's glass have seen By whom his tomes to speak our tongue were taught, The old man would have felt as pleased, I ween, As when he won the ear of that great Empress Queen."

DOBROWSKY, JOSEPH (1753-1829), Hungarian philologist, was born of Bohemian parentage at Gjermet, near Raab, in Hungary. He received his first education in the German school at Bischofteinitz, made his first acquaintance with Bohemian at the Deutschbrod gymnasium, studied for some time under the Jesuits at Klattau, and then proceeded to the university of Prague. In 1772 he was admitted among the Jesuits at Briinn; but on the dissolution of the order in 1773 he returned to Prague to study theology. After holding for some time the office of tutor in the family of Count Nostitz, he obtained an appointment first as vice-rector, and then as rector, in the general seminary at Hradisch; but in 1790 he lost his post through the abolition of the seminaries throughout Austria, and returned as a guest to the house of the count. In 1792 he was commissioned by the Bohemian Academy of Sciences to visit Stockholm, Abo, Petersburg and Moscow in search of the manuscripts which had been scattered by the Thirty Years' War; and on his return he accompanied Count Nostitz to Switzerland and Italy. His reason began to give way in 1795, and in 1801 he had to be confined in a lunatic asylum; but by 1803 he had completely recovered. The rest of his life was mainly spent either in Prague or at the country seats of his friends Counts Nostitz and Czernin; but his death took place at Briinn, whither he had gone in 1828 to make investigations in the library. While his fame rests chiefly on his labours in Slavonic philology his botanical studies are not without value in the history of the science.

The following is a list of his more important works, Fragmentum Pragense evangelii S. Marci, vulgo autographi, (1778); a periodical for Bohemian and Moravian Literature (1780-1787); Scriptores rerum Bohemicarum (2 vols., 1783); Geschichte der bbhm. Sprache und dltern Literatur (1792) ; Die Bildsamkeit der slaw. Sprache (1799) ; a Deutsch-bbhm. Wbrterbuch compiled in collaboration

with Leschka- Puchmayer and Hanka (1802-1821); Entwurf eines Pflanzensystems nach Zahlen und Verhdltnissen (1802); Glagolitica (1807); Lehr- gebdude der bbhm. Sprache (1809); Institutiones linguae slavicde dia- lecti veteris (1822); Entwurf zu einem dllgemeinen Etymologikon der slaw. Sprachen (1813); Slowanka zur Kenntniss der slaw. Literatur (1-814) > a "d a critical edition of Jordanes, De rebus Geticis, for Pertz's Monumenta Germaniae historica. See Palacky, /. Dobrowskys Leben und gelehrtes Wirken (1833) .

DOBRUDJA (Bulgarian Dobritch, Rumanian Dobrogea), also written Dobrddscha, and Dobruja, a region of south-eastern Europe, bounded on the north and west by the Danube, on the east by the Black Sea, and on the south by Bulgaria. Pop. (1900) 267,808; area, 6000 sq. m. The strategic importance of this territory was recognized by the Romans, who defended it on the south by " Trajan's Wall," a double rampart, drawn from Constantza, on the Black Sea, to the Danube. In later times it was utilized by Russians and Turks, as in the wars of 1828, 1854

and 1878, when it was finally wrested from Turkey. By the treaty of Berlin, in 1878, the Russians rewarded their Rumanian allies with this land of mountains, fens and barren steppes, peopled by Turks, Bulgarians, Tatars, Jews and other aliens; while, to add to the indignation of Rumania, they annexed instead the fertile country of Bessarabia, largely inhabited by Rumans. After 1880, however, the steady decrease of aliens, and,the development of the Black Sea ports, rendered the Dobrudja a source of prosperity to Rumania.

DOBSINA (Ger. Dobschau),a. town of Hungary, 165 m. N.E. of Budapest by rail. Pop. (1900) 5109. It is situated in the county of Gomor, at the foot of the Radzim (3200 ft. high) in the central Carpathians, and lies to the south of the beautiful Straczena valley, watered by the river Gdllnitz, and enclosed on all sides by mountains. In the vicinity are mines of iron, cobalt, copper and mercury, some of them being very ancient. But the most remarkable feature is a large cavern some 3$ m. N.W., in which is an icefield nearly 2 acres in extent, containing formations which are at once most curious and strikingly beautiful. This cavern, which lies in the above-mentioned Straczena valley, was discovered in 1870. The place was founded in the first half of the 14th century by German

miners.

DOBSON, HENRY AUSTIN (1840-), English poet and man of letters, was born at Plymouth on the 18th. of January 1840, being the eldest son of George Clarisse Dobson, a civil engineer, and on his grandmother's side of French descent. When he was about eight years old the family moved to Holyhead, and his first school was at Beaumaris, in the Isle of Anglesea. He was afterwards educated at Coventry, and the Gymnase, Strassburg, whence he returned at the age of sixteen with the intention of becoming a civil engineer. He had a taste for art, and in his earlier years at the office continued to study it at South Kensington, at his leisure, but without definite ambition. In December 1856 he entered the Board of Trade, gradually rising to a principalship in the harbour department, from which he with- drew in the autumn of 1901. He married in 1868 Frances Mary, daughter of Nathaniel Beardmore of Broxbourne, Herts, and settled at Ealing. His official career was industrious though uneventful, but as poet and biographer he stands among the most distinguished of his time. The student of Mr Austin Dobson's work will be struck at once by the fact that it contains nothing immature: there are no juvenilia to criticize or excuse. It was about 1864 that Mr Dobson first turned his attention to composi- tion in prose and verse, and some of his earliest known pieces remain among his best. It was not until 1868 that the appearance of St Paul's, a magazine edited by Anthony Trollope, afforded Mr Dobson an opportunity and an audience; and during the next six years he contributed to its pages some of his favourite poems, including " Tu Quoque," " A Gentleman of the Old School," " A Dialogue from Plato," and " Une Marquise." Many of his poems in their original form were illustrated — some, indeed, actually written to support illustrations. By the autumn of 1873 Mr Dobson had produced sufficient verse for a volume, and put forth his Vignettes in Rhyme, which quickly passed through three editions. During the period of their appearance in the magazine the poems had received unusual attention, George Eliot, among others, extending generous encouragement to the anonymous author. The little book at once introduced him to a larger public. The period was an interesting one for a first appearance, since the air was full of metrical experiment. Swinburne's bold and dithyrambic excursions into classical metre had given the clue for an enlargement of the borders of English prosody; and, since it was hopeless to follow him in his own line without necessary loss of vigour, the poets of the day were looking about for fresh forms and variations. It was early in 1876 that a small body of English poets lit upon the French forms of Theodore de

Banville, Marot and Villon, and determined to introduce them into English verse. Mr Austin Dobson, who had already made successful use of the triolet, was at the head of this movement, and in May 1876 he published in The Prodigals the first original ballade written in English. This he followed by English versions of the rondel, rondeau and villanelle. An article in the Cornhill Magazine by

Mr Edmund Gosse, " A Plea for Certain Exotic Forms of Verse," appearing in Julyi877, simultaneously with Mr Dobson's second volume, Proverbs in Porcelain, drew the general eye to the possibilities and achievements of the movement. The experiment was extremely fortunate in its introduction. Mr Dobson is above all things natural, spontaneous and unaffected in poetic method; and in his hands a sheaf of metrical forms, essentially artificial and laborious, was made to assume the colour and bright profusion of a natural product. An air of pensive charm, of delicate sensibility, pervades the whole of these fresh revivals; and it is perhaps this personal touch of humanity which has given something like stability to one side of a movement other- wise transitory in influence. The fashion has faded, but the flowers of Mr Dobson's French garden remain bright and scented.

In 1883 Mr Dobson published Old-World Idylls, a volume which Contains some of his most characteristic work. By this time his taste was gradually settling upon the period with which it has since become almost exclusively associated; and the spirit of the 18th century is revived in " The Ballad of Beau Brocade " and in " The Story of Rosina," as nowhere else in modern English poetry. In " Beau Brocade," indeed, the pictorial quality of his work, the dainty economy of eloquent touches, is at its very best: every couplet has its picture, and every picture is true and vivacious. The touch has often been likened to that of Randolph Caldecott, with which it has much in common; but Mr Dobson's humour is not so " rollicking," his portraiture not so broad, as that of the illustrator of " John Gilpin." The appeal is rather to the intellect, and the touches of subdued pathos in the " Gentleman " and " Gentlewoman of the Old School " are addressed directly to the heart. We are in the 18th century, but see it through the glasses of to-day; and the soft intercepting sense of change which hangs like a haze between ourselves and the subject is altogether due to the poet's sympathy and sensi- bility. At the Sign of the Lyre (1885) was the next of Mr Dobson's separate volumes of verse, although he has added to the body of his work in a volume of Collected Poems (1897). At the Sign of the Lyre contains examples of all his various moods. The admirably fresh and breezy " Ladies of St James's " has precisely the qualities we have traced in his other

18th-century poems; there are ballades and rondeaus, with all the earlier charm; and in " A Revolutionary Relic," as in " The Child Musician " of the Old-World Idylls, the poet reaches a depth of true pathos which he does not often attempt, but in which, when he seeks it, he never fails. At the pole opposite to these are the light occasional verses, not untouched by the influence of Praed, but also quite individual, buoyant and happy. But the chief novelty in At the Sign of the Lyre was the series of " Fables of Literature and Art," founded in manner upon Gay, and exquisitely finished in scholarship, taste and criticism. It is in these perhaps, more than in any other of his poems, that we see how with much felicity Mr Dobson interpenetrates the literature of fancy with the literature of judgment. After 1885 Mr Dobson was engaged principally upon critical and biographical prose, by which he has added very greatly to the general knowledge of his favourite 18th century. His biographies of Fielding (1883), Bewick (1884), Steele (1886), Goldsmith (1888), Walpole (1890) and Hogarth (1879-1898) are studies marked alike by assiduous research, sympathetic pre-sentation and sound criticism. It is particularly noticeable that Mr Dobson in his prose has always added something, and often a great deal, to our positive knowledge of the subject in question, his work as a critic never being solely aesthetic. In Four French- women (1890), in the three series of Eighteenth-Century Vignettes (1892-1894-1896), and in The Paladin of Philanthropy (1899), which contain unquestionably his most delicate prose work, the accurate detail of each study is relieved by a charm of expression which could only be attained by a poet. In 1901 he collected his hitherto unpublished poems in a volume en- titled Carmina Votiva. Possessing an exquisite talent of defined range, Mr Austin Dobson may be said in his own words to have " held his pen in trust for Art " with a service sincere and distinguished.

DOBSON, WILLIAM (1610-1646), English portrait and historical painter, was born in London. His father was master of the alienation office, but by improvidence had fallen into reduced circumstances. The son was accordingly bound an apprentice to a stationer and picture dealer in Holborn Bridge; and while in his employment he began to copy the pictures of Titian and Van Dyck. He also took portraits from life under the advice and instruction of Francis Cleyn, a German artist of considerable repute. Van Dyck, happening to pass a shop in Snow Hill where one of Dobson's pictures was exposed,

sought out the artist, and presented him to Charles I., who took Dobson under his protec- tion, and not only sat to him several times for his own portrait, but caused the prince of Wales, Prince Rupert and many others to do the same. The king had a high opinion of his artistic ability, styled him the English Tintoretto, and appointed him serjeant- painter on the death of Van Dyck. After the fall of Charles, Dobson was reduced to great poverty, and fell into dissolute habits. He died at the early age of thirty-six. Excellent examples of Dobson's portraits are to be seen at Blenheim, Chatsworth and several other country seats throughout England. The head in the " Decollation of St John the Baptist " at Wilton is said to be a portrait of Prince Rupert.

DOCETAE, a name applied to those thinkers in the early Christian Church who held that Christ, during his life, had not a real or natural, but only an apparent (8ok£v, to appear) or phantom body. Other explanations of the Wktjow or appear- ance have, however, been suggested, and, in the absence of any statement by those who first used the word of the grounds on which they did so, it is impossible to determine between them with certainty. The name Docetae is first used by Theodoret (Ep. 82) as a general description, and by Clement of Alexandria as the designation of a distinct sect, 1 of which he says that Julius Cassianus was the founder. Docetism, however, undoubtedly existed before the time of Cassianus. The origin of the heresy is to be sought in the Greek, Alexandrine and Oriental philosophiz- ing about the imperfection or rather the essential impurity of matter. Traces of a Jewish Docetism are to be found in Philo; and in the Christian form it is generally supposed to be combated in the writings of John, 2 and more formally in the epistles of Ignatius. 3 It differed much in its complexion according to the points of view adopted by the different authors. Among the Gnostics and Manichaeans it existed in its most developed type, and in a milder form it is to be found even in the writings of the orthodox teachers. The more thoroughgoing Docetae assumed the position that Christ was born without any participation of matter; and that all the acts and sufferings of his human life, including the crucifixion, were only apparent. They denied accordingly, the resurrection and the ascent into heaven. To this class belonged Dositheus, Saturninus, Cerdo, Marcion and their followers, the Ophites, Manichaeans and others. Marcion, for example, regarded the body of Christ merely as an " umbra," a " phantasma." His denial (due to his abhorrence of the world) that Jesus was born or subjected to human development, is in striking contrast to the value which he sets on Christ's death on the cross. The other, or milder school of Docetae, attributed to Christ

an ethereal and heavenly instead of a truly human body. Amongst these were Valentinus, Bardesanes, Basilides, Tatian and their followers. They varied considerably in their estimation of the share which this body had in the real actions and sufferings of Christ. Clement and Origen, at the head of the Alexandrian school, took a somewhat subtle view of the Incarnation, and Docetism pervades their controversies with the Monarchians. Hilary especially illustrates the prevalence of naive Docetic views as regards the details of the Incarnation. Docetic tendencies

1 Not a distinct sect, but a continuous type of Christology. Hippolytus, however (Philosophumena, viii. 8-1 1), speaks of a definite party who called themselves Docetae.

2 1 Ep. iv. 2, ii. 22, v. 6, 20; 2 Ep. 7, cf. Jerome (Dial. adv. Lucifer. § 23 " Apostolis adhuc in saeculo superstitibus, adhuc apud Judaeam Christi sanguine recenti, phantasma Domini corpus asserebatur "). ' ^

'Ad Troll. 9 f., Ad Smyrn. 2, 4, Ad Ephes. 7. Cf. Polycarp, Ad Phil. 7.

vni. 1 a

have also been developed in later periods of ecclesiastical history, as for example by the PrisciUianists and the Bogomils, and also since the Reformation by Jacob Boehme, Menno Simons and a small fraction of the Anabaptists. Docetism springs from the same roots as Gnosticism, and the Gnostics generally held Docetic views (see Gnosticism).

OOCHMIAC (from Gr. 5oxpv> a hand's breadth), a form of verse, consisting of dochmii or pentasyllabic feet(usually 0..0-).

DOCK, a word applied to (1) a plant (see below), (2) an artificial basin for ships (see below), (3) the fleshy solid part of an animal's tail, and (4) the railed-in enclosure in which a prisoner is placed in court at his trial. Dock (1) in O.E. is docce, represented by Ger. Dockea-blatter, O.Fr. docque, Gael. dogha; Skeat compares Gr. davKos, a kind of parsnip. Dock (2) appears in Dutch (dok) and English in the 16th century; thence it was adopted into other languages. It has been connected with Med.Lat. doga, cap, Gr. Soxfl, receptacle, from 5ex«r0ai, to receive. Dock (3), especially used of a horse or dog, appears in English in the 14th century; a parallel is found in Icel. docke, stumpy tail, and Ger. Docke, bundle, skein, is also connected with it. This word has given the verb " to dock," to

cut short, curtail, especially used of the shortening of an animal's tail by severing one or more of the vertebrae. The English Kennel Club (Rules, 1905, revised 1907) disqualifies from prize-winning dogs whose tails have been docked; several breeds are, however, excepted, e.g. varieties of terriers and spaniels, poodles, &c, and such foreign dogs as may from time to time be determined by the club. The prisoners' dock (4) is apparently to be referred to Flem. dok, pen or hutch. It was probably first used in thieves' slang; according to the New English Dictionary it was known after 1610 in " bail-dock," a room at the corner of the Old Bailey left open at the top, " in which during the trials are put some of the malefactors " (Scots. Mag., 1753).

DOCK, in botany, the name applied to the plants constituting the section Lapathum of the genus Rumex, natural order Polygon- aceae. They are biennial or perennial herbs with a stout root- stock, and glabrous linear-lanceolate or oblong-lanceolate leaves with a rounded, obtuse or hollowed base and a more or less wavy or crisped margin. The flowers are arranged in more or less crowded whorls, the whole forming a denser or looser panicle; they are generally perfect, with six sepals, six stamens and a three-sided ovary bearing three styles with much-divided stigmas. The fruit is a triangular nut enveloped in the three enlarged leathery inner sepals, one or all of which bear a tubercle. In the common or broad-leaved dock, Rumex obtusifolius, the flower- stem is erect, branching, and 18 in. to 3 ft. high, with large radical leaves, heart-shaped at the base, and more or less blunt; the other leaves are more pointed, and have shorter stalks. The whorls are many-flowered, close to the stem and mostly leafless. The root is many-headed, black externally and yellow within. The flowers appear from June to August. In autumn the whole plant may become of a bright red colour. It is a troublesome weed, common by roadsides and in fields, pastures and waste places throughout Europe. The great water dock, R. hydro- lapathum, believed to be the herba britannica of Pliny (Nat. Hist. xxv. 6), is a tall-growing species; its root is used as an anti- scorbutic. Other British species are R. crispus; R. conglomeratus, the root of which has been employed in dyeing; R. sanguineus (bloody dock, or bloodwort); R. palustris; R. pulcher (fiddle dock), with fiddle-shaped leaves; R. maritimus; R. aquaticus; R. pratensis. The naturalized species, R. alpinus, or " monk's rhubarb," was early cultivated in Great Britain, and was ac- counted an excellent remedy for ague, but, like many ether such drugs, is now discarded.

DOCK, in marine and river engineering. Vessels require to lie afloat alongside quays provided with suitable appliances in sheltered sites

in order to discharge and take in cargoes con- veniently and expeditiously; and a basin constructed for this purpose, surrounded by quay walls, is known as a dock. The term is specially applied to basins adjoining tidal rivers, or close to the sea-coast, in which the water is maintained at a fairly uniform level by gates, which are closed when the tide begins to

ri

fall, as exemplified by the Liverpool and" Havre docks (figs, i and 2). Sometimes, ' however, at ports situated on tidal rivers near their tidal limit, as at Glasgow (fig. 3), Hamburg and

Low-lying land adjoining a tidal river or estuary frequently provides suitable sites for docks; for the position, being more or less inland, is sheltered; the low level reduces the excavation

Fig. 1. — Liverpool Docks, North End.

Rouen, and at some ports near the sea-coast, such as Southampton (fig. 4) and New York, the tidal range is sufficiently moderate for dock gates to be dispensed with, and for open basins and river quays to serve for the accommodation of vessels. For ports

Fig. 2. — Havre Docks and Outer Harbour.

established on the sea-coast of tideless seas, such as the Mediterranean, on account of the rivers being barred by deltas at their outlets, like the Rhone and the Tiber, and thus rendered inaccessible, open basins, provided with quays and protected by

Fig. 3. — Glasgow Docks.

breakwaters, furnish the necessary commercial requirements for sea-going vessels, as for example at Marseilles (fig. 5), Genoa, Naples and Trieste. These open basins, however, are precisely the same as closed docks, except for the absence of dock gates; and the accommodation for shipping at the quays round basins in river ports is so frequently supplemented by river quays, that closed docks, open basins and river quays are all naturally included in the general consideration of dock works.

required for forming the docks, and enables the excavated materials to be utilized in raising the ground at the „ sides for quays; and the river furnishes a sheltered Docks. approach channel. Notable instances of these are the

docks of the ports of London, Liver- pool, South Wales, Southampton, Hull, Belfast, St Nazaire, Rotter- dam, Antwerp and Hamburg. Some- times docks are partially formed on foreshores reclaimed from estuaries, as at Hull, Grimsby, Cardiff, Liver- pool, Leith and Havre; whilst at Bristol, a curved portion of the river Avon was appropriated for a dock, and a straight cut made for the river. By carrying docks across sharp bends of tidal rivers, upper and lower en- trances can be provided, thereby con- veniently separating the inland and sea-going traffic ; and of this the London, Surrey Commercial, West India, and Victoria and Albert docks are examples on the Thames and Chatham dockyard on the Medw'ay. Occasionally, when a small tidal river has a shallow entranceˆ or an estuary exhibits signs of silting up,

Fig. 4, — Southampton Docks and River Quays.

docks alongside, formed on foreshores adjoining the sea-Coast, are provided with a sheltered entrance direct from the sea,

as exemplified by the Sunderland docks adjacent to the mouth of the river Wear, and the Havre docks at the outlet of the Seine estuary (fig. 2). Some old ports, originally estab- lished on sandy coasts where a creek, maintained by the influx and efflux of the tide from low-lying spaces near the shore, afforded some shelter and an outlet to the sea across the beach, have had their access improved by parallel jetties and dredging; and docks have been readily formed in the low-lying land only

of, suction dredgers in sand (see Dredge), together with the increasing draught of vessels, has resulted in a considerable increase being mtide in the available depth of rivers and channels leading to docks, and has necessitated the making of due allowance for the possibility of a reasonable improvement in determining the depth to be given to a new dock. On the other hand, there is a limit to the deepening of an approach channel, depending upon its length, the local conditions as regards

Fig. 5- — Port of Marseilles. Basins and Extensions.

separated by sand dunes from the sea, as ,at Calais, Dunkirk (fig. 6) and Ostend (see Harbour). In sheltered places on the sea-coast, docks have sometimes been constructed on low- lying land bordering the shore, with direct access to the sea, as at Barrow and Hartlepool; whilst at Mediterranean ports open basins have been formed in the sea, by establishing quays along the foreshore, from which wide, solid jetties, lined with quay walls, are carried into the sea at intervals a"t right angles to the shore, being sheltered by an outlying break- water parallel to the coast, and reached at each £•;•: end through the openings left between the projecting j/i.V jetties and the breakwater, as at Marseilles (fig. 5) '•'•r'- and Trieste, and at the extensions at Genoa (see y.V.— Harbour) and Naples. Where, however, the basins are formed within the partial protection of a bay, as in the old ports of Genoa and Naples, the re- quisite additional shelter has been provided by converging breakwaters across the opening of the bay; and an entrance to the port is left between the breakwaters. The two deep arms of the sea at New York, known as the Hudson and East rivers, are so protected by Staten Island and Long Island that it has been only necessary to form open basins by projecting wide jetties or quays into them from the west and east shores of Manhattan Island, and from the New Jersey and Brooklyn shores, at in- tervals, to provide adequate accommodation for Atlantic liners and the sea-going trade of New York.

The accessibility of a port depends upon the depth of its approach channel, which also determines the depth of the docks

or basins to which it leads; for it is useless to give a chaaaeis. depth to a dock much in excess of the depth down to

which there is a prospect .of carrying the channel by which it is reached. The great augmentation, however, in the power and capacity for work of modern dredgers, and especially

silting, and the resources and prospects of trade of the port, for every addition to the depth generally involves a corresponding increase in the cost of maintenance. •'

At tidal ports the available depth for vessels should be reckoned from high water of the lowest neap tides, as the standard which is certain to be reached at high tide; and the period during which docks can be entered at each tide depends upon the nature of the approach channel, the extent of the tidal range and

<

u

V)

x

o

z

Fig. 6. — Dunkirk Docks and Jetty Channel.

the manner in which the entrance to the docks is effected. Thus where the tidal range is very large, as in the Severn estuary, the approach channels to some of the South Wales ports are nearly dry at low water of spring tides, and it would be impossible to make these ports accessible near low tide; whereas at high water, even of neap tides, vessels of large draught can enter their docks. At Liverpool, with a rise of 31 ft. at equinoctial spring tides, owing to the deep channel between Liverpool and Birkenhead and into the outer estuary of the Mersey in Liverpool

Bay, maintained by the powerful tidal scour resulting from the filling and emptying of the large inner estuary, access to the river by the largest vessels has been rendered possible, at any state of the tide, by dredging a channel through the Mersey bar; but the docks cannot be entered till the water has risen above half-tide level, and the gates are closed directly after high water.

A large floating landing-stage, however, about half a mile in length, in front of the centre of the docks, connected with the shore by several hinged bridges and rising and falling with the tide, enables Atlantic liners to come alongside and take on board or disembark their passengers at any time.

Comparatively small tidal rivers offer the best opportunity of a considerable im- provement in the approach channel to a port; for they can be converted into artificially deep channels by dredging, and their necessary maintenance is somewhat aided by the increased influx and efflux of tidal water due to the lowering of the low-water

line by the outflow of the ebb tide being facili- tated by the deepening. Thus systematic, continuous dredging

AlVIR THAMES.

Fig. 7. — Tilbury Docks

HH»T° l

CHANNEL.

Fig. 8. — Barry Docks.

in the Tyne and the Clyde has raised the Tyne ports and Glasgow into first-class ports. In large tidal rivers and estuaries, docks should be placed alongside a concave bank which the deep navigable channel hugs, as effected at Hull and Antwerp, or close to a permanently deep channel in an estuary, such as chosen for Garston and the entrance to the Manchester ship canal at Eastham in the inner Mersey estuary, and for Grimsby and the authorized Illingham dock in the Humber estuary; for a channel

carried across an estuary to deep water requires constant dredging to maintain its depth. Occasionally, extensive draining works and dredging have to be executed to form an adequately deep channel through a shifting estuary and shallow river to a port, as for instance on the Weser to Bremerhaven and Bremen, on the Seine to Honfleur and Rouen, on the Tees to Middlesborough and Stockton, on the Ribble to Preston, on the Maas to Rotterdam and on the Nervion to Bilbao (see River Engineering) . South- ampton possesses the very rare combination of advantages of a well-sheltered and fairly deep estuary, a rise of only 12 ft. at spring tides, and a position at the head of Southampton Water at the confluence of two rivers (fig. 4), so that, with a moderate amount of dredging and the construction of quays along the lower ends of the river with a depth of 35 ft. in front of them at low water, it is possible for vessels of the largest draught to come alongside or leave the quays at any state of the tide. This circumstance has enabled Southampton to attract some of the Atlantic steamers formerly running to Liverpool.

Ports on tideless seas have to be placed where deep water approaches the shore, and where there is an absence of littoral drift. The basins of such ports are always accessible for vessels of the draught they provide for; but they require most efficient protection, and, unlike tidal ports, they are not able to ex- ceptional occasions to admit a vessel of larger draught than the basins have been formed to

accommodate. Occasionally, an old port whose approach channel has become inadequate for modern vessels, or from which the sea has receded, has been provided with deep access from the sea by a ship canal, as exemplified by Amsterdam and Bruges; whilst Manchester has become a sea- port by similar works (see Manchester Ship Canal). In such cases, however, perfectly sheltered open basins are formed inland at the head of the ship canal, in the most convenient available site; and the size of vessels that can use the port depends wholly on the dimensions and facility of access of the ship canal.

Docks require to be so designed that they may provide the maximum length of quays in proportion to the water area consistent with easy access for vessels to the quays; but often the space available does not admit of the adoption of the best forms, and the design has _ . . to be made as suitable as practi- 2w£° cable under the existing conditions. uoc,a ‘ On this account, and owing to the small size of vessels in former times, the docks of old ports present a great variety in size and arrangement, being for the most part narrow and small, forming a sort of string of docks communicating with one another, and pro- vided with locks or entrances at suitable points for their common use, as noticeable in the older London and Liverpool docks. Though narrow timber jetties were introduced in some of the wider London docks for in- creasing the length of quays by placing vessels alongside them, no definite arrange- ment of docks was adopted in carrying out the large Victoria and Albert docks between 1850 and 1880; whilst the Victoria dock was made wide with solid quays, provided with warehouses, projecting from the northern quay wall, thereby affording a large accom- modation for vessels lying end on to the : ;.” north quay, the Albert dock subsequently

constructed was given about half the width of the earlier dock, but made much longer, so that vessels lie alongside the north and south quays in a long line. This change of form, however, was probably dictated by the advantage of stretching across the remainder of the wide bend, in order to obtain a second entrance in a lower reach of the river. The Tilbury docks, the latest and lowest docks on the Thames, were constructed on the most approved modern system, consisting of a series of branch docks separated by wide, well-equipped solid quays, and opening straight into a main dock or basin communicating with the entrance lock, in which vessels can turn on entering or leaving the docks (fig. 7). The most recently constructed Liverpool docks, also, at the northern end have been given this form; and the older docks adjoining them to the south have been transformed by reconstruction into a similar series of branch docks

opening into a dock alongside the river wall, leading to a half-tide basin or river entrances (fig. 1).

The Manchester and Salford docks were laid out on a precisely similar system, which was also adopted for the most recent docks at Dunkirk (fig. 6) and Prince's dock at Glasgow (fig. 3), and at some of the principal Rhine ports ; whilst the Alexandra dock at Hull resembles it in principle. The basins in tideless seas have naturally been long formed in accordance with this system (fig. 5). The Barry docks furnish an example of the special arrangements for a coal-shipping port, with numerous coal-tips served by sidings

(fig- «)• . ,

Tidal basins, as they are termed, are generally interposed in the docks of London between the entrance locks and the docks, withthe object of facilitating the passage of vessels out of and into Tidal and the ˆ oc ˆ s before and after high water, by lowering the halt-tide wa t er j n the basin as soon as the tide has risen sufficiently, basins. am j open ; ng t he lock gates directly a level has been formed with the tide in the river. Then the vessels which have collected in the basin, when level with the dock, are readily passed successively into the river. The incoming vessels are next brought into the basin, and the gates are closed ; and the water in the basin having been raised to the level in the dock, the gates shutting off the basin from the dock when the water was lowered are opened, and the vessels are admitted to the dock. In this manner, by means of an inner pair of gates, the basin can be used as a large lock without unduly altering the water-level in the dock, and saves the delay of locking most of the vessels out and in, the lock being only used for the smaller vessels leaving early or coming in late on the tide. Similar tidal basins have also been provided at Cardiff, Penarth, Barry (fig. 8), Sunderland, Antwerp and other docks.

The large half-tide docks introduced at the most modern Liverpool docks (fig. 1) serve a similar purpose as tidal basins; but being much larger, and approached by entrances instead of locks, the exit and entrance of vessels are effected by lowering their water-level on a rising tide, and opening the gates, which are then closed at high water to prevent the lowering of the water-level in the dock, and to avoid closing the gates against a strong issuing current;

The tidal basins outside the locks at Tilbury and Barry are quite open to the tide, and have been carried down to 24 ft. and 16 ft. respectively below low water of spring tides, in order to afford vessels a deep sheltered approach to the lock in each case, available at or near low water (figs. 7 and 8). Such basins, however, open to a considerable tidal range where the water is densely charged with silt, are exposed to a large deposit in the fairly still water, and their depth has to be constantly maintained by sluicing or dredging.

Where the range of tide is moderate, or on large inland rivers, docks or basins are usefully supplemented by river quays, which though subject to changes in the water-level, and exposed River to currents ; n the river, are very convenient for access,

quays. an(j are sometimes very advantageously employed in regulating a river and keeping up its banks when deepened by dredging. Generally 10 to 12 ft. is the limit of the tidal range convenient for the adoption of open basins and river quays; but the banks of the Tyne have been utilized for quays, jetties and coal-staiths, with a somewhat larger maximum tidal range ; and a long line of quays stretching along the right bank of the Scheldt in front of Antwerp, constructed so as to regulate this reach of the river, accommodates a large sea-going traffic, with a rise at spring tides of 15 ft. ,

When a dock has to be formed on land, the excavation is effected by men with barrows and powerful steam navvies, loading into wagons drawn in trains by locomotives to the place of Excava- deposit, usually to raise the land at the sides for forming tionsfor q uays . Directly the underground water-level is reached, docks. ˆ water has to be removed from the excavations by

pumps raising the inflowing water from sumps, lined with timber, sunk down below the lowest foundations at suitable positions, so that the lower portions of the dock walls and sills of the lock or entrance maybe built out of water. A cofferdam has to be constructed extending out from the bank of the river or approach channel in front of the site of the proposed entrance or lock, so that the excavations for the entrance to the dock may be pushed forwards, and the lock or entrance built under its protection. Sometimes the lowest portion of the excavation for the dock can be accomplished economically by dredging, after the dock walls and lock have been completed and the water admitted.

Where a dock is partially or wholly constructed on reclaimed land,

the reclamation bank for enclosing the site and excluding the tide has to be undertaken first by tipping an embankment from each end with wagons, protected and consolidated along its outer toe by rubble stone or chalk. When the ends of the embankments are approaching one another, it is essential to connect them by a long low bank of selected materials brought up gradually in successive layers, and retaining the water in the enclosure to the level of this bank, so that the influx and efflux of the tide, filling and emptying the reclaimed area, may take place over a long length, and in smaller volume as the low bank is raised. In this way a reduction is effected of the tidal current in and out, which in the case of a large enclosure and a considerable tidal range, would create such a scour in the narrowing gap between two high embankments as to wash away their ends and prevent the closing of the gap. Occasionally the final closure is effected by lowering timber panels in grooves between

a series of piles driven down at intervals across the gap. On the closing of the reclamation bank the water is pumped out; and the excavation is carried on in the ordinary manner. It is very important that such an embankment should be carried well above the level of the highest tide which might be raised by a high wind ; and in exposed sites, the outer slope of the bank should be protected by pitching from the action of waves, for any overtopping or erosion of the bank might result in a large breach through it, and the flooding of the works inside.

Docks are generally surrounded by walls retaining the quays, alongside which vessels lie for discharging and taking in cargoes. In order to ascertain the nature of the strata upon which these walls have to be founded, borings are taken at the ™ m ” a ” outset to the requisite depth at intervals near the line L on £ n of the walls, but inside the dock area if the piercing of vaua.

quicksand is anticipated, as in excavating for the foundations, these holes might give rise to the outflow, under pressure, of underlying quicksand into the foundations. As docks are generally formed near rivers or estuaries, these strata are commonly alluvial; but being situated at some depth below the surface, they are usually fairly hard. When they consist of gravel, clay or firm sand, the walls can be founded on the natural bottom excavated a few feet below the bottom of the dock, their weight being somewhat distributed by making them rest on a broad bed of concrete filling up the excavation at the bottom. When, however, fine sand or silt charged with water, or quicksand is met with at the required depth, the necessary pumping and excavation for the foundations might occasion the

influx of sand or silt with the water into the excavations, leading to settlement and slips; or the soft stratum might be too thick to remove. The wall may then be founded on bearing piles driven down to a solid stratum, and having their tops joined together by walings and planking, or by a layer of concrete, upon which the wall is built. Or the soft stratum can be enclosed with a double row of sheet piling along the front and back of the line of wall, by which it sometimes becomes sufficiently confined and consolidated to sustain the weight of the wall on a broad foundation of concrete ; or it can be excavated without any danger of sand or silt running in from outside ; whilst the sheet piling at the back relieves the wall to some extent from the pressure of the earth behind it, and in front retains the wall from sliding forwards. Firmer foundations have been obtained by sinking brick, concrete or masonry wells through soft ground to a solid stratum, upon which the dock wall is built. Clusters of small concrete cylinders, in sets of three in front, and a line of double cylinders at the back, were used for the foundations of the walls of Prince's dock at Glasgow. Wells of rubble masonry were sunk in the silty fore- shore of the Seine estuary for the walls of the Bellot docks at Havre ; and they served as piers, connected by arches, for the foundations of a continuous dock wall above, being carried down to a considerable depth through alluvium at the St Nazaire, Bordeaux and Rochefort docks. These well foundations, derived from the old Indian system, are built up upon a curb, sometimes furnished with a cutting edge underneath, and gradually sunk by excavating inside ; and eventu- ally the central hollow is filled up solid with concrete or masonry.

The walls round a dock serve as retaining walls to keep up the quays; and though they have the support of the water in front of them when the docks are in use, they have to sustain the full pressure of the filling at the back on the completion of the dock before the water is admitted. They have, accordingly, to be increased in thickness downwards to support the pressure increasing with the depth. This pressure, with perfectly dry material, n

would be represented by the weight of half the prism of ■

filling between the natural slope of the material behind and the back of the wall ; but the pressure is often increased by the accumulation of water at the back, which, with fine silty backing, is liable to exert a sort of fluid pressure against the wall proportionate to the density of the mixture of silt and water. The increase of thickness towards the base used formerly to be effected by a batter on the face, as well as by steps out at the back ; but the vertical form now given to the

sides of large vessels necessitates a corresponding fairly vertical face for the wall, to prevent the upper part of the vessel being kept unduly away from the quay. Examples of the most modern types of dock walls are given in figs. 9 to 12.

The height of a dock wall depends upon the depth of water always available for vessels, at tideless sea-ports and at ports removed from tidal influences, such as Man- chester, Bruges and the ports on the Rhine ; this depth should not be less than 28 to 30 ft. for large sea-going vessels, together with a margin of 5 to 8 ft. above the normal water- level for the quays, and the foundations below. At tidal ports, however, an addition has to be made equal to the difference in height between the high-water levels of spring and neap tides; so that at ports with a large tidal range, such as the South Wales ports on the Severn estuary and Liverpool, specially high dock ‘ walls are necessary. Under normal conditions, a dock wall should

Fig. 9.— Havre Bellot Dock Wall.

I

tua,

be given a width at a height half-way between dock-bottom and quay-level’, equal to one-third of its height above dock-bottom, and a width of half this height at dock-bottom.

Dock walls are constructed of masonry, brickwork or concrete, or of concrete with a facing of masonry or brickwork. Masonry is adopted where large stone quarries are readily accessible, in the form of rubble masonry with dressed stone on the face, as for instance at the Hull and Barry docks, and forms a very durable wall; but strong overhead staging carrying powerful gantries is necessary for laying large blocks. Brickwork has been often used where bricks are the ordinary building material of the district or can be made on the

, . ,, works, and requires only ordinary scaffolding;

2:‘j ‘. «_• ‘/ »v v~’ and harder or pressed bricks are employed for

cSv”-‘ ■••«•’»”. ■ ■,■/:££; the facework. Concrete is very commonly

.... – ... ■■'•'" jf / "J resorted to now where sand and stones are*

K fcXˆfifc'^^ J&k. readily procured; and where clean, sharp

"~ '■ " " sand and gravel are found in thick layers in

the excavations for a dock, as in the alluvial

strata bordering the Thames, dock walls can

p IG I0 Liverpool ˆ e constructed cheaply and economically with

Dock Wall. concrete deposited within timber framing,

dispensing with regular scaffolding and skilled, labour. Such walls require to be given a facing of stronger con- crete, or of blue bricks, as at Tilbury, to guard against abrasion by vessels, chains and ropes; and dock walls are commonly pro- vided at the top with granite or other hard stone coping where the wear is greatest. The foundations for dock walls are excavated in a trench below dock-bottom, only lined with timbering where the faces of the trench cannot stand for a short time without support, and with sheet piling through very unstable silt or sand ; and the trench is conveniently filled up solid with concrete,carried out in short lengths i lw ' fl'. •■'•" "'•I? in untrustworthy ground. To reduce*

■ I. VTr =ˆ ' r ■ •' j,' ˆkˆr the amount of filling behind the wall,thd – T ~ K*,' – •»..' 4g-~ excavation at the back above dock- bottom, preparatory for the trench, is ij ' U'» <ˆ !'..'*.' ˆC given as steep a slope as practicable,*

*"ˆ J, ', • * » ,' ' • •. ˆi supported sometimes towards the base*

I Y' t. " m ' .' .' "v 5 by timbering and struts; but occasion-

*j sTlH' **••• "ˆ r * t> ally the wall is built within a timbered*

-ra -«•(•_• ' '. • _'i'rrr trench carried down to the required depth, before the excavation for the dock in front of it has been executed, as effected at Tilbury. The filling at the back is thus reduced to a minimum, and the lower portion of the excavation can be accomplished by dredging, if expedi- ent, after the admission of the water, the dock wall in this waybeingexposed to theleast possible pressure behind. The walls of open basins are often constructed out of water precisely like dock walls, as in the case of the basins forming the Manchester, Bruges and Glasgow docks; and basin walls*

open to the tide, as at Glasgow and in the tidal basin outside Tilbury docks (fig. 7), differ only from dock walls in being exposed to variations in the pressure at the back resulting from the lowering of the water-level in front, which is, indeed, shared to some extent by the walls round closed docks where the difference in the high- water levels of springs and neaps is considerable. The walls, however, :zi \ˆT round basins in tideless seas, such as dr^rl Marseilles, occasionally those inside Jiˆi—iharbours, and especially quay walls rr-ˆfˆCalong rivers and round open basins ^^^.Sˆalongside rivers, have to be constructed under water.

At Marseilles, the simple expedient was long ago adopted of constructing the quay walls lining the basins formed in the sea, by depositing tiers of large concrete blocks on a rubble foundation, one on top of the other, till they reached sea-level, and then building a solid masonry quay wall . out of water on the top up to quay-level, faced with ashlar

Open basin ˆ fig ˆ the wa]1 being foamed by rubble for some distance and river behind up to the water-level. The same system was em- quay walls pi y et j f or the quay walls af Trieste, and at Genoa and founded other Italian ports. A quay wall inside Marmagao har- under bour, on the west coast of India, was erected on a founda-

water. t ; on i aver f ru bble by the sloping-block system, to

provide against unequal settlement on the soft bottom (see Break- water). The quay walls alongside the river Liffey, and round the

Fig. ii.-

-Tilbury Basin Wall.

HMM«

LIAS SHALE.

Fig. 12.

— Barry Wall.

Dock

Fig. 13. — Marseilles Quay Wall.

UK

adjacent basins below Dublin, were erected under water by building rubble-concrete blocks of 360 tons on staging carried out into the water, from which they were lifted one by one by a powerful floating derrick, which conveyed the block to the site, and deposited it on a levelled bottom at low tide in a depth of 28 ft., raising the wall a little above low water. After a row of these blocks had been laid, and connected together by filling the grooves formed at the sides and the interstices between the blocks with concrete, a continuous masonry wall faced with ashlar was built on the top out of water. A quay wall was built up to a little above low water on a similar principle at Cork, with three smaller blocks as a founda- tion,- in lengths of 8 ft. Cylindrical well foundations have been extensively used for the foundations of the quay walls along the Clyde, formerly made of brick, but subsequently of concrete, sunk through a considerable variety of alluvial strata, but mostly sand and gravel fully charged with water. Compressed air in bottomless caissons has been increas- ingly employed in recent years for carrying down th«ˆ subaqueous founda- tions of river quay walls, through allu- vial deposits, to a solid stratum. About 1880, a long line of river quays was commenced in front of Antwerp, extending in the central portion a considerable dis- tance out into the Scheldt, with the object of regulating the width of the river simultaneously

ˆˆquayttr ™ H-Antwerp Quay Wall, founded by sea-going vessels; Compressed air. ...

and the quay wallwas erected, out of water, on the flat tops of a , series of wrought-iron caissons, 82 ft. long and 29ˆ ft. wide, con- structed on shore, floated out one by one to their site in the river between two barges, and gradually lowered as the wall was built up inside a plate-iron enclosure round the roof of the caisson, which was eventually sunk by aid of compressed air through the bed of the river to a compact stratum (fig. 14). The weight of the wall counteracted the ten- dency of the caisson and the enclosure above it to float; and the caisson, furnished with seven circular wrought – iron shafts, provided with air-locks at the top for the ad- mission of men and materials and for the removal of the excava- tions, was gradually carried down by ex- cavating inside the working chamber at the bottom, 6| ft. high, till a good foundation was reached.

Fig. 15.-

-Caracciolo Jetty Genoa.

Quay Wall,

The. working chamber was then filled with concrete through some of the shafts, the plate-iron sides of the upper enclosure were removed to be used for another length of wall, the shafts were drawn out and the hollows left by them filled with concrete, the apertures between adjacent lengths were closed at each face with wooden panels and filled with concrete, and a continuous quay wall was completed above. The most recent quay walls constructed in the old harbour

Fig. 16. — Glasgow River Quay Wall.

at Genoa were founded under water on a rubble mound in a similar manner by the aid of compressed air (fig. 15). Quay walls also on the Clyde have been founded on caissons, consisting of a bottom- less steel structure, surmounted by a brick superstructure having hollows filled with concrete, in lengths of 80 ft. and 27 ft., and widths of 18 ft. and 21 ft. respectively, carried down by means of compressed air from 54 to 70 ft. below quay-level, on the top of which a continuous wall of concrete, faced with brickwork,

^_^and having a ^F granite c o pi n g , ”” was built up from near low - water level (fig. 16). In many cases where soft strata extend to considerable depths, river quays and basin walls have been constructed by building a light quay wall upon a series of bearing and raking piles driven into, and if possible through, the soft alluvium. Thus the walls along the Seine, and round the basins at Rouen, were built upon bearing piles carried down through the alluvial bed of the river to the chalk. The lower portion of the quay wall was constructed of concrete faced with brickwork within water-tight timber caissons, resting upon the piles at a depth of 9f ft. below low water ; and upon this a rubble wall faced with bricks was erected from low water to quay-level, backed by rubble stone laid on a timber flooring sup- ported by piles, together with chalk, to form a quay right back to the top of the slope of the bank of the deepened river (fig. 17). The

quay walls of the open basins bordering the Hudson river at New York have had, in cer- tain parts, to be founded on bearing piles com- bined with raking piles, driven into a thick bed of soft silt where no firm stratum could be reached, and where, therefore, the weight could only be borne by the adherence of the long piles in the silt. Before driving the piles, however, the silt round the upper part of the

piles and under the quay wall was consoli- dated by depositing small stones in a trench dredged Fig, i 7 .-Rouen Quay Wall. Joa de^th of 30ft. belw

were driven through these stones, and were further kept in place by a long toe of rubble stone in front and a backing of rubble stone behind carried nearly up to quay-level, behind which a light filling of ashes and earth was raised to quay-level. The slight quay wall resting upon the front rows of bearing piles was carried up under water by 70-ton concrete blocks deposited by means of a floating derrick ; and the upper part of the wall was built of concrete faced with ashlar masonry (fig. 18). The basin and quay walls at Bremen, Bremerhaven and Hamburg were built on a series of bearing and raking piles driven down to a firm stratum, the wall being begun a few feet below low water. At Southampton, ferro-concrete piles were employed in constructing the deep quays; and a wharfing of timber pilework has been frequently used for river quays.

Where the increase of trade is moderate and the conditions of the traffic permit, and also at coal-shipping ports, economy in construction is obtained by giving sloping sides to a portion of a dock in place of dock walls, the slope being pitched where necessary with stone ; and the length of the slope projecting into a dock is sometimes reduced by substituting sheet piling for the slope at the toe up to a certain height. By this arrangement jetties can be carried Out across the slope as required, enabling vessels to lie against their ends; and coal-tips are very conveniently extended out across the slope at suitable intervals (fig. 8).

As dock walls, especially before the admission of water into the dock, constitute high retaining walls, not infrequently founded upon soft or slippery strata, and backed up with the excavated materials _ „ . from alluvial beds, into which water is liable to percolate,

*docket? t ‘ ley are natura “y exposed Under unfavourable conditions * * to the danger of failure. A dock wall erected on un- satisfactory foundations is liable, where the bottom is soft, to*

CHALK- ‘ ‘ ”” T

settle down at its toe, owing to the pressure at the back, and to fall forwards into the dock, as occurred at Belfast; or where the silty bottom slips forward under the weight of the backing, the wall may follow the slip at the bottom and settle down at the back, falling to some extent backwards, as exemplified by the failure of the Empress

basin wall at Southampton. The most common form, however, of failure is the_ sliding forwards of a dock wall, with little or no subsidence, on a silty or slippery stratum under the pressure imposed by the backing. ‘ Thus the Kidderpur dock walls furnish an instance of sliding forwards on muddy silt, and part of the South West India dock walls on two underlying, detached, slippery seams of London clay.

To avoid these failures with untrustworthy foundations, great care has to be exercised in selecting the best hard material available, unaffected by water, for the backing, which should be brought up in thin, horizontal layers carefully consolidated; and where there is a possibility of water accumulating at the back, pipes should be introduced at intervals near the bottom right through the wall in building it, and rubble stone deposited close to the back of the wall, so as to carry off any water from behind, these pipes being stopped up just before the water is let into the dock. These precautions, more-over, are assisted by reducing the amount of backing to a minimum in the construction of the wall, best effected by building the wall inside a timbered trench. The liability to slide forwards can be obviated by carrying down the foundations of the wall sufficiently below dock-bottom to provide an efficient buttress of earth in front of the wall, and also by making the base of the wall slope down

Fig. 18. — New York Quay Wall, Hudson river.

towards the back, thereby forcing the wall in sliding forwards to mount the slope, or to push forward a larger mass of earth; whilst a row of sheet piling in front of the foundations offers a very effectual impediment to a forward movement, and, in combination with bearing piles, prevents settlement at the toe in soft ground. In very treacherous foundations it may be advisable to defer the completion of the backing till after the admission of the water ; but the additional stability given to a retaining wall or reservoir dam by an ample batter in front, is precluded in dock walls by the modern requirements of vessels.

Silt accumulates in docks where the lowering of the water-level by locking, the drawing down of half-tide basins, and the raising of the water at spring tides, involve the admission of con- siderable volumes of tidal water heavily charged with silt, Malate ”’ which is deposited in still water and has to be periodically Z” C fu removed by dredging. To avoid this, the water is some- ‘

times replenished from some clear inland source, an arrangement

adopted at some of the South Wales ports opening into the muddy Severn estuary, and at the Alexandra dock, Hull, to exclude the silty waters of the Humber. At the Kidderpur docks on the Hugh, the water from the river for replenishing the docks is conducted by a circuitous canal, in which it deposits its burden of silt before it is pumped into the docks.

In order to deal expeditiously with the cargoes and goods brought into and despatched from docks, numerous sidings communicating with the railways of the district are arranged along the quays, which are also provided % "ˆy" ' with steam, hydraulic or electric travelling cranes at intervals alongside the docks, basins or river, for discharging or loading vessels, and with sheds and warehouses for the storage of merchandise, &c, the arrangements depending largely upon the special trade of the port. Though different sources of power are sometimes made use of at different parts of the same port, as for example at Hamburg, where the numerous cranes are worked by steam, hydraulic power or most recently by elec- tricity, and a few by gas engines, it is generally most convenient to work the various installations by one form of power from a central station. Water-pressure has been very commonly used

as the motive power at docks, being generated by a steam- engine and stored up by one or more accumulators, from which the water is transmitted under pressure through strong cast-iron pipes to the hydraulic engines which actuate the cranes, lifts, coal-tips, capstans, swing-bridges and gate machinery through- out the docks (see Power Transmission: Hydraulic). The intermittent working of the machinery in docks results in a considerable variation in the power needed at different times; but economical working is secured by arranging that when the accumulators are full, steam is automatically shut off from the pumping engines, but is supplied again as soon as water is drawn off. Electricity affords another means for the economical trans-mission of power to a distance suited for intermittent working; as far back as 1902 it was being adopted at Hamburg as the source of power for the machinery of the extensive additional basins then recently opened for traffic.

At ports where the principal trade is the export of coal from neighbouring collieries, special provision has to be made for its rapid shipment. Coal-tips, accordingly, are erected at the sides of the dock

in these ports, with sidings on the quays at the back for receiving the trains of coal trucks, from which two lines of way diverge to each coal-tip, one serving for the conveyance of the full wagons one by one to the tip, after passing over a weigh-bridge, and the other for the return of the empty wagons to the siding where the empty train is made up for returning to the colliery (fig. 8). Each full wagon is either run at a low level upon a cradle at the tip, then raised on the cradle within a wrought-iron,lattice tower to a suitable height, and lastly, tipped up at the back for discharging the coal; or it is brought along a high-level road on to a cradle raised to this level on the tower, and tipped up at this or some slightly modified level. The coal is discharged down an adjustable iron shoot, gradually narrowed so as to check the fall; and on first dis- charging into the hold of a vessel, an anti-breakage box is sus- pended below the mouth of the shoot. When full, this is lowered to the bottom of the hold and emptied, thereby gradually forming a cone of coal upon which the coal can be discharged directly from the shoot without danger of breakage. Other contrivances are also adopted with the same object.

In designing dock works, it is expedient to make provision, as far as possible, for future extensions as the trade of the port increases. Generally this can be effected alongside tidal rivers and estuaries ^^ by utilizing sites lower down the river, as carried out on

Dock ex- t jJ e Thames for the port of London, or reclaiming unoccu- tensions. pj ec [foreshores of an estuary, as adopted for extensions of the ports of Liverpool, Hull and Havre. At ports on the sea-coast of tideless seas, it is only necessary to extend the outlying break- water parallel to the shore line, and form additional basins under its shelter, as at Marseilles (fig. 5) and Genoa (see Harbour). Quays also along rivers furnish very valuable opportunities of readily extending the accommodation of ports. Ports, however, established inland like Manchester, though extremely serviceable in converting an inland city into a seaport, are at the disadvantage of having to acquire very valuable land for any extensions that may be required ; but, nevertheless, some compensation is afforded by the complete shelter in which the extensions can be carried out, when compared with Liverpool, where the additions to the docks can only be effected by troublesome reclamation works along the foreshore to the north, in increasingly exposed situations.

Bock Entrances and Locks. — The size of vessels which a port can admit depends upon the depth and width of the entrance to the docks; for, though the access of vessels is also governed by the depth of the approach channel, this channel is often capable of being

further deepened to some extent by dredging; whereas the entrance, formed of solid masonry or concrete, cannot be adapted, except by troublesome and costly works sometimes amounting to reconstruction, to the increasing dimensions of vessels. Accordingly, in designing new dock works with entrances and locks, it is essential to look forward to the possible future requirements of vessels. The necessity for such forethought is illustrated by the rapid increase which has taken place in the size of the largest ocean liners. Thus the " City of Rome," launched in 1881, is 560 ft. long, and 52J ft. beam, and has a maximum recorded draught of 275 ft. ; the " Campania " and " Lucania," in 1893, measure 600 ft. by 65 ft. ; the " Oceanic,"

in 1899, 685J ft. by 68j ft., with a maximum draught of 31J ft.; the " Baltic," in 1903, 709 ft. by 75 ft., with a maximum draught of 31J ft.; and the " Lusitania " and " Mauretania," launched in 1906, 787J ft. by 88 ft.

The width and depth of access to docks are of more importance than the length of locks; for docks which are reached through entrances with a single pair of gates have to admit Dtolel ,. vessels towards high water when the water-level in the sions of dock is the same as in the approach channel, or through entrance a half-tide basin drawn down to the level of the water * a " Be **» outside, and are therefore accessible to vessels of any length, provided the width of the entrance and depth over the sill are adequate; whilst at docks which are entered through locks, vessels which are longer than the available length of the lock can get in at high water when both pairs of gates of the lock are open. Open basins are generally given an ample width of entrance, and river quays also are always accessible to the longest and broadest vessels; but in a tidal riyer the available depth has to be reckoned from the lowest low water of spring tides, instead of from the lowest high water of neap tides, if the vessels in the open basins and alongside the river quays have to be always afloat.*

Many years ago the Canada lock at Liverpool, the outer North lock at Birkenhead, the Ramsden lock and entrance at Barrow- in-Furness, and the Eure entrance at Havre, were given a width of 100 ft. Probably this was done with the view of admitting paddle steamers, since subsequent entrances at Liverpool were given widths of 80 and 65 ft.; whereas none of the locks in the port of London has been made wider than 80 ft., which has been the standard maximum width since the completion of the Victoria dock in 1866. The widest locks at Cardiff are 80 ft., and tHe entrance to the Barry docks is the same; but the lock of the Alexandra dock, Hull, opened in 1885, was made 85 ft. wide. At Liverpool, where the access to the docks is

mainly through entrances, on account of the small width between the river and the high ground rising at the back, and where ample provision has to be made for the largest Atlantic liners, though the entrances to the Langton dock, completed in 1881, leading to the latest docks at the northern end were made 65 ft. wide, with their sills 3 ft. below low water of spring tides and 203 ft. below high water of the lowest neap tides, the two new entrances to the deepened Brunswick dock near the southern end, giving access to the adjacent reconstructed docks, completed in 1906, were made 80 and 100 ft. wide, with sills 28 ft. below high water of the lowest neap tides. Moreover, the three new entrances to the new Sandon half tide dock, completed in 1906, communicating with the reconstructed line of docks to the south of the Canada basin, and with the latest northern extensions of the Liverpool docks, were made 40 ft. wide with a depth over the sill of 24J ft., and 80 and 100 ft. wide on each end of the central entrance, with sills 29 ft. below high water of the lowest neap tides, each entrance being provided with two pairs of gates, in case of any accident occur ring to one pair, according to the regular custom at Liverpool. Powers were also obtained in 1906 for the construction of a half- tide dock and two branch docks to the north of the Hornby dock, which are to be reached from the river by two entrances designed to be 130 ft. wide, with sills 383 ft. below high water of the lowest neap tides, so as to meet fully the assumed future increase in the beam and draught of the largest vessels; whilst the authorized extension of the river wall northwards will enable additional docks to be constructed in communication with these entrances when required.

Though, with the exception of Southampton and Dover, other British ports do not aim, like Liverpool, at accommodating the largest Atlantic liners at all times, the depths of the sills at the principal ports have been increased in the most recent extensions. Thus at the port of London the sills of the first lock of the Albert dock were 26J ft. below high water of neap tides, and of the second lock adjoining, 323 ft. deep; whilst the sills of the lock of the Tilbury docks are 403 ft. below high water of neap tides. Moreover, in spite of the great range of tide at the South Wales ports on the Severn estuary, the available depth at high water of neap tides of 25 ft. at the Roath lock. Cardiff, was increased

in the lock of the new dock to 31 j ft.; the depth at the entrance to

the Barry docks, opened in 1889, was 29! ft., but at the lock opened in 1896 was made 41I ft.; whilst a depth of 34 ft. has been proposed for the new lock of the Alexandra dock extension at Newport, nearly 10 ft. deeper than the existing lock sills there. Similar improvements in depth have also been made or designed at other ports to provide for the increasing draught of vessels.

The length of locks has also been increased, from 550 ft. at the Albert dock, to 700 ft. at Tilbury in the port of London, from 300 ft. to 550 ft. at Hull, and from 350 ft. to 660 ft. at Cardiff. The lock at the Barry docks is 647 ft. long, though only 65 ft. wide. A lock constructed in connexion with the improvement works at Havre, carried out in 1896-1907, was given an available length of 80s It; – aQ d a width of 98? ft., with a depth over the sills of 34$ ft. at high water of neap tides.

Entrances with a single pair of gates, closing against a raised sill at the bottom and meeting in the centre, have to be made long

Fig. 19. — Barry Docks, Entrance.

*enough to provide a recess in each side wall at the back to receive the gates when they are opened, and to form a buttress in front on each side to bear the thrust of the gates when closed 1 dHHk** a S amst a head of water inside. A masonry floor is laid to docks. Qn t j le b ottom m continuation of the sill, serving as an apron against erosion by water leaking between or under the gates, and by the current through the sluiceways in the gates, when opened for scouring the entrance channel or to assist in lowering the water in a half-tide dock for opening the gates (fig. 19). A sluice- way in each side wall, closed by a vertical sluice-gate, generally provided in duplicate in case of accidents and worked by a machine actuated by hydraulic pressure, enables the half-tide basin to be brought down to the level of the approach channel outside with a rising tide, so that vessels may be brought into or passed out of the basin towards high water. The advantages of these entrances are, that they occupy comparatively little room where the space is limited, and are much less costly than locks; whilst in conjunction with a half-tide basin they serve the same purpose as a lock with a rising tide. Vessels also pass more readily through the short entrances than through locks; and as entrances are only used towards high water, their sills need not be placed so low as the outer sills of locks to accommodate vessels of large draught. On the other hand, they are accessible for a more limited period at each tide than iocks; and they do not allow of the exclusion of silt-bearing tidal water, and therefore necessitate a*

greater amount of dredging in the docks, and especially in half-tide basins, for maintenance. Entrances, however, at large ports are frequently supplemented by the addition of a lock at some convenient site, rendering the ports accessible for the smaller class of vessels for some time before and after high water, as for instance at Liverpool, Barry, Havre and St Nazaire. A small basin with an entrance at each end — an arrangement often adopted — is in reality, for all practical purposes, a lock with a very

large lock-chamber. An entrance or passage with gates has also to be provided at the inner end of a large half-tide basin like the basins adopted at Liverpool, to shut off the half-tide basin from the docks to which it gives access, and maintain their water-level when the water is drawn down in the basin to admit vessels before high tide.

Reverse gates pointing outwards are sometimes added in passages to docks and at entrances, to render the water-level in one set of docks independent of adjacent docks, to exclude silty tidal water and very high tides, and also to protect the gates of outer entrances in exposed situations from swell, which might force them open slightly and lead to a damaging shock on their closing again.

Locks differ from entrances in having a pair of gates with ar- rangements similar to an entrance at each end, separated from one another by a lock-chamber, which should be large enough to receive the longest and broadest vessel coming regularly j OC ? s at to the port. Thˆse dock locks are similar in principle to docks. locks on canals and canalized rivers, but are on a much larger scale. The lock-chamber has its water raised or lowered in proportion to the difference in level between the water-level in the dock and the water in the entrance channel, by passing water, when the gates are closed at both ends, from the dock into the lock-chamber or from the lock-chamber into the entrance channel, through large sluiceways in the side walls, controlled, as at entrances, by vertical sluice-gates. In this way the vessel is raised or lowered in the chamber, till, when a level has been reached, the intervening pair of gates is opened and the vessel is passed into the dock or out to the channel. Gener- ally the upper and lower sills of a lock are at the same level, a foot or two higher than dock-bottom; and the depth at which they are laid is governed by the same considerations as the sill of an entrance. Vessels longer than the available length between the two pairs of gates can be admitted close to high water, when the water in the dock and outside is at the same level, and both pairs of gates can be opened. When the range of tide at a port is large, and the depth in the approach channel is sufficient to allow vessels to come up or go

out some time before and after high water, and also where the water in the dock is kept up to a high level from an inland source to exclude very silty tidal water, it is expedient to reduce the cost of construc- tion by limiting the depth of the excavations for the dock, and consequently also the height of the dock walls, to what is necessary to provide a sufficient depth of water below high water of the lowest neap tides, or below the water-level to which the water in the dock is always maintained, for the vessels of largest draught frequenting the port, or those which may be reasonably expected in the near future. The upper sill of the lock is then determined by the level of dock- bottom ; but the lower sill is taken down approximately to the depth of the bottom of the approach channel, or to the depth to which it can be carried by dredging, so as to enable the lock to admit or let out at any time all vessels which can navigate the approach channel. Thus, for instance, the outer and intermediate sills of the lock at the Barry docks are 9 ft. lower then the upper sill.

The foundations for the sill and side walls at each end of a lock, and also for the side walls and invert commonly enclosing the lock-chamber at the sides and bottom, are generally constructed simultaneously with the dock works, under shelter of a cofferdam across the entrance channel, and in the excavations kept dry by means of pumps. The foundations under the sills and adjacent side walls are carried down to a lower level than the rest, and impossible to a water- tight stratum, to prevent infiltration of water under them owing to the water-pressure on the upper side of the gates ; or sometimes one or two rows of sheet piling have been driven across the lock under the sills to an impermeable stratum, to stop any flow. The foundations for the sills consist usually of concrete deposited in a trench extended out under the adjoining side walls. The sill, projecting generally about 2 ft. above the adjacent gate floor over which the gates turn, is built of granite ; and the same material is also used for the hollow quoins in which the heelpost, or pivot, of the dock gates turns, and which, together with the sills, are exposed to considerable wear. The side walls of the lock-chamber are very similar in construction to the dock walls; but they are strengthened against the loss of water-pressure in front of them when the water is lowered in the chamber by an inverted arch of masonry, brickwork or concrete, termed an " invert," laid across the bottom of the chamber along its whole length, against which the toe of each side wall abuts and effectually prevents any forward movement. The side walls also, alongside the gates at each end, abut against a thick level gate floor and apron, and, moreover, are considerably widened to provide space for the sluiceways and gate machinery.

The new Florida lock (fig. 20), forming the main entrance through the new approach harbour and tidal harbour to the Eure dock and other docks of the port of Havre, is the largest lock hitherto constructed. It has an available length of chamber between the gates of 805 ft., a width of 98J ft., and depths over the sills of 15J ft. at the lowest low water of spring tides, 23I ft. at low water of neap tides, 35 ft. at high water of neap tides, and 40 \ ft. at high water of spring tides. Owing to the alluvial stratum at the site of the lock close to the Seine estuary, of which it doubtless at one time formed part, the foundations for the sill and side walls or heads at each end of the lock were executed by aid of compressed air. The foundations for these heads were carried down to an impermeable stratum by means of two bottomless caissons, filled eventually with concrete, 2134 ft.

long across the lock and 105 ft. wide in the line of the lock at the upper end, and 2o6f ft. long and 1 16| ft. wide at the lower end, to a depth of 18 ft. ibelow the sill at the upper end, and 41 ft. at the lower end, owing to the dip down seawards and southward of the water-tight stratum. These caissons were provided for their sinkage with temporary dams of masonry closing the opening of the lock at the extremities of each caisson, enabling the gates to be subsequently erected under their shelter. The junctions between the foundations

the side walls, 67 \ ft. apart, and provide for the filling and emptying of the chamber. •

The gates closing the entrances and locks at docks are made of wood or of iron. In iron gates, the heelpost, or a vertical closing strip attached to the outer side of the gate close to the heelpost, Dock

the meeting-post at the end of each gate closing against gates.

each other when the gates are shut, and the sill piece fitting against the sill are generally made of wood. Wooden gates consist of

Longitudinal Section, Lower End

Cross Section on AB.

Longitudinal Section, Upper End.

Fig. 20. — Florida Lock, Havre Docks, Sections and Plan.

of the heads and the adjacent foundations were effected by small movable caissons carried down in recesses provided in the buried caissons. The connexions with the adjacent quay walls were accomplished by two supplementary side caissons at the end of each head ; and the north side wall of the lock was founded by means of seven bottomless caissons sunk by aid of compressed air, on account of the proximity of the tidal harbour on that side. The south side wall was founded for a length of about 200 ft. at its western end in an excavated trench kept dry by pumping; but the greater portion

Fig. 21. — Wooden Dock Gate.

Fig.

22. — Iron Segmental Dock Gate.

was founded in a dredged trench in which bearing piles were driven under water, on which the masonry was built in successive layers, about 3i ft. thick, in a movable caisson 93 £ ft. long and 37I ft. wide ; whilst a bottomless caisson, left in the work, was employed for founding about 100 ft. of wall at the eastern end. The bed of concrete also, 10 ft. thick, forming the floor of the chamber, was carried out for 82 ft. at the western end in the open air, and the remainder in the same movable caisson as used for the south wall. Two sluiceways on each side running the whole length of the lock, differing 6i ft. in level, communicate with the lock-chamber through openings m

a series of horizontal framed beams, made thicker and put closer together towards the bottom to resist the water-pressure increasing with the depth, fastened to the heelpost and meeting-post at the two ends and to intermediate uprights, and supporting water-tight planking on theinnerface (fig. 21). Iron gates have generally an outer as well as an inner skin of iron plates braced vertically and horizontally by plate- iron ribs, the horizontal ribs being placed nearer together and the plates made thicker towards the bottom (figs. 22 and 23). Green- heart is the wood used for gates exposed to salt water, as it resists the attack of the teredo in temperate climates. As cellular iron gates are made water-tight, and have to be ballasted with enough water to prevent their flotation, or are provided with air chambers below and are left open to the rising tide on the outer side above, the gates are light in the water and are easily moved; whereas greenheart gates with their fastenings are considerably heavier than water, so that a considerable weight has to be moved when the water is somewhat low in the dock and the gates therefore only partially

immersed. On the other hand, wooden gates are less liable than iron gates to be seriously damaged if run into by a vessel.

Dock gates are sometimes made straight, closing against a straight sill (figs. 20 and 23) ; and occasionally they are made segmental with the inner faces forming a continuous circular arc and closing against a sill corresponding to the outer curves of the gates (fig. 22), or by means of a projecting sill piece against a straight sill (fig. 21). More frequently the gates, curved on both faces, meet at an angle forming a Gothic arch in plan, and close by aid of a projecting piece against a straight sill, which in the Barry entrance gates is modified by making the outer faces nearly straight (fig. 19), giving an unusual width to the centre of the gates. The pressures produced by a head of water against these gates when closed depends not only on the form of the gates, but also upon the projection given to the angle of the sill in proportion to the width of the lock, which is known as the rise, and is generally placed at a distance along the centre line of the lock, from a line joining the centres of the heel-posts, of about one-fourth the width. With straight gates, the stresses consist, first of a transverse stress due to the water-pressure against the gate, which increases with the head of water and length of the gate ; and secondly, of a compressive stress along the gate, resulting from the pressure of the other gate against its meeting-post, which is equal to half the water-pressure on the gate multiplied by the tangent of half the angle between the closed gates, varying inversely with the rise. Though an increase in the rise reduces this stress, it increases the length of the gate and the trans- verse stress, and also the length of the lock. By curving the gates

Fig. 23. — Straight Iron Dock Gate.

suitably, the transverse stress is reduced and the longitudinal compressive stress is augmented, till at last, when the gates form a horizontal segmental arch, the stresses become wholly compressive and uniform in each horizontal section, increasing with the depth ;

Fig. 24. — Sliding Caisson.

Fig. 25. — Ship Caisson.

and the total stress is equal to the pressure on a unit of surface multiplied by the radius of curvature. Though the water-pressure is

most uniformly and economically borne by cylindripal gates, they are longer, and encroach more upon the lines of quay with their curved recesses than straighter gates; and, consequently, Gothic-arched gates are often preferred. Straight gates afford the greatest simpli- city in construction.

Gates in wide entrances or locks are generally sup- ported towards their outer end by a roller running along a cast- iron roller-path on the gate floor (figs. 19, 21 and 22), as well as by the heel- post, fitted over a steel pivot at the

bottom, and tied back against the hollow quoins at the top by anchor straps and bolts, on which the gate turns. In some cases, by placing the water ballast in iron gates close to the heelpost, a roller has been dispensed with, even, for instance, at the wide entrance at Havre (fig. 23). The gates are opened and closed, either by an opening and a closing chain for each gate, fastened on either side and worked from opposite side walls by hydraulic power, or by a single hydraulic piston or bar hinged to the inner side K'y Wiˆf of each gate (figs. 19 and 20). The latter system has the ---'-~/f advantages of being simpler and occupying less space in the side walls, of avoiding the slight loss of available depth over the sill due to the two closing chains crossing on the sill when the gates are open, and especially of keeping the gates closed against a swell in exposed sites.

A sliding or rolling caisson is occasionally placed across each end of a lock in place of a pair of dock gates, being Caissons drawn back into a recess at the side for opening for docks, the lock. As a caisson chamber has to be covered over to provide a continuous quay or roadway on the top, a lowering platform is supplied to enable the caisson to pass under the small girders spanning the top of the chamber, or the caisson is sunk down sufficiently (fig. 24). The caisson is furnished with an air chamber to give it flotation, which is adjusted by ballast according to the depth of water. The advantages of a caisson, as compared with a pair of gates, are that the gate recesses, gate floor, hollow quoins and arrangements for working in the side walls are dispensed with, so that the lock can be made shorter, and the work at each head is rendered less complicated. The caisson itself also serves as a very strong movable bridge, and therefore is often preferred at dockyards to dock gates. By improvements in the hauling machinery, a caisson can open or close a lock as quickly as dock gates; the caissons at

Zeebrugge lock, at the entrance to the Bruges ship canal, are drawn across the lock or into their chamber by electricity in two minutes. A

caisson is specially useful in cases where there may be a head of water on either side, as then it takes the place of two pairs of gates pointing in opposite directions, or for closing an entrance against a current. A caisson, however, requires a much larger amount of material than a pair of dock gates, and a considerable width on one side for its chamber, so that under ordinary conditions gates are generally used at docks.

A ship caisson, so called from its presenting some resemblance in section to the hull of a vessel, occupies too much time in being towed, floated into position, and sunk into grooves at the bottom and sides of an entrance for closing it, and then refloated and towed away for opening the entrance again, to be used at entrances and locks to docks (fig. 25). Being, however, simple in construction, taking up little Space, and requiring no chamber or machinery for moving it, this form of caisson is generally used for closing the entrance to a; graving dock, where it remains for several days in place during the execution of repairs to a vessel in the dock. A ship caisson only requires the admission of sufficient water to sink it when in position across the entrance to a graving dock ; and this water has to be pumped out before it can be floated, and removed to some vacant position in the neighbouring dock till it is again required. Like a sliding or rolling caisson, it provides a bridge for crossing over the ‘ entrance of the graving dock when in position.

Graving Docks. — Provision has to be made at ports for the repairs of vessels frequenting them. The simplest arrangement is a timber gridiron, on which a vessel settles with a falling tide, and can then be inspected and slightly cleaned and repaired till the tide .floats it again. Inclined slipways are sometimes provided, up which a vessel resting in a cradle on wheels can be drawn out of the water; and they are also used for shipbuilding, the vessel when ready for launching being allowed to slide down them into the water. Graving or dry docks, however, opening oiut of a dock, are the usual means provided for enabling the cleaning and repairs of vessels to be carried out.

A graving dock consists of an enclosure, surrounded by side walls stepped on the face, and paved at the bottom with a thick floor

Fig. 26. — Plan of Southampton Graving Dock.

sloping slightly down from the centre to drains along the sides, long enough to receive the longest vessel likely to come to the port. Its entrance, at the end adjoining the dock, is just wide enough to admit

the vessel of greatest beam, and deep enough over the sill to receive the vessel of greatest draught, when light, at the lowest water-level of the dock (figs. 26 and 27). Graving docks are constructed of

ffiZZrPˆZ

Fig. 27. — Cross Section of Southampton Graving Dock.

masonry, brickwork or concrete, or formerly in America of timber) they should be founded on a solid impervious stratum, or, where that is impracticable, they should be built upon bearing piles and enclosed within sheet piling, to prevent settlement and the infiltra- tion of water under pressure below the dock. Keel blocks are laid along the centre line of the dock, for the keel of the vessel to restˆpn when the water is pumped out ; and the vessel is further supported on each side by timber shores supported on the steps or ” altars “of the side walls, which are lined with granite or other hard stone, t>r

blue bricks, or, when constructed of concrete, with a facing of stronger concrete, to enable these altars to withstand the wear and shocks to which they are subjected. Steps and slides are provided at con- venient places at the sides to give access for men and materials to the bottom of the dock; and culverts and drains lead the water to pumps for removing the water from the dock when the entrance has been closed, and to keep it dry whilst a vessel is under repair. Culverts in the side walls of the entrance enable water to be admitted for filling the dock to let the vessel out. Graving docks are generally closed by ship caissons; but where they open direct on to a tidal river, and there is some exposure, gates are adopted, or sometimes sliding caissons.

The dimensions of graving docks vary considerably with_ the nature of the trade and the date of construction; and sometimes an intermediate entrance is provided to accommodate two smaller vessels. The sizes of some of the largest graving docks are as follows : Liverpool, Canada dock, 925ˆ ft. long, 94 ft. width of entrance, and 29 ft. depth at the ordinary water-level in the dock; Southampton, 851! ft. by 90 ft., and 29 J ft. depth at high- water neaps (figs. 26 and 27); Tilbury, 875 ft. by 70 ft. by 31! ft.; and Glasgow, 880 ft. by 80 ft. by 26J ft.

Floating Dry Docks. — Where there is no site available for a graving

dock, or the ground is very treacherous, floating dry docks, built originally of wood, but more recently of iron or steel, have occasionally been resorted to. The first Bermuda dock towed across the Atlantic in 1869, and the new dock launched in 1902, 545 ft. by 100 ft., are notable examples. Water is admitted into the pontoon at the bottom to sink the dock sufficiently to admit a vessel at its open end ; and then the water is pumped out of compartments in the pontoon till the vessel is raised out of water. It is only necessary to find a sheltered site, with a sufficient depth of water, for conducting the operations. (L. F. V.-H.)

DOCKET (perhaps from " dock," to curtail or cut short, with the diminutive suffix et, but the origin of the word is obscure; it has come into use since the 15th century) , in law, a brief summary or digest of a case, or a memorandum of legal decisions; also the alphabetical list of cases down for trial, or of suits pending. Such cases are said to be " on the docket." In commercial use, a docket is a warrant from the custom-house, stating that the duty on goods entered has been paid, or the label fastened to goods, showing their destination, value, contents, &c, and, generally, any indorsement on the back of a document, briefly setting out its contents.

DOCK WARRANT, in law, a document by which the owner of a marine or river dock certifies that the holder is entitled to goods imported and warehoused in the docks. In the Factors Act 1889 it is included in the phrase " document of title " and is defined as any document or writing, being evidence of the title of any person therein named … to the property in any goods or merchandise lying in any warehouse or wharf and signed or certified by the person having the custody of the goods. It passes by indorsement and delivery and transfers the absolute right to the goods described in it. A dock warrant is liable to a stamp duty of threepence, which may be denoted by an adhesive stamp, to be cancelled by the person by whom the instrument is executed or issued.

DOCKYARDS. In the fullest meaning of the word, a " dock- yard " (or " navy yard " in America) is a government establish- ment where warships of every kind are built and repaired, and supplied with the men and stores required to maintain them in a state of efficiency for war. Thus a dockyard in this extended sense would include slips for building ships, workshops for manufacturing their machinery, dry docks for repairing them, stores of arms, ammunition, coal, provisions, &c, with basins in which they may lie while being supplied with such things, and an establishment for providing the personnel necessary for manning them. But in practice few, if any,

existing dockyards are of so complete a nature; many of them, for instance, do not undertake the building of ships at all, while others are little more than harbours where a ship may replenish her stores of coal, water and provisions and carry out minor repairs. Private firms are relied upon for the construction of many ships down to an advanced stage, the government dockyards completing and equipping them for commission.

Great Britain. — Previous to the reign of Henry VIII., the kings of England had neither naval arsenals nor dockyards, nor any regular establishment of civil or naval officers to provide ships of war, or to man them. There are, however, strong evi-

dences of the existence of dockyards, or of something answering thereto, at very early dates, at Rye, Shoreham and Winchelsea. In November 1243 the sheriff of Sussex was ordered to enlarge the house at Rye in which the king's galleys were kept, so that it might contain seven galleys. In 1238 the keepers of some of the king's galleys were directed to cause those vessels to be breamed, and a house to be built at Winchelsea for their safe custody. In 1254 the bailiffs of Winchelsea and Rye were ordered to repair the buildings in which the king's galleys were kept at Rye. At Portsmouth and at Southampton there seem to have been at all times dep6ts for both ships and stores, though there was no regular dockyard at Portsmouth till the middle of the 16th century. It would appear, from a curious poem in Hakluyt's Collection called " The Policie of Keeping the Sea," that Little- hampton, unfit as it now is, was the port at which Henry VIII. built

" his great Dromions Which passed other great shippes of the commons."

The " dromion," " dromon," or " dromedary " was a large war- ship, the prototype of which was furnished by the Saracens. Roger de Hoveden, Richard of Devizes and Peter de Longtoft celebrate the struggle which Richard I., in the " Trench the Mer," on his way to Palestine, had with a huge dromon, — " a marvellous ship ! a ship than which, except Noah's ship, none greater was ever read of." This vessel had three masts, was very high out of the water, and is said to have had 1300 men on board. It required the united force of the king's galleys, and an obstinate fight, to capture the dromon.

The foundation of a regular British navy, by the establishment of dockyards, and the formation of a board, consisting of certain commissioners for the management of its affairs, was first laid by

Henry VIII., and the first dockyard erected during his reign was that of Woolwich. Those of Portsmouth, Deptford, Chatham and Sheerness followed in succession. Plymouth was founded by William III. Pembroke was established in 1814, a small yard having previously existed at Milford.

The most important additions yet made at any one period to the dockyard and harbour works required to meet the necessities of the British fleet were those sanctioned by the Naval Works Acts of 1895 and subsequent years, the total estimated cost, as stated in the act of 1899, being over 23J millions sterling. The works proposed under these acts were classified under three heads, viz. (a) the enclosure and defence of harbours against torpedo attacks; (b) adapting naval ports to the present needs of the fleet; (c) naval barracks and hospitals. Under the first heading were included the defensive harbours at Portland, Dover and Gibraltar. Under heading (b) were included the deepening of harbours and approaches, the dockyard extensions at Gibraltar, Keyham (Devonport), Simons Bay, and Hong-Kong, with sundry other items. Under heading © were included the naval barracks at Chatham, Portsmouth and Keyham; the naval hospitals at Chatham, Haslar and Haulbowline; the colleges at Keyham and Dartmouth; and other items.

Great Britain possesses dockyards at Portsmouth, Devonport, Chatham, Malta and Gibraltar, each in charge of an admiral-superintendent, and at Sheerness and Pembroke in charge of a captain-superintendent, together with establishments at Ascen- sion, Bermuda, Simons Town (Cape of Good Hope), Queenstown (Haulbowline); Hong-Kong, Portland, Sydney and Weihaiwei. The Indian Government has dockyards at Bombay and Calcutta. The medical establishments include Ascension, Bermuda, Cape of Good Hope, Chatham, Dartmouth, Deal, Gibraltar, Haslar, Haulbowline, Hong-Kong, Malta, Osborne, Plymouth, Portland, Portsmouth, Sheerness, Sydney, Yarmouth, Yokohama and Weihaiwei.

The arrangements for the administrative control of the dock- yards have varied with those adopted for the regulation of the navy as a whole. (See Admiralty Administration; and Navy: History.) At the present time, whether at home or abroad, they lie within the province of the controller of the navy (the third lord of the board of admiralty) ; and the director of dockyards, whose office, replacing that of surveyor of dockyards was created in

December 1885, is responsible to the controller for the building of ships, boats, &c, in dockyards, and for the maintenance and repair of ships and boats, and of all steam machinery in ships, boats, dockyards and factories. The director of naval construc- tion, who is also deputy-controller, is responsible, not only for the design of ships, but for their construction, in the sense that he approves great numbers of working drawings of structural parts prepared at the dockyards. But the director of dockyards is the admiralty official under whose instructions the work goes on, involving the employment and supervision of an army of artisans and labourers. Instructions, therefore, emanate from the admiralty, but the details he with the dockyard officials, and in practice there is a considerable decentralization of duties.

The chief function of a dockyard is the building and maintain- ing of ships in efficiency. The constructive work is carried out under the care of the chief constructor of the yard, in accordance with plans sent down from the admiralty. The calculations for displacement, involving the draught of water forward and aft, have already been made, and, in order to ensure accuracy in the carrying out of the design, an admirable system has been devised for weighing everything that is built into the new ships or that goes on board; and it is astonishing how very closely the actual displacement approximates to that which was intended, par- ticularly when the tendency of weights to increase, in perfecting a ship for commission, is considered.

The ship having been built to her launching weight, the duty of putting her into the water devolves upon the chief constructor of the yard, and failures in this matter are so extremely rare that it may almost be said they do not occur. As soon as the ship is water-borne the responsibility falls upon the king's harbour master, who has charge of her afloat and of moving her into the fitting basins. When the ship has been brought alongside the wharf, the responsibility of the chief constructor of the yard is resumed, and the ship is carried forward to completion by the affixing of armour plating (if that has not been done before launching), the mounting of guns, the instalment of engines, boilers, and electrical and hydraulic gear, and the fitting of cabins for officers, mess places for men, and storerooms, and a vast volume of other work unnecessary to be specified. In regard to the complicated details of guns and torpedoes, the captains of the gunnery and torpedo schools have a function of supervision. The captain of the fleet reserve also closely watches the

work, because, when the heads of all departments have reported the ship to be ready, she has to be inspected by the commander-in-chief at the port, and then passed into the fleet reserve as ready for sea, and there the captain of the fleet reserve is responsible for her efficiency. Other important officers of a dockyard are the chief engineer; the superintendent civil engineer, who has charge of the work involved in keeping all buildings, docks, basins, caissons, roads,- &c, in repair; the naval store officer, who has charge of most of the stores in the dockyard; and the cashier of the yard, whose name sufficiently expresses his duties.

The system of conducting business at the dockyards is analogous to that which prevails at the admiralty. There is personal communication between the officers responsible for the work, and facilities are afforded for coming to rapid decisions upon matters that are in hand, and the operations are conducted with an ease which contributes much to efficiency. In 1844 the custom was introduced of all the principal officers of the dockyard meeting at the superintendent's office at 9.30 a.m. every day, to hear the orders from the admiralty and discuss the work of the day. But this system of " readings " was abolished at the beginning of 1906, the naval establishments inquiry committee considering that the assembling of the officials was unnecessary since the communications after reception are copied and sent to the departments concerned. 1

The police force necessary in a dockyard is in some cases supplied from the London metropolitan police, and is under the orders of the superintendent of the yard for duties connected with it, and under the commissioner r>f police for the discipline and disposition of the force. The charges are, of course, paid by the admiralty, and the system answers well. "

United States. — The shore stations under control of the Navy Department (see also Admiralty Administration), and collectively known as naval stations, are under different names according to their nature. Of those called Navy Yards, and intended for the general purpose of sources of supply and for repairs of ships, there are within the United States eight in number. Two of them are on the Pacific coast, situated on Puget Sound, at Bremerton, Washington; and at Mare Island, near San Francisco. The other six are on the Atlantic coast, and are situated at Portsmouth, N.H.; Boston, Mass.; Brooklyn, N.Y.; Philadelphia, Pa.; Washington, D.C.; and Norfolk, Va. There are also naval stations at Port Royal and Charleston, S.C.; Key West and Pensacola, Fla.; New Orleans, La.; Guan- tanamo, Cuba; Culebra and San Juan, Porto Rico; Honolulu, H.I.; Cavite,

P.I.; Tutuila, Samoa; and Island of Guam, in the Ladrones Islands. The floating dock Dewey, having a lifting capacity of 18,500 gross tons with a free-board of 2 ft., was stationed in the Philippine Islands in 1906.

Besides these, there are important naval stations established for special purposes, which in some cases are also available for ports of supply and for repairs. These are: the U.S. Naval Academy, Annapolis, Md., for the instruction of naval cadets; the training stations at Newport, R.I., and Yerba Buena Island, Cal., for the instruction of apprentices; the proving ground at Indian Head, Md., on the Potomac river, where all government- built ordnance is tested; the War College at Newport, R.I., for the instruction of officers; the torpedo station at Newport, fbr the instruction of officers and men in torpedoes, electricity and submarine diving; the naval observatory at Washington; and the marine post at Sitka, Alaska. Coaling depots have been established at Honolulu, Pago Pago, Samoan Islands, and at Manila, P.I. Naval hospitals are located at the Portsmouth, Boston, New York, Philadelphia, Washington, Norfolk and Mare Island yards; at Las Animas, Colo.; at Newport, R.I.; Canacao, P.I.; L Sitka, Alaska; and Yokohama, Japan.*

The commandant of a navy yard and station, who is usually a rear-admiral, is its commander-in-chief. His official assistants are called heads of departments. The captain of the yard, who is next in succession to command, has general charge of the water front and the ships moored there, and of the police of the navy yard; it is his duty to keep the commandant informed as to the nature and efficiency of all work in progress. The equipment officer has charge of anchors, chains, rigging, sails and the electric generating plant. The other heads of departments are the ordnance officer, the naval constructor, the engineering officer, the general storekeeper, the paymaster of the yard, the surgeon and the civil engineer. The clerks and draughtsmen employed by these pfficers are appointed under civil service rules, and their employment is continuous so long as funds are available. The foremen are selected by competitive examination, and their number is fixed. In the employment of mechanics and labourers, veterans are given preference, after which follow persons previ- ously employed who have displayed especial efficiency and good conduct. The rates of wages are determined semi-annually by a board of officers, who ascertain the wages paid by private establishments in the vicinity of the navy yard. Eight hours constitute the legal work day. When emergencies necessitate longer hours the workmen are paid at the ordinary rate plus

The nature and extent of work to be performed upon naval vessels is determined by the secretary of the navy; the com- mandant then issues the necessary orders. The material required is obtained by a system of requisitions, which provide for the purchase from the lowest bidder after open competition. Heads of departments initiate the purchase of materials which are peculiar to their own work; ordinary commercial articles, however, are usually carried in a special stock called the " Naval Supply Fund," which may be drawn upon by any head of depart- ment. All materials are inspected, both as to quantity and quality, by a board of inspectors consisting of three officers.

France. — The French coast is divided into five naval arrondiue- ments, which have their headquarters at the five naval ports of

which Cherbourg, Brest and Toulon are the most important, Lorient and Rochefort being of lesser degree. All are building and fitting-out yards. Corsica, which has naval stations at Ajaccio, Porto Vecchio, Bonifacio and other places, is a dependency of the arsenal at Toulon. On the African coast there are docking facilities in Algeria. Bizerta, the Tunisian port, has been made a naval base by the deepening and fortifying of the canal which is the approach to the inner lake. There are arsenals also at Saigon and Hai-phong, and an establishment at Diego Suarez.

The subsidiary establishments in France are the gun foundry at Ruelle ; the steel and iron works at Guerigny, where anchors, chains and armour-plate are made; and the works at Indret, on an island in the lower Loire, where machinery is constructed. There are many private shipbuilding establishments in the country, the most important being the Forges et Chantiers de la Mediterranee at La Seyne, on the lesser roadstead at Toulon where many French and foreign warships of the largest classes have been built. The same company has a building yard at Havre. Other establishments are the Ateliers et Chantiers de la Loire, at Saint Nazaire ; the Normand Yard, at Havre ; and the Chantiers de la Gironde, near Bordeaux.

Each of the arrondissements above mentioned is divided into sous- arrondissements, having their centres in the great commercial ports, but this arrangement is purely for the embodiment of the men of the Inscription Maritime, and has nothing to do with the dock- yards as

naval arsenals. In each arrondissement the vice-admiral, who is naval prefect, is the immediate representative of the minister of marine, and has full direction and command of the arsenal, which is his headquarters. He is thus commander-in-chief, as also governor-„designate for time of war, but his authority does not extend to ships belonging to organized squadrons or divisions. The naval prefect is assisted by a rear-admiral as chief of the staff (except at Lorient and Rochefort, where theoffice is filled by a captain) , and a certain number of officers, the special functions of the chief of the staff having relation principally to the efficiency and personnel of the fleet, while the " major-general," who is usually a rear-admiral, is concerned chiefly with the materiel. There are also directors of stores, of naval construction, of the medical service and of the submarine defences (which are concerned with torpedoes, mines and torpedo-boats), as well as of naval ordnance and works. The prefect directs the operations of the arsenal, and is responsible for its efficiency and for that of the ships which are there in reserve. In regard to the consti- tution and maintenance of the naval forces, the administration of the arsenals is divided into three principal departments, the first con- cerned with naval construction, the second with ordnance, including gun-mountings and small-arms, and the third with the so-called submarine defences, dealing with all torpedo materiel.

Germany. — With the expansion of the German navy considerable additions have been made to the two principal dockyards. These are Wilhelmshaven, the naval headquarters on the North Sea, and Kiel, the headquarters on the Baltic, Danzig being an establishment of lesser importance, and Kiao-chau an undeveloped base in the Shantung peninsula, China. The chief official at each home dock-yard is the superintendent (Obentrerftdirektor), who is a rear-admiral or senior captain directly responsible to the naval secretary of state. Under the superintendent's orders are the chief of the Ausriistung department, or captain of the fleet reserve, the directors of ordnance, torpedoes, navigation, naval construction, engineering and harbour works, with some other officers. The chiefs of the constructive and engineering departments are responsible for the building of ships and machinery, and for the maintenance of the hulls and machinery of existing vessels ; while the works department has charge of all work on the quays, docks, &c, in the dockyard and port. A great advance has been made in increasing the efficiency and capabilities of the imperial dockyards by introducing a system of continuous work in the building of new ships and effecting alterations in others, and German material is exclusively used. The

Schichau Works at Elbing and Danzig, the Vulkan Yard at Bredow, near Stettin, the Weser Company at Bremen, and the establishment of Blohm and Voss at Hamburg, are important establishments which have built many vessels for the German navy, as well as for foreign states.

Italy. — The principal Italian state dockyards are Spezia, Naples and Venice, the first named being by far the most important. It covers an area, including the water spaces, of 629 acres, and there are five dry docks, three being 433 ft. long and 105 ft. wide, and two 361 ft. long and 98 Ft. 6 in. wide. The dockyard is very completely equipped with machinery of the best British, German and Italian makes, and it has built several of the finest Italian ships. The number of hands employed in the yard averages 4000. There are two building slips, and for smaller vessels there are two in the neighbouring establishment of San Bartolommeo (which is the head- quarters for submarine mining), and one at San Vito, where is a Government gun factory. Castellammare di Stabia is subsidiary to Naples. A large dry dock has been built at Taranto. There is a small naval establishment at Maddalena Island on the Strait of Bonifacio. The Italian Government has no gun or torpedo factories, nearly all the ordnance coming from the Armstrong factory at Pozzuoli near Naples, and the torpedoes from the Schwarzkopf factory at Venice, while armour-plates are produced at the im- portant works at Terni. Machinery is supplied by the firms of Ahsaldo, Odero, Orlando, Guppv & Hawthorn and Pattison. The

three establishments first named have important shipbuilding yards, and have constructed vessels for the Italian and foreign navies. The Orlando Yard at Leghorn is Government property, but is leased by the firm, and possesses five building slips.

Austria-Hungary. — The naval arsenal is on the well-protected harbour of Pola, in Istria, which is the headquarters of the national navy, and includes establishments of all kinds for the maintenance of the fleet. There are large building and docking facilities, and a number of warships have been built there. There is a construction yard also at Trieste. A new coaling and torpedo station is at Teodo, large magazines and stores are at Vallelunga, and the mining establish- ment is at Ficella. The shipbuilding branch of the navy is under the direction of a chief constructor {Oberster-Ingenieur), assisted by seven constructors, of whom two are of the first class. The engineering and ordnance branches are similarly organized.

Spain.— The Spanish dockyards are of considerable antiquity, but of

diminishing importance.. There is an establishment at Ferrol, another at Cartagena, and a third at Cadiz. They are well equipped in all necessary respects, but are not provided with continuous work. A recent airangement is the specialization of the yards, Ferrol being designed for larger, and Carthagena for smaller, building work. The ordnance establishment is at Carraca.

Russia. — In Russia the naval ports are of two classes. The most important are Kronstadt, St Petersburg and Nikolayev. Of lesser importance are Reval, Sveaborg, Sevastopol, Batum, Baku and Vladivostok. The administration of the larger ports, except St Petersburg, which is under special regulations, is in the hands of vice-admirals, who are commanders-in-chief, while the smaller ports are under the direction of rear-admirals. All are directly under the minister of marine, except that the Black Sea ports and Astrabad, on the Caspian, are subordinate to the commander-in-chief at Nikolayev. Sevastopol has grown in importance, and become mainly a naval harbour, the commercial harbour being removed to Theodosia. The Russian government has also proposed to remodel the harbour works at St Petersburg and Kronstadt. The Emperor Alexander III. Port at Libau, on the Baltic, is in a region less liable to be icebound in the winter. There are no strictly private yards for the building of large vessels in Russia, except that of the Black Sea Company at Nikolayev. Messrs Creighton build torpedo-boats at Abo in Finland, and the admiralty has steel works at Ijora, where some torpedo-boats have been built. Other ordnance and steel works are at Obukhov and Putilov.

Japan. — The principal Japanese dockyard, which was established by the Shogunate in 1866, is Yokosuka. French naval constructors and engineers were employed, and several wooden ships were built. The Japanese took the administration into their own hands in 1875, and built a number of vessels of small displacement in the yard. The limit of size was about 5000 tons, but the establishment has been enlarged so that vessels of the first class may be built there. There is a first-class modern dry dock which will take the largest battleship. Shipbuilding would be undertaken to a larger extent but for the fact that nearly all material has to come from abroad. Down to 1905 all the important vessels of the Japanese navy were built in Great Britain, France, Germany and the United States, but at the end of that year a first-class cruiser of 13,500 tons (the " Tsukuba ") was launched from the important yard at Kure. There are other yards at Sassebo and Maisuru.

DOCTOR (Lat. for " teacher "), the title conferred by the highest

university degree. Originally there were only two degrees, those of bachelor and master, and the title doctor was given to certain masters as a merely honorary appellation. The process by which it became established as a degree superior to that of master cannot be clearly traced. At Bologna it seems to have been conferred in the faculty of law as early as the 12th century. Paris conferred the degree in the faculty of divinity, according to Antony Wood, some time after 1150. In England it was introduced in the 13th century; and both in England and on the continent it was long confined to the faculties of law and divinity. Though the word is so commonly used as synonymous with " physician," it was not until the 14th century that the doctor's degree began to be conferred in medicine. The tendency since has been to extend it to all faculties; thus in Germany, in the faculty of arts, it has replaced the old title of magister. The doctorate of music was first conferred at Oxford and Cambridge.

Doctors of the Church are certain saints whose doctrinal writ- ings have obtained, by the universal consent of the Church or by papal decree, a special authority. In the case of the great schoolmen a characteristic qualification was added to the title doctor, e.g. "angelicus" (Aquinas), " mellifluus " (Bernard), The doctors of the Church are: for the East, SS. Athanasius, Gregory of Nazianzus, Basil the Great, John Chrysostom; for the West, SS. Hilary, Ambrose, Jerome, Augustine, Gregory the

Great, Anselm, Bernard, Bonaventura and Thomas Aquinas. To these St Alphonso dei Liguori was added by Pope Pius IX.

DOCTORS' COMMONS, the name formerly, applied to a society of ecclesiastical lawyers in London, forming a distinct profession for the practice of the civil and canon laws. Some members of the profession purchased in 1567 a site near St Paul's, on which at their own expense they erected houses (destroyed in the great fire, but rebuilt in 1672) for the residence of the judges and advocates, and proper buildings for holding the ecclesiastical and admiralty courts. In 1768 a royal charter was obtained by virtue of which the then members of the society and their successors were incorporated under the name and title of " The College of Doctors of Law exercent in the Ecclesiastical and Admiralty Courts." The college consisted of a president (the dean of Arches for the time being) and of those doctors

of law who, having regularly taken that degree in either of the universities of Oxford or Cambridge, and having been admitted advocates in pursuance of the rescript of the archbishop of Canterbury, were elected fellows in the manner prescribed by the charter. There were also attached to the college thirty-four proctors, whose duties were analogous to those of solicitors. The judges of the archiepiscopal courts were always selected from this college. By the Court of Probate Act 1857 the college was empowered to sell its real and personal estate and to surrender its charter, and it was enacted that on such surrender the college should be dissolved and the property thereof belong to the then existing members as tenants in common for their own use and benefit. The college was ac- cordingly dissolved, and the various ecclesiastical courts which sat at Doctors' Commons (the Court of Arches, the Prerogative Court, the Faculty Court and the Court of Delegates) are now open to the whole bar.

DOCTRINAIRES, the name given to the leaders of the moderate and constitutional Royalists in France after the second restora- tion of Louis XVIII. in 1815. The name, as has often been the case with party designations, was at first given in derision, and by an enemy. In 18 16 the Nain jaune rSfugiS, a French paper published at Brussels by Bonapartist and Liberal exiles, began to speak of M. Royer-Collard as the " doctrinaire " and also as le pere Royer-Collard de la doctrine chretienne. The peres de la doctrine chritienne, popularly known as the " doctrinaires," were a French religious order founded in 1592 by Cesar de Bus. The choice of a nickname for M. Royer-Collard does credit to the journalistic insight of the contributors to the Nain jaune refugie, for he was emphatically a man who made it his business to preach a doctrine and an orthodoxy. The popularity of the name and its rapid extension to M. Royer-Collard's colleagues is the suffi- cient proof that it was well chosen and had more than a personal application. These colleagues came, it is true, from various quarters. The due de Richelieu and M. de Serre had been Royalist emigres during the revolutionary and imperial, epoch. MM. Royer-Collard himself, Laine, and Maine de Biran had sat in the revolutionary Assemblies. MM. Pasquier, Beugnot, de Barante, Cuvier, Mounier, Guizot and Decazes had been imperial officials. But they were closely united by political principle, and also by a certain similarity of method. Some of them, notably Guizot and Maine de Biran,were theorists and commentators on the principles of government. M. de Barante was an eminent man of letters. All were noted for the doctrinal coherence of their principles and the dialectical rigidity of their arguments. The object of the party as defined by M. (afterwards the due) Decazes was to "

nationalize the monarchy and to royalize France." The means by which they hoped to attain this end were a loyal application of the charter granted by Louis XVIII. , and the steady co-opera- tion of the king with the moderate Royalists to defeat the extreme party known as the Ultras, who aimed at the complete undoing of the political and social work of the Revolution. The Doctrinaires were ready to allow the king a large discretion in the choice of his ministers and the direction of national policy. They refused to allow that ministers, should be removed in obedience to a hostile vote in the chamber. Their ideal in fact was a combination of a king who frankly accepted the results

of the Revolution, and who governed in a liberal spirit, with the advice of a chamber elected by a very limited constituency, in which men of property and education formed, if not the whole, at least the very great majority of the voters. Their views were set forth by Guizot in 18 16 in his treatise Du gouvernement reprisentatif et de Vetat actuel de la France. The chief organs of the party in the press were the. Independent, renamed the Con- stitutionnel in 1817, and the Journal des d&bats. The supporters of the Doctrinaires in the country were chiefly ex-officials of the empire, — who believed in the necessity for monarchical govern- ment but had a lively memory of Napoleon's tyranny and a no less lively hatred of the ancien regime, — merchants, manu- facturers and members of the liberal professions, particularly the lawyers. The history of the Doctrinaires as a separate political party began in 1816 and ended in 1830. In 1816 they obtained the co-operation of Louis XVIII., who had been frightened by the violence Of the Ultras in the Chambre introuvable of 181 5. In 1830 they were destroyed by Charles X. when he took the Ultra prince de Polignac as his minister and entered on the con- flict with Liberalism in P'rance 1 which ended in his overthrow. During the revolution of 1830 the Doctrinaires became absorbed in the Orleanists, from whom they had never been separated on any ground of principle (see France: History).

The word " doctrinaire " has become naturalized in English terminology, as applied, in a slightly contemptuous sense, to a theorist, as distinguished from a practical man of affairs.

See Duvergier de Hauranne, Histoire du gouvernement parle- mentaireen France (Paris, 1857-1871), vol. iii.

DOCUMENT, strictly, in law, that which can serve as evidence or proof, and is written or printed, or has an inscription or any significance that can be " read "; thus a picture, authenticated

photograph, seal or the like would furnish "documentary evidence." More generally the word is used for written or printed papers that provide information or evidence on a subject. The Latin documentum, from which the word is derived, meant, in classical times, a lesson, example or proof (docere, to teach), and only in medieval Latin came to be applied to an instrumentum, or record in writing. The classical Latin use is found in English; thus Jeremy Taylor (Works, ed. 1835, i. 815) speaks of punish- ment being a " single and sudden document if instantly in- flicted " (see Diplomatic; and Evidence).

DODD, WILLIAM (1729-1777), English divine, was born at Bourne in Lincolnshire in May 1729. He was admitted a sizar of Clare Hall, Cambridge, in 1745, and took the degree of B.A. in 1750, being fifteenth wrangler. On leaving the university he married a young woman of a more than questionable reputation, whose extravagant habits helped to ruin him. In 1 751 he was ordained deacon, and in 1753 priest, and he soon became a popular and celebrated preacher. His first preferment was the lectureship of West-Ham and Bow. In 1754 he was also chosen lecturer of St Olave's, Hart Street; and in 1757 he took the degree of M.A. at Cambridge, subsequently becoming LL.D. He was a strenuous supporter of the Magdalen hospital, founded in 1758, and soon afterwards became preacher at the chapel of that charity. In 1763 he obtained a prebend at Brecon, and in the same year he was appointed one of the king's chaplains, — soon "after which the education of Philip Stanhope, afterwards earl of Chesterfield, was committed to his care. In 1768 he had a fashionable congregation and was held in high esteem, but indiscreet ambition led to his ruin. On the living of St George's, Hanover Square, becoming vacant in 1774, Mrs Dodd wrote an anonymous letter to the wife of the lord chancellor, offering three thousand guineas if, by her assistance, Dodd were promoted to the benefice. This letter having been traced, a complaint was immediately made to the king, and Dodd was dismissed from his office as chaplain. After residing for some time at Geneva and Paris, he returned to England in 1776. He still continued to exercise his clerical functions, but his extravagant habits soon involved him iii difficulties. To meet his creditors he forged a bond on his former pupil Lord Chesterfield for £4200, and actually received the money. He was detected, committed to prison, tried at the Old Bailey, found guilty, and sentenced td

death; and, in spite of numerous applications for mercy, he was executed at Tyburn on the 27th of June 1777. Samuel Johnson was very zealous in pleading for a pardon, and a petition from the city of London received 23,000 signatures. Dr Dodd was a voluminous writer and possessed considerable abilities, with but little judgment and much vanity. He wrote one or two comedies, and his Beauties of Shakespeare, published in 1752, was long a well-known work; while his Thoughts in Prison, a poem in blank verse, written between his conviction and execution, naturally attracted much attention. He published a large number of sermons and other theological works, including a Commentary on the Bible (1765-1770). A list of his fifty-five writings and an account of the writer is included in the Thoughts in Prison. See also P. Fitzgerald, A Famous Forgery (1865).

DODDER (Frisian dodd, a bunch; Dutch dot, ravelled thread), the popular name of the annual, leafless, twining, parasitic plants

forming the genus Cuscuta, formerly regarded as repre- senting a distinct natural order Cuscutaceae, but now generally ranked as a tribe of the natural order Convolvu- laceae. The genus contains nearly 100 species and is widely distributed in the temperate

*IC~ˆif \ 1 \\W#?J , <; C :; «ˆ an< * warmer P ar ts*

‘tJ/ wlnl! ˆxV of the earth. The

lis.. . Jv « mvffs, j \ s i en d er thread-like

stem is white, yellow, or red in colour, bears no leaves, and at- taches itself by suckers to the stem or leaves of some other plant round which it twines and from which it derives its nourish- ment. It bears clusters of small flowers with a four- or five- toothed calyx, a cup-shaped corolla with four or five stamens inserted on its tube, and sometimes a ring of scales below the stamens; the two- celled ovary becomes when ripe a capsule splitting by a ring just above the base. The seeds are angular and contain a thread-like spirally coiled embryo which bears no cotyledons. On coming in contact with the living stem of some other plant the seedling dodder throws out a sucker, by which it attaches itself and begins to absorb the sap of its foster-parent; it then soon ceases to have any connexion with the ground. As it grows, it throws out fresh suckers, establishing itself firmly on the host-plant (fig. 2) . After making a few turns round one stem the dodder finds its way to another, and thus it continues twining and branching till it resembles ” fine, closely-tangled, wet cat- gut.” The injury done to flax, clover, hop and bean crops by

species of dodder is often very great. . C. europaea, the greater dodder (fig. 1) is found parasitic on nettles, thistles, vetches and the hop; C. Epilinum, on flax; C. Epithymum, on furze, ling

Fig. 1. — Cuscuta europaea, Dodder. 1. Flower removed from 2, Calyx.

3. Ovary cut across.

4. Fruit enveloped by a persistent corolla.

5. Seed.

6. Embryo. 1-6 enlarged.

and thyme. C. Trifolii, the Clover Dodder, is perhaps a sub- species of the last mentioned.

DODDRIDGE, PHILIP (1702-1751), English Nonconformist divine, was born in London on the 26th of June 1702. His father, Daniel Doddridge, was a London merchant, and his mother the orphan daughter of the Rev. John Bauman, a Lutheran clergyman who had fled from Prague to escape religious persecution, and had held for some time the mastership of the grammar school at Kingston-upon-Thames. Before he could read, his mother taught him the history of the Old and New Testament by the assistance of some blue Dutch chimney-tiles. He afterwards went to a private school in London, and in 1712 to the grammar school

at Kingston-upon- jg&t A

*Thames. About 17 15 he was removed to a private school at St Albans, where he was much influenced by the Presbyterian minister, Samuel Clarke. He de- clined offers which would have led him into the Anglican ministry or the bar, and in 17 19 entered the very liberal academy for dissenters at Kib- worth in Leicestershire, taught at that time by the Rev. John Jennings, whom Doddridge suc- ceeded in the ministry at that place in 1723, declining overtures from Coventry, Pershore and London (Haberdashers' Hall). In 1729, at a general meeting of Non- conformist ministers, he was chosen to conduct' the academy established in that year at Market Harborough. In the same year he received an invitation from the independent congrega- tion at Northampton, which he accepted. Here he continued his multifarious labours; but the church seems to have de- creased, and his many engagements and bulky correspondence interfered*seriously with his pulpit work, and with the discipline of*

his academy, where he had some 200 students to whom he lectured on philosophy and theology in the mathematical or Spinozistic style. In 17 51 his health, which had never been good, broke down, and he sailed for Lisbon on the 30th of September of that year; but the change was unavailing, and he died there on the 26th of October. His popularity as a preacher is said to have been chiefly due to his " high suscepti- bility, joined with physical advantages and perfect sincerity." His sermons were mostly practical in character, and his great aim was to cultivate in his hearers a spiritual and devotional frame of mind. He laboured for the attainment of a united Nonconformist body, which should retain the cultured element without alienating the uneducated. His principal works are, The Rise and Progress of Religion in the Soul (1745), which best illustrates his religious genius, and has been widely translated; The Family Expositor (6 vols., i739- I 756), Life of Colonel Gardiner (1747); and a Course of Lectures on Pneumatology, Ethics and Divinity (1763). He also published several courses of sermons on particular topics, and is the author of many well- known and justly admired hymns, e.g. " O God of Bethel, by whose hand." In 1736 both the universities at Aberdeen gave him the degree of D.D.

See Memoirs, by Rev. Job Orton (1766) ; Letters to and from Dr Doddridge, by Rev. Thomas Stedman (1790) ; and Correspondence and Diary, in 5 vols., by his grandson, John Doddridge Humphreys (1829). The best life is Stanford's Philip Doddridge (1880). Dodd- ridge's academy is now represented by New College, Hampstead, in the library of which there is a large collection of his manuscripts.

Fig. 2. — Cuscuta glomerata. Section through union between parasite and host.

c, stem of host.

d, stem of Cuscuta. h, haustoria.

(After Dodel-Port.)

DODDS, ALFRED AMEDEE (1842-), French general, was born at St Louis, Senegal, on the 6th of February 1842; his father's family was of Anglo-French origin. He was educated at Carcassonne and at St Cyr, and in 1864 joined the marine infantry as a sub-lieutenant. He was promoted captain for his services during the disturbances in

Reunion in 1868-69, in the course of which he was wounded. He served as a company commander in the Franco-German War, was taken prisoner at Sedan but escaped, and took part in the campaigns of the Loire and of the East. In 1872 he was sent to West Africa, and, except when on active service in Cochin China (1878) and Tong-King (1883), he remained on duty in Senegal for the next twenty years, taking a prominent part in the operations which brought the countries of the Upper Senegal and Upper Niger under French rule. He led the expeditions against the Boal and Kayor (1889), the Serreres (1800) and the Futa (1891), and from 1888 to 1891 was colonel commanding the troops in Senegal. At the close of 189 1 he returned to France to command the eighth marine infantry at Toulon. In April 1892 Dodds was selected to command the expeditionary force in Dahomey; he occupied Abomey, the hostile capital, in November, and in a second campaign (1894) he completed the subjugation of the country. He was then appointed inspector-general of the marine infantry, and after a tour of the French colonies was given the command of the XX. (Colonial) Army Corps, subsequently becoming inspector-general of colonial troops and a member of the Conseil superieur de guerre.

DODECAHEDRON (Gr. S&Beica, twelve, and Upa, a face or base) , in geometry, a solid enclosed by twelve plane faces. The " ordinary dodecahedron " is one of the Platonic solids (see Polyhedron) . The Greeks discovered that if a line be divided in extreme and mean proportion, then the whole line and the greater segment are the lengths of the edge of a cube and dodecahedron inscriptible in the same sphere. The ; ' small stellated dode- cahedron," the " great dodecahedron " and the " great stellated dodecahedron " are Kepler-Poinsot solids; and the " truncated " and " snub dodecahedra " are Archimedean solids (see Poly- hedron). In crystallography, the regular or ordinary dode- cahedron is an impossible form since the faces cut the axes in irrational ratios; the " pentagonal dodecahedron " of crystal- lographers has irregular pentagons for faces, while the geometrical solid, on the other hand, has regular ones. The " rhombic dodecahedron," one of the geometrical semiregular solids, is an important crystal form. Many other dodecahedra exist as crystal forms, for which see Crystallography.

DODECASTYLE (Gr. 5d)5oca, twelve, and otvXos, column), the architectural term given to a temple where the portico has twelve columns in front, as in the portico added to the temple of Demeter at Eleusis, designed by Philo, the architect of the arsenal at the Peiraeus.

DODERLEIN, JOHANN CHRISTOPH WILHELM LUDWIG (1791-1863), German philologist, was born at Jena on the 19th of December 1791. His father, Johann Christoph Doderlein, professor of theology at Jena, was celebrated for his varied learning, for his eloquence as a preacher, and for the import- ant influence he exerted in guiding the transition movement from strict orthodoxy to a freer theology. Ludwig Doderlein, after receiving his preliminary education at Windsheim and Schulpforta (Pforta), studied at Munich, Heidelberg, Erlangen and Berlin. He devoted his chief attention to philology under the instruction of such men as F. Thiersch, G. F. Creuzer, J. H. Voss, F. A. Wolf, August Bockh and P. K. Buttmann. In 1815, soon after completing his studies at Berlin, he accepted the appoint- ment of ordinary professor of philology in the academy of Bern. In 181 9 he was transferred to Erlangen, where he became second professor of philology in the university and rector of the gymnasium. In 1827 he became first professor of philology and rhetoric and director of the philological seminary. He died on the 9th of November 1863 . Doderlein's most elaborate work as a philologist was marred by over-subtlety, and lacked method and clearness. He is best known by his Lateinische Synonymen und Etymologien (1826-1838), and his Homerisches Glossarium

(1850-1858). To the same class belong his Lateinische Wort- btidung (1838), Handbuch der lateinischen Synonymik (1839), and the Handbuch der lateinischen Etymologie (1841), besides various works of a more elementary kind intended for the use of schools and gymnasia. Most of the works named have been translated into English. To critical philology Doderlein con- tributed valuable editions of Tacitus {Opera, 1847; Germania, with a German translation) and Horace (Epistolae, with a German translation, 1856-1858; Satirae, i860). His Reden und AufsStze (Erlangen, 1843-1847) and Ojfentliche Reden (i860) consist chiefly of academic addresses dealing with various subjects in paedagogy and philology.

DODGE, THEODORE AYRAULT (1842-1909), American soldier and military writer, was born at Pittsfield, Massachusetts, on the 28th of May 1842. He received a military education in Germany and subsequently studied at Heidelberg and London University, returning to the United States in 1861. At the out- break of the Civil War he at once enlisted in the federal army, and he soon rose to commissioned rank. He served in the Army of the Potomac until Gettysburg, where he lost a leg. Incapacitated for further active service, he continued to be employed in admini- strative posts to the end of the war, and for several years there- after he served at army headquarters, becoming

captain in 1866 and brevet lieutenant-colonel in 1867. He retired in 1870. His works include The Campaign of Chancellorsville (1881), A Bird's Eye View of our Civil War (1882, later edition 1897), a complete, accurate and remarkably concise account of the whole war, Patroclusand Penelope, aChatinthe Saddle (1883), Great Captains (1886), a series of lectures, Riders of Many Lands (1893), and a series of large illustrated volumes entitled A History of the Artof War, being lives of " Great Captains, ' ' including A lexander (2 vols. , 1888), Hannibal (2 vols., 1889), Caesar (2 vols., 1892), Gustavus Adolphus (2 vols., 1896) and Napoleon (4 vols., 1904-1907). He died in France, at Versailles, on the 26th of October 1909.

DODGSON, CHARLES LUTWIDGE ["Lewis Carroll"] (1832-1898), English mathematician and author, son of the Rev. Charles Dodgson, vicar of Daresbury, Cheshire, was born in that village on the 27th of January 1832. The literary life of " Lewis Carroll " became familiar to a wide circle of readers, but the private life of Charles Lutwidge Dodgson was retired and practic- ally uneventful. After four years' schooling at Rugby, Dodgson matriculated at Christ Church, Oxford, in May 1850; and from 1852 till 1870 held a studentship there. He took a first class in the final mathematical school in 1854, and the following year was appointed mathematical lecturer at Christ Church, a post he continued to fill till 1881. In 1861 he was ordained deacon, but he never took priest's orders, possibly because of a stammer which prevented reading aloud. His earliest publications, beginning with A Syllabus of Plane Algebraical Geometry (i860) and The Formulae of Plane Trigonometry (1861), were exclusively mathe- matical; but late in the year 1865 he published, under the pseudonym of " Lewis Carroll," Alice's Adventures in Wonderland, a work that was the outcome of his keen sympathy with the imagination of children and their sense of fun. Its success was immediate, and the name of " Lewis Carroll " has ever since been a household word. A dramatic version of the " Alice " books by Mr Savile Clarke was produced at Christmas, 1886, and has since enjoyed many revivals. Mr Dodgson was always very fond of children, and it was an open secret that the original of " Alice " was a daughter of Dean Liddell. Alice was followed (in the " Lewis Carroll " series) by Phantasmagoria, in 1869; Through the Looking-Glass, in 1871; The Hunting of the Snark (1876); Rhyme and Reason (1883); A Tangled Tale (1885); and Sylvie and Bruno (in two parts, 1S89 and 1893). He wrote skits on Oxford subjects from time to time. The Dynamics of a Particle was written on the occasion of the contest between Gladstone and Mr Gathorne Hardy

(afterwards earl of Cranbrook) ; and The New Belfry in ridicule of the erection put up at Christ Church for the bells that were removed from the Cathedral tower. While " Lewis Carroll " was delighting children of all ages, C. L. Dodgson periodically published mathematical works — An Elementary Treatise on Determinants (1867);

Euclid, Book V., proved Algebraically (1874); Euclid and his Modern Rivals (1879), the work on which his reputation as a mathematician largely rests; and CuriosaMathemaHca(x&8&), Throughout this dual existence Mr Dodgson pertinaciously refused to acquiesce in being publicly identified with " Lewis Carroll." Though the fact of his authorship of the " Alice " books was well known, he invariably stated, when occasion called for such a pronouncement, that " Mr Dodgson neither claimed nor acknowledged any connexion with the books hot published under his name." He died at Guildford, on the 14th of January 1898. His memory is appropriately kept green by a cot in the Children's Hospital, Great Ormond Street, London, which was endowed perpetually by a public subscription. See S. D. Collingwood, Life and Letters of Lewis Carroll (1898).

DODO (from the Portuguese Ddudo, a simpleton), a large bird formerly inhabiting the island of Mauritius, but now extinct — the Didus ineptus of Linnaeus. When, in 1507, the Portuguese discovered the island which we now knowas Mauritius they named it Ilha do C erne, from a notion that it must be the island of that name mentioned by Pliny; but most authors have insisted that it was known to the seamen of that nation as Ilha do Cisneˆ— perhaps but a corruption of Cerne, and brought about by their finding it stocked with large fowls, which, though not aquatic, they likened to swans, the most familiar to them of bulky birds. In 1598 the Dutch, under Van Neck, took possession of the island and renamed it Mauritius. A narrative of this voyage was published, in 1601, if not earlier, and has been of ten, reprinted. Here we have birds spoken of as big as swans or bigger, with large heads, no wings, and a tail consisting of a few curly feathers. The Dutch called them Walgvogels (the word is variously spelled), i.e. nauseous birds, either because no cooking made them palatable, or because this island-paradise afforded an abundance of fare so much superior. De Bry gives two admirably quaint prints of the doings of the Hollanders, and in one of them the Walgvogel appears, being the earliest published representation of its un- wieldy form, with a footnote stating that the voyagers brought an

example alive to Holland. Among the company there was a draughtsman, and from a sketch of his, Clusius, a few years after, gave a figure of the bird, which he vaguely called " Gallinaceus Callus peregrinus," but described rather fully. Meanwhile two other Dutch fleets had visited Mauritius. One of them had rather an accomplished artist on board, and his drawings fortunately still exist (see article Bird). Of the other a journal kept by one of the skippers was subsequently published. This in the main corroborates what has been before said of the birds, but adds the curious fact that they were now called by some Dodaarsen and by others Dronten. 1

Henceforth Dutch narrators, though several times mentioning the bird, fail to supply any important fact in its history. Their navigators, however, were not idle, and found work for their naturalists and painters. Clusius says that in 1605 he saw at Pauw's House in Leyden a dodo's foot, 2 which he minutely describes. In a copy of Clusius's work in the high school of Utrecht is pasted an original drawing by Van de Venne super- scribed " Vera effigies huius avis Walghvogel (quae & a nautis Dodaers propter foedam posterioris partis crassitiem nuncupatur), qualis viua Amsterodamum perlata est ex insula Mauri tii. Anno M.DC.XXVI." Now a good many paintings of the dodo drawn from life by Roelandt Savery (1576-1639) exist; and the paint- ings by him at Berlin and Vienna — dated 1626 and 1628 — as

1 The etymology of these names has been much discussed. That of the latter, which has generally been adopted by German and French authorities, seems to defy investigation, but the former has been shown by Prof. Schlegel (Versl. en Mededeel. K. Akad. Wetensch. ii. pp. 2 = > 5 et seq.) to be the homely name of the dabchick or little grebe (Podiceps minor), of which the Dutchmen were reminded by the round stern and tail diminished to a tuft that characterized the dodo. The same learned authority suggests that dodo is a corruption of Dodaars, but, as will presently be seen, we herein think him mistaken.

2 What has become of the specimen (which may have been a relic of the bird brought home by Van Neck's- squadron) is not known. Brodeiip and Dr Gray have suggested its identity with that now in the British Museum, but on what grounds is not apparent.

well as the picture by Goiemare, belonging to the duke ;• of Northumberland, dated 1627, may be with greater plausibility than ever considered portraits of a captive bird. It is even probable that this was not the first example painted in Europe. In the private

library of the emperor Francis I. of Austria was a series of pictures of various animals, supposed to be by the Dutch artist Hoefnagel, who was born about 1545. One of these represents a dodo, and, if there be no mistake in Von Frauenf eld's ascription, it must almost certainly have been painted before 1626, while there is reason to think that the original may have been kep£ in the vivarium of the emperor Rudolf II., and that the portion of a dodo's head, which was found in the museum at Prague about 1850, belonged to this example. The other pictures by Roelandt Savery, like those in the possession of the Zoological Society of London and others, are undated, but were probably all painted about the same time — 1626-1628. The large picture in the British Museum, once belonging to Sir Hans Sloane, by an unknown artist, but supposed to be by Roelandt Savery, is also undated; while the still larger one at Oxford (considered to be by the younger Savery) bears a much later date, 1 65 1 . Undated also is a picture in Holland said to be by Pieter Holsteyn.

In 1628 we have the evidence of the first English observer of the bird — one Emanuel Altham, who mentions it in two letters written on the same day from Mauritius to his brother at home (Proc. Zool. Soc. 1874, pp. 447-449). In one he says: "You shall receue … a strange fowle: which I had at the Hand Mauritius called by ye portingalls a Do Do: which for the rare- ness thereof I hope wilbe welcome to you." The passage in the other letter is to the same effect, with the addition of the words " if it Hue." In the same fleet with Altham sailed Sir Thomas Herbert, whose Travels ran through several editions. It is plain that he could not have reached Mauritius till 1629, though 1627 has been usually assigned as the date of his visit. The fullest account he gives of the bird is in his edition of 1638: " The Dodo comes first to a description: here, and in Dygarrois 3 (and no where else, that ever I could see or heare of) is generated the Dodo (a Portuguize name it is, and has reference to her simpleness,) a Bird which for shape and rareness might be call'd a Phoenix (wer't in Arabia:) " &c. Herbert was weak as an etymologist, but his positive statement, corroborated as it is by Altham, cannot be set aside, and hence we do not hesitate to assign a Portuguese derivation for the word. 4 Herbert also gave a figure of the bird.

Proceeding chronologically we next come upon a curious bit of evidence. This is contained in a MS. diary kept between 1626 and 1640, by Thomas Crossfield of Queen's College, Oxford, where, under the year 1634, mention is casually made of one Mr Gosling " who bestowed the Dodar (a blacke Indian bird) vpon ye Anatomy school." Nothing more is known of it. About 1638, Sir Hamon

Lestrange tells us, as he walked London streets he saw the picture of a strange fowl hung out on a cloth canvas, and going in to see it found a great bird kept in a chamber " somewhat bigger than the largest Turky cock, and so legged and footed, but shorter and thicker." The keeper called it a dodo and showed the visitors how his captive would swallow " large peble stones . . . as bigge as nutmegs."

In 1651 Morisot published an account of a voyage made by Francois Cauche, who professed to have passed fifteen days in Mauritius, or " 1'isle de Saincte Apollonie," as he called it, in 1638, According to De Flacourt the narrative is not very trustworthy, and indeed certain statements are obviously inaccurate. Cauche says he saw there birds bigger than swans, which he describes so as to leave no doubt of his meaning dodos; but perhaps the most important facts (if they be facts) that he

3 i.e. Rodriguez ; an error.

4 Hence we venture to dispute Prof. Schlegel's supposed origin of " Dodo." The Portuguese must have been the prior nomenclators, and if, as is most likely, some of their nation, or men acquainted with their language, were employed to pilot the Hollanders, we see at once how the first Dutch name Walghvogel would give way. The meaning of Doudo not being plain to the Dutch, they would, as is the habit of sailors, convert it into something they did understand.

1 Then Dodaers would easily suggest itself.

relates are that they had a cry like a gosling (" il a uri cry comrne l'oison "), and that they laid a single white egg (" gros comme un pain d'un sol ") on a mass of grass in the forests. He calls them " oiseaux de Nazaret," perhaps, as a marginal note informs us, from an island of that name which was then supposed to lie more to the northward, but is now known to have no existence.

Id the catalogue of Tradescant's Collection of Rarities, preserved at South Lambeth, published in 1656, we have entered among the

Fig. 1. — Skeleton of a Dodo, Didus ineptus, Museum of Zoology, Cambridge, and cast of a Head in Oxford.

" Whole Birds," a " Dodar from the island Mauritius; it is not able to

flie being so big." This specimen may well have been the skin of the bird seen by Lestrange some eighteen years before, but anyhow we are able to trace the specimen through Willughby, Edward Llwyd and Thomas Hyde, till it passed in or before 1684 to the Ashmolean collection at Oxford. In 1755 it was ordered to be destroyed, but, in accordance with the original orders of Ashmole, its head and right foot were preserved, and still orna- ment the museum of that university. In the second edition of a Catalogue of many Natural Rarities, &c, " to be seen at the place formerly called the Music House, near the West End of St Paul's Church," collected by one Hubert alias Forbes, and published in 1665, mention is made of a " legge of a Dodo, a great heavy bird that cannot fly; it is a Bird of the Mauricius Island." This is supposed to have subsequently passed into the possession of the Royal Society. At all events such a specimen is included in Grew's list of their treasures which was published in 1681. This was afterwards transferred to the British Museum. It is a left foot, without the integuments, but it differs sufficiently in size from the Oxford specimen to forbid its having been part of the same individual. In 1666 Olearius brought out the Gottorffische Kunst Kammer, wherein he describes the head of a Walghvogel, which some sixty years later was removed to the museum at Copenhagen, and is now preserved there, having been the means of first leading zoologists, under the guidance of Prof. J. Th. Reinhardt, to recognize the true affinities of the bird.

We have passed over all but the principal narratives of voyagers or other notices of the bird. A compendious bibliography, up to the year 1848, will be found in Strickland's classical work, 1 and the list was continued by Von Frauenfeld 2 for twenty years later.'

1 The Dodo and its Kindred, by H. E. Strickland and A. G. Melville (London, 1848, 4to).

2 Neu aufgefundene Abbildung des Bronte, by Geore Ritter von Frauenfeld (Wien, 1868, fol.).

The last evidence we have of the dodo's existence is furnished by a journal kept by Benj. Harry, and now in the British Museum (MSS. Addit, 3668. 11. D). This shows its survival till 1681, but the writer's sole remark upon it is that its " fHesh is very hard." The successive occupation of the island by different masters seems to have destroyed every tradition relating to the bird, and doubts began to arise whether such a creature had ever existed. Dr Henry Duncan, Scottish minister and journalist, in 1828, showed how ill-founded these doubts were, and some ten years later William John Broderip

with much diligence collected all the available evidence into an admirable essay, which in its turn was succeeded by Strickland's monograph just mentioned. But in the meanwhile little was done towards obtaining any material advance in our knowledge, Prof. Reinhardt's determination of its affinity to the pigeons (Columbae) excepted; and it was hardly until George Clark's discovery in 1865 of a large number of dodos' remains in the mud of a pool (theMareaux Songes)that zoologists generally were prepared to accept that affinity without question. The examination of bone after bone by Sir R. Owen (Trans. Zoo'. Soc. vi. p. 49) confirmed the judgment of the Danish naturalist.

In 1889 Th. Sauzier, acting for the government of Mauritius, sent a great number of bones from the same swamp to Sir Edward Newton. 3 From these the first correctly restored and properly mounted skeleton was prepared and sent to Paris, to be forwarded to the museum of Mauritius. Good specimens are in the British Museum, at Paris and at Cambridge, England.

The huge blackish bill of the dodo terminated in a large, horny hook; the cheeks were partly bare, the stout, short legs yellow. The plumage was dark ash – coloured, with whitish breast and tail, yellowish white wings (incapable of flight). The short tail formed a curly tuft.

The dodo is said to have inhabited forests and to have laid one large white egg on a mass of grass. Besides man, hogs and other imported animals seem to have exter- minated it. But the dodo is not the only member of its family that has vanished. The little island which has successively borne the name of Mas- caregnas, England's Forest, Bourbon and Reunion, and lies to the southward of Mauritius, had also an allied bird,, now dead and gone. Of this not a relic has been handled by any natur- alist. "•■ The latest de- , Fl< l\ ?' — Th ?/ Solitaire of Rodriguez

..... r ' ... 4 „ (rezopnaps sotitarius). from Leeuat s scrrption of it, by Du fi gure .

Bois in 1674, is very

meagre, while Bontekoe (1646) gave a figure, apparently intended

to represent it. It was originally called the " solitaire," but this

name was also applied to Pezophaps solitarius of Rodriguez by

the Huguenot exile Leguat, who described and figured it about

1691.

The solitaire, Didus solitarius of Gmelin, referred by Strickland

to a district genus Pezophaps, is supposed to have lingered in the

3 E. Newton and H. Gadow, Trans. Zool. Soc. xiii. (1893) pp. 281-302, pis.

island of Rodriguez until about .1761. Leguat 1 has given a delightful description of its quaint habits. The male stood about 2 ft. 9 in. high; its colour was brownish grey, that of its mate more inclined to brown, with a whitish breast. The wings were rudimentary, the tail very small, almost hidden, and the thigh feathers were thick and curled " like shells." A round mass of bone, " as big as a musket ball," was developed on the wings of the males, and they used it as a weapon of offence while they whirled themselves about twenty or thirty times in four or five minutes, making a noise with their pinions like a rattle. The mien was fierce and the walk stately, the birds living singly or in pairs. The nest was a heap of palm leaves a foot high, and contained a single large egg which was incubated by both parents. The food consisted of seeds and leaves, and the birds aided digestion by swallowing large stones; these were used by the

Fig. 3. — Skeleton of a male Solitaire, Pezophaps solitarius, Museum of Zoology, Cambridge.

Dutch sailors to sharpen their knives with. One of these stones, nearly an inch and a half in length, of extremely hard volcanic rock, is in the Cambridge museum. The fighting knobs mentioned above, are very interesting, large exostoses on one of the wrist- bones of either wing; they were undoubtedly covered with a thick, callous skin. Thousands of bones of this curious flightless pigeon were collected through Sir E. Newton's 2 exertions, and by H. H. Sclater on behalf of the Royal Society of London. The results are several almost complete skeletons of both sexes, composed however out of the enormous mass of the dissociated bones. (A.N.; H.F.G.)

DODONA, in Epirus, the seat of the most ancient and venerable of all Hellenic sanctuaries. Its ruins are at Dramisos, near Tsacharovista. In later times the Greeks of the south looked on the inhabitants of

Epirus as barbarians; nevertheless for Dodona they always preserved a certain reverence, and the temple there was the object of frequent missions from them. This temple was dedicated to Zeus, and connected with the temple was an oracle

1 Voyage et aventures de Frangois Leguat, &c. (2 vols., London, 1708). An English translation, edited with many additional illustrations by Captain Oliver, has been published by the Hakluyt Society (2 vols., 1891).

- *E. Newton and J. W. Clark, Phil. Trans, clix. (1869), pp. 327-362 ; clxviii. (1879), pp. 448-451.*

which enjoyed more reputation in Greece than any other save that at Delphi, and which would seem to date from earlier times than the worship of Zeus; for the normal method of gathering the responses of the oracle was by listening to the rustling of an old oak tree, which was supposed to be the seat of the deity. We seem here to have a remnant of the very ancient and widely diffused tree-worship. Sometimes, however, auguries were taken in other manners, being drawn from the moaning of doves in the branches, the murmur of a fountain which rose close by, or the resounding of the wind in the brazen caldrons which formed a circle all round the temple. Croesus proposed to the oracle his well-known question; Lysander sought to obtain from it a sanction for his ambitious views; the Athenians frequently appealed to its authority during the Peloponnesian War. But the most frequent votaries were the neighbouring tribes ef the Acarnanians and Aetolians, together with the Boeotians, who claimed a special connexion with the district.

Dodona is not unfrequently mentioned by ancient writers. It is spoken of in the Iliad as the stormy abode of Selli who sleep on the ground and wash not their feet, and in the Odyssey an imaginary visit of Odysseus to the oracle is referred to. A Hesiodic fragment gives a complete description of the Dodonaea or Hellopia, which is called a district full of corn-fields, of herds and flocks and of shepherds, where is built on an extremity (iir' kaxarixi) Dodona, where Zeus dwells in the stem of an oak ($17765). The priestesses were called doves (iriXeiat) and Herodotus tells a story which he learned at Egyptian Thebes, that the oracle of Dodona was founded by an Egyptian priestess who was carried away by the Phoenicians, but says that the local legend sub- stitutes for this priestess a black dove, a substitution in which he tries to find a rational meaning. From inscriptions and later writers we learn that in historical times there was worshipped, together with Zeus, a consort named Dione

(see further Zeus; Oracle; Dione).

The ruins, consisting of a theatre, the walls of a town, and some other buildings, had been conjectured to be those of Dodona by Wordsworth in 1832, but the conjecture was changed into ascertained fact by the excavations of Constantin Carapanos. In 1875 he made some preliminary investigations; soon after, an extensive discovery of antiquities was made by peasants, digging without authority; and after this M. Carapanos made a system- atic excavation of the whole site to a considerable depth. The topographical and architectural results are disappointing, and show either that the site always retained its primitive simplicity, or else that whatever buildings once existed have been very completely destroyed.

To the south of the hill, on which are the walls of the town, and to the east of the theatre, is a plateau about 200 yds. long and 50 yds. wide. Towards the eastern end of this terrace are the scanty remains of a building which can hardly be anything but the temple of Zeus; it appears to have consisted of pronaos, naos or cella, and opisthodomus, and some of the lower drums of the internal columns of the cella were still resting on their founda- tions. No trace of any external colonnade was found. The temple was about 130 ft. by 80 ft. It had been converted into a Christian church, and hardly anything of its architecture seems to have survived. In it and around it were found the most interest- ing products of excavation — statuettes and decorative bronzes, many of them bearing dedications to Zeus Naius and Dione, and inscriptions, including many small tablets of lead which contained the questions put to the oracle. Farther to the west, on the same terrace, were two rectangular buildings, which M. Carapanos conjectures to have been connected with the oracle, but which show no distinguishing features.

Below the terrace was a precinct, surrounded by walls and flanked with porticoes and other buildings; it is over 100 yds. in length and breadth, and of irregular shape. One of the buildings •on the south-western side contained a pedestal or altar, and is identified by M. Carapanos as a temple of Aphrodite, on the insufficient evidence of a single dedicated object; it does not seem to have any of the characteristics of a temple. In front of the porticoes are rows of pedestals, which once bore statues and

other dedications. At the southern corner of the precinct is a kind of gate or propylaeum, flanked with two towers, between which are plated two coarse limestone drums. If these are in situ and belong to the original gateway, it must have been of a very rough character; it does not seem probable that they carried, as M. Carapanos suggests, the statuette and bronze bowl by which divinations were carried on.

The chief interest of the excavation centres in the smaller antiquities discovered, which have now been transferred from M. Carapanos's collection to the National Museum in Athens. Among the dedications, the most interesting historically are a set of weapons dedicated by King Pyrrhus from the spoils of the Romans, including characteristic specimens of the pilum. The leaden tablets of the oracle contain no certain example of a response, though there are many questions, varying from matters of public policy or private enterprise to inquiries after stolen goods.

The temple of Dodona was destroyed by the Aetolians in 219 B.C., but the oracle survived to the times of Pausanias and even of the emperor Julian.

See C. Wordsworth, Greece (1839), p. 247; Constantin Carapanos, Dodone et ses mines (Paris, 1878). For the oracle inscriptions, see E. S. Roberts in Journal of Hellenic Studies, vol. i. p. 228. (E. Gr.)

DODS, MARCUS (1834-1909), Scottish divine and biblical scholar, was born at Belford, Northumberland, the youngest son of Rev. Marcus Dods, minister of the Scottish church of that town. He was trained at Edinburgh Academy and Edinburgh Univer- sity, graduating in 1854. Having studied theology for five years he was licensed in 1858, and in 1864 became minister of Renfield Free Church, Glasgow, where he worked for twenty-five years. In 1889 he was appointed professor of New Testament Exegesis in the New College, Edinburgh, of which he became principal on the death of Dr Rainy in 1907. He died in Edinburgh on the 26th of April 1 909 . Throughout his life, both ministerial and professorial, he devoted much time to the publication of theological books. Several of his writings, especially a sermon on Inspiration delivered in 1878, incurred the charge of unorthodoxy, and shortly before his election to the Edinburgh professorship he was summoned before the General Assembly, but the charge was dropped by a large majority, and in 1891 he received the honorary degree of D.D. from Edinburgh University. He edited Lange's Life of Christ in English (Edinburgh, 1864, 6 vols.), Augustine's works (1872-1876), and, with Dr Alexander Whyte, Clark's " Handbooks for Bible Classes " series. In

the Expositor's Bible series he edited Genesis and 1 Corinthians, and he was also a contributor to the 9th edition of the Encyclopaedia Britannica and Hastings' Dictionary of the Bible. Among other important works are: The Epistle to the Seven Churches (1865); Israel's Iron Age (1874); Mohammed, Buddha and Christ (1877); Handbook on Haggai, Zechariah and Malachi (1879); The Gospel according to St John (1897), in the Expositor's Greek Testament; The Bible, its Origin and Nature (1904), the Bross Lectures, in which he gave an able sketch of the use of Old Testament criticism, and finally set forth his Theory of Inspiration. Apart from his great services to Biblical scholarship he takes high rank among those who have sought to bring the results of technical criticism within the reach of the ordinary reader.

DODSLEY, ROBERT (1703-1764), English bookseller and miscellaneous writer, was born in 1703 near Mansfield, Nottinghamshire, where his father was master of the free school. He is said to have been apprenticed to a stocking-weaver in Mansfield, from whom he ran away, taking service as a footman. In 1729 Dodsley published his first work, Servitude; a Poem . . . written by a Footman, with a preface and postscript ascribed to Daniel Defoe; and a collection of short poems, A Muse in Livery, or the Footman's Miscellany, was published by subscription in 1732, Dodsley's patrons comprising many persons of high rank. This was followed by a satirical farce called The Toyshop (Covent Garden, 1735), in which the toyman indulges in moral observa- tions on his wares, a hint which was probably taken from Thomas Randolph's Conceited Pedlar. The profits accruing from the sale of his works enabled Dodsley to establish himself with the help of

his friends — Pope lent him £100 — as a bookseller at the " Tully's Head " in Pall Mall in 1735. His enterprise soon made him one of the foremost publishers of the day. One of his first publica- tions was Dr Johnson's London, for which he gave ten guineas in 1738. He published many of Johnson's works, and he suggested and helped to finance the English Dictionary. Pope also made over to Dodsley his interest in his letters. In 1738 the publica- tion of Paul Whitehead's Manners, voted scandalous by the Lords, led to a short imprisonment. Dodsley published for Edward Young and Mark Akenside, and in 1751 brought out Thomas Gray's Elegy. He also founded several literary periodicals: The Museum (1746-1767, 3 vols.); The Preceptor containing a general course of education (1748, 2 vols.), with an introduction by Dr Johnson; The World (1753-1756, 4 vols.); and The Annual Register, founded in 1758 with Edmund Burke as editor. To these various works, Horace

Walpole, Akenside, Soame Jenyns, Lord Lyttelton, Lord Chesterfield, Burke and others were contributors. Dodsley is, however, best known as the editor of two collections: Select Collection of Old Plays (12 vols., 1744; 2nd edition with notes by Isaac Reed, 12 vols., 1780; 4th edition, by W. C. Hazlitt, 1874-1876, 15 vols.); and A collection of Poems by Several Hands (1748, 3 vols.), which passed through many editions. In 1737 his King and the Miller of Mansfield, a " dramatic tale " of King Henry II., was produced at Drury Lane, and received with much applause; the sequel, Sir John Cockle at Court, a farce, appeared in 1 738. In 1745 he published a collection of his dramatic works, and some poems which had been issued separately, in one volume under the modest title of Trifles. This was followed by The Triumph of Peace, a Masque occasioned by the Treaty of Aix-la-Chapelle (1749); a fragment, entitled Agriculture, of a long tedious poem in blank verse on Public Virtue (1753); The Blind Beggar of Bethnal Green (acted at Drury Lane 1739, printed 1741); and an ode, Melpomene (1757). His tragedy of Cleone (1758) had a long run at Covent Garden, 2000 copies being sold on the day of publication, and it passed through four editions within the year. Lord Chesterfield is, however, almost certainly the author of the series of mock chronicles of which The Chronicle of the Kings of England by " Nathan ben Saddi " (1740) is the first, although they were included in the Trifles and " ben Saddi " was received as Dodsley's pseudonym. The Economy of Human Life (1750), a collection of moral precepts frequently reprinted, is also by Lord Chesterfield. In 1759 Dodsley retired, leaving the conduct of the business to his brother James (1 724-1 797), with whom he had been many years in partnership. He published two more works, The Select Fables of Aesop translated by R. D. (1764) and the Works of William Shenstone (3 vols., 1764-1769). He died at Durham while on a visit to his friend the Rev. Joseph Spence, on the 23rd of September 1764.

See also Shadows of the Old Booksellers, by Charles Knight (1865), pp. 189-216; "At Tully's Head" in Eighteenth Century Vignettes, 2nd series, by Austin Dobson (1894); E. Solly in The Bibliographer, v. (1884) pp. 57-61. Dodsley's poems are reprinted with a memoir in A. Chalmers's Works of English Poets, vol. xv. (1810).

DODSWORTH, ROGER (1585-1654), English antiquary, was born near Oswaldkirk, Yorkshire. He devoted himself early to antiquarian research, in which he was greatly assisted by the fact that his father, Matthew Dodsworth, was registrar of York cathedral, and could give him access to the records preserved there. He married the widow of Laurence Rawsthorne of Hutton Grange, where he 'subsequently resided till his death in August 1654. At various times in his life he

was enabled to study the records in the library of Sir Robert Cotton, in Skipton Castle, and in the Tower of London. He collected a vast store of materials for a history of Yorkshire, a Monasticon Anglicanum, and an English baronage. The second of these was published with considerable additions by Sir William Dugdale (2 vols., 1655 and 1661). The MSS. were left to Thomas, third Lord Fairfax, who by his will bequeathed them (160 volumes in all) to the Bodleian Library at Oxford. Portions have been printed by the Yorkshire Archaeological Society (Dodsworth's Yorkshire Notes, 1884) and the Chetham Society (copies of Lancashire post- mortem inquisitions, 1875-1876).

DODWELL, EDWARD (1767-1832), English traveller and writer on archaeology. He belonged to the same family as Henry Dodwell the theologian, and was educated at Trinity College, Cambridge. He travelled from 1801 to 1806 in Greece, and spent the rest of his life for the most part in Italy, at Naples and Rome. He died at Rome on the 13th of May 1832, from the effects of an illness contracted in 1830 during a visit of explora- tion to the Sabine Mountains. His widow, a daughter of Count Giraud, thirty years his junior, subsequently became famous as the " beautiful " countess of Spaur, and played a considerable r61e iii the political life of the papal city. He published A Classical and Topographical Tour through Greece (1810), of which a German translation appeared in 1821; Views in Greece, thirty coloured plates (1821); and Views and Descriptions of Cyclopian or Pelasgic Remains in Italy and Greece (London and Paris, with French text, 1834).

DODWELL, HENRY (1641-1711), scholar, theologian and controversial writer, was born at Dublin in October, 1641. His father, having lost his property in Connaught during the rebellion, settled at York in 1648. Here Henry received his preliminary education at the free school. In 1654 he was sent by his uncle to Trinity College, Dublin, of which he subsequently became scholar and fellow. Having conscientious objections to taking orders he relinquished his. fellowship in 1666, but in 1688 he was elected Camden professor of history at Oxford. In 1691 he was deprived of his professorship for refusing to take the oath of allegiance to William and Mary. Retiring to Shottesbrooke in Berkshire, and living on the produce of a small estate in Ireland, he devoted himself to the study of chronology and ecclesiastical polity. Gibbon speaks of his

learning as " immense," and says that his "skill in employing facts is equal to his learning," although he severely criticizes his method and style. DodwelPs works on ecclesiastical polity are more numerous and of much less value than those on chronology, his judgment being far inferior to his power of research. In his earlier writings he was regarded as one of the greatest champions of the non- jurors; but the doctrine which he afterwards promulgated, that the soul is naturally mortal, and that immortality could be enjoyed only by those who had received baptism from the hands of one set of regularly ordained clergy, and was therefore a privilege from which dissenters were hopelessly excluded, did not strengthen his reputation. Dodwell died at Shottesbrooke on the 7th of June 1 71 1. His chief works on classical chronology are: A Discourse concerning Sanchoniathon's Phoenician History (1681); Annales Thucydidei et Xenophontei (1702); Chronologia Graeco- Romana pro hypothesibus Dion. Halicarnassei (1692); Annales Velleiani, Quintilianei, Statiani (1698); and a larger treatise entitled De veteribus Graecorum Romanorumque Cyclis (1701).

His eldest son Henry (d. 1784) is known as the author of a pamphlet entitled Christianity not founded on Argument, to which a reply was published by his brother William (1709- 1785), who was besides engaged in a controversy with Dr Conyers Middleton on the subject of miracles.

See The Works of H. D. . . . abridg'd with an account of his life, by F. Brokesby (2nd ed., 1723) and Thomas Hearne's Diaries.

DOG, the English generic term for the quadruped of the domesticated variety of Canis (Fr. chien) . The etymology of the word is unknown; " hound " represents the common Teutonic term (Ger. Hund), and it is suggested that the " English dog " — for this was a regular phrase in continental European countries — represented a special breed. Most canine experts believe that the dog is descended from the wolf, although zoologists are less certain (see Carnivora); the osteology of one does not differ materially from that of the other: the dog and the wolf breed with each other, and the progeny thus obtained will again breed with the dog. There is one circumstance, however, which seems to mark a difference between the two animals: the eye of the dog of every country and species has a circular pupil, but the position or form of the pupil is oblique in the wolf. W. Youatt says there is also a marked difference in the temper and habits of the two. The dog is generally easily managed, and although H. C. Brooke of Welling, Kent, succeeded in making a wolf '

fairly tractable, the experience of others has been the reverse of encouraging. G. Cuvier gives an interesting account of a young wolf which, having been trained to follow his master, showed affection and submission scarcely inferior to the domesticated dog. During the absence from home of his owner the wolf was sent to a menagerie, but pined for his master and would scarcely take any food for a considerable time. At length, however, he became attached to his keepers and appeared to have forgotten his former associate. At the end of eighteen months his master returned, and, the moment his voice was heard, the wolf recog- nized him and lavished On him the most affectionate caresses. A still longer separation followed, but the wolf again remembered his old associate and showed great affection upon his return. Such an association proves that there is very little difference between the dog and the wolf in recognition of man as an object of affection and veneration. H. C. Brooke succeeded in training his wolf so well that it was no uncommon sight to see the latter following his master like a dog. The wolf did not like strangers, however, and was very shy in their presence.

In the Old and New Testaments the dog is spoken of almost with abhorrence; it ranked amongst the unclean beasts: traffic in it was considered as an abomination, and it was forbidden to be offered in the sanctuary in the discharge of any vow. Part of the Jewish ritual was the preservation of the Israelites from the idolatry which at that time prevailed among every other people. Dogs were held in considerable veneration by the Egyptians, from whose tyranny the Israelites had just escaped; figures of them appeared on the friezes of most of the temples, and they were regarded as emblems of the divine being. Herodotus, speaking of the sanctity in which some animals were held by the Egyptians, says that the people of every family in which a dog died shaved themselves — their expression of mourning — adding that this was a custom of his own time.

The cause of this attachment to and veneration for the dog is, however, explained in a far more probable and pleasing way than by many of the fables of ancient mythology. The prosperity of Lower Egypt, and almost the very subsistence of its inhabitants, depended upon the annual overflowing of the Nile; and they looked for it with the utmost anxiety. Its approach was an- nounced by the appearance of a certain star, Sirius, and as soon as that star was seen above the horizon the people hastened to remove their flocks to the higher ground and abandoned the lower pastures to the fertilizing influence of the stream. They hailed it as their guard and protector; and, associating with its apparent watchfulness the well-known fidelity of the dog, they called it the " dog-star " and worshipped it. It was in

far later periods and in other countries that the appearance of the dog- star was regarded as the signal of insufferable heat or prevalent disease. In Ethiopia, not only was great veneration paid to the dog, but the inhabitants used to elect a dog as their king. It was kept in great state, and surrounded by a numerous train of officers and guards: when it fawned upon them it was supposed to be pleased with their proceedings; when it growled, it dis- approved of the manner in which their government was con- ducted. Such indications of will were implicitly obeyed, or were translated by the worshippers as their own caprice or interest indicated.

Even 1000 years after this period, the dog was highly esteemed in Egypt for its sagacity and other excellent qualities; for when Pythagoras, after his return from Egypt, founded a new sect in Greece, and at Croton in southern Italy, he taught, with the Egyptian philosophers, that at the death of the body the soul entered into that of various animals. After the death of any of his favourite disciples he would hold a dog to the mouth of the man in order to receive the departing spirit, saying that there was no animal which could perpetuate his virtues better than that quadruped. It was in order to preserve the Israelites from errors and follies of this kind, and to prevent the possibility of such idolatry being established, that the dog was afterwards regarded with utter abhorrence amongst the Jews, and this feeling prevailed during the continuance of the Israelites in Palestine.

DOG

HfM'

Plate I.

m

GREAT DAXE.

DALMATI \N.

MASTIFF.

•

Li

OLD ENGLISH SHEEP DOG.

/

“**»

J

NEWFOUNDLAND.

iV

i-sa

• ;^ at* 3 ,

POODLE.

VIII. 374.

BULL DOG. FRENCH BULL DOG.

(From Photos by Bowdon Bros.) TYPICAL NON-SPORTING DOGS.

From “Country Life in A m erica.”

BOSTON TERRIER.

DOG

ENGLISH SETTER.

POINTER.

IRISH SETTE

l||f||H

■ ; **’-“‘4^^B;

Egt.—igu ■ ‘

,

IRISH TERRIER.

DACHSHUND. ROUGH-COATED FOX TERRIER. FIELD SPANIEL.

{From Photos by Bowdm. Bros.) TYPICAL SPORTING DOGS.

The Hindus also regard the dog as unclean, and submit to various purifications if they accidentally come in contact with it, believing that every dog is animated by a wicked and malignant spirit condemned to do penance in that form for crimes committed in a previous state of existence. In every Mahommedan and Hindu country the most scurrilous epithet bestowed on a Euro- pean or a Christian is " a dog," and that accounts for the fact that in the whole of the Jewish history there is not a single allusion to hunting with dogs. Mention is made of nets and snares, but the dog does not seem to have been used in the pursuit of game.

In the early periods of the history of other countries this seems to have been the case even where the dog was esteemed and valued, and had become the companion, the friend and the defender of man and his home; and in the 2nd century of the Christian era Arrian wrote that " there is as much difference between a fair trial of speed in a good run, and ensnaring a poor animal without an effort, as between the secret piratical assaults of robbers at sea and the victorious naval engagements of the Athenians at Artemisium and at Salamis." The first hint of the employment of the dog in the pursuit of other animals is given by Oppian in his Cynegetica, who attributes it to Pollux about 200 years after the promulgation of the Levitical law. The precise species of dog that was cultivated in Greece at that early period cannot be affirmed, although a beautiful piece of sculpture in the possession of Lord Feversham at Duncombe Hall, representing the favourite dog of Alcibiades, differs but little from the New-foundland dog of the present day. In the British Museum is another piece of early sculpture from the ruins of the villa of Antoninus, near Rome. The greyhound puppies which it repre- sents are identical with a brace of saplings of the present day. In the early periods of their history the Greeks depended too much on their nets to capture game, and it was not until later times that they pursued their prey with dogs, and then not with greyhounds, which run by sight, but with beagles, the dwarf hound which is still very popular. Later, mention is made of large and ferocious dogs which were employed to guard sheep and cattle, or to watch at the door of the house, or even to act as a companion, and G. Cuvier expresses the opinion that the dog exhibits the most complete and the most useful conquest that man has made. Each individual is entirely devoted to his master, adopts his manners, distinguishes and defends his property, and remains attached to him even unto death; and all this springs not from mere

necessity nor from constraint, but simply from gratitude and true friendship.

The swiftness, the strength and the highly developed power of scent in the dog, have made it a powerful ally of man against the other animals; and perhaps these qualities in the dog were necessary to the establishment of society. Instances of dogs having saved the lives of their owners by that strange intuition of approaching danger which they appear to possess, or by their protection, are innumerable: their attachment to man has inspired the poet and formed the subject of many notable books, while in Daniel's Rural Sports is related a story of a dog dying in the fulness of joy caused by the return of his master after a two years' absence from home.

It is not improbable that all dogs sprang from one common source, but climate, food and cross-breeding caused variations of form which suggested particular uses, and these being either designedly or accidentally perpetuated, the various breeds of dogs arose, and became numerous in proportion to the progress of civilization. Among the ruder or savage tribes they possess but one form; but the ingenuity of man has devised many inventions to increase his comforts; he has varied and multiplied the characters and kinds of domestic animals for the same purpose, and hence the various breeds of horses, cattle and dogs. The parent stock it is now impossible to trace; but the wild dog, wherever found on the continent of Asia, or northern Europe, has nearly the same character, and bears no inconsiderable resem- blance to the British dog of the ordinary type; while many of those from the southern hemisphere can scarcely be distinguished from the cross-bred poaching dog, the lurcher.

Dogs were first classified into three groups: — (1) Those having the head more or less elongated, and the parietal bones of the skull widest at the base and gradually approaching towards each other as they ascend, the condyles of the lower jaw being on the same line with the upper molar teeth. The greyhound and all its varieties belong to this class. (2) The head moderately elongated and the parietals diverging from each other for a certain space as they rise upon the side of the head, enlarging the cerebral cavity and the frontal sinus. To this class belong most of the useful dogs, such as the spaniel, the setter, the pointer and the sheepdog. (3) The muzzle more or less shortened, the frontal sinus enlarged, and the cranium elevated and diminished in capacity. To this class belong some of the terriers and most of the toy dogs.

Later, however, "Stonehenge" (J. H. Walsh), in British Rural Sports,

classified dogs as follows: — {a) Dogs that find game for man, leaving him to kill it himself — the pointer, setters, spaniels and water spaniels, (b) Dogs which kill game when found for them — the English greyhound, (c) Dogs which find and also kill their game-— the bloodhound, the foxhound, the harrier, the beagle, the otterhound, the fox terrier and 'the truffle dog. (d) Dogs which retrieve game that has been wounded by man—' the retriever, the deerhound. (e) Useful companions of man— the mastiff, the Newfoundland, the St Bernard dog, the bulldog, the bull terrier, terriers, sheepdogs, Pomeranian or Spitz, and Dalmatian dogs. (J) Ladies' toy dogs — King Charles spaniel, the Blenheim spaniel, the Italian greyhound, the pug dog, the Maltese dog, toy terriers, toy poodles, the lion dog, Chinese and Japanese spaniels. In 1894 Modern Dogs (Rawdon B. Lee) was issued, the simple classification of sporting and non-sporting dog— terriers and toy dogs, being adopted; but although there had been an understanding since 1874, when the first volume of the Kennel Club Stud Book (Frank C. S. Pearce) was issued, as to the identity of the two great divisions of dogs, an incident at Altrincham Show in September 1900 — an exhibitor entering a Russian wolfhound in both the sporting and non-sporting com- petitions—made it necessary for authoritative information to be given as to how the breeds should be separated. Following petitions to the Kennel Club from exhibitors at the club's own show at the Crystal Palace, and also at the show of the Scottish Kennel Club in Edinburgh during the autumn of 1900, the divisions were decided upon as follows: —

Sporting. — Bloodhound, otterhound, foxhound, harrier, beagle, basset hound (smooth and rough), dachshund, greyhound, deerhound, Borzoi, Irish wolfhound, whippet, pointer, setter (English, Irish and black and tan), retriever (flat-coated, curly-coated and Labrador), spaniel (Irish water, water other than Irish, Clumber, Sussex, field, English springer, other than Clumber, Sussex and field: Welsh springer, red and white and Cocker); fox terriers (smooth- and wire-coated) ; Irish terrier, Scotch terrier, Welsh terrier, Dandie Dinmont terrier, Skye terrier (prick-eared and drop-eared), Airedale terrier and Bedlington terrier. >

Non-Sporting. — Bulldog, bulldog (miniature), mastiff, Great Dane, Newfoundland (black, white and black, or other than black), St Bernard (rough and smooth), Old English sheepdog, collie (rough and smooth), Dalmatian, poodle, bull terrier, white English terrier, black, and tan terrier, toy spaniel (King Charles ct black and tan, Blenheim, ruby or red and tricolour), Japanese, Pekingese, Yorkshire terrier, Maltese, Italian greyhound, chow- chow, black and tan

terrier (miniature), Pomeranian, pug (fawn and black), Schipperke, Griffon Bruxellois, foreign dogs (bouledogues francais, elk-hounds, Eskimos, Lhasa terriers, Samoyedes and any other varieties not mentioned under this heading).

On the 4th of May 1898 a sub-committee of the Kennel Club decided that the following breeds should be classified as "toy dogs ": — Black and tan terriers (under 7 ft>); bull terriers (under 8 lb), griffons, Italian greyhounds, Japanese, Maltese, Pekingese, poodles (under 15 in.), pugs, toy spaniels, Yorkshire terriers and Pomeranians. '

All these varieties were represented at the annual show of the

Kennel Club in the autumn of 1905, and at the representative exhibition of America held under the management of the West-minster Kennel Club in the following spring the classification was substantially the same, additional breeds, however, being Boston terriers — practically unknown in England, — Chesapeake Bay dogs, Chihuahuas, Papillons and Roseneath terriers. The latter were only recently introduced into the United States, though well known in Great Britain as the West Highland or Poltalloch terrier; an application which was made (1900) by some of their admirers for separate classification was refused by the Kennel Club, but afterwards it was granted, the breed being classified as the West Highland white terrier.

The establishment of shows at Newcastle-on-Tyne in June 1859 secured for dogs attention which had been denied them up to that time, although sportsmen had appreciated their value for centuries and there had been public coursing meetings since the reign of Charles I. Lord Orford, however, established the first club at Marham Smeeth near Swaffham, where coursing is still carried on, in 1776. The members were in number confined to that of the letters in the alphabet; and when any vacancy happened it was filled up by ballot. On the decease of the founder of the club, the members agreed to purchase a silver cup to be run for annually, and it was intended to pass from one to the other, like the whip at Newmarket, but before starting for it, in the year 1792, it was decided that the winner of the cup should keep it and that one should be annually purchased to be run for in November. At the formation of the club each member assumed a colour, and also a letter, which he used as the initial of

his dog's name. The Newcastle dog show of 1859 was promoted by Mr Pape — a local sporting gunmaker — and Mr Shorthose, and although only pointers and setters were entered for in two classes immense interest was taken in the show. But neither the promoters nor the sportsmen who supported it could have had the faintest idea as to how popular dog shows would become. The judges at that historic gathering were: Messrs J. Jobling (Morpeth), T. Robson (Newcastle-on-Tyne) and J. H. Walsh (London) for pointers, and E. Foulger (Alnwick), R. Brailsford (Knowsley) and J. H. Walsh for the setters. Sixty dogs were shown, and it was said that such a collection had not been seen together before; while so even was the quality that the judges had great difficulty in making their awards. The prizes were sporting guns made by Mr Pape and presented by him to the promoters of the show. So great a success was scored that other shows were held in the same year at Birmingham and Edinburgh; while the Cleveland Agricultural Society also established a show of foxhounds at Redcar, the latter being the forerunner of that very fine show of hounds which is now held at Peterborough every summer and is looked upon as the out-of-season society gathering of hunting men and women.

Mr Brailsford was the secretary of the show at Birmingham, and he had classes for pointers, English and Irish setters, retrievers and Clumber spaniels. Another big success was scored, and the National Dog Show Society was established for the purpose of holding a show of sporting dogs in Birmingham every winter. Three years later proposals were made in The Field to promote public trials of pointers and setters over game, but it was not until the 18th of April 1865 that a further step was taken in the recognition of the value of the dog by the promotion of working trials. They were held at Southill, near Bedford, on the estate of S. Whitbread, M.P., and they attracted great interest. The order of procedure at the early field trials was similar to what it is to-day, only the awards were given in accordance with a scale of points as follows: nose, 40; pace and range, 30; temperament, 10; staunchness before, 10; behind, 10. Style of working was also taken into consideration. In 1865 a show was held in Paris, and after the National Dog Club — not the Birmingham society — had failed, as the result of a disastrous show at the Crystal Palace, a further exhibition was arranged to be held in June 1870 under the management of G. Nutt and a very strong committee, among whom were many of the most noted owners of sporting dogs of that time. The details of the show were arranged by S. E. Shirley and J. H. Murchison, but the exhibition, although a

most interesting one, was a failure, and the guarantors had to face a

heavy loss. A second venture proved to be a little more encouraging, although again there was a loss; but in April 1873, the Kennel Club, which is now the governing body of the canine world, was founded by S. E. Shirley, who, after acting as its chairman for many years, was elected the president, and occupied that position until his death in March 1904. His successor was the duke of Connaught- and Strathearn; the vice-presidents including the duke of Portland, Lord Algernon Gordon Lennox, J. H. Salter and H. Richards. The progress of the club has been remarkable, and that its formation did much to improve the conditions of the various breeds of dogs, to encourage their use in the field by the promotion of working trials, and to check abuses which were common with regard to the registration of pedigrees, &c, cannot be denied. The abolition of the cropping of the ears of Great Danes, bull terriers, black and tan terriers, white English terriers, Irish terriers and toy terriers, in 1889 gained the approval of all humane lovers of dogs, and although attempts have been made to induce the club to modify the rule which prohibits the exhibition of cropped dogs, the practice has not been revived; it is declared, however, that the toy terriers and white English terriers have lost such smartness by the retention of the ears that they are becoming extinct. The club has control over all the shows held in the United Kingdom, no fewer than 519 being held in 1905, the actual number of dogs which were entered at the leading fixtures being: Kennel Club show 1789, Cruft's 1768, Ladies' Kennel Association 1306, Manchester 1190, Edinburgh 896 and Birmingham 892. In 1906, however, no fewer than 1956 dogs were entered at the show of the Westminster Kennel Club, held in Madison Square Garden, New York; a fact proving that the show is as popular in America as it is in the United Kingdom, the home of the move- ment. The enormous sum of £1 500 has been paid for a collie, and 1000 guineas for a bulldog, both show dogs pure and simple; while £500 is no uncommon price for a fox terrier. Excepting for greyhounds, however, high prices are rarely offered for sporting dogs, 300 guineas for the pointer " Coronation " and 200 guineas for the retriever " High Legh Blarney " being the best reported prices for gun dogs during the last few years.

The foreign and colonial clubs which are affiliated to the Kennel Club are: the Guernsey Dog Club, the Italian Kennel Club, the Jersey Dog Club, La Societe Centrale (Paris), Moscow Gun Club of the Emperor Alexander II., New South Wales Kennel Club, Nimrod Club (Amsterdam), Northern Indian Kennel Association, Royal St Hubert's Society (Brussels) and the South African Kennel Club (Cape Town). Its ramifications therefore extend to all parts of the world; while its rules are the basis of those adopted by the American Kennel

Club, the governing body of the " fancy " in the United States. A joint conference between representatives of the two bodies, held in London in 1900, did much towards securing the uniformity of ideas which is so essential between associations having interests in common.

Most of the leading breeds have clubs or societies, which have been founded by admirers with a view to furthering the interests of their favourites; and such combinations as the Bulldog Club (incorporated), the London Bulldog Society, the British Bulldog Club, the Fox Terrier Club, the Association of Bloodhound Breeders — under whose management the first man-hunting trials were held,— the Bloodhound Hunt Club, the Collie Club, the Dachshund Club, the Dandie Dinmont Terrier Club, the English Setter Club, the Gamekeepers' Association of the United Kingdom, the International Gun Dog League, the Irish Terrier Club, the Irish Wolfhound Club, the St Bernard Club, the National Terrier Club, the Pomeranian Club, the Spaniel Club, the Scottish Terrier Club and the Toy Bulldog Club have done good work in keeping the claims of the breeds they represent before the dog- owning public and encouraging the breeding of dogs to type. Each club has a standard of points; some hold their own shows; while others issue club gazettes. All this has been brought about by the establishment of a show for sporting dogs at Newcastle-on-Tyne in the summer of 1859.

America can claim a list of over twenty specialist clubs, and in both countries women exhibitors have their independent

associations, Queen Alexandra having become one of the chief supporters of the Ladies' Kennel Association (England), There is a ladies' branch of the Kennel Club, and the corresponding clubs in America are the Ladies' Kennel Association of America and the Ladies' Kennel Association of Massachusetts.

The Gazette is the official organ of the Kennel Club. The Field, however, retains its position as the leading canine journal, the influence of J. H. Walsh (" Stonehenge "), who did so much towards establishing the first dog shows and field trials, having never forsaken it: the work he began was carried on by its kennel editor, Rawdon B. Lee (d. 1908), whose volumes on Modern Dogs (sporting, non-sporting and terriers) are the standard works on dpgs. Our Dogs,

The Kennel Magazine, and The Illustrated Kennel News are the remaining canine journals in England. Several weekly papers published on the continent of Europe devote a considerable portion of their space to dogs, and canine journals have been started in America, South Africa and even India: while apart from Lee's volumes and other carefully compiled works treating on the dog in general, the various breeds have been written about, and the books or monographs have large sales. At the end of 1005 E. W. Jaquet wrote The Kennel Club: a History and Record of its Work, and an edition de luxe of Dogs is edited by Mr Harding Cox; Mr Sidney Turner, the chairman of the Kennel Club committee, edited The Kennel Encyclopaedia, the first number of which was issued in 1907. Dog lovers are now numbered by their tens of thousands, and in addition to shows of their favourites, owners are also liberally catered for in the shape of working trials, for during the season competitions for bloodhounds, pointers, setters, retrievers, spaniels and sheepdogs are held.

Breeds of Dog.

Nothing is known with certainty as to the origin of the vast majority of breeds of dogs, and it is an unfortunate fact that the progressive changes which have been made within comparatively recent times by fanciers have not been accurately recorded by the preservation, in museums or collections, of the actual specimens considered typical at different dates. No scientific classification of the breeds of dogs is at present possible, but whilst the division already given into " sporting " and " non-sporting " is of some practical value, for descriptive purposes it is convenient to make a division into the six groups: — wolf dogs, greyhounds, spaniels, hounds, mastiffs and terriers. It is to be remembered, however, that all these types interbreed freely, and that many intermediate, and forms of wholly doubtful position, occur.

Wolfhounds. — Throughout the northern regions of both hemispheres there are several breeds of semi-domesticated dogs which are wolf-like, with erect ears and long woolly hair. The Eskimo dog has been regarded as nothing more than a reclaimed wolf, and the Eskimo are stated to maintain the size and strength of their dogs by crossing them with wolves. The domestic dogs of some North American Indian tribes closely resemble the coyote; the black wolf dog of Florida resembles the black wolf of the same region; the sheepdogs of Europe and Asia resemble the wolves of those countries, whilst the pariah dog of India is closely similar to the Indian wolf. The Eskimo dog has small, upright ears, a straight bushy tail, moderately sharp muzzle

and rough coat. Like a wolf, it howls but does not bark. It occurs through- out the greater part of the Arctic regions, the varieties in the old and new world differing slightly in colour. They are fed on fish, game and meat. They are good hunters and wonderfully cunning and enduring. Their services to their owners and to Arctic explorers are well known, but Eskimo dogs are so rapacious that it is impossible to train them to refrain from attacking sheep, goats or any small domesticated animals. The Hare Indian dog of the Great Bear Lake and the Mackenzie river is more slender, gentle and affectionate than the Eskimo dog, but is impatient of restraint, and preserves many of the characters of its wild ally, the coyote, and is practically unable to bark.

The Pomeranian dog is a close ally of the Eskimo breed and was formerly used as a wolfdog, but has been much modified. The larger variety of the race has a sharp muzzle, upright

pointed ears, and a bushy tail generally carried over the back. It varies in colour from black through grey to reddish brown and white. The smaller variety, sometimes known as the Spitz, was formerly in some repute as a fancy dog, a white variety with a black tip to the nose and a pure black variety being specially prized. Pomeranians have been given most attention in Germany and Belgium, while the so-called Spitz has been popular in England and America.

The sheepdogs and collies are still further removed from the wolf type, and have the tip of the ear pendent. The tail is thick and bushy, the feet and legs particularly strong, and there is usually a double dew-claw on each hind limb. The many varieties found in different countries have the same general characters. The bark is completely dog-like, and the primitive hunting instincts have been cultivated into a marvellous aptitude for herding sheep and cattle. The training takes place during the first year, and the work is learned with extreme facility. The Scotch collie is lighter and more elegant, and has a sharper muzzle. Since it became popular as a pet dog, its appearance has been greatly improved, and whilst it has lost its old sullen concentration, it has retained unusual intelligence and has become playful and affectionate. The wolfdogs all hunt chiefly by scent.

Greyhounds. — These are characterized by slight build, small ears falling at the tips, elongated limbs and tails and long narrow muzzles. They hunt entirely by sight, the sense of smell being defective. The English greyhound is the most conspicuous and best-known member of the group, and has been supposed to be the parent

of most of the others. The animal is thoroughly adapted for extreme speed, the long, rat-like tail being used in balancing the body in quick turns. The favourite colour is a uniform sandy, or pale grey tone, but characters directly related to capacity for speed have received most attention. The Italian greyhound is a miniature greyhound, still capable of considerable speed but so delicate that it is almost unable to pull down even a rabbit, and is kept simply as a pet. The eyes are large and soft, and a golden fawn is the colour most prized. The Scotch deer- hound is a larger and heavier variety of the English greyhound, with rough and shaggy hair. It has been used both for deer stalking and for coursing, and several varieties exist. The Irish wolfhound is now extinct, but appears to have been a powerful race heavier than the deerhound but similar to it in general characters. Greyhounds have been bred from time immemorial in Eastern Europe and Western Asia, while unmistakable representatives are figured on the monuments of ancient Egypt. The existing Oriental varieties are in most cases characterized by silky hair. The hairless dogs of Central Africa are greyhounds employed chiefly in hunting antelopes, and there are somewhat similar varieties in China, Central and South America.

The whippet is a local English dog, used chiefly in rabbit coursing and racing, and is almost certainly a cross between greyhounds and terriers.

The lurcher is a dog with the general shape of a greyhound, but with a heavier body, larger ears and rougher coat. Lurchers are cross-bred dogs, greyhounds and sheepdogs, or deerhounds and collies, being the parents.

Spaniels are heavily built dogs with short and very wide skulls rising suddenly at the eyes. The brain is relatively large and the intelligence high. The muzzle is short, the ears large and pendent, the limbs relatively short and heavy, and the coat thick and frequently long. It is supposed, from their name, that they are of Spanish origin. They may be divided into field spaniels, water spaniels and the smaller breeds kept as pets. Field spaniels are excellent shooting dogs, and are readily trained to give notice of the proximity of game. The Clumber, Sussex, Norfolk and Cocker breeds are the best established. The Clumber is long, low and heavy. It is silent when hunting, and has long ears shaped like vine leaves. The ground colour of the coat is white with yellow spots. The Sussex is a lighter, more noisy animal, with a wavy, golden coat. The Cockers are smaller spaniels, brown, or brown-and-white in the Welsh variety, black in the more common modern English form. The head is short,

and the coat silky and wavy. Of the water spaniels the Irish breeds are best known; They are relatively large dogs, with broad splay feet, and silky oily coats.

The poodle is probably derived from spaniels, but is of slighter, more graceful build, and is pre-eminent even among spaniels for intelligence. The best known pet spaniels are the King Charles and the Blenheim, small dogs with fine coats, probably descended from Cockers.

Setters owe their name to their having been trained originally to crouch when marking game, so as to admit of the net with which the quarry was taken being drawn over their heads. Since the general adoption of shooting in place of netting or bagging game, setters have been trained to act as pointers. They are pre-eminently dogs for sporting purposes, and special strains or breeds adapted to the peculiarities of different kinds '. of sporting have been produced. Great Britain is probably the country where setters were first produced, and as early as the 17th century spaniels were used in England as setting dogs. It is probable that pointer blood was introduced in the course of shaping the various breeds of setter. The English setter should have a silky coat with the hair waved but not curly; the legs and toes should be hairy, and the tail should have a bushy fringe of hairs hanging down from the dorsal border. The colour varies ;much, ranging according to the strains, from black-and-white through orange-and-white and liver-and-white to pure white, whilst black, white, liver, and red or yellow self-coloured setters are common. The Irish setter is red without trace of black, but occasionally flecked with white. The Gordon setter, the chief Scottish variety, is a heavier animal with coarser hair, black-and- tan in colour. The Russian setter has a woolly and matted coat.

The retriever is a large dog used for retrieving game on land, as a water spaniel is used for the same purpose in water. The breed is almost certainly derived from water-spaniels, with a strong admixture of Newfoundland blood. The colour is black or tan, and the hair of the face, body and tail is close and curly, although wavy-coated strains exist.

The Newfoundland is simply an enormous spaniel, and shows its origin by the facility with which it takes to water and the readiness

with which it mates with spaniels and setters. It has developed a definite instinct to save human beings from drown- ing, this probably being an evolution of the retrieving instinct of the original spaniels. The true Newfoundland is a very large dog and may reach 31 in. in height at the shoulder. The coat is shaggy and oily, and is preferred with as little white as possible, but the general black coloration may have rusty shades. The eyes and ears are relatively small, and the forehead white and dome-shaped, giving the face the well-known appear- ance of benignity and intelligence. Although these dogs were originally brought to Great Britain from Newfoundland and are still bred in the latter country, greater size, perfection and intelligence have been attained in England, where Newfound- lands for many years have been the most popular large dogs. They are easily taught to retrieve on land or water, and their strength, intelligence and fidelity make them specially suitable as watchdogs or ■ guardians. The Landseer Newfoundland is a black and white variety brought into notice by Sir Edwin Landseer, but the exact ancestry of which is unknown. The Labrador Newfoundland is a smaller black variety with a less massive head. It occurs both in Newfoundland and England, and has been used largely in producing crosses, being almost certainly one parent of the retriever.

The St Bernard is a large breed taking its name from the monastery of Mount St Bernard in the Alps, and remarkable for high intelligence and use in rescuing travellers from the snow. The origin of the breed is unknown, but undoubtedly it is closely related to spaniels. The St Bernard attains as great a size as that of any other breed, a fine specimen being between 60 and 70 in. from the tip of the nose to the root of the tail. The colour varies, but shades of tawny-red and white are more frequent than in Newfoundlands. In the rough-haired breed the coat is long and wavy, but there exists a smooth breed with a nearly smooth coat.

Hotinds.— These ate large dogs, hunting by smell, with massive structure, large drooping ears, and usually smooth coats, without fringes of hair on the ears, limbs or tail. The bloodhound is probably the stock from which all the English races of hounds have been derived. The chief character is the magnificent head, narrow and dome-like between the huge pendulous ears, and with transverse puckers on the forehead and between the eyes. The prevailing colour is tan with large black spots. Blood- hounds, or, as they are sometimes termed, sleuthhounds, have been employed since the time of the Romans in pursuing and hunting down human beings, and a small variety, known as the Cuban bloodhound, probably of Spanish origin, was used to track fugitive negroes in slaveholding times.

Bloodhounds quest slowly and carefully, and when they lose the scent cast backwards until they recover the original trail and make a fresh attempt to follow it.

Staghounds are close derivatives of the bloodhound, and formerly occurred in England in two strains, known respectively as the northern and southern hounds. Both breeds were large and heavy, with pendulous ears and thick throats with dewlaps. These strains seem to be now extinct, having been replaced by foxhounds, a large variety of which is employed in stag-hunting.

The modern English foxhound has been bred from the old northern and southern hounds, and is more lightly built, having been bred for speed and endurance. The favourite and most common colour is blaek-white-and-tan. The ears are usually artificially clipped so as to present a rounded lower margin. Their dash and vigour in the chase is much greater than that of the bloodhound, foxhounds casting forwards when they have lost the trail.

Harriers are a smaller breed of foxhounds, distinguished by their pointed ears, as it is not the custom to trim these. They are used in the pursuit of hares, and, although they are capable of very fast runs, have less endurance than foxhounds, and follow the trail'with more care and deliberation.

Otterhounds are thick, woolly harriers with oily underfuf. They are savage and quarrelsome, but are naturally excellent water-dogs.

Beagles are small foxhounds with long bodies and short limbs. They have a full bell-like cry and great cunning and perseverance in the tracking of hares and rabbits. They are relatively slow, and are followed on foot. ■

Turnspits were a small, hound-like race of dogs with long bodies, pendulous ears, out-turned feet and generally black-and-tan coloration. They were employed as animated roasting jacks, turning round and round the wire cage in which they were confined, but with the employment of mechanical jacks their use ceased and the race appears to be extinct.

Basset hounds are long and crooked-legged dogs, with pendu- lous ears. They appear to have been produced in Normandy and the Vendee, where they were employed for sporting purposes, and originally were no very definite breed. In comparatively recent times they have been adopted by English fanciers, and a definite strain

with special points has been produced.

The dachshund, or badger hound, is of German origin, and like the basset hound was originally an elongated distorted hound with crooked legs, employed in baiting and hunting badgers, but now greatly improved and made more definite by the arts of the breeder. The colour is generally black-and-tan or brownish, the body is-extremely long and cylindrical; the ears are large and pendulous, the legs broad, thick and twisted, with everted paws. The coat is short, thick and silky, and the tail is long and tapering.

The pointers, of which there are breeds slightly differing m most European countries, are descendants of the foxhound which have been taught to follow game by general body scent, not by tracking, nose to the ground, the traces left by the feet of the quarry, and, on approaching within sight of the game, to stand rigid, " pointing " in its direction. The general shape is like that of the foxhound, but the build is lighter and better knit, and the coat is soft, whilst white and spotted colorations are preferred. Pointers are employed to mark game for guns, and are especially useful in low cover such as that afforded by turnip fields.

DOG

Plate III.

BKJ B ffiWˆMBPPtSgWMˆˆflM

m

-JSˆPi

f:

LˆJ 11 JˆBBMB Bw

BORZOI.

Si

ˆ«lw

GREYHOUND.

DEERHOUXD.

BLOODHOUND.

(

U

AUSTRALIAN' TERRIER.

VLU. 3 ,f

SKYE TERRIER. SCOTCH TERRIER.

(From Photos by Bmvden Bros.) TYPICAL SPORTING DOGS.

BEDLINGTON TERRIER.

Plate IV.

DOG

Photo, Btnvden B;

•

f' * ^

POMERANIAN.

ITALIAN GREYHOUND.

Photo, Bo-oslon tiros.

TOY BULL TERRIER.

Photo. Kmilim Bras.

TOY SPANIEL.

BLENHEIM.

mi

Photo, Titos. Fall. IA1TLLON.

Photo, Borodai Bros.

SCIIIPPF.RKE.

W>

t%»i

*Photo, BolDdenBro**

MALTESE.

rt

Photo, Thos. Foil.

TOY BLACK AND TAN.

Photo, Borden Bros.

YORKSHIRE TERRIER.

PUG.

Photo, Btnoden Bros.

GRIFFON.

Photo, Bowdett Bros.

JAPANESE.

Photo, Bo-Men Bros.

PEKINGESE.

TYPICAL TOY DOGS.

DOGE

379

The Dalmatian or coach dog (sometimes called the plum- pudding dog) is a lightly built pointer, distinguished by its spotted coloration, consisting of evenly disposed circular black spots on a white ground. The original breed is said to have been used as a pointer in the country from which it takes its name, but has been much modified by the fancier's art, and almost certainly the original strain has been crossed with bull-terriers.

Mastiffs are powerful, heavily built dogs, with short muzzles, frequently protruding lower jaws, skulls raised above the eyes, ears erect or pendulous, pendulous upper lips, short coats and thin tails.

The English mastiff is a huge and powerful dog with pendent ears but short and silky coat. Fawn and brindle are the colours preferred. The Tibetan mastiff is equally powerful, but has still larger pendent ears, a shaggy coat and a long brush-like tail. Mastiffs are employed for fighting or as watchdogs, and for the most part are of uncertain temper and not high intelligence.

The bulldog is a small, compact but extremely heavily built animal of great strength, vigour and tenacity. The lower jaw should be strongly protruding, the ears should be small and erect, the forehead deeply wrinkled with an indentation between the eyes, known as the " stop." The coat should be thick, short and very silky, the favourite colours being white and white marked with brindle. Bulldogs were formerly employed in bull-baiting, and the tenacity of their grip is proverbial. Their ferocious appearance, and not infrequently the habits of their owners, have given this breed a reputation for ferocity and low intelli- gence. As puppies, however, bulldogs are highly intelligent and unusually docile and affectionate, and if well trained retain throughout life an unusual sweetness of disposition, the universal friendliness of which makes them of little use as guardians.

The German boarhound is one of the largest races of dogs, originally used in Germany and Denmark for hunting boars or deer, but now employed chiefly as watchdogs. The build is rather slighter than that of the English mastiff, and the ears are small and carried erect.

The Great Dane is somewhat similar in general character, but is still more gracefully built, with slender limbs and more pointed muzzle. The ears, naturally pendent at the tips, are always cropped. It is probable that the strain contains greyhound blood.

The bull-terrier, as its name implies, is a cross between the bulldog and the smooth terrier. It is a clever, agile and powerful dog, extremely pugnacious in disposition.

The pugdog is a dwarf race, probably of mastiff origin, and kept solely as a pet. The Chinese pug is slender legged, with long hair and a bushy tail.

Terriers are small dogs of agile and light build, short muzzles, and very highly arched skulls. The brains are large, and the intelligence and educability extraordinarily high. The number of breeds is very large, the two extreme types being the smooth fox-terrier with compact shape, relatively long legs, and the long- bodied, short-legged Skye terrier, with long hair and pendent ears.

All the well-known breeds of dogs are highly artificial and their maintenance requires the constant care of the breeder in mating, and in rejecting aberrant progeny. The frequency with which even the most highly cultivated strains produce degenerate offspring is notorious, and is probably the reason for the profound belief in telegonic action asserted by most breeders. When amongst the litter of a properly mated, highly bred fox-terrier, pups are found with long bodies and thick short legs and feet, breeders are disposed to excuse the result by the supposition that the bitch has been contaminated by some earlier mating. There is ample evidence, however, that such departures from type are equally frequent when there was no possibility of earlier mismating (see Telegony).

Glossary of Points of the Dog. Apple Head. A rounded head, instead of flat on top. Blaze. A white mark up the face. Brisket. The part of body in front of the chest. Brush. The tail, usually applied to sheepdogs. Butterfly Nose. A spotted nose.

Button Ear. Where the tip falls over and covers the orifice. Cat Foot. A short round foot, knuckles high and well developed.

Cheeky. When the cheek bumps are strongly defined.

Chest. Underneath a dog from brisket to belly.

Chops. The pendulous lip of the bulldog.

Cobby. Well ribbed up, short and compact in proportion.

Couplings. Space between tops of shoulder blades and tops of hip

joints. : Cow Hocks. Hocks that turn in.

Dew Claw. Extra claw, found occasionally on all breeds. Dewlap. Pendulous skin under the throat. Dish Faced. When nose is higher than muzzle at the stop. Dudley Nose. A yellow or flesh-coloured nose. Elbow. The joint at the top of the forearm. Feather. The hair at the back of the legs and under the tail. Flag. A term for the tail, applied to a setter. Flews. The pendulous lips of the bloodhound and other breeds. ‘ Forearm. Part of foreleg extending from elbow to pastern. Frill. A mass of hair on the chest, especially on collies. Hare Foot. A long narrow foot, carried forward. Haw. Red inside eyelid, shown in bloodhounds and St Bernards. Height. Measured at the shoulder, bending head gently down. Hocks. The hock joints. Hucklebones. Tops of the hip joints. Knee. The joint attaching fore-pastern and forearm. Leather. The skin of the ear.

Occiput. The projecting bone or bump at the back of the head. Overshot. The upper teeth projecting beyond the under. Pastern. Lowest section of leg, below the knee or hock. Pig Jaw. Exaggeration of overshot. Pily. A term applied to soft coat.

Rose Ear. Where the tip of ear turns back, showing interior. Septum. The division between the nostrils.

Smudge Nose. A nose which is not wholly black, but not spotted. Stifles. The top joints of the hind legs.

Stop. The indentation below the eyes, most prominent in bulldogs. Tulip Ear. An erect or pricked ear.

Undershot. The lower teeth projecting in front of the upper ones.

(W. B.; P. CM.)

DOGE (a modified form of the Ital. duca, Lat. dux, a leader; or duke), the title of the chief magistrate in the extinct republics of Venice and Genoa.

In Venice the office of doge was first instituted about 700 John the Deacon, referring to this incident in his Chronicon Venetum, written about 1000, says " all the Venetian cities {omnes Venetiae) determined that it would be more honourable henceforth to be under dukes than under tribunes." The result was that the several tribunes were replaced by a single official who was called a doge and who became the head of the whole state; The first doge was Paolo Lucio Anafesto, and some authorities think that the early doges were subject to the authority of the emperors of Constantinople, but in any case this subordination was of short duration. The doge held office for life and was regarded as the ecclesiastical, the civil and the military chief; his duties and prerogatives were not defined with precision and the limits of his ability and ambition were practically the limits of his power. About 800 his independence was slightly diminished by the appointment of two assistants for judicial work, but these officers soon fell into the background and the doge acquired a greater and more irresponsible authority. Concurrently with this process the position was entrusted to members of one or other of the powerful Venetian families, while several doges associated a son with themselves in the ducal office. Matters reached a climax after the fall of the Orseole family in 1026. In 1033, during the dogeship of Dominico Flabianico, this tendency towards a hereditary despotism was checked by a law which decreed that no

doge had the right to associate any member of his family with himself in his office, or to name his successor. It was probably at this time also that two councillors were appointed to advise the doge, who must, moreover, invite the aid of prominent citizens when discussing important matters of state. In 1172 a still more important change was introduced. The ducal councillors were increased in number from two to six; universal suffrage, which theoretically still existed, was replaced by a system which entrusted the election of the doge to a committee of eleven, who were chosen by a great council of 480 members, the great council being nominated annually by twelve persons. When a new doge was chosen he was presented to the people with the formula "this is your doge, if it please you." Nominally the citizens confirmed the election, thus maintaining as a constitutional fiction the right of the whole people to choose their chief magistrate. Five years

later this committee of eleven gave way to a committee of forty who were chosen by four persons selected by the great council. After the abdication of Doge Pietro Ziani in 1229 two com- missions were appointed which obtained a permanent place in the constitution and which gave emphatic testimony to the fact that the doge was merely the highest servant of the community. The first of these commissions consisted of five Correttori delta promissione ducale, whose duty was to consider if any change ought to be made in the terms of the oath of investiture {promissione) administered to each incoming doge, this oath, which was prepared by three officials, being a potent factor in limiting the powers of the doge. The second commission con- sisted of three inquisitori sopra il doge defunto, their business being to examine and pass judgment upon the acts of a deceased doge, whose estate was liable to be mulcted in accordance with their decision. In consequence of a tie at the election of 1 2 29 the number of electors was increased from forty to forty-one. The official income of the doge was never large, and from early times many holders of the office were engaged in trading ventures. One of the principal duties of the doge was to celebrate the symbolic marriage of Venice with the sea. This was done by casting a precious ring from the state ship, the " Bucentaur," into the Adriatic. In its earlier form this ceremony was instituted to commemorate the conquest of Dalmatia by Doge Pietro Orseole

II. in 1000, and was celebrated on Ascension day. It took its later

anqj more magnificent form after the visit of Pope Alexander

III. and the emperor Frederick I. to Venice in 1177.

New regulations for the elections of the doge were introduced in 1268, and, with some modifications, these remained in force until the end of the republic. Their object was to minimize as far as possible the influence of the individual families, and this was effected by a very complex machinery. Thirty members of the great council, chosen by lot, were reduced, again by lot, to nine; the nine chose forty and the forty were reduced by lot to twelve, who chose twenty-five. The twenty-five were reduced by lot to nine and the nine elected forty-five. Then the forty-five were reduced by lot to eleven, and the eleven chose the forty-one, who actually elected the doge. As the oligarchical element in the con- stitution developed, the more important functions of the ducal office were assigned to other officials, or to administrative boards, and he who had once been the pilot of the ship became little more than an animated figurehead, properly draped and garnished. On state occasions he was surrounded by an increasing amount of ceremonial, and in international relations he had the status of a sovereign prince of the first rank. But he was under the strictest surveillance. He must wait for the presence of other officials before opening despatches from foreign powers; he was for- bidden to leave the city and was not allowed to possess any property in a foreign land. To quote H. F. Brown, " his pomp was splendid, his power limited; he appears as a symbol rather than as a factor in the constitution, the outward and visible sign of the impersonal oligarchy." The office, however, was main- -tained until the closing days of the republic, and from time to time it was held by men who were able to make it something more than a sonorous title. The last doge was Lodovico Manin, who abdicated in May 1797, when Venice passed under the power of Napoleon.

In Genoa the institution of the doge dates from 1339. At first he was elected without restriction and by popular suffrage, holding office for life; but after the reform effected by Andrea Doria in 1528 the term of his office was reduced to two years. At the same time plebeians were declared ineligible, and the appoint- ment of the doge was entrusted to the members of the great and the little councils, who employed for this purpose a machinery almost as complex as that of the later Venetians. The Napoleonic Wars put an end to the office of doge at Genoa.

See Cecchetti, II Doge di Venezia (1864) ; Musatti, Storia delta

promissione ducale (Padua, 1888); and H. F. Brown, Venice: a Historical Sketch (1893).

DOG-FISH, a name applied to several species of the smaller sharks, and given in common with such names as hound and beagle, owing to the habit these fishes have of pursuing or hunt-

ing their prey in packs. The small-spotted dog-fish or rough hound (Scyllium canicula) and the large-spotted or nurse hound {Scyllium catulus) are also known as ground-sharks. They keep near the sea bottom, feeding chiefly on .the smaller fishes and Crustacea, and causing great annoyance to the fishermen by the readiness with which they take bait. They differ from the majority of sharks, and resemble the rays in being oviparous. The eggs are enclosed in semi-transparent horny cases, known on the British coasts as " mermaids' purses," and these have tendril- like prolongations from each of the four corners, by means of which they are moored to sea- weed or some other fixed object near the shore, until the young dog-fish is ready to make its exit. The larger of these species attains a length of 4 to 5 ft., the smaller rarely more than 30 in. The picked dog-fish (Acanthias vulgaris, formerly known as Squalus acanthias) is pre-eminently the dog- fish. It is the most abundant of .the British sharks, and occurs in the temperate seas of both northern, and southern hemispheres. It attains a length of 4 ft., but the usual length is 2 to 3 ft., the female, as in most sharks, being larger than the male. The body is round and tapering, the snout projects, and the mouth is placed ventrally some distance from the end of the snout. There are two dorsal fins, each of which is armed on its anterior edge with a sharp and slightly curved spine, hence its name " picked." This species is viviparous, the female producing five to nine young at a birth; the young when born are 9 to 10 in. long and quite similar to the parents in all respects except size. It is gregarious, and is abundant at all seasons everywhere on the British coasts. In 1858 an enormous shoal of dog-fish, many square miles in extent, appeared in the north of Scotland, when, says J. Couch, " they were to be found floating in myriads on the surface of every harbour." They are the special enemies of the fisherman, injuring his nets, removing the hooks from his lines, and spoiling his fish for the market by biting pieces out of them as they hang on his lines. They are however eaten, both fresh and salted, by fishermen, especially on the west coast of England, and they are sold regularly in the French markets.

DOGGER BANK, an extensive shoal in the North Sea, about 60 m. E. of the coast of Northumberland, England. Over its most elevated parts there is a depth of only about six fathoms, but the depth is

generally from ten to twenty fathoms. It is well known as a fishing ground. The origin of the name is obscure ; but the middle Dutch dogger signifies a trawling vessel, and was formerly applied generally to the two-masted type of vessel employed in the North Sea fisheries, and also to their crews (doggermen) and the fish taken (dogger-fish). Off the south end of the bank an engagement took place between English and Dutch fleets in 1781. On the night of the 21st of October 1904 during the Russo- Japanese War, some British trawlers of the Hull fishing fleet were fired upon by vessels of the Russian Baltic fleet under Admiral Rozhdestvensky on its voyage to the Far East, one trawler being sunk, other boats injured, two men killed and six wounded. This incident created an acute crisis in the relations between Russia and England for several days, the Russian version being that they had seen Japanese torpedo-boats, but on the 28th Mr Balfour, the English prime minister, announced that the tsar had expressed regret and that an international commission would investigate the facts with a view to the punishment of any responsible parties. The terms were settled on 25th November, the com- mission being composed of five officers (British, Russian, American and French, and one selected by them), to meet in Paris. On the 22nd of December the four original members, Vice-admiral Sir Lewis Beaumont, Vice-admiral Kaznakov (afterwards replaced by Vice-admiral Dubassov), Rear-admiral Davis and Vice-admiral Fournier, met and chose Admiral Baron von Spaun (Austria- Hungary) as the fifth. Their report was issued on the 25th of February 1 905. While recognizing that the information received as to a possible attack led the admiral to mistake the trawlers for the enemy, the majority of the commissioners held Rozhdestvensky responsible for the firing and its results, and "being of opinion that there were no torpedo-boats either among the trawlers nor anywhere near " concluded that " the opening of fire was not justifiable," though they absolved him and his squadron from

discredit either to their " military qualities " or their " humanity." The affair ended in compensation being paid by the Russian government.

DOGGETT (or Dogget), THOMAS (d. 1721), English actor, was born in Dublin, and made his first appearance in London in 1601 as Nincompoop in D'Urfey's Love for Money. In this part, and as Solon in the same author's Marriage-hater matched, he gained the favour

of the public. He followed Betterton to Lincoln's Inn Fields, creating the part of Ben, especially written for him, in Congreve's Love for Love, with which the theatre opened (1695); and next year played Young Hobb in his own The Country Wake. He was associated with Cibber and others in the management of the Haymarket and Drury Lane, and he continued to play comedy parts at the former until his retirement in 17 13. Doggett is highly spoken of by his contemporaries, both as an actor and as a man, and is frequently referred to in The Tatler and Spectator. It was he who in 1715 founded the prize of " Doggett's Coat and Badge " in honour of the house of Hanover, " in commemoration of his Majesty King George's happy Accession to the Brittish Throne." The prize was a red coat with a large silver badge on the arm, bearing the white horse of Hanover, and the race had to be rowed annually on the 1st of August on the Thames, by six young watermen who were not to have exceeded the time of their apprenticeship by twelve months. Although the first contest took place in 17 15, the names of the winners have only been preserved since 1791. The race is still rowed each year, but under modified conditions.

See Thomas Doggett, Deceased (London, 1908).

DOGMA (Gr. bbyixa, from 86ictiv, to seem; literally " that which seems, sc. good or true or useful " to any one), a term which has passed through many senses both general and technical, and is now chiefly used in theology. In Greek constitutional history the decision of — •" that which seemed good to " — an assembly was called a Soyfia. (i.e. decree), and throughout its history the word has generally implied a decision, or body of decisions or opinions, officially adopted and regarded by those who make it as possess- ing authority. As a technical term in theology, it has various shades of meaning according to the degree of authority which is postulated and the nature of the evidence on which it is based. Thus it has been used broadly of all theological doctrines, and also in a narrower sense of fundamental beliefs only, confession of which is insisted upon as a term of church communion. By sceptics the word " dogma " is generally used contemptuously, for an opinion grounded not upon evidence but upon assertion; and this attitude is so far justified from the purely empirical standpoint that theological dogmas deal with subjects which, by their very nature, are not susceptible of demonstration by the methods of physical science. Again, popularly, an unproved ex cathedra statement of any kind is called " dogmatic," with perhaps an insinuation that it is being obstinately adhered to without, or beyond, or in defiance of, obtainable evidence. But again to " dogmatize " may mean simply to assert,

instead of hesitating or suspending judgment.

Three pre-Christian or extra-ecclesiastical usages are recorded by a half-heretical churchman, Marcellus of Ancyra (in Eusebius of Caesarea, Contra Marcellum, i. 4); — words which Adolf Harnack has placed on the title-page of his larger History of Dogma. First there is a medical usage — empirical versus dogmatic medicine. On this old-world technical controversy we need not dwell. Secondly, there is a philosophical usage (e.g. Cicero, Seneca and others). First principles — speculative or practical — are Soyˆara, Lat. decreta, scita or placita. The strongest state- ment regarding the inviolability of such dogmas is in Cicero's Academics, ii. chap. 9. But we have to remember that this is dialogue; that the speaker, Hortensius, represents a more dogmatic type of opinion than Cicero's own; that it is the maxims of " wisdom," not of any special school, which are described as unchangeable. 1 Marcellus's third type of dogma is

1 Sextus Empiricus (c. a.d. 240) denounces all forms of dogmatism, even perhaps the scepticism of definite denial. Blaise Pascal and Immanuel Kant, among others, have Sextus's grouping in mind when they oppose themselves to "dogmatism" and "scepticism"

legal or political, the decree (says Marcellus) of the legislative assembly; but it might also be of the emperor (Luke ii. 1; Acts xvii. 7), or of a church gathering (Acts xvi. 4), or of Old Testa- ment law; so especially in Philo the Jew, and in Flavius Josephus (even perhaps at Contra Apionem, i. 8).

While the New Testament knows only the political usage of S6yixa, the Greek Fathers follow one which is more in keeping with philosophical tradition. With few and early exceptions, such as we may note in the Epistle of pothers. Barnabas, chap, i., they confine the word to doctrine. Either dogma (sing.) or dogmas (plural) may be spoken of. Actually, as J. B. Lightfoot points out, the best Greek com- mentators among the Fathers are so dominated by this new usage, that they misinterpret Col. ii. 14 (20) and Eph. ii. 15 of Christian doctrines. Along with this goes the fundamental Catholic view of " dogmatic faith " — the expression is as old as Cyril of Jerusalem (died 386), if not older — according to which it consists in obedient assent to the voice of authority. All doctrines are " dogmas " to the Greek Fathers, not simply the central teachings of their system, as with the philosophers. Very noteworthy is Cyril of Jerusalem's fourth Catechetical Discourse on the " Ten Dogmas " (we might render " Ten Great Doctrines "). The figure ten may be taken from the commandments, 2 as in Gregory Nazianzen's later, and more

incidental, decalogue of belief. In any case, Cyril marks out the way for the subsequent division of the creeds into twelve or fourteen " articles " or heads of belief (see below). In saying that all doctrines rank as " dogmas " during the Greek period, we ought to add a qualification. They do so, in so far as they are held to be of authority. Clement of Alexandria or Origen would not call his speculations dogmas. Yet these audacious spirits start from a basis of authority, and insist upon opdoTonia doyiMaruv (Stromata, vii. 763). The " dogma " or " dogmas " of heretics are frequently mentioned by orthodox writers. There can be no question of confining even orthodox " dogma " to conciliar decisions in an age when definition is so incomplete; still, we do meet with references to the Nicene " dogma " (e.g. letter in Theodoret, H.E. ii. 15). But dogma is not yet technical for what is Christian or churchly. The word which emerges in Greek for that purpose is " orthodox," " orthodoxy," as in John of Damascus (d. 760), or as in the official title still claimed by the Holy Orthodox Church of the East.

*Latin Fathers borrow the word " dogma," though sparingly, and employ it in all the Greek usages. Something novel is added by Jerome's phrase (in the De viris illustribus, cc. xxxi., cix.) ecclesiastica dogmata, — found again in the Fathers. title of the treatise now generally ascribed to Gennadius, and occurring once more in another writer of southern Gaul. 3 The phrase is a serviceable one, contrasting church teachings with heretical " dogmas." But the main Latin use of dogma in patristic times is found in Vincent of Lerins (d. c. 450) in his brief but influential Commonitorium; again from southern Gaul. Thereafter the usage gradually drops. In Thomas Aquinas * it does not once occur. On the other hand Thomas has his own technical name — doctrine (sing.) or rather sacra doctrina; and this expression holds its ground, though the usage of Abelard, Theologia, was destined to an even more important place (see Theology). Another medieval usage of importance is the division of the creed into twelve articles corresponding to the number of the apostles, who, according to a legend already found in Rufinus (d. 410) On the Apostles' Creed, composed that formula by contributing each a single sentence.*

alike. A new shade of condemnation for dogmas as things merely assumed comes to be noticeable here, especially in Kant.

2 But there is a variant reading — eleven — supported by a different arrangement.

3 Quoted by C. H. Turner in Journal of Theol. Studies (Oct. 1906,

and cf. Oct. 1905). G. Elmenhorst's statement, that Musanus and Didymus in an earlier age wrote treatises with the name De ecclesiasticis dogmatibus, seems a plain blunder, if we compare Jerome's Latin with Eusebius' s Greek.

- *" So viel uns bekannt " — J. B. Heinrich, " Dogma," in Wetzer and Welte's (Catholic) Kirchenlexihon.*

Medieval usages.

3 8"2

DOGMA

The He- formation,

Article.

The division is found applied also to the" Nicene-Constantinopolitan " creed, both in East and West. Sometimes fourteen articles are detected (in either creed), 7+7; the sacred number twice over. 1

The Reformation set up a new idea of faith, or recurred to one of the oldest of all. Faith was not belief in authoritative teach- ings; it was trust in the promises of God and in Jesus Christ as their fulfilment. But the Protestant view was apt to seem intangible, and the influence of the learned tradition was strong — for a time, indeed, doctrine was more cultivated among Protestants than in the Church of Rome. The result was a structure which is well named the Protestant scholasticism. The new view of faith is bracketed with the old, and practically neutralized by it; as was already the case in Melanchthon's theological definitions in the 1552-1553 edition of Loci Communes, also printed in other works by him. This brings back again the Catholic view of " dogmatic faith."

The word " article " for a time holds the field. Pope Leo X. in 1520 condemns among other propositions of Martin Luther's the twenty-seventh — ■" Certum est in manu, Papae, aut ecclesiae, prorsusnon essestatuere articulos fidei (imo nee leges merum seu bonorum operum)." The Augsburg Confession (1530) is divided into numerous "articles," while Luther's Lesser Catechism gathers Christianity under three "articles " — Creation, Redemption, Sanctification. Where moderns would speak of the " doctrine " of this or that, Lutherans especially, but also churchmen of other communions, wrote upon this or that " article." Nikolaus Hunnius (&ao7ce)/as, &c, 1626), A. Quenstedt (c. 1685) and others — in a controversial interest, to

blacken the Calvinists still more — distinguished which articles were " fundamental." Modern Lutheranism (G. Thomasius, Dogmengeschichte, 1874-1876, influenced by T. F. D. Kliefoth 1839) speaks rather of "central dogmas"; 2 and the Roman Catholic J. B. Heinrich 3 is willing to speak of "fundamental dogmas," those which must be known for salvation; those for which " implicit " faith does not suffice. When Addis and Arnold's Catholic Dictionary denounces the conception of central dogmas,- what they desire to exclude as uncatholic is the belief that dogmas lying upon the circumference may be questioned or perhaps denied. 4 This suggests the great ambiguity both in Roman Catholic and Protestant writers of the 17th century as to the relation between " articles " and " dogmas." Many writers in each communion felt that an " article " is a higher thing. Others, in each communion, made the identification absolute. Perhaps the Roman theologians of that age were more concerned than the Protestants to draw a line round necessary truths. This attempt was made by Dr Henry Holden {Div. Fidei Analysis, 1652) in connexion with the word " articles. 6 "

Another term to be considered is decretum, the old Latin equivalent for dojfia. Another of Luther's assertions branded by the pope in 1520 — the twenty-ninth— claimed liberty judicandi conciliorum decreta. On the other hand, the Augsburg Confession protests its loyalty to the decretum of Nice. What Protestantism saw in the distant past, Trent naturally recognized in the present. Every one of its own find- ings is a decretum — except five, among the sacramental chapters, each of which is headed doctrina. Holden again quotes the (indefinite) decretum of the Council of Basel regarding the Immaculate Conception.

The word " dogma " was however to revive, and, with more or less success, to differentiate itself from " doctrine." Early writers of the modern period, Protestant or Roman Catholic, use

1 See G. Hoffmann, Fides implicita, vol. i. (1903), pp. 82, &c. ; and cf. the 17th-century creed of Bishop Mogilas adopted by the whole Greek Church.

2 A. Schweizer's Protestant Central Dogmas (1854-1856) was an historical study of Reformed, i.e. Calvinist-ZwingUan theology.

3 ". Dogma," &c, in Wetzer and Welte's Kirchenlexikon.

4 The distinction of pure and mixed articles — those of revelation and those taught in common by revelation and natural theology —

reappears in modern Roman Catholic theology as a distinction between pure and mixed dogmas.

6 Luther's Schmalkalden Articles and the Thirty-Nine Articles of the Church of England should also be mentioned.

*it frequently of heretics; thus the Augsburg Confession protests that the Protestants have carefully avoided nova dogmata. A Roman Catholic writer, Jan Driedo of Louvain, revives the reference to Ecclesiastica dogmata— De ■ D °2 mata ecclesiasticis scripturis et dogmatibus (1533) — using use< the word, though not exclusively yet emphatically, of teachings extra canonem scripturae sacrae. Philip Melanchthon's preface to his Loci communes (ed. 1535) protests that he has not expressed himself de ullo dogmate — on any point of doctrine — ■ without careful consideration of what has been said before him. Richard Hooker (d. 1600) in bk. viii. of Eccl. Polity (pub. 164*8 or perhaps 1651) quotes Thomas Stapleton, the Roman Catholic {De principiis doctrinalibus fidei, 1579), on the royal right or duty to enforce " dogmas," and adds a gloss of his own — " very articles of the faith,"- — a surprising and probably isolated usage. Many identified Dogmas and Articles by levelling down or broadening out; but Hooker levels up. The statement of the Council of Trent (1 545-1 562) may be quoted here. The Council will rely chiefly upon Scripture s in reformandis dogmatibus et inslaurandis in ecclesia moribus; the Roman reply to the two sets of arliculi of Augsburg, and the Roman counterpart to the (later) Protestant assertion that the Bible 7 is the "only rule of faith and practice." At Trent, therefore, once more, dogma means doctrine. It still means " doctrine " when the collected decreta of Trent bear on their title-page (1564) reference to an Index dogmatum et reformations; but here " dogma " is already verging towards the narrower and more precise sense— truth de- fined by church authority. In other words, it is already edging away from its identification with (all or any) doctrines. On the Protestant side the identity is still clear in the Lutheran Formula of Concord (1577). This creed formulates its relation to Scripture over and over, as the one regula by which all dogmata are to be tried. That characteristic Protestant assertion had been still earlier pushed to the front in " Reformed " creeds, e.g. the First Helvetic Confession (1536), and more notably in the Second*

(1566).

Protestant creeds had clearly affirmed that nothing possessed authority which was not in Scripture: in a short time, Protestant theologians — following an impulse common to all „ „ … Christian

communions — define more sharply the ,- a Pro- identity of what is authoritative with the letter of testaat Scripture, and call these entire contents dogmas^ Here scboIas – then, under Protestant scholasticism (Lutheran and Reformed), we have the first perfectly definite conception of dogma, and the most definite ever reached. Dogma is the whole text of the Bible, doctrinal, historical, scientific, or what not. Thus dogma is revealed and is infallibly true. Dogma is doctrine, viz. that body of doctrines and related facts which God Himself has propounded for dogmatic faith. Every true dogma, says Johann Gerhard 8 — the most representative figure of Lutheran scholasticism — occurs in plain terms somewhere in Scripture.

Over against these sweeping assumptions and deductions, the Roman Catholic Church had to build up its own statement of the basis of belief. Its early controversialists — like Driedo or Cardinal Bellarmine — meet assertions such as c°th"u Gerhard's with a flat denial. The great dogmas are not, replies. literally and verbally, in the Bible. Along with the Bible we must'accept unwritten traditions; the Council of Trent makes this perfectly clear. But not any and every tradition; only such as the church stamps with her approval. And that raises the question whether the church has not a further part to play? A. M. Fairbairn holds that D. Petavius's great work De theologicis dogmatibus (especially the 1st vol., 1644) made the word " dogma " current for doctrines which were authoritative as formulated by the church. We must keep in mind, however, that the question is not simply one as to the meaning of a word. The equation holds, more firmly than ever; dogma = the contents of

6 That seems to be what is meant.

7 Early Protestantism lived too much in the thought of justification to mark out the boundaries of creed with this scholastic precision.

8 Loci communes (1610-1622), on Interpretation of Sacred Scripture, ix. 149.

faith.: It has to be established on the Roman Catholic side that faith (or dogma; the two are inseparable) deals with divine truths historically revealed long ago but now administered with authority, according to God's will, by the church. The English- man Henry Holden (see above), the Frenchman Veronius (Francois Veron, S.J.,

1575-1649) in his Regie ginirale de la Joy catkolique (1652), the German Philipp Neri Chrismann, 1 in his Regula fidei catholicae et collectio dogmatum credendorum (1702), 2 all work at this task. Dogmas or articles of faith (taken as synonymous) depend upon revelation in Scripture or tradition, as confirmed by the church whether acting in general councils or through the pope (in some undefined way; Holden)— in general councils or by universal consent (Chrismann; of bishops ? the definite Gallican theory?). Veronius is willing to waive the difficult point of church infallibility as the Council of Trent did not define it. Holden insists strongly upon infallibility. Church traditions are infallible; and church dogmas reach us (from the original revelation) through an infallible medium, the Catholic Church, which the Protestants sadly lack. In Chrismann the word " dogma " has superseded the word " article "; Holden uses both, though " article " has the preponderance. All three writers seek to draw a sharp line round what is " of faith." Hence in Chrismann (who is in other respects the most definite of the three) we hˆve a view of dogma almost as clear-cut as that of the Protestant schoolmen. Dogmas are revealed; dogmas are infallible; the church is infallible on dogmas (for this statement he cites Muratori) and on nothing else.

This whole period of theology, Protestant and Roman Catholic, is statical. Men are defining and protecting the positions they have inherited; they do not think of progress. And yet the Roman Catholic Church had upon its hands one great unsettled question — the thesis of the Immaculate Conception of the Virgin. This became the standing type of an assertion which, while favoured by the church and on the very verge of dogma, was yet not a dogma 3 — till the definition came through Pius IX. in 1854. Here then the frontier of dogma had unquestionably moved forward. Its Conception must become dynamic; there was need of some theory of development like J. H. Newman's (1845). It does not happen, however, that the papal definition of 1854 employs the word " dogma "; that honour was withheld from the word until the Vatican decrees of 1870 affirmed the personal infallibility of the pope as divinitus revelatum dogma. With this, one line of tendency in Roman Catholic doctrine reached its climax; the pope and the council use " dogma " in a distinctive sense for what is definitely formulated by authority. But there is another line of tendency. The same council defines not indeed dogma but faith — inseparable from dogma — as 4

(1) revealed, (a) in Scripture or (b) in unwritten tradition, and

(2) taught by the church, (a) in formulated decrees, or (b) in her

ordinary magisterium. This is a correction of Chrismann. Not only does the correction involve the substitution of papal authority for a universal consent of " pastors " and " the faithful "; it also deliberately ranks the unformulated teachings of the church on points of doctrine as no less de fide than those formulated. This amounts to a serious warning against trying to draw a definite line round dogma. The modern Roman Catholic temper must be eager to believe and eager to submit. New dogmas have been precipitated more than once during the 19th century; there may still be others held in solution in the church's teaching. If so, these are likely one day to crystallize into full dogmas; and, even while not yet "declared," they have the same claim upon faith.

Thus there seems to be a measure of uncertainty as to what the Church of Rome now calls " dogma " — only in part relieved by

1 Three writers mentioned in Wetzer's and Welte's Kirchenlexikon.

2 Also quoted as having appeared 1745, but that is an error; he quotes F. A. Blau, On the Rule of Faith (Mainz, 1780). See further the sketch of Chrismann in Allgemeine deutsche Biographie, supplement.

3 G. Perrone, e.g. De immaczdato B. V. Mariae conceptu; an dogmatico decreto definiri possit? (1847). •

4 These divisions and subdivisions are not numbered in the Decrees, as for clearness they have been numbered above.

the distinction between " dogmas strictly " and mere " dogmatic truths." Again, the assertion that the church is infallible upon some questions, not belonging to the area of revelation (properly so-called in Roman Catholic theology), destroys the identification of " dogmas " with " infallible certainties " which we noted both in the Protestant schoolmen and in Chrismann. The identifica- tion of dogma with revelation remains, with another distinction in support of it, between " material dogmas " (all scriptural or traditional truth) and " formal " or ecclesiastically formulated dogmas. 6 On the other hand, there is absolute certainty on a point long disputed. Questions about church authority are henceforth questions about the pope's authority. What he calls heresy, under the sanction of excommunication or that more formal excommunication known as anathema, is heresy. What he finds it necessary to condemn even in milder terms as bad doctrine is infallibily condemned; that is certain, Roman Catholic theologians tell us, though not yet de fide.

Finally we have to glance at a new list of definitions which perhaps in some cases seek more or less to formulate modern Protestant ideas, but which in general represent rather the world of disinterested historical scholarship. That world of the learned offers us non-dogmatic definitions, drawn up from the outside; definitions which do not share the root assumptions either of Catholicism or of post-Reformation Protestant orthodoxy. It might have been best to surrender the term " dogma " to the dogmatists; but few scholars have consented to do so.

1. We may brush aside the view 6 for which J. C. Dbderlein, J. A. A. Tittmann, and more recently C. F. A. Kahnis are quoted. According to this definition, " dogma " means the opinion of some individual theologian of distinction. That might be a conceivable development of usage. It has been said that persons who dislike authority often show great devotion to " authorities "; and the word dogma might make a similar transition. But, in its case, such a usage would constitute a violent break with the past.

2. Though there is no formal definition in the passage, it is worth recording that, towards the end of his Chief End of Revela- tion (1881), A. B. Bruce sharply contrasts " dogmas of theology " with " doctrines of faith." 7 While he manifests no wholesale dislike to doctrine, such as is seen in the Broad Church school, Bruce inverts the Catholic estimate. Dogma stands lowest, not highest. It seems hardly better than a caput mortuum, out of relation to the original faith or the original facts that are held to have given it birth. There is more than a touch of Matthew Arnold in this; though, while Arnold held nothing in religious experience beyond morality to be objectively genuine, Bruce believed in God's "gracious " purpose. 8

3. Much more like Chrismann's vie\r is the " generally accepted position " among Protestant scholars, as its leading representative to-day, F. Loofs, has called it; 9 the doctrine enforced within any one church community is dogma. This definition is significant. It means that historians recognize the peculiar importance of those beliefs which are constitutive of church agreement; and it finds some support from the philo- sophical and political associations of ancient " dogma." . Also Roman Catholic writers could accept the definition in so far as

6 Three zones apparently (1) the church's formal decrees, (2) the church's general teaching, (3) points of revelation which the church may not yet have overtaken. Per contra, much that was only " implicit " in the deposit of faith has become " explicit " in dogma.

(The reader must note that " implicit " is used here in a different sense from that referred to earlier in this article. Here, church dogma has explicated what was implicit in revelation. There, the un- learned accept by implication, i.e. by a general acceptance of church belief and teaching, dogmas they perhaps have never heard of. Both usages are current in Roman Catholic theology.)

6 Or the view of D. Schenkel, that dogma is what is enforced by civil and criminal law.

7 Cf. also preface to 2nd ed. pp. ix., x.

8 Cf. pp. 279, 280; the undogmatic words of religious emoticn are " thrown out," not at " a cloud mistaken for a mountain," but at a " majestic " and " veritable mountain range."

9 See art. " Dogmengeschichte " in HerzOg-Hauck's Realenr.ykl. fur prot. Theol. Cf. also Prof. Loofs's Leitfaden zum StiiA>u.w de> Dogmengeschichte,

their own church's authoritative teachings are concerned. But can a historian separate the opinions which rose to authority in the church from the other opinions which succumbed? Or the accepted modifications of a theory from those which were rejected? Again, can we substitute church authority for that which is always the background of " dogma " as interpreted from inside— divine authority? 1 Or, again, can we say definitely which doctrines are " enforced " in Protestant communions and so are " dogmas "? It has even been asserted by A. Schweizer (Christliche Glaubenslehre nach prot. Grundsatzen, 1863-1872) that Protestantism ought not to speak of dogmas at all, except as things of its imperfect past. 2 And historically it seems plain that — since the age of Protestant scholasticism — there has been nothing in Protestant church life to which the name " dogma " can be assigned, without dropping a good deal of its original connotation. Dogma is no longer 3 held to be of immediate divine authority. Hence Catholic, and scientific or historical, definitions of dogma are on different planes. They never properly meet. 4

4. A. Harnack varies in his usage. He is not prepared to exclude the great medieval pronouncements, or the modern Roman Catholic definitions, from the list of dogmas; but on the whole he prefers to keep in view " one historical species " — Loofs suggests that he ought perhaps rather to say one individual type — that greatest group of Christian dogmas which " was created by the Greek spirit upon the soil of the gospel " (Hist, of Dogma, Eng. tr., vol. i. pp. 17, 21, 22). Thus Harnack agrees with Catholic theologians in holding that, in the fullest sense, there is no dogma except the Catholic. He differs, of course, in holding dogma to be obsolete now. While Protestants, he thinks, have undermined it by a deeper conception of faith, 6 Roman Catholics have come to attach more value to obedience and " implicit belief " than to knowledge; and even the Eastern Church lives to-day

by the cultus more than by the vision of supernatural truth. Again, Harnack gravely differs from Catholic dogmatists in assigning a historical origin to what in their view is essentially divine — supernatural in origin, supernatural even in its declaration by the church. If they do not deny that Greek philosophy has entered into Christian doctrine, they consider it a colourless medium used in fixing the contents of revelation. In all this, Harnack speaks from a point of view of his own. He is no friend of Catholicism or of dogma. Perhaps his detachment makes for clearness of thought; Loofs's friendliness towards dogma, but in a much humbler sense than the Catholic, involves the risk of confusion.

Both Loofs and Harnack contrast with " dogma " the work of individual thinkers, calling the latter " theology." Hence they and other authorities wish to see " History of Dogma " supplemented by " Histories of Theology." Our usual English phrase " History of Doctrine " ignores that distinction.

5. A place must be made for the definition proposed by a philosopher, J. M. E. McTaggart. In Some Dogmas of Religion (1906), he uses " dogma " of affirmations, whether supported by reasoning or merely asserted, if they claim " metaphysical " value, metaphysics being defined as " the systematic study of the ultimate nature of reality." Briefly, a dogma is what claims ultimate, not relative, truth. This agrees with one feature in ordinary literary usage — the contrast between " dogmatizing " and suspending judgment, or taking refuge in conjecture. But it

1 It should be noted that Loofs does not speak merely as a historian. He places himself in a sense within the dogmatic circle by his declara- tion that guidance is to be expected from developments — in a " free Protestant evangelical spirit " — out of the old confessions of the Protestant churches. This belief may be called what Loofs has called Harnack's definition of dogma — individuett berechtigt, and perhaps nur individuell. Others, who hold no less strongly to theological progress by evolution, not revolution, will hesitate to grant that the line of advance passes through the symbolical books.

2 Cf. Dogmatic Theology, and the footnote above.

3 Unless in certain confined circles.

4 When Loofs declares (art. "Dogmengeschichte " in Herzog- Hauck's Realencykl., 1898) that dogma is historically equivalent to regtila fidei, he is in flat contradiction to. the " dogma " of his own church

as stated in the Formula of Concord. See above.

6 Here perhaps Harnack speaks from inside his own type of religious faith ; t>ut not from inside dogma.

ignores another quality marked out in common speech — that in respect of which " dogmatism " is opposed to proof. Also it omits the political or social reference so much insisted on by Loofs and others. There are materials for misunderstanding here.

6. A very different view is implied in the symbolo-fidtisme of Athanase Sabatier and some other French Protestants: religious dogma consists of symbols in contrast to a scientific gnosis of reality. This is a radical version of the early Protestant idea of faith, and yields a theory of what in English we call " doctrine." More precisely, it is a theory of what doctrine ought to be, or a deeper analysis of its nature; it is not a statement of what doctrine has been held to be in the past. And therefore the definition does not proceed from historical scholarship. Nor yet does it throw light upon " dogma," if dogma is to be distinguished — somehow — from doctrine.

Literature. — Matthew Arnold's Literature, and Dogma (1873) is important for literary usage : cf . A. B. Bruce, op. cit. Classical and early Christian usages, E. Hatch, Hibbert Led. (1888), pp. 119. 120; J. B. Lightfoot on Colossians ii. 14 (20); W. Schmidt, Dogmatik, vol. i. (1895)— many quotations in extenso; C. Stange, Das Dogma und seine Beurieilung in der neueren Dogmengeschichte (1898)— a pamphlet protesting against what Loofs terms the " generally accepted view." Articles in the (Roman Catholic) Kirchenlexikon of WetzerandWelte,2nd ed; (by Hergenrother and Kaulen), 1882-1901, Arts. " Dogmatik " (J. Kdstlin), " Dogmengeschichte " (F. Loofs) in Herzog-Hauck's Encykl. f. prot. Theol. (vol. iv., 1898). Art. " Glaubensartikel " in previous ed. (Herzog-Plitt, vol. v., 1879) by C. F. Kling and L. F. Schoeberlein. For works on the history of dogma see Theology. See also Dogmatic Theology. (R. Ma.)

DOGMATIC THEOLOGY, the name usually given in modern times to the systematic study of Christian doctrine or of dogma in the widest sense possible (see Dogma). Among the many terms used in the early days of Protestant theology to denote the great systems, three deserve special notice — Thetic Theology, Positive Theology, Dogmatic Theology. " Thetic theology " is connected with academic life. It recalls the literal and original meaning of graduation " theses," also Martin Luther's memorable theses and the replies made to him. "

Thetic theology," a name now obsolete, naturally included the whole of doctrine, i.e. what- ever would be argued for or against; and " dogmatic theology " came into use absolutely as a synonymous expression. " Positive theology " is also a term employed by Petau (De theologicis dogmatibus, 1644-1650), and more or less current even to-day in Roman Catholic scholarship (e.g. Joseph Turmel, Histoire de la tMologie positive, 1906). " Dogmatic theology " proved to have most vitality in it. After some partial precedents of early date (e.g. F. Turrianus — one of the papal theologians at the Council of Trent, — Dogmaticus (liber?) de Justification, 1557), the title was used in 1659 by the Lutheran Lukas Friedrich Reinhard (1623- 1688), professor of theology at Altdorf (Synopsis theologiae dogmaticae, eds. 1659, 1660, 1661), and his influence is already seen on the Reformed theologian Andreas van Essen (Essenius, 1618-1677), who, in 1659, published his Systematis theologiae pars prior, the tomus secundus in 1661, but Systematis dogmatici tomus tertius et ultimus in 1665. The same author published a shorter Compendium theologiae dogmaticum in 1669. A. M. Fairbairn holds that it was the fame of Petau which gave currency to the new coinage " dogmatic theology "; and though the same or kindred phrases had been used repeatedly by writers of less influence since Reinhard and Essenius, F. Buddeus (Institutiones theol. dogmat., 1723; Compendium, 1728) is held to have given the expression its supremacy. Noel Alexandre, the Gallican divine, possibly introduced it in the Roman Catholic Church (1693; Theologia dogmatica et moralis). Both Roman Catholic and Protestant authorities agree that the expression was con- nected with the new habit of distinguishing dogmatics from Christian ethics or moral theology, though A. Schweizer denies this of Reinhard. In another direction dogmas and dogmatic theology were also contrasted with truths of reason and natural theology. 6 F. E. D. Schleiermacher, in his Kurze Darstellung des theologischen Studiums, and again in his great System, Der christliche Glaube . . . dargestellt, ingeniously proposed to treat dogmatic as an historical statement, or report, of beliefs held in 6 For " mixed articles " see Dogma.

the writer's communion at the ˆtime of writing. He also insisted, however, upon personal conviction in writers on dogmatic. The expression Glaubenslehre — doctrine of faith — which he did much to bring into a wider currency, and which Schweizer, the most loyal of all his disciples, holds to be alone fitted for Protestant use,

emphasizes the latter requirement. But " dogmatic " has also continued in use among Protestant theologians of the Left no less than among the orthodox. When we consider the different attitude towards dogma of Roman Catholicism, we feel con- strained to question whether the expression " dogmatic theology " can be equally suitable for both communions. Roman theologians may properly define dogmatic as the scientific study of dogmas; Protestant scholars have come to use " dogma " in ways which make that impossible. Indeed, many of them bid us regard " dogmatic " as falling under the history of theology and not of dogma (see Dogma). Still, usage is decisive. It will be im- possible to uproot the phrase " dogmatic theology " among Protestants. When A. Harnack 1 praises Schleiermacher's description of dogmatic as " historical," he rather strains the meaning of the remark, and creates fresh confusion. Harnack's point is that " dogmatic theology " ought to be used in a sense corresponding to what he regards as the true meaning of " dogma " — Christian belief in its main traditional outlines. This claim is an innovation, and finds no precedent in Schleiermacher. The latter regarded dogmatic as stating in scientific connexion "the doctrine prevailing in a (single) Christian church at a given time " — as " not merely historical {geschichtlich) ," but containing an " apologetic element "—as " not confined to the symbolical books, but " including all — even local expressions of the common faith which produce no breach of harmony— and as having for its " very business and task " to "purify and perfect" doctrine (Der christliche Glaube, § 19). The one merit which " dogmatic " may claim as a term in Protestant theology is that it contrasts positive statements of belief with mere reports {e.g. Biblical theology; history of doctrine) of what has been taught in the past. (See Dogma; and Theology.)

DOGRA, a race of Hill Rajputs in India, inhabiting Kashmir and the adjacent valleys of the Himalayas. They form the ruling race in Kashmir. " Dogra " is the name given to the country round Jammu, and is said to be derived from a word meaning the " two lakes," as the original home of the Dogra people was situated between the lakes of Siroensar and Mansar. There are numerous castes in the Dogra country, and the Hindu, Mahom- medan and Sikh religions are represented. All, whether Hindus or Mahommedans, whether high-born Rajputs of the Maharaja's caste or low-born menials, are known as Dogras. At the time of the first Sikh War the Dogras had a great reputation as soldiers, which they have worthily maintained in the ranks of the Indian native army. They are classed as fighting men with the Sikh and Punjabi Mahommedan. They distinguished themselves in the Hunza Nagar Expedition and the affair at Chilas in

189 1, and in the Tirah campaign of 1897-98.

DOGS, ISLE OF, a district of London, England, on the north bank of the Thames, which surrounds it on three sides.- It falls within the metropolitan borough of Poplar. It is occupied by docks, riverside works and poor houses. The origin of the name is not known. The suggestion that it is corrupted from the Isle of Docks falls to the ground on the question of chronology; another, that there were royal kennels here, is improbable, though they were situated at Deptford in the 17th century. (See Poplar.')

DOG-TOOTH (the French dent-de-scie) , in architecture, an ornament found in the mouldings of medieval work of the commencement of the 12th century, which is thought to have been introduced by the Crusaders from the East. The earliest example is found in the hall at Rabbath-Ammon in Moab (c. a.d. 614) built by the Sassanians, where it decorates the arch mould- ing of the blind arcades and the string courses. In the apse of the church at Murano, near Venice, it is similarly employed. In the 1 2th and 13th centuries it was further elaborated with carving, losing therefore its primitive form, but constituting a 1 Hist. of Dogma; Eng. trans, i. p. 21, footnote. VIII. 13

most beautiful decorative feature. In Elgin cathedral the dog- tooth ornament in the archivolt becomes a four-lobed leaf, and in Stone church, Kent, a much more enriched type of flower. The term has been supposed to originate in a resemblance to the dog-tooth violet, but the original idea of a projecting tooth is a sufficient explanation.

DOGWOOD (i.e. wood Of the dog-tree; referred by the New English Dictionary to " dog," apparently as indicating inferiority; but by others connected with " dag," " dagger," and by Prior with A.S. dole, a brooch-pin), the name applied to plants of the genus Cornus, of the natural order Cornaceae. The common dogwood, prick-wood, skewer-wood, cornel or dogberry, C. sanguinea, is a shrub reaching a height of 8 or 9 ft., common in hedges, thickets and plantations in Great Britain. Its branches are dark red; the leaves egg-shaped, pointed, about 2 in. long by 13 broad, and turning red in autumn; the flowers are dull white, in terminal clusters. The berries are small, of a black- purple, bitter and one-seeded, and contain a considerable per- centage of oil, which in some places is employed for lamps, and in the manufacture of soap. The wood is white and very hard, and like that of other species of the genus is used for making ladder-spokes, wheel-work, skewers, forks and other implements, and gunpowder charcoal. The red berries of the dwarf species, C. suecica,

of the Scottish Highlands, are eaten, and are reputed to be tonic in properties. C. mas, the Cornelian cherry, a native of Europe and Northern Asia, bears a pulpy and edible fruit, which when unripe contains much tannin. It is a good garden plant, as is also the North American species C.florida, one of the commonest trees of the deciduous forests of the middle and southern states. Professor C. S. Sargent (Silva of North America) describes it as " one of the most beautiful of the small trees of the American forests, which it enlivens in early spring with the whiteness of its floral leaves and in autumn with the splendour of its foliage and the brilliancy of its fruit. No tree is more desirable in the garden or park in regions where the summer's sun is sufficiently hot to ensure the production of its flowers through the perfect develop- ment of the branchlets." The Jamaica dogwood, the root-bark of which is poisonous, is the species Piscidia Erythrina, of the natural order Leguminosae.

DOL, a town of north-western France, in the department of Ille-et-Vilaine, 36 m. N. of Rennes on the Western railway. Pop. (1906) 3543. Dol is situated to the south-west of the rich agri- cultural district known as the marsh of Dol, where market- gardening is especially flourishing. The streets are still rendered picturesque by houses of the 14th and 15th centuries, which form deep arcades by the projection of their upper storeys: and, high above all, rises the grey granite of the cathedral, mainly of the 13th century, which in the middle ages ranked as the metropolitan church of all Brittany, and still keeps fresh the name of Bishop St Samson, who, having fled, as the legend tells, from the Saxon invaders of England, selected this spot as the site of his monastery. To the architect it is interesting for the English character of its design, and to the antiquarian, for its stained-glass windows of the 13th century, and for the finely sculptured tomb of Bishop Thomas James (d. 1504). About 15 m. from the town is the pierre de Champ Dolent, a menhir some 30 ft. in height; not far off stands the great granite rock of Mont Dol, over 200 ft. in height, surmounted by the statue and chapel of Notre-Dame de 1'Esperance. Dol has trade in grain, vegetables and fruit, tobacco is cultivated in the neighbourhood and there are salt-marshes. Tanning and leather-currying are carried on in the town. The town was unsuccessfully besieged by William the Conqueror, taken by Henry II. in n 64 and by Guy de Thouars in 1204. In 1793 it witnessed the defeat of the republican forces by the Vendeans who had taken refuge within its walls. The bishopric established in the 6th century was suppressed in 1790.

DOLABELLA, PUBLIUS CORNELIUS, Roman general and son-in-law of Cicero, was born about 70 B.C. He was by far the most important

of the Dolabellae, a family of the patrician gens Cornelia. In the civil wars he at first took the side of Pompey, but afterwards went over to Caesar, and was present at the battle of Pharsalus. To escape the urgent demands of his creditors, he

introduced (as one of the tribunes) a bill proposing that. all debts should be cancelled. This was strongly resisted by his colleagues, and led to serious disturbances in the city. Caesar, on his return from Alexandria, seeing the expediency of removing Dolabella from Rome, took him as one of his generals in the expedition to Africa and Spain. On Caesar's death Dolabella seized the insignia of the consulship (which had already been conditionally promised him), and, by making friends with Brutus and the other assassins, was confirmed in his office. When, however, M. Antonius offered him the command of the expedition against the Parthians and the province of Syria he changed sides at once. His journey to the province was marked by plundering, extortion and the murder of C. Trebonius, proconsul of Asia, who refused to allow him to enter Smyrna. He was thereupon declared a public enemy and superseded by C. Cassius(the murderer of Caesar), who attacked him in Laodicea. On the capture of the place, Dolabella ordered one of his soldiers to kill him (43). Throughout his life he was a profligate and a spendthrift.

See Cicero's Letters (ed. Tyrrell and Purser) ; G. Boissier, Cicero and his Friends (Eng. trans., 1897); Orelli, Onomasticon Tullianum; Dio Cassius xli. 40, xlii. 29, xliii. 51, xliv. 22, xlvi. 40, xlvii. 30; Appian, Bell. civ. iii. 7, iv. 60.

DOLBEN, JOHN (1625-1686), English divine, was the son of William Dolben (d. 163 1), prebendary of Lincoln and bishop-designate of Gloucester, He was educated at Westminster under Richard Busby and at Christ Church, Oxford. He fought on the royalist side at Marston Moor, 1644. Subsequently he took orders and maintained in private the proscribed Anglican service. At the Restoration he became canon of Christ Church (1660) and prebendary of St Paul's, London (i66ij. As dean of Westminster (1662-1683) he opposed an attempt to bring the abbey under diocesan rule. In 1666 he was made bishop of Rochester, and in 1683 archbishop of York; he distinguished himself by reforming the

discipline of the cathedrals in these dioceses. His son John Dolben (1662-1710) was a barrister and politician; he was M.P. for Liskeard from 1707 to 17 10 and manager of Sacheverell's impeachment in 1709.

DOLCE, LUDOVICO, or Luigi (1508-1568 or 1569), Italian writer, was a native of Venice, and belonged to a family of honourable tradition but decadent fortune. He received a good education, and early undertook the task of maintaining himself by his pen. Translations from Greek and Latin epics, satires, histories, plays and treatises on language and art followed each other in rapid succession, till the whole number amounted to upwards of seventy works. But he is now mainly memorable as the author of Marianna, a tragedy from the life of Herod, which was recast in French by Tristan and by Voltaire, and still keeps a place on the stage. Four licentious comedies, 77 Ragazzo (1541), II Capitano (1545), // Marilo (,1560), II Rufflano (1560), and seven of Seneca's tragedies complete the list of his dramatic efforts. In one epic— to translate the title-page — " he has marvellously reduced into otiava rima and united into one narrative the stories of the Iliad and the Aerieid "; in another he devotes thirty-nine cantos to a certain Primaleone, son of Palmerius; in a third he celebrates the first exploits of Count Orlando; and in a fourth he sings of the Paladin Sacripante. A life of the emperor Charles V. and a similar account of Ferdinand I., published respectively in 1 560 and 1 566, are his chief historical productions; and among his minor treatises it is enough to mention the Osservazioni sulla lingua volgare (1550); the Dialogo della pittura (1557); and the Dialogo nel quale si ragiona del modo di accrescar la memoria (.1552).

DOLCI, CARLO, or Carlino (1616-1686), Italian painter, was born in Florence in May 1616. He was the grandson of a painter on the mother's side, and, became a disciple of Jacopo Vignali; and when only eleven years of age he attempted a whole figure of St John, and a head of the infant Christ, which received extra- ordinary approbation. He afterwards painted a portrait of his mother, and displayed a new and delicate style which brought him into notice, and procured him extensive employment at Florence (from which city he hardly ever moved) and in, other parts of Italy. Dolci used his pencil chiefly in sacred subjects,

and bestowed much labour on his pictures. In his manner of working he was remarkably slow. It is said that his brain was affected by seeingLuca Giordano, in 1682, despatch more business in four or five hours than he could have executed in as many months, and that he

hence fell into a state of hypochondria, which compelled him to relinquish his art, and soon brought him to the grave. His works are not very numerous. He generally painted in a small size, although there are a few pictures by him as large as life. He died in Florence in January 1686, leaving a daughter (Agnese), who arrived at some degree of excellence in copying the works of her father.

Carlo Dolci holds somewhat the same rank in the Florentine that Sassoferrato does in the Roman school. Without the possession of much genius, invention or elevation of type, both these artists produced highly wrought pictures, extremely attractive to some tastes. The works of Dolci are easily distinguishable by the delicacy of the composition, and by an agreeable tint of colour, improved by judicious management of the chiaroscuro, which gives his figures a striking relief; he affected the use of ultramarine, much loaded in tint. " His pencil," says Pilkington, " was tender, his touch inexpressibly neat, and his colouring transparent; though he has often been censured for the excessive labour bestowed on his pictures, and also for giving his carnations more of the appearance of ivory than the look of flesh." All his best productions are of a devout description; they frequently represent the patient suffering of Christ or the sorrows of the Mater Dolorosa. Dolci was, in fact, from early youth, exceedingly pious; it is said that during passion week every year he painted a half -figure of the Saviour. His sacred heads are marked with pathetic or at least strongly sentimental emotion. There is a want of character in his pictures, and his grouping lacks harmonious unison, but the general tone accords with the idea of the passion portrayed. Among the best works of this master are the. "St Sebastian"; the "Four Evangelists," at Florence; " Christ Breaking the Bread," in the marquess of Exeter's collection at Burleigh; the " St Cecilia " in Dresden; an " Adoration of the Magi "; and in especial " St Andrew praying before his Crucifixion," in the Pitti gallery, his most important composition, painted in 1646; also several smaller pictures, which are highly valued, and occupy honourable places in the richest galleries. (W. M. R.)

DOLDRUMS (a slang term, dol = dull; cf. tantrum), the region of calms near the equator where the trade-winds die away, a region of constant precipitation in which the weather is close, hot, vaporous and extremely dispiriting. In the old days of sailing vessels, a becalmed ship sometimes lay helpless for weeks. A letter from this region saying " we are in the doldrums " (" in the dumps ") seems to have been regarded as written from " The Doldrums," which thus became the name of this undesirable locality.

DOLE, a town of eastern France, capital of an arrondissement in the department of Jura, 29 m. S.E. of Dijon on the Paris-Lyon railway. Pop. (1906) 1 1,166. It occupies the slope of a hill over- looking the forest of Chaux, on the right bank of the Doubs, and of the canal from the Rhone to the Rhine which accompanies that river. The streets, which in general are steep and narrow, contain many old houses recalling, in their architecture, the Spanish occupation of the town. The principal buildings are the church of Notre Dame,, a Gothic structure of the 16th century; the college, once a Jesuit establishment, which contains the library and a museum of paintings and has a chapel of the Renaissance period; the Hotel-Dieu and h6tel de ville, both 17th- century buildings; and the law court occupying an old convent of the Cordeliers. In the courtyard of the hotel de ville there stands an old tower dating from the 15th century. The birth of Louis Pasteur (1822) in the town is commemorated by a monument, and there is also a monument to Jules Grevy. D61e is the seat of a sub-prefect and has tribunals of first instance and of commerce and a communal college. Metal-founding and the manufacture of fire-pumps, kitchen-ranges and other iron goods, chemical products, machinery, leather, liqueurs and pastry, are among the industries. There is a good trade in agricultural produce and

live stock, and in wood, iron, coal and the stone of the vicinity. Wine is largely grown in the district.

Dole, the ancient Dola, was in Roman times the meeting place of several roads, and considerable remains have been found there; in the later middle ages and till 1648 it was the capital of Franche Comt6 and seat of a parlement and a university; but in the year 1479 the town was taken by the forces of Louis XI., and so completely sacked that only the house of Jean Vurry, as it is still called, and two other buildings were left standing. It subsequently came into the hands of Maximilian of Austria, and in 1530 was fortified by Charles V. In 1668 and 1674 it was captured by the French and lost its parlement and its university, both of which were transferred by Louis XIV. to Besancon.

DOLE (from Old Eng. dal, cf. mod. ” deal “), a portion, a distribution of gifts, especially of food and money given in charity. The derivation from O. Fr. doel, Late Lat. dolium, “grief,” suggested by the custom of funeral doles, is wrong. In early Christian days, St

Chrysostom says: " doles were used at funerals to procure the rest of the soul of the deceased,' that he might find his judge propitious." The distribution of alms to the local poor at funerals was a universal custom in the middle ages. The amount of doles was usually stated in the will. Thus in 1399 Eleanor, duchess of Gloucester, ordered that fifteen poor men should carry torches at her funeral, " each having a gown and hood lined with white, breeches of blue cloth, shoes and a shirt, and twenty pounds amongst them." Later doles usually took the form of bequests of land or money, the interest or rent of which was to be annually employed in charity. Often the distribution took place at the grave of the donor. Thus one William Robinson of Hull at his death in 1708 left money to buy annually a dozen loaves, costing a shilling each, to be given to twelve poor widows at his grave every Christmas. Lenten doles were also formerly common. A will of 1537 bade a barrel of white herrings and a case of red herrings be given yearly to the poor of Clavering, Essex, to help them tide over the fast. One or two London doles are still distributed, e.g. that of St Peter's, Walworth, where a Christmas dinner is each year served to 300 parish poor in the crypt. No one under sixty is eligible, and the dinner is unique in that it is cooked in the church. A pilgrim's dole of bread and ale can be claimed by all wayfarers at the Hospital of St Cross, Winchester. This is said to have been founded by William of Wykeham. Emerson, when visiting Winchester, claimed and received the dole. What were known as Scrambling Doles, so called because the meat and bread distributed were thrown among the poor to be scrambled for, were not uncommon in England. Such a dole existed at St Briavel's, Gloucestershire, baskets of bread and cheese cut into small squares being thrown by the churchwardens from the gallery into the body of the church on Whit Sunday. At Wath near Ripon a testator in 1810 ordered that forty penny loaves should be thrown from the church leads at midnight on every Christmas eve. The best known dole in the United States is the " Leake Dole of Bread." John Leake, a millionaire dying in 1792, left £1000 to Trinity Church, New York, the income to be laid out in wheaten loaves and distributed every Sabbath morning after service. The dole still survives, though the day has been altered to Saturday, each week sixty-seven loaves being given away.

DOLERITE (from Gr. Sokepos, deceptive), in petrology, the name given by Haiiy to those basaltic rocks which are Comparatively coarse grained and nearly, if not. quite, holo- crystalline. As may be inferred from their highly crystalline state they are very often intrusive, and occur as dikes and sills, but many of them form lava flows. Their essential minerals are those of basalt, viz. olivine, augite

and plagioclase felspar, while hornblende,, ilmenite, apatite and biotite are their commonest accessory ingredients. The chemical and microscopic features of these minerals agree generally with those presented in the basalts, and only their exceptional peculiarities need be mentioned here. Many dolerites are porphyritic and carry phenocrysts of olivine, augite and plagioclase felspar (or of one or more of these) . Others, probably the majority, are non-porphyritic,and these are generally coarser grained than the ground-mass of the former group; though

lacking their large conspicuous phenocrysts. The commonest type of structure in dolerite is the ophitic, which results from the felspar of the rock having crystallized before the augite; the latter mineral forms shapeless masses in which the idiomorphic felspars lie. The augite enclosing the felspars is well crystallized, though its continuity is interrupted more or less completely by the numerous crystals of felspar which it envelops, and in polarized light the former often behaves as a single individual over a considerable area, while the latter mineral consists of independent crystals. This structure may be so coarse as to be easily detected by the unaided eye, or so fine that it cannot be seen except in microscopic sections. Some of the porphyritic dolerites have ophitic ground-masses; in others this structure is imperfect (subophitic) ; while in many the augite, like the felspar, occurs as small and distinct individuals, which react differently on polarized light, and have the outlines of more or less perfectly shaped crystals. Ophitic structure is commonest in olivine-dolerites, though the olivine takes no part in it.

The quartz-dolerites are an important group, hardly less common than the olivine-dolerites. They contain a small amount of quartz, and often micropegmatite, as the last element to consolidate, filling up little angular interspaces between the felspars and pyroxenes, which had previously crystallized. They rarely contain olivine, but pleochroic hypersthene is by no means rare in them (hypersthene-dolerites). Some contain larger in- dividuals of pale green, rather pleochroic augite (the so-called sahlite), and a little brown mica, and brownish-green hornblende may also be present.

Allied to these are divine-free dolerites with more or less of interstitial glassy base (tholeites, &c). In the rocks of this group ophitic structure is typically absent, and the presence of an interstitial finely crystalline or amorphous material gives rise to the structure which is known as " intersertal." Transitions to the porphyritic dolerites and basalts arise by increase in the proportion of this ground-mass. The edges of dolerite sills and dikes often

contain much dark brown glass, and pass into tachylytes, in which this material preponderates.

Another interesting group of doleritic rocks contains analcite.' They may be ophitic, though often_they are not, and they usually contain olivine, while their augite has distinctly purple shades, and a feeble dichroism. !

Their characteristic feature is the presence of a small amount of analcite, which never shows crystalline outlines but fills up the interspaces between the other minerals. Some writers held that this mineral has resulted from the decomposition of nepheline; others regard it as a primary mineral. Usually it can be clearly shown to be secondary to some extent, but there is reason to suppose that it is really a pneumatolytic deposit. These rocks are known as teschenites, and have a wide distribution in England, Scotland, on the continent and in America. Often they are comparatively rich in brown hornblende. This last-named mineral is not usually abundant in dolerites, but in a special group, the proterobases, it to a large extent replaces the customary augite. A few dolerites Contain much brown mica (mica-dolerites). Nepheline may appear in these rocks, as in the basalts. Typical nepheline-dolerites are scarce, and consist of idiomorphic augite, surrounded by nepheline. Examples are known from the Tertiary volcanic districts of the Rhine.

Dolerites have a very wide distribution, as they are found wherever basalts occur in any number. It is superfluous to cite localities for them as they are among the commonest of igneous, rocks. They are much employed for road-mending and for kerb- stones, though their dark colour and the tendency they have to weather with a dingy brown crust make them unsuitable for the better classes of architectural work. (J. S. F.)

DOLET, ETIENNE (1509-1546), French scholar and printer, was born at Orleans on the 3rd of August 1509. A doubtful tradition makes him the illegitimate son of Francis I.; but it is evident that he was at least connected with some family of rank, and wealth. From Orleans he was taken to Paris about 1521; and after studying under Nicolas B6rauld, the teacher of Coligny, he proceeded in 1526 to Padua. The death of his friend and

master, Simon de Villanova, led him, in 1530, to accept the post of secretary to Jean de Langeac, bishop of Limoges and French ambassador to the republic of Venice; he contrived, however, to attend the lectures of the Venetian scholar Battista Egnazio, and found time to write Latin love poems to some Venetian Elena. Returning to France soon afterwards he proceeded to Toulouse to study law; but there he soon became involved in the violent disputes between the different " nations " of the uni- versity, was thrown into prison, and finally banished by a decree of the parlement. In 1535 he entered the lists against Erasmus in the famous Ciceronian controversy, by publishing through Sebastien Gryphe (Gryphius) at Lyons a Dialogus de imitatione Ciceroniana; and the following year saw the appearance of his two folio volumes Commentariorum linguae Lalinae. This work was dedicated to Francis L, who gave him the privilege of print- ing during ten years any works in Latin, Greek, Italian or French, which were the product of his own pen or had received his supervision; and accordingly, on his release from an imprison- ment occasioned by his justifiable homicide of a painter named Compaing, he began at Lyons his typographical and editorial labours. That he was not altogether unaware of the dangers to which he was exposed from the bigotry of the time is shown not only by the tone of his mottoes — Preserve moi, Seigneur, des calomnies des hommes, and Durior est spectatae virtutis quam incognitae conditio — but also by the fact that he endeavoured first of all to conciliate his opponents by publishing a Cato christianus, or Christian moralist, in which he made profession of his creed. The catholicity of his literary appreciation, in spite of his ultra- Ciceronianism, was soon displayed by the works which proceeded from his press — ancient and modern, sacred and secular, from the New Testament in Latin to Rabelais in French. But before the term of his privilege expired his labours were interrupted by his enemies, who succeeded in imprisoning him (1542) on the charge of atheism. From a first imprisonment of fifteen months Dolet was released by the advocacy of Pierre Duchatel, bishop of Tulle; from a second (1544) he escaped by his own ingenuity; but, venturing back from Piedmont, whither he had fled in order that he might print at Lyons the letters by which he appealed for justice to the king of France, the queen of Navarre and the parlement of Paris, he was again arrested, branded as a relapsed atheist by the theological faculty of the Sorbonne, and on the 3rd of August 1546 put to the torture, strangled and burned in the Place Maubert. On his way thither he is said to have composed the punning pentameter — Non dolet ipse Dolet, sed pia turba dolet.

Whether Dolet is to be classed with the representatives of

Protestantism or with the advocates of anti-Christian rationalism has been frequently disputed; by the principal Protestants of his own time he was not recognized, and by Calvin he is formally condemned, along with Agrippa and his master Villanova, as having uttered execrable blasphemies against the Son of God; but, to judge by the religious character of a large number of the books which he translated or published, such a condemnation is altogether misplaced. His repeated advocacy of the reading of the Scriptures in the vulgar tongue is especially noticeable. A statue of Dolet was erected on the Place Maubert in 1889.

See J. F. Nee de la Rochelle, Vie d'&ienne Dolet (1779); Joseph Boulmier, E. Dolet, sa vie, ses asuvres, son martyre (1857) ; A. F. Didot, Essai sur latypographie (1852) and article in the Nouvelle \Biographie generate; L. Michel. Dolet: sa statue, place Maubert: ses amis, ses ennemis (1889) ; R. C. Christie, iLtienne Dolet, the Martyr of the Renaissance (2nd ed., 1889), containing a full bibliography of works published by him as author or printer; O. Galtier, litienne Dolet (Paris, 1908). The procis, or trial, of Dolet was published (1836) by A. H. Taillandier from the registers of the parlement of Paris.

DOLGELLEY (Dolgellau, dale of hazels), a market town and the county town of Merionethshire, North Wales, situated on the streams Wnion and Aran at the north base of Cader Idris, on the Cambrian and Great Western railways, 232 m. from London. Pop. of urban district (1901) 2437. It consists of small squares and narrow streets, with a free grammar school (1665), market hall, assize hall, county gaol, &c. The so-called parliament house (1404) of Owen Glendower's members has been demolished. There is some trade in coarse flannel and tweed. Glendower's

treaty with Charles of France (Owinus D.G. princeps Walliae. . . Datum apud Dolguelli . . .) was dated here. The families of county rank in the neighbourhood include those of Nannau, Hengwrt (the famous Hengwrt Welsh MSS. are at Peniarth), Caerynwch, Fronwnion, Bron-y-gadair, Brynygwin, Brynadda, Abergwynnant, Garthangharad. The county family, Vaughan, claims descent from Rodric Fawr, king of North Wales, Glendower's kinsman and enemy lived at Nannau. Scott (Marmion. vi. canto, note) refers to the demon oak at Nannau in 1813. Among neighbouring hills are Moel Offrwm (or Orthrwm — of sacrifice or of oppression) and Moel Cynwch.

DOLGORUKI, VASJLY LUKICH, Count (1672-1739), Russian

diplomatist and minister, was one of the first batch of young Russians whom Peter the Great sent abroad to be educated. From 1687 to 1700 he resided at Paris, where he learned thoroughly the principal European languages, acquired the superficial elegance of the court of Versailles, and associated with the Jesuits, whose moral system he is said to have appropriated. On his return home he entered the diplomatic service. From 1706 to 1707 he represented Russia in Poland; and from 1707 to 1720 he was her minister at Copenhagen, where he succeeded in persuading King Frederick IV. to join the second coalition against Charles XII. At the end of 1720 he was transferred to Versailles, in order to seek the mediation of France in the pro- jected negotiations with Sweden and obtain the recognition of Peter's imperial title by the French court. In 1 7 24 he represented Russia at Warsaw and in 1726 at Stockholm, the object of the latter mission being to detach Sweden from the Hanoverian alliance, in which he did not succeed. During the reign of Peter II. (1727-1730) Dolgoruki was appointed a member of the supreme privy council, and after procuring the banishment of Menshikov he appropriated the person of the young emperor, whom he would have forced to marry his niece Catherine but for Peter's untimely death. He then drew up a letter purporting to be the last will of the emperor, appointing Catherine Dolgoruki his successor, but shortly afterwards abandoned the nefarious scheme as impracticable, and was one of the first to support the election of Anne of Courland to the throne on condition that she first signed nine " articles of limitation," which left the supreme power in the hands of the Russian council. Anne, who repudiated the " articles " on the first opportunity, never forgave Dolgoruki for this. He was deprived of all his offices and dignities on the 17th of April 1730, and banished first to his country seat and then to the Solovetsky monastery. Nine years later the charge of forging the will of Peter II. was revived against him, and he was tortured and then beheaded at Novgorod on the 8th of November

1739-

See Robert Nisbet Bain, The Pupils of Peter the Great (London, 1895)- (R. N. B.)

DOLHAIN, the most eastern town of Belgium, situated on the Vesdre, N. E. of Verviers and close to the Prussian frontier. Pop. (1904) 4757. It is quite a modern town, occupying the site of the lower town of the ancient city of Limburg, which was destroyed by Louis XIV. in 1675. O n a rocky eminence above Dolhain are still to be seen the fine ruins of the old castle of Limburg, the cradle of the ancient family of that name from which sprang the Luxemburg family and

several emperors of Germany. The Gothic church of St George of the 13th century has been restored. At a short distance from Dolhain is the'famous dam of the Gileppe, the vast reservoir constructed to supply Verviers with water free from lime for its cloth manufactures. The aqueduct from Gileppe to Verviers is nearly 55 m. in length.

DOLICHOCEPHALIC (long-headed), a term invented by Andreas Retzius to denote (as opposed to " brachycephalic ") those skulls the diameter of which from side to side, or the transverse diameter, is small in comparison with the longitudinal diameter or that from front to back. Retzius, though inventing the term, did not define it precisely. Paul Broca applied it to skulls having a cephalic index of seventy-five and under, and this limit is generally adopted. Dolichocephaly, according to Retzius, was the distinctive cranial feature of the earliest inhabitants of Europe. To-day it is characteristic of the negro races, of the

Papuans, the Polynesians and the Australians, though among the negritos and some of the pigmy races of Africa brachycephalic skulls are the rule. Of the yellow races the Eskimo is the most dolichocephalic. Of white races the Arabs and Kabyles of Algeria, and the Guanchos of the Canary Islands, are most notable for dolichocephalic tendency. Dolichocephaly is some- times frontal, as among adult whites, sometimes occipital or confined to the back of the head, as among inferior negro-races, Australians, Papuans and newly-born whites.

DOLL, a child's plaything in the shape of a human figure or taken as representing one. The word " doll " was not in common use in the middle ages, " children's babies " and other terms being substituted for it; the commonly accepted view is that it is abbreviated from the name Dorothy (cf. Scottish "Doroty"). " Idol " has also been connected with it; but the accent is held to tell against this. Another derivation is from Norse daul (woman) , with which may be compared O.H.G. toccha, M.H.G. docke, a girl, doll, used also in the sense of butterfly, nightmare, &c, thus connecting the doll with magic and superstition. The same connexion is found in Asia Minor, South India, among the Pueblo peoples and in South Africa; philology apart, therefore, the derivation from " idol " has much to recommend it, and some side influence from this word may well have caused the selection of the form " doll." Dolls proper should be distinguished

from (a) idols, (b) magical figurines, (c) votive offerings, (d) costume figures. The festival figures of Japan, like the bambino of Italy, given to the child only on certain saints' days, hardly come within the category of dolls.

Dolls were known in ancient Egypt(XVIIIthDynasty)and Asia Minor; they were common both in Greece and Rome; Persius mentions that girls vowed them to Venus when they got married; dolls found in the catacombs are preserved in the Vatican and the Museum Carpegna. The veapbairaxtTov (Lat. crepundia) of Greek finds of the 6th and later centuries B.C. was a marionette. Dolls were in use among the Arabs at the time of Mahomet, and the prophet's nine-year-old wife Ayesha is said to have induced him to join her in her play with them. Although Mahommedan- ism prohibits the making of figures in human shape, dolls do not seem to have disappeared from Mahommedan countries, though substitutes for them are perhaps more common there than elsewhere.

Dolls are extremely common in Africa. There seem to be forms peculiar to different regions, such as the flat, spade-shaped figure on the Gold Coast. Among the Wasaramo the girls carry from-the age of puberty till the birth of their first child an object indistinguishable from the ordinary doll; it is called mwana ya kiti (stool-child) because it is placed on a stool at home; it probably has a magical significance. The same may be said of the Australian figurines; others, made of cane, are undoubtedly children's dolls; excellently moulded wax figures are also found. In Asia dolls properly so-called are apparently rare; but there are specimens in museums from the Malay peninsula, Persia and South India, and in Asia Minor children use cushions, &c, as surrogates. They are found in Alaska among the Eskimo. Most Red Indian tribes had them; a mother who has lost her child carries its dolls and other playthings. Cortes is said to have found Montezuma and his court playing with elaborate dolls; they have been dug up from prehistoric Peruvian graves. In the Gran Chaco metacarpal bones of the rhea are in use, wrapped in a blanket when they represent male, in a petticoat when they are female.

But little attention has been paid to the psychological side of dolls. Though many boys play with them, dolls are mainly confined to girls; and female dolls predominate in the proportion of twelve to one. The culmination of the doll instinct is between the age of eight and nine; but they are not entirely dropped till much later; in fact unmarried and childless women sometimes keep it up for years. In children it is said by Hall to be by no means always a manifestation of the maternal instinct; for dolls are not always regarded as children, and

the proportion of adults increases with the age of the children. But the important point is whether the child regarded itself as older or younger than the

doll. There is, on the other hand, a tendency to neglect dolls for babies and a reverse current of love of dolls which arises out of love of babies.

Bibliography. — For a list of works see A. MacDonald, Man and Abnormal Man (U. S. Senate Document, 1905), vol. ix. No. 187, p. 275); see also Andree, Ethnogtaphische Parallelen N. F. ; Schlegel, Indische \Bibliothek. i. 139; Brandenburgia, xi. 28; Delineator, lviii. 927; Globus, lxxv. 354, Ixxx. 205; Internal. Archiv f. Ethnog. vii. 45; Ladies' Home Journ. xvi. ; Westermann's Monatshefte (Feb. 1899, &c); Man (1903, No. 22). For the psycho- logical side see Paedagogical Seminary, iv. 129, discussed in Con- temporary Rev. lxxv. 58 ; Mrs F. H. Burnett, " The One I know best of all "; Sully, Studies of Childhood; G. Sand, Histoire de ma vie. (N. W. T.)

DOLLAR, a town of Clackmannanshire, Scotland, 6 m. N.E. of Alloa by the North British railway, not far from the Devon. Pop. (1901) 1619. The village, which is beautifully situated, contains several handsome stone villas occupied by families attracted to the town by its educational facilities. The academy, housed in a fine mass of buildings of the Grecian order (opened about 1819), was founded by Captain John McNab (1732-1802), a native who began life as a herdboy, and afterwards became a rich shipowner. From the burn of Dollar (or Dolour), which runs through the ravine of Dollar Glen, the town draws its water- supply. On an isolated hill above the junction of the parent streams, named Sorrow and Care, stands the ruin of Castle Campbell, known also as Gloom Castle, an old stronghold of the Argyll family. The castle was burned by the Macleans in 1644, in the interest of the marquess of Montrose, and not again restored. Although a ruin it is carefully preserved. The Rev. Dr James Aitken Wylie (1808-1890), the historian of Protestantism, was a minister in Dollar for several years. Patrick Gibson, the etcher and landscape-painter, was drawing-master at the academy from 1824 to 1829, and William Tennant, the author of Anster Fair, was a teacher of classics from 1819 till 1834, when he was appointed to the chair of Hebrew in St Andrews University. Harviestoun Castle, about midway between Dollar and Tillicoultry, once belonged to the Tait family, and here Archibald Campbell Tait, archbishop of Canterbury, spent some of his boyhood.

DOLLAR, a silver coin at one time current in many European

countries, and adopted under varying forms of the name else- where. The word " dollar " is a modified form of thaler, which, with the variant forms (daler, dalar, daalder, tallero, &c), is said to be a shortened form of Joachimsthaler. This Joachimsthaler was the name given to a coin intended to be the silver equivalent of the gold gulden, a coin current in Germany from the 14th century. In 1516 a rich silver mine was discovered in Joachimsthal (Joachim's dale), a mining district of Bohemia, and the count of Schlitz, by whom it was appropriated, caused a great number of silver coins to be struck (the first having the date 1518), bearing an effigy of St Joachim, hence the name. The Joachimsthaler was also sometimes known as the Schlickenthaler. The first use of the word dollar in English was as applied to this silver coin, the thaler, which was current in Germany at various values from the 16th century onwards, as well as, more particu- larly, to the unit of the German monetary union from 1857 to 1873, when the mark was substituted for the thaler. The Spanish piece-of-eight (reals) was also commonly referred to as a dollar. When the Bank of England suspended cash payments in 1797, and the scarcity of coin was very great, a large number of these Spanish coins, which were held by the bank, were put into circulation, after having been countermarked at the Mint with a small oval bust of George III., such as was used by the Gold- smiths' Company for marking plate. Others were simply over- stamped with the initials G.R. enclosed in a shield. In 1804 the Maundy penny head set in an octagonal compartment was employed. Several millions of these coins were issued. These Spanish pieces-of-eight were also current in the Spanish- American colonies, and were very largely used in the British North American colonies. As the reckoning was by pounds, shillings and pence in the British-American colonies, great inconveniences naturally arose, but these were to some extent lessened by the adoption of a tariff list, by which the various gold and silver coins circulating

were rated. In 1787 the dollar was introduced as the unit in the United States, and it has remained as the standard of value either in silver or gold in that country. For the history of the various changes in the weights and value of the coin see Numismatics. The Spanish piece-of-eight was also the ancestor of the Mexican dollar, the Newfoundland dollar, the British dollar circulating in Hong Kong and the Straits Settlements, and the dollar of the South American republics, although many of them are now dollars only in name.

DOLLING, ROBERT WILLIAM RADCLYFFE (1851-1902), English divine, known as Father Dolling, was born at Magheralin, Co. Down, and educated at Harrow and Cambridge. From 1878 to 1882 he was warden of one of the houses of the Postmen's League, started by Father Stanton of St Alban's, Holborn. He was ordained in 1883 to a curacy at Corscombe, Dorset, but resided in London as head of St Martin's mission, Stepney. In 1885 a difficulty as to the relation of his. mission to Holy Trinity parish, Stepney, led to his resignation, and he next accepted the charge of St Agatha's, Landport, the Winchester College mission. The remarkable reforms he accomplished there may be ascertained from his Ten years in a Portsmouth slum (London 1896). In 1885 he again resigned, owing to the bishop of Winchester's refusal to sanction the extreme ritual used in the service at St Agatha's. In 1897 he visited America, where his preaching made a great im- pression. He returned to England in the following year as vicar of St Saviour's, Poplar, and retained that living until his death.

An account of Dolling's person and missionary work among- the poor is given in The Life of Father Polling (London, 1903);, by the Rev. C. E. Osborne.

DOLLINGER, JOHANN JOSEPH IGNAZ VON (1790-1890), German theologian and church historian, was born at Bamberg, Bavaria, on the 28th of February 1799. He came of an in- tellectual stock, his grandfather and father having both been physicians of eminence and professors of one or other of the branches of medical science; his mother too belonged to a family not undistinguished in intellectual power. Young Dollinger was first educated in the gymnasium at Wiirzburg, and then began to study natural philosophy at the university in that city, where his father now held a professorship. In 181 7 he began the study of mental philosophy and philology, and in 1818 turned to the study of theology, which he believed to lie beneath every other science. He particularly devoted himself to an independent study of ecclesiastical history, a subject very indifferently taught in Roman Catholic Germany at that time. In 1820 he became acquainted with Victor Aime Huber (1800-1869), a fact which largely influenced his life. On the 5th of April 1822 he was ordained priest, after studying at Bamberg, and in 1823 he became professor of ecclesiastical history and canon law in the lyceum at Aschaffenburg. He then took his doctor's degree, and in 1826 became professor of theology at Munich, where he spent the rest of his life. About this time Dollinger brought upon himself the animadversion of Heine, who was then editor of a Munich paper. The unsparing satirist described the professor's face as the " gloomiest "

in the whole procession of ecclesiastics which took place on Good Friday.

It has been stated that in his earlier years Dollinger was a pronounced Ultramontane. This does not appear to have been altogether the case; for, very early in his professorial career at Munich, the Jesuits attacked his teaching of ecclesiastical history, and the celebrated J. A. Mohler (q.v.) who afterwards became his friend, on being appealed to, pronounced on the whole in his favour. He also entered into relations with the well-known French Liberal Catholic Lamennais, whose views on the reconcilia- tion of the Roman Catholic Church with the principles of modern society had aroused much suspicion in Ultramontane circles. In 1832 Lamennais, with his friends Lacordaire and Montalembert, visited Germany, and obtained considerable sympathy in their attempts to bring about a modification of the Roman Catholic attitude to modern problems. Dollinger seems to have regarded favourably the removal, by the Bavarian government, in 1841, of Professor Kaiser from his chair, because he had taught the infallibility of the pope. On the other hand, he published a

treatise in 1838 against mixed marriages, and in 1843 wrote strongly in favour of requiring Protestant soldiers to kneel at the consecration of the Host when compelled officially to be present at Mass. Moreover, in his works on The Reformation' (3 vols. Regensburg, 1846-1848) and on Luther (1851, Eng, tr., 1853) he is very severe on the Protestant leaders, and he also accepts, in his earlier works, the Ultramontane view then current on the practical condition of the Church of England, a view which in later days he found reason to change. Meanwhile he had visited England, where he was well received; and he afterwards travelled in Holland, Belgium and France, acquainting himself with the condition and prospects of the Roman Catholic Church. In 1842 he entered into correspondence with the leaders of the Tractarian movement in England, and some interesting letters have been preserved which were exchanged between him and Pusey, Gladstone and Hope Scott. When the last-named joined the Church of Rome he was warmly congratulated by Dollinger on the step he had taken. He, however, much regretted the gradual and very natural trend of his new English allies towards extreme Ultramontane views, of which Archdeacon, afterwards Cardinal, Manning ultimately became an enthusiastic advocate. In 1845 Dollinger was made representative of his university in the second chamber of the Bavarian legislature. In 1847, in consequence of the fall from power of the Abel ministry in Bavaria, with which he had been in close relations, he was removed from his professorship at

Munich, but in 1849 he was invited to occupy the chair of ecclesiastical history. In 1848, when nearly: every throne in Europe was shaken by the spread of revolutionary sentiments, he was elected delegate to the national German assembly at Frankfort, — a sufficient proof that at this time he was regarded as no mere narrow and technical theologian, but as a man of wide and independent views.

It has been said that his change of relations to the Papacy dated from the Italian war in 1859, but no sufficient reason has been given for this statement. It is more probable that, like Grosseteste, he had imbibed in early youth an enthusiastic sentiment of attachment to the Papacy as the only centre of authority, and the only guarantee for public order in the Church, but that his experience of the actual working of the papal system (and especially a visit to Rome in 1857) had to a certain extent convinced him how little correspondence there was between his ideal and the reality. He may also have been unfavourably impressed with the promulgation by Pius IX. in 1854 of the dogma of the Immaculate Conception of the Blessed Virgin. But what- ever may have been his reasons, he ultimately became the leader of those who were energetically opposed to any addition to, or more stringent definition of, the powers which the Papacy had possessed for centuries. In some speeches delivered at Munich in 1861 he outspokenly declared his view that the maintenance of the Roman Catholic Church did not depend on the temporal sovereignty of the pope. His book on The Church and the Churches (Munich, 1861) dealt to a certain extent with the same question. In 1863 he invited 100 theologians to meet at Malines and discuss the question which Lamennais and Lacordaire had prematurely raised in France, namely, the attitude that should be assumed by the Roman Catholic Church towards modern ideas. His address to the assembled divines was " practically a declara- tion of war against the Ultramontane party." He had spoken boldly in favour of freedom for the Church in the Frankfort national assembly in 1848, but he had found the authorities of his Church claiming a freedom of a very different kind from that for which he had contended. The freedom he claimed for the Church was freedom to manage her affairs' without the interference, of the state; the champions of the papal monarchy, and notably the Jesuits, desired freedom in order to put a stop to the dis- semination of modern ideas. The addresses delivered in the Catholic congress at Malines were a declaration in the direction of a Liberal solution of the problem of the relations of Church and State. The pope for a moment seemed to hesitate, but there could be little doubt what course he would ultimately pursue, and after four days' debate

the assembly was closed at his command. On the 8th of December 1864 Pius IX. issued

the famous Syllabus, in which he declared war against modern science and progress (see Syllabus). It was in connexion with this question that Dollinger published his Past and Present of Catholic Theology (1863) and his Universities Past and Present (Munich, 1867).

We now approach the critical period of Dollinger's life. It was about this time that some of the leading theologians of the Roman Catholic Church, conceiving that the best way of meeting present perils was to emphasize, as well as to define more clearly, the authority of the pope, advised him to make his personal infalli- bility a dogma of the Church, and urged strenuously on him the necessity of calling a council for that purpose. There was considerable opposition in various quarters. Many bishops and divines considered the proposed definition a false one. Others, though accepting it as the truth, declared its promulgation to be inopportune. But the headquarters of the opposition was Germany, and its leader was Dollinger, whose high reputation and vast stores of learning placed him far above any other member of the band of the theological experts who now gathered around him. Among them were his intimate friends Johann Friedrich (q.v.) and J. N. Huber, in Bavaria. In the rest of Germany he found many supporters, chiefly professors in the Catholic faculty of theology at Bonn: among these were the famous canonist von Schulte, Franz Heinrich Reusch, the ecclesiastical historian Joseph Langen, as well as J.H. Reinkens, afterwards bishop of the Old Catholic Church in Germany, Knoodt, and other distinguished scholars. In Switzerland, Professor Edward Herzog, who became Old (or, as it is sometimes called, Christ-) Catholic bishop in Switzerland, and other learned men supported the movement. Early in 1869 the famous Letters of Janus (which were at once translated into English; 2nd ed. Das Papsttum, 1891) began to appear. They were written by Dollinger in conjunction with Huber and Friedrich, afterwards professor at Munich. In these the tendency of the Syllabus towards obscurantism and papal despotism, and its incompatibility with modern thought, were clearly pointed out; and the evidence against papal infallibility, resting, as the Letters asserted, on the False Decretals, and accepted without controversy in an age of ignorance, was ably marshalled for the guidance of the council.

When, on the 8th Of December 1869, it had actually assembled, the world was kept informed of what was going on in the Letters of Quirinus, written by Dollinger and Huber while the debates of the council were proceeding. Some of these letters appeared in the German newspapers, and an English translation was published by Rivington. Augustin Theiner, the librarian at the Vatican, then in disgrace with the pope for his outspoken Liberalism, kept his German friends well informed of the course of the discussions. The proceedings of the council were frequently very stormy, and the opponents of the dogma of infallibility complained that they were not unfrequently interrupted, and that endeavours were made to put them down by clamour. The dogma was at length carried by an overwhelming majority, and the dissentient bishops, who — with the exception of two — had left the council before the final division, one by one submitted (see Vatican Council). Dollinger, however, was not to be silenced. He headed a protest by forty-four professors in the university of Munich, and gathered together a congress at Nuremberg, which met in August 1870 and issued a declaration adverse to theVatican decrees. An immense ferment took place. In Bavaria, where Dollinger's influence was greatest, the strongest determination to resist the resolutions of the council prevailed. But the authority of the council was held by the archbishop of Munich to be paramount, and he called upon Dollinger to submit. Instead of submitting, Dollinger, on the 28th of March 1871, addressed a memorable letter to the arch- bishop, refusing to subscribe the decrees. They were, he said, opposed to Holy Scripture, to the traditions of the Church for the first 1000 years, to historical evidence, to the decrees of the general councils, and to the existing relations of the Roman Catholic Church to the state in every country in the world. " As a Christian, as a theologian, as an historian, and as a citizen," he added, " I cannot accept this doctrine."

The archbishop replied by excommunicating the disobedient

professor. This aroused fresh opposition. Dollinger was almost unanimously elected rector-magnificus of the university of Munich, and Oxford, Edinburgh and Marburg universities conferred upon him the honorary degree of doctor of laws and Vienna that of philosophy. The Bavarian clergy invited Bishop Loos of the Jansenist Church in Holland, which for more than 150 years had existed independent of the Papacy and had adopted the name of " Old Catholic," to hold confirmations in Bavaria. The offer was accepted, and the bishop was received with ' triumphal arches and other demonstrations of joy. The three Dutch Old Catholic bishops declared themselves ready to con- secrate a bishop, if it were desired. The momentous question

was discussed at a meeting of the opponents of the Vatican decrees, and it was resolved to elect a bishop and ask the Dutch bishops to consecrate him. Dollinger, however, voted against the proposi tion, and withdrew from any further steps towards the promotion of the movement. This was the critical moment in the history of the resistance to the decrees. Had Dollinger, with his immense reputation as a scholar, as a divine and as a man, allowed himself to be consecrated bishop of the Old Catholic Church, it is impossible to say how wide the schism would have been. But he declined to initiate a schism. His refusal lost Bavaria to the movement; and the number of Bavarian sympathizers was still further reduced when the seceders, in 1878, allowed their priests to marry, a decision which Dollinger, as was known, sincerely regretted. The Old Catholic Communion, however, was formally constituted, with Reinkens at its head as bishop, and it still continues to exist (see Old Catholics).

Dollinger's attitude to the new community was not very clearly defined. It may be difficult to reconcile the two declara- tions made by him at different times: " I do not wish to join a schismatic society; I am isolated," and " As for myself, I consider that I belong by conviction to the Old Catholic com- munity." The latter declaration was made some years after the former, in a letter to Pastor Widmann. The nearest approach to a reconciliation of the two statements would appear to be that while, at his advanced age, he did not wish to assume the responsibility of being head of a new denomination, formed in circumstances of exceptional difficulty, he was unwilling to condemn those who were ready to hazard the new departure. " By conviction " he belonged to the Old Catholics, but he never formally joined them. Yet at least he was ready to meet their leaders, to address them, and to discuss difficult problems with them. His addresses on the reunion of the Churches, delivered at the Bonn Conference of 1872, show that he was by no means hostile to the newly formed communion, in whose interests these conferences were held. In 1874 and again in 1875, he presided over the Reunion Conferences held at Bonn and attended by leading ecclesiastics from the British Isles and from the Oriental Church, among whom were Bishop Christopher Wordsworth of Lincoln; Bishop Harold Browne of Ely; Lord Plunket, arch- bishop of Dublin; Lycurgus, archbishop of Syros and Tenos; Canon Liddon; and Professor Ossinine of St Petersburg. At the latter of these two conferences, when Dollinger was seventy- six years of age, he delivered a series of marvellous addresses in German and English, in which he discussed the state of theology on the continent, the reunion question, and the religious condition of the various countries of Europe in which the Roman

Catholic Church held sway. Not the least of his achievements on this occasion was the successful attempt, made with extraordinary tact, ability, knowledge and perseverance, to induce the Orientals, Anglicans and Old Catholics present to accept a formula, of concord, drawn from the writings of the leading theologians of the Greek Church, on the long- vexed question of the Procession of the Holy Spirit. This result having been attained, he passed the rest of his days in retirement, emerging sometimes from his retreat to give addresses on theological questions, and also writing, in conjunction with his friend Reusch, his last book, Ceschichte der Moralstreitigkeiten in der romisch-katholiscken Kirahe seit dent sechzehnten Jahrhundert mit Beitrdgen mr Geschichle ■ und Charakteristik des Jesuitenordens (Nordlingen, 1889), in which he deals with the moral theology of St Alfonso de' Ligupri. He died

in Munich, on the 14th of January 1890, at the age of ninety-one. Even in articulo mortis he refused to receive the sacraments from the parish priest at the cost of submission, but the last offices were performed by his friend Professor Friedrich.

In addition to the works referred to in the foregoing sketch, we may mention The Eucharist in the First Three Centuries (Mainz, 1826) ; a Church History (1836, Eng. trans. 1840) ; Hippolytus and Callistus (1854, Eng. trans., 1876) ; First Age of Christianity (i860) ; Lectures on the Reunion of the Churches; The Vatican Decrees; Studies in European History (tr. M. Warre, 1890) ; Miscellaneous Addresses (tr. M. Warre, 1894).

See Life by J. Friedrich (3 vols. 1899-1901) ; obituary notice in The Times, nth January 1890; L. von Kobell, 'Conversations of Dr Bollinger (tr. by K. Gould, 1892). (J. J. L.)*

DOLLOND, JOHN (1706-1761), English optician, was the son of a Huguenot refugee, a silk-weaver at Spitalfields,' London, where he was born on the 10th of June 1706. He followed his father's trade, but found time to acquire a knowledge of Latin, Greek, mathematics, physics, anatomy and other subjects. In 1752 he abandoned silk-weaving and joined his eldest son, Peter Dollond (1730-1820), who in 1750 had started in business as a maker of optical instruments. His reputation grew rapidly, and in 1761 he was appointed optician to the king. In 1758 he published an " Account of some experiments

concerning the different refrangibility of light " {Phil. Trans., i75 8), describing the experiments that led him to the achievement with which his name is specially associated, the discovery of a means of construct- ing achromatic lenses by the combination of crown and flint glasses. Leonhard Euler in 1 747 had suggested that achromatism might be obtained by the combination of glass and water lenses. Relying on statements made by Sir Isaac Newton, Dollond disputed this possibility (Phil. Trans., 1753), but subsequently, after the Swedish physicist, Samuel Klingenstjerna (1698-1765), had pointed out that Newton's law of dispersion did not harmonize with certain observed facts, he began experiments to settle the question. Early in 1757 he succeeded in producing refraction without colour by the aid of glass and water lenses, and a few months later he made a successful attempt to get the same result by a combination of glasses of different qualities (see Telescope). For this achievement the Royal Society awarded him the Copley medal in 1758, and three years later elected him one of its fellows. Dollond also published two papers on apparatus for measuring small angles (Phil. Trans., 1753, 1754)- He died in London, of apoplexy, on the 30th of November 1761.

An account of his life, privately printed, was written by the Rev. John Kelly (1750-1809), the Manx scholar, who married one of his granddaughters.

DOLMAN (from Turk, dolaman), originally a long and loose garment left unfastened in front, and with narrow sleeves. It is worn generally by the Turks, and is not unlike a cassock in shape. The name was given to the uniform jacket, worn by hussars, and slung from the shoulders with the sleeves hanging loose; and it is also used for a similar garment worn by ladies, with wide cape- like arrangements instead of sleeves.

DOLNJA TUZLA, or Donji Soli, the capital of the Dolnja Tuzla district, in Bosnia, beautifully situated on the Jala or Julia, a small stream flowing into the Spreca, which joins the Bosna at Doboj, 39 m. W.N.W.; and on a branch railway from Doboj. Pop. (1895) 10,227; almost all, including a permanent colony of gipsies, being Moslems. Dolnja Tuzla is the seat of a district court and an Orthodox bishop; with several churches, many mosques, a hospital, gymnasium and commercial school. Besides large alkali works, it has a vigorous trade in grain, livestock, timber and coal, from the surrounding hills, where there is a colony of Hungarian miners; while the salt springs, owned by the state both at Dolnja, or Lower, and Gornja, or Upper Tuzla, 6 m. E., are without a rival in the Balkan

Peninsula.

Dolnja Tuzla was called by the Romans Ad Salinas. Constantine Porphyrogenitus mentions it, in the 10th century, as Salenes; in other medieval documents it appears as Sou, Sow or Soli. Its modern name is derived from the Turkish tuz, " salt." In 1690 the Austrians routed the Turks at Gornja Tuzla, and removed the Franciscan friars, with about 3000 other Roman Catholics, into Slavonia.

DOLOMIEU, DEODAT GUY SILVAIN TANCREDE GRATET

DE (1 750-1801), French geologist and mineralogist, was born at Dolomieu, near Tour-du-Pin,in the department of Isere in France, on the 24th of June 1750. He was admitted in his infancy a mem- ber of the Order of Malta. In his nineteenth year he quarrelled with a knight of the galley on which he was serving, and in the duel that ensued killed him. He was condemned to death for his crime, but in consideration of his youth the grand master granted him a pardon, which, at the instance of Cardinal Torrigiani, was confirmed by Pope Clement XIIL, and after nine months' imprisonment he was set at liberty. Throughout that period he had solaced himself with the study of the physical sciences, and during his subsequent residence at Metz he continued to devote himself to them. In 1775 he published his Recherches sur la pesanteur des corps A dijferentes distances du centre de la terre, and two Italian translations of mineralogical treatises by A. F. Cronstedt (1702-1765) and T. O. Bergman (1735-1784). These works gained for him the honour of election as a corresponding member of the Academie des Sciences at Paris. To obtain leisure to follow his favourite pursuits Dolomieu now threw up the commission which, since the age of fifteen, he had held in the carabineers, and in 1777 he accompanied the oailli (afterwards Cardinal L. R. E.) de Rohan to Portugal. In the following year he visited Spain, and in 1780 and 1781 Sicily and the adjacent islands. Two months of the year 1782 were spent in examining the geological structure of the Pyrenees, and in 1783 the earth- quake of Calabria induced him to go to Italy. The scientific results of these excursions are given in his Voyage aux ties de Lipari (1783); Mimoire sur le tr emblement de terre de la Calabre (1784); MSmoire sur les ties Ponces, et catalogue raisonnt des produits de VEtna (1788) and other works. In 1789 and 1790 he busied himself with an examination of the Alps, his observations on which form the subject of numerous memoirs published in the Journal de physique. The mineral dolomite, which was named after him, was described by Dolomieu in 1791. He returned to France in that year, bringing with him rich collections of minerals. On the 14th of September 1792 the

due de la Roche- foucauld, with whom he had been for twenty years on terms of the closest intimacy, was assassinated at Forges, and Dolomieu retired with the widow and daughter of the duke to their estate of Roche Guyon, where he wrote several important scientific papers. The events oithe 9th Thermidor (July 27, 1794) having restored the country to some tranquillity, Dolomieu recommenced his geological tours, and visited various parts of France with which he had been previously unacquainted. He was in 1 796 appointed engineer and professor at the school of mines, and was chosen a member of the Institute at the time of its formation. At the end of 1797 he joined the scientific staff which in 1798 accompanied Bonaparte's expedition to Egypt. He had proceeded up the Nile as far asCairo when ill-health made his return toEurope necessary, and on the 7th of March 1799 he set sail from Alexandria. His ship proving unseaworthy put into Taranto, and as Naples was then at war with France, all the French passengers were made prisoners. On the 2 2nd of May they were carried by ship to Mes- sina, whence, with the exception of Dolomieu, they embarked for the coast of France. Dolomieu had been an object of the hatred of the Neapolitan court since 1783, when he revealed to the grand master of his order its designs against Malta, and the calumnies of his enemies "on that island served now as a pretext for his detention. He was confined in a pestilential dungeon, where, clothed in rags, and having nothing but a little straw f$r a bed, he languished during twenty-one months. Dolomieu, however, did not abandon himself to despair. Deprived of writing materials, he made a piece of wood his pen, and with the smoke of his lamp for ink he wrote upon the margins of a Bible, the only book he still possessed, his treatise Sur la philosophie minSralogique el sur I'espece minerale (1801). Friends entreated, but in vain, for his liberty; it was with difficulty that they succeeded in furnishing him with a little assistance, and it was only by virtue of a special clause in the treaty between France and Naples that, on the 15th of March 1801, he was released. On his arrival in France he commenced the duties of the chair of mineralogy at the museum

of natural history, to which, after the death of Daubenton, he had been elected in January 1800. His course of lectures concluded, he revisited Switzerland. Returning thence he reached the residence of his brother-in-law at CMteau-Neuf, in the department of Sa6ne-et-Loire, where he was seized with a fever, to which in a few days he succumbed, on the 26th of November

1801.

Dolomieu's geological theories are remarkable for originality and boldness of conception. The materials constituting the primordial globe he held to have arranged themselves according to their specific gravities, so as to have constituted a fluid central sphere, a solid crust external to this, next a stratum of water, and lastly the atmosphere. Where water penetrated through the crust, solidification took place in the underlying fluid mass, which enlarging in consequence produced rifts in the superincumbent rocks. Water rushing down through the rifts became decom- posed, and the resulting effervescence occasioned submarine volcanoes. The crust of the earth he believed to be continually increasing in thickness, owing to the deposition of aqueous rocks, and to the gradual solidification of the molten interior, so that the volcanic eruptions and other geological phenomena of former must have been of far greater magnitude and frequency than those of recent times.

See Lacepede, " £loge historique de Dolomieu," in Memoires de la classe des sciences de I'lnstitut (1806); Thomson, in Annals of Philosophy, vol. xii. p. 161 (1808).

DOLOMITE, a mineral species consisting of calcium and magnesium carbonate, CaMg (003)2, and occurring as rhombo- hedral crystals or large rock-masses. Analyses of most well- crystallized specimens correspond closely with the above formula, the two carbonates being present in equal molecular proportions (CaC0 3 ,54-3S; MgC03,4S-6s%). Normal dolomite is thus not an isomorphous mixture of calcium and magnesium carbonates, but a double salt; and any variations in composition are to be explained by the isomorphous mixing of this double salt with carbonates of calcium, iron, magnesium, manganese, and rarely of zinc and cobalt.

In crystalline form dolomite is very similar to calcite, belonging to the same group of rhombohedral carbonates; the primitive rhombohedron, r (100), parallel to the faces of which there are perfect cleavages, has interfacial angles of , 73 45', the angle of the cleavage rhombohedron of calcite being 74 55'. A specially characteristic feature is that this rhombohedron is fre- quently the only form present on the crystals (in calcite it is rare except in combination with other forms); the faces are also usually curved (fig. 1), sometimes to an extraordinary degree giving rise to saddle-shaped crystals (fig. 2). Crystals with plane faces are usually twinned, there being an interpenetration of two rhombohedra with the vertical axes parallel. The secondary twin-lamination, parallel to

the obtuse rhombohedron e (no), so common in calcite, does not exist in dolomite. In the degree of symmetry possessed by the crystals there is, however, an important difference be- tween calcite and dolomite; the former has the full number of planes and axes of symmetry of a rhombohedral crystal, whilst the latter is hemihedral with parallel faces, having only an axis of triad symmetry and a centre of sym- metry. This lower degree of symmetry, which is the same as that of dioptase and phenacite, is occasionally shown by the presence of an obliquely placed rhombohedron, and also by the want of symmetry in the etching and elasticity figures on the faces of the primitive rhombohedron.

Dolomite is both harder (H. = 3j-4) and denser (sp. gr. 2-85) than calcite. The two minerals may also be readily distinguished

Fig. 1.

Fig. 2.

by the fact that dolomite is not acted upon by cold, dilute acids (see below, Dolomite Rock). Crystals of dolomite vary from transparent to translucent, and often exhibit a pearly lustre, especially when the faces are curved; the colour is usually white or yellowish.

The crystallized mineral was first examined chemically by P. Woulfe in 1779, and was named compound-spar by R. Kirwan in 1784; other early names are bitter-spar, rhomb-spar and pearl-spar (but these included other rhombohedral carbonates). The name dolomite {dolomie of N. T. de Saussure, 1792) is in honour of the French geologist, D. G. Dolomieu, who in 1791 noted that certain Tyrolese calcareous rocks and Italian marbles effervesce only slightly in contact with acid; this name was for many years applied to the rock only, but was later extended to the crystallized mineral, first in the form dolomite-spar.

In the white crystalline dolomite-rock of the Binnenthal near Brieg in Switzerland beautiful water-clear crystals of dolomite are found; and crystallized masses occur embedded in serpentine, talc-schist and other magnesian silicate rocks. The best crystal- lized specimens are, however, usually found in metalliferous deposits; for example, in the iron mines of Traversella near Ivrea in Piedmont (as large twinned rhombohedra) and Cleator Moor in Cumberland; in the deposits of lead and zinc ores at Alston in Cumberland, Laxey in the Isle of Man, Joplin in Missouri; and in the silver veins of Schemnitz in Hungary and Guanajuato in Mexico.

Several varieties of dolomite have been distinguished, depending on differences in structure and chemical composition. Miemite is a crystallized or columnar variety, of a pale asparagus-green colour, from Miemo near Volterra in Tuscany; taraspite is a similar variety from Tarasp in Switzerland. Gurhofite, from Gurhof near Aggsbach in Lower Austria, is snow-white, compact and porcellanous. Brossite, from the Brosso valley near Ivrea in Piedmont, and tharandite, from Tharand in Saxony, are crystal- lized varieties containing iron. Closely related is the species ankerite (q.v.). (L. J. S.)

Dolomite Rock. — The rock dolomite, also known as dolomitic or magnesian limestone, consists principally of the mineral of the same name, but often contains admixture of other substances, such as calcite, quartz, carbonate and oxides of iron, argillaceous material, and chert or chalcedony. Dolomites when very pure and well crystallized may be snowy white (e.g. some examples from the eastern Alps), but are commonly yellow, creamy, brownish or grey from the presence of impurities. They tend to be crystalline, though on a fine scale, and appear under the microscope composed of small sharply angular rhombohedra, with a perfect cleavage and very strong double refraction. They can be often recognized by this, but are most certainly dis- tinguished from similar limestones or marbles by tests with weak acid. Dolomite dissolves only very slowly in dilute hydrochloric acid in the cold, but readily when the acid is warmed; limestones are freely attacked by the acid in either state. Magnesian lime- stones, which contain both dolomite and calcite, may be etched by exposing polished surfaces for a brief time to cold weak acid; the calcite is removed, leaving small pits or depressions. The distribution of the calcite may be rendered more clear by using ferric chloride solution. This is decomposed, leaving a yellow stain of ferric hydrate where the calcite occurred. Alternatively, a solution of aluminium chloride will serve; this precipitates gelantinous alumina on contact with calcite and the film can be stained with aniline dyes (Lemberg's solution). The dolomite is not affected by these processes.

Dolomites of compact structure have a higher specific gravity than limestones, but they very often have a cavernous or drusy character, the walls of the hollows being lined with small crystals of dolomite with a pearly lustre and rounded faces. They are also slightly harder, and for these and other reasons they last better as building stones and wear better when used for paving or road- mending. Dolomites are rarely fossiliferous, as the process of dolomitization tends to destroy any organic remains originally present. As compared with limestones they are less frequently well bedded, but there are exceptions to this rule. Many

dolomites, particularly those of the north of England, show a very remarkable concretionary structure. The beds look as if made up of rounded balls of all sizes from a foot or two in diameter downwards. Often they are stuck together likepilescf shot or bunches of grapes. They are composed of fibrous radiate calcite crystals, which by some kind of concretionary action have segregated from the dblomitic material and grouped themselves together in this way. Other concretions from these beds resemble bunches of corals, tufts of plants, or present various strange imitative forms.

Dolomite, Unlike calcite, is not secreted by marine animals to build up the hard parts of their skeletons, and it is generally agreed also that dolomite is only very rarely and under excep- tional conditions deposited directly from solution in water. On the other hand, there is much evidence to show that limestones may absorb or be partly replaced by magnesium carbonate, and the double salt dolomite substituted for calcite by one of those processes which are described as " metasomatic." Thus the Carboniferous limestones of various parts of Britain pass into dolomites along lines of joint, fissure or fault, or occasionally along certain bedding planes. At the same time therock becomes crystalline, its minute structure is altered, its fossils are effaced, and as dolomite has a higher specific gravity than limestone, contraction results and cavities are formed. The prevalence of crystalline, concretionary and drusy structures in dolomite can thus be simply explained. The process may actually be studied in many " magnesian limestonss," in which by means of the microscope we may trace the gradual growth of dolomite crystals taking place simultaneously with the destruction of the original features of the limestone. Recent investigations in coral reefs show that these changes are going on at the present day at no considerable depths and in rocks which have not long con- solidated.

All this goes to prove that the double carbonate of calcium and magnesium is under certain conditions a more stable salt than either of the simple carbonates, and that these conditions recur in nature with considerable frequency. Experiments have proved that at moderately high temperatures (100° to 200 C.) solutions of magnesium salts will convert calcite into dolomite in the laboratory, and that aragonite is even more readily affected than calcite. The analogy with dolomitization of limestones is strong but not complete, as the latter process must take place at ordinary temperatures and

approximately under atmospheric pressures. No completely satisfactory explanation of the change, from the Standpoint of the geologist, has as yet been advanced, though much light has been thrown upon the problem. Many limestones are rich in aragonite, but this in course of time tends to re- crystallize as calcite. Magnesium salts are abundant in sea- water, and in the waters of evaporating enclosed coral lagoons and of many bitter lakes. Calcite is more soluble than dolomite in water saturated with carbonic acid and would tend to be slowly removed from a limestone, while the dolomite increased in relative propor- tion. Dolomite also being denser than calcite may be supposed to replace it more readily when pressure is increased. These and many other factors probably co-operate to effect the transmuta- tion of limestones into dolomites.

Examples of dolomitization may be obtained in practically every geological formation in which limestones occur. The oldest rocks are most generally affected, e.g. the Cambrian lime- stones of Scotland, but the change occurs, as has already been stated, even in the upraised coral reefs of the Indian and Pacific oceans which are very recent formations. It is very interesting to note that dolomites are very frequent among rocks which indicate that desert or salt-lake conditions prevailed at the time of their deposit. The dolomite or magnesian limestone of the English Permian is an instance of this. The explanation may be found in the fact that the waters of bitter lakes are usually rich in magnesium salts which, percolating through beds of limestone, would convert them into dolomite. Among the most famous dolomites are those of the Dolomite Alps of Tirol. They are of Triassic age and yield remarkably picturesque mountain scenery; it is believed that some were originally coral reefs; they are now highly crystalline and often contain interesting minerals and ores.

The galena limestone of the North American Trenton rocks is mostly a dolomite.

Dolomites furnish' excellent building stones, and those of the north-east of England (Mansfield stone, &c.) have long been regarded with great favour on account of their resistance to decomposition. They vary a good deal in quality, and have not all proved equally satisfactory in practice. Part of the Houses of Parliament at Westminster is built of dolomite. (J. S. F.)

DOLOMITES, THE, a mountain district in the South Tirolese Alps, though sometimes it is erroneously considered to form part of some other chain than the Alps. The distinguishing feature of this district is

that it is composed of magnesian limestone, which rises in peaks of a most singular degree of sharpness and streaked by veins of the most startling colours. Nowadays it has become well known to tourists, who, however, keep mainly to a few great centres, though most of the more striking peaks were first ascended in the late sixties and early seventies of the 19th century by' English mountaineers. Roughly speaking the Dolomite region lies between the Brenner railway from Franzensfeste to Trent (W.) and the road over the Monte Croce Pass from Innichen in the Drave valley by way of the Sexten glen and the Piave valley to Belluno and Feltre (E.). On the north it is limited by the railway line from Innichen to Frahzenfeste, and on the south by the railway and road from Trent to Feltre. The highest summit is the Marmolata (10,972 ft.), but far more typical are the Sorapiss, the Cimon della Pala, the Larigkofel, the Pelmo, the Drei Zinnen, the Sass Maof and the Rosengatten (see Alps). Among the chief tourist resorts are St Ulrich (in the Groden valley), San Martino di Castrozza (near Primiero), Caprile and Cortina d'Ampezzo.

Besides the Dolomites included in the above region there are several other Dolomite groups (though less extensive) in the Alps. N.W. of Trent rises the Tosa group, while in Switzerland there are the Piz d'Aela group, S.W. of Bergiin on the Albula Pass route, and the curious little group N. of the village of Spliigen, besides other isolated peaks between the St Gotthard and Lukmanier Passes. In Dauphine itself (the home of the geologist Dolomieu) the mountain districts of the Royannais, of the Vercors, and of the Devoluy (all S.W. of Grenoble) are more or less Dolomitic in Character.

See J. Gilbert and G. C. Churchill, The Dolomite Mountains (London, 1864); Miss L. Tuckett, Zigzagging among Dolomites (London, 1871); P. Grohmann, Wanderungen in den Dolomiten (Vienna, 1877); L. Sinigaglia, Climbing Reminiscences of the Dolo- mites (London, 1896); The Climbs of Norman- Neruda (London, 1899); V. Wolf von Glanvell, Dolomitenfiihrer (Vienna, 1898) ; J. Ball, Western Alps (new ed., London, 1898, section 9, Rte. P. French Dolomites). (W. A. B. C)

DOLPHIN, a name properly belonging to the common cetacean mammal known as Delpkinus delphis, but also applied to a number of more or less nearly allied species. The dolphins, bottle-noses, or, as they are more commonly called, " porpoises," are found in abundance in all seas, while some species are inhabitants of large rivers, as the Amazon. They are among the

The Common Dolphin (Delphinus delphis).

smaller members of the cetacean order, none exceeding 10 ft. in length. -Their food is chiefly fish, for the capture of which their long narrow beaks, armed with numerous sharp-pointed teeth, are well adapted, but some also devour crustaceans and molluscs. They are mostly gregarious, and the agility and grace of their movements in the water are themes of admiration to the spectators when a " school of porpoises " is playing round the bows of a vessel at sea.

The type of the group is the common dolphin (D. delphis) of the Mediterranean and Atlantic, which usually measures 6 to 8, ft. in length, and is thickest near the centre, where the back fin rises to

a height of 9 or 10 in., and whence the body tapers towards both extremities. The forehead descends abruptly to the base of the slightly flattened beak, which is about 6 in. long, and is separated from the forehead by a transverse depression. ■ The mouth is armed with sharp, slightly curved teeth, of uniform size, varying in number from forty to fifty on each side of both jaws. The aper- ture of the ear is exceedingly minute; the eyes are of moderate size and the blow-hole is crescent-shaped. The colour of the upper surface is black, becoming lighter on the flanks, and perfectly white below. Dolphins are gregarious, and large herds often follow ships. They exhibit remarkable agility, individuals having been known to leap to such a height out of the water as to fall upon the deck. Their gambols and apparent relish for human society have attracted the attention of mariners in all ages, and have probably given rise to the many fabulous stories told of dolphins. Their appearance at sea was regarded as a good omen, for although it presaged a tempest, yet it enabled the sailors to steer for a place of safety. The dolphin is exceedingly voracious, feeding on fish, cuttlefishes and crustaceans. On the south coast of England it lives chiefly on pilchard and mackerel, and when in pursuit of these is often taken in the nets. The female brings forth a single young one, which she nurses most carefully. Her milk is abundant and rich, and during the operation of suckling, the mother floats in a slightly sidelong position, so as to allow of the necessary respiration in herself and her young. The dolphin was formerly supposed to be a fish, and allowed to be eaten by Roman Catholics when the use of flesh was prohibited, and it seems to have been esteemed as a delicacy by the French. Among the seafaring population of Britain the name " dolphin " is most usually given to the beautifully coloured fish Coryphaena hippuris —the

dorado of the Portuguese, and it is to the latter the poet is alluding when he speaks of " the dying dolphin's changing hues."

Many other allied genera, such as Prodelphinus, Steno, Lagenorhynchus, &c, are also included in the family Delphinidae, some of which live wholly in rivers.

Beside these there is another group of largely freshwater species, constituting the family Platanistidae, and typified by the susu (Platanista gangetica), extensively distributed throughout nearly the whole of the river-systems of the Ganges, Brahmaputra and Indus, ascending as high as there is water enough to swim in, but never passing out to sea. It is about 8 ft. long, blind and feeds on small fish and crustaceans for which it gropes with its long snout in the muddy waters at the bottom. Inia geqffroyensis, the single species of its genus, frequents the Amazon, and reaches an extreme length of 8 ft. It is wholly pink or flesh-coloured, or entirely black, or black above and pink beneath. A third is the La Plata dolphin, Stenodelphis blainvittei, a species about 5 ft. in length. Its colour is palish brown, which harmonizes with the brown-coloured water of the estuary of the Rio de la Plata. See Cetacea. (R. L.)*

DOMAT, or Daumat, JEAN (1625-1696), French jurisconsult, was born at Clermont in Auvergne, on the 30th of November 1625. He was closely in sympathy with the Port-Royalists, was intimate with Pascal, and at the death of that celebrated philo- sopher was entrusted with his private papers. He is principally known from his elaborate legal digest, in three volumes 4to, under the title of Lois civiles dans leur ordre naturel (1689), — an undertaking for which Louis XIV. settled on him a pension of 2000 livres. A fourth volume, Le Droit public, was published in 1697, a year after his death. This is one of the most important works on the science of law that France has produced. Domat endeavored to found all law upon ethical or religious principles, his motto being L'homme est fait par Dieu et pour Dieu. Besides the Lois Civiles, Domat made in Latin a selection of the most common laws in the collections of Justinian, under the title of Legum delectus (Paris, 1700; Amsterdam, 1703); it was sub- sequently appended to the Lois civiles. His works have been translated into English. Domat died in Paris on the 14th of March 1696.

In the Journal des savants for 1843 are several papers on Domat by Victor Cousin, giving much information not otherwise accessible.

DOMBES, a district of eastern France, formerly part of the province

of Burgundy, now comprised in the department of Ain, and bounded W. by the Saone, S. by the Rhone, E. by the Ain and N. by the district of Bresse. The region forms an undulating plateau with a slight slope towards the north-west, the higher ground bordering the Ain and the Rhone attaining an average height of about 1000 ft. The Dombes is characterized by an impervious surface consisting of boulder clay and other relics of glacial action. To this fact is due the large number of rain-water pools, varying for the most part from 35 to 250 acres in size which cover some 23,000 acres of its total area of 282,000 acres. These pools, artificially created, date in many cases from the 15th century, some to earlier periods, and were formed by landed proprietors who in those disturbed times saw a surer source of revenue in fish-breeding than in agriculture. Disease and depopulation resulted from this policy and at the end of the 1 8th century the Legislative Assembly decided to reduce the area of the pools which then covered twice their present extent. Drainage works were continued, roads cut, and other improve- ments effected during the 19th century. Large numbers of fish, principally carp, pike and tench are still reared profitably, the pools being periodically dried up and the ground cultivated. . The Dombes (Lat. Dumbae) once formed part of the kingdom of Aries. In the nth century, when the kingdom began to break up, the northern part of the Dombes came under the power of the lords of Bauge, and in 1218, by the marriage of Marguerite de Bauge with Humbert IV. of Beaujeu, passed to the lords of Beaujeu. The southern portion was held in succession by the lords of Villars and of Thoire. Its lords took advantage of the excommunication of the emperor Frederick II. to assert their complete independence of the Empire. In 1400, Louis II., duke of Bourbon, acquired the northern part of the Dombes, together with the lordship of Beaujeu, and two years later bought the southern part from the sires de Thoire, forming the whole into a new sovereign principality of the Dombes, with Trevoux as its capital. The principality was confiscated by King Francis I. in 1523, along with the other possessions of the Constable de Bourbon, was granted in 1527 to the queen-mother, Louise of Savoy, and after her death was held successively by kings Francis I., Henry II. and Francis II., and by Catherine de' Medici. In 1561 it was granted to Louis, duke of Bourbon- Montpensier, by whose descendants it was held till, in 1682, " Mademoiselle," the duchess of Montpensier, gave it to Louis XIV. 's bastard, the duke of Maine, as part of the price for the release of her lover Lauzun. The eldest son of the duke of Maine, Louis Auguste de Bourbon (1700-1755), prince of Dombes, served in the army of Prince Eugene against the Turks (1717), took part in the War of the Polish Succession (1 733-1 734), and in that of the

Austrian Succession (1742-1747). He was made colonel-general of the Swiss regiment, governor of Languedoc and master of the hounds of France. He was succeeded, as prince of Dombes, by his brother the count of Eu (?.».), who in 1762 surrendered the principality to the crown. The little principality of Dombes showed in some respects signs of a vigorous life; the prince's mint and printing works at Trevoux were long famous, and the college at Thoissey was well endowed and influential.

See A. M. H. J. Stokvis, Manuel d'histoire (Leiden, 1889); Guichenon, Histoire de Dombes (1863, 1872); and various works by M. C. Guigue, including Bibliotheca Dumbensis (with Valentin Smith)

(1856-1885).

DOMBROWSKI, JAN HENRYK (1755-1818), Polish general, was born at Pierszowice in the palatinate of Cracow, on the 29th of August 1755. Brought up in Saxony, he served for some years in the Saxon army; but when, in 1791, the Polish diet recalled all Poles serving abroad, he returned to his native land. Under Poniatowski, he took part in the campaign of 1792 against the Russians. In 1794 he distinguished himself under Kosciusko in the defence of Warsaw. For two years thereafter he lived in retirement, declining the offers of high ranks in their armies made to him by Russia and Prussia. He then went to Paris, and in January 1797 was authorized by the government of the Cisalpine Republic to organize a Polish legion. This task he executed at

Milan. In command of his legion he played an important part in the war in Italy, entered Rome in May 1798, and distinguished himself greatly at the Trebbia (June 19, 1799), and in other battles and combats of 1799-1801. After the peace of Amiens he passed, as general of division, into the service of the Italian republic. Summoned by Napoleon in 1806 to promote a rising in Poland, he organized several divisions of Poles, and distinguished himself at Danzig and at Friedland. In 1809 he served in the Polish campaign and in 181 2 he commanded a. Polish division in the Grande Armie, being wounded at the passage of the Beresina. He fought under Marmont at the battle of Leipzig (1813), and in the following year returned to Poland. He was one of the generals entrusted by the tsar with the reorganization of the Polish army, and was named in 181 5

general of cavalry and senator palatine of the new kingdom of Poland. He retired, however, in the following year, to his estates in Posen. General Dombrowski died at his seat of Wina-Gora in Posen on the 26th of June 1818. He wrote several military historical worksinthe Polish language.

DOME (Lat domus, house; Ital. duomo, cathedral), an archi- tectural term, derived from a characteristic feature of Italian cathedrals, correctly applied only to a spherical or spheroidal vault, the horizontal plan of which is always a circle. It may be supported on a circular wall, as in the Pantheon at Rome; or on a drum, as in the later Byzantine churches and generally so in the Renaissance styles; or be carried over a square or polygonal area, in which case the base of the dome is connected to the lines of the main wall by pendentives, squinches, corbels or a series of con- centric arches, or two of these combined. Its section may be semi- circular, pointed, ovoid or segmental; in the latter case it is usually termed a cupola, although the pendentives which carry it continue, on the diagonal lines, the complete spherical dome, as in the entrance vestibule on the south side of the Sanctuary at Jerusalem, attributed to Herod, or in those crowning the bays of the Golden Gateway by Justinian. The dome may be constructed in horizontal courses, as in the " beehive " tombs at Mycenae, with joints radiating to the centre, or a compromise between the two, in a series of small segments of circles, as in the Temple of Jupiter in Diocletian's palace at Spalato, or again with the lower portion in horizontal courses and the upper portion with arches, as in the Pantheon at Rome.

The dome is probably one of the earliest forms of covering invented by man, but owing probably to its construction in ephemeral materials, such as the unburnt bricks in Chaldaea, there are no examples existing. But in a bas-relief (see Archi- tecture, fig. 10), brought by Layard from Kuyunjik, are representations of semicircular and ovoid domes, which show that the feature was well known in Assyria, and as they build domes of the same nature down to the present day and without centring of any kind, it suggests that they may have existed from the remotest ages. The most ancient examples in Europe are those of the " beehive " tombs at Mycenae and elsewhere in Greece, ascribed generally to the nth century B.C. In a sense, they are not true domes, because they are built in horizontal courses of stone, which act like the voussoirs of an arch in resist- ing the thrust of the earth at the back. This did not exist in the Choragic Monument of Lysicrates or other circular buildings in Greece, because their vertical sections were not portions of circles. For this reason, the conical vault of the Baths in Pompeii is not a

dome. The circular Laconicon in the Baths of Titus (a. d. 72) may have been domed, and the great hemicycles in the Thermae must certainly have been roofed with semi-domes.

The earliest Roman domes are those of the great circular halls at Baiae near Naples, described as temples, but really forming part of the immense bathing establishments there, the favourite place of resort of the Romans during the latter part of the Republic. The largest on the east side of the Lake of Avernus, known as the Temple of Apollo, is a circular hall with an internal diameter of 100 ft. Those of Diana/Mercury and Venus at Baiae, were 96, 66 and 60 ft. respectively. The vaults were all built in tufa with horizontal courses in brick and cement. Half of the dome of the Temple of Mercury had fallen down, showing the

section to have been nearly that of an equilateral arch. From the fact that there were pierced openings or windows in all these domes, they probably constituted the frigidaria of the baths.

The first example still existing in Rome is that of the Pantheon (A.D.112), where a circular dome, 142 ft. in diameter, rests on a circular wall, its height being about equal to its diameter. The lower courses of this dome, built in the Roman brick or tile, were, up to the top of the third coffer, all laid in horizontal courses; above that, the construction is not known for certain ; externally a series of small arches is shown, but they rested on a shell already built. The so-called Temple of Minerva Medica (now recognized as the Nymphaeum of the Baths of Gallienus, a. d. 366) is the next dated example. The Nymphaeum was decagonal on plan, so that small pendentives were required to carry the brick dome.

The domed Laconicon of the Thermae of Diocletian (a.d. 302) still exists as the vestibule of the church of Santa Maria degli Angeli. Of Constantine's time there are two small domed examples in the tomb of S. Costanza and the Baptistery of the Lateran, both in Rome, and one in the tomb of Galla Placidia at Ravenna (c. a.d. 450). From these we pass to the Sassanian domes at Serbistan and Firuzabad, of the 4th and 5th centuries respectively. These were built in brick and rested on square pendentives. In section they were ovoid. In Syria, the dome over the octagonal church at Esra, built in stone and dated a.d. 515, is also ovoid, its height being equal to its diameter, i.e. 28 ft. This, as well as the Sassanian domes, was built without centring. The next example is that of the church of Sta Sophia at Constantinople, the finest example existing, both in its con- ception and execution. It was built by Justinian (537-552) from the designs

of Anthemius of Tralles and Isidorus of Miletus. The dome is 104 ft. in diameter, and is carried on pendentives over a square area. The construction is of brick and stone in alternate courses, and the lower part of the dome is pierced with forty windows, which give it an extraordinary lightness. The height from the pavement of the church to the soffit of the dome is 1 79 f t. No dome of similar dimensions was ever again attempted by the Byzantine architects, and the principal difference in later examples was the raising of the dome on a circular drum pierced with windows.

In order to lighten the dome erected over the church of San Vitale, at Ravenna, it was constructed with hollow cylindrical jars, fitted, the end of one into the mouth of the other; a similar contrivance was adopted in the tomb of the empress Helena (the Torre Pignatiara), the vaults of the Circus of Maxentius on the Via Appia, and the outer aisles of San Stefano, all at Rome, thus dispensing with the buttresses of Sta Sophia.

The domes of the earlier mosques in Cairo were built on the model of Sta Sophia, with windows pierced round the base of the dome and external buttresses between them; these domes were all built in brick coated over with cement or stucco. At a later date, and when built in stone, the upper portion was raised in height and terminated with a point on which a finial was placed. These are the domes inside and outside Cairo, which are carved with an infinity of geometrical patterns interwoven with con- ventional floral decoration. The upper portion of the dome is very thin, so that there is little weight and comparatively no thrust, and it is to these facts that we probably owe their preservation.

In India, in the " great mosque " of Jama Masjid (a.d. 1560) and the Gol Gumbaz, or tomb of Mahommed Adil Shah (a. d. i 630) at Bijapur, the domes are carried on pendentives consisting of arches crossing one another and projecting inwards, and their weight counteracts any thrust there may be in the dome. It is possibly for a similar reason that in the Jama Masjid of Shah Jahan at Delhi (163 2-1638) and the Taj Mahal (a.d. 1630) the domes assume a bulbous form, the increased thickness of the dome below the haunches by its weight served as a counterpoise to any thrust the upper part of the dome might exert. The form is not much to be admired, and when exaggerated, as it is in the churches of Russia, where it was introduced by the Tatars, at times it became monstrous.

DOMENICHINO

From these we pass to the domes of Perigord and La Charente, the earliest of which date from the commencement of the nth century. Of the western dome of St Etienne at Perigueux (a.d. 14) only the pendentives remain, sufficient, however, with later examples, to show that these French domes were different from the Byzantine both in construction and form. The pendentives are built on horizontal courses of stone, and the voussoirs of the pointed arches which carried them form part of the pendentives ; a few feet above the top of the arches is a moulding and a ledge, above which the dome, ovoid in section, is built. The principal examples following St fitienne are those of S. Jean-de-Cole, Cahors, Souiilac,Solignac,Angouleme,Fontev- rault, and lastly St Front at Perigueux, built about n 50, in imitation of St Mark's at Venice. The domes of the latter church were introduced into the old basilica about 1063, and were based on the church of the Apostles at Constantinople, which was pulled down in the 15th century, so that we have only the clear descrip- tion of Procopius to go by. The domes over the north and south transepts and the choir of St Mark's are smaller than those over the nave and crossing, because they had to be fitted in between more ancient structures. The construction of the domes of St Mark's is not known, but at St Front the general design only was copied, and they built them in the Perigordian manner. The masons from Perigord are also responsible for the domes of the Crusaders' churches in Palestine and for some of the early churches still remaining in Cyprus. The domes of San Cyriaco at Ancona and Sant' Antonio at Padua were based upon those of St Mark's at Venice.

In central Italy we have the dome (elliptical in plan) of the cathedral of Pisa, and it was a favourite feature over the crossing of the churches throughout Italy, being generally carried on squinch pendentives. The domes of the baptisteries of Florence, Parma, Trieste and Piacenza, are only internal, being enclosed with vertical walls and a sloping roof. In Sicily, on account of the strong Saracenic influence, the squinches are simple versions of the stalactite pendentives described under Architecture: Mahommedan (q.v.), the earliest example being found in the church of San Giovanni-dei-Leprosi (a.d. 1072), all the domes being ovoid in section.

Except in Perigord and La Charente, domes are not found in the churches in France, but in Spain they were introduced over the crossing at Burgos, Tarragona and Salamanca cathedrals, and were

made architectural features externally. This is rarely found in Germany, for although in the cathedrals of Worms, Spires and Mainz, and in the churches of St Martin and Sankt Maria im Capitol at Cologne, the crossings are covered by domes, always carried on squinch pendentives, externally they built lanterns round them.

In the Renaissance styles, the dome was at once accepted as the principal characteristic feature, and its erection over the crossing of Santa Maria del Fiore at Florence was the first important work entrusted to Brunelleschi. The dome was begun in 1422, and finished in 1431, with the exception of the lantern, begun the year of his death in 1444, and completed in 1471. The dome, which is octagonal on plan, is 139 ft. in diameter, and is built with an inner and outer casing, concentric one with the other, tied together by ribs between them: the lower portion is stone, the upper part is brick.

The double shell was also employed by Michelangelo in the dome of St Peter's at Rome, the outer shell being raised higher than the lower and connected by ribs one with the other. The diameter is 140 ft. and the construction in brick, similar to that at Florence, but the ribs are in stone from Tivoli. In both these cases the weight of the lantern was a very important considera- tion, and is responsible for the repeated repairs required and the introduction of additional ties.

In this respect Sir Christopher Wren solved the difficulty at St Paul's cathedral, London, in another way: he provided three shells, the lower one with an eye in the centre forming the inner dome as seen from the interior; the middle one of conical form, and the outer one framed in timber and covered with lead. The conical shell carries the lantern, the weight of which is carried

direct to the base, bound with iron ties, with such additional strength as may be given by the portico round.

In all these cases these domes are built on lofty drums, so that externally they present quite a different appearance to those of the Pantheon at Rome, or Sta Sophia in Constantinople.

Of other examples, the domes of the Invalides in Paris, by Mansard (1 706) , and of the Pantheon by Soufflot (1735), have each three shells, the former having a graceful outline. In Spain the dome of the cathedral at Granada (1530) and the Escurial (1563) ; in Italy those of Sta Maria della Salute at Venice, the small example of Bramante at Todi (1480) and of the Carignano at Genoa, are worth recording, as also the dome of the Suleimanie mosque at Constantinople (1550). See plates illustrating Architecture; and Indian Architecture. (R. P. S.)

DOMENICHINO (or Domenico), ZAMPIERI (1581-1641), Italian painter, born at Bologna, on the 21st of October 1581, was the son of a shoemaker. The diminutive form of Christian name by which he is constantly known indicates his short stature. He was placed, when young, under the tuition of Denis Calvart; but having been treated with great severity by that master, he left him, and became a pupil in the academy of the Caracci, under Agostino. Towards the beginning of the 17th century he went to Rome, at the invitation of his fellow-pupil and intimate Albani, and prosecuted his studies under Annibale Caracci. The faculty of Domenichino was slow in its development. He was at first timid and distrustful of his powers; while his studious, unready and reserved manners were mis- understood by his companions for dulness, and he obtained the nickname of the " Ox " (Bue). But Annibale Caracci, who observed his faculties with more attention, predicted that the apparent slowness of Domenichino's genius would in time produce what would be an honour to the art of painting. When his early productions had brought him into notice, he studied with extreme application, and made such advance as to raise his works into a comparison with those of the most admired masters of the time. From his acting as a continual censor of his own works, he became distinguished amongst his fellow-pupils as an accurate and expressive designer; his colours were the truest to nature; Mengs, indeed, found nothing to desire in his works, except a somewhat larger proportion of elegance. That he might devote his whole powers to the art, Domenichino shunned all society; or, if he occasionally sought it in the public theatres and walks, this was in order better to observe the play of the passions in the features of the people — those

of joy, anger, grief, terror and every affection of the mind — and to commit them vividly to his tablets;thus, saysBellori, it was that he succeeded in delineating the soul, in colouring life, and calling forth heartfelt emotions, at which all his works aim. In personal character he is credited with temperance and modesty; but, besides his want of socia- bility, he became somewhat suspicious, and jealous of his master.

In Rome, Domenichino obtained employment from Cardinals Borghese, Farnese and Aldobrandini, for all of whom he painted works in fresco. The distinguished reputation which he had acquired excited the envy of some of his contemporaries. Lanfranco in particular, one of his most inveterate enemies, asserted that his celebrated " Communion of St Jerome " (painted for the church of La Carita. towards 16 14, for a pittance of about ten guineas, now in the Vatican Gallery, and ordinarily, but most irrationally, spoken of as the second or third best oil picture in the world) was an imitation from Agostino Caracci; and he procured an engraving of this master's picture of the same subject (now in the Gallery of Bologna), copies of which were circulated for the purpose of proving that Domenichino was a plagiarist. There is in truth a very marked resemblance between the two compositions. The pictures which Zampieri painted immediately afterwards, representing subjects from the life of St Cecilia, only increased the alarm of his competitors, and redoubled their injustice and malignity. Disgusted with these cabals, he left Rome for Bologna, where he remained until he was recalled by Pope Gregory XV., who appointed him principal painter and architect to the pontifical palace. In this archi- tectural post he seems to have done little or nothing, although he

was not inexpert in the art. He designed in great part the Villa di Belvedere at Frascati, and the whole of the Villa Ludovisi, and some other edifices. From 1630 onwards Domenichino was engaged in Naples, chiefly on a series of frescoes (never wholly completed) of the life of St Januarius in the Cappella del Tesoro. He settled in that city with his family, and opened a school. There the persecution against him became far more shameful than in any previous instance. The notorious so-called " Gabal of Naples " — the painters Corenzio, Ribera and Caracciolo — leagued together as they were to exclude all alien competition, plagued and decried the Bolognese artist in all possible ways; for instance, on returning in the morning

to his fresco work, he would find not infrequently that someone had rubbed out the performance of the previous day. Perpetual worry is believed to have brought the life of Domenichino to a close; contemporary suspicion did not scruple to speak broadly of poison, but this has remained unconfirmed. He died in Naples, after two days' illness, on the 15th of April 1641.

Domenichino, in correctness of design, expression of the passions, and simplicity and variety in the airs of his heads, has been considered little inferior to Raphael; but in fact there is the greatest gulf fixed between the two. Critics of the 18th century adulated the Bolognese beyond all reason or toleration; he is now regarded as commonplace in mind and invention, lacking any innate ideality, though undoubtedly a forcible, resolute and learned executant. " We must," says Lanzi, " despair to find paintings exhibiting richer or more varied draperies, details of costume more beautifully adapted, or more majestic mantles. The figures are finely disposed both in place and action, conducing to the general effect; whilst a light pervades the whole which seems to rejoice the spirit, growing brighter and brighter in the aspect of the best countenances, whence they first attract the eye and heart of the beholder. The persons delineated could not tell their tale to the ear more plainly than they speak it to the eye. The ' Scourging of St Andrew,' which he executed in competition with Guido Reni at Rome (a fresco in the church of San Gregorio), is a powerful illustration of this truthful expression, Of the two works of these masters, Annibale Caracci preferred that of Domenichino. It is said that in painting one of the executioners the artist actually wrought himself into a passion, using threatening words and actions, and that Annibale Caracci, surprising him at that moment, embraced him, exclaiming with joy, ' To-day, my dear Domenichino, thou art teaching me.' So novel, and at the same time so natural, it appeared to him that the artist, like the orator, should feel within himself all that he is representing to others." Domenichino is esteemed the most distinguished disciple of the Caracci, or second only to Guido Reni. Algarotti preferred him to the greatest masters; and Nicolas Poussin considered the painter of the " Communion of St Jerome " to be the first a/ter Raphael. His pictures of " Adam and Eve," and the " Martyrdom of St Agnes," in the Gallery of Bologna, are amongst his leading works. Others of superior interest are his first known picture, a fresco of the " Death of Adonis," in the Loggia of the Giardino Farnese, Rome; the " Martyrdom of St Sebastian," in Santa Maria degli Angeli; the " Four Evangelists," in Sant', Andrea della Valle; " Diana and her Nymphs," in the Borghese gallery; the " Assumption of the Virgin," in Santa Maria di Trastevere; and

frescoes in the neighbouring abbey of Grotta Ferrata, lives of SS. Nilus and Bartholomew. His portraits are also highly reputed. It is admitted that in his compositions he often borrowed figures and arrangements from previous painters. Domenichino was potent in fresco. He excelled also in landscape painting. In that style (in which he was one of the earliest practitioners) the natural elegance of his scenery, his trees, his well-broken grounds, the character and expression of his figures, gained him as much public admiration as any of his other performances.

See Bolognini, Life of Domenichino (1839); C. Landon, Works of Domenichino, with a Memoir (1823). (W. M. R.)

DOMESDAY BOOK, or simply Domesday, the record of the great survey of England executed for William the Conqueror. We learn from the English Chronicle that the scheme of this

survey was discussed and determined in the Christmas assembly of 1085, and from the colophon of Domesday Book that the survey (descriptio) was completed in 1086. But Domesday Book (liber) although compiled from the returns of that survey, must be carefully distinguished from them; nor is it certain that it was compiled in the year in which the survey was made. For the making of the survey each county was visited by a group of royal officers (legati), who held a public inquiry, probably in the great assembly known as the county court, which was attended by representatives of every township as well as of the local lords. The unit of inquiry was the Hundred (a subdivision of the county which had then an administrative entity), and the return for each Hundred was sworn to by twelve local jurors, half of them English and half Normans. What is believed to be a full tran- script of these original returns is preserved for several of the Cambridgeshire Hundreds, and is of great illustrative importance. The InquisitioEliensis, the " Exon Domesday " (so called from the preservation of the volume at Exeter), and the second volume of Domesday Book, also all contain the full details which the original returns supplied.

The original MS. of Domesday Book consists of two volumes, of which the second is devoted to the three eastern counties, while the first, which is of much larger size, comprises the rest of England except the most northerly counties. Of these the north- westerly portion, which had Carlisle for its head, was not con- quered till some years after the survey was made; but the omission of Northumberland and Durham has not been satis- factorily explained. There are also no surveys of London, Winchester and some other

towns. For both volumes the contents of the returns were .entirely rearranged and classified according to fiefs. Instead of appearing under the Hundreds and townships they now appeared under the names of the local " barons," i.e. those who held the lands directly of the crown in fee. In each county the list opened with the holding of the king himself (which had possibly formed the subject of separate inquiry); then came those of the churchmen and religious houses; next were entered those of the lay tenants-in-chief (barones); and last of all those of women, of the king's Serjeants (servientes) , of the few English " thegns " who retained land, and so forth. In some counties one or more principal towns formed the subject of a separate section ; in some the clamores (disputed titles to land) were similarly treated apart. But this description applies more specially to the larger and principal volume; in the smaller one the system is more confused, the execution less perfect. The two volumes are distinguished even more sharply by the exclusion, in the larger one, of certain details, such as the enumeration of the live stock, which would have added greatly to its size. It has, indeed, been suggested that the eastern counties' volume represents a first attempt, and that it was ftjund impossible, or at least inconvenient, to complete the work on the same scale.

For the object of the survey we have three sources of informa- tion: (1) the passage in the English Chronicle, which tells us why it was ordered, (2) the list, of questions which the jurors were asked, as preserved in the Inquisitio Eliensis, (3) the contents of Domesday Book and the allied records mentioned above. Although these can by no means be reconciled in every detail, it is now generally recognized that the primary object of the survey was to acertain and record the fiscal rights of the king. These were mainly (1) the national land-tax (geldum), paid on a fixed assessment, (2) certain miscellaneous dues, (3) the proceeds of the crown lands. After a great political convulsion such as the Norman conquest, and the wholesale confiscation of landed estates which followed it, it was William's interest to make sure that the rights of the crown, which he claimed to have inherited, had not suffered in the process. More especially was this the case as his Norman followers were disposed to evade the liabilities of their English predecessors. The Domesday survey therefore recorded the names of the new holders of lands and the assess- ments on which their tax was to be paid. But it did more than this; by the king's instructions it endeavoured to make a national valuation list, estimating the annual value of all the

land in the country, (i) at the time of King Edward's death, (2) when the new owners received it, (3) at the time of the survey, and further, it reckoned, by command, the potential value as well. It is evident that William desired to know the financial resources of his kingdom, and probable that he wished to compare them with the existing assessment, which was one of considerable antiquity, though there are traces that it had been occasionally modified. The great bulk of Domesday Book is devoted to the somewhat arid details of the assessment and valuation of rural estates, which were as yet the only important source of national wealth. After stating the assessment of the manor, the record sets forth the amount of arable land, and the number of plough- teams (each reckoned at eight oxen) available for working it, with the additional number (if any) that might be employed; then the river-meadows, woodland, pasture, fisheries (i.e. weirs in the streams), water-mills, saltpans (if by the sea) and other subsidiary sources of revenue; the peasants are enumerated in their several classes; and finally the annual value of the whole, past and present, is roughly estimated. It is obvious that, both in its values and in its measurements, the survey's reckoning is very crude.

Apart from the wholly rural portions, which constitute its bulk, Domesday contains entries of interest concerning most of the towns, which were probably made because of their bearing on the fiscal rights of the crown therein. These include fragments of custumals, records of the military service due, of markets, mints, and so forth. From the towns, from the counties as wholes, and from many of its ancient lordships, the crown was entitled to archaic dues in kind, such as honey. The information of most general interest found in the great record is that on political, personal, ecclesiastical and social history, which only occurs sporadically and, as it were, by accident. Much of this was used by E. A. Freeman for his work on the Norman Conquest. Although unique in character and of priceless value to the student, Domesday will be found disappointing and largely unintelligible to any but the specialist. Even scholars are unable to explain portions of its language and of its system. This is partly due to its very early date, which has placed between it and later records a gulf that is hard to bridge.

But in the Dialogus de scaccario (temp. Hen. II.) it is spoken of as a record from the arbitrament of which there was no appeal (from which its popular name of " Domesday " is said to be derived). In the middle ages its evidence was frequently in- voked in the law-courts; and even now there are certain cases in which appeal is made to its

testimony. To the topographer, as to the genealogist, its evidence is of primary importance; for it not only contains the earliest survey of a township or manor, but affords in the majority of cases the clue to its subse- quent descent. The rearrangement, on a feudal basis, of the original returns (as described above) enabled the Conqueror and his officers to see with ease the extent of a baron's possessions; but it also had the effect of showing how far he had enfeoffed " under-tenants," and who those under-tenants were. This was of great importance to William, not only for military reasons, but also because of his firm resolve to make the under-tenants (though the " men " of their lords) swear allegiance directly to himself. As Domesday normally records only the Christian name of an under-tenant, it is vain to seek for the surnames of families claiming a Norman origin; but much has been and is still being done to identify the under-tenants, the great bulk of whom bear foreign names.

Domesday Book was originally preserved in the royal treasury at Winchester (the Norman kings' capital), whence it speaks of itself (in one later addition) as Liber de Wintonia. When the treasury was removed to Westminster (probably under Henry II.) the book went with it. Here it remained until the days of Queen Victoria, being preserved from 1696 onwards in the Chapter House, and only removed in special circumstances, as when it was sent to Southampton for photozincographic repro- duction. It was eventually placed in the Public Record Office, London, where it can be seen in a glass case in the museum. In 1869 it received a modern binding. The ancient Domes-

day chest, in which it used to be kept, is also preserved in the building.

The printing of Domesday, in " record type," was begun by government in 1773, and the book was published, in two volumes fol. in 1783; in 1811 a volume of indexes was added, and in 1816 a supplementary volume, separately indexed, containing (1) the " Exon Domesday " (for the south-western counties), (2) the Inquisitio Eliensis,\$) the Liber Winton (surveys of Winchester early in the 12th century), and (4) the Boldon Book — a survey of the bishopric of Durham a century later than Domesday. Photo- graphic facsimiles of Domesday Book, for each county separately, were published in 1861-1863, also by government.

Bibliography. — The following are the more important works to be consulted:— R. Kelharn, Domesday Book, illustrated (1788) ; H. Ellis, General Introduction, to Domesday Book (1833), 2 vols.,

containing valu- able indexes to the names of persons ; N. E. S. A. Hamilton, Inquisitio Cantabrigiensis (1876), containing the only transcripts of the original returns and the text of the Inquisitio Eliensis ; E. A. Freeman, History of the Norman Conquest, vols. iv. and v. ; F. Seebohm, The English Village Community (1883); Domesday Studies, 2 vols. (1888, 1891), on the occasion of the Domesday Commemoration (1886), by various writers, with bibliography to date; J. H. Round, Feudal England (1895); F. W. Maitland, Domesday Book and Beyond (1897); P. Vinogradoff, Villainage in England (1892) and Growth of the Manor; A. Ballard, The Domesday Boroughs (1904) and The Domes- day Inquest (1906), an excellent summary ; W. H. Stevenson, " A con- temporary description of the Domesday Survey " in The English Historical Review (the general index to which should be consulted) (1907). The Victoria County History contains a translation of the Domesday text, a map, and an explanatory introduction for each county. (J. H. R.)

DOMESTIC RELATIONS, a term used to express the legal relations subsisting between the various units that comprise the family or domestic group. Those units which go to build up the domestic structure of modern society are parent, child, husband, wife, master and servant. The law which deals with the various relations subsisting between them is made up largely of the law of agency, of contract and of tort. See Husband and Wife; Master and Servant; Children, Law relating to; Infant.

DOMETT, ALFRED (1811-1887), British colonial statesman and poet, was born at Camberwell Grove, Surrey, on the 20th of May 1811. He entered St John's College, Cambridge, but left the university in 1833. He published one or two volumes of poetry and contributed several poems to Blackwood' s Magazine, one of which, " A Christmas Hymn," attracted much admiring attention. For ten years he lived a life of ease in London, where he became the intimate friend of Robert Browning, of whose poem "Waring" he was the subject. An interesting account of the friendship between the two men appeared in The Con- temporary Review for January 1905, by W. H. Griffin. (See also Robert Browning and Alfred Domett, edited by F. G. Kenyon, 1906). In 1842 Domett emigrated to New Zealand where he filled many important administrative posts, being colonial secretary for New Munster in 1848, secretary for the colony in 1851, and prime minister in 1862. He returned to England in 1871, was created C.M.G. in 1880, and died on the 2nd of November 1887. Among his books of poetry, Ranolf and Amohia, a South Sea Day Dream, is the best known (1872), and Flotsam and Jetsam

(1877) is dedicated to Browning.

DOMFRONT, a town of north-western France, capital of an arrondissement in the department of Orne, 43 m. W.N.W. of Alengon by rail. Pop. (1906) of the town, 2215; of the commune, 4663. The town, which is picturesquely situated on a bluff over- looking the Varenne, has a church, Notre-Dame-sur-1'Eau, dating from the nth century. In the middle ages it was one of the chief strongholds in Normandy, and there still remain several towers of its ramparts, and ruins of the keep of its castle built in ion, rebuilt in the 12th century by Henry II., king of England, and dismantled at the end of the 16th century. The town is the seat of a sub-prefect, and has a tribunal of first instance and a communal college. Cloth is manufactured, and there are granite quarries in the vicinity. Domfront is said to have grown up in the 6th century round the oratory of the hermit St Front, and played an important part in the wars against the

English and the Religious Wars. In 1574 it was occupied by the Protestant leader Gabriel de Montgomery, who after a stubborn siege was forced to yield it to Jacques Goyon, count of Matignon.

DOMICILE (Lat. domicilium, from domus, home), in law, a term which may be defined generally as the place of a man's permanent abode; a precise definition is a matter of acknowledged difficulty. Its use in Roman jurisprudence was to fix the jurisdiction to which a person was subject generally, not by reason of a par- ticular circumstance, as the place where a contract was made or where property is situate. Hence it was admitted that a person might have as many domiciles as he had residences possessing some degree of permanence. In the middle ages, when a great diversity of laws had arisen, questions concerning personal status, as the age of majority or the capacity to contract a given marriage, came naturally to depend on the law to which the person was subject by reason of the general jurisdiction over him; and questions relating to the various items of his movable property grouped together, as those of his testamentary capacity or of the succession on his intestacy, had to be considered from a similarly personal point of view. There resulted a general agreement that a man's legal character, so to speak, should be determined by his domicile, and this introduced a stricter notion of domicile, allowing each person to have but one. He might be subjected without great inconvenience to more than one jurisdiction,

but not to more than one law. This is the position which domicile now holds in English jurisprudence. It is the criterion of the law applicable in a large class of cases, and it must be single for each person; and English courts have continually to struggle with the difficulty of selecting his domicile from among the various places in any of which he may be said to reside.

Since the beginning of the 19th century most of the leading continental states have unified their internal laws; and attach- ment to a province by domicile having thus become an un- necessary consideration, they have adopted political nationality as the criterion of the law to be applied in most of the questions which used to depend on domicile. Thus as between themselves they have greatly simplified the determination of those questions, but a similar elimination of domicile is impossible in what concerns British subjects, because the British empire continues to include a great variety of laws, as those of England, Scotland, the province of Quebec, the Cape Colony, &c. Within the British dominions domicile is the only available criterion of the legal character of a British subject, and all British courts continue to apply the same criterion to British subjects outside those dominions and to foreigners, so that, for example, the age of majority of a British subject or of a Frenchman domiciled in Germany would be referred by a British court to German law. Indeed so deeply is the principle of domicile seated in British law that only legislative action could allow a British court to substi- tute a new principle. And even a French, Italian or German court, applying political nationality as its new criterion to the legal character of a British subject, could obtain no definite result unless it supplemented that criterion by the old one, domicile, in order to connect the person in question with one of the legal systems existing in the British dominions.

Again, so long as the change of the criterion has not become universal, a new question is introduced by its having been made in some countries only. Denmark being one of those European states which still adhere to the principle of domicile, we will take it as an example in order not to complicate the illustration by such differences of internal law as exist in the British dominions. Suppose that a Danish court has to decide on the age of majority of a Danish subject domiciled in France, Italy or Germany. Its rule refers the question to the law of the domicile, and the law of the domicile refers it back to the law of the political nationality. What is to be done? This and all other questions relating to the application of the principle of domicile, which has been only summarily indicated, are treated under International Law (Private). Here we shall deal briefly

with the determination of domicile itself.

The Roman jurists defined domicile to be the place " ubi quis larem rerumque ac fortunarum summam constituit; unde

rursus non sit discessurus si nihil avocet: unde cum profectus est, peregrinari videtur: quo si rediit peregrinari jam destitit." This makes that place the domicile which may be described as the headquarters of the person concerned; but a man's habits of life may point to no place, or may point equally to two places, as his headquarters, and the connexion of domicile with law requires that a man shall always have a domicile, and never more than one. The former of these difficulties is met in the manner described by Lord Westbury in Udny v. Udny {Law Reports, 1 House of Lords, Scottish Appeals). " It is," he said, " a settled principle that no man shall be without a domicile, and to secure this end the law attributes to every individual as soon as he is born the domicile of his father, if the child be legitimate, and the domicile of his mother, if the child be illegitimate. This is called the domicile of origin, and is involuntary. It is the creation of the law, not of the party. It may be extinguished by act of law, as for example by sentence of death or exile for life, which destroys the status civilis of the criminal; but it cannot be destroyed by the will and act of the party. Domicile of choice is the creation of the party. When a domicile of choice is acquired, the domicile of origin is in abeyance, but is not absolutely extinguished or obliterated. When a domicile of choice is abandoned, the domicile of origin revives, a special intention to revert to it not being necessary. A natural-born Englishman may domicile himself in Holland, but if he breaks up his establishment there and quits Holland, declaring that he will never return, it is absurd to suppose that his Dutch domicile clings to him until he has set up his tabernacle elsewhere." If to this we add that legitimate minors follow the changes of the father's domicile and a married woman follows the domicile of her husband, also that compulsory detention will not create a domicile, the outlines of involuntary domicile will have been sufficiently sketched.

For the establishment of a domicile of choice there must be both animus and factum, intention and fact. The fact need not be more than arrival in the territory of the new domicile if there be the necessary intention, while any number of years' continuance there will not found a domicile if the necessary intention is absent. As the result of the most recent English and Scottish cases it may be laid down that the necessary intention is incompatible with the contemplation by the person in question of any event on the occurence of which his residence in the territory in question would

cease, and that if he has not formed a fixed and settled purpose of settling in that territory, at least his conduct and declarations must lead to the belief that he would have declared such a purpose if the necessity of making an election between that territory and his former one had arisen. The word territory, meaning a country having a certain legal system, is used advisedly, for neither the intention nor the fact need refer to a locality. It is possible that a Scotsman or a foreigner may have clearly established a domicile of choice in England, although it may be impossible to say whether London, Brighton or a house in the country is his true or principal residence. What is here laid down has been gradually attained. In the older English cases an intention to return to the former domicile was not excluded, if the event on which the return depended was highly uncertain and regarded by the person in question as remote. Afterwards a tendency towards the opposite extreme was manifested by requiring for a domicile of choice the intention to associate oneself with the ideas and habits of the new territory — Quatenus in illo exuere pairiam, not in the political sense, which it was never attempted to connect with change of domicile, but in the social and legal sense. At present it is agreed that the only intention to be considered is that of residence, but that, if the intention to reside in the territory be proved to amount to what has been above stated, a domicile will be acquired from which the legal consequences will follow, even defeating intentions about them so clearly expressed as, for instance, by making a will which by reason of the change of domicile is invalid. The two most important cases are Douglas v. Douglas, 1871, L. R. 12 Equity 617, before Vice-chancellor Wickens, and Winans v. Alt. Gen., 1904, Appeal Cases 287, before the House of Lords.

When the circumstances of a person's life point to two territories

as domiciles, the selection of the one which alone can fill that character often leads to appeals even up to the highest court. The residence of a man's wife and family as contrasted with his place of business, his exercise of political or municipal functions, and any conduct which tends to connect his children with a given country, as by their education or the start given them in life, as well as other indications, are often cited as important; but none of them are in themselves decisive. The situation must be considered as a whole. When the question is between the domicile of origin and an alleged

one of choice, its solution is rendered a little easier than it is when the question is between two alleged domiciles of choice, the burden of proof lying on the party which contends that the domicile of origin has been abandoned.

In the state of the law which has been described it will not be found surprising that an act of parliament, 24 & 25 Vict. c. 121, recites that by the operation of the law of domicile the expectation and belief of British subjects dying abroad with regard to the distribution of their property are often defeated, and enacts that when a convention to that effect has been made with any foreign country, no British subject dying in such country shall be deemed to have acquired a domicile therein, unless he has been resident in such country for one year previous to death and has made a declaration in writing of his intention to become domiciled; and that British subjects so dying without having so resided and made such declaration shall be deemed for all purposes of testate or intestate succession as to movables to retain the domicile they possessed at the time of going to reside in such foreign country. Similar exemptions are conferred on the subjects of the foreign state dying in Great Britain or Ireland. But the act does not apply to foreigners who have obtained letters of naturalization in any part of the British dominions. It has not been availed of, and is indeed an anachronism, ignoring as it does the fact that domicile has no longer a world-wide importance, owing to the substitution for it of political nationality as a test of private law in so many important countries. The United States of America is not one of those countries, but there the importance of domicile suffers from the habit of referring questions of capacity to the law of the place of contract instead of to any personal law. (J no. W.)

DOMINIC, SAINT (1170-1221), founder of the Dominican Order of Preaching Friars, was born in n 70 at Calaroga in Old Castile. He spent ten or twelve years in study, chiefly theological, at Palencia, and then, about 1195, he was ordained and became a canon in the cathedral chapter of Osma, his native diocese. The bishop induced his canons to follow the Rule of St Augustine and thus make themselves Augustinian Canons (q.v.); and so Dominic became a canon regular and soon the prior or provost of the cathedral community. The years from 1195 to 1203 have been filled up with fabulous stories of missions to the Moors; but Dominic stayed at Osma, preaching much in the cathedral, until 1 203 , when he accompanied the bishop on an embassy in behalf of the king of Castile to " The Marches." This has commonly been taken as Denmark, but more probably it was the French or Italian Marches.

When the embassy was over, the bishop and Dominic repaired to Rome, and Innocent III. charged them to preach among the Albigensian heretics in Languedoc. For ten years (1 205-1 215) this mission in Languedoc was the work of Dominic's life.

The Albigenses (q.v.) have received much sympathy, as being a kind of pre-Reformation Protestants; but it is now recognized that their tenets were an extreme form of Manichaeism. They believed in the existence of two gods, a good (whose son was Christ) and an evil (whose son was Satan) ; matter is the creation of the evil principle, and therefore essentially evil, and the greatest of all sins is sexual intercourse, even in marriage; sinful also is the possession of material goods, and the eating of flesh meat, and many other things. So great was the abhorrence of matter that some even thought it an act of religion to commit suicide by voluntary starvation, or to starve children to death (see article " Neu-Manichaer " by Otto Zockler in ed. 3 of Herzog's RealencyklopHdie fiir protestantische Theologie . (1003); or c. iii. of

Paul Sabatier's Life of St Francis). Such tenets were destructive not only of Catholicism but of Christianity of any kind and of civil society itself ; and for this reason so unecclesiastical a person as the emperor Frederick II. tried to suppress the kindred sects in Italy. In 1208, after the murder of a papal legate, Innocent III. called on the Christian princes to suppress the Albigensian heresy by force of arms, and for seven years the south of France was devastated by one of the most bloodthirsty wars in history, the Albigenses being slaughtered by thousands and their property confiscated wholesale.

During this time, it is the judgment of the most recent Protestant writer on St Dominic that, though keeping on good terms with Simon de Montfort, the leaderˆnd praying for the success of the crusaders' arms during the battle of Muret, " yet, so far as can be seen from the sources, Dominic took no part in the crusade, but endeavoured to carry his spiritual activity on the same lines as before. The oldest trustworthy sources know nothing of his having exercised the office of Inquisitor during the Albigensian war " (Griitzmacher). This verdict of a fair-minded and highly competent Protestant church historian on the most controverted point of Dominic's career is of great value. His method was to travel over the country on foot and barefooted, in extreme poverty, simplicity and austerity, preaching and instructing in highways and villages and towns, and in the castles of the nobility, controverting and discussing with the heretics. He used often to organize formal disputations with Albigensian leaders, lasting a number of days. Many times plots were laid against

his life. Though in his ten years of preaching a large number of converts were made, it has to be said that the results were not such as had been hoped for, and after it all, and after the crusade, the population still remained at heart Albigensian. A sense of failure appears in Dominic's last sermon in Languedoc : " For many years I have exhorted you in vain, with gentleness, preaching, praying and weeping. But according to the proverb of my country, ' where blessing can accomplish nothing, blows may avail.' We shall rouse against you princes and prelates, who, alas, will arm nations and kingdoms against this land . . . and thus blows will avail where blessings and gentleness have been powerless." The threat that seems to be conveyed in these words, of trying to promote a new crusade, was never carried out; the remaining years of Dominic's life were wholly given up to the founding of his order.

The Order of Dominicans grew out of the little band of volunteers that had joined Dominic in his mission among the Albigenses. He had become possessed with the idea of addressing wider circles and of forming an order whose vocation should be to preach and missionize throughout the whole world. By 1 2 14 the nucleus of such an institute was formed round Dominic and was knownasthe "Holy Preaching." In 1215 the bishop of Toulouse, Dominic's great friend, established them in a church and house of the city, and Dominic went to Rome to obtain the permission of Innocent III. to found his order of preachers. The course of events is traced in the article Dominicans. After three years, in 1 218, the full permission he desired was given by Honorius III. These last years of his life were spent in journeying backwards and forwards between Toulouse and Rome, where his abode was at the basilica of Santa Sabina on the Aventine, given to him by the pope; and then in extended journeys all over Italy, and to Paris, and into Spain, establishing friaries and organizing the order wherever he went. It propagated and spread with extraordinary rapidity, so that by Dominic's death in 1221, only five or six years after the first practical steps towards the execution of the idea, there were over 500 friars and 60 friaries, divided into 8 provinces embracing the whole of western Europe. Thus Dominic was at his death able to contemplate his great creation solidly established, and well launched on its career to preach to the whole world.

It appears that at the end of his life Dominic had the idea ot going himself to preach to the heathen Kuman Tatars on the Dnieper and the Volga. But this was not to be; he was worn out by the incessant toils and fatigues and austerities of his laborious life, and he died at his monastery at Bologna, on the

6th qf August 1221. He was canonized in 1234 by Gregory IX., who, as Cardinal Ugolino, had been the great friend and supporter both of Dominic and of Francis of Assisi. As St Dominic's character and work do not receive the same general recognition as do St Francis of Assisi's, it will be worth while to quote from the appreciation by Prof. Griitzmacher of Heidelberg: — " It is certain that Dominic was a noble personality of genuine and true piety. . . .Only by the preaching of pure doctrine would he overcome heretics. ...He was by nature soft-hearted, so that he often shed tears through warm sympathy. ... In the purity of his intention and the earnestness with which he strove to carry out his ideal, he was not inferior to Francis."

The chief sources for St Dominic's life are the account by Jordan of Saxony, his successor as master-general of the order, and the evidence of the witnesses at the Process of Canonization, — all in the Bullandists' Acta sanctorum, Aug. 4. Probably the best modern Life is that by Jean Guiraud, in the series Les Saints (translated into English by Katharine de Mattos, 1901); the bibliography contains a useful list of the chief sources for the history of St Dominic and the order, and of the best modern works thereon. See also the article " Dominicus " in ed. 2 of Wetzer and Welte, Kirchenlexicon, and Griitzmacher's excellent article " Dominikus," in ed. 3 of Herzog, Realencyklopadie fiir protestantische Theologie, already referred to. (E. C. B.)

DOMINICA, the largest of the five presidencies in the colony of the Leeward Islands, British West Indies. It lies in 15 30′ N. and 6i° 20′ W., between the French islands of Martinique and Guadeloupe, at a distance of about 25 m. from each, is 29 m. long, has a maximum breadth of 16 m. and an area of 291 sq. m. A range of lofty rugged mountains traverses the islandfrom N. to S., broken in the centre by a narrow plain drained by the rivers Layou and Pagoua, flowing W. and E. respectively. The highest point is Morne Diablotin (5314 ft.), situated in the northern half of the range. Signs of volcanic activity abound in the shape of solfataras, subterranean vapours and hot springs; while in the south is the greatest natural curiosity, the renowned Boiling Lake. It lies on the mountain side, 2300 ft. above the sea, its banks are steep and its depth unknown, being more than 300 ft. at a short distance from the margin. Its seething waters are often forced 3 ft. above the normal level by the pressure of the

escaping gases; and the fumes rising from the lake are occasionally poisonous. The island is botanically remarkable for its great number of peculiar species, offering in this respect a marked contrast to the poverty of the adjacent islands. The hills are covered with valuable timber, while coffee, limes, oranges, india-rubber trees, spices and all tropical fruits grow luxuriantly in the rich brown mould of the lowlands. There are some thirty streams of considerable size, besides numerous mountain torrents, and this abundance of water renders the island very fertile. The fisheries are pro- ductive, and honey and wax are furnished by wild bees, originally introduced from Europe. The temperature varies from 78 to 86° F. in the hot season from August to October, and from 72 to 84° in the cooler months; the rainfall varies in different parts from 50 to 162 in. per annum, but the porous soil soon absorbs the rain, rendering the atmosphere dry and invigorating.

The manufactures include sugar, lime-juice and essential oils; the exports are coffee, cocoa, sugar, limes and lime-juice, essential oils and fruit of all kinds. The inhabitants in 1901 numbered 28,894. The majority are negroes; the whites are of French and British descent. There are also a few Caribs, the remnant of the aboriginal population. A French patois is the language of the peasantry, but English is generally understood. The capital, Roseau (5764), is a fortified town and a port; Portsmouth, the only other town, possesses the better harbour in Prince Rupert's Bay on the north-west. In religion the Roman Catholics predominate, and a bishop resides at Roseau, but there is no established church. Education is free and compulsory, and the Cambridge local examinations are held annually.

Dominica was so named on its discovery by Columbus in 1493, in commemoration of the date, Sunday (Dies Dominica) the 3rd of November. Dominica was included in the grant of various islands in the Caribbean Sea made in 1627 by Charles I. to the earl of Carlisle, but the first European settlers (1632) were French. They brought with them negro slaves and lived on terms of

friendship with the Caribs, who were then a numerous body. In 1660 a treaty appears to have been made between the French, British and the natives assigning St Vincent and Dominica to the Caribs, but shortly afterwards attempts were made by the British to gain a foothold in the island. These attempts failed, and in 1748 it was once more agreed by France and Great Britain that Dominica should be left in the undisturbed possession of the natives. Nevertheless the French settlers increased, and the island came under the rule of a

French governor. It was captured by the British in 1761 and formally ceded by France at the peace of Paris, 1763, French settlers being secured in their estates. In 1778a French force from Martinique seized the island. Rodney's victory over De Grasse in the neighbouring sea in 1782 was followed by the restoration of the island to Britain in 1783; in the interval the trade of Dominica had been ruined. In 1795 a force from Guadeloupe made an unsuccessful descent on the island, and in 1805 the French general La Grange, at the head of 4000 troops, took Roseau and pillaged the island — an event now remembered as the most memorable in its history. The French were, however, unable to make good their hold, and Dominica has remained since undisturbed in British possession. Its later history presents few features not common to the other British West Indian islands.

Since 1872 Dominica has formed part of the colony of the Leeward Islands, but local affairs are in the hands Of an adminis- trator, aided by an executive council of ten members. In 1898 the local legislature, in consideration of pecuniary assistance from Great Britain, passed an act abrogating the semi-elective constitution and providing for a legislative council of twelve nominated members, six of whom sit ex officio.

DOMINICANS, otherwise called Friars Preachers, and in England Black Friars, from the black mantle worn over a white habit, an order of friars founded by St Dominic (q.v.). Their first house was in Toulouse, where the bishop established them at the church of St Romain, 1215. Dominic at once Went to Rome to obtain permission to found an order of preachers whose sphere of activity should be the whole world, but Innocent III. said they must adopt one of the existing rules. Dominic returned to Toulouse and it was resolved to take the Rule of St Augustine, Dominic himself having been an Augustinian canon at Osma (see Augustinian Canons). Dominic went again to Rome, and during the year 12 16 he obtained from Honorius III. a series of confirmations of the community at Toulouse as a congregation of Canons Regular of St Augustine with a special mission to preach. Early in 12 18 an encyclical bull was issued to the bishops of the whole Catholic world recommending to them the " Order of Friars Preachers," followed in 1221 by another ordering them to give to the friars faculties to preach and hear confessions in their dioceses. Already in 1217 Dominic had scattered the little band of seventeen over the world — to Paris, into Spain, and one he took with himself to Rome. Within a few months there were forty friars in Rome, at Santa Sabina on the Aventine, and thirty in Paris; and before Dominic's death in 1221 friaries had been established at

Lyons, Limoges, Reims, Mctz, Poitiers and Orleans; at Bologna, Milan, Florence, Verona, Piacenza and Venice; at Madrid, Palencia, Barcelona and Seville; at Friesach in Carinthia; at Cracow and Prague; and friars were on their way to Hungary and England.

The order took definite shape at the two general chapters held at Bologna in 1220 and 1221. At first it had been but a congregation of canons regular and had worn the canons' black cassock with white linen rochet. But now a white woollen habit with a black cloak or mantle was assumed. The Rule of St Augustine was supplemented by a body of regulations, adopted mostly from those of the Premonstratensian canons. At the head of the order was the master-general, elected for life until recent times, when the term of office was limited to six and then to twelve years; he enjoys supreme power over the entire order, both houses and individuals, all of whom are directly subject to him. He dwells in Rome and is assisted by a council. The order is divided into provinces and over each is a provincial, elected for four years. Each friary has its prior, elected, by the community

every four years. The friars belong not to the house or province in which they make their profession, but to the order; and it rests with the master-general to assign to each his place of residence. The manner of life was very austere — midnight office, perpetual abstinence from meat, frequent disciplines, prolonged fasts and silence. At St Dominic's suggestion, and under his strong pressure, but not without considerable opposition, the general chapter determined that the poverty practised in the order should be not merely individual, as in the monastic orders, but corporate, as among the Franciscans; so that the order should have no possessions, except the monastic buildings and churches, no property, no fixed income, but should live on charity and by begging. Thus, doubtless in imitation of the Franciscans, the Dominicans became a mendicant order.

The extraordinarily rapid propagation of the institute suffered no' diminution through the founder's death ; this was mainly due to the fact that his four immediate successors in the generalate were men of conspicuous ability and high character. In a few years the Dominicans penetrated into Denmark, Sweden, Russia, Prussia and Poland, preaching and missionizing in the still pagan districts of

these countries; and soon they made their way to Greece and Palestine and thence to central Asia. St Hyacinth, a Pole received by St Dominic, during missionary journeys extend- ing over thirty-five years travelled over the north and east of Europe and into Tatary, Tibet and northern China. In 1252 the pope addressed a letter to the Dominicans who were preaching " among the Saracens, Greeks, Bulgarians, Kumans, Syrians, Goths, Jacobites, Armenians, Jews, Tatars, Hungarians." From the 14th century until the middle of thei7th the Dominicans had numerous missions in Persia, India and China, and in the northern parts of Africa. They followed the Spanish and Portuguese explorers and conquerors both to the East and to the West, converting, protecting and civilizing the aborigines. On these missionary enterprises great numbers of Dominicans laid down their life for the Gospel.

Another conspicuous field of work of the Dominicans lay in the universities. It had been St Dominic's policy to aim at founding houses first of all in the great university towns — at Paris, Bologna, Palencia, Oxford. This policy was adhered to, and the Dominicans soon became a power in the universities, occupying chairs in those just named and in Padua, Cologne, Vienna, Prague and Salamanca. The scholastic doctors Albert the Great and Thomas Aquinas were the leaders in this side of Dominican activity, and the order's influence on the course of medieval theological development was exercised mainly by these doctors and by the Dominican school of theology, which to this day has maintained the principles and methods elaborated by St Thomas. The Dominican name is in an especial way associated with the Inquisition, the office of Inquisitor in all countries, including Spain, having usually been held by Dominicans. The vicissitudes of the order have been much like those of other orders — periods of relaxation being followed by periods of revival and reform; but there were not any reforms of the same historical importance as in most other orders, the policy having been to keep all such movements strictly within the organization of the order. In 1425 Martin V. relaxed for some houses the law of corporate poverty, allowing them to hold property, and to have fixed sources of income ; and fifty years later Sixtus IV. extended this mitigation to the entire order, which thereby ceased to be mendicant. This change caused no troubles, as among the Franciscans, for it was felt that it did not touch St Dominic's fundamental idea.

The Friars Preachers came to England and were established at Oxford in 1221, and by the end of the century fifty friaries were founded ail over England, usually in the towns, and several in Ireland and Scotland. In London they were first on the site of

Lincoln's Inn, but in 1275 they migrated to that now occupied by Printing-house Square, and their name survives in Blackfriars Bridge. The only nunnery was at Dartford. At the Dissolution there were fifty-seven friaries (see lists in F. A. Gasquet's English Monastic Life, Catholic Dictionary and C. F. Palmer's Life of Cardinal Howard, where historical notes are added). In Mary's reign some of the scattered friars were brought together and

established in Smithfield, and the remnant of the nuns were restored to Dartford. In 1559 these houses were suppressed and the nuns and two friars expatriated, and for a hundred years there was no English Dominican community. But throughout the reigns of Elizabeth and the early Stuarts there were usually some Dominicans, either Englishmen professed in foreign monasteries or foreigners, labouring on the English mission or attached to the foreign embassies. In 1658 Friar Thomas Howard (afterwards Cardinal) succeeded in establishing at Bornhem near Antwerp a house for the English friars. From that time there has always been an organized body of English Dominicans, again and again reduced almost to extinction, but ever surviving; it now has half a dozen thriving friaries. The Irish province also survived the days of persecution and possesses a dozen friaries. In 1840 Lacordaire restored the French province. In 1900 there were 43 50 Dominicans, including lay brothers, and 300 friaries, scattered all over the world. Missionary work still holds a prominent place in Dominican life; there are missions in Annam, Tongking and China, and in Mesopotamia, Mosul and Kurdistan. They have also a remarkable school for Biblical studies and research at Jerusalem, and the theological faculty in the Roman Catholic university at Fribourg in Switzerland is in their hands. There have been four Dominican popes: Innocent V. (t 1276), Benedict XI. (t 1304), Pius V. (t 1572), Benedict XIII. (t i73o). –

The friars form the " First Order " ; the nuns, or Dominicanesses, the " Second Order." The latter may claim to have chrono- logical precedence over the friars, for the first nunnery was established by St Dominic in 1206 at Prouille in the diocese of Toulouse, as a refuge for women converted from the Albigensian heresy. The second convent was at San Sisto in Rome, also founded by Dominic himself. From that time the institute spread widely. The rule resembled that of the friars, except that the nuns were to be strictly enclosed and purely contemplative; in course of time, however, they undertook educational work. In 1909 there were nearly 100 nunneries of the Second Order, with some 1500 nuns. They have schools and orphanages in South Africa, especially in the Transvaal.

A considerable number of other convents for women follow the Rule of the " Third Order." This rule was not written until the 1 5th century, and it is controverted whether, and in what sense, it can be held that the " Third Order " really goes back to St Dominic, or whether it grew up in imitation of the Franciscan Tertiaries. Besides the conventual Tertiaries, there are con- fraternities of lay men and women who strive to carry out this rule while living their family life in the world (see Tertiaries). St Catharine of Siena was a Dominican Tertiary.

See the authorities cited in the article Dominic, Saint; also Helyot, Hist, des ordres religieux (1714), iii. cc. 24-29, and Max Heimbucher, Orden u. Kongregationen (,1896), §§ 86-91 ; and C. F. Palmer, Life of Cardinal Howard (1867), which gives a special account of the English Dominican province. (E. C. B.)

DOMINIS, MARCO ANTONIO DE (1560-1624), Italian theo- logian and natural philosopher, was born of a noble Venetian family in 1560 in the island of Arbe, off the coast of Dalmatia. He was educated by the Jesuits in their colleges at Loreto and Padua, and is supposed by some to have joined their order; the more usual opinion, however, is that he was dissuaded from doing so by Cardinal Aldobrandini. For some time he was employed as a teacher at Verona, as professor of mathematics at Padua, and professor of rhetoric and philosophy at Brescia. In 1 596 he was appointed to the bishopric of Segnia (Zengg) in Dalmatia, and two years later was raised to the archbishopric of Spalato and primacy of Dalmatia and Croatia. His endeavours to reform the Church soon brought him into conflict with his suffragans; and the interference of the papal court with his rights as metropolitan, an attitude intensified by the quarrel between the papacy and Venice, made his position intolerable. This, at any rate, is the account given in his own apology — the Consilium profectionis — in which he also states that it was these troubles that led him to those researches into ecclesiastical law, church history and dogmatic theology, which, while confirming him in his love for the ideal of " the true Catholic Church," revealed to him how far the

papal system was from approximating to it. After a visit to Rome, when he in vain attempted to gain the ear of Pope Paul V., he resigned his see in September 1616, wrote at Venice his Consilium profectionis, and then went by way of Switzerland, Heidelberg and

*Rotterdam to England, where he arrived in December. He was welcomed by the king and the Anglican clergy with great respect, was received into the Church of England in St Paul's cathedral, and was appointed master of the Savoy (1618) and dean of Windsor (1619); he subsequently presented himself to the living of West Ilsley, Berkshire. Contemporary writers give no pleasant account of him, describing him as fat, irascible, pretentious and very avaricious; but his ability was undoubted, and in the theological controversies of the time he soon took a foremost place. His published attacks on the papacy succeeded each other in rapid succession: the Papatus Romanus, issued anonymously (London, 1617; Frankfort, 1618), the Scogli del naufragio Christiano, written in Switzerland (London, (?) 1618), of which English, French and German translations also appeared, and a Sermon preached in Italian, &*c, before the king. But his principal work was the De repuUica scclesiastica, of which the first part — after revision by Anglican theologians — was published under royal patronage in London (16 17), in which he set forth with a great display of erudition his theory of the church. In the main it is an elaborate treatise on the historic organization of the church, its principal note being its insistence on the divine prerogatives of the Catholic episcopate as against the encroach-ments of the papal monarchy. In 1619 Dominis published in London, with a dedication to James I., Paolo Sarpi's Historia del Concilio Tridentino, the MS. of which he had brought with him from Venice. It is characteristic of the man that he refused to hand over to Sarpi a penny of the money present given to him by the king as a reward for this work.*

Three years later the ex-archbishop was back again in Rome, doing penance for his heresies in St Peter's with a cord round his neck. The reasons for this sudden revolution in his opinions, which caused grave scandal in England, have been much debated ; it is probably no libel on his memory, however, to say that they were connected with the hopes raised by the elevation of his kinsman, Alessandro Ludovisi,to the papal throne as Gregory XV. (1621). It is said that he was enticed back to Rome by the promise of pardon and rich preferment. If so, he was doomed to bitter disappointment. He had barely time to publish at Rome (1623) his Sui reditus ex Angliae consilium, an abject repudiation of his anti-papal works as written " non ex cordis sinceritate, non ex bona conscientia, non ex fide," when Gregory died (July 1623). During the interregnum that followed, the proceedings of the Inquisition against the archbishop were revived, and they continued under Urban VIII. Before they were concluded, however, Dominis died in prison, on the 8th of September

1624. Even this did not end his trial, and on the 20th of December judgment was pronounced over his corpse in the church of Santa Maria sopra Minerva. By order of the Inquisition his body was taken from the coffin, dragged through the streets of Rome, and publicly burnt in the Campo di Fiore. By a strange irony of fate the publication of his Reditus consilium was subsequently forbidden in Venice because of its uncompromising advocacy of the supremacy of the pope over the temporal powers. As a theologian and an ecclesiastic Dominis was thoroughly dis- credited; as a man of science he was mere happy. He was the first to put forward a true theory of the rainbow, in his De radiis visus et lucis in vitris perspectives et iride (Venice, 161 1).

See the article by Canon G. G. Perry in the Diet, Nat. Biog., and that by Benrath in Herzog-Hauck, Realencyklopadie (ed. 1898), iv. p. 781, where a full bibliography is given. Also H. Newland, Life and Contemporaneous Church History of Antonio de Dominis (Oxford,

1859)-

DOMINOES, a game unknown until the 18th century, and probably invented in Italy, played with twenty-eight oblong pieces, or dominoes, known also as cards or stones, having ivory faces backed with ebony; frorh this ebony backing, as resembling the cloak (usually black) called a domino (see Mask), the name is said to be derived. Cardboard dominoes to be held in the hand are also in use. The face of each card is divided into two squares

by a black line, and in each square half the value of the card is indicated by its being either a blank or marked with one or more black pips, generally up to six, but some sets run as high as double-nine. There are various ways of playing dominoes described below.

The Block and Draw Games. — The dominoes are shuffled face down- wards on the table. The lead is usually decided by drawing for the highest card, but it is sometimes held that any doublet takes pre-cedence. The cards are then reshuffled, and each player draws at random the number of cards required for the particular form of the game, usually seven. The cards left behind are called the stock. To play a card is known technically as to pose. The leader poses first, generally playing his highest domino, since at the end the player loses according to the number of pips in the cards he has left in his hand. By some rules, a player after playing a double may play another card which matches it: e.g. if he plays double-six hie may

Elay another card which has a six at one end. The second player as to match the leader's pose by putting one of his cards in juxta-position at one end, i.e. if the leader plays four-five, the second player has to play a card which contains either a four or a five, the five being applied to the five, or the four to the four. Doublets are placed & cheval {crosswise). If a player cannot match, he says " go," and his opponent _ plays, unless the Draw game— the usual game — is being played, in which case the player who cannot match draws from the stock (two cards must always be left in the stock) till he takes a card that matches. If a player succeeds in posing all his cards, he calls " Domino !"■ and wins the hand, scoring as many points as there are pips on the cards still held by his opponent. If neither

E layer can match, that player wins who has the fewest pips left in is hand, and he scores as many points as are left in the two hands combined (sometimes only the excess held by his opponent) ; but when a player has called " Go!" his adversary must match if he can, in which case the other player may be able to match in turn. A game is generally 100 points.

All Fives (or Muggins). — Each player takes five cards. If the leader poses either double-five, six-four, five-blank, or three-two, he scores the number of pips that are on the card. If in the course of play a player can play such a card as makes the sum of the end pips, 5, 10, 15 or 20, he scores that number; e.g. if to two-four he can play double-four (A cheval) he scores 10; if to six-one he plays six-four he scores 5. He must pose if he can match ; if he cannot, he draws till he can. Scores are called and taken immediately. At the point of domino, the winner scores in points the multiple of five which is nearest to the number of pips in his adversary's hand : e.g. he scores 25 if his adversary has 27 pips, 30 if he has 28. If neither hand can match, the lowest number of pips wins, and the score is taken as before, without addition or subtraction, according to the adversary's pips.

All Threes is played in the same manner as Muggins, save that three or some multiple of three are aimed at.

Threes-and- Fives is similar, but only one point is scored for each five or three made at the two ends, though they can be scored in combination. Thus A plays six-five; B six-one; B scores 2 points for 5-1 (two threes). A plays one-five; B double five; B now scores 8 more, 5 for five threes and 3 for three fives.

Domino-Whist is played by four players. Partners are drawn for as at Whist, the player drawing the highest card leading. Each player takes seven cards. There are no tricks, trumps or honours. The cards are played as in ordinary dominoes, a hand being finished when one of the players plays his last card, or when both ends are blocked. Pips are then counted, and the holder or holders of the highest number score to their debit the aggregate number of points. The side that is first debited with 100 points loses the game. Strength in a suit is indicated by the lead; i.e. a lead of double-blank or double-six implies strength in blanks or sixes respectively.

Matador (from the Spanish word meaning " killer," i.e. of the bull in a bull-fight). This is a favourite and perhaps the most scientific form of the game. It is played on a different principle from the preceding variations, the object being not to match the end number, but to pose such a number, as, added to the end, will make seven; e.g. to a five a two must be played, to a three a four, &c. Seven dominoes are drawn and the highest double begins. When a player cannot make a seven on either end he must draw from the stock until he secures a card that will enable him to make seven, two cards remaining in the stock. As Matadorisplayed with dominoes no higher than six, a blank means the blocking of that end. In this case no further play can take place at that end excepting by posing a matador, which may be played at any time. There aie four matadors, the 6-1, 5-2, 4-3 and double-blank. It is often better to draw one or more fresh cards than to play one's last matador, as it may save the game at a critical juncture. In posing a double counts as a single number only, but in scoring the full number of pips is counted. When the game has been definitely blocked the player whose pips aggregate the lower number scores the number of the combined hands (sometimes only the excess in his opponent's hand), the game being usually 100. Matador can be played by three persons, in which case the two having the lowest sco;es usually combine against the threatening winner; and also by four, either each for himself or two on a side.

Other varieties of the game not often played are the Bergen game, Sevastopol and Domino Loo.

See Card and Table Games by Hoffmann (London, G. Routledge & Sons).

DOMINUS (from an Indo-European root dam-, cf. Gr. Sapav, to subdue, and Eng. " tame "), the Latin word for master or owner. As a title of sovereignty the term under the republic at Rome had all the associations of the Greek rvpavvos; refused during the early principate, it finally became an official title of the Roman emperors under Diocletian. Dominus, the French equivalent being sieur, was the Latin title of the feudal (superior and mesne) lords, and also'an ecclesiastical and academical title. The ecclesiastical title was rendered in English " sir," which was a common prefix before the Reformation for parsons, as in '" Sir Hugh Evans " in Shakespeare's Merry Wives of Windsor. The academical use was for a bachelor of arts, and so is still used at Cambridge and other universities. The shortened form " dom " is used as a prefix of honour for ecclesiastics of the Roman Church, and especially for members of the Benedictine and other religious orders. The same form is also a title of honour in Portugal, as formerly in Brazil, used by members of the blood royal and others on whom it has been conferred by the sovereign. The Spanish form " don " is also a title, formerly applicable only to the nobility, and now one of courtesy and respect applied to any member of the better classes. The feminine form " donna " is similarly applied to a lady. The English colloquial use of " don" for a fellow or tutor of a college at a university is derived either from an application of the Spanish title to one having authority or position, or from the academical use of dominus. The earliest use of the word in this sense appears, according to the New English Dictionary, in South's Sermons (1660). An English corruption " dan " was in early use as a title of respect, equiva- lent to " master." The particular literary application to poets is due to Spenser's use of " Dan Chaucer, well of English undefyled " (Faery Queen, IV. ii. 32).

DOMITIAN (Titus Flavius Domitianus), Roman emperor a.d. 81-96, the second son of Titus Flavius Vespasianus and Flavia Domitilla, twelfth of the Caesars, and third of the Flavian dynasty, was born at Rome on the 24th of October a.d. 51. When Vespasian was proclaimed emperor at Alexandria,Domitian escaped with difficulty from the temple of the Capitol, which had been set on fire by the Vitellians, and remained in hiding till his father's party proved victorious. After the fall of Vitellius he was saluted as Caesar, or prince imperial, by the troops, obtained the city praetorship, and was entrusted with the administration of Italy till his father's return from the East. But although in his father's lifetime he several times filled the office of consul, and after his death was nominally the partner in the empire with his brother Titus, he never took any part in public business, but lived in great retirement, devoting himself to a life of

pleasure and of literary pursuits till he succeeded to the throne. The death of Titus, if not hastened by foul means, was at least eagerly welcomed by his brother. Domitian's succession (on the 13th of September 81) was unquestioned, and it would seem that he had intended, so far as his weak volition and mean abilities would allow, to govern well. Like Augustus, he attempted a reforma- tion of morals and religion. As chief pontiff he inquired rigorously into the character of the vestal virgins, three of whom were buried alive ; he enforced the laws against adultery, mutilation, and the grosser forms of immorality, and forbade the public acting of mimes. He erected many temples and public buildings (amongst them the Odeum, a kind of theatre for musical performances) and restored the temple of the Capitol. He passed many sumptuary laws, and issued an edict forbidding the over-cultivation of vines to the neglect of corn-growing. Finally, he took a personal share in the administration of justice at Rome, checked the activity of the informers (delatores) , and exercised a jealous supervision over the governors of provinces. Such public virtues at first counter- balanced his private vices in the eyes of the people. Domitian was the first emperor who arrogated divine honours in his life- time, and caused himself to be styled Our Lord and God in public documents. Doubtless in the poems of writers like Martial this

deification was nothing but fulsome flattery, but in the case of the provincials it was a sincere tribute to the impersonation of the Roman Empire, as the administrator of good government and the peacemaker of the world. Even when Rome and Italy smarted beneath his proscriptions and extortions, the provinces were undisturbed.

Though he took the title of imperator more than twenty times, and enjoyed at least one triumph, Domitian's military achieve- ments were insignificant. He defeated the Chatti, annexed the dis- trict of the Taunus, and established the Limes as a line of defence; but he suffered defeats at the hands of the Quadi, Sarmatae and Marcomanni; in Dacia he received a severe check, and was obliged to purchase peace (go) from Decebalus by the payment of a large sum of money and by guaranteeing a yearly tribute — the first instance in Roman history. His jealousy was provoked by the successes of Agricola in Britain, who was recalled to Rome (85) in the midst of his conquests, condemned to retirement, and perhaps removed by poison. The revolt of Antonius Saturninus, the commander of the Roman forces in Upper Germany (88 or 89), marks the turning-point in his reign (on the date see H. Schiller, Geschichte der romischen Kaiserzeil, i. pt. 2, p. 524, note 2). It was speedily crushed; but from

that moment Domitian's character changed. He got rid of all whom he disliked on the charge of having taken part in the conspiracy, and no man of eminence was safe against him. He was in constant fear of assassination and distrusted all around him. During the last three years of his life his behaviour was that of a madman. He sentenced to death his own cousin and nephew by marriage, Flavius Clemens, whose wife he banished for her supposed leaning towards Judaism (Christianity). A conspiracy among his own freedmen — set on foot, it is said, by his wife Domitia Longina, who knew her own life to be threatened — cut short his career. He was stabbed in his bedroom by a freedman of Clemens named Stephanus on the 18th of September 96.

Authorities. Ancient. — Tacitus, Histories, in. iv. ; Suetonius, Domitian; Dio Cassius lxvi., lxvii. ; Tacitus, Agricola, 18-22. Modern accounts by A. Imhof, T. Flavius Domitianus (Halle, 1857), which, while not claiming any special originality, is based on a conscientious study of authorities; A. Halberstadt, De imperatoris Domitiani moribus _ et rebus (Amsterdam, 1877), an attempt to rehabilitate Domitian; S. Gsell, Essai sur le regne de I'empereur Domitien (1894), very complete in every respect; H. Schiller (as above), pp. 520-538; C. Merivale, Hist, of the Romans under the Empire, ch. 61, 62. For Domitian's attitude towards Christianity see V. Schultze in Herzog-Hauck's Realencyklopddie fur protestan- tische Theologie, iv. (1898); Sir W. M. Ramsay, The Church in the Roman Empire (1903); E. G. Hardy, Christianity and the Roman Government (1894) I J- B. Bury, Appendix 8 to vol. ii. of his edition of Gibbon.

DOMREMY-LA-PUCELLE, a village of eastern France, in the department of Vosges, on the left bank of the Meuse, 7 m. N. of Neuf chateau by road. Pop. (1906) 233. Domremy was the birth- place of Joan of Arc, and the cottage in which she was born still stands. Above the door are the arms of France and of Joan of Arc and an inscription of 1481 reading " Vive labeur; vive le roi Louys." There are several monuments to the heroine, and a modern basilica has been erected in her honour on a neighbouring hill, where she is said to have heard the voices in obedience to which she took up the sword. The story of the heroine is annually celebrated by a play in which the villagers take part.

DON (anc. Tanais), a river of European Russia, called Tuna or Duna by the Tatars, rising in Lake Ivan (580 ft. above sea-level) in the government of Tula, where it has communication with the Volga by means of the Yepifan Canal, which links it with the Upa, a tributary

of the Oka, which itself enters the Volga. The Don, after curving east through the government of Ryazan, flows generally south through the governments of Tambov, Orel, Voronezh and the Don Cossacks territory, describing in the last- named a sweeping loop to the east, in the course of which it approaches within 48 m. of the Volga in 49 N. In the middle of the Don Cossacks territory it turns definitely south-west, and finally enters the north-east extremity of the Sea of Azov, form- ing a delta 130 sq. m. in extent. Its total length is 1325 m., and its drainage area is calculated at 166,000 sq. m. The average fall

of the river is about 5j in. to the mile. In its uppercourse, which may be regarded as extending to the confluence of the Voronezh in 51 40', the Don flows for the most part through a lowJying, fertile country, though in the government of Ryazan its banks are rocky and steep, and in some places even precipitous. In the middle division, or from the mouth of the Voronezh to the point where it makes its nearest approach to the Volga, the stream cuts its way for the most part through Cretaceous rocks, which in many places rise on either side in steep and elevated banks, and at intervals encroach on the river-bed. A short distance below the town of Rostov it breaks up into several channels, of which the largest and most southern retains the name of the river. Before it receives the Voronezh the Don has a breadth of 500 to 700, or even in a few places 1000 ft., while its depth varies from 4 to 20 ft. ; by the time it reaches its most eastern point the depth has increased to 8-50 ft., and the ordinary breadth to 700-1000 ft,, with an occasional maximum of 1400 ft.; in the lowest division the depth is frequently 70 ft., and the breadth in many places 1870 ft. Generally speaking, the right bank is high and the left flat and low. Shallow reaches are not uncommon, and there are at least seven considerable shoals in the south-western part of the course; partly owing to this cause, and partly to the scarcity of ship-timber in the Voronezh government, the Don, although navigable as far up as Voronezh, does not attain any great importance as a means of communication till it reaches Kachaiinskaya in the vicinity of the Volga. From that point, or rather from Kalach, where the railway (built in 1862) from the Volga has its western terminus, the traffic is very extensive. Of the tributaries of the river, the Voronezh, the Khoper, the Medvyeditsa and the Donets are navigable— the Donets having a course of 680 m., and during high water affording access to the government of Kharkov. The Manych, another large affluent on

the left, marks the ancient line of water connexion between the Sea of Azov and the Caspian Sea. The lower section of the Don is subject to two annual floods, of which the earlier, known as the " cold water," is caused by the melting of the snow in the country of the Don Cossacks, and the later, or the " warm water," is due to the same process taking place in the region drained by the upper parts of the stream. About the beginning of June the river begins to subside with great rapidity; in August the water is very low and navigation almost ceases; but occasionally after the September rains the traffic with small craft is again practicable. Since the middle of the 18th century there have been five floods of extraordinary magnitude, — namely, in 1748, 1786, 1805, 1820 and 1845. The river is usually closed by ice from November or December to March or April, and at rare intervals it freezes in • October. At Aksai, in the delta, it remains open on the average for 250 days in the year, at the mouth of the Medvyeditsa for 239, and at Novo-Cherkask, on another arm of the delta, for 246. This river supports a considerable fishing population, who despatch salt fish and caviare all over Russia. Salmon and herrings are taken in large numbers. (P. A. K.; J. T. Be.)

DON, a river in the south of Aberdeenshire, Scotland, rising in peat-moss to the east of Glen Avon on the borders of Banffshire, at a height of nearly 2000 ft. above the sea. It follows a generally easterly course, roughly parallel with that of the Dee, and a few miles to the south of it, falling into the North Sea close to Old Aberdeen, after a run of 82 m. At the mouth the two rivers are only 2! m. apart. Like its greater neighbour, the Don is an excellent salmon stream. On the left its chief affluents are the Ernan, Nochty, Bucket and Urie; on the right, the Conrie, Carvie, Deskry and Strow. The principal places of interest on its banks are Strathdon, Towie, Kildrummy, Alford, Kelg, Monymusk, Inverurie, Kintore and Dyce.

DONAGHADEE, a market town of Co. Down, Ireland, in the north parliamentary division, near the south of Belfast Lough, on the Irish Channel, 25 m. E. by N. of Belfast by a branch of the Belfast and Co. Down railway. Pop. (1901) 2073. It is the nearest port in Ireland to Great Britain, being 215 m. S.W. of Portpatrick in Wigtownshire. Telegraph and telephone cables join these ports, but a regular passenger route does not exist owing to the unsuitability of Portpatrick. Donaghadee harbour admits

vessels up to 200 tons. On the north-east side of the town there is a rath or encampment 70 ft. high, in which a powder magazine is erected. The parish church dates from 1626. There are two holy wells in the town. The town is frequented as a seaside watering-place

in the summer months.

DONALDSON, SIR JAMES (1831-), Scottish classical scholar, educational and theological writer, was born at Aberdeen on the 26th of April 1831. He was educated at Aberdeen University and New College, London. In 1854 he was appointed rector of the Stirling high school, in 1866 rector of that of Edinburgh, in 1881 professor of humanity in the university of Aberdeen, and in 1890 principal of the university of St Andrews, by the Universities (Scotland) Act. His chief works are: Modern Greek Grammar (1853); Lyra Graeca (1854), specimens of Greek lyric poetry from Callinus to Soutsos; A Critical History of Christian Literature and Doctrine from the Death of the Apostles to the Niccne Council (i.-iii., 1864-1866; new ed. of i. as The Apostolical Fathers, 1874), a book unique of its kind in England at the time of its appearance and one which adds materially to the knowledge of Christian antiquities as deduced from the apostolic fathers; Lectures on the History of Education in Prussia and England (1874); The Westminster Confession of Faith and the Thirty-Nine Articles of the Church of England (1905) ; Woman, her position and influence in ancient Greece and Rome (1907). He was knighted in 1907.

DONALDSON, JOHN WILLIAM (1811-1861), English philo- logist and biblical critic, was born in London on the 7th of June 181 1. He was educated at University College, London, and Trinity College, Cambridge, of which society he subsequently became fellow. In 1841 he was elected headmaster of King Edward's school, Bury St Edmunds. In 1855 he resigned his post and returned to Cambridge, where his time was divided between literary work and private tuition. He died on the 10th of February 1861. He is remembered as a pioneer of philoJogy in England, and as a great scholar in his day, though much of his work is now obsolete. The New Cratylus (1839), the book on which his fame mainly rests, was an attempt to apply to the Greek language the principles of comparative philology. It was founded mainly on the comparative grammar of Bopp, but a large part of it was original, Bopp's grammar not being completed till ten years after the first edition of the Cratylus. In the Varronianus (1844) the same method was applied to Latin, Umbrian and Oscan. His Jashar (1854), written in Latin as an appeal to the learned world, and especially to German theologians, was an attempt to reconstitute the lost biblical book of Jashar from the remains of old songs and historical records, which, according to the author, are incorporated in the existing text of the Old Testament. His bold views on the nature of inspiration, and his free handling of the sacred text, aroused the anger of the theologians. Of his numerous other works

the most important are Ttte Theatre of the Greeks; The History of the Literature of Ancient Greece (a translation and completion of C. O. Muller's unfinished work) ; editions of the Odes of Pindar and the Antigone of Sophocles; a Hebrew, a Greek and a Latin Grammar.

DONATELLO (diminutive of Donato) (c. 1386-1466), Italian sculptor, was the son of Niccolo di Betto Bardi, a member of the Florentine Woolcombers' Gild, and was born in Florence probably in 1386. The date is conjectural, since the scanty contemporary records of Donatello's life are contradictory, the earliest docu- mentary reference to the master bearing the date 1406, when a payment is made to him as an independent sculptor. That Donatello was educated in the house of the Martelli family, as stated by Vasari, and that he owed to them his introduction to his future friend and patron, Cosimo de' Medici, is very doubtful, in view of the fact that his father had espoused the cause of the Albizzi against the Medici, and was in consequence banished from Florence, where his property was confiscated. It is, however, certain that Donatello received his first training, according to the custom of the period, in a goldsmith's workshop, and that he worked for a short time in Ghiberti's studio. He was too young to enter the competition for the baptistery gates in 1402, from which Ghiberti issued victorious against Brunelleschi, Jacopo

della Quercia, Niccold d'Arezzo and other rivals. But when Brunelleschi in his disappointment left Florence and went to Rome to study the remains of classic art he was accompanied by young Donatello. Whilst pursuing their studies and excavations on classic soil, which made them talked about amongst the Romans of the day as " treasure seekers," the two young men made a living by working at the goldsmiths' shops. This Roman sojourn was decisive for the entire development of Italian art in the 1 5th century, for it was during this period that Brunelleschi undertook his measurements of the Pantheon dome and of other Roman buildings, which enabled him to construct the noble cupola of S. Maria del Fiore in Florence, while Donatello acquired his knowledge of classic forms and ornamentation. The two masters, each in his own sphere, were to become the leading spirits in the art movement of the 15th century. Brunelleschi's buildings and Donatello's monuments are the supreme expression of the spirit of the early Renaissance in architecture and sculpture and exercised a potent influence upon the painters of that

age.

Donatello probably did not return to Florence before 1405, since the earliest works in that city that can be traced to his chisel are two small statues of " prophets " for the north door of the cathedral, for which he received payment inNovember i4o6andin the beginning of 1408. In the latter year he was entrusted with the important commissions for the marble " David," now at the Bargello, and for the colossal seated figure of " St John the Evangelist," which until 1 588 occupied a niche of theoldxathedral facade, and is now placed in a dark chapel of the Duomo. We find him next employed at Or San Michele, where between 1340 and 1406 only four of the fourteen niches had been filled. As the result of a reminder sent by the Signory to the gilds who had undertaken to furnish the statues, the services of Ciuffagni,Nanni di Banco, Ghiberti and Donatello were enlisted, and Donatello completed between 141 2 and 1415 the" St Peter," the "St George" (the original, now in the Bargello, has been replaced by a copy) and the " St Mark." He probably also assisted Nanni di Banco in his group of four saints. To this early period — in spite of Dr 'Bode's contention, who places it about twenty years later — belongs the wooden crucifix in S. Croce, the most striking instance of Donatello's realism in rendering the human form and his first attempt at carving the nude. It is said that this crucifix was executed in rivalry with Brunelleschi's noble work at S. Maria Novella, and that Donatello, at the sight of his friend's work, exclaimed, " It has been left to you to shape a real Christ, whilst I have made a peasant." In this early group of statues, from the prophets for the cathedral door to the " St George," can be followed the gradual advance from Gothic stiffness of attitude and draping to a forceful rendering of the human form and of move- ment, which is a distinct approach to the classic ideal; from the massiveness of the heavily draped figure to easy poise and muscular litheness. All these figures were carved in marble and are admirably conceived in relation to their architectural setting. In fact, so strong is this tendency that the " St Mark," when inspected at the master's workshop, was disapproved of by the heads of the Gild of Linen-weavers, but aroused public enthusiasm when placed in situ, and at a later date received Michelangelo's unstinted admiration.

Between the completion of the niches for Or San Michele and his second journey to Rome in 1433, Donatello was chiefly occupied with statuary work for the campanile and the cathedral, though from this period dates the bronze figure of the Baptist for the christening font of Orvieto Cathedral, which was never delivered and is now among the treasures of the Berlin museum. This, and the " St Louis

of Toulouse," which originally occupied a niche at Or San Michele and is now badly placed at S. Croce, were the first works in bronze which owed their origin to the partnership of Donatello with Michelozzo, who undertook the casting of the models supplied by his senior. The marble statues for the campanile, which are either proved to be Donatello's by documentary evidence or can be recognized as his work from their style, are the " Abraham," wrought by the master in conjunction with Giovanni di Bartolo (il Rosso); the "St John the Baptist"; the so-called " Zuccone " (Jonah?);

"Jeremiah"; " Habakuk " (?); the unknown "prophet" who is supposed to bear the features of the humanist Poggio Bracciolini; and possibly he may have had a share in the completion of the " Joshua " commenced by Ciuffagni in 141 5. All these statues, and the " St John " at the Bargello, mark a bold departure from the statuesque balance of the " St Mark " and " St George " to an almost instantaneous impression of life. The fall of the draperies is no longer arranged in harmonious lines, but is treated in an accidental, massive, bold manner. At the same time the heads are no longer, as it were, impersonal, but almost cruelly realistic character portraits of actual people, just as the arms and legs and necks are faithfully copied from life with all their angularities and deviations from the lines of beauty. During this period Donatello executed some work for the baptismal font at S. Giovanni in Siena, which Jacopo della Quercia and his assistants had begun in 1416. Though the Florentine's share in it is confined to a relief which may have been designed, or even begun, by Jacopo, and a few statuettes, it is of considerable importance in Donatello's life-work, as it includes his first attempt at relief sculpture-except the marble relief on the socle of the " St George "—his first female figures,—" Faith " and " Hope," and his first putti. The relief, " Herod's Feast," shows already that power of dramatic narration and the skill of express- ing the depth of space by varying the treatment from plastic roundness to the finest sliacciato, which was to find its mature expression in the panels of the altar of S. Antonio in Padua and of the pulpit of S. Lorenzo in Florence. The casting of the pieces for the Siena font was probably done by Michelozzo, who is also credited with an important share in the next two monumental Works, in the designing of which Donatello had to face a new problem — the tomb of John XXIII. in the baptistery (begun about 1425), and that of Cardinal Brancacci at S. Angelo a Nilo in Naples (executed in Pisa, 1427). The noble recumbent figure of the defunct on the former, the relief on the sarcophagus, and the whole architectural design, are unquestionably due to Donatello; the figure of the pope is the most beautiful tomb

figure of the 1 5th century, and served as the model oh which Rossellino, Desiderio, and other sculptors of the following period based their treatment of similar problems. Donatello's share in the Naples monument is probably confined to the characteristic low relief of the " Ascension." The baptistery tomb shows how completely Donatello had mastered the forms of Renaissance architecture, even before his second visit to Rome. An earlier proof of his knowledge of classic art is his niche for the " St Louis " at Or S. Michele, now occupied by Verrocchio's " Christ and St Thomas." Similar in treatment to the " Ascension " relief is the " Charge to St Peter " at South Kensington, which is almost impressionistic in its suggestion of distance and intervening atmosphere expressed by the extreme sllghtness of the relief. Another important work of this period, and not, as Vasari maintains, of Donatello's youth, is the " Annunciation " relief, with its wealth of delicately wrought Renaissance motifs in the architectural setting.

When Cosimo, the greatest art patron of his time, was exiled from Florence in 1433, Michelozzo accompanied him to Venice, whilst Donatello for the second time went to Rome to drink once more at the source of classic art. The two works which still testify to his presence in this city, the " Tomb of Giovanni Crivelli " at S. Maria in Aracoeli, and the " Ciborium " at St Peter's, bear the stamp of classic influence. Donatello's return to Florence in the following year almost coincides with Cosimo's. Almost immediately, in May 1434, he signed a contract for the marble pulpit on the facade of Prato cathedral, the last work executed in collaboration with Michelozzo, a veritable bacchan- alian dance of half-nude putti, pagan in spirit, passionate in its wonderful rhythmic movement — the forerunner of the " singing tribune " for Florence cathedral, at which he worked inter- mittently from 1433 t0 J440, and which is now restored to its original complete form at the museum of the Opera del Duomo. But Donatello's greatest achievement of his " classic period " is the bronze " David " at the Bargello, the first nude statue of the Renaissance, the first figure conceived in the round, independent of any architectural surroundings — graceful, well-proportioned,

superbly balanced, suggestive of Greek art in the simplification of form, and yet realistic, without any striving after ideal pro- portions. The same tendencies are to be noted in the bronze putlo at the Bargello.

In 1443 Donatello was invited to Padua to undertake the decoration of the high altar of S. Antonio, but in the period preceding his departure he not only assisted Brunelleschi in the decoration of the sacristy of S. Lorenzo, towards which the bronze doors are his chief contribution, but found time to chisel, or model in wax or terra-cotta, for Cosimo and other private patrons, most of the portrait busts and small reliefs, which are now distributed over the museums of the world. His first work in Padua was the bronze crucifix for the high altar, a work immeasurably superior to the early wooden crucifix at S. Croce, both as regards nobility of expression and subtlety of form. In the very year when Donatello arrived in Padua the famous Condottiere Erasmo de' Narni, called Gattamelata, had died, and when it was decided to honour his memory with an equestrian statue, it was only natural that this master should be chosen to undertake a task from the difficulties of which all others may well have shrunk — had shrunk, indeed, since classic times. This commission, and the reliefs and figures for the high altar, kept Donatello in Padua for ten years, though during that time he visited Venice (where he carved the wooden " St John " at the Frari) and probably Mantua, Ferrara and Modena. At least, he was in communication with Borso d' Este of Modena about a project for an equestrian statue, and had to give expert opinion about two equestrian statues at Ferrara. In his workshop in Padua he gathered around him quite a small army of assistants, stone-carvers, metal-workers, painters, gilders and bronze-casters. The Gattamelata was finished and set up in 1453 — a work powerful and majestic in its very repose; there is no striving for dramatic effect, no exaggerated muscular action, but the whole thing is dominated by the strong, energetic head, which is modelled with the searching realism of the Zuccone and the Poggio heads. The high altar, for which Donatello executed twenty-two reliefs, seven statues and the crucifix, was completed in 1450, but had subsequently to undergo many changes, in the course of which the original disposition of the sculptures was entirely lost sight of, the present arrangement being due to Camillo Boito (1895) . The chief features of the altar are the wonderfully animated and dramatic bronze reliefs, four in number,' of the " Miracles of St Anthony."

With the exception of another visit to Siena in 1457, of which the bronze " St John " in the cathedral is a reminder, Donatello spent the remaining years of his life in Florence. Closely akin to the rugged " St John " at Siena, and therefore probably contemporaneous, is the repulsively ugly, emaciated "Magdalen" at the baptistery in Florence. The dramatic intensity of the " Judith " group in the Loggia de'

Lanzi, which was originally placed in the court of the Medici Palace, marks it as belonging to the post-Paduan period of the master's life. His last work of importance was the bronze reliefs for the pulpit of S. Lorenzo, commissioned about 1460, and finished after Donatello's death by his pupil Bertoldo. The reliefs of the " Flagellation " and " Crucifixion " at the Victoria and Albert Museum are typical examples of the master's style at this closing period of his life. He died on the 13th of December 1466.

As happened subsequently to Velazquez and Frans Hals, Donatello, whose supreme mastery had been acknowledged by Michelangelo, Raphael and the other giants of the late Renais- sance, almost sank into oblivion during the 18th and early 19th centuries, and only in comparatively recent times has he been restored to the eminent position which is his due in the history of art. The full power of his genius was only revealed to the world when, at the quincentenary celebration of his birth, the greater part of his life-work was brought together in Florence. The large hall at the Bargello has ever since been devoted to the display of his works, the numerous original bronzes and marbles and terra- cottas being supplemented by casts of works at other places, such as the colossal Gattamelata monument.

Authorities.— Before the date of the Florence exhibition in 1886 the only books on the subject of Donatello — apart from references in

general histories of art — were Pastor's Donatello (Giessen, 1882) and Semper's Donatello, seine Zeit und seine Schule (Vienna, 1875). Since then the great Florentine sculptor has received attention from many of the leading art writers, though England has only contributed a not very complete record of his life and work by Hope Rea, Donatello (London, 1900), and an excellent critical study by Lord Balcarres, Donatello (London, 1903), besides a translation of A. G. Meyer's fully illustrated and exhaustive monograph in the Knackfuss series (London, 1904). Other notable books on the subject are: — Eugene Muntz, Donatello (Paris, 1885), and in the series of Les Artistes celibres (Paris, 1890); Schmarzow, Donatello (Breslau, 1886); Cava- lucci, Vita ed opere del Donatello (Milan, 1886) ; Tschudi, Donatello e la critica moderna (Turin, 1887) ; Reymond, Donatello (Florence, 1899) ; and Bode, Florentiner Bildhauer der Renaissance (Donatello als Architekt und Dekorator, Die Madonnenreliefs Donatellos) (Berlin, 1902). (P. G. K.)

DONATI, GIOVANNI BATTISTA (1826-1873), -Italian astronomer, was born at Pisa on the 16th of December 1826. He entered the observatory of Florence as a student in 1852, became assistant to G.

B. Amici in 1854, and was appointed in 1864 to succeed him as director. A new observatory at Arcetri near Florence, built under his supervision, was completed in 1872. During the ten years 1854-1864 Donati discovered six comets, one of which, first seen on the 2nd of June 1858, bears his name (see Comet). He observed the total solar eclipse of the 18th of July 1 860, at Torreblanca in Spain, and in the same year began experiments in stellar spectroscopy. In 1862 he published a memoir, Intorno alle strie degli spettri stellari, which indicated the feasibility of a physical classification of the stars: and on the 5th of August 1864 discovered the gaseous composition of comets by submitting to prismatic analysis the light of one then visible. An investigation of the great aurora of the 4th of February 1872 led him to refer such phenomena to a distinct branch of science, designated by him " cosmical meteorology "; but he was not destined to prosecute the subject. Attending the International Meteorological Congress of August 1873 at Vienna, he fell ill of cholera, and died a few hours after his arrival at Arcetri, on the 20th of September 1873.

See Vierteljahrsschrift der astr. Gesellschaft (Leipzig), ix. 4;, Monthly Notices Roy. Astr. Society, xxxiv. 153; Memorie degli spettroscopisti italiani. ii. 125 (G. Cacciatore); Nature, viii. 556; &c.
___ (A. M. C.)

DONATIO MORTIS CAUSA (grant in case of death), in law, a gift of personal property made in contemplation of death and intended either expressly or impliedly to take complete effect only if the donor dies of the illness affecting him at the time of the gift. The conception as well as the name is borrowed from Roman law, and the definition given by Justinian (Inst. ii. 7. 1) applies equally to a donatio mortis causa in Roman and English law. A distinction, however, has arisen between the English and civil codes; by English law delivery either actual or (when from the nature of the thing actual delivery is impossible) constructive is essential, and this delivery must pass not only the possession but the dominion of the thing given; by the civil law, in some cases at least, delivery of possession was not essential (see the judgment of Lord Chancellor Hardwicke in Ward v. Turner, 1751, 2 Ves. sen. 431, where the whole question is exhaustively discussed). A donatio mortis causa stands halfway between a gift inter vivos and a legacy, and has some of the characteristics of each form of disposition. It resembles a legacy in that (1) it is revocable during the donor's life, (2) it is subject to legacy and estate duty, and (3) it is liable to satisfy debts of the testator in default of other assets. On the other hand, it resembles a gift inter vivos in that it takes effect from delivery; therefore the consent of the executor is

not necessary. Anything may be the subject of a donatio mortis causa, the absolute property in which can be made to pass by delivery after the donor's death either in law or equity; this will cover bankers' deposit notes, bills of exchange, and notes and cheques of a third person, but not promissory notes and cheques of the donor in favour of the donee, for the donor's signature is merely an authority for his banker to pay, which is revoked by his death.

DONATION OF CONST ANTINE (Donatio Constantini) , the supposed grant by the emperor Constantine, in gratitude for his conversion by Pope Silvester, to that pope and his successors

for ever, not only of spiritual supremacy over the other great patriarchates and over all matters of faith and worship, but also of temporal dominion over Rome, Italy and " the provinces, places and civitates of the western regions." The famous document, known as the Constitutum Constantini and compounded of various elements (notably the apocryphal Vita S. Silvestri), was forged at Rome some time between the middle and end of the 8th century, was included in the 9th century in the collection known as the False Decretals, two centuries later was incorporated in the Decretum by a pupil of Gratian, and in Gibbon's day was still " enrolled among the decrees of the canon law," though already rejected " by the tacit or modest censure of the advocates of the Roman church." It is now universally admitted to be a gross forgery. 1 In spite, however, of Gibbon's characteristic scepticism on this point, it is certain that the Constitutum was regarded as genuine both by the friends and the enemies of the papal pretensions throughout the middle ages. 2 Though no use of it was made by the popes during the oth and 10th centuries, it was quoted as authoritative by eminent ecclesiastics of the Frankish empire (e.g. by Ado of Vienne and Hincmar of Reims), and it was employed by two Frankish popes, Gregory V. and Silvester II., in urging certain territorial claims. But not till 1050 was it made the basis of the larger papal claims, when another Frankish pope, Leo IX., used it in his controversy with the Byzantines. From this time forward it was increasingly used by popes and canonists in support of the papal pretensions, and from the 1 2 th century onwards became a powerful weapon of the spiritual against the temporal powers. It is, however, as Cardinal Hergenrother points out, possible to exaggerate its importance in this respect; a charter purporting to be a grant by an emperor to a pope of spiritual as well

as temporal jurisdiction was at best a double-edged weapon; and the popes generally preferred to base their claim to universal sovereignty on their direct commission as vicars of God. By the partisans of the Empire, on the other hand, the Donation was looked upon as the fons et origo malorum, and Constantine was regarded as having, in his new-born zeal, betrayed his imperial trust. The expression of this opinion is not uncommon in medieval literature (e.g.Walther von der Vogelweide, Pfeiffer's edition, 1880, Nos. 85 and 164), the most famous instance being in the Inferno of Dante (xix. 115):

" Ahi, Costantin, di questo mal fu matre Non la tua conversion, ma quella dote Che da te prese il primo ricco patre ! "

The genuineness of the Constitutum was first critically assailed by Laurentius Valla in 1440, whose De falso credita et ementita Constantini donatione declamatio opened a controversy that lasted until, at the close of the 18th century, the defence was silenced. In modern times the controversy as to the genuineness of the document has been succeeded by a debate scarcely less lively as to its date, its authorship and place of origin. The efforts of Roman Catholic scholars have been directed (since Baronius ascribed the forgery to the Greeks) to proving that the fraud was not committed at Rome. Thus Cardinal Hergenrother holds that it was written by a Frank in the 9th century, in order to prove that the Greeks had been rightfully expelled from Italy and that Charlemagne was legitimate emperor. This view, with variations, was maintained by the writer of an article in the Civilta catlolicain 1864 {Serie v. vol. x. pp. 303, &c.) and supported by Grauert, who maintains that the document was concocted at the abbey of St Denis, after 840. The evidence now available, however, confirms those who ascribe an earlier date to the forgery and place it at Rome. The view held by Gibbon and DSUinger among others, 3 that the Constitutum is referred to in

1 Dr Hodgkin's suggestion (Italy and her Invaders, vii. p. 153) that the Constitutum may have been originally a mere pious romance, recognized as such by its author and his contemporaries, and laid up in the papal archives until its origin was forgotten, is wholly inconsistent with the unquestioned results of the critical analysis of the text.

2 Leo of Vercelli, the emperor Otto III.'s chancellor, protested that the Constitutum was a forgery, but without effect. The attacks upon it by the heretical followers of Arnold .of Brescia (1152) convinced neither the partisans of the pope nor those of the emperor.

3 So Langen (1883) and E. Mayer (1904).

the letter of Pope Adrian I. to Charlemagne (778), is now indeed largely rejected; there is nothing in the letter to make such an assumption safe, and the same must be said of Friedrich's attempt to find such reference in the letter addressed in 785 by the same pope to Constantine VI., emperor of the East, and his mother Irene. Still less safe is it to ascribe the authorship of the forgery to any particular pope on the ground of its style; for papal letters were drawn up in the papal chancery and the style employed there was apt to persist through several pontificates. Friedrich's theory that the Constitutum is a composite document, part written in the 7th century, part added by Paul I. when a deacon under Stephen IL, though supported by a wealth of learning, has been torn to tatters by more than one critic (G. Kriiger, L. Loening).

On one point, however, a fair amount of agreement seems now to have been reached, a result due to the labour in collating documents of Scheffer-Boichorst, namely, that the style of the Constitutum is generally that of the papal chancery in the latter half of the 8th century. This being granted, there is room for plentiful speculation as to where and why it was concocted. We may still hold the opinion of Dollinger that it was intended to impress the barbarian Pippin and justify in his eyes the Frank intervention in favour of the pope in Italy; or we may share the view of Loening (rejected by Brunner, Rechtsgeschichte) that the forgery was a pious fraud on the part of a cleric of the Curia, committed under Adrian I., 4 with the idea of giving a legal basis to territorial dominion which that pope had succeeded in establishing in Italy. The donations of Pippin and Charlemagne established him as sovereign de facto; the donation of Constantine was to proclaim him as sovereign dejure. It is significant in this connexion that it was under Adrian (c. 774) that the papal chancery ceased to date by the regnal years of the Eastern emperor and substituted that of the pontificate. Dollinger's view is supported and carried a step further by H. Bohmer, who by an ingenious argument endeavours to prove that the Constitutum was forged in 753, probably by the notary Christophorus, and was carried with him by Pope Stephen II. to the court of Pippin, in 754, with an eye to the acquisition of .the Exarchate. In support of this argument it is to be noted that the forged docu- ment first appears at the abbey of St Denis, where Stephen spent the winter months of 754. E. Mayer, on the other hand, denies that the Constitutum can have been forged before the news of the iconoclastic decrees of the council of Constantinople of 754 had reached Rome. He lays stress on the relation of the supposed confession of faith of Constantine, embodied

in the forgery, to that issued by the emperor Constantine V., pointing out the efforts made by the Byzantines between 756 and the synod of Gentilly in 767 to detach Pippin from the cause of Rome and the holy images. The forgery thus had a double object: as a weapon against Byzantine heresy and as a defence of the papal patrimony. As the result of an exhaustive analysis of the text and of the political and religious events of the time, Mayer comes to the conclusion that the document was forged about 775, i.e. at the time when Charlemagne was beginning to reverse the policy by which in 774 he had confirmed the possession of the duchies of Spoletq and Benevento to the pope.

Bibliography. — See Dollinger, Papstfabeln des Mittelalters (Munich, 1863; Eng. trans. A. Plummer, 1871) ; " Janus," Der Pabst und das Konzil (Munich, 1869; Eng. trans. 1869); Hergenrother, Catholic Church and Christian State (Freiburg im Breisgau, 1872; Eng. trans. 2 vols. 1876) ; W. Martens, Die romische Frage unter Pippin u. Karl d. Grossen (Stuttgart, 1881), with text; H. Grauert, " Die Konstantinische Schenkung " in Hist. Jahrb. der Gorres- Gesellsch. iii. (1882), iv. (1883) ; Langen, " Entstehung u. Tendenz der Konst. Schenkungsurkunde " in Sybel's Hist. Zeitschr. 1. (1883) ; L. Weiland, " Die Konst. Schenkung " in Zeitschr. f. Kirchenrecht, xxii. (1887-1888), maintains that the Constitutum was forged at Rome between 813 and 875, in connexion with the papal claim to crown the emperors; H. Brunner and K. Zeumer, Die Konstantinische Schenkungsurkunde (Berlin, 1888; Festgaben fur R. v. Gneist) , with text ; Friedrich, Die Konst.Schenkung (Nordlingen, 1889), with text; W. Martens, Die falsche Generalkonzession Kon- stantins des Grossen (Munich, 1889); P. Scheffer-Boichorst, " Neue

4 This is also W. Mayer's view in his later work. In his Die romische Frage (1 881) he had placed the forgery in 805 or 806.

Forschungen iiber die Konst. Schenkung," i. ii. (Mitteilungen des Instituts fur osterr. Geschichtsforschung, x. (1889), xi. (1890); G. Kriiger, " Die Frage der Entstehungszeit der Konst. Schenkung," in Theologische Literaturzeitung, xiv. (1889) ; J. Hodgkin, Italy and her Invaders, vol. vii. p. 135 (Oxford, 1899); article " Konstantinische Schenkung," G. H. Bohmer, in Herzog-Hauck, Reatencykl. (1902); E. Mayer, " Die Schenkungen Konstantins und Pipins " in Deutsche Zeitschr. fur Kirchenrecht (Tubingen, 1904).

Laurentius Valla's treatise was issued in a new edition, With French translation and historical introduction, by A. Bonneau, La Donation de Constantin (Lisieux, 1879). (W. A. P.)

DONATISTS, a powerful sect which arose in the Christian church of northern Africa at the beginning of the 4th century.' In its doctrine it sprang from the same roots, and in its history it had in many things the same character, as the earlier Novatians. The predisposing causes of the Donatist schism were the belief, early introduced into the African church, that the validity of all sacerdotal acts depended upon the personal character of the agent, and the question, arising out of that belief, as to the eligibility for sacerdotal office of the traditores, or those who had delivered up their copies of the Scriptures under the compulsion of the Diocletian persecution; the exciting cause was the election of a successor to Mensurius, bishop of Carthage, who died in 311. Mensurius had held moderate views as to the treatment of the traditores, and accordingly a strong fanatical party had formed itself in Carthage in opposition to him, headed by a wealthy and influential widow named Lucilla, and countenanced by Secundus of Tigisis, episcopus primae sedis in Numidia. There were thus two parties, each anxious to secure the succession to the vacant see. The friends of the late bishop fixed their choice on Caecilian, the archdeacon, and secured his election and his consecration by Felix, the bishop of Aptunga, before the other party were ready for action. It had been customary for the Numidian bishops to be present at the election and consecration of the bishop of Carthage, who as metropolitan of proconsular Africa occupied a position of primacy towards all the African provinces. Caecilian's party, however, had not waited for them, knowing them to be in sympathy with their opponents. Soon after Caecilian's consecra- tion, Secundus sent a commission to Carthage, which appointed an interventor temporarily to administer the bishopric which they regarded as vacant. Then Secundus himself with seventy of the Numidian bishops arrived at Carthage. A synod of Africa was formed, before which Caecilian was summoned; his con- secration was declared invalid, on the ground that Felix had been a traditor; and finally, having refused to obey the summons to appear, he was excommunicated, and the lector Majorinus, a dependant of Lucilla's, consecrated in his stead. This synod forbade the African churches to hold communion with Caecilian, the schism became overt, and in a very short time there were rival bishops and rival churches throughout the whole province.

It was soon clear, by the exclusion of the " Pars Majorini " from certain privileges conferred on the African church, that the sympathies of Constantine were with the other party (Eusebius, Hist.

eccl. x. 6, 7). To investigate the dispute an imperial commission was issued to five Gallic bishops, under the presidency of Melchiades, bishop of Rome. The number of referees was afterwards increased to twenty, and the case was tried at Rome in 313. 2 Ten bishops appeared on each side, the leading re- presentative of the Donatists being Donatus of Casae Nigrae. The decision was entirely in favour of Caecilian, and Donatus was found guilty of various ecclesiastical offences. An appeal was taken and allowed; but the decision of the synod of Aries in 314 not only, confirmed the position of Caecilian, but greatly strengthened it by passing a canon that ordination was not

1 There were three prominent men named Donatus connected with the movement — Donatus of Casae Nigrae ; Donatus surnamed Magnus, who succeeded Majorinus as the Donatist bishop of Carthage; and Donatus of Bagoi, a leader of the circumcelliones , who was captured and executed c. 350. The name of the sect Was derived from the second of these. The Donatists themselves repudiated the designation, which was applied to them by their opponents as a reproach. They called themselves " Pars Majorini " or " Pars Donati."

2 The Donatist movement affords a valuable illustration of the new importance which the changed position of the church under ' Constantine gave to the synodal system of ecclesiastical legislation.

invalid because performed by a traditor, if otherwise regular. Felix had previously been declared innocent after an examination of records and witnesses at Carthage. A further appeal to the emperor in person was heard at Milan in 316, when all points were finally decided in favour of Caecilian, probably on the advice of Hosius, bishop of Cordova. Henceforward the power of the state was directed to the suppression of the defeated party. Persistent Donatists were no longer merely heretics; they were rebels and incurred the confiscation of their church property and the forfeiture of their civil rights.

The attempt to destroy the sect by force had the result of intensifying its fanaticism. Majorinus, the Donatist bishop of Carthage, died in 315, and was succeeded by Donatus, surnamed Magnus, a man of great force of character, under whose influence the schism gained fresh strength from the opposition it en- countered. Force was met with force; the Circumcelliones, bands of fugitive slaves and vagrant (circum cellas) peasants, attached themselves to the Donatists, and their violence reached such a height as to threaten civil war. In 321

Constantine, see- ing probably that he had been wrong in abandoning his usual policy of toleration, sought to retrace his steps by granting the Donatists liberty to act according to their consciences, and declaring that the points in dispute between them and the orthodox should be left to the judgment of God. This wise policy, to which he consistently adhered to the close of his reign, was not followed by his son and successor Constans, who, after repeated attempts to win over the sect by bribes, resorted to persecution. The renewed excesses of the Circumcelliones, among whom were ranged fugitive slaves, debtors and political malcontents of all kinds, had given to the Donatist schism a revolutionary aspect; and its forcible suppression may therefore have seemed to Constans even more necessary for the preservation of the empire than for the vindication of orthodoxy. The power which they had been the first to invoke having thus declared so emphatically and persistently against them, the Donatists revived the old world-alien Christianity of the days of persecution, and repeated Tertullian's question, " What has the emperor to do with the church ? " {Quid est imperatori cum ecclesia ?) Such an attitude aggravated the lawlessness of the Circumcellion adherents of the sect, and their outrages were in turn made the justification for the most rigorous measures against the whole Donatist party indiscriminately. Many of their bishops fell victims to the persecution, and Donatus (Magnus) and several others were banished from their sees.

With the accession of Julian (361) an entire change took place in the treatment of the Donatists. Their churches were restored and their bishops reinstated (Parmenianus succeeding the deceased Donatus at Carthage), with the natural result of greatly increasing both the numbers and the enthusiasm of the party. A return to the earlier policy of repression was made under Valentinian I. and Gratian, by whom the Donatist churches were again closed, and all their assemblies forbidden. It was not, however, until the commencement of the 5th century that the sect began to decline, owing largely to the rise among them of a group of moderate and scholarly men like the grammarian Tychonius, who vainly strove to overcome the more fanatical section. Against the house thus divided against itself both state and church directed not unsuccessful assaults. In 405 an edict was issued by the emperor Honorius commanding the Donatists, under the severest penalties, to return to the Catholic church. On the other hand, Augustine, bishop of Hippo, after several years' negotiation, arranged a great conference between the Donatists and the orthodox, which was held under the authority of the emperor at Carthage in 411. There were present 286 Catholics and 279 Donatist

bishops. Before entering on the proceedings the Catholics pledged themselves, if defeated, to give up their sees, while in the other event they promised to recognize the Donatists as bishops on their simply declaring their adherence to the Catholic church. The latter proposal, though it was received with scorn at the time, had perhaps ultimately as much influence as the logic of Augustine in breaking the strength of the schism. The discussion, Which lasted for three days, Augustine

and Aurelius of Carthage being the chief speakers on the one side, and Primian and Petilian on the other, turned exclusively upon the two questions that had given rise to the schism — first, the question of fact, whether Felix of Aptunga who consecrated Caecilian had been a traditor; and secondly, the question of doctrine, whether a church by tolerance of unworthy members within its pale lost the essential attributes of purity and catholicity. The Donatist position, like that of the Novatians, was that the mark of the true church is to guard the essential predicate of holiness by excluding all who have committed mortal sin; the Catholic standpoint was that such holiness is not destroyed by the presence of unworthy members in the church but rests upon the divine foundation of the church and upon the gift of the Holy Spirit and the communication of grace through the priesthood. In the words of Optatus of Milevi, sanctitas de sacramentis colligitur, non de superbia personarum ponder a. And the much wider diffusion of the orthodox church was also taken as practical confirmation that it alone possessed what was regarded as the equally essential predicate of catholicity.

The decision of Marcellinus, the imperial commissioner, was in favour of the Catholic party on both questions, and it was at once confirmed on an appeal to the emperor. The severest penal measures were enforced against the schismatics; in 414 they were denied all civil rights, in 415 the holding of assemblies was forbidden on pain of death. But they lived on, suffering with their orthodox brethren in the Vandal invasions of the 5th century, and like them finally disappearing before the Saracen onslaught two centuries later.

Authorities. — 1. Contemporary sources: Optatus Milevitanus De Schismate Donatistarum adversus Parmenianum, written c. 368 (Dupin's ed., Paris, 1700), and several of the works of Augustine. 2. Modern: C. W. F. Walch, Entwurf einer vollstdndigen Historie der Ketzereien (Leipzig, 1768); Hauck-Herzog, Realencyk. fur prot.

Theol., art. " Donatismus " by N. Bonwetsch, who cites the literature very fully; W. Moller, History of the Christian Church (vol. i. pp. 331 ff., 445 ff.) ; D. Volter, Der Ursprung des Donatismus (Freiburg, 1883).

DON ATUS, AELIUS, Roman grammarian and teacher of rhetoric, flourished in the middle of the 4th century a.d. The only fact known regarding his life is that he was the tutor of St Jerome. He was the author of a number of professional works, of which there are still extant: — Ars grammatica; the larger portion of his commentary on Terence (a compilation from other com- mentaries), but probably not in its original form; and a few fragments of his notes on Virgil, preserved and severely criticized by Servius, together with the preface and introduction, and life of Virgil. The first of these works, and especially the section on the eight parts of speech, though possessing little claim to originality, and in fact evidently based on the same authorities which were used by the grammarians Charisius and Diomedes, attained such popularity as a school-book that in the middle ages the writer's name, like the French Calepin, became a common metonymy (in the form donet) for a rudimentary treatise of any sort. On the introduction of printing editions of the little book were multiplied to an enormous extent. It is extant in the form of an Ars Minor, which only treats of the parts of speech, and an Ars Major, which deals with grammar in general at greater length.

Aelius Donatus is to be distinguished from Tiberius Claudius Donatus, the author of a commentary (Interpretationes) on the Aeneid (of far less value than that of Servius) , who lived about fifty years later.

The best text of the Ars and the commentaries upon it by Servius and others is in H. Keil, Grammatici Latini, iv. ; of the commentary on Terence there is an edition by P. Wessner (1902, Teubner series), with bibliography and full account of MSS. See generally E. A. Grafenhan, Geschichte der klassischen Philologie im Altertum, iv. (1850); P. Rosenstock, De Donato, Terenti . . . explicatore (1886); H. T. Karsten, De comm. Don. ad Terenti fabulas origine et com- positione (Leiden, 1907). For the commentary of Tiberius Donatus see O. Ribbeck, Prolegomena to Virgil, Grafenhan (as above), and V. Burkas, De Tiberii Claudii Donati in Aeneidem commentario (1889). The. text will be found in G. Fabricius's edition of Virgil (1561), ed. by H. George, i. (1905 foil.).

DONAUWORTH, a town of Germany in the kingdom of Bavaria, on

the left bank of the Danube, at the confluence of the WOrnitz, 25 m. N. of Augsburg by rail and at the junction of lines

to Ulm and Ingolstadt. Pop. 5000. It is an ancient town and has several medieval buildings of interest. Notable among its seven churches (six Roman Catholic) are the Kloster-Kirche (monasterial), a beautiful Gothic edifice with the sarcophagus of Maria of Brabant, and that of the former Benedictine abbey, Heilig-Kreuz, with a lofty tower. Remarkable among secular buildings are the Gothic town hall, and the so-called Tanz-haus, which now includes both a theatre and a school. The industries embrace machinery, brewing and saw-milling; the place is of some importance as a river port, and the centre of a considerable agricultural trade.

Donauworth grew up in the course of the nth and 12th centuries under the protection of the castle of Mangoldstein, became in the 13th a seat of the duke of Upper Bavaria, who, however, soon withdrew to Munich to escape from the manes of his wife Maria of Brabant, whom he had there beheaded on an unfounded suspicion of infidelity. The town received the freedom of the Empire in 1308, and maintained its position in spite of the encroachments of Bavaria till 1607, .when the interference of the Protestant inhabitants with the abbot of the Heilig-Kreuz called forth an imperial law authorizing the duke of Bavaria to inflict chastisement for the offence. In the Thirty Years' War it was stormed by Gustavus Adolphus (1632), and captured by King Ferdinand (1634). In the vicinity, on the Schellenberg, the Bavarians and French were defeated by Marlborough and Prince Louis of Baden on the 2nd of July 1704. The imperial freedom restored to the town by Joseph I. in 1705 was again lost by reincorporation with Bavaria in 17 14. In the neighbourhood the Austrians under Mack were, on the 6th of October 1805, decisively defeated by the French under Soult.

See Konigsdorfer, Geschichte des Klosters zum Heiligen Kreuz in Donauworth (1819-20).

DON BENfTO, a town of western Spain, in the province of Badajoz; near the left bank of the river Guadiana, on the Madrid- Badajoz-Lisbon railway. Pop. (1900) 16,565. Don Benito is a thriving and comparatively modern town; for it dates only from the 15th century, when it was founded by refugees from Don Llorente, who deserted their own town owing to the danger of floods from the Guadiana. Besides manufactures of brandy, flour, oil, soap, linen and cloth, it has an active trade in wheat, wine and fruit, especially melons.

DONCASTER, a market-town and municipal borough in the Doncaster parliamentary division of the West Riding of York- shire, England, 156 m. N. by W. from London. Pop. (1901) 28,932. It lies in a flat plain on the river Don, with slight hills rising westward. It is an important station on the Great Northern railway, whose principal locomotive and carriage works are here, and it is also served by the North Eastern, Great Eastern, Great Central, Lancashire & Yorkshire, and Midland railways. The Don affords intercommunication with Goole and the Humber. The parish church of St George, occupying the site of an older structure of the same name, destroyed by fire in 1853, was finished in 1858 under the direction of Sir G. G. Scott. It is a fine cruciform structure of Decorated character, with a central tower 170 ft. high, and contains a particularly fine organ. St James's church was erected, under the same architect and Lord Grimthorpe, by the Great Northern railway company. Other important build- ings are the town hall, mansion house, free library and art school, corn exchange and markets. The grammar school was founded in 1553 and reorganized in 1862. Doncaster race-meetings are widely famous. The racecourse lies 1 m. S.E. of the town. The old course is 1 m. 7 fur. 70 yds. in length, and the Sandall course of 1 m. was added in 1892. The grand stand was erected in 1777, but there are several additional stands. Races have long been held at Doncaster, and there was a stand on the course before the year 1615. The St Leger takes its name from Lieut. - General St Leger, who originated the race in 1776; but it was not so named till 1778. The meetings are held in the second week of September. A system of electric tramways connects the town with its principal suburbs. The agricultural trade is extensive, and there are iron, brass and agricultural machine works. Doncaster lies on the outskirts of a populous district extending

up the valley of the Don. Two miles S.W. is the urban district of Balby-with-Hexthorpe (pop. 6781); and 7 m. S. is that of Tickhill, where there are remains of a Norman castle. Wheatley (3579) lies 2 m. N.E. The borough of Doncaster is under a mayor, six aldermen and eighteen councillors. Area, 1695 acres.

History. — There was a Roman station here, and numerous remains of the Roman period have been found. In the reign of Edward the Confessor, Doncaster, as a berewic of the manor of Hexthorp, belonged to Earl Tostig; but before 1086 it had been granted to

Robert, earl of Mortain, whose successor William was attainted for treason in the time of Henry I. The overlordship then fell to the crown, and the families of Frossard, Mauley and Salvin successively held the manor as underlords. Doncaster was evidently a borough held of the crown for a fee farm rent before 1 194, when Richard I. granted and confirmed to the burgesses their soke and town to hold by the ancient rent and by twenty- five marks yearly. The town was incorporated in 1467 by Edward IV., who granted a gild merchant and appointed that the town should be governed by a mayor and two serjeants-at-mace elected every year by the burgesses. Henry VII., while confirming this charter in 1505, granted further that the burgesses should hold their town and soke with all the manors in the soke on payment of a fee farm. He also by another charter in 1508 confirmed letters patent granted by Peter de Mauley in 1341, by which the latter renounced to the inhabitants of Doncaster all the manorial claims which he had upon them, with the " pernicious customs " which his ancestors claimed from bakers? brewers, butchers, fishers and wind-fallen trees. In 1623 Ralph Salvin tried to regain the manor of Doncaster from the mayor and burgesses, who, fearing that the case would go against them, agreed to pay about £3000, in return for which he gave up his claim to all the manors in the soke. Charles II. in 1664 gave the town a new charter, granting that it should be governed by a mayor, twelve aldermen and twenty-four capital burgesses, but since this was not enrolled and was therefore of no effect the burgesses obtained another charter from James II. in 1684 by which the town was governed until the Municipal Corporation Act. In 1 200 a fair at Doncaster on the vigil and day of St James the Apostle was con- firmed to Robert de Turnham, who held the manor in right of his wife, with the addition of an extra day, for which he had to give the king two palfreys worth 100s. each. By the charter of 1 1 94 che burgesses received licence to hold a fair on the vigil, feast and morrow of the Annunciation, and this with the fair on St James's day was confirmed to them by Henry VII. in 1505. The fairs and markets are still held under these charters.

See Victoria County History, Yorkshire; Edward Miller, The History and Antiquities of Doncaster (1828-1831); Calendar to the Records of the Borough of Doncaster, published by the Corporation.

DON COSSACKS, TERRITORY OF THE (Russ. Donskaya Oblast), a government of S.E. Russia, bounded W. by the govern- ments of Voronezh, Kharkov and Ekaterinoslav, S.W. by the Sea of Azov, S. by the governments of Kuban and Stavropol, and E. by those of Astrakhan and Saratov. Area, 63,532 sq. m. Pop. 1,010,135 in

1867, 2,585,920 in 1897 and 3,125,400 (estimate) in 1906. It belongs almost entirely to the region of the South Russian steppes, but in the N., W. and S.W. presents more the aspects of elevated plains gapped with ravine-like river-courses, while in the S.E., towards the Manych depression, it passes over into the arid Aral-Caspian steppes (e.g. Zadonsk Steppe), dotted over with salt lakes. Geologically the region is made up of Carboniferous limestones, clay slates and sandstones, containing anthracite and coal; of Cretaceous marls, chalk, sandstone and greensands — chalk cliffs, in fact, accompany the Don for 200 m.; and of Miocene limestones and clays. The surface, especially W. of the Don, is the fertile black earth, intermingled here and there, especially in the Zadonsk Steppe, with clay impregnated with salt. The government is drained by the Don and its tributaries, of which the Donets, Chir and Mius enter from the right and the Khoper and Medvyeditsa from the left. The Don is navigable throughout the government, and at Kalach is connected by a railway, 45 m. long, with Tsaritsyn on the Volga, routes by which an enormous amount of heavy merchandise is transported. The

climate is continental and dry, the average temperatures being — year 43° Fahr., January 13 , July 72 at Uryupina (in 50° 48′ N.; alt. 92 ft.); and year 48 , January 21°, July 73 at Taganrog. The annual rainfall at the same two places is 13-4 and 17-4 in. respectively. Forests cover only 2 % of the area.

Nearly one-half of the population are Cossacks, the other ethnological groups being (1897) 27,234 Armenians, 2255 Greeks, 1267 Albanians, 16,000 Jews and some 30,000 Kalmuck Tatars, who are Lamaists in religion. Nearly all the rest of the people, except the Jews and about 3000 Mahommedans, belong to the Orthodox Eastern Church. The Cossacks own nearly 30,000,000 acres of land. The government is well provided with schools, especially on the Cossack territory. Agriculture is the principal occupation, but the crops vary very greatly from year to year, owing to deficiency of rain. Vines are cultivated on a large scale, and tobacco is grown in the south. Cattle-breeding is important, and there are fine breeds of horses and large flocks of sheep. Productive fisheries are carried on at the mouth of the Don. Nearly 13,000 persons are engaged in coal-mining; the coalfields form part of the vast Donets coal basin (10,420 sq. m., with a total output of nearly 13 ,000,000 tons annually) . Some iron ore, gypsum, salt and limestone are also produced. The principal branches of manufacturing industry are flour-milling, potteries, ironworks and tobacco factories. The exports consist chiefly of cereals, cattle, horses, sheep, wine, fish and hides. The government is under the administration of the ministry of war, and is divided into nine districts — Donets (chief town, Kamenskaya with 23,576 inhabitants in 1897), First Don dis- trict (Konstantinovskaya, 8800), Second Don district (Nizhne- Chirskaya, 15,196), Rostov (Rostov-on-Don, 119,889), Salsky (Velikoknyazheskaya), Taganrog (Taganrog, 58,928 in 1900), Ust-medvyeditsa (Ust-medvyeditsa, 16,000), Khoper (Uryupina, 9600), Cherkasky (Novo-cherkassk, 52,005). The capital of the government is Novo-cherkassk. Many of the Cossack slanitsas (villages) are very populous. (P. A. K.; J. T. Be.)

DONEGAL, a county in the extreme north-west of Ireland, in the province of Ulster, bounded N.and W. by the Atlantic Ocean, E. by Lough Foyle and the counties Londonderry and Tyrone, and S. by Donegal Bay and the counties Fermanagh and Leitrim. The area is 1,197,153 acres, or about 1871 sq. m., the county being the largest in Ireland after Cork and Mayo. This portion of the country possesses little natural wealth; its physical character- istics are against easy communications, and although its northern coast

affords one or two good natural harbours, there is no commercial inducement to take advantage of them. The fine scenery and other natural attractions of Donegal thus remained practically unknown until late in the 19th century, but an effort was then made by Lord George Hill to introduce wealth from without into the county, and to develop its resources in this/ almost the only possible direction. The county possesses a large extent of sea-coast indented by numerous inlets. Ballyshannon harbour, the most southern of these, is small, and has a bar at its mouth, as has Donegal harbour farther north. Killybegs harbour is' well sheltered, and capable of receiving large vessels. These, with Bruckles or M'Swiney's Bay, and Teelin harbour, suitable for small vessels, are arms of the fine inlet of Donegal Bay. The western shore is beautified by the indentations of Loughros Beg, Gweebarra, Trawenagh and Inishfree Bays. On the north is Sheephaven, within which is Dunfanaghy Bay, where the largest ships may lie in safety, as they may also in Mulroy Bay and Lough Swilly farther east. Lough Foyle, which divides Donegal from Londonderry, is a noble sheet of water, but is shallow and in part dry at ebb tide, contracted at its entrance, and encumbered with shoals. A few miles west of Malin Head, the most northerly point of the mainland of Ireland, the varied and extensive Lough Swilly runs far into the interior. From these two loughs much land has been reclaimed. Numerous islands and rocks stud the coast. The largest island is North Aran, about 15 m. in circumference, with a lofty hill in its centre, and a gradual declivity down to the sea. On the northern coast are Tory Island, and, farther east, Inishtrahull, the ultima Thule of Ireland. The inhabitants of these islands obtain a precarious

livelihood by fishing, kelp-burning and rude husbandry, but are often reduced to extreme destitution.

Mountains and irregular groups of highlands occupy the whole interior of the county, and a considerable portion is bog and moorland. Errigal mountain in the north-west attains an elevation of 2466 ft. and commands from its summit a fine view over a considerable portion of the country. In its vicinity, the Derryveagh mountains reach 2240 ft. in Slieve Snaght; Muckish is 2197 ft.; in the south Bluestack reaches 2219 ft.; and in the Innishowen peninsula between Loughs Swilly and Foyle, another Slieve Snaght is 2019 ft. in elevation. At the western extremity of the north coast of

Donegal Bay stands Slieve League, whose western flank consists of a mighty cliff, descending almost sheer to the Atlantic, exhibiting beautiful variegated colouring, and reaching an extreme height of 1972 ft. From these details it will appear that the scenery of the highlands and the sea-coast often attain a character of savage and romantic grandeur; whereas the eastern and southern portions are generally less elevated and more fertile, but still possess considerable beauty. A considerable portion of the surface, however, is occupied by bogs, and entirely destitute of timber.

With the exception of the tidal river Foyle, which forms the boundary between this county and Tyrone and Londonderry, the rivers, though numerous, are of small size. The branches of the Foyle which rise in Donegal are the Derg, issuing from Lough Derg, and the Finn, rising in the beautiful little lake of the same name in the highlands, and passing through some of the best cultivated land in the county. The Foyle, augmented by their contributions, and by those of several other branches from the counties Tyrone and Londonderry, proceeds northward, dis- charging its waters into the southern extremity of Lough Foyle, at the city of Londonderry. It is navigable for vessels of large burden to this place, and thence by lighters of fifty tons as far as Lifford. Boats of fourteen tons can proceed up the Finn river as far as Castlefinn. The fine river Erne flows from Lough Erne through the southern extremity of the county into the southern extremity of Donegal Bay. Its navigation is prevented by a fall of 12 ft., generally called the Salmon Leap, in the neighbour- hood of Ballyshannon, and by rapids between Ballyshannon and Belleek, on the confines of Co. Fermanagh. The Gweebarra, the Owenea, and the Eask are the only other streams of any note. Lakes are very numerous in Donegal. The most remarkable, and also the largest, is Lough Derg, comprising within its waters several islets, on one of which, Station Island, is the cave named St Patrick's Purgatory, a celebrated place of resort for pilgrims and devotees. The circumference of the lake is about 9 m., and the extent of the island to which the pilgrims are ferried over is less than 1 acre. The landscape round Lough Derg is desolate and sombre in the extreme, barren moors and heathy hills surrounding it on all sides. Salmon, sea-trout and brown trout afford sport in most of the rivers and loughs, and Glenties for the Owenea river, and Gweedore for the Cla dy, in the west; Killybegs for the Eanymore and Eask, in the south; and Rathmelton and Rosapenna for the Owencarrow and Leannan, in the north, may be mentioned as centres. Ballyshannon and Bundoran, in the extreme south, are centres for the Erne and other waters outside the county.

Geology. — The dominant feature in the geology of this county is the

north-east and south-west strike forced upon the older rocks during earth-movements that set in at the close of Silurian times. The granite that forms characteristically the core of the folds is probably of the same age as that of Leinster, or may possibly repre- sent older igneous masses, brought into a general parallelism during the main epoch of stress. The oldest recognizable series of rocks is the Dalradian, and its quartzites form the white summits of Muckish, Errigal and Aghla. The intruding granite, which pre- dominates in the north-west, has frequently united with the meta- morphic series to form composite gneiss. In the southern mass near Pettigo, once regarded as Archaean and fundamental, residual " eyes " of the hornblendic rocks that are associated with the Dalradian series remain floating, as it were, in the gneiss. North of this, the country is wilder, consisting largely of mica-schist, through which a grand mass of unfoliated granite rises at Barnesmore. The course of the Gweebarra, or Glen Beagh, of the Glendowan mountains, and the Aghla ridge, have all been determined by the general strike

imparted to the country. At Donegal Bay the Lower Carboniferous sandstone and limestone come in as a synclinal, and the limestone extends to Bundoran. Small Carboniferous outliers on the summits of the great cliff of Slieve League show the former extension of these strata. Bog iron-ore is raised as a gas-purifier; and talc-schist has been worked for steatite at Crohy Head. In most parts of the west the patches of glacial drift form the only agricultural 'and. The fine-grained sandstone of Mount Charles near Donegal is a well- known building stone, and the granites 'of the north-west have attracted much attention.

Industries. — The modes of agriculture present little that is peculiar to the county, and the spade still supplies the place of the plough where the rocky nature of the surface prevents the application of the latter implement. The soil of the greater portion of the county, i.e. the granite, quartz and mica slate districts, is thin and cold, while that on the carboniferous lime- stone is warm and friable. Owing to the boggy nature of the soil, agriculture has not made much progress, although in certain districts (Gweedore, for instance) much land has been brought under cultivation through the enterprise of the proprietors. Roughly speaking, however, about 45 % of the land is waste, 35 % pasture and 15 % tillage. Wheat and barley are quite an inconsiderable crop, and in this as well as in other respects Donegal is much behind the rest of Ulster in the extent of its crops. It bears, however, a more favourable comparison as regards its live stock, as cattle, sheep and poultry are extensively kept.

In Donegal, as in other counties of Ulster, the linen manu- facture affords employments a number of inhabitants, especially at Raphoe, while the manufacture of excellent homespun, woollen stockings and worked muslin is carried on pretty extensively. The trade in these manufactures and in the domestic produce of the county finds its principal outlets through the port of Londonderry and the inland town of Strabane, Co. Tyrone. The deep-sea fisheries are important, and are centred at Killybegs, Gweedore and Rathmullen. The salmon fishery is also prose- cuted to a considerable extent, the principal seats of the trade being at Ballyshannon and Letterkenny.

The railway system includes the County Donegal railway from Londonderry south-west to Donegal town and Killybegs, with branches to Glenties, a village near the west coast, and to Ballyshannon; and the Londonderry and Lough Swilly, serving Letterkenny, and continuing to Burtonport with a branch north to Buncrana, a watering-place on Lough Swilly, and Cardonagh in the Innishowen peninsula. From Letterkenny the line con- tinues to Dunfanaghy on the north coast, thence to Gweedore and Burtonport.

Population and Administration. — The population (185,635 in 1891; 173,722 in 1901) decreases less seriously than in most Irish counties, though the proportion of emigrants is large. About 78 % of the population is Roman Catholic, and almost the whole is rural. The native Erse naturally dies out slowly in this remote county, and the Donegal dialect is said to be the purest in the Irish language. The towns are small in extent and importance. Lifford (pop. 446), the cOunty town, is practically a suburb of Strabane, in the neighbouring Co. Tyrone. Ballyshannon (2359) on the river Erne, Letterkenny (2370) at the head of Lough Swilly, and Donegal (1214) at the head of the bay of that name, are the other principal towns. The principal watering-places are Moville on Lough Foyle, Buncrana and Rathmelton on Lough Swilly; while, following the coast from north to south, Rosapenna, Dunfanaghy, Gweedore, Dungloe and Ardara, with Bundoran in the extreme south, are seaside villages frequently visited. Resorts deserving mention for the attractive scenery for which they are centres, are — Ardara, on the Owenea river, where the cliffs of the neighbouring coast are particularly fine; Carrick, Malin Head, the beautiful land-locked bay of Mulroy, Narin on Boylagh Bay, Portsalon on Lough Swilly, and Stranorlar, a small market town near the fine mountain pass of Barnesmore.

Donegal contains seven baronies and fifty parishes. Assizes are held at Lifford, and quarter sessions at Ballyshannon, Bun- crana, Donegal, Cardonagh, Glenties, Letterkenny and Lifford. The county

is in the Protestant dioceses of Clogher and Derry,

and the Roman Catholic dioceses of Raphoe, Clogher and Derry. The county returned twelve members to the Irish parliament; after the Union it returned two; but it is now divided into north, east, south and west divisions, each returning one member.

History and Antiquities. — The greater part of Donegal was anciently called Tyrconnell (q.v.) or the country of Conall; and it was sometimes called O'Donnell's country, after the head chieftains of the district. This district was formed into the county of Donegal in the reign of Queen Elizabeth, in 1585, by the lord-deputy Sir John Perrott. The most noteworthy architectural remains of antiquity in the county are to be found at the head of Lough Swilly, where, situated on the summit of a hill 802 ft. high, some remarkable remains exist of a fortress or palace of the northern Irish kings. These are known as the Grianan of Aileach, and evidently date from a period prior to the 1 2th century. On Tory Island there are one of the best specimens of a round tower and some other interesting remains. Numerous ruins of ancient castles along the coast prove that much attention was formerly paid to the defence of the country from invasion. The principal are — Kilbarron Castle, an ancient stronghold of the O'Clerys, near Ballyshannon; Donegal Castle, built by the O'Donnells, anciently their chief residence, and now a fine ruin standing close to the water's edge; Burt Castle, built in the reign of Henry VIII. on the shores of Lough Swilly by Sir Cahir O'Dogherty, to whom is also attributed the erection of Green Castle, one of the strongholds of the clan on Lough Foyle. Near the Castle of Doe, or M'Swiney's C ast le, at Horn Head, is a natural perforation in the roof of a cave, called M'Swiney's Gun, formed by the workings of the ocean into the overhanging cliff. When the wind blows due north, and the tide is at half flood, the gun is seen to spout up jets of water to a height of 100 ft., attended with explosions heard occasionally in favourable weather at an immense distance. Gulmore Fort, on the coast of Lough Swilly, supposed to have been erected by the O'Doghertys, having come into the possession of the crown, was granted in 1609 to the corporation of London. It was afterwards enlarged or rebuilt, and acted a prominent part in the celebrated siege of Derry. Traces of religious houses, some existing only in traditionary or documental records, are also numerous. The ruins of that of Donegal, founded in 1474, afford proofs of its ancient

grandeur. At Raphoe, 5 m. N.W. of Lifford, is the cathedral of a former diocese united to that of Derry in 1835.

DONEGAL, a small seaport and market town of Co. Donegal, Ireland (not, as its name would suggest, the county town, which is Lifford), in the south parliamentary division, at the head of Donegal Bay, and the mouth of the river Eask, on the Donegal railway. Pop. (1901) 1214. Its trade in agricultural produce is hampered by the unsatisfactory condition of its harbour, the approach to which is beset with shoals. Here are the ruins of a fine Jacobean castle, occupying the site of a fortress of the O'Donnells of Tyrconnell, but built by Sir Basil Brooke in 1610. There are also considerable remains of a Franciscan monastery, founded in 1474 by one of the O'Donnells, and here were compiled the famous " Annals of the Four Masters," a record of Irish history completed in 1636 by one Michael O'Clery and his coadjutors. There is a chalybeate well near the town, and 7 J m. S., at Ballintra, a small stream forms a series of limestone caverns known a"s the Pullins. Donegal received a charter from James I., and returned two members to the Irish parliament. The name is said to signify the " fortress of the foreigners," and to allude to a settlement by the Northmen.

DONELSON, FORT, an entrenched camp at Dover, Tennessee, U.S.A., erected by the Confederates in the Civil War to guard the lower Cumberland river, and taken by the Federals on the 16th of February 1862. It consisted of two continuous lines of entrenchments on the land side, and water batteries commanding the river. After the capture (Feb. 6) of Fort Henry on the lower Tennessee the Union army (three divisions) under Brigadier-General U. S. Grant marched overland to invest Donelson, and the gunboat flotilla (Commodore A. H. Foote) descended the Tennessee and ascended the Cumberland to meet him. Albert Sidney Johnston, the Confederate commander in Kentucky, had thrown a large

I garrison under General Floyd into Donelson, and Grant was at first outnumbered; though continually reinforced, the latter had at no time more than three men to the Confederates' two. The troops of both sides were untrained but eager.

On the 12th and 13th of February 1862 the Union divisions, skirmishing heavily, took up their positions investing the fort, and on the 14th Foote's gunboats attacked the water batteries. The latter received a severe repulse, Foote himself being amongst the wounded, and soon afterwards the Confederates determined to cut their way through Grant's lines. On the 15th General Pillow attacked the

Federal division of McClernand and drove it off the Nashville road; having done this, however, he halted, and even retired. Grant ordered General C. F. Smith's division to assault a part of the lines which had been denuded of its defenders in order to reinforce Pillow. Smith personally led his young volunteers in the charge and carried all before him. The Confederates returning from the sortie were quite unable to shake his hold on the captured works, and, Grant having reinforced McClernand with Lew Wallace's division, these two generals reoccupied the lost position on the Nashville road. On the 16th, the two senior Confederate generals Floyd and Pillow having escaped by steamer, the infantry left in the fort under General S. B; Buckner surrendered unconditionally. The Confederate cavalry under Colonel Forrest made its escape by road. The prisoners numbered about 15,000 out of an original total of

18,000.

DONGA, a Bantu word for a ravine, narrow watercourse or gully formed by the action of water. Adopted by the European residents of South Africa from the Kaffirs, the use of the word has been extended by English writers to ravines or watercourses of the nature indicated in various other parts of the world. It is almost equivalent to the Arabic khor, which, however, also means the dry bed of a stream, or a stream flowing through a ravine. The Indian word nullah (properly a watercourse) has also the same significance. The three words are often used interchange- ably by English writers.

DONGOLA, a mudiria (province) of the Anglo-Egyptian Sudan. It lies wholly within the region known as Nubia and extends along both banks of the Nile from about 18 N. to 20 N. The rainfall is very slight, and the area of fertility is mainly confined to the lands watered by the Nile. Beyond stretches eastward the Nubian desert, westward the Libyan desert. The Wadi el Kab (Gab), west of and parallel to the Nile, contains, however, a good deal of arable land. This wadi, which is some 63 m. long, obtains water by percolation from the Nile. Farther west is the extensive plateau of Jebel Abiad, and beyond, some 250 m. due west of Debba, is Bir Natron, or Bir Sultan, a valley whence natron is obtained. In this desert region is found the addax, the rarest of Sudan antelopes. The chief grain crops are durra and barley, and date palms are extensively cultivated. The province is also noted for a breed of strong, hardy horses. The largest town is Dongola, but the administrative headquarters of the mudiria are at New Merawi (Merowe, Meroe), on the left bank of the Nile, below the 4th cataract. Other towns, also on the Nile, are Debba and Korti, whence start caravan routes to Kordofan and Omdurman. At

Jebel Barkal, in the neighbourhood of Merawi, and elsewhere in the mudiria, are ancient ruins (see Sudan; Anglo-Egyptian) . Old Merawi, on the right bank of the Nile, and Sanam Abu Dom, on the left bank, indicate the site of the Ethiopian city of Napata. From Kareima, on the right or northern bank of the Nile, 6 m. above New Merawi, a railway (opened in March 1906) runs to Abu Hamed, whence there is railway connexion with the Red Sea, Khartum and Egypt. From Kareima downstream the Nile is navigable to Kerma, just above the 3rd cataract. Between 1896 and 1904 a rail- way ran between Kerma and Wadi Haifa. In the last-named year this railway was closed. It had been built for purely military purposes and was unremunerative as a commerical undertaking.

The Dongolese (Dongolawi, Danaglas, Danagalehs) are Nubas in type and language, but have a large admixture of Arab, Turk and other blood. They are great agriculturists and keen

traders, and were notorious slave-dealers. South of Old Dongola the inhabitants are not Nubians but Shagia (q.v.) , and the Nubian tongue is replaced by Arabic. Of the nomad desert tribes the chief are the Hawawir and Kabbabish.

The country now forming the mudiria was once part of the ancient empire of Ethiopia (q.v.), Napata being one of its capital cities. From about the beginning of the Christian era the chief tribes in the region immediately south of Egypt were the Blemmyes and the Nobatae. The last named became converted to Christianity about the middle of the 6th century, through the instrumentality, it is stated, of the empress Theodora. A chieftain of the Nobatae, named Silko, between the middle and the close of that century, conquered the Blemmyes, founded a new state, apparently on the ruins of that of the southern Meroe (Bakarawiya), made Christianity the official religion of the country, and fixed his capital at (Old) Dongola. This state, now generally referred to as the Christian kingdom of Dongola, lasted for eight or nine hundred years. Though late in reaching Nubia, Christianity, after the wars of Silko, spread rapidly, and when the Arab conquerors of Egypt sought to subdue Nubia also they met with stout resistance. Dongola, however, was captured by the Moslems in 652, and the country laid under tribute (bakt)— 400 men having to be sent yearly tc Egypt. This tribute was paid when it could be enforced; at periods the Nubians gained the upper hand, as in 737

when Cyriacus, their then king, marched into Egypt with a large army to redress the grievances of the Copts. There is a record of an embassy sent by a king Zacharias in the 9th century to Bagdad concerning the tribute, while by the close of the 10th century the Nubians seem to have regained almost complete independence. They did not, however, possess any part of the Red Sea coast, which was held by the Egyptians, who, during the 9th and 10th centuries, worked the emerald and gold mines between the Nile and the Red Sea. The kingdom, according to the Armenian historian Abu Salih, was in a very flourishing condition in the 12 th century. It then extended from Assuan southward to the 4th cataract, and contained several large cities. Gold and copper mines were worked. The liturgy used was in Greek. In 1173 Shams addaula, a brother of Saladin, attacked the Nubians, captured the city of Ibrim (Primis), and among other deeds destroyed 700 pigs found therein. The Egyptians then retired, and for about 100 years the country was at peace. In 1275 the Mameluke sultan Bibars aided a rebel prince to oust his uncle from the throne of Nubia; the sultans Kalaun and Nasir also sent expeditions to Dongola, which was several times captured. Though willing to pay tribute to the Moslems, the Nubians clung tenaciously to Christianity, and, despite the raids to which the country was subjected, it appears during the 12th and 13th centuries to have been fairly prosperous. No serious attempt was made by the Egyptians to penetrate south of Napata, nor is it certain how far south of that place the authority of the Dongola kingdom (sometimes known as Mukarra) extended. It was neighboured on the south by another Christian state, Aloa (Aiwa), with its capital Soba on the Blue Nile.

Cut off more and more from free intercourse with the Copts in Egypt, the Nubian Christians at length began to embrace Jewish and Mahommedan doctrines; the decay of the state was hastened by dissensions between Mukarra and Aloa. Neverthe- less, the Nubians were strong enough to invade upper Egypt during the reign of Nawaya Krestos (1342-1372), because the governor of Cairo had thrown the patriarch of Alexandria into prison. The date usually assigned for the overthrow of the Christian kingdom is 1 3 5 1 . Only the northern part of the country (as far as the 3rd cataract) came under the rule of Egypt. Never- theless, according to Leo Africanus, at the close of the 15th century Christianity and native states still survived in Nubia, and in the 16th century the Nubians sent messengers to Abyssinia to Father Alvarez, begging him to appoint priests to administer the sacraments to them — a request with which he was not able to comply. Thereafter the Nubian Church is without records. The Moslems may have extinguished it in blood, for the

region between Dongola and Shendi appears to have been depopulated.

Between Assuan and Hannek the Turks introduced in the 16th century numbers of Bosnians, whose descendants ruled the district, paying but a nominal allegiance to the Porte. At Ibrim, Mahass, and elsewhere along the banks and in the islands of the Nile, they built castles, now in ruins. South of Hannek the kings of Sennar became overlords of the country. As the power of the Sennari declined, the nomad Shagia (or Shaikiyeh) attained pre-eminence in the Dongola district.

About 18 1 2 Mamelukes fleeing from Mehemet Ali, the pasha of Egypt, made themselves masters of part of the country, destroying the old capital and building a new one lower down the Nile. In 1820 both Mamelukes and Shagia were conquered by the Egyptians, and the Dongola province annexed to Egypt. In consequence of the rising of the Dervishes Egypt evacuated Dongola in 1886. The attempt to set up an independent govern- ment failed, and the Dervishes held the town until September 1896, when it was reoccupied by an Egyptian force.

See J. L. Burckhardt, Travels in Nubia (London, 1819) ; Naum Bey Shucair, The History and Geography of the Sudan (in Arabic, 3 vols., Cairo, 1903); E. A. Wallis Budge, The Egyptian Sudan (2 vols., London, 1907).

DONGOLA, a town of the Anglo-Egyptian Sudan, which gives its name to a mudiria. It is situated on the W. bank of the Nile, about 45 m. above the 3rd cataract, in 19 10′ N., 30 29′ E. Pop. about 10,000. It is 1082 m. S. of Cairo by river and 638 m. N. of Khartum by the same route. Its commerical outlet, however, is Port Sudan, on the Red Sea, 600 m. E.S.E. by steamer and railway. It is a thriving, well-built town; an important agricultural and trading centre. Lignite is found on the east bank of the Nile opposite the town. Founded c. 1812 by Mamelukes who fled to Nubia from the persecutions of Mehemet Ali, the town is called Dongola Makara (New Dongola) to distinguish it from Dongola Agusa (Old Dongola), which it supplanted. It is also called El Ordi (the barracks), a reminiscence of the buildings erected by the Egyptians after their occupation of the town in 1820. The Mahdi Mahommed Ahmed was a native of Dongola. In 1884-1885 the town was the base of the British troops in their advance on Khartum.

Dongola Agusa, 75 m. upstream from New Dongola, now a heap of

ruins, was the capital of the Nubian state usually called the Christian kingdom of Dongola. An Arab historian of the nth century describes it as a large city with many churches, fine houses and wide streets. It is said to have been finally destroyed by the Mamelukes. On a hill near the ruins is a mosque in which is an Arabic inscription stating that the building was opened " on the 20th Rabi el Aneh in the year 717 (June 1, 1317 a.d.) after the victory of Sefeddin Abdallah en Nasir over the Infidels."

DONIZETTI, GAETANO (1798-1848), Italian musical composer, was born at Bergamo in 1798, the son of a government official of limited means. Originally destined for the bar, he showed at an early age a strong taste for art. At first, strangely enough, he mistook architecture for his vocation, and only after an unsuccessful trial in that direction did he discover his real talent. He entered the conservatoire of his native city, where he studied under Simon Mayr, the fertile operatic composer. His second master was Mattei, the head master of the celebrated music school of Bologna, where Donizetti resided for three years. After his return to Bergamo the young composer determined to devote himself to dramatic music, but his father insisted upon his giving lessons with a view to immediate gain. The disputes arising from this cause ultimately led to Donizetti's enlisting in the army. But this desperate step proved beneficial against all expectation. The regiment was quartered at Venice, and here the young composer's first dramatic attempt, an opera called Enrico comte di Borgogna, saw the light in 18 18.

The success of this work, and of a second opera brought out in the following year, established Donizetti's reputation. He obtained his discharge from the army, and henceforth his operas followed each other in rapid and uninterrupted succession at the rate of three or four a year. Although he had to contend successively with two such dangerous rivals as Rossini and Bellini, he succeeded in taking firm hold of the public, and the

brilliant reception accorded to his Anna Bolena at Milan carried his name beyond the limits of his own country. In 1835 Donizetti went for the first time to Paris, where, however, his Marino Faliero failed to hold its own against Bellini's Puritani, then recently produced at the Theatre Italien. The disappointed composer went to Naples, where the enormous success of his Lucia di Lammermoor consoled

him for his failure in Paris. For Naples he wrote a number of works, none of which is worth notice. In 1840 the censorship refused to pass his Poliuto, an Italian version of Corneille's Polyeucte, in consequence of which the disgusted composer once more left his country for Paris. Here he produced at the Opera Comique his most popular opera, La Fille du regiment, but again with little success. It was not till after the work had made the round of the theatres of Germany and Italy that the Parisians reconsidered their unfavourable verdict. A serious opera, Les Martyrs, produced about the same time with the Daughter of the Regiment, was equally unsuccessful, and it was reserved to La Favorita, generally considered as Donizetti's masterpiece, to break the evil spell. His next im- portant work, Linda di Chamounix, was written for Vienna, where it was received most favourably in 1842, and the same success accompanied the production of Don Pasquale after Donizetti's return to Paris in 1843. Soon after this event the first signs of a fatal disease, caused to a great extent by overwork, began to show themselves. The utter failure of Don Sebastian, a large opera produced soon after Don Pasquale, is said to have hastened the catastrophe. A paralytic stroke in 1844 deprived Donizetti of his reason; for four years he lingered on in a state of mental and physical prostration. A visit to his country was proposed as a last resource, but he reached his native place only to die there on the 1st of April 1848.

The sum total of his operas amounts to sixty-four. The large number of his works accounts for many of their chief defects. His rapidity of working made all revision impossible. It is said that he once wrote the instmmentation of a whole opera within thirty hours, a time hardly sufficient, one would think, to put the notes on paper. And yet it may be doubted whether more elaboration would have essentially improved his work; for the last act of the Favorita, infinitely superior to the preceding ones, is also said to have been the product of a single night.

There is a strange parallelism observable in the lives of Rossini, Bellini and Donizetti. They had no sooner established their reputations on the Italian stage than they left their own country for Paris, at that time the centre of the musical world. All three settled in France, and all three were anxious to adapt the style of their music to the taste and artistic traditions of their adopted country. The difference which exists between Rossini's Tell and his Semiramide may, although in a less striking degree, be noticed between Donizetti's Fille du rigiment and one of his earlier Italian operas. But here the parallel ends. As regards artistic genius Donizetti can by no

means be compared with his illustrious countrymen. He has little of Bellini's melancholy sweetness, less of Rossini's sparkle, and is all but devoid of spontaneous dramatic impulse. For these shortcomings he atones by a considerable though by no means extraordinary store of fluent melody, and by his rare skill in writing for the voice. The duet in the last act of the Favorita and the ensemble in Lucia following upon the signing of the contract, are masterpieces of concerted music in the Italian style. These advantages, together with considerable power of humorous delineation, as evinced in Don Pasquale and VElisir d'amore, must account for the unimpaired vitality of many of his works on the stage.

DONJON (from a Late Lat. accusative form domnionem, connected with domnus or dominus, a lord), the French term for the keep of a medieval castle, used now in distinction to "dungeon" (q.v.), the prison, which is only an anglicized spelling (see also Keep).

DON JUAN, a legendary character, whose story has found currency in various European countries. He was introduced into formal literature in the Spanish El Burlador de Sevilla y convidado de piedra, a play which was first printed at Barcelona in 1630, and is usually attributed to Tirso de Molina; but the story of a

profligate inviting a dead man to supper, and finding his invita- tion accepted, was current before 1630, and is not peculiar to Spain. A Don Juan Tenorio is said to have frequented the court of Peter the Cruel, and at a later period another Don Juan Tenorio, a dissolute gallant, is reported as living at Seville; but there is no satisfactory evidence of their existence, and it is unlikely that the Don Juan legend is based on historical facts. It exists in Picardy as Le Souper de fantome, and variants of it have been found at points so far apart as Iceland and the Azores; the available evidence goes to show that Don Juan is a universal type, that he is the subject of local myths in many countries, that he received his name in Spain, and that the Spanish version of his legend has absorbed certain elements from the French story of Robert the Devil. Some points of resemblance are observable between El Burlador de Sevilla and Dineros son calidad, a play of earlier date by Lope de Vega ; but these resemblances are super- ficial, and the character of Don Juan, the incarnation of perverse sensuality and arrogant blasphemy, may be considered as the creation of Tirso de Molina, though the ascription to him of El Burlador de Sevilla has been disputed. The Spanish drama was apparently more popular in Italy than in Spain, and was fre- quently given in pantomime by the Italian actors, who accounted for its permanent vogue by saying that Tirso de Molina had sold his soul to

the devil for fame. A company of these Italian mimes took the story into France in 1657, and it was dramatized by Dorimond in 1659 and by De Villiers in 1661; their attempts suggested Le Festin de pierre (1665) to Moliere, who, apparently with the Spanish original before his eyes, substituted prose for verse, reduced the supernatural element, and interpolated comic effects completely out of keeping with the earlier conception. Later adaptations by Rosimond and Thomas Corneille were even less successful. The story was introduced into England by Sir Aston Cokain in his unreadable Tragedy of Ovid (1669), and was the theme of The Libertine (1676), a dull and obscene play by Shadwell. Goldoni's D. Giovanni Tenorio osia II Dissoluto, based upon the adaptations of Moliere and Thomas Corneille, is one of his least interesting productions. Tirso de Molina's play was recast, but not improved, by Antonio de Zamora early in the 18th century. A hundred years later the character of Don Juan was endowed with a new name in Espronceda's Estudiante de Salamanca; Don Felix de Montemar is plainly modelled on Don Juan Tenorio, and rivals the original in licentiousness, impiety and grim humour. But the most curious resuscitation of the type in Spain is the protagonist in Zorrilla's Don Juan Tenorio, which is usually played in all large cities during the first week in November, and has come to be regarded as an essentially national work. It is in fact little more than an adaptation of the elder Dumas' Don Juan de Marana, which, in its turn, derives chiefly from Merimee's novel, Les Ames du purgaloire. Less exotic are Zorrilla's two poems on the same subject — El Desaflo del diablo and El Testigo de bronce. Byron's Don Juan presents a Regency lady-killer who resembles Ulloa's murderer in nothing but his name.

The sustained popularity of the Don Juan legend is undoubtedly due in great measure to Mozart's incomparable setting of Da Ponte's mediocre libretto. In this pale version of El Burlador de Sevilla the French romantic school made acquaintance with Don Juan, and hence, no doubt, the works of Merimee and Dumas already mentioned, Balzac's Elexir d'une longue vie, and Alfred de Musset's Une Matinee de Don Juan and Namouna. The legend has been treated subsequently by Flaubert and Barbey d'Aurevilly in France, by Landau and Heyse in Germany, and by Sacher-Masoch in Austria. It has always fascinated composers. Mozart's Don Giovanni has annihilated the earlier operas of Le Tellier, Righini, Tritto, Gardi and Gazzaniga; but Gluck's ballet- music still survives, and Henry Purcell's setting — the oldest of all — has saved some of Shadwell's insipid lyrics from oblivion.

Bibliography. — F. de Simone Brouwer, Don Giovanni nella poesia e

nell' arte musicale (Napoli, 1894); A. Farinelli, Don Giovanni: Note critiche (Torino, 1896) ; A. Farinelli, Cuatro palabras sobre Don Juan y la literatura donjuanesca del porvenir in the Homenaje d Menendez y Pelayo (Madrid, 1899), vol. i. pp. 205- 222. (J. F.-K.)

DONKIN, SIR RUFANE SHAW (1773-1841), British soldier, came of a military family. His father, who died, a full general, in 182 1, served with almost all British commanders from Wolfe to Gage. Rufane Donkin was the eldest child, and received his first commission at the age of five in his father's regiment; he joined, at fourteen, with eight years' seniority as a lieutenant. Becoming a captain in 1793, he was on active service in the West Indies in 1 794, and (as major) in 1 796. At the age of twenty-five he became lieutenant-colonel, and in 1 798 led a light battalion with distinction in the Ostend expedition. He served with Cathcart in Denmark in 1807, and two years later was given a brigade in the army in Portugal, which he led at Oporto and Talavera. He was soon transferred, as quartermaster-general, to the Mediterranean command, in which he served from 1810 to 1813, taking part in the Catalonian expeditions. Sir John Murray's failure at Tarragona did not involve Donkin, whose advice was proved to be uniformly ignored by the British commander. In July 181 5 Major-General Donkin went out to India, and distinguished himself as a divisional commander in Hastings' operations against the Mahrattas (1817-1818), receiving the K.C.B. as his reward. The death of his young wife seriously affected him, and he went to the Cape of Good Hope on sick leave. From 1820 to 182 1 he administered the colony with success, and named the rising seaport of Algoa Bay Port Elizabeth in memory of his wife. In 1821 he became lieutenant-general and G.C.H. The rest of his life was spent in literary and political work. He was one of the original fellows of the Royal Geographical Society, and was a member of the Royal Society and of many other learned bodies. His theories as to the course of the river Niger, published under the title Dissertation on the Course and Probable Termination of the Niger (London, 1829), involved him in a good deal of controversy. From 1832 onwards he sat in the House of Commons, and in 1835 was made surveyor-general of the ordnance. He committed suicide at Southampton in 1841. He was then a general, and colonel of the nth Foot.

See Jerdan, National Portraits, vol. iii. ; Gentleman's Magazine, xcii.

i. 273.

DONNAY, CHARLES MAURICE (1859-), French dramatist, was born of middle-class parents in Paris in 1859. He made his serious debut as a dramatist on the little stage of the Chat Noir with Phryne (1891), a series of Greek scenes. Lysistrata, a four-act comedy, was produced at the Grand Theatre in 1892 with Mme Rejane in the title part. Later plays were Folle Enlreprise (1894); Pension de famille (1894); Complices (1895), in collaboration with M. Groselande; Amants (1895), produced at the Renaissance theatre with Mme Jeanne Granier as Claudine Rozeray; La Douloureuse (1897); U AJJranchie (1898); Georgette Lemeunier (1898); Le Torrent (1899), at the Comedie Francaise; Education de prince (1900); La Clairiere (1900), and Oiseaux de passage (1904), in collaboration with L. Descaves; La Bascule (1901); L' Autre danger, at the Comedie Francaise (1902); Le Retour de Jerusalem (1903); L' scolade (1904); and Paraitre (1906). With Amants he won a great success, and the play was hailed by Jules Lemaltre as the Berenice of contemporary French drama. Very advanced ideas on the relations between the sexes dominate the whole series of plays, and the witty dialogue is written with an apparent carelessness that approximates very closely to the language of every day.

DONNE, JOHN (1573-1631), English poet and divine of the reign of James I., was born in 1573 in the parish of St Nicholas Olave, in the city of London. His father was a wealthy merchant, who next year became warden of the Company of Ironmongers, but died early in 1576. Donne's parents were Catholics, and his mother, Elizabeth Heywood, was directly descended from the sister of the great Sir Thomas More; she was the daughter of John Heywood the epigrammatist. As a child, Donne's precocity was such that it was said of him that " this age hath brought forth another Pico della Mirandola." He entered Hart Hall, Oxford, in October 1584, and left it in 1587, proceeding for a time to Cambridge, where he took his degree: At Oxford he began his friendship with Henry Wotton, and at Cambridge, probably, with Christopher Brooke. Donne was " removed to London " about vni. 14

1590, and in 1592 he entered Lincoln's Inn with the intention of studying the law.

When he came of age, he found himself in possession of a considerable fortune, and about the same time rejected the Catholic doctrine in favour of the Anglican communion. He began to produce Satires, which were not printed, but eagerly passed from hand to

hand; the first three are known to belong to 1593, the fourth to 1594, while the other three are probably some years later. In 1596 Donne engaged himself for foreign service under the earl of Essex, and" waited upon his lordship " on board the " Repulse," in the magnificent victory of the nth of June. We possess several poems written by Donne during this expedition, and during the Islands Voyage of 1597, in which he accompanied Essex to the Azores. According to Walton, Donne spent some time in Italy and Spain, and intended to proceed to Palestine, " but at his being in the farthest parts of Italy, the disappointment of company,or of a safe convoy,or the uncertainty of returns of money into those remote parts, denied him that happiness." There is some reason to suppose that he was on the continent at intervals between 1595 and the winter of 1597. His lyrical poetry was mainly the product of his exile, if we are to believe Ben Jonson, who told Drummond of Hawthornden that Donne " wrote all his best pieces ere he was 25 years old." At his return to England he became private secretary in London to Sir Thomas Egerton, the lord keeper (afterwards Lord Brackley), in whose family he remained four years. In 1 600 he found himself in love with his master's niece, Anne More, whom he married secretly in December 1601. As soon as this act was discovered, Donne was dismissed, and then thrown into the Fleet prison (February 1602), from which he was soon released. His circum- stances, however, were now very much straitened. His own fortune had all been spent and " troubles did still multiply upon him." Mrs Donne's cousin, Sir Francis Wooley, offered the young couple an asylum at his country house of Pyrford, where they resided until the end of 1604.

During the latter part of his residence in Sir Thomas Egerton's house, Donne had composed the longest of his existing poems, The Progress of the Soul, not published until 1633. In the spring of 1605 we find the Donnes living at Camberwell, and a little later in a small house at Mitcham. He had by this time " acquired such a perfection " in civil and common law that he was able to take up professional work, and he now acted as a helper to Thomas Morton in his controversies with the Catholics. Donne is believed to have had a considerable share in writing the pamphlets against the papists which Morton issued between 1604 and 1607. In the latter year, Morton offered the poet certain preferment in the Church, if he would only consent to take holy orders. Donne, however, although he was at this time become deeply serious on religious matters, did not think himself fitted for the clerical life. In 1607 he started a correspondence with Mrs Magdalen Herbert of Montgomery Castle, the mother of George Herbert. Some of these pious epistles were printed by Izaak Walton.

These exercises were not of a nature to add to his income, which was extremely small. His uncomfortable little house he speaks of as his " hospital " and his " prison; " his wife's health was broken and he was bowed down by the number of his children, who often lacked even clothes and food. In the autumn of 1608, however, his father-in-law, Sir George More, became reconciled with them, and agreed to make them a generous allowance. Donne soon after formed part of the brilliant assemblage which Lucy, countess of Bradford, gathered around her at Twickenham; we possess several of the verse epistles he addressed to this lady. In 1609 Donne was engaged in composing his great controversial prose treatise, the Pseudo-Martyr, printed in 1610; this was an attempt to convince Roman Catholics in England that they might, without any inconsistency, take the oath of allegiance to James I. In 16 11 Donne wrote a curious and bitter prose squib against the Jesuits, entitled Ignatius his Conclave. To the same period, but possibly somewhat earlier, belongs the apology for the principle of suicide, which was not published until 1644, long after Donne's death. This work, the Biaihanatos, is an attempt to show that " the scandalous disease

:i

4i8.

DONNE

of headlong dying," to which Donne himself in his unhappy moods had " often such a sickly inclination," was not necessarily and essentially sinful.

In 1610 Donne formed the acquaintance of a wealthy gentleman, Sir Robert Drury of Hawsted, who offered him and his Wife an apartment in his large house in Drury Larie. Drury lost his only daughter, and in 161 1 Donne published an extravagant elegy on her, entitled An Anatomy of the World, to which he added in 1613 a Progress of the Soul on the same subject; he threatened to celebrate the " blessed Maid," Elizabeth Drury, in a fresh elegy on each anniversary of her death, but he happily refrained from the third occasion onwards. At the close of 16 11 Sir Robert Drury determined to visit Paris (but not, as Walton supposed, on an embassy of any kind), and he took Donne with him. When he left London, his wife was expecting an eighth child. It seems almost certain that her fear to have him absent led him to compose one of his loveliest poems:

" Sweetest Love, I do not go . For weariness of thee."

He is said to have had a vision, while he was at Amiens, of his wife, with her hair over her shoulders, bearing a dead child in her arms, on the very night that Mrs Donne, in London (or more probably in the Isle of Wight), was delivered of a still-born infant. He suffered, accordingly, a great anxiety, which was not removed until he reached Paris, where he received reassuring accounts of his wife's health. The Drurys and Donne left Paris for Spa in May 1612, and travelled in the Low Countries and Germany until September, when they returned to London'. In 1613 Donne contributed to the Lachrymae lachrymarum an obscure and frigid elegy on the death of the prince of Wales, and wrote his famous Marriage Song for St Valentine's Day to celebrate the nuptials of the elector palatine with the princess Elizabeth. About this time Donne became intimate with Robert Ker, then Viscount Rochester and afterwards the infamous earl of Somerset, from whom he had hopes of preferment at court. Donne was now in weak health, and in a highly neurotic condition. He suggested to Rochester that if he should enter the church, a place there might be found for him. But he was more useful to the courtier in his legal capacity, and Rochester dissuaded him from the ministry. At the close of 1614, however, the king sent for Donne to Theobald's, and " descended to a persuasion, almost to a solicitation of him, to enter into sacred orders," but Donne asked for a few days to consider. Finally, early in 1614, King, bishop of London, " proceeded with all convenient speed to ordain him, first deacon, then priest." He was, perhaps, a curate first at Paddington, and presently was appointed royal chaplain.

His earliest sermon before the king at Whitehall carried his audience "to heaven, in holy raptures." In April, not without much bad grace, the university of Cambridge consented to make the new divine a D.D. In the spring of 1616, Donne was. presented to the living of Keyston, in Hunts., and a little later he became rector of Sevenoaks; the latter preferment he held until his death. In October he was appointed reader in divinity to the benchers of Lincoln's Inn. His anxieties about money now ceased, but in August 1617 his wife died, leaving seven young children in his charge. Perhaps in consequence of his bereave- ment, Donne seems to have passed through a spiritual c isis, which inspired him with a peculiar fervour of devotion. In 1618 he wrote two cycles of religious sonnets, La Corona and the Holy Sonnets, the latter not printed in complete form until by Mr Gosse in 1 899. Of the very numerous sermons preached by Donne at Lincoln's Inn, fourteen have come down to us. His health suffered from the austerity of his life, and it was probably in connexion with this fact that he allowed himself to be persuaded in May 1619 to

accompany Lord Doncaster as his chaplain on an embassy to Germany. Haying visited Heidelberg, Frankfort and other German cities, the embassy returned to England at the opening of 1620.

In November 1621, James I., knowing that London was " a dish " which Donne " loved well," " carved " for him the deanery of St Paul's. He resigned Keyston, and his preachership in Lincoln's Inn (Feb., 1622). In October 1623 he suffered from

a dangerous attack of illness, and during a long convalescence wrote his Devotions, a volume published in 1624. He was now appointed to the vicarage of St Dunstan's in the West. In April 1625 Donne preached before the new king, Charles I., a sermon which was immediately printed, and he now published his Four Sermons upon Special Occasions, the earliest collection of his discourses. When the plague broke out he retired with his children to the house of Sir John Danvers in Chiswick, and for a time he disappeared so completely that a rumour arose that he was dead. Sir John had married Donne's old friend; Mrs Magdalen Herbert, for whom Donne wrote two of the most ingenious of his lyrics, " The Primrose " and " The Autumnal." The popularity of Donne as a preacher rose to its zenith when he returned to his pulpit, and it continued there until his death. Walton, who seems to have known him first in 1624, now became an intimate and adoring friend. In 1630 Donne's health, always feeble, broke down completely, so that, although in August of that year he was to have been made a bishop, the entire break- down of his health made it worse than useless to promote him. The greater part of that winter he spent at Abury Hatch, in Epping Forest, with his widowed daughter, Constance Alley n, and was too ill to preach before the king at Christmas. It is believed that his disease was a malarial form of recurrent quinsy acting upon an extremely neurotic system. He came back to London, and was able to preach at Whitehall on the 12 th of February 1631. This, his latest sermon, was published, soon after his demise, as Death's Duel. He now stood for his statue to the sculptor, Nicholas Stone, standing before a fire in his study at the Deanery, with his winding-sheet wrapped and tied round him, his eyes shut, and his feet resting on a funeral urn. This lugubrious work of art was set up in white marble after his death in St Paul's cathedral, where it may still be seen. Donne died on the 31st of March 163 1, after he had lain " fifteen days earnestly expecting his hourly change." His aged mother, who had lived in the Deanery, survived him, dying in 1632.

Donne's poems were first collected in 1633, and afterwards in 1635, 1639, 1649, 1650, 1654 and 1669. Of his prose works, the

Juvenilia appeared in 1633; the LXXX Sermons in 1640; Biathandtos in ,1644; Fifty Sermons in 1649; Essays in Divinity, 165 1 ; his Letters to Several Persons of Honour, 165 1; Paradoxes, Problems and Essays, 1652; and Six and Twenty Sermons, 1661. Izaak Walton's Life of Donne, an admirably written but not entirely correct biography, preceded the Sermons of 1640. The principal editor of his posthumous writings was his son, John Donne the younger (1604-1662), a man of eccentric and scandalous character, but of considerable talent.

The influence of Donne upon the literature of England was singularly wide and deep, although almost wholly malign. His originality and the fervour of his imaginative passion made him extremely attractive to the younger generation of poets, who saw that he had broken through the old tradition, and were ready to follow him implicitly into new fields. In the 18th century his reputation almost disappeared, to return, with many vicissitudes in the course of the 19th. It is, indeed, singularly difficult to pronounce a judicious opinion on the writings of Donne. They were excessively admired by his own and the next generation, praised by Dryden, paraphrased by Pope, and then entirely neglected for a whole century. The first impression of an unbiassed reader who dips into the poems of Donne is unfavour- able. He is repulsed by the intolerably harsh and crabbed versification, by the recondite choice of theme and expression, and by the oddity of the thought. In time, however, he perceives that behind the fantastic garb of language there is an earnest and vigorous mind, an imagination that harbours fire within its cloudy folds, and an insight into the mysteries of spiritual life which is often startling. Donne excels in brief flashes of wit and beauty, and in sudden daring phrases that have the full perfume of poetry in them. Some of his lyrics and one or two of his elegies excepted, the Satires are his most important contribution to literature. They are probably the earliest poems of their kind in the language, and they are full of force and picturesqueness. Their obscure and knotty language only serves to give peculiar

■brilliancy to the not uncommon passages of noble perspica- city. To the odd terminology of Donne's poetic philosophy Dryden gave the name of " metaphysics," and Johnson, bor- rowing the suggestion, invented the title of the " metaphysical school " to describe, not Donne only, but all the amorous and philosophical poets who

succeeded him, and who employed a similarly fantastic language, and who affected odd figurative inversions.

Izaak Walton's Life, first published in 1640, and entirely recast in 1659, has been constantly reprinted. The best edition of Donne's Poems was edited by E. K. Chambers in 1896. His prose works have not been collected. In 1899 Edmund Gosse published in two volumes The Life and Letters of John Donne, for the first time revised and collected. (E. G.)

DONNYBROOK, a part of Dublin, Ireland, in the south-east of the city. The former village of the name was famous for a fair held under licence from King John in 1204. It gained, however, such a scandalous notoriety for disorder that it was discontinued in 1855, the rights being purchased for £3000.

DONOSO CORTfiS, JUAN, Marquis de Valdegamas (1809-1853), Spanish author and diplomatist, was born at Valle de la Serena (Extremadura) on the 6th of May 1809, studied law at Seville, and entered politics as an advanced liberal under the influence of Quintana (q.v.). His views began to modify after the rising at La Granja, and this tendency towards conservatism, which became more marked on his appointment as private secretary to the Queen Regent, finds expression in his Lecciones de derecho politico (1837). Alarmed by the proceedings of the French revolutionary party in 1 848-1 849, Donoso Cortes issued his Ensayo sobre el catolicismo, el liberalismo, y el socialismo con- siderados en sus principios fundamentales (1851), denouncing reason as the enemy of truth and liberalism as leading to social ruin. He became ambassador at Paris, and died there on the 3rd of May 1853. The Ensayo has failed to arrest the movement against which it was directed, and is weakened by its extravagant paradoxes; but, with all its rhetorical excesses, it remains the finest specimen of impassioned prose published in Spain during the 19th century.

Donoso Cortes' works were collected in five volumes at Madrid (1854-1855) under the editorship of Gavino Tejado.

DONOVAN, EDWARD (1768-1837), English naturalist, was the author of many popular works on natural history and botany. In 1792 appeared the first volume of his Natural History of British Insects, which extended to sixteen volumes, and was completed in 1813. He also published Natural Histories of British Birds, in 10 vols. 8vo (1 799-1819), of British Fishes, in 5 vols. (1802-1808), of British Shells, in 5 vols. (1800-1804), a series of illustrated works

*on The Insects of India, China, New Holland, &*c, in 3 vols. 4to (1 798-1805) , and Excursions in South Wales and Monmouthshire (1805). To these works must be added his periodical entitled The Naturalist's Repository, a monthly publication, of which three volumes were completed (1823-1825), and an Essay on the Minute Parts of Plants in general. Donovan was author of the articles on natural history in Rees's Cyclopaedia. In 1833 he published a Memorial respecting my Publications in Natural History, in which he complains that he had been nearly ruined by his publishers. He was a fellow of the Linnean Society, and died in London on the 1st of February 1837.*

DOOM (Old Eng. ddm, a word common to Teut. languages for that which is set up or ordered, from " do," in its original meaning of "place"; cf. Gr. de/xis, from stem of rtft/jut), originally a law or enactment, the legal decision of a judge, and particularly an adverse sentence on a criminal. The word is thus applicable to the adverse decrees of fate, and particularly to the day of judgment. The verb " deem," to deliver a judgment, and hence to give or hold an opinion, is a derivative, and appears also in various old Teutonic forms. It is seen in " deemster," the name of the two judges of the Isle of Man.

DOON DE MAYENCE, a hero of romance, who gives his name to the third cycle of the Charlemagne romances, those dealing with the feudal revolts. There is no real unity in the geste of Doon de Mayence. The rebellious barons are connected by the

trouveres with Doon by imaginary genealogical ties, and all are represented as in opposition to Charlemagne, though their adventures, in so far as they possess a historical basis, must generally be referred to earlier or later periods than the reign of the great emperor. The general insolence of their attitude to the sovereign suggests that Charlemagne is here only a name for his weaker successors. The tradition of a traitorous family of Mayence, which was developed in Italy into a series of stories of criminals, was however anterior to the Carolingian cycle, for an interpolator in the chronicle of Fredegarius states (iv. 87) that the army of Sigebert was betrayed from within its own ranks by men of Mayence in a battle fought with Radulf on the banks of the Unstrut in Thuringia. The chief heroes of the poems which make up the geste of Doon de Mayence are Ogier the Dane (q.v.), the four sons of Aymon (see Renaud), and Huon of Bordeaux (q.v.). It is probable that Doon himself was one of the last personages to be clearly defined, and that the chanson de geste relating his exploits was drawn up partly with the view of supply- ing a suitable ancestor for the other heroes. The

latter half of the poem, the story of Doon's wars in Saxony, is perhaps based on historical events, but the earlier half, which is really a separate romance dealing with his romantic childhood, is obviously pure fiction and dates from the 13th century. Doon had twelve sons: Gaufrey de Dane Marche (Ardennes?), the father of Ogier; Doon de Nanteuil, whose son Gamier married the beautiful Aye d'Avignon; Griffon d'Hauteville, father of the arch-traitor Ganelon; Aymon de Dordone or Dourdan, whose four sons were so relentlessly pursued by Charles; Beuves d'Aigremont, whose son was the enchanter Maugis; Sevin or Seguin, the father of Huon of Bordeaux; Girard de Roussillon, and others less known. The history of these personages is given in Doon de Mayence, Gaufrey, the romances relating to Ogier, Aye d'Avignon, the fragmentary Doon de Nanteuil, Gui de Nanteuil, Tristan de Nanteuil, Parise la Duchesse, Maugis d'Aigremont, Vivien I'amachour de Monbranc, Renaus de Montauban or Les Quatre Fils Aymon, and Huon de Bordeaux. Some of this material, which dates in its existing form from the 12th and 13th centuries, remains unpublished, but the chief poems are available in the .series of Anciens Poeles de la France (1859, &c).

See Hist. litt. de la France, vols. xxii. and xxvi. (1852 and 1873), for analyses of these poems by Paulin Paris; also J. Barrois, Elements carolingiens (Paris, 1846) ; W. Niederstadt, Alter und Heimat der altfr. Doon (Greifswald, 1889). The prose romance, La Fleur des batailles Doolin de Mayence, was printed by Antoine Verard (Paris, 1501), by Alain Lotrian and Denis Janot (Paris, c. 1530), by N. Bonfons (Paris; no date), by J. Waesbergue (Rotterdam, 1604), &c.

DOOR (corresponding to the Gr. 6vpa, Lat. fores or valvae; the English word, with other forms common in allied languages, comes from the same Indo-European stem as the Gr. 8vpa and Lat. feres), in architecture, the slab, flap or leaf forming the enclosure of a doorway (q.v.) , either in wood, metal or stone. The earliest records are those represented in the paintings of the Egyptian tombs, in which they are shown as single or double doors, each in a single piece of wood. In Egypt, where the climate is intensely dry, there would be no fear of their warping, but in other countries it would be necessary to frame them, which according to Vitruvius (iv. 6.) was done with stiles (scapi) and rails (impages) : the spaces enclosed being filled with panels (tympana) let into grooves made in the stiles and rails. The stiles were the vertical boards, one of which, tenoned or hinged, is known as the hanging stile, the other as the middle or meeting stile. The horizontal cross pieces are the top rail, bottom rail, and middle or intermediate rails. The most ancient doors were

in timber, those made for King Solomon's temple being in olive wood (1 Kings vi. 31-35), which were carved and overlaid with gold. The doors dwelt upon in Homer would appear to have been cased in silver or brass. Besides olive wood, elm, cedar, oak and Cyprus were used. All ancient doors were hung by pivots at the top and bottom of the hanging stile which worked in sockets in the lintel and cill, the latter being always in some hard stone such as basalt or granite. Those found at Nippur by Dr Hilprecht, dating from 2000 B.C.. were in dolorite. The tenons of

the gates at Balawat (see fig.) (895-825 B.C.) were sheathed with bronze (now in the British Museum). These doors or gates were hung in two leaves, each about 8 ft. 4 in. wide and 27 ft. high; they were encased with bronze bands or strips, 10 in. high, covered with repousse decoration of figures, &c. The wood doors would seem to have been about 3 in. thick, but the hanging stile was over 14 in. in diameter. Other sheathings of various sizes in bronze have been found, which proves this to have been the universal method adopted to protect the wood pivots. In the Hauran in Syria, where timber is scarce, the doors were made in stone, and one measuring 5 ft. 4 in. by 2 ft. 7 in. is in the British Museum; the band on the meeting stile shows that it was one of the leaves of a double door. At Kuffeirnear Bostra in Syria, Burckhardt found stone doors, 9 to 10 ft. high, being the entrance doors of the town. In Etruria many stone doors are referred to by Dennis.

The ancient Greek and Roman doors were either single doors (jiovodvpcu, unifores), double doors (diffvpai, bifores or geminae) or folding doors (ittux&, valvae); in the last case the leaves were hinged and folded back one over Balawat Gates, the other. At Pompeii, in the portico of sheath and socket. Eumachia, is a painting of a door with three .From History of Art i eaves the two outer ones of which were

in Chaldaea and As- ■, ■, i i • ifrij-

syria, by permission of presumably hung, the inner leaf folding on Chapman & Hall Ltd. Qne Qr the other; hinges connecting the

folding leaves of a door have been found in Pompeii. In the tomb of Theron at Agrigentum there is a single four-panel door carved in

stone. In the Blundell collection is a bas-relief of a temple with double doors, each leaf with five panels. Among existing examples, the bronze doors in the church of SS. Cosmas and Damiano, in Rome, are important examples of Roman metal work of the best period; they are in two leaves, each with two panels, and are framed in bronze. Those of the Pantheon are similar in design, with narrow horizontal panels in addition, at the top, bottom and middle. Two other bronze doors of the Roman period are in the Lateran Basilica. t

The doors of the church of the Nativity at Bethlehem (6th century) are covered with plates of bronze, cut out in patterns: those of Sta Sophia at Constantinople, of the 8th and 9th cen- tury, are wrought in bronze, and the west doors of the cathedral of Aix-la-Chapelle (9th century), of similar manufacture, were probably brought from Constantinople, as also some of those in St Mark's, Venice.

Of the nth and 12th centuries there are numerous examples of bronze doors, the earliest being one at Hildesheim, Germany (1015). Of others in South Italy and Sicily, the following are the finest: in Sant' Andrea, Amain (1060); Salerno (1099); Canosa (mi); Troja, two doors (1119 and 1124); Ravello (1179), by Barisano of Trani, who also made doors for Trani cathedral; and in Monreale and Pisa cathedrals, by Bonano of Pisa. In all these cases the hanging stile had pivots at the top and bottom. The exact period when the hinge was substituted is not quite known, but the change apparently brought about another method of strengthening and decorating doors, viz. with wrought-iron bands of infinite varieties of design. As a rule three bands from which the ornamental work springs constitute the hinges, which have rings outside the hanging stiles fitting on to vertical tenons run into the masonry or wooden frame. There is an early example of the 1 2th century in Lincoln; in France the metal work of the doors of Notre Dame at Paris is perhaps the most beautiful in execution, but examples are endless throughout France and England.

Returning to Italy, the most celebrated doors are those of the Baptistery of Florence, which together with the door frames are all in bronze, the borders of the latter being perhaps the most remarkable: the modelling of the figures, birds and foliage of the south doorway, by Andrea Pisano (1330), and of the east doorway by Ghiberti (1425-1452), are of great beauty; in the north door (1402-1424) Ghiberti ˆdopted the same scheme of design for the

panelling and figure subjects in them as Andrea Pisano, but in the east door the rectangular panels are all filled with bas-reliefs, in

which Scripture subjects are illustrated with innumerable figures, these being probably the gates of Paradise of which Michelangelo speaks.

The doors of the mosques in Cairo were of two kinds; those which, externally, were cased with sheets of bronze or iron, cut out in decorative patterns, and incised or inlaid, with bosses in relief; and those in wood, which were framed with interlaced designs of the square and diamond, this latter description of work being Coptic in its origin. The doors of the palace at Palermo, which were made by Saracenic workmen for the Normans, are fine examples and in good preservation. A somewhat similar decorative class of door to these latter is found in Verona, where the edges of the stiles and rails are bevelled and notched.

In the Renaissance period the Italian doors are quite simple, their architects trusting more to the doorways for effect; but in France and Germany the contrary is the case, the doors being elaborately carved, especially in the Louis XIV. and Louis XV. periods, and sometimes with architectural features such as columns and entablatures with pediment and niches, the doorway being in plain masonry. While in Italy the tendency was to give scale by increasing the number of panels, in France the contrary seems to have been the rule; and one of the great doors at Fontainebleau, which is in two leaves, is entirely carried out as if consisting of one great panel only.

The earliest Renaissance doors in France are those of the cathedral of St Sauveur at Aix (1503); in the lower panels there are figures 3 ft. high in Gothic niches, and in the upper panels a double range of niches with figures about 2 ft. high with canopies over them, all carved in cedar. The south door of Beauvais cathedral is in some respects the finest in France; the upper panels are carved in high relief with figure subjects and canopies over them. The doors of the church at Gisors (1575) are carved with figures in niches subdivided by classic pilasters superimposed. In St Maclou at Rouen are three magnificently carved doors; those by Jean Goujon have figures in niches on each side, and others in a group of great beauty in the centre. The other doors, probably about forty to fifty years later, are enriched with bas- reliefs, landscapes, figures and elaborate interlaced borders.

In England in the 17 th century the door panels were raised with " bolection " or projecting mouldings, sometimes richly carved, round them; in the 18th century the mouldings worked on the stiles and rails were carved with the egg and tongue orna- ment. (R. P. S.)

DOORWAY (corresponding to the Gr. xv\r}, Lat. porta), in architecture, the entrance to a building, apartment or enclosure. The term is more generally applied to the framing of the opening in wood, stone or metal. The representations in painting, and existing examples, show that whilst the jambs of the doorway in Egyptian architecture were vertical, the outer side had almost the same batter as the walls of the temples. In the doorways of enclosures or screen walls there was no lintel, but a small projec- tion inwards at the top, to hold the pivot of the door. In Greece the linings of the earliest doorways at Tiryns were in wood, and in order to lessen the bearing of the lintel the dressings or jambs (antepagmenta) sloped inwards, so that the width of the doorway opening was less at the top than at the bottom. In the entrance doorway of the tomb of Agamemnon at Mycenae, 18 ft. in height, the width is about 6 in. less at the top than at the bottom. The lintel of the Greek doorway projected on either side beyond the dressings, constituting what are known as the shoulders or knees (projecturae), a characteristic feature which has been retained down to our time. The next step was to work a projecting moulding round the dressings and lintel forming the architrave. Examples with shoulders in stone exist in the Beule doorway of the Acropolis at Athens, in the tomb of Theron, and in a temple at Agrigentum in Sicily; also in the temples of Hercules at Cora, and of Vesta at Trivoli, and with a peculiar pendant in all the Etruscan tombs. The most beautiful example of a Greek door- way is that under the north portico of the Erechtheum (420 B.C.). There is a slight diminution in the width at the top of the opening,

and outside the ordinary architrave mouldings (which here and in all classic examples are derived from those of the architrave of an order) is a band with rosettes, which recall the early decorative features in Crete and Mycenae; the band being carried across the top of the lintel and surmounted by a cornice supported on each side by corbels (ancones).

In the Roman doorways, excepting those at Cora and Tivoli, there is, as a rule, no diminishing of the width, which is generally speaking half of the height. The dimensions of some of the Roman doorways are enormous; in the temple of the Sun at Palmyra the doorway is 15 ft. 6 in. wide and 23 ft. high; and in the temple of Jupiter at Baalbec, 20 ft. wide and 45 ft. high, the lintel is composed of three stones forming voussoirs the keystone measuring 7 ft. at the bottom, 8 ft. at

the top, 10 ft. high and 7 ft. 6 in. deep.

All the doorways mentioned above have cornices, and in those at Palmyra and Baalbec richly carved friezes with side corbels. In the Pantheon there is a plain convex frieze, but the outer mouldings of the architrave and the bed-mould of the cornice are richly carved. In the Byzantine doorways at Sta Sophia, Constantinople, a bold convex moulding and a hollow take the place of the fasciae of the classic architrave.

So far we have only referred to square-headed doorways, but the side openings of the triumphal arches of Titus and Constantine are virtually doorways, and they have semicircular heads, the mouldings of which are the same as those of the square-headed examples. In Saxon doorways, which had semicircular heads, the outer mouldings projected more boldly than in classic examples, and were sometimes cut in a separate ring of stone like the hood mould of later date.

During the Romanesque period in all countries, the doorway becomes the chief characteristic feature, and consists of two or more orders, the term " order " in this case being applied to the concentric rings of voussoirs forming the door-head. In classic work the faces of these concentric rings were nearly always flush one with the other; in Romanesque work the upper one projected over the ring immediately below, and the employment of a different design in the carving of each ring produced a magnificent and imposing effect: in the Italian churches the decoration of the arch mould is frequently carried down the door jambs, and the same is found, but less often, in the English and French doorways; but as a rule each ring or order is carried by a nook shaft, those in England and France being plain, but in Italy and Sicily elaborately carved with spirals or other ornaments and sometimes inlaid with mosaic.

The deeply recessed Norman doorways in English work required a great thickness of wall, and this was sometimes obtained by an addition outside, as at IfHey, Adel, Kirkstall and other churches.

In France, during the Gothic period, the several orders were carved with figure sculpture, as also the door jambs; and the great recessing of these doorways brought them more into the categories of porches. In England much less importance was given to the Gothic doorways, and although they consisted of many orders, these were emphasized only by deep hollows and converse mouldings and always carried on angle or nook shafts. In the perpendicular period the pointed-arch doorway was often enclosed within a square head-moulding, the

spandrel being enriched with foliage or quatrefoil tracery.

In the Mahommedan style the doorway itself is comparatively simple, except that the voussoirs of its lintel are joggled with a series of curves, and being of different coloured stones have a decorative effect. These doorways are placed in a rectangular recess roofed with the stalactite vault.

With the Renaissance architect, the doorway continued as the principal characteristic of the style; the actual door-frame was simply moulded, by enclosing it with pilasters or columns, isolated or semi-detached, raised on pedestals and carrying an entablature with pediment and other kind of super- doorway; and great importance was given to the feature. In the Italian cinquecento period, the panels of the side pilasters were enriched with the most elaborate carving, and this would seem to have

been an ancient Roman method, to judge by portions of carved panels now in the museums of Rome. The doorways of Venice are remarkable in this respect. At Como the two side doorways of the cathedral, one of which is said to be by Bramante, are of great beauty, and the same rich decoration is found throughout Spain and France. In Germany and England the pattern book too often suggested designs of an extremely rococo character, and it was under the influence of Palladio, through Inigo Jones, that in England the architect returned to the simpler and purer Italian style. (R. P. S.)

DOPPLERITE, a naturally occurring organic substance found in amorphous, elastic or jelly-like masses, of brownish-black colour, in peat beds in Styria and in Switzerland. It is tasteless, insoluble in alcohol and ether, and is described by Dana as an acid substance, or mixture of different acids, related to humic acid.

DORAN, JOHN (1807-1878), English author, was born in London of Irish parentage on the 1 ith cf March 1807. He became tutor in several distinguished families, and while travelling on the continent contributed journalistic sketches to The Literary Chronicle, a paper which was afterwards incorporated with The Athenaeum. His play, Justice or the Venetian Jew, was produced at the Surrey theatre in 1824, and in 1830 he began to write translations from French, German, Latin and Italian authors for The Bath Journal. After some years of travel on the continent he became in 1841 literary editor of The Church and State Gazette, and in 1852 under the title of Filia dolorosa produced a memoir of Maria Therese Charlotte, duchesse d' Angouleme. Two years later he became a regular contributor to The

Athenaeum, succeeding Hepworth Dixon as editor for a short time in 1869, until he became editor of Notes and Queries in 1870. His most elaborate work, Their Majesties' Servants, a history of the English stage from Betterton to Kean, was published in i860, and was supplemented by In and About Drury Lane, which was written for Temple Bar and was not published in book form till 1885, after Doran's death. Among his other works may be mentioned Table Traits and Habits of Men (1854), The Queens of the House of Hanover (1855), Knights and their Days (1856), Monarchs retired from Business (1856), The History of Court Fools (1858), an edition of the Bentley Ballads (1858), The Last Journals of Horace Walpole (2 vols., 1859), The Princess of Wales (i860), and the Memoirs of Queen Adelaide (1861). These were followed by A Lady of the Last Century (1873), an account of Mrs Elizabeth Montagu and the blue-stockings; London in Jacobite Times (1877); and Memories of our Great Towns (1878). Doran died in London, on the 25th of January 1878.

DORAT, CLAUDE JOSEPH (1734-1780), French man of letters, was born in Paris on the 31st of December 1734. He belonged to a family whose members had for generations been lawyers, and he entered the corps of the king's musketeers. He obtained a great vogue by his Riponse d'A bailard a Heloise, and followed up this first success with a number of heroic epistles, Les Viclimes de I'amour, ou lettres de quelques amants ctlebres (1776). Dorat was possessed by an ambition quite out of proportion to his very mediocre ability. Besides light verse he wrote comedies, fables and, among other novels, Les Sacrifices de I'amour, ou lettres de la vicomtesse de Senanges et du chevalier de Versenay (1771). He tried to cover his failures as a dramatist by buying up a great number of seats, and his books were lavishly illustrated by good artists and expensively produced, to secure their success. He was maladroit enough to draw down on himself the hatred both of the philosophe party and of their arch-enemy Charles Palissot, and thus cut himself off from the possibility of academic honours. Le Tartufe litteraire (1777) attacked La Harpe and Palissot, and at the same time D'Alembert and Mile de Lespinasse. Dorat died on the 29th of April 1780 in Paris.

See G. Desnoireterres, Le Chevalier Dorat et les poeles legers au X VIII' siecle (1887). For the bibliographical value of his works, see Henry Cohen, Guide de V amateur de livres a figures et a vignettes du XVIII' siecle (editions of Ch. Mehl, 1876, and R. Portalis, 1887).

DORCHESTER, DUDLEY CARLETON, Viscount (1573-1632), English diplomatist, son of Antony Carleton of Baldwin

Brightwell, Oxfordshire, and of Jocosa, daughter of John Goodwin of Winchington, Buckinghamshire, was born on the ioth of March 1573, and educated at Westminster school and Christ Church, Oxford, where he graduated M.A. in 1600. He travelled abroad, and was returned to the parliament of 1604 as member for St Mawes. Through his connexion as secretary with the earl of Northumberland his name was associated with the Gunpowder Plot, but after a short confinement he succeeded in clearing himself of any share in the conspiracy. In 16 10 he was knighted and was sent as ambassador to Venice, where he was the means of concluding the treaty of Asti. He returned in 1615, and next year was appbinted ambassador to Holland. The policy of England on the continent depended mainly upon its relations with that state, and Carle ton succeeded in improving these, in spite of his firm attitude on the subject of the massacre of Amboyna, the bitter commercial disputes between the two countries, and the fatal tendency of James I. to seek alliance with Spain. It was in his house at the Hague that the unfortunate Elector Frederick and the princess Elizabeth took refuge in 1621. Carleton returned to England in 1625 with the duke of Buckingham, and was made vice-chamberlain of the household and a privy councillor. Shortly afterwards he took part in an abortive mission to France in favour of the French Protestants and to inspire a league against the house of Austria. On his return in

1626 he found the attention of parliament, to which he had been elected for Hastings, completely occupied with the attack upon Buckingham. Carleton endeavoured to defend his patron, and supported the king's violent exercise of his prerogative. It was perhaps fortunate that his further career in the Commons was cut short by his elevation in May to the peerage as Baron Carleton of Imbercourt. Shortly afterwards he was despatched on another mission to the Hague, on his return from which he was created Viscount Dorchester in July 1628. He wag active in forwarding the conferences between Buckingham and Contarini for a peace with France on the eve of the duke's intended departure for La Rochelle, which was prevented by the latter's assassination. In December 1628 he was made principal secretary of state, and died on the 15th of February 1632, being buried in Westminster Abbey. He was twice married, and had children, but all died in infancy, and the title became extinct. Carleton was one of the ablest diplomatists of the time, and his talents would have secured greater triumphs had he not

been persistently hampered by the mistaken and hesitating foreign policy of the court.

His voluminous correspondence, remarkable for its clear, easy and effective style, and for the writer's grasp of the main points of policy, covers practically the whole history of foreign affairs during the period 1610-1628, and furnishes valuable material for the study of the Thirty Years' War. His letters as ambassador at the Hague, January 1616 to December 1620, were first edited by Philip Yorke, afterwards second earl of Hardwicke, with a biographical and historical preface, in 1757; his correspondence from the Hague in

1627 by Sir Thomas Phillipps in 1841 ; other letters are printed in the Cabala, and in T. Birch's Court and Times of James I. and Charles I., but by far the greater portion remains in MS. among the state papers.

DORCHESTER, GUY CARLETON, ist Baron (1 724-1808), British general and administrator, was born at Strabane, Co. Tyrone, Ireland, on the 3rd of September 1724. He served with distinction on the continent under the duke of Cumberland, and in 1759 in America as quartermaster-general, under his friend Wolfe. He was wounded at the capture of Quebec, and promoted to the rank of brigadier-general. In 1766 he was appointed governor-general of Canada, which position he held till 1778. His justice and kindliness greatly endeared him to the recently conquered French-Canadians, and did much to hold them neutral during the War of American Independence. He ordered the first codification of the civil law of the province, and was largely responsible for the passing of the Quebec Act. On the American invasion of Canada in 1775 he was compelled to abandon Montreal and narrowly escaped capture, but defended Quebec (q.v.) with skill and success. In October of the same year he destroyed the American flotilla on Lake Champlain. In 1777 he was superseded in his command of the military forces by Major-General John Burgoyne, and asked to be recalled. He returned, however, to

America in May 1782 as commander-in-chief, remaining till November 1783. In 1786 he was again sent to Canada as governor-general and commander of the forces, with the title of Baron Dorchester. Many important reforms marked his rule; he administered the country with tact and moderation, and kept it loyal to the British crown amid the ferment caused by the French Revolution, and by the attempts of American emissaries to arouse discontent. In 1791 the province was divided into Upper and Lower Canada by the Constitutional Act. Of this division Carleton

disapproved, as he did also of a provision tending to create in the new colony an hereditary aristocracy. In 1796 he insisted on retiring, and returned to England. He died on the ioth of November 1808. He married in 1772 a daughter of the 2nd earl of Effingham, and had nine children, being succeeded in the title by his grandson Arthur. On the death in 1897 of the 4th baron (another grandson) the title became extinct, but was revived in 1899 for his cousin and co-heiress Henrietta Anne as Baroness Dorchester.

J. C. Dent's Canadian Portrait Gallery (Toronto, 1880) gives a sketch of Lord Dorchester's Canadian career. His life by A. G. Bradley is included in the Makers of Canada series (Toronto). Most of his letters and state papers, which are indispensable for a knowledge of the period, are in the archives department at Ottawa, and are calendared in Brymner's Reports on Canadian Archives (Ottawa, 1885, sea.). (W. L. G.)

DORCHESTER, a market town and municipal borough and the county town of Dorsetshire, England, in the southern par- liamentary division, 135 m. S.W. by W. from London by the London & South Western railway; served also by the Great Western railway. Pop. (1901) 9458. It stands on an eminence on the right bank of the river Frome, within a wide open tract of land, containing 3400 acres, held under the duchy of Cornwall, called Fordington Field. Several of the streets are planted with trees, and the town is nearly surrounded by fine avenues. St Peter's church is a Perpendicular building with a fine tower. All Saints and Holy Trinity churches are modern, but Fordington church retains Norman and Transitional details. Of public buildings the principal are — the town-hall, with market-house, shire-hall, county prison and county hospital; there is also a county museum, containing many local objects of much interest. The grammar school (founded in 1569) is endowed with exhibitions to Oxford and Cambridge. There is a statue to William Barnes the Dorsetshire poet (1801-1886). The town is noted also for its ale. It is a place of considerable agricultural trade, and large sheep and lamb fairs are held annually. The borough is under a mayor, six aldermen and eighteen councillors. Area 1648 acres.

History. — Durnovaria was here, a Romano-British country town of considerable size, probably successor to a British tribal centre of the Durotriges. The walls can be traced in part, and many mosaics, remains of houses, &c, have been found. The remains of an amphitheatre are seen at Maumbury Rings, near the town. Maiden Castle, 2 m. S.W. of the town, is a vast earth- work considered to have been a stronghold of the tribe of the Durotriges. There are other

such remains in the vicinity. Little mention of Dorchester (Dornceaster, Dorcestre) occurs in Saxon annals, but a charter from iEthelstan to Milton Abbey in 939 is dated at villa regalis quae dicitur Doracestria, and at this period it possessed a mint. According to the Domesday Survey it was a royal borough, and at the time of Edward the Confessor contained 172 houses, of which 100 had been totally destroyed since the Conquest. Mention is made of a castle at Dorchester in records of the 12th and 13th centuries; and the Franciscan priory, founded some time before 1331, is thought to have been constructed out of its ruins. The latter was suppressed among the lesser monasteries in 1536. Edward II. granted the borough to the bailiffs and burgesses at a fee-farm rent of £20 for five years, and the grant was renewed in perpetuity by Edward III. Richard III. empowered the burgesses to elect a coroner and two constables, to be exempt from tolls, and to try minor pleas in the king's court within the borough before a steward to be chosen by themselves. The first charter of incorporation, granted by James I. in 1610, established a governing council of two bailiffs and

fifteen capital burgesses. Charles I. in 1629 instituted a mayor, six aldermen and six capital burgesses, and also incorporated all the freemen of the borough, for the purposes of trade, under the government of a council consisting of a governor, assistants and twenty-four freemen, the governor and four assistants to be chosen out of the twenty-four by the freemen, and five other assistants to be chosen by the mayor out of the capital burgesses; the Council was empowered to hold four courts yearly and to make laws for the regulation of the markets and trade. Dorchester returned two members to parliament from 1295, until the Representation of the People Act of 1868 reduced the number to one; by the Redistribution Act of 1885 the representation was merged in the county. Edward III. granted to the burgesses the perquisites from three fairs lasting one day at the feasts of Holy Trinity, St John Baptist and St James, and markets on Wednesday, Friday and Saturday. Elizabeth granted an additional three days' fair at Candlemas. The days of the fairs and markets have remained unchanged. The cloth industry which nourished during the 16th century never recovered from the depression following on the Civil War. The malting and brewing industries came into prominence in the 17th century, when there was also a considerable serge manufacture, which has since declined.

See Victoria County History, Dorsetshire; John Hutchins, The History and Antiquities of the Town and Borough of Dorchester (3rd edition, corrected, augmented and improved by W. Shipp and J. W. Hodson, Blandford, 1865).

DORCHESTER, a large village in the south parliamentary division of Oxfordshire, England, 9 m. S.S.E. of Oxford by road, on the river Thame, 1 m. from its junction with the Thames. This is a site of much historical interest. There was a Roman station near the present village, facing, across the Thames, the double isolated mound known as Wittenham Hills (historically Sinodun), on one summit of which are strong early earthworks. In Dorchester itself the chief point of interest is the abbey church of St Peter and St Paul. This consists of a nave of great length, primarily of the transitional Norman period; a choir with arcades of the finest Decorated work; north choir aisle of the close of the 13th century, south choir aisle (c. 1300) and south nave aisle (c. 1320). The tower (western) is an erection of the late 17th century. The eastern bay of the choir is considered to have been added as a Lady chapel, and the north window is a magnificent example of a " Jesse window," in which the tracery represents the genealogical tree of Jesse, the complete execution of the design being carried on in the glass. The sedilia and piscina are very fine. The Decorated windows on the south side of the church form a beautiful series, and there are monuments and brasses of great interest.

Dorchester (Dorcinia, Domacestre, Dorchecestre) was con- quered by the West Saxons about 560. It occupied a com- manding position at the junction of the Thames and the Thame, and in 635 was made the seat of a bishopric which at its founda- tion was the largest in England, comprising the whole of Wessex and Mercia. The witenagemot of Wessex was held at Dorchester three times in the 9th century, and in 958 jEthelstan held a council here. In the nth century, however, the town is described as small and ill-peopled and remarkable only for the majesty of its churches, and in about 1086 William I. and Bishop Remigius removed the bishop's stool to Lincoln, as a city more worthy of the distinction. According to the Domesday Survey Dorchester was held by the bishop of Lincoln; it was assessed at 100 hides and comprised two mills. In n 40 Alexander bishop of Lincoln founded an abbey of Black Canons at Dorchester, but the town declined in importance after the removal of the cathedral, and is described hy i6thˆcentury writers as a mere agricultural village and destitute of trade.

See Victoria County History, Oxfordshire; Henry Addington, Some Account of the Abbey Church of St Peter and St Paul at Dorchester,

Oxfordshire, reissue with additional notes (Oxford, i860).

DORCHESTER, a residential and manufacturing district of Boston, Massachusetts, U.S.A., a separate town until 1870, between the Neponset river on the S. and South Boston and Boston proper on the N. It is served by three lines of the New

York, New Haven & Hartford railway. A ridge, with an average height of about 100 ft. above the sea, extends through the district from N. to S. and commands delightful views of Boston Bay to the E. and of the Blue Hills to the S. There are many large private estates, with beautiful lawns, and Franklin Field and Franklin Park, one of the largest parks of the Boston park system, are in Dorchester. The Shawmut school for girls is in the district. Among the landmarks are the Barnard Capen house, built in the fourth decade of the 17th century and now probably the second oldest house in New England; and the James Blake house (1648), now the home of the Dorchester Historical Society, which has a library and a museum. Opposite the Blake house formerly stood the house in which Edward Everett was born. Not far away is the old Dorchester burying ground, which dates from 1634; it has many curious epitaphs, and contains the graves of Barnard Capen, who died in 1638 (probably the oldest marked grave in the United States); of William Stoughton (1631-1701), chief justice of the court which tried the Salem " witches " in 1692, lieutenant-governor of the colony from 1692, acting governor in 1694-1699 and 1 700-1 701, and founder of the original Stoughton Hall, Harvard; and of Richard Mather, pastor of the First Parish church here from 1636 until his death. In Dorchester Maria Susana Cummins (1827-1866) wrote The Lamplighter (1854), one of the most popular novels of its time, and William T. Adams (" Oliver Optic ") and Charles Follen Adams (" Yawcob Strauss ") did much of their writing; it was long the home of Mrs Lucy Stone (Blackwell). Among the manufactures are cocoa, chocolate, &c. (of the long-established Walter Baker & Co.), paper, crushing and grinding machinery (Sturtevant Mill Co.), chemicals, horseshoe nails, valves, organs and pianos, lumber, automobiles and shoe machinery.

Dorchester was founded by about 140 colonists from Dorset- shire, England, with whom the movement for planting the colony in Massachusetts Bay was begun under the leadership of Rev. John White. They organized as a church while at Plymouth, England, in March 1630, then embarked in the ship " Mary ard John," arrived in Boston Bay two weeks before Governor Winthrop with the rest of the fleet, and in June selected Savin Hill (E. of what is now Dorchester Avenue and between Crescent Avenue and Dorchester Bay) as the

site for their settlement. At the time the place was known as Mattapanock, but they named it Dorchester. Town affairs were at first managed by the church, but in October 1633 a town government was organized, and the example was followed by the neighbouring settlements; this seems to have been the beginning of the town-meeting form of government in America. Up to this time Dorchester was the largest town in the colony, but dissatisfaction arose with the location (Boston had a better one chiefly on account of the deeper water in its harbour), and in 1635-1637 many of the original settlers removed to the valley of the Connecticut where they planted Windsor. New settlers, however, arrived at Dorchester and in 1639 that town established a school supported by a public tax; this was the first free school in America supported by direct taxation or assessment on the inhabitants of a town. 1 In October 1695, a few of the inhabitants of Dorchester organized a church and in December removed to South Carolina where they planted another Dorchester (on the N. bank of the Ashley river, about 26 m. from Charleston); by 1752 they had become dissatisfied with their location, which was unhealthy, and they gradually removed to Georgia, where they settled at Medway

1 In 1635 the general court of the colony of Massachusetts Bay had granted to Dorchester Thompson's Island, situated near the coast of the township. By the township of Dorchester this island was apportioned among the freemen of the township. On the 20th of May 1639 it was ordered that the proprietors of land in this island should collectively pay a " rent of twenty pounds a year forever," this rent "to be paid to such a school-master as shall undertake to teach English, Latin, and other tongues, and also writing," it being " left, to the discretion of the elders and the seven men for the time being whether maids shall be taught with the boys or not." In 1642 the proprietors of the island conveyed it to the township "for and toward the maintenance of a free school in Dorchester aforesaid for the instructing and teaching of children and youth in good literature and learning."

(half way between the Ogeechee and Altamaha rivers), their settlement soon developing into St John's Parish (see Georgia: History). It was the fortification of Dorchester Heights, under orders from General Washington, on the night of the 4th and 5th of March 1776, that forced the British to evacuate Boston. At one time

Dorchester extended from Boston nearly to the Rhode Island line; but its territory was gradually reduced by the creation of new townships and additions to old ones. Dorchester Neck was annexed to Boston in 1804, Thompson's Island in 1834, and the remaining portions in 1855 and 1870.

See W. D. Orcutt, Good Old Dorchester (Cambridge, 1893).

DORDOGNE, a river of central and south-western France, rising at a height of 5640 ft. on the Puy-de-Sancy, a mountain of the department of Puy-de-D6me, and flowing to the Garonne with which it unites at Bee d'Amb^s to form the Gironde estuary. It has a length of 295 m. and the area of its basin is 9214 sq. m. Descending rapidly from its source, sometimes over cascades, the river soon enters deep gorges through which it flows as far as Beaulieu (department of Correze) where it debouches into a wide and fertile valley and is shortly after joined by the Cere. Enter- ing the department of Lot, it abandons a south-westerly for a westerly course and flowing in a sinuous channel traverses the department of Dordogne, where it receives the waters of the Vezere. Below the town of Bergerac it enters the department of Gironde, where at Libourne it is joined by the Isle and widens cut, attaining at its union with the Garonne 45 m. from the sea a width of nearly 3300 yds. A few miles above this point the river is spanned by the magnificent bridges of Cubzac-les-Ponts, which carry a road and railway. Below its confluence with the Vezere, over the last 112 m. of its course, the river carries considerable navigation. The influence of the highest tides is felt at Pessac, a distance of 100 m. from the ocean.

DORDOGNE, an inland department of south-western France, formed in 1790 from nearly the whole of Perigord, a part of Agenais, and small portions of Limousin and of Angoumois. Area 3560 sq. m. Pop. (1906) 447,052. It is bounded N. by Haute- Vienne, W. by Charente, Charente-Inf erieure and Gironde, S. by Lot-et-Garonne, and E. by Lot and Correze. Situated on the western slopes of the Massif Central, Dordogne consists in the north-east and centre of sterile plateaus sloping towards the west, where they end in a region of pine forests known as the Double. The greatest altitudes are found in the highlands of the north, where many points exceed 1300 ft. in height. The department is intersected by many fertile and beautiful river valleys, which converge from its northern and eastern borders towards the south- west. The Dordogne is the principal river of the department and its chief affluent is the Isle, which crosses the centre of the depart- ment and flows into the Dordogneat Libourne,in the neighbouring department of Gironde. The Dronne and the Auvezere,

*both tributaries of the Isle, are the other main rivers. The climate is generally agreeable and healthy, but rather humid, especially in the north-east. Agriculture flourishes in the south and south-west of the department, especially in the valleys of the Dordogne and Isle, the rest of its surface being covered to a great extent by woods and heath. Pasture and forage amply suffice for the raising of large flocks and herds. The vine, cultivated mainly in the neighbourhood of Bergerac, and tobacco are important sources of profit. Wheat and maize are the chief cereals and potatoes are largely grown. The truffles of Perigord are famous for their abundance and quality. The plum and cider-apple yield good crops. In the forests the prevailing trees are the oak and chestnut. The fruit of the latter is much used both as food by the people and for fattening hogs, which are reared in large numbers. The walnut is extensively grown for its oil. The department has mines of lignite, and produces freestone, lime, cement, mill-stone, peat, potter's clay and fireclay. The leather * industry and the preparation of preserved foods are important, and there are flour-mills, brick and tile works, earthenware manufactories, printing works, chemical works and a few iron foundries. Exports consist of truffles, wine, chestnuts and other fruit, live/tock, poultry, and minerals of various kinds. Dordogne is served by the Orleans railway; the Dordogne, the Isle and the*

Vezere furnish nearly 200 m. of navigable waterway. It is divided into the arrondissements of Pengueux, Bergerac, Nontron, Riberac and Sarlat, with 47 cantons and 587 communes, and belongs to the ecclesiastical province of Bordeaux, to the academie (educational division) of Bordeaux and to the region of the XII. army corps, which has its headquarters at Limoges. Its court of appeal is at Bordeaux.

Pengueux, the capital. Bergerac, Sarlat and Brant6me are the principal towns (see separate articles). There are several other places of interest. Bourdeilles has two finely preserved chateaux, one of the 14th century, with an imposing keep, the other in the Renaissance style of the 16th century. Both buildings are contained within the same fortified enceinte. The celebrated chateau of Biron, founded in the nth century, preserves examples of many subsequent architectural styles, among them a beautiful chapel of late Gothic and early Renaissance workmanship. The chateau of Jumilhac-le-Grand belongs to the 15th century. Dordogne possesses several medieval bastides, the most perfect of which is Monpazier. At Cadouin there are the remains of a Cistercian abbey. Its church is a fine cruciform building in the Romanesque style, while the cloister is an excellent example of Flamboyant architecture. St Jean-de-C61e has an interesting Romanesque church and a chateau of the 15th,

16th and 18th centuries. In the rocks of the valley of the lower Vez&re there are prehistoric caves of great archaeological importance, in which have been found tools, and carvings on bone, flint and ivory. Troglodytic dwellings are to be found in many other places in Dordogne (see Cave).

DORDRECHT (abbreviated Dordt, or Dort), a town and river- port of Holland, in the province of South Holland, on the south side of the Merwede, and a junction station i2§ m. by rail S.E. of Rotterdam. Steam ferries connect it with Papendrecht and Zwyndrecht on the opposite shore, and it has excellent com- munication by water in every direction. Pop. (1900) 38,386. Dordrecht presents a picturesque appearance with its busy quays and numerous canals and windmills, its quaint streets and curiously gabled houses. The Groote Kerk, of Our Lady, whose massive tower forms a conspicuous object in the views of the town, dates from the 14th century and contains some finely carved stalls (1540) by Jan Terween Aertsz, a remarkable pulpit (1759), many old monuments and a set of gold communion plate. In the town museum is an interesting collection of paintings, chiefly by modern artists, but including also pictures by some of the older masters, among whom Ferdinand Bol, the two Cuyps, Nicolas Maes, Godefried Schalcken, and in later times Ary Scheffer, were all natives of Dordrecht. The celebrated 17th- century statesman John de Witt was also a native of the town. Close to the museum is one of the old city gates, rebuilt in 1618, and now containing a collection of antiquities belonging to the Oud-Dordrecht Society. The South African Museum (1902) contains memorials of the Boer War of 1 899-1 902. The harbour of Dordrecht still has a large trade, but much has been diverted to Rotterdam. Large quantities of wood are imported from Germany, Scandinavia and America. There are numerous saw-mills, shipbuilding yards, engineering works, distilleries, sugar refineries, tobacco factories, linen bleacheries and stained glass, salt and white lead works.

Dordrecht was founded by Count Dirk III. of Holland in 1018, becoming a town about 1200. One of the first towns in the Netherlands to embrace the reformed religion and to throw off the yoke of Spain, it was in 1572 the meeting-place of the de- puties who asserted the independence of the United Provinces. In 1618 and 1619 it was the seat of the synod of Dort (q.v.).

DORE, LOUIS AUGUSTE GUSTAVE (1832-1883), French artist, the son of a civil engineer, was born at Strassburg on the 6th of January 1832. In 1848 he came to Paris and secured a three years' engagement on the Journal pour rire. His facility as a draughtsman

was extraordinary, and among the books he illustrated in rapid succession were Balzac's Contes drolatiques (1855), Dante's Inferno (1861), Don Quixote (1863), The Bible (1866), Paradise Lost (1866), and the works of Rabelais (1873). He painted also many large and ambitious compositions of a

religious or historical character, and made some success as a sculptor, his statue of Alexandre Dumas in Paris being perhaps his best-known work in this line. He died on the 25th of January

1883.

DORIA, ANDREA (1466-1560), Genoese condottiere and admiral, was born at Oneglia of an ancient Genoese family. Being left an orphan at an early age, he became a soldier of fortune, and served first in the papal guard and then under various Italian princes. In 1503 we find him fighting in Corsica in the service of Genoa, at that time under French vassalage, and he took part in the rising of Genoa against the French, whom he compelled to evacuate the city. From that time forth it was as a naval captain that he became famous. For several years he scoured the Mediterranean in command of the Genoese fleet, waging war on the Turks and the Barbary pirates. In the mean- while Genoa had been recaptured by the French, and in 1522 by the Imperialists. But Doria now veered round to the French or popular faction and entered the service of King Francis I., who made him captain-general; in 1524 he relieved Marseilles, which was besieged by the Imperialists, and helped to place his native city once more under French domination. But he was dissatisfied with his treatment at the hands of Francis, who was mean about payment, and he resented the king's behaviour in connexion with Savona, which he delayed to hand back to the Genoese as he had promised; consequently on the expiry of Doria's contract we find him in the service of the emperor Charles V. (1528). He ordered his nephew Filippino, who was then blockading Naples in concert with a French army, to withdraw, and sailed for Genoa, where, with the help of some leading citizens, he expelled the French once more and re-established the republic under imperial protection. He reformed the constitution in an aristocratic sense, most of the nobility being Imperialists, and put an end to the factions which divided the city. He refused the lordship of Genoa and even the dogeship, but accepted the position of perpetual censor, and exercised predominant

influence in the councils of the republic until his death. He was given two palaces, many privileges, and the title of Liberator et Pater Patriae. As imperial admiral he commanded several expeditions against the Turks, capturing Corona and Patras, and co-operating with the emperor himself in the capture of Tunis (1535)- Charles found him an invaluable ally in the wars with Francis, and through him extended his domination over the whole of Italy. Doria's defeat by the Turks at Preveza in 1538 was said to be not in- voluntary, and designed to spite the Venetians whom he detested. He accompanied Charles on the ill-fated Algerian expedition of 1 541, of which he disapproved, and by his ability just saved the whole force from complete disaster. For the next five years he continued to serve the emperor in various wars, in which he was generally successful and always active, although now over seventy years old; there was hardly an important event in Europe in which he had not some share. After the peace of Crepy between Francis and Charles in 1544 he hoped to end his days in quiet. But his great wealth and power, as well as the arrogance of his nephew and heir Giannettino Doria, made him many enemies, and in 1547 the Fiesco conspiracy to upset the power of his house took place. Giannettino was murdered, but the conspirators were defeated, and Andrea showed great vindictiveness in punishing them. Many of their fiefs he seized for himself, and he was implicated in the murder of Pier Luigi Farnese, duke of Parma (see Farnese), who had helped Fiesco. Other conspiracies followed, of which the most important was that of Giulio Cib6 (1 548) , but all failed. Although Doria was ambitious and harsh, he was a good patriot and successfully opposed the emperor Charles's repeated attempts to have a citadel built in Genoa and garrisoned by Spaniards; neither blandishments nor threats could win him over to the scheme. Nor did age lessen his energy, for in 1550, when eighty-four years old, he again put to sea to punish the raids of his old enemies the Barbary pirates, but with no great success. War between France and the Empire having broken out once more, the French seized Corsica, then admin- istered by the Genoese Bank of St George; Doria was again summoned, and he spent two years (1553-1555) in the island

fighting the French with varying fortune. He returned to Genoa for good in 1555, and being very old and infirm he gave over the command of the galleys to his great-nephew Giovanni Andrea Doria, who conducted an expedition against Tripoli, but proved even more unsuccessful than his uncle had been at Algiers, barely escaping with his life. Andrea Doria died on the 25th of November 1560, leaving his estates to Giovanni Andrea. The family of Doria-Pamphilii-Landi

(q.v.) is descended from him and bears his title of prince of Melfi. Doria was a man of indomitable energy and a great admiral. If he appears unscrupulous and even treacherous he did but conform to the standards of 16th-century Italy.

*Bibliography.— E. Petit's AndrS Doria (Paris, 1887) is an ac- curate and documented biography, indicating all the chief works on the subject, but the author is perhaps unduly harsh in his judgment of the admiral ; F. D. Guerrazzi's Vita di Andrea Doria (3rd ed., Milan, 1874) ; among the earlier works L. Cappelloni's Vita di Andrea Doria (Italian edition, Genoa, 1863) and V. Sigonius's VitaAndreaeDoriae (1576) may be mentioned ; see also " Documenti ispano-genovesi del- l'Archiyio di Simancas " in the Atti della Societk ligure di Storia patria, vol. viii. ; the Archivio storico italiano (serie iii. tome iv. parte i., 1866) contains a bibliography, but a great deal has been published since that date. (L, V. *)*

DORIANS, a name applied by the Greeks to one of the principal groups of Hellenic peoples, in contradistinction to Ionians and Aeolians. In Hellenic times a small district known as Doris in north Greece, between Mount Parnassus and Mount Oeta, counted as " Dorian " in a special sense. Practically all Pelo- ponnese, except Achaea and Elis, was " Dorian," together with Megara, Aegina, Crete, Melos, Thera, the Sporades Islands and the S.W. coast of Asia Minor, where Rhodes, Cos, Cnidus and (formerly) Halicarnassus formed a " Dorian " confederacy. " Dorian " colonies, from Corinth, Megara, and the Dorian islands, occupied the southern coasts of Sicily from Syracuse to Selinus. Dorian states usually had in common the " Doric " dialect, a peculiar calendar and cycle of festivals of which the Hyacinthia and Carneia were the chief, and certain political and social institutions, such as the threefold " Dorian tribes." The worships of Apollo and Heracles, though not confined to Dorians, were widely regarded as in some sense " Dorian " in character.

But those common characters are not to be pressed too far. The northern Doris, for example, spoke Aeolic, while Elis, Phocis, and many non-Dorian districts of north-west Greece spoke dialects akin to Doric. Many Dorian states had additional " non- Dorian tribes "; Sparta, which claimed to be of pure and typical Dorian origin, maintained institutions and a mode of life which were without parallel in Peloponnese, in the Parnassian and in the Asiatic Doris, and were partially reflected in Crete only.

Most non-Dorian Greeks, in fact, seem to have accepted much as

Dorian which was in fact only Spartan: this was particularly the case in the political, ethical and aesthetic controversies of the 5th and 4th centuries B.C. Much, however, which was common (in art, for example) to Olympia, Argolis and Aegina, and might thus have been regarded as Dorian, was conspicuously absent from the culture of Sparta.

Traditional History. — In the diagrammatic family tree of the Greek people, as it appears in the Hesiodic catalogue (6th century) and in Hellanicus (5th century), the " sons of Hellen " are Dorus, Xuthus (father of Ion and Achaeus) and Aeolus. Dorus' share of the inheritance of Hellen lay in central Greece, north of the Corinthian Gulf, between Xuthus in north Peloponnese and Aeolus in Thessaly. His descendants, either under Dorus or under a later king Aegimius, occupied Histiaeotis, a district of northern Thessaly, and afterwards conquered from the Dryopes the head-waters of the Boeotian Cephissus between Mount Parnassus and Mount Oeta. This became " Doris " par excellence. Services rendered to Aegimius by Heracles led (1) to the adoption of Hyllus, son of Heracles, by Aegimius, side by side with his own sons Dymas and Pamphylus, and to a threefold grouping of the Dorian clans, as Hylleis, Dymanes and Pamphyli; (2) to the association of the people of Aegimius in the repeated attempts of Hyllus and his family to recover their lost inheritance in

Peloponnese- (see Heraclidae). The last of these attempts resulted in the " Dorian conquest " of the " Achaeans " and " Ionians " of Peloponnese, and in the assignment of Argolis, Laconia and Messenia to the Heracleid leaders, Temenus, Aristodemus and Cresphontes respectively; of Elis to their Aetolian allies; and of the north coast to the remnants of the conquered Achaeans. The conquest of Corinth and Megara was placed a generation later: Arcadia alone claimed to have escaped invasion. This conquest was dated relatively by Thucydides (i. 12) at eighty years after the Trojan War and twenty years after the conquest of Thessaly and Boeotia by the similar " invaders from Arne "; absolutely by Hellanicus and his school (5th century) at 1149 B.C.; by Isocrates and Ephorus (4th century B.C.) at about 1070 B.C.; and by Sosibius, Eratosthenes (3rd century), and later writers generally, at the generations from 1125 to 1100 B.C.

The invasion was commonly believed to have proceeded by way of

Aetolia and Elis, and the name Naupactus was interpreted as an allusion to the needful " shipbuilding " on the Corinthian Gulf. One legend made Dorus himself originally an Aetolian prince; the participation of Oxylus, and the Aetolian claim to Elis, appear first in Ephorus (4th century). The conquest of Laconia at least is represented in sth-century tradition as immediate and complete, though one legend admits the previous death of the Heracleid leader Aristodemus, and another describes a protracted struggle in the case of Corinth. Pausanias, however (following Sosibius), interprets a long series of conflicts in Arcadia as stages in a gradual advance southward, ending with the conquest of Amyclae by King Teleclus (c. 800 B.C.) and of Helos by King Alcamenes (c. 770 B.C.).

Of the invasion of Argolis a quite different version was already current in the 4th century. This represents the Argive Dorians as having come by sea (apparently from the Maliac Gulf, the nearest seashore to Parnassian Doris) , accompanied by survivors of the Dryopes (former inhabitants of that Doris), whose traces in south Euboea (Styra and Carystus), in Cythnus, and at Eion (Halieis), Hermione and Asine in Argolis, were held to indicate their probable route.

The Homeric Dorians of Crete were also interpreted by Andron and others (3rd century) as an advance-guard of this sea-borne migration, and as having separalsd from the other Dorians while still in Histiaeotis. The sth-century tradition that the Heracleid kings of Macedon were Temenid exiles from Argos may belong to the same cycle.

The fate of the Dorian invaders was represented as differing locally. In Messenia (according to a legend dramatized by Euripides in the 5th century, and renovated for political ends in the 4th century) the descendants of Cresphontes quarrelled among themselves and were exterminated by the natives. In Laconia Aristodemus (or his twin sons) effected a rigid military occupation which eventually embraced the whole district, and permitted (a) the colonization of Melos, Thera and parts of Crete (before 800 B.C.), (b) the recOnquest and annexation of Messenia (about 750 B.C.), (c) a settlement of half-breed Spartans at Tarentum in south Italy, 700 B.C. In Argos and other cities of Argolis the descendants of the Achaean chiefs were taken into political partnership, but a tradition of race-feud lasted till historic times. Corinth, Sicyon and Megara, with similar political compromises, mark the limits of Dorian conquest; a Dorian invasion of Attica (c. 1066 B.C.) was checked by the self-sacrifice of King Codrus: "Either Athens must perish or her king." Aegina was reckoned a colony of Epidaurus. Rhodes, and some Cretan towns, traced descent from Argos; Cnidus from Argos and Sparta; the rest of Asiatic Doris from Epidaurus or Troezen in Argolis. The colonies of Corinth, Sicyon and Megara, and the Sicilian offshoots of the Asiatic Dorians, belong to historic times (8th-6th centuries).

Criticism of the Traditional History. — The following are the problems: — (1) Was there a Dorian invasion as described in the legeiids; and, if not, how did the tradition arise? (2) Who were the Dorian invaders, and in what relation did they stand to the rest of the population of Greece? (3) How far do the Dorian

states, or their characteristics, represent the descendants, or the culture, of the original invaders?

The Homeric poems (i2th-ioth centuries) know of Dorians only in Crete, with the obscure epithet rptxaJKes, and no hint of their origin. All those parts of Peloponnese and the islands which in historic times were " Dorian " are ruled by recently established dynasties of " Achaean " chiefs; the home of the Asiatic Dorians is simply "Caria"; and the geographical " catalogue " in Iliad ii. ignores the northern Doris altogether.

The almost total absence from Homer not only of " Dorians " but of " Ionians " and even of " Hellenes " leads to the conclusion that the diagrammatic genealogy of the " sons of Hellen " is of post-Homeric date; and that it originated as an attempt to classify the Doric, Ionic and Aeolic groups of Hellenic settlements on the west coast of Asia

Minor, for here alone do the three names correspond to territorial, linguistic and political divisions. The addition of an " Achaean " group, and the inclusion of this and the Ionic group under a single generic name, would naturally follow the recognition of the real kinship of the " Achaean " colonies of Magna Graecia with those of Ionia. But the attempt to interpret, in terms of this Asiatic diagram, the actual distribu- tion of dialects and peoples in European Greece, led to difficulties. Here, in the 8th-6th centuries, all the Dorian states were in the hands of exclusive aristocracies, which presented a marked contrast to the subject populations. Since the kinship of the latter with the members of adjacent non-Dorian states was admitted, two different explanations seem to have been made, (1) on behalf of the non-Dorian populations, either that the Dorians were no true sons of Hellen, but were of some other northerly ancestry; or that they were merely Achaean exiles; and in either case that their historic predominance resulted from an act of violence, ill-disguised by their association with the ancient claims of the Peloponnesian Heraclidae; (2) on behalf of the Dorian aristocracies, that they were in some special sense " sons of Hellen," if not the only genuine Hellenes; the rest of the European Greeks, and in particular the anti-Dorian Athenians (with their marked likeness to Ionians), being regarded as Hellenized barbarians of " Pelasgian " origin (see Pelasgians). This process of Hellenization, or at least its final stage, was further regarded as intimately connected with a movement of peoples which had brought the " Dorians " from the northern highlands into those parts of Greece which they occupied in historic times.

So long as the Homeric poems were believed to represent Hellenic (and mainly Ionian) beliefs of the 9th century or later, the historical value of the traditions of a Dorian invasion was repeatedly questioned; most recently and thoroughly by J. Beloch (Gr. Geschichte, i., Strassburg, 1893), as being simply an attempt to reconcile the political geography of Homer {i.e. of 8th-century Ionians describing 12th-century events) With that of historic Greece, by explaining discrepancies (due to Homeric ignorance) as the result of " migrations " in the interval. Such legends often arise to connect towns bearing identical or similar names (such as are common in Greece) and to justify political events or ambitions by legendary precedents; and this certainly happened during the successive political rivalries of Dorian Sparta with non-Dorian Athens and Thebes. But in proportion as an earlier date has become more probable for Homer, the hypothesis of Ionic origin has become less tenable, and the belief better founded (1) that the poems represent

accurately a well- defined phase of culture in prehistoric Greece, and (2) that this " Homeric " or " Achaean " phase was closed by some such general catastrophe as is presumed by the legends.

The legend of a Dorian invasion appears first in Tyrtaeus, a 7th-century poet, in the service of Sparta, who brings the Spartan Heracleids to Peloponnese from Erineon in the northern Doris; and the lost Epic of Aegimius, of about the same date, seems to have presupposed the same story. In the 5th century Pindar ascribes to Aegimius the institutions of the Peloponnesian Dorians, and describes them as the " Dorian folk of Hyllus and Aegimius," and as " originating from Pindus " (Pyth. v. 75: cf. Fr. 4). Herodotus, also in the 5th century, describes them as the

typical (perhaps in contrast to Athenians as the only genuine) Hellenes, and traces their numerous wanderings from (1) an original home " in Deucalion's time " in Phthiotis (the Homeric " Hellas ") in south Thessaly, to (2) Histiaeotis " below Ossa and Olympus " in north-east Thessaly (note that the historic Histiaeotis is " below Pindus " in north-weˆ Thessaly) : this was " in the days of Dorus," i.e. it is at this stage that the Dorians are regarded as becoming specifically distinct from the generic " Hellene ": thence (3) to a residence " in Pindus," where they passed as a " Macedonian people. " Hence (4) they moved south to the Parnassian Doris, which had been held by Drydpes: and hence finally (5) to Peloponnese. Elsewhere he assigns the expulsion of the Dryopes to Heracles in co-operation not with Dorians but with Malians. Here clearly two traditions are combined: — one, in which the Dorians originated from Hellas in south Thessaly, and so are " children of Hellen "; another, in which they were a " Macedonian people " intruded from the north, from Pindus, past Histiaeotis to Doris and beyond. It is a note- worthy coincidence that in Macedonia also the royal family claimed Heracleid descent; and that " Pindus " is the name both of the mountains above Histiaeotis and of a stream in Doris. It is noteworthy also that later writers (e.g. Andron in Strabo 475) derived the Cretan Dorians of Homer from those of Histiaeotis, and that other legends connected Cretan peoples and places with certain districts of Macedon.

Thucydides agrees in regarding the Parnassian Doris as the " mother-state " of the Dorians (i. 107) and dates the invasion (as above)

eighty years after the Trojan War; this agrees approxi- mately with the pedigree of the kings of Sparta, as given by Herodotus, and with that of Hecataeus of Miletus (considered as evidence for the foundation date of an Ionian refugee-colony). Thucydides also accepts the story of Heracleid leadership.

The legend of an organized apportionment of Peloponnese amongst the Heracleid leaders appears first in the 5th-century tragedians, — not earlier, that is, than the rise of the Peloponnesian League, — and was amplified in the 4th century; the Aetolians' aid, and claim to Elis, appear first in Ephorus. The numerous details and variant legends preserved by later writers', particu- larly Strabo and Pausanias, may go back to early sources (e.g. Herodotus distinguished the " local " from the " poetic " versions of events in early Spartan history); but much seems to be referable to Ephorus and the 4th-century political and rhetorical historians: — e.g. the enlarged version of the Heracleid claims in Isocrates (Archidamus, 120) and the theory that the Dorians were mere disowned Achaeans (Plato, Lams, 3). Moreover, many independent considerations suggest that in its main outlines the Dorian invasion is historical.

The Doric Dialects.- — These dialects have strongly marked features in common (future in – at] = 17), but differ more among themselves than do the Ionic. Laconia with its colonies (includ ing those in south Italy) form a clear group, in which -e and -o lengthen to -r\ and -co as in Aeolic. Corinth (with its Sicilian colonies), the Argolid towns, and the Asiatic Doris, form another group, in which -« and -o become -ei and -ov as in Ionic. Connected with the latter (e.g. by -ei and -ov) are the " northern" group: — Phocis, including Delphi, with Aetolia, Acarnania, Epirus and Phthiotis in south Thessaly. But these have also some forms in common with the " Aeolic " dialect of Boeotia and Thessaly, which in historic times was spoken also in Doris; Locris and Elis present similar northern " Achaean-Doric " dialects. Arcadia, on the other hand, in the heart of Peloponnese, retained till a late date a quite different dialect, akin to the ancient dialect of Cyprus, and more remotely to Aeolic. This distribution makes it clear (1) that the Doric dialects of Peloponnese represent a superstratum, more recent than the speech of Arcadia; (2) that Laconia and its colonies preserve features alike, -rj and -co which are common to southern Doric and Aeolic; (3) that those parts of " Dorian " Greece in which tradition makes the pre-Dorian population " Ionic," and in which the political structure shows that the conquered were less completely subjugated, exhibit the Ionic -et and -ov; (4) that as

we go north, similar though more barbaric dialects extend far up the

western side of central-northern Greece, and survive also locally in the highlands of south Thessaly; (5) that east of the watershed Aeolic has prevailed over the area which has legends of a Boeotian and Thessalian migration, and replaces Doric in the northern Doris. All this points on the one hand to an intrusion of Doric dialect into an Arcadian-and-Ionic-speaking area; on the other hand to a subsequent expansion of Aeolic over the north-eastern edge of an area which once was Dorian. But this distribution does not by itself prove that Doric speech was the language of the Dorian invaders. Its area coincides also approxi- mately with that of the previous Achaean conquests ; and if the Dorians Were as backward culturally as traditions and archaeology suggest, it is not improbable that they soon adopted the language of the conquered, as the Norman conquerors did in England. As evidence of an intrusion of northerly folk, however, the distribu- tion of dialects remains important. See Greek Language.

The common calendar and cycle of festivals, observed by all Dorians (of which the Carneia was chief), and the distribution in Greece of the worships of Apollo and Heracles, which attained pre-eminence mainly in or 1 near districts historically " Dorian," suggest that these cults, or an important element in them, were introduced comparatively late, and represent the beliefs of a fresh ethnic superstratum. The steady dependence of Sparta on the Delphic oracle, for example, is best explained as an observance inherited from Parnassian ancestors.

The social and political structure of the Dorian states of Peloponnese presupposes likewise a conquest of an older highly civilised population by small bands of comparatively barbarous raiders. Sparta in particular remained, even after the reforms of Lycurgus, and on into historic times, simply the isolated camp of a compact army of occupation, of some 5000 families, bearing traces, still of the fusion of several bands of invaders, and main- tained as an exclusive political aristocracy of professional soldiers by the labour of a whole population of agricultural and industrial serfs. The serfs were rigidly debarred from intermixture or social advancement, and were watched by their masters with a suspicion fully justified by recurrent ineffectual revolts. The other states, such as Argos and Corinth, exhibited just such compromises between conquerors and conquered as the legends described, conceding to the older population, or to sections of it, political incorporation more or less incomplete. The Cretan cities, irrespective of origin, exhibit serfage, militant aristocracy, rigid martial discipline of all citizens, and other marked analogies with Sparta; but the Asiatic Dorians and the other

Dorian colonies do not differ appreciably in their social and political history from their Ionian and Aeolic neighbours. Tarentum alone, partly from Spartan origin, partly through stress of local conditions, shows traces of : militant asceticism for a while. . – Archaeological evidence points clearly now to the conclusion that the splendid but overgrown civilization of the Mycenaean or " late Minoan " period of the Aegean Bronze Age collapsed rather suddenly before a rapid succession of assaults by com- paratively barbarous invaders from the European mainland north of the Aegean; that these invaders passed partly by way of Thrace and the Hellespont into Asia Minor, partly by Macedon and Thessaly into peninsular Greece and the Aegean islands; that in east Peloponnese and Crete, at all events, a first shock (somewhat later than 1500 B.C.) led to the establishment of a cultural, social and political situation which in many respects resembles what is depicted in Homer as the " Achaean " age, with principal centres in Rhodes, Crete, Laconia, Argolis, Attica, Orchomenus and south-east Thessaly; and that this r6gime was itself shattered by a second shock or series of shocks somewhat earlier than 1000 B.C. These latter events correspond in character and date with the traditional irruption of the Dorians and their associates.

The nationality of these invaders is disputed. Survival of fair hair and complexion and light eyes among the upper classes in Thebes and some other localities shows that the blonde type of mankind which is characteristic of north-western Europe had already penetrated into Greek lands before classical times ; but

the ascription of the same physical traits to the Achaeans of Homer forbids us to regard them as peculiar to that latest wave of pre-classical immigrants to which the Dorians belong; and there is no satisfactory evidence as to the coloration of the Spartans, who alone were reputed to be pure-blooded Dorians in historic times.

Language is no better guide, for it is not clear that the Dorian dialect is that of the most recent conquerors, and not rather that of the conquered Achaean inhabitants of southern Greece; in any case it presents no such affinities with any non-Hellenic speech as would serve to trace its origin. Even in northern and west- central Greece, all vestige of any former prevalence has been obliterated by the spread of " Aeolic " dialects akin to those of Thessaly and Boeotia; even the northern Doris, for example, spoke "Aeolic" in historic

times.

The doubt already suggested as to language applies still more to such characteristics as Dorian music and other forms of art, and to Dorian customs generally. It is clear from the traditions about Lycurgus (q.v.), for example, that even the Spartans had been a long while in Laconia before their state was rescued from disorder by his reforms; and if there be truth in the legend that the new institutions were borrowed from Crete, we perhaps have here too a late echo of the legislative fame of the land of Minos. Certainly the Spartans adopted, together with the political traditions of the Heracleids, many old Laconian cults and observances such as those connected with the Tyndaridae.

Bibliography. — K. O. Miiller, Die Dorier (ed. F. W. Schneidewin, Breslau, 1844); G. Gilbert, Studien zur altspartanischen Geschichte (Gottingen, 1872) ; H. Gelzer, " Die Wanderziige der lakedamonischen Dorier," in Rhein. Museum, xxxii. (1877), p. 259; G. Busolt, Die Lakedaimonier und ihre Bundesgenossen, i. (Leipzig, 1878); S. Beloch, " Die dorische Wanderung, ' in Rhein. Mus. xlv. (1890), 555 ff. ; H. Collitz, Sammlung der gr. Dialekt-Inschriften, iii. (Gottingen, 1899-1905); R. Meister, "Dorier undAchaer"inv46A. d. K. Sachs. Ges. Wiss. (Phil.-hist. KL), xxiv. 3 (Leipzig, 1904).

(J. L. M.)

DORIA-PAMPHILII-LANDI, a princely Roman family of Genoese extraction. The founder of the house was Ansaldo d'Oria, consul of Genoa in the 12th century, but the authentic pedigree is traced no further back than to Paolo d'Oria (1335). The most famous member of the family was Andrea Doria (q.v.), perpetual censor of Genoa in 1528 and admiral to the emperor Charles V., who was created prince of Melfi (1531) and marquis of Tursi (in the kingdom of Naples) in 1555. The marquisate of Civiez and the county of Cavallamonte were conferred on the family in 1576, the duchy of Tursi in 1594, the principality of Avella in 1607, the duchy of Avigliano in 16 13. In 1760 the title of Reichsfurst or prince of the Holy Roman Empire was added and attached to the lordship of Torriglia and the marquisate of Borgo San Stefano, together with the qualification of Hoch- geboren. That same year the Dorias inherited the fiefs and titles of the house of Pamphilii-Landi of Gubbio, patricians of Rome and princes of San Martino, Valmontano, Val di Toro, Bardi and Corupiano. The Doria-Pamphilii palace in Rome, a splendid edifice, was built in the 17th century, and contains a valuable collection of paintings. The Villa Doria-Pamphilii with its gardens is one of the

loveliest round Rome. During the siege of 1849 it was Garibaldi's headquarters.

DORION, SIR ANTOINE AIME 1 (1816-1891), Canadian lawyer and statesman, son of Pierre Dorion and Genevieve Bureau, was born in the parish of Sainte Anne de la Perade on the 17 th of January 18 16. He was educated at Nicolet College, and in his twenty-second year went to Montreal to read law with M. Cherrier, an eminent lawyer for whom he retained a lasting friendship. On the 6th of January 1842 he was admitted to the bar of the province, became the partner of M. Cherrier, and in the course of a few years attained the highest rank in his profession. He married in 1848 Iphigenie, daughter of Dr Jean Baptiste Trestler, of Vaudreuil. Dorion descended from an old Liberal family which from early days had supported the reform party in Canada. His father, a merchant of Sainte Anne, was a. member of the legislative assembly for the county of Champlain, from

1 In the baptismal certificate the name is entered as "Erne" (= Edme-Aime).

1830 to 1838, and his grandfather, on the maternal side, represented the county of Saint Maurice in the same body from 1819 to 1830. At the time that Dorion commenced the study of law, Canada was entering upon a new phase of her political life. The rebellion of 1837 had resulted in the suspension of the constitution of 1791, and the union of the provinces, effected under the Imperial Act of 1840, was framed to compel the obedience of the refractory population. It was an unsatisfactory measure, providing a single legislature for two provinces, with an equal number of representatives from each province, irrespective of population. At the time the lower province was the larger, but it was foreseen that a tide of English emigration would eventually place the upper province in the stronger position. Indeed, at the date'of the Union, there were many English residents in the lower province, so that in the aggregate the English had then the majority. From the first it was apparent that representation by population would become an issue, and for several years there was a constant struggle for the establishment of responsible govern- ment, which was only achieved after the contest of 1848, when the La Fontaine-Baldwin administration was maintained in power. The difficulty had been avoided during the first years of the Union by La Fontaine, who succeeded in uniting English and French Liberals, and by substituting principles for race carried out a policy based upon a broader conception of human interests. Although a decisive victory had been gained by La Fontaine and Baldwin in 1848, they did not

press for an immediate overthrow of institutions which for years had been a cause of contention, and their influence gradually diminished until, on the 28th of October 1851, the administration was handed over to Hincks and Morin. Liberal principles had now become aggressive; the new leaders did not keep abreast of the spirit of the times, their majority decreased, and, on the nth of September 1854, a government was formed by McNab and Morin.

The elections of 1854 had Drought new blood into the ranks of the Liberal party, young men eager to carry out measures of reform, and Dorion was chosen as leader. Under the coalition brought about by McNab between the Tories of Upper Canada and the Liberals of the lower province old abuses were removed, and, after the abolition of seigneurial tenure and clergy reserves, it appeared that the political atmosphere was clear. In 1856 the question of representation by population was again prominent. Upper Canada had increased, and it contributed a larger share to the revenue, and demanded proportionate representation. La Fontaine had pointed out, at the time he was prime minister, that representation by population would subject the weaker province to the control of the stronger, and that as he would not impose the principle upon Upper Canada at the time he would not concede it, without constitutional restraint, if her position were reversed. Upper Canada now became aggressive and the question had to be settled. Macdonald, who became prime minister in 1856, and had formed a new government with Cartier in 1857, maintained that no amendment to the constitution was necessary; that existing conditions were satisfactory. Brown, on the opposite side of the House, declared that representation by population was imperative, with or without constitutional changes; and Dorion appears to have suggested the true remedy, when he gave notice of a motion in 1856: —

"That a committee be appointed to inquire into the means that should be adopted to form a new political and legislative organization of the heretofore provinces of Upper and Lower Canada, either by the establishment of their former territorial divisions or by a division of each province, so as to form a federation, having a federal govern- ment and a local legislature for each one of the new provinces, and to deliberate as to the course which should be adopted to regulate the affairs of united Canada, in a manner which would be equitable to the different sections of the province."

Dorion was in advance of the time. He understood the true principle of federative union as applicable to Canada. But he did not pursue

this idea, and in fact his following was never sufficiently strong to enable him to give effect to the sound measures he was so capable of formulating. This, perhaps, was his special weakness. On the 2nd of August 1858 he formed an administration with Brown, but was forced to resign after being in office three days.

When the question of confederation was discussed a few years later he opposed the scheme, believing there was nothing to justify the union at the time, although he admitted " that commercial intercourse may increase sufficiently to render confederation desirable." In 1873 he accepted the portfolio of minister of justice in the Mackenzie government, and during the six months that he was in office passed the Electoral Law of 1874 and the Controverted Elections Act. Dorion sat as member of the assembly for the province of Canada for the city of Montreal from 1854 to 1 861, for the county of Hochelaga from 1862 to 1867 ; as member of the House of Commons for the county of Hochelaga from 1867 to July 1872, and for the county of Napierville from September 1872 to June 1874, when he was appointed chief justice of the province. In 1878 he was created a knight bachelor. He died at Montreal on the 31st of May 1891. No more able or upright judge ever adorned the Canadian bench. He had a broad, clear mind, vast knowledge, and commanded respect from the loftiness of his character and the strength of his abilities. The keynote of his life was an unswerving devotion to duty.

See Dorion, a Sketch, by Fennings Taylor (Montreal, 1865) ; and " Sir Antoine Amie Dorion," by Sir Wilfrid Laurier, in The Week (1887). (A. G. D.)

DORIS, in ancient geography, a small district in central Greece, forming a wedge between Mts. Oeta and Parnassus, and contain- ing the head- waters of the Cephissus, which passes at the gorge of Dadion into the neighbouring land of Phocis. This little valley, which nowhere exceeds 4 m. in breadth and could barely give sustenance to four small townships, owed its importance partly to its command over the strategic road from Heracleia to Amphissa, which pierced the Parnassus range near Cytinium, but chiefly to its prestige as the alleged mother-country of the Dorian conquerors of Peloponnesus (see Dorians). Its-history is mainly made up of petty wars with the neighbouring Oetaeans and Phocians. The latter pressed them hard in 457, when the Spartans, admitting their claim to be the Dorian

metropolis, sent an army to their aid, and again during the second Sacred War (356-346). Except for a casual mention of its cantonal league in 196, Doris passed early out of history; the inhabitants may have been exterminated during the conflicts between Aetolia and Macedonia.

See Strabo, pp. 417, 427; Herodotus i. 56, viii. 31; Thucydides i. 107, iii. 92; Diodorus xii. 29, 33; W. M. Leake, Travels in Northern Greece, chap. xi. (London, 1835). (M. O. B. C.)

DORISLAUS. ISAAC (1595-1649), Anglo-Dutch lawyer and diplomatist, was born in 1595 at Alkmaar, Holland, the son of a minister of the Dutch reformed church. He was educated at Leiden, removed to England about 1627, and was appointed to a lectureship in history at Cambridge, where his attempt to justify the Dutch revolt against Spain led to his early resignation. In 1629 he was admitted a commoner of the College of Advocates. In 1632 he made his peace at court, and on two occasions acted as judge advocate, in the bishops' war of 1640 and in 1642 in the army commanded by Essex. In 1648 he became one of the judges of the admiralty court, and was sent on a diplomatic errand to the states general of Holland. He assisted in preparing the charge of high treason against Charles I.,and,while negotiating an alliance between the Commonwealth and the Dutch Republic, was murdered at the Hague by royalist refugees on the 10th of May 1649. His remains were buried in Westminster Abbey, and moved in 1661 to St Margaret's churchyard.

DORKING, a market town in the Reigate parliamentary division of Surrey, England, 26 m. S.S.W. of London, on the London, Brighton & South Coast and the South-Eastern . & Chatham railways. Pop. of urban district (igbi) 7670. It is pleasantly situated on the river Mole, in a sheltered vale near the base of Box Hill. It is the centre of an extensive residential district. The parish church of St Martin's is a handsome edifice rebuilt in 1873. Lime of exceptionally good quality is burnt to a large extent in the neighbourhood, and forms an important article of trade; it is derived from the Lower Chalk formation. Dorking has long been famous for a finely flavoured breed of fowl distinguished by its having five toes. Several fine mansions are in the vicinity of the town, notably that of Deepdene, contain-

ing part of a gallery of sculpture collected here by Thomas Hope, the author of A nasta-sius. A Roman road, which crossed from the Sussex coast to the Thames, passed near the present churchyard of St Martin.

DORLEANS, LOUIS (1 542-1629), French poet and political pamphleteer, was born in 1542, in Paris. He studied under Jean Daurat, and after taking his degree in law began to practise at the bar with but slight success. He wrote indifferent verses, but was a redoubtable pamphleteer. After the League had arrested the royalist members of parliament, he was appointed (1589) advocate-general. His " Avertissement des catholiques anglais aux Francois catholiques du danger oil Us sont de perdre la religion et d' experimenter, comme en Angleterre, la cruauti des ministres s'ils reqoivent a la couronne un roi qui soit heritique " went through several editions, and was translated into English. One of his pamphlets, Le Banquet ou apres-dinSe du comte d' Arete, in which he accused Henry of insincerity in his return to the Roman Catholic faith, was so scurrilous as to be disapproved of by many members of the League. When Henry at length entered Paris, Dorleans was among the number of the proscribed. He took refuge in Antwerp, where he remained for nine years. At the expiration of that period he received a pardon, and returned to Paris, but was soon imprisoned for sedition. The king, however, released him after three months in the Conciergerie, and by this means attached him permanently to his cause. His last years were passed in obscurity, and he died in 1629.

DORMER (from Lat. dormire, to sleep), in architecture, a window rising out of the roof and lighting the room in it : some- times, however, pierced in a small gable built flush with the wall below, or corbelled out, as frequently in Scotland. In Germany, where the roofs are very lofty, there are three or four rows of dormers, one above the other, but it does not follow that the space in the roof is necessarily subdivided by floors. In some of the French chateaux the dormers (Fr. lucarne) are highly elaborated, and in some cases, as in Chambord, they form the principal architectural features. In these cases they are either placed flush with the wall or recede behind a parapet and gutter only, so as to rest on the solid wall, as they are built in stone. In Germany they assume larger proportions and constitute small gables with two or three storeys of windows. The term " dormer " arose from the windows being those of sleeping-rooms. In the phrase " dormer beam " or " dormant beam," meaning a tie-beam, we have the same sense as in the modern " sleeper."

DORMITORY (Lat. dormitorium, a sleeping place), the name given in monasteries to the monks' sleeping apartment. Some- times it formed one long room, but was more generally subdivided into as many cells or partitions as there were monks. It was generally placed on the first floor with a direct entrance into the church. The dormitories were sometimes of great length ; the longest known, in the monastery of S.

Michele in Bosco near Bologna (now suppressed), is said to have been over 400 ft. In some of the larger mansions of the Elizabethan period the space in the roof constitutes a long gallery, which in those days was occasionally utilized as a dormitory. The name " dormitory " is also applied to the large bedrooms with a number of beds, in schools and similar modern institutes.

DORMOUSE (a word usually taken to be connected with Lat. dormire, to sleep, with " mouse " added, cf. Germ. Schlafratte; it is not a corruption of Fr. dormeuse; Skeat suggests a connexion with Icel. ddr, benumbed, cf. Eng. " doze "), the name of a small British rodent mammal having the general appearance of a squirrel. This rodent, Muscardinus avellanarius, is the sole re- presentative of its genus, but belongs to a family — the Gliridae, or Myoxidae — containing a small number of Old World species. All the dormice are small rodents (although many of them are double the size of the British species), of arboreal habits, and for the most part of squirrel-like appearance; some of their most distinctive features being internal. In the more typical members of the group, forming the sub-family Glirinae, there are four pairs of cheek-teeth, which are rooted and have transverse enamel-folds. As the characters of the genera are given in the article Rodentia it will suffice to state that the typical genus Glis is represented by

the large European edible dormouse, G. vulgaris (or G. glis),a. grey-species with black markings known in Germany as Siebenschldfer; the genus ranges from continental Europe to Japan. The common . dormouse Muscardinus avellanarius, ranging from England to Russia and Asia, is of the size of a mouse and mainly chestnut- coloured. The third genus is represented by the continental lerol, or garden-dormouse, Eliomys guercinus, which is a large parti- coloured species, with several local forms — either species or races. Lastly, Graphiurus, of which the species are also large, is solely African. In their arboreal lif e, and the habit of sitting up on their hind-legs with their food grasped in the fore-paws, dormice are like squirrels, from which they differ in being completely nocturnal. They live either among bushes or in trees, and make a neat nest for the reception of their young, which are born blind. The species inhabiting cold climates construct a winter nest in which they hibernate, waking up at times to feed on an accumulated store of nuts and other food. Before retiring they become very fat, and at such times the edible

dormouse is a favourite article of diet on \ the Continent. At the beginning of the cold season the common dormouse retires to its nest, and curling itself up in a ball, becomes dormant. A warmer day than usual restores it to temporary activity, and then it supplies itself with food from its autumn hoard, again becoming torpid till roused by the advent of spring. The young are generally four in number, and are produced twice a year. They are born blind, but in a marvellously short period are able to cater for themselves; and their hibernation begins later in the season than with the adults. The fur of the dormouse is tawny above and paler beneath, with a white patch on the throat. A second subfamily is represented by the Indian Platacanlhomys and the Chinese Typhlomys, in which there are only three pairs of cheek-teeth; thus connecting the more typical members of the family with the Muridae. (R. L.)*

DORNBIRN, a township in the Austrian province of the Vorarlberg, on the right bank of the Dornbirner Ach, at the point where it flows out of the hilly region of the Bregenzerwald into the broad valley of the Rhine, on its way to the Lake of Constance. It is by rail 7§ m. S. of Bregenz, and 1$ m. N. of Feldkirch. It is the most populous town in the Vorarlberg, its population in 1900 being 13,052. The name Dornbirn is a collective appellation for four villages — Dornbirn, Hatlerdorf, Oberdorf and Haselstauden — which straggle over a distance of about 3 m. It is the chief industrial centre in the Vorarlberg, the regulated Dornbirner Ach furnishing motive power for several factories for cotton spinning and weaving, worked muslin, dyeing, iron-founding and so on. (W. A. B. C.)

DORNBURG, a town of Germany, in the grand-duchy of Saxe-Weimar, romantically situated on a hill 400 ft. above the Saale, on the railway Grossheringen-Jena and 7 m. N.E. of the latter. Pop. 700. Dornburg is an ancient town, but is chiefly famous for its three grand-ducal castles. Of these, the Altes Schloss is built on the site of an imperial stronghold (Kaiserpfalz), once a bulwark against the Slavs, often a residence of the emperors Otto II. and Otto III., and where the emperor Henry II. held a diet in 1005; the Neues Schloss in Italian style of architecture, built 1 7 28-1 748, with pretty gardens. Here Goethe was often a guest, " healing the blows of fate and the wounds of the heart in Dornburg." The third and southernmost of the three is the so- called Stohmannsches Rittergut, purchased in 1824 and fitted as.a modern palace.

DORNER, ISAAC AUGUST (1809-1884), German Lutheran divine, was born at Neuhausen-ob-Eck in Wiirttemberg on the 20th of June 1809. His father was pastor at Neuhausen. He was educated at

Maulbronn and the university of Tubingen. After acting for two years as assistant to his father in his native place he travelled in. England and Holland to complete his studies and acquaint himself with different types of Protestantism. He returned to Tubingen in 1834, and in 1837 was made professor extraordinarius of theology, As a student at the university, one of his teachers had been Christian Friedrich Schmid (1794-1852), author of a well-known book, Biblische Theologie des Nenen Testamenles, and one of the most vigorous opponents of F. C. Baur. At Schmid's suggestion, and with his encouragement,

Dorner set to work upon a history of the development of the doctrine of the person of Christ, Entwickhmgsgeschichte der Lehre von der Person Christi, He published the first part of it in 1835, the year in which Strauss, his colleague, gave to the public his Life of Jesus; completed it in 1839, and afterwards considerably enlarged it for a second edition (1845-1856). It was an indirect reply to Strauss, which showed " profound learning, objectivity of judgment, and fine appreciation of the moving ideas of history " (Otto Pfleiderer). The author at once took high rank as a theologian and historian, and in 1839 was invited to Kiel as professor ordinarius. It was here that he produced, amongst other works, Das Princip unserer Kirche nach dem innern Verhdltniss seiner zwei Seiten betrachtet (1841). In 1843 he removed as professor of theology to Konigsberg. Thence he was called to Bonn in 1847, and to Gqttingen in 1853. Finally in 1862 he settled in the same capacity at Berlin, where he was a member of the supreme consistorial council. . A few years later (1867) he published his valuable Geschichte der protestantischen Theologie (Eng. trans., History of Protestant Theology, 2 vols.;i87 1) , in which he " developed and elaborated," as Pfleiderer says, " his own convictions by his diligent and loving study of the history of the Church's thought and belief." The theological positions to which he ultimately attained are best seen in his Christliche Glaubenslehre, published shortly before his death (1879ˆ1881). It is ' 'a work extrernely rich in thought and matter. It takes the reader through a mass of historical material by the examination and discussion of ancient and modern teachers, and so leads up to the author's own view, which is mostly one intermediate between the opposite extremes, and appears as a more or less successful synthesis of antagonistic theses " (Pfleiderer). The companion work, System der christlichen Sittenlehre, was published by his son August Dorner in 1886. He also contributed articles to Herzog- Hauck's RealencyhlopSdie, and was the founder and for many years one of the editors of the Jahrbucher fiir deutsche Theologie. He died at

Wiesbaden oh the 8th of July 1884. One of the most noteworthy of the " mediating " theologians, he has been ranked with Friedrich Schleiermacher, J. A. W. Neander, Karl Nitzsch, Julius Muller- and Richard Rothe.

His son, August (b. 1846), after studying at Berlin and acting as Repetent at Gqttingen (1870-1873), became professor of the- ology and co-director of the theological seminary at Wittenberg. Amongst his works' is Augustinus, sein theologisches System und seine religionsphilosoph. Anschauung (1873), and he is the author of the article on Isaac Dorner in the Allgemeine deutsche Biographie.

See Herzog-Hauck, Realencyklopddie; Allgemeine deutsche Biographie (1904); Otto Pfleiderer, The Development of Theology in Germany since Kant (1890) ; F. Lichtenberger, History of German Theology in the Nineteenth Qentury (1889);. Carl Schwarz, Zur Geschichte der neuesten Theologie (1869). (M. A. C.)

DORNOCH, a royal and police burgh and county town of Sutherlandshire, Scotland. Pop. (1901) 624. It lies on the north shore of Dornoch Firth, an arm of the North Sea, 7! m. S.S.E. of Mound station on the Highland railway by light railway. Its dry and bracing climate and fine golf course have brought it into great repute as a health arid holiday resort. Before the Reforma- tion it was the see of the bishopric of Caithness and Sutherland. The cathedral, built by Bishop Gilbert de Moravia (Moray) (d. 1245), the last Scot enrolled in the Calendar of Scottish saints, was damaged by fire in 1570, during the raid of the Master of Caithness and Mackay of Strathnaver, and afterwards neglected till 1837, when it was restored by the 2nd duke Of Sutherland, and has since been used as the parish church. Noticeable for its high roof, low tower and dwarf spire, the church consists of an aisleless nave, chancel (adorned with Chantrey's statue of the 1st duke) and transepts. It is the burying-place of the Sutherland family and contains the reinains of sixteen earls. Of the ancient castle, which was also the bishop's palace, only the west tower exists, the rest of the structure having been destroyed in the out- rage of 1570. The county buildings adjoin it. Dornoch became a royal burgh in 1628, and, as one of the Wick burghs, returns a member to parliament. It was the scene of the last execution for witchcraft in Scotland (1722). At Embo, 2 m. N.N.E., a

sculptured stone commemorates the battle with the Danes in the 13th century, in which Richard de Moravia was killed. He was buried in the cathedral, where his effigy was found in the chancel. Skibo castle, about 4 m. W. of Dornoch, once a residence of the bishops of Caithness, was acquired in 1898 by Andrew Carnegie. DOROHOI, or Dorogoi, the capital of the department of Dorohoi, Rumania; on the right bank of the river Jijia, which broadens into a lake on the north. Pop. (1900) 12,701, more than half being Jews. The Russian frontier is about 30 m. E., the Austrian 20 m. W.; and there is railway communication with Botoshani and Jassy. Dorohoi is a market for the timber and farm produce of the north Moldavian highlands; merchants from the neighbouring states flock to its great fair, held on the 1 2th of June. There is a church built by Stephen the Great

(1458-1504).

DOROTHEUS, a professor of jurisprudence in the law school of Berytus in Syria, and one of the three commissioners appointed by the emperor Justinian to draw up a book of Institutes, after the model of the Institutes of Gaius, which should serve as an introduction to the Digest already completed. His colleagues were Tribonian and Theophilus; and their work was accomplished in 533. Dorotheus was subsequently the author of a commentary on the Digest, which is called the Index, and was published by him in 542. Fragments of this commentary, which was in the Greek language, have been preserved in the Scholia appended to the body of law compiled by order of the emperor Basilius the Macedonian and his son Leo the Wise, in the 9th century, known as the Basilico, from which it seems probable that the com- mentary of Dorotheus contained the substance of a course of lectures on the Digest delivered by him in the law school of Berytus, although it is not cast in a form so precisely didactic as the Index of Theophilus.

D'ORSAY, ALFRED GUILLAUME GABRIEL, Count (1801- 1852), the famous dandy and wit, was born in Paris on the 4th of September i8oi,andwas the son of General D'Orsay, from whom he inherited an exceptionally handsome person. Through his mother he was grandson by a morganatic marriage of the king of Wiirttemberg. In his youth he entered the French army, and served as a garde du corps of Louis XVIII. In 1822, while stationed at Valence on the Rhone, he formed an acquaintance with the earl and countess of Blessington (q.v.) which quickly ripened into intimacy, and at the invitation of the earl he ac- companied the party on their tour through Italy. In the spring of 1823 he met Lord Byron at Genoa, and the published

corre- spondence of the poet at this period contains numerous references to the count's gifts and accomplishments, and to his peculiar relationship to the Blessington family. A diary which D'Orsay had kept during a visit to London in 1821-1822 was submitted to Byron's inspection, and was much praised by him for the know- ledge of men and manners and the keen faculty of observation it displayed. On the 1st of December 1827 Count D'Orsay married Lady Harriet Gardiner, a girl of fifteen, the daughter of Lord Blessington by his previous wife. The union, if it rendered his connection with the Blessington family less ostensibly equivocal than before, was in other respects an unhappy one, and a separation took place almost immediately. After the death of Lord Blessington, which occurred in 1829, the widowed countess returned to England, accompanied by Count D'Orsay, and her home, first at Seamore Place, then at Gore House, soon became a resort of the fashionable literary and artistic society of London, which found an equal attraction in host and in hostess. The count's charming manner, brilliant wit, and artistic faculty were accompanied by benevolent moral qualities, which endeared him to all his associates. His skill as a painter and sculptor was shown in numerous portraits and statuettes representing his friends, which were marked by great vigour and truthfulness, if wanting in the finish that can only be reached by persistent discipline. Count D'Orsay had been from his youth a zealous Bonapartist, and one of the most frequent guests at Gore House was Prince Louis Napoleon. In 1849 he went bankrupt, and the establishment at Gore House being broken up, he went to Paris with Lady Blessington, who died a few weeks after their arrival.

He endeavoured to provide for himself by painting portraits. He was deep in the counsels of the prince president, but the relation between them was less cordial after the coup d'etat, of which the count had by anticipation expressed his strong dis- approval. His appointment to the post of director of fine arts was announced only a few days before his death, which occurred on the 4th of August 1852.

Much information as to the life and character of Count D'Orsay is to be found in Richard Madden's Literary Life and Correspondence of the Countess of Blessington (1855).

DORSET, EARLS, MARQUESSES AND DUKES OF, English titles one or more of which have been borne by the families of Beaufort, Grey and Sackville. About 1070 Osmund, or Osmer, an alleged son of Henry, count of Seez, by a sister of William the Conqueror, is said to have been created earl of Dorset, but the authority is a very late one

and Osmund describes himself simply as bishop (of Salisbury). William de Mohun of Dunster, a partisan of the empress Matilda, appears as earl of Dorset or Somerset, these two shires being in early times united under a single sheriff. In 1397 John Beaufort, earl of Somerset (d. 1410), the eldest son of John of Gaunt, duke of Lancaster, and Catherine Swinford, was created marquess of Dorset; two years later, however, he was reduced to his former rank of earl of Somerset. In 141 1 his brother Thomas, afterwards duke of Exeter, was created earl of Dorset, and in 1441 his youngest son Edmund ob tained the same dignity. Two years later Edmund was created marquess of Dorset and still later duke of Somerset. Edmund's son Henry, duke of Somerset and marquess of Dorset, was attainted during the Wars of the Roses, and was beheaded after the battle of Hexham in May 1464, when the titles became extinct. In 1475 Thomas Grey, 8th Lord Ferrers of Groby (1451-1501), a son of Sir John Grey (d. 1461) and a stepson of King Edward IV., having resigned the earldom of Huntingdon, which he had received in 1471, was created marquess of Dorset (see below). He was succeeded in this title by his son Thomas (1477-1530), and then by his grandson Henry (c. 1510-1554), who was created duke of Suffolk in 1551. When in February 1554 Suffolk was beheaded for sharing in the rising of Sir Thomas Wyat, the marquessate of Dorset again became extinct; but in 1604 Thomas- Sackville (see the account of the family under Sackville, ist Baron) was created earl of Dorset (see below), and his descendant the 7 th earl was created duke in 1720. In 1843 the titles became extinct.

*Thomas Grey, ist Marquess or Dorset (1451-1501), was the elder son of Sir John Grey, 7th Lord Ferrers of Groby (143 2-1461), by his wife Elizabeth Woodville, afterwards queen of Edward IV. He fought for Edward at Tewkesbury, 1]a * m re, > ' and became Lord Harington and Bonville by right of his wife Cecilia, daughter of William Bonville, 6th Lord Harington (d. 1460) ; in 1475 he was created marquess of Dorset, and he was also a knight of the Garter and a privy councillor. After the death of Edward IV. Dorset and his brother Richard Grey were among the supporters of their half-brother, the young king Edward V.; thus they incurred the enmity of Richard duke of Gloucester, afterwards Richard III., and Richard Grey having been arrested, was beheaded at Pontefract in June 1483, while his elder brother, the marquess, saved his life by flight. Dorset was one of the leaders of the duke of Buckingham's insurrection, and when this failed he joined Henry earl of Richmond in Brittany, but he was left behind in Paris when the future king crossed over to England in 1485. After Henry's victory at Bosworth*

the marquess returned to England and his attainder was reversed, but he was suspected and imprisoned when Lambert Simnel revolted; he had, however, been released and pardoned, had marched into France and had helped to quell the Cornish rising, when he died on the 20th of September 1501.

Dorset's sixth son, Lord Leonard Grey (c. 1490-1541), went to Ireland as marshal of the English army in 1535, being created an Irish peer as Viscount Grane in the same year, but he never assumed this title. In 1536 Grey was appointed lord deputy of Ireland in succession to Sir William Skeffington; he was active in marching against the rebels and he presided over the important

parliament of 1 536, but he was soon at variance with the powerful family of the Butlers and with some of the privy councillors.

He did not relax his energy in seeking to restore order, but he was accused, probably with truth, of favouring the family of the Geraldines, to whom he was related, and the quarrel with the Butlers became fiercer than ever. Returning to England in 1 540 he was thrown into prison and was condemned to death for treason. He was beheaded on the 28th of July 1541 (see R. Bagwell, Ireland under the Tudors, vol. i., 1885).

Thomas Grey, 2nd Marquess or Dorset (1477-1530), the eldest son of the 1st marquess, fled to Brittany with his father in 1484; after receiving several marks of the royal favour and succeeding to the title, he was imprisoned by Henry VII., and remained in prison until 1509. He was on very good terms with Henry VIII . , who in 1 5 1 2 appointed him to command the English army which was to invade France in conjunction with the Spanish forces under Ferdinand of Aragon. In spite of the failure which attended this enterprise, Dorset again served in France in the following year, and in 1516 he was made lieutenant of the order of the Garter. Later he was at the Field of the Cloth of Gold, and he was warden of the eastern and middle marches towards Scotland in 1523 and the following years. He received many other positions of trust and profit from the king, and he helped to bring about the fall of Cardinal Wolsey, under whom he had probably been educated. He was famous for his skill in the tournament. He died on the 10th of October 1530.

His eldest son Henry Grey, 3rd marquess of Dorset, was in 1 55 1 created duke of Suffolk (q.v.) . A younger son, Lord Thomas Grey, was beheaded in April 1554 for sharing in the rebellion of Sir Thomas Wyat; another son, Lord John Grey, was also sentenced to death for his share in this rising, but his life was spared owing to the efforts of his wife Mary, daughter of Sir Anthony Browne. Under Elizabeth, Lord John, a strong Protestant, was restored to the royal favour, and he died on the 19th of November 1569. In 1603 his son Henry (d. 1614) was created Baron Grey of Groby, and in 1628 his great-grandson Henry was made earl of Stamford. Thomas Sackville, ist Earl of Dorset (c. 1530-1608), English statesman and poet, son of Sir Richard Sackville and his wife Winifrede, daughter of Sir John Bruges or vflle line. Bridges, lord mayor of London, was born at Buckhurst, in the parish of Withyham, Sussex. In his fifteenth or sixteenth year he is said to have been entered at Hart Hall, Oxford; but it was at Cambridge that he completed his studies and took the degree of M.A. He joined the Inner Temple, and was called to the bar. He married at the age of eighteen Cicely, daughter of Sir John Baker of Sissinghurst, Kent; in 1558 he entered parliament as member for Westmorland, in 1559 he sat for East Grinstead, Sussex, and in 1563 for Aylesbury in Buckinghamshire. A visit to the continent in 1565 was in- terrupted by an imprisonment at Rome, caused by a rash declaration of Protestant opinions. The news of his father's death on the 21st of April 1566 recalled him to England. On his return he was knighted in the queen's presence, receiving at the same time the title of baron of Buckhurst. With his mother he lived at the queen's palace of Sheen, where he entertained in 1568 Odet de Coligni, cardinal de Chatillon. In 1571 he was sent to France to congratulate Charles IX. on his marriage with Elizabeth of Austria, and he took part in the negotiations for the projected marriage of Elizabeth with the duke of Anjou. He became a member of the privy council, and acted as a com- missioner at the state trials. In 1572 he was one of the peers who tried Thomas Howard, duke of Norfolk, and in 1586 he was selected to convey the sentence of death to Mary, queen of Scots, a task he is said to have performed with great consideration. He was sent in 1587 as ambassador to the Hague "to expostulate in favour of peace with a people who knew that their existence depended on war, to reconcile those to delay who felt that delay was death, and to heal animosities between men who were enemies from their cradles to their graves." 1 This task was further complicated by the parsimony and prevarication of

1 J. L. Motley, Hist, of the United Netherlands (vol. ii. p. 216, ed. 1867).

Elizabeth. Buckhurst carried out under protest the foolish and often contradictory orders he received. His plain speaking on the subject of Leicester's action in the Netherlands displeased the queen still more. She accused him on his return of having followed his instructions too slavishly, and ordered him to keep to his own house for nine months. His disgrace was short, for in 1588 he was presented with the order of the Garter, and was sent again to the Netherlands in 1589 and 1598. He was elected chancellor of the university of Oxford in 1591, and in 1599 he succeeded Lord Burghley as lord high treasurer of England. In 1601 as high steward he pronounced sentence on Essex, who had been his rival for the chancellorship and his opponent in politics. James I. confirmed him in the office of lord treasurer, the duties of which he performed with the greatest impartiality. He was created earl of Dorset in 1604, and died suddenly on the 19th of April 1608, as he was sitting at the council table at Whitehall. Hiseldestson, Robert, the 2nd earl (1561-1609), was a member of parliament and a man of great learning. Two other sons were William (c. 1568-1591), a soldier who was killed in the service of Henry IV. of France, and Thomas (1571-1646), also a soldier.

It is not by his political career, distinguished as it was, that Sackville is remembered, but by his share in early life in two works, each of which was, in its way, a new departure in English litera- ture. In A Myrroure for Magistrates, printed by Thomas Marshe in 1 559, he has sometimes been erroneously credited with the inception of the general plan as well as with the most valuable contributions. But there had been an earlier edition, for the editor, William Baldwin, states in his preface that the work was begun and partly printed " four years agone." He also says that the printer (John Wayland) had designed the work as a continua- tion of Lydgate's Fall of Princes derived from the narrative of Bochas. Fragments of this early edition are extant, the title page being sometimes found bound up with Lydgate's book. It runs A Memoriall of such princes, as since the tyme of Richard the seconde, have been unfortunate in the realme of England, while the 1559 edition has the running title A brief e memorial of unfortunate Englysh princes. The disconnected poems by various authors were given a certain continuity by the simple device of allowing the ghost of each unfortunate hero " to bewail unto me [Baldwin] his grievous chances, heavy destinies and woefull misfortunes." After a delay caused by an examination by Stephen Gardiner, bishop of Worcester, the book appeared. It contained nineteen tragic legends by six poets, William Baldwin, George Ferrers, " Master " Cavyll, Thomas Chaloner, Thomas Phaer and John Skelton. In 1 563 appeared a second edition with eight

additional poems by William Baldwin, John Dolman, Sackville, Francis Segar, Thomas Churchyard and Cavyll. Sackville contributed the Complaint of Henry Stafford, duke of Buckingham, to which he prefixed an Induction. This was evidently designed as an introduction to a version of the whole work, and, being arbitrarily transposed (16 10) to the beginning by a later editor, Richard Niccols, led to the attribution of the general design to Sackville, an error which was repeated by Thomas Warton. The originators were certainly Baldwin and his " printer." In 1574 Thomas Marshe printed a series of new tragedies by John Higgins as the Firste parte of the Mirour for Magistrates. . . . From the coming of Brute to the Incarnation. The seventh edition (1578) contained for the first time the two tragedies of Eleanor Cobham and Humphrey duke of Gloucester. In 1587, when the original editor was dead, the two quite separate publications of Baldwin and Higgins were combined. The primary object of this earliest of English miscellanies was didactic. It was to be a kind of text- book of British history, illustrating the evils of ambition. The writers pretended to historical accuracy, but with the notable exceptions of Churchyard and Sackville they paid little attention to form. The book did much to promote interest in English history, and Mr W. J. Courthope has pointed out that the subjects of Marlowe's Edward II., of Shakespeare's Henry VI., Richard II. and Richard III. are already dealt with in the Myrroure.

Sackville's Induction opens with a description of the oncoming of winter. The poet meets with Sorrow, who offers to lead him to

the infernal regions that he may see the sad estate of those ruined by their ambition, and thus learn the transient characterof earthly joy. At the approaches of Hell he sees a group of terrible abstrac- tions, Remorse of Conscience, Dread, Misery, Revenge, Care, &c, each vividly described. The last of these was War, on whose shield he saw depicted the great battles of antiquity. Finally, penetrat- ing to the realm of Pluto himself, he is surrounded by the shades, of whom the duke of Buckingham is the first to advance, thus introducing the Complaint. To this induction the epithet " Dantesque " has been frequently applied, but in truth Sackville's models were Gavin Douglas and Virgil. The dignity and artistic quality of the narrative of the fall of Buckingham are in strong contrast to the crude attempts of Ferrers and Baldwin, and make the work one of the most

important between the Canterbury Tales and the Faerie Queene.

Sackville has also the credit of being part author with Thomas Norton of the first legitimate tragedy in the English language. This was Gorboduc or Ferrex and Porrex, performed as part of the Christmas festivities (i 560-1 561) by the society of the Inner Temple, and afterwards on the 18th of January 1561 before Elizabeth at Whitehall. The argument is as follows:

" Gorboduc, king of Brittaine, devided his Realme in his lyfe time to his Sones, Ferrex and Porrex. The Sonnes tell to dyvision and discention. The yonger kylled the elder. The Mother, that more dearely loved thelder, fr revenge kylled the yonger. The people, moved with the Crueltie of the facte, rose in Rebellion, and Slewe both father and mother. The Nobilitie assembled, and most terribly destroyed the Rebelles. And afterwards for want of Issue of the Prince, wherby the Succession of the Crowne became uncertayne, they fell to Ciuill warre, in whiche both they and many of their Issues were slayne, and the Lande for a longe tyme almoste desolate, and myserablye wasted."

The argument shows plainly enough the didactic intention of the whole, and points the moral of the evils of civil discord. The story is taken from Book II. chap. xvi. of Geoffrey of Monmouth's history. It was first printed (1565) in an unauthorized edition as The Tragedie of Gorboduc " whereof three Actes were wrytten by Thomas Nortone, and the two laste by Thomas Sackvyle." Norton's share has been generally minimized, and it seems safe to assume that Sackville is responsible for the general design. In 1570 appeared an authentic edition, The Tragedie of Ferrex and Porrex, with a preface from the printer to the reader stating that the authors were " very much displeased that she (the tragedy) so ran abroad without leave." The tragedies of Seneca were now being translated, and the play is conceived on Senecan lines. The plot was no doubt chosen for its accumulated horrors from analogy with the tragic subjects of Oedipus and Thyestes. None of the crimes occur on the stage, but the action is described in lofty language by the characters. The most famous and harrow- ing scene is that in which Marcello relates the murder of Porrex by his mother (Act IV. sc. ii.). The paucity of action is eked out by a dumb show to precede each act, and the place of the Chorus is supplied by four " ancient and sage men of Britain." In the variety of incident, however, the authors departed from the classical model. The play is written in excellent blank verse, and is the first example of the application of Surrey's innovation to drama. Jasper Heywood in the poetical address prefixed to his translation of

the Thyestes alludes to " Sackvylde's Sonnets sweetly sauste," but only one of these has survived. It is pre- fixed to Sir T. Hoby's translation of Castiglione's Courtier. Sackville's poetical preoccupations are sufficiently marked in the subject matter of these two works, which remain. the sole literary productions of an original mind.

The best edition of the Mirror for Magistrates is that of Joseph Haslewood (1 8 1 5) . Gorboduc was edited for the Shakespeare Society by W. D. Cooper in 1847; in 1883 by Miss L. Toulmin Smith for C. Vollmoller's Englische Sprach-und Litteraturdenkmale (Heilbronn, 1883). The Works of Sackville were edited by C. Chappie (1820) and by the Hon. and Rev. Reginald Sackville- West (1859). See also A Mirror for Magistrates (1898) by Mr W. F. Trench; an excellent account in Mr W. J. Courthope's History of English Poetry, .vol. i. pp. 1 1 1 e t seq. ; and an important article by Dr J. W. Cunliffe in the Cambridge History of English Literature, vol. iii.

Edward Sackville, 4TH Earl of Dorset (1591-1652), son of the 2nd earl, succeeded his brother Richard, the 3rd earl

(1 590-1624), in March 1624. He had attained much notoriety by killing Edward Bruce, 2nd Lord Kinloss, in a duel, in August 16 13, the place in the Netherlands where this encounter took place being called Bruceland in quite recent times, and in 1620 he was one of the leaders of the English contingent which fought for James I.'s son-in-law, Frederick V., elector palatine of the Rhine, at the battle of the White Hill, near Prague. In the House of Commons, where he represented Sussex, Sackville was active in defending Bacon and in advocating an aggressive policy with regard to the recovery of the Rhenish Palatinate; twice he was ambassador to France, and he was interested in Virginia and the Bermuda Islands. Under Charles I. he was a privy councillor and lord chamberlain to Queen Henrietta Maria. He was frequently employed by the government from the accession of Charles until the outbreak of the Civil War, when he joined the king at York, but he disliked the struggle and was constant in his efforts to secure peace. At Oxford he was lord chamberlain to the king and lord president of his council, but Charles did not altogether approve of his pacific attitude, and is said on one occasion to have remarked to him " Your voice is the voice of Jacob, but your hands are the hands of Esau." He died on the 17th of July 1652. His wife Mary (d. 1645), daughter of Sir George Curzon, was governess to the sons of Charles I., the future kings Charles II. and James II. His character is thus summed up by S. R. Gardiner: " Pre-

eminent in beauty of person, and in the vigour of a cultivated intellect, he wanted nothing to fit him for the highest places in the commonwealth but that stern sense of duty without which no man can be truly great."

Charles Sackville, 6th Earl of Dorset (1638-1706), English poet and courtier, son of Richard Sackville, 5th earl (1622-1677), was born on the 24th of January 1638. His mother was Frances Cranfield, sister and heiress of Lionel, 3rd earl of Middlesex, to whose estates and title he succeeded in 1674, being created Baron Cranfield and 4th earl of Middlesex in 1675. He succeeded to his father's estates and title in August 1677. Buckhurst was educated privately, and spent some time abroad with a private tutor, returning to England shortly before the Restoration. In Charles II.'s first parliament he sat for East Grinstead in Sussex. He had no taste for politics, however, but won a reputation as courtier and wit at Whitehall. He bore his share in the excesses for which Sir Charles Sedley and the earl of Rochester were notorious. In 1662 he and his brother Edward, with three other gentlemen, were indicted for the robbery and murder of a tanner named Hoppy. The defence was that they were in pursuit of thieves, and mistook Hoppy for a highwayman. They appear to have been acquitted, for when in 1663 Sir Charles Sedley was tried for a gross breach of public decency in Covent Garden, Buckhurst, who had been one of the offenders, was asked by the lord chief justice " whether he had so soon forgot his deliverance at that time." Something in his character made his follies less obnoxious to the citizens than those of the other rakes, for he was never altogether unpopular, and Rochester is said to have told Charles II. that he did not " know how it was, my Lord Dorset might do anything, yet was never to blame." In 1665 he volunteered to serve under the duke of York in the Dutch War. His famous song, " To all you ladies now at Land," was written, according to Prior, on the night before the victory gained over " foggy Opdam " off Harwich (June 3, 1665). Dr Johnson, with the remark that " seldom any splendid story is wholly true," says that the earl of Orrery had told him it was only retouched on that occasion. In 1667 Pepys laments that Buckhurst had lured Nell Gwyn away from the theatre, and that with Sedley the two kept " merry house " at Epsom. Next year the king was paying court toNell, and her " Charles the First," as she called Buckhurst, was sent on a " sleeveless errand " into France to be out of the way. His gaiety and wit secured the continued favour of Charles II., but did not especially recommend him to James II., who could not, moreover, forgive Dorset's lampoons on his mistress, Catharine Sedley, countess of Dorchester. On James's accession, therefore, he

retired from court. He concurred in the invitation to William of Orange, who made him privy councillor, lord chamberlain (1689), and knight of the Garter (1692). During

William's absences in 1695-1698 he was one of the lord justices of the realm.

He was a generous patron of men of letters. When Dryden was dismissed from the laureateship, he made him an equivalent pension from his own purse. Matthew Prior, in dedicating his Poems on Several Occasions (1709) to Dorset's son, affirms that his opinion was consulted by Edmund Waller; that the duke of Buckingham deferred the publication of his Rehearsal until he was assured that Dorset would not " rehearse upon him again "; and that Samuel Butler and Wycherley both owed their first recognition to him. Prior's praise of Dorset is no doubt ex- travagant, but when his youthful follies were over he appears to have developed sterling qualities, and although the poems he has left are very few, none of them are devoid of merit. Dryden's " Essay on Satire" and the dedication of the "EssayOn Dramatic Poesy " are addressed to him. Walpole {Catalogue of Noble A uthors, iv.) says that he had as much wit as his first master, or his contemporaries Buckingham and Rochester, without the royal want of feeling, the duke's want of principles or the earl's want of thought; and Congreve reported of him when he was dying that he " slabbered " more wit than other people had in their best health. He was three times married, his first wife being Mary, widow of Charles Berkeley, earl of Falmouth. He died at Bath on the 29th of January 1706.

The fourth act of Pompey the Great, a tragedy translated out of French by certain persons of honour, is by Dorset. The satires for which Pope classed him with the masters in that kind seem to have been short lampoons, with the exception of A faithful catalogue of our most, eminent ninnies (reprinted in Bibliotheca Curiosa, ed. Goldsmid, 1885). The Works of the Earls of Rochester, Roscommon and Dorset, the Dukes of Devonshire, Buckinghamshire, &c, with Memoirs of their Lives (1731) is catalogued (No. 20841) by H. G. Bohn in 1841. His Poems are included in Anderson's and other collections of the British poets.

Lionel Cranfield Sackville, ist Duke of Dorset (1688- 1765), the only

son of the 6th earl, was born on the 18th of January 1688. He succeeded his father as 7th earl of Dorset in January 1706, and was created duke of Dorset in 1720. He was lord steward of the royal household from 1725 to 1730, and lord- lieutenant of Ireland from 1730 to 1737; he was again lord steward from 1737 to 1745, and was lord president of the council from 1745 to 1751. In 1750 he was appointed lord-lieutenant of Ireland for the second time, and after a stormy viceroyalty he was dismissed from office in 1755- The duke, who was several times one of the lords justices of Great Britain and held many other positions of trust, died on the 10th of October 1765. He left three sons: Charles, the 2nd duke; John Philip (d. 1765); and George, who took the additional name of Germain in 1770, and in 1782 was created Viscount Sackville (q.v.).

Charles Sackville, 2nd Duke of Dorset (1711-1769), an associate of Frederick, prince of Wales, was a member of parlia- ment for many years and a lord of the treasury under Henry Pelham; he died on the 5th of January 1769, when his nephew, John Frederick (1745-1799), became the 3rd duke: This noble- man was ambassador in Paris from 1783 to 1789, and lord steward of the household from 1789 to 1799; he died on the 19th of July 1799, and was succeeded by his only son, George John Frederick (1793-18 1 5). When the 4th duke died unmarried in February 1815, the titles passed to his kinsman, Charles Sackville Germain (1767-1843), son and heir of the rst Viscount Sackville, who thus became 5th duke of Dorset. When he died on the 29th of July 1843 tne titles became extinct.

DORSETSHIRE (Dorset), a south-western county of England, bounded N.E. by Wiltshire, E. by Hampshire, S. by the English Channel, W. by Devonshire and N.W. by Somersetshire. The area is 987-9 sq. m. The surface is for the most part broken. A line of hills or downs, forming part of the system to which the general name of the Western Downs is applied, enters the county in the north-east near Shaftesbury, and strikes across it in a direction generally W. by S., leaving it towards Axminster and Crewkerne in Devonshire. East of Beaminster in the south-west another line, the Purbeck Downs, branches S.E. to the coast, which it follows as far as the district called the Isle of Purbeck in the

south-east of the county. Both these ranges occasionally exceed a height of 900 ft. Of the principal rivers and streams, the Stour rises just outside the county in Wiltshire, and flows with a general south-easterly course to join the Hampshire Avon close to its mouth. It receives the Cale, Lidden and other streams in its upper course, and

breaches the central hills in its middle course between Sturminster Newton and Blandford. The Lidden and Cale are the chief streams of the well-watered and fertile district known as the Vale of Blackmore. The small river Piddle or Trent and the larger Frome, rising in the central hills, traverse a plain tract of open country between the central and southern ranges, and almost unite their mouths in Poole Harbour. In the north- west the Yeo, collecting many feeders, flows northward to join the Parret and so sends its waters to the Bristol Channel. The Char, the Brit and the Bride, with their feeders, water many picturesque short valleys in the south-west. The coast is always beautiful, and in some parts magnificent. In the east it is broken by the irregular, lake-like inlet of Poole Harbour, pleasantly diversified with low islands, shallow, and at low tide largely drained. South of this a bold foreland, the termination of the southern hills (here called Ballard Down) divides Studland Bay from Swanage Bay, after which the coast line turns abruptly westward round Durlston Head. The peninsula thus formed with Poole Harbour on the north is known as the Isle of Purbeck, an oblong projection measuring 10 m. by 7. St Albans or Aldhelms Head is the next salient feature, after which the fine cliffs are indented with many little bays, of which the most noteworthy is the almost landlocked Lulworth Cove. The coast then turns southward to embrace Weymouth Bay and Portland Roads, where a harbour of refuge with massive breakwaters is protected to the south by the Isle of Portland. The isle is connected with the mainland by Chesil Bank, a remarkable beach of shingle. After this the coast is less broken than before and continues highly picturesque as far as the confines of the county near Lyme Regis. This small town, with Charmouth, Bridport, Weymouth, Lulworth Cove and Swanage, are in considerable favour as watering-places.

Geology. — Occupying as it does the central and most elevated part of the county, the Chalk is the most prominent geological formation in Dorsetshire. It sweeps in a south-westerly direction, as a belt of high ground about 12 m. in width, from Cranborne Chase, through Blandford, Milton Abbas and Frampton to Dorchester; westward it reaches a point just north of Beaminster. From about Dorchester the Chalk outcrop narrows and turns south-eastward by Portisham, Bincombe, to West Lulworth, thence the crop proceeds eastward as the ridge of the Purbeck Hills, and finally runs out to sea as the headland between Studland and Swanage Bays.

Upon the Chalk in the eastern part of the county are the Eocene beds of the Hampshire Basin. These are fringed by the Reading Beds and London Clay, which occur as a narrow belt from Cranborne through Wimborne Minster, near Bere Regis and Piddletown ; here the crop

swings round south-eastward through West Knighton, Winfrith and Lulworth, and thence along the northern side of the Purbeck Hills to Studland. Most of the remaining Eocene area is occupied by the sands, gravel and clay of the Bagshot series. The Agglestone Rock near Studland is a hard mass of the Bagshot forma- tion r certain clays in the same series in the Wareham district have a world-wide reputation for pottery purposes; since they are exported from Poole Harbour they are often known as " Poole Clay." From beneath the Chalk the Selbornian or Gault and Upper Greensand crops out as a narrow, irregular band. The Gault clay is only dis- tinguishable in the northern and southern districts. Here and there the Greensand forms prominent hills, as that on which the town of Shaftesbury stands. The Upper Greensand appears again as outliers farther west, forming the high ground above Lyme Regis, Golden Cap, and Pillesden and Lewesden Pens. The Lower Green- sand crops out on the south side of the Purbeck Hills and may be seen at Punfield Cove and Worbarrow Bay, but this formation thins out towards the west. By the action of the agencies of denudation upon the faulted anticline of the Isle of Purbeck, the Wealden beds are brought to light in the vale between Lulworth and Swanage; a similar cause has accounted for their appearance at East Chaldon. South of the strip of Weald Clay is an elevated plateau consisting of Purbeck Beds which rest upon Portland Stone and Portland Sand. Cropping out from beneath the Portland beds is the Kimmeridge Clay with so-called " Coal " bands, which forms the lower platform near the village of that name.

The Middle Purbeck building stone and Upper Purbeck Paludina marble have been extensively quarried in the Isle of Purbeck. An interesting feature in the Lower Purbeck is the " Dirt bed," the remains of a Jurassic forest, which may be seen near Mupe Bay and

on the Isle of Portland, where both the Purbeck and Portland format tions are well exposed, the latter yielding the well-known freestones. In the north-west of the county the Kimmeridge Clay crops in a N.S. direction from the neighbourhood of Gillingham by Woolland to near Buckland Newton; in the south, a strip runs E. and W. between Abbotsbury, Upway and Osmington Mill. Next in order come the Corallian Beds and Oxford Clay which follow the line of the Kimmeridge Clay, that is, they run from the north to the south west except in the neighbourhood of Abbotsbury and Weymouth, where

these beds are striking east and west.

Below the Oxford Clay is the Cornbrash, which may be seen near Redipole, Stalbridge and Stourton ; then follows the Forest Marble, which usually forms a strong escarpment over the Fuller's Earth beneath — at Thornford the Fuller's Earth rock is quarried. Next comes the Inferior Oolite, quarried near Sherborne and Beaminster; the outcrop runs on to the coast at Bridport. Beneath the Oolites are the Midford sands, which are well exposed in the cliff between Bridport and Burton Brandstock. Except where the Greensand outliers occur, the south-western part of the county is occupied by Lower and Middle Lias beds. These are clays and marls in the upper portions and limestones below. Rhaetic beds, the so-called " White Lias," are exposed in Pinhay Bay.

Many of the formations in Dorsetshire are highly fossiliferous, notably the Lias of Lyme Regis, whence Ichthyosaurus and other large reptiles have been obtained; remains of the Iguanodon have been taken from the Wealden beds of the Isle of Purbeck; the Kimmeridge Clay, Inferior Oolite, Forest Marble and Fuller's Earth are all fossil-bearing rocks. The coast exhibits geological sections of extreme interest and variety ; the vertical and highly inclined strata of the Purbeck anticline are well exhibited at Gad Cliff or near Ballard Point ; at the latter place the fractured fold is seen to pass into an " overthrust fault."

Climate and Agriculture. — The air of Dorsetshire is remarkably mild, and in some of the more sheltered spots on the coast semi-tropical plants are found to flourish. The district of the clays obtains for the county the somewhat exaggerated title of the " garden of England," though the rich Vale of Blackmore and the luxuriant pastures and orchards in the west may support the name. Yet Dorsetshire is not generally a well-wooded county, though much fine timber appears in the richer soils, in some of the sheltered valleys of the chalk district, and more especially upon the Greensand. About three-fourths of the total area is under cultivation, and of this nearly five-eighths is in permanent pasture, while there are in addition about 26,000 acres of hill pasturage; the chalk downs being celebrated of old as sheep- walks. Wheat, barley and oats are grown about equally. Turnips occupy nearly three-fourths of the average under green crops. Sheep are largely kept, though in decreasing numbers. The old horned breed of Dorsetshire were well known, but Southdowns or Hampshires are now frequently preferred. Devons, shorthorns and Herefords are the most common breeds of cattle. Dairy farming is an important industry.

Other Industries. — The quarries of Isles of Portland and Purbeck are important. The first supplies a white freestone employed for many of the finest buildings in London and else- where. Purbeck marble is famous through its frequent use by the architects of many of the most famous Gothic churches in England. A valuable product of Purbeck is a white pipeclay, largely applied to the manufacture of china, for which purpose it is exported to the Potteries of Staffordshire. Industries, beyond those of agriculture and quarrying, are slight, though some ship- building is carried on at Poole, and paper is made at several towns. Other small manufactures are those of flax and hemp in the neighbourhood of Bridport and Beaminster, of bricks, tiles and pottery in the Poole district, and of nets (braiding, as the industry is called) in some of the villages. There are silk-mills at Sherborne and elsewhere. There are numerous fishing stations along the coast, the fishing being mostly coastal. There are oyster beds in Poole Harbour. The chief ports are Poole, Weymouth, Swanage, Bridport, and Lyme Regis. The harbour of refuge at Portland, under the Admiralty, is an important naval station, and is fortified.

Communications. — The main line of the London & South Western railway serves Gillingham and Sherborne in the north of the county. Branches of this system serve Wimborne, Poole, Swanage, Dorchester, Weymouth and Portland. The two last towns, with Bridport, are served by the Great Western railway; the Somerset & Dorset line (Midland and South Western joint)

follows the Stour valley by Blandford and Wimborne; and Lyme Regis is the terminus of a light railway from Axminster on the South Western line.

Population and Administration. — The area of the ancient county is 632,270 acres, with a population in 1891 of 194,517, and in 1901 of 202,936. The area of the administrative county is 625,578 acres. The county contains 35 hundreds. It is divided into northern, eastern, southern and western parliamentary divisions, each returning one member. In contains the following municipal boroughs — Blandford Forum (pop. 3649), Bridport (5710), Dorchester, the county town (9458), Lyme Regis (2095), Poole (19,463), Shaftesbury (2027), Wareham (2003), Weymouth and Melcombe Regis (19,831). The following are other urban districts — Portland (15,199), Sherborne (5760), Swanage (3408), Wimborne Minster (3696). Dorsetshire is in the western circuit, and assizes are held at Dorchester. It has one court of quarter sessions, and is divided into nine petty sessional divisions. The boroughs of Bridport, Dorchester,

Lyme Regis, Poole, and Weymouth and Melcombe Regis have separate commissions of the peace, and the borough of Poole has in addition a separate court of quarter sessions. There are 289 civil parishes. The ancient county, which is almost entirely in the diocese of Salisbury, contains 256 ecclesiastical parishes or districts wholly or in part.

History. — The kingdom of Wessex originated with the settle- ment of Cerdic and his followers in Hampshire in 495, and at some time before the beginning of the 8th century the tide of conquest and colonization spread beyond the Frome and Kennet valleys and swept over the district which is now Dorsetshire. In 705 the West Saxon see was transferred to Sherborne, and the numerous foundations of religious houses which followed did much to further the social and industrial development of the county; though the wild and uncivilized state in which the county yet lay may be conjectured from the names of the hundreds and of their meeting-places, at barrows, boulders and vales. In 787 the Danes landed at Portland, and in 833 they arrived at Charmouth with thirty-five ships and fought with Ecgbert. The shire is first mentioned by name in the Saxon Chronicle in 845, when the Danes were completely routed at the mouth of the Parret by the men of Dorsetshire under Osric the ealdorman. In 876 the invaders captured Wareham, but were driven out next year by Alfred, and 120 of their ships were wrecked at Swanage. During the two following centuries Dorset was constantly ravaged by the Danes, and in 1015 Canute came on a plundering expedition to the mouth of the Frome. Several of the West Saxon kings resided in Dorsetshire, and ˆEthelbald and .(Ethelbert were buried at Sherborne, and ˆEthelred at Wimborne. In the reign of Canute Wareham was the shire town; it was a thriving seaport, with a house for the king when he came there on his hunting expeditions, a dwelling for the shire-reeve and accommodation for the leading thegns of the shire. At the time of the Conquest Dorset formed part of Harold's earldom, and the resistance which it opposed to the Conqueror was punished by a merciless harrying, in which Dorchester, Wareham and Shaftesbury were much devastated, and Bridport utterly ruined.

No Englishman retained estates of any importance after the Conquest, and at the time of the Survey the bulk of the land, with the exception of the forty-six manors held by the king, was in the hands of religious houses, the abbeys of Cerne, Milton and Shaftesbury being the most wealthy. There were 272 mills in the county at the time of the Survey, and nearly eighty men were employed in working salt along the coast. Mints existed at Shaftesbury, Wareham, Dorchester and Bridport, the three former having been founded by

ˆEthelstan. The forests of Dorsetshire were favourite hunting-grounds of the Norman kings, and King John in particular paid frequent visits to the county.

No precise date can be assigned for the establishment of the shire system in Wessex, but in the time of Ecgbert the kingdom was divided into definite pagi, each under an ealdorman, which no doubt represented the later shires. The Inquisitio Geldi, drawn up two years before the Domesday Survey, gives the names of the 39 pre-Conquest hundreds of Dorset. The 33 hundreds and

21 liberties of the present day retain some of the original names, but the boundaries have suffered much alteration. The 8000 acres of Stockland and Dalwood reckoned in the Dorset Domesday are now annexed to Devon, and the manor of Holwell now included in Dorset was reckoned with Somerset until the 19th century. Until the reign of Elizabeth Dorset and Somerset were united under one sheriff.

After the transference of the West Saxon see from Sherborne to Sarum in 1075, Dorset remained part of that diocese until 1 542, when it was included in the newly formed diocese of Bristol. The archdeaconry was coextensive with the shire, and was divided into five rural deaneries at least as early as 1291.

The vast power and wealth monopolized by the Church in Dorsetshire tended to check the rise of any great county families. The representatives of the families of Mohun, Brewer and Arundel held large estates after the Conquest, and William Mohun was created earl of Dorset by the empress Maud. The families of Clavel, Lovell, Maundeville, Mautravers, Peverel and St Lo also came over with the Conqueror and figure prominently in the early annals of the county.

Dorsetshire took no active part in the struggles of the Norman and Plantagenet period. In 1627 the county refused to send men to La Rochelle, and was reproved for its lack of zeal in the service of the state. On the outbreak of the Civil War of the 1 7th century the general feeling was in favour of the king, and after a series of royalist successes in 1643 Lyme Regis and Poole were the only garrisons in the county left to the parliament. By the next year however, the parliament had gained the whole county with the exception of Sherborne and the Isle of Portland. The general aversion

of the Dorsetshire people to warlike pursuits is demonstrated at this period by the rise of the " clubmen," so called from their appearance without pikes or fire-arms at the county musters, whose object was peace at all costs, and who punished members of either party discovered in the act of plundering.

In the 14th century Dorsetshire produced large quantities of wheat and wool, and had a prosperous clothing trade. In 1626 the county was severely visited by the plague, and from this date the clothing industry began to decline. The hundred of Pimperne produced large quantities of saltpetre in the 17th century, and the serge manufacture was introduced about this time. Portland freestone was first brought into use in the reign of James I., when it was employed for the new banqueting house at Whitehall, and after the Great Fire it was extensively used by Sir Christopher Wren. In the 1 8th century Blandf ord, Sherborne and Lyme Regis were famous for their lace, but the industry has now declined.

The county returned two members to parliament in 1290, and as the chief towns acquired representation the number was increased, until in 1572 the county and nine boroughs returned a total of twenty members. Under the Reform Act of 1832 the county returned three members, and Corfe Castle was dis- franchised. By the Representation of the People Act of 1868 Lyme Regis was disfranchised, and by the Redistribution Act of 1885 the remaining boroughs were disfranchised.

Antiquities. — Remains of medieval castles are inconsiderable, with the notable exception of Corfe Castle and the picturesque ruins of Sherborne Castle, both destroyed after the Civil War of the 1 7 th century. The three finest churches in the county are the abbey church of Sherborne, Wimborne Minster and Milton Abbey church, a Decorated and Perpendicular structure erected on the site of a Norman church which was burnt. It has transepts, chancel and central tower, but the nave was not built. This was a Benedictine foundation of the 10th century, and the refectory of the 15th century is incorporated in the mansion built in 1772. At Ford Abbey part of the buildings of a Cistercian house are similarly incorporated. There are lesser monastic remains at Abbotsbury, Cerne and Bindon. The parish churches of Dorset- shire are not especially noteworthy as a whole, but those at Cerne Abbas and Beaminster are fine 'examples of the Perpendicular style, which is the most common in the county. A little good Norman work remains, as in the churches of Bere Regis and

Piddletrenthide, but both these were reconstructed in the Perpendicular period; Bere Regis church having a superb timber roof of that period.

The dialect of the county, perfectly distinguishable from those of Wiltshire and Somersetshire, yet bearing many common marks of Saxon origin, is admirably illustrated in some of the poems of William Barnes (q.v.). Many towns, villages and localities are readily to be recognized from their descriptions in the " Wessex " novels of Thomas Hardy (q.v.).

A curious ancient Survey of Dorsetshire was written by the Rev. Mr Coker, about the middle of the 17th century, and published from his MS. (London, 1732). See also J. Hutchins, History and Antiquities of the County of Dorset (London, 1774) ; 2nd ed. by R. Gough and E. B. Nichols (1796-1815); 3rd ed. by W. Shipp and J. W. Hodson (1861-1873); C. Warne, Ancient Dorset (London, 1865) ; R. W. Eyton, A Key to Domesday, exemplified by an analysis and digest of the Dorset Survey (London, 1878) ; C. H. Mayo, Bibliotheca Dorsetiensis (London, 1885) ; W. Barnes, Glossary of Dorset Dialect (Dorchester, 1886) ; H. J. Moule, Old Dorset (London, 1893) ; Victoria County History, Dorsetshire.

DORSIVENTRAL (Lat. dorsum, the back, venter, the belly), a term used to describe an organ which has two surfaces differing from each other in appearance and structure, as an ordinary leaf.

DORT, SYNOD OF. An assembly of the Reformed Dutch Church, with deputies from Switzerland, the Palatinate, Nassau, Hesse, East Friesland, Bremen, Scotland and England, called to decide the theological differences existing between the Arminians (or Remonstrants) and the Calvinists (or Counter-Remonstrants) , was held at Dort or Dordrecht (q.v.) in the years 1618 and 1619. The government of Louis XIII. prohibited the attendance of French delegates. During the life of Arminius a bitter con- troversy had sprung up between his followers and the strict Calvinists, led by Francis Gomar, his fellow-professor at Leiden ; and, in order to decide their disputes, a synodical conference was proposed, but Arminius died before it could be held. At the conference held at the Hague in 1610 the Arminians addressed a remonstrance to the states-general in the form of five articles, which henceforth came to be known as the five points of Arminianism. In these they reacted against both the supra- lapsarian and the infralapsarian developments of the doctrine of predestination and combated the irresistibility of grace; they held that Christ died for all men and not

only for the elect, and were not sure that the elect might not fall from grace. This conference had no influence in reconciling the opposing parties, and another, held at Delft in the year 1613, was equally unsuccessful. In 1614, at the instance of the Arminian party, an edict was passed by the states-general, in which toleration of the opinions of both parties was declared and further controversy forbidden; but this act only served, by rousing the jealousy of the Calvinists, to fan the controversial flame into greater fury. Gradually the dispute pervaded all classes of society, and the religious questions became entangled with political issues; the partisans of the house of Orange espoused the cause of the stricter Calvinism, whereas the bourgeois oligarchy of republican tendencies, led by Oldenbarnevelt and Hugo Grotius, stood for Arminianism. In 161 7 Prince Maurice of Orange committed himself definitely to the Calvinistic party, found an occasion for throwing Oldenbarnevelt and Grotius into prison, and in November of that year called a synod intended to crush the Arminians. This synod, which assembled at Dort in November 1618, was strictly national — called by the national authority to decide a national dispute, and not intended to have more than a national influence. The foreign deputies were invited to attend, only to assist by their advice in the settlement of a controversy which concerned the Netherland church alone, and which the Netherland church alone could decide. At the fourth sitting it was decided to cite Simon Episcopius and several other Remonstrants to appear within fourteen days before the synod, to state and justify their doctrines. It was also agreed to allow the Arminian deputies to take part in the deliberations, only on condition that they forbore to consult with, or in any way assist.

their cited brethren, but this they refused. During the interval between the citation and the appearance of the accused, the professorial members of the synod was instructed to prepare themselves to be able to confute the Arminian errors, and the synod occupied itself with deliberations as to a new translation of the Bible, for which a commission was named, made arrangements for teaching the Heidelberg catechism, and granted permission to the missionaries of the East Indies to baptize such children of heathen parents as were admitted into their f amilies. At the 2 5 th sitting Episcopius and the others cited appeared, when Episcopius surprised the deputies by a bold and outspoken defence of his views, and even went so far as to say that the synod, by excluding the Arminian deputies, could now

only be regarded as a schismatic assembly. The Remonstrants were asked to file copious explana- tions of the five points in dispute (Sententia Remonstrantium) , but objecting to the manner in which they were catechized, they were, at the 57th sitting, dismissed from the synod as convicted " liars and deceivers." The synod then proceeded in their absence to judge them from their published writings, and came to the conclusion that as ecclesiastical rebels and trespassers they should be deprived of all their offices. The synodical decision in regard to the five points is contained in the canons adopted at the 136th session held on the 23rd of April 1619; the points were: unconditional election, limited atonement, total depravity, irresistibility of grace, final perseverance of the saints. The issue of supralapsarianism v. infralapsarianism was avoided. These doctrinal decisions and the sentence against the Remonstrants were, at the 144th sitting, read in Latin before a large audience in the great church. The Remonstrants were required to subscribe the condemnation, and many of them refused and were banished. The synod was concluded on the oth of May 1619, by a magnificent banquet given by the chief magistrate of Dort. The Dutch deputies remained a fortnight longer to attend to ecclesiastical business. Though the canons of Dort were adopted by but two churches outside of Holland, the synod ranks as the most impressive assemblage of the Reformed Church.

Authorities. — Acta synodi nationalis . . . Dordrechti habitae (Lugd. Bat. 1620, official edition); Acta der Nationale Synode te Dordrecht 1618 (Leiden, 1887), French translation (Leiden, 1622 and 1624, 2 vols.), for the Canons, and the Sententia Remonstrantium, E. F. Karl Müller, Die Bekenntnisschriften der reformierten Kirche (Leipzig, 1903), p. lix. ff., 843 ff. ; for canons and abridged translation used by the Reformed Church in America, P. Schaff, The Creeds of Christendom (3rd ed., New York, 1877), 550 ff. See also H. Heppe, in Niedner's Zeitschrift fur die historische Theologie, Bd. 23 (Hamburg, 1853), 226-327 (letters of Hessian deputies) ; Acta et scripta synodalia Dordracena ministrorum Remonstrantium, Hardervici, 1620 (valuable side-lights) ; A. Schweizer, Die protestantischen Centraldogmen in ihrer Entwicklung innerhalb der reformierten Kirche, zweite Halfte (Zurich, 1856), 25-224; H. C. Rogge in Herzog-Hauck, Realencyklopadie, Bd. 4 (Leipzig, 1898), 798-802; H. H. Kuyper, De Post-Acta of Nahandelingen van de Nationale Synode van Dordrecht, een historische Studie (Amsterdam, 1899, new material) ; J. Reitsma, Geschiednis van de Hervorming en de Hervormde Kerk der Nederlanden (2nd ed. Groningen, 1899); F. Loofs, Dogmengeschichte (4th ed., Halle, 1906), 935 ff. ; T. Van

Oppenraij, La Predestination dans I'Eglise rSformee des Pays-Bas depuis Vorigine jusqu'au synode national de Dordrecht (Louvain, 1906). (W. W. R.)*

DORTMUND, a town of Germany, the chief commercial centre of the Prussian province of Westphalia, on the Emscher, in a fertile plain, 50 m. E. from Diisseldorf by rail. Pop. (1875) 57,742; (1895) 111,232; (1905) 175,292. Since the abolition of the old walls in 1863 and the conversion of their site into pro- menades, the town has rapidly assumed a modern appearance. The central part, however, with its winding narrow streets, is redolent of its historical past, when, as one of the leading cities of the Hanseatic League, it enjoyed commercial supremacy over all the towns of Westphalia. Among its ancient buildings must be mentioned the Reinoldikirche, with fine stained-glass windows, the Marienkirche, the nave of which dates from the nth century, the Petrikirche, with a curious altar, and the Dominican church, with beautiful cloisters. The 13th-century town hall was restored in 1899 and now contains the municipal antiquarian museum, having been superseded by a more commodious build- ing. Among the chief modern structures may be mentioned the magnificent post office, erected in 1895, the provincial law courts,

the municipal infirmary and the large railway station. To the W. of the last there existed down to 1906 (when it was removed) one of the ancient lime trees of the Konigshof, where the meetings of the Vehmgericht were held (see Fehmic Courts). But the real interest of Dortmund centres in its vast industries, which owe their development to the situation of the town in the centre of the great Westphalian coal basin. In the immediate vicinity are also extensive beds of iron ore, and this combination of mineral wealth has enabled the town to become a competitor with Essen, Oberhausen, Duisburg and Hagen in the products of the iron industry. These in Dortmund more particularly embrace steel railway rails, mining plant, wire ropes, machinery, safes and sewing machines. Dortmund has also extensive breweries, and, in addition to the manufactured goods already enumerated, does a considerable trade in corn and wood. Besides being well furnished with a convenient railway system, linking it with the innumerable manufacturing towns and villages of the iron district, it is also connected with the river Ems by the Dortmund-Ems Canal, 170 m. in length.

Dortmund, the Throtmannia of early history, was already a town of some importance in the 9th century. In 1005 the emperor Henry II. held here an ecclesiastical council, and in 1016 an imperial diet. The town was walled in the 12th century, and in 1387-1388 successfully

withstood the troops of the archbishop of Cologne, who besieged it for twenty-one months. About the middle of the 13th century it joined the Hanseatic League. At the close of the Thirty Years' War the population had become reduced to 3000. In 1803 Dortmund lost its rights as a free town, and was annexed to Nassau. The French occupied it in 1806, and in 1808 it was made over by Napoleon to the grand-duke of Berg, and became the chief town of the department of Ruhr. Through the cession of Westphalia by the king of the Netherlands, on the 31st of May 1815, it became a Prussian town.

See Thiersch, Geschichte der Freireichsstadt Dortmund (Dort, 1854), and Ludoff, Bau- und Kunstdenkmaler in Dortmund (Paderborn, 1895) ; also A. Shadwell, Industrial Efficiency (London, 1906).

DORY, or John Dory (Zeusfaber), an Acanthopterygian fish, the type of the family Zeidae, held in such esteem by the ancient Greeks that they called it Zeus after their principal divinity. Its English name is probably a corruption of the French jaune doree, and has reference to the prevailing golden-yellow colour of the living fish. The body in the dory is much compressed, and is nearly oval in form, while the mouth is large and capable of extensive protrusion. It possesses two dorsal fins, of which the anterior is armed with long slender spines, and the connecting membrane is produced into long tendril-like filaments; while a row of short spines extends along the belly and the roots of the anal and dorsal fins. The colour of the upper surface is olive- brown; the sides are yellowish, and are marked with a prominent dark spot, on account of which the dory divides with the haddock the reputation of being the fish from which Peter took the tribute money. It is an inhabitant of the Atlantic coasts of Europe, the Mediterranean and the Australian seas. It is occasionally abundant on the coasts of Devon and Cornwall, and is also found, though more sparingly, throughout the British seas. It is exceed- ingly voracious, feeding on molluscs, shrimps and the young of other fish; and Jonathan Couch (1789-1870), author of a History of British Fishes, states that from the stomach of a single dory he has taken 25 flounders, some 25 in. long, 3 fatherlashers half grown and 5 stones from the beach, one i| in. in length. They are often taken in the fishermen's nets off the Cornwall and Devon coast, having entered these in pursuit of pilchards. They are seldom found in deep water, preferring sandy bays, among the weeds growing on the bottom of which they lie in wait for their prey, and in securing this they are greatly assisted by their great width of gape, by their power of protruding the mouth, and by the slender filaments of the first dorsal fins, which float like worms in the water, while the greater part of the body is buried in the sand, and thus they entice the smaller fishes

to come within easy reach of the capacious jaws. The dory often attains a weight of 1 2 lb, although those usually brought into the market do not averajra more than 6 or 7 lb. It is highly valued as an article of food.

The family Zeidae has assumed special interest of late, 0. Thilo x and G. A. Boulenger 8 having shown that they have much in common with the flat-fishes or Pleuronectidae and must be nearly related to the original stock from which this asymmetrical type has been evolved, especially it the Upper Eocenegenus Amphistium be taken into consideration. This affinity is further supported by the observations made by L. W. Byrne 3 on the asymmetry in the number and arrangement of the bony plates at the base of the dorsal and anal fins in the young of the John Dory. (G. A. B.)

DOSITHEUS MAGISTER, Greek grammarian, flourished at Rome in the 4th century a.d. He was the author of a Greek translation of a Latin grammar, intended to assist the Greek- speaking inhabitants of the empire in learning Latin. The translation, at first word for word, becomes less frequent, and finally is discontinued altogether. The Latin grammar used was based on the same authorities as those of Charisius and Diomedes, which accounts for the many points of similarity. Dositheus contributed very little of his own. Some Greek-Latin exercises by an unknown writer of the 3rd century, to be learnt by heart and translated, were added to the grammar. They are of con- siderable value as illustrating the social life of the period and the history of the Latin language. Of these 'Ep/xˆeujuara {Inter pretamenta) , the third book, containing a collection of words and phrases from everyday conversation (KaBr]fjiepi,vfi 6fii\ia) has been preserved. A further appendix consisted of Anecdotes, Letters and Rescripts of the emperor Hadrian; fables of Aesop; extracts from Hyginus; a history of the Trojan War, abridged from the Iliad; and a legal fragment, Hepl eKevdepoxrewv {De manumissionibus) .

Editions: Grammatica in H. Keil, Grammatici Latini, vii. and separately (1871); Hermeneumata by G. Gotz (1892) (in G. Lowe's Corpus glossariorum Lalinorum, iii.) and E. Bocking (1832), which contains the appendix ' (including the legal fragment) ; see also C. Lachrnann, Versuch ilber Dositheus (1837) ; H. Hagen, De Dosithei magistri quae feruntur glossis (1877).

DOSSAL (dossel, dorsel or dosel; Fr. dos, back), an ecclesi- astical ornamented clcth suspended behind the altar.

DOSSERET, or impost block (a Fr. term, from dos, back), in architecture, the cubical block of stone above the capitals in a Byzantine church, used to carry the arches and vault, the springing of which had a superficial area greatly in excess of the column which carried them.

DOST MAHOMMED KHAN (1793-1863), founder of the dynasty of the Barakzai in Afghanistan, was born in 1793. His elder brother, the chief of the Barakzai, Fatteh Khan, took an important part in raising Mahmud to the sovereignty of Afghanistan in 1800 and in restoring him to the throne in 1809. That ruler repaid his services by causing him to be assassinated in 1818, and thus incurred the enmity of his tribe. After a bloody conflict Mahmud was deprived of all his possessions but Herat, the rest of his dominions being divided among Fatteh Khan's brothers. Of these Dost Mahommed received for his share Ghazni, to which in 1826 he added Kabul, the richest of the Afghan provinces. From the commencement of his reign he found himself involved in disputes with Ranjit Singh, the Sikh ruler of the Punjab, who used the dethroned Saduzai prince, Shuja-ul-Mulk, as his instrument. In 1834 Shuja made a last attempt to recover his kingdom. He was defeated by Dost Mahommed under the walls of Kandahar, but Ranjit Singh seized the opportunity to annex Peshawar. The recovery of this fortress became the Afghan amir's great concern. Rejecting overtures from Russia, he endeavoured to form an alliance with England, and welcomed Alexander Burnes to Kabul in 1837. Burnes, however, was unable to prevail on the governor-general, Lord Auckland, to respond to the amir's advances. Dost Mahommed was enjoined to abandon the attempt to recover Peshawar, and to place his foreign policy under British guidance. In return he was cnly promised protection from Ranjit Singh, of

1 " Die Vorfahren der Schollen," Biol. Centralbl. xxii. (1902), p. 717.

2 " On the systematic position of the Pleuronectidae," Ann. and Mag. N. H. x. (1902), p. 295.

3 " On the number and arrangement of the bony plates of the young John Dory," Biometrika, ii. (1902), p. 115.

whom he had no fear. He replied by renewing his relations with Russia, and in 1838 Lord Auckland set the British troops in motion

against him. In March 1839 the British force under Sir Willoughby Cotton advanced through the Bolan Pass, and on the 26th of April it reached Kandahar. Shah Shuja was proclaimed amir, and entered Kabul on the 7th of August, while Dost Mahommed sought refuge in the wilds of the Hindu Kush. Closely followed by the British, Dost was driven to extremities, and on the 4th of November 1840 surrendered as a prisoner. He remained in captivity during the British occupation, during the disastrous retreat of the army of occupation in January 1842, and until the recapture of Kabul in the autumn of 1842. He was then set at liberty, in consequence of the resolve of the British govern- ment to abandon the attempt to intervene in the internal politics of Afghanistan. On his return from Hindustan Dost Mahommed was received in triumph at Kabul, and set himself to re-establish his authority on a firm basis. From 1846 he renewed his policy of hostility to the British and allied himself with the Sikhs; but after the defeat of his allies at Gujrat on the 21st of February 1849 he abandoned his designs and led his troops back into Afghanistan. In 1850 he conquered Balkh, and in 1854 he acquired control over the southern Afghan tribes by the capture of Kandahar. On the 30th of March 1855 Dost Mahommed reversed his former policy by concluding an offensive and defensive alliance with the British government. In 1857 he declared war on Persia in conjunction with the British, and in July a treaty was concluded by which the province of Herat was placed under a Barakzai prince. During the Indian Mutiny Dost Mahommed punctiliously refrained from assisting the insurgents. His later years were disturbed by troubles at Herat and in Bokhara. These he composed for a time, but in 1862 a Persian army, acting in concert with Ahmad Khan, advanced against Kandahar. The old amir called the British to his aid, and, putting himself at the head of his warriors, drove the enemy from his frontiers. On the 26th of May 1863 he captured Herat, but on the 9th of June he died suddenly in the midst of victory, after playing a great role in the history of Central Asia for forty years. He named as his successor his son, Shere AliKhan. (E. I. C.)

DOSTOIEVSKY, FEODOR MIKHAILOVICH (1821-1881), Russian author, born at Moscow, on the 30th of October 1821, was the second son of a retired military surgeon of a decayed noble family. He was educated atMoscow andatthe military engineer- ing academy at St Petersburg, which he left in 1843 with the grade of sub-lieutenant. Next year his father died, and he resigned his commission in order to devote himself to literature — thus com- mencing a long struggle with ill-health and penury. In addition to the old Russian masters Gogol and Pushkin, Balzac and George Sand supplied him

with literary ideals. He knew little of Dickens, but his first story is thoroughly Dickensian in character. The hero is a Russian " Tom Pinch," who entertains a pathetic, humble adoration for a fair young girl, a solitary waif like himself. Characteristically the Russian story ends in " tender gloom." The girl marries a middle-aged man of property; the hero dies of a broken heart, and his funeral is described in lamentable detail. The germ of all Dostoievsky's imaginative work may be discovered here. The story was submitted in manuscript to the Russian critic, Bielinski, and excited his astonishment by its power over the emotions. It appeared in the course of 1846 in the Recueil de Saint- PStersbourg, under the title of " Poor People." An English version, Poor Folk, with an introduction by Mr George Moore, appeared in 1894. The successful author became a regular contributor of short tales to the Annals of the Country, a monthly periodical conducted by Kraevsky; but he was wretchedly paid, and his work, though revealing extraordinary power andintensity, commonly lacks both finish and proportion. Poverty and physical suffering robbed him of the joy of life and filled him with bitter thoughts and morbid imaginings. During 1847 he became an enthusiastic member of the revolutionary reunions of the political agitator, Petrachevski. Many of the students and younger members did little more than discuss the theories of Fourier and other economists at these gatherings. Exaggerated

reports were eventually carried to the police, and on the 23rd of April 1849 Dostoievsky and his brother, with thirty other suspected personages, were arrested. After a short examination by the secret police they were lodged in the fortress of St Peter and St Paul at St Petersburg, in which confinement Feodor wrote his story A Little Hero. On the 22nd of December 1849 the accused were all condemned to death and conveyed in vans to a large scaffold in the Simonoysky Place. As the soldiers were preparing to carry out the sentence, the prisoners were informed that their penalty was commuted to exile in Siberia. The novelist's sentence was, four years in Siberia and enforced military service in the ranks for life. On Christmas eve 1849 he commenced the long journey to Omsk, and remained in Siberia, " like a man buried alive, nailed down in his coffin," for four terrible years. His Siberian experiences are graphically narrated in a volume to which he gave the name of Recollections of a Dead-House (1858). It was known in an English translation as Buried Alive in Siberia (1881; another version, 1888).

His release only subjected him to fresh indignities as a common soldier at Semipalatinsk; but in 1858, through the intercession of an old schoolfellow, General Todleben, he was made an under-officer; and in 1859, upon the accession of Alexander IL, he was finally recalled from exile, In 1858 he had married a widow, Madame Isaiev, but she died at St Petersburg in 1867 after a somewhat stormy married life.

After herding for years with the worst criminals, Dostoievsky obtained an exceptional insight into the dark and seamy side of Russian life. He- formed new conceptions of human life, of the balance of good and evil in man, and of the Russian character. Psychological studies have seldom, if ever, found a more intense form of expression than that embodied by Dostoievsky in his novel called Crime and Punishment. The hero Raskolnikov is a poor student, who is led on to commit a mvirder partly by self- conceit, partly by the contemplation of the abject misery around him. Unsurpassed in poignancy in the whole of modern literature is the sensation of compassion evoked by the scene between the self-tormented Raskolnikov and the humble street-walker, Soma, whom he loves, and from whom, having confessed his crime, he derives the idea of expiation. Raskolnikov finally gives himself up to the police and is exiled to Siberia, whither Sonia follows him. The book gave currency to a number of ideas, not in any sense new, but specially characteristic of Dostoievsky: the theory, for instance, that in every life, however fallen and degraded, there are ecstatic moments of self-devotion; the doctrine of purification by suffering, and by suffering alone; and the ideal of a Russian people forming a social state at some future period bound together by no obligation save mutual love and the magic of kindness. In this visionary prospect, as well as in his objection to the use of physical force, Dostoievsky anticipated in a remarkable manner some of the conspicuous tenets of his great successor Tolstoy. The book electrified the reading public in Russia upon its appear- ance in 1866, and its fame was confirmed when it appeared in Paris in 1867. To his remarkable faculty of awakening reverberations of melancholy and compassion, as shown in his early work, Dostoievsky had added, by the admission of all, a rare mastery over the emotions of terror and pity. But such mastery was not long to remain unimpaired. Crime and Punishment was written when he was at the zenith of his power. His remaining works ex T hibit frequently a marvellous tragic and analytic power, but they are unequal, and deficient in measure and in balance. The chief of them are: The Injured and the Insulted, The Demons (1867), TheIdiot(i86g), The Adult (1875), The Brothers Karamzov (1881).

From 1865, when he settled in St Petersburg, Dostoievsky was absorbed in a succession of journalistic enterprises, in the Slavophil interest, and suffered severe pecuniary losses. He had to leave Russia, in order to escape his creditors, and to seek refuge in Germany and Italy. He was further harassed by troubles with his wife, and his work was interrupted by epileptic fits and other physical ailments. It was under such conditions as these that his most enduring works were created . He managed finally to return to Russia early in the seventies, and was for some time director of The Russian World. From 1876 he published a kind of review, entitled Camel d'un Icrivain, to the pages of which he committed

many strange autobiographical facts and reflections. The last eight years of his life were spent in comparative prosperity at St Petersburg, where he died on the 9th of February 1881.

His life had been irremediably seared by his Siberian experi- ences. He looked prematurely old; his face bore an expression of accumulated sorrow; in disposition he had become distrustful, taciturn, contemptuous — his favourite theme the superiority of the Russian peasant over every other class; as an artist, though uncultured, he had ever been subtle and sympathetic, but latterly he was tortured by, tragic visions and morbidly preoccupied by exceptional and perverted types. M. de Vogue, in his admirable Ecrivains russes, has worked out with some success a parallel between the later years of Dostoievsky and those of Jean Jacques Rousseau. Siberia effectually convinced the novelist of the impotence of Nihilism in such a country as Russia; but though he was assailed by ardent Liberals for the reactionary trend of his later writings, Dostoievsky became, towards the end of his life, an extremely popular figure, and his funeral, on the 12th of February 1881, was the occasion of one of the most remarkable demonstrations, of public feeling ever witnessed in the Russian capital. The death of the Russian novelist was riot mentioned in the London press; it is only since 1885, when Crime and Punish- ment first appeared, in English, that his name has become at all familiar in England, mainly through French translations.

A complete edition of his novels was issued at St Petersburg in fourteen volumes (1882-1883). Two critical studies by Tchij and Zelinsky appeared at Moscow in i885,and a German life by Hoffmann at Vienna in 1899. (T. Se.)

DOUAI, a town of northern France, capital of an arrondisse- ment in the department of Nord, 20 m. S. of Lille on the Northern railway

between that city and Cambrai. Pop. (1906) town, 21,679; commune, 33,247. Douai is situated in a marshy plain on the banks of the Scarpe which intersects the town from south to north, and supplies water to a canal skirting it on the west. The old fortifications, of which the Porte de Valenciennes (15th century) is the chief survival, have been demolished to make room for boulevards and public gardens. The industrial towns of Dorignies, Sin-le-Noble and Aniche are practically suburbs of Douai. Of the churches, that of Notre-Dame (12th and 14th centuries) is remarkable for the possession of a fine altar- piece of the early 16th century, composed of wooden panels painted by Jean Bellegambe, a native of Douai. The principal building of the town is a handsome hotel de ville, partly of the 15th century, with a lofty belfry. The Palais de Justice (18th century) was formerly the town house (refuge) of the abbey of Marchiennes. Houses of the 16th, 17th and 18th centuries are numerous. There is a statue of Madame Desbordes Valmore, the poet (d. 1859), a native of the town. The municipal museum contains a library of over 85,000 volumes as well as 1800 MSS., and a ; fine collection of sculpture and paintings. Douai is the seat of a court of appeal, a court of assizes and a subprefect, and has a tribunal of first instance, a board of trade-arbitrators, an exchange, a chamber of commerce, and a branch of the Bank of France. Its educational institutions include a lycee, training colleges, a school of mines, an artillery school, schools of music, agriculture, drawing, architecture, &c, arid a national school for instruction in brewing and other industries connected with agriculture. In addition to other iron and engineering works, Douai has a large cannon foundry and an arsenal; coal-mining and the manufacture of glass and bottles and chemicals are carried on on a large scale in the environs; arriong the other industries are flax-spinning, rope-making, brewing and the manufacture of farm implements, oil, sugar, soap and leather. Trade, which is largely water-borne, is in grain and agricultural products, coal and building material.

Douai, the site of which was occupied by a castle (Castrum Duacense) as early as the 7th century, belonged in the middle ages to the counts of Flanders, passed in 1384ˆ0 the dukes of Burgundy, and so in 1477 with the rest of the Netherlands to Spain. In 1667 it was/ captured by Louis XIV., and was ulti- mately ceded to France by the treaty of Utrecht in 1713. His- torically Douai is mainly important as the centre of the political and religious propaganda of the exiled English Roman Catholics.

In 1562 Philip II. of Spain founded a university here, in which several English scholars were given chairs; and in connexion with this William Allen (q.v.) in 1568 founded the celebrated English college. It was here that the " Douai Bible " was pre- pared (see Vol. III. p. 901). There were also an Irish and a Scots college and houses of English Benedictines and Francis- cans. All these survived till 1793, when the university was suppressed.

See F. Brassart, Hist, du chateau et de la chdtellenie de Douai (Douai, 1877-87) ; C. Mine, Hist. pop. de Douai {ib. 1861) ; B. Ward, Dawn of the Catholic Revival (London, 1909) ; Handecoeur, Hist, du Collbge anglais, Douai (Reims, 1898); Daucoisne, Etablissements britanniques a Douai (Douai, 1881).

DOUARNENEZ, a fishing-port of western France, in the depart- ment of Finistere,on the southern shore of the Bay of Douarnenez 15 m. N.W. of Quimper by rail. Pop. (1906) 13,472- Its sardine fishery, which is carried on from the end of June to the beginning of December, gives occupation to about 800 boats, and between 3000 and 4000 men, and the preserving of the fish is an important industry. Mackerel fishing, boat-building and rope and net making also occupy the inhabitants. There is a lighthouse on the small island of Tristan off Douarnenez.

DOUBLE (from the Mid. Eng. duble, the form which gives the present pronunciation, through the Old Er. duble, from Lat. duplus, twice as much), twice as much, or large, having two parts, having a part repeated, coupled, &c. The word appears as a substantive with the special meaning of the appearance to a person of his own apparition, generally regarded as a warning, or of such an apparition of one living person to another, the German Doppelgdnger (see Apparitions). Another word often used with this meaning is " fetch." According to the New English Dictionary, "fetch " is chiefly of Irish usage, and may possibly be connected with " fetch," to bring or carry away, but it may be a separate word. The Corpus Glossary of the beginning of the 10th century seems to identify a word facce with mare, meaning a goblin which appears in " nightmare." " Double " is also used of a person whose resemblance to another is peculiarly striking or remarkable, so that confusion between them may easily arise.

DOUBLE BASS (Fr. contrebasse; Ger. Kontrabass, Gross Bass Geige; Ital. contrabasso, violone), the largest member of the modern family

of stringed instruments played with a bow, known as the violin family, and the lowest in pitch. The double bass differs slightly in construction from the other members of the family in that it has slanting shoulders (one of the features of the viola da gatnba, see Violin); that is to say that where the belly is joined by the neck and finger-board, it has a decided point, whereas in the violin, viola and violoncello, the finger-board is at right-angles to the horizontal part of a wide curve. It is probable that the shoulders of the double bass were made drooping for the sake of additional strength of construction on account of the strain caused by the tension of the strings. The double bass was formerly made with a flat back — another characteristic of the viol family — whereas now the back is as often found arched as flat. The bow Is for obvious reasons shorter and stouter than the violin bow.

The technique of the double bass presents certain difficulties inherent in an instrument of such large proportions. The stretches for the fingers are very great, almost double those required for the violoncello, and owing to the thickness of the strings great force is required to press them against the finger-board when they are vibrating. The performer plays standing owing to the great size of the instrument.

The double bass sometimes has three strings tuned in England

and Italy in fourths; 53EEE=1EE=== in France and Germany

to fifths.

S

Owing to the scoring of modern

composers, however, it was found necessary to adopt an accordance of four strings in order to obtain the additional lower notes required, although this entails the sacrifice of beauty of tone, the three-stringed instrument being more sonorous. Some orchestras make a compromise dividing the double basses into twoequal sections of three and four-stringed basses. The four strings are tuned

in fourths :— £ 1 7T~ g ~ ~ Mr A. C. White, finding that

a n additional lower compass was required, first tuned his double 1 The real sounds are an octave lower.

bass with three strings to

w

m

afterwards adding

. . 32 1

a fourth string, the lower D. By this accordance the third and fourth strings gain additional power and clearness from the fact that the first and second, being their octaves higher, vibrate in sympathy, obviating the necessity of making the 'cello play in octaves with the double basses to increase the tone when the lowest register is used. In order to obtain equal sonority on his double bass with four strings, Mr White 2 found it necessary to have a wider bridge measuring about 5 in., so that the distance between the strings should remain the same as on a double bass with three strings, thus allowing plenty of room for vibration. The neck was also widened in proportion. A five-stringed double bass w as some times

used .in Germany tuned either to © 1 — <> — * ^ or to*

m

= but such instruments have been almost

=s — — —

superseded by those with four strings. A somewhat larger double bass with five strings by Karl Otho of Leipzig was introduced between 1880 and 1890 with the following accordance: —

The practical compass of the double bass extends from \3 ,_ to (real sounds) with all chromatic intervals. In order

to avoid using numerous ledger lines the music is written an octave higher. The qualityof toneisverypowerfulbutsomewhatrough,and varies greatly in its gradations. The notes of the lowest register, when played piano, sound weird and sometimes grotesque, and are sometimes used instead of the kettledrum ; when played forte the tone is grand and full. The lowest octave is mainly used as a fundamental octave bass to 'cello, bassoon or trombone. The tone of the pizzicato is full and rich owing to the slowness of the vibrations, and it changes character according to the harmonies which lie above it: with a chord of the diminished seventh above it, for instance, the pizzicato sounds like a menace, but with the common chord calm and majestic. Both natural and artificial harmonics are possible on the double bass, the former being the best; but they are seldom used in orchestral works. As an instance of their use may be cited the scene by the Nile at the beginning of the third act of Verdi's A ida, where harmonics are indicated for both 'cellos and double basses.

The technical capabilities of the double bass are necessarily somewhat more limited than those of the violoncello. Quick passages, though possible, are seldom written for it; they cannot sound clear owing to the time required for the strings to vibrate. An excellent effect is produced by what is known as the intermittent tremolo: owing to the elasticity of the bow, it rebounds several times on the strings when a single blow is sharply struck, forming a series of short tremolos. The double bass is the foundation of the whole orchestra and therefore of great importance; it plays the lowest part, often, as its name indicates, only doubling the 'cello part an octave lower. It is only since the beginning of the 19th century that an independent voice has occasionally been allotted to it, as in the Scherzo of Beethoven's Fifth Symphony in C minor : —

CONTRABASSI.

These openingbars are played soli by 'cellos and double basses, a daring innovation of Beethoven's which caused quite a consternation at first in musical circles.

The remote origin of the double bass is the same as that of the violin. 3 It was evolved from the bass viol; whether the trans- formation took place simultaneously with that of the violin from the treble viol or preceded it, has not been definitely proved, but both Gasparo da Salo and Maggini constructed double basses, which were in great request in the churches. De Salo made one with three strings for St Mark's, Venice, which is still preserved there. 4 It was Dragonetti's favourite concert instrument, pre- sented to him by the monks of St Mark, and, according to the desire expressed in his will, the instrument was restored after his death to St Mark's, where it is at present preserved. Dragonetti used a straight bow similar to the violoncello bow, held overhand with the hair slanting towards the neck of the instrument; it

2 The Double Bass (Novello, Music Primers, No. 32), p. 6.

3 See Kathleen Schlesinger, The Instruments of the Orchestra, Part II. " The Precursors of the Violin Family " (1908-1909).

4 See Laurent Grillet, Les Ancttres du violon et du violoncelle (Paris, 1901), tome ii. p. 159; [Willebald Leo von Lustgendorff, Die Geigen und Lautenmacher vom Mittelalter bis zur Gegenwart (Frankfurt a. M., 1904), p. 50; A. C. White, The Double Bass, p. 8.

was introduced into England from Paris, and is a favourite with orchestral players. Praetorius gives an illustration of a sub-bass viol da gamba or gross contra-bass geige 1 "recently constructed," which displaced the other large contra-bass viols; of which he also gives an illustration. 2

Giovanni Bottesini (1822-1889) was the greatest virtuoso on the double bass that the world has ever known. It was not only the perfection of his technique and tone which won him artistic fame, but also the delicacy of his style and his exquisite taste in phrasing. (K. S.)

DOUBLEDAY, ABNER (1819-1893), American soldier, was born at Ballston Spa, New York, on the 26th of June 1819, and graduated

from West Point in 1842. He served in the U.S. artillery during the Mexican War, being present at the battles of Monterey and Buena Vista. He was second in command at Fort Sumter, Charleston, South Carolina, when it was bombarded and taken by the Confederates in 186 1, and later in the campaign of that year he served in the Shenandoah valley as a field officer. In February 1862 he was made a brigadier-general of volunteers and employed in the fines of Washington. He commanded a division in the Army of the Potomac in the second Bull Run campaign and at Antietam, becoming major-general U.S.V. in November 1862. He continued to command his division in the Fredericksburg and Chancellorsville campaigns, and on the first day of the battle of Gettysburg he led the I. corps, and for a time all the Union forces on the field, after the death of General Reynolds. In the latter part of the war he was employed in various administrative and military posts; in July 1863 he was breveted colonel, and in March 1865 brigadier-general and major-general U.S.A. General Doubleday continued in the army after the war, becoming colonel U.S.A. in 1867; he retired in 1873. He published two important works on the Civil War, Reminiscences of Forts Sumter and Moultrie (1876) and Chancellorsville and Gettysburg (1882), the latter being a volume of the series " Campaigns of the Civil War." He died at Mendham, New Jersey, on the 26th of January 1893.

His younger brother, Ulysses Doubleday (1824-1893), fought through the Civil War as an officer of volunteers, was breveted brigadier-general U.S.V. in March 1865, and com- manded a brigade at the battle of Five Forks (1st April).

DOUBLEDAY, THOMAS (1790-1870), English politician and author, was born at Newcastle-on-Tyne in February 1790. In early life he adopted the views of William Cobbett, and was active in promoting the agitation which resulted in the passing of the Reform Bill of 1832. As secretary of the Northern Political Union of Whigs and Radicals he took a prominent part in forwarding the interests of Earl Grey and the reforming party. In 1858-1859 he was a member of the council of the Northern Reform Union; and to the last he was a keen observer of political events. He succeeded his father, George Doubleday, as partner in a firm of soap manufacturers at Newcastle, but devoted his attention rather to literature than to mercantile affairs. On the failure of the firm he obtained the office of registrar of St Andrew's parish, Newcastle, a post which he held until appointed secretary to the coal trade. He died at Bulman's Village, Newcastle-on- Tyne, on the 18th of December 1870. In 1832 Doubleday published an Essay on Mundane Moral Government, and

in 1842 he attacked some of the principles of Malthus in his True Law of Population. He also wrote A Political Life of Sir Robert Peel (London, 1856); A Financial, Statistical and Monetary History of England from 1688 (London, 1847); Matter for Materialists (London, 1870); The Eve of St Mark, a Romance of Venice; and three dramas, The Statue Wife, Diocletian and Caius Marius, in addition to some fishing songs, and many contributions to various newspapers and periodicals.

DOUBLET (a Fr. word, diminutive of double, folded or of two thicknesses), a close-fitting garment, with or without sleeves, extending from the neck to a little below the waist, worn by men of all ranks and ages from the 14th century to the time of Charles

1 M. Praetorius, Syntagma music. (Wolfenbuttel, 1618 and 1620), PP- 54-55 and pi. v. (I).

2 lb. pi. vi. No. 4.

II., when it began to be superseded by coat and waistcoat. The doublet was introduced into England from France, and was originally padded for defence or warmth. " Doublet " is also used of a pair or couple — a thing that is the facsimile of another; as in philology, one of two words differing in form, but repre- sented by an identical root, as " alarm " or " alarum "; in optics. of a pair of lenses, combined, for example, to correct aberration. In the work of the lapidary a doublet is a counterfeit gem, made by cementing two pieces of plain glass or crystal on each side of a layer of glass (coloured to represent the stone counterfeited); a thin portion of a genuine stone may be cemented upon an in- ferior one, as a layer of diamond upon a topaz, or ruby on a garnet.

DOUBS, a river of eastern France, rising in the Jura at the foot of the Noirmont ridge at a height of 3074 ft. and flowing into the Sa6ne. Its course is 269 m. in length, though the distance from its source to its mouth is only 56 m. in direct line; its basin has an area of 3020 sq. m. Flowing N.E. the river traverses the lake of St Point and passes Pontarlier; thenceforth its course lies chiefly through wooded gorges of great grandeur. After skirting the town of Morteau, below which it expands into the picturesque lake of Chaillexon and descends over the Falls of the Doubs (88 ft. in height), the river for about 28 m. forms the frontier between France and Switzerland. Flowing into the latter country for a short distance, it turns abruptly west, then north, and finally at Voujeaucourt, south-west. Just below that town the river is joined by the canal from the Rhone to the Rhine, to

accommodate which its course has been canalized as far as Dole. Till it reaches Besancon which lies on a peninsula formed by the river, the Doubs passes no town of importance except Pontarlier. Some distance below Besancon it enters the department of Jura, passes Dole, and leaving the region of hill and mountain, issues into a wide plain. Traversing this, it receives the waters of the Loue, its chief affluent, and broadening out to a width of 260 ft., at length reaches the Sa6ne at Verdun. Below Dole the river is navigable only for some 8 m. above its mouth.

DOUBS, a frontier department of eastern France, formed in 1790 of the ancient principality of Montbeliard and of part of the province of Franche-Comte. It is bounded E. and S.E. by Switzerland, N. by the territory of Belfort and by Haute Saone, and W. and S.W. by Jura. Pop. (1906) 298,438. Area, 2030 sq. m. The department takes its name from the river Doubs, by which it is traversed. Between the Ognon, which forms the north-western limit of the department, and the Doubs, runs a range of low hills known as " the plain." The rest of Doubs is mountainous, four parallel chains of the Jura crossing it from N.E. to S.W. The Lomont range, the lowest of these chains, dominates the left bank of the Doubs. The central region is occupied by hilly plateaux covered with pasturage and forests, while the rest of the department is traversed by the remaining three mountain ranges, the highest and most easterly of which contains the Mont d'Or (4800 ft.), the culminating point of Doubs. Besides the Doubs the chief rivers are its tributaries, the Dessoubre, watering the east of the department, and the Loue, which traverses its south-western portion. The climate is in general cold and rainy, and the winters are severe. The soil is stony and loamy, and at the higher levels there are numerous peat-bogs. Approximately a fifth of the total area is planted with cereals; more than a third is occupied by pasture. In its agricultural aspect the department may be divided into three regions. The highest, on which the snow usually lies from six to eight months in the year, is in part barren, but on its less exposed slopes is occupied by forests of fir trees, and affords good pasturage for cattle. In the second or lower region the oak, beech, walnut and sycamore flourish; and the valleys are susceptible of cultivation. The region of the plain is the most fertile, and produces all kinds of cereals as well as hemp, vegetables, vines and fruit. Cattle-rearing and dairy-farming receive much attention; large quantities of cheese, of the nature of Gruyere, are produced, mainly by the co-operative cheese-factories or fruitieres. The rivers of the department abound in gorges and falls of great beauty. The most important manufactures are watches, made chiefly at Besancon and Morteau, hardware

(Herimoncourt and Valentigney), and machinery.

4-42

DOUCE-ˆBOUGLAS, HQP3E OF

Large iron foundries are found at Audincourt (pop. 5317) and other towns. The distillation of brandy and absinthe, and the manufacture of cotton and woollen goods, automobiles and paper,, are also carried on. Exports include watches, live-stock, wine, vegetables, iron and hardware; cattle, hides, timber, coal, wine and machinery are imported. Large quantities of goods, in transit between France and Switzerland, pass through the depart- ment. Among its mineral products are building stone and lime, and there are peat workings. Doubs is served by the Paris- Lyon railway, the line from Dole to Switzerland passing, via Pontarlier, through the south of the department. The canal from the Rhone to the Rhine traverses it for 84 miles.

The department is divided into the arrondissements of Besancon, Baume-les-Dames, Montbeliard and Pontarlier, with 27 cantons and 637 communes. It belongs to. the acadtmie (educational circumscription) and the diocese of Besancon, which is the capital, the seat of an archbishop and of a court of appeal, and headquarters of the VII. army corps. Besides Besancon the chief towns are Montbeliard and Pontarlier (qq.v.). Ornans, a town on the Loue, has a church of the 16th century and ruins of a feudal castle, which are of antiquarian interest. Mo.ntbenoit on the Doubs near Pontarlier has the remains of an Augustine abbey (13th to 16th centuries). The cloisters are of the 15th century, and the church contains, among other works of art, some fine stalls executed in the 16th century. Lower down the Doubs is the town of Morteau, with the Maison Pertuisier, a house of the Renaissance period, and a church which still preserves remains of a previous structure of the 13th century. Baume-les-Dames owes the affix of its name to a Benedictine convent founded in 763, to which only noble ladies were admitted. Numerous antiquities have been found at Mandeure (near Montbeliard), which stands on the site of the Roman town of Epomnnduodurum.

DOUCE, FRANCIS (1757-1834), English antiquary, was born in London in 1757. His father was a clerk in Chancery. After completing his education he entered his father's office, but soon quitted it to devote himself to the study of antiquities. He became a prominent member of the Society of Antiquaries, and for a time held the post of keeper of manuscripts in the British Museum, but was

compelled to resign it owing to a quarrel with one of the trustees. In 1807 he published his Illustrations .of Shakespeare and Ancient Manners (2 vols. 8vo), which contained some curious information, along with a great deal of trifling criticism and mistaken interpretation. An unfavourable notice of the work in The Edinburgh Review greatly irritated the author, and made him unwilling to venture any further publications. He contributed, . however, a considerable number of papers to the Archaeologia and The Gentleman's Magazine. In 1833 he published a Dissertation on the various Designs of the Dance of Death, the substance of which had appeared forty years before. He died on the 30th of March 1834. By his will he left his printed books, illuminated manuscripts, coins, &c, to the Bodleian library; his own manuscript works to the British Museum, with directions that the chest containing them should not be opened until the 1st of January 1900; and his paintings, carvings and miscellaneous antiquities to Sir Samuel Meyrick, who published an account of them, entitled The Doucean Museum.

DOUGLAS, the name of a Scottish noble family, now re- presented by the dukes of Hamilton (Douglas-Hamilton, heirs- male), the earls Of Home (Douglas-Home) who also bear the title of Baron Douglas of Douglas, the dukes of Buccleuch and Queensberry (Montagu-Douglas-Scott), the earls of Morton (Douglas), the earls of Wemyss (Wemyss-Charteris-Douglas), and the baronets Douglas of Carr, of Springwood, of Glenbervie, &c. The marquessate of Douglas and the earldom of Angus, the historic dignities held by the two chief branches of the family, the Black and the Red Douglas, are merged in the Hamilton peerage. The name represented the Gaelic dubh glas, dark water, and Douglasdale, the home of the family in Lanarkshire, is still in the possession of the earls of Home. The first member of the family to emerge with any distinctness was William de Douglas, or Dufglas, whose name frequently appears on charters from 1175 to 1 2 13. He is said to have been brother, or brother-in-law, of

Freskin; of Murray, , the founder of the house, of Murray. His second son, Brice (d. 1222), became bishop of Moray, while the estate fell to the eldest, Sir Archibald (d. c. 1 240) .

Sir William os Douglas (d. 1298), called " le hardi," Archibald's grandson, was the first formally to assume the title of lord of Douglas. After the death of his first wife, Elizabeth, daughter of Alexander the Steward, he abducted from the manor of the La Zouches at Tranent an heiress, Eleanor of Lovain, widow of William de Ferrers, lord of Groby in Leicestershire, who in 1291 appeared by proxy in the court of the English king, Edward I., to answer for the

offence of marrying without his permission. He gave a grudging allegiance to John de Baliol, and swore fealty to Edward I. in 1291; but when the Scottish barons induced Baliol to break his bond with Edward I. he com- manded at Berwick Castle, which he surrendered after the sack of the town by the English in 1296. After a short imprisonment Douglas was restored to his Scottish estates on renewing his homage to Edward I., but his English possessions were forfeited. He joined Wallace's rising in 1 297, and died in 1 298, a prisoner in the Tower of London.

His son, Sir James of Douglas (1286-1330), lord of Douglas, called the " Good," whose exploits are among the most romantic in Scottish history, was educated in Paris. On his return he found an Englishman, Robert de Clifford, in possession of his estates. His offer of allegiance to Edward I. being refused, he cast in his lot with Robert Bruce, whom he joined before his coronation "at Scone in 1306. From the battle of Methven he escaped with Bruce and the remnant of his followers, and ac- companied him in his wanderings in the Highlands. In the next year they returned to the-south of Scotland. He twice outwitted the English garrison of Douglas and destroyed the castle. One of these exploits, carried out on Palm Sunday, the 19th of March 1307, with barbarities excessive even in those days, is known as the " Douglas Larder." Douglas routed Sir John de Mowbray at Ederford Bridge, near Kilmarnock, and was entrusted with the conduct of the war in the south, while Bruce turned to the High- lands. In 1308 he captured Thomas Randolph (afterwards earl of Moray), soon to become one of Bruce's firm supporters, and a friendly rival of Douglas, whose exploits he shared. He made many successful raids on the English border, which won for him the dreaded name of the " Black Douglas " in English households. Through the capture of Roxburgh Castle in 13 14 by stratagem, the assailants being disguised as black oxen, he secured Teviot- dale; and at Bannockburn, where he was knighted on the battle- field, he commanded the left wing with Walter the Steward. During the thirteen years of intermittent warfare that followed he repeatedly raided England. He slew Sir Robert de Nevill, the " Peacock of the North," in single combat in 1316, and in 1319 he invaded Yorkshire, in company with, Randolph, defeating an army assembled by William de Melton, archbishop of York, at Mittc-n-on-Swale (September 20), in a fight known as " The Chapter of Myton." In 1322 he captured the pass of Byland in Yorkshire, and forced the English army to retreat. He was rewarded by the " Emerald Charter," granted by Bruce, which gave him criminal jurisdiction over the family estates, and released the lords of Douglas from various feudal

obligations. The emerald ring which Bruce gave Douglas in ratification of the charter is lost, but another of the king's gifts, a large two-handed sword (bearing, however, a later inscription), exists at Douglas Castle. In a daring night attack on the English camp in Weardale in 1327 Douglas came near capturing Edward III. himself. After laying waste the northern counties he retreated, without giving battle to the English. B e f ore his death in 1329 Bruce desired Douglas to carry his heart to Palestine in redemption of his unfulfilled vow to go on crusade. Accordingly Sir James set out in 1330, bearing with him a silver casket containing the embalmed heart of Bruce. He fell fighting with the Moors in Spain on the 25th of August of that year, and was buried in St Bride's Church, Douglas. Since his day the Douglases have borne a human heart in their coat of arms. Sir James was said to have fought in seventy battles and to have conquered in fifty- seven. His exploits, as told in Froissart's Chronicles and in John

DOUGLAS, EARLS OF

Barbour's Bruceˆ are familiar from Scott's Tales of a Grandfather and Castle Dangerous. His half-brother, Sir Archibald, defeated Edward Baliol at Annan in 1332, and had just been appointed regent of Scotland for David II. when he risked a pitched battle at Halidon Hill, where he was defeated and killed (1333), with his nephew William, lord of Douglas. The inheritance fell to his brother, a churchman, Hugh the "Dull" (b. 1294), who surrendered his lands to David II.; and a re-grant was made to William Douglas, next referred to.

William Douglas, ist Earl or Douglas (c. 1327-1384), had been educated in France, and returned to Scotland in 1348. In 1353 he killed in Ettrick Forest his kinsman, William, 1 the knight of Liddesdale (c. 1300-1353), known as the " Flower of Chivalry," who had been warden of the western marches during David II. 's minority, and had taken a heroic share in driving the English from southern Scotland. Liddesdale had in 1342 lost the king's favour by the murder of Sir Alexander Ramsay of Dalhousie, whom David had made constable of the castle of Roxburgh and sheriff of Teviotdale in his place; he was taken prisoner at Nevill's Cross in 1346, and only released on becoming liegeman of Edward III. for the lands of Liddesdale and the castle of the Hermitage; Liddesdale 2 was also accused of contriving the murder of Sir David Barclay in 1350. Some of his lands fell to his kinsman and murderer, who was created earl of Douglas in 1358. In 1357 his marriage with Margaret, sister and heiress of Thomas, 13 th earl of Mar, eventually brought him the

estates and the earldom of Mar. During a short truce with the warden of the English marches he had served in France, being wounded at Poitiers in 1356. He was one of the securities for the payment of David II. 's ransom, and in consequence of the royal misappropriation of some moneys raised for this purpose Douglas was for a short time in rebellion in 1363. In 1364 he joined David II. in seeking a treaty with England which should deprive Robert the Steward, formerly an ally of Douglas, of the succession by putting an English prince on the Scottish throne. The in r dependence of Scotland was to be guaranteed, and a special clause provided for the restoration of the English estates of the Douglas family. On the accession of Robert II. he was neverthe- less reconciled, becoming justiciar of southern Scotland, and the last years of his life were spent in making and repelling border raids. He died at Douglas in May 1384, and was succeeded by his son James. By his wife's sister-in-law, Margaret Stewart, countess of Angus in her own right, and widow, of the 13th earl of Mar, he had a son George, afterwards ist earl of Angus.

James, 2nd Earl of Douglas and Mar(c. 1358-1388), married Lady Isabel Stewart, daughter of Robert II. In 1385 he made war on the English with the assistance of a French contingent under John de Vienne. He allowed the English to advance to Edinburgh, wisely refusing battle, and contented himself with a destructive counter-raid on Carlisle. Disputes soon arose between the allies, and the French returned home at the end of the year. In 1388 Douglas captured Hotspur Percy's pennon in a skirmish near Newcastle. Percy sought revenge in the battle of Otterburn (August 1388), which ended in a victory for the Scots and the capture of Hotspur and his brother, though Douglas fell in the fight. The struggle, narrated by Froissart, is celebrated in the English and Scottish ballads called " Chevy Chase " and " The Battle of Otterburn." Sir Philip Sidney " never heard the oide song of Percy and Douglas that I found not my heart mooved more than with a trumpet " (Apologie for Poetrie). The 2nd earl left no legitimate male issue. His natural sons William and Archibald became the ancestors of the families of Douglas of

1 A descendant of a younger son of the original William de Douglas.

2 On the murder of the knight of Liddesdale, his lands, with the exception of Liddesdale and the Hermitage forfeited to the crown and then secured by his nephew, fell to his nephew, Sir James Douglas of Dalkeith and Aberdour (d. 1420), whose great-grandson James Douglas, 3rd Lord Dalkeith (d. 1504), became earl of Morton in 1458 on his marriage with Lady Joan Stewart, third daughter of

James I. His grandson, the 3rd earl, left daughters only, of whom the eldest, Margaret, married James Hamilton, earl of Arran, regent of Scotland, ancestor of the dukes of Hamilton; Elizabeth married in 1543 James Douglas, who became by this marriage 4th earl of Morton. ■.

443

Drumlanrig (see Queensberry) and Douglas of Cavers. His sister Isabel became countess of Mar, inheriting the lands of Mar and his unentailed estates.

The earldom and entailed estates of Douglas reverted by the patent of 1358 to Archibald Douglas, 3RD Earl of Douglas, called "■" The Grim " (c. 1328-c. 1400), a natural son of the " good" Sir James. With his cousin, the ist earl of Douglas, he had fought at Poitiers, where he was taken prisoner, but was released through ignorance of his real rank. On his return to Scotland he became constable and sheriff of Edinburgh, and, later, warden of the western marches, where his position Was strengthened by his becoming lord of Galloway in 1369 and by his purchase of the earldom of Wigtown in 1372. He further increased his estates by his marriage with Joanna Moray, heiress of Bothwell. During the intervals of war with the English he imposed feudal law on the border chieftains, drawing up a special code for the marches. He was twice sent on missions to the French court. The power of the Black Douglas overshadowed the crown under the weak rule of Robert III., and in 1399 he arranged a marriage between David, duke of Rothesay, the king's son and heir, and his own daughter, Marjory Douglas. Rothesay was already contracted to marry Elizabeth Dunbar, daughter of the earl of March, who had paid a large sum for the honour. March, alienated from his allegiance by this breach of faith on the king's part, now joined the English forces. A natural son of Archibald, Sir William of Douglas, lord of Nithisdale (d. 1392), married Egidia, daughter of Robert III.

Archibald the Grim was succeeded by his eldest son, Archibald, 4TH Earl of Douglas, ist duke of Touraine, lord of Galloway and Annandale (1372-1424), who married in 1390 Lady Margaret Stewart, eldest daughter of John, earl of Carrick, afterwards King Robert III. In 1400 March and Hotspur Percy had laid waste eastern Scotland as far as Lothian when they were defeated by Douglas (then master of Douglas) near Preston. With the regent, Robert, duke of Albany, he was suspected of complicity in the murder (March 1402) of David, duke of Rothesay, who was in their custody at Falkland

Castle, but both were officially declared guiltless by the parliament. In that year Douglas raided England and was taken prisoner at Homildon Hill by the Percys. He fought on the side of his captors at Shrewsbury (1403), and was taken prisoner by the English king Henry IV. He became reconciled during his captivity with the earl of March,whose lands had been conferred on Douglas, but were now, with the exception of Annandale, restored. He returned to Scotland in 1409, but was in constant communication with the English court for the release of the captive king James I. In 141 2 he had visited Paris, when he entered into a personal alliance with John the Fearless, duke of Burgundy, and in 1423 he commanded a contingent of 10,000 Scots sent to the help of Charles VII. against the English. He was made lieutenant-general in the French army, and received the peerage-duchy of Touraine with remainder to his heirs-male. The new duke was defeated and slain at Verneuil (1424) with his second son, James; his persistent ill-luck earned him the title of the Tyneman (the loser).

Archibald, sth Earl of Douglas (c. 1391-1439), succeeded to his father's English and Scottish honours, though he never touched the revenues of Touraine. He fought at Bauge in 1421, and was made count of Longueville in Normandy.

His two sons, William, 6th Earl (1423 7-1440), and David, were little more than boys at the time of their father's death in 1439. They can hardly have been guilty of any real offence when, on the 24th of November 1440, they were summoned to court by Sir William Crichton, lord chancellor of Scotland, and, after a mock trial in the young king's presence, were beheaded forthwith in the courtyard of Edinburgh Castle. This murder broke up the dangerous power wielded by the Douglases. The lordships of Annandale and Bothwell fell to the crown; Galloway to the earl's sister Margaret, the " Fair Maid of Galloway "; while the Douglas lands passed to his great-uncle James Douglas, 7TH Earl of Douglas, called the " Gross," of Balvany (1371-1444), lord of Abercorn and Aberdour, earl of Avondale (cr. 143 7) , younger son of the 3rd earl.

The latter's sons, William (c. 1425-1452) and James (1426-

1488), became 8th and 9th earls respectively; Archibald became earl of Moray by marriage with Elizabeth Dunbar, daughter and co-

heiress of James, earl of Moray; Hugh was created earl of Ormond in 1445; John was lord of Balvany; Henry became bishop of Dunkeld.

The power of the Black Douglases was restored by the 8th earl, who recovered Wigtown, Galloway and Bothwell by marriage (by papal dispensation) with his cousin, the Fair Maid of Galloway. He was soon high in favour with James II., and procured the disgrace of Crichton, his kinsmen's murderer, by an alliance with his rival, Sir Alexander Livingstone. In 1450 James raided the earl's lands during his absence on a pilgrimage to Rome; but their relations seemed outwardly friendly until in 1452 the king invited Douglas to Stirling Castle under a safe-conduct, in itself, however, a proof of strained relations. There James demanded the dissolution of a league into which Douglas had entered with Alexander Lindsay, the ." Tiger " earl (4th) of Crawford. On Douglas's refusal the king murdered him (February 22) with his own hands, the courtiers helping to despatch him. The tales of the hanging of Sir Herbert Henries of Terregles and the murder of McLellan of Bombie by Douglas rest on no sure evidence.

James Douglas, 9TH Earl (and last), denounced his brother's murderers and took up arms, but was obliged by the desertion of his allies to submit. He obtained a papal dispensation to marry his brother's widow, in order to keep the family estates together. He intrigued with the English court, and in 1455 rebelled once more. Meanwhile another branch of the Douglas family, known as the Red Douglas, had risen into importance (see Angus, earls of), and George Douglas, 4th earl of Angus (d. 1463), great- grandson of the 1st earl of Douglas, took sides with the king against his kinsmen. James Douglas, again deserted by his chief allies, fled to England, and his three brothers, Ormond, Moray and Balvany, were defeated by Angus at Arkinholm on the Esk. Moray was killed, Ormond taken prisoner and executed, while Balvany escaped to England. Their last stronghold, the Thrieve in Galloway, fell, and the lands of the Douglases were declared forfeit, and were divided among their rivals, the lordship of Douglas falling to the Red Douglas, 4th earl of Angus. In England the earl of Douglas intrigued against his native land; he was employed by Edward IV. in 146 1 to negotiate a league with the western highlanders against the Scottish kingdom. In 1484 he was taken prisoner while raiding southern Scotland, and was relegated to the abbey of Lindores, where he died in 1488.

The title of Douglas was restored in 1633 when William, nth earl of Angus (1589-1660), was created ist Marquess of Douglas by Charles I. In 1645 he joined Montrose at Philip- haugh, and was imprisoned

in 1646 at Edinburgh Castle, only obtaining his release by signing the Covenant. His eldest son, Archibald, created earl of Ormond, Lord Bothwell and Hartside, in 1651, predeceased his father; Lord James Douglas (c. 1617- 1645) and his half-brother, Lord George Douglas (c. 1636-1692), created earl of Dumbarton in 1675, successively commanded a Scots regiment 1 in the French service. William (1635-1694), created earl of Selkirk in 1646, became 3rd duke of Hamilton after his marriage (1656) with Anne, duchess of Hamilton in her own right. By the failure of heirs in the elder branches of the family the dukes of Hamilton (q.v.) became heirs-male of the house of Douglas.

James Douglas, 2nd Marquess of Douglas (1646-1700), succeeded his grandfather in 1660. His eldest son, John, by courtesy eari of Angus, raised a regiment of 1 200 men, first known as the Angus regiment, later as the Cameronians (26th Foot). He was killed at its head at Steinkirk in 1692. The younger son, Archibald, 3RD Marquess (1694-1761), was created duke of Douglas in 1703, but the dukedom became extinct on his death, without heirs, in 1761. He was a consistent supporter of the Hanoverian cause, and fought at Sheriffmuir. The heir-pre- sumptive to the Douglas estates was his sister, Lady Jane Douglas (1698-1753), who in 1746 secretly married Colonel, afterwards Sir, John Steuart of Grandtully, by whom she had twin sons, born

1 Transferred to the British service in 1669 and eventually known as the Royal Scots regiment.

in Paris in 1748. These children were alleged to be spurious, and when Lady Jane and the younger of the two boys died in 1753, the duke refused to acknowledge the survivor as his nephew; but in 1760 he was induced, under the influence of his wife, to revoke a will devising the estates to the Hamiltons in favour of Lady Jane's son, Archibald James Edward Steuart (1748-1827), ist baron Douglas of Douglas (cr. 1790) in the British peerage. The inheritance of the estates was disputed by the Hamiltons, representing the male line, but the House of Lords decided in favour of Douglas in 1 769. Three of his sons succeeded Archibald Douglas as Baron Douglas, but as they left no male issue the title passed to the earls of Home, Cospatrick Alexander, nth earl of Home, having married a granddaughter of Archibald, ist Baron Douglas. Their descendants, the earls of Home, represent the main line of Douglas on the female side.

Authorities. — David Hume of Godscroft (i56o?-i63o), who was

secretary to Archibald Douglas, 8th earl of Angus, wrote a History of the House and Race of Douglas and Angus, printed under his daughter's superintendence (Edinburgh, 1644). He was a partial historian, and his account can only be accepted with caution. Modern authorities are Sir William Fraser, The Douglas Book (4 vols., Edinburgh, 1885), and Sir H. Maxwell, History of the House of Douglas (2 vols., 1902). See also G. E. C.[okayne]'s Peerage, and Douglas's Scots Peerage; Calendar of State Papers, Scottish Series, The Hamilton Papers, &c.

DOUGLAS, SIR CHARLES, Bart. (d. 1789), British admiral, a descendant of the Scottish earls of Morton, was promoted lieutenant in the navy on the 4th of December 1753. Nothing is known of his early life. He became commander on the 24th of February 1759, and attained to post rank in 1761. When the War of American Independence began, he took an active part in the defence of Canada in 1775, an d he afterwards commanded the " Stirling Castle " 64 in the battle of the Ushant, 27th of July 1778. His reputation is based first on the part he played in the battle of Dominica, 12th of April 1782, and then on the improve- ments in gunnery which he introduced into the B itish navy. It appears from the testimony of Sir F. Thesiger (d. 1805), who was present on the quarter-deck of the flagship, that Sir Charles Douglas, who was then captain of the fleet, first pointed out to Rodney the possibility and the advantage of passing through the French line. His advice was taken with reluctance. On the other hand, Lord Hood accuses Douglas of living in such abject fear of his admiral that he did not venture to speak with the freedom which his important post entitled him to take. His more certain claim to be ranked high among naval officers is founded on the many improvements he introduced into naval gunnery. Some account of these will be found in the writings of his son. He became rear-admiral on the 24th of September 1787, and died suddenly of apoplexy in February 1789. He was made a baronet for his services in the West Indies.

There is a life of Sir Charles Douglas in Charnock, Biogr. Nav. vi. 427.

DOUGLAS, GAVIN (i474?-i522), Scottish poet and bishop, third son of Archibald, 5th earl of Angus (called the " great earl of Angus " and " Bell-the-Cat "), was born c. 1474, probably at one of his father's seats. He was a student at St Andrews, 1489-1494, and thereafter, it is supposed, at Paris. In 1496 he obtained the living of Monymusk, Aberdeenshire, and later he became parson of Lynton (mod. Linton) and rector of Hauch (mod. Prestonkirk), in East

Lothian; and about 1501 was preferred to the deanery or provostship of the collegiate church of St Giles, Edinburgh, which he held with his parochial charges. From this date till the battle of Flodden, in September 1513, he appears to have been occupied with his ecclesiastical duties and literary work. Indeed all the extant writings by which he has earned his place as a poet and translator belong to this period. After the disaster at Flodden he was completely absorbed in public business. Three weeks after the battle he, still provost of St Giles, was admitted a burgess of Edinburgh, his father, the " Great Earl," being then civil provost of the capital. The latter dying soon afterwards (January 1514) in Wigtownshire, where he had gone as justiciar, and his son having been killed at Flodden, the succession fell to Gavin's nephew Archibald (6th earl). The marriage cˆf this youth to James IV. 's widow on the 6th of August 1514 did much to

identify the Douglases with the English party in Scotland, as against the French party led by Albany, and incidentally to determine the political career of his uncle Gavin. During the first weeks of the queen's sorrow after the battle, Gavin 3 with one or two colleagues of the council, acted as personal adviser, and it may be taken for granted that he supported the pretensions of the young earl. His own hopes of preferment had been strengthened by the death of many of the higher clergy at Flodden. The first outcome of the new connexion was his appointment to the abbacy of Aberbrothock by the queen regent, before her marriage, probably in June 1514. Soon after the marriage she nominated him archbishop of St Andrews, in succession to Elphinstone, archbishop-designate. But Hepburn, prior of St Andrews, having obtained the vote of the chapter, expelled him, and was himself in turn expelled by Forman, bishop of Moray, who had been nominated by the pope. In the interval, Douglas's rights in Aberbrothock had been transferred to James Beaton, archbishop of Glasgow, and he was now without title or temporality. The breach between the queen's party and Albany's had widened, and the queen's advisers had begun an intrigue with England, to the end that the royal widow and her young son should be removed to Henry's court. In those deliberations Gavin Douglas took an active part, and for this reason stimulated the opposition which successfully thwarted his preferment.

In January 1515 on the death of George Brown, bishop of Dunkeld, Douglas's hopes revived. The queen nominated him to the see, which

he ultimately obtained, though not without trouble. For the earl of Athole had forced his brother, Andrew Stewart, prebendary of Craig, upon the chapter, and had put him in possession of the bishop's palace. The queen appealed to the pope and was seconded by her brother of England, with the result that the pope's sanction was obtained on the 18th of February 1515. Some of the correspondence of Douglas and his friends incident to this transaction was intercepted. When Albany came from France and assumed the regency, these documents and the " purchase " of the bishopric from Rome contrary to statute were made the basis of an attack on Douglas, who was imprisoned in Edinburgh Castle, thereafter in the castle of St Andrews (under the charge of his old opponent, Archbishop Hepburn), and later in the castle of Dunbar, and again in Edinburgh. The pope's intervention procured his release, after nearly a year's imprison- ment. The queen meanwhile had retired to England. After July 1 516 Douglas appears to have been in possession of his see, and to have patched up a diplomatic peace with Albany.

On the 1 7th of May 1 5 1 7 the bishop of Dunkeld proceeded with Albany to France to conduct the negotiations which ended in the treaty of Rouen. He was back in Scotland towards the end of June. 'Albany's longer absence in France permitted the party- faction of the nobles to come to a head in a plot by the earl of Arran to seize the earl of Angus, the queen's husband. The issue of this plot was the well-known fight of "Clear-the-Causeway," in which Gavin Douglas's part stands out in picturesque relief. The triumph over the Hamiltons had an unsettling effect upon the earl of Angus. He made free of the queen's rents and abducted Lord Traquair's daughter. The queen set about to obtain a divorce, and used her influence for the return of Albany as a means of undoing her husband's power. Albany's arrival in November 1521, with a large body of French men-at-arms, compelled Angus, with the bishop and others, to flee to the Borders. From this retreat Gavin Douglas was sent by the earl to the English court, to ask for aid against the French party and against the queen, who was reported to be the mistress of the regent. Meanwhile he was deprived of his bishopric, and forced, for safety, to remain in England, where he effected nothing in the interests of his nephew. The declaration of war by England against Scotland, in answer to the recent Franco-Scottish negotia- tions, prevented his return. His case was further complicated by the libellous animosity of Beaton, archbishop of St Andrews (whose life he had saved in the " Clear-the-Causeway " incident), who was anxious to thwart his election to the archbishopric of St Andrews, now vacant by the death of Forman. In

was stricken by the plague which raged in London, and died at the house of his friend Lord Dacre. During the closing years of exile he was on intimate terms with the historian Polydore Vergil, and one of his last acts was to arrange to give Polydore a corrected version of Major's account of Scottish affairs. Douglas was buried in the church of the Savoy, where a monumental brass (removed from its proper site after the fire in 1864) still records his death and interment.

Douglas's literary work, now his chief claim to be remembered, belongs, as has been stated, to the period 1 501-15 13, when he was provost of St Giles. He left four poems.

1. The Police of Honour, his earliest work, is a piece of the later type of dream-allegory, extending to over 2000 lines in nine- lined stanzas. In its descriptions of the various courts on their way to the palace, and of the poet's adventures — first, when he incautiously slanders the court of Venus, and later when after his pardon he joins in the procession and passes to s,ee the glories of the palace — the poem carries on the literary traditions of the courts of love, as shown especially in the " Romaunt of the Rose" and " The Hous of Fame." The poem is dedicated to James IV., not without some lesson in commendation of virtue and honour. No MS. of the poem is extant. The earliest known edition {c- IS53) wa s printed at London by William Copland; an Edin- burgh edition, from the press of Henry Charteris, followed in 1579. From certain indications in the latter and the evidence of some odd leaves discovered by David Laing, it has been con- cluded that there was an earlier Edinburgh edition, which has been ascribed to Thomas Davidson, printer, and dated c. 1 540.

2. King Hart is another example of the later allegory, and, as such, of higher literary merit. Its subject is human life told in the allegory of King Heart in his castle, surrounded by his five servitors (the senses), Queen Plesance, Foresight and other courtiers. The poem runs to over 900 lines and is written in eight-lined stanzas. The text is preserved in the Maitland folio MS. in the Pepysian library, Cambridge. It is not known to have been printed before 1786, when it appeared in Pinkerton's Ancient Scottish Poems.

3. Conscience is in four seven-lined stanzas. Its subject is the "conceit" that men first clipped away the "con" from "con- science" and left "science" and "na mair." Then they lost, " sci," and had nothing but " ens " (" that schrew, Riches and geir").

4. Douglas's longest, last, and in some respects most im- portant work is his translation of the Aeneid, the first version of a great classic poet in any English dialect. The work includes the thirteenth book by Mapheus Vegius; and each of the thirteen books is introduced by a prologue. The subjects and styles of these prologues show great variety: some appear to be literary exercises with little or no connexion with the books which they introduce, and were perhaps written earlier and for other purposes. In the first, or general, prologue, Douglas claims a higher position for Virgil than for his master Chaucer, and attacks Caxton for his inadequate rendering of a French translation of the Aeneid. That Douglas undertook this work and that he makes a plea for more accurate scholarship in the translation have been the basis of a prevalent notion that he is a Humanist in spirit and the first exponent of Renaissance doctrine in Scottish literature. Careful study of the text will not support this view. Douglas is in all important respects even more of a medievalist than his contemporaries; and, like Henryson and Dunbar, strictly a member of the allegorical school and a follower, in the most generous way, of Chaucer's art. There are several early MSS. of the Aeneid extant: (a) in the library of Trinity College, Cambridge, c. 1525, (b) the Elphynstoun MS. in the library of the university of Edinburgh, c. 1525, (c) the Ruthven MS. in the same collection, c. 1535, (d) in the library of Lambeth Palace, 1 S4S I S46 The first printed edition appeared in London in 1553. An Edinburgh edition was issued from the press of Thomas Ruddimanin 1710.

For Douglas's career see, in addition to the public records and general histories, Bishop Sage's Life in Ruddiman's edition, and that by John Small in the first volume of his edition of the Works of Gavin

Douglas (4 vols., 1874, tne only collected edition of Douglas's works). A new edition of the texts is much to be desired. On Douglas's place in Scottish literature see Scotland: Scottish Literature, also G. Gregory Smith's Transition Period (1900) and chapters in the Cambridge History of English Literature, vol. ii. (1908). P. Lange's dissertation Chaucer's Einfluss auf die Originaldichtungen des Schotten Gavin Douglas (Halle, 1882) draws attention to Douglas's indebted- ness to Chaucer. Further discussion of the question of Douglas's alleged Humanism will be found in Courthope's History of English Poetry, i. (1895), T. F. Henderson's

Scottish Vernacular Literature (1898), and J. H. Millar's Literary History oj 'Scotland (1903). Forthe language of the poems see G. Gregory Smith's Specimens of Middle Scots (1902). (G. G. S.)

DOUGLAS, SIR HOWARD, Bart. (1776-1861), British general, younger son of Admiral Sir Charles Douglas, was born at Gosport in 1776, and entered the Royal Military Academy in 1790. He was commissioned second lieutenant in the Royal Artillery in 1794, becoming first lieutenant a few months later. In 1795 he was shipwrecked while in charge of a draft for Canada, and lived with his men for a whole winter on the Labrador coast. Soon after his return to England in 1799 he was made a captain- lieutenant, and in the same year he married. In his regimental service during the next few years, he was attached to all branches of the artillery in succession, becoming captain in 1804, after which he was placed on half-pay to serve at the Royal Military College. Douglas was at this time (1804) appointed to a majority in the York Rangers, a corps immediately afterwards reduced, and he remained on the roll of its officers until promoted major-general. The senior department of the R.M.C. at High Wycombe, of which he was in charge, was the forerunner of the Staff College. Douglas, since 1806 a brevet lieutenant-colonel, served in 1808-1809 in the Peninsula and was present at Corunna, after which he took part in the Walcheren expedition. In 1809 he succeeded to the baronetcy on the death of his half-brother, Vice-admiral Sir William Henry Douglas. In 1812 he was employed in special missions in the north of Spain, and took part in numerous minor operations in this region, but he was soon recalled, the home government deeming his services indispensable to the Royal Military College. He became brevet colonel in 1814 and C.B. in 1815. In 1816 appeared his Essay on the Principles and Construction of Military Bridges (subsequent editions 1832, 1853) ; in 18 1 9, Observations on the Motives, Errors and Tendency of M. Carnot's System of Defence, and in the following year his Treatise on Naval Gunnery (of which numerous editions and translations appeared up to the general introduction of rifled ordnance). In 18 2 1 he was prompted major-general. Douglas's criticisms of Carnot led to an important experiment being carried out at Woolwich in 1822, and his Naval Gunnery became a standard text-book, and indeed first drew attention to the subject of which it treated. From 1823 to 1831 Sir Howard Douglas was' governor of New Brunswick, and, while there, he had to deal with the Maine boundary dispute of 1828. He also founded Fredericton College, of which he was the first chancellor. On his return to Europe he was employed in various missions, and he published about this time Naval Evolutions, a

controversial work dealing with the question of " breaking the line " (London, 1832). From 1835 to 1840 Douglas, now a G.C.M.G., was lord high com- missioner of the Ionian Islands, where, amongst other reforms, he introduced a new code of laws. In 1837 he became a lieutenant- general, in 1840 a K.C.B., in 1841 a civil G.C.B., and in 1851 a general. From 1842 to 1847 Douglas sat in parliament, where he took a prominent part in debates on military and naval matters and on the corn laws. He was frequently consulted on important military questions. His later works included Observations on the Modem System of Fortification, &c. (London, 1859), and Navdl Warfare Under Steam (London, 1858 and i860). He died on the 9th of November 1861 at Tunbridge Wells. Sir Howard Douglas was a F.R.S., one of the founders of the R.G.S., and an honorary D.C.L. of Oxford University. Shortly before his death he declined the offer of a military G.C.B.

See S. W. Fullom, Life of SirHowdrd Douglas (London, 1862), and Gentleman's Magazine, 3rd series, xii. 90-92.

DOUGLAS, JOHN (1721-1807.), Scottish man of letters and Anglican bishop, was the son of a small shopkeeper at Pittenweem, Fife, where he was born on the 14th of July 1721. He was

educated at Dunbar and at Balliol College, Oxford, where he took his M.A. degree in 1743, and as chaplain to the 3rd regiment of foot guards he was at the battle of Fontenoy, 1745. He then returned to Balliol as a Snell exhibitioner; became vicar of High Ercall, Shropshire, in 1750; canon of Windsor, 1762; bishop of Carlisle, 1787 (and also dean of Windsor, 1788); bishop of Salisbury, 1791. Other honours were the degree of D.D., 1758, and those of F.R.S. and F.S.A. in 1778. Douglas was not con- spicuous as an ecclesiastical administrator, preferring to his livings the delights of London in winter and the fashionable watering- places in summer. Under the patronage of the earl of Bath he entered into a good many literary controversies, vindicating Milton from W. Lauder's charge of plagiarism (1750), attacking David Hume's rationalism in his Criterion of Miracles (1752), and the Hutchinsonians in his A pology for the Clergy (1755). He also edited Captain Cook's Journals, and Clarendon's Diary and Letters (1 763) . He died on the 18th of May 1807, and a volume of Miscellaneous Works, prefaced by a short biography, was published in 1820.

DOUGLAS, STEPHEN ARNOLD (1813-1861), American statesman, was born at Brandon, Vermont, on the 23rd of April 1813. . His father, a physician, died in July 1813, and the boy was under the

care of a bachelor uncle until he was fourteen, when his uncle married and Douglas was thrown upon his own resources. He was apprenticed to a cabinetmaker in Middlebury, Vt., and then to another in Brandon, but soon abandoned this trade. He attended schools at Brandon and Canandaigua (N. Y.), and began the study of law. In 1833 he went West, and finally settled in Jacksonville, Illinois, where he was admitted to the bar in March 1834, and obtained a large practice. From the first he took an active interest in politics, identifying himself with the Jackson Democrats, and his rise was remarkably rapid even for the Middle West of that period. In February 1835 he was elected public prosecutor of the first judicial circuit, the most important at that time in Illinois; in 1835 he was one of several Democrats in Morgan county to favour a state Democratic convention to elect delegates to the national convention of 1836 — an important move toward party regularity; in December 1836 he became a member of the state legislature. In 1837 he was appointed by President Van Buren registrar of the land office at Springfield, which had just become the state capital. In 1840 he did much to carry the state for Van Buren; and for a few months he was secretary of state of Illinois. He was a judge of the supreme court of Illinois from 1 841 to 1843- I n !843 he was elected to the national House of Representatives.

In Congress, though one of the youngest members, he. at once sprang into prominence by his clever defence of Jackson during the consideration by the House of a bill remitting the fine imposed on Jackson for contempt of court in New Orleans. He Was soon recognized as one of the ablest and most energetic of the Democratic leaders. An enthusiastic believer in the destiny of his country and more especially of the West, and a thorough- going expansionist, he heartily favoured in Congress the measures which resulted in the annexation of Texas and in the Mexican War — in the discussion of the annexation of Texas he suggested as early as 1845 that the states to be admitted should come in slave or free, as their people should vote when they applied to Congress for admission, thus foreshadowing his doctrine of "Popular Sovereignty." He took an active share in the Oregon controversy, asserting his unalterable determination, in spite of President Polk's faltering from the declaration of his party's platform, not to," yield up one inch " of the territory to Great Britain, and advocating its occupation by a military force; indeed he consistently regarded Great Britain as the natural and foremost rival of the United States, the interests of the two nations, he thought, being always opposed, and few senators fought more vigorously the Clayton-Bulwer Treaty or Great Britain's

reassertion of the right of search on the high seas. He ardently supported the pohcy of making Federal appropriations (of land, but not of money) for internal improvements of a national character, being a prominent advocate of the con- struction, by government aid, of a trans-continental railway,

■*and the chief promoter (1850) of the Illinois Central; in 1854 he suggested that Congress should impose tonnage duties from which towns and cities might themselves pay for harbour improvement, &c. To him as chairman of the committee on territories, at first in the House, and then in the Senate, of which he became a member in December 1847, it fell to introduce the bills for admitting Texas, Florida, Iowa, Wisconsin, Minnesota, California and Oregon into the Union, and for organizing the territories of Minnesota, Oregon, New Mexico, Utah, Washington, Kansas and Nebraska. In 1848 he introduced a bill proposing that all the territory acquired from Mexico should be admitted into the Union as a single state, and upon the defeat of this bill proposed others providing for the immediate admission of parts of this territory.*

In the bitter debates concerning the keenly disputed question of the permission of. slavery in the territories, Douglas was particularly prominent. Against slavery itself he seems never to have had any moral antipathy; he married (1847) the daughter 1 of a slaveholder, Colonel Robert Martin of North Carolina, and a cousin of Douglas's colleague in Congress, D. S. Reid; and his wife and children were by inheritance the owners of slaves^ though he himself never was. He did more probably than any other one man, except Henry Clay, to secure the adoption of the Compromise Measures of 1850. In 1849 the Illinois legislature demanded that its representatives and senators should vote for the prohibition of slavery in the Mexican cession, but next year this sentiment in Illinois had grown much weaker, and, both there and in Congress, Douglas's name was soon to become identified with the so-called " popular sovereignty " or " squatter sovereignty " theory, previously enunciated by Lewis Cass, by which each territory was to be left to decide for itself whether it should or should not have slavery. In 1850 his power of specious argument won back to him his Chicago constituents who had violently attacked him for not opposing the Fugitive Slave Law.

The bill for organizing the territories of Kansas and Nebraska, which

Douglas reported in January 1854 and which in amended form was signed by the president on the 30th of May, reopened the whole slavery dispute — wantonly, his enemies charged, for the purpose of securing Southern support, — and caused great popular excitement, as it repealed the Missouri Compromise, and declared the people of " any state or territory " " free to form and regulate their domestic institutions in their own way, subject only to the Constitution of the United States. V The passage of this Kansas- Nebraska Bill, one of the most momentous in its consequences ever passed by the Federal Congress, was largely a personal triumph for Douglas, who showed marvellous energy, adroitness and resourcefulness, and a genius for leadership. There was great indignation throughout the free states; and even in Chicago Douglas was unable to win for himself a hearing before a public meeting. In 1852, and again in 1856, he was a candidate for the presidential nomination in the national Democratic convention, and though on both occasions he was unsuccessful, he received strong support. In 1857 he broke with President Buchanan and the " administration " Democrats and lost much of his prestige in the South, but partially restored himself to favour in the North, and especially in Illinois, by his vigorous opposition to the method of voting on the Lecompton constitution, which he maintained to be fraudulent, and (in 1858) to the admission of Kansas into the Union under this constitution. In 1858, when the Supreme Court, after the vote of Kansas against the Lecompton con- stitution, had decided that Kansas was a" slave "territory, thus quashing Douglas's theory of " popular sovereignty," he engaged in Illinois in a close and very exciting contest for the senatorship with Abraham Lincoln, the Republican candidate, whom he met in a series of debates (at Ottawa, Freeport, Jonesboro, Charleston, Galesburg, Quincy and Alton), in one of which, that at Freeport, Douglas was led to declare that any territory, by " unfriendly

1 Her death in 1853 was a great blow to him and embittered him. In November 1856 he married Adele Cutts, a Maryland belle, a grand-niece of Dolly Madison, and a Roman Catholic, who became the leader of Washington: society, especially in the Vviniter of 1857-1858, when Douglas was in revolt against Buchanan.

legislation," could exclude slavery, no matter what the action of the Supreme Court. This, the famous " Freeport Doctrine," lost to Douglas the support of a large element of his party in the South, and in Illinois his followers did not poll so large a vote as Lincoln's. Douglas, however, won the senatorship by a vote in the legisla- ture of 54 to 46. In the Senate he was not reappointed chairman of the committee on territories. In i860 in the Democratic national

convention in Charleston the adoption of Douglas's platform brought about the withdrawal from the convention of Alabama, Mississippi, Louisiana, South Carolina, Florida, Texas and Arkansas. The convention adjourned to Baltimore, where the Virginia, North Carolina, Tennessee, Kentucky and Maryland delegations left it, and where Douglas was nominated for the presidency by the Northern Democrats; he campaigned vigorously but hopelessly, boldly attacking disunion, and in the election, though he received a popular vote of 1,376,957, he received an electoral vote of only 12 — Lincoln receiving 180. Douglas urged the South to acquiesce in Lincoln's election. On the outbreak of the Civil War, he denounced secession as criminal, and was one of the strongest advocates of maintaining the integrity, of the Union at all hazards. At Lincoln's request he undertook a mission to the border states and the North-west to rouse the spirit of Unionism; he spoke in West Virginia, Ohio and Illinois. He died on the 3rd of June 1861 at Chicago, where he was buried on the shore of Lake Michigan; the site was afterwards bought by the state, and an imposing monument with a statue by Leonard Volk now stands over his grave.

In person Douglas was conspicuously small, being hardly five feet in height, but his large head and massive chest and shoulders gave him the popular sobriquet " The Little Giant." His voice was strong and carried far, he had little grace of delivery, and his gestures were often violent. As a resourceful political leader, and an adroit, ready, skilful tactician in debate, he has had few equals in American history,

See Allen Johnson's Stephen A. Douglas: A Study in American Politics (New York, 1908), W. G. Brown's Stephen Arnold Douglas (Boston, 1902), and an excellent review of his later life in James Ford Rhodes's History of the United States from the Compromise of 1850 (New York, 1893-1906); also P. O. Ray, Repeal of the Missouri Compromise (Cleveland, Ohio, 1909), and E. C. Carr, Stephen A. Douglas (Chicago, 1909).

DOUGLAS, the capital of the Isle of Man, a municipal borough and a favourite watering-place. Pop. (1901) 19,223. It stands on a fine semicircular bay on the east coast of the island, at the common mouth of two streams, the Awin-Dhoo and Awin-Glass, 62 m. W.N.W. of Fleetwood and 80 m. N.W. of Liverpool. The older streets are irregular and narrow, but the town has greatly extended in modern times, with numerous terraces of good dwelling-houses. A fine parade sweeps round the bay, which, from Derby Castle on the north to Douglas Head on the south, has a circuit exceeding 2 m.

Low hills, penetrated by the valleys of the Dhoo and Glass, encircle the town on the north, west and south, the southern spur projecting seaward in the promontory of Douglas Head. The harbour, in the river mouth, lies immediately north of this; vessels drawing 9 ft. may enter it during neap tides, and those drawing 13 ft. during spring tides. A castellated building, called the Tower of Refuge, erected in 1832, marks the dangerous Conister rocks, north of the harbour entrance. The Battery pier protects the entrance on the south- west, and there is a short pier (the Red pier) within the harbour, while the Victoria pier on the north, at which passengers can land and embark at all heights of the tide, was erected in 1872. There is regular daily communication with Liverpool by the steamers of the Isle of Man Steam Packet Company, and during the season there are connexions with Fleetwood, Barrow, Dublin, Belfast and Glasgow. Douglas is connected by electric tramway north- ward with Laxey, the summit of the mountain of Snaefell and Ramsey, and southward with Port Soderick, while the Isle of Man railway runs to Peel in the west, and Castletown and Port Erin in the south-west. The town has services of cable and horse trams. The various popular attractions of Douglas include theatres, dancing halls, a race-course and two golf links Howstrake and Quarter Bridge. The shore of the bay is of firm

sand (covered at high tide) , and the sea-bathing is good. Among buildings and institutions in Douglas may be mentioned the legislative buildings (1893), the town hall (1899), the large free library, the court house and the Isle of Man hospital. Castle Mona, erected in 1804 by John, 4th duke of Arrol and lord of Man, is transformed into an hotel. St George's church, the oldest remaining in Douglas, dates from 1 780. Douglas was incorporated in 1895, and is governed by a mayor, six aldermen and eighteen councillors.

DOUGLAS, a village of Lanarkshire, Scotland. Pop. (1901) 1 206. It is situated on Douglas water, 3 m. from Douglas station on the branch line from Carstairs to Ayr, n m. by road S.S.W. of Lanark. It is a place of ancient aspect, bearing evident signs of decay, but possesses peculiar interest as the original home of the great Douglas family. Of the old castle, Scott's Castle Dangerous, only a tower exists. The stronghold repeatedly changed hands during the wars waged against Edward I. for the independence of Scotland. The modern castle is the seat of the earl of Home. Only the choir and spire remain of the 12th-century church of St Bride, the patron saint

of the Douglases. The vault beneath the choir was, until 1761, the burial-place of the family, and it contains a silver case said to hold the ashes of the heart of the " good Sir James " (1286-1330). In i879thechoir was restored and the tombs (including that of Sir James Douglas) repaired. David Hackston of Rathillet, the Covenanter, is stated to have been captured in the village (in a house still standing) after the battle of Aird's Moss in 1680. On the hill of Auchensaugh (1286 ft.), 2% m. S.E., the Cameronians assembled in 1712 to renew the Solemn League and Covenant. This gathering, the "Auchensaugh Wark," as it was called, led up to the secession of the Reformed Presbyterians from the Kirk.

DOUGLASS, FREDERICK (1817-1895), American orator and journalist, was born in Tuckahoe, Talbot county, Maryland, probably in February 181 7. His mother was a negro slave of exceptional intelligence, and his father was a white man. Until nearly eight years of age, he was under the care of his grand-mother; then he lived for a year on the plantation of Colonel Edward Lloyd, of whose vast estate his master, Captain Aaron Anthony, was manager. After a year he was sent to Baltimore, where he lived in the family of Hugh Auld, whose brother, Thomas, had married the daughter of Captain Anthony; Mrs Auld treated him with marked kindness and without her husband's knowledge began teaching him to read. With money secretly earned by blacking boots he purchased his first book, the Columbian Orator; he soon learned to write " free passes " for runaway slaves. Upon the death of Captain Anthony in 1833, he was sent back to the plantation to serve Thomas Auld, who hired him out for a year to one Edward Covey, who had a wide reputation for disciplining slaves, but who did not break Frederick's spirit. Although a new master, William Freeland, who owned a large plantation near St Michael's, Md., treated him with much kindness, he attempted to escape in 1836, but his plans were suspected, and he was put in jail. From lack of evidence he was soon released, and was then sent to Hugh Auld in Baltimore, where he was apprenticed as a ship caulker. He learned his trade in one year, and in September 1838, masquerad- ing as a sailor, he escaped by railway train from Baltimore to New York city. For the sake of greater safety he soon removed to New Bedford, Massachusetts, where he changed his name from Frederick Augustus Washington Bailey to Frederick Douglass, " Douglass " being adopted at the suggestion of a friend who greatly admired Scott's Lady of the Lake. For three years he worked as a day labourer in New Bedford. An extempore speech made by him before an anti-slavery meeting at Nantucket, Mass., in August 1 84 1 led to his being appointed one of the agents of the Massachusetts Anti-

Slavery Society, and in this capacity he delivered during the next four years numerous addresses against slavery, chiefly in the New England and middle states. To quiet the suspicion that he was an impostor, in 1845 he published the Narrative of the Life of Frederick Douglass, an American Slave. Fearing his recapture, his friends persuaded him to go to England, and from August 1845 to April 1847 he lectured in Ireland,

Scotland and England, and did much to enlist the sympathy of the British public with the Abolitionists in America. Before his return a sum of £150 was raised by subscription to secure his legal manumission, thus relieving him from the fear of being returned to slavery in pursuance of the Fugitive Slave Law. From 1847 to i860 he conducted an anti-slavery weekly journal, known a,sThe North Star, and later as Frederick Douglass's Paper, at Rochester, New York, and, during this time, also was a frequent speaker at anti-slavery meetings. At first a follower of Garrison and a disunionist, he allied himself after 1851 with the more conservative political abolitionists, who, under the leader- ship of James G. Birney, adhered to the national Constitution and endeavoured to make slavery a dominant political issue. He disapproved of John Brown's attack upon Harper's Ferry in 1859, and declined to take any part'in it. During the Civil War he was among the first to suggest the employment of negro troops by the United States government, and two of his sons served in the Union army. After the war he was for several years a popular public lecturer; in September 1866 he was a delegate to the national Loyalist convention at Philadelphia; and in 1869 he became the editor, at Washington, of a short-lived weekly paper, The New National Era, devoted to the interests of the negro race. In 1871 he was assistant secretary of the Santo Domingo commission, appointed by President Grant. He was marshal of the District of Columbia from 1877 to 1881, was recorder of deeds for the district from 1881 to 1886, and from 1889 to 1891 was the American minister resident and consul-general in the Republic of Haiti. He died in Anacostia Heights, District of Columbia, on the 20th of February 1895. He was widely known for his eloquence, and was one of the most effective orators whom the negro race has produced in America.

His autobiography appeared, after two revisions, as The Life and Times of Frederick Douglass (London, 1882). See F. M. Holland, Frederick Douglass, The Colored Orator (New York, 1891); C. W. Chesnutt, Frederick Douglass, (Boston, 1899); and Booker T. Washington, Frederick Douglass (Philadelphia, 1907), in the series of American Crisis Biographies.

DOUKHOBORS, a name given by the Russian Orthodox clergy to a community of nonconformist peasants. The word etymo- logically signifies " spirit-fighters," being originally intended by the priesthood to convey that they fight against the Spirit of God; but the Doukhobors themselves accepted the term as signifying that they fight, not against, but for and with the Spirit. Of late, however, they have decided to give up this name and call themselves " Christians of the Universal Brotherhood." This religious community was first heard of in the middle of the 18th century. By the end of that century or the beginning of the 19th their doctrine had become so clearly defined, and the number of their members had so greatly increased, that the Russian govern- ment and Church, considering this sect to be peculiarly obnoxious, started an energetic campaign against it. The foundation of the Doukhobors' teaching consists in the belief that the Spirit of God is present in the soul of man, and directs him by its word within him. They understand the coming of Christ in the flesh, his works, teaching and sufferings, in a spiritual sense. The object

illiterate and did not possess any written book. They found alike their mutual relations and their relations to other people — and not only to people, but to all living creatures — exclusively on love, and therefore they hold all people equal and brethren. They extend this idea of equality also to the government authorities, obedience to whom they do not consider binding upon them in those cases when the demands of these authorities are in conflict with their conscience; while in all that does not infringe what they regard as the will of God they willingly fulfil the desire of the authorities. They consider killing, violence, and in general all relations to living beings not based on love as opposed to their conscience and to the will of God. They are industrious and abstemious in their lives, and when living up to the standard of their faith they present one of the nearest approaches to the realization of the Christian ideal which have ever been attained. In many ways they have thus a close resemblance to the Quakers or Society of Friends. For these beliefs and practices the Doukhobors long endured cruel persecution. Under Nicholas I., in the years 1840 and 1850, the Doukhobors, who on religious grounds refused to participate in military service, were all banished from the government of Tauris — whither they had been previously transported from various parts of Russia by Alexander I. — to Transcaucasia, near the Turkish frontier. But neither the severe climate nor the neighbourhood of wild and warlike hillmen shook

their faith, and in the course of half a century, in one of the most unhealthyandunfertile localities in the Caucasus, they trans- formed this wilderness into flourishing colonies, and continued to live a Christian and laborious life, making friends with, instead of fighting, the hillmen. But the wealth to which they attained in the Caucasus weakened for a time their moral fervour, and little by little they began to depart somewhat from the require- ments of their belief. As soon, however, as events happened among them which disturbed their outward tranquillity, the religious spirit which had guided their fathers immediately revived within them. In 1887, in the reign of the tsar Alexander III., universal military service was introduced in the Caucasus; and even those for whom, as in the case of the Doukhobors, it had formerly been replaced with banishment, were called upon to serve. This measure took the Doukhobors unawares, and at first they outwardly submitted to it. About the same time, by the decision of certain government officials, the right to the possession of the public property of the Doukhobors (valued at about £50,000) passed from the community to one of their members, who had formed out of the more demoralized Doukhobors a group of his own personal adherents, which was henceforth called the " Small Party." Soon afterwards several of the most respected representatives of the community were banished to the govern- ment of Archangel. This series of calamities was accepted by the Doukhobors as a punishment from God, and a spiritual awaken- ing of a most energetic character ensued. The majority (about 1 2,000 in number) resolved to revive in practice the traditions left them by their fathers, which they had departed from during the period of opulence. They again renounced tobacco, wine, meat and every kind of excess, many of them dividing up all their property in order to supply the needs of those who were in want, and they collected a new public fund. They also renounced all participation in acts of violence, and therefore refused military service. In confirmation of their sincerity, in the summer of 1895 the Doukhobors of the " Great Party," as they were called in distinction from the " Small Party," burnt all the arms which they, like other inhabitants of the Caucasus, had taken up for their protection from wild animals, and those who were in the army refused to continue service. At the commencement of the reign of the tsar Nicholas II., in 1895, the Doukhobors became the victims of a series of persecutions, Cossack soldiers plundering, insulting, beating and maltreating both men and women in every way. More than 400 families of Doukhobors who were living in the province of Tiflis were ruined and banished to Georgian villages. Of 4000 thus exiled, more than 1000 died in the course of the first two years from exhaustion and disease; and more would have perished had not information

reached Count Leo Tolstoy and his friends, and through them the Society of Friends viii. 15

in England. Funds were immediately raised by sympathizers for alleviating the sufferings of the starving victims. At the same time an appeal, written by Tolstoy and some of his friends, requesting the help of public opinion in favour of the oppressed Doukhobors, was circulated in St Petersburg and sent to the emperor and higher governmentofficials. The Doukhobors them- selves asked for permission to leave Russia, and the Society of Friends petitioned the emperor to the same effect. In March 1898 the desired permission was granted, and the first party of Doukhobors, 1126 in number, were able in the summer of 1898 to sail from Batum for Cyprus, which was originally chosen for their settlement because at that time funds were not sufficient for transferring them to any otherBritishterritory. But as contribu- tions accumulated, it was found possible to send a number of Doukhobor emigrants to Canada, whither they arrived in two parties, numbering above 4000, in January 1899. They were joined in the spring of the same year by the Cyprus party, and another party of about 2000 arrived from the Caucasus. In all about 7500 Doukhobor immigrants arrived in Canada. The Canadian government did their best to facilitate the immigration, and allotted land to the Doukhobors in the provinces of Assiniboia near Yorktown and of Saskatchewan near Thunder Hill and Prince Albert. They were very cordially received by the population of the Canadian port towns. In April 1 90 1 , in the Canadian House of Commons, the minister of justice made a statement about them in which he said that " not a single offence had been committed by the Doukhobors; they were law-abiding, and if good conduct was a recommendation, they were good immigrants. . . . The large tracts of land demanded population, and if they were not given to crime, the conclusion was that they would make good citizens." About eighteen months after they arrived in Canada the Doukhobors sent the Society of Friends a collective letter in which they sincerely thanked the English and American Friends for all the generous help of every kind they had received at their hands, but begged the Quakers to cease sending them any more pecuniary support, as they were now able to stand on their own feet, and therefore felt it right that any further help should be directed to others who were more in need of it. At Yorktown in the summer of 1907 the Doukhobors established one of the largest and best brick-making plants in Canada, a significant testimony to the way in which the leaders of the community were working in the interests of the whole. Now and again small bodies broke off from the main

community and adopted a semi-nomadic life, but these formed a very small percentage of the total number, which in 1908 was over 8000.

See also Christian Martyrdom in Russia, by V. Tchertkoff (The Free Age Press, Christchurch, Hants) ; Aylmer Maude, A Peculiar People, the Doukhobors. (V. T.)

DOULLENS, a town of northern France, capital of an arrondissement in the department of Somme, on the Authie, 27 m. N of Amiens by rail. Pop. (1906) 4495. It has a citadel of the 15th and 16th centuries which has often served as a state prison and is now used as a reformatory for girls. There are also a belfry of the 17th century and two old churches. The town is the seat of a sub-prefect and has a tribunal of first instance; it has trade in phosphates, of which there are workings in the vicinity, and carries on cotton-spinning and the manufacture of leather, paper and sugar. Doullens, the ancient Dulincum, was seat of a viscountship and an important stronghold in the middle ages. In 147 sit was burnt by Louis XL for openly siding with the house of Burgundy. In 1595 it was besieged and occupied by the Spaniards, but was restored to France by the treaty of Vervins

(iS98).

DOULTON, SIR HENRY (1820-1897), English inventor and manufacturer of pottery, born in Vauxhall on the 25th of July 1820, was from the age of fifteen actively employed in the pottery works of his father, John Doulton, at Lambeth. One of the first results of his many experiments was the production of good enamel glazes. In 1846 he initiated in Lambeth the pipe works, in which he superintended the manufacture of the drainage and sanitary appliances which have helped to make the firm of Doulton famous. In 1870 the manufacture of " Art pottery "

was begun at Lambeth, and in 1877 works were opened at Burslem, where almost every variety of china and porcelain, as well as artistic earthenware, has been produced. Works have since been opened at Rowley Regis, Smethwick, St Helens, Paisley and Paris. After the Paris exhibition of 1878 Henry Doulton was made a chevalier of the Legion of Honour. In 1872 the " Art department " was instituted in the Doulton works, giving employment to both male and female artists, amongst whom such workers as George Tinworth and the

Misses Barlow have obtained a reputation outside their immediate sphere. In

1887 Doulton received the honour of knighthood, and a few years later was awarded the Albert medal by the Society of Arts. He married in 1849 the daughter of Mr J. L. Kennaby; she died in 1888. Sir Henry Doulton took an active interest, as almoner, in St Thomas's hospital. He died in London on the 18th of November 1897.

DOUMER, PAUL (1857-), French politician, was born at Aurillac. He studied law and made his d£but in politics as chef de cabinet to Floquet, when president of the chamber in 1885. In

1888 he was elected Radical deputy for the department of the Aisne. Defeated in the general elections of September 1889, he was elected again in 1890 by the arrondissement of Auxerre. As minister of finance in the Bourgeois cabinet (from the 3rd of November 1895 to the 21st of April 1896) he tried without suc- cess to introduce an income-tax. In January 1897 he became governor of Indo-China, where he carried out important public works. In 1902 he returned to France and was elected by Laon to the chamber as a Radical. He refused, however, to support the Combes ministry, and formed a Radical dissident group, which grew in strength and eventually caused the fall of the ministry. Doumer became a prominent personage in Paris and was elected president of the chamber in January 1905, being re-elected in January 1906. At the presidential election of the 17th of January 1 906 he was a candidate in opposition to M. Fallieres and obtained only 371 votes against 449; and the new chamber passed him over as its new president in favour of Henri Brisson. As an author he is known by his L'Indo-Chine franchise (1904), and Le Livre de mes fits (1906) .

DOUMIC, RENE (i860-), French critic and man of letters, was born in Paris, and after a distinguished career at the Ecole Normale began to teach rhetoric at the College Stanislas. He was a contributor to the Moniteur, the Journal des DZbats and the Revue bleue, but was best known as the independent and un- compromising literary critic of the Revue des Deux Mondes. His works. include : Elements d'histoire litteraire (1888); Portraits d'icrivains (1892); De Scribe a Ibsen (1893); Scrivains d'aujour- d'hui (1894) ; Etudes sur la littirature jrancaise (5 vols., 1896- 1905); Les Jeunes (1896); Essais sur le tM&tre conlemporain (1897); Les Hommes et les idSes du XlX'siecle (1903); and an edition of the Lettres d'Elvire a Lamartine (1905).

DOUNE, a police burgh of Perthshire, Scotland, 8| m. N.W. of Stirling by the Caledonian railway. Pop. (1901) 930. It is Situated on the left bank of the Teith, here crossed by the bridge built in 1535 by Robert Spittal, tailor to James IV. The town was once famous for its pistols and sporrans (as the purses worn with the kilt are called), which were in great request by the clansmen of the Highlands. Doune Castle, now in ruins, occupies a commanding position on the Teith, at the point where it is joined by the Ardoch. It is believed to have been built by Murdoch, 2nd duke of Albany (d. 1425), and was sometimes a residence of the sovereigns, among them James V. and Queen Mary. A nephew of Rob Roy held it for Prince Charlie, and it figures in Scott's Waverley. It belongs to the earl of Moray (Murray) , who derives from it his title of Lord Doune, and was the home of James Stewart, the " bonnie earl " of Moray, murdered at Donibristle in Fife by the earl of Huntly (1592). The braes of Doune lie to the north-west of the town and extend towards Uam . Var. Deanston (pop. 65 2) , 1 m. S. W. of Doune, on the right bank of the Teith, was the scene of the labours of James Smith (1789- 1850), the agricultural engineer, who was also manager of the cotton mills established there in 1 785. On his farm Smith carried out his experiments in deep and thorough draining, and also

invented a reaping machine, the subsoil plough and numerous other valuable appliances.

DOURO (Span. Duero, Port. Douro, anc. Durius), a river of the Iberian Peninsula. The Douro rises south of the Sierra de la Demanda, in the Pico de Urbion, an isolated mountain mass 7389 ft. high. It describes a wide curve eastwards past Soria, then flows westward across the Castilian table-land, passing south of Valladolid, with Toro and Zamora on its right bank; then from a point 3 m. E. of Paradella to Barca d'Aiva it flows south-west and forms the frontier between Spain and Portugal for 65 m. It crosses Portugal in a westerly direction through a narrow and tortuous bed, and enters the Atlantic 3 m. below Oporto at Sao Joao da Foz. . The length of the Douro, which is greater than that of any other Iberian river except the Tagus and Guadiana, is probably about 485 m.; but competent authorities differ Widely in their estimates, the extremes given being 420 and 507 m. In Spain the Douro receives from the right the rivers Pisuerga, Valderaduey and Esla, and from the left several small streams which drain the Sierra Guadarrama, besides the more important rivers Adaja, Tormes and Yeltes; in Portugal it receives the Agueda, Coa and'Paiva from the left, and the Sabor, Tua and Tamega from the right. The area drained by the Douro and its tributaries is upwards of 37,500 sq. m., and includes the greater part

of the vast plateau of Old Castile, between the water- sheds of the Cantabrian Mountains, on the north, and the Guadarrama, Gredos, Gata and Estrella ranges; on the south. The lower stream is beset with numerous rapids, called pontos, and is subject to swift and violent inundations. On this account navigation is attended with difficulties and risks between its mouth and Barca d'Aiva; but a railway, running for the most part along the right bank, skirts the river during the greater part of its course through Portugal. The mouth of the river is partly blocked by a sandy bar; only ships of light draught can enter, while those of greater burden are accommodated at the harbour of Leixoes, an artificial basin constructed about 3 m. N. On its way through Portugal the Douro traverses the Paiz do Vinho, one of the richest wine-producing territories in the world; large quantities of wine are conveyed to Oporto 1 in sailing boats. The Douro yields an abundance of fish, especially trout, shad and lampreys.*

DOUROUCOULI, apparently the native name (perhaps derived from their cries) of a small group of American monkeys ranging from Nicaragua to Amazonia and eastern Peru, and forming the genus Nyctipithecus. In addition to the absence of prehensile power in their tails, douroucoulis, also known as night-apes, are distinguished by their large eyes, the sockets of which occupy nearly the whole front of the upper part of the skull, the partition between the nostrils being in consequence narrower than usual. The ears are short, and the hair round the eyes forms a disk. Douroucoulis live in parties, and are purely nocturnal, sleeping during the day in hollow trees, and coming out at night to feed on insects and fruits, when they utter piercing cat-like screams.

DOUSA, JANUS [Jan van der Does], lord of Noordwyck (1545-1604), Dutch statesman, historian, poet and philologist, and the heroic defender of Leiden, was born at Noordwyck, in the province of Holland, on the 6th of December 1545. He began his studies at Lier in Brabant, became a pupil of Henry Junius at Delft in 1 560, and then passed on in succession to Louvain, Douai and Paris. Here he studied Greek under Pierre Dorat, professor at the College Royal, and became acquainted with the chancellor L'Hdpital, Turnebus, Ronsard and other eminent men. On his return in 1565 he married Elizabeth van Zuylen. His name stands in the list of nobles who in that year formed a league against Philip II. of Spain, but he does not appear to have taken any active part in public affairs till 1572, when he was sent as a member of an embassy to England. He was not, however, at first very eager to commit himself to the fortunes of William the Silent, prince of Orange, but having once

chosen his side, he threw himself heart and soul into the struggle for freedom from the Spanish yoke. Fortunately for Leiden he was residing in the town at the time of the famous siege. He held no post in the government, but in the hour of need he, though not trained to

DOVE

Plate I.

3

ROCK DOVE OR BLUE ROCK PIGEON, Columba livia.

*AM ” R1CA L U W D CAR f !ER PIGE ° N ‘ RI * G D °VE OR WOOD PIGEON;*

*,., , , * Columba palumbus.*

(After the coloured drawings by Mmc. K„ip (Pauline de CourcelUs), paintef to the Empress Marie Louise, m Les P tg eon S VI”. 450. I ext by C. J. Themminck, Paris, 181 1.)

Plate II.

DOVE

Photographs of two typical pedigree Homing or Racing Pigeons, colours black and blue chequer, bred and shown by Frederick Romer, Esq., prize-winners in races from France to England.

- *By ixrrmissioQ of the proprietors of the Racing Pigeon*

DOUVILLE-ˆDOVE

4Si

arms, took the command of a company of troopsˆ His fearlessness and unshaken resolution had no small influence in encouraging the regents and the citizens to prolong the defence. On the foundation of the university of Leiden by William the Silent, Dousa was appointed first curator, and he held this office for nearly thirty years. Through his friendships with foreign scholars, he drew to Leiden many illustrious teachers and professors. After the assassination of the prince of Orange in 1584, Dousa undertook a private journey to England to try and persuade Queen Elizabeth to support the cause of

the states, and in 1585 he went at the head of a formal embassy for the same purpose. About the same time he was appointed keeper of the archives of Holland {registermeester van Holland), and the opportunities thus afforded him of historical research he turned to good account. He bad three sons and five daughters. All his sons acquired a reputation for learning, but two of them died before their lather. Dousa was author of several volumes of Latin verse and of philological commentaries on Horace, Plautus, Catullus and other Latin poets. His principal work is the Annals of Hohand, which first appeared in a metrical form in 1599, and was published in prose under the title of Bataviae Hollandiaeque am ties in 1601. Dousa also took part as editor or contributor in various other publications. He died at Noordwyck on the 8th of October 1604, and was interred at the Hague ; but no monument was erected to his memory till 1792, when one of his descendants placed a tomb to his • honour in the church of Noordwyck. 'There are good portraits of the Great Dousa, as he is often called, by Yisscher and Houbraken.

DOUVILLE, JEAN BAPTISTE (i7o 4 ?i837), French traveller, was born at Hambye, in the department of Manche. Having at an early age inherited a fortune, he decided to gratify his taste for foreign travel. According to his own profession he visited India, Kashmir, Khorasan, Persia, Asia Minor and many parts of Europe. In 1826 he went to South America, and in 1827 left Brazil for the Portuguese possessions on the West coast of Africa, where his presence in March 1828 is proved by the mention made of him in letters of Castillo Branco,' the governorˆgeneral of Loanda. In May 1831 he reappeared in France, claiming to have pushed his explorations into the very heart of central Africa. His story was readily accepted by the Societ6 de Geographie of Paris, which hastened to recognize his services by assigning him the great gold medal, and appointing him their secretary for the year 1832. On the publication of his narrative, Voyage au Congo et dans I'intSrieur de I'Afrique iquinoxiale, which occupied three volumes and was accompanied by an elaborate atlas, public enthusiasm ran high. Before the year 1832 was out, however, it was established that Douville's Voyage was romance and not verity. He had probably been inspired by the appearance of Rene Caillie's account of his journey to Timbuktu, and wished to obtain a share of the fame attaching to African explorers. Douville tried vainly to establish the truth of his story in Ma Offense (1832), and Trente moisde ma vie, ou quinze mois avanl et quinze mois apres mon voyage au Congo (1833). Mile Audrun, a lady to whom he was about to be married, committed suicide from grief at the disgrace; and the adventurer withdrew in 1833 to Brazil, and

proceeded to make explorations in the valley of the Amazon. According to Dr G. Gardner, in his Travels in the Interior of Brazil (1846), he was murdered in 1837 on the banks of the Sao Francisco for charging too high for his medical assistance. Douville may well have explored part of the pro vince of Angola, and Sir Richard Burton maintained that the Frenchman's descriptions of the country of the Congo were life- like; that his observations on the anthropology, ceremonies, customs and maladies of the people were remarkably accurate; and that even the native words used in his narrative were " for the most part given with unusual correctness." It has been shown, however, that the chief source of Douville's inspiration was a number of unpublished Portuguese manuscripts to which he had access.

DOUW (or Dow), GERHARD (1613-1680), Dutch painter, was born at Leiden on the 7th of April 1613. His first instructor in drawing and design was Bartholomew Dolendo, an engraver;

and he afterwards learned the art of glass-painting under Peter Kouwhoorn. At the age of fifteen he became a pupil of Rembrandt, with whom he continued for three years. From the great master of the Flemish school he acquired his skill in colouu- ing, and in the more, subtle effects of chiaroscuro; and the style of Rembrandt is reflected in several of his earlier pictures, notably in a portrait of himself at the age of twenty-two, in the Bridge- water House gallery, and in the " Blind Tobit going to meet his Son," at Wardour Castle. At a comparatively early point in his career, however, he had formed a manner of his own distinct from, and indeed- in some respects antagonistic to, that of his master. Gifted with unusual clearness of vision and precision of manipulation, he cultivated a minute and elaborate style of treatment ; and probably few painters ever spent more time and pains on all the details of their pictures down to the most trivial. He is said to have spent five days in painting a hand; and his work was so fine that he found it necessary to manufacture his own brushes. Notwithstanding the minuteness of his touch, how- ever, the general effect was harmonious and free from stiffness, and his colour was always admirably fresh and transparent. He was fond of representing subjects in lantern or candle light, the effects of which he reproduced with a fidelity and skill which no other master has equalled. He frequently painted by the aid of a concave mirror, and to obtain exactness looked at his subject through a frame crossed with squares of silk thread. His practice as a portrait painter, which was at first considerable, gradually declined, sitters being unwilling to give him the time that he deemed necessary. His pictures were always small in size, and represented chiefly subjects in still

life. Upwards of 200 are attributed to him, and specimens are to be found in most of the great public collections of Europe. His chef-d'oeuvre is generally considered to be the " Woman sick of the Dropsy," in the Louvre. The " Evening School," in the Amsterdam gallery, is the best example of the candlelight scenes in which he excelled. In the National Gallery, London, favourable specimens are to be seen in the " Poulterer's Shop," and a portrait of himself. Douw's pictures brought high prices, and it is said that President Van Spiring of the Hague paid him 1000 florins a year simply for the right of pre-emption. Douw died in 1680. His most celebrated pupil was Francis Mieris.

DOVE, a river of England, tributary to the Trent, rising in Axe Edge, Derbyshire, and through almost its entire course forming the boundary of that county with Staffordshire. In its upper course it traverses a fine narrow valley, where the limestone hills exhibit many picturesque cliffs, gullies and caves. Dovedale, that part of the valley which lies between Dove Holes and Thorpe Cloud (or with a wider significance between the towns of Harrington and Ashbourne) , is especially famous. Below Thorpe Cloud the Dove receives on the west the waters of the Manifold, which, like its tributary the Hamps, and other streams in the limestone district, has part of its course below ground. Near the village of Rocester the Churnet joins the Dove on the west, and then the course of the main stream, hitherto southerly, bends nearly easterly on passing Uttoxeter, and, winding through a widening valley, joins the Trent at Newton Solney, a short distance below Burton-on-Trent. The length of the valley is about 40 m. and the total fall of the river about 1450 ft. The Dove is well known for its trout-fishing, and the portion of the upper valley called Beresford Dale, below Harrington, has a special interest for fishermen through its associations with Izaak Walton and his friend Charles Cotton, whose fishing-house stands near the Pike Pool, a reach of the river with a lofty rock rising from its centre.

DOVE (Dutch duyve, Dan. due, Ice. dufa, Ger. Taube), a name most commonly applied by ornithologists to the smallei- members of the group of birds usually called pigeons (Columbae) ; but no sharp distinction can be drawn between pigeons and doves, and in general literature the two words are used almost indifferently, while no one species can be pointed out to which the word dove, taken alone, seems to be absolutely proper. The largest of the group to which the name is applicable is perhaps the ring-dove, or wood-pigeon, also called in many pa?ts of

Britain cushat and queest (Columba palumbus, Linn.), a very common bird throughout the British Islands and most parts of Europe. It associates in winter in large flocks, the numbers of which (owing partly to the destruction of predaceous animals, but still more to the modern system of agriculture, and the growth of plantations in many districts that were before treeless) have increased enormously. In former days, when the breadth of land in Britain under green crops was comparatively small, these birds found little food in the dead season, and this scarcity was a natural check on their superabundance. But since the extended cultivation of turnips and plants of similar use the case is altered, and perhaps at no time of the year has provender become more plentiful than in winter. The ring-dove may ■ be easily dis- tinguished from other European species by its larger size, and especially by the white spot on either side of its neck, forming a nearly continuous " ring," whence the bird takes its name, and the large white patches in its wings, which are very conspicuous in flight. It breeds several times in the year, making for its nest a slight platform of sticks on the horizontal bough of a tree, and laying therein two eggs — which, as in all the Columbae, are white. It is semi-dctaestic in the London parks.

The stock-dove (C. aenas of most authors) is a smaller species, with many of the habits of the former, but breeding by preference in the stocks of hollow trees or in rabbit-holes. It is darker in colour than the ring-dove, without any white on its neck or wirtgs, and is much less common and more locally distributed.

The rock-dove (C. livia, Temm.) much resembles the stock-dove, but is of a lighter colour, with two black bars on its wings, and a white rump. In its wild state it haunts most of the rocky parts of the coast of Europe, from the Faeroes to the Cyclades, and, seldom going inland, is comparatively rare. Yet, as it is without contradiction the parent-stem of all British domestic pigeons, its numbers must far exceed those of both the former put together. In Egypt and various parts of Asia it is represented by what Charles Darwin has called " wild races," which are commonly accounted good " species " (C. schimperi, C. afflnis, C. intermedia, C. leuconota, and so forth), though they differ from one another far less than do nearly all the domestic forms, of which more than 150 kinds that " breed true," and have been separately named, are known to exist. Very many of these, if found wild, would have unquestionably been ranked by the best ornithologists as distinct " species " and several of them would as undoubtedly have been placed in different genera. These various

breeds are classified by Darwin x in four groups as follows: —

Group I., composed of a single Race, that of the " Pouters," having the gullet of great size, barely separated from the crop, and often inflated, the body and legs elongated, and a moderate bill. The most strongly marked sub-race, the Improved English Pouter, is considered to be the most distinct of all domesticated pigeons.

Group II. includes three Races: — (1) " Carriers," with a long pointed bill, the eyes surrounded by much bare skin, and the neck and body much elongated; (2) " Runts," with a long, massive bill, and the body of great size; and (3) " Barbs," with a short, broad bill, much bare skin round the eyes, and the skin over the nostrils swollen. Of the first four and of the second five sub-races are distinguished.

Group III. is confessedly artificial, and to it are assigned five Races: — (1) " Fan-tails," remarkable for the extraordinary develop- ment of their tails, which may consist of as many as forty-two rectrices in place of the ordinary twelve; (2) " Turbits " and " Owls," with the feathers of the throat diverging, and a short thick bill; (3) " Tumblers," possessing the marvellous habit of tumbling backwards during flight, or, in some breeds, even on the ground, and having a short, conical bill; (4) " Frill-backs," in which the feathers are reversed; and (5) "Jacobins," with the feathers of the neck forming a hood, and the wings and tail long.

Group IV. greatly resembles the normal form, and comprises two Races: — (1) " Trumpeters," with a tuft of feathers at the base of the neck curling forward, the face much feathered, and a very peculiar voice, and (2) Pigeons scarcely differing in structure from the wild stock.*

Besides these some three or four other little-known breeds exist, and the whole number of breeds and sub-breeds almost defies computation. The difference between them is in many cases far

1 TheVariation of Animals and Plants under Domestication (London, 1868), vol. i. pp. 131-224.

from being superficial, for Darwin has shown that there is scarcely any part of the skeleton which is constant, and the modifications that have been effected in the proportions of the head and sternal apparatus are very remarkable. Yet the proof that all these different birds have descended from one common stock is nearly certain. Here

there is no need to point out its bearing upon the theory of natural selection. The antiquity of some of these breeds is not the least interesting part of the subject, nor is the use to which one at least of them has long been applied. The dove from the earliest period in history has been associated with the idea of a messenger (Genesis viii. 8-12), and the employment of pigeons in that capacity, developed successively by Greeks, Romans, Mussulmans and Christians, has come down to modern times.

The various foreign species, if not truly belonging to the genus Columba, are barely separable therefrom. Of these examples may be found in the Indian, Ethiopian and Neotropical regions. Innumerable other forms entitled to the name of " dove " are to be found in almost every part of the world, and nowhere more abundantly than in the Australian Region. A. R. Wallace (Ibis, 1865, pp. 365-40°) considers that they attain their maximum development in the Papuan Subregion, where, though the land area is less than one-sixth that of Europe, more than a quarter of all the species (some 300 in number) known to exist are found — owing, he suggests, to the absence of forest-haunting and fruit- eating mammals, which are in most cases destructive to eggs also.

To a small group of birds the name dove is, however, especially applicable in common parlance. This is the group containing the turtle-doves— the time-honoured emblem of tenderness and conjugal love. The common turtle-dove of Europe (Turtur auritus) is one of those species which are gradually extending their area. In England, in the 1 8th century, it seems to have been chiefly, if not solely, known in the southern and western counties. Though in the character of a straggler only, it now reaches the extreme north of Scotland, and is perhaps nowhere more abundant than in many of the midland and eastern counties of England. On the continent of Europe the same thing has been observed, though indeed not so definitely; and this species has appeared as a casual visitor within the Arctic Circle. Its graceful form and the delicate harmony of its modest colouring are pro- verbial. The species is migratory, reaching Europe late in April and retiring in September. Another species, and one perhaps better known from being commonly kept in confinement, is that called by many the collared or Barbary dove (T. risorius) — the second English name probably indicating that it was by way of the Barbary coast that it was brought to England. This is distinguished by its cream-coloured plumage and black necklace. (A. N.)

DOVER, GEORGE JAMES WELBORE AGAR-ELLIS, Baron (1 797-1833), English man of letters, born on the 14th of January

1797, was the only son of the 2nd Viscount Clifden. He was educated at Westminster school and at Christ Church, Oxford. In 181 8 he was returned to parliament as member for Heytesbury. He afterwards represented Seaford (1820), Ludgershall (1826) and Okehampton (1830). He seconded Canning's motion in 1822 for a bill to relieve the disabilities of Roman Catholic peers, and consistently supported liberal principles. In party politics, however, he took little interest, but he zealously advocated in parliament and elsewhere that state encouragement should be given to the cause of literature and the fine arts. In 1824 he was the leading promoter of the grant of £57,000 for the purchase of John Julius Angerstein's collection of pictures, which formed the foundation of the National Gallery. On the formation of Lord Grey's administration, in November 1830, he was appointed chief commissioner of woods and forests, but was compelled by delicate health to resign it after two months' occupancy. In June 1831, during the lifetime of his father, he was raised to the House of Lords, receiving an English peerage with the title of Baron Dover. He was president (1832) of the Royal Society of Literature, a trustee of the British Museum and of the National Gallery, and a commissioner of public records. He died on the 10th of July

1833. Lord Dover's works are chiefly historical, and include The True History of the Iron Mask, extracted from Documents in The French Archives (1826), Inquiries respecting the Character of Clarendon (1827), and a Life of Frederick II. (1831). He also edited the Ellis Correspondence (1829) and Walpole's Letters to Sir Horace Mann (1833).

DOVER, HENRY JERMYN, Earl of (c. 1636-1708), was the second son of Sir Thomas Jermyn, of Rushbroke, Suffolk, elder brother of Henry Jermyn, earl of St Albans (q.v.). Jermyn surpassed his uncle, St Albans, in reputation for profligacy, figuring frequently as " the little Jermyn " in the Grammont Memoirs, as the lover of Lady Castlemaine, Lady Shrewsbury, Miss Jennings and other beauties of the court of Charles II. He was also a noted duellist and a lifelong gambler. While the court was in exile, he obtained a post in the household of the duke of York, to whom he became master of the horse at the Restora- tion. Being a Roman Catholic he enjoyed a position of influence with James II., who on his accession raised Jermyn to the peerage as Baron Dover in 1685, and appointed him

lieutenant-general of the royal guard in 1686. At the Revolution, Dover adhered to James, whom he followed abroad, and in July 1689 the deposed sovereign created him Baron Jermyn of Royston, Baron Ipswich, Viscount Cheveley and earl of Dover; these honours being among the " Jacobite peerages " which were not recognized by the English government, though Jermyn became generally known as the earl of Dover. He commanded a troop at the battle of the Boyne; but shortly afterwards made his submission to William III. He succeeded his brother Thomas as 3rd Baron Jermyn of St Edmundsbury in 1 703 , and died in 1 708. As he left no children by his wife, Judith, daughter of Sir Edmund Poley, of Badley, Suffolk, his titles became extinct at his death.

See Samuel Pepys, Diary, edited by H. B. Wheatley, 9 vols. (London, 1893); Anthony Hamilton, Memoirs of Grammont (Bohn edition, London, 1846); J. S. Clarke, Life of James II., 2 vols. (London, 1816); Narcissus Luttrell, Brief Relation of State Affairs 1678-1714, 6 vols. (Oxford, 1857).

DOVER, ROBERT (1575-1641), English captain and attorney, is known as the founder and director for many years of the " Cotswold Games," which he originated as a protest against the growing Puritanism of the day. These sports, which were referred to by contemporary writers as " Mr Robert Dover's Olimpick Games upon the Cotswold Hills," consisted of cudgel- playing, wrestling, running at the quintain, jumping, casting the bar and hammer, hand-ball, gymnastics, rural dances and games and horse-racing, the winners in which received valuable prizes. They continued from about the year 1604 until three years after the death of Dover, which took place in 1641. They were revived for a brief period in the reign of Charles II.

DOVER, the capital of Delaware, U.S.A., and the county seat of Kent county, on the St Jones River, in the central part of the state, about 48 m. S. of Wilmington and about 9 m. from Delaware Bay. Pop. (1890) 3061; (1900) 3329 (772 negroes); (1910) 3720. Dover is served by the Philadelphia, Baltimore & Washington railway (Pennsylvania system). The state house, built about 1722 for a court house, was remodelled for its present purpose in 1 791; it contains the state library, which in 1908 had about 50,000 bound volumes. Dover is the seat of the Wilmington Conference Academy (Methodist Episcopal) ; and about 2 m. N. is the state college for coloured students (co-educational; opened in 1892), an agricultural and manual training school. The surrounding country is largely devoted to the raising of small fruit. Among the manufactures are canned fruit and meat (especially poultry), timber, machine shop products,

baskets and crates, and silk. The town was laid out in 1717; in 1777 it replaced New Castle as the capital of the state, and in 1829 it was incorporated as a town. Dover was the birthplace of the American patriot, Caesar Rodney (1728-1784), whose home near Dover is still standing.

DOVER, a seaport and municipal and parliamentary borough of Kent, England, one of the Cinque .Ports, 76 rrr. E.S.E. of London by the South-Eastern & Chatham railway. Pop. (1891) 33>S°3; (1901) 41)794' It is situated at the mouth of a small

stream, the Dour, whose valley here breaches the high chalk cliffs which fringe the coast on either hand. It is an exceptionally healthy locality, and the steep shore and open downs make it an agreeable summer resort. The better residential quarters he along the seaboard and on the higher ground, notably on a western spur of the Castle Hill. The dominant object of the place is the castle, on the east height, 37s ft. above sea-level, between which and the batteries on the western heights lies the old town. The castle occupies a space of 35 acres. Within its precincts are a Roman pharos or lighthouse, still exhibiting the Roman masonry; the ancient fortress church (St Mary in Castro) ; some remains of the Saxon fort; and the massive keep and subsidiary defences (such as the Constable's, Avranche's, and other towers) of the Norman building. The church, substantially unaltered, forms an almost unique Christian relic. It has been called Roman, but is later. It is cruciform in shape, and the walls are built mainly of flint, but jambs and arches are formed of Roman bricks. At the end of the 12th century it was remodelled and given an Early English character. In the beginning of the 18th century it was dismantled and turned into a storehouse; and so continued until 1863, when, having been restored by Sir G. G. Scott, it was again opened for divine service, and is now the chapel of the castle garrison.

The view from the castle keep includes on a clear day the line of cliffs from Folkestone to Ramsgate on the one side, and from Boulogne to Gravelines on the other side of the strait. The cliffs are honeycombed in all directions with military works. They are covered by modern works on the north side known as Fort Burgoyne, and additional works extend eastwards towards St Margaret's Bay. The western heights, where is the foundation of another Roman lighthouse, form a further circuit of fortifica- tions. They are still more elevated than the castle. A military shaft, locally known as the Corkscrew Staircase, affords com- munication between the barracks and the town. Remains were discovered here in 1854 of a round

church of the Templars (Holy Sepulchre), 32 ft. in diameter; the church, doubtless, in which King John made his submission to the Papal Nuncio in 12 13. Archcliffe Fort lies to the south-west of old Dover. There may further be mentioned the remnant of the Saxon collegiate church of the canons of St Martin, and the parish church of St Mary the Virgin. This last was rebuilt and enlarged in 1843-1844, but preserves the three bays of the Saxon church, with its western narthex, on which was superimposed the Norman tower, which presents its rich front to the street. The rest of the church is mainly Norman and Early English. A later Norman church stands under the Castle Hill, but its parochial status was trans- ferred to the modern church of St James.

The remains of the splendid foundation of St Martin's priory, of the 1 2th century, include the great gate, the house refectory, with campanile, and the spacious strangers' refectory, now incor- porated in Dover College. The college of St Martin for twenty-two secular canons, which had been established in the castle in 696, was removed into the town in the beginning of the 8th century, and in 1139 became a Benedictine priory under the jurisdiction of that at Canterbury, to which see the lands are still attached. The interior of the refectory is very fine. In High Street may be seen the noble hall and truncated fabric of the Maison Dieu founded by Hubert de Burgh in the 13th century for the reception of pilgrims of all nations. From the time of Henry VIII. to 1830 it was used as a crown victualling office, but was subsequently purchased by the corporation and adapted as a town hall. The new town hall adjoining the old hall of the Maison Dieu was opened in 1883. The museum (1849) contains an interesting collection of local antiquities and a natural history collection.

Among various charitable institutions are the National Sailors' Home and the Gordon Boys' and Victoria Seaside Orphanages. Besides the church of St James, mentioned above, other modern churches are those of Holy Trinity and Christ church, and further up the valley there are the parish churches of Charlton (originally Norman) and Buckland (Early English). Among educational establishments is Dover College, occupying the site and remaining buildings of St Martin's priory, with additional modern buildings.

It was instituted in 1871, and educates about 220 boys. There is a

separate junior school. ‘ :

Dover is the only one of the Cinque Ports which is still a great port. It is one of the principal ports for passenger communica- tions across the Channel, steamers connecting it with Calais and Ostend. The Admiralty pier was begun in 1847 and practically completed to a length of about 2000 ft. in 1871. In 1888 the gates of Wellington dock were widened to admit a larger 1 type of Channel steamers; new coal stores were erected on the Northampton quay; the slipway was lengthened 40 ft., and widened for the reception of vessels up to 800 tons. In 1891 it was resolved to construct a new commercial harbour at an estimated cost of about £700,000. Begun in 1893, the works •included the construction of an east pier (” Prince of Wales’s Pier “), running parallel to the general direction of the Admiralty pier and in conjunction with it enclosing an area of sheltered water amounting to seventy-five acres. This pier was completed in 1902. A railway line connected with the South-Eastern and Chatham system runs to its head, and in July 1903 it was brought into use for the embarcation of passengers by transatlantic liners. In 1896 and subsequent years funds were voted by parliament for the construction of an artificial harbour for naval purposes, having an area of 610 acres, of which 322 acres were to have a depth of not less than 30 ft. at low water. The scheme comprised three enclosing breakwaters — on the west an extension of the Admiralty pier in a south-easterly direction for a length of 2060 ft.;’ on the south an isolated breakwater, 4200 ft. long, curving round shore- ward at its eastern end to accord with the direction of the third breakwater; on the east, which runs out from the shore in a southerly direction for a length of 3320 ft. These three break- waters, with a united length of rather more than if- m., are each built of massive concrete blocks in the form of a practically vertical wall founded on the solid chalk and rising to a quay level of 10 ft. above high water. Two entrances, one 800 ft. and the other 600 ft. in width, with a depth of about seven fathoms at low water, are situated at either end of the detached break- water. The plan also included the reclamation of the foreshore at the foot of the cliffs, between the castle jetty and the root of the eastern breakwater, by means of a massive sea-wall. The construction of three powerful forts was undertaken in defence of the harbour, which was opened in 1909.

Besides the mail service and harbour trade, Dover has a trade in shipbuilding, timber, rope and sail making, and ships’ stores. Dover is a suffragan bishopric in the diocese of Canterbury. The parliamentary borough returns one member. The town is governed by a mayor, six aldermen and eighteen councillors. Area, 2026 acres.

History. — Dover (Dttbris) was one of the ports for continental traffic in Roman times. In the 4th century it was guarded by a fort lying down near the harbour, and forming part of the defences of the Saxon shore (Litus Saxonicum) . As a Cinque Port, Dover (Dofra, Dovorra) had to contribute twenty of the quota of ships furnished by those ports; in return for this service a charter of liberties was granted to the ports by Edward the Confessor, making the townsmen quit of shires and hundreds, with the right to be impleaded only at Shepway, and other privileges, which were confirmed by subsequent kings, with additions, down to James II. During the middle ages Dover Castle was an object of contention both in civil wars and foreign invasions, and was considered. the key to England; the constable of the castle, who from the reign of John was appointed by the crown, was also warden of the Cinque Ports. The castle was successfully defended in 1216 against the French under the dauphin Louis by Hubert de Burgh, who was also the founder of the Maison Dieu established for the accommodation of pilgrims. The title of mayor as chief municipal officer first occurs about the middle of the 13th century, when the town was governed by a mayor and twelve jurats. The Cinque Ports were first represented in the parliament of 1265; Dover returned two members until 1885 when the number was redu'ced to one. In 1685 Charles II. confirmed to the inhabitants of Dover a fair beginning on the nth of November, which had been held of old in the town, and granted

two others on the 23rd and 24th of April and the 25th and 26th. of September.

After the decay of Richborough harbour the passage from Dover to Whitsand, and later to Calais, became the accustomed route to France, and by a statute of 1465 no one might ship for Calais except at Dover. The guardians of the harbour were incorporated by James I. in 1607.

See S. P. H. Statham, History of the Castle, Town and Port of Dover (London, 1899); and Dover^ Charters and other Documents (London, 1902).

Battle 0$ Dover

This famous and important naval victory was won off the town of Dover by the ships of the Cinque Ports on the 21st of August 1 2 1 7 , during the minority of King Henry III. The barons, who were in arms against his father Ring John, had called Louis, son of Philip Augustus, king of the French, to their aid. Having been recently

defeated in Lincoln, they were hard pressed, and reinforcements were sent to them from Calais in a fleet commanded by a pirate and mercenary soldier called Eustace the Monk. His real name is uncertain, but according to the chronicle of Lanercost it was Matthew. He passed the Straits of Dover with a numerous flotilla laden with military machines and stores, and also carrying many knights and soldiers. The Monk's fleet was seen from Dover, where the regent, Hubert de Burgh, lay with a naval force of the Cinque Ports, said to have been very small. Sixteen vessels of large size for the time, and a number of smaller craft, is said to have been their total strength. But medieval estimates of numbers are never to be trusted, and the strength of the Cinque Port squadron was probably diminished to exalt the national glory. It put to sea, and by hugging the wind gained the weather gage of the French adventurer. Eustace is said to have been under the impression that they meant to attack Calais in his absence, and to have derided them because he had left the town well guarded. When they were to windward of his fleet the Cinque Port ships bore down on the enemy. As they approached they threw unslaked lime in the air and the wind blew it in the faces of the French. This form of attack, and the flights of arrows discharged by the English (which flew with the wind), produced confusion in the crowded benches of the French vessels, which in most cases must have been little more than open boats. It is further said that in some cases at least the English vessels were " bearded," that is to say, strengthened by iron bands across the bows for ramming, and that they sank many of the French. The Monk was certainly defeated, and his fleet was entirely scattered, sunk or taken. His own vessel was captured. Eustace, who had concealed himself in the bilge, was dragged out. In answer to his appeals for quarter and promises to pay ransom, he was told by Richard, the bastard son of King John, that he was a traitor who would not be allowed to deceive more men. His head was struck off by Richard, and was sent round the ports on a pike. The Cinque Port seamen returned in triumph, towing their prizes, after throwing the common soldiers overboard, and taking the knights to ransom according to the custom of the age.

The political importance of the battle was very great, for it gave the death-blow to the cause of the barons who supported Louis, and it fixed Henry III. on the throne. But the defeat and death of the Monk was widely regarded as in a peculiar sense a victory over the powers of evil. The man became within a few years after his death the herb of many legends of piracy and necromancy. It was said that after leaving the cloister he studied the black art in Toledo, which had a great reputation in the middle ages as a school of witchcraft. A

French poem written seemingly within a generation after his death represents him as a wizard. In a prose narrative discovered and printed by M. Francisque Michel, it is said that he made his ship invisible by magic spells. A brother wizard in the English fleet, by name Stephen Crabbe, detected him while he was invisible to others. The bold and patriotic Crabbe contrived to board the bewitched flagship, and was seen apparently laying about him with an axe on the water — which the spectators took to be a proof either that he was mad, or that this was the devil in his shape. At last he struck off the head of Eustace, upon which the spell was broken, and the ship

Scale of Feet

500 1000 1500 2000

DOVER

m

455

' —jig

k— — — i

m

mm

m

m

m

tˆSMˆˆ

appeared. Crabbe was torn to pieces — presumably by the familiar spirits of the Monk — and the fragments were scattered over the water. Saint Bartholomew, whose feast is on the 2 1st of August, came to encourage the English by his presence and his voice.

Ascertainable fact concerning Eustace is less picturesque, but enough is known to show that he was an adventurous and unscrupulous scoundrel. In his youth he was a monk, and left ihe cloister to claim an inheritance from the count of Boulogne. Not having received satisfaction he became a freebooter on land and sea, and mercenary

soldier. He is frequently mentioned in the Pipe, Patent and Close Rolls. For a time he served King John, but when the king made friends with the count of Boulogne, he fled abroad, and entered the service of the French prince Louis and his father Philip Augustus. Chroniclers lavish on him the titles of " archipirata," " vir flagitiosissimus et nequissimus," and poets made him an associate of the devil.

The evidence concerning Eustace is collected by Herren Wendelin Forster and Johann Trost, in their edition of the French poem " Wistasse le moine " (Halle, 1891). See for the battle Sir N. Harris Nicolas, History of the Royal Navy (London, 1847).

DOVER, a city and the county seat of Strafford county), New Hampshire, U.S.A., on the Cochecho river, at the head of navigation, 10 m. N.W. of Portsmouth. Pop. (1890) 12,790; (1900) 13,207, of whom 3298 were foreign-born; (1910 census) 13,247. Land area, 26-4 sq. m. It is at the intersection of two branches of the Boston & Maine railway, and is served by several interurban electric lines. The street plan is irregular. Dover has a fine city hall of red brick and freestone; a public library containing (1907) 34,000 volumes; the Wentworth hospital; the Wentworth home for the aged; a children's and an orphans' home. The Strafford Savings Bank is said to be the largest and oldest savings institution in the state. Dover has long had a considerable commerce, both by rail and by water, that by water being chiefly

in coal and building materials. The navigation of the Cochecho river has been greatly improved by the Federal government, at a cost between 1829 and 1907 of about $300,000, and in 1909 there was a navigable channel, 60-75 ft- wide and 7 ft. deep at mean low water, from Dover to the mouth of the river; the mean range of tides is 6-8 ft. The Cochecho river falls 315 ft. within the city limits and furnishes water-power for factories; among the manufactures are textiles, boots and shoes, leather belting, sash, doors and blinds, carriages, machinery and bricks. In 1905 Dover ranked fourth among the manufacturing cities of the state, and first in manufactures of woollens; the value of the city's total factory product in that year was $6,042,901. Dover is one of the two oldest cities in the state. In May 1623 a settlement was established by Edward Hilton on Dover Point, about 5 m. S.E. of the Cochecho Falls; the present name was adopted in 1639, and with the development of manufacturing and trading interests the population gradually removed nearer the falls; Hilton and his followers were Anglicans, but in 1633 they were joined by several Puritan families

under Captain Thomas Wiggin, who settled on Dover Neck (1 m. above Dover Point), which for 100 years was the business centre of the town. As the settlement was outside the jurisdiction of any province, and as trouble arose between the two sects, a plantation covenant was drawn up and signed in 1640 by forty-one of the inhabitants. Dissensions, however, continued, and in 1641, by the will of the majority, Dover passed under the jurisdiction of Massachusetts and so remained for nearly half a century. The town, between 1675 and 1725, suffered greatly from Indian attacks, particularly from that of the 28th of June 1689 at Cochecho Falls. Dover was first chartered as a city in 1855. Within the original territory of the town were included Newington, set off in 17 13, Somersworth (1729), Durham (1732), Medbury (1755), Lee, set off fromDurham in 1766, and Rollinsford, set off from Somersworth in 1849.

See Jeremy Belknap, History of New Hampshire (Philadelphia, 1 784-1 792); and Rev. Dr A. H. Quint's Historical Memoranda of Persons and Places in Old Dover, N.H., edited by John Scales (Dover, 1900).

DOVER, a town of Morris county, New Jersey, U.S.A., on the Rockaway river and the Morris canal, about 40 m. by rail W.N.W. of Hoboken. Pop. (1900) 5938, of whom 947 were foreign-born; (1905) 6353; (1910) 7468. The area of the town is 1-72 sq. m. Dover is at the junction of the main line and the Morris & Essex division of the Delaware, Lackawanna & Western railway (which has large repair shops here), and is also served by the High Bridge branch of the Central of New Jersey, and by an electric line connecting with neighbouring towns. The town is situated about 570 ft. above sea-level. Building stone, used extensively for railway bridges, and iron ore abound in the vicinity. The river furnishes good water-power, and the town has various manufactures, including stoves and ranges, boilers, bar iron, rivets, steel castings, rock drills, air compressors, silk hose and underwear, organzine or thrown silk, and overalls. The water- works are owned by the town, water being obtained from wells varying in depth from 193 to 213 ft. Dover was settled as early as 1748, and was separated from Randolph township and incorporated as a town in 1869.

DOVERCOURT, a watering-place in the Harwich parliamentary

division of Essex, England, immediately S.W. of Harwich, with a station between Parkeston Quay and Harwich town on the Great Eastern railway, 70 m. N.E. by E. from London. Pop. (1901) 3894. The esplanade and sea-wall front the North Sea, and there is a fine expanse of sand affording good bathing. There is also a chalybeate spa. The scenery of the neighbouring Orwell and Stour estuaries is pleasant. The church, which stands inland in the old village distinguished as Upper Dovercourt, is Early English and later; it formerly possessed a miraculous rood which became an object of pilgrimage of wide repute. It is said to have been stolen and burnt in 1532, three of the four thieves being subsequently taken and hanged.

DOW, LORENZO (17 77-1834), American preacher, noted for his eccentricities of dress and manner, was born at Coventry, Connecticut, on the 16th of October 1777. He was much troubled in his youth by religious perplexities, but ultimately joined the Methodists, and in 1798 was appointed a preacher " on trial " in a New York circuit. In the following year, however, he crossed the Atlantic and preached as a missionary to the Catholics of Ireland, and thereafter was never connected officially with the ministry of the Methodist Church, though he remained essentially a Methodist in doctrine. Everywhere, in America and Great Britain, he attracted great crowds to hear and see him, and he was often persecuted as well as admired. In 1805 he visited England, introduced the system of camp meetings, and thus led the way to the formation of the Primitive Methodist Society. Dow's enthusiasm sustained him through the incessant labours of more than thirty years, during which he preached in almost all parts of the United States. His later efforts were directed chiefly against the Jesuits; indeed he was in general a vigorous opponent of Roman Catholicism. He died in Georgetown, District of Columbia, on the 2nd of February 1834. Among his publications are: Polemical Works (1814); The Stranger in Charleston, or the Trial and Confession of Lorenzo Dow (1822) ; A Short Account of a Long Travel; with Beauties of Wesley (1823); and the History of a Cosmopolite; or the Four Volumes of the Rev. Lorenzo Dow's Journal, concentrated in One, containing his Experience and Travels from Childhood to 1814 (1814; many later editions) ; this volume also contains " All the Polemical Works of Lorenzo." The edition of 1854 was entitled The Dealings of God, Man, and the Devil as exemplified in the Life, Experience and Travels of Lorenzo Dow.

DOW, NEAL (1804-1897), American temperance reformer, was born at Portland, Maine, on the 20th of March 1 804. His parents were Quakers and he was educated at the Friends' School in New Bedford,

Massachusetts. He subsequently became a merchant in his native city and rose to a position of importance in its business and political life, riis chief interest, however, was in

the temperance question, and he early attracted attention as an ardent champion of the prohibition of the sale of intoxicating drinks. He drafted the drastic Maine prohibitory law of 1851. He was mayor of Portland in 1851 and in 1855, and was a member of the Maine legislature in 1858-1859. Early in the Civil War he became colonel of the 13th Maine Volunteer Infantry. He served in General B. F. Butler's New Orleans expedition, was commissioned brigadier-general of volunteers in April 1862, and subsequently commanded for a time the department of Florida. He was twice wounded in the attack on Port Hudson, on the 27th of May 1863, and was taken prisoner, remaining eight months in Libby and other prisons before he was exchanged. After the war he devoted a great part of his time and energy to the extension of the prohibition movement in America and England. Through his exertions the prohibitory amendment was added to the Maine constitution in 1884. In 1880 he was the candidate of the National Prohibition Party for president, polling 10,305 votes. He died at Portland on the 2nd of October 1897.

His Reminiscences were published at Portland in 1898.

DOWAGER (from the Old Fr. douagiere, mod. douairiere), strictly, a widow in the enjoyment of dower. " Dowager " is also applied to widows of high rank to distinguish them from the wives of their sons, as queen-dowager, dowager-duchess, &c. The title was first used in England of Catherine of Aragon, widow of Arthur, prince of Wales, who was styled princess dowager till her marriage with Henry VIII. By transference the word is used of an elderly lady.

DOWDEN, EDWARD (1843-), Irish critic and poet, son of John Wheeler Dowden, merchant and landowner, was born at Cork on the 3rd of May 1843, being three years junior to his brother John, who became bishop of Edinburgh in 1886. His literary tastes were shown early, in a series of essays written at the age of twelve. His home education was continued at Queen's College, Cork, and Trinity College, Dublin; at the latter uni- versity he had a distinguished career, becoming president of the Philosophical Society, and winning the vice-chancellor's prize for English verse and prose, and the first senior moderatorship in ethics and logic. In 1867 he was elected professor of oratory and English literature in Dublin University. His first book, Shakespeare, his Mind and Art (1875), was a revision of a course of lectures, and made him widely known as a critic, being

translated into German and Russian; and his Poems (1876) went into a second edition. His Shakespeare Primer (1877) was also translated into Italian and German. In 1878 he was awarded the Cunningham gold medal of the Royal Irish Academy " for his literary writings, especiallyin the field of Shakespearian criticism." Later works by him in this field were his Shakespeare's Sonnets (1881), Passionate Pilgrim (1883), Introduction to Shakespeare (1893), Hamlet (1899), Romeo and Juliet (1900), Cymbeline (1903), and his article (National Review, July 1902) on " Shakespeare as a Man of Science," criticizing T. E. Webb's Mystery of William Shakespeare. His critical essays " Studies in Literature " (1878), " Transcripts and Studies " (1888), " New Studies in Literature " (1895) showed a profound knowledge of the currents and tendencies of thought in various ages and countries; but it was his Life of Shelley (1886) that made him best known to the public at large. In 190c he edited an edition of Shelley's works. Other books by him which indicate his interests in literature are his Southey (in the " English Men of Letters " series, 1880), his edition of Southey' s Correspondence with Caroline Bowles (1881), and Select Poems of Southey (1895), his Correspondence of Sir Henry Taylor (1888), his edition of Wordsworth's Poetical Works (1892) and of his Lyrical Ballads (1890), his French Revolution and English Literature (1897; lectures given at Princeton University in 1896), History of French Literature (1897), Puritan and Anglican (1900), Robert Browning (1904) and Michel de Montaigne (1905). His devotion to Goethe led to his succeed- ing Max Miiller in 1 888 as president of the English Goethe Society. In 1889 he became the first Taylorian lecturer at Oxford, and from 1892 to 1896 was Clark lecturer at Trinity College, Cambridge. To his sagacity in research are due, among other matters of literary interest, the first account of Carlyle's

"Lectures on periods of European culture "; the identification of Shelley as the author of a review (in The Critical Review of December 1814) of a lost romance by Hogg; description of Shelley's " Philosophical View of Reform "; a MS. diary of Fabre D'Eglantine; and a record by Dr Wilhelm Weissenborn of Goethe's last days and death. He also discovered a " Narrative of a Prisoner of War under Napoleon " (published in Blackwood's Magazine), an unknown pamphlet by Bishop Berkeley, some unpublished writings of Hayley relating to Cowper, and a unique copy of the Tales of Terror. His wide sympathies and scholarly methods made his influence on

criticism both sound and stimulating, and his own ideals are well described in his essay on " The Interpretation of Literature " in his Transcripts and Studies. As commissioner of education in Ireland (1896-1901), trustee of the National Library of Ireland, secretary of the Irish Liberal Union and vice-president of the Irish Unionist Alliance, he enforced his view that literature should not be divorced from practical life. He married twice, first (1866) Mary Clerke, and secondly (1895) Elizabeth Dickinson West, daughter of the dean of St Patrick's.

DOWDESWELL, WILLIAM (1721-1775), English politician, was a son of William Dowdeswell of Pull Court, Bushley, Worcestershire, and was educated at Westminster school, at Christ Church, Oxford, and at the university of Leiden. He became member of parliament for the family borough of Tewkesbury in 1747, retaining this seat until 1754, and from 1761 until his death he was one of the representatives of Worcester- shire. Becoming prominent among the Whigs, Dowdeswell was made chancellor of the exchequer in 1765 under the marquess of Rockingham, and his short tenure of this position appears to have been a successful one, he being in Lecky's words " a good financier, but nothing more." To the general astonishment he refused to abandon his friends and to take office under Lord Chatham, who succeeded Rockingham in August 1766. Dowdeswell then led the Rockingham party in the House of Commons, taking an active part in debate until his death at Nice on the 6th of February 1775. The highly eulogistic epitaph on his monument at Bushley was written by Edmund Burke.

DOWER (through the Old Fr. douaire from late Lat. dotarium, classical Lat. dos, dowry), in law, the life interest of the widow in a third part of her husband's lands. There were originally five kinds of dower: (1) at common law; (2) by custom; (3) ad ostium ecclesiae, or at the church porch; (4) ex assensu patris; (5) de la plus belle. The last was a conveyance of tenure by knight service, and was abolished in 1660, by the act which did away with old tenures. Dower ad ostium ecclesiae, by which the bride was dowered at the church porch (where all marriages used formerly to take place), and dower ex assensu patris, by the father of the bridegroom, though long obsolete, were formally abolished by the Dower Act 1834. Dower is governed in the United Kingdom, so far as women married after the 1st of January 1834 are concerned, by the Dower Act 1834, and under it only attaches oh the husband's death to the lands which he actually possessed for an estate of inheritance at the time of his death. It must be claimed within twelve years of the time of its accrual, but only six years' arrears are recoverable. The wife is also

entitled to dower out of equitable estates, but joint estates are exempt. By the act the wife's dower is placed completely under her husband's control. It does not attach to any land actually disposed of by him in his lifetime or by his will, nor to any land from which he has declared by deed his wife shall not be entitled to dower. He may also defeat her right, either as to any particular land or to all his lands, by a declaration in his will; while it is subject to all the deceased husband's debts and contracts, and to any partial estates which he may have created during his life or by his will. A widow tenant in dower may make leases for twenty-one years under the Settled Estates Act 1878. Free-bench is an analogous right in regard to copyhold land; it does not fall within the Dower Act 1834, and varies with the custom of each manor. At common law, and prior to the act of 1834, dower was of a very different nature. The wife's right attached, while the husband was still living, to any land whereof

he was solely seised in possession (excluding equitable and joint estates) for an estate of inheritance at any time during the continuance of the marriage, provided that any child the wife might have had could have been heir to the same, even though no child was actually born. When once this right had attached it adhered to the lands, notwithstanding any sale or devise the husband might make; nor was it liable for his debts. In this way dower proved an obstacle to the free alienation of land, for it was necessary for a husband wishing to make a valid conveyance to obtain the consent of his wife releasing her right to dower. This release was only effected by a fine, the wife being separately examined. Often, by reason of the expense involved, the wife's concurrence was not obtained, and thus the title of the purchaser was defective during the wife's lifetime. The acceptance of a jointure by the wife before marriage was, however, destructive of dower, if after marriage she was put to her election between it and dower. By the ingenuity of the old conveyancers, devices, known as " uses to bar dower " (the effect of which was that the purchaser never had at any time an estate of inheritance in possession), were found to prevent dower attaching to newly purchased lands, and so to enable the owner to give a clear title, without the need of the wife's concurrence., in the event of his wishing, in his turn, to convey the land. All this was, however, swept away by the Dower Act 1834, and a purchaser of land no longer need trouble himself to inquire whether the dower of the wife of the vendor has been barred, or to insist on her concurrence in a fine. (H. S. S.)

DOWIE, JOHN ALEXANDER (1848-1907), founder of " Zionism,"

was born in Edinburgh, and went as a boy to South Australia with his parents. He returned in 1868 to study for the Congregationalist ministry at Edinburgh University, and sub- sequently became pastor of a church near Sydney, Australia. He was a powerful preacher, and later, having become imbued with belief in his powers as a healer of disease by prayer, he obtained sufficient following to move to Melbourne, build a tabernacle, and found " The Divine Healing Association of Australia and New Zealand." In 1888 he went to America, preaching and " healing," and in spite of opposition and ridicule attracted a number of adherents. In 1896 he established " The Christian Catholic Apostolic Church in Zion," with himself as " First Apostle "; and in 1901, with money liberally contributed by his followers, he founded Zion City, on a site covering about 10 sq. m. on the west shore of Lake Michigan, with a central temple for the Zionist church. In 1903 and 1904, in the course of a visit to the branches of the Zionist movement throughout the world, he appeared in London, but was mobbed. In April 1906 a revolt against his domination took place in Zion City. He was charged with peculation and with practising polygamy, and was deposed, with the assent of his own wife and son. A suit brought by him in the United States district court to recover possession of the Zion City property, valued at two millions sterling, was unsuccessful, and his defalcations were fully proved. Dowie was now broken in health and unmistakably insane; he was struck with paralysis and gradually becoming weaker died in Zion City in March 1907.

DOWLAS, the name given to a plain cloth, similar to sheeting, but usually coarser. It is made in several qualities, from line warp and weft to two warp and weft, and is used chiefly for aprons, pocketing, soldiers' gaiters, linings and overalls. The finer makes are sometimes made into shirts for workmen, and occasionally used for heavy pillow-cases. The word is spelt in many different ways, but the above is the common way of spelling adopted in factories, and it appears in the same form in Shakespeare's First Part of Henry IV., Act III. scene 3. The modern dowlas is a good, strong and closely woven linen fabric.

DOWN, a maritime county of Ireland, in the province of Ulster, occupying the most easterly part of the island, bounded N. by Co. Antrim and Belfast Lough, E. and S. by the Irish Sea, and W. by Co. Armagh. The area is 607, 916 acres, or nearly 950 sq. m. The coast line is indented by several loughs and bays. The largest of these is Strangford Lough, a fine sheet of water studded with 260 islets, 54 of which have names. All are well wooded 01

rich in pasturage. The lough runs for 10 m. northwards, and the ancient castles and ruined abbeys on some of the islets render the scene one of singular interest and beauty. Farther south Dundrum Bay forms a wider expanse of water. In the south- west Carlingford Lough separates the county from Louth. There are no lakes of importance. Between Strangford and Carlingford loughs the county is occupied by a range of hills known in its south-western portion as the Mourne Mountains, which give rise to the four principal rivers — the Bann, the Lagan, the Annacloy and the Newry. This mass includes, several striking peaks, of which the principal is Slieve Donard, rising finely direct from the sea to a height of 2796 ft., which is exceeded in Ireland only by one peak in the Wicklow range, and by the higher reeks in Killarney. Several other summits exceed 2000 ft. Holy wells and mineral springs are numerous in Co. Down. These areboth chalybeate and sulphurous, and occur at Ardmillan, Granshaw, Dundonnell,Magheralin, Dromore, Newry, Banbridge and Tierkelly. Those of Struell near Downpatrick were accred- ited with miraculous powers by the natives until recent times, and religious observances of an extravagant nature took place there.

Geology. — The foundationof this countyisSilurianrockthroughout, the slates and sandstones striking as a whole north-east, but giving rise to a country of abundant small hills. The granite that appears along the same axis in Armagh continues from Newry to Slieve Croob, furnishing an excellent building stone. South of it, the Eocene granite of the Mournes forms a group of rocky summits, set with scarps and tors, and divided by noble valleys, which are not yet choked by the detritus of these comparatively youthful mountains. Basalt dykes abound, being well seen along the coast south of Newcastle. At the head of Strangford Lough, the basalt, possibly as intrusive sheets, has protected Triassic sandstone; which is quarried at Scrabo Hill. A strip of marine Permian occurs on the shore at Holywood. The north-west of the county includes, at Moira, a part of the great basaltic plateaux, with Chalk and Trias protected by them. The haematite of dehomet near Banbridge is well spoken of. Topaz and aquamarine occur in hollows in the granite of the Mournes. The Mourne granite is quarried above Annalong, and an ornamental dolerite is worked at Rosstrevor.

Industries. — The predominating soil is a loam of little depth, in most places intermixed with considerable quantities of stones of

various sizes, but differing materially in character according to the nature of the subsoil. Clay is mostly confined to the eastern coast, and to the northern parts of Castlereagh. Of sandy soil the quantity is small ; it occurs chiefly near Dundrum. Moor grounds are mostly confined to the skirts of the mountains. Bogs, though frequent, are scarcely sufficient to furnish a supply of fuel to the population. Agriculture is in a fairly satisfactory condition. The bulk of the labouring population is orderly and industrious, and dwell in circumstances contrasting well with those of others of their class in some other parts of Ireland. Tillage land declines somewhat in favour of pasture land. Oats, potatoes and turnips are the principal crops; flax, formerly important, is almost neglected. The breed of horses is an object of much attention, and some of the best racers in Ireland have been bred in this county. The native breed of sheep, a small hardy race, is confined to the mountains. The various other kinds of sheep have been much improved by judicious crosses from the best breeds. Pigs are reared in great numbers, chiefly for the Belfast market, where the large exportation occasions a constant demand for them. Poultry farming is a growing industry. The fisheries, of less value than formerly, are centred at Donaghadee, Newcastle, Strangford and Ardglass, the headquarters of the herring fishery. The chief industries in the county generally are linen manu- facture and bleaching, and brewing.

Communications. — The Great Northern railway has an alternative branch route to its main line by Portadown, from Lisburn through Banbridge to Scarva, with a branch from Banbridge to Ballyroney and Newcastle. Newry is on a branch from the Dublin-Belfast line to Warrenpoint on Carlingford Lough. The main line between Lisburn and Portadown touches the north-western extremity of the county. The eastern part of the county is served by the Belfast & County Down railway with its main line from Belfast to Newcastle to Dundrum Bay, and branches from Belfast to Bangor, Comber to Newtownards and Donaghadee, Ballynahinch Junction to Ballynahinch, and

Downpatrick to Ardglass and Killough. The Newry Canal skkts the west of the county, and the Lagan Canal intersects the rich lands in the Lagan valley to the north.

Population and Administration. — The population (219,405 in 1891; 205,889 in 1901) decreases slightly. The population in 1891 on the area of the county before the Local Government (Ireland) Act 1898 was 224,008, for in this case the figures for part of the county borough of Belfast were included. This is worth notice from the

comparative point of view, since, whereas emigration to foreign, ports is considerable, a large portion of the moving population travels no farther than the metropolis of Belfast. About 39% of the population is of the Presbyterian faith, about 31 % Roman Catholic, among whom, as usual, education is in the most backward condition; about 23% are Protestant Episcopalians. r

The following are the principal towns: — Newry (pop. 12,405), Newtownards (91 10), Banbridge (5006), Downpatrick (2993 • thee ounty town), Holy wood (3 840), Gilford (1199), Bangor (5903), Dromore (2307), Donaghadee (2073), Comber (2095) and Warren-point (1817). Other small towns are Portaferry, Rathfryland, Killyleagh, Kilkeel, Ballynahinch, Dundrum, a small port, and Hillsborough, near Dromore, where the castle is the seat of the marquesses of Downshire. There are several popular watering- place on the coast, notably Newcastle, Donaghadee, Ardglass and Rosstrevor. On the shore of Belfast Lough are many pleasant residential villages and seats of the wealthy class in Belfast. The county is divided into fourteen baronies, and contains sixty-four parishes. The assizes are held at Down- patrick, and quarter-sessions at the same town and at Banbridge, Newry and Newtownards. The county is in the Protestant diocese of Down, and the Roman Catholic dioceses of Down and Dromore. Down returns four members to parliament — for the north, south, east and west divisions. The borough of Newry returns a member. Previous to the act of Union the county returned fourteen members to the Irish parliament.

History and Antiquities. — The period at which Down was constituted a county is not certain. A district, however, appears to have borne this name before the beginning of the 14th century, but little is known of it even later than this. However, when in 1535 Sir John Perrot undertook the shiring of Ulster, Down and Antrim were excepted as already settled counties. That some such settlement would have been attempted at an early period is likely, as this coast was a place of Anglo-Norman colonization, and to this movement was due the settlement of the baronies of Lecale, the Ards and others.

The county is not wanting in interesting remains. At Slidderyford, near Dundrum, there is a group of ten or twelve pillar stones in a circle, about 10 ft. in height. A very curious cairn on the summit of Slieve Croob is 80 yds. in circumference at the base and 50 at the top, where is a platform on which cairns of various heights are found standing. The village of Anadorn is famed for a cairn covering a cave which contains ashes and human bones. Cromlechs, or altars, are numerous, the most remarkable being the Giant's Ring, which stands

on the summit of a hill near the borders of Antrim. This altar is formed of an unwrought stone 7 ft. long by 6| broad, resting in an inclined position on rude pillars about 3 ft. high. This solitary landmark is in the centre of an enclosure about a third of a mile in circumference, formed of a rampart about 20 ft. high, and broad enough on the top to permit two persons to ride abreast. Near Downpatrick is a rath, or encampment, three-quarters of a mile in circumference. In its vicinity are the ruins of Saul Abbey, said to have been founded by St Patrick, and Inch Abbey, founded by Sir John de Courcy in 1 1 80. The number of monastic ruins is also considerable. The most ancient and celebrated is the abbey or cathedral of Down- patrick. Dundrum Castle, attributed to the de Courcy family, stands finely above that town, and affords an unusual example (for Ireland) of a donjon keep. The castle of Hillsborough is of Carolean date. There are three round towers in the county, but all are fragmentary.

DOWN, a smooth rounded hill, or more particularly an expanse of high rolling ground bare of trees. The word comes from the

Old English dun, hill. This is usually taken to be a Celtic word. The Gaelic and Irish dun and Welsh din are specifically used of a hill-fortress, and thus frequently appear in place-names, e.g. Dum-barton, Dunkeld, and in the Latinized termination — dunum, e.g. Lugdunum, Lyons. The Old Dutch duna, which is the same word, was applied to the drifted sandhills which are a prevailing feature of the south-eastern coast of the North Sea (Denmark and the Low Countries), and the derivatives, Ger. Dune, modern Dutch duin, Fr. dune, have this particular meaning. The English " dune " is directly taken from the French. The low sandy tracts north and south of Yarmouth, Norfolk, are known as the " Dunes," which may be a corruption of the Dutch or French words. From " down," hill, comes the adverb " down," from above, in the earlier form " adown," i.e. off the hill. The word for the soft under plumage of birds is entirely different, and comes from the Old Norwegian dun, cf. cedar-dun, eider-down. For the system of chalk hills in England known as " The Downs " see Downs.

DOWNES [D(o)tJNAEus], ANDREW (c. 1540-1628), English classical scholar, was born in the county of Shropshire. He was educated at Shrewsbury and St John's College, Cambridge, where he

did much to revive the study of Greek, at that time at a very low ebb. In 1571 he was elected fellow of his college, and, in 1585, he was appointed to the regius professorship of Greek, which he held for nearly forty years. He died at Coton, near Cambridge, on the 2nd of February 1627/1628. According to Simonds d'Ewes (Autobiography, ed. J. O. Halliwell, i. pp. 139, 141), who attended his lectures on Demosthenes and gives a slight sketch of his personality, Downes was accounted " the ablest Grecian of Christendom." He published little, but seems to have devoted his chief attention to the Greek orators. He edited Lysias Pro caede Eralosthenis (1593); Praelectiones in Philip- picam de pace Demosthenis (162 1), dedicated to King James I.; some letters (written in Greek) to Isaac Casaubon, printed in the Epistolae of the latter; and notes to St Chrysostom, in Sir Henry Savile's edition. Downes was also one of the seven translators of the Apocrypha for the " authorized " version of the Bible, and one of the six learned men appointed to revise the new version after its completion.

DOWNING, SIR GEORGE, Bart. (c. 1624-1684), English soldier and diplomatist, son of Emmanuel Downing, barrister, and of Lucy, sister of Governor John Winthrop, was born in England about 1624. 1 His family joined Winthrop in America in 1638, settling in Salem, Massachusetts, and Downing studied at Harvard College. In 1645 he sailed for the West Indies as a preacher and instructor of the seamen, and arrived in England some time afterwards, becoming chaplain to Colonel John Okey's regiment. Subsequently he seems to have abandoned his religious vocation for a military career, and in 1650 he was scout-master- general of Cromwell's forces in Scotland, and as such received in 1657 a salary of £365 and £300 as a teller of the exchequer. His marriage in 1654 with Frances, daughter of Sir William Howard of Naworth, and sister of the 1st earl of Carlisle, aided his advancement. In Cromwell's parliament of 1654 he represented Edinburgh, and Carlisle in those of 1656 and 1659. He was one of the first to urge Cromwell to take the royal title and restore the old constitution. In 1655 he was sent to France to remonstrate on the massacre of the Protestant Vaudois. Later in 1657 he was appointed resident at The Hague, to effect a union of the Protestant European powers, to mediate between Portugal and Holland and between Sweden and Denmark, to defend the interests of the English traders against the Dutch, and to inform the government concerning the movements of the exiled royalists.

He showed himself in these negotiations an able diplomatist. He was maintained in his post during the interregnum subsequent to the fall of Richard Cromwell, and was thus enabled in April 1660 to make

his peace with Charles II., to whom he com- municated Thurloe's despatches, and declared his abandonment of " principles sucked in " in New England, of which he now "saw the error." At the Restoration, therefore, Downing was knighted

1 The date of his birth is variously given as 1623, 1624 and 1625 (Sibley's Harvard Graduates, 1883).

(May 1660), was continued in his embassy in Holland, was confirmed in his tellership of the exchequer, and was further rewarded with a valuable piece of land adjoining St James's Park for building purposes, now known as Downing Street. 2 Consider- ing his past, he showed a very indecent zeal in arresting in Holland and handing over for execution the regicides Barkstead, Corbet and Okey. Pepys, who characterized his conduct as odious though useful to the king, calls him a " perfidious rogue," and remarks that " all the world took notice of him for a most ungrateful villain for his pains." 3 On the 1st of July 1663 he was created a baronet. Downing had from the first been hostile to the Dutch as the commercial rivals of England. He had strongly supported the Navigation Act of 1660, and he now deliberately drew on the fatal and disastrous war. During its continuance he took part at home in the management of the treasury, introduced the appropriation of supplies, opposed strongly by Clarendon as an encroachment on the prerogative, and in May 1667 was made secretary to the commissioners, his appointment being much welcomed by Pepys. 4 He had been returned for Morpeth in the convention parliament of April 1660, a constituency which he represented in every ensuing parliament till his death, and he spoke with ability on financial and commercial questions. He was appointed a commissioner of the customs in 1 67 1 . The same year he was again sent to Holland to replace Sir William Temple, to break up the policy of the Triple alliance and incite another war between Holland and England in furtherance of the French policy. His unpopularity there was extreme, and after three months' residence Downing fled to England, in fear of the fury of the mob. For this unauthorized step he was sent to the Tower on the 7th of February 1672, but released some few weeks after- wards. He defended the Declaration of Indulgence the same year, and made himself useful in supporting the court policy. He died in July 1684. Downing Street, London, is named after him, while Downing College, Cambridge, derived its name from his grandson, the 3rd baronet. The title became extinct when the 4th baronet, Sir Jacob G. Downing, died in 1764.

Downing was undoubtedly a man of great political and diplomatic

ability, but his talents were rarely employed for the advantage of his country and his character was marked by all the mean vices, treachery, avarice, servility and ingratitude. " A George Downing " became a proverbial expression in New England to denote a false man who betrayed his trust. 6 He published a large number of declarations and discourses, mostly in Dutch, enumerated in Sibley's biography, and wrote also " A True Relation of the Progress of the Parliament's Forces in Scotland" (1651), Thomason Tracts, Brit. Mus., E 640 (5).

DOWNMAN, JOHN (1750-1824), English portrait painter, was the son of Francis Downman«attorney, of St Neots, by Charlotte Goodsend, eldest daughter of the private secretary to George I. ; his grandfather, Hugh Downman (1672-1729), having been the master of the House of Ordnance at Sheerness. He is believed to have been born near Ruabon, educated first at Chester, then at Liverpool, and finally at the Royal Academy schools, and he was for a while in the studio of Benjamin West. His exquisite pencil portrait drawings, slightly tinted in colour, usually from the reverse, are well known, and many of them are of remarkable beauty. Several volumes of sketches for these drawings are still in existence. Downman is believed to have been " pressed " for the navy as a young man, and on his escape settled down for a while in Cambridge, eventually coming to London, and later (1804) going to reside in Kent in the village of West Mailing. He afterwards spent some part of his life in the west of England, especially in Exeter, and then travelled all over the country painting his dainty portraits. In 1818 he settled down at Chester, finally removing to Wrexham, where his only daughter married and where he died and was buried. He was an associate of the Royal Academy. The Downman family is usually known as a Devonshire one, but the exact connexion between the artist

2 Col. of St Pap.; Dom. (1661-1662) p. 408; Notes and Queries, ix. ser. vii. 92.

3 Diary, March 12, 17, 1662. ' 26.. May 27, 1667. 6 Sibley, i. 46.

and the Devonshire branch has not been traced. Many of his portraits have attached to them remarks of considerable importance respecting the persons represented.

See John Downman, his Life and Works, by G. C. Williamson (London, 1907). (G. C. W,J

DOWNPATRICK, a market town and the county town of Co. Down, Ireland, in the east parliamentary division, 28 m. S.S.E. of Belfast by the Belfast & County Down railway. Pop. (1901) 2993. It stands picturesquely on a sloping site near the south- west extremity of Strangford Lough. It is the seat of the Protestant and Roman Catholic dioceses of Down. St Patrick founded the see about 440, but the present Protestant cathedral dates from 1790, the old structure, after suffering many vicissitudes, having been in ruins for 250 years. The cathedral is said to contain the remains of its founder, together with those of St Columba and St Bridget. A round tower adjoining it was destroyed in 1790. A small trade is carried on at Strangford Lough by means of vessels up to 100 tons, which discharge at Quoile quay, about 1 m. from the town; but vessels of larger tonnage can discharge at a steamboat quay lower down the Quoile. The imports are principally iron, coal, salt and timber; the exports barley, oats, cattle, pigs and potatoes. Linen manu- facture is also carried on, and brewing, tanning and soap-making give considerable employment. The Down corporation race- meeting is important and attracts visitors from far outside the county. The rath or dun from which the town is named remains as one of the finest in Ireland. It was called Rath-Keltair, or the rath of the hero Keltar, and covers an area of 10 acres. In the vicinity of the town are remnants of the monastery of Saul, a foundation ascribed to St Patrick, and of Inch Abbey (ii8o)j founded by Sir John de Courcy. Three miles south is a fine stone circle, and to the south-east are the wells of Struell, famous as miraculous healers among the peasantry until modern times. The town is of extreme antiquity. It was called Dun-leth-glas, the fort of the broken fetters, from the miraculous deliverance from bondage of two sons of Dichu, prince of Lecale, and the first convert of St Patrick. It is the Dunum of Ptolemy, and was a residence of the kings of Ulster. It was already incorporated early in the 1 5th century. It returned two members to the Irish parliament until the Union in 1800, and thereafter one to the Imperial parliament until 1832.

DOWNS, the name of a system of chalk hills in the south-east of England. For the etymology of the word and its meaning see Down. It is most familiar in its application to the two ranges of the North and South Downs. Of these the North Downs are confined chiefly to the counties of Surrey and Kent, and the South to Sussex. Each forms a well-defined long range springing from the chalk area of Dorsetshire and Hampshire, to which, though broken up into a great number of short ranges and groups of hills, the general name of the Western

Downs is given. The Downs enclose the rich district of the Weald (q.v.).

The North Downs, extending from a point near Farnham to the English Channel between Dover and Folkestone, have a length along the crest line, measured directly, of 95 m. The crest, however, is not continuous, as the hills are breached by a suc- cession- of valleys, forming gaps through which high-roads and railways converge upon London. The rivers flowing through these gaps run northward, and, except in the extreme east, are members of the Thames basin. These breaching valleys, which are characteristic of the South Downs also, "carry us back to a time when the greensand and chalk were continued across, or almost across, the Weald in a great dome." The rivers " then ran down the slopes of the dome, and as the chalk and greensand gradually weathered back . . . deepened and deepened their valleys, and thus were enabled to keep their original course." l The western termination of the North Downs is the Hog's Back, a narrow ridge, little more than a quarter of a mile broad at the summit, sloping sharply north and south, and reaching 489 ft. in height. At the west end a depression occurs where the rivers Wey and Blackwater closely approach each other; and it is thought that the Wey has beheaded the Blackwater, which formerly 1 Avebury, The Scenery of England, ch. xi.*

flowed through the gap. In this depression lies Farnham, the first of a series of towns which have grown up at these natural gateways through the hills. The Wey, flowing south of the Hog's Back, breaches the Downs at its eastern extremity, the town of Guildford standing at this point. The next gap is that of the Mole, in which Dorking lies. Between Guildford and Dorking the main line of the Downs reaches a height of 712 ft., but a lateral depression, followed by the railway between these towns, marks off on the south a loftier range of lower greensand, in which Leith Hill, famous as a view-point, is 965 ft. in height. East of the Mole the northward slope of the Downs is deeply cut by narrow valleys, and the depression above Redhill may have been traversed by a stream subsequently beheaded by the Mole. A height of 868 ft. is attained east of Caterham. The next river to break through the main line is the Darent, but here another lateral depression, watered by the headstreams of that river, marks off the Ragstone Ridge,southof Sevenoaks,reaching8ooft. The lateral depression is continued along the valleys of streams tributary to the Medway, so that nearly as far as Ashford the Downs consist of two parallel ranges; but the Medway itself breaches both, Maidstone lying in the gap. The elevation now begins to decrease, and 682 ft. is the extreme height east of the Medway. The direction, hitherto E. by

N., trends E.S.E. The final complete breach is made by the Great Stour, between Ashford and Canterbury, east of which a height of 600 ft. is rarely reached. The valley of the Little Stour, however, offers a well-marked pass followed by the Folkestone- Canterbury railway, and the North Downs finally fall to the sea in the grand white cliffs between Dover and Folkestone.

The South Downs present similar characteristics on a minor scale. Springing from the main mass of the chalk to the south of Petersfield they have their greatest elevation (889 ft. in Butser Hill) at that point, and extend E. by S. for 65 m. to the English Channel at the cliffs of Beachy Head. As in the case of the North Downs a succession of rivers breach the hills, and a succession of towns mark the gaps. These are, from east to west, the Arun, with the town of Arundel, the Adur, with Shoreham, the Ouse, with Lewes and Newhaven, and the Cuckmere, with no considerable town. The steep slope of the South Downs is north- ward towards the Weald. The southern slopes reach the coast east of Brighton, but west of this town a flat coastal belt intervenes, widening westward. Apart from the complete breaches mentioned, the South Downs, scored on the south with many deep vales, are generally more easily penetrable than the North Downs, and the coast is less continuous.

Smooth convex curves are characteristic of the Downs; their graceful and striking outline gives them an importance in the landscape in excess of their actual height; their flanks are well wooded, their summits covered with close springy turf.

" The Downs " is also the name of a roadstead in the English Channel off Deal between the North and the South Foreland. It forms a favourite anchorage during heavy weather, protected on the east by the Goodwin Sands and on the north and west by the coast. It has depths down to 12 fathoms. Even during southerly gales some shelter is afforded, though under this condition wrecks are not infrequent.

DOWNSHIRE, WILLS HILL, ist Marquess of (1718-1793), son of Trevor Hill, ist Viscount Hillsborough, was born at Fairford in Gloucestershire on the 30th of May 1718. He became an English member of parliament in 1741, and an Irish viscount on his father's death in the following year, thus sitting in both the English and Irish parliaments. In 1751 he was created earl of Hillsborough in the Irish peerage; in 1754 he was made comp- troller of the royal household and an English privy councillor; and in 1756 he became a peer of Great Britain as baron of Harwich. For nearly two years he was president of the board of trade and plantations under George

Grenville, and after a brief period of retirement he filled the same position, and then that of joint postmaster-general, under the earl of Chatham. From 1768 to 1772 Hillsborough was secretary of state for the colonies and also president of the board of trade, becoming an English earl on his retirement; in 1779 he was made secretary of state for the northern department, and he was created marquess of

Downshire seven years after his final retirement in 1782. Both in and out of office he opposed all concessions to the American colonists, but he favoured the project for a union between England and Ireland. Reversing an earlier opinion Horace Walpole says Downshire was " a pompous composition of ignorance and want of judgment." He died on the 7th of October 1793 and was succeeded by his son Arthur (1753-1801), from whom the present marquess is descended.

DOWRY (in Anglo-Fr. dowarie, O. Fr. douaire, Med. Lat. dotaria, from Lat. dos; from root of dare, to give; in Fr. dot), the property which a woman brings with her at her marriage, a wife's marriage portion (see Settlement).

DOWSER and DOWSING (from the Cornish " dowse," M.E. duschcn, to strike or fall) , one who uses, or the art of using, the dowsing-rod (called " deusing-rod " by John Locke in 1601), or " striking-rod " or divining-rod, for discovering subterranean minerals or water. (See Divining- Rod.)

DOXOLOGY (Gr. doˆoKoyia, a praising, giving glory), an ascription of praise to the Deity. The early Christians continued the Jewish practice of making such an ascription at the close of public prayer (Origen, liepl eiixys, 33) and introduced it after the sermon also. The name is often applied to the Trisagion (tersanctus), or " Holy, Holy, Holy," the scriptural basis of which is found in Isaiah vi. 3, and which has had a place in the worship of the Christian church since the 2nd century; to the Hallelujah of several of the Psalms and of Rev. xix. ; to such passages of glorification as Rom. ix. 5, xvi. 27, Eph. iii. 21; and to the last clause of the Lord's Prayer as found in Matt. vi. 13 (A. V.), which critics are generally agreed in regarding as an interpolation, and which, while used in the Greek and the Protestant churches, is omitted in the Roman rite. It is used, however, more definitely as the designation of two hymns

distinguished by liturgical writers as the Greater and Lesser Doxologies.

The origin and history of these it is impossible to trace fully. The germ of both is to be found in the Gospels; the first words of the Greater Doxology, or Gloria in Excelsis, being taken from Luke ii. 14, and the form of the Lesser Doxology, or Gloria Patri, having been in all probability first suggested by Matt, xxviii. 19. The Greater Doxology, in a form approximating to that of the English prayer-book, is given in the Apostolical Constitutions (vii. 47). At this time (c. 375) itranthus: " Glory to God on high, and on earth peace to men of (his) goodwill. We praise thee, we bless thee, we worship thee, we glorify thee, we give thanks to thee for thy great glory. O Lord God, heavenly king, God the Father Almighty; O Lord, the only begotten Son, Jesus Christ; O Lord God, Lamb of God, Son of the Father, that takest away the sins of the world, have mercy upon us; Thou that takest away the sins of the world, receive our prayer; Thou that sittest at the right hand of the Father, have mercy upon us; For Thou alone art holy. Thou only, Jesus Christ, with the Holy Ghost, art most high in the glory of God the Father. Amen." This is the earliest record of it, but it is also found in the Alexandrine Codex. Alcuin attributes the authorship of the Latin form — the Gloria in Excelsis — to St Hilary of Poitiers (died 367). The quotations from the hymn in the pseudo-Athanasian De Virginitate, and in Chrysostom (Horn. 69 in Matth.), include only the opening words (those from St Luke's gospel), though the passage in Athanasius shows by an et caetera that only the beginning of the hymn is given. Three references indicate that the hymn was used in private devotions; as it does not appear in any of the earliest liturgies, whether Eastern or Western, its introduction into the public services of the church was probably of a later date than has often been supposed. Its first introduction into the Roman liturgy is due to Pope Symmachus (498-514), who ordered it to be sung on Sundays and festival days. There was much opposi- tion to the expansion, but it was suppressed by the fourth council of Toledo in 633. Until the end of the nth century its use was confined to bishops, and to priests at Easter and on their installa- tion. The Mozarabic liturgy provides for its eucharistic use on Sundays and festivals. In these and other early liturgies the Greater Doxology occurs immediately after the beginning of the service v in the English prayer-book it introduced at the close

of the communion office, but it does not occur in either the morning or evening service. This doxology is also used in the Protestant Episcopal and Methodist Episcopal churches of America, as indeed in

most Protestant churches at the eucharist.

The Lesser Doxology, or Gloria Patri, combines the character of a creed with that of a hymn. In its earliest form it ran simply — " Glory be to the Father, and to the Son, and to the Holy Ghost, world without end, Amen," or " Glory be to the Father, in (or through) the Son, and in (or through) the Holy Ghost." Until the rise of the Arian heresy these forms were probably regarded as indifferent, both being equally capable of an orthodox interpretation. When the Arians, however, finding the second form more consistent with their views, adopted it persistently and exclusively, its use was naturally discountenanced by the Catholics, and the other form became the symbol of orthodoxy. To the influence of the Arian heresy is also due the Catholic addition — " as it was in the beginning, is now, and ever shall be," the use of which was, according to some authorities, expressly enjoined by the council of Nicaea. There is no sufficient evidence of this, but there exists a decree of the second council of Vaison (529), asserting its use as already established in the East propter haereticorum astutiam, and ordering its adoption throughout the churches of the West. In the Western Church the Gloria Patri is repeated at the close of every psalm, in the Eastern Church at the close of the last psalm. This last is the optional rule of the American Episcopal Church.

Metrical doxologies are often sung at the end of hymns, and the term has become especially associated with the stanza beginning " Praise God from whom all blessings flow," with which Thomas Ken, bishop of Winchester, concluded his morning and evening hymns.

See J. Bingham, Biog. eccles. xiv. 2; Siegel, Christl. Alterthiimer, i. 515, &c. ; F. Procter, Book of Common Prayer, p. 212; W. Palmer, Orig. Liturg. iv. § 23; art. " Liturgische Formeln " (by Drews) in Hauck-Herzog, Realencyk. fiir prot. Theol. xi. 547.

DOYEN, GABRIEL FRANCOIS (1726-1806), French painter, was born at Paris in 1726. His passion for art prevailed over his father's wish, and he became in his twelfth year a pupil of Vanloo. Making rapid progress, he obtained at twenty the Grand Prix, and in 1748 set out for Rome. He studied the works of Annibale Caracci, Cortona, Giulio Romano and Michelangelo, then visited Naples, Venice, Bologna and other Italian cities, and in 1755 returned to Paris. At first unappreciated and disparaged, he resolved by one grand effort to conquer a reputation, and in 1758 he exhibited his " Death of Virginia." It was completely success- ful, and procured him admission to the Academy. Among his greatest works are reckoned

the " Miracle des Ardents," painted for the church of St Genevieve at St Roch (1773) ; the " Triumph of Thetis," for the chapel of the Invalides; and the " Death of St Louis," for the chapel of the Military School. In 1776 he was appointed professor at the Academy of Painting. Soon after the beginning of the Revolution he accepted the invitation of Catherine II. and settled at St Petersburg, where he was loaded with honours and rewards. He died there on the 5th of June 1806.

DOYLE, SIR ARTHUR CONAN (1859-), English novelist, eldest son of the artist Charles Doyle, was born on the 22nd of May 1859. He was sent to Stonyhurst College, and further pursued his education in Germany, and at Edinburgh University where he graduated M.B. in 1881 and M.D. in 1885. He had begun to practise as a doctor in Southsea when he published A Study in Scarlet in 1887. Micah Clarke (1888), a tale of Monmouth's rebellion, The Sign of Four (1889), and The White Company (1891) , a romance of Du Guesclin's time, followed. In Rodney Stone (1896) he drew an admirable sketch of the prince regent; and he collected a popular series of stories of the Napoleonic wars in The Exploits of Brigadier Gerard (1896). In 1891 he attained immense popularity by The Adventures of Sherlock Holmes, which first appeared in The Strand Magazine. These ingenious stories of the success of the imperturbable Sherlock Holmes, who had made his first appearance in A Study in Scarlet (1887), in detecting crime and disentangling mystery, found a host of imitators. The novelist himself returned to his

heroin The Memoirs of Sherlock Holmes (1893), TheHoundofthe Baskervilles (1902), and The Return of Sherlock Holmes (1905). His later books include numerous novels; plays, The Story of Waterloo (1 894) , in which Sir Henry Irving played the leading part, The Fires of Fate (1909), and The House of Temperley (1909); and two books in defence of the British army in South Africa — The Great Boer War (1900) and The War in South Africa; its Causes and Conduct (1902). Dr Conan Doyle served as registrar of the Langman Field Hospital in South Africa, and was knighted in 1902.

DOYLE, SIR FRANCIS HASTINGS CHARLES, Bart. (1810- English man of letters, was born at Nunappleton,

Yorkshire, on the 21st of August 1810. He was the son of Major-

General Sir Francis Hastings Doyle, 1st baronet (1783-1839), and was educated at Eton and at Christ Church, Oxford, where he took a first-class in classics in 183 1. He read for the bar and was called in 1837. He had been elected to a fellowship of All Souls' in 1835, and his interests were chiefly literary. Among his intimate friends was Mr Gladstone, at whose marriage he assisted as " best man "; but in later life their political opinions widely differed. In 1834 he published Miscellaneous Verses, reissued with additions in 1840. This was followed by Two Destinies (1844), The Duke's Funeral (1852), Return of the Guards and other Poems (1866); and from 1867 to 1877 he was professor of poetry at Oxford. In 1869 some of the lectures he delivered were published in book form. One of the most interesting was his appreciation of William Barnes, and the essay on Newman's Dream of Gerontius was translated into French. In 1886 he published his Reminiscences, full of records of the interesting people he had known. Sir Francis Doyle succeeded his father (chairman of the board of excise) as 2nd baronet in 1839, and in 1844 married Sidney, daughter of Charles Watkin Williams Wynn (1775-1850). From 1845 he held various important offices in the customs. He died on the 8th of June 1888. Doyle's poetry is memorable for certain isolated and spirited pieces in praise of British fortitude. The best-known are his ballads on the " Birkenhead " disaster and on " The Private of the Buffs."

DOYLE, JOHN ANDREW (1844-1907), English historian, the son of Andrew Doyle, editor of The Morning Chronicle, was born on the 14th of May 1844. He was educated at Eton and at Balliol College, Oxford, winning the Arnold prize in 1868 for his essay, The American Colonies. He was a fellow of All Souls' from 1870 until his death, which occurred at Crickhowell, South Wales, on the 4th of August 1907. His principal work is The English Colonies in America^ in five volumes, as follows: Virginia, Maryland and the Carolinas (1 vol., 1882), The Puritan Colonies (2 vols., 1886), The Middle Colonies (1 vol., 1907), and The Colonies under the House of Hanover (r vol., 1907), the whole work dealing with the history of the colonies from 1607 to 1759. Doyle also wrote chapters i., ii., v. and vii. of vol. vii. of the Cambridge Modern History, and edited William Bradford's His- tory of the Plimouth Plantation (1896) and the Correspondence of Susan Ferrier (1898) .

DOYLE, RICHARD (1824-1883), English artist, son of John Doyle, the caricaturist known as " H. B." (1797-1868), was born in London in 1824. His father's " Political Sketches " took the town by storm in the days of Lord Grey and Lord Melbourne. The son was an extremely precocious artist, and in his " Home for the Holidays,"

done when he was twelve, and his " Comic English Histories," drawn four years later, he showed extraordinary gifts of humour and fancy. He had no art training outside his father's studio. In 1843 he joined the staff of Punch, drawing cartoons and a vast number of illustrations, but he retired in 1850, in consequence of the attitude adopted by that paper towards what was known as " the papal aggression," and especially towards the pope himself. In 1854 he published his " Continental Tour of Brown, Jones and Robinson." His illustrations to three of the Christmas Books of Charles Dickens, and to The Newcomes by Thackeray, are reckoned among his principal achievements; and his fanciful pictures of elves and fairies have always been general favourites. He died on the nth of December 1883. His most popular drawing is his cover of Punch.

DOZSA, GYORGY (d. 1514), Hungarian revolutionist, was a Szekler squire and soldier of fortune, who won such a reputation for valour in the Turkish wars that the Hungarian chancellor, Tam&s Bakocz, on his return from Rome in 1514 with a papal bull preaching a holy war in Hungary against the Moslems, appointed him to organize and direct the movement. In a few weeks he collected thousands of so-called Kuruczok (a corruption of Cruciati), consisting for the most part of small yeomen, peasants, wandering students, friars and parish priests, the hum- blest and most oppressed portion of the community, to whom alone a crusade against the Turk could have the slightest attrac- tion. They assembled in their counties, and by the time Dozsa had drilled them into some sort of discipline and self-confidence, they began to air the grievances of their class. No measures had been taken to supply these voluntary crusaders with food or clothing; as harvest-time approached, the landlords commanded them to return to reap the fields, and on their refusing to do so, proceeded to maltreat their wives and families and set their armed retainers upon the half-starved multitudes. Instantly the movement was diverted from its original object, and the peasants and their leaders began a war of extermination against the landlords. By this time Dozsa was losing control of the rabble, which had fallen under the influence of the socialist parson of Czegled, Lorincz Meszaros. The rebellion was the more dangerous as the town rabble was on the side of the peasants, and in Buda and other places the cavalry sent against the Kuruczok were unhorsed as they passed through the gates. The rebellion spread like lightning, principally in the central or purely Magyar provinces, where hundreds of manor-houses and castles were burnt and thousands of the gentry done to death by impalement, crucifixion and other unspeakable methods. Dozsa's camp at Czegled was the centre of the jacquerie, and from

thence he sent out his bands in every direction, pillaging and burning. In vain the papal bull was revoked, in vain the king issued a proclama- tion commanding the peasantry to return to their homes under pain of death. By this time the rising had attained the dimensions of a revolution; all the feudal levies of the kingdom were called out against it; and mercenaries were hired in haste from Venice, Bohemia and the emperor. Meanwhile Dozsa had captured the city and fortress of Csanad, and signalized his victory by impaling the bishop and the castellan. Subsequently, at Arad, the lord treasurer, Istvan Telegdy, was seized and tortured to death with satanic ingenuity. It should, however, in fairness be added that only notorious bloodsuckers, or obstinately resisting noblemen, were destroyed in this way. Those who freely submitted were always released on parole, and Dozsa not only never broke his given word, but frequently assisted the escape of fugitives. But he could not always control his followers when their blood was up, and infinite damage was done before he could stop it. At first, too, it seemed as if the government were incapable of coping with him. In the course of the summer he took the fortresses of Arad, Lippa and Vilagos; provided himself with guns and trained gunners ; and one of his bands advanced to within five leagues of the capital. But his half-naked, ill-armed ploughboys were at last overmatched by the mail-clad chivalry of the nobles. Dozsa, too, had become demoralized by success. After Csanad, he issued proclamations which can only be described as nihilistic. His suppression had become a political necessity. He was finally routed at Temesvar by the combined forces of Janos Zapolya and Istvan Bathory, was captured, and condemned to sit on a red-hot iron throne, with a red-hot iron crown on his head and a red-hot sceptre in his hand. This infernal sentence was actually carried out, and, life still lingering, the half -roasted carcass of the unhappy wretch, who endured everything with invincible heroism, was finally devoured by half-a-dozen of his fellow-rebels, who by way of preparation had been starved for a whole week beforehand.

See Sandor Marki, Dozsa Gybrgy (Hung.), Budapest, 1884.

(R. N. B.)

DOZY, REINHART PIETER ANNE (1820-1883), Dutch Arabic scholar of French (Huguenot) origin, was born at Leiden in February 1820. The Dozys, like so many other contemporary

French families, emigrated to the Low Countries after the revocation of the edict of Nantes, but some of the former appear to have settled in Holland as early as 1647. Dozy studied at the university of Leiden, obtained the degree of doctor in 1844, was appointed an extraordinary professor of history in 1850, and professor in 1857. The first results of his extensive studies in Oriental literature, Arabic language and history, manifested themselves in 1847, when he published Al-Marrakushi's History of the Almohades (Leiden, 2nd ed., 1881), which, together with his Scriptorum Arabum loci de Abbaditis (Leiden, 1846-1863, 3 vols.), his editions of Ibn-Adhari's History of Africa and Spain (Leiden, 1848-1852, 3 vols.), of Ibn-Badrun's Historical Commentary on the Poem of Ibn-Abdun (Leiden, 1848), and his Dictionnaire dStaille des noms des vetements chez les Arabes (Amsterdam, 1845) — a work crowned by the Dutch Institute — stamped Dozy as one of the most learned and critical Arabic scholars of his day. But his real fame as a historian mainly rests on his great work, Histoire des Mussulmans d'Espagne, jusqu'a la conquite de V Andalousie par les Almoravides, 711-1110 (Leiden, 1861; 2nd ed., ibid., 1881); a graphically written account of Moorish dominion in Spain, which shed new light on many obscure points, and has remained the standard work on the subject. Dozy's Recherches sur V histoire et la litterature de VEspagne pendant le moyen Age (Leiden, 2 vols., 1849; 2nd and 3rd ed., completely recast, i860 and 1881) form a needful and wonderfully trenchant supplement to his Histoire des Mussulmans, in which he mercilessly exposes the many tricks and falsehoods of the monks in their chronicles, and effectively demolishes a good part of the Cid legends. As an Arabic scholar Dozy stands well-nigh unsurpassed in his Supplement aux dictionnaires arabes (Leiden, 1877-1881, 2 vols.), a work full of research and learning, a storehouse of Arabic lore. To the same class belongs his Glossaire des mots espagnols et portugais, derives de I'Arabe, edited with Dr W. H. Engelmann of Leipzig (Leiden, 1866; 2nd ed., 1868), and a similar list of Dutch words derived from the Arabic. Dozy also edited Al Makkari's Analectes sur I'histoire et la litterature des Arabes d'Espagne (Leiden, 1855—1861, 2 vols.), and, in conjunction with his friend and worthy successor, Professor De Goeje, at Leiden, Idrisi's Description de V Afrique et del' Espagne (1866), also the Calendrier de Cordoue de Vannee q6i; texte arabe et ancienne traduction latine (Leiden, 1874). Het Islamisme (Islamism; Haarlem, 1863, 2nd ed., 1880; French translation) is a popular exposition of Mahommedanism, of a more controversial character; and De Israelieten te Mekka ("The

Israelites at Mecca," Haarlem, 1864) became the subject of a rather heated discussion in Jewish circles. Dozy died at Leiden in May 18S3. (H. Ti.)

DRACAENA, in botany, a genus of the natural order Liliaceae, containing about fifty species in the warmer parts of the Old World. They are trees or shrubs with long, generally narrow leaves, panicles of small whitish flowers, and berried fruit. The most remarkable species is Dracaena Draco, the dragon-tree of the Canary Isles, which reaches a great size and age. The famous specimen in Teneriffe, which was blown down by a hurricane in 1868, when measured by Alexander von Humboldt, was 70 ft. high, with a circumference of 45 ft. several feet above the ground. A resin exuding from the trunk is known as dragon's blood (q.v.).

Many of the cultivated so-called Dracaenas belong to the closely-allied genus Cordyline. They are grown for the beauty of form, colour and variegation of their foliage and are extremely useful as decorative stove plants or summer greenhouse plants, or for room and table decoration. They are easy to grow and may be increased by cuttings planted in sandy soil in a tempera- ture of from 65° to 70° by night, the spring being the best time for propagation. The old stems laid flat in a propagating frame will push young shoots, which may be taken off with a heel when 2 or 3 in. long, and planted in sandy peat in 3-in. pots; the tops can also be taken off and struck. The established plants do best in fibry peat made porous by sand. In summer they should have a day temperature of 75°, and in winter one of 65°. Shift as required, using coarser soil as the pots become larger. By the end of the summer the small cuttings will have made nice

plants, and in the spring following they can be kept growing by the use of manure water twice a week. Those intended for the conservatory should be gradually inured to more air by mid-summer, but kept out of cold draughts. When the plants get too large the)' can be headed down and the tops used for cuttings.

A large number of the garden species of Dracaena are varieties of Cordyline terminalis. D. Goldieana is a grandly variegated species from west tropical Africa, and requires more heat.

DRACHMANN, HOLGER HENRIK HERBOLDT (1846-1908), Danish poet and dramatist, son of Dr A. G. Drachmann, a physician of Copenhagen, whose family was of German ex- traction, was born in Copenhagen on the 9th of October 1846. Owing to the early death of

his mother, who was a Dane, the child was left much to his own devices. He soon developed a fondness for semi-poetical performances, and loved to organize among his companions heroic games, in which he himself took such parts as those of Tordenskjold and Niels Juul. His studies were belated, and he did not enter the university until 1865, leaving it in 1866 to become a student in the Academy of Fine Arts. From 1866 to 1870 he was learning, under Professor Sorensen, to become a marine painter, and not without success. But about the latter date he came under the influence of Georg Brandes, and, without abandoning art, he began to give himself more and more to literature. At various periods he travelled very extensively in England, Scotland, France, Spain and Italy, and his literary career began by his sending letters about his journeys to the Danish newspapers. After returning home, he settled for some time in the island of Bornholm, painting sea- scapes. He nowissued his earliest volume of poems, Digte (1872), and joined the group of young Radical writers who gathered under the banner of Brandes. Drachmann was unsettled, and still doubted whether his real strength lay in the pencil or in the pen. By this time he had enjoyed a surprising experience of life, especially among sailors, fishermen, students and artists, and the issues of the Franco- German War and the French Commune had persuaded him that a new and glorious era was at hand. His volume of lyrics, Daempede Melodier (" Muffled Melodies," 1875), proved that Drachmann was a poet with a real vocation, and he began to produce books in prose and verse with great rapidity. Ungt Blod (" Young Blood," 1876) contained three realistic stories of contemporary life. But he returned to his true field in his magnificent Sange ved Havet; Venezia (" Songs of the Sea; Venice," 1877), an d won the passionate admiration of his countrymen by his prose work, with interludes inverse, called Derovre fra Graensen ("Over the Frontier there," 1877), a series of impressions made on Drachmann by a visit to the scenes of the war with Germany. During the succeeding years he was a great traveller, visiting most of the principal countries of the world, but particularly familiarizing himself, by protracted voyages, with the sea and with the life of man in maritime places. In 1879 he published Ranker og Roser (" Tendrils and Roses "), amatory lyrics of a very high order of melody, in which he showed a great advance in technical art. To the same period belongs Paa Somands Tro og Love (" On the Faith and Honour of a Sailor," 1878), a volume of short stories in prose. It was about this time that Drachmann broke with Brandes and the Radicals, and set himself at the head of a sort of " nationalist " or popular-Conservative party in Denmark. He continued to celebrate the life of the fishermen and sailors in books, whether in prose or

verse, which were the most popular of their day. Paul og Virginie and Lars Kruse (both 1879) ; Osten for Sol og vestenfor Maone (" East of the Sun and Moon," 1880) ; Puppe og Sommerfugl (" Chrysalis and Butterfly," 1882); and Strandby Folk (1883) were among these. In 1882 Drachmann pub- lished his fine translation, or paraphrase, of Byron's Don Juan. In 1885 his romantic play called Der var en Gang (" Once upon a Time ") had a great success on the boards of the Royal theatre, Copenhagen; and his tragedies of Volund Smed (" Wayland the Smith ") and Brav-Karl (1897) made him the most popular playwright of Denmark. He published in 1894 a volume of exquisitely fantastic Melodramas in rhymed verse, a collection which contains some of Drachmann's most perfect work. His

novel Med den brede Pensel (" With a Broad Brush," 1887) was followed in 1890 by Forskrevet, the history of a young painter, Henrik Gerhard, and his revolt against his bourgeois surround- ings. With this novel is closely connected Den hellige lid (" The Sacred Fire," 1899), in which Drachmann speaks in his own person. There is practically no story in this autobiographical volume, which abounds in lyrical passages. In 1899 he produced his romantic play called Giirre; in 1900 a brilliant lyrical drama, Hallfred Vandraadeskjald; and in 1903, Del grdnne Haab. He died in Copenhagen on the 14th of January 1908.

See an article by K. Gjellerup in Dansk Biografisk Lexikon vol. iv. (Copenhagen, 1890). (E. G.)

DRACO (7th century B.C.), Athenian statesman, was Archon Eponymus (but see J. E. Sandys, Constitution of Athens, p. 12, note) in 621 B.C. His name has become proverbial as an in- exorable lawgiver. Up to his time the laws of Athens were unwritten, and were administered arbitrarily by the Eupatridae. As at Rome by the twelve Tables, so at Athens it was found necessary to allay the discontent of the people by publishing these unwritten laws in a codified form, and Draco, himself a Eupatrid, carried this out. According to Plutarch (Life of Solon) : " For nearly all crimes there was the same penalty of death. The man who was convicted of idleness, or who stole a cabbage or an apple, was liable to death no less than the robber of temples or the murderer." For the institution of the 51 Ephetae and their relation to the Areopagus in criminal juris- diction see Greek Law. The orator Demades (d. c. 318 B.C.) said that Draco's laws

were written in blood. Whether this implies peculiar severity, or merely reflects the attitude of a more refined age to the barbarous enactments of a primitive people, among whom the penalty of death was almost universal for all crimes, cannot be decided. According to Suidas, however, in his Lexicon, the people were so overjoyed at the change he made, that they accidentally suffocated him in the theatre at Aegina with the rain of caps and cloaks which they flung at him in their enthusiasm.

The appearance in 1891 of Aristotle's lost treatise on the constitution of Athens gave rise to a most important controversy on the subject of Draco's work. From the statements contained in chapter iv. of this treatise, and inferences drawn from them, many scholars attributed to Draco the construction of an entirely new constitution for Athens, the main features of which were:

(1) extension of franchise to all who could provide themselves with a suit of armour — or, as Gilbert (Constitutional Antiquities, Eng. trans, p. 121) says, to the Zeugite class, from which mainly the hoplites may be supposed to have come; (2) the institution of a property qualification for office (archon 10 minae, strategus 100 minae); (3) a council of 401 members (see Bottle); (4) magistrates and councillors to be chosen by lot; further, the four Solonian classes are said to be already in existence.

For some time, especially in Germany, this constitution was almost universally accepted; now, the majority of scholars reject it. The reasons against it, which are almost overwhelm- ing, may be-shortly summarized. (1) It is ignored by every other ancient authority, except an admittedly spurious passage in Plato 1 ; whereas Aristotle says of his laws " they are laws, but he added the laws to an existing constitution " (Pol. ii. 9. 9).

(2) It is inconsistent with other passages in the Constitution of Athens. According to c. vii., Solon repealed all laws of Draco except those relating to murder; yet some of the most modern features of Solon's constitution are found in Draco's constitution.

(3) Its ideas are alien to the 7th century. It has been said that the qualification of the strategus was ten times that of the archon. This, reasonable in the 5th, is preposterous in the 7th century, when the archon was unquestionably the supreme executive official. Again, it is unlikely that Solon, a democratic reformer, would have reverted from a democratic wealth" qualification such as is attributed to Draco, to an aristocratic birth quali-

1 A passage (long overlooked) in Cicero, De republica, shows that, by the 1st century B.C. the interpolation had already been made; the quotation is evidently taken from the list in c. xli. of the Constitution, which it reproduces.

fication. Thirdly, if Draco had instituted a hoplite census, Solon would not have substituted citizenship by birth. (4) The terminology of Draco's constitution is that of the 5th, not the 7 th, century, whereas the chief difficulty of Solon's laws is the obsolete 6th-century phraseology. (5) Lastly, a comparison between the ideals of the oligarchs under Theramenes (end of 5th century) and this alleged constitution shows a suspicious similarity (hoplite census, nobody to hold office a second time until all duly qualified persons had beeen exhausted, fine of one drachma for non-attendance in Boule). It is reasonable, there- fore, to conclude that the constitution of Draco was invented by the school of Theramenes, who wished to surround their revolutionary views with the halo of antiquity; hence the allusion to " the constitution of our father " (17 Trarpux iroKiTtia). This hypothesis is further corroborated by a criticism of the text. Not only is chapter iv. considered to be an interpolation in the text as originally written, but later chapters have been edited to accord with it. Thus chapter iv. breaks the connexion of thought between chapters iii. and v. Moreover, an inter- polator has inserted phrases to remove what would otherwise have been obvious contradictions: thus (a) in chapter vii., where we are told that Solon divided the citizens into four classes (n/xi7M aT < 1)) the interpolator had added the words " according to the division formerly existing " (KaBairep Si-gprjTat, kcu Kpbrepov) , which were necessary in view of the statement that Draco gave the franchise to the Zeugites; (b) in chapter xli., where successive constitutional changes are recorded, the words " the Draconian " (17 iirl ApaKovros) are inserted, though the subsequent figures are not accommodated to the change. Solon is also here spoken of as the founder of democracy, whereas the Draconian constitution of chap. iv. contains several democratic innovations. Two further points may be added, namely, that whereas Aristotle's treatise credits Draco with establishing a money fine, Pollux definitely quotes a law of Draco in which fines are assessed at so many oxen; secondly, if chapter iv. did exist in the original text, it is more than curious that though the treatise was widely read in antiquity there is no other reference to Draco's consti tution except the two quoted above. In any case, whatever were Draco's laws, we learn from Plutarch's life of Solon that Solon abolished all of them, except those dealing with homicide.

Authorities. — Beside the works of J. E. Sandys and G. Gilbert

quoted above, see those quoted in article Constitution of Athens ; Grote, Hist, of Greece (ed. 1907), pp. 9-1 1, with references; and histories of Greece published after 1894. (J. M. M.)

DRACO ("the Dragon"), in astronomy, a constellation of the northern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.); it was catalogued by Ptolemy, 31 stars, Tycho Brahe, 32, Hevelius, 40. The Greeks had many fables concerning this constellation ; one is that when Heracles killed the dragon guarding the Hesperian fruit Hera transferred the creature to heaven as a reward for its services. The planetary nebula H. IV. 37 Draconis is of a decided pale blue colour, and one of the most conspicuous objects of its class.

DRACONTIUS, BLOSSIUS AEMILIUS, of Carthage (according to the early tradition, of Spanish origin), Christian poet, flour- ished in the latter part of the 5th century a.d. He belonged to a family of landed proprietors, and practised as an advocate in his native place. After the conquest of the country by the Vandals, Dracontius was at first allowed to retain possession of his estates, but was subsequently deprived of his property and thrown into prison by the Vandal king, whose triumphs he had omitted to celebrate, while he had written a panegyric on a foreign and hostile ruler. He subsequently addressed an elegiac poem to the king, asking pardon and pleading for release. The result is not known, but it is supposed that Dracontius obtained his liberty and migrated to northern Italy in search of peace and quietness. This is consistent with the discovery at Bobbio of a 15th-century MS., now in the Museo Borbonico at Naples, containing a number of poems by Dracontius (the Carmina minora). The most important of his works is the De laudibus Dei or De Deo in three books, wrongly attributed by MS. tradition to St Augustine. The account of the creation,

which occupies the greater part of the first book, was at an early date edited separately under the title of Hexaemeron, and it was not till 1 791 chat the three books were edited by Cardinal Arevalo. The apology (Satisf actio) consists of 158 elegiac couplets; it is generally supposed that the king, addressed is Gunthamund (484-496). The Carmina minora, nearly all in hexameter verse, consist of school exercises and rhetorical declamations, amongst others the fable of Hylas, with a preface to his tutor, the grammarian Felicianus; the

rape of Helen; the story of Medea; two epithalamia. It is also probable that Dracontius was the author of the Orestis tragoedia, a poem of some 1000 hexameters, which in language, metre and general treatment of the subject exhibits a striking resemblance to the other works of Dracontius. Opinions differ as to his poetical merits, but, when due allowance is made for rhetorical exaggera- tion and consequent want of lucidity, his works show considerable vigour of expression, and a remarkable knowledge of the Bible and of Roman classical literature.

Editions. — De Deo and Satisfactio, ed. Arevalo, reprinted in Migne's Patrologiae cursus, lx. ; Carmina minora, ed. F. de Duhn (1873). On Dracontius generally, see A. Ebert, Allgemeine Geschichle der Lit. des Mittelalters im Abendlande, i. (1874); C. Rossberg, In D. Carmina minora (1878) ; H. Mailfait, De Dracontii poetae lingua (1902). On the Orestis tragoedia, see editions by R. Peiper (1875) and C. Giarratino (Milan, 1906); pamphlets by C. Rossberg (1880, on the authorship; 1888, materials for a commentary).

DRAFTED MASONRY, in architecture, the term given to large stones, on the face of which has been dressed round the edge a draft or sunken surface, leaving the centre portion as it came from the quarry. The dressing is worked with an adze of eight teeth to the inch, used in a vertical direction and to a width of 2 to 4 in. The earliest example of drafted masonry is found in the immense platform built by Cyrus 530 B.C. at Pasargadae in Persia. It occurs again in the palace of Hyrcanus, known as the Arak-el-Emir (176 B.C.), but is there inferior in execution. The finest drafted masonry is that dating from the time of Herod, in the tower of David and the walls of the Haram in Jerusalem, and at Hebron. In the castles built by the Crusaders, the adze has been worked in a diagonal direction instead of vertically. In all these examples the size of the stones employed is some- times enormous, so that the traditional influence of the Phoenician masons seems to have lasted till the 12th century.

DRAG (from the Old Eng. dragan, to draw; the word preserves the g which phonetically developed into w), that which is drawn or pulled along a surface, or is used for drawing or pulling. The term is thus applied to a harrow for breaking up clods of earth, or for an apparatus, such as a grapnel, net or dredge, used for searching water for drowned bodies or other objects. As a name of a vehicle, "drag" is sometimes used as equivalent to " break," a heavy carriage without a body used for training horses, and also a large kind of wagonette, but is more usually applied to a privately owned four-horse coach for four-in-hand driving. The word is also given to the "

shoe " of wood or iron, placed under the wheel to act as a brake, and also to the " drift " or " sea-anchor," usually made of spars and sails, employed for checking the lee- way of a ship when drifting. In fox-hunting, the " drag " is the line of scent left by the fox, but more particu- larly the term is given to a substitute for the hunting of a fox by hounds, an artificial line of scent being laid by the dragging of a bag of aniseed or other strong smelling substance which a pack will follow.

DRAG ASH ANI (Rumanian Dragasani) , a town of Rumania, near the right bank of the river Olt, and on the railway between Caracal and Ramnicu Valcea. Pop. (1900) 4398. The town is of little commercial importance, but the vineyards on the neighbouring hills produce some of the best Walachian wines. Dragashani stands on the site of the Roman Rusidava. In 182 1 the Turks routed the troops of Ypsilanti near the town.

DRAGOMAN (from the Arabic 0> V/* terjuman, an interpreter or translator; the same root occurs in the Hebrew word tar gum signifying translation, the title of the Chaldaean translation of the Bible), a comprehensive designation applied to all who act as intermediaries between Europeans and Orientals, from the*

hotel tout or travellers' guide, hired at a few shillings a day, to the chief dragoman of a foreign embassy whose functions include the carrying on of the most important political negotia- tions with the Ottoman government, or the dragoman of the imperial divan (the grand master of the ceremonies) .

The original employment of dragomans by the Turkish government arose from its religious scruples to use any language save those of peoples which had adopted Islamism. The political relations between the Porte and the European states, more frequent in proportion as the Ottoman power declined, com- pelled the sultan's ministers to make use of interpreters, who rapidly acquired considerable influence. It soon became neces- sary to create the important post of chief dragoman at the Porte, and there was no choice save to appoint a Greek, as no other race in Turkey combined the requisite knowledge of languages with the tact and adroitness essential for conducting diplomatic negotiations. The first chief dragoman of the Porte was Panayot Nikousia, who held his office from 1665 to 1673. His successor, Alexander Mavrocordato, surnamed Exaporritos, was charged by the Turkish government with the delicate and arduous negotiation of the treaty of Carlowitz, and by his dexterity succeeded, in spite of his questionable fidelity to the interests of his

employers, in gaining their entire confidence, and in becoming the factotum of Ottoman policy. From that time until 1 82 1 the Greeks monopolized the management of Turkey's foreign relations, and soon established the regular system whereby the chief dragoman passed on as a matter of course to the dignity of hospodar of one of the Danubian principalities.

In the same way, the foreign representatives accredited to the Porte found it necessary, in the absence of duly qualified countrymen of their own, to engage the services of natives, Greek, Armenian, or Levantine, more or less thoroughly ac- quainted with the language, laws and administration of the country. Their duties were by no means confined to those of a mere translator, and they became the confidential and in- dispensable go-betweens of the foreign missions and the Porte. Though such dragomans enjoyed by treaty the protection of the country employing them, they were by local interests and family ties very intimately connected with the Turks, and the disadvantages of the system soon became apparent. Accord- ingly as early as 1669 the French government decided on the foundation of a school for French dragomans at Constantinople, for which in later years was substituted the Ecole des langues orientates in Paris; most of the great powers eventually took some similar step, England also adopting in 1877 a system, since modified, for the selection and tuition of a corps of British- born dragomans.

The duties of an embassy dragoman are extensive and not easily defined. They have been described as partaking at once of those of a diplomatist, a magistrate, a legal adviser and an administrator. The functions of the first dragoman are mainly political; he accompanies the ambassador or minister at his audiences of the sultan and usually of the ministers, and it is he who is charged with the bulk of diplomatic negotiations at the palace or the Porte. The subordinate dragomans transact the less important business, comprising routine matters such as requests for the recognition of consuls, the settlement of claims or furthering of other demands of their nationals, and in general all the various matters in which the interests of foreign subjects may be concerned. An important part of the dragoman's duties is to attend during any legal proceedings to which a subject of his nationality is a party, as failing his attendance and his concurrence in the judgment delivered such proceedings are null and void. Moreover, the dragoman is frequently enabled, through the close relations which he necessarily maintains with different classes of Turkish officials, to furnish valuable and confidential information not otherwise obtainable. The high estimation in which the dragomans are held by most foreign powers is shown by the fact that

they are usually and in the regular course promoted to the most important diplomatic posts. This is the case in the Russian and Austrian services (where more than one ambassador began his career as a junior dragoman)

and generally in the German service; the French chief drago- man usually attains the rank of minister plenipotentiary. The value of a tactful and efficient intermediary can hardly be over-estimated, and in the East a personal interview of a few minutes often results in the conclusion of some important matter which would otherwise require the exchange of a long and laborious correspondence. The more important consulates in the provinces of Turkey are also provided with one or more dragomans, whose duties, mutatis mutandis, are of a similar though less important nature. In the same way banks, railway companies and financial institutions employ dragomans for facilitating their business relations with Turkish officials.

DRAGOMIROV, MICHAEL IVANOVICH (1830-1905), Russian general and military writer, was born on the 8th of November 1830. He entered the Guard infantry in 1849, becoming 2nd lieutenant in 1852 and lieutenant in 1854. In the latter year he was selected to study at the Nicholas Academy (staff college), and here he distinguished himself so much that he received a gold medal, an honour which, it is stated, was paid to a student of the academy only twice in the 19th century. In 1856 he was promoted staff-captain and in 1858 full captain, being sent in the latter year to study the military methods in vogue in other countries. He visited France, England and Belgium, and wrote voluminous reports on the instructional and manoeuvre camps of these countries at Chalons, Aldershot and Beverloo. In 1859 he was attached to the headquarters of the king of Sardinia during the campaign of Magenta and Solferino, and immediately upon his return to Russia he was sent to the Nicholas Academy as professor of tactics. Dragomirov played a leading part in the reorganization of the educational system of the army, and acted also as instructor to several princes of the imperial family. This post he held until 1863, when, as a lieutenant-colonel, he took part in the suppression of the Polish insurrection of 1863-64, returning to St Petersburg in the latter year as colonel and chief of staff to one of the Guard divisions. During the Austro - Prussian War of 1866, Dragomirov was attached to the headquarters of the II. Prussian army. He was present at the battles on the upper

Elbe and at Koniggratz, and his comments on the operations which he witnessed are of the greatest value to the student of tactics and of the war of 1866.

In 1868 he was made a major-general, and in the following year became chief of the staff in the Kiev military circum- scription. In 1873 he was appointed to command the 14th division, and in this command he distinguished himself very greatly in the Russo-Turkish War of 1877-78. The 14th division led the way at the crossing of the Danube at Zimnitza, Drago- mirov being in charge of the delicate and difficult operation of crossing and landing under fire, and fulfilling his mission with complete success. Later, after the reverses before Plevna, he, with the cesarevich and Generals Todleben and Milutine, strenuously opposed the suggestion of the Grand-duke Nicholas that the Russian army should retreat into Rumania, and the demoralization of the greater part of the army was not per- mitted to spread to Dragomirov's division, which retained its discipline unimpaired and gave a splendid example to the rest.

He was wounded at the Shipka Pass, and, though promoted lieutenant-general soon after this, was not able to see further active service. He was also made adjutant-general to the tsar and chief of the 53rd Volhynia regiment of his old division. For eleven years thereafter General Dragomirov was chief of the Nicholas Academy, and it was during this period that he collated and introduced into the Russian army all the best military literature of Europe, and in many other ways was active in improving the moral and technical efficiency of the Russian officer-corps, especially of the staff officer. In 1889 Dragomirov became commander-in-chief of the Kiev military district, and governor-general of Kiev, Podolsk and Volhynia, retaining this post until 1903. He was promoted to the rank of general of infantry in 1891. His advanced age and failing health prevented his employment at the front during the Russo-Japanese war of 1904-5, but his advice was continually solicited by the general headquarters at St Petersburg, and while he disagreed with

General Kuropatkin in many important questions of strategy and military policy, they both recommended a repetition of the strategy of 181 2, even though the total abandonment of Port Arthur was involved therein. General Dragomirov died at Konotop on the 28th of October 1905. In addition to the orders which he already possessed, he received in 1901 the order of St Andrew.

His larger military works were mostly translated into French, and his occasional papers, extending over a period of nearly fifty years, appeared chiefly in the Voienni Svornik and the Razoiedschik; his later articles in the last-named paper were, like the general orders he issued to his own troops, attentively studied throughout the Russian army. His critique of Tolstoy's War and Peace attracted even wider attention. Dragomirov was, in formal tactics, the head of the " orthodox " school. His conservatism was not, however, the result of habit and early training, but of deliberate reasoning and choice. His model was, as he admitted in the war of 1866, the British infantry of the Peninsular War, but he sought to reach the ideal, not through the methods of repression against which the " advanced " tacticians revolted, but by means of thorough efficiency in the individual soldier and in the smaller units. He inculcated the " offensive at all costs," and the combination of crushing short- range fire and the bayonet charge. He carried out the ideas of Suvarov to the fullest extent, and many thought that he pressed them to a theoretical extreme unattainable in practice. His critics, however, did not always realize that Dragomirov de- pended, for the efficiency his unit required, on the capacity of the leader, and that an essential part of the self-sacrificing discipline he exacted from his officers was the power of assuming responsi- bility. The details of his brilliant achievement of Zimnitza suffice to give a clear idea of Dragomirov's personality and of the way in which his methods of training conduced to success.

DRAGON (Fr. dragon, through Lat. draco, from the Greek; connected with SipKOfiai, " see," and interpreted as " sharp-sighted"; O.H. Ger. tracho, dracho, M.H.G. trache, Mod. Ger. Bracken; A.S. draca, hence the equivalent English form " drake," " fire-drake," cf. Low Ger. and Swed. drake, Dan. drage), a fabulous monster, usually conceived as a huge winged fire-breathing lizard or snake. In Greece the word Sp&Kuv was used originally of any large serpent, and the dragon of mythology, whatever shape it may have assumed, remains essentially a snake. For the part it has played in the myths and cults of various peoples and ages see the article Serpent- Worship. Here it may be said, in general, that in the East,

where snakes are large and deadly (Chaldea, Assyria, Phoenicia, to a less degree in Egypt), the serpent or dragon was symbolic of the principle of evil. Thus Apophis, in the Egyptian religion, was the great serpent of the world of darkness vanquished by Ra, while in Chaldaea the goddess Tiamat, the female principle of primeval Chaos, took the form of a dragon. Thus, too, in the Hebrew sacred books the serpent or dragon is the source of death and sin, a conception which was adopted in the New Testament and so passed into Christian mythology. In Greece and Rome, on the other hand, while the oriental idea of the serpent as an evil power found an entrance and gave birth to a plentiful brood of terrors (the serpents of the Gorgons, Hydra, Chimaera and the like), the dracontes were also at times conceived as beneficent powers, sharp-eyed dwellers in the inner parts of the earth, wise to discover its secrets and utter them in oracles, or powerful to invoke as guardian genii. Such were the sacred snakes in the temples of Aesculapius and the sacri dracontes in that of the Bona Dea at Rome; or, as guardians, the Python at Delphi and the dragon of the Hesperides.

In general, however, the evil reputation of dragons was the stronger, and in Europe it outlived the other. Christianity, of course, confused the benevolent and malevolent serpent- deities of the ancient cults in a common condemnation. The very ." wisdom of the serpent " made him suspect; the devil, said St Augustine, " leo et draco est; leo propter impetum, draco propter insidias." The dragon myths of the pagan East took new shapes in the legends of the victories of St Michael and

St George; and the kindly snakes of the " good goddess " lived on in the immanissimus draco whose baneful activity in a cave of the Capitol was cut short by the intervention of the saintly pope Silvester I. (Duchesne, Liber pontificaiis, i. 109 seq.), In this respect indeed Christian mythology found itself in harmony with that of the pagan North. The similarity of the Northern and Oriental snake myths seems to point to some common origin in an antiquity too remote to be explored. Whatever be the origin of the Northern dragon, the myths, when they first become articulate for us, show him to be in all essentials the same as that of the South and East. He is a power of evil, guardian of hoards, the greedy withholder of good things from men; and the slaying of a dragon is the crowning achievement of heroes — of Siegmund, of Beowulf, of Sigurd, of Arthur, of Tristram

— even of Lancelot, the beau ideal of medieval chivalry. Nor were these dragons anything but very real terrors, even in the imaginations of the

Dragon Lizard (Draco taeniopterus).

learned, until comparatively modern times. As the waste places were cleared, indeed, they withdrew farther from the haunts of men, and in Europe their last lurking-places were the in- accessible heights of the Alps, where they lingered till Jacques Balmain set the fashion which has finally relegated them to the realm of myth. In the works of the older naturalists, even in the great Hisloria animalium of so critical a spirit as Conrad Gesner (d. 1564), they still figure as part of the fauna known to science.

As to their form, this varied from the beginning. The Chaldaean dragon Tiamat had four legs, a scaly body, and wings. The Egyptian Apophis was a monstrous snake, as were also, originally at least, the Greek dracontes. The dragon of the Apocalypse (Rev. xii. 3), " the old serpent," is many-headed, like the Greek Hydra. The dragon slain by Beowulf is a snake (worm), for it " buckles like a bow "; but that done to death by Sigurd, though its motions are heavy and snake-like, has legs, for he wounds it " behind the shoulder." On the other hand, the dragon seen by King Arthur'in his dreams is, according to Malory, winged and active, for it " swoughs " down from

the sky. The belief in dragons and the conceptions of their shape were undoubtedly often determined, in Europe as in China, by the discovery of the remains of the gigantic extinct saurians.

The qualities of dragons being protective and terror-inspiring, and their effigies highly decorative, it is natural that they should have been early used as warlike emblems. Thus, in Homer (Iliad xi. 36 seq.), Agamemnon has on his shield, besides the Gorgon's head, a blue three-headed snake (Spa/cuv), just as ages afterwards the Norse warriors painted dragons on their shields and carved dragons' heads on the prows of their ships. From the conquered Dacians, too, the Romans in Trajan's time borrowed the dragon ensign which became the standard of the cohort as the eagle was that of the legion; whence, by a long descent, the modern dragoon. Under the later East Roman emperors thepurple dragon ensign became the ceremonial standard of the emperors, under the name of the bpaKbvrtwv. The imperial fashion spread; or similar causes elsewhere produced similar results. In England before the Conquest the dragon was chief

among the royal ensigns in war. Its origin, according to the legend pre- served in the Flores historiarum, was as follows. Uther Pen-dragon, father of King Arthur, had a vision of a flaming dragon in the sky, which his seers interpreted as meaning that he should come to the kingdom. When this happened, after the death of his brother Aurelius, " he ordered two golden dragons to be fashioned, like to those he had seen in the circle of the star, one of which he dedicated in the cathedral of Winchester, the other he kept by him to be carried into battle." From Uther Dragon- head, as the English called him, the Anglo-Saxon kings borrowed the ensign, their custom being, according to the Flores, to stand in battle inter draconem et standardum. The dragon ensign, which was borne before Richard I. in 1 191 when on crusade " to the terror of the heathen beyond the sea," was that of the dukes of Normandy; but even after the loss of Normandy the dragon was the battle standard of English kings (signunt regium quod Draconem vocanf), and was displayed, e.g. by Henry III. in 1 245 when he went to war against the Welsh. Not till the 20th century, under King Edward VII., was the dragon officially restored as proper only to the British race of Uther Pendragon, by its incorporation in the armorial bearings of the prince of Wales. As a matter of fact, however, the dragon ensign was common to nearly all nations, the reason for its popularity being naively stated in the romance of Athis (quoted by Du Cange),

" Ce souloient Romains porter, Ce nous fait moult a redouter:"

" This the Romans used to carry, This makes us very much to be feared." Thus the dragon and wyvern (i.e. a two-legged snake, M.E. where, viper) took their place as heraldic symbols (see Heraldry).

As an ecclesiastical symbol it has remained consistent to the present day. Wherever it is represented it means the principle of evil, the devil and his works. In the middle ages the chief of these works was heresy, and the dragon of the medieval church legends and mystery plays was usually heresy. Thus the knightly order of the vanquished dragon, instituted by the emperor Sigismund in 1418, celebrated the victory of orthodoxy over John Huss. Hell, too, is represented in medieval art as a dragon with gaping jaws belching fire. Of the dragons carried in effigy in religious processions some have become famous, e.g. the Gargouille (gargoyle) at Rouen, the Graully at Metz, and the Tarasque at Tarascon. Their popularity tended to disguise their evil significance and to restore to them something of the beneficent qualities of the ancient dracontes as local tutelary genii.

In the East, at the present day, the dragon is the national symbol of

China and the badge of the imperial family, and as such it plays a large part in Chinese art. Chinese and Japanese dragons, though regarded as powers of the air, are wingless. They are among the deified forces of nature of the Taoist religion, and the shrines of the dragon-kings, who dwell partly in water and partly on land, are set along the banks of rivers.

The constellation Draco (anguis, serpens) was probably so

called from its fanciful likeness to a snake. Numerous myths, in various countries, are however connected with it. The general character of these may be illustrated by the Greek story which explains the constellation as being the dragon of the Hesperides slain by Heracles and translated by Hera or Zeus to the heavens.

See C. V. Daremberg and E. Saglio, Diclionnaire des antiquites grecques et romaines (Paris, 1 886, &c), s.v. "Draco"; Pauly-Wissowa, Realencyclopddie, s.v. " Drakon " ; Du Cange, Glossarium, s.v. "Draco"; La Grande Encyclopedic, s.v. "Dragon"; J. B. Panthot, Histoire des dragons et des escarboucles (Lyons, 1691). See also the articles Egypt: Religion, and Babylonian and Assyrian Religion. (W. A. P.)

In zoology the name " dragon " is now applied to a highly interesting, but very harmless, group of small flying lizards form- ing the genus Draco, belonging to the Agamidae, a family of Saurian reptiles. About 20 species of " flying dragons " inhabit the various Indo-Malayan countries; one, D. dussumieri, occurs in Madras. They are small creatures, measuring about 10 in. long, including the tail, which in some cases is more than half of the entire length. The head is small, and the throat is pro- vided with three pouches which are spread out when they lie on the trunks of trees. They are, however, chiefly remarkable for the wing-like cutaneous processes with which their sides are provided, and which are extended and supported by greatly elongated ribs. These form a sort of parachute by which the animals are enabled to glide from branch to branch of the trees on which they live, but, being altogether independent of the fore limbs, they cannot be regarded as true wings, nor do they enable the lizard to fly, but merely to make extensive leaps. But they have the habit of opening and folding these prettily coloured organs, when resting upon a branch, which gives them the appearance of butterflies. When

not in use they are folded by the side after the manner of a fan, and the dragon can then walk or run with considerable agility. Its food consists of insects.

DRAGONETTI, DOMENICO (1763-1846), Italian double-bass player, was born in Venice on the 7th of April 1763. Having become famous as a performer on his instrument, he went to London in 1704, where his playing created a furore. He was the friend of Haydn and of Beethoven, and a well-known character in his day. He died in London on the 16th of April

1846.

DRAGON-FLY (Ger. Wasserjungfer; Swed. trollslanda; Dan. guldsmed; Dutch, setter pstekendevlieg; Fr. demoiselle), the popular English name applied to the members of a remarkable group of insects which formed the genus Libellula of Linnaeus and the ancient authors. In some parts of the United States they appear to be known as " devil's darning needles," and in many parts of England are termed " horse-stingers." It is almost needless to say that (excepting to other insects upon which they prey) they are perfectly innocuous, though some of the larger species can inflict a momentarily painful bite with their powerful jaws. Their true systematic position is still contested and somewhat uncertain. By most of the older systematists they were placed as forming part of the hetero- geneous order Neuroptera. J. C. Fabricius, however, elevated them to the rank of a distinct order, which he termed Odonata; and whatever may be the difference of opinion amongst authors at the present day, that term is almost universally employed for the group. W. F. Erichson transferred all the groups of so-called Neuroptera with incomplete metamorphoses, hence in- cluding the dragon-flies, as a division of Orthoptera, which he termed Pseudo-Neuroptera. K. E. A. Gerstacker more recently also retains them in the Orthoptera, terming those groups in which the earlier states are subaquatic Orthoptera amphibotica. All entomologists are agreed in maintaining the insects as form- ing a group marked by characters at once extraordinary and isolated in their nature, and in most modern classifications they are treated as a distinct order.

The group Odonata is divided into three families, and each of these again into two subfamilies. The families are the Agri- onidaeˆ Aeschnidae and Libellulidae — the first including the sub-

families Calopterygina and Agrionina, the second Gomphina and Aeschnina, and the third Cordulina and Libellulina.

Anatomy. — The structure of a dragon-fly being so very remarkable, it is necessary to enter somewhat extensively into details. The head is comparatively small, and excavated posteriorly, connected very slightly with the prothorax, on which it turns almost as on a pivot. The eyes are, as a rule, enormous, often contiguous, and occupying nearly the whole of the upper surface of the head, but sometimes (Agrionidae and Gomphina) widely distant ; occupied by innumerable facets, which are often larger on the upper portion. The antennae, which are smaller in proportion than in almost any other insects, consist only of two short swollen basal joints and a 5 or 6-jointed bristle-like thread. The large labrum conceals the jaws and inner mouth parts. The lower lip, or labium (formed by the conjoined second maxillae), is attached to a very small chin piece (or mentum), and is generally very large, often (Agrionidae) divided almost to its base into two portions, or more frequently entire or nearly so; on each side of it are two usually enormous hypertrophied pieces, which form the " palpi," and which are often furnished at the tips with an articulated spine (or terminal joint), the whole structure serving to retain the prey. Considerable diversity of opinion exists with respect to the composition of the mouth parts, and by some authors the " palpi "have been termed the side pieces of the lower lip. The prothorax is extremely small, consisting of only a narrow ring. The rest of the thorax is very large, and consolidated into a single piece with oblique sutures on the sides beneath the wings.

The abdomen varies excessively in form, the two extremes being the filiform structure observable in most Agrionidae, and the very broad and depressed formation seen in the familiar British Libellula depressa. It consists of ten distinct segments, whereof the basal two and those at the apex are short, the others elongate, the first being excessively short. In a slit on the under side of the second in the male, accompanied by external protuberances, are concealed the genital organs: on the under side of the eighth in the female is a scale-like formation, indicating the entrance to the oviduct. The tenth is always provided in both sexes with prominent appendages, differing greatly in form, and often furnishing the best specific (and even generic) characters.

The legs vary in length and stoutness, but may, as a rule, be termed long and slender. The anterior pair probably assist in capturing and holding insect prey, but the greatest service all the legs render is possibly in enabling the creature to rest lightly, so that it can quit a position of repose in chase of passing prey in the quickest possible manner. The coxa is short and stout, followed by a still shorter trochanter; the femora and tibiae long and slender, almost in-

variably furnished on their under surface with two series of strong spines, as also are the tarsi, which consist of three slender joints, the last having two long and slender claws.

The wings are always elongate, and furnished with strong longitudinal neuration and dense transverse nervules strengthening the already strong (although typically transparent) membrane. In the Agrionidae both pairs are nearly equal, and are carried vertically and longitudinally in repose, and the neuration and membrane are less strong; hence the species of this family are not so powerful on the wing as are those of the other groups in which the wings are horizontally extended in a position ready for instant service. The neuration is peculiar, and in many respects without precise analogy in other groups of insects, but it is not necessary here to enter into more than some special points. The arrangement of the nervures at the base of the wing is very singular, and slight differences in it form useful aids to classification. In the Aeschnidae and Libellulidae this arrangement results in the formation of a triangular space (known as the " triangle "), which is either open or traversed by nervules; but in many Agrionidae this space, instead of being triangular, is oblong or elongately quadrate, or with its upper edge partly straight and partly oblique. This fixitude of type in neuration is not one of the least important of the many peculiarities exhibited in these insects.

The internal structure is comparatively simple. The existence of salivary glands, denied by L. Duprix, has been asserted by O. Poletajewa. The rest of the digestive apparatus consists of an elongate canal extending from mouth to anus, comprising the oesophagus, stomach and intestine, with certain dilatations and constrictions; the characteristic Malpighian vessels are stated to number about forty, placed round the posterior extremity of the stomach. Dragon-flies eat their prey completely, and do not content themselves by merely sucking its juices; the harder portions are rejected as elongate, nearly dry, pellets of excrement.

Pairing. — But the most extraordinary feature in the economy — one which has attracted the attention of naturalists from remote times — is the position of the genital organs, and the corresponding anomalous manner in which the pairing of the sexes and impregnation is effected. In the male the intromittent organ is situated in a slit on the under surface of the second abdominal segment ; it is usually very crooked or sinuous in form, and is accompanied by sheaths, and by external hooks or secondary appendages, and also by seminal vessels. But the ducts of the vessels connected with the testes unite and open on the under surface of the

ninth segment ; hence, before copulation can take place, it is necessary that the vessels in the second

segment be charged from this opening, and in the majority of cases this is done by the male previously to seeking the female. In the latter sex the entrance to the oviduct and genital organs is on the under surface of the eighth abdominal segment. The act of pairing may be briefly stated as follows. The male, when flying, seizes the prothbrax of the female with the strong appendages at the extremity of the abdomen, and the abdomen of this latter sex is then curved upward so as to bring the under side of the eighth segment into

Fig. 1. — The anterior portion of the body of Aeschna cyanea freed from the nymph-cuticle.

Fig. 2. — The tail being extricated.

contact with the organs of the second segment of the male. In the more powerful Libellulidae, &c, the act is of short duration, and it is probable that polygamy and polyandry exist, for it possibly requires more than one almost momentary act to fertilize all the eggs in the ovaries of a female. But in many Agrionidae, and in some others, the male keeps his hold of the prothorax of the female for a lengthened period, retaining himself in flight in an almost perpendicular manner, and it may be that the deposition of eggs and pairing goes on alternately. There is, however, much yet to be learned on these points. The gravid female usually lays her eggs in masses (but perhaps sometimes singly), and the operation may be witnessed by any one in localities frequented by these insects. She hovers for a considerable time over nearly the same spot, rapidly dipping the apex of her abdomen into the water, or at any rate touching it, and often in places where there are no water-weeds,

so that in all probability the eggs fall at once to the bottom. But in some of the Agrionidae the female has been often noticed by trustworthy ob- servers to creep down the stems of aquatic plants several inches below the surface, emerging after the act of oviposition has been effected ; and in the case of Lestes sponsa, K. T. E. von Siebold saw the male descend with the female. The same exact observer noticed also in this species that the female makes slight incisions in the stems or leaves of water plants with the double

serrated apparatus (vulva) forming a prolonga- tion of the ninth segment beneath, depositing an egg in each incision. He has seen two pairs thus occupied be- neath the surface on one and the same stem.

Larva and Nymph. — The duration of the subaquatic life of a dragon-fly is no doubt variable, according to the species. In the smaller forms it is probably less than a year, but precise evidence is wanting as to the occurrence of two broods in one year. On the other hand, it is certain that often a longer period is requisite to enable the creature to attain its full growth, and three years have been stated to be necessary for this in the large and powerful

Fig. 3. — The whole body extricated.

Anax formosus. Like all insects with incomplete metamorphoses, there is no quiescent pupal condition, no sharp line of demar- cation between the larval and so-called " nymph " or pen- ultimate stage. The creature goes on eating and increasing in size from the moment it emerges from the egg to the time when it leaves the water to be transformed into the aerial perfect insect. The number of moults is uncertain, but they are without doubt numerous. At probably about the antepenultimate of these operations, the rudimentary wings begin to appear as thoracic buddings, and in the full-grown nymph these wings overlap about one-half of the dorsal surface of the abdomen. In structure there is a certain amount of resemblance to the perfect insect, but the body is always much stouter and shorter, in some cases most disproportionately so, and the eyes are always separated; even in those genera (e.g. Aeschna) in which the eyes of the imago are absolutely contiguous, the most that can be seen in the larva is a prolongation towards each other, and there are no ocelli. The legs are shorter and more fitted for crawling about water plants and on the bottom. In the mouth parts the mandibles and maxillae are similar in form to those of the adult, but there is an extraordinary and unique modification of the lower lip. This is attached to an elongate and slender mentum articulated to the posterior portion of the lower surface of the head, slightly widened at its ex- tremity, to which is again articulated the labium proper, which is very large, flattened, and gradually dilated to its extremity; but its form differs according to group as in the perfect insect. Thus in the Agrionidae it is deeply cleft, _ and FlG _ 4 ._The perfect insect (the wings with comparatively having acquired their full dimensions) resting slender side-pieces to dry itself, preparatory to the wings being (or palpi), and horizontally extended, strongly developed articulated spines; in the Aeschnidae it is at the most notched, with narrow side-pieces and very strong spines; in the Libellulidae it is entire, often triangular at

its apex, and with enormously developed palpi with- out spines, but having the opposing inner edges furnished with interlocking serrations. The whole of this apparatus is commonly termed the mask. In a state of repose it is applied closely against the face, the elongated mentum directed back- ward and lying between the anterior pair of legs; but when an approaching victim is seen the whole apparatus is suddenly projected, and the prey caught by the raptorial palpi; in some large species it is capable of being projected fully half an inch in front of the head. The prey, once caught and held by this apparatus, is devoured in the usual manner. There are two pairs of thoracic spiracles, through which the nymph breathes during its later life by thrusting the anterior end of the body into the air; but respiration is mostly effected by a peculiar apparatus at the tail end, and there are two different methods. In the Agrionidae there are three elongate flattened plates, or false gills, full of tracheal ramifications, which extract the air from the water, and convey it to the internal tracheae (in Calo- pteryx these plates are excessively long, nearly equalling the abdomen), the plates also serving as means of locomotion. But in the other groups these external false gills are absent, and in

their place are five valves, which by their sudden opening and closing force in the water to the rectum, the walls of which are furnished with branchial lamellae. The alternate opening and closing of these valves enables the creature to make quick jerks or rushes (incorrectly termed " leaps ") through the water, 1 and, in conjunction with its mouth parts, to make sudden attacks upon prey from a considerable distance. Well-developed Aeschnid larvae have been observed to take atmospheric air into the rectum. The lateral angles of the terminal abdominal segments are sometimes produced into long curved spines. In colour these larvae are generally muddy, and they frequently have a coating of muddy particles, and hence are less likely to be observed by their victims. If among insects the perfect dragon- fly may be termed the tyrant of the air, so may its larva be styled that of the water. Aquatic insects and larvae form the principal food, but there can be no doubt that worms, the fry of fish, and even younger larvae of their own species, form part of the bill of fare. The " nymph " when arrived at its full growth sallies forth from the water, and often crawls a considerable distance (frequently many feet up the trunks of trees) before it fixes itself for the final change, which is effected by the thorax splitting longitudinally down the back, through which

fissure the perfect insect gradually drags itself. The figures indicate this process as observed in Aeschna cyanea.

The Complete Insect. — For a considerable time after its emer- gence a dragon-fly is without any of its characteristic colours, and is flaccid and weak, the wings (even in those groups in which they are afterwards horizontally extended) being held vertically in a line with the abdomen. By degrees the parts harden, and the insect essays its first flight, but even then the wings have little power and are semi-opaque in appearance, as if dipped in mucilage. In most species of Calopterygina, and in some others, the prevailing colour of the body is a brilliant bronzy green, blue or black, but the colours in the other groups vary much, and often differ in the sexes. Thus in Libellula depressa the abdomen of the fully adult male is covered with a bluish bloom, whereas that of the female is yellow; but several days elapse before this pulverulent appearance is attained, and a comparatively young male is yellow like the female. The wings are typically hyaline and colourless, but in many species (espe- cially Calopterygina and Libellulina) they may be wholly or in part opaque and often black, due apparently to gradual oxydization of a pigment between the two membranes of which the wings are composed; the brilliant iridescence, or metallic lustre, so frequently found is no doubt due to interference — the effect of minute irregularities of the surface — and not produced by a pigment. A beautiful little genus (Chalcopteryx) of Calo- pterygina from the Amazon is a gem in the world of insects, the posterior wings being of the most brilliant fiery metallic colour, whereas the anterior remain hyaline.

These insects are pre-eminently lovers of the hottest sunshine (a few are somewhat crepuscular), and the most powerful and daring on the wing in fine weather become inert and compara- tively lifeless when at rest in dull weather, allowing themselves to be captured by the fingers without making any effort to escape. Many of the larger species (Aeschna, &c.) have a habit of affecting a particular twig or other resting place like a fly-catcher among birds, darting off after prey and making long excursions, but returning to the chosen spot. A. R. Wallace, in his Malay Archipelago, states that the inhabitants of Lombok use the large species for food, and catch them by means of limed twigs.

They are distributed over the whole world excepting the polar regions, but are especially insects of the tropics. At the present day about 2200 species are known, dispersed unequally among the several subfamilies as follows: Agrionina, 700 species; Calopterygina, 280; Gomphina, 320; Aeschnina, 170; Corduliina,

130; Libellulina, 600. In Europe proper only 100 species have been observed, and about 46 of these occur in the British islands. New Zealand is excessively poor, and can only number 8 species, whereas they are very numerous in Australia.

1 A similar contrivance was suggested and (if the writer mistakes not) actually tried as a means of propelling steamships.

Some species are often seen at sea, far from land, in calm weather, in troops which are no doubt migratory; the common Libellula quadrimaculata, which inhabits the cold and temperate regions of the northern hemisphere, has been frequently seen in immense migratory swarms. One species (Pantala flavescens) has about the widest range of any insect, occurring in the Old World from Kamtchatka to Australia, and in the New from the Southern States to Chili, also all over Africa and the Pacific islands, but is not found in Europe. The largest species occur in the Aeschnina and Agrionina; a member of the former subfamily from Borneo expands to nearly t\ in., and with a moderately strong body and powerful form; in the latter the Central American and Brazilian Megaloprepus caerulatus and species of Mecistogaster are very large, the former expanding to nearly 7 in., and the latter to nearly as much, but the abdomen is not thicker than an ordinary grass-stem and of extreme length (fully 5 in. in Mecistogaster).

Fossils. — Among fossil insects dragon-flies hold a conspicuous position. Not only do they belong to what appears to have been a very ancient type, but in addition, the large wings and strong dense reticulation are extremely favourable for preserva- tion in a fossil condition, and in many cases all the intricate details can be as readily followed as in a recent example. From the Carboniferous strata of Commentry, France, C. Brongniart has described several genera of gigantic insects allied to dragon- flies, but with less specialized thoracic segments and simpler wing-neuration. These form a special group — the Protodonata. True Odonata referable to the existing families are plentiful in Mesozoic formations; in England they have been found more especially in the Purbeck beds of Swanage, and the vales of Wardour and Aylesbury, in the Stonesfield Slate series, and in the Lias and Rhaetic series of the west of England. But the richest strata appear to be those of the Upper Miocene at Oeningen, near Schaffhausen in the Rhine valley; the Middle Miocene at Radaboj, near Krapina in Croatia; the Eocene of Aix, in Provence; and more especially the celebrated Secondary rocks furnishing the lithographic stone of Solenhofen, in Bavaria. This latter deposit would appear to have been of marine origin, and

it is significant that, although the remains of gigantic dragon-flies discovered in it are very numerous and perfect, no traces of their subaquatic conditions have been found, although these as a rule are numerous in most of the other strata, hence the insects may be regarded as having been drowned in the sea and washed on shore. Many of these Solenhofen species differ considerably in form from those now existing, so that Dr H. A. L. Hagen, who has especially studied them, says that for nearly all it is necessary to make new genera. It is of great interest, how- ever, to find that a living Malayan genus (Euphaea) and another living genus Uropetala, now confined to New Zealand, are repre- sented in the Solenhofen deposits, while a species of Mega- podagrion now entirely Neotropical, occurs in the Eocene beds of Wyoming.

A notice of fossil forms should not be concluded without the remark that indications of at least two species have been found in amber, a number disproportionately small if compared with other insects entombed therein; but it must be remembered that a dragon-fly is, as a rule, an insect of great power, and in all probability those then existing were able to extricate themselves if accidentally entangled in the resin.

See E. de Selys-Longchamps, Monographie des Libellulidees d' Europe (Brussels, 1840); Synopses des Agrionines, Calopterygines, Gomphines, et Cordulines, with Supplements (Brussels, from 1853 to 1877) ; E. de Selys-Longchamps and H. A. L. Hagen, Revue des Odonates d' Europe (Brussels, 1856); Monographie des Calopterygines et des Gomphines (Brussels, 1854 and 1858) ; Charpentier, Libellulinae europeae (Leipzig, 1840). For modern systematic work see various • papers by R. M'Lachlan, P. P. Calvert, J. G. Needham, R. Martin, E. B. Williamson, F. Karsch, &c; also H. Tumpel, Die Geradflugler Mitteleuropas (Eisenach, 1900) ; and W. F. Kirby, Catalogue of Neuroptera Odonata (London, 1890). For habits and details of trans- formation and larval life, see L. C. Miall, Natural History of Aquatic Insects (London, 1895); H. Dewitz, Zool. Anz. xiii. (1891); and J. G. Needham, Bull. New York Museum, lxviii. (1903). For geo- graphical distribution, G. H. Carpenter, Sci. Proc. R. Dublin Soc. viii. (1897). For British species, W. J. Lucas, Handbook of British

Dragonflies (London, 1899). For wings and mechanism of flight, R.

von Lendenfeld, S.B. Akad. Wien, lxxxiii. (1881), and J. G. Needham, Proc. U.S. Nat. Mus. xxvi. (1903). For general morphology, R. Heymons, Abhandl. k. preuss. Akad. (1896), and Ann. Hofmus. Wein, xix. (1904). (R. M'L.; G. H. C.)

DRAGON'S BLOOD, a red-coloured resin obtained from several species of plants. Calamus draco (Willd.), one of the rotang or rattan palms, which produces much of the dragon's blood of commerce, is a native of Further India and the Eastern Archi- pelago. The fruit is round, pointed, scaly, and the size of a large cherry, and when ripe is coated with the resinous exudation known as dragon's blood. The finest dragon's blood, called jernang or djernang in the East Indies, is obtained by beating or shaking the gathered fruits, sifting out impurities, and melting by exposure to the heat of the sun or by placing in boiling water; the resin thus purified is then usually moulded into sticks or quills, and after being wrapped in reeds or palm-leaves, is ready for market. An impurer and inferior kind, sold in lumps of considerable size, is extracted from the fruits by boiling. Dragon's blood is dark red-brown, nearly opaque and brittle, contains small shell-like flakes, and gives when ground a fine red powder; it is soluble in alcohol, ether, and fixed and volatile oils. If heated it gives off benzoic acid. In Europe it was once valued as a medicine on account of its astringent properties, and is now used for colouring varnishes and lacquers; in China, where it is mostly consumed, it is employed to give a red facing to writing paper. The drop dragon's blood of commerce, called cinnabar by Pliny (N.H. xxxiii. 39), and sangre de dragon by Barbosa was formerly and is still one of the products of Socotra, and is obtained from Dracaena cinnabari. The dragon's blood of the Canary Islands is a resin procured from the surface of the leaves and from cracks in the trunk of Dracaena draco. The hardened juice of a euphorbiaceous tree, Croton draco, a resin resembling kino, is the sangre del drago or dragon's blood of the Mexicans, used by them as a vulnerary and astringent.

DRAGOON (Fr. dragon, Ger. Dragoner), originally a mounted soldier trained to fight on foot only (see Cavalry). This mounted infantryman of the late 16th and 17th centuries, like his comrades of the infantry who were styled " pike " and " shot," took his name from his weapon, a species of carbine or short musket called the " dragon." Dragoons were organized not in squadrons but in companies, like the foot, and their officers and non-commissioned officers bore infantry titles, The invariable tendency of the old-fashioned dragoon, who was always at a disadvantage when engaged against true cavalry, was to improve his horsemanship and

armament to the cavalry standard. Thus

dragoon " came to mean medium cavalry, and this significance the word has retained since the early wars of Frederick the Great, save for a few local and temporary returns to the original mean- ing The phrases " to dragoon " and " dragonnade " bear witness to the mounted infantry period, this arm being the most efficient and economical form of cavalry for police work and guerrilla warfare. The " Dragonnades," properly so called, were the operations of the troops (chiefly mounted) engaged in enforcing Louis XIV.'s decrees against Protestants after the revocation of the edict of Nantes. In the British service the dragoons (1st Royals, 2nd Scots Greys, 6th Inniskillings) are heavy cavalry, the Dragoon Guards (seven regiments) are medium, as are the dragoons of other countries. The light cavalry of the British army in the 18th and early 19th century was for the most part called light dragoons.

DRAGUIGNAN, the chief town of the department of the Var in S.E. France; 51 m. N.E. of Toulon, and 28-3- m. N.W. of Frejus by rail; situated at a height of 679 ft. above the level of thˆ sea, at the southern foot of the wooded heights of Malmont, and on the left bank of the Nartuby river; pop. (1906) 7766. It possesses no notable buildings, save a modern parish church, a prefecture, also modern, and a building wherein are housed the town library and a picture gallery, with some fair works of art. In modern times the ramparts have been demolished, and new wide streets pierced through the town-.

DRAINAGE OF LAND. The verb " to drain," with its sub- stantives " drain " and " drainage," represents the O. Eng.

dreahnian, from the same root found in "dry," and signifies generally the act of drawing off moisture or liquid from some- where, and so drinking dry, and (figuratively) exhausting; the substantive " drain " being thus used not only in the direct sense of a channel for carrying off liquid, but also figuratively for a very small amount such as would be left as dregs, The term " drainage " is applied generally to all operations involving the drawing off of water or other liquid, but more particularly to those connected with the treatment of the soil in agriculture, or with the removal of water and refuse from streets and houses. For the last, see Sewerage; the following article being devoted to the agricultural aspects of this subject. See also the articles Reclamation of Land, Canal, Irrigation, River Engineer- ing, Water Supply and (law) Water Rights.

Agricultural or field drainage consists in the freeing of the soil from stagnant and superfluous water by means of surface or underground channels. It may be distinguished from the draining of land on a large scale which is exemplified in the re- clamation of the English Fens (see Fens). Surface drainage is usually effected by ploughing the land into convex ridges off which the water runs into intervening furrows and is conveyed into ditches. For several reasons this method is ineffective, and, where possible, is now superseded by underground drainage by means of pipe-tiles. Land is not in a satisfactory condition with respect to drainage unless the rain that falls upon it can sink down to the minimum depth required for the healthy develop- ment of the roots of crops and thence find vent either through a naturally porous subsoil or by artificial channels.

A few of the evils inseparable from the presence of overmuch water in the soil may be enumerated. Wet land, if in grass, produces only the coarser grasses, and many subaquatic plants and mosses, which are of little or no value for pasturage; its herbage is late in spring, and fails early in autumn; the animals grazed upon it are unduly liable to disease, and sheep, especially, to foot-rot and liver-rot. In the case of arable land the crops are poor and moisture-loving weeds flourish. Tillage operations on such land are easily interrupted by rain, and the period always much limited in which they can be prosecuted at all; the com- pactness and toughness of the soil renders each operation more arduous, and its repetition more necessary than in the case of dry land. The surface must necessarily be thrown into ridges, and the furrows and cross-cuts cleared out after each process of tillage, and upon this surface-drainage as much labour is expended in twenty years as would suffice to make under-drains enough to lay it permanently dry. With all these precautions the best seed time is often missed, and this usually proves the prelude to a scanty crop, or to a late and disastrous harvest. The cultivation of the turnip and other root crops, which require the soil to be wrought to a deep and free tilth, either becomes altogether impracticable and must be abandoned for the safe but costly bare fallow, or is carried out with great labour and hazard; and the crop, when grown, can neither be removed from the ground, nor consumed upon it by sheep without damage by " poaching."

The roots of plants require both air and warmth. A deep stratum through which water can percolate, but in which it can never stagnate, is therefore necessary. A waterlogged soil is impenetrable by air, and owing to the continuous process of evaporation and radiation, its temperature is much below that of drained soil. The surface of the water in the supersaturated soil is known as the "

water-table " and is exemplified in water standing in a well. Water will rise in clay by capillarity to a height of 50 in., in sand to 22 in. Above the " water-table " the water is held by capillarity, and the percentage of water held decreases as we approach the surface where there may be perfect dryness. Draining reduces the " surface tension " of the capil- lary water by removal of the excess, but the " water-table " may be many feet below. Drains ordinarily remove only excess of capillary water, an excess of percolating water in wet weather.

In setting about the draining of a field, or farm, or estate, the first point is to secure a proper outfall. The lines of the receiving drains must next be determined, and then the direction of the

parallel drains. The former must occupy the lowest part of the natural hollows, and the latter must run in the line of the greatest slope of the ground. In the case of flat land, where a fall is obtained chiefly by increasing the depth of the drains at their lower ends, these lines may be disposed in any direction that is found convenient; but in undulating ground a single field may require several distinct sets of drains lying at different angles, so as to suit its several slopes. When a field is ridged in the line of the greatest ascent of the ground, there is an obvious con- venience in adopting the furrows as the site of the drains; but wherever this is not the case the drains must be laid off to suit the contour of the ground, irrespective of the furrows altogether. When parts of a field are flat, and other parts have a considerable acclivity, it is expedient to cut a receiving drain near to the bottom of the slopes, and to give the flat ground an independent set of drains. In laying off receiving drains it is essential to give hedgerows and trees a good offing, lest the conduit be obstructed by the roots.

When a main drain is so placed that parallel ones empty into it from both sides, care should be taken that the inlets of the latter are not made exactly opposite to each other. Much of the success of draining depends on the skilful planning of these main drains, and in making them large enough to discharge the greatest flow of water to which they may be exposed. Very long main drains are to be avoided. Numerous outlets are also objectionable, from their liability to obstruction. An outlet to an area of from 10 to 15 acres is a good arrangement. These outlets should be faced with mason work, and

guarded with iron gratings.

The distance and depth apart of the parallel drains is deter- mined chiefly by reference to the texture of the soil. In an impervious clay the flow of the water is much impeded and the water-table can be controlled only by frequent lines of pipes. On such land it is customary to lay them about 3 ft. from the surface and from 15 to 21 ft. apart. In lighter soils the depth, and proportionately the distance apart, is increased, but the drains are rarely more than 4 ft. 6 in. below the surface, though they may be 75 or 100 apart. A fall of at least 1 in 200 is desirable.

There are various forms of under-drainage, some of them alluded to in the historical section below, but by far the common- est is by means of cylindrical or oval pipes of burnt clay about 1 ft. in length, sometimes supplemented by collars, though nowadays the use of these is being abandoned. Pipes vary in bore from 2 in. for the parallel to 6 in. for the main drains.

In constructing a drain, it is of importance that the bottom be cut out just wide enough to admit the pipes and no more. Pipes, when accurately fitted in, are much less liable to derangement than when laid in the bottom of a trench several times their width, into which a mass of loose earth must necessarily be returned. This is easily effected in the case of soils tolerably free from stones by the use of draining spades and the tile-hook which are represented in the accompanying cut. The tile-hook is an implement by means of which the pipes may be lowered from the edge of the trench and laid at the bottom. An implement, sometimes propelled by steam, known as the draining plough, can be used for opening the trenches. Draining can be carried on at all seasons, but is usually best done in autumn or summer. A thoroughly trustworthy and experienced workman should be selected to lay the pipes, with instructions to set no pipes until he is satisfied that the depth of the drains and level of the bottoms are correct. The expense of tile-drainage may vary from about £2:ios. per acre on loose soils to £10 an acre on the most tenacious soils, the rate of wages and the cost of the pipes, the depth of the trenches and the ease with which they can be dug, all influencing the cost of the process.

Drainage is not a modern discovery. The Romans were careful to keep their arable lands dry by means of open trenches or covered drains filled with stones or twigs. It is at least several centuries since covered channels of various kinds were used by British husbandmen for drying their land. Walter Blith (see Agriculture) about the middle

of the 17th century wrote of

the improvement which might be effected in barren land by free- ing it from the excess of stagnant water on or near the surface by means of channels filled with faggots or stones, but his principles, never generally adopted, were ultimately forgotten. In the latter half of the 18th century. Joseph Elkington, a Warwickshire farmer, discovered a plan of laying dry sloping ground that is drowned by the outbursting of springs. When the higher-lying portion of such land is porous, rain falling upon it sinks down until it is arrested by clay or other impervious matter, which causes it again to issue at the surface and wet the lower-lying ground. Elkington showed that by cutting a deep drain through the clay, aided when necessary by wells or auger holes, the subjacent bed of sand or gravel in which a body of water is pent up by the clay, as in a vessel, might be tapped and the water conveyed harmlessly in the covered drain to the nearest ditch or stream. In the circumstances to which it is applicable, and in the hands of skilful drainers, Elkington's

Draining Implements.

plan, known as " sink-hole drainage," by bringing into play the natural drainage furnished by porous strata, is often eminently successful.

During the subsequent thirty or forty years most of the drain- ing that took place was on this system, and an immense capital was expended in such works with varying results. Things continued in this position until about 1823, when James Smith of Deanston, having discovered anew those principles of draining so long before indicated by Blith, proceeded to exemplify them in his own practice, ˆnd to expound them to the public in a way that speedily effected a complete revolution in the art of draining, and marked an era in agricultural progress. Instead of persisting in fruitless attempts to dry extensive areas by a few dexterous cuts, he insisted on the necessity of providing every field that needed draining at all with a complete system of parallel under- ground channels, running in the line of the greatest slope of the ground, and so near to each other that the whole rain falling at any time upon the surface should sink down and be carried off by the drains. A main receiving drain was to be carried along the lowest part of the ground, with sub-drains in every subor- dinate hollow that the ground presented. The distances between drains he showed must be regulated by the greater or less reten- tiveness of the ground operated upon, and gave 10 to 40 ft. as the limits of their distance apart. The depth which he prescribed for his

parallel drains was 30 in., and these were to be filled with 12 in. of stones small enough to pass through a 3-in. ring — in short a new edition of Blith's drain. Josiah Parkes, engineer

DRAKE, SIR FRANCIS

to the Royal Agricultural Society, advocated a greater distance apart for the drains, and, in order that the subterranean water might be reached, a depth of at least 4 ft.

The cultivated lands of Britain being disposed in ridges which usually lie in the line of greatest ascent, it became customary to form the drains in each furrow, or in each alternate, or third or fourth one, as the case might require, or views of economy dictate and hence the system soon came to be popularly called " furrow draining." From the number and arrangement of the drains, the terms " frequent " and " parallel " were also applied to it. Smith himself more appropriately named it, from its effects, " thorough draining." The sound principles thus promulgated by him were speedily adopted and extensively carried into practice. The great labour and cost incurred in procuring stones in adequate quantities, and the difficulty of carting them in wet seasons, soon led to the substitution of " tiles," and soles of burnt earthenware. The limited supply and high price of these tiles for a time impeded the progress of the new system of draining; but the invention of tile-making machines removed this impediment, and gave a stimulus to this fundamental agricultural improvement. The substitution of cylindrical pipes for the original horse-shoe tiles has still further lowered the cost and increased the efficiency and permanency of drainage works.

The system introduced by Smith of Deanston has now been virtually adopted by all drainers. Variations in matters of detail (having respect chiefly to the depth and distance apart of the parallel drains) have indeed been introduced; but the distinctive features of his system are recognized and acted upon.

A great stimulus was given to. the improvement of land by the passing in England of a series of acts of parliament, which removed certain obstacles that effectually hindered tenants with limited interests from investing capital in works of drainage and kindred amelioration. The Public Money Drainage Acts 1846-1856 authorized the advance of public money to landowners to enable them to make improvements in their lands, not only by draining, but by irrigation, the making of permanent roads, clearing, erecting buildings, planting for shelter, &c. The rapid absorption of the funds

provided by these acts led to further legislative measures by which private capital was rendered available for the improvement of land. A series of special improvement acts were passed, authorizing companies to execute or advance money for executing improvements in land. Finally, the Land Improvement Act 1864, amended and extended by the act of 1899, gave facilities for borrowing money by charging the cost of draining, &c, as a rent-charge upon the inheritance of the land. The instalments must be repaid with interest in equal amounts extending over a fixed term of years by the tenant for life during his lifetime, the tenant being bound to maintain the improvements.

See C. G. Elliott, Engineering for Land Drainage (New York, 1903); F. H. King, Irrigation and Drainage (New York, 1899); G. S. Mitchell, Handbook of Land Drainage (London, 1898), with a good bibliography.

DRAKE, SIR FRANCIS (c. i54S~iS95), English admiral, was born near Tavistock, Devonshire, about 1545 according to most early authorities, but possibly as early as 1539 (see Corbett, vol. i., Appendix A). His father, a yeoman and a zealous Protestant, was obliged to take refuge in Kent during the persecutions in the reign of Queen Mary. He obtained a naval chaplaincy from Queen Elizabeth, and is said to have been after- wards vicar of Upnor Church (evidently a misprint or slip of the pen for Upchurch) on the Medway. Young Drake was educated at the expense and under the care of Sir John Hawkins, who was his kinsman; and, after passing an apprenticeship on a coasting vessel, at the age of eighteen he had risen to be purser of a ship trading to Biscay. At twenty he made a voyage to Guinea; and at twenty-two he was made captain of the " Judith." In that capacity he was in the harbour of San Juan de Ulloa, in the Gulf of Mexico, where he behaved most gallantly in the actions under Sir John Hawkins, and returned with him to England, having acquired great reputation, though with the loss of all the money which he had embarked in the expedition. In 1570 he obtained a regular privateering commission from Queen Eliza- beth, the powers of which he immediately exercised in a cruise in the Spanish Main. Having next projected an attack against

the Spaniards in the West Indies to indemnify himself for his former losses, he set sail in 1572, with two small ships named the " Pasha " and the " Swan." He was afterwards joined by another vessel; and with this small squadron he took and plundered the Spanish town of

Nombre de Dios. With his men he penetrated across the isthmus of Panama, and committed great havoc among the Spanish shipping. From the top of a tree which he climbed while on the isthmus he obtained his first view of the Pacific, and resolved " to sail an English ship in these seas." In these expeditions he was much assisted by the Maroons, descendants of escaped negro slaves, who were then engaged in a desultory warfare with the Spaniards. Having embarked his men and filled his ships with plunder, he bore away for England, and arrived at Plymouth on the 9th of August 1573.

His success and honourable demeanour in this expedition gained him high reputation; and the use which he made of his riches served to raise him still higher in popular esteem. Having fitted out three frigates at his own expense, he sailed with them to Ireland, and rendered effective service as a volunteer, under Walter, earl of Essex, the father of the famous but unfortunate earl. After his patron's death he returned to England, where he was introduced to Queen Elizabeth (whether by Sir Christopher Hatton is doubtful), and obtained a favourable reception. In this way he acquired the means of undertaking the expedition which has immortalized his name. The first proposal he made was to undertake a voyage into the South Seas through the Straits of Magellan, which no Englishman had hitherto ever attempted. This project having been well received at court, the queen furnished him with means; and his own fame quickly drew together a sufficient force. The fleet with which he sailed on this enterprise consisted of only five small vessels, and their united crews mustered only 166 men. Starting on the 13th of December 1577, his course lay by the west coast of Morocco and the Cape Verde Islands. He reached the coast of Brazil on the 6th of April, and entered the Rio de la Plata, where he parted company with two of his ships; but having met them again, and taken out their provisions, he turned them adrift. On the 19th of June he entered the port of St Julian's, where he remained two months, partly to lay in provisions, and partly delayed by the trial and execution of Thomas Doughty, who had plotted against him. On the 21st of August he entered the Straits of Magellan. The passage of the straits took sixteen days, but then a storm carried the ships to the west; on the 7th of October, having made back for the mouth of the strait, Drake's ship and the two vessels under his vice-admiral Captain Wynter were separated, and the latter, missing the rendezvous arranged, returned to England. Drake went on, and came to Mocha Island, off the coast of Chile, on the 25th of November. He thence continued his voyage along the coast of Chile and Peru, taking all opportunities of seizing Spanish ships, and attacking them on shore, till his men were

satiated with plunder; and then coasted along the shores of America, as far as 48 N. lat., in an unsuccessful endeavour to discover a passage into the Atlantic. Having landed, however, he named the country New Albion, and took possession of it in the name of Queen Elizabeth. Having careened his ship, he sailed thence on the 26th of July 1579 for the Moluccas. On the 4th of November he got sight of those islands, and, arriving at Ternate, was extremely well received by the sultan. On the 10th of December he made the Celebes, where his ship unfortunately struck upon a rock, but was taken off without much damage. On the nth of March he arrived at Java, whence he intended to have directed his course to Malacca; but he found himself obliged to alter his purpose, and to think of returning home. On the 26th of March 1580 he again set sail; and on the 15th of June he doubled the Cape of Good Hope, having then on board only fifty-seven mten and three casks of water. He passed the line on the 12th of July, and on the 16th reached the coast of Guinea, where he watered. On the nth of September he made the Island of Terceira, and on the 26th of September (?) he entered the harbour of Plymouth. This voyage round the world, the first accomplished by an Englishman, was thus performed in two years and about ten

months. The queen hesitated for some time whether to recog- nize his achievements or not, on the ground that such recognition might lead to complications with Spain, but she finally decided in his favour. Accordingly, soon after his arrival she paid a visit to Deptford, went on board his ship, and there, after partaking of a banquet, conferred upon him the honour of knight- hood, at the same time declaring her entire approbation of all that he had done. She likewise gave directions for the preser- vation of his ship, the " Golden Hind," that it might remain a monument of his own and his country's glory. After the lapse of a century it decayed and had to be broken up. Of the sound timber a chair was made, which was presented by Charles II. to the university of Oxford. In 1581 Drake became mayor of Plymouth; and in 1585 he married a second time, his first wife having died in 1583. In 1585, hostilities having commenced with Spain, he again went to sea, sailing with a fleet to the West Indies, and taking the cities of Santiago (in the Cape Verde Islands), San Domingo, Cartagena and St Augustine. In 1587 he went to Lisbon with a fleet of thirty sail; and having received intelligence of a great fleet being assembled in the bay of Cadiz, and destined to form part of the Armada, he with great courage entered the port on the 19th of

April, and there burnt upwards of 10,000 tons of shipping — a feat which he afterwards jocosely called " singeing the king of Spain's beard" In 1588, when the Spanish Armada was .approaching England, Sir Francis Drake was appointed vice-admiral under Lord Howard, and made prize of a very large galleon, commanded by Don Pedro de Valdez, who was reputed the projector of the invasion, and who struck at once on learning his adversary's name.

It deserves to be noticed that Drake's name is mentioned in the singular diplomatic communication from the king of Spain which preceded the Armada: —

" Te veto ne pergas bello defendere Belgas;

guae Dracus eripuit nunc restituantur oportet ; uas pater evertit jubeo te condere cellas: Religio Papae fac restituatur ad unguem."

To these lines the queen made this extempore response: — " Ad Graecas, bone rex, fiant mandata kalendas."

In 1589 Drake commanded the fleet sent to restore Dom Antonio, king of Portugal, the land forces being under the orders of Sir John Norreys; but they had hardly put to sea when the commanders differed, and thus the attempt proved abortive. But as the war with Spain continued, a more formidable ex- pedition was fitted out, under Sir John Hawkins and Sir Francis Drake, against their settlements in the West Indies, than had hitherto been undertaken during the whole course of it. Here, however, the commanders again disagreed about the plan; and the result in like manner disappointed public expectation. These disasters were keenly felt by Drake, and were the principal cause of his death, which took place on board his own ship^ near the town of Nombre de Dios, in the West Indies, on the 28th of January 1595.

The older Lives by Samuel Clarke (1671) and John Barrow, junr. (1843), have been superseded by Julian Corbett's two admirable volumes on Drake and the Tudor Navy (1898), the best source of information on the subject, which were preceded by the same author's Sir Francis Drake in the " English Men of Action " series (1890). See also E. J. Payne's edition of Voyages of the Elizabethan Seamen to America : Thirteen original narratives from the collection of Hakluyl (new ed., 1893).

DRAKE, NATHAN (1766-1836), English essayist and phy- sician, son of Nathan Drake, an artist, was born at York in 1766. He was

apprenticed to a doctor in York in 1779, and in 1786 proceeded to Edinburgh University, where he took his degree as M.D. in 1789. In 1790 he set up as a general prac- titioner at Sudbury, Suffolk, where he found an intimate friend in Dr Mason Good (d. 1827). In 1792 he removed to Hadleigh, Suffolk, where he died in 1836. His works include several volumes of literary essays, and some papers contributed to medical periodicals; but his most important production was Shakespeare and his Times, including the Biography of the Poet,

Criticisms on his Genius, and Writings; a new Chronology of his Plays; a Disquisition on the Object of his Sonnets; and a History of the Manners, Customs and Amusements, Superstitions, Poetry and Elegant Literature of his Age (2 vols., 1817). The title sufficiently indicates the scope of this ample work, which has the merit, says G. G. Gervinus {Shakespeare Commentaries, Eng. trans., 1877) " of having brought together for the first time into a whole the tedious and scattered material of the editions and of the many other valuable labours of Tyrwhitt, Heath, Ritson, &c."

DRAKENBORCH, ARNOLD (1684-1748), Dutch classical scholar, was born at Utrecht on the 1st of January 1684. Having studied philology under Graevius and Burmann the elder, and la w under Cornelius Van Eck, in 1 7 1 6 he succeeded B urmann in his professorship (conjointly with C. A. Duker), which he continued to hold till his death on the 16th of January 1748. Although he obtained the degree of doctor of laws, and was intended for the legal profession, he determined to devote himself to philo- logical studies. His edition of Livy (1738-1746, and subsequent editions) is the work on which his fame chiefly rests. The preface gives a particular account of all the literary men who have at different periods commented on the works of Livy. The edition itself is based on that of Gronovius; but Drakenborch made many important alterations on the authority of manuscripts which it is probable Gronovius had never seen. He also published Disserlatio de praefectis urbi (1704; reprinted at Frankfort in 1752 with a life of Drakenborch); Dissertatio de officio praefectorum praetorio (1707); and an edition of Silius Italicus (1717).

DRAKENSBERG (Quathlamba or • Kahlamba, i.e. " heaped up and jagged," of the natives), a mountain chain of S.E. Africa, running parallel to the coast from Basutoland to the Limpopo river — a distance of some 600 m. The Drakensberg are the eastern part of the rampart which forms the edge of the inner tableland of South Africa. The sides of the mountains facing the sea are in general precipitous;

on their inner face they slope more or less gently to the plateau. The culminating points of the range, and the highest lands in South Africa, are found in a sharp bend from S.E. to N.W. in about 29 S. 29° E., where " the Berg " (as the range is called locally) forms the frontier between Natal and Basutoland. Within 60 m. of one another are three mountains, Giant's Castle, Champagne Castle or Cathkin Peak, and Mont aux Sources, 10,000 to 11,000 or more ft. above the sea. From Mont aux Sources the normal N.E. direction of the range is resumed. Conspicuous among the heights along the Orange Free State, Transvaal and Natal frontiers are Tintwa, Malani, Inkwelo and Amajuba or Majuba (q.v.), all between 7000 and 8000 ft. The Draken's Berg— the particular hill from which the range is named — is 5682 ft. high and lies between Malani and Inkwelo heights. It was so named by the voor- trekkers about 1840. North of Majuba the range enters the Transvaal. Here the elevation is generally lower than .in the south, but the Mauch Berg is about 8500 ft. high. At its northernmost point the range joins the Zoutpansberg. In their southern part the Drakensberg form the parting between the rivers draining west to the Atlantic and those flowing south and east to the Indian Ocean. At Mont aux Sources rise the chief headwaters of the Orange, Tugela and other rivers. In the north, however, several streams rising in the interior plateau, e.g. the Komati, the Crocodile and the Olifants, pierce the Drakensberg and reach the Indian Ocean. The range has numerous passes, many available for wheeled traffic. Van Reenen's Pass, between Tintwa and Malani, is crossed by a railway which connects the Orange Free State and Natal: Laing's Nek, the main pass leading from Natal to the Transvaal, which lies under the shadow of Majuba, is pierced by a railway tunnel. The railway from Delagoa Bay to Pretoria crosses the Drakensberg by a very steep gradient. Several subsidiary ranges branch off from the main chain of the Berg. This is especially the case in Natal, where one range is known as the Little Drakensberg. (See further Basutoland; Natal and Transvaal.)

DRAMA

475

DRAMA (literally "action," from Gr. Sp&v, act or do), the term applied to those productions of Art which imitate or, to use a more modern term, " represent " action by introducing the personages taking part in them as real, and as employed in the action itself. There are numerous varieties of the drama., differing more or less widely from one another, both as to the objects imitated and as to the means used in the process. But they all agree in the method or

manner which is essential to the drama and to dramatic art, namely, imitation in the way of action. The function of all Art being to give pleasure by representation (see Fine Arts), it is clear that what is distinctive of any one branch or form must be the manner in which this function is performed by it. In the epos, for instance, the method or manner is narrative, and even when Odysseus tells of his action, he is not acting.

i. Theory of the Drama, and Dramatic Art The first step towards the drama is the assumption of character, whether real or fictitious. It is caused by the desire, inseparable

from human nature, to give expression to feelings and the drama, ideas. These man expresses not only by sound and

gesture, like other animals, and by speech significant by its delivery as well as by its purport, but also by imitation superadded to these. To imitate, says Aristotle, is instinctive in man from his infancy, and no pleasure is more universal than that which is given by imitation. Inasmuch as the aid of some sort of dress or decoration is usually at hand, while the accompaniment of dance or song, or other music, naturally suggests itself, especially on joyous or solemn occasions, we find that this pre- liminary step is taken among all peoples, however primitive or remote. But it does not follow, as is often assumed, that they possess a drama in germ. Boys playing at soldiers, or men walking in a pageant — a shoemaker's holiday in ribbons and flowers, or a Shetland sword-dance— none of these is in itself a drama. This is not reached till the imitation or representation extends to action.

An action which is to present itself as such to human minds must enable them to recognize in it a procedure from cause to

effect. This of course means, neither that the cause

suggested must be the final cause, nor that the result

shown forth need pretend to be the ultimate result. We look upon an action as ended when the purpose with which it began is shown to have been gained or frustrated; and we trace the beginning of an action back to the human will that set it on foot — though this will may be in bondage to a higher or stronger will, or to fate, in any or ail of its purposes. Without an action in the sense stated — without a plot, .in a word — there can be no drama. But the very simplest action will satisfy the dramatic test; a mystery representing the story

of Cain and Abel without a deviation from the simple biblical narrative, a farce exhibiting the stalest trick played by designing sobriety upon oblivious drunkenness, may each of them be a complete drama. But even to this point, the imitation of action by action in however crude a form, not all peoples have advanced.

But after this second step has been taken, it only remains for the drama to assume a form regulated by certain literary laws,

in order that it may become a branch of dramatic literature, literature. Such a literature, needless to say, only a

limited number of nations has come to possess; and, while some are to be found that have, or have had, a drama with- out a dramatic literature, it is quite conceivable that a nation should continue in possession of the former after having ceased to cultivate the latter. It is self-evident that no drama which forms part of a dramatic literature can ignore the use of speech; and however closely music, dancing and decoration may associate themselves with particular forms or phases of the drama, their aid cannot be more than adventitious. As a matter of fact, the beginnings of dramatic composition are, in the history of such literatures as are well known to us, preceded by the earlier stages in the growth of the lyric and epic forms of poetry, or by one of these at all events; .and it is in the continua- tion of both that the drama in its literary form takes its origin in those instances which lie open to our study.

Dramatic action.

While the aid of all other arts — even, strictly speaking, the aid of the literary art — is merely an accident, the co-operation of the art of acting is indispensable to that of the drama. Tbe rf The dramatic writer may have reasons for preferring to matic and leave the imagination of his reader to supply the

To essay, whether in a brief summary or in more or less elaborate detail, a statement of the main laws of the drama, has often been regarded as a superfluous, not to say, futile effort. But the laws of which it is proposed to give „/J^ s /° some indication here are not so much those which any the drama. particular literature or period has chosen to set up and follow, as those abstracted by criticism, in pursuit of its own free comparative method, from the process that repeats itself in every drama adequately meeting the demands upon it. Aristotle, whom we still justly revere as the originator of the theory of the drama, and thus its great vonodirris, was, no doubt, in

his practical knowledge of it, confined to its Greek examples, yet his object was not to produce another generation of great Attic tragedians, but rather to show how it was by following the necessary laws of their art that the great masters, true to them- selves and to their artistic ends, had achieved what they had achieved. Still more distinctly was such the aim of the greatest modern critical writer on the drama, Lessing, whose chief design was to combat false dramatic theories and to overthrow laws demonstrated by him to be artificial inventions, unreal figments. He proved, what before him had only been suspected, that Shakespeare, though in hopeless conflict with certain rules dating from the siecle de Louis XI V, was not in conflict with those laws of the drama which are of its very essence, and that, accordingly, if Shakespeare and the rules in question could not be harmonized, it was only so much the worse for the rules. To illustrate from great works, and expound with their aid, the organic processes of the art to which they belong, is not only among the highest, it is also one of the most useful functions of literary and artistic criticism. Nor is there, in one sense at least, any finality about it. Neither the great authorities on dramatic theory nor the resolute and acute apologists of more or less transitory phases of the drama — Corneille, Dryden and many later successors — have exhausted the statement of the means which the drama has proved, or may prove, capable of employing. The multitude of technical terms and formulae which has gathered round the practice of the most living and the most Protean of arts has at no time seriously interfered with the operation of creative power. Ontheotherhand, no dramaturgic theory has (though the attempt has been often enough made) ever succeeded in giving rise to a single dramatic work of enduring value, unless the creative force was there to animate the form.

It is therefore the operation of this creative force which we are chiefly interested in noting; and its task begins with the beginning of the dramatist's labours. He must of course start with the choice of a subject; yet it is subieet obvious that the subject is merely the dead material out of which is formed that living something, the action of a play; and it is only in rare instances — far rarer than might at first sight appear — that the subject is as it were self-moulded as a dramatic action. The less experienced a playwright, the more readily will he, as the phrase is, rush at his subject, more especially if it seems to him to possess prima facie dramatic capabilities; and the consequence will be that which usually attends upon a precipitate start. On the other hand, while the quickness of a great dramatist's apprehension is apt to suggest

to him an infinite number of subjects, and insight and experience may lead him half instinctively in the direction of suitable themes, it will often be long before in his mind the subject converts itself into the initial conception of the action of a play. To mould a subject — be it a Greek legend, or a portion of a Tudor chronicle, or one out of a hundred Italian tales, or a true story of modern life — into the action or fable of a play, is the primary task of the dramatist, and with this all-important process the creative part of his work really begins. Although his conception may expand or modify itself as he executes it, yet upon the conception the execution must largely depend. The range of subjects open to a dramatist may be as wide as the world itself, or it may be restricted by an endless variety of causes, conven- tions and considerations; and it is quite true that even the greatest dramatists have not always found time for contemplating each subject that occurs to them till the ray is caught which proclaims it a dramatic diamond. What they had time for, and what only the playwright who entirely misunderstands his art ignores the necessity of finding time for, is the transformation of the dead material of the subject into the living action of a drama. What is it, then, that makes an action dramatic, and without which no action, whatever may be its nature — serious or ludicrous, stately or trivial, impetuous as a flame of fire, or light

-w»il° as a western breeze — can be so described? The answer action,

to this question can only suggest itself from an attempt to ascertain the laws which determine the nature of all actions corresponding to this description. The first of the laws in question is in so far the most noteworthy among them that it has been the most amply discussed and the most pertinaciously misunderstood. This is the law which requires that a dramatic action should be one — that it should possess unity. What in the subject of a drama is merely an approximate or supposititious, must in its action be an actual unity; and it is indeed this requirement which constitutes the most arduous part of the task of transforming subject into action. There is of course no actual unity in any group of events in human life which we may choose to call by a single collective name — a war, a revolution, a con- spiracy, an intrigue, an imbroglio. The events of real life, the facts of history, even the imitative incidents of narrative fiction, are

like the waves of a ceaseless flood; that which binds a group or body of them into a single action is the bond of the dramatic idea; and this it is incumbent upon the dramatist to supply. Within the limits of a dramatic action all its parts should (as in real life or in history they so persistently refuse to do) flow into its current like tributaries to a single stream; or, to vary the figure, everything in a drama should form a link in a single chain of cause and effect. This law is incumbent upon every kind of drama — alike upon the tragedy which sets itself to solve one of the problems of a life, and upon the farce which sums up the follies of an afternoon.

Such is not, however, the case with certain more or less arbi- trary rules which have at different times been set up for this or that kind of drama. The supposed necessity that an action should consist of one event is an erroneous interpretation of the law that it should be, as an action, one. For an event is but an element in an action, though it may be an element of decisive moment. The assassination of Caesar is not the action of a Caesar tragedy; the loss of his treasure is not the action of The Miser. Again, unity of action, while excluding those uncon- nected episodes which Aristotle so severely condemns, does not prohibit the introduction of one or even more subsidiary actions as contributing to the progress of the main action. The sole indispensable law is that these should always be treated as what they are — subsidiary only; and herein lies the difficulty, which Shakespeare so successfully overcame, of fusing a combination of subjects taken from various sources into the idea of a single action; herein also lies the danger in the use of that favourite device of the Spanish and other modern dramas — "by-plots" or " under-plots." On the other hand, the modern French drama has largely employed another device — quite legitimate in itself — for increasing the interest of an action without destroying its unity. This may be called the dramatic use of backgrounds,

the depiction of surroundings on which the action or its chief characters seem sympathetically to reflect themselves, back- biting " good villagers " or academicians who inspire oneanother — with tedium. But a really double or multiple action, logically carried out as such, is inconceivable in a single drama, though many a play is palpably only two plays knotted into one. It was therefore not all pedantry which protested against the multiplicity of action which had itself formed part of the revolt against the too narrow interpretation of unity adopted by the French classical drama. Thirdly, unity of action need not imply unity of hero — for hero (or heroine) is merely a conventional term signifying the principal personage of the action. It is only when the change in the degree of

interest excited by different characters in a play results from a change in the conception of the action itself, that the consequent duality (or multiplicity) of heroes recalls a faulty uncertainty in the conception of the action they carry on. Such an objection, while it may hold in the case of Schiller's Don Carlos, would therefore be erroneously urged against Shakespeare's Julius Caesar. Lastly, as to the theory which made the so-called unities of time and place con- stitute, together with that of action, the Three Unities indispen- sable to the (tragic) drama, the following note must suffice. Aristotle's supposed exaction of all the Three Unities, having been expanded by Chapelain and approved by Richelieu, was stereotyped by Corneille, though he had (as one might say) got on very well without them, and was finally set forth in Horatian verse by Boileau. Thus it came to be overlooked that there is nothing in Aristotle's statement to show that in his judgment unity of time and place are, like unity of action, absolute dramatic laws. Their object is by representing an action as visibly continuous to render its unity more distinctly or easily perceptible. But the imagination is capable of con- structing for itself the bridges required for preserving to an action, conceived of as such, its character of continuousness. In another sense these rules were convenient usages conducing to a concise and clear treatment of a limited kind of themes; for they were a Greek invention, and the repeated resort to, the same group of myths made it expedient for a Greek poet to seek the subject of a single tragedy in a part only of one of the myths at his disposal. The observance of unity of place, moreover, was suggested to the Greeks by certain outward conditions of their stage — as assuredly as it was adopted by the French in accordance with the construction and usages of theirs, and as the neglect of it by the Elizabethans was in their case encouraged by the established form of the English scene. The palpable artificiality of these laws needs no demonstration, so long as the true meaning of the term " action " be kept in view. Of the action of Othello part takes place at Venice and part at Cyprus, and yet the whole is one in itself; while the limits of time over which an action — Hamlet's progress to resolve, for instance — extends cannot be restricted by a revolution of the earth round the sun or of the moon round the earth.

In a drama which presents its action as one, this action must be complete in itself. This Aristotelian law, like the other, dis- tinguishes the dramatic action from its subject. The former may be said to have a real artistic, while the Complete^ latter has only an imaginary real, completeness. The action! historian, for instance, is aware that the complete ex- position of a body of events and transactions at which he aims can never be more than partially accomplished, since he may

present only what he knows, and all human knowledge is im- perfect. But Art is limited by no such uncertainty. The dramatist, in treating an action as one, comprehends the whole of it in the form of his work, since, to him who has conceived it, all its parts, from cause to effect, are equally clear. It is his fault if in the action of his drama anything is left unaccounted for — not motive"; though a dramatic motif might not always prove to be a sufficient explanation in real life. Accordingly, every drama should represent in organic sequence the several stages of which a complete action consists, and which are essential to it. This law of completeness, therefore, lies at the foundation of all systems of dramatic " construction."

ANALYSIS]

DRAMA

477

Every action, if conceived of as complete, has its causes, growth, height, consequences and close. There is no binding ' . law to prescribe the relative length or proportion at

construe- which these several stages in the action should be don based treated in a drama; or to regulate the treatment of °" th,s Iaw such subsidiary actions as may be introduced in aid

pieteness. °^ ^ e ma ' n P^ ot » or °f suc ^ 1 m °re or less directly con- nected " episodes " as may at the same time advance and relieve its progress. But experience has necessarily from time to time established certain rules of practice, and from the adoption of particular systems of division for particular species of the drama — such as that into five acts for a regular tragedy or comedy, which Roman example has caused to be so largely followed — has naturally resulted a certain uniformity of relation between the conduct of an action and the outward sections of a play. Essentially, however, there is no difference between the laws regulating the construction of a Sophoclean or Shakespearian tragedy, a comedy of Moliere or Congreve, and a well-built modern farce, because all exhibit an action complete in itself.

The " introduction " or " exposition " forms an integral part of the action, and is therefore to be distinguished from the Prolosues " P r °l °g ue " m tfle more ordinary sense of the term, and which like the " epilogue " (and the Greek 7rapaj3a

epilogues stands outside the action, and is a mere address to the

outside the p U blj c from author, presenter or actor occasioned by the play. Prologue and epilogue are mere external, though at times effective, adjuncts, and have, properly speaking, as little to do with the construction of a play as the bill which announces it or the musical prelude which disposes the mind for its reception. A special kind of preface or argument is the " dumb-show," which in some old plays briefly rehearses in pantomime the action that is to follow. The introduction or Parts of exposition belongs to the action itself; it is, as the the action. Hindu critics called it, the seed or circumstance from introduc- which the business arises. Clearness being its primary tloa ° rex " requisite, many expedients have been at various times ° ' adopted to secure this feature. Thus the Euripidean prologue, though spoken by one of the characters of the play, took a narrative form, more acceptable to the audience than to the critics, and placed itself half without, half within, the action. The same purpose is served by the separate " inductions " in many of the old English plays, and by the preludes or prologues, or whatever name they may assume, in numberless modern dramas of all kinds — from Faust down to the favourites of the Ambigu and the Adelphi. More facile is the orientation supplied in French tragedy by the opening scenes between hero and confidant, and in French comedy and its derivatives by those between observant valet and knowing lady's-maid. But all such expedients may be rendered unnecessary by the art of the dramatist, who is able outwardly also to present the introduction of his action as an organic part of that action itself; who seems to take the spectators in medias res, while he is really building the foundations of his plot; who touches in the opening of his action the chord which is to vibrate throughout its course — " Down with the Capulets ! down with the Montagues !" — " With the Moor, sayest thou ? "

The exposition, which may be short or long, but which should

always prepare and may even seem to necessitate the action, ends

. when the movement of the action itself begins. This Openlngot . . . ,, , . , ° . , ,

movement, transition may occasionally be marked with the

utmost distinctness (as in the actual meeting between the hero and the Ghost in Hamlet), while in other instances sub- sidiary action or episode may judiciously intervene (as in King Lear, where the subsidiary action of Gloster and his sons oppor- tunely prevents too abrupt a sequence of cause and effect). From this point the second stage of the action — its " growth " — progresses to that third stage

which is called its " height " or " climax." All that has preceded the attainment of this constitutes that half of the drama — usually its much larger half — which Aristotle terms the Sims, or tying of the knot. The varieties in the treatment of the growth or second stage of. the action are infinite; it is here that the greatest

Growth.

freedom is manifestly permissible; that in the Indian drama the personages make long journeys across the stage; and that, with the help of their under-plots, the masters of the modern tragic and the comic drama — notably those unequalled weavers of intrigues, the Spaniards — are able most fully to exercise their inventive faculties. If the growth is too rapid, the climax will fail of its effect; if it is too slow, the interest will be exhausted before the greatest demand upon it has been made — a fault to which comedy is specially liable; if it is involved or inverted, a vague uncertainty will take the place of an eager or agreeable suspense, the action will seem to halt, or a fall will begin pre- maturely. In the contrivance of the " climax " itself lies one of the chief tests of the dramatist's art; for while the transactions of real life often fail to reach any H 'j l x ator climax at all, that of a dramatic action should present itself as self-evident. In the middle of everything, says the Greek poet, lies the strength; and this strongest or highest point it is the task of the dramatist to make manifest. Much here depends upon the niceties of constructive instinct; much (as in all parts of the action) upon a thorough dramatic transformation of the subject. The historical drama at this point presents peculiar difficulties, of which the example of Henry VIII. may be cited as an illustration.

From the climax, or height, the action proceeds through its " fall " to its " close," which in a drama with an unhappy ending we still call its " catastrophe," while to termina- Pan

tions in general we apply the term dSnouement. This latter name would, however, more properly be applied in the sense in which Aristotle employs its Greek equivalent Xwis— the untying of the knot — to the whole of the second part of the action, from the climax downwards. In the management of the climax, everything depends upon producing the effect; in the fall, everything depends upon not marring it. This may be ensured by a rapid advance to the close; but neither does every action admit of such treatment, nor is it in accordance with the character of those which are of a more subtle or com- plicated kind. With the latter, therefore, the " fall " is often a revolution or " return," i.e. in Aristotle's phrase a change into the

reverse of what is expected from the circumstances of the action (irepnreTti.a) — as in Coriolanus, where the " etoro – Roman story lends itself so admirably to dramatic demands. In any case, the art of the dramatist is in this part of his work called upon for the surest exercise of its tact and skill. The effect of the climax was to concentrate the interest; the fall must therefore, above all, avoid dissipating it. The use of episodes is not even now excluded; but, even where serving the purpose of relief, they must now be such as help to keep alive the interest, previously raised to its highest pitch. This may be effected by the raising of obstacles between the height of the action and its expected consequences; in tragedy by the sugges- tion of a seemingly possible recovery or escape from them (as in the wonderfully powerful construction of the latter part of Macbeth) ; in comedy, or wherever the interest of the action is less intense, by the gradual removal of incidental difficulties. In all kinds of the drama " discovery " will remain, as it was in the judgment of Aristotle, a most effective expedient; but it should be a discovery prepared by that method of treatment which in its consummate master, Sophocles, has been termed his " irony." Nowhere should the close or catastrophe be other than a consequence of the action itself. Sudden revulsions from the conditions of the action— such as a ° se or are supplied with the aid of the deus ex machina, or frophe therevising officer of the emperor of China,or the nabob returned from India, or a virulent malaria — condemn themselves as unsatisfactory makeshifts. However sudden, and even in manner of accomplishment surprising, may be the catastrophe, it should, like every other part of the action, be in organic con- nexion with the whole preceding action. The sudden suicides which terminate so many tragedies, and the unmerited paternal blessings which close an equal number of comedies, should be something more than a " way out of it," or a signal for the fall of the curtain. A catastrophe may conveniently, and even (as in

Faust) with powerful effect, be left to the imagination; but to substitute for it a deliberate blank is to leave the action incom- plete, and the drama a fragment ending with a — possibly interest- ing — confession of incompetence.

The action of a drama, besides being one and complete in itself,

ought likewise to be probable. The probability or necessity (in

the Aristotelian sense of the terms) required of a drama ability / ‘ s not t ‘ lat ° actua -l or historical experience — it is a action. conditional probability, or in other words an internal*

consistency between the course of the action and the conditions under which the dramatist has chosen to carry it on. As to the former, he is fettered by no restrictions save those which he imposes upon himself, whether or not in deference to the usages of certain accepted species of dramatic composition. Ghosts seldom appear in real life or in dramas of real life; but, the introduction of supernatural agency is neither enjoined nor prohibited by any general dramatic law. The use of such expedients is as open to the dramatic as to any other poet; the judiciousness of his use of them depends upon the effect which, consistently with the general conduct of his action, they will exercise upon the spectator, whom other circumstances may or may not predispose to their acceptance. The Ghost in Hamlet belongs to the action of the play; the Ghost in the Persae is not intrinsically less probable, but seems a less immediate product of the surrounding atmosphere. Dramatic probability has, how- ever, a far deeper meaning than this. The Eumenides is prob- able, with all its mysterious commingling of cults, and so is Macbeth, with all its barbarous witchcraft. The proceedings of the feathered builders of Cloudcuckootown in the Birds of Aristophanes are as true to dramatic probability as are the pranks of Oberon’s fairies in Midsummer Night’s Dream. In other words, it is in the harmony between the action and the characters, and in the consistency of the characters with themselves, in the appropriateness of both to the atmosphere in which they have their being, that this dramatic probability lies. The dramatist has to represent characters affected by the progress of an action in a particular way, and contributing to it in a particular way, because, if consistent with themselves, they must be so affected, and must so act.*

Upon the invention and conduct of his characters the dramatist must therefore expend a great proportion — even a preponderance — of his labour. His treatment of them will, in at least as high

a degree as his choice of subject, conception of action, ization’ an(* method of construction, determine the effect which*

his work produces. And while there are aspects of the dramatic art under which its earlier phases already exhibit an unsurpassed degree of perfection, there is none under which its

advance is more notable than this. Many causes have the drama contributed to this result; the chief is to be sought in la this the multiplication of the opportunities for mankind's. respect study of man. The theories of the Indian critics on the subject of dramatic character are little more than an elaborate scaffolding. Aristotle's remarks on the subject are scanty; nor indeed is the strength of the dramatic literature from whose examples he abstracted his maxims to be sought in the fulness or variety of its characterization. This relative deficiency was beyond doubt largely caused by the outward conditions of the Greek theatre — the remoteness of actor from spectator, and the consequent necessity for the use of masks, and for the raising, and consequent conventionalizing, of the tones of the voice. Later Greek and Roman comedy, unable or unwilling to resist the force of habit, limited their range of characters to an accepted gallery of types. Nor is it easy to ignore the fact that the influence of these classical examples, combined with that of national tendencies of mind and temperament, have all along inclined the dramatists of the Romance nations to attach less importance to characterization of a closer and more varied kind than to interest of action and effectiveness of construction. The Italian and the Spanish drama more especially, and the French during a great part of its history, have in general shown a disposition to present their characters, as it were, ready made— whether in the case of tragic heroes and heroines, or in that of comic types, often

moulded, as in the commedia dell' arte" and beyond," according to a long-lived system of local or national selection. These types, expanded, heightened and modified, are recognizable in some of the triumphs of comic characterization achieved by the Germanic drama, and by its master, Shakespeare, above all; but this fact must not obscure one of more importance than itself. In the matter of comic as well as of serious characterization — in the individualizing of characters and in evolving them as it were out of the progress of the action — the modern drama has not only advanced, but in a sense revolutionized, the dramatic art, as inherited from its ancient masters.

Yet, however the method and scope of characterization may vary under the influence of different historical epochs and different tendencies or tastes of races or nations, the laws of this branch of the dramatic art remain based o,n &i a,sltes the same essential requirements. What interests us in character. a man or woman in real life, or in the impressions we form of historical personages, is that which seems to us to give them individuality. A dramatic character must therefore, whatever its part in the action, be

sufficiently marked by features of its own to interest the imagination; with these features its subsequent conduct must be consistent, and to them its partici- pation in the action must correspond. In order to achieve such a result, the dramatist must have, in the first instance, distinctly conceived the character, however it may have been suggested to him. His task is, not to paint a copy of some contemporary or " historical " personage, but to conceive a particular kind of man, acting under the operation of particular circumstances. This conception, growing and modifying itself with the progress of the action, also invented by the dramatist, will determine the totality of the character which he creates. The likeness which the result bears to an actual or historical personage may very probably, from secondary points of view, affect the immediate stage success of the creation; upon its dramatic result this likeness can have no influence whatever. In a wider sense than that in which Shakespeare denied the charge that Falstaff was Oldcastle, it should be possible to say of every dramatic character which it is sought to identify with an actual personage, " This is not the man." The mirror of the drama is not a photographic apparatus ; and not even the most conscientious combination of science and art can bring back even a " phase " of the real Napoleon.

Distinctiveness, as the primary requisite in dramatic char- acterization, is to be demanded in the case of all personages introduced into a dramatic action, but not in all cases in an equal degree. Schiller, in adding to the dramatis Olstiact- personae of his Fiesco superscriptions of their chief characteristics, labels Sacco as " an ordinary person," and this, no doubt, suffices for Sacco. But with the great masters of character- ization a few touches, of which the true actor's art knows how to avail itself, distinguish even their lesser characters from one another; and every man is in his humour down to the " third citizen." Elaboration is necessarily reserved for characters who are the more important contributors to the action, and the fulness of elaboration for its heroes. Many expedients may lend their aid to the higher degrees of distinctiveness. Much is gained by a significant introduction of hero or heroine— thus Antigone is dragged in by the watchman, Gloucester enters alone upon the scene, Volpone is discovered in adoration of his golden saint. Nothing marks character more clearly than the use of contrast — as of Othello with Iago, of Ottavio with Max Piccolomini, of Joseph with Charles Surface. Nor is direct antithesis the only effective kind of contrast; Cassius is a foil to Brutus, and Leonora to her namesake the Princess. But, besides impressing the imagination as a conception distinct in itself, each character must maintain a consistency

between its conduct in the action and the features it has established as its own. This consistency does not imply uniformity; for, as Aristotle observes, there are characters which, to be represented with uniformity, must be presented as uniformly un-uniform. Of such consistently complex characters the great critic cites no instances, nor indeed are they of frequent occurrence in Greek tragedy; in the modern drama Hamlet is their unrivalled

Self-con- sistency.

*exemplar; and Weislingen in Goethe's Gote, and Alceste in the Misanthrope, may be mentioned as other illustrations in dramas differing widely from one another. The list might be enlarged almost indefinitely from the gallery of female characters, in view of the greater pliability and more habitual dependence of the nature of women. It should be added that those dramatic literatures which freely admit of a mixture of the serious with the comic element thereby enormously increase the opportunities of varied characterization. The difficulty of the task at the same time enhances the effect resulting from its satisfactory accom- plishment; and, if the conception of a character is found to meet a variety of tests resembling that which life has at hand for every man, its naturalness, as we term it, becomes more obvious to the imagination. " Naturalness " is only another word for what Aristotle terms " propriety "; the artificial rules by which usage has at times sought to define particular species of character are in their origin only a convenience of the theatre, though they have largely helped to conventionalize dramatic characteriza- tion. Lastly, a character should be directly effective with regard PHecti t0 t * le dramatic action*in which it takes part — that is to ness. ' say > the influence it exerts upon the progress of the action should correspond to its distinctive features; the conduct of the play should seem to spring from the nature of its characters. In other words, no characterization can be effective which is not what may be called economical, i.e. which does not strictly limit itself to suiting the purposes of the action. Even the minor characters should not idly intervene; while the chief characters should predominate over, or determine, the course of the action, its entire conception should harmonize with their distinctive features. It is only a Prometheus whom the gods bind*

fast to a rock, only a Juliet who will venture into a living death for her Romeo. Thus, in a sense, chance is excluded from dramatic action, or rather, like every other element in it, bends to the dramatic idea.

In view of this predominance of character over action, we may appropriately use such expressions as a tragedy of love or jealousy or ambition, or a comedy of character. For such collocations merely indicate that plays so described have proved (or were intended to prove) specially impressive by the concep- tion or execution of their chief character or characters.

The term " manners " (as employed in a narrower sense than the Aristotelian ijdrj) applies to that which colours both action and characters, but does not determine the essence of either. As exhibiting human agents under certain con- ditions of time and place, and of the various relations of life, the action of a drama, together with the characters engaged in it, and the incidents and circumstances belonging to it, must more or less adapt itself to the external conditions assumed. From the assumption of some such conditions not even those dramatic species which indulge in the most sovereign licence, such as Old Attic comedy, or burlesque in general, can wholly emancipate themselves; and even supernatural or fantastic characters and actions must suit themselves to some sort of antecedents. But it depends altogether on the measure in which the nature of an action and the development of its characters are effected by considerations of time and place, or of temporary social systems and the transitory distinctions incidental to them, whether the imitation of a particular kind of manners becomes a significant Their element in a particular play. The Hindu caste-system

relative is an antecedent of every Hindu drama, and the peculiar sigalfl- organization of Chinese society of nearly every Chinese cance. pj av ˆjj vvlaich. we are acquainted. Greek tragedy itself, though treating subjects derived from no historic age, had established a standard of manners from which in its decline it did not depart with impunity. Again, the imitation of manners of a particular age or country may or may not be of moment in a play. In some dramas, and in some species of drama, time and place are so purely imaginary and so much a matter of in difference that the adoption of a purely conventional standard of manners, or at least the exclusion of any definitely fixed standard, is here desirable. The ducal reign of Theseus at Athens (if its period be ascertainable) does not date A Midsummer

Manners.

Night's Dream; nor do the coasts of Bohemia in The Winter's Tale localize the manners of the customers of Autolycus. Where, on the other hand, as more especially in the historic drama, or in that kind of comedy which directs its shafts against the ridiculous vices of a particular age or country, significance attaches to the degree in which the manners represented resemble what is more or less known, the dramatist will do well to be careful in his colouring. How admirably is the French court specialized in Henry V.; how completely are we transplanted among the burghers of Brussels in the opening scenes of Egmont; what a portraiture of a clique We have in the Pricieuses ridicules of Moliere; what a reproduction of a class in the pot-house politicians of Holberg ! And how minutely have modern dramatists found it necessary to study the more fascinating aspects of la vie parisienne, in order to convey to the curious at home and abroad a conviction of the verisimilitude of their pictures ! Yet, even in such instances, the dramatist will only use what suits his dramatic purpose; he will select, not transfer in mass, historic features, and discriminate in his use of modern instances. The details of historic fidelity, and the lesser shades distinguishing the varieties of social usage, will be introduced by him at his choice, or left to be supplied by the actor. Where the reproduction of manners becomes the primary purpose of a play, its effect can only be of an inferior kind; and a drama purely of manners is a contradiction in terms.

No complete system of dramatic species can be abstracted from any one dramatic literature. They are often the result of particular antecedents, and their growth is often affected by peculiar conditions. Different nations or

Species of the drama.

ages use the same names and may preserve some of the same rules for species which in other respects their usage may have materially modified from that of their neighbours or predecessors. The very question of the use of measured or pedestrian speech as fit for different kinds of drama, and therefore distinctive of them, cannot be profitably discussed except in reference to particular literatures. In the Chinese drama the most solemn themes are treated in the same form — an admixture of verse and prose — which not so very long since was character- istic of that airiest of Western dramatic species, the French vaudeville. Who would undertake to define, except in the applications which have been given to the words in successive generations, such terms as " tragi-comedy," or indeed as "drama"

(drame) itself ? Yet this uncertainty does not imply that all is confusion in the terminology as to the species of the drama. In so far as they are distinguishable according to the effects which their actions, or those which the preponderating parts of their actions, produce, these species may primarily be ranged in accordance with the broad difference established by Aristotle between tragedy and comedy. " Tragic " and " comic " effects differ in regard to the emotions of the mind which they excite; and a drama is tragic or comic according as such effects are produced by it. The strong or serious emotions are co ˆf ai ' alone capable of exercising upon us that influence which, employing a bold but marvellously happy figure, Aristotle termed purification, and which a Greek comedian, after a more matter-of-fact fashion, thus expressed:

" For whensoe'er a man observes his fellow Bear wrongs more grievous than himself has known, More easily he bears his own misfortunes."

That is to say, the petty troubles of self which disturb without elevating the mind are driven out by the sympathetic participa- tion in greater griefs, which raises while it excites the mind employed upon contemplating them. It is to these emotions — which are and can be no others than pity and terror — that actions which we call tragic appeal. Naif as we may think Aristotle in desiderating for such actions a complicated rather than a simple plot, he obviously means that in form as well as in design they should reveal their relative importance. Those actions which we term comic address themselves to the sense of the ridiculous, and their themes are those vices and moral infirmities the repre- sentation of which is capable of touching the springs of laughter. Where, accordingly, a drama confines itself to effects of the

former class, it may be called a pure " tragedy "; when to those of the latter, a pure " comedy." In dramas where the effects are mixed the nature of the main action and of the main characters (as determined by their distinctive features) alone enables us to classify such plays as serious or humorous dramas — or as " tragic " or " comic," if we choose to preserve the terms. But the classification admits of a variety of transitions, from " pure " tragedy to " mixed, "

from " mixed tragedy " to " mixed comedy," and thence to " pure comedy," with the more freely licensed " farce " and " burlesque," the time-honoured inversion of the relations of dramatic method and purpose. This system of distinction has no concern with the mere question of the termina- tion of the play, according to which Ehilostratus and other authorities have sought to distinguish tragic from comic dramas. The serious drama which ends happily (the German Schauspiel) is not a species co-ordinate with tragedy and comedy, but at the most a subordinate variety of the former. Other distinctions may be almost infinitely multiplied, according to the point of view adopted for the classification.

The historical sketch of the drama attempted in the following pages will best serve to indicate the successive growth of national dramatic species, many of which, by asserting their influence in other countries and ages than those which gave birth to them, have acquired a more than national vitality.

The art of acting, whose history forms an organic though a distinct part of that of the drama, necessarily possesses a theory and a technical system of its own. But into these it is acting. ° impossible here to enter. One claim, however, should be vindicated for the art of acting, viz. that, though it is a dependent art, and most signally so in its highest forms, yet its true exercise implies (however much the term may have been abused) a creative process. The conception of a character is determined by antecedents not of the actor's own making; and the term originality can be applied to it only in a relative sense. Study and reflection enable him, with the aid of experience and of the intuition which genius bestows, but which experience may in a high degree supply, to interpret, to combine, and to supplement given materials. But in the transformation of the conception into the represented character the actor's functions are really creative; for here he becomes the character by means which belong to his art alone. The distinctiveness which he gives to the character by making the principal features recognized by him in it its groundwork — the consistency which he maintains in it between groundwork and details — the appropriateness which he preserves in it to the course of the action and the part borne in it by the character — all these are of his own making, though suggested by the conception derived by him from his materials. As to the means at his disposal, they are essentially of two kinds only; but not all forms of the drama have admitted of the use of both, or of both in the same com- pleteness. All acting includes the use of gesture, or, as it has been more comprehensively termed, of bodily eloquence. From various points of vie w its laws regulate the actor's bearing, walk and

movements of face and limbs. They teach what is aesthetically permitted and what is aesthetically pleasing. They deduce from observation what is appropriate to the ex- pression of particular affections of the mind and of their combina- tions, of emotions and passions, of physical and mental conditions — joy and grief, health and sickness, waking, sleeping and dreaming, madness, collapse and death — of particular ages of life and temperaments, as well as of the distinctive characteristics of race, nationality or class. While under certain con- ditions—as in the masked drama — the use of bodily movement as one of the means of expression has at times been partially restricted, there have been, or are, forms of the drama which have altogether excluded the use of speech (such as pantomime), or have restricted the manner of its employment (such as opera). In the spoken drama the laws of rhetoric regulate the actor's use of speech, but under conditions of a special nature. Like the orator, he has to follow the laws of pronunciation, modulation, accent and rhythm (the last in certain kinds of prose as well as in such forms of verse as he may

Its means.

Gesture.

Speech.

Origin.

be called upon to reproduce). But he has also to give his atten- tion to the special laws of dramatic delivery, which vary in soliloquy and dialogue, and in such narrative or lyrical passages as may occur in his part.

The totality of the effect produced by the actor will in some degree depend upon other aids, among which those of a purely external kind are unlikely to be lost sight of. But the _ , significance of costume (q.v.) in the actor, like that of decoration and scenery (see Theatre) in an action, is a wholly relative one, and is to a large measure determined by the claims which custom enables the theatre to make, or forbids its making, upon the imagination of the spectators. The actor's real achieve- ment lies in the transformation which the artist himself effects; nor is there any art more sovereign in the use it can make of its means, or so happy in the directness of the results it can accom- plish by them.

2. Indian Drama

The origin of the Indian drama may unhesitatingly be de- scribed as purely native. The Mahommedans, when they overran India, brought no drama with them; the Persians, the Arabs and the Egyptians were without a national theatre. It would be absurd to suppose the Indian drama to have owed anything to the Chinese or its offshoots. On the other hand, there is no real evidence for assuming any influence of Greek examples upon the Indian drama at any stage of its progress. Finally, it had passed into its ' decline before the dramatic literature of modern Europe had sprung into being.

The Hindu writers ascribe the invention of dramatic enter- tainments to an inspired sage Bharata, or to the communications made to him by the god Brahma himself concerning an art gathered from the Vedas. As the word Bharata signifies an actor, we have clearly here a mere personification of the invention of the drama. Three kinds of entertainments, of which the ndtya (defined as a dance combined with gesticula- tion and speech) comes nearest to the drama, were said to have been exhibited before the gods by the spirits and nymphs of Indra's heaven, and to these the god Siva added two new styles of dancing.

The origin of the Indian drama was thus unmistakably religious. Dramatic elements first showed themselves in certain of the hymns of the Rig Veda, which took the form of dialogues between divine personages, and in one of which is to be found the germ of Kalidasa's famous Vikrama and Urvasi. These hymns were combined with the dances in the festivals of the gods, which soon assumed a more or less conventional form. Thus, from the union of dance and song, to which were afterwards added narrative recitation, and first sung, then spoken, dialogue, was gradually evolved the acted drama. Such scenes and stories from the mythology of Vishnu are still occasionally enacted by pantomime or spoken dialogue in India (jdtras of the Bengalis; rasas of the Western Provinces); and the most ancient Indian play was said to have treated an episode from the history of that deity — the choice of him as a consort by Laxmi — a favourite kind of subject in the Indian drama. The tradition connecting its earliest themes with the native mythology of Vishnu agrees with that ascribing the origin of a particular kind of dramatic performance — the sanglta — to Krishna and the shepherdesses. The author's later poem, the Gitagovinda, has been conjectured to be suggestive of the earliest species of Hindu dramas. But, while the epic poetry of the Hindus gradually approached the dramatic in the way of dialogue, their drama developed itself independently out of the union of the lyric and the epic forms. Their dramatic poetry arose later than their epos, whose great works, the Mahabharata and the

Ramayana, had themselves been long preceded by the hymnody of the Vedas — just as the Greek drama followed upon the Homeric poems and these had been preceded by the early hymns.

There seems, indeed, no reason for dating the beginnings of the regular Indian drama farther back than the 5th century a.d., though it is probable that the earliest extant Sanskrit play, the delightful, and in some respects incomparable, Mrichchhakatlka

INDIAN]

DRAMA

48 1,

(The Toy Cart), was considerably earlier in date than the works of Kalidasa. Indeed, of his predecessors in dramatic composition very little is known, and even the contemporaries who com- peted with him as dramatists are mere names. Thus, by the time the Indian drama produced almost the earliest specimens with which we are acquainted, it had already reached its zenith; and it was therefore looked upon as having sprung into being as a perfect art. We know it only in its glory, in its decline, and in its decay.

The history of Indian dramatic literature may be roughly divided into the following periods.

I. To the nth Century a.d. — This period virtually belongs to the pre-Mahommedan age of Indian history; but already to that second division of it in which Buddhism had become plt V . a powerful factor in the social as well as in the moral (.classical). an d intellectual life of the land. It is the classical period of the Hindu drama, and includes the works of its two indisputably greatest masters. The earliest extant Sanskrit play is the pathetic Mrichchhakatlkd (The Toy Cart), which has been dated back as far as the close of the 2nd century a.d. It is attributed (as is not uncommon with Indian plays) to a royal author, named Sudraka; but it was more probably written by his court poet, whose name has been concluded to have been Dandin. It may be described as a comedy of middle-class life, treating of the courtship and marriage of a ruined Brahman and a wealthy and large-hearted courtesan.

Kalidasa, the brightest of the " nine gems " of genius in whom the Indian drama gloried, lived at the court of Ujjain, though whether in the earlier half of the 6th century a.d., or in the 3rd century, or at a yet earlier date, remains an unsettled question. He is the author of

Sakuntala — the work which, in the translation by Sir William Jones (1789), first revealed to the Western world of letters the existence of an Indian drama, since repro- duced in innumerable versions in many tongues. This heroic comedy, in seven acts, takes its plot from the first book of the Mahdbhdrata. It is a dramatic love-idyll of surpassing beauty, and one of the masterpieces of the poetic literature of the world. Another drama by Kalidasa, Vikrama and Urvdsi (The Hero and the Nymph), though unequal as a whole to Sakuntala, contains one act of incomparable loveliness; and its enduring effect upon Indian dramatic literature is shown by the imitations of it in later plays. (It was translated into English in 1827 by H. H. Wilson.) To Kalidasa has likewise been attributed a third play, Malavika and Agnimitra; but it is possible that this con- ventional comedy, though held to be of ancient date, was com- posed by a different poet of the same name.

To Harsadeva, king of northern India, are ascribed three extant plays, which were more probably composed by some poet in his pay. One of these, Nagananda (Joy of the Serpents), which begins as an erotic play, but passes into a most impressive exemplification of the supreme virtue of self-sacrifice, is notable as the only Buddhist drama which has been preserved, though others are known to have existed and to have been represented.

The palm of pre-eminence is disputed with Kalidasa by the great dramatic poet Babhavtiti (called Crikantha, or he in whose throat is fortune), who flourished in the earlier part of the 8th century. While he is considered more artificial in language than his rival, and in general more bound by rules, he can hardly be deemed his inferior in dramatic genius. Of his three extant plays, Mahdvdra-Charitra and Uttara-Rdma-Charitra are heroic dramas concerned with the adventures of Rama (the seventh incarnation of Vishnu); the third, the powerful melodrama, in ten acts, of Mdlati and Mddhava, has love for its theme, and has been called (perhaps with more aptitude than usually belongs to such comparisons) the Romeo and Juliet of the Hindus. It is considered by their critical authorities the best example of the prakarana, or drama of domestic life. Babhavuti's plays, as is indicated by the fact that no jester appears in them, are devoid of the element of humour.

The plays of Rajasekhara. who lived about the end of the 9th century, deal, like those of Harsadeva, with harem and court life. One of them, Karpura Manjuri (Camphor Cluster), rtn — 16

is stated to be the only example of the sallaka or minor heroic

comedy, written entirely in Prakrit.

In this period may probably also be included Visakhadatta's interesting drama of political intrigue, Mudra-Rakshasa (The Signet of the Minister), in which Chandragupta (Sandracottus) appears as the founder of a dynasty. In subject, therefore, this production, which is one of the few known Indian historical dramas, goes back to the period following on the invasion of India by Alexander the Great ; but the date of composition is probably at least as late as a.d. iooo. The plot of the play turns on the gaining-over of the prime minister of the ancien rigime.

Among the remaining chief works of this period is the Veni- Samhara (Binding of the Braid) by Narayana Bhatta. Though described as a play in which both pathos and horror are ex- aggerated — its subject is an outrage resembling that which Dunstan is said to have inflicted on Elgiva — it is stated to have been always a favourite, as written in exact accordance with dramatic rules. Perhaps the Candakaniika by Ksemlsvara should also be included, which deals with the working of a curse pro- nounced by an aged priest upon a king who had innocently offended him.

II. The Period of Decline. — This may be reckoned from about the nth to about the 14th century of the Christian era, the beginning roughly coinciding with that of a continuous

series of Mahommedan invasions of India. Hanuman- Sec 2 n ˆ Naiaka, or " the great Nataka " (for this irregular faecline). play,, the work of several hands, surpasses all other Indian dramas in length, extending over no fewer than fourteen acts), dates from the 10th or nth century. Its story is taken from the Rama-cycle, and a prominent character in it is the mythical monkey-chief King Hanuman, to whom, indeed, tradition ascribed the original authorship of the play. Kfishfia- micra's " theosophic mystery," as it has been called, — though it rather resembles some of the moralities, — Prabodha-Chandrodaya (The Rise of the Moon of Insight, i.e. the victory of true doctrine over error), is ascribed by one authority to the middle of the nth century, by another to about the end of the 12th. The famous Ratnavali (The Necklace), a court-comedy of love and intrigue, with a half-Terentian plot, seems also to date from the earlier half of the period.

The remaining plays of which it has been possible to conjecture the dates range in the time of their composition from the end of the nth to the 14th century. Of this period, as compared with the first, the

general characteristics seem to be an undue preponderance of narrative and description, and an affected and over-elaborated style. As a striking instance of this class is mentioned a play on the adventures of Rama, the Anargha-Rdghava, which in spite, or by reason, of the commonplace character of its sentiments, the extravagance of its diction, and the obscurity of its mythology, is stated to enjoy a higher reputation with the pundits of the present age than the masterpieces of Kalidasa and Babhavuti. To the close of this period, the 14th century, has likewise (but without any pretension to certainty) been ascribed the only Tamil drama of which we possess an English version. Arichandra (The Martyr of Truth) exemplifies — with a strange likeness in the contrivance of its plot to the Book of Job and Faust — by the trials of a heroically enduring king the force of the maxim " Better die than lie."

III. Period of Decay. — Isolated plays remain from centuries later than the 14th; but these, which chiefly turn on the legends of Krishna (the last incarnation of Vishnu), may be regarded as a mere aftergrowth, and exhibit the Indian T ˆ , a drama in its decay. Indeed, the latest of them, (decay). Chitra- Yajna, which was composed about the beginning

of the 19th century, and still serves as a model for Bengali dramatic performances, is imperfect in its dialogue, which (after the fashion of Italian improvised comedy) it is left to the actors to supplement. Besides these there are farces or farcical entertain- ments, more or less indelicate, of uncertain dates.

The number of plays which have descended to us from so vast an expanse of time is still comparatively small. But though, in 1827, Wilson doubted whether all the plays to be found, and

ti

those mentioned by Hindu writers on the drama, amounted to many more than sixty, M. Schuyler's bibliography (1906) enumerates over five hundred Sanskrit plays. To these have to be added the plays in Tamil, stated to be about a hundred in number, and to have been composed by poets who enjoyed the patronage of the Pandian kings of Madura, and some in other vernaculars.

There certainly is among the Hindus no dearth of dramatic theory. The sage Bharata, the reputed inventor of dramatic entertainments, was likewise revered as the father of literature, dramatic criticism — a combination of functions to which the latter days of the English theatre might perhaps furnish an occasional parallel. The commentators (possibly under the influence of inspiration rather than as a strict matter of memory) constantly cite his sutras, or aphorisms. (From sutra, thread, was named the sUtra-dkara, thread-holder, carpenter, a term applied to the architect and general manager of sacrificial solemnities, then to the director of theatrical perform- ances.) By the nth century, when the drama was already approaching its decline, dramatic criticism had reached an advanced point; and the Dasa-Rupaka (of which the text belongs to that age) distinctly defines the ten several kinds of dramatic composition. Other critical works followed at later dates, exhibiting a rage for subdivision unsurpassed by the efforts of Western theorists, ancient or modern; the misfortune is that there should not be examples remaining (if they ever existed) to illustrate all the branches of so elaborate a dramatic system.

" What," inquires the manager of an actor in the induction to one of the most famous of Indian plays, " are those qualities Exclusive- WQ i cn tne virtuous, the wise, the venerable, the learned aess ottbe and the Brahmans require in a drama? " " Profound Indian exposition of the various passions," is the reply, drama. « pi eas j n g interchange of mutual affection, loftiness of character, delicate expression of desire, a surprising story and elegant language." " Then," says the manager (for the Indian dramatists, though not, like Ben Jonson, wont to " rail " the public " into approbation," are unaffected by mauvaise honte), " I recollect one." And he proceeds to state that " Babhavuti has given us a drama composed by him, replete with all qualities, to which indeed this sentence is applicable : ' How little do they know who speak of us with censure! This entertainment is not for them. Possibly some one exists, or will exist, of similar tastes with myself; for time is boundless, and the world is wide ! '■" This disregard of popularity, springing from a consciousness of lofty aims, accounts for much that is characteristic of the higher class of Indian plays. It explains both their relative paucity and their extraordinary length, renders intelligible the chief peculiarity in their diction, and furnishes the key to their most striking ethical as well as literary qualities. Connected in their origin with religious worship, they were only performed on solemn occasions, chiefly of a public nature, and more especially at seasons sacred to some divinity. Thus, though they might in some instances be reproduced, they were always written

with a view to one particular solemn representation. Again, the greater part of every one of the plays of Northern India is written in Sanskrit, which ceased to be a popular language by 300 B.C., but continued the classical and learned, and at the same time the sacred and court form of speech of the Brahmans. Sanskrit is spoken by the heroes and principal personages of the plays, while the female and inferior characters use varieties, more or less refined, of the Prakrit languages (as a rule not more than three, that which is employed in the songs of the women being the poetic dialect of the most common Prakrit language, the SaurasenI). Hence, part at least of each play cannot have been understood by the large majority of the audience, except in so far as their general acquaintance with the legends or stories treated enabled them to follow the course of the action. Every audience thus contained an inner audience, which could alone feel the full effect of the drama. It is; then, easy to see why the Hindu critics should make demands upon the art, into which only highly-trained and refined intellects were capable of entering, or called upon to enter. The general public could not be expected

to appreciate the sentiments expressed in a drama, and thus (according to the process prescribed by Hindu theory) to receive instruction by means of amusement. These sentiments are termed rasas (tastes or flavours), arid said to spring from the bhavas (conditions of mind and body) . A variety of subdivisions is added; but the santa rasa is logically enough excluded from dramatic composition, inasmuch as it implies absolute quiescence.

The Hindu critics know of no distinction directly corresponding to that between tragedy and comedy, still less of any determined by the nature of the close of a play. For, in accordance with the child-like element of their character, the XwoIs° Hindus dislike an unhappy ending to any story, and a positive rule accordingly prohibits a fatal conclusion in their dramas. The general term for all dramatic compositions is rUpaka (from rupa, form), those of an inferior class being distin- guished as uparupakas. Of the various subdivisions of the rupaka, in a more limited sense, the nataka, or play proper, represents the most perfect kind. Its subject should always be celebrated and important— it is virtually either heroism or love, and most frequently the latter — and the hero should be a demigod or divinity (such as Rama in Babhavuti's heroic plays) or a king (such as the hero of Sakunlala). But although the earlier dramatists took their plots from the sacred writings or Puranas, they held themselves at liberty to vary the incidents — a licence from which the later poets abstained. Thus, in accordance, perhaps, with the respective developments in the religious life of the two peoples, the Hindu

drama in this respect reversed the progressive practice of the Greek. The prakaranas agree in all essentials with the natdkas except that they are less elevated; their stories are mere fictions, taken from actual life in a respect- > able class of society. 1 Among the species of the uparilpaha may be mentioned the troiaka, in which the personages are partly human, partly divine, and of which a famous example remains. 2 Of the bhana, a monologue in one act, one literary example is extant— a curious picture of manners in which the speaker describes the different persons he meets at a spring festival in the streets of Kolahalapur. 3 The satire of the farcical prahasanas is usually directed against the hypocrisy of ascetics and Brahmans, and the sensuality of the wealthy and powerful. These trifles represent the lower extreme of the dramatic scale, to which, of course, the principles that follow only partially apply.

Unity of action is strictly enjoined by Hindu theory, though not invariably observed in practice. Episodical or prolix interruptions are forbidden; but, in order to facilitate the connexion, the story of the play is sometimes •'unities." carried on by narratives spoken by actors or " inter- preters," something after the fashion of the Chorus in Henry V., or of Gower in Pericles. " Unity of time " is liberally, if rather arbitrarily, understood by the later critical authorities as limiting the duration of the action to a single year; but even this is exceeded in more than one classical play. 4 The single acts are to confine the events occurring in them to "one course of the sun," and usually do so. " Unity of place " is unknown to the Hindu drama, by reason of the absence of scenery; for the plays were performed in the open courts of palaces, perhaps at times in large halls set apart for public entertainments, or in the open air. Hence change of scene is usually indicated in the texts ; and we find 6 the characters making long journeys on the stage, under the eyes of spectators not trained to demand " real " mileage.

With the solemn character of the higher kind of dramatic performances accord the rules and prohibitions defining what may be called the proprieties of the Indian drama. It has been already seen that all plays must have a happy ending. Furthermore, not only should death never be inflicted coram populo, but the various operations of biting, scratching, kissing, eating, sleeping, the bath, and the marriage ceremony should never take place on the stage. Yet such rules are made to be occasionally broken. It is true that the mild humour of the vidushaka is restricted to his " gesticulating

1 e.g. Mrichchhakatikd ; Malatt ajtd Madhava.

2 Vikrama and Urvast. 3 Safada-Tilaka.

- *Sdkimtala; Uttara-Rama-Charitra. 6 Arichandra, act iv.*

Pro- prieties.

INDIAN]

DRAMA

483

Construc- tion.

eating " instead of perpetrating the obnoxious act. 1 The charm- ing love-scene in the Sakuntala (at least in the earlier recension pf the play) breaks off just as the hero is about to act the part of the bee to the honey of the heroine's lips. 2 But later writers are less squeamish, or less refined. In two dramas 3 the heroine is dragged on the stage by her braid of hair; and this outrage is in both instances the motive of the action. In a third, 4 sleeping and the marriage ceremony occur in the course of the represen- tation.

The dramatic construction of the Indian plays presents no very striking peculiarities. They open with a benediction (nandi), spoken by the manager (supposed to be a highly accomplished person), and followed by " some account " of the author, and an introductory scene between the manager and one of the actors, which is more or less skilfully connected by the introduction of one of the characters with the epening of the play itself. This is divided into acts (ankas) and scenes; of the former a ndtaka should have not fewer than 5, or more than 10; 7 appears a common number; " the great ndtaka " reaches 14. Thus the length of the higher class of Indian plays is considerable — about that of an Aeschylean trilogy; but not more than a single play was ever performed on the same occasion. Comic plays are restricted to two acts (here called sandhis). In theory the scheme of an Indian drama corresponds very closely to the general outline of dramatic construction given above; it is a characteristic merit that the business is rarely concluded before the last act. The &e fl es aad piece closes, as it began, with a benediction or prayer. Within this framework room is found for situations as ingeniously devised and highly wrought as those in any modern Western play. What could be more pitiful than the scene in Sakuntala, where the true wife appears before her husband, whose remembrance of her is fatally overclouded by a charm; what more terrific than that in Mdlali and Mddhava, where the lover rescues his beloved from the

horrors of the charnel field? Recognition — especially between parents and children — fre- quently gives rise to scenes of a pathos which Euripides has not surpassed. 5 The ingenious device of a " play within the play " (so familiar to the English drama) is employed with the utmost success by Babhavuti. 6 On the other hand, miraculous meta- morphosis 7 and, in a later play, 8 vulgar magic lend their aid to the progress of the action. With scenes of strong effectiveness contrast others of the most delicate poetic grace — such as the indescribably lovely little episode of the two damsels of the god of love helping one another to pluck the red and green bud from the mango tree; or of gentle domestic pathos — such as that of the courtesan listening to the prattle of her lover's child, one of the prettiest scenes of a kind rarely kept free from affectation in the modern drama. For the denouement in the narrower sense of the term the Indian dramatists largely resort to the expedient of the deus ex machina, often in a sufficiently literal sense. 9

Every species of drama having its appropriate kind of hero or heroine, theory here again amuses itself with an infinitude of subdivisions. Among the heroines, of whom not less than three hundred and eighty-four types are said to be distinguished, are to be noticed the courtesans, whose social position to some extent resembles that of the Greek hetaerae, and association with whom does not seem in practice, however it may be in theory, to be regarded as a disgrace even to Brahmans. 10 In general, the Indian drama indicates relations between the sexes subject to peculiar restraints of usage, but freer than those which Mahommedan example seems to have introduced into higher Indian society. The male characters are frequently drawn with skill, and sometimes with genuine force. Prince Samsthanaka u is a type of selfishness born in the purple worthy to rank beside figures of the modern drama, of which 1 Nagdnanda, act i. 2 Act iii. ; cf . Nagdnanda, act iii.

8 Veni-Samhara; Prachanda-Paftddva. 4 Viddha-Salabhanjika.

- *Sakuntala; Vtlara-Rama-Charitra. '■lb. act vii.*

' Vikrama and Urvasl, act iv.. • 8 RalndvaM.

9 Vikrama and Urvdsl: Arichandr a; Nagdnanda.

10 MrichchhakaMkd. " MfichchhakaRkd.

Characters.

Diction.

Actors.

this has at times naturally been a favourite class of character, elsewhere, 12 the intrigues of ministers are not more fully exposed than their characters and principles of action are judiciously discriminated. Among the lesser personages common in the Indian drama, two are worth noticing, as corresponding, though by no means precisely, to familiar types of other dramatic literatures. These are the vita, the accomplished but dependent companion (both of men and women), and the vidilshaka, the humble associate (not servant) of the prince, and the buffoon of the action. 13 Strangely enough, he is always a Brahman, or the pupil of a Brahman — perhaps a survival from a purely popular phase of the drama. His humour is to be ever intent on the pleasures of a quiet life, and on that of eating in particular; his jokes are generally devoid of both harm and point.

Thus, clothing itself in a diction always ornate and tropical, in which (as Riickert has happily expressed it) the prose is the warp and the verse the weft, where (as Goethe says) words become allusions, allusions similes, and similes metaphors, the Indian drama essentially depended upon its literary qualities, and upon the familiar sanctity of its favourite themes for such effects as it was able to produce. Of scenic apparatus it knew but little. The plays were usually performed in the hall of a palace; the simple devices by which exits and entrances were facilitated it is unnecessary to describe, and on the contrivances employed for securing such Sce " ef y " properties " as were required (above all, the cars of cos t ua >e. the gods and of their emissaries), 14 it is useless to speculate. Propriety of costume, on the other hand, seems always to have been observed, agreeably both to the peculiarities of the Indian drama and to the habits of the Indian people.

The ministers of an art practised under such conditions could not but be regarded with respect, and spared the contempt or worse, which, except among one other great civilized people, the Greeks, has everywhere, at one period or another, been the actor's lot. Companies of actors seem to have been common in India at an early date, and the inductions show the players to have been regarded as respectable members of society. In later, if not in earlier, times individual actors enjoyed a widespread reputation — " all the world " is acquainted with the talents of Kalaha-Kandala. 18 The managers or directors, as already stated, were usually gifted and highly-cultured Brahmans. Female parts were in general, though not invariably, represented by females. One would like to know whether

such was the case in a piece 16 where— after the fashion of more than one Western play — a crafty minister passes off his daughter as a boy, on which assumption she is all but married to a person ol her own sex.

The Indian drama would, if only for purposes of comparison, be invaluable to the student of this branch of literature. But from the point of view of purely literary excellence it holds its own against all except the very foremost dramas of the world. It is, indeed, a mere phrase to call Kalidasa the Indian Shakespeare — a title which, moreover, if intended as anything more than a synonym for poetic pre-eminence, might fairly be disputed in favour of Babhavuti; while it would be absolutely misleading to place a dramatic literature, which, like the Indian, is the mere quintessence of the culture of a caste, by the side of one which represents the fullest development of the artistic consciousness of such a people as the Hellenes. The Indian drama cannot be described as national in the broadest and highest sense of the word; it is, in short, the drama of a literary class, though as such it exhibits many of the noblest and most refined, as well as of the most characteristic, features of Hindu religion and civilization. The ethics of the Indian drama are of a lofty character, but they are those of a scholastic system of religious philosophy, self-conscious of its completeness. To the power of Fate is occasionally ascribed a supremacy, to which gods as well as mortals must bow; 17 but, if man's present life is merely a

12 Mudrd-Rakshasa. u Sakuntala; Nagdnanda.

14 Sakuntala, acts vi. and vii ; MalaH and Mddhava, act v. 16 Induction to Anargha-Rdghava. 18 Viddha-Salabhanjika. a Vikrama and Vrvdsi.

Summary.

phase in the cycle of his destinies, the highest of moral efforts at the same time points to the summit of possibilities, and self- sacrifice is the supreme condition both of individual perfection and of the progress of the world. Such conceptions as these, seem at once to enfold and to overshadow the moral life of the Indian drama. The affections and passions forming part of self it delineates with a

fidelity to nature which no art can afford to neglect; on the other hand, the freedom of the picture is re- stricted by conditions which to us are unfamiliar and at times seem intolerable, but which it was impossible for the Indian poet's imagination to ignore. The sheer self-absorption of ambition or love appears inconceivable by the minds of any of these poets; and their social philosophy is always based on the system of caste. On the other hand, they are masters of many of the truest forms of pathos, above all of that which blends with resignation. In humour of a delicate kind they are by no means deficient; to its lower forms they are generally strangers, even in productions of a professedly comic intention. Of wit, Indian dramatic literature — though a play on words is as the breath of its nostrils — furnishes hardly any examples intelligible to Western minds.

The distinctive excellence of the Indian drama is to be sought

in the poetic robe which envelops it as flowers overspread the

bosom of the earth in the season of spring. In its

Poe ry of no tji er productions, at least, it is never untrue to its the Indian f . , . , , , . . . , ,

drama. half religious, half rural origin; it weaves the wreaths

of idyllic fancies in an unbroken chain, adding to its favourite and familiar blossoms ever fresh beauties from an inexhaustible garden. Nor is it unequal to depicting the grander aspects of nature in her mighty forests and on the shores of the ocean. A close familiarity with its native literature can here alone follow its diction through a ceaseless flow of phrase and figure, listen with understanding to the hum of the bee as it hangs over the lotus, and contemplate with Sakuntala's pious sympathy the creeper as it winds round the mango tree. But the poetic beauty of the Indian drama reveals itself in the mysterious charm of its outline, if not in its full glow, even to the untrained; nor should the study of it — for which the materials seem con- tinually on the increase — be left aside by any lover of literature.

3. Chinese Drama

Like the Indian drama, the Chinese arose from the union of the arts of dance and song. To the ballets and pantomimes out of which it developed itself, and which have continued to flourish by the side of its more advanced forms, the Chinese ascribe a primitive antiquity of

origin; many of them originally had a symbolical reference to such subjects as the harvest, and war and peace. A very ancient pantomime is said to have symbolized the •conquest of China by Wu-Wang; others were of a humbler, and often of a very obscure, character. To their music the Chinese likewise attribute a great antiquity of origin.

There are traditions which carry back the characters of the Chinese drama to the 18th century before the Christian era. Others declare the Emperor Wan-Te (fl. about a.d. 580) to have invented the drama; but this honour is more usually given to the emperor Yuen-Tsung (a.d. 720), who is likewise remembered as a radical musical reformer. Pantomimes henceforth fell into disrepute; and the history of the Chinese drama from this date is divided, with an accuracy we cannot profess to control, into four distinct periods. Each of these periods, we are told, has a style, and each style a name of its own; but these names, such as " Diversions of the Woods in Flower," have little or no meaning for us; and it would therefore be useless to cite them.

The first period is that of the dramas composed under the T'ang dynasty, from a.d. 720 to 907. These pieces, called Tchhouen-Khi, were limited to the representation of extra- ordinary events, and were therefore, in design at least, a species of heroic drama. The ensuing times of civil war interrupted the " pleasures of peace and prosperity " (a Chinese phrase for dramatic performances) — which, however, revived.

The second period is that of the Tsung Dynasty, from 960 to

1 1 19. The plays of this period are called Hi-Khio, and presented what became a standing peculiarity of the Chinese classical drama, viz. that in them figures a principal personage »»■ ■who sings.*

The third and best-known age of the Chinese drama was under the Kin and Yuen dynasties, from 1125 to 1367. The plays of this period are called Yuen-Pen and Tsa-Ki; the latter seem to have resembled the Hi-Khio, and to have treated very various subjects. The Yuen-Pen are the plays from which our literary knowledge of the Chinese drama is mainly derived; the short pieces called Yen-Kia were in the same style, but briefer. The list of dramatic authors under the Yuen dynasty, the most important period in Chinese literary annals, which covered the years 1260 to 1368, is tolerably extensive, comprising 85, among whom four are designated as courtesans; the number of plays composed by these and by anonymous authors is reckoned at

not less than 564. In 1735 the Jesuit missionary Joseph Henry Premare first revealed to Europe the existence of the tragedy Tchao-Chi-Cu-Eul (The Little Orphan of the House of Tchao), which was founded upon an earlier piece treating of the fortunes of an heir to the imperial throne, who was preserved in a mysterious box like another Cypselus or Moses. Vol taire seized the theme of the earlier play for a rhetorical tragedy, L'Orphelin de la Chine, in which he coolly professes it was his intention " to paint the manners of the Chinese and the Tartars." The later play, which is something less elevated in the rank of its characters, and very decidedly less refined in treatment, was afterwards retranslated by Stanislas Julien; and to the labours of this scholar, of Sir J. F. Davis (1795-1890) and of Antoine Bazin (1799-1863), we owe a series of translated Chinese dramas, among which there can be no hesitation whatever in designating the master-piece.

*The justly famous Pi-Pa-Ki (The Story of the Lute) belongs to a period rather later than that of the Yuen plays, having been composed towards the close of the 14th century by Kao-Tong-Kia, and reproduced in 1 404, under the Ming pl ' Pa ' KI – dynasty, with the alterations of Mao-Tseu, a commentator of learning and taste. Pi-Pa-Ki, which as a domestic drama of sentiment possesses very high merit, long enjoyed a quite exceptional popularity in China; it was repeatedly republished with laudatory prefaces, and so late as the 18th century was regarded as a monument of morality, and as the master-piece of the Chinese theatre. It would seem to have remained without any worthy competitors; for, although it had been originally designed to produce a reaction against the immorality of the drama then in fashion, especially of Wang-Chi-Fou's celebrated Si-Siang-Ki (The Story of the Western Pavilion), yet the fourth period of the Chinese drama, under the Ming dynasty, from 1368 to 1644, exhibited no improvement. " What " (says the preface to the 1704 edition of Pi-Pa-Ki) " " do you find there ? Farcical dialogue, a mass of *" eC " y ' scenes in which one fancies one hears the hubbub of the streets or the ignoble language of the highways, the extravagances of ■ demons and spirits, in addition to love-intrigues repugnant to delicacy of manners." Nor would it appear that the Chinese theatre has ever recovered from its decay.*

In theory, no drama could be more consistently elevated in purpose and in tone than the Chinese. Every play, we learn, should have both a moral and a meaning. A virtuous aim is imposed upon Chinese dramatists by an article ™i S alms' of the penal code of the empire; and those who write immoral plays are to expect after death a purgatory which will last so long as these plays continue to be

performed. In practice, however, the Chinese drama falls far short of its ideal; indeed, according to the native critic already cited, among ten thousand playwrights not one is to be found intent upon perfecting the education of mankind by means of precepts and examples.

The Chinese are, like the Hindus, unacquainted with the dis- tinction between tragedy and comedy; they classify their plays according to subjects in twelve categories. It may be doubted whether what seems the highest of these is 4°”%™ actually such; for the religious element in the Chinese drama is often sheer buffoonery. Moreover, Chinese religious*

Historical.

life, as reflected in the drama, seems one in which creed elbows creed, and superstitions are welcome whatever their origin. Of all religious traditions and doctrines, however, those of Buddhism (which had reached China long before the known beginnings of its drama) are the most prominent; thus, the theme of absolute self-sacrifice is treated in one play, 1 that of entire absorption in the religious life in another. 2 The historical drama is not unknown to the Chinese; and although a law prohibits the bringing on the stage of ” emperors, empresses, and the famous princes, ministers, and generals of former ages,” no such restriction is observed in practice. In Han-Kong-Tseu {The Sorrows of Han), for instance, which treats a national historic legend strangely recalling in parts the story of Esther and the myth of the daughter of Erechtheus, the emperor Yuen-Ti (the representative, to be sure, of omes c a {allen dynasty) pi a y S a par t ; and a sufficiently sorry one. By far the greater number, however, of the Chinese plays accessible in translations belong to the domestic species, and to that subspecies which may be called the criminal drama. Their favourite virtue is piety, of a formal 3 or a practical 4 kind to parents or parents-in-law; their favourite interest lies in the discovery of long-hidden guilt, and in the vindication of per- secuted innocence. 5 In the choice and elaboration of such subjects they leave little to be desired by the most ardent devotees of the literature of agony. Besides this description of plays, we have at least one love-comedy pure and simple — a piece

of a nature not " tolerably mild," but ineffably harmless. 6 Free in its choice of themes, the Chinese drama is likewise remarkably unrestricted in its range of characters. Chinese society, it is well known, is not based, like Indian, characters. u P on the principle of caste; rank is in China deter- mined by office, and this again depends on the results of examination. These familiar facts are constantly brought home to the reader of Chinese plays. The Tchoang-Yuen, or senior classman on the list of licentiates, is the flower of Chinese society, and the hero of many a drama; 7 and it is a proud boast that for years " one's ancestors have held high posts, which they owed to their literary successes." 8 On the other hand, a person who has failed in his military examination, becomes, as if by a natural transition, a man-eating monster. 9 But of mere class the Chinese drama is no respecter, painting with noteworthy freedom the virtues and the vices of nearly every phase of society. The same liberty is taken with regard to the female sex; it is clear that in earlier times there were few vexatious restrictions in Chinese life upon the social intercourse between men and women. The variety of female characters in the Chinese drama is great, ranging from the heroine who sacrifices herself for the sake of an empire 10 to the well-brought-up young lady who avers that " woman came into the world to be obedient, to unravel skeins of silk, and to work with her needle " " — from the chamber- maid who contrives the most gently sentimental of rendezvous, 12 to the reckless courtesan who, like another Millwood, upbraids the partner of her guilt on his suing for mercy, and bids him die with her in hopes of a reunion after death. 13 In marriage the first or legitimate wife is distinguished from the second, who is at times a ci-devant courtesan, and towards whom the feelings of the former vary between bitter jealousy " and sisterly kindness. 15 The conduct of the plays exhibits much ingenuity, and an aversion from restrictions of time and place; in fact, the nature of the plot constantly covers a long series of years, and spans wide intervals of local distance. The plays are divided into acts and scenes — the former being usually four in number, at times

1 The Self-Sacrifice of Tchao-Li.

2 Lai-Seng-Tchai (The Debt to be Paid in the Next World).

3 Lao-Seng-Eul. l Pi-Pa-Ki.

6 The Circle of Chalk (Hoei-Lan-Ki) ; The Tunic Matched ; The Revenge of Teou-Ngo.

6 Tchao-Mei-Hiang {The Intrigues of a Chambermaid).

7 Tchao-Mei-Hiang; Ho-Han-Chan; Pi-Pa-Ki.

8 Hoei-Lan-Ki, Prol. sc. i. 9 Tchao-Li.

w Han-Kong-Tseu. . " Pi-Pa-Ki, sc. 2.

12 Tchao-Mel-Hiang.

13 He-Lang-Tan, act iv. ; cf. Hoei-Lan-Ki, act iv.

14 Hoei-Lan-Ki. " Pi-Pa-Ki.

with an induction or narrative prologue spoken by some of the characters (Sie-Tsen). Favourite plays were, however, allowed to extend to great length; the Pi-Pa-Ki is divided construe- into 24 sections, and in another recension apparently Uon and comprised 42. "I do not wish," says the manager conduct of in the prologue, "that this performance should last po ' too long; finish it to-day, but cut out nothing " — whence it appears that the performance of some plays occupied more than a single day. The rule was always observed that a separate act should be given up to the dSnouement; while, according to a theory of which it is not always easy to trace the operation, the perfection of construction was sought in the dualism or contrast of scene and scene, just as the perfection of diction was placed in the parallelism or antithesis of phrase and phrase. Being subject to no restrictions as to what might, or might not, be represented on the stage, the conduct of the plots allowed of the introduction of almost every variety of incidents. Death takes place, in sight of the audience, by starvation, 16 by drowning, 17 by poison, 18 by execution; 19 flogging and torture are inflicted on the stage; 20 wonders are wrought; 21 and magic is brought into play; 22 the ghost of an innocently-executed daughter calls upon her father to revenge her foul murder, and assists in person at the tubsequent judicial enquiry. 23 Certain peculiarities in the conduct of the business are due to the usages of society rather than to dramaturgic laws. Marriages are generally managed — at least in the higher spheres of society — by ladies professionally employed as matrimonial agents. 24 The happy resolution of the nddus of the action is usually brought about by the direct inter- position of superior official authority 26 — a tribute to the paternal aystem of government, which is the characteristic Chinese variety of the deus ex machina. This naturally tends to the favourite close of a glorification of the emperor, 26 resembling that of Louis XIV. at the end of Tartufe, or in spirit, at all events, those of the virgin queen in more than one Elizabethan play. It should be added that the

characters save the necessity for a bill of the play by persistently announcing and re-announcing their names and genealogies, and the necessity for a book by frequently recapitulating the previous course of the plot.

One peculiarity of the Chinese drama remains to be noticed. The chief character of a play represents the author as well as the personage; he or she is hero or heroine and chorus in xheprin- one. This is brought about by the hero's (or heroine's) clpalper- singing the poetical passages, or those containing sonage maxims of wisdom and morality, or reminiscences and w os 'W 8- examples drawn from legend or history. Arising out of the • dialogue, these passages at the same time diversify it, and give to it such elevation and brilliancy as it can boast. The singing character must be the principal personage in the action, but may be taken from any class of society. If this personage dies in the course of the play, another sings in his place. From the mention of this distinctive feature of the Chinese drama it will be obvious how unfair it would be to judge of diction. any of its productions, without a due appreciation of the lyric passages, which do not appear to be altogether restricted to the singing of the principal personage, for other characters frequently " recite verses." In these lyrical or didactic passages are to be sought those flowers of diction which, as Julien has shown, consist partly in the use of a metaphorical phraseology of infinite nicety in its variations — such as a long series of phrases compounded with the word signifying jet and expressing severally the ideas of rarity, distinction, beauty, &c, or as others derived from the names of colours, birds, beasts, precious metals, ele- ments, constellations, &c, or alluding to favourite legends or anecdotes. These features constitute the literary element par excellence of Chinese dramatic composition. At the same time, though it is impossible for the untrained reader to be alive to

16 Pi-Pa-Ki, sc. 15. _

18 Hoei-Lan-Ki, act i.

20 Hoei-Lan-Ki, act ii.

22 Pi-Pa-Ki, sc. 18.

24 Tchao-Mei-Hiang; Pi-Pa-Ki.

26 Ho-Han-Chan.

17 Ho-Han-Chan, act ii. 15 Teou-N 'go-Yuen, act iii. 21 Teou-Ngo-Yuen, act iii. 23 Teou-Ngo- Yuen, act. iv. 26 Hoei-Lan-Ki.

the charms of so unfamiliar a phraseology, it may be questioned whether even in its diction the Chinese drama can claim to be regarded as really poetic. It may abound in poetic ornament; it is not, like the Indian, bathed in poetry.

On the other hand, the merits of this dramatic literature are by no means restricted to ingenuity of construction and variety Merits of °f character — merits, in themselves important, which the no candid criticism will deny to it. Its master-piece

Chinese j s no i on]y truly pathetic in the conception and the rama. mam situations of its action, but includes scenes of singular grace and delicacy of treatment — such as that where the remarried husband of the deserted heroine in vain essays in the presence of his second wife to sing to his new lute, now that he has cast aside the old. 1 In the last act of a tragedy appealing at once to patriotism and to pity, there is true imagina- tive power in the picture of the emperor, when aware of the departure, but not of the death, of bis beloved, sitting in solitude broken only by the ominous shriek of the wild-fowl. 2 Nor is the Chinese drama devoid of humour. The lively abigail who has to persuade her mistress into confessing herself in love by arguing (almost like Beatrice) that "humanity bids us love men"; 3 the corrupt judge (a common type in the Chinese plays) who falls on his knees before the prosecuting parties to a suit as before " the father and mother who give him sustenance," 4 may serve as examples; and in Pi-Pa-Ki there is a scene of admirable burlesque on the still more characteristic theme of the humours of a competitive examination. 6 If such illustrations could not easily be multiplied, they are at least worth citing in order to deprecate a perfunctory criticism on the qualities of a dramatic literature as to which our materials for judgment are still scanty.

While in the north of China houses are temporarily set apart for dramatic performances, in the south these are usually con-

fined to theatres erected in the streets (Hiˆ Tha'i). aa

costumes, on the other hand, are described as magnifi- cent; they are traditionally those worn before the 17th century, in accordance with the historical colouring of most of the plays. Actors. The actor's

profession is not a respectable one in China,

the managers being in the habit of buying children of slaves and bringing them up as slaves of their own. Women may not appear on the stage, since the emperor K'ien-Lung admitted an actress among his concubines; female parts are therefore played by lads, occasionally by eunuchs.

4. Japanese Drama

The Japanese drama, as all evidence seems to agree in showing, still remains what in substance it has always been — an amuse- ment passionately loved by the lower orders, but hardly dignified by literature deserving the name. Apart from its native elements of music, dance and song, and legendary or historical narrative and pantomime, it is clearly to be regarded as a Chinese im- portation; nor has it in its more advanced forms apparently even attempted to emancipate itself from the reproduction of the conventional Chinese types. As early as the close of the 6th century Hada Kawatsu, a man of Chinese extraction, but born in Japan, is said to have been ordered to arrange entertainments for the benefit of the country, and to have written as many as thirty-three plays. The Japanese, however, ascribe the origin of their drama to the introduction of the dance called Sambdso as a charm against a volcanic depression of the earth which occurred in 805; and this dance appears still to be used as a prelude to theatrical exhibitions. In 1108 lived a woman called Iso no Zenji, who is looked upon as " the mother of the Japanese drama." But her performances seem to have been confined to dancing or posturing in male attire (otokomai) ; and the intro-

Han-Kong- Tseu.

1 Pi-Pa-Ki, sc. 14.

- *Tchao-Mei-Hiang, act ii.*

1 Teou-Ngo- Yuen, act il ; cf. Hoe'i-Lan-Ki.

« Pi-Pa-Ki, sc. 5.

duotion of the drama proper is universally attributed to Sarnwaka Kanzaburo, who in 1624 opened the first theatre (sibaia) at Yeddo. Not long afterwards (1651) the playhouses were re- moved to their present site in the capital; and both here and in the provincial towns, especially of the north, the drama has since continued to flourish. Persons of rank were formerly never seen at these theatres; but

actors were occasionally engaged to play in private at the houses of the nobles, who appear themselves to have taken part in performances of a species of opera affected by them, always treating patriotic legends and called no. The mikado has a court theatre.

The subjects of the serious popular plays are mainly mytho- logical — the acts of the great spirit Day-Sin, the incarnation of Brahma, and similar themes — or historical, treating of the doings of the early dynasties. In these the ˆHepˆys"' names of the personages are changed. An example of the latter class is to be found in the joruri, or musical romance, in which the universally popular tale of Chiushingura {The Loyal League) has been amplified and adapted for theatrical representa- tion. This famous narrative of the feudal fidelity of the forty- seven ronins, who about the year 1699 revenged their chief's judicial suicide upon the arrogant official to whom it was due, is stirring rather than touching in its incidents, and contains much bloodshed, together with a tea-house scene which suffices as a specimen of the Japanese comedy of manners. One of the books of this dramatic romance consists of a metrical description, mainly in dialogue, of a journey which (after the fashion of Indian plays) has to be carried out on the stage. The performance of one of these quasi-historical dramas sometimes lasts over several days; they are produced with much pomp of costume; but the acting is very realistic, and hari-kari is performed, almost " to the life." Besides these tragic plays (in which, however, comic intermezzos are often inserted) the Japanese have middle-class domestic dramas of a very realistic kind. The language of these, unlike that of Chinese comedy, is often gross and scurrilous, but intrigues against married women are rigidly excluded. Fairy and demon operas and ballets, and farces and intermezzos, form an easy transition to the interludes of tumblers and jugglers. As a specimen of nearly every class of play is required to make up a Japanese theatrical entertainment, which lasts from sunrise to sunset, and as the lower houses appropriate and mutilate the plays of the higher, it is clear that the status of the Japanese theatre cannot be regarded as at all high. In respect, however, of its movable scenery and properties, it is in advance of its Chinese prototype. The performers are, except in the ballet, males only; and the comic acting is said to be excellent of its kind. Though the leading actors enjoy great popularity and very respectable salaries, the class is held in contempt, and the companies were formerly recruited from the lowest sources. The disabilities under which they lay have, however, been removed; a Dramatic Reform Association has been organized by a number of noblemen and scholars, and a theatre on European lines built (see Japan).

5. Persian and other Asiatic, Polynesian and Peruvian

Drama Such dramatic examples of the drama as may be discoverable in Siam will probably have to be regarded as belonging to a branch of the Indian drama. The drama of the Malay populations of Java and the neighbouring island of Sumatra also resembles the Indian, to which it may have owed what development it has reached. The Javanese, as we learn, distinguish among the lyrics sung on occasions of popular significance the panton, a short simile or fable, Sumatra and the tcharita, a more advanced species, taking the etc. form of dialogue and sung or recited by actors proper. From the tcharita the Javanese drama, which in its higher forms treats the stories of gods and kings, appears to have been derived. As in the Indian drama, the functions of the director or manager are of great importance; as in the Greek, the performers wear masks, here made of wood. The comic drama is often represented in both Java and Sumatra by parties of strollers consisting of

Slam.

PERSIAN]

DRAMA

487

Persian.

The teazles.

two men and a woman— a troop sufficient for a wide variety of plot.

Among other more highly civilized Asiatic peoples, the traces of the dramatic art are either few or late. The originally Aryan Persians exhibit no trace of the drama in their ample earlier literature. But in its later national development the two species, widely different from one another, of the religious drama or mystery and of the popular comedy or farce have made their appearance — the former in a growth of singular interest.

Of the Persian tiaziSs (lamentations or complaints) the subjects are invariably derived from religious history, and more or less directly connected with the " martyrdoms " of the house of Ali. The performance of these episodes or scenes takes place during the first ten days of the month of Muharram, when the adherents of the great Shi'ite sect all over Persia and Mahommedan India commemorate the

cteaths of the Prophet and his daughter Fatima, the mother of Ali, the martyrdoms of Ali himself, shamefully murdered in the sanctuary, and of his unoffending son Hasan, done to death by hi? miserable guilty Deianira of a wife, and lastly the never-to-be-forgotten sacrifice of Hasan's brother, the heroic Hosain, on the bloody field of Kerbela (a.d. 680). With the establishment in Persia, early in the 16th century, of the Safawid (Sufi) dynasty by the Shi'ites, the cult of the martyrs Hasan and Hosain secured the official sanction which it has since retained. Thus the perform- ance of these ttazies, and the defraying of the equipment of them, are regarded as religious, and in a theological sense meritorious, acts; and the plays are frequently provided by the court or by other wealthy persons, by way of pleasing the people or securing divine favour. The plays are performed, usually by natives of Isfahan, in courtyards of mosques, palaces, inns, &c, and in the country in temporary structures erected for the purpose.

It would seem that, no farther back than the beginning of the 19th century, the Uaziis were still only songs or elegies in honour of the martyrs, occasionally chanted by persons actually repre- senting them. Just, however, as Greek tragedy was formed by a gradual detachment of the dialogue from the choric song of which it was originally only a secondary outgrowth, and by its gradually becoming the substance of the drama, so the Miracle Play of Hasan and Hosain, as we may call it, has now come to be a continuous succession of dramatic scenes. Of these fifty-two have, thanks to the labours of Alexander Chodzko and Sir Lewis Pelly, been actually taken down in writing, and thirty-seven published in translations; and it is clear that there is no limit to the extension of the treatment, as is shown by such a tiaziS as the Marriage of Kassem, dealing with the unfortunate Hosain's unfortunate son. 1 The performance is usually opened by a prologue delivered by the rouzikhdn, a personage of semi-priestly character claiming descent from the Prophet, who edifies and excites the audience by a pathetic recitation of legends and vehement admonitions in prose or verse concerning the subject of the action. But the custom seems to have arisen of specially prefacing the drama proper by a kind of induction which illus- trates the cause or effect of the sacred story — as for instance that of Amir Timur (Tamerlane) , who appears as lamenting and avenging the death of Hosain; or the episode of Joseph's be- trayal by his brethren, as prefiguring the cruelty shown to Ali and his sons. At the climax of the action proper Hosain prays to be granted at the day of judgment the key of the treasure of intercession; and the final scene shows the fulfilment of his prayer, which opens paradise to

those who have helped the holy martyr, or who have so much as shed a single tear for him. It will thus be seen that not only is this complex and elaborate production unapproached in its length and in its patient develop- ment of a long sequence of momentous events by any chronicle history or religious drama, but that it embodies together with the passionately cherished traditions of a great religious com- munity the expression of a long-lived resentment of foreign invasion — and is thus a kind of Oberammergau play and complaint of the Nibelungs in one. ■

1 Translated by Comte de Gobineau, in his Religions et philosophies dans VAsie centrale (Paris, 1865).

The other kind of Persian drama is the timacha (= spectacle), a kind of comedy or farce, sometimes called teglid (disguising), performed by wandering minstrels or joculatores called loutys, who travel about accompanied by their baya- ˆJj,,*— deres, and amuse such spectators as they find by their improvised entertainments, which seem to be on much the same level as English " interludes." A favourite and ancient variety of the species is the karaguez or puppet-play, of which the protagonist is called kStchel pShlevan (the bald hero) .

The modern Persian drama seems to have admitted Western influences, as in the case of such comedies as The Pleaders of the Court, and, avowedly, Monsieur Jourdan and Musla'li Shah, of whom the former steals away the wits of young Persia by his pictures of the delights of Paris.

There is no necessity for any reference here to the civilization or to the literature of the Hebrews, or to those of other Semitic peoples, with whom the drama is either entirely wanting, or only appears as a quite occasional and mSˆ w „ exotic growth. Dramatic elements are apparent in two of the books of the Hebrew scripture — the Book of Ruth and the Book of Job, of which latter the author of Everyman, and Goethe in his Faust, made so impressive a use.

From Polynesia and aboriginal America we also have isolated traces of drama. Among these are the performances, accom- panied by dancing and intermixed with recitation and singing, of the South Sea Islanders, first described by soutt Captain Cook, and reintroduced to the notice of students Peru. of comparative mythology by W. Wyatt Gill. Of the so-called Inca drama of the Peruvians, the unique relic, Apu Ollantay, said to have been written down in the Quichua tongue from native dictation by Spanish priests shortly after the conquest of

Peru, has been partly translated by Sir Clements Markham, and has been rendered into German verse. It appears to be an historic play of the heroic type, combining stirring incidents with a pathos finding expression in at least one lyric of some sweetness — the lament of the lost Collyar. With it may be contrasted the ferocious Aztek dramatic ballet, Rabinal-Achi (translated by Brasseur de Bourbourg), of which the text seems rather a suc- cession of warlike harangues than an attempt at dramatic treat- ment of character. But these are mere isolated curiosities.

6. Dramatic Elements in Egyptian Culture The civilization and religious ideas of the Egyptians so vitally influenced the people of whose drama we are about to speak that a reference to them cannot be altogether omitted. The influence of Egyptian upon Greek civilization has probably been over- estimated by Herodotus; but while it will never be clearly known how much the Greeks owed to the Egyptians in divers branches of knowledge, it is certain that the former confessed themselves the scholars of Egypt in the cardinal doctrine of its natural theology. The doctrine of the immortality of the soul there found its most solemn expression in mysterious recitations connected with the rites of sepulture, and treating of the migra- tion of the soul from its earthly to its eternal abode. These solemnities, whose transition into the Hellenic mysteries has usually been attributed to the agency of the Thracian worship of Dionysus, undoubtedly contained a dramatic element, upon the extent of which it is, however, useless to speculate. The ideas to which they sought to give utterance centred in that of Osiris, the vivifying power or universal soul of nature, whom Herodotus simply identifies with the Dionysus of the Greeks. The same deity was likewise honoured by processions among the rural Egyptian population, which, according to the same authority, in nearly all respects except the absence of choruses resembled the Greek phallic processions in honour of the wine-god.

That the Egyptians looked upon music as an important science seems fully established; it was diligently studied by their priests, though not, as among the Greeks, forming a part of general education, and in the sacred rites of their gods they as a rule permitted the use of flute and harp, as well as of vocal music. Dancing was as an art confined to prof essionalpersonp ;but though, the higher orders abstained from its practice, the lower indulged

[GREEK

in it on festive occasions, when a tendency to pantomime naturally asserted itself, and licence and wanton buffoonery prevailed, as in the early rustic festivals of the Greek and Italian peoples. Of a dance of armed men, on the other hand, there seems no satisfactory trace in the representations of the Egyptian monuments.

7. Greek Drama

Whatever elements the Greek drama may, in the sources from which it sprang, have owed to Egyptian, or Phrygian, or other

Asiatic influences, its development was independent origia'." anc * self-sustained. Not only in its beginnings, but*

so long as the stage existed in Greece, the drama was in intimate connexion with the national religion. This is the most signal feature of its history, and one which cannot in the same degree or to the same extent be ascribed to the drama of any other people, ancient or modern. Not only did both the great branches of the Greek drama alike originate in the usages of religious worship, but they never lost their formal union with it, though one of them (comedy) in its later growth abandoned all direct reference to its origin. Hellenic polytheism was at once so active and so fluid or flexible in its anthropomorphic formations, that no other religious system has ever with the same conquering force assimilated to itself foreign elements, or with equal vivacity and variety developed its own. Thus, the worship of Dionysus, introduced into Greece by the Phoenicians as that of the tauri- form sun-god whom his worshippers adored with loud cries (whence Bacchus or Iacchus), and the god of generation (whence his phallic emblem) and production, was brought into connexion with the Dorian religion of the sun-god Apollo. Apollo and his sister, again, corresponded to the Pelasgian and Achaean divinities of sun and moon, whom the Phoenician Dionysus and Demeter superseded, or with whose worship theirs was blended. Dionysus, whose rites were specifically conducted with reference to his attributes as the wine-god, was attended by deified representations of his original worshippers, who wore the skin of the goat sacrificed to him. These were the satyrs. Out of the connected worships of Dionysus, Bacchus, Apollo and Demeter sprang the beginnings of the Greek drama.

" Both tragedy and comedy," says Aristotle, "originated in a rude and unpremeditated manner — the first from the leaders of the dithyramb, and the second from those who led off the phallic songs." This diversity of origin, and the distinction jealously maintained down to the latest times between the two branches of the dramatic art, even where they might seem to come into actual contact with one another, necessitate a separate statement as to the origin and history of either.

The custom of offering thanks to the gods by hymns and dances in the places of public resort was first practised by the

Greeks in the Dorian states, whose whole system of tragedy. ˆ e was organized on a military basis. Hence the

dances of the Dorians originally taught or imitated the movements of soldiers, and their hymns were warlike chants. Such were the beginnings of the chorus, and of its songs (called paeans, from an epithet of Apollo), accompanied first by the phorminx and then by the flute. A step in advance was taken when the poet with his trained singers and dancers, like the Indian sutra-dhara, performed these religious functions as the representa- tive of the population. From the Doric paean at a very early period several styles of choral dancing formed themselves, to which the three styles of dance in scenic productions— the tragic, the comic and the satyric — are stated afterwards to have corresponded. But none of these could have led to a literary growth. This was due to the introduction among the Dorians

of the dithyramb (from 5tos, descended from Zeus, and ramb. , ” 6 p’ˆnffos , the Latin triumphus) , originally a song of

revellers, probably led by a flute-player and accom- panied by the music of other Eastern instruments, in which it was customary in Crete to celebrate the birth of Bacchus (the doubly-born) and possibly also his later adventures. The leader of the band (coryphaeus) may be supposed to have at times assumed the character of the wine-god, whose worshippers

bore aloft the vineclad thyrsus. The dithyramb was reduced to a definite form by the Lesbian Arion (fl. 610), who composed regular poems, turned the moving band of worshippers into a standing or ” cyclic ” chorus of attendants on Dionysus — a chorus of satyrs, a tragic or goat chorus — invented a style of music adapted to the character of the chorus, and called these songs ” tragedies ” or ” goat-songs. ” Arion, whose goat-chorus may perhaps have some connexion with an early Arcadian worship of Pan, associated it permanently with Dionysus, and thus became the inventor of ” lyrical tragedy ” — a transition stage between the dithyramb and the regular drama. His invention, or the chorus with which it dealt, was tragedy. established according to fixed rules by his contem- porary Stesichorus. About the time when Arion introduced these improvements into the Dorian city of Corinth, the (likewise Dorian) ‘families at Sicyon honoured the hero-king Adrastus by tragic choruses. Hence the invention of tragedy was ascribed by the Sicyonians to their poet Epigenes; but this step, signifi- cant for the future history of the Greek drama, of employing the Bacchic chorus

for the celebration of other than Bacchic themes, was soon annulled by the tyrant Cleisthenes.

The element which transformed lyrical tragedy into the tragic drama was added by the Ionians. The custom of the recitation of poetry by wandering minstrels, called rhapsodes (from pd/85os, staff, or from pairreiv, to piece so j e s. Bp ~ together), first sprang up in the Ionia beyond the sea; to such minstrels was due the spread of the Homeric poems and of subsequent epic cycles. These recitations, with or without musical accompaniment, soon included gnomic or didactic, as well as epic, verse; if Homer was a rhapsode, so was the sen- tentious or " moral " Hesiod. The popular effect of these recita- tions was enormously increased by the metrical innovations of Archilochus (from 708), who invented the trochee and the iambus, the latter the arrowy metre which is the native form of satirical invective — the species of composition in which Archi- lochus excelled— though it was soon used for other purposes also. The recitation of these iambics may already have nearly approached to theatrical declamation. The rhapsodes were welcome guests at popular festivals, where they exercised their art in mutual emulation, or ultimately recited parts, perhaps the whole, of longer poems. The recitation of a long epic may thus have resembled theatrical dialogue; even more so must the alternation of iambic poems, the form being frequently an address in the second person. The rhapsode was in some sense an actor; and when these recitations reached Attica, they thus brought with them the germs of theatrical dialogue.

The rhapsodes were actually introduced into Attica at a very early period; the Iliad, we know, was chanted at the Brauronia, a rural festival of Bacchus, whose worship had early invention entered Attica, and was cherished among its rustic of the population. Meanwhile the cyclic chorus of the t ˆ a s ,c Dorians had found its way into Attica and Athens, ever since the Athenians had recognized the authority of the great centre of the Apolline religion at Delphi. From the second half of the 6th century onwards the chorus of satyrs formed a leading feature of the great festival of Dionysus at Athens. It therefore only remained for the rhapsodic and the cyclic — in other words, for the epic and the choral — elements to coalesce; and this must have been brought about by a union of the two accompaniments of religious worship in the festive rites of Bacchus, and by the domestication of these rites in the ruling city. This occurred in the time of Peisistratus, perhaps after his restoration in 554. To Thespis (534), said to have been a contemporary of the tyrant and a native of an Attic deme (Icaria), the invention of tragedy is accordingly ascribed. Whether his name be that of an

actual person or not, his claim to be regarded as the inventor of tragedy is founded on the statement that he introduced an actor {moKpiT-qs , originally, " answerer ") > doubtless, at first, generally the poet himself, who, instead of merely alternating his recitations with the songs of the chorus, addressed his speech to its leader — the coryphaeus — with whom he thus carried on a

species of " dialogue." Or, in other words, the leader of the chorus (coryphaeus), instead of addressing himself to the chorus, held converse with the actor. The chorus stood round its leader in front of the Bacchic altar (thymele) ; the actor stood with the coryphaeus, who had occupied a more elevated position in order to be visible above his fellows, on a rude table, or possibly on a cart, though the wagon of Thespis may be a fiction, due to a confusion between his table and the wagon of Susarion. In any case, we have here, with the beginnings of dialogue, the beginning of the stage. It is a significant minor invention ascribed to Thespis, that he disguised the actor's face first by means of a pigment, afterwards by a mask. In the dialogue was treated some myth relating to Bacchus, or to some other deity or hero. Whether or not Thespis actually wrote tragedies (and there seems no reason to doubt it), Phrynichus and one or two other poets are mentioned as having carried on choral tragedy as set on foot by him, and as having introduced improvements into its still predominating lyrical element. The step which made dramatic action possible, and with which the Greek drama thus really began, was, as is distinctly stated by Aristotle, taken by Aeschylus. He added a second actor; and, by reducing the functions of the chorus, he further established the dialogue as the principal part of tragedy. Sophocles afterwards added a third actor, by which change the preponderance of the dialogue was made complete.

If the origin of Greek comedy is simpler in its nature than that of Greek tragedy, the beginnings of its progress are involved

in more obscurity. Its association with religious wor- comedy. sn iP was not initial; its foundations lay in popular

mirth, though religious festivals, and those of the vintage god in particular, must from the first have been the most obvious occasions

for its exhibition. It is said to have been " invented " by Susarion, a native of Doric Megaris, whose in- habitants were famed for their coarse humour, which they communicated to their own and other Dorian colonies in Sicily, to this day the home of vivacious mimic dialogue. In the rural Bacchic vintage festivals bands of jolly companions (mfios, properly a revel continued after supper) went about in carts or afoot, carrying the phallic emblem, and indulging in the ribald licence of wanton mirth. From the song sung in these processions or at the Bacchic feasts, which combined the praise of the god with gross personal ridicule, and was called comus in a secondary sense, the Bacchic reveller taking part in it was called a comus- singer or comoedus. These phallic processions, which were after- wards held in most Greek cities, and in Athens seem to have early included a " topical " speech as well as a choral song, determined the character of Old Attic comedy, whose most prominent feature was an absolute licence of personal vilification.

Thus independent of one another in their origin, Greek tragedy and comedy never actually coalesced. The "satyr-drama,"

though in some sense it partook of the nature of both, drama. yr ~ was i n i ts origin as in its history connected with

tragedy alone, whose origin it directly recalled. Pratinas of Philus, a contemporary of Aeschylus in his earlier days, is said to have restored the tragic chorus to the satyrs; i.e. he first produced dramas in which, though they were the same in form and theme as the tragedies, the choric dances were, different and entirely carried on by satyrs. The tragic poets, while never writing comedies, henceforth also composed satyr- dramas; but neither tragedies nor satyr-dramas were ever written by the. comic poets, and it was in conjunction with tragedies only that the satyr-dramas were performed. The theory of the Platonic Socrates, that the same man ought to be the best tragic and the best comic poet, was among the Greeks

never exemplified in practice. The so-called " hilaro-

tragedy " or " tragi-comedy " of later writers, perhaps

in some of its features in a measure anticipated by Euripides, 1 in form nowise differed from tragedy; it merely contained a comic element in its characters, and invariably had a happy ending. It is an instructive fact that the serious and sentimental element in the comedy of Menander and his con- 1 Alcestis; Orestes.

Tragi- comedy.

temporaries did far more to destroy the essential difference between the two great branches of the Greek dramatic art.

Periods of Greek Tragedy. — The history of Greek — which to all intents and purposes remained Attic — tragedy divides itself into three periods.

I. The Period before Aeschylus (535-499). — From this we have but a few names of authors and plays — those of the former being (besides Thespis) Choerilus, Phrynichus and Pratinas, all of whom lived to contend with Aeschylus for the tragic prize. To each of them certain innovations are ascribed — for instance the intro- duction of female characters to Phrynichus. He is best re- membered by the overpowering effect said to have been created by his Capture of Miletus, in which the chorus consisted of the wives of the Phoenician sailors in the service of the Great King.

II. The Classical Period of Attic Tragedy— that of Aeschylus, Sophocles and Euripides, and their contemporaries (499-405). To this belong all the really important phases in the progress of Greek tragedy, which severally connect themselves with the names of its three great masters. They may be regarded as the representatives of successive generations of Attic history and life, though of course in these, as in the progress of their art itself, there is an unbroken continuity.

Aeschylus (525-456) had not only fought both at Marathon and at Salamis against those Persians whose rout he celebrated with patriotic price, 2 but he had been trained in the jˆ esc i,yi us- Eleusinian mysteries, and strenuously asserted the value of the institution most intimately associated with the primitive political traditions of the past — the Areopagus. 3 He had been born in the generation after Solon, to whose maxims he fondly clung; and it was the Dorian development of Hellenic life and the philosophical system based upon it with which his religious and moral convictions were imbued. Thus even upon the generation which succeeded him, and to which the powerful simplicity of his dramatic and poetic diction seemed strange, the ethical loftiness of his conceptions and the sublimity of his dramatic imagination fell like the note of a mightier age. To us nothing is more striking than the conciliatory tendencies of his conservative mind, and the progressive nature of what may have seemed to his later contemporaries antiquated ideals.

Sophocles (495-405) was the associate of Pericles, and an upholder of his authority, rather than a consistent pupil of his political principles; but his manhood, and perhaps goohocles. the maturity of his genius, coincided with the great days when he could stand, like his mighty friend and the com- munity they both so gloriously represented, on the sunny heights of achievement. Serenely pious as well as nobly patriotic, he nevertheless treats the myths of the national religion in the spirit of a conscious artist, contrasting with lofty irony the struggles of humanity with the irresistible march of its destinies. Perhaps he, too, was one of the initiated; and the note of personal responsibility which is the mystic's inner religion is recognizable in his view of life. 4 The art of Sophocles may in its perfection be said to typify the greatest epoch in the life of Athens — an epoch conscious of unequalled achievements, but neither wholly unconscious of the brief endurance which was its destiny.

*Euripides (480-406) , as is the fate of genius of a more complex kind, has been more variously and antithetically judged than either of his great fellow-tragedians. His art has g ur i P ia es , been described as devoid of the idealism of theirs, his genius as rhetorical rather than poetical, his morality as that of a sophistical wit. On the other hand, he has been recognized not only as the most tragic of the Attic tragedians and the most pathetic of ancient poets, but also as the most humane in his social philosophy and the most various in his psychological insight. At least, though far removed from the more naif age of the national life, he is, both in patriotic spirit and in his choice of themes, genuinely Attic; and if he was " haunted on the stage by the daemon of Socrates," he was, like Socrates himself, the representative of an age which was a seed- time as well as a season of decay. His technical innovations 2 Persae. 3 Eumenides. * Antigone; Oedipus Rex.*

corresponded to his literary characteristics; but neither in the treatment of the chorus, nor in his management of the beginning and the ending of a tragedy, did he introduce any radical change. To Euripides the general progress of dramatic literature never- theless owes more than to any other ancient poet. Tragedy followed in his footsteps in Greece and at Rome. Comedy owed him something in the later phases of the very Aristophanes who mocked him, and more in

the human philosophy expressed in the sentiments of Menander; and, when the modern drama came to engraft the ancient upon its own crude growth, his was directly or indirectly the most powerful influence in the establish- ment of a living connexion between them.

The incontestable pre-eminence of the three great tragic poets was in course of time acknowledged at Athens by the _. f usage allowing no tragedies but theirs to be performed tragic more than once, and by the prescription that one

masters play of theirs should be performed at each Dionysia, and their as we u as by the law of Lycurgus (c. 330) which content- obliged the actors to use, in the case of works of the great masters, authentic copies preserved in the public archives. Yet it is possible that the exclusiveness of these tributes is not entirely justifiable; and not all the tragic poets contemporary with the great writers were among the myriad of younglings derided by Aristophanes. Of those who attained to celebrity Ion of Chios (d. before 419) seems to have followed earlier traditions of style than Euripides; Agathon, who survived the latter, on the other hand, introduced certain innovations of a transnormal kind both into the substance and the form of dramatic composition. 1

III. Of the third period of Greek tragedy the concluding limit cannot be precisely fixed. Down to the days of Alexander _. the Great, Athens had remained the chief home of

cessorsof tragedy. Though tragedies must have begun to be the great acted at the Syracusan and Macedonian courts, since masters at Aeschylus, Euripides and Agathon had sojourned Athens. there— though the practice of producing plays at the Dionysia before the allies of Athens must have led to their holding similar exhibitions at home — yet before the death of Alexander we meet with no instance of a tragic poet writing or of a tragedy written outside Athens. An exception should indeed be made in favour of the tyrant Dionysius of Syracuse, who (like Critias in his earlier days at Athens) was " addicted to " tragic composition. Not all the tragedians of this period, however, were Athenians born; though the names of Euphorion, the son of Aeschylus, Iophon, the son of Sophocles, and Euripides and Sophocles, the nephew and the grandson respectively of their great namesakes, illustrate the descent of the tragic art as an hereditary family possession. Chaeremon (fl. 380) already exhibits tragedy on the road to certain decay, for we learn that his plays were written for reading.

Soon after the death of Alexander theatres are found spread over the whole Hellenic world of Europe and Asia — a result to which the practice of the conqueror and his father andrians" ° celebrating their victories by scenic performances had doubtless contributed. Alexandria having now become a literary centre with which even Athens was in some respects unable to compete, while the latter still remained the home of comedy, the tragic poets flocked to the capital of the Ptolemies; and here, in the canon of Greek poets drawn up by command of Ptolemy Philadelphus (283-247), Alexander the Aetolian undertook the list of tragedies, while Lycophron was charged with the comedies. But Lycophron himself was in- cluded in all the versions of the list of the seven tragic poets famed as the " Pleias " who still wrote in the style of the Attic masters and followed the rules observed by them. Tragedy and the dramatic art continued to be favoured by the later Ptolemies; and about 100 B.C. we meet with the curious phenomenon of a Jewish poet, Ezechiel, composing Greek tragedies, of one of which (the Exodus from Egypt) fragments have come down to us. Tragedy, with the satyr-drama and comedy, survived in Alexandria beyond the days of Cicero and*

1 Anthos.

Varro; nor was their doom finally sealed till the emperor Caracalla abolished theatrical performances in the Egyptian capital in a.d. 217.

Thus Greek tragedy is virtually only another name for Attic; nor was any departure from the lines laid down i ne by its three great masters made in most respects by tragedy ot the Roman imitators of these poets and of their sue- the great

cessors. masters.

Tragedy was defined by Plato as an imitation of the noblest life. Its proper themes — the deeds and sufferings of heroes — were familiar to audiences intimately acquainted with the mythology of the national religion. To such Subjects themes Greek tragedy almost wholly confined itself ; tragedy. and in later days there were numerous books which discussed these myths of the tragedians. They only very exceptionally treated historic themes, though one great national calamity, 2 and a yet greater national victory, 3 and in later times a few other historical subjects, 4 were brought upon the stage. Such veiled historical allusions as critical ingenuity has sought not only in passages but in the entire themes of other Attic tragedies 6 cannot, of course, even if accepted as such, stamp the plays in

which they occur as historic dramas. No doubt Attic tragedy, though after a different and more decorous fashion, shared the tendency of her comic sister to introduce allusions to contemporary events and persons; and the in- dulgence of this tendency was facilitated by the revision {SmaKtvi}) to which the works of the great poets were subjected by them, or by those who produced their works after them. 6 So far as we know, the subjects of the tragedies before Aeschylus were derived from the epos; and it was a famous saying of this poet that his dramas were " but dry scraps from the great banquets of Homer " — an expression which may be understood as includ- ing the poems which belong to the so-called Homeric cycles. Sophocles, Euripides and their successors likewise resorted to the Trojan, and also to the Heraclean and the Thesean myths, and to Attic legend in general, as well as to Theban, to which already Aeschylus had had recourse, and to the side or subsidiary myths connected with these several groups. These substantially remained to the last the themes 'of Greek tragedy, the Trojan myths always retaining so prominent a place that Lucian could jest on the universality of their dominion. Purely invented subjects were occasionally treated by the later tragedians; of this innovation Agathon was the originator. 7

Thespis is said to have introduced the use of a " prologue " and a "rhesis" (speech) — the former being probably the opening speech recited by the coryphaeus, the latter the dialogue between him and the actor. It was a natural result

Construc- tion.

of the introduction of the second actor that a second rhesis should likewise be added; and this tripartite division would be the earliest form of the trilogy,- — three sections of the same myth forming the beginning, middle and end of a single drama, marked off from one another by the choral Tae songs. From this Aeschylus proceeded to the treat- Aeschy ment of these several portions of a myth in three tea " separate plays, connected together by their subject trilogy. and by being performed in sequence on a single occasion. This is the Aeschylean trilogy, of which we have only one extant example, the Oresteia—as to which critics may differ whether Aeschylus adhered in it to his principle that the strength should

2 Phrynichus, Capture of Miletus.

3 Id., Phoenissae; Aeschylus, Persae (Persae-trilogy?).

4 Moschion, Themistocles; Theodectes, Mausolus; Lycophron,

Marathonii; Cassandrei; Socii; Philiscus, Themistocles.

6 Aeschylus, Septem c. Thebas ; Prometheus Vinctus ; Danais-trilogy; Sophocles, Antigone; Oedipus Coloneus; Euripides, Medea.

6 Quite distinct from this revision was the practice against which the law of Lycurgus was directed, of " cobbling and heeling " the dramas of the great masters by alterations of a kind familiar enough to the students of Shakespeare as improved by Colley Cibber and other experts. The later tragedians also appear to have occasionally transposed long speeches or episodes from one tragedy into another — a device largely followed by the Roman dramatists, and called contamination by Latin writers. 7 Anthos {The Flower).

GREEK]

DRAMA

49 x

The tetra- logy.

Com- plicated actions.

lie in the middle — in other words, that the interest should centre in the second play. In any case, the symmetry of the trilogy was destroyed by the practice of performing after it a satyr-drama, probably as a rule, if not always, con- nected in subject with the trilogy, which thus became a tetralogy, though this term, unlike the other, seems to be a purely technical expression invented by th© learned. 1 Sophocles, a more conscious and probably a more self-critical artist than Aeschylus, may be assumed from the first to have elaborated his tragedies with greater care; and to this, as well as to his innovation of the third actor, which materially added to the fulness of the action, we may attribute his introduction of the custom of contending for the prize with single plays. It does not follow that he never produced connected trilogies, though we have no example of such by him or any later author; on the other hand, there is no proof that either he or any of his successors ever departed from the Aeschylean rule of producing three tragedies, followed by a satyr-drama, on the same day. This remained the third and last stage in the history of the con- struction of Attic tragedy. The tendency of its action towards complication was a natural progress, and is emphatically approved by Aristotle. This complication, in which Euripides excelled, led to his use of prologues, in which one of the characters opens the play by an exposition of the circumstances

under which its action begins. This practice, though ridiculed by Aristophanes, was too convenient not to be adopted by the successors of Euripides, and Menander transferred it to comedy. As the dialogue in- creased in importance, so the dramatic significance of the chorus diminished. While in Aeschylus it mostly, and in Sophocles occasionally, takes part in the action, its songs could not but more and more approach the character of lyrical intermezzos; and this they openly assumed when Agathon began the practice of inserting choral songs (embolima) which had nothing to do with the action of the play. In the general contrivance of their actions it was only natural that, as compared with Aeschylus, Sophocles and Euripides should exhibit an advance in both freedom and ingenuity; but the palm, due to a treatment at once piously adhering to the substance of the ancient legends and original in an effective dramatic treatment of them,. must be given to Sophocles. Euripides was, moreover, less skilful in untying complicated actions than in weaving them; hence his frequent resort 2 to the expedient of the deus ex machina, which Sophocles employs only in his latest play. 3

The other distinctions to be drawn between the dramatic qualities of the three great tragic masters must be mainly based upon a critical estimate of the individual genius of each. In the characters of their tragedies, Aeschylus and Sophocles avoided those lapses of dignity with which from one point of view Euripides has been charged by Aristophanes and other critics, but which, from another, connect themselves with his humanity. If his men and women are less heroic and statuesque, they are more like men and women. Aristotle objected to the later tragedians that, compared with the great masters, they were deficient in the drawing of character — by which he meant the lofty drawing of lofty character. In _. ,. diction, the transition is even more manifest from the

" helmeted phrases " of Aeschylus, who had Milton's love of long words and sonorous proper names, to the play of Euripides' " smooth and diligent tongue "; but to a sustained style even he remained essentially true, and it was reserved for his successors to introduce into tragedy the " low speech " — i.e. the conversational language — of comedy. Upon the whole, however, the Euripidean diction seems to have remained the standard of later tragedy, the flowery style of speech introduced by Agathon finding no permanent favour.

1 One satyr-drama only is preserved to us, the Cyclops of Euripides, a dramatic version of the Homeric tale of the visit of Odysseus to Polyphemus. Lycophron, by using the satyr-drama (in his Mene- demus) as a vehicle of personal ridicule applied it to a purpose

resembling that of Old Attic Comedy. •

'Ion; Supplices; Iphigenia in Tauris; Electro.; Helena; Hippolytus; Andromache. 3 Philoctetes.

Charac- ters.

Improve- ments In costume, &c.

Finally, Aeschylus is said to have made certain reforms in tragic costume of which the object is self-evident — to have improved the mask, and to have invented the cothurnus or buskin, upon which the actor was raised to loftier stature. Euripides was not afraid of rags and tatters; but the sarcasms of Aristophanes on this head seem feeble to those who are aware that they would apply to King Lear as well as to Telephus.

Periods of Greek Comedy. — The history of Greek comedy is likewise that of an essentially Attic growth, although Sicilian comedy was earlier in date than her Attic sister or descendant. The former is represented by Epicharmus (fl. 500), and by the names of one or two other poets. It probably had a chorus, and, dealing as it did in a mixture of philosophical discourse, anti- thetical rhetoric and wild buffoonery, necessarily varied in style. His comedies were the earliest examples of the class distinguished as motoriae from the slatariae and the mixtae by their greater freedom and turbulence of movement. Though in some respects Sicilian comedy seems to have resembled the Middle rathet than the Old Attic comedy, its subjects sometimes, like those of the latter, coincided with the myths of tragedy, of which they were doubtless parodies. The so-called " mimes " of Sophron (ft. 430) were dramatic scenes from Sicilian everyday life, in- tended, not for the stage, but for recitation, and classed as " male " and "female " according to the sex of the characters.

Attic comedy is usually divided into three periods or species.

I. Old comedy, which dated from the complete establishment of democracy by Pericles, though a comedy directed against Themistocles is mentioned. The Megarean farcical entertainments had long spread in the rural districts comedy. of Attica, and were now introduced into the city,where from about 460 onwards the " comus " became a matter of public concern. Cratinus (c. 450-422) and Crates (c. 449-425) first moulded these beginnings into the forms of Attic art. The final victory of Pericles and the democratic

party may be reckoned from the ostracism of Thucydides (444) ; and so eagerly was the season of freedom employed by the comic poets that already four years afterwards a law — which, however, remained only a short time in force — limited their licence. Cratinus, 4 an exceed- ingly bold and broad satirist, apparently of conservative tendencies, was followed by Eupolis (446-after 415), every one of whose plays appears to have attacked some individual, 5 by Phrynichus, Plato and others; but the representative of old comedy in its fullest development is Aristophanes (c. 444-c. 380), a comic poet of unique and unsurpassed genius. Dignified by the acquisition of a chorus (more numerous — twenty-four to twelve or afterwards fifteen — though, of a less costly kind than the tragic) of masked actors, and of scenery and .

machinery, as well as by a corresponding literary phane's. elaboration and elegance of style, Old Attic comedy nevertheless remained true both to its origin and to the purposes of its introduction into the free imperial city. Its special season was at the festival of the Lenaea, when the Athenians could enjoy the fun against one another without espying strangers; but it was also performed at the Great Dionysia. It borrowed much from tragedy, but it retained the phallic abandonment of the old rural festival's, the licence of word and gesture, and the audacious directness of personal invective. These characteristics are not features peculiar to Aristophanes. He was twitted by some of the older comic poets with having degenerated from the full freedom of the art by a tendency to refinement, and he took credit to himself for having superseded the time-honoured cancan and the stale practical joking of his predecessors by a nobler kind of mirth. But in daring, as he likewise boasted, he had no peer; and the shafts of his wit, though dipped in wine- lees and at times feathered from very obscene fowl, flew at high game. 6 He has been accused of seeking to degrade what he ought to have recognized as good 7 ; and it has been shown with com- plete success that he is not to be taken as an impartial or accurate

4 Archilochi; Pytine (The Bottle).

5 Maricas (Cleon) ; Baptae (Alcibiades) ; Lacones (Cimon)

6 Knights. 7 Clouds.

authority on Athenian history. But partisan as he was, he was also a genuine patriot; and his very political sympathies — which were conservative, like those of the comic poets in general, not only because it was the old families upon whom the expense of the choregia in the main devolved — were such as have often stimulated the most effective political satire. Of the conservative quality of reverence he was, however, altogether devoid; and his love for Athens was that of the most free-spoken of sons. Flexible even in his religious notions, he was, in this as in other respects, ready to be educated by his times; and, like a true comic poet, he could be witty at the expense even of his friends, and, it might almost be said, of himself. In wealth of fancy * and in beauty of lyric melody, he has few peers among the great poets of all times.

The distinctive feature of Old, as compared with Middle comedy, is the parabasis, the speech in which the chorus, moving

towards and facing the audience, addressed it in the basis.***' name °f tne poet, often abandoning all reference to the

action of the play. The loss of the parabasis was involved in the loss of the chorus, of which comedy was deprived in consequence of the general reduction of expenditure upon the comic drama, culminating in the law of the personally aggrieved dithyrambic poet Cinesias (396) ? But with the downfall of the independence of Athenian public life, the ground had been cut from under the feet of its most characteristic representative. Already in 414, in the anxious time after the sailing of the Sicilian expedition, the law of Syracosius had prohibited the comic poets from making direct reference to current events; but the Birds had taken their flight above the range of all regulations. The catastrophe of the city (405) was preceded by the temporary overthrow of the democracy (411), and was followed by the establishment of an oligarchical " tyranny " under Spartan protection; and, when liberty was restored (404), the citizens for a time addressed themselves to their new life in a soberer spirit, and continued (or passed) the law prohibiting the introduc- tion by name of any individual as one of the personages of a play. The change to which comedy had to accommodate itself was one which cannot be denned by precise dates, yet it was not the less inevitable in its progress and results. Comedy, in her struggle for existence, now chiefly devoted herself to literary and social themes, such as the criticism of tragic poets, 3 and the literary craze of women's rights, 4 and the transition to Middle comedy accomplished itself. Of the later

plays of Aristophanes, three 6 are without a parabasis, and in the last of those preserved to us which properly belongs to Middle comedy 6 the chorus is quite insignificant.

II. Middle comedy, whose period extends over the remaining years of Athenian freedom (from about 400 to 338), thus differed

*in substance as well as in form from its predecessor. It Middle * s represented by the names of thirty-seven writers comedy. (more than double the number of poets attributed to*

Old comedy), among whom Eubulus, Antiphanes and Alexis are stated to have been pre-eminently fertile and successful. It was a comedy of manners as well as character, although its ridicule of particular classes of men tended to the creation of standing types, such as soldiers, parasites, courtesans, revellers, and — a favourite figure already drawn by Aristophanes 7 — the self-conceited cook. In style it necessarily inclined to become more easy and conversational and to substitute insinuation for invective; while in that branch which was devoted to the parody- ing of tragic myths its purpose may have been to criticize, but its effect must have been to degrade. This species of the comic art had found favour at Athens already before the close of the great civil war; its inventor was the Thasian Hegemon, whose Gigantomachia was amusing the Athenians on the day when the news arrived of the Sicilian disaster.

1 Birds.

s Strattis, The Choricide (against Cinesias).

3 Aristophanes, Frogs; Phrynichus, Musae; Tragoedi.

‘ Aristophanes, Ecclesiazusae.

6 Lysistrata; Thesmophoriazusae; Plutus II.

e Plutus. 7 Aeolosicon.

III. New comedy, which is dated from the establishment of the Macedonian supremacy (338), is merely a further development of Middle, from which indeed it was not distinguished till the time of Hadrian. If its favourite types were comedy! more numerous, including the captain (of mercenaries) ■ — the original of a long line of comic favourites — the cunning slave, &c, they were probably also more conventional. New comedy appears to have first constituted love intrigues the main subject of dramatic actions. The

most famous of the sixty-four writers said to have belonged to this period of comedy were Philemon (fl. from 330), Menander (342-329) and his contem- porary Diphilus. Of these authors we know something from fragments, but more from their Latin adapters andNien- Plautus and Terence. As comedians of character, ander. they were limited by a range of types which left little room for originality of treatment; in the construction of their plots they were skilful rather than varied. In style, as well as to some extent in construction, Menander seems to have taken Euripides as his model, infusing into his comedy an element of moral and sentimental reflection, which refined if it did not enliven it.

New comedy, and with it Greek comedy proper, is regarded as having come to an end with Posidippus (fl. c. 280). Other comic writers of a later date are, however, mentioned, among them Rhinthon of Tarentum (fl. c. 30b), whose comedy. mixed compositions have been called by various names, among them by that of " phlyacographies " (from phlyax, idle chatter). He was succeeded by Sopater, Sotades and others; but the dramatic element in these often obscene, but not perhaps altogether frivolous, travesties is not always clearly ascertainable. It is certain that Greek comedy gradually ceased to be pro- ductive; and though even in its original form it long continued to be acted in imperial Rome, these are phases of its history which may here be passed by.

The religious origin of the Attic drama impresses itself upon

all its most peculiar features. Theatrical performances were

held at Athens only at fixed seasons in the early part „ ,, . r ii . ,1 t, 1 . , .. , , , ‘ r Results 01

of the year — at the Bacchic festivals of the country religious

Dionysia (vintage), the Lenaea (wine-press), probably origin of at the Anthesteria, and above all, at the Great Dionysia, / \ ttic or the Dionysia par excellence, at the end of March and beginning of April, when in her most glorious age Athens was crowded with visitors from the islands and cities of her federal empire. As a part of religious worship, the performances took place in a sacred locality — the Lenaeum on the south- eastern declivity of the Acropolis, where the first wine-press (lenos) was said to have been set up, and where now an altar of Bacchus (thymele) formed the centre of the theatre. For the same reason the exhibitions claimed the attendance of the whole population, and room was therefore provided on a grand scale —

according to the Platonic Socrates, for " more than 30,000 " spectators (see Theatre). The performances lasted all day, or were at least, in accordance with their festive character, extended to as great a length as possible. To their religious origin is likewise to be attributed the fact that they were treated as a matter of state concern. The expenses of the chorus, which in theory represented the people at large, were defrayed on behalf of the state by the liturgies (public services) of wealthy citizens, chosen in turn by the tribes to be choragi (leaders, i.e. providers of the chorus), the duty of training being, of course, deputed by them to professional persons (chorodidascali) . Publicly appointed and sworn judges decided between the merits of the dramas produced in competition with one another; the successful poet, performers and choragus were crowned with ivy, and the last- named was allowed at his own expense to consecrate a tripod in memory of his victory in the neighbourhood of the sacred Bacchic enclosure. Such a monument — one of the most graceful relics of ancient Athens — still stands in the place where it was erected, and recalls to posterity the victory of Lysicrates, achieved in the same year as that of Alexander on the Granicus. The dramatic exhibitions being a matter of religion and state, the entrance money (theoricum), which had been introduced to

prevent overcrowding, was from the time of Pericles provided out of the public treasury. The whole population had a right to its Bacchic holiday; neither women, nor boys, nor slaves were excluded from theatrical spectacles at Athens.

The religious character of dramatic performances at Athens, and the circumstances under which they accordingly took place, likewise determined their externals of costume and Costume scener y. The actor's dress was originally the festive "cenery. Dionysian attire, of which it always retained the gay and variegated hues. The use of the mask, sur- mounted, high over the forehead, by an ample wig, was due to the actor's .appearing in the open air and at a distance from most of the spectators; the several species of mask were elaborated with great care, and adapted to the different types of theatrical character. The cothurnus, or thick-soled boot, which further raised the height of the tragic actor (while the comedian wore a thin-soled boot), was likewise a relic of Bacchic costume. The scenery was, in

the simplicity of its original conception, suited to open-air performances; but in course of time the art of scene-painting came to be highly cultivated, and movable scenes were contrived, together with machinery of the ambitious kind required by the Attic drama, whether for bringing gods down from heaven, or for raising mortals aloft.

On a stage and among surroundings thus conventional, it might seem as if little scope could have been left for the actor's

. art. But, though the demands made upon the Attic

actor differed in kind even from those made upon his Roman successor, and still more from those which the histrionic art has to meet in modern times, they were not the less rigorous. Mask and buskin might increase his stature, and the former might at once lend the appropriate expression to his appearance and the necessary resonance to his voice. But in declamation, dialogue and lyric passage, in gesticulation and movement, he had to avoid the least violation of the general harmony of the performance. Yet it is clear that the refinements of by-play must, from the nature of the case, have been impossible on the Attic stage; the gesticulation must have been broad and massive; the movement slow, and the grouping hard, in tragedy; and the weighty sameness of the recitation must have had an effect even more solemn and less varied than' the half chant which still lingers on the modern stage. Not more than three actors, as has been seen, appeared in any Attic tragedy. The actors were provided by the poet; perhaps the performer of the first parts (protagonist) .was paid by the state. It was again a result of the religious origin of Attic dramatic performances and of the public importance attached to them, that the actor's profession was held in high esteem. These artists were as a matter of course free Athenian citizens, often the dramatists themselves, and at times were employed in other branches of the public service. In later days, when tragedy had migrated to Alexandria, and when theatrical entertainments had«spread over all the Hellenic world, the art of acting seems to have reached an unprecedented height, and to have taken an extraordinary hold of the public mind. Synods, or companies, of Dionysian artists abounded, who were in possession of various privileges, and in one instance at least (at Pergamum) of rich endowments. The most important of these was the Ionic company, established first in Teos, and afterwards in Lebedos, near Colophon, which is said to have lasted longer than many a famous state. We like wise hear of strolling companies performing in partibus. Thus it came to pass that the vitality of some of the masterpieces of the

Greek drama is without a parallel in theatrical history; while Greek actors were undoubtedly among the principal and most effective agents of the spread of literary culture through a great part of the known world.

The theory and technical system of the drama exercised the critical powers both of dramatists, such as Sophocles, and of the Writers on greatest among Greek philosophers. If Plato touched the theory the subject incidentally, Aristotle has in his Poetics oftbe (after 334) included an exposition of it, which, mutilated rama. ag ˆ ˆ j Jag f orme(j t jj e basis of all later systematic in- quiries. The specialities of Greek tragic dramaturgy refer above

all to the chorus; its general laws are those of the regular drama of all times. The theories of Aristotle and other earlier writers were elaborated by the Alexandrians, many of whom doubtless combined example with precept; they also devoted themselves to commentaries on the old masters, such as those in which Didymus (c. 30 B.C.) abundantly excelled, and collected a vast amount of learning on dramatic composition in general, which was doomed to perish, with so many other treasures, in the flames kindled by religious fanaticism.

8. Roman Drama

In its most productive age, as well as in the times of its declin l and decay, the Roman drama exhibits the continued coexistence of native forms by the side of those imported from Greece — either kind being necessarily often subject to the influence of the other. Italy (with Sicily) has ever been the native land of acting and of scenic representation; and, though Roman dramatic literature at its height is but a faint reflex of Greek examples, there is perhaps no branch of Roman literary art more congenial than this to the soil whence it sprang.

Quick observation and apt improvisation have always been distinctive features in the Italian character. Thus in the rural festivities of Italy there developed from a very early period in lively intermixture the elements of the 9f lgln t ? f dance, of jocular and abusive succession of song, forms. speech and dialogue, and of an assumption of character such as may be witnessed in any ordinary dialogue carried on by southern Italians at the present day. Not less indigenous was the invariable accompaniment of the music of the flute (tibia). The occasions of these half obligatory, half impromptu festivities were religious celebrations, public or private — among the

latter more especially weddings, which have in all ages been provocative of demonstrative mirth. The so-called Fescennine verses (from Fescennium in southern Etruria, and very possibly connected with fascinum = phallos), which were afterwards con- fined to weddings, and ultimately suggested an elaborate species of artistic poetry, never merged into actual dramatic perform- ances. In the saturae, on the other hand — a name saturae originally suggested by the goatskins of the shepherds, but from primitive times connected with the " fulness " of both performers and performance — there seems from the first to have been a dramatic element; they were probably comic songs or stories recited with gesticulation and the invariable flute ac- companiment. Introduced into the city, these entertainments received a new impulse from the performances of the Etruscan players (ludiones) who had been brought into Rome when scenic games (ludi scenici) were introduced there in 364 B.C. for purposes of religious propitiation. These (h)istriones, as they j striones were called at Rome (istri had been their native name) , who have had the privilege of transmitting their appellation to the entire histrionic art and its professors, were at first only dancers and pantomimists in a city where their speech was exotic. But their performances encouraged and developed those of other players and mountebanks, so that after the establishment of the regular drama at Rome on the Greek model, the saturae came to be performed as farcical after-pieces (exodia), until they gave way to other species. Among these the mimi were at Rome probably coeval in their beginnings with the stage itself, where those who performed them were after- wards known under the same name, possibly in the place of an older appellation (planipedes, bare-footed, representatives of slaves and humble folk) . These loose farces, after being probably at first performed independently, were then played as after- pieces, till in the imperial period, when they reasserted their predominance, they were again produced independently. At the close of the republican period the mimus found its way into literature, through D. Laberius, C. Matius and Publilius Syrus, and was assimilated in both form and subjects to other varieties of the comic drama — preserving, however, as its distinctive feature, a preponderance of the mimic or gesticulatory element. Together with the pantomimus (see below) the mimus continued to prevail in the days of the Empire, having transferred its

Mlmi.

original grossness to its treatment of mythological subjects, with which it dealt in accordance with the demands of a " lubrique and adulterate age." As a matter of course, the mimus freely- borrowed from other species, among which, so far as they were of native Italian origin, the A tellane fables (from Atella

e anae. j n Campania) call for special mention. Very probably of Oscan origin, they began with delineations of the life of small towns, in which dramatic and other satire has never ceased to find a favourite subject. The principal personages in these living sketches gradually assumed a fixed and conventional character, which they retained even when, after the final overthrow of Campanian independence (210), the Atellanae had been trans- planted to Rome. Here the heavy father or husband (pappus), the ass-eared glutton (maccus), the full-cheeked, voracious chatterbox (bucco), and the wily sharper (dorsenus) became accepted comic types, and, with others of a smiliar kind, were handed down, to reappear in the modern Italian drama. In these characters lay the essence of the Atellanae: their plots were extremely simple; the dialogue (perhaps interspersed with songs in the Saturnian metre) was left to the performers to improvise. In course of time these plays assumed a literary form, being elaborated as after-pieces by Lucius Pomponius of Bononia, Novius and other authors; but under the Empire they were gradually absorbed in the pantomimes.

The regular, as distinct from the popular, Roman drama, on the other hand, was of foreign {i.e. Greek) origin; and its Origin ot early history, at all events, attaches itself to more or the regular less fixed dates. It begins with the year 240 B.C., Roman when at the ludi Romani, held with unusual splendour drama. a ft e r the first Punic War, its victorious conclusion was, in accordance with Macedonian precedent, celebrated by the first production of a tragedy and a comedy on the Roman stage. The author of both, who appeared in person as an actor, was Livius Andronicus (b. 278 or earlier), a native of the Greek city of Tarentum, where the Dionysiac festivals enjoyed high popularity. His models were, in tragedy, the later Greek tragedians and their revisions of the three great Attic masters; in comedy, we may feel sure, Menander and his school. Greek examples continued to dominate the regular Roman drama during the whole of its course, even when it resorted to native themes.

The main features of Roman tragedy admit of no doubt,

although our conclusions respecting its earlier progress are only

derived from analogy, from scattered notices, especially

History ot f tne t j t j es of pi avSj anc i f rom sucn fragments — mostly

tragedy. very brief — as have come down to us. Of the known titles of the tragedies of Livius Andronicus, six belong to the Trojan cycle, and this preference consistently maintained itself among the tragedians of the " Trojugenae " ; next in popularity seem to have been the myths of the house of Tantalus, of the Pelopidae and of the Argonauts. The distinctions drawn by later Roman writers between the styles of the tragic poets of the republican period must in general be taken on trust. The Campanian Cn. Naevius (fl. from 236) wrote comedies as well as tragedies, so that the rigorous separation observed among the Greeks in the cultivation of the two dramatic species was at first neglected at Rome. His realistic tendency, displayed in that fondness for political allusions which brought upon him the vengeance of a noble family (the Metelli) incapable of understanding a joke of this description, might perhaps under more favourable circumstances have led him more fully to develop a new tragic species invented by him. But the fabula praetexta or praetextata (from the purple-bordered robe worn by higher magistrates) was not destined to become the means of emancipating the Roman serious drama from the control of Greek examples. In design, it was national tragedy on historic subjects of patriotic interest — which the Greeks had treated only in isolated instances; and one might at first sight marvel why, after Naevius and his successors had produced skilful examples of the species, it should have failed to over- shadow and outlast in popularity a tragedy telling the oft-told foreign tales of Thebes and Mycenae, or even the pseudo-ancestral

story of Troy. But it should not be forgotten to how great an extent so-called early Roman history consisted of the traditions of the gentes, and how little the party-life of later republican Rome lent itself to a dramatic treatment likely to be acceptable both to the nobility and to the multitude. As for the emperors, the last licence they would have permitted to the theatre was a free popular treatment of the national history; if Augustus prohibited the publication of a tragedy by his adoptive father on the subject of Oedipus, it was improbable that he or his successors should have sanctioned the performance of plays dealing with the earthly fortunes of Divus Julius himself, or with the story of Marius, or that

of the Gracchi, or any of the other tragic themes of later republican or imperial history. The historic drama at Rome thus had no opportunity for a vigorous life, even could tragedy have severed its main course from the Greek literature of which it has been well called a " free-hand copy." The praetextae of which we know chiefly treat — possibly here and there helped to form 1 — legends of a hoary antiquity, or celebrate battles chronicled in family or public records 2 ; and in the end the species died a natural death. 3

Q. Ennius (239-168), the favourite poet of the great families, was qualified by his Tarentine education, which taught the Oscan youth the Greek as well as the Latin tongue (so that he boasted "three souls"), to become the literary a ^^ s exponent of the Hellenizing tendencies of his age of successors. Roman society. Nearly half of the extant names of his tragedies belong to the Trojan cycle; and Euripides was clearly his favourite source and model. M. Pacuvius (b. c. 229), like Ennius subject from his youth up to the influences of Greek civilization, and the first Roman dramatist who devoted himself exclusively to the tragic drama, was the least fertile of the chief Roman tragedians, but was regarded b}' the ancients as indisput- ably superior to Ennius. He again was generally (though not uniformly) held to have been surpassed by L. Accius (b. 170), a learned scholar and prolific dramatist, of whose plays 50 titles and a very large number of fragments have been preserved. The plays of the last-named three poets maintained themselves on the stage till the close of the republic; and Accius was quoted by the emperor Tiberius. 4 Of the other tragic writers of the republic several were dilettanti — such as the great orator and eminent politician C. Julius Strabo; the cultivated officer Q. Tullius Cicero, who made an attempt, disapproved by his illustrious brother, to introduce the satyr-drama into the Roman theatre; L. Cornelius Balbus, a Caesarean partisan; and finally C. Julius Caesar himself.

Tragedy continued to be cultivated under the earlier emperors; and one author, the famous and ill-fated L. Annaeus Seneca (4 B.C.-a.d. 65), left behind him a series of works seaeca. which were to exercise a paramount influence upon the beginnings of modern tragedy. In accordance with the character of their author's prose-work, they exhibit a strong predominance of the rhetorical element, and an artificiality of style far removed from that of the poets Sophocles and Euripides, from whom Seneca derived his themes. Yet he is interesting, not only by these devices and by a " sensational " choice of themes, but also by a quickness of treatment which we may call " modern," a quality not easily resisted in a dramatist. The metrification of his plays is very strict, and they were doubtless

intended for recitation, whether or not also designed for the stage. A few tragic poets are mentioned after Seneca, till about the reign of Domitian (81-96) the list comes to an end. The close of Roman tragic literature is obscurer than its beginning; and, while there are traces of tragic performances at Rome as late as even the 6th century, we are ignorant how long the works of the old

1 Naevius, Lupus (The Wolf) ; Romulus; Ennius, Sabinae (The-Sabine Women); Accius, Brutus.

2 Naevius, Clastidium (Marcellus?) ; Ennius, Ambracia; Pacuvius, Paulus; Accius, Aeneadae (Decius?).

3 Balbus's Iter (The Mission), an isolated play on an episode of the Pharsalian campaign, seems to have been composed for the mere private delectation of its author and hero. Octavia, a late praetexta ascribed to Seneca, was certainly not written by him. ,

4 " Oderint dum metuant " (Atreus).

masters of Roman tragedy maintained themselves on the stage.

It would obviously be an error to draw from the plays of Seneca conclusions as to the method and style of the earlier Character-writers. In general, however, no important changes istics of seem to have occurred in the progress of Roman tragic Roman composition. The later Greek plays remained, so far rage y. ag can ˆ g g a ˆ-jjered, the models in treatment; and, inasmuch as at Rome the several plays were performed singly, there was every inducement to make their action as full and complicated as possible. The dialogue-scenes (diverbid) appear to have been largely interspersed with musical passages (cantica) ; but the effect of the latter must have suffered from the barbarous custom of having the songs sung by a boy, placed in front of the flute-player (cantor), while the actor accompanied them with gesticulations. The chorus (unlike the Greek) stood on the stage itself and seems occasionally at least to have taken part in the action. But the whole of the musical element can hardly have attained to so full a development as among the Greeks. The divisions of the action appear at first to have been three; from the addition of prologue and epilogue may have arisen the invention (probably due

in tragedy to Varro) of the fixed number of five acts. In style, such influence as the genius of Roman literature could exercise must have been in the direction of the rhetorical and the pathetic; a superfluity of energy on the one hand, and a defect of poetic richness on the other, can hardly have failed to characterize these, as they did all the other productions of early Roman poetry.

In Roman comedy two different kinds — respectively called palliata and togata from well-known names of dress — were dis- tinguished, — the former treating Greek subjects and Roman ° imitating Greek originals, the latter professing a native comedy, character. The palliata sought its originals especially in New Attic comedy; and its authors, as they advanced in refinement of style, became more and more de- pendent upon their models, and unwilling to gratify the coarser Palliata. tastes of the public by local allusions or gross season- ings. But that kind of comedy which shrinks from the rude breath of popular applause usually has in the end to give way to less squeamish rivals; and thus, after the species had been cultivated for about a century (c. 250-1 50 B.C.) , palliatae ceased to be composed except for the amusement of select circles, though the works of the most successful authors, Plautus and Terence, kept the stage even after the establishment of the empire. Among the earlier writers of palliatae were the tragic poets Andronicus, Naevius and Ennius, but they were alike Plautus. surpassed by T. Maccius Plautus (254-184), nearly all of whose comedies esteemed genuine by Varro — not less than 20 in number — have been preserved, though twelve of them were not known to the modern world before 1420. He was exclusively a comic poet, and, though he borrowed his plots from the Greeks — from Diphilus and Philemon apparently in preference to the more refined Menander — there was in him a genuinely national as well as a genuinely popular element. Of the extent of his originality it is impossible to judge; probably it lies in his elaboration of types of character and the comic turns of his dialogue rather than in his plots. Modern comedy is indebted to him in all these points; and, in consequence of this fact, as well as of the attention his text has for linguistic reasons received from scholarship both ancient and modern, his merits have met with quite their full share of recognition. Caecilius Statius (an Insubrian brought to Rome as a captive c. 200) stands midway between Plautus and Terence, but no Terence. PˆY S of his remain. P. Terentius Afer (c. 185-159) was, as his cognomen implies, a native of Carthage, of whose conqueror he enjoyed the patronage. His six extant comedies ■ seem to be tolerably close renderings of their Greek originals, nearly all of which were plays of Menander. It was the good fortune of the works

of Terence to be preserved in an exceptionally large number of MSS. in the monastic libraries of the middle ages, and thus (as will be seen) to become a main link between the ancient and the Christian drama. As a

dramatist he is distinguished by correctness of style rather than by variety in his plots or vivacity in his characters; his chief merit — and at the same time the quality which has rendered him so suitable for modem imitation — is to be sought in the polite ease of his dialogue. In general, the main features of the palliatae, which were divided into five acts, are those of the New Comedy of Athens, like which they had no chorus; for purposes of explanation from author to audience the prologue sufficed; the Roman versions were probably terser than their originals, which they often altered by the process called contamination.

The togatae, in the wider sense of the term, included all Roman plays of native origin — among the rest, the praetextae, in contradistinction to which and to the transient T t species of the trabeatae (from the dress of the knights) the comedies dealing with the life of the lower classes were afterwards called tabernariae (from taberna, a shop), a name suited by some of their extant titles, 1 while others point to the treatment of provincial scenes. 2 The togata, which was necessarily more realistic than the palliata, and doubtless fresher as well as coarser in tone, flourished in Roman literature between 170 and 80 B.C. In this species Titinius, all whose plays bear Latin titles and were tabernariae, was succeeded by the more refined L. Afranius, who, though still choosing natural subjects, seems to have treated them in the spirit of Menander. His plays continued to be performed under the empire, though with an admixture of elements derived from that lower species, the pantomime, to which they also were in the end to succumb. The Romans likewise adopted the burlesque kind of comedy called from its inventor Rhinthonica, and by other names (see above). But with them, the general course of the drama, which with the Greeks lost itself in the sand, could not fail to be merged into the flood.

The end of Roman dramatic literature was dilettantism and criticism; the end of the Roman drama was spectacle and show, buffoonery and sensual allurement. It was for this that the theatre had passed through all its early ˆ„ ma „ troubles, when the political puritanism of the old theatre. school had upheld the martial games of the circus against the enervating influence of the stage. In those days the guardians of Roman virtue had sought to diminish the attractions of the theatre by insisting upon its remaining as uncomfortable as

possible; but as was usual at Rome, the privileges of the upper orders were at last extended to the population at large, though a separation of classes continued to be characteristic of a Roman audience. The first permanent theatre erected at Rome was that of Cn. Pompeius (55 B.C.), which contained nearly 18,000 seats; but even of this the portion allotted to the performers (scaena) was of wood; nor was it till the reign of Tiberius (a.d. 22) that, after being burnt down, the edifice was rebuilt in stone.

Though a species of amateur literary censorship, introduced by Pompeius, became customary in the Augustan age, in general the drama's laws at Rome were given by the drama's patrons — in other words, the production of plays was a matter of private speculation. The exhibitions were contracted for with the officials charged with the superintendence of public amusements (curatores ludorum) ; the actors were slaves trained for the art, mostly natives of southern Italy or Greece. Many of them rose to reputation and wealth, purchased their freedom, and themselves became directors of companies; but, though Sulla might make a knight of Roscius, and Caesar and his friends defy ancient prejudice, the stigma of civil disability (infamia) was not removed from the profession, which in the great days of the Attic drama had been held in honour at Athens. But, on the whole, the social treatment of actors was easy in the days of the early empire; senators and knights actually appeared on the stage; Nero sang on it; and a pantomimus was made praefectus urbi by Elagabalus.

The actor's art was carried on at Rome under conditions differing in other respects from those of the Greek theatre.

1 Augur; Cinerarius (The Crimper); Fullonia (The Fuller's Trade); Libertus (The Freedman); Tibicina (The Flute-Girl).

2 Brundisinae ; Ferentinatis ; Setina.

Actors.

The Romans loved a full stage, and from the later period of the republic liked to see it crowded with supernumeraries. This accorded with their military instincts, and with the general grossness of their

tastes, which led them in the theatre as well as in the circus to delight in spectacle and tumult, and to applaud Pompeius when he furnished forth the return of Agamemnon in the Clytaemnestra with a grand total of 600 heavily-laden mules. On the other hand, the actors stood nearer to the spectators in the Roman theatre than in the Greek, the stage (pulpitum) not being separated from the first rows of the audience by an orchestra occupied by the chorus; and this led in earlier times to the absence of masks, diversely coloured wigs serving to distinguish the age of the characters. Roscius, however, is said (because of an obliquity of vision which disfigured his countenance) to have introduced the use of masks; and the retrograde innovation, though disapproved of, maintained itself. The tragic actors wore the crepida, corresponding to the cothurnus, and a heavy toga, which in the praetexta had the purple border giving its name to the species. The conventional costumes of the various kinds of comedy are likewise indicated by their names. The comparative nearness of the actors to the spectators encouraged the growth of that close criticism of acting which has always been dear to an Italian public, and which in ancient days mani- fested itself at Rome in all the ways familiar to modern audiences. Where there is criticism, devices are apt to spring up for anticipat- ing or directing it; and the evil institution of the claque is modelled on Roman precedent, typified by the standing conclu- sion " plaudite! " in the epilogues of the palliatae.

In fine, though the art of acting at Rome must have originally formed itself on Greek example and precept, it was doubtless elaborated with a care unknown to the greatest Attic Roscius ar ti s ts. Its most famous representatives were Gallus, Aesopas. called after his emancipation Q. Roscius Gallus (d. c. 62 B.C.), who, like the great " English Roscius," excelled equally in tragedy and comedy, and his younger con- temporary Clodius Aesopus, a Greek by birth, likewise eminent in both branches of his art, though in tragedy more particularly. Both these great actors are said to have been constant hearers of the great orator Hortensius; and Roscius wrote a treatise on the relations between oratory and acting. In the influence of oratory upon the drama are perhaps to be sought the chief among the nobler features of Roman tragedy to which a native origin may be fairly ascribed.

9. Downfall or the Classical Drama

The ignoble end of the Roman— and with it of the ancient classical — drama has been already foreshadowed. The elements of dance and song, never integrally united with the dialogue in Roman tragedy, were now altogether separated from it. While it became customary

simply to recite tragedies to the small audiences who continued (or, as a matter of courtesy, affected) to appreciate them, the pantomimus commended itself to the heterogeneous multitudes of the Roman theatre and to an effete upper class by confining the performance of the actor to mimu's. gesticulation and dancing, a chorus singing the accom- panying text. The species was developed with extra- ordinary success already under Augustus by Pylades and Bathyllus; and so popular were these entertainments that even eminent poets, such as Lucan (d. a.d. 65), wrote the librettos for these fabulae salticae (ballets), of which the subjects were generally mythological, only now and then historical, and chiefly of an amorous kind. A single masked performer was able to enchant admiring crowds by the art of gesticulation and move- ment only. In what direction this art tended, when suiting itself to the most abnormal demands of a recklessly sensual age, may be gathered from the remark of one of the last pagan historians of the empire, that the introduction of pantomimes was a sign of the general moral decay of the world which began with the Mimas. beginning of the monarchy. Comedy more easily lost itself in the cognate form of the mimus, which sur- vived all other kinds of comic entertainments because of its more audacious immorality and open obscenity. Women took

part in these performances, by means of which, as late as the 6th century, a mima acquired a celebrity which ultimately raised her .to the imperial throne, and perhaps occasioned the removal of a disability which would have rendereu her marriage with Justinian impossible.

Meanwhile, the regular drama had lingered on, enjoying in all its forms imperial patronage in the days of the literary revival under Hadrian (11 7-138); but the perennial T he drama taste for the spectacles of the amphitheatre, which and the was as strong at Byzantium as it was at Rome, and Christian which reached its climax in the days of Constantine Cnun!b – the Great (306-337), under whom the reaction set in, determined the downfall of the dramatic art. It was not absolutely extin- guished even by the irruptions of the northern barbarians; but a bitter adversary had by this time risen into power. The whole authority of the Christian Church had, without usually caring to distinguish between the nobler and the looser elements in the drama, involved all its manifestations in a consistent condem- nation (as in Tertullian's De spectaculis, 200 c), comprehended them all in an uncompromising anathema. When the faith of that Church was acknowledged as the religion of the Roman empire, the doom of the theatre was sealed. It died hard, however, both in the capitals and in many of the provincial centres

of East and West alike. At Rome the last mention of spectacula as still in existence seems to date from the sway of the East-Goths under Theodoric and his successor, in the earlier half of the 6th century. In the capital and provinces of the Eastern empire the decline and fall of the stage cannot be similarly traced; but its end is authoritatively assigned to the period of Saracen invasions which began with the Omayyad dynasty in the 7th century.

It cannot be pretended that the doom which thus slowly and gradually overtook the Roman theatre was undeserved. The remnants of the literary drama had long been overshadowed by entertainments such as both earlier and later Roman emperors — Domitian and Trajan as well as Galerius and Constantine — had found themselves constrained to prohibit in the interests of public morality and order, by the bloody spectacles of the amphitheatre and by the maddening excitement of the circus. The art of acting had sunk into pandering to the lewd or frivolous itch of eye and ear; its professors had, in the words of a most judicious modern historian, become " a danger to the peace of house- holders, as well as to the peace of the streets "; and the theatre had contributed its utmost to the demoralization of a world. The attitude taken up by the Christian Church towards the stage was in general as unavoidable as its particular expressions were at times heated by fanaticism or distorted by ignorance. Had she not visited with her condemnation a wilderness of decay, she could not herself have become — what she little dreamt of becoming — the nursing mother of the new birth of an art which seemed incapable of regeneration.

Though already in the 4th century scenici had been excluded from the benefit of Christian sacraments, and excommunication had been extended to those who visited theatres instead of churches on Sundays and holidays, while the clergy Survival were absolutely prohibited from entering a theatre, mimes. and though similar enactments had followed at later dates — yet the entertainments of the condemned profession had never been entirely suppressed, and had even occasionally received imperial patronage. The legislation on the subject in the Codex Theodosianus (accepted by both empires in the earlier part of the 5th century) shows a measure of tolerance indicating a conviction that the theatrical profession could not be suppressed. Gradually, however, as they lost all footing in the centres of civic life, the mimes and their fellows became a wandering fraternity, who doubtless appeared at festivals when their services were required, and vanished again -into the depths of the obscurity which has ever covered that mysterious existence— the strollers' life. It was thus that these strange intermediaries of civilization carried

dQwn such traditions as survived of the acting drama of pagan antiquity into the succeeding ages.

io. Medieval Drama

While the scattered and persecuted strollers thus kept alive something of the popularity, if not of the loftier traditions, of _ , . their art, neither, on the other hand, was there an tkaiaad utter absence of written compositions to bridge the monastic gap between ancient and modern dramatic literature. literary j n tne m ifet of the condemnation with which the

Christian Church visited the stage, its professors and votaries, we find individual ecclesiastics resorting in their writings to both the tragic and the comic form of the ancient drama. These isolated productions, which include the Xpicrrds irhcrxuv {Passion of Christ) formerly attributed to St Gregory Nazianzen, and the Querolus, long fathered upon Plautus himself, were doubtless mostly written for educational purposes — whether Euripides and Lycophron, or Menander, Plautus and Terence, served as the outward models. The same was probably „ H . the design of the famous ” comedies ” of Hrosvitha, the

Benedictine nun of Gandersheim, in Eastphalian Saxony, which associate themselves in the history of Christian literature with the spiritual revival of the ioth century in the days of Otto the Great. While avowedly imitated in form from the comedies of Terence, these religious exercises derive their themes — martyrdoms, 1 and miraculous or otherwise startling conversions 2 — from the legends of Christian saints. Thus, from perhaps the 9th to the 12th centuries, Germany and France, and through the latter, by means of the Norman Conquest, England, became acquainted with what may be called the literary monastic drama. It was no doubt occasionally performed by the children under the care of monks or nuns, or by the religious themselves; an exhibition of the former kind was that of the Play of St Katharine, acted at Dunstable about the year n 10 in ” copes ” by the scholars of the Norman Geoffrey, afterwards abbot of St Albans. Nothing is known concerning it except the fact of its performance, which was certainly not regarded as a novelty.

These efforts of the cloister came in time to blend themselves with more popular forms of the early medieval drama. The Thejoca- natural agents in the transmission of these popular Mores, forms werethosemiwes, whom, while therepresentatives jongleurs, f more elaborate developments, the " pantomimes "

in particular, had inevitably succumbed, the Roman drama had left surviving it, unextinguished and unextinguishable. Above all, it is necessary to point out how in the long interval now in question — - the " dark ages," which may, from the present point of view, be reckoned from about the 6th to the 1 ith century — the Latin and the Teutonic elements of what may be broadly designated as medieval " minstrelsy," more or less imperceptibly, coalesced. The traditions of the disestablished and disendowed tnimus combined with the " occupation " of the Teutonic scdp, who as a professional personage does not occur in the earliest Teutonic poetry, but on the other hand is very distinctly traceable under this name or that of the " gleeman," in Anglo-Saxon literature, before it fell under the control of the Christian Church. Her influence and that of docile rulers, both in England and in the far wider area of the Frank empire, gradually prevailed even over the inherited goodwill which neither Alfred nor even Charles the Great had denied to the composite growth in which tnimus and scdp alike had a share.

How far the joculatores — which in the early middle ages came to be the name most widely given to these irresponsible trans- mitters of a great artistic trust — kept alive the usage of entertain- ments more essentially dramatic than the minor varieties of their performances, we cannot say. In different countries these entertainers suited themselves to different tastes, and with the rise of native literatures to different literary tendencies. The literature of the troubadours of Provence, which communicated itself to Spain and Italy, came only into isolated contact with the beginnings of the religious drama; in northern France the jongleurs, as the joculatores were now called, were confounded

1 Gallicanus, part ii. ; Sapienlia.

1 Gallicanus, part i. ; CaUimachus; Abraham ; Paphnutius.

with the trouveres, who, to the accompaniment of vielle or harp, sang the chansons de geste commemorative of deeds of war. As appointed servants of particular households they were here, and afterwards in England, called menestrels (from ministe.riales) or minstrels. Such a histrio or mimus (as he is called) was Taillefer, who rode first into

the fight at Hastings, singing his songs of Roland and Charlemagne, and tossing his sword in the air and catching it again. In England such accomplished minstrels easily outshone the less versatile gleemen of pre- Norman times, and one or two of them appeared as landholders in Domesday Book, and many enjoyed the favour of the Norman, Angevin and Plantagenet kings. But here, as elsewhere, the humbler members of the craft spent their lives in strolling from castle to convent, from village-green to city-street, and there exhibiting their skill as dancers, tumblers, jugglers proper, and as masquers and conductors of bears and other dumb contributors to popular wonder and merriment. Their only chance of survival finally came to lie in organization under the protection of powerful nobles; but when, in the 15th century in England, companies of players issued forth from towns and villages, the profession, in so far as its members had not secured preference, saw itself threatened with ruin.

In any attempt to explain the transmission of dramatic elements from pagan to Christian times, and the influence exercised by this transmission upon the beginnings of Survivals the medieval drama, account should finally be taken and adapt- of the pertinacious survival of popular festive rites and atlons OT ceremonies. From the days of Gregory the Great, i.e. f es tive from the end of the 6th century onwards, the Western ceremonies Church tolerated and • even attracted to her own aDd festivals popular customs, significant of rejoicing, usages ‘ which were in truth relics of heathen ritual. Such were the Mithraic feast of the 25th of December, or the egg of Eostre-tide, and a multitude of Celtic or Teutonic agricultural ceremonies. These rites, originally symbolical of propitiation or of weather- magic, were of a semi-dramatic nature — such as the dipping of the neck of corn in water, sprinkling holy drops upon persons or animals, processions of beasts or men in beast-masks, dressing trees with flowers, and the like, but above all ceremonial dances, often in disguise. The sword-dance, recorded by Tacitus, of which an important feature was the symbolic threat of death to a victim, endured (though it is rarely mentioned) to the later middle ages. By this time it had attracted to itself a variety of additional features, and of characters familiar as pace-eggers, mummers, morris-dancers (probably of distinct origin), who continually enlarged the scope of their performances, especially as regarded their comic element. The dramatic ” expulsion of death,” or winter, by the destruction of a lay-figure — common through western Europe about the 8th century — seems con- nected with a more elaborate rite, in which a disguised performer (who perhaps originally represented summer) was slain and afterwards revived (the Pfingstl, Jack in the

Green, or Green Knight). This representation, after acquiring a comic com- plexion, was annexed by the character dancers, who about the 15th century took to adding still livelier incidents from songs treating of popular heroes, such as St George and Robin Hood; which latter found a place in the festivities of May Day with their central figure, the May Queen. The earliest ceremonial obser- vances of this sort were clearly connected with pastoral and agricultural life; but the inhabitants of the towns also came to have a share in them; and so, as will be seen later, did the clergy. They were in particular responsible for the buffooneries of the feast of fools (or asses), which enjoyed the greatest popu- larity in France (though protests against it are on record from the nth century onwards to the 17th), but was well known from London to Constantinople. This riotous New Year's celebration was probably derived from the ancient Kalend feasts, which may have bequeathed to it both the hobby-horse and the lord, or bishop, of misrule. In the 16th century the feast of fools was combined with the elaborate festivities of, courts and cities during the twelve Christmasf east-days — the season when through- out the previous two centuries the " mummers " especially

Tropes.

flourished, who in their disguisings and " viseres " began as dancers gesticulating in dumb-show, but ultimately developed into actors proper.

Thus the literary and the professional element, as well as that of popular festive usages, had survived to become tributaries to the main stream of the early Christian drama, The liturgy w j 1 j c j 1 nac j jts direct source in the liturgy of the Church source of itself. The service of the Mass contains in itself the dramatic elements, and combines with the reading

medieval out f por tions of Scripture by the priest — its " epical " 'drama." P art — a " lyrical " P art m the anthems and responses of the congregation. At a very early period — certainly already in the 5th century — it was usual on special occasions to increase the attractions of public worship by living pictures, illustrating the

Gospel narrative and accompanied by songs; and thus a certain amount of action gradually introduced itself into the service. The insertion, before or after sung portions of the service, of tropes, originally one or more verses of texts, usually serving as introits and in connexion with the gospel of the day, and recited by the two halves qf the choir, naturally led to dialogue chanting; and this was frequently accompanied by illustrative fragments of action, such as drawing down the veil from before the altar.

This practice of interpolations in the offices of the church, which is attested by texts from the 9th century onwards (the so-called " Winchester tropes " belong to the 10th Tbe . and nth), progressed, till on the great festivals of the mystery, church the epical part of the liturgy was systematically connected with spectacular and in some measure mimical adjuncts, the lyrical accompaniment being of course retained. Thus the liturgical mystery — the earliest form of the Christian drama — was gradually called into existence. This had certainly been accomplished as early as the 10th century, when on great ecclesiastical festivals it was customary for the priests to perform in the churches these offices (as they were called). The whole Easter story, from the burial to Emmaus, was thus presented, the Maries and the angel adding their lyrical planctus; while the surroundings of the" Nativity — the Shepherds, the Innocents, &c. — were linked with the Shepherds of Epiphany by a recitation of " Prophets," including Vergil and the Sibyl. Before long, from the nth century onwards, mysteries, as they were called, were produced in France on scriptural subjects unconnected with the great Church festivals — such as the Wise and Foolish Virgins, Adam (with the fall of Lucifer), Daniel, Lazarus, &c. Compositions on the last-named two themes remain from the hand of one of the very earliest of medieval play-writers, Hilarius, who may have been an Englishman, and who certainly studied under Abelard. He also wrote a " miracle " of St Nicholas, one of the most widely popular of medieval saints. Into the pieces founded on the Scripture narrative outside characters and incidents were occasionally introduced, by way of diverting the audience.

These mysteries and miracles being as yet represented by the clergy only, the language in which they were usually written is Latin— in many varieties of verse with occasional Tbe prose; but already in the nth century the further

mystery. ste P was taken of composing these texts in the ver- nacular — the earliest example being the mystery of the Resurrection. In time a whole series of mysteries was joined together; a process which was

at first roughly and then more elaborately pursued in France and elsewhere, and finally resulted in the collective mystery — merely a scholars' term of course, but one to which the principal examples of the English mystery -drama correspond.

*The productions of the medieval religious drama it is usual technically to divide into three classes. The mysteries proper Mysteries ˆ ea ˆ w * 1 ˆ scr iptural events only, their purpose being miracles, to set forth, with the aid of the prophetic or preparatory and morals history of the Old Testament, and more especially of distln- the fulfilling events of the New, the central mystery guished. f t jj e Redemption of the world, as accomplished by the Nativity, the Passion and the Resurrection. But in fact*

these were not kept distinctly apart from the miracle-plays, or miracles, which are strictly speaking concerned with the legends of the saints of the church; and in England the name mysteries was not in use. Of these species the miracles must more especi- ally have been fed from the resources of the monastic literary drama. Thirdly, the moralities, or moral-plays, teach and illustrate the same truths — not, however, by direct representation of scriptural or legendary events and personages, but allegoric- ally, their characters being personified virtues or qualities. Of the moralities the Norman trouveres had been the inventors; and doubtless this, innovation connects itself with the endeavour, which in France had almost proved victorious by the end of the 13th century, to emancipate dramatic performances from the control of the church.

The attitude of the clergy towards the dramatic performances which had arisen out of the elaboration of the services of the church, but soon admitted elements from other sources, The clergy was not, and could not be, uniform. As the plays grew and the longer, their paraphernalia more extensive, and their religious , spectators more numerous, they began to be repre- drama – sented outside as well as inside the churches, at first in the churchyards, and the use of the vulgar tongue came to be gradu- ally preferred. A Beverley Resurrection play (1220c.) and some others are bilingual. Miracles were less dependent on this connexion with the church services than mysteries proper; and lay associations, gilds, and schools in particular, soon began to act plays in honour of their patron saints in or hear their own halls. Lastly, as scenes and characters of a more or less trivial description were admitted even into the plays acted or super- intended by the clergy, as spme of these characters came to be depended on by the audiences for conventional extravagance or fun, every new Herod seeking to out-Herod his predecessor, and the devils

and their chief asserting themselves as indispensable favourites, the comic element in the religious drama increased; and that drama itself, even where it remained associated with the church, grew more and more profane. The endeavour to sanctify the popular tastes to religious uses, which connects itself with the institution of the great festival of Corpus Christi (1264, confirmed 131 1), when the symbol of the mystery of the Incarna- tion was borne in solemn procession, led to the closer union of the dramatic exhibitions (hence often called processus) with this and other religious feasts; but it neither limited their range nor controlled their development.

It is impossible to condense into a few sentences the extremely varied history of the processes of transformation undergone by the medieval drama in Europe during the two centuries progress — from about 1200 to about 1400 — in which it ran of the a course of its own, and during the succeeding period, medieval in which it was only partially affected by the influence drama in of the Renaissance. A few typical phenomena may, Bur °P e – however, be noted in the case of the drama of each of the several chief countries of the West; where the vernacular successfully supplanted Latin as the ordinary medium of dramatic speech, where song was effectually ousted by recitation and dialogue, and where finally, though the emancipation was on this head nowhere absolute, the religious drama gave place to the secular.

In France, where dramatic performances had never fallen entirely into the hands of the clergy, the progress was speediest and most decided towards forms approaching those France of the modern drama, The earliest play in the French tongue, however, the 12th-century Adam, supposed to have been written by a Norman in England (as is a fragmentary RSsurreclion of much the same date) , still reveals its connexion with the liturgical drama. Jean Bodel of Arras' miracle-play of St Nicolas (before 1 205) is already the production of a secular author, probably designed for the edification of some civic con- fraternity to which he belonged, and has some realistic features. On the other hand, the Theophilus of Rutebeuf (d. c. 1280) treats its Faust-like theme, with which we meet again in Low-German dramatic literature two centuries later, in a rather lifeless form but in a highly religious spirit, and belongs to the cycle of miracles of the Virgin of which example? abound throughout.

MEDIEVAL]

DRAMA

this period. Easter or Passion plays were fully established in popular acceptance in Paris as well as in other towns of France by the end of the 14th century; and in 1402 the ConfrSrie de la Passion, who at first devoted themselves exclusively to the performance of this species, obtained a royal privilege for the purpose. These series of religious plays were both extensive and elaborate; perhaps the most notable series (c. 1450) is that by Arnoul Greban, who died as a canon of Le Mans, his native town. Its revision, by Jean Michel, containing much illustrative detail (first performed at Angers in i486), was very popular. Still more elaborate is the Rouen Christmas mystery of 1474, and the celebrated Mystere du vieil testament, produced at Abbeville in 1458, and performed at Paris in 1500. Most of the Provencal Christmas and Passion plays date from the 14th century, as well as a miracle of St Agnes. The miracles of saints were popular in all parts of France, and the diversity of local colouring naturally imparted to these productions contributed materially to the growth of the early French drama. The miracles of Ste Genevieve and St Denis came directly home to the inhabitants of Paris, as that of St Martin to the citizens of Tours; while the early victories of St Louis over the English might claim a national significance for the dramatic celebration of his deeds. The local saints of Provence were in their turn honoured by miracles dating from the 15th and 16th centuries.

It is less easy to trace the origins of the comic medieval drama in France, connected as they are with an extraordinary variety of associations for professional, pious and pleasurable purposes. The ludi inhonesti in which the students of a Paris college (Navarre) were in 13 15 debarred from engaging cannot be proved to have been dramatic performances; the earliest known secular plays presented by university students in France were moralities, performed in 1426 and 1431. These plays, depicting conflicts between opposing influences — and at bottom the struggle between good and evil in the human soul — become more frequent from about this time onwards. Now it is (at Rennes in 1439) the contention between Bien-avisl and Mal-avisi (who at the close find themselves respectively in charge of Bonne-fin and Male- fin); now, one between Ihomme juste and Vhomme mondain; now, the contrasted story of Les Enfants de Maintenant, who, however, is no abstraction, but an honest baker with a wife called Mignotte. Political and social problems are likewise treated; and the Mystere du Concile de Bdie — an historical morality — dates back to 1432. But thought is taken even more largely of the sufferings of the people than of the controversies of the

Church; and in 1507 we even meet with a hygienic or abstinence morality (by N. de la Chesnaye) in which " Banquet " enters into a conspiracy with " Apoplexy," " Epilepsy " and the whole regiment of diseases.

Long before this development of an artificial species had been consummated— from the beginning of the 14th century onwards — the famous fraternity or professional union of the Basoche (clerks of the Parlement and the Ch&telet) had been entrusted with the conduct of popular festivals at Paris, in which, as of right, they took a prominent personal share; and from a date unknown they had performed plays. But after the ConfrSrie de la Passion had been allowed to monopolize the religious drama, the basochiens had confined themselves to the presentment of moralities and of farces (from Italian farsd, Latin farcUa), in which political satire had as a matter of course when possible found a . place. A third association, calling themselves the Enfans sans souci, had, apparently also early in the 15th century, acquired celebrity by their performances of short comic plays called soties — in which, as it would seem, at first allegorical figures ironically " played the fool," but which were probably before long not very carefully kept distinct from the farces of the Basoche, and were like these on occasion made to serve the purposes of State or of Church. Other confraternities and associations readily took a leaf out of the book of these devil-may-care good-fellows, and interwove their religious and moral plays with comic scenes and characters from actual life, thus becoming more and more free and secular in their dramatic methods, and unconsciously preparing the transition to the regular drama.

*The earliest example of a serious secular play known to have been written in the French tongue is the Estoire de Griseldis (*393) > which is in the style of the miracles of the Virgin, but is iargely indebted to Petrarch. The Mystere du siege d'Orlians, on the other hand, written about half a century later, in the epic tediousness of its manner comes near to a chronicle history, and interests us chiefly as the earliest of many efforts to bring Joan of Arc on the stage. Jacques Milet's celebrated mystery of the Destruction de Troye la grant (1452) seems to have been addressed to readers and not to hearers only. The begin- nings of the French regular comic drama are again more difficult to extract from the copious literature of farces and soties, which, after mingling actual types with abstract and allegorical figures, gradually came to exclude all but the concrete personages; moreover, the large majority of these productions in their extant form belong to a later period than that now under considera- tion. But there is ample evidence that the most famous of*

all medieval farces, the immortal Maistre Pierre Pathelin (other- wise L'Avocat Pathelin), was written before 1470 and acted by the basochiens; and we may conclude that this delightful story of the biter bit, and the profession outwitted, typifies a multi- tude of similar comic episodes of real life, dramatized for the delectation of clerks, lawyers and students, and of all lovers of laughter.

*In the neighbouring Netherlands many Easter and Christmas mysteries are noted from the middle of the 1 5 th century, attesting the enduring popularity of these religious plays; and with them the celebrated series of the Seven Joys of T! 1 * Maria — of which the first is the Annunciation and the lands. seventh the Ascension. To about the same date belongs the small group of the so-called abele spelen (as who should say plays easily managed), chiefly on chivalrous themes. Though allegorical figures are already to be found in the Netherlands miracles of Mary, the species of the moralities was specially cultivated during the great Burgundian period of this century by the chambers or lodges of the Rederijkers (rhetoricians) — the well-known civic associations which devoted themselves to the cultivation of learned poetry and took an active share in the festivals that formed one of the most characteristic features of the life of the Low Countries. Among these moralities was that of Elckerlijk (printed 1495 and presumably by Peter Dorlandus) , which there is good reason for regarding as the original of one of the finest of English moralities, Everyman.*

In Italy the liturgical drama must have run its course as elsewhere; but the traces of it are few, and confined to the north-east. The collective mystery, so common in other Western countries, is in Italian literature represented by a single example only — a Passione di Gesu Cristo, performed at Revello in Saluzzo in the 15th century; though there are some traces of other cyclic dramas of the kind. The Italian religious plays, called figure when on Old, vangeli when on New, Testament subjects, and differing from those of northern Europe chiefly by the less degree of coarseness in their comic characters, seem largely to have sprung out of the development of the processional element in the festivals of the Church. Besides such processions as that of the Three Kings at Epiphany in Milan, there were the penitential processions and songs (laude) , which at Assisi, Perugia and elsewhere already contained a dramatic element; and at Siena, Florence and other centres these again developed into the so-called isacre) rappresentazioni, which became the most usual name for this kind of entertainment, Such a piece was the San Giovanni e San Paolo (1489), by Lorenzo the Magnificent — the prince who afterwards sought to reform the Italian stage by paganizing it;

another was the Santa Teodora, by Luigi Pulci (d. 1487); San Giovanni Gualberto (of Florence) treats the religious experience of a latter-day saint; Rosana e Ulimento is a love-story with a Christian moral. Passion plays were performed at Rome in the Coliseum by the Compagnia del Gonf alone; but there is no evidence on this head before the end of the 1 5th century. In general, the spectacular magnificence of Italian theatrical displays accorded with the growing pomp of the processions both ecclesiastical and lay— called trionfi

Kafy.

5°°

DRAMA

[EARLY ENGLISH

already in the days of Dante; while the religious drama gradu- ally acquired an artificial character and elaboration of form assimilating it to the classical attempts, to be noted below, which gave rise to the regular Italian drama. The poetry of the Troubadours, which had come from Provence into Italy, here frequently took a dramatic form, and may have suggested some of his earlier poetic experiments to Petrarch.

It was a matter of course that remnants of the ancient popular dramatic entertainments should have survived in particular abundance on Italian soil. They were to be recognized in the improvised farces performed at the courts, in the churches (farse spiritual!), and among the people; the Roman carnival had preserved its wagon-plays, and various links remained to connect the modern comic drama of the Italians with the Atellanes and mimes of their ancestors. But the more notable later comic developments, which belong to the 16th century, will be more appropriately noticed below. Moralities proper had not flourished in Italy, where the love of the concrete has always been dominant in popular taste; more numerous are examples of scenes, largely mythological, in which the influence of the Renaissance is already perceptible, of eclogues, and of allegorical festival-plays of various sorts.

In Spain hardly a monument of the medieval religious drama has been preserved. There is manuscript evidence of the nth „ . century attesting the early addition of dramatic

elements to the Easter office; and a Spanish fragment of the Three Kings Epiphany play, dating from the 12th century, is, like the

French Adam, one of the very earliest examples of the medieval drama in the vernacular. But that religious plays were performed in Spain is clear from the permission granted by Alphonso X. of Castile (d. 1284) to the clergy to represent them, while prohibiting the performance by them of juegos de escarnio (mocking plays). The earliest Spanish plays which we possess belong to the end of the 15th or beginning of the 16th century, and already show humanistic influence. In 1472 the couplets of Mingo Revulgo (i.e. Domingo Vulgus, the common people) , and about the same time another dialogue by the same author, offer examples of a sort resembling the Italian contrasti (see below) .

The German religious plays in the vernacular, the earliest of which date from the 14th and 15th centuries, and were produced _ at Trier, Wolfenbtittel, Innsbruck, Vienna, Berlin, &c,

were of a simple kind; but in some of them, though they were written by clerks, there are traces of the minstrels' hands. The earliest complete Christmas play in German, contained in a 14th-century St Gallen MS., has nothing in it to suggest a Latin original. On the other hand, the play of The Wise and the Foolish Virgins, in a Thuringian MS. thought to be as early as 1328, a piece of remarkable dignity, was evidently based on a Latin play. Other festivals besides Christmas were celebrated by plays; but down to the Reformation Easter enjoyed a preference. In the same century miracle-plays began to be performed, in honour of St Catherine, St Dorothea and other saints. But all these productions seem to belong to a period when the drama was still under ecclesiastical control. Gradually, as the liturgical drama returned to the simpler forms from which it had so surprisingly expanded, and ultimately died out, the religious plays performed outside the churches expanded more freely; and the type of mystery associated with the name of the Frankfort canon Baldemar von Peterweil communicated itself, with other examples, to the receptive region of the south- west. The Corpus Christi plays, or (as they were here called) Frohnleichnamsspiele, are notable, since that of Innsbruck (1301) is probably the earliest extant example of its class. The number of non-scriptural religious plays in Germany was much smaller than that in France; but it may be noted that (in accordance with a long-enduring popular notion) the theme of the last judgment was common in Germany in the latter part of the middle ages. Of this theme Antichrist may be regarded as an episode, though in 1469 an Antichrist appears to have occupied at Frankfort four days in its performance. The earlier (12th century) Antichrist is a production quite unique of its kind;

this political protest breathes the Ghibelline spirit of the reign (Frederick Barbarossa's) in which it was composed.

Though many of the early German plays contain an element of the moralities, there were few representative German examples of the species. The academical instinct, or some other influence, kept the more elaborate productions on the whole apart from the drolleries of the professional strollers (fahrende Leute), whose Shrove-Tuesday plays (Fastnachtsspiele) and cognate productions reproduced the practical fun of common life. Occasionally, no doubt, as in the Lubeck Fastnachtsspiel of the Five Virtues, the two species may have more or less closely approached to one another. When, in the course of the 15th century, Hans Rosen- pltit, called Schnepperer — or Hans Schnepperer, called Rosenplut — the predecessor of Hans Sachs, first gave a more enduring form to the popular Shrove-Tuesday plays, a connexion was already establishing itself between the dramatic amusements of the people and the literary efforts of the " master-singers " of the towns. But, while the main productivity of the writers of moralities and cognate productions — a species particularly suited to German latitudes — falls into the periods of Renaissance and Reformation, the religious drama proper survived far beyond either in Catholic Germany, and, in fact, was not suppressed in Bavaria and Tirol till the end of the 18th century. 1

*It may be added that the performance of miracle-plays is traceable in Sweden in the latter half of the 14th century; and that the German clerks and laymen who immigrated Sweden into the Carpathian lands, and into Galicia in particular, Car- in the later middle ages, brought with them their pathian religious plays together with other elements of culture. laads > *& This fact is the more striking, inasmuch as, though Czech Easter plays were performed about the end of the 14th century, we hear of none among the Magyars, or among their neighbours of the Eastern empire.*

Coming now to the English religious drama, we find that from its extant literature a fair general idea may be derived of the character of these medieval productions. The miracle- plays, miracles or plays (these being the terms used in Religious England) of which we hear in London in the 12 th England. century were probably written in Latin and acted by ecclesiastics; but already in the following century mention is made— in the way of prohibition — of plays acted by professional players. (Isolated moralities of the 12th century are not to be regarded as popular productions.) In England as elsewhere, the clergy either sought to retain their control over the religious plays, which continued to be occasionally acted in churches even after the

Reformation, or else reprobated them with or without qualifications. In Cornwall miracles in the native Cymric dialect were performed at an early date ; C° ralsb but those which have been preserved are apparently plays. copies of English (with the occasional use of French) originals; they were represented, unlike the English plays, in the open country, in extensive amphitheatres constructed for the purpose — one of which, at St Just near Penzance, has recently been restored.

The flourishing period of English miracle-plays begins with the practice of their performance by trading-companies in the towns, though these bodies were by no means possessed of any special privileges for the purpose. Of this practice Chester is said to have set the example (1268-1276); it was followed in the course of the 13 th and 14th centuries by many other towns, while in yet others traces of such performances are not to be found till the 15th, or even the 16th. These towns with their neighbourhoods include, starting from liast Anglia, where the religious drama was particularly at home, Wymondham, Norwich, Sleaford, Lincoln, Leeds, Wakefield, Beverley, York, Newcastle-on-Tyne, with a deviation across the border to Edinburgh and Aberdeen. In the north-west they are found at Kendal, Lancaster, Preston,

l The passion-play of Oberammergau, familiar in its present artistic form to so many visitors, was instituted under special circum-stances in the days of the Thirty Years' War (1634). Various reasons account for its having been allowed to survive.

Localities of the perform- ance of miracle- plays.

Chester; whence they may be supposed to have migrated to Dublin. In the west they are noticeable at Shrewsbury, Wor- cester and Tewkesbury; , in tne Midlands at Coventry and Leicester; in the east at Cambridge and Bassingbourne, Hey- bridge and Manningtree; to which places have to be added Reading, Winchester, Canterbury, Bethesda and London, in which last the performers were the parish-clerks. Four collections, in addition to some single examples of such plays, Th Y k have come down to us, the York plays, the so-called Towneley, Towneley plays, which were probably acted at the Chester

fairs of Widkirk, near Wakefield, and those bearing the aad names of Chester and of Coventry. Their dates, in the

plays. Iorms m which they have come down to us, are more or less uncertain; that of the York may on the whole be concluded to be earlier than that of the Towneley, which were probably put together about the middle of the 14th century ; the Chester may be ascribed to the close of the 14th or the earlier part of the 15th; the body of the Coventry probably belongs to the 1 5th or 16th. Many of the individual plays in these collections were doubtless founded on French originals; others are taken direct from Scripture, from the apocryphal gospels, or from the legends of the saints. Their characteristic feature is the combina- tion of a whole series of plays into one collective whole, exhibiting the entire course of Bible history from the creation to the day of judgment. For this combination it is unnecessary to suppose that they were generally indebted to foreign examples, though there are several remarkable coincidences between the Chester plays and the French Mystere du vieil testament. Indeed, the oldest of the series — the York plays — exhibits a fairly close parallel to the scheme of the Cursor mundi, an epic poem of Northumbrian origin, which early in the 14th century had set an example of treatment that unmistakably influenced the collective mysteries as a whole. Among the isolated plays of the same type which have come down to us may be mentioned The Harrowing of Hell (the Saviour's descent into hell), an East-Midland production which professes to tell of " a strif of Jesu and of Satan " and is probably the earliest dramatic, or all but dramatic, work in English that has been preserved; and several belonging to a series known as the Digby Mysteries, including Parfre's Candlemas Day (the massacre of the Innocents) , and the very interesting miracle of Mary Magdalene. Of the so-called " Paternoster " and " Creed " plays (which exhibit the miraculous powers of portions of the Church service) no example remains, though of some we have an account; the Croxton Play of the Sacrament, the MS. of which is preserved at Dublin, and which seems to date from the latter half of the 15th century, exhibits the triumph of the holy wafer over wicked Jewish wiles.

To return to the collective mysteries, as they present them- selves to us in the chief extant series. " The manner of these plays," we read in a description of those at Chester, collective dating from the close of the 16th century, " were : — mysteries. Every company had his pageant, which pageants were a high scaffold with two rooms, a higher and a lower, upon four wheels. In the lower they apparelled themselves, and in the higher room they played, being all open at the

top, that all beholders might hear and see them. The places where they played them was in every street. They began first at the abbey gates, and when the first pageant was played, it was wheeled to the high cross before the mayor, and so to every street, and so every street had a pageant playing before them at one time till all the pageants appointed for the day were played; and when one pageant was near ended, word was brought from street to street, that so they might come in place thereof, ex- ceedingly orderly, and all the streets have their pageants afore them all at one time playing together; to see which plays was great resort, and also scaffolds and stages made in the streets in those places where they determined to play their pageants."

Each play, then, was performed by the representative of a particular trade or company, after whom it was called the fishers', glovers', &c, pageant; while a general prologue was spoken by a herald. As a rule the movable stage sufficed for the

action, though we find horsemen riding up to the scaffold, and Herod instructed to " rage in the pagond and in the strete also." There is no probability that the stage was, as in France, divided into three platforms with a dark cavern at the side of the lowest, appropriated respectively to the Heavenly Father and his angels, to saints and glorified men, to mere men, and to souls in hell. But the last-named locality was frequently displayed in the English miracles, with or without fire in its mouth. The costumes were in part conventional, — divine and saintly person- ages being distinguished by gilt hair and beards, Herod being clad as a Saracen, the demons wearing hideous heads, the souls black and white coats according to their kind, and the angels gold skins and wings.

*Doubtless these performances abounded in what seem to us ludicrous features; and, though their main purpose was serious, they were not in England at least intended to be devoid of fun. But many of the features in question oˆthe *" are in truth only homely and naif, and the simplicity plays. of feeling which they exhibit is at times pathetic rather than laughable. The occasional grossness is due to an absence of refinement of taste rather than to an obliquity of moral sentiment. These features the four series have more or less in common, still there are certain obvious distinctions between them. The York plays (48), which were performed at Corpus Christi, are comparatively free from the tendency to jocularity and vulgarity observable in the Towneley; several of the plays concerned with the New Testament and early Christian story are, however, in substance common to both series. The Towneley Plays or Wakefield Mysteries (32) were*

undoubtedly composed by the friars of Widkirk or Nostel; but they are of a popular character; and, while somewhat over-free in tone, are superior in vivacity and humour to both the later collections. The Chester Plays (25) were undoubtedly indebted both to the Mystere du vieil testament and to earlier French mysteries; they are less popular in character than the earlier two cycles, and on the whole undistinguished by original power of pathos or humour. There is, on the other hand, a notable inner completeness in this series, which includes a play of Antichrist, devoid of course of any modern application. While these plays were performed at Whitsuntide, the Coventry Plays (42) were Corpus Christi performances. Though there is no proof that the extant series were composed by the Grey Friars, they reveal a considerable knowledge of ecclesiastical literature. For the rest, they are far more effectively written than the Chester Plays, and occasionally rise to real dramatic force. In the Coventry series there is already to be observed an element of abstract figures, which connects them with a different species of the medieval drama.

The moralities corresponded to the love for allegory which manifests itself in so many periods of English literature, and which,while dominating the whole field of medieval M 0ra /#/ es literature, was nowhere more assiduously and effectively cultivated than in England. It is necessary to bear this in mind, in order to understand what to us seems so strange, the popularity of the moral-plays, which indeed never equalled that of the miracles, but sufficed to maintain the former species till it received a fresh impulse from the connexion established between it and the " new learning," together with the new political and religious ideas and questions, of the Reformation age. Moreover, a specially popular element was supplied to these plays, which in manner of representation differed in no essential point from the miracles, in a character borrowed from the latter, and, in the moralities, usually provided with a com- panion whose task it was to lighten the weight of such abstrac- tions as Sapience and Justice. These were the Devil and his attendant the Vice, of whom the latter seems to and tbe have been of native origin, and, as he was usually dressed vice. in a fool's habit, was probably suggested by the familiar custom of keeping an attendant fool at court or in great houses. The Vice had many aliases {Shift, Ambidexter, Sin, Fraud, Iniquity, &c), but his usual duty is to torment and tease the Devil his master for the edification and diversion of the audience.

He was gradually blended with the domestic fool, who survived in the regular drama. There are other concrete elements in the moralities; for typical figures are often fitted with concrete names, and thus all but converted into concrete human personages.

The earlier English moralities I — from the reign of Henry VI. to that of Henry VII. — usually allegorize the conflict between

good and evil in the mind and life of man, without any p""!!"h 0f side-intention of theological controversy. Such also moralities. is st iU essentially the purpose of the extant morality

by Henry VIII.'s poet, the witty Skelton. 2 Everyman (pr. c. 1529), perhaps the most perfect example of its class, with which the present generation has fortunately become familiar, contains passages certainly designed to enforce the specific teaching of Rome. But its Dutch original was written at least a generation earlier, and could have no controversial intention. On the other hand, R. Wever's Lusty Juventus breathes the spirit of the dogmatic reformation of the reign of Edward VI. Theological controversy largely occupies the moralities of the earlier part of Elizabeth's reign, 3 and connects itself with political feeling in a famous morality, Sir David Lyndsay's Satire of the Three Estaitis, written and acted (at Cupar, in 1539) on the other side of the border, where such efforts as the religious drama proper had made had been extinguished by the Reformation. Only a single English political morality proper remains to us, which belongs to the beginning of the reign of Elizabeth. 4 Another series connects itself with the ideas of the Renaissance rather than the Reformation, treating of intellectual progress rather than of moral conduct; 5 this extends from the reign of Henry VIII. to that of his younger daughter. Besides these, there remain some Elizabethan moralities which have no special theological or scientific purpose, and which are none the less lively in consequence. 6

The transition from the morality to the regular drama in England was effected, on the one hand, by the intermixture of

historical personages with abstractions— as in Bishop frˆmtte" Bale's KyngJohan(c. 1548)— which easily led over to morality the chronicle history; on the other, by the introduction to the f types of real life by the side of abstract figures. regular r £\ i { s latter tendency, of which instances occur in earlier

plays, is observable in several of the 16th-century moralities ; 7 but before most of these were written, a further step in advance had been taken by a man of genius, John

Heywood (b. c. 1500, d. between 1577 and 1587), Tteri'des' 5 wnose " interludes " 8 were short farces in the French

manner. The term " interludes " was by no means new, but had been applied by friend and foe to religious plays, and plays (including moralities) in general, already in the 14th century. But it conveniently serves to designate a species which marks a distinct stage in the history of the modern drama. Heywood's interludes dealt entirely with real — very real— men and women. Orthodox and conservative, he had at the same time a keen eye for the vices as well as the follies of his age, and not the least for those of the clerical profession. Other writers, such as T. Ingeland, 9 took the same direction; and the allegory of abstractions was thus undermined on the stage, very much as in didactic literature the ground had been cut from under its feet by the Ship of Fooles. Thus the interludes facilitated the advent of comedy, without having superseded the earlier form. Both moralities and miracle-plays survived into the Elizabethan age after the regular drama had already begun its course.

1 To the earliest group belong The Castle of Perseverance ; Wisdom who is Christ; Mankind; to the second, or early Tudor group, Med well, Nature; The World and the Child; Hycke-Scorner, &c.

2 Magnyfycence.

- *New Custome ; N. Woodes, The Conflict of Conscience, &c. 4 Albyon Knight.*

6 Rastell, Nature of the Four Elements; Redford, Wit and Science; The Trial of Treasure; The Marriage of Wit and Science.

6 The Marriage of Wit and .Wisdom; The Contention between Liberality and Prodigality.

7 Jack Juggler; Tom Tiler and his Wife, &c.

8 The Four P's, &c. » The Disobedient Child (c. 1560).

Such, in barest outline, was the progress of dramatic entertainments in the principal countries of Europe, before the revival of classical studies brought about a return to the examples p of the

classical drama, or before this return had distinctly asserted itself. It must not, however, be forgotten that from an early period in England as elsewhere had flourished a species of entertainments, not properly speaking dramatic, but largely contributing to form and foster a taste for dramatic spectacles. The pageants — as they were called in England — were the successors of those ridings from which, when they gladdened " Chepe," Chaucer's idle apprentice would not keep away; but they had advanced in splendour and ingenuity of device under the influence of Flemish and other foreign examples. Costumed figures represented before gaping citizens the heroes of mythology and history, and the abstractions of moral, patriotic, or municipal allegory; and the city of London clung with special fervour to these exhibitions, which the Elizabethan drama was neither able nor — as represented by most of its poets who composed devices and short texts for these and similar shows — willing to oust from popular favour. Some of the greatest and some of the least of English dramatists were the ministers of pageantry; and perhaps it would have been an advantage for the future of the theatre if the legitimate drama and the Triumphs of Old Drapery had been more jealously kept apart. With the reign of Henry VIII. there also set in a varied succession of entertainments at court and in the houses of the great nobles, which may be said to have lasted through the Tudor and early Stuart periods; but it would be an endless task to attempt to discriminate the dramatic elements contained in these produc- tions. The " mask," stated to have been introduced from Italy into England as a new diversion in 1512-1513, at first merely added a fresh element of " disguising " to those already in use; as a quasi-dramatic species (" mask " or " masque ") capable of a great literary development it hardly asserted itself till quite the end of the 16th century.

11. The Modern National Drama The literary influence which finally transformed the growths noticed above into the national dramas of the several countries of Europe, was that of the Renaissance. Among the i„a ueace remains of classical antiquity which were studied, of the translated arid imitated, those of the drama necessarily Renais- held a prominent place. Never altogether lost sight of , saace – they now became subjects of devoted research and models for more or less exact imitation, first in Greek or Latin, then in modern tongues; and these essentially literary endeavours came into more or less direct contact with, and acquired more or less control over, dramatic performances and entertainments already in existence. This process it will be most convenient to pursue seriatim, in connexion with the rise and progress of the several dramatic literatures of the West. For

no sooner had the stream of the modern drama, whose source and contributories have been described, been brought back into the ancient bed, than its flow diverged into a number of national currents, unequal in impetus and strength, and varying in accordance with their manifold surroundings. And even of these it is only possible to survey the most productive or important.

(a) Italy. The priority in this as in most of the other aspects of the Renaissance belongs to Italy. In ultimate achievement the Italian drama fell short of the fulness of the results The obtained elsewhere — a surprising fact when it is modern considered, not only that the Italian language had the Italian vantage-ground of closest relationship to the Latin, drama. but that the genius of the Italian people has at all times led it to love the drama. The cause is doubtless to be sought in the lack, noticeable in Italian national life during a long period, and more especially during the troubled days of division and strife coinciding with the rise and earlier promise of Italian dramatic literature, of those loftiest and most potent impulses of popular feeling to which a national drama owes so much of its strength. This deficiency was due partly to the peculiarities of the Italian

character, partly to the political and ecclesiastical experiences which Italy was fated to undergo. The Italians were alike strangers to the enthusiasm of patriotism, which was as the breath in the nostrils of the English Elizabethan age, and to the religious devotion which identified Spain with the spirit of the Catholic revival. The clear-sightedness of the Italians had something to do with this, for they were too intelligent to believe in their tyrants, and too free from illusions to deliver up their minds to their priests. Finally, the chilling and enervating effects of a pressure of foreign domination, such as no Western people with a history and a civilization like those of Italy has ever experienced, contributed to paralyse for many generations the higher efforts of the dramatic art. No basis was permanently found for a really national tragedy; while literary comedy, after turning from the direct imitation of Latin models to a more popular form, lost itself in an abandoned immorality of tone and in reckless insolence of invective against particular classes of society. Though its productivity long continued, the poetic drama more and more

concentrated its efforts upon subordinate or subsidiary species, artificial in origin and decorative in purpose, and sur- rendered its substance to the overpowering aids of music, dancing and spectacle. Only a single form of the Italian drama, impro- vised comedy, remained truly national; and this was of its nature dissociated from higher literary effort. The revival of Italian tragedy in later times is due partly to the imitation of French models, partly to the endeavour of a brilliant genius to infuse into his art the historical and political spirit. Comedy likewise attained to new growths of considerable significance, when it was sought to accommodate its popular forms to the representation of real life in a wider range, and again to render it more poetical in accordance with the tendencies of modern romanticism.

The regular Italian drama, in both its tragic and its comic branches, began with a reproduction, in the Latin language, of classical models — the first step, as it was to prove, towards the transformation of the medieval into the modern drama, and the birth of modern dramatic literature. But the process was both tentative and tedious, and must have died away but for the pomp and circumstance with which some of the patrons of the Renaissance at Florence, Rome and elsewhere surrounded these manifestations of a fashionable taste, and for the patriotic inspiration which from the first induced Italian writers to dramatize themes of national historic interest. Greek tragedy had been long forgotten, and one or two indications in the earlier part of the 16th century of Italian interest in the Greek drama, chiefly due to the printing presses, may be passed by. 1 To the later middle ages classical tragedy meant Seneca, and even his plays remained unremembered till the study of them was revived by the Paduan judge Lovato de' Lovati (Lupatus, d. 1309). Of the comedies of Plautus three-fifths were not rediscovered till 1420; and though Terence was much read in the schools, he found no dramatic imitators, pour le bon motif or otherwise, since Hrosvitha.

Thus the first medieval follower of Seneca, Albertino Mussato (1261-1330) ma}' in a sense be called the father of modern dramatic literature. Born at Padua, to which city all his services were given, he in 1315 brought out his Eccerinis, a Latin tragedy very near to the confines of epic poetry, intended to warn the Paduans against the designs of Can Grande della Scala by the example of the tyrant Ezzelino. Other tragedies of mudi the same type followed during the ensuing century; such as L. da Fabiano's De casu Caesenae (1377) a sort of chronicle history in Latin prose on Cardinal Albornoz' capture of Caesena. 2 Purely

1 The Xpioros vaaxav, an artificial Byzantine product, probably of the nth century, glorifying the Virgin in Euripidean verse, was not known to the Western world till 1542.

2 Of G. Manzini della Motta's Latin tragedy on the fall of Antonio della Scala only a chorus remains. He died after 1389. Probably to the earlier half of the century belongs the Latin prose drama Columpnarium, the story of which, though it ends happily, resembles that of The Cenci. Later plays in Latin of the historic type are the extant Landivio de' Nobili's De captivitate Duds Jacobi (the condottiere Jacopo Piccinino, d. 1464); C. Verardi's Historia Baetica

classical themes were treated in the Achilleis of A. de' Loschi of Vicenza (d. 1441), formerly attributed to Mussato, several passages of which are taken verbally from Seneca; in the celebrated Progne of the Venetian Gregorio Cornaro, which is dated 1428-1429, and in later Latin productions included among the translations and imitations of Greek and Latin tragedies and comedies by Bishop Martirano (d. 1557), the friend of Pope Leo X., 3 and the efforts of Pomponius Laetus and his followers, who, with theaid of Cardinal Raffaele Riario (1451-1521), sought to revive the ancient theatre, with all its classical associations, at Rome.

In this general movement Latin comedy had quickly followed suit, and, as just indicated, it is almost impossible, when we reach the height of the Italian Renaissance under the Medici at Florence and at Rome in particular, to review the progress of either species apart from that of the other. If we possessed the lost Philologia of Petrarch, of which, as of a juvenile work, he declared himself ashamed, this would be the earliest of extant humanistic comedies. As it is, this position is held by Paulus, a Latin comedy of life on the classic model, by the orthodox P. P. Vergerio (1370-1444) ; which was followed by many others. 4

Early in the 16th century, tragedy began to be written in the native tongue; but it retained from the first, and never wholly lost, the impress of its origin. Whatever the source /< a // an of its subjects — which, though mostly of classical tragedy in origin, were occasionally derived from native romance, the 16th or even due to invention — they were all treated with cen ury ' a predilection for the horrible, inspired by the example of Seneca, though no doubt encouraged by a perennial national taste. The chorus, stationary on the stage as in old Roman tragedy, was not reduced to a merely occasional appearance between the acts till the beginning of the 17th century, or ousted altogether from the tragic drama till the earlier

half of the 18th. Thus the changes undergone by Italian tragedy were for a long series of generations chiefly confined to the form of versification and the choice of themes; nor was it, at all events till the last century of the course which it has hitherto run, more than the aftergrowth of an aftergrowth. The honour of having been the earliest tragedy in Italian seems to belong to A. da Pistoia's Pamfila (1499), of which the subject was taken from Boccaccio, introduced by the ghost of Seneca, and marred in the taking. Carretto's Sofonisba, which hardly rises above the art of a chronicle history, though provided with a chorus, followed in 1502. But the play usually associated with the beginning of Italian tragedy — that with which " th' Italian scene first learned to glow " — was another Sofonisba, acted before Leo X. in 1515, and written in blank hendecasyllables instead of the ottava and lerza rima of the earlier tragedians (retaining, however, the lyric measures of the chorus), by G. G. Trissino, who was employed as nuncio by that pope. Other tragedies of the former half of the 16th century, largely inspired by Trissino's example, were the Rosmunda of Rucellai, a nephew of Lorenzo the Magnificent ■(1516); Martelli's Tullia, Alamanni's Antigone (1532); the Canace of Sperone Speroni, the envious Mopsus of Tasso, who, like Guarini, took Sperone's elaborate style for his model; the

(the expulsion of the Moors from Granada) (1492), and the same author's Ferdinandus (of Aragon) Servatus, which is called a tragi-comedy because it is neither tragic nor comic. The Florentine L. Dalis Hiempsal (1441-1442) remains in MS. A few tragedies on sacred subjects were produced in Italy during the last quarter of the 15th century, anc} a little later. Such were the religious dramas written for his pupils by P. Domizio, on which Politian cast contempt ; and the tragedies, following ancient models, of T. da Prato of Treviso, B. Campagna of Verona, De passione Redemptvris; and G. F. Conti, author of Theandrothanalos and numerous vanished plays.

3 Imber aureus (Danae), &c.

4 L. Brum's Poliscena (c. 1395) ; Sicco Polentone's (1370-1463) jovial Lusus ebriorum s. De lege bibia; the papal secretary P. Candido Decembrio's (1399-1477) non-extant Aphrodisia; L. B. Alberti's Philodoxios (1424); Ugolino Pisani of Parma's (d. before 1462) Philogenia and Confutatio coqainaria (a merry students' play) ; the Fraudiphila of A. Tridentino, also of Parma, who died after 1470 and perhaps served Pius II.; Eneo Silvio de' Piccolomini's own verse comedy, Chrisis, likewise in MS., written in 1444; P. Domizio's Lucinia, acted in the palace of Lorenzo de' Medici in

Orazia. the earliest dramatic treatment of this famous subject by the notorious Aretino (1549); and the nine tragedies of G. B. Giraldi (Cinthio) of Ferrara, among which L' Orbecche (1541) is accounted the best and the bloodiest. Cinthio, the author of those Hecatommithi to which Shakespeare was indebted for so many of his subjects, was (supposing him to have invented these) the first Italian who was the author of the fables of his own dramas; he introduced some novelties into dramatic construc- tion, separating the prologue and probably also the epilogue from the action, and has by some been regarded as the inventor of the pastoral drama. But his style was arid. In the latter half of the 1 6th century may be mentioned the Didone and the Marianna of L. Dolce, the translator of Euripides and Seneca (1565); A. Leonico's II Soldato (1SS0); the Adriana (acted before 1561 or 1586) of L. Groto, which treats the story of Romeo and Juliet; Tasso's Torrismondo (1587); the Tancredi of Asinari (1588) ; and the Merope of Torelli (1593), the last who employed the stationary chorus (corofisso) on the Italian stage. Leonico's Soldato is noticeable as supposed to have given rise to the tragedia cittadina, or domestic tragedy, of which there are few examples in the Italian drama, and De Velo's Tamar (1586) as written in prose. Subjects of modern historical interest were in this period treated only in isolated instances. 1

The tragedians of the 17th century continued to pursue the beaten track, marked out already in the 16th by rigid prescrip- italiaa tion. In course of time, however, they sought by the tragedy introduction of musical airs to compromise with the in the nth danger with which their art was threatened of being and 18th (; n Voltaire's phrase) extinguished by the beautiful cen unes. mons t er) tri e p eraj now rapidly gaining ground in the country of its origin. (See Opera.) To Count P. Bonarelli (1589-1659), the author of Solimano, is on the other hand ascribed the first disuse of the chorus in Italian tragedy. The innovation of the use of rhyme attempted in the learned Palla- vicino's Erminigildo (1655), and defended by him in a discourse prefixed to the pkiy, was unable to achieve a permanent success in Italy any more than in England; its chief representative was afterwards Martelli (d. 1727), whose rhymed Alexandrian verse

(Martelliano) , though on one occasion used in comedy by Goldoni, failed to commend itself to the popular taste. By the end of the 1 7 th century Italian tragedy seemed destined to expire, and the great tragic actor Cotta had withdrawn in disgust at the apathy of the public towards the higher forms of the drama. The 1 8th century was, however, to witness a change, the begin- nings of which are attributed to the institution of the Academy of the Arcadians at Rome (1690). The principal efforts of the new school of writers and critics were directed to the abolition of the chorus, and to a general increase of freedom in treatment. Mattel Before long the marquis S. Maffei with his Merope

(first printed 17 13) achieved one of the most brilliant successes recorded in the history of dramatic literature. This play, which is devoid of any love-story, long continued to be considered the masterpiece of Italian tragedy; Voltaire, who declared it " worthy of the most glorious days of Athens," adapted it for the French stage, and it inspired a celebrated production of the English drama. 2 It was followed by a tragedy full of horrors, 3 noticeable as having given rise to the first Italian dramatic parody; and by the highly esteemed productions of

Granelli(d.i769)andhiscontemporaryBettinelli. P.T. stasia. Metastasio (1698-1782)ˆ110 had early begun his career

as a dramatist by a strict adherence to the precepts of Aristotle, gained celebrity by his contributions to the operatic drama at Naples, Venice and Vienna (where he held office as poela cesareo, whose function was to arrange the court entertain- ments). But his libretti have a poetic value of their own; 4 and Voltaire pronounced much of him worthy of Corneille and of Racine, when at their best. The influence of Voltaire had now come to predominate over the Italian drama; and, in accordance

1 Mondella, Isifile (1582); Fuligni, Bragadino (1589).

2 Home, Douglas.

3 Lazzaroni, Ulisse il giovane (1719).

4 Didone abbandonata, Siroe, Semiramide, Artaserse, Demetris, &c.

with the spirit of the times, greater freedom prevailed in the choice of tragic themes. Thus the greatest of Italian tragic poets, Count V. Alfieri (1749-1803), found his path prepared Mn for him. Alfieri's grand and impassioned treatment of his subjects caused his faultiness

of form, which he never altogether overcame, to be forgotten. His themes were partly classical; 6 but the spirit of a love of freedom which his creations 6 breathe was the herald of the national ideas of the future. Spurning the usages of French tragedy, his plays, which abound in soliloquies, owe" part of their effect to an impassioned force of declamation, part to those "points" by which Italian acting seems pre-eminently capable of thrilling an audience. He has much besides the subjects of two of his dramas 7 in common with Schiller, but his amazon-muse (as Schlegel called her) was not schooled into serenity, like the muse of the German poet. Among his numerous plays (21), Merope and Saul, and perhaps Mirra, are accounted his masterpieces.

The political colouring given by Alfieri to Italian tragedy reappears in the plays of U. Foscolo and A. Manzoni, both of whom are under the influence of the romantic school of modern literature; and to these names must be .ˆ age ." added those of S. Pellico and G. B. Niccolini (1785- AiOeti. 1861), Paolo Giacometti (b. 1816) and others, whose dramas 8 treat largely national themes familiar to all students of modern history and literature. In their hands Italian tragedy upon the whole adhered to its love of strong situations and passionate declamation. Since the successful efforts of G. Modena (1804-1861) renovated the tragic stage in Italy, the art of tragic acting long stood at a higher level in this than in almost any other European country; in Adelaide Ristori (Marchesa del Grillo) the tragic stage lost one of the greatest of modern actresses; and Ernesto Rossi (1827-1896) and Tommaso Salvini long remained rivals in the noblest forms of tragedy.

In comedy, the efforts of the scholars of the Italian Renaissance for a time went side by side with the progress of the popular entertainments noticed above. While the contrasti of Italian the close of the 15th and of the 16th century were comedy, disputations between pairs of abstract or allegorical popular figures, in the frottola human types take the place of forms. abstractions, and more than two characters appear. The farsa (a name used of a wide variety of entertainments) was still under medieval influences, and in this popular form Alione of Asti (soon after 1500) was specially productive. To these popular diversions a new literary as well as social significance was given by the Neapolitan court-poet Sarmazaro (c. 1492); about the same time a capitano valoroso, Venturmo of Pesara, first brought on the modern stage the capitano glorioso or spavente, the military braggart, who owed his origin both to Plautus 9 and to the Spanish officers who abounded in the Italy of those days. The popular character-comedy, a relic of the ancient

Atellanae, likewise took a new lease of life — and this in a double form. The improvised comedy (commedia a soggelto) was now as a rule performed by professional actors, members of a craft, and was thence called the commedia dell' arte, which is said to have been invented by Francesco (called Terenziano) ieip arte> Cherea, the favourite player of Leo X. Its scenes, still unwritten except in skeleton (scenario) , were connected together by the ligatures or links (lazzi) of the arlecchino, the descendant of the ancient Roman sannio (whence our zany). Harlequin's summit of glory was probably reached early in the 17 th century, when he was ennobled in the person of Cecchino by the emperor Matthias; of Cecchino's successors, Zaccagnino and Truffaldino, we read that " they shut the door in Italy to good harle- Masked quins." Distinct from this growth is that of the masked comedy. comedy, the action of which was chiefly carried on by certain

5 Cleopatra, Antigone, Octavia, Mirope, &c.

6 e.g. Bruto I. and II. 7 Filippo ; Maria Stuarda.

8 Pellico, Francesca da Rimini; Niccolini, Giovanni da Procida; Beatrice Cenci; Giacometti, Cola di Rienzi (Giacometti's master-piece was La Marte civile).

9 Pyrogopolinices in the Miles Gloriosus

typical figures in masks, speaking in local dialects, 1 but which was not improvised, and indeed from the nature of the case hardly could have been. Its inventor was A. Beolco of Padua, who called himself Ruzzante (joker), and is memorable under that name as the first actor-playwright — a combination of extreme significance for the history of the modern stage. He published six comedies in various dialects, including the Greek of the day (1530). This was the masked comedy to which the Italians so tenaciously clung, and in which, as all their own and imitable by no other nation, they took so great a pride that even Goldoni was unable to overthrow it. Improvisation and burlesque, alike abominable to comedy proper, were inseparable from the species.

Meanwhile, the Latin imitations of Roman, varied by occa- sional

translations of Greek, comedies early led to the production Early OI Italian translations, several of which were performed

Italian at Ferrara in the last quarter of the 15th century, regular whence they spread to Milan, Pavia and other towns comedy. of the north. Contemporaneously, imitations of Latin comedy made their appearance, for the most part in rhymed verse; most of them applying classical treatment to subjects derived from Boccaccio's and other novelle, some still mere adaptations of ancient models. In these circumstances it is all but idle to assign the honour of having been " the first Italian comedy " — and thus the first comedy in modern dramatic literature — to any particular play. Boiardo's Timone (before 1494), for which this distinction was frequently claimed, is to a large extent founded on a dialogue of Lucian's; and, since some of its personages are abstractions, and Olympus is domesticated on an upper stage, it cannot be regarded as more than a transition from the moralities. A. Ricci's / Tre Tiranni (before 1530) seems still to belong to the same transitional species. Among the earlier imitators of Latin comedy in the vernacular may be noted G. Visconti, one of the poets patronized by Ludovico il Moro at Milan; 2 the Florentines G. B. Araldo, J. Nardi, the historian, 3 and D. Gianotti. 4 The step — very important had it been adopted consistently or with a view to consistency — of substituting prose for verse as the diction of comedy, is some- times attributed to Ariosto; but, though his first two comedies were originally written in prose, the experiment was not new, nor did he persist in its adoption. Caretto's / Sei Contenti dates from the end of the 15th century, and Publio Filippo's Formicone, taken from Apuleius, followed quite early in the 16th. Machiavelli, as will be seen, wrote comedies both in prose and in verse.

But, whoever wrote the first Italian comedy, Ludovico Ariosto was the first master of the species. All but the first two of his comedies, belonging as they do to the field of commedia erudita, or scholarly comedy, are in blank verse, to which he gave a singular mobility by the dactylic ending of the line (sdrucciolo) . Ariosto's models were the masterpieces of the palliata, and his morals those of his age, which emulated those of the worst days of ancient Rome or Byzantium in looseness, and surpassed them in effrontery. He chose his subjects accordingly; but his dramatic genius displayed itself in the effective drawing of character, 5 and more especially in the skilful management of complicated intrigues. 6 Such, with an additional brilliancy of wit and lasciviousness of tone, are likewise the characteristics of Machiavelli's famous prose comedy, the Mandragola {The

1 The masked characters, each of which spoke the dialect of the place he represented, were (according to Baretti) Pantalone, a Venetian merchant; Dottore, a Bolognese physician; Spaviento, a Neapolitan braggadocio ; Pullicinella, a wag of Apulia ; Giangurgulo and Coviello, clowns of Calabria; Gelfomino, a Roman beau; Brighella, a Ferrarese pimp; and Arlecchino, a blundering servant of Bergamo. Besides these and a few other such personages (of whom four at least appeared in each play), there were the Amorosos or Innamoratos, men or women (the latter not before 1560, up to which time actresses were unknown in Italy) with serious parts, and Smeraldina, Colombina, Spilletta, and other servettas or waiting-maids. All these spoke Tuscan or Roman, and wore no masks.

*2 Pasitea. 3 Amicizia. * MUesia.*

6 La Lena ; II Negromante. 6 La Cassaria ; i" Suppositi.

Magic Draught) ; ' and at the height of their success, of the plays of P. Aretino, 8 especially the prose Marescaico (1526-1527) whose name, it has been said, ought to be written in asterisks. It may be added that the plays of Ariosto and his followers were represented with magnificent scenery and settings. Other dramatists of the 16th century were B. Accolti, whose Virginia (prob. before 1513) treats the story from Boccaccio which reappears in All's Well that Ends Well ; G. Cecchi, F. d'Ambra, A. F. Grazzini, N. Secco or Secchi and L. Dolce — all writers of romantic comedy of intrigue in verse or prose.

*During the same century the " pastoral drama " flourished in Italy. The origin of this peculiar species- — which was the bucolic idyll in a dramatic form, and which freely lent itself to the introduction of both mythological * ,*

and allegorical elements — was purely literary, and drama. arose directly out of the classical studies and tastes of the Renaissance. It was very far removed from the genuine peasant plays which flourished in Venetia and Tuscany early in the 16th century. The earliest example of the artificial, but in some of its productions exquisite, growth in question was the renowned scholar A. Politian's Orfeo (1472), which begins like an idyll and ends like a tragedy. Intended to be performed with music — for the pastoral drama is the parent of the opera — this beautiful work tells its story simply. N. da Correggio's (1450- 1508) Cefalo, or Aurora, and others followed, before in 1554 A. Beccari produced, as totally new ofits kind, his Arcadian pastoral drama II Sagrifizio, in which the comic element

predominates. But an epoch in the history of the species is marked by the Aminta of Tasso (1573) , in whose Arcadia is allegorically mirrored the Ferrara court. Adorned by choral lyrics of great beauty, it presents an allegorical treatment of a social and moral problem; and since the conception of the characters, all of whom think and speak of nothing but love, is artificial, the charm of the poem lies not in the interest of its action, but in the passion and sweetness of its sentiment. This work was the model of many others, and the pastoral drama reached its height of popularity in the famous Pastor fido (written before 1590) of G. B. Guarini, which, while founded on a tragic love-story, introduces into its complicated plot a comic element, partly with a satirical inten- tion. It is one of those exceptional works which, by circumstance as well as by merit, have become the property of the world's literature at large. Thus, both in Italian and in other literatures, the pastoral drama became a distinct species, characterized, like the great body of modern pastoral poetry in general, by a tend- ency either towards the artificial or towards the burlesque. Its artificiality affected the entire growth of Italian comedy, includ- ing the commedia dell' arte, and impressed itself in an intensified form upon the opera. The foremost Italian masters of the last- named species, so far as it can claim to be included in the poetic drama, were A. Zeno (1668-1750) and P. Metastasio.

The comic dramatists of the 17th century are grouped as followers of the classical and of the romantic school, G. B. della Porta (q.v.) and G. A. Cicognini (whom Goldoni comedy in describes as full of whining pathos and commonplace the mh drollery, but as still possessing a great power to aad ,8th interest) being regarded as the leading representatives ceatur,es – of the former. But neither of these largely intermixed groups of writers could, with all its fertility, prevail against the com- petition, on the one hand of the musical drama, and on the other of the popular farcical entertainments and those introduced in imitation of Spanish examples. Italian comedy had fallen into decay, when its reform was undertaken by the wonderful theatrical genius of C. Goldoni. One of the most n id 1 fertile and rapid of playwrights (of his 150 comedies 16 were written and acted in a single year), he at the same time pursued definite aims as a dramatist. Disgusted with the conventional buffoonery, and ashamed of the rampant

7 Of Machiavelli's other comedies, two are prose adaptations from Plautus and Terence, La Clizia (Casina) and Andria; of the two others, simply called Commedie, and in verse, his authorship seems doubtful.

8 La Cortigiana, La Talanta, II Ipocrito, II Filosofo.

immorality of the Italian comic stage, he drew his characters from real life, whether of his native city (Venice) 1 or of society at large, and sought to enforce virtuous and pathetic sentiments without neglecting the essential objects of his art. Happy and various in his choice of themes, and dipping deep into a popular life with which he had a genuine sympathy, he produced, besides comedies of general human character, 2 plays on subjects drawn from literary biography 3 or from fiction. 4 Goldoni, whose style was considered defective by the purists whom Italy has at no time lacked, met with a severe critic and a temporarily successful

rival in Count C. Gozzi (1722-1806), who sought to

rescue the comic drama from its association with the actual life of the middle classes, and to infuse a new spirit into the figures of the old masked comedy by the invention of a new species. His themes were taken from Neapolitan 5 and Oriental 6 fairy tales, to which he accommodated some of the standing figures upon which Goldoni had made war. This attempt at mingling fancy and humour— occasionally of a directly satirical turn 7 — was in harmony with the tendencies of the modern romantic school; and Gozzi 's efforts, which though successful found hardly any imitators in Italy, have a family resemblance to those of Tieck and of some more recent writers whose art wings its flight, through the windows, " over the hills and far away."

During the latter part of the 18th and the early years of the 19th century comedy continued to follow the course marked

out by its acknowledged master Goldoni, under the c l me Q fa f s influence of the sentimental drama of France and other doai. countries. Abati Andrea Villi, the marquis Albergati

Capacelli, Antonio Simone Sografi (1760-1825), Federici, and Pietro Napoli Signorelli (1731-1815), the historian of the drama, are mentioned among the writers of this school ; to the 19th century

belong Count Giraud, Marchisio (who took his subjects especially from commercial life), and Nota, a fertile writer, among whose plays are three treating the lives of poets. Of still more recent date are L. B. Bon and A. Brofferio. At the same time, the comedy of dialect to which the example of Goldoni had given sanction in Venice, flourished there as well as in the mutually remote spheres of Piedmont and Naples. Quite modern developments must remain unnoticed here; but the fact cannot be ignored that they signally illustrate the perennial vitality of the modern drama in the home of its beginnings. A new realistic style set fully in about the middle of the 18th century with P. Ferrari and A. Torelli; and though an historical reaction towards classical and medieval themes is associated with the names of P. Cossa and G. Giacosa, modernism reasserted itself through P. Bracco and other dramatists. It should be noted that the influence of great actors, more especially Ermete Novelli and Eleanora Duse, must be credited with a large share of the success with which the Italian stage has held its own even against the foreign influences to which it gave room. And it would seem as if even the paradoxical endeavour of the poet Gabrielle d' Annunzio to lyricize the drama by ignoring action as its essence were a problem for the solution of which the stage can furnish unexpected conditions of its own. In any event, both Italian tragedy and Italian comedy have survived periods of a seemingly hopeless decline; and the fear has vanished that either the opera or the ballet might succeed in ousting from the national stage the legitimate forms of the national drama.

1 Momolo Cortesan {Jerome the Accomplished Man); La Bottega del cage, &c.

2 La Vedova scaltra {The Cunning Widow) ; . La Putta onorata {The Respectable Girl); La Buona Figlia; La B. Sposa; La B. Famiglia ; La B. Madre (the last of which was unsuccessful ; " good- ness," says Goldoni, " never displeases, but the public weary of every thing "), &c. ; and II Burbero benefico, called in its original French version Le Bourru bienfaisant.

3 Moliere; Terenzio; Tasso.

- *Pamela; Pamela Maritata; II Filosofo Inglese {Mr Spectator). 6 L' Amore delle tre melarancie {The Three Lemons) ; II Corvo.*

6 Turandot; Zobeide.

7 V Amore delle tre m. (against Goldoni) ; L' Angellino Belverde

{The Small Green Bird), (against Helvetius, Rousseau and Voltaire).

(6) Greece.

The dramatic literature of the later Hellenes is a creation of the literary movement which preceded their noble struggle for independence, or which may be said to form part nodern of that struggle. After beginning with dramatic Greek and dialogues of a patriotic tendency, it took a step in Dalmatian advance with the tragedies of J. R. Nerulos 8 (1778- draa "- 1850), whose name belongs to the politicalas well as to the literary history of his country. His comedies — especially one directed against the excesses of journalism '—largely contributed to open a literary life for the modern Greek tongue. Among the earlier patriotic Greek dramatists of the 19th century are T. Alkaeos, J. Zampelios (whose tragic style was influenced by that of Alfieri), 10 S. K. Karydis and A. Valaoritis. A. Zoiros 11 is noteworthy as having introduced the use of prose into Greek tragedy, while preserving to it that association with sentiments and aspirations which will probably long continue to pervade the chief productions of modern Greek literature. The love of the theatre is ineradicable from Attic as it is from Italian soil; and the tendencies of the young dramatic literature of Hellas which is not wholly absorbed in the effort to keep abreast of recent modern developments, seem to justify the hope that a worthy future awaits it.

Under Italian influence an interesting dramatic growth attained to some vitality in the Dalmatian lands about the beginning of the 16th century, where the religious drama, whose days were passing away in Italy, found favour with a people with a scant popular literature of its own. At Ragusa Italian literary influence had been spread by the followers of Petrarch from the later years of the 15th century; here several Servo- Croatian writers produced religious plays in the manner of the Italian rappresentazioni; and a gifted poet, Martin Drzic, composed, besides religious plays and farces, a species of pastoral which enjoyed much favour.

(c) Spain.

Spain is the only country of modern Europe which shares with England the honour of having achieved, at a relatively early date, the creation of a genuinely national form of the regular drama. So proper to Spain was the form of the drama which she produced and perfected, that to it the term romantic has been specifically applied, though so restricted a use of the epithet is clearly unjustifiable. The influences which from the Romance peoples — in whom Christian

and Germanic elements mingled with the legacy of Roman law, learning and culture — spread to the Germanic nations were represented with the most signal force and fulness in the institutions of chivalry, — to which, in the words of Scott, " it was peculiar to blend military valour with the strongest passions which actuate the human mind, the feelings of devotion and those of love." These feelings, in their combined operation upon the national character, and in their reflection in the national literature, were not confined to Spain; but nowhere did they so long or so late continue to animate the moral life of a nation.

Outward causes contributed to this result. For centuries after the crusades had become a mere memory, Spain was a battle-ground between the Cross and the Crescent. And it was just at the time when the Renaissance was establishing new starting-points for the literary progress of Europe, that Christian Spain rose to the height of Catholic as well as national self- consciousness by the expulsion of the Moors and the conquest of the New World. From their rulers or rivals of so many centuries the Spaniards derived that rich, if not very varied, glow of colour which became permanently distinctive of their national life, and more especially of its literary and artistic

8 Aspasia; Polyxena.

9 Ephemeridophobos.

10 Timoleon ; Konstantinos Palaeologos ; Rhigas of Pherae.

11 The Three Hundred, or The Character of the Ancient Hellene (Leonidas); The Death of the Orator (Demosthenes); A Scion of Timoleon, &c.

expressions; they also perhaps derived from the same source a not less characteristically refined treatment of the passion of love. The ideas of Spanish chivalry — more especially religious devotion and a punctilious sense of personal honour — asserted themselves (according to a process often observable in the history of civilization) with peculiar distinctness in literature and art, after the period of great achievements to which they had con- tributed in other fields had come to an end. The ripest glories of the Spanish drama

belong to an age of national decay — mindful, it is true, of the ideas of a greater past. The chivalrous enthusiasm pervading so many of the masterpieces of its literature is indeed a distinctive feature of the Spanish nation in all, even in the least hopeful, periods of its later history; and the religious ardour breathed by these works, though associating itself with what is called the Catholic Reaction, is in truth only a manifesta- tion of the spirit which informed the noblest part of the Reforma- tion movement itself. The Spanish drama neither sought nor could seek to emancipate itself from views and forms of religious life more than ever sacred to the Spanish people since the glorious days of Ferdinand and Isabella; and it is not so much in the beginnings as in the great age of Spanish dramatic literature that it seems most difficult to distinguish between what is to be termed a religious and what a secular play. After Spain had thus, the first after England among modern European countries, fully unfolded that incomparably richest expression of national life and sentiment in an artistic form — a truly national dramatic literature, — the terrible decay of her greatness and prosperity gradually impaired the strength of a brilliant but, of its nature, dependent growth. In the absence of high original genius the Spanish dramatists began to turn to foreign models, though little supported in such attempts by popular sympathy; and it is only in more recent times that the Spanish drama has sought to reproduce the ancient forms from whose masterpieces the nation had never become estranged, while accommodating them to tastes and tendencies shared by later Spanish literature with that of Europe at large.

The earlier dramatic efforts of Spanish literature may without inconvenience be briefly dismissed. The reputed author of the Coplas de Mingo Revulgo (R. Cota the elder) likewise composed the first act of a story of intrigue and character, purely dramatic but not intended for repre- sentation. This tragic comedy of Calisto and Meliboea, which was completed (in 21 acts) by 1499, afterwards became famous under the name of Celestina; it was frequently imitated and translated, and was adapted for the Spanish stage by R. de Zepeda in 1582. But the father of the Spanish drama was J. de la Enzina, whose representacion.es under the name of ” eclogues ” were dramatic dialogues of a religious or pastoral character. His attempts were imitated more especially by the Portuguese Gil Vicente, whose writings for the stage appear to be Vicente. included in the period 1502-1536, and who wrote both in Spanish and in his native tongue. A further impulse came, as was natural, from Spaniards resident in Italy, and especially from B. de Torres Naharro, who in 1517 published, as the chief among the ” firstlings of his genius ”

(Propaladia), a series of eight comedias — a term generally applied in Spanish literature to any kind of drama. He claimed some knowledge of the theory of the ancient drama, divided his plays into jornadas 1 (to correspond to acts), and opened them with an introyto (prologue). Very various in their subjects, and occasionally odd in form, 2 they were gross as well as audacious in tone, and were soon prohibited by the Inquisition. The church remained un-willing to renounce her control over such dramatic exhibitions as she permitted, and sought to suppress the few plays on not strictly religious subjects which appeared in the early part of the reign of Charles I. Though the universities produced both translations from the classical drama and modern Latin plays,

1 The term is the same as that used in the old French collective mysteries (journees).

2 In some of his plays {Comedia Serafina; C. Tinelaria) there is a mixture of languages even stranger than that of dialects in the Italian masked comedy.

Early efforts.

Classical dramas.

these exercised very little general effect. Juan Perez' (Petreius') posthumous Latin comedies were mainly versions of Ariosto. 3

Thus the foundation of the Spanish national theatre was reserved for a man of the people. Cervantes has vividly sketched the humble resources which were at the command of Lopede Lope de Rueda, a mechanic of Seville, who with his Rueda friend the bookseller Timoneda, and two brother anah,s authors and actors in his strolling company, succeeded ° owers ' in bringing dramatic entertainments out of the churches and palaces into the public places of the towns, where they were produced on temporary scaffolds. The manager carried about his properties in a corn-sack; and the " comedies " were still only " dialogues, and a species of eclogues between two or three shepherds and a shepherdess," enlivened at times by intermezzos of favourite comic figures, such as the negress or the Biscayan, " played with inconceivable talent and truthfulness by Lope." One of his plays at least, 4 and one of Timoneda's, 6 seem to have been taken from an Italian source; others mingled modern themes with classical apparitions,' one of Timoneda's was (perhaps again through the Italian) from Plautus. 7 Others of a slighter description were called pasos, — a species afterwards termed

entremeses and resembling the modern French proverbes. With these popular efforts of Lope de Rueda and his friends a considerable dramatic activity began in the years 1 560-1 590 in several Spanish cities, and before the close of this period permanent theatres began to be fitted up at Madrid. Yet Spanish dramatic literature might still have been led to follow Italian into an imitation of classical models. Two plays by G. Bermudez (1577), called by their learned author " the first Spanish tragedies," treating the national subject of Inez de Castro, but divided into five acts, composed in various metres, and introducing a chorus; a Dido (c. 1580) by C. de Virues (who claimed to have first divided dramas into three jornadas) ; and the tragedies of L. L. de Argensola (acted 1585, and praised in Don Quixote) alike represent this tendency.

Such were the alternatives which had opened for the Spanish drama, when at last, about the same time as that of the English, its future was determined by writers of original genius. The first of these was the immortal Cervantes, who, Cervantes – however, failed to anticipate by his earlier plays (1584-1588) the great (though to him unproductive) success of his famous romance. In his endeavour to give a poetic character to the drama he fell upon the expedient of introducing personified abstractions speaking a " divine " or elevated language — a device which was for a time favourably received. But these plays exhibit a neglect or ignorance of the laws of dramatic construction; their action is episodical; and it is from the realism of these episodes (especially in the Numancia, which is crowded with both figures and incidents), and from the power and flow of the declamation, that their effect must have been derived. When in his later years (161 5) Cervantes returned to dramatic composition, the style and form of the national drama had been definitively settled by a large number of writers, the brilliant success of whose acknowledged chief may previously have diverted Cervantes from his labours for the theatre. His influence upon the general progress of dramatic literature is, however, to be sought, not only in his plays, but also in those novelas exemplares — incomparable alike in their clearness and their terseness of narrative — to which more than one drama is indebted for its plot, and for much of its dialogue to boot.

Lope de Vega, one of the most astonishing geniuses the world has known, permanently established the national forms of the Spanish drama. Some of these were in their beginnings taken over by him from ruder predecessors; some \^ de were cultivated with equal or even superior success by subsequent authors; but in variety, as in fertility of dramatic production, he has no rivals. His fertility, which was such that he wrote about 1500 plays, besides 300 dramatic

works classed

‘ Necromanticus, Lena, Decepti, Suppositi.

4 Los Enganos (Gli Ingannati). 6 Cornelia {II Negromante) .

6 Lope, Armelina (Medea and Neptune as deus ex machina-si modo machina adfuisset). ‘ Menennos.

5 o8

DRAMA

as aulas sacramentales and entremeses, and a vast series of other literary compositions, has indisputably prejudiced his reputation with those to whom he is but a name and a num'ber. Yet as a 'dramatist Lope more fully exemplifies the capabilities of the Spanish theatre than any of his successors, though as a poet Calderon may deserve the palm. Nor would it be possible to imagine a truer representative of the Spain of his age than a poet who, after suffering the hardships of poverty and exile, and the pangs of passion, sailed against the foes of the faith in the. Invincible Armada, subsequently became a member of the Holy Inquisition and of the order of St Francis, and after having been decorated by the pope with the cross of Malta and a theological doctorate, honoured by the nobility, and idolized by the nation, ended with the names of Jesus and Mary on his lips. From the plays of such a writer we may best learn the manners and the sentiments, the ideas of religion and honour, of the Spain of the Philippine age, the age when she was most prominent in the eyes of Europe and most glorious in her own. For, with all its inventiveness and vigour, the genius of Lope primarily set itself the task of pleasing his public, — the very spirit of whose inner as well as outer life is accordingly mirrored in his dramatic works. In them we have, in the words of Lope's French translator Baret, " the movement, the clamour, the conflict of unforeseen intrigues suitable to unreflecting spectators; perpetual flatteries addressed to an unextinguishable national pride; the painting of passions dear to a people never tired of admiring itself; the absolute sway of the point of honour; the deification of revenge; the adoration of symbols; buffoonery and burlesque, everywhere beloved of the multitude, but here never defiled by obscenities, for this people has a sense of delicacy, and the foundation of its character is nobility; lastly, the flow of proverbs which at times escape from the gracioso " (the comic servant domesticated in the Spanish drama by Lope) — " the commonplace literature of those who possess no other."

The plays of Lope, and those of the national Spanish drama in general, are divided into classes which it is naturally not always

easy, and which there is no reason to suppose him Comedias a i wa ys to have intended, to keep distinct from one Tespada. another. After in his early youth composing eclogues,

pastoral plays, and allegorical moralities in the old style, he began his theatrical activity at Madrid about 1390, and the plays which he

thenceforth produced have been distri- buted under the following heads. The comedias, all of which are in verse, include (1) the so-called c. de capa y espada — not comedies proper, but dramas in which the principal personages are taken from the class of society that wears cloak and sword. Gallantry is their main theme, an interesting and complicated, but well-constructed and perspicuous intrigue their chief feature ; and this is usually accompanied by an underplot in which the gracioso plays his part. Their titles are frequently taken from the old proverbs or proverbial phrases of the people 1 upon the theme suggested, by which the plays often (as G. H. Lewes admirably expresses it) constitute a kind of gloss (glosa) in action. This is the favourite species of the national Spanish theatre; and to the plots of the plays belonging to it the drama of other nations owes a debt almost incalculable in extent. Herokas (2) The c. herdicas are distinguished by some of their

personages being of royal or very high rank, and by their themes being often historical and largely 2 (though not in- variably 3) taken from the national annals, or founded on con- temporary or recent events. 4 Hence they exhibit a greater gravity of tone; but in other respects there is no difference between them and the cloak-and-sword comedies with which they share the element of comic underplots. Occasionally Lope conde- scended in the opposite direction, to (3) plays of which the scene is laid in common life, but for which no special name appears

1 El Azero de Madrid (The Steel Water of Madrid); Diner os son Calidad (= The Dog in the Manger), &c.

2 La Estrella de Sevitia (The Star of Seville, i.e. Sancho the Brave) ; El Nuevo Mundo (Columbus), &c.

3 Roma Abrasada (R. in Ashes — Nero).

4 Arauco domado (The Conquest of Araueo, 1560).

to have existed. 6 Meanwhile, both he and his successors were too devoted sons of the church not to acknowledge in some sort her claim to influence the national drama. This claim she had never relinquished, even when she could no longer retain an absolute control over the stage. For a time, indeed, she was able to reassert even this; for the exhibition of all secular plays was in 1598 prohibited by the dying Philip II., and remained so for two years; and Lope with his usual facility proceeded to supply religious plays of various kinds. After a few dramas on scriptural subjects he turned to

the legends of the saints; and the comedias de santos, of which he wrote a great number, became an accepted later Spanish variety 4e™ aa tos. of the miracle-play. True, however, to the popular instincts of his genius, he threw himself with special zeal and success into the composition of another kind of religious plays — a development of the Corpus Christi pageants, in honour of which all the theatres had to close their doors for a month. These were the famous autos sacramentales (i.e. solemn " acts " or proceedings in honour of the Sacrament), sacramen- which were performed in the open air by actors who tales. had filled the cars of the sacred procession. Of these Lope wrote about 400. These entertainments were, arranged on a fixed scheme, comprising a prologue in dialogue between two or more actors in character (loo), a farce (entr ernes), and the auto proper, an allegorical scene of religious purport, as an example of which Ticknor cites the Bridge of the World, — in which the Prince of Darkness in vain seeks to defend the bridge against the Knight of the Cross, who finally leads the Soul of Man in triumph across it. Not all the entremeses of Lope and others were, however,, composed for insertion meses; in these autos. This long-lived popular species, together with the old kind of dramatic dialogue called eclogues, completes the list of the varieties of his dramatic works.

The example of Lope was followed by a large number of writers, and Spain thus rapidly became possessed of a dramatic literature almost unparalleled in quantity — for in fertility also Lope was but the first among many. ™£ c * 00/ Among the writers of Lope's school, his friend G. de Castro (1569-1631) must not be passed by, for his Cid$ was the basis of Corneille's; nor J. P. de Montalban, " the first-born of Lope's genius," the extravagance of whose imagination, like that of Lee, culminated in madness. Soon after him died (1639) Juan Ruiz de Alarcon, in whose plays, as contrasted with those of Lope, has been recognized the distinctive element of a moral purpose. To G. Tellez, called Tirso de Molina (d. 1648), no similar praise seems due; but the frivolous gaiety of the inventor of the complete character of Don Juan was accompanied by ingenuity in the construction of his excellent 7 though at times "sensational" 8 plots. F. de Rojas Zorrilla (b. 1607), who was largely plundered by the French dramatists of the latter half of the century, survived Molina for about a generation. In vain scholars of strictly classical tastes protested in essays in prose and verse against the ascendancy of the popular drama ; the prohibi- tion of Philip II. had been recalled two years after his death and was never renewed; and the activity of the theatre spread through the towns and villages of the land, everywhere under the controlling influence of the school of writers*

who had established so complete a harmony between the drama and the tastes and tendencies of the people.

The glories of Spanish dramatic literature reached their height in P. Calderon de la Barca, though in the history of the Spanish theatre he holds only the second place. He elaborated calderon some of the forms of the national drama, but brought about no changes of moment in any of them. Even the brilliancy of his style, glittering with a constant reproduction of the same family of tropes, and the variety of his melodious versification, are mere intensifications of the poetic qualities of Lope, while

6 La Moza de cantaro (The Water-maid).

6 Las Mocedades (The Youthful Adventures) del Cid.

7 Don Gil de las calzas verdes (D. G. in the Green Breeches) .

8 El Burlador de Sevilla y Convivado de piedra (The Deceiver of Seville, i.e. Don Juan, and the Stone Guest).

in their moral and religious sentiments, and their general views of history and society, there is no difference between the two. Like Lope, Calderon was a soldier in his youth and an ecclesiastic in his later years; like his senioi, he suited himself to the tastes of both court and people, and applied his genius with equal facility to the treatment of religious and of secular themes. In fertility Calderon was inferior to Lope (for he wrote not many more than 100 plays) ; but he surpasses the elder poet in richness of style, and more especially in fire of imagination. In his autos (of which he is said to have left not less than 73), Calderon prob- ably attained to his most distinctive excellence; some of these appear to take a wide range of allegorical invention, 1 while they uniformly possess great beauty of poetical detail. Other of his most famous or interesting pieces are comedias de santos? In his secular plays he treats as wide a variety of subjects as Lope, but it is not a dissimilar variety; nor would it be easy to decide whether a poet so uniformly admirable within his limits has achieved greater success in romantic historical tragedy, 3 in the comedy of amorous intrigue, 4 or in a dramatic work combining fancy and artificiality in such a degree that it has been

diversely described as a romantic caprice and as a philosophical poem. 6

During the life of the second great master of the Spanish drama there was little apparent abatement in the productivity of its literature; while the autos continued to flourish Coatem- j n jj a([r y an(j elsewhere, till in 1765 (shortly before Calderon! tne expulsion of the Jesuits from Spain) their public representation was prohibited by royal decree. In the world of fashion, the opera had reached Spain already during Calderon's lifetime, together with other French influences, and the great dramatist had himself written one or two of his plays for performance with music. But the regular national Moreto drama continued to command popular favour, and and the with A. Moreto may be said to have actually taken a comedia de s t e p i n advance. While he wrote in all the forms ttguron. established by Lope and cultivated by Calderon, his manner seems most nearly to approach the masterpieces of French and later English comedy of character; he was the earliest writer of the comedias de figuron, in which the most prominent personage is (in Congreve's phrase) " a character of affectation," in other words, the Spanish fop of real life. 6 His masterpiece, a favourite of many stages, is one of the most graceful and pleasing of modern comedies — simple but interesting in plot, and true to nature, with something like Shakespearian truth. 7 Other writers trod more closely in the footsteps of the masters without effecting any noticeable changes in the form of the Spanish drama; even the saynete (tit-bit), which owes its name to Benavente (fl. 1645), was only a kind of enlremes. The Spanish drama in all its forms retained its command over the nation, because they were alike popular in origin and character; nor is there any other example of so complete an adaptation of a national art to the national taste and sentiment in its ethics and aesthetics, in the nature of the plots of the plays (whatever their origin), in the motives of their actions, in the conduct and tone and in the very costume of their characters.

National as it was, and because of this very quality, the Spanish drama was fated to share the lot of the people it so fully repre- _ sented. At the end of the 17th century, when the

of the Spanish throne at last became the declared apple of

national discord among the governments of Europe, the Spanish Spanish people lay, in the words of an historian of its later days, " like a corpse, incapable of feeling its own impotence." That national art to which it had so faithfully clung had fallen into decline and decay with the spirit of Spain itself. By the time of the close of the

great war, the theatre had sunk into a mere amusement of the populace, which during the greater part

1 El Divino Orfeo, &c.

2 El Magico prodigioso ; El Purgatorio de San Patricio ; La Devocion de la Cruz.

3 El Principe constante (Don Ferdinand of Portugal).

4 La Dama duende (The Fairy Lady).

6 Vida es sueno (Life is a Dream).

8 El Lindo Don Diego (Pretty Don Diego).

7 Desden con el desden (Disdain against Disdain).

of the 18th century, while allowing the old masters the measure of favour which accords with traditional esteem, continued to uphold the representatives of the old drama in its degeneracy — authors on the level of their audiences. But the Spanish court was now French, and in the drama, even more than in any other _. form of art, France was the arbiter of taste in Europe. Prench With the restoration of peace accordingly began isolated school of attempts to impose the French canons of dramatic the tsta theory, and to follow the example of French dramatic ce " ury ' practice; and in the middle of the century these endeavours assumed more definite form. Montiano's bloodless tragedy of Virginia (1750), which was never acted, was accompanied by a discourse endeavouring to reconcile the doctrines of the author with the practice of the old Spanish dramatists; the play itself was in blank verse (a metre never used by Calderon, though occasionally by Lope), instead of the old national ballad-measures (the romance-measure with assonance and the rhymed redondilla quatrain) preferred by the old masters among the variety of metres employed by them. The earliest Spanish comedy in the French form (a translation only, though written in the national metre) 8 (1751), and the first original Spanish comedy on the same model, Nicolas Moratin's Petimetra (Petite-Maitresse), printed in 1726 with a critical dissertation, likewise remained unacted. In 1770, however, the same author's Hormesinda, an historic drama on a national theme and in the national metre, but adhering to the French rules, appeared on the stage; and similar attempts followed in tragedy by the same writer and others (including Ayala, who ventured in 1775 to compete with Cervantes on the theme of Numantia), and in comedy by Iriarte and Jovellanos (afterwards

minister under Godoy), who produced a sentimental comedy in Diderot's manner. 9 But these endeavours failed to effect any change in the popular theatre, which was with more success raised Other later from its deepest degradation by R. de la Cruz, a fertile t] s t s . author of light pieces of genuine humour, especially saynetes, depicting the manners of the middle and lower classes. In literary circles Garcia de la Huerta's voluminous collection of the old plays (1785) gave a new impulse to dramatic pro- ductivity, and the conflict continued between representatives of the old school, such as Luciano Francisco Cornelia (1716-1779) and of the new, such as the younger Moratin, whose comedies — of which the last and most successful 10 was in prose — raised him to the foremost position among the dramatists of his age. In tragedy N. de Cienfuegos likewise showed some originality. After, however, the troubles of the French domination and the war had come to an end, the precepts and examples of the new school failed to reassert themselves.

Already in 181 5 an active critical controversy was carried on by Bohl de Faber against the efforts of J. Faber and Alcala Galiano to uphold the principles of classicism; and with the aid of the eminent actor Maiquez the old romantic masterpieces were easily reinstated in the public favour, which as a matter of fact they had never forfeited. The Spanish dramatists of the 19th century, after passing, as in the instance of F. Martinez de la Rosa and Breton de los Herreros, from the system of French comedy to the manner of the national drama, appear either to have stood under the influence of the French romantic school, or to have returned once more to the old Spanish models. Among the former class A. Gil y Zarate, of the latter J. Zorrilla, are mentioned as specially prominent. The most renowned Spanish dramatist at the opening of the 20th century was the veteran politician and man of letters J. Echegaray.

Meanwhile, the old religious performances are not wholly extinct in Spain, and the relics of the solemn pageantry with which they were associated may long continue to survive there, as in the case of the pasos, which claim to have been exhibited in Holy Week at Seville for at least three centuries. As to the theatre itself, there can be no fear either that the imitation

8 Luzan, La Razon contra la mode (La Chaussee, Le Prejuge i la mode).

9 El Delinquente honrado (The Honoured Culprit). 10 El Si delas ninas (The Young Maidens' Consent).

of foreign examples will satisfy Spanish dramatists — especially when, like the author of Dona Perfecta (Perez Galdos) , they have excellent home material of their own for adaptation, — or that the Spanish public itself, with fine actors and actresses still uphold- ing the lofty traditions of the national drama, will remain too fatigued to consume the drama unless bit by bit — in the shape of zarzuelas and similar one-act confections. Whatever may be the future of one of the noblest of modern dramatic literatures, it may confidently be predicted that, so long as Spain is Spain, her theatre will not be permanently either denationalized or degraded.

(d) Portugal. The Portuguese drama in its earlier phases, especially before in the latter part of the 14th century the nation completely

achieved its independence, seems to have followed The Porta- mucn tne same course as the Spanish; and the re- drama, ligious drama in all its prevailing forms and direct

outgrowths retained its popularity even by the side of the products of the Renaissance. In the later period of that movement translations of classical dramas into the vernacular were stimulated by the cosmopolitan example of George Buchanan, who for a time held a post in the university of Coimbra; to this class of play Teive's Johannes (1553) may be supposed to have belonged. In the next generation Antonio Ferreira 1 and others still wrote comedies more or less on the classical model. But the rather vague title of " the Plautus of Portugal " is accorded to an earlier comic writer, the celebrated Gil Vicente, who died about 1 536, after, it is stated, producing forty-two plays. He was the founder, of popular Portuguese comedy, and his plays were called autos, or by the common name of praticas? Among his most gifted successors are mentioned A. Ribeiro, called Chiado (the mocking-bird), who died in isoo; 3 his brother Jeronymo, B. Dias, A. Pires, J. Pinto, H. Lopes and others. The dramatic efforts of the illustrious poet Luis de Camoes (Camoens) are relatively of slight importance; they consist of one of the many modern versions of the Amphitruo, and of two other comedies, of which the earlier (Filodemo) was acted at Goa in 1553, the subjects having a romantic colour. 4 Of greater importance were the contributions to dramatic literature of F. de Sa.

de Miranda, who, being well acquainted with both Spanish and Italian life, sought early in his career to domesticate the Italian comedy of intrigue on the Portuguese stage; 5 but he failed to carry with him the public taste, which preferred the autos of Gil Vicente. The followers of Miranda were, however, more successful than he had been himself, among them the already-mentioned Antonio Ferreira; the prose plays of Jorge Ferreira de Vasconcellos, which bear some resemblance to the Spanish Celestina, are valuable as pictures of contemporary manners in city and court. 6

The later Portuguese dramatic literature seems also to have passed through phases corresponding to those of the Spanish, though with special features of its own. In the 18th century Alcino Mycenio (1728-1770), known as Domingos dos Reis Quito in everyday life, in which his avocation was that of Allan Ramsay, was remarkably successful with a series of plays, 7 including of course an Inez de Castro, which in a subsequent adaptation by J. B. Gomes long held the national stage. Another dramatist, of both merit and higher aspirations, was Lycidas Cynthio (alias ManoeldeFigueiredo, 1725-1801). 8 But the romantic movement was very late in coming to Portugal. Curiously enough, one of its chief representatives, the viscount da Almeida Garrett, exhibited his sympathy with French, revolutionary and anti-

1 cioso (The Jealous Man), &c. His Inez de Castro is a tragedy with choruses, partly founded on the Spanish play of J. Bermudez.

2 Don Duardos, Amadis, &c.

3 Auto das Regateiras (The Market-women), Pratica de compadres (The Gossips), &c.

4 Emphatrioes, Filodemo, Seleuco.

5 Os Estrangeiros, Os Vilhalpandos (The Impostors).

6 Eufrosina, Ulyssipo (Lisbon), Aulegrafia.

7 Astarte, Hermione, Megara.

8 These assumptions of names remind us that we are in the period of the " Arcadias."

English ideas by a tragedy on the subject of Cato; 9 but his later works were mainly on national subjects. 10 The expansive tendencies of later Portuguese dramatic literature are illustrated by the

translations of A. F. de Castilho, who even ventured upon Goethe's Faust (1872). Among 19th-century dramatists are to be noted Pereira da Cunha, R. Cordeiro, E. Biester, L. Palmeirin, and Garrett's disciple F. G. de Amorim, by whom both political and social themes have been freely treated. The reaction against romanticism observable in Portuguese poetic literature can hardly fail to affect (or perhaps has already affected) the growth of the national drama ; for the receptive qualities of both are not less striking than the productive.

(e) France.

France was the only country, besides Italy, in which classical tragedy was naturalized. In 1531 the Benedictine Barthelemy of Loches printed a Christus Xylonicus; and a very The notable impulse was given both to the translation and French to the imitation of ancient models by a series of efforts regular made in the university of Paris and other French r ˆ m »- places of learning. The most successful of these attempts was the Johannes Baptistes of George Buchanan, who taught in Paris for five years and at a rather later date resided at Bordeaux, where in 1540 he composed this celebrated tragedy (afterwards translated into four or five modern languages), in which it is now ascertained that he had in view the trial and condemnation of Sir Thomas More. He also wrote Jephthah, and translated into Latin the Medea and Alcestis of Euripides. At a rather later date the great scholar M. A. Muret (Muretus) produced his Julius Caesar, a work perhaps superior in correctness to Buchanan's tragic masterpiece, but inferior to it in likeness to life. About the same time the enthusiasm of the Paris classicists showed itself in several translations of Sophoclean and Euri- pidean tragedies into French verse. 11

Thus the beginnings of the regular drama in France, which, without absolutely determining, potently swayed its entire course, came to connect themselves directly with the great literary movement of the Renaissance. Du Bellay sounded the note of attack which converted that movement in France into an endeavour to transform the national literature; and in Ronsard the classical school of poetry put forward its conquering hero and sovereign lawgiver. Among the disciples who gathered round Ronsard, and with him formed the " Pleiad " jodelle of French literature, Etienne Jodelle, the reformer of the French theatre, soon held a distinguished place. The stage of this period left ample room for the enterprise of this youthful writer. The popularity of the old entertainments had reached its height when Louis XII., in his conflict with Pope Julius II., had not scrupled to

call in the aid of Pierre Gringoire (Gringon), and when the Mere sotte had mockingly masqueraded in the petticoats of Holy Church. In the reign of Francis I. the Inquisition, and on occasion the king himself, had to some extent succeeded in repressing the audacity of the actors, whose follies were at the same time an utter abomination in the eyes of the Huguenots. For a time the very mysteries of the Brethren of the Passion had been prohibited; while the moralities and farces had sunk to an almost contemptible level. Yet to this reign belong the contributions to farce-literature of three writers so distinguished as Rabelais (non-extant), Clement Marot and Queen Margaret of Navarre. Meanwhile isolated translations of Italian 12 as well as classical dramas had in literature begun the movement which Jodelle now transferred to the stage itself. His tragedy Cliopatre captive was produced there on the same day as his comedy L'Eugene, in 1552, his Didon se sacrifianl following in 1558. Thus at a time when a national theatre was perhaps impossible in a country distracted by civil and religious

9 Catao. 10 Manoel de Sousa, &c.

11 A ntigone and Electra; Hecuba: and Iphigenia in Aulis. The Andria was also translated, and in 1540 Ronsard translated the Plutus of Aristophanes.

12 Trissino, Sofonisba, by de Saint-Gelais.

conflicts, whose monarchy had not yet welded together a number of provinces attached each to its own traditions, and whose population, especially in the capital, was enervated by frivolity or enslaved by fanaticism, was born that long-lived artificial growth, the so-called classical tragedy of France. For French comedy, though subjected to the same influences as tragedy, had a national basis upon which to proceed, and its history is partly that of a modification of old popular forms.

The history of French tragedy begins with the CUopdtre captive, in the representation of which the author, together French Wlth otner members of the " Pleiad," took part. It is tragedy in a tragedy in the manner of Seneca, devoid of action the 16th and provided with a ghost and a chorus. Though century. ma inly written in the five-foot

Iambic couplet, it already contains passages in the Alexandrine metre, which soon afterwards J. de La Peruse by his Medee (pr. 1556) established in French tragedy, and which Jodelle employed in his Didon. Numerous tragedies followed in the same style by various authors, among whom Gabriel Bounyn produced the first French regular tragedy on a subject neither Greek nor Roman, 1 and the brothers de la Taille, 2 and J. Grevin, 3 distinguished themselves by their style. In the reign of Charles IX. a vain attempt was made by Nicolas Filleul to introduce the pastoral style of the Italians into French tragedy; 4 and the Brotherhood of the Passion was intermingling with pastoral plays its still continued reproductions of the old entertainments, and the religious drama making its expiring efforts, among which T. Le Coq's interesting mystery of Cain (1580) should be noted. Beza's Abraham sacrifiant (1550), J- de Coignac's Goliath (dedicated to Edward VI.), Rivandeau's Haman (1561), belong to a group of Biblical tra- gedies, inspired by Calvinist influences. But these more and more approached to the examples of the classical school, which, in spite of all difficulties and rivalries, prevailed. Among its followers Montchretien exhibited unusual vigour of rhetoric, 6 and in R. Gamier French tragedy reached the greatest height in nobility and dignity of style, as well as in the exhibition of dramatic passion, to which it attained before Corneille. In his tragedies 6 choruses are still interspersed among the long Alexand- rine tirades of the dialogue.

During this period comedy had likewise been influenced by classical models; but the distance was less between the national Comedy f arces and Terence, than between the mysteries and under moralities, and Seneca and the Greeks. L' Eugene Italian differs little in style from the more elaborate of the old influence. farces; an(j w hile it satirizes the foibles of the clergy without any appreciable abatement of the old licence, its theme is the favourite burden of the French comic theatre in all times— le cocuage. The examples, however, which directly facilitated the productivity of the French comic dramatists of this period, among whom Jean de la Taille was the first to attempt a regular comedy in prose, 7 were those of the Italian stage, which in 1576 established a permanent colony in France, destined to survive there till the close of the 17th century, by which time it had adopted the French language, and was ready to coalesce with French actors, without, however,' relinquishing all remembrance of its origin. R. Belleau, a member of the " Pleiad," produced a comedy in which the type (already approached by Jodelle) of the swaggering captain appears, 8 J. Grevin copied Italian intrigue, characters and manners; 9 O. de Turnebe (d. 1581)

borrowed the title of one Italian play 10 and perhaps parts of the plots of others; the Florentine F. d'Amboise (d. 1558) produced versions of two Italian comedies; 11 and the foremost French comic poet of the century, P. de Larivey, likewise an Italian born (of the name of Pietro Giunto), openly professed to imitate the poets of his native country. His plays are more or less literal

1 La Soltane (1561). 2 Daire (Darius).

*3 La Mort de Cesar. , * Achille (1563).*

6 Les Lacenes ; Marie Stuart or L'Ecossaise.

5 La Juive, &c. 7 Les Corivaux (1573).

8 La Reconnue (Le Capitaine Rodomont).

' Les Esbahis.

'" Les Contens (S. Parabosco, I Contenti). n Les Neapolitaines ; Les Disesperades de V amour.

*translations of L. Dolce, 1 * Secchi 13 and other Italian dramatists; and this lively and witty author, to whom Molie~re owes much, thus connects two of the most important and successful growths of the modern comic drama.*

The close conjunction between the history of a living dramatic literature and that of the theatre can least of all be ignored in the case of France, where the actor's art has gone through so ample an evolution, and where the theatre has so long and continuously formed an important part of the national life. By the middle of the 1 6th century not only had theatrical representations, now quite emancipated from clerical control, here and there already become matters of speculation and business, but the acting profession was beginning to organize itself as such; strolling companies of actors had become a more or less frequent ex- perience; and the attitude of the church and of civic' respect- ability were once more coming to be systematically hostile to the stage and its representatives.

*Before, however, either tragedy or comedy in France entered into the period of their history when genius was to illuminate both of them with creations of undying merit, and p renc j before the theatre had associated itself enduringly tragedy with the artistic and literary divisions of court and "> d society and the people at large, the country had passed ^°™ e * r through a new phase of the national life.*

When the uth troubles and terrors of the great civil and religious century 1 wars of the 16th century were over at last, they were ~ e/ orB . / , found to have produced a reaction towards culture and refinement which spread from certain spheres of society whose influence was for a time prevailing. The seal had been set upon the results of the Renaissance by Malherbe, the father of French style. The masses meanwhile continued to solace or distract their weariness and their sufferings with the help of the accredited ministers of that half-cynical gaiety which has always lighted up the darkest hours of French popular life. In the troublous days preceding Richelieu's definitive accession to power (1624), the tabarinades — a kind of street dialogue recalling the earliest days of the popular drama — had made the Pont-Neuf the favourite theatre of the Parisian populace. Meanwhile the influence of Spain, which Henry IV. had overcome in politics, had throughout his reign and afterwards been predominant in other spheres, and not the least in that of literature. The stilo culto, of which Gongora was the native Spanish, Marino the Italian, and Lyly the English representative, asserted its dominion over the favourite authors of French society; the pastoral romance of Honore d'Urfe — the text-book of pseudo-pastoral gallantry — was the parent of the romances of the Scuderys, de La Calprenede and Mme de La Fayette; the Hotel de Ram- bouillet was in its glory; the true (not the false) pricieuses sat on the heights of intellectual society; and J. L. G. de Balzac (ridiculed in the earliest French dramatic parody) 14 and Voiture were the dictators of its literature. Much of the French drama of this age is of the same kind as its romance-literature, like which it fell under the polite castigation of Boileau's satire. Heroic love (quite a technical passion), " fertile in tender senti- ments," seized hold of the theatre as well as of the romances; and La Calprenede, G. de Scudery 16 and his sister and others were equally fashionable in both species. The Gascon Cyrano de Bergerac, though not altogether insignificant as a dramatist, 16 gained his chief literary reputation by a Rabelaisian fiction. Meanwhile, Spanish and Italian models continued to influence both branches of the drama. Everybody knew by heart Gongora's version of the story of " young Pyramus and his love Thisbe," as dramatized by Th. Viaud (1590-1626); and the sentiment of Tristan 17 (1601-1655) overpowered Herod on the stage, and drew tears from Cardinal Richelieu in the audience. J. Mairet was noted for superior vigour. 18 P. Du Ryer's style is described as, while otherwise superior to that of his contemporaries,

12 Le Laquais (II Ragazzd).

13 Les Tromperies (Gli Inganni).

14 ” L. du Peschier ” (de Barry), La Comedie des comedies.

16 L’ Amour tyrannique. 16 Agrippine, Le Pedant joue.

” Marianne. a Sophonisbe.

*$*2*

DRAMA

[MODERN FRENCH

Italian in its defects. A mixture of the forms of classical comedy with elements of Spanish and of the Italian pastoral was attempted with great temporary success by A. Hardy, a play- wright who thanked Heaven that he knew the precepts of his art while preferring to follow the demands of his trade. The mixture of styles begun by him was carried on by the marquis de Racan, 1 J. de Rotrou and others; and among these comedies of intrigue in the Spanish manner the earliest efforts of Corneille himself 2 are to be classed. Rotrou’s noteworthier productions 3 are later in date than the event which marks an epoch in the history of the French drama, the appearance of Corneille’s Cid (1636).

P. Corneille is justly revered as the first, and in some respects the unequalled, great master of French tragedy, whatever may _ … have been unsound in his theories, or defective in his practice. The attempts of his. predecessors had been without life, because they lacked really tragic characters and the play of really tragic passions; while their style had been either pedantically imitative or a medley of plagiarisms. He conquered tragedy at once for the national theatre and for the national literature — and this, not by a long tentative process of produc- tion, but by a few masterpieces, which may be held to be comprehended within the ten years 1636 to 1646; for in his many later tragedies he never again proved fully equal to himself. The French tragedy, of which the great age begins with the Cid, Horace, Cinna, Polyeucte and Rodogune, was not, whatever it professed to be, a copy of the classical tragedy of Greeks or Romans, or an imitation of the Italian imitations of these; nor, though in his later tragedies Corneille depended less and less upon characters, and more and more, after the fashion of the Spaniards, upon situations, and even upon spectacle, were the forms of the Spanish drama able to assert their dominion over the French tragic stage. The mould of French tragedy was cast by Corneille; but the creative power of his genius was unable to fill it with more than a few examples. His range

of passions and characters was limited; he preferred, he said, the reproach of having made his women too heroic to that of having made his men effeminate. His actions inclined too much to the exhibition of conflicts political rather than broadly ethical in their significance. The defects of his style are of less moment; but in this, as in other respects, he was, with all his strength and brilliancy, not one of those rarest of artists who are at the same time the example and the despair of their successors. The examens which he printed of all his plays up to 1660 show how much self-criticism (though it may not always be as in this case conscious) contributes to the true fertility of genius.

In comedy also Corneille begins the first great original epoch of French dramatic literature; for it was to him that Moliere owed the inspiration of the tone and style which he made those of the higher forms of French comedy. But Le Menteur (the parent, with its sequel, of a numerous dramatic progeny 4) was itself derived from a Spanish original, 5 which it did not (as was the case with the Cid) transform into something new. French tragi-comedy Corneille can hardly be said to have invented; 6 and of the mongrel growths of sentimental comedy and of domestic drama or drame, he rather suggested than exemplified the conditions.

The tragic art of Racine supplements rather than surpasses that of his older contemporary. His works reflect the serene and settled formality of an age in which the sun of monarchy shone with an effulgence no clouds seemed capable of obscuring, and in which the life of a nation seemed reducible to the surroundings of a court. The tone of the poetic literature of such an age is not necessarily unreal, because the range of its ideas is limited, and because its forms seem to exist by an immutable authority. That Racine should permanently hold the position which belongs to him in French dramatic

1 Les Bergeries. J Milite ; Clitandre, &c.

3 Le Veritable Saint Genest; Venceslas.

4 Steele, The Lying Lover; Foote, The Liar; Goldoni, II Bugiardo.

5 Ruiz de Alarcon, La Verdad sospechosa.

- *V Illusion comique is antithetically mixed.*

literature is due to the fact that to him it was given to present these

forms — the forms approved by his age — in what may reasonably be called perfection; and, from the point of view of workmanship, Sophocles could not have achieved more. What his plays contain is another question. They suit them- selves so well to the. successive phases in the life of Louis XIV., that Madame de Sevign6 described Racine as having in his later years loved God as he had formerly loved his mistresses; and this sally at all events indicates the range of passions which inspired his tragic muse. His heroes are all of one type — -that of a gracious gloriousness; his heroines vary in their fortunes, but they are all the "trophies of love," 7 with the exception of the scriptural figures, which stand apart from the rest. 3 T. Corneille, Campistron, Joseph Duche (1668-1704), Antoin de Lafosse (c. 1653-1708) and Quinault were mere followers of one or both of the great masters of tragedy, though the last named achieved a reputation of his own in the bastard species of the opera.

The type of French tragedy thus established, like everything else which formed part of the " age of Louis XIV.," proclaimed itself as the definitively settled model of its kind, and character- was accepted as such by a submissive world. Proud istics of of its self-imposed fetters, French tragedy dictatorially French denied the liberty of which it had deprived itself to the classical art of which it claimed to furnish the highest examples. tra ˆ ed y' Yet, though calling itself classical, it had not caught the essential spirit of the tragedy of the Greeks. The elevation of tone which characterizes the serious drama of the age of Louis XIV. is a true elevation, but its heights do not lose themselves in a sphere peopled by the myths of a national religion, still less in the region of great thoughts which ask Heaven to stoop to the aspirations and the failures of man. The personages of this drama are conventional like its themes, but the convention is with itself only; Orestes and Iphigenia have not brought with them the cries of the stern goddesses and the flame on the altar of Artemis; their passions like their speech are cadenced by a modern measure. In construction, the simplicity and regularity of the ancient models are stereotyped into a rigid etiquette by the exigencies of the court-theatre, which is but an apartment of the palace. The unities of time and place, with the Greeks mere rules of convenience, French tragedy imposes upon itself as a permanent yoke. The Euripidean prologue is judiciously exchanged for the exposition of the first act, and the lyrical element essential to Greek tragedy is easily suppressed in its would-be copy; lyrical passages still occur in some of Corneille's early master- pieces, 9 but the chorus is consistently banished, to reappear only in Racine's latest works 10 as a scholastic experiment appropriate to a conventual atmosphere. Its uses for explanation and*

comment are served by the expedient, which in its turn becomes conventional, of the conversations with confidants and confidantes, which more than sufficiently supply the foil of general sentiments. The epical element is allowed full play in narrative passages, more especially in those which relate parts of the catastrophe, 11 and, while preserving the stage intact from realisms, suit them- selves to the generally rhetorical character of this species of the tragic drama. This character impressed itself more and more upon the tragic art of a rhetorical nation in an age when the loftiest themes were in the pulpit receiving the most artistic oratorical treatment, and developed in the style of French classical tragedy the qualities which cause it to become some- thing between prose and poetry — or to appear (in the phrase of a French critic) like prose in full dress. The force of this descrip- tion is borne out by the fact that the distinction between the versification of French tragedy and that of French comedy seems at times imperceptible.

The universal genius of Voltaire found it necessary to shine in all branches of literature, and in tragedy to surpass pre- decessors whom his own authority declared to have surpassed

7 Andromaque; Phedre; Berenice, &c.

8 Esther; Athalie.

9 Le Cid; Polyeucte. 10 Esther; Athalie. 11 Corneille, Rodogune; Racine, Phedre.

the efforts of the Attic muse. He succeeded in impressing the world with the belief that his innovations had imparted a fresh . . vitality to French tragedy; in truth, however, they represent no essential advance in art, but rather augmented the rhetorical tendency which paralyses true dramatic life. Such life as his plays possess lies in their political and social sentiments, their invective against tyranny, 1 and their exposure of fanaticism. 2 In other respects his versatility was barren of enduring results. He might take his themes from French history, 3 or from Chinese, 4 or Egyptian, 5 or Syrian, 6 from the days of the Epigoni 7 or from those of the Crusades; 8 he might appreciate Shakespeare, with a more or less partial comprehension of his strength, and condescendingly borrow from and improve the

barbarian. 9 But he added nothing to French tragedy where it was weakest — in character; and where it was strongest — in diction — he never equalled Corneille in fire or Racine in refine- ment. While the criticism to which French tragedy in this age at last began to be subjected has left unimpaired the real titles to immortality of its great masters, the French theatre itself has all but buried in respectful oblivion the dramatic works bear- ing the name of Voltaire — a name persistently belittled, but second to none in the history of modern progress and of modern civilization.

*As it is of relatively little interest to note the ramifications of an art in its decline, the contrasts need not be pursued among French *^ e contemporaries of Voltaire, between his imitator classical Bernard Joseph Saurin (1706-1781), Saurin's royalist tragedy rival de Belloy, Racine's imitator Lagrange-Chancel lnlts and Voltaire's own would-be rival, the "terrible"*

00 ne ' Crebillon the elder, who professed to vindicate to French tragedy, already mistress of the heavens through Corneille, and of the earth through Racine, Pluto's supplementary realm, but who, though thus essaying to carry tragedy lower, failed to carry it farther. In the latter part of the 18th century French classical tragedy as a literary growth was dying a slow death, however numerous might be the leaves which sprouted from the decaying tree. Its form had been permanently fixed; and even Shakespeare, as manipulated by Ducis 10 — an author whose tastes were better than his times — failed to bring about a change. " It is a Moor, not a Frenchman, who has written this play," cried a spectator of Ducis' Othello (1791); but Talma's conviction was almost as strong as his capacity was great for convincing his public; and he certainly did much to prepare the influence which Shakespeare was gradually to assert over the French drama, and which was aided by translations, more especially that of Pierre Letourneur (1736-1788), which had attracted the sympathy of Diderot and the execrations of the aged Voltaire. 11 Meanwhile, the command which classical French tragedy con- tinued to assert over the stage was due in part, no doubt, to the love of Roman drapery — not always abundant, but always in the grand style — which characterized the Revolution, and which was by the Revolution handed down to the Empire. It was likewise, and more signally, due to the great actors who freed the tragic stage from much of its artificiality and animated it by their genius. No great artist has ever more generously estimated the labours of a predecessor than Talma judged those of Le Kain; but it was Talma himself whose genius was pre- eminently fitted to reproduce the great figures of antiquity in the mimic world, which,

like the world outside, both required and possessed its Caesar. He,' like Rachel after him, reconciled French classical tragedy with nature; and it is upon the art of great original actors such as these that the theatrical future of this form of the drama in France depends. Mere whims of fashion

1 Brutus ; La Mort de Cesar ; Semiramis.

2 (Edipe; Le Fanatisme {Mahomet).

3 Adelaide du Guesclin. 4 L'Orphelin de la Chine. 6 Tanis et Zelide. 6 Les Guebres. ' Olimpie.

8 Tancrede. 9 La Mort de CSsar; Zaire (Othello).

10 Hamlet ; Le Rot Lear, &c.

11 The lectures delivered by the late . Prof essor A. Beljame at Trinity College, Cambridge, in 1905-1906 may be mentioned as valuable contributions to our knowledge of the growth of Shake-speare's influence in France.

— even when inspired by political feeling — will not waft back to it a real popularity; nor will occasional literary aftergrowths, however meritorious, such as the admirable Lucricefli F. Ponsard and the attempts of even more recent writers, suffice to re- establish a living union between it and the progress of the national literature.

The rival influences under which classical tragedy has after a long struggle virtually become a thing of the past in French literature are also to be traced in the history of French comedy, which under the co-operation of other in- omea y- fluences produced a wide variety of growths. The germs of most of these — though not of all — are to be found in the works of the most versatile, the most sure-footed, and, in some respects, the most consummate master of the comic drama whom the world has known — Moliere. What Moliere found in existence was a comedy of intrigue, derived from Spanish or Italian examples, and the elements of a comedy of character, in French and more especially in Italian farce and ballet-pantomime. Corneille's Menteur had pointed the way to a fuller combination of character with intrigue, and in this direction Moliere's genius exercised the height of its creative powers. After beginning with farces, he

produced in the earliest of his plays (from 1652), of which more than fragments remain, comedies of intrigue which are at the same time marvellously lively pictures of manners, and then proceeded, with the Ecole des maris (1 661), to begin a long series of masterpieces of comedy of character. Yet even these, the chief of which are altogether unrivalled in dramatic literature, do not exhaust the variety of his productions. To define the range of his art is as difficult as to express in words the essence of his genius. For though he has been copied ever since he wrote, neither his spirit nor his manner has descended in full to any of his copyists, whole schools of whom have missed elements of both. A Moliere can only be judged in his relations to the history of comedy at large. He was indeed the inheritor of many forms and styles — remaining a stranger to those of Old Attic comedy only, rooted as it was in the political life of a free imperial city; though even the rich extravagances of Aristophanes' burlesque was not left wholly unreproduced by him. Moliere is both a satirist and a humorist; he displays at times the sentiments of a loyal courtier, at others that gay spirit of opposition which is all but indispensable to a popular French wit. His comedies offer elaborate and subtle — even tender — pictures of human character in its eternal types, lively sketches of social follies and literary extravagances, and broad appeals to the ordinary sources of vulgar merriment. Light and perspicuous in construction, he is master of the delicate play of irony, the penetrating force of wit, and the expansive gaiety of frolicsome fun. Faithful to the canons of artistic taste, and under the sure guidance of true natural humour, his style suits itself to every species attempted by him. His morality is the reverse of rigid, but its aberrations are not those of prurience, nor its laws those of pretence; and, wholly free as he was from the didactic aim which is foreign to all true dramatic representa- tion, the services rendered by him to his art are not the less services rendered to society, concerning which the laughter of genuine comedy tells the truth. He raised the comedy of char- acter out of the lower sphere of caricature, and in his greatest creations subordinated to the highest ends of all dramatic composition the plots he so skilfully built, and the pictures of the manners he so faithfully reproduced.

Even among the French comic dramatists of this age there must have been many who " were not aware " that Moliere was its greatest poet. For though he had made the true Moliere's path luminous to them, their efforts were still often matern- al a tentative kind, and one was reviving Pathelin poraries while another was translating the Andria. A more and sue- unique attempt was made in one of the very

few really cessors – modern versions of an Aristophanic comedy, which deserves to be called an original copy — the Plaideurs of Racine. The tragic poets Quinault and Campistron likewise wrote comedies, one u

12 Quinault, L' Amour indiscret (Newcastle and Dryden's Sir Martin Mar all).

or more of which furnished materials to contemporary English dramatists, as did one, of the felicitous plays in which Boursault introduced Mercury and Aesop into the theatrical salon. 1 Antoine Montfleury (1640-168 5), Baron and Dancourt, who were actors like Moliere, likewise wrote comedies. But if the mantle , of Moliere can be said to have fallen upon any of his contemporaries or successors, this honour must be ascribed to J. F. Regnard, who imitated the great master in both themes and characters, 2 while the skilfulness of his plots, and his gaiety of the treatment even of subjects tempting into the by-path of sentimental comedy, 3 entitle him to be regarded as a comic poet of original genius. With him C. R. Dufresny occasionally collaborated.

In the next generation (that of Voltaire) comedy gradually — but only gradually — surrendered for a time the very essence of its vitality to the seductions of a hybrid species, which disguised its identity under more than a single name. A. R- le Sage, who as a comic dramatist at first followed successfully in the footsteps of Moliere, proved himself on the stage as well as in picturesque fiction a keen observer and inimitable satirist of human life. 4 The light texture of the playful and elegant art of J. B. L. Gresset was shown on the stage in a character comedy of merit; 5 and in a comedy which reveals something of his pointed wit, A. Piron produced something like a new type of enduring ridiculousness. 6 P. C. de Marivaux, the French Spectator, is usually supposed to have formed the connecting link between the " old " French . comedy and the " new " and bastard variety. Yet, though his minute analysis of the tender passion excited the scorn of Voltaire, it should not be overlooked that in tnarivaudage proper the wit holds the balance to

the sentiment, and that in some of this frequently misjudged writer's earlier and most delightful plays the elegance and gaiety of diction are as irresistible as the pathetic sentiment, which is in fact rather an ingredient in his comedy than the pervading characteristic of it. 7 Some of the comedies of P. H. Destouches no doubt have a serious basis, and in his later plays he comes near to a kind of drama in which the comic purpose has been virtually sub- merged. 8 The writer who is actually to be credited with the transition to sentimental comedy, and who was fully conscious of the change which he was helping to effect, was Nivelle de La Chaussee, in whose hands French comedy became a champion of the sanctity of marriage, and reproduced the sentiments — in one instance even the characters — of Richardson. 9 To his play La Fausse Antipathie the author supplied a critique, amounting to an apology for the new species of which it was designed as an example.

The new species known as comSdie larmoyante was now fairly in the ascendant; and it would be easy to show how even Voltaire, who had deprecated the innovation, had to yield to a power greater than his own, and introduced the. sentimental element into some of his comedies. 10 The further step, by which comSdie larmoyante was transformed into tragidie bourgeoise, from which the comic element was to all intents and purposes extruded, was taken by a great French writer, D. Diderot; to whose influence it was largely due that the species which had attained to this consummation for more than a generation ruled supreme in the dramatic literature of Europe. But the final impulse, as Diderot himself virtually acknowledged in the entretiens subjoined by him to his Fits naturel (1757), had been

1 Le Mercure galant; Itsope A la ville; £sope A la cour (Vanbrugh, Aesop).

2 Le Bal (M. de Pourceaugnac) ; Geronte in Le Ligataire universel (Argan in Le Malade imaginaire) ; La Critique du L. (La C. de Vicole desfemmes).

3 Le Joueur ; Le Ligataire universel.

4 Crispin rival de son maitre ; Turcaret.

*6 Le Mechant. * La Metromanie.*

7 Le Jeu de l' amour et du hasard ; Le Legs ; La Surprise de V amour ; Les Fausses Confidences; L'ltpreuve.

8 Le Philosophe marie ; Le Glorieux ; Le Dissipateur.

9 La Fausse A ntipathie ; Le Prejuge d la mode ; L'ltcole des amis ; Meluside; Pamila. L'Scoledes meres was the play which Frederick the Great described as turning the stage into a bureau general de la fadeur.

10 See especially Nanine, founded oh the original Pamela.

given by a far humbler citizen of the world of letters, the author of The London Merchant. Diderot's own plays were a literary rather than a theatrical success. Le Fils naturel ou les epreuves de la vertu was not publicly performed till 1771, and then only in deference to the determination of a single actor of the Francais (Mole); nor was the performance of it repeated. Diderot's Second play, Le Pere defamille, printed in 1758 with a Discours sur la poisie dramatique, went through a few public performances in 1 761; and a later revival was unsuccessful. But "at a distance," as was well said, the effect of Diderot's endeavours, the earlier in particular, was extremely great, and Lessing, though very critical as to particular points, greatly helped to spread it. Diderot had for the first time consciously sought to proclaim the theatre an agency of social reform, and to entrust to it as its task the propagation of the gospel of philanthropy. Though the execution of his dramatic works fell far short of his aims; though Madame de Stael was not far wrong in denouncing them as exhibiting not nature itself, but " the affectation of nature," yet they contained, in a measure almost unequalled in the history of the modern drama, the fermenting element which never seems to subside. Their author announced them as examples of a third dramatic form — the genre sirieux — which he declared to be the consummation of the dramatic art. Making war upon the frigid artificiality of classical tragedy, he banished verse from the new species. The effect of these plays, was intended to spring from their truth to nature—a truth such as no spectator could mistake, and which should bring home its moral teachings to the business as well as the bosoms of all. The theatre was to become a real and realistic school of the principles of society and of the conduct of life — it was, in other words, to usurp functions with which it has no concern, and to essay the direct reformation of mankind. The idea was neither new nor just; but its speciousness will probably continue to commend it to many enthusiastic minds, whensoever and in whatsoever shape it is revived.

From this point the history of the French drama becomes that of a conflict between an enfeebled artistic school and a tendency which is hardly to be dignified by the name _. of a school at all. Among the successful dramatists mmea – y following on Diderot may be

mentioned the critical of the and versatile J. F. Marmontel, and more especially Revolution M.J.Sedaine, who though chiefly working fortheopera, aaathe produced two comedies of acknowledged merit. u P.A.C. e/no '-„ de Beaumarchais (1732-1790), who for his early senti- mental plays, 12 in which he imitated Diderot, invented the appella- tion drame — so convenient in its vagueness that it became the accepted name of the hybrid species to which they belonged — in two works of a very different kind, the famous Barbier de Seville and the still more famous Mariage de Figaro, boldly carried comedy back into its old Spanish atmosphere of intrigue; but, while surpassing all his predecessors in the skill with which he constructed his frivolous plots, he drew his characters with a lightness and sureness of touch peculiar to himself, animated his dialogue with an unparalleled brilliancy of wit, and seasoned action as well as dialogue with a political and social meaning, which caused his epigrams to become proverbs, and which marks his Figaro as a herald of the Revolution. Such plays as these were ill suited to the rule of the despot whose vigilance could not overlook their significance. The comedy of the empire is, in the hands of Collin d'Harleville, Louis Picard (1760-1828), A. Duval, Etienne and others, mainly a harmless comedy of manners; nor was the attempted innovation of N. Lemercier — who was fain to invent a new species, that of historical comedy — more than a flattering self-delusion. The theatre had its share in all the movements and changes which ensued in France; though the most important revolution which the drama itself was to undergo was not one of wholly native origin. Those branches of the drama which belong specifically to the history of the opera, or which associate themselves with it, are here passed by. Among them was the vaudeville (from Val de Vire in Calvados), which

11 Le Philosophe sans le savoir ; La Gageure imprevue.

12 e.g. Eugenie (the original of Goethe's Clavigo) and Les Deux Amis, or Le Nigociant de Lyon.

The stage.

Transition to the romantic school.

began as an interspersion of pantomime with the airs of popular

songs, and which, after the Italian masks had been removed from it, was cultivated by Ponsard and Marmontel, vllles'etc wn il e Sedaine wrote a didactic poem on the subject (1756). Sedaine was the father of the opero-comique proper; x Marmontel, 2 as well as Rousseau, 3 likewise composed operettes — a smaller sort of opera, at first of the pastoral variety; and these flexible species easily entered into combination. The melodrama proper, of which the invention is also attributed to Rousseau, 4 in its latter development became merely a drama accentuated by music, though usually in little need of any accentuation.

The chief home of the regular drama, however, demanded efforts of another kind. At the Th6atre Francais, or Comedie Francaise, whose history as that of a single company of actors had begun in 1680, the party-strife of the times made itself audible; and the most prominent tragic poet of the Revolution, M. J. de Chenier, a disciple of Voltaire in dramatic poetry as well as in political philosophy, wrote for the national stage the historical drama — with a political moral 5 — in which in the memorable year 1789 the actor Talma achieved his first complete triumph. But the victorious Revolution proclaimed among other liberties that of the theatres in Paris, of which soon not less than 50 were open. In 1807 the empire restricted the number to 9, and reinstated the Th6atre Francais in sole possession (or nearly such) of the right of performing the classic drama. No writer of note was, however, tempted or inspired by the rewards and other encouragements offered by Napoleon to produce such a classic tragedy as the emperor would have willingly stamped from out of the earth. The tragedies of C. Delavigne represent the transition from the expiring efforts of the classical to the ambitious beginnings of the romantic school of the French drama.

Of modern romantic drama in France it must suffice to say that it derives some of its characteristics from the general movement of romanticism which in various ways and Tbe at various points of time transformed nearly every

school modern European literature, others from the rhetorical tendency which is a French national feature. Victor Hugo was the founder whom it followed in a spirit of high emprise to success upon success, his own being the most conspicuous of all; 6 A. Dumas the elder its unshrinking middleman. The marvellous fire and grandeur of genius of the former, always in extremes but often most sublime at the height of danger, was nowhere more signally such than in the drama; Dumas was a Briareus, working, however, with many hands besides his own. Together with them may, with more or less

precision, be classed in the romantic school of dramatists A. de Vigny 7 and George Sand, 8 neither of whom, however, attained to the highest rank in the drama, and Jules Sandeau; 9 A. de Musset, whose origin- ality pervades all his plays, but whose later works, more especially in his prose " proverbs " and pieces of a similar kind, have a flavour of d a delicacy altogether indescribable; 10 perhaps also P. Merimee (1803-1870), who invented not only Spanish dramas but a Spanish dramatist, and who was never more audacious than when he seemed most naif. u

The romantic school was not destined to exercise a permanent control over French public taste; but it can hardly be said to have been overthrown by the brief classical revival begun by F. Ponsard, and continued, though in closer contact with modern

1 Richard Cceur de Lion, &c.

2 Zemire et Azor; Jeannot et Jeannette.

*8 Les Muses galantes ; Le Devin du village. * Pygmalion.*

6 Charles IX, ou I'ecole des rois.

6 Hernani (1839); Le Roi s' amuse; Ruy Bias; Les Burgraves, &c. Even in Torquemada, the fruit of its author's old age, and full of bombast, the original power has not altogether gone out.

1 Chatterton. 8 Francois le chantpi; Claudie.

3 Le Gendre de M. Poirier.

10 On ne badine pas avec V amour, as interpreted by Delaunay, must always remain the most exquisite type of this inimitable genre.

11 Thedtre de Clara Gazul. La Famille Carvajal, one of these pieces, treats the same story as that of The Cenci.

ideas, both by him 12 and by E. Augier, a dramatist who gradually attained to an extraordinary effectiveness in the self- restrained treatment of social as well as of historical themes. 13 While the theatrical fecundity and the ˆhZl™ remarkable constructive ability of E. Scribe u supplied a long series of productions attesting the rapid growth of the playwright's mastery over the secrets of his craft the name of his competitors is legion. Among them may be mentioned, if only as the authors of two of the most successful plays of the historical species produced in the century, two writers of great

eminence — C. Delavigne 16 and E. Legouve. 16 Later developments of the drama bore the impress of a period of social decay, prepared to probe its own sufferings, while glad at times to take refuge in the gaiety traditional in France in her more light-hearted days, but which even then had not yet deserted either French social life or the theatre which reflected it. After a fashion which would have startled even Diderot, while recalling his efforts in the earnestness of its endeavour to arouse moral interests to which the theatre had long been a stranger, A. Dumas the younger set himself to reform society by means of the stage. 17 But the technical skill which he and contemporary dramatists displayed in the execution of their self-imposed task was such as Sad been undreamt of by Diderot. O. Feuillet, more eminent as a novelist than on the stage, applied himself, though with the aid of fewer prefaces, to the solution of the same or similar problems; while the extraordinary versatility of V. Sardou and his unfailing constructive skill was applied by him to almost every kind of serious, or serio-comic, drama — even the most solid of all. 18 In the same period, while E. Pailleron revived some of the most characteristic tendencies of the best French satirical comedy in ridiculing the pompous pretentiousness of learning for its own sake, 19 the light-hearted gaiety of E. Labiche changed into something not altogether similar in the productions of the comic muse of L. Halevy and H. Meilhac, ranging from the licence of the musical burlesque which was the congenial delight of the later days of the Second Empire to a species of comedy in which the ingredients of bitterness and even of sadness found a place. 20

Dramatic criticism in France has had a material share in the maintenance of a deep as well as wide national interest in the preservation of a high standard of excellence both in the performance of plays and in the plays themselves, t”“” 98 Among its modern representatives the foremost place drama and would probably be by common consent allowed to of the F. Sarcey, whose Monday theatrical feuilleton in the {ˆ»m» Temps was long awaited week by week as an oracle of dramaturgy. But he was only the first among equals, and the successor and the predecessor of writers who have at least sought to be equal to a function of real public importance. For it seems hardly within the range of probability to suppose that the theatre will for many a generation to come lose the hold which it has established over the intellectual and moral sympathies of nearly the whole of the educated — to say nothing of a great part of the half-educated — population of France. This does not, of course, imply that the creative activity of French dramatic literature is certain to endure. Since the great changes set in which

were consequent upon the disastrous war of 1870, French dramatic literature has reflected more than one phase of national sentiment and opinion, and has represented the aspira- tions, the sympathies and the philosophy of life of more than one class in the community. Thus it has had its episodes of reaction in the midst of an onward flow of which it would be difficult to predict the end. The tendency of what can only vaguely be described as the naturalistic school of writers has corresponded to that even more prominent in the dramatic literatures of

12 Lucrece (1843) ; L'Honneur et V argent; Charlotte Corday.

13 La Cigu'e; L'Aventuriere; Gabrielle; Le Fils de Giboyer, &c.

14 Valerie ; Bertrand et Raton ; Le Verre d'eau, &c.

16 Louis XI. is Adrienne Lecouvreur.

*" La Dame aux camBias ; Le Demi-monde ; Le Supplice d'une femme; Les Idees de Mme Aubray; L'Htrangere; Francillon. 18 Les Pattes de mouche ; Nos bons villageois ; Patrie. 18 Le Monde oil Von s'ennuie. *> Frou-frou.*

certain other European nations; but it must be allowed that a new poetic will have to be constructed if the freedom of develop- ment which the dramatic, like all other arts, is entitled to claim is to be reconciled to laws deducible from the whole previous history of the drama. The reaction towards earlier forms has asserted itself in various ways — through the poetic plays of the later years of F. Coppee; in the success (notable for reasons other than artistic) of Vicomte H. de Bornier's first tragedy; and of late more especially in the dramas — highly original and truly romantic in both form and treatment—of E. Rostand.

The art of acting is not altogether dependent upon the measure of contemporary literary productivity, even in France, where the connexion between dramatic literature and the stage has perhaps been more continuously intimate than in many other countries. Talma and Mile Mars flourished in one of the most barren ages of the French literary drama; and though this cannot be asserted of the

two most brilliant stars of the French 19th century tragic stage, Rachel and Sarah Bernhardt, or of their comic contemporaries from Frederick-Lemaitre down to types less unique than the " Talma of the boulevards," the constantly accumulating experience of the successive schools of acting in France may here ensure to the art a future not less notable than its past. Moreover, the French theatre has long been, and is more than ever likely to continue, an affair of the state as well as of the nation; and the judicious policy of not leaving the chief theatres at the mercy of shifting fashion and the base demands of idleness and sensuality will remain the surest guarantee for the maintenance of a high standard both in principle and in practice. So long as France continues to main- tain her ascendancy over other nations in matters of taste, and in much else that adorns, brightens and quickens social life, the predominant influence of the French theatre over the theatres of other nations is likewise assured. But dramatic literature is becoming international to a degree hardly dreamt of half a century ago; and the distinctive development of the French theatre cannot fail to be affected by the success or failure of the national drama in retaining and developing its own most char- acteristic qualities. Its history shows periods of marvellously rapid advance, of hardly less swift decline, and of frequent though at times fitful recovery. Its future may be equally varied; but it will remain not less dependent on the conditions which in every people, ancient or modern, have proved to be indispensable to national vigour and vitality. (A. W. W.)

- Recent French Drama. — The last twenty-five years of the 19th century witnessed an important change in the constructive methods, as well as in the moral tendencies, of the French play- wrights. Of the two leading dramatists who reigned supreme over the haute comedie in 1875, one, Emile Augier, had almost ended his career, but the other, Alexandre Dumas, was to main- tain his ascendancy for many years longer. Sardou's fertility of invention, and extraordinary cleverness at manipulating a complicated intrigue, were also greatly admired, and much was expected from Edouard Pailleron's brilliant and — as it seemed — inexhaustible wit in satirizing the whims and weaknesses of high-born and highly-cultured society. Alexandre Dumas had created and still monopolized the problem play, of which Le Demi-monde, Le Fils naturel, La Question d'argent, Les IdSes de Madame Aubray, La Femme de Claude, Monsieur Alphonse, La Visile de noces, L'Etrangere, Francillon and Denise may be mentioned as the most characteristic specimens. The problem play is the presentation of a particular case, with a view to a general conclusion on some important question of human conduct. This afforded the

author, who was, in his way, a moralist and a reformer, excellent opportunities for humorous discussions and the display of that familiar eloquence which was his greatest gift and most effective faculty. Among other subjects, the social position of women had an all-powerful attraction for his mind, and many of his later plays were written with the object of placing in strong relief the remarkable inequality of the sexes, both as regards freedom of action and responsibility, in modern marriage. Like all the dramatists of his time, he adhered to

Scribe's mode of play-writing — a mixture of the drame bourgeois, as initiated by Diderot, and the comedy of character and manners, long in vogue — from the days of Moliere, Regnard, Destouches and Marivaux, down to the beginning of the 19th century. In his prefaces Dumas often undertook the defence of the system which, in his estimation, was best calculated to serve the purpose of the artist, the humorist and the moralist — a dramatist being, as he conceived, a combination of the three.

Though the majority of French playgoers continued to side with him, and to cling to the time-honoured theatrical beliefs, a few young men were beginning to murmur against the too elaborate mechanism and artificial logic. Scribe and his suc- cessors, whose plays were a combination of comedy and drama, were wont to devote the first act to a brilliant and witty presenta- tion of personages, then to crowd the following scenes with incidents, until the action was brought to a climax about the end of the fourth act, invariably concluding, in the fifth, with an optimistic dSnouement, just before midnight, the time appointed by police regulations for the closing of playhouses. At the same time a more serious and far-reaching criticism was levelled at the very principles on which the conception of human life was then dependent. A new philosophy, based on scientific research, had been gradually gaining ground and penetrating the French mind. A host of bold writers had been trying, with considerable firmness and continuity of purpose, to start a new kind of fiction, writing in perfect accordance with the determinist theories of Auguste Comte, Darwin and Taine. The long-disputed success of the Naturalistic School carried everything before it during the years 1875-1885, and its triumphant leaders were tempted to make the best of their advantage by annexing a new province and establishing a footing on the stage. In this they failed signally, either when they were assisted by professional dramatists or when left to their own resources. It became evident that Naturalism, to be made acceptable on the stage, would have to undergo a special process of transformation and be handled in a peculiar way. Henry Becque succeeded in embodying

the new theories in two plays, which at first met with very indifferent success, but were revived at a later period, and finally obtained permanent recognition in the French theatre— even with the acquiescence of the most learned critics, when they discovered,' or fancied they discovered, that Becque's comedies agreed, in the main, with Moliere's conception of dramatic art. In Les Corbeaux and La Parisienne the plot is yery simple; the episodes are incidents taken from ordinary life. No extraneous character is introduced to discuss moral and social theories, or to acquaint us with the psychology of the real dramatis personae, or to suggest humorous observations about the progress of the dramatic action. The characters are left to tell their own tale in their own words, which are sometimes very comical, sometimes very repulsive, but purport to be always true to nature. Human will, which was the soul and mainspring of French tragedy in the 17th century, and played such a paramount part in the drame bourgeois and the haute comedie of the 19th, appears in M. Becque's plays to have fallen from its former exalted position and to have ceased to be a free agent. It is a mere passive instrument to our inner desires and instincts and appetites, which, in their turn, obey natural laws. Thus, in Becque's comedies, as in the old Greek drama, destiny, not man, is the chief actor, the real but unseen protagonist.

Becque was not a prolific writer, and when he died, in 1899, it was remarked that he had spent the last ten years of his life in comparative inactivity. But during these years his young and ardent disciples had spared no effort in putting their master's theories to the test. It had occurred to a gifted and enterprising actor-manager, named Andr6 Antoine, that the time had come for trying dramatic experiments in a continued and methodical manner. For this purpose he gathered around him a number of young authors, and produced their plays before a select audience of subscribers, who had paid in advance for their season- tickets. The entertainment was a strictly private one. In this way Antoine made himself independent of the censors, and at the same time was no longer obliged to consider the requirements

of the average playgoer, as is the case with ordinary managers, anxious, above all things, to secure long runs. At the Theatre Libre

the most successful play was not to be performed for more than three nights.

The reform attempted was to consist in the elimination of what was contrary to nature in Dumas's and Augier's comedies: of the intrigue parallele or underplot, of the over-numerous and improbable incidents which followed the first act and taxed the spectator's memory to the verge of fatigue; and, lastly, of the conventional denouement for which there was no justification. A true study of character was to take the place of Sardou's complicated fabrications, and Dumas's problem plays. The authors would present the spectator with a fragment of life, but would force no conclusion upon him at the termination of the play. The reformation in histrionic art was to proceed apace. The actors and actresses of the preceding period had striven to give full effect to certain witty utterances of the author, or to preserve and to develop their own personal peculiarities or oddities. Antoine and his fellow-artists did their best to make the public realize, in every word and every gesture, the character- istic features and ruling passions of the men and women they were supposed to represent.

It was in the early autumn of 1887 that the Theatre Libre opened its doors for the first time. It struggled on for eight years amidst unfailing curiosity, but not without encountering some adverse, or even derisive, criticism from a considerable portion of the public and the press. The Theatre Libre brought under public notice such men as George Courteline and George Ancey, who gave respectively, in Bonbouroche and La Dupe, specimens of a comic vein called the " comique cruel." Fabre, in L' Argent, approached if not surpassed his master, Henry Becque. Brieux, in Blanchette, gave promise of talent, which he has since in a great measure justified. In Les Fossiles and L'Envers d'une sainte, by Francois de Curel, were found evidences of dramatic vigour and concentrated energy, allied with a remarkable gift for the minute analysis of feeling. Antoine's activity was not exclusively confined to the efforts of the French Naturalistic School; he included the Norwegian drama in his programme, and successively produced several of Ibsen's plays. They received a large amount of attention from the critics, the views then expressed ranging from the wildest enthusiasm to the bitterest irony. Francisque Sarcey was decidedly hostile, and Jules Lemaitre, who ranked next to him in authority, ventured to suggest that Ibsen's ideas were nothing better than long- discarded social and literary paradoxes, borrowed from Pierre Leroux through George Sand, and returned to the French market as novelties. Ibsen was not understood by the French public at large, though his influence could be clearly

traced on thoughtful men like Paul Hervieu and Francois de Curel.

The authors of the Theatre Libre were sadly wanting in tact and patience. They went at once to extremes, and, while trying to free themselves from an obsolete form of drama, fell into a state of anarchy. If a too elaborate plot is a fault, no plot at all is an absurdity. The old school had been severely taken to task for devoting the first act to the delineation of character, and the delineation of character was now found to have extended over the whole play; and worse still, most of these young men seemed to find pleasure in importing a low vocabulary on to the stage; they made it their special object to place before the specr tator revolting pictures of the grossest immorality. In this they were supported by a knot of noisy and unwise admirers, whose misplaced approval largely contributed towards bringing an otherwise useful and interesting undertaking into disrepute. The result was that after the lapse of eight years the little group collected round Antoine had lost in cohesion and spirit, that it was both less hopeful and less compact than it had been at the outset of the campaign. But some authors who had kept aloof from the movement were not slow in reaping the moral and intellectual profit of these tentative experiments. Among them must be cited George de Porto-Riche, Henri Lavedan, Paul Hervieu, Maurice Donnay and Jules Lemaitre. Alone among the authors of the Theatre Libre, £. Brieux secured an assured position on

the regular stage. Instead of attacking the vices and follies of his times, he has made a name by satirizing the weak points or the wrong application of certain fundamental principles by which modern institutions are supported. He mocked at universal suffrage in L' Engrenage, at art in Manages d'artistes, at popular instruction in Blanchette, at charity in Les Bienfaiteurs, at science in L'Evasion, and then at law in La Robe rouge. Of Les Trots Filles de M. Dupont, one is an old maid with a strong bent towards mysticism, another is a star in the demi-monde, and the third is married. Neither religion, nor free love, nor marriage has made one of the three happy. The strange fact about Brieux is that he propounds his uncomfortable ideas with an incredible amount of dash and spirit.

All the plays written by the above-mentioned authors, and by those who follow in their steps, have been said to constitute the " new comedy." But one may question the advisability of applying the same name to literary works which present so little, if any, family likeness. It was tacitly agreed to remove the intricacies of the plot and the forced denouement. But no one will trace in those plays the

uniformity of moral purpose which would justify us in comprising them under the same head, as products of the same school. Then, before the Naturalistic, or half-Naturalistic, School had attained to a practical result or taken a definite shape, a wave of Romanticism swept over the French public, and in a measure brought back the old artistic and literary dogmas propounded by Victor Hugo and the genera- tion of 1830. Signs of a revival in French dramatic poetry were not lacking. The success of La Fille de Roland, by the Vicomte de Bornier, was restricted to the more cultivated classes, but the vogue of Jean Richepin's Chemineau was at once general and lasting. Cyrano de Bergerac, produced in the last days of 1897, brought a world-wide reputation to its young author, Edmond Rostand. This play combines sparkling wit and brilliancy of imagination with delightful touches of pathos and delicate tenderness. It was assumed that Rostand was endowed to an extraordinary degree both with theatrical genius and the poetic faculty. L'Aiglon fell short of this too favourable judgment. It is more a dramatic poem. than a real drama, and the author handles history with the same childish incompetence and in- accuracy as Hugo did in Cromwell, in Ruy Bias and Hernani. The persistent approbation of the public seemed, however, to indicate a growing taste for poetry, even when unsupported by dramatic interest— a curious symptom among the least poetical of modern European races.

To sum up, the French, as regards the present condition of their drama, were confronted with two alternative movements. Naturalism, furthered by science and philosophy, was contending against traditions three centuries old, and seemed unable to crystallize into masterly works; while romantic drama, founded on vague and exploded theories, had become embodied in pro ductions of real artistic beauty, which have been warmly wel- comed by the general playgoer. It should nevertheless be noted that in Cyrano and L'Aiglon human will, which was the main- spring of Corneille's tragedy and Hugo's drama, tried to reassert itself, but was baffled by circumstance, and had to submit to inexorable laws. This showed that the victorious school would have to reckon with the doctrines of the defeated party, and suggested that a determinist theatre might be the ultimate outcome of a compromise. ' (A. Fi.)

(/) English Drama.

Among the nations of Germanic descent the English alone succeeded, mainly through the influence of the Renaissance movement, in transforming the later growths of the medieval drama into the beginnings of a great and enduring national dramatic literature,

second neither in volume nor in splendour to any other in the records of the world. And, although in England, as elsewhere, the preparatory process had been con- tinuing for some generations, its consummation coincided with one of the greatest epochs of English national history, and indeed forms one of the chief glories of that epoch itself; so that, in thinking or speaking of the Elizabethan age and the Elizabethan

drama, the one can scarcely be thought or spoken of without the other.

It is of course conceivable that the regular drama, or drama proper, might in England have been called into life without the Beginnings direct influence of classical examples. Already in the ot the reign of Edward VI. the spirit of the Reformation had regular (with the aid of a newly awakened desire for the study drama. ˆ history, which was no doubt largely due to Italian examples) quickened the relatively inanimate species of the morality into the beginning of a new development. 1 But though the Kyng Johan of Bale (much as this author abhorred the chronicles as written by ecclesiastics) came very near to the chronicle histories, there is no proof whatever that the work, long hidden away for very good reasons, actually served as a transition to the new species; and Bale's production was entirely unknown to the particular chronicle history which treated the same subject. Before the earliest example of this transitional species was produced, English tragedy had directly connected its beginnings with classical models.

Much in the same way, nothing could have been more natural and in accordance with the previous sluggish evolution of the English drama than that a gradual transition, however complete in the end, should have been effected from the moralities to comedy. It was not, however, John Heywood himself who was to accomplish any such transition;: possibly, he was himself the author of the morality Genus humanum performed at the coronation feast of Queen Mary, whose council speedily forbade the performance of interludes without the queen's licence. Nor are we able to conjecture the nature of the pieces bearing this name composed by Richard Farrant, afterwards the master of the Children of St George's at Windsor, or of William

Hunnis, master under Queen Elizabeth of the Children of the Chapel Royal. But the process of transition is visible in productions, also called interludes, but charged with serious purpose, such as T. Ingeland's noteworthy Disobedient Child (before 1560), and plays in which the element of abstractions is perceptibly yielding to that of real personages, or in which the characters are for the most part historical or the main element in the action belongs to the sphere of romantic narrative. 2 The demonstration would, however, be alien to the purpose of indicating the main conditions of the growth of the English drama. The immediate origin of the earliest extant English comedy must, like that of the first English tragedy, be sought, not in the develop- ˆcl's'slca! ment ˚f anv popular literary or theatrical antecedents, examples. Dut m tne imitation, more of less direct, of classical models. This cardinal fact, unmistakable though it is, has frequently been ignored or obscured by writers intent upon investigating the origines of our drama, and to this day remains without adequate acknowledgment in most of the literary histories accessible to the great body of students.

It is true that in tracing the entrance of the drama into the national literature there is no reason for seeking to distinguish very narrowly between the several tributaries to the main stream which fertilized this as well as other fields under Renaissance culture. The universities then still remained, and for a time became more prominently than ever, the leading agents of education in all its existent stages; and it is a patent fact that no influence could have been so strong upon the Elizabethan dramatists as that fo which they had been subjected during the university life through which the large majority of them had passed. The corporate life of the universities, and the enthusi- asms (habitually unanimous) of their undergraduates and younger graduates, communicated this influence, as it were automatically, to the students, and to the learned societies themselves, of the Inns of Court. In the Tudor, as afterwards in the early Stuart, times, these Inns were at once the seminaries

1 As has been already seen, Sir David Lyndsay's celebrated Satyre of the Three Estaits, a dramatic manifesto in favour of the Reforma- tion, is in form a morality pure and simple.

- *Tom Tiler and his Wife (1578) ; A Knack to know a Knave (c. 1594); Sir Clyomon and Sir Ctamydes (misattributed to G. Peele), (printed 1599).*

of loyalty, and the obvious resort for the supply of young men of

spirit desirous of honouring a learned court by contributing to its choicer amusements. Thus, whether we trace them in the universities, in the " bowers " or halls of the lawyers, or in the palaces of the sovereign, the beginnings of the English academical drama, which in later Elizabethan and Jacobean literature cannot claim to be more than a subordinate species of the national drama, in an earlier period served as the actual link between classical tragedy and comedy and the surviving native growths, and supplied the actual impulse towards the beginnings of English tragedy and comedy.

*The academical drama of the early years of Elizabeth's reign and of the preceding part of the Tudor period — including the school-drama in the narrower sense of the term and other performances of academical origin — consisted, Theear,ler apart from actual reproductions of classical plays in M*drama. the original Latin or in Latin versions of the Greek, in adaptations of Latin originals, or of Latin or English plays directly modelled on classical examples. A notable series of plays of this kind was performed in the hall of Christ Church, Oxford, from the first year of Edward VI. onward, when N. Grimald's Archipropheta, treating in classic form the story of St John the Baptist, but introducing the Vice and comic scenes, was brought out. 3 Others were J. Calfhill's Progne and R. Edwardes' Palaemon and Arcyte (both 1566), and, from about 1580 onwards, a succession of Latin plays by William Gager, beginning with the tragedy Meleager, and including, with other tragedies, 4 a comedy Rivales. Yet another comedy, acted at Christ Church, and extolled in 1591 by Harington for " harmless mirth," was the Bellum grammatical, or Civil War between Nouns and Verbs, which may have been a revision of a comedy written by Bale's friend, R. Radcliff, in 1538, but of which in any case the ultimate origin was a celebrated Italian allegorical treatise. 6 In Cambridge, as is not surprising, the activity of the early academical friends and favourers of the drama was even more marked. At St John's College, where Bishop Watson's Latin tragedy called Absolom was produced within the years 1534 and 1544, plays were, according to Ascham, repeatedly performed about the middle of the century; at Christ's a controversial drama in the Lutheran interest called Pammachius, of which Gardiner complained to the privy council, and which seems afterwards to have been translated by Bale, was acted in 1544; and at Trinity there was a long series of performances which began with Chris topherson's Jephtha about 1546, and consisted partly of reproductions of classical works, 6 partly of plays and "shows" unnamed; while on one occasion at all events, in 1559, " two English plays " were produced. In 1560 was acted, doubtless in the original*

Latin, and not in Palsgrave's English translation (1540) for schoolboys, the celebrated " comedy " of Acolastus, by W. Gnaphaeus, on the story of the Prodigal Son. The long series of Trinity plays interspersed with occasional plays at King's (where Udall's Ezechias was produced in English in 1 564) , at St John's (where T. Legge's Richardus III. was first acted in 1573), and, as will be seen below, at Christ's, continued, with few noticeable breaks, up to the time when the Elizabethan drama was in full activity. 7 Among the " academical " plays not traceable to any particular university source may be mentioned, as acted at court so early as the end of 1565 or the beginning of 1566, the Latin Sapientia Solomonis, which generally follows the biblical narrative, but introduces a comic element in the sayings of the popular Marcolph, who here appears as a court fool.

3 An earlier drama by him, Christus redivivus, is said to have been printed at Cologne.

4 Oedipus ; Dido ; Ulysses redux. 6 By A. Guarna.

6 Pax; Troas; Menaechmi; Oedipus; Mostellarta; Hecuba; Amphy- truo; Medea. These fall between 1546 and 1560. The date and place of the production of William Goldingham of Trinity Hall's Herodes, some time after 1567, are unknown.

7 The date and place of performance of the Latin Fatum Vorti- gerni are unknown; but it was not improbably produced at a later time than Shakespeare's Richard II., which it seems in certain points to resemble.

ENGLISH]

DRAMA

5i9

English tragedies.

It was under the direct influence of the Renaissance, viewed primarily, in England as elsewhere, as a revival of classical studies, and in connexion with the growing taste in of Seneca, university and cognate circles of society, and at a court which prided itself on its love and patronage of learning, that English tragedy and comedy took their actual beginnings. Those of comedy, as it would seem, preceded those of tragedy by a few years. Already in Queen Mary's reign, translation was found the readiest form of expression offering

itself to literary scholarship; and Italian examples helped to commend Seneca, the most modern of the ancient tragedians, and the imitator of the most human among the masters of Attic tragedy, as a favourite subject for such exercises. In the very year of Elizabeth's accession— seven years after Jodelle had brought out the earliest French tragedy — a group of English university scholars began to put forth a series of translations of the ten tragedies of Seneca, which one of them, T. Newton, in 1581 collected into a single volume. The earliest of these versions was that of the Troades (1559) by Jasper Hey wood, a son of the author of the Interludes. He also published the Thyestes (1560) and the Hercules Furens (1561); the names of his fellow-translators were A. Neville, T. Nuce, J. Studley and the T. Newton aforesaid. These translations, which occasionally include original interpolations (" additions," a term which was to become a technical one in English dramaturgy), are in no instance in blank verse, the favourite metre of the dialogue being the couplets of fourteen-syllable lines best known through Chapman's Homer.

The authority of Seneca, once established in the English literary world, maintained itself there long after English drama had emancipated itself from the task of imitating this pallid Earliest model, and, occasionally, Seneca's own prototype, Euripides. 1 Nor can it be doubted that some transla- tion of the Latin tragic poet had at one time or another passed through Shakespeare's own hands. But what is of present importance is that to the direct influence of Seneca is to be ascribed the composition of the first English tragedy which we possess. Of Gorboduc (afterwards re-named F err ex and Porrex), first acted on the 1 8th of January 1562 by the members of the Inner Temple before Queen Elizabeth, the first three acts are stated to have been written by T. Norton; the rest of the play (if not more) was the work of T. Sackville, afterwards Lord Buckhurst and earl of Dorset, whom Jasper Heywood praised for his sonnets, but who is better known for his leading share in The Mirror for Magistrates. Though the subject of Gorboduc is a British legend, and though the action is neither copied nor adapted from any treated by Seneca, yet the resemblance between this tragedy and the Thebais is too strong to be fortuitous. In all formal matters — chorus, messengers, &c. — Gorboduc adheres to the usage of classical tragedy; but the authors show no respect for the unities of time or place. Strong in construction, the tragedy is — like its model, Seneca — weak in characterization. The dialogue, it should be noticed, is in blank verse; and the device of the dumb-show, in which the contents of each act are in suc- cession set forth in pantomime only, is employed

at once to instruct and to stimulate the spectator.

The nearly contemporary Apius and Virginia (c. 1563), though it takes its subject — destined to become a perennial one on the modern stage — from Roman story; the Historie of Horestes (pr. 1567); and T. Preston's Cambises King of Percia (1569-1570), are somewhat rougher in form, and, the first and last of them at all events, more violent in diction, than Gorboduc. They still contain elements of the moralities (above all the Vice) and none of the formal features of classical tragedy. But a Julyus Sesyar seems to have been performed, in precisely the same circumstances as Gorboduc, so early as 1 562 ; and, four years later, G. Gascoigne, the author of the satire The Steele Glass, produced with the aid of two associates (F. Kinwelmersh and Sir Christopher Yelverton,

1 Latin " academical " plays directly imitated from Seneca, but of unknown date, are Solymannidae (or the story of Solyman II. and his son Mustapha), and Tomumbeius (Tuman Bey, sultan of Egypt, 1516) ; yet others exhibit his influence.

who wrote an epilogue), Jocasta, a virtual translation of L. Dolce' s Giocasta, which was an adaptation, probably, of R. Winter's Latin translation of the Phoenissae of Euripides. 2 Between the years 1567 and 1580 a large proportion of the plays presented at court by choir- or school-boys, and by various companies of actors, were taken from Greek legend or Roman history; as was R. Edwardes' Damon and Pithias (perhaps as early as 1 564-1 565), which already shades off from tragedy into what soon came to be called tragi-comedy. 3 Simultaneously with the influence, exercised directly or indirectly, of classical literature, that of Italian, both dramatic and narrative, with its marked tendency to treat native themes, asserted itself, and, while diversifying the current of early English tragedy, infused into it a long- abiding element of passion. There are sufficient grounds for concluding that a play on the subject of Romeo and Juliet, which L. da Porto and M. Bandello had treated in prose narrative — that of the latter having through a French version formed itself into an English poem — was seen on an English stage in or before 1562. Gismonde of Salerne, a play founded on Boccaccio, was acted before Queen Elizabeth at the Inner Temple in 1568, nearly a generation before it was published, rewritten in blank verse by R. Wilmot, one of the performers, then in holy orders; G. Whetstone's Promos and Cassandra, founded on G. Cinthio (from which came the plot of Measure for Measure), followed, printed in 1578; and there were other " casts of Italian devices '" belonging to this age, in which the choice of a striking themu still seemed the chief preoccupation of

English tragic poets.

From the double danger which threatened English tragedy in the days of its infancy — that it would congeal on the wintry heights of classical themes, or dissolve its vigour in the glow: ; njj heat of a passion fiercer than that of the Italians — Ingles) Italianato e un diavolo incarnato — it was preserved more than by any other cause by its happy association with the traditions oi the national history. An exceptional position might seem to bu in this respect occupied by T. Hughes' interesting tragedy Tht Misfortunes of Arthur (1587). But the author of this play — hj certain portions of whose framework there were associated with him seven other members of Gray's Inn, including Francis Bacon , and which was presented before Queen Elizabeth like Gorboduc— in truth followed the example of the authors of that work botii in choice of theme, in details of form, and in a general though far from servile imitation of the manner of Seneca; nor does hi represent any very material advance upon the first English tragedy.*

Fortunately, at the very time when from such beginnings as those just described the English tragic drama was to set fordi upon a course in which it was to achieve so much, a new sphere of activity suggested itself. And in this, ^™Jtff after a few more or less tentative efforts, English dramatists very speedily came to feel at home. In their direcv dramatization of passages or portions of English history (i»< which the doings and sufferings of King Arthur could only by courtesy or poetic licence be included) classical models would bt» of scant service, while Italian examples of the treatment ox national historical subjects, having to deal with material so> wholly different, could not be followed with advantage. The native species of the chronicle history, which designedly assumed this name in order to make clear its origin and purpose, essayed nothing more or less than a dramatic version of an existing chronicle. Obviously, while the transition from half historical, half epical narrative often implied carrying over into the new form some of the features of the old, it was only when the subject matter had been remoulded and recast that a true dramatic action could result. But the histories to be found among the plays of Shakespeare and one or two other Elizabethans are true dramas, and it would be inconvenient to include these in the transitional species of those known as chronicle histories. Among these ruder

2 " Supposes " and " Jocasta," ed. J. W. Cunliffe.

3 His Palamon and Arcyte (produced in Christ Church hall, Oxford,

in 1566) is not preserved; or we should be able to compare with The Two Noble Kinsmen this early dramatic treatment of a singularly fine theme.

Earliest comedies.

compositions, which intermixed the blank verse introduced on the Stage by Gorboduc with prose, and freely combined or placed •side by side tragic and comic ingredients, we have but few distinct examples. One of these is The Famous Victories of Henry the Fifth, known to have been acted before 1588; in which both the verse and the prose are frequently of a very rude sort, while it is neither divided into acts or scenes nor, in general, constructed with any measure of dramatic skill. But its vigour and freshness are considerable, and in many passages we recognize familiar situations and favourite figures in later masterpieces of the English historical drama. The second is The Troublesome Raigne of King John, in two parts (printed in 1591), an epical narrative transferred to the stage, neither a didactic effort like Bale's, nor a living drama like Shakespeare's, but a far from contemptible treatment of its historical theme. The True Chronicle History of King Leir (acted in 1593) in form resembles the above, though it is not properly on a national subject (its story is taken from Geoffrey of Monmouth); but, with all its defects, it seems only to await the touch of the master's hand to become a tragedy of supreme effectiveness. A yet further step was taken in the Tragedy of Sir Thomas More (c. 1590) — in which Shakespeare's hand has been thought traceable, and which deserves its designation of "tragedy " not so much on account of the relative nearness of the historical subject to the date of its dramatic treatment, as because of the tragic responsi- bility of character here already clearly worked out.

Such had been the beginnings of tragedy in England up to the time when the genius of English dramatists was impelled by the spirit that dominates a great creative epoch of literature to seize the form ready to their hands. The birth of English comedy, at all times a process of less labour and eased by an always ready popular responsive- ness to the most tentative efforts of art, had slightly preceded that of her serious sister. As has been seen from the brief review given above of

the early history of the English academical drama, isolated Latin comedies had been performed in the original or in English versions as early as the reign of Henry VIII. — perhaps even earlier ; while the morality and its direct descendant, the interlude, pointed the way towards popular treatment in the vernacular of actions and characters equally well suited for the diversion of Roman, Italian and English audiences. Thus there was no innovation in the adaptation by N. Udal (q.v.) of the Miles Gloriosus of Plautus under the title of Ralph Roister Doister, which may claim to be the earliest extant English comedy. It has a genuinely popular vein of humour, and the names fit the characters after a fashion familiar to the moralities. The second English comedy — in the opinion of at least one high authority our first — is Misogonus, which was certainly written as early as 1560. Its scene is laid in Italy; but the Vice, commonly called " Cacurgus," is both by himself and others fre- quently designated as " Will Summer," in allusion to Henry VHI.'s celebrated jester. Gammer Gurton's Needle, long regarded as the earliest of all English comedies, was printed in 1575, as acted " not long ago in Christ's College, Cambridge." Its authorship was till recently attributed to John Still (afterwards bishop of Bath and Wells), who was a resident M.A. at Christ's, when a play was performed there in 1 566. But the evidence of his authorship is inconclusive, and the play " made by Mr. S., Master of Arts," may be by William Stevenson, or by some other contemporary. This comedy is slighter in plot and coarser in diction than Ralph Roister Doister, but by no means unamusing. In the main, however, early English comedy, while occasionally introducing characters and scenes of thoroughly native origin and complexion (e.g. Grim, the Collier of Croydon), 1 was content to borrow its themes from classical or Italian sources. 2 G. Gascoigne's Supposes (acted at Gray's Inn in 1 566) is a translation of I Suppositi of Ariosto, remarkable for the flowing facility of

1 The History of the Collier.

2 A Historie of Error (1577), one of the many imitations of the Menaechmi, may have been the foundation of the Comedy of Errors. In the previous year was printed the old Taming of a Shrew, founded on a novel of G. F. Straparola. Part of the plot of Shakespeare's Taming of the Shrew may have been suggested by The Supposes.

its prose. While, on the one hand, the mixture of tragic with comic motives, which was to become so distinctive a feature of the Elizabethan drama, was already leading in the direction of tragi-comedy, the precedent of the Italian pastoral drama encouraged the

introduction of figures and stories derived from classical mythology; and the rapid and diversified influence of Italian comedy, in close touch with Italian prose fiction, seemed likely to affect and quicken continuously the growth of the lighter branch of the English drama.

Out of such promises as these the glories of English drama were ripened by the warmth and light of the great Elizabethan age — of which the beginnings may fairly be reckoned Condi- horn the third decennium of the reign to which it owes t,oas ot its name. The queen's steady love of dramatic enter- snza- tainments could not of itself have led, though it un- bethan doubtedly contributed, to such a result. Against the drama, attacks which a nascent puritanism was already directing against the stage by the hands of J. Northbrooke, 3 the repentant playwright S. Gosson, 4 P. Stubbes, 6 and others, 6 were to be set not only the frugal favour of royalty and the more liberal patronage of great nobles, 7 but the fact that literary authorities were already weighing the endeavours of the English drama in the balance of respectful criticism, and that in the abstract at least the claims of both tragedy and comedy were upheld by those who shrank from the desipience of idle pastimes. It is noticeable that this period in the history of the English theatre coincides with the beginning of the remarkable series of visits made to Germany by companies of English comedians, which did not come to an end till the period immediately before the Thirty Years' War, and were occasionally resumed after its close. As at home the popularicy of the stage increased, the functions of playwright and actor, whether combined or not, began to hold out a reasonable promise of personal gain. Nor, above all, was that higher impulse which leads men of talent and genius to attempt forms of art in harmony with the tastes and tendencies of their times wanting to the group of writers who can be remembered by no nobler name than that of Shakespeare's predecessors.

The lives of all of these are, of course, in part contemporary with the life of Shakespeare himself; nor was there any sub-

stantial difference in the circumstances under which

The pre-

most of them, and he, led their lives as dramatic decessors authors. A distinction was manifestly kept up ° fsl >ake- between poets and playwrights. Of the contempt entertained for the actor's profession some fell to the share of the dramatist; " even Lodge," says C. M. Ingleby, " who had indeed never trod the stage, but had written

several plays, and had no reason to be ashamed of his antecedents, speaks of the vocation of the play-maker as sharing the odium attaching to the actor." Among the dramatists themselves good fellowship and literary partnership only at times asserted themselves as stronger than the tendency to mutual jealousy and abuse; of all chapters of dramatic history, the annals of the early Elizabethan stage perhaps least resemble those of Arcadia.

Moreover, the theatre had hardly found its strength as a powerful element in the national life, when it was involved in a bitter controversy, with which it had originally no m s t oryo t connexion, on behalf of an ally whose sympathy with the Eliza- it can only have been of a very limited kind. The b ˆ tna " Marprelate controversy, into which, among leading playwrights, Lyly and Nashe were drawn, in 1 589 led to a stoppage

3 Treatise wherein Dicing, Dauncing, Vaine Playes or Enterluds . . . . are reproved, &c. (1577).

4 The School of Abuse. 6 The Anatomy of Abuses.

6 H. Denham, G. Whetstone (the author of Promos and Cassandra), W. Rankine.

7 It may be mentioned that the practice of companies of players, of one kind or another, being taken into the service of members of the royal family, or of great nobles, dates from much earlier times than the reign of Elizabeth. So far back as 1400/1 the corporation of Shrewsbury paid rewards to the histriones of Prince Henry and of the earl of Stafford, and in 1408/9 reference is made to the players of the earl and countess of Arundel, of Lord Powys, of Lord Talbot and of Lord Furnival.

of stage-plays which proved only temporary; but the general result of the attempt to make the stage a vehicle of political abuse and invective was beyond a doubt to coarsen and degrade both plays and players. Scurrilous attempts and rough repression continued during the years 1590-1593; and the true remedy was at last applied, when from about 1594, the chief London actors became divided into two great rival companies — the lord chamberlain's and the lord

admiral's — which alone received licences. Instead of half a dozen or more companies whose jealousies communicated themselves to the playwrights belonging to them, there were now, besides the Children of the Chapel, two established bodies of actors, directed by steady and, in the full sense of the word, respectable men. To the lord chamberlain's company, which, after being settled at " the Theater " (opened as early as 1576 or 1577), moved to Blackfriars, purchased by James Burbage, in 1596, and to the Globe on the Bankside in 1599, Shakespeare and Richard Burbage, the greatest of the Eliza- bethan actors, belonged; the lord admiral's was managed by Philip Henslowe, the author of the Diary, and Edward Alleyn, the founder of Dulwich College, and was ultimately, in 1600, settled at the Fortune. In these and other houses were per- formed the plays of the Elizabethan dramatists, with few adventitious aids, the performance being crowded into a brief afternoon, when it is obvious that only the idler sections of the population could attend. No woman might appear at a play- house, unless masked; on the stage, down to the Restoration, women's parts continued to be acted by boys.

It is futile to take no account of such outward circumstances as these and many which cannot here be noted in surveying the progress of the literature of the Elizabethan drama. Like that of the Restoration — and like that of the present day — it was necessarily influenced in its method and spirit of treatment by the conditions and restrictions which governed the place and circumstances of the performance of plays, including the con- struction of theatre and stage, as well as by the social composition of its audiences, which the local accommodation, not less than the entertainment, provided for them had to take into account. But to these things a mere allusion must suffice. It may safely be said, at the same time, that no dramatic literature which has any claim to rank beside the Elizabethan — not that of Athens nor those of modern Italy and Spain, nor those of France and Germany in their classic periods — had to contend against such odds; a mighty inherent strength alone ensured to it the vitality which it so triumphantly asserted, and which enabled it to run so unequalled a course.

Among Shakespeare's predecessors, John Lyly, whose plays were all written for the Children of the Chapel and the Children of St Paul's, holds a position apart in English dra- matic literature. The euphuism, to which his famous romance gave its name, likewise distinguishes his mythological, 1 quasi-historical, 2 allegorical, 3 and satirical 4 comedies. But his real service to the progress of English drama is to be sought neither in his choice of subjects nor in his imagery — though to his fondness for fairylore and for the whole

phantasmagoria of legend, classical as well as romantic, his contemporaries, and Shakespeare in particular, were indebted for a stimulative precedent, and though in his Endimion at all events he excites curiosity by an allegorical treatment of contemporary characters and events. It does not even lie in the songs interspersed in his plays, though none of his predecessors had in the slightest degree anticipated the lyric grace which distinguishes some of these incidental efforts. It consists in his adoption of Gascoigne's innovation of writing plays in prose; and in his having, though under the fetters of an affected and pretentious style, given the first example of brisk and vivacious dialogue — an example to which even such successors as Shakespeare and Jonson were indebted. Thomas Kyd, the author of the Spanish Tragedy (preceded or followed by the first part of Jeronimo), and probably of several plays whose author was

1 The Woman in the Moone; Sapho and Phao.

- *Alexander and Campaspe.*

*' Endimion; My das. * Gallathea.*

Lyly.

Kyd.

Peek.

unnamed, possesses some of the characteristics, but none of the genius, of the greatest tragic dramatist who preceded Shake- speare. No slighter tribute than this is assuredly the M . due of Christopher Marlowe, whose violent end pre- maturely closed a poetic career of dazzling brilliancy. His earliest play, Tamburlaine the Great, in which the use of blank verse was introduced upon the English public stage, while full of the " high astounding terms " of an extravagant and often bombastic diction, is already marked by the passion which was the poet's most characteristic feature, and which was to find expression so luxuriantly beautiful in his Doctor Faustus, and so surpassingly violent in his Jew of Malta. His masterpiece, Edward II., is a tragedy of singular pathos and of a dramatic power unapproached by any of his contemporaries. George Peele was a far more versatile writer even as a dramatist; but, though his plays contain passages of exquisite beauty, not one of them is worthy to be ranked by the side of Marlowe's Edward II., compared with which, if indeed not absolutely, Peele's Chronicle of Edward I. still stands on

*the level of the species to which its title and character alike assign it. His finest play is undoubtedly David and Bethsabe, which resembles Edward I. in construction, but far surpasses it in beauty of language and versification, besides treating its subject with greatly superior dignity. If the difference between Peele and Shakespeare is still, in many respects besides that of genius, an immeasurable one, we seem to come into something like a Shakespearian atmosphere in more than one passage of _ the plays of the unfortunate Robert Greene — un- fortunate perhaps in nothing more enduringly than in the proof which he left behind him of his supercilious jealousy of Shake- speare. Greene's genius, most conspicuous in plays treating English life and scenes, could, notwithstanding his academic self-sufficiency, at times free itself from the pedantry apt to beset the flight of Peele's and at times even of Marlowe's muse; and his most delightful work 6 seems to breathe something of the air, sweet and fresh like no other, which blows over an English countryside. Thomas Lodge, whose dramatic, and much less of course his literary activity, is measured by the only play that we know to have been wholly his; 6 Thomas Nashe, the redoubtable pamphleteer and the father of the English picaresque novel; 7 Henry Chettle, who worked the chords of both pity 8 and terror * with equal vigour, and Anthony Munday, better remembered for his city pageants than for his plays, are among the other more important writers of the early Elizabethan drama, though not all of them can strictly speaking be called predecessors of Shakespeare. It is not possible here to enumerate the more interesting of the anonymous plays which belong to this " pre- Shakespearian " period of the Elizabethan drama; but many of them are by intrinsic merit as well as for special causes deserving of the attention of the student.*

*The common characteristics of nearly all these dramatists and plays were in accordance with those of the great age to which they belonged. Stirring times caUed for stirring Comm a themes, such as those of " Mahomet, Scipio and character- Tamerlane"; and these again for a corresponding isticsof vigour of treatment. Neatness and symmetry of the early construction were neglected for fulness and variety ?^**' of matter. Novelty and grandeur of subject seemed well matched by a swelling amplitude and often reckless extra- vagance of diction. As if from an inner necessity, the balance of rhymed couplets gave way to the impetuous march of blank verse; "strong lines" were as inevitably called for as strong situations and strong characters. Although the chief of these poets are marked off from one another by the individual genius which impressed itself upon both the form and the matter of their works, yet the stamp of the age is upon them all.*

Writing

5 Friar Bacon and Friar Bungay.

6 The Wounds of Civil War. With Greene he wrote A Looking- Glass for London.

7 Summer's Last Will and Testament is his sole entire extant play. Dido, Queen of Carthage, is by him and Marlowe.

*8 Patient Grissil (with Dekker and Haughton). * Hoffman, or A Revenge for a Father.*

for the stage only, of which some of them possessed a personal experience and from which none of them held aloof, they acquired an instinctive insight into the laws of dramatic cause and effect, and infused a warm vitality into the dramatic literature which they produced, so to speak, for immediate consumption. On the other hand, the same cause made rapidity of workmanship indispensable to a successful playwright. How a play was produced, how many hands had been at work upon it, what loans and what spoliations had been made in the process, were considerations of less moment than the question whether it was produced, and whether it succeeded. His harness— frequently double or triple— was inseparable from the lusty Pegasus of the early English drama, and its genius toiled, to borrow the phrase of the Attic comedian, " like an Arcadian mercenary."

This period of the English drama, though it is far from being one of crude effort, could not therefore yet be one of full con- summation. In tragedy the advance which had been oftraredy ma(ˆ e m tne cn ˚i ce or great themes, in knitting closer aatf the connection between the theatre and the national

comedy history, in vindicating to passion its right to adequate before expression, was already enormous. In comedy the advance had been less decisive and less independent; much had been gained in reaching greater freedom of form and something in enlarging the range of subjects; but artificiality had proved a snare in the one direction, while the licence of the comic stage, upheld by favourite " clowns,"

such as Kemp or Tarlton, had not succumbed before less elastic demands. The way of escaping from the dilemma had, however, been already recognized to lie in the construction of suitable plots, for which a full storehouse was open in the popular tradi- tions preserved in national ballads, and in the growing literature of translated foreign fiction, or of native imitations of it. Mean- while, the aberration of the comic stage to political and religious controversy, which it could never hope to treat with Attic freedom in a country provided with a strong monarchy and a dogmatic religion, seemed likely to extinguish the promise of the beginnings of English romantic comedy.

These were the circumstances under which the greatest of dramatists began to devote his genius to the theatre. Shake- speare's career as a writer of plays can have differed little in its beginnings from those of his contemporaries

Shake- speare.

Shake- speare.

and rivals. Before or while he was proceeding from the re-touching and re-writing of the plays of others to original dramatic composition, the most gifted of those whom we have termed his predecessors had passed away. He had been decried as an actor before he was known as an author; and after living through days of darkness for the theatre, if not for himself, attained, before the close of the century, to the beginnings of his prosperity and the beginnings of his fame. But if we call him fortunate, it is not because of such rewards as these. As a poet, Shakespeare was no doubt happy in his times, which intensified the strength of the national character, expanded the activities of the national mind, and were able to add their stimulus even to such a creative power as his. He was happy in the antecedents of the form of literature which commended itself to his choice, and in the opportunities which it offered in so many directions for an advance to heights yet undiscovered and unknown. What he actually accomplished was due to his genius, whose achievements are immeasurable like itself. His influence upon the progress of English drama divides itself in very unequal proportions into a direct and an indirect influence. To the former alone reference can here be made.

Already the first editors of Shakespeare's works in a collected form recognized so marked a distinction between his plays Shake- ta ken from English history and those treating other speare historical

subjects (whether ancient or modern) that, and the while they included the latter among the tragedies at national large, they grouped the former as histories by them- bistoHcai se i ves These histories are in their literary genesis a

development of the chronicle histories of Shakespeare's predecessors and contemporaries, the taste for which had greatly increased towards the beginning of his own career as a dramatist,

in accordance with the general progress of national life and sentiment in this epoch. Though it cannot be assumed that Shakespeare composed his several dramas from English history in the sequence of the chronology of their themes, his genius gave to the entire series an inner harmony, and a continuity corresponding to that which is distinctive of the national life, such as not unnaturally inspired certain commentators with the wish to prove it a symmetrically constructed whole. He thus brought this peculiarly national species to a perfection which made it difficult, if not impossible, for his later con- temporaries and successors to make more than an occasional addition to his series. None of them was, however, found able or ready to take up the thread where Shakespeare had left it, after perfunctorily attaching the present to the past by a work (probably not all his own) which must be regarded as the end rather than the crown of the series of his histories. 1 But to furnish such supplements accorded little with the tastes and tendencies of the later Elizabethans; and with the exception of an isolated work, 2 the national historical drama in Shakespeare reached at once its perfection and its close. The ruder form of the old chronicle history for a time survived the advance made upon it; but the efforts in this field of T. Heywood, 3 S. Rowley, 4 and others are, from a literary point of view, anachronisms.

Of Shakespeare's other plays the several groups exercised a more direct influence upon the general progress of our dramatic literature. His Roman tragedies, though following their authorities with much the same fidelity as that of the English histories, even more effectively taught the great lesson of free dramatic treatment of historic themes, and thus pre-eminently became the perennial models of the modern historic drama. His ' tragedies on other subjects, which necessarily admitted' of a more absolute freedom of treatment, established themselves as the examples for all time of the highest kind of tragedy. Where else is exhibited with the same fulness the struggle between will and obstacle, character and circumstance ? Where is mirrored with equal power and variety the working of those

passions in the mastery of which over man lies his doom? Here, above all, Shakespeare as compared with his predecessors, as well as with his successors, " is that nature which they paint and draw." He threw open to modern tragedy a range of hitherto unknown breadth and depth and height, and emancipated the national drama in its noblest forms from limits to which it could never again restrict itself without a consciousness of having renounced its enfranchisement. Happily for the variety of his creative genius on the English stage, no divorce had been proclaimed between the serious and the comic, and no division of species had been established such as he himself ridicules as pedantic when it professes to be exhaustive. The comedies of Shakespeare accordingly refuse to be tabulated in deference to any method of classification deserving to be called precise; and several of them are comedies only according to a purely technical use of the term. In those in which the instinct of reader or spectator recognizes the comic interest to be supreme, it is still of its nature incidental to the progress of the action; for the criticism seems just, as well as in agreement with what we can conclude as to Shakespeare's process of construction, that among all his comedies not more than a single one 6 is in both design and effect a comedy of character proper. Thus in this direction, while the un- paralleled wealth of his invention renewed or created a whole gallery of types, he left much to be done by his successors; while the truest secrets of his comic art, which interweaves fancy with observation, draws wisdom from the lips of fools, and imbues with character what all other hands would have left shadowy, monstrous or trivial, are among the things inimitable belonging to the individuality of his poetic genius.

The influences of Shakespeare's diction and versification upon those of the English drama in general can hardly be overrated, though it would be next to impossible to state them definitely. In these points, Shakespeare's manner as a writer was progressive;

1 Henry VIII. 2 Ford, PerHn Warbeck.

3 Edward IV.; If You Know Not Me, &c.

4 Henry VIII. 6 The Merry Wives of Windsor.

construc- tion.

and this progress has been deemed sufficiently well trace- able in his plays to be used as an aid in seeking to determine

their chronological sequence. The general laws of this andˆs" progress accord with those of the natural advance of influence, creative genius; artificiality gives way to freedom,

and freedom in its turn submits to a greater degree of regularity and care. In versification as in diction the earliest and the latest period of Shakespeare's dramatic writing are more easily recognizable than what lies between and may be called the normal period, the plays belonging to which in form most resemble one another, and are least affected by distinguish- ablepeculiarities — such astherhymesandintentionally euphuistic colouring of style which characterize the earliest, or the feminine endings of the lines and the more condensed manner of expression common to the latest of his plays. But, such distinctions apart, there can be no doubt but that in verse and in prose alike, Shake- speare's style, so far as it admitted of reproduction, is itself to be. regarded as the norm of that of the Elizabethan drama; that in it the prose form of English comedy possesses its first accepted model; and that in it the chosen metre of the English versified drama established itself as irremovable unless at the risk of an artificial experiment.

The assertion may seem paradoxical, that it is by their con- struction that Shakespeare's plays exerted the most palpable influence influence upon the English drama, as well as upon the of his modern drama of the Germanic nations in general, method of anc i upon such forms of the Romance drama as have

been in more recent times based upon it. For it was

not in construction that his greatest strength lay, or that the individuality of his genius could raise him above the conditions under which he worked in common with his immediate predecessors and contemporaries. Yet the fact that he accepted these conditions, while producing works of matchless strength and of unequalled fidelity to the demands of nature and art, established them as inseparable from the Shakespearian drama — to use a term which is perhaps unavoidable but has been often misapplied. The great and irresistible demand on the part of Shakespeare's public was for incident — a demand which of itself necessitated a method of construction different from that of the Greek drama, or of those

modelled more or less closely upon it. To no other reason is to be ascribed the circumstance that Shake- speare so constantly combined two actions in the course of a single play, not merely supplementing the one by means of the other as a bye- or under-plot. In no respect is the progress of his technical skill as a dramatist more apparent, — a proposition which a comparison of plays clearly ascribable to successive periods of his life must be left to prove.

Should it, however, be sought to express in one word the greatest debt of the drama to Shakespeare, this word must be

the same as that which expresses his supreme gift as gjgˆs 1 * a dramatist. It is in characterization — in the drawing*

of characters ranging through almost every type of humanity which furnishes a fit subject for the tragic or the comic art — that he remains absolutely unapproached; and it was in this direction that he pointed the way which the English drama could not henceforth desert without becoming untrue to itself. It may have been a mere error of judgment which afterwards held him to have been surpassed by others in particular fields of characterization (setting him down, forsooth, as supremely excellent in male, but not in female, characters). But it was a sure sign of decay when English writers began to shrink from following him in the endeavour to make the drama a mirror of humanity, and when, in self-condemned arrogance, they thrust unreality back upon a stage which he had animated with the warm breath of life, where Juliet had blossomed like a flower of spring, and where Othello's noble nature had suffered and sinned.

By the numerous body of poets who, contemporary with Shakespeare or in the next generation, cultivated the wide field of the national drama, every form commending itself to the tastes and sympathies of the national genius was essayed. None were neglected except those from which the spirit of English

literature had been estranged by the Reformation, and those which had from the first been artificial importations of the Renaissance. The mystery could not in England, as in p orms f Spain, produce such an aftergrowth as the auto, and the the later confines of the religious drama were only now and then Eliza- tentatively touched. 1 The direct imitations of classical l > etnaa examples were, except perhaps in the continued efforts of the academical drama, few and feeble. Chapman, while resorting to use of narrative in tragedy and perhaps otherwise indebted to ancient models, was no follower of

them in essentials. S. Daniel (1562-1619) may be regarded as a belated disciple of Seneca, 2 while experiments like W. Alexander's (afterwards earl of Stirling) Monarchicke Tragedies 3 (1603-1605) are the mere isolated efforts of a student, and more exclusively so than Milton's imposing Samson Agonistes, which belongs to a later date (1677). At the opposite end of the dramatic scale, the light gaiety of the Italian and French farce could not establish itself on the English popular stage without more substantial adjuncts; the Engli&man's festive digestion long continued robust, and he liked his amusements solid. In the pastoral drama and the mask, however, many English dramatists Tae found special opportunities for the exercise of their drama. lyrical gifts and of their inventive powers. The former could never become other than an exotic, so long as it retained the artificial character of its origin. Shakespeare had accord- ingly only blended elements derived from it into the action of his romantic comedies. In more or less isolated works Jonson, Fletcher, Daniel, Randolph, and others sought to rival Tasso and Guarini — Jonson 4 coming nearest to nationalizing an essentially foreign growth by the fresh simplicity of his treatment, Fletcher 6 bearing away the palm for beauty of poetic execution ; Daniel being distinguished by simpler beauties of style in both verse and prose. 6

The mask (or masque) was a more elastic kind of composition, mixing in varying proportions its constituent elements of declamation and dialogue, music and dancing, decora- tion and scenery. In its least elaborate literary form — which, of course, externally was the most elaborate — it closely approached the pageant; in other instances the distinctness of its characters or the fulness of the action introduced into its scheme, brought it nearer to the regular drama. A frequent ornament of Queen Elizabeth's progresses, it was cultivated.with increased assiduity in the reign of James I., and in that of his successor outshone, by the favour it enjoyed with court and nobility, the attractions of the regular drama itself. Most of the later Elizabethan dramatists contributed to this species, upon which Shakespeare expended the resources of his fancy only incidentally in the course of his dramas; but by far the most successful writer of masks was Ben Jonson, of whose numerous compositions of this kind many hold a permanent place in English poetic literature, and " next " whom, in his own judgment, " only Fletcher and Chapman could write a mask." From a poetic point of view, however, they were at least rivalled by Dekker and Ford; in productivity and favour T. Campion, who was equally eminent as poet and as musician, seems for a time to have excelled. Inasmuch, however, as the history of the mask in England is to a great extent that of " painting and carpentry

” and of Inigo Jones, and as, more- over, this kind of piece, while admitting dramatic elements, is of its nature occasional, it need not further be pursued here. The Microcosmus of T. Nabbes (printed 1637), which is very like a morality, seems to have been the first mask brought upon the public stage. It was the performance of a mask by Queen Henrietta Maria and her ladies at Whitehall which had some years previously (1632) been thought to have supplied to the invective of Histrio-Mastix against the stage the occasion for disloyal innuendo; and it was for the performance of a

1 Massinger, The Virgin Martyr ; Shirley, St Patrick for Ireland.

2 Cleopatra; Philotas.

3 Darius; Croesus; Julius Caesar; The Alexandraean Tragedy.

4 The Sad Shepherd: 5 The Faithful Shepherdess. 6 The Queen’s Arcadia.

mask in a great nobleman’s castle that Milton — a Puritan of a very different cast — not long afterwards (1634) wrote one of the loftiest and loveliest of English poems. Comus has been judged and condemned as a drama — unjustly, for the dramatic qualities of a mask are not essential to it as a species. Yet its history in England remains inseparably connected with that of the Elizabethan drama. In later times the mask merged into the opera, or continued a humble life of its own apart from contact with higher literary effort. It is strange that later English poets should have done so little to restore to its nobler uses, and to invest with a new significance, a form so capable of further development as the poetic mask.

The annals of English drama proper in the period reaching from the closing years of Elizabeth to the outbreak of the The later great Revolution include, together with numerous Eliza- names relatively insignificant, many illustrious in the bethan history of our poetic literature. Among Shakespeare’s contemporaries and successors there is, however, but one who by the energy of his genius, not less than by the circum- stances of his literary career, reached undisputed primacy among his fellows. Ben Jon son, to whom in his latter days a whole generation of younger writers did filial homage as to their

veteran chief, was alone in full truth the founder of a school or family of dramatists. Yet his pre-eminence did not (whatever he or his followers may have thought) extend to both branches of the regular drama. In tragedy he fell short of the highest success; the weight of his learning lay too heavily upon his efforts to draw from deeper sources than those which had sufficed for Shakespeare. Such as they are, his tragic works 1 stand almost, though not quite, alone in this period as examples of sustained effort in historic tragedy proper. G. Chapman treated stirring themes, more especially from modern French history, 2 always with vigour, and at times with genuine effective- ness; but, though rich in beauties of detail, he failed in this branch of the drama to follow Shakespeare even at a distance in the supreme art of fully developing a character by means of the action. Mention has been made above of Ford's isolated effort in the direction of historic tragedy, as well as of excursions into the still popular domain of the chronicle history by T. Heywood, Dekker and others, which cannot be regarded as anything more than retrogressions. With the great body of the English dramatists of this and of the next period, tragedy had passed into a phase where its interest depended mainly upon plot and incident. The romantic tragedies and tragi-comedies which crowd English literature in this period constitute together a growth of at first sight astonishing exuberance, and in mere externals of theme — ranging as these plays do from Byzantium to ancient Britain, and from the Caesars of ancient Rome to the tyrants of the Renaissance — of equally astonishing variety. The sources from which these subjects were derived had been perennially augmenting. Besides Italian, Spanish and French fiction, original or translated, besides British legend in its Romance dress, and English fiction in its humbler or in its more ambitious and artificial forms, the contemporary foreign drama, especially the Spanish, offered opportunities for resort. To the English, as to the French and Italian drama, of both this and the following century, the prolific dramatists clustering round Lope de Vega and Calderon, and the native or naturalized fictions from which they drew their materials supplied a whole arsenal of plots, incidents and situations — among others to Middleton, to Webster, and most signally to Beaumont and Fletcher. And, in addition to these resources, a new field of supply was at hand since English dramatists had begun to regard events and episodes of domestic life as fit subjects for tragic treatment. Domestic tragedy of this description was indeed no novelty on the English stage; Shakespeare himself may have retouched with his master- hand more than one effort of this kind; 3 but T. Heywood may be set down as the first who achieved any work of considerable

1 Sejanus his Fall; Catiline his Conspiracy.

- *Bussy d'Ambois; The Revenge of B. d'A.; The Conspiracy of Byrort; The Tragedy of B. ; Chabot, Admiral of France (with Shirley). s Arden of Faversham; A Yorkshire Tragedy. 3*

literary value of this class, 4 to which some of the plays of T. Dekker, T. Middleton, and others likewise more or less belong. Yet, in contrast to this wide variety of sources, and consequent apparent variety of themes, the number of motives employed — at least as a rate — in the tragic drama of this period was com- paratively small and limited. Hence it is that, notwithstanding the diversity of subjects among the tragic dramas of such writers as Marston, Webster, Fletcher, Ford and Shirley, an impression of sameness is left upon us by a connected perusal of these works. Scheming ambition, conjugal jealousy, absolute female devotion, unbridled masculine passion — such are the motives which constantly recur in the Decameron of our later Elizabethan drama. And this impression is heightened by the want of moderation, by the extravagance of passion, which these dramatists so habitually exhibit in ' the treatment of their favourite themes. All the tragic poets of this period are not equally amenable to this charge; in J. Webster, 6 master as he is of the effects of the horrible, and in J. Ford, 6 surpassingly seductive in his sweetness, the monotony of exaggerated passion is broken by those marvellously sudden and subtle touches through which their tragic genius creates its most thrilling effects. Nor will the tendency to excess of passion which F. Beaumont and J. Fletcher undoubtedly exhibit be confounded with their distinctive power of sustaining tenderly pathetic characters and irresistibly moving situations in a degree unequalled by any of their contemporaries— a power seconded by a beauty of diction and softness of versification which for a time raised them to the highest pinnacle of popular esteem, and which entitles them in their conjunction, and Fletcher as an independent worker, to an enduring pre-eminence among their fellows. In their morals Beaumont and Fletcher are not above the level of their age. The manliness of sentiment and occasionally greater width of outlook which ennoble the rhetorical genius of P. Massinger, and the gift of poetic illustration which entitles J. Shirley to be remembered not merely as the latest and the most fertile of this group of dramatists, have less direct bearing upon the general character of the tragic art of the period. The common features of the romantic tragedy of this age are sufficiently marked; but they leave unobscured the distinctive features in its individual writers of which a discerning criticism has been able to take note. In comedy, on the other hand, the genius and the insight of Jonson pointed the way to a

steady and legitimate advance. His theory of " humours " (which found the most palpable expression in two of his earliest plays 7), if translated into the ordinary language of dramatic art, signifies the paramount importance in the comic drama of the presentation of distinctive human types. As such it survived by name into the Restoration age 8 and cannot be said to have ever died out. In the actual reproduction of humanity in its infinite but never, in his hands, alien variety, it was impossible that Shakespeare should be excelled by Jonson; but in the consciousness with which he recognized and indicated the highest sphere of a comic dramatist's labours, he rendered to the drama a direct service which the greater master had left unperformed. By the rest of his con- temporaries and his successors, some of whom, such as R. Brome, were content avowedly to follow in his footsteps, Jonson was only occasionally rivalled in individual instances of comic creations; in the entirety of its achievements his genius as a comic dramatist remained unapproached. The favourite types of Jonsonian comedy, to which Dekker, J. Marston and Chapman had, though to no large extent, added others of their own, were elaborated with incessant zeal and remarkable effect by their contemporaries and successors. It was after a very different fashion from that in which the Roman comedians reiterated the ordinary types of the New Attic comedy, that the inex- haustible verve of T. Middleton, the buoyant productivity of Fletcher, the observant humour of N. Field, and the artistic

4 A Woman killed with Kindness ; The English Traveller.

6 Vittoria Coromboni ; The Duchess of Malfi. 6 ' Tis Pity She's a Whore ; The Broken Heart.

7 Every Man in his Humour ; Every Man out of his Humour.

8 Shadwell, The Humonsis.

versatility of Shirley — not to mention many later and not necessarily minor names 1 — mirrored in innumerable pictures of contemporary life the undying follies and foibles of mankind. As comedians of manners more than one of these surpassed the old master, not indeed in distinctness and correctness — the fruits of the

most painstaking genius that ever fitted a learned sock to the representation of the living realities of life — but in a lightness not incompatible with sureness of touch; while in the construction of plots the access of abundant new materials, and the greater elasticity in treatment resulting from accumulated experience, enabled them to advance from success to success. Thus the comic dramatic literature from Jonson to Shirley is unsurpassed as a comedy of manners, while as a comedy of character it at least defies comparison with any other national literary growth preceding or contemporaneous with it. Though the younger generation, of which W. Cartwright may be taken as an example, was unequal in originality or force to its prede- cessors, yet so little exhausted was the vitality of the species, that its traditions survived the interregnum of the Revolution, and connected themselves more closely than is sometimes assumed with later growths of English comedy.

Such was also the case with a special growth which had continued side by side, but in growing frequency of contact,

with the progress of the national drama. The

a f 1 academical drama of the later Elizabethan period and

drama. °f tne nrs ^ *- w0 Stuart reigns by no means fell off

either in activity or in variety from that of the preced- ing generations. At Oxford, after an apparent break of several years — though in the course of these one or two new plays, including a Tancred by Sir Henry Wotton at Queen's, seem to have been produced — a long succession of English plays, some in Latin doubtless from time to time intervening, were performed, from the early years of the 17th century onwards to the dark days of the national theatre and beyond. The production of these plays was distributed among several colleges, among which the most conspicuously active were Christ Church and St John's, where a whole series of festal performances took place under the collective title of The Christmas Prince (i.e. master of the Christmas revels). They included a wide variety of pieces, from the treatment by an author unnamed of the story of " Ovid's owne Narcissus " (1602) and S. Daniel's Queen's Arcadia (1606) to Barten Holiday's Technogamia (1618), a complicated allegory on the relations between the arts and sciences quite in the manner of the moralities; interspersed by romantic dramas of the ordinary contemporary type by T. Goffe (1591-1629), W. Cartwright, J. Maine (1604-1672) and others. At Cambridge the list of Latin and English academical plays,

performed in the latter half of Elizabeth's reign at Trinity, St John's, Queen's and a few other dolleges, contains several examples in each language which for one reason or another possess a special interest. Thus E. Forsett's Pedantius, probably acted at Trinity in 1581, ridicules a personage who lived very near the rose — the redoubtable Gabriel Harvey; 2 a Laelia, acted at Queen's in 1590 and again in 1598, resembles Twelfth Night in part of its plot; while in Silvanus, performed in 1596, probably at St John's, there are certain striking similarities to As You Like It. These are in Latin, as are the comedies Hispanus (containing some curious allusions to the Armada, Drake and Dr Lopez) and M achiavellus, acted at St John's in 1597. 3 By far the most interesting of the English plays of the later Cambridge series, and, it may be averred, of the remains of the English academical drama as a whole, are the Parnassus Plays (q.v.), successively produced at St John's in 1598-1602, which illustrate

1 It is impossible in a summary survey to seek to discriminate by any kind of evidence the respective shares in many Elizabethan plays, and the respective credit due to them, of the joint writers. Yet some such inquiry is necessary before judging the claims to remembrance of highly-gifted dramatists such as William Rowley, his namesake Samuel, John Day, and not a few others.

2 The Latin comedy Victoria by Abraham Fraunce of St John's was written some time before 1583, and dedicated to Sir Philip Sidney; but there is no evidence to show that it was ever acted.

- *(Bishop) Hacket's Loyola was acted at Trinity in 1623.*

with much truthfulness as well as fancy the relations between university life and the outside world, including the world of letters and of the stage. Upon a different, but also a very notable, aspect of English university life — the relations between town and gown — a partisan light is thrown by Club-Law, acted at Clare in 1599 — and in G. Ruggle's celebrated Latin comedy of Ignoramus, twice acted by members of Clare at Trinity in 1615 before King James I. On one of these occasions were also pro- duced in English T. Tomkis' comedy Albumazar (a play absurdly attributed to Shakespeare), and Phineas Fletcher's Sicelides, a " piscatory " (i.e. a pastoral drama in which the place of the shepherds is taken by fishermen). Latin and English plays continued to be brought out in Cambridge till the year of the outbreak of the Civil War, T. Randolph and A. Cowley 4 being among the authors of some of the latest so produced; and with the Restoration the usage recommenced, the Adelphi of Terence and other Latin comedies being performed as they had been a century

earlier. A complete survey and classification of the English academical drama, for which the materials are at last being collected and compared, will prove of an importance which is only beginning to be recognized to the future historian of the English drama.

To return to the general current of that drama. The rivals against which it had to contend in the times with which its greatest epoch came to an end have in their turn been _.. . noticed. From the masks and triumphs at court and at the houses of the nobility, with their Olympuses and Par- nassuses built by Inigo Jones, and filled with goddesses and nymphs clad in the gorgeous costumes designed by his inventive hand, to the city pageants and shows by land and water — from the tilts and tournaments at Whitehall to the more philosophical devices at the Inns of Court and the academical plays at the universities — down even to the brief but thrilling theatrical excitements of Bartholomew Fair and the " Ninevitical motions " of the puppets— in all these ways the various sections of the theatrical public were lempted aside. Foreign performers — French and Spanish actors, and even French actresses — paid visits to London. But the national drama held its ground. The art of acting maintained itself at least on the level to which it had been brought by Shakespeare's associates and contemporaries, Burbage and Heminge, Alleyn, Lewin, Taylor, and others " of the older sort." The profession of actor came to be more gener- ally than of old separated from that of playwright, though they were still (as in the case of Field) occasionally combined. But this rather led to an increased appreciation of the artistic merit of actors who valued the dignity of their own profession and whose co-operation the authors leamt to esteem as of independent significance. The stage was purged from the barbarism of the old school of clowns. Women's parts were still acted by boys, many of whom attained to considerable celebrity; and a practice was thus continued which must assuredly have placed the English theatre at a considerable disadvantage as compared with the Spanish (where it never obtained), and which may, while it has been held to have facilitated freedom of fancy, more certainly encouraged the extreme licence of expression cherished by the dramatists. The arrangement of the stage, which facilitated a rapid succession of scenes without any necessity for their being organically connected with one another, remained essentially what it had been in Shakespeare's days; though the primitive expedients for indicating locality had begun to be occasionally exchanged for scenery more or less appropriate to the place of action. Costume was apparently cultivated with much greater care; and the English stage of this period had probably gone a not inconsiderable way in a direction to

which it is obviously in the interests of the dramatic art to set some bounds, if it is to depend for its popular success upon its qualities as such, and upon the interpretation of its agents upon the stage. At the same time, the drama had begun largely to avail itself of adventitious aids to favour. The system of prologues and epilogues, and of dedications to published plays, was more

4 Naufragium joculare — The Guardian (rewritten later as The Cutter 0} Coleman Street).

uniformly employed than it had been by Shakespeare as the conventional method of recommending authors and actors to the favour of individual patrons, and to that of their chief patron, the public.

Up to the outbreak of the Civil War the drama in all its forms continued to enjoy the favour or good-will of the court,

although a close supervision was exercised over all rb< dPurL a attem P ts t0 make the stage the vehicle of political tanism. references or allusions. The regular official agent of

this supervision was the master of the revels; but under James I. a special ordinance, in harmony with the king's ideas concerning the dignity of the throne, was passed " against representing any modern Christian king in plays on the stage." The theatre could hardly expect to be allowed a liberty of speech in reference to matters of state denied to the public at large; and occasional attempts to indulge in the freedom of criticism dear to the spirit of comedy met with more or less decisive repression and punishment. 1 But the sympathies of the dramatists were so entirely on the side of the court that the real difficulties against which the theatre had to contend came from a directly opposite quarter. With the growth of Puritanism the feeling of hostility to the stage increased in a large part of the population, well represented by the civic authorities of the capital. This hostility found many ways of expressing itself. The attempts to suppress the Blackfriars theatre (1619, 1631, 1633) proved abortive; but the representation of stage-plays continued to be prohibited on Sundays, and during the prevalence of the plague in London in 1637 was temporarily suspended altogether. The desire of the Puritans of the

more pronounced type openly aimed at a permanent closing of the theatres. The war between them and the dramatists was accordingly of a life-and-death kind. On the one hand, the drama heaped its bitterest and often coarsest attacks upon whatever savoured of the Puritan spirit; gibes, taunts, caricatures in ridicule and aspersion of Puritans and Puritanism make up a great part of the comic literature of the later Elizabethan drama and of its aftergrowth in the reigns of the first two Stuarts. This feeling of hostility, to which Shakespeare was no stranger, 2 though he cannot be connected with the authorship of one of its earliest and coarsest expressions, 3 rose into a spirit of open defiance in some of the masterpieces of Ben Jonson; 4 and the comedies of his contemporaries and successors 5 abound in caricatured re- productions of the more common or more extravagant types of Puritan life. On the other hand, the moral defects, the looseness of tone, the mockery of ties sanctioned by law and consecrated by religion, the tendency to treat middle-class life as the hunting- ground for the diversions of the upper classes, which degraded so much of the dramatic literature of the age, intensified the Puritan opposition to all and any stage plays. A patient en- deavour to reform instead of suppressing the drama was not to be looked for from such adversaries, should they ever possess the means of carrying out their views; and whenever Puritanism should victoriously assert itself in the state, the stage was doomed. Among the attacks directed against it in its careless heyday of prosperity Prynne's Histrio-Mastix (1632), while it involved its author in shamefully cruel persecution, did not remain wholly without effect upon the tone of the dramatic literature of the subsequent period; but the quarrel between Puritanism and the theatre was too old and too deep to end in any but one way, so soon as the latter was deprived of its

protectors. The Civil War began in August 1642; c, ° s ˆ ag and early in the following month was published the theatres, ordinance of the Lords and Commons, which, after a

brief and solemn preamble, commanded " that while these sad causes and set-times of humiliation do continue, public stage plays shall cease and be forborne." Many actors

1 Chapman, Marston (and Jonson), Eastward Hoe (1605) ; Middle- ton, A Game at Chess (1624) ; Shirley and Chapman, The Ball (1632) ; Massinger(?), The Spanish Viceroy (1634). 2 Twelfth Night.

3 The Puritan, or the Widow of Watling Street, by " W. S." (Went-

worth Smith?). 4 The Alchemist; Bartholomew Fair.

5 Chapman, An Humorous Day's Mirth; Marston, The Dutch Courtesan ; Middleton, The Family of Love.

and playwrights followed the fortunes of the royal cause in the field; some may have gone into a more or less voluntary exile; upon those who lingered on in the familiar haunts the hand of power lay heavy; and, though there seems reason to believe that dramatic entertainments of one kind or another continued to be occasionally presented, stringent ordinances gave summary powers to magistrates against any players found engaged in such proceedings (1647), and bade them treat all stage-players as rogues, and pull down all stage galleries, seats and boxes (1648). A few dramatic works were published in this period; 6 while at fairs about the country .were acted farces called " drolls," consisting of the most vulgar scenes to be found in popular plays. Thus, the life of the drama was not absolutely extinguished; and its darkest day proved briefer than perhaps either its friends or its foes could have supposed.

Already " in Oliver's time " private performances took place from time to time at noblemen's houses and (though not un- disturbed) in the old haunt of the drama, the Red Bull. In 1656 the ingenuity of Sir William Davenant 0%'^' whose name (though not really so significant in the drama. dramatic as in another field of English literature) is memorable as connecting together two distinct periods in it, ventured on a bolder step in the production of a quasi-dramatic entertainment " of declamation and music " ; and in the following year he brought out with scenery and music a piece which was afterwards in an enlarged form acted and printed as the first part of his opera, The Siege of Rhodes. This'' entertainment he afterwards removed from the private house where it had been produced to the Cockpit, where he soon ventured upon the performance of regular plays written by himself. Thus, under the cover of two sister arts, whose aid was in the sequel to prove by no means altogether beneficial to its progress, the English drama had boldly anticipated the Restoration, and was no longer hiding its head when that much-desired event was actually brought about. Soon after Charles II.'s entry into London, two theatrical companies are known to have been acting in the capital. For these companies patents were soon granted, under the names of " the Duke (of York)'s " and " the King's Servants," to Davenant and one of the brothers Killigrew respectively — the former from 1662 acting at Lincoln's Inn Fields, then at Dorset Garden in Salisbury Court, the latter from 1663 at the Theatre Royal near Drury Lane. These companies were united from

1682, a royal licence being granted in 1695 to a rival company which performed in Lincoln's Inn Fields, and which migrated to Covent Garden in 1733. Meanwhile, Vanbrugh had in 1705 built the theatre in the Haymarket; and a theatre in Goodman's Fields — afterwards rendered famous by the first appearance of Garrick — led a fitful existence from 1729 to 1733. The act of 1737 deprived the crown of the power of licensing any more theatres; so that the history of the English stage for a long period was confined to a restricted area. The rule which prevailed after the Restoration, that neither of the rival com panies should ever attempt a play produced by the other, oper- ated beneficially both upon the activity of dramatic authorship and upon the progress of the art of acting, which was not exposed to the full effects of that deplorable spirit of personal rivalry which too often leads even most intelligent actors to attempt parts for which they have no special qualification. There can be little doubt that the actor's art has rarely flourished more in England than in the days of T. Betterton and his contemporaries, among whose names those of Hart, Mohun, Kynaston, Nokes, Mrs Barry, Mrs Betterton, Mrs Bracegirdle and Mrs Eleanor Gwyn have, together with many others, survived in various connexions among the memories of the Restoration age. No higher praise has ever been given to an actor than that which Addison bestowed upon Betterton, in describing his performance of Othello as a proof that Shakespeare could not have written the most striking passages of the character otherwise than he has done.

6 Among these was Sir Richard Fanshawe's English version of the Pastor fido (1646) ; after his death were published his translations of two plays by A. de Mendoza.

The Irish stage-

It may here be noticed that the fortunes of the Irish theatre in general followed those of the English, of which Of course it was merely a branch. Of native dramatic compositions in earlier times not a trace remains in Ireland; and the drama was introduced into that country as an English exotic — apparently already in the reign of Henry VIII., and more largely in that of Elizabeth. The first theatre in Dublin was built in 1635; but in 1641 it was closed, and even after

the Restoration the Irish stage continued in a precarious condition till near the end of the century. About that time an extra- ordinarily strong taste for the theatre took possession of Irish society, and' during the greater part of the 18th century the Dublin stage rivalled the English in the brilliancy of its stars. Betterton's rival, R. Wilks, Garrick's predecessor in the homage paid to Shakespeare, Macklin, and his competitor for favour, the " silver-tongued " Barry, were alike products of the Irish stage, as were Mrs Woffington and other well-known actresses. Nor should it be forgotten that three of the foremost English writers of comedy in its later days, Congreve, Farquhar and Sheridan, were Irish, the first by education, and the latter two by birth also.

Already in the period preceding the outbreak of the Civil

War the English drama had perceptibly sunk from the height

to which it had been raised by the great Elizabethans.

The later \yjjgjj jj had once more recovered possession of that Stuart . , , . , ... , r ,. .,

drama. arena with which no living drama can dispense, it

would have been futile to demand that the dramatists

should return altogether into the ancient paths, unaffected by

the influences, native or foreign, in operation around them.

But there was no reason why the new drama should not, like the

Elizabethan, have been true in spirit to the higher purposes of

the dramatic art, to the nobler tendencies of the national life,

and to the demands of moral law. Because the later Stuart

drama as a whole proved untrue to these, and, while following

its own courses, never more than partially returned from the

aberrations to which it condemned itself, its history is that of a

decay which the indisputable brilliancy, borrowed or original,

of many of its productions is incapable of concealing.

Owing in part to the influence of the French theatre, which

by this time had taken the place of the Spanish as the ruling

drama of Europe, the separation between tragedy and

comedy is clearly marked in post-Restoration plays.

Comic scenes are still occasionally introduced into tragedies

by some dramatists who adhered more closely to the Elizabethan

models (such as Otway and Crowne), but the practice fell into

disuse; while the endeavour to elevate comedy by pathetic

scenes and motives is one of the characteristic marks of the beginning of another period in English dramatic literature. The successive phases through which English tragedy passed in the later Stuart times cannot be always kept distinct from one another; and the guidance offered by the theories put forth by some of the dramatists in support of their practice is often delusive. Following the example of Corneille, Dryden and his contemporaries and successors were fond of proclaiming their adherence to this or that principle of dramatic construction or form, and of upholding, with much show of dialectical acumen, maxims derived by them from French or other sources, or elaborated with modifications and variations ot their own, but usually amounting to little more than what Scott calls " certain romantic whimsical imitations of the dramatic art." Students of the drama will find much entertainment and much instruction in these prefaces, apologies, dialogues and treatises. They will acknowledge that Dryden's incomparable vigour does not desert him either in the exposing or in the upholding of fallacies, while le bon sens, which he hardly ever fails to exhibit, and which is a more eclectic gift than common-sense, serves as a sure guide to the best in telligence of his age. Even Rymer, 1 usually regarded as having touched the nadir of dramatic criticism, will be found to be not wholly without grains of salt. But Restoration tragedy itself must not be studied by the light of Restoration criticism.

So long as any dramatic power remained in the tragic poets —

1 A Short View of Tragedy (1693).

Tragedy.

and it is absent from none of the chief among them from Dryden to Rowe — the struggle between fashion (disguised as theory) and instinct (tending in the direction of the Elizabethan tradi- tions) could never wholly determine itself in favour of the former.

Lord Orrery, in deference, as he declares, to the expressed tastes of his sovereign King Charles II. himself, was the first to set up the standard of heroic plays? This new species of tragedy (for such it professed to be) commended itself by its novel choice of themes, to a large extent supplied by recent French romance — the romans de longue haleine of the Scuderys and their con- temporaries — and by French plays treating similar themes. It likewise borrowed from France that garb of rhyme which the English drama had so long abandoned, and which now re- appeared in the heroic couplet. But the themes which to readers of novels might seem of their nature inexhaustible could not long suffice to satisfy the more capricious appetite of theatrical audiences; and the form, in the application which it was more or less sought to enforce for it, was doomed to remain an exotic. In conjunction with his brother-in-law Sir R. Howard, 3 and afterwards more confidently by himself, 4 Dryden threw the in- comparable vigour and brilliancy of his genius into the scale, which soon rose to the full height of fashionable popularity. At first he claimed for English tragedy the right to combine her native inheritance of freedom with these valuable foreign acquisitions. 5 Nor was he dismayed by the ridicule which the celebrated burlesque (by the duke of Buckingham and others) of The Rehearsal (1671) cast upon heroic plays, without dis- criminating between them and such other materials for ridicule as the contemporary drama supplied to its facetious authors, but returned 6 to the defence of a species which he was himself in the end to abandon. 7 The desire for change proved stronger than the love of consistency— which in Dryden was never more than theoretical. After summoning tragedy to rival the freedom (without disdaining the machinery) of opera — with whose birth its own revival was as a matter of fact simultaneous — he came to recognize in characterization the truest secret of the master- spirit of the Elizabethan drama, 8 and after audaciously, but in one instance not altogether unhappily, essaying to rival Shake- speare on his own ground, 9 produced under the influence of the same views at least one work of striking merit. 10 But he was already growing

weary of the stage itself as well as of the rhymed heroic drama; and, though he put an end to the species to which he had given temporary vitality, he failed effectively to point the way to a more legitimate development of English tragedy. Among the other tragic poets of this period, N. Lee, in the out- ward form of his dramas, accommodated his practice to that of Dryden, with whom he occasionally co-operated as a dramatist, and like whom he allowed political partisanship to intrude upon the stage. 11 His rhetorical genius was not devoid of genuine energy, nor is he to be regarded as a mere imitator. T. Otway, the most gifted tragic poet of the younger generation con- temporary with Dryden, inherited something of the spirit of the Elizabethan drama; he possessed a real gift of tragic pathos and melting tenderness; but his genius had a worse alloy than stageyness, and, though he was often happy in his novel choice of themes, his most successful efforts fail to satisfy tests supple-mentary to that of the stage. 12 Among dramatists who con- tributed to the vogue of the " heroic " play may be mentioned J. Bankes, J. Weston, C. Hopkins, E. Cooke, R. Gould, S. Pordage, T. Rymer and Elkanah Settle. The productivity of J. Crowne (d. c. 1 703) 13 covers part of the earlier period as well as of the later, to which properly belong T. Southerne, a writer gifted with much

2 The Black Prince; Tryphon; Herod the Great; Altemira.

3 The Indian Queen.

4 The Indian Emperor ; Tyrannic Love ; The Conquest of Granada.

6 Essay of Dramatic Poesy. 6 Essay of Heroic Plays.

7 A direct satirical invective against rhymed tragedy of the " heroic " type is to be found in Arrowsmith's comedy Reformation (1673). s The Grounds of Criticism in Tragedy.

9 All for Love (Antony and Cleopatra). 10 Don Sebastian.

11 The Rival Queens; Lucius Junius Brutus; The Massacre of Paris. I2 Don Carlos ; The Orphan ; Venice Preserved.

13 Oroonoko ; The Fatal Marriage.

pathetic power, but probably chiefly indebted for his long-lived popularity to his skill in the discovery of " sensational " plots; and Lord Lansdowne (" Granville the polite ") (c. 1667-173 5). Congreve, by virtue of a single long celebrated but not really remarkable tragedy, 1 and N. Rowe, may be further singled out from the list of the tragic dramatists of this period, many of whom were, like their comic contemporaries, mere translators or adapters from the French. The tragedies of Rowe, whose direct services to the study of Shakespeare deserve remembrance, indicate with singular distinctness the transition from the fuller declamatory style of Dryden to the calmer and thinner manner of Addison. 2 In tragedy (as to a more marked degree in comedy) the excesses (both of style and subject) of the past period of the English drama had produced an inevitable reaction; decorum was asserting its claims on the stage as in society; and French tragedy had set the example of sacrificing what passion — and what vigour — it retained in favour of qualities more acceptable to the " reformed " court of Louis XIV. Addison, in allowing his Cato to take its chance upon the stage, when a moment of political excitement (April 17 13) ensured to it an extraordinary success, to which no feature in it corresponds, except an unusual number of lines predestined to become familiar quotations, unconsciously sealed the doom of English national tragedy. The " first reasonable English tragedy," as Voltaire called it, had been produced, and the oscillations of the tragic drama of the Restoration were at an end.

English comedy in this period displayed no similar desire to cut itself off from the native soil, though it freely borrowed _ . the materials for its plots and many of its figures from Spanish, and afterwards more generally from French, originals. The spirit of the old romantic comedy had long since fled; the graceful artificialities of the pastoral drama, even the light texture of the mask, ill suited the demands of an age which made no secret to itself of the grossness of its sensuality. With a few unimportant exceptions, such poetic elements as admitted of being combined with the poetic drama were absorbed by the opera and the ballet. No new species of the comic drama formed itself, though towards the close of the period may be noticed the beginnings of modern English farce. Political and religious partisanship, generally in accordance with the dominant reaction against Puritanism, were allowed to find expression in the directest and coarsest forms upon the stage, and to hasten the necessity for a more systematic control than even the times before the Revolution had found requisite. At the same time the unblushing indecency which the Restoration had spread through court and capital had

established its dominion over the comic stage, corrupting the manners, and with them the morals, of its dramatists, and forbidding them, at the risk of seeming dull, to be anything but improper. Much of this found its way even into the epilogues, which, together with the prologues, proved so important an adjunct of the Restoration drama. These influences determine the general character of what is with a more than chronological meaning termed the comedy of the Restoration. In construction, the national love of fulness and solidity of dramatic treatment induced its authors to alter what they borrowed from foreign sources, adding to complicated Spanish plots characters of native English directness, and supplementing single French plots by the addition of others. 3 At the same time, the higher efforts of French comedy of char- acter, as well as the refinement of expression in the list of their models, notably in Moliere, were alike seasoned to suit the coarser appetites and grosser palates of English patrons. The English comic writers often succeeded in strengthening the borrowed texture of their plays, but they never added comic

1 The Mourning Bride.

2 The Fair Penitent; Jane Shore.

3 A notable influence was exercised upon English comedy as well as upon other branches of literature by C. de Saint-Evremond, a soldier and man of fashion who was possessed of great intellectual ability and of a charming style. Though during his long exile in England — from 1670 to his death — he never learned English, his critical works included Remarks on English Comedy (1677), and one of his own comedies, the celebrated Sir Politick Would-be, professed to be composed " a la maniere angloise."

humour without at the same time adding coarseness of their own. Such were the productions of Sir George Etheredge, Sir Charles Sedley, and the " mob of gentlemen who wrote with ease "; nor was there any signal difference between their productions and those of a playwright-actor such as J. Lacy (d. 1681), and a professional dramatist of undoubted ability such as J. Crowne. Such, though often displaying the brilliancy of a genius which even where it sank could never wholly abandon its prerogative, were, it must be confessed, the comedies of Dryden himself. On the other hand, the lowest literary deeps of the Restoration drama were sounded by T. D'Urfey, while of its moral degrada- tion the " divine Astraea," the " unspeakable " Mrs'Aphra Behn, has an indefeasible title to be considered the most faithful representative. T. Shadwell, fated, like the tragic poet Elkanah Settle, to be chiefly remembered as a victim of Dryden's

satire, deserves more honourable mention. Like J. Wilson, whose plays seem to class him with the pre-Restoration dramatists, Shadwell had caught something not only of the art, but also of the spirit, of Ben Jonson; but in most of his works he was, like the rest of his earlier contemporaries, and like the brilliant group which succeeded them, content to take his moral tone from the reckless society for which, or in deference to the tastes of which, he wrote. 4 The absence of a moral sense, which, together with a grossness of expression often defying exaggeration, characterizes English comic dramatists from the days of Dryden to those of Congreve, is the main cause of their failure to satisfy the demands which are legitimately to be made upon their art. They essayed to draw character as well as to paint manners, but they rarely proved equal to the former and higher task; and, while choosing the means which most readily commended their plays to the favour of their immediate public, they achieved but little as interpreters of those essential distinctions which their art is capable of illustrating. 6 Within these limits, though occasionally passing beyond them, and always with the same deference to the immoral tone which seemed to have become an indispensable adjunct of the comic style, even the greatest comic authors of this age moved. W. Wycherley was a comic dramatist of real power, who drew his characters with vigour and distinctness, and constructed his plots and chose his language with natural ease. He lacks gaiety of spirit, and his wit is of a cynical turn. But, while he ruthlessly uncloaks the vices of his age, his own moral tone is affected by their influence in as marked a degree as that of the most light-hearted of his contemporaries. 6 The most brilliant of these was indisputably W. Congreve, who is not only one of the very wittiest of English writers, but equally excels in the graceful ease of his dialogue, and draws his characters and constructs his plots with the same masterly skill. His chief fault as a dramatist is one of excess — the brilliancy of the dialogue, whoever be the speaker, overpowers the distinction between the " humours " of his personages. Though he is less brutal in expression than " manly " Wycherley, and less coarse than the lively Sir J. Vanbrugh, licentiousness in him as in them corrupts the spirit of his comic art; but of his best though not most successful play 7 it must be allowed that the issue of the main plot is on the side of virtue. G. Farquhar, whose morality is on a par with that of the other members of this group, is inferior to them in brilliancy; but as pictures of manners in a wider sphere of life than that which contemporary comedy usually chose to illustrate, two of his plays deserve to be noticed, in which we already seem to be entering the atmosphere of the 18th-century novel. 8 His influence upon Lessing is a remarkable fact in the international history of dramatic

literature.

The improvement which now begins to manifest itself in the moral tone and spirit of English comedy is partly due to the reaction against the reaction of the Restoration, partly to the punishment which the excesses of the comic stage had brought

4 Epsom Wells; The Squire of Alsatia; The Volunteers.

6 A dramatic curiosity of a rare kind would be The Female Rebellion (1682), which has been, on evidence rather striking at first sight, attributed to Sir Thomas Browne. It is more likely to have been by his son.

6 The Country Wife ; The Plain-Dealer. 7 The Double Dealer.

8 The Recruiting Officer ; The Beaux' Stratagem.

mental comedy.

upon it in the invective of Jeremy Collier 1 (1698), of all the assaults the theatre in England has had to undergo the best- founded, and that which produced the most perceptible Senti- results. The comic poets, who had always been more or less conscious of their sins, and had at all events not defended them by the ingenious sophistries which it has pleased later literary criticism to suggest on their behalf, now began with uneasy merriment to allude in their prologues to the reformation which had come over the spirit of the town. Writers like Mrs Centlivre became anxious to reclaim their offenders with much emphasis in the fifth act; and Colley Cibber — whose Apology for his Life furnishes a useful view of this and the subsequent period of the history of the stage, with which he was connected as author, manager and actor (excelling in this capacity as representative of those fools with which he peopled the comic stage) s — may be credited with having first deliberately made the pathetic treatment of a moral sentiment the basis of the action of a comic drama. But he cannot be said to have consistently pursued the vein which in his Careless Husband (1704) he had essayed. His Non-Juror is a political adaptation of Tartuffe; and his almost equally celebrated Provoked Husband only supplied a happy ending to

Vanbrugh's unfinished play. Sir R. Steele, in accordance with his general tendencies as a writer, pursued a still more definite moral purpose in his comedies; but his genius perhaps lacked the sustained vigour necessary for a dramatist, and his humour naturally sought the aid of pathos. From partial 3 he passed to more complete 4 experiment; and thus these two writers, who trans- planted to the comic stage a tendency towards the treatment of domestic themes noticeable in such writers of Restoration tragedy as Southerne and Rowe, became the founders of senti- mental comedy, a species which exercised a most depressing influence upon the progress of English drama, and helped to hasten the decline of its comic branch. With Cato English tragedy committed suicide, though its pale ghost survived; with The Conscious Lovers English comedy sank for long into the tearful embraces of artificiality and weakness.

During the 18th century the productions of dramatic literature were still as a rule legitimately designed to meet the demands of the stage, from which its higher efforts afterwards and stage" to so large an extent became dissociated. The goodwill In the of most sections of the public continued to be steadily

period accorded to a theatre which had ceased to defy the £^* t accepted laws and traditions of morality; and the opposition still aroused by it was confined to a small minority of thinkers, though these included some who were far from being puritans. John Dennis was not thought to have the worst of the controversy, when he defended the stage against the attack of an opponent far above him in stature — the great mystic William Law 5 — and to John Wesley himself it seemed that " a great deal more might be said in defence of seeing a serious tragedy " than of taking part in the amusements of bear-baiting and cock-fighting. On the other hand, the demands of the stage and those of its patrons and of the public of the " Augustan " age, and of that which succeeded it, were, in general, fast bound by the trammels of a taste with which a revival of the poetic drama long remained irreconcilable. There is every reason to conclude that the art of acting progressed in the same direction of artificiality, and became stereotyped in forms corresponding to the " chant " which represented tragic declamation in a series of actors ending with Quin and Macklin. In the latter must be recognized features of a pre- cursor, but it was reserved to the genius of Garrick, whose theatrical career extended from 1741 to 1776, to open a new era in his art. His unparalleled success was due in the first instance to his incomparable natural gifts; yet these were indisputably enhanced by a careful and continued 1 A Short View of the Immorality and Profaneness of the English Stage. 2 Sir Novelty Fashion (Lord

Foppington), &c.

*3 The Lying Lover ; The Tender Husband. * The Conscious Lovers.*

6 The Absolute Unlawfulness of Stage Entertainments fully Demonstrated; The Stage defended, &c. (1726).

Oarrick.

literary training, and ennobled by a purpose which prompted him to essay the noblest, as he was capable of performing the most various, range of English theatrical characters. By devoting himself as actor and manager with special zeal to the production of Shakespeare, Garrick permanently popularized on the national stage the greatest creations of English drama, and indirectly helped to seal the doom of what survived of the tendency to maintain in the most ambitious walks of dramatic literature the nerveless traditions of the pseudo-classical school. A generation of celebrated actors and actresses, many of whom live for us in the drastic epigrams of Churchill's Rosciad (1761), were his helpmates or his rivals; but their fame has paled, while his is destined to endure as that of one of the typical masters of his art.

The contrast between the tragedy of the 18th century and those plays of Shakespeare and one or two other Elizabethans which already before Garrick were known to the English stage, was weakened by the mutilated form trageay° in which the old masterpieces generally, if not always, made their appearance there. Even so, however, there are perhaps few instances in theatrical history in which so unequal a competition was so long sustained. In the hands of the tragic poets of the age of Pope, as well as that of Johnson, tragedy had hopelessly stiffened into the forms of its accepted French models. Direct reproductions of these continued, as in Ambrose Philips's and Charles Johnson's (1670-1748) transla- tions from Racine, and Aaron Hill's from Voltaire. Among other tragic dramatists of the earlier part of the century may be mentioned J. Hughes, who, after assisting Addison in his Cato, produced at least one praiseworthy tragedy of his own; 6 E. Fenton, a joint translator of " Pope's Homer " and the author of one extremely successful drama on a theme of singularly enduring interest, 7 and L. Theobald the first hero of the Dunciad, who, besides translations of Greek dramas, produced a few more or less original plays, one of which he was daring enough to father upon Shakespeare. 8 A more distinguished name is that of J. Thomson, whose unlucky Sophonisba and subsequent tragedies are, however, barely remembered by the side of his poems {The Seasons,

&c). The literary genius of E. Young, on the other hand, possessed vigour and variety enough to distin- guish his tragedies from the ordinary level of Augustan plays; in one of them he seems to challenge comparison in the treatment of his theme with a very different rival, 9 but by his main charac- teristics as a dramatist he belongs to the school of his contem- poraries. The endeavour of G. Lillo, in his London Merchant, or George Barnwell (1731), to bring the tragic lessons of terror and pity directly home to his fellow-citizens exercised an extra- ordinarily widespread as well as enduring effect on the history of the 18th-century drama. At home, they gave birth to the new, or, more properly speaking, to the revived, species of domestic tragedy, which connects itself more or less closely with a notable epoch in the history of English prose-fiction as well as of English painting. Abroad, this play — whose success was of the kind which nothing can kill — supplied the text to the teachings oi Diderot, as well as an example to his own dramatic attempts; and through Diderot the impulse communicated itself to Lessing, and long exercised a great effect upon the literature of the German stage. At the same time, it must be allowed that Lillo's pedestrian muse failed in the end to satisfy higher artistic demands than those met in his most popular play, while in another 10 she was less consciously guilty of an aberration towards that " tragedy of destiny," which, in the modern drama at least, obscures the ethical character of all tragic actions. " Classical " tragedy in the generation of Dr Johnson pursued the even tenor of its way, the dictator himself treading with solemn footfall in the accustomed path, 11 and W. Mason making the futile attempt to produce a close imitation of Greek

7 Mariamne.

9 The Revenge (Othello).

6 The Siege of Damascus. 8 The Double Falsehood.

10 Fatal Curiosity.

11 Irene (1749); The Patriot, attributed to Johnsoiu is bv Joseph Simpson.

English opera.

models. 1 The best-remembered tragedy of the century, Home's Douglas (1757), was the production of an author whose famous kinsman, David Hume (though no friend of the contemporary English stage), had advised him " to read Shakespeare, but to get Racine and Voltaire by heart." The indisputable merits of the play cannot blind us to the fact that Douglas is the offspring of Merope.

While thus no high creative talent arose to revive the poetic genius of English tragedy, comedy, which had to contend

against the same rivals, naturally met the demands

of the conflict with greater buoyancy. The history of

the most formidable of those rivals, Music, forms no part of this sketch; but the points of contact between its progress and the history of dramatic literature cannot be alto- gether left out of sight. H. Purcell's endeavours to unite English music to the words of English poets were now a thing of the past; analogous attempts in the direction of musical dialogue, which have been insufficiently noticed, had likewise proved transitory; and the isolated efforts of Addison 2 and others to recover the operatic stage for the native tongue had proved powerless. Italian texts, which had first made their entrance piecemeal, in the end asserted themselves in their entirety; and the marvellously assimilative genius of Handel completed the triumphs of a form of art which no longer had any connexion with the English drama, and which reached the height of its fashionable popularity about the time when Garrick began to adorn the national stage. In one form, however, the English opera was preserved as a pleasing species of the popular drama. The pastoral drama had (in 1725) produced an isolated aftergrowth in Allan Ramsay's Gentle Shepherd, which, with genuine freshness and humour, but without a trace of burlesque, transferred to the scenery of the Pentland Hills the lovely tale of Florizel and Perdita. The dramatic form of this poem is only an accident, but it doubtless suggested an experiment of a different kind to the most playful of London wits. Gay's " Newgate Pastoral " of The Beggar's Opera (1728), in which the amusing text of a burlesque farce was interspersed with songs set to popular airs, caught the fancy of the town by this novel combination, and became the ancestor of a series of agreeable productions, none of which, however, not even its own continua- tion, Polly (amazingly successful in book form, after its produc- tion was forbidden by the lord chamberlain), have ever rivalled it in success or celebrity.

Among these may be mentioned the pieces of I. Bickerstaffe 3 and C. Dibdin. 4 The opera in England, as elsewhere, thus absorbed what vitality remained to the pastoral drama, while to the ballet and the pantomime (whose glories in England began at Covent Garden in 1733, and to whose popularity even Garrick was obliged to defer) was left (in the 1 8th century at all events) the inheritance of the external attractions of the mask and the pageant.

In the face of such various rivalries it is not strange that comedy, instead of adhering to the narrow path which Steele

and others had marked out for her, should have Burlesque, permitted herself some vagaries of her own. Gay's

example pointed the way to a fatally facile form of the comic art; and burlesque began to contribute its influence to the decline of comedy. In an age when party-government was severely straining the capabilities of its system, dramatic satire had not far to look for a source of effective seasonings. The audacity of H. Fielding, whose regular comedies (original or adapted) have secured no enduring remembrance, but whose love of parody was afterwards to suggest to him the theme of the

first of the novels which have made his name immortal, Tbe accordingly ventured in two extravaganzas 5 (so we

Act." S " g should ca H them in these days)' upon a larger admixture

of political with literary and other satire. A third attempt 6 (which never reached the stage) furnished the offended minister, Sir Robert Walpole,with the desired occasion for

1 Elfrida ; Caractacus. 2 Rosamunda.

s Love in a Village, &c. 4 The Waterman, Sec.

6 Pasquin ; The Historical Register for 1736.

6 The Golden Rump.

century.

placing a curb upon the licence of the theatre, such as had already

been advocated by a representative of its old civic adversaries.

The famous act of 1737 asserted no new principle, but converted

into legal power the customary authority hither exercised by the lord chamberlain (to whom it had descended from the master of the revels). The regular censorship which this act established has not appreciably affected the literary progress of the English drama, and the objections which have been raised against it seem to have addressed themselves to practice rather than to principle. The liberty of the stage is a question differing in its conditions from that of the liberty of speech in general, or even from that of the liberty of the press; and occasional lapses of official judgment weigh lightly in the balance against the obvious advantages of a system which in a free country needs only the vigilance of public opinion to prevent its abuse. The policy of the restraint which the act of 1737 put upon the number of playhouses is a different, but has long become an obsolete, question. 7

Brought back into its accustomed grooves, English comedy seemed inclined to leave to farce the domain of healthy ridicule, and to coalesce with domestic tragedy in the attempt „ _, ,

, i, . i-i i- , • Comedy in

to make the stage a vehicle of homespun didactic the latter

morality. Farce had now become a genuine English half of the species, and has as such retained its vitality through t8 J^ all the subsequent fortunes of the stage; it was actively cultivated by Garrick as both actor and author; and he undoubtedly had more than a hand in the very best farce of this age, which is ascribed to clerical authorship. 8 S. Foote, whose comedies 9 and farces are distinguished both by wit and by variety of characters (though it was an absurd misapplication of a great name to call him the English

Aristophanes), introduced into comic acting the abuse of personal mimicry, for the ex- hibition of which he ingeniously invented a series of entertain- ments, the parents of a long progeny of imitations. Meanwhile, the domestic drama of the sentimental kind achieved, though not immediately, a success only inferior to that of The London Merchant, in The Gamester of E. Moore, to which Garrick seems to have directly contributed; 10 and sentimental comedy courted sympathetic applause in the works of A. Murphy, the single comedy of W. Whitehead, u and the earliest of H. Kelly. 12 It cannot be said that this species was extinguished, as it is some- times assumed to have been, by O. Goldsmith; but he certainly published a direct protest against it between the production of his admirable character-comedy of The Good-Natured Man, and his delightfully brisk and fresh She Stoops to Conquer, which, after startling critical propriety from its self-conceit, taught comedy no longer to fear being true to herself. The most successful efforts of the elder G. Colman 13 had in them something of the spirit of genuine comedy, besides a finish which, however playwrights may shut their eyes to the fact, is one of the qualities which ensure a long life to a play. And in the masterpieces of R. B. Sheridan some of the happiest features of the comedy of Congreve were revived, together with its too uniform brilliancy of dialogue, but without its indecency of tone. The varnish of the age is indeed upon the style, and the hollowness of its morality in much of the sentiment (even where that sentiment is meant for the audience) of The Rivals and The School for Scandal; but in tact of construction, in distinctness of characters, and in pungency of social satire, they are to be ranked among the glories

7 The first dramatic performance licensed by the lord chamberlain after the passing of the act was appropriately entitled The Nest of Plays, and consisted of three comedies named respectively The Prodigal Reformed, In Happy Constancy and The Trial of Conjugal Love. It is a curious fact that in the first decade ofthe reign of George III. a severe control of the theatre was very actively exerted after a positive as well as a negative fashion — objectionable passages being ruthlessly suppressed and plays actually written and licensed for the purpose of upholding the existing regime.

8 J. Townley, High Life Below Siairs (1759).

9 The Minor; Taste; The Author, &c.

m This celebrated play was at first persistently attributed to Miss Elizabeth Carter. 11 The School for Lovers. 12 False Delicacy.

13 The Jealous Wife ; The Clandestine Marriage.

ENGLISH]

DRAMA

53 1

of English comedy. Something in Sheridan's style, but quite without his brilliancy, is the most successful play 1 of the un- fortunate General Burgoyne. R. Cumberland, who too con- sciously endeavoured to excel both in sentimental morality and in comic characterization, in which he was devoid of depth, closes the list of authors of higher pretensions who wrote for the theatre. 3 Like, him, Mrs Cowley 3 (" Anna Matilda "), T. Hol- croft, 4 and G. Colman the younger, 6 all writers of popular comedies, as well as the prolific J. O'Keefe (i 746-1833), who contributed to nearly every species of the comic drama, survived into the 19th century. To an earlier date belong the favourite burlesques of O'Keefe's countryman K. O'Hara 6 (d. 1782), good examples of a species the further history of which may be left aside. In the hands of at least one later writer, J. R. Planche, it proved capable of satisfying a more refined taste than his successors have habitually consulted.

The decline of dramatic composition of the higher class, perceptible in the history of the English theatre about the The beginning of the 19th century, was justly attributed

English by Sir Walter Scott to the wearing out of the French drama of model that had been so long wrought upon; but when the 19th jj e asser t e d that the new impulse which was sought in ceo ury. ˆ e dramatic literature of Germany was derived from some of its worst, instead of from its noblest, productions — • from Kotzebue rather than from Lessing, Schiller and Goethe — he showed a very imperfect acquaintance with a complicated literary movement which was obliquely reflected in the stage- plays of Iffland and his contemporaries. The change which was coming over English literature was in truth of a wider and deeper nature than it was possible for even one of its chief representatives to perceive. As that literature freed itself from the fetters so long worn by it as indispensable ornaments, and threw aside the veil which had so long obscured both the full glory of its past and the lofty capabilities of its future, it could not resort except tentatively to a form which like the dramatic is bound by a hundred bonds to the life of the age itself. Soon, the poems with which

ScOttandByron,andtheunrivalledprosefictions with which Scott, both satisfied and stimulated the imaginative demands of the public, diverted the attention of the cultivated classes from dramatic literature, which was unable to escape, with the light foot of verse or prose fiction, into " the new, the romantic land." New themes, new ideas, new forms occupied a new generation of writers and readers; nor did the drama readily lend itself as a vessel into which to pour so many ferment- ing elements. In Byron the impressions produced upon a mind not less open to impulses from without than subjective in its way of recasting them, called forth a series of dramatic attempts betraying a more or less wilful ignorance of the demands of dramatic compositions; his beautiful Manfred, partly suggested by Goethe's Faust, and his powerful Cain, have but the form of plays; his tragedies on Italian historical subjects show, some resemblance in their political rhetoric to the contemporary works of Alfieri; his Sardanapalus, autobiographically interesting, fails to meet the demands of the stage; his Werner (of which the authorship has been ascribed to the duchess of Devonshire) is a hastily dramatized sensation novel. To Coleridge (1772-1834), who gave to English literature a splendidly loose translation of Schiller's Wallenstein, the same poet's Robbers (to which Words- worth's only dramatic attempt, the Borderers, is likewise in- debted) had probably suggested the subject of his tragedy of Osorio, afterwards acted under the title of Remorse. Far superior to this is his later drama of Zapolya, a genuine homage to Shake- speare, out of the themes of two of whose plays it is gracefully woven. Scott, who in his earlier days had translated Goethe's Gblz von Berlichingen, gained no reputation by his own dramatic compositions. W. S. Landor, apart from those Imaginary Conversations upon which he best loved to expend powers of observation and characterization such as have been given to

1 The Heiress. 2 The West Indian ; The Jew.

8 The Belle's Stratagem; A Bold Stroke for a Husband, &c. 4 The Road to Ruin, &c. 6 John Bull ; The Heir at Law, &c.

8 Midas ; The Golden Pippin.

few playwrights, cast in a formally dramatic mould studies of character of which the value is far from being confined to their wealth in beauties of detail. Of these the magnificent, but in construction altogether undramatic, Count Julian, is the most noteworthy. Shelley's The Cenci, on the other hand, is not only a poem of great beauty, but a drama of true power, abnormally revolting indeed in theme, but singularly pure and delicate in

treatment. A humbler niche in the temple of dramatic literature belongs to some of the plays of C. R. Maturin, 7 Sir T. N. Talfourd, 8 and Dean Milman. 9

Divorced, except for passing moments, from the stage, English dramatic literature could during much the greater part of the 19th century hardly be regarded as a connected national growth; though, already in the last decades of the Victorian age, the revival of public interest in the theatre co-operated with a gradual change in poetic taste to awaken the hope of a future living reunion. Among English poets who lived in this period, Sir Henry Taylor probably approached nearest to the objective treatment and the amplitude of style characteristic of the Elizabethan drama. 10 R. H. Home, long an almost solitary survivor of the romantic school, was able in at least one memorable dramatic attempt to revive something of the early Elizabethan spirit. 11 Of the chief poets of the age, Tennyson only in his later years addressed himself to a form of composition little suited to his genius, though the very fact of the homage paid by him to the national forms of the historic drama and of romantic comedy could not fail to ennoble the contemporary stage. 12 Matthew Arnold's stately revival of the traditions of classical tragedy proper, on the other hand, deliberately excluded itself from any such contact; 13 while Longfellow's refined literary culture and graceful facility of form made ready use of a quasi-dramatic medieval vesture. 14 William Morris's single " morality," too, cannot be regarded as a contribution to dramatic literature proper. 16 Of very different importance are the excursions into dramatic composition of Robert Browning, whose place in the living inheritance of the English drama has in one instance at least been not unsuccessfully vindicated by a later age, and some of whose greatest gifts are beyond a doubt displayed in his dramatic work; 16 and the sustained endeavours of A. C. Swin- burne, after adding a flower of exquisite beauty to the wreath which the lovers of the Attic muse have laid at her feet, to enrich the national historic drama by a trilogy instinct with the ardent eloquence of passion. 17 Until a date too near the times in which we live to admit of its being fixed with precision, most of the English writers who sought to preserve a connexion between their dramatic productions and the demands of the stage addressed themselves to the theatrical rather than the literary public — for the distinction, in those times at all events, was by no means without a difference. The modestly simple and judici- ously concentrated efforts of Joanna Baillie deserve a respectful remembrance in the records of literature as well as of the stage, though the day has passed when the theory which suggested her Plays on the Passions

could find acceptance among critics, or her exemplifications of it satisfy the demands of playgoers. Sheridan Knowles, on the other hand, composed his conventional semblances of genuine tragedy and comedy with a thorough knowledge of stage effect, and some of them can hardly yet be said to have vanished from the stage. 18 The first Lord Lytton, though his plays were for the most part of a lighter texture, showed even more artificiality of sentiment in their conception and execution ; but the romantic touch which he imparted to at least one of them accounts for its long-lived popularity. Among later Victorian playwrights T. W. Robertson brought back a breath of naturalness into the acted comic drama; Tom Taylor, rivalling Lope in fertility, made little pretence to original invention, but adapted with an instinct that rarely failed him, and materially helped to keep the theatrical diversions of his

"Bertram. 8 Ion. 5 Fazio. 10 Philip van Artevelde.

n The Death of Marlowe. 12 Becket; The Cup. 13 Merope. 14 The Golden Legend. u Love is Enough.

16 Strafford ; The Blot on the Scutcheon.

17 Atalanta in Calydon; Bothwell; Chastelard; Mary Stuart. a Virginius; The Hunchback.

age sound and pure ; an endeavour in which he had the co- operation of Charles Reade and that of most of those who competed with them for the favour of generations of playgoers more easily contented than their successors. The one deplorable aspect of this age of the English drama was to be found neither in the sphere of tragedy nor in that of comedy — nor even in that of farce. It was presented in the low depths of contemporary burlesque, which had degenerated from the graceful extravaganza of J. R. Planche into witless and tasteless emptiness.

Curiously enough, it was at this point that something like real originality — discovering a new sub-species of its own — first began, with the aid of a sister-art, to renovate the English popular comic stage. At the beginning of the roth century the greatest tragic actress of the English theatre, Mrs Siddons, had passed her prime; and

before its second decade had closed, not only she (1812) but her brother John Kemble (r8r7), the repre- sentative of a grand style of acting which later generations might conceivably find overpowering, had withdrawn from the boards. Mrs Siddons was soon followed into retirement by her successor Miss O'Neill (1819); while Kemble's brilliant later rival, Edmund Kean, an actor the intuitions of whose genius seem to have supplied, so far as intuition ever can supply, the absence of a consecutive self culture, remained on the stage till his death in 1833. Young, Macready, and others handed down some of the traditions of the older school of acting to the very few artists who remained to suggest its semblance to a later generation. Even these — among them S. Phelps, whose special merit it was to present to a later age, accustomed to elaborate theatrical environments, dramatic masterpieces as dependent upon them selves and adequate interpretation; and the foremost English actress of the earlier Victorian age, Helen Faucit (Lady Martin) — were unable to leave a school of acting behind them. Still less was this possible to Charles Kean the younger, with whom the decorative production of Shakespearian plays really had its beginning; or even to Sir Henry Irving, an actor of genius, but also an irrepressible and almost eccentric theatrical personality, whose great service to the English drama was his faith in its masterpieces. The comic stage was fortunate in an ampler aftergrowth, from generation to generation, of the successors of the old actors who live for us all in the reminiscences of Charles Lamb; nor were the links suddenly snapped which bound the humours of the present to those of the past. In the first decade of the 20th century a generation still survived which could recall, with many other similar joys, the brilliant levity of Charles Mathews the younger; the not less irresistible stolidity of J. B. Buckstone; the solemn fooling of H. Compton (1805- 1877); the subtle humours of J. L. Toole, and the frolic charm of Marie Wilton (Lady Bancroft), the most original comic actress of her time. (A. W. W.)

Recent English Drama. — In England the whole mechanism of theatrical life had undergone a radical change in the middle decades of the roth century. At the root of this change lay the immense growth of population and the enormously increased facilities of communication between London and the provinces. Similar causes came into operation, of course, in France, Germany and Austria, but were much less distinctly felt, because the numerous and important subventioned theatres of these countries remained more or less unaffected by economic influences. Free trade in theatricals (subject only to certain licensing regulations and to a court censorship of new

plays) was established in England by an act of 1843, which abolished the long moribund monopoly of the " legitimate drama " claimed by the " Patent Theatres " of Drury Lane and Covent Garden. The drama was thus formally subjected to the operation of the law of supply and demand, like any other article of commerce, and managers were left, unaided and unhampered by any subvention or privilege, to cater to the tastes of a huge and growing community. Theatres very soon multiplied, competition grew ever keener, and the long run, with its accompaniments of ostentatious decoration and lavish advertisement, became the one object of managerial effort. This process of evolution may be said to have begun in the second quarter of the 19th century and completed itself in

the 3rd. The system which obtains to-day, almost unforeseen in r82S, was in full operation in 1875. The repertory theatre, with its constant changes of programme, maintained on the continent partly by subventions, partly by the mere force of artistic tradition, had become in England a faint and far-off memory. There was not a single theatre in London at which plays, old and new, were not selected and mounted solely with a view to their continuous performance for as many nights as possible, anything short of fifty nights constituting an igno- minious and probably ruinous failure. It was found, too, that those theatres were most successful which were devoted exclu- sively to exploiting the talent of an individual actor. Thus when the fourth quarter of the century opened, the long " run " and the actor-manager were in firm possession of the field.

The outlook was in many ways far from encouraging. It was not quite so black, indeed, as it had been in the late 'fifties and early 'sixties, when the " legitimate " enterprises of Phelps at Sadler's Wells and Charles Kean at the Princess's had failed to hold their ground, and when modern comedy and drama were represented almost exclusively by adaptations from the French. There had been a slight stirring of originality in the series of comedies produced by T. W. Robertson at the Prince of Wales's theatre, where, under the management of Bancroft (q.v.) a new school of mounting and acting, minutely faithful (in theory at any rate) to everyday reality, had come into existence. But the hopes of a revival of English comedy seemed to , have died with Robertson's death. One of his followers, James Albery, possessed both imagination and wit, but had not the strength of character to do justice to his talent, and sank into a mere adapter. In the plays of another disciple, H. J. Byron, the Robertsonian or " cup-and-saucer " school declined upon sheer inanity. Of the numerous plays signed by Tom Taylor some were original in substance, but all were cast in the machine-made French

mould. Wilkie Collins, in dramatizing some of his novels, produced somewhat crude anticipations of the modern " problem play." The literary talent of W. S. Gilbert displayed itself in a group of comedies both in verse and prose ; but Gilbert saw life from too peculiar an angle to represent it otherwise than fantastic- ally. The Robertsonian impulse seemed to have died utterly away, leaving behind it only five or six very insubstantial comedies and a subdued, unrhetorical method in acting. This method the Bancrofts proceeded to apply, during the 'seventies, to revivals of stage classics, such as The School for Scandal, Money and Masks and Faces, and to adaptations from the French of ˆSardou.

While the modern drama appeared to have relapsed into a comatose condition, poetic and romantic drama was giving some signs of life. At the Lyceum in r87i Henry Irving had leapt into fame by means of his performance of Mathias in The Bells, an adaptation from the French of Erckmann-Chatrian. He followed this up by an admirably picturesque performance of the title-part in Charles I. by W. G. Wills. In the autumn of 1874 the great success of Irving's Hamlet was hailed as the prelude to a revival of tragic acting. As a matter of fact, it was the prelude to a long series of remarkable achievements in romantic drama and melodrama. Irving's lack of physical and vocal resources prevented him from scaling the heights of tragedy, and his Othello, Macbeth, and Lear could not be ranked among his successes; but he was admirable in such parts as Richard III., Shylock, Iago and Wolsey, while in melodramatic parts, such as Louis XI. and the hero and villain of The Lyons Mail, he was unsurpassed. Mephistopheles in a version of Faust (r88s), perhaps the greatest popular success of his career, added nothing to his reputation for artistic intelligence; but on the other hand his Becket in Tennyson's play of that name (1893) was one of his most masterly efforts. His management of the Lyceum (1878-1899) did so much to raise the status of the actor and to restore the prestige of poetic drama, that the knighthood conferred upon him in r89S was felt to be no more than an appropriate recognition of his services. But his managerial career had scarcely any significance for the living English drama. ˆHe seldom experimented with a new play,

and, of the few which he did produce, only The Cup and Becket by

Lord Tennyson have the remotest chance of being remembered.

To trace the history of the new English drama, then, we must go back to the Prince of Wales's theatre. Even while it seemed that French comedy of the school of Scribe was resuming its baneful predominance, the seeds of a new order of things were slowly germinating. Diplomacy, an adaptation of Sardou's Dora, produced in 1878, brought together on the Prince of Wales's stage Mr and Mrs Bancroft, Mr and Mrs Kendal, John Clayton and Arthur Cecil — in other words, the future managers of the Haymarket, the St James's and the Court theatres, which were destined to see the first real stirrings of a literary revival. Mr and Mrs Kendal, who, in conjunction with John Hare, managed the St James's theatre from 1879 to 1888, produced A. W. Pinerp's first play of any consequence, The Money-Spinner (1881), and afterwards The Squire (1882) and The Hobby Horse (1887). The Bancrofts, who, after entirely rebuilding the Haymarket theatre, managed it from 1880 till their retirement in 1885, produced in 1883 Pinero's Lords and. Commons; and Messrs Clayton and Cecil produced at the Court theatre between 1885 and 1887 his three brilliant farces, The Magistrate, The School- mistress and Dandy Dick, which, with the sentimental comedy, Sweet Lavender, produced at Terry's theatre in 1888, assured his position as an original and fertile dramatic humorist of no small literary power. It is to be noted, however, that Pinero was almost the only original playwright represented under the Bancroft, Hare-Kendal and Clayton-Cecil managements, which relied for the rest upon adaptations and revivals. Adaptations of French vaudevilles were the staple productions of Charles Wyndham's management at the Criterion from its beginning in 1876 until 1893, when he first produced an original play of any importance. When Herbert Beerbohm Tree went into manage- ment at the Haymarket in 1887, he still relied largely on plays of foreign origin. George Alexander's first managerial ventures (Avenue theatre, 1890) were two adaptations from the French. Until well on in the 'eighties, indeed, adaptation from the French was held the normal occupation of the British playwright, and original composition a mere episode. Robertson, Byron, Albery, Gilbert, Tom Taylor, Charles Reade, Herman Merivale, G. W. Godfrey, all produced numerous adaptations ; Sydney Grundy was for twenty years occupied almost exclusively in this class of work; Pinero himself has adapted more than one French play. The 'eighties, then, may on the whole be regarded as showing a very gradual decline in the predominance of France on the English stage, and an equally slow revival of originality, so far as comedy and drama were concerned, manifesting

itself mainly in the plays of Pinero.

The reaction against French influence, however, was no less apparent in the domain of melodrama and operetta than in that of comedy and drama. Until well on in the 'seventies, D'Ennery and his disciples, adapted and imitated by Dion Boucicault and others, ruled the melodramatic stage. The reaction asserted itself in two quarters — in the East End at the Grecian theatre, and in the West End at the Princess's. In The World, produced atDrury Lane in 1880, Paul Meritt (d. 1895) and Henry Pettitt (d. 1893) brought to the West End the " Grecian " type of popular drama ; and at Drury Lane it survived in the elaborately spectacular form imparted to it by Sir Augustus Harris, who managed that theatre from 1879 till his death in 1896. The production of G. R. Sims's Lights 0' London at the Princess's in 1881, under Wilson Barrett's management, also marked a new departure. This style of melodrama was chiefly cultivated at the Adelphi theatre, from 1882 until the end of the century, when it died out there as a regular institution, apparently because a host of suburban theatres drew away its audiences. Of all these English melodramas, only one, The Silver King, by Henry Arthur Jones (Princess's, 1882), could for a moment compare in invention or technical skill with the French dramas they sup- planted. The fact remains, however, that even on this lowest level of dramatic art the current of the time set decisively towards home-made pictures of English life, however crude and puerile.

For twenty-five years, from 1865 to 1890, the English stage was overrun with French operettas of the school of Offenbach. Hastily adapted by slovenly hacks, their librettos (often witty in the original) became incredible farragos of metreless doggrel and punning ineptitude. The great majority of them are now so utterly forgotten that it is hard to realize how, in their heyday, they swarmed on every hand in London and the provinces. The reaction began in 1875 with the performance at the Royalty theatre of Trial by Jury, by W. S. Gilbert and Arthur Sullivan. This was the prelude to that brilliant series of witty and melodious extravaganzas which began with The Sorcerer at the Opera Comique theatre in 1877, but was mainly associated with the Savoy theatre, opened by R. D'Oyly Carte (d. 1901) in 1881. Little by little the Gilbert and Sullivan operettas (of which the most famous, perhaps, were H.M.S. Pinafore, 1878, Patience, 1881, and The Mikado, 1885) undermined the popularity of the French opera-bouffes, and at the same time that of the indigenous " burlesques " which, graceful enough in the hands of their inventor J. R. Planch6, had become mere incoherent jumbles of buffoonery, devoid alike of dramatic ingenuity and of literary ' form.

When, early in the 'nineties, the collaboration between Gilbert and Sullivan became intermittent, and the vogue of the Savoy somewhat declined, a new class of extravaganza arose, under the designation of " musical comedy" or " musical farce." It first took form in a piece called In Town, by Messrs " Adrian Ross " and Osmond Carr (Prince of Wales's theatre, 1892), and rapidly became very popular. In these plays the scene and costumes are almost always modern though sometimes exotic, and the prose dialogue, setting forth an attenuated and entirely negligible plot, is frequently interrupted by musical numbers. The lyrics are often very clever pieces of rhyming, totally different from the inane doggrel of the old opera-bouffes and burlesques. In other respects there is little to be said for the literary or intellectual quality of " musical farce " ; but, being an entirely English (or Anglo-American) product, it falls into line with the other indications we have noted of the general decline — one might almost say extinction — of French influence on the English stage.

To what causes are we to trace this gradual disuse of adapta- tion ? In the domain of modern comedy and drama, to two causes acting simultaneously : the decline in France of the method of Scribe, which produced "well-made," exportable plays, more or less suited to any climate and environment; and the rise in England of a generation of playwrights more original, thoughtful and able than their predecessors. It is not at all to be taken for granted that the falling off in the supply of exportable plays meant a decline in the absolute merit of French drama. The historian of the future may very possibly regard the movement in France, no less than the'movement in England, as a step in advance, and may even see in the two movements co-ordinate manifestations of one tendency. Be this as it may, the fact is certain that as the playwrights of the Second Empire gradually died off, and were succeeded by the authors of the " new comedy," plays which would bear transplantation became ever fewer and farther between. Of recent years Henri Bernstein, author of Le Voleur and Samson, has been almost the only French dramatist whose works have found a ready and steady market in England. Attempts to acclimatize French poetical drama — Pour la Couronne, Le Chemineau, Cyrano de Bergerac — were all more or less unsuccessful.

Having noted the decline of adaptation, we may now trace a stage farther the development of the English drama. The first stage, already surveyed, ends with the production of Sweet Lavender in 1888. Up to this point its author, Pinero (b. 1855), stood practically alone, and had won his chief successes as a humorist. Henry Ai$thur Jones (b. 1851) was known as little more than an able

melodramatist, though in one play, Saints and Sinners (1884), he had made some attempt at a serious study of provincial life. R. C. Carton (b. 1856) had written, in collaboration, one or two plays of slight account. Sydney Grundy (b. 1848) had produced scarcely any original work. The second stage may be taken as extending from 1889 to 1893.

On the 24th of April 1889 John Hare opened the new Garrick theatre with The Profligate, by Pinero — an unripe and superficial piece of work in many ways, but still a great advance, both in ambition and achievement, upon any original work the stage had seen for many a year.

With all its faults, it may be said that The Profligate notably enlarged at one stroke the domain open to the English dramatist. And it did not stand alone. The same year saw the production of two plays by H. A. Jones, Wealth and The Middleman, in which a distinct effort towards a serious criticism of life was observable, and of two plays tˆy Sydney Grundy, A Fool's Paradise and A White Lie, which, though very French in method, were at least original in substance. Jones during the next two years made a steady advance with Judah (1890), The Dancing Girl and The Crusaders (1 89 1) . Pinero in these years was putting forth less than his whole strength in The Cabinet Minister (1890), Lady Bountiful and The Times (1891), and The Amazons (March 1893). But meanwhile new talents were coming forward. The management of George Alexander, which opened at the Avenue theatre in 1890, but was transferred in the following year to the St James's, brought prominently to the front R. C. Carton, Haddon Chambers and Oscar Wilde. Carton's two sentimental comedies, Sunlight and Shadow (1890) and Liberty Hall (1892), showed excellent workmanship, but did not yet reveal his true originality as a humorist. Haddon Chambers's work (notably The Idler, 1891) was as yet sufficiently commonplace; but in Lady Windermere's Fan (1892) Oscar Wilde showed himself at his first attempt a brilliant and accomplished dramatist. Wilde's subsequent plays, A Woman of No Importance (1893) and An Ideal Husband and The Importance of being Earnest (1895), though marred by mannerism and insincerity, did much to promote the movement we are here tracing.

As the production of The Profligate marked the opening of the second period in the revival of English drama, so the production of the same author's The Second Mrs Tanqueray is very clearly the starting-point of the third period. Before attempting to trace its course we may do well to glance at certain conditions which probably influenced it.

In the first place, economic conditions. The Bancroft- Robertson movement at the old Prince of Wales's, between 1865 and 1870, was of even more importance from an economic than from a literary point of view. By making their little theatre a luxurious place of resort, and faithfully imitating in their productions the accent, costume and furniture of upper and upper-middle class life, the Bancrofts had initiated a reconcilia- tion between society and the stage. Throughout the middle decades of the century it was the constant complaint of the managers that the world of wealth and fashion could not be tempted to the theatre. The Bancroft management changed all that. It was at the Prince of Wales's that half-guinea stalls were first introduced; and these stalls were always filled. As other theatres adopted the same policy of upholstery, both on and off the stage, fashion extended its complaisance to them as well. In yet another way the reconciliation was promoted — by the ever- increasing tendency of young men and women of good birth and education to seek a career upon the English stage. The theatre, in short, became at this period one of the favourite amuse- ments of fashionable (though scarcely of intellectual) society in London. It is often contended that the influence of the sensual and cynical stall audience is a pernicious one. In some ways, no doubt, it is detrimental; but there is another side to the case. Even the cynicism of society marks an intellectual advance upon the sheer rusticity which prevailed during the middle years of the 19th century and accepted without a murmur plays (original and adapted) which bore no sort of relation to life. In a celebrated essay published in 1879, Matthew Arnold (whose occasional dramatic criticisms were very influential in intellectual circles) dwelt on the sufficiently obvious fact that the result of giving English names and costumes to French characters was to make their sayings and doings utterly unreal and " fantastic." During the years of French ascendancy, audiences had quite forgotten that it was possible for the stage to be other than " fantastic "

in this sense. They no longer thought of comparing the mimic world with the real world, but were content with what may be called abstract humour and pathos, often of the crudest quality. The cultivation of external realism, coinciding with, and in part occasioning, the return of society to the playhouse, gradually led to a

demand for some approach to plausibility in character and action as well as in costume and decoration. The stage ceased to be entirely " fantastic," and began to essay, however imperfectly, the representation, the criticism of life. It cannot be denied that the influence of society tended to narrow the outlook of English dramatists and to trivialize their tone of thought. But this was a passing phase of development; and cleverly trivial representations of reality are, after all, to be preferred to brainless concoctions of sheer emptiness.

Quite as important, from the economic point of view, as the reconciliation of society to the stage, was the reorganization of the mechanism of theatrical life in the provinces which took place between 1865 and 1875. From the Restoration to the middle of the 19th century the system of " stock companies " had been universal. Every great town in the three kingdoms had its established theatre with a resident company, playing the " legitimate " repertory, and competing, often by illegitimate means, for the possession of new London successes. The smaller towns, and even villages, were grouped into local " circuits, " each served by one manager with his troupe of strollers. The " circuits " supplied actors to the resident stock companies, and the stock companies served as nurseries to the patent theatres in London. Metropolitan " stars " travelled from one country theatre to another, generally alone, sometimes with one or two subordinates in their train, and were " supported," as the phrase went, by the stock company of each theatre. Under this system, scenery, costumes and appointments were often grotesquely inadequate, and performances almost always rough and unfinished. On the other hand, the constant practice in a great number and variety of characters afforded valuable training for actors, and developed many remarkable talents. As a source of revenue to authors, the provinces were practically negligible. Stageright was unprotected by law; and even if it had been protected, it is doubtful whether authors could have got any considerable fees out of country managers, whose precarious ventures usually left them a small enough margin of profit.

The spread of railways throughout the country gradually put an end to this system. The "circuits" disappeared early in the 'fifties, the stock companies survived until about the middle of the 'seventies. As soon as it was found easy to transport whole companies, and even great quantities of scenery, from theatre to theatre throughout the length and breadth of Great Britain, it became apparent that the rough makeshifts of the stock company system were doomed. Here again we can trace to the old Prince of Wales's theatre the first

distinct impulse towards the new order of things. Robertson's comedies not only encouraged but absolutely required a style of art, in mounting, stage-management and acting, not to be found in the country theatres. To entrust them to the stock companies was well-nigh impossible. On the other hand, to quote Sir Squire Bancroft, " perhaps no play was ever better suited than Caste to a travelling company; the parts being few, the scenery and dresses quite simple, and consequently the expenses very much reduced." In 1867, then, a company was organized and rehearsed in London to carry round the provincial theatres as exact a reproduction as possible of the London performance of Caste and Robertson's other comedies. The smoothness of the representation, the delicacy of the interplay among the characters, were new to provincial audiences, and the success was remarkable. About the same time the whole Haymarket company, under Buckstone's management, began to make frequent rounds of the country theatres; and other " touring combinations " were soon organized. It is manifest that the " combination " system and the stock company system cannot long coexist, for a manager cannot afford to keep a stock company idle while a London combination is occupying his theatre. The stock companies, therefore, soon dwindled away, and were probably quite extinct before the end

of the 'seventies. Under the present system, no sooner is a play an established success in London than it is reproduced in one, two or three exact copies and sent round the provincial theatres (and the numerous suburban theatres which have sprung up since 1895), Company A serving first-class towns, Company B the second-class towns, and so forth. The process is very like that of taking plaster casts of a statue, and the provincial companies often stand to their London originals very much in the relation of plaster to marble. Even the London scenery is faithfully reproduced in material of extra strength, to stand the wear-and-tear of constant removal. The result is that, instead of the square pegs in round holes of the old stock company system, provincial audiences now see pegs carefully adjusted to the particular holes they occupy, and often incapable of fitting any other. Instead of the rough performances of old, they are now accustomed to performances of a mechanical and soulless smoothness.

In some ways the gain in this respect is undeniable, in other ways the loss is great. The provinces are no longer, in any effective sense, a nursery of fresh talents for the London theatres, for the art acquired in touring combinations is that of mimicry rather than of acting. Moreover, provincial playgoers have lost all personal interest and pride in their local theatres, which have no longer any individuality of their own, but serve as a mere frame for the presentation of a series of ready-made London pictures. Christmas pantomime is the only theatrical product that has any really local flavour in it, and even this is often only a second-hand London production, touched up with a few topical allusions. Again, the railways which bring London pro- ductions to the country take country playgoers by the thousand to London. The wealthier classes, in the Lancashire, Yorkshire and Midland towns at any rate, do almost all their theatre-going in London, or during the autumn months when the leading London companies go on tour. Thus the better class of comedy and drama has a hard fight to maintain itself in the provinces, and the companies devoted to melodrama and musical farce enjoy an ominous preponderance of popularity.

On the whole, however — and this is the main point to be observed with regard to the literary development of the drama — the economic movement of the five- and twenty years between 1865 and 1890 was enormously to the advantage of the dramatic author. A London success meant a long series of full houses at high prices, on which he took a handsome percentage. The provinces, in which a popular playwright would often have three or four plays going the rounds simultaneously, became a steady source of income. And, finally, it was found possible, even before international copyright came into force, to protect stageright in the United States, so that about the beginning of the 'eighties large receipts began to pour in from America. Thus successful dramatists, instead of living from hand to mouth, like their predecessors of the previous generation, found themselves in comfortable and even opulent circumstances. They had leisure for reading, thought and careful composition, and they could afford to gratify their ambition with an occasional artistic experiment. Failure might mean a momentary loss of prestige, but it would not spell ruin. A distinctly progressive spirit, then, began to animate the leading English dramatists — a spirit which found intelligent sympathy in such managers as John Hare, George Alexander, Beerbohm Tree and Charles Wyndham. Nor must it be forgotten that, though the laws of literary property, internal and international, remained far from perfect, it was found possible to print and publish plays without incurring loss of stageright either at

home or in America. The playwrights of the present generation have accordingly a motive for giving literary form and polish to their work which was quite inoperative with their predecessors, whose productions were either kept jealously in manuscript or printed only in miserable and totally unreadable stage editions. It is no small stimulus to ambition to know that even if a play prove to be in advance of the standards of taste or thought among the public to which it is originally presented, it will not perish utterly, but will, if it have any inherent vitality, continue to live as literature.

Having now summed up the economic conditions which made for progress, let us glance at certain intellectual influences which tended in the same direction. The establishment of the Theatre Libre in Paris, towards the close of 1 88 7 , ”'/j^^ unquestionably marked the beginning of a period of drama. restless experiment throughout the theatrical world of Europe. A. Antoine and his supporters were in open rebellion against the artificial methods of Scribe and the Second Empire playwrights. Their effort was to transfer to the stage the realism, the so-called ” naturalism,” which had been dominant in French fiction since 1870 or earlier ; and this naturalism was doubtless, in its turn, the outcome of the scientific movement of the century. New methods (or ideals) of observation, and new views as to the history and destiny of the race, could not fail to produce a profound effect upon art ; and though the modern theatre is a cumbrous contrivance, slow to adjust its orientation to the winds of the spirit, even it a t last began to revolve, like a rusty windmill, so as to fill its sails in the main current of the intellectual atmosphere. Within three or four years of its inception, Antoine’s experiment had been imitated in Germany, England and America. The ” Freie Biihne ” of Berlin came into existence in 1889, the Independent Theatre of London in 1891. Similar enterprises were set on foot in Munich and other cities. In America several less formal experiments of a like nature were attempted, chiefly in Boston and New York. Nor must it be forgotten that in Paris itself the Theatre Libre did not stand alone. Many other thedtres d coli sprang up, under such titles as ” Theatre d’Art,” ” Theatre Moderne,” ” Theatre de l’Avenir Dramatique.” The most important and least ephemeral was the ” Theatre de 1’CEuvre,” founded in 1893 by Alex. Lugne-Poe, which represented mainly, though not ex- clusively, the symbolist reaction against naturalism.

The impulse which led to the establishment of the Theatre Libre was, in the first instance, entirely French. If any foreign influence helped to shape its course, it was that of the great Russian novelists. Tolstoi’s Puissance des tenebres was the only ” exotic ” play announced in Antoine’s opening manifesto. But the whole movement

was soon to receive a potent stimulus from the Norwegian poet Henrik Ibsen.

Ibsen's early romantic plays had been known in Germany since 1875. In 1878 Pillars of Society and in 1880 A Doll's House achieved wide popularity, and held the German stage side by side with A Bankruptcy, by Bjornstjerne Bjornson. But these plays had little influence on the German drama. Their methods were, indeed, not essentially different from those of the French school of the Second Empire, which were then dominant in Germany as well as everywhere else. It was Ghosts (acted in Augsburg and Meiningen 1886, in Berlin 1887) that gave the impulse which, coalescing with the kindred impulse from the French Theatre Libre, was destined in the course of a few years to create a new dramatic literature in Germany. During the middle decades of the century Germany had produced some dramatists of solid and even remarkable talent, such as Friedrich Hebbel, Heinrich Laube, Karl Gutzkow and Gustav Freytag. Even the generation which held the stage after 1870, and in- cluded Paul Heyse, Paul Lindau and Adolf Wilbrandt, with numerous writers of light comedy and farce, such as E. Wichert, O. Blumenthal, G. von Moser, A. L'Arronge and F. von Schon- than, had produced a good many works of some merit. But, in the main, French artificiality and frivolity predominated on the German stage. In point of native talent and originality, the Austrian popular playwright Ludwig Anzengruber was well ahead of his North German contemporaries. It was in 1889, with the establishment of the Berlin Freie Biihne, that the reaction definitely set in. In Berlin, as afterwards in London, Ghosts was the first play produced on the outpost stage, but it was followed in Berlin by a very rapid development of native talent. Less than a month after the performance of Ibsen's play, Gerhart Hauptmann came to the front with Vor Son- nenaufgang, an immature piece of almost unrelieved Zolaism, which he soon followed up, however, with much more important works. In Das Friedensfest (1890) and Einsame Menschen

(i8gi) he transferred his allegiance from Zola to Ibsen. His true originality first manifested itself in Die Weber (1892); and subsequently he produced plays in several different styles, all bearing the stamp of a potent individuality. His most popular productions

have been the dramatic poems Hannele and Die versunkene Glocke, the low-life comedy Der Biberpelz, and the low-life tragedy Fuhrmann Henschel. Other remarkable play- wrights belonging to the Freie Buhne group are Max Halbe (b. 1865), author of Jugend and Mutter Erie, and Otto Erich Hartleben (b. 1864), author of Hanna Jagert and Rosenmontag. These young men, however, so quickly gained the ear of the general public, that the need for a special " free stage " was no longer felt, and the Freie Buhne, having done its work, ceased to exist. Unlike the French Theatre Libre and the English Independent theatre, it had been supported from the outset by the most influential critics, and had won the day almost without a battle. The productions of the new school soon made their way even into some of the subventioned theatres; but it was the unsubventioned Deutsches Theater of Berlin that most vigorously continued the tradition of the Freie Buhne. One or two play- wrights of the new generation, however, did not actually belong to the Freie Buhne group. Hermann Sudermann produced his first play, Die Ehre, in 1888, and his most famous work, Heimat, in 1 89 2 . In him the influence of Ibsen is very clearly perceptible ; while Arthur Schnitzler of Vienna, author of Liebelei, may rather be said to derive his inspiration from the Parisian " new comedy." Originality, verging sometimes on abnormality, distinguishes the work of Frank Wedekind (b. 1864), author of Erdgeist and Friihlingserwachen. Hugo von Hofmannsthal (b. 1874), in his Elektra and Odipus, rehandles classic themes in the light of modern anthropology and psychology.

The promoters of the Theatre Libre had probably never heard of Ibsen when they established that institution, but three years later his fame had reached France, and Les Revenants was pro- duced by the Theatre Libre (29th May 1890). Within the next two or three years almost all his modern plays were acted in Paris, most of them either by the Theatre Libre or by L'(Euvre. Close upon the heels of the Ibsen influence followed another, less potent, but by no means negligible. The exquisite tragic symbolism of Maurice Maeterlinck began to find numerous admirers about 1890. In 1891 his one-act play L'Intruse was acted; in 1893, PellSas et MUisande. By this time, too, the reverberation of the impulse which the Theatre Libre had given to the Freie Buhne began to be felt in France. In 1893 Haupt- mann's Die Weber was acted in Paris, and, being frequently repeated, made a deep and lasting impression.

The English analogue to the Theatre Libre, the Independent theatre, opened its first season (March 13, 1891) with a perform- ance of Ghosts. This was not, however, the first introduction of Ibsen to the

English stage. On the 7th of June 1889 (six weeks after the production of The Profligate) A Doll's House was acted at the Novelty theatre, and ran for three weeks, amid a storm of critical controversy. In the same year Pillars of Society was presented in London. In 1891 and 1892 A Doll's House was frequently acted; Rosmersholm was produced in 1891, and again in 1893; in May and June 1891 Hedda Gabler had a run of several weeks; and early in 1893 The Master Builder enjoyed a similar passing vogue. During these years, then, Ibsen was very much " in the air " in England, as well as in France and Germany. The Independent theatre, in the meantime, under the manage- ment of J. T. Grein, found but scanty material to deal with. It presented translations of Zola's ThSrese Raquin, and of A Visit, by the Danish dramatist Edward Brandes; but it brought to the front only one English author of any note, in the person of George Bernard Shaw, whose " didactic realistic play," Widowers' Houses, it produced in December 1892.

None the less is it true that the ferment of fresh energy, which between 1887 and 1893 had created a new dramatic literature both in France and in Germany, was distinctly felt in England as well. England did not take at all kindly to it. The productions of Ibsen's plays, in particular, were received with an outcry of reprobation. A great part of this clamour was due to sheer

misunderstanding; but some of it, no doubt, arose from genuine and deep-seated distaste. As for the dramatists of recognized standing, they one and all, both from policy and from conviction, adopted a hostile attitude towards Ibsen, expressing at most a theoretical respect overborne by practical dislike. Yet his influence permeated the atmosphere. He had revealed possi- bilities of technical stagecraft and psychological delineation that, once realized, were not to be banished from the mind of the thoughtful playwright. They haunted him in spite of himself. Still subtler was the influence exerted over the critics and the more intelligent public. Deeply and genuinely as many of them disliked Ibsen's works, they found, when they returned to the old-fashioned play, the adapted frivolityˆor the home- grown sentimentalism, that they disliked this still more. On every side, then, there was an instinctive or deliberate reaching forward towards something new; and once again it was Pinero who ventured the decisive step.

On the 27th of May 1893 The Second Mrs Tanqueray was produced at the St James's theatre. With The Second Mrs Tanqueray the English acted drama ceased to be a merely insular product, and took rank in the literature of Europe. Here was a play which, whatever its

faults, was obviously comparable with the plays of Dumas,of Sudermann,of B jornson,of Echegaray. It might be better than some of these plays, worse than others; but it stood on the same artistic level. The fact that such a play could not only be produced, but could brilliantly succeed, on the London stage gave a potent stimulus to progress. It encouraged ambition in authors, enterprise in managers. What Hernani was to the romantic movement of the 'thirties, and La Dame aux camilias to the realistic movement of the 'fifties, The Second Mrs Tanqueray Was to the movement of the 'nineties towards the serious stage-portraiture of English social life. All the forces which we have been tracing — Robertsonian realism of externals, the leisure for thought and experiment involved in vastly improved financial conditions, the substitution in France of a simpler, subtler technique for the outworn artifices of the Scribe school, and the electric thrill communicated to the whole theatrical life of Europe by contact with the genius of Ibsen — all these slowly converging forces coalesced to produce, in The Second Mrs Tanqueray, an epoch-marking play.

Pinero followed up Mrs Tanqueray with a remarkable series of plays — The Notorious Mrs Ebbsmith, The Benefit of the Doubt, The Princess and the Butterfly, Trelawny of the " Wells," The Gay Lord Quex, Iris, Letty, His House in Order and The Thunder- bolt— all of which show marked originality of conception and intellectual force. In January 1893 Charles Wyndham initiated a new policy at the Criterion theatre, and produced an original play, The Bauble-Shop, by Henry Arthur Jones. It belonged very distinctly to the pre-Tanqueray order of things; but the same author's The Case of Rebellious Susan, in the following year, showed an almost startlingly sudden access of talent, which was well maintained in such later works as Michael and his Lost Angel (1896), that admirable comedy The Liars (1897), and Mrs Dane's Defence (1900). Sydney Grundy produced after 1893 by far his most important original works, The Greatest of These (1896) and The Debt of Honour (1900). R. C. Carton, breaking away from the somewhat laboured sentimentalism of his earlier manner, produced several light comedies of thoroughly original humour and of excellent literary workmanship — Lord and Lady Algy, Wheels within Wheels, Lady Huntworth's Ex- periment, Mr Hopkinson and Mr Preedy and the Countess. Haddon Chambers, in The Tyranny of Tears (1899) and The Awakening (1901), produced two plays of a merit scarcely fore- shadowed in his earlier efforts.

What was of more importance, a new generation of play- wrights came to the front. Its most notable representatives were J. M. Barrie,

who displayed his inexhaustible gift of humor- ous observation and invention in Quality Street (1902), The Admirable Crichton (1903), Little Mary (1903), Peter Pan (1904), Alice Sit-by-the-Fire (1905) and What Every Woman Knows (1908) ; Mrs Craigie (" John Oliver Hobbes "), who produced in The Ambassador (1898) a comedy of fine accomplishment;

and H. V. Esmond, Alfred Sutro, Hubert Henry Davies, W. S. Maugham, Rudolf Besier, Roy Horniman and J. B. Fagan.

Meanwhile, the efforts to relieve the drama from the pressure of the long-run system had not been confined to the Independent theatre. Several other enterprises of a like nature had proved more or less short-lived; but the Stage Society, founded in 1900, was conducted with more energy and perseverance, and became a real force in the dramatic world. After two seasons devoted mainly to Bernard Shaw, Ibsen, Maeterlinck and Hauptmann, it produced in its third season The Marrying of Ann Leete, by Granville Barker (b. 1877), who had developed in its service his remarkable gifts as a producer of plays. A year or two later, Barker staged for another organization, the New Century theatre, Professor Gilbert Murray's rendering of the Hippolytus of Euripides; and it was partly the success of this production that suggested the Vedrenne-Barker partnership' at the Court theatre, which, between 1904 and 1907, gave an extraordinary im- pulse to the intellectual life of the theatre. Adopting the " short- run " system, as a compromise between the long-run and the repertory systems, the Vedrenne-Barker management made the plays of Bernard Shaw (both old and new) for the first time really popular. Of the plays already published You Never Can Tell and Man and Superman were the most successful; of the new plays, John Bull's Other Island, Major Barbara and The Doctor's Dilemma. But though Shaw was the mainstay of the enter- prise, it gave opportunities to several other writers, the most notable being John Galsworthy (b. 1867), author of The Silver Box and Strife, St John Hankin (1869-1909), author of The Return of the Prodigal and The Charity that began at Home, and Granville Barker himself, whose plays The Voysey Inheritance and Waste (1907) were among the most important products of this movement. It should also be noted that the production of the Hippolytus was followed up by

the production of the Trojan Women, the Electra and the Medea of Euripides, all translated by Gilbert Murray.

The impulse to which were due the Independent theatre, the Stage Society and the Vedrenne-Barker management, combined with local influences to bring about the foundation in Dublin of the Irish National theatre. Its moving spirit was the poet W. B. Yeats (b. 1865) , who wrote for it Cathleen-ni-Hoolikan, The Hour-Glass, The King's Threshold and one or two other plays. Lady Gregory, Padraic Collum, Boyle and other authors also contributed to the repertory of this admirable little theatre; but its most notable products were the plays of J. M. Synge (1871- 1909), whose Riders to the Sea, Well of the Saints and Playboy of the Western World showed a fine and original dramatic faculty combined with extraordinary beauty of style.

Both in Manchester and in Glasgow endeavours have been made, with considerable success, to counteract the evils of the touring system, by the establishment of resident companies acting the better class of modern plays on a " short-run " plan, similar to that of the Vedrenne-Barker management. The Manchester enterprise was to some extent subsidized by Miss E. Horniman, and may therefore claim to be the first endowed theatre in England. The need for endowment on a much larger scale was, however, strongly advocated in the early years of the 20th century by the more progressive supporters of English drama, and in 1908 found a place in the scheme for a Shakespeare National theatre, which was then superimposed on the earlier proposal for a memorial commemorating the Shakespeare tercentenaiy, organized by an influential committee under the chairmanship of the Lord Mayor of London. The scheme involved the raising of £500,000, half to be devoted to the requisite site and building, while the remainder would be in- vested so as to furnish an annual subvention.

It remains to say a few words of the English literary drama, as opposed to the acted drama. The two classes are not nearly so distinct as they once were; but plays continue to be produced from time to time which are wholly unfitted for the theatre, and others which, though they may be experimentally placed on the stage, make their appeal rather to the reading public. Tennyson had essayed in his old age an art which is scarcely

to be mastered after the energy of youth has passed. He con- tinued to the last to occupy himself more or less with drama, and all his plays, except Harold, found their way to the stage. The Cup and

Becket, as we have seen, met with a certain success, but The Promise of May (1882), an essay in contemporary drama, was a disastrous failure, while The Falcon (1879) and The Foresters (acted by an American company in 189.3) made little impression. Lord Tennyson was certainly not lacking in dramatic faculty, but he worked in an outworn form which he had no longer the strength to renovate. Swinburne continued now and then to cast his creations in the dramatic mould, but it cannot be said that his dramas attained either the vitality or the popu- larity of his lyrical poems. Mary Stuart (1881) brought his Marian trilogy to a close. In Locrine he produced a tragedy in heroic couplets — a thing probably unattempted since the age of Dryden. The Sisters is a tragedy of modern date with a medieval drama inserted by way of interlude. Rosamund, Queen of the Lombards (1899), perhaps approached more nearly than any of his former works to the concentration essential to drama. It may be doubted, however, whether his copious and ebullient style could ever really subject itself to the trammels of dramatic form. Of other dramas on the Elizabethan model, the most notable, perhaps, were the works of two ladies who adopt the pseudonym of " Michael Field "; Callirrhoe (1884), Brutus Ultor (1887), and many other dramas, show considerable power of imagination and expression, but are burdened by a deliberate artificiality both of technique and style. Alfred Austin put forth several volumes in dramatic form, such as Savonarola (1881), Prince Lucifer (1887), England's Darling (1896), Flodden Field (1905). They are laudable in intention and fluent in utterance. Notable additions to the purely literary drama were made by Robert Bridges in his Prometheus (1883), Nero (1885), The Feast of Bacchus (1889), and other solid plays in verse, full of science and skill, but less charming than his lyrical poems. Sir Lewis Morris made a dramatic experiment in Gycia, but was not encouraged to repeat it.

From the outset of his career, John Davidson (1857-1909) was haunted by the conviction that he was a born dramatist; but his earlier plays, such as Smith: a Tragedy (1886), Bruce: a Chronicle Play (1884) and Scaramouch in Naxos (1888), contained more poetry than drama; and his later pieces, such as Self's the Man (1901), The Theatrocrat (1905) and the Triumph of Mammon (1907), showed a species of turbulent imagination, but became more and more fantastic and impracticable. Stephen Phillips (b. 1867), on the other hand, having had some experience as an actor, wrote always with the stage in view. In his first play, Paolo and Francesca (1899; produced in 1902), he succeeded in combining great beauty of diction with intense dramatic power and vitality. The same may be

said of Herod (1900); but in Ulysses (1902) and Nero (1906) a great falling- off in constructive power was only partially redeemed by the fine inspiration of individual passages.

The collaboration of Robert Louis Stevenson with William Ernest Henley produced a short series of interesting experiments in drama, two of which, Beau Austin (1883) and Admiral Guinea (1884), had more than a merely experimental value. The former was an emotional comedy, treating with rare distinction of touch a difficult, almosfan impossible, subject; the latter was a nautical melodrama, raised by force of imagination and diction into the region of literature. Imcomparably the most important of recent additions to the literary drama is Thomas Hardy's vast panorama of the Napoleonic wars, entitled The Dynasts (1 904-1 908). It is rather an epic in dialogue than a play; but however we may classify it we cannot but recognize its extra- ordinary intellectual and imaginative powers.

United States.— American dramatists have shown on their own account a progressive tendency, quite as marked as that which we have been tracing in England. Down to about 1890 the influence of France had been even more predominant in America than in England. The only American dramatist of eminence, Bronson Howard (1842-1908), was a disciple, though a very able one, of the French school. A certain stirring of native

originality manifested itself during the 'eighties, when a series of semi-improvised farces, associated with the names of two actor-managers, Harrigan and Hart, depicted low life in New York with real observation, though in a crude and formless manner. About the same time a native style of popular melo- drama began to make its appearance — a play of conventional and negligible plot, which attracted by reason of one or more faith- fully observed character-types, generally taken from country life. The Old Homestead, written by Denman Thompson, who himself acted in it, was the most popular play of this class. Rude as it was, it distinctly foreshadowed that faithfulness to the external aspects, at any rate, of everyday life, in which lies the strength of the native American drama. It was at a sort of free theatre in Boston that James A. Heme (1840-1901) produced

in 1891 his realistic drama of modern life, Margaret Fleming, which did a great deal to awaken the interest of literary America in the theatrical movement. Heme, an actor and a most accomplished stage-manager, next produced a drama of rural life in New England, Shore Acres (1892), which made an immense popular success. It was a play of the Old Homestead type, but very much more coherent and artistic. His next play, Griffith Davenport (1898), founded on a novel, was a drama of life in Virginia during the Civil War, admirable in its strength and quiet sincerity; while in his last work, Sag Harbour (1900), Heme returned to the study of rustic character, this time in Long Island. Heme showed human nature in its more obvious and straightforward aspects, making no attempt at psychological subtlety; but within his own limits he was an admirable crafts- man. The same preoccupation with local colour is manifest in the plays of Augustus M. Thomas, a writer of genuine humour and originality. His localism announces itself in the very titles of his most popular plays— Alabama, In Mizznura, Arizona. He also made a striking success in The Witching Hour, a play dealing with the phenomena of hypnotism and suggestion. Clyde Fitch (1865-1 909), an immensely prolific playwright of indubitable abil- ity, after becoming known by some experiments in quasi-historic drama (notably Nathan Hale, 1898; Barbara Frietchie, 1899), devoted himself mainly to social drama on the French model, in which his most notable efforts have been The Climbers (1900), The Truth (1906), and The Girl with the Green Eyes (1902). In popular drama, with elaborate scenic illustration, William Gillette (b. 1856), David Belasco (b. 1859) and Charles Klein (b. 1867) have done notable work. William Vaughn Moody (b. 1869) produced in The Great Divide (1907) a play of somewhat higher artistic pretensions; Eugene Walter in Paid in Full (1908) and The Easiest Way (1909) dealt vigorously with char- acteristic themes of modern life ; and Edward Sheldon produced in Salvation Nell a slum drama of very striking realism. The poetic side of drama was mainly represented by Percy Mackaye (b. 1875), whose Jeanne d' Arc (1906) and Sappho and Phaon showed a high ambition and no small literary power. On the whole it may be said that, though the financial conditions of the American stage are even more unfortunate than those which prevail in England, they have failed to check a very strong movement towards nationalism in drama. Season by season, America writes more of her own plays, good or bad, and becomes less dependent on imported work, whether French or English.

(W. A.)

(g) German Drama.

The history of the German drama differs widely from that of the English, though a close contact is observable between them at an early point, and again at relatively recent points, in their annals. The dramatic literature of Germany, though in its beginnings intimately connected with the great national move- ment of the Reformation, soon devoted its efforts to a. sterile imitation of foreign models; while the popular stage, persistently suiting itself to a robust but gross taste, likewise largely due to the influence of foreign examples, seemed destined to a hopeless decay. The literary and the acted drama were thus estranged from one another during a period of extraordinary length; nor was it till the middle of the 18th century that, with the opening of a more, hopeful era for the life and literature of the

nation, the reunion of dramatic literature and the stage began to accomplish itself. Before the end of the same century the progress of the German drama in its turn began to influence that of other nations, and by the widely comprehensive character of its literature, as well as by the activity of its stage, to invite a steadily increasing interest.

It should be premised that in its beginnings the modern German drama might have seemed likely to be influenced even more largely than the English or the French by the copious imitation of classical models which marked J e La f la the periods of the Renaissance and the Reformation; a ermany . but here the impulse of originality was wanting to bring about a speedy and gradually a complete emancipation, and imitative reproduction continued in an all but endless series. The first German (and indeed the earliest transalpine) writer to follow in the footsteps of the modern Latin drama of the Italians was the famous Strassburg humanist Jacob Wimpheling (1450-1528), whose comedy of Stylpho (1480), an attack upon the ignorance of the pluralist beneficed clergy, marks a kind of epoch in the history of German dramatic effort. It was succeeded by many other Latin plays of various kinds, among which may be mentioned J. Kerckmeister's Codrus (1485), satirizing pedantic schoolmasters; a series of historical dramas in a moralizing vein, partly on the Turkish peril, as well as of comedies, by Jacob Locher (1471-1528); two plays by the great Johann Reuchlin, of which the so-called Henno went through more than thirty editions; and the Ludus Dianae, with another play likewise in honour of the emperor Maximilian I., by the celebrated Viennese scholar Conrad Celtes (1459-1 508). Sebastian Brant's Hercules in Bivio (1512) is lost; but Wilibald Pirck- heimer's Eckius dedolatus (1520) survives as a dramatic contribu- tion to Luther's controversy with one of his most*

active opponents. The Acolastus (1525) of W. Gnaphaeus (alias Fullonius, his native name was de Voider) should also be mentioned in the present connexion, as, though a Dutchman by birth, he spent most of his literary life in Germany. This Terentian version of the parable of the Prodigal Son was printed in an almost endless number of editions, as well as in various versions in modern tongues, among which reference has already been made to the English, for the use of schools, by J. Palsgrave (1540). Macro- pedius (Langhveldt) belongs wholly to the Low Countries. In Germany the stream of these compositions continued to flow almost without abatement throughout the earlier half of the 1 6th century; but in the days of the Reformation it takes a turn to scriptural subjects, and during the 'latter part of the century remains on the whole faithful to this preference. 1 These Latin plays may be called school-dramas in the most precise sense; for they were both performed in the schools and read in class with commentaries specially composed for them; nor was it except very reluctantly that in this age the vernacular drama was allowed to intrude into scholastic circles. It should be noticed that the Jesuit order, which afterwards proved so keenly alive to the influence which dramatic per- formances exercise over the youthful mind, only arama. very gradually abandoned the principle, formally sanctioned in their Ratio studiorum, that the acting of plays (these being always in the Latin tongue) should only rarely be permitted in their seminaries. The flourishing period of the Jesuit drama begins with the spread of the order in the west and south-west of the Empire in the last decade of the 16th century, and then continues, through the vicissitudes of good and evil, with a curious intermixture of Latin and German plays, during the whole of the 17 th and the better part of the 18th. These productions, which ranged in their subjects from biblical and classical story to themes of contemporary history (such as the relief of Vienna by Sobiesky and the peace of Rys- wick), seem generally to bear the mark of their authorship — that of teachers appointed by their superiors to execute this among other tasks allotted to them; but, as it seems unnecessary to return to this special growth, it may be added that the

1 A drama entitled Speculum vitae humanae is mentioned as produced by Archduke Ferdinand of the Tirol in 1584.

Hans Sachs.

extraordinary productiveness of the Jesuit dramatists, and the steadiness of self-repetition which is equally characteristic of them, should warn us against underrating its influence upon a considerable proportion of the nation's educational life during a long succession of generations.

While the scholars of the German Renaissance, who became so largely the agents of the Reformation, eagerly dramatized Begin- scriptural subjects in the Latin, and sometimes (as in "'fa tne case °f Luther's protege P. Rebhun 1) in the native

vernacular tongue, the same influence made itself felt in another Qermaa sphere of dramatic activity. Towards the close of the drama. middle ages, as has been seen, dramatic performances had in Germany, as in England, largely fallen into the hands of the civic gilds, and the composition of plays was more especially cultivated by the master-singers of Nuremberg and other towns. It was thus that, under the influence of the Reformation, and of the impulse given by Luther and others to the use of High German as the popular literary tongue, Hans Sachs, the immortal shoemaker of Nuremberg, seemed destined to become the father of the popular German drama. In his plays, " spiritual," " secular," and Fostnachtsspiele alike, the interest indeed lies in the dialogue rather than in the action, nor do they display any attempt at development of character. In their subjects, whether derived from Scripture or from popular legend and fiction, 2 there is no novelty, and in their treatment no originality. But the healthy vigour and fresh humour of this marvellously fertile author, and his innate sympathy with the views and sentiments of the burgher class to which he belonged, were elements of genuine promise— a promise which the event was signally to disappoint. Though the manner of Hans Sachs found a few followers, and is recogniz- able in the German popular drama even of the beginning of the 17th century, the literature of the Reformation, of which his works may claim to form part, was soon absorbed in labours of a very different kind. The stage, after admitting novelties introduced from Italy or (under Jesuit supervision) from Spain, was subjected to another and enduring influence. Among the foreign actors of various nations who flitted through the in- numerable courts of the empire, or found a temporary J fte home there, special prominence was acquired, towards

comedians, the close of the 1 6th and in the early years of the 17th century, by the " English comedians," who appeared at Cassel,

Wolfenbiittel, Berlin, Dresden, Cologne, &c. Through these players a number of early English dramas found their way into Germany, where they were performed in more or less imperfect versions, and called forth imitations by native authors. Duke Henry Julius of Brunswick-Luneburg 3 (1564-1613) and Jacob Ayrer (a citizen of Nuremberg, where he died, 1605) represent the endeavours of the early German drama to suit its still uncouth forms to themes suggested by English examples; and in their works, and in those of contemporary playwrights, there reappears no small part of what we may conclude to have been the " English comedians' " rSpertoire. 4 (The converse influence of German themes brought home with them by the English actors, or set in motion by their strolling ubiquity, cannot have been equal in extent, though Shakespeare himself may have derived the idea of one of his plots 6 from such a source). But, though welcome to both princes and people, the exertions of these foreign comedians, and of the native imitators who soon arose in the earliest professional companies of actors known in Germany, instead of bringing about a union between the stage and literature, led to a directly opposite result. The popularity of these strollers was owing partly to the (very real) blood and other horrors with which their plays were deluged, partly to the buffoonery with which they seasoned, and the various tricks and feats with which they diversified, their per-

1 Susanna (Geistliches Spiel) (1536), &c. Sixt Birk also brought out a play on the story of Susanna, which he had previously treated in a Latin form, in the vernacular (1552).

8 Siegfried ; Eulenspiegel, &c.

3 Susanna ; Vincentius Ladislaus, &c.

- *Mahomet ; Edward III. ; Hamlet ; Romeo and Juliet, &c.*

6 The Tempest (Ayrer, Comedia v. d. schonen Sidea).

literature.

formances. The representatives of the English clowns had learnt much on their way from their brethren in the Netherlands, where in this period the art of grotesque acting greatly flourished. Nor were the aids of other arts neglected, — to this day in Germany professors of the " equestrian drama " are known by the popular appellation of " English riders." From these true descendants of the mimes, then, the professional actors in Germany inherited a variety of tricks and

traditions; and soon the favourite figures of the popular comic stage became conventional, and were stereotyped by the use of masks. Among these an ac- knowledged supremacy was acquired by the native Hans Wurst (Jack Pudding) — of whose name Luther disavowed the invention, and who is known already to Hans Sachs — the privileged buffoon, and for a long series of generations the real lord and master, of the German stage. If that stage, with its grossness and ribaldry, seemed likely to become permanently estranged from „ .

the tastes and sympathies of the educated classes, between ” the fault was by no means entirely its own and that the stage of its patron the populace. The times were evil times f,”^_ for a national effort of any kind; and poetic literature was in all its branches passing into the hands of scholars who were often pedants, and whose language was a jargon of learned affectations. Thus things continued, till the awful visitation of the Thirty Years' War cast a general blight upon the national life, and the traditions of the popular theatre were left to the guardianship of the marionettes (Puppenspiele) !

When, in the midst of that war, German poets once more began to essay the dramatic form, the national drama was left outside their range of vision. M. Opitz, who holds an Th honoured place in the history of the German language literary and literature, in this branch of his labours contented drama of himself with translations of classical dramas and of thel7th Italian pastorals — among the latter one of Rinuccini's

*The history of the German stage remains to about the second decennium of the 18th century one of the most melancholy, as it is in its way one of the most instructive, chapters of theatrical history. Ignored by the world of letters, **f sta f? the actors in return deliberately sought to emancipate reform. their art from all dependence upon literary material. Improvisation reigned supreme, not only in farce,where Hans Wurst, with the aid of Italian examples, never ceased to charm*

6 Kerr Peter Squenz {Pyramus and Tkisbe) ; Horribilicribrifax (Pistol?).

7 His son, Christian Gryphius, was author of a curious dramatic summary (or revue) of German history, both literary and political ; but the title of this school-drama is far too long for quotation.

his public, but in the serious drama likewise (in which, however, he also played his part) in those Haupt- und Staatsactionen (high-matter-of -state-dramas), the plots of which were taken from the old stores of the English comedians, from the religious drama and its sources, and from the profane history of all times. The hero of this period is " Magister " J. Velthen (or Veltheim), who at the head of a company of players for a time entered the service of the Saxon court, and, by reproducing comedies of Moliere and other writers, sought to restrain the licence which he had himself carried beyond all earlier precedent, but who had to fall back into the old ways and the old life. His career exhibits the climax of the efforts of the art of acting to stand alone; after his death (c. 1693) chaos ensues. The strolling companies, which now included actresses, continued to foster the popular love of the stage, and even under its most degraded form to uphold its national character against the rivalry of the opera, and that of the Italian commedia dell' arte. From the latter was borrowed Harlequin, with whom Hans Wurst was blended, and who became a standing figure in every kind of popular play. 1 He established his sway more especially at Vienna, where from about 171 2 the first permanent German theatre was maintained. But for the actors in general there was little permanence, and amidst miseries of all sorts, and under the growing ban of clerical intolerance, the popular stage seemed destined to hopeless decay. A certain vitality of growth seems, under clerical guidance, to have characterized the plays of the people in Bavaria and parts of Austria.

The first endeavours to reform what had thus apparently passed beyond all reach of recovery were neither wholly nor

generally successful; but this does not diminish the Neuber honour due to two names which should never be dottsched, mentioned without respect in connexion with the and the history of the drama. Friederike Karoline Neuber's Le 'h Z 'f (169 7-1 760) biography is the story of a long-continued

effort which, notwithstanding errors and weaknesses, and though, so far as her personal fortunes were concerned, it ended in failure, may almost be described as heroic. As direct- ress of a company of actors which from 1 727 had its headquarters at Leipzig (hence the new school of acting is called the Leipzig school), she resolved to put an end to the formlessness of the existing stage, to separate tragedy and

comedy, and to extinguish Harlequin. In this endeavour she was supported by the Leipzig professor J. Chr. Gottsched, who induced her to establish French tragedy and 'comedy as the sole models of the regular drama. Literature and the stage thus for the first time joined hands, and no temporary mischance or personal misunderstanding can obscure the enduring significance of the union. Not only were the abuses of a century swept away from a representative theatre, but a large number of literary works, designed for the stage, were produced on it. It is true that they were but versions or imita- tions from the French (or in the case of Gottsched's Dying Cato .from the French and English), 2 and that at the moment of the regeneration of the German drama new fetters were thus imposed upon it, and upon the art of acting at the same time. But the impulse had been given, and the beginning made. On the one hand, men of letters began to subject their dramatic compositions to the test of performance; the tragedies and comedies of J. E. Schlegel, the artificial and sentimental comedies of Chr. F. Gellert and others, together with the vigorous popular comedies of the Danish dramatist Holberg, were brought into competition with translations from the French. On the other hand, the

Leipzig school exercised a continuous effect upon the

progress of the art of acting, and before long K. Ekhof began a career which made his art a fit subject for the critical study of scholars, and his profession one to be esteemed by honourable men.

Among the authors contributing to Mme. Neuber's Leipzig enterprise had been a young student destined to complete, after

1 One of his aliases was Pickelharnig. In 1702 the electress Sophia is found requesting Leibniz to see whether a more satis- factory specimen of this class cannot be procured from Berlin than is at present to be found at Hanover.

2 Deschamps and Addison.

a very different fashion and with very different aims, the work which she and Gottsched had begun. The critical genius of G. E. Lessing is peerless in its comprehensiveness, as in its keenness and depth; but if there was any branch of literature and art which by study and practice he made pre- eminently his own, it was that of the drama.

As bearing upon the progress of the German theatre, his services to its literature, both critical and creative, can only be described as inestimable. The Hamburgische Dramaturgie, a series of criticisms of plays and (in its earlier numbers) of actors, was undertaken in further- ance of the attempt to establish at Hamburg the first national German theatre (1767-1769). This fact alone would invest these papers with a high significance; for, though the theatrical enterprise proved abortive, it established the principle upon which the progress of the theatre in all countries depends — that for the dramatic art the immediate theatrical public is no sufficient court of appeal. But the direct effect of the Drama- turgie was to complete the task which Lessing had in previous writings begun, and to overthrow the dominion of the arbitrary French rules and the French models established by Gottsched. Lessing vindicated its real laws to the drama, made clear the difference between the Greeks and their would-be representatives, and established the claims of Shakespeare as the modern master of both tragedy and comedy. His own dramatic productivity was cautious, tentative, progressive. His first step was, by his Miss Sara Sampson (1755), to oppose the realism of the English domestic drama to the artificiality of the accepted French models, in the forms of which Chr. F. Weisse (1726-1804) was seeking to treat the subjects of Shakespearian plays. 3 Then, in his Minna von Barnhelm (1767), which owed something to Farquhar, he essayed a national comedy drawn from real life, and appealing to patriotic sentiments as well as to broad human sympathies. It was written in prose (like Miss Sara Sampson), but in form held a judicious mean between French and English examples.

The note sounded by the criticisms of Lessing met with a ready response, and the productivity displayed by the nascent dramatic literature of Germany is astonishing, both Efforts of in the efforts inspired by his teachings and in those the theatre which continued to controvert or which aspired and of to transcend them. On the stage, Harlequin and IHeratan – his surroundings proved by no means easy to suppress, more especially at Vienna, the favourite home of frivolous amusement; but even here a reform was gradually effected, and, under the intelligent rule of the emperor Joseph II., a national stage grew into being. The mantle of Ekhof fell upon the shoulders of his eager younger rival, F. L. Schroder, who was the first to domesticate Shakespeare upon the German stage. In dramatic literature few of Lessing's earlier contemporaries produced any works of permanent value, unless the religious dramas of F. G. Klopstock — a species in which he had been preceded by J. J. Bodmer — and the patriotic Bardietten of the same author be

excepted. S. Gessner, J. W. L. Gleim, and G. K. Pfeffel (1 736-1809) composed pastoral plays. But a far more potent stimulus prompted the efforts of the younger generation. The translation of Shakespeare, begun in 1762 by C. M. Wieland, whose own plays possess no special significance, and completed in 1775 by Eschenburg, which furnished the text for many of Lessing's criticisms, helps to mark an epoch in German literature. Under the influence of Shakespeare, or of their conceptions of his genius, arose a youthful group of writers who, while wor- shipping their idol as the representative of nature, displayed but slight anxiety to harmonize their imitations of him with the demands of art. The notorious Ugolino of H. W. von Gerstenberg seemed a premonitory sign that the coming flood might merely rush back to the extravagances and horrors of the old popular stage; and it was with a sense of this danger in prospect that Lessing in his third important drama, the prose tragedy Emilia Galotti (1772), set the example of a work of incomparable nicety in its adaptation of means to end. But successful as it proved, it could not stay the excesses of the Sturm und Drang period 3 Richard III. ; Romeo and Juliet.

which now set in. Lessing's last drama, Nathan der Weise (1779), was not measured to the standard of the contemporary- stage; but it was to exercise its influence in the progress of time — not only by causing a reaction in tragedy from prose to blank verse (first essayed in J. W. von Brawe's Brutus, 1770), but by ennobling and elevating by its moral and intel- lectual grandeur the branch of literature to which in form it belongs.

Meanwhile the young geniuses of the Sturm und Drang had gone forth, as worshippers rather than followers of Shakespeare,

to conquer new worlds. The name of this group of J e writers, moreremarkablefortheircollectivesignificance*

Drang. than for their individual achievements, was derived

from a drama by one of the most prolific of their number, M. F. von Klinger; 1 other members of the fraternity were J. A. Leisewitz 2 (1752-1806), M. R. Lenz 3 and F. Miiller 4 the " painter." The youthful genius of the greatest of German poets was itself under the

influences of this period, when it produced the first of its masterpieces. But Goethe's Gotz von Berlichingen (1773), both by the choice and treatment of its national theme, and by the incomparable freshness and originality of its style, holds a position of its own in German dramatic literature. Though its defiant irregularity of form prevented its complete success upon the stage, yet its influence is far from being represented by the series of mostly feeble imitations to which it gave rise. The Ritterdramen (plays of chivalry) had their day like similar fashions in drama or romance; but the permanent effect of Gotz was, that it crushed as with an iron hand the last remnants of theatrical conventionality (those of costume and scenery included), and extinguished with them the lingering respect for rules and traditions of dramatic com- position which even Lessing had treated with consideration. Its highest significance, however, lies in its having been the first great dramatic work of a great national poet, and having definitively associated the national drama with the poetic glories of the national literature.

Thus, in the classical period of that literature, of which Goethe and Schiller were the ruling stars, the drama had a full share a a of the loftiest of its achievements. Of these, the

dramatic works of Goethe vary so widely in form and character, and connect themselves so intimately with the different phases of the development of his own self-directed poetic genius, that it was impossible for any of them to become the starting-points of any general growths in the history of the German drama. His way of composition was, moreover, so peculiar to himself — conception often preceding execution by many years, part being added to part under the influence of new sentiments and ideas and views of art, flexibly followed by changes of form — that the history of his dramas cannot be severed from his general poetic and personal biography. His Clavigo and Stella, which succeeded Gotz, are domestic dramas in prose; but neither by these, nor by the series of charming pastorals and operas which he composed for the Weimar court, could any influence be exercised upon the progress of the national drama. In the first conception of his Faust, he had indeed sought the suggestion of his theme partly in popular legend, partly in a domestic motive familiar to the authors of the Sturm und Drang (the story of Gretchen); the later additions to the First Part, and the Second Part generally, are the results of metaphysical and critical studies and meditations belonging to wholly different spheres of thought and experience. The dramatic unity of the whole is thus, at the most, external only; and the standard of judgment to be applied to this wondrous poem is not one of dramatic criticism. Egmont,

originally designed as a companion to Gotz, was not completed till many years later; there are few dramas more effective in parts, but the idea of a historic play is lost in the elaboration of the most graceful of love episodes. In Iphigenia and Tasso, Goethe exhibited the perfection of form of which his classical period had

1 Die Zwillinge {The Twins); Die Soldaten, &c.

- *Julius von Tarent.*
- *Der Hofmeister {The Governor), &c. * Genoveva, &c.*

enabled him to acquire the mastery; but the sphere of the action of the former (perfect though it is as a dramatic action), and the nature of that of the latter, are equally remote from the demands of the popular stage. Schiller's genius, fi ._ unlike Goethe's, was naturally and consistently suited to the claims of t the ˆtheatre. His juvenile works, The Robbers, Fiesco, Kabale und Liebe, vibrating under the influence of an age of social revolution, combined in their prose form the truthful expression of passion with a considerable admixture of extra- vagance. But, with true insight into the demands of his art, and with unequalled single-mindedness and self-devotion to it, Schiller gradually emancipated himself from his earlier style; and with his earliest tragedy in verse, Don Carlos, the first period of his dramatic authorship ends, and the promise of the second announces itself. The works which belong to this — from the Wallenstein trilogy to Tell — are the acknowledged masterpieces of the German poetic drama, treating historic themes recon- structed by conscious dramatic workmanship, and clothing their dialogue in a noble vestment of rhetorical verse. The plays of Schiller are the living embodiment of the theory of tragedy elaborated by Hegel, according to which its proper theme is the divine, or, in other words, the moving ethical, element in human action. In one of his later plays, The Bride of Messina, Schiller attempted a new use of the chorus of Greek tragedy; but the endeavour was a splendid error, and destined to exercise no lasting effect. The reaction against Schiller's ascendancy began with writers who could not reconcile themselves with the cos- mopolitan and non-national elements in his genius, and is still represented by eminent critics; but the future must be left to settle the contention.

Schiller's later dramas had gradually conquered the stage, over which his juvenile works had in this time triumphantly passed, but on which his Don Carlos had met with a cold welcome. For a long time, however, its favourites The . were authors of a very different order,

who suited stage. themselves to the demands of a public tolerably indifferent to the literary progress of the drama. After popular tastes had oscillated between the imitators of Gotz and those of Emilia Galotti, they entered into a more settled phase, as the establishment of standing theatres at the courts and in the large towns increased the demand for good " acting " plays. Famous actors, such as Schroder and A. W. Iffland, sought by translations or compositions of their own to meet the popular likings, which largely took the direction of that irrepressible favourite of theatrical audiences, the sentimental domestic drama. 5 But the most successful purveyor of such wares was an author who, though not himself an actor, understood the theatre with a professional instinct — August von Kotzebue. His productivity ranged from the domestic drama and comedy of all kinds to attempts to rival Schiller and Shakespeare in verse; and though his popularity (which ultimately proved his doom) brought upon him the bitterest attacks of the romantic school and qjher literary authorities, his self-conceit is not astonishing, and the time has come for saying that there is some exaggeration in the contempt which has been lavished upon him by posterity. 6 Nor should it be forgotten that German literature had so far failed to furnish the comic stage with any successors to Minna von Barnhelm; for Goethe's efforts to dramatize characteristic events or figures of the Revolutionary age 7 must be dismissed as failures, not from a theatrical point of view only. The joint efforts of Goethe and Schiller for the Weimar stage, important in many respects for the history of the German drama, at the same time reveal the want of a national dramatic literature sufficient

6 Iffland's best play is Die Jdger (1785), which recently still held the stage. From Mannheim he in 1796 passed to Berlin by desire of King Frederick William II., who thus atoned for the hardships which he had allowed the pietistic tyranny of his minister Wollner to inflict upon the Prussian stage as a whole.

6 Die deutschen Kleinstddter is his most celebrated comedy and Menschenhass und Reuejme of the most successful of his [sentimental dramas. According to one classification he wrote 163 plays with a moral tendency, 5 with an immoral, and 48 doubtful.

7 Der Groosskophta (Cagliostro) ; Der Burgergeneral.

[GERMAN

to supply the needs of a theatre endeavouring to satisfy the demands of art.

Meanwhile the so-called romantic school of German literature was likewise beginning to extend its labours to original dramatic

composition. From the universality of sympathies romaati proclaimed by this school, to whose leaders Germany school. owed its classical translation of Shakespeare, 1 and

an introduction to the dramatic literatures of so many ages and nations, 2 a variety of new dramatic impulses might be expected; while much might be hoped for the future of the national drama (especially in its mixed and comic species) from the alliance between poetry and real life which they preached, and which some of them sought personally to exemplify. But in practice universality presented itself as peculiarity or even as eccentricity; and in the end the divorce between poetry and real life was announced as authoritatively as their union had been. Outside this school, the youthful talent of Th. Korner, whose early promise as a dramatist 3 might perhaps have ripened into a fulness enabling him not unworthily to occupy the seat left vacant by his father's friend Schiller, was extinguished by a patriotic death. The efforts of M. von Collin (1779-1824) in the direction of the historical drama remained isolated attempts. But of the leaders of the romantic school, A. W. 4 and F. von Schlegel 5 contented themselves with frigid classicalities; and L. Tieck, in the strange alembic of his Phantasm, melted legend and fairy-tale, novel and drama, 6 poetry and satire, into a compound, enjoyable indeed, but hardly so in its entirety, or in many of its parts, to any but the literary mind.

F. de La Motte Fouque infused a spirit of poetry into the chivalry drama. Klemens Brentano was a fantastic dramatist

unsuited to the stage. Here a feeble outgrowth of the drama-romanticists, the " destiny dramatists " Z. Werner 7 — tists. the most original of the group — A. Milliner, 8 and

Baron C. E. v. Houwald, 9 achieved a temporary furore; and it was with an attempt in the same direction 10 that the Austrian dramatist F. Grillparzer began his long career. He is assuredly, what he pronounced himself to be, the foremost of the later dramatic poets of Germany, unless that tribute be thought due to the genius of H. von

Kleist, who in his short life produced, besides other works, a romantic drama u and a rustic comedy 12 of genuine merit, and an historical tragedy of singular originality and power. 13 Grillparzer's long series of plays includes poetic dramas on classical themes 14 and historical subjects from Austrian history, 15 or treated from an Austrian point of view. 1 The romantic school, which through Tieck had satirized the drama of the bourgeoisie and its offshoots, was in its turn satirized by Count A. von Platen-Hallermund's admirable imitations of Aristophanic comedy. 16 Among the objects of his banter were the popular playwright E. Raupach, and K. Immermann, a true poet, who is, however, less generally remembered as a dramatist. F. Hebbel 17 is justly ranked high among the foremost latgr dramatic poets of his country, few of whom equal him in intensity. The eminent lyrical (especially ballad) poet L. Uhland left behind him a large number of dramatic fragments, but little or nothing really complete. Other names of literary mark are those of C. D. Grabbe, J. Mosen, O. Ludwig ls (1813-1865), a dramatist of great power, and " F. Halm " (Baron von Miinch- Bellinghausen) (1806-1871), and, among writers of a more

i x A. W. von Schlegel and Tieck's (1797-1833).

2 A. W. von Schlegel, Lectures on Dramatic Art and Literature, &c.

3 Zriny, &c. 4 Ion. 5 Alarcos.

6 Kaiser Octavianus; Der gestiefelte Kater (Puss in Boots), &c. ' Der 24. Februar (produced on the Weimar stage with Goethe's sanction). 8 Der 29. Februar; Die Schuld (Guilt).

9 Das Bild (The Picture); Der Leuchtthurm (The Lighthouse).

10 Die Ahnfrau (The Ancestress).

11 Das Kdthchen (Kate) von Heilbronn.

12 Der zerbrochene Krug (The Broken Pitcher).

13 Prinz Friedrich von Homburg. 14 Sappho, Medea, &c.

15 Konig Ottokar's Gliick und Ende (Fortune and Fall) ; Der Bruderzwist (Fraternal Feud) in Habsburg.

16 Die verhangnissvolle Gabel (The Fatal Fork) ; Der romantische Oedipus.

17 Die Nibelungen ; Judith, &c. u Der Erbforster.

modern school, K. Gutzkow, 18 G. Freytag, 20 and H. Laube. 21 L. Anzengruber, a writer of real genius though restricted range, imparted a new significance to the Austrian popular drama, 22 formerly so commonplace in the hands of F. Raimund and J. Nestroy.

During the long period of transition which may be said to have ended with the establishment of the new German empire, the German stagein some measure anticipated the develop- ments which more spacious times were to witness in J** the German drama. The traditions of the national stage of theatre contemporary with the great epoch of the tie latter national literature were kept alive by a succession of ˆSi t h ottbe eminent actors — such as the nephews of Ludwig century. Devrient, himself an artist of the greatest originality, whose most conspicuous success, though nature had fitted him for Shakespeare, was achieved in Schiller's earliest play. 23 Among the younger generation of Devrients the most striking person- ality was that of Emil; his elder brother Karl August, husband of Wilhelmine Schroder-Devrient, the brilliant star of the operatic stage, and their son Friedrich, were also popular actors; yet another brother, Eduard, is more widely remembered as the historian of the German stage. Partly by reason of the number and variety of its centres of intellectual and artistic life, Germany was long enabled both to cherish the few masterpieces of its own drama, and, with the aid of a language well adapted for transla- tion, to give admittance to the dramatic masterpieces of other nations also, and to Shakespeare in particular, without going far in the search for theatrical novelty or effect. But a change came over the spirit of German theatrical management with the endeavours of H. Laube, from about the middle of the century onwards, at Vienna (and Leipzig), which avowedly placed the demands of the theatre as such above those of literary merit or even of national sentiment. In a less combative spirit, F. Dingelstedt, both at Munich, which under King Maximilian he had made a kindly nurse of German culture, and, after his efforts there had come to an untimely end, 24 at Weimar and at Vienna, raised the theatre to a very high level of artistic achieve- ment. The most memorable event in the annals of his manage- ments was the production on the Weimar stage of the series of Shakespeare's histories. At a rather later period, of which the height extended from 1874 to 1890, the company of actors in the service, and under the personal direction, of Duke George of Saxe-Meiningen, created a great effect by their performances both in and outside Germany — not so, much by their artistic improvements in

scenery and decoration, as by the extraordinary perfection of their ensemble. But no dramaturgic achievement in the century could compare in grandeur either of conception or of execution with Richard Wagner's Bayreuth performances, where, for the first time in the history of the modern stage, the artistic instinct ruled supreme in all the conditions of the work and its presentment. Though the Ring of the Nibelungs and its successors belong to opera rather 1 than drama proper, the im- portance of their production (1876) should be overlooked by no Student of the dramatic art. Potent as has been the influence of foreign dramatic literatures — whether French or Scandinavian — and that of a movement which has been common to them all, and from which the German was perhaps the least likely to exclude itself, the most notable feature in the recent history of the German drama has been its quick response to wholly new demands, which, though the attempt was made with some persistence, could no longer be met without an effort to span the widths and sound the depths of a more spacious and more self-conscious era. 26

19 Uriel Acosta; Der Konigslieutenant.

20 Die Valentine. 21 Die Karlsschuler.

22 Der Pfarrer von Kirchfeld ; Der Meineidbauer ; Die Kreuzel-schreiber; Das vierte Gebot.

23 The Robbers (Franz Moor) . His next most famous part was Lear.

24 In connexion with the production in 1855 of " F. Halm's " Fechter von Ravenna, of which the authorship was claimed by a half-demented schoolmaster.

25 As to more recent developments of German theatrical literature see the article German Literature, and the remarks on the influence of foreign works in the section on Recent English Drama above.

OTHER EUROPEAN]

DRAMA

543

h. Dutch Drama.

Among other modern European dramas the Dutch is interesting both in its beginnings, which to all intents and purposes form part of those of the German, and because of the special influence of the so-called

chambers of the rederykers (rhetoricians), from the early years of the 15th century onwards, which bear some resemblance to the associations of the master-singers in con- temporary higher Germany. The earliest of their efforts, which so effectively tempered the despotism of both church and state, seem to have been of a dramatic kind; and a manifold variety of allegories, moralities and comic entertainments (esbatementen or comedies, kluiten and factien or farces) enhanced the attractions of those popular pageants in which the Nether- lands surpassed all other countries of the North. The Low Countries responded more largely to the impulse of the Renaissance than, with some local exceptions, any other of the Germanic lands. They necessarily had a considerable share in the cultivation of the modern Latin drama; and, while the author of Acolastus may be claimed as its own by the country of his adoption as well as by that of his birth, G. M. Macropedius (Langhveldt) (c. 1475-1508), who may be regarded as the fore- most Latin dramatist of his age, was born and died at Hertogen- bosch or in its immediate vicinity. Macropedius, who belonged to the fraternity of the Common Life, was a writer of great realistic power as well as of remarkable literary versatility. 1 The art of acting flourished in the Low Countries even during the troubles of the great revolt; but the birth of the regular drama was delayed till the advent of quieter times. Dutch dramatic literature begins, under the influence of the classical studies cherished in the seats of learning founded before and after the close of the war, with the classical tragedies of S. Koster (c. 1585-e. 1650). The romantic dramas and farces of Gerbrand Bredero (1585-1618) and the tragedies of P. Hooft (1581-1647) belong to the same period; but its foremost dramatic poet was J. van den Vondel, who from an imitation of classical models passed to more original forms of dramatic composition, including a patriotic play and a dramatic treatment of part of what was to form the theme of Paradise Lost. 2 But Vondel had no successor of equal mark. The older form of Dutch tragedy — in which the chorus still appeared — was, especially under the in- fluence of the critic A. Pels, exchanged for a close imitation of the French models, Corneille and Racine; nor was the attempt to create a national comedy successful. Thus no national Dutch drama was permanently called into life.

i. Scandinavian Drama. Still more distinctly, the dramatic literature of the Scandi- navian peoples springs from foreign growths. In Denmark, Denmark wnere tne beginnings of the drama in the plays of the schoolmaster Chr. Hansen recall the mixture of religious and farcical elements in contemporary German efforts, the drama in the latter half of the 16th century remained essen- tially scholastic, and

treated scriptural or classical subjects, chiefly in the Latin tongue. J. Ranch (1539-1607) and H. S. Sthen were authors of this type. But often in the course of the 17th century, German and French had become the tongues of Danish literature and of the Danish theatre; in the 18th Den- mark could boast a comic dramatist of thorough originality and of a wholly national cast. L. Holberg, one of the most note- worthy comic poets of modern literature, not only marks an epoch in the dramatic literature of his native land, but he contributed to overthrow the trivialities of the German stage in its worst period, which he satirized with merciless humour, 3 and set an example, never surpassed, of a series of comedies 4 deriving their types from popular life and ridiculing with healthy directness those vices and follies which are the proper theme of the most widely effective species of the comic drama. Among

1 Alula; Asotus; Hecastus, &c.

2 Gysbrecht van Aemstel; Lucifer. 3 Ulysses of Ithaca.

4 The Politician-Tinman; Jean de France or Hans Franzen; The Lying-in, &c.

his followers, P. A. Heiberg is specially noted. Under the influence of the Romantic school, whose influence has nowhere proved so long-lived as in the Scandinavian north, A. Ohlen- schlager began a new era of Danish literature. His productivity, which belongs partly to his native and partly to German literary history, turned from foreign 6 to native themes; and other writers followed him in his endeavours to revive the figures of Northern heroic legend. But these themes have in their The turn given way in the Scandinavian theatre to subjects modem coming nearer home to the popular consciousness, Norwegian and treated with a direct appeal to the common rawa – experience of human life, and with a searching insight into the actual motives of human action. The most remarkable move- ment to be noted in the history of the Scandinavian drama, and one of the most widely effective of those which mark the more recent history of the Western drama in general, had its origin in Norway. Two Norwegian dramatists, H. Ibsen and Bj8rnsterne Bjornson, standing as it were side by side, though by ho means always judging eye to eye, have vitally influenced the whole course of modern dramatic literature in the direction of a fearlessly candid and close delineation of human nature. The lesser of the pair in inventive genius, and in the power of exhibiting with scornful defiance the conflict between soul and circumstance, but the stronger by virtue of the conviction of hope which lies at the root of achievement, is Bjornson. 6 Ibsen's long

career as a dramatist exhibits a succession of many changes, but at no point any failure in the self-trust of his genius. His early masterpieces were dramatic only in form. 7 His world- drama of Emperor and Galilean was still unsuited to a stage rarely trodden to much purpose by idealists of Julian's type. The beginnings of his real and revolutionary significance as a dramatist date from the production of his first plays of con- temporary life, the admirable satirical comedy The Pillars of Society (1877), the subtle domestic drama A Doll's House (1879), and the powerful but repellent Ghosts (1881), 8 which last, with the effects of its appearance, modern dramatic literature may even to this day be said to have failed altogether to assimilate. Ibsen's later prose comedies — (verse, he writes, has immensely damaged the art of acting, and a tragedy in iambics belongs to the species Dodo) — for the most part written during an exile which accounts for the note of isolation so audible in many of them, succeeded one another at regular biennial intervals, growing more and more abrupt in form, cruel in method, and intense in ele- mental dramatic force. The prophet at last spoke to a listening world, but without the amplitude, the grace and the whole-heartedness which are necessary for subduing it. But it may be long before the art which he had chosen as the vehicle of his comments on human life and society altogether ceases to show the impress of his genius.

j. Drama of the Slav Peoples. As to the history of the Slav drama, only a few hints can be here given. Its origins have not yet — at least in works accessible to Western students — been authoritatively traced. The Russian drama in its earliest or religious beginnings is stated to have been introduced from Poland early in the 12th century; and, again, it would seem that, when the influence of the Renaissance touched the east of Europe, the religious drama was cultivated in Poland in the 16th, but did not find its way into Russia till the 17 th century. It is probable that the species was, like so many other elements of culture, imported into the Carpathian lands in the 15th or 16th century- from Germany. How far indigenous growths, such as the Russian popular puppet-show called vertep, which about the middle of the 17th century began to treat secular and popular themes, helped to foster dramatic tendencies and tastes, cannot here be estimated. The regular drama of eastern Europe is to all intents and purposes of Western origin. Thus, the history of the Polish drama may be fairly

5 A laddin ; Corregio.

6 Maria Stuart ; A Bankruptcy ; Leonarda.

7 Brand ; Peer Gynt.

8 Samfundets Stottere ; Et Dukkehjem ; Gengangere.

dated as beginning with the reign of the last king of Poland, Stanislaus II. Augustus, who in 1765 solemnly opened a national Polish theatre at Warsaw. This institution was carried on till the fatal year 1794, and saw the production of a considerable number of Polish plays, mostly translated or adapted, but in part original — as in the case of one or two of those from the active pen of the secretary to the educational commission, Zablonski. But it was not till after the last partition that, paradoxically though not wholly out of accordance with the history of the relations between political and literary history, the attempts of W. Bogulawski and J. N. Kaminski to establish and carry on a Polish national theatre were crowned with success. Its literary mainstay was a gifted Franco-Pole, Count Alexander Fredro (1793-1876), who in the period between the Napoleonic revival and the long exodus fathered a long-lived species of modern Polish comedy, French in origin ((for Fredro was a true disciple of Moliere), and wholly out of contact with the sentiment that survived in the ashes of a doomed nation. 1 His complaint as to the exiguity of the Polish literary public — a brace of theatres and a bookseller's handcart — may have been premature; but a national drama was most certainly impossible in a denationali»ed and dismembered land, in whose historic capital the theatre in which Polish plays continued to be produced seemed garrisoned by Cossack officers.

Much in the same way, though with a characteristic difference, the Russian regular drama had its origin in the cadet corps at Russian. St Petersburg, a pupil of which, A. Sumarokov (1718- 1777), has been regarded as the founder of the modern Russian theatre. As a tragic poet he seems to have imitated Racine and Voltaire, though treating themes from the national history, among others the famous dramatic subject of the False Demetrius. He also translated Hamlet. As a comic dramatist he is stated to have been less popular than as a tragedian; yet it is in comedy that he would seem to have had the most note- worthy successors. Among these it is impossible to pass by the empress Catherine II., whose comedies seem to have been satirical sketches of the follies and foibles of her subjects, and who in one comedy as well as in a tragedy had the courage to imitate

Shakespeare. Comedy aiming at social satire long continued to temper the conditions of Russian society, and had representa- tives of mark in such writers as A. N. Ostrovsky of Moscow and Griboyedov, the author of Gore et uma.

In any survey of the Slav drama that of the Czech peoples, whose national consciousness has so fully reawakened, must not be overlooked. A Czech theatre was called into life at Prague as early as the 18th century; and in the 19th its demands, centring in a sense of nationality, were met by J. N. Stepinek (1783-1844), W. C. Klicpera (1792-1859) and J. C. Tyl (1808- 1856); and later writers continued to make use of the stage for a propaganda of historical as well as political significance.

Bibliography. — The following works treat the general theory of the drama and the dramatic art, together with the principles of dramaturgy and of the art of acting. Works which have reference to the drama of a particular period or of a particular nation only are mentioned separately. Works which deal with special authors only have been intentionally omitted in this bibliography, as being mentioned in the articles in the several authors.

Aristotle's Poetics (text and transl. by S. H. Butcher, London, 1895; transl. by T. Twining, London, 1812; see also Donaldson's Theatre of the Greeks); H. Baumgart, Aristoteles, Lessing, u. Goethe, fiber das ethische u. asthelische Princip der Tragodie (Leipzig, 1877); H. A. Bulthaupt, Dramaturgie des Schauspiels (4 vols., Oldenburg u. Leipzig, 1893-1902); L. Campbell, Tragic Drama in Aeschylus, Sophocles and Shakespeare (London, 1904) ; P. Corneille, Discours du poeme dramatique — de la tragedie — des trois unites, CEuvres, vol. i. (Paris, 1862) ; W. L. Courtney, The Idea of Tragedy in Ancient and Modern Drama (Westminster, 1900); Diderot, De la poesie drama- tique. Entretiens sur le Fils Naturel, CEuvres completes, vii. (Paris, J 875) ; J- Dryden, Essay of Dramatic Poesy and other critical essays (Essays of J. Dryden, ed. W. P. Ker, 2 vols., Oxford, 1900); G. Freytag, Die Technik des Dramas (5th ed., Leipzig, 1886); G. W. F. Hegel, Vorlesungen iiber Asthetik, ed. H. G. Hotho, bd. 3, chap. iii. c. Die dramatische Poesie (Werke, x. 3; Berlin, 1838); G. Larroumet, Eludes d'histoire et de critique dramaiiques, 2 ser. (Paris, 1 892-1 899); G. E. Lessing, Hamburgische Dramaturgie.

1 Pan Jowialski; Oludki i Poeta {The Misanthrope and the Poet).

[BIBLIOGRAPHY

Erlautert von F. Schroter u. R. Thiele (Halle, 1877) ; Materialien zu Lessing's Hamburgische Dramaturgie, von W. Cosack (Paderborn, 1876) ; G. H. Lewes, On Actors and the Art of Acting (London, 1875) ; Sir T. Martin, Essays on the Drama (London, 1874); K. Mantzius, History of Theatrical Art in Ancient and Modern Times, transl. by L. von Cossel (London, 1903, &c.) ; G. Meredith, Essay on Comedy (Westminster, 1897); R. PrOlss, Katechismus der Dramaturgie (Leipzig, 1877) ; H. T. Rotscher, Die Kunst der dramatischen Dar- stellung (3 vols., Berlin, 1841-1846); Jahrbucher fur dramatische Kunst u. Literatur (Berlin and Frankfort, 1848-1849); P. de Saint- Victor, Les Deux Masques, tragedie — comedie (3rd ed., 3 vols., Paris, 1881, &c); Saint-Marc Girardin, Cours de litterature dramatique (7th ed., 5 vols., Paris, 1868); A. W. von Schlegel, Lectures on Dramatic Art and Literature (Eng. transl., London, 1846) ; Sir W. Scott, Essays on Chivalry, Romance and the Drama (including his article " Drama " written for the Supplement to the 4th edition of the Ency. Brit., and reprinted in the 5th, 6th, 7th and 8th editions) ; F. T. Vischer, Asthetik, vol. iv. (Stuttgart, 1857).

The fullest general history of the drama extant is J. L. Klein's Geschichte des Dramas, 13 vols, and index (Leipzig, 1 865-1 886). See also, for encyclopaedic information, W. Davenport Adams, A Dictionary of the Drama, vol. i. (London, 1904) ; C. M. E. Bequet, EncyclopSdie de I'art dramatique (Paris, 1886); A. Pougin, Diction- naire historique et pittores'que du thedtre et des arts qui s'y rattachent (Paris, 1885).

The drama of the Eastern nations is generally treated in: — A. P. Brozzi, Teatri e spettacoli dei popoli orientali Ebrei, Arabi, Persani, Indiani, Cinesi, Giapponesi e Giavanesi (Milan, 1887) ; Comte J. A. de Gobineau, Les Religions et les philosophies dans I'Asie centrale (2nd ed., Paris, 1866).

The following works deal with the Indian drama: — M. Schuyler, Bibliography of the Sanskrit Drama (Columbia Univ., Indo-Iranian, ser. iii., New York, 1906); H. H. Wilson, Select Specimens of the Theatre of the Hindus, transl. from the original Sanskrit (with introduction on the dramatic system of the Hindus), 3rd ed., 2 vols. (London, 1871); S. Levi, Le Thedtre indien (supplements Wilson) (Paris, 1891).

For Chinese: — Tscheng-Ki-Tong, Le Thidtre des Chinois (Paris, 1886); see also H. A. Giles, History of Chinese Literature (London,

1901).

For Japanese: — C. Florenz, Gesch. d. japan. Litteratur, vol. i. I (Leipzig, 1905); see also F. Brinkley, Japan, its History, Arts and Literature, vol. iii. (Boston and Tokyo, 1901).

For Persian: — A. Chodzko, Thedtre person. Chcix de teaziis ou drames, traduits pour la premiere fois du persan par A . Chodzko (Paris, 1878); E. Montet, Le Thedtre en Perse (Geneva, 1888); Sir L. Pelly, The Miracle Play of Hasan and Husain, collected from oral tradition; revised with explanatory notes by A.N. Wollaston (2 vols. , London, 1 879) .

Of works treating of the ancient Greek and Roman drama only a small selection can be given here. In the case of the Greek drama, the chief histories of literature — such as G. Bernhardy's, K. O. Midler's (Eng. tr. by Sir G. C. Lewis, with continuation by J. W. Donaldson) andG. Murray's — and general histories — suchasGrote's, Thirlwall's, Curtius's, &c. — should also be consulted; and for the administration and finance of the Attic theatre, Boeckh's Public Economy of Athens, Eng. tr. (London, 1842). Much useful information will be found in A Companion to Greek Studies, ed. by L. Whibley (Cambridge, 1905). The standard collective edition of the ancient Greek dramatic poets is the Po'etae scenici Graeci, ed. C. W. Dindorf (5th ed., Leipzig, 1869), and that of the Comic poets A. Meineke's Historia critica comicorum Graecorum. Cum fragmentis (5 vols., Berlin, 1839-1857). Aristotle's Poetics, cited above, will of course be consulted for the theory of the Greek drama in particular ; and much valuable critical matter will be found in passages of Bentley's Phalaris (1699), which are reprinted in Donaldson's Theatre of the Greeks. The following later works, some of which treat of the ancient classical drama in general, may be noted : — E. A. Chaignet, La Tragtdie grecque (Paris, 1877); J- Denys, Histoire de la

comedie grecque (2 vols., Paris, 1886) ; J. W. Donaldson, The Theatre of the Greeks (7th ed., London, i860) ; Du Meril, Histoire de la comedie. Periode primitive (Paris, 1864); Histoire de la comedie ancienne (Paris, 1869) ; A. E. Haigh, The Tragic Drama of the Greeks (Oxford, 1896); The Attic Theatre (Oxford, 1898); G. Korting, Gesch. des Theaters in seinen Beziehungen zur Kunstentwickelung der drama- tischen Dichtkunst, Bd. i. Gesch. des griechischen u. romischen Theaters (Paderborn, 1897); R. G. Moulton, The Ancient Classical Drama (Oxford, 1898) ; M. Patin, Etude sur les tragiques grecs (3 vols., Paris, 1861); C. M. Rapp, Gesch. des griechischen Schauspiels vom Stand- punkt der dramatischen Kunst (Tubingen, 1862); H. Weil, Etudes sur le drame antique (Paris, 1897) ; F. G. Welcker, " Die griechischen Tragodien, mit Rucksicht auf den epischen Cyklus " (Rhein. Mus. Suppl. ii.) 3 pts. (Bonn, 1839-1841).

In addition to the works of individual Roman dramatists, and critical writings concerning them, see Scaenicae Romanorum po'esis fragmenta, 2 vols. (I. Tragic, II. Comic) ed. by O. Ribbeck (3rd ed. Leipzig, 1897-1898). W. S. Teuffel's History of Roman Literature, Eng. tr. (2 vols., London, 1891-1892), and M. Schanz' Gesch. der romischen Litteratur bis Justinian (2 vols., Munich, 1890-1892), may be consulted for a complete view of the course of the Roman drama. For its later developments consult Dean Merivale's History of the

Romans under the Empire, and S. Dill's Roman Society in the Last Days of the Western Empire (London, 1898). See also L. Friedlander, Darstellungen aus der Sittengeschickte Roms, 6th ed., vol. ii. (Leipzig, 1889); M. Meyer, £tude sur le thSdtre latin (Paris, 184.7); O. Ribbeck, Die romische Tragodie im Zeitalter der Republik (Leipzig, 1875).

The following works treat of the medieval drama, religious or secular, of its origins and of usages connected with it : — H. Anz, Die lateinischen Magierspiele (Leipzig, 1905) ; E. K. Chambers, The Medieval Stage (2 vols., Oxford, 1903), with full bibliography; E. de Coussemaker, Drames liturgiques du moyen Age (Pans, 1861) ; du Meril, Theatri liturgici quae Latina supersunt monumenta (Caen and

Paris, 1849) ; C. A. Hase, Miracle Plays and Sacred Dramas (Eng. tr.), (London, 1880) ; Hilarius, Versus et ludi, ed. Champollion-Figeac (Paris, 1838) ; R. Froning, Das Drama des Mittelalters (3 vols., Stuttgart, 1891, &c); Edwin Norris, Ancient Cornish Drama (ed. and tr. 2 vols., 1859) ; W. Hone, Ancient Mysteries Described (London, 1823); A. von Keller, Fastnachtsspiele aus dem 15. Jahrhundert (Stuttgart, 1858) ; C. Magnin, Les Origines du theatre moderne, vol. i. only (Paris, 1838); F. J. Mone, Schauspiele des Mittelalters (2 vols., Karlsruhe, 1846) ; A. Reiners, Die Tropen-, Prosen- u. Prafations-Gesdnge (Luxemburg, 1884); J. de Rothschild, he Mislere du Viel Testament, ed. J. de Rothschild (6 vols., Paris, 1878-1891) ; M. Sepet, Le Drame chretien au moyen dge (Paris, 1878) ; Origines catholiques du thedtre moderne. Les drames liturgiques (Paris, 1901); T. Wright, Early Mysteries and other Latin Poems of the 1 2th and 13th Centuries (London, 1838) ; C. A. G. von Zezschwitz, Das mittelalterliche Drama (Leipzig, 1 881).

For French medieval drama in particular: — L. Cledat, Le Thedtre en France au moyen dge (Paris, 1896) ; E. Fournier, Le Thedtre francais avant la Renaissance (Paris, 1872) ; Miracles de Notre Dame par personnages, ed. G. Paris and U. Robert (8 vols., Paris, 1876-1893); L..J. N. Monmerque and F. Michel, ThSdtre francais au moyen dge (Paris, 1839) ; L. Petit de Julleville, Histoire du thedtre en France au moyen dge (5 vols., Paris, 1880-1886) ; E. L. N. Viollet-le-Duc, Ancien Thedtre francais (10 vols., Paris, 1854-1857).

For the medieval Italian in particular: — A. d'Ancona, Sacre rappresentazioni dei secoli XIV., XV. e XVI. (Florence, 1872).

For medieval English in particular: — Ahn, English Mysteries and Miracle Plays (Treves, 1867) ; S. W. Clarke, The Miracle Play in England (London, 1897); F. W. Fairholt, Lord Mayors' Pageants, 2 vols. (Percy Soc.) (London, 1843-1844) ; A. W. Pollard, English Miracle Plays, Moralities and Interludes (3rd ed., Oxford 1898) ; Chester Plays ed. T. Wright, 2 vols. (Shakespeare Soc.) (London, 1843), re-ed. by H. Deimling (part only) (E.E.T.S.) (London, 1893); Coventry Plays, Ludus Coventriae, ecf. J. O. Halliwell (-Phillipps) (Shakespeare Soc.) (London, 1841); Coventry Plays. Dissertation on the pageants or mysteries at Coventry, by T. Sharp (Coventry, 1825) ; Digby Plays, ed. F. J. Furnivall (E.E.T.S.) (London, 1896) ; Towneley Mysteries, ed. G. England and A. W. Pollard (E.E.T.S.) (London, 1897); York Plays, ed. L. T. Smith (Oxford, 1885).

For the German in particular: — F. J. Mone, Altteutsche Schauspiele

(Quedlinburg, 1841) ; H. Reidt, Das geistliche Schauspiel des Mittelalters in Deutschland (Frankfort, 1868) ; E. Wilken, Gesch. der geistlichen Spiele in Deutschland (Gottingen, 1872).

The revival of the classical drama in the Renaissance age is treated in P. Bahlmann's Die Erneuerer des antiken Dramas und ihre ersten dramatischen Versuche, 1314-1478 (Munster, 1896) ; A. Chassang's Des essais dramatiques imites de I'antiquiti au XIV' et XV' siecle (Paris, 1852) ; and in V. de Amitis' L'Imitazione latina nella commedia del XVI. secolo (Pisa, 1871).

Both the medieval and portions of the later drama are treated in W. Cloetta, Beitrdge zur Litteratur geschichte des Mittelalters und der Renaissance (2 vols., Halle, 1890-1892); W. Creizenach, Geschichte des neueren Dramas, vols, i.iii. (Halle, 1893 1903); R. Prolss, Geschichte des neueren Dramas (3 vols., Leipzig, 1881-1883). See also L.-V. Gofflot, Le Theatre au college, du moyen dge & nos jours, Preface par Jules Claretie (P^ris, 1907).

The history of the modern I talian drama, in its various stages, is treated by A. d'Ancona, Origini del teatro italiano (2nd ed., 2 vols., Turin, 1891) ; J. Dornis, Le Thedtre italien contemporain (Paris, 1904) ; H. Lyonnet, Le Thedtre en Italie (Paris, 1900) ; L. Riccoboni, Histoire du thedtre italien (2 vols., Rome, 1728-1731) ; J. C. Walker, Historical Memoir on Italian Tragedy (London, 1799). See also A. Gaspary, History of Early Italian Literature, transl. by H. Oelsner (London,

1901).

Some information as to the modern Greek drama is given in R. Nicolai, Geschichte der neugriechischen Literatur (Leipzig, 1876).

Modern Spanish drama: — M. A. Fee, £.tudes sur V ancien thedtre espagnol (Paris 1873) ; A. Gassier, Le Thedtre espagnol (Paris, 1898) ; G. H. Lewes, The Spanish Drama (London, 1846) ; H. Lyonnet, Le Thedtre en Espagne (Paris, 1897) ; A. Schaffer, Gesch. des spanischen Nationaldramas (2 vols., Leipzig, 1890); L. de Viel-Castel, Essai sur le thSdtre espagnol (2 vols., Paris, 1882). See also G. Ticknor, History of Spanish Literature (3 vols., London, 1863).

Modern Portuguese : — H. Lyonnet, Le Thedtre au Portugal (Paris, 1898) ; see also K. von Reinhardstoettner's Portugiesische Literaturgeschichte (Sammlung Goschen) (Leipzig, 1904), which contains a useful bibliography.

Regular French drama (tragedy and comedy) :— F. Brunetiere, Les Epoques du thedtre francais, 1636-1830 (Paris, 1892) ; E. Chasles,

La ComSdie en France au XVI' siecle (Paris, 1862); E. Faguet, La Tragedie francaise au XVI" siecle (Paris, 1883); A. Filon, The Modern French Drama (London, 1898) ; V. Fournel, Le Thedtre au XVII' siecle (Paris, 1892); E. Fpurnier, Le Thedtre francais au XVI' et au XVII' siecle (2 vols., Paris, s.d.); F. Hawkins, Annals of the French Stage (London, 1884) ; H. Lucas, Hist, philosophique et litteraire du thedtre francais depuis son origine (3 vols., Paris) ; Parfait, Hist, du thedtre francais (15 vols., Paris, 1745-1749); L. Petit de Julleville, Le thSdtre en France depuis ses origines jusqu'i nos jours (Paris, 1899) ; E. Rigal, Le thidtre francais avant la periode classique (Paris, 1901); E. Roy, Etudes sur le thedtre francais du XV' et du XVI' siecle (Dijon, 1901).

The connexion between the Italian and French theatre in the 17th century is traced in L. Moland, Moliire et la comedie italienne (2nd ed., Paris, 1867). See also J. C. Demogeot's, H. von Laun's and Saintsbury's histories of French Literature.

Of the ample literature concerned with the modern English drama the following works may be specially mentioned, as dealing with the entire range of the English drama, or with more than one of its

Eeriods: — D. E. Baker, Biographia dramatica (continued to 181 1 y J. Reed and S. Jones) (3 vols., London, 1812); J. P. Collier, History of English Dramatic Poetry, new ed. (3 vols., London, 1879) ; C. Dibdin, A complete History of the English Stage (5 vols., London, i8oo);J. J. Jusserand, £e ThSdtreen Angleterre (2nd ed., Paris, 1881); G. Langbaine, Lives and Characters of the English Dramatic Poets (London, 1699) ; The Poetical Register: or lives and characters of the English dramatick poets (London, 1719) ; C. M. Rapp, Studien uber das englische Theater, 2 parts (Tubingen, 1862); " G. S. B. ", Study of the Prologue and Epilogue in English Literature (London, 1884) ; The Thespian Dictionary: or dramatic biography of the 18th century (London, 1802); A. W. Ward, History of English Dramatic Literature to the Death of Queen Anne (2nd ed., 3 vols., London, 1899) ; see also the histories of English Literature or Poetry, by Warton, Taine, ten Brinck, Courthope, Saintsbury, &c.

The following works contain the most complete lists of English plays : — W. W. Greg, A List of English Plays written before 1643 and

published before 1700 (Bibliogr. Soc.) (London, 1900) ; J. O. Halliwell (-Phillipps), Dictionary of Old English Plays (London, i860) ; W. C. Hazlitt, A Manual for the Collector and Amateur of Old English Plays (London, 1892); R. W. Lowe, Bibliographical Account of English Dramatic Literature (London, 1888) is a valuable handbook for the whole of English theatrical literature and matters connected with it. The unique work of Genest, Some Account of the English Stage from 1660-1830 (10 vols., Bath, 1832), includes, with a chronological series of plays acted on the English stage, notices of unacted plays, and critical remarks on plays and actors. " A Compleat List " of English dramatic poets and plays to 1747 was published with T. Whincop's Scanderbeg in that year.

The following are the principal collections of English plays — Ancient British Drama, ed. Sir W. Scott (3 vols., London, 1810); Modern British Drama, ed. Sir W. Scott (5 vols., London, 181 1); W. Bang, Materialien zur Kunde des dlteren englischen Dramas (Louvain, 1902, &c.) ; A. H. Bullen, Collection of Old English Plays (4 vols., London, 1882) ; R. Dodsley, A Select Collection of Old Plays, 4th ed. by W. C. Hazlitt (15 vols., London, 1874-1876) ; Dramatists of the Restoration (14 vols., Edinburgh, 1 872-1 879) ; Early English Dramatists, ed. J. S. Farmer (London, 1905, &c.) ; C. M. Gayley, Representative English Comedies (vol. i., New York, 1903) ; T. Hawkins, Origin of the English Drama (3 vols., Oxford, 1773); Mrs Inchbald, British Theatre, new ed. (20 vols., London, 1824), Modern Theatre (10 vols., London, 181 1), Collection of Farces and Afterpieces (7 vols., London, 1815); Malone Society publications (London, 1907, &c.) ; J. M. Manly, Specimens of the Pre-Shakespearean Drama (3 vols., London, 1897) ; Mermaid Series of Old Dramatists, ed. Havelock Ellis (London, 1887, &c.) ; Old English Drama (2 vols., London, 1825) ; Pearson's Reprints of Elizabethan and Jacobean Plays (London, 1871, &c).

The following deal with the Elizabethan and Jacobean drama in especial:— W. Creizenach, Die Schauspiele der englischen Komodianten (Berlin, 1895); J. W. Cunliffe, The Influence of Seneca on Elizabethan Tragedy (London, 1893) ; F. G. Fleay, A Chronicle History of the London Stage, 1539-1642 (London, 1890), A Biographical Chronicle of the English Drama, 155 0-1642 (London, 1891) ; W. C. Hazlitt, The English Drama and Stage under the Tudor and Stuart Princes, 1543-1664 (London, 1869) ; W. Hazlitt, Dramatic Literature of the Age of Elizabeth (Works, ed. A. R. Waller, vol. v.) (London, 1902) ; A. F. von Schack, Die englischen Dramatiker vor, neben, und nach Shakespeare (Stuttgart, 1893); J. A. Symonds, Shakspere's Predecessors in the English Drama

(London, 1884).

As to the Latin academical drama of the Elizabethan age see G. B. Churchill and W. Keller, " Die latein. Universitats-Dramen Englands in der Zeit d. Konigin Elizabeth " in Jahrbuch der deutschen Shakespeare-Gesellschaft. For a short bibliography of the Oxford academical drama, 1547-1663, see the introduction to Miss M. L. Lee's edition of Narcissus (London, 1893). A list of Oxford plays will also be found in Notes and Queries, ser. vii., vol. ii. For a list of Cambridge plays from 1534 to 1671, the writer of this article is indebted to Prof. G. C. Moore-Smith of the university of Sheffield.

For an account of the Mask see R. Brotanek, Die englischen Masken-spiele (Vienna and Leipzig, 1902) ; H. A. Evans, English Masques

(London, 1897); W. W. Greg, A List of Masques, Pageants, &c. (Bibliogr. Soc.) (London, 1902).

As to early London theatres see T. F. Ordish, Early London Theatres (London, 1894).

Some information as to puppet-plays, &c, will be found in Henry Morley's Memoirs of Bartholomew Fair (London, 1859).

Among earlier critical essays on the Elizabethan and Stuart drama should be mentioned those of Sir Philip Sidney, G. Putten- ham and W. Webbe, T. Rymer and Dryden. For recent essays and notes on the Elizabethan drama in general, see, besides the essays of Coleridge, Lamb (including the introductory remarks in the Specimens), Hazlitt, &c, and the remarkable series of articles in the Retrospective Review (1820-1828), the Publications and Transactions of the Old and New Shakespeare Societies (1841, &c. ; 1874, &c), which also contain reprints of early works of great importance for the history of the Elizabethan drama and stage, such as Henslowe's Diary, &c, the Jahrbuch der deutschen Shakespeare-Gesellschaft (1865, &c), as well as the German journals A nglia, Englische Studien, &c, and the Modern Language Review (Cambridge).

The later English drama from the reopening of the theatres (1660) is treated in L. N. Chase, The English Heroic Play (New York, 1903) ;

C. Cibber, Apology for the Life of C. Cibber, written by himself, new ed. by R. W. Lowe (2 vols., London, 1889), who has also edited Churchill's Rosciad and Apology (London, 1891); J. Doran, Their Majesties' Servants: annals of the English Stage (3 vols., London, 1888); A. Filon, Le Theatre anglais: hier, aujourd'hui, demain (Paris, 1896); W. Hazlitt, A View of the English Stage (Works, ed. A. R. Waller, vol. viii.) (London, 1903) ; W. Nicholson, The Struggle for a Free Stage in London (Westminster, 1907).

The following treat of the modern German drama in particular periods: — R. Prolss, Gesch. der deutschen Schauspielkunst von den Anfangen bis 1850 (Leipzig, 1900); R. E. Prutz, Vorlesungen fiber die Geschichte des deutschen Theaters (Berlin, 1847); R. Froning, Das Drama der Reformationszeit (Stuttgart, 1900) ; C. Heine, Das Schauspiel der deutschen Wanderbuhne vor Gottsched (Halle, 1889); J. Minor, Die Schicksalstragodie in ihren Hauptvertretern (Frankfort, 1883); M. Martersteig, Das deutsche Theater im XIX' e " Jahrh. (Leipzig, 1904). See also G. G. Gervinus, Geschichte der deutschen Dichlung (5th ed., 5 vols., Leipzig, 1871-1874); and the literary histories of K. Goedeke (Grundriss), A. Koberstein, &c. A special aspect of the drama in modern Germany is dealt with in P. Bahlmann, Die laleinischen Dramen von Wimpheling's Stylpho bis zur Mitte des XVI""> Jahrhunderts, 1480-1550 (Miinster, 1893), and the same author's Jesuiten-Dramen der niederrheinischen Ordensprovinz (Leipzig, 1896).

The standard history of the modern German stage is Eduard Devrient, Gesch. der deutschen Schauspielkunst (2 vols., Leipzig, 1848-1861); see also R. Prolss, Gesch. der deutschen Schauspielkunst von den Anfangen bis 1830 (Leipzig, 1900); O. G. Fluggen, Bio- graphisches Bilhnen-Lexikon der deutschen Theater (Munich, 1892).

A good account of the history of the Dutch drama is F. von Hellwald's Geschichte des holldndischen Theaters (Rotterdam, 1874). See also the authorities under J. van den Vondel.

Information concerning the Danish drama will be found in the autobiographies of Holberg, Ohlenschlager and Andersen; see also vol. i. of G. Brandes's Main Currents in Nineteenth Century Literature (Eng. tr., London, 1901). As to the modern Norwegian drama see the same writer's Ibsen-Bjornson Studies (Eng. tr., London, 1899); also E. Tissot, Le Drame norvegien (Paris, 1893).

The Russian drama is treated in P. O. Morozov's Istoria Russkago

Teatra (History of the Russian Theatre), vol. i. (St Petersburg, 1889); see also P. de Corvin, Le Thedtreen Russie (Paris, 1890). A. Bruckner, Geschichte der russischen Literatur (Leipzig, 1905), may be consulted with advantage. Information as to the dramatic portions of other Slav literatures will be found in A. Pipin and V. Spasovich's Istoria Slavianskikh Literatur (History of Slavonic Literatures), German translation by T. Pech (2 vols., Leipzig, 1880-1884)- (A.-W. W.)

DRAMBURG, a town of Germany in the kingdom of Pr.ussia, on the Drage, a tributary of the Oder, 50 m. E. of Stettin, on the railway Ruhnow-Neustettin. Pop. 5800. It contains an Evangelical church, a gymnasium, a hospital and various administrative offices, and carries on cotton and woollen weaving, tanning, brewing and distilling.

DRAMMEN, a seaport of Norway, in Buskerud and Jarlsberg-Laurvik amter (counties), at the head of Drammen Fjord, a western arm of Christiania Fjord, 33 m. by rail S.W. from Christiania. Pop. (1900) 23,093. Its situation, at the mouth of the broad Drammen river, between lofty hills, is very beautiful. It is the junction of railways from Christiania to Haugsund, Kongsberg and Honefos, and to Laurvik and Skien. The town is modern, having suffered from fires in 1866, 1870 and 1880. It consists of three parts: Bragernaes on the north, divided by the river from Stromso and the port, Tangen, on the south. The prosperity of Drammen depends mainly on the timber trade; and saw-milling is an active industry, the logs being

floated down the river from the upland forests. Timber and wood-pulp are exported (over half of each to Great Britain), with paper, ice and some cobalt and nickel ore. The chief imports are British coal and German machinery. Salmon are taken in the upper reaches of the Drammen.

DRANE, AUGUSTA THEODOSIA (1823-1894), English writer, was born at Bromley, near Bow, on the 29th of December 1823. Brought up in the Anglican creed, she fell under the influence of Tractarian teaching at Torquay, and joined the Roman Catholic Church in 1850. She wrote, and published anonymously, an essay questioning the Morality of Tractarianism, which was attributed to John Henry Newman. In 1852, after a prolonged stay in Rome, she joined the third order of St Dominic, to which she belonged for over forty years. She was prioress (1872-1881) of the Stone convent in Staffordshire, where she died on the 29th of April 1894. Her chief works in prose and verse are: The History of Saint Dominic (1857; enlarged edition,

1891); The Life of St Catherine of Siena (1880; 2nd ed., 1899); Christian Schools and Scholars (1867); The Knights of St John (1858); Songs in the Night (1876); and the Three Chancellors (1859), a sketch of the lives of William of Wykeham, William of Waynflete and Sir Thomas More.

A complete list of her writings is given in the Memoir of Mother Francis Raphael, O.S.D., Augusta Theodosia Drane, edited by B. Wilberforce, O.P. (London, 1895).

DRAPER, JOHN WILLIAM (1811-1882), American scientist, was born at St Helen's, near Liverpool, on the 5th of May 181 1. He studied at Woodhouse Grove, at the University of London, and, after removing to America in 1832, at the medical school of the University of Pennsylvania in 1835-1836. In 1837 he was elected professor of chemistry in the University of the City of New York, and was a professor in its school of medicine in 1840- 1850, president of that school in 1850-1873, and professor of chemistry until 1881. He died at Hastings, New York, on the 4th of January 1882. He made important researches in photo- chemistry, made portrait photography possible by his improve- ments (1839) on Daguerre's process, and published a Text-book on Chemistry (1846), Text-book on Natural Philosophy (1847), Text- book on Physiology (1866), and Scientific -Memoirs (1878) on radiant energy. He is well known also as the author of The History of the Intellectual Development of Europe (1862), applying the methods of physical science to history, a History of the American Civil War (3 vols., 1867-1870), and a History of the Conflict between Religion and Science (1874).

His son, Henry Draper (1837-1882), graduated at the University of New York in 1858, became professor of natural science there in i860, and was professor of physiology (in the medical school) and dean of the faculty in 1866-1873. He succeeded his father as professor of chemistry, but only for a year, dying in New York on the 20th of November 1882. Henry Draper's most important contributions to science were made in spectroscopy; he ruled metal gratings in 1869-1870, made valuable spectrum photographs after 187 1, and proved the presence of oxygen in the sun in a monograph of 1877. Edward C. Pickering carried on his study of stellar spectra with the funds of the Henry Draper Memorial at Harvard, endowed by his widow (nee Mary Anna Palmer).

See accounts by George F. Barker in Biographical Memoirs of the National Academy of Science, vols. 2 and 3 (Washington, 1886, IS"'

DRAPER, one who deals in cloth or textiles generally. The Fr. drap, cloth, from which drapier and Eng. " draper " are derived, is of obscure origin. It is possible that the Low Lat. drappus or trappus (the last form giving the Eng. " trappings ") may be connected with words such as " drub," Ger. irejfen, beat; the original sense would be fulled cloth. " Drab," dull, pale, brown, is also connected, its first meaning being a cloth of a natural undyed colour. The Drapers' Company is one of the great livery companies of the city of London. The fraternity is of very early origin. Henry Fitz-Alwyn (d. 1212 ?), the first mayor of London, is said to have been a draper. The first charter was granted in 1364. The Drapers' Gild was one of the

numerous subdivisions of the clothing trade, and appeared to have been confined to the retailing of woollen cloths, the linen- drapers forming in the 15th century a separate fraternity, which disappeared or was merged in the greater company. It is usual for drapers to combine the sale of " drapery," i.e. of textiles generally, with that of millinery, hosiery, &c. In Wills v. Adams (reported in The Times, London, Nov. 20, 1908), the term " drapery " in a restrictive covenant was held not to include all goods that a draper might sell, such as furs or fur-lined goods.

DRAUGHT (from the common Teutonic word "to draw"; cf. Ger. Tracht, load; the pronunciation led to the variant form " draft," now confined to certain specific meanings), the act or action of drawing, extending, pulling, &c. It is thus applied to animals used for drawing vehicles or loads, " draught oxen," &c, to the quantity of fish taken by one " drag " of a net, to a quantity of liquid taken or " drawn in " to the mouth, and to a current of air in a chimney, a room or other confined space. In furnaces the "draught" is "natural" when not increased artificially, or "forced" when increased by mechanical methods (see Boiler). The water a ship " draws," or her " draught," is the depth to which she sinks in the water as measured from her keel. The word was formerly used of a " move " in chess or similar games, and is thus, in the plural, the general English name of the game known also as "checkers" (see Draughts). The spelling " draft " is generally employed in the following usages. It is a common term for a written order "drawn on " a banker or other holder of funds for the payment of money to a third person; thus a cheque (q.v.) is a draft. A special form of draft is a " banker's draft," an instruction by one bank to another bank, or to a branch of the bank making the

instruction, to pay a sum of money to the order of a certain specified person. Other meanings of " draft " are an outline, plan or sketch, or a pre- liminary drawing up of an instrument, measure, document, &c, which, after alteration and amendment, will be embodied in a final or formal shape; an allowance made by merchants or importers to those who sell by retail, to make up a loss incurred in weighing or measuring; and a detachment or body of troops " drawn off " for a specific purpose, usually a reinforcement from the depot or reserve units to those abroad or in the field. For the use of the term " draft " or " draught " in masonry and architecture see Drafted Masonry.

DRAUGHTS (from A.S. dragan, to draw), a game played with pieces (or " men ") called draughtsmen on a board marked in squares of two alternate colours. The game is called Checkers m America, and is known to the French as Les Dames and to the Germans as Damenspiel. Though the game is not mentioned in the Complete Gamester, nor the Academie dejeux, and is styled a " modern invention " by Strutt, yet a somewhat similar game was known to the Egyptians, some of the pieces used having been found in tombs at least as old as 1600 B.C., and part of Anect Hat-Shepsa's board and some of her men are to be seen in the Egyptian gallery of the British Museum. An Egyptian vase also shows a lion and an antelope playing at draughts, with five men each, the lion making the winning move and seizing the bag or purse that contains the stakes. Plato ascribes the invention of the game of imrooi, or draughts, to Thoth, the Egyptian Hermes Trismegistus, and Homer represents Penelope's suitors as playing it (Odyss. i. 107). In one form of the game as played by the Greeks there were 25 squares, and each player had 5 men which were probably moved along the lines. In another there were 4 men and 16 squares with a " sacred enclosure," a square of the same size as the others, marked in the exact centre and bisected by one of the horizontal lines, which was known as the " sacred line." From the incident in the game of a piece hemmed in on this line by a rival piece having to be pushed forward as a last resort, arose the phrase " to move the man from the sacred line " as synonymous with being hard pressed. This and other phrases based on incidents in the game testify to the vogue the game enjoyed in ancient Greece. The Roman game of Lalrunculi was similar, but there were officers (kings in modern draughts) as well as men. When a player's pieces were all hemmed in he was stale-mated, to

use a chess phrase (ad incitas redactus est), and lost the game. Other explanations of this phrase are, however, given (see Les Jeux des anciens, by Becq de Fouquieres). The fullest account of the Roman game is to be found in the De laude Pisonis, written by an

anonymous contemporary of Nero (see Calpurnius, Titus). Unfortunately the texts are full of obscurities, so that it is difficult to make any definite statements as to how the game was played.

As early as the nth century some form of the game was practised by the Norsemen, for in the Icelandic saga of Grettir the Strong the board and men are mentioned more than once.

The history of the modern forms of the game starts with El Ingenio juego de marro, de punto damas, published by Torquemada at Valencia in 1547. Another Spaniard, Juan Garcia Canalejas, is said to have published in 1610 the first edition of his work, a better-known edition of which appeared in 1650. The third Spanish classic, that of Joseph Carlos Garcez, was printed in Madrid in 1684. It is noteworthy that in an illustration in Garcez's book the pieces depicted resemble some- what some of those used by the Egyptians, and are not unlike the pawns used in chess.

In 1668 Pierre Mallet had published the first French work on the game, and elementary though his knowledge of the game seems to have been, even in comparison with that of Canalejas or Garcez, the historical notes, rules and instructions which he gave, served as a basis for many later works. Mallet wrote on Le Jeu de dames a la francaise, which was almost identical with the modern English game. The old French game is, however, no longer practised in France, having been superseded by Le Jeu de dames a la polonaise. Manoury gives reasons for believing that the latter game originated in Paris about 1727.

About 1756 a famous player named Laclef published the first book on Polish draughts, but the first important book on the game is Manoury's Jeu de dames a la polonaise, in the production of which it is said that the author had the assistance of Diderot and other encyclopedisles. This book, which appeared in 1787, was to the new game all that Mallet's was to the old Frensh game, and until the appearance of Poirson Prugneaux's EncyclopMie du jeu de dames in 1855 it remained the standard authority on so-called Polish draughts. The Polish game early attained popularity in Holland, and in 1785 the standard Dutch work, Ephraim van Embden's Verhandeling over het Damspel, was produced. In German-speaking countries the progress of the new game was slower, and the works produced in the first half of the 19th century generally treat of the older game as well as the Polish game. This is also the case with Petroff's book published in St Petersburg in 1827; and similarly Zongono's, which dates from 1832, deals with the new game and

with the older Italian game.

In 1694 Hyde wrote Historia dami ludi seu latrinculorum, in which he tried to prove the identity of draughts with ludus latrinculorum. This work is historical and descriptive, but con- tains nothing concerning the game as played in Great Britain. The authentic history of draughts in England commences with William Payne's Introduction to the Game of Draughts, the dedication of which was written by Samuel Johnson. Payne's games and problems were incorporated in a much more important work, namely Sturges's Guide to the Game of Draughts, which appeared in 1800 and has gone through a score of editions. About this time the game was much practised in both England and Scotland, but the first important production of the Scottish school was Drummond's Scottish Draught Player, the first part of which dates from 1838, additional volumes appearing in 1851- 1853 and 1861. In 1852 Andrew Anderson published his Game of Draughts Simplified. A first edition had appeared in 1848, but the later print is the important one, as it standardized the laws of the game, fixed the nomenclature of the openings, introduced a better arrangement of the play, and, since Anderson was one of the finest players of the game, excelled in accuracy. In Anderson's time little was known about the openings com- mencing with any move other than 11-15, an d it was not until more than thirty years later that the other openings received

more adequate recognition. This was done in Robertson's Guide to the Game of Draughts, and perhaps better in Lees' Guide

(1892).

Andrew Anderson was the first recognized British champion player of the game. He and Wyllie, better known as " the herd laddie," contested five matches for the honour, Anderson win- ning four to Wyllie's one. After his victory in 1847 Anderson retired from match play and the title fell to Wyllie, who made the game his profession and travelled all over the English- speaking world to play it. In 1872 he successfully defended his position against Martins, the English champion, and in 1874 against W. R. Barker, thp American champion, but two years later he was beaten by Yates, a young American. On the latter's retirement from the game, the championship lapsed to Wyllie, who held it successfully until his

defeat by Ferrie, the Scottish champion, in 1894. Two years later Ferrie was beaten in his turn by Richard Jordan of Edinburgh, who had just gained the Scottish championship; and the new holder defeated Stewart, who challenged him in 1897, and successfully defended his title against C. F. Barker, the American champion, to meet whom he visited Boston in 1900 and played a drawn match.

In 1884 the first international match between England and Scotland took place, and resulted in so decisive a victory for the northerners that the contest was not renewed for ten years. The matches played in 1894 and 1899 also went strongly in favour of the Scots, but in 1903 the Englishmen gained their first victory.

In 1905 a British team visited America and defeated a side representing the United States.

The tournament for the Scottish championship has been held annually in Glasgow since 1893. The number and skill of the Scottish players have given this tournament its pie-eminence; but if the levelling up of the standards of play in Scotland and England continues, the competition which is held biennially by the English Draughts Association is likely to rank as a serious rival to the Glasgow tourney.

The English Game. — Draughts as played now in English- speaking countries is a game for two persons with a board and twenty-four men — twelve white and twelve black — which at starting are placed as follows: the black men on the squares numbered 1 to 12, and the white men on the squares numbered 21 to 32 on the diagram below. In printed diagrams the men are usually shown on the white squares for the sake of clearness, black. but in actual play the black squares

are generally used now. In playing on the black squares the board must be placed with a black square in the left-hand corner. The game is played by moving a man forward, one square at a time except when making a cap- ture, along the diagonals to the right or left. Thus a white man placed on square 18 in the diagram can move to 15 or 14. Each player moves alternately, black always moving first. If a player touch a piece he must move that piece and no other. If the piece cannot be moved, or if it is not the player's turn to move, he forfeits the game. As soon as a man reaches one of the squares farthest from his side of the board, he is " crowned " by having one of the unused or captured men of his own colour placed on him, and becomes a " king." A king has the power of moving and taking backwards as well as forwards.

If a man is on the square adjacent to an opponent's man, and there is an unoccupied square beyond, the unprotected man must be captured and removed from the board. Thus, if there is a white man on square 18, and a black man on square 14, square 9 being vacant, and white having to move, he jumps over 14 and remains on square 9, and the man on 14 is taken up. 1 If two or more men are so placed that one square intervenes

WHITE.

between each they may all be taken at one move. Thus if white having to move has a man on 28, and black men on 24, 16 and 8, the intermediate squares and square 3 being vacant, white could move from 28 to 3, touching 19 and 12 en route, and take the men on 24, 16, and 8; but if there is a piece on 7 and square 10 is vacant, the piece on 7 cannot be captured, for becoming a king ends the move.

It is compulsory to take if possible. If a player can take a man (or a series of men) but makes a move that does not capture (or does not capture all that is possible), his adversary may allow the move to stand, or he may have the move retracted and compel the player to take, or he may allow the move to stand and remove the piece- that neglected to capture from the board (called " huffing "). " Huff and move " go together, i.e. the player who huffs then makes his move. When one player has lost all his pieces, or has all those left on the board blocked, he loses the game.

The game is drawn when neither of the players has sufficient advantage in force or position to enable him to win.

The losing game, or " first off the board," is a form of draughts not much practised now by expert draught players. The player wins who gets all his pieces taken first. There is no " huffing "; a player who can take must do so.

Draughts Openings.— As there are seven possible first moves, with seven possible replies to each, or forty-nine in all, there is an abundant variety ˆof openings; but as two of these (9-14, 2i-i7and 10-14, 2I_I 7) are obviously unsound, the number is really reduced to forty-seven. Much difference of opinion exists regarding the relative strength of the various openings. It was at one time generally held that for the black side 11-15 was the best opening move.

Towards the end of the 19th century this view became much

modified, and though 11-15 still remained the favourite, it was recognized that 10-15, 9. -I 4 an< i II_ i6 were little, if at all, inferior; 10-14 an d 12-16 were rightly rated as weaker than the four moves named above, whilst 9-13, the favourite of the " unscientific " player, was found to be weakest of all.

The white replies to 11-15 have gone through many vicissitudes. The seven possible moves have each at different times figured as the general favourite. Thus 24-19, which analysis proved to be the weakest of the seven, was at one period described by the title of " Wyllie's Invincible." In course of time it came to be regarded as decidedly weak, and its name was altered to the less pretentious title of " Second Double Corner." In the Scottish Tournament of 1894 this opening was played between Ferrie and Stewart, and the latter won the game with white, introducing new play which has stood the test of analysis, and so rehabilitating the opening in public favour. The 21-17 reply to 11-15 was introduced by Wyllie, who was so successful with it that it became known as the " Switcher." This opening perhaps lacks the solid strength of some of the others, but it so abounds in traps as to be well worthy of its name. The other five replies to 11-15, namely 24-20, 23-19, 23-18, 22-18 and 22-17, are productive of games which give equal chances to both sides.

The favourite replies to 10-15 are 23-18, 22-18 and 21-17, but they do not appear to be appreciably stronger than the others, with the possible exception of 24-20.

In response to n-16, 23-18 is held to give white a trifling advantage, but it is more apparent than real. With the exception of 23-19, which is weak, the other replies are of equal strength, and are only slightly, if at all, inferior to the more popular 23-18. 9-14 is most frequently encountered by 22-18, but all white's replies are good, except of course 21-17 which loses a man, and 23-18 which weakens the centre of white's position.

Against 10-14 the most popular move is 22-17, which gives white an advantage. Next in strength come 22-18 and 24-19. 23-18 is weak.

The strongest reply to 12-16 is 24-20. The others, except 23-19, which is weak, give no initial advantage to either side.

As already mentioned, 9-13 is black's weakest opening move, both 22-18 and 24-19 giving white a distinct advantage. Neverthe- less 9-13 is a favourite d6but with certain expert players, especially when playing with inferior opponents.

The term " opening " is frequently applied in a more restricted sense than that used above. When practically all games started with 11-15 it was convenient to assign names to the more popular lines of play. Thus 11—15, 23-19, 8-1 1, 22-17, if followed by 11-16, was called the "Glasgow"; if followed by 9-13, 17-14, the "Laird and Lady "; if by 3-8, the " Alma."

The variety possible in the opening is a fair reply to the objection sometimes heard that the game does not afford sufficient scope for variation. As a matter of fact a practically unlimited number of different games might be played on any one opening.

The three following games are typical examples of the play arising from three of the most frequently played openings : —

DRAUGHTS

549

Game No. I. — " Ayrshire Lassie " Opening.

en-15. 25-18 10-15 22-17 615-18 24-6

o 24-20 3-8 23-19 13-22 24-20 2-9

8-1 1 26-22 6-10 26-17 18-27 17-10

28-24 5-9 C A 27-23 11-16 31-24 8-11

9-13 30-26 9-14 20-11 16-23 Drawn.

22-18 1-5 18-9 7-16 20-16 R. Jordan.

15-22 32-28 5-14 29-25 12-19

a. 11-15, 24-20 forms the " Ayrshire Lassie " opening, so named, by Wyllie. It is generally held to admit of unusual scope for the display of critical and brilliant combinations.

b. 16-20, 25-22, 20-27, 31-24, 8-11, 17-13, 2-6, 21-17, 14-21, 22-17, 21-25, 17-14, 10-17, 19-1. Drawn. R. Jordan.

26-23 28-19 20-16 7-1 1 14-10 15-10

9-14 2-6 6-10 19-24 26-23 23-18

18-9 20-11 16-11 11-18 10-7 10-15

5-14 8-24 10-15 24-27 4-8 20-16

29-25 27-20 1 1-7 18-15 7-3 15-22

11-16 10-15 14-18 27-31 8-12 16-7

20-11 31-26 7-3 22-18 3-7 Drawn.

7-16 15-19 18-23 31-27 27-24 A. B. Scott.

24-20 23-16 3-7 18-14 7-1 1 t>.

15-24 12-19 23-30 30-26 24-20 R. Jordan.

(d)

19-16 7-10 23-19 11-15 16-11 25-30

12-19 6-1 15-24 27-24 18-25 20-16

22-17 9-14 28-19 22-25 17-14 Drawn.

15-22 26-23 8- i 1 29-22 10-17 R- Jordan.

24-6 11-15 19-16 14-18 21-14

Game No. 2. — " Kelso-Cross " Opening.

o 10-15 8-12 13-22 5-9 14-18 22-25

023-18 25-21 26-17 20-16 17-14 29-22

12-16 1-6 d 19-26 2-7 10-17 17-26

21-17 32-27 30-23 24-19 21-14 5-i

9-13 12-16 15-22 15-24 6-10 26-30

17-14 27-23 24-19 23-19 14-9 1-5

16-19 7-io 9-14 24-27 10-14 30-26

24-20 14-7 19-12 31-24 19-15 5-9

6-9 3-10 11-15 9-13" 14-17 26-23

b 27-24 c 22-17 28-24 24-20 9-5 Drawn.

R. Jordan.

a. These two moves form the " Kelso-Cross " opening.

b. 27-23 is also a strong line for white to adopt.

c. 30-25, 4-8, 18-14, 9-27, 22-18, 15-22, 24-15, 11-18, 20-4, 27-32, 26-17, 13-22, 4-8, 22-26, and black appears to have a winning advantage. R. Jordan.

d. Taking the piece on 18 first seems to lose, thus: —

15-22 e 0-13 13-17 6-9 5-14

24-8 17-14 23-18 14-10 10-7 White

4-1 1 10-17 17-21 9-14 2-6 wins.

31-27 21-14 28-24 l8 ~9 7-2 Dallas.

e. 2-7, 27-24, 22-26, 23-18, 26-31, 18-15, 11-18, 20-2, 9-13, 2-9, 5-14, 24-19, 13-22, 30-26. White wins.

9-14 b 16-19

22-17 23-16

3-8 12-19

o 26-22 20-16

12-16 . 11-15 c 8-12 4-8 9-14 1-26

24-20 20-11 17-13 18-15 26-22 31-22

8-12 7-16 5-9 2-7 14-17 19-23

28-24 24-20 22-18 30-26 21-14 13-9

15-22 10-14 18-23 12-19 25-18 29-25 27-18 9-6

14-23 14-18 6-10 7-1 1

27-18 32-27 15-6 Drawn.

R. Jordan.

o. This move is the favourite at this point on account of its

” trappiness,” but 25-22 is probably stronger, thus: 25-22, 16-19,

24-15, 11-25, 29-22, 8-11, 17-13, 11-16, 20-11, 7-16, and white

can with advantage continue by 27-24, 22-17, 23-19 or 22-18.

6. 15-19, 20-11, 8-15, 23-16, 12-19, 17-13, 5-9, 30-26, 4-8, 27-23, 8-12, 23-16, 12-19, 31-27. 1-5. 27-23, 19-24, 32-27, 24-31,

22-17. White wins. C. F. Barker.

c 8-11 27-18 15-18 14-10 24-27 7-10

16-7 15-22 14-10 19-24 31-24 27-31

2-1 1 25-18 6-15 10-7 16-20 10-26

22-18 10-15 17-14 18-23 3-7 31-22

14-23 18-14 11-16 7-3 20-27 30-25

Drawn. R. Stewart v. R. Jordan.

Problem No. I is the simplest form of that known to draughts- players as the ” First Position.” It is of more frequent occurrence in actual play than any other end-game, and is, besides, typical of a class of draughts problems which may be described as analytical, in contradistinction to ” strokes,”

Problem No. 1 , by Wm. Payne. BLACK.

‘ʸˆjwˆpVMˆ

28-32 27-31

15-19 31-26

19-24

White

WHITE. White to move and win. Solution : —

27-32 18-15 15-” n-15

28-24 2-28-24 • 12-16 19-24

23-18 32-28 28-32 32-28

3-0-24-28 1-24-20 16-19 24-27

o. 12-16 same as Var. I. at 5th move.

Var. I.

24-27 18-15 19-16 28-32 8-12 15-11

15-18 b 16-20 18-23 8-12 23-18 White

12-16 15-18 16-11 32-27 12-8 wins.

28-32 24-19 23-19 12-8 18-15

27-24 32-28 1 1-8 27r23 8-12

b. 24-28 same as Var. II. at 1st move.

Var. II. 12-16, 15-11, 16-19, 32-27> 28-32, 27-31, 32-28, n-16, 19-23, 16-19. White wins.

Var. III. 24-19, 32-28, c 19-16, 28-24, 16-11,24-20, n-8, 18-15. White wins.

c. 12-16, 28-32, 19-24 or 16-20, same as Var. II. at 5th and 9th moves respectively. White wins.

Problem No. 2.

BLACK.

WHITE. White to move and win. Problem No. 2 is a fine example of another class of problems, namely, " strokes." It is formed from the " Paisley " opening,

thus:-

11-16 24-19 8-1 1 28-24 16-20

22-17

9-13 17-14 10-17 21-14

11-16 25-21

(^)

23-18 16-23

26-19 4-8 29-25 13-17 31-26

9-13 25-22

7-i 1

19-15 12-16

opening,

15-10

o 2-7

o. This forms the position on the diagram. The solution is as follows : —

27-23 7-14 18-9 14-23 26-3

20-27 9-6 5-H 21-7 27-31

I4-_9 „r, ? -10 . 23 ~ 18 3-io 3-7

White wins. Jacques and Campbell.

Other Varieties. — The forms of draughts practised on the European continent differ in some respects from the English variety, chiefly in respect of the power assigned to a man after " crowning." The game of Polish Draughts is played in France, Holland, Belgium and Poland, where it has entirely superseded Le Jeu de dames d la francaise. It is played on a board of 100 squares with 20 men a side. The men move and capture as in English draughts, except that in capturing they move either forward or backward. A crowned man becomes a queen, and can move any number of squares along the diagonal. In her capture she takes any unguarded man or queen in any diagonal she commands, leaping over the captured man or queen and remaining on any unoccupied square she chooses of the same diagonal, beyond the piece taken. But if there is another un- guarded man she is bound to choose the diagonal on which it can be taken. For example (using an English draught-board) place a queen on square 29 and adverse men at squares 22, 16, 24, 14. The queen is bound to move from 29 to 11, 20, 27, and having made the captures to remain at 9 or 5, whichever she prefers. The capturing queen or man must take all the adverse pieces that are en prise, or

that become so by the uncovering of any square from which a piece has been removed during the capture, e.g. white queen at square 7, black at squares 10, 18, 19, 22 and 27, the queen captures at 10, 22, 27 and 19, and the piece at 22 being now removed, she must go to 15, take the man at 18, and stay at 22, 25 or 29. In consequence of the intricacy of some of these moves, it is customary to remove every captured piece as it is taken. If a man arrives at a crowning square when taking, and he can still continue to take, he must do so, and not stay on the crowning square as at draughts. Passing a crowning square in taking does not entitle him to be made a queen. In capturing, the player must choose the direction by which he can take the greatest number of men or queens, or he may be huffed. Numerical power is the criterion, e.g. three men must be taken in preference to two queens. If the numbers are equal and one force comprises more queens than the other, the player may take which-ever lot he chooses. This form of draughts, played on a board of 144 squares with 30 men a side, is extensively practised by British soldiers in India.

The German Damenspiel is Polish draughts playedon a board of the same size and with the same number of men as in the English game. It is sometimes called Minor Polish draughts, and is practised in Germany and Russia.

The Italian game differs from the English in two important particulars — a man may not take a king, and when a player has the option of capturing pieces in more than one way he must take in the manner which captures most pieces. There is a difference too in the placing of the board, the black square in the corner of the board being at the player's right hand, but until a king is obtained the differences from the English system are unimportant in practice.

In Spanish draughts the board is set as for the Italian game. The men move as in English draughts, but, in capturing, the largest possible number of pieces must be taken, and the king has the same powers as in the Polish game. The game does not differ essentially from the English game until a king is obtained, and many games from Spanish works will be found incorporated in English books. Some- times the game is played with 11 men and a king, or 10 men and 2 kings a side, instead of the regulation 12 men.

Turkish draughts differs widely from all other modern varieties of the game. It is played on a board of 64 squares, all of which are used

in play. Each player has 16 pieces, which are not placed on the two back rows of squares, as in chess, but on the second and third back rows. The pieces do not move diagonally as in other forms of the game, but straight forward or to the right or left horizontally. The king has the same command of a horizontal or vertical row of squares that the queen in Polish draughts has over a diagonal. Capturing is compulsory, and the greatest possible number of pieces must be taken, captured pieces being removed one at a.time as taken.

Authorities. — Falkener's Games Ancient and Oriental; Lees' Guide to the Game of Draughts; Drummond's Scottish Draught Players (Kear's reprint) ; Gould's Memorable Matches and Book of Problems, &c. The Draughts World is the principal magazine devoted to the game. In Dunne's Draught Players' Guide and Companion a section is devoted to the non-English varieties. (J. M. M. D. ; R. J.)

DRAUPADI, in Hindu legend, the daughter of Drupada, king of Panchala, and wife of the five Pandava princes. She is an important character in the Mahabharata.

DRAVE, or Drava (Ger. Drau, Hung. Drdva, Lat. Dravus), one of the principal right-bank affluents of the Danube, flowing through Austria and Hungary. It rises below the Innichner Eck, near the Toblacher Feld in Tirol, at an altitude of a little over 4000 ft., runs eastward, and forms the longest longitudinal valley of the Alps. The Drave has a total length of 450 m., while the length of its Alpine valley to Marburg is 150 m., and to its junction with the Mur 250 m. Owing to its great extent and easy accessibility the valley of the Drave was the principal road through which the invading peoples of the East, as the Huns, the .Slavs and the Turks, penetrated the Alpine countries. The Drave flows through Carinthia and Styria, and enters Hungary near Friedau, where up to its confluence with the Danube, at Almas, 14 m. E. of Esseg, it forms the boundary between that country and Croatia-Slavonia. At its mouth the Drave attains a breadth of 1055 ft. and a depth of 20 ft. The Drave is navig- able for rafts only from Villach, and for steamers from Bares, a distance of 95 m. The principal affluents of the Drave are: on the left the Isel, the Gurk, the Lavant, and the largest of all, the Mur; and on the right the Gail and the Drann.

DRA VIDIAN (Sanskrit Dravida), the name given to a collection of Indian peoples, and their family of languages 1 comprising all

1 In Dravidian words a line above a vowel shows that it is long. The dotted consonants t, d, and n are pronounced by striking the tip of

the tongue against the centre of the hard palate. The dotted I is distinguished from /in a similar way. Its sound, however, differs

the principal forms of speech of Southern India. Their territory, which also includes the northern half of Ceylon, extends north-wards up to an irregular line drawn from a point on the Arabian Sea about 100 m. below Goa along the Western Ghats as far as Kolhapur, thence north-east through Hyderabad, and farther eastwards to the Bay of Bengal. Farther to the north we find Dravidian dialects spoken by small tribes in the Central Provinces and Chota Nagpur, and even up to the banks of the Ganges in the Rajmahal hills. A Dravidian dialect is, finally, spoken by the Brahuls of Baluchistan in the far north-west. The various Dravidian languages, with the number of speakers returned at the census of 1901, are as follows: —

Tamil 17,494,901

Malayalam 6,022,131

Kanarese 10,368,515

Tulu 535.210

Kodagu 39.I9I

Toda 805

Kota 1,300

Kurux 609,721

Malto 60,777

Gone}! 1,125,479

Kui 494,099

Telugu 20,697,264

Brahul 48,589

Total . . 57.497.982

Of these Tamil and Malayalam can be considered as two dialects of One and the same language, which is, in its turn, closely related to Kanarese. Tulu, Kodagu, Toda and Kota can be described as lying

between Tamil-Ma lay alam and Kanarese, though they are more nearly related to the latter than to the former. The same is the case with Kurux and Malto, while Kui and G6ndi gradually approach Telugu, which latter language seems to have branched off from the common stock at an early date. Finally, the Brahul dialect of Baluchistan has been so much influenced by other languages that it is no longer a pure Dravidian form of speech.

The Dravidian languages have for ages been restricted to the territory they occupy at the present day. Moreover, they are gradually losing ground in the north, where they meet with Aryan forms of speech. If we compare the caste tables and the language tables in the Indian census of 1901 we find that only 1,125,479 out of the 2,286,913 Gonds returned were stated to speak the Dravidian Gondl. Similarly only 1505 out of 17,187 Kolams entered their language as Kolaml. Such tribes are gradually becoming Hinduized. Their language adopts an ever- increasing Aryan element till it is quite superseded by Aryan speech. In the north-eastern part of the Dravidian territory, to the east of Chanda and Bhandara, the usual state of affairs is that Dravidian dialects are spoken in the hills while Aryan forms of speech prevail in the plains. The Dravidian Kui thus stands out as an isolated island in the sea of Aryan speech.

This process has been going on from time immemorial. The Dravidians were already settled in India when the Aryans arrived from the north-west. The fair Aryans were at once struck by their dark hue, and named them accordingly krisna Ivac, the black skin. In the course of time, however, the two races began to mix, and it is still possible to trace a Dravidian element in the Aryan languages of North India.

The teaching of anthropology is to the same effect. Most speakers of Dravidian languages belong to a distinct anthropo- logical type which is known as the Dravidian. " The Dravidian race," says Sir H. Risley, " the most primitive of the Indian types, occupies the oldest geological formation in India, the medley of forest-clad ranges, terraced plateaus, and undulating plains which stretches, roughly speaking, from the Vindhyas to Cape Comorin. On the east and west of the peninsular area the domain of the Dravidian is conterminous with the Ghats, in the different districts. A Greek x marks the sound of ch in " loch "; £ is the English sh; c the ch in " church "; and ri is an r which is used as a vowel. In the list of Dravidian languages the names are spelt fully, with all the necessary diacritical marks. In the rest of the article dots under consonants have been omitted in these words.

while farther north it reaches on one side to the Aravallis and on the other to the Rajmahal hills."

This territory is the proper home of the race. A strong Dravidian element can, however, also be traced in the population of northern India. In Kashmir and Punjab, where the Aryans had already settled in those prehistoric times when the Vedic hymns were composed, the prevailing type is the Aryan one. The same is the case in Rajputana. From the eastern frontier of the Punjab, on the other hand, and eastwards, a Dravidian element can be traced. This is the case in the valleys of the Ganges and the Jumna, where the Aryans only settled at a later period. Anthropologists also state that there is a Dravidian element in the population of western India, from Gujarat to Coorg.

It is thus probable that Dravidian languages have once been spoken in many tracts which are now occupied by Aryan forms of speech. The existence of a Dravidian dialect in Baluchistan seems to show that Dravidian settlers have once lived in those parts. The tribe in question, the Brahuls, are, however, now Eranians and not Dravidians by race, and it is not probable that there has ever been a numerous Dravidian population in Baluchistan. The Brahuls are most likely the descendants of settlers from the south.

There is no indication that the Dravidians have entered India from outside or superseded an older population. For all practical purposes they can accordingly be considered as the aborigines of the Deccan, whence they appear to have spread over part of northern India. Their languages from an isolated group, and it has not been possible to prove a connexion with any other family of languages. Such attempts have been made with reference to the Munda family, the Tibeto-Burman languages, and the dialects spoken by the aborigines of the Australian continent. The arguments adduced have not, however, proved to be sufficient, and only the Australian hypothesis can still lay claim to some probability. Till it has been more closely tested we must therefore consider the Dravidian family as an isolated group of languages, with several characteristic features of its own.

The pronunciation is described as soft and mellifluous. Abrupt- ness and hard combinations of sounds are avoided. There is, for example, a distinct tendency to avoid pronouncing a short consonant at the end of a word, a very short vowel being often added after it. Thus the

pronoun of the third person singular, which is avan, " he," in Tamil, is pronounced avanu in Kanarese; the Sanskrit word vak, " speech," is borrowed in the form vaku in Tamil; the word gurram, " horse," is commonly pronounced gurramu in Telugu, and so on. Combinations of consonants are further avoided in many cases where speakers of other languages do not experience any difficulty in pronouncing them. This tendency is well illustrated by the changes undergone by some borrowed words. Thus the Sanskrit word brahmana, " a Brahmin," becomes bardmana in Kanarese and piramaria in Tamil; the Sanskrit Dramit}a, " Dravi- dian," is borrowed by Tamil under the form Tiramida. Dramida, which also occurs as Dravida, is in its turn developed from an older Damila, which is identical with the word Tamir, Tamil.

The forms piramaria and Tiramida in Tamil illustrate another feature of Dravidian enunciation. There is a tendency in all of them, and in Tamil and Malayalam it has become a law, against any word being permitted to begin with a stopped voiced consonant (g. j, d, d, b), the corresponding voiceless sounds (k, c, (, t, p, re- spectively) being substituted. In the middle of a word or compound, on the other hand, every consonant must be voiced. Thus the Sanskrit word danta, " tooth," has been borrowed by Tamil in the form tandam, and the Telugu anna, " elder brother," tammulu, " younger brother," become when compounded annadammulu, " elder and younger brothers."

*There is no strongly marked accent on any one syllable, though there is a slight stress upon the first one. In some dialects this equilibrium between the different parts of a word is accompanied by a tendency to approach to each other the sound of vowels in consecutive syllables. This tendency, which has been called the " law of harmonic sequence," is most apparent in Telugu, where the short « of certain suffixes is replaced by * when the preceding syllable contains one of the vowels i (short and long) and ei. Com- pare the dative suffix ku, ki, in gurramu-ku, " to a horse " ; but tammuni-ki, " to a younger brother." This tendency does not, however, play a prominent r61e in the Dravidian languages.*

Words are formed from roots and bases by means of suffixed formative additions. The root itself generally remains unchanged throughout. Thus from the Tamil base per, " great," we can form adjectives such as per-iya and per-um, "great"; verbs such as

per-u-gu, " to become increased " ; per-u-kku, " to cause to increase," and so on.

Many bases can be used at will as nouns, as adjectives, and as verbs. Thus the Tamil kadu can mean " sharpness," " sharp," and " to be sharp." Other bases are of course more restricted in their respective spheres.

The inflection of words is effected by agglutination, i.e. various additions are suffixed to the base in order to form what we would call cases and tenses. Such additions have probably once been separate words. Most of them are, however, now only used as suffixes. Thus from the Tamil base kon, " king," we can form an accusative kon-ei, a verb kon-en, " I am king," and so on.

Dravidian nouns are divided into two classes, which Tamil grammarians called high-caste and casteless respectively. The former includes those nouns which denote beings endowed with reason, the latter all others. Gender is only distinguished in the formet class, while all casteless nouns are neuter. The gender of animals (which are irrational) must accordingly be distinguished by using different words for the male and the female, or else by adding words meaning male, female, respectively, to the name of the animal — processes which do not, strictly speaking, fall under the head of grammar.

There are two numbers, the singular and the plural. The latter is formed by adding suffixes. It, however, often remains unmarked in the case of casteless nouns.

Cases are formed by adding postpositions and suffixes, usually to a modified form of the noun which is commonly called the oblique base. Thus we have the Tamil maram, " tree "; maratt-al, " from a tree"; maratt-u-kku, "to a tree"; vidu, "a house"; vtft-al, " from a house." The case terminations are the same in the singular and in the plural. The genitive, which precedes the governing noun, is often identical with the oblique base, or else it is formed by adding suffixes.

The numeral system is decimal and higher numbers are counted in tens; thus Tamil pattu, " ten "; iru-badu, " two tens," " twenty."

The personal pronoun of the first person in most dialects has a double form in the plural, one including and the other excluding the person addressed. Thus, Tamil nam, " we," i.e. I and you; nangal, " we," i.e. I and they.

There is no relative pronoun. Relative clauses are effected by using relative participles. Thus in Telugu the sentence " the book which you

gave to me " must be translated mxru naku iccina pus- takamu, i.e. " you me-to given book." There are several such participles in use. Thus from the Telugu verb ko((a, " to strike," are formed kotf-ut-unna, " that strikes," koff-i-na, " that struck," ko(te, " that would strike," " that usually strikes." By adding pronouns, or the terminations of pronouns, to such forms, nouns are derived which denote the person who performs the action. Thus trom Telugu kotfe and vadu, " he," is formed ko((e-vddu, " one who usually strikes." Such forms are used as ordinary verbs, and the usual verbal forms of Dravidian languages can broadly be described as such nouns of agency. Thus, the Telugu, kottinadu, " he struck," can be translated literally " a striker in the past."

Verbal tenses distinguish the person and number of the subject by adding abbreviated forms of the personal pronouns. Thus in Kanarese we have madid-enu, " I did "; mddid-i, " thou didst "; madid-evu, " we did "; madtd-aru, " they did."

One of the most characteristic features of the Dravidian verb is the existence of a separate negative conjugation. It usually has only one tense and is formed by adding the personal terminations to a negative base. Thus, Kanarese mad-enu, " I did not "; mad- evu, " we did not "; mad-aru, " they did not." "*

The vocabulary has adopted numerous Aryan loan-words. This was a necessary consequence of the early connexion with the superior Aryan civilization.

The oldest Dravidian literature is largely indebted to the Aryans though it goes back to a very early date. Tamil, Malayalam! Kanarese and Telugu are the principal literary languages. The language of literature in all of them differs considerably from the colloquial. The oldest known specimen of a Dravidian language occurs in a Greek play which is preserved in a papyrus of the 2nd century a.d. The exact period to which the indigenous litera- ture can be traced back, on the other hand, has not been fixed with certainty.

Bibliography. — Bishop R. Caldwell, A Comparative Grammar of the Dravidian or South-Indian Family of Languages (London, 1856; 2nd edition, 1875); Dr Friedrich Miiller, Reise der osterreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 185Q, unter den BefMen des Commodore B. von Wiillerstorff-Urbair: Linguis-tischer Theil. (Wien, 1867, pp. 73 and ff.) ; Dr Friedrich Miiller, Grundriss der Sprachwissenschaft, vol. iii. (Wien, 1884), pp. 106 and ff. ; G. A. Grierson, Linguistic Survey of India, vol. iv. " Munda

and Dravidian Languages " (Calcutta, 1906), pp. 277 and ff. by Sten Konow. ,■ (S. K.)

DRAWBACK, in commerce, the paying back of a duty previ- ously paid upon the exportation of excisable articles or upon the re-exportation of foreign goods. The object of a drawback is to enable commodities which are subject to taxation to be exported

and sold in a foreign country on the same terms as goods from countries where they are untaxed. It differs from a bounty in that the latter enables commodities to be sold abroad at less than their cost price; it may occur, however, under certain conditions that the giving of a drawback has an effect equivalent to that of a bounty, as in the case of the so-called sugar bounties in Germany (see Sugar). The earlier tariffs contained elaborate tables of the drawbacks allowed on the exportation or re- exportation of commodities, but so far as the United Kingdom is concerned the system of " bonded warehouses " practically abolished drawbacks, as commodities can be warehoused (placed " in bond ") until required for subsequent exportation.

DRAWING, in art. Although the verb " to draw " has various meanings, the substantive drawing is confined by usage to its artistic sense, delineation or design. The word " draw," from a root common to the Teutonic languages (Goth, dragan, O.H.G. drahan, Mod. Ger. tragen, which all have the sense of " carry," 0. Norse draga, A.S. drazan, drazen, " draw," cf. Lat. trahere), means to pull or " drag " (a word of the same origin) as distinct from the action of pushing. It is thus used of traction generally, whether by men, animals or machines. The same idea is pre- served in " drawing " as applied to the fine arts. We do not usually say, or think, that a sculptor is drawing when he is using his chisel, although he may be expressing or defining forms, nor that an engraver is drawing when he is pushing the burin with the palm of the hand, although the result may be the rendering of a design. But we do say that an artist is drawing when he uses the lead pencil, and here we have a motion bearing some resemblance to that of traction generally. The action of the artist in drawing the pencil point with his fingers along the paper is analogous, e.g., to that of a horse or man drawing a pole over soft ground and leaving a mark behind. The same analogy may be observed between two of the senses in which the Freeh verb tirer is

frequently employed. This word, the origin of which is quite uncertain, was formerly used by good writers in the two senses of the verb to draw. Thus Lafontaine says, "Six forts chevaux tiraient un coche "; and Caillieres wrote, " II n'y a pas longtemps que je me suis fait tirer par Rigaud," meaning that Rigaud had drawn or painted his portrait. At the present day the verb tirer has fallen into disuse amongst culti- vated Frenchmen with regard to drawing and painting, but it is still universally used for all kinds of design and even for photo- graphy by the common people. The cultivated use it still for printing, as for example " cette gravure sera tiree a cent exem- plaires," in the sense of pulling. A verb much more nearly related to the English verb to draw is the French traire (Lat. trahere), which has trait for its past participle. Traire is now used exclusively for milking cows and other animals, and though the analogy between this and artistic drawing is not obvious at first, nevertheless there is a certain analogy of motion, since the hand passing down the teat draws the milk downwards. The word trait is much more familiar in connexion with art as " les traits du visage," the natural markings of the face, and it is very often used in a figurative sense, as we say " traits of character." It is familiar in the English portrait, derived from protrahere. The ancient Romans used words which expressed more clearly the conception that drawing was done in line (delineare) or in shade (adumbrate) , though there are reasons for believing that the words were often indiscriminately applied. Although the modern Italians have both traire and trarre, they use delineare still is the sense of artistic drawing, and also adombrare. The Greek verb ypaei.v appears in English in "graphic" and in many compounds, such as photograph, &c. It is worth observing that the Greeks seem to have considered drawing and writing (q.v.) as essentially the same process, since they used the same word for both. This points to the early identity of the two arts when' drawing was a kind of writing, and when such writing as men had learned to practise was essentially what we should call drawing, though of a rude and simple kind. Even in the present day picture writing is not unfrequently resorted to by travellers as a means of making themselves intelligible. There is also a kind of art which is writing in the modern sense and

drawing at the same time, such as the work of the medieval illuminators in their manuscripts. (X.)

The Art of Drawing. — Rather than attempt here a historical survey of the various so-called " styles " of drawing, or write a personal appreciation of them, it seems of greater use to give a logical account of drawing as an art, applicable to all times and countries. Reference

to the teaching of drawing will be occasion- ally given rather to illustrate the argument than with a view to its being of practical use.

At the outset a distinction must be made between drawing as a means of symbolic or literary expression and drawing as the direct and only means of expressing the beauty of form. If Pharaoh wants to have it known that a hundred ducks were consumed at one meal in his court, he employs a draughtsman to register the fact on a frieze by picturing a row of cooks occupied in preparing the hundred ducks. The artist in this case does not represent the scene as he must have known it in the kitchen, with all its variety of movement and composition (as an early Greek vase painter conceived the interior of a vase factory), but all he does and is required to do is to give the sufficient number of figures and ducks. The more uniform the figures the greater will be the effect of number. Drawing has been employed here to tell a story, and it succeeds in so far as it tells the spectator plainly what could be told, perhaps less conveniently, in words. It matters not whether the figures and objects be feelingly rendered and harmoniously composed. So, to-day, a child, or any one who has a simple trick of symbolizing figures and objects in nature, can describe any event or moral by this process, provided the plot be not too elaborate to be expressed by a scene, or series of scenes, enacted by dumb symbolic figures. It is plain that the amusing pictures in Punch or Fliegende Blatter would be none the more amusing if they were done by the hand of Michelangelo, nor would the mystic designs of Blake be more full of meaning if drawn by Rembrandt, for in neither case do these works depend upon any subtle rendering of the forms of nature for their success, but upon the dramatic or intellectual imagination of the man who conceived them. When the witty or ethical man is at the same time a master draughts- man his work has two values, the " literary " content and the beauty of his drawing of natural objects. But it must be borne in mind that these values are fundamentally distinct; so much so that the spectator who has no appreciation of the forms of nature enjoys the story told and remains blind to the qualities of draughtsmanship, whilst the lover of nature's forms may or may not trouble to unravel the literary plot but finds perfect satisfaction in the drawing. By far the greater part of illustra- tion, and of artistic production generally, must be classed as symbolic art. Magazine stories to-day are sometimes illustrated even by photography, for the hand of the artist is not required. Symbolic art describes indirectly and in a necessarily limited scope what literature can do directly and with unlimited powers. The only content of symbolic drawing is its literary meaning; as drawing it may be quite worthless.

Pure drawing, however, whether it represent a dramatic event or a knee-joint, has a content that cannot be expressed by words, and is not necessarily directed towards literary ex- pression. Just as a fragment of good sculpture pleases the connoisseur without any reference either to the whole original or to its spiritual significance, fine drawing can appeal to the lover of nature independently of indirect considerations.

What is the content of pure drawing? It is held by some that drawing or monochrome can suggest colour, and many people, some consciously, others unconsciously, attempt to represent in drawings the colours of figures and landscape. It seems a strange aberration to argue that by different intensities of the one colour various other colours can be suggested: it would not be more unreasonable to maintain that E flat and F could be suggested by striking the note G with varying strength. Now the draughtsman employs various intensities of his mono- chrome as light and shade by which to give roundness to his forms. But if on the same drawing he uses the same means in his attempt to express colour, a conflict would be at once set up

between that which makes for form and that which would make for colour, and the result would generally be a confusion. Again, let one attempt to give red hair to a monochrome drawing of a man, and if the red be plain and unmistakable to all who are not the artist's accomplices, then the artist has succeeded; otherwise it is bootless to treat of colour and colour values (which of course must depend upon the existence of colour) in mono- chrome. Apart from theory, if we examine the drawings, etchings and monochromes of great artists, where do we find them attempting to give colour or colour values ? The hundreds of costume studies by Rembrandt might have been done from white plaster models, and there are only a few exceptions where a man has, for instance, a black hat or cloak. But in these few instances the " colour " tone is applied with such discretion that the true representation of the form is scarcely, perhaps only theoretically, impaired: they certainly have gained nothing in colour value because no specific colour is manifest in them. In Rembrandt's, Claude's or Turner's drawings of landscapes the formation of the country, the architecture, &c, is expressed by line, light and shade, and enhanced by shadows cast from clouds

dimension in all objects causes light and shade, which in their turn bring about radical changes of the local colour, even in uniformly coloured objects. Now since drawing cannot suggest colour, local or atmospherical, any attempt to effect an illusion by a monochrome is at once defeated. If the end of drawing were to approach imitation or illusion as nearly as possible, how is it that a mere " sketch " by a master draughtsman can be for itself as valuable as his highly finished drawing ? And surely a masterly outline drawing of a figure or landscape does not pretend to be an illusion. If then the draughtsman does not, and cannot hope to imitate nature, he is compelled to state only his ideas of it, ideas of three-dimensional form. For this reason only drawing must be treated as an art, and not as a mechanical act of getting an illusion.

It is interesting to trace in the history of an indigenous art- the development of drawing that shall ultimately express ideas of three-dimensional form. Prof. Emanuel Loewy, in his Rendering of Nature in Early Greek Art, demonstrates how the early Greek sculpture (and that of all primitive peoples, children and ungifted artists) shows an aversion from depth. Their reliefs

(From a Greek vase in the British Museum (E, 46).

Fig. 1.

(From Bulletino arch. Napol. (1843, torn. 1, tav. 7).

Fig. 2.

(From a drawing by Michelangefo (1854, 5, 13, i.), Print Room, British Museum).

Fig. 3.

and trees. If, in the drawings of masters, we should find objects darker or lighter than their position in the light would warrant, they have value (perhaps not quite a legitimate one) for balancing the composition as a flat pattern. They were never intended to suggest colour, nor do they. Yet, in spite of the failure to succeed, and contrary to logical argument and the practice of great draughtsmen, the student of most of the schools of Europe and America still persists in doing the hair dark, and, by attempt- ing to give colour values to the clothes, breaks up the consistency of the whole. For the same reason that the sculptor uses uni- formly coloured material in order that the natural light and shade may have full opportunity of making his forms manifest to the spectator, the draughtsman

confines himself to giving light and shade only. If a monochrome has " colour tones," the effect is similar to that produced by a draped statue made out of variously coloured marbles — an inartistic jumble.

As the immediate purpose and content of drawing there remains the representation of form only. Drawing is, therefore, essen- tially the same activity as sculpture, and has no additional scope. " Pupils," says Donatello, " I give you the whole art of sculpture when I tell you to draw " (cited by Holroyd, Michel Angelo, p. 295), and the only practical teaching of drawing might be summed up by the inversion of the above.

Now if everything in nature — men, mountains or clouds — were as flat targets, i.e. two-dimensional, drawing could be legitimately reduced to a mechanical process, — to trace their contours upon a glass screen or even photograph them would be all that would be required. Indeed, provided the size of the drawing, the local colour and the texture be the same as those of the original, a complete illusion would be the result, in fact the proper end of one's labours. But the presence of the third

are of the flattest description, almost raised contours, and their figures in the round have at first only one aspect, or flat facade, so to speak, then three and four aspects, and finally at the date of Lysippus the figures are fully rounded out, and the members project at liberty in all directions. Then for the first time Greek sculpture showed a complete conception of the body's corporeity (Korperlichkeit). The primitive artist, however well he may be intellectually aware of the three dimensions of an object, does not fully apprehend its true aspect as offered to the eye from one point of view. Following this conclusion, it is easy to see also in the drawing of the early Greeks, children and so on, the same lack of idea of the third dimension. The figures on the vases of the " finest period " (about 475 B.C.), despite occasional fore- shortenings, have, when considered as representations of solid forms, a papery appearance. They have not half the draughts- manship shown by the later period of the vase industry, where the figures, though careless, stereotyped and ill-composed, come forwards (to use Prof. Loewy's description of later sculp- ture), go .backwards, twist and turn in space in a manner which cannot be excelled. The reproductions in figs. 1, 2, 3 will illustrate the development. The primitive draughtsman is at first bound by the silhouette. Later, he desires to fill out the interior, but this cannot be done without in great part modifying his contour lines, because they are generally merely indications of the disappearing

and reappearing inner modelling, i.e. of the figure's third dimension. Finally, the draughtsman in full posses- sion of a feeling for the corporeity of the object will determine his contour entirely from within, a procedure which is the exact opposite to that of his first beginnings. He conceives the length, breadth and depth of an object and all its parts as solid wholes. To him a body in violent foreshortening is as easy as a simple

profile, and, though it may not be as attractive, it is perhaps more interesting because its contours are more bound up with, and dependent upon, the inner modelling; in other words, it has more depth. The draughtsman's idea of a form in nature is not a " flat idea," but one containing three dimensions. This idea he seeks to express either by line alone or by light and shade. If an artist has not a three-dimensional " grasp " of forms, and, like a child, confines himself to the primitive tracing of the silhouette, his compositions may be of excellent flat pattern, and equal to any of the designs of ancient carpets or early Greek vases; but in the light of the above argument, and when compared with the productions of mature draughtsmen of all ages and countries, they cannot be said to be complete drawings, any more than the early unifacial statues of the Greeks can be called true plastic, simply because in neither case has the artist yet reached the highest possible development of corporeous con- ception, by which truly to interpret the solid objects of nature as we know them, and as master draughtsmen see them.

An attempt should be made to explain the psycho-physio- logical process that must take place in the mind of the real draughtsman. When we look at an object in nature we know its length and breadth by the flat image on the retina; we see also the light and shade, which at once gives us a correct idea of the object's depth or relief. But we do not, nor could we, have this idea from the flat image on the retina alone, i.e. from the mere perception of the light and shade: our knowledge of its depth is the result of experience, i.e. of our having from infancy remarked a certain dispensation of light and shade on, and peculiar to, every form we have touched or traversed, and so, by association and inference, being early enabled to have ideas of the depth of things by their various arrangements of lights and darks without having to touch or traverse them. Nevertheless the act (generally, but by no means always, an unconscious one) of visually touching a form must necessarily take place before we can

apprehend the third dimension of a form. It is, then, by the-combination of the ideas derived from pure vision and the ideas derived from touch that we know the length, breadth and depth of a solid form. We have shown that the art of drawing is not an imitation, but an expression of the artist's ideas of form; therefore all drawing of forms that merely reproduces the image on the retina, and leaves unconsulted the ideas of touch, is incomplete and primitive, because it does not express a conception of form which is the result of an associa- tion of the two senses; in other words, it does not contain an idea of the object's relief or solidity. And all teaching of drawing that does not impress upon the student the necessity of combin- ing the sense of vision with that of touch is erroneous, for it is thereby limiting him to a mechanical task, viz. the tracing of the flat image on the retina, which could be equally well done by mechanical means, or by photography alone.

In most of the schools of Europe and America it is true that great stress is laid upon the importance of giving life-like relief to

! drawings, but the method by which the students are allowed to get the relief is by employing the sense of vision -p only. Tracing the

- *IG ' 4 – silhouette of the*

figure as minutely as possible, they then fill it out with inner-modelling, which also is done by vision alone, for the lights and darks of the original are copied down as so many flat patterns fitted together and gradated like a child's puzzle, and are not used merely as indication by which to " feel " the depth of the object. Such a procedure is as if in drawing a brick of which three sides were visible, one were first to draw the entire contour (fig. 4, a), the subtle perspective of which he might get correct with some mechanical apparatus or by infinite mechanical pains, and then fill up the interior with its " shading " (fig. 4, 6). The method would be plainly laborious, unintelligent

and unedifying, and in drawing the most complicated fore- shortened forms of the human body it would seem still more illogical. That this principle of instruction does not help the student to grasp the three-dimensional character properly can be proved by the twenty-minute studies of the average student who in his fourth year has won a gold medal for an astounding piece of life-like stippling. They are still unintelligent contour tracings, as if of cardboard figures, with a few irrelevant patches of dark here and there within the silhouette.

But high modelling that would make for illusion of reality is not the first aim of draughtsmanship, nor have the best draughtsmen employed it save by exception. Michelangelo, Ingres, Holbein and Rembrandt have shown us that it is possible to give sufficient relief with a mere outline drawing. Again, the desire for salience often blunts the student's sense of the real character of the forms he is rounding out. So his elaborately modelled portrait may look very " life-like," but when compared with the original it will generally be seen that the whole and each of the individual forms of the drawing lack the peculiar character of those of the original. It is by carefully watching for the character of each fresh variety in figure and feature that great draughtsmen have excelled, and not by " life-like " relief, or even a sophisticated exposition of anatomical details at the expense of character. Can it be seriously maintained that a masterly sudden grasp of true formal character can be developed in a student by a system in which he patiently spends many days and weeks in stippling into plastic appearance one drawing which has originally been " laid in " by a mechanical process?

It has been shown that to attempt to make an illusion of nature is neither within the power of monochrome nor has been the chief aim of draughtsmen, but that the art of drawing consists in giving a plain statement of one's ideas, be they slight or studied, of the solid forms of nature. But the question may still be asked : Why is it that a rigorously accurate and finished drawing by a student or artist with no such ideas or conception is not good drawing, containing as it must do all that can be seen in the original, missing only its complete illusion? Why, in a word, is not a photograph a work of art?

The common explanation of the above important question is that the artist " selects and eliminates from the forms of nature." But surely this is the principle of the caricaturist and virtuoso? A beautiful drawing, however slight, is but the precipitate of the whole in the artist's mind. And a highly finished drawing by a master does not show even any apparent selection or elimination. The adoption of the principle of selection to differentiate art from mechanical reproduction is fundamentally vicious, and could be shown to be wholly inapplicable to the so-called formative arts. Nor could the theory of " selection " be used as a principle of teaching, for if to the first question the pupil would make, " What am I to select?" it were answered, " Only the important things," then the next question, "What are the important things?" could be answered only by saying, " That alone the real artist knows, but cannot teach." Certainly there are important things that can be taught the student in the initial stage of " laying-in " a figure, but when to begin selecting or

eliminating no teacher could tell him, simply because he must be aware that a true draughtsman can afford to eliminate nothing when the truth of the whole is at stake. The artist's conception and its expression may be slight or elaborate, but in neither case can selection or elimination take place, for a true conception must be founded upon the character of the whole, which is determined by the entire complex of all the parts.

To explain the essential difference between art and mechanical drawing or mechanical reproduction, a more applicable theory must be found. Compare the art of telling a story, If, to describe an incident in the street you had the entire affair re- enacted on the same spot, you would have but made a mechanical reproduction of it, leaving the spectator to simplify the affair, and construct his own conception of it. You have not given your ideas of the event, and so you have not made a work of art. So, if a man draws an object detail for detail by any mechanical process, or traces over its photograph, he has but reduplicated

the real aspect of the object, and has failed to give the spectator a simple and intelligible idea of it. Starting out with the generous notion of giving all, that there may he " something for everyone," he has given nothing. He did not originally form an intelligible and simplified idea of the figure, so how can his drawing be expected to give one to others ?

But how can forms be made more simple and intelligible than by reproducing their aspect with absolute accuracy? Our combined sense of vision and touch comprehends very easily certain elementary solid forms, the sphere, the cube, the pyramid and the cylinder. No forms but these, and their modifications, can be apprehended by the mind in one and the same act of vision. Every complex form, even so simple as that of a kidney, for instance, must be first broken up into its component parts before it can be fully apprehended or remembered. Analogously with the above, Prof. Wundt has shown how the mind can apprehend as separate units any number, of marbles for instance, up to five, after which every number must be split up into lots of twos, threes, fours and fives, or twenties, thirties and so on, before it can realize the full content of that number in one and the same mental picture. So the only way to receive an intelligible idea of a complex form, such as a human

figure, is first to discover in the figure itself, and then in all its parts, only modifications of the above elementary solid forms, and the drawing of a concep- tion thus informed must needs be a very clear and intelligible one. The more the artist is capable and practised, the more clearly will he conceive and distinguish in nature each subtle modification of these elementary forms, their direction, their relation to, and their dependence upon one another. The only difference between a good draughtsman and a bad one is the degree of subtlety of his apprehension. Unless the draughtsman has seen some such clear forms in his original, his labour to produce a work of art will be grievous and fruitless. All good drawing is stamped with this kind of structural insight. The more the artist adheres to nature, and the more finished his drawing, the more will the lines and forms that he makes be, so to speak, in excess of those of nature, or dull imitation or photo- graphy. It is not to be supposed that able draughtsmen work, or need ever have worked, consciously in this manner. It is, indeed, the virtue peculiar to the artist, as interpreter of form, that he instinctively comprehends the real elemental character of complex forms, whilst the majority of people (on the showing of their own drawings) entertain but confused or no ideas of them. It is because a good drawing reduces the chaos of ideas supplied by the raw material of nature, to one intelligible manner of seeing it, that all lovers of nature welcome it with joy. It is this process of discovery and interpretation that marks the essential difference between art and mechanical drawing or reproduction. Art gives intelligible ideas of the forms of nature, mechanism attempts to reduplicate their aspects.

*There are some who hold that drawing is not exclusively a matter of interpreting form, but that great artists have their own " personalities " which they infuse into their work. They will ask, How is it otherwise to be explained that two equally good draughtsmen will invariably make different drawings of the same figure ? Is it not for the same reason that one man will divide up a row of eight marbles into groups of four, and another into five and three ? The subjectivity of experience governs th< *. different conceptions that good draughtsmen will form of the same object. Accordingly as a draughtsman feels form so will he draw it, and it is only because our sense apparatuses are more or less similarly constituted that we can understand and appreciate one another's conceptions.*

But if the master draughtsman gives the true character of his model's form, why is it that his drawings are not pleasing to all alike? Whence the doubts and criticism that have been called forth by all original artists? If we first examine the attitude of the average man,

artist or layman-, towards nature, we can better explain his attitude towards works of art. The average man or artist has not a highly developed appreciation of form per se, whether it be the form of natural or manufactured objects. And it would seem that he is still less a disinterested

spectator of the forms and features of his fellow beings and animals, their movements, their colour, their value in a room or landscape. He has sentimental, moral or intellectual prefer- ences. In other words, he likes or dislikes only those faces or figures which hundreds of personal associations have taught him to like or dislike. The riding man's admiration for the look of a particular horse is based upon the fact that it looks like " a horse to go," and hence it is what he calls beautiful, while the artist, in the capacity of artist and not of sportsman, is not particular in his choice of horse-flesh, but finds each animal equally interesting for itself alone. Consequently in art any face, figure or object that does not come into the category of what the average man cares for is condemned by him even as it would be in real life, since he is no lover of form for form's sake, but provided the subject or moral be pleasing the quality of the draughtsmanship is of small account. The picture of a dwarf, or of an anatomy lesson, or of a group of ordinary bourgeois folk would not really please him, even though he were told that the work was by Velazquez, Rembrandt or Manet. We have only to listen to the common criticism of works of art to know that it is founded upon personal predilection only. We do not hear such personal criticism upon drawings of landscape, not because artists do them better, but because natural landscape has no interest for any one other than for its form, or, at least, people do not hold such definite personal likes or dislikes with regard to its various manifestations. But the artist, though his own personal predilections may, and generally do, lead him to work within that agreeable milieu, has, in the capacity of artist, no subjective prejudices; indeed, if he had them, he could not represent them by line, light and shade. He seeks always new varieties of form; hence his subjects, and his manner of posing them, are often unpleasing to the man who is busy with other affairs, and has no great experience of nature's forms. Let a good draughtsman make a successful likeness of the mother of some average man, and the latter will be delighted, but it by no means follows that he will delight in a drawing of the wife of the artist, though done by the same hand and with equal skill.

If drawing is the art of giving one's ideas of the forms of nature, then all criticism of drawing must be based upon the question, " How far does such and such a work show an intimate knowledge of or

intelligent visualization of the forms we know in nature? " and no other principle of judgment can be applicable to all drawing alike. Hence only those who have by natural endowment a clear sense of the forms of things, and who have made more than ordinary study of them, are in a position to apply to drawings the above criterion with any approach to infallibility. It is a fact that there are, and always have been, a certain number of people who agree perfectly in their apprecia- tion of the works of certain draughtsmen of different times and countries, and who can state reasons for their appreciation in definite and almost identical terms, for it is based upon knowledge and experience. To such people all fine draughtsmanship owes its public fame, and its immortality lies in their safe keeping.

It may be argued that each has a right to his own opinion about form and its representation, on the supposed ground that we all see form in different ways. But there is a fallacy in this argument. If we take the average man's drawing of any form more complex than a loaf of bread as a fair and only testimony of his power of visualization of forms, -we must conclude that most of us see not differently, but wrongly, or rather confusedly and disconnectedly, and that some can visualize form scarcely at all. If this be true, the average person's sight and ability to judge drawing is seriously diminished. If, then, drawing can be judged and appreciated only by knowledge and experience of the forms of nature, no critical formula could be made out so as to enable a child or savage or ordinary civilized adult to estimate or enjoy it. If it be argued that drawings are to be judged from some abstract or symbolic point of view, independently of its subtle representation of form, then incompetent drawing might be as beautiful as the competent, which would be absurd. However, if the competent characterization of form were admitted as at least the first condition of beautiful drawing, it would follow

that any abstract value it might have must be wholly dependent upon the manner in which form is represented, and so it would be superfluous to judge it by any standard other than the direct, definite and concrete one of form. Abstract beauty, since no one has yet defined it agreeably to all, is, apparently, with those who affect a feeling for it, a matter of individual taste, and therefore cannot be questioned. But the clear visualization of the forms of nature is based upon a special endowment and knowledge, and can be criticized by demonstration. People may differ in their tastes, but

they may not, nor do they, differ upon questions of real knowledge. Drawing, as the activity of giving one's ideas of form, must therefore be judged not by taste but by knowledge.

In view of the purpose and content of drawing as here demonstrated, there is no other principle of judgment that is relevant. Yet we often hear drawing judged by criteria which are founded upon no such concrete base but upon certain vague abstractions; or, again, upon a literary or moral base which could be applicable only to symbolic art.

It is said that this or that draughtsman excels in " beauty of line." Now in spite of the labours of many painters and theorists, it cannot reasonably be held that one purely abstract line or curve is more beautiful than another, for the simple reason that people have no common ground upon which to establish the nature of abstract beauty. It may be, however, that even as certain simple forms are more easily apprehended than complex ones, there is the same distinction with regard to lines. If then an artist of clean vision sees in an object of reality such clear characteristic lines, he draws them not for their abstract beauty, but merely because by them alone can he express his idea of the form before him. The early Greek vase painters, and all great artists of primitive periods, being attracted only by the silhouette, became very subtle to observe nature's outlines in their most intelligible character, and to this capacity is due their " beauty of line," and not to any preconceived notion of an abstract line of perfect beauty, and nowhere will " beauty of fine " be found on Greek vases, or elsewhere, that is not informed by, and does not express, a fine conception of nature's contours. So too in later three-dimensional drawing there is no beauty of line which does not intelligibly express not only the directions and angles of the main contour, but the inner modelling, i.e. the relief of the figure. It is only a superficial judgment that would prefer one drawing to another, even if both may be equally good, because the line of one is neat and the other " tormented." Contour being in nature an ideal line between one form and another, it is illogical to treat it or criticize it in a drawing as an actual and specific thing, apart from the forms that make it and are made by it. If an artist drew a dragon with deliberate disregard for animal construction, his drawing would be silly, and only by a profound knowledge of the forms of nature could it be made, to have beautiful lines. Truth to nature is always originality, and it is the only originality worth the name.

Again, some people judge one drawing as better than another in that it shows more ' individuality" or "temperament." Now a man's

individuality is, presumably, a vague feeling in our minds produced by the net result of the ways in which he sees, hears, loves, thinks and so on, so that we could not tell a man's individuality from any single one of his manifestations. With his entire work as an artist before us, i.e. his manner of seeing, we could do no more than infer, with the help of outside data, from the subjects he chooses, and the neatness or boldness of his line, something about his general character, and that with small degree of certainty. To regard a man's works of art, or indeed any of his manifestations, from this point of view, is, after all, nothing but a kind of inquisitive cheiromancy. Those who pretend to like the drawings of Watteau or Michelangelo " because they show more individuality " than the incompetent work of a beginner or poor artist cannot be skilled in their own business, because the lady who tells your character by your handwriting finds as much individuality in bad writing as in good, — some- times even more. It may be entertaining to some to guess at the artist's character from his works by this process of inference

and comparison, but it is unreasonable to imagine that " in- dividuality," as such, can be made a serious criterion of aesthetic judgment. The only individuality a draughtsman can show directly by his drawing is his individual way of conceiving the forms of nature, and even this is immaterial provided the conception and drawing be good.

A word or two are necessary upon " style," which unfortunate word has made much mystery in criticism. The great draughts- men of every time and country are known by their own words, as well as their works, to have been infinitely respectful to the form of every detail in nature. Their drawings always recall to our minds reality as we ourselves have seen it (provided we have studied from nature and not from pictures). The drawing of a hand, for instance, by Hokusai, Ingres or Durer, revives in us our own impressions of the forms and aspects of real hands. In short there is manifest in all good drawings, whatever their difference of medium or superficial appearance, an entire de- pendence upon the forms of nature. Hence we cannot imagine that they were conceived and executed with the conscious effort to obtain some abstract style independent of the material treated. The style they plainly have can spring from this common quality, their truthful and well understood representa- tion of forms. Style, then, is the expression of a clear under- standing of the material from which the artist works. Unless a drawing shows this understanding it L Would be as impossible as it would be gratuitous to argue that it could have style. But it would seem that some people mean by style nothing more than the mere superficial appearance of

the work. They would have a draughtsman draw " in the style of Holbein," but not " in the style " of Rembrandt. This kind of preference, as remarked above, is superficial, for it overlooks the main issue and purpose of drawing, viz. the representation, by any means whatever, of the artist's ideas of form. It is as though one should prefer a letter from Holbein to one from Rembrandt, though both were equally expressive, simply because Holbein's handwriting was prettier than Rembrandt's. Each draughtsman manifests a kind of handwriting peculiar to himself even in his most faithful rendering of form; and by this we can imme- diately recognize the artist; many, for instance Hogarth and some Japanese, seem to have let their quirks, full stops and so on, get the upper hand at the expense of serious, sensitive draughtsmanship.

It is fair to suppose that all abstract principles of aesthetic judgment, such as beauty of line, personality, style, nobility of thought, romanticism, are merely pretexts set up by people who would still affect to admire the drawings of recognized masters when they have neither the knowledge of, nor the care for, the forms of nature by virtue of which alone these drawings are what they are, and by which alone they can be immediately appreciated. (J. R. Fo.)

Drawing-Office Work. — In modern engineering, few pieces of mechanism are ever produced in the shops until their design has been settled in the " drawing office," and embodied in suitable drawings showing general and detailed views. This is a broad statement to which there are exceptions, to be noted presently.

Drawing-office work is divisible into four principal groups. First, there is the actual designing, by far the most difficult work, which is confined to relatively few well-paid men. The qualifications necessary for it are a good scientific, mathematical and engineering training, and a specialized experience gathered in the particular class of mechanism to which the designing relates. Second, there is the work of the rank and file who take instructions from the chiefs, and elaborate the smaller details and complete the drawings. Third, there are the tracers, either youths or girls, who copy drawings on tracing paper without necessarily understanding them. Fourth, there is a printing department in which phototypes are produced on sensitized paper from tracings.

The character of the drawings used includes the general drawings, or those which show a mechanism complete; and the detailed drawings, which illustrate portions isolated from their connexions and relationships. The first are retained in the office

for reference, and copies are only sent out to the men who have to assemble or erect and complete mechanisms. The second are distributed to the several shops and departments where sectional portions are being prepared, as pattern shop, smithy, turnery, machine shop, &c. General drawings are, as a rule, drawn to a small scale, ranging say from | in. to i in. to the foot; but details are either to actual size, or to a large scale, as from i| in. to the foot or 3 in. or 6 in. to the foot.

A large number of minutiae are omitted from general drawings, but in the detailed ones that are sent into the shops nothing is apparently too trivial for insertion. In this respect, however, there is much difference observable in the practice of different firms, and in the best practice of the present compared with that of former years. In the detailed drawings issued by many firms now, every tiny element and section is not only drawn to actual size, but also fully dimensioned, and the material to be used is specified in every case. This practice largely adds to the work of the drawing-office staff, but it pays.

The present tendency therefore is to throw more responsibility than of old on the drawing-office staff, in harmony with the tendency towards greater centralization of authority. Much of detail that was formerly left to the decision of foremen and skilled hands is now determined by the drawing-office staff. Heterogeneity in details is thus avoided, and the drawings reflect accurately and fully the past as well as the present practice of the firm. To so great an extent is this the case that the preparation of the tools, appliances, templets, jigs and fixtures used in the shops is often now not permitted to be undertaken until proper drawings have been prepared for them, though formerly the foreman's own hand sketches generally sufficed. The practice of turret work has been contributory to this result. In many establishments now the designing of shop tools and fixtures is done in a department of the office specially set apart for that kind of work.

The growing specialization of the engineer's work is reflected in the drawing office. Specialists are sought after, and receive the highest rates of pay. A man is required to be an expert in some one branch, as electric cranes or hydraulic machines, steel works plant, lathes, or heavy or light machine tools. The days are past in which all-round

men were in request. In those firms which manufacture a large range of machinery, the drawing- office staff is separated into departments, each under its own chief, and there is seldom any transference of men from one to another.

Although in the majority of instances designs and drawings are completed before the manufacture is undertaken, exceptions to this rule occur in connexion with the work of standardizing machines and motors, for repetitive and interchangeable manu- facture on a large scale. Here it is so essential to secure the most minute economies in manufacture that the first articles made are of a more or less experimental character. Only after no further improvement seems for the time being possible are the drawings made or completed for standard use and reference. In some modern shops even standardized drawings are scarcely used, but their place is taken by the templets, jigs and fixtures which are employed by the workmen as their sole guides in machining and assembling parts. By the employment of these aids locations and dimensions are embodied and fixed absolutely for any number of similar parts; reference to drawings thus becomes unnecessary, and they therefore fall into disuse.

The mechanical Work of the drawing office is confined strictly to orthographic projections and sections of objects. Per- spective views are of ho value, though occasionally an object is sketched roughly in perspective as an aid to the rapid grasp of an idea. Drawings involve plans, elevations, and sectional views, in vertical and angular relations.

There are a good many conventionalities adopted which have no correspondences in fact, with the object of saving the draughts- man's time; or else, as in the case of superposition of plans and sections, to show in one view what would otherwise require two drawings. Among the convenient conventionalities are the indications of toothed wheels by their pitch lines only, of screws

by parallel lines and by diagonal shade lines; and of rivets, bolts and studs by their centres only. The adoption of this practice never leads to error.

In the preliminary preparation of drawings in pencil no distinction is made between full or unbroken lines, and dotted or centre lines, and the actual outlines of the objects. These differences are made when the inking-in is being done. Indian or Chinese ink is used, because it does not run when colours are applied. There are conventional colours used to indicate different materials. But colouring is not adopted so much as formerly, because of the practice of making sun prints instead of the more expensive tracings for the multiplication of drawings. When tracings are coloured the colour is applied on the

back instead of on the side where the ink lines are drawn.

The economical importance of the printing department of the drawing office cannot be overestimated. Before its introduction drawings could only be reproduced by laborious tracing on paper or cloth, the first being flimsy, the second especially liable to absorb grease from the hands of the workmen. By the sun copying processes (see Sun Copying) any number of prints can be taken from a single tracing. But even the fickle sun is being displaced by electricity, so that prints can be made by night as well as day, on cloudy days as well as on bright ones. Twenty minutes of bright sunshine is required for a print, but the electric light produces the same result within five minutes. Prints are blue, white or brown. The advantage of white is that they can be coloured. But the majority are blue (white lines on blue ground). All can be had on stout, thin or medium paper.

An innovation in drawing-office equipment is that of vertical boards, displacing horizontal or sloping ones. They have the advantage that the draughtsman is able to avoid a bending posture at his work. The objection on the ground that the tee- square must be held up constantly with one hand is overcome by supporting and balancing it with cords and weights. (J. G. H.)

DRAWING AND QUARTERING, part of the penalty anciently ordained in England for treason. Until 1870 the full punishment for the crime was that the culprit be dragged on a hurdle to the place of execution; that he be hanged by the neck but not till he was dead; that he should be disembowelled or drawn and his entrails burned before his eyes; that his head be cut off and his body divided into four parts or quartered. This brutal penalty was first inflicted in 1284 on the Welsh prince David, and on Sir William Wallace a few years later. In Richard III.'s reign one Collingbourne, for writing the famous couplet " The Cat, the Rat and Lovel the Dog, Rule all England under the Hog," was executed on Tower Hill. Stow says, " After having been hanged, he was cut down immediately and his entrails were then extracted and thrown into the fire, and all this was so speedily done that when the executioners pulled out his heart he spoke and said 'Jesus, Jesus.'" Edward Marcus Despard and his six accom- plices were in 1803 hanged, drawn and quartered for conspiring to assassinate George III. The sentence was last passed (though not carried out) upon the Fenians Burke and O'Brien in 1867. There is a tradition that Harrison the regicide, after being disembowelled, rose and boxed the ears of the executioner.

DRAWING-ROOM (a shortened form of " with-drawing room," the

longer form being usual in the 16th and 17th centuries), the English name generally employed for a room used in a dwelling- house for the reception of company. It originated in the setting apart of such a room, as the more private and exclusive preserve of the ladies of the household, to which they withdrew from the dining-room. The term " drawing-room " is also used in a special sense of the formal receptions or " courts " held by the British sovereign or his representative, at which ladies are presented, as distinguished from a " levee," at which men are presented.

DRAYTON, MICHAEL (1563-1631), English poet, was born at Hartshill, near Atherstone, in Warwickshire in 1563. Even in childhood it was his great ambition to excel in writing verses. At the age of ten he was sent as page into some great family, and a little later he is supposed to have studied for some time at Oxford. Sir Henry Goodere of Powlesworth became his patron, and introduced him to the countess of Bedford, and for

several years he was esquire to Sir Walter Aston. How the early part of his life was spent, however, we possess no means of ascertaining. It has been surmised that he served in the army abroad. In 1590 he seems to have come up to London, and to have settled there.

In 1591 he produced his first book, The Harmony of the Church, a volume of spiritual poems, dedicated to Lady Devereux. The best piece in this is a version of the Song of Solomon, executed with considerable richness of expression. A singular and now incomprehensible fate befell the book; with the exception of forty copies, seized by the archbishop of Canterbury, the whole edition was destroyed by public order. It is probable that he had come up to town laden with poetic writings, for he published a vast amount within the next few years. In 1593 appeared Idea: The Shepherd's Garland, a collection of nine pastorals, in which he celebrated his own love-sorrows under the poetic name of Rowland. The circumstances of this passion appear more distinctly in the cycle of 64 sonnets, published in 1594, under the title of Idea's Mirror, by which we learn that the lady lived by the river Ankor in Warwickshire. It appears that he failed to win his " Idea," and lived and died a bachelor. In 1593 appeared the first of Drayton's historical poems, The Legend of Piers Gaveston, and the next year saw the publication of Matilda, an epical poem in rhyme royal. It

was about this time, too, that he brought out Endimion and Phoebe, a volume which he never republished, but which contains some interesting autobiographical matter, and acknowledgments of literary help from Lodge, if not from Spenser and Daniel also. In his Fig for Momus, Lodge has reciprocated these friendly courtesies. In 1596 Drayton published his long and important poem of Mortimerades, which deals with the Wars of the Roses, and is a very serious production in ottava rima. He afterwards enlarged and modified this poem, and republished it in 1603 under the title of The Barons' Wars. In 1596 also appeared another historical poem, The Legend of Robert, Duke of Normandy, with which Piers Gaveston was reprinted. In 1597 appeared England's Heroical Epistles, a series of historical studies, in imitation of those of Ovid. These last poems, written in the heroic couplet, contain some of the finest passages in Drayton's writings.

With the year 1597 the first half of the poet's literary life closes. He had become famous by this rapid production of volumes, and he rested on his oars. It would seem that he was much favoured at the court of Elizabeth, and he hoped that it would be the same with her successor. But when, in 1603, he addressed a poem of compliment to James I., on his accession, it was ridiculed, and his services rudely rejected. His bitterness of spirit found expression in a satire, The Owl, which he printed in 1604, although he had no talent in this kind of composition. Not much more entertaining was his scriptural narrative of Moses in a Map of his Miracles, a sort of epic in heroics printed the same year. In 1605 Drayton reprinted his most important works, that is to say, his historical poems and the Idea, in a single volume which ran through eight editions during his lifetime. He also collected his smaller pieces, hitherto unedited, in a volume undated, but probably published in 1605, under the title of Poems Lyric and Pastoral; these consisted of odes, eclogues, and a fantastic satire called The Man in the Moon. Some of the odes are extremely spirited. In this volume he printed for the first time the famous Ballad of Agincourt.

He had adopted as early as 1598 the extraordinary resolution of celebrating all the points of topographical or antiquarian interest in the island of Great Britain, and on this laborious work he was engaged for many years. At last, in 1613, the first part of this vast work was published under the title of Poly-Olbion, eighteen books being produced, to which the learned Selden supplied notes. The success of this great work, which has since become so famous, was very small at first, and not until 1622 did Drayton succeed in finding a publisher willing to undertake the risk of bringing out twelve more

books in a second part. This completed the survey of England, and the poet, who had hoped " to crown Scotland with flowers," and arrive at last at the Orcades, never crossed the Tweed. In 1627 he published

another of his miscellaneous volumes, and this contains some of his most characteristic and exquisite writing. It consists of the following pieces: The Battle of Agincourt, an historical poem in ottava rima (not to be confused with his ballad on the same subject), and The Miseries of Queen Margaret, written in the same verse and manner; Nimphidia, the Court of Faery, a most joyous and graceful little epic of fairyland; The Quest of Cinthia and The Shepherd's Sirena, two lyrical pastorals; and finally The Moon Calf, a sort of satire. Of these Nimphidia is perhaps the best thing Drayton ever wrote, except his famous ballad on the battle of Agincourt; it is quite unique of its kind and full of rare fantastic fancy.

The last of Drayton's voluminous publications was The Muses' Elizium in 1630. He died in London on the 23rd of December 163 1, was buried in Westminster Abbey, and had a monument placed over him by the countess of Dorset, with memorial lines attributed to Ben Jonson. Of the particulars of Drayton's life we know almost nothing but what he himself tells us; he enjoyed the friendship of some of the best men of the age. He corresponded familiarly with Drummond; Ben Jonson, William Browne, George Wither and others were among his friends. There is a tradition that he was a friend of Shakespeare, supported by a statement of John Ward, once vicar of Stratford- on-Avon, that " Shakespear, Drayton and Ben Jonson had a merry meeting, and it seems, drank too hard, for Shakespear died of a feavour there contracted." In one of his poems, an " elegy " or epistle to Mr Henry Reynolds, he has left some valuable criticisms on poets whom he had known. He was even engaged in the labour of the dramatists; at least he had a share, with Munday, Chettle and Wilson, in writing Sir John Oldcastle, which was printed in 1600. That he was a restless and discontented, as well as a worthy, man may be gathered from his own admissions.

The works of Drayton are bulky, and, in spite of the high place that he holds in critical esteem, it cannot be pretended that he is much read. For this his ponderous style is much to blame. The Poly-Olbion, the most famous but far from the most suc- cessful of his writings, is tedious and barren in the extreme. It was, he tells us, a " Herculean toil " to him to compose it, and we are conscious of the effort. The metre in which it is composed, a couplet of alexandrines, like the French classical measure, is wholly unsuited to the English language,

and becomes excessively wearisome to the reader, who forgets the learning and ingenuity of the poet in labouring through the harsh and over- grown lines. His historical poems, which he was constantly re-writing and improving, are much more interesting, and often rise to a true poetic eloquence. His pastorals are brilliant, but overladen with colour and sweet to insipidity. He is, with the one magnificent exception of " Since there's no help, come let us kiss and part," which was first printed in 1619, an indifferent sonneteer. The poet with whom it is most natural to compare him is Daniel; he is more rough and vigorous, more varied and more daring than the latter, but Daniel surpasses him in grace, delicacy and judgment. In their elegies and epistles, however, the two writers frequently resemble each other. Drayton, however, approaches the very first poets of the Elizabethan era in his charming Nimphidia, a poem which inspired Herrick with his sweet fairy fancies and stands alone of its kind in English literature; while some of his odes and lyrics are inspired by noble feeling and virile imagination.

In 1748 a folio edition of Drayton's complete works was published under the editorial supervision of William Oldys, and again in 1753 there appeared an issue in four volumes. But these were very un-intelligently and inaccurately prepared. A complete edition of Drayton's works with variant readings was projected by Richard Hooper in 1876, but was never carried to a conclusion; a volume of selections, edited by A. H. Bullen, appeared in 1883. See especially Oliver Elton, Michael Drayton (1906). (E. G.)

DREAM (from a root dreug, connected with Germ, triigen, to deceive), the state of consciousness during sleep; it may also be defined as a hallucination or illusion peculiarly associated with the condition of sleep, but not necessarily confined to that state. In sleep the withdrawal of the mind from the external

world is more complete and the objectivity of the dream images is usually unquestioned, whereas in the waking state the hallucination is usually recognized as such; we may, however, be conscious that we are dreaming, and thus in a measure be aware of the hallucinatory character of our percepts. The physiological nature of sleep (q.v. ; see also Muscle and Nerve) and of dreaming is obscure. As a rule the control over the voluntary muscles in dreams is slight; the sleep-walker is the exception and not the rule, and the motor activity

represented in the dream is seldom realized in practice, largely, no doubt, because we are ignorant, under these circumstances, of the spatial relations of our bodies. Among the psychological problems raised by dreams are the condition of attention, which is variously regarded as altogether absent or as fixed, the extent of mental control, and the relation of ideas and motor impulses. There is present in all dreams a certain amount of dissociation of consciousness, or of obstructed association, which may manifest itself in the preliminary stage of drowsiness by such phenomena as the apparent transformation or inversion of the words of a book. We may distinguish two types of dreams, (a) representative or centrally initiated, (b) presentative or due to the stimulation of the end organs of sense. In both cases, the dream having once been initiated, we are concerned with a process of reasoning, i.e. the combination of ideas suggested by resemblances or other associative elements. The false reasoning of dreams is due in the first place to the absence, to a large extent, of the memory elements on which our ordinary reasoning depends, and, secondly, to the absence of sensory elements.

Objectivity of Dreams. — In waking life we distinguish ideas or mental images from real objects by the fact that we are able under normal circumstances to dismiss the former at will. In sleep, on the other hand, we have, in the first place, no real objects with which to compare the images, which therefore take on a character of reality comparable to the hallucination of waking life; moreover, powers of visualization and other faculties are enhanced in sleep, so that the strength of dream images con- siderably exceeds those of the mental images of the ordinary man; changes in powers of attention, volition and memory help to increase the hallucinatory force of the dream. In the second place, the ideas of our dreams are presented in the form of images, which we are- unable to dismiss; we therefore mistake them for realities, exactly as the sufferer from delirium tremens in waking life is apt to regard his phantoms as real.

Relations of Dreaming and Sleep. — It has been maintained by Hamilton and others (see below, Modern Views) that dreams invariably accompany sleep, and that we always find ourselves dreaming when we are awakened. But even if it were true that dreams were invariably experienced at the moment of waking, this would not by any means establish the invariable concomitance of dreams and sleep of all sorts; at most it would show that imperfect sleep is a condition of dreaming; in the same way, dreams before wakening, known to have taken place either from the recollection of the dreamer or from the observation of another person, may clearly be due to imperfect wakening, followed by a deepening of sleep. It is,

however, by no means true that awakening from sleep is invariably accompanied by a dream; in considering the question it must be recollected that it is complicated by the common experience of very rapid forgetfulness of even a vivid and complicated dream, only the fact of having dreamt remaining in the memory; it is clear that amnesia may go so far that even the fact of dreaming may be forgotten. On the whole, however, there appear to be no good grounds for the assertion that we always dream when we are asleep. On the other hand, there is no proof that partial awakening is a necessary condition of dreaming.

Representative Dreams. — Centrally initiated dreams may be due to a kind of automatic excitation of the cerebral regions, especially in the case of those clearly arising from the occupations or sensations of the day or the hours immediately preceding the dream. To the same cause we may attribute the recalling of images apparently long since forgotten. Some of these revivals of memory may be due to the fact that links of association which

are insufficient to restore an idea to consciousness in the waking state may suffice to do so in sleep. Just as a good visualizer in his waking moments may call up an object never clearly seen and yet distinguish the parts, so in sleep, as L. F. A. Maury (1817-1892) and others have shown, an image may be more distinct in a dream than it was when originally presented (see also below, Memory).

Presentative Dreams. — The dreams due to real sensations, more or less metamorphosed, may arise (a) from the states of the internal organs, (b) from muscular states, (c) from subjective sensations due to the circulation, &c, or (d) from the ordinary cause of the action of external stimuli on the organs of sense.

(a) The state of the stomach, heart, &c, haslongbeenrecognized as important in the causation of dreams (see below, Classical Views). The common sensation of flying seems to be due in many cases to the disturbance of these organs setting up sen- sations resembling those felt in rapidly ascending or descending, as in a swing or a lift. Indigestion is a frequent cause of night- mare—the term given to oppressive and horrible dreams — and bodily discomfort is sometimes translated into the moral region, giving rise to the dream that a murder has been committed. (b) Dreams of flying, &c, have also been attributed to the condition of the muscles during sleep; W. Wundt remarks that the movements of the body, such as breathing, extensions of the limbs and so on, must give rise to dream fancies; the awkward position of the limbs may also excite images, (c)

Especially important, probably, for the dreams of the early part of the night are the retinal conditions to which are due the illusions hypnagogiques of the preliminary drowsy stage; but probably Ladd goes too far in maintaining that entoptic stimuli, either, intra- or extra-organic in origin, condition all dreams. Illusions hypnagogiques, termed popularly " faces in the dark," of which Maury has given a full account, are the not uncommon sensations experienced, usually visual and seen with both open and closed eyes, in the interval between retiring to rest and actually falling asleep; they are comparable to the crystal-gazing visions of waking moments; though mainly visual they may also affect other senses. Besides the eye the ear may supply material for dreams, when the circulation of the blood suggests rushing waters or similar ideas, (d) It is a matter of common observation that the temperature of the surface of the body determines in many cases the character of the dreams, the real circumstances, as might be expected from the general character of the dream state, being exaggerated. In the same way the pres- sure of bed-clothes, obstruction of the supply of air, &c, may serve as the starting-point of dreams. The common dream of being unclothed may perhaps be due to this cause, the sensations associated with clothing being absent or so far modified as to be unrecognizable. In the same way the absence of foot-gear may account for some dreams of flying. It is possible to test the influence of external stimuli by direct experiment; Maury made a number of trials with the aid of an assistant.

Rapidity of Dreams. — It has often been asserted that we dream with extreme rapidity; but this statement is by no means borne out by experiment. In a trial recorded by J. Claviere the beginning of the dream was accurately fixed by the sounding of an alarm clock, which rang, then was silent for 22 seconds, and then began to ring continuously; the dream scene was in a theatre, and he found by actual trial that the time required in ordinary life for the performance of the scenes during the interval of silence was about the same as in ordinary? life. Spontaneous dreams seem to show a different state of things; it must be remembered that (1) dreams are commonly a succes- sion of images, the number of which cannot be legitimately compared with the number of extra-organic stimuli which would correspond to them in ordinary life; the real comparison is with mental images; and (2) the rapidity of association varies enormously in ordinary waking life. No proof, therefore, that some dreams are slow can show that this mentation in others is not extremely rapid. The most commonly quoted case is one of Maury's; a bed-pole fell on his neck, and (so it is stated)

he dreamt of the French Revolution, the scenes culminating in the fall of the guillotine on his neck; this has been held to show that (i) dreams are extremely rapid; and (2) we construct a dream story leading up to the external stimulus which is assumed to have originated the dream. But Maury's dream was not recorded till many years after it had occurred; there is nothing to show that the dream, in this as in other similar cases, was not in progress when the bed-pole fell, which thus by mere coincidence would have intervened at the psychological moment; Maury's memory on waking may have been to some extent hallucinatory. But there are records of waking states, not necessarily abnormal, in which time-perception is disturbed and brief incidents seem interminably long; on the other hand, it appears from the experiences of persons recovered from drowning that there is great rapidity of ideation before the extinction of consciousness; the same rapidity of thought has been observed in a fall from a bicycle.

Reason in Dreams. — Studies of dreams of normal individuals based on large collections of instances are singularly few in number; such as there are indicate great variations in the source of dream thoughts and images, in the coherence of the dream, and in the powers of memory. In ordinary life attention dominates the images presented; in dreams heterogeneous and disconnected elements are often combined; a resemblance need not even have been consciously recognized for the mind to com- bine two impressions in a dream; for example, an aching tooth may (according to the dream) be extracted, and found to resemble rocks on the sea-shore, which had not struck the waking mind as in any way like teeth. Incongruence and incoherence are not, however, a necessary characteristic of dreams, and individuals are found whose dream ideas and scenes show a power of reasoning and orderliness equal to that of a scene imagined or experienced in ordinary life. In some cases the reasoning power may attain a higher level than that of the ordinary conscious life. In a well-authenticated case Professor Hilprecht was able in a dream to solve a difficulty connected with two Babylonian inscriptions, which had not previously been recognized as com-plementary to each other; a point of peculiar interest is the dramatic form in which the information came to him — an old Babylonian priest appeared in his dream and gave him the clue to the problem (see also below, Personality).

Memory in Dreams. — Although prima facie the dream memory is fragmentary and far less complete than the waking memory, it is by no means uncommon to find a revival in sleep of early, apparently quite forgotten, experiences: more striking is the recollection in dreams of matters never supraliminally (see Subliminal Self) apperceived at all.

The relation between the memory in dreams and in the hypnotic trance is curious: suggestions given in the trance may be accepted and then forgotten or never remembered in ordinary life; this does not prevent them from reappearing occasionally in dreams; conversely dreams forgotten in ordinary life may be remembered in the hypnotic trance. These dream memories of other states of consciousness suggest that dreams are some- times the product of a deeper stratum of the personality than comes into play in ordinary waking life. It must be remembered in this connexion that we judge of our dream consciousness by our waking recollections, not directly, and our recollection of our dreams is extraordinarily fragmentary; we do not know how far our dream memory really extends. Connected with memory of other states is the question of memory in dreams of previous dream states; occasionally a separate chain of memory, analogous to a secondary personality, seems to be formed. We may be also conscious that we have been dreaming, and subse- quently, without intermediate waking, relate as a dream the dream previously experienced. In spite of the irrationality of dreams in general, it by no means follows that the earlier and later portions of a dream do not cohere; we may interpolate an episode and again take up the first motive, exactly as happens in real life. The strength of the dream memory is shown by the recurrence of images in dreams; a picture, the page of a book, or other image may be reproduced before our eyes several times

in the course of a dream without the slightest alteration, although the waking consciousness would be quite incapable of such a feat of visualizing. In this connexion may be mentioned the pheno- menon of redreaming; the same dream may recur either on the same or on different nights; this seems to be in many cases pathological or due to drugs, but may also occur under normal conditions.

Personality. — As a rule the personality of the dreamer is unchanged; but it also happens that the confusion of identity observed with regard to other objects embraces the dreamer himself; he imagines himself to be some one else; he is alter- nately actor and observer; he may see himself playing a part or may divest himself of his body and wander incorporeally. Ordinary dreams, however, do

not go beyond a splitting of personality; we hold conversations, and are intensely surprised at the utterances of a dream figure, which, however, is merely an alter ego. As in the case of Hilprecht (see above) the informa- tion given by another part of the personality may not only appear but actually be novel.

Supernormal Dreams. — In addition to dreams in which there is a revival of memory or a rise into consciousness of facts previously only subliminally cognized, a certain number of dreams are on record in which telepathy (q.v.) seems to play a part; much of the evidence is, however, discounted by the possibility of hallucinatory memory. Another class of dreams (prodromic) is that in which the abnormal bodily states of the dreamer are brought to his knowledge in sleep, sometimes in a symbolical form; thus a dream of battle or sanguinary conflict may presage a haemorrhage. The increased power of suggestion which is the normal accompaniment of the hypnotic trance may make its appearance in dreams, and exercise either a curative influence or act capriciously in producing hysteria and the tropic changes known as " stigmata." We may meet with various forms of hyperaesthesia in dreams; quite apart from the recovery of sight by those who have lost it wholly or in part (see below, Dreams of the Blind), we find that the powers of the senses may undergo an intensification, and, e.g., the power of appreciating music be enormously enhanced in persons usually indifferent to it. Mention must also be made of the experience of R. L. Stevenson, who tells in Across the Plains how by self-suggestion he was able to secure from his dreams the motives of some of his best romances.

Voluntary Action in Dreams. — Connected with dreams volun- tarily influenced is the question of how far dreams once initiated are modifiable at the will of the dreamer. Some few observers, like F. W. H. Myers and Dr F. van Eeden, record that they can at longer or shorter intervals control their actions in their dreams, though usually to a less extent than their imagined actions in waking life. Dr van Eeden, for example, tells us that he has what he calls a " clear dream " once a month and is able to predetermine what he will do when he becomes aware that he is dreaming.

Dreams of Children. — Opinions differ widely as to the age at which children begin to dream; G. Compayre' maintains that dreaming has been observed in the fourth month, but reflex action is always a possible explanation of the observed facts. S. de Sanctis found that in boys of eleven only one out of eight said that he dreamt seldom, as against four out of seven at the age of six; but we cannot exclude the possibility that dreams were frequent but forgotten. If correct, the

observation suggests that dreams appear comparatively late. Individual cases of dreaming, or possibly of waking hallucination, are known as early as the age of two and a half years; according to de Sanctis dreams occur before the fifth year, but are seldom remembered; as a rule the conscious dream age begins with the fourth year; speech or movement, however, in earlier years, though they may be attributed to reflex action, are more probably due to dreams.

Dreams of the Old. — In normal individuals above the age of sixty-five de Sanctis found dreams were rare; atmospheric influences seem to be important elements in causing them; memory of them is weak; they are emotionally poor, and deal with long past scenes.

• Dreams of Adults. — Any attempt to record or influence our dreams may be complicated by (a) direct suggestion, leading to the production of the phenomena for which we are looking, and (b) indirect suggestion leading to the more lively recollection of dreams in general and of certain dreams in particular. Conse- quently it cannot be assumed that the facts thus ascertained represent the normal conditions. According to F. Heerwagen's statistics women sleep more lightly and dream more than men; the frequency of dreams is proportional to their vividness; women who dream sleep longer than those who do not; dreams tend to become less frequent with advancing age. The total number of remembered dreams varies considerably with different observers, some attaining an average of ten per night. The senses mainly active in dreams are, according to one set of experiments, vision in 60%, hearing in 5%, taste in 3%, and smell in 1.5%, where the dreamers had looked at coloured papers before falling asleep; when taste or smell had been stimulated, the visual dreams fell to about 50%, and the sense stimulated was active twice as often as it would otherwise be; dreams in which motion was a prominent feature were 10% of the former class, 14% and 18% of the two latter. Experiments by J. Mourly Void show even more distinctly the influence of suggestion both as to the form, visual or otherwise, and the content (colours and forms of objects) of dreams. According to most observers dreams are most vivid and frequent between the ages of 20 and 25, but H. Maudsley puts the maximum between 30 and 35. De Sanctis got replies from 165 men and 55 women: the proportion between the sexes closely agrees with the results attained by Heerwagen and M. W. Calkins; 13% of men

and 33% of women said they always dreamt, 27% and 45% often, 50% and 13% rarely, and the remainder (precisely the same percentage for men and women — 9.09) either did not dream or did not remember that they dreamt. Nearly twice as many women as men had vivid dreams; in the matter of complication of the dream experiences the sexes are about equal; daily life supplies more material in the dreams of men; nearly twice as many women as men remember their dreams clearly, a fact which hangs together to some extent with the vividness of the dreams, though it by no means follows that a vivid dream is well remembered. There are great variations in the emotional character of dreams; some observers report twice as many unpleasant dreams as the reverse; in other cases the emotions seem to be absent ; others again have none but pleasing dreams. Individual experience also varies very largely as to the time when most dreams are experienced; in some cases the great majority are subsequent to 6.30 a.m. ; others find that quite half occur before 4.0 a.m.

Dreams of the Neuropathic, Insane, Idiots, &c. — Much attention has been given to the dreams of hysterical subjects. It appears that their dreams are specially liable to exercise an influence over their waking life, perhaps because they do not distinguish them, any more than their waking hallucinations, from reality. P. Janet maintains that the cause of hysteria may be sought in a dream. The dreams of the hysterical have a tendency to recur. Epileptic subjects dream less than the hysterical, and their dreams are seldom of a terrifying nature; certain dreams seem to take the place of an epileptic attack. Dreaming seems to be rare in idiots. De Sanctis divides paranoiacs into three classes: (a) those with systematized delusions, (b) those with frequent hallucinations, and © degenerates; — the dreams of the first class resemble their delusions; the second class is distinguished by the complexity of its dreams; the third by their vividness, by their delusions of megalomania, and by their influence on daily life. Alcoholic subjects have vivid and terrifying dreams, characterized by the frequent appearance of animals in them, and delirium tremens may originate during sleep.

*Dreams of the Blind, Deaf, &*c. — As regards visual dreams the blind fall into three classes — (1) those who are blind from birth or become blind before the age of five; (2) those who become blind at the " critical age " from five to seven; (3) those who become blind after the age of seven. The dreams of the first class are non-visual; but in the dreams of Helen Keller there are traces of*

a visual content; the second class sometimes has visual dreams; the

third class does not differ from normal persons, though visual dreams may fade away after many years of blindness. In the case of the partially blind the clearness of vision in a dream exceeds that of normal life when the partial loss of sight occurred in the sixth or later years. The education of Helen Keller is interesting from another point of view; after losing the senses of sight and hearing in infancy she began her education at seven years and was able to articulate at eleven; it is recorded that she "talked" in her dreams soon after. This accords with the experience of normal individuals who acquire a foreign language. Her extraordinary memory enables her to recall faintly some traces of the sunlit period of her life, but they hardly affect her dreams, so far as can be judged. The dreams of the blind, according to the records of F. Hitschmann, present some peculiarities; animals as well as man speak; toothache and bodily pains are perceived as such; impersonal dreaming, taking the form of a drama or reading aloud, is found; and he had a strong tendency to reproduce or create verse.

Dreams of Animals. — We are naturally reduced to inference in dealing with animals as with very young children; but various observations seem to show that dreams are common in older dogs, especially after hunting expeditions; in young dogs sleep seems to be quieter; dogs accustomed to the chase seem to dream more than other kinds.

Dreams among the Non-European Peoples. — In the lower stages of culture the dream is regarded as no less real and its personages as no less objective than those of the ordinary waking life; this is due in the main to the habit of mind of such peoples (see Animism) , but possibly in some measure also to the occurrence of veridical dreams (see Telepathy). In either case the savage explanation is animistic, and animism is commonly assumed to have been developed very largely as a result of theorising dreams. Two explanations of a dream are found among the lower races: (1) that the soul of the dreamer goes out, and visits his friends, living or dead, his old haunts or unfamiliar scenes and so on; or (2) that the souls of the dead and others come to visit him, either of their own motion or at divine command. In either of the latter cases or at a higher stage of culture when the dream is regarded as god-sent, though no longer explained in terms of animism, it is often regarded as oracular (see Oracle), the explanation being sometimes symbolical, sometimes simple.

There are two classes of dreams which have a special import- ance in the lower cultures: (1) the dream or vision of the initia- tion fast;

and (2) the dream caused by the process known as incubation, which is often analogous to the initiation fast. In many parts of North America the individual Indian acquires a tutelary spirit, known as manito or nagual, by his initiation dream or vision; the idea being perhaps that the spirit by the act of appearing shows its subjection to the will of the man. Similarly, the magician acquires his familiar in North America, Australia and elsewhere by dreaming of an animal. Incubation consists in retiring to sleep in a temple, sometimes on the top of a mountain or other unusual spot, in order to obtain a revelation through a dream. Fasting, continence and other observances are frequently prescribed as preliminaries. Certain classes of dreams have, especially in the middle ages, been attributed to the influence of evil spirits (see Demonology).

Classical and Medieval Views of Dreams. — Side by side with the prevalent animistic view of dreams we find in antiquity and among the semi-civilized attempts at philosophical or physio- logical explanations of dreams. Democritus, from whom the Epicureans derived their theory, held the cause of them to be the simulacra or phantasms of corporeal objects which are constantly floating about the atmosphere and attack the soul in sleep — a view hardly distinguishable from animism . Aristotle, however, refers them to the impressions left by objects seen with the eyes of the body; he further remarks on the exaggeration of slight stimuli when they are incorporated into a dream; a small sound becomes a noise like thunder. Plato, too, connects dreaming with the normal waking operations of the mind; Pliny, on the other hand, admits this only for dreams which take

place after meals, the remainder being supernatural. Cicero, however, takes the view that they are simply natural occurrences no more and no less than the mental operations and sensations of the waking state. The pathological side of dreams attracted the notice of physicians. Hippocrates was disposed to ad.mt that some dreams might be divine, but held that others were premonitory of diseased states of the body. Galen took the same view in some of his speculations.

Symbolical interpretations are combined with pathological no less than animistic interpretations of dreams; they are also extremely common among the lower classes in Europe at the present day, but in

this case no consistent explanation of their importance for the divination of future events is usually discoverable. Among the Greeks Plato in the Timaeus (ch. xlvi., xlvii.) explains dreams as prophetic visions received by the lower appetitive soul through the liver; their interpretation requires intelligence. The Stoics seem to have held that dreams may be a divine revelation, and more than one volume on the interpreta- tion of dreams has come down to us, the most important being perhaps the 'OveipoKpinKa of Daldianus Artemidorus. We find parallels to this in a Mussulman work by Gabdorrachaman, translated by Pierre Vattier under the name of Onirocrite mussulman, and in the numerous books on the interpretation of dreams which circulate at the present day. In Siam dream books are found (Intern. Archiv fur Anlhr. viii. 150); one of the functions of the Australian medicine man is to decide how a dream is to be interpreted.

Modern Views. — The doctrine of Descartes that existence depended upon thought naturally led his followers to maintain that the mind is always thinking and consequently that dreaming is continuous. Locke replied to this that men are not always conscious of dreaming, and it is hard to be conceived that the soul of the sleeping man should this moment be thinking, while the soul of the waking man cannot recollect in the next moment a jot of all those thoughts. That we always dream was main- tained by Leibnitz, Kant, Sir W. Hamilton and others; the latter refutes the argument of Locke by the just observation that the somnambulist has certainly been conscious, but fails to recall the fact when he returns to the normal state.

It has been commonly held by metaphysicians that the nature of dreams is explained by the suspension of volition during sleep; Dugald Stewart asserts that it is not wholly dormant but loses its hold on the faculties, and he thus accounts for the incoherence of dreams and the apparent reality of dream images.

Cudworth, from the orderly sequence of dre.am combinations and their novelty, argues that the state arises, not from any " fortuitous dancings of the spirits," but from the " phantastical power of the soul." According to K. A. Schemer, dreaming is a decentralization of the movement of life; the ego becomes purely receptive and is merely the point around which the peripheral life plays in perfect freedom. Hobbes held that dreams all proceed from the agitation of the inward parts of a man's body, which, owing to their connexion with the brain, serve to keep the latter in motion. For Schopenhauer the cause of dreams is the stimulation of the brain by the internal regions of the organism through the sympathetic nervous system. These

impressions the mind afterwards works up into quasi- realities by means of its forms of space, time, causality, &c.

Bibliography. — For full lists of books and articles see J. M. Baldwin's Dictionary of Philosophy, bibliography volume (1906), and S. de Sanctis, / Sogni, also translated in German with additions as Die Trdume. Important works are: — Binz, Uber den Traum; Giessler, A us den Tiefen des Traumlebens ; Maury, Le Sommeil et les reves; Radestock, Schlaf und Traum; Tessie, Les Reves; Spitta, Schlaf und Traumzustdnde. For super-normal dreams see F. W. H. Myers, Human Personality, vol. i., and Proc. S.P.R. viii. 362. For voluntary dreams see Proc. S.P.R. iv. 241, xvii. 112. On prophetic dreams see Monist, xi. 161; Bull. Soc. Anth. (Paris, 1901), 196, (1902), 228; Rev. de synthese historique (1901), 151, &c. On in- cubation see Deubner, De incubalione ; Maury, La Magic On the dreams of American Indians see Handbook of American Indians (Washington, 1907), s.v. " Dreams " and " Manito." On the interpretation of dreams see Freud, Die Traumdeutung. Other works are F. Greenwood, Imagination in Dreams; Hutchinson, Dreams and their Meanings. (N. W. T.)

DREDGE and DREDGING. The word " dredge " is used in two senses. (1) From Mid. Eng. dragie, through Fr. dragee, from Gr. Tpayrmara, sweetmeats, it means a confection of sugar formed with seeds, bits of spice or medicinal agents. The word in this sense is obsolete, but survives in " dredger," a box with a perforated top used for sprinkling such a sugar-mixture, flour or other powdered substance. " Dredge " is also a local term for a mixed crop of oats and barley sown together (" maslin " or " meslin," cf. Fr. dragie), and in mining is applied to ore of a mixed value. (2) Connected with " drag," or at least derived from the same root, dredge or dredger is a mechanical appliance for collecting together and drawing to the surface (" dredging ") objects and material from the beds of rivers or the bottom of the sea. In the following account the operations of dredging in this sense are discussed (1) as involved in hydraulic engineering, (2) in connexion with the work of the naturalist in marine biology.

1. Hydraulic Engineering

Dredging is the name given by engineers to the process of excavating materials under water, raising them to the surface and depositing them in barges, or delivering them through a shoot, a longitudinal conveyor, or pipes, to the place where it is desired to deposit them. It has long been useful in works of marine and hydraulic engineering,

and has been brought in modern times to a state of high perfection.

The employment of dredging plant and the selection of special appliances to be used in different localities and in varying circumstances require the exercise of sound judgment on the part of the engineer. In rivers and estuaries where the bottom is composed of light soils, and where the scour of the tide can be governed by training walls and other works constructed at reasonable expense, so as to keep the channel clear without dredging, it is manifest that dredging machinery with its large cost for working expenses and for annual upkeep should be as far as possible avoided. On the other hand, where the bottom consists of clay, rock or other hard substances, dredging must, in the first instance at any rate, be employed to deepen and widen the channel which it is sought to improve. In some instances, such as the river Mississippi, a deep channel has for many years been maintained by jetties, with occasional resort to dredging to preserve the required channel section and to hasten its enlargement. The bar of the river Mersey is 11 m. from land, and the cost of training works would be so great as to forbid their construction; but, by a capital expenditure of £120,000 and an annual expense of £20,000 for three years, the depth of water over the bar at low tide has been increased by dredging from n ft. to 27 ft., the channel being 1500 ft. wide.

" Bag and Spoon " Dredger. — The first employment of machinery for dredging is, like the discovery of the canal lock, claimed by Holland and Italy, in both of which countries it is believed to have been in use before it was introduced into Britain. The Dutch, at an early period, used what is termed the " bag and spoon " dredger for cleansing their canals. The "spoon" consisted of a ring of iron about 2 ft. in diameter flattened and steeled for about a third of its circumference and having a bag of strong leather attached to it by leathern thongs. The ring and bag were fixed to a pole which was lowered to the bottom from the side of a barge moored in the canal or river. The " spoon " was then dragged along the bottom by a rope made fast to the iron ring actuated by a windlass placed at the other end of the barge, the pole being prevented from rising by a hitched rope which caused the " spoon " to penetrate the bottom and fill the bag. When the " spoon " reached the end of the barge where the windlass was placed, the winding was still continued, and the suspended rope being nearly perpendicular the " bag " was raised to the gunwale of the barge and the excavated material emptied into the barge. The " bag " was then hauled back to the opposite end to be lowered for another supply. This system is still in use, but is only adaptable to a limited depth of water and a soft bottom; it has been

largely used in canals and frequently in the Thames. At the Fosdyke Canal in Lincolnshire 135,000 tons were raised in the manner described. According

to J. J. Webster \Proc. Inst. C. E. vol. 89), the first applica- tion of steam power for dredging operations was to a " spoon & bag " dredger for cleansing Sunderland harbour, the engine being made by Messrs Boulton & Watt of Soho, Birmingham.

Dredging by Bucket between Two Lighters. — Another plan of dredging, practised at an early period in rivers of considerable breadth, was to moor two barges, one on each side of the river. Between them was slung an iron dredging bucket, which was attached to both barges by chains wound on the barrels of a crab winch worked by six men in one barge and round a simple windlass worked by two men in the other barge; The bucket, being lowered at the side of the barge carrying the windlass, was drawn across the bottom of the river by the crab winch on the other barge; and having been raised and emptied, it was hauled across by the opposite windlass for repetition of the process. This process was in use in the River Tay until 1833.

Bucket Ladder Dredgers.— The earliest record of a bucket ladder dredger is contained in the first paper of the first volume (1836) of the Transactions of the Institution of Civil Engineers. This machine was brought into use at the Hull Docks about 1782. The bucket chain was driven by two horses working a horse-gear on the deck of the vessel. The buckets were con- structed of f in. bars of iron spaced \ in. apart, and were 4 ft. long, 13 in. deep, 12 in. wide at the mouth and about 6 in. wide at the bottom. This dredger raised about 30 tons per hour at the cost of 2jd. per ton, which covered the wages of three men working the dredger, eight men working the lighters and the keep of three horses. A dredger of this kind and power would only work in ballast, mud or other soft material, but the machine was gradu- ally improved and increased in capacity and power by different manufacturers until it became a very efficient machine in skilful hands, excavating and raising material from depths of 5 ft. to 60 ft. of water at a cost not very different from, and in many cases less than, that at which the same work could be performed on land. With the powerful dredgers now constructed, almost all materials, except solid rock or very large boulders, can be dredged with ease.

Loose gravel is perhaps the most favourable material to work in, but a powerful dredger will readily break up and raise indurated beds of gravel, clay and boulders, and has even found its way through the surface of soft rock, though it will not penetrate very far into it. In some cases steel diggers alternating with the buckets on the bucket frame have been successfully employed. The construction of large steam dredgers is now carried on by many engineering firms. The main feature of the machine is the bucket ladder which is hung at the top end by eye straps to the frame of the vessel, and at the lower end by a chain reived in purchase blocks and connected to the hoisting gear, so that the ladder may be raised and lowered to suit the varying depths of water in which the dredger works. The upper tumbler for working the bucket chain is generally square or pentagonal in form and made of steel with loose steel wearing pieces securely bolted to it. The tumbler is securely keyed to the steel shaft which is connected by gearing and shafting to the steam engine, a friction block being inserted at a convenient point to prevent breakage should any hidden obstacle causing unusual strain be met with in the path of the buckets. The lower tumbler is similar in construction to the upper tumbler, but is usually pentagonal or hexagonal in shape. The buckets are generally made with steel backs to which the plating of the buckets is riveted; the cutting edge of the buckets consists of a strong steel bar suitably shaped and riveted to the body. The intermediate links are made of hammered iron or steel with removable steel bushes to take the wear of the connecting pins, which are also of steel. The hoisting gear may be driven either from the main engine by frictional gearing or by an independent set of engines. Six anchors and chains worked by powerful steam crabs are provided for regulating the position of the dredger in regard to its work.

Barge-loading Dredgers used formerly to be provided with two ladders, one on each side of the vessel, or contained in wells formed in the vessel near each side. Two ladders were adopted, partly to permit the dredger to excavate the material close to a

quay or wall, and partly to enable one ladder to work while the other was being repaired. Bucket ladder dredgers are now, however, generally constructed with one central ladder working in a well; frequently the bucket ladder projects at either the head or stern of the vessel, to enable it to cut its own way through a shoal or bank, a construction which has been found very useful. In one modification of this method the bucket ladder is supported upon a traversing frame which slides along the fixed framing of the dredger and moves the bucket ladder forward as soon as it has been sufficiently lowered

to clear the end of the well. In places where a large quantity of dredging has to be done, a stationary dredger with three or four large hopper barges proves generally to be the most economical kind of plant. It has, however, the disadvantage of requiring large capital expenditure, while the dredger and its attendant barges take up an amount of space which is sometimes inconvenient where traffic is large and the navigable width narrow. The principal improvements made in barge-loading dredgers have been the increase in the size of the buckets and the strength of the dredging gear, the application of more economical engines for working the machinery, and the use of frictional gearing for driving the ladder-hoisting gear. It is very important that the main drive be fitted with the friction blocks or clutches before alluded to.

Up to the year 1877 dredgers were seldom made with buckets of a capacity exceeding 9 cub. ft., but since that time they have been gradually increased in capacity. In the dredger " Melbourne," constructed by Messrs William Simons & Co. to the design and specification of Messrs Coode, Son & Matthews, about the year 1886, the buckets had a capacity of 22 cub. ft., the dredger being capable of making 37 ft. of water. The driving power consists of two pairs of surface-condensing engines, each of 250 i.h.p., having cylinders 20 in. and 40 in. in diameter respectively, with a 30 in. stroke, the boiler pressure being 90 lb per sq. in. The vessel is 200 ft. long by 36 ft. wide and II ft. 6 in. deep, and is driven by twin screw propellers. The gearing is arranged so that either pair of engines can be em- ployed for dredging. The speed under steam is 7 knots, and in free- getting material 800 tons per hour can be dredged with ease. On one occasion the dredger loaded 400 tons in 20 minutes. The speed of the bucket chain is 83 lineal ft. per minute. The draught of the dredger in working trim is 7 ft. forward and 9 ft. aft. The efficiency of the machine, or the net work in raising materials compared with the power exerted in the cylinders, is about 25 %. The dredged material is delivered into barges moored alongside. Contrasting favourably with former experience, the " Melbourne " worked for the first six months without a single breakage. She is fitted with very powerful mooring winches, a detail which is of great importance to ensure efficiency in working.

The "St Austell " (Plate I. fig. 3), a powerful barge-loading dredger 195 ft. long by 35 ft. 6 in. beam by 13 ft. deep, fitted with twin-screw compound surface-condensing propelling engines of 1000 i.h.p., either set of engines being available for dredging, was constructed for H.M. Dockyard, Devonport, by Messrs Wm. Simons & Co. in 1896. This dredger loaded thirty-five 500-ton hopper barges

in the week ending April 2, 1898, dredging 17,500 tons of material in the working time of 29 hours 5 minutes.

An instance of a still larger and more powerful dredger is the "Develant," constructed by Messrs Wm. Simons & Co., for Nicolaiev, South Russia. She is a bow- well, barge-loading, bucket ladder dredger, with a length of 186 ft., a breadth, moulded, of 36 ft., and a depth, moulded, of 13 ft. The bucket ladder is of sufficient length to dredge 36 ft. below the water level. The buckets are exceptionally large, each having a capacity of 36 cub. ft., or fully two tons weight of material, giving a lifting capacity of 1890 tons per hour. At the dredging trials 2000 tons of spoil were lifted in one hour with an expenditure of 250 i.h.p. The propelling power is supplied by one pair of compound surface-condensing marine engines of 850 i.h.p., having two cylindrical boilers constructed for a working pressure of 120 lb per sq. in. Each boiler is capable of supplying steam to either the propelling or dredging machinery, thus allowing the vessel to always nave a boiler in reserve. On the trials a speed of 8 J knots was obtained. The bucket ladder, which weighs over 100 tons, exclusive of dredgings, is raised and lowered by a set of independent engines. For manoeuvring, powerful winches driven by independent engines are placed at the bow and stern. The vessel is fitted throughout with electric light, arc lamps being provided above the deck to enable dredging to be carried on at night. Steam steering gear, a repairing shop, a three-ton crane, and all the latest appliances are installed on board.

The " Derocheuse " (Plate II. fig. 12), constructed by Messrs Lobnitz & Co., is a good example of the dredger fitted with their patent rock cutters, as used on the Suez Canal. These rock cutters consist of stamps passing down through the bottom of the dredger, slightly in advance of the bucket chain, and are employed for break- ing up rock in front of the bucket ladder so that it may be raised by

buckets afterwards. This system of subaqueous rock cutting plant, on Messrs Lobnitz's patent system, was effectively employed in deepening the Manchester Ship Canal, and removed a considerable length of rock, increasing the depth of water from 26 ft. to 28 ft. at a cost of about 9d. per cub. yd. A full and illustrated description of this plant, and of a similar plant supplied to the Argentine Government, was published in Engineering of August 17, 1906. An illustration of a

bucket of 54 cub. ft. capacity constructed by Messrs Lobnitz & Co. is given (Plate II. fig. n), from which some idea of the size of dredging machinery as developed in recent practice may be ob- tained. In regard to the depth of water that can be obtained by dredging, it is interesting to note that the dredger " Diver," con- structed by Messrs. Hunter & English for Mr Samuel Williams of London, is capable of working in 60 ft. of water. In this vessel an ingenious arrangement was devised by Mr Williams, by which part of the weight of the dredger was balanced while the ladder itself could be drawn up through the bucket well and placed upon the deck, enabling a long ladder to be used for a comparatively short vessel. The " Tilbury " dredger, also constructed by Messrs Hunter & English, was able to dredge to a depth of 45 ft. below the surface of the water.

Hopper Barges. — To receive the materials excavated by barge-loading dredgers, steam hopper barges are now generally employed, capable of carrying 500 tons or more of excavation and of steaming loaded at a speed of about 9 m. per hour. These hopper barges are made with hinged flaps in their bottoms, which can be opened when the place of deposit is reached and the dredgings easily and quickly discharged.

Good examples of these vessels are the two steam hopper barges built for the Conservators of the river Thames in 1898. The dimensions are: length 190 ft., breadth 30 ft., depth 13 ft. 3 in., hopper capacity 900 tons. They are propelled by a set of triple expansion engines of 1200 i.h.p., with two return-tube boilers having a working pressure of 160 lb. Special appliances are provided to work the hopper doors by steam power from independent engines placed at the forward end of the hopper. A steam windlass is fixed forward and a steam capstan aft. The vessels are fitted with cabins for the officers and crew. On their trial trip, the hoppers having their full load, a speed of n knots was obtained, the coal consumption being 1-44 lb per i.h.p.

Methods of Dredging. — In river dredging two systems are pursued. One plan consists in excavating a series of longitudinal furrows parallel to the axis of the stream ; the other in dredging cross furrows from side to side of the river. It is found that inequalities are left between the longitudinal furrows when that system is practised, which do not occur, to the same extent, in side or cross dredging; and cross dredging leaves a more uniform bottom. In either case the dredger is moored from the head and stern by chains about 250 fathoms in length. These chains in improved dredgers are wound round windlasses worked by the engine, so that the vessel can be moved ahead or astern by simply throwing them into or out of gear.

In longitudinal dredging the vessel is worked forward by the head chain, while the buckets are at the same time performing the excavation, so that a longitudinal trench is made in the bottom of the river. After proceeding a certain length, the dredger is stopped and permitted to drop down and commence a new longitudinal furrow, parallel to the first one. In cross dredging, on the other hand, the vessel is supplied with four additional moorings, two on each side, and these chains are, like the head and stern' chains, wound round barrels worked by steam power. In cross dredging we may suppose the vessel to be moored at one side of the channel to be excavated. The bucket frame is set in motion, but instead of the dredger being drawn forward by the head chain, she is drawn across the river by the starboard chains, and, having reached the extent of her work in that direction, she is then drawn a few feet forward by the head chain, and the bucket frame being still in motion the vessel is hauled across by the port chains to the side whence she started. By means of this transverse motion of the dredger a series of cross cuts is made; the dredger takes out the whole excavation from side to side to a uniform depth and leaves no protuberances such as are found to exist between the furrows in longitudinal dredging, Even when it is executed with great care. The two systems will be understood by reference to fig. 1, where A and B are the

head and stern moorings, and C, D, E and F the side moorings. The arc e f represents the course of the vessel in cross dredging;

'SSSSEMlp

ifeSSfeiSˆssi

i-'i ', i: iilti ii-iiid

*i~**»*

c.

t I

Fig. 1. — Diagram showing Moorings for Transverse Dredging.

while in longitudinal dredging, as already explained, she is drawn forward towards A, and again dropped down to commence a new longitudinal furrow.

Hopper Dredgers. — In places where barge-loading dredgers are inconvenient, owing to confined space and interference with

navigation, and where it is necessary to curtail capital expendi- ture, hopper dredgers are convenient and economical. These dredgers were first constructed by Messrs. Wm. Simons & Co. of Renfrew, who patented and constructed what they call the " Hopper Dredger," combining in itself the advantages of a dredger for raising material and a scow hopper vessel for con- veying it to the place of discharge, both of which services are performed by the same engines and the same crew.

The vessel for this type of dredger is made of sufficient length and floating capacity to contain its own dredgings, which it carries out to the depositing ground as soon as its hopper is full. Considerable time is of course occupied in slipping and recovering moorings, and conveying material to the depositing ground, but these disadvantages are in many instances counterbalanced by the fact that less capital is required for plant and that less room is taken up by the dredger. If the depositing ground is far away, the time available for dredging is much curtailed, but the four-screw hopper dredger constructed by Messrs Wm. Simons & Co. for Bristol has done good work at the cost of Sd. per ton, including wages, repairs, coals, grease, sundries and interest on the first cost of the plant, notwithstanding that the material has to be taken 10 m. from the Bristol Dock. She can lift 400 tons of stiff clay per hour from a depth of 36 ft. below the water line, and the power required varies from 120 i.h.p. to 150 i.h.p., according to the nature of the material. The speed is 9 knots, and 4 propellers are provided, two at the head and two at the stern, to enable the vessel to steam equally well either way, as the river Avon is too narrow to permit her to be turned round.

The hopper dredger "La Puissante " (Plate I. fig. 4), constructed by Messrs Wm. Simons & Co. for the Suez Canal Co. for the improve- ment of Port Said Roads, is a fine example of this class of dredger. She is 275 ft. long by 47ft. beam by 19 ft. deep. The hopper capacity is 2000 tons, and the draught loaded 16 ft. 5 in. The maximum dredging depth is 40 ft., and the minimum dredging depth is only limited by the vessel's draught, she being able to cut her own way. The bucket ladder works through the well in the stern and weighs with buckets 120 tons. The buckets have each a capacity of 30 cub. ft. and raised on trial 1600 tons per hour. The dredger is propelled by two sets of independent triple expansion surface-condensing engines of 1800 i.h.p. combined, working with steam at 160 lb pressure, supplied by two mild steel multitubular boilers. Each set of engines is capable of driving the buckets independently at speeds of 16 and 20 buckets_ per minute. The bucket ladder is fitted with buffer springs at its upper end to lessen the shock when working in a

sea- way. The dredger can deliver the dredged material either into its own hopper or into barges lying on either side. The vessel obtained a speed of 9! knots per hour on trial. The coal consumption during 6 hours' steaming trial was 1-66 lb per i.h.p. hour. Fig. 9 (Plate I.) shows a still larger hopper dredger by the same constructors.

Dredgers fitted with Long Shoot or Shore Delivering Apparatus. — The first instance of dredgers being fitted with long shoots was in the Suez Canal. The soil in the lakes was very variable, the surface being generally loose mud which lay in some places in the sand, but frequently more or less on hard clay. Resort was had to shoots 230 ft. long, supported on pontoons connected with the hull of the dredger. The sand flowed away with a moderate supply of water to the shoots when they were fixed

at an inclination of about 1 in 20, but when the sand was mixed with shells these formed a coating which prevented the stream of water from washing out the shoot, and even with an inclination of 1 in 10 material could not be delivered. A pair of endless chains working down the long shoot overcame the difficulty, and also enabled hard clay in lumps to be dealt with. One dredger turned out about 2000 cub. yds. of thick clay in 15 hours, and when the clay was not hard it could deliver 150,000 cub. yds. in a month for several consecutive months.

Shore delivery has been successfully effected by raising the material by buckets in the ordinary way and delivering it into a vertical cylinder connected with floating jointed pipes through which the dredgings pass to the shore. This, of course, can only be done where the place of deposit is near the spot where the material is dredged. Two plans have been satisfactorily employed for this operation. At the Amsterdam Canal the stuff was discharged from the buckets into a vertical cylinder, and after being mingled with water by a revolving Woodford pump was sent off under a head of pressure of 4 or 5 ft. to the place of deposit in a semi-fluid state through pipes made of timber, hooped with iron. These wooden pipes were made in lengths of about 15 ft., connected with leather joints, and floated on the surface of the water. A somewhat similar process was also employed on the Suez Canal.

A dredger (Plate I. fig. 5), constructed by Messrs Hunter & English

for reclamation works on Lake Copais in Greece was fitted with delivery belts running on rollers in steel lattice frames on each side of the vessel supported by masts and ropes. It could deliver 100 cub. metres per hour at 85 ft. from the centre of the dredger, at a cost of 1 -82d. per cub. metre for working expenses, with coal at 45s. per ton, including o-66d. per cub. metre for renewal of belts, upon which the wear and tear was heavy.

Another instance of the successful application of shore delivery apparatus is that of a dredger for Lake Titicaca, Peru, constructed by Messrs Hunter & English, which was fitted with long shoots on both sides, conveying the dredged material about 100 ft. from the centre of the dredger upon either side. The shoots were supported by shear-legs and ropes, and were supplied with water from a centri- fugal pump in the engine room. This dredger could excavate and deliver 120 cub. yds. per hour at a cost of i-725d. per cub. yd. with coal costing 40s. per ton. If coal had been available at the ordinary rate in England of 20s. per ton, the cost of the dredging and delivery would have been o-82d. per cub. yd. for wages, coal, oil, &c, but not including the salary of the superintendent.

An interesting example of a shore delivering dredger is a light draught dredger constructed by Messrs Hunter & English for the Lakes of Albufera at the mouth of the river Ebro in Spain (Plate I. fig. 6). The conditions laid down for this dredger were that it should float in 18 in. of water and deliver the dredged material at 90 ft. from the centre of its own hull. In order to meet these requirements the vessel was made of steel plates j in. thick, and longitudinal girders from end to end of the vessel, the upward strain of flotation being conveyed to them from the skin plating by transverse bulk-heads at short intervals. The dredger was 94 ft. long, 25 ft. wide, and 3 ft. deep, and the height of the top tumbler above the water was 25 ft. When completed the dredger drew 17 in. of water. The dredgings were delivered by the buckets upon an endless belt, driven from the main compound surface-condensing engine, which ran over pulleys supported upon a steel lattice girder, the outer end of which rested upon an independent pontoon. This belt delivered the dredgings at 90 ft. from the centre of the dredger round an arc of 180°. The dredger delivered 125 cub. yds. per hour of compact clay at a cost of i-i6d. per cub. yd. or o-86d. per ton for wages, coal and stores. Another method of delivering dredgings is that of pneu- matic delivery, introduced by Mr F. E. Duckham, of the Millwall Dock Co., by which the dredgings are delivered into cylindrical tanks in the dredger, closed by air-tight doors, and are expelled by compressed air either into the sea or through long pipes to the land. The Millwall

Dock dredger is 113 ft. long, with a beam of 17 ft. and a depth of 12 ft. The draught loaded is 8 ft. It contains two cylindrical tanks, having a combined capacity of 240 cub. yds., and is fitted with compound engines of about 200 i.h.p., with a 20 in. air-compressing cylinder. The discharge pipe is 15 in. diameter by 150 yds. long. The nozzles of the air-injection pipes must not be too small, otherwise the compressed air, instead of driving out the material, simply pierces holes through it and escapes through the discharging pipe, carrying with it all the liquid and thin material in the tanks. The cost of working the Millwall Dock dredger is given by Mr Duckham at i-75d. per cub. yd. of mud lifted, conveyed and deposited on land 450 ft. from the water-side, for working ex- penses only. This dredger is believed to be the first machine con- structed with a traversing ladder, as suggested by Captain Gibson when dock-master of the Millwall Docks.

Blasting combined with Dredging. — In some cases it has been found that the bottom is too hard to be dredged until it has been to some extent loosened and broken up. Thus at Newry, John Rennie, after blasting the bottom in a depth of from 6 to 8 ft. at low water, removed the material by dredging at an expense of from 4s. to 5s. per cub. yd. The same process was adopted by Messrs Stevenson at the bar of the Erne at Bally- shannon, where, in a situation exposed to a heavy sea, large quantities of boulder stones were blasted, and afterwards raised by a dredger worked by hand at a cost of 10s. 6d. per cub. yd. Sir William Cubitt also largely employed blasting in connexion with dredging on the Severn (see Proc. Inst, C.E. vol. iv. p. 362). The cost of blasting and dredging the marl beds is given as being 4s. per cub. yd. A combination of blasting and dredging was employed in 1875 by John Fowler of Stockton at the river Tees. The chief novelty was in the barge upon which the machinery was fixed. It was 58 ft. by 28 ft. by 4 ft., and had eight legs which were let down when the barge was in position. The legs were then fixed to the barge, so that on the tide falling it became a fixed platform from which the drilling was done. Holes were bored and charged, and when the tide rose the legs were heaved up and the barge removed, after which the shots were discharged. There were 24 boring tubes on the barge, and that was the limit which could at any time be done in one tide. The area over which the blasting was done measured 500 yds. in length by 200 in breadth, a small part being un- covered at low water. The depth obtained in mid-channel was 14 ft. at low water, the average depth of rock blasted being about 4 ft. 6 in. The holes, which were bored with the diamond drill, varied in depth from 7 to 9 ft., the distance between them being 10 ft. Dynamite in tin

canisters fired by patent fuse was used as the explosive, the charges being 2 lb and under. The rock is oolite shale of variable hardness, and the average time occupied in drilling holes 5 ft. deep was 12 minutes. The dredger raised the blasted rock. The cost for blasting, lifting and discharging at sea was about 4s. per cub. yd., including interest on dredging and other plant employed. The dredger sometimes worked a face of blasted material of from 7 to 8 ft. The quantity blasted was 110,000 cub. yds., and the contract for blasting so as to be lifted by the dredger was 3s. id. per cub. yd. A similar plan was adopted at Blyth Harbour (see Proc'. Inst. C.E. vol. 81, p. 302). The cost of the explosives per cub. yd. was is. 4d., of boring is. 9d. per cub. yd., and of dredging 3s. per cub. yd., including repairs, but nothing for the use of plant. The whole cost worked out at 6s. id. per cub. yd. on the average.

Sand-pump Dredgers. — Perhaps the most important develop- ment which has taken place in dredging during recent years has been the employment of sand-pump dredgers, which are very useful for removing sandy bars where the particular object is to remove quickly a large quantity of sand or other soft material. They are, however, apt to make large holes, and are therefore not fitted for positions where it is necessary to finish off the dredging work to a uniform flat bottom, for which purpose bucket dredgers are better adapted. Pump dredgers are, how ever, admirable and economical machines for carrying out the work for which they are specially suited.

In the discussion upon Mr J. J. Webster's paper upon " Dredging-Appliances " {Proc. Inst. C.E. vol. 89) at the Institution of Civil Engineers in 1886, Sir John Coode stated that he had first seen sand-pump dredgers at the mouth of the Maas in Holland. The centri-fugal pump was placed against the bulkheads in the after part of the vessel, and the sand and water were delivered into a horizontal breeches-piece leading into two pipes running along the full length of the hopper. The difficulty of preventing the sand from running overboard was entirely obviated by its being propelled by the pump through these pipes, the bottoms of which were perforated by a series of holes. In addition, there were a few small flap-doors fixed at intervals, by means of which the men were able to regulate the discharge. On being tested, the craft pumped into its hopper 400 tons of sand in 22 minutes. The coamings round the well of the hoppers were constructed with a dip, and when the hopper was full the water ran over in a steady stream on either side. The proportion of sand delivered into the hopper was about 20% of the total capacity of the pump. The dredger was constructed by Messrs

Smit of Kinderdijk, near Rotterdam. In the same discussion Mr A. A. Langley, then engineer to the Great Eastern railway, gave particulars of a sand pump upon the Bazin system, which had been used successfully at Lowestoft. The boat was 60 ft. long by 20 ft. wide, and the pump was 2 ft. in diameter, with a two-bladed disk. The discharge pipe was 12 in. in diameter. The pump raised 400 tons of sand, gravel and stones per hour as a maximum quantity, the average quantity being about 200 tons per hour. The depth dredged was from 7 ft. to 25 ft. The pump was driven by a double- cylinder engine, having cylinders of 9 in. diameter by 10 in. stroke, and making 120 revolutions per minute. An important improvement was made by fitting the working faces of the pump with india-rubber, which was very successful and largely reduced the wear and tear. The cost of the dredging at Lowestoft was given by Mr Langley at 2d. per ton, including delivery 2 m. out at sea. The quantity dredged was about 200,000 tons per annum.

One of the earliest pumps to be applied to dredging purposes was the Woodford, which consisted of a horizontal disk with two or more arms working in a case somewhat similar to the ordinary centrifugal pump. The disk was keyed to a vertical shaft which was driven from above by means of belts or other gear coupled to an ordinary portable engine. The pump within rested on the ground ; the suction pipe was so arranged that water was drawn in with the sand or mud, the proportions being regulated to suit the quality of the material. The discharge pipe was rectangular and carried a vertical shaft, the whole apparatus being adjustable to suit different depths of water. This arrangement was very effective, and has been used on many works. Burt & Freeman's sand pump, a modification of the Woodford pump, was used in the construction of the Amster- dam Ship Canal, for which it was designed. The excavations from the canal had to be deposited on the banks some distance away from the dredgers, and after being raised by the ordinary bucket dredger, instead of being discharged into the barges, they were led into a vertical chamber on the top side of the pump, suitable arrangements being made for regulating the delivery. The pump was 3ˆ ft. in diameter, and made about 230 revolutions per minute. The water was drawn up on the bottom side and mixed with the descending mud on the top side, and the two were discharged into a pipe 15 in. in diameter. The discharge pipe was a special feature, and consisted of a series of wooden pipes jointed together with leather hinges and floated on buoys from the

dredger to the bank. In some cases this pipe was 300 yds. long, and discharged the material 8 ft. above the water level. Each dredger and pump was capable of discharg- ing an average of 1500 cub. yds. per day of 12 hours. Schmidt's sand pump is claimed to be an improvement on the Burt & Freeman pump. It consists of a revolving wheel 6 ft. in diameter, with cutters revolving under a hood which just allows the water to pass under- neath. To the top side of the hood a 20 in. suction pipe from an ordinary centrifugal pump is attached. The pump is driven by two ■ 16 in. by 20 in. cylinders, at 134 revolutions per minute, the boiler pressure being 95 H> per sq. in. This apparatus is capable of ex- cavating sticky blue clayey mud, and will deliver the material at 500 to 650 yds. distance. The best results are obtained when the mixture of mud and water is as 1 to 6-5. The average quantity excavated per diem by the apparatus is 1300 cub. yds., the maximum quantity being 2500 cub. yds.

Kennard's sand pump is entirely different from the pumps already described, and is a direct application of the ordinary lift pump. A wrought iron box has a suction pipe fitted at the bottom, rising about half way up the inside of the box; on the top of the box is fitted the actual pump and the flap valves. The apparatus is towered by chains, and the pump lowered from above. As soon as the box is filled with sand it is raised, the catches holding up the bottom released, and the contents discharged into a punt.

Sand-pump dredgers, designed and arranged by Mr Darnton Hutton, were extensively used on the Amsterdam Ship Canal. A centrifugal pump with a fan 4 ft. in diameter was employed, the suction and delivery pipes, each 18 in. in diameter, being attached to an open wrought-iron framework. The machine was suspended between guides fixed to the end of the vessel, which was fitted with tackle for raising, lowering and adjusting the machine. The vessel was fitted with a steam engine and boiler for working and mani- pulating the pumps and the heavy side chains for the guidance of the dredger. The engine was 70 h.p., and the total cost of one dredger was £8000. The number of hands required for working this sand- pump dredger was one captain, one engineer, one stoker and four sailors. Each machine was capable of raising about 1300 tons of material per day, the engines working at 60 and the pump at 180 revolutions per minute. The sand was delivered into barges along- side the dredger. The cost of raising the material and depositing it in barges was about id. per ton when the sand pumps were work- ing, but upon the year's work the cost was 2-4d. per cub. yd. for working expenses and repairs, and l-24d. per cub. yd. for interest and depreciation at 10% upon the cost of the plant, making a total cost for dredging of 3-64d. per cub.

yd. The cost for transport was 3-588d. per cub. yd., making a total cost for dredging and transport of 7-234d. per cub. yd. Dredging and transport on the same works by an ordinary bucket dredger and barges cost 8-328d. per cub. yd.

Two of the largest and most successful instances of sand-pump dredgers are the " Brancker " and the " G. B. Crow," belonging

to the Mersey Docks and Harbour Board. Mr A. G. Lyster gave particulars of the work done by these dredgers in a paper read before the Engineering Congressin 1899. They .are each 320 ft. long, 47 ft. wide and 20-5 ft. deep, the draught loaded being 16 ft. They are fitted with two centrifugal pumps, each 6 ft. in diameter, with 36 in. suction and delivery pipes, united into a 45 in. diameter pipe, hung by a ball and socket joint in a trunn' an, so as to work safely in a sea- way when the waves are 10 ft. high. The suction pipe is 76 ft. long and will dredge in 53 ft. of water. The eight hoppers hold 3000 tons, equivalent' when solid to 2000 cub. yds. ; they can be filled in three- quarters of an hour and discharged in five minutes. Mr Lyster stated that up to May 1899, the quantity removed from bar and main-channel shoals amounted to 41,240,360 tons, giving a width of channel of 1500 ft. through the bar, with a minimum depth of 27 ft. The cost of dredging on the bar by the " G. B. Crow " during 1898, when 4,309,350 tons of material were removed, was b-6id. per ton for wages, supplies and repairs. These figures include all direct working costs and a proportion of the charge for actual superintendence, but no allowance for interest on capital cost or depreciation. On an average, 20% of the sand and mud that are raised escapes over the side of the vessel. Mr Lyster has, however, to a- considerable extent overcome this difficulty by a special arrangement added to the hoppers (see Proc. Inst. C.E. vol. 188).

At the Engineering Conference, 1907, Mr Lyster read a note in which he stated that the total quantity of material removed from the bar of the Mersey, from the Crosby channel, and from other points of the main channel by the " G. B. Crow " and " Brancker " suction dredgers amounted to 108,675,570 tons up to the 1st of May 1907. " In the note of 1899 (he added) it was pointed out that the Mersey was a striking instance of the improvement of a river by dredging rather than by permanent works, and the economy of the system as well as the advantage which its elasticity and adapta- bility to varying circumstances permit, was pointed out. . . . . The most recent experience, which has resulted in the adoption of the proposal to revet the Taylor's bank, indicates that the dredging method has its limitations and cannot provide for every contingency which is likely

to arise; at the same time, the utility and economy

of the dredging system is in no way diminished Having

regard to the ever-increasing size of vessels, a scheme for new docks and entrances on a very large scale received the authority of parliament during the session of 1905-1906. In this scheme it was considered necessary to make provision for vessels of 1000 ft. in length and 40 ft. in draught, and having regard to this prospective growth of vessels it has been determined still further to deepen and improve the outer channel of the Mersey. No fixed measure of improvement has been decided on, but after careful survey of existing conditions and a comparison with probable requirements, it has been determined to construct a dredger of 10,000 tons capacity, provided with pump- ing power equivalent to about three times that of any existing dredgers. By the use of this vessel it is anticipated that it will be possible to deal with very much larger quantities of sand at a cheaper rate, and to 10 ft. greater depth than the existing plant permits."

The vessel in question was launched on the Mersey from the yard of Messrs Cammell, Laird & Co. in October 1908, and was named the " Leviathan." Her length is 487 ft., beam 69 ft., and depth 30 ft. 7 in. Her dredging machinery consists of four centrifugal pumps driven by four sets of inverted triple expansion engines, and connected to four suction tubes 90 ft. long and 42 in. in internal diameter. Her.propelling machinery, consisting of two sets of triple expansion engines, is capable of driving her at a speed of 10 knots.

Another powerful and successful sand-pump dredger, "Kate" (Plate I. fig. 7), was built in 1897 by Messrs Wm. Simons & Co. Ltd. for the East London Harbour Board, South Africa. Its dimensions are : length 200 ft., breadth 39 ft., depth 14 ft. 6 in., hopper capacity 1000 tons. The pumping arrangements for filling the hopper with sand or discharging overboard consist of two centrifugal pumps, each driven from one of the propelling engines. The suction pipes are each 27 in. in diameter, and are so arranged that they may be used for pumping either forward or aft, as the state of the weather may require. Four steam cranes are provided for manipulating the suction pipes. Owing to the exceptional weather with which the vessel had to contend, special precautions were taken in designing the attachments of the suction pipes to the vessel. The attachment is above deck and consists of a series of joints, which give a perfectly free and universal movement to the upper ends of the pipes. The joints, on each side of the vessel, are attached to a carriage, which is traversed laterally by

hydraulic gear. By this means the pipes are pushed out well clear of the vessel's sides when pumping, and brought inboard when not in work. Hydraulic cushioning cylinders are provided to give any required resistance to the fore and aft movements of the pipes. When the vessel arrived at East London on the 18th of July 1897, there was a depth of 14 ft. on the bar at high tide. On the 10th of October, scarcely three months afterwards, there was a depth of 20 ft. on the bar at low water. Working 22 days in rough weather during the month of November 1898, the " Kate " raised and deposited 2\ m. at sea 60,000 tons of dredgings. Her best day's work (12 hours) was on the 7th of November, when she dredged and deposited 6440 tons.

A large quantity of sand-pump dredging has been carried out at Boulogne and Calais by steam hopper pump dredgers, workable when

the head waves are not more than 3 ft. high and the cross waves not more than 1 § ft. high. The dredgings are taken 2 m. to sea, and the price for dredging and depositing from 800,600 to 900,000 cub. metres in 5 or 6 years was 7-25d. per cub. yd. The contractor offered to do the work at 4-625d. per cub. yd. on condition of being allowed to work either at Calais or Boulogne, as the weather might permit. Sand-pump dredging has also been extensively carried out at the mouth of the ports of Amsterdam, Rotterdam and on the north coast of France by sand dredgers constructed by Messrs L. Smit & Son and G. & K. Smit. The largest dredger, the " Amsterdam," is 141 ft. by 27 ft. by 10 ft. 8 in., and has engines of 190 i.h.p. The hopper capacity is 10,600 cub. ft., and the vessel can carry 600 tons of dredgings. The pump fan is 6 ft. 3 in. in diameter by 10 in. wide, the plates being of wrought iron, and makes 130 revolutions a minute. The pump can raise 230 cub. ft. a minute from a depth of 33 ft., which, taking the proportion of I of sand to 7 of water, gives a delivery of 29 cub. ft. of sand per minute. The hopper containing 10,600 cub. ft. was under favourable circumstances filled in 40 minutes. The vessels are excellent sea boats.

Combined Bucket-Ladder and Sand-Pump Dredgers. — Bucket ladders and sand pumps have also been fitted to the same dredger. A successful example of this practice is furnished by the hopper dredger " Percy Sanderson " (Plate I. fig. 8), con- structed under the direction of Sir C. A. Hartley, engineer of the Danube Commission for the deepening of the river Danube and the Sulina bar. This

dredger is 220 ft. by 40 ft. by 17 ft. 2 in., and has a hopper capacity for 1250 tons of dredgings. The buckets have each a capacity of 25 cub. ft., and are able to raise 1000 tons of ordinary material per hour. The suction pump, which is driven by an independent set of triple expansion engines, is capable of raising 700 tons of sand per hour, and of dredging to a depth of 35 ft. below the water-line. The lower end of the suction pipe is controlled by special steam appliances by which the pipe can be brought entirely inboard. The " Percy Sanderson " raises and deposits on an average 5000 tons of material per day.

Grab Dredgers. — The grab dredger was stated by Sir Benjamin Baker (Proc. Inst. C.E. vol. 113, p. 38) to have been invented by Gouff e in 1 703 , and was worked by two ropes and a bar. Various kinds of apparatus have been designed in the shape of grabs or buckets for dredging purposes. These are usually worked by a steam crane, which lets the open grab down to the surface of the ground to be excavated and then closes it by a chain which forces the tines into the ground ; the grab is then raised by the crane, which deposits the contents either into the hopper of the vessel upon which the crane is fixed or into another barge.

The Priestman grab has perhaps been more extensively used than any other apparatus of this sort. It is very useful for excavating mud, gravel and soft sand, but is less effective with hard sand or stiff clay — a general defect in this class of dredger. It is also capable of lifting large loose pieces of rock weighing from I to 2 tons. A dredger of this type, with grab holding I ton of mud, dredged during six days, in 19 ft. of water, an average of 52J tons and a maximum of 68J tons per hour, and during 12 days, in 16 ft. of water, an average of 48 tons and a maximum of 58 tons per hour, at a cost of I -63d. per ton, excluding interest on the capital and depreciation. The largest dredger to which this apparatus nas been applied is the grab bucket hopper dredger " Miles K. Burton " (Plate I. fig. 9), belonging to the Mersey Docks and Harbour Board. It is equipped with 5 grabs on Morgan's patent system, which is a modification of Priestman's, the grabs being worked by 5 hydraulic cranes. It raised and deposited, 12 to 15 m. at sea, II loads of about 1450 tons each with a double shift of hands, at a cost of about is. 5d. per cub. yd. of spoil, including the working expenses for wages of crew, fuel and stores. Mr R. A. Marillier of Hull has stated that "the efficiency of these grabs is not at all dependent upon the force of the blow in falling for the penetration and grip in the material, as they do their work very satisfactorily even when lowered quite gently on to the material to be cut out, the jaws being so framed as to draw down and penetrate the

material as soon as the upward strain is put on the lifting chain. Even in hard material the jaws penetrate so thoroughly as to cause the bucket to be well filled. The grab is found to work successfully in excavating hard clay from its natural bed on dry land. " It is claimed on behalf of grabs that they lift a smaller proportion of water than any other class of dredger.

Since the beginning of the 20th century considerable advance has been made in the use of Priestman grabs, not only for dredging and excavating (for which work they were originally designed), but also in discharging bulk cargo. The first quadruple dredger used by the Liverpool Docks Board had grabs of a capacity of 30 cub. ft., but subsequently second and third quadruple dredgers were put to work in the Liverpool Docks, with grabs having a capacity of 70 and 100 cub. ft. respectively. In discharging coal at Southampton, Havre,

Erith, as well as at the coaling station at Purfleet on the Thames, grabs having a capacity of about 80 cub. ft. are in constant use. Perhaps the most difficult kind of bulk cargo to lift is " Narvick " iron ore, which sets into a semi-solid body in the holds of the vessels, and for this purpose one of the largest grabs, having about 150 cub. ft. capacity and weighing about 8 tons, has been adopted. This grab was designed as a result of experiments extending over a long period in lifting iron ore. It is fitted with long, forged, interlocked steel teeth for penetrating the compact material, which is very costly to remove by hand labour. The Priestman grab is made to work with either one or two chains or wire ropes. Grabs worked with two chains or ropes have many advantages, and are therefore adopted for large undertakings.

Wild's single chain half-tine grab works entirely with a single chain, and has been found very useful in excavating the cylinders in Castries harbour. Upon experimenting with an ordinary grab a rather curious condition of things was observed with respect to sinking. On penetrating the soil to a certain depth the ground was found as it were nested, and nothing would induce the grab to sink lower. Sir W. Matthews suggested that a further set of external tines might possibly get over this difficulty. A new grab having been made with this modification, and also with a large increase of weight — all the parts being of steel — it descended to any required depth with ease, the outside tines loosening the ground effectually whilst the inside bucket or tines picked up the material.

Miscellaneous Appliances. — There are several machines or appliances which perhaps can hardly be called dredgers, although

they are used for cleansing and deepening rivers and harbours.

Kingfoot's dredger, used for cleansing the river Stour, consisted of a boat with a broad rake fitted to the bow, capable of adjustment to different depths. At the sides of the boat were hinged two wings of the same depth as the rake and in a line with it. When the rake was dropped to the bottom of the river and the wings extended to the side, they formed a sort of temporary dam, and the water began to rise gradually. As soon as a sufficient head was raised, varying from 6 to 12 in., the whole machine was driven forward by the pressure, and the rake carried the mud with it. Progress at the rate of about 3 m. an hour was made in this manner, and to prevent the accumulation of the dredgings, operations were begun at the mouth of the river and carried on backwards. The apparatus was ver} effective and the river was cleansed thoroughly, but the distance travelled by the dredger must have been great.

In 1876 J. J. Rietschoten designed a " propeller dredger " for removing the shoals of the river Maas. It consisted of an old gun-boat fitted with a pair of trussed beams, one at each side, each of which carried a steel shaft and was capable of being lowered or raised by means of a crab. An ordinary propeller 3 ft. 6 in. in diameter was fixed to the lower end of the shaft, and driven by bevel gear from a cross shaft which derived its motion by belting from the fly-wheel of a 12 h.p. portable engine. The propellers were lowered until they nearly reached the shoals, and were then worked at 150 revolutions per minute. This operation scoured away the shoal effectively, for in about 40 minutes it had been lowered about 3 ft. for a space of 150 yds. long by 8 yds. wide.

A. Lavalley in 1877 designed an arrangement for the harbour of Dunkirk to overcome the difficulty of working an ordinary bucket-ladder dredger when there is even a small swell. A pump injects water into the sand down a pipe terminating in three nozzles to stir up the sand, and another centrifugal pump draws up the mixed sand and water and discharges it into a hopper, the pumps and all machinery being on board the hopper. To allow for the rising and falling of the vessel — either by the action of the tide or by the swell — the ends of the pipes are made flexible. The hopper has a capacity of 190 cub. yds., and is propelled and the pumps worked by an engine of 150 i.h.p. From 50 to 80 cub. yds. per hour can be raised by this dredger.

The " Aquamotrice," designed by Popie, and used on the Garonne at Agen, appears to be a modification of the old bag and spoon

arrangement. A flat-bottomed boat 51I ft. long by 6§ ft. wide was fitted at the bow with paddles, which were actuated by the tide. Connected with the paddles was a long chain, passing over a pulley on uprights and under a roller, and a beam was attached to the chain 14 ft. 8 in. long, passing through a hole in the deck. At the end of the beam was an iron scoop 2 ft. wide and 2 ft. 6 in. deep. When the tide was strong enough it drew the scoop along by means of the paddles and chains, and the scoop when filled was opened by a lever and discharged. About 65 cub. yds. of gravel could be raised by the apparatus in 12 hours. When the tide failed the apparatus was worked by men.

The Danube Steam Navigation Co. removed the shingle in the shallow parts of the river by means of a triangular rake with wrought- iron sides 18 ft. long, and fitted with 34 teeth of chilled cast iron 12 in. deep. This rake was hung from the bow of a steamer 180 ft. long by 21 ft. beam, and dragged across the shallows, increasing the depth of water in one instance from 5 ft. 6 in. to 9 ft., after passing over the bank 355 times.

A combination of a harrow and high pressure water jets, arranged by B. Tydeman, was found very efficacious in removing a large

quantity of mud which accumulated in the Tilbury Dock basin, which has an area of about 17 acres, with a depth of 26 ft. at low- water spring tides. In the first instance chain harrows merely were used, but the addition of the water jets added materially to the success of the operation. The system accomplished in six tides more than was done in twelve tides without the water jets which worked at about 80 lb pressure per sq. in. at the bottom of the dock.

Ive's excavator consists of a long weighted spear, with a sort of spade at the end of it. The spade is hinged at the top, and is capable of being turned at right angles to the spear by a chain attached to the end of the spear. The spade is driven into the ground, and after releasing the catch which holds it in position during its descent, it is drawn up at right angles to the spear by the chain, carrying the material with it. Milroy's excavator is similar, but instead of having only one spade it generally has eight, united to the periphery of an octagonal iron frame fixed to a central vertical rod. When these eight spades are drawn up by means of chains, they form one flat table or

tray at right angles to the central rod. In operation the spades hang vertically, and are dropped into the material to be excavated ; the chains are then drawn up, and the table thus formed holds the material on the top, which is lifted and discharged by releasing the spade. This apparatus has been extensively used both in Great Britain and in India for excavating in bridge cylinders.

The clam shell dredger consists of two hinged buckets, which when closed form one semi-cylindrical bucket. The buckets are held open by chains attached to the top of a cross-head, and the machine is dropped on to the top of the material to be dredged. The chains holding the bucket open are then released, while the spears are held firmly in position, the buckets being closed by another chain. Bull's dredger, Gatmell's excavator, and Fouracre's dredger are modifications with improvements of the clam shell dredger, and have all been used successfully upon various works.

Bruce & Batho's dredger, when closed, is of hemispherical form, the bucket being composed of three or four blades. It can be worked by either a single chain or by means of a spear, the latter being generally used for stiff material. The advantage of this form of dredger bucket is that the steel points of the blades are well adapted for penetrating hard material. Messrs Bruce & Batho also designed a dredger consisting of one of these buckets, but worked entirely by hydraulic power. This was made for working on the Tyne. The excavator or dredger is fixed to the end of a beam which is actuated by two hydraulic cylinders, one being used for raising the bucket and the other for lowering it; the hydraulic power is supplied by the pumps in the engine-room. The novelty in the design is the ingenious way in which the lever in ascending draws the shoot under the bucket to receive its contents, and draws away again as the bucket descends. The hydraulic cylinder at the end of the beam is carried on gimbals to allow for irregularities on the surface being dredged. The hydraulic pressure is 700 lb per sq. in., and the pumps are used in connexion with a steam accumulator.

An unloading apparatus was designed by Mr A. Manning for the East & West India Dock Co. for unloading the dredged materials out of barges and delivering it on the marsh at the back of the bank of the river Thames at Crossness, Kent. A stage constructed of wooden piles commanded a series of barge beds, and the unloading dredger running from end to end of the stage, lifted and delivered the materials on the marsh behind the river wall at the cost of I d. per cub. yd.

Dredging on the River Scheldt below Antwerp. — This dredging took place at Krankeloon and the Belgian Sluis under the direc- tion of L. Van Gansberghe. At Melsele there is a pronounced bend in the river, causing a bar at the Pass of Port Philip, and just below the pass of Lillo there is a cross-over in the current, making a neutral point and forming a shoal. After dredging to 8 metres (26-24 ft.) below low tide, in clay containing stone and ferruginous matter, a sandstone formation was encountered, which was very compact and difficult to raise. A suction dredger being unsuited to the work, a bucket-ladder dredger was employed. The dredging was commenced at Krankeloon in September 1894 and continued to the end of 1897. A depth of 6 metres (19-68 ft.) was excavated at first, but was afterwards increased to 8 metres (26-24 ft-)- The place of deposit was at first on lands acquired by the State, 2-17 m. above Krankeloon, and placed at the disposal of the contractor. The dredgings excavated by the bucket-ladder dredger were deposited in scows, which were towed to the front of the deposit ground and dis- charged by a suction pump fixed in a special boat, moored close to the bank of the river. The material brought by the suction dredger in its own hull was discharged by a plant fixed upon the dredger itself. In both instances the material was deposited at a distance of 1640 ft. from the river, the spoil bank varying in depth from 2 to 7 metres. The water thrown out behind the dyke with the excavated material returned to the river,

after settlement, by a special discharge lock built under the dyke. After 1896 the material was delivered into an abandoned pass by means of barges with bottom hopper doors or by the suction dredger. One suction dredger and three bucket-ladder dredgers were employed upon the work, and a vessel called " Scheldt I." used for discharging the material from the scows. Four tug- boats and twenty scows were also employed.

The largest dredger, "Scheldt III.," was 147-63 ft. long by 22-96 ft. wide by 10-98 ft. deep, and had buckets of 21-18 cub. ft. capacity. The output per hour was 10,594 cub. ft. This dredger had also a complete installation as a suction dredger, the suction pipe being 2 ft. diameter. The fan of the centrifugal pump was 5-25 ft. diameter, and was driven by the motor of the bucket ladder. The three bucket dredgers worked with head to the ebb tide. They could also work with head to the flood tide, but it took so long a time to turn them about that it was impracticable. The work was for from 13 to 14 hours a day on the ebb tide. The effective daily excavation averaged 4839 cub. yds. Each dredger was fitted with six anchors. The excavated cut was 164 ft. wide by 6-56 ft. deep. " Scheldt III." was capable of

lifting a mass 9-84 ft. thick. The suction dredger " Scheldt II." was of the multiple type, and is stated to be unique in construction. It can discharge material from a scow alongside, fill its own hopper with excavations, discharge its own load upon the bank or into a scow by different pipes provided for the purpose, and discharge its own load through hopper doors. The machinery is driven by a triple expansion engine of 300 i.h.p. working the pro- peller by a clutch._ Owing to the rise and fall in the tide of 23 ft. the suction pipe is fitted with spherical joints and a telescopic arrangement. The vessel is 157-5 ft. by 28-2 ft. by 12-8 ft. The diameter of the pump is 5-25 ft. The wings of the pump are curved, the surface being in the form of a cylinder parallel to the axis of rotation, the directrix of which is an arc of a circle of 2-62 ft. radius with the straight part beyond. The suction and discharge pipes are 2 ft. diameter. A centrifugal pump is provided for throwing water into the scows to liquefy the material during discharge. The dredger, which is fitted with electric lights for work at night, is held by two anchors, to prevent lurching backwards and forwards; it can work on the flood as well as on the ebb tide, and can excavate to a depth of 42-65 ft., the output depending upon the nature of the material. With good material it can fill its tanks in thirty minutes. To empty the tanks by suction and discharge upon the bank over the dyke takes about fifty minutes, depending upon the height and distance to which the material requires to be delivered. The daily work has averaged eighteen hours, ten trips being made when the distance from the dredging ground to the point of delivery is about 1 m. When the dredged material is discharged into the Scheldt, a quantity of 5886 cub. yds. has been raised and deposited in a day, the mean quantity being 4700 cub. yds. When the distance of transportation is increased to 2J m., six voyages were made in a day, and the day's work amounted to 3530 cub. yds.

Gold Dredgers. — Dredgers for excavating from river beds soil containing gold are generally fitted with a screen and elevator.

Fig. 2. — Diagram showing Action of Lobnitz Gold Dredger.

They have been extensively designed and built by Messrs Lobnitz & Co. (fig. 2) and also by Messrs Hunter & English.

The writer is indebted to the Proceedings of the Institution of Civil Engineers, and especially to the paper of Mr J. J. Webster {Proc. Inst. C.E. vol. 89), for much valuable information upon the subject treated. He is also indebted to many manufacturers who have furnished him with particulars and photographs of dredging plant. (W. H.)*

2. Marine Biology

The naturalist's dredge is an instrument consisting essentially of a net or bag attached to a framework of iron which forms the mouth of the net. When in use as the apparatus is drawn over the sea-bottom mouth forwards, some part of the framework passes beneath objects which' it meets and so causes them to

DREDGING

lllBllll

Plate 1.

Fig. 3. — Barge-loading dredger, "St Austell," constructed for the British Government by Wm. Simons & Co.

FlG. 4. — Stern-well hopper-dredger " La Puissante," by Wm. Simons & Co. Length 275 ft., breadth 47 ft., depth 19 ft.

Fig. 5.— Dredger constructed for the Lake Copais Co. by Hunter & English.

FlG. 6.— Light draught dredger, with delivery apparatus work ing round an arc of 210 , by Hunter & English.

Fig. 7. — Twin-screw sand-pump dredger, "Kate," built for the East London Harbour Board by Wm. Simons & Co.

FlG. 9. — Twin-screw grab-dredger, "Miles K. Burton," built for the Mersey Docks and Harbour Board by Wm. Simons & Co.

Fig. 8. — Twin-screw hopper-dredger, "Percy Sanderson," built for the European Danube Commission by Wm. Simmons & Co.

Fig. 10. — Hopper-dredger, "David Dale," with buckets ot 54 cub. ft. capacity (see fig. 11) built for the North Eastern Rail- way Company by Lobnitz & Co.

DREDGING

Fig. ii.— BUCKETS OF 5 AND 54 CUBIC FEET CAPACITY COMPARED. argest ever made, were for the hopper-dredger "David Dale" (Plate I. fie- 10), built b

i m»

m.

J

Fig. 12.— MODEL OF ROCK-CUTTING DREDGER, "DEROCHEUSE." Built for special work on the Suez Canal by Lobnitz & Co. Length 180 ft,, breadth 40 ft., depth 12 ft.

enter the net. It is intended for the collection of animals and plants living on or near the sea-bottom, or sometimes of specimens of the sea-bottom itself, for scientific purposes.

Until the middle of the 18th century, naturalists who studied the marine fauna and flora relied for their materials on shore collection and the examination of the catches of fishing boats. Their knowledge of creatures living below the level of low spring tides was thus gained only from specimens cast up in storms, or caught by fishing gear designed for the capture of certain edible species only. The first effort made to free marine biology from these limitations was the use of the dredge, which was built much on the plan of the oyster dredge.

The Oyster Dredge. — At first naturalists made use of the ordinary oyster dredge, which is constructed as follows. The frame is an iron triangle, the sides being the round iron " arms " of the dredge, the base a flat bar called the shere or lip, which is sloped a little, not per- pendicular to the plane of the triangle; an iron bar parallel to the base joins the arms. The net is fastened to the parallel bars and the portion of the arms between them, and consists of two parts: that attached to the Otho shere is of round iron rings linked together by Frederick Miiller's smaller ones of wire lashings, that attached Dredge (1770). to the upper bar is of ordinary network.

Where these two portions of the bag meet a wooden beam is fastened. In use the frame is towed forward by its apex: the shere passes below oysters, &c, which pass back on to the iron netting. The length of each side of the triangular frame is about 6 ft., the width of the shere 3 in. and the height of the mouth just under a foot. The rings vary in size, but are usually some 2j in. in diameter. The weight is about 60 lb. This dredge was soon aban- doned: its weight was prohibitive for small boats, from which the naturalist usually worked, its wide rings allowed precious specimens to fall through, and its shallow net favoured the washing out of light objects on hauling through the

moving water of the surface. More- over, it sometimes fell on its back and was then useless, although when the apex or towing point was weighted no great skill is needed to avoid this.

Otho Miiller used a dredge (fig. 13) consisting of a net with a square iron mouth, each of whose sides was furnished with a thin edge turned slightly away from the dredge's centre. As any one of these everted lips could act as a scraper it was a matter of indifference which struck the bottom when the dredge was lowered. The chief defect of the instru- ment was the ease with which light objects could be washed out on hauling, owing to the size of the mouth. However, with this instrument Miiller obtained from the often stormy Scandinavian seas all the material for his celebrated Zoologia Danica, a descrip- tion of the marine fauna of Denmark and Norway which was published with excellent Icoloured plates in 1778; and historical interest attaches to the dredge as the first made specially for scientific work.

Ball's Dredge. — About 1838 a dredge de- vised by Dr Ball of Dublin was introduced. It has been used all over the world, and is so apt for its purpose that it has suffered very little modification during its 70 years of life. It is known as Ball's dredge or more generally simply " the dredge."

Ball's dredge (fig. 14) consists of a rec- tangular net attached to a rectangular frame much longer than high, and furnished with rods stretching from the four corners to meet at a point where they are attached to the dredge rope. It differs from Miiller's dredge in the slit-like shape of the opening, which prevents much of the " washing out " suffered by the earlier pattern, and in the edges. The long edges only are fashioned as scrapers, being wider and heavier than Miiller's, especially in later dredges. The short edges are of round iron bar.

Like Miiller's form, Ball's dredge will act whichever side touches the bottom first, as its frame will not remain on its short edge, and either of the long edges acts as a scraper. The scraping lips thicken gradually from free edge to net; they are set at no to the plane of the mouth, and in some later patterns curve outwards instead of merely sloping. All dredge frames are of wrought iron.

The thick inner edges of the scrapers are perforated by round holes at distances of about an inch, and through these strong iron rings about an inch in diameter are passed, and two or three similar rings run on the short rods which form the ends of the dredge-frame.

Fig. 14. — Ball's Naturalist's Dredge.

A light iron rod, bent to the form of the dredge opening, usually runs through these rings, and to this rod and to the rings the mouth of the dredge-bag is securely attached by stout cord or strong copper wire. Various materials have been used for the bag, the chief of which are hide, canvas and netting. The hide was recommended by its strength, but it is now abandoned. Canvas bags fill quickly with mud or sand and then cease to operate: on the other hand wide mesh net fails to retain small specimens. Probably the most suitable material is hand-made netting of very strong twine, the meshes half an inch to the side, the inter-spaces contracting to a third of an inch across when the twine is thoroughly soaked, with an open canvas or " bread-bag " lining to the last 6 in. of the net. A return to canvas covering has latterly occurred in the small dredge called the mud-bag, trailed behind the trawl of the " Albatross " for obtaining a sample of the bottom, and in the conical dredge.

The dimensions of the first dredges were as follows : Frame about 12 in. by about 4 in.; scraping lips about 2 in. wide; all other iron parts of round iron bar f in. diameter; bag rather more than 1 ft. long. These small dredges were used from rowing boats. Larger dredges were subsequently made for use from yawls or cutters. The mouth of these was 18 by 5 in., the scraping lips about 2 in. wide and bag 2 ft. deep; such a dredge weighs about 20 lb. The dredge of the " Challenger " had a frame 4 ft. 6 in. by I ft. 3 in. and the bag had a length of 4 ft. 6 in. ; the " Porcupine used a dredge of the same size; weighing 225 lb. Doubtless the size of Ball's dredge would have grown still more had it not been proved by the " Challenger ' expedition that for many purposes trawls could be used advantageously instead of dredges.

Operation of the Dredge from Small Vessels. For work round the coasts of Europe, at depths attainable from a row-boat or yawl, probably the best kind of line is bolt-rope of the best Russian hemp, not less than i§ in. in circumference, containing 18 to 20 yarns in 3 strands. Each yarn should be nearly a hundredweight, so that the breaking strain of such a rope ought to be about a ton. Of course it is never voluntarily exposed to such a strain, but in shallow water the dredge is often caught among rocks or coral, and the rope should be strong enough in such a case to bring up the boat, even if there were some little way on. It is always well, when dredging, to ascertain the approximate depth with the lead before casting the dredge; and the lead ought always to be accompanied by a registering thermometer, for the subsequent haul of the dredge will gain greatly in value as an

observation in geographical distribution, if it be accompanied by an accurate note of the bottom tem- perature. For depths under 100 fathoms the amount of rope paid out should be at least double the depth; under 30 fathoms, where one usually works more rapidly, it should be more nearly three times; this gives a good deal of slack before the dredge if the boat be moving very slowly, and keeps the lip of the dredge well down. When there is anything of a current, from whatever cause, it is usually convenient to attach a weight, varying from 14 lb to half a hundredweight, to the rope 3 or 4 fathoms in front of the dredge. This prevents in some degree the lifting of the mouth of the dredge; if the weight be attached nearer the dredge it is apt to injure delicate objects passing in.

In dredging in sand or mud, the dredge-rope may simply be passed through the double eye formed by the ends of the two arms of the dredge-frame; but in rocky or unknown ground it is better to fasten the rope to the eye of one of the arms only, and to tie the two eyes together with three or four turns of rope-yarn. This stop breaks much more readily than the dredge-rope, so that if the dredge get caught it is the first thing to give way under the strain, and in doing so it often alters the position of the dredge so as to allow of its extrication.

The dredge is slipped gently over the side, either from the bow or from the stern— in a small boat more usually the latter — while there is a little way on, and the direction which the rope takes indicates roughly whether the dredge is going down properly. When it reaches the ground and begins to scrape, an experienced hand upon the rope can usually detect at once a tremor given to the dredge by the scraper passing over the irregularities of the bottom. The due amount of rope is then paid out, and the rope hitched to a bench or rowlock-pin. The boat should move very slowly, probably not faster than a mile an hour. In still water or with a very slight current the dredge of course anchors the boat, and oars or sails are necessary; but if the boat be moving at all it is all that is required. It is perhaps

most pleasant to dredge with a close-reefed sail before a light wind, with weights, against a very slight tide or current; but these are conditions which cannot be commanded. The dredge may remain down from a quarter of an hour to twenty minutes, by which time, if things go well, it ought to be fairly filled. In dredging from a small boat the simplest plan is for two or three men to haul in, hand over

hand, and coil in the bottom of the boat. For a large yawl or yacht, and for depths over 50 fathoms, a winch is a great assistance. The rope takes a couple of turns round the winch, which is worked by two men, while a third hand takes it from the winch and coils it down.

It is easier to operate a dredge from a steam vessel than a sailing boat, but if the steamer is of any size great care should be taken that the dredge does not move too rapidly.

Two ingenious cases of dredging under unusual conditions are worthy of mention, one case from shore, one from ice. In the Trondligem Fjord, Canon A. M. Norman in 1890 worked by hauling the dredge up the precipitous shores of the fjord. The dredge was shot from a boat close to the shore, to which after paying out some hundreds of fathoms of line it returned. The dredge was then hauled from the top of the cliffs up whose side it scraped. Hitches against projecting rocks were frequent and were overcome by suddenly paying out line for a time. The dredge was lifted into a boat when it reached the surface of the sea. The other case occurred during the Antarctic expedition of the " Discovery." Hodgson dropped loops of line along cracks which occasionally formed in the ice. The ice always joined up again, but with the line below it; and a hole being cleared at each place at which the end of the line emerged, the dredge could be worked between them.

The dredge comes up variously freighted according to the locality, and the next step is to examine its contents and to store the objects of search for future use. In a regularly organized dredging expedition a frame or platform is often erected with a ledge round it to receive the contents of the dredge, but it does well enough to capsize it on an old piece of tarpaulin. There are two ways of emptying the dredge; we may either turn it up and pour out its contents by the mouth, or we may have a contrivance by which the bottom of the bag is made to unlace. The first plan is the simpler and the one more usually adopted; the second has the advantage of letting the mass slide out more smoothly and easily, but the lacing introduces rather a damaging complication, as it is apt to loosen or give way. Any objects visible on the surface of the heap are now carefully removed, and placed for identification in jars or tubs of sea-water, of which there should be a number secured in some form of bottle basket, standing ready. The heap should not be much disturbed, for the delicate objects contained in it have already been unavoidably subjected to a good deal of rough usage, and the less friction among the stones the better.

Examination of the Catch. Sifting. — The sorting of the catch is facilitated by sifting. The sieves used in early English expedi- tions were of various sizes and meshes, each sieve having a finer mesh than the sieve smaller than itself. In use the whole were put together in the form of a nest, the smallest one with the coarsest mesh being on top. A little of the dredge's contents were then put in the top sieve, and the whole set moved gently up and down in a tub of sea water by handles attached to the bottom one. Objects of different sizes are thus left in different sieves. A simple but effective plan is to let the sieves of various sized mesh fit accurately on each other like lids, the coarsest on top, and to pour water upon material placed on the top one. In the United States Bureau of Fisheries ship " Albatross " these sieves are raised to form a table and the water is led on them from a hose: the very finest objects or sediments are retained by the waste water escaping from a catchment tub by muslin bags let into its sides. Any of these methods are preferable to sifting by the agitation of a sieve hung over the side, as in the last anything passing through the sieve is gone past recall.

Preservation of Specimens. — The preservation of specimens will of course depend on the purpose for which they are intended. For microscopic observation formaldehyde has some advantages.

It can be stored in 40% solution and used in 2%, thus saving space, and it preserves many animals in their colours for a time: formalin preparations do not, however, last as well as do those in spirit. The suitable fluids for various histological inquiries are beyond the scope of the present article; but for general marine histology Bles' fluid is useful, being simple to prepare and not necessitating the removal of the specimen to another fluid. It is composed of 70% alcohol 90 parts, glacial acetic acid 7 parts, 4% formaldehyde 7 parts.

The scientific value of a dredging depends mainly upon two things, the care with which the objects procured are preserved and labelled for future identification and reference, and the accuracy with which all the circumstances of the dredging — the position, the depth, the nature of the ground, the date, the bottom- temperature, &c. — are recorded. In the British Marine Biological Association's work in the North Sea, a separate sheet of a printed book with carbon paper and duplicate sheets (which remain always on the ship) is used for the record of the particulars of each haul; depth, gear, &c, being filled into spaces indicated in the form. This use of previously prepared forms has been found to be a great saving of time and avoids risk of omission. Whether labelled externally or not, all bottles should contain parchment or good paper labels written with a soft pencil.

These cannot be lost. The more fully details of reference number of station, gear, date, &c, are given the better, as should a mistake be made in one particular it can frequently be traced and rectified by means of the rest.

Growth of Scope of Operations. — At the Birmingham meeting of the British Association in 1839 an important committee was appointed " for researches with the dredge with a view to the investigation of the marine zoology of Great Britain, the illlustra- tion of the geographical distribution of marine animals, and the more accurate determination of the fossils of the Pliocene period." Of this committee Edward Forbes was the ruling spirit, and under the genial influence of his contagious enthusiasm great progress was made during the next decade in the knowledge of the fauna of the British seas, and many wonderfully pleasant days were spent by the original committee and by many others who from year to year were " added to their number." Every annual report of the British Association contains communications from the English, the Scottish, or the Irish branches of the committee; and in 1850 Edward Forbes submitted its first general report on British marine zoology. This report, as might have been anticipated from the eminent qualifications of the reporter, was of the highest value; and, taken along with his remarkable memoirs previously published, " On the Distribution of the Mollusca and Radiata of the Aegean Sea," and " On the Zoological Relations of the existing Fauna and Flora of the British Isles," may be said to mark an era in the progress of human thought.

The dredging operations of the British Association committee were carried on generally under the idea that at the 100-fathom line, by which amateur work in small boats was practically limited, the zero of animal life was approached — a notion which was destined to be gradually undermined, and finally over- thrown. From time to time, however, there were not wanting men of great skill and experience to maintain, with Sir James Clark Ross, that " from however great a depth we may be enabled to bring up mud and stones of the bed of the ocean we shall find them teeming with animal life." Samples of the sea- bottom procured with great difficulty and in small quantity from the first deep soundings in the Atlantic, chiefly by the use of Brooke's sounding machine, an instrument which by a neat contrivance disengaged its weights when it reached the bottom, and thus allowed a tube, so arranged as to get filled with a sample of the bottom, to be recovered by the sounding line, were eagerly examined by microscopists; and the singular fact was established that these samples consisted over a large part of the bed of the Atlantic of the entire or broken shells of certain foraminifera. Dr Wallich, the

naturalist to the " Bulldog " sounding ex- pedition under Sir Leopold M'Clintock, reported that star-fishes, with their stomachs full of the deep-sea foraminifera, had come

up from a depth of 1200 fathoms on a sounding line; and doubts began to be entertained whether the bottom of the sea was in truth a desert, or whether it might not present a new zoological region open to investigation and discovery, and peopled by a peculiar fauna suited to its special conditions.

In the year 1867, while the question was still undecided, two testing investigations were undertaken independently. In America Count L. F. de Pourtales (1824-1880), an officer em- ployed in the United States Coast Survey under Benjamin Peirce, commenced a series of deep dredgings across the Gulf Stream off the coast of Florida, which were continued in the following year, and were productive of most valuable results; and in Great Britain the Admiralty, on the representation of the Royal Society, placed the " Lightning," a small gun-vessel, at the disposal of a small committee to sound and dredge in the North Atlantic between Shetland and the Faroe Islands.

In the "Lightning," with the help of a donkey-engine for winding in, dredging was carried on with comparative ease at a depth of 600 fathoms, and at that depth animal life was found to be still abundant. The results of the " Lightning's " dredgings were regarded of so great importance to science that the Royal Society pressed upon the Admiralty the advantage of continuing the researches, and accordingly, during the years 1869 and 1870, the gun-boat " Porcupine " was put under the orders of a committee consisting of Dr W. B. Carpenter, Dr Gwyn Jeffreys, and Professor (afterwards Sir Charles) Wyville Thomson, one or other of whom superintended the scientific work of a series of dredging trips in the North Atlantic to the north and west of the British Islands, which occupied two summers.

In the " Porcupine," in the summer of 1869, dredging was carried down successfully to a depth of 2435 fathoms, upwards of two miles and a half, in the Bay of Biscay, and the dredge brought up well-developed representatives of all the classes of marine invertebrates. During the cruises of the " Porcupine " the fauna of the deep water off the western coasts of Great Britain and of Spain and Portugal

was tolerably well ascertained, and it was found to differ greatly from the fauna of shallow water in the same region, to possess very special characters, and to show a very marked relation to the faunae of the earlier Tertiary and the later Cretaceous periods.

In the winter of 1872, as a sequel to the preliminary cruises of the " Lightning " and " Porcupine," by far the most consider- able expedition in which systematic dredging had ever been made a special object left Great Britain. ILM.S. " Challenger," a corvette of 2306 tons, with auxiliary steam working to 1234 h.p., was despatched to investigate the physical and biological conditions of the great ocean basins.

The " Challenger " was provided with a most complete and liberal organization for the purpose ; she had powerful deck engines for hauling in the dredge, workrooms, laboratories and libraries for investigating the results on the spot", and a staff of competent naturalists to undertake such investigations and to superintend the packing and preservation of the specimens reserved for future study. Since the " Challenger " expedition the use of wire rope has enabled far smaller vessels to undertake deep sea work. The " Challenger, " however, may be said to have established the practicability of dredging at any known depth.

Operating Dredges and Trawls in deep Seas. — Dredging opera- tions from large vessels in deep seas present numerous difficulties. The great weight of theshipmakeshermotion, whether of progress or rolling, irresistible to the dredge. The latter tends to jump, therefore, which both lowers its efficiency and causes it to exert a sudden strain on the dredge rope.

The efficiency or evenness of dredging was secured, therefore, by the special device of fastening a heavy weight some 200 or 300 fathoms from the dredge end of the dredge rope. This was either lowered with the dredge or sent down after by means of a "messenger," a ring of rope fixed round, but running freely on, the dredge rope. The latter plan was used on the "Chal- lenger "; the weights were six 28 lb leads in canvas

covers: their descent was arrested by a toggle or wooden cross-bar previously attached to the rope at the desired point. When, how- ever, the rope used is of wire this front weight is unnecessary.

The possibility of sudden strain necessitates a constant watching of the dredge rope, as the ship's engines 'may at any moment be needed

to ease the tension by stopping the vessel's way, and the hauling engines by paying out more rope. The use of accumulators both renders the strain more gradual and gives warning of an increase or decrease; indeed they can be calibrated and used as dynamometers to measure the strain. One of the best forms of accumulator consists of a pile of perforated rubber disks, which receive the strain and become compressed in doing so. The arrange- ment is in essence as follows. The disks form a column resting on a cross-bar or base, from which two rods pass up one on each side of the column. Another cross-bar rests on the top disk, and from it a rod passes freely down the centre perforation of disks and base. Eyes are attached to the lower end of this rod and to a yoke con- necting the side rods at the top : a pull exerted on these eyes is thus modified by the elasticity of the dredge. In the " Porcupine " and other early expeditions the accumulator was hung from the main yard arm, and the block through which the dredge rope ran sus- pended from it. In more recent ships a special derrick boom is rigged for this block, and a second accumulator is sometimes inserted between the topping lift by which this is raised and the end of the boom.

The margin of safety of steel wire rope is much larger than is that of hempen rope, a fact of importance both in towing in a rough sea and in hauling. Galvanized steel wire with a hempen core was first used by Agassiz on the " Blake." He states that his wire weighed one pound per fathom, against two pounds per fathom of hempen rope, and had a breaking strain nearly twice that of hempen rope, which bore two tons. Thus in hauling the wire rope has both greater capability and less actual strain. It has also the advantages of occupying a mere fraction (j) of the storage space needed for rope, of lasting much longer, and its vibrations transmit much more rapid and minute indications of the conduct of the dredge.

Wire rope is kept wound on reels supplied with efficient brakes to check or stop its progress, and an engine is often fitted for winding it in and veering it out. From the reel it passes to the drum of the hauling engine, round which it takes some few turns; care is taken by watching or by the use of an automatic regulator (Tanner) that it is taken at a rate equal to that at which it is moving over the side. From the hauling engine it passes over leading wheels (one of which should preferably be a registering wheel and indicate the amount of rope which has passed it), and so it reaches the end of the derrick boom.

The dredge is lowered from the derrick boom, which has been previously trained over to windward so that its end is well clear of the ship, while the ship is slowly moving forward. The rope is

checked until the net is seen to be towing clear, and then lowered rapidly. Where a weight is used in front of the trawl Captain Calver successfully adopted the plan of backing after sufficient line had been paid out: the part of the rope from weight to surface thus became more vertical, while the shorter remainder, previously in line with it, sank to the bottom without change of relative position of weight and dredge. The ship was then ready for towing. When no front weight is used the manoeuvre is unnecessary.

There should be a relation maintained between speed of vessel onward and of rope downward, or a foul haul may result owing to the gear capsizing (in the case of a trawl), or getting the net over the mouth (in a dredge). The most satisfactory method of ensuring this relation seems to be so to manage the two speeds that the angle made by the dredge rope is fairly constant. This angle can be observed with a simple clinometer. The following table abridged from Tanner most usefully brings together the requisite angles with other useful quantities.

Speed of ship

Length of

Angle of dredge

Angle of dredge

Depth of water.

while shooting

rope

rope while

rope while

dredge or trawl.

required.

lowering trawl.

dragging trawl.

Fathoms.

Knots.

Fathoms.

100

3

200

60

55

200

3

400

60

55

400

3

700

60

52

600

2f

1000

55

50

800

31

1200

50

44

1000

2|

1500

50

40

1500

2i

2166

5°

40

2000

2

2670

45

35

3000

2

4000

40

35

DREDGE AND DREDGING

The speed of towing, always slow, may be assumed to be approximately correct if the appropriate angle is maintained. Hauling should at first be slow from great depths, but may increase in speed as the gear rises.

For further details of deep-sea dredging, especially of the hauling machinery and management of the gear, the special reports of the various expeditions must be consulted. Commander Tanner, U.S.N. , has given in Deep Sea Exploration (1897) a very full and good account of the equipment of an exploring ship ; and to this book the present article is much indebted.

Modifications and Additions to the Dredge. — From 1818, when Sir John Ross brought up a fine Astrophyton from over 800 fathoms on a sounding line in Baffin's Bay, instances gradually accumulated of specimens being obtained from great depths without nets or traps. The naturalists of the " Porcupine " and other expeditions found that echinoderms, corals and sponges were often carried up adhering to the outer surface of the dredge and the last few fathoms of dredge rope. In order to increase the effectiveness of this method of capture a bar was fastened to the bottom of the dredge, to which bunches of teased-out hemp were tied. In this way specimens of the greatest interest, and frequently of equal importance with those in the dredge bag, were obtained. The tangle bar was at first attached to the back of the net. From the " Challenger" expedi- tion onward it has been fixed behind the net by iron bars stretching back from the short sides of the dredge frame which pass through eyes in their first ends (fig. 15). The swabs are thus unable to fold over the mouth of the dredge. Rope lashings to the lips of the dredge are sometimes added, and a weight is tied to the larger bar to keep it down.

Occasionally the tangle bar is used alone (Agassiz), and one form (Tanner) has two bars, stretching back like the side strokes of the letter A from a strong steel spring in the form of an almost complete circle. The whole is pulled forward from a spherical sinker fastened in front of the spring apex; and should Fig. 15.— Deep-sea j ne a p ex enter a crevice between rock Dredge, with Tangle Bar. masses> tfae side barg are doged b y the

pressure instead of catching and bringing up. This is said to be a very useful instrument among corals.

The Blake Dredge. — In the soft ooze which forms the bottom of deep seas the common dredge sinks and digs much too deeply for its ordinary purpose, owing partly to its chief weight bearing on the

frame only, partly to its everted lips. To obviate these defects Lieutenant Commander Sigsbee of the " Blake " devised the Blake dredge. Its novel features were the frame and lips. The former was in the form of a skeleton box; that is, a rectangle of iron bars was placed at the back as well as the front or mouth of the net and four more iron bars connected the two rectangles. The lips instead of being everted were in parallel planes — those, namely, of the top and bottom of the net. The effect of this was to minimize digging and somewhat spread the incidences of the weight. Another advantage was that the net being constantly distended by its frame, and, moreover, protected top and bottom by an external shield of canvas, quite delicate specimens reached the surface uninjured. The dredge weighed 80 lb and was 4 ft. square and 9 in. deep.

Rake Dredges. — These are devices for collecting burrowing creatures without rilling the dredge with the soil in which they live. Holt used, at Plymouth, a dredge whose side bars and lower lip were of iron, the latter armed with forward and downward pointing teeth which stirred up the sand and its denizens in front of the dredge mouth. The upper lip of the dredge was replaced by a bar of wood. The bag was of cheese-cloth or light open canvas, and the whole was of light construction. The apparatus was very useful in capturing small burrowing Crustacea. The Chester rake dredge is a Blake dredge in front of which is secured a heavy iron rectangle with teeth placed almost at right angles to its long sides and in the plane of the rectangle. Each of these instruments has a width along the scraping edge of about 3 ft.

Triangular and Conical Dredges. — Two other dredges are worthy of mention. The triangular dredge, much resembling Mtiller's but with a triangular mouth, and hung by chains from its angles, is an

As the the

by

old fashion now not in general use. It is, however, very useful for rocky ground. At the Plymouth marine laboratory was also devised the conical dredge (1901), the circular form being the suggestion of Garstang. This dredge (fig. 16) was intended for digging deeply. It is of wrought iron, and of the following dimensions: diameter of mouth 16 in., length 33 in., depth of ring at mouth 9 in. Its weight is 67 lb. at first used spaces between bars are closed wire netting; if used for collecting bottom samples it is fur- nished with a lining of strong sail-cloth.

Its weight and the small length of edge in contact with the ground cause this dredge to dig well, and enable the user to obtain many objects which though quite common are of rare occurrence in an ordinary dredge. Thus on the Brown Ridges, a fishing- ground west of Hol- land, although Donax vittalus is known from examination of fish stomachs to be abundant, it is rarely)ˆ taken except in the conical dredge : the same is true of Echino- cyamus pusillus,—*

pa" C s h of' the fi£H FlG.l6.-ConicalDredgebeinghoistedin. Sea abundant in bottom samples and in no ordinary dredgings. With the sail-cloth lining the conical dredge fills in about 10 minutes on most ground, and no material washing out of fine sediment occurs on hauling. In shallow seas such as the North Sea commercial beam and other trawls are now used as quantitative instruments in the estimation of the fish population, especially of the Pleuronectidae.

Use of Small Trawls for Dredging.— Although these trawls do not here concern us, certain adaptations of small beam trawls for bio- logical exploration are of such identical use with the dredge, and differ from it so little in structure and size, that they may be here described.

A small beam trawl was first used from the " Challenger " (fig. 17). It was sent down in 600 fathoms off Cape St Vincent, the reason for its use being the frequency with which the dredge sank into the sea- bottom and there remained until hauling. The experiment was entirely successful. The sinking of the net was avoided, the net had a much greater spread than the dredge, and in addition to invertebrates it captured several fish. After this the trawl was frequently used instead of the dredge. Indeed tangle bar, dredge and trawl form a series which are fitted for use on theˆroughest, moderately rough and fairly firm, and the softest ground respectively, although the dredge can be used almost anywhere.

The frame of the " Challenger " trawl con- sisted of a 15 ft. wooden beam which in use was drawn over the sea-bed on two runners resembling those of a sledge, by means of two ropes or bridles attached to eyes in the front of the runners or " trawl heads." A net 30 ft. long was suspended by one side to the beam by half-a-dozen stops. The remainder of the net's mouth was of much greater length than the beam, and was weighted with close-set ro'ls of sheet lead; it thus dragged along the bottem in a curve approximately to a semicircle, behind the beam. The net tapers towards the hinder of Macmillan & Co.,

end, and contains a second net with open p IG x _ Trawl of the

bottom, which, reaching about three-quarters "Challenger" of the way down the main net, acts as a

valve or pocket. Both heels (or hinder ends) of the trawl heads and the tail of the net were weighted to assist the net in digging sufficiently and to maintain its balance — an important point, since if the trawl lands on its beam the net's mouth remains closed, and nothing is caught.

The main differences of this trawl from the dredge are the replacement of scraping lip by ground rope, the position of this ground rope

From Sir Charles Wyville Thomson's Voyage of the "Challenger. "By permission •" " ~ , Ltd.

From Alexander E. Agassiz's Three Cruises oj the "Blake." By permission of Houghton, Mifflin & Co.

Fig. i 8. — Agassiz or Blake Trawl.

and the greater size of the mouth. The absence of a lip makes it less effective for burrowing and sessile creatures, but the weighted ground rope nevertheless secures them to a very surprising extent. The position of the ground rope is an important feature, as any free swimming creature not disturbed until the arrival of the ground rope cannot escape by simply rising or " striking " up. This and the greater spread make the trawl especially suitable for the collec- tion of fishes and other swiftly moving animals. The first haul of the " Challenger " trawl brought up fishes, and most of our know- ledge of fish of the greatest depths is due to it.

A tendency to return to the use of the small beam trawl for deep- sea work has lately shown itself. That used by Tanner on the "Albatross" has runners more heart-shaped than the" Challenger's" instrument; the net is fastened to the downward and backward sloping edge of the runner as well as to the beam, being thus fixed on three sides instead of one ; and a Norwegian glass float is fastened in a network cover to that part of the net which is above and in front of the ground rope in use, to assist in keeping the opening clear. These floats can stand the pressure at great depths, and do not become

waterlogged as do cork floats. The largest "Albatross " trawl has a beam II ft. long, runners 2 ft. 5 in. high, and its frame weighs 275 lb.

Agassiz or Blake Trawl. — This is generally considered to possess advantages over the pre- ceding, and is decidedly better for those not experts in trawling. Its frame (fig. 18) consists of two iron runners each the shape of a capital letter D, joined by iron rods or pipes which connect the middle of each stroke with the corresponding point on the other letter. The net is a tapering one, its mouth being a strong rope bound with finer rope for protection till the whole reaches a thickness of some 2 in. It is fastened to the frame at four points only, the ends of the curved rods, and thus has a rect- angular opening.

The chief advantage of this frame is that it does not matter in the least which side lands first on the bottom; it is to the other trawls what Ball's dredge is to an oyster dredge. The course can also be altered during shooting or towing the Blake trawl with far greater ease than is the case with others. An Agassiz trawl very successful in the North Sea has the following dimensions: length of the con- necting rods and therefore of the mouth 8 ft., height of runners and of mouth 1 ft. 9 in., extreme length of runners 2 ft., length of net 11 ft. 3 in., weight of whole trawl 94 lb, 63 of which are due to the frame.

It is instructive to note how closely our knowledge of bottom- living forms has been associated with the instruments of capture in use. As long as small vessels were used in dredging, the belief that life was limited to the regions accessible to them was widely spread. The first known denizens of great depths were the foraminifera and few echinoderms brought up by various sound- ing apparatus. Next with the dredge and tangles the number of groups obtained was much greater. As soon as trawls were adopted fish began to make their appearance. The greatest gaps in our knowledge still probably occur in the large and swiftly moving forms, such as fish and cephalopods. As we can hardly hope to move apparatus swiftly over the bottom in great depths, the way in which improvement is possible probably is that of increasing the spread of the nets; and a start in this direction appears to have been made by Dr Petersen, who has devised a modified otter sieve which catches fish at all events very well, and has been operated already at considerable depths.

Of the economy of quite shallow seas, however, we are still largely ignorant. Much as has been learnt of the bionomics of the sea, it is but a commencement; and this is of course especially true of deep seas. The dredge and its kindred have, however, in less than a

century enabled naturalists to compile an immense mass of knowledge of the structure, development, affinities and distribution of the animals of the sea-bed, and in the most accessible seas to produce enumerations and morpho- logical accounts of them of some approach to complete- ness. (J- O. B.)

DRELINCOURT, CHARLES (1595-1669), French Protestant divine, was bom at Sedan on the 10th of July 1595. In 1618 he undertook the charge of the French Protestant church at Langres, but failed to receive the necessary royal sanction, and early in 1620 he removed to Paris, where he was nominated

minister of the Reformed Church at Charenton. He was the author of a large number of works in devotional and polemical theology, several of which had great influence. His Catechism {CaUchisme ou instruction familiere, 1652) and his Christian's Defense against the Fears of Death (Consolations de I'dme fidele contrelesfrayeursdelamort, 1651) became well known in England by means of translations, which were very frequently reprinted. It has been said that Daniel "Defoe wrote his fiction of Mrs Veal (.4 True Relation of the Apparition of Mrs Veal), who came from the other world to recommend the perusal of Drelincourt on Death, for the express purpose of promoting the sale of an English translation of the Consolations; Defoe's contribution is added to the fourth edition of the translation (1706). Another popular work of his was Les Visites charitables pour toutes sortes de personnes affligees (1 669) . Drelincourt 's controversial works were numerous. Directed entirely against Roman Catholicism, they did much to strengthen and consolidate the Protestant party in France. He died on the 3rd of November 1669.

Several of his sons were distinguished as theologians or physicians. Laurent (1626-1681) became a pastor, and was the author of Sonnets chrUiens sur divers sujets (1677);' Charles (1633-1697) was professor of physic at the university of Leiden, and physician to the prince of Orange; Peter (1644-1722) was ordained a priest in the Church of England, and became dean of Armagh.

DRENTE, a province of Holland, bounded N. and N.E. by Groningen, S.E. by the Prussian province of Hanover, S. and S.W. by Overysel, and N.W. by Friesland; area, 1128 sq. m.; pop. (1900) 149,551. The province of Drente is a sandy plateau forming the kernel of the surrounding provinces. The soil consists almost entirely of sand and gravel, and is covered with bleak moorland, patches of wood, and fen. This is only varied by the strip of fertile clay and grass-land

which is found along the banks of the rivers, and by the areas of high fen in the south- eastern corner and on the western borders near Assen. The surface of the province is a gentle slope from the south-west towards the north-east, where it terminates in the long ridge of hills known as the Hondsrug (Dog's Back) extending along the eastern border into Groningen. The watershed of the province runs from east to west across the middle of the province, along the line of the Orange canal. The southern streams are all collected at two points on the southern borders, namely, at Meppel and Koevorden, whence they communicate with the Zwarte Water and the Vecht respectively by means of the Meppeler Diep and the Koevorden canal. The Steenwyker Aa, however, enters the Zuider Zee independently. The northern rivers all flow into Groningen. The piles of granite rocks some- what in the shape of cromlechs which are found scattered about this province, and especially along the western edge of the Hondsrug, have long been named Hunebedden, from a popular superstition that they were " Huns' beds." Possibly the word originally meant " beds of the dead," or tombs.

Two industries have for centuries been associated with the barren heaths and sodden fens so usually found together on the sand-grounds, namely, the cultivation of buckwheat and peat- digging. The work is conducted on a regular system of fen colonization, the first operation being directed towards the drainage of the country. This is effected by means of drainage canals cut at regular intervals and connected by means of cross ditches. These draining ditches all have their issue in a main drainage canal, along which the transport of the peat and peat- litter takes place and the houses of the colonists are built. The heathlands when sufficiently drained are prepared for cultivation by being cut into sods and burnt. This system appears to have been practised already at the end of the 17th century. After eight years, however, the soil becomes exhausted, and twenty to thirty years are required for its refertilization. The cultiva- tion of buckwheat on these grounds has decreased, and large areas which were formerly thus treated now lie waste. Potatoes, rye, oats, beans and peas are also largely cultivated. In con- nexion with the cultivation of potatoes, factories are established for making spirits, treacle, potato-meal, and straw-paper.

Furthermore, agriculture is everywhere accompanied on the sand-grounds by the rearing of sheep and cattle, which assist in fertilizing

the soil. Owing to the meagreness of their food these animals are usually thin and small, but are quickly restored when placed on richer grounds. The breeding of pigs is also widely practised on the sand-grounds, as well as forest culture. Of the fen-colonies in Drente the best known are those of Frederiksoord and Veenhuizen.

Owing to the general condition of poverty which prevailed after the French evacuation in the second decade of the 19th century, attention was turned to the means of industry offered by the unreclaimed heath-lands in the eastern provinces, and in 1818 the Society of Charity (Maalschappij van Weldadigkeid) was formed with Count van den Bosch at its head. This society began by establishing the free agricultural colony of Frederiks- oord, about 10 m. N. of Meppel, named after Prince Frederick, son of William I., king of the Netherlands. An industrious colonist could purchase a small farm on the estate and make him- self independent in two years. In addition to this, various in- dustries were set on foot for the benefit of those who were not capable of field work, such as mat and rope making, and jute and cotton weaving. In later times forest culture was added, and the Gerard Adriaan van Swieten schools of forestry, agriculture and horticulture were established by Major van Sweiten in memory of his son. A Reformed and a Roman Catholic church are also attached to the colony. To this colony the Society of Charity later added the adjoining colonies of Willemsoord and Kolonie VII. in Overysel, and Wilhelminasoord partly in Friesland. The colony of Veenhuizen lies about 7 m. N.W. of Assen, and was founded by the same society in 1823. In 1859, however, the Veenhuizen estates were sold to the government for the purpose of a penal establishment for drunkards and beggars.

Owing to its geographical isolation, the development of Drente has remained behind that of every other province in the Nether- lands, and there are few centres of any importance, either agricultural or industrial. Hence the character and customs of the people have remained peculiarly conservative. Assen is the chief town. In the south Meppel and Koevorden absorb the largest amount of trade. Hoogeveen, situated between these two, owes its origin to the fen reclamation which was begun here in 1625 by Baron van Echten. In the following year it was erected into a barony which lasted till 1795. The original industry has long since moved onwards to other parts, but the town remains a prosperous market centre, and has a considerable industrial activity. Extensive fir woods have been laid out in the neighbourhood. Zuidlaren is a picturesque village at the northern end of the Hondsrug, with an important market. The railway from Amsterdam to Groningen traverses Drente; branch lines

connect Meppel with Leeuwarden and Assen with Delfzyl.

History. — The early history of Drente is obscure. That it was inhabited at a remote date is proved by the prehistoric sepulchral mounds, the Hunebedden already mentioned. In the 5th and 6th centuries the country was overrun by Saxon tribes, and later on was governed by counts under the Frankish and German kings. Of these only three are recorded, Eberhard (943-944), Balderic (1006) and Temmo (1025). In 1046 the emperor Henry III. gave the countship to the bishop and chapter of Utrecht, who governed it through the burgrave, or chatelain, of Koevorden, a dignity which became hereditary after 1143 in the family of Ludolf or Roelof, brother of Heribert of Bierum, bishop of Utrecht (1138-1150). This family became extinct in the male line about 1232, and was succeeded by Henry I. of Borculo (1 232-1 261), who had married the heiress of Roelof III. of Koevorden. In 1395 Reinald IV. (d. 1410) of Borculo-Koe- vorden was deposed by Bishop Frederick of Utrecht, and the country was henceforth administered by an episcopal official (amptman), who was, however, generally a native. With its popularly elected assembly of twenty-four Etten (jurati) Drente remained practically independent. This state of things con- tinued till 1522, when it was conquered by Duke Charles of Gelderland, from whom it was taken by the emperor Charles V. in 1 536, and became part of the Habsburg dominions.*

Drente took part in the revolt of the Netherlands, and being a district covered by waste heath and moor was, on account of its poverty and sparse population, not admitted into the union as a separate province, and it had no voice in the assembly of the states-general. It was subdued by the Spaniards in 1580, but reconquered by Maurice of Nassau in 1594. During the years that followed, Drente, though unrepresented in the states- general, retained its local independence and had its own stadt- holder. William Louis of Nassau-Siegen (d. 1620) held that office, and it was held later by Maurice, Frederick Henry, William II. and William III., princes of Orange. At the general assembly of 1651 Drente put forward its claim to admission as a province, but was not admitted. After the deaths of William II. (1650) and of William III. (1702) Drente remained for a term of years without a stadtholder, but in 1722 William Charles Henry of the house of Nassau-Siegen, who, through the extinction of the elder line, had become prince of Orange, was elected stadt- holder. His descendants held that office, which was declared hereditary, until the French conquest in 1795. In the following year Drente at length obtained the privilege, which it had long sought, of being reckoned as an eighth province with representa- tion in the states-general.

Between 1806 and 1813 Drente, with the rest of the Netherlands, was incorporated in the French empire, and, with part of Groningen, formed the department of Ems Occidental. With the accession of William I. as king of the Netherlands it was restored to its old position as a province of the new kingdom.

DRESDEN, a city of Germany, capital of the kingdom of Saxony, 71 m. E.S.E. from Leipzig and in m. S. from Berlin by railway. It lies at an altitude of 402 ft. above the Baltic, in a broad and pleasant valley on both banks of the Elbe. The prospect of the city with its cupolas, towers, spires and the copper green roofs of its palaces, as seen from the distance, is one of striking beauty. On the left bank of the river are the Altstadt (old town) with four old suburbs and numerous new suburbs, and the Friedrichstadt (separated from the Altstadt by a long railway viaduct); on the right, the Neustadt (new town), Antonstadt, and the modern military suburb Alberstadt. Five fine bridges connect the Altstadt and Neustadt. The beautiful central bridge — the Alte or Augustusbriicke — with 16 arches, built in 1727-1731, and 1420 ft. long, has been demolished (1906) and replaced by a wider structure. Up-stream are the two modern Albert and Konigin Carola bridges, and, down-stream, the Marien and the Eisenbahn (railway) bridges. The streets of the Alstadt are mostly narrow and somewhat gloomy, those of the Neustadt more spacious and regular.

On account of its delightful situation and the many objects of interest it contains, Dresden is often called " German Florence," a name first applied to it by the poet Herder. The richness of its art treasures, the educational advantages it offers, and its attractive surroundings render it a favourite resort of people with private means. There are a large number of foreign resi- dents, notably Austro-Hungarians and Russians, and also a considerable colony of English and Americans, the latter amount- ing to about 1500. The population of the city on the 1st of December 1905 was 516,996, of whom 358,776 lived on the left bank (Altstadt) and 158,220 on the right (Neustadt). The royal house belongs to the Roman Catholic confession, but the bulk of the inhabitants are Lutheran Protestants.

Dresden is the residence of the king, the seat of government for the kingdom of Saxony, and the headquarters of the XII. (Saxon) Army Corps. Within two decades (1880-1900) the capital almost at a single bound advanced into the front rank of German commercial and industrial towns; but while gaining in prosperity it has lost much of its medieval aspect. Old buildings in the heart of the Altstadt have been swept away, and their place occupied by modern business

houses and new streets. Among the public squares in the Altstadt must be mentioned the magnificent Theaterplatz, with a fine equestrian statue of King John, by Schilling; the Altmarkt, with a monument com- memorative of the war of 1870-71; the Neumarkt, with a bronze statue of King Frederick Augustus II.,by E. J. Hahnel;

the Postplatz, adorned by a Gothic fountain, by Semper; and the Bismarckplatz in the Anglo-American quarter. In the Neustadt are the market square, with a bronze equestrian statue of Augustus the Strong; the Kaiser Wilhelmplatz; and the Albertplatz. The continuous Schloss-, See- and Prager-Strasse, and the Wilsdruffer- and Konig Johann-Strasse are the main streets in the Altstadt, and the Hauptstrasse in the Neustadt.

The most imposing churches include the Roman Catholic Hofkirche, built (1739-1751) by C. Chiaveri, in rococo style, with a tower 300 ft. high. It contains a fine organ by Silbermann and pictures by Raphael Mengs and other artists, the outside being adorned with 59 statues by Mattielli. On the Neumarkt is the Frauenkirche, with a stone cupola rising to the height of 311 ft.; close to the Altmarkt, the Kreuzkirche, rebuilt after destruction by fire in 1897, also with a lofty tower surmounted by a cupola; and near the Postplatz the Sophienkirche, with twin spires. In the Neustadt is the Dreikonigskirche (dating from the 1 8th century) with a high pinnacled tower. Among more modern churches may be mentioned: in the Altstadt, the Johanneskirche, with a richly decorated interior; the Lukas- kirche; and the Trinitatiskirche; and in the Neustadt, the Martin Luther-Kirche and the new garrison church. Apart from the chapels in the royal palaces, Dresden contains in all 32 churches, viz. 21 Evangelical, 6 Roman Catholic, a Reformed, a Russian, an English (erected byGilbert Scott) with a graceful spire, a Scottish (Presbyterian), and an American (Episcopal) church, the last a handsome building, with a pretty parsonage attached.

Of secular buildings, the most noteworthy are grouped in the Altstadt near the river. The royal palace, built in 1530-1535 by Duke George (and thus called Georgenschloss), was thoroughly restored, and in some measure rebuilt between 1890 and 1902, in German Renaissance style, and is now an exceedingly handsome structure. The Georgentor has been widened, and through it, and beneath the royal apartments, vehicular traffic from the centre of the town is

directed to the Augustusbriicke. The whole is surmounted by a lofty tower — 387 ft. — the highest in Dresden. The interior is splendidly decorated. In the palace chapel are pictures by Rembrandt, Nicolas Poussin, Guido Reni and Annibale Caracci. The adjoining Prinzen-Palais on the Taschen- berg, built in 17 15, has a fine chapel, in which are various works of S. Torelli; it has also a library of 20,000 volumes. The Zwinger, begun in 1711, and built in the rococo style, forms an enclosure, within which is a statue of King Frederick Augustus I. It was intended to be the vestibule to a palace, but now contains a number of collections of great value. Until 1846 it was open at the north side; but this space has since been occupied by the museum, a beautiful Renaissance building, the exterior of which is adorned by statues of Michelangelo, Raphael, Giotto, Dante, Goethe and other artists and poets by Rietschel and Hahnel, and it contains the famous picture gallery. The Briihl palace, built in 1 737 by Count Briihl, the minister of Augustus II., has been in some measure demolished to make room for the new Standehaus (diet house), with its main facade facing the Hof- kirche; before the main entrance there is an equestrian statue (1906) of King Albert. Close by is the Briihl Terrace, approached by a fine flight of steps, on which are groups, by Schilling, representing Morning, Evening, Day and Night. The terrace commands a view of the Elbe and the distant heights of Loschwitz and the Weisser Hirsch, but the prospect has of late years become somewhat marred, owing to the extension of the town up the river and to the two new up-stream bridges. The Japanese palace in the Neustadt, built in 171 5 as a summer residence for Augustus II., receives its name from certain oriental figures with which it is decorated; it is sometimes called the Augusteum and contains the royal library. Among other buildings of note is the Hoftheatre, a magnificent edifice in the Renaissance style, built after the designs of Semper, to replace the theatre burnt in 1869, and completed in 1878. A new town hall of huge dimensions, also in German Renaissance, with an octagon tower 400 ft. in height, stands on the former southern ramparts of the inner town, close to the Kreuzkirche. In the Altstadt the most striking of the newer edifices is the Kunstakademie, constructed

from designs by K. Lipsius in the Italian Renaissance style > 1890-1894. The Albertinum, formerly the arsenal, built in 1550-1563, was rebuilt 1884-1889, and fitted up as a museum of oriental and classical antiquities, and as the depository of the state archives. On the right bank of the Elbe in Neustadt stand the fine buildings of the ministries of war, of finance, justice, the interior and education. The public monuments of Dresden also include the Moritz

Monument, a relief dedicated by the elector Augustus to his brother Maurice, a statue of Weber the composer by Rietschel, a bronze statue of Theodor Korner by Hahnel, the Rietschel monument on the Briihl Terrace by Schilling, a bust of Gutzkow, and a statue of Bismarck on the promenade. In the suburbs which encircle the old town are to be noted the vast central Hauptbahnhof (1893-1898) occupying the site of the old Bohmischer railway station, the new premises of the municipal hospital and the Ausstellungs-Halle (exhibition buildings).

The chief pleasure-ground of Dresden is the Grosser Garten, in which there are a summer theatre, the Reitschel museum, and a chateau containing a museum of antiquities. The latter is composed chiefly of objects removed from the churches in consequence of the Reformation. Near the chateau is the zoological garden, formed in i860, and excellently arranged. A little to the south of Dresden, on the left bank of the Elbe, is the village Racknitz, in which is Moreau's monument, erected on the spot where he was mortally wounded in 1813. The moun- tains of Saxon Switzerland are seen from this neighbourhood.

Art.— Dresden owes a large part of its fame to its extensive artistic, literary and scientific collections. Of these the most valuable is its splendid picture gallery, founded by Augustus I. and increased by his successors at great cost. It is in the museum, and contains about 2500 pictures, being especially rich in speci- mens of the Italian, Dutch and Flemish schools. The gem of the collection is Raphael's " Madonna di San Sisto," for which a room is set apart. There is also a special room for the " Madonna " of the younger Holbein. Other paintings with which the name of the gallery is generally associated are Correggio's " La Notte " and " Mary Magdalene "; Titian's " Tribute Money " and "Venus"; "The Adoration" and "The Marriage in Cana," by Paul Veronese; Andrea del Sarto's " Abraham's Sacrifice "; Rembrandt's " Portrait of Himself with his Wife sitting on his Knee "; " The Judgment of Paris " and " The Boar Hunt," by Rubens; Van Dyck's " Charles I., his Queen, and their Children."

Of modern painters, this magnificent collection contains masterpieces by Defregger, Vautier, Makart, Munkacsy, Fritz von Uhde, Bocklin, Hans Thoma; portraits by Leon Pohle, Delaroche and Sargent; landscapes by Andreas and Oswald Achenbach and allegorical works by Sascha Schneider. In separate compartments there are a number of crayon portraits, most of them by Rosalba Camera, and views of Dresden by Canaletto and other artists. Besides the picture gallery the museum includes a magnificent

collection of engravings and drawings. There are upwards of 400,000 specimens, arranged in twelve classes, so as to mark the great epochs in the history of art. A collection of casts, likewise in the museum, is designed to display the progress of plastic art from the time of the Egyp- tians and Assyrians to modern ages. This collection was begun by Raphael Mengs, who secured casts of the most valuable antiques in Italy, some of which no longer exist.

The Japanese palace contains a public library of more than 400,000 volumes, with about 3000 MSS. and 20,000 maps. It is especially rich in the ancient classics, and in works bearing on literary history and the history of Germany, Poland and France. There are also a valuable cabinet of coins and a collection of ancient works of art. A collection of porcelain in the " Museum Johanneum " (which once contained the picture gallery) is made up of specimens of Chinese, Japanese, East Indian, Sevres and Meissen manufacture, carefully arranged in chronological order. There is in the same building an excellent Historical Museum. In the Griine Gewolbe (Green Vault) of the Royal Palace, so called from the character of its original decorations, there is an unequalled collection of precious stones, pearls and works of art in gold, silver, amber and ivory. The objects, which are about 3000

S7f>

DRESDEN

in nu mber, are arranged in eight rooms. They include the regalia of Augustus II. as king of Poland; the electoral sword of Saxony; a group by Dinglinger, in gold and enamel, representing the court of the grand mogul Aurungzebe, and consisting of 132 figures upon a plate of silver 4 ft. 4 in. square; the largest onyx known, 6| in. by 2\ in.; a pearl representing the dwarf of Charles II. of Spain; and a green brilliant weighing 40 carats. The royal palace also has a gallery of arms consisting of more than 2000 weapons of artistic or historical value. In the Zwinger are the zoological and mineralogical museums and a collection of instru- ments used in mathematical and physical science. Among other collections is that of the Korner museum with numerous reminiscences of the Goethe-Schiller epoch, and of the wars of liberation (1813-15), and containing valuable manuscripts and relics. Founded by Hofrath Dr Emil Peschel, it has passed into the possession of the city.

Education. — Dresden is the seat of a number of well-known scientific associations. The educational institutions are numerous and of a high order, including a technical high school (with about 1 100 students), which enjoys the privilege of conferring the degrees of doctor of engineering, doctor of technical sciences, &c, a veterinary college, a political-economic institution (Gehestiftung), with library, a school of architects, a royal and four municipal gymnasia, numerous lower grade and popular schools, the royal conservatorium for music and drama, and a celebrated academy of painting. Dresden

has several important hospitals, asylums and other charitable institutions.

Music and the Theatres. — Besides the two royal theatres, Dresden possesses several minor theatres and music halls. The pride of place in the world of music is held by the orchestra attached to the court theatre. Founded by Augustus II., it has become famous throughout the world, owing to the masters who have from time to time been associated with it — such as Paer, Weber, Reissiger and Wagner. Symphony and popular concerts are held throughout the year in various public halls, and, during the winter, concerts of church music are frequently given in the Protestant Kreuz- and Frauen-Kirchen, and on Sundays in the Roman Catholic church.

Communications and. Industries. — Dresden lies at the centre of An extensive railway system, which places it in communication with the chief cities of northern and central Germany as well as with Austria and the East. Here cross the grand trunk lines Berlin-Vienna, Chemnitz-Gorlitz-Breslau. It is connected by two lines of railway with Leipzig and by local lines with neighbour- ing smaller towns. The navigation on the Elbe has of recent years largely developed, and, in addition to trade by river with Bohemia and Magdeburg-Hamburg, there is a considerable pleasure-boat traffic during the summer months. The com- munications within the city are maintained by an excellent system of electric trams, which bring the more distant suburbs into easy connexion with the business centre. A considerable business is done on the exchange, chiefly in local industrial shares, and the financial institutions number some fifty banks, among them branches of the Reichs Bank and of the Deutsche Bank. Among the more notable industries may be mentioned the manufacture of china (see Ceramics), of gold and silver ornaments, cigarettes, chocolate, coloured postcards, perfumery, straw-plaiting, artificial flowers, agricultural machinery, paper, photographic and other scientific instruments. There are several great breweries ; corn trade is carried on, and an extensive business is done in books and objects of art.

Surroundings. — The environs of the city are delightful: To the north are the vine-clad hills of the Lossnitz commanding views of the valley of the Elbe from Dresden to Meissen; behind them, on an island in a lake, is the castle of Moritzburg, the hunting box of the king of Saxony. On the right bank of the Elbe, 3 m. above the city, lies the village of Loschwitz, where Schiller, in the summer of 1786, wrote the greater part of his Don Carlos: above it on the fringe of the Dresdner Heide, the climatic health resort Weisser-Hirsch; farther up

the river towards Pirna the royal summer palace Pillnitz; to the south the Plauensche Grund, and still farther the Rabenauer Grund.

History. — Dresden (Old Slav Drezga, forest, Drezgajan, forest-dwellers), which is known to have existed in 1206, is of Slavonic origin, and was originally founded on the right bank of the Elbe, on the site of the present Neustadt, which is thus actually the old town. It became the capital of Henry the Illustrious, margrave of Meissen, in 1270, but belonged for some time after his death, first to Wenceslaus of Bohemia, and next to the margrave of Brandenburg. Early in the 14th century it was restored to the margrave of Meissen. On the division of Saxony in 1485 it fell to the Albertine line, which has since held it. Having been burned almost to the ground in 149 1, it was rebuilt; and in the 16th century the fortifications were begunand gradually extended. John George II., in the 17th century, formed the Grosser Garten, and otherwise greatly improved the town; but it was in the first half of the 18th century, under Augustus I. and AugustusIL, who were kings of Poland as well as electors of Saxony, that Dresden assumed something like its present appearance. The Neustadt, which had been burned down in the 17th century, was founded anew by Augustus I. ; he also founded Friedrichstadt. The town suffered severely during the Seven Years' War, being bombarded in 1760. Some damage was also inflicted on it in 1813, when Napoleon made it the centre of his operations; one of the buttresses and two arches of the old bridge were then blown up. The dis- mantling of the fortifications had been begun by the French in 1810, and was gradually completed after 1817, the space occupied by them being appropriated to gardens and promenades. Many buildings were completed or founded by King Anthony, from whom Antonstadt derives its name. Dresden again suffered severely during the revolution of 1849, but all traces of the disturbances which then took place were soon effaced. In 1866 it was occupied by the Prussians, who did not finally evacuate it until the spring of the following year. Since that time numerous improvements have been carried out.

See Lindau, Geschichte der Haupt- und Residenzstadt Dresden (2 vols., Dresden, 1884-1885); Prolss, Geschichte des Hoftheaters in Dresden (Dresden, 1877') ! Schumann, Fiihrer durch die konigl. Sammlungen zu Dresden (1903); Woerl, Fiihrer durch Dresden; Daniel, Deutschland (1894).

Battle of Dresden. The battle of Dresden, the last of the great victories of Napoleon, was fought on the 26th and 27th of August 1813. The intervention of Austria in the War of Liberation, and the

consequent advance of the Allies under the Austrian field-marshal Prince Schwarzenberg from Prague upon Dresden, recalled Napoleon from Silesia, where he was engaged against the Prussians and Russians under Bliicher. Only by a narrow margin of time, indeed, was he able to bring back sufficient troops for the first day's battle. He detached a column under Vandamme to the mountains to interpose between Schwarzen- berg and Prague (see Napoleonic Campaigns) ; the rest of the army pressed on by forced marches for Dresden, around which a position for the whole army had been chosen and fortified, though at the moment this was held by less than 20,000 men under Gouvion St Cyr, who retired thither from the mountains, leaving a garrison in Konigstein, and had repeatedly sent reports to the emperor as to the allied masses gathering to the south-ward. The battle of the first day began late in the afternoon, for Schwarzenberg waited as long as possible for the corps of Klenau, which formed his extreme left wing on the Freiberg road. At last, about 6 p.m. he decided to wait no longer, and six heavy columns of attack advanced against the suburbs defended by St Cyr and now also by the leading troops of the main army. Three hundred guns covered the assault, and Dresden was set on fire in places by the cannonade, while the French columns marched unceasingly over the bridges and through the Altstadt. On the right the Russians under Wittgen- stein advanced from Striesen, the Prussians under Kleist through the Grosser Garten, whilst Prussians under Prince Augustus and Austrians under Colloredo moved upon the Moczinski redoubt, which was the scene of the most desperate fighting, and was repeatedly taken and retaken. The attack to the westward was carried out by the other Austrian corps; Klenau, however, was still far distant. In the end, the French defences remained unshaken. Ney led a counter-attack against the Allies' left,

the Moczinski redoubt was definitely recaptured from Colloredo, and the Prussians were driven out of the Grosser Garten. The coup of the Allies had failed, for every hour saw the arrival of fresh forces on the side of Napoleon, and at length the Austrian leader drew off his men to the heights again. He was prepared to fight another battle on the morrow — indeed he could scarcely have avoided it had he wished to do so, for behind him lay the mountain defiles, towards which Vandamme was marching with all speed.

Napoleon's plan for the 27th was, as usual, simple in its outline. As

at Friedland, a ravine separated a part of the hostile line of battle from the rest. The villages west of the Plauen ravine and even Lobda were occupied in the early morning by General Metzko with the leading division of Klenau's corps from Freiberg, and upon Metzko Napoleon intended first to throw the weight of his attack, giving to Victor's infantry and the cavalry of Murat, king of Naples, the task of overwhelming the isolated Austrians. The centre, aided by the defences of the Dresden suburbs, could hold its own, as the even^ of the 26th had shown, the left, now under Ney, with whom served Kellermann's

English Miles

Cowry Vtlkcr ac.

cavalry and the Young Guard, was to attack Wittgenstein's Russians on the Pirna road. Thus, for once, Napoleon decided to attack both flanks of the enemy. His motives in so doing have been much discussed by the critics; Vandamme's move- ments, it may be suggested, contributed to the French emperor's plan, which if carried out would open the Pirna road. Still, the left attack may have had a purely tactical object, for in that quarter was the main body of the Prussians and Russians, and Napoleon's method was always to concentrate the fury of the attack on the heaviest masses of the enemy, i.e. the best target for his own artillery. A very heavy rainstorm during the night seriously affected the movements of troops on the follow- ing day, but all to Napoleon's advantage, for his more mobile artillery, reinforced by every horse available in and about Dresden, was still able to move where the Allied guns sank in mud. Further, if the cavalry had to walk, or at most trot, through the fields the opposing infantry was almost always unable to fire their muskets. " You cannot fire; surrender," said Murat to an Austrian battalion in the battle. " Never," they replied; " you cannot charge us." On the appearance of Murat's horse artillery, however, they had to surrender at once. Under such conditions, Metzko, unsupported either by Klenau or the main army beyond the ravine, was an easy victim. Victor from Lobda drove in the advanced posts and assaulted the line of villages Wolfnitz-Toltschen; Metzko had to retire to the higher ground S.W. of the first line, and Murat, with an overwhelming cavalry force from Cotta and Burgstadl, outflanked his left, broke up vin. 19

whole battalions, and finally, with the assistance of the renewed. frontal attack of Victor's infantry, annihilated the division. The Austrian corps of Gyulai arrived too late to save it. A few formed

bodies escaped across the ravine, but Metzko and three- fourths of his men were killed or taken prisoners.

Meanwhile Ney on the other flank, with his left on the Pillnitz road and his right on the Grosser Garten, had opened his attack. The Russians offered a strenuous resistance, defending Seidnitz, Gross Dobritz and Reick with their usual steadiness, and Ney was so far advanced that several generals at the Allied headquarters suggested a counter-attack of the centre by way of Strehlen, so as to cut off the French left from Dresden. This plan was adopted, but, owing to various misunderstandings, failed of execution. Thus the Allied centre remained inactive all day, cannonaded by the Dresden redoubts. One incident only; but that of great importance, took place here. The tsar, the king of Prussia, Schwarzenberg and a very large headquarter staff watched the fighting from a hill near Racknitz and offered an easy mark to the French guns. In default of formed bodies to fire at, the latter had for a moment ceased fire; Napoleon, riding by, half carelessly told them to reopen, and one of their first shots, directed at 2000 yards range against the mass of officers on the sky-line, mortally wounded General Moreau, who was standing by the emperor Alexander. A council of war followed. The Allied sovereigns" were for continuing the fight; Schwarzenberg, however, knowing the exhaustion of his troops decided to retreat. As at Bautzen, the French cavalry was unable to make any effective pursuit.

The forces engaged were 96,000 French, Saxons, &c, and 200,000 Austrians, Russians and Prussians. The French losses were about 10,000, or a little over 10%, those of the Allies 38,000 killed, wounded and prisoners (the latter 23,000) or 19%. They lost also 15 colours and 26 guns.

DRESS (from the Fr. dresser, to set out, arrange, formed from Lat. directus, arranged, dirigere, to direct, arrange), a substantive of which the current meaning is that of clothing or costume in general, or, specifically, the principal outer garment worn by a woman (see Costume). The verb " to dress " has various applications which can be deduced from its original meaning. It is thus used not only of the putting on of clothing, but of the preparing and finishing of leather, the preparation of food f6r eating, the application of cleansing and healing substances or of bandages, &c, to a wound, the drawing up in a correct line of a body of troops, and, generally, adorning or decking out, as of a ship with flags. In the language of the theatre the " dresser " is the person who looks after the actor's wardrobe and assists him in the changing of his costumes. For the printer's use of "

dresser " see Typography.

DRESSER, in furniture, a form of sideboard. The name is derived from the Fr. dressoir, a piece of furniture used to range or dresser the more costly appointments of the table. The applian ce is the direct descendant of the credence and the buffet, and is, indeed, a much more legitimate inheritor of their functions than the modern sideboard, which, as we know it, is practically an 18th-century invention. It developed into its present shape about the second quarter of the 17th century, and has since then changed but little. As a piece of movable furniture it was made rarely, if at all, after the beginning of the 19th century until the revival of interest in what is called " farmhouse furniture " at the very beginning of the 20th century led in the first place to the construction of many imitation antique dressers from derelict pieces of old oak, and especially from panels of chests, and in the second to the making of avowed imitations. The dresser conformed to a model which varied only in detail and in ornament. Its simple and agreeable form consisted of a long and rather narrow table or slab, with drawers or cupboards beneath and a tall upright closed-in back arranged with a varying number of shallow shelves for the reception of plates; hooks for mugs were often fixed upon the face of these shelves. Towards the end of the 17th century small cupboards were often added to the superstructure. The majority of these dressers were made of oak, but when, early in the Georgian period

mahogany came into general use, they were frequently inlaid with that wood; holly and box were also used for inlaying, most frequently in the shape of plain bands or lines. A peculiarly effective combination of oak and mahogany is found in the dressers, as in other " farmhouse furniture," made on the borders of Staffordshire and Shropshire. The excellence of the work of this kind in that district and in the country lying west of it may perhaps explain the expression " Welsh dresser," which is now no more than a trade term, not necessarily suggestive of the place of origin, and applied to all dressers of this type. They are most frequently found in the houses of small yeomen and sub- stantial farmers, into whichf ashion penetratedslo wly. The dresser is now most familiar as necessary plenishing of the kitchen, in which it is invariably a fixture. In form

it is essentially identical with the movable variety, but it is usually much larger, is made of deal or other soft wood, and the superstructure has no back;

DREUX, a town of north-western France, capital of an arrondissement in the department of Eure-et-Loir, 27 m. N.N.W. of Chartres by rail. Pop. (1906) 8209. It is situated on the Blaise, which at this point divides into several arms. It is overlooked from the north by an eminence on which stands a ruined medieval castle; within the enclosure of this building is a gorgeous chapel, begun in 18 16 by the dowager duchess of Orleans, and completed and adorned at great cost by Louis Philippe. It contains the tombs of the Orleans family, chief among them that of Louis Philippe, whose remains were removed from England to Dreux in 1876. The sculptures on the tombs and the stained glass of the chapel windows are masterpieces of modern art. The older of the two hotels-de-ville of Dreux was built in the early 16th century, chiefly by Clement Metezau, the founder of a famous family of architects, natives of the town. It is notable both for the graceful carvings of the facade and for the fine staircase and architectural details of the interior. The church of St Pierre, which is Gothic in style, contains good stained glass and other works of art. The town has a statue of the poet Jean de Rotrou, born there in 1609. Dreux is the seat of a subprefect. Among the public institutions are tribunals of first instance and of commerce, and a communal college. The manufacture of boots and shoes, metal-founding and tanning, are carried on, and there is trade in wheat and other agricultural products and poultry.

Dreux was the capital of the Gallic tribe of the Durocasses. In 1 188 it was taken and burnt by the English; and in 1562 Gaspard de Coligny, and Louis I., prince of Conde, were defeated in its vicinity by Anne de Montmorency and Francis, duke of Guise. In 1593 Henry IV. captured the town after a fortnight's siege. It was occupied by the Germans on the 9th of October 1870, was subsequently evacuated, and was again taken, on the 17 th of November, by General Von Tresckow. In the 10th century Dreux was the chief town of a countship, which Odo, count of Chartres, ceded to king Robert, and Louis VI. gave to his son Robert, whose grandson Peter of Dreux, younger brother of Count Robert III., became duke of Brittany by his marriage with Alix, daughter of Constance of Brittany by her second husband Guy of Thouars. By the marriage of the countess Jeanne II. with Louis, viscount of Thouars (d. 1370), the Capetian countship of Dreux passed into the Thouars family. In 1377 and 1378, however, two of the three co-heiresses of Jeanne, Perronelle and Marguerite, sold their shares of the countship to King Charles V. Charles VI. gave

it to Arnaud Amanien d'Albret, but took it back in order to give it to his brother Louis of Orleans (1407); later he gave it back to the lords of Albret. Francis of Cleves laid claim to it in the 16th century as heir of the d'Albrets of Orval, but the parlement of Paris declared the countship to be crown property. It was given to Catherine de' Medici (1539), then, to Francis, duke of Alencon (1569); it was pledged to Charles de Bourbon, count of Soissons, and through him passed to the houses of Orleans, Vendome and Conde.

DREW; the name of a family of American actors. John Drew (-1827-1862) was born in Dublin and made his first New York appearance in 1846. He played Irish and light comedy parts with success in all the American cities, and was manager

of the Arch Street theatre in Philadelphia. He visited England in 1855, and Australia in 1859, and died in Philadelphia. His wife, Louise Lane Drew (1820-1897), was the daughter of a London actor, and in 1827 went to America, appearing as the Duke of York to the elder Booth's Richard III., and as Albert to Edwin Forrest's William Tell. After this she starred as a child actress, and then as leading lady. She had been twice married before she became Mrs Drew in 1850. Fom 1861 to 1892 she had the management of the Arch Street theatre in Philadelphia. In 1880 she toured with Joseph Jefferson in his elaborate revival of The Rivals, playing Mrs Malaprop to perfection. She had three children, John, Sidney and Georgiana, wife of Maurice Barrymore (1847-1905), and mother of Lionel and Ethel Barrymore, all actors. The eldest son, John Drew (b. 1853), began his stage career under his mother's management in Philadelphia as Plumper in Cool as a Cucumber, on the 22nd of March 1873; and after playing with Edwin Booth and others, became leading man in Augustin Daly's company in 1879. ˆHis association with this company, and with Ada Rehan as the leading lady, constituted a brilliant period in recent stage history, his Petruchio being only one, though perhaps the most striking, of a series of famous impersonations. In 1892 he left Daly's company, and began a career as a " star." DREW, SAMUEL (1765-1833), English theologian, was born in the parish of St Austell, in Cornwall, on the 6th of March 1765. His father was a poor farm labourer, and could not afford to send him to school long enough even to learn to read and write. At ten he was apprenticed to a shoemaker, and at twenty he settled in the town of St Austell, first as manager for a shoemaker, and in 1787 began business on his own account. He had already gained a reputation in his narrow circle as a keen debater and a jovial companion, and it is said that he had several smuggling adventures. He was first aroused to serious thought in 1785 by a funeral sermon

preached over his elder brother by Adam Clarke. He joined the Methodists, was soon employed as a class leader and local preacher, and continued to preach till a few months before his death. His opportunities of gaining knowledge were very scanty, but he strenuously set himself to make the most of them. It is stated that an accidental intro- duction to Locke's great essay determined the ultimate direction of his studies. In 1798 the first part of Thomas Paine's Age of Reason was put into his hands; and in the following year he made his first appearance as an author by publishing his Remarks on that work. The book was favourably received, and was republished in 1820. Drew had begun to meditate a greater attempt before he wrote his Remarks on Paine; and, encouraged by the antiquary John Whi taker, he published his Essay on the Immateriality and Immortality of the Soul in 1802. This work made the " Cornish metaphysician," as he was called, widely known, and for some time it held a high place in the judgment of the religious world as a conclusive argument on its subject. A fifth edition appeared in 183 1. Drew continued to work at his trade till 1805, when he entered into an engagement with Dr Thomas Coke, a prominent Wesleyan official, which enabled him to devote himself entirely to literature. In 1809 he published his Essay on the Identity and General Resurrection of the Human Body, perhaps the most original of his works, which reached a second edition in 1822. In '1-814 he completed a history of Cornwall begun by F. Hitchins. In 18 19 he removed to Liverpool, being appointed editor of the Imperial Magazine, then newly established, and in 182 1 to London, the business being then transferred to the capital. Here he filled the post of editor till his death, and had also the supervision of all works issued from the Caxton Press. He was an unsuccessful • competitor for the Burnett prize offered in 181 1 for an essay on the existence and attributes of God. The work which he then wrote, and which in his own judgment was his best, was published in 1820, under the title of An Attempt to demonstrate from Reason and Revelation the Necessary Existence, Essential Perfections, and Superintending Providence of an Eternal Being, who is the Creator, the Supporter, and the Governor of all Things (2 vols. 8 vo). This procured him the degree of M. A. from the university of Aberdeen.

Among Drew's lesser writings are a Life of Br Thomas Coke (1817), and a work on the deity of Christ (1813). He died at Helston in Cornwall on the 29th of March 1833. He was a man of strong mind,

honourable spirit and affectionate disposition, energetic both in speech and in writing. A memoir of his life by his eldest son appeared in 1834.

DREWENZ, a river of Germany, a right-bank tributary of the Vistula. It rises on the plateau of Hohenstein in East Prussia,

5 m. S.W. of the town of Hohenstein. After passing through the lake of Drewenz (7 m, long), it flows S.W. through flat marshy country, and forms, from just below the town of Strass- burg to that of Leibitsch, a distance of 30 m., the frontier between Prussia and Russian Poland. After a course of 148 m. it enters the Vistula from the right, a little above the fortress of Thorn. It is navigable only for rafts. Lake Drewenz is con- nected with Elbing (and so with the Baltic) by the navigable Elbing-Oberland Canal.

DREXEL, ANTHONY JOSEPH (1826-1893), American banker, was born in Philadelphia, Pennsylvania, on the 13th of September 1826. He was the son of Francis M. Drexel (1792-1863), a native of Austrian Tirol, who emigrated to America in 181 7, and, after some years spent as a portrait-painter, became a banker and the founder of the house of Drexel & Company. Anthony, who entered his father's counting-house in 1839, eventually, with his brothers Francis and Joseph, succeeded to the control of the business, and organized the banking houses of Drexel, Morgan & Company, New York, of which his brother Joseph W. (1833-1888) was long the resident head, and of Drexel, Harjes

6 Company, Paris. In 1864 he joined his friend George W. Childs in the purchase of the Philadelphia Public Ledger, and with him in 1892 founded the Printers' Home for union men at Colorado Springs. In 1891 he founded, and endowed with $2,000,000, the Drexel Institute of Art, Science and Industry in Philadelphia, the buildings for which he constructed at a cost of $750,000. This institution provides technical instruction for both night and day classes and public lecture courses, and has a good museum and a library of 35,000 volumes. Drexel died at Carlsbad, Germany, on the 30th of June 1893.

DREYFUS, ALFRED (1859-), French soldier, of Jewish parentage, the scandal of whose condemnation for treason and subsequent rehabilitation convulsed French political life between 1894 and 1899, and only ended in 1906, was born in Mulhausen, Upper Alsace, removing to Paris in 1874. After going through the usual course of military instruction with credit, he became a sous-

lieutenant in the artillery in 1882, and was promoted captain in 1889; and, after passing through the Ecole de Guerre with distinction, he was appointed to the general staff. His name was, however, unknown to the general public till he was arrested on the 15th of October 1894 on a charge of selling military secrets to Germany, condemned, publicly degraded (January 4, 1895), and transported (March 10) to the He du Diable, French Guiana. The story of the subsequent proceedings in this cele- brated case is told in the article Anti-Semitism, and need not here be repeated. It was not till 1899 that the unfortunate prisoner was brought back to France for retrial by court-martial, and even then, so strong was the anti-Semitic and military prejudice, he was again found guilty " with extenuating circum- stances " at Rennes (September 9), though ten days later he was " pardoned " by President Loubet. It was not till the Cour de Cassation ordered a further investigation, and on the 12th of July 1906 decided that his conviction had been based on a forgery and that Dreyfus was innocent, that the agitation came to a final conclusion. He was then restored to his rank in the army and promoted major. But the anti-Semitic and anti- Dreyfusard spirit in certain French circles could not easily be quelled even then ; and on the occasion of the translation of the remains of Emile Zola (Dreyfus's determined champion) to the Pantheon on the 4th of June 1908, Major Dreyfus was shot at and wounded by a fanatical journalist named Gregori, who was subsequently acquitted by a Paris jury of the charge of attempted murder, his own plea being that he had merely intended a " demonstration."

See Dreyfus's own Five Years of my Life (1901), and literature cited under Anti-Semitism.

DRIBUR6, a town and spa of Germany, in Prussian West- phalia, pleasantly situated on the Aa and the railway Soest- HOxter-Berlin. Pop. 2600. It has an Evangelical and a Roman Catholic church and some glass manufactures. It is celebrated for its saline-ferruginous springs, discovered in 766, and since 1779 largely frequented in summer. In the vicinity are the rains of Iburg, a castle destroyed by Charlemagne in 7 7 5, and bestowed by him upon the bishopric of Paderborn.

DRIFFIELD (officially Great Driffield), a market town in the Buckrose parliamentary division of the East Riding of Yorkshire, England, 19 j m. N. by W. from Hull, the junction of several branch lines of the North Eastern railway. Pop. of urban district (1901) 5766. It is pleasantly situated at the foot of the Wolds, and is connected with Hull by a navigable canal. The church of All Saints is

of various dates from Norman onwards. The town is the centre of a rich agricultural district, and large markets and fairs are held. There are works for the manufacture of oil-cake. Driffield is of high antiquity, and numerous tumuli are seen in the vicinity, while there is an excellent private antiquarian museum in the town.

DRIFT (from " drive "), a verb or noun used in various connexions with the sense of propelled motion, especially (but not necessarily) of an aimless sort, undirected. Thus it is possible to speak of a snow-drift, an accumlation driven by the wind; of a ship drifting out of its course; of the drift of a speech, i.e. its general tendency. The word is also used in some technical senses, more immediately resulting from the action of driving something in. But the most important technical use of the word is in geology, as introduced by C. Lyell in 1840 in place of " Diluvium." The earlier geologists had been in the habit of dividing the Quaternary deposits into an older Diluvium and a younger Alluvium; the latter is still employed in England, but the former has dropped out of use, though it is still retained by some continental writers. The Alluvium was distinguished from Diluvium by the fact that its mammalian fossils were representatives of still living forms, but it is a matter of great difficulty to separate these two divisions in practice. " The term drift is now applied generally to the Quaternary deposits, which consist for the most part of gravel, sand, loam or brickearth and clay; it naturally refers to strata laid down at some distance from the rocks to whose destruction they are largely due; but, although applied to river deposits, the word drift is more appro- priately used in reference to the accumulations of the Glacial period.

" The occurrence of stones and boulders far removed from their parent source early attracted the attention of geologists, but for a long period the phenomena, now known as of glacial origin, were unexplained, and the drifts were looked upon as little more than ' extraneous rubbish,' the product of geological agents, quite distinct from those which helped to form the more ' solid ' rocks that underlie them." (See H. B. Woodward, The Geology of England and Wales, 2nd ed., 1887.) The conception of an underlying "solid" geological structure covered by a superficial mantle of " drift " is still retained for certain practical purposes; thus, the Geological Survey of Great Britain issues many of the maps in two forms, the " Solid Edition," showing the " solid geology," which embraces all igneous rocks and the stratified rocks older than Pleistocene, and the " Drift Edition," which shows only such older strata as are unobscured by drift.

In writing and in conversation the geological expression " drift " is

now usually understood to mean Glacial drift, including boulder clay and all the varieties of sand, gravel and clay deposits formed by the agency of ice sheets, glaciers and icebergs. But in the " Drift " maps many other types of deposit are indicated, such, for instance, as the ordinary modern alluvium of rivers, and the older river terraces (River-drift of various ages), including gravels, brickearth and loam; old raised sea beaches and blown-sand (Aeolian-drift); the " Head " of Cornwall and Devon, an angular detritus consisting of stones with clay or loam; clay-with-flints, rainwash (land wash), scree and talus;

the " Warp," a marine and estuarine silt and clay of the Humber; and also beds of peat and diatomite. See Glacial Period; Pleistocene; Boulder Clay. (J- A. H.)

DRILL, (i) A tool for boring or making holes in hard sub- stances, such as stone, metal, &c. (an adaptation in the 17th century from the Dutch dril or drille, from drillen, to turn, bore a hole; according to the New English Dictionary the word is not to be connected with the English "thrill "). The word drillen was used in Dutch, German and Danish, from the 17th century for training in military exercises arid was adopted into English in the same sense. The origin of the application seems to be in the primary sense of " to turn round," from the turning of the troops in their evolutions and from the turning of the weapons in the soldiers' hands. Drill is, formally, the prepara- tion of soldiers for their duties in war by the practice or rehearsal of movements in military order and the handling of arms, and, psychologically, the method of producing in the individual soldier habits of self-control and of mechanically precise actions under dis- turbing conditions, and of rendering the common instinctive will of a body of men, large or small, amenable to the control of, and susceptible to a stimulus imparted by its commander's will.

(2) A furrow made in the soil in which seed maybe sown, and a machine used for sowing seed in such furrows (see Sowing). The word is somewhat doubtful in origin. It may be the same as an obsolete word " drill," to trickle, flow in drops, also a small stream or flow of water, a rill, and is possibly an altered form of " trill." ■ (3) In zoology, the native name of a large short-tailed west African baboon, Papio leucopkaeus, closely allied to the mandrill (q.v.), but distinguished by the absence of brilliant blue and scarlet on the jaws

of the fully adult males.

(4) The name of a fabric made in both linen and cotton, and commonly bleached and finished stiff. The word is a shortened form of " drilling," from the German drillich, or " three- threaded," and is so named because the weave originally used in its construction is what is termed the three-leaf twill, nine repeats of which appear in the accompanying figure, while immediately below the design is an intersec- tion of all the nine threads with the first pick. It is essentially a warp-faced fabric; that is, the upper surface is composed mostly of warp threads. In the figure it will be seen that two out of every three threads appear on the surface, and, by introducing a greater number of threads per inch than picks per inch, the weft is made to occupy a still more subordinate position so far as the upper surface of the cloth is concerned. Although the weave shown is still extensively used in this branch, there are others, e.g. the 4-thread and the 5-thread weaves, which are employed for the production of this cloth. Large quantities of drill are shipped to the Eastern markets and to other subrtropical centres, from which it is sold for clothing. In temperate climates it forms a satisfactory material for ladies' and children's summer clothing, and it is used by chefs, hairdressers, provision merchants, grocers, buttermen, painters and decorators, &c, while many of the long jackets or overalls, such as those worn by many mill and factory managers, are made from the same material.

DRINKING VESSELS. 1 The use of special vessels for drinking purposes may fairly be assumed to have had a natural origin and development. From a practical point of view it would soon be found desirable to provide vessels for liquids in addition to those serving to hold food. As in many other commonplace details of modern life, we must turn to the primitive races to understand how our present conditions were reached. In almost all parts of the world many of the products of nature are capable of serving such purposes, with little or no change at the hands of man; in tropical and sub-tropical climates the coco-nut and the gourd or calabash require but little change to adapt them as the most convenient of drinking utensils; the eggs of the larger birds, such as the ostrich or the emu, shells, like the nautilus and other univalves, as well as the deeper bivalves, 'The verb " to drink " is Common Teut. ; cf. Ger. trinken, &c.

zzzzzx

are equally convenient. Such natural objects are in fact used by the uncivilized tribes of Africa, America and Polynesia, as well as, in

some cases, by the white races who have intruded into those parts of the world, and adopted some of the native habits. In Paraguay, for example, the so-called " Paraguay tea," an infusion of the yerba mate {Ilex paraguayensis), is drunk through a tube from a small gourd held in the hand, and often handsomely mounted in silver or even gold. In the same way, as we shall see, civilized man has adopted nearly all the natural forms that were found convenient by the savage, altering and adorning them in accordance with the taste of the time or country where they were used.

Another line of development, however, has been found to be the natural outcome of the human mind. Nothing could form a more practical drinking cup than the half of a coco-nut shell or part of a gourd. Such cups, however, in the countries where the plants producing them are common, would be easily obtained, and every one, rich or poor, could possess one or more. In order, therefore, to distinguish the chief's possessions from those of his inferiors, his cup is often made with great labour, from some more intractable material, wood or stone, though in practically the same form as that of the natural object.

Among European races in medieval times the same lines have been followed, though for different reasons. Human ingenuity, though perhaps originally inspired by natural forms, is apt to turn aside into more artificial channels. Earl y The invention of the potter's art (see Ceramics), d ^"" g where the plastic nature of the raw material renders it capable of infinite changes of form, gave rise to types of vessels having no obvious or necessary relation to the productions of nature. In Britain and in northern Europe generally, the interments of the races of the Neolithic and Bronze Ages have furnished vessels of pottery of a beaker-like form, to which the name of " drinking-cups " has been given. It must be confessed that the evidence for attributing such a use to them is slender, and mainly consists of the fact that their thin lips would render them better adapted for the purpose than the other pottery vessels found with them, some of which, on equally slight grounds, have been called food vessels. The general use and acceptance of the term by two generations of archaeologists is, however, an adequate reason for a passing mention in this place. In the later prehistoric times of Europe vessels of gold, bronze and other materials, including amber, were made, sometimes of elegant forms, and would seem to have been used as drinking vessels; still, this is again an assumption, though a fairly prob- able one. A small gold cup with handle was found in a barrow at Rillaton, Cornwall; one of amber of a similar form was found at Hove, and a third cf shale near Honiton. All of these doubtless may be referred to

the Bronze Age.

Schliemann found many drinking vessels in his exploration of the superimposed cities of Troy. A pretty form is that found in the first city. It is of clay, and closely resembles New fbrms an early Victorian tea cup on a high foot. This form found by is of interest, as Schliemann discovered the same both Schlie- at Tiryns and Mycenae, five from the latter site being ""■""• of gold, while the type also occurs from Ialysus in Rhodes in association with bronze swords. This Trojan cup was found at a depth of 50 ft. below the present surface and about 18 ft. below the stratum of what Schliemann claimed to be the Homeric Troy. In his second city appears a different type of ware, somewhat fantastic in form, one vessel being in the form of a sow, while others foreshadow the crater and amphora of later and more familiar Greek wares.

But the drinking vessel to which Schliemann draws most attention is the tall cup of a trumpet form furnished with two earlike loop handles. This curious and original type occurs also in the Third (or Homeric), Fourth and Sixth Cities, with little if any change. Schliemann devotes some pages to the discussion of the form, in which he sees the 5«ras hfupiKbireKkov 1 of Homer, which has been more usually understood to mean an hour-glass shaped cup, in which the distinguishing feature 1 See Plate, Plate I.

was two cups, not two handles. He applies the same term to a drinking vessel of a very different form, found with several others in the Third City. This is a sauce-boat shaped vessel 1 of gold, made with a lip for pouring or drinking at either end, and with two loop handles. This equals those previously mentioned in originality of form; with it were found others of gold, silver and electrum (i.e. 4 parts of gold to 1 of silver). Of these three were shaped like 18th-century coffee cups but wanting handles. In the Sixth City appear forms more nearly approaching those of later times, particularly prototypes of the canlharus and scypkus.

These discoveries in the various strata of Troy may be taken as the analogues in the Mediterranean and hither Asia of the later Stone and Bronze Ages of northern Europe, with. an allowance of some centuries of greater antiquity for the former.

It is not proposed in this article to deal with the ceramic and metallic drinking vessels of the Greeks and Romans, of what is generally known as the classical period (see Ceramics and Plate). It may be mentioned, however, that both on the Rhine and in various places in Britain, notably at Castor in North- amptonshire and in the New Forest, were factories where large numbers of pocula or drinking cups were made; those made on the Rhine and at Castor bearing legends to indicate their use. Many of these are to be seen in the British Museum and in the Wallraf-Richartz Museum in Cologne.

After the decline of Roman power, the Gothic and Scandinavian races who replaced the Romans in central and northern Europe Gothic and brought with them their own forms and types of drink- Scandh ing vessels. These, from about the 4th century, re- aavian placed the well-known Roman vessels. The northern

*IVDCB**

barbarians were as great drinkers as fighters, and their literature recites with equal zest the richness of their drinking cups as the power and deadly qualities of their arms. Fortu- nately the practice of burying with the dead warrior all his property, or at least as much of it as he would be supposed to need, has preserved to our day the actual vessels in use by the pagan northmen who pervaded northern Europe from the 4th century onward. Saxon graves in Britain have furnished great numbers of drinking cups and horns, in many cases quite unbroken. From the remains, of which the chief series are in the British and Liverpool Museums, we can learn a great deal to amDlify the references in literature. The richest single interment that has yet been found was within the present church- yard at Taplow. Here under a huge mound lay buried a Saxon chieftain surrounded by his belongings; arms defensive and offensive, his drinking cups, and even his game of draughts. The drinking vessels consisted of five cows' horns and four glass cups. The former were of great size, 2 ft. long, richly mounted at the mouth and at the point with silver bands embossed and gilt. The glasses also were of great size and of a type familiar in Saxon interments. Each was of a trumpet shape, with a small foot, while the sides were ornamented with hollow pointed tubes bent downwards, and open on the inner side, so that the liquid would fill them. Such a plan is most unpractical, and it must have been very difficult to keep the vessels clean. Glasses of this uncommon form have not been found elsewhere than in Saxon graves, either in England or in the north of the continent. Other types are perhaps nearly as characteristic, though of simpler construction. One of these is a simple cone of glass, sometimes quite plain, at

others ornamented with an applied spiral glass thread, or more rarely with festoons of white glass embedded in the body of the vessel. A third form is a plain cup or bowl widely expanded at the mouth and with a rounded base, so that it could only be set down when empty, in fact a true " tumbler." This feature is in fact a very common one in the drinking vessels of the Saxon race. There are many other varieties, plain cylindrical goblets, generally with ornamental glass threads on the outside, and a more usual type has a rounded body somewhat of the shape of an orange with a wide plain mouth. Many of all these classes were found in the famous .cemetery known as the King's Field at Faversham in Kent (the relics from which are now in the British Museum), at Chessel 1 See Plate, Plate I.

Down in the Isle of Wight, and in the cemetery within the ancient camp on High Down, near Worthing. In Belgium, France and Germany the same types occur, and even as far north as Scandinavia, where they are found in association with Roman coins of the 4th century On the continent, however, additional types are found that do not occur in Britain — one of these is a drinking glass in the form of a hunting hern with glass threads forming an ornamental design on the outside. From the wide distribution of these types, it seems certain that they sprang originally from a common centre, and the slender evidence available on the subject seems to point to that centre having been somewhere on the lower Rhine. Although glass seems to have been popular and by no means rare as a material for drinking vessels, other materials also were used. A large number of the smaller pottery vessels would serve such a purpose, and in one grave at Broomfield in Essex two small wooden cups were found which, from their small size and thinness, were no doubt used for liquid.*

Of the later Saxon domestic utensils nothing remains, the habit of burying such objects with the dead having ceased on the gradual introduction of Christianity through the country. Manuscripts are our only resource, and they are not only of great rarity, but in the main rudely and conventionally drawn in their details. In those of the 9th to the nth century various simple forms are seen, some resembling our modern tumbler in shape, others like a dice box. Horns as drinking vessels certainly retained their popularity at all times, surviving especially among the northern nations, and many of the vessels of this form were no doubt actual horns, though horn-shaped vessels were often made of other materials. Until we come to the 13th and 14th centuries there is an absolute dearth of the actual objects used in domestic life. And here we begin with plate used in

the service of the church.'

The drinking vessel possessing the most unbroken history is doubtless the chalice of the Christian Church. 2 Like other ceremonial objects it was no doubt differentiated from the drinking cups in ordinary use by a gradual transi- yesseh. tion, and in the early centuries it is unlikely that it differed either in form or material from the ordinary domestic vessel of the time. Figures of such vessels, apparently with a symbolic intention, are found upon early Christian tombstones, and it has been contended that the vessel indicated the grave of a priest. While this may be the case, the similarity of the vessel represented to the ordinary non-liturgical form renders the conclusion somewhat weak. Among objects found under conditions which lend colour to their specific use as chalices are the bottoms of glass vessels found inserted in plaster in the Catacombs at Rome; but here again the Jesuit Padre Garrucci was unable to find any evidence to support such a conclusion. It is not in fact until the 6th century that the sacred vessel would appear to have assumed a definite form. From about that time date the lost golden chalices of Monza, representations of which still exist in that city; and the famous chalice of Gourdon in the Bibliotheque Nationale in Paris is probably of about the same time. All of these are two-handled with a vase-shaped body and supported on a high foot; and thus quite unlike the more recent medieval types. Two glass vases of exactly this two-handled form are in the Slade collection at the British Museum, and may well have been chalices. Another chalice, in the same collection, of the 6th or 7th century, was found with a silver treasure at Lampsacus on the Hellespont. It is of silver, with a cylindrical body and small expanding foot; with it were found a number of silver spoons and dishes, the former inscribed with the names of Apostles, Greek hexa- meters and lines from Virgil's Eclogues. No doubt the whole was the treasure of a monastery, buried and never reclaimed. So far as evidence exists for the form of the chalice, the vase- shape with two handles seems to have been mainly succeeded by a goblet with straight sides and without handles; these latter in great part disappeared. Then came the rounded cup-shaped bowl as seen in the well-known Kremsmiinster chalice. Au 2 For two illustrations see Plate, Plate II.

interesting silver vessel, probably a chalice, found at Trewhiddle in Cornwall, is in the British Museum. It is of plain semi- oviform

shape, and dates from the 9th century. The 13th century chalice was usually a broad somewhat shallow cup, on a conical base, and squat in its general lines as compared with those of later date. These gradually became taller, and with a bowl smaller in proportion, following the tendency of the civil vessels towards more elegant lines. Both civil and religious vessels eventually carried this tendency to an extreme point, so that in the 17th century the continental chalices and standing cups had lost all sense of true artistic proportions; the bowl of the chalice had greatly shrunk in size while the foot had become huge and highly elaborate, both in general form and in ornamental details. In Britain chalices ceased to be used in the English church in the reign of Edward VI., and were replaced by communion cups. These were much plainer in make, recalling in their outlines the goblet form of about a thousand years earlier, the sides of the bowl being concave, or nearly straight, as opposed to the convexity of the chalice, while the paten was reversed over the mouth and so arranged as to form a closely fitting cover. With the beginning of the 17th century English communion cups again followed the civil fashion in adapting the outline of the Venetian drinking glass, a shape which has survived to our own days.

The materials of which chalices were made in the early centuries seem to have been as various as those of ordinary vessels. Glass was undoubtedly a favourite substance, perhaps from its lending itself readily to scrupulous cleanliness; but wood, horn, ivory and similar materials were undoubtedly in use, and were from time to time condemned as improper by the Fathers of the Church. Pewter was in common use, and it was not an unusual practice in the 12th and 13th centuries to place sacramental vessels, of this or more precious metal, in the grave of an ecclesiastic. Bronze was also used, and the Kremsmiinster chalice is of that metal, which was a favourite one in the Celtic church. But gold or silver chalices were no doubt always preferred when they could be obtained.

It may be mentioned here that it was a common practice in the 16th century and later in England for laymen to make gifts to the church of vessels of an entirely domestic character for use in the service. Many of these from their associations, and in the character of the designs upon them, were entirely unsuited for such purposes, and in our own time, when a healthy desire has sprung up for the proper investigation of such matters, many such unsuitable vessels have been withdrawn from use. Domestic plate, however, being much more highly appreciated by collectors, there has been a regrettable tendency on the part of the holders of such pieces to sell them to the highest bidders; the tendency is to be deplored, for while they remain

the pro- perty of the church, they are a national asset; if sold by auction, there is a great probability of their going abroad.

It would seem fairly certain that the ordinary drinking vessel of medieval times was, like the trenchers of wood, turned on the Medieval lathe. Of these the commoner varieties have entirely vessels for disappeared, having become useless from distortion common or ther damage. Such as have come down to our " es " own time owe their preservation to the added refine-*

ment of a silver mount. Vessels of this kind are known as mazer bowls, a word of uncertain origin, but undoubtedly, „ in the medieval sense, indicating wood of some more

or less valuable kind, and not improbably, in the 16th century, maple or a wood of that appearance. Spenser in the " Shepherd's Kalendar " speaks of " a mazer ywrought of the maple .warre." Although such vessels are mentioned in the inventories and other contemporary records as far back as the 12th century, no example is known to exist of an earlier date than the 14th century, of which date there are two in the posses- sion of Harbledown hospital. This type of drinking vessel was in common use in well-to-do households until the 16th century, when a change of fashion and the greater luxury and refinement dictated the adoption of more elegant and complex forms. The ordinary mazer was a shallow bowl (see Plate,

Plate II.) about 6 in. in diameter, with a broad expanding rim of silver gilt often engraved with a motto in black letter or Lombardic capitals, at times referring to the function of the cup, such as: — V

" In the name of the Trinity Fille the Kup and drinke to me."

or, i

" Potum et nos benedicat Agios."

Within the bowl, in the centre is often found a circular medallion called a " print " with some device upon it, engraved and filled with enameL The reason of this addition may conceivably be found in the fact that such bowls were sometimes made from the lower half of a gourd or calabash, in the centre of which would be a rough projection whence the fibres of the fruit had diverged. A rarer form of mazer has the characters just men- tioned and in addition is mounted upon a high foot, bringing it nearer to the category of standing cups or "hanaps." The famous Scrope mazer belonging to York Minster (early 15th century) stands upon three small feet. Of

the hanap type examples are in the possession of Pembroke College, Cambridge (the Foundress' Cup), and All Souls' College, Oxford, the former an exceedingly fine specimen, of the third quarter of the 15th century. The form dictated originally by the simple wooden cup was at times carried out entirely in silver, or even in stone, mazer-like cups being found either entirely in metal or with the main portion made of serpentine or some other ornamental stone. An example of the former from the Hamilton Palace collection, as well as several ordinary mazers, are to be seen in the British Museum. The types above described are of English origin, with the exception of that made entirely of silver, which is thought to be French. Most of the continental forms differed from the English, and were more elaborately finished. One of the finest is that which belonged to Louis de Male, last count of Flanders. It is an exceedingly thin, shallow bowl of fine-grained wood, with a cover of the same make. The latter is surmounted by a silver figure of a falcon holding a shield in its mouth with the arms of the count. The foot is of silver with lozenge-shaped panels inserted, bearing in enamel the arms of the count. A German form of the 16th century consisted of a depressed sphere of wood for the bowl, with a silver rim, and a cover formed of a similarly shaped sphere, called in France a " creuse- quin." Such mazers were furnished in addition with a short metal handle turned up at the end, a feature unknown in the English types. All of these again are to be seen in the British Museum series.

Although the use of wooden vessels more or less elaborately mounted was continued well into the 16th century as a fashion, many other materials of far greater value were in use among the wealthy long before tha,t time. Crystal, agate and other hard stones, ivory, Chinese porcelain, as well as more ordinary wares, were all in use, as well as the precious metals. The inventories of the 14th and 15th centuries are full of entries showing that such precious cups were fairly common. Of gold cups of 'any antiquity naturally but few remain; the intrinsic value of the metal probably is a sufficient explanation. One of the most important in existence is however preserved in the British Museum, viz. the royal gold cup of the kings of England and France. It is of nearly pure gold with a broad bowl and a high foot, the cover pyramidal. The whole is orna- mented with translucent enamels of the most perfect quality, and with a little damage in one part, absolutely well preserved. The subjects represented on it are scenes from the life of St Agnes, in two rows, one on the cover and one outside the bowl; on the foot are the symbols of the four Evangelists, and around the base a coronal of leaves alternating with pearls; the cover originally had a similar

adjunct, but it has unfortunately been cut away. This is the only piece of royal plate of the treasures of the kings of England and France that now remains, and its history has been traced from the time it was made, about the year 1380, to the present time. It was made by one of the goldsmiths of the luxurious Due de Berri, the brother of Charles V. of France, no doubt to offer as a gift to the king, whose

Hanaps,

DRINKING VESSELS

Plate I.

JWˆw 7 ^^ 1

'mmBumiii>ˆ.

Fig. i.— ROMAN GLASS CUP. With re- Fig. 2.— TEUTONIC GLASS CUP. From Fig. 3.— SAXON GLASS "TUMBLER."

presentation of a chariot race. Found at a grave at Sdzen, Rhenish Hesse.

Colchester.

Fig. 4.— PRANKISH GLASS DRINKING HORN. Bingerbruck. Fig. 5 — SAXON COW'S HORN. Mounted in silver. Taplow.

1 r " — -i

Fig. 6— SAXON T RUM PET- Fig. 7-

SHAPED DRINKING VESSEL. With hollow tubular ornamentation.

-THE ROYAL GOLD ENAMELLED HANAP. Made about 1380.

Fig. 8— SARACENIC ENAMELLED GOBLET. With French silver mountings. Fourteenth century.

Plate II.

DRINKING VESSELS

,A!I the objects represented on these two plates are in the British Museum.

Fig. i.— VENETIAN GLASS GOBLET. With ena melled decora tion . Fifteen th century.

Fig. 2.— ENGLISH "BLACKJACK." With initials of Charles I. and date 1646.

Fig. 3.— THE ROCHESTER MAZER. Presented by Brother Rob er t Peach am. Sixteenthˆcentury.

Fig. 4.-

Fig. 8.— A GLASS "YARD OF ALE" (English). Eighteenth cen- tury.

-CHINESE CUP. Carved from rhinoceros horn. Eighteenth century.

Fig. 5.— ENGLISH GLASS TANKARD. Bearing the Arms of Lord Burleigh.

Fig. 6.— COCO-NUT CUP. German, about 1600.

Fig. 7.— SWISS " TANZENMANN.' Seventeenth century.

birthday was St Agnes' day. It was, however, never presented, probably owing to the death of Charles V. in 1380. The due de Berri was not on friendly terms with his nephew Charles VI., but on their being reconciled he presented the young king with this cup. The troubles of his reign led to the invasion of France by Henry V. of England, and the ultimate appointment of his brother, John, duke of Bedford, as regent. The necessities of the half-insane Charles doubtless caused this cup and other valuables to pass into the possession of the regent in exchange for ready money, for it appears in the duke of Bedford's will, under which it passed into the treasury of Henry VI. There it remained and appears in all subsequent royal inventories up to the time of James I. This monarch, whose motto was " Beati pacifici," received with joy the embassy sent from Spain in the year 16 10 to conclude the first treaty of peace with England since the Armada, and showered upon the envoy, Don Juan de Velasco, constable of Castile, the most lavish and extravagant gifts. The constable, in fact, was so impressed by the warmth of his reception that he printed an account of his embassy, and from this work the main story of the cup has eventually been traced. On his return to Spain the constable, a piously disposed man, presented this

cup, with many other valuable gifts, to the convent of Santa Clara Medina de Pomar at Burgos, of which his sister was Superior. Although it was a domestic vessel, a " hanap " in fact, the constable elected that it should be consecrated and made use of as a chalice at great festivals. And so it continued to be used from the early years of the 17th century until about the year 1882, when the convent having fallen upon evil times, it was decided to sell this precious relic. A priest from the Argentine being at the time in Burgos, it was confided to him to sell in Paris, and he deposited the sum of £100 by way of security. This was all that the unfortunate nuns at Burgos ever received in return for their chalice, for they never saw the priest again. He took the cup to Paris, arriving in the month of September, when the majority of the well-to-do are away from town. After many failures to dispose of it, he ultimately succeeded in selling it to Baron Jerome Pichon for the sum of about £400, practically its weight in gold. The baron, after vainly trying to resell it at various sums from £20,000 downwards, eventually parted with it to Messrs Wertheimer of Bond Street for £8000, and that firm very liberally ceded it to Sir Wollaston Franks for the same sum, and it was finally secured by a subscription for the British Museum.

Such is the story of one of the most remarkable " hanaps " in existence. The word " hanap " is translated by Cotgrave in his French dictionary of 1660 as " a drinking cup or goblet," and probably was intended to mean what would be called a standing cup, that is, raised on a foot, to distinguish it from a bowl of the mazer class. Such vessels were chiefly used to ornament the dinner table or sideboard, in the way that loving-cups are now used at civic banquets, where, almost alone in fact, the ancient ceremonial of the table is still observed to some extent; and the loving-cup is the direct descendant of the hanap of the middle ages.

Of all the ornaments of the table in medieval times the most conspicuous was probably the " nef ." This was in the form of a ship „ . (navis), as itsname implies, and originally was designed

to hold the table utensils of the host — knives, napkins, and at times even the wine. Some of the later examples which alone survive are carried out with the greatest elaboration, the sails and rigging being carefully finished and with a number of figures on the deck. The reason for the existence of such an article of table furniture was doubtless the fear of poison. As in course of time this became less, the nef changed its character, and became either a mere ornament, or sometimes was capable of being used as a drinking vessel. The former, however, was much more common, and the number of nefs

that can be practi- cally used as drinking cups is small.

In the 15th and 16th centuries the shapes, decoration and materials of drinking vessels were almost endless. A favourite object to be so adapted was an ostrich egg, and many can be seen in museums in elaborate silver mounts; coco-nuts were also

used in the same way, and Chinese and other Oriental wares then of great variety, were often turned into cups and vases by ingeniously devised silver mounting. The use of drink- ing vessels either formed of actual horns or of other ,6tb ~ materials was common in the 15th and 16th centuries, types. especially in the north. They were usually provided with feet so as to serve as standing cups, and some of them were mounted with great richness. An excellent example is the famous drinking-horn in the possession of Queen's College, Oxford, dating from the 14th century. The medieval beliefs about " griffins' claws " still survived to this late date, and a horn cup in the British Museum bears the inscription " Ein Greifen Klau bin ich genannt, In Asia, Africa wohl bekannt." Another horn, probably that of an ibex, is in the same institution, and has a silver mount inscribed " Gryphi unguis divo Cuthberto dunelmensi sacer." The elegant natural curve of the horn adds greatly to the charm of the vessel. In Germany the ingenuity of the silversmith was turned in the direction of making vessels in the forms of animals, at times in allusion to the coat of arms of the patron. Stags, lions, bears and various birds are oftep found; the head generally removable so as to form a small cup Switzerland and south Germany had a special type, in the forn? of the figure of a peasant, generally in wood, carrying on his back a large basket, which edged with silver formed the drinking cup. This type is only found in wine-growing districts, the basket being used for carrying grapes. In Germany such cups are called " Buttenmann," in Switzerland " Tanzenmann." The royal and princely museums of Germany contain great numbers of such vessels, the Green Vault in Dresden in particular, while a good number are to be seen in our own great museums. A curious fancy, combining instruction with conviviality, was to make cups in the form of a globe, terrestrial or celestial, which are still useful as showing the state of geographical or astronomical knowledge at the time. Several of those made in the 16th century are still in existence, one in the British Museum, a second at Nancy, and others are in Copenhagen and Zurich and in private collections. The upper half of the globe is removable, leaving the lower as the drinking cup. Ivory both from the beauty of its colour and the evenness of its structure has been a favourite material for drinking vessels at all times, and would seem to have been continuously used from the earliest period, whether derived from

Asia or Africa, while the semi-fossil mammoth ivory of Siberia has not been neglected. In general, however, the vessels made from this material presented no essential differences of form from those in wood, until the art of lathe-turning attained great perfection, when a wide field was opened for ingenuity and even extravagance of form. The most remarkable examples of the possibilities of this kind of mechanical skill are seen in the productions of the Nuremberg turners of the 17th century, whose elaborate and entirely useless tours deforce comprise among many other things standing cups of ivory sometimes 2 ft. high, exempli- fying every eccentricity of which the lathe is capable. Peter Zick (d. 1632) and his three sons were celebrated for such work. Several pieces, doubtless from their hands, are in the British Museum.

The use of glass cups was not common in England until the 16th century, Venice having practically the monopoly of the supply. A silver-mounted glass goblet which belonged to the great Lord Burghley is, however, in the British Museum, where there is also a very large series of Venetian drinking glasses of various kinds, clear and lace glass as well as some of the 15th-century goblets with enamelled designs, now of the greatest rarity. The relations of Venice with the East were of so intimate a character that the earlier forms of Venetian glasses were nearly identical with those of the Mahom- medan East.

A common type of Arab drinking glass resembled our modern tumbler (a beaker), but gradually expanding in a curve towards the mouth, and often enamelled. The enamelled designs were at times related to the purpose of the vessel, figures drinking and the like, but more commonly bore either a mark of ownership, such as the armorial device of an emir, or some simple decorative

Glass cups.

design. This simple form probably has its origin in the horn cup made from the base of a cow's horn and closed at the smaller end. The later forms in the late 15th century and after, followed the fashion in other materials, and were raised on a tall foot, so that from the 16th century onwards the type of wine glass has hardly changed, except in details. An interesting variety in one detail is seen in the German fashion of providing an elaborate silver stand into which the foot of

such an ordinary- shaped glass was made to fit. Frequently, as might be expected, such stands are found without glasses, and their use then seems difficult to explain.

Another characteristic German type is the " wiederkom," a vessel more conspicuous for capacity than for its artistic qualities. It is usually a cylindrical vessel of green glass often holding as much as a quart, elaborately enamelled with coats of arms and views of well-known places; and at times when the cup was a wedding gift the figures of the bride and bridegroom are seen upon it.

A very fanciful kind of cup was known in England as a " yard of ale, " a long tube of glass generally shaped like a coach horn, but ending sometimes in three prongs as a trident, the opening in the latter being at the end of the handle, which was about a yard in length.

Small silver cups were often made in dozens with various devices, differing in each, such as the signs of the zodiac, the occupations of the months, or figures of the classical gods and goddesses, engraved upon them.

The tankard came into fashion in the 16th century, a practical, but seldom graceful object. At first some attempt was made, by shaping the sides, to attain to some artistic quality, but usually the tankard from the late 16th century to the present time is found with straight sides, either vertical or contracting towards the top, which is of course always furnished with a hinged fid.

A material that has one obvious merit, that of being practically unbreakable, is leather, and drinking cups were often made of it. 17th and The flagon called a " black jack " is the best-known, istb and examples are very common, mostly of the 17th

century an(j jgfjj cen t U ries. A quaint fashion was to have a leather cup made in the form of a lady's shoe; this, however, was confined to Germany and might be thought in somewhat questionable taste.

In the 17th and 18th centuries a great impetus was given to the production of curious drinking vessels in pottery. In England at various potting centres a great number of cups called " tygs " were made: capacious mugs with several handles, three or four, round the sides, so that the cup could be readily passed from one to the other. Many of these have quaint devices and inscriptions upon them. Another favourite plan is to make a jug with open- work round the

neck and a variety of spouts, one only com- municating with the liquid. These " puzzle jugs " no doubt caused a good deal of amusement when attempted by a novice, who would inevitably spill some of the contents. r

The horn of the rhinoceros is much favoured by the Chinese as a material for drinking cups often of a somewhat archaic form. The dense structure of the horn is well adapted for the purpose, and its beautiful amber hue makes the vessel a very agreeable object to the eye. The usual form is of a boat shape on a square foot, and the carved decoration is often copied from that of the bronze vessels of the earlier dynasties. Others are treated in a freer and more naturalistic manner, the bowl being formed as the flower of the magnolia, and the entire horn, at times more than 2 ft. in length, is utilized in carrying out the design. One of this kind is in the Victoria and Albert Museum. Cups of the former type are commonly found imitated in ivory-white porcelain, and are known as " libation cups." Rhinoceros horn is held by the Chinese to be an antidote against poison, a belief shared by other nations.

There is but little to be said about the vessels used in the drinking of tea and coffee. In Europe the type has practically remained unchanged since the introduction of tea and coffee drinking, except that in the 18th century the tea-cups imported from China had no handles, and were generally thinner than the

*coffee cups. In Japan there is a ceremonious way of drinking tea, known as Cha no yu. Here powdered green tea is used; the party assembles in a small pavilion in a garden, and the tea is made in accordance with a rigid etiquette. Te * aad The infusion is stirred with a whisk in a rudely cupSm fashioned bowl, holding about a pint, and passed from one guest to another. The bowls are of very thick pottery, never of porcelain, and the most valued kind is that made in Korea. In the drinking of rice spirit (sake) in Japan small wide shallow cups are used, made generally of porcelain, but sometimes of finely lacquered wood. Both kinds are usually ornamented with elaborate and sometimes allusive designs.*

Among savage races the most peculiar drinking ceremony is that of kava drinking in Polynesia, principally in the Fijian, Tongan and Samoan groups. The best description of the process is given in Mariner's Tonga. The u tensOs. principal vessel is usually a large bowl, sometimes measuring 2 or 3 ft. in diameter, cut from a solid block of wood. It has four short legs and an ear at one side to which a rope of coco-nut fibre is generally attached. The liquid is prepared

in this bowl and ladled out in small cups often made of coco-nut shells, and these are handed round with great ceremony. Both the bowl and the cups become coated in the inside with a highly polished layer, pale blue in colour; but this beautiful tint fades when the vessel is out of use, and it is therefore very rarely seen in specimens in Europe. The kava itself is prepared from the root of a tree of the pepper family (Piper methysticum) ; the root is cut into pieces of a convenient size, and these are given to young men and women of the company, who masticate them, and the lumps thus shredded are placed in the large bowl, water is poured over them, and the mass is strained with great care by wringing it in strips of the inner bark of the hibiscus. The liquor is slightly intoxicating.

If the Polynesian method of preparing kava as a drink is distasteful to our ideas, the favourite drinking bowl of the old Tibetans is even more so. Friar Odoric (14th century), quoted by Yule, describes how the Tibetan youth " takes his father's head and straightway cooks and eats it, and of the skull he makes a goblet from which he and all his family always drink devoutly to the memory of the deceased father." This recalls Livy's account of the Boii in Upper Italy, who made a drinking vessel of the head of the Roman consul Postumus. Among the Tibetans skulls are still used, but generally for libations only; for this purpose great care is exercised in the selection of the skull, and the " points " of a good skull are well understood by the Lamas. (C. H. Rd.)

DRIPSTONE, in architecture, a projecting moulding weathered on the upper surface and throated underneath so as to form a drip. The term is more correctly applied to a string course. When carried round an arch its more correct description would be a hood (q.v.). When employed inside a building it serves a decorative purpose only.

DRISLER, HENRY (1818-1897), American classical scholar, was born on the 27th of December 1818, on Staten Island, New York. He graduated at Columbia College in 1 83 9, taught classics in the Columbia grammar school for four years, and was then appointed tutor in classics in the college. In 1845 he became adjunct professor of Latin and Greek there, in 1857 was appointed to the new separate chair of Latin language and literature, and ten years later succeeded Dr Charles Anthon as Jay professor of Greek language and literature. He was acting president in 1867 and in 1888-1889, and from 1890 to his retirement as professor emeritus in 1894 was dean of the school of arts. He died in New York City on the 30th of November 1897. Dr Drisler completed and supplemented Dr Anthon's labours as an editor of classical texts. His criticisms and corrections

of Liddell and Scott's Greek-English Lexicon, of which he brought out a revised American edition in 1846, won his name a place on the title-page of the British edition in 1879, and in 1870 he published a revised and enlarged edition of Ycnge's English- Greek Lexicon. He was ardently opposed to slavery, and brilliantly refuted The Bible View of Slavery, written by Bishop

J. H. Hopkins of Vermont, in a Reply (1863), which meets the bishop on purely Biblical ground and displays the wide range of Dr Drisler's scholarship.

DRIVER, SAMUEL ROLLES (1846-), English divine and Hebrew scholar, was born at Southampton on the 2nd of October 1846. He was educated at Winchester and New College, Oxford, where he had a distinguished career, taking a first class in jLiterae Humaniores in 1869. He was awarded the Pusey and Ellerton scholarship in 1866, the Kennicott scholarship in 1870 (both Hebrew), and the Houghton Syriac prize in 1872. From 1870 he was a fellow, and from 1875 also a tutor, of New College, and in 1883 succeeded Pusey as regius professor of Hebrew and canon of Christ Church. He was a member of the Old Testament Revision Committee (1876-1884) and examining chaplain to the bishop of Southwell (1 884-1 904); received the honorary degrees of doctor of literature of Dublin (1892), doctor of divinity of Glasgow (1901), doctor of literature of Cambridge (1905); and was elected a fellow of the British Academy in 1902. Dr Driver devoted his life to the study, both textual and critical, of the Old Testament. Among his numerous works are commentaries on Joel and Amos (1897); Deuteronomy (1902); Daniel (1901); Genesis (1909); the Minor Prophets, Nahum to Malachi (1905); Job (1905); Jeremiah (1906); Leviticus (1894 Hebrew text, 1898 trans, and notes); Samuel (Hebrew text, 1890). Among his more general works are: Treatise on the Use of the Tenses in Hebrew (1892); Isaiah, his Life and Times (1893); Introd. to the Literature of the Old Test. (1897, ed. 1909) ; Sermons cm Subjects connected with the Old Testament (1892); The Parallel Psalter (1904); Heb. and Eng. Lexicon of the O.T. (in collaboration, 1906); Modern Research as illustrating the Bible (1909); articles in the Ency. Brit., Ency. Bibl. and Hastings' Diet, of the Bible.

DRIVING (from " to drive," i.e. generally to propel, force along or in, a word common in various forms to the Teutonic languages) , a

word used in a restricted sense for the art of con- trolling and directing draught animals from a coach or other conveyance or movable machine to which they are harnessed for the purpose of traction. This has been an occupation prac- tised since domesticated animals were first put to this use. In various parts of the world a number of different animals have been, and still are, so employed; of these the horse, ox, mule and ass are the most common, though their place is taken by the reindeer in northern latitudes, and by the Eskimo dog in arctic and antarctic regions. The driving of each of these requires special skill, only to be acquired by practice combined with knowledge of the characteristics peculiar to the several animals employed. The most accomplished driver of spirited horses would probably be in difficulties if called upon to drive sixteen or twenty dogs in an arctic sledge, or a team of oxen or mules drawing the guns of a mountain battery; and the adept in either of these branches of the art might provoke the com- passion of a farmer from Lincolnshire or Texas by his attempts to manage a pair of Clydesdale horses in the plough or the reaping machine.

Under all these different conditions driving is a work of utility, of economic value to civilized society. But from very early times driving, especially of horses, has also been regarded as a sport or pastime. This probably arose in the first instance from its association with battle. In the earliest historical records, such as the Old Testament and the Homeric poems, the driver of the chariot fills a place of importance in the economy of war; and on his skill and efficiency the fate of kings, and even of kingdoms, must often have depended. The statement in the Book of Kings that Jehu the son of Nimshi was recognized from a distance by his style of driving appears to indicate that the warrior himself on occasion took the place of the professional charioteer; and although it would be unsafe to infer from the story that the pleasure derived from the pecupation was his motive for doing so, the name of this king of Israel has become the eponym of drivers. Among the Greeks at an equally early period driving was a recognized form of sport, to the popularity of which Horace afterwards made allusion. Racing between teams of horses harnessed to war-chariots took the place occupied

by saddle-horse racing and American trotting races (see Horse Racing) in the sport of modern times. The element of danger doubtless gave pleasurable excitement to chariot racing and kept alive its association with incidents familiar in war ; just as at a later period, when the institution of chivalry had given the armed knight on horseback a conspicuous place in medieval warfare, the tournament became the most popular sport of the aristocracy*

throughout Europe.

This element of danger cannot be said to enter usually into the enjoyment of driving at the present day. Though accidents occasionally happen, the pastime is practically unattended by serious risk; and the source of the pleasure it affords the driver must be sought in the skill it requires, combined with the love of the horse which is common to sportsmen, and of exercise of power. The art of driving as practised to-day for pleasure without profit, and without the excitement of racing, is of quite modern development. Oliver Cromwell, indeed, met with a mishap in Hyde Park while driving a team of four horses pre- sented to him by the count of Oldenburg, which was the subject of more than one satirical allusion by contemporary royalist writers; but two things were needed before much enjoyment could be found in driving apart from utility. These were the invention of carriages on springs, and the construction of roads with smooth and solid surface. The former did not come into general use till near the end of the 18th century, and it was about the same "period that the engineering skill of Thomas Telford and the invention of John London Macadam combined to provide the latter. The influence on driving of these two developments was soon apparent. Throughout the 18th century stage-coaches, ponderous unwieldy vehicles without springs, had toiled slowly over rough and deeply rutted tracks as a means of communication between different parts of Great Britain; but those who made use of them did so as a matter of necessity and not for enjoyment. But by the beginning of the 19th century the improvement in carriage-building and road-construction alike had greatly diminished the dis- comfort of travel; and interest in driving for its own sake grew so rapidly that in 1807 the first association of amateur coachmen was formed. This was the Bensington Driving Club, the fore- runner of many aristocratic clubs for gentlemen interested in driving as a pastime.

In modern driving one, two or four horses are usually em- ployed. When a greater number than four is put in harness, as in the case of the state equipages of royal personages on occasions of ceremony, the horses are not driven but are controlled by " postillions " mounted on the near-side horse of each pair. When two horses are used they may either be placed side by side, in " double harness," which is the commoner mode of driving a pair of horses, or one following the other, in a " tandem." Four horses, or " four-in-hand," are harnessed in two pairs, one following the other, and called respectively the " leaders " and the " wheelers "—the same terms being used for the two horses of a tandem.

Though it is a less difficult accomplishment to drive a single horse than a tandem or four-in-hand, or even a pair, it neverthe- less requires both knowledge and the skill that practice alone confers. The driver should have some knowledge of equine character, and complete familiarity with every part of the harness he uses, and with the purpose which each buckle or strap is intended to serve. The indefinable quality known in horsemanship as " good hands " is scarcely less desirable on the box-seat than in the saddle. It is often said to be un- attainable by those who do not possess it by nature; but though this may be true to some extent, " good hands " are partly at least the result of learning the correct position for the arm and hand- that holds the reins. The reins are held in the left hand, which should be kept at about the level of the lowest button of the driver's waistcoat, and near the body though not pressed against it. The driving hand should never be reached forward more than a few inches, nor raised as high as the breast. The upper arm should lie loosely against the side, the forearm hori- zontal across the front of the body, forming a right angle or

thereabouts at the elbow-joint, the wrist very slightly bent in- wards, and the back of the hand and knuckles facing outwards towards the horses. In this position the three joints of the arm form a kind of automatic spring that secures the " give " to the movement of the horse's mouth which, in conjunction with firmness, is a large part of what is meant by "good hands." But this result is only obtained if the reins be also held with the proper degree of bearing on the bit. What the proper degree may be depends greatly on the character of the horses and the severity of the bit. Pulling horses must be restrained by a strong draw on their bits, such as would bring other animals to a standstill. But under no circumstances, no matter how sluggish the horses may be, should the reins be allowed to lie slack; for if this is done the horse receives no support in the event of a sudden stumble, and no control if he shies unex- pectedly. The driver should therefore always just " feel his horse's mouth " as lightly as possible; he then has the animal well under control in readiness for every emergency, while avoiding such a pull on the mouth as would cause a high-spirited horse to chafe and fret. Well-broken carriage horses should always be willing to run into their bits, and those that draw back when lightly held in hand should be kept up to the bit with the whip.

These principles are common to all branches of the art of driving,

whether of one, two or four horses. When they are observed no great difficulty confronts the coachman who is content with single or double harness, provided he has acquired the eye for pace and distance, and the instinctive realization of the length of the carriage behind him, without which he may suffer collision with other vehicles, or allow insufficient room in turning a corner or entering a gateway. For before he can have had the practice by which alone this knowledge is to be gained, the beginner will have learnt such elementary facts as that his horses must be held well in hand going down hill and given their heads on an ascent, and that on no account should the horse's mouth be " jobbed " by the driver jerking the reins; he will also have learnt a good deal about the character and temperament of the horse, on which so much of the art of driving depends, and which can best be studied on the box-seat and not at all in the library. If he has pursued this study with any degree of insight, he will have learnt further to be sparing in the use of the hand-brake with which most modern carriages are provided. This apparatus is most useful in case of emergency, or for taking weight off the carriage on a really steep descent; but the habit which too many coachmen fall into of using the brake on every trifling decline should be avoided. Its effect is that the horses are continually doing collar-work, and are thus deprived of the relief which ought to be given them by occasional light pole or shaft work instead.

When the ambition of the amateur coachman leads him to attempt a tandem or four-in-hand he enters on a much more complex department of the art of driving. In the and four- nrst P^ ace he has now four reins instead of two to in-hand, manipulate, and the increase of weight on his hand, especially when four horses are being driven, requires considerable strength of wrist to support it without tiring. It is of the first importance, moreover, that he should know instinct- ively the position in his hand of each of the reins, and be able automatically and instantaneously to lay a finger on any one of them. The driver who has to look at his reins to find the off-side leader's rein, or who touches the near-side wheeler's in mistake for it, is in peril of a catastrophe. It is therefore essential that the reins should be correctly disposed between the fingers of the left hand, and that the driver should as quickly as possible accustom himself to handle them automatically. This is some- what more difficult in driving tandem than in driving four-in- hand, because in the latter case there is greater spread of the reins in front of the hand than with tandem, where the reins lie much more nearly parallel one above the other. The actual holding of the reins is the same in both cases. The coachman should be careful to take the reins in his hand

before mounting to the box-seat, as otherwise his team may make a start without

his having the means to control them. It is customary to hitch the reins, ready for him to take them, on the outside terret (the ring on the pad through which the rein runs) of the wheeler — the off-side wheeler in four-in-hand. Standing on the ground beside the off-side wheel of his carriage, ready to mount to the box-seat, the coachman, after drawing up his reins till he almost feels the horses' mouths, must then let out about a foot of slack in his off-side reins, in order that when on his seat he may find all the reins as nearly as possible equal in length in his hand. He mounts with them disposed in his right hand precisely as they will be in his left when ready to start. The leaders' reins should be separated by the forefinger, and the wheelers' by the middle finger. The near-leader's rein will then be uppermost of the four, between the forefinger and thumb; then between the forefinger and middle finger are two reins together — the off- leader's and the near- wheeler's in the order named; while at the bottom, between the middle and third fingers, is the off- wheeler's rein. It will be found that held thus the reins spread immediately in front of the hand in such a way that each several rein, and each pair of reins — two near-side, two off-side, two wheelers' or two leaders' — can be conveniently manipulated ; and the proficient driver can instinctively and instantaneously grasp any of them he chooses with his right hand without having to turn his eyes from the road before him to the reins in his hand. Having seated himself on the box and transferred the reins, thus disposed, from the right to the left hand, the coachman should shorten them till he just feels his wheelers' mouths and holdi back his leaders sufficiently to prevent them quite tightening their traces; then, when he has taken the whip from its socket in his right hand, he is ready to start. This is an operation requiring careful management, to secure that leaders and wheelers start simultaneously; for if the leaders start first they will be drawn up sharp by their bits, or, what is worse, if their reins have not been sufficiently shortened they will jump into their collars and possibly break a swinging bar, and in either case they will be fretted and disconcerted and will possibly in con- sequence either kick or rear; if the wheelers start before the leaders they will ram the swinging bars under the tails of the latter, with results equally unfortunate. The worst possible method of starting is suddenly to give the horses their heads and use the whip. But no positive rule can be laid down, for it is just one of those points which depend largely on familiarity with the horses forming the team. Horses even moderately accustomed to the work will generally start best in obedience to the voice, and their

attention may simultaneously be aroused by gently feeling their mouths. When once started the driver should at once see that his team is going straight. If the leaders and wheelers are not exactly on the same line, this or that rein must be shortened or lengthened as the case may require; and it is to be noticed that as the near-wheeler's and off-leader's reins lie together between the same fingers, a simultaneous shortening or lengthening of these two reins will usually produce the desired result. With rare exceptions, reins should be shortened or lengthened by pushing them back or drawing them forward with the right hand from in front of the driving hand, and not from behind it. As soon as the team is in motion the leaders may be let out till they draw their traces taut; but draught should be taken off them on falling ground or while rounding a corner. Good drivers touch the reins as little as possible with the whip-hand, and nothing is less workmanlike than for a coachman to act as if he were an angler continually letting out or reeling in his line. In rounding a corner a loop of an inch or two of the leaders' rein on the side to which the turn is to be made is taken up by the right hand and placed under the left thumb. This " points the leaders," who accordingly make the required turn, while at the same time the right hand bears lightly on the wheelers' rein of the opposite side, to prevent them making the turn too sharply for safety to the coach behind them. As soon as the turn is made — and all this applies equally to the passing of other vehicles or obstacles on the road — the driver's left thumb releases the loop, which runs out of itself, and the team returns to the straight formation. A circumstance

useful to bear in mind is that the swinging bars are wider than the maximum width of the coach; consequently the driver knows that wherever the swinging bars can pass through with safety — and as they are before his eyes the calculation is easy — the coach will safely follow.

A necessary part of driving four horses or tandem is the proper use of the whip. The novice, before beginning to drive, should

acquire the knack — which can only be learnt by the whip. Practical instruction and experiment — of catching

up the thong of the whip on to the stick by a flick of the wrist. With practice this is done almost automatically and without looking at the

whip. It is not merely an ornamental accomplishment, but a necessary one; for in no other way can the whip be kept in constant readiness for use either on wheelers or leaders as the need of the moment may dictate. The point of the thong is confined in the whip-hand when striking the wheelers (which should be done in front of the pad), and is released for reaching the leaders. Considerable dexterity is required in using the whip on the leaders without at the same time touching, or at all events alarming or fretting, the wheelers. The thong of the whip should reach the leaders from beneath the swinging bar; and proficient "whips" can unerringly strike even the near leader from under the off-side bar without disturb- ing the equanimity of any other member of the team. This demands great skill and accuracy; but no coachman is competent to drive four horses until he is able to touch with the whip any particular horse that may require it, and no other.

Essential as is proficiency in the use of the whip when driving four horses, it is even more imperative for the driver of tandem. For in four-in-hand the leaders act in some measure as a restraint upon each other's freedom of action, whereas the leader in tandem is entirely independent and therefore more difficult to control. If he takes it into his head to turn completely round and face the driver, there is no effectual means of preventing him. It is here that a prompt and accurate use of the whip is important. A sharp cut with the thong of the whip on the side to which he is turning will often drive the leader back into his place. But it must be done instantaneously, and the driver who has got his thong coiled round the stick of his whip, or who cannot make certain of striking the horse on precisely the desired spot, will miss the opportunity and may find his team in a sad mess, possibly with disastrous results. If the leader, in spite of a stroke from the whip at the right moment and on the right spot, still persists in turning, the only thing to be done is to turn the wheeler also; and then when the tandem has been straightened, to turn the horses back once more to their original direction. For this reason it is never safe to harness a tandem to a four-wheeled vehicle; because if it should be necessary to turn the wheeler sharply round, the fore-carriage would probably lock and the trap be overturned. Of comparatively recent years a great improvement has been effected in the harnessing of a tandem by the introduction of swinging bars similar to those used in four-in-hand. Formerly the leading traces in tandem drew direct from tugs on the wheeler's hames, or less frequently from the stops on the shafts. This left a considerable length of trace which, when draught was taken off the leader, hung slack between the two horses; with the result that either of them

might get a leg over the leading trace, with dangerous consequences. In the more modern arrangement short traces attached to the wheeler's tugs hold a bar, which is kept in place by a few inches of chain from the kidney-link on the wheeler's collar. This bar is connected by short traces or chains with a second bar to which the leader's true traces are hooked in the usual way, allowing him a comfortable distance clear of the bar precisely as in four-in-hand. The leader thus draws as before from the wheeler's tugs; but the length of trace is broken up by the two swinging bars, and as these are prevented from falling low by their attachment to the wheeler's collar, the danger from a too slack leading trace is reduced to a minimum; though care is needed when the leader is not pulling to prevent the bar falling on his hocks.

Expert tandem driving, owing to the greater freedom of the

leader from control, is a more difficult art than the driving of four horses, in spite of the fact that the weight on the hand is much less severe; but the general principles of the two are the same. In Great Britain, however, the coach-and-four is the more popular. It is more showy than tandem; it keeps alive the romantic associations of the days when the stagecoach was the ordinary means of locomotion; and a coach, or " drag," accommo- dates a larger party of passengers to a race-meeting or other expedition for pleasure than a dogcart. But for those whose means do not permit the more costly luxury of a four-horse team, a tandem will be found to make all the demand on skill and nerve which, in combination with the taste for horses, makes the art of driving a source of enjoyment.

See Donald Walker, British Manly Exercises: in which Riding, Driving, Racing are now first described (London, 1834) ; Fuller, Essay on Wheel Carriages (London, 1828); William Bridges Adams, English Pleasure Carriages: their Origin, History, Materials, Con- struction (London, 1837) ; The Equestrian: A Handbook of Horseman- ship, containing Plain Rules for Riding, Driving and the Management of the Horse (London, 1 854) ; a Cavalry Officer, The Handy Horse Book; or Practical Instruction in Driving and the Management of the Horse (London, 1865-1867, 1871-1881); H. J. Helm, American Roadsters and Trotting Horses (Chicago, 1878); E. M. Stratton, The World on Wheels (New York, 1878); J. H.Walsh (" Stone- henge "), Riding and Driving (London, 1863); James A. Garland, The Private Stable (2nd ed., Boston, 1902) ; the Duke of Beaufort, Driving (The Badminton Library, London, 1889), containing a bibliography; F. H. Huth, Works on Horses and Equitation: A Bibliographical Record of Hippology (London, 1887).

(R. J. M.)

DROGHEDA, a municipal borough, seaport and market town, on the southern border of Co. Louth, Ireland, in the south parliamentary division, on the river Boyne, about 4 m. from its mouth in Drogheda Bay, and 31I m. N. by W. from Dublin on the Great Northern main line. Pop. (1901) 12,760. It occupies both banks of the river; but the northern division is the larger of the two, and has received greater attention in modern times. The ancient fortifications, still extant in the beginning of the 19th century, have disappeared almost entirely, but of the four gateways one named after St Lawrence remains nearly perfect, consisting of two loopholed circular towers; and there are considerable ruins of another, the West or Butler Gate. Among the public buildings are a mansion-house or mayoralty, with a suite of assembly rooms attached; and the Tholsel, a square building with a cupola. St Peter's chapel formerly served as the cathedral of the Roman Catholic archbishopric of Armagh; and In the abbey of the Dominican nuns there is still preserved the head of Oliver Plunkett, the archbishop who was executed at Tyburn in 1681 on an unfounded charge of treason. There was formerly an archiepiscopal palace in the town, built by Archbishop Hampton about 1620; and the Dominicans, the Franciscans, the Augustinians, the Carmelites and the knights of St John have monastic establishments. Of the Dominican monastery (1224) there still exists the stately Magdalen tower; while of the Augustinian abbey of St Mary d'Urso (1206) there are the tower and a fine pointed arch. At the head of the educa- tional institutions there is a classical school endowed by Erasmus Smith. There is also a blue-coat school, founded about 1727 for the education of freemen's sons. The present building was erected in 1870. Benjamin Whitworth, M.P., was a generous benefactor to the town, who built the Whitworth Hall, furnished half the funds for the construction of waterworks, established a cotton factory, and is commemorated by a statue in the Mall. The industrial establishments comprise cotton, flax and flour mills, sawmills, tanneries, salt and soap works, breweries, chemical manure and engineering works. The town is the headquarters of the valuable Boyne salmon-fishery. A brisk trade is carried on mainly in agricultural produce, especially with Liverpool (which is distant 135 m. due E.) and with Glasgow. Many works of improvement have been effected from time to time in the harbour, the quays of which occupy both sides of the river, the principal, 1000 yds. in length, being on the north side. Here is a depth of 21 ft. at the highest and 14 ft. at the lowest tides. The tide reaches 25 m. above the town to Oldbridge; and barges of 50 tons burden can proceed 19 m. inland to Navan. The river is crossed by a

bridge for ordinary traffic, and by a

fine railway viaduct. Tbe town is governed by a mayor, 6 aldermen and 18 councillors.

In the earliest notices the town of Drogheda is called Inver- Colpa or the Port of Colpa; the present name signifies " The Bridge over the Ford." In 1152 the place is mentioned as the seat of a synod convened by the papal legate, Cardinal Paparo; in 1224 it was chosen by Lucas de Netterville, archbishop of Armagh, for the foundation of the Dominican friary of which there are still remains; and in 1228 the two divisions of the town received separate incorporation from Henry III. But there grew up a strong feeling of hostility between Drogheda versus Uriel and Drogheda versus Midiam, in consequence of trading vessels lading their cargoes in the latter or Southern town, to avoid the pontage duty levied in the former or northern town. At length, after much blood had been shed in the dispute, Philip Bennett, a monk residing in the town, succeeded by his eloquence, on the festival of Corpus Christi, 1412, in persuading the authorities of the two corporations to send to Henry IV. for a new charter sanctioning their combination, and this was granted on the 1st of November. Drogheda was always con- sidered by the English a place of much importance. In the reign of Edward III. it was classed along with Dublin,Waterford and Kilkenny as one of the four staple towns of Ireland. Richard II. received in its Dominican monastery the submissions of O'Neal, O'Donnell and other chieftains of Ulster and Leinster. The right of coining money was bestowed on the town, and parlia- ments were several times held within its walls. In the reign of Edward IV. the mayor received a sword of state and an annuity of £20, in recognition of the services rendered by the inhabitants at Malpus Bridge against O'Reilly; the still greater honour of having a university with the same privileges as that o': Oxford remained a mere paper distinction, owing to the poverty of the town and the unsettled state of the country; and an attempt made by the corporation in modern times to resuscitate their rights proved unsuccessful. In 1495 Poyning's laws were enacted by a parliament held in the town. In the civil wars of 1641 the place was besieged by O'Neal and the Northern Irish forces; but it was gallantly defended by Sir Henry Tichbourne, and after a long blockade was relieved by the Marquess of Ormond. The same nobleman relieved it a second time, when it was invested by the

Parliamentary army under Colonel Jones. In 1649 it was captured by Cromwell, after a short though spirited defence; and nearly every individual within its walls, without distinction of age or sex, was put to the sword. Thirty only escaped, who were afterwards trans- ported as slaves to Barbados. In 1690 it was garrisoned by King James's army; but after the decisive battle of the Boyne (q.v.) it surrendered to the conqueror without a struggle, in consequence of a threat that quarter would not be granted if the town were taken by storm.

Drogheda ceased to be a parliamentary borough in 1885, and a county of a town in 1898. Before 1885 it returned one member, and before the Union in 1800 it returned four members to the Irish parliament.

From the close of the 12 th century, certainly long before the Reformation and for some time after it, the primates of Ireland lived in Drogheda. Being mostly Englishmen, they preferred to reside in the portion of their diocese within the gate, and Drogheda, being a walled town, was less liable to attack from the natives. From 141 7 onwards Drogheda was their chief place of residence and of burial. Its proximity to Dublin, the seat of government and of the Irish parliament, in which the primates were such prominent figures, induced them to prefer it to Ardmacha inter Hibernicos. Archbishop O'Scanlain, who did much in the building of the cathedral at Armagh, preferred to live at Drogheda, and there he was buried in 1270. Near Drogheda in later times was the primates' castle and summer palace at Termonfeckin, some ruins of which remain. In Drogheda itself there is now not a vestige of the palace, except the name " Palace Street." It stood at the corner of the main street near St Lawrence's gate, and its grounds extended back to St Peter's church. The primates of the 15 th century were

buried in or near Drogheda. After the Reformation five in succession lived in Drogheda and there were buried, ' though there is now nothing to fix the spot where any of them lies. The last of these — Christopher Hampton — who was consecrated to the primacy in 1613, repaired the ruined cathedral of Armagh. He built a new and handsome palace at Drogheda, and he repaired the old disused palace at Armagh and bestowed on it a demesne of 300 acres.

DROIT (Fr. for " right," from Lat. directus, straight), a legal title, claim or due; a term used in English law in the phrase droits of admiralty, certain customary rights or perquisites formerly belonging to the lord high admiral, but now to the crown for public purposes and paid into the exchequer. These droits (see also Wreck) consisted

of flotsam, jetsam, ligan, treasure, deodand, derelict, within the admiral's jurisdiction; all fines, forfeitures, ransoms, recognizances and pecuniary punishments; all sturgeons, whales, porpoises, dolphins, grampuses and such large fishes; all ships and goods of the enemy coming into any creek, road or port, by durance or mistake,- all ships seized at sea, salvage, &c, with the share of prizes — such shares being afterwards called " tenths," in imitation of the French, who gave their admiral a droit.de dixieme. The droits of admiralty were definitely surrendered for the benefit of the public by Prince George of Denmark, when lord high admiral of England in 1 702. American law does not recognize any such droits, and the dis-position of captured property is regulated by various acts of Congress. ■ , ■

The term droit is also used in various legal connexions (for French law, see France: Law), such as the droit of angary (q.v.), the droit d 'achat (right of pre-emption) in the case of contraband (q.v.), the feudal droit de bris (see Wreck), the droit de re" gale or ancient royal privilege of claiming the revenues and patronage of a vacant bishopric, and the feudal droits of seignory generally.

DROITWICH, a market town and municipal borough in the Droitwich parliamentary division of Worcestershire, England, 55 m. N.N.E. of Worcester, and 126 m. N.W. by W. from London by the Great Western railway. Pop. (1901) 42or. It is served by the Bristol-Birmingham line of the Midland railway, and by the Worcester-Shrewsbury line of the Great Western. It stands on the river Salwarpe, an eastern tributary of the Severn. There is connexion with the Severn by canal. There are three parish churches, St Andrew, St Peter and St Michael, of which the two first are fine old buildings in mixed styles, while St Michael's is modern. The principal occupation is the manufacture of the salt obtained from the brine springs or wyches, to which the town probably owes both its name and its origin. The springs also give Droitwich a considerable reputation as a health resort. There are Royal Brine baths, supplied with water of extreme saltness, St Andrew's baths, and a private bath hospital. The water is used in cases of gout, rheumatism and kindred diseases. Owing to the pumping of the brine for the salt-works there is a continual subsidence of the ground, detrimental to the buildings, and new houses are mostly built in the suburbs. In the pleasant well-wooded district surrounding Droitwich the most noteworthy points are Hindlip Hall, 3 m. S., where (in a former mansion) some of the conspirators in the Gunpowder Plot defied search for eight days (1605); and Westwood, a fine hall of Elizabethan and Carolean date on the site of a Benedictine nunnery, a mile west of Droitwich, which

offered a retreat to many Royalist cavaliers and churchmen during the Commonwealth. Droitwich is governed by a mayor, 4 aldermen and 12 councillors. Area, 1856 acres.

A Roman villa, with various relics, has been discovered here, but it is doubtful how far the Romans made use of the brine springs. Droitwich (Wic, Salturic, Wich) probably owed its origin to the springs, which are mentioned in several charters before the Conquest. At the time of the Domesday Survey all the salt springs belonged to the king, who received from them a yearly farm of £65, but the manor was divided between several churches and tenants-in-chief. The burgesses of Droitwich are mentioned in the Domesday Survey, but they probably only had certain franchises in connexion with the salt trade. The

town is first called a borough in the pipe roll of 2 Henry II., when an aid of 20s. was paid, but the burgesses did not receive their first charter until 121 5, when King John granted them freedom from toll throughout the kingdom and the privilege of holding the town at a fee-farm of £100. The burgesses appear to have had much difficulty in paying this large farm; in 1227 the king pardoned twenty-eight marks of the thirty-two due as tallage, while in 1237 they were £23 in arrears for the farm. They continued, however, to pay the farm until the payment gradually lapsed in the 18th century. In medieval times Droitwich was governed by two bailiffs and twelve jurats, the former being elected every year by the burgesses; Queen Mary granted the incorporation charter in 1554 under the name of the bailiffs and burgesses. James I. in 1625 granted another and fuller charter, which remained the governing charter until the Municipal Reform Act. King John's charter granted the burgesses a fair on the feast of SS. Andrew and Nicholas lasting for eight days, but Edward III. in 1330 granted instead two fairs on the vigil and day of St Thomas the Martyr and the vigil and day of SS. Simon and Jude. Queen Mary granted three new fairs, and James I. changed the market day from Monday to Friday.

DROME, a department in the south-east of France, formed of parts of Dauphine and Provence, and bounded W. by the Rhone, which separates it from Ardeche, N. and N.E. by Isere, E. by Hautes-Alpes, S.E. by Basses- Alpes, and S. by Vaucluse; area 2533 sq. m.; pop. (1906) 297,270. Drome is traversed from east to west by numerous

rivers of the Rhone basin, chief among which are the Isere in the north, the Drome in the centre and the Aygues in the south. The left bank of the Rhone is bordered by alluvial plains and low hills, but to the east of this zone the department is covered to the extent of two-thirds of its surface by spurs of the Alps, sloping down towards the west. To the north of the Dr6me lie the Vercors and the Royans, a region of forest-clad ridges running uniformly north and south. South of that river the mountain system is broken, irregular and intersected everywhere by torrents. The most easterly portion of the department, where it touches the mountains of the Devoluy, contains its culminating summit (7890 ft.). North of the Isere stretches a district of low hills terminating on the limits of the department in the Valloire, its most productive portion. The climate, except in the valleys bordering the Rhone, is cold, and winds blow incessantly. Snow is visible on the mountain-tops during the greater part of the year.

The agriculture of the department is moderately prosperous. The main crops are wheat, which is grown chiefly on the banks of the Isere and Rhone, oats and potatoes. Large flocks of sheep feed on the pastures in the south; cattle-raising is carried on principally in the north-east. Good wines, among which the famous Hermitage growth ranks first, are grown on the hills and plains near the Rhone and Drome. Fruit culture is much practised. Olives and figs are grown in the south; the cultiva- tion of mulberries and walnuts is more widely spread. In the rearing of silkworms Dr6me ranks high in importance among French departments. The Montelimar district is noted for its truffles, which are also found elsewhere in the department. The mineral products of Dr6me include lignite, blende, galena, calamine, freestone, lime, cement, potter's clay and kaolin. Brick and tile works, potteries and porcelain manufactories exist in several localities. The industries comprise flour-milling, distilling, wood-sawing, turnery and dyeing. The chief textile industry is the preparation and weaving of silky- which is carried on in a number of towns. Woollen and cotton goods are also manufactured. Leather working and boot-making, which are carried on on a large scale at Romans, are important, and the manufacture of machinery, hats, confectionery and paper employs much labour. Dr6me exports fruit, oil, cheese, wine, wool, live stock and its manufactured articles; the chief import is coal. It is served by the Paris-Lyon railway, and the Rhone and Isere furnish over 100 m. of navigable waterway. The canal de la Bourne, the only one in the department, is used for purposes of irrigation only. Drome is divided into the arrondissements

of Valence, Die, Montelimar and Nyons, comprising 29 cantons and 379 communes; The capital is Valence, which is the seat of a bishopric of the province of Avignon. The department forms part of the academie (educational division) of Grenoble, where its court of appeal is also located, and of the region of the XIV. army corps.

Besides Valence, the chief towns of the department are Die, Montelimar, Crest and Romans(gg.».) . Nyons is a small industrial town with a medieval bridge and remains of ramparts. Suze-la-Rousse is dominated by a fine chateau with fortifications of the 12th and 14th centuries; in the interior the buildings are in the Renaissance style. At St Donat there are remains of the palace of the kings of Cisjuran Burgundy; though but little of the building is of an earlier date than the 12th century, it is the oldest example of civil architecture in France. The churches of L6oncel, St Restitut and La Garde-Adhemar, all of Romanesque architecture, are also of antiquarian interest. St Paul-Trois- ChElteaux, an old Roman town, once the seat of a bishopric, has a Romanesque cathedral. At Grignan there are remains of the Renaissance chateau where Madame de Sevigne died. At Tain there is a sacrificial altar of a.d. 184.,

DROMEDARY (from the Gr. Spo/ios, SpojudSor, running, Bpafiuv, to run), a word applied to swift riding camels of either the Arabian or the Bactrian species. (See Camel.)

DROMORE, a market town of Co. Down, Ireland, in the west parliamentary division, on the upper Lagan, 17I m. S.W. of Belfast by a branch of the Great Northern railway. Pop. of urban district (1901) 2307. It is in the linen manufacturing district. The town is of high antiquity, and was the seat of a bishopric, which grew out of an abbey of Canons Regular attributed to St Colman in the 6th century, and was united in 1 84 2 to Down and Connor. The town and cathedral were wholly destroyed during the insurrection of 1641, and the present church was built by Bishop Jeremy Taylor in 1661, who is buried here, as also is Thomas Percy, another famous bishop of the diocese, who laid out the fine grounds of the palace. Remains of a castle and earthworks are to be seen, together with a large rath or encampment known as the Great Fort. The town gives its name to a Roman Catholic diocese.

DROMOS (Gr. for running-place), in architecture, the name of the entrance passage leading down to the beehive tombs in Greece, open to the air and enclosed between stone walls.

DRONE, in music 1 (corresponding to Fr. bourdon; Ger. Summer, Stimmer, Hummel; Ital. bordone), the bass pipe or pipes of the bagpipe, having no lateral holes and therefore giving out the same note without intermission as long as there is wind in the bag, thus forming a continuous pedal, or drone bass. The drone consists of a jointed pipe having a cylindrical bore and usually terminating in a bell. During the middle ages bagpipes are represented in miniatures with conical drones, 2 and M. Praetorius 3 . gives a drawing of a bagpipe, which he calls Grosser Bock, having two drones ending in a curved ram's horn. The drone pipe has, instead of a mouthpiece, a socket fitted with a reed, and inserted into a stock or short pipe immovably fixed in an aperture of the bag. The reed is of the kind known as beating reed or squeaker, prepared by making a cut in the direction of the circumference of the pipe and splitting back the reed from the cut towards a joint or knot, thus leaving a flap or tongue which vibrates or beats, alternately opening and closing the aperture. The sound is produced by the stream of air forced from the bag by the pressure of the performer's arm causing the reed tongue to vibrate over the aperture, thus setting the whole column of air in vibration. Like all cylindrical pipes with reed mouthpiece, the drone pipe has the acoustic properties of the closed pipe and produces a note of the same pitch as that of an open pipe twice its length. The conical drones mentioned above

1 For the " drone," the male of the honey bee, see Bee. The musical sense, both for the noise made and for the instrument, comes from the buzzing of the bee.

2 British Museum, Add. MS. 12,228 (Italian work), Roman du Roy Meliadus, 14th century, fol. 221 b., and Add. MS. 18,851, end 15th century (Spanish work illustrated by Flemish artists), fol. 13.

3 Syntagma musicum. Theatrum instrumentorum, pi. xi. No. 6.

would, therefore, speak an octave higher than a cylindrical drone of the same length. The drones are tuned by means of sliding tubes at the joints.

The drones of the old French cornemuse played in concert with the hautbois de Poitou (see Bagpipe), and differing from the shepherd's cornemuse or chaUmie, formed an exception to this method of

construction, being furnished with double reeds like that of the oboe. The drones of the musette and of the union pipes of Ireland are also constructed on an altogether different plan. Instead of having long cumbersome pipes, pointing over the shoulder, the musette drones consist of a short barrel containing lengths of tubing necessary for four or five drones, reduced to the most compact form and resembling the rackett (q.v.). The narrow bores are pierced longitudinally through the thickness of the barrel in parallel channels communi- cating with each other in twos or threes, and so arranged as to provide the requisite length for each drone. The reeds are double reeds all set in the wooden stock within the bag. By means of regulating slides (called in English regulators and in French layettes), which may be pushed up and down in longitudinal grooves round the circumference of the barrel, the length of each drone tube can be so regulated that a simple harmonic bass consisting of the common chord is obtainable. In the union pipes the drones are separate pipes having keys played by the elbow, which correspond to the sliders in the musette drone and produce the same kind of harmonic bass. The modern Egyptian arghool consists of a kind of clarinet with a drone attached to it by means of waxed thread; in this case the beating reed of the drone is set in vibration directly by the breath of the performer, who takes both mouthpieces into his mouth, without the medium of a wind reservoir. Mersenne gave very clear descriptions of the construction of cornemuse and musette, with clear illustrations, of the reeds and stock. 1 There are allusions in the Greek classics which point to the existence of a pipe with a drone, either of the arghool or the bagpipe type. 2 (K. S.)

DRONFIELD, an urban district in the north-eastern parlia- mentary division of Derbyshire, England, 6 m. S. of Sheffield, on the Midland railway. Pop. (1901) 3809. It lies on the small river Drone, a tributary of the Rother, in a busy industrial district in which are numerous coal-mines, and there are iron foundries and manufactures of tools and other iron and steel goods. The church of St John the Baptist, with a lofty spire, is a good example of Decorated work, with Perpendicular additions.

DROPSY (contracted from the old word hydropisy, derived from the Gr. vbpwˆ/; vdaip, water, and &\p, appearance), the name given to a collection of simple serous fluid in all or any of the cavities of the body, or in the meshes of its tissues. Dropsy of the subcutaneous connective tissue is termed oedema when it is localized and limited in extent; when more diffuse it is termed anasarca; the term oedema is also applied to dropsies of some of the internal organs, notably to that of the lungs. Hydrocephalus signifies an accumulation of fluid

within the ventricles of the brain or in the arachnoid cavity; hydrothorax, a collection of fluid in one or both pleural cavities; hydroperi- cardium, in the pericardium; ascites, in the peritoneum; and, when anasarca is conjoined with the accumulation of fluid in one or more of the serous cavities, the dropsy is said to be general (see also Pathology) .

Dropsy (excluding " epidemic dropsy," for which see below) is essentially a symptom and not a specific disease, and is merely an exaggeration of a certain state of health. Fluid, known as lymph, is continually passing through the capillary walls into the tissues, and in health this is removed as fast as it is exuded, in one or more of three ways : part of it is used in the nutrition

1 L'Harmonie universelle (Paris, 1636-1637), t. ii. bk. 5, pp. 282-287 and p. 305.

2 Plato, Crito, 54; Aristophanes, Acharnians, 865, where some musicians are in derision dubbed " bumblebee pipers." See Bag- pipe; also Kathleen Schlesinger, " Researches into the Origin of the Organs of the Ancients," Intern, mus. Ges. vol. ii. (1901), Sammel- band ii. pp. 188-202.

of the tissues, part is returned to the general circulation by the veins, and part by the lymphatics. Any accumulation con- stitutes dropsy and is a sign of disease, though not a disease in itself. The serous effusions due to inflammation are not included under the term dropsy. A dropsical fluid varies considerably in composition according to its position in the body, but varies only slightly according to the disease which has given rise to it. Its specific gravity ranges between 1008 and 1018; the mineral salts present are the same and in about the same pro- portion as those of blood, nor do they vary with the position of the exudation. The quantity of albumin, however, depends much on the position of the fluid, and slightly on the underlying disease. In oedema the fluid contains only traces, whereas a pleural or peritoneal effusion is always highly albuminous. Also an effusion due to heart disease contains more albumin than one due to kidney disease. In appearance it may be colourless, greenish or reddish from the presence of blood pigment, or yellowish from the presence of bile pigment; transparent or opalescent or milky from the presence of fatty matter derived from the chyle. The membrane from which the dropsical fluid escapes is healthy, or at least not inflamed, and only somewhat sodden by long contact with the fluid — the morbid condition on which the transudation depends lying elsewhere.

The simplest cause of dropsy is purely mechanical, blood pressure being raised beyond a certain point owing to venous obstruction. This may be due to thrombosis of a vein as in phlegmasia dolens (white leg), retardation of venous circulation as in varicose veins, or obstruction of a vein due to the pressure of an, aneurism or tumour. Cardiac and renal dropsy are more complicated in origin, but cardiac dropsy is probably due to diminished absorption, and renal dropsy, when unassociated with heart failure, to increased exudation. But the starting point of acute renal dropsy, of the dropsy sometimes occurring in diabetes, and that of chlorosis is the toxic condition of the blood. For accounts of the various local dropsies see Hydro- cephalus; Ascites; Liver, &c; general dropsy, or dropsy which depends on causes acting on the system at large, is due chiefly to diseases of the heart, kidneys or lungs, occasionally on lardaceous disease, more rarely still on diabetes or one of the anaemias.

Broadly speaking, 50% of cases of general dropsy are due to disease of the heart or aorta, and 25% to renal troubles. The natural tendency of all diseases of the heart is to transfer the blood pressure from the arteries to the veins, and, so soon as this has reached a sufficient degree, dropsy in the form of local oedema commences to appear at whatever may be the most depending part of the body — the instep and ankle in the upright position, the lower part of the back or the lungs if the patient be in bed — and this tends gradually to increase till all the cavities of the body are invaded by the serous accumulation. The diseases of the lungs which produce dropsy are those which obstruct the passage of the blood through them, such as emphy- sema and fibrosis, and thus act precisely like disease of the heart in transferring the blood pressure from the arteries to the veins, inducing dropsy in exactly a similar manner. The dropsy of renal disease is dependent for the most part on an excess of exudation, due largely to an increase of arterial and cardiac ten«On. This in its turn produces arterial thickening and cardiac hypertrophy, which, if the case be sufficiently prolonged, brings about a natural removal of the fluid. In kidney cases, in the absence of cardiac disease, the dropsy will be found to appear first abou,t the loose cellular tissue surrounding the eyes, where the vessels, turgid with watery blood, have less efficient support. The dropsy of chlorosis is very similar to renal dropsy, a toxic condition of blood being present in both; also other forms of anaemia, as also hydraemia, tend to produce or assist in the production of dropsical effusions.

For the treatment of dropsy the reader is referred to the articles on the several diseases of which it is a symptom. Briefly, however, tapping of the abdomen or puncture of the legs are constantly

resorted to in severe cases. Dehydration by diet is very valuable under certain circumstances when the dropsy

is other than renal. And there is the routine treatment by drugs, purgative, diaphoretic and diuretic as the symptoms of the case may demand.

It may be well to mention that there are certain affections which may be termed spurious dropsies, such as ovarian dropsy, which is only a cystic disease of the ovary; hydrometria, dropsy of the uterus, due to inflammatory occlusion of the os uteri; hydronephrosis, dropsy of the kidney, due to obstruction of the ureter, and subsequent distension of these organs by serous accumulations; other hollow organs may also be similarly affected.

Having no known relation to the preceding is epidemic dropsy, the first recorded outbreak of which occurred in Calcutta in the year 1877. It disappeared during the hot weather of the following year, only to recur over a wider area in the cold months of 1878 ■to 1879, and once again in the cold of 1879 to 1880. Since then only isolated cases have been recorded in the immediate neigh- bourhood of Calcutta, though epidemics have broken out in other places both by land and sea. At the end of 1902 an outbreak occurred in the Barisal gaol, Bengal, in which nearly one-third of the cases ended fatally. Dropsy was an invariable feature of the disease, and was either the first symptom or occurred early. The lower limbs were first affected, trunk and upper limbs later in severe cases, the face very rarely. It was accompanied by pyrexia, gastro-enteritis, deep-seated pains in limbs and body, and burning and pricking of the skin. Various rashes appeared early in the attack, while eczema, desquamation and even ulceration supervened later. Anaemia was very marked, giving rise in Mauritius to the name of acute anaemic dropsy. The duration of the disease was very variable, the limits being three weeks and three months. Death was often sudden, resulting chiefly from cardiac and respiratory complications. The cause of the disease has remained obscure, but there is reason to suppose that it was originally imported from the Madras famine tracts.

DROPWORT, in botany, the common name for a species of Spiraea, S. filipendula (nat. ord. Rosaceae), found in dry pastures. It is a

perennial herb, with much divided radical leaves and an erect stem 2 to 3 ft. high bearing a loose terminal inflorescence of small white flowers, closely resembling those of the nearly allied species S. Ulmaria, or meadowsweet.

Water Dropwort, Oenanthe crocata (nat. ord. Umbelliferae) , is a tall herbaceous plant growing in marshes and ditches. The stem, which springs from a cluster of thickened roots, is stout, branched, hollow and 2 to 5 ft. high; the leaves are large and pinnately divided, and the flowers are borne in a compound umbel, the long rays bearing dense partial umbels of small white flowers. The plant, which is very poisonous, is often mistaken for celery.

DROSHKY (Russ. drozhki, diminutive of drogi, a wagon), a light four-wheeled uncovered carriage used in Russia. Pro- perly it consists of two pairs of wheels joined by a board. This forms a seat for the passengers who sit sideways, while the driver sits astride in front. The word Droschke, however, is applied especially in Germany to light carriages generally which ply for hire.

DROSTE-HULSHOFF, ANNETTE ELISABETH, Freiin von (1 797-1848), German poet, was born at the family seat of Hulshoff near Miinster in Westphalia on the 10th of January 1797. Her early mental training was largely influenced by her cousin, Clemens August, Freiherr von Droste zu Vischering, who, as archbishop of Cologne, became notorious for his extreme ultramontane views (see below) ; and she received a more liberal education than in those days ordinarily fell to a woman's lot. After prolonged visits among the intellectual circles at Coblenz, Bonn and Cologne, she retired to the estate of Rusch- haus near Miinster, belonging to her mother's family. In 1841, owing to delicate health, she went to reside in the house of her brother-in-law, the well-known scholar, Joseph, Freiherr von Lassberg (1770-1855), at Schlqss Meersburg on the Lake of Constance, where she met Levin Schiicking (q.v.); and there she died on the 24th of May 1848. Annette von Droste-Hulshofi

is, beyond doubt, the most gifted and original of German women poets. Her verse is strong and vigorous, but often unmusical even to harshness; one looks in vain for a touch of sentimentality or melting sweetness in it. As a lyric poet, she is at her best when she is able to attune her thoughts to the sober landscape of the Westphalian moorlands of her home. Her narrative poetry, and especially Das Hospiz auf dem Grossen St Bernard and Die Schlacht im Loener Bruch (both 1838), belongs to the best German poetry of its kind. She was a strict Roman Catholic, and her religious poems, published

in 1852, after her death, under the title Das geistliche Jahr, nebst einem Anhang religioser Gedichte, enjoyed great popularity.

Annette von Droste-Hiilshoff's Gedichte were first published in 1844 during her lifetime, and a number of her poems were translated into English by Thomas Medwin. The most complete edition of her works is that in 4 vols, edited by E. von Droste-Hulshoff (Miinster, 1886). The Ausgewahlte Gedichte were edited by W. von Scholz (Leipzig, 1901). See Levin Schiicking, Annette von Droste-Hulshoff, ein Lebensbild (2nd ed., Hanover, 1 871)— her letters to L. Schiicking were published at Leipzig in 1893; also H. Hueffer, Annette von Droste-Hulshoff und ihre Werke (Gotha, 1 887), and W. Kreiten, Annette von Droste-Hulshoff (2nd ed., Paderborn, 1900).

DROSTE-VISCHERING, CLEMENS AUGUST, Baron von (1 773-1845), German Roman Catholic divine, was born at Miinster on the 21st of January 1773. He was educated in his native town and entered the priesthood in 1798; in 1807 the local chapter elected him vicar-general. This office he resigned in 1 813 through his opposition to Napoleon, but assumed it again after the battle of Waterloo (181 5) until a disagreement with the Prussian government in 1820 led to his abdication. He remained in private life until 1835, when he was appointed archbishop of Cologne. Heve again his zeal for the supremacy of the church led him to break the agreement between the state and the Catholic bishops which he had signed at his installation, and he was arrested by the Prussian government in November 1837. A battle of pamphlets raged for some time; Droste was not re-installed but was obliged to accept a coadjutor. His chief works were: Uber die Religionsfreiheit der Katholiken (181 7), and Uber den Frieden unter der Kirche und den Staaten

(1843).

See Carl Mirbt's article in Herzog-Hauck, Realencyk. fur prot. Theol. v. 23.

DROUAIS, JEAN GERMAIN (1763-1788), French historical painter, was born at Paris on the 25th of November 1763. His father, Francois Hubert Drouais, and his grandfather, Hubert Drouais, were well-known portrait painters; and it was from his father that he received his first artistic instruction. He was after- wards entrusted to the care of Brenet, an excellent teacher, though his own pictures did not take high rank. In 1 780 David, who had just returned from Rome, opened a school of painting in Paris, and Drouais was one of his earliest and most promising pupils. He adopted the classical style

of his master, and gave his whole time to study — painting during the day, and spending a great part of every night in designing. For weeks together it is said that he never left his studio. In 1783 he was admitted to com- pete for the great prize of painting offered by the Academy, the subject being the " Widow of Nain." After inspecting the works of his fellow-competitors, however, he lost hope and destroyed his own canvas, but was consoled by the assurance of his master David that had he not done so he would have won the prize. Next year he was triumphantly successful, the " Woman of Canaan at the Feet of Christ," with which he gained the prize, being compared by competent critics with the works of Poussin. He was carried shoulder high by his fellow-students through the streets to his mother's house, and a place was afterwards found for his picture in the Louvre. His success making him only the more eager to perfect himself in his art, he accompanied David to Rome, where he worked even more assiduously than in Paris. He was most strongly influenced by the remains of ancient art and by the works of Raphael. Goethe, who was at Rome at the time it was finished, has recorded the deep impression made by his " Marius at Minturno," which he characterizes as in some respects superior to the work of David, his master. The last picture which he completed was his " Philoctetus on the

Island of Lemnos." He died on the 15th of July' 1788. A monument to his memory was erected by his fellow-students in the church of Santa Maria in the Via Lata.

DROUET, JEAN BAPTISTE (1763-1824), French Revolu- tionist, chiefly noted for the part he played in the arrest of Louis XVI. at Varennes, was born at Sainte-Menehould. He served for seven years in the army, and afterwards assisted his father, who was post-master of his native town. The carriages conveying the royal family on their flight to the frontier stopped at his door on the evening of the 21st of June 1791; and the passengers, travelling under assumed names, were recognized by Drouet, who immediately took steps which led to their arrest and detection on reaching Varennes. For this service the Assembly awarded him 30,000 francs, but he appears to have declined the reward. In September 1792 he was elected deputy to the Convention, and took his place with the most violent party. He voted the death of the king without appeal, showed implacable hostility to the Girondins, and proposed the slaughter of all English residents in

France. Sent as commissioner to the army of the north, he was captured at the siege of Maubeuge and imprisoned at Spielberg till the close of 1795- He then became a member of the Council of Five Hundred, and was named secretary. Drouet was implicated in the conspiracy of Babeuf, and was imprisoned; but he made his escape into Switzerland, and thence to Teneriffe. There he took part in the successful resistance to the attempt of Nelson on the island, in 1797, and later visited India. The first empire found in him a docile sub-prefect of Sainte-Menehould. After the second Restoration he was compelled to quit France. Returning secretly he settled at Macon, under the name of Merger and a guise of piety, and preserved his incognito till his death on the nth of April 1824.

See G. Lenotre, Le Drame de Varennes (Paris, 1905).

DROWNING AND LIFE SAVING. To " drown " (a verb used both transitively and intransitively, of which the origin, though traced to earlier forms, is unknown) is to suffer or inflict death by submersion in water, or figuratively to submerge entirely m water or some other liquid. As a form of ancient capital punishment, the method of drowning is referred to at the end of this article, but the interest of the subject is mainly associated with rescue-work in cases of accident.

Death from drowning is the result of asphyxia, due to the stoppage of a supply of fresh air to the lungs. There is a certain amount of stationary air in the lungs, and into this is diffused oxygen from the fresh air taken in, while the carbonic acid which it has taken from the blood through the walls of the capillaries is driven out. This process of exchange is ever proceeding, the whole of it being regulated from the nervous centre at the base of the brain. When a person gets under water and cannot swim, there is a natural tendency to struggle, and in the efforts to respire water is drawn into the windpipe and cough is brought on. This expels the air from the lungs with the water which threatened to suffocate him, and as further efforts are made to respire more water is taken in and has to be swallowed. Mean- while, the oxygen in the lungs is gradually diminishing, the quantity of carbonic acid is increasing, and at length the air in the lungs becomes too impure to effect an exchange with the blood. Then the blood passing into the heart becomes venous and the heart begins to send out venous instead of arterial blood to all parts of the body. Immediately a dull, sickening pain becomes apparent at the base of the neck, and insensibility rapidly ensues. This arises from the affection of the respiratory nerve centre. In a short space of time the face becomes dark and congested through the

veins being gorged with blood, and the heart ultimately ceases to beat.

When a person unable to swim falls into the water, he usually rises to the surface, throws up his arms and calls for help. This, with the water swallowed, will make him sink, and if the arms are moved above the head when under water, he will, as a natural consequence, sink still lower. The struggle will be prolonged a few seconds, and then probably cease for a time, allowing him to rise again, though perhaps not sufficiently high to enable him

to get another breath of air. If still conscious, he will renew his struggle, more feebly perhaps, but with the same result. As soon as insensibility occurs, the body sinks altogether, owing to the loss of air and the filling of the stomach with water. There is- a general belief that a drowning person must rise three times before he finally sinks, but this is a fallacy. The question whether ~~-ˆ- he rises at all, or how "vjˆ often he does so, en- tirely depends upon circumstances. A man may get entangled among weeds, which prevent his coming to the surface, or he may die through heart failure from the shock or fright of entering the water.

On seeing a per- son struggling in the

Fig. i.— 1st Release Method.

water in danger of drowning, no time should be lost in going to his assistance, for he may sink at once, and then there is danger of missing the body when searching under water for it, or it may get entangled among weeds and then the rescuer's task is rendered doubly dangerous. Before diving in to the rescue the boots and heavy clothing should be discarded if possible, and in cases where a leap has to be made from a height, such as a bridge, high embankment, vessel or pier, or where the depth of the water is not known, it is best to drop in feet first. Where weeds abound there is always danger of entanglement, and therefore progress should be made in the direction of the stream. When approaching a drowning man there is always the danger of being clutched, but a swimmer who knows the right way to deal with a man in the water can easily avoid this; but if through some mistake he finds himself seized by the drowning person, a necessary thing for the swimmer to do is to take advantage of his knowledge of the water and keep uppermost, as this weakens the drowning person and makes the effort of effecting a release much easier than would otherwise be the case. To the Royal Life Saving Society in England is due the credit of disseminating, throughout the

entire world, the ideas of swimmers, based on practical experience, as to the safest methods which should be adopted for release and rescue, and their methods, as well as the approved ones for resuscitation, are now taught in almost every school and college.

If the rescuer be held by the wrists, he must turn both arms simultaneously against the drowning person's thumbs, and bring his arms at right angles to the body, thus dislocating the thumbs of the drowning person if he does not leave go (fig. 1). If he be clutched round the neck he must take a deep breath and lean well over the drowning person, at the same time placing one hand in the small of his back, then raise the other arm in line with the shoulder, and pass it over the drowning person's arm, then pinch the nostrils close with the fingers, and at Fig. 2.— 2nd Release Method,

the same time place the palm of the hand on the chin and push away with all possible force. By the firm holding of the nose the drowning person is made to open his mouth for breathing, and as he will then be under water, choking ensues and he gives way to the rescuer, who then gains complete control (fig. 2). One of

the most dangerous clutches is that round the body and arms or round the body only. When so tackled the rescuer should lean well over the drowning person, take a breath as before, and either withdraw both arms in an upward direction in front of his body, or else act in the same way as when releasing oneself

when clutched round the neck. In any case one hand must be placed on the drowning man's shoulder, and the palm of the other hand against his chin, and at the same time one knee should be brought up against the lower part of his chest. Then, with a strong and. sud- den push, the arms and legs should be stretched out straight and the whole weight of the body thrown backwards. This sudden and totally unexpected action will break the clutch and leave the rescuer free to get hold of the drowning person in such a manner as to be able to bring him to land (fig. 3).

There are several practical methods of carrying a person through the water, the easiest assistance to render being that to a swimmer attacked by cramp or exhaustion, or a drowning person who may be obedient and remain quiet when approached and assured of safety.

Then the person assisted should place his arms on the rescuer's shoulders, close to the neck, with the arms at full stretch, lie on his back perfectly still, with the

head well back. The rescuer will then be uppermost, and hav- ;(. ~ ing his arms and legs lgˆ)free can, with the breast stroke, make rapid progress to the shore; indeed a good pace can easily be made (fig. 4). In

Fig. 3. — 3rd Release Method.

FlG. 4. — Easiest method of carrying a person not struggling.

this, as in the other methods afterwards described, every, care should be taken to keep the face of the drowning person above the water. All jerking, struggling or tugging should be avoided, and the stroke of the legs be regular and well timed, thus hus- banding strength for further effort. The drowning person being able to breathe with freedom is reassured, and is likely to cease struggling, feeling that he is in safe hands.

When a drowning person is not struggling, but yet seems likely to do so when approached, the best method of rescue is to swim straight up, turn him on his back, and then place the

Fig. 5. — 1st Rescue Method.

hands on either side of his face. Then the rescuer should lie on his back, holding the drowning man in front of him, and swim with the back stroke, always taking care to keep the man's face above water (fig. 5). If the man be struggling and in a condition difficult to manage, he should be turned on his back as before, and a firm hold taken of his arms just above his elbows. Then

the man's arms should be drawn up at right angles to his body and the rescuer should start swimming with the back stroke (fig. 6). He should take particular care not to go against the current or stream, and thereby avoid exhaustion. If the arms be difficult to grasp, or the struggling so violent as to prevent a firm hold, the rescuer should slip his hands under the armpits of the drowning per- son, and place them _ c ˆ J BˆajfeSˆBSFW-ˆysˆ on his chest or round v ˆ—

his arms, then raise them at right angles to his body , thus plac- ing the drowning per- son completely in his power. The journey to land can then be made by swimming on the back as in the other methods (fig. 7)

Fig. 6. — 2nd Rescue Method.

In carrying a person through the water, it will be of much advantage to keep his elbows well out from the sides, as this expands the chest, inflates the lungs and adds to his buoyancy. The legs should be kept well up to the surface and the whole body as horizontal as possible. This avoids a drag through the water, and will considerably help the rescuer, j In some cases it may happen that the drowning person has sunk to the bottom and does not rise again. In that event the rescuer should look for bubbles rising to the surface before diving in. In still water the bubbles rise perpendicularly; in running water they rise obliquely, so that the rescuer must look for his object higher up the stream than where the bubbles rise. It is also well to remember that in running water a body may be carried along by the current and must be looked for in the direction in which it flows. When a drowning person is recovered on the bottom, the rescuer should seize him by the head or shoulders, place the left foot on the ground and the right knee in the small of his back, and then, with a vigorous push, come to the surface. When the rescuer reaches land with an insensible person, no time should be lost in sending for a medical man, but in the meantime an attempt to induce artificial respiration may be made. The first recorded cases of resuscitating the apparently drowned are mentioned in the notes to William Derham's Physico-Theology, as having occurred at Troningholm and Oxford, about 1650. In 1745 Dr J. Fothergill read a paper on the subject before the Royal Society. It dealt with the recovery of a man dead in appearance by distending the lungs by Mr William Tossack, surgeon in Alloa, in 1744. In 1767 several cases of resuscitation were reported in Switzerland, and shortly after a society was formed at Amsterdam for recovery of the apparently drowned, and to instruct the common people as to the best manner of treating them when rescued, and to reward the people for their services. In 1773 Dr A. Johnson suggested the forma- tion of a similar society in England, and Dr Thomas Cogan translated the memoirs of the Amsterdam society. Dr William Hawes secured a copy and tried to form a society. There was, however, a strong pre- judice against the idea, but he publicly offered rewards to persons who, between Westminster and London Bridges,

should rescue drowning _ , _ .. . ,

, , . ., Fig. 7. — 3rd Rescue Method,

persons and bring them ‘ °

to certain places on shore in order that resuscitation might be attempted. In this way he was instrumental in the saving of several lives, and paid the rewards out of his own pocket, until his zeal brought him sympathy and the Royal Humane Society was founded. This was in 1 774. The system then in vogue was a means of inducing artificial respiration by inserting the pipe

of a pair of bellows into one nostril and closing the other. Air was forced into the lungs and then expelled by pressing the chest, thus imitating respiration. Dt Hawes used for his resuscitation work a kind of cradle, in which the subject was placed, and then raised over a furnace. Bleeding, holding up by the heels, rolling on casks, &c. were at various times resorted to. Simple means are often as effective as the official ones. In 1801 a subject was restored in Australia by being held over a smoky fire, which is the native method of restoring life; while a few years back, at an English riverside town, a patient was saved by the placing of a handkerchief over his mouth and the alternate blowing into and drawing air out of the lungs until natural breathing was restored.

One of the oldest methods of resuscitation was that of Dr Marshall Hall (1700-1857), introduced in 1856. In this method the operator takes his place at the patient's left side, and places a roll of clothing or pillow (which must be the same length as that used in the previous methods) , so that it may be in position under the chest when the patient is turned over. The assistant at the head pays particular attention to the patient's arms, that they may not be laid upon or twisted at the wrists, elbows, hands or shoulders. The patient is then turned face downwards, with the body reclining over the pillow, the operator makes a firm pressure with the hand upon the back, between and on the shoulder blades, he then pulls the patient slowly up on to the side towards himself. Once in position, the operator pushes the patient back again until the face is downward, when the pressure on the back is to be repeated. These three movements must be continued at the rate of about fifteen times a minute, until natural breathing has been restored.

Then came the methods of Dr H. R. Silvester and Dr Benjamin Howard, of New York.

When using the Silvester method, or, for the matter of that, any other method, the first thing to do is to send for medical assistance. Dr Silvester recommended that the patient should not be carried face downwards or held up by his feet. All rough usage should be avoided, especially twisting or bending of limbs, and the patient must not be allowed to remain on the back unless the tongue is pulled forward. In the event of respiration not being entirely suspended when a person is lifted out of the water, it may not be necessary to imitate breathing, but natural respira- tion may be assisted by the application of an irritant substance to the nostrils and tickling the nose. Smelling-salts, pepper and snuff may be used, or hot and cold water alternately dashed on the face or chest. Provided no sign of fife can be seen or felt or the heart's action heard, promotion of breathing, not circulation must be the first aim and effort. Lay the patient flat on his back, with the head at a slightly higher level than the feet. Remove all tight clothing about the neck, chest and abdomen, and loosen the braces, belts or corsets. The operator taking his place at the head, with an assistant on one side, will turn the patient over until he is lying face downwards, his head resting upon one arm. He should then, after the assistant has given one or two sharp blows with the open hand between the shoulder blades, wipe and clear the mouth, throat and -nostrils of all matter that may prevent the air from entering the lungs, using a handkerchief for this purpose. This being done, the patient should be turned upon his back, the tongue pulled forward and kept in position by means of a dry cloth, handkerchief or piece of string tied round the jaw. Every care must be taken not to let it fall back into the mouth and thus obstruct the air passages. When this work has been accomplished (it should only last a few seconds) the operator at the head should lift the patient, handling the head and shoulders very carefully, in order that the assistant may place a roll of clothing or pillow under the shoulder blades. The roll being placed in position, the operator will lean forward and grasp the arms below the elbows. He will then draw the patient's arms steadily upwards and outwards, above the head, until fully extended in line with the body. Having held the arms in this position for about one second, the operator will carry them back again and press them firmly against the side and front of the chest for another second. By these means an exchange of

air is produced in the lungs similar to that effected by natural respiration. These movements must be repeated carefully and deliberately about fifteen times a minute, 'and persevered in. When

natural respiration is once established, the operator should cease to imitate the movements of breathing, and proceed with the treatment for the promotion of warmth and circulation.

Friction over the surface of the body must be at once resorted to, using handkerchiefs, flannels, &c, so as to propel the blood along the veins towards the heart, while the operator attends to the mouth, nose and throat. The friction along the legs, arms and body should all be towards the heart and should be continued after the patient has been wrapped in blankets or some dry clothing. As soon as possible, the patient should be removed to the nearest house and further efforts made to promote warmth by the application of hot flannels to the pit of the stomach, and bottles or bladders of hot water, heated bricks, &c. to the armpits, between the thighs and to the soles of the feet. If there be pain or difficulty in breathing, apply a hot linseed meal poultice to the chest. On the' restoration of life, a teaspoon- ful of warm water should be given; and then, if the power of swallowing has returned, very small quantities of wine, warm brandy and water, beef tea or coffee administered, the patient kept in bed, and a disposition to sleep encouraged. The patient should be carefully watched for some time to see that breathing does not fail, and, should any signs of failure appear, artificial respiration should at once be resumed. While the patient is in the house, care should be taken to let the air circulate freely about the room and all overcrowding should be prevented.

In the Howard method there are only two movements; its knowledge is said to be necessary in case the patient's arm be in any way injured, or a more vigorous method than the " Silvester " deemed necessary, but care should be exercised not to injure the patient by too forcible pressure. The patient is laid on his back, the roll is larger than that used in the Silvester method, and is placed farther under the back in order that the lower part of the chest may be highest. After adjusting the roll, the oper- ator kneels astride of the patient, while his assistant goes to the head, lifts the patient's arms beyond the head, and holds them to the ground, cleans the mouth and nose, and attends to the tongue. The operator, with his fingers spread well apart, taking care that the thumbs do not press into the pit of the stomach, grasps the most compressible part of the lower ribs, and with both hands applies pressure firmly by leaning over the patient; then he springs back, lifting his hands off the patient. Artificial respiration is thus effected, and continued at the rate of about fifteen times a minute. When natural breathing has been restored, the treatment is the same as in the Silvester method.

These methods have now been superseded by the Schafer method, - which has been taken up by the Royal Life Saving Society, a body instituted in 1891 for the promotion of technical education in life saving and resuscitation of the apparently drowned. The Schafer method has much to recommend it, owing to its extreme simplicity and the ease with which the physical operations necessary to carry on artificial respiration may be performed, hardly any muscular exertion being required. It involves no risk of injury to the congested liver or to any other organ, and as the patient is laid face downwards, there is no possibility of the air passages being blocked by the falling back of the tongue into the pharynx. The water and mucus can also be expelled much more readily from the air passages through the mouth and nostrils.

It was due to the happy selection of Professor E. A. Schafer, as chairman of a committee appointed by the Royal Medical & Chirurgical Society for the investigation of the methods in use for resuscitation of the apparently drowned, that the new method was devised. This committee made many experiments upon the cadaver but failed to arrive at any definite conclusidn by that means. The necessity then appeared of thorough investigation of the subject by experiments upon animals, so that the phenomena attendant upon drowning might be better known, and the various methods of resuscitation properly tried. These experiments were made in Edinburgh by Professor

ˆchafer, with the co-operation of Dr P. T. Herring, and the results obtained were embodied in the report of the committee, which was presented tothe Royal Medical and Chirurgical Society in 1904, and published as a supplement to volume 86 of the Transactions of the society. As the direct outcome of these experiments, Professor Schafer was led to believe that a pressure method of resuscitation was not only simpler to perform but also more efficacious than any other. This conclusion was put to the test by measurements of the results obtained upon the normal human subject by the various methods in vogue; from these measurements, which were published in the Proceedings of the Royal Society of Edinburgh in December 1903, it appeared that when such pressure is exerted in the prone position the highest degree of efficiency as well as simplicity is obtained. The description of this method was communicated to the Royal Medical and Chirur- gical Society, and was published in the

following year (1904) in volume 87 of the Transactions of the society.

Thus it came about that by investigating the phenomena of drowning, and the means of resuscita- tion in dogs, and by applying the results obtained to man, the method which the society now advocates as the best was arrived at. In the experiments referred to, it was found necessary to drown 38 dogs, all but two of which were from first to last in a complete state of anaesthesia, the two exceptions having been simply drowned without anaesthesia. It is important that the public should understand that the evolution of a method which will probably be the means of saving thousands of ‘ lives has resulted from the painless, sacrifice of less than 40 dogs, a number which would doubtless in any case have been destroyed by drowning or some other form of suffoca-*

of the operator is swayed slowly forwards and backwards upon the arms from twelve to fifteen times a minute, and should be continued for at least half an hour, or until the natural respira- tions are resumed. Whilst one person is carrying out artificial respiration in this way, others may, if there be opportunity, busy themselves with applying hot flannels to the body and limbs, and hot bottles to the feet, but no attempt should be made to remove the wet clothing or to give any restoratives by the mouth until natural breathing has recommenced.

In his paper read before the Royal Society of Edinburgh in December 1903 Professor Schafer gave the following table of the relative exchanges of air under different methods: —

Mode of Respiration.

Number

per minute.

Amount of air

exchanged per

respiration.

Amount of air

exchanged per

minute.

Natural respiration (supine) .

Natural ,, (prone)

Prone (pressure), ” Schafer”

Supine (pressure), ” Howard ” .

Rolling (with pressure), “Marshall Hall ”

Rolling (without pressure), “Mar- shall Hall”

Traction (with pressure), ” Sil- vester ”

13 12-5

13 13-6

13 12

12-8

489 c.c. 422 „ 520 „

295 ..

254 –

192 „

178 „

6-460 c.c. 5-240 „ 6-760 „ 4-020 „

3-300 „

2-300 „

2-280 „

Fig. 8.-

-Schafer method of treatment of the apparently drowned. Position A.

tion, but without the benefit of the anaesthetics which were employed in the experiments.

Professor Schafer describes the method as follows: — Lay the subject face downwards on the ground, then without stopping to remove the clothing the operator should at once place himself in position astride or at one side of the subject, facing his head and kneeling upon one or both knees. He then places his hands flat over the lower part of the back (on the lowest ribs), one on each side (fig. 8), and then gradually throws the weight of his body forward on to them so as to produce firm pressure (fig. 9) — which must not be violent, or upon the patient's chest. By this means the air, and water if any, are driven out of the patient's lungs. Immediately thereafter the operator raises his body slowly so as to remove the pressure, but the hands are

Fig. 9. — Schafer method of treatment of the apparently drowned. Position B.

left in position. This forward and backward movement is repeated every four or five seconds; in other words, the body

These experiments all tend to show that by far the most efficient method of performing artificial respiration is that of intermittent pressure upon the lower ribs with the subject in the prone position or face downward. It is also the easiest to perform, requiring practically no exertion, as the weight of the operator's body produces the effect, and the swinging forwards and back- wards of the body some thirteen times a minute, which alone is required, is by no means fatiguing, and has the further great advantage that it can be effectively carried out by one person.

See Taylor, Medical Jurisprudence; "Description of a simple and efficient method of performing artificial respiration in the human subject, especially in cases of drowning," by E. A. Schafer, F.R.S. (vol. 87, Medico-Chirurgical Society's Transactions); "The relative efficiency of certain methods of performing artificial respiration in man," by E. A. Schafer, F.R.S. (vol. 23, part i. Proceedings of the Royal Society of Edinburgh); A Method for the Treatment of the Apparently Drowned,"hy R. S. Bowles (London, 1903); Handbook of Instruction, Royal Life Saving Society (London, 1908).

(W. Hy.) '

Penal Use of Drowning. — As a form of capital punishment, drowning was once common throughout Europe, but it is now only practised in Mahommedan countries and the Far East. Tacitus states that the ancient Germans hanged criminals of any rank, but those of the low classes were drowned beneath hurdles in fens and bogs. The

Romans also drowned convicts. The Lex Cornelia ordained that parricides should be sewn in a sack with a dog, cock, viper and ape, and thrown into the sea. The law of ancient Burgundy ordered that an unfaithful wife should be smothered in mud. The Anglo-Saxon punishment for women guilty of theft was drowning. So usual was the penalty in the middle ages that grants of life and death jurisdiction were worded to be "cum fossa et furca" (i.e. " with drowning-pit and gallows "). The owner of Baynard's Castle, London, in the reign of John, had powers of trying criminals, and his descendants long afterwards claimed the privileges, the most valued of which was the right of drowning in the Thames traitors taken within their jurisdiction. Drowning was the punish- ment ordained by Richard Cceur de Lion for any soldier of his army who killed a fellow-crusader during the passage to the Holy Land. Drowning was usually reserved for women as being the least brutal form of death-penalty, but occasionally a male criminal was so executed as a matter of favour. Thus in Scotland in 1526 a man convicted of theft and sacrilege was ordered to be drowned "by the queen's special grace." In 161 1 a man was drowned at Edinburgh for stealing a lamb, and in 1623 eleven gipsy, women suffered there. By that date the penalty was obsolete in England. It survived in Scotland till 1685 (the year of the drowning of the Wigtoun martyrs). The last

execution by drowning in Switzerland was in 1652, in Austria 1776, in Iceland 1777; while in France during the Revolution the penalty was revived in the terrible Noyades carried out by the terrorist Jean Baptiste Carrier at Nantes. It was abolished in Russia at the beginning of the 18th century.

DROYSEN, JOHANN GUSTAV (1808-1884), German historian, was born on the 6th of July 1808 at Treptow in Pomerania. His father, Johann Christoph Droysen, was an army chaplain, in which capacity he was present at the celebrated siege of Kolberg in 1806-7. As a child young Droysen witnessed some of the military operations during the War of Liberation, for his father was pastor at Greifenhagen, in the immediate neighbourhood of Stettin, which was held by the French during the greater part of 1813. The impressions of these early years laid the foundation of the ardent attachment to Prussia which distinguished him, like so many other historians of his generation. He was educated at the gymnasium of Stettin and at the university of Berlin; in 18.20 he became a master at the Graue

Kloster (or Grey Friars), one of the oldest schools in Berlin; besides his work there he gave lectures at the university, from 1833 as privat-dozent, and from 1835 as professor, without a salary. During these years he was occupied with classical antiquity; he published a trans- lation of Aeschylus and a paraphrase of Aristophanes, but the work by which he made himself known as a historian was his Geschichte Alexanders des Grossen (Berlin, 1833,. and other editions), a book which still remains probably the best work on the subject. It was in some ways the herald of a new school of German historical thought, for it shows that idealization of power and success which he had learnt from the teaching of Hegel. It was followed by other volumes dealing with the successors of Alexander, published under the title of Geschichte des Hellenis- mus (Hamburg, 1836-1843). A new and revised edition of the whole work was published in 1885; it has been translated into French, but not into English.

In 1840 Droysen was appointed professor of history at Kiel. He was at once attracted into the political movement for the defence of the rights of the Elbe duchies,, of which Kiel was the centre. Like his predecessor F. C; Dahlmann, he placed his historical learning at the service of the estates of Schleswig- Holstein and composed the address of 1844, in which the estates protested against the claim of the king of Denmark to filter the law of succession in the duchies. In 1848 he was elected a member of the Frankfort parliament, and acted as secretary to the committee for drawing up the constitution. He was a determined supporter of Prussian ascendancy, and was one of the first members to retire after the king of Prussia refused the imperial crown in 1849. During the next two years he con- tinued to support the cause of the duchies, and in 1850, with Carl Samwer, he published a history of the dealings of Denmark with Schleswig-Holstein, Die Herzogthiimer Schleswig-Holstein und das Konigreich Ddnemark seit dem Jahre 1806 (Hamburg, 1850). A translation was published in London in the same year under the title The Policy of Denmark towards the Dnchies of Schleswig-Holstein. The work was one of great political importance, and had much to do with the formation of German public opinion on the rights of the duchies in their struggle with Denmark.

After 1851 it was impossible for him to remain at Kiel, and he was appointed to a professorship at Jena; in 1859 he was called to Berlin, where he remained till his death. In his later years he was almost entirely occupied with Prussian history. In 1851 he brought out a life of Count Yorck von Wartenburg (Berlin, 1851-1852, and many later editions), one of the best biographies in the German

language, and then began his great work on the Geschichte der preussischen Pblitik (Berlin, 1855-1886). Seven volumes were published, the last not till after his death. It forms a complete history of the growth of the Prussian monarchy down to the year 1756. This, like all Droysen's work, shows a strongly marked individuality, and a great power of tracing the ™ianner in which important dynamic forces worked themselves out in history. It was this characteristic quality of compre- hensiveness that also gave him so much influence as a teacher.

Droysen, who was twice married, died in Berlin on the 19th of June 1884. His eldest son, Gustav, is the author of several well-known historical works, namely, Gustav Adolf (Leipzig, 1869-1870); Herzog Bernhard von Weimar (Leipzig, 1885); an admirable Historischer Handatlas (Leipzig, 1885), and several writings on various events of the Thirty Years' War. Another son, Hans Droysen, is the author of some works on Greek history and antiquities.

See M. Duncker, Johann Gustav Droysen, ein Nachruf (Berlin, 1885); and Dahlmann- Waitz, Quellenkunde der deutschen Geschichte (Leipzig, 1906). Q. W. He.)

DROZ, ANTOINE GUSTAVE (1832-1895), French man of letters, son of the sculptor J. A. Droz (1807-1872), was born in Paris on the 9th of June 1832. He was educated as an artist, and began to exhibit in the Salon of 1857. A series of sketches dealing gaily and lightly with the intimacies of family life, published in the Vie parisienne and issued in book form as Monsieur, Madame et Bibe (1866), won for the author an im- mediate and great success. Entre nous (1867) was built on a similar plan, and was followed by some psychological novels: Le Cahier bleu de Mile Cibot (1868) ; Autour d'une source (1869) ; Un Paquet de lettres (1870); Babolein (1872); Les Etangs (1875); L'Enfant (1885). His Tristesses et sourires (1884) is a delicate analysis of the niceties of family intercourse and its difficulties. Droz's first book was translated into English under the title of Papa, Mamma and Baby (1887). Un ftti a la campagne, a book which caused considerable scandal, was erroneously attributed to him. He died on the 22nd of October 1895.

DROZ, FRANQOIS-XAVIER JOSEPH (1773-1850), French writer on ethics and political science, was born on the 31st of October 1773 at Besancon, where his family had furnished men of considerable mark to the legal profession. His own legal studies led him to Paris in 1792; he arrived on the very day after the dethronement of the king, and was present during the massacres of September; on the

declaration of war he joined the volunteer bataillon of the Doubs, and for the next three years served in the Army of the Rhine. Receiving his discharge on the score of ill-health, he obtained a much more congenial post in the newly-founded tcole centrale of Besancon; and in 1799 he made his first appearance as an author by an Essai sur Part oratoire (Paris, Fructidor, An VII.), in which he acknowledges his indebtedness more especially to Hugh Blair. Removing to Paris in 1803, he became intimate not only with the like-minded Ducis, but also with the sceptical Cabanis; and it was on this philosopher's advice that, in order to catch the public ear, he produced the romance of Lina, which Sainte-Beuve has, characterized as a mingled echo of Florian and Werther. Like several other literary men of the time, he obtained a post in the revenue office known as the Droits reunis; but from 1814 he devoted himself exclusively to literature and became a contributor to various journals. Already favourably known by his Essai sur Vartd'etreheureux (Paris, 1806), his Elogede Montaigne (1812), and his Essai sur le beau dans les arts (181 5), he not only gained the Monthyon prize in 1823 by his work De la philosophic morale ou des difffrents systemes sur la science de la vie, but also in 1824 obtained admission to the Academie Francaise. The main doctrine inculcated in this last treatise is that society will never be in a proper state till men have been educated to think of their duties and not of their rights. It was followed in 1825 by Application de la morale d la philosophic et a la politique, and in 1829 by Economic politique, ou principes de la science des richesses, a methodical and clearly written treatise, which was edited by Michel Chevalier in 1854. His next and greatest work was a Histoire du regne de Louis X VI (3 vols., Paris, 1839- 1842). As he advanced in life Droz became more and more decidedly religious, and the last work of his prolific pen was Pensees du Christianisme (1842). Few have left so blameless a reputation: in the words of Sainte-Beuve, he was born and he remained all his life of the race of the good and the just.

See Guizot, Discours academiques ; Montalembert, " Discours de reception," in Memoires de V Academie frangaise; Sainte-Beuve, Causeries du lundi, t. iii. ; Michel Chevalier, Notice prefixed to the Economie politique.

DRUG, a district and town of British India, in the Chhattis- garh division of the Central Provinces. The district was formed in 1906

out of portions of the districts of Bilaspur and Raipur. It has an area of 3807 sq. m., and the population on that area in 1901 was 628,885, showing a heavy decrease in the preceding decade, owing to the famines of 1897 and 1900. The district is a long narrow tract, with lofty ridges of gravel in the centre and north, but otherwise consisting of open rolling country. The Tendula and Seonath are the principal rivers. Rich black soil covers a large part of the district, and rice, wheat and other crops are grown. The main line of the Bengal-Nagpur railway passes through the district. Drug, the capital of the district, is on the railway, 685 m. from Bombay, and had in 1901 a popula- tion of 4002. Bell-metal-founding and cotton-weaving are carried on.

DRUG (from Fr. drogue, a word common in Romance languages, cf. Span, and Ital. droga; the origin of the word is obscure, but may possibly be connected with Dutch droog, dry)', any organic and inorganic substance used in the preparation of medicines, by itself or in combination with others, and either prepared by some method or used in a natural state (see Pharmacology and Pharmacopoeia). In a particular sense " drug " is of ten used synonymously for narcotics or poisonous substances, and hence " to drug " means to stupefy or poison. The word is also applied to any article for which there is no sale, or of which the value has greatly depreciated — a " drug in the market."

DRUIDISM, the name usually given to the religious system of the ancient inhabitants of Gaul and the British Islands. The word Druid (Lat. druida) probably represents a Gaulish druid-s, Irish drtii,. gen. sing, druad. On the analogy of Irish sui

We find in Caesar the first and at the same time the most circumstantial account of the Druids to be met with in the classical writers. He tells us that all men of any rank and dignity in Gaul were included among the Druids or the nobles. In other words, the Druids constituted the learned and the priestly class, and they were in addition the chief expounders and guardians of the law. We are, however, informed by Diodorus and Strabo that this class was composed of Druids, bards and soothsayers. Hence Caesar seems to assign more extensive functions to the Druids than they actually possessed. The substance of Caesar's account is as follows. On those who refused to submit to their decisions they had the power of in-flicting severe penalties, of which excommunication from society was the most dreaded. As they were not a hereditary caste and enjoyed exemption from service in the field as well as from pay- ment of taxes, admission to the order was eagerly sought after by the youth

of Gaul. The course of training to which a novice had to submit was protracted, extending sometimes over twenty years. All instruction was communicated orally, but for ordinary purposes they had a written language in which they used the Greek characters. The president of the order, whose office was elective and who enjoyed the dignity for life, had supreme authority among them. They taught that the soul was immortal. Astrology, geography, physical science and natural theology were their favourite studies.

Britain was the headquarters of Druidism, but once every year a general assembly of the order was held within the terri- tories of the Carnutes in Gaul. The Gauls were accustomed to offer human sacrifices, usually criminals. Cicero remarks on the existence among the Gauls of augurs or soothsayers, known by the name of Druids, with one of whom, Divitiacus, an Aeduan, he was acquainted. Diodorus informs us that a sacrifice accept- able to the gods must be attended by a Druid, for they are the intermediaries. Before a battle they often throw themselves between two armies to bring about peace. They are said to

have had a firm belief in the immortality of the soul and in metempsychosis, a fact which led several ancient writers to conclude that they had been influenced by the teaching of the Greek philosopher Pythagoras.

A rescript of Augustus forbade Roman citizens to practise druidical rites. In Strabo we find the Druids still acting as arbiters in public and private matters, but they no longer deal with cases of murder. Under Tiberius the Druids were sup- pressed by a decree of the senate, but this had to be renewed by Claudius in a.d. 54. In Mela we find the Druids teaching in the depths of a forest or in caverns. In Pliny their activity is limited to the practice of medicine and sorcery. According to this writer the Druids held the mistletoe in the highest veneration. Groves of oak were their chosen retreat. Whatever grew on that tree was thought to be a gift from heaven, more especially the mistletoe. When thus found, the mistletoe was cut with a golden knife by a priest clad in a white robe, two white bulls being sacrificed on the spot. Tacitus, in describing the attack made on the island of Mona (Anglesea) by the Romans under Suetonius Paulinus, represents the legionaries as being awe- struck on landing by the appearance of a band of Druids, who, with hands uplifted towards heaven, poured forth terrible imprecations on the heads of the invaders. The courage of the Romans, however, soon overcame such fears; the Britons were put to flight; and the groves of Mona, the scene of many a sacrifice and bloody rite, were cut down.

After this the continental Druids disappear entirely, and are only referred to on very rare occasions. Ausonius, for instance, apostrophizes the rhetorician Attius Patera as sprung from a race of Druids.

When we turn to the British Islands we find, as we should expect, no traces of the Druids in England and Wales after the conquest of Anglesea mentioned above, except in the story of Vortigern as recounted by Nennius. After being excommuni- cated by Germanus the British leader invites twelve Druids to assist him. These probably came from North Britain. In Irish literature, however, the Druids are frequently mentioned, and their functions in the island seem to correspond fairly well to those of their Gaulish brethren described by classical writers. The functions of Caesar's Druids we here find distributed amongst Druids, bards and poets (fili), but even in very early times the poet has usurped many of the duties of the Druid and finally supplants him with the spread of Christianity. The following is the position of the Druid in the pagan literature. The most important documents are contained in MSS. of the 12th century, but the texts themselves go back in large measure to about a.d. 700. In the heroic cycles the Druids do not appear to have formed any corporation, nor do they seem to have been exempt from military service. Cathbu (Cathbad), the Druid connected with Conchobar, king of Ulster, in the older cycle is accompanied by a number of youths (100 according to the oldest version) who are desirous of learning his art, though what this consisted in we are not told. The Druids are represented as being able to foretell the future and to perform magic. Before setting out on the great expedition against Ulster, Medb, queen of Connaught, goes to consult her Druid, and just before the famous heroine Derdriu (Deirdre) is born, Cathbu prophesies what sort of a woman she will be. We may cite two instances of the magical skill of the Druids. The hero Cuchulinn has returned from the land of the fairies after having been enticed thither by a fairy-woman named Fand, whom he is now unable to forget. He is given a potion by some Druids, which banishes all memory of his recent adventures and which also rids his wife Emer of the pangs of jealousy. More remarkable still is the story of Etain. This lady, now the wife of Eochaid Airem, high-king of Ireland, was in a former existence the beloved of the god Mider, who again seeks her love and carries her off. The king has recourse to his Druid Dalan, who requires a whole year to discover the haunt of the couple. This he accomplished by means of four wands of yew inscribed with ogam characters. The following description of the band of Cathbu's Druids occurs in the epic taie, the Cattle-spoiling of Cualnge (Cooley) : "

The attendant raises his

eyes towards heaven and observes the clouds and answers the band around him. They all raise their eyes towards heaven, observe the clouds, and hurl spells against the elements, so that they arouse strife amongst them and clouds of fire are driven towards the camp of the men of Ireland." We are further told that at the court of Conchobar no one had the right to speak before the Druids had spoken. In other texts the Druids are able to produce insanity.

In the religious literature they are almost exclusively repre- sented as magicians and diviners opposing the Christian mission- aries, though we find two of them acting as tutors to the daughters of Laegaire, the high-king, at the coming of St Patrick. They are represented as endeavouring to prevent the progress of St Patrick and St Columba by raising clouds and mist. Before the battle of Culdremne (561) a Druid made an airbe druad (fence of protection?) round one of the armies, but what is precisely meant by the phrase is obscure. The Irish Druids seem to have had a peculiar tonsure. The word drui is always used to render the Latin magus, and in one passage St Columba speaks of Christ as his Druid.

See D'Arbois de Jubainville, Les Druides et les dieux celtiques a forme d'animaux (Paris, 1906), and Introduction a I'etude de la litterature celtique (Paris, 1883); P. W. Joyce, A Social History of Ancient Ireland (London, 1903). (E. C. Q.)

DRUIDS, ORDER OF, a friendly society founded, as an imitation of the ancient Druids, in London in 1781. They adopted Masonic rites and spread to America (1833) and Aus- tralia. Their lodges are called " Groves." • In 1872 the Order was introduced into Germany. (See Friendly Societies.)

DRUM (early forms drome or dromme, a word common to many Teut. languages, cf. Dan. tromme, Ger. Trommel: the word is ultimately the same as " trumpet," and is probably onomatopoeic in origin; it appears late in Eng. about the middle of the 16th century), the name given to the well-known musical instrument (see below) and also to many objects resembling it in shape. Thus it is used of any receptacle of similar shape, as a " drum " of oil, &c; in machinery, of a revolving cylinder, round which belting is passed; of

the tympanum or cylindrically shaped middle ear, and specially of the membrane that closes the external auditory meatus; and, in architecture, of the sub- structure of a dome when raised to some height above the pendentives. The architectural drum had a twofold object; first, to give greater elevation to the dome externally so that it should rise well above the surrounding building, and secondly, to allow of the interior being lighted with vertical windows cut in the drum, instead of forming penetrations in the dome itself, as in St Sophia, Constantinople. The term is also applied to the circular blocks of stone, which in columns of large dimensions were built with a series of drums. At Selinus in Sicily some of these great circular blocks are found on the road between the quarries and the temples; they vary from 8 to 10 ft. in diameter, being about 6 ft. high. The term frusta is sometimes applied to them.

In music the drum (Fr. tambour; Ger. Trommel; Ital. tamburo) is an instrument of percussion common in some form to all nations and ages. It consists of a frame or vessel forming a resonant cavity, over one or both ends of which is stretched a skin or vellum set in vibration by direct percussion of hand or stick. Drums fall into two divisions according to the nature of their sonority: — (1) instruments producing sounds of definite musical pitch, and qualified thereby to take part in the harmony of the orchestra, such as the kettledrum (q.v.); (2) instruments of indefinite sonorousness, and therefore excluded from the harmony of the orchestra; such are the bass drum, the side or snare drum, the tenor drum, the tambourine, all used for marking the rhythm and adding tone colour.

Drums are further divided into three classes according to special features of construction: — (1) instruments having a skin stretched over one end of the resonant cavity, the other being open, such as the tambourine (q.v.) and the darabukkeh or Egyptian drum, shaped like a mushroom; (2) instruments consisting of a cup-shaped receptacle of metal, wood or earthen- ware entirely closed by a skin or vellum stretched across the

opening, as in the kettledrum; (3) a receptacle in the shape of a cylinder closed at both ends by skins, as in the bass drum, side drum, &c.

Skin or parchment only acquires the elasticity requisite to produce vibration by tension; the vibrations of the parchmerft are taken up by the air enclosed in the receptacle, which thus reinforces the sound produced by the parchment. The tone of the instrument whether definite or indefinite depends upon the dimensions of the vellum, the

shape of the resonant receptacle, and the method of percussion. The intensity of the sound depends upon the degree of percussive force used and the dia- meter of the vellum in proportion to the dimensions of the resonant receptacle; the material of which the latter consists has little or no influence on the tone of the instrument. The pitch of the sound is determined by the dimensions of the vellum taken in conjunction with the degree of tension, the pitch varying in acuteness directly with the degree of tension and inversely with the size of the vellum.

The bass drum or Turkish drum (Fr. grosse caisse; Ger. Grosse Trommel; Ital. gran cassa or tamburo grande) consists of a short cylinder of very wide diameter covered at both ends by vellum stretched over thin hoops, which in turn are kept in place by larger hoops fitting tightly over them. At regular intervals in the two large hoops are bored holes through which passes an endless cord stretched in zig-zag round the cylinder and connecting the two hoops. The tension of the vellum is controlled by means of leather braces which are made to slide up and down the zig-zag of cord, slackening or tighten- ing the large hoops, and with them the vellum, at the will of the per- former. Systems of rods and screws are also used for the purpose. The bass drum is mounted on a stand when used in the orchestra. The sound is produced by striking the centre of the vellum on the one end of the drum with a stick having a large soft round knob composed of wood covered with cork, sponge or felt. The bass drum cannot be tuned since it gives out no definite note, but the pitch may be varied, according as a rich full tone or a mere dull thud be required, by tightening or loosening the braces; the instrument can, moreover, be muffled by covering it with a piece of cloth. The music for the bass drum is generally

written on a stave with a bass clef, ˆ 1 — , the C being

merely used to show the rhythm and — ‘ “~ accents. Some- times the stave is dispensed with, a single note on a single line being sufficient. The bass drum has a place in every orchestra, although it is used but sparingly to accentuate the rhythm. It is possible to make gradations in forte and piano on the bass drum, and to play quavers and semi-quavers in moderate tempo. A roll is sometimes played by holding a short stick, furnished with a knob at each end, in the middle and striking in quick succession with each knob alternately; two kettledrum sticks answer the purpose still better. It is under- stood that the cymbals play the same music as the bass drum unless the composer has written senza piatti over the part Wagner did not once score for the bass drum after he composed Rienzi, but Verdi,*

Gounod, Berlioz and Sullivan used it effect- ively. The bass drum was formerly known as the long drum, the cylinder being long in proportion to the diameter.

The side or snare drum (Fr. tambour militaire; Ger. MilitSr- trommel; Ital. tamburo militare) is an instrument consisting of

Fig. 1. — Military Bass Drum 'Besson & Co.)

a small wooden or brass cylinder with a vellum at each end. The parchments are lapped over small hoops and pressed firmly down by larger hoops. As in the bass drum, these and the vellums are tightened or slackened by means of cords and leather braces^ or by a system of rods and screws. Acioss the lower head are stretched two or more catgut strings called snares, which produce a rattling sound at each stroke on the upper head, owing to the sympathetic vibration of the lower head which jars against the snares. The upper head, set in vibration by

Fig. 2. — Guards pattern Side Drum (Besson & Co.).

Fig. 3. — Regulation Side Drum (Besson & Co.).

direct percussion from the sticks, induces sympathetic vibrations in the air contained within the resonating receptacle, and these vibrations are communicated to the lower head. The presence of the snares across the diameter of the latter produces a pheno- menon which gives the side drum its peculiar timbre, changing the nature of the vibrations, now no longer free: the snares form a kind of nodal contact, inducing double the number of vibrations and a sound approximately an octave higher than would be the case were the heads left to vibrate freely. More- over, the vibrations of the upper head being weaker, the latter is compelled to vibrate synchronously with the lower vellum. 1

The side drum, so called because it is worn at the side, is Struck in the centre by two small wooden sticks with elongated heads or knobs of hard wood, producing a hard rasping sound when the drum is played singly and in close proximity to the hearer; when, however, several drums are played simultaneously or with other instruments the effect is brilliant and exhilarating. The roll is produced by striking two blows alternately with each hand quite regularly and

very rapidly, the result being a rattling tremolo. This roll (" daddy-mammy ") is very difficult to acquire, and requires long practice. The side drum can be muffled by loosening the snares or by inserting a piece of silk or cloth between the snares and the parchment. An impressive effect is produced by a continued roll on muffled drums in funeral marches. The notation for the side drum is similar to that in use for the bass drum; the value of the note is alone of importance; the place of the note on the staff is immaterial and purely a matter of custom. In orchestral scores, a single line is often used, or the part for side and bass drum is written on the same staff. A great variety of rhythmical figures can be played on the side drum, such as

5555 Hi 1

" (rem. "

The tenor drum (Fr. caisse roulante; Ger. Roll- or Riihrtrommel; Ital. tamburo rulanle) is similar to the side drum but has a larger cylinder of wood and no snares; consequently its timbre lacks the brilliancy and incisiveness of the side drum. It is used for the roll in military bands, in some theatre orchestras, and on the stage.

The tambourin de Provence is a small drum with a long cylinder of narrow diameter used in the Basque provinces with a small pipe (galoubet) having three holes. The drum is beaten with one stick only, the performer steadying it with the hand which fingers

'See Victor Mahillon, Catalogue descriplif (Ghent, 1880), vol. i. pp. 19 and 20.

the pipe. The tambourin and galoubet are in fact a survival of the pipe and tabor (

The popularity of all kinds of drums in the most ancient civilizations is established beyond a doubt by the numerous representations of the instrument in a variety of shapes and sizes on the monuments and paintings of Egypt, Assyria, India and Persia. The tympanon, under which name seem to have been included tambourines and kettledrums, as well as the dulcimer (during the middle ages), was in use among Greeks and Romans chiefly in the worship of Cybele and Bacchus; it was introduced through the medium of the Roman civilization into western Europe. It is often said that the drum was intro- duced by the crusaders, but it was certainly known in England lqng before the crusades, for Bede (Musica practica) mentions it in his list of instruments, and Cassiodorus (ii. p. 507) describes it. The

side drum was, until the reign of Elizabeth, of a much larger size than now and was held horizontally and beaten on one head only. It is not known at what date snares were added; Praetorius (Syntagma musicum, 1618) and Mersenne (V Harmonic universelle, Paris, 1636) both mention them. A drawing of a side drum showing a snare appears in a book 2 from the printing press of J. Badius Ascensius (1510); the instrument also has cords and braces. Another woodcut of the same century is given as frontispiece to an edition of Flavius Vegetius Renatus. 3 An actual side drum with two curved drumsticks belonging to the ancient Egyptians was found during the excavations conducted at Thebes in 1823. 4 It measured 15 ft. in height by 2 ft. in diameter; the tension of the heads was regulated by cords braced by means of catgut encircling both ends of the drum, and wound separately round each cord so that these could be tightened or slackened at will by pulling the catgut bands closer together or pushing them farther apart. The Berlin Museum possesses some ancient Egyptian straight drumsticks with handle and knob. Drums were used at the battle of Halidon Hill (1333). An old ballad celebrating Edward III.'s victory on this occasion appears in a chronicle of the 14th century, preserved in the British Museum (Harl. MS. 4690),

" This was do with merry sowne, With pipes trumpes and tabers thereto, And loud clariones they blew also."

A prose account of the battle "in the same MS. states that the " Englische mynstrelles beaten their tabers and blewen their trompes and pipers pipenede loude and made a great schowte upon the Skottes."

Froissart, under date 1338, gives details of the means taken by the Scots to intimidate the soldiers of Edward III. 5 Having mentioned their great horns, he adds, " ils font si grand' noise avec grands tambours qu'ils ont aussi." The same chronicler, describing the triumphal entry of Edward III. into Calais (1347), gives the following list of instruments used: " trompes, tambours, nacaires, chalemies, muses." 6

Drums were used in the British army in the 16th century to give signals in war and peace — side drums by the infantry and dragoons, and kettledrums by the cavalry. 7 In the reign of Henry VIII. two drummers were allowed to every company of 100 men. The chief drum beats used by the infantry in the 17th century 8 were call, troop, preparative, march, battaile and retreat; these were later 9 changed to general, reveille", assembly or troop, tattoo, chamade,

&c. The side drum was admitted into the orchestra in the 17th century, when Marais (1636-1728) scored for it in his opera Alcione. (K. S.)

2 Joannes Mauburnius, Rosetum exercitiorum spiritualium et sacrarum meditationum (Paris, 15 10), Alphabetum, ix.

5 Vier Bucher der Ritterschaft; mit manicherleyen gerilsten, &c; (Augsburg, 1534).

4 Carl Engel, The Music of the Most Ancient Nations (London, 1864), p. 219.

6 Chron. ii. p. 737, see also Grose's Military Antiquities, ii. 41.

6 See Froissart in J. A. Buchon, Pantheon lilt. (Paris, 1837), vol. i. cap. 322, p. 273.

7 Sir John Smythe, A Brief Discourse (London, 1594), pp. 158-159.

8 Lieut. -Col. W. Bariffe, Militarie Discipline, or the Young Artilleryman (London, 1643).

9 Sir James Turner, Pallas armata (1685), xxi. 302.

6oo DRUMMOND, H.— DRUMMOND OF HAWTHORNDEN

DRUMMOND, HENRY (1786-1860), English banker, politician and writer, best known as one of the founders of the Catholic Apostolic or " Irvingite " Church, was born at the Grange, near Alresford, Hampshire, on the 5th of December 1786. , He was the eldest son of Henry Drummond, a prominent London banker, by a daughter of the first Lord Melville. He was educated at Harrow and at Christ Church, Oxford, but took no degree. His name is permanently connected with the university through the chair of political economy which he founded in 1823. He entered parliament in early life, and took an active interest from the first in nearly all departments of politics. Thoroughly independent and often eccentric in his views, he yet acted generally with the Conservative party. His speeches were often almost inaudible but were generally lucid and informing, and on occasion caustic and severe. From 1847 until his death in i860 he represented West Surrey in parliament. Drummond took a deep interest in religious subjects, and published numerous books and pamphlets on such questions as the interpretation of prophecy, the circulation of the Apocrypha, the principles of Christianity, &c, which attracted considerable attention. In 1817 he met Robert

Haldane at Geneva, and continued his movement against the Socinian tendencies then prevalent in that city. In later years he was intimately associated with the origin and spread of the Catholic Apostolic Church. Meetings of those who sympathized with the views of Edward Irving were held for the study of prophecy at Drummond's seat, Albury Park, in Surrey ; he contributed very liberally to the funds of the new church; and he became one of its leading office-bearers, visiting Scotland as an " apostle " and being ordained as an " angel " for that kingdom. The numerous works he wrote in defence of its distinctive doctrines and practice were generally clear and vigorous, if seldom convincing. He died on the 20th of February i860.

DRUMMOND, HENRY (1851-1897), Scottish evangelical writer and lecturer, was born in Stirling on the 17th of August 185 1. He was educated at Edinburgh University, where he displayed a strong inclination for physical and mathematical science. The religious element was an even more powerful factor in his nature, and disposed him to enter the Free Church of Scotland. While preparing for the ministry, he became for a time deeply interested in the evangelizing mission of Moody and Sankey, in which he actively co-operated for two years. In 1877 he became lecturer on natural science in the Free Church College, which enabled him to combine all the pursuits for which he felt a vocation. His studies resulted in his writing Natural Law in the Spiritual World, the argument of which was that the scientific principle of continuity extended from the physical world to the spiritual. Before the book issued from the press (1883), a sudden invitation from the African Lakes Company drew Drummond away to Central Africa. Upon his return in the following year he found himself famous. Large bodies of serious readers, alike among the religious and the scientific classes, discovered in Natural Law the common standing-ground which they needed; and the universality of the demand proved, if nothing more, the seasonableness of its publication. Drum- mond continued to be actively interested in missionary and other movements among the Free Church students. In 1888 he published Tropical Africa, a valuable digest of information. In 1890 he travelled in Australia, and in 1893 delivered the Lowell Lectures at Boston. It had been his intention to reserve them for mature revision, but an attempted piracy compelled him to hasten their publication, and they appeared in 1894 under the title of The Ascent of Man. Their object was to vin- dicate for altruism, or the disinterested care and compassion of animals for each other, an important part in effecting " the survival of the fittest," a thesis previously maintained by Professor John

Fiske. Drummond's health failed shortly after- wards, and he died on the nth of March 1897. His character was full of charm. His writings were too nicely adapted to the needs of his own day to justify the expectation that they would long survive it, but few men exercised more religious influence in their own generation, especially on young men.

DRUMMOND, THOMAS (1797-1840), British inventor and administrator, was born at Edinburgh on the 10th of October 1797, and was educated at the high school there. He was appointed to a cadetship at the Royal Military Academy, Woolwich, in 1813; and in 1815 he entered the Royal Engineers. In 1819, when meditating the renunciation of military service for the bar, he made the acquaintance of Colonel T. F. Colby (1784-1852), from whom in the following year he received an appointment on the trigonometrical survey of Great Britain. During his winters in London he attended the chemical lectures of W. T. Brande and M. Faraday at the Royal Institution, and the mention at one of these of the brilliant luminosity of lime when incandescent suggested to him the employment of the lime light for making distant surveying stations visible. In 1825, when he was assisting Colby in the Irish survey, his lime-light apparatus (" Drummond light ") was put to a practical test, and enabled observations to be completed between Divis mountain, near Belfast, and Slieve Snaght, a distance of 67 m. About the same time he also devised an improved heliostat, and in 1829 he was employed in adopting his light for lighthouse purposes. In 183 1 he entered political life and was appointed superintendent of the boundary commission. Four years later he was made under-secretary of state for Ireland, where he proved himself a most successful administrator, and did much to promote law and order. It was he who in 1838 told the Irish landlords that " property has its duties as well as its rights." In 1836 he proposed the appointment of a commission on rail- ways in Ireland, and took a large share in its work, which resulted in the recommendation, not, however, carried out, that the state should construct a system of lines throughout the island. Drummond's health was undermined by overwork, and he died at Dublin on the 15th of April 1840.

See Life by J. F. M'Lennan (1867) ; Life and Letters by R. Barry O'Brien (1889); and Sir T. A. Larcom in Papers on the Duties of the Royal Engineers, vol. iv. (1840).

DRUMMOND, WILLIAM (1585-1649), called "of Hawthorn- den," Scottish poet, was born at Hawthornden, near Edinburgh, on the 13th of December 1585. His father, John Drummond, was the first

laird of Hawthornden; and his mother was Susannah Fowler, sister of William Fowler (q.v.)., poet and courtier. Drummond received his early education at the high school of Edinburgh, and graduated in July 1605 as M.A. of the recently founded university of Edinburgh. His father was a gentleman usher at the English court (as he had been at the Scottish court from 1590) and William, in a visit to London in 1606, describes the festivities in connexion with the visit of the king of Denmark. Drummond spent two years at Bourges and Paris in the study of law; and, in ±609, he was again in Scotland, where, by the death of his father in the following year, he became laird of Hawthornden at the early age of twenty-four. The list of books he read up to, this time is preserved in his own handwriting. It indicates a strong preference for imaginative literature, and shows that he was keenly interested in contemporary verse. His collection (now in the library of the university of Edinburgh) contains many first editions of the most famous productions of the age. On finding himself his own master, Drummond natur- ally abandoned law for the muses; " for," says his biographer in 1711, " the delicacy of his wit always run on the pleasantness and usefulness of history, and on the fame and softness of poetry." In 161 2 began his correspondence with Sir William Alexander of Menstrie, afterwards earl of Stirling (q.v.), which ripened into a life-long friendship after Drummond's visit to Menstrie in 1614.

Drummond's first publication appeared in 1613, an elegy on the death of Henry, prince of Wales, called Teares on the Death of Meliades (Moeliades, 3rd edit. 1614). The poem shows the influence of Spenser's and Sidney's pastoralism. In the same year he published an anthology of the elegies of Chapman, Wither and others, entitled Mausoleum, or The Choisest Flowres of the Epitaphs. In 1616, the year of Shakespeare's death, appeared Poems: Amorous, Funerall, Divine/ Pastorall: in Sonnets, Songs, Sextains, Madrigals, being substantially the

story of his love for Mary Cunningham of Barns, who was about to become his wife when she died in 1615. The poems bear marks of a close study of Sidney, and of the Italian poets. He sometimes translates direct from the Italian, especially from Marini. Forth Feasting: A Panegyricke to the King's Most Excellent Majestie (1617), a poem written in heroic couplets of remarkable facility, celebrates James's visit to Scotland in that year. In 1618 Drummond

began a correspondence with Michael Drayton. The two poets continued to write at intervals for thirteen years, the last letter being dated in the year of Drayton's death. The latter had almost been persuaded by his " dear Drummond" to print the later books of Poly-Olbum at Hart's Edinburgh press. In the winter of 1618-1610, Drummond had included Ben Jonson in his circle of literary friends, and at Christmas 1618 was honoured with a visit of a fortnight or more from the dramatist. The account of their conversations, long supposed to be lost, was discovered in the Advocates' Library, Edinburgh, by David Laing, and was edited for the Shakespeare Society in 1842 and printed by Gifford & Cunningham. The conversations are full of literary gossip, and embody Ben's opinion of himself and of his host, whom he frankly told that " his verses were too much of the schooles, and were not after the fancie of the time," and again that he " was too good and simple, and that oft a man's modestie made a fool of his witt." But the publication of what was obviously intended merely for a private journal has given Jonson an undeserved reputation for harsh judgments, and has cast blame on Drummond for blackening his guest's memory.

In 1623 appeared the poet's fourth publication, entitled Flowers of Sion: By William Drummond of Hawthornedenne: to which is adjoyned his Cypresse Grove. From 1625 till 1630 Drummond was probably for the most part engaged in travelling on the Continent. In 1627, however, he seems to have been home for a short time, as, in that year, he appears in the entirely new character of the holder of a patent for the construction of military machines, entitled "Litera Magistri Gulielmi Drummond de Fabrica Machinarum Militarium, Anno 1627." The same year, 1627, is the date of Drummond's munificent gift (referred to above) of about 500 volumes to the library of the university of Edinburgh.

In 1630 Drummond again began to reside permanently at Hawthornden, and in 1632 he married Elizabeth Logan, by whom he had five sons and four daughters. In 1633 Charles made his coronation- visit to Scotland; and Drummond's pen was employed in writing congratulatory speeches and verses. As Drummond preferred Episcopacy to Presbytery, and was an extremely loyal subject, he supported Charles's general policy, though he protested against the methods employed to enforce it. When Lord Balmerino was put on his trial on the capital charge of retaining in his possession a petition regarded as a libel on the king's government, Drummond in an energetic " Letter " (1635) urged the injustice and folly of the proceedings. About this time a claim by the earl of Menteith to the earldom of Strathearn, which was based on the assertion that Robert

III., husband of Annabella Drummond, was illegitimate, roused the poet's pride of blood and prompted him to prepare an historical defence of his house. Fartly to please his kinsman the earl of Perth, and partly to satisfy his own curiosity, the poet made researches in the genealogy of the family. This investigation was the real secret of Drummond's interest in Scottish history; and so we find that he now began his History of Scotland during the Reigns of the Five Jameses, a work which did not appear till 1655, and is remarkable only for its good literary style. His next work was called forth by the king's enforced submission to the opposition of his Scottish subjects. It is entitled Irene: or a Remonstrance for Concord, Amity, and Love amongst His Majesty's Subjects (1638), and embodies Drummond's political creed of submission to authority as the only logical refuge from democracy, which he hated. In 1639 Drummond had to sign the Covenant in self-protection, but was uneasy under the burden, as several political squibs by him testify. In 1643 he published Sjaajuaxta.: or a Defence of a Petition tendered to- the Lords of the Council of

Scotland by certain Noblemen and Gentlemen, a political pamphlet in support of those royalists in Scotland who wished to espouse the king's cause against the English parliament. Its burden is an invective on the intolerance of the then dominant Presby- terian clergy.

His later works may be described briefly as royalist pamphlets, written with more or less caution, as the times required. Drum- mond took the part of Montrose; and a letter from the Royalist leader in 1646 acknowledged his services. He also wrote a pamphlet, " A Vindication of the Hamiltons," supporting the claims of the duke of Hamilton to lead the Scottish army which was to release Charles I. It is said that Drummond's health received a severe shock when news was brought of the king's execution. He died on the 4th of December 1649. He was buried in his parish church of Lasswade.

Drummond's most important works are the Cypresse Grove and the poems. The Cypresse Grove exhibits great wealth of illustration, and an extraordinary command of musical English. It is an essay on the folly of the fear of death. "This globe of the earth," says he, " which seemeth huge to us, in respect of the universe, and compared with that wide pavilion of heavenj is less than little, of no sensible quantity, and but as a point." This is one of Drummond's favourite moods; and he uses constantly in his poems such phrases as " the All," " this great All." Even in such of his poems as may be called more distinc- tively Christian, this philosophic conception is at work.

A noteworthy feature in Drummond's poetry, as in that of his courtier contemporaries Ayton {q.v.), Lord Stirling and others, is that it manifests no characteristic Scottish element, but owes its birth and inspiration rather to the English and Italian masters. Drummond was essentially a follower of Spenser, but, amid all his sensuousness, and even in those lines most conspicuously beautiful, there is a dash of melancholy thoughtfulness — a tendency deepened by the death of his first love, Mary Cunningham. Drummond was called " the Scottish Petrarch "; and his sonnets, which are the expression of a genuine passion, stand far above most of the confemporary Petrarcan imitations. A remarkable burlesque poem Polemo-Middinia inter Vitarvam el Nebernam (printed anonymously in 1684) has been persistently, and with good reason, ascribed to him. It is a mock-heroic tale, in dog-Latin, of a country feud on the Fifeshire lands of his old friends the Cunninghams.

Drummond's Poems, with Cypresse Grove, the History, and a few of the minor tracts, were collected in 1656 and edited by Edward Phillips, Milton's nephew. The Works of William Drummond, of Hawthornden (171 1), edited by Bishop Sage and Thomas Ruddiman, contains a life by the former, and some of the poet's letters. A handsome edition of the Poems was printed by the Maitland Club in 1832. Later editions are by Peter Cunningham (1833), by William R. Turnbull in " The Library of Old Authors " (1856), and by W. C. Ward (1894) for " The Muses' Library." The standard biography of Drummond is by David Masson (1873). Extracts from the Hawthornden MSS. preserved in the Library of the Society of Antiquaries of Scotland were printed by David Laing in Archaeologia Scotica, vol. iv.

DRUNKENNESS, a term signifying generally a state resulting from excessive drinking, and usually associated with alcoholic intoxication, or alcohol poisoning. It may represent either an act or a habit, the latter consisting in frequent repetitions of the former. As an act it may be an accident, most usually arising from the incautious use of one or other of the commonly emploj'ed intoxicating agents; as a habit (as in the form of chronic alcoholism) it is one of the most degrading forms of vice which can result from the enfeeblement of the moral principle by persistent self-indulgence.

What appears to be " intoxication " may arise from many different causes (e.g. epilepsy, fractured skull, intracranial haemorrhage, and the toxaemic coma of diabetes and uraemia), and the close resemblance between the pathological and the toxic phenomena has been the cause of many untoward accidents. Cold alone may produce

such peculiar effects that Captain Parry said in his Journal, " I cannot help thinking that many a man may have been punished for intoxication who was only suffering from the benumbing effects of frost; for I have more than once

seen our people in a state so exactly resembling that of the most stupid intoxication, that I should certainly have charged them with the offence had I not been quite sure that no possible means were afforded them on Melville Island to procure anything stronger than snow water." The same confusion is frequently found in cases which come before the police-courts, people being arrested as " drunk and disorderly " who can prove that the symptoms were not due to over-indulgence in drink at all. Some individuals have, moreover, a special idiosyncrasy or susceptibility to alcohol, due to heredity or to one of the sequelae of sunstroke or cranial injury. The children of drunkards are usually very susceptible to the poison, becoming intoxicated by a far smaller quantity than is needed by a normal person.

But, as a rule, the phenomena of drunkenness are actually due to excessive consumption of some intoxicating liquid. The physiological action of all such agents may be described as a cumulative production of paralysis of various parts of the nervous system, but this effect results only in doses of a certain amount — a dose which varies with the agent, the race and the individual. Even the cup so often said to " cheer, but not inebriate," cannot be regarded as altogether free from the last- named effect. Tea-sots are well known to be affected with palpitation and irregularity of the heart, as well as with more or less sleeplessness, mental irritability and muscular tremors, which in some culminate in paralysis; while positive intoxication has been known to be the result of the excessive use of strong tea. In short, from tea to haschisch we have, through hops, alcohol, tobacco and opium, a sort of graduated scale of intoxicants, which stimulate in small doses and narcotize in larger, — the narcotic dose having no stimulating properties whatever, and only appearing to possess them from the fact that the agent can only be gradually taken up by the blood, and the system thus comes primarily under the influence of a stimulant dose. In certain circumstances and with certain agents — as in the pro- duction of chloroform narcosis — this precursory stage is capable of being much abbreviated, if not altogether annihilated; while with other agents —

as tea — the narcotic stage is by no means always or readily produced.

No subject in modern times has led to more extreme opinions than this of indulgence in " intoxicants " to any degree whatever. It is well to remember that (in spite of apparently authoritative modern views to the contrary) there is not a shadow of proof that the moderate use of any one of these agents as a stimulant has any definite tendency to lead to its abuse; it is otherwise with their employment as narcotics, which, once indulged in, is almost certain to lead to repetition, and to a more or less rapid process of degradation, thotigh there are many exceptions to this latter statement. It is interesting to know that a former English judge, who lived to nearly ninety years of age, believed he had prolonged his life and added greatly to his comfort by the moderate use of ether, which he was led to employ because neither wine nor tobacco agreed with him; while the immoderate use of the same agent has given rise to a most deleterious form of drunkenness, both in parts of Ireland and in some of the large industrial centres in Great Britain.

Various modern biologists have discussed, with more or less acceptance in certain circles, the historical conditions in various races and in different countries as to the use and abuse of in-toxicants, and have drawn varying conclusions from their theories. It has even been contended, with much show of learned authority, that since drunkenness leads to disease and early death, the proneness to strong drink in the long run causes the elimination of the unfit, and results in a general sobering of the community, a race being therefore temperate in proportion to its past sufferings through alcohol. But on this subject it may be said that, at least, no agreement has been reached.

The effects of intoxicants are variously modified by the tem-perament of the individual and the nature of the inebriant. When that is alcohol, its action on an average individual is first to fill him with a serene and perfect self-complacency. His feelings and faculties are exalted into a state of great activity and buoyancy, so that his language becomes enthusiastic, and

his conversation vivacious if not brilliant. The senses gradually become hazy, a soft humming seems to fill the pauses of the conversation, and modify the tones of the speaker, a filmy haze obscures the vision, the head seems lighter than usual, the equilibrium unstable. By-and-by objects appear double, or flit confusedly before the eyes; judgment is abolished, secretive- ness

annihilated, and the drunkard pours forth all that is within him with unrestrained communicativeness; he becomes boisterous, ridiculous, and sinks at length into a mere animal. Every one around him, the very houses, trees, even the earth itself, seem drunken and unstable, he alone sober, till at last the final stage is reached, and he falls on the ground insensible— dead drunk (alcoholic coma) — a state from which, after profound slumber, he at last awakes feverish, exhausted, sick and giddy, with ringing ears, a throbbing heart and a violent headache.

The poison primarily affects the cerebral lobes, and the other parts of the cerebro-spinal system are consecutively involved, till in the state of dead-drunkenness the only parts not invaded by a benumbing paralysis are those automatic centres in the medulla oblongata which regulate and maintain the circulation and respiration. But even these centres are not unaffected; the paralysis of these as. of the other sections of the cerebro-spinal system varies in its incompleteness, and at times becomes complete, the coma of drunkenness terminating in death. More usually the intoxicant is gradually eliminated, and the individual restored to consciousness, a consciousness disturbed by the secondary results of the agent he has abused, which vary with the nature of that agent. Whether, however, directly or in- directly through the nervous system, the stomach suffers in every case; thus nutrition is interfered with by the defective ingestion of food, as well as by the mal-assimilation of that which is ingested; and from this cause, as well as by the peculiar local action of the various poisons, the various organic degenera- tions are induced (cirrhosis of the liver, &c.) which in most cases shorten the drunkard's days.

The primary discomforts of an act of drunkenness are readily removed for the time by a repetition of the cause. Thus what has been an act may readily become a habit, all the more readily that each repetition more and more enfeebles both the will and the judgment, till they become utterly unfit to resist the temptation to indulgence supplied by the knowledge of the temporary relief to suffering which is sure to follow, and in spite of the consciousness that each repetition of the act only forges their chains more tightly. From this condition there is no hope of relief but in enforced abstinence; any one in this condition must be regarded , as temporarily insane (see Insanity and Neuropathology), and ought to be placed in an inebriate asylum till he regain sufficient self-control to enable him to overcome his love for drink. Numerous " cures " have been started in recent years, which have often succeeded in individual cases. An anti-alcoholic serum obtained from alcoholized horses has been advocated by Dr Sapelier.

For the law concerning drunkenness the reader is referred to Inebriety, Law of. Its prevalence as a vice has varied con- siderably according to the state of education or comfort in different classes of society. In considering the extent to which intemperance has prevailed, the statistics of prosecutions upon which such comparisons are usually based are far from being completely satisfactory, but, inasmuch as they constitute the only possible data for such comparisons, we are compelled to accept them. The following table gives the average number of persons per 1000 of the population proceeded against for drunkenness in England and Wales for quinquennial periods, dating from 1857, the first year of the Judicial Statistics: —

1857-1861 4-28

1862-1866 478

1867-1871 5-47

1872-1876 7-83

1877-1881 7-25

1882-1886 6-90

1887-1891 6-19

1892-1896 584

1897-1901 6-42

1902-1906 . , 6-51

The figures, it will be seen, show a steady decline from 1872- 1876 (when the consumption of alcohol was quite abnormal) to 1892-1896. After that year, however, the figures again rose. The increase was especially marked in 1899, when a tide of exceptional prosperity was again accompanied by great drunken- ness. It is also disquieting to discover that the average number of prosecutions for drunkenness in the three years 1897-1899 was 51% higher than the average for 1857-1861, and 35% higher than the average for 1862-1866. That the increase was partly due to more efficient police

administration is probable, but that this is not a complete explanation of the figures is made evident by an analysis of the general statistics of crime during the same period, from which it may be seen that, while crime generally (excluding drunkenness) decreased 28% in England and Wales since 1857-1861, drunkenness increased 51%. Speaking generally, it may be said that in the United Kingdom drunkenness appears chiefly prevalent in the seaport and mining districts. If a line be drawn from the mouth of the Severn to the Wash, it will be found that the " black " counties, without exception, lie to the north-west of this line. The worst counties in England and Wales in the matter of drunkenness are Northumberland, Durham and Glamorganshire, while Pembrokeshire and Lancashire follow close behind. The most sober counties, on the other hand, are Cambridgeshire, Suffolk, Oxfordshire and Wiltshire. Averages based upon the returns of entire counties do not, however, afford a complete guide to the distribution of drunkenness, inasmuch as offences are not equally distributed over the whole area of a county. A heavy ratio of drunkenness in a small district may often give a county an unfavourable position in the general averages, notwithstanding favourable conditions in the rest of its area.

Analysis of the prosecutions for drunkenness shows that about 24% of the total number of offences are committed by women. In the larger towns the proportion, as a rule, is higher. In London, 38% of the drunkenness is attributable to women; in Manchester, 36%; in Belfast and Glasgow, 32%. In Liverpool, on the other hand, the proportion is only 24%. The much-controverted question as to whether intemperance is increasing among women can hardly, however, be decided by an appeal to the criminal statistics. So far as these statistics throw any light at all upon the question, they suggest important local differences. A more direct clue is afforded by the registrar- general's annual returns of deaths directly attributed to in-temperance. The figures are given below. In order to eliminate accidental variations, the comparison is based upon the average mortality during consecutive periods: —

Average No. of deaths

Males

Females

Years.

(England and Wales).

per cent.

per cent.

1 877-1 88 1

107 1

69

31

1882-1886

1320

66

34

1887-1891

1710

64

36

1 892-1 896

2044

61

39

1897-1899

2577

61

39

1899

2871

60

40

For the ten years ending 1904, out of 26,426 deaths from alcoholism, 59-34% were males and 40-66% females.

The figures are certainly striking. They show, it will be noticed, that out of every 100 deaths from alcoholic excess in England and Wales women contributed nine more at the end of the century then they did in 1880. If, instead of taking the total number of deaths, we take the ratio per million persons living, the increase is seen even more clearly: —

Males per

Females per

Years.

million living.

million living.

1877-1881

60

25

1882-1886

67

32

1887-1891

79

42

1892-1896

86

51

1 897-1 899

103

63

1899

112

70

It appears that, while the ratio of mortality from alcoholic excess increased 87% among males during the last two decades of the century, among females it increased by no less than 180%.

See also Liquor Laws and Temperance.

DRURY, SIR WILLIAM (1527-1579), English statesman and soldier, was a son of Sir Robert Drury of Hedgerley in Bucking- hamshire, and grandson of another Sir Robert Drury (d. 1536), who was speaker of the House of Commons in 1495. He was born at Hawstead in Suffolk on the 2nd of October 1527, and was educated at Gonville Hall, Cambridge. Fighting in France, Drury was taken prisoner in 1544; then after his release he helped Lord Russell, afterwards earl of Bedford, to quell a rising in Devonshire in 1549, but he did not come to the front until the reign of Elizabeth. In 1559 he was sent to Edinburgh to report on the condition of Scottish politics, and five years later he became marshal and deputy-governor of Berwick. Again in Scotland in January 1570, it is. interesting to note that the regent James Stewart, earl of Murray, was proceeding to keep an appointment with Drury in Linlithgow when he was mortally wounded, and it was probably intended to murder the English envoy also. After this event Drury led two raids into Scotland; at least thrice he went to that country on more peaceable errands, during which, however, his life was continually in danger from assassins; and he commanded the force which compelled Edinburgh Castle to surrender in May 1573. In 1576 he was sent to Ireland as president of Munster, where his stern rule was very successful, and in 1578 he became lord justice to the Irish council, taking the chief control of affairs after the departure of Sir Henry Sidney. The rising of the earl of Desmond had just broken out when Sir William died in October 1579.

Drury's letters to Lord Burghley and others are invaluable for the story of the relations between England and Scotland at this time.

DRUSES, or Druzes (Arab. Druz), a people of mid-Syria (for the derivation of the name see History section below) , distributed nowadays into three isolated groups, of which the most numerous inhabits Jebel Hauran (Jebel Druz), E. of Jordan (about 55,000) ; the second, the cazas of Shuf and Metn in Lebanon (about 50,000) ; the third, the cazas of Hasbeya, Rasheya, W. al Ajem, Horns, Hamadiyeh and Selimiyeh in Anti-Lebanon and Hermon (about 45,000) . The first group, which has been greatly increased by migrants from the second, since the establishment of the privileged Lebanon province (1861) under Christian auspices, lives apart from other peoples in semi-independence. The second is now confined to the southern Lebanon, and even there is greatly outnumbered by Maronites, who, in the whole " Moun- tain," stand to Druses as 9 to 2. The third is counterbalanced everywhere by a large population of Moslem and Orthodox Syrians. The Hauran, therefore, has become the stronghold of the Druses, offering nowadays the best field for studying their peculiar customs and religion; and the group there still increases at the expense of the other groups, despite efforts on the part of the Ottoman government to check Druse migration by both conciliatory and repressive measures. The actual distinction of the Druses, as a racial unity, despite their disper- sion, depends so exclusively on the peculiarity of their common religion, that it will be well at once to give an account of Druse creed and practice as they are understood to stand at the present day. How this religion may have grown up and come to be theirs will be considered later.

Religion. — Druse religion is a secret faith, and the following account is given with all reserves. There are many indications that a more primitive cult, containing elements of Nature worship, preceded it, and still survives in the popular practices of the more remote Druse districts, e.g. in the eastern Hauran. The Muwahhidin (Unitarians), as the Druses call themselves, believe that there is one and only one God, indefinable, incom- prehensible, ineffable, passionless. He has made himself known to men by successive incarnations, of which the last was Hakim, the sixth Fatimite caliph. How many these incarnations have been is stated variously; but seventy, one for each period of the world, seems the best-attested number. Jesus appears to

be accepted as one such incarnation, but not Mahomet, although it is agreed that, in his time, the " Universal Intelligence " (see later) was

made flesh, in the person of Mikdad al-Aswad. No further incarnation can now take place: in Hakim a final appeal was made to mankind, and after the door of mercy had stood open to all for twenty-six years, it was finally and for ever closed. When the tribulation of the faithful has reached its height, Hakim will reappear to conquer the world and render his religion supreme. Druses, believed to be dispersed in China, will return to Syria. The combined body of the Faithful will take Mecca, and finally Jerusalem, and all the world will accept the Faith. The first of the creatures of God is the Universal Intelligence or Spirit, impersonated in Hamza, Hakim's vizier. This Spirit was the creator of all subordinate beings, and alone has immediate communion with the Deity. Next in rank, and equally supporting the throne of the Almighty, are four Minister- ing Spirits, the Soul, the Word, the Right Wing and the Left Wing, who, in Hakim's time, were embodied respectively in Ismael Darazi, Mahommed ibn Wahab, Selama ibn Abd al- Wahal and Baha ud-Din; and beneath these again are spiritual agents of various ranks. The material world is an emanation from, and a " mirror " of, the Divine Intelligence. The number of human beings admits neither of increase nor of decrease, and a regular process of metempsychosis goes on continually. The souls of the virtuous pass after death into ever new incar- nations of greater perfection, till at last they reach a point at which they can be re-absorbed into the Deity itself; those of the wicked may be degraded to the level of camels or dogs. All previous religions are mere types of the true, and their sacred books and observances are to be interpreted allegorically. The Gospel and the Koran are both regarded as inspired books, but not as religious guides. The latter function is performed solely by the Druse Scriptures. As the admission of converts is no longer permitted, the faithful are enjoined to keep their doctrine secret from the profane; and in order that their allegiance may not bring them into danger, they are allowed (like Persian mystics) to make outward profession of whatever religion is dominant around them. To this latter indulgence is to be attributed the apparent indifferentism which leads to their joining Moslems in pra ; yers andablutions,orsprinklingthemselves with holy water in Maronite churches. Obedience is required to the seven commandments of Hamza, the first and greatest of which enjoins truth in words (but only those of Druse speaking with Druse); the second, watchfulness over the safety of the brethren; the third, absolute renunciation of every other religion; the fourth, complete separation from all who are in error; the fifth, recognition of the unity of " Our Lord " in all ages; the sixth, complete resignation to his will; and the seventh, complete obedience to his orders. Prayer, however, is regarded as an

impertinent interference with the Creator; while, at the same time, instead of the fatalistic predestination of Mahommedanism, the freedom of the human will is distinctly maintained. Not only is the charge of secrecy rigidly obeyed in regard to the alien world, but full initiation into the deeper mysteries of the creed is permitted only to a special class desig- nated Akils, (Arabic'^/, intelligence), in contradistinction from whom all other members of the Druse community, whatever may be their position or attainments, are called Jahel, the Ignorant. About 1 5 % of the adult population belong to the order of Akils. Admission is granted to any Druse of either sex who expresses willingness to conform to the laws of the society, and during a year of probation gives sufficient proof of sincerity and stability of purpose. There appears to be no formal distinction of rank among the various members; and though the amir, Beshir Shehab, used to appoint a sheikh of the Akils, the person thus distinguished obtained no primacy over his fellows. Exceptional influence depends upon exceptional sanctity or ability. All are required to abstain from tobacco and wine; the women used not to be allowed to wear gold or silver, or silk or brocade, but this rule is commonly broken now; and although neither celibacy nor retirement from the affairs of the world is either imperative or customary, unusual respect

is shown to those who voluntarily submit themselves to ascetic discipline. While the Akils mingle frankly with the common people, and are remarkably free from clerical pretension, they are none the less careful to maintain their privileges. They are distinguished by the wearing of a white turban, emblematic of the purity of their life. Their food must be purchased with money lawfully acquired; and lest they should unwittingly partake of any that is ceremonially unclean, they require those Jahels, whose hospitality they share, to supply their wants from a store set apart for their exclusive use. The ideal Akil is grave, calm and dignified, with an infinite capacity of keeping a secret, and a devotion that knows no limits to the interests of his creed. On Thursday evening, the commencement of the weekly day of rest, the members of the order meet together in the various districts, probably for the reading of their sacred books and consultation on matters of ecclesiastical or political import- ance. Their meeting-houses, khahvas, are plain, unornamented edifices. These have property attached to them, the revenues of which are consecrated to the relief of the poor and the demands of hospitality. In the eastern Hauran, there are hill-top shrines containing each a black stone, on which rugs, &c, are hung, and these seem to perpetuate features of pre-Islamic Arabian cult, including the sacrifice of animals, e.g.

goats. They are held in reverence by the Bedouins. The women assemble in the khalwas at the same time as the men, a part of the space being fenced off for them by a semi-transparent black veil. Even while the Akils are assembled, strangers are readily enough admitted to the khahvas; but as long as these are present the ordinary ceremonies are neglected, and the Koran takes the place of the Druse Scriptures. It has been frequently asserted that the image of a calf is kept in a niche, and traces of phallic and gynaecocratic worship have been vaguely suspected; but there is no authentic information in support of either state- ment. The calf, if calf there be, is probably a symbol of the execrable heresy of Darazi, who is frequently styled the calf by his Orthodox opponents. Ignorance is the mother of suspicion as well as of superstition; and accordingly the Christian in- habitants of the Lebanon have long been persuaded that the Druses in their secret assemblies are guilty of the most nefarious practices. For this allegation, so frequently repeated by Euro- pean writers, there seems to be little evidence; and it is certain that the sacred books of the religion contain moral teaching of a high order on the whole.

As a formulated creed, the Druse system is not a thousand years old. In the year a.d. 996 (386 a.h.) Hakim Biamrillahi (i.e. he who judges by the command of God), sixth of the Fatimite caliphs (third in Egypt), began to reign; and during the next twenty-five years he indulged in a tyranny at once so terrible and so fantastic that little doubt can be entertained of his insanity. He believed that he held direct intercourse with the deity, or even that he was an incarnation of the divine intelli- gence; and in a.d. 1016 (407 a.h.) his claims were made known in the mosque at Cairo, and supported by the testimony of Ismael Darazi. The people showed such bitter hostility to the new gospel that Darazi was compelled to seek safety in flight; but even in absence he was faithful to his god, and succeeded in winning over certain ignorant inhabitants of Lebanon. Accord- ing to the Druses, this great conversion took place in a.d. 1019 (410 a.h.). Meanwhile the endeavours of the caliph to get his divinity acknowledged by the people of Cairo continued. The advocacy of Hasan ibn Haidara Fergani was without avail; but in 1017 (408 a.h.) the new religion found a more successful apostle in the person of Hamza ibn Ali ibn Ahmed, a Persian mystic, felt-maker by trade, who became Hakim's vizier, gave form and substance to his creed, and by an ingenious adaptation of its various dogmas to the prejudices of existing sects, finally enlisted an extensive body of adherents. In 1020 (411 a.h.) the caliph was assassinated by contrivance of his sister Sitt ul-Mulk; but it was given out by Hamza

that he had only' withdrawn for a season, and his followers were encouraged to look forward with confidence to his triumphant return. Darazi, who had acted independently in his apostolate, was branded

by Hamza as a heretic, and thus, by a curious anomaly, he is actually held in detestation by the very sect which perhaps bears his name. The propagation of the faith in accordance with Hamza's initiation was undertaken by Ismael ibn Mahom- med Tamimi, Mahommed ibn Wahab, Abul-Khair Selama ibn Abd al-Wahal ibn Samurri, and Moktana Baha ud-Din, the last of whom became known by his writings from Constantinople to the borders of India. In two letters addressed to the em- perors Constantine VIII. and Michael the Paphlagonian he endeavoured to prove that the Christian Messiah reappeared in the person of Hamza.

It is possible, even probable, that the segregation of the Druses as a people dates only from the adoption of Hamza's creed. But when it is recalled that other inhabitants of the same mountain system, e.g. the Maronites, the Ansarieh, the Metawali and the " Isma'ilites," also profess creeds which, like the Druse system, differ from Sunni Islam in the important feature of admitting incarnations of the Deity, it is impossible not to suspect that Hamza's emissaries only gave definition and form to beliefs long established in this part of the world. Many of the fundamental ideas of Druse theology belong to a common West Asiatic stock; but the peculiar history of the Mountain is no doubt responsible for beliefs, held elsewhere by different peoples, being combined there in a single creed. Some allowance, too, must be made for the probability that Hamza's system owed something to doctrines Christian and other, with which the metro- politan position of Cairo brought Fatimite society into contact.

History There is good reasonto regard the Druses as, racially,

a mixture of refugee stocks, in which the Arab largely predomi- nates, grafted on to an original mountain population of Aramaic blood and Incarnationist tendencies. The latter is represented more purely by the Maronites (q.v.). The native tradition regards an immigration of Hira Arabs into S. Lebanon, under Khalid ibn Walid in the 9th century, as the beginning of Druse distinctiveness and power; but it also accepts Turkoman and Kurdish elements in the

original Druse state. About the same time, or a little later (in the reign of Saladin), it believes that Hermon was colonized by a population of 15,000 Hira and Yemenite Arabs, who had sojourned awhile in Hauran. The name Druse is met with first in Benjamin of Tudela (c. a.d. i 170), and its origin has been much disputed. Some authorities see in it a descriptive epithet, derived from Arabic darasa (those who read the Book), or darisa (those in possession of Truth) or durs (the clever or initiated); but more connect it with the name of the first missionary, Ismael Darazi.

As soon as we begin to know anything of the Druses they were living in a feudal state of society, as village communities under sheikhs, themselves generally subordinate to one or more amirs. In the time of the first crusades the main power was in the hands of the Arslan family, which, however, suffered so severely in wars with the Franks, that it was superseded by the Tnuhs, who, holding Beirut and nearly all the Phoenician coast, came into conflict with the sultans of Egypt. One of these latter, Malik Ashraf, about a.d. 1300, forced outward compliance with Sunni Islam on the Mountain, after defeating the Druses at Ain Sofar. Meanwhile, however, the Maan family, lately immigrant from N. Arabia, was growing in power, and throwing in its lot with the Osmanli invaders in the reign of Selim I., it was promoted to the supreme amirate about 1517. Fakr ud-Din Maan II. increased Druse dominion until it included all the N. Syrian region from the edge of the Antioch plain to Acre, with part of the eastern desert, dominated by his castle at Tadmor (Palmyra), and the important towns of Latakia, Tripoli, Beirut and Saida; and forming further ambitious designs, he intrigued with Christians and broke with the Turks. In 1614 the pasha of Damascus moved against him with a large force, and compelled him to fly from Syria. He sought the courts of Tuscany and Naples and tried to enlist Frank sympathies, inventing (probably) the curious myth, so often credited since, that the Druses are of crusading origin and owe their name to the counts of Dreux. 1

1 Sophisticated Druses still sometimes claim connexion with Rosicrucians, and a special relation to Scottish freemasons.

He landed again at Saida in 1619 and recovered his old position. But in 1633 Kuchuk Ahmed Pasha was sent against him with a large army, and succeeded in capturing him with his sons. The family was sent to Constantinople, and two years later strangled. The dynasty struggled on till the end of the century, amid civil war, in which the parties seem to have been divided by the earlier Arab factions of Kaisites (Qaisites) and Yemenites, the Maan belonging to the latter.

The Shehab family, originally Hira Arabs, which had governed Hauran under the early caliphs of Damascus, and thereafter held power in Hermon, intermarried with the Maan; and in the latter's day of weakness sided with the Kaisi faction and obtained the supreme amirate of the Mountain. But it appears never to have professed the Druse creed, remaining Sunnite. Haidar Shehab, third of the line, inflicted a notable defeat on the pasha of Saida (capital of an Ottoman eyalet since 1688) and the Yemenite Druses at Ain Dara, near Zahleh, in 17 11, and proceeded to consolidate Shehab power, breaking up the old feudal society and substituting for the sheikhs mukatajis (tax-contractors), who had penal jurisdiction. The Yemenite Druses thereupon emigrated in large numbers to the Hauran, and laid the founda- tion of Druse power there. The Turks recognized the status quo, and made terms with the Shehab amir in 1748; but his power was none too well secured against the opposition of the Kurdish Jumblat family, even though he was supported by the Talhuk, Abd al-Malik and Yezbeki families; and it appears that some members of the Shehab joined the Maronite faith in the middle of the 18th century, causing a suspicion of secret apostasy to fall on all the family.

It is said that the amir Beshir, who succeeded about 1786, was himself a crypto-Christian. This remarkable man, who ruled the Mountain for fifty-four years, maintained his power by taking the side of one rebel pasha after another, betraying each in turn, and cultivating relations with European admirals. His earliest ally was Ahmed " Jezzar," who established himself in Acre in contumacious independence late in the 18th century. Beshir supported Jezzar against Napoleon in 1799 and earned the friendship of Sir Sidney Smith. Falling out with Jezzar, Beshir fled to Cairo 'in 1805, attached himself to Mehemet Ali, and returned to take up the reins. Once more chased out by the Turks, he was again in the Mountain in 1 823 , allied with Abdallah, on whom Jezzar's mantle had ultimately fallen at Acre, and maintaining friendly relations with the " English Princess," Lady Hester Stanhope. He now finally worsted the Jumblat. The invasion of Syria by Mehemet Ali in 183 1 caused Beshir to desert Abdallah and throw in his lot with Ibrahim Pasha; but he was not cordially followed by the Druses in general, and had good excuse for revolt in 1839, and intrigue with the British admiral in 1840. Ibrahim, however, by his possession of Druse hostages, restrained the amir, and after the bombardment of Acre, the Turks called him to account for his record of rebellion and treachery. He fled to Malta on a British ship, but was induced to go to Constantinople, where he died in 1851.

His successor, Beshir al-Kassim, openly joined the Maronites, and instigating these against the malcontents of his own people, brought enmities, which had been growing for a century, to a head, and initiated a devastating internecine warfare which was to continue for twenty years. The state of the Lebanon went from bad to worse, and at last, in January 1842, the Turkish government appointed Omar Pasha as administrator of the Druses and Maronites, with a council of four chiefs from each party; but the pasha, attempting to effect a disarming, was besieged in November in the castle of Beit ed-Din by the Druses under Shibli el-Arrian. At the instigation of the European powers he was recalled in December, and the Druses and Maro- nites were placed under separate kaimakams (governors), who, it was stipulated, were not to be of the family of Shehab. Dis- turbances again broke out in 1845, the native mukatajis refusing to obey the kaimakams. The Maronites flew to arms, but with the assistance of the Turks their opponents carried the day. A superficial pacification effected by Shekib Effendi, the Ottoman commissioner, lasted only till his departure; and the Porte

was obliged to despatch a force of 12,000 men to the Lebanon. Forty of the chiefs were seized, the people was nominally dis- armed, and in 1846 a new constitution was inaugurated, by which the kaimakam was to be assisted by two Druses, two Maronites, four Greeks, two Turks and one Metawali. All, however, was in vain: the conflict was continued through 1858, 1859 and i860; and the disturbance culminated in the famous Damascus massacre (see Syria). The European powers now determined to interfere; and, by a protocol of the 3rd of May i860, it was decided that the Lebanon should be occupied by a force of 20,000 men, of whom half were to be French. A body of troops was accordingly landed on the 16th of August under General Beaufort d'Hautpoul; and Fuad Pasha, who had been appointed Turkish commissioner with full powers, proceeded to bring the leaders of the massacres to justice. The French occupation continued till the 5th of June 1861, and the French and English squadrons cruised on the coast for several months after. In accordance with the recommendation of the European powers the Porte determined to appoint a Christian governor not belonging

The privileged province of Lebanon (q.v.) was finally con- stituted by the Organic Statute of the 6th of September 1864, and the subsequent history of the Lebanon Druses is one of gradual

withdrawal from the jurisdiction of that state, in which they see their ancient independence irretrievably compromised, and their religion subordinated to Christian supremacy. Many now emigrate, when occasion offers, to America.

Meanwhile, the Hauran, the old seat of the Shehab family and Hermon Druses, had been steadily receiving a Druse influx, since the day of Ain Dara (see above). Towards the close of the 18th century some 600 families left Lebanon for the Hauran, in discontent with the rule of the Shehab dynasty, and their place and property were taken by 1500 families driven out of Jebel Ansarieh by To pal Ah in 181 1. The Hauran Druses increased by the middle of the 19th century to 7000 souls. They had successfully resisted Ibrahim, the Egyptian, in 1839 in the Lija, and asserted complete independence of the Turks, living under a theocratic government directed by the chief Akil in Suweda. A great effort, made by Kibrisli Pasha in 1852 to subdue the Hauran, came to nothing. In 1879 the population numbered 20,000, and by a murderous raid attracted the atten- tion of Midhat Pasha, then vali of the province of Syria. After experiencing one disaster he defeated their forces and imposed a kaimakam, at first drawn from the Talhuks, but subsequently chosen from the Atrash family of Kunawat. But the Druses still refused to pay taxes, to serve in the Ottoman army, or to recognize the kaimakam, and maintained their contumacy under the lead of the Jumblat, till 1896; when, as the result of a military expedition under Tahir Pasha and a great defeat at Ijun, a compromise was arrived at, under which the Druses agreed to pay taxes, but to serve in their own territory only as a frontier guard. The government was put into the hands of a mutessarif resident at Sheikh Saad, under whom are kaimakams at Suweda and Salkhad. Since that epoch there has been comparative peace between the Druses and the government, largely because the latter, having learned wisdom, leaves the people very much to itself, maintaining only a small garrison of regular troops, and enlisting Druse police for service in Jebel Druz itself. The Druses are allowed to carry on their feuds with the Bedouins of the E. Desert as they will, so long as they do not disturb western districts. With the recent opening out of the W. Hauran by railway, the Druse sheikhs are beginning to acquire commercial ambitions, and to desire peace.

The Hauran Druses are a vigorous, independent folk, with a well-deserved reputation for courage, very astute, and hospitable

to Europeans, especially the British, with whom they have ah old tradition of friendship. But, like most persecuted but semi-independent peoples, they are both cruel, and, by our standards,

treacherous. They are a handsome race, the women being often beautiful. The latter no longer carry the head-horn which used to support the veil dropped over the face out of doors. But their dress is still black with the exception of red slippers, and the veil is never abandoned, not even, it is said, during sleep. An English lady, who has been much among them, states that the Druse women of the Hauran never unve/led before her. The men wear a tarbush with white roll, a black under-robe with white girdle, a short loose jacket, and when necessary an aba or parti-coloured cloak over all. They go habitually armed with scimitar and half-moon axe, besides gun or rifle.

Polygamy is forbidden. Marriage retains certain traces of the original system of capture; but Druse women enjoy much consideration, and are comparatively well educated, dignified and free in their bearing in spite of their close veiling. As has been stated above, they join the men in religious functions. Divorce is easy and can be initiated by the woman; but re- marriage of the pair can only be effected by the good offices of a proxy (as in Moslem societies, after a third divorce). Burial takes place in family mausoleums, walled up after each interment ; but Akils are buried in their own houses. The body is laid on its side, with its face to the south (Mecca).

Education is widely spread, and there is a considerable religious literature, much of which is known in Europe. A copy of the Book of the Testimonies to the Mysteries of the Unity, consisting of seventy treatises in four folio volumes, was found in the house of the chief Akil at Bakhlin, and presented in 1700 to Louis XIV. by Nusralla ibn Gilda, a Syrian doctor. Other manuscripts are to be found at Rome in the Vatican, at Oxford in the Bodleian, at Vienna, at Leiden, at Upsala and at Munich; and Dr J. L. Porter got possession of seven standard works of Druse theology while at Damascus. The Munich collection was presented to the king of Bavaria by Clot Bey, the chief physician in the Egyptian army during its occupation of Syria; and for a number of the other manuscripts we are indebted to the elder Niebuhr. A history of the Druse nation by the amir Haidar Shehab is quoted by Urquhart.

Bibliography. — Adler, ” Druze Catechism,” in Museum Cuficum Borgia,num (1782) ; Silvestre de Sacy, Expose de la religion des Druses (1838) ; Ph. Wolff, Reisein das gelobte Land, and Die Drusen und ihre Vorlaufer (1842) ; C. H. Churchill, Ten Years’ Residence in Mount Lebanon (3 vols., 1853) i G. W. Chasseaud, The Druzes of the Lebanon (1855); E. G. Ray, Voyage dans le Haouran, execute

pendant les annees 1857 et 1858; C. H. Churchill, The Druzes and Maronites under the Turkish Rule from 1840 to i860 (London, 1862) ; H. Guys, Le ThSogonie des Druses (1863), and La Nation Druse (1864); M. von Oppenheim, Vom Mittelmeer, &c. (1899); Gertrude L.Bell, The Desert and the Sown (1907). (D. G. H.; G. Be.)

DRUSIUS (or van den Driesche), JOHANNES (1550-1616), Protestant divine, distinguished specially as an Orientalist and exegete, was born at Oudenarde, in Flanders, on the 28th of June 1550. Being designed for the church, he studied Greek and Latin at Ghent, and philosophy at Louvain; but his father having been outlawed for his religion, and deprived of his estate, retired to England, where the son followed him in 1567. He found an admirable teacher of Hebrew in Chevalier, the cele- brated Orientalist, with whom he resided for some time at Cambridge. In 1572 he became professor of Oriental languages at Oxford. Upon the pacification of Ghent (1576) he returned with his father to their own country, and was appointed professor of Oriental languages at Leiden in the following year. In 1585 he removed to Friesland, and was admitted professor of Hebrew in the university of Franeker, an office which he discharged with great honour till his death, which happened in February 1616. He acquired so extended a reputation as a professor that his class was frequented by students from all the Protestant countries in Europe. His works prove him to have been well skilled in Hebrew and in Jewish antiquities; and in 1600 the states-general employed him, at a salary of 400 florins a year, to write notes on the most difficult passages in the Old Testament; but this work was not published until after his death. As the friend of

Arminius, he was charged by the orthodox and dominant party with unfairness in the execution of the task, and the last sixteen years of his life were therefore somewhat embittered by contro- versy. He carried on an extensive correspondence with the learned in different countries; for, besides letters in Hebrew, Greek and other languages, there were found amongst his papers upwards of 2000 written in Latin. He had a son, John, who died in England at the age of twenty-one, and was accounted a prodigy of learning. He had mastered Hebrew at the age of nine, and Scaliger said that he was a better Hebrew scholar than his father. He wrote a large number of letters in Hebrew, besides notes on the Proverbs of Solomon and other works.

Paquot states the number of the printed works and treatises of the elder Drusius at forty-eight, and of the unprinted at upwards of twenty. Of the former more than two-thirds were inserted in the collection entitled Crilici sacri, she annolata doctissimorum virorum in Vetus et Novum Testamentum (Amsterdam, 1698, in 9 vols, folio, or London, 1660, in 10 vols, folio). Amongst the works of Drusius not to be found in this collection may be mentioned — (1) Alphabetum Hebraicum vetus (1584, 4to) ; (2) Tabulae in grammaticam Chaldaicam ad usum juventutis (1602, 8vo) ; (3) An edition of Sulpicius Severus (Franeker, 1807, l2mo); (4) Opuscula quae ad grammaticam spectant omnia (1609, 4to) ; (5) Lacrymae in obitum J. Scaligeri (1609, 4to) ; and (6) Grammatica linguae sanctae nova (1612, 4to).

DRUSUS, MARCUS LIVIUS, Roman statesman, was colleague of Gaius Gracchus in the tribuneship, 122 B.C. The proposal of Gracchus (q.v.) to confer the full franchise on the Latins had been opposed not only by the senate, but also by the mob, who imagined that their own privileges would thereby be diminished. Drusus threatened to veto the proposal. Encouraged by this, the senatorial party put up Drusus to outbid Gracchus. Gracchus had proposed to found colonies outside Italy; Drusus provided twelve in Italy, to each of which 3000 citizens were to be sent. Gracchus had proposed to distribute allotments to the poorer citizens subject to a state rent-charge; Drusus promised them free of all charge, and further that they should be inalienable. In addition to the franchise, immunity from corporal punishment (even in the field) was promised the Latins. The absence of Gracchus, and the inefficiency of his representative at Rome, led to the acceptance of these proposals, which were never intended to be carried. Drusus himself declined all responsi- bility in connexion with carrying them out. He was rewarded for his services by the consulship (112), and the title of pair onus senatus. He received Macedonia for his province, where he distinguished himself in a campaign against the Scordisci, whom he drove across the Danube, being the first Roman general who reached that river. It is possible that he is the Drusus mentioned by Plutarch as having died in 109, the year of his censorship.

Appian, Bell. Civ. i. 23; Plutarch, Gaius Gracchus, 8-1 1; Florus iii. 4; A. H. J. Greenidge, Hist, of Rome, vol. i. (1904).

His son, Marcus Livius Drusus, became tribune of the people in 91 B.C. He was a thoroughgoing conservative, wealthy and generous, and a man of high integrity. With some of the more intelligent members of his party (such as Marcus Scaurus and L. Licinius

Crassus the orator) he recognized the need of reform. At that time an agitation was going on for the transfer of the judicial functions from the equites to the senate; Drusus proposed as a compromise a measure which restored to the senate the office of judices, while its numbers were doubled by the admission of 300 equites. Further, a special commission was to be appointed to try and sentence all judices guilty of taking bribes. But the senate was lukewarm, and the equites, whose occupation was threatened, offered the most violent opposition. In order, therefore, to catch the popular votes, Drusus proposed the establishment of colonies in Italy and Sicily, and an increased distribution of corn at a reduced rate. By help of these riders the bill was carried. Drusus now sought a closer alliance with the Italians, promising them the long- coveted boon of the Roman franchise. The senate broke out into open opposition. His laws were abrogated as informal, and each party armed its adherents for the civil struggle which was now inevitable. Drusus was stabbed one evening as he was returning home. His assassin was never discovered.

See Rome: History, ii. " The Republic " (Period C) ; also Appian, Bell. Civ. i. 35; Florus iii. 17; Diod. Sic. xxxvii. 10; Livy, Epit. 70; Veil. Pat. ii. 13.

DRUSUS, NERO 1 CLAUDIUS (38-9 B.C.) Roman general, son of Tiberius Claudius Nero and Livia Drusilla, stepson of Augustus and younger brother of the emperor Tiberius. Having held the office of quaestor and acted as praetor for his brother during the latter's absence in Gaul, he began (in 15 B.C.) the military career which has made his name famous. In conjunction with Tiberius, he carried on a successful campaign against the Raeti and Vindelici, who, although repulsed from Italy, continued to threaten the frontiers of Gaul. The credit of the decisive victory, however, must be assigned to Tiberius. Two of the Odes of Horace (iv. 4 and 14) were written to glorify the exploits of the brothers. In 13 Drusus was sent as governor to the newly organized province of the three Gauls, where considerable discontent had been aroused by the exactions of the Roman governor Licinius. Drusus made a fresh assessment for taxation purposes, and summoned the Gallic representatives to a meeting at Lugdunum to discuss their grievances. It was of great importance to pacify the Gauls, in order to have his hands free to deal with the German tribes, one of which, the Sugambri, on the right bank of the Rhine, had seized the opportunity, during the absence of Augustus, to cross the river (12). Drusus drove them back and pursued them through the island of the Batavi and the land of the Usipetes (Usipes, Usipii) to their own territory, which he devastated. Sailing down the Rhine, he

subdued the Frisii and, in order to facilitate operations against the Chauci, dug a canal (Fossa Drusiana) leading from the Rhenus (Rhine) to the Isala (Yssel) 2 into the lacus Fie vus (Zuider- see) and the German Ocean. Making his way along the Frisian coast, he conquered the island of Burchanis (Borkum), defeated the Bructeri in a naval engagement on the Amisia (Ems), and went on to the mouth of the Visurgis (Weser) to attack the Chauci. On the way back his vessels grounded on the shallows, and were only got off with the assistance of the Frisii. Winter being close at hand, the campaign was abandoned till the following spring, and Drusus returned to Rome with the honour of having been the first Roman general to reach the German Ocean.

In his second campaign (n), Drusus defeated the Usipetes, threw a bridge over the Luppia (Lippe), attacked the Sugambri, and advanced through their territory and that of the Tencteri and Chatti as far as the Weser, where he gained a victory over the Cherusci. Lack of provisions, the approach of winter, and an inauspicious portent prevented him from crossing the Weser. While making his way back to the Rhine he fell into an ambus- cade, but the carelessness of the enemy enabled him to inflict a crushing defeat upon them. In view of future operations, he built two castles, one at the junction of the Luppia and Aliso (Alme), the other in the territory of the Chatti on the Taunus, near Moguntiacum (Mainz).

The third campaign (10) was of little importance. The Chatti had joined the Sugambri in revolt; and, after some insignificant successes, Drusus returned with Augustus and Tiberius to Rome, and was elected consul for the following year. In spite of unfavourable portents at Rome, he determined to enter upon his fourth and last campaign (9) without delay. He attacked and defeated the Chatti, Suebi, Marcomanni and Cherusci, crossed the Weserand penetrated as faras the Albis (Elbe). Here trophies were set up to mark the farthest point ever reached by a Roman army. Various measures were taken to secure the possession of the conquered territory: fortresses were erected along the Elbe Weser and Maas (Meuse, Mosa) ; a flotilla was placed upon the Rhine and a dam built upon the right arm of its estuary to in- crease the flow of water into the canal mentioned above. Drusus was said to have been deterred from crossing the Elbe by the sudden appearance of a woman of supernatural size, who pre- dicted his approaching end. On his return, probably between the Elbe and the Saale (Sala), his horse stumbled and threw him. His leg was fractured and he died thirty days after the accident,*

1 Originally Decimus. 2 The district extending from Westervoort to Doesborgh.

on the 1 4th of September. Suetonius mentions an absurd rumour that he had been poisoned by order of Augustus, because he had refused to obey the order for his recall. The body was carried to the winter quarters of the army, whence it was escorted by Tiberius to Rome, the procession being joined by Augustus at Ticinum (Pavia) . Tiberius delivered an oration over the remains in the Forum, whence they were conveyed to the Campus Martius and cremated, and ashes being deposited in the mauso- leum of Augustus.

Drusus was one of the most distinguished men of his time. His agreeable manners, handsome person and brilliant military talents gained him the affection of the troops, while his sympathy with republican principles, endeared him to the people. It is not too much to say that, had he and his son lived long enough, they might have brought about the abolition of the monarchy. Although the successes of Drusus, resulting in the subjection of the German tribes from the Rhine to the Elbe, were too rapid to be lasting, they brought home the fact of the existence of the Romans to many who had never heard their name. For his victories he received the title of Germanicus. He married Antonia, the daughter of Marcus Antonius the triumvir, by whom he had three children: Germanicus, adopted by Tiberius; Claudius, afterwards emperor; and a daughter Livilla.

The chief ancient authorities for the life of Drusus are Dio Cassius, the epitomes of Livy, Suetonius (Claudius), Tacitus (portions of the Annals), Florus (whose chief source is Livy), Velleius Paterculus, and the Consolatio ad Liviam. The German campaigns were described in the last books of Livy and the lost Bella Germaniae of the elder Pliny. As would naturally be expected, they have produced an extensive literature in Germany, J. Asbach's " Die Feldziige des Nero Claudius Drusus " (Rhein. Jahrb. lxxxv. 14-30) being especi- ally recommended; see also Mommsen's History of the Roman Provinces, i. ; Merivale, History of the Romans under the Empire, ch. 36; A. Stein in Pauly-Wissowa's Realencyclopadie (1899), where other authorities are given; J. C. Tarver, Tiberius the Tyrant

(1902).

DRUSUS CAESAR (c. 15 b.c.-a.d. 23), commonly called Drusus junior, to distinguish him from his uncle Nero Claudius Drusus, was the only son of the emperor Tiberius by his first wife Vipsania Agrippina. After having held several curule offices, he was consul elect in a.d. 14, the year of Augustus's death. His father, on his accession to the throne, immediately sent him to put down a mutiny of the troops in Pannonia, a task which he successfully accomplished (Tacitus, Annals, i. 24-30). As governor of Illyri- cum (17), he set the Germanic tribes against one another, and encouraged Catualda, chief of the Gothones, to drive out Marbod (Maroboduus) , king of the Marcomanni. On his return Drusus was consul a second time (21) and in the following year received the tribunician authority from Tiberius, which practically indi- cated him as heir to the throne. Sejanus, who also aspired to the supreme power, determined to remove Drusus. He endeavoured to poison Tiberius's mind against him, seduced Drusus's wife and persuaded her to assist him in murdering her husband. Her physician Eudemus prepared and the eunuch Lygdus administered a slow poison, from the effects of which Drusus died after a lingering illness. Although Tiberius is said to have received the news of his death with indifference, there is no reason to suppose that he had any hand in it; indeed, he seems to have entertained a genuine affection for his son. Drusus svas a man of violent passions, a drunkard and a debauchee, but not entirely devoid of better feelings, as is shown by his undoubtedly sincere grief at the death of Germanicus. The cunning and reserve which he exhibited on occasion were prob- ably due to the instructions or influence of Tiberius (Annals, iii. 8), since he was himself naturally frank and open, and for this reason, notwithstanding his vices, more popular than his father. He revelled in bloody gladiatorial displays, and the sharpest swords used on such occasions were called " Drusine."

See Tacitus, Annals, i. 76, iv. 8-n; Dio Cassius lvii. 13, 14; Suetonius, Tiberius, 62; J. C. Tarver, Tiberius the Tyrant (1902).

DRYADES, or Hamadryades, in Greek mythology, nymphs of trees and woods. Each particular tree (5pDs) was the home of its own special Dryad, who was supposed to be born and to die with it (&/ m).

DRYANDER, JONAS (1748-1810), Swedish botanist, was born in 1748. By his uncle, Dr Lars Montin, to whom his education was entrusted, he was sent to the university of Gothenburg, whence he removed to Lund. After taking his degree there in 1776, he studied at Upsala under Linnaeus, and then became for a time tutor to a young

Swedish nobleman. He next visited England, and, on the death of his friend Dr Daniel Charles Solander (1736-1782), succeeded him as librarian to Sir Joseph Banks. He was librarian to the Royal Society and also to the Linnean Society. Of the latter, in 1788, he was one of the founders, and, when it was incorporated by royal charter in 1802, he took a leading part in drawing up its laws and regulations. He was vice-president of the society till his death, which took place in London on the 19th of October 1810. Besides papers in the Transactions of the Linnean and other societies, Dryander published Dissertatio gradualis fungos regno vegetabili vindicans (Lund, 1776), and Calalogus bibliothecae historico-naturalis Josephi Banks, Bart. (London, 1 796-1 800, 5 vols.). He also edited the first and part of the second edition of W. Aiton's Hortus Kewensis and W. Roxburgh's Plants of the Coast of Coromandel.

DRYBURGH ABBEY, a monastic ruin in the extreme south- west of Berwickshire, Scotland, about 5 m. S.E. of Melrose, and ii m. E. of St Boswells station on the North British railway's Waverley route from Edinburgh to Carlisle. The name has been derived from the Gaelic darach bruach, " oak bank, " in allusion to the fact that the Druids once practised their rites here. The abbey occupies the spot where, about 522, St Modan, an Irish Culdee, established a sanctuary — a secluded position on a tongue of land washed on three sides by the Tweed. Founded in 1150 by David I. — though it has also been ascribed to Hugh de Morville (d. 1162), lord of Lauderdale and constable of Scotland — it enjoyed great prosperity until 1322, when it was partially destroyed by the English under Edward II. It suffered again at the hands of Richard II. in 1385, and was reduced to ruin during the expedition of the earl of Hertford in 1545. After the Refor- mation the estate was erected into a temporal lordship and given (.1604) by James VI. to John Erskine, 2nd earl of Mar. At a later date it was sold, but reverted to a branch of the Erskines in 1 786, when it was acquired by the nth earl of Buchan. In 1 700 the abbey lands belonged to Thomas Haliburton, Scott's great-grandfather, and, but for an extravagant grand-uncle who became bankrupt and had to part with the property, they would have descended to Sir Walter by inheritance. " We have nothing left of Dryburgh," he said, ".but the right of stretching our bones there." The style in general is Early English, but the west door and the restored entrance from the nave to the cloisters are fine examples of transitional Norman. Though in various stages of decay, nearly every one of the monastic buildings is represented by a fragment. Of the cruciform church — 190 ft. long by 75 broad at the transepts — there remain some of the outer walls, a segment of the choir, the east

aisle of the north transept, the stumps of some of the pillars of the nave, the west gable, the south transept and its adjacent chapel of St Modan. The most beautiful of these relics is St Mary's aisle of the north transept, in which were buried Sir Walter Scott (1832), his wife, son, his son-in-law John Gibson Lockhart, and his ancestors, the Hali- burtons of New Mains. Sir Walter's tomb is a plain block of polished Peterhead granite, inscribed only with his name and the dates of his birth and death. The next aisle is the burial-place of; the Erskines of Shielhill and the Haigs of Bemersyde. On the south side of the church, at a lower level, stand the cloisters, about 100 ft. square, bounded on the west by the dungeons, on the south-west by the cellars and refectory, in the west wall of which is an exquisite ivy-clad rose window, and on the east by the chapter-house, on a still lower level. The chapter-house, a lofty building with vaulted roof, is the most complete structure of the group, and adjoining it on the south are, first the abbot's parlour and then the library, the three apartments communicat- ing with each other, and constituting the oldest portion of the abbey. In the grounds are many venerable trees, a yew near the chapter- house being at least coeval with the abbey.

DRYDEN

609

DRYDEN, JOHN (1631-1700), English poet, born on or about the 9th of August 163 1, at Aldwinkle, in Northamptonshire, was of Cumberland stock, though his family had been settled for three generations in Northamptonshire, had acquired estates and a baronetcy, and intermarried with landed families in that county. His great-grandfather, who first carried the name south , and acquired by marriage the estate of Canons Ashby, is said to have known Erasmus, and to have been so proud of the great scholar's friendship that he gave the name of Erasmus to his eldest son. The name Erasmus was borne by the poet's father, the third son of Sir Erasmus Dryden. The leanings and con- nexions of the family were Puritan and anti-monarchical. Sir Erasmus Dryden went to prison rather than pay loan money to Charles I.; the poet's uncle, Sir John Dryden, and his father Erasmus, served on government commissions during the Com- monwealth. His mother's family, the Pickerings, were still more prominent on the Puritan side. Sir Gilbert Pickering, his cousin, was chamberlain to the Protector, and was summoned to Crom- well's House of Lords in 1657. A trustworthy tradition asserts that John Dryden was born at the rectory of Aldwinkle All Saints, of which his maternal grandfather, Henry Pickering, was rector.

Dryden's education was such as became a scion of these respectable families of squires and rectors, among whom the chance contact with Erasmus had left a certain tradition of scholarship. His father, whose own fortune, added to his wife's, was not large, procured for the poet, who was the eldest of fourteen children, admission to Westminster school as a king's scholar, under the famous Dr Busby. Some elegiac verses which Dryden wrote there on the death of a schoolfellow, Henry, Lord Hastings, son of the earl of Huntingdon, in 1649, were published in Lacrymae Musarum, among other elegies by " divers persons of nobility and worth " in commemoration of the same event. He appeared soon after again in print, among writers of com- mendatory verses to a friend of his, John Hoddesdon, who published a volume of Epigrams in 1650. Dryden's contribution is signed " John Dryden of Trinity C," as he had gone up from Westminster to Cambridge in May 1650. He was elected a scholar of Trinity on the Westminster foundation in October of the same year, and took his degree of B.A. in 1654. The only recorded incident of his college residence is some unexplained act of disobedience to the vice-master, for which he was " put out of commons " and " gated " for a fortnight. His father died in 1654, leaving him master of two-thirds of a small estate near Blakesley, worth about £60 a year. The next three years he is said to have spent at Cambridge. In any case they were spent somewhere in study; for his first considerable poem bears indisputable marks of scholarly habits, as well as of a command of verse that could not have been acquired without practice.

The middle of 1657 is given as the date of his leaving the university to take up his residence in London. In one of his many subsequent literary quarrels, it was said by Shadwell that he had been clerk to Sir Gilbert Pickering, his cousin, who was chamberlain to Cromwell; and nothing is more likely than that he obtained some employment under his powerful cousin when he came to London. He is said to have lived at first in the house of his first publisher, Herringman, with whom he was connected till 1679, when Jacob Tonson began to publish his books. He first emerged from obscurity with his Heroic Stanzas (1659) to the memory of the Protector. That these stanzas should have made him a name as a poet does not appear surprising when we compare them with Waller's verses on the same occasion. Dryden took some time to consider them, and it was impossible that they should not give an impression of his intellectual strength. Donne was his model; it is obvious that both his ear and his imagination were saturated with Donne's elegiac strains when he wrote; yet when we look beneath the surface we find unmistakable traces that the

pupil was not without decided theories that ran counter to the practice of the master. It is plainly not by accident that each stanza contains one clear-cut brilliant point. The poem is an academic exercise, and it seems to be animated by an under-current of strong contumacious protest against the

irregularities tolerated by the authorities. Dryden had studied the ancient classics for himself, and their method of uniformity and elaborate finish commended itself to his robust and orderly mind. In itself the poem is a magnificent tribute to the memory of Cromwell.

To those who regard the poet as a seer with a sacred mission, and refuse the name altogether to a literary manufacturer to order, it comes with a certain shock to find Dryden, the hereditary Puritan, the panegyrist of Cromwell, hailing the return of King Charles in Astraea Redux (1660), deploring his long absence, and proclaiming the despair with which he had seen " the rebel thrive, the loyal crost." A Panegyric on the Coronation followed in 1 66 1. From a literary point of view also, Astraea Redux is inferior to the Heroic Stanzas.

Dryden was compelled to supplement his slender income by his writings. He naturally first thought of tragedy, — his own genius, as he has informed us, inclining him rather to that species of composition; and in the first year of the Restoration he wrote a tragedy on the fate of Henry, duke of Guise. But some friends advised him that its construction was not. suited to the requirements of the stage, so he put it aside, and used only one scene of the original play later on, when he again attempted the subject with a more practised hand. Having failed to write a suitable tragedy, he next turned his attention to comedy, although, as he admitted, he had little natural turn for it. " I confess," he said, in a short essay in his own defence, printed before The Indian Emperor, " my chief endeavours are to delight the age in which I live. If the humour of this be for low comedy, small accidents and raillery, I will force my genius to obey it, though with more reputation I could write in verse. I know I am not so fitted by nature to write comedy; I want that gaiety of humour which is required to it. My conversation is slow and, dull; my humour saturnine and reserved; in short, I am none of those who endeavour to break jests in company or make repartees. So that those who decry my comedies do me no injury, except it be in point of profit; reputation in them is the last thing to which I shall pretend." He was really as well as ostentatiously a playwright; the

age demanded comedies, and he endeavoured to supply the kind of comedy that the age demanded. His first attempt was unsuccessful. Bustle, intrigue and coarsely humorous dialogue seemed to him to be part of the popular demand; and, looking about for a plot, he found some- thing to suit him in a Spanish source, and wrote The Wild Gallant. The play was acted in February 1663, by Thomas Killigrew's company in Vere Street. It was not a success, and Pepys showed good judgment in pronouncing the play " so poor a thing as ever I saw in my life." Dryden never learned moderation in his humour; there is a student's clumsiness and extravagance in his indecency; the plays of Etheredge, a man of the world, have not the uncouth riotousness of Dryden's. Of this he seems to have been conscious, for when the play, was revived, in 1667, he complained in the epilogue of the difficulty of comic wit, and admitted the right of a common audience to judge of the wit's success. Dryden, indeed, took a lesson from the failure of The Wild Gallant; his next comedy, The Rival Ladies, also founded on a Spanish plot, produced before the end of 1663, and printed in the next year, was correctly described by Pepys as " a very innocent and most pretty witty play," though there was much in it which the taste of our time would consider indelicate. But he never quite conquered his tendency to extravagance. The Wild Gallant was not the only victim. The Assignation, or Love in a Nunnery, produced in 1673, shared the same fate; and even as late as 1680, when he had had twenty years' experience to guide him, The Kind Keeper, or Mr Limber- ham was prohibited, after three representations, as being too indecent for the stage. Dislike to indecency we are apt to think a somewhat ludicrous pretext to be made by Restoration play- goers, and probably there was some other reason for the sacrifice of Limber ham; still there is a certain savageness in the spirit of Dryden's indecency which we do not find in his most licentious contemporaries. The undisciplined force of the man carried him to an excess from which more dexterous writers held back.

6io

DRYDEN

After the production of The Rival Ladies in 1663, Dryden assisted Sir Robert Howard in the composition of a tragedy in heroic verse, The Indian Queen, produced with great splendour in January 1664. He married Lady Elizabeth Howard, Sir Robert's sister and daughter of the 1st earl of Berkshire, on the 1st of December 1663. Lady Elizabeth's reputation was some- what compromised before this union, which was not a happy one, and there is some evidence for

the scandal in a letter written by her before her marriage to Philip, 2nd earl of Chesterfield. The Indian Queen was a great success, one of the greatest since the reopening of the theatres. This was in all likelihood due much less to the heroic verse and the exclusion of comic scenes from the tragedy than to the magnificent scenic accessories — the battles and sacrifices on the stage, the spirits singing in the air, and the god of dreams ascending through a trap. The novelty of these Indian spectacles, as well as of the Indian characters, with the splendid Queen Zempoalla, acted by Mrs Marshall in a real Indian dress of feathers presented to her by Mrs Aphra Behn, as the centre of the play, was the chief secret of the success of The Indian Queen. . These melodramatic properties were so marked a novelty that they could not fail to draw the town. Dryden was tempted to return to tragedy; he followed up The Indian Queen with The Indian Emperor, or the Conquest of Mexico by the Spaniards, which was acted in 1665, and also proved a success.

But Dryden was not content with writing tragedies in rhymed verse. He took up the question of the propriety of rhyme in serious plays immediately after the success of The Indian Queen, in the preface to an edition (1664) of The Rival Ladies. In that first statement of his case, he considered the chief objection to the use of rhyme, and urged his chief argument in its favour. Rhyme was not natural, some people had said; to which he answers that it is as natural as blank verse, and that much of its unnaturalness is not the fault of the rhyme but of the writer, who has not sufficient command of language to rhyme easily. In favour of rhyme he has to say that it at once stimulates the imagination, and prevents it from being too discursive in its flights.

During the Great Plague, when the theatres were closed, and Dryden was living at Charlton, Wiltshire, at the seat of his father-in-law, the earl of Berkshire, he occupied a considerable part of his time in thinking over the principles of dramatic com- position, and threw his conclusions into the form of a dialogue, which he called an Essay of Dramatick Poesie and published in 1668. The essay takes the form of a dialogue between Neander (Dryden), Eugenius (Charles, Lord Buckhurst, afterwards earl of Dorset), Crites (Sir R. Howard), and Lisideius (Sir C. Sedley), who is made responsible for the famous definition of a play as a " just and lively image of human nature, representing its passions and humours, and the changes of fortune to which it is subject, for the delight and instruction of mankind." Dryden's form is of course borrowed from the ancients, and his main source is ths critical work of Corneille in the prefaces and discourses contained in the edition of 1660, but he was well acquainted with

the whole body of contemporary French and Spanish criticism. Crites maintains the superiority of the classical drama ; Lisideius supports the exacting rules of French dramatic writing; Neander defends the English drama of the preced- ing generations, including, in a long speech, an examination of Ben Jonson's Silent Woman. Neander argues, however, that English drama has much to gain by the observance of exact methods of construction without abandoning entirely the liberty which English writers had always claimed. He then goes on to defend the use of rhyme in serious drama. Howard had argued against the use of rhyme in a " preface " to Four New Plays (1665), which had furnished the excuse for Dryden's essay. Howard replied to Dryden's essay in a preface to The Duke of Lerma (io"68). Dryden at once replied in a masterpiece of sarcastic retort and vigorous reasoning, A Defence of an Essay of Dramatique Poesie, prefixed to the second edition (1668) of The Indian Emperor. It is the ablest and most complete statement of his views about the employment of rhymed couplets in tragedy.

Before his return to town at the end of 1666, when the theatres (which had been closed during the disasters of 1665 and 1666) were reopened, Dryden wrote a poem on the Dutch war and the Great Fire entitled Annus Mirabilis. The poem is in quatrains, the metre of his Heroic Stanzas in praise of Cromwell, which Dryden chose, he tells us, " because he had ever judged it more noble and of greater dignity both for the sound and number than any other verse in use amongst us." The preface to the poem contains an interesting discussion of what he calls "wit- writing," introduced by the remark that " the composition of all poems is or ought to be of wit." His description of the Great Fire is a famous specimen of this wit-writing, much more careless and daring, and much more difficult to sympathize with, than the graver conceits in his panegyric of the Pro- tector. In Annus Mirabilis the poet apostrophizes the newly founded Royal Society, of which he had been elected a member in 1662.

From the reopening of the theatres in 1666 till November 1681, the date of his Absalom and Achitophel, Dryden produced nothing but plays. The stage was his chief source of income. Secret Love, or the Maiden Queen, a tragi-comedy, produced in March 1667, was based on an episode in the Artamene, ou le Grand Cyrus of Mile de Scudery, the historical original of the " Maiden Queen" being Christina, queen of Sweden. The pro- logue claims that the piece is written with pains and thought, by the exactest rules, with strict observance of the unities, and " a mingled chime of Jonson's humour and of Corneille's rhyme"; but it owed its success chiefly to the charm of Nell Gwyn's acting in the part of Florimel. It is noticeable

that only the more passionate parts of the dialogue are rhymed, Dryden's theory apparently being that rhyme is then demanded for the elevation of the style. His next play, Sir Martin Mar-all, or the Feigned Innocence, an adaptation in prose of the duke of Newcastle's translation of Moliere's L'Etourdi, was produced at the Duke's theatre, without the author's name, in 1667. It was about this time that Dryden became a retained writer under contract for the King's theatre, receiving from it £300 or £400 a year, till it was burnt down in 1672, and about £200 for six years more till the beginning of 1678. His co-operation with Davenant in a new version (1667) of Shakespeare's Tempest — for his share in which Dryden can hardly be pardoned on the ground that the chief alterations were happy thoughts of Dave- nant's, seeing that he affirms he never worked at anything with more delight — must also be supposed to be anterior to the completion of his contract with the Theatre Royal. He was engaged to write three plays a year, and he contributed only ten plays during the ten years of his engagement, finally ex- hausting the patience of his partners by joining in the composi- tion of a play for the rival house. In adapting L'Etourdi, Dryden did not catch Moliere's lightness of touch; his alterations go towards making the comedy into a farce. Perhaps all the more on this account Sir Martin Mar-all had a great run at the theatre in Lincoln's Inn Fields. There is always a certain coarseness in Dryden's humour, apart from the coarseness of his age, — a certain forcible roughness of touch which belongs to the character of the man. His An Evening's Love, or the Mock Astrologer, an adaptation from Le Feint Astrologue of the younger Corneille, produced at the King's theatre in 1668, seemed to Pepys " very smutty, and nothing so good as The Maiden Queen or The Indian Emperor of Dryden's making." Evelyn thought it foolish and profane, and was grieved " to see how the stage was degenerated and polluted by the licentious times." Ladies a la Mode, another of Dryden's contract comedies, produced in 1668, was " so mean a thing," Pepys says, that it was only once acted, and Dryden never published it. Of his other comedies, Marriage a la Mode (produced 1672), The Assignation, or Love in a Nunnery (1673), The Kind Keeper, or Mr Limberham (1678), only the first was moderately successful.

While Dryden met with such indifferent success in his willing efforts to supply the demand of the age for low comedy, he struck upon a really popular and profitable vein in heroic tragedy. Tyrannic Love, or the Royal Martyr, a Roman play

dealing with the persecution of the Christians by Maximin, in which St Catherine is introduced, and with her some supernatural machinery, was produced in 1669. It is in rhymed couplets, but the author again did not trust solely for success to them; for, besides the magic incantations, the singing angels, and the view of Paradise, he made Nell Gwyn, who had stabbed herself as Valeria, start to life again as she was being carried off the stage, and speak a riotous epilogue, in violent contrast to the serious character of the play. Almanzor and Almahide, or the Conquest of Granada, a tragedy in two parts, was written in 1669 to 1670. The historical background is taken chiefly from Mile de Scudery's romance of Almahide, but Dryden borrows freely from other books of hers and her contemporaries. This piece seems to have given the crowning touch of provocation to the, wits, who had never ceased to ridicule the popular taste for these extravagant heroic plays. Dryden almost invited burlesque in his epilogue to the second part of The Conquest of Granada, in which he charged the comedy of the Elizabethan age with coarseness and mechanical humour, and its conceptions of love and honour with meanness, and claimed for his own time and his own plays an advance in these respects. The Rehearsal, written by the duke of Buckingham, with the assistance, it was said, of Samuel Butler, Martin Clifford, Thomas Sprat and others, and produced in 1671, was a severe and just punishment for this boast. Davenant was originally the hero, but on his death in 1668 the satire was turned upon Dryden, who is here unmercifully ridiculed under the name of Bayes, the name being justified by his appointment in 1670 as poet laureate and historio- grapher to the king (with a pension of £300 a year and a butt of canary wine). It is said that The Rehearsal was begun in 1663 and ready for representation before the plague. But this probably only means that Buckingham and his friends had resolved to burlesque the absurdities of Davenant's operatic heroes in The Siege of Rhodes, and the extravagant heroics of The Indian Queen. Materials accumulated upon them as the fashion continued, and by the time Dryden had produced his Tyrannic Love, and his Conquest of Granada, he had so established himself as the chief offender as to become naturally the central figure of the burlesque. Later Dryden fully avenged himself on Buckingham by his portrait of Zimri in Absalom and Achito- phel. His immediate reply is contained in the preface " Of Heroic Plays "and the " Defence of the Epilogue," printed in the first edition (1672) of his Conquest of Granada. In these, so far from laughing with his censors, he addresses them from the eminence of success. " But I have already swept the stakes; and,

with the common good fortune of prosperous gamesters, can be content to sit quietly; to hear my fortune cursed by some, and my faults arraigned by others, and to suffer both without reply." Heroic verse, he assures them, is so established that few tragedies are likely henceforward to be written in any other metre. In the course of a year or two The Conquest of Granada was attacked also by Elkanah Settle, on whom Dryden revenged himself later, making him the " Doeg " of the second part of Absalom, and Achitophel.

His next tragedy, Amboyna (1673), an exhibition of certain atrocities committed by the Dutch on English merchants in the East Indies, put on the stage to inflame the public mind in view of the Dutch war, was written, with the exception of a few passages, in prose, and those passages in blank verse. An opera which he wrote in rhymed couplets, called The State of Innocence, and Fall of Man, an attempt to turn part of Paradise Lost into rhyme, as a proof of its superiority to blank verse, was prefaced by an " Apology for Heroique Poetry and Poetique Licence," and entered at Stationers' Hall in 1674, but it was never acted. The redeeming circumstance about the performance is the admiration professed by the adapter for his original, which he pronounces " undoubtedly one of the greatest, most noble and most sublime poems which either this age or nation has pro- duced." Dryden is said to have had the elder poet's leave " to tag his verses." In Aurengzebe, which was Dryden's last, and also his best, rhymed tragedy, he borrowed from contemporary history, for the Great Mogui was stuY living. In the prologue

he confessed that he had grown weary of his long-loved mistress rhyme and retracted, with characteristic frankness, his disparagr ing contrast of the Elizabethan with his own age. But the stings of The Rehearsal had stimulated him to do his utmost to justify his devotion to his mistress, and he claims that Aurengzebe is " the most correct " of his plays. It was entered at Stationers' Hall and probably acted in 1675, and published in the following year.

After the production of Aurengzebe he seems to have rested for an interval from writing, enabled to do so, probably by an additional pension of £100 granted to him by the king. During this interval he would seem to have reconsidered the prineiples of dramatic composition, and to have made a particular study of the works of Shakespeare. The fruits of this appeared in All for Love, or the World Well Lost, a version of the story of Antony and Cleopatra, produced in 1678, which must be regarded as a very remarkable departure for a man of his age, and a wonderful proof of undiminished openness and plasticity of mind. In his previous writings on dramatic theory,

Dryden, while admiring the rhyme of the French dramatists as an advance in art, did not give unqualified praise to the regularity of their plots; he was disposed to allow the irregular structure of the Elizabethan dramatists, as being more favourable to variety both of action and of character. , But now, in frank imitation of Shakespeare, he abandoned rhyme, and, if we might judge from All for Love, and the precepts laid down in his " Grounds of Criticism in Tragedy," prefixed to Troilus and Cressida (1679), the chief point in which he aimed at excelling the Elizabethans was in giving greater unity to his plot. He upheld still the superiority of Shakespeare to the French dramatists in the delineation of character, but he thought that the scope of the action might be restricted, and the parts bound more closely together with advantage. All for Love and Antony and Cleopatra are two excellent plays for the comparison of the two methods. Dryden gave all his strength to All for Love, writing the play for himself, as he said, and not for the public. Carrying out the idea ex- pressed in the title, he represents the two lovers as being more entirely under the dominion of love than Shakespeare's Antony and Cleopatra. Shakespeare's Antony is moved by other im- pulses than the passion for Cleopatra; it is his master motive, but it has to maintain a struggle for supremacy; "Roman thoughts " strike in upon him even in the very height of the enjoyment of his mistress's love, he chafes under the yoke, and breaks away from her of his own impulse at the call of spontane- ously reawakened ambition. Dryden's Antony is so deeply sunk in love that no other impulse has power to stir him; it takes much persuasion and skilful artifice to detach him from Cleopatra even in thought, and his soul returns to her violently before the rupture has been completed. On the other hand, Dryden's Cleopatra is so completely enslaved by love for Antony that she is incapable of using the calculated caprices and meretricious coquetries which Shakespeare's Cleopatra deliberately practises as the highest art of love, the surest way of maintaining her empire over her great captain's heart. It is with difficulty that Dryden's Cleopatra will agree, on the earnest solicitation of a wily counsellor, to feign a liking for Dolabella to excite Antony's jealousy, and she cannot keep up the pretence through a few sentences. The characters of the two lovers are thus very much contracted, indeed almost overwhelmed, beneath the pressure of the one ruling motive. And as Dryden thus introduces a greater regularity of character into the drama, so he also very much contracts the action, in order to give probability to this temporary subjugation of individual character. The action of Dryden's play takes place wholly in Alexandria, within the compass of a few days; it does not, like Shakespeare's, extend over several years, and present incessant changes of scene. Dryden chooses, as it

were, a fragment of a historical action, a single moment during which motives play within a narrow circle, the culminating point in the relations between his two personages. He devotes his whole play, also, to those relations; only what bears upon them is admitted. In Shakespeare's play we get a certain historical perspective, in which the love of Antony and Cleopatra

appears in its true proportions beneath the firmament that overhangs human affairs. In Dryden's play this love is our universe; all the other concerns of the world retire into a shadowy, indistinct background. If we rise from a comparison of the plays with an impression that the Elizabethan drama is a higher type of drama, taking Dryden's own definition of the word as " a just and lively image of human nature," we rise also with an impression of Dryden's power such as we get from nothing else that he had written since his Heroic Stanzas, twenty years before.

It was twelve years before Dryden produced another tragedy worthy of the power shown in All for Love. Don Sebastian was acted and published in 1690. In the interval, to sum up briefly Dryden's work as a dramatist, he wrote Oedipus (pr. 1679) and The Duke of Guise (pr. 1683) in conjunction with Nathaniel Lee; Troilus and Cressida (1679); The Spanish Friar (1681); Albion and Albanius, an opera (1685); Amphitryon (1690). In Troilus and Cressida he follows Shakespeare closely in the plot, but the dialogue is rewritten throughout, and not for the better. The versification and the language of the first and the third acts of Oedipus, which with the general plan of the play were Dryden's contribution to the joint work, bear marked evidence of his recent study of Shakespeare. The Duke of Guise provided an obvious parallel with contemporary English politics. Henry III. was identified with Charles II., and Monmouth with the duke. The lord chamberlain refused to license it until the political situation was less disturbed. The plot of Don Sebastian is more intricate than that of All for Love. It has also more of the characteristics of his heroic dramas; the extravagance of sentiment and the suddenness of impulse remind us occasionally of The Indian Emperor; but the characters are much more elaborately studied than in Dryden's earlier plays, and the verse is sinewy and powerful. It would be difficult to say whether Don Sebastian or All for Love is his best play; they share the palm between them. Dryden's subsequent plays are not remarkable. Their titles and dates am—

King Arthur, an opera (1691), for which Purcell wrote the music; Cleomenes (1692); Love Triumphant (1694).

Soon after Dryden's abandonment of heroic couplets in tragedy, he found new and more congenial work for his favourite instru- ment in satire. As usual the idea was not original to Dryden, though he struck in with his majestic step and energy divine, and immediately took the lead. The pioneer was Mulgrave in his Essay on Satire, an attack on Rochester and the court, which was circulated in MS. in 1679. Dryden himself was suspected of the authorship, and it is not impossible that he gave some help in revising it; but it is not likely that he attacked the king on whom he was dependent for the greater part of his income, and Mulgrave in a note to his Art of Poetry in 171 7 expressly asserts Dryden's ignorance. Dryden; however, was attacked in Rose Street, Covent Garden, and severely cudgelled by a company of ruffians who were generally supposed to have been hired by Rochester. In the same year Oldham's satire on the Jesuits had immense popularity, chiefly owing to the excite- ment about the Popish plot. Dryden took the field as a satirist towards the close of 168 1, on the side of the court, at the moment when Shaftesbury, baffled in his efforts to exclude the duke of York from the throne as a papist, and secure the succession of the duke of Monmouth, was waiting his trial for high treason. Absalom and Achitophel produced a great stir. Nine editions were sold in rapid succession in the course of a year. There was no compunction in Dryden's ridicule and invective. Delicate wit was not one of Dryden's gifts; the motions of his weapon were sweeping, and the blows hard and trenchant. The advan- tage he had gained by his recent studies of character was fully used in his portraits of Shaftesbury and Buckingham, Achitophel and Zimri. In these portraits he shows considerable art in the introduction of redeeeming traits to the general outline of malignity and depravity. It is not impossible that the fact that his pension had not been paid since the beginning of 1680 weighed with him in writing this satire to gain the favour of the court. In a play produced in 1681, The Spanish Friar, he had

written on the other side, gratifying the popular feeling by attacking the Roman Catholic priesthood.

Three other satires followed Absalom and Achitophel, one of them hardly inferior in point of literary power. The Medall; a Satyre against Sedition (March 1682) was written in ridicule of the medal struck to commemorate Shaftesbury's acquittal. Then Dryden had to take vengeance on the literary champions of the Whig party who had opened upon him with all their artillery. Their leader, Shadwell, had

attacked him in The Medal of John Bayes, which Dryden answered in October 1682 by Mac Flecknoe, or a Satyr upon the True-Blew Protestant Poet, T.S. This satire, in which Shadwell filled the title-r61e, served as the model of the Dunciad. To the second part of Absalom and Achitophel (November 1682), written chiefly by Nahum Tate, he contributed a long passage of invective against Robert Ferguson, one of Monmouth's chief advisers, Elkanah Settle, Shadwell and others. Religio Laid, which appeared in the same month, though nominally an exposition of a layman's creed, and deservedly admired as such, was not without a political purpose. It attacked the Papists, but declared the " fanatics " to be still more dangerous.

Dryden's next poem in heroic couplets was in a different strain. On the accession of James, in 1685, he became a Roman Catholic. There has been much discussion as to whether this conversion was or was not sincere. It can only be said that the coincidence between his change of faith and his change of patron was sus- picious, and that Dryden's character for consistency is certainly not of a kind to quench suspicion. The force of the coincidence cannot be removed by such pleas as that his wife had been a Roman Catholic for several years, or that he was converted by his son, who was converted at Cambridge, even if there were any evidence for these statements. Scott defended Dryden's con- version, — as Macaulay denounced it, from party motives. It is worth while, however, to notice that in his earlier defence of the English Church he exhibits a desire for the definite guidance of a presumably infallible creed, and the case for the Roman Church brought forward at the time may have appeared convincing to a mind singularly open to new impressions. At the same time nothing can be clearer than that Dryden always regarded his literary powers as a means of subsistence, and had little scruple about accepting a brief on any side. The Hind and the Panther, published in 1687, is an ingenious argument for Roman Catholi-cism, put into the mouth of " a milk-white hind, immortal and unchanged." There is considerable beauty in the picture of this tender creature, and its enemies in the forest are not spared. One can understand the admiration that the poem received when such allegories were in fashion. It was the chief cause of the veneration with which Dryden was regarded by Pope, who, himself educated in the Roman Catholic faith, was taken as a boy of twelve to see the veteran poet in his chair of honour and authority at Wills's coffee-house. It was also very open to ridicule, and was treated in this spirit by Prior and Montagu, the future earl of Halifax, in The Hind and the Panther transversed to the story of the Country Mouse and the

City Mouse. Dryden's other literary services to James were a savage reply to Stilling- fleet — who had attacked two papers published by the king immediately after his accession, one said to have been written by his late brother in advocacy of the Church of Rome, the other by his late wife explaining the reasons for her conversion — and a translation of a life cf Xavier in prose. He had written also a panegyric of Charles, Threnodia Augustalis, and a poem in honour of the birth of James II. 's heir, under the title of Britannia rediviva (1688).

Dryden did not abjure his new faith on the Revolution, and so lost his office and pension as laureate and historiographer royal. For this act of constancy he deserves credit, if the new powers would have considered his services worth having after his frequent apostasies. His rival Shadwell reigned in his stead. Dryden was once more thrown mainly upon his pen for support. He turned again to the stage and wrote the plays already enumer- ated. A great feature in the last decade of his life was his translations from the classics. Ovid's Epistles translated appeared

in 1680; and numerous translations from Virgil, Horace, Ovid, Lucretius and Theocritus appeared in the four volumes of Miscellany Poems — Miscellany Poems (1684), Sylvae (1685), Examen poeticum (1693), The Annual Miscellany (1694 by the "most eminent hands"); in 1693 was published the verse translation of the Satires of Juvenal and of Persius by " Mr Dryden and several other eminent hands," which contained his " Discourse concerning the Original and Progress of Satire "; and in 1697 Jacob Tonson published his most important transla- tion, The Works of Virgil.- The book, which was the result of three years' labour, was a vigorous, rather than a close, rendering of Virgil into the style of Dryden. Among other notable poems of this period are the two " Songs for St Cecilia's Day," written for a London musical society for 1687 and 1697, and published separately. The second of these is the famous ode on " Alex- ander's Feast." The well-known paraphrase of Vent, Creator Spiritus was posthumously printed, and his " Ode to the memory of Anne Killigrew," called by Dr Johnson the noblest ode in the language, was written in 1686.

His next work was to render some of Chaucer's and Boccaccio's tales and Ovid's Metamorphoses into his own verse. These trans- lations

appeared in November 1699, a few months before his death, and are known by the title of Fables, Ancient and Modern. The preface, which is an admirable example of Dryden's prose, contains an excellent appreciation of Chaucer, and, incident- ally, an answer to Jeremy Collier's attack on the stage. Thus a large portion of the closing years of Dryden's life was spent in translating for bread. He had a windfall of 500 guineas from Lord Abingdon for a poem on the death of his wife in 1691, and he received liberal presents from his cousin John Driden and from the duke of Ormonde, but generally he was in con- siderable pecuniary straits. Besides, his three sons held various posts in the service of the pope at Rome, and he could not well be on good terms with both courts. However, he was not molested in London by the government, and in private he was treated with the respect due to his old age and his admitted position as the greatest of living English poets. He held a small court at Wills's coffee-house, where he spent his evenings; here he had a chair by the fire in winter and by the window in summer; Congreve, Vanbrugh and Addison were among his admirers, and here Pope saw the old poet of whom he was to be the most brilliant disciple. He died at his house in Gerrard Street, London, on the 1st of May 1700 and was buried on the 13th of the month in Westminster Abbey. Dryden's portrait, by Sir G. Kneller, is in the National Portrait Gallery.

Bibliography. — The Comedies, Tragedies and Operas written by John Dryden, Esq. (2 vols., 1701) was published by Tonson, who also issued the poet's Dramatick Works (6 vols., 1717), edited by Congreve. Poems on Various Occasions and Translations from Several A uthors (1 701), also published by Tonson, was. very incomplete, and although other editions followed there was no satisfactory col- lection until the edition of the Works (18 vols., 1808, 2nd ed. 1821) by Sir Walter Scott, who supplied historical and critical notes with a life of the author. This, as revised and corrected by G. Saintsbury (18 vols., Edinburgh, 1882-1893), remains the standard edition. His Critical and Miscellaneous Prose Works (4 vols., 1800) were edited by Edmund Malone, who collected industriously the materials for a life of Dryden. Convenient partial modern editions are the Poetical Works (Globe edition, 1870) edited by W. D. Christie with an excellent "life"; The Best Plays of John Dryden (Mermaid series, 2 vols.), edited by G. Saintsbury; and Essays of John Dryden (2 vols., 1 90c, Oxford), edited by W. P. Ker. Besides the critical and biographical matter in these editions see Dr Johnson's Lives of the Poets; Dryden (English Men of Letters series, 1881), by G. Saintsbury; A. Beljame, Le Public et les hommes de lettres en Angle- terre 1660-174.4 (2nd ed. Paris, 1897) ; A. W.

Ward, History of English Dramatic Literature (new ed. 1899), vol. iii. pp. 346-392 ; J. Churton Collins, Essays and Studies; W. J. Courthope, History of English Poetry, vol. iv. (1903), chap, xiv., and L. N. Chase, The English Heroic Play (New York, 1903). See also English Literature. (W. M.; M.Br.)

DRYOPITHECUS (Gr. Spvs, oak, -kWt)kos, ape, " the ape of the oak-woods "), the name of an extinct ape or monkey from Miocene deposits of France, believed to be allied to the baboons, but perhaps with some affinity to the higher apes.

DRY ROT, a fungoid disease in timber which occasions the destruction of its fibres, and reduces it eventually to a mass of dry

dust. It is produced most readily in a warm, moist, stagnant atmosphere, while common or wet rot is the result of the exposure of wood to repeated changes of climatic conditions. The most formidable of the dry rot fungi is the species Merulius lacrymans, which is particularly destructive of coniferous wood; other species are Polyporus hybridus, which thrives in oak-built ships, and P. destructor and Thelephora puteana, found in a variety of wooden structures.

The felling of trees when void of fresh sap, as a means of obviat- ing the rotting of timber, is a practice of very ancient origin. Vitruvius directs (ii. cap. 9) that, to secure good timber, trees should be cut to the pith, so as to allow of the escape of their sap, which by dying in the wood would injure its quality; also that felling should take place only from early autumn until the end of winter. The supposed superior quality of wood cut in winter, and the early practice in England of felling oak timber at that season, may be inferred from a statute of James I., which enacted " that no person or persons shall fell, or cause to be felled, any oaken trees meet to be barked, when bark is worth 2s. a cart- load (timber for the needful building and reparation of houses, ships or mills only excepted), but between the first day of April and last day of June, not even for the king's use, out of barking time, except for building or repairing his Majesty's houses or ships." In giving testimony before a committee of the House of Commons in March 1771, Mr Barnard of Deptford expressed it as his opinion that to secure durable timber for shipbuilding, trees should be barked in spring and not felled till the succeeding winter. In France, so long ago as 1669, a royal decree limited the felling of timber from the 1st of October to the 15th of April; and, in an order issued to the commissioners of forests, Napoleon I. directed that the felling of naval timber should take place only from November 1 to

March 15, and during the decrease of the moon, on account of the rapid decay of timber, through the fermentation of its sap, if cut at other seasons. The burying of wood in water, which dissolves out or alters its putrescible constituents, has long been practised as a means of seasoning. The old " Resistance " frigate, which went down in Malta harbour, remained under water for some months, and on being raised was found to be entirely freed from the dry rot fungus that had previously covered her; similarly, in the ship " Eden," the progress of rot was completely arrested by 18 months' submergence in Plymouth Sound, so that after remaining a year at home in excellent condition she was sent out to the East Indies. It was an ancient practice in England to place timber for thrashing-floors and oak planks for wainscotting in running water to season them. Whale and other oils have been recommended for the preservation of wood; and in 1737 a patent for the employment of hot oil was taken out by a Mr Emerson.

For the modern processes of preserving timber see Timber.

DUALISM (from rare Lat. dualis, containing two, from duo), a philosophical term applied to all theories which attempt to explain facts by reference to two coexistent principles. The term plays an important part in metaphysical, ethical and theological speculation.

In Metaphysics. — Metaphysical dualism postulates the eter- nal coexistence of mind and matter, as opposed to monism both idealistic and materialistic. Two forms of this dualism are held. On the one hand it is said that mind and matter are absolutely heterogeneous, and, therefore, that any causal relation between them is ex hypothesi impossible. On the other hand is a hypothetical dualism, according to which it is held that mind cannot bridge over the chasm so far as to know matter in itself, though it is compelled by its own laws of cause and effect to postulate matter as the origin, if not the motive cause, of its sensations. It follows that, for the thinking mind, matter is a necessary hypothesis. Hence the theory is a kind of monism, inasmuch as it confessedly does not assert the existence of matter save as an intellectual postulate for the thinking mind. Matter, in other words, must be assumed to exist, though mind cannot know it in itself. From this question there emerges a second and more difficult problem. Consciousness, it is held, is of two

main kinds, sensation and reason. Sensation alone is insufficient to explain all our intellectual phenomena; all sensation is momentary and individual (cf. Empiricism). How then are we to account for memory and the principles of necessity, similarity, universality? It is argued that there must be in the mind an enduring, primary faculty whereby we retain, compare and group the presentations of sense. This faculty is a priori, transcendental, and entirely separate from all the data of ex- perience and sense-perception. Here then we have a dualism within experience. The mind is not to be regarded as a sensitized film which automatically records the impressions of the senses. It contains within itself this modifying critical faculty which reacts upon and arranges the sense-given presentations.

In Ethics and Theology. — In the domain of morals, : dualism postulates the separate existence of Good and Evil, as principles of existence. In theology the appearance of dualism is sporadic and has not the fundamental, determining importance which it has in metaphyf ics. It is a result rather than a starting-point. The old Zoroastrianism, and those Christian sects (e.g. Mani- chaeism) which were influenced by it, postulate two contending deities Ormuzd and Ahriman (Good and Evil), which war against one another in influencing the conduct of men. So, in Christianity, the existence of Satan as an evil influence, antago- nistic to God, involves a kind of dualism. But generally speaking this dualism is permissive, inasmuch as it is always held that God will triumph over Satan in His own time. So in Zoroastrianism the dualism is not ultimate, for Ahriman and Ormuzd are represented as the twin sons of Zervana Akarana, i.e. limitless time, wherein both will be finally absorbed. The postulate of an Evil Being arises from the difficulty, at all times acutely felt by a certain type of mind, of reconciling the existence of evil with the divine attributes of perfect goodness, full knowledge and infinite power. John Stuart Mill (Essay on Religion) preferred to disbelieve in the omnipotence of God rather than forgo the belief in His goodness. It follows from such a view that Satan is not the creation of God, but rather a power coeval in origin, over whose activity God has no absolute control.

In Theology. — Dualism is also used in a special theological sense to describe a doctrine of the Nestorian heresy. According to this doctrine the personality of Christ is twofold; the divine Logos dwells as a distinct personality in the man Jesus Christ, the union of the two natures being analogous to the relation between the believer and the indwelling Holy Spirit.

History of the Doctrine. — The earliest European thinkers (see

Ionian School or Philosophy) endeavoured to reduce all the facts of the universe to a single material origin, such as Fire, Water, Air. It is only gradually that there appears any recognition of a spiritual principle exercising a modifying or causal influence over inert matter. Anaxagoras was the first to postulate the existence of Reason (vovi) as the source of change and progress. Yet even he did hot conceive this Reason as incorporeal; it was in reality only the most highly rarefied form of matter in existence. In Plato for the first time we find a truly dualistic conception of the universe. Asserting that Ideas alone really exist, he yet found it necessary to postulate a second principle of not-being, the groundwork of sensuous existence and of imperfection and evil. Herein he identified metaphysics and ethics, combining the good with the truly existent and evil with the non-existent. Aristotle rebels against this conception and substitutes the idea of irpwrri 6X17 and develop- ment. Nevertheless he does not escape from the dualism of Form and Matter, vovs and lihj. The scholastic philosophers naturally held dualistic views resulting from their extreme devotion to formalism. This blind dualism found its natural consequence in the revolt of the Renaissance thinkers, Bruno and Paracelsus, who asserted the unity of mind and matter in all existence and were the precursors of the more intelligent monism of Leibnitz and the scientific metaphysics of his suc- cessors. The birth of modern physical science on the other hand in the investigations of Bacon and Descartes obscured the metaphysical issue by the predominance of the mechanical principles of natural philosophy. They attempted to explain

the fundamental problems of existence by the unaided evidence of the new natural science. Thus Descartes maintained the absolute dualism of the res cogitans and the res extensa. Spinoza realized the flaw in the division and preferred to postulate behind mind and matter a single substance (unica substantia) while Leibnitz explained the universe as a harmony of spiritual or semispiritual principles. Kant practically abandons the problem. He never really establishes a relation between pure reason and things-in-themselves (Dinge an sich), but rather seeks refuge in a dualism within consciousness, the transcendental and the empirical. Since Kant there are, therefore, two streams of dualism, dealing, one with the radical problem of the relation between mind and matter, the other with the relation between the pure rational and the empirical elements within consciousness. To the first problem there is one obvious and conclusive answer, namely that matter in itself is inherently unthinkable and comes within the vision of the mind only as an intellectual presentation. It follows that philosophy is in a sense both

dualist and monist; it is a cosmic dualism inasmuch as it admits the possible existence of matter as a hypothesis, though it denies the possibility of any true knowledge of it, and is hence in regard of the only possible knowledge an idealistic monism. It is a self-destructive dualism, a confessedly one-sided monism, agnostic as to the fundamental problem. To the second problem there are two main answers, that of Associationism which denies to the mind any a priori existence and asserts that sensation is the only source of know- ledge, and that which admits the existence of both transcen- dental and empirical knowledge.

DUALLA, one of the principal negro peoples of Cameroon estuary, West Africa. When the Germans established themselves in that region, the Dualla were under many petty chiefs, whose domains were usually restricted to one village. Over these were two greater chiefs, Bell (Mbeli) and Akwa, representing the principal families of the tribe. The Dualla are physically a fine race. They are proud of their racial purity, and it was formerly usual for all half-caste children to be strangled at birth. The Dualla tattoo themselves, the women the whole body, the men the face only. They also pull out their eyelashes, which they believe prevent sharp sight. The monarchical system is more developed among the Dualla than any other of the peoples of Cameroon. The kings, many of whom have grown rich through trade, retain part of their former power, subject to the German government. The Dualla, who are laborious, industrious and capable of great physical endurance, are great traders and are proportionately prosperous. The average price for a wife among the Dualla is from £90 to £120; but sometimes a great deal more is paid. Girls are usually betrothed young and may be divorced if sterile. The penalty for adultery is a fine imposed on the seducer; if he cannot pay he becomes the husband's slave. Cannibalism as a religious rite was formerly common among the Dualla. All accessions to power were preceded by a sacrifice, a king having no authority till his hands were stained with blood. The religion is fetish blended with ancestor-worship, and certain secret societies exist among them which seem to have a religious connexion. The dead are buried within the hut, which is aban- doned shortly afterwards; slaves were formerly buried with men of importance. Missionary efforts have yielded many converts, and some churches have been built. Many of the natives can read. The Dualla are in possession of an interesting code, in accordance with which messages can be sent and even conversations maintained by means of drums, or rather gongs, giving two notes. (See Cameroon.)

DU BARRY, MARIE JEANNE BfiCU, Comtesse (1746- !793) >

French adventuress, mistress of Louis XV., was the natural daughter of a poor woman of Vaucouleurs, and was born there on the 19th of August 1746. Placed in a convent in Paris at an early age, she received a very slight education, learning little but the catechism and drawing; and at the age of sixteen entered a milliner's shop in the rue St Honore. Subse- quently she lived as a courtesan under the name of Mdlle Lange. Her great personal charms led the adventurer Jean, comte du Barry, to take her into his house in order to make it more

attractive to the dupes whose money he won by gambling. Her success surpassing his expectations, his hopes took a higher flight, and through Lebel, valet de chambre of Louis XV., and the due de Richelieu, he succeeded in installing her as mistress of the king. In order to present her at court it was necessary to find a title for her, and as Count Jean du Barry was married himself his brother Guillaume offered himself as nominal husband. The comtesse du Barry was presented at court on the 22nd of April 1769, and became official mistress of the king. Her influence over the monarch was absolute until his death, and courtiers and ministers were in favour or disgrace with him in exact accordance with her wishes. The due de Choiseul, who refused to acknowledge her, was disgraced in 17 71; and the due d'Aiguillon, who had the reputation of being her lover, took his place, and in concert with her governed the monarch. Louis XV. built for her the magnificent mansion of Luciennes. At his death in 1774 an order of his successor banished her to the abbey of Pont-aux-Dames, near Meaux, but, the queen interceding for her, the king in the following year gave her permission to reside at Luciennes with a pension. Here she led a retired life with the comte de Cosse-Brissac, and was visited there by Benjamin Franklin and the emperor Joseph II., among many other distinguished men. Having gone to England in 1 792 to endeavour to raise money on her jewels, she was on her return accused before the Revolutionary Tribunal of having dissipated the treasures of the state, conspired against the republic, and worn, in London, " mourning for the tyrant." She was con- demned to death on the 7 th of December 1793, and beheaded the same evening. Her contemporaries, scorning her low birth rather than her vices, attributed to her a malicious political r61e of which she was at heart incapable, and have done scant justice to her quick wit, her frank but gracious manners, and her seduc- tive beauty. The volume of Lettres et Anecdotes (1779) which bears her name was not written by her.

See E. and J. de Goncourt, La du Barry (Paris, 1880) ; C. Vatel, Histoire de Madame du Barry (1 882-1 883), based on sources; R. Douglas, The Life and Times of Madame du Barry (London, 1896).

DU BARTAS, GUILLAUME DE SALUSTE, Seigneur (1544- 1590), French poet, was born near Auch in 1544. He was employed by Henry IV. of France in England, Denmark and Scotland; and he commanded a troop of horse in Gascony, under the marshal de Martingan. He was a convinced Huguenot, and cherished the idea of writing a great religious epic in which biblical characters and Christian sentiment were to supplant the pagan mise en scene then in fashion. His first epic, Judith, appeared in a volume entitled La Muse chretienne (Bordeaux, iS7S)- This was followed five years later by his principal work, La Sepmaine, a poem on the creation of the world. This work was held by admirers of du Bartas to put him on a level with Ronsard, and thirty editions of it were printed within six years after its appearance. Its religious tone and fanciful style made it a great favourite in England, where the author was called the " divine " du Bartas, and placed on an equality with Ariosto. Spenser, Hall and Ben Jonson, all speak in the highest terms of what seems to us a most uninteresting poem. King James VI. of Scotland tried his " prentice hand " at the translation of du Bartas's poem U Uranie, and the compliment was returned by the French writer, who translated, as La Lepanthe, James's poem on the battle of Lepanto. Du Bartas began the publication of the Seconde Semaine in 1584. He aimed at a great epic which should stretch from the story of the creation to the coming of the Messiah. Of this great scheme he only executed a part, marked by a certain elevation of style, but he did not succeed in acclimatizing the religious epic in France. The work is spoiled by a constant tendency to moralize, and is filled with the in- discriminate information that passed under the name of science in the 16th century. Du Bartas, perhaps more than any other writer, brought the Ronsardist tradition into dispute. He introduced many unwieldy compounds foreign to the genius of the French language, and in his borrowings from old French, from provincial dialects and from Latin, he failed to show the sure instinct and prudence of Ronsard and du Bellay. He was

also guilty of reduplicating the first syllables of words, producing such expressions as pepUiller, sousouflantes. Du Bartas died in July 1590 in Paris from wounds received at the battle of

Ivry.

Joshua Sylvester translated the Sepmaine in 1598; other English

translations from du Bartas are The Historie of Judith . . . (1584),, by Thomas Hudson; of portions of the " Weeks " (1625) by William Lisle (1569-1637), the Anglo-Saxon scholar; Urania (1589), by Robert Ashley (1565-1641); and Sir Philip Sidney (see Florio's dedication of the second book of his translation of Montaigne to Lady Rich) wrote a translation of the first " Week," which is lost. The CEuvres completes of du Bartas were printed at Paris (1579), Paris and Bordeaux (161 1). See also G. Pellissier, La Vie et les ceuvres de du Bartas (1883).

DUBAWNT, or Doobaunt (Indian Toobaung, i.e. turbid), a river of Mackenzie and Keewatin districts, Canada. It rises in Wholdaia (or Daly) Lake, in 104 20′ W. and 6o° 15′ N., and flows northward to its confluence with the Thelon river, and thence eastward to Chesterfield Inlet, an arm of Hudson Bay. It passes through numerous lake-expansions, including Dubawnt Lake, with an area of 1700 sq. m. and an altitude of 500 ft. above the sea; Aberdeen, altitude 130 ft.; and Baker, 30 ft. From the head of Wholdaia Lake to the head of Chesterfield Inlet is 750 m. and thence to the west coast of Hudson Bay 125 m. The river is shallow, and banks and bed are chiefly composed of boulders; grassy slopes, however, occur at intervals along its banks, especially on the shores of Dubawnt Lake, and are the feeding grounds of large bands of cariboo. Discovered in 1770 by Samuel Hearne, the Dubawnt'was explored by J. B. Tyrrell in 1893, and the Thelon by David Hanbury in' 1899.

See Annual Report of the Geological Survey of Canada for 1896 (printed 1898).

DUBBO, a municipal town of Lincoln county, New South Wales, Australia, on the Macquarie river, 278 m. by rail N.W. of Sydney. Pop. (1901) 3409. It is a flourishing manufacturing town in a pastoral district, in part also cultivated. Coal and copper are found in the neighbourhood.

DU BELLAY, GUILLAUME, Sieur de Langey (1491-1543), French soldier and diplomat, was born at the chateau of Glatigny, near Montmirail, in 149 1. His father, Louis du Bellay-Langey. was a younger son of the Angevin family of du Bellay, which from the 14th century was distinguished in the service of the dukes of Anjou and afterwards of the kings of France; and Louis had six sons, who were among the best servants of Francis I. Guillaume, the eldest, is one of the most remarkable figures of the time; a brave soldier, a humanist and a historian, he was above all the most able diplomat at the command of Francis I., prodigiously active, and excelling in secret

negotiations. He entered the military service at an early age, was taken prisoner at Pavia (1525) and shared the captivity of Francis I. His skill and devotion attached him to the king. His missions to Spain, Italy, England and Germany were innumerable; sent three times to England in 1529-1530, he was occupied with the execu- tion of the treaty of Cambrai and also with the question of Henry VIII. 's divorce- and with the help of his brother Jean, then bishop of Paris, he obtained a decision favourable to Henry VIII. from the Sorbonne (July 2, 1530). From 1532 to 1536, though he went three times to England, he was principally employed in uniting the German princes against Charles V.; in May 1532 he signed the treaty of Scheyern with the dukes of Bavaria, the landgrave of Hesse, and the elector of Saxony, and in January 1534 the treaty of Augsburg. During the war of 1537 Francis I. sent him on missions to Piedmont; he was governor of Turin from December 1537 till the end of 1539, and subsequently replacing Marshal d'Annebaut as governor of the whole of Piedmont, he displayed great capacity in organization. But at the end of 1542, overwhelmed by work, he was compelled to return to France, and died near Lyons on the 9th of January 1543. Rabelais, an eye-witness, has left a moving story of his death (Pantagruel, iii. ch. 21, and iv. ch. 27). He was buried in the cathedral of Le Mans, where a monument was erected to his memory, with the inscription, " Ci git Langey, dont la plume et l'epee Ont surmontS Ciceron et Pompee "; Charles V. ! is said to have remarked that Langey, by his own unaided efforts,

did more mischief and thwarted more schemes than all the French together.

Guillaume du Bellay was the devoted protector of freedom of thought; without actually joining the reformers, he defended the innovators against their fanatical opponents. In 1534- 1535 he even tried, unsuccessfully, to bring about a meeting between Francis I. and Melanchthon; and in 1541 he intervened in favour of the Vaudois. Rabelais was the most famous of his clients, and followed him to Piedmont from 1540 to 1542. Guillaume was himself a valuable historian, and a clear and precise writer. He imitated Livy in his Ogdoades, a history of the rivalry between Francis I. and the emperor from 1521, of which, though he had no time to finish it, important fragments remain, inserted by his brother Martin du Bellay (d. 1559) in his Mimoires (1569). The celebrated

Instructions, reprinted as Traiti de la discipline militaire in 1554 and 1592, was formerly attributed to him, but it has been proved that he could not have written it (see Bayle, Diet. Hist. i. 502, and Jahns, Geschichte der Kriegswissenschaften, i. 498 seq.); this work, however, is of the highest value for the study of the military art of the 16th century; in 1550 an Italian, in 1567 a Spanish, and in 1594 and 1619 German translations were published.

See also the edition of Martin du Bellay's Mimoires by Michaud and Poujoulat (1838), and Bourrilly's Fragments de la premiere Ogdoade (Paris, 1905). There is an excellent study of Guillaume du Bellay by V. L. Bourrilly (Paris, 1905). (J. I.)

DU BELLAY, JEAN (c. 1493-1560), French cardinal and diplomat, younger brother of Guillaume du Bellay, appears as bishop of Bayonne in 1526, member of the privy council in 1530, and bishop of Paris in 1532. Supple and clever, he was well fitted for a diplomatic career, and carried out several missions in England (1527-1534) and Rome (1534-1536)- I n I53S he received his cardinal's hat; in 1536-1537 he was nominated " lieutenant-general " to the king at Paris and in the lie de France, and was entrusted with the organization of the defence against the imperialists. When Guillaume du Bellay went to Piedmont, Jean was put in charge of the negotiations with the German Protestants, principally through the humanist Johann Sturm and the historian Johann Sleidan. In the last years of the reign of Francis I., cardinal du Bellay was in favour with the duchesse d'Etampes, and received a number of benefices—the bishopric of Limoges (1541), archbishopric of Bordeaux (1544), bishopric of LeMans (1546); but his influence in the council was supplanted by that of Cardinal de Tournon. Under Henry II., being involved in the disgrace of all the servants of Francis I., he was sent to Rome (1547), and he obtained eight votes in the con- clave which followed the death of Pope Paul III. After three quiet years passed in retirement in France (1550-1553), he was charged with a new mission to Pope Julius III. and took with him to Rome his young cousin the poet Joachim du Bellay (q.v.). He lived in Rome thenceforth in great state. In 1555 he was nominated bishop of Ostia and dean of the Sacred College, an appointment which was disapproved of by Henry II. and brought him into fresh disgrace, lasting till his death in Rome on the 16th of February 1560. Less resolute and reliable than his brother Guillaume, the cardinal had brilliant qualities, and an open and free mind. He was on the side of toleration and protected the reformers. Budaeuswas his friend, Rabelais his faithful secretary and doctor ; men of letters, like fitienne Dolet, and the poet Salmon Macrin, were indebted to him for

assistance. An orator and writer of Latin verse, he left three books of graceful Latin poems (printed with Salmon Macrin's Odes, 1 546, by R. Estienne) , and some other compositions, including Francisci Francorum regis epistola apologetica (1 542) . His voluminous correspondence, mostly in MS., is remarkable for its verve and picturesque quality.

Bibliography. — The Bibliotheque Nationale at Paris has numer- ous unpublished letters of Jean du Bellay. See also Ribier, Lettres et mimoires d'estat (Paris, 1666) ; V. L. Bourrilly and P. de Vaissiere, Ambassade de Jean du Bellay en Angleterre, vol. i. (Paris, 1905); marquis de la Jonquiere, Le Cardinal du Bellay (Alencon, 1887); Heulhard, Rabelais, ses voyages en Italie (Paris, 1891); Chamarci, Joachim du Bellay (Lille, 1900) ; V. L. Bourrilly, Guillaume du Bellay (Paris, 1905); " Jeandu Bellay, les protestants et la Sorbonne "

in the Bulletin du Protestantisme frangais (1903, 1904); and " Jean Sleidan et le Cardinal du Bellay," in the Bulletin, &c. (1901, 1906).

(J. I.)

DU BELLAY, JOACHIM (c. 1522-1560), French poet and critic, member of the Pleiade, was born 1 at the chateau of La Turmeliere, not far from Lire, near Angers, being the son of Jean du Bellay, seigneur de Gonnor, cousin-german of the cardinal Jean du Bellay and of Guillaume du Bellay. Both his parents died while he was still a child, and he was left to the guardianship of his elder brother, Rene du Bellay, who neglected his education, leaving him to run wild at La Turmeliere. When he was twenty- three, however, he received permission to go to Poitiers to study law, no doubt with a view to his obtaining perferment through his kinsman the Cardinal Jean du Bellay. At Poitiers he came in contact with the humanist Marc Antoine Muret, and with Jean Salmon Macrin (1490-1557), a Latin poet famous in his day. There too he probably met Jacques Peletier du Mans, who had published a translation of the Arspoetica of Horace, with a preface in which much of the programme advocated later by the Pleiade is to be found in outline.

It was probably in 1547 that du Bellay met Ronsard in an inn on the way to Poitiers, an event which may justly be regarded as the starting-point of the French school of Renaissance poetry. The two had much in common, and immediately became fast friends. Du Bellay returned with Ronsard to Paris to join the circle of students of the humanities attached to Jean Daurat {q.v.) at the College de

Coqueret. While Ronsard and Antoine de Baif were most influenced by Greek models, du Bellay was more especially a Latinist, and perhaps his preference for a language so nearly connected with his own had some part in determining the more national and familiar note of his poetry. In 1548 appeared the Art poitique of Thomas Sibilet, who enunciated many of the ideas that Ronsard and his followers had at heart, though with essential differences in the point of view, since he held up as models Clement Marot and his disciples. Ronsard and his friends dissented violently from Sibilet on this and other points, and they doubtless felt a natural resentment at finding their ideas forestalled and, moreover, inadequately presented. The famous manifesto of the Pleiade, the Defence et illustration de la langue franqoyse (1549), was at once a complement and a refutation of Sibilet's treatise. This book was the expression of the literary principles of the Pleiade as a whole, but although Ronsard was the chosen leader, its redaction was entrusted to du Bellay. To obtain a clear view of the reforms aimed at by the Pleiade, the Defence should be further considered in con- nexion with Ronsard's Abrigi d'art poitique and his preface to the Franciade. Du Bellay maintained that the French language as it was then constituted was too poor to serve as a medium for the higher forms of poetry, but he contended that by proper cultivation it might be brought on a level with the classical tongues. He condemned those who despaired of their mother tongue, and used Latin for their more serious and ambitious work. For translations from the ancients he would substitute imitations. Not only were the forms of classical poetry to be imitated, but a separate poetic language and style, distinct from those employed in prose, were to be used. The French language was to be enriched by a development of its internal resources and by discreet borrowing from the Latin and Greek. Both du Bellay and Ronsard laid stress on the necessity of prudence in these borrowings, and both repudiated the charge of wishing to latinize their mother tongue. The book was a spirited defence of poetry and of the possibilities of the French language; it was also a declaration of war on those writers who held less heroic views.

The violent attacks made by du Bellay on Marot and his followers, and on Sibilet, did not go unanswered. Sibilet replied in the preface to his translation (1549) of the Iphigenia of Euri- pides; Guillaume des Autels, a Lyonnese poet, reproached du Bellay with ingratitude to his predecessors, and showed the weakness of his argument for imitation as opposed to translation in a digression in his Riplique aux furieuses defenses de Louis Meigret (Lyons, 1550) ; Barthelemy Aneau, regent of the

1 For the date of his birth, commonly given as 1525, see H. Chamard, Joachim du Bellay (Lille, 1900).

College de la Trinit6 at Lyons,attacked him in his Quintil Horatian (Lyons, 1551), the authorship of which was commonly attributed to Charles Fontaine. Aneau pointed out the obvious incon- sistency of inculcating imitation of the ancients and depreciating native poets in a work professing to be a defence of the French language. Du Bellay replied to his various assailants in a preface to the second edition (1550) of his sonnet sequence Olive, with which he also published two polemical poems, the Musagnaeo- machie, and an ode addressed to Ronsard, Conlre les envieux poeles. Olive, a collection of love-sonnets written in close imitation of Petrarch, first appeared in 1549. With it were printed thirteen odes entitled Vers lyriques. Olive has been supposed to be an anagram for the name of a Mile Viole, but there is little evidence of real passion in the poems, and they may perhaps be regarded as a Petrarcan exercise, especially as, in the second edition, the dedication to his lady is exchanged for one to Marguerite de Valois, sister of Henry II. Du Bellay did not actually introduce the sonnet into French poetry, but he acclimatized it; and when the fashion of sonneteering became a mania he was one of the first to ridicule its excesses.

About this time du Bellay had a serious illness of two years' duration, from which dates the beginning of his deafness. He had further anxieties in the guardianship of his nephew. The boy died in 1553, and Joachim, who had up to this time borne the title of sieur de Lire, became seigneur of Gonnor. In 1 549 he had published a Recueil de ˆoesiesdedicatedto the PrincessMarguerite. This was followed in 1552 by a version of the fourth book of the Aeneid, with other translations and some occasional poems. In the next year he went to Rome as one of the secretaries of Cardinal du Bellay. To the beginning of his four and a half years' residence in Italy belong the forty-seven sonnets of his Antiquitis de Rome, which were rendered into English by Edmund Spenser (The Ruins of Rome, 1591). These sonnets were more personal and less imitative than the Olive sequence, and struck a note which was revived in later French literature by Volney and Chateaubriand. His stay in Rome was, however, a real exile. His duties were those of an intendant. He had to meet the cardinal's creditors and to find money for the expenses of the household. Nevertheless he found many friends among Italian

scholars, and formed a close friendship' with another exiled poet whose circumstances were similar to his own, Olivier de Magny. Towards the end of his sojourn in Rome he fell violently in love with a Roman lady called Faustine, who appears in his poetry as Columba and Columbelle. This passion finds its clearest expression in the Latin poems. Faustine was guarded by an old and jealous husband, and du Bellay 's eventual conquest may have had something to do with his departure for Paris at the end of August 1557. In the next year he published the poems he had brought back with him from Rome, the Latin Poemata, the A ntiquites de Rome, the Jeux rustiques, and the 191 sonnets of the Regrets, the greater number of which were written in Italy. The Regrets show that he had advanced far beyond the theories of theDeffence. The simplicity and tenderness speciallycharacteristic of du Bellay appear in the sonnets telling of his unlucky passion for Faustine, and of his nostalgia for the banks of the Loire. Among them are some satirical sonnets describing Roman manners, and the later ones written after his return to Paris are often appeals for patronage. His intimate relations with Ronsard were not renewed; but he formed a close friendship with the scholar Jean de Morel, whose house was the centre of a learned society. In 1559 du Bellay published at Poitiers La Nouvelle Maniere de faire son profit des leltres, a satirical epistle translated from the Latin of Adrien Turnebe, and with it Le Poete courtisan, which introduced the formal satire into French poetry. These were published under the pseudonym of J. Quintil du Troussay, and the courtier-poet was generally supposed to be Melin de Saint-Gelais, with whom du Bellay had always, however, been on friendly terms.

A long and eloquent Discours au roi (detailing the duties of a prince, and translated from a Latin original written by Michel de l'Hopital, now lost) was dedicated to Francis II. in 1559, and is said to have secured for the poet a tardy pension. In

Paris he was still in the employ of the cardinal, who delegated to him the lay patronage which he still retained in the diocese. In the exercise of these functions Joachim quarrelled with Eustache du Bellay, bishop of Paris, who prejudiced his relations with the cardinal, less cordial since the publication of the out- spoken Regrets. His chief patron, Marguerite de Valois, to whom he was sincerely attached, had gone to Savoy. Du Bellay's health was weak; his deafness seriously hindered his official duties; and on the 1st of January 1 560 he died. There is no evidence that he was in priest's orders, but he was a clerk, and as such held various preferments. He had at one time been a canon of Notre Dame of Paris, and was accordingly buried in the cathedral. The statement that he was

nominated archbishop of Bordeaux during the last year of life is unauthenticated by documentary evidence and is in itself extremely improbable.

Bibliography. — The best edition of the works of J. du Bellay is CEuvres franqaises (2 vols., 1866-1867), edited with introduction and notes by C. Marty-Laveaux in his Pleiade francaise. His CEuvres choisies were published by L. Becq de Fouquieres in 1876. The chief source of his biography is his own poetry, especially the Latin elegy addressed to Jean de Morel, " Elegia ad Janum Morellum Ebredunensem, Pylademmum," printed with a volume of Xenia (Paris, 1569). A study of his life and writings by H. Chamard, forming vol. viii. of the Travaux et memoiresde I' univer site de Lille (Lille, 1 900), contains all the available information and corrects many common errors. See also Sainte-Beuve, Tableau de la poesie frangaise au XVI' siicle (1828); La Defense et Must, de la langue francaise (1905), with bio- graphical and critical introduction by Leon Seche, who also wrote Joachim du Bellay-, documents nouveaux et inedits (1880), and pub- lished in 1903 the first volume of a new edition of the CEuvres; Lettres de Joachim du Bellay (1884), edited by P. de Nolhac; G. Wyndham, Ronsard and La Pleiade (1906) ; H. Belloc, Avril (1905) ; A. Tilley, The Literature of the French Renaissance (2 vols., 1904).

DUBLIN, a county of Ireland in the province of Leinster, bounded N. by Co. Meath, E. by the Irish Sea, S. by Wicklow, and W. by Kildare and Meath. With the exception of Louth and Carlow, Dublin is the smallest county in Ireland, having an area of 218,873 acres, or about 342 sq. m. The northern portion is flat, and the soil good, particularly on the borders of Meath; but on the southern side the land rises into elevations of con- siderable height. The mountains are chiefly covered with heath, except where a subsidence in the ground affords a nucleus for the formation of bog, with which about 2000 acres are covered. There are also a few small tracts of bog in the northern part of the county. The mountain district is well adapted for timber. The northern coast of the county from Balbriggan to Howth has generally a sandy shore, and affords only the small harbours of Balbriggan and Skerries. In the promontory of Howth, the coast suddenly assumes a bolder aspect; and between the town of Howth and the rocky islet of Ireland's Eye an unsuccessful artificial harbour was constructed. Kingstown harbour on the south side of Dublin Bay superseded this, and is by far the best in the county. Dalkey Island, about 22 acres in extent, lies about midway between Kingstown harbour and the beautiful bay of Killiney. North of Howth lies Lambay Island, about 600 acres in area. Shell fish, especially

*lobsters, are taken here in abundance. Small islets lie farther north og Skerries; the most interesting of which is that known as Inispatrick, reputed as the first landing-place of St Patrick, and having the ruins of a church said to be the saint's first foundation, though it shares this reputation with other sites. Ireland's Eye, off Howth, is a very picturesque rock with about 54 acres of grass land. It has afforded great room for geological disquisition. The chief river in the county is the Liffey, which rises in the Wicklow mountains about 12 m. S.W. of Dublin, and, after running about 50 m.. empties itself into Dublin Bay. The course of the river is so tortuous that 40 m. may be traversed and only 10 gained in direction. The scenery along the banks of the Liffey is remark- ably beautiful. The mountains which occupy the southern border of the county are the extremities of the great group belonging to the adjacent county Wicklow. The principal summits are the group containing Glendoo (1919 ft.) and Two Rock (1699 ft.) within the county, and the border group oi Kippure, reaching in that summit a height of 2475 ft. The grandest features of these hills are the great natural ravine**

which open in them, the most extraordinary being the Scalp through which the traveller passes from Dublin to Wicklow.

Geology. — On the north a Silurian upland stretches, falling to the sea at Balbriggan, where fossiliferous strata contain contemporaneous volcanic rocks. A limestone of Bala age comes out under shales and andesites in the promontory of Portrane, and rocks of the same series occur in the bold island of Lambay, associated with a large mass of dark green porphyritic andesite (the " Lambay porphyry "). Silurian rocks reappear at Tallaght in the south-west, where the granite of Leinster rises through them, forming a moorland 2000 ft. in height only a few miles south of Dublin. Old Red Sandstone, seen at Donabate and Newcastle, leads up into Carboniferous Lime- stone, which is often darkened by mud and even shaly (" calpy " type). This rock produces a fairly level country, both north and south of the valley of the Liffey, although the beds are greatly folded. Beds of a higher Carboniferous zone are retained in syn- clinals near Rush. The rugged peninsula of Howth, connected by a raised bench with the mainland, is formed of old quartzites and shales, crushed and folded, and probably of Cambrian age. The rocks of the county show many signs of ice-action, and boulder- clays and drift-gravels cover the lowland, the latter being banked up on the

mountain-slopes to heights of 1200 ft. or more. Much of this glacial material has been imported from the area of the Irish Sea. Lead-ore has been mined at the granite-contact at Ballycorus.

Industries. — The extension of Dublin city and its suburbs has no doubt had its influence on the decrease of acreage under both tillage and pasture. Oats and potatoes are the principal crops, but live stock, especially cattle, receives greater attention. A large pro- portion of holdings are of the smallest, nearly one-half of those beneath fifteen acres being also beneath one acre. The manufactures of the county are mainly confined to the city and suburbs, but there is manufacture of cotton hosiery at Balbriggan. The haddock, herring and other fisheries, both deep-sea and coastal, are important, and Kingstown is the headquarters of the fishery district. The salmon fishery district of Dublin also affords considerable employ- ment. As containing the metropolis of Ireland, the communications of the county are naturally good, several important railways and two canals converging upon the city of Dublin, under the head of which they are considered.

Population and Administration. — The population (148,210 in 1891; 157,568 in 1901) shows a regular increase, which, however, is not consistent from year to year. About 70% are Roman Catholics, the Protestant Episcopalians (24%) standing next. The chief towns, apart from the capital, are Balbriggan (pop. 2236), Blackrock (8719), Dalkey (3398), Killiney and Ballybrack (2744), Pembroke (25,799), Rathmines an d Rathgar (32,602), and the important port of Kingstown (17,377). These are urban districts. Skerries, Howth and Rush are small maritime towns. There are nine baronies in the county, which, including the city of Dublin, are divided into 100 parishes, all within the Protestant and Roman Catholic dioceses of Dublin. Assizes are held in Dublin, and quarter sessions also in the capital, and at Bal- briggan, Kilmainham, Kingstown and Swords. Previous to the union with Great Britain, this county returned ten representatives to the Irish Parliament, — two for the county, two for the city, two for the university, and two for each of the boroughs of Swords and Newcastle. The county parliamentary divisions are now two, north and south, each returning one member. The city of Dublin constitutes a separate county.

History. — Dublin is among the counties generally considered to have been formed by King John, and comprised the chief portion of country within the English pale. The limits of the county, however, were uncertain, and underwent many changes before they were fixed. As late as the 17th century the moun- tainous country south of

Dublin offered a retreat to the lawless, and it was not until 1606 that the boundaries of the county received definition in this direction, along with the formation of the county Wicklow. Although so near the seat of government 67,142 acres of profitable land were forfeited in the Rebellion of 1641 and 34,536 acres in the Revolution of 1688. In 1867 the most formidable of the Fenian risings took place near the village of Tallaght, about 7 m. from the city. The rebels, who numbered from 500 to 700, were found wandering at dawn, some by a small force of constabulary who, having in vain called upon them to yield, fired and wounded five of them; but the great bulk of them were overtaken by the troops under Lord Strathnairn, who captured them with ease and marched them into the city. There are numerous antiquities in the county. Raths or en- campments are frequent, and those at Raheny, Coolock, Lucan,

with the large specimen at Shankill or Rathmichael near the Scalp pass may be mentioned. Cromlechs occur in Phoenix Park, Dublin, at Howth, and elsewhere. There are fine round towers at Swords, Lusk and Clondalkin, and there is the stump of one at Rathmichael.

DUBLIN, a city, county of a city, parliamentary borough and seaport, and the metropolis of Ireland, in the province of Leinster. It lies at the head of a bay of the Irish Sea, to which it gives name, about midway on the eastern coast of the island, 334 m. W.N.W. of London by the Holyhead route, and 70 m. W. of Holyhead on the coast of Anglesey, Wales. (For map, see Ireland.) Its population in 1901 was 290,638.

Site, Streets and Buildings. — Dublin lies on the great central limestone district which stretches across the island from the Irish Sea to the Atlantic Ocean, and occupies both banks of the river Liffey. Its situation is justly admired. The populous shores of the bay are exceedingly picturesque. To the north and west the country is comparatively level, the central plain of Ireland here reaching to the coast, but to the south the foothills of the Wicklow Mountains practically touch the confines of Greater Dublin, affording comprehensive views of the physical position of the city, and forming a background to some of the finest streets. The municipal boundary lies generally a little outside the so-called Circular Road, which may be taken as encircling the city proper, with a few breaks. It bears this name on both the north and south sides of the river. As the city is approached from the bay, the river Liffey, which divides the city from west to east roughly into two equal parts, is seen to be lined with a fine series of quays. At its mouth, on the north side, is the North Wall quay, where .the principal steamers he, and in this

vicinity are the docks. At the opposite (western) end of the city, the Phoenix Park may be taken as a convenient landmark. Between this and North Wall the river is crossed by twelve bridges, which, in order from west to east, are these: — Sarah Bridge, the bridge of the North Wall extension railway; King's, commemorating a visit of George IV.; Victoria or Barrack; Queen's; Whitworth, of interest as occupying the site where a bridge has stood since the 12th century; Richmond, Grattan and Wellington; O'Connell, Butt and a swivel bridge carrying a loop railway. Of these O'Connell bridge (formerly known as Carlisle) is the principal, as it connects the chief thoroughfare on the north side, namely Sackville (or O'Connell) Street, with Great Brunswick Street and others on the south. Sackville Street, which gains in appearance from its remarkable breadth, contains the principal hotels, and the post office, with a fine Ionic portico, founded in 181 5. At the crossing of Henry Street and Earl Street is the Nelson pillar, a beautiful monument 134 ft. in height, consisting of a fluted Doric column, raised on a massive pedestal, and crowned by a statue of the admiral. At the southern end of the street is Daniel O'Connell's monument, almost com- pleted by John Henry Foley before his death, and erected in 1882. In Rutland Square, at the northern end, is the Rotunda, containing public rooms for meetings, and adjoining it, the Rotunda hospital with its Doric facade.

From the north end of Sackville Street, several large thorough- fares radiate through the northern part of the city, ultimately joining the Circular Road at various points. To the west there are the Broadstone station, Dominion Street, and beyond this the large workhouse, prison, asylum and other district buildings, while the Royal barracks front the river behind Albert Quay. Two other notable buildings face the river on the north bank. Between Whitworth and Richmond bridges stands the " Four Courts " (law courts), on the site of the ancient Dominican monastery of St Saviour. It was erected between r 786 and 1 796, and is adjoined by other court buildings, the public record office, containing a vast collection, and the police offices. Below the lowest bridge on the river, and therefore in the neighbourhood of the shipping quarter, is the customs house (1781-1791), considered one of the chief ornaments of the city. It presents four fronts, that facing the river being of Portland stone, in the Doric order, while the rest are of granite. The centre is crowned by a dome, surmounted by a statue of Hope. This building

Christ Church.

provides offices for the Local Government Board, Boards of Trade and of Public Works and other bodies.

It is, however, to the south of the river that the most interest- ing buildings are found. Crossing O'Connell bridge, the short Westmoreland Street strikes into a thoroughfare which traverses the entire city parallel with the river, and is known successively (from west to east) as James, Thomas, High, Castle, Dame, College and Great Brunswick streets. At the end of Westmore- land Street a fine group of buildings is seen— Trinity College on the left and the Bank of Ireland on the right. Barely half a mile westward down Dame Street, rises the Castle, and 300 yds. beyond this again is the cathedral of Christ Church. These, with the second cathedral of St Patrick, are more conveniently described in the inverse order. .

The cathedral of Christ Church, or Holy Trinity, the older of the two Protestant cathedrals in the possession of which Dublin is remarkable, was founded by Sigtryg, a Christianized king of the Danes of Dublin, in 1038, but dates its elevation to a deanery and chapter from 1341. It was restored in 1870-1877 by G. E. Street at the charge of Mr Henry Roe, a merchant of Dublin, who also presented the Synod House. The restoration involved the complete re-building of the choir and the south side of the nave, but the model of the ancient building was followed with great care. The crypt embodies remains of the founder's work; the rest is Transitional Norman and Early English in style. Among the monuments is that of Strongbow, the invader of Ireland, to whom the earlier part of the superstructure (n 70) is due. Here the tenants of the church lands were accustomed to pay their rents. The monument was injured by the fall of one of the cathedral walls, but was repaired. By its side is a smaller tomb, ascribed to Strongbow's son, whom his father killed for showing cowardice in battle. Synods were occasionally held in this church, and parliaments also, before the Commons' Hall was destroyed in 1566 by an accidental explosion of gunpowder. Here also the pretender Lambert Simnel was crowned.

A short distance south from Christ Church, through the squalid quarter of Nicholas and Patrick streets, stands the other Protestant cathedral dedicated to St Patrick, Patrick's, the foundation of which was an attempt to supersede the older foundation of Christ Church, owing to jeal- ousies, both ecclesiastical and political, arising out of the Anglo- Norman invasion. It was founded about n 90 by John Comyn, archbishop of Dublin; but there was a church dedicated to

the same saint before. It was burnt about two hundred years later, but was raised from its ruins with increased splendour. At the Reformation it was deprived of its status as a cathedral, and the building was used for some of the purposes of the courts of justice. Edward VI. contemplated its change into a univer- sity, but the project was defeated. In the succeeding reign of Mary, St Patrick's was restored to its primary destination. The installations of the knights of St Patrick, the first of which took place in 1783, were originally held here, and some of their insignia are preserved in the choir. This cathedral contains the monuments of several illustrious persons, amongst which the most celebrated are those of Swift (dean of this cathedral), of Mrs Hester Johnson, immortalized under the name of " Stella "; of Archbishop Marsh; of the first earl of Cork; and of Duke Schomberg, who fell at the battle of the Boyne. The tablet over Schomberg's grave contains what Macaulay called a " furious libel," though it only states that the duke's relatives refused the expense of the tablet. In the cathedral may be seen the chain ball which killed General St Ruth at the battle of Aughrim, and the spurs which he wore. The cathedral was restored by Sir Benjamin Lee Guinness (1864), whom a fine statue by John Henry Foley commemorates, and the work was resumed by his son Lord Iveagh in 1900. Attached to the cathedral is Marsh's library, incorporated in 1707, by a request of Primate Marsh, archbishop of Armagh. It contains a good number of theological works and of manuscripts, and is open to the public; but is deficient in modern publications.

Dublin Castle stands high, and occupies about ten acres of

ground, but excepting St Patrick's Hall, the apartments are small, and the building is of a motley and unimposing appear- ance, with the exception of the chapel (a Gothic building of the early 19th century) and great tower. The castle castle was originally built in the first two decades of the 13th century; and there are portions of this period, but nearly the whole is of the 16th Century and later. In St Patrick's hall where the knights of St Patrick are invested, are the banners of that order. Opposite the castle is the city hall (1779), in the possession of the corporation, with statues in the central hall of George III., of Grattan (a superb work by Sir Francis Chantry), of Daniel O'Connell, and of Thomas Drummond by John Hogan and several others.

The Bank of Ireland (see Architecture, fig. 85) occupies five acres, and was formerly the House of Parliament. There are three fronts; the principal, towards College Green, is a colonnade of the Ionic order, with facade , fJlfjLZ and two projecting wings; it connects

with the western portico by a colonnade of the same order, forming the quadrant of a circle. The eastern front, which was the entrance of the House of Lords, is, by their special wish, of the Corinthian order, made conformable with the rest of the building not without difficulty to the architect. The House of Lords contains tapestry dating from 1733, and remains in its original condition, but the octagonal House of Commons was demolished by the bank directors, and replaced with a cash-office. The building was begun in 1729, but the fronts date from the end of the century; the remodelling took place in 1803.

Trinity College, or Dublin University, fronts the street with a Palladian facade (1759), with two good statues by Foley, of Goldsmith and Burke. Above the gateway is a hall called the Regent House. The first quadrangle, J- rl if' tr Parliament Square, contains the chapel (1798), with a Corinthian portico, the public theatre or examination hall (1787), containing portraits of Queen Elizabeth, Molyneux, Burke, Bishop Berkeley and other celebrities, and the wain- scotted dining hall, also containing portraits. A beautiful modern campanile (1853), erected by Lord John George Beresf ord, archbishop of Armagh and chancellor of the university, occupies the centre of the square. Library Square takes its name from the library, which is one of the four scheduled in the Copyright Act as entitled to receive a copy of every volume published in the United Kingdom. There is a notable collection of early Irish manuscripts, including the magnificently ornamented Book of Kells, containing the gospels. The building was begun in 1 7 1 2. In this square are the oldest buildings of the foundation, dating in part from the close of the 17th century, and the modern Graduates' Memorial buildings (1 904) . These contain a theatre, library and reading-room, the rooms of the college societies and others. The schools form a fine modern pile (1856), and other buildings are the provost's house (1760), printing house (1760), museum (1857) and the medical school buildings, in three blocks, one of the best schools in the kingdom. Other buildings of the 20th century include chemical laboratories. The College Park and Fellows' Garden are of considerable beauty. In the former most of the recreations of the students take place; but the college also supports a well-known rowing-club. The college observatory is at Dunsink, about 5 m. north-west of Dublin; it is amply furnished with astronomical instruments. It was endowed by Dr Francis Andrews, provost of Trinity College, was erected in 1785, and in 1791 was placed by statute under the management of the royal astronomer of Ireland, whose official residence is here. The magnetic observatory of Dublin was erected in the years 1837-1838 in the gardens attached

to Trinity College, at the expense of the university. A normal climatological station was established in the Fellows' Garden in 1904. The botanic garden is at Ball's Bridge, 1 m. S.E. of the college.

The alternative title of Dublin University or Trinity College, Dublin (commonly abbreviated T.C.D.), is explained by the fact that the university consists of only one college, that of " the Holy and Undivided Trinity." This was founded under charter from Queen Elizabeth in 1.591. and is the greatest foundation of its kind in the

country. The corporation consists of a provost, 7 senior fellows, 25 junior fellows and 70 scholars. A vacancy among the fellows is filled up by the provost and a select number of the fellows, after examination comprised in five principal courses, mathematics, experimental science, classics, mental and moral science and Hebrew. Fellowships are held for life. Until the year 1840 the fellows were bound to celibacy, but that restriction was then removed. All except five (medical and law fellows) were bound to take Holy Orders until 1872. The scholars on the foundation (or " of the House ") are chosen from among the undergraduates, for merit in classics, mathe- matics or experimental science. The pecuniary advantages attaching to scholarship (£20 Irish, free commons, and rooms at half the charge made to other students) last for four years. Students after an examination are admitted as fellow-commoners, pensioners or sizars. Fellow-commoners, who have decreased in numbers in modern times; pay higher fees than the ordinary undergraduates or pensioners, and have certain advantages of precedence, including the right of dining at the fellows' table. Sizarships are awarded on examination to students of limited means, and carry certain relaxations of fees. They were formerly given on the nomination of fellows. Noblemen, noblemen's sons and baronets (nobilis, filius nobilis, eques) have the privilege of forming a separate order with peculiar advantages, on the payment of additional charges. The mode of admission to the univer- sity is in all cases by examination. Various exhibitions and prizes are awarded both in connexion with the entrance of students and at subsequent stages of the course of instruction, which normally lasts four years. There are three terms in each year— Michaelmas (begin- ning the Academic year), Hilary and Trinity. _ The undergraduate is called in his 'first year a junior freshman, in his second a senior freshman, in his third a junior sophister, and in his fourth a senior sophister. The usual arts and

scientific courses are provided, and there are four professional schools — divinity, law, physic and engineering. The undergraduate has certain examinations in each year, and four " commencements " are held every year for the purpose of conferring degrees. Freedom is offered to students who wish to be transferred from Oxford, Cambridge, or certain colonial universities to Trinity College, by the recognition of terms kept in the former institutions as part of the necessary course at Trinity College. In 1903 it was decided to bestow degrees on women, and in 1904 to establish women's scholarships. The funds of the college, arising from lands and the fees of students, are managed solely by the provost and seven senior fellows, who form a board, to which and to the academic council the whole government of the university, both in its executive and its legislative branches, is committed. The council consists of the provost and sixteen members of the senate elected by the fellows, professors, &c; the senate consists of the chancellor or his deputy and doctors and masters who keep their names on the books. The average number of students on the books is about 1300. By an act passed in 1873, known as Fawcett's Act, all tests were abolished, and the prizes and honours of all grades hitherto reserved for Protestants of the Established Church were thrown open to all. The university returns two members to parliament. (See Dublin University Calendar, annual.)

There remain to be mentioned the following buildings in D ublin. The permanent building of the International Exhibition of 1865 adjoins the pleasure ground of St Stephen's Green. This building was occupied by the Royal University of Ireland until its dissolution under the Irish Universities Act 1908, which provided for a new university at Dublin, to which the building was transferred under the act (see Ireland: Education). The new university is called the National University of Ireland. At the same time a new college was founded under the name of University College. The Royal University replaced the Queen's University under the University Act (Ireland) in 1879. No teaching was carried on, but examinations were held and degrees conferred, both on men and on women. On the west side of St Stephen's Green is the Catholic University (1854), which is under the Jesuit Fathers and affiliated to the Royal University. Between Trinity College and St Stephen's Green, a large group of buildings includes the Royal Dublin Society, founded in 1683 to develop agriculture and the useful arts, with a library and gallery of statuary; the Science and Arts Museum, and the National Library, the former with a noteworthy collection of Irish antiquities; the Museum of Natural History, with a splendid collection of Irish

fauna; and the National Gallery of Ireland, founded in 1853. Here was once a residence of the duke of Leinster, and the buildings surround the open space of Leinster Lawn. Educational foundations include the Royal College of Physicians, of Surgeons and of Science; the Royal Irish Academy, with an unequalled collection of national antiguities, including manuscripts and a library; and the Royal Hibernian Academy of painting, sculpture and architecture. In 1904 the

formation of a municipally supported gallery of modern art (mainly due to the initiative and generosity of Mr Hugh Lane) was signalized by an exhibition including the pictures intended to constitute the nucleus of the gallery. In 1905 King Edward VII. laid the foundation stone of a college of science on a site in the vicinity of Leinster Lawn. The full scheme for the occupa- tion of the site included, not only the college, but also offices for the Board of Works and the Department of Agriculture. The famous Dublin Horse and Agricultural Shows are held at Ball's Bridge in April, August and December.

The most notable churches apart from the cathedrals are Roman Catholic and principally modern. The lofty church of the Augustinians in Thomas Street; St Mary's, the pro-cathedral, in Marlborough Street, with Grecian ornamentation within, and a Doric portico; St Paul's on Arran Quay, in the Ionic style; and the striking St Francis Xavier in Gardiner Street, also Ionic, are all noteworthy, and the last is one of the finest modern churches in Ireland. Among theatres Dublin has, in the Royal, a handsome building which replaced the old Theatre Royal, burnt down in 1880. Clubs, which are numerous, are chiefly found in the neighbourhood of Sackville Street; and there should further be mentioned the Rotunda, at the corner of Great Britain Street and Sackville Street, a beautiful building of its kind, belonging to the adjacent hospital, and used for concerts and other entertainments, while its gardens are used for agricultural shows.

Suburbs. — To the west of the city lies the Phoenix Park. Here, besides the viceregal demesne and lodge and the magazine, are a zoological garden, a people's garden, the Wellington monument, two barracks, the Hibernian military school, the " Fifteen Acres," a natural amphitheatre (of much greater extent than its name implies) used as a review ground, and a racecourse. The amenities of Phoenix Park were enhanced in 1905 by the purchase for the crown of land extending along the Liffey from Island bridge to Chapelizod, which might otherwise have been built over. To the south lies Kilmainham. Here is the royal hospital for pensioners and maimed soldiers. Close

by is Kilmainham prison. To the west the valley of the Liffey affords pleasant scenery, with the well-known grounds called the " Strawberry Beds " on the north bank. In this direction lies Chapelizod, said to take its name from that Iseult whom Tennyson, Matthew Arnold and Wagner made a heroine; beyond which is Lucan connected with the city by tramway. Northward lies Clondalkin, with its round tower, marking the site of the important early see of Cluain Dolcain; Glasnevin, with famous botanical gardens; Finglas, with a ruined church of early foundation, and an Irish cross; and Clontarf, a favoured resort on the bay, with its modern castle and many residences of the wealthy classes in the vicinity. South of the city are Rathmines, a populous suburb, near which, at the " Bloody Fields," English colonists were murdered by the natives in 1209; and Donnybrook, celebrated for its former fair. Rathmines, Monkstown, Clontarf, Dalkey and Killiney, with the neighbourhood of Kingstown and Pem- broke, are the most favoured residential districts. Howth, Malahide and Sutton to the north, and Bray to the south, are favoured seaside watering-places outside the radius of actual suburbs.

Communications. — The direct route to Dublin from London and other parts of England is by the Holyhead route, controlled by the London & North Western railway with steamers to the port of Dublin itself, while the company also works in conjunction with the mail steamers of the City of Dublin Steam Packet Company to the outlying port of Kingstown, 7 m. S.E. Passenger steamers, however, also serve Liverpool, Heysham, Bristol, the south coast ports of England and London; Edinburgh and Glasgow, and other ports of Great Britain. The railways leaving Dublin are the following: the Great Northern, with its terminus in Amiens Street, with suburban lines, and a main line running north to Drogheda, Dundalk and Belfast, with ramifications through the northern countries; the Great Southern & Western (Kingsbridge terminus) to Kilkenny, Athlone and Cork; the Midland Great Western (Broadstone terminus), to Ca van, Sligo

and Galway; the Dublin & South-Eastern (Harcourt Street and Westland Row for Kingstown) ; and there is the North Wall station of the London & North-Western, with the line known as the North Wall extension, connecting with the other main lines. The internal communications of the city are excellent, electric tramways traversing the principal streets, and connecting all the principal

suburbs.

Trade. — Dublin was for long stigmatized as lacking, for so large a city, in the proper signs of commercial enterprise. A certain spirit of foolish pride was said to exist which sought to disown trade; and the tendency to be poor and genteel in the civil service, at the bar, in the constabulary, in the army, in professional life, rather than prosperous in business, was one of the most unfortunate and strongly marked characteristics of Dublin society. This was attributable to the lingering yet potent influence of an unhappy past was held by some; while others attributed the weakness to the viceregal office and the effects of a sham court. About the time of the Revolution, the woollen trade flourished in Dublin, and the produce attained great celebrity. The cheapness of labour attracted capitalists, who started extensive factories in that quarter of the town known even now as the Liberties. This quarter was inhabited altogether by workers in wool, and as the city was small, the aristocracy lived close by in noble mansions which are now miser- able memorials of past prosperity. About 1700 the English legislature prevailed on William III. to assent to laws which directly crushed the Irish trade. All exportation except to England was peremptorily forbidden, and the woollen manu- facture soon decayed. But at the close of the 18th century there were 5000 persons at work in the looms of the Liberties. About 17 1 5 parliament favoured the manufacture of linen, and the Linen Hall was built. The cotton trade was soon afterwards introduced; and silk manufacture was begun by the Huguenots, who had settled in Dublin in considerable numbers after the revocation of the edict of Nantes. Acts favourable to these enterprises were passed, and they flourished apace. But the old jealously arose in the reign of George I., and in the reign of George III. an act was passed which tended directly to tire ruin of the manufacture. The linen shared the same fate. Dublin poplins, however, keep their reputation. However adverse influences may have been combated, Dublin yet produces little for export save whisky and porter, the latter from the famous Guinness brewery and others; but a considerable export trade, principally in agricultural produce, passes through Dublin from the country. The total annual export trade may be valued at about £120,000, while imports exceed in value £3,000.000. To the manufacturing industries of the city there should be added mineral water works, foundries and shipbuilding.

By continual dredging a great depth of water is kept available in the harbour. The Dublin Port and Docks Board, which was . created in 1898 and consists of the mayor and six

members of the corporation, with other members representing the trading and shipping interests, undertook considerable works of improvement at the beginning of the 20th century. These improvements, inter alia, enabled vessels drawing up to 23 ft. to lie alongside the extensive quays which border the Liffey, at low tide. The extensive Alexandra tidal basin, on the north side of the Liffey, admits vessels of similar capacity. The Custom House Works on the north side have about 17 ft. of water. With docks named after them are connected the Royal and Grand Canals, passing respectively to north and south of the city, the one penetrating the great central plain of Ireland on the north, the other following the course of the Liffey, doing the same on the south, and both joining the river Shannon. The docks attached to the canals, and certain other smaller docks, are owned by companies, and tolls are levied on vessels entering these, but not those entering the docks under the Board.

Government. — Dublin was formerly represented by two members in the imperial parliament, but in 1885 the parlia- mentary borough was divided into the four divisions of College Green, Harbour, St Stephen's Green and St Patrick's, each returning one member. The lord-lieutenant of Ireland occupies

Dublin Castle and the Viceregal Lodge in Phoenix Park. Dublin is thus the seat of the viceregal court. It is also the seat of the Irish courts of law and equity. In connexion with these it may be noted that in 1904 a special court was established for children. On the constitution of Dublin as a county borough in 1898, the positions and duties of its corporation were left practically unaltered. The corporation consists of a lord mayor, 20 aldermen and 60 councillors, representing 20 wards. The income of the body arises from rents on property, customs and taxes. Under an act passed in 1875 the corporation has the right to forward every year three names of persons suitable for the office of high sheriff to the viceroy, one of which shall be selected by him. The corporation has neither control over the police nor any judicial duties, excepting as regards a court of conscience dealing with debts under 40s. (Irish) ; while the lord mayor holds a court for debts over 40s., and for the settlement of cases between masters and servants. The lord mayor is clerk of the markets and supervises weights and measures and deals with case? of adulteration. Besides the usual duties of local government, and the connexion with the port and docks boards already explained, there should be noticed the connexion of the corpora- tion with such bodies as those controlling the city technical schools, the Royal Irish Academy of Music, and the gallery of modern art. The corporation

has shown some concern for the housing of the poor, and an extensive scheme taken up in 1904 included the provision of cottage dwellings in the suburbs, as at Clontarf, besides improvements within the city itself. In 1905 a home on the model of the Rowton Houses in London, pro- vided by Lord Iveagh, was opened in Bride Road. A competent fire-brigade is maintained by the corporation. The city coroner is a corporate officer. The city hall, used as municipal offices, has already been mentioned ; the official residence of the lord mayor is the Mansion House, Dawson Street. The Dublin metropolitan police is a force peculiar to the city, the remainder of Ireland being protected civilly by the Royal Irish Constabulary. A large military force is usually maintained in the city of Dublin, which is the headquarters of the military district of Dublin and of the staff of Ireland (q.v.). The troops are accommodated in several large barracks in various parts of the city.

Charities. — The number of charitable institutions is large. The hospital and Free School of King Charles I., commonly called the Blue Coat hospital, was founded in 1 670. It is devoted to the education and maintenance of the sons of citizens in poor circumstances. Before the Irish Parliament Houses were erected the parliament met in the school building. Among hospitals those of special general interest are the Steevens, the oldest in the city, founded under the will of Dr Richard Steevens in 1720; the Mater Misericordiae (1861), which includes a laboratory and museum, and is managed by the Sisters of Mercy, but relieves sufferers independently of their creed; the Rotunda lying-in hospital (1756); the Royal hospital for incur- ables, Donnybrook, which was founded in 1744 by the Dublin Musical Society; and the Royal Victoria Eye and Ear hospital, Adelaide Road, which amalgamated (1904) two similar institu- tions. Lunatics are maintained in St Patrick's hospital, founded in 1745, pursuant to the will of Dean Swift, and conducted by governors appointed under the charter of incorporation. The Richmond lunatic asylum, erected near the House of Industry, and placed under the care of officers appointed by government, receives patients from a district consisting of the counties of Dublin, Louth, Meath and Wicklow, each of these contributing towards its expenses in proportion to the number of patients sent in. Besides these public establishments for the custody of lunatics, there are in the vicinity of Dublin various private asylums. The principal institution for blind men (and also those afflicted by gout) is Simpson's hospital (1780), founded by a merchant of Dublin; while blind women are maintained at the Molyneux asylum (1815). An institution for the maintenance and

education of children born deaf and dumb is maintained at Claremont, near Glasnevin (18 16). The plan of the Royal hospital, for old and maimed soldiers, was first suggested by the earl of Essex, when lord-lieutenant, and carried into effect

through the repeated applications of the duke of Ormond to Charles II. The site chosen for it was that of the ancient priory of Kilmainham, founded by Strongbow for Knights Templars. The building, completed in 1684, according to a plan of Sir Christopher Wren, is an oblong, three sides of which are dwelling- rooms, connected by covered corridors. The fourth contains the chapel, the dining-hall, and the apartments of the master, who is always the commander of the forces for the time being. The Royal Hibernian military school in Phoenix Park (1765) provides for soldiers' orphan sons. TheDrummondInstitution,Chapelizod, for the orphan daughters of soldiers, was established in 1864 by John Drummond,alderman, who left £20,000 to found the asylum. The Hibernian Marine Society for the maintenance of seamen's sons was established in the city in 1766, but now has buildings at Clontarf . The Roman Catholic Church has charge of a number of special charities, some of them educational and some for the relief of suffering.

History. — The name of Dublin signifies the " Black pool." The early" history is mainly legendary. It is recorded that the inhabitants of Leinster were defeated by the people of Dublin in the year 291. Christianity was introduced by St Patrick about 450. In the ath century the Danes attacked Dublin and took it. The first Norseman who may be reckoned as king was Thorkel I. (832), though the Danes had appeared in the country as early as the close of the previous century. Thorkel established himself strongly at Armagh. In 1014 Brian Boroihme, king of Munster, attacked the enemy and fought the battle of Clontarf, in which he and his son and 1 1 ,000 of his followers fell. The Irish, however, won the battle, but the Danes reoccupied the city. Constant struggles with 'the Irish resulted in intermissions of the Danish supremacy from 1052 to 1072, at various intervals between 1075 and 1 1 18 and from 1 1 24 to 1 136. The Danes were finally ousted by the Anglo-Normans in n 71. In 11 72 Henry II. landed at Waterf ord, and came to Dublin and held his court there in a pavilion of wickerwork where the Irish chiefs were entertained with great pomp, and alliances entered into with them. Previous to his departure for England, Henry bestowed the

government on Hugh de Lacy, having granted by charter " to his subjects of Bristol his city of Dublin to inhabit, and to hold of him and his heirs for ever, with all the liberties and free customs which his subjects of Bristol then enjoyed at Bristol and through all England." In 1176 Strongbow, earl of Pembroke, and chief leader of the Anglo-Norman forces, died in Dublin of a mortifica- tion in one of his feet, and was buried in Christ Church Cathedral, where his monument remains well preserved. A fresh charter was granted in 1207 by King John to the inhabitants of Dublin, who had not yet made their peace with the neighbourhood, but, like the settlers in other towns, were at constant feud with the native Irish; so that two years after the date of this charter, whilst the citizens of Dublin were celebrating Easter at Cullens- wood, they were set upon by the Irish of the neighbouring mountains, and 500 of them killed. The scene of slaughter is still called the Bloody Fields, and Easter Monday denominated Black Monday. On each succeeding anniversary of that day, with the prevalent desire of perpetuating a feud, the citizens marched out to Cullenswood with banners displayed—" a terror to the native Irish." In 1216 Magna Carta, a copy of which is to be found in the Red Book of the Exchequer, was granted to the Irish by Henry III. In 121 7 the fee farm of the city was granted to the citizens at a rent of 200 marks per annum; and about this peiiod many monastic buildings were founded. In 1227 the same monarch confirmed the charter of John fixing the city boundaries and the jurisdiction of its magistrates.

During the invasion of Ireland by Edward Bruce in 1315 some of the suburbs of Dublin were burnt to prevent them from falling into his hand. The inroad of Bruce had been coun- tenanced by the native Irish ecclesiastics, whose sentiments were recorded in a statement addressed to Pope John XXII. Some notion of the defence made against Bruce's invasion may be gained from the fact that the churches were torn down to supply stones for the building of the city walls. Bruce had seized Greencastle on his march; but the natives re-took the town,

and brought to Dublin the governor who: had yielded to Bruce. He was starved to death.

Richard II. erected Dublin into a marquisate in favour of Robert de Vere; whom he also created duke of Ireland. The same monarch entered Dublin in 1394 with 30,000 bowmen and 4000 cavalry, bringing with him the crown jewels; but after holding a parliament and making much courtly display before the native chieftains, on several of whom he conferred knighthood, he returned to England. Five years later, enriched with the spoils of his uncle, John of Gaunt, Richard returned to Ireland, landing at Waterford, whence he marched through the counties of Kilkenny and Wicklow, and subsequently arrived in Dublin, where he remained a fortnight, sumptuously entertained by the provost, as the chief magistrate of the city was then called, till intelligence of the invasion of his kingdom by Bolingbrdke recalled him to England.

In 1534 Lord Thomas Fitzgerald, better known as Silken- Thomas (so called because of a fantastic fringe worn in the helmet of his followers), a young man of rash courage and good abilities, son of the Lord Deputy Kildare, believing his father, who was imprisoned in the Tower of London, to have been beheaded, organized a rebellion against the English Government, and marched with his followers from the mansion of the earls of Kildare in Thomas Court, through Dame's Gate to St Mary's Abbey, where, in the council chamber, he proclaimed himself a rebel. On his appearing before the wall with a powerful force, the citizens were induced through fear to give admission to a detachment of his troops to besiege the castle; but, on hearing that he had met with a reverse in another quarter, they suddenly closed their gates and detained his men as prisoners. He then attacked the city itself; but, finding it too strong to be seized by a coup de main, he raised the siege on condition of having his captured soldiers exchanged for the children of some of the principal citizens who had fallen into his hands. After much vicissitude of fortune, Lord Thomas and others concerned in this rebellion were executed at Tyburn in 1536.

At the outbreak of civil war in 1641, a conspiracy of the Irish septs, under the direction of Roger Moore, to seize Dublin Castle, was disclosed by one Owen Connolly on the eve of the day on which the attempt was to have been made, and the city was thus preserved for the king's party; but the Irish outside began an indiscriminate extermination of the Protestant population. In 1646 Dublin was besieged, but without success, by the Irish army of 16,000 foot and 1600 horse, under the guidance of the Pope's nuncio Rinuccini and others, banded together " to restore and establish in Ireland the exercise of the Roman Catholic religion." The city had been put in an

efficient state of defence by the marquess of Ormonde, then lord-lieutenant; but in the following year, to prevent it falling into the hands of the Irish, he surrendered it on conditions "to Colonel Jones, com- mander of the Parliamentary forces. In 1649 Ormonde was totally defeated at the battle of Baggotrath, near Old Rathmines, in an attempt to recover possession. The same year Cromwell landed in Dublin, as commander-in-chief under the parliament, with 9000 foot and 4000 horse, and proceeded thence on his career of conquest.

When James II. landed in Ireland in 1689 to assert his right to the British throne, he held a parliament in Dublin, which passed acts of attainder against upwards of 3000 Protestants. The governor of the city, Colonel Luttrell, at the same time issued a proclamation ordering all Protestants not housekeepers, except- ing those following some trade, to depart from the city within 24 hours, under pain of death or imprisonment, and in various ways restricting those who were allowed , to remain. In the hope of relieving his financial difficulties, the king erected a mint, where money was coined of the " worst kind of old brass, guns and the refuse of metals, melted down together," of the nominal value of £1,568,800, with which his troops were paid, and trades- men were compelled to receive it under penalty of being hanged in case of refusal. Under these regulations' the entire coinage was put into circulation. After his defeat at the battle of the Boyne, James returned to Dublin, but left it again before

daybreak the next day; and William III. advancing by slow marches, on his arrival encamped at Finglas, with upwards of 30,000 men, and the following day proceeded in state to St Patrick's cathedral to return. thanks for his victory.

In 1783 a convention of delegates from all the volunteer corps in Ireland assembled in Dublin for the purpose of procuring a reform in parliament; but the House of Commons refused to entertain the proposition, and the convention separated without coming to any practical result. In May 1798 the breaking out of a conspiracy planned by the United Irishmen to seize the city was prevented by the capture of Lord Edward Fitzgerald, son of the duke of Leinster and husband of the celebrated " Pamela." Lord Edward died in prison of the wounds received in the encounter which preceded his capture. In 1803 an insurrection headed by Robert Emmett, a young barrister of much promise, broke out, but was immediately quelled, with the loss

of some lives in the tumult, and the death of its leaders on the scaffold. In 1848 William Smith O'Brien, M.P. for Limerick, raised a rebellion in Tipperary, and the lower classes in Dublin were greatly agitated. Owing, however, to timely and judicious disposition of the military and police forces the city was saved from much bloodshed. In 1867 the most serious of modern conspiracies, that known as the Fenian organization, came to light. The reality of it was proved by a ship being found laden with gunpowder in the Liverpool docks, and another with £5000 and 2000 pike-heads in Dublin. The Habeas Corpus Act was suspended at one sitting by both Houses of Parliament and about 960 arrests were made in Dublin in a few hours. Dublin castle was fortified; and the citizens lived in a state of terror for several weeks together. For later history, see Ireland.

See W. Harris, History and Antiquities of the City of Dublin (Dublin, 1766); Sir J. T. Gilbert, History of the City of Dublin (Dublin, 1859). The history of the Norsemen in Dublin has been dealt with by a Nor- wegian writer, L. J. Vogt, Dublin som Norsk By (Christiania, 1896).

DUBNER, JOHANN FRIEDRICH (1802-1867), German classical scholar (naturalized a Frenchman), was born in Hor selgau, near Gotha, on the 20th of December 1802. After study- ing at the university of Gottingen he returned to Gotha, where from 1827-1832 he held a post (inspector coenobii) in connexion with the gymnasium. During this period he made his name known by editions of Justin and Persius (after Casaubon). In 1832 he was invited by the brothers Didot to Paris, to co-operate in a new edition of H. Etienne's Greek Thesaurus. He also contributed largely to the Bibliotheca Graeca published by the same firm, a series of Greek classics with Latin translation, critical notes and valuable indexes. One of Dubner's most important works was an edition of Caesar undertaken by com- mand of Napoleon III., which obtained him the cross of the Legion of Honour. His editions are considered to be models of literary and philological criticism, and did much to raise the standard of classical scholarship in France. He violently attacked Burnouf's method of teaching Greek, but without result. Diibner may have gone too far in his zeal for reform, and his opinions may have been too harshly expressed, but time has shown him to be right. The old text-books have been discarded, and a great improvement in classical teaching has taken place in recent years. Diibner died at Montreuil-sous-Bois, near Paris, on the 13 th of December 1867.

See F. Godefroy, Notice sur J. F. Diibner (1867); Sainte-Beuve, Discours a la memoire de Diibner (1868); article in Allgemeine

deutsche Biographie.

DUBOIS, FRANCOIS CLEMENT THEODORE (1837-), French musical composer, was born at Rosney (Marne) on the 24th of August 1837. He studied at the Conservatoire under Ambroise Thomas, and won the Grand Prix de Rome in 1861 with his cantata Atala. After the customary sojourn in Rome, Dubois returned to Paris and devoted himself to teaching. He was appointed " maitre de Chapelle " at the church of Ste Clotilde, where Cesar Franck was organist, in 1863, and remained at this post for five years, during which time he composed a quantity of sacred music, notably Les Sept Paroles du Christ (1867), a work which has become well known in France. In 1868 he became " maitre de Chapelle " at the church of the

Madeleine, and nine years later succeeded Camille Saint-Saens there as organist. He became professor of harmony at the Conservatoire in 1871, and was appointed professor of composi- tion in succession to L60 Delibes in 1891. At the death of Ambroise Thomas in 1896 he became director of the Conserva- toire. Dubois is an extremely prolific composer and has written in a variety of forms. His sacred works include four masses, a requiem, Les Sept Patoles du Christ, a large number of motets and pieces for organ. For the theatre he has composed La Guzla de I'Emir, an opera comique in one act, played at the Theatre Lyrique de l'Athenee in 1873; Le Pain bis, an opera comique in one act, given at the Opera Comique in 1879; La Farandole, a ballet in three acts, produced at the Grand Opera in 1883; Aben-Hamet, a four-act opera, heard at the Theatre Italien in 1884; Xaviere, a dramatic idyll in three acts, played at the Opera Comique in 1895. His orchestral works include two concert overtures, the overture to Frithiojf (1880), several suites, Marche Mroique de Jeanne d' Arc (1888), &c. He is also the author of Le Paradis perdu, an oratorio which gained for him the prize offered by the city of Paris in 1878; V 'Enlevement de Proserpine (1879), a scene lyrique; Dilivrance (1887), a cantata; Hylas (1890), a scene lyrique for soli, chorus and orchestra; Notre Dame de la mer, a symphonic poem (1897); and a musical setting of a Latin ode on the baptism of Clovis (1899). In addition, he composed much for the piano and voice.

DUBOIS, GUILLAUME (1656-1723), French cardinal and statesman, was born at Brive, in Limousin, on the 6th of September 1656. He was, according to his enemies, the son of an apothecary, his father being in fact a doctor of medicine of respectable family, who kept a small drug store as part of the necessary outfit of a

country practitioner. He was educated at the school of the Brothers of the Christian Doctrine at Brive, where he received the tonsure at the age of thirteen. In 1672, having finished his philosophy course, he was given a scholarship at the college of St Michel at Paris by Jean, marquis de Pompa- dour, lieutenant-general of the Limousin. The head of the college, the abbe Antoine Faure, who was from the same part of the country as himself, befriended the lad, and continued to do so for many years after he had finished his course, finding him pupils and ultimately obtaining for him the post of tutor to the young duke of Chartres, afterwards the regent duke of Orleans. Astute, ambitious and unrestrained by conscience, Dubois ingratiated himself with his pupil, and, while he gave him formal school lessons, at the same time pandered to his evil passions and encouraged him in their indulgence. He gained the favour of Louis XIV. by bringing about the marriage of his pupil with Mademoiselle de Blois, a natural but legitimated daughter of the king; and for this service he was rewarded with the gift of the abbey of St Just in Picardy. He was present with his pupil at the battle of Steinkirk, and " faced fire," says Marshal Luxembourg, " like a grenadier." Sent to join the French embassy in London, he made himself so active that he was recalled by the request of the ambassador, who feared his intrigues. This, however, tended to raise his credit with the king. When the duke of Orleans became regent (17 15) Dubois, who had for some years acted as his secretary, was made councillor of state, and the chief power passed gradually into his hands.

His policy was steadily directed towards maintaining the peace of Utrecht, and this made him the main opponent of the schemes of Cardinal Alberoni for the aggrandizement of Spain. To counteract Alberoni's intrigues, he suggested an alliance with England, and in the face of great difficulties succeeded in negotiating the Triple Alliance (1717). In 1719 he sent an army into Spain, and forced Philip V. to dismiss Alberoni. Otherwise his policy remained that of peace. Dubois's success strengthened him against the bitter opposition of a large section of the court. Political honours did not satisfy him, however. The church offered the richest field for exploitation, and in spite of his dissolute life he impudently prayed the regent to give him the archbishopric of Cambray, the, richest in France. His demand was supported by George I., and the regent yielded.

In one day all the usual orders were conferred on him, and even the great preacher Massillon consented to take part in the ceremonies. His next aim was the cardinalate, and, after long and most profitable negotiations on the part of Pope Clement XI., the red hat was given to him by Innocent XIII. (1721), whose election was largely due to the bribes of Dubois. It is estimated that this cardinalate cost France about, eight million francs. In the following year he was named first minister of France (August). He was soon after received at the French Academy; and, to the disgrace of the French clergy, he was Darned president of their assembly.

When Louis XV. attained his majority in 1723 Dubois re- mained chief minister. He had accumulated an immense private fortune, possessing in addition to his see the revenues of seven abbeys. He was, however, a prey to the most terrible pains of body and agony of mind. His health was ruined by his de- baucheries, and a surgical operation became necessary. This was almost immediately followed by his death, at Versailles, on the 10th of August 1723. His portrait was thus drawn by the due de St Simon: — " He was a little, pitiful, wizened, herring- gutted man, in a flaxen wig, with a weasel's face, brightened by some intellect. All the vices — perfidy, avarice, debauchery, ambition, flattery — fought within him for the mastery. He was so consummate a liar that, when taken in the fact, he could brazenly deny it. Even his wit and knowledge of the world were spoiled, and his affected gaiety was touched with sadness, by the odour of falsehood which escaped through every pore of his body." This famous picture is certainly biassed. Dubois was unscrupulous, but so were his contemporaries, and whatever vices he had, he gave France peace -after the disastrous wars of Louis XIV.

In 1789 appeared Vie privee du Cardinal Dubois, attributed to one of his secretaries, Mongez; and in 18 15 his Memoires secrets et corre- spondance inSdite, edited by L. de Sevelinges. See also A. Cheruel, Saint-Simon et I'abbe Dubois; L. Wiesener, Le Regent, I'abU Dubois et les Anglais (1891) ; and memoirs of the time.

DUBOIS, JEAK ANTOINE (1765-1848), French Catholic missionary in India, was ordained in the diocese of Viviers in 1792, and sailed for India in the same year under the direction of the Missions Etrangeres. He was at first attached to the Pondicherry mission, and worked in the southern districts of the present Madras Presidency. On the fall of Seringapatam in 1799 he went to Mysore to reorganize the Christian community that had been shattered by Tipu Sultan. Among the benefits which he conferred upon his impoverished flock were the founding of agricultural colonies and the introduction of

vaccination as a preventive of smallpox. But his great work was his record of Hindu Manners, Customs and Ceremonies. Immediately on his arrival in India he saw that the work of a Christian missionary should be based on a thorough acquaintance with the innermost life and character of the native population. Accordingly he abjured European society, adopted the native style of clothing, and made himself in habit and costume as much like a Hindu as he could. He gained an extraordinary welcome amongst people of all castes and conditions, and is still spoken of in many parts of South India with affection and esteem as " the prince's son, the noblest of Europeans." Although Dubois modestly dis- claimed the rank of an author, his collections were not so much drawn from the Hindu sacred books as from his own careful and vivid observations, and it is this, united to a remarkable prescience, that makes his work so valuable. It is divided into three parts: (1) a general view of society in India, and especially of the caste system; (2) the four states of Brahminical life; (3) religion — feasts, temples, objects of worship. Not only does the abbe give a shrewd, clear-sighted, candid account of the manners and customs of the Hindus, but he provides a very sound estimate of the British position in India, and makes some eminently just observations on the difficulties of administering the Empire according to Western notions of civilization and progress with the limited resources that are available. Dubois's French MS. was purchased for eight thousand rupees by Lord William Bentinck for the East India Company in 1807; in 1816 an

English translation was published, and of this edition about 1864 a curtailed reprint was issued. The abb6, however, largely recast his work, and of this revised text (now in the India Office) an edition with notes was published in 1897 by H. K. Beauchamp. Dubois left India in January 1823, with a special pension con- ferred on him by the East India Company, and on reaching Paris was appointed director of the Missions Etrangeres, of which he afterwards became superior (1836-1839). He translated into French the famous book of Hindu fables called Panchatantra, and also a work called The Exploits of the Guru Paramarta. Of more interest were his Letters on the State of Christianity in India, in which he asserted his opinion that under existing circumstances there was no human possibility of so overcoming the invincible barrier of Brahminical prejudice as to convert the Hindus as a nation to any sect of Christianity. He acknowledged that low castes and outcastes might be converted in large numbers, but of the higher castes he wrote: " Should the intercourse between individuals of both nations, by becoming mere intimate and more friendly, produce a change in the religion and

usages of the country, it will not be to turn Christians that the ̂will forsake their own religion, but rather … to become mere atheists." He died in 1848.

DUBOIS, PAUL (1829-1905), French sculptor and painter, was born at Nogent-sur-Seine on the 18th of July 1829. He studied law to please his family, and art to please himself, and finally adopted the latter, and placed himself under Tous- saint. After studying at the Ecole des Beaux- Arts, Dubois went to Rome. His first contributions to the Paris Salon (i860) were busts of " The Countess de B." and " A Child." For his first .statues, " St John the Baptist " and " Narcissus at the Bath " (1863) , he was awarded a medal of the second class. The statue of " The Infant St John," which had been modelled in Florence in i860, was exhibited in Paris in bronze, and was acquired by the Luxemburg. "A Florentine Singer of the Fifteenth Century," one of the most popular statuettes in Europe, was shown in 1865; " The Virgin and Child " appeared in the Paris Universal Exhibition in 1867; " The Birth of Eve " was pro- duced in 1873, and was followed by striking busts of Henner, Dr Parrot, Paul Baudry, Pasteur, Gounod and Bonnat, remark- able alike for life, vivacity, likeness, refinement and subtle handling. The chief work of Paul Dubois was " The Tomb of General Lamoriciere " in the cathedral of Nantes, a brilliant masterpiece conceived in the Renaissance spirit, with allegorical figures and groups representing Warlike Courage, Charity, Faith and Meditation, as well as bas-reliefs and enrichments; the two first-named works were separately exhibited in the Salon of

1877. The medallions represent Wisdom, Hope, Justice, Force, Rhetoric, Prudence and Religion. The statue of the " Constable Anne de Montmorency " was executed for Chantilly, and that of " Joan of Arc " (1889) for the town of Reims. The Italian influence which characterized the earlier work of Dubois dis- appeared as his own individuality became clearly asserted. As a painter he restricted himself mainly to portraiture. " My Children " (1876) being probably his most noteworthy achieve- ment. His drawings and copies after the Old Masters are of peculiar excellence: they include " The Dead Christ " (after Sebastian del Piombo) and " Adam and Eve " (after Raphael). In 1873 Dubois was appointed keeper of the Luxemburg Museum. He succeeded Guillaume as director of the Ecole des Beaux-Arts,

1878, and Perraud as member of the Academie des Beaux-Arts. Twice at the Salon he obtained the medal of honour (1865 and 1876), and once at the Universal Exhibition (1878). He also won

numerous other distinctions, and was appointed grand cross of the Legion of Honour. He was made a member of several European orders, and :n 1895 was elected an honorary foreign academician of the Royal Academy of London. He died at Paris in 1905.

DUBOIS, PIERRE (c. 1250-c. 13 12), French publicist in the reign of Philip the Fair, was the author of a series of political pamphlets embodying original and daring views. He was known to Jean du Tillet in the 16th, and to Pierre Dupuy in the 17th century, but remained practically forgotten until the

middle of the 19th century, when his history was reconstructed from his works. He was a Norman by birth, probably a native of Coutances, where he exercised the functions of royal advocate of the bailliage and procurator of the university. He was educated at the university of Paris, where he heard St Thomas Aquinas and Siger of Brabant. He was, nevertheless, no adherent of the scholastic philosophy, and appears to have been conversant with the works of Roger Bacon. Although he never held any important political office, he must have been in the confidence of the court when, in 1300, he wrote his anonymous Summaria, brevis et compendiosa dpctrina felicis expedicionis et abbreviationis guerrarum et litium regni Francorum, which is extant in a unique MS., but is analysed by N. de Wailly in the Bibliotheque de I'Ecole des Charles (2nd series, vol. iii.). In the contest between Philip the Fair and Boniface VIII. Dubois identified himself completely with the secularizing policy of Philip, and poured forth a series of anti-clerical pamphlets, which did not cease even with the death of Boniface. His Supplication du pueble de France au roy contre le pape Boniface le VIII", printed in 1614 in Acta inter Bonifacium VIII. et Philippum Pulchrum, dates from 1304, and is a heated indict- ment of the temporal power. He represented Coutances in the states-general of 1302, but in 1306 he was serving Edward I. as an advocate in Guienne, without apparently abandoning his Norman practice by which he had become a rich man. The most important of his works, his treatise De recuperatione terrae sanctae, 1 was written in 1306, and dedicated in its extant form to Edward I., though it is certainly addressed to Philip. Dubois outlines the conditions necessary to a successful crusade — the establishment and enforcement of a state of peace among the Christian nations of the West by a council of the church; the reform of the monastic, and especially of the military, orders; the

reduction of their revenues; the instruction of a number of young men and women in oriental languages and the natural sciences with a view to the government of Eastern peoples; and the establishment of Philip of Valois as emperor of the East. The king of France was in fact, when once the pope was deprived of the temporal power, to become the suzerain of the Western nations, and in a later and separate memoir Dubois proposed that he should cause himself to be made emperor by Clement V. His zeal for the crusade was probably subordinate to the desire to secure the wealth of the monastic orders for the royal treasury, and to transfer the ecclesiastical jurisdiction to the crown. His ideas on education, on the celibacy of the clergy, and his schemes for the codification of French law, were far in advance of his time. He was an early and violent " Gallican," and the first of the great French lawyers who occupied themselves with high politics. In 1308 he attended the states-general at Tours. He is generally credited with Quaedam proposita papae a rege super facto Templariorum, a draft epistle supposed to be addressed to Clement by Philip. This was followed by other pamphlets in the same tone, in one of which he proposed that a kingdom founded on the property of the Templars in the East should be established on behalf of Philip the Tall.

See an article by E. Renan in Hist. litt. de la France, vol. xxvi. pp. 471-536; P. Dupuy Hist, de la condamnation . . . des Templiers (Brussels, 17 13), and Hist, du differend entre le pape Boniface VIII et Philippe le Bel (Paris 1655) ; and Notices et extraits de manuscrits, vol. xx.

DUBOIS, a borough of Clearfield county, Pennsylvania, U.S.A., 129 m. by rail N.E. of Pittsburg. Pop. (1890) 6149, (1900) 937s, of whom 1655 were foreign-born; (1910 census) 1 2,623. It is served by the Pennsylvania, the Buffalo, Rochester & Pittsburg, and the Buffalo & Susquehanna railways. The borough is built on a small plateau surrounded by hills, on the west slope of the Alleghany Mountains, nearly 1400 ft. above sea-level. Its chief importance is as a coal and lumber centre; among its manufacturing establishments are blast furnaces, iron works, machine shops, railway repair shops, tanneries, planing mills, flour mills, locomotive works and a glass factory. Dubois was first settled in 1872, was named in honour of its founder, John Dubois, and was incorporated in 1881.

1 Printed in Collections d servir a I'etude de Vhistoire (1891).

DUBOIS-CRANCfi, EDMOND LOUIS ALEXIS (1747-1814), French Revolutionist, born at Charleville,was at first a musketeer, then a

lieutenant of the mar6chaux,ox guardsmen of the old regime. He embraced liberal ideas, and in 1789 was elected deputy to the states-general by the third estate of Vitry-le-Francois. At the Constituent Assembly, of which he was named secretary in November 1789, he busied himself mainly with military reforms. He wished to see the old military system, with its caste distinc- tions and its mercenaries, replaced by an organization of national guards in which all citizens should be admitted. In his report, on the 12th of December 1789, he gave utterance for the first time to the idea of conscription, which he opposed to the recruiting system of the old regime. His report was not, however, adopted. He succeeded in securing the Assembly's vote that any slave who touched French soil should become free. After the Constituent, Dubois-Crance was named marSchal de camp, but he refused to be placed under the orders of Lafayette and preferred to serve as a simple grenadier. Elected to the Convention by the department of the Ardennes, he sat among the Montagnards, but without following any one leader, either Danton or Robespierre. In the trial of Louis XVI. he voted for death without delay or appeal. On the 21st of February 1793 he was named president of the Convention. Although he was a member of the two committees of general defence which preceded that of public safety, he did not belong to the latter at its creation. But he composed a remarkable report on the army, recommending two measures which contributed largely to its success, the rapid advancement of the lower officers, which opened the way for the most famous generals of the Revolution, and the fusion of the volunteers with the veteran troops. In August 1793 Dubois-Crance was designated " representative on mission " to the army of the Alps, to direct the siege of Lyons, which had revolted against the republic. Accused of lack of energy, he was replaced by G. Couthon. On his return he easily justified himself, but was excluded from the Jacobin club at the instance of Robespierre, before whom he refused to bend. Consequently he was naturally drawn to participate in the revolution of the 9th of Thermidor of the year II., directed against Robespierre. But he would not join the Royalist reaction which followed, and was one of the committee of five which had to oppose the Royalist insurrection of Vendemiaire (see French Revolution!. It was also during this period that Dubois-Crance was named a member of the committee of public safety, then much reduced in importance. After the Convention, under the Directory, Dubois-Cranc6 was a member of the Council of the Five Hundred, and was appointed inspector-general of infantry; then, in 1799, minister of war. Opposed to the coup d'etat of the 18th of Brumaire, he lived in retirement during the Consulate and the Empire. He died at Rethel on the 29th of June 1814. His portrait stands in the foreground in J. L. David's

celebrated sketch of the " Oath of the Tennis Court."

Among the numerous writings of Dubois-Crance may be noticed his Observations sur la constitution militaire, ou bases du travail propose au comite militaire. See H. F. T. Jung, Dubois de Crance. L'armee et la Revolution, 1789-1794 (2 vols., Paris, 1884).

DU BOIS-REYMOND, EMIL (1818-1896), German physiologist, was born in Berlin on the 7th of November 1818. The Prussian capital was the place both of his birth and of his life's work, and he will always be counted among Germany's great scientific men; yet he was not of German blood. His father belonged to Neuchatel, his mother was of Huguenot descent, and he spoke of himself as " being of pure Celtic blood." Educated first at the French college in Berlin, then at Neuchatel, whither his father had returned, he entered in 1836 the university of Berlin. He seems to have been uncertain at first as to the bent of his studies, for he sat at the feet of the great ecclesiastical historian August Neander, and dallied with geology; but eventually he threw himself into the study of medicine, with such zeal and success as to attract the notice of the great teacher of anatomy and physiology, who was then making Berlin famous as a school for the sciences ancillary to medicine. Johannes Miiller may be regarded as the central figure in the history of modern physiology.

the physiology of the 19th century. Mtiller's earlier studies had been distinctly physiological; but his inclination, no less than his position as professor of anatomy as well as of physiology in the university of Berlin, led him later on into wide studies of comparative anatomy, and these, aided by the natural bent of his mind towards problems of general philosophy, gave his views of physiology a breadth and a depth which profoundly influenced the progress of that science in his day. He had, about the time when the young Du Bois-Reymond came to his lectures, puhlished his great Elements of Physiology, the dominant note of which may be said to be this:—" Though there appears to be something in the phenomena of living beings which cannot be explained by ordinary mechanical, physical or chemical laws, much may be so explained, and we may without fear push these explanations as far as we can, so long as we keep to the solid ground of observa- tion and experiment." Muller recognized in the Neuchatel lad a mind fitted to carry on physical researches into the pheno- mena of living things in a legitimate way. He made him in

1840 his assistant in physiology, and as a starting-point for an inquiry put into his hands the essay which the Italian, Carlo Matteucci, had just published on the electric phenomena of animals. This determined the work of Du Bois-Reymond's life. He chose as the subject of his graduation thesis " Electric Fishes," and so commenced a long series of investigations on animal electricity, by which he enriched science and made for himself a name. The results of these inquiries were made known partly in papers communicated to scientific journals, but also and chiefly in his work Researches on Animal Electricity, the, first part of which appeared in 1848, the last in 1884.

This great work may be regarded under two aspects. On the one hand, it is a record of the exact determination and approxima- tive analysis of the electric phenomena presented by living beings. Viewed from this standpoint, it represents a remarkable advance of our knowledge. Du Bois-Reymond, beginning with the imperfect observations of Matteucci, built up, it may be said, this branch of science. He did so by inventing or improving methods, by devising new instruments of observation or by adapting old ones. The debt which science owes to him on this score is a large one indeed. On the other hand, the volumes in question contain an exposition of a theory. In them Du Bois- Reymond put forward, a general conception by the help of which he strove to explain the phenomena which he had observed. He developed the view that a living tissue, such as muscle, might be regarded as composed of a number of electric molecules, of molecules having certain electric properties, and that the electric behaviour of the muscle as a whole in varying circum- stances was the outcome of the behaviour of these native electric molecules. It may perhaps be said that this theory has not stood the test of time so well as have Du Bois-Reymond's other more simple deductions from observed facts. It was early attacked by Ludimar Hermann, who maintained that a living untouched tissue, such as a muscle, is not the subject of electric currents so long as it is at rest, is isoelectric in substance, and therefore need not be supposed to be made up of electric molecules, all the electric phenomena which it manifests being due to internal molecular changes associated with activity or injury. Although most subsequent observers have ranged themselves on Hermann's side, it must nevertheless be admitted that Du Bois-Reymond's theory was of great value if only as a working hypothesis, and that as such it greatly helped in the advance of science.

Du Bois-Reymond's work lay chiefly in the direction of animal electricity, yet he carried his inquiries' — such as could be studied by

physical methods — into other parts of physiology, more especially into the phenomena of diffusion, though he pub- lished little or nothing concerning the results at which he arrived. For many years, too, he exerted a great influence as a teacher. In 1858, upon the death of Johannes Muller, the chair of anatomy and physiology, which that great man had held, was divided into a chair of human and comparative anatomy, which was given to K. B. Reichert (1811-1883), and a chair of ; physiology, which naturally fell to Du Bois-Reymond. This he held to his death, carrying out his researches for many years under unfavourable

conditions of inadequate accommodation. In 1877, through his influence, the government provided the university with a proper physiological laboratory. In 1851 he was admitted into the Academy of Sciences of Berlin, and in 1867 became its perpetual secretary. For many years he and his friend H. von Helmboltz, who like him had been a pupil of Johannes Muller, were prominent men in the German capital. Acceptable at court, they both used their position and their influence for the advancement of science. Both, from time to time as opportunity offered, stepped out of the narrow limits of the professorial chair and gave the world their thoughts concerning things on which they could not well dwell in the lecture room. Du Bois-Reymond, as has been said, had in his earlier years wandered into fields other than those of physiology and medicine, and in his later years he went back to some of these. His occasional discourses, dealing with general topics and various problems of philosophy, show that to the end he possessed the historic spirit which had led him as a lad to listen to Neander; they are marked not only by a charm of style, but by a breadth of view such as might be expected from Johannes Miiller's pupil and friend. He died in the city of his birth and adoption on the 26th of November 1896. (M. F.)

DUBOS, JEAN-BAPTISTE (1670-1743), French author, was born at Beauvais in December 1670. After studying for the church, he renounced theology for the study of public law and politics. He was employed by M. de Torcy, minister of foreign affairs, and by the regent and Cardinal Dubois in several secret missions, in which he acquitted himself with great success. He was rewarded with a pension and several benefices. Having obtained these, he retired from political life, and devoted himself to history and literature. He gained such distinction as an author that in 1720 he was elected a member of the French Academy, of which, in 1 7 23, he was appointed perpetual secretary in the room of M. Dacier. He died at Paris on the 23rd of March 1742, repeating as he expired the well-known remark of an ancient, " Death is a law, not a punishment."

His first work was L'Histoire des quatre Gordiens prouv&e et illustrSe par des mSdailles (Paris, 1695, i2mo), which, in spite of its ingenuity, did: not succeed in altering the common opinion, which only admits three emperors of this name. About the commencement of the war of 1701, being charged with different negotiations both in Holland and in England, with the design to engage these powers if possible to adopt a pacific line of policy, he, in order to promote the objects of his mission, published a work entitled Les Intertts de V Angleterre mal entendus dans la guerre prSsente (Amsterdam, 1703, i2mo). But as this work contained indiscreet disclosures, of which the enemy took advantage, and predictions which were not fulfilled, a wag took occasion to remark that the title ought to be read thus: Les Intuits de V Angleterre mal entendus par l*abb& Dubos. It is remarkable as containing a distinct prophecy of the revolt of the American colonies from Great Britain. His next work was L'Histoire de la Ligue de Cambray (Paris, 1709, 1728 and 1785, 2 vols. i2mo), a full, clear and interesting history, which obtained the commendation of Voltaire. In 1734 he published his Histoire critique de V Uablissement de la monarchic francaise dans les Gaules (3 vols. 4to) — a work the object of which was to prove that the Franks had entered Gaul, not as conquerors, but at the request of the nation, which, according to him, had called them in to govern it. But this system, though unfolded with a degree of skill and ability which at first procured it many zealous partisans, was victoriously refuted by Montesquieu at the end of the thirtieth book of the Esprit des lois. His Reflexions critiques sur la poisie et sur la peinture, published for the first time in 17 19 (2 vols. i2mo), but often reprinted in three volumes, constitute one of the works in which the theory of the arts is explained with the utmost sagacity and discrimination. Like his history of the League of Cambray, it was highly praised by Voltaire. The work was rendered more remarkable by the fact that its author had no practical acquaintance with any one of the arts whose principles he discussed. Besides the works above enumerated, a manifesto of Maximilian, elector of Bavaria, against the emperor Leopold, relative to the succession in Spain, has been

attributed to Dubos, chiefly, it appears, from the excellence of the style.

DUBUQUE, a city and the county-seat of Dubuque county, Iowa, U.S.A., on the Mississippi river, opposite the boundary line between

Wisconsin and Illinois. Pop. (1890) 30,311; (1900) 36,297; (1905, state census) 41,041 (including 6835 foreign-born, the majority of whom were German and Irish) ; (1910 U.S. census) 38,494. Dubuque is served by the Illinois Central, the Chicago, Milwaukee & Saint Paul (which has repair shops here); the Chicago, Burlington & Quincy, and the Chicago Great Western railways; it also has a considerable river traffic. The river is spanned here by a railway bridge and two wagon bridges. The business portion of the city lies on the low lands bordering the river; many of the residences are built on the slopes and summits of bluffs commanding extensive and picturesque views. Among the principal buildings'are the Carnegie-Stout free public library (which in 1908 had 23,600 volumes, exclusive of the valuable Senator Allison collection of public documents), the public high school, and the house of the Dubuque Club. Dubuque is a Roman Catholic archiepiscopal see, and is the seat of St Joseph's College (1873), a small Roman Catholic institution; of Wartburg Seminary (1854), a small Evangelical Lutheran theological school; of the German Presbyterian Theological School of the Northwest (1852); of St Joseph's Ladies' Academy; and of Bayless Business College. Fifteen miles from Dubuque is a monastery of Trappist monks. Among the city's charitable institutions are the Finley and the Mercy hospitals, a home for the friendless, a rescue home, a House of the Good Shepherd, and an insane asylum. In 1900 Dubuque ranked fourth and in 1905 fifth among the cities of the state as a manufacturing centre, the chief products being those of the planing mills and machine shops, and furniture, sashes and doors, liquors, carriages, wagons, coffins, clothing, boots and shoes, river steam boats, barges, torpedo boats, &c, and the value of the factory product being $9,279,414 in 1905 and $9,651,247 in 1900. The city lies in a region of lead and zinc mines, quantities of zinc ore in the form of black-jack being taken from the latter. Dubuque is important as a distributing centre for lumber, hardware, groceries and dry-goods.

As early as 1788 Julien Dubuque (1765-1810), attracted by the lead deposits in the vicinity, which were then being crudely worked by the Sauk and Fox Indians, settled here and carried on the mining industry until his death. In June 1829 miners from Galena, Illinois, attempted to make a settlement here in direct violation of Indian treaties, but were driven away by United States troops under orders from Colonel Zachary Taylor. Immediately after the Black Hawk War, white settlers began coming to the mines. Dubuque was laid out under an act of Congress approved on the 2nd of July 1836, and was incorporated in 1841.

DU CAMP, MAXIME (1822-1894), French writer, the son of a successful surgeon, was born in Paris on the 8th of February 1822. He had a strong taste for travel, which his father's means enabled him to indulge as soon as his college days were over. Between 1844 and 1845, and again, in company with Gustave Flaubert, between 1849 and 185 1, he travelled in Europe and the East, and made excellent use of his experiences in books published after his return. In 185 1 he was one of the founders of the Revue de Paris (suppressed in 1858), and was a frequent contributor to the Revue des deux mondes. In 1853 he was made an officer of the Legion of Honour. He served as a volunteer with Garibaldi in i860, and gave an account of his experiences in his Expedition des deux Sidles (1861). In 1870 he was nominated for the senate, but his election was frustrated by the downfall of the Empire. He was elected a member of the French Academy in 1880, mainly, it is said, on account of his history of the Commune, published under the title of Les Convulsions de Paris (1878-1880). His writings include among others the Chants modernes (1855), Convictions (1858); numerous works on travel, Souvenirs et paysages d'orient (1848), Egypte, Nubie, Palestine, Syrie (1852); works of art criticism, Les Salons de 1857, 1859, 1861; novels, L'Homme au bracelet d'or (1862), Une

Histoire d'amour (1889) ; literary studies, TMophile Gautier (1890) . Du Camp was the author of a valuable book on the daily life of Paris, Paris, ses organes, ses fonctions, sa vie dans la seconde moitie du XIX e siecle (1869-1875). He published several works on social questions, one of which, the Mceurs de mon temps, was to be kept sealed in the Bibliotheque 'Natioriale until ' 1910. His Souvenirs litleraires (2 vols., 1882-1883) contain much information about contemporary writers, especially Gustave Flaubert, of whom Du Camp was an early and intimate friend. He died on the 9th of February 1894. Du Camp was one of the earliest amateur photographers, and his books of travel were among the first to be illustrated by means of what was then a new art.

DU CANGE, CHARLES DU FRESNE, Sieur (1610-1688), one of the lay members of the great 17th century group of French critics and scholars whc laid the foundations of modern historical criticism, was born at Amiens on the 18th of December 16 10. At an early age his father sent him to the Jesuits' college at Amiens, where he greatly distinguished himself. Having com- pleted the usual course at this seminary, he applied himself to the study of law at Orleans, and afterwards went to Paris, where in 163 1 he was received as an advocate before the parlia- ment. Meeting with very slight success in his profession, he returned to his native city, and in July 1638

married Catherine Dubois, daughter of a royal official, the treasurer in Amiens; and in 1647 he purchased the office of treasurer from his father- in-law; but its duties did not interfere with the literary and historical work to which he had devoted himself since returning to Amiens. Forced to leave his native city in 1668 in consequence of a plague, he settled in Paris, where he resided until his death on the 23rd of October 1688. In the archives of Paris Du Cange was able to consult charters, diplomas, manuscripts and a multitude of printed documents, which were not to be met with elsewhere. His industry was exemplary and unremitting, and the number of his literary works would be incredible, if the originals, all in his own handwriting, were not still extant. He was distinguished above nearly all the writers of his time by his linguistic acquirements, his accurate and varied knowledge, and his critical sagacity. Of his numerous works the most important are the Glossarium ad scriptores mediae et infimae latinitatis (Paris, 1678), and the Glossarium ad scriptores mediae et infimae graecitatis (Lyons, 1688), which are indispensable aids to the student of the history and literature of the middle ages. To the three original volumes of the Latin Glossarium, three supplementary volumes were added by the Benedictines of St Maur (Paris, 1733-1736), and a further addition of four volumes (Paris, 1766), by a Benedictine, Pierre Carpentier (1697- 1767). There were other editions, and an abridgment with some corrections was brought out by J. C. Adelung (Halle, 1 772-1 784). The edition in seven volumes edited by G. A. L. Henschel (Paris, 1840-1850) includes these supplements and also further additions by the editor, and this has been improved and published in ten volumes by Leopold Favre (Niort, 1883- 1887). An edition of the Greek Glossarium was published at Breslau in 1889.

Du Cange took considerable interest in the history of the later empire, and wrote Historia Byzantina duplici commentario illustrate (Paris, 1680), and an introduction to his edition and translation into modern French of Geoffrey de Villehardouin's Histoire de V empire de Constantinople sous les empereurs francais (Paris, 1657). He also brought out editions of the Byzantine historians, John Cinnamus and John Zonaras, as Joannis Cinnami historiarum de rebus gestis a Joanne et Manuele Comnenis (Paris, 1670) and Joannis Zonarae Annates ab exordio mundi ad mortem Alexii Comneni (Paris, 1686). He edited Jean de Joinville's Histoire de St Louis, roi de France (Paris, 1668), and his other works which may be mentioned are Traite historique du chef de St Jean Baptiste (Paris, 1666); Lettre du Sieur N., conseiller du roi (Paris, 1682) ; Cyrilli, Philoxeni, aliorumque veterum glos- saria, and Memoire sur le projet d'un

nouveau recueil des historiens de France, avec le plan gSniral de ce recueil, which has been inserted by Jacques Lelong in his Bibliotheque historique de la

France (Paris, 1 768-1 778). His last work, Chronicon Pasckale a rmmdo condito ad Heraclii imperatoris annum vigesimum (Paris, 1689), was passing through the press when Du Cange died, and consequently it was edited by Etienne Baluze, and published with an iloge of the author prefixed.

His autograph manuscripts and his large and valuable library passed to his eldest son, Philippe du Fresne, who died unmarried in 1692. They then came to his second son, Francois du Fresne, who sold the collection, the greater part of the manuscripts being purchased by the abbe du Champs. The abM handed them over to a bookseller named Mariette, who resold part of them to Baron Hohendorf. The remaining part was, acquired by a member of the family of Hozier, the French genealogists. The French government, however, aware of the importance of all the writings of Du Cange, succeeded, after much trouble, in collecting the greater portion of the manuscripts, which were preserved in the imperial library at Paris. Some of these were subsequently published, and the manuscripts are now found in various libraries. The works of Du Cange published after his death are: an edition of the Byzantine historian, Nicephorus Gregoras (Paris, 1 702) ; De imperatorum Constantino politanorum seu injerioris aevi vel imperii uti vocant numismatibus dissertatio (Rome, 1755); Histoire de I'itat de la ville d' Amiens et de ses comtes (Amiens, 1840); and a valuable work Des principautis d'outre-mer, published by E. G. Rey as Les Families d'outre-mer (Paris, 1869).

See H. Hardouin, Essai sur la vie et sur les ouvrages de Ducange (Amiens, 1849) ; and L. J. Feugere, in the Journal de I' instruction publique (Paris, 1852).

DUCANGE, VICTOR HENRI JOSEPH BRAHAIN (1 783-1833), French novelist and dramatist, was born on the 24th of November 1 783 at the Hague, where his father was secretary to the French embassy. Dismissed from the civil service at the Restoration, Victor Ducange became one of the favourite authors of the liberal party, and owed some part of his popularity to the fact that he was fined and imprisoned more than once for his out- spokenness. He was six

months in prison for an article in his journal Le Diable rose, ou le petit courrier de Lucifer (1822); for Valentine (182 1), in which the royalist excesses in the south of France were pilloried, he was again imprisoned; and after the publication of Htlene ou V amour et la gutrre (1823), he took refuge for some time in Belgium. Ducange wrote numerous plays and melodramas, among which the most successful were Marco Loricot, ou le petit Chouan de 1830 (1836), and Trente ans, ou la vie d'un joueur (1827), in which Frederick Lemaitre found one of his best parts. Many of his books were prohibited, ostensibly for their coarseness, but perhaps rather for their political tendencies. He died in Paris on the 15th of October

1833-

DUCAS, Dukas or Doukas, the name of a Byzantine family which supplied several rulers to the Eastern Empire. The family first came into prominence during the 9th century, but was ruined when ConstantineDucas, a son of the general Androni- cus Ducas, lost his life in his effort to obtain the imperial crown in 913. Towards the end of the 10th century there appeared another family of Ducas, which was perhaps connected with the earlier family through the female line and was destined to attain to greater fortune. A member of this family became emperor as Constantine X. in ro59, and Constantine's son Michael VII. ruled, nominally in conjunction with his younger brothers, Andronicus and Constantine, from 1071 to 1078. Michael left a son, Constantine, and, says Gibbon, " a daughter of the house of Ducas illustrated the blood, and confirmed the succession, of the Comnenian dynasty." The family was also allied by marriage with other great Byzantine houses, and after losing the imperial dignity its members continued to take an active part in public affairs. In 1 204 Alexius Ducas, called Mourzoufle, deposed the emperor Isaac Angelus and his son Alexius, and vainly tried to defend Constantinople against the attacks of the Latin crusaders. Nearly a century and a half later one Michael Ducas took a leading part in the civil war between the emperors John V. Palaeologus and John VI. Cantacuzenus, and Michael's

grandson was the historian Ducas (see below). Many of the petty sovereigns who arose after the destruction of the Eastern Empire sought to gain prestige by adding the famous name of Ducas to their own.

DUCAS (15th cent.), Byzantine historian, flourished under Constantine XIII. (XL) Dragases, the last emperor of the East, about 1450. The dates of his birth and death are unknown. He was the

grandson of Michael Ducas (see above). After the fall of Constantinople, he was employed in various diplomatic missions by Dorino and Domenico Gateluzzi, princes of Lesbos, where he had taken refuge. He was successful in securing a semi-independence for Lesbos until 1462, when it was taken and annexed to Turkey by Sultan Mahommed II. It is known that Ducas survived this event, but there is no record of his subsequent life. He was the author of a history of the period 1341-1462; his work thus continues that of Gregoras and Cantacuzene, and supplements Phrantzes and Chalcondyles. There is a preliminary chapter of chronology from Adam to John Palaeologus I. Although barbarous in style, the history of Ducas is both judicious and trustworthy, and it is the most valuable source for the closing years of the Greek empire. The account of the capture of Constantinople is of special importance. Ducas was a strong supporter of the union of the Greek and Latin churches, and is very bitter against those who rejected even the idea of appealing to the West for assistance against the Turks.

The history, preserved (without a title) in a single Paris MS., was first edited by I. Bullialdus (Bulliaud) (Paris, 1649); later editions are in the Bonn Corpus scriptorum Hist. Byz., by I. Bekker (1834) and Migne, Patrologia Graeca, clvii. The Bonn edition contains a 15th century Italian translation by an unknown author, found by Leopold Ranke in one of the libraries of Venice, and sent by him to Bekker.

DUCASSE, PIERRE EMMANUEL ALBERT, Baron (1813- 1893), French historian, was born at Bourges on the 16th of November 1813. In 1849 he became aide-de-camp to Prince Jerome Bonaparte, ex-king of Westphalia, then governor of the Invalides, on whose commission he wrote Mimoires pour servir a I'histoire de la campagne de 1812 en Russie (1852) . Subsequently he published Mimoires du roi Joseph (1853-1855), and, as a sequel, Histoire des nigociations diplomatiques relatives aux traitis de Morfontaine, de Luneville et d' Amiens, together with the unpublished correspondence of the emperor Napoleon I. with Cardinal Fesch (1855-1856). From papers in the possession of the imperial family he compiled Mimoires du prince Eugene (18 58-1860) and Refutation des mimoires du due de Raguse (1857), part of which was inserted by authority at the end of volume ix. of the Mimoires. He was attache to Jerome's son, Prince Napoleon, during the Crimean War, and wrote a Pricis historique des operations militaires en Orient, de mars 1854 a octobre 185s (1857), which was completed many years later by a volume entitled La Crimie et Sevastopol de 1S5J a 1856, documents intimes et inidits, followed by the complete list of the French officers

killed or wounded in that war (1892). He was also employed by Prince Napoleon on the Correspondance of Napoleon I., and afterwards published certain letters, purposely omitted there, in the Revue historique. These documents, subsequently collected in Les Rois freres de Napolion (1883), as well as the Journal de la reine Catherine de Westphalie (1893), were edited with little care and are not entirely trustworthy, but their publication threw much light on Napoleon I. and his entourage, His Souvenirs d'un ojjicier du 2′ Zouaves, and Les Dessous du coup d'itat (1891), contain many piquant anecdotes, but at times degenerate into mere tittle-tattle. Ducasse was the author of some slight novels, and from the practice of this form of literature he acquired that levity which appears even in his most serious historical publications.

DUCAT, the name of a coin, generally of gold, and of varying value, formerly in use in many European countries. It was first struck by Roger II. of Sicily as duke of Apulia, and bore an inscription " Sit tibi, Christe, datus, quern tu regis, iste ducatus" (Lord, thou rulest this duchy, to thee be it dedicated) ; hence, it is said, the name. Between 1280 and 1284 Venice also struck

a gold coin, known first as the ducat, afterwards as the zecchino or sequin, the ducat becoming merely a money of account. The ducat was also current in Holland, Austria, the Netherlands, Spain and Denmark (see Numismatics). A gold coin termed a ducat was current in Hanover during the reigns of George I. and George III. A pattern gold coin was also struck by the English mint in 1887 for a proposed decimal coinage. On the reverse was the inscription " one ducat " within an oak wreath; above " one hundred pence," and below the date between two small roses. There is a gold coin termed a ducat in the Austria- Hungary currency, of the value of nine shillings and fourpence.

DU CHAILLU, PAUL BELLONI (1835-1903), traveller and anthropologist, was born either at Paris or at New Orleans (accounts conflict) on the 31st of July 1835. In his youth he accompanied his father, an African trader in the employment of a Parisian firm, to the west coast of Africa. Here, at a station on the Gabun, the boy received some education from mission- aries, and acquired an interest in and knowledge of the country, its natural history, and its natives, which guided him to his subsequent career. In 1852 he

exhibited this knowledge in the New York press, and was sent in 1855 by the Academy of Natural Sciences at Philadelphia on an African expedition. From 1855 to 1859 he regularly explored the regions of West Africa in the neighbourhood of the equator, gaining considerable knowledge of the delta of the Ogowe river and the estuary of the Gabun. During h'is travels he saw numbers of the great anthropoid apes called the gorilla (possibly the great ape described by Cartha- ginian navigators), then known to scientists .only by a few skeletons. A subsequent expedition, from 1863 to 1865, enabled him to confirm the accounts given by the ancients of a pygmy people inhabiting the African forests. Narratives of both expeditions were published, in 1861 and 1867 respectively, under the titles Explorations and Adventures in Equatorial Africa, with Accounts of the Manners and Customs of the People, and of the Chace of the Gorilla, Crocodile, and other Animals; and A Journey to Ashango-land, and further penetration into Equatorial Africa. The first work excited much controversy on the score of its veracity, but subsequent investigation proved the correctness of du Chaillu's statements as to the facts of natural history; though possibly some of the adventures he described as happening to himself were reproductions of the hunting stories of natives (see Proc. Zool. Soc. vol. i., 1905, p. 66). The map accompanying Ashango-land was of unique value, but the explorer's photographs and collections were lost when he was forced to flee from the hostility of the natives. After some years' residence in America, during which he wrote several books for the young founded upon his African adventures, du Chaillu turned his attention to northern Europe, and published in 188 1 The Land of the Midnight Sun, in 1889 The Viking Age, and in 1900 The Land of the Long Night. He died at St Petersburg on the 29th of April 1903.

DUCHENNE, GUILLAUME BENJAMIN AMAND (1806-1875), French physician, was born on the 17 th of September 1806 at Boulogne, the son of a sea-captain. He was educated at Douai, and then studied medicine in Paris until the year 183 1, when he returned to his native town to practise his profession. Two years later he first tried the effect of electro-puncture of the muscles on a patient under his care, and from this time on devoted himself more and more to the medical applications of electricity, thereby laying the foundation of the modern science of electro-therapeutics. In 1842 he removed to Paris for the sake of its wider clinical opportunities, and there he worked until his death over thirty years later. His greatest work, L' Electrisation localisee (1855), passed through three editions during his lifetime, though by many his Physiologie des mouve- ments (1867) is considered his masterpiece. He published over fifty

volumes containing his researches on muscular and nervous diseases, and on the applications of electricity both for diagnostic purposes and for treatment. His name is especially connected with the first description of locomotor ataxy, progressive muscular atrophy, pseudo-hypertrophic paralysis, glosso-labio laryngeal paralysis and other nervous troubles. He died in Paris on the 17th of September 1875.

For a detailed life see Archives generates de medicine (Decem- ber 1875), and for a complete list of his works the 3rd edition of U Electrisation localisee (1872).

DU CHESNE [Latinized Duchenius, Querneus, or Querce- tanus], ANDR£ (1584-1640), French geographer and historian, generally styled the father of French history, was born at He- Bouchard, in the province of Touraine, in May 1584. He was educated at Loudun and afterwards at Paris. From his earliest years he devoted himself to historical and geographical research, and his first work, Egregiarum seu selectarum lectionum et antiquitatum liber, published in his eighteenth year, displayed great erudition. He enjoyed the patronage of Cardinal Richelieu, a native of the same district with himself, through whose influence he was appointed historiographer and geographer to the king. He died in 1640, in consequence of having been run over by a carriage when on his way from Paris to his country house at Verriere. Du Chesne's works were very numerous and varied, and in addition to what he published, he left behind him more than 100 folio volumes of manuscript extracts now preserved in the Bibliotheque Nationale (L.Delisle, Le Cabinet des manuscrits de la bibliotheque impiriale, t. L, 333-334). Several of his larger works were continued by his only son Frangois du Chesne (1616-1693), who succeeded him in the office of historiographer to the king. The principal works of Andre du Chesne are — Les Anti- quiUs et recherches de la grandeur et majesti des rois de France (Paris, 1609), Les AntiquitSs et recherches des villes, chdteaux, &c, de toute la France (Paris, 1609), Histoire d' Angleterre, d' Ecosse, et d'Irelande (Paris, 1614), Histoire des Papes jusqu' A Paul V (Paris, 1619), Histoire des rois, dues, et comtes de Bourgogne (1619-1628, 2 vols, fol.), Historiae Normanorum scriptores antiqui (1619, fol., now the only source for some of the texts), and his Historiae Francorum scriptores (5 vols, fol., 1636-1649). This last was intended to comprise 24 volumes, and to contain all the narrative sources for French history in the middle ages; only two volumes were published by the author, his son Francois published three more, and the work remained unfinished. Besides these du Chesne published a great number of genealogical histories of illustrious families, of

which the best is that of the house of Montmorency. His Histoire des cardinaux francais (2 vols. fol. 1660-1666) and Histoire des chanceliers et gardes, des sceaux de France (1630) were published by his son Francois. Andre also published a translation of the Satires of Juvenal, and editions of the works of Alcuin, Abelard, Alain Chartier and Etienne Pasquier.

DUCHESNE, LOUIS MARIE OLIVIER (1843-), French scholar and ecclesiastic, was born at Saint Servan in Brittany on the 13th of September 1843. Two scientific missions — to Mount Athos in 1874 and to Asia Minor in 1876 — appeared at first to incline him towards the study of the ancient history of the Christian churches of the East. Afterwards, however, it was the Western church which absorbed almost his whole attention. In 1877 he received the degree of docteur es lettres with two remarkable theses, a dissertation De Macario magnete, and an fitude sur le Liber pontificalis, in which he explained with un- erring critical acumen the origin of that celebrated chronicle, determined the different editions and their interrelation, and stated precisely the value of his evidence. Immediately after- wards he was appointed professor at the Catholic Institute in Paris, and for eight years presented the example and model, then rare in France, of a priest teaching church history according to the rules of scientific criticism. His course, bold even to the point of rashness in the eyes of the traditionalist exegetists, was at length suspended. In November 1885 he was appointed lecturer at the Ecole Pratique des Hautes Etudes. In 1886 he published volume i. of his learned edition of the Liber pontificalis (completed in 1892 by volume ii.), in which he resumed and completed the results he had attained in his French thesis. In 1888 he was elected member of the Academie des Inscriptions et Belles- Lettres, and was afterwards appointed director of the French school of archaeology at Rome. Much fight is thrown upon the Christian origins, especially those of France, by his Origines du culte chrUien, etude sur la liturgie latine avant Charlemagne

(1889; Eng. trans, by M. L. McClure, ChristianW '01 ship: its Origin and Evolution, London, 1902, 2nd ed. 1904); Memoire sur Vorigine des dioceses Spiscopaux dans I'ancienne Gauie (1890), the preliminary sketch of a more detailed work, Fastes Spiscopaux dans I'ancienne Gaule (vol. i. Les provinces du sud-est, 1894, and vol. ii. L'Aquitaine et les Lyonnaises, 1899); and Catalogues Spiscopaux de

la province de Tours (1898). When a proposal was set on foot to bring about a reconciliation between the Roman Church and the Christian Churches of the East, the Abbe Duchesne endeavoured to show that the union of those churches was possible under the Roman supremacy, because unity did not necessarily entail uniformity. His Autonomies ecclesiastiques; iglises separees (1897), in which he speaks of the origin of the Anglican Church, but treats especially of the origin of the Greek Churches of the East, was received with scant favour in certain narrow circles of the pontifical court. In 1906 he began to publish, under the title of Histoire ancienne de Viglise, a course of lectures which he had already delivered upon the early ages of the Church, and of which a few manuscript copies were circulated. The second volume appeared in 1908. In these lectures Duchesne touches cleverly upon the most delicate problems, and, without any elaborate display of erudition, presents conclusions of which account must be taken. His incisive style, his fearless and often ruthless criticism, and his wide and penetrating erudition, make him a redoubtable adversary in the field of polemic. The Bulletin critique, founded by him, for which he wrote numerous articles, has contributed powerfully to spread the principles of the historical method among the French clergy.

DUCIS, JEAN FRANCOIS (1733-1816), French dramatist and adapter of Shakespeare, was born at Versailles on the 22nd of August 1733. His father, originally from Savoy, was a linen- draper at Versailles; and all through life he retained the simple tastes and straightforward independence fastened by his bour- geois education. In 1768 he produced his first tragedy, AmSlise. The failure of this first attempt was fully compensated by the success oihh Hamlet (1769), and Romeo et Juliette (1772). CEdipe chez Admete, imitated partly from Euripides and partly from Sophocles, appeared in 1778, and secured him in the following year the chair in the Academy left vacant by the death of Voltaire. Equally successful was Le Roi Lear in 1783. Macbeth in 1783 did not take so well, and Jean sans peur in 1791 was almost a failure; but Othello in 1792, supported by the acting of Talma, obtained immense applause. Its vivid picturing of desert life secured for Abufas, ou la famille arabe (1795), an original drama, a flattering reception. On the failure of a similar piece, Phidor et Vladimir ou la famille de SibSrie (1801), Ducis ceased to write for the stage; and the rest of his life was spent in quiet retire- ment at Versailles. He had been named a member of the Council of the Ancients in 1798, but he never discharged the functions of the office; and when Napoleon offered him a post of honour under the empire, he refused. Amiable, religious and bucolic,

he had little sympathy with the fierce, sceptical and tragic times in which his lot was cast. " Alas! " he said in the midst of the Revolution, " tragedy is abroad in the streets ; if I step outside of my door, I have blood to my very ankles. I have too often seen Atreus in clogs, to venture to bring an Atreus on the stage." Though actuated by honest admiration of the great English dramatist, Ducis is not Shakespearian. His ignorance of the English language left him at the mercy of the translations of Pierre Letourneur (1736-1788) and of Pierre de la Place (1707- 1793); and even this modified Shakespeare had still to undergo a process of purification and correction before he could be pre- sented to the fastidious criticism of French taste. That such was the case was not, however, the fault of Ducis; and he did good ' service in modifying the judgment of his fellow countrymen. He did not pretend to reproduce, but to excerpt and refashion; and consequently the French play sometimes differs from its English namesake in everything almost but the name. The plot is different, the characters are different; the motif different, and the scenic arrangement different. To Othello, for instance, he wrote two endings. In one of them Othello was enlightened in

time and Desdemona escaped her tragic fate. Le Banquet de I'amitie, a poem in four cantos (1771), Au roi de Sardaigne (1775), Discours de rSception d I'acadSmie frangaise (1779), £pttre a Famiiie (1786), and a Recueil de poSsies (1809), complete the list of Ducis's publications.

An edition of his works in three volumes appeared in 18 13; CEuvres posthumes were edited by Campenon in 1826; and Hamlet, CEdipe chez Admete, Macbeth and Abufar are reprinted in vol. ii. of Didot's Chefs-d'auvre tragiques. See Onesime Leroy, jitude sur la personne et les ecrits de Ducis (1832), based on Ducis's own memoirs preserved in the library at Versailles; Sainte-Beuve, Causeries du lundi, t. vi., and Nouveaux lundis, t. iv.; Villemain, Tableau de la htt. au XVIII" siicle.

DUCK. (1) (From the verb " to duck," to dive, put the head under water, in reference to the bird's action, cf. Dutch duiker, Ger. Toucher, diving-bird, duiken, tauchen, to dip, dive, Dan. dukand, duck, and Ger. Ente, duck; various familiar and slang usages are based on analogy with the bird's action), the general English name for a large number of birds forming the greater part of the family Anatidae.oi modern ornithologists. Technically the term duck is restricted to the female, the male being called drake (cognate with the termination oiGer. Enterich), and in one species mallard (Fr. Malart).

The Anatidae may be at once divided, into six more or less well marked subfamilies— (1) the Cygninae or swans, (2) the Anserinae.or geese — which are each very distinct, (3) the Anatinae or freshwater-ducks, (4) those commonly called Fuligulinae or sea-ducks, (5) the Erismatwinae or spiny-tailed ducks, and (6) the Merginae or mergansers.

The Anatinae are the typical group, and it is these only that are considered here. We start with the Anas boschas of Linnaeus, the common wild duck, which from every point of view is by far the most important species, as it is the most plentiful, the most widely distributed, and the best known — being indeed the origin of all the British domestic breeds. It inhabits the greater part of the northern hemisphere, reaching in winter so far as the Isthmus of Panama in the New World, and in the Old being abundant at the same season in Egypt and north-western India, while in summer it ranges throughout the Fur-Countries, Green- land, Iceland, Lapland and Siberia. Most of those which fill British markets are no doubt bred in more northern climes, but a considerable proportion of them are yet produced in the British Islands, though not in anything like the numbers that used to be supplied before the draining of the great fen-country and other marshy places. The wild duck pairs very early in the year— the period being somewhat delayed by hard weather, and the ceremonies of courtship, which require some little time. Soon after these are performed, the respective couples separate in search of suitable nesting-places, which are generally found, by those that remain with us, about the middle of March. The spot chosen is sometimes near a river or pond, but often very far removed from water, and it may be under a furze-bush, on a dry heath, at the bottom of a thick hedge-row, or even in any convenient hole in a tree. A little dry grass is generally collected, and on it the eggs, from 9 to n in number, are laid. So soon as incubation'commences the mother begins to divest herself of the down which grows thickly beneath her breast-feathers, and adds it to the nest-furniture, so that the eggs are deeply imbedded in this heat-retaining substance — a portion of which she is always careful to pull, as a coverlet, over her treasures when she quits them for food. She is seldom absent from the nest, how,- ever, but once, or at most twice, a day, and then she dares not leave it until her mate, after several circling flights of observation, has assured her she may do so unobserved. Joining him the pair betake themselves to some quiet spot where she may bathe and otherwise refresh herself. Then they return to the nest, and after cautiously reconnoitring the neighbourhood, she loses no time in reseating herself on her eggs, while he, when she is settled, repairs,

again to the waters, and passes his day listlessly in the company of his brethren, who have the same duties, hopes and cares. Shorthand infrequent as. are the absences of the duck when incubation begins, they become shorter and more in- frequent towards its close, and for the last day or two of the

28 necessary to develop the young it is probable that she will not stir from the nest at all. When all the fertile eggs are hatched her next care is to get the brood safely to the water. This, when the distance is great, necessarily demands great caution, and so cunningly is it done that but few persons have encountered the mother and offspring as they make the dangerous journey. 1 If disturbed the young instantly hide as they best can, while the mother quacks loudly, feigns lameness, and flutters off to divert the attention of the intruder from her brood, who lie motionless at her warning notes. Once arrived at the water they are com- paratively free from harm, though other perils present themselves from its inmates in the form of pike and other voracious fishes, which seize the ducklings as they disport in quest of insects on the surface or dive beneath it. Throughout the summer the duck continues her care unremittingly, until the young are full grown and feathered; but it is no part of the mallard's duty to look after his offspring, and indeed he speedily becomes incapable of helping them, for towards the end of May he begins to undergo his extraordinary additional moult, loses the power of flight, and does not regain his full plumage till autumn. About harvest- time the young are well able to shift for themselves, and then resort to the corn-fields at evening, where they fatten on the scattered grain. Towards the end of September or beginning of October both old and young unite in large flocks and betake themselves to the larger waters. If long-continued frost prevail, most of the ducks resort to the estuaries and tidal rivers, or even leave these islands almost entirely. Soon after Christmas the return-flight commences, and then begins anew the course of life already described.

For the farmyard varieties, descending from Anas boschas, see Poultry. The domestication of the duck is very ancient. Several distinct breeds have been established, of which the most esteemed from an economical point of view are those known as the Rouen and Aylesbury; but perhaps the most remarkable deviation from the normal form is the so-called penguin-duck, in which the bird assumes an upright attitude and its wings are much diminished in size. A

remarkable breed also is that often named (though quite fancifully) the " Buenos-Ayres " duck, wherein the whole plumage is of a deep black, beautifully glossed or bronzed. But this saturation, so to speak, of colour only lasts in the individual for a few years, and as the birds grow older they become mottled with white, though as long as their reproductive power lasts they " breed true." The amount of variation in domestic ducks, however, is not comparable to that found among pigeons, no doubt from the absence of the competition which pigeon-fanciers have so long exercised. One of the most curious effects of domestication in the duck, however, is, that whereas the wild mallard is not only strictly monogamous, but, as Waterton believed, a most faithful husband, remaining paired for life, the civilized drake is notoriously polygamous.

Very nearly allied to the common wild duck are a considerable number of species found in various parts of the world in which there is little difference of plumage between the sexes — both being of a dusky hue — such as Anas obscura, the commonest river-duck of America, A. super ciliosa of Australia, A. poecilo- rhyncha of India, A . melleri of Madagascar, A . xanthorhyncha of South Africa, and some others.

Among the other genera of Anatinae, we must content our- selves by saying that both in Europe and in North America there are the groups represented by the shoveller, garganey, gadwall, teal, pintail and widgeon — each of which, according to some systematists, is the type of a distinct genus. Then there is the group Aix, with its beautiful representatives the wood-duck {A. sponsa) in America and the mandarin-duck (A. galericulata) in Eastern Asia. Besides there are the sheldrakes (Tadorna), confined to the Old World and remarkably developed in the Australian Region; the musk-duck (Cairina) of South America, which is often domesticated and in that condition

1 When ducks breed in trees, the precise way in which the young get to the ground is still a matter of uncertainty. The mother is supposed to convey them in her bill, and most likely does so, but they are often simply allowed to fall.

will produce hybrids with the common duck; and finally the tree-ducks (Dendrocygna), which are almost limited to the tropics. (For duck-shooting, see Shooting.) (A. N.)

2 (Probably derived from the Dutch doeck, a coarse linen material, cf. Ger. Tuch, cloth), a plain fabric made originally from tow yarns. The cloth is lighter than canvas or sailcloth, and differs from these in

that it is almost invariably single in both warp and weft. The term is also used to indicate the colour obtained at a certain stage in the bleaching of flax yarns; it is a colour between half-white and cream, and this fact may have something to do with the name. Most of the flax ducks (tow yarns) appear in this colour, although quantities are bleached or dyed. Some of the ducks are made from long flax, dyed black, and used for kit-bags, while the dyed tow ducks may be used for inferior purposes. The fabric, in its various qualities and colours, is used for an enormous variety of purposes, including tents, wagon and motor hoods, light sails, clothing, workmen's overalls, bicycle tubes, mail and other bags and pocketings. Russian duck is a fine white linen canvas.

DUCKING and CUCKING STOOLS, chairs used for the punishment of scolds, witches and prostitutes in bygone days. The two have been generally confused, but are quite distinct. The earlier, the Cucking-stool 2 or Stool of Repentance, is of very ancient date, and was used by the Saxons, who called it the Scealding or Scolding Stool. It is mentioned in Domesday Book as in use at Chester, being called cathedra Stercoris, a name which seems to confirm the first of the derivations suggested in the foot- note below. Seated on this stool the woman, her head and feet bare, was publicly exposed at her door or paraded through the streets amidst the jeers of the crowd. The Cucking-stool was used for both sexes, and was specially the punishment for dishonest brewers and bakers. Its use in the case of scolding women declined on the introduction in the middle of the 16th century of the Scold's Bridle (see Branks), and it disappears on the introduction a little later of the Ducking-stool. The earliest record of the use of this latter is towards the beginning of the 17th century. It was a strongly made wooden armchair (the surviving specimens are of oak) in which the culprit was seated, an iron band being placed around her so that she should not fall out during her immersion. Usually the chair was fastened to a long wooden beam fixed as a seesaw on the edge of a pond or river. Sometimes, however, the Ducking-stool was not a fixture but was mounted on a pair of wooden wheels so that it could be wheeled through the streets, and at the river-edge was hung by a chain from the end of a beam. In sentencing a woman the magistrates ordered the number of duckings she should have. Yet another type of Ducking-stool was called a tumbrel. It was a chair on two wheels with two long shafts fixed to the axles. This was pushed into the pond and then the shafts released, thus tipping the chair up backwards. Sometimes the punishment proved fatal, the unfortunate woman dying of shock. Ducking- stools were used in England as late as the beginning of the

19th century. The last recorded cases are those of a Mrs Ganble at Plymouth (1808); of Jenny Pipes, " a notorious scold " (1809), and Sarah Leeke (181 7), both of Leominster. In the last case the water in the pond was so low that the victim was merely wheeled round the town In the chair.

See W. Andrews, Old Time Punishments (Hull, 1890) ; A. M. Earle, Curious Punishments of Bygone Days (Chicago, 1896); W. C. Hazlitt, Faiths and Folklore (London, 1905) ; Llewellynn Jewitt in The Reliquary, vols. i. and ii. (1860-1862) ; Gentleman s Magazine for 1732.

DUCKWEED, the common botanical name for species of Lemna which form a green coating on fresh-water ponds and ditches. The plants are of extremely simple structure and are the smallest and least differentiated of flowering plants. They consist of a so-called " frond " — a flattened green more or less oval structure which emits branches similar to itself from lateral pockets at or near the base. From the under surface a root with a well-developed sheath grows downwards into the water. The flowers, which are rarely found in Britain, are

2 Probably from " cuck," to void excrement; but variously connected with Fr. coquin, rascal.

developed in one of the lateral pockets. The inflorescence is a very simple one, consisting of one or two male flowers each comprising a single stamen, and a female flower comprising a flask-shaped pistil. The order Lemnaceae to which they belong

i, Lemna minor (Lesser Duck- stamen, and a female flower,

weed) nat. size. the whole enclosed in a

2, Plant in flower. . sheath.

3, Inflorescence containing two 4, Wolffia arrhiza.

male flcwers each of one (2,3, 4 enlarged.)

is regarded as representing a very reduced type nearly allied to the Aroids. It is represented in Britain by four species of Lemna, and a

still smaller and simpler plant, Wolffia, in which the fronds are only one-twentieth of an inch long and have no roots.

DUCKWORTH, SIR JOHN THOMAS (1748-1817), British admiral, was born at Leatherhead, in Surrey, on the 28th of February 1748. He entered the navy in 1759, and obtained his commission as lieutenant in June 1770, when he was appointed to the " Princess Royal," the flagship of Admiral Byron, in which he sailed to the West Indies. While serving on board this vessel he took part in the engagement with the French fleet under Count D'Estaing. In July 1779 he became commander, and was appointed to the " Rover " sloop; in June of the following year he attained the rank of post-captain. Soon afterwards he returned to England in charge of a convoy. The outbreak of the war with France gave him his first opportunity of obtaining marked distinction. Appointed first to the " Orion " and then to the " Queen " in the Channel Fleet, under the command of Lord Howe, he took part in the three days' naval engagement with the Brest fleet, which terminated in a glorious victory on the 1 st of June 1794. For his conduct on this occasion he received a gold medal and the thanks of parliament. He next proceeded to the West Indies, where he was stationed for some time at St Domingo. In 1798 he commanded the " Leviathan " in the Mediterranean, and had charge of the naval detachment which, in conjunction with a military force, captured Minorca. Early in 1799 he was raised to the rank of rear-admiral, and sent to the West Indies to succeed Lord Hugh Seymour. During the voyage out he captured a valuable Spanish convoy of eleven merchantmen. In March 1801 he was the naval commander of the combined force which reduced the islands of St Bartholomew and St Martin, a service for which he was rewarded with the order of the Bath and a pension of £1000 a year. Promoted to be vice- admiral of the blue, he was appointed in 1804 to the Jamaica station. Two years later, while cruising off Cadiz with Lord Collingwood, he was detached with his squadron to pursue a French fleet that had been sent to the relief of St Domingo. He came up with the enemy on the 6th February 1806, and, after two hours' fighting, inflicted a signal defeat upon them, capturing three of their five vessels and stranding the other two. For this, the most distinguished service of his life, he received the thanks of the Jamaica assembly, with a sword of the value of a thousand guineas, the thanks of the English parliament, and the freedom of the city of London. In 1807 he was again sent to the Medi- terranean to watch the movements of the Turks. In command of the "Royal George " he forced the passage of the Dardanelles, but sustained considerable loss in effecting his return, the Turks having

strengthened their position while he was being kept in

play by their diplomatists and Napoleon's ambassador General Sebastiani. He held the command of the Newfoundland fleet for four years from 18 10, and at the close of that period he was made a baronet. In 181 5 he was appointed to the chief command at Plymouth, which he held until his death on the 14th of April 1817. Sir John Duckworth sat in parliament for some time as member for New Romney. See Naval Chronicle, xviii. ; Ralfe's Naval Biography, ii.

DUCLAUX, AGNES MARY F. (1856-), English poet and critic, who first became known in England under her maiden name of Mary F. Robinson, was born at Leamington on the 27th of February 1856. She was educated at University College, London, devoting herself chiefly to the study of Greek literature. Her first volume of poetry, A Handful of Honeysuckle, was published in 1879. Her next work was a translation from Euripides, The Crowned Hippolytus (1881). Monographs on Emily Bronte" (1883) and on Marguerite of Angouleme (1886) followed; and The New Arcadia and other Poems (1884) and An Italian Garden (1886) contain some of her best verses. Her poems attracted the attention of the orientalist, James Darmesteter (q.v.), then in Peshawur, and he made an admirable translation of them in French. The acquaintance led to their marriage in 1888, and from that time a large part of her work was done in French. Madame Darmesteter translated her hus- band's Etudes anglaises into English (1896). Her most con- siderable prose work is the Life of Ernest Renan (1897). She also wrote the End of the Middle Ages (1888); the volume on Froissarl (1894) in the Grands Scrivains francais; essays on the Brontes, the Brownings and others, entitled Grands icrivains d'Outre-Manche (1901). After Darmesteter's death, she married in 1901 Emile Duclaux, the associate of Pasteur, and director of the Pasteur institute. He died in 1904. She published Retrospect and other Poems in 1893, and in 1904 appeared The Return to Nature, Songs and Symbols. The qualities of Mary Robinson's work, its conciseness and purity of expression, were only gradually recognized. Her Collected Poems, Lyrical and Narrative were published in 1902.

DUCLOS, CHARLES PINOT (1704-1772), French author, was born at Dinan, in Brittany, in 1704. At an early age he was sent to study at Paris. After some time spent in dissipation he began to cultivate the society of the wits of the time, and became a member of the club or association of young men who published their joint efforts in light literature under the titles of Recueil de ces messieurs, Utrennes de la

*St- Jean, (Eufsde Pdques, &c. His romance of Acajou and Zirphile, composed to suit a series of plates which had been engraved for another work, was one of the fruits of this association, and was produced in conse- quence of a sort of wager amongst its members. Duclos had previously written two other romances, which were more favour- ably received — The Baroness de Luz (1741), and the Confessions of the Count de*** (1747). His first serious publication was the History of Louis XL, which is dry and epigrammatical in style, but displays considerable powers of research and impartiality. The reputation of Duclos as an author was confirmed by the publication of his Considerations sur les moeurs de ce siecle (17 51), a work justly praised by Laharpe, as containing a great deal of sound and ingenious reflection. It was translated into English and German. The MSmoires pour servir d Vhistoire du dix- huilieme siecle, intended by the author as a sort of sequel to the preceding work, are much inferior in style and matter, and are, in reality, little better than a kind of romance. In consequence of his History of Louis XL, he was appointed historiographer of France, when that place became vacant on Voltaire's retirement to Prussia. His Secret Memoirs of the Reigns of Louis XI V. and Louis XV. (for which he was able to utilize the Mimoires of Saint Simon, suppressed in 1755), were not published until after the Revolution.*

Duclos became a member of the Academy of Inscriptions in 1739, and of the French Academy in 1747, being appointed perpetual secretary in 1747. Both academies were indebted to him not only for many valuable contributions, but also for severa! usefuf regulations and improvements. As a member of the

Academy of Inscriptions, he composed several memoirs on trial by combat, on the origin and revolutions of the Celtic and French languages, and on scenic representations and the ancient drama. As a member of the French Academy, he assisted in compiling the new edition of the Dictionary, which was published in 1762; and he made some just and philosophical remarks on the Port Royal Grammar. On several occasions he distinguished himself by vindicating the honour and prerogatives of the societies to which he belonged, and the dignity of the literary character in general. He used to say of himself, "I shall leave behind me a name dear to literary men." The citizens of Dinan, whose interests he always supported with zeal, appointed him mayor of their town in 1 744, though he was resident at Paris,

and in this capacity he took part in the assembly of the estates of Brittany. Upon the requisition of this body the king granted him letters of nobility. In 1763 he was advised to retire from France for some time, having rendered himself obnoxious to the government by the opinions he had expressed on the dispute between the due d'Aiguillon and M. de la Chalotais, the friend and countryman of Duclos. Accordingly he set out first for England (1763), then for Italy (1766); and on his return he wrote his Considerations on Italy. He died at Paris on the 26th of March 1772. The character of Duclos was singular in its union of impulsiveness and prudence. Rousseau described him very laconically as a man droit et adroit. In his manners he displayed a sort of bluntness in society, which frequently rendered him disagreeable; and his caustic wit on many occasions created enemies. To those who knew him, however, he was a pleasant com- panion. A considerable number of his bons mots have been preserved by his biographers.

A complete edition of the works of Duclos, including an unfinished autobiography, was published by Auger (1821). See also Saint-Beuve, Causeries du lundi, t. ix. ; Ren6 Kerviler, La Bretagne et I'Academie francaise du XVIII" siecle (1889); L. Mandon, De la valeur historique des mimoires secrets de Duclos (1872).

DUCOS, PIERRE ROGER (1754-1816), French poli- tician and director, was born at Dax. He was an advocate when elected deputy to the Convention by the department of the Landes. He sat in the " Plain," i.e. in the party which had no opinion of its own, which always leaned to the stronger side. He voted for the death of Louis XVI., without appeal or delay, but played no noticeable part in the Convention. He was a member of the Council of the Five Hundred, over which he presided on the 18th of Fructidor in the year V. (see French Revolution). At the end of his term he became a judge of the peace, but after the parliamentary coup d'etat of the 30th of Prairial of the year VIII. he was named a member of the executive Directory, thanks to the influence of Barras, who counted on using him as a passive instrument. Ducos accepted the coup d'etat of Bonaparte on the 18th cf Brumaire, and was one of the three provisional consuls. He became vice-president of the senate. The Empire heaped favours upon him, but in 1814 he abandoned Napoleon, and voted for his deposition. He sought to gain the favour of the government of the Restoration, but in 1816 was exiled in virtue of the law against the regicides. He died in March 1816 at Ulm, from a carriage accident. In spite of his absolute lack of talent, he attained the highest of positions — an exceptional fact in the history of the French Revolution.

DUCTLESS GLANDS, in anatomy. A certain number of glands in the body, often of great physiological importance, have no ducts (Lat. ductus, from ducere, to lead, i.e. vessels, tubes or canals for conveying away fluid or other substance); and their products, known as internal secretions, are at once carried away by the veins or lymphatics which drain them. Among these structures are the spleen, the adrenals, the thyroid gland, the parathyroids, the thymus and the carotid and coccygeal bodies. In addition to these the lymphatic glands are described in the article on the lymphatic system (q.v.), and the pineal and pituitary bodies in the article on the brain (q.v.).

The Spleen

The human spleen (Gr. ottXijj') is an oval, flattened gland, of a dull purple colour, and about 5 in. long by 3 broad, situated in the upper and back part of the left side of the abdominal cavity. If the right hand is passed round the left side of its owner's body, as far as it will reach, it approximately covers the spleen. The long axis of the organ is obliquely placed so that the upper pole is much nearer the vertebral column than the lower pole. For practical purposes the long axis of the left tenth rib corresponds with that of the spleen. There is an external

JJiHa/on

Hilum

From D

Pancreatic impression /

Intermediate angle Posterior angle

. J. Cunningham, Cunningham's Texl-bookoj A nalomy.

Fig. 1. — The Spleen — Visceral Aspect.

or parietal surface and an internal or visceral, the latter of which is again subdivided; these surfaces are limited by ventral and dorsal borders. The external, parietal, or phrenic surface is convex to adapt it to the concavity of the diaphragm, against the posterior part of which it lies; external to the diaphragm is the pleural cavity, and more externally still, the ninth, tenth and eleventh ribs. The internal or visceral surface is divided by a prominent ridge into a gastric or anterior and a renal or posterior surface. Sometimes a triangular impression called the basal surface is formed at the lower part of the

visceral surface by the left end of the transverse colon, though at other times no such impression is seen. It is probable that the exact shape of the spleen depends a good deal on the amount of dis- tension of the surrounding hollow viscera at the time of death. (For details of the basal surface see D. J. Cunningham, Journ. Anat. and Phys. vol. xxix. p. 501.) The gastric surface is concave and adapts itself to the fundus of the stomach, while just in front of the ridge separating the gastric and renal surfaces is tho hilum, where the vessels enter and leave the organ; in front of this the tail of the pancreas usually touches the spleen. Tho renal surface is as a rule smaller than the gastric and, like it, ik> concave; it is moulded on to the upper part of the outer border of the left kidney and just reaches the left adrenal body. The anterior or ventral border of the spleen has usually two or more notches in it, though these are often also seen on the dorsal border. The whole spleen is surrounded by peritoneum, which is reflected off on to the stomach as the gastro- splenic omentum, and on to the kidney as the lieno-renal ligament; occasionally the lesser sac reaches it near its connexion with the pancreas. Small accessory spleens are fairly often found in the neighbour- hood of the spleen, though it is possible that some of these may be haemo-lymph glands (see Lymphatic System) .

Surface in contact, with liver'

Microscopically the spleen has a fibro-elastic coat in which in- voluntary muscle is found (fig. 2). This coat sends multitudes of fine trabeculae into the interior of the organ, which subdivide it into numbers of minute compartments, in which the red, highly vascular, spleen pulp is contained. This pulp contains small spherical masses of adenoid tissue, forming the Malpighian corpuscles, situated on the terminal branches of the splenic blood-vessels, together with numerous cells, some of which are red blood corpuscles, others lymph cor- puscles, others contain pigment granules or fat, while others have in their interior numerous blood cor- puscles. The arteries of the spleen in part end in capillaries from which the veins arise, but more frequently they open into lacunae or blood spaces, which give origin to the veins.

Embryology. — The spleen is developed in the dorsal mesogastrium(see Coelom and Serous Membranes) from the mesenchyme, or that portion of the meso- derm, the cells of which lie

scattered in a matrix. Large lymphoid cells are early seen among those of the mesenchyme, but whether these migrate from the coelomic epithelium, or are originally mesen- chymal is doubtful, though the former seems more probable. The network of the spleen seems certainly to be derived from cells of the mesenchyme which lose their nuclei.

Comparative Anatomy. — The spleen is regarded as the remains of a mass of lymphoid tissue which, in a generalized type of vertebrate, stretched all along the alimentary canal. It is absent as a distinct gland in the Acrarria and Cyclostomata. In the fishes it is closely applied to the U-shaped stomach, and in some of the Elasmobranchs, e.g. the basking and porbeagle sharks (Selache and Lamna), it

different appearance in different parts. Most superficially is the zona glomerulosa, then the zona fascicularis, and most deeply the zona reticularis. These names convey a fair idea of the appearance of the bundles. To the naked eye the cortical

Capsular vein

Surface covered by inferior cava

Surface covered by peritoneum

From D. J. Cunningham, Cunningham's Text-book oj Anatomy.

Fig. 3. — A, Anterior surface of right suprarenal capsule.

B, Anterior surface of

SSShEtMˆ !JX£L)t Tn TwiftSˆ ; »mnna left <»warenal capsule. The upperˆand inner parts of each kidney are indicated

*tiˆ P r , hT n «sˆwMs*CTs , s5 ˆ= r ˆ ri n! rightcapsuli ˆ hedotted line indicates the upper limit of the*

stomach. In the.Anura (frogs and toads) among Peritoneal covering.

part is yellow while the medullary is red. The medullary part consists of small islets of cells, which resemble columnar epi- thelium lying among venous sinuses; these cells are said to be in close connexion with the sympathetic nerve filaments from the great solar plexus.

A— -•

the Amphibia it is a spherical mass close to the rectum, and this may

be explained by regarding it as derived from a different part of the original mass, already mentioned, to that which persists in other vertebrates. In the Iguana among the

reptiles the organ has many notches, and each one corresponds to the point of entrance of a vessel. In Mammals the notches, when they are present, so frequently correspond to the points of entrance of arteries at the hilum that the present writer believes that the former are determined by the latter in many cases (see F. G. Parsons on the Notches of the Spleen, J. Anat. and Phys. vol. 35, p. 416; also Charnock Bradley, Proceedings of R. Soc. Edin., vol. 24, pt. 6, p. 521). The Monotremata and Mar- supialia have curious Y-shaped spleens. As a rule flesh-eating animals have larger and more notched spleens than vegetable feeders, though among the Cetacea the spleen is relatively very small.

dˆ.~

Fig. 2. — Section of the Spleen seen

under a low power.

A, Fibrous capsule. d, Blood-vessels.

b, Trabeculae. e, Spleen pulp.

c, Malpighian corpuscles.

Adrenal Glands

The adrenal glands or suprarenal capsules are two conical bodies, flattened from before backward, resting on the upper poles of the kidneys close to the sides of the vertebral column; each has an anterior and posterior surface and a concave base which is in contact with the kidney. When viewed from in front the right gland is triangular and the left crescentic. On the anterior surface there is a transverse sulcus or hilum from which a large vein emerges. The arteries are less constant in their points of entry, and are derived from three sources, the phrenic, the abdominal aorta and the renal arteries. The glands are entirely retro-peritoneal, though the right one, even on its anterior surface,. is very little covered by peritoneum. In a vertical transverse section each gland is seen to consist of two parts, cortical and medullary. The cortical substance is com- posed of bundles of cells, separated by a stroma, which have a

Embryology. — The generally accepted opinion at present is that the cortical substance is derived from the coelomic epithelium covering the mesoderm of the upper (cephalic) portion of the Wolffian body, and corresponds to the nephrostomes of mesonephridial tubules (see Urinary System), while the medullary part grows out from the sympathetic ganglia and so is probably ectodermal in origin. J. Janosik, however {Archiv. f. mikrosk. Anat. bd. xxii. 1883 and Sitzungsber. d. Wiener A kad., 1885), thinks that the cortical part is derived from the germ epithelium covering the upper part of the genital ridge. C. S. Minot {Human Embryology, 1897) believes that the original cells which grow in from the sympathetic disappear later, and that the adult medullary cells are derived from the cortical.

In the early human embryo the adrenals are larger than the kidneys, and at birth they are proportionately much larger than in the adult. (For literature see Development of the Human Body, J. P. McMurrich, London, 1906; and Handbuch der Entwickelungs- lehre, by O. Hertwig, Jena.)

Comparativeˆ Anatomy. — Adrenals are unknown in Amphioxus and the Dipnoi (mud fish). ! In the Cyclostomata (hags and lampreys) they are said by some to arise in connexion with the cephalic part of the pronephros, though other writers deny their presence at all (see W. E. Collinge and Swale Vincent, Anat. Anz. bd. xii., 1896). In the Elasmobranchs and Holocephali the medullary and cortical parts are apparently distinct, the former being represented by a series of organs situated close to the intercostal arteries, while the latter may be either median or paired, and, as they are placed between the kidneys, are often spoken of as interrenals. In the Amphibia the glands are sunk into the surface of the kidney. In reptiles and birds they are long lobulated bodies lying close to the testis or ovary and receiving an adrenal portal vein. In the lower mammals they are not as closely connected with the kidneys as they are in man, and their shape is usually oval or spherical.

The Thyroid Gland

The thyroid body or gland is a deep red glandular mass con- sisting of two lobes which lie one on each side of the upper part of the trachea and lower part of the larynx; these are joined across the middle line by the isthmus which lies in front of the second and third rings of the trachea. Occasionally, from the top of the isthmus, a nearly but not quite median pyramidal lobe runs up toward the hyoid bone, while in other cases the isthmus may be absent. The gland is relatively larger in women and

children than in the adult male. It is enclosed in a capsule of cervical fascia and is supplied by the superior and inferior thyroid arteries on each side, though occasionally a median thyroidea ima artery is present. On microscopical examination the gland shows a large number of closed tubular alveoli, lined by columnar epithelial cells, unsupported by a basement mem- brane, and filled with colloid or jelly-like material. These are supported by fibrous septa growing in from the true capsule, which is distinct from the capsule of cervical fascia. The lymphatic vessels are large and numerous, and have been shown by E. C. Baber {Phil. Trans., 1881) to contain the same colloid material as the alveoli. Accessory thyroids, close to the main gland, are often found.

Embryology. — The median part of the gland is developed from a tube which grows down in the middle line from the junction of the buccal and pharyngeal parts of the tongue (q.v.), between the first and second branchial arches. This tube is called the thyro-glossal duct and is entodermal in origin. The development of the hyoid bone obliterates the middle part of the duct, leaving its upper part as the foramen caecum of the tongue, while its lower part bifurcates, and so the asymmetrical arrangement of the pyramidal lobe is accounted for. A. Kanthack (J. Anat. and Phys. vol. xxv., 1891) has denied the existence of this duct, but on slender grounds. The lateral parts of the gland are developed from the entoderm of the fourth visceral clefts, and, joining the median part, lose their pharyn- geal connexion. Nearly, but not quite, the whole of the lateral lobes probably belong to this part. (For literature and further details see Quain's Anatomy, London, 1892, and J. P. McMurrich's Development of the Human Body, London, 1906.)

Comparative Anatomy. — The endostyle or hypobranchial groove of Tunicata (sea squirts) and Acrania (Amphioxus) is regarded as the first appearance of the median thyroid; this is a median entodermal groove in the floor of the pharynx, secreting a glairy fluid in which food particles become entangled and so pass into the intestine. In the larval lamprey (Ammocoetes) among the Cyclo- stomata the connexion with the pharynx is present, but in the adult lamprey (Petromyzon), as in all adult vertebrates, this connexion is lost. In the Elasmobranchs the single median thyroid lies close to the mandibular symphysis, but in the bony fish (Teleostei) it is paired. In the mud fish (Dipnoi) there is also an indication of a division into

two lobes. In the Amphibia the thyroid forms numer- ous vesicles close to the anterior end of the pericardium. In Reptilia it lies close to the trachea, and in the Chelonia and Crocodilia is paired. In birds it is also paired and lies near the origin of the carotid arteries. In Mammalia the lateral lobes make their first appearance. In the lower orders of this class the isthmus is often absent. (For further details and literature see R. Wiedersheim's Vergleichende Anatomie der Wirbeltiere, Jena, 1902, and also for literature, Quain's Anatomy, London, 1896.)

Parathyroid Glands These little oval bodies, of considerable physiological import- ance, are two in number on each side. From their position they are spoken of as postero-superior and antero-inferior; the postero-superior are embedded in the thyroid at the level of the lower border of the cricoid cartilage, while the antero-inferior may be embedded in the lower edge of the lateral lobes of the thyroid or may be found a little distance below in relation to the inferior thyroid veins. They are often very difficult to find, but it is easiest to do so in a perfectly fresh, full-term foetus or young child. Microscopically they consist of solid masses of epithelioid cells with numerous blood-vessels between, while, embedded in their periphery, are often found masses of thymic tissue including the concentric corpuscles of Hassall. They have been regarded as undeveloped portions of thyroid tissue in an embryonic state, but the experiments of Gley (Comples rendus de la Soc. de Biol. No. 11, 1895) and of W. Edmunds {Proc. Physiol. Soc. — Jotirn. Phys. vol. xviii., 1895) do not confirm this. They are developed from the entoderm of the third and fourth branchial grooves.

Parathyroids have been found in the orders of Primates, Cheirop- tera, Carnivora, Ungulata and Rodentia among the Mammalia, and also in Birds. In the other classes of vertebrates little is known of them. The fullest and most recent account of these bodies is that of D. A. Welsh in Journ. Anat. and Phys. vol. 32, 1898, pp. 292 and

380.

The Thymus Gland

The thymus gland (Gr. 0i>/ios, from a fancied resemblance to the corymbs of the Thyme) is a light pink gland, consisting

of two unequal lobes, which lies in the superior and anterior mediastina of the^ thorax in front of the pericardium and great vessels; it also extends up into the root of the neck to within a short

distance of the thyroid gland. It continues to grow until the second year of life, after which it remains stationary until puberty, when it usually degenerates rapidly. The writer has seen it perfectly well developed in a man between 40 and 50, though such cases are rare; probably, however, some patches of its tissue remain all through life. Each lobe is divided into a large number of lobules divided by areolar tissue, and each of these, under the microscope, is seen to consist of a cortical and medullary part. The cortex is composed of lymphoid tissue and resembles the structure of a lymphatic gland (see Lymphatic System); it is imperfectly divided into a number of follicles. In the medulla the lymphoid cells are fewer, and nests of epithelial cells are found, called the concentric corpuscles of Hassall. The vascular supply is derived from all the vessels in the neighbour-hood, the lymphatics are very large and numerous, but the nerves, which come from the sympathetic and vagus, are few and small. H. Watney {Phil. Trans., 1882) has discovered haemoglobin, and apparently developing red blood corpuscles, in the thymus. (For further details see Gray's or Quain's Anatomy.)

Embryology. — The thymus is formed from a diverticulum, on each side, from the entoderm lining the third branchial groove, but the connexion with the pharynx is soon lost. The lymphoid cells and concentric corpuscles are probably the derivatives of the original cells lining the diverticulum.

Comparative Anatomy. — The thymus is always a paired gland. In most fishes it rises from the dorsal part of all five branchial clefts; in Lepidosiren (Dipnoi), from all except the first; in Urodela from 3rd, 4th and 5th, and in Anura from the 2nd only (see T. H. Bryce, " Development of Thymus in Lepidosiren," Journ. Anat. and Phys. vol. 40, p. 91). In all fishes, including the Dipnoi (mud fish) it is placed dorsally to the gill arches on each side. In the Amphibia it is found close to the articulation of the mandible. In the Reptilia it is situated by the side of the carotid artery ; but in young croco- diles it is lobulated and extends all alongtheneck.as it does in birds, lying close to the side of the oesophagus. In Mammals the Mar- supials are remarkable for having a well-developed cervical as well as thoracic thymus (J. Symington, /. Anat. and Phys. vol. 32, p. 278). In some of the lower mammals the gland does not disappear as early as it does in man. The thymus of the calf is popularly known as " the chest sweetbread."

Carotid Bodies

These are two small bodies situated, one on each side, between the

origins of the external and internal carotid arteries. Micro- scopically they are divided into nodules or cell balls by connective tissue, and these closely resemble the structure of the para- thyroids, but are without any thymic tissue. The blood-vessels in their interior are extremely large and numerous. The modern view of their development is that they are part of the sympathetic system, and the reaction of their cells to chromium salts bears this out. (See Kohn, Archivf. mikr. Anat. lxx., 1907.)

In the Anura there is a rete or network into which the carotid artery breaks up in the position of the carotid body, and this has an important effect on the course of the circulation. It is probable, however, that this structure has nothing to do with the carotid body of Mammalia.

Coccygeal Body

This is a small median body, about the size of a pea, situated in front of the apex of the coccyx and between the insertions of the levatores ani muscles. It resembles the carotid body in its microscopical structure, but is not so vascular. Concentric corpuscles, like those of the thymus, have been recorded in it. It derives its arteries from the middle sacral and its nerves from the sympathetic. Of its embryology and comparative anatomy little is known, though J. W. Thomson Walker has recently shown that numerous, outlying, minute masses of the same structure lie along the course of the middle sacral artery {Archiv f. mikroscop. Anat. Bd. lxiv.). The probability is that, like the carotid body, it is sympathetic in origin. (Quain's Anatomy gives excellent illustrations of the histology of this as well as of all the other ductless glands.)

For the literature on and further details concerning the foregoing structures the following works should be consulted: Quain's

Anatomy, vol. i (igo8,London,Longman & Co.) ; McMurrich's Develop- ment of the Human Body (London, Rebman, 1906) ; Wiedersheim's Vergleich. Anat. der Wirbeltiere (Jena, 1898). ' (F. G. P.)

DUDERSTADT, a town of Germany, in the Prussian province of Hanover, situated in a beautiful and fertile valley (formerly called Goldene Mark) watered by the Hahle, and on the rail- way Wulften-

Leinefelde. Pop. (1905) 5327. It is an interesting medieval town with many ancient buildings. Notable are the two Roman Catholic churches, beautiful Gothic edifices of the 14th century, the Protestant church, and the handsome town- hall. Its chief industries are woollen and cotton manufactures, sugar-refining and cigar-making; it has also a trade in singing- birds. Duderstadt was founded by Henry I. (the Fowler) in 929, passed later to the monastery of Quedlinburg, and then to Brunswick. It was a member of the Hanseatic League, and during the Thirty Years' War became a stronghold of the Imperialists. It was taken by Duke William of Weimar in 1 63 2 ; in 1761 its Walls were dismantled, and, after being alternately Prussian and Hanoverian, it passed finally in 1866 with Hanover to Prussia.

DUDLEY, BARONS AND EARLS OF. The holders of these English titles are descended from John de Sutton (c. 1310-1359) of Dudley castle, Staffordshire, who was summoned to parlia- ment as a baron in 1342. Sutton was the son of another John de Sutton, who had inherited Dudley Castle through his marriage with Margaret, sister and heiress of John de Somery (d. 1321); he was called Lord Dudley, or Lord Sutton of Dudley, the latter being doubtless the correct form. However, his descendants, the Suttons, were often called by the name of Dudley; and from John Dudley of Atherington, Sussex, a younger son of John Sutton, the 5th baron, the earls of Warwick and the earl of Leicester of the Dudley family are descended.

John Sutton or Dudley (c. 1400-1487), the 5th baron, was first summoned to parliament in 1440, having been viceroy of Ireland from 1428 to 1430. He served Henry VI. as a diplo- matist and also as a soldier, being taken prisoner at the first battle of St Albans in 1455, but this did not prevent him from enjoying the favour of Edward IV. He died on the 30th of September 1487. He was succeeded as 6th baron by his grandson Edward (c. 1459-1532), and one of his sons, William Dudley, was bishop of Durham from 1476 until his death in 1483. His descendant Edward Sutton or Dudley, the 9th .baron (1567- i643),had several illegitimate sons. Among them was Dud Dudley (1599-1684), who in 1665 published Metallum Martis, describing a process of making iron with " pit-coale, sea-coale, &c." which was put in operation at his father's ironworks at Pensnet, Worcestershire, of which he was manager. His success aroused much opposition on the part of other ironmasters, and his com- mercial ventures at Himley, at Askew Bridge and at Bristol ended in loss and disaster. During the Civil War he was a colonel in the army of Charles I.

Dying without lawful male issue in June 1643, the 9th baron was succeeded in the barony by his grand-daughter, Frances. (1611-1697); shei married Humble Ward (c. 1614-1670), the son of a London goldsmith, who was created Baron Ward of Birmingham in 1644. Their son Edward (1631-1701) succeeded both to the barony of Dudley and to that of Ward, but these were separated when his grandson William died unmarried in May 1740. The barony of Dudley passed to a nephew, Ferdi- nando Dudley Lea, falling into abeyance on his death in October 1757; that of Ward passed to the heir male, John Ward (d. 1774), a descendant of Humble Ward. In 1763 Ward was created Viscount Dudley, and in April 1823 his grandson, John William Ward (1781-1833), became the 4th viscount.

Educated at Oxford, John William Ward entered parliament in 1802, and except for a few months he remained in the House of Commons until he succeeded his father in the peerage. In 1827 he was minister for foreign affairs under Canning and then under Goderich and under Wellington, resigning office in May 1828. As foreign minister he was only a cipher, but he was a man of considerable learning and had some reputation as a writer and a talker. Dudley took an interest in the foundation

of the university of London, and his Letters to the bishop of Llandaff were published by the bishop (Edward Copleston) in 1840 (new ed. 1841). He was created Viscount Ednam and earl of Dudley in 1827, and when he died unmarried On the 6th of March 1833 these titles became extinct. His barony of Ward, however, passed to a kinsman, William Humble Ward (1781- !835), whose son, William (1817-1885), inheriting much of the dead earl's great wealth, was created Viscount Ednam and earl of Dudley in i860. The 2nd earl of Dudley in this creation was the latter's son William Humble (b. 1866) ,who was lord-lieutenant of Ireland from 1 902 to 1906, and in 1908 was appointed governor- general of Australia.

See H. S. Grazebrook in the Herald and Genealogist, vols. ii. , v. and vi. ; in Notes andr Queries, 2nd series, vol. xi. ; and in vol. ix. of the publications of the. William Salt Society (1888).

DUDLEY, EDMUND (c. 1462-1510), minister of Henry VII. of England, was a son of John Dudley of Atherington, Sussex, and a member of the great baronial family of Sutton or Dudley. After studying at Oxford and at Gray's Inn, Dudley came under the notice of Henry VII., and is said to have been made a privy councillor at the early age of twenty-three. In 1492 he helped to negotiate the treaty

of Etaples with France and soon j became prominent in assisting the king to check the lawlessness of the barons, and at the same time to replenish his own ex- : chequer. He and his colleague Sir Richard Empson (q.v.) are called fiscales judices by Polydore Vergil, and owing to their extortions they became very unpopular. Dudley, who was speaker of the House of Commons in 1 504, in addition to aiding Henry, amassed a great amount of wealth for himself, and possessed large estates in Sussex, Dorset and Lincolnshire. When Henry VII. died in April 1509, he was thrown into prison by order of Henry VIII. and charged with the crime of con- structive treason, being found guilty and attainted. After having made a futile attempt to escape from prison, he was executed on the 17th or 18th of August 1 510. Dudley's nominal crime was that during the last illness of Henry VII. he had ordered his friends to assemble in arms in case the king died, but the real reason for his death was doubtless the unpopularity caused by his avarice. During his imprisonment he sought to gain the favour of Henry VIII. by writing a treatise in support of absolute monarchy called The Tree of Commonwealth. This never reached the king's hands, and was not published until 1859, when it was printed privately in Manchester. Dudley's first wife was Anne, widow of Roger Corbet of Morton, Shrop- shire, by whom he had a daughter, Elizabeth, who married William, 6th Lord Stourton. By his second wife, Elizabeth, daughter of Edward Grey, Viscount Lisle, he had three sons: John, afterwards duke of Northumberland (q.v.) ; Andrew (d. 1559), who was made a knight and held various important posts during the reign of Edward VI.; and Jasper.

See Francis Bacon, History of Henry VII., edited by J. R. Lumby (Cambridge, 1881); and J. S. Brewer, The Reign of Henry VIII., edited by J. Gairdner (London, 1884).

DUDLEY, SIR ROBERT (1573-1649), titular duke of North- umberland and earl of Warwick, English explorer, engineer and author, was the son of Robert Dudley, earl of Leicester (q.v.), the favourite of Queen Elizabeth. His mother was Lady Douglas Sheffield, daughter of Thomas, first Baron Howard of Effingham. Leicester, who deserted Lady Douglas Sheffield for Lettice Knollys, widow of the first earl of Essex, denied that they were married. She asserted that they were, at Esher in Surrey, but her marriage with Sir Edward Stafford of Grafton, after her desertion by Leicester, would seem to be a tacit confession that her claim had no foundation. Her son Robert was born in May 1573, was recognized by Leicester, and sent to Christ Church, Oxford, in 1587. He inherited all Leicester's property under the earl's will at his death in 158&, and in the

following year the property of Ambrose Dudley, earl of Warwick. In 1594 he made a voyage to the West Indies, and in 1596 he took part in the expedition to Cadiz and was knighted. In 1592 he had married a sister of Thomas Cavendish the circumnavigator. On her death he married Alicia Leigh in 1596, by whom he had four daughters. After the death of Elizabeth he endeavoured

to secure recognition of his legitimacy, and of his right to inherit the titles of his father and uncle. The proceedings were quashed by the Star Chamber. In 1605 he obtained leave to travel abroad, and went to Italy accompanied by the beautiful Miss Elizabeth Southwell, daughter of Sir Robert Southwell of Woodrising, in the dress of a page. When ordered to return home and to provide for his deserted wife and family, he refused, was outlawed, and his property was confiscated. On the continent he avowed himself a Roman Catholic, married Elizabeth South- well at Lyons, and entered the service of Cosimo II., grand-duke of Tuscany. In the service of the grand-duke he is said to have done some fighting against the Barbary pirates, and he was un- doubtedly employed in draining the marshes behind Leghorn, and in the construction of the port. In 1620 the emperor Ferdinand II. gave him a patent recognizing his claim not only to the earldom of Warwick but to the duchy of Northumberland, which had been held by his grandfather, who was executed by Queen Mary Tudor. In Italy Dudley was known as Duca di Nortombria and Conte di Warwick. He died near Florence on the 6th of September 1649, leaving a large family of sons and daughters. His deserted wife, Alicia, was created duchess of Dudley by Charles I. in 1644, and died in 1670, when the title became extinct. Through a daughter who married the Marquis Paleotti, Dudley was the ancestor of the wife of the first duke of Shrewsbury (of the revolution of 1688), and of her brother who was executed at Tyburn for murder on the 17th of March 1718. Dudley was the author of a pamphlet addressed to King James I., showing how the " impertinences of parliament " could be bridled by military force. But his chief claim to memory is the magnifi- cent Arcano dell mare, published in Italian at Florence in 1645- 1646 in three volumes folio. It is a collection of all the naval knowledge of the age, and is particularly remarkable for a scheme for the construction of a navy in five rates which Dudley designed and described. It was reprinted in Florence in two volumes folio in 1 66 1 without the charts of the first edition.

Authorities. — G. L. Craik, Romance of the Peerage (London,i848-1850), vol. iii. ; Sir N. H. Nicolas, Report of Proceedings on the

Claim to the Barony of V Isle (London, 1829); and The Italian Biography of Sir R. Dudley, published anonymously, privately and without date or name of place, but known to have been written by Doctor Vaughan Thomas, vicar of Stoneleigh, who died in 1858. (D. H.)

DUDLEY, THOMAS (1576-1653), British colonial governor of Massachusetts, was born in Northampton, England, in 1576, a member of the elder branch of the family to the younger branch of which Robert Dudley, earl of Leicester, belonged. He was the son of a country gentleman of some means and high standing, was captain of an English company in the French expedition of 1597, serving under Henry of Navarre, and eventually became the steward of the earl of Lincoln's estates, which he managed with great success for many years. Having been converted to Puritanism, he became a strict advocate of its strictest tenets. About 1627 he associated himself with other Lincolnshire gentlemen who in 1629 entered into an agreement to settle in New England provided they were allowed to take the charter with them. This proposal the general court of the Plymouth Company agreed to, and in April 1630 Dudley sailed to America in the .same ship with John Winthrop, the newly appointed governor, Dudley himself at the last moment being chosen deputy-governor in place of John Humphrey (or Humfrey), the earl of Lincoln's son-in-law, whose departure was delayed. Dudley was for many years the most influential man in thS Massachusetts Bay colony, save Winthrop, with whose policy he was more often opposed than in agreement. He was deputy-governor in 1629- 1634, in 1637-1640, in 1646-1650 and in •1651-1653, and was governor four times, in 1634, 1640, 1645 an d 1650. Soon after his arrival in the colony he settled at Newton (Cambridge); of which he was one of the founders; he was also one of the earliest promoters of the plan for the establishment of Harvard College. Winthrop's decision to make Boston the capital instead of Newton precipitated the first of the many quarrels between the two, Dudley's sterner and harsher Puritanism, being in strong contrast to Winthrop's more tolerant and liberal views. He was an earnest and persistent heresy-hunter — not only the

Antinomians, but even such a good Puritan as John Cotton, against whom he brought charges, feeling the weight of his stern and remorseless hand. His position he himself best expressed in the following brief verse found among his papers :

" Let men of God in courts and churches watch O'er such as do a Toleration hatch, Lest that ill egg bring forth a Cockatrice To poison

all with heresy and vice."

He died at Roxbury, Massachusetts, on the 31st of July 1653.

See Augustine Jones, Life and Work of Thomas Dudley, the Second Governor of Massachusetts (Boston, 1899) ; and the Life of Mr Thomas Dudley, several times Governor of the Colony of Massachusetts, written as is supposed by Cotton Mather, edited by Charles Deane (Cambridge, 1 870) . Dudley 's interesting and valuable " Letter to the Countess of Lincoln," is reprinted in Alexander Young's Chronicles of the Planters of the Colony of Massachusetts Bay (Boston, 1846), and in the New Hampshire Historical Society Collections, vol. iv. (1834).

His son Joseph Dudley (1647-1720), colonial governor of Massachusetts, was born in Roxbury, Massachusetts, on the 23rd of September 1647. He graduated at Harvard College in 1665, became a member of the general court, and in 1682 was sent by Massachusetts to London to prevent the threatened revocation of her charter by Charles II. There, with an eye to his personal advancement, he secretly advised the king to annul the charter; this was done, and Dudley, by royal appointment, became president of the provisional council. With the advent of the new governor, Sir Edmund Andros, Dudley became a judge of the superior court and censor of the press. Upon the deposi- tion of Andros, Dudley was imprisoned and sent with him to England, but was soon set free. In 1691-1692 he was chief- justice of New York, presiding over the court that condemned Leisler and Milburn. Returning to England in 1693, he was lieutenant-governor of the Isle of Wight and a member of parliament, and in 1702, after a long intrigue, secured from Queen Anne a commission as governor of Massachusetts, serving until 1 715. His administration was marked, particularly in the earlier years, by ceaseless conflict with the general court, from which he demanded a regular fixed salary instead of an annual grant. He was active in raising volunteers for the so- called Queen Anne's War, and in 1707 sent a fruitless expedition against Port Royal. He was accused by the Boston merchants, who petitioned for his removal, of being in league with smugglers and illicit traders, and in 1708 a bitter attack on his administra- tion was published in London, entitled The Deplorable State of New England by reason of a Covetous and Treacherous Governor and Pusillanimous Counsellors. His character may be best summed up in the words of one of his successors, Thomas Hutchinson, that " he had as many virtues as can consist with so great a thirst for honour and power." He died at Roxbury on the 2nd of April 1720.

Joseph Dudley's son, Paul Dudley (1675-1751), graduated at Harvard in 1690, studied law at the Temple in London, arid became attorney-general of Massachusetts (1702 to 1718). He was associate justice of the superior court of that province from 1 718 to 1745, and chief justice from 1745 until his death. He was a member of the Royal Society (London), to whose Trans- actions he contributed several valuable papers on the natural history of New England, and was the founder of the Dudleiah lectures on religion at Harvard.

The best extended account of Joseph Dudley's administration is in J. G. Palfrey's History of New England, vol. iv. (Boston, 1875).

DUDLEY, a municipal, county and parliamentary borough and market-town of Worcestershire, England, in a portion of that county enclaved in Staffordshire, 8 m. W.N.W. of Birming- ham, and 121 N.W. of London by the London & North Western railway. The Great Western railway also serves the towi. Pop. (1891) 45,724; (1901) 48,733. Dudley lies on an elevated ridge, in the midst of the district of the midlands known as the Black Country, which is given up to ironworks and coal mines. The " ten-yard " coal, in the neighbourhood, is the thickest seam worked in England. Limestone is extensively quarried, fire-clay is abundant; and iron-founding, brass-founding, engineering works, glass works andbrickworksarecomprisedintheindustries. Among the principal buildings are the churches of the five parishes into

which the town is divided, the town hall, county court, free libraries, and school of art, grammar school with university and foundation scholarships, technical school, mechanics' institute, Guest hospital (founded by Joseph Guest, a citizen, in 1868), arid a dispensary. In the market-place stands a large domed fountain, erected by the earl of Dudley (1867). There is a geological society with a museum, for the neighbourhood of Dudley is full of geological interest, the Silurian limestone abounding in fossils. To the north of the town are extensive remains of an ancient castle, surrounded by beautiful grounds. The hill on which it stands is of limestone, which by quarrying has been hollowed out in extensive chambers and galleries. The view from the castle is remarkable. The whole district is seen to be set with chimneys, pit-buildings and factories; and at night the glare of furnaces reveals the tireless activity of the Black Country. Dudley and its environs are connected by a tramway system, and

water communication is afforded by the Dudley canal with Birmingham and with the river Severn.

Included in the parliamentary borough, but in Staffordshire, and 25 m. by rail S.W. of Dudley, is Brierley Hill, a market- town on the river Stour and the Stourbridge and Birmingham Canals. Its chief buildings are the modern church of St Michael, standing on a hill, the Roman Catholic church of St Mary, by A. W. Pugin, the town hall and free library. Between this and Dudley lie the great ironworks of Roundoak, and the extensive suburb of Netherton in the enclaved portion of Worcestershire. The industries are similar to those of Dudley. Three miles W. of Dudley is Kingswinford, a mining township, with large brick works, giving name to a parliamentary division of Staffordshire. The parliamentary borough of Dudley returns one member. The town itself is governed by a mayor, 10 aldermen and 30 councillors. Area 3546 acres.

In medieval times the importance of Dudley (Dudelei) de- pended on the castle, which is mentioned in the Domesday Survey. Before the Conquest Earl Eadwine held the manor, which in 1086 belonged to William FitzAnsculf, from whom it passed, probably by marriage, to Fulk Paynel, afterwards to the Somerys, Suttons and Wards, whose descendants (earls of Dudley) now hold it. The first mention of Dudley as a borough occurs in an inquisition taken after the death of Roger de Somery in 1272. This does not give a clear account of the privileges held by the burgesses, but shows that they had probably been freed from some or all of the services required from them as manorial tenants, in return for a fixed rent. In 1865 Dudley was incorporated. Before that time it was governed by a high and low bailiff appointed every year at the court leet of the manor. Roger de Somery evidently held a market by prescrip- tion in Dudley before 1261, in which year he came to terms with the dean of Wolverhampton, who had set up a market in Wolver- hampton to the disadvantage of Roger's market at Dudley. According to the terms of the agreement the dean might con- tinue his market on condition that Roger and his tenants should be free from toll there. Two fairs, on the 21st of September and the 21st of April, were granted in 1684 to Edward Lord Ward, lord of the manor. Dudley was represented in the parliament of 1295, but not again until the privilege was revived by the Reform Act of 1832. Mines of sea-coal in Dudley are mentioned as early as the reign of Edward I., and by the beginning of the 1 7th century mining had become an important industry.

DUDb, or Dudon (fl. c. 1000), Norman historian, was dean of St Quentin, where he was born about 965. Sent in 986 by Albert I.

count of Vermandois, on an errand to Richard I., duke of Normandy, he succeeded in his mission, and, having made a very favourable impression at the Norman court, spent some years in that country. During a second stay in Normandy Dudo wrote his history of the Normans, a task which Duke Richard I. had urged him to undertake. Very little else is known about his life, except that he died before 1043. Written between 1015 and 1030, his Historia Normannorum, or Libri III. de moribus et actis primorum Normanniae ducum, was dedicated to Adalberon, bishop of Laon. Dudo does not appear to have

consulted .any existing documents for his history, but to have obtained his information from oral tradition, much of it being supplied by Raoul, count of Ivry, a half-brother of Duke Richard I. Consequently the Historia partakes of the nature of a romance, and on this ground has been regarded as untrustworthy by such competent critics as E. Dummler and G. Waitz. Other authorities, however, e.g. J. Lair and J. Steenstrup, while admitting the existence of a legendary element, regard the book as of considerable value for the history of the Normans. Although Dudo was acquainted with Virgil and other Latin writers, his Latin is affected and obscure. The Historia, which is written alternately in prose and in verse of several metres, is divided into four parts, and deals with the history of the Normans from 852 to the death of Duke Richard I. in 996. It glorifies the Normans, and was largely used by William of Jumieges, Wace, Robert of Torigni, William of Poitiers and Hugh of Fleury in compiling their chronicles, and was first published by A.Duchesne in his Histariae Normannorum scriptores antiqui, at Paris in 1619. Another edition is in the Palrologia Latina, tome cxli. of J. P. Migne (Paris, 1844), but the best is perhaps the one edited by J. Lair (Caen, 1865).

See E. Dummler, " Zur Kritik Dudos von St Quentin " in the Forschungen zur deutschen Geschichte, Bande vi and ix. (Gottingen, 1866) ; G. Waitz, " Ober die Quellen zur Geschichte der Begriin-dung der normannischen Herrschaft in Frankreich," in the Gottinger gel. Anzeigen (Gottingen, 1866); J. C. H. R. Steenstrup, Nor-mannerne, Band i. (Copenhagen 1876) ; J. Lair. EJude critique et historique sur Dudon (Caen, 1865) ; G. Kortung, tlber die Quellen des Roman de Rou (Leipzig, 1867) ; W. Wattenbach, Deutschlands Geschichtsquellen, Band i. (Berlin, 1904) ; and A. Molinier, Les Sources de I'histoire de France, tome ii. (Paris, 1902).

DUDWEILER, a town of Germany, in the Prussian Rhine province, on the Sulzbach, 4 m. by rail N.E. from Saarbriicken. It has

extensive coal mines and ironworks and produces fire- proof bricks. Pop. (1905) 16,320.

DUEL (Ital. duello, Lat. duellum — old form of bellum — from duo, two), a prearranged encounter between two persons, with deadly weapons, in accordance with conventional rules, with the object of voiding a personal quarrel or of deciding a point of honour. The first recorded instance of the word occurs in Coryate's Crudities (1611), but Shakespeare has duello in this sense, and uses " duellist " of Tybalt in Romeo and Juliet. In its earlier meaning of a judicial combat we find the word latinized in the' Statute of Wales (Edw. I., Act 12), " Placita de terris in partibus istis non habent terminari per duellum."

Duels in the modern sense were unknown to the ancient world, and their origin must be sought in the feudal age of Europe. The single combats recorded in Greek and Roman history and legend, of Hector and Achilles, Aeneas and Turnus, the Horatii and Curiatii, were incidents in national wars and have nothing in common with the modern duel. It is, however, noteworthy that in Tacitus (Germania, cap. x.) we find the rudiments of the judicial duel (see Wager, for the wager of battle). Domestic differences, he tells us, were settled by a legalized form of combat between the disputants, and when a war was impending a captive from the hostile tribe was armed and pitted against a national champion, and the issue of the duel was accepted as an omen. The judicial combat was a Teutonic institution, and it was in fact an appeal from human justice to the God of battles, partly a sanction of the current creed that might is right, that the brave not only will win but deserve to win. It was on these grounds that Gundobald justified, against the complaints of a bishop, the famous edict passed at Lyons (a.d. 501) which established the wager of battle as a recognized form of trial. It is God, he argued, who directs the issue of national wars, and in private quarrels we may trust His providence to favour the juster cause. Thus, as Gibbon comments, the absurd and cruel practice of judicial duels, which had been peculiar to some tribes of Germany, was propagated and established in all the monarchies of Europe from Sicily to the Baltic. Yet in its defence it may be urged that it abolished a worse evil, the compurgation by oath which put a premium on perjury, and the ordeal, or judgment of God, when the cause was decided by blind chance, or more often by priestcraft.

Those who are curious to observe the formalities and legal rules of a judicial combat will find them described at length in

the 28th book of Montesquieu's Esprit des lots. On Judicial these regulations he well remarks that, as there are an combat. infinity of wise things conducted in a very foolish

manner, so there are some foolish things conducted in a very wise manner. For our present purpose it is sufficient to observe the development of the idea of personal honour from which the modern duel directly sprang. In the ancient laws of the Swedes we find that if any man shall say to another, " You are not a man equal to other men," or " You have not the heart of a man," and the other shall reply, " I am a man as good as you," they shall meet on the highway, and then follow the regulations for the combat. What is this but the modern challenge ? By the law of the Lombards if one man call another arga, the insulted party might defy the other to mortal combat. What is arga but the dummer Junger of the German student ? Beaumanoir thus describes a legal process under Louis le Debon-naire : — The appellant begins by a declaration before the judge that the appellee is guilty of a certain crime; if the appellee answers that his accuser lies, the judge then ordains the duel. Is not this the modern point of honour, by which to be given the lie is an insult which can only be wiped out by blood ?

From Germany the judicial combat rapidly spread to France, where it flourished greatly from the 10th to the 1 2th century, the period of customary law. By French kings it was welcomed as a limitation of the judicial powers of their half independent vassals. It was a form of trial open to all freemen and in certain cases, as under Louis VI., the privilege was extended to serfs. Even the church resorted to it not unfrequently to settle disputes concerning church property. Abbots and priors as territorial lords and high justiciaries had their share in the confiscated goods of the defeated combatant, and Pope Nicholas when applied to in 858 pronounced it " a just and legitimate combat." Yet only three years before the council of Valence had condemned the practice, imposing the severest penance on the victor and refusing the last rites of the church to the vanquished as to a suicide. In 1385 a duel was fought, the result of which was so preposterous that even the most superstitious began to lose faith in the efficacy of such a judgment of God. A certain Jacques Legris was accused by the wife of Jean Carrouge of having intro- duced himself by night in the guise of her husband whom she was expecting on his return from the Crusades. A duel was ordained by the parlement of Paris, which was fought in the presence of Charles VI. Legris was

defeated and hanged on the spot. Not long after, a criminal arrested for some other offence confessed himself to be the author of the outrage. No institution could long survive so open a confutation, and it was annulled by the parlement. Henceforward the duel in France ceases to be an appeal to Heaven, and becomes merely a satisfaction of wounded honour. Under Louis XII. and Francis I. we find the first vestiges of tribunals of honour. The last instance of a duel authorized by the magistrates, and conducted according to the forms of law, was the famous one between Francois de Vivonne de la Chataignerie and Guy Chabot de Jarnac. The duel was fought on the 10th of July 1547 in the courtyard of the chateau of St Germain-en-Laye, in the presence of the king and a large assembly of courtiers. It was memorable in two ways. It en- riched the French language with a new phrase; a sly and un- foreseen blow, such as that by which de Jarnac worsted La Chataignerie, has since been called a coup de Jarnac. And Henry, grieved at the death of his favourite, swore a solemn oath that he would never again permit a duel to be fought. This led to the first of the many royal edicts against duelling. By a decree of the council of Trent (cap. xix.) a ban was laid on " the detestable use of duels, an invention of the devil to compass the destruction of souls together with a bloody death of the body."

In England, it is now generally agreed, the wager of battle did not exist before the time of the Norman Conquest. Some previous examples have been adduced, but on examination they will be seen to belong rather to the class of single combats between the champions of , two opposing armies. One such

instance is worth quoting as a curious illustration of the superstition of the time. It occurs in a rare tract printed in London, 1610, The Duello, or Single Combat. " Danish irruptions and the bad aspects of Mars having drencht the common mother earth with her sonnes' blood streames, under the reigne of Edmund, a Saxon monarch, misso in compendium (so worthy Camden expresseth it) hello utriusque gentis fata Edmundo Anglorum et Canuto Danorum regibus commissa fuerunt, qui singulari certamine de summa imperij in hac insula (that is, the Eight in Glostershire) depugnarunt." By the laws of William the Conqueror the trial by battle was only compulsory when the opposite parties were both Normans, in other cases it was optional. As the two nations were gradually merged into one, this form of trial spread, and until the reign of Henry II. it was the only mode for determining a suit for the recovery of land. The method of procedure is admirably described by Shakespeare in the opening scene in Richard II., where Henry of Bolingbroke, duke of Hereford, challenges Thomas, duke of Norfolk; in the mock-heroic

battle between Horner the Armourer and his man Peter in Henry VI.; and by Sir W. Scott in the Fair Maid of Perth, where Henry Gow appears before the king as the champion of Magdalen Proudfute.. The judicial duel never took root in England as it did in France. In civil suits it was superseded by the grand assize of Henry II., and in cases of felony by indict- ment at the prosecution of the crown. One of the latest instances occurred in the reign of Elizabeth, 1571, when the lists were actually prepared and the justices of the common pleas appeared at Tothill Fields as umpires of the combat. Fortunately the petitioner failed to put in an appearance, and was consequently nonsuited (see Spelman, Glossary, s.v. " Campus "). As late as 1817 Lord Ellenborough, in the case of Thornton v. Ashford, pronounced that " the general law of the land is that there shall be a trial by battle in cases of appeal unless the party brings himself within some of the exceptions." Thornton was accused of murdering Mary Ashford, and claimed his right to challenge the appellant, the brother of the murdered girl, to wager of battle. His suit was allowed, and, the challenge being refused, the accused escaped. Next year the law was abolished (59 Geo. III., c. 46).

In sketching the history of the judicial combat we have traced the parentage of the modern duel. Strip the former of its legality, and divest it of its religious sanction, and the latter remains. We are justified, then, in dating „fi,oiiour. the commencement of duelling from the abolition of the wager of battle. To pursue its history we must return to France, the country where it first arose, and the soil on which it has most flourished. The causes which made it indigenous to France are sufficiently explained by the condition of society and the national character. As Buckle has pointed out, duelling is a special development of chivalry, and chivalry is one of the phases of the protective spirit which was predominant , _ in France up to the time of the Revolution. Add to this the keen sense of personal honour, the susceptibility and the pugnacity which distinguish the French race. Montaigne, when touching on this subject in his essays, says, " Put three Frenchmen together on the plains of Libya, and they will not be a month in company without scratching one another's eyes out." The third chapter of d'Audiguier's Ancien usage des duels is headed, " Pourquoi les seuls Francais se battent en duel." English literature abounds with allusions to this characteristic of the French nation. Lord Herbert of Cherbury, who was ambassador at the court oi Louis XIII., says, " There is scarce a Frenchman worth looking on who has not killed his man in a duel." Ben Jonson, in his- Magnetic Lady, makes Compass, the scholar and soldier, thus describe France, " that garden of

humanity" : —

" There every gentleman professing arms Thinks he is bound in honour to embrace The bearing of a challenge for another, Without or questioning the cause or asking Least colour of a reason."

Duels were not common before the 16th century. Hallam

attributes their prevalence to the barbarous custom of wearing swords as a part of domestic dress, a fashion which was not introduced till the later part of the 15th century. In 1560 the states-general at Orleans supplicated Charles IX. to put a stop to duelling. Hence the famous ordinance of 1566, drawn up by the chancellor de l'Hopital, which served as the basis of the successive ordinances of the following kings. Under the frivolous and sanguinary reign of Henry III., " who was as eager for excitement as a woman," the rage for duels spread till it became almost an epidemic. In 1602 the combined remonstrances of the church and the magistrates extorted from the king an edict condemning to death whoever should give or accept a challenge or act as second. But public opinion was revolted by such rigour, and the statue remained a dead letter. A duel forms a fit conclusion to the reign. A hair-brained youth named L'Isle Marivaux swore that he would not survive his beloved king, and threw his cartel into the air. It was at once picked up, and Marivaux soon obtained the death he had courted. Henry IV. began his reign by an edict against duels, but he was known in private to favour them; and, when de Crequi asked leave to fight Don Philip of Savoy, he is reported to have said, " Go, and if I were not a king I would be your second." Fontenay-Mareuil says, in his MSmoires, that in the eight years between 1601 and 1609, 2000 men of noble birth fell in duels. In 1609 a more effective measure was taken at the instance of Sully by the establishment of a court of honour. The edict decrees that all aggrieved persons shall address themselves to the king, either directly or through the medium of the constables, marshals, &c. ; that the king shall decide, whether, if an accommodation could not be effected, permission to fight should be given; that the aggressor, if pronounced in the wrong, shall in any case be sus- pended from any public office or employment, and be mulcted of one-third of his revenue till he has satisfied the aggrieved party; that any one giving or receiving a challenge shall forfeit all right of reparation and all his offices; that any one who kills his adversary in an unauthorized

duel shall suffer death without burial, and his children shall be reduced to villanage; that seconds, if they take part in a duel, shall suffer death, if not, shall be degraded from the profession of arms. This edict has been pronounced by Henri Martin " the wisest decree of the ancient monarchy on a matter which involves so many delicate and profound questions of morals, politics, and religion touching civil rights " (Histoire de France, x. 466).

In the succeeding reign the mania for duels revived. Rostand's Cyrano is a life-like modern portraiture of French bloods in the first half of the 17th century. De Houssaye tells us that in Paris when friends met the first question was, " Who fought yesterday ? who is to fight to-day ? " They fought by night and day, by moonlight and by torch-light, in the public streets and squares. A hasty word, a misconceived gesture, a question about the colour of a riband or an embroidered letter, such were the commonest pretexts for a duel. The slighter and more frivolous the dispute, the less were they inclined to submit them to the king for adjudication. Often, like gladiators or prize-fighters, they fought for the pure love of fighting. A misunderstanding is cleared up on the ground. " N'importe," cry the principals, " puisque nous sommes ici, battons-nous." Seconds, as Montaigne tells us, are no longer witnesses, but must take part themselves unless they would be thought wanting in affection or courage; and he goes on to complain that men are no longer contented with a single second, " c'etait ancieime- ment des duels, ce sont a. cette heure . rencontres et batailles." There is no more striking instance of Richelieu's firmness and power as a statesman than his conduct in the matter of duelling. In his Testament' politique he has assigned his reasons for dis- approving it as a statesman and ecclesiastic. But this disapproval was turned to active detestation by a private cause. His elder brother, the head of the house, had fallen in a duel stabbed to the heart by an enemy of the cardinal. Already four edicts had been published under Louis XIII. with little or no effect, when in 1626 there was published a new edict condemning to death any one who had killed his adversary in a duel, or had

been found gtiilty of sending a challenge a second time. Banish- ment and partial confiscation of goods were awarded for lesser offences. But this edict differed, from preceding ones not so much in its severity as in the fact that it was the first which was actually enforced. The cardinal began by imposing the penalties of banishment and fines, but, these proving ineffectual to stay the evil, he determined to make a terrible example. To quote his own words to the king, " II s'agit de couper la gorge aux duels ou aux 6dits de votre Majeste." The count de Boutteville, a renohimist who had

already been engaged in twenty-one affairs of honour, determined out of pure bravado to fight a twenty- second time. The duel took place at midday on the Place Royale. Boutteville was arrested with his second, the count de Chapelles; they were tried by the parlement of Paris, condemned and, in spite of all the influence of the powerful house of Mont- morenci, of which de Boutteville was a branch, they were both beheaded on the 21st of June 1627. For a short time the ardour of duellists was cooled. But the lesson soon lost its effect. Only five years later we read in the M ercure de France that two gentlemen who had killed one another in a duel were, by the cardinal's orders, hanged on a gallows, stripped and with their heads downwards, in tha sight of all the people. This was a move in the right direction, since, for fashionable vices, ridicule and ignominy is a more drastic remedy than death. It was on this principle that Caraccioli, prince of Melfi, when viceroy of Piedmont, finding that his officers were being decimated by duel- ling, proclaimed that all duels should be fought on the parapet of the Ponte Vecchio, and if one of the combatants chanced to fall into the river he should on no account be pulled out.

Under the long reign of Louis XIV. many celebrated duels took place, of which the most remarkable were that between the duke of Guise and Count Coligny, the last fought on the Place Royale, and that between the dukes of Beaufort and Nemours,, each attended by four friends . Of the ten combatants, Nemours and two others were killed on the spot, and none escaped without some wound. No less than eleven edicts against duelling were issued under le Grand Monarque. That of 1643 established a supreme court of hon&ur composed of the marshals of France; but the most famous was that of 1679, which con- firmed the enactments of his predecessors, Henry IV. and Louis XII. At the same time a solemn agreement was entered into by the principal nobility that they would never engage in a duel on any pretence whatever. A medal was struck to commemorate the occasion, and the firmness of the king, in refusing pardon to all offenders, contributed more to restrain this scourge of society than all the efforts of his predecessors.

The subsequent history of duelling in France may be more shortly treated. In the preamble to the edict of 1 704 Louis XIV. records his satisfaction at seeing under his reign an almost entire cessation of those fatal combats which by the inveterate force of custom had so long prevailed. Addison (Spectator, 99) notes it as one of the most glorious exploits of his reign to have banished the false point of honour. Under the regency of Louis XV. there was a brief revival. The last legislative act for the sup- pression of duels was passed on

the 12th of April 1723. Then came the Revolution, which in abolishing the ancien rigime fondly trusted that with it would go the duel, one of the privileges and abuses of an aristocratic society. Dupleix, in his Military Law concerning the Duel (1611), premises that these have no application to lawyers, merchants, financiers or justices. This explains why in the legislation of the National Assembly there is no mention of duels. Camille Desmoulins when challenged shrugged his shoulders and replied to the charge of cowardice that he would prove his courage on other fields than the Bois de Boulogne. The two great Frenchmen whose writings preluded the French Revolution both set their faces against it. Voltaire had indeed, as a young man, in obedience to the dictates of society, once sought satisfaction from a nobleman for a brutal insult, and had reflected on his temerity in the solitude of the Bastille. 1 Henceforward he inveighed against the practice,

1 Voltaire met the chevalier Rohan-Chabot at the house of the Marquis of Sully. ■ The chevalier, offended by Voltaire's free speech,

not only for its absurdity, but also for its aristocratic exclusive- ness. Rousseau had said of duelling, " It is not an institution of honour, but a horrible and barbarous custom, which a courageous man despises and a good man abhors." Napoleon was a sworn foe to it. " Bon duelliste mauvais soldat " is one of his best known sayings; and, when the king of Sweden sent him a challenge, he replied that he would order a fencing-master to attend him as plenipotentiary. After the battle of Waterloo duels such as Lever loves to depict were frequent between dis- banded French officers and those of the allies in occupation. The restoration of the Bourbons brought with it a fresh crop of duels. Since then duels have been frequent in France — : more frequent, however, in novels than in real life — fought mainly between politicians and journalists, and with rare exceptions bloodless affairs. If fought with pistols, the distance and the weapons chosen render a hit improbable; and, if fought with rapiers, honour is generally satisfied with the first blood drawn. Among Frenchmen famous in politics or letters who have "gone out " may be mentioned Armand Carrel, who fell in an encounter with Emile Girardin; Thiers, who thus atoned for a youthful indiscretion; the elder Dumas; Lamartine; Ste Beuve, who to show at once his sangfroid and his sense of humour, fought under an umbrella; Ledru Rollin; Edmond

About; Clement Thomas; Veuillot, the representative of the church militant; Rochefort; and Boulanger, the Bonapartist fanfaron, whose discomfiture in a duel with Floquet resulted in a notable loss of popular respect.

Duelling did not begin in England till some hundred years after it had arisen in France. There is no instance of a private

duel fought in England before the 16th century, England. an< ˆ tne y are rare before the reign of James I. A very

fair notion of the comparative popularity of duelling, and of the feeling with which it was regarded at various periods, might be gathered by examining the part it plays in the novels and lighter literature of the times. The earliest duels we re- member in fiction are that in the Monastery between Sir Piercie Shafton and Halbert Glendinning, and that in Kenilworth between Tressilian and Varney. (That in Anne of Geier stein either is an anachronism or must reckon as a wager by battle.) Under James I. we have the encounter between Nigel and Lord Dal- garno. The greater evil of war, as we observed in French history, expels the lesser, and the literature of the Commonwealth is in this respect a blank. With the Restoration there came a reaction against Puritan morality, and a return to the gallantry and loose manners of French society, which is best represented by the theatre of the day. The drama of the Restoration abounds in duels. Passing on to the reign of Queen Anne, we find the subject frequently discussed in the Tatler and the Spectator, and Addison points in his happiest way the moral to a con- temporary duel between Mr Thornhill and Sir Cholmeley Dering. " I come not," says Spinomont to King Pharamond, " I come not to implore your pardon, I come to relate my sorrow, a sorrow too great for human life to support. Know that this morning I have killed in a duel the man whom of all men living I love best." No reader of Esmond can forget Thackeray's description of the doubly fatal duel between the duke of Hamilton and Lord Mohun, which is historical, or the no less life-like though fictitious duel between Lord Mohun and Lord Castlewood. The duel between the two brothers in Stevenson's Master of Ballantrae is one of the best conceived in fiction. Throughout the reigns of the Georges they are frequent. Richardson expresses his opinion on the subject in six voluminous letters to the Literary Repositor.

insolently asked the marquis, " Who is that young man?" " One," replied Voltaire, " who if he does not parade a great name, honours that he bears." The chevalier said nothing at the time, but, seizing his

opportunity, inveigled Voltaire into his coach, and had him beaten by six of his footmen. Voltaire set to work to learn fencing, and then sought the chevalier in the theatre, and publicly challenged him. A bon-mot at the chevalier's expense was the only satisfaction that the philosopher could obtain. " Monsieur, si quelque affaire d'interSt ne vous a point fait oublier l'outrage dont j'ai a me plaindre, j'espere que vous m'en rendrez raison." The chevalier was said to employ his capital in petty usury.

VIII. 21

Sheridan, like Farquhar in a previous generation, not only dramatized a duel, but fought two himself. Byron thus com- memorates the bloodless duel between Tom Moore and Lord Jeffrey : —

" Can none remember that eventful day, That ever glorious almost fatal fray. When Little's leadless pistols met the eye, And Bow Street myrmidons stood laughing by?"

There are no duels in Miss Austen's novels, but in those of Miss Edge worth, her contemporary, there are three or four. As we approach the 19th century they become rarer in fiction. Thackeray's novels, indeed, abound in duels. " His royal high- ness the late lamented commander-in-chief " had the greatest respect for Major Macmurdo, as a man who had conducted scores of affairs for his acquaintance with the greatest prudence and skill; and Rawdon Crawley's duelling pistols, " the same which I shot Captain Marker," have become" a household word. Dickens, on the other hand, .who depicts contemporary English life, and mostly in the middle classes, in all his numerous works has only three; and George Eliot never once refers to a duel. Tennyson, using a poet's privilege, laid the scene of a duel in the' year of the Crimean War, but he echoes the spirit of the times when he stigmatizes " the Christless code that must have life for a blow." Browning, who delights in cases of conscience, has given admirably the double moral aspect of the duel in his two lyrics entitled " Before " and " After."

To pass from fiction to fact we will select the most memorable English duels of the last century and a half. Lord Byron killed Mr Chaworth in 1765; Charles James Fox and Mr Adams fought in 1779; duke of York and Colonel Lennox, 1789; William Pitt and George Tierney, 1796; George Canning and Lord Castlereagh, 1809; Mr Christie killed John Scott, editor of the London Magazine, 1821; duke of Wellington and earl of Winchelsea, 1829; Mr Roebuck and

Mr Black, editor of Morning Chronicle, 1835; Lord Alvanley and a son of Daniel O'Connell in the same year; Earl Cardigan wounded Captain Tuckett, was tried by his peers, and acquitted on a legal quibble, 1840.

The year 1808 is memorable in the annals of duelling in England. Major Campbell was sentenced to death and executed for killing Captain Boyd in a duel. In this case it is true that there was a suspicion of foul play; but in the case of Lieutenant Blundell, who was killed in a duel in 1813, though all had been conducted with perfect fairness, the surviving principal and the seconds were all convicted of murder and sentenced to death, and, although the royal pardon was obtained, they were all cashiered, The next important date is the year 1843, when public attention was painfully called to the subject by a duel in which Colonel Fawcett was shot by his brother-in-law, Lieutenant Monro. The survivor, whose career was thereby blasted, had, it was well known, gone out most reluctantly, in obedience to the then prevailing military code. A full account of the steps taken by the prince consort, and of the correspondence which passed between him and the duke of Wellington, will be found in the Life of the Prime by Sir Theodore Martin. The duke, un-fortunately, was not an unprejudiced counsellor. Not only had he been out himself, but, in writing to Lord Londonderry on the occasion of the duel between the marquess and Ensign Battier in 1824, he had gone so far as to state that he considered the probability of the Hussars having to fight a duel or two a matter of no consequence. In the previous year there had been formed in London the association for the suppression of duelling. It included leading members of both houses of parliament and distinguished officers of both services. The first report, issued in 1844, gives a memorial of the association presented to Queen Victoria through Sir James Graham, and in a debate in the House of Commons (15th of March 1844) Sir H. Hardinge, the secretary of war, announced to the House that Her Majesty had expressed herself desirous of devising some expedient by which the barbarous practice of duelling should be as much as possible discouraged. In the same debate Mr Turner reckoned the number of duels fought during the reign of George III. at 172, of which 91 had been attended with fatal results; yet in only two of these cases

had the punishment of death been inflicted. But though the

proposal of the prince consort to establish courts of honour met with no favour, yet it led to an important amendment of the articles of war (April 1844). The,o8th article ordains that " every person who shall fight or promote a duel, or take any steps thereto, or who shall not do his best to prevent duel, shall, if an officer, be cashiered, or suffer such other penalty as a general court-martial may award." These articles, with a few verbal changes, were incorporated in the consolidated Army Act of 1879 (section 38), which is still in force.

In the German army duels are still authorized by the military code as a last resort in grave cases. A German officer who is involved in a difficulty with another is bound to

/?._...., notify the circumstance to a council of honour at the (iermany. J 11.,. . 1

latest as soon as he has either given or received a

challenge. A council of honour consists of three officers of different ranks and is instructed, if possible, to bring about a reconciliation. If unsuccessful it must see that the conditions of the duel are not out of proportion to the gravity of the quarrel. Public opinion was greatly roused by a tragic duel fought by 'two officers of the reserve in 1896; and the German emperor in a cabinet order of 1897, confirmed in 1901, enforced the regulation of the military court of honour, and gave warning that any infringement would be visited with the full penalties of the law. It is, notwithstanding, still the fact that a German officer who is not prepared to accept a challenge and fight, if the opinion of his regiment demands it, must leave the service. The German penal code (Reichsstrafgesetzbuch, pars. 101-110) only punishes a duel when it is fought with lethal weapons; and much controversy has raged round the question of the Mensuren or students' duels, which, as being conducted with sharpened rapiers, have, despite the precautions taken, in the way of bandaging the vital parts of the body which a cut would reach, to reduce the risk of a fatal issue to a minimum, been declared by the Supreme Court of the

Empire to fall under the head of duels, and as such to be punishable.

The Mensuren (German students' duels) above referred to are frequently misunderstood. They bear little resemblance, save in form, to the duel d outrance, and should rather be con- sidered in the light of athletic games, in which the overflow of high animal spirits in young Germany finds its outlet. These combats are indulged in principally by picked representatives of the " corps " (recognized clubs), and according to the position and value of the Schmisse (cuts which have landed) points are awarded to either side. Formerly these so-called duels could be openly indulged in at most universities without let or hind- rance. Gradually, however, the academic authorities took cognizance of the illegality of the practice, and in many cases inflicted punishment for the offence. Nowadays, owing to the decision of the supreme court reserving to the common law tribunals the power to deal with such cases, the governing bodies at the universities have only a disciplinary control, which is exercised at the various seats of learning in various degrees: in some the practice is silently tolerated, or at most visited by reprimand; in others, again, by relegation or career — with the result that the students of one university frequently visit another, in order to be able to fight out their battles under less rigorous surveillance.

Any formal discussion of the morality of duelling is, in England at least, happily superfluous. No fashionable vice has been so unanimously condemned both by moralists and divines, and in tracing its history we are reminded of the words of Tacitus, " in civitate nostra et vetabitur semper et retinebitur." Some, however, of the problems, moral and social, which it suggests may be shortly noticed. That duelling flourished so long in England the law is, perhaps, as much to blame as society. It was doubtless from the fact that duels were at first a form of legal procedure that English law has refused to take cognizance of private duels. A duel in the eye of the law differs nothing from an ordinary murder. The greatest English legal authorities, from the time of Elizabeth downwards, such as Coke, Bacon and Hale, have all distinctly

Modern views.

\ affirmed this interpretation of the law. But here as elsewhere the severity of the penalty defeated its own object. The public conscience revolted against a Draconian code which made no distinction between wilful murder and a deadly combat wherein each party consented to his own death or submitted to the risk of it. No jury could be found to convict when conviction involved in the same

penalty a Fox or a Pitt and a Turpin or a Brownrigg. Such, however, was the conservatism of English publicists that Bentham was the first to point out clearly this defect of the law, and propose a remedy. In his Introduction to the Principles of Morals and Legislation, published in 1789, Bentham discusses the. subject with his usual boldness and logical precision. In his exposition of the absurdity of duelling considered as a branch of penal justice, and its inefficiency as a punishment, he only restates in a clearer form the arguments of Paley. So far there is nothing novel in his treatment of the subject. But he soon parts company with the Christian moralist, and proceeds to show that duelling does, however rudely and imperfectly, correct and repress a real social evil. " It entirely effaces a blot which an insult imprints upon the honour. Vulgar moralists, by condemning public opinion upon this point, only confirm the fact." He then points out the true remedy for the evil. It is to extend the same legal protection to offences against honour as to offences against the person. The legal satisfactions which he suggests are some of them extremely grotesque. Thus for an insult to a woman, the man is to be dressed in a woman's clothes, and the retort to be inflicted by the hand of a woman. But the principle indicated is a sound one, that in offences against honour the punishment must be analogous to the injury. Doubtless, if Bentham were now alive, he would allow that the necessity for such a scheme of legislation had in a great measure passed away. That duels have since become extinct is no doubt principally owing to social changes, but it may be in part ascribed to improvements in legal remedies in the sense which Bentham indicated. A notable instance is Lord Campbell's Act of 1843, by which, in the case of a newspaper libel, a public apology coupled with a pecuniary payment is allowed to bar a plea. In the Indian Code there are special enactments concerning duelling, which is punishable not as murder but as homicide.

Suggestions have from time to time been made for the establish- ment of courts of honour, but the need of such tribunals is doubt- ful, while the objections to them are obvious. The present tendency of political philosophy : is to contract rather than extend the province of law, and any interference with social life is justly resented. Real offences against reputation are sufficiently punished, and the rule of the lawyers, that mere scurrility or opprobrious words, which neither of themselves import nor are attended with any hurtful effects, are not punish- able, seems on the whole a wise one. What in a higher rank is looked upon as a gross insult may in a lower rank be regarded as a mere pleasantry or a harmless joke. Among the lower orders offences against honour can hardly be said to exist; the

learned professions have each its own tribunal to which its members are amenable; and the highest ranks of society, however imperfect their standard of morality may be, are perfectly competent to enforce that standard by means of social penalties without resorting either to trial by law or trial by battle.

The duel, which in a barbarous age may be excused as " a sort of wild justice," was condemned by Bacon as "a direct affront of law and tending to the dissolution of magistracy." It survived in more civilized times as a class distinction and as an ultimate court of appeal to punish violations of the social code. In a democratic age and under a settled government it is doomed to extinction. The military duels of the European continent, and the so-called American duel, where the lot decides which of the two parties shall end his life, are singular survivals. For real offences against reputation law will provide a sufficient remedy, The learned professions will have each its own tribunal to which its members are amenable. Social stigma is at once a surer and a juster defence against conduct unworthy of a gentleman. Yet

thie duel dies hard, and even to-day it is approved or palliated by some notable publicists and professors in France and Germany. M. H. Marion {La Grande Encyclopedic) , in an article strongly condemnatory of duels, still holds that the wrongdoer is bound to accept a challenge, though he may not take the offensive, and further allows that obligatory duels may be the only way of evoking a sense of honour and of maintaining discipline in the army. Dr Paulsen goes much further, and not only defends the duels of university students (Mensuren) as an encouragement of physical exercise, a proof of courage and a protest of worth against wealth, but maintains generally that the duel should be retained as an expedient in those exceptional cases when a man cannot bring himself to drag before a law court the outrage done to his personal honour. But in such cases Dr Paulsen would have the courts hold the injured person scathless, whether he be challenger or challenged, and visit the- aggressor with condign punishment.

Bibliography. — Castillo, Tractatus de duello (Turin, 1525) ; J. P. Pigna, 77 Duello (1554); Muzio Girolamo, Traite du duel (Venice, 1553); Boyssat, Recherches sur les duels (Lyons, 1610) ; J. Savaron, Traite contre les duels (Paris, 1610); Brant6me, Memoire sur les

duels rodomontades; F. Bacon, Charge concerning Duels, &c. (1614); d'Audiguier, Le Vray el ancien usage des duels (Paris, 1617) ; His Majesties Edict and severe Censure against private combats (London, 1618); Cockburn, History of Duels (London, 1720) ; Brillat Savarin, Essai sur le duel (1819); Chateauvillard, Essai sur le duel (1836); Colombey, Histoire anecdotique du duel (Paris) ; Fourgeroux de Champigneules, Histoire des duels anciens et modernes (2 vols. , Paris, 1835-1837) ; Millingen, History of Duelling (London, 1841) ; L. Sabine, Notes on Duels (Boston, 1855) ; Steinmetz, Romance of Duelling (London, 1868). See also Eugene Cauchy, Du duel, &c. (1846), a learned and philosophic treatise by a French lawyer ; G. Letainturier- Fradin, Le Duel & travers les Ages (Paris, 1892) ; Mackay, History of Popular Delusions, Duels and Ordeals; and for a valuable list of authorities, Buckle, History of Civilization in England, ii. 137, note 71. For judicial combats see Gibbon, Decline and Fall, ch. xxxviii. For courts of honour see Armed Strength of the German Empire (1876). For Mensur, see Paulsen, The German Universities (1906), ch. vi. (F. S.)

DUENNA (Span, duefia, a married lady or mistress, Lat. domino), specifically the chief lady-in-waiting upon the queen of Spain. The word is more widely applied, however, to an elderly lady in Spanish and Portuguese households (holding a position midway between a governess and companion) appointed to take charge of the young girls of the family; and " duenna " is thus used in English as a synonym for chaperon (q.v.).

DUET (an adaptation of the Ital. duetto, from Lat. duo, two) , a term in music for a composition for two performers, both either vocal or instrumental. The term is not properly applied to a composition for one voice and one instrument, the latter being regarded as an accompaniment, though in the modern evolution of this latter form of composition it often has the same character. Both parts must be of equal importance; if one is subordinated to the other it becomes an accompaniment and the work ceases to be a duet. Instrumental duets are written either for two different instruments, such as Mozart's duets for violin and piano, or for two similar instruments. Duets written for the pianoforte are either for two performers on two separate instru- ments or for two performers on the same instrument, when they are termed " duets d quatre mains."

DUFAURE, JULES ARMAND STANISLAS (1 798-1881), French statesman, was born at Saujon (Charente-Inferieure) on the 4th of December 1 798. He became an advocate at Bordeaux, where he won a great reputation by his oratorical gifts, but soon abandoned law for

politics, and in 1834 was elected deputy. In 1839 he became minister of public works in the Soult ministry, and succeeded in freeing railway construction in France from the obstacles which till then had hampered it. Losing office in 1840, Dufaure became one of the leaders of the Opposition, and on the outbreak of the revolution of 1848 he frankly accepted the Republic, and joined the party of moderate republicans. On October 13th he became minister of the interior under G. Cavaignac, but retired on the latter's defeat in the presidential election. During the Second Empire Dufaure abstained from public life, and practised at the Paris bar with such success that he was elected bdtonnier in 1862. In 1863 he succeeded to

Pasquier's seat in the French Academy. In 1871 he became a member of the Assembly, and it was on his motion that Thiers was elected President of the Republic. Dufaure became the minister of justice as chief of the party of the " left-centre," and his tenure of office was distinguished by the passage of the jury-law. In 1873 he fell with Thiers, but in 1875 resumed his former post under L. J. Buffet, whom he succeeded on the 9th of March 1876 as president of the council. In the same year he was elected a life senator. On December the 12th he withdrew from the ministry owing to the attacks of the republicans of the left in the chamber and of the conservatives in the senate. After the check which the conservatives received on the 16th of May he returned to power on the 24th of December 1877. Early in 1 879 Dufaure took part in compelling theresignation of Marshal MacMahon, but immediately afterwards (1st February), worn out by opposition, he himself retired. He died in Paris on the 28th of June 1 88 1. See G. Picot, M. Dufaure, sa vie et ses discours (Paris, 1883).

DUFF, ALEXANDER (1806-1878), Scottish missionary in India, was born on the 26th of April 1806, at Auchnahylein the parish of Moulin, Perthshire. At St Andrews University he came under the influence of Dr Chalmers. He then accepted an offer made by the foreign mission committee of the general assembly to become their first missionary to India. He was ordained in August 1829, and started at once for India, but was twice shipwrecked before he reached Calcutta in May 1830, and lost all his books and other property. Making Calcutta the base of his operations, he at once identified himself with a policy which had far-reaching results. Up to this time Protestant missions in India had been successful only in reaching low-caste and outcaste peoples, particularly in Tinevelly and south Travan- core. The Hindu and Mahommedan communities had been practically untouched. Duff saw that, to reach these com- munities, educational must take the place of evangelizing methods, and he devised the policy of an educational mission. The success of

his work had the effect (1) of altering the policy of the government of India in matters of education, (2) of securing the recognition of education as a missionary agency by Christian churches at home, and (3) of securing entrance for Christian ideas into the minds of high-caste Hindus. He first opened an English school in which the Bible was the centre of the school work, and along with it all kinds of secular knowledge were taught from the rudiments upwards to a university standard. The English language was used on the ground that it was destined to be the great instrument of higher education in India, and also as giving the Hindu the key of Western knowledge. The school soon began to expand into a missionary college, and a government minute was adopted on the 7th of March 1835, to the effect that in higher education the object of the British government should be the promotion of European science and literature among the natives of India, and that all funds appropriated for purposes of education would be best employed on English education alone. Duff wrote a pamphlet on the question, entitled " A New Era of the English Language and Literature in India." He returned home in 1834 broken in health, but succeeded in securing the approval of his church for his educational plans, and also in arousing much interest in the work of foreign missions.

In 1840 he returned to India. In the previous year the earl of Auckland, governor-general, had yielded to the " Orientalists " who opposed Duff, and adopted a policy which was a compromise between the two. At the Disruption of 1843 Duff sided with the Free Church, gave up the college buildings, with all their effects, and with unabated courage set to work to provide a new institution. He had the support of Sir James Outram and Sir Henry Lawrence, and the encouragement of seeing a new band of converts, including several young men of high caste. In 1844 Viscount Hardinge opened government appointments to all who had studied in institutions similar to Duff's foundation. In the same year Duff took part in founding the Calcutta Review, of which from 1845 to 1849 he was editor. In 1849 he returned home. He was moderator of the Free Church assembly in 1851. He gave evidence before various Indian committees of

parliament on matters of education. This led to an important despatch by Viscount Halifax, president of the board of control, to the marquess of Dalhousie, the governor-general, authorizing an

educational advance in primary and secondary schools, the provision of technical and scientific teaching, and the establish- ment of schools for girls.

In 1854 Duff visited the United States, where what is now New York University gave him the degree of LL.D.; he was already D.D. of Aberdeen. In 1856 he returned to India, where the mutiny soon broke out; his descriptive letters were collected in a volume entitled The Indian Mutiny, its Causes and Results (1858). Duff gave much thought and time to the university of Calcutta, which owes its examination system and the prominence given to physical sciences to his influence. In 1863 Sir Charles Trevelyan offered him the post of vice-chancellor of the University, but his health compelled him to leave India. As a memorial of his work the Duff Hall was erected in the centre of the educational buildings of Calcutta; and a fund of £11,000 was raised for his disposal, the capital of which was afterwards to be used for invalided missionaries of his own church. In 1864 Duff visited South Africa, and on his return became convener of the foreign missions committee of the Free Church. He raised £10,000 to endow a missionary chair at New College, Edinburgh, and himself became first professor. Among other missionary labours of his later years, he helped the Free Church mission on Lake Nyassa, travelled to Syria to inspect a mission at Lebanon, and assisted Lady Aberdeen and Lord Polwarth to establish the Gordon Memorial Mission in Natal. In 1873 the Free Church was threatened with a schism owing to negotia- tions for union with the United Presbyterian Church. Duff was called to the chair, and guided the church happily through this crisis. He also took part in forming the alliance of Reformed Churches holding the Presbyterian system. He died on the 12th of February 1878. By his will he devoted his personal property to found a lectureship on foreign missions on the model of the Hampton Lectures.

See his Ltfej by George Smith (2 vols.). (D. Ms.)

DUFFERIN AND AVA, FREDERICK TEMPLE HAMILTON- TEMPLE-BLACKWOOD, ist Marquess of (1826-1002), British diplomatist, son of Price Blackwood, 4th Baron Dufferin, was born at Florence, Italy, on the 21st of June 1826. The Irish Blackwoods were of old Scottish stock, 1 tracing their descent back to the 14th century. John Blackwood of Bangor (1591- 1663) , the ancestor of the Irish line, made a fortune and acquired landed property in county Down, and his great-grandson Robert was created a baronet in 1763. Sir Robert's son, Sir John, married the heiress of the Hamiltons, earls of Clanbrassil and viscounts of Clandeboye ("clan of yellow Hugh"),

and thus brought into the family a large property in the borough of Killyleagh and barony of Dufferin, county Down. Sir John Blackwood (d. 1799) declined a peerage, and so did his heir James at the time of the Union, but the Irish title of Baroness Dufferin was conferred (1800) on Sir John's widow, and James (d. 1836) succeeded as second baron in 1808. His brother Hans (d. 1839) became third baron, and by his marriage with Miss Temple (a descendant of the Temples of Stowe) was the father of Price Blackwood, 4th baron. Among other distinguished members of the family was Admiral, Sir Henry Blackwood, Bart. (1770-1832) — a brother of James and Hans — one of Nelson's captains, who commanded the " Euryalus " at Trafalgar. Price Blackwood, too, was in the Navy; his marriage in 1825 with Helen Selina Sheridan, a daughter of Thomas Sheridan, and granddaughter of Richard Brinsley Sheridan, the dramatist and politician, was against his parents' wishes, but his young wife's talents and beauty soon won them over.

Frederick went to Eton (1839-1843) and Christ Church, Oxford (1845-1847), where he took a pass school and was President of the Union. His father died in 1841, and the in- fluence of his mother — one of three unusually accomplished

1 One branch of the Blackwood family emigrated to France; the head of this line being Adam Blackwood (d. 1613), jurist, poet and divine, and senator of the presidial court of Poitiers.

sisters, the other two being the duchess of Somerset and Mirs Norton (g.11.)— was very marked on his mental development; she lived till 1867 and is commemorated by the " Helen's Tower " erected by her son in her honour at Clandeboye (the Irish seat of the Blackwoods) in 1861, and adorned; with epigraphical verses written by Tennyson, Browning and others. On leaving Oxford Lord Dufferin busied himself for some little while with the management of his Irish estates. In 1 846-1 848 he was active in relieving the distress in Ireland due to the famine, and he was always generous and liberal in his relations with his tenants. In 1855 he already advocated compensation for disturbance and for improvements; but while supporting reasonable reform, he demanded justice for the landowners. In later years (1868-1881) he wrote much, in opposition to J. S. Mill, on behalf of Irish landlordism, and, when Gladstone adopted Home Rule, Lord Dufferin, who had been attached throughout his career to the Liberal party, regarded the new policy as fatal both to Ireland and to the United Kingdom, though, being then an ambassador, he took no public part in opposing it.

Starting with every personal and social advantage, Lord Dufferin quickly became a favourite both at Court and in London society; and in 1849 he' was made a lord-in-waiting. In political life he followed Lord John Russell, and in 1850 was further attached to the party by being created a peer of the United Kingdom as Baron Clandeboye. In 1855 Lord John Russell took him as attache" on his special mission to the Vienna Con- ference. Meanwhile Lord Dufferin was enlarging his experience by foreign travel, and in 1856 he went On a yachting-tour to Iceland, which he described with much humour and graphic power in his successful book, Letters from High Latitudes; this volume made his reputation as a writer, though his only other purely literary publication was his memorial edition (1894) of his mother's Poems and Verses. In i860 Lord John Russell sent him as British representative on a joint commission of the powers appointed to inquire into the affairs of the Lebanon (Syria), where the massacres of Christian Maronites by the Mussulman Druses had resulted in the landing of a French force and the possibility of a French occupation. Lord Dufferin was associated with French, Russian, Prussian and Turkish colleagues, and his difficult diplomatic position was made none the less delicate by his conscientious endeavour to be just to all parties. Even if he had not satisfied himself that the Mahommedans were by no means wholly to blame, the question of punishment was in any case complicated by the problem of future administration. His own proposal to put the whole Syrian province under a responsible governor, appointed by the sultan for a term of years, with unfettered jurisdiction, was rejected; but at last it was agreed to place a Christian governor, subordinate to the Porte, over the Lebanon district, and to set up local administrative councils. In May 1861 the French forces departed, and Lord Dufferin was thanked for his services by the government.

In 1862 he married Hariot, daughter of Captain A. Rowan Hamilton, of Killyleagh Castle, Down. He held successively the posts of under-secretary for India (1864-1866) and under- secretary for war (1866) in Lord Palmerston's and Earl Russell's ministries; and he was chancellor of the duchy of Lancaster, outside the cabinet, under Mr Gladstone (1868-1872). In 1871 he was created earl of Dufferin.

In 1872 he was appointed governor-general of Canada. There his tact and personal charm and genial hospitality were invalu- able. He had already become known as a powerful and graceful orator, and a man of culture and political distinction; and his abilities were brilliantly displayed in dealing with the problems of the newly united provinces of the Canadian Dominion. At a time when a wegJs. or unattractive governor-general might easily have damaged theimperial

connexion,he admittedly strengthened and consolidated it. Lord Dufferin left Canada in 1878, and in 1879, rather to the annoyance of his old party leader, he accepted from the conservative prime minister, Lord Beaconsfield, the appointment of ambassador to Russia. At St Petersburg he did useful diplomatic work for a couple of years, and then, in

1881, was transferred to , Constantinople as ambassador to Turkey. He was soon involved in the negotiations connected with the situation in Egypt caused by Arabi's revolt and the intervention of Great Britain. It was Lord Dufferin's task to arrange matters at Constantinople, so that no international friction should be created by any inconvenient assertion by the sultan of his position as suzerain, while it was also necessary to avoid offending either the sultan or the other powers by any appearance of ignoring their rights. He was considerably helped by Turkish ineptitude, and by the accomplished fact of British military successes in Egypt, but his own diplomacy was respon- sible for securing the necessary freedom of action for the British government.

From October 1882 to May 1883 he was himself in Egypt as British commissioner to report on a scheme of reorganization; and his recommendations— drawn up in a somewhat elaborate State paper — formed the basis of the subsequent reforms. In 1884 he was appointed viceroy of India, succeeding Lord Ripon, whose zeal on behalf of the natives had created a good deal of antagonism among the officials and the Anglo-Indian community. Lord Dufferin, though agreeing in the main with Lord Ripon's policy, was excellently fitted for the task of restoring confidence without producing any undesirable reaction, and in domestic affairs his viceroyalty was a period of substantial progress, in the reform of the evils of land tenure and in other directions. He was responsible also for initiating stable relations with Afghanistan, and settling the crisis with Russia arising out of the Panjdeh incident (1885), which led to the delimitation of the north-west frontier (1887). The' most striking event of his administration was, however, the annexation of Burma, resulting from the Burmese War of 1885; and this procured him, on his resignation, the title of marquess of Dufferin and Ava (1888). His viceroyalty was also memorable for Lady Dufferin's work, and the starting of a fund called by her name, for providing better medical treatment for ndtive women. In 1888 he was made

ambassador at Rome, and in 1892 he was promoted to be ambassador in Paris, a post which he retained till 1896, when he retired from the public service.

Lord Dufferin was one of the most admired public servants of his time. A man of great natural gifts, he had a special talent for diplomacy, though he. has no claim to a place in the first rank of statesmen. He was remarkable for tact and amiability and had a florid and rather elaborately literary style of oratory, which also characterized his despatches and reports. For purposes of ceremony his courtliness, dignity and charm of manner were invaluable, and both in public and in private life he was a conspicuous " great gentleman." His last years, spent mainly at his Irish home, were clouded by the death of his eldest son, the earl of Ava, at Ladysmith .in the Boer War (1900), and by bivsiness troubles. He was so ill-advised as to become chairman in 1897 of the " London and Globe Finance Corpora- tion," a financial company which most good judges in the city of London thought to be too much in the hands of its managing director, Mr Whitaker Wright, whose methods had been a good deal criticized. At last there came a complete crash, and an exposure before the liquidator, which ultimately led to Mr Whitaker Wright's trial for fraud in 1904, and his suicide within the precincts of the court on being found guilty. Lord Dufferin did not live to see this final catastrophe. The affairs of the company were still under investigation in bankruptcy when, on the 1 2th of February 1902, he died. He had been in failing health for two or three years, but, having once become chairman of the " London and Globe," he had insisted upon standing by his colleagues when difficulties arose. Incautious as he had been in accepting the position, no reflections were felt to be possible on Lord Dufferin's personal honour; he was a serious loser by the failure, and he had followed his predecessor in the chairmanship, lord Loch, in confiding too wholly in the masterful personality of Mr Wright. He was succeeded in the title by his second son Terence (b. r866).*

The official Life of Lord Dufferin, by Sir Alfred Lyall, appeared in 1905. There are two Canadian histories of his Canadian adminis-

tration, one by George Stewart (1878ˆ, the other by W. Leggo (1878), Lady Dufferin brought out Our Viceregal Life in India in 1889, and My Canadian Journal in 1891. See also the articles on India: History ; Canada : History; and Egypt: History. (H. Ch.)

DUFF-GORDON, LUCIE (1821-1869), English woman of letters, daughter of John and Sarah Austin (q.v.), was born on the 24th of

June 182 1. Her chief playfellows as a child were her cousin, Henry Reeve, and John Stuart Mill, who lived next door in Queen Square, London. In 1834 the Austins went to Boulogne, and at table d'h6te Lucie found herself next to Heinrich Heine., The poet and the little girl became fast friends, and years afterwards she contributed to Lord Houghton's Monographs Personal and Social a touching account of a renewal of their friendship when Heine lay dying in Paris. Her parents went to Malta in 1836, and Lucie Austin was left in England at school, but her unconventional education made the restrictions of a girls' school exceedingly irksome. She showed her independence of character by joining the English Church, though this step was certain to cause pain to her parents, who were Unitarians, and to many of her friends. She married in 1840 Sir Alexander Duff-Gordon (1811-1872). With her mother's beauty she had inherited her social gifts, and she gathered round her a brilliant circle of friends. George Meredith has analysed and described her extraordinary success as a hostessˆ and the process by which she reduced too ardent admirers to "happy crust munching devotees." " In England, in her day," he says, " while health was with her, there was one house where men and women con versed. When that house perforce was closed, a light had gone but in our country." , After her father's death, she fell into weak health and was obliged to seek sunnier climes. She went in i860 to the Cape of Good Hope, and later to Egypt, where she died on the 14th of July 1869. She had translated among other works Ancient Grecian Mythology (1839) from the German of Niebuhr; Mary Schweidler; The Amber Witch (1844) from the German of Wilhelm Meinhold; and Stella and Vanessa (1850) from the French of A. F. L. de Wailly. Her Letters from the Cape (1862-1863) appeared in 1865; and in 1865 her Letters from Egypt, edited by her mother, attracted much attention. Last Letters from Egypt, (1875) contained a memoir by her daughter, Mrs Janet Ross. Lady Duff-Gordon won the hearts of her Arab dependents and neighbours. She doctored their sick, taught their children, and sympathized with their sorrows.

The Letters from Egypt were not originally published in a complete form. A fuller edition than had before been possible, with an introduction by George Meredith, was edited in 1902 by Mrs Janet Ross. See also Mrs Ross's Three Generations of Englishwomen (1886).

DUFFTOWN, a municipal and police burgh of Banffshire, Scotland, on the Fiddich, 64 m. W.N.W. of Aberdeen by the Great North of Scotland railway. Pop. (1901) 1823. It dates from 1817 and bears the name of its founder, James Duff, 4th earl of Fife. Although planned in the shape of a cross, with a square and tower in the

middle, the arms of the cross are not straight, the constructor holding the ingenious opinion that, in order to prevent little towns from being taken in at a glance, their streets should be crooked. The leading industries are lime- works and distilleries, the water being specially fitted for the making of whisky. The town has considerable repute as a health resort, owing partly to its elevation (737 ft.) and partly to the natural charms of the district. The parish of Mortlach, in which Dufftown is situated, is rich in archaeological and historical associations. What is called the Stone of Mortlach is tradition- ally believed to have been erected to commemorate the success of Malcolm II. over the Danes in 1010. The three large stones known as " The King's Grave," a hill-fort, and cairns are of interest to the antiquary. The old church of Mortlach, though restored and almost renewed, still contains some lancet windows and a round-headed doorway, besides monuments dating from' 1417. A portion of old Balvenie Castle, a ruin, is considered to be of Pictish origin, but most of it is in the Scots Baronial. It has associations with Alexander Stewart, earl of Buchan and lord of Badenoch (1343-1405), son of Robert II., whose ruffianly conduct in Elginshire earned him the designation of the Wolf of

Badenoch, the Comyns, the Douglases (to whom it gave the title of baron in the 15th century), the Stuarts and the Duffs. The new castle, an uninteresting building, was erected in 1724 by the earl of Fife, and though untenanted is maintained in repair. Two miles to the S.E. of Dufftown is the ruined castle of Auchin- down, finely situated on a limestone crag, 200 ft. high, of which three sides are washed by the Fiddich and the fourth was pro- tected by a moat. It dates from the nth century, and once belonged to the Ogilvies, from whom it passed in 1535 to the Gordons. The Gothic hall with rows of fluted pillars is in fair preservation. Ben Rinnes (2755 ft.) and several other hills of lesser altitude all lie within a few miles of Dufftown. About 4 m. to the N.W. is Craigellachie — Gaelic for " the rock of alarm " — (pop. 454) , on the confines of Elginshire. It is situated on the Spey amidst scenery of surpassing loveliness. The slogan of the Grants is " Stand fast Craigellachie!" The place has become an important junction of the Great North of Scotland railway system.

.- DUFFY, SIR CHARLES GAVAN (1816-1903), Irish and colonial politician, was born in Monaghan, Ireland, on the 12th of April

1816. At an early age he became connected with the press, and was one of the founders (1842) of the Nation, a Dublin weekly which was remarkable for its talent, for its seditious tendencies, and for the fire and spirit of its political poetry. In 1844 Duffy was included in the same indictment with O'Connell, and shared his conviction in Dublin and his acquittal by the House of Lords upon a point of law. His ideas, neverthe- less, were too revolutionary for O'Connell; a schism took place in 1846, and Duffy united himself to the " Young Ireland " party. He was tried for treason-felony in 1848, but the jury were unable to agree. Duffy continued to agitate in the press and in parliament, to which he was elected in 1852, but his failure to bring about an alliance between Catholics and Protest- ants upon the land question determined him in 1856 to emigrate to Victoria. There he became ir 1857 minister of public works, and after an active political career, in the course of which he was prime minister from 187 1 to 1873, when he was knighted, he was elected speaker of the House of Assembly in 1877, being made K.C.M.G. in the same year. In 1880 he resigned and returned to Europe, residing mostly in the south of France. He published The Ballad Poetry of Ireland (1845), several works on Irish history, Conversations with Carlyle (1892), Memoirs (1898), &c. In 1 89 1 he became first president of the Irish Literary Society. He was married three times, his third wife dying in 1889. He died on the 9th of February 1903.

DUFOUR, WILHELM HEINRICH [Guillaume Henri] (1787-1875), Swiss general, was born at Constance of Genevese parents temporarily in exile, on the 15th of September 1787. In 1807 he went to the Ecole Poly technique at Paris, Switzerland being then under French rule, taking the 140th place only in his entrance examination. By two years' close study he so greatly improved his position that he was ranked fifth in the exit examination. Immediately on leaving the school he received a commission in the engineers, and was sent to serve in Corfu, which was blockaded by the English. During the Hundred Days he attained the rank of captian, and was employed in raising fortifications at Grenoble. After the peace that followed Waterloo he resumed his status as a Swiss citizen, and devoted himself to the military service of his native land. From 18 19 to 1830 he was chief instructor in the military school of Thun, which had been founded mainly through his instru- mentality. Among other distinguished foreign pupils he in- structed Louis Napoleon, afterwards emperor of the French. In 1827 he was raised to the rank of colonel, and commanded the Federal army in a series of field manoeuvres. In 1831 he became chief of the staff, and soon afterwards he was appointed quartermaster-general.

Two years later the diet commissioned him to superintend the execution of a complete trigonometrical survey of Switzerland. He had already made a cadastral survey of the canton of Geneva, and published a map of the canton on the scale of -g s&oo – The larger work occupied thirty- two years, and was accomplished with complete success. The

map in 25 sheets on the scale of TTnsVinr was published at intervals between 1842 and 1865, and is an admirable specimen of carto- graphy. In recognition of the ability with which Dufour had carried out his task, the Federal Council in 1868 ordered the highest peak of Monte Rosa to be named Dufour Spitze. In 1847 Dufour was made general of the Federal Army, which was employed in reducing the revolted Catholic cantons. The quickness and thoroughness with which he performed the painful task, and the wise moderation with which he treated his vanquished fellow-countrymen, were acknowledged by a gift of 60,000 francs from the diet and various honours from different cities and cantons of the confederaton. In politics he belonged to the moderate conservative party, and he consequently lost a good deal of his popularity in 1848. In 1864 he presided over the international conference which framed the Geneva Conven- tion as to the treatment of the wounded in time of war, &c. He died on the 14th of July 1875. His Be la fortification per- manente (1850) is an important and original contribution to the science of fortification, and he was also the author of a Memotre sur I'artillerie des anciens et sur celle du tnoyen Age (1840), Manuel de tactique pour les officiers de toutes armes (1842), and various other works in military science. His memoir, La Campagne du Sonderbund (Paris, 1876), is prefaced by a biographical notice. An equestrian statue of General Dufour was erected after his death at Geneva by national subscription.

DUFRENOY, OURS PIERRE ARMAND PETIT (1792-1857), French geologist and mineralogist, was born at Sevrah, in the department of Seine-et-Oise, in France, on the 5th of September 1792. After leaving the Imperial Lyceum, in 1811, he studied till 1813 at the Ecole Polytechnique, and then entered the Corps des Mines. He subsequently assisted in the management of the Ecole des Mines, of which he was professor of mineralogy and afterwards director. He was also professor of geology at the Ecole des Ponts et Chauss6s. In conjunction with Elie de Beaumont he in 1841 published a. great geological map of France, the result of investigations carried on during thirteen years (1823-1836). Five years (1836-1841) were spent in writing the text to accompany the map, the publication of the work with two quarto vols, of text extending from 1841-1848; a

third volume was issued in 1873. The two authors had already together published Voyage mltallurgique en Angleterre (1827, 2nd ed. 183 7-1839), Mtmoires pour servir d une description giologique de la France, in four vols. (1830-1838), and &M6moire on Cantal and Mont-Dore (1833). Other literary productions of Dufrenoy are an account of the iron mines of the eastern Pyrenees (1834), and a treatise on mineralogy (3 vols, and atlas, 1844-1845; 2nd ed., 4 vols, and atlas, 1856-1859), in whicb the geological relations as well as the physical and chemical properties of minerals were dealt with; he likewise contributed numerous papers to the Annates des mines and other scientific publications, one of the most interesting of which is entitled Des terrains volcaniques des environs de Naples. Dufr6noy was a member of the Academy of Sciences, a commander of the Legion of Honour, and an inspector- general of mines. He died in Paris on the 20th of March 1857.

DUFRESNY, CHARLES, Sieur de la Riviere (1648-1724), French dramatist, was born in Paris in 1648. The allegation that his grandfather was an illegitimate son of Henry IV. pro- cured him the liberal patronage of Louis XIV., who gave him the post of valet de chambre, and affixed his name to many lucrative privileges. Dufresny's expensive habits neutralized all efforts to enrich him, and as if to furnish a piquant commentary on the proverb that poverty makes us acquainted with strange bedfellows, he married, as his second wife, a washerwoman, in discharge of her bill — a whimsicality which supplied Le Sage with an episode in the Diable boiteux, and was made the subject of a comedy by J. M. Deschamps {Charles Riviere Dufresny, ou le mariage impromptu). He died in Paris on the 6th of October i 7 24. His plays, destitute for the most part of all higher qualities, abound in sprightly wit and pithy sayings. In the six volumes of his Th&dtre (Paris, 1731), some of the best are L' Esprit de contradiction (1700), Le DoubleVeuvage (1 70 1), La Joueuse (1709), La Coquette de village (17 15), La Reconciliation normande (17 19)

and Le Manage fait et rompu (1721). A volume of PoSsies diverses, two volumes of Nouvelles historiques (1692), and Les

i Amusements serieux et comiques d'un Siamois (1705), a work to which Montesquieu was indebted for the idea of his Lettres persanes, complete the list of Dufresny's writings. The best edition of his works

is that of 1747 (4 vols.). His Theatre was edited (1882) by Georges d'Heylli.

DUGAZON [Jean Henri Gourgaud] (1746-1809), French actor, was born in Marseilles on the 15th of November 1746, the son of the director of military hospitals there. He began his

' career in the provinces, making his debut in 1770 at the Comedie Francaise, where he aspired to leading comedy r61es. He pleased the public at once and was made societaire in 1772. Dugazon was an ardent revolutionist, helped the schism which divided the company, and went with Talma and the others to what became the Theatre de la Republique. After the closing of this theatre, and the dissolution of the Comedie Francaise, he took refuge at the Theatre Feydeau until (1799) he returned to the restored Comedie. He retired in 1807, and died insane at Sandillon in 1809. Dugazon wrote three mediocre comedies of a political character, performed at the Theatre de la Republique. He married, in 1776, Louis Rose Lefevre, but was soon divorced and then married again. The first Madame Dugazon (1755-182 1), the daughter of a Berlin dancing master, was a charming actress. Her first appearance on the stage was made at the age of twelve as a dancer. It was as an actress " with songs " that she made her debut at the Comedie Italienne in 1774 in Gretry's Sylvain. She was at once admitted pensionnaire and in 1776 societaire. Madame Dugazon delighted all Paris, and nightly crowded the Comedie Italienne for more than twenty years. The two kinds of parts with which she was especially identified — young mothers and women past their first youth — are still called "dugazons" and "meres dugazons." Examples of the first are Jenny in La Dame blanche and Berthe de Simiane in Les Mousquetaires de la reine; of the second, Marguerite in Le Pre aux clercs and the queen in La Part du diable.

Dugazon's sister, Marie Rose Gourgaud (1743-1804), was an actress who first played at Stuttgart, where she married Angelo, brother of Ga£tano Vestris, the dancer. Under the pro- tection of the dukes of Choiseul and Duras, she was commanded to make her debut at the Comedie Francaise in 1768, where she created important parts in a number of tragedies.

DUGDALE, SIR WILLIAM (1605-1686), English antiquary, was born at Shustoke, near Coleshill, in Warwickshire, on the 12th of September 1605, the son of a country gentleman of an old Lancashire stock; he was educated at Coventry. To please his father, who was old and infirm, he married at seventeen. He lived with his wife's family until his father's death in 1624, when he went to live at

*Fillongley, near Shustoke, an estate formerly purchased for him by his father. In 1625 he purchased the manor of Blythe, Shustoke, and removed thither in 1626. He had early shown an inclination for antiquarian studies, and in 1635, meeting Sir ** Symon Archer (1581-1662), himself a learned anti- quary, who was then employed in collecting materials for a history of Warwickshire, he accompanied him to London. There he made the acquaintance of Sir Christopher (afterwards Lord) Hatton, comptroller of the household, and Thomas, earl of Arundel, then earl marshal of England. In 1638 Dugdale was created a pursuivant of arms extraordinary by the name of Blanch Lyon, and in 1639 rouge croix pursuivant in ordinary. He now had a lodging in the Heralds' Office, and spent much of his time in London examining the records in the Tower and the Cottonian and other collections of MSS. In 1641 Sir Christopher Hatton, foreseeing the war and dreading the ruin and spoliation of the Church, commissioned him to make exact drafts of all the monuments in Westminster Abbey and the principal churches in England, including Peterborough, Ely, Norwich, Lincoln, Newark, Beverley, Southwell, Kingston-upon-Hull, York, Selby, Chester, Lichfield, Tamworth and Warwick. In June*

1642 he was summoned to attend the king at York. When war broke out Charles deputed him to summon to surrender the castles of Banbury and Warwick, and other strongholds which were being rapidly filled with ammunition and rebels. He went with Charles to Oxford, remaining there till its surrender in 1646. He witnessed the battle of Edgehill, where he made afterwards an exact survey of the field, noting how the armies were drawn up, and where and in what direction the various movements took place, and marking the graves of the slain. In November 1642 he was admitted M. A. of the university, and in 1644 the king created him Chester herald. During his leisure at Oxford he collected material at the Bodleian and college libraries for his books. In 1646 Dugdale returned to London and compounded for his estates, which had been sequestrated, by a payment of £168. After a visit to France in 1648 he continued his anti- • quarian researches in London, collaborating with Richard Dodsworth in his Monasticon Anglicanum, which was published successively in single volumes in 1655, 1664 and 1673. At the Restoration he obtained the office of Norroy king-at-arms, and in 1677 was created garter principal king-at-arms, and was knighted. He died " in his chair " at Blythe Hall on the 10th of February 1686.

Dugdale's most important works are Antiquities of Warwickshire (1656); Monasticon Anglicanum (1655-1673); History of St Paul's Cathedral (1658) ; and Baronage of England (1675-1676). His Life,

written by himself up to 1678, with his diary and correspondence, and an index to his manuscript collections, was edited by William Hamper, and published in 1827.

DUGONG, one of the two existing generic representatives of the Sirenia, or herbivorous aquatic mammals. Dugongs are distinguished from their cousins the manatis by the presence in the upper jaw of the male of a pair of large tusks, which in the female are arrested in their growth, and remain concealed. There are never more than five molar teeth on each side of either jaw, or twenty in all, and these are flat on the grinding surface. The flippers are unprovided with nails, and the tail is broad, and differs from that of the manati in being crescent-shaped instead of rounded. The bones are hard and firm, and take a polish equal to that of ivory. Dugongs frequent the shallow waters of the tropical seas, extending from the east coast of Africa north of the mouth of the Zambezi, along the shores of the Indian, Malayan and Australian seas, where they may be seen basking on the surface of the water, or browsing on submarine pastures of seaweed, for which the thick obtuse lips and truncated snout pre-eminently fit them. They are gregarious, feeding in large

The Dugong.

numbers in localities where they are not often disturbed. The female produces a single young one at a birth, and is remarkable for the great affection it shows for its offspring, so that when the young dugong is caught there is no difficulty in capturing the mother. Three species — the Indian dugong (Halicore dugong), the Red Sea dugong (H. tabernaculi) and the Australian dugong (H . australis) — are commonly recognized. The first is abundant along the shores of the Indian Ocean, and is captured in large numbers by the Malays, who esteem its flesh a great delicacy; the lean portions, especially of young specimens, are regarded by Europeans as excellent eating. It is generally taken by spearing, the main object of the hunter being to raise the tail out of the water, when the animal becomes perfectly powerless. It seldom attains a length of more than 8 or 10 ft. The Australian dugong is a larger species, attaining sometimes a length of 15 ft.; it occurs along the Australian coast from

Moreton Bay to Cape York, and is highly valued by the natives, who hunt it with spears, and gorge themselves with its flesh, when they

are fortunate enough to secure a carcase. Of late years the oil obtained from the blubber of this species has been largely used in Australia as a substitute for cod-liver oil. It ■ does not contain iodine, but is said to possess all the therapeutic qualities of cod-liver oil without its nauseous taste. A full- grown dugong yields from 10 to 12 gallons of oil, and this forms in cold weather a thick mass, and requires to be melted before a fire previous to being used. The flesh of the Australian dugong is easy of digestion, the muscular fibre when fresh resembling beef, and when salted having the flavour of bacon. In the earliest Australian dugong-fishery natives were employed to harpoon these animals, which soon, however, became too wary • to allow themselves to be approached near enough for this purpose, and the harpoon was abandoned for the net. The latter is spread at night, and in its meshes dugongs are caught in considerable numbers. (R. L.)*

DUGUAY-TROUIN, RENE (1673-1736), French sea captain, belonged to a well-known family of merchants and sea captains of St Malo. He was born at St Malo'on the idth of June 1673. He was originally intended for the church, and studied with that view at Rennes and Caen; but on the breaking out of the war with England and Holland in 1689 he went to sea in a privateer owned by his family. During the first three months. his courage was tried by a violent tempest, an imminent shipwreck, the boarding of an English ship, and the threatened destruction of his own vessel by fire. The following year, as a volunteer in a vessel of 28 guns, he was present in a bloody combat with an English fleet of five merchant vessels. The courage he then showed was so remarkable that in 1601, at the age of eighteen, his family gave him a corsair of 14 guns; and having been thrown by a tempest on the coast of Ireland, he burned two English ships in the river Limerick. In 1694 his vessel of 40 guns was captured by the English, and, being taken prisoner, he was confined in the castle of Plymouth. He escaped, according to his own account, by the help of a pretty shopwoman and her lover, a French refugee in the English service. He then obtained command of a vessel of 48 guns, and made a capture of English vessels on the Irish coast. In 1696 he made a brilliant capture of Dutch vessels, and the king hearing an account of the affair gave him a commission as capitaine de fregate (commander) in the royal navy. In 1 704-1 705 he desolated the coasts of England. In 1706 he was raised to the rank of captain of a vessel of the line. In 1707 he was made chevalier of the order of St Louis, and captured off the Lizard the greater part of an English convoy of troops and munitions bound for Portugal. His most glorious action was the capture in 1711 of Rio Janeiro, on which he

imposed a heavy contribution. In 17 15 he was made chef d'escadre, the rank which in the French navy answered to the English commodore, and in 1728 commander of the order of St Louis and lieutenant gSneral des armies navales. In 173 1 he commanded a squadron for the protection of French commerce in the Levant. He died on the 27th of September 1736.

See his own MSmoires (1740); and J. Poulain, Duguay-Trouin

(1882).

DU GUESCLIN, BERTRAND (c. 1320-1380), constable of France, the most famous French warrior of his age, was born of an ancient but undistinguished family at the castle of La Motte- Broons (Dinan) . The date of his birth is doubtful, the authorities varying between 1311 and 1324. The name is spelt in various ways in contemporary records, e.g. Claquin, Klesquin, Guesc- quin, Glayaquin, &c. The familiar form is found on his monu- ment at St Denis, and in some legal documents of the time. In his boyhood Bertrand was a dull learner, spending his time in open-air sports and exercises, and could never read or write. He was remarkable for ugliness, and was an object of aversion to his parents. He first made himself a name as a soldier at the tournament held at Rennes in 1338 to celebrate the marriage of Charles of Blois with Jeanne de Perithievre, at which he unseated the most famous competitors. In the war which followed betw«en Charles of Blois and John de Montfort, for the

possession of the duchy of Brittany, he served his apprenticeship as a soldier (1341). As he was not a great baron with a body of vassals at his command, he put himself at the head of a band of adventurers, and fought on the side of Charles and of France. He distinguished himself by a brilliant action at the siege of Vannes in 1342; and after that he disappears from history for some years.

In 1354, having shortly before been made a knight, he was sent into England with the lords of Brittany to treat for the ransom of Charles of Blois, who had been defeated and captured by the English in 1347. When Rennes and Dinan were attacked by the duke of Lancaster in 1356, Du Guesclin fought continuously against the English, and at this time he engaged in a celebrated duel with Sir Thomas Canterbury. He finally forced his way with provisions and reinforcements into Rennes, which he successfully defended till June 1357, when the siege was raised in pursuance of the truce of Bordeaux. For this service he was rewarded with the lordship of Pontorson. Shortly afterwards he passed into the service of France,

and greatly distinguished himself at the siege of Melun (1359), being, however, taken prisoner a little later by Sir Robert Knollys. In 1360, 1361 and 1362 he was continually in the field, being again made prisoner in 1360. In 1364 he married, but was soon again in the field, this time against the king of Navarre. In May 1364 he won an important victory over the Navarrese at Cocherel, and took the famous Captal de Buch prisoner. He had previously been made lord of La Roche-Tesson (1361) and chamberlain (1364); he was now made count of Longueville and lieutenant of Normandy. Shortly afterwards, in aiding Charles of Blois, Du Guesclin was taken prisoner by Sir John Chandos at the battle of Auray, in which Charles was killed. The close of the general war, however, had released great numbers of mercenaries (the great com- panies) from control, and, as they began to play the part of brigands in France, it was necessary to get rid of them. Du Guesclin was ransomed for 100,000 crowns, and was charged to lead them out of France. He marched with them into Spain, supported Henry of Trastamara against Pedro the Cruel, set the former upon the throne of Castile (1366), and was made constable of Castile and count of Trastamara. In the following year he was defeated and captured by the Black Prince, ally of Pedro, at Navarette, but was soon released for a heavy ransom. Once more he fought for Henry, won the battle of Montiel (1369), reinstated him on the throne, and was created duke of Molinas.

In May 1370, at the command of Charles V., who named him constable of France, he returned to France. War had just been declared against England, and Du Guesclin was called to take part in it. For nearly ten years he was engaged in fighting against the English in the south and the west of France, recovering from them the provinces of Poitou, Guienne and Auvergne, and thus powerfully contributing to the establishment of a united France. In 1373, when the duke of Brittany sought English aid against a threatened invasion by Charles V., Du Guesclin was sent at the head of a powerful army to seize the duchy, which he did ; and two years later he frustrated the attempt of the duke with an English army to recover it. Finding in 1379 that the king entertained suspicions of his fidelity to him, he resolved to give up his constable's sword and retire to Spain. His resolution was at first proof against remonstrance; but ultimately he received back the sword, and continued in the service of France. In 1380 he was sent into Languedoc to suppress disturbances and brigandage, provoked by the harsh government of the duke of Anjou. His first act was to lay siege to the fortress of Chateauneuf-Randon, but on the eve of its surrender the constable died on the 13th of July

1380. His remains were interred, by order of the king, in the church of St Denis. Du Guesclin lost his first wife in 137 1, and married a second in 1373, but he left no legitimate children.

See biography by D. F. Jamison (Charleston, 1863), which was translated into French (1866) by order of Marshal Count Randon, minister of war; also S. Luce, Histoire de B. du Guesclin (Paris,

1876).

DUHAMEL, JEAN BAPTISTE (1624-1.706), French physicist, was bom in 1624 at Vire in Normandy. He studied at Caen and Paris; wrote at eighteen a tract on the Spherics of Theodosius of.Tripolis; then became an Oratorian priest, and fulfilled with great devotion for ten years (1653-1663) the duties of cure" at Neuilly-sur-Marne. He was appointed in 1656 almoner to the king, and in 1666 perpetual secretary to the newly founded Academy of Sciences. He died on the 6th of August 1706. He published among other works: Astronomia physica (1660) and De meleoris et fossilibus (1660), both in ,dialogue form; De consensu veteris et novae philosophiae (1663); De corporum qffectionibus (1672); De mente humana (1673); Regiae scien- tiarum Academiae historia, i666-i6q6 (1698), new edition brought down to 1700 (1701); Institutiones biblicae (1698); followed by annotated editions of the Psalms (1701), of the Book of Wisdom, &c. (1703), and of the entire Bible in 1705.

DUHAMEL DU MONCEAU, HENRI LOUIS (1700-1782), French botanist and engineer, son of Alexandre Duhamel, lord of Denainvilliers, was born at Paris in 1700. Having been requested by the Academy of Sciences to investigate a disease which was destroying the saffron plant in Gatinais, he discovered the cause in a parasitical fungus which attached itself to the roots, and this achievement gained him admission to the Academy in 1728. From then until his death he busied himself chiefly with making experiments in vegetable physiology. Having learned from Sir Hans Sloane that madder possesses the property of giving colour to the bones, he fed animals successively on food mixed and unmixed with madder; and he found that their bones in general exhibited concentric strata of red and white, whilst the softer parts showed in the meantime signs of having been progressively extended. • From a number of experiments he was led to believe himself able to explain the growth of bones, and to demonstrate a parallel between the manner of their growth and that of trees. Along with the naturalist Buffon, he made numerous experiments on the growth and strength of wood, and experimented also on the growth of the mistletoe, on layer planting, on smut in corn, &c. He was probably the first, in 1736, to distinguish clearly between the alkalis, potash and soda. From the year 1740 he made meteorological observa- tions, and kept

records of the influence of the weather on agri- cultural production. For many years he was inspector-general of marine, and applied his scientific acquirements to the im- provement of naval construction. He died at Paris on the 13th of August 1782'.

His works are nearly ninety in number, and include many technical handbooks. The principal are: — Traite des arbres et arbustes qui se cultivent en France en pleine terre ; Elements de V architecture navale ; Traite gineral des piches maritimes et fluviatiles; Elements d' agri- culture ; La Physique des arbres ; Des Semis et plantations des arbres et de leur culture ; De V exploitation des bois ; Traite des arbres fruitier s.

DUHRING, EUGEN KARL (1833-1901), German philosopher and political economist, was born on the r2th of January 1833 at Berlin. After a legal education he practised at Berlin as a lawyer till 1859. A weakness of the eyes, ending in total blind- ness, occasioned his taking up the studies with which his name is now connected. In 1864 he became docent of the university of Berlin, but, in consequence of a quarrel with the professoriate, was deprived of his licence to teach in 1874. Among his works are Kapital und Arbeit (1865); Der Wert des Lebens (1865); Natiirlich-e Dialektik (1865); Kritische Geschichte der Philosophic (1869) ; Kritische Geschichte der aUgemeinen Principien der Mechanik (i872)ˆone of his most successful works; Kursus der National- und Sozialokonomie (1873); Kursus der Philosophie (1875), entitled in a later edition Wirklichkeitsphilosophie; Logik und Wissenschaftstheorie (1878); Der Ersatz der Religion durch Vollkommeneres (1883). He published his autobiography in 1882 under the title Sache, Leben und Feinde; the mention of " Feinde " (enemies) is characteristic. Diihring's philosophy claims to be emphatically the philosophy of reality. He is passionate in his denunciation of everything which, like mysti- cism, tries to veil reality. He is almost Lucretian in his anger against religion which would withdraw the secret of the universe from our direct gaze. His " substitute for religion " is a doctrine

in many points akin to Comte and Feuerbach, the former of whom he resembles in his sentimentalism. Diihring's Opinions changed considerably after his first appearance as a writer. His earlier work, Natiirliche Dialektik, in form and matter not the worst of his writings, is entirely in the spirit of the Critical Philosophy. Later, in his movement towards Positivism, he strongly repudiates Kant's separation of phenomenon from nou- menon, and affirms that our intellect is capable of grasping the whole reality. This adequacy of thought to things is due to the fact that the universe contains but one

reality, i.e. matter. It is to matter that we must look for the explanation both of conscious and of physical states. B ut matter is not, in his system, to be understood with the common meaning, but with a deeper sense as the substratum of all conscious and physical existence; and thus the laws of being are identified with the laws of thought. In this materialistic or quasi-materialistic system Diihring finds room for teleology; the end of Nature, he holds, is the production of a race of conscious beings. From his belief in teleology he is not deterred by the enigma of pain; he is a determined optimist. Pain exists to throw pleasure into conscious relief. In ethics Diihring follows Comte in making sympathy the foundation of morality. In political philosophy he teaches an ethical com- munism, and attacks the Darwinian principle of struggle for existence. It economics he is best known by his vindication of the American writer H. C. Carey, who attracts him both by his theory of value, which suggests an ultimate harmony of the interests of capitalist and labourer, and also by his doctrine of " national " political economy, which advocates protection on the ground that the morals and culture of a people are pro- moted by having its whole system of industry complete within its own borders. His patriotism is fervent, but narrow and exclusive. He idolized Frederick the Great, and denounced Jews, Greeks, and the cosmopolitan Goethe.- Diihring's clear, incisive writing is disfigured by arrogance and ill-temper, failings which may be extenuated on the ground of his physical affliction. He died in 1901.

See H. Druskowitz, Eugen Diihring (Heidelberg, 1888) ; E. Doll, Eugen Diihring (Leipzig, 1892); F. Engels, Eugen D.'s Umwdlzung der Wissenschaft (3rd ed., Stuttgart, 1894) ; H. Vaihinger, Hartmann, Diihring und Lange (1876). (H. St.)

DUIGENAN, PATRICK (1735-1816), Irish lawyer and poli- tician, was the son of a Leitrim Roman Catholic farmer named O'Duibhgeannain. Through the tuition of the local Protestant clergyman, who was interested in the boy, he got a scholarship in 1756 at Trinity College, Dublin, and subsequently became a fellow. He was called to the Irish bar in 1767 and obtained a rich practice. He is remembered, however, mainly as a politician, on account of his opposition to Grattan, his support of the Union, and his violent antagonism to Catholic emancipa- tion. He was elected member for Armagh in the first united parliament, and was a well-known character at Westminster till he died on the nth of April 1816.

DUIKER (diver), or Duikerbok, the Dutch name of a small S. African antelope, scientifically known as Cephalophus grimnti; the popular name alluding to its habit of diving into and threading its way

through thick bush. Scientifically the name is extended to include all the members of the African genus Cephalophus, which, together with the Indian chousingha, or four-horned antelope (Tetraceros) , constitutes the subfamily Cephalophinae. Duikers are animals of small or medium size, usually frequenting thick forest. The horns, usually present in both sexes, are small and straight, situated far back on the forehead; and between them rises the crest-like tuft of hair from which the genus takes its scientific name. The common or true duiker (C. grimmi) is found in bush-country from the Cape to the Zambezi and Nyasaland, and ranges northward on the west coast to Angola. The banded duiker (C. doriae) from West Africa is golden brown with black transverse bands on the back and loins. C. sylvicultor, of West Africa, is the largest species, and approaches a donkey in size. (See Antelope.) (R. L.)*

DUILIUS (or Duellius), GAIUS, Roman general during the first Carthaginian War and commander in the first Roman naval

victory. In 260 B.C., when consul in command of the land forces in Sicily, he was appointed to supersede his colleague Cn. Cornelius Scipio Asina, commander Of the fleet, who had been captured in the harbour of Lipara. Recognizing that the only chance of victory lay in fighting under conditions as similar as possible to those of a land engagement, he invented a system of grappling irons (corvi) and boarding bridges, and gained a brilliant victory over the Carthaginian fleet off Mylae on the north coast of Sicily. He was accorded a triumph and the distinction of being accompanied, when walking in the streets during the evening, by a torchbearer and a flute-player. A memorial column (columna rostrata), adorned with the beaks of the captured ships, was set up in honour of his victory. The inscription upon it (see Latin Language, section 3, " The Language as Recorded ") has been preserved in a restored form in pseudo-archaic language, ascribed to the reign of Claudius.

See Corpus Inscriplionum Latinarum, i. No. 195; Polybius i. 22; Diod. Sic. xvii. 44; Frontinus, Stmt. ii. 3; Florus ii. 2; Cicero, De senectute, 13 ; Silius Italicus vi. 667 ; and Punic Wars.

DUISBURG, a town of Germany in the kingdom of Prussia, 15 m. by rail N. from Diisseldorf, between the Rhine and the Ruhr, with which rivers it communicates by a canal. It is an important railway centre.

Pop. (1885) 47,519; (1900) 92,729; (1905), including many outlying townships then recently in- corporated, 191,551. It has six Roman Catholic and six Pro- testant churches, among the latter the fine Gothic Salvator- kirche, of the 15th century. It is well furnished with schools, which include a school of machinery. Of modern erections, the concert hall, the law courts and a memorial fountain to the cartographer Gerhard Kremer (Mercator) are worthy of mention. There are important foundries, rolling mills for copper, steel and brass plates, chemical works, saw-milling, shipbuilding, tobacco, cotton, sugar, soap and other manufactures.

Duisburg was known to the Romans as Castrum Deutonis, and mentioned under the Frankish kings as Dispargum. In the 1 2th century it attained the rank of an imperial free town, but on being mortgaged in 1290 to Cleves it lost its privileges. At the beginning of the 17th century it was transferred to Branden- burg, and during the Thirty Years' War was alternately occupied by the Spaniards and the Dutch. In 1655 the elector Frederick' William of Brandenburg founded here a Protestant university, which flourished until 1802.

DUK-DUK, a secret society of New Britain or New Pomerania, Bismarck Archipelago, in the South Pacific. The society has religious and political as well as social objects. It represents a rough sort of law and order through its presiding spirit Duk-Duk, a mysterious figure dressed in leaves to its waist, with a helmet like a gigantic candle-extinguisher made of network. Upon this figure women and children are forbidden to look. Women, who are entitled in New Britain to their own earnings and work harder than men, are the special victims of Duk-Duk, who levies blackmail upon them if they are about during its visits. These are generally timed to coincide with the hours at which the women are out in the fields and therefore cannot help seeing the figure. Justice is executed, fines extorted, taboos, feasts, taxes and all tribal matters are arranged by the Duk-Duk members, who wear hideous masks or chalk their faces. In carrying out punishments they are allowed to burn houses and even kill people. Only males can belong to Duk-Duk, the entrance fees of which vary from 50 to 100 fathoms of dewarra (small cowrie shells strung on strips of cane). The society has its secret signs and ritual, and festivals at which the presence of a stranger would mean his death. Duk-Duk only appears with the full moon. The society is now much discredited and is fast dying out.

See " Duk-Duk and other Customs or Forms of Expression of the Melanesian's Intellectual Life," by Graf von Pfeil {Journ. of Anthrop. Instit. vol. 27, p. 181).

DUKE (corresponding to Fr. due, Ital. duca, Ger. Herzog), the title of one of the highest orders of the European nobility, and of some minor sovereign princes. The word " duke," which is derived from the Lat. dux, a leader, or general, through the

Fr. due (O. Fr. dusc, dues, dus), originally signified a leader, and more especially a military chief, and in this latter sense was the equivalent of the A.S. heretoga {here, an army, and teon, from togen, to draw; Ger. Ziehen, zog; Goth, tiuhan; Lat. ducere) and the old Ger. herizog. In this general sense the word survived in English literature until the 17th century, but is now obsolete.

The origin of modern dukes is twofold. The dux first appears in the Roman empire under the emperor Hadrian, and by the time of the Gordians has already a recognized place in the official hierarchy. He was the general appointed to the command of a particular expedition and his functions were purely military. In the 4th century, after the separation of the civil and military administrations, there was a duke in command of the troops quartered in each of the frontier provinces of the empire, e.g. the dux Britanniarum. The number of dukes continually in- creased, and in the 6th and 7th centuries there were duces at Rome, Naples, Rimini, Venice and Perugia. Gradually, too, they be- came charged with civil as well as military functions, and even exercised considerable authority in ecclesiastical administration. Under the Byzantine- emperors they were the representatives in all causes of the central power. The Roman title of duke was less dignified than that of count (comes, companion) which im- plied an honourable personal relation to the emperor (see Count). Both titles were borrowed by the Merovingian kings for the administrative machinery of the Frank empire, and under them the functions of the duke remained substantially unaltered. He was a great civil and military official, charged to watch, in the interests of the crown, over groups of several comitatus, or count- ships, especially in the border provinces. The sphere of the dukes was never rigidly fixed, and their commission was sometimes permanent, sometimes temporary. Under the Carolingians the functions of the dukes remained substantially the same; but with the decay of the royal power in the 10th century, both dukes and counts gained in local authority; the num- ber of dukes became for the time fixed, and finally title and office were made hereditary, the relation to the crown being reduced to that of more or less shadowy vassalage. (See Feudalism.)

Side by side with these purely official dukedoms, however, there had continued to exist, or had sprung up, either inde- pendently or in

more or less of subjection to the Frank rulers, national dukedoms, such as those of the Alemanni, the Aqui- tanians, and, later, of the Bavarians and Thuringians. These were developed from the early Teutonic custom by which the herizog was elected by the nation as leader for a particular cam- paign, as in the case of the heretogas who had led the first Saxon invaders into Britain. Tacitus says of the ancient Germans reges ex nobilitate, duces ex virtute sumunt; i.e. they elected their dukes for their warlike prowess only, and as purely military chiefs, whereas their kings were chosen from a royal family of divine descent. Sometimes the dukes so chosen succeeded in making their power permanent without taking the style of king. To this national category belong, besides the great German dukedoms, the dukes of Normandy, and the Lombard dukes of Spoleto and Benevento, who traced their origin, not to an administrative office, but to the leadership of Teutonic war bands. With the development of the feudal system the distinc- tion between the official and the national dukedoms was more and more obliterated. By the 13th and 14th centuries the title had become purely territorial, and implied no necessary over- lordship over counts and other nobles, who existed side by side with the dukes as tenants-in-chief of the crown. From this time the significance of the ducal title varies widely in different countries. Whenever the crown got the better of the feudal spirit of independence, as in France or Naples, it sank from being a sovereign title to a mere social distinction, implying no political power, and not necessarily any territorial influence. In northern Italy and in Germany, on the other hand, where the crown had proved too weak to combat the forces of disruption, it came ultimately to imply independent sovereignty.

The abolition of the Holy Empire in 1806 removed even the shadow of vassalage from the German reigning dukes, who retain

their sovereign status under the new empire. Only one, however, the grand duke of Luxemburg, is now both sovereign and independent. Besides the sovereign dukes in Germany there are certain " mediatized " ducal houses, e.g. that of Ratibor, which share with the dispossessed families of the Italian sovereign duchies certain royal privileges, notably that of equality of blood (Ebenbiirtigkeit) . In Italy, where titles of nobility give no pre- cedence at court, that of duke (duca) has lost nearly all even of its social significance owing to lavish creations by the popes and minor sovereigns, and to the fact

that the title often passes by purchase with a particular estate. Political significance it has none. Some great Italian nobles are dukes, notably the heads of the great Roman ducal families, but not all Italian dukes are great nobles.

In France the title duke at one time implied vast territorial power, as with the dukes of Burgundy, Normandy, Aquitaine and Brittany, who asserted a practical independence against the crown, though it was not till the 12th century that the title duke was definitely regarded as superior to others. At first (in the 10th and nth centuries) it had no defined significance, and even a baron of the higher nobility called himself in charters duke, count or even marquis, indifferently. In any case the strengthen- ing of the royal power gradually sapped the significance of the title, until on the eve of the Revolution it implied no more than high rank and probably territorial wealth.

There were, under the ancien regime, three classes of dukes in France: (1) dukes who were peers (see Peerage) and had a seat in the parlement of Paris; (2) hereditary dukes who were not peers; (3) " brevet " dukes, created for life only. The French duke ranks in Spain with the " grandee " (q.v.), and vice versa. In republican France the already existing titles are officially recognized, but they are now no more than the badges of dis- tinguished ancestry. Besides the descendants of the feudal aristocracy there are in France certain ducal families dating from Napoleon I.'s creation of 1806 (e.g. dues d'Albufera, de Montebello, de Feltre), from Louis Philippe (due d'Isly, and due d'Audiffret-Pasquier),andfromNapoleonIII. (Malakoff,Magenta, Morny).

In England the title of duke was unknown till the 14th century, though in Saxon times the title ealdorman, afterwards exchanged for " earl," was sometimes rendered in Latin as dux, 1 and the English kings till John's time styled themselves dukes of Nor- mandy, and dukes of Aquitaine even later. In 1337 King Edward III. erected the county of Cornwall into a duchy for his son Edward the Black Prince, who was thus the first English duke. The second was Henry, earl of Lancaster, Derby, Lincoln and Leicester, who was created duke of Lancaster in 1351. In Scot- land the title of duke was first bestowed in 1398 by Robert III. on his eldest son David, who was made duke of Rothesay, and on his brother, who became duke of Albany.

British dukes rank next to princes and princesses of the blood royal, the two archbishops of Canterbury and York, the lord Chancellor, &c, but beyond this precedence they have no special privileges which

are not shared by peers of lower rank (see Peerage). Though their full style as proclaimed by the herald is " most high, potent and noble prince," and they are included in the Almanack de Gotha, they are not recognized as the equals in blood of the crowned or mediatized dukes of the continent, and the daughter of an English duke marrying a foreign royal prince can only take his title by courtesy, or where, under the " house-laws " of certain families, a family council sanctions the match. The eldest son of an English duke takes as a rule by courtesy the second title of his father, and ranks, with or without the title, as a marquess. The other sons and daughters bear the titles " Lord " and " Lady " before their Christian names, also by courtesy. A duke in the British peerage, if not royal, is addressed as "Your Grace " and is styled " the Most Noble." (See Archduke, Grand Duke, and, for the ducal coronet, Crown andCoronet.) (W. A. P.)

1 So Ego Haroldus dux, Ego Tostinus dux, in a charter of Edward the Confessor (1060), Hist. MSS. Comm. 12th rep. app. pt. ix. p. 581.

DUKE OF EXETER'S DAUGHTER, a nickname applied to a isth-century instrument of torture resembling the rack (q.v.). Blackstone says (Commentaries, ii. sec. 326): " The trial by rack is utterly unknown to the law of England, though once when the dukes of Exeter and Suffolk, and other ministers of Henry VI., had laid a design to introduce the civil (i.e. Roman) law into the kingdom as the rule of government, for a beginning thereof they erected a rack for torture, which was called in derision the duke of Exeter's daughter, and still remains in the Tower of London, where it was used as an engine of state, not of law, more than once in Queen Elizabeth's reign. But when, upon the assassina- tion of Villiers, duke of Buckingham, by Felton, it was proposed in the privy council to put the assassin to the rack, in order to discover his accomplices, the judges being consulted, declared unanimously that no such proceeding was allowable by the laws of England."

DUKER, CARL ANDREAS (1670-1752), German classical scholar and jurist, was born at Unna in Westphalia. He studied at the university of Franeker under Jacob Perizonius. In 1700 he was appointed teacher of history and eloquence at the Herborn gymnasium, in 1704 vice-principal of the school at the Hague,' and in 17 16 he succeeded (with Drakenborch as colleague) to the professorship formerly held by Peter Burmann at Utrecht. After eighteen years' tenure he resigned his post, and lived in retirement at Ysselstein and Vianen. His health finally broke down under excessive study, and he died, almost blind, at the house of a relative in

Meiderich near Duisburg, on the 5th of November 1752. His chief classical works were editions of Floras (1722) and Thucydides (1731, considered his best). He brought out the 2nd edition of Perizonius's Origines Babylonicae et Aegyptiacae (1736) and his commentary on Pomponius Mela (1736-1737). Duker was also an authority on ancient law, and published Opuscula varia de latinitate veterum jurisconsultorum (1711), and a revision of the Leges Atticae of S. Petit (1741).

See C Saxe, Onomasticon litterarium, vi. 267; articles in Allgemeine deutsche Biographie and in Ersch and Gruber's Allgemeine Encyklopddie.

DUKERIES, THE, a name given to a district in the N.W. of Nottinghamshire, England; included within the ancient Sherwood Forest (q.v.). The name is taken from the existence of several adjacent demesnes of noblemen, and the character of the Forest is to some extent preserved here. On the north is the Sheffield-Retford branch of the Great Central railway, serving the town of Worksop, connecting at Retford with the Great Northern railway, while on the south the Great Central railway serves the small market town of Ollerton, and connects with the Great Northern at Dukeries Junction. The following demesnes are comprised in the district. Worksop Manor formerly belonged to the dukes of Norfolk. Welbeck Abbey is the seat of the dukes of Portland, to whom it came from the Cavendish family (dukes of Newcastle) ; the mansion is mainly classic in style, dating from the early 17 th century, but with many subsequent additions; the fifth duke of Portland (d. 1879) built the curious series of subterranean corridors and chambers beneath the grounds. Clumber House, the seat of the dukes of Newcastle, is beautifully placed above a lake in a fine park. Thoresby House is the seat of the earls Manvers, to whom it came on the extinction of the dukedom of Kingston; part of this demesne is a splendid tract of wild woodland.

DUKES, LEOPOLD (1810-1891), Hungarian critic of Jewish literature. He spent about twenty years in England, and from his researches in the Bodleian library and the British Museum (which contain two of the most valuable Hebrew libraries in the world) Dukes was able to complete the work of Zunz (q.v.). The most popular work of Dukes was his Rabbinische Blumenlese (1844), in which he collected the rabbinic proverbs and illustrated them from the gnomic literatures of other peoples. Dukes made many contributions to philology, but his best work was connected with the medieval Hebrew poetry, especially Ibn Gabirol. (j. a.)

DUKINFIELD, a municipal borough of Cheshire, England, within the parliamentary borough of Stalybridge, 6 m. E. of

Manchester. Pop. (1901) 18,929. It lies in the densely populated district in the north-east of the county, between Stalybridge and Ashton-under-Lyne, and is served by the London & North Western and Great Central railways. There are extensive collieries, and the other industries include cotton manufactures, calico-printing, hat-making, iron-founding, engineering and the manufacture of firebricks and tiles. A portion remains of the old timbered Dukinfield Hall, in the chapel of which Samuel Eaton (d. 1665) taught the first congregational church in the north of England. The chapel, much enlarged, is still used by this denomination. The borough, incorporated in 1899, is under a mayor, 6 aldermen and 18 councillors. Area, 1405 acres.

DULCIGNO (Servian, Ultsin, Turk. Olgun), a seaport of Monte-negro, on the Adriatic Sea, 8 m. W. of the Albanian frontier. Pop. (1900) about 5000. Shut in by hills and forests, and built partly on a promontory overlooking its bay, partly along the shore, Dulcigno is the .prettiest of Montenegrin towns. Its narrow crooked lanes, however, with its bazaars, mosques, minarets and veiled women, give to its picturesqueness a 'decidedly Turkish air. The old quarter, on the promontory, is walled, and has a medieval castle, once of great strength. Turks form the bulk of the inhabitants, although their numbers decreased steadily after 1880, when the population numbered about 8000. Albanians and Italians are fairly numerous. Dulcigno has a Roman Catholic cathedral and an ancient Latin church. The Austrian Lloyd steamers call at intervals, and some shipbuilding and fishing are carried on; but the harbour lacks shelter and is liable to deposits of silt.

To the Romans, who captured it in 167 B.C., Dulcigno was known as Ulcinium or Olcinium; in the middle ages it was a noted haunt of pirates; in the 17th century it was the residence of Sabbatai Zebi (d. 1676), a Jew who declared himself to be the Messiah but afterwards embraced Islam. In 17 18 Dulcigno was the scene of a great Venetian defeat. It belonged to the Turks until 1880, when its cession, according to the terms of the treaty of Berlin (1878), was enforced by the " Dulcigno demon- stration," in which the fleets of Great Britain, France, Germany, Austria and Russia took part.

DULCIMER (Fr. tympanon; Ger. Hackbrett, Cymbal; Ital. cembalo, timpanon or salterio tedesco), the prototype of the pianoforte, an instrument consisting of a horizontal sound-chest over which are stretched a varying number of wire strings set in vibration by strokes of little sticks or hammers. The dulcimer differed from the psalterium or psaltery chiefly in the manner of playing, the latter having the strings plucked by means of fingers or plectrum. The shape of the dulcimer is a trapeze or truncated triangle, having the bass strings stretched parallel with the base, which measures from 3 to 4 ft.; the strings de- crease gradually in length, the shortest measuring from about 18 to 24 in. at the truncated apex. The sound-board has one or two rose sound-holes; the strings are attached on one side to hitch pins and at the other to the larger tuning pins firmly fixed in the wrest plank. The strings of fine brass or iron wire are in groups of two to five unisons to each note; the vibrating lengths of the strings are determined by means of two bridges. The dulcimer is placed upon a table in front of the performer, who strikes the strings with a little hammer mounted on a metal rod and covered on one side with hard and on the other with soft leather for forte and piano effects. The compass, now chromatic throughout, varies according to the size of the instru- ment; the large cymbalom of the Hungarian gipsies has a

range of four chromatic octaves, eE

£=

The origin of the dulcimer is remote, and must be sought in. the East. In the bas-reliefs from Kuyunjik, now in the British Museum, are to be seen musicians playing on dulcimers of ten strings with long sticks curved at the ends, and damping the strings with their hands. This is the pisantir of the days of Nebuchadrezzar, translated " psaltery " in Dan. iii. 5, &c, and rendered " psalterion " in the Septuagint, a confusion which

has given rise to many misconceptions. 1 In the Septuagint no less than four different instruments are rendered psalterion (from Gr. ipaXXu, pluck, pull), i.e. ugab, nebel, pisantir and toph, two stringed, one wind and one percussion. The use of the word in Greek for a musical instrument is not recorded before the 4th century B.C. The modern santir of the Persians, almost identical with the German hackbrett, has a compass from

B^=^to=ffiII — _ according to Fetis. 2 The Persians place

its origin in the highest antiquity. Carl Engel 3 gives an illus- tration

said to be taken from a very old painting. 4

The dulcimer was extensively used during the middle ages in England, France, Italy, Germany, Holland and Spain, and although it had a distinctive name in each country, it was everywhere regarded as a kind of psalterium. The importance of the method of setting the strings in vibration by means of hammers, and its bearing on the acoustics of the instrument, were recognized only when the invention of the pianoforte had become a matter of history. It was then perceived that the psalterium in which the strings were plucked, and the dulcimer in which they were struck, when provided with keyboards, gave rise to two distinct families of instruments, differing essentially in tone quality, in technique and in capabilities: the evolution of the psalterium stopped at the harpsichord, that of the dulcimer gave us the pianoforte. The dulcimer is described and illustrated by Mersenne, 6 who calls it psaltirion; it has thirteen courses of pairs of unisons or octaves; the first strings were of brass wire, the others of steel. The curved stick was allowed to fall gently on to the strings and to rebound many times, which, Mersenne remarks, produces an effect similar to the trembling or tremolo of other instruments. Praetorius 6 figures a hackbrett having a body in the shape of a truncated triangle, with a bridge placed between two rose sound-holes, and played by means of two sticks. Another kind of hackbrett 7 (a psaltery), which was played with the fingers, was known to Praetorius. The pantaleon, a double dulcimer, named after the inventor, Pantaleon Hebenstreit of Eisleben, a violinist, had two sound-boards, 185 strings, one scale of overspun catgut, the other of wire. Hebenstreit travelled to Paris with his monster dulcimer in 1705 and played before Louis XIV., who baptized it PantaUon. Quantz 8 and Quirin of Blankenburg 9 both gave descriptions of the instrument. (K. S.)

DULKEN, a town of Germany, in the Prussian Rhine Province, 1 1 m. by rail S. W. from Crefeld. Pop. 10,000. It has a (Roman Catholic) Gothic parish church. There are manufactures of linen, cotton, silk and velvet, &c, ironworks and foundries.

DULONG, PIERRE LOUIS (1785-1838), French chemist and physicist, was born at Rouen on the 12th (or 13th) of February 1785. He began as a doctor in one of the poorest districts of Paris, but soon abandoned medicine for scientific research. After acting as assistant to Berthollet, he became successively professor of chemistry at the faculty of sciences and the normal and veterinary schools at Alfort, and then (1820) professor of physics at the Ecole Polytechnique, of which he was appointed director in 1830. He died

in Paris on the 18th (or 19th) of July 1838. His earliest work was chemical in character. In 181 1 he discovered chloride of nitrogen; during his experiments serious explosions occurred twice, and he lost one eye, besides sustaining severe injuries to his hand. He also investigated the oxygen compounds of phosphorus and nitrogen, and was

1 The names of the musical instruments in those verses of the Book of Daniel have formed the basis of a controversy as to the authenticity of the book.

2 Histoire de la musique (Paris, 1869), vol. ii. p. 131.

3 Music of the most Ancient Nations (London, 1864), pp. 42-3.

4 Hommaire de Hell, Voyage en Perse, p. lxii.

6 L'Harmonie universelle (Paris, 1636), livre iii. p. 174.

6 Syntagma musicum (Wolfenbuttel. 1618), pi. 18 (■?).

7 PL 36 (I).

8 "Herrn Joh. Joachim Quantzens Lebenslauf von ihm selbst entworfen," in Fr. W. Marpurg's Histor. kritische Beytrage, Bd. L p. 207 (I754-I755)-

9 Elementa musica, chap. xxvi.

one of the first to hold the hydrogen theory of acids. In 1815, in conjunction with Alexis Therese Petit (1791-1820), the professor of physics at the Ecole Polytechnique, he made careful comparisons between the mercury and the air thermometer. The first published research (1816) dealt with the dilatation of solids, liquids and gases and with the exact measurement of temperature, and it was followed by another in 18 18 on the measurement of temperature and the communication of heat, which was crowned by the French Academy. In a third, " On some important points in the theory of heat " (1819), they stated that the specific heats of thirteen solid elements which they had investigated were nearly proportional to their atomic weights — a fact otherwise expressed in the " law of Dulong and Petit " that the atoms of simple substances have equal capacities for

heat. Subsequent papers by Dulong were concerned with " New determinations of the proportions of water and the density of certain elastic fluids" (1820, with Berzelius); the property possessed by certain metals of facilitating the com- bination of gases (1823 with Thenard); the refracting powers of gases (1826); and the specific heats of gases (1829). In 1830 he published a research, undertaken with Arago for the academy of sciences, on the elastic force of steam at high tem- peratures. For the purposes of this determination he set up a continuous column of mercury, constructed with 13 sections of glass tube each 2 metres long and 5 mm. in diameter, in the tower of the old church of St Genevieve in the College Henri IV. The apparatus was first used to investigate the variation in the volume of air with pressure, and the conclusion was that up to twenty-seven atmospheres, the highest pressure attained in the experiments, Boyle's law holds good. In regard to steam, the old tower was so shaky that it was considered unwise to risk the effects of an explosion, and therefore the mercury column was removed bodily to a court in the observatory. The original intention was to push the experiments to a pressure equivalent to thirty atmospheres, but owing to the signs of failure exhibited by the boiler the limit actually reached was twenty-four atmo- spheres, at which pressure the thermometers indicated a tempera- ture of about 2 24°C. In his last paper, published posthumously in 1838, Dulong gave an account of experiments made to deter- mine the heat disengaged in the combination of various simple and compound bodies, together with a description of the calori- meter he employed.

DULSE (Ir. and Gael, duileasg) , in botany, Rhodymenia palmata, one of the red seaweeds, consisting of flat solitary or tufted purplish-red fronds, fan-shaped in general outline and divided into numerous segments, which are often again and again divided in a forked manner. It varies very much in size and degree of branching, ranging from 5 or 6 to 12 or more inches long. It grows on rocks, shell-fish or larger seaweeds, and is used by the poor in Scotland and Ireland as a relish with their food. It is commonly dried and eaten raw, the flavour being brought out by long chewing. In the Mediterranean it is used cooked in ragouts and made dishes.

See W. H. Harvey, Phycologica Britannica, vol. ii. plates 217, 218.

DULUTH, a city and the county-seat of St Louis county, Minnesota, U.S.A., at the W. end of Lake Superior, at the mouth of the St Louis river, about 150 m. N.E. of Minneapolis and St Paul. Pop. (1880) 3483; (1890) 33, us; (1900) 52,969, of whom 20,983 were foreign-born and 357 were negroes; (1910 census) 78,466. Of the 20,983

foreign-born in 1900, 5099 were English-Canadians, 5047 Swedes, 2655 Norwegians, 1685 Germans, and 1285 French-Canadians. Duluth is served by the Duluth and Iron Range, the Duluth, Missabe & Northern, the Duluth, South Shore & Atlantic, the Chicago & North- western (the North-Western line), the Great Northern, and the Northern Pacific railways. Situated attractively on the side and along the base of a high bluff rising 600 ft. above the lake level, Duluth lies at the W. end of Superior Bay (here called Duluth Harbour), directly opposite the city of Superior, Wisconsin. A narrow strip of land known as Minnesota Point, 7 m. in length and extending toward Wisconsin Point, which projects from the Wisconsin shore, separates the bay from the lake and forms

with St Louis Bay one of the finest natural harbours in the world. The natural entrance to the harbour is the narrow channel between the two points, but there is also a ship-canal across Minnesota Point, spanned by a curious aerial bridge 400 ft. long and 186 ft. above the water.

The unusually favourable position for lake transportation, and the extensive tributary region in the N.W., with ample rail connexions, make Duluth-Superior one of the greatest com- mercial ports in the country. The two cities constitute the largest coal-distributing centre in the N.W., and have some of the largest coal-docks in the world. Upwards of twenty grain elevators, with a net capacity of nearly 35,000,000 bushels, which receive enormous quantities of grain from the Red Riyer Valley, Manitoba, and the Dakotas, either for home manufacture or for transhipment to the East, are among the noteworthy sights of the place; and extensive ore-docks are required for handling the enormous and steadily increasing shipments of iron ore from the rich Vermilion and Mesabi iron ranges first opened about 1890. In 1907 more than 29,000,000 tons of iron ore were shipped from this port. Duluth is also an important hay market. There are flour and lumber mills, foundries and machine shops, wooden ware, cooperage, sash, door and blind, lath and shingle factories, and shipyards. In 1909 great mills of the Minnesota Steel Co. were begun here. In 1905 the factory product of Duluth was valued at $10,139,009, an increase of 29-8% over that of 1900. The St Louis river furnishes one of the finest water-powers in the United States.

The commanding heights upon which the principal residential section of the city is built render it at once attractive in appear- ance and healthful; there is a fine system of parks and boule- vards, the chief of the former being Lester, Fairmount, Portland, Cascade, Lincoln

and Chester. The popular Boulevard drive at the back of Duluth commands excellent views of city and lake. Among the principal buildings are the court house, the Masonic temple, chamber of commerce, board of trade, Lyceum theatre, Federal, Providence, Lonsdale, Torrey, Alworth, Sellwood and Wolvin buildings, St. Mary's hospital, St. Luke's hospital and Spalding Hotel. There is a public (Camegie) library with 50,000 volumes in 1908. The building of the central high school (classi- cal) , one of the finest in the United States, erected at a cost of about $500,000, has a square clock tower 230 ft. high, and an auditorium seating 2000. The city also has a technical high school, and in addition to the regular high school courses there are departments of business, manual training and domestic science. At Duluth also is a state normal school, erectedin 1902. The federal govern- ment maintains here a life-saving station on Minnesota Point, and an extensive fish hatchery.

The first Europeans to visit the site of Duluth were probably French coureurs-des-bois, possibly the adventurous Radisson and Groseilliers. The first visitor certainly known to have been here was Daniel Greysolon, Sieur Du Lhut (d. 1709), a French trader and explorer, who about 1678 skirted Lake Superior and built a stockaded trading-post at the mouth of Pigeon river on the N. shore. From him the place received its name. A trading-post was established near the present city, at Fond du Lac, about 1752, and this eventually became a depot of Astor's American Fur Company. There was no permanent settlement at Duluth proper, however, until 1853, and in i860 there were only 80 inhabitants. Incorporated in 1870, in which year railway connexion with the South was established, its growth was slow for some years, the increase for the decade 1870-1880 being very slight (from 3131 to 3483) ; but the extension of railways into the north-western wheat region, the opening up of Lake Superior to commerce, and finally the development of the Vermilion and Mesabi iron ranges, brought on a period of almost unparalleled growth, marked by the remarkable increase in population of more than 850% between 1880 and 1890; between 1890 and 1900 the increase was 60%.

See J. R. Carey, History of Duluth and Northern Minnesota (Duluth. 1898); Leggett and Chipman, Duluth and its Environs (Duluth, 1895) ; and J. D. Ensign, History of St Louis County (Duluth, 1900).

DULWICH, a district in the metropolitan borough of Camber- well, London, England. The manor, which had belonged to the

Cluniac monks of Bermondsey, passed through various hands to Edward Alleyn (q.v.) in 1606. His foundation of the College of God's Gift, commonly called Dulwich College, was opened with great state on the 13th of September 1619, in the presence of Lord Chancellor Bacon, Lord Arundell, Inigo Jones and other distinguished men. According to the letters patent the alms- people and scholars were to be chosen in equal proportions from the parishes of St Giles (Camberwell), St Botolph without Bishopsgate, and St Saviour's (Southwark), and " that part of the parish of St Giles without Cripplegate which is in the county of Middlesex." By a series of statutes signed in 1626, a few days before his death, Alleyn ordained that his school should be for the instruction of 80 boys consisting of three distinct classes: — (1) the twelve poor scholars; (2) children of inhabitants of Dul- wich, who were to be taught freely; and (3) " towne or foreign schollers," who were "to pay such allowance as the master and wardens shall appoint." The almspeople consisted of six " poor brethren " and six " poor sisters," and the teaching and governing staff of a master and a warden, who were always to be of the founder's surname, and four fellows, all " graduates and divines," among whom were apportioned the ministerial work of the chapel, the instruction of the boys, and the supervision of the almspeople. That it was the founder's intention to establish a great public school upon the model of Westminster and St Paul's, with provision for university training, is shown by the statutes; but for more than two centuries the educational benefits of God's Gift College were restricted to the twelve poor scholars. Suc- cessive actions at law resulted in the ruling that it was not within the competence of the founder to divert any portion of the revenues of his foundation to the use of others than the members thereof, as specified in the letters patent. In 1842, however, some effort was made towards the realization of Alleyn's schemes, and in 1858 the foundation was entirely reconstituted by act of parliament. It comprises two schools, the " Upper " and the " Lower," now called respectively Dulwich College and Alleyn's school. In the Upper school, now one of the important English "'public schools," there are classical, modern, science and engineer- ing sides. The Lower school is devoted to middle-class education. The buildings of the Upper school, by Charles Barry, contain a fine hall. The college possesses a splendid picture gallery, bequeathed by Sir P. F. Bourgeois, R.A., in 1811, with a separate endowment. The pictures include some exquisite Murillos and choice specimens of the Dutch school. The surplus income of the gallery fund is devoted to instruction in

drawing and design in the two schools.

See W. H. Blanch, Dulwich College and Edward Alleyn (London, 1877) ; R. Hovenden, The History of Dulwich College, with a short biography of its founder (London, 1873).

DUMAGUETE, the capital town of the province of Negros Oriental, island of Negros, Philippine Islands, on Tanon Strait. Pop. (1903) 14,894. The town of Sibulan (pop. in 1903, 8413) was annexed to Dumaguete in 1903, after the census had been taken. Dumaguete lies in the midst of a fertile agricultural district. The inhabitants are chiefly natives, but the shops are kept by Chinese merchants. The public buildings, which include an interesting watch-tower and belfry, are large, substantial and well cared for.

DUMANJUG, a town of the province of Cebu, island of Cebu, Philippine Islands, on the W. coast, at the mouth of the Duman- jug river, about 40 m. S.W. of the town of Cebu. Pop. (1903) 22,203. I n 1903, after the census had been taken, the adjacent town of Ronda (pop. 9662) was annexed to Dumanjug. Duman- jug is in communication with the town of Sibonga, on the opposite shore of one of the few passes through the mountains of the interior. Indian corn and sugar-cane are grown successfully in the neighbouring country, and the town has an important coast trade.

DU MARSAIS, CESAR CHESNEAU, Sieur (1676-1756), French philologist, was born at Marseilles on the 17th of July 1676. He was educated in his native town by the Fathers of the Oratory, into whose congregation he entered; but he left it at the age of twenty-five and went to Paris, where he married

and was admitted an advocate (1704). He was tutor to the sons successively of the president de Maisons, of John Law, the projector, and of the marquis de Bauffremont. He then opened a boarding school in the faubourg St Victor, which scarcely afforded him the means of subsistence. He made contributions of great value on philological and philosophical subjects to the Encyclopedic, and after vain attempts to secure a competence from the court he was insured against want by the generosity of a private patron. He died in Paris on the nth of June 1756. The researches of Du Marsais are distinguished by considerable individuality. He held sensible views on education and elabor- ated a system of teaching Latin, which, although open to grave criticism,wasauseful protest against current methods of teaching. His best works are his Principes de grammaire and his Des tropes, ou des dijfirents sens dans lesquels on pent

prendre un mot

(i73°)- _

An edition of his works (7 vols.) was collected by Duchosal and Millon, and was ˆpublished with an eloge on Du Marsais by D'Alerabert at Paris in 1797.

DUMAS, ALEXANDRE [Alexandre Davy de la Paille- terie] (1802-1870), French novelist and dramatist, was born at Villers-Cotterets (Aisne) on the 24th of July 1802. His father, the French general, Thomas Alexandre Dumas (1762-1806) — also known as Alexandre Davy de la Pailleterie — was born in Saint Domingo, the natural son of Antoine Alexandre Davy, marquis de la Pailleterie, by a negress, Marie Cessette Dumas, who died in 1 772. In 1 780 he accompanied the marquis to France, and there the father made a mesalliance which drove the son into enlisting in a dragoon regiment. Thomas Alexandre Dumas was still a private at the outbreak of the revolution, but he rose rapidly and became general of division in 1793. He was general- in-chief of the army of the western Pyrenees, and was transferred later to commands in the Alps and in La Vendee. Among his many exploits was the defeat of the Austrians at the bridge of Clausen on the 22nd of April 1 797, where he commanded Joubert's cavalry. He lost Napoleon's favour by plain speaking in the Egyptian campaign, and presently returned to France to spend the rest of his days in retirement at Villers Cotterets, where he had married in 1792 Marie Elisabeth Labouret.

The novelist, who was the offspring of this union, was not four years old when General Dumas died, leaving his family with no further resource than 30 acres of land. Mme Dumas tried to obtain help from Napoleon, but in vain, and lived with her parents in narrow circumstances. Alexandre received the rudi- ments of education from a priest, and entered the office of a local solicitor. His chief friend was Adolphe de Leuven, the son of an exiled Swedish nobleman implicated in the assassination of Gustavus III. of Sweden, and the two collaborated in various vaudevilles and other pieces which never saw the footlights. Leuven returned to Paris, and Dumas was sent to the office of a solicitor at Crepy. When in 1823 Dumas contrived to visit his friend in Paris, he was received to his great delight by Talma. He returned home only to break with his employer, and to arrange to seek his fortune in Paris, where he sought help without success from his father's old friends. An introduction to- the deputy of his department, General Foy, procured for him, however, a place as clerk in the service of the duke of Orleans at a salary of 1 200

francs. He set to work to rectify his lack of education and to collaborate with Leuven in the production of vaudevilles and melodramas. Madame Dumas presently joined her son in Paris, where she died in 1838.

Soon after his arrival in Paris Dumas had entered on a liaison with a dressmaker, Marie Catherine Labay, and their son, the famous Alexandre Dumas fils (see below), was born in 1824. Dumas acknowledged his son in 1831, and obtained the custody of him after a lawsuit with the mother.

The first piece by Dumas and Leuven to see the footlights was La Chasse et I'amour (Ambigu-Comique, 22nd of Sept. 1825), and in this they had help from other writers. Dumas had a share in another vaudeville, La Noce et V enterrement (Porte Saint- Martin, 21st of Nov. 1826). It was under the influence of the Shakespeare plays produced in Paris by Charles Kemble, Harriet

Smithson (afterwards Mme Berlioz) and an English company that the romantic drama of Christine was written. The subject was' suggested by a bas-relief of the murder of Monaldeschi exhibited at the Salon of 1827. The piece was accepted by Baron Taylor and the members of the Comedie Franfaise with the stipulation that it should be subject to revision by another dramatist because of its innovating tendencies. But the pro- duction of the piece was deferred. Meanwhile Dumas had met with the story of the ill-fated Saint-Megrin and the duchess of Guise in Anquetil's history, and had written, in prose, Henri III. et sa cour, which was immediately accepted by the Comedie Francaise and produced on the nth of February 1829. It was the first great triumph of the romantic drama. The brilliant stagecraft of the piece and its admirable historical setting delighted an audience accustomed to the decadent classical tragedy, and brought him the friendship of Hugo 1 and Vigny. His literary efforts had met with marked disapproval from his official superiors, and he had been compelled to resign his clerk- ship before the production of Henri III. The duke of Orleans had, however, been present at the performance, and appointed him assistant-librarian at the Palais Royal. Christine was now recast as a romantic trilogy in verse in five acts with a prologue and epilogue, with the sub-title of Stockholm, Fontainebleau, Rome, and was successfully produced by Harel at the Odeon in March 1830.

The revolution of 1830 temporarily diverted Dumas from letters. The account of his exploits should be read in his Memoires, where, though the incidents are true in the main, they lose nothing in the telling. During the fighting in Paris he attracted the attention of La Fayette, who sent him to Soissons to secure powder. With the help of some inhabitants he com- pelled the governor to hand over the magazine, and on his return to Paris was sent by La Fayette on a mission to raise a national guard in La Vendee. The advice he gave to Louis-Philippe on this subject was ill-received, and after giving offence by further indiscretions he finally alienated himself from the Orleans govern- ment by being implicated in the disturbances which attended the funeral of General Lamarque in June 1832, and he received a hint that his absence from France was desirable. A tour in Switzerland undertaken on this account furnished material for the first of a long series of amusing books of travel. Dumas re- mained, however, on friendly and even affectionate terms with the young duke of Orleans until his death in 1842.

Meanwhile he had produced Napoleon Bonaparte (Odeon, 10th of Jan. 183 1), his unwillingness to make a hero of the man who had slighted his father having been overcome by Harel, who put him under lock and key until the piece was finished. His next play, A ntony, had a real importance in the history of the romantic theatre. It was put in rehearsal by Mile Mars, but so unsatis- factorily that Dumas transferred it to Bocage and Mme Dorval, who played it magnificently at the Porte Saint-Martin theatre on the 3rd of May 183 1. The Byronic hero Antony was a portrait of himself in his relations with Mme Melanie Waldor, the wife of an officer, and daughter of the journalist M. G. T. de Villenave, except of course in the extravagantly melodramatic denouement, when Antony, to save his mistress's honour, kills her and ex- claims, " Elle me resistait, je l'ai assassinee." He produced more than twenty more plays alone or in collaboration before 1845, exclusive of dramatizations from his novels. Richard Darlington (Porte Saint-Martin, 10th of Dec. 183 1), the first idea of which was drawn from Sir Walter Scott's Chronicles of the Canongate, owed part of its great success to the admirable acting of Frederick Lemaitre. La Tour de Nesle (Porte Saint-Martin, 29th of May 1832), announced as by MM. XXX and Gaillardet, was the occasion of a duel and a law-suit with the original author, Frederic Gaillardet, whose MS. had been revised, first by Jules Janin and then by Dumas. In rapidity of movement, and in the terror it inspired, the piece surpassed Henri III. and Antony.

1 His friendship with Victor Hugo was interrupted in 1833-1834 by the articles contributed to the Journal des debats by a friend and

protege of the poet, Granier de Cassagnac, who brought against Dumas charges of wholesale plagiarism from other dramatists.

A lighter drama, Mademoiselle de Belle-Isle (Theatre Francais, 2nd of April 1839), still remains in the repertory.

In 1840 Dumas married Ida Ferrier, an actress whom he had imposed on the theatres that took his pieces. The amiable relations which had subsisted between them for eight years were disturbed by the marriage, which is said to have been under- taken in consequence of a strong hint from the duke of Orleans, and Mme Dumas lived in Italy separated from her husband.

As a novelist Dumas began by writing short stories, but his happy collaboration with Auguste Maquet, 2 which began in 1839, led to the admirable series of historical novels in which he proposed to reconstruct the whole course of French history. In 1844 he produced, with Maquet's help, that most famous of " cloak and sword " romances, Lcs Trois Mousquetaires (8 vols.), the material for which was discovered in the Memoires de M. d'Artagnan (Cologne, 1 701-1702) of Courtils de Sandras. The adventures of d'Artagnan and the three musketeers, the gigantic Porthos, the clever Aramis, and the melancholy Athos, who unite to defend the honour of Anne of Austria against Richelieu and the machinations of " Milady," are brought down to the murder of Buckingham in 1629. Their admirers were gratified by two sequels, Vingt ans aprcs (10 vols., 1845) and Dix ans plus tard, ou le vicomte de Bragelonne (26 pts., 1848-1850), which opens in 1660, showing us a mature d'Artagnan, a respectable captain of musketeers, and contains the magnificent account of the heroic death of Porthos. The three musketeers are as famous in England as in France. Thackeray could read about Athos from sunrise to sunset with the utmost contentment of mind, and R. L. Stevenson and Andrew Lang have paid tribute to the band in Memories and Portraits and Letters to Dead Authors. Before 1844 was out Dumas had completed a second great romance in 1 2 volumes, Le Comte de M onte-Cristo , in which he had help from Fiorentino as well as from Maquet. The idea of the intrigue was suggested by Peuchet's Police devoilee, and the stress laid on the earlier incidents, Dantes, Danglars and the Chateau d'lf, is said to have been an afterthought. Almost as famous as these two romances is the set of Valois novels of which Henri IV. is the central figure, beginning with La Reine Margot (6 vols., 1845), which contains the history of the struggle between Catherine of Medicis and Henry of Navarre; the history of the reign of Henry III. is told in La Dame de Monsoreau (8 vols., 1846), generally known in English as Chicot the

Jester, from its principal character; and in Les Quar ante-cinq (10 vols., 1847-1848), in which Diane de Monsoreau avenges herself on the duke of Anjou for the death of her former lover, Bussy d'Amboise.

Much has been written about the exact share which Dumas had in the novels which bear his name. The Dumas-Maquet series is undoubtedly the best, but Maquet alone never accom- plished anything to approach them in value. The MSS. of the novels still exist in Dumas's handwriting, and the best of them bear the unmistakable stamp of his unrivalled skill as a narrator. The chief key to his enormous output is to be found in his un- tiring industry and amazing fertility of invention, not in the system of wholesale collaboration which was exposed with much exaggeration by Querard in his SuperchSries litUraires and by "Eugene de Mirecourt" (C. B. J. Jacquot) in his misleading Fabrique de romans, maison Alexandre Dumas et c ie (1845). His assistants, in fact, supplied him with outlines of romances on plans drawn up by himself, and he then rewrote the whole thing. That this method was never abused it would be impossible to say; Les Deux Diane, for instance, a prelude to the Valois novels, is said to have been written, entirely by Paul Meurice, although Dumas's name appears on the title-page.

The latter part of Dumas's life is a record of excessive toil to meet prodigal expenditure and accumulated debts. His disasters began with the building of a house in the Renaissance style, with a Gothic pavilion and an " English " park, at Saint Germain-

2 The details of this collaboration were brought to light in a suit brought against Dumas by Maquet with regard to his share in the profits. See the Gazette des tribunaux (January 21 , 22, 28, and February 4, 1858).

en-Laye. This place, called Monte-Cristo, was governed by a crowd of hangers-on of both sexes, who absorbed Dumas's large earnings and left him penniless. Dumas also founded the Theatre Historique chiefly for the performance of his own works. The enterprise was under the patronage of the due deMontpensier, and was under the management of Hippolyte Hostein, who had been the secretary of the Comedie Francaise. The theatre was opened in February 1847 with a dramatic version of La Reine Margot. Meanwhile Dumas had been

the guest of the due de Montpensier at Madrid, and made a quasi-official tour to Algeria and Tunis in a government vessel, which caused much comment in the press. Dumas had never changed his republican opinions. He greeted the revolution of 1848 with delight, and was even a candidate for electoral honours in the department of the Yonne. But the change was fatal to his theatrical enterprise, for the failure of which in 1850 he was made financially responsible. His son, Alexandre Dumas, was at that time living with his mother Mile Labay, who was eventually reconciled with the elder Dumas. Father and son, though always on affectionate terms when they met, were too different in their ideas to see much of one another. After the coup d'etat of 1851 Dumas crossed the frontier to Brussels, and two years of rapid production, and the economy of his secretary, Noel Parfait, restored something like order to his affairs. On his return to Paris in the end of 1853 he established a daily paper, Le Mousquetaire, for the criticism of art and letters. It was chiefly written by Dumas, whose Memoires first appeared in it, and survived until 1857, when it was suc- ceeded by a weekly paper, the Monte-Cristo (1857-1860). In 1858 Dumas travelled through Russia to the Caucasus, and in i860 he joined Garibaldi in Sicily. After an expedition to Marseilles in search of arms for the insurgents, be returned to Naples, where Garibaldi nominated him keeper of the museums. After four years' residence in Naples he returned to Paris, and after the war of '66 he visited the battlefields and produced his story of La Terreur prussienne. But his powers were beginning to fail, and in spite of the 1200 volumes which he told Napoleon he had written, he was at the mercy of his creditors, and of the succession of theatrical ladies who tyrannized over him and feared nothing except the occasional visits of Dumas fils. He was finally rescued from these by his daughter, Mme Petel, who came to live with him in 1868; and two years later, on the 5th of December 1870, he died in his son's house at Puys, near Dieppe.

Dumas was never an actual candidate for academic honours, but he had more than once taken steps to investigate his chances of success. A statue of him was erected on the Place Malesherbes, Paris, in 1883, and the figure of d'Artagnan finds a place on the pedestal.

Auguste Maquet was^Dumas's chief collaborator. Others were Paul Lacroix (the bibliophile "P. L. Jacob"), Paul Bocage, J. P. Mallefille and P. A. Fiorentino. The novels of Dumas may be conveniently arranged in a historical sequence. The Valois novels and the musqueteers series brought French history down to 1672. Contributions to later history are: — La Dame de voluptS (2 vols., 1864), being the memoirs of Mme de Luynes, and its sequel Les Deux

Reines (2, vols., 1864); La Tulipe noire (3 vols., 1850), giving the history of the brothers de Witt; Le Chevalier d'Harmental (4 vols., 1853), and UneFille du regent (4 vols., 1845), the story of two plots against the regent, the duke of Orleans; two books on Mme du Deffand, Mimoires d'une aveugle (8 vols., 1856-1857) and Les Confessions de la marquise (8 vols., 1857), both of doubtful authorship; Olympe de Cleves (9 vols., 1852), the story of an actress and a young Jesuit novice in the reign of Louis XV., one of his most popular novels; five books on the beginning of the Revolution down to the execution of Marie Antoinette: the Memoires d'un midecin, including Joseph Balsamo (19 pts., 1846-1848), in which J. J. Rousseau, Mme du Barry and the dauphiness Marie Antoinette figure, with its sequels; Le Collier de la reine (9 vols., 1 840-1850), in which Balsamo appears under the alias of Cagliostro; Ange Pitou (8 vols., 1852), known in English as " The Taking of the Bastille "; La Comtesse de Charny (19 vols., 1853-1855), describing the attempts to save

the monarchy and the flight to Varennes; and Le Chevalier de maison rouge (6 vols., 1846), which opens in 1793 with the hero's attempt to save the queen. Among the numerous novels dealing with the later revolutionary period are: — Les Blancs et les bleus (3 vols., 1868) and Les Compagnons de Jehu (7 vols., 1857). Les Louves de Machecoul (10 vols., 1859) deals with the rising in 1832 in La Vendee. Other famous ; stories are: — Les Freres corses (2 vols., 1845); La Femme au collier de velours (2 vols., 1851); Les Mohicans de Paris (19 vols., 1854-1855), detective stories with which may be classed the series of Crimes celebres (8 vols., 1839- 1841), which are, however, of doubtful authorship; La San FSlice (9 vols., 1864-1865), in which Lady Hamilton played a prominent part, with its sequels Emma Lyonna and Souvenirs d'une favorite. Of his numerous historical works other than fiction the most important is his Louis XIV et son siecle (4 vols., 1845). Mes MSmoires (20 vols., 1852-1854; Eng. trans, of selections by A. F. Davidson, 2 vols., 1891) is an account of his father and of his own life down to 1832. There are collective editions of his plays (6 vols., 1834-1836, and 15 vols., 1863-1874), but of the 91 pieces for which he was wholly or partially re- sponsible, 24 do not appear in these collections.

The complete works of Dumas were issued by Michel Levy freres in 277 volumes (1860-1884). The more important novels have been frequently translated into English. There is a long list of writings on his life and his works both in English and French. The more important French authorities are : his own memoirs, already cited ; C. Glinel, Alexandre Dumas et son ceuvre (Reims, 1884) ; H.

Parigot, Dumas pere (Grands ecrivains frangais series, 1902), and Le Drame d' Alexandre Dumas (1899) ; H. Blaze de Bury, Alexandre Dumas (1885); Philibert Andebrand, Alexandre Dumas d. la maison a" or (1888); G. Ferry, Dernieres Annees d' Alexandre Dumas (1883); and L. H. Lecomte, Alexandre Dumas (1904). Of the English lives of Dumas perhaps the best is that by Arthur F. Davidson, Alexandre Dumas Pere, his] Life and Works (1902), which contains an extensive bibliography. See also lives by P. Fitzgerald (2 vols., 1873) and H. A. Spurr (1902), and essays by Andrew Lang (Letters to Dead Authors), Brander Matthews (French Dramatists), R. L. Stevenson (Memories and Portraits). (M. Br.)

DUMAS, ALEXANDRE ["Dumas fils"] (1824-1895), French dramatist and novelist, was born in Paris on the 27 th of July 1824, the natural son of Alexandre Dumas (see above) and the dressmaker Marie Labay. His father at that date was still a humble clerk and not much more than a boy. " Happily," writes the son, " my mother was a good woman, and worked hard to bring me up "; while of his father he says, " by a most lucky chance he happened to be well-natured," and " as soon as his first successes as a dramatist " enabled him to do so, " recognized me and gave me his name." Nevertheless, the lad's earlier school-life was made bitter by his illegitimacy. The cruel taunts and malevolence of his companions rankled through life (see preface to La Femme de Claude and L' Affaire Clemenceau), and left in- delible marks on his character and thoughts. Nor was his paternity, however distinguished, without peril. Alexandre the younger and elder saw life together very thoroughly, and Paris can have had few mysteries for them. Suddenly the son, who had been led to regard his prodigal father's resources as inexhaustible, was rudely undeceived. Coffers were empty, and he had accumulated debts to the amount of two thousand pounds.

Thereupon he pulled himself together. To a son of Dumas the use of the pen came naturally. Like most clever young writers — and report speaks of him as specially brilliant at that time — he opened with a book of verse, Ptches dejeunesse (1847). It was succeeded in 1848 by a novel, La Dame aux camelias, a sort of reflection of the world in which he had been living. The book had considerable success, and was followed, in fairly quick succession, by Le Roman d'une femme (1848) and Diane de Lys (185 1). All this, however, did not deliver him from the load of debt, which, as he tells us, remained odious. In 1849 he dramatized La Dame aux camttias, but for various reasons, the rigour of the censorship being the most important, it was not till the 2nd of February 1852, and then only by the intervention of Napoleon's all-powerful minister, Morny, that the play could be

produced at the Vaudeville. It succeeded then, and has held the stage ever since, less perhaps from inherent superiority to

other plays which have foundered than to the great opportunities it affords to any actress of genius.

Thenceforward Dumas's career was that of a brilliant and prosperous dramatist. Diane de Lys (1853), Le Demi-Monde (1855), La Question d' argent (1857) , Le Fits naturel (1858), Le P'ere prodigue (1859) followed rapidly. Debts became a thing of the past, and Dumas a wealthy man. The didactic habit was always strong upon him. " Alexandre loves preaching overmuch," wrote his father; and in most of his plays he assumes the attitude of a rigid and uncompromising moralist commissioned to impart to a heedless world lessons of deep import. The lessons them- selves are mostly concerned with the " eternal feminine," by which Dumas was haunted, and differ in ethical value. Thus in Les Idees de Madame Atibray (1867) he inculcates the duty of the seducer to marry the woman he has seduced; but in La Femme de Claude (1873) he argues the right of the husband to take the la,w into his own hand and kill the wife who is un- faithful and worthless — a thesis again defended in his novel, L'Ajfaire Clemenceau, and in his pamphlet, L'Homme-femme; while in Diane de Lys he had taught that the betrayed husband was entitled to kill — not in a duel, but summarily—the man who had taken his honour; and in L'Etrangere (1876) the bad husband is the victim. Nor did he preach only in his plays. He preached in voluminous introductions, and pamphlets not a few. And when, in 1870 and 1872, France was going through bitter hours of humiliation, he called her to repentance and amendment in a Nouvelle Lettre de Junius and two Leltres sur les choses du jour.

As a moralist Dumas fits took himself very seriously indeed. As a dramatist, didacticism apart, he had great gifts. He knew his business thoroughly, possessed the art of situation, interest, crisis — could create characters that were real and alive. His dialogue also is admirable, the repartee rapier-like, the wit most keen. He was singularly happy, too, in his dramatic interpreters. The cast of L'Etrangere, for instance, comprised Sarah Bernhardt, Sophie Croizette, Madeleine Brohan, in the female characters; and Coquelin, Got, Mounet-Sully and Febvre in the male char- acters; and Aimee Desclee, whom he discovered, gave her genius to the

creation of the parts of the heroine in Une Visite de noces, the Princesse Georges and La Femme de Claude. His wit has been mentioned. He possessed it in abundance, of a singularly trenchant kind. It shows itself less in his novels, which, however, do not contain his best work; but in his introductions, whether to his own books or those of his friends, and what may be called his " occasional " writings, there is an admirable brightness. At work of this kind he showed the highest literary skill. His style is that of the best French traditions. Towards his father Dumas acted a kind of brother's part, and while keeping strangely free from his literary influence, both loved and admired him. The father never belonged to the French Academy. The son was elected into that august assembly on the 30th of January 1874. He died on the 27th of November 1895.

See also Jules Claretie, A. Dumas fils (1883); Paul Bourget, Nouveaux Essais de psyckologie contemporaine (1885) ; " La Comedie de moeurs," by Rene Doumic, in L. Petit de Julleville's Histoire de la langue et de la litterature francaise, viii. pp. 82 et seq. ; R. Doumic, Portraits d'ecrivains (1892) , Emile Zola, Documents litteraires, Hudes et portraits (1881). (F. T. M.)

DUMAS, GUILLAUME MATHIEU, Count (1753-1837), French general, was born at Montpellier, of a noble family, on the 23rd of November 1753. He joined the army in 1773, and entered upon active service in 1780, as aide-de-camp to Rochambeau in the American War. He had a share in all the principal engagements that occurred during a period of nearly two years. On the conclusion of peace in 1783 he returned to France as a major. He was engaged from 1784 to 1786 in exploring the archipelago and the coasts of Turkey. He was present at the siege of Amsterdam in 1787, where he co-operated with the Dutch against the Prussians. At the Revolution he acted with Lafayette and the constitutional liberal party. He was entrusted by the Assembly with the command of the escort which conducted Louis XVI. to Paris from Varennes. In 1791

as a marechal de camp he was appointed to a command at Metz, where he rendered important service in improving the discipline of the troops. Chosen a member of the Legislative Assembly in the same year by the department of Seine-et-Oise, he was in the following year elected president of the Assembly. When the extreme republicans gained the ascendancy, however, he judged it prudent to make his escape to England. Returning after a brief interval, under the apprehension that his father-in- law would be held responsible for his absence, he arrived in Paris in the midst of the Reign of Terror, and

had to flee to Switzerland. Soon after his return to France he was elected a member of the Council of Ancients. After the 18th Fructidor (1797) Dumas, being proscribed as a monarchist, made his escape to Holstein, where he wrote the first part of his Precis des eve'nements mili- taires (published anonymously at Hamburg, 1800). « Recalled to his native country when Bonaparte became First Consul, he was entrusted with the organization of the "Army of Reserve " at Dijon. In 1801 he was nominated a councillor of state. He did good service at Austerlitz, and went in 1806 to Naples, where he became minister of war to Joseph Bonaparte. On the transfer of Joseph to the throne of Spain, Dumas rejoined the French army, with which he served in Spain during the campaign of 1808, and in Germany during that of 1809. After the battle of Wagram, Dumas was employed in negotiating the armistice. In 1810 he became grand officer of the Legion of Honour and a count of the empire. In the Russian campaign of 181 2 he held the post of intendant-general of the army, which involved the charge of the administrative department. The privations he suffered in the retreat from Moscow brought on a dangerous illness. Resuming, on his recovery, his duties as intendant-general, he took part in the battles of 1 813, and was made prisoner after the capitulation of Dresden. On the acces- sion of Louis XVIIL, Dumas rendered his new sovereign im- portant services in connexion with the administration of the army. When Napoleon returned from Elba, Dumas at first kept himself in retirement, but he was persuaded by Joseph Bonaparte to present himself to the emperor, who employed him in organizing the National Guard. Obliged to retire when Louis XVIIL was restored, he devoted his leisure to the con- tinuation of his PrScis des ivenements mililaires, of which nineteen volumes, embracing the history of the war from 1798 to the peace of 1807, appeared between 1817 and 1826. A growing weakness of sight, ending in blindness, prevented him from carrying the work further, but he translated Napier's Peninsular War as a sort of continuation to it. In 1818 Dumas was restored to favour and admitted a member of the council of state, from which, however, he was excluded in 1822. After the revolution of 1830, in which he took an active part, Dumas was created a peer of France, and re-entered the council of state. He died at Paris on the 16th of October 1837.

Besides the Precis des evenements mililaires, which forms a valu- able source for the history of the period, Dumas wrote Souvenirs du lieut.-general Comte Mathieu Dumas (published posthumously by his son, Paris, 1839).

DUMAS, JEAN BAPTISTE ANDBJ (1800-1884), French chemist, was born at Alais (Gard) on the 15th of July 1800. Disappointed in

his early hope of entering the navy, he became apprentice to an apothecary in his native town; but seeing little prospect of advancement in that calling, he soon moved to Geneva (in 1816). There he attended the lectures of such men as M. A. Pictet in physics, C. G. de la Rive in chemistry, and A. P. de Candolle in botany, and before he had reached his majority he was engaged with Pierre Prevost in original work on problems of physiological chemistry, and even of embryology. In 1823, acting on the advice of A. von Humboldt, he left Geneva for Paris, which he made his home for the rest of his life. There he gained the acquaintance of many of the foremost scientific men of the day, and quickly made a name for himself both as a teachei and an investigator, attaining within ten years the honour of membership of the Academy of Sciences. When approaching his fiftieth year he entered political life, and became a member I of the National Legislative Assembly. He acted as minister

of agriculture and commerce for a few months in 1850-1851, and subsequently became a senator, president of the municipal council of Paris, and master of the French mint; but his official career came to a sudden end with the fall of the Second Empire. He died at Cannes on the nth of April 1884. Dumas is one of the most prominent figures in the chemical history of the middle part of the 19th century. He was one of the first to criticize the electro-chemical doctrines of J. J. Berzelius, which at the time his work began were widely accepted as the true theory of the constitution of compound bodies, and opposed a unitary view to the dualistic conception of the Swedish chemist. In a paper on the atomic theory, published so early as 1826, he anticipated to a remarkable extent some ideas which are frequently supposed to belong to a later period; and the continuation of these studies led him to the ideas about substitution (" metalepsis ") which were developed about 1839 into the theory (" Older Type Theory ") that in organic chemistry there are certain types which remain unchanged even when their hydrogen is replaced by an equivalent quantity of a haloid element. Many of his well-known researches were carried out in support of these views, one of the most important being that on the action of chlorine on acetic acid to form trichloracetic acid — a derivative of essen- tially the same character as the acetic acid itself. In the 1826 paper he described his famous method for ascertaining vapour densities, and the redeterminations which he undertook by its aid of the atomic weights of carbon and oxygen proved the forerunners of a long series which included some

thirty of the elements, the results being mostly published in 1858-1860. He also devised a method of great value in the quantitative analysis of organic substances for the estimation of nitrogen, while the classification of organic compounds into homologous series was advanced as one consequence of his researches into the acids generated by the oxidation of the alcohols. Dumas was a prolific writer, and his numerous books, essays, memorial addresses, &c, show him to have been gifted with a clear and graceful style. His earliest large work was a treatise on applied chemistry in eight volumes, the first of which was published in 1828 and the last twenty years afterwards. In the Essai de statique chimique des itres organises (1841), written jointly with J. B. J. D. Boussin- gault (1802-1887), he treated the chemistry of life, both plant and animal; this book brought him into conflict with Liebig, who conceived that some of his prior Work had been appropriated without due acknowledgment. In 1824, in conjunction with J. V. Audouin and A. T. Brongniart, he founded the Annates des sciences naturelles, and from 1840 he was one of the editors of the Annates de chimie et de physique. As a teacher Dumas was much sought after for his lectures at the Sorbonne and other institutions both on pure and applied science; and he was one of the first men in France to realize the importance of experi- mental laboratory teaching.

DU MAURIER, GEORGE LOUIS PALMELLA BUSSON (1834-1896), British artist and writer, was born in Paris. His father, a naturalized .British subject, was the son of emigres who had left France during the Reign of Terror and settled in London. In Peter Ibbetson, the first of the three books which won George Du Maurier late in life a reputation as novelist almost as great as he had enjoyed as artist and humorist for more than a generation, the author tells in the form of fiction the story of his singularly happy childhood. He was brought to London, in- deed, when three or four years old, and spent in Devonshire Terrace and elsewhere two colourless years; but vague memories of this period were suddenly exchanged one beautiful day in June — " the first day of his conscious existence " — for the charming realities of a French garden and " an old yellow house with green shutters and mansard roofs of slate." Here, at Passy, with his " gay and jovial father " and his young English mother, the boy spent " seven years of sweet priceless home-life — seven times four changing seasons of simple genial prae-Imperial French- ness." The second chapter of Du Maurier's life had for scene a Paris school, very much in the style of that "Institution F. Brossard " which he describes, at once so vividly and so sym- pathetically, in The Martian; and like "Barty Josselin's"

schoolfellow and biographer, he left it (in 1851) to study chemistry at University College, London, actually setting up as an analyti- cal chemist afterwards in Bucklersbury. But this was clearly not to be his metier, and the year 1856 found him once more in Paris, in the Quartier Latin this time, in the core of that art- world of which in Trilby, forty years later, he was to produce with pen and pencil so idealistic and fascinating a picture. Then, like "Barty Josselin" himself, he spent some years in Belgium and the Netherlands, experiencing at Antwerp in 1857, when he was working in the studio of van Lerius, the one great misfortune of his life — the gradual loss of sight in his left eye, accompanied by alarming symptoms in his right. It was a period of tragic anxiety, for it seemed possible that the right eye might also become affected; but this did not happen, and the dismal cloud was soon to show its silver lining, for, about Christmas- time 1858, there came to the forlorn invalid a copy of Punch's Almanac, and with it the dawn of a new era in his career.

There can be little doubt that the study of this Almanac, and especially of Leech's drawings in it, fired him with the ambition of making his name as a graphic humorist; and it was not long after his return to London in i860 that he sent in his first contribution (very much in Leech's manner) to Punch. Mark Lemon, then editor, appreciated his talent, and on Leech's death in 1865 appointed him his successor, counselling him with wise discrimination not to try to be "too funny," but "to undertake the light and graceful business" and be the "romantic tenor" in Mr Punch's little company, while Keene, as Du Maurier puts it, " with his magnificent highly-trained basso, sang the comic songs." These respective r61es the two artists continued to play until the end, seldom trespassing on each other's province; the "comic songs" finding their inspiration principally in the life of the homely middle and lower middle classes, while the "light and graceful business" enacted itself almost exclusively in "good Society." To a great extent, also, Du Maurier had to leave outdoor life to Keene, his weak sight making it difficult for him to study and sketch in the open air and sunshine, thus cutting him off, as he records regretfully, from " so much that is so popular, delightful and exhilarating in English country life " — hunting and shooting and fishing and the like. He contrived, however, to give due attention to milder forms of outdoor recreation, and turned to good account his familiarity with Hampstead Heath and Rotten Row, and his holidays with his family at Whitby and Scar- borough, Boulogne and Dieppe.

Of Du Maurier's life during the thirty-six years of his connexion with Punch there is not, apart from his work as an artist, much to record.

In the early 'sixties he lived at 85 Newman Street in lodgings, which he shared with his friend Lionel Henley, after- wards R.B.A., working hard at his Punch sketches and his more serious contributions to Once a Week and the Cornhill Magazine. After his marriage with Miss Emma Wightwick in 1862 he took a spacious and pleasant house near Hampstead Heath, in sur- roundings made familiar in his drawings. Shortly before he died he moved to a house in Oxford Square. About 1866 he struck out a new line in his admirable illustrations to Jerrold's Story of a Feather. In 1869 he realized a long-cherished aspiration, the illustrating of Thackeray's Esmond, and in 1879 he drew twelve additional vignettes for it, in the same year providing several illustrations for the Ballads. From time to time he sent pretty and graceful pictures to the exhibitions of the Royal Society of Painters in Water-colour, to which he was elected in 1881. In 1885 the first exhibition of his works at the Fine Art Society took place. Thus occupied in the practice of his art, spending his leisure in social intercourse with his many friends and at home with his growing family, hearing all the new singers and musicians, seeing all the new plays, he lived the happiest of lives. He died somewhat suddenly on the 8th of October 1896, and was buried in the Hampstead parish churchyard. He left a family of two sons — the elder, Major Guy Du Maurier (b. 1865), a soldier who became more widely known in 1909 as author of the military play An Englishman's Home, and the younger, Gerald, a well-known actor — and three daughters.

DUMBARTON

659

It is impossible, in considering Du Maurier's work, to avoid comparing it with that of Leech and Keene, the more so that in his little book on Social Pictorial Satire he himself has set forth or suggested the points both of resemblance and of difference. Like Keene, though Keene's marvellous technique was his despair, Du Maurier was a much more finished draughtsman than John Leech, but in other respects he had less in common with the younger than with the older humorist. He shows himself, in the best sense, a man of feeling in all his work. He is clearly himself in love with " his pretty woman," as he calls her — every pen-stroke in his presentment of her is a caress. How affec- tionate, too, are his renderings of his fond young mothers and their big, handsome, simple-minded husbands; his comely children and neat nurserymaids; even his dogs — his elongated dachshunds and magnificent St Bernards! And how he scorns the snobs and philistines — Sir Gorgius Midas and Sir

Pompey Bedell, Grigsby and Cadby, Soapley and ToadsonI How merciless is his ridicule of the aesthetes of the 'eighties — Maudle and Postlethwaite and Mrs Cimabue Brown! Even to Mrs Ponsonby de Tomkyns, his most conspicuous creation, his satire is scarcely tempered, despite her prettiness. He shows up unsparingly all her unscrupulous little ways, all her cynical, cunning little wiles. Like Leech, he revelled in the lighter aspects of life — the humours of the nursery, the drawing-room, the club, the gaieties of the country house and the seaside — without being blind to the tragic and dramatic. Just as Leech could rise to the height of the famous cartoon " General Fevrier turned Traitor," so it was Du Maurier who inspired Tenniel in that impressive drawing on the eve of the Franco-German War, in which the shade of the great Napoleon is seen warning back the infatuated emperor from his ill-omened enterprise. In his tender drawings in Once a Week, also, and in his occasional excursions into the grotesque in Punch, such as his picture of " Old Nickotin stealing away the brains of his devotees," he has given ample proof of his faculty for moving and impressive art. The technique of Du Maurier's work in the 'eighties and the 'nineties, though to the average man it seems a marvel of finish and dexterity, is considered by artists a falling off from what was displayed in some of his earlier Punch drawings, and especially in his contributions to the Cornhill Magazine and Once a Week. His later work is undoubtedly more mannered, more " finicking," less simple, less broadly effective. But it is to his fellow-craftsmen only and to experts that this is noticeable.

A quaint tribute has been paid to the literary talent shown in Du Maurier's inscriptions to his drawings by Mr F. Anstey (Guthrie), author of Vice Versa, and Du Maurier's colleague on the staff of Punch. " In these lines of letterpress," says Mr Anstey, "he has brought the art of precis-writing to perfection." They are indeed singularly concise and to the point. It is the more curious, therefore, to note that in his novels, and even in his critical essays, Du Maurier reveals very different qualities: the precis-writer has become an improvisatore, pouring out his stories and ideas in full flood, his style changing with every mood — by turn humorous, eloquent, tender, gay, sometimes merely " skittish," sometimes quite solemn, but never for long; some- times, again, breaking into graceful and haunting verse. He writes with apparent artlessness; but, in his novels at least, on closer examination, it is found that he has in fact exerted all his ingenuity to give them — what such flagrantly untrue tales most require — verisimilitude. It is hard to say which of the three stories is the more impossible: that of Trilby, the tone-deaf

artist's model who becomes a prima donna, that of Barty Josselin and his guardian angel from Mars, or that of the dream-existence of Peter Ibbetson and the duchess of Towers. They are all equally preposterous, and yet plausible. The drawings are cunningly made to serve the purpose of evidence, circumstantial and direct. These books cannot be criticized by the ordinary canons of the art of fiction. They are a genre by themselves, a blend of unfettered day-dream and rose-coloured reminiscence. For the dramatic version of Trilby by Mr Paul Potter Du Maurier would accept no credit. The play was produced in 1895 by

Herbert Beerbohm Tree, at the Haymarket, with immense popular success.

Some striking examples of Du Maurier's work for Once a Week and the Cornhill Magazine are included in Gleeson White's English Illustrators of the Sixties. The following is a list of the chief works which he illustrated: Foxe's Book of Martyrs (1865) ; Mrs. Gaskell's Wives and Daughters (1866); Jerrold's Story of a Feather (1867); Owen Meredith's Lucile (1868); The Book of Drawing-room Plays, by H. Dalton (1868); Sooner or Later, by C. A. G. Brooke (1868); Thackeray's Esmond (1869 and 1879), and Ballads (1879) ; Misunder- stood, by Florence Montgomery (1874) ; Round about the Islands, by C. W. Scott (1874); Hurlock Chase, by G. E. Sargent (1876); Songs of many Seasons, by J. Browne (in collaboration) (1876); Pegasus Re-saddled, by H. C. Pennell (1877) ; Ingoldsby Legends (in colla- boration), by R. Barham (1877); Prudence, by L. C. Lillie (1882); As in a Looking-glass, by F. C. Phillips (1889); Luke Ashleigh, by A. Elwes (1891) ; and his own three novels, which appeared serially in Harper's Magazine: Peter Ibbetson (1892); Trilby (1894); The Martian (1897), and published after his death. In 1897 also there was published, under the title English Society, with an introduction by W. D. Howells, a collection of full-page drawings which he had contributed regularly to Harper's Magazine.

Some of his Punch drawings have been reproduced also in The Collections of Mr Punch (1880) ; Society Pictures from Punch (1890) ; A Legend of Camelot (1890). To his Social Pictorial Satire (1890) reference has been made. He contributed two essays upon book illustration to the Magazine of Art (1890). See also the Magazine of Art for 1892, for an article upon his work by W. Delaplaine Scull, with illustrations. Other volumes containing information about his life and work are: The History of Punch, by M. H. Spielmann; In Bohemia with Du Maurier, by Felix Moscheles; Henry James's " Du Maurier and London Society," Century

Magazine (1883); and " Du Maurier," Harper's Magazine (September 1897, June 1899). See also Ruskin's Art of England, Lecture 5, Pennell's Pen- Drawing and Pen-Draughtsmen, and Muther's Modern Painting vol. ii. (F. W. W.)

DUMBARTON, a royal, municipal and police burgh, seaport, and county town of Dumbartonshire, Scotland, situated on the river Leven, near its confluence with the Clyde, 155 m. W. by N. of Glasgow by the North British and Caledonian railways. Pop. (1891) 17,625; (1901) 19,985. TheAlcluith(" hill of the Clyde ") of the Britons, and Dunbreatan (" fort of the Britons ") of the Celts, it was the capital of the district of Strathclyde. Here, too, the Romans had a naval station which they called Theodosia. Although thus a place of great antiquity, the history of the town practically centres in that of the successive fortresses on the Rock of Dumbarton, a twin-peaked mount, 240 ft. high and a mile in circumference at the base. The fortress was often besieged and sometimes taken, the Picts seizing it in 736 and the Northmen in 870, but the most effectual surprise of all was that accom- plished, in the interests of the young King James VI., by Thomas Crawford of Jordanhill on March 31, 1571. The castle was held by Queen Mary's adherents, and as it gave them free com- munication with France, its capture was deemed essential. Crawford decided to climb the highest point, concluding that, owing to its imagined security, it would be carelessly guarded. Favoured with a dark and foggy night the party of 150 men and a guide reached the first ledge of rock undiscovered. In scaling the secoiid precipice one of the men was seized with an epileptic fit on the ladder. Crawford bound him to the ladder and then turned it over and was thus enabled to ascend to the summit. At this moment the alarm was given, but the sentinel and the sleepy soldiers were slain and the cannon turned on the garrison. Further resistance being useless, the castle was surrendered. During the governorship of Sir John Menteith, William Wallace was in 1305 imprisoned within its walls before he was removed to London. The higher of the two peaks is known as Wallace's seat, a tower, perhaps the one in which he was incarcerated, being named after him. On the portcullis gateway may still be seen rudely carved heads of Wallace and his betrayer, the latter with his finger in his mouth. Queen Mary, when a child, resided in the castle for a short time. It is an ugly barrack -like structure, defended by a few obsolete guns, although by the Union Treaty it is one of the four fortresses that must be maintained. The rock itself is basalt, with a tendency to columnar formation, and some parts of it have a magnetic quality.

The town arms are the elephant and castle, with the motto Fortitudo

et fidelitas. Dumbarton was of old the capital of the

earldom of Lennox, but was given up by Earl Maldwyn to Alexander II., by whom it was made a royal burgh in 1221 and declared to be free from all imposts and burgh taxes. Later sovereigns gave it other privileges, and the whole were finally confirmed by a charter of James VI. It had the right to levy customs and dues on all vessels on the Clyde between Loch Long and the Kelvin. " Offers dues " on foreign ships entering the Clyde were also exacted. In 1700 these rights were transferred to Glasgow by contract, but were afterwards vested in a special trust created by successive acts of parliament.

Most of the town lies on the left bank of the Leven, which almost converts the land here into a peninsula, but there is communication with the suburb of Bridgend on the right bank by a five-arched stone bridge, 300 ft. long. The public buildings include the Burgh Hall, the academy (with a graceful steeple), the county buildings, the Denny Memorial, a Literary and a Mechanics' institute, Masonic hall, two cottage hospitals, a fever hospital, a public library and the combination poorhouse. There are two public parks — Broad Meadow (20 acres), part of ground reclaimed in 1859, and Lev'engrove (32 acres), presented to the corporation in 1885 by Peter Denny and John McMillan, two ship- builders who helped lay the foundation of the town's present prosperity. The old parish kirkyard was closed in 1856, but a fine cemetery was constructed in its place outside the town. Dum- barton is controlled by a provost and a council. With Port- Glasgow, Renfrew, Rutherglen and Kilmarnock it unites in returning one member to parliament. The principal industry is shipbuilding. The old staple trade of the making of crown glass, begun in 1777, lapsed some 70 years afterwards when the glass duty was abolished. There are several great engineering works, besides iron and brass foundries, saw-mills, rope-yards and sail-making works. There are quays, docks and a harbour at the mouth of the Leven, and a pier for river steamers runs out from the Castle rock. The first steam navigation company was established in Dumbarton in 1815, when the " Duke of Welling- ton " (built in the town) plied between Dumbarton and Glasgow. But it was not till 1844, consequent on the use of iron for vessels, that shipbuilding became the leading industry.

DUMBARTONSHIRE, a western county of Scotland, bounded N. by

Perthshire, E. by Stirlingshire, S.E. by Lanarkshire, S. by the Clyde and its estuary, and W. by Loch Long and Argyllshire. There is also a detached portion, comprising the parish of Kirkintilloch and part of that of Cumbernauld enclosed between the shires of Stirling and Lanark. This formerly formed part of Stirlingshire, but was annexed in the 14th century when the earl of Wigtown, to whom it belonged, became heritable sheriff of Dumbartonshire. Dumbartonshire has an area of 170,762 acres or 267 sq. m. The north-west and west are mountainous, the chief summits being Ben Vorlich (3092 ft.), Ben Vane (3004), Doune Hill (2409), Beinn Chaorach (2338), Beinn a Mhanaich (2328), Beinn Eich (2302), Cruach ant Suthein (2244), Ben Reoch (2168), Beinn Tharsuinn (2149), Beinn Dubh (2018), Balcnock (2092) and Tullich Hill (2075). In the south are the Kilpatrick Hills, their highest points being Duncomb and Fynloch (each 13 13 ft.). The Clyde, the Kelvin and the Leven are the only rivers of importance. The Leven flows out of Loch Lomond at Balloch and joins the Clyde at Dumbarton after a serpentine course of about 7 m. Most of the other streams are among the mountains, whence they find their way to Loch Lomond, the principal being the Inveruglas, Douglas, Luss, Finlas and Fruin. Nearly all afford good sport to the angler. Of the inland lakes by far the largest and most magnificent is Loch Lomond (q.v.). The boundary between the shires of Dumbarton and Stirling follows an imaginary line through the lake from the mouth of Endrick Water to a point opposite the isle of Vow, giving about two-thirds of the loch to the former county. Loch Sloy on the side of Ben Vorlich is a long, narrow lake, 812 ft. above the sea amid wild scenery. From its name the Macfarlanes took their slogan or war-cry. The shores of the Gareloch, a salt-water inlet 65 m. long and 1 m. wide, are studded with houses of those whose business lies in Glasgow. Garelochhead has grown into a favourite summer

resort; Clynder is famed for its honey. The more important salt-water inlet, Loch Long, is 17 m. in length and varies in width from 2 m. at its mouth to about 5 a mile in its upper reach. It is the dumping-place for the dredgers which are constantly at work preserving the tide-way of the Clyde from Dumbarton to the Broomielaw— its use for this purpose being a standing grievance to anglers. The scenery on both shores is very beauti- ful. Only a mile separates Garelochhead from Loch Long, and at Arrochar the distance from Tarbet on Loch Lomond is barely if m. Nearly all the glens are situated in the Highland part of the shire, the principal being Glen Sloy, Glen Douglas, Glen Luss and Glen Fruin. The last is memorable as the scene of the bloody conflict in 1603 between the Macgregors and the

Colquhouns, in which the latter were almost exterminated. It was this savage encounter that led to the proscription of the Macgregors, including the famous Rob Roy.

Geology. — Like the other counties along the eastern border of the Highlands, Dumbartonshire is divided geologically into two areas, the boundary between the two being defined by a line extending from Rossdhu on Loch Lomond south-west by Row and Roseneath to Kilcreggan. The mountainous region lying to the north of this line is composed of rocks belonging to the metamorphic series of the Eastern Highlands and representing several of the groups met with in the adjoining counties of Perth and Argyll. Immediately to the north of the Highland border the Aberfoyle slates and grits appear, repeated by isoclinal folds trending north-east and south- west and dipping towards the north-west. These are followed by a great development of the Ben Ledi grits and schists — the repre- sentatives of the Beinn Bheula grits and ablite schists of Argyllshire, which, by means of rapid plication, spread over the high grounds northwards to beyond the head of Loch Lomond. Along the line of section between Luss and Ardlui important evidence is obtained of the gradual increase of metamorphism as we proceed northwards from the Highland border. The original clastic characters of the strata are obscured and the rocks between Arrochar and Inverarnan in Glen Falloch merge into quartz-biotite gneisses and albite schists. In the extreme north between Ardlui and the head of Glen Fyne in Argyllshire there is a large development of plutonic rocks piercing the Highland schists and producing marked contact metamorphism. These range from acid to ultrabasic types and include granite, augite-diorite, picrite and serpentine. On the hill-slopes to the west of Ardlui and Inverarnan the diorite appears, while farther west, between the watershed and Glen Fyne, there is a large mass of granite. Boulders of plutonic rocks from this area have been widely distributed by the ice during the glacial period. Immediately to the south of the Highland border line there is a belt of Upper Old Red Sandstone strata which stretches from the shores of Loch Lomond westwards by Helensburgh and Roseneath Castle to Kil- creggan. These sandstones and conglomerates are succeeded by the sandstones, shales, clays and cementstones at the base of the Carboniferous formation which occupy a narrow strip between Loch Lomond and Gareloch and are cut off by a fault along their south-east margin. East of this dislocation there is a belt of Lower Old Red Sandstone strata extending from the mouth of the Endrick Water south-westwards by Balloch to the shore of the Clyde west of Cardross, which is bounded on either side by the upper division of that system. Still farther east

beyond Dumbarton the Upper Old Red Sandstone is again surmounted by the representatives of the Cementstone group, which are followed by the lavas, tuffs and agglomerates of the Kirkpatrick Hills, intercalated in the Calciferous Sandstone series. Here the terraced features of the volcanic plateau, produced by the denudation of the successive floys is well displayed. Eastwards by Kilpatrick and Bearsden to the margin of the county- near Maryhill the rocks of Calciferous Sandstone age are followed in normal order by the Carboniferous Limestone series ; the Hurlet Limestone and Hurlet Coal of the lower limestone group being prominently developed. In the detached portion of the county between Kirkintilloch and Cumbernauld there is an important coalfield embracing the seams in the middle or coal-bearing group of the Carboniferous Limestone series. In this county there are several striking examples of the east and west dolerite dykes which are probably of late Carboniferous age. These traverse the High- land schists between Loch Long and Loch Lomond, the Old Red Sandstone area between Alexandria and the Blane Valley, and the Carboniferous tract near Cumbernauld. The ice which radiated from the Dumbartonshire Highlands moved south-east and east towards the central plain of Carboniferous rocks. Hence the boulder clay of the lowland districts is abundantly charged with boulders of schistose grit, slate, gneiss and granite derived from areas lying far to the north-west. Along the shores of the Clyde the broad terraced features indicate the limits of successive raised beaches.

Climate and Agriculture. — There is excessive rainfall in the Highlands, averaging 53 in. at Helensburgh up to nearly 70 in. in the north. The temperature, with an average for the year

of 475 F., varies from 38 in January to 58° in July, but in the valleys the heat in midsummer is often oppressive. The pre- vailing winds are from the west and south-west, but easterly winds are frequent in the spring. Frosts are seldom severe, and, except on the mountains, snow never lies long. The arable lands extend chiefly along the Clyde and the Leven, and are composed of rich black loam, gravelly soil and clay. From the proximity to Glasgow and other large towns the farmers have the double advantage of good manure and a ready market for all kinds of stock and produce, and under this stimulus high farming and dairying on a considerable scale prosper. Black-faced sheep and Highland cattle are pastured on the hilly lands and

Cheviots and Ayrshires on the low grounds. Oats and wheat are the principal cereals, but barley and potatoes in abundance, and turnips and beans are also grown.

Other Industries. — Turkey-red dyeing has long been the distinctive industry of the county. The water of the Leven being not only constant but also singularly soft and pure, dyers and bleachers have constructed works at many places in the Vale of Leven. Bleaching has been carried on since the early part of the 1 8th century, and cotton-printing at Levenfield dates from 1768. The establishments at Alexandria, Bonhill, Jamestown, Renton and other towns for all the processes connected with the bleaching, dyeing and printing of cottons, calicoes and other cloths, besides yarns, are conducted on the largest scale. At Milton the first power-loom mill was erected. The engineering works and shipbuilding yards at Clydebank are famous, and at Dumbarton there are others almost equally busy. The extensive Singer sewing-machine works are at Kilbowie, and the Clyde Trust barge-building shops are at D almuir. There are distilleries and breweries at Duntocher, Bowling, Dumbarton, Milngavie (pronounced Milguy) and other towns. In fact the Vale of Leven and the riverside towns east of Dumbarton form a veritable hive of industry. In the detached portion, Kirkintilloch and Cumbernauld are seats of great activity in the mining of coal and ironstone, and there are besides chemical works and saw- mills in the former town. There is some fishing at Helensburgh and along the Gareloch.

The populous districts of the county are served almost wholly by the North British railway. From Helensburgh to Inverarnan the Highland railway runs through scenery of the most diversified and romantic character. The Caledonian railway has access to Balloch from Glasgow, and its system also traverses the detached portion. Portions of the Forth and Clyde Canal, which connects with the Clyde at Bowling, and was opened for traffic in 177s, pass through the shire. There is regular steamer communication between Glasgow and the towns and villages on the coast, and on Loch Lomond steamers call at several points between Balloch and Ardlui.

Population and Government. — The population of Dumbarton- shire in 1891 was 98,014 and in 1901 113,865, of whom 3101 spoke both Gaelic and English and 14 Gaelic only. The principal towns, with populations in 1901, are — Alexandria (8007), Bonhill (3333)> Clydebank (21,591), Dumbarton (19,985), Duntocher (2122), Helensburgh (8554), Jamestown (2080), Kirkintilloch (11,681), Milngavie (3481), New Kilpatrick or Bearsden (2705) and

Renton (5067). The county returns one member to parlia- ment. Dumbarton, the county town, is the only royal burgh, and belongs to the Kilmarnock group of parliamentary burghs. The municipal and police burghs are Clydebank, Cove and Kil- creggan, Dumbarton, Helensburgh, Kirkintilloch and Milngavie. Dumbartonshire forms a sheriffdom with the counties of Stirling and Clackmannan, and there is a resident sheriff-substitute at Dumbarton, who sits also at Kirkintilloch. The shire is under school-board jurisdiction, but there are several voluntary schools, besides St Peter's Roman Catholic College in New Kilpatrick. Science, art and technical classes are subsidized out of the whole of the county " residue " and, if necessary, out of part of the burgh " residue " also. Agricultural lectures and the travelling expenses and fees of county students at Glasgow Technical College are also paid for from the same source.

History. — The country is rich in antiquities connected with

the aborigines and also with the Romans. The Caledonians and Picts have left their traces in rude forts and tumuli, but of greater interest are remains in several places of the wall of Antoninus, built from the Forth to the Clyde, and running along the north of the detached portion of the shire and through the south-eastern corner of the county to Kilpatrick. Other Roman relics have been found at Duntocher, Cumbernauld and elsewhere. The shire forms part of the old Scottish territory of, Lennox (Levenachs, " fields of the Leven "), which embraced the Vale of the Leven and the basin of Loch Lomond, or all modern Dum- bartonshire, most of Stirling and parts of the shires of Renfrew and Perth. It gave the title of the earldom created in n 74 by William the Lion and of the dukedom conferred by Charles II. on his natural son, Charles, duke of Richmond and Lennox. In 1702 the Lennox estates were sold to the marquis of Montrose. The captive Wallace was conveyed in chains to Dumbarton Castle, whence he was taken to his death in London. Robert Bruce is said to have mustered his forces at Dullatur prior to the battle of Bannockburn, and died at Cardross Castle in 1329. The Covenanters in their flight from the bloody field of Kilsyth, where in 1645 Montrose had defeated them with great slaughter, made their way through the southern districts. When the Forth and Clyde Canal was being excavated swords, pistols, and other weapons dropped by the fugitives were found at Dullatur, together with skeletons of men and horses. In the Highland country the clans of Macgregor and Macfarlane made their home in the fastnesses, whence they descended in raids upon the cattle, the goods and sometimes the persons of their Lowland neighbours.

See J. Irving, History of Dumbartonshire (Dumbarton, i860) ; Book of Dumbartonshire (Edinburgh, 1879) ; Sir W. Fraser, Chiefs of Colquhoun (Edinburgh, 1869) ; The Lennox (Edinburgh, 1874) ; D. Macleod, Castle and Town of Dumbarton (Dumbarton, 1877) ; Dumbarton (Dumbarton, 1884); Dumbarton: Ancient and Modern (Glasgow, 1893); Ancient Records of Dumbarton (Dumbarton, 1896) ; J. Glen, History of Dumbarton (Dumbarton, 1876).

DUMB WAITER, 1 a small oblong or circular table to hold reserve plates, knives and forks, and other necessaries for a meal. This piece of furniture originated in England towards the end of the 1 8th century, and some exceedingly elegant examples were designed by Sheraton and his school. They were usually circular, with three diminishing tiers, sometimes surrounded by a continuous or interrupted pierced gallery in wood or brass. The smaller varieties are now much used in England for the dis- play of small silver objects in drawing-rooms.

DUM-DUM, a town and cantonment in British India at the head of an administrative subdivision in the district of the Twenty-four Parganas, in the presidency division of Bengal, with a station on the Eastern Bengal railway, 45 m. N.E. of Calcutta. It was the headquarters of the Bengal artillery from 1783 to 1853, when they were transferred to Meerut as a more central station; and its possession of a cannon foundry and a percussion-cap factory procured for it the name of the Woolwich of India. The barracks — still occupied by small detachments — are brick-built and commodious; and among the other buildings are St Stephen's Protestant church, a Roman Catholic chapel, a European and native hospital, a large bazaar and an English school. The population in 1901 of North Dum-Dum was 9916, and of South Dum-Dum 10,904. It was at Dum-Dum that the treaty of 1757 was signed by which the nawab of Bengal ratified the privileges of the English, allowed Calcutta to be fortified, and bestowed freedom of trade. On the 7th of December 1908 a serious explosion occurred by accident at the Dum-Dum arsenal, resulting in death or serious injury to about 50 native workmen.

At the Dum-Dum foundry the hollow-nosed " Dum-Dum " (Mark IV.) bullets were manufactured, the supposed use of which by the British during the Boer War caused considerable comment in 1899. Their peculiarity consisted in their expanding on

1 The term " dumb," strictly meaning mute or destitute of speech (see Deaf and Dumb), is applied in this and other analogous cases (e.g.

dumb-bell, dumb-barge) as connoting the absence of some normal capacity in the term with which it is associated.

impact and thus creating an ugly wound, and they had been adopted in Indian frontier fighting owing to the failure of the usual type of bullets to stop the rushes of fanatical tribesmen. They were not, in fact, used during the Boer War. Other and improvised forms of expanding bullet were used in India and the Sudan, the commonest methods of securing expansion being to file down the point until the lead core was exposed and to make longitudinal slits in the nickel envelope. All these forms of bullet have come to be described colloquially, and even in diplomatic correspondence, as " dum-dum bullets," and their alleged use by Russian troops in the Russo-Japanese War of 1 904- 1 905 formed the subject of a protest on the part of the Japanese government. The proposals made at the second Hague Conference to forbid the use of these bullets by international agreement were agreed to by all the powers except Great Britain and the United States.

DUMESNIL, MARIE FRANfOISE (1713-1803), French actress, whose real name was Marchand, was born in Paris on the 2nd of January 17 13. She began her stage career in the provinces, whence she was summoned in 1737 to make her dibut at the Comedie Francaise as Clytemnestre in Iphigenie en Tauride. She at once came into the front rank, playing Cleopatre, Phedre, Athalie and Hermione with great effect, and when she created Merope (1743) Voltaire says that she kept the audience in tears for three successive acts. She retired from the stage in 1776, but lived until the 20th of February 1803. Her rival, Clairon, having spoken ill of her, she authorized the publication of a MSmoire de Marie Framboise Dumesnil, en rSponse aux mSmoires d'Hippolyte Clairon (1800).

*DUMFRIES (Gaelic, " the fort in the copse "), a royal and parliamentary burgh and capital of the county, Dumfriesshire, Scotland. It lies on the left bank of the Nith, about 8 m. from the Solway Firth and 81 m. S.E. of Glasgow by the Glasgow & South-Western railway. Pop. (1891) 16,675; (l 9 01) *7,°79- Dumfries is beautifully situated and is one of the handsomest county towns in Scotland. The churches and chapels of the Presbyterian and other communions are, many of them, fine buildings. St Michael's (1746), a stately pile, was the church which Robert Burns attended, and in*

its churchyard he was buried, his remains being transferred in 1815 to the magnificent mausoleum erected in the south-east corner, where also He his wife, Jean Armour, and several members of his family. The Gothic church of Greyfriars (1866-1867) occupies the site partly of a Franciscan monastery and partly of the old castle of the town. On the site of St Mary's (1837-1839), also Gothic, stood the small chapel raised by Christiana, sister of Robert Bruce, to the memory of her husband, Sir Christopher Seton, who had been executed on the spot by Edward I. St Andrew's (1811-1813), in the Romanesque style, is a Roman Catholic church, which also serves as the pro-cathedral of the diocese of Galloway.

Besides numerous schools, there is an admirably equipped Academy. The old infirmary building is now occupied by St Joseph's College, a commercial academy of the Marist Brother- hood, in connexion with which there is a novitiate for the training of members of the order for missionary service at home or abroad. In the middle of the market-place stands the old town hall, with red tower and cupola, known from its situation as the Mid Steeple, built by Tobias Bachup of Alloa (1708). The new town hall and post-office are near the uppermost bridge. The county buildings, in Buccleuch Street, are an imposing example of the Scots Baronial style. To Mr Andrew Carnegie and Mr and Mrs M'Kie of Moat House was due the free library. The charitable institutions include Moorhead's hospital (1753) for reduced householders; the Dumfriesshire and Galloway royal infirmary, dating from 1778, but now housed in a fine edifice in the northern Italian style; the Crichton royal institution for the insane, founded by Dr James Crichton of Friars Carse, and supple- mented in 1848 by the Southern Counties asylum; the new infirmary, a handsome building ; the contagious diseases hospital, the industrial home for orphan and destitute girls and a nurses' home. The Theatre Royal, reconstructed in 1876, dates

from 1787. Burns composed several prologues and epilogues for some of its actors and actresses. Among other public buildings are the assembly rooms, St George's hall, the volunteer drill hall, and the Crichton Institution chapel, completed at a cost of £30,000. The corporation owns the water supply, public baths and wash-houses and the gasworks. In front of Greyfriars church stands a marble statue of Burns, unveiled in 1882, and there is also a monument to Charles, third duke of Queensberry. The Nith is crossed by three bridges and the railway viaduct. The bridge, which is used for vehicular traffic, dates from 1790- 1794. Devorgilla's bridge, below it, built of stone in 1280, originally consisted of nine arches (now reduced to three), and is reserved in spite of its massive appearance

for foot passengers only, as is also the suspension bridge opened in 1875.

Dumfries, Annan, Kirkcudbright, Lochmaben and Sanquhar— the " Five Carlins " of Burns's Election Ballads — combine to return one member to Parliament. As a parliamentary burgh Dumfries includes Maxwelltown, on the opposite side of the river, which otherwise belongs to Kirkcudbrightshire.

The leading industries comprise manufactures of tweeds, hosiery, clogs, baskets and leather, besides the timber trade, nursery gardening and the making of machinery and iron implements. Dumfries markets for cattle and sheep, held weekly, and for horses, held five times annually, have always ranked with the best, and there is also a weekly market for pork during the five months beginning with November. The sea-borne trade is small compared with what it was before the railway came.

Although Dumfries was the site of a camp of the Selgovian Britons, nothing is known of its history until long after the withdrawal of the Romans. William the Lion (d. 1214) made it a royal burgh, but the oldest existing charter was granted by Robert II. in 1395. The town became embroiled in the struggles that ended in the independence of Scotland. It favoured the claims to the throne, first of John Baliol — whose mother Devor- gilla, daughter of Alan, lord of Galloway, had done much to promote its prosperity by building the stone bridge over the Nith — and then of the Red Comyn, as against those of Robert Bruce, who drew his support from Annandale. When Edward I. besieged Carlaverock Castle in 1300 he lodged in the Franciscan monastery, which, six years later (10th of February 1306), was the scene of the murder of Comyn (see Robert the Bruce). From this time to nearly the close of the 16th century the burgh was exposed to frequent raids, both from freebooters on the English side and from partisans of the turbulent chiefs — Douglases, Maxwells, Johnstones. The Scottish sovereigns, however, did not wholly neglect Dumfries. James IV., James V., Mary and her son each visited it. James VI. was royally enter- tained on the 3rd of August 1617, and afterwards presented the seven incorporated trades with a silver gun to encourage the craftsmen in the practice of musketry. The competition for this cannon-shaped tube, now preserved in the old town hall, took place annually — with a great festival every seven years — until 1831. John Mayne (1759-1836), a native of Dumfries, com- memorated the gathering in an excellent humorous poem called " The Siller Gun." Though in sympathy with the Covenanters, the town was the scene of few incidents comparable to those which took place in

the northern parts of the shire. The Union with England was so unpopular that not only did the provost vote against the measure in the Scottish parliament, but the articles were burned (20th of November 1706) at the Market Cross by a body of Cameronians, amidst the approving cheers of the inhabitants. In both 1715 and 1745 Dumfries remained apathetic. Prince Charles Edward indeed occupied the town, holding his court in a building afterwards known as the Commercial Hotel, levying £2000 tribute money and re-quisitioning 1000 pairs of shoes for his Highlanders, by way of punishing its contumacy. But, in a false alarm, the Jacobites suddenly retreated, and a few years later the town was reimbursed by the State for the Pretender's extortions. The most interesting event in the history of Dumfries is its connexion with Burns, for the poet resided here from December 1791 till his death on the 21st of July 1796. The house in which he died is still standing.

The picturesque ruins of Carlaverock Castle — the " Elian- . gowan " of Guy Mannering — are 8 m. to the south. Above the entrance are the arms of the Maxwells, earls of Nithsdale, to whose descendant, the duchess of Norfolk, it belongs. The castle, which is in an excellent state of preservation, is built of red sandstone, on the site of a fortress supposed to have been erected in the 6th century, of which nothing now remains. In plan it is a triangle, protected by a double moat, and has round towers at the angles. Part of the present structure is believed to date from 1220 and once sheltered William Wallace. It withstood Edward I.'s siege in 1300 for two days, although garrisoned by only sixty men. In the troublous times that followed it often changed hands. In 1570 it fell into disrepair, but was restored, and in 1641 was besieged for the last time by the Covenanters.

A mile and a half to the north-west of Dumfries lies Lincluden Abbey, " an old ruin," says Burns, " in a sweet situation at the confluence of the Cluden and the Nith." Originally the abbey was a convent, founded in the 12 th century, but converted two centuries later into a collegiate church by Archibald, earl of Douglas. The remains of the choir and south transept disclose rich work of the Decorated style.

DUMFRIESSHIRE, a border county of Scotland, bounded S. by the Solway Firth, S.E. by Cumberland, E. by Roxburgh- shire, N. by the shires of Lanark, Peebles and Selkirk, and W. by Ayrshire and

Kirkcudbrightshire. Its area is 686,302 acres or 1072 sq. m. The coast line measures 21 m. The county slopes very gradually from the mountainous districts in the north down to the sea, lofty hills alternating in parts with stretches of tableland or rich fertile holms. At various points within a few miles of the Solway are tracts of moss land, like Craigs Moss, Lochar Moss and Longbridge Moor in the west, and Nutberry Moss in the east, all once under water, but now largely reclaimed. The principal mountains occur near the northern boundaries, the highest being White Coomb (2695 ft.), Hart Fell (2651), Saddle Yoke (2412), Swatte Fell (2389), Lowther Hills (2377), Queensberry (2285), which gives his secondary title to the duke of Buccleuch and the title of marquess to a branch of the house of Douglas, and Ettrick Pen (2269). The three longest rivers are the Nith, the Annan and the Esk, the basins of which form the great dales by which the county is cleft from north to south— Nithsdale, Annandale and Eskdale. From the point where it enters Dumfriesshire, 16 m. from its source near Enoch Hill in Ayrshire, the course of the Nith is mainly south- easterly till it enters the Solway, a few miles below Dumfries. Its total length is 65 m., and its chief affluents are, on the right, the Kello, Euchan, Scar, Cluden and Cargen, and, on the left, the Crawick, Carron and Campie. The Annan rises near the Devil's Beef Tub, a remarkable chasm in the far north, and after flowing about 40 m., mainly in a southerly course, it enters the Solway at Bamkirk headland. It receives, on the right, the Kinnel (reinforced by the Ae), and, on the left, the Moffat, the Dryfe and the Milk. From the confluence of the White Esk (rising near Ettrick Pen) and the Black Esk (rising near Jock's Shoulder, 1754 ft.) the Esk flows in a gradually south-easterly direction till it crosses the Border, whence it sweeps to the S.W. through the extreme north-western territory of Cumberland and falls into the Solway. Of its total course of 42 m., 12 belong to the White Esk, 20 are of the Esk proper on Scottish soil and 10 are of the stream in its English course. On the right the Wauchope is the chief affluent, and on the left it receives the Megget, Ewes, Tarras and Line — the last being an English tributary. Other rivers are the Lochar (18 m.), the Kirtle (17) and the Sark (12), all flowing into the Solway. For one mile of its course the Esk, and for 7 m. of its course the Sark, form the boundaries between Dumfriesshire and Cumberland. Loch Skene in the north (1750 ft. above the sea), the group of lochs around Lochmaben, and Loch Urr in the west, only part of which belongs to Dumfriesshire, are the principal lakes. There are few glens so named in the shire, but the passes of Dalveen, Enterkin and Menock, leading up from Nithsdale to the Lowther and other hills, yield to few glens in Scotland in the wild grandeur of their scenery. For part of the way

Enterkin Pass runs

between mountains rising sheer from the burn to a height of nearly 2000 ft. Loch Skene finds an outlet in Tail Burn, the water of which at a short distance from the lake leaps from a height of 200 ft. in a fine waterfall, known as the Grey Mare's Tail. A much smaller but picturesque fall of the same name, also known as Crichope Linn, occurs on the Crichope near Thornhill. Mineral waters are found at Moffat, Hartfell Spa, some three miles farther north, Closeburn and Brow on the Solway.

Geology. — The greater portion of the county of Dumfries belongs to the Silurian tableland of the south of Scotland which contains representatives of all the divisions of that system from the Arenig to the Ludlow rocks. By far the largest area is occupied by strata of Tarannon and Llandovery age which cover a belt of country from 20 to 25 m. across from Drumlanrig Castle in the north to Torthorwald in the south. Consisting of massive grits, sometimes conglomeratic, greywackes, flags and shales, these beds are repeated by innumerable folds frequently inverted, striking N.E. and S.W. and usually dipping towards the N.W. In the midst of this belt there are lenticular bands of older strata of Arenig, Llandeilo, Caradoc and Llandovery age composed of fine sediments such as cherts, black and grey shales, white clays and flags, which come to the surface along anticlinal folds and yield abundant graptolites characteristic of these divisions. These black shale bands are typically developed in Moffatdale ; indeed the three typical sections chosen by Professor Lapworth to illustrate his three great groups — (1) the Glenkill shales (Upper Llandeilo), (2) the Hartfell shales (Caradoc), (3) Birkhill shales (Lower Llandovery) — occur respectively in the Glenkill Burn north of Kirkmichael, on Hartfell and in Dobbs Linn near St Mary's Loch in the basin of the river Annan. In the extreme N.W. of the county between Drumlanrig Castle and Dalveen Pass in the S. and the Spango and Kello Waters on the N., there is a broad development of Arenig, Llandeilo and Caradoc strata, represented by Radiolarian cherts, black shales, grits, con glomerates, greywackes and shales which rise from underneath the central Tarannon belt and are repeated by innumerable folds. In the cores of the arches of Arenig cherts there are diabase lavas, tuffs and agglomerates which are typically represented on Bail Hill E. of Kirkconnel. Along the southern margin of the Tarannon belt, the Wenlock and Ludlow rocks follow in normal order, the boundary between the two being defined by a line extending from the head of the Ewes Water in Eskdale, S.W. by Lockerbie to Mouswald. These consist of greywackes, flags and shales with bands of dark graptolite shales,

the finer sediments being often well cleaved. They are like- wise repeated by inverted folds, the axial planes being usually inclined to the S.E. The Silurian tableland in the N.W. of the county is pierced by intrusive igneous rocks in the form of dikes and bosses, which are regarded as of Lower Old Red Sandstone age. Of these, the granite mass of Spango Water, N.E. of Kirkconnel, is an excellent example. Along the N.W. margin of the county, on the N. side of the fault bounding the Silurian tableland, the Lower Old Red Sandstone occurs, where it consists of sandstones and con- glomerates associated with contemporaneous volcanic rocks. The Upper Old Red Sandstone forms a narrow strip on the south side of the Silurian tableland, resting unconformably on the Silurian rocks and passing upwards into the Carboniferous formation. It stretches from the county boundary E. of the Ewes Water, S.W. by Langholm to Birrenswark. Along this line these Upper Red sandstones and shales are overlaid by a thin zone of volcanic rocks which point to contemporaneous volcanic action in this region at the beginning of the Carboniferous period. Some of the vents from which these igneous materials may have been discharged are found along the watershed between Liddesdale and Teviotdale in Rox- burghshire. The strata of Carboniferous age are found in three areas: (1) between Sanquhar and Kirkconnel, (2) at Closeburn near Thornhill, (3) in the district between Liddesdale and Ruthwell. In the first two instances (Sanquhar and Thornhill) the Carboniferous sediments lie in hollows worn out of the old Silurian tableland. _ In the Sanquhar basin the strata belong to the Coal Measures, and include several Valuable coal-seams which are probably the southern pro- longations of the members of this division in Ayrshire. At the S.E. limit of the Sanquhar Coalfield there are patches of the Car- boniferous Limestone series, but towards the N. these are overlapped by the Coal Measures which thus rest directly on the Silurian plat- form. At Closeburn and Barjarg there are beds of marine limestone, associated with sandstones and shales which probably represent marine bands in the Carboniferous Limestone series. The most important development of Carboniferous strata occurs between Liddesdale and Ruthwell. In the valleys of the Liddel and the Esk the following zones are represented, which are given in ascending order: (1) The Whita Sandstone, (2) the Cementstone group, (3) the Fell Sandstones, (4) the Glencartholm volcanic group, (5) Marine limestone group with Coal-seams, (6) Millstone Grit, (7) Rowanburn cOal group, (8) Byreburn coal group, (9) Red Sandstones of Canonbie yielding plants characteristic of the Upper Coal Measures. The coal- seams of the Rowanburn field have been chiefly wrought, and in view of their exhaustion bores have been sunk to prove the

beneath the red sandstone of upper Carboniferous age. From a palaeontological point of view the Glencartholm volcanic zone is of special interest, as the calcareous shale associated with the tuffs has yielded a large number of new species of fishes, decapod crustaceans, phyllopods and scorpions. The Triassic rocks rest unconformably on all older formations within the county. In the tract along the Solway Firth they repose on the folded and eroded edges of the Carboniferous strata, and when traced westwards to the Dumfries basin they rest directly on the Silurian platform. They occur in five areas, (i) between Annan and the mouth of the Esk, (2) the Dumfries basin, (3) the Thornhill basin, (4) at Locbmaben and Corn- cockle Moor, (5) at Moffat. The strata consist of breccias, false- bedded sandstones and marls, the sandstones being extensively quarried for building purposes. In the sandstones of Corncockle Moor reptilian footprints have been obtained. In the Thornhill basin there is a thin zone of volcanic rocks at the base of this series which are evidently on-the horizon of the lavas beneath the Mauch- line sandstones in Ayrshire. In the Sanquhar basin there are small outliers of lavas probably of this age and several vents filled with agglomerate from which these igneous materials in the Thornhill basin may have been derived. There are several striking examples of basalt dikes of Tertiary age, one having been traced from the Lead Hills south-east by Moffat, across Eskdalemuir to the English border.

Climate and Industries. — The climate is mild, with a mean yearly temperature of 48° F. (January, 38-5°; July, 59-5°), and the average annual rainfall is 53 ins. Towards the middle of the 18th century farmers began to raise stock for the south, and a hundred years later 20,000 head of heavy cattle were sent annually to the English markets. The Galloways, which were the breed in vogue at first, have been to a large extent replaced by shorthorns and Ayrshire dairy cattle. Sheep breeding, of later origin, has attained to remarkable dimensions, the walks in the higher hilly country being given over to Cheviots, and the richer pasture of the low-lying farms being reserved for half-bred lambs, a cross of Cheviots and Leicesters or other long-woolled rams. Pig-feeding, once important, has declined before the imports of bacon from foreign countries. Horse- breeding is pursued on a considerable scale. Grain crops, of which oats are the principal, show a downward tendency. Arable farms range from 100 acres to

300 acres, and pastoral from 300 to 3000 acres.

In general the manufactures are only of local importance and mostly confined to Dumfries and a few of the larger towns. Langholm is famous for its tweeds; breweries and distilleries are found at Annan, Sanquhar and elsewhere; some shipping is carried on at Annan and Dumfries; and the salmon fisheries of the Nith and Annan and the Solway Firth are of value.

Communications. — The Glasgow & South-Western railway from Glasgow to Carlisle runs through Nithsdale, practically following the course of the river, and lower Annandale to the Border. The Caledonian railway runs through Annandale, throwing off at Beattock a small branch to Moffat, at Lockerbie a cross-country line to Dumfries, and at Kirtlebridge a line that ultimately crosses the Solway to Bowness. From Dumfries westwards there is communication with Castle Douglas, Kirkcud- bright, Newton Stewart, Stranraer and Portpatrick. The North British railway sends a short line to Langholm from Riddings Junction in Cumberland, giving access to Carlisle and, by the Waverley route, to Edinburgh. There is also coach service between various points, as from Dumfries to New Abbey and Dalbeattie, and from Langholm to Eskdalemuir. •

Population and Government. — The population in 1891 was 74,245, and in 1901, 72,371, when there were 176 persons who spoke Gaelic and English. The chief towns are Annan (pop. in 1901, 4309), Dumfries (14,444), Langholm (3142), Lockerbie (2358) and Moffat (2153). The county returns one member to parliament. Dumfries, the county town, Annan, Lochmaben and Sanquhar are royal burghs; Dumfries forms a sheriffdom with the shires of Kirkcudbright and Wigtown, and there is a resident sheriff-substitute at Dumfries, who sits also at Annan, Langholm and Lockerbie. The shire is under school-board jurisdiction, and some of the public schools earn grants for higher education. The county council and most of the borough councils give the bulk of the " residue " grant to the county committee on secondary education, which is thus enabled,

besides assisting building schemes, to subsidize high schools, to provide bursaries and apparatus, and to carry on science and technical classes, embracing agriculture, dairying (at Kilmarnock Dairy school) and practical chemistry. There are academies at Dumfries, Annan, Moffat and other centres.

History. — The British tribe which inhabited this part of Scotland was called by the Romans Selgovae. They have left many signs of

their presence, such as hill forts in the north, stone circles (as in Dunscore and Eskdalemuir), camps (Dryfes- dale), tumuli and cairns (Closeburn), and sculptured stones (Dornock). The country around Moffat especially is rich in remains. At Holywood, near Dumfries, there stand the relic of the grove of sacred oaks from which the place derived its name, and a stone circle known locally as the Twelve Apostles. In the parish church of Ruthwell (pron. Rivvel : the " rood, or cross, well ") is preserved an ancient cross which tells in Runic characters the story of the Crucifixion. There are traces of the Roman roads which ran by Dalveen Pass into Clydesdale and up the Annan to Tweeddale, and at Birrens is one of the best- preserved examples of a Roman camp. Roman altars, urns and coins are found in many places. Upon the withdrawal of the Romans, the Selgovae were conquered by Scots from Ireland, who, however, fused with the natives. The Saxon conquest of Dumfriesshire does not seem to have been thorough, the people of Nithsdale and elsewhere maintaining their Celtic institutions up to the time of David I.

As a Border county Dumfriesshire was the scene of stirring deeds at various epochs, especially in the days of Robert Bruce. Edward I. besieged Carlaverock Castle, and the factions of Bruce (who was lord of Annandale), John Comyn and John Baliol were at constant feud. The Border clans, as haughty and hot-headed as the Gaels farther north, were always at strife. There is record of a bloody fight in Dryfesdale in 1593, when the Johnstones slew 700 Maxwells, and, overtaking the fugitives at Lockerbie, there massacred most of the remnant. These factions embroiled the dalesmen until the 18th century. The highlands of the shire afforded retreat to the persecuted Covenanters, who, at Sanquhar, published in 1680 their declaration against the king, anticipating the principles of the " glorious Revolution " by several years. Prince Charles Edward's ambition left the shire comparatively untouched, for the Jacobite sentiment made little appeal to the people.

Dumfriesshire is inseparably connected with the name of Robert Burns, who farmed at Ellisland on the Nith for three years, and spent the last five years of his life at Dumfries. Thomas Carlyle was born at Ecclefechan, in a house still standing, and was buried beside his parents in the kirkyard of the old Secession church (now the United Free). His farm of Craigen- puttock was left to Edinburgh University in order to found the John Welsh bursaries in classics and mathematics.

See W. M'Dowall, History of the Burgh of Dumfries (Edinburgh, 1887) ; Sir Herbert Maxwell, Dumfries and Galloway (Edinburgh

and London, 1897) ; J. Macdonald and J. Barbour, Birrens and its Antiquities (Dumfries, 1897) ; Sir William Fraser, The Book of Carlaverock (Edinburgh, 1873); The Douglas Book (Edinburgh, 1885) ; The Annandale Book (Edinburgh, 1894) ; G. Neilson, Annandale under the Bruces (Annan, 1887) ; C. T. Ramage, Drumlanrig Castle and the Douglases (Dumfries, 1876).

DUMICHEN, JOHANNES (1833-1894), German Egyptologist, was born near Grossglogau. He studied philology and theology in Berlin and Breslau. Subsequently he became a pupil of Lepsius and Brugsch, and devoted himself to the study of Egyptian inscriptions. He travelled widely in Egypt, and published his results in a number of important books. In 1872 he was chosen professor of Egyptology at Strassburg. The value of his work consists not only in the stores of material which he collected, but also in the success with which he dealt with many of the problems raised by the inscriptions.

Among his works are Bauurkunde des Tempels von Dendera (1865) ; Geographische Inschriften altdgyptischer Denkmaler (4 vols., 1865-1885); Altdgyptische Kalenderinschriften (1866); Altagypt. Tempelinschriften (2 vols., 1867) ; Historische Inschriften altagypt. Denkmaler (2 vols., 1867-1869); Baugeschichte und Beschreibung des Denderatempels (Strassburg, 1877); Die Oasen der libyschen

Wiiste (1878) ; Die kalendarischen Opferfestlisten von Medinet-Habu (1881); Gesch. des alien Aegypten (1878-1883); Der Grabpalast des Patuamenap in der thebanischen Nekropolis (.1884-1894).

DUMMLER, ERNST LUDWIG (1830-1902), German historian, the son of Ferdinand Dummler (1777-1846), a Berlin bookseller, was born in Berlin, on the 2nd of January 1830. He studied at Bonn under J. W. Lobell (1786-1863), under L. von Ranke and W. Wattenbach, and his doctor's dissertation, De Arnulfo Francorum rege (Berlin, 1852), was a notable essay. He entered the faculty at Halle in 1855, and started an historical Seminar. In 1858 he became professor extraordinary, in 1866 full professor. In 1875 he became a member of the revised committee directing the Monumenta Germaniae historica, himself undertaking the direction of the section Antiquitales, and in 1888 became president of the central board in Berlin. This was an official recognition of Diimmler's leading

position among German historians. In addition to numerous critical works and editions of texts, he published Piligrim von Passau und das Erzbistum Lorch (1854), liber die dlteren Slawen in Dalmatien (1856), Das Formelbuch des Bischofs Salomo III. von Konstanz (1857) and Anselm der Peripatetiker (1872). But his great work was the Geschichte des ostjrdnkischen Reiches (Berlin, 1862-1865, in 2 vols.; 2nd ed. 1887-1888, in 3 vols.). In conjunction with Wattenbach he completed the Monumenta Alcuiniana (Berlin, 1873), which had been begun by Philipp Jaffe, and with R. Kopke he wrote Kaiser Otto der Grosse (Leipzig, 1876). He edited the first and second volumes of the Poetae latini aevi Carolini for the Monumenta Germaniae historica (Berlin, 1881-1884). Diimmler died in Berlin on the nth of September 1902.

His son, Ferdinand (1859-1896), who won some reputation as an archaeologist and philologist, was professor at the university of Basel from 1890 until his death on the 15th of November 1896.

DUMONT, the name of a family of prominent French artists. Francois Dumont (1688-1726), a sculptor, best known for his figures in the church of Saint Sulpice, Paris, was the brother of the painter Jacques Dumont, 1 known as " le Romain" (1701-1781), whose chief success was gained with a great allegorical composi- tion for the Paris hdtel-de-ville in 1761. Francois's son Edme (1720-1775), the latter's son Jacques Edme (1761-1844), and the last-named's son Augustin Alexander (1801-1884) were also famous sculptors.

See G. Vattier, line Famille d'artistes (1890).

DUMONT, ANDRg HUBERT (1800-1857), Belgian geologist, was born at Liege on the 15th of February 1809. His first work was a masterly Memoire on the geology of the province of Liege published in 1832. A few years later he became professor of mineralogy and geology and afterwards rector in the university of Liege. His attention was now given to the mineralogical and stratigraphical characters of the geological formations in Belgium — and the names given by him to many subdivisions of Cretaceous and Tertiary ages have been adopted. His Memoire sur les terrains ardennais et rhenan de V Ardenne, du Brabant et du Condroz (1847-1848) is notable for the care with which the mineral characters of the strata were described, but the palaeonto- logical characters were insufficiently considered, and neither the terms " Silurian " nor " Devonian " were adopted. During twenty years he laboured at the preparation of a geological map of Belgium (1849). He spared no pains to make his work as complete as possible, examining on foot almost every area of

importance in the country. Journeying to the more southern parts of Europe, he investigated the shores of the Bosphorus, the mountains of Spain and other tracts, and gradually gathered materials for a geological map of Europe: a work of high merit which was " one of the first serious attempts to establish on a larger scale the geological correlation of the various countries of Europe." The Geological Society of London awarded him in 1840 the Wollaston medal. He died at Liege on the 28th of February 1857.

See Memoir by Major-General J. E. Portlock in Address to Geol. Soc. (London, 1858).

1 Not to be confounded with his contemporary Jean Joseph Dumons (1687-1779), sometimes called Dumont, best known for his designs for the Aubusson tapestries.

DUMONT, FRANCOIS (1751-1831), French miniature painter was born at Luneville (Meurthe), and was left an orphan when quite young, with five brothers and sisters to support. He was for a while a student under Jean Girardet, and then, on the advice of a Luneville Academician, Madame Coster, set up a studio for himself. In 1784 he journeyed to Rome, returning after four years' careful study, and in 1788 was accepted as an Acade- mician and granted an apartment in the Louvre. He married the daughter of Antoine Vestier, the miniature painter, and had two sons, Aristide and Bias, both of whom became painters. He was one of the three greatest miniature painters of France, painting portraits of Louis XVI. and Marie Antoinette, Louis XVIII. and Charles X., and of almost all the important persons of his day. His own portrait was engraved both by Audouin and by Tardieu. He resided the greater part of his life in Paris, and there he died. A younger brother, known as Tony Dumont, was also a miniature painter, a pupil of his brother, a frequent exhibitor and the recipient of a medal from the Academy in 18 10. Each artist signed with the surname only, and there is some controversy concerning the attribution to each artist of his own work. Tony was an expert violinist and delighted in painting portraits of persons who were playing upon the violin. Many of Dumont's finest paintings came into the collection of Mr J. Pierpont Morgan, but others are in the Louvre, presented by the heir of Bias Dumont. The work of both painters is distinguished by breadth, precision and a charming scheme of colouring, and the unfinished works of the elder brother are amongst some of the most beautiful miniatures ever produced.

See The History of Portrait Miniatures, by G. C. Williamson

(London, 1904) ; also the privately printed Catalogue of the Collection of Miniatures of Mr J. Pierpont Morgan, vol. iv. (G. C. W.)

DUMONT, JEAN (d. 1726), French publicist, was born in France in the 17th century, the precise date being unknown. He followed the profession of arms; but, not obtaining promo- tion so rapidly as he expected, he quitted the service and travelled through different parts of Europe. He stopped in Holland with the intention of publishing an account of his travels. But in the interval, at the request of his bookseller, he wrote and published several pamphlets, which were eagerly sought after, owing to the unceremonious manner in which he treated the ministry of France. This freedom having deprived him of all hope of employ- ment in his own country, he thought of forming a permanent establishment in that where he resided, and accordingly com- menced a course of lectures on public law. The project succeeded far beyond his expectations; and some useful compilations which he published about the same period made him favourably known in other countries. The emperor appointed him his historio- grapher, and some time afterwards conferred on him the title of baron de Carlscroon. He died at Vienna in 1726, at an advanced age.

The following is a list of his publications: — (1) Voyages en France, en Italie, en Auemagne, a Malte, et en Turquie (Hague, 1699, 4 vols. 1 2 mo) ; (2) MSmoires politiques pour servir a la parfaite intelligence de I'histoire de la Paix de Ryswick (Hague, 1699, 4 vols. !2mo) ; (3) Recherches modestes des causes de la presente guerre, en ce qui concerne les Provinces Unies (1713, i2mo) ; (4) Recueil de traitSs d'alliance, de pai, et de commerce entre les rois, princes, et etats, depuis la Paix de Munster (Amsterdam, 1710, 2 vols. i2mo) ; (5) Soupirs de l' Europe a la vue du projet de paix contenu dans la harangue de la reine de la Grande-Bretagne (1712, l2mo); (6) Corps universel diplomatique du droit des gens, contenant un recueil des traites de paix, d'alliance, &c, faits en Europe, depuis Charlemagne jusqu'a present (Amsterdam, 1626, and following years, 8 vols, fol., continued after Dumont's death by J. Rousset) ; and (7) Batailles gagnees par le Prince Eugene de Savoie (Hague, 1723). Dumont was also the author of Lettres kistoriques contenant ce qui se passe de plus important en Europe (i2mo). This periodical, which was commenced in 1692, two volumes appearing annually, Dumont conducted till 1710, from which time it was continued by Basnage and others until 1728 The earlier volumes are much prized.

DUMONT, PIERRE ETIENNE LOUIS (1750-1829), French political

writer, was born on the 18th of July 1759 at Geneva, of which his family had been citizens of good repute from the days of Calvin. He was educated for the ministry at the college of Geneva, and in 1781 was chosen one of the pastors of the city. The political troubles which disturbed Geneva in 1782, however,

suddenly turned the course of his life. He belonged to the liberals or democrats, and the triumph of the aristocratic party, through the interference of the courts of France and Sardinia, made residence in his native town impossible, though he was not among the" number of the proscribed. He therefore went to join his mother and sisters at St Petersburg. In this he was probably influenced in part by the example of his townsman Pierre Lefort, the first tutor, minister, and general of the tsar. At St Petersburg he was for eighteen months pastor of the French church. In 1785 he removed to London, Lord Shelburne, then a minister of state, having invited him to undertake the education of his sons. It was at the house of Lord Shelburne, now 1st marquess of Lansdowne, where he was treated as a friend or rather member of the family, that he became acquainted with many illustrious men, amongst others Fox, Sheridan, Lord Holland and Sir Samuel Romilly. With the last of these he formed a close and enduring friendship, which had an important influence on his life and pursuits.

In 1788 Dumont visited Paris with Romilly. During a stay of two months in that city he had almost daily intercourse with Mirabeau, and a certain affinity of talents and pursuits led to an intimacy between two persons diametrically opposed to each other in habits and in character. On his return from Paris Dumont made the acquaintance of Jeremy Bentham. Filled with admiration for the genius of Bentham, Dumont made it one of the chief objects of his life to recast and edit the writings of the great English jurist in a form suitable for the ordinary reading public. This literary relationship was, according to Dumont's own account, one of a somewhat peculiar character. All the fundamental ideas and most of the illustrative material were supplied in the' manuscripts of Bentham; Dumont's task was chiefly to abridge by striking out repeated matter, to supply lacunae, to secure uniformity of style, and to improve the French. The following works of Bentham were published under his editorship: Traiti de legislation civile et pinole (1802), ThSorie des peines et des recompenses (1811), Tactique des assemblies legislatives (1815), Traite des preuves judiciaires (1823) and De I

‘organization judiciaire et de la codification (1828).

In the summer of 1789 Dumont went to Paris. The object of the journey was to obtain through Necker, who had just returned to office, an unrestricted restoration of Genevese liberty, by cancelling the treaty of guarantee between France and Switzer- land, which prevented the republic from enacting new laws without the consent of the parties to this treaty. The proceedings and negotiations to which this mission gave rise necessarily brought Dumont into connexion with most of the leading men in the Constituent Assembly, and made him an interested spectator, sometimes even a participator, indirectly, in the events of the French Revolution. The same cause also led him to renew his acquaintance with Mirabeau, whom he found occupied with his duties as a deputy, and with the composition of his journal, the Courier de Provence. For a time Dumont took an active and very efficient part in the conduct of this journal, supplying it with reports as well as original articles, and also furnishing Mirabeau with speeches to be delivered or rather read in the assembly, as related in his highly instructive and interesting posthumous work entitled Souvenirs sur Mirabeau (1832). In fact his friend George Wilson used to relate that one day, when they were dining together at a table d’hdte at Versailles, he saw Dumont engaged in writing the most celebrated para- graph of Mirabeau’s address to the king for the removal of the troops. He also reported such of Mirabeau’s speeches as he did not write, embellishing them from his own stores, which were inexhaustible. But this co-operation soon came to an end; for, being attacked in pamphlets as one of Mirabeau’s writers, he felt hurt at the notoriety thus given to his name in connexion with a man occupying Mirabeau’s peculiar position, and returned to England in 1791.

In 1 80 1 he travelled over various parts of Europe with Lord Henry Petty, afterwards 3rd marquess of Lansdowne, and on his return settled down to the editorship of the works of Bentham already mentioned. In 1814 the restoration of Geneva to in-

dependence induced Dumont to return to his native place, and he soon became the leader of the supreme council. He devoted particular attention to the judicial and penal systems of his native state, and many improvements on both are due to him. He died at Milan when on an autumn tour on the 29th of Sep- tember 1829.

DUMONT D’URVILLE, JULES SEBASTIEN CESAR (1700- 1842), French navigator, was born at Conde-sur-Noireau, in Normandy, on the 23rd of May 1790. The death of his father, who before the

revolution had held a judicial post in Conde, devolved the care of his education on his mother and his maternal uncle, the Abbe de Croizilles. Failing to pass the entrance examination for the Ecole Polytechnique, he went to sea in 1807 as a novice on board the "Aquilon." During the next twelve years he gradually rose in the service, and added a knowledge of botany, entomology, English, German, Spanish, Italian and even Hebrew and Greek to the professional branches of his studies. In 1820, while engaged in a hydrographic survey of the Mediterranean, he was fortunate enough to recognize the Venus of Milo (Melos) in a Greek statue recently unearthed, and to secure its preservation by the report he presented to the French ambassador at Constantinople. A wider field for his energies was furnished in 1822 by the circumnavigating expedition of the "Coquille" under the command of his friend Duperrey; and on its return in 1825 his services were rewarded by promotion to the rank of capitaine de fr&gate, and he was entrusted with the control of a similar enterprise, with the especial purpose of dis- covering traces of the lost explorer La P6rouse, in which he was successful. The "Astrolabe," as he renamed the "Coquille," left Toulon on the 25th of April 1826, and returned to Marseilles on the 25th of March 1829, having traversed the South Atlantic, coasted the Australian continent from King George's Sound to Port Jackson, charted various parts of New Zealand, and visited the Fiji Islands, the Loyalty Islands, New Caledonia, New Guinea, Amboyna, Van Diemen's Land, the Caroline Islands, Celebes and Mauritius. Promotion to the rank of capitaine de vaisseau was bestowed on the commander in August 1829; and in August of the following year he was charged with the delicate task of conveying the exiled king Charles X. to England. His proposal to undertake a voyage of discovery to the south polar regions was discouraged by Arago and others, who criticized the work of the previous expedition in no measured terms; but at last, in 1837, all difficulties were surmounted, and on the 7th of September he set sail from Toulon with the "Astrolabe" and its convoy "LaZ616e." On the 15th of January 1838 they sighted the Antarctic ice, and soon after their progress southward was blocked by a continuous bank, which they vainly coasted for 300 m. to the east. Returning westward they visited the South Orkney Islands and part of the New Shetlands, and discovered Joinville Island and Louis Philippe Land, but were compelled by scurvy to seek succour at Talcahuano in Chile. Thence they proceeded across the Pacific and through the Asiatic archipelago, visiting among others the Fiji and the Pelew Islands, coasting New Guinea, and circumnavigating Borneo. In 1840, leaving their sick at Hobart Town, Tasmania, they returned to the Antarctic region, and on the 21st of the month were

rewarded by the discovery of Adelie Land, which D'Urville named after his wife, in 140 E. The 6th of November found them at Toulon. D'Urville was at once appointed contre-amiral, and in 1841 he received the gold medal of the Societe de Geographic On the 8th of May 1842 he was killed, with his wife and son, in a railway accident near Meudqn.

His principal works are — Enumeratio plantarum quas in insulis Archipelagi aut littoribus Ponti Euxini, &c. (1822); Voyage de la corvette "I' Astrolabe," 1826-1829 (Paris, 1830-1835), and Voyage au pole sud et dans I'Oceanie, 1837-1840 (Paris, 1842- 1854), in each of which his scientific colleagues had a share; Voyages autour du monde; re'sumS gfniral des voyages de Magellan, &c. (Paris, 1833 and 1844). An island (also called Kairu) off the north coast of New Guinea, and a cape on the same coast, bear the name of D'Urville.

DUMORTIERITE, a mineral described in 1881 by M. F. Gonnard, who named it after Eugene Dumortier, a palaeonto- logist of Lyons, France. It is essentially a basic aluminium boro- silicate, belonging to the orthorhombic system ; it occurs usually in fibrous forms, of smalt-blue, greenish-blue, lavender or almost black colour, and exhibits strong pleochroism. According to W. T. Schaller (Amer. Journ. Sci., 1905 (iv.), 19, p. 211) a purple colour may be due to the presence of titanium. Analyses of some specimens point to the formula (Si0 4) 3 Al(A10)7(BO)H, which, written in this form, explains the analogy with andalusite and the alteration into muscovite. Dumortierite occurs in gneiss at Chaponost, near Lyons, and at a few other European localities ; it is found also in the United States, being known from near New York City, from" Riverside and San Diego counties, California, and from Yuma county, Arizona. The last-named locality yields the mineral in some quantity in the form of dense fibres embedded in quartz, to which it imparts a blue colour. The mineral aggregate is polished as an ornamental stone, rather resembling lapis-lazuli.

DUMOULIN, CHARLES [Molinaetjs] (1500-1566), French jurist, was born in Paris in 1500. He began practice as an advocate before the parlement of Paris. Dumoulin turned Calvinist, and when the persecution of the Protestants began he went to Germany, where for a long time he taught law at Strassburg, Besancon and elsewhere. He

returned to France in 1557. Dumoulin had, in 1552, written Commentaire sur I'idit du roi Henri II sur les petites dates, which was condemned by the Sorbonne, but his Conseil sur le fait du concile de Trente created a still greater stir, and aroused against him both the Catholics and the Calvinists. He was imprisoned by order of the parlement until 1564. It was as a jurist that Dumoulin gained his great reputation, being regarded by his contemporaries as the " prince of jurisconsults." His remarkable erudition and breadth of view had a considerable effect on the subsequent development of French law. He was a bitter enemy of feudalism, which he attacked in his Defeudis (Paris, 1539). Other import- ant works were his commentaries on the customs of Paris (Paris, ˆQ) J 554; Frankfort, 1575; Lausanne, 1576), valuable as the only commentary on those in force in 15 10, and the Extricatio labyrinthi dividui et individui, a treatise on the law of surety.

A collected edition of Dumoulin's works was published in Paris in 1681 (5 vols.).

DUMOURIEZ, CHARLES FRANCOIS (1739-1823), French general, was born at Cambray in 1739. His father was a com- missary of the royal army, and educated his son most carefully in various branches of learning. The boy continued his studies at the college of Louis-le-Grand, and in 1757 began his military career as a volunteer in the campaign of Rossbach. He received a commission for good conduct in action, and served in the later German campaigns of the Seven Years' War with distinction; but at the peace he was retired as a captain, with a small pension and the cross of St Louis. Dumouriez then visited Italy and Corsica, Spain and Portugal, and his memorials to the due de Choiseul on Corsican affairs led to his re-employment on the staff of the French expeditionary corps sent to the island, for which he gained the rank of lieutenant-colonel. After this he became a member of the Secret du roi, the secret service under Louis XV., where his fertility of diplomatic resource had full scope. In 1770 he was sent on a mission into Poland, where in addition to his political business he organized a Polish militia. The fall of Choiseul brought about his recall, and somewhat later he was imprisoned in the Bastille, where he spent six months, occupying himself with literary pursuits. He was then removed to Caen, where he was detained until the accession of Louis XVI.

Upon his release in 1774 he married his cousin Mile de Broissy, but he was neglectful and unfaithful, and in 1789 the pair separated, the wife taking refuge in a convent. Meanwhile Dumouriez had devoted his attention to the internal state of his own country, and amongst

the very numerous memorials which he sent in to the government was one on the defence of Normandy and its ports, which procured him in 1778 the post

of commandant of Cherbourg, which he administered with much success for ten years. He became marichal de camp in 1788; but his ambition was not satisfied, and at the outbreak of the Revolu- tion, seeing the opportunity for carving out a career, he went to Paris, where he joined the Jacobin Club. The death of Mirabeau, to whose fortunes he had attached himself, was a great blow to him; but, promoted to the rank of lieutenant-general and commandant of Nantes, his opportunity came after the flight to Varennes, when he attracted attention by offering to march to the assistance of the Assembly. He now attached himself to the Girondist party, and on the 15th of March 1792 was appointed minister of foreign affairs. He was mainly responsible for the declaration of war against Austria (April 20), and the invasion of the Low Countries was planned by him. On the dismissal of Roland, Claviere and Servan (June 13), he took the latter's post of minister of war, but resigned it two days later on account of the king's refusal to come to terms with the Assembly, and went to join the army of Marshal Luckner. After the entente of August 10 and Lafayette's flight he was appointed to the command of the " Army of the Centre," and at the same moment the Coalition assumed the offensive. Dumouriez acted promptly. His subordinate Kellermann repulsed the Prussians at Valmy (September 20, 1792), and he himself severely defeated the Austrians at Jemappes (November 6). Returning to Paris, he was received with a popular ovation; but he was out of sympathy with the extremists in power, his old-fashioned methodical method of conducting war exposed him to the criticism of the ardent Jacobins, and a defeat would mean the end of his career. Defeat coming to him at Neerwinden in January 1793, he ventured all on a desperate stroke. Arresting the commissaries of the Convention sent to inquire into his conduct, he handed them over to the enemy, and then attempted to persuade his troops to march on Paris and overthrow the revolutionary government. The attempt failed, and Dumouriez, with the due de Chartres (afterwards King Louis Philippe) and his brother the due de Montpensier, fled into the Austrian camp. He now wandered from country to country, occupied in ceaseless intrigues with Louis XVIII. , or for setting up an Orleanist monarchy, until in 1804 he settled in England, where the government conferred on him a pension of £1200 a year. He became a valuable adviser to the War Office in connexion with the struggle with Napoleon, though the extent to which this went was only known in public many years later.

In 1814 and 181 5 he endeavoured to procure from Louis XVIII. the baton of a marshal of France, but was refused. He died at Turville Park, near Henley-on-Thames, on the 14th of March 1823. His memoirs were published at Hamburg in 1794. An enlarged edition, La Vie et les m&moires du General Dumouriez, appeared at Paris in 1823. Dumouriez was also the author of a large number of political pamphlets.

See A. von Boguslawski, Das Leben des Generals Dumouriez (Berlin, 1878-1879); Revue des deux mondes (15th July, 1st and 15th August 1884); H. Welschinger, Le Roman de Dumouriez (1890) ; A. Chuquet, La Premiere Invasion, Valmy, La Retraite de Brunswick, Jemappes, La Trahison de Dumouriez (Paris, 1886-1891); A. Sorel, L'Europe et la Revolution francaise (1885- 1892); J. Holland Rose and A. M. Broadley, Dumouriez and the Defence of England (1908) ; E. Daudet, La Conjuration de Pichegru et les complots royalistes du midi et du Vest, 1795-1797 (Paris, 1 901).

DUMP. (1) (Of obscure origin; corresponding in form and possibly connected with the word, are the Mid. Dutch domp, mist or haze, and the Ger. dumpf, dull or dazed), a state of wonder, perplexity or melancholy. The word thus occurs particularly in the plural, in such phrases as " doleful dumps." It was also formerly used for a tune, especially one of a mournful kind, a dirge. (2) (Connected with " dumpy," but appearing later than that word, and also of obscure origin), something short and thick, and hence used of many objects such as a lead counter or medal, of a coin formerly used in Australia, formed by punching a circular piece out of a Spanish dollar, and of a short thick bolt used in shipbuilding. (3) (Probably of Norse origin, cf. Nor. dumpa, and Dan. dumpe, meaning " to fall " suddenly, with a bump), to throw down in a heap, and hence

particularly applied to the depositing of any large quantity of material, to the shooting of rubbish, or tilting a load from a cart. It is thus used of the method of disposal. of the masses of gravel, &c, disintegrated by water in the hydraulic method of gold mining. A " dump " or " dumping-ground " is thus the place where such waste material is deposited. The use of the term " dumping" in the economics of international trade has come into prominence in the tariff reform controversy in the United Kingdom. It is sometimes used loosely of the importing of foreign goods at prices below those ruling

in the importing country; but strictly the term is applied to the importing, at a price below the cost of production, of the surplus of manufactures of a foreign country over and above what has been disposed of in its home market. The ability to sell such a surplus in a foreign market below the cost of production depends on the prices of the home market being artificially sustained at a sufficiently high level by a monopoly or by a tariff or by bounties. An essential factor in the operation of " dumping " is the lessening of the whole cost of production by manufacture on a large scale.

DUNASH, the name of two Jewish scholars of the ioth century.

i. Dun ash Ben Labrat, grammarian and poet, belonged to the brilliant circle attracted to Cordova by IJasdai, and took a large share in promoting the Jewish " Golden Age " under the Moors in Andalusia. Dunash not only helped in the founda- tion of a school of scientific philology, but adapted Arabian metres to Hebrew verse, and thereby gave an impulse to the neo-Hebraic poetry, which reached its highest level in Spain.

2. Dunash Ibn Tamim was, like the preceding, a leader in the critical study of language among Arabic-speaking Jews. Professor Bacher says of him: " In the history of Hebrew philology, Ibn Tamim ranks as one of the first representatives of the systematic comparison of Hebrew and Arabic." The philo- logical researches of the ioth century were closely associated with the Spanish-Moorish culture of the period. (I. A.)

DUNBAR, GEORGE (1774-1851), English classical scholar and lexicographer, was born at Coldingham in Berwickshire. In early life he followed the humble profession of gardening, but, having been permanently injured by an accident, devoted himself to the study of the classics. When about thirty years of age, he settled in Edinburgh, where he obtained a tutorship in the family of Lord Provost Fettes. In 1807 he succeeded Andrew Dalzel as professor of Greek in the university. Dunbar held his appointment till his death on the 6th of December 1851. Although a man of great energy and industry, Dunbar did not produce anything of permanent value. He deserves mention, however, for his Greek-English and English-Greek lexicon (1840), on the compilation of which he spent eight years. Although now superseded, it was the best work of its kind that had appeared in England.

The little that is known of Dunbar's life will be found in the Caledonian Mercury (8th of December 185 1).

DUNBAR, PAUL LAURENCE (187 2-1906), American author, of negro descent, was born in Dayton, Ohio, on the 27th of June 1872. He graduated (1891) from the Dayton high school, had a varied experience as elevator boy, mechanic and journalist, and in 1897-1898 held a position on the staff of the Library of Congress, resigning in December 1898 to devote himself to literary work. He died of consumption at his home in Dayton on the 8th of February 1906. His poetry was brought to the attention of American readers by William Dean Howells, who wrote an appreciative introduction to his Lyrics of Lowly Life (1896). Subsequently Dunbar published eleven other volumes of verse, three novels and five collections of short stories. Some of his short stories and sketches, especially those dealing with the American negro, are charming; they are far superior to his novels, which deal with scenes in which the author is not so much at home. His most enduring work, however, is his poetry. Some of this is in literary English, but the best is in the dialect of his people. In it he has preserved much of their very tempera- ment and outlook on life, usually with truth and freshness of feeling, united with a happy choice of language and much

lyrical grace and sweetness, and often with rare humour and pathos. These poems of the soil are a distinct contribution to American literature, and entitle the author to be called pre- eminently the poet of his race in America.

See Life and Works of Paul Laurence Dunbar (Naperville, 111., 1907), with a biography by L. K. Wiggins.

DUNBAR, WILLIAM (c. 1460-c. 1520), Scottish poet, was probably a native of East Lothian. This is assumed from a satirical reference in the Flyting of Dunbar and Kennedie, where, too, it is hinted that he was a member of the noble house of Dunbar. His name appears in 1477 in the Register of the Faculty of Arts at St Andrews, among the Determinants or Bachelors of Arts, and in 1479 among the masters of the university. Thereafter he joined the order of Observantine Franciscans, at St Andrews or Edinburgh, and proceeded to France as a wandering friar. He spent a few years in Picardy, and was still abroad when, in 1491, Bothwell's mission to secure a bride for the young James. IV. reached the French court. There is no direct evidence that he accompanied Blackadder, archbishop of Glasgow, on a similar embassy to Spain in 1495. On the other hand, we know that he proceeded with that prelate to England on his more successful mission in 1501. Dunbar had meanwhile (about 1500) returned to Scotland, and had become a priest at court, and a royal pensioner. His literary life begins with his attachment to James's household. All

that is known of him from this date to his death about 1520 is derived from the poems or from entries in the royal registers of payments of pension and grants of livery. He is spoken of as the Rhymer of Scotland in the accounts of the English privy council dealing with the visit of the mission for the hand of Margaret Tudor, rather because he wrote a poem in praise of London,than because, as has been stated, he held the post of laureate at the Scottish court. In 1511 he accompanied the queen to Aberdeen and commemorated her visit in verse. Other pieces such as the Orisoun (" Quhen the Gouernour past in France "), apropos of the setting out of the regent Albany, are of historical interest, but they tell us little more than that Dunbar was alive. The date of his death is uncertain. He is named in Lyndsay's Testament and Complaynt of the Papyngo (1530) with poets then dead, and the reference precedes that to Douglas who had died in 1522. He certainly survived his royal patron. We may not be far out in saying that he died about 1520.

Dunbar's reputation among his immediate successors was considerable. By later criticism, stimulated in some measure by Scott's eulogy that he is " unrivalled by any which Scotland has produced," he has held the highest place among the northern makars. The praise, though it has been at times exaggerated, is on the whole just, certainly in respect of variety of work and mastery of form. He belongs, with James I., Henryson and Douglas, to the Scots Chaucerian school. In his allegorical poems reminiscences of the master's style and literary habit are most frequent. Yet, even there, his discipleship shows certain limitations. His wilder humour and greater heat of blood give him opportunities in which the Chaucerian tradition is not helpful, or even possible. His restlessness leads us at times to a comparison with Skelton, not in respect of any parallelism of idea or literary craftsmanship, but in his experimental zeal in turning the diction and tuning the rhythms of the chaotic English which only Chaucer's genius had reduced to order. The comparison must not, however, be pushed too far. Skelton 's work carries with it the interest of attempt and failure. Dunbar's command of the medium was more certain. So that while we admire the variety of his work, we also admire the competence of his effort.

One hundred and one poems have been ascribed to Dunbar. Of these at least ninety are generally accepted as his: of the eleven attributed to him it would be hard to say that they should not be considered authentic. Most doubt has clung to his verse tale The Freiris of Berwik.

Dunbar's chief allegorical poems are The Goldyn Targe and The

Thrissil and the Rois. The motif of the former is the poet's futile endeavour, in a dream, to ward off the arrows of Dame

Beautee by Reason's " scheld of gold." When wounded and made prisoner, he discovers the true beauty of the lady: when she leaves him, he is handed over to Heaviness. The noise of the ship's guns, as the company sails off, wakes the poet to the real pleasures of a May morning. Dunbar works on the same theme in a shorter poem, known as Beauty and the Prisoner. The Thrissil and the Rois is a prothalamium in honour of James IV. and Margaret Tudor, in which the heraldic allegory is based on the familiar beast-parliament.

The greater part of Dunbar's work is occasional — personal and social satire, complaints (in the style f amiliar in the minor verse of Chaucer's English successors), orisons and pieces of a humorous character. The last type shows Dunbar at his best, and points the difference between him and Chaucer. The best specimen of this work, of which the outstanding characteristics are sheer whimsicality and topsy-turvy humour, is The Ballad of Kynd Kittok. This strain runs throughout many of the occasional poems, and is not wanting in odd passages in Dunbar's con- temporaries; and it has the additional interest of showing a direct historical relationship with the work of later Scottish poets, and chiefly with that of Robert Burns. Dunbar's satire is never the gentle funning of Chaucer: more often it becomes invective. Examples of this type are The Satire on Edinburgh, The General Satire, the Epitaph on Donald Owre, and the powerful vision of The Dance of the Sevin Deidlie Synnis. In the Flyting of Dunbar and Kennedie, an outstanding specimen of a favourite northern form, analogous to the continental estrif, or tenzone, he and his rival reach a height of scurrility which is certainly without parallel in English literature. This poem has the additional interest of showing the racial antipathy between the " Inglis "- speaking inhabitants of the Lothians and the " Scots " or Gaelic-speaking folk of the west country.

There is little in Dunbar which may be called lyrical, and little of the dramatic. His Interlud of the Droichis [Dwarf's] part of the Play, one of the pieces attributed to him, is supposed to be a fragment of a dramatic composition. It is more interesting as evidence of his turn for whimsicality, already referred to, and may for that reason be safely ascribed to his pen. If further selection be made from the large body of miscellaneous poems, the comic poem on the physician

Andro Kennedy may stand out as one of the best contributions to medieval Goliardic literature; The Two Mariit Wemen and the Wedo, as one of the richest and most effective pastiches in the older alliterative style, then used by the Scottish Chaucerians for burlesque purposes; Done is a battell on the Dragon Blak, for religious feeling expressed in melodious verse; and the well-known Lament for the Makaris. The main value of the last is historical, but it too shows Dunbar's mastery of form, even when dealing with lists of poetic predecessors.

The chief authorities for the text of Dunbar's poems are: — (a) the Asloan MS. (c. 1515); (6) the Chepman and Myllar Prints (1508) preserved in the Advocates' library, Edinburgh; (c) Banna- tyne MS. (1568) in the same; (d) the Maitland Folio MS. (c. 1570- 1590) in the Pepysian library, Magdalene College, Cambridge. Some of the poems appear in the Makculloch MS. (before 1500) in the library of the university of Edinburgh; in MS. Cotton Vitellius A. xvi., appendix to Royal MSS. No. 58, and Arundel 285, in the British Museum; in the Reidpath MS. in the university library of Cambridge; and in the Aberdeen Register of Sasines. The first complete edition was published by David Laing (2 vols., Edinburgh, 1834) with a supplement (Edinburgh, 1865). This has been super- seded by the Scottish Text Society's edition (ed. John Small, Aeneas J. G. Mackay and Walter Gregor, 3 vols., Edinburgh, 1893), and by Dr Schipper's 1 vol. edition (Vienna; Kais. Akad. der Wissen- schaften, 1894). The editions by James Paterson (Edinburgh, i860) and H. B. Baildon(Cambridge, 1907) are of minor value. Selections have been frequently reprinted since Ramsay's Ever-Green (1724) and Hailes's Ancient Scottish Poems (1817). For critical accounts see Irving's History of Scottish Poetry, Henderson's Vernacular Poetry of Scotland, Gregory Smith's Transition Period, J. H. Millar's Literary History of Scotland, and the Cambridge History of English Literature, vol. ii. (1908). Professor Schipper's William Dunbar, sein Leben und seine Gedichte (with German translations of several of the poems), appeared at Berlin in 1884. (G. G. S.)

- *DUNBAR (Gaelic, " the fort on the point "), a royal, municipal and police burgh, and seaport of Haddingtonshire, Scotland. Pop. (1901) 3581. It is situated on the southern shore of the*

entrance to the Firth of Forth, 29ˆ m. E. by N. of Edinburgh by the North British railway. Dunbar is said to have the smallest rainfall in Scotland and is a favourite summer resort. The ruins of the castle, and the remains of the Grey Friars' monastery, founded in 1218, at the west end of the town, and Dunbar House in High Street, formerly

a mansion of the Lauderdales, but now used as barracks, are of historic interest. The parish church, a fine structure in red sandstone, the massive tower of which, 107 ft. high, is a landmark for sailors, dates only from 1819, but occupies the site of what was probably the first collegiate church in Scotland, and contains the large marble monument to Sir George Home, created earl of Dunbar and March by James VI. in 1605. Among other public buildings are the town hall, assembly rooms, St Catherine's hall, the Mechanics' institute and library.

There'are two harbours,difficult of access owing to the'number of reefs and sunken rocks. Towards the cost of building the eastern or older harbour Cromwell contributed £300. The western or Victoria harbour is a refuge for vessels between Leith Roads and the Tyne. On the advent of steam the shipping declined, and even the herring fishery, which fostered a large curing trade, has lost much of its prosperity. The industries are chiefly those of agricultural-implement making, rope-making, brewing and distilling, but a considerable business is done in the export of potatoes. Dunbar used to form one of the Haddington district group of parliamentary burghs, but its constituency was merged in that of the county in 1885.

About 4 m. S.W. is the village of Biel, where, according to some authorities, William Dunbar the poet was born. One mile to the S.E. of the town is Broxmouth Park (or Brocksmouth House), the first position of the English left wing in the battle of 1650, now belonging to the duke of Roxburghe.

The site of Dunbar is so commanding that a castle was built on the cliffs at least as early as 856. In 1070 Malcolm Canmore gave it to Cospatric, earl of Northumberland, ancestor of the earls of Dunbar and March. The fortress was an important bulwark against English invasion, and the town — which was created a royal burgh by David II. — grew up under its protection. The castle was taken by Edward I., who defeated Baliol in the neighbourhood in 1296, and it afforded shelter to Edward II. after Bannockburn. In 1336 it was besieged by the English under William, Lord Montacute, afterwards 1st earl of Salisbury, b"t was successfully defended by Black Agnes of Dunbar, countess of March, a member of the Murray family. Joanna Beaufort, widow of James I., chose it for her residence, and in 1479, after his daring escape from Edinburgh Castle, the duke of Albany concealed himself within its walls, until he contrived to sail for France. In 1567 Mary made Bothwell keeper of the castle, and sought its shelter herself after the murder of Rizzio and again after her flight from Borthwick Castle. When she surrendered at Carberry

Hill the stronghold fell into the hands of the regent Moray, by whom it was dismantled in 1568, but its ruins are still a picturesque object on the hill above the harbour.

The Battle or Dunbar was fought on the 3rd (13th) of September 1650 between the English army under Oliver Crom- well and the Scots under David Leslie, afterwards Lord Newark. It took place about 3 m. S.E. of the centre of the town, where between the hills and the sea coast there is a plain about 1 m. wide, through the middle of which the main road from Dunbar to Berwick runs. The plain and the road are crossed at right angles by the course of the Brocksburn, or Spott Burn, which at first separated the hostile armies. Rising from the right bank of the Brock is Doon Hill (650 ft.), which overlooks the lower course of the stream and indeed the whole field. For the events preceding the battle, see Great Rebellion.

Cromwell, after a war of manceuvre near Edinburgh, had been compelled by want of supplies to withdraw to Dunbar; Leslie pursued and took up a position on Doon Hill, commanding the English line of retreat on Berwick. The situation was more than difficult for Cromwell. Some officers were for withdrawing by sea, but the general chose to hold his ground, though his army was enfeebled by sickness and would have to fight on unfavour- able terrain against odds of two to one. Leslie, however, who

was himself in difficulties on his post among the bare hills, and was perhaps subjected to pressure from civil authorities, descended from the heights on the 2nd of September and began to edge towards his right, in order first to confront, and after- wards to surround, his opponent. The cavalry of his left wing stood fast, west of Doon Hill, as a pivot of manoeuvre, the northern face of Doon (where the ground rises from the burn at an average slope of fifteen degrees and is even steeper near the summit) he left unoccupied. The centre of infantry stood on the forward slope of the long spur which runs east from Doon, and beyond them, practically on the plain, was the bulk of the Scottish cavalry. In the evening Cromwell drew up his army, under 11,000 effective men, along the ravine, and issued orders to attack the Scots at dawn of the 3rd (13th). The left of the Scots was ineffective, as was a part of their centre of foot on the upper part of the hillside, and the English com- mander proposed to deal with the remainder. Before dawn the English advanced troops crossed the

ravine, attacked Doon, and pinned Leslie's left; under cover of this the

S .' firunt) ,,, , ,,,,

iti . &i- – — i ' ; ˆO u ˆ ' • iˆrTlsJ*-*

■It / , >& ! '., ˆ \ .. '• ˆz&s'J+r!?—

~\// /' .' .' 6<£--> i— y\ˆ ' S /dSy? Contours at intervals of 100 ft

V"'i '■. "/>;&&. < -$9i'ˆj/

bmery Walker w.

whole army began its manoeuvre. The artillery was posted on the Dunbar side of the burn, directly opposite and north of Doon, the infantry and cavalry crossed where they could, and formed up gradually in a line south of and roughly parallel to the Berwick road, the extreme left of horse and foot, acting as a reserve, crossed at Brocksmouth House on the outer flank. The Scots were surprised in their bivouacs, but quickly formed up, and at first repulsed both the horse and the foot. But ere long Cromwell himself arrived with his reserve, and the whole English line advanced again. The fresh impulse enabled it to break the Scottish cavalry and repulse the foot, and Leslie's line of battle was gradually rolled up from right to left. In the words of an English officer, " The sun appearing upon the sea, I heard Nol say, ' Now let God arise, and let His enemies be scattered,' and following us as we slowly marched I heard him say, 'I profess they run.' " Driven into the broken ground, and penned between Doon Hill and the ravine, the Scots were indeed helpless. " They routed one another after we had done their work on their right wing," says the same officer. Ten thousand men, including almost the whole of the Scottish foot, surrendered, and their killed numbered three thousand. Few of the English were killed. " I do not believe," wrote Cromwell, " that we have lost twenty men."

The account of the battle of Dunbar here followed is that of C. H. Firth, for which see his Cromwell, pp. 281 ff. and references there given. For other accounts see Carlyle, Cromwell' s Letters and Speeches, letter cxl. ; Hoenig, Cromwell; Baldock, Cromwell as a Soldier; and Gardiner, Hist, of the Commonwealth and Protectorate, vol. i.

DUNBLANE, a police burgh of Perthshire, Scotland, on the left bank of Allan Water, a tributary of the Forth, 5 m. N. by W. of Stirling by

the Caledonian railway. Pop. (1901) 2516. It is a place of great antiquity, with narrow streets and old-fashioned houses. The leading industry is the manufacture of woollens. The cathedral is situated by the side of the river, and was one of the few ecclesiastical edifices that escaped injury at the hands of the Reformers. The first church is alleged to have been erected by Blane, a saint of the 7th century, but the cathedral as founded by David I. in 1 141, and almost entirely rebuilt about 1 240 by Bishop Clemens. Excepting the tower, which is Early Norman and was probably incorporated from the earlier structure, the building is of the Early Pointed style. It consists of a nave (130 ft. long, 58 ft. wide, 50 ft. high), aisles, choir (80 ft. long by 30 ft. wide), chapter-house and tower. Ruskin con- sidered that there was " nothing so perfect in its simplicity " as the west window, the design of which resembles a leaf. After the decline of episcopacy the building was neglected for a long period, but the choir, which contains some carved oak stalls of the 1 6th century, was restored in 1873, and the nave roofed and restored in 1892-1895, under the direction of Sir Rowand Anderson, the architect. From the time of the Reformation the choir had been used as the parish church, but since its restoration the whole cathedral has been devoted to this purpose. The new oak roof is emblazoned with the arms of the Scottish and later British monarchs, and of the old earls of Strathearn. Several members of the families of Strathearn and Strathallan were buried in the cathedral, and three stones of blue marble in the floor of the choir are supposed to mark the graves of Lady Margaret Drummond (b. 1472), mistress of James IV., and her two sisters, daughters of Lord Drummond, who were mysteriously poisoned in 1501. An ancient Celtic cross, 65 ft. high, stands in the north- western corner of the nave. Robert Leighton was the greatest of the bishops of Dunblane, and held the see from 1661 to 1670. The library of 1 500 volumes which he bequeathed to the clergy of the diocese is housed in a building with an outside stair, standing near the cathedral, and the Bishop's Walk by the river also perpetuates his memory. Of the bishop's palace only a few ruins remain. The battlefield of Sheriffmuir is about 25 m. E. of the town. A mile and a half S. of Dunblane is the estate of Keir which belonged to Sir William Stirling-Maxwell, the historian and art critic. The duke of Leeds derives the title of one of his viscounties from Dunblane.

DUNCAN, the name of two Scottish kings.

Duncan I. (d. 1040) was a son of Crinan or Cronan, lay abbot of Dunkeld, and became king of the Scots in succession to his maternal grandfather, Malcolm II., in 1034, having previously as rex Cumbrorum ruled in Strathclyde. His accession was " the first

example of inheritance of the Scottish throne in the direct line." Duncan is chiefly known through his connexion with Macbeth, which has been immortalized by Shakespeare. The feud between these two princes originated probably in a dispute over the succession to the throne; its details, however, are obscure, and the only fact which can be ascertained with any certainty is that Duncan was slain by Macbeth in 1040. Two of Duncan's sons, Malcolm III. Canmore and Donald V. Bane, were afterwards kings of the Scots.

Duncan II. (d. 1094) was a son of Malcolm III. and therefore a grandson of Duncan I. For a time he lived as a hostage in England and became king of the Scots after driving out his uncle, Donald Bane, in 1093, an enterprise in which he was helped by some English and Normans. He was killed in the following year.

See W. F. Skene, Celtic Scotland (1876-1880), and A. Lang, History of Scotland, vol. i. (1900).

DUNCAN, ADAM DUNCAN, ist Viscount (1 731-1804), British naval commander, was born on the ist of July 1731, at Lundie, in Forfarshire, Scotland. After receiving the rudi- ments of his education at Dundee, he was in 1746 placed under Captain Haldane, of the " Shoreham " frigate, and in 1749 he became a midshipman in the " Centurion." In 175s he was appointed second lieutenant of the " Norwich," but on the arrival of that ship in America , whither, with the rest of Keppel's

squadron, it had convoyed General Braddock's forces, he was transferred to the " Centurion." Once again in England, he was promoted to be second lieutenant of the " Torbay," and after three years on the home station he assisted in the attack on the French settlement of Goree, on the African coast, in which he was slightly wounded. He returned to England as first lieutenant of the " Torbay "; and in 1759 was made a commander, and in 1761 a post-captain. His vessel, the " Valiant " (74), was Commodore Keppel's flag-ship in the expedition against Belle-Ile en Mer in that year, and also in 1762, when it took an important part in the capture of Havana. In 1778, on the recommencement of war with France, Captain Duncan was appointed to the " Suffolk " (74), whence before the close of the year he removed to the "Monarch" (74), one of the Channel Fleet. On the 16th of January 1780, in an action off Cape St Vincent,

between a Spanish squadron under Don Juan de Langara and the British fleet under Sir George Rodney, Captain Duncan in the " Monarch " was the first to engage the enemy; and in 1782, as captain of the " Blenheim " (90), he took part in Lord Howe's relief of Gibraltar. From the rank of rear- admiral of the blue, received in 1789, he was gradually promoted until, in 1799, he became admiral of the white. In February 1795 he hoisted his flag as commander-in-chief of the North Sea fleet, appointed to harass the Batavian navy. Towards the end of May 1797, though, in consequence of the widespread mutiny in the British fleet, he had been left with only the " Adamant " (50), besides his own ship the " Venerable " (74), Admiral Duncan proceeded to his usual station off the Texel, where lay at anchor the Dutch squadron of fifteen sail of the line, under the command of Vice-Admiral de Winter. From time to time he caused signals to be made, as if to the main body of a fleet in the offing, a stratagem which probably was the cause of his freedom from molestation until, in the middle of June, reinforcements arrived from England. On the 3rd of October the admiral put into Yarmouth Roads to refit and victual his ships, but, receiving information early on the 9th that the enemy was at sea, he immediately hoisted the signal for giving him chase. On the morning of the nth de Winter's fleet, consisting of 4 seventy-fours, 7 sixty-fours, 4 fifty-gun ships, 2 forty-four-gun frigates, and 2 of thirty-two guns, besides smaller vessels, was sighted lying about 9 m. from shore, between the villages of Egmont and Camperdown. The British fleet numbered 7 seventy-fours, 7 sixty-fours, 2 fifties, 2 frigates, with a sloop and several cutters, and was slightly superior in force to that of the Dutch. Shortly after mid-day the British ships, without waiting to form in order, broke through the Dutch line, and an engagement commenced which, after heavy loss on both sides, resulted in the taking by the British of eleven of the enemy's vessels. When the action ceased the ships were in nine fathoms water, within 5 m. of a lee shore, and there was every sign of an approaching gale. So battered were the prizes that it was found impossible to fit them for future service, and one of them, the " Delft," sank on her way to England. In recognition of this victory, Admiral Duncan was, on the 21st of October, created Viscount Duncan of Camperdown and baron of Lundie, with an annual pension of £3000 to himself and the two next heirs to his title. The earldom of Camperdown was created for his son Robert (1785- 1859) in 1831, and is still in the possession of his descendants. In 1800 Lord Duncan withdrew from naval service. He died on the 4th of August 1804.

See Charnock, Biog. Nav. (1794-1796) ; Collins, Peerage of

England, p. 378 (1812); W. James, Naval History of Great Britain (1822); Yonge, History of the British Navy, vol. i. (1863) ; Earl of Camper- down, Admiral Duncan (1898), vol. xvi. of the Navy Record Soc. Publications, contains the logs of the ships engaged in the battle of Camperdown.

DUNCAN, PETER MARTIN (1824-1891), English palaeonto- logist, was born on the 20th of April 1824 at Twickenham, and was educated partly at the local grammar school and partly in Switzerland. Having entered the medical department of King's College, London, in 1842, he obtained the degree of M.B.(Lond.) in 1846, and then acted for a short time as assistant to a doctor

at Rochester. Subsequently he practised at Colchester (1848- i860), and during this period he served for a year as mayor of the city. Returning to London in i860 he practised for a few years at Blackheath, and then gave his time entirely to scientific research, first in botany, and later in geology and palaeontology. His attention was directed especially to fossil corals, and in 1863 he contributed to the Geological Society of London the first of a series of papers on the fossil corals of the West Indian Islands in which he not only described the species, but discussed their bearings on the physical geography of the Tertiary period. Corals from various parts of the world and from different geological formations were subsequently dealt with by Duncan, and he came to be regarded as a leading authority on these fossils. He prepared also for the Palaeontographical Society (1866-1872) an important work on British fossil corals, as a supplement to the monograph by Henri Milne-Edwards and Jules Haime. He was elected F.R.S. in 1868. In 1870 he was chosen professor of geology at King's College. He was president of the Geological Society (1876-1877), and in 1881 was awarded the Wollaston medal. In addition to papers on fossil corals, he dealt with some of the living forms, also with the Echinoidea and other groups, recent and fossil. He edited the six volumes of Cassell's Natural History (1877, &c). He died at Gunnersbury on the 28th of May 1891.

DUNCAN, THOMAS (1807-1845), Scottish portrait and historical painter, was born at Kinclaven, in Perthshire. He was educated at the Perth Academy, and began the study of the law, but abandoned it for art. Beginning under the instruc- tion of Sir William Allan, he early attained distinction as a delineator of the human figure; and his first pictures established his fame so completely, that at a very early age he was appointed professor of colouring, and afterwards of drawing, in theTrustees' Academy of Edinburgh. In 1840 he painted

one of his finest pictures, " Prince Charles Edward and the Highlanders entering Edinburgh after the Battle of Prestonpans," which secured his election as an associate of the Royal Academy in 1843. In the same year he produced his picture of " Charles Edward asleep after Culloden, protected by Flora MacDonald," which, like many other of his works, has been often engraved. In 1844 appeared his " Cupid " and his " Martyrdom of John Brown of Priesthill." His last work was a portrait of himself, now in the National Gallery in Edinburgh. He particularly excelled in his portraits of ladies and children. He died in Edinburgh on the 25th of May 1845.

DUNCE, a slow or stupid person, one incapable of learning. The word is derived from the name of the great schoolman, John Duns Scotus, whose works on logic, theology and philosophy were accepted text-books in the universities from the 14th century. " Duns " or " Dunsman " was a name early applied by their opponents to the followers of Duns Scotus, the Scotists, and hence was equivalent to one devoted to sophistical distinc- tions and subtleties. When, in the 16th century, the Scotists obstinately opposed the " new learning," the term " duns " or " dunce " became, in the mouths of the humanists and reformers, a term of abuse, a synonym for one incapable of scholarship, a dull blockhead.

DUNCKER, MAXIMILIAN WOLFGANG (1811-1886), German historian and politician, eldest son of the publisher Karl Duncker, was born at Berlin on the 15th of October 1811. He studied at the universities of Bonn and Berlin till 1834, was then accused of participation in the students' societies, which the government was endeavouring to suppress, and was condemned to six years' imprisonment, afterwards reduced to six months. He had already begun his labours as a historian, but after serviftg his sentence in 1837, found himself debarred till 1839 from complet- ing his course at Halle, where in 1842 he obtained a professorship. Elected to the National Assembly at Frankfort in 1848, he joined the Right Centre party, and was chosen reporter of the projected constitution. He sat in the Erfurt assembly in 1850, and in the second Prussian chamber from 1 849 to 1 8 5 2 . During the crisis in Schleswig and Holstein in 1850 he endeavoured in person to aid the duchies in their struggles. An outspoken opponent of the

policy of Manteuffel, he was refused promotion by the Prussian

government, and in 1857 accepted the professorship of history at Tubingen. In 1859, however, he was recalled to Berlin as assistant in the ministry of state in the Auerswald cabinet, and in 1 86 1 was appointed councillor to the crown prince. In 1867 he became director of the Prussian archives, with which it was his task to incorporate those of Hanover, Hesse and Nassau. He retired on the 1st of January 1875, and died at Ansbach on the 21st of July 1886. Duncker's eminent position, among German historians rests mainly on his Geschichte des Alterthums (1st ed., 1852-1857); 5th ed. in 9 vols., 1878-1886; English translation by Evelyn Abbott, 1877-1882). He edited, with J. G. Droysen, Preussische Staatssckriften, Politische Corre- sponded Friedrichs des Grossen, and Urkunden und Actenstiicke zur Geschichte des Kurfiirsten Friedrich Wilhelm von Brandenburg. To the period of his political activity belong Zur Geschichte der deutschen Reichsversammlung in Frankfurt (1849); Heinrich von Gagern (1850), in the series of Manner der Gegenwart ; and the anonymous Vier Monate auswartiger Politik (1851). His other works include Origines Germanicae (1840); the lectures Die Krisis der Reformation (1845) and Feudalitat und Aristokratie (1858); Aus der Zeit Friedrichs des Grossen und Friedrich Wilhelms HI. Abhandlungen zur preussischen Geschichte (1876); followed after his death by Abhandlungen aus der griechischen Geschichte and Abhandlungen aus der neueren Geschichte (1887).

DUNCKLEY, HENRY (1823-1896), English journalist, was born at Warwick on the 24th of December 1823. Educated at the Baptist college at Accrington, Lancashire, and at Glasgow University, he became in 1848 minister of the Baptist church at Salford, Lancashire. Here he closely investigated the educa- tional needs of the working-classes, embodying the results of his inquiries in an essay, The Glory and the Shame of Britain (185 1), which gained a prize offered by the Religious Tract Society. In 1852 he won the Anti-Corn-law League's prize with an essay on the results of the free-trade policy, published in 1854 under the title The Charter of the Nations. In 1855 he abandoned the ministry to edit the Manchester Examiner and Times, a prominent Liberal newspaper, in charge of which he remained till 1889. For twenty years he wrote, over the signature " Verax," weekly letters to the Manchester papers; those on The Crown and the Cabinet (1877) and The Crown and the Con- stitution (1878) evoked so much enthusiasm that a public sub- scription was set on foot to present the writer with a handsome testimonial for his public services. In 1878 Dunckley, who had often declined to stand for parliament, was elected a member of the

Reform Club in recognition of his services to the Liberal party, and in 1883 he was made an LL.D. by Glasgow University. He died at Manchester on the 29th of June 1896.

DUNCOMBE, SIR CHARLES (c. 1648-1711), English politician, was a London apprentice, who became a goldsmith and a banker; he amassed great wealth in his calling and was chosen an alderman of the city of London in 1 683 . D uncombe's parliamentary career began in 1685, when he was elected member of parliament for Hedon, and he was afterwards one of the representatives of Yarmouth in the Isle of Wight and of Downton in Wiltshire. He was made receiver of the customs, and upon the flight of James II. from England in 1688 refused to forward to him the sum of £1500 as requested; accordingly his name alone was excepted from the pardon issued by the exiled king in 1692. A strong Tory, Duncombe held for a short time the office of receiver of the excise, and in this capacity he profited slightly by a transaction over some exchequer bills which had been falsely endorsed. Consequently he was imprisoned by the House of Commons, and expelled from parliament; and having been released by order of the House of Lords, where his friends were more powerful, he was again imprisoned by the Commons. Tried before the courtof king's bench he was found "not guilty" on two occasions and the matter was allowed to drop. Duncombe made three unsuccessful attempts to enter parliament as member for the city of London, and then represented Downton a second time from 1702 until his death. In 1699 he was knighted, and in 1709 he served as lord mayor of London. Upon retiring from business

in 1695 Duncombe caused some stir by giving the representatives of the duke of Buckingham a high price for an estate at Helmsley in Yorkshire, where he built a magnificent house.

He died at his residence at Teddington on the 9th of April 17 1 1, and much of his great wealth passed to his sister, Ursula, wife of Thomas Browne, who took the name of Duncombe. Ursula's great-grandson, Charles Duncombe (1764-1841), was created Baron Feversham in 1826, and in 1868 his grandson, William Ernest, the 3rd baron (b. 1829), was made earl of Feversham. Sir Charles Duncombe's nephew, Anthony Dun- combe (c. 1695-1763), who was made a baron in 1747, left an only daughter, Anne (1757-1829), who married Jacob Pleydell- Bouverie, 2nd earl of Radnor, by whom she was the ancestress of the succeeding earls of Radnor.

A celebrated member of the Duncombe family was Thomas Slingsby Duncombe (1796-1861)ˆ Radical politician, who was member of

parliament for Hertford from 1826 to 1832 and for Finsbury from 1834 until his death. Duncombe defended Lord Durham's administration of Canada; he sought to obtain the release of John Frost and other Chartists, whose immense petition he presented to parliament in 1842; and he interested himself in the affairs of Charles II., the deposed duke of Bruns- wick. He showed a practical sympathy with Mazzini, whose letters had been opened by order of the English government, by urging for an inquiry into this occurrence; and also with Kossuth. He died at Lancing on the 13th of November i€6i.

See Life and Correspondence of T. S. Duncombe, edited by T. H. Duncombe (1868).

DUNDALK, a seaport of Co. Louth, Ireland, in the north parliamentary division, on the Castletown river near its mouth in Dundalk Bay. Pop. of urban district (1901), 13,076. It is an important junction on the Great Northern railway, by the main line of which it is 54 m. N. from Dublin. The company has its works here, and a line diverges to the north-west of Ireland. Dundalk is connected with the port of Greenore (for Holyhead) by a line owned by the London & North- Western railway company of England. The parish church is an old and spacious edifice with a curious wooden steeple covered with copper; and the Roman Catholic chapel is a handsome building in the style of King's College chapel, Cambridge. There are ruins of a Franciscan priory, with a lofty tower. Adjacent to the town are several fine parks and demesnes. Until 1885 a member was returned to parliament. A brisk trade, chiefly in agricultural and dairy producers carried on, and the town contains some manufactories. Distilling and brewing are the principal industrial works, and there are besides a flax and jute-spinning mill, salt works, &c. The port is the seat of a considerable trade, mainly in agricul- tural produce and live stock. It is also the centre of a sea-fishery district and of salmon fisheries. Dundalk was a borough by prescription, and received charters from Edward III. and successive monarchs. Edward Bruce, having invaded Ireland from Scotland in 131 5, proceeded south from his landing-place in Antrim, ravaging as he came, to Dundalk, which he stormed, and proclaimed himself king here. In this neighbourhood, too, he was defeated and killed by the English under Sir John de B ermingham in 1318, and at Faughart near Dundalk, near the ruined church of St 'Bridget, he is buried.

DUNDEE, JOHN GRAHAM OF CLAVERHOUSE, Viscount (c. 1649-1689), Scottish soldier, was the elder son of Sir William Graham and Lady Madeline Carnegie. Of his youth little record has

been kept; but in the year 1665 he became a student at the university of St Andrews. His education was upon the whole good, as appears from the varied and valuable correspondence of his later years. Young Graham was destined for a military career; and after about four years he proceeded abroad as a volunteer in the service of France. In 1673 or 1674 he went to Holland, and obtained a cornetcy, and he was soon raised to the rank of captain, as a reward for having saved the life of the prince of Orange at the battle of Seneff. A few years later, being disappointed in his hopes of obtaining a regiment, Graham resigned his commission. In the beginning ofi677he returned to England, bearing, it is said, letters of strong recommendation

from the prince to Charles II. and the duke of York. In 1678 he became a lieutenant, and soon afterwards captain of a troop, in the regiment commanded by his relative the marquis of Montrose. The task before him was the suppression of the Covenanters' rebellion. To this he brought, over and above the feelings of romantic loyalty and the cavalier spirit, which in his case was free from its usual defects, a hatred of the Covenanters which was based largely on his hero-worship of the great Montrose. Further, his uncompromising disposition and unmistakable capacity at once marked him out as a leader upon whom the government could rely. But the difficulties of his task, the open or secret 'hostility of the whole people, and the nature and extent of the 'country he was required to watch, were too great for the leader of a small body of cavalry, and in spite of his vigorous and energetic . action, Graham accomplished but little. He entered, however, 'upon his occupation with zest, and interpreted consistently the orders he received. There is evidence, also, that his efforts were appreciated at headquarters in his appointment, jointly with the laird of Earlshall, his subaltern, to the office of sheriff - depute of Dumfries and Annandale in March 1679, with powers — specially narrated in his commission — anent " separation," conventicles, " disorderly baptisms and marriages," and the like.

For some years thereafter the position of Graham was in the highest degree difficult and delicate. In the midst of enemies, and in virtue of the most erroneous but direct orders of his government, he combined the functions of soldier, spy, pro- secutor and judge. Shortly after the murder of Archbishop Sharp (1679), he was summoned to increased activity. There were reports of rebels gathering near Glasgow, and

Graham went in pursuit. On the 1st of June, the Covenanters being in a well- protected position upon the marshy ground of Drumclog, Graham advanced to the attack. Hindered by the ground, he had to wait till the impatience of his adversaries induced them to commence an impetuous attack. The charge of the Covenanters routed the royal cavalry, who turned and fled, Graham himself having a narrqw escape. This was the only regular engagement he had with the Covenanters. The enthusiasm raised by this victory was the beginning of a serious and open rebellion.

On the 22nd of June Graham was present at the battle of Bothwell Bridge, at the head of his own troop. Immediately thereafter he was commissioned to search the south-western shires for those who had taken part in the insurrection. In this duty he seems to have been engaged till the early part of 1680, when he disappears for a time from the record of these stringent measures. The wide powers given to him by his commission were most sparingly used, and the gravest accusation made against him in reference to this period is that he was a robber.

He was, in any case, an advocate of rigorous measures, and his own systematic and calculated terrorism, directed principally against the ringleaders, proved far more efficacious than' the irregular and haphazard brutalities of other commanders. During these months he was despatched to London, along with Lord Linlithgow, to influence the mind of Charles II. against the indulgent method adopted by Monmouth with the extreme Covenanting party. The king seems to have been fascinated by his loyal supporter, and from that moment Graham was destined to rise in rank and honours. Early in 1680 he obtained a royal grant of the barony of the outlawed Macdougal of Freuch, and the grant was after some delay confirmed by subsequent orders upon the exchequer in Scotland. In April 1680 it appears that his roving commission had been withdrawn by the privy council. He is thus free from all concern with the severe measures which followed the Sanquhar Declaration of the 22nd of June 1680.

The turbulence occasioned by the passing of the Test Act of 1681 required to be quelled by a strong hand; and in the begin- ning of the following year Graham was again commissioned to act in the disaffected districts. In the end of January he was appointed to the sheriffships of Wigtown, Dumfries, Kirk- cudbright and Annandale. He retained his commission in the army — the pernicious combination of his offices being thus repeated. He appears further to have had powers of life and vin. 22

death in virtue of a commission of justiciary granted to him about the same time. These powers he exercised strictly and in conformity with the tenor of his orders, which were not more severe than he himself desired. He quartered on the rebels, rifled their houses, and, to use his own words, " endeavoured to destroy them by eating up their provisions." The effect of his policy, if we believe his own writ, is not overstated as " Death, desolation, ruin and decay."

The result of a bitter quarrel between Graham and Sir John Dalrymple, who, with many others of the gentry, was far from active in the execution of the government's orders, confirmed his prestige. Graham was acauitted by the privy council of the charges of exaction and oppression preferred against him, and Sir John condemned to fine and imprisonment for interference with his proceedings. In December 1682 Graham was appointed colonel of a new regiment raised in Scotland. He had still greater honours in view. In January 1683 the case of the earl of Lauderdale, late Maitland of Hatton, was debated in the House of Lords. Maitland was proprietor of the lands and lordship of Dundee and Dudhope, and the decree of the Lords against him was in March 1683 issued for the sum of £72,000. Graham succeeded in having part of the property of the defaulter transferred to him by royal grant, and in May he was nominated to the privy council of Scotland.

Shortly afterwards Claverhouse was appointed to be present at the sittings of the Circuit Court of Justiciary in Stirling, Glasgow, Dumfries and Jedburgh, recently instituted for the imposition of the test and the punishment of rebels. Several were sentenced to death. During the rest of the year he attended the meetings of council, in which he displayed the spirit of an obedient soldier rather than that of a statesman capable of independent views. There is, however, one record of his direct and efficacious interference. He declared decisively against the proposal to let loose the Highland marauders upon the south of Scotland.

In June 1684 he was again at his old employment — the inspection of the southern shires; and in August he was com- missioned as second in command of the forces in Ayr and Clydes- dale to search out the rebels. By this time he was in possession of Dudhope, and on the 10th of June he married Lady Jean, daughter of William, Lord Cochrane. As constable of Dundee he recommended the remission of extreme punishment in the case of many petty offences. He issued from his retirement to take part in a commission of lieutenancy which perambulated the southern districts as a criminal court; and in the end of the year he was again in the same region on the occasion

of disturbances in the town of Kirkcudbright.

Shortly after the death of Charles II. (February 1685) Graham incurred a temporary disgrace by his deposition from the office of privy councillor; but in May he was reinstated, although his commission of justiciary, which had expired, was not renewed.

In May 1685 he was ordered with his cavalry to guard the borders, and to scour the south-west in search of rebels. By act of privy council, a certificate was required by all persons over sixteen years of age to free them from the hazard of attack from government officials. Without that they were at once liable to be called upon oath to abjure the declaration of Renwick, which was alleged to be treasonable. While on this mission he pursued and overtook two men, one of whom, John Brown, called the " Christian carrier," having refused the abjuration oath, was shot dead. The order was within the authorized powers of Graham.

In 1686 he was promoted to the rank of major-general, and had added to his position of constable the dignity of provost of Dundee. In 1688 he was second in command to General Douglas in the army which had been ordered to England to aid the falling dynasty of the Stuarts.

His influence with James II. was great and of long standing, and amid the hurry of events in this critical time he was created Viscount Dundee on the 1 2th of November 1688. Throughout the vexed journeyings of the king, Dundee is found accompanying or following him, endeavouring in vain to prompt him to make

his stand in England, and fight rather than flee from the invader. At last James announced his resolve to go to France, promising that he would send Dundee a commission to command the troops in Scotland.

Dundee returned to Scotland in anticipation of the meeting of the convention, and at once exerted himself to confirm the waning resolution of the duke of Gordon with regard to holding Edinburgh Castle for the king. The convention proving hostile (March 16th, 1688), he conceived the idea of forming another convention at

Stirling to sit in the name of James II., but the hesitancy of his associates rendered the design futile, and it was given up. Previous to this, on the 18th of March, he had left Edinburgh at the head of a company of fifty dragoons, who were strongly attached to his person. He was not long gone ere the news was brought to the alarmed convention that he had been seen clambering up the castle rock and holding con- ference with the duke of Gordon. In excitement and confusion order after order was despatched in reference to the fugitive. Dundee retired to Dudhope. On the 30th of March he was publicly denounced as a traitor, and in the latter half of April attempts were made to secure him at Dudhope, and at his residence in Glen Ogilvy. But the secrecy and speed of his movements outwitted his pursuers, and he retreated to the north.

In the few years which had elapsed since 1678 he had risen, despite the opposition of his superiors in rank, from the post of captain and the social status of a small Scottish laird to positions as a soldier and statesman and the favourite of his sovereigns, of the greatest dignity, influence and wealth. In this period he had, justly or unjustly, earned the reputation of being a cruel and ruthless oppressor. When the ruling dynasty changed, and he had himself become an outlaw and a rebel, he supported the cause of his exiled monarch with such skill and valour that his name and death are recorded as heroic.

In the Highlands his diplomatic skill was used with effect amongst the chieftains. General Hugh Mackay was now in the field against him, and a Highland chase began. The campaign resembled those of Montrose forty years earlier. The regular troops were at a great disadvantage in the wild Highland country, and Dundee, like Montrose, invariably anticipated his enemy. But, as usual, the army of the clans required the most careful management. After the first few weeks of operations, Dundee's army melted away, and Mackay, unable to follow his opponent, retired also.

Throughout the whole of the campaign Dundee was inde- fatigable in his exertions with the Highland chiefs and his communications with his exiled king. To the day of his death he believed that formidable succour for his cause was about to arrive from Ireland and France. He justly considered himself at the head of the Stewart interest in Scotland, and his despatches form a record of the little incidents of the campaign, strangely combined with a revelation of the designs of the statesman. It mattered little to him that on the 24th of July a price of £20,000 had been placed upon his head. The clans had begun to reassemble; he was now in command of a considerable force, and in July both sides took the field again. A contest for the

castle of Blair forced on the decision. Mackay, in his march towards that place, entered the pass of Killiecrankie, the battle- ground selected by Dundee and his officers. Here, on the 17th- 27th of July 1689, was fought the battle of Killiecrankie (

death of Dundee, in the mist and the confusion of a cavalry charge, formed the subject of numerous legends, the best known of which is the long prevalent tradition that he was invulnerable to all bullets and was killed by a silver button from his own coat.

See Mark Napier, Memorials and Letters of Graham of Claverhouse (1859-1862) ; Bannatyne Club, Letters of the Viscount Dundee (1826) ; C. S. Terry, John Graham of Claverhouse, Viscount Dundee; and authorities quoted in Diet. Nat. Biogr., s.v. ‘ ‘ Graham of Claverhouse. ‘ ‘

DUNDEE, a royal, municipal and police burgh, county of a city, and seaport of Forfarshire, Scotland. Pop. (1891) 153,587; (1001) 161,173. It hes on the north shore of the Firth of Tay, 591 m. N. by E. of Edinburgh by the North British railway via the Forth and Tay bridges. The Caledonian railway finds access to the city by way of Perth, which is distant about 22 m. W. by S. The general disposition of the town is from east to west, with a frontage on the water of 4 m. The area northwards that has already been built over varies in depth from half a mile to nearly 25 m. (from Esplanade Station to King’s Cross). The city rises gradually from the river to Dundee Law and Balgay Hill. Since the estuary to the E. of Tay bridge is 13 m. wide, and the commodious docks — in immediate contact with the river at all stages of the tide — are within 12 m. of the sea, the position of the city eminently adapts it to be the emporium of a vast trade by land and sea. But its prosperity is due in a far greater measure to its manufactures of jute and linen — of which it is the chief seat in the United Kingdom — -than to its shipping.

Public Buildings. — The town-hall, built in 1734 from the designs of Robert Adam, stands in High Street. It is surmounted by a steeple 140 ft. high, carrying a good peal of bells, and beneath it is a piazza. The old Town Cross, a shaft 1 5 ft. high, bearing a unicorn with the date of 1586, once stood in High Street also, but was re-erected within the enclosure on the S.W. of Town Churches (see below). Albert Square, with statues of Robert Burns, George Kinloch, the first member for Dundee in the Reform Parliament (both by Sir John Steell), and James Car- michael (1776-1853), inventor of the fan-blast (by John Hutchi- son, R.S.A.), contains several good buildings, among them the Royal Exchange in Flemish Pointed (erected in

1853-1856), the Eastern Club-house, and the Albert Institute, founded in memory of the prince consort. The last, built mainly from designs by Sir Gilbert Scott, is one of the most important edifices in the city, since it embraces the art gallery, free library, reference library, museum and several halls. On the north side of the building is the seated figure, in bronze, of Queen Victoria, on a polished red granite pedestal containing bas-reliefs of episodes in Her Majesty's life, the work of Harry Bates, A.R. A. The custom house, near the docks, is in Classical style and dates from 1843. The Sheriff Court buildings and Police Chambers, a structure of Grecian design, with a bold portico, was erected in 1 864-1865. The halls used for great public meetings are the Volunteer Drill Hall in Parker Square, and Kinnaird Hall in Bank Street. Of the newer streets, Commercial, Reform, Whitehall, Bank and Lindsay contain many buildings of good design and the principal shops. In Bank Street are the offices of the Dundee Advertiser, the leading newspaper in the north-east of Scotland; and in Lindsay Street the headquarters of the Dundee Courier. In Dock Street stands the Royal Arch, an effective structure, erected to commemorate the visit of Queen Victoria in 1844. Among places of amusement are the Theatre Royal, the People's Palace theatre, the Music Hall, the Circus and the Gymnasium. The cattle market and slaughter-houses, both on an extensive scale, are in the east end of the city, not far from Camperdown Dock. Dudhope Castle, once the seat of the Scrymgeours, hereditary constables of the burgh — one of whom (Sir Alexander) was a companion-in-arms of Wallace, — was granted by James II. to John Graham of Claverhouse. On his death it reverted to the crown, and at a later date was converted into barracks. When the new barracks at Dudhope Park were occupied, the Castle was transformed into an industrial museum. Though Dundee was once a walled town, the only relic of its walls is the East Port, the preservation of which was due to the tradition that George

Wishart preached from the top of it during the plague of

1544-

Churches.— Of the many churches and chapels the most in teresting is Town Churches — St Mary's, St Paul's and St Clement's, the three under one roof — surmounted by the noble square tower, 156 ft. high, called the Old Steeple, once the belfry of the church which was

erected on this spot by David, earl of Huntingdon, as a thank-offering for his escape from shipwreck on the shoals at the mouth of the Tay (1193). The church perished, but the bell-tower remained and was restored in 187 1- 1873 by Sir Gilbert Scott. The fine Roman Catholic pro- cathedral of St Andrew's is in Early English style, and St Paul's Episcopal church, in Decorated Gothic style, with a spire 211 ft. high, from designs by Sir Gilbert Scott, was due to the zeal of Bishop Forbes (1817-1875), who transferred the headquarters of the see of Brechin to Dundee. It occupies the site of the old castle. Memorial churches commemorate the work of Robert Murray McCheyne (1813-1843) and of George Gilfillan (1813-1878), long ministers in Dundee. John Glas (1695-1 773), founder of the Glasites (q.v.), ministered here from 1730 to 1733.

Cemeteries. — The ancient burying-ground in the centre of the city is called the Howff. It has long been closed, but contains several interesting monuments and epitaphs. Not far from it the New Cemetery was laid out in West Bell Street; to the east of Baxter Park lies the Eastern Cemetery; and the Western Cemetery was constructed in Perth Road. The most beautifully situated of all the burying-grounds, however, is the Western Necropolis, which occupies the western portion of the hill of Balgay. A bridge over the ravine connects it with Balgay Park.

Public Parks and Open Spaces.— On the N. of the city rises Dundee Law (571 ft.), the property of the Corporation, a prominent landmark, on the summit of which are traces of an old vitrified fort. The surrounding park covers 18 acres. Near the eastern boundary of the city lies Baxter Park, of 37 acres, pre- sented to the town by Sir David Baxter (1793-1872), a leading manufacturer, and his sisters. It was laid out by Sir Joseph Paxton, and contains a statue of Sir David by Sir John Steell, erected by public subscription. In the west the finely wooded hill of Balgay was acquired in 1869 and 36 acres of the area were converted into a park. Immediately adjoining it on the north is Lochee Park, of 25 acres, given to the city in 1891 by Messrs Cox Brothers of Camperdown Works. In the extreme north lies the park of Fair Muir, of 1 2 acres, which was secured in 1890, and nearer to the heart of the town is Dudhope or Barrack Park, purchased in 1893. Near the north end of the Tay bridge is Magdalen Green, an old common of 17 acres, and along the shore of the estuary there runs for a distance of 2 J m. from Magdalen Point to beyond Craig Pier a promenade called the Esplanade.

Education. — University College in Nethergate, founded in 1880 by Miss Baxter of Balgavies (d. 1884) and Dr John Boyd Baxter, was

opened in 1883, and united to the university of St Andrews in 1890. The affiliation was cancelled in 1895 owing to divergence of view in the governing body, but this was over- come and the college finally incorporated in 1897. The staff consists of a principal, professors and lecturers, and the curri- culum, which may be taken by students of both sexes, is especi- ally concerned with medicine and natural and applied science. The endowments exceed £250,000. Adjoining the buildings is the Technical Institute, built and endowed by Sir David Baxter and opened in 1888. In connexion with the high school, a building in the Doric style, dating from 1833, there is a museum which was endowed in 1880 by Mr William Harris. Morgan hospital, a structure in the Scots Baronial style, situated immedi- ately to the north of Baxter Park, was founded in 1868 by John Morgan, a native of Dundee, for the board and education of a hundred boys, sons of indigent tradesmen, but was acquired by the school board and transformed into a secondary school. Besides a high school for girls and Roman Catholic and Epis- copalian schools, there are numerous efficient and thoroughly equipped board schools.

Charitable Institutions. — One of the most conspicuous buildings in the city, occupying a prominent position in the centre, is the

Royal Infirmary, a fine structure in the Tudor style. On the southern face of Balgay Hill stands the Royal Victoria hospital for incurables, opened in 1889. In addition to the maternity hospital and nurses' home, there are several institutions devoted to special afflictions and diseases — among them the Blind and the Deaf and Dumb institutions, the Royal asylum, the fever hospital at King's Cross, and, in the parish of Mains — beyond the municipal boundary — the Baldovan asylum for imbeciles, founded in 1854 by Sir John Ogilvy and said to be the earliest of its kind in Scotland, besides the smallpox and cholera hospital. The large Dundee hospital adjoins the poorhouse, andanepidemic hospital has been built in the Fair Muir district. One of the convalescent homes is situated at Broughty Ferry. Among other institutions are the Royal Orphan and the Wellburn Charitable institutions, the rescue home for females, the sailors' home and Lady Jane Ogilvy's orphanage in Mains.

Trade. — Hector Boece, in his History and Croniklis of Scotland, thus quaintly writes of the manufactures of Dundee in the opening of the 16th century — " Dunde, the toun quhair we wer born; quhair mony virtewus and lauborius pepill ar in, making of claith." Jute is, par excellence, the industry of the city. Enormous quantities of the raw material — estimated at 300,000 tons a year — are imported directly from India in a fleet solely devoted to this trade, and many

of the factories in Bengal are owned by Dundee merchants. Fabrics in jute range from the roughest sacking to carpets of almost Oriental beauty. Another staple industry is the linen manufacture, which is also one of the oldest, although it was not till the introduction of steam power that headway was made. Bell Mill, erected in 1806, was the first work of any importance, and the first power-loom factory dates from 1836. Now factories and mills are to be counted by the score, and the jute, hemp and flax manufactures alone employ about 50,000 hands, while the value of the combined annual output exceeds £6,000,000. Some of the works are planned on a colossal scale, and many of the buildings in respect of design and equipment are among the finest and most complete in the world. In the thriving quarter of Lochee are situated the Camperdown Linen Works, covering an immense area and employing more than 5000 hands. The chimney-stalk (282 ft. high), in the style of an Italian campanile, built of parti-coloured bricks with stone cornices, is a conspicuous feature. The chief textile products are drills, ducks, canvas (for which the British navy is the largest customer), ropes, sheetings, sackings and carpets. Dundee is also celebrated for its confectionery and preserves, especially marmalade. Among other prominent industries are bleaching and dyeing, engineering, shipbuilding, tanning, the making of boots and shoes and other goods in leather, foundries, breweries, corn and flour mills, and the construction of motor-cars.

Shipping. — By reason of its excellent docking facilities Dundee can cope with a shipping trade of the largest proportions. On the front wharves and harbour works extend for 2 m., and the docks cover an area of 35! acres, made up thus — Earl Grey Dock, Si acres; King William IV. Dock, 6i acres; Tidal Harbour, 4! acres; Victoria Dock, 10} acres; Camperdown Dock, 85 acres. There are, besides, graving docks, the Ferry harbour and timber ponds. The warehouses are capacious and the ample quays equipped with steam cranes and other modern appliances. In 1898 there entered and cleared 2914 vessels of 1,390,331 tons; in 1904 the numbers were 2428 vessels of 1,227,429 tons. At the close of 1904 the registered shipping of the port was 131 vessels of 109,885 tons. Dundee is the seat of the Arctic fishery, once an important and lucrative business, but now shrunk to the most meagre dimensions in consequence of the increasing scarcity of whales and seals. There is regular communication by steamer with London, Hull, Newcastle, Liverpool and Leith, besides Rotterdam, Hamburg and other continental ports. Of the local excursions the two hours' run to Perth is the favourite summer trip.

Local Government. — Dundee returns two members to parlia- ment. The city council consists of the lord provost, bailies and councillors. The corporation owns the gas and water supplies

(the latter drawn from the loch of Lintrathen, 18 m. to the N.W.) and the electric tramcars.

History. — There appears to be some doubt as to the origin of the name of Dundee. It is extravagant to trace it to the Latin Donum Dei, " the gift of God," as some have done, or the Celtic Dun Dhia, " the hill of God." More probably it is the Gaelic Dun Taw, " the fort of the Tay," of which the Latin Taodunum is a transliteration— the derivation pointing to the fact of a Pictish settlement on the site. The earliest authentic mention of the city is in a deed of gift by David, earl of Huntingdon, younger brother of William the Lion, dated about 1200, in which it is designated as " Dunde." Shortly afterwards it was erected into a royal burgh by William the Lion. When Edward I. visited it, however, as he did twice (in 1296 and 1303) with hostile intent, he is said to have removed its charter. Consequently Robert Bruce and successive kings confirmed its privileges and rights, and Charles I. finally granted it its great charter. Dundee played a prominent part in the War of Scottish Independence. Here Wallace finished his education, and here he slew young Selby, son of the English constable, in 1 291 , for which deed he was outlawed. In that year the town fell into the hands of the English, and it was whilst engaged in besieging the castle in 1297 that Wallace withdrew to fight the battle of Stirling Bridge. In their incursion into Scotland under John of Gaunt the English captured and partially destroyed the town in 1385, but retreated to meet a counter-invasion of their own country. The English seized i.t again for a brief space during one of the 1st earl of Hertford's devastating raids in the reign of Edward VI. Dundee bore such a prominent part in propagating the Reformed doctrines that it was styled " the Scottish Geneva." It saw more trouble at the time of the Civil War, for the marquess of Montrose sacked it in 1645, and then gave a considerable portion of it to the flames. Charles II. spent a few days in the castle after his crowning at Scone (January 1st, 1651). In the same year General Mo»lt demanded the submission of the town to Cromwell, and on its refusal captured it after an obstinate resistance and visited it with condign punishment. More than one-sixth of the inhabitants and garrison, including its governor Lumsden, were put

to the sword, and no fewer than 60 vessels were seized and filled with plunder; but the ships, says Gumble in his Life of Monk, " were cast away within sight of the town and that great wealth perished." In 1684 John Graham of Claverhouse — whose family derived its name from the lands of Claverhouse in the parish of Mains immediately to the north of the town — became constable, and in 1688 provost. In the same year James II. created him Viscount Dundee. Thenceforward the annals of the town cease to touch national history, save at very rare intervals. The greatest local disaster of modern times was the destruction of the first Tay bridge (see Tay).

Many interesting old documents have been preserved in the Town House, such as certain characteristic despatches from Edward I. and Edward II., the original charter of Robert Bruce, dated 1327, a papal order from Leo X., and a letter from Queen Mary, dated 1 564, providing for extra-mural interments. It may be mentioned that to describe Claverhouse himself as " bonnie Dundee " is a modern invention, the old song from which Sir Walter Scott borrowed a hint for his refrain referring solely to the town.

Since the middle and particularly during the last quarter of the 19th century many of the more unsightly districts have been demolished. In the process several picturesque but insanitary buildings, narrow winding streets and unsavoury closes dis- appeared, along with a few structures of more or less historic interest, like the castle, the mint and numerous convents. The wholesale clearances, however, improved both the public health and the appearance of the city, some of the new thoroughfares vieing with the finest business streets of the largest commercial centres in the United Kingdom. Queen Victoria granted a charter to Dundee, dated the 25th of January 1889, erecting it to the status of a city, and since 1892 its chief magistrate has been styled lord provost.

Among men more or less eminent who were born in Dundee may

be named Hector Boece (1465-1536), the historian; George Dempster of Dunnichen (1732-1818), the agriculturist, a former owner of Skibo; Thomas Dick (1774-1857), the author of The Christian Philosopher; Admiral Lord Duncan (1 731-1804); Viscount Dundee (1643-1689); James Halyburton (1518- 1589), the Scottish Reformer, who was provost of the town for thirty-three years; Sir James Ivory (1765-1842), the mathe- matician, who bequeathed his science library to the town, and his nephew Lord Ivory (1792-1866), the judge; Sir George Mackenzie (1636-1691), the celebrated lawyer; Sir Alexander Scrymgeour (d. 13 10), Wallace's standard-bearer, and many of the Scrymgeours, his successors, who were constables of the town; James (1495-1553), John (1500-1556) and Robert Wedderburn (1510-1557), the poets, who were all concerned in the authorship or collection of the book of Gude and Godlie Ballatis published in 1578; Sir John Wedderburn (1599-1679), the physician; and Sir Peter Wedderburn(i6i6-i679), the judge. Many well-known persons lived for longer or shorter periods in the town. James Chalmers (1782-1853), the inventor of the adhesive postage stamp (1 834) , was a bookseller in Castle Street. George Constable of Wallace Craigie, the prototype of Jonathan Oldbuck in Sir Walter Scott's Antiquary, had a residence in the east end of Seagate, the house standing until about 1820. Thomas Hood's father was a native and the poet spent part of his youth in the town, his first literary effort appearing in the Dundee Advertiser about 1816.' James Bowman Lindsay (1799-1862), electrician and philologist, carried on his experiments for many years in Dundee, where he died. Robert Nicoll (1814-1837), the poet, kept a circulating library in Castle Street; and William Thorn (1798-1848), the writer of The Rhymes of a Handloom Weaver, was buried in the Western Cemetery.

Suburbs. — Close to the municipal boundaries on the N.W. liesBenvie, where John Playf air (1748-1819), the mathematician, was born, and which has a mineral well that once enjoyed con- siderable repute. Camperdown House, the seat of the earl of Camperdown, a fine building of Greek design, standing in beautiful grounds, is situated in the parish. Fowlis, 5 m. N.W., is remarkable for its church, which dates from the 15th century, but has even been assigned to the 12 th. It contains a carved ambry and rood-screen (with a curious representation of the Crucifixion), decorated font, crocketed door canopy and several pictures. The ruined castle adjoining the church ultimately became a dwelling for labourers. The Dell of Balruddery is rich in geological and botanical specimens.

Lundie, 3 m. farther out in the same direction, contains several lakelets, and its kirkyard is the burial-place of the earls of Camperdown. Tealing, 4 m. N. of Dundee, was the scene of the ministry of John Glas before he was deposed for heresy.

Authorities. — David Barrie, The City of Dundee Illustrated (Dundee, 1890); Alexander Maxwell, Old Dundee (Dundee, 1891); A. C. Lamb, Dundee: its Quaint and Historic Buildings (Dundee, 1895) ; A. H. Millar, Roll of Eminent Burgesses of Dundee (Dundee,

1887).

DUNDERLANDSDAL, a valley of northern Norway, in Nord- land amt (county), draining south-westward from the neigh- bouring glaciers to the Ranenfjord (lat. 66° 20′ N). There are deposits of iron ore, the working of which was undertaken in 1902 by the Dunderland Iron Ore Company, water-power being provided by the strong Dunderland river. There are also pyrites mines. At the mouth of the river is Mo, a considerable trading village. The valley is remarkable for several stalactite caverns in the limestone, some of the tributary streams flowing for considerable distances underground. From Mo a fine road crosses the mountains to the head-lake of the great Ume river, draining to the Baltic, and from the head of Dunderlandsdal a sequestered bridle-path runs to Saltdal on the Skjerstadfjord, with a branch through the magnificent Junkersdal.

DUNDONALD, THOMAS COCHRANE, ioth Earl of (1775- 1860), British admiral, was born at Annsfield in Lanarkshire on the 14th of December 1775. He came of an old Scottish family, the first earl having been Sir William Cochrane (d. 1686), a soldier who was created Baron Cochrane in 1647 and earl of

Dundonald in 1669. He was the son of Archibald Cochrane, 9th Earl (1 740-1831), who is remembered as a most ingenious, but also most unfortunate, scientific speculator and inventor, who was before his time in suggesting and attempting new processes of alkali manufacture, and various other uses of applied science. The family was greatly impoverished owing to his losses over these schemes, but still possessed a good deal of interest. By the help of friends Thomas was provided with a commission in an infantry regiment, and at the

same time put on the books of a man-of-war by his uncle, Captain A. F. I. Cochrane (1758-1832), while still a boy. He finally chose the navy, and went to sea in his uncle's ship, the " Hind," in 1793. He could already count nearly five years' nominal service, an example of those naval abuses which he was to denounce (and to profit by) during a large part of his career. His promotion was rapid. He became a lieutenant in 1796. While in that rank he was led by his self-assertive temper into a quarrel with his superior, Lieutenant Philip Beaver (1766-1813), for which he was sent before a court-martial. A warning to avoid flippancy in future was, however, the worst that happened to him.

In 1800 he was appointed to the command of the " Speedy " brig, a small vessel in which he gained a great and deserved reputation as a daring and skilful officer. His capture of the Spanish frigate " El Gamo " (32) on the 6th of May 1801 was indeed a feat of unparalleled audacity. His promotion to post rank followed on the 8th of August. Though he was apt to represent himself as disliked and neglected by the admiralty, and was frequently insolent towards his superiors, he was, as a matter of fact, pretty constantly employed, and he more than justified his appointments by his activity and success as captain of the " Pallas " (32) and " Imperieuse " (38) on the ocean and in the Mediterranean. Unfortunately for himself he secured his return to parliament as member for Honiton in 1806 and for Westminster in 1807. In the House of Commons he soon made his mark as a radical, and as a denouncer of naval abuses. But his views did not prevent him from profiting to the utmost by one very bad abuse, for he did his utmost to secure the retention of his frigate in port, in order that he might be able to attend parliament. In spite of his radical opinions he made a furious attack on the admiralty for the new prize money regulations which diminished the shares of the captains to the advantage of the men. In April 1809 he was engaged in the attack on the French squadron in the Basque Roads, which was very ill con- ducted by Lord Gambier. The conduct of Lord Cochrane, as he was called till the death of his father, was brilliant and was rewarded by the order of the Bath, but his aggressive temper led him into making attacks on the admiral which necessitated a court-martial on Gambier. The admiral was acquitted, and Cochrane naturally fell into disfavour with the admiralty. He was not employed again till 18 13, when he was named to the command of the " Tonnant, " which was ordered for service as flagship on the coast of America. In the interval he was rest- lessly active in parliament in denouncing naval abuses, and was also, most disastrously for himself, led into speculations on the Stock

Exchange, by which he was brought at the beginning of 1814 into pressing danger of total ruin.

At this moment a notorious fraud was perpetrated on the Stock Exchange by an uncle of his and by other persons with whom he habitually acted in his speculations. Lord Cochrane was brought to trial with the others before Lord Ellenborough on the 8th of June 18 14 and all were condemned. He was sen- tenced to an hour in the pillory, which was remitted, and to fine and imprisonment, which were enforced. He continued to assert his innocence, and to protest that he had been unjustly condemned, but he was expelled from parliament and the order of the Bath. He was, however, almost immediately re-elected member for Westminster, but he had to serve his term (one year) of imprisonment, and, after escaping and being recaptured, he regained his liberty in 1815 on payment of the fine of £1000 to which he had been sentenced. In 1817 he accepted the invitation of the Chileans, who were

then in revolt against Spain, to take command of their naval forces, and remaining in their service until 1822 contributed largely to their success. His capture of the Spanish frigate " Esmeralda " (40) in the harbour of Callao, on the 5th of November 1820, was an achievement of signal daring. In 1823 he transferred his services to Brazil, where he helped the emperor Dom Pedro I. to shake off the yoke of Portugal; but by the end of 1825 he had fallen out with the Brazilians, and he returned to Europe. His activity was next devoted to the aid of the Greeks, then at the end of their struggle with the Turks, but he found no opportunity for distinguishing himself, and in 1828 he returned home. His efforts were now steadily directed to securing his restoration to the navy, and in this he succeeded in 1832; but though he was granted a " free pardon " he failed to obtain the new trial for which he was anxious, or to secure the arrears of pay he claimed. 1 He was restored to his place in the order of the Bath in 1847. In 1848 he was appointed to the command of the North American and West India station, which he retained till 1851. At various periods of his life he occupied himself with scientific invention. He took out patents for lamps to burn oil of tar, for the propulsion of ships at sea, for facilitating excavation, mining and sinking, for rotary steam-engines and for other purposes; and so early as 1843 he was an advocate of the employment of steam and the screw propeller in warships. During the Crimean War he revived his " secret war plan " for the total destruction of an enemy's fleet, and offered to conduct in person an attack on Sevastopol and destroy it in a few hours without loss to the attacking force. This plan, the details of which have never been divulged, he had proposed

so far back as 181 1, and the committee which was then appointed to con- sider it reported on it as effective but inhuman. Lord Dundonald died in London on the 30th of October i860, and was buried in Westminster Abbey. No one ever excelled him in daring and resource as a naval officer, but he suffered from serious defects of character, and even those who think him guiltless of the charge on which he was convicted in 1814 must feel that he had his own imprudence and want of self-command to thank for many of his misfortunes.

He was succeeded in the title by his son Thomas as nth earl (d. 1885), and the latter by his son Douglas (b. 1852) as 12th earl, a distinguished cavalry officer who became a lieutenant-general in 1907.

The 10th earl's Autobiography of a Seaman (2 vols., 1860-1861), the main source for his Life (1869, by his son and heir), is written with spirit, but it was composed at the end of his career when his memory was failing, and was chiefly executed by others. He also wrote Notes on the Mineralogy, Government and Condition of the British West India Islands (1851), and a Narrative of Services in the Liberation of Chili, Peru and Brazil (1858). The whole story of his trial and of the Stock Exchange fraud for which he was condemned has been examined by Mr J. B. Atlay in The Trial of Lord Cochrane before Lord Ellenborough (1897).

DUNEDIN, a city of New Zealand, capital of the provincial district of Otago, and the seat of a bishop, in Taieri county. Pop. (1906) 36,070; including suburbs, 56,020. It lies 15 m. from the open sea, at the head of Otago harbour, a narrow inlet (averaging 2 m. in width) on the south-eastern coast of South Island. The situation was chosen on the consideration of this harbour alone, for the actual site offered many difficulties, steep forest-clad hills rising close to the sea, and rendering reclamation necessary. The hills give the town a beautiful appearance, as the forest was allowed to remain closely embracing it, being preserved in the public ground named the Town Belt. The principal thoroughfare is comprised in Prince's Street and George Street, running straight from S.W. to N.E., and passing through the Octagon, which is surrounded by several of the principal buildings. From these streets others strike at right angles down to the harbour, while others again lead obliquely up towards the Belt, beyond which are extensive suburbs. There are several handsome commercial and banking houses.

1 In 1878, as the result of the report of a select committee of the House of Commons appointed in 1877, a grant of £5000 was made

to the then Lord Cochrane " in respect of the distinguished services of his grandfather, the late earl of Dundonald."

• The town hall, Athenaeum and museum are noteworthy buildings, the last having a fine biological collection. The university, founded in 1869, built mainly of basalt, has schools of arts, medicine, chemistry and mineralogy. It is in reality a university college, for though it was originally intended to have the power of conferring degrees, it was subsequently affiliated to the New Zealand University. The churches are numerous and some are particularly handsome; such as the First church, which over- looks the harbour, and is so named from its standing on the site of the church of the original settlers; St Paul's, Knox church and the Roman Catholic cathedral of St Joseph. Finally, one of the most striking buildings in the city is the high school (1885) with its commanding tower. The white Oamaru stone is com- monly used in these buildings. The primary and secondary schools of the town are excellent, and there is a small training college for state teachers. Besides the Belt there are several parks and reserves, including botanical and acclimatization gardens, the so-called Ocean Beach, and two race-courses.

Dunedin is connected by rail with Christchurch northward and Invercargill southward, with numerous branches. Electric tramways serve the principal thoroughfares and suburbs. The most important internal industries are in wool and frozen meat. The harbour is accessible, owing to extensive dredging, to vessels drawing 19 ft., at high tide; and Dunedin is the headquarters of the coasting services of the Union Steamship Go. Port Chalmers, however (9 m. N.E. by rail) though incapacitated by its site from growing into a large town, is more readily accessible for shipping, and has extensive piers and a graving dock. Dunedin is governed by a mayor and corporation, and most of its numerous suburbs are separate municipalities.

The colony of Otago (from a native word meaning ochre, which was found here and highly prized by the Maoris as a pigment for the body when preparing for battle) was founded as the chief town of the Otago settlement by settlers sent out under the auspices of the lay association of the Free Church of Scotland in 1848. The discovery of large quantities of gold in Otago in 1861 and the following years brought prosperity, a great " rush " of diggers setting in from Australia. Gold- dredging, in the hands of rich companies, remains a

primary source of wealth in the district.

DUNES, 1 or Dunkirk Dunes, Battle or, was fought near Dunkirk on the 24th of May (3rd of June) 1658, between the French and English army under the command of Marshal Turenne and the Spanish army under Don Juan of Austria and the prince of Cond6. The severest part of the fighting was borne by the English contingents on either side. Six thousand English infantry under General Lockhart were sent by Cromwell to join the army of Turenne, and several Royalist corps under the command of the duke of York (afterwards James II.) served in the Spanish forces. The object of the Spaniards was to relieve Dunkirk, which Turenne was besieging, and the complete victory of the French and English caused the speedy surrender of the fortress.

DUNFERMLINE, ALEXANDER SETON, ist Earl or (c. 1555- 1622), was the fourth son of George, 5th Lord Seton, and younger brother of Robert, ist earl of Winton. He was sent as a boy to Rome, where he studied at the Jesuits' College with a view to becoming a priest. He turned, however, to the study of law, and after some years' residence in France was called to the bar about 1577. He was suspected of Romanist leanings by the officials of the Scottish kirk, and was temporarily deprived of the priory of Pluscardine, which had been granted to him by his god-mother, Queen Mary. In 1583 he accompanied his father, Lord Seton, on an embassy to Henry III. of France. His promotion was now rapid: he was made extraordinary lord of session in 1586 as prior of Pluscardine, ordinary lord of session in 1588 as lord Urquhart, judge in 1593, lord president of the court session in 1598, Baron Fyvie in 1597 and chancellor in 1604. In 1595 he was one of the commission formed by James VI. to control the royal finance. The eight commissioners were known from their number as the Octavians, and were 1 For the word " dune " see Down. '

relieved of their functions about two years later. Urquhart's continued influence was, however, assured, in spite of the animosity of the kirk, by his appointment as lord provost of Edinburgh of nine successive years. He showed considerable independence in his relations with James VI., and dissuaded him from his intention of forming a standing army in readiness to enforce his claims to the English crown. He was entrusted with the care of Prince Charles, afterwards Charles I., after the king's departure for England, and arranged the details of the union between Scotland and England. He became chancellor of Scotland in 1604, and on the 4th of March 1605 he was created earl of Dunfermline. He died at Pinkie House,

near Musselburgh, on the 16th of June 1622.

His son Charles, 2nd earl of Dunfermline (c. 1608-1672), was the offspring of his third marriage with Margaret Hay, sister of John, ist earl of Tweeddale. He signed the National Covenant and was one of the leaders of the Presbyterian party, but as one of the " Engagers " of 1648 he was prevented from holding any public office, and after the execution of Charles I. he joined Charles II. on the continent. He was made privy councillor at the Restoration, extraordinary lord of session and lord of the articles in 1667, and in 1671 lord privy seal. He died in May 1672. The earldom was then held successively by his sons Alexander (d. 1675) and James; but at the latter's death, at St Germains on the ?6th of December 1694, the title became extinct.

See G. Seton, Memoir of Alex. Seton, first Earl of Dunfermline (1882) ; and Sir Robert Douglas, Scots Peerage, vol. ii. (1906, edited by Sir J. B. Paul).

DUNFERMLINE, JAMES ABERCROMBY, ist Baron (1776- 1858), third son of General Sir Ralph Abercromby, was born on the 7th of November 1776. He was called to the bar at Lincoln's Inn in 1801, and became a commissioner in bankruptcy, and subsequently steward for the estates of the 5th duke of Devonshire. In 1807 he was chosen member of parliament for the borough of Midhurst, and in 181 2 was returned for Calne by the influence of the 3rd marquess of Lansdowne. He attached himself to the Whigs, but his chief interest was reserved for Scottish questions, and on two occasions he sought to change the method of electing representatives to parliament for the city of Edinburgh. When the Whigs under George Canning came into power in 1827, Abercromby was made judge-advocate-general, and became chief baron of the exchequer of Scotland in 1830, when he resigned his seat in parliament. This office was abolished in 1832, and Abercromby received a pension of £2000 a year, and was sent as member for Edinburgh to the reformed parliament. After being an unsuccessful candidate for the office of speaker he joined the cabinet of Earl Grey in 1834 as master of the mint. Again a candidate for the speaker- ship in the new parliament of 1835, Abercromby was elected to this office after an exceptionally keen contest by a majority of ten votes. As speaker he was not very successful in quelling disorder, but he introduced several important reforms in the management of private bills. Resigning his office in May 1839 he was created Baron Dunfermline of Dunfermline, and granted a pension of £4000 a year. He continued his interest in the affairs of Edinburgh, and was one of the founders of the United Industrial school. He died at Colinton House, Midlothian, on the

17th of April 1858, and was succeeded in the title by his only son, Ralph. His wife was Marianne, daughter of Egerton Leigh of West Hall, High Leigh, Cheshire. He wrote a life of his father, Sir Ralph Abercromby, which was published after his death (Edinburgh, 1861).

See Spencer Walpole, History of England (London, 1890) ; Greville Memoirs, edited by H. Reeve (London, 1896) ; Lord Cockburn's Journal (Edinburgh, 1874).

DUNFERMLINE (Gaelic, " the fort on the crooked linn "), a royal, municipal and police burgh of Fifeshire, Scotland. Pop. (1891) 22,157; (1901) 25,250. It is situated on high ground 3 m. from the shore of the Firth of Forth, with two stations on the North British railway — Lower Dunfermline i6f m., and Upper Dunfermline 191 m. N.W. of Edinburgh, via the Forth Bridge. The town is intersected from north to south by Pittencrieff Glen,

a deep, picturesque and tortuous ravine, from which the town derives its name and at the bottom of which flows Lyne Burn.

The history of Dunfermline goes back to a remote period, for the early Celtic monks known as Culdees had an establishment here; but its fame and prosperity date from the marriage of Malcolm Canmore and his queen Margaret, which was solemnized in the town in 1070. The king then lived in a tower on a mound surrounded on three sides by the glen. A fragment of this castle still exists in Pittencrieff Park, a little west of the later palace. Under the influence of Queen Margaret in 1075 the foundations were laid of the Benedictine priory, which was raised to the rank of an abbey by David I. Robert Bruce gave the town its charter in 1322, though in his Fife: Pictorial and Historical (ii. 223), A. H. Millar contends that till the confirming charter of James VI. (1588) all burghal privileges were granted by the abbots.

In the 1 8th century Dunfermline impressed Daniel Defoe as showing the " full perfection of decay," but it is now one of the most prosperous towns in Scotland. Its staple industry is the manufacture of table linen. The weaving of damask was intro- duced in 1 7 18 by James Blake, who had learned the secret of the process in the workshops at Drumsheugh near Edinburgh, to which he gained admittance by feigning idiocy; and since that date the linen trade has

advanced by leaps and bounds, much of the success being due to the beautiful designs produced by the manufacturers. Among other industries that have largely contributed to the welfare of the town are dyeing and bleaching, brass and iron founding, tanning, machine-making, brewing and distilling, milling, rope-making and the making of soap and candles,while the collieries in the immediate vicinity are numerous and flourishing.

The town is well supplied with public buildings. Besides the New Abbey church, the United Free church in Queen Anne Street founded by Ralph Erskine, and the Gillespie church, named after Thomas Gillespie (1708-1774), another leader of the Secession movement, possess some historical importance. Erskine is commemorated by a statue in front of his church and a sarcophagus over his grave in the abbey churchyard; Gillespie by a marble tablet on the wall above his resting-place within the abbey. The Corporation buildings, a blend of the Scots Baronial and French Gothic styles, contain busts of several Scottish sovereigns a statue of Robert Burns, and Sir Noel Paton's painting of the " Spirit of Religion." Other structures are the County buildings, the Public, St Margaret's, Music and Carnegie halls, the last in the Tudor style, Carnegie public baths, high school (founded in 1560), school of science and art, and two hospitals. Several distinguished men have been associated with Dunfermline. Robert Henryson (1430-1 506) , the poet, was long one of its schoolmasters. John Row (1568-1646), the Church historian, held the living of Carnock, 3 m. to the E., and David Ferguson (d. 1598) who made the first collection of Scottish proverbs (not published till 1641), was parish minister; Robert Gilfillan (1798-1850), the poet, and Sir Joseph Noel Paton (1821- 1901), painter and poet — whose father was a designer of patterns for the damask trade — were all born here. Andrew Carnegie (b. 1837), however, is in a sense the most celebrated of all her sons, as he is certainly her greatest benefactor. He gave to his birth- place the free library and public baths, and, in 1903, the estate of Pittencrieff Park and Glen, rich in historical associations as well as natural charm, together with bonds yielding £25,000 a year, in trust for the maintenance of the park, the support of a theatre for the production of plays of the highest merit, the periodical exhibitions of works of art and science, the promotion of horti- culture among the working classes and the encouragement of technical education in the district. The town is governed by a provost, bailies and council, and, with Stirling, Culross, Inver- keithing and Queensferry (the Stirling group), combines in returning a member to parliament.

Dunfermline Abbey is one of the most important remains in Scotland.

Excepting Iona it has received more of Caledonia's royal dead than any other place in the kingdom. Within its precincts were buried Queen Margaret and Malcolm Canmore; their sons Edgar and Alexander I., with his queen; David I. and

his two queens; Malcolm IV.; Alexander III., with his first wife and their sons David and Alexander; Robert Bruce, with his queen Elizabeth and their daughter Matilda; and Annabella Drummond, wife of Robert III. and mother of James I. Brace's heart rests in Melrose, but his bones lie in Dunfermline Abbey, where (after the discovery of the skeleton in 18 18) they wer$ reinterred with fitting pomp below the pulpit of the New church. In 1891 the pulpit was moved back and a monumental brass inserted in the floor to indicate the royal vault. The tomb of St Margaret and Malcolm, within the ruined walls of the Lady chapel, was restored and enclosed by command of Queen Victoria. During the winter of 1303 the court of Edward I. was held in the abbey, and on his departure next year most of the buildings were burned. When the Reformers attacked the abbey church in March 1560, they spared the nave, which served as the parish church till the 19th century, and now forms the vestibule of the New church. This edifice, in the Perpendicular style, opened for public worship in 182 1, occupies the site of the ancient chancel and transepts, though differing in style and proportions from the original structure. The old building was a fine example of simple and massive Norman, as the nave testifies, and has a beautiful doorway in its west front. Another rich Norman doorway was exposed in the south wall in 1903, when masons were cutting a site for the memorial to the soldiers who had fallen in the South African War. A new site was found for this monument in order that the ancient and beautiful entrance might be preserved. The venerable structure is maintained by the commissioners of woods and forests, and private munificence has provided several stained-glass windows. Of the monastery there still remains the south wall of the refectory, with a fine window. The palace, a favourite residence of many of the kings, occupying a picturesque position near the ravine, was of considerable size, judging from the south-west wall, which is all that is left of it. Here James IV., James V. and James VI. spent much of their time, and within its walls were born three of James VI.'s children — Charles I., Robert and Elizabeth. After Charles I. was crowned he paid a short visit to his birthplace, but the last royal tenant of the palace was Charles II., who occupied it just before the battle of Pitreavie (20th of July 1650), which took place 3 m. to the south-west, and here also he signed the National League and Covenant.

See A. H. Millar's Fife: Pictorial and Historical (2 vols., 1895); and Sheriff yEneas Mackay's History of Fife and Kinross (1896).

DUNGANNON, a market town of Co. Tyrone, Ireland, in the east parliamentary division, on an acclivity 8 m. W. of the south- western shore of Lough Neagh. Pop. of urban district (1901) 3694. It is 103 m. N.N.W. from Dublin by the Great Northern railway, and a branch line runs thence to Cookstown. The only public buildings of note are the parish church, with an octagonal spire, and a royal school founded in 1614 and settled in new buildings at the end of the 18th century; it is now managed by the county Protestant Board of Education. Linens, muslin and coarse earthenware are manufactured, tanning is prosecuted, and there is trade in corn and timber. The early history of the place is identified with the once powerful family of the O'Neills, whose chief residence was here, and a large rath or earthwork north of the town was the scene of the inauguration of their chiefs, but of the castle and abbey founded by this family there are no remains. In Dungannon the independence of the Irish parlia- ment (to which the town returned two members) was proclaimed in 1782. The town was formerly corporate, and was a parlia- mentary borough returning one member to the Imperial parlia- ment until 1885.

DUNGARPUR, a native state of India, in the Rajputana agency, in the extreme south of Rajputana. A large portion is hilly, and inhabited by Bhils. Its area is 1447 sq. m. In 1901 the total population was 100,103, showing an increase of 2% in the decade. The revenue is £15,100, and the tribute £2276. An annual fair is held at Baneswar. Kherwara is the head- quarters of the Mewar Bhil corps.

The chiefs of Dungarpur, who bear the title of maharawal, are descended from Mahup, eldest son of Karan Singh, chief of Mewar in the 1 2 th century, and claim the honours of the elder line

of Mewar. Mahup, disinherited by his father, took refuge with his mother's family, the Chauhans of Bagar, and made himself master of that country at the expense of the Bhil chiefs. The town of Dungarpur (pop. 6094 in 1001), the capital of the state, was founded towards the end of the 14th century by his descendant Rawal Bir Singh, who named it after Dungaria, an independent Bhil chieftain whom he had

caused to be assassin- ated. After the death of Rawal Udai Singh of Bagar at the battle of Khanua in 1527, his territories were divided into the states of Dungarpur and Banswara, the name of Bagar being still often applied to the tract covered by these states. Dungarpur fell under the sway of the Moguls and Mahrattas in turn, and was taken under British protection by treaty in 1818.

DUNGARVAN, a market town and seaport of Co. Waterford, Ireland, in the west parliamentary division, 28§ m. W.S.W. from Waterford by the Waterford and Mallow branch of the Great Southern & Western railway. Pop. of urban district (1001) 4850. It is situated on the south coast, on the Bay of Dungarvan, at the mouth of the Colligan, which divides the town into two parts, connected by a bridge of a single arch. The eastern suburb is called Abbeyside, where the remains of an ancient keep, erected by the M'Graths, still exist, together with portions of an Augustinian friary, founded by the same family in the 14th century and incorporated with a Roman Catholic chapel. In the main portion of the town a part of the keep of a castle of King John remains. Brewing is carried on, and there are woollen mills. The exports consist chiefly of agricultural produce. Dungarvan was incorporated in the 1 5th century, was represented by two members in the Irish parliament until the Union, and returned a member to the Imperial parlia- ment until 1885. It was fortified with walls by John when the castle was built. A story is told that Cromwell spared the town from bombardment owing to the wit of a woman who drank his health at the town-gate.

DUNGENESS, a promontory of the south coast of England, in the south of Kent, near the town of Lydd. It is a low-lying broad bank of shingle, forming the seaward apex of the great level of the Romney Marshes. Its seaward accretion is estimated at 6 ft. annually. Its formation is characteristic, consisting of a series of ridges forming a succession of curves from a common centre. It is unique, however, among the great promontories of the south coast of England, the accretion of gravel banks falling into deep water contrasting with the cliff-bound headlands of the North Foreland, Beachy Head and the Lizard, and with the low eroded Selsey Bill, off which the sea is shallow. A light- house (50° 55′ N., 0° 58′ E.) stands on the ness, which has been the scene of many shipwrecks, and has been lighted since the time of James I. There are also here Lloyds' signalling station, coast-guard stations, and the terminus of a branch of the South- Eastern & Chatham railway.

The name Dungeness has also been applied elsewhere; thus the point

on the north side of the eastern entrance to Magellan Strait is so called, and there is a town of Dungeness near a promontory on the coast of Washington, U.S.A. (Strait of Juan de Fuca).

DUNGEON, the prison in a castle keep, so called because the Norman name for the latter is donjon (q.v.), and the dungeons or prisons (q.v.) are generally in its lowest storey. (See Keep.)

DUNKELD, a town of Perthshire, Scotland, on the left bank of the Tay, 15J m. N.W. of Perth by the Highland railway. Pop. (1901) 586. The river is crossed by a bridge of seven arches which was designed by Thomas Telford in 1805 and opened in 1 808. The town lies in the midst of luxuriant trees, and the noble sweep of the Tay, the effectively situated bridge, the magnificent grounds of Dunkeld House, and the protecting mountains com- bine to give it a very romantic appearance. The town hall is the principal modern building, and the fountain erected in Market Square to the memory of the 6th duke of Atholl (d.1864) occupies the site of the old cross.

As early as 729 — some authorities fix the date a hundred and fifty years before — the Culdees possessed a monastery at Dunkeld, which was converted into a cathedral by David I. in 1127. This structure stood until the Reformation, when it

was unroofed and suffered to fall into ruin. The building consists of the nave (120 ft. long, 60 ft. wide, 40 ft. high), aisles (12 ft. wide), choir, chapter-house and tower. The nave is the most beautiful portion. The Pointed arches rest upon pillars, possibly Norman, and above them, below the Decorated clere- story windows, is a series of semicircular arches with flamboyant tracery, a remarkable feature. The choir, founded by Bishop William Sinclair (d. 1337), has been repaired, and serves as the parish church, a blue marble slab in the floor marking the bishop's grave. The chapter-house, adjoining the choir, was built by Bishop Thomas Lauder (1395-1481) in 1469, and the vault beneath is the burial-place of the Atholl Murrays. Lauder also began the tower, completed in 1501. In the porch of the church is the most interesting of the extant old tombs, namely, the recumbent effigy of Alexander Stewart, the Wolf of Badenoch (1343-1405; the inscription refers his death to 1394, but this is said to be an error). The most famous of the Bishops was Gavin Douglas (1474-1522), translator of the Aeneid. One of the most heroic exploits in the annals of warfare is associated with the cathedral. Shortly after the battle of Killiecrankie (1689), the Cameronian regiment, enrolled in the same year (afterwards the 26th Foot), was despatched to hold Dunkeld prior to another invasion of the

Highlands. It was under the command of Colonel William Cleland (b. 1661), a poet of some merit. On the 26th of August a force of 5000 Highlanders suddenly appearing, Cleland posted his men in the church and behind the wall of the earl of Atholl's mansion. Still flushed with their victory under Dundee, and animated by bitterest hatred of their Whiggamore foes, the Highlanders assaulted the position of the Covenanters, who were 1200 strong, with the most desperate valour. Sustained by their enthusiasm, however, the recruits displayed equal courage, and, at the end of four hours' stubborn fighting, their defence was still intact. Fearing lest victory, even if won, might be purchased too dearly, the Highlanders gradually withdrew. While leading a sortie Cleland was shot dead, and was buried in the churchyard.

Adjoining the cathedral is Dunkeld House, a seat of the duke of Atholl, the grounds of which are estimated to contain 50 m. of walks and 30 m. of drives. On the lawn near the cathedral stand two of the earliest larches grown in Great Britain, having been introduced from Tirol by the 2nd duke in 1738. The 4th duke planted several square miles of the estate with this tree, of which he had made a special study.

A mile south of Dunkeld, on the left bank of the Tay, is the village of Bimam (pop. 389), where Sir John Everett Millais, the painter, made his summer residence. It lies at the foot of Birnam Hill (1324 ft.), once covered with a royal forest that has been partly replaced by plantations. The oak and sycamore in front of Birnam House, the famed twin trees of Birnam, are believed to be more than 1000 years old, and to be the remnant of the wood of Birnam which Shakespeare immortalized in Macbeth. The Pass of Birnam, where the river narrows, was the path usually taken by the Highlanders in their forays. In the vicinity are the castles of Murthly, one a modern mansion in the Elizabethan style, erected about 1838 from designs by James Gillespie Graham (1777-1855), and the other the old castle, still occupied, which was occasionally used as a hunting-lodge by the Scottish kings.

At Little Dunkeld, almost opposite to Dunkeld, the Bran joins the Tay, after a run of n m. from its source in Loch Freuchie. It is celebrated for its falls about 2 m. from the mouth. The upper fall is known as the Rumbling Bridge from the fact that the stream pours with a rumbling noise through a deep narrow gorge in which a huge fallen rock has become wedged, forming a rude bridge or arch. Inver, near the mouth of the Bran, was the birthplace of the two famous fiddlers, Niel Gow (1727-1807) and his son Nathaniel (1766-1831).

DUNKIRK (Fr. Dunkerque), a seaport of northern France, capital of an arrondissement in the department of Nord, on the Straits of Dover, 53 m. N.W. of Lille on the Northern railway. Pop. (1906) 35,767. Dunkirk is situated in the low but fertile, district of the Wateringues. It lies, amidst a network of canals.

immediately to the west and south of its port, which disputes with Bordeaux the rank of third in importance in France. The populous suburbs of Rosendael and St Pol-sur-Mer he respectively to the east and west of the town; to the north-east is the bathing resort of Malo-les-Bains. The streets of Dunkirk are wide and well paved, the chief of them converging to the square named after Jean Bart (born at Dunkirk in 1651), whose statue by David d' Angers stands at its centre. Close to the Place Jean Bart rises the belfry (290 ft. high) which contains a fine peal of bells and also serves as a signalling tower. It was once the western tower of the church of St Eloi, from which it is now separated by a street. St Eloi, erected about 1560 in the Gothic style, Was deprived of its first two bays in the 18th century; the present facade dates from 1889. The chapel of Notre-Dame des Dunes possesses a small image, which is the object of a well-known pilgrimage. The chief civil buildings are a large Chamber of Commerce, including the customs and port services, and a fine modern town hall. Dunkirk is the seat of a sub-prefect; its public institutions include tribunals of first instance and of commerce, a board of trade-arbitrators, an exchange, a branch of the Bank of France and a communal college; and it has a school of drawing, architecture and music, a library and a rich museum of paintings. Dunkirk forms with Bergues, Bourbourg and Gravelines a group of fortresses enclosed by inundations and canals. A chain of forts to the eastward is designed to facilitate the deployment of an army, concentrated within the fortified region, towards the Belgian frontier. : The harbour of Dunkirk (see Dock) is approached by a fine natural roadstead entered on the east and west, and protected on the north by sand-banks. From the roadstead, entrance is by a channel into the outer harbour, which communicates with seven floating basins about 115 acres in area and is accessible to the largest vessels. The port is provided with four dry docks and a gridiron, and its quays exceed 5 m. in length. Its commerce is much facilitated by the system of canals which bring it into communication with Belgium, the coal-basins of Nord and Pas- de-Calais, the rich agricultural regions of Flanders and Artois, and the industrial towns

of Lille, Armentieres, Roubaix, Tour- coing, Valenciennes, &c. The roadstead is indicated by light- ships and the entrance channel to the port by a lighthouse which, at an altitude of 193 ft., is visible at a distance of 19 m.

Dunkirk annually despatches a fleet to the Icelandic cod- fisheries, and takes part in the herring and other fisheries. It imports great quantities of wool from the Argentine and Australia, and is in regular communication with New York, London and the chief ports of the United Kingdom, Brazil and the far East. Besides wool, leading imports are jute, cotton, flax, timber, petroleum, coal, pitch, wine, cereals, oil-seeds and oil-cake, nitrate of soda and other chemical products, and metals. The principal exports are sugar, coal, cereals, wool, forage, cement, chalk, phosphates, iron and steel, tools and metal-goods, thread and vegetables. The average annual value of the imports for the years 1901-1905 was £23,926,000 (£22,287,000 for 1896-1900), of exports £6,369,000 (£4,481,000 for 1896-1900). The industries include the spinning of jute, flax, hemp and cotton, iron-founding, brewing, and the manufacture of machinery, fishing-nets, sail- cloth, sacks, casks, and soap. There are also saw-and flour-mills, petroleum refineries and oil-works. Ship-building is carried on, and the preparation of fish and cod-liver oil occupies many hands.

Dunkirk is said to have originated in a chapel founded by St Eloi in the 7th century, round which a small village speedily sprang up. In the 10th century it was fortified by Baldwin III., count of Flanders; together with that province it passed successively to Burgundy, Austria and Spain. In the 15th, 16th and 1 7th centuries its possession was disputed by French and Spaniards. In 1658 Turenne's victory of the Dunes (q.v.) gave it into the hands of the French and it was ceded to England. After the Restoration, Charles II., being in money difficulties, sold it to the French king Louis XIV., who fortified it. By the terms of the peace of Utrecht (17 13) the fortifications were demolished and its harbour filled up, a sacrifice demanded by England owing to the damage inflicted on her shipping by Jean

Bart and other corsairs of the port. In 1793 it was besieged by the English under Frederick Augustus, duke of York, who was compelled to retire after the defeat of Hondschoote.

See A. de St Leger, La Flandre maritime et Dunkerque (Paris, 1900).

DUNKIRK, a city and a port of entry of Chautauqua county, New

York, U.S.A., on the S. shore of Lake Erie, 40 m. S.W. of Buffalo. Pop. (1890) 9416; (1900) 11,616, of whom 3338 were foreign-born; (1910 census) 17,221. The city is served by the Pennsylvania, the Erie, the Lake Shore & Michigan Southern, the New York, Chicago & St Louis, and the Dunkirk, Allegheny Valley & Pittsburg railways, by the electric line of the Buffalo & Lake Erie Traction Co., and by several lines of freight and passenger steamships. Dunkirk is attractively situated high above the lake, and has several parks, including Point Gratiot and Washington; in the city are the Dunkirk free library, the Brooks Memorial hospital (1891), and St Mary's academy. The city lies in an agricultural and grape-growing region, and has a fine harbour and an extensive lake trade; the manufactures include locomotives, radiators, lumber, springs, shirts, axes, wagons, steel, silk gloves and concrete blocks. The value of factory products increased from $5,225,996 in 1900 to $9,909,260 in 1905, or 89-6%. Large numbers of food-fish are caught in the lake. The municipality owns and operates the water works and the electric lighting plant. Dunkirk was first settled about 1805. It was incorporated as a village in 1837, and was chartered as a city in 1880.

DUNLOP, JOHN COLIN (1785-1842), Scottish man of letters, was born on the 30th of December 1785. In 1816 he became sheriff of Renfrewshire, and retained this office until his death at Edinburgh, on the 26th of January (according to others, in February) 1842. The work by which he is best known, and which will always hold an honourable place in English literature, is his History of Fiction (1814; new edition, 1888, with notes by H. Wilson, in Bohn's ' ' Standard Library ") . In spite of the somewhat contemptuous notices in Blackwood's Magazine (September 1824) and the Quarterly Review (July 181 5), it may be pronounced the best book on the subject in English. F. Liebrecht, by whom it was translated into German (1851) with valuable notes, describes it as the only work of its kind. Dunlop was also the author of A History of Roman Literature (1823-1828), and of Memoirs of Spain during the Reigns of Philip I V . and Charles II.

(1834)-

DUNMORE, a borough of Lackawanna county, Pennsylvania, U.S.A., adjoining Scranton on the N.E. and about 20 m. N.E. of Wilkesbarre. Pop. (1890) 8315; (1900) 12,583, of whom 3103 were foreign-born; (1910 census) 17,615. It is served by the Erie, the Delaware, Lackawanna & Western, and the Lackawanna & Wyoming Valley (electric) railways. Its chief industry is the mining of

anthracite coal; the principal estab- lishments are railway repair shops, which in 1905 gave employ- ment to 48-9% of all wage-earners engaged in manufacturing. Among the borough's manufactures are stoves and furnaces, malt liquors and silk. Dunmore is the seat of the state oral school for the deaf. The town was first settled in 1783 and was incorporated in 1862. Its growth was accelerated by the establishment here, in 1863, of the shops of the railway from Pittston to Hawley built in 1849- 18 50 by the Pennsylvania Coal Company. Dunmore became a station of the Scranton post office in 1902.

DUNMOW (properly Great Dtjnmow), a market town in the Epping (W.) parliamentary division of Essex, England, on the river Chelmer, 40 m. N.E. by N. from London on a branch of the Great Eastern railway. Pop. (1901) 2704. The church of St Mary is Decorated and Perpendicular. The town was corporate from the 16th century until 1886. Roman remains have been discovered. Two miles E. is the village of Little Dunmow, formerly the seat of a priory, remarkable for the custom of presenting a flitch of bacon to any couple who could give proof that they had spent the first year of married life in perfect harmony, and had never at any moment wished they had tarried. In place of the monastic judicature a jury of six bachelors and six maidens appear in the 16th century. A

rhyming oath, quoted by Fuller, was taken. The institution of this strange matrimonial prize — which had its parallel at Whicha- noure (or Wichnor) in Staffordshire, at St Moleine in Brittany, and apparently also at Vienna — appears to date from the reign of John. The first instance of its award recorded is in 1445, and there are a few others. But there are references which suggest its previous award in Piers Plowman and Chaucer. The Chaucerian couplet conveys the idea of an award to a patient husband, without reference to the wife. A revival of the custom was effected in 1855 by Harrison Ainsworth, author of the novel The Flitch of Bacon, but the scene of the ceremony was transferred to the town hall of Great Dunmow. It has since been maintained in altered form. (For details see Chambers's Book of Days, ii. 748-751; and W. Andrews, History of the Dunmow Flitch of Bacon Customs, 187 7.) Close to Little Dunmow is Felsted (q.v.) or Felstead; and Easton Lodge (with a railway station), a seat of the earl of Warwick, is in the vicinity.

DUNNE, FINLEY PETER (1867-), American journalist and humorist, was born, of Irish descent, in Chicago, Illinois, on the 10th of July 1867. After a public school education he became a newspaper reporter (1885); he was city editor of the Chicago Times (1891-1892), a member of the editorial staff of the Chicago Evening Post and of the Chicago Times-Herald (1892-1897), and editor of the Chicago Journal (1897-1900). In 1900 he removed to New York city. Although for several years he had been contributing humorous sketches in Irish brogue to the daily papers, he did not come into prominence until he wrote for the Chicago Journal a series of satirical observa- tions and reflections attributed to an honest Irish-American, Martin Dooley, the shrewd philosopher of Archey Road, on social and political topics of the day. These were widely copied by the press of America and England. The first published collection, Mr Dooley in Peace and in War (1898), was followed by several others, similar in subject-matter and method, including Mr Dooley in the Hearts of his Countrymen (1899), Mr Dooley' s Philosophy (1900), Mr Dooley's Opinions (1901), Observations by Mr Dooley (1902), and Dissertations by Mr Dooley (1906). These books made their author widely known as the creator of a delightfully original character, and as a humorist of shrewd insight. In 1906 he became associate editor of the American Magazine.

DUNNOTTAR CASTLE, a ruined stronghold, on the east coast of Kincardineshire, Scotland, about 2 m. S. of Stonehaven. It stands on a rock 160 ft. high, with a summit area of 4 acres, and surrounded on three sides by the sea. It is accessible from the land by a winding path leading across a deep chasm, to the outer gate in a wall of enormous thickness. It is supposed that a fortress stood here since perhaps the 7th century, but the existing castle dates from 1392, when it was begun by Sir William Keith (d. r407), great marischal of Scotland. The keep and chapel are believed to be the oldest structures, most of the other buildings being two centuries later. It was the residence of the earls marischal and was regarded as impregnable. Here the seventh earl entertained Charles II. before the battle of Wor- cester. When Cromwell became Protector, the Scottish regalia were lodged in the castle for greater security, and, in 1651, when the Commonwealth soldiers laid successful siege to it, they were saved by a woman's wit. Mrs Granger, wife of the minister of Kinneff, a parish about 6 m. to the S., was allowed to visit the wife of the governor, Ogilvy of Barras, and when she rode out she was spinning lint on a distaff. The crown was concealed in her lap, and the distaff consisted of the sword and sceptre. The regalia were hidden beneath the flagstones in the parish church, whence they were

recovered at the Restoration. In 1685 the castle was converted into a Covenanters' prison, no fewer than 167 being confined in a dungeon, called therefrom the Whigs' Vault. On the attainder of George, tenth and last marischal, for his share in the earl of Mar's rising in 1715 the castle was dismantled (1720).

DUNOIS, JEAN, Count of (1403-1468), commonly called the " Bastard of Orleans," a celebrated French commander, was the natural son of the duke of Orleans (brother of Charles VI.) and Mariette d'Enghien, Madame de Canny. He was brought

up in the house of the duke, and in the company of his legitimate sons, and it appears that he was present at the battle of Beaug6 in 142 1 and Verneuil in 1424. His earliest feat of arms was the surprise and rout in 1427 of the English, who were besieging Montargis — the first successful blow against the English power in France following a long series of French defeats. In 142$ he defended Orleans with the greatest spirit, and enabled the place to hold out until the arrival of Joan of Arc, when he shared with her the honour of defeating the enemy there in 1429. He then accompanied Joan to Reims and shared in the victory of Patay. After her death he raised the siege of Chartres and of Lagny (1432) and engaged in a series of successful cam- paigns which ended in his triumphal entry into Paris on the 13th of April 1436. He continued to carry on the war against the English, and gradually drove them to the northward, though his work was to some extent interrupted by the civil disorders of the time, in which he played a conspicuous part. Finally in

1450 he completed the reconquest of northern France, and in

1451 he attacked them in Guienne, taking among other towns Bordeaux, which the English had held for three hundred years, and Bayonne. After the expulsion of the English he was con- stantly engaged in the highest diplomatic and military missions. In 1465 he joined the league of revolted princes, but, assuming the function of negotiator, he was after a time reinstated in his offices. Dunois was thenceforward in the greatest favour with the court. He died on the 24th of November 1468.

DUNOON, a police and municipal burgh of Argyllshire, Scot- land, on the western shore of the Firth of Clyde, opposite to Gourock. Pop. (1901) 6779. Including Kirn and Hunter's Quay, it presents a practically continuous front of seaside villas. The mildness of its climate and the beauty of its situation have made it one of the most prosperous watering-places on the west coast. The principal buildings

are the parish church, well-placed on a hill overlooking the pier, convalescent homes, Cottage and Victoria fever hospitals, and the town house. On a conical hill above the pier stand the remains of Dunoon Castle, the hereditary keepership of which was conferred by Robert Bruce on the family of Sir Colin Campbell of Loch Awe, an ancestor of the duke of Argyll. It was visited by Queen Mary in 1563, and in 1643 was the scene of the massacre of the Lamonts by the Campbells. The grounds have been laid out as a recreation garden. Near the hill stands the modern castle. Facing the pier a statue was erected in 1898 of Mary Campbell, Burns's " Highland Mary," who was a native of Dunoon. The town itself is of modern growth, having been a mere fishing village at the beginning of the 19th century. There is frequent com- munication daily by steamer with the railway piers at Craigen- doran and Gourock, and Glasgow merchants are thus enabled to reside here all the year round. Hunter's Quay is the yachting headquarters, the Royal Clyde Yacht Club's house adjoining the pier. Kilmun, on the northern shore of Holy Loch, a portion of the parish of Dunoon and Kilmun, contains the ruins of a Collegiate chapel founded in 1442 by Sir Duncan Campbell of Loch Awe and used as the burial-ground of the Argyll family.

DUNROBIN CASTLE, a seat of the duke of Sutherland, picturesquely situated on the north-eastern shore of Dornoch Firth, Sutherlandshire, Scotland, about 2 m. N.E. of Golspie, with a private station on the Highland railway. The name is said to have originally meant the fort of Raffu, the " law-man," or crown agent for the district in 1222, but it was renamed out of compliment to Robert (or Robin), 6th earl of Sutherland, who died in 1389. The ancient portion, dating from the end of the 13th century, was a square structure with towers at the corners, but in 1856 there was added a wing, a main north-eastern tower, and front, with numerous bartizan turrets, and dormer windows in the roof. The stately entrance porch recalls that of Windsor Castle, and the interior is designed and decorated on a sumptuous scale. In April 1746 George Mackenzie, the 3rd earl of Cromarty, thinking that Prince Charles Edward had prevailed at Culloden^ seized the castle in his interests, but the Sutherland militia surrounded the building and captured the earl in an apartment which was afterwards called the Cromartie room. The beautiful

gardens contain a Wealth of trees, which grow With remarkable luxuriance for the latitude of 58° N. The 3rd duke of Sutherland erected a museum in the grounds in which are many specimens of the antiquities of the shire, such as querns, stone tools and weapons, silver brooches and the like, found in brochs and elsewhere. There is a graceful waterfall in Dunrobin glen, through which flows Golspie Burn, near the left bank of which are remains of Pictish towers. About 1 m. N.W. of Golspie rises Ben Bhragie (1256 ft.), crowned by a colossal statue of the 1st duke of Sutherland, by Chantrey.

DUNS, a police burgh and county town of Berwickshire, Scotland. Pop. (1001) 2206. It is situated 44 m. E.S.E. of Edinburgh by road, with a station on the branch line of the North British railway from Reston to St Boswells. The principal buildings are the town-hall, county buildings, corn exchange, mechanics' institute and the public library. There is a woollen mill, and stock sales are held at frequent intervals. The alternative spelling of Dunse seems to have been in vogue from 1 740 till 1882. It was on Duns Law (700 ft.) that the Covenanters, under Alexander Leslie, were encamped in 1639, and the Covenanters' Stone on the top of the hill has been enclosed to preserve it from relic-hunters. Duns castle, adjoining the town on the W., includes the Tower erected by Thomas Randolph, earl of Moray (d. 1332), and about 3 m. S.W. is the village of Polwarth.

DUNSINANE, a peak of the Sidlaw Hills, in the parish of Collace, Perthshire, Scotland, 8 m. N.E. of Perth. It is 1012 ft. high, and commands a fine view of the Carse of Gowrie and the valley of the Tay. Its chief claim to mention, however, is due to its association with Birnam Wood (about 12 m. N.W.) in two well-known passages in Shakespeare's Macbeth. An old fort on the summit, of which faint traces are still discernible, is tradition- ally called Macbeth's Castle.

DUNS SCOTUS, JOHN (1265 or 1275-1308), one of the foremost of the schoolmen. His birthplace has been variously given as Duns in Berwickshire, Dunum (Down) in Ulster, and Dunstane in Northumberland, but there is not sufficient evidence to settle the question. He joined the Franciscan order in early life, and studied at Merton College, Oxford, of which he is said to have been a fellow. He became remarkably proficient in all branches of learning, but especially in mathematics. When his master, William Varron, removed to Paris in 1301, Duns Scotus was appointed to succeed him as professor of philosophy, and his lectures attracted an immense number of students. Probably in 1304 he went to Paris, in 1307 he received his doctor's degree from the university, and in the same year was appointed regent of the theological school. His connexion with

the university was made memorable by his defence of the doctrine of the Immaculate Conception, in which he displayed such dialectical ingenuity as to win for himself the title Doctor Subtilis. The doctrine long continued to be one of the main subjects in dispute between the Scotists and the Thomists, or, what is almost the same thing, between the Franciscans and the Dominicans. The university of Paris was so impressed by his arguments, that in 1387 it formally condemned the Thomist doctrine, and a century afterwards required all who received the doctor's degree to bind themselves by an oath to defend the doctrine of the Immaculate Conception. In 1308 Duns Scotus was sent by the general of his order to Cologne, with the twofold object of engaging in a controversy with the Beghards and of assisting in the foundation of a uni- versity; according to some, his removal was due to jealousy. He was received with enthusiasm by the inhabitants but died suddenly (it was said, of apoplexy) on the 8th of November in the same year. There was also a tradition that he had been buried alive.

His philosophical position was determined, or at least very greatly influenced, by the antagonism between the Dominicans and the Franciscans. Further, while the genius of Aquinas was constructive, that of Duns Scotus was destructive; Aquinas was a philosopher, Duns a critic. The latter has been said to stand to the former in the relation of Kant to Leibnitz. In the matter of Universals, Duns was more of a realist and less of an eclectic than

Aquinas. Theologically, the Thomistic system approximates to pantheism, while that of Scotus inclines distinctly to Pelagianism. The doctrine of the Immaculate Conception was the great subject in dispute between the two parties; it was strenuously opposed by Aquinas, and supported by Duns Scotus, although not without reserve. There were, however, differences of a wider and deeper kind. In opposition to Aquinas, who maintained that reason and revelation were two independent sources of knowledge, Duns Scotus held that there was no true knowledge of anything knowable apart from theology as based upon revelation. In conformity with this principle he denied that the existence of God was capable of being proved, or that the nature of God was capable of being comprehended. He therefore rejected as worthless the ontological proof offered by Aquinas. Another chief point of difference with Aquinas was in regard to the freedom of the will, which Duns Scotus maintained absolutely. He reconciled free-will and necessity by representing the divine decree not as temporarily antecedent, but as immediately related to the action of the created will. He maintained, in opposition to Aquinas, that the will was independent of the

understanding, that only will could affect will. From this difference as to the nature of free-will followed by necessary consequence a difference with the Thomists as to the operation of divine grace. In ethics the distinction he drew between natural and theological virtues is common to him with the rest of the schoolmen. (Cf. Aquinas.) Duns Scotus strongly upheld the authority of the church, making it the ultimate authority on which that of Scripture depends. (See also Scholasticism.)

The most important of his works consisted of questions and commentaries on the writings of Aristotle, and on the Sentences of Lombard, the so-called Opus Oxoniense or Anglicanum. Complete works, edited by Luke Wadding (13 vols., Lyons, 1639) and at Paris (26 vols., 1891-1895). There is an edition of his De modis significandi or Grammatica speculative!,, the first attempt to investigate the general laws of language, by F. M. Fernandez Garcia (Quaracchi, Florence, 1902).

On Duns Scotus generally, see life by Wadding in vol. i. of the works (full, however, of legendary absurdities) ; J. Muller, Biographisches iiber Duns Scotus (progr., Cologne, 1881); W. J. Townsend, The Great Schoolmen (1881) ; K. Werner, Die Scholastik des spateren Mittelalters, i. (1881); J. M. Rigg, in Dictionary of National Biography. On his theology: C. Frassen, Scotus Academicus (1744, new edition, 1900) ; Hieronymus de Montefortino (Jerome de Fortius), Scoti summa theologica (1728-1738, new edition, 1900); L. F. 0-Baumgarten-Crusius, De theologia Scoti (1826); R. Seeberg, Die Theologie des J. Duns Scotus (1900), and in Herzog-Hauck, Realencyklopadie fur protestantische Theologie (1898), with bibliog. refs; F. Morin, Dictionnaire de philosophic et de theologie scolastiques [=J. P. Migne, Troisieme encyclopedic theologique, xxi., xxii., 1857]; C. R. Hagenbach, History of Doctrines (Eng. tr., if., 1880). On his philosophy: E. Pluzanski, Essai sur la philosophic de Duns Scot (1887) ; A. Schmid, Die Thomistische und Scotistische Gewissheit- lehre (1859) ; M. Schneid, Die Korperlehre des J. Duns Scotus — its relation to Thomism and Atomism (1879); P. Minges, " 1st Duns Scotus Indeterminist? " in Beitrdge zur Geschichte der Philosophic des Mittelalters, Bd. v. Heft 4 (1905) ; W. Kabl, Die Lehre vom Primat des Willens bei Augustinus, Duns Scotus, und Descartes (1886).

DUNSTABLE, a municipal borough and market town in the southern parliamentary division of Bedfordshire, England, 37 m. N.W. of London, on branches of the Great Northern and London & North-Western railways. Pop. (1901) 5157. It lies at an elevation of about

500 ft. on the bleak northward slope of the Chiltern Hills. The church of St Peter and St Paul is a fine fragment of the church of the Augustinian priory founded by Henry I. in 1131. The building was cruciform, but only the west front and part of the nave remain. The front has a large late Norman portal of four orders, with rich Early English arcading above ; the nave arcade is ornate Norman. The original triforium is transformed into a clerestory, the original clerestory being lost. The north-west tower has a Perpendicular upper portion, but the south-west tower is destroyed. The church contains various monuments of the 18th century. Foundations of a palace of Henry I. are traceable near the church. The main part of the town extends for a mile along the broad straight Roman road, Watling Street; the high road from Luton to Tring, which crosses it in the centre of the town, representing the ancient Icknield Way. The chief industry is straw hat

manufacture; there are also printing, stationery and engineering works. The borough is under a mayor, 4 aldermen, and 12 councillors. Area, 453 acres.

There may have been a Romano-British village on this site on the Watling Street. Dunstable (Duneslaple, Donestaple) first appears as a royal borough in the reign of Henry I., who, according to tradition, on account of the depredations of robbers, cleared the forest where Watling Street and the Icknield Way met, and encouraged his subjects to settle there by various grants of privileges. He endowed the priory by charter with the lordship of the manor and borough, which it retained till its dissolution in 1536-1537. The Dunstable Annals deal exhaus- tively with the history of the monastery and town in the 13th century. In 1219 the prior secured the right of holding a court there for all crown pleas and of sitting beside the justices itinerant, and this led to serious collision between the monks and burgesses. The body of Queen Eleanor rested here for a night on its journey to Westminster, and a cross, of which there is now no trace, was subsequently erected in the market-place. At Dunstable Cranmer held the court which, in 1533, declared Catherine of Aragon's marriage invalid. At the dissolution a plan was set on foot for the creation of a new bishopric from the spoils of the religious houses, which was to include Bedfordshire and Buckinghamshire with Dunstable as cathedral city. The scheme was never realized, though plans for the cathedral were actually drawn up.

From the earliest time Dunstable has been an agricultural town. The Annals' abound with references to the prices and comparative abundance or scarcity of the two staple products, wool and corn. The straw hat manufacture has flourished since the 1 8th century. Henry I. granted a market held twice a week, and a three days' fair on the feast of St Peter ad Vincula. John made a further grant of a three days' fair from the 10th of May. A market is still held weekly, also fairs in May and August correspond to these grants. Dunstable had also a gild merchant and was affiliated to London. In 1864 the town was made a municipal borough by royal charter.

DUNSTAFFNAGE, a ruined castle of Argyllshire, Scotland, 3 m. N.N.E. of Oban. It is situated on a platform of conglomerate rock forming a promontory at the south-west of the entrance to Loch Etive and is surrounded on three sides by the sea. It dates from the 13th century, occupying the site of the earlier stronghold in which was kept the Stone of Destiny prior to its removal to Scone (q.v.) in 843. The castle is a quadrangular structure of great strength, with rounded towers at three of the angles, and has a circumference of about 400 ft. The walls are 60 ft. high and 10 ft. thick, affording a safe promenade, which commands a splendid view. Brass cannon recovered from wrecked vessels of the Spanish Armada are mounted on the walls. In 1308 Robert Bruce captured the fortress from the original owners, the MacDougalls, and gave it to the Campbells. It was garrisoned at the period of the Jacobite rebellions of 17 15 and 1745, fell into decay early in the 19th century, and is now the property of the crown, the duke of Argyll being hereditary keeper. The adjoining chapel, in a very ruinous state, was the burial-place of the Campbells of Dunstaffnage.

There are other interesting places on Loch Etive, an arm of the sea, measuring 191 m. in length and from J m. to fully 1 m. in width. Near the mouth, where the lake narrows to a strait, are the rapids which Ossian called the Falls of Lora, the ebbing and flowing tides, as they rush over the rocky bar, creating a roaring noise audible at a considerable distance. In the parish of Ardchattan, on the north shore, stands the beautiful ruin of St Modan's Priory, founded in the 13th century for Cistercian monks of the order of Vallis Caulium. It is said that Robert Bruce held within its walls the last parliament in which the Gaelic language was used. On the coast of Loch Nell, or Ardmuck- nish Bay, is the vitrified fortof Beregonium, not to be confounded with Rerigonium (sometimes miscalled Berigonium) on Loch Ryan in Wigtownshire — a town of the Novantae Picts, identified with Innermessan. The confusion has arisen through a textual error in an early edition of Ptolemy's Geography.

DUNSTAN, SAINT (924 or 925-988) ,» English archbishop, entered the household of King ˆEthelstan when still quite a boy. Here he soon excited the dislike of his young companions, who procured his banishment from the court. He now took refuge with his kinsman Alphege, bishop of Winchester, whose per- suasion, seconded by a serious illness, induced him to become a monk. ˆEthelstan's successor, Edmund, recalled him to the court and made him one of his counsellors. Through the machina- tions of enemies he was again expelled from the royal presence; but shortly afterwards Edmund revoked the sentence and made him abbot of Glastonbury. His successor Edred showed him greater favour still. On the accession of Edwig, however, in 955, Dunstan's fortunes underwent a temporary eclipse. Having offended the influential ˆElfgifu, he was outlawed and compelled to flee to Flanders. But in 957 the Mercians and Northumbrians revolted and chose Edgar as their king. The new king at once recalled Dunstan, who was made a bishop. At first apparently he was without a see; but that of Worcester falling vacant, he was appointed to fill it. In 959 he received the bishopric of London as well. In the same year Edwig died and Edgar became sole king, Dunstan shared his triumph, and was appointed archbishop of Canterbury. On Edgar's death in 975 the arch- bishop's influence secured the crown for his elder son Edward. But with the accession of ˆEthelred in 979 Dunstan's public career came to an end. He retired to Canterbury, and died on the 19th of May 988.

Dunstan is of more importance as a lay than as an ecclesiastical statesman. The great church movement of his time — the reformation of English monasticism on Benedictine lines — found in him a sympathizer, but in no sense an active participant. But as a secular statesman he occupies a high place. He guided the state successfully during the nine years' reign of the invalid Edred. Through that of Edgar, he was the king's chief minister and most trusted adviser; and to him a great share in its glories must be assigned.

See Memorials of St Dunstan, edited by W. Stubbs (London, 1874) ; Anglo-Saxon Chronicle, edited by C. Plummer (Oxford, 1892—1899).

DUNSTER, a market town in the Western parliamentary division of Somersetshire, England, 15 m. from the shore of the Bristol Channel, on the Minehead branch of the Great Western railway. Pop. (1901) 1182. Its streets, sloping sharply, contain many old houses. On an eminence stands the ancient castle, entered by a gateway of the 13th century. There are portions of later date, but still ancient, in the

main building, but it has been considerably modernized as a residence. The church of St George has Norman portions, but the building is in the main Perpendicular. The fine tower in this style is characteristic of this part of England. There are traces of monastic buildings near the church, for it belonged to a Bene- dictine house of early Norman foundation. The church is cruci- form and the altar stands beneath the eastern lantern arch, a fine rood screen separating off the choir, which was devoted to monastic use, while the nave was kept for the parishioners, in consequence of a dispute between the vicar and the monastery in 1499. The Yarn Market, a picturesque octagonal building with deep sloping roof, in the main street, dates from c. 1600, and is a memorial of Dunster's former important manufacture of cloth.

There were British, Roman and Saxon settlements at Dunstei {Torre Dunestorre, Dunester), fortified against the piracies of the Irish Northmen. The Saxon fort of Alaric was replaced by a Norman castle built by William de Mohun, first lord of Dunster, who founded the priory of St George. Before 1183, Dunster had become a mesne borough, owned by the de Mohuns until the 14th century when it passed to the Luttrells, the present owners. Reginald de Mohun granted the first charter between 1245 and 1247, which diminished fines and tolls, limited the lord's " mercy," and provided that the burgesses should not against their will

1 The date of Dunstan's birth here given is that given in the Anglo-Saxon chronicle and hitherto accepted. In an appendix to the Bosworth Psalter, edited by Mr Edmund Bishop and Abbot Gasquet (1908), Mr Leslie A. St L. Toke gives reason to believe that the date must be set back at least as early as 910.

be made bailiffs or farmers of the seaport. John de Mohun granted other charters in 1301 and 1307. Dunster was only represented in parliament in conjunction with Minehead, one of its tithings being part of that borough. Representation began in 1562, and was lost in 1832. Feudal in origin, Dunster's later importance was commercial, and the port had a considerable wool, corn and cattle trade with Ireland. During the middle ages the Friday market and fair in Whit week, granted by the first charter, were centres for the sale of yarn and cloth called " Dunsters," made in the town. The market day is still Friday. The manufacture of cloth had disappeared, the harbour

is silted up, and there is no special local industry.

See Sir H. C. Maxwell Lyte, Dunster and its Lords (1882) ; Victoria County History, Somerset, vol. ii.

DUNTOCHER (Gaelic, "The Fort of ill hap "), a town on Dalmuir Burn, Dumbartonshire, Scotland, 9 m. from Glasgow. Pop. (1901) 2122. The district contains coal, limestone and ironstone, but there is not much mining. Many of the inhabit- ants are employed at the Singer factory in Kilbowie and at the Clyde Trust yards in Dalmuir. There are considerable Roman remains in the neighbourhood. Antoninus' Wall passed immediately to the south; the burn is crossed by a bridge alleged to be of Roman origin (which at least is doubtful); subterranean remains indicate a Roman structure; a Roman camp has been traced, and the vicinity has yielded a number of altars, urns, vases, coins and tablets, which are now in the custody of Glasgow University.

DUNTON, JOHN (1659-1733), English bookseller and author, was born at Graff ham, in Huntingdonshire, on the 4th of May 1659. His father, grandfather and great-grandfather had all been clergymen. At the age of fifteen he was apprenticed to Thomas Parkhurst, bookseller, at the sign of the Bible and Three Crowns, Cheapside, London. Dunton ran away at once, but was soon brought back, and began to " love books." During the struggle which led to the Revolution, Dunton was the treasurer of the Whig apprentices. He became a bookseller at the sign of the Raven, near the Royal Exchange, and married Elizabeth Annesley, whose sister married Samuel Wesley. His wife managed his business, so that he was left free in a great measure to follow his own eccentric devices. In 1686, probably because he was concerned in the Monmouth rising, he visited New England, where he stayed eight months selling books and observ- ing with interest the new country and its inhabitants. Dunton had become security for his brother's debts, and to escape the creditors he made a short excursion to Holland. On his return to England, he opened a new shop in the Poultry in the hope of better times. Here he published weekly the Athenian Mercury which professed to answer all questions on history, philosophy, love, marriage and things in general. His wife died in 1697, and he married a second time; but a quarrel about property led to a separation; and being incapable of managing his own affairs, he spent the last years of his life in great poverty. He died in 1733. He wrote a great many books and a number of political squibs on the Whig side, but only his Life and Errors of John Dunton (1705), on account of its naivete, its pictures of bygone times, and of the

literary history of the period, is remembered. His letters from New England were published in America in 1867.

DUNTZER, JOHANN HEINRICH JOSEPH (1813-1901), German philologist and historian of literature, was born at Cologne on the 1 2th of July 18 13. After studying philology and especially ancient classics and Sanskrit at Bonn and Berlin (1830-1835), he took the degree of doctor of philosophy and established himself in 1837 at Bonn as Privat docent for classical literature. He had already, in his Goetkes Faust in seiner Einheit und Ganzheit (1836) and Goethe als Dramatiker (1837), advocated a new critical method in interpreting the German classics, which he wished to see treated like the ancient classics. He subsequently turned his attention almost exclusively to the poets of the German classical period, notably Goethe and Schiller. Diintzer's method met with much opposition and he consequently failed to obtain the professorship he coveted. In 1846 he accepted the post of librarian at the Roman Catholic

gymnasium in Cologne, where he died on the 16th of December 1901. Diintzer was a painstaking and accurate critic, but lacking in inspiration and finer literary taste; consequently his work as a biographer and commentator has, to a great extent, been superseded and discredited.

Among his philological writings may be mentioned Die Lehre von der lateinischen Wortbildung (1836) ; Die Deklination der indo-germanischen Sprachen (1839) ; Homer und der epische Kyklos (1839) ; Die homerischen Beiworter des Cotter- und Menschengeschlechts (1859). Of his works on the German classical poets, especially Goethe, Schiller and Herder, the following are particularly worthy of note, Erlauterungen zu den deutschen Klassikern (1853-1892); Goethes Prometheus und Pandora (1850); Goethes Faust (2 vols., 1850-1851; 2nd ed. 1857); Goethes G'otz und Egmont (1854); Aus Goethes Freundeskreise (1868); Abhandlungen zu Goethes Leben und Werken (2 vols., 1885); Goethes Tagebiicher der sechs ersten weimarischen Jahre (1889); Goethes Leben (1880; 2nd ed. 1883; Engl, transl. by T. Lyster, London, 1884); Schillers Leben (1881); Schiller und Goethe; Vbersicht und Erlduterung zum Briefwechsel zwischen Schiller und Goethe (1859) ; Herders Reise nach Italien (1859); Aus Herders Nachlass (3 vols., 1856-1857), and further, Charlotte von Stein (1874).

DUNWICH, a village in the Eye parliamentary division of Suffolk, England, on the coast between Southwold and Alde- burgh, 5 m.

S.S.W. of Southwold. Pop. (1901) 157. This was in Anglo-Saxon days the most important commercial centre and port of East Anglia. It was probably a Romano-British site. The period of its highest dignity was the Saxon era, when it was called Dommocceaster and Dunwyk. Early in the 7th century, when Sigebert became king of East Anglia, Dunwich was chosen his capital and became the nursery of Christianity in Eastern Britain. A bishopric was founded (according to Bede in 630, while the Anglo-Saxon chronicle gives 635), the name of the first bishop being Felix. Sigebert's reign was notable for his founda- tion of a school modelled on those he had seen in France; it was probably at Dunwich, but formed the nucleus of what afterwards became the university of Cambridge. By the middle of the nth century {temp. Edward the Confessor) Dunwich was declining, as it had already suffered from an evil which later caused its total ruin, namely the inroads of the sea on the unstable coast. At the Norman Conquest the manor was granted to Robert Malet; but the history of the place remains blank until the reign of Henry II., when it re-emerged into prosperity. In 1 1 73 the sight of its strength caused Robert earl of Leicester to despair of besieging it. The town received a charter from King John. In the reign of Edward I. it is recorded to have possessed 36 ships and " barks," trading to the North Seas, Iceland and elsewhere, with 24 fishing boats, besides maintaining n ships of war. But early in the reign of Edward III. the attacks of the sea began to make headway again. In 1347 over 400 houses were destroyed. In 1570, after a terrible storm, appeal was made to Elizabeth, who parsimoniously granted money obtained by the sale of lead and other materials from certain neighbouring churches. But the doomed town was gradually engulfed, and now the only outward evidence of the old wealthy port is the ruined fragment of the church of All Saints, overhanging a low cliff, which, as it crumbles, exposes the coffins and bones in the former churchyard, the greater part of which has disappeared. A small white flower growing wild among the ruins is called the Dunwich Rose, and is traditionally said to have been planted and cultivated by monks. Many relics have been discovered by excavation, and even from beneath the waves. Until 1832 Dunwich returned 2 members to parliament.

DUOVIRI, less correctly Duumviri (from Lat. duo two, and vir, man), in ancient Rome, the official style of two joint magis- trates. Such pairs of magistrates were appointed at various periods of Roman history both in Rome itself and in the colonies and municipia. (1) Duumviri iuri (iure) dicundo, municipal magistrates, whose chief duties were concerned with the ad- ministration of justice. Sometimes there were four of these magistrates (Quattuorviri) . (2) Duumviri

quinquennales , also municipal officers, not to be confused with the above, who were elected every fifth year for one year to exercise the function of the censorship which was in abeyance for the intervening four years. (3) Duumviri sacrorum, officers who originally had

charge of the Sibylline books; they were afterwards increased to ten {decemviri sacris faciundis), and in Sulla's time to fifteen {quindecimviri) . (4) Duumviri aedi locandae, originally officers specially appointed to supervise the erection of a temple. There were also duumviri aedi dedicandae. (5) Duumviri navales, extraordinary officers appointed ad hoc for the equipping of a fleet. Originally chosen by consuls or dictator, they were elected by the people after 311 B.C. (Livy ix. 30; xl. 18; xli. 1). (6) Duumviri perduellionis, the earliest criminal court for trying offences against the state (see Treason: Roman Law). (7) Duumviri viis extra urbem purgandis, subordinate officers under the aediles, whose duty it was to look after those streets of Rome which were outside the city walls. Apparently in 20 B.C., certainly by 12 B.C., their duties were transferred to the Curatores viarum. From at least as early as 45 B.C. (cf. the Lex lulia Municipalis) the streets of the city were superintended by Quattuorviri viis in urbe purgandis, dater called Quattuorviri viarum purgandarum.

See Fiebiger and Liebenam in Pauly-Wissowa, Realencyc. v. pt. 2.

DUPANLOUP, FELIX ANTOINE PHILIBERT (1802-1878), French ecclesiastic, was born at St Felix in Savoy on the 3rd of January 1802. In his earliest years he was confided to the care of his brother, a priest in the diocese of Chambery. In 1810 he was sent to a pensionnat ecclisiastique at Paris. Thence he went to the seminary of St Nicolas de Chardonnel in 1813, and was transferred to the seminary of St Sulpice at Paris in 1820. In 1825 he was ordained priest, and was appointed vicar of the Madeleine at Paris. For a time he was tutor to the Orleans princes. He became the founder of the celebrated academy at St Hyacinthe, and received a letter from Gregory XVI. eulogizing his work there, and calling him Apostolus juventutis. His imposing height, his noble features, his brilliant eloquence, as well as his renown for zeal and charity, made him a prominent feature in French life for many years. Crowds of persons attended his addresses, on whom his energy, command of language, powerful voice and impassioned gestures made a profound

impression. When made bishop of Orleans in 1849, he pronounced a fervid panegyric on Joan of Arc, which attracted attention in England as well as France. Before this he had been sent by Archbishop Affre to Rome, and had been appointed Roman prelate and protonotary apostolic. For thirty years he remained a notable figure in France, doing his utmost to arouse his countrymen from religious indifference. In ecclesi- astical policy his views were moderate; thus he opposed the definition of the dogma of papal infallibility both before and during the Vatican council, but was among the first to accept the dogma when decreed. He was a distinguished educationist who fought for the retention of the Latin classics in the schools and instituted the celebrated catechetical method of St Sulpice. Among his publications are De I' Education (1850), De la haute education intellectuelle (3 vols., 1866), (Euvres choisies (1861, 4 vols.); Hisloire de Jesus (1872), a counterblast to Renan's Vie de Jesus. He died on the nth of October 1878.

See Life by F. Lagrange (Eng. tr. by Lady Herbert, London, 1885).

DUPERRON, JACQUES DAVY (1556-1618), French cardinal, was born at St L6, in Normandy, on the 15th of November 1556. His father was a physician, who on embracing the doctrines of the Reformation became a Protestant minister, and to escape persecution settled at Bern, in Switzerland. Here Jacques Davy received his education, being taught Latin and mathematics by his father, and learning Greek and Hebrew and the philosophy then in vogue. Returning to Normandy he was presented to the king by Jacques of Matignon; after he had abjured Protestant- ism, being again presented by Philip Desportes, abbot of Tiron, as a young man without equal for knowledge and talent, he was appointed reader to the king. He was commanded to preach before the king at the convent of Vincennes, when the success of his sermon on the love of God, and of a funeral oration on the poet Ronsard, induced him to take orders. On the death of Mary queen of Scots he was chosen to pronounce her eulogy. On the death of Henry III., after having supported for some time the cardinal de Bourbon, the head of the league against the

king, Duperron became a faithful servant of Henry IV., and in 1 59 1 was created by him bishop of Evreux. He instructed Henry in the Catholic religion; and in 1594 was sent to Rome, where with Cardinal d'Ossat (1536-1604) he obtained Henry's absolution. On his return to his diocese,his zeal and eloquence were largely instrumental in withstanding the progress of Calvinism, and among others he converted Henry Sponde, who became bishop of Pamiers,

and the Swiss general Sancy. At the conference at Fontainebleau in 1600 he argued with much eloquence and ingenuity against Du Plessis Mornay (1549-1623). In 1604 he was sent to Rome as charge d'affaires de France; when Clement VIII. died, he largely contributed by his eloquence to the election of Leo XL to the papal throne, and, on the death of Leo twenty-four days after, to the election of Paul V. While still at Rome he was made a cardinal, and in 1606 became archbishop of Sens. After the death of Henry IV. he took an active part in the states-general of 1614, when he vigorously upheld the ultramontane doctrines against the Third Estate. He died in Paris on the 6th of September 1618.

See Les Divefses (Euvres de Villustrissime cardinal Duperron (Paris, 1622) ; Pierre Feret, Le Cardinal Duperron (Paris, 1877).

DUPIN, ANDRlS MARIE JEAN JACQUES (1783-1865), commonly called Dupin the Elder, French advocate, president of the chamber of deputies and of the Legislative Assembly, was born at Varzy, in Nievre, on the 1st of February 1783. He was educated by his father, who was a lawyer of eminence, and at an early age he became principal clerk of an attorney at Paris. On the establishment of the Academie de Legislation he entered it as pupil from Nievre. In 1800 he was made advo- cate, and in 1802, when the schools of law were opened, he received successively the degrees of licentiate and doctor from the new faculty. He was in 18 10 an unsuccessful candidate for the chair of law at Paris, and in 181 1 he also failed to obtain the office of advocate-general at the court of cassation. About this time he was added to the commission charged with the classifica- tion of the laws of the empire, and, after the interruption caused by the events of 1814 and 1815, was charged with the sole care of that great work. When he entered the chamber of deputies in 18 1 5 he at once took an active part in the debates as a member of the Liberal Opposition, and strenuously opposed the election of the son of Napoleon as emperor after his father's abdication. At the election after the second restoration Dupin was not re- elected. He defended with great intrepidity the principal political victims of the reaction, among others, in conjunction with Nicolas Berryer, Marshal Ney; and in October 181 5 boldly published a tractate entitled Libre Defense des accuses. In 1827 he was again elected a member of the chamber of deputies and in 1830 he voted the address of the 221, and on the 28th of February he was in the streets exhorting the citizens to resist- ance. At the end of 1832 he became president of the chamber, which office he held successively for eight years. On Louis Philippe's abdication in 1848 Dupin ir.trodued the young count of Paris into the chamber, and proposed him as king with the duchess

of Orleans as regent. This attempt failed, but Dupin submitted to circumstances, and, retaining the office of procureur- general, his first act was to decide that justice should henceforth be rendered to the " name of the French people." In 1849 he was elected a member of the Assembly, and became president of the principal committee — that on legislation. After the coup d'etat of the 2nd of December 1851 he still retained his office of procureur-general, and did not resign it until effect was given to the decrees confiscating the property of the house of Orleans. In 1857 he was offered his old office by the emperor, and accepted it, explaining his acceptance in a discourse, a sentence of which may be employed to describe his whole political career. " I have always," he said, " belonged to France and never to parties." He died on the 8th of November 1865. Among Dupin's works, which are numerous, may be mentioned Principia Juris Civilis, 5 vols. (1806); Memoires et plaidoyers de 1806 au i er Janvier 1830, in 20 vols. ; and Memoires ou souvenirs du barreau, in 4 vols. (1855-1857).

His brother, Francois Pierre Charles Dupin (i 784-1873),

wrote several geometrical works, treating of descriptive geometry after the manner of Monge, and of the theory of curves.

DU PIN, LOUIS ELLIES (1657-1719), French ecclesiastical historian, came of a noble family of Normandy, and was born at Paris on the 17th of June 1657. When ten years old he entered the college of Harcourt, where he graduated M.A. in 1672. He afterwards became a pupil of the Sorbonne, and received the degree of B.D. in 1680 and that of D.D. in 1684. About this time he conceived the idea of his Bibliotheque universelle de tous les auteurs ecclesiastiques, the first volume of which appeared in 1686. The liberty with which he there treated the doctrines of the Fathers aroused ecclesiastical prejudice, and the archbishop of Paris condemned the work. Although Du Pin consented to a retractation, the book was suppressed in 1693; he was, however, allowed again to continue it on changing its title by substituting nouvelle for universelle. He was subsequently exiled to Chatel- lerault as a Jansenist, but the sentence of banishment was repealed on a new retractation. In 17 18 he entered into a correspondence with William Wake, archbishop of Canterbury, with a view to a union of the English and Gallican churches; being suspected of projecting a

change in the dogmas of the church, his papers were seized in February 17 19, but nothing incriminating was found. The same zeal for union induced him, during the residence of Peter the Great in France, and at that monarch's request, to draw up a plan for uniting the Greek and Roman churches. He died at Paris on the 6th of June 1719.

Du Pin was a voluminous author. Besides his great work (Paris, 1686-1704, 58 vols. 8vo; Amsterdam, 19 vols. 4to; in the last of which he gives much autobiographical information), mention may be made of Bibliotheque universelle des historiens (2 vols., 1707); L'Histoire de Viglise en abregg (1712); and L'Histoire profane depuis le commencement du monde jusqu'd present (4 vols., 1712).

DUPLEIX, JOSEPH FRANCOIS (1697-1763), governor- general of the French establishment in India, the great rival of Clive (q.v.) , was born at Landrecies, France, on the 1st of January 1697. His father, Francois Dupleix, a wealthy farmer-general, wished to bring him up as a merchant, and, in order to distract him from his taste for science, sent him on a voyage to India in 1715 on one of the French East India Company's vessels. He made several voyages to America and India, and in 1720 was named a member of the superior council at Pondicherry. He displayed great business aptitude, and, in addition to his official duties, made large ventures on his own account, and acquired a fortune. In 1730 he was made superintendent of French affairs in Chandernagore, the town prospering under his energetic administration and growing into great importance. His reputation procured him in 1 742 the appointment of governor- general of all French establishments in India. His ambition now was to acquire for France vast territories in India; and for this purpose he entered into relations with the native princes, and adopted a style of oriental splendour in his dress and surround- ings. The British took the alarm. But the danger to their settlements and power was partly averted by the bitter mutual jealousy which existed between Dupleix and La Bourdonnais, French governor of the isle of Bourbon. When Madras capitulated to the French in 1764, Dupleix opposed the re- storation of the town to the British, thus violating the treaty signed by La Bourdonnais. He then sent an expedition against Fort St David (1747), which was defeated on its march by the nawab of Arcot, the ally of the British. Dupleix succeeded in gaining over the nawab, and again attempted the capture of Fort St David, but unsuccessfully. A midnight attack on Cuddalore was repulsed with great loss. In 1748 Pondicherry was besieged by the British; but in the course of the operations news arrived of the peace concluded between the French and the British at Aix-la-Chapelle. Dupleix next

*entered into negotiations which had for their object the subjugation of southern India, and he sent a large body of troops to the aid of two claimants of the sovereignty of tb < * CofOotic and the Deccan. The British were engaged on Che side of their rivals. After temporary successes the scheme failed. Dupleix was a great organizer, but did not*

possess the genius for command in the field that was shown by Clive. The conflicts between the French and the British in India continued till 1754, when the French government, anxious to make peace, sent out to India a special commissioner with orders to supersede Dupleix and, if necessary, to arrest him. These orders were carried out with needless harshness, what survived of Dupleix's work was ruined at a blow, and he himself was com- pelled to embark for France on the 12th of October 1754. He had spent his private fortune in the prosecution of his public policy; the company refused to acknowledge the obligation; and the government would do nothing for a man whom they persisted in regarding as an ambitious and greedy adventurer. The greatest of French colonial governors died in obscurity and want on the 10th of November 1763. In 1741 he had married Jeanne Albert, widow of one of the councillors of the company, a woman of strong character and intellect, known to the Hindus as Joanna Begum, who proved of great use to her husband in his negotiations with the native princes. She died in 1756, and two years later he married again.

See Tibulle Hamont, Dupleix, d'apres sa correspondance inedite (Paris, 1881); H. Castonnet, Dupleix, ses expeditions et ses projets (Paris, 1888) and La Chute de Dupleix (Angers, 1888); G. B. Malle- son, Dupleix (Rulers of India series, 1890) ; and E. Guerin, Dupleix

(1908).

DUPONT, PIERRE (1821-1870), French song-writer, the son of a blacksmith, was born at Lyons on the 23rd of April 182 1. His parents both died before he was five years old, and he was brought up in the country by his godfather, a village priest. He was educated at the seminary of L'Argentiere, and was afterwards apprenticed to a notary at Lyons. In 1839 he found his way to Paris, and some of his poems were inserted in the Gazette de France and the Quotidienne. Two years later he was saved from the conscription and enabled to publish his first volume — Les]Deux Anges — through the exertions of a kinsmanand of Pierre Lebrun. In 1 842 he received a prize from the Academy, and worked for some time on the official dictionary. Gounod's appreciation of his peasant song, J'ai deux grands bceufs

dans mon Stable (1846), settled his vocation as a song- writer. He had no theoretical knowledge of music, but he composed both the words and the melodies of his songs, the two processes being generally simultaneous. He himself remained so innocent of musical know- ledge that he had to engage Ernest Reyer to write down his airs. He sang his own songs, as they were composed, at the workmen's concerts in the Salle de la Fraternite du Faubourg Saint-Denis; the public performance of his famous Le Pain was forbidden; Le Chant des ouvriers was even more popular; and in 1851 he paid the penalty of having become the poet laureate of the socialistic aspirations of the time by being comdemned to seven years of exile from France. The sentence was cancelled, and the poet withdrew for a time from participation in politics. He died at Lyons, where his later years were spent, on the 24th of July 1870. His songs have appeared in various forms— Chants et chansons (3 vols., with music, 1852-1854), Chants et poisies (7th edition, 1862), &c. Among the best-known are Le Braconnier, Le Tisserand, La Vache blanche, La Chanson du ble, but many others might be mentioned of equal spontaneity and charm. His later works have not the same merit.

See also Sainte-Beuve, Causeries du lundi, iv. ; Ch. Baudelaire, Notice sur P. Dupont (1849) ; Dechaut, Biographie de Pierre Dupont (1871); and Ch. Lenient, Poesie patriotique en France (1889), ii. 352 et seq.

DUPONT DE L'ETANG, PIERRE ANTOINE, Count (1765- 1840), French general, first saw active service as a member of Maillebois' legion in Holland, and in 1791 was on the staff of the Army of the North under Dillon. He distinguished himself at Valmy, and in the fighting around Menin in 1793 he forced an Austrian regiment to surrender. Promoted general of brigade for this feat, he soon received further advancement from Carnot, who recognized his abilities. In 1797 he became general of division. The rise of Napoleon, whom he warmly supported in the coup d'etat of 18th Brumaire, brought him further opportunities. In the campaign of 1800 he was chief of the staff to Berthier, the nominal commander of the " Army of Reserve of the Alps "

which won the battle of Marengo. After the battle he sustained a brilliant combat, against greatly superior forces, at Pozzolo. In the campaign on the Danube in 1805, as the leader of one of Ney's

divisions, he earned further distinction, especially at the action of Albeck-Haslach, in which he prevented the escape of the Austrians from Ulm, and so contributed most effectively to the isolation and subsequent capture of Mack and his whole army (see Napoleonic Campaigns). At Friedland he won further fame. With a record such as but few of Napoleon's divisional commanders possessed, he entered Spain in 1808 at the head of a corps. After the occupation of Madrid, Dupont, newly created count by Napoleon, was sent to subdue Anda- lusia. After a few initial successes he had to retire on the passes of the Sierra Morena. Pursued and cut off by the Spanish army under Castafios, his corps was defeated and he felt himself con- strained to capitulate (Baylen, ioth-23rd July; see Peninsular War) . The disgrace which fell upon the general was not entirely merited. His troops were for the most part raw levies, and ill-luck contributed materially to the catastrophe, but, after his return to France, Dupont was sent before a court-martial, deprived of his rank and title, and imprisoned from 1812 to 1814. Released only by the fall of Napoleon, he was employed by Louis XVIII. in a military command, which he lost on the return of Napoleon. But the Second Restoration saw him restored to the army, and appointed a member of the conseil prive of Louis XVIII. From 1815 to 1830 he was deputy for the Charente. He lived in retirement from 1 83 2 till his death in 1 840. Amongst the writings Dupont left are some poems, including L' Art de la guerre (1838), and verse translations from Horace (1836), and the following military works: Opinion sur le nouveau mode de recrutement (1818), Lettres sur I'Espagne en 1808 (1823), Lettre sur la campagne d'Autriche (1826). At the time of his death he was on the point of publishing his memoirs.

See Lieut.-Col. Titeux, Le General Dupont: une erreur historique (Paris, 1903).

DUPONT DE L'EURE, JACQUES CHARLES (1767-1855), French lawyer and statesman, was born at Neubourg (Eure), in Normandy, on the 27th of February 1767. In 1789 he was an advocate at the parlement of Normandy. During the republic and the empire he filled successively judicial offices at Louviers, Rouen and Evreux. He had adopted the principles of the Revolution, and in 1798 he commenced his political life as a member of the Council of Five Hundred. In 18 13 he became a member of the Corps Legislatif. During the Hundred Days he was vice-president of the chamber of deputies, and when the allied armies entered Paris he drew up the declaration in which the chamber asserted the necessity of maintaining the principles of government that had been established at the Revolution. He was chosen one of the commissioners to nego- tiate with the allied

sovereigns. From 18 17 till 1849 he was uninterruptedly a member of the chamber of deputies, and he acted consistently with the liberal opposition, of which at more than one crisis he was the virtual leader. For a few months in 1830 he held office as minister of justice, but, finding himself out of harmony with his colleagues, he resigned before the close of the year and resumed his place in the opposition. At the revolu- tion of 1848 Dupont de l'Eure was made president of the provi- sional assembly as being its oldest member. In the following year, having failed to secure his re-election to the chamber, he retired into private life. He died in 1855. The consistent firmness with which he adhered to the cause of constitutional liberalism during the many changes of his times gained him the highest respect of his countrymen, by whom he was styled the Aristides of the French tribune.

DU PONT DE NEMOURS, PIERRE SAMUEL (1739-1817), French political economist and statesman, was born at Paris on the 14th of September 1739. He studied for the medical profession, but did not enter upon practice, his attention having been early directed to economic questions through his friendship with Frangois Quesnay, Turgot and other leaders of the school known as the Economists. To this school he rendered valuable service by several pamphlets on financial questions, and numerous

articles representing and advocating its views in a popular style in the Journal de I' agriculture, du commerce, et des finances, and the Mphemerides du citoyen, of which he was successively editor. In 1772 he accepted the office of secretary of the council of public instruction from Stanislas Poniatowski, king of Poland. Two years later he was recalled to France by the advent of his friend Turgot to power. After assisting the minister in his wisely- conceived but unavailing schemes of reform during the brief period of his tenure of office, Du Pont shared his dismissal and retired to Gatinais, in the neighbourhood of Nemours, where he employed himself in agricultural improvements. During his leisure he wrote a translation of Ariosto (1781), and M&moires sur la vie de Turgot (1782). He was drawn from his retirement by C. G. de Vergennes, minister of foreign affairs, who employed him in 1782 in negotiating, with the English commissioner Dr James Hutton, for recognition of the independence of the United States (1782), and in preparing a treaty of commerce with Great Britain (1786). Under Calonne he became councillor of state, and was appointed commissary-general of commerce.

During the Revolution period he advocated constitutional monarchy,

and was returned as deputy by the Third Estate of the bailliage of Nemours to the states-general, and then to the Constituent Assembly, of which he was elected president on the 16th of October 1790. But his conservative opinions rendered him more and more unpopular, and after the 10th of August 1792, when he took the side of the king, he was forced to lie con- cealed for some weeks in the observatory of the Mazarin College, from which he contrived to escape to the country. During the time that elapsed before he was discovered and arrested he wrotehis Philosophic de I'univers. Imprisoned in La Force (1794), he was one of those who had the good fortune to escape the guillotine till the death of Robespierre set them free. As a member of the Council of Five Hundred, Du Pont carried out his policy of resistance to the Jacobins, and made himself prominent as a member of the reactionary party. After the republican triumph on the 18th Fructidor (4th of September) 1797 his house was sacked by the mob, and he himself only escaped transporta- tion to Cayenne through the influence of M. J. Chenier. In 1 799 he found it advisable for his comfort, if not for his safety, to emigrate with his family to the United States. Jefferson's high opinion of Du Pont was shown in using him in 1802 to convey to Bonaparte unofficially a threat against the French occupation of Louisiana; and also, earlier, in requesting him to prepare a scheme of national education, which was published in 1800 under the title Sur I 'Education nationale dans les Etats-Unis d' Amirique. Though the scheme was not carried out in the United States, several of its features have been adopted in the existing French code. On his return to France in 1802 he declined to accept any office under Napoleon, devoted himself almost exclusively to literary pursuits, and was elected to the Institut. On the down- fall of Napoleon in 1814 Du Pont became secretary to the provisional government, and on the restoration he was made a councillor of state. The return of the emperor in 18 15 deter- mined him to quit France, and he spent the close of his life with his younger son, Eleuthere Irenee (1771-1834), who had established a powder manufactory in Delaware. He died at Eleutherian Mills near Wilmington, Delaware, on the 6th of August 18 1 7.

His family continued to conduct the powder-mills, which brought them considerable wealth. The business was subse- quently converted into the E. I. Du Pont de Nemours Powder Company. His grandson, Admiral Samuel Francis Du Pont (1803-1865), played a conspicuous part as a U.S. naval officer in the American Civil War. His great-grandson, Henry Algernon Du Pont (b. 1838), president of the Wilmington & Northern railway, was a soldier in the Civil War, and afterwards a United States senator.

Du Pont's most important works, besides those mentioned above, were his De Vorigine et des progres d'une science nouvelle (London and Paris, 1767); Physiocratie, ou constitution naturelle du gouverne- ment le plus avantageux au genre humain (Paris, 1768); and his Observations sur les effets de la liberte du commerce des grains (1760). They are gathered together in vol. ii. of the Collection des economises

(1846). See notices of his life (1818) by Silvestre and Baron de Gerando ; also Schelle, Du Pont de Nemours et I'ecole physiocratique

(1888).

DUPORT, ADRIEN (1759-1798), French politician, was born in Paris. He became an influential advocate in the parlement, becoming prominent in opposition to the ministers Calonne and Lomenie de Brienne. Elected in 1789 to the states-general by the noblesse of Paris, he soon revealed a remarkable eloquence. A learned jurist, he contributed during the Constituent Assembly to the organization of the judiciary of France. His report of the 29th of March 1 790 is especially notable. In it he advocated trial by jury; but he was unable to obtain the jury system in civil cases. Duport had formed with Barnave and Alexandre de Lameth a group known as the " triumvirate," which was popular at first. But after the flight of the king to Varennes, Duport sought to defend him; as member of the commission charged to question the king, he tried to excuse him, and on the 14th of July 1 79 1 he opposed the formal accusation. He was thus led to separate himself from the Jacobins and to join the Feuillant party. After the Constituent Assembly he became president of the criminal tribunal of Paris, but was arrested during the insurrection of the 10th of August 1792. He escaped, thanks probably to the complicity of Danton, returned to France after the 9th of Thermidor of the year II., left it in exile again after the republican coup d'etat of the 18th of Fructidor of the year V., and died at Appenzell in Switzerland in 1798.

See F. A. Aulard, Les Orateurs de la Constituante (2nd ed., Paris, 1905, 8vo).

DUPORT, JAMBS (1606-1679), English classical scholar, was born at Cambridge. His father, John Duport, who was descended from an

old Norman family (the Du Ports of Caen, who settled in Leicestershire during the reign of Henry IV.), was master of Jesus College. The son was educated at West- minster and at Trinity College, where he became fellow and subsequently vicemaster. In 1639 he was appointed regius professor of Greek, in 1664 dean qf Peterborough, and in 1668 master of Magdalene College. He died at Peterborough on the 17th of July 1679. Throughout the troublous times of the Civil War, in spite of the loss of his clerical offices and eventually of his professorship, Duport quietly continued his lectures. He is best known by his Homeri gnomologia (1660), a collection of all the aphorisms, maxims and remarkable opinions in the Iliad an& Odyssey, illustrated by quotations from the Bible and classical literature. His other published works chiefly consist of translations (from the Bible and Prayer Book into Greek) and short original poems, collected under the title of Horae subsecivae or Stromata. They include congratulatory odes (inscribed to the king); funeral odes; carmina comitialia (tripos verses on different theses maintained in the schools, remarkable for their philosophical and metaphysical knowledge) ; sacred epigrams; and three books of miscellaneous poems (Sylvae) . The character of Duport's work is not such as to appeal to modern scholars, but he deserves the credit of having done much to keep alive the study of classical literature in his day.

The chief authority for the life of Duport is J. H. Monk's " Memoir " (1825) ; see also Sandys, Hist. Class. Schol. (1908), ii. 349.

DUPPEL, a village of Germany, in the Prussian province of Schleswig-Holstein, opposite the town of Sonderburg (on the island of Alsen). (Pop. 600.) The position of Duppel, forming as it does a bridge-head for the defenders of the island of Alsen, played a conspicuous part in the wars between Denmark and the Germans. On the 28th of May 1848 the German federal troops were there defeated by the Danes under General Hede- mann, and a second battle was fought on the 6th of June 1848. On the 13th of April 1849 an indecisive battle was fought between the federal troops under von Prittwitz and the Danes under von Biilow. The most important event in the military history of Duppel was, however, the siege by the Prussians of the Danish position in 1864. The flanks of the defenders' line rested upon the Alsen Sund and the sea, and it was strengthened by ten redoubts. A second line of trenches with lunettes at intervals was constructed behind the front attacked, and a small reduit opposite Sonderburg to cover the bridges between Alsen and the

mainland. The Prussian siege corps was commanded by Prince Frederick Charles (headquarters, Duppel village), and after three weeks' skirmishing a regular siege was begun, the batteries being opened on the 1 5th of March. The first parallel was completed fifteen days later, the front of attack being redoubts II. to VI., forming the centre of the Danish entrenchments on the road Duppel-Sonderburg. The siege was pushed rapidly from the first parallel and the assault delivered on the 18th of April, against the redoubts I. to VI., each redoubt being attacked by a separate column. The whole line was carried after a brief but severe conflict, and the Prussians had penetrated to and captured the reduit opposite Sonderburg by 2 p.m. The loss of the Danes, half of whose forces were not engaged, included 1800 killed and wounded and 3400 prisoners. This operation was followed by the daring passage of the Alsen Sund, effected by the Prussians in boats almost under the guns of the Danish warships, and resulting in the capture of the whole island of Alsen (June 29th, 1864). After being still further strengthened and linked with similar defences at Sonderburg, the Duppel entrenchments were abandoned in 1881 in favour of landward fortifications around Kiel.

See R. Neumann, Uber den Angriff der Diippeler Schanzen in der Zeit vom 15. Man bis 18. April 1864 (Berlin, 1865) ; and Der deulsch-ddnische Krieg 1864, published by the Prussian General Staff (Berlin, 1887).

DU PRAT, ANTOINE (1463-1535), chancellor of France and cardinal, was born at Issoire on the 17th of January 1463. He began life as a lawyer, and rose rapidly in the legal hierarchy owing to the influence of his cousin Antoine Bohier, cardinal archbishop of Bourges. The first office which he held was that of lieutenant-general in the bailliage of Montferrand; in 1507 he became first president of the parlement of Paris. Louise of Savoy had employed him as her adviser in her affairs, and had made him tutor to her son. When Francis I. ascended the throne he made Du Prat chancellor of France, in which capacity he played an important part in the government. It was he who negotiated with Leo X. concerning the abolition of the Pragmatic Sanction and the establishment of a concordat. After the meeting of the Field of the Cloth of Gold (1520) he was engaged in unsuccessful negotiations with Wolsey. During the regency of Louise of Savoy he, together with Florimond Robertet, was at the head of affairs. He took an active part in the suit brought by Louise of Savoy against the Constable de Bourbon, and in 1532 completed the work of uniting Brittany to France. After the death of his wife in 1507 Du Prat had taken orders; he received the bishoprics of Valence, Die,

Meaux and Albi, and the archbishopric of Sens (1525); in 1527 he became cardinal, and in 1530 papal legate. He was a determined adversary of the Reformation. He died on the 9th of July 1535.

See the marquis Du Prat, Vie d' Antoine Du Prat (Paris, 1857).

DUPRE, JULES (1812-1889), French painter, was one of the chief members of the Barbizon group of romantic landscape painters. If Corot stands for the lyric and Rousseau for the epic aspect of the poetry of nature, Dupre is the exponent of her tragic and dramatic aspects. He was the son of a porcelain manufacturer, and started his career in his father's works, whence he went to his uncle's china factory at Sevres.. After studying for some time under Diebold, a painter of clock faces, he had to pass through a short period of privation, until he attracted the attention of a wealthy patron, who came to his studio and bought all the studies on the walls at the price demanded by the artist — 20 francs apiece. Dupre exhibited first at the Salon in 1831, and three years later was awarded a second-class medal. In the same year he came to England, where he was deeply impressed by the genius of Constable. From him he learnt how to express movement in nature; and the district of Southampton and Plymouth, with its wide, unbroken expanses of water, sky and ground, gave him good opportunities for studying the tempestuous motion of storm-clouds and the movement of foliage driven by the wind. He received the cross of the Legion of Honour in 1848. Dupre's colour is sonorous and resonant; the subjects for which he showed marked preference are dramatic

sunset effects and stormy skies and seas. Late in life he changed his style and gained appreciably in largeness of handling and arrived at greater simplicity in his colour harmonies. Among his chief works are the " Morning " and " Evening " at the Louvre, and the early " Crossing the Bridge " in the Wallace Collection.

DUPUIS, CHARLES FRANCOIS (1742-1809), French scientific writer and politician, was born of poor parents at Trye-Chateau, between Gisors and Chaumont, on the 26th of October 1742. His father, who was a teacher, instructed him in mathematics and land-surveying. While he was engaged in measuring a tower by a geometrical method, the due de la Rochefoucauld met him and was so taken by the lad's intelligence that he gave him a bursary in the

college of Harcourt. Dupuis made such rapid progress that, at the age of twenty-four, he was appointed professor of rhetoric at the college of Lisieux, where he had previously passed as a licentiate of theology. In his hours of leisure he studied law, and in 1770 he abandoned the clerical career and became an advocate. Two university discourses which he delivered in Latin were printed, and laid the foundation of his literary fame. His chief attention, however, was devoted to mathematics, the object of his early studies; and for some years he attended the astronomical lectures of Lalande, with whom he formed an intimate friendship. In 1778 he constructed a telegraph on the principle suggested by Guillaume Amontons (q.v.), and employed it in keeping up a correspondence with his friend Jean Fortin in the neighbouring village of Bagneux, until the Revolution made it necessary to destroy his machine to avoid suspicion. About the same time Dupuis formed his theory as to the origin of the Greek months. He endeavoured to account for the want of any resemblance between the groups of stars and the names by which they are known, by supposing that the zodiac was, for the people who invented it, a sort of calendar at once astronomical and rural, and that the figures chosen for the constellations were such as would naturally suggest the agricultural operations of the season. It seemed only necessary, therefore, to discover the clime and the period in which the constellation of Capricorn must have arisen with the sun on the day of the summer solstice, and the vernal equinox must have occurred under Libra. It appeared to Dupuis that this clime was Upper Egypt, and that the perfect correspondence between the signs and their significations had existed in that country at a period of between fifteen and sixteen thousand years before the present time; that it had existed only there; and that this harmony had been disturbed by the effect of the precession of the equinoxes. He therefore ascribed the invention of the signs of the zodiac to the people who then inhabited Upper Egypt or Ethiopia. This was the basis on which Dupuis established his mythological system, and endeavoured to explain fabulous history and the whole system of the theogony and theology of the ancients. Dupuis published several detached parts of his system in the Journal des savants for 1777 and 1781. These he afterwards collected and published, first in Lalande's Astronomy, and then in a separate volume in 4to, 1781, under the title of Memoirs sur I'origine des constellations et sur V explication de la fable par V astronomic The theory propounded in this memoir was refuted by J. S. Bailly in his Histoire de I'astronomie, but, at the same time, with a just acknowledgment of the erudition and ingenuity exhibited by the author.

Condbrcet proposed Dupuis to Frederick the Great of Prussia as a fit person to succeed Thiebault in the professorship of literature at Berlin; and Dupuis had accepted the invitation,; when the death of the king cancelled the engagement. The chair of humanity in the College of France having at the same time become vacant, it was conferred on Dupuis; and in 1788 he became a member of the Academy of Inscriptions. He now resigned his professorship at Lisieux, and was appointed by the administrators of the department of Paris one of the four com- missioners of public instruction. At the outbreak of the Revolu- tionary troubles Dupuis sought safety at Evreux; and, having been chosen a member of the National Convention by the department of Seine-et-Oise, he distinguished himself by his moderation. In the third year of the republic he was elected secretary to the Assembly, and in the fourth he was chosen a

member of the Council of Five Hundred. After Bonaparte's coup d'Uat of the 18th Brumaire he was elected by the depart- ment of Seine-et-Oise a member of the Legislative Body, of which he became the president. He was proposed as a candidate for the senate, but resolved to abandon politics, devoting himself during the rest of his life to his favourite studies.

In 1795 he published the work by which. he is best known, en- titled Origine de tons les cultes, ou la religion universelle (3 vols. 4to, with an atlas, or 12 vols. i2mo). This work, of which an edition revised by P. R. Auguis was published in 1822 (10th ed., 1835-1836), became the subject of much bitter controversy, and the theory it propounded as to the origin of mythology in Upper Egypt led to the expedition organized by Napoleon for the ex- ploration of that country. In 1798 Dupuis published an abridg- ment of his work in one volume 8vo, which met with no better success than the original. Another abridgment of the same work, executed upon a much more methodical plan, was published by M. de Tracy. The other works of Dupuis consist of two memoirs on the Pelasgi, inserted in the Memoirs of the Institute; a memoir " On the Zodiac of Tentyra," published in the Revue philosophique for May 1806; and a Memoir e explicatif du zodiaque chrondlogique et mythologique, published the same year, in one volume 4to. He died on the 29th of September 1809,

DUPUY, CHARLES ALEXANDRE (1851-), French statesman, was born at Le Puy on the 5th of November 1851, his father being a local official. After being a professor of philosophy in the provinces, he was appointed a school inspector, and thus obtained a practical acquaintance with the needs of French education. In 1885 he was elected to the chamber as an Opportunist Republican. After acting as " reporter " of the budget for public instruction, he became minister for the depart- ment, in M. Ribot's cabinet, in 1892. In April 1893 he formed a ministry himself, taking as his office that of minister of the interior, but resigned at the end of November, and on 5th December was elected president of the chamber. During his first week of office an anarchist, Vaillant, who had managed to gain admission to the chamber, threw a bomb at the president, and M. Dupuy's collected bearing, and his historic words: " Messieurs, la seance continue," gained him much credit. In May 1894 he again became premier and minister of the interior; and he was by President Carnot's side when the latter was stabbed to death at Lyons in June. He then became a candidate for the presidency, but was defeated, and his cabinet remained in office till January 1895; it was under it that Captain

Dreyfus was arrested and condemned (23rd of December 1894). The progress of V affaire then cast its shadow upon M. Dupuy, along with other French " ministrables," but in November 1898, after M. Brisson had at last remitted the case to the judgment of the court of cassation, he formed a cabinet of Republican concentration. In view of the apparent likelihood that the judges of the criminal division of the court of cassation — who formed the ordinary tribunal for such an appeal — would decide in favour of Dreyfus, it was thought that M. Dupuy's new cabinet would be strong enough to reconcile public opinion to such a result; but, to the surprise of outside observers, it was no sooner discovered how the judges were likely to decide than M. Dupuy proposed a law in the chamber transferring the decision to a full court of all the divisions of the court of cassation. This arbitrary act, though adopted by the chamber, was at once construed as a fresh attempt to maintain the judgment of the first court-martial; but in the interval President Faure (an anti-Dreyfusard) died, and the accession of M. Loubet doubtless had some effect in quieting public feeling. At all events, the whole court of cassation decided that there must be a new court-martial, and M. Dupuy at once resigned (June 1899). In June 1900 he was elected senator for the Haute Saone.

DUPUY, PIERRE (1582-1651), French scholar, otherwise known as Puteanus, was born at Agen (Lot-et-Garonne)onthe 27th of November 1582. In 1615 he was commissioned by Mathieu Mole, first president of the parlement of Paris, to draw up an inventory of the documents which constituted what at that time was known as the Tresor des chartes. This work

occupied eleven years. His MS. inventory is preserved in the original and in copy in the Bibliotheque Nationale, and transcrip- tions are in the national archives in Paris, at the record office in London, and elsewhere. Dupuy's classification is still regarded with respect, but the inventory has been partially replaced by the publication of the Layettes du tresor (four volumes, coming down to 1270; 1863-1902). Dupuy also published, with his brother Jacques, and their friend Nicolas Rigault, the History of Aug. de Thou (1620, 1626). The two brothers then bought from Rigault the post of keeper of the king's library, and drew up a catalogue of the library (Nos. 9352-9354 and 10366-10367 of the Latin collection in the Bibliotheque Nationale). In the course of this work, Dupuy became

acquainted with and copied an enormous mass of unpublished documents, which furnished him with the material for some excellent works: Traite des droits et des libertis de I'Sglise gallicane, avec les preuves (1639), Histoire de I'ordre -militaire des Tern-pliers (1654), Histoire ginirale du schisme qui a H6 dans I'iglise depuis ijˆ8jusqu'd 1428 (1654), and Histoire du diffSrend entre le pape Boniface VIII et le roi Philippe le Bel (1655). These works, especially the last, are important contributions to the history of the relations of church and state in the middle ages. They were written from the Gallican standpoint, i.e. in favour of the rights of the crown in temporal and political matters, and this explains the delay in their publication until after Dupuy's death. He wrote also Traite des regences et des majorites des rois de France (1655) and Recueil des droits du roi (1658). Dupuy's papers, preserved in the Bibliotheque Nationale, were inventoried by Leon Dorez {Catalogue de la collection Dupuy, 1899). See also L. Delisle's Le Cabinet des manuscrits -de la bibliotheque imperiale. Dupuy died in Paris on the 14th of December 1651J

DUPUY DE LdME, STANISLAS CHARLES HENRI LAURENT (1816-1885), French naval architect, the son of a retired naval officer, was born at Ploemeur, near Lorient, on the 15th of October 18 16. He entered the Ecole Poly technique in 1835, and in 1842 was sent to England to study and report on iron ship- building. Acting on his report, which was published in 1844, the government built their first iron vessels under his supervision. He planned and built the steam line-of-battle ship " Napoleon " (1848-1852), and devised the method of altering sailing ships of the line into steamers, which was afterwards extensively practised in both France and England. He also showed the practicability of armouring the sides of a ship, and the frigate " Gloire " gave a very clear demonstration of his views. It was the beginning of the great change in the construction of ships of war which has been going on ever since. In 1857 Dupuy de Lome was appointed " chef de la direction du materiel," at Paris; and in 1861, " inspecteur general du materiel de la marine." In 1866 he was elected a member of the Academy of Sciences. At the beginning of the Franco-German War he was appointed a member of the committee of defence, and during the siege of Paris occupied himself with planning a steer- able balloon, for carrying out which he was given a credit of 40,000 f r. ; but the balloon was not ready till a few days before the capitulation. The experiments that wereafterwardsmadewith it did not prove entirely satisfactory. In 1875 he was busy over a scheme for embarking a railway train at Calais, and exhibited plans of the improved harbour and models of

the " bateaux porte-trains " to the Academy of Sciences in July. In 1877 he was elected a senator for life. He received the cross of the Legion of Honour in 1845, was made a commander in 1858, and grand officer in December 1863. He died at Paris on the 1st of February 1885.

DUPUYTREN, GUILLAUME, Baron (1777-1835), French anatomist and surgeon, was born on the 6th of October 1777 at Pierre Buffiere (Haute Vienne). He studied medicine in Paris at the newly established Ecole de Medecine, and was appointed by competition prosector when only eighteen years of age. His early studies were directed chiefly to morbid anatomy. In 1803 he was appointed assistant-surgeon at the Hotel-Dieu, and in 181 1 professor of operative surgery in succession to R. B. Sabatier (1732-1811). In 1815 he was appointed to the chair of clinical

surgery, and became head surgeon at the H6tel-Dieu. Dupuytren's energy and industry were alike remarkable. He visited the Hotel-Dieu morning and evening, performing at each time several operations, lectured to vast throngs of students, gave advice to his outdoor patients, and fulfilled the duties consequent upon one of the largest practices of modern times. By his indefatigable activity he amassed a fortune of £300,000, the bulk of which he bequeathed to his daughter, with the deduc- tion of considerable sums for the endowment of the anatomical chair in the Ecole de Medecine, and the establishment of a benevolent institution for distressed medical men. The most important of Dupuytren's writings is his Treatise on Artificial Anus, in which he applied the principles laid down by John Hunter. In his operations he was remarkable for his skill and dexterity, and for his great readiness of resource. He died in Paris on the 8th of February 1835.

DUQUE DE ESTRADA, DIEGO (1589- ?), Spanish memoir writer, soldier and adventurer, son of Juan Duque de Estrada, also a soldier of rank, was born at Toledo on the 15th of August 1589. Having been left an orphan when very young, he was educated by a cousin. While still young he was betrothed to his cousin's daughter. One night he found an intruder in the house, a gentleman with whom he was acquainted, and in a fit of jealousy killed both him and the young lady. The prevailing code of honour was considered a sufficient justification for Duque de Estrada's violence, but the law looked upon the act as a vulgar assassination, and he had to flee. After leading a vagabond life in the south of Spain, he was arrested at Ecija, was brought to Toledo, and was there put to the torture with extreme ferocity, in order to extort a general confession as to his life

during the past months. He had the strength not to yield to pain, and was finally able to escape from prison, partly by the help of a nun in a religious house which faced the prison, and partly by the intervention of friends. He made his way to Naples, where he entered the service of the duke of Osuna (q.v.), at that time viceroy. Duque de Estrada saw a good deal of fighting both ' with the Turks and the Venetians; but he is mainly interesting because he was employed by the viceroy in the conspiracy against Venice. He was one of the disguised Spanish soldiers who were sent into the town to destroy the arsenal, and who were warned in time that the conspiracy had been betrayed, and therefore escaped. After the fall of his patron, Duque de Estrada resumed his vagabond life, served under Bethlen Gabor in Transylvania, and in the Thirty Years' War. In 1633 he entered the order of San Juan de Dios, and died at some time after 1637 in Sardinia, where he is known to have taken part in the defence of the island against an attack by the French. He left a book of memoirs, entitled Comentarios de el desengenado de si Mismo prueba de todos estados, y eleccion del Mejor de ellos — " The Commentaries of one who knew his own little worth, the touchtstone of all the state of man, and the choice of the best." They were written at different times, and part has been lost. The style is incorrect, and it would be unsafe to trust them in every detail, but they are amazingly vivid, and contain a wonderful picture of the moral and intellectual state of a large part of Spanish society at the time.

The memoirs have been reprinted by Don Pascual de Gayangos in the Memorial historico espanol, vol. xii. (Madrid, i860).

DUQUESNE, ABRAHAM, Marquis (1610-1688), French naval officer, was born at Dieppe in 1610. Born in a stirring seaport, the son of a distinguished naval officer, he naturally adopted the profession of a sailor. He spent his youth in the merchant service, and obtained his first distinction in naval warfare by the capture of the island of Lerins from the Spaniards in May 1637. About the same time his father was killed in an engagement with the Spaniards, and the news raised his hatred of the national enemy to the pitch of a personal and bitter animosity. For the next five years he sought every opportunity of inflicting defeat and humiliation on the Spanish navy, and he distinguished himself by his bravery in the engagement at Guetaria (1638), the expedition to Corunna (1639), and in battles at Tarragona (1641), Barcelona (1643), and the Cabo de Gata.

The French navy being left unemployed during the minority of Louis XIV., Duquesne obtained leave to offer his services to the king of Sweden, who gave him a commission as vice-admiral in 1643. In this capacity he defeated the Danish fleet near Gothenburg and thus raised the siege of the city. The Danes returned to the struggle with increased forces under the command of King Christian in person, but they were again defeated— their admiral being killed and his ship taken. Peace having beei concluded between Sweden and Denmark in 1645, Duquesne returned to France. The revolt at Bordeaux, supported as it was by material aid from Spain, gave him the opportunity of at once serving his country and gratifying his long-cherished hatred of the Spaniards. In 1650 he fitted out at his own expense a squadron with which he blockaded the mouth of the Gironde, and compelled the city to surrender. For this service he was promoted in rank, and received a gift of the castle and isle of Indre, near Nantes. Peace with Spain was concluded in 1659, and for some years afterwards Duquesne was occupied in endeavours to suppress piracy in the Mediterranean. On the revolt of Messina from Spain, he was sent to support the insurgents, and had to encounter the united fleets of Spain and Holland under the command of the celebrated Admiral de Ruyter. After several battles, in which the advantage was generally on the side of the French, a decisive engagement took place near Catania, on the 20th of April 1676, when the Dutch fleet was totally routed and de Ruyter mortally wounded. The greater part of the defeated fleet was afterwards burned in the harbour of Palermo, where it had taken refuge, and the French thus secured the undisputed command of the Mediter- ranean. For this important service Duquesne received a letter of thanks from Louis XIV., together with the title of marquis and the estate of Bouchet. His last achievements were the bom- bardment of Algiers (1682-1683), in order to effect the deliver- ance of the Christian captives, and the bombardment of Genoa in 1684. He retired from service in 1684, on the ground of age and ill-health. It is probable also that he foresaw the revocation of the edict of Nantes, which took place in the following year. He died in Paris on the 2nd of February 1688.

See Jal, Abraham Duquesne, et la marine de son temps (1873).

DUQUESNE, a borough of Allegheny county, Pennsylvania, U.S.A., on the Monongahela river, about 12 m. S.E. of Pittsburg. Pop. (1900) 9036, of whom 3451 were foreign-born; (1910 census) 15,727. It is served by the Pennsylvania railway. Its most prominent buildings are the Carnegie free library and club (opened in 1904 and containing 17,500 volumes in 1908), and the city hall. A short distance N. of the borough limits Kenny- wood Park, with a large

auditorium and pavilion, is an attractive resort. By far the most important industry of the borough is the manufacture of steel. The value of the borough's factory products increased from $20,333,476 in 1900 to $28,494,303 in 1905, or 40-1%. The municipality owns and operates its water-works. Duquesne was settled in 1885 and was incor- porated in 1 89 1.

DURAMEN (a rare Latin word, meaning hardness, from durus, hard), a botanical term for the inner, harder wood of a tree, the heart-wood.

DURAN, a Jewish Provencal family of rabbis and scholars, of whom the following are the most important.

1. Profiat Duran, called also Ephodi. He was in 1391 compelled to profess Christianity, but remained devoted to Judaism. His chief works were grammatical and philosophical. In the former realm his most important contribution was the Ma'aseh 'Ephod (completed in 1403); in the latter, his com- mentary to the Guide of the Perplexed by Maimonides (q.v.).

2. Simon Ben Zemah Duran (1361-1441), rabbi of Algiers. He was one of the first of the medieval rabbis to be a salaried official of the synagogue. Before the 14th century the rabbinical post had been almost invariably honorary, and filled by men who derived their income from a profession, epecially medicine. Duran wrote a systematic work on theology, Magen 'Aboth, but is chiefly famous for his numerous Responsa (known as Tashbaz) published in three vols, in 1738-1 739. These Responsa,

" Answers to questions sent from many lands," give valuable information as to social and religious conditions in the earlier part of the 15th century. (I. A.)

DURAN, AGUSTfN (1789-1862), Spanish scholar, was born in 1789 at Madrid, where his father was court physician. He was sent to the seminary at Vergara, whence he returned learned in the traditions of Spanish romance. In 1817 he began the study of philosophy and law at the university of Seville, and in due course was admitted to the bar at Valladolid. From 18 21 to 1823 he held a post in the education department at Madrid, but in the latter year he was suspended on account of his political opinions. In 1834 he became secretary of the board for the censorship of the press, and shortly afterwards obtained a post in the national library at Madrid. The revolution of 1840 led to his dismissal; but he was reinstated in

1843, and in 1854 was appointed chief librarian. Next year, however, he retired to devote himself to his literary work. In 1828, shortly after his first discharge from office, he published anonymously his Discurso sobre el influjo que ha tenido la critica moderna en la decadencia del teatro antiguo; this treatise greatly influenced the younger dramatists of the day. He next endeavoured to interest his fellow-countrymen in their ancient, neglected ballads, and in the forgotten dramas of the 17th century. Five volumes of a Romancero general appeared from 1828 to 1832 (republished, with considerable additions, in 2 vols. 1840-1851), and Talia espaiiola (1834), a reprint of old Spanish comedies. Duran's Romancero general is the fullest collection of the kind and is therefore unlikely to be superseded, though the texts are inferior to those edited by Menendez y Pelayo.

DURANCE (anc. Druentia), one. of the principal rivers descending from the French slope of the Alps towards the Mediterranean. Its total length from its source to its junction with the Rhone (of which it is one of the principal affluents), a little below Avignon, is 217ˆ m. For the greater part of its course it flows in a south-westerly direction, but near Pertuis gradually bends N.W. and thenceforth preserves this direction. It passes through the departments of Hautes-Alpes, of Basses- Alpes, and between those of Vaucluse and Bouches-du-Rh&ne. It is commonly said to take its origin in some small lakes a little south of the summit plateau of the Mont Genevre Pass. But really this stream is surpassed both in volume and length of course by two others which it joins beneath Briancon: — the Clairee, flowing in from the north, through the smiling Nevache glen, at the head of which, not far from the foot of the Mont Thabor (ro,44o ft.), it rises in some small lakes, on the east side of the Col des Rochilles; and the Guisane (flowing in from the north- west and rising near the Col du Lautaret, 6808 ft.). The united stream soon receives its first affluent, the Cerveyrette (left), and, after having passed through some fine deep-cut gorges, the Gyronde (right). It then runs through a stony plain, where it frequently overflows and causes great damage, this being indeed the main characteristic of the Durance throughout its course. At the foot of the fortress of Mont Dauphin it receives (left) the Guil, which flows through the Queyras valley from near the foot of Monte Viso. Some way beyond it passes beneath Embrun, the first important town on its banks. It soon becomes the bpundary for a while between the departments of the Hautes- Alpes and of the Basses-Alpes, and receives successively the considerable Ubaye river, flowing from near the foot of Monte Viso past Barcelonnette (left), and then the small stream of the Luye (right),

on which, a few miles above, is Gap. It enters the Basses-Alpes shortly before reaching Sisteron, where it is joined (right) by the wild torrent of the Buech, flowing from the desolate region of the Devoluy, and receives the Bleone (left) (on which Digne, the capital of the department, is situated) and the Asse (left), before quitting the department of the Basses-Alpes just as it is reinforced (left) by the Verdon, flowing from the lower summits of the Maritime Alps past Castellane. After passing through some narrow gorges near Sisteron the bed of the river becomes wide, and spreads desolation around, the frequent overflows being kept within bounds by numerous dykes and enbankments. These features are especially marked when the

river, after leaving the Basses-Alpes, soon bends N.W. and, always serving as the boundary between the departments of Vaucluse (N.) and of the Bouches-du- Rhone (S.), passes Cavaillon before it effects its junction with the Rhone. The drainage area of the Durance is about 5166 sq. m., while the height it descends is 6550 ft., if reckoned from the lakes on the Mont Genevre, or 7850 ft. if we take those at the head of the Nevache valley as the true source of the river. (W. A. B. C.)

DURAND, ASHER BROWN (1796-1886), American painter and engraver, was born at South Orange, New Jersey, on the 21st of August 1796. He worked with his father, a watch- maker; was apprenticed in 181 2 to an engraver named Peter Maverick; and his first work, the head of an old beggar after Waldo, attracted the attention of the artist Trumbull. Durand established his reputation by his engraving of Trumbull's " Declaration of Independence." After 1835, however, he de- voted himself chiefly to portrait painting. He painted several of the presidents of the United States and many other men of political and social prominence. In 1840 he visited Europe, where he studied the work of the old masters; after his return he devoted himself almost entirely to landscape. He died at South Orange on the 17th of September 1886. He had been one of the founders of the National Academy of Design in 1826, and was its president in 1845-1861. Durand may be called the father of the Hudson River School. Although there was some- thing hard and unsympathetic about his landscapes, and un- necessary details and trivialities were over-prominent, he was a well-trained craftsman, and his work is marked by sincerity.

DURAND, GUILLAUME (Guillelmus Durandus), also known as Duranti or Durantis, from the Italian form of Durandi filius, as he sometimes signed himself (c. 1230-1296), French canonist and liturgical writer, and bishop of Mende, was born at Puimisson, near Beziers, of a noble family of Languedoc. He studied law at Bologna, especially with Bernardus of Parma, and about 1264 was teaching canon law with success at Modena. Clement IV., his fellow-countryman, called him to the pontifical court as a chaplain and auditor of the palace, and in 1274 he accompanied Clement's successor Gregory X. to the council of Lyons, the constitutions of which he drew up, along with some other prelates. As spiritual and temporal legate of the patrimony of St Peter, he received in 1278, in the name of the pope, the homage of Bologna and of the other cities of Romagna. Martin IV. made him vicar spiritual in 128 1, then governor of Romagna and of the March of Ancona (1283). In the midst of the struggles between Guelfs and Ghibellines, Durandus successfully defended the papal territories, both by diplomacy and by arms. Honorius IV. retained him in his offices, and although elected bishop of Mende in 1286, he remained inltaly until 1 291. In 129 5 he refused the archbishopric of Ravenna, offered him by Boniface VIII., but accepted the task of pacifying again his former provinces of Romagna and the March of Ancona. In 1296 he withdrew to Rome, where he died on the 1st of November.

Durandus' principal work is the Speculum judiciale, which was drawn up in 1271, and revised in 1286 and 1291. It is a general explanation of civil, criminal and canonical procedure, and also includes a survey of the subject of contracts. It is a remarkable synthesis of Roman and ecclesiastical law, distin- guished by its clarity, its method, and especially its practical sense, in a field in which it was pioneer, and its repute was as great and lasting in the courts as in the schools. It won for Durandus the name of " The Speculator." It was commented upon by Giovanni Andrea (in 1346), and by Baldus, and in 1306 Cardinal Beranger drew up an alphabetical table of its contents (Inventorium). There are many manuscripts of the Speculum, and several editions, of which the most usual is that of Turin in 1578 in 2 volumes, containing all additions and tables. This edition was reproduced at Frankfort in 1612 and 1668. The next important work of Durandus is the Rationale divinorum officiorum, a liturgical treatise written in Italy before 1286, on the origin and symbolic sense of the Christian ritual. It presents a picture of the liturgy of the 13th century in the West, studied in its various forms, its traditional sources, and its relation to

the church buildings and furniture. With Martene's De antiquis Ecclesiae ritibus it is the main authority on Western liturgies. It has run through various editions, from its first publication in 1459 to the last edition at Naples, 1866. The other important works of Durandus comprise a Repertorium juris canonici (Breviarium aureum), a collection of citations from canonists on questions of controversy — often published along with the Speculum; a Commentarius in sacrosanctum Lugdunense con- cilium (ed. Fano, 1569), of especial value owing to the share of Durandus in the elaboration of the constitutions of this council (1274), and inserted by Boniface VIII. in the Sextus.

A nephew of " The Speculator," also named Guillaume Durand (d. 1330), and also a canonist, was rector of the uni- versity of Toulouse and succeeded his uncle as bishop of Mende. He wrote in 1311, in connexion with the council of Vienne, De modo celebrandi concilii et corruptelis in Ecclesia reformandis. It attacks the abuses of the Church with extreme sincerity and vigour.

On the elder Durand see V. Leclerc in Histoire littiraire de la France, vol. xx. pp. 411-497 (1842); Schulte, Geschichte der Quellen des canonischen Rechts (1877); E. Male, L'Art religieux au XIII" siecle en France (1898). On the nephew see B. Haureau, in Journal des savants (1892), 64.

DURAND, GUILLAUME (d. 1334), French scholastic theo- logian, known also by the Latin form of his name as Durandus of St Pourcain {de Sancto Porciano), and as Doctor Resolutissimus, was born at St Pourgain-sur-Sioule in the Bourbonnois. He entered the Dominican order at Clermont, and in 13 13 was made a doctor in Paris, where he taught till Pope John XXII. called him to Avignon as master of the sacred palace, i.e. theo- logical adviser and preacher to the pope. He subsequently became bishop of Limoux (1317), of Le Puy (1318) and of Meaux (1326). He composed a commentary on the Sentences of Peter Lombard, in which, breaking with the realism of St Thomas Aquinas, he anticipated the terminism of William of Occam, and gave up the attempt to show that dogmas can be demon- strated by reason. In the question of the beatific vision, arising out of opinions promulgated by John XXII. (q.v.), he sided with Thomas Walleis, Armand de Bellovisu and the doctors of the faculty of theology in Paris against the pope, and composed his De statu animarum post separationem a corpore. Mention should also be made of his De origine jurisdictionum quibus populus regitur, sive de jurisdictione ecclesiastica et de legibus.

See B. Haureau, Histoire de la philosophie scolastique (2nd ed., Paris, 1872); C. Werner, Die Scholastik des spateren Mittelalters, vol. ii. (Vienna, 1883); H. S. Denifle, in Archiv f. Litteratur und Kirchengeschichte, ii. (1886); U. Chevalier, Rip. des sources hist, du moyen dge, s.v. Durand de St Pourcain.

DURANDO, GIACOMO (1807-1894), Italian general and statesman, was born at Mondovi in Piedmont. He was impli- cated in the revolutionary movements of 183 1 and 1832, after which he was obliged to take refuge abroad. He served in the Belgian army, taking part in the war of 1832, and fought in Portugal in 1833. The following year he entered the service of Spain, when he fought in various campaigns, and was promoted colonel in 1838. After a short stay in France he returned to Italy and identified himself with the Liberal movement; he became an active journalist, and founded a newspaper called L' Opinione in 1847. I n J 848 he was one of those who asked King Charles Albert for the constitution. On the outbreak of the war with Austria he took command of the Lombard volunteers as major-general, and in the campaign of 1849 he was aide-de- camp to the king. He was elected member of the first Pied- montese parliament and was a strenuous supporter of Cavour; during the Crimean campaign he took General La Marmora's place as war minister. In 1855 he was nominated senator, lieutenant-general in 1856, ambassador at Constantinople in 1859, and minister for foreign affairs in the Rattazzi cabinet two years later. He was president of the senate from 1884 to 1887, after which year he retired from the army. He died in 1894.

His brother, Giovanni Durando (1804-1869), was in early life driven into exile on account of his Liberal opinions. He served in the armies of Belgium, Portugal and Spain, distinguishing

himself in many engagements. Returning to Italy on the out- break of the revolution of 1848, he was appointed commander of a division of the pontifical forces, and fought against the Austrians in Venetia until the fall of Vicenza, when he returned to Piedmont as major-general. In the campaign of 1849 he com- manded the first Piedmontese division; he subsequently served in the Crimea, in the war of 1859, and in that of 1866 as com- mander of the I. Army Corps. In 1867 he was appointed president of the supreme military and naval tribunal.

DURANGO, a state of northern Mexico, bounded N. by Chihuahua, E. and S.E. by Coahuila, S. by Zacatecas and the territory of Tepic, and W. by Sinaloa. Pop. (1895) 2 9 2 >549; (1900)370,294. Area 38,009 sq. m. Durango is a continuation southward of the high, semi-arid plateau of Chihuahua, with the Sierra Madre extending along its western side. The Bolson de Mapimi covers its N.E. angle, and in the S. there are peculiar volcanic hills, covering about 1000 sq. m. and known as La Brefia. The Bolson de Mapimi, previous to the building of the Mexican Central railway across it, had been considered an uninhabitable desert, but irrigation experiments have demonstrated that its soil is highly fertile and well adapted to the production of cotton and fruit. The rainfall is very light in the eastern part of the state, a succession of years sometimes passing without any precipitation whatever, but in the W. it is sufficient to produce good pasturage and considerable areas of forest. There are no rivers of any magnitude in the state. The largest is the Rio Nazas, which flows eastward into the lakes of the Mapimi depres- sion, and the Mezquital, which flows S.W. through the sierras to the Pacific coast. The climate is generally dry and healthful. Cotton is produced to a limited extent, especially where irriga- tion is employed, and wheat, Indian corn, tobacco, sugar-cane and grapes are also grown. In the elevated valleys of the sierras stock-raising is successful. The principal industry of Durango, however, is mining, and some of the richest and best known mines of Mexico are found in the state. Besides silver, which has been extensively mined since the first arrival of the Spanish under Francisco de Ibarra (1554-1562), gold, copper, iron, cinnabar, tin, coal and rubies are found. The famous Cerro del Mercado, 2 m. from the city of Durango, is a hill composed in great part of remarkably pure iron ore, and is estimated to contain 300,000,000 tons of that metal. Near it are iron and steel works. The principal mining districts of Durango include San Dimas (on the western slope of the main sierra), Guarisamey, Buenavista, Gavilanes, Guanacevi, Mapimi, El Oro and Inde. In the first- named is the celebrated Candelaria mine, where the ores (largely argentite) assay between $70 and $140 a ton, the aggregate output being estimated as over $100,000,000 before the close of the 19th century. With the exception of silver, the mineral resources of the state have been but slightly developed because of difficult and expensive transportation. The Mexican Central railway crosses the eastern side of the state, and the Mexican International crosses N.E. to S.W. through the state capital on its way to the port of Mazatlan. The history of Durango is similar to that of Chihuahua, the state originally forming part of the province of Nueva Viscaya. The capital is Durango, and among the principal towns are Guanacevi (pop.

6859), El Oro, Nombre de Dios (the first Spanish settlement in the state), San Juan de Guadalupe, San Dimas and Villa Lerdo. These are comparatively small mining towns. Mapimi lies 130 m. N.N.E. of Durango and gives its name to the great arid depression situated still farther north.

DURANGO, sometimes called Ciudad de Victoria, a city of Mexico, capital of the state of Durango, 574 m. N.W. of the federal capital, in lat. 24° 25′ N., long. 105° 55′ W. Pop. (1900) 31,092. Durango is served by the Mexican International railway. The city stands in the picturesque Guadiana valley formed by easterly spurs of the Sierra Madre, about 6850 ft. above the sea. It has a mild, healthy climate, and is surrounded by a district of considerable fertility. Durango is an important mining and commercial centre, and was for a time one of the most influential towns of northern Mexico. It is the seat of a bishop, and has a handsome cathedral, ten parish churches, a national institute

or college, an episcopal seminary, government buildings, a public library, hospital, penitentiary and bull-ring. The city is provided with urban and suburban tramways, electric light, telephone service and an abundant water-supply, and there are thermal springs in its vicinity. Its manufacturing establishments include reduction works, cotton and woollen mills, glass works, iron foundries, tanneries, flour mills, sugar refineries and tobacco factories. Durango was founded in 1563 by Alonso Pacheco under the direction of Governor Francisco de Ibarra, who named it after a city of his native province in Spain. It was known, however, as Guadiana for a century thereafter, and its first bishops were given that title. It was the capital of Ibarra's new province of Nueva Viscaya, which included Durango and Chihuahua, and continued as such down to their separation in

1823.

DURANI, or Durrani, the dominant race of Afghans, to which the ruling family at Kabul belongs. The Duranis number 100,000 fighting men, and have two branches, the Zirak and the Panjpai. To the former section belong the Popalzai, Alikozai, Barakzai and Achakzai; and to the latter the Nurzai, Alizai, Isakzai, Khokani and Maku tribes. The Saddozai clan of the Popalzai Duranis furnished the first independent shahs of the Durani dynasty (a.d. 1747), the Barakzais furnishing the amirs. The line of the shahs was overthrown in the third generation (a.d. 1834), after a protracted period of anarchy and dissension, which broke out on the death in a.d. 1773

of Ahmad Shah Durani, the founder of Afghan national independence.

Bar Durani is a name sometimes applied to the independent Pathan tribes who inhabit the hill districts south of the Hindu Rush, parts of the Indus valley, the Salt Range, and the range of Suliman, which were first conceded to them by Ahmad Shah. Bar Durani includes the Yusafzai, Utman Khel, Tarkanis, Mohmands, Afridis, Orakzais and Shinwaris, as well as the Pathan tribes of the plains of Peshawar and those of Bangash and Khattak, although the derivation of some of these tribes from the true Durani stock is doubtful.

DURANTE, FRANCESCO (1684-1755), Italian composer, was born at Frattamaggiore, in the kingdom of Naples, on the 15th of March 1684. At an early age he entered the Conservatorio dei poveri di Gesu Cristo, at Naples, where he received lessons from Gaetano Greco; later he became a pupil of Alessandro Scarlatti at the Conservatorio di Sant' Onofrio. He is also supposed to have studied under Pasquini and Pitoni in Rome, but no docu- mentary proof of this statement can be given. He is said to have succeeded Scarlatti in 1725 at Sant' Onofrio, and to have re- mained there until 1742, when he succeeded Porpora as head of the Conservatorio di Santa Maria di Loreto, also at Naples. This post he held for thirteen years, till his death on the 13th of August 1755 at Naples. He was married three times. His fame as a teacher was all but unrivalled, and Jommelli, Paesiello, Pergolesi, Piccini and Vinci were amongst his pupils. A com- plete collection of Durante's works, consisting all but exclusively of sacred compositions, was presented by Selvaggi, a Neapolitan lover of art, to the Paris library. A catalogue of it may be found in Fetis's Biographie universelle. The imperial library of Vienna also preserves a valuable collection of Durante's manuscripts. Two requiems, several masses (one of which, a most original work, is the Pastoral Mass for four voices) and the Lamentations of the prophet Jeremiah are amongst his most important settings. The fact that Durante never composed for the stage brought him a somewhat exaggerated reputation as a composer of sacred music. Although certainly one of the best church composers of his style and period, he is far inferior to Leo, and seems to have been the founder of the sentimental school of Italian church music. Leo and Scarlatti at their best have a solidity and dignity entirely wanting in Durante, and Alessandro Scarlatti at his worst is frivolous rather than sentimental. This type of music is characteristic of Durante as a man; intellectually uncultured, but sincerely devout. As a teacher he insisted on the strict observance of rules for which he either would not or could not give a reason, differing thus from Alessandro

Scarlatti, whose first care was to develop his pupils' talents according to

their own individualities, regarding all rules as subservient to his exquisite sense of musical beauty. Hasse rightly protested against Durante's being described as the greatest harmonist of Italy, a title which could be claimed only by Alessandro Scarlatti. (E. J. D.)

DURAO, JOSfi DE SANTA RITA (1 720-1 784), Brazilian poet, was born near Marianna, in the province of Minas Geraes, in 1 7 20, and died in Lisbon in 1 784. He studied at Coimbra, in Portugal, graduated as a doctor of divinity, became a member of the Augustinian order of friars, and obtained a great reputation as a preacher. Having irritated the minister Pombal by his defence of the Jesuits, he retired from Portugal in 1759; and, after being imprisoned in Spain as a spy, found his way to Italy in 1763, where he became acquainted with Alfieri, Pindemonte, Casti and other literary men of the time. On his return to Portugal he delivered the opening address at the university of Coimbra for the year 1777; but soon after retired to the cloisters of a Gratian convent. At the time of his death he taught in the little college belonging to that order in Lisbon. His epic in ten cantos, entitled Caramuru, poema epico do descubrimento da Bahia, appeared in Lisbon in 1781, but proved at first a total failure. Its value has gradually been recognized, and it now ranks as one of the best poems in Brazilian literature — remarkable especially for its fine descriptions of scenery and native life in South America. The historic institute of Rio de Janeiro offered a prize to the author of the best essay on the legend of Caramuru; and the successful competitor published a new edition of Durao's poem. There is a French translation which appeared in Paris in 1829.

See Adolf o de Varnhagen, Epicos Brazileiros (1845) ; Pereira da Silva, Os Varoes illustres do Brasil (1858); Wolf, Le Bresil litteraire (Berlin, 1863) ; Sotero dos Reis, Curso de litteratura Portugueza e Brazileira, vol. iv. (Maranhao, 1868); Jose Verissimo, Estudos de literature, Brazileira, segunda serie (Rio, 1901).

DURAZZO (anc. Epidamnus and Dyrrachium; Albanian, Durresi; Turkish and Slavonic, Drach), a seaport and capital of the san jak of Durazzo, in the vilayet of Iannina, Albania, Turkey. Pop. (1900)

about 5000. Durazzo is about 50 m. S. of Scutari, on the Bay of Durazzo, an inlet of the Adriatic Sea. It is the seat of a Roman Catholic archbishop and a Greek metropolitan, but in every respect has greatly declined from its former prosperity. The walls are dilapidated; plane-trees grow on the gigantic ruins of its old Byzantine citadel; and its harbour, once equally commodious and safe, is gradually becoming silted up. The only features worthy of notice are the quay, with its rows of cannon, and the bridge, 750 ft. long, which leads across the marshes stretching along the coast. The chief exports are olive oil — largely manufactured in the district — wheat, oats, barley, pottery and skins.

Epidamnus was founded by a joint colony of Corcyreans and Corinthians towards the close of the 7th century B.C., and from its admirable position and the fertility of the surrounding country soon rose into very considerable importance. The dissolution of its original oligarchical government by the demo- cratic opposition, the consequent quarrel between Corcyra and the oligarchical city of Corinth, and the intervention of Athens on behalf of Corcyra, are usually included among the contribu- tory causes of the Peloponnesian War (431-404 B.C.). In 312 B.C., Epidamnus was seized by the Illyrian king Glaucias, and shortly afterwards it passed into the power of the Romans. As the name Epidamnus sounded to Roman ears like an evil omen, as though it were derived from the Latin damnum, " loss " or " harm," the alternative name of Dyrrachium, which the city possibly received from the rugged nature of the adjoining sea-coast, came into general use. Thenceforward Epidamnus rose rapidly in importance. It was a favourite point of debarca- tion for the Roman armies; the great military road known as the Via Egnatia led from Dyrrachium to Thessalonica (Salonica) ; and another highway passed southwards to Buthrotum and Ambracia. Broad swamps rendered the city almost impregnable, and in 48 B.C. it became famous as the place where Pompey made his last successful resistance to Caesar. After the battle of Actium in 31 B.C., Augustus made over Dyrrachium to a

colony of his veterans; it became a civitas libera and a great commercial emporium (for coins see Maier, Numis. Zeitschr., 1 908) . The summit of its prosperity was reached about the end of the 4th century, when it was made the capital of Epirus Nova. Its bishopric, created about a.d. 58, was raised to an archbishopric in 449. In 481 the city was besieged by Theodoric, the king of the East Goths; and in the 10th and nth centuries it fre- quently had to defend itself against the Bulgarians. In 1082 it was stormed by the Norman Robert Guiscard, who in the previous year had defeated the Greeks under

their emperor Alexius; and in 1185 it fell into the hands of King William of Sicily. Surrendered to Venice in 1202, it afterwards broke loose from the republic and in 1268 passed into the possession of Charles of Anjou. In 1273 it was laid in ruins by an earth- quake, but it soon recovered from the disaster, and became an independent duchy under John, the grandson of Charles (1294- 1304), and afterwards under Philip of Otranto. In 1333 it was annexed to Achaea, in 1336 to Servia, and in 1394 to Venice. The Turks obtained possession in 1501.

D'URBAN, SIR BENJAMIN (1777-1849), British general and colonial administrator, was bom in 1777, and entered the British army in 1793. Promoted lieutenant and captain in 1794 he took part in that year in operations in Holland and Westphalia. In 1795 he served under Sir Ralph Abercromby in San Domingo. He went on half -pay in 1800, joining the Royal Military College, where he remained until 1805, when he went to Hanover with the force under Lord Cathcart. Returning to England he filled various staff offices, and in November 1807 went to Dublin as assistant-quartermaster-general, being transferred successively to Limerick and the Curragh. He joined the army in the Peninsula in 1808, and his marked abilities as a staff officer led to his selection by General (afterwards Viscount) Beresford as quartermaster-general in the reorganiza- tion of the Portuguese army. He served throughout the Penin- sular War without once going on leave and took part in nine pitched battles and sieges, Busaco, Albuera, Badajoz, Salamanca, Vittoria, the Pyrenees, the Nivelle, the Nive and Toulouse. He was promoted major-general in the Portuguese army and colonel in the British army in 1813, and made a K.C.B. in 1815. He remained in Portugal until 1816, when he was sum- moned home to take up the posts of colonel of the royal staff corps and deputy quartermaster-general at the Horse Guards. In 1819 he became major-general and in 1837 lieutenant-general. From 1829 he was colonel of the 51st Foot.

Sir Benjamin began his career as colonial administrator in 1820 when he was made governor of Antigua. In 1824 he was transferred to Demerara and Essequibo, then in a disturbed condition owing to a rising among the slaves consequent on the emancipation movement in Great Britain. D'Urban's rule proved successful, and in 183 1 he carried out the amalgamation of Berbice with the other counties, the whole forming the colony of British Guiana, of which D'Urban was first governor. The ability with which he had for nine years governed a community of which the white element was largely of Dutch origin led to his appointment as governor of Cape Colony. He assumed office in January 1834, and the four years during which he held that

post were of great importance in the history of South Africa. They witnessed the abolition of slavery, the establishment of a legislative council and municipal councils in Cape Colony, the first great Kaffir war and the beginning of the Great Trek. The firmness and justice of his administration won the cordial support of the British and Dutch colonists. The greater part of 1835 was occupied in repelling an unprovoked invasion of the eastern borders of the colony by Xosa Kaffirs. To protect the inhabitants of the eastern province Sir Benjamin extended the boundary of the colony to the Kei river and erected military posts in the district, allowing the Xosa to remain under British supervision. Since his appointment to the Cape there had been a change of ministry in England, and Lord Glenelg had become secretary for the Colonies in the second Melbourne administration. Prejudiced against any extension of British authority and lending a ready ear to a small but influential party in South

Africa, Glenelg adopted the view that the Kaffirs had been the victims of systematic injustice. In a momentous despatch dated the 26th of December 1835 he set forth his views and instructed Sir Benjamin D'Urban to give up the newly annexed territory. At the same time Sir Andries Stockenstrom, Bart. (1792-1864), was appointed lieutenant-governor for the eastern provinces of the colony to carry out the policy of the home government, in which the Kaffir chiefs were treated as being on terms of full equality with Europeans. D'Urban in vain warned Glenelg of the disastrous consequences of his decision, the "beginning of the long course of vacillation which wrought great harm to South Africa. One result of the new policy was to recreate a state of insecurity, bordering on anarchy, in the eastern province, and this condition was one of the causes of the Great Trek of the Dutch farmers which began in 1836. In various despatches D'Urban justified his position, characterizing the Trek as due to " insecurity of life and property occasioned by the recent measures, inadequate compensation for the loss of the slaves, and despair of obtaining recompense for the ruinous losses by the Kaffir invasion." (See further South Africa: History, and Cape Colony: History.) But Glenelg was not to be convinced by any argument, however cogent, and in a despatch dated the 1st of May 1837 he informed Sir Benjamin that he had been relieved of office. D'Urban, however, remained governor until the arrival of his successor, Sir George Napier, in January 1838.

During his governorship Sir Benjamin endeavoured to help the British settlers at Port Natal, who in 1835 named their town D'Urban (now written Durban) in his honour, but his suggestion that the district should be occupied as a British possession was vetoed by Lord Glenelg. Though no longer in office D'Urban remained in South Africa until April 1846. In 1840 he was made a G.C.B., and in 1842 declined a high military appointment in India offered him by Sir Robert Peel. In January 1847 he took up the command of the troops in Canada, and was still in command at the time of his death at Montreal on the 25th of May 1849.

DURBAN, the principal seaport and largest city of Natal, South Africa, the harbour being known as Port Natal, in 29 52′ 48″ S. 31° 42′ 49″ E. It is 6810 m. from London via Madeira and 7785 via Suez, 823 m. by water E.N.E. from Cape Town and 483 m. by rail S.S.E. of Johannesburg. Pop. (1904) 67,842, of whom 31,302 were whites, 15,631 Asiatics (chiefly British Indians), 18,929 natives and 1980 of mixed race. From its situation and the character of its buildings Durban is one of the finest cities in South Africa. The climate is generally hot and humid, but not unhealthy. Although nearly half the citizens are British, the large number of Indians engaged in every kind of work gives to Durban an oriental aspect possessed by no other town in South Africa. The town is built on the E. side of a bay (Durban Bay or Bay of Natal), the entrance to which is marked on the west by a bold cliff, the Bluff, whose summit is 195 ft. above the sea, and on the east by a low sandy spit called the Point. The city extends from the Point along the side of the bay and also for some distance along the coast of the Indian Ocean, and stretches inland to a range of low hills called the Berea.

The chief streets, Smith, West and Pine, are in the lower town, parallel to one another and to the bay. They contain the principal public buildings, warehouses and shops, the Berea being a residential quarter. Of the three streets mentioned, West Street, the central thoroughfare, is the busiest. In its centre are the public gardens, in which is a handsome block of buildings in the Renaissance style, built in 1906-1908 at a cost of over £300,000, containing the town hall, municipal offices, public library, museum and art gallery. The art gallery holds many pictures of the modern British school. Opposite the municipal buildings are the post and telegraph offices, a fine edifice (built 1881-1885) with a clock tower 164 ft. high. The post office formerly served as town hall. In Pine Street is the Central railway station and the spacious Market House. Among the churches St Cyprian's (Anglican), in Smith Street, has a hand-

some chancel. The Roman Catholic cathedral is a fine building in the Gothic style. The town possesses several parks, one, the Victoria Park, facing the Indian Ocean. This part of the town is laid out with pleasure grounds and esplanades. The botanic gardens, in the upper town, contain a very fine collection of flowering shrubs and semi-tropical trees. Above the gardens is the observatory. There is a fine statue of Queen Victoria by Hamo Thornycroft, R.A., in the public gardens, and a memorial to Vasco da Gama at the Point. There is an extensive system of electric trams. Another favourite means of conveyance is by rickshaw, the runners being Zulus. The town is governed by a municipality which owns the water and electric lighting supplies and the tramway system. The sanitary services are excellent. The main water-supply is the Umlaas river, which enters the ocean 10 m. S. of the port. The municipal valuation, which is based on capital value, was £9,494,400 in 1909, the rate, including water, being 2§d. in the £.

The entrance to the harbour was obstructed by a formidable sand bar, but as the result of dredging operations there is now a minimum depth of water at the opening of the channel into the bay of over 30 ft., with a maximum depth of over 33 ft. The width of the passage between the Bluff and the Point is 450 ft. From the foot of the Bluff a breakwater extends over 2000 ft. into the sea, and parallel to it, starting from the Point, is a pier. The harbour is landlocked, and covers 75 sq. m. Much of this area is shoal water, but the accommodation avail- able was largely increased by the removal during 1904-1908 of 24,000,000 tons of sand. The port has over 3 m. of wharfage. It possesses a floating dock capable of lifting a vessel of 8500 tons, a floating workshop, a patent slip for small craft, hydraulic cranes, &c. The minimum depth alongside the quays at low water is 23 ft., increased at places to over 30 ft. The principal wharves, where passengers, mails and general merchandise are landed, are along the Point. On the opposite side at the foot of the Bluff land has been reclaimed and extensive accommodation provided for ships coaling. At Congella at the N.E. end of the harbour some 65 acres of land were reclaimed during 1905-1906, and wharves built for the handling of heavy and bulky goods such as timber and corrugated iron. Here also are situated warehouses and railway works. The port is defended by batteries armed with modern heavy guns. The trade of the port is almost coextensive with the foreign trade of Natal.

History. — The early history of Durban is closely identified with that of the colony of Natal. The first permanent settlement by white men in the bay was made by Englishmen in 1824, when Lieutenant F. G.

Farewell, R. N., and about ten companions went thither from Cape Town in the brig " Salisbury," from which circumstance the island in the bay gets its name. In 183 5 a town- ship was laid out and the colonists gave it the name of D'Urban, in honour of Sir Benjamin D'Urban, then governor of Cape Colony. At this time a mission church was built on the heights overlooking the bay by Captain Allen Gardner, R.N., who named the hill Berea in gratitude for support received from the settlers, whom he found "more noble than those of " Zululand — Dingaan having refused to allow the captain to start a mission among his people. From December 1838 to December 1839 a small British military force was stationed at the port. On its recall the little settlement was taken possession of by Dutch emigrants from the Cape, who had defeated the Zulu king Dingaan, and who the year before at the upper end of the bay had formed an encampment, Kangela (look-out), the present Congella. The Dutch claimed independence, and on the block-house at Durban hoisted the flag of the " Republic of Natalia." In 1842, however, a British military force reoccupied Durban, and on the 15th of July of that year a treaty was signed in which the Dutch recognized British sovereignty (see further Natal: History). From that date Durban, though not the seat of government, became the principal town in Natal. In 1850 there were 500 white in- habitants, and in 1853 the town was granted municipal govern- ment. The first mayor was Mr George Cato (c. 1810-1893), one of the earliest settlers in Natal. In i860 a railway from the Point to the town, the first railway in South Africa, was opened. The

discovery of the gold-mines on the Rand greatly increased the importance of the port, and renewed efforts were made to remove the bar which obstructed the entrance to the bay. The Harbour Board, which was formed in 1881 and ceased to exist in 1893, effected, under the guidance of Mr Harry Escombe, enormous improvements in the port — on which the prosperity of Durban is dependent. But it was not until 1904 that the fairway was deepened sufficiently to allow mail steamers of the largest class to enter the harbour. The growth of the port as illustrated by customs receipts is shown in the increase from £250,000 in 1880 to £981,000 in 1904. In 1846 the customs revenue was returned

at £351°-

See Durban: Fifty Years' Municipal History, compiled for the corporation by W. P. M. Henderson, Asst. Town Clerk (Durban, 1904) ; G. Russell, History of Old Durban [to i860] (Durban, 1899).

DURBAR, a term in India for a court or levee, from the Persian darbar. A durbar may be either a council for administering affairs of state, or a purely ceremonial gathering. In the former sense the native rulers of India in the past, like the amir of Afghanistan to-day, received visitors and conducted business in durbar. A durbar is the executive council of a native state. In the latter sense the word has come to be applied to great cere- monial gatherings like Lord Lytton's durbar for the proclamation of the queen empress in India in 1872, or the Delhi durbar of 1903.

DUREN, a town of Germany, in the Prussian Rhine province, on the right bank of the Roer, 19 m. E. from Aix-la-Chapelle on the main line of railway to Cologne. Pop. (1905) 29,270. It has two Protestant and six Roman Catholic churches, among the latter the Gothic St Annakirche, said to contain a portion of the head of the saint, to the shrine of which frequent pilgrimages are made. There are several high-grade schools, monuments to the emperor William I., Bismarck and Moltke, and, in the town-hall, a collection of antiquities. It is the seat of considerable manu- factures, notably cloth, paper, flax-spinning, carpet, artificial wool, sugar, iron wares and needles.

Diiren derives its name, not, as was at one time believed, from the Marcodurum of the Ubii, mentioned in Tacitus, but from the Dura or Duria, assemblies held by the Carolingians in the 8th century. It received civic rights early in the 13th century. Hypothecated by the emperor Frederick II. to Count William of Jiilich, it became incorporated with the duchy of that name, and with it passed to Prussia in 1816.

DURENE (i-2-4-5 tetramethyl benzene) C6H 2 (CH 3)4, a hydro-carbon which has been recognized as a constituent of coal-tar. It may be prepared by the action of methyl iodide on brom-pseudocumene or 4-6 dibrom metaxylene, in the presence of sodium; or by the action of methyl chloride on toluene, in the presence of anhydrous aluminium chloride. It crystallizes in plates, having a camphor-like smell, melting at 79-80° C. and boiling at 189-191° C. It is easily soluble in alcohol, ether and benzene, and sublimes slowly at ordinary temperature. On oxidation with chromic acid mixture, it is completely decomposed into carbon dioxide and acetic acid; nitric acid oxidizes it to durylic and cumidic acids [C6H 2 2(COOH)2].

DURER, ALBRECHT (1471-1528), German painter, draughts- man and engraver, was born at Nuremberg on the 21st of May 147 1. His family was not of Nuremberg descent, but came from the village of Eytas in Hungary. The name, however, is German, and the family device — an open door — points to an original form Thiirer, meaning a maker of doors or carpenter. Albrecht Diirer the elder was a goldsmith by trade, and settled soon after the middle of the 1 5th century in Nuremberg. He served as assistant under a master-goldsmith of the city, Hieronymus Holper, and in 1468 married his master's daughter Barbara, the bridegroom being forty and the bride fifteen years of age. They had eighteen children, of whom Albrecht was the second. The .elder Diirer was an esteemed craftsman and pious citizen, sometimes, as was natural, straitened in means by the pressure of his numerous progeny. His famous son writes with reverence and affection of both parents, and has left a touching narrative of their death-bed hours. He painted the portrait of his father twice, first in 1490, next in 1497. The former of these is in the

Uffizi at Florence; of the latter, four versions exist, that in the National Gallery (formerly in the Ashburton-Northampton collections) having the best claim to originality.

The young Albrecht was his father's favourite son. " My father," he writes, " took special delight in me. Seeing that I was industrious in working and learning, he put me to school; and when I had learned to read and write, he took me home from school and taught me the goldsmith's trade." By and by the boy found himself drawn by preference from goldsmith's work to painting; his father, after some hesitation on the score of the time already spent in learning the former trade, gave way and apprenticed him for three years, at the age of fifteen and a half, to the principal painter of the town, Michael Wolgemut. Wolgemut furnishes a complete type of the German painter of that age. At the head of a large shop with many assistants, his business was to turn out, generally for a small price, devotional pieces com- missioned by mercantile corporations or private persons to decorate their chapels in the churches — the preference being usually for scenes of the Passion, or for tortures and martyrdoms of the saints. In such work the painters of Upper Germany at this time, working in the spirit of the late Gothic style just before the dawn of the Renaissance, show considerable technical attainments, with a love of quaint costumes and rich draperies crumpled in complicated angular folds, some feeling for romance in landscape backgrounds, none at all for clearness or balance in' composition, and in the attitudes and expressions of their over-

crowded figures a degree of grotesqueness and exaggeration amounting often to undesigned caricature. There were also produced in the workshop of Wolgemut, as in that of other artistˆ craftsmen of his town, a great number of woodcuts for book illustration. We cannot with certainty identify any of these as being by the 'prentice hand of the young Diirer. Authentic drawings done by him in boyhood, however, exist, including one in silver-point of his own likeness at the age of thirteen in the Albertina at Vienna, and others of two or three years later in the print room at Berlin, at the British Museum and at Bremen.

In the school of Wolgemut Diirer learned much, by his own account, but suffered not a little from the roughness of his companions. At the end of his apprenticeship in 1490 he entered upon the usual course of travels — the Wanderjahre — of a German youth. Their direction we cannot retrace with certainty. There had been no one at Nuremberg skilled enough in the art of metal-engraving to teach it him to much purpose, and it had at one time been his father's intention to apprentice him to Martin Schongauer of Colmar, the most refined and accomplished German painter-engraver of his time. But after travelling two years in various parts of Germany, where we are unable to follow him, the young Diirer arrived at Colmar in 1492, only to find that Schongauer had died the previous year. He was received kindly by three brothers of the deceased master established there, and afterwards, still in 1492, by a fourth brother at Basel. Under them he evidently had some practice both in metal-engraving and in furnishing designs for the woodcutter. There is in the museum at Basel a wood-block of St Jerome executed by him and elaborately signed on the back with his name. This was used in an edition of Jerome's letters printed in the same city in the same year, 1492. Some critics also maintain that his hand is to be recognized in several series of small blocks done about the same date or somewhat later for Bergmann and other printers of Basel, some of them being illustrations to Terence (which were never printed), some to the romance of the Ritter vom Turm, and some to the Narrenschiffoi Sebastian Brandt. But the prevailing opinion is against this conjecture, and sees in these designs the work not of a strenuous student and searcher such as Diirer was, but of a riper and more facile hand working in a spirit of settled routine. Whether the young Diirer's stay at Basel was long or short, or whether, as has been supposed, he travelled from there into the Low Countries, it is certain that in the early part of 1494 he was working at Strassburg, and returned to his home at Nuremberg immediately after Whitsuntide in that year. Of works certainly executed by him during his years of

travel there are extant, besides the Basel wood-block, only a much-injured

portrait of himself, very finely dressed and in the first bloom of his admirable manly beauty, dated 1493 and originally painted on vellum but since transferred to canvas (this is the portrait of the Felix Goldschmid collection); a miniature painting on vellum at Vienna (a small figure of the Child-Christ); and some half a dozen drawings, of which the most important are the character- istic pen portrait of himself at Erlangen, with a Holy Family on the reverse much in the manner of Schongauer; another Holy Family in nearly the same style at Berlin; a study from the female nude in the Bonnat collection; a man and woman on horseback in Berlin; a man on horseback, and an executioner about to behead a young man, at the British Museum, &c. These drawings all show Diirer intent above all things on the sternly accurate delineation of ungeneralized individual forms by means of strongly accented outline and shadings curved, some- what like the shadings of Martin Schongauer's engravings, so as to follow their modellings and roundness.

Within a few weeks of his return (July 7th, 1494) Diirer was married, according to an arrangement apparently made between the parents during his absence, to Agnes Frey, the daughter of a well-to-do merchant of the city. By the autumn of the same year, probably feeling the incompleteness of the artistic training that could be obtained north of the Alps, he must have taken advantage of some opportunity, we know not what, to make ' an excursion of some months to Italy, leaving his lately married wife at Nuremberg. The evidences of this travel (which are really incontestable, though a small minority of critics still decline to admit them) consist of (1) some fine drawings, three of them dated 1494 and others undated, but plainly of the same time, in which Diirer has copied, or rather boldly translated into his own Gothic and German style, two famous engravings by Mantegna, a number of the "Tarocchi" prints of single figures which pass erroneously under that master's name, and one by yet another minor master of the North-Italian school; with another drawing dated 1495 an d plainly copied from a lost original by Antonio Pollaiuolo, and yet another of an infant Christ copied in 1495 from Lorenzo di Credi, from whom also Diirer took a motive for the composition of one of his earliest Madonnas; (2) several landscape drawings done in the passes of Tirol and the Trentino,

which technically will not fit in with any other period of his work, and furnish a clear record of his having crossed the Alps about this date; (3) two or three drawings of the costumes of Venetian courtesans, which he could not have made anywhere but in Venice itself, and one of which is used in his great woodcut Apocalypse series of 1498; (4) a general preoccupation which he shows for some years from this date with the problems of the female nude, treated in a manner for which Italy only could have set him the example; and (5) the clear implication' contained in a letter written from Venice in 1506 that he had been there already eleven years before; when things, he says, pleased him much which at the time of writing please him no more. Some time in 1495 Diirer must have returned from this first Italian journey to his home in Nuremberg, where he seems to have lived, without further change or removal, in the active practice of his art for the next ten years.

The hour when Diirer, the typical artist of the German nation, attained maturity was one of the most pregnant in the history of his race. It was the crisis, in northern Europe, of the transi- tion between the middle ages and our own. The awakening of Germany at the Renaissance was not, like the awakening of Italy a generation or two earlier, a movement almost exclusively intellectual. It was indeed from Italy that the races of the north caught the impulse of intellectual freedom, the spirit of science and curiosity, the eager retrospect towards the classic past; but joined with these in Germany was a moral impulse which was her own, a craving after truth and right, a rebellion against spiritual tyranny and corruption — the Renaissance was big in the north, as it was not in the south, with a Reformation to come. The art of printing had been invented in good time to help and hasten the new movement of men's minds. Nor was it by the diffusion of written ideas only that the new art supplied

the means of popular enlightenment. Along with word-printing, or indeed in advance of it, there had sprung into use another kind of printing, picture-printing, or what is commonly called engraving. Just as books were the means of multiplying, cheapening and disseminating ideas, so engravings on copper or wood were the means of multiplying, cheapening and dis- seminating images which gave vividness to the ideas, or served, for those ignorant of letters, in their stead. Technically one of these arts, that of line-engraving on copper, sprang from the craft of the goldsmith and metal-chaser; while that of wood- engraving sprang from the craft of the printers of pattern-blocks and playing cards. The engraver on metal habitually cut his own designs, and between the arts of the goldsmith and the painter there had always been a close alliance, both being habitually

exercised by persons of the same family and some- times by one and the same person; so that there was no lack of hands ready-trained for the new craft which required of the man who practised it that he should design like a painter and cut metal like a goldsmith. Designs intended to be cut on wood, on the other hand, were usually drawn by the artist on the block and handed over for cutting to a class of workmen — Formschneider or Brief maler — especially devoted to that industry. Both kinds of engraving soon came to be in great demand. Independently of the illustration of written or printed books, for which purpose woodcuts were almost exclusively used, separate engravings or sets of engravings in both kinds were produced, the more finely wrought and more expensive, appealing especially to the more educated classes, on copper, the bolder, simpler and cheaper on wood; and both kinds found a ready sale at all the markets, fairs and church festivals of the land. Subjects of popular devotion predominated. Figures of the Virgin and Child, of the apostles and evangelists, the fathers of the Church, the saints and martyrs, with illustrations of sacred history and the Apocalypse, were supplied in endless repetition to satisfy the cravings of a pious and simple-minded people. But to these were quickly added subjects of allegory, of classical learning, of witchcraft and superstition and of daily life; scenes of the parlour and the cloister, of the shop, the field, the market and the camp; and lastly portraits of famous men, with scenes of court life and princely pageant and ceremony. Thus the new art became a mirror of almost all the life and thoughts of the age. The genius of Albrecht Diirer cannot be rightly estimated without taking into account the position which the arts of engraving on metal and on wood thus held in the culture of this time. He was indeed professionally and in the first place a painter; but throughout his career a great, and on the whole the most successful, part of his industry was devoted to drawing on the block for the woodcutter or engraving with his own hand on copper. The town of Nuremberg in Franconia, in the age of Diirer's early manhood, was a favourable home for the growth and exercise of his powers. Of the free imperial cities of central Germany, none had a greater historic fame or a more settled and patriotic government. None was more the favourite of the emperors, nor the seat of a more active and flourishing commerce. Nuremberg was the chief mart for the merchandise that came to central Europe from the east through Venice and over the passes of Tirol. She held not only a close commercial intercourse, but also a close intellectual intercourse, with Italy. Without being so forward as the rival city of Augs- burg to embrace the architectural fashions of the Italian renais- sance — continuing, indeed, to be profoundly imbued with the old and homely German burgher spirit,

and to wear, in a degree which time has not very much impaired even yet, the quaintness of the old German civic aspect- — she had imported before the close of the 15th century a fair share of the new learning of Italy, and numbered among her citizens distinguished humanists like Hartmann Schedel, Sebald Schreier, Willibald Pirkheimer and Conrad Celtes. From associates like these Diirer could imbibe the spirit of Renaissance culture and research; but the external aspects and artistic traditions which surrounded him were purely Gothic, and he had to work out for himself the style and form-language fit to express what was in him. During the first seven

or eight years of his settled life in his native city from 1405; he betrays a conflict of artistic tendencies as well as no small sense of spiritual strain and strife. His finest work in this period was that which he provided for the woodcutter. After some half – dozen miscellaneous single prints — " Samson and the Lion," the "Annunciation," the "Ten Thousand Martyrs," the "Knight and Men-at-arms," the "Men's Bath," &c— he undertook and by 1498 completed his famous series of sixteen great designs for the Apocalypse. The northern mind had long dwelt with eagerness on these phantasmagoric mysteries of things to come, and among the earliest block-books printed in Germany is an edition of the Apocalypse with rude figures. Founding himself to some extent on the traditional motives, Diirer con- ceived and carried out a set of designs in which the qualities of the German late Gothic style, its rugged strength and restless vehemence, its love of gnarled forms, writhing actions and agitated lines, are fused by the fire of the young master's spirit into vital combination with something of the majestic power and classic severity which he had seen and admired in the works of Mantegna. Of a little later date, and of almost as fine a quality, are the first seven of a large series of woodcuts known as the Great Passion; and a little later again (probably after 1500), a series of eleven subjects of the Holy Family and of saints singly or in groups: then, towards 1504-1505, come the first seventeen of a set illustrating the life of the Virgin: neither these nor the Great Passion were published till several years later.

In copper-engraving Diirer was at the same time diligently training himself to develop the methods practised by Martin Schongauer and earlier masters into one suitable for his own self-expression. He attempted no subjects at all commensurate with those of his great

woodcuts, but contented himself for the most part with Madonnas, single figures of scripture or of the saints, some nude mythologies of a kind wholly new in northern art and founded upon the impressions received in Italy, and groups, sometimes bordering on the satirical, of humble folk and peasants. In the earliest of the Madonnas, the " Virgin with the Dragon-fly " (1495-1496), Diirer has thrown something of his own rugged energy into a design of the traditional Schongauer type. In examples of a few years later, like the " Virgin with the Monkey," the design of Mother and Child clearly betrays the influence of Italy and specifically of Lorenzo di Credi. The subjects of the "Prodigal Son" and "St Jerome in the Wilderness " he on the other hand treats in an almost purely northern spirit. In the nudes of the next four or five years, which included a "St Sebastian," the so-called "Four Witches" (1497), the "Dream" or "Temptation," the "Rape of Amy- mome," and the "Jealousy" or "Great Hercules," Venetian, Paduan and Florentine memories are found, in the treatment of the human form, competing somewhat uncomfortably with his own inherited Gothic and northern instincts. In these early engravings the highly-wrought landscape backgrounds, when- ever they occur, are generally the most satisfying feature. This feature reaches a climax of beauty and elaboration in the large print of " St Eustace and the Stag," while the figures and animals remain still somewhat cramped and immature. In the first three or four years of the 16th century, we find Diirer in his graver- work still contending with the problems of the nude, but now with added power, though by methods which in different subjects contrast curiously with one another. Thus the "Nemesis," belonging probably to 1503, is a marvellously wrought piece of quite unflinching realism in the rendering of a common type of mature, muscular, unshapely German womanhood. The conception and attributes of the figure are taken, as has lately been recognized, from a description in the " Manto " of Politian: the goddess, to whose shoulders are appended a "pair of huge wings, stands like Fortune on a revolving ball, holding the emblems of the cup and bridle, and below her feet is spread a rich landscape of hill and valley. In the " Adam and Eve " of the next year, we find Diirer treating the human form in an entirely opposite manner; constructing it, that is, on principles of abstract geometrical proportion. The Venetian painter-

etcher, Jacopo de Barbari, whom Diirer had already, it would seem, met in Venice in 1494-1495, and by the example of whose engravings he had already been much influenced, came to settle for a while in Nuremberg in 1500. He was conversant to some extent with the new sciences of perspective, anatomy and proportion, which had

been making their way for years past in Italy, and from him it is likely that Diirer received the impulse to similar studies and speculations. At any rate a whole series of extant drawings enables us to trace the German gradually working out his own ideas of a canon of human proportion in the composition of his famous engraving of "Adam and Eve" (1504); which at first, as a drawing in the British Museum proves, had been intended to be an Apollo and Diana conceived on lines somewhat similar to one of Barbari's. The drama of the subject has in this instance not interested him at all, but only the forms and designs of the figures, the realization of the quality of flesh surfaces by the subtlest use of the graving-tool known to him, and the rendering, by methods of which he had become the greatest of all masters, of the richness and intricacy of the forest background. Two or three other technical masterpieces of the engraver's art, the " Coat-of-Arms with the Skull," the "Nativity," with its exquisite background of ruined buildings, the "Little Horse" and the "Great Horse," both of 1505, complete the list of the master's chief productions in this kind before he started in the last-named year for a second visit to Italy.

The pictures of this earlier Nuremberg period are not many in number and not very admirable. Diirer's powers of hand and eye are already extraordinary and in their way almost unparalleled, but they are often applied to the too insistent, too glittering, too emphatic rendering of particular details and individual forms, without due regard to subordination or the harmony of the whole. Among the earliest seem to be two examples of a method practised in Italy especially by the school of Mantegna, but almost without precedent in Germany, that of tempera-painting on linen. One of these is the portrait of Frederick the Wise of Saxony, formerly in the Hamilton collec- tion and now at Berlin; the second, much disfigured by restora- tion, is the Dresden altarpiece with a Madonna and Child in the middle and St Anthony and Sebastian in the wings. A mythology reminiscent of Italy is the " Hercules and the Stym- phalian Birds" in the Germanic Museum at Nuremberg, founded directly upon the " Hercules and Centaur Nessus " of Pollaiuolo, now at New Haven, Connecticut, U.S.A. Of portraits, besides that of his father already mentioned as done in 1497, there is his own of 1498 at Madrid. Two totally dissimilar portraits of young women, both existing in duplicate examples (one pair at Augsburg and Frankfort, the other pair in the collections of M. Hengel in Paris and Baron Speck von Sternburg at Liitz- schema, for each of which has been claimed the name Furlegerin, that is, a member of the Fiirleger family at Nuremberg), belong to nearly the same time. Other panel portraits of

the period are three small ones of members of the Tucher family at Weimar and Gassel, and the striking, restlessly elaborated half-length of Oswald Krell at Munich. In some devotional pictures of the time Diirer seems to have been much helped by pupils, as in the two different compositions of the Maries weeping over the body of Christ preserved respectively at Munich and Nuremberg. In an altarpiece at Ober St Veit and in the scattered wings of the Jabach altarpiece severally preserved at Munich, Frankfort and Cologne, the workmanship seems to be exclusively that of journeymen working from his drawings. The period is closed, so far as paintings are concerned, by two examples of far higher value than those above named, that is to say the Paumgartner altarpiece at Munich, with its romantically attractive com- position of the Nativity with angels and donors in the central panel, and the fine armed figures of St George and St Eustace (lately freed from the over-paintings which disfigured them) on the wings; and the happily conceived and harmoniously finished " Adoration of the Magi " in the Uffizi at Florence.

In the autumn of 1505 Diirer journeyed for a second time to Venice, and stayed there until the spring of 1507. The occasion of this journey has been erroneously stated by Vasari. Diirer's

engravings, both on copper and wood, had by this time attained great popularity both north and south of tjie Alps, and had begun to be copied by various hands, among others by the cele- brated Marcantonio of Bologna, then in his youth. According to Vasari, Marcantonio, in copying Diirer's series of the Little Passion on wood, had imitated the original monogram, and Diirer, indignant at this fraud, set out for Italy in order to protect his rights, and having lodged a complaint against Marcantonio before the signory of Venice, carried his point so far that Marc- antonio was forbidden in future to add the monogram of Diirer to copies taken after his works. This account will not bear examination. Chronological and other proofs show that if such a suit was fought at all, it must have been in connexion with another set of Diirer's woodcuts, the first seventeen of the Life of the Virgin. Diirer himself, a number of whose familiar letters written from Venice to his friend Pirkheimer at Nuremberg are preserved, makes no mention of anything of the kind. Neverthe- less some such grievance may possibly have been among the causes which determined his journey. Other causes, of which we have explicit record, were an outbreak of sickness at Nurem- berg; Diirer's desire,

which in fact was realized, of finding a good market for the proceeds of his art; and the prospect, also realized, of a commission for an important picture from the German community settled at Venice, who had lately caused an exchange and warehouse — the Fondaco de' Tedeschi — to be built on the Grand Canal, and who were now desirous to dedicate a picture in the church of St Bartholomew. The picture painted by Diirer on this commission was the "Adoration of the Virgin," better known as the "Feast of Rose Garlands"; it was sub- sequently acquired by the emperor Rudolf II., and carried as a thing beyond price upon men's shoulders to Vienna; it now exists in a greatly injured state in the monastery of Strahow at Prague. It shows the pope and emperor, with a lute-playing angel between them, kneeling to right and left of the enthroned Virgin and Child, who crown them with rose garlands, with a multitude of other kneeling saints disposed with free symmetry in the background, and farther in the background portraits of the donor and the painter, and a flutter of wreath-carrying cherubs in the air. Of all Diirer's works, it is the one in which he most deliberately rivalled the combined splendour and playfulness of certain phases of Italian art. The Venetian painters assured him, he says, that they had never seen finer colours. They were doubtless too courteous to add that fine colours do not make fine colouring. Even in its present ruined state, it is apparent that in spite of the masterly treatment of particular passages, such as the robe of the pope, Diirer still lacked a true sense of harmony and tone-relations, and that the effect of his work must have been restless and garish beside that of a master like the aged Bellini. That veteran showed the German visitor the most generous courtesy, and Diirer still speaks of him as the best in painting (" der pest im gemell") in spite of his advanced years. A similar festal intention in design and colouring, with similar mastery in passages and even less sense of harmonious relations in the whole, is apparent in a second important picture painted by Diirer at Venice, " The Virgin and Child with the Goldfinch, " formerly in the collection of Lord Lothian and now at Berlin. A " Christ disputing with the Doctors " of the same period, in the Barberini Gallery at Rome, is recorded to have cost the painter only five days' labour, and is an unsatisfying and ill- composed congeries of heads and hands, both of such strenuous character and individuality as here and there to pass into cari- cature. The most satisfying of Diirer's paintings done in Venice are the admirable portrait of a young man at Hampton Court (the same sitter reappears in the "Feast of Rose Garlands"), and two small pieces, one the head of a brown Italian girl modelled and painted with real breadth and simplicity, formerly in the collection of Mr Reginald Cholmondeley and now at Berlin, and the small and very striking little " Christ

Crucified " with the figure relieved against the night sky, which is preserved in the Dresden Gallery and has served as model and inspiration to numberless later treatments of the theme. An interesting, rather fantastic, portrait of a blonde girl wearing a wide cap,

now in the Berlin museum, is dated 1507 and may have been done in the early months of that year at Venice. It is possible, though not certain, that to this date also belongs the famous portrait of himself at Munich bearing a false signature and date, 1500; in this it has been lately shown that the artist modified his own lineaments according to a preconceived scheme of facial pro- portion, so that it must be taken as an ideal rather than a literal presentment of himself to posterity as he appeared in the flower of his early middle age. From Venice Diirer kept up a con- tinuous correspondence, which has been published, with his bosom friend Pirkheimer at Nuremberg. He tells of the high position he holds among the Venetians; of the jealousy shown him by some of the meaner sort of native artist; of the honour and wealth in which he might live if he would consent to abandon home for Italy; of the northern winter, and how he knows that after his return it will set him shivering for the south. Yet he resisted all seductions and was in Nuremberg again before the summer of 1507- First, it seems, he had made an excursion to Bologna, having intended to take Mantua on the way, in order to do homage to the old age of that Italian master, Andrea Mantegna, from whose work he had himself in youth learned the most. But the death of Mantegna prevented his purpose.

From the spring of 1507 until the summer of 1520, Diirer was again a settled resident in his native town. Except the brilliant existences of Raphael at Rome and of Rubens at Antwerp and Madrid, the annals of art present the spectacle of few more honoured or more fortunate careers. His reputation had spread all over Europe. From Flanders to Rome his distinction was acknowledged, and artists of less invention, among them some of the foremost on both sides of the Alps, were not ashamed to borrow from his work this or that striking combination or expressive type. He was on terms of friendship or friendly communication with all the first masters of the age, and Raphael held himself honoured in exchanging drawings with Diirer. In his own country, all orders of men, from the emperor Maximilian down, delighted to honour him; and he was the familiar com- panion of chosen spirits among the statesmen, humanists and reformers of the new age. The burgher life of even Nuremberg, the noblest German city, seems narrow, quaint and harsh beside the grace and opulence and poetical surroundings of Italian life in the same and the

preceding generation. The great cities of Flanders also, with their world-wide commerce and long- established eminence in the arts, presented aspects of more splendid civic pomp and luxury. But among its native surround- ings the career of Diirer stands out with an aspect of ideal elevation and decorum which is its own. His temper and life seem to have been remarkably free from all that was jarring, jealous and fretful; unless, indeed, we are to accept as true the account of his wife's character which represents her as having been no fit mate for him, but an incorrigible shrew and skinflint. The name of Agnes Diirer was for centuries used to point a moral, and among the unworthy wives of great men the wife of Diirer became almost as notorious as the wife of Socrates. The source of the traditions to her discredit is to be found in a letter written a few years after Diirer's death by his life-long intimate, Willibald Pirkheimer, who accuses her of having plagued her husband to death by her meanness, made him overwork himself for money's sake, and given his latter days no peace. No doubt there must have been some kind of foundation for Pirkheimer's charges; and it is to be noted that neither in Diirer's early correspondence with this intimate friend, nor anywhere in his journals, does he use any expressions of tenderness or affection for his wife, only speaking of her as his housemate and of her helping in the sale of his prints, &c. That he took her with him on his journey to the Netherlands shows at any rate that there can have been no acute estrangement. And it is fair to remember in her defence that Pirkheimer when he denounced her was old, gouty and peevish, and that the immediate occasion of his outbreak against his friend's widow was a fit of anger because she had not let him have a pair of antlers — a household ornament much prized in those days — to which he fancied himself entitled out of the property left by

Diirer. We have evidence that after her husband's death Agnes Diirer behaved with generosity to his brothers.

The thirteen or fourteen years of Durer's life between his return from Venice and his journey to the Netherlands (spring 1 507- midsummer 1520) can best be divided according to the classes of work with which, during successive divisions of the period, he was principally occupied. The first five years, 1507-1511, are pre- eminently the painting years of his life. In them, working with infinite preliminary pains, as a vast number of extant drawings and studies testify, he

produced what have been accounted his four capital works in painting, besides several others of minor importance. The first is the "Adam and Eve" dated 1507, in which both attitudes and proportions are as carefully calculated, though on a somewhat different scheme, as in the engraving of 1504. Two versions of the picture exist, one in Florence at the Pitti palace, the other, which is generally allowed to be the original, at Madrid. To 1508 belongs the life-sized " Virgin with the Iris," a piece remarkable for the fine romantic invention of its background, but plainly showing the hand of an assistant, perhaps Hans Baldung, in its execution: the best version is in the Cook collection at Richmond, an inferior one in the Rudolph- inum at Prague. In 1508 Diirer returned to a subject which he had already treated in an early woodcut, the " Massacre of the Ten Thousand Martyrs of Nicomedia." The picture, painted for the elector Frederick of Saxony, is now in the Imperial Gallery at Vienna; the overcrowded canvas (into which Diirer has again introduced his own portrait as a spectator alongside of the elector) is full of striking and animated detail, but fails to make any great impression on the whole, and does not do justice to the improved sense of breadth and balance in design, of clearness and dignity in composition, which the master had undoubtedly brought back with him from his second visit to Italy. In 1 509 followed the "Assumption of the Virgin" with the Apostles gathered about her tomb, a rich altarpiece with figures of saints and portraits of the donor and his wife in the folding wings, executed for Jacob Heller, a merchant of Frankfort, in 1509. This altarpiece was afterwards replaced at Frankfort (all except the protraits of the donors, which remained behind) by a copy, while the original was transported to Munich, where it perished by fire in 1674. The copy, together with the many careful and highly finished preparatory studies for the heads, limbs and draperies which have been preserved, shows that this must have been the one of Durer's pictures in which he best combined the broader vision and simpler habits of design which had impressed him in the works of Italian art with his own inherited and ingrained love of unflinchingly grasped fact and rugged, accentu- ated character. In 1 5 1 1 was completed another famous painting, multitudinous in the number of its figures though of very moderate dimensions, the "Adoration of the Trinity by all the Saints," a subject commissioned for a chapel dedicated to All Saints in an almshouse for decayed tradesmen at Nuremberg, and now at the Imperial Gallery at Vienna. Nothing can exceed the fulness and variety of invention, or the searching force and precision of detail in this picture; nor does it leave so much to desire as several of the master's other paintings in point of colour-harmony and pleasurable general effect.

In the meantime Diirer had added a few to the number of his line-engravings and had completed the two woodcut series of the Great Passion, begun about 1498-1499, and the Life of the Virgin. The new subjects compared with the old show some falling off in dramatic stress and intensity of expression, but on the other hand a marked gain in largeness of design and clearness of composition. In 1 51 1 these two works were brought out for the first time, and the Apocalypse series in a second edition; and for the next three years, 1511-1514, engraving both on wood and copper, but especially the latter, took the first place among Durer's activities. Besides such fine single woodcuts as the " Mass of St Gregory," the " St Christopher," the " St Jerome," and two Holy Families of 1 5 1 1 , Diirer published in the same year the most numerous and popularly conceived of all his woodcut series, that known from the dimensions of its thirty-seven subjects as the "Little Passion " on wood; and in the next year, 1512, a set of fifteen small

copper-engravings on the same theme, the "Little Passion" on copper. Both of these must represent the labour of several preceding years: one or two of the "Little Passion" plates, dating back as far as 1507, prove that this series at least had been as long as five years in his mind. In thus repeating over and over on wood and copper nearly the same incidents of the Passion, or again in rehandling them in yet another medium, as in the highly finished series of drawings known as the "Green Passion " in the Albertina at Vienna, Diirer shows an inexhaustible variety of dramatic and graphic invention, and is never betrayed into repeating an identical action or motive.

In 1513 and 1514 appeared the three most famous of Durer's works in copper-engraving, "The Knight and Death" (or simply "The Knight," as he himself calls it, 1513), the "Melan- colia" and the "St Jerome in his Study" (both 15 14). These are the masterpieces of the greatest mind which ever expressed itself in this form of art. Like other masterpieces, they suggest much more than they clearly express, and endless meanings have been, rightly or wrongly, read into them by posterity. Taken together as a group, they have been supposed to be three out of an uncompleted series designed to illustrate the four " temperaments " and complexions of men. Again, more reason- ably, they have been taken as types severally of the moral, the intellectual and the theological virtues. The idea at the bottom of the " Knight and Death " seems to be a combination of the Christian knight of Erasmus's Enchiridion militis Christiani with the type, traditional in medieval imagery, of the pilgrim on his way through the world. The imaginative force of the presentation, coming from a man of Durer's powers, is intense; but what consciously

occupied him most may well have been the problem how to draw accurately the proportions and action of a horse in motion. This problem he here solves for the first time, with the help of an Italian example: at least his design so closely repeats that of Leonardo da Vinci's famous and early destroyed equestrian statue of Francesco Sforza that we must certainly suppose him to have seen either the model itself or such a drawing of it as is still preserved by Leonardo's own hand. The face of the rider seems to recall that of the statue of Barto- lommeo Colleoni at Venice; for the armour Diirer had recourse to an old drawing of his own, signed and dated in 1498. The " Melancolia," numbered "1" as though intended to be the first of a series, with its brooding winged genius sitting dejectedly amidst a litter of scientific instruments and symbols, is hard to interpret in detail, but impossible not to recognize in general terms as an embodiment of the spirit of intellectual research (the student's " temperament " was supposed to be one with the melancholic), resting sadly from its labours in a mood of lassitude and defeat. Comparatively cheerful beside these two is the remaining subject of the student saint reading in his chamber, with his dog and domestic lion resting near him, and a marvellous play of varied surface and chequered light on the floor and ceiling of his apartment and on all the objects which it contains. Besides these three masterpieces of line-engraving, the same years, 1512-1515, found Diirer occupied with his most important experiments in etching, both in dry-point ("The Holy Family and Saints " and the " St Jerome in the Wilderness ") and with the acid bath. At the same time he was more taken up than ever, as is proved by the contents of a sketch-book at Dresden, with mathematical and anatomical studies en the proportions and structure of the human frame. A quite different kind of study, that of the postures of wrestlers in action, is illustrated by a little-known series of drawings, still of the same period, at Vienna. Almost the only well-authenticated painting of the time is a "Virgin and Child" in the Imperial Museum at Vienna. The portraits of the emperors Charles the Great and Sigismund (1512), in their present state at any rate, can hardly be recog- nized as being by the master's hand. An interval of five years separates the Vienna " Madonna " from the two fine heads of the apostles Philip and James in the Uffizi at Florence, the pair of boys' heads painted in tempera on linen in the Bibliotheque Nationale at Paris, the " Madonna with the Pink " at Augsburg, and the portrait of Wolgemut at Munich, all of 1516. Among

engravings of the same time are three Madonnas, the apostles Thomas and Paul, a bagpiper and two peasants dancing, and three or four experiments in etching on plates of iron and zinc. In wood-engraving his energies were almost entirely given to bearing a part — which modern research has proved to have been not nearly so large as was traditionally supposed — in the great decorative schemes commanded by the Emperor Max in his own honour, and devised and carried out by a whole corps of men of letters and artists: namely, the Triumphal Gate and the Triumphal March or Procession. A third and smaller commemorative design, the Triumphal Car, originally designed to form part of the second but in the end issued separately, was entirely Durer's own work. A far more successful and attractive effort of his genius in the same service is to be found in the marginal decorations done by him in pen for the emperor's prayer-book. This unequalled treasure of German art and invention has in later times been broken up, the part executed by Diirer being preserved at Munich, the later sheets, which were decorated by other hands, having been transported to Besancon. Durer's designs, drawn with the pen in pale lilac, pink and green, show an inexhaustible richness of invention and an airy freedom and playfulness of hand beyond what could be surmised from the sternness of those studies which he made direct from life and nature. They range from subjects of the homeliest and most mirthful realism to others serious and devout, and from literal or almost literal transcripts of natural form to the most whimsically abstract combinations of linear pattern and tendril and flourish.

All these undertakings for his imperial friend and patron were stopped by the emperor's death in 1519. A portrait-drawing by the master done at Augsburg a few months previously, one of his finest works, served him as the basis both of a commemora- tive picture and a woodcut. Other paintings of this and the succeeding year we may seek for in vain; but in line engravings we have four more Madonnas, two St Christophers, one or two more peasant subjects, the well-known St Anthony with the view of Nuremberg in the background, and the smaller of the two portraits of the Cardinal-Elector of Mainz; and in wood- engraving several fine heraldic pieces, including the arms of Nuremberg.

In the summer of 1520 the desire of Diirer to secure from Maximilian's successors a continuance of the patronage and privileges granted during his lifetime, together with an outbreak of sickness in Nuremberg, gave occasion to the master's fourth and last journey from home. Together with his wife and her maid he set out in July for the Netherlands in order to be present at the coronation of

the young emperor Charles V., and if possible to conciliate the good graces of the all-powerful regent Margaret. In the latter part of his aim Diirer was but partially successful. His diary of his travels enables us to follow his movements almost day by day. He journeyed by the Rhine, Cologne, and thence by road to Antwerp, where he was handsomely received, and lived in whatever society was most distinguished, including that of Erasmus of Rotterdam. Besides his written notes, interesting traces of his travels exist in the shape of the scattered leaves of a sketch-book filled with delicate drawings in silver- point, chiefly views of places and studies of portrait and costume. Several of his finest portrait-drawings in chalk or charcoal, including those of his brother artists Lucas Van Leyden and Bernard Van Orley, as well as one of two fine portrait paintings of men, belong to the period of this journey. So does a magnifi- cent drawing of a head of a nonagenarian with a flowing beard who sat to him at Antwerp, together with a picture from the same head in the character of St Jerome; the drawing is now at Vienna, the picture at Lisbon. Durer's interest and curiosity, both artistic and personal, were evidently stimulated by his travels in the highest degree. Besides going to Aachen for the coronation, he made excursions down the Rhine from Cologne to Nijmwegen, and back overland by 's Hertogenbosch; to Brus- sels; to Bruges and Ghent; and to Zealand with the object of seeing a natural curiosity, a whale reported ashore. The vivid account of this last expedition given in his diary contrasts

with the usual dry entries of interviews arid disbursements, A still more striking contrast is the passionate outburst of sympathy and indignation with which, in the same diary, he comments on the supposed kidnapping of Luther by foul play on his return from the diet of Worms. Without being one of those who in his city took an avowed part against the old eccle- siastical system, and probably without seeing clearly whither the religious ferment of the time was tending — without, that is, being properly speaking a Reformer — Diirer in his art and his thoughts was the incarnation of those qualities oi the German character and conscience which resulted in the Reformation; and, personally, with the fathers of the Reforma- tion he lived in the warmest sympathy.

On the 1 2th of July 1 521 Diirer reached home again. Drawings of this and the immediately following years prove that on his return his mind was full of schemes for religious pictures. For a great group of the Madonna surrounded with saints there are extant two varying sketches of the whole composition and a number of finished studies for individual heads and figures. Less abundant, but still sufficient to

prove the artist's intention, are the preliminary studies to a picture of the Crucifixion. There exist also fine drawings for a " Lamentation over the body of Christ," an "Adoration of the Kings," and a "March to Calvary "; of the last-named composition, besides the beautiful and elaborate pen-and-ink drawing at Florence, three still more highly-wrought versions in green monochrome exist; whether any of them are certainly by the artist's own hand is matter of debate. But no religious paintings on the grand scale, corresponding to these drawings of 1521-1524, were ever carried out; perhaps partly because of the declining state of the artist's health, but more because of the degree to which he allowed his time and thoughts to be absorbed in the preparation of his theoretical works on geometry and perspective, proportion and fortification. Like Leonardo, but with much less than Leonardo's genius for scientific speculation and divination, Diirer was a confirmed reasoner and theorist on the laws of nature and natural appearances. He himself attached great importance to his studies in this kind; his learned friends expected him to give their results to the world; which accordingly, though having little natural gift or felicity in verbal expression, he laboured strenuously to do. The consequence was that in the last and ripest years of his life he produced as an artist comparatively little. In painting there is the famous portrait of Hieronymus Holtzschuher at Berlin, in which the personality and general aspect of the sitter assert themselves with surprising power. This and the Antwerp head of Jerome are perhaps the most striking examples of Durer's power of forcing into subordination to a general impression such a multiplicity of insistent detail as would have smothered any weaker conception than his. No other hand could have ventured to render the hair and beard of a sitter, as it was the habit of this inveterate linearist to do, not by indication of masses, but by means of an infinity of single lines swept, with a miraculous certainty and fineness of touch, in the richest amd most intricate of decorative curves. To the same period belong a pleasing but somewhat weak "Madonna and Child " at Florence; and finally, still in the same year 1526, the two famous panels at Munich embodying the only one of the great religious conceptions of the master's later years which he lived to finish. These are the two pairs of saints, St John with St Peter in front and St Paul with St Mark in the background. The John and Paul are conceived and executed really in the great style, with a commanding nobility and force alike in the character of the heads, the attitudes, and the sweep of draperies; they represent the highest achievement of early German art in painting. In copper-engraving Durer's work during the same years was con- fined entirely to portraits, those of the cardinal-elector of Mainz ("The Great Cardinal "), Frederick the Wise, elector

of Saxony, Willibald Pirkheimer, Melanchthon and Erasmus. To the tale of his woodcuts, besides a few illustrations to his book on measure- ments (that is, geometry and perspective), and on fortification, he only added one Holy Family and one portrait, that of his friend Eoban Hesse. Of his theoretical books, he only succeeded

in getting two finished and produced during his lifetime, that on. geometry and perspective or measurement, to use his own title— which was published at Nuremberg in 1525, and that on fortifi- cation, published in 1527; the work on human proportions was brought out shortly after his death in 1528. His labours, whether artistic or theoretic, had for some time been carried on in the face of failing health. In the canals of the Low Countries he had caught a fever, of which he never shook off the effects. We have the evidence of this in his own written words, as well as in a sketch which he drew to indicate the seat of his suffering to some physician with whom he was in corre- spondence, and again in the record of his physical aspect which is preserved by a portrait engraved on wood just after his death, from a drawing made no doubt not long before: in this portrait we see his shoulders already bent, the features somewhat gaunt, the old pride of the abundant locks shorn away. The end came on the night of the 6th of April 1528, so suddenly that there was no time to call his dearest friends to his bedside. He was buried in a vault which belonged to his wife's family, but was afterwards disturbed, in the cemetery of St John at Nuremberg. An appro- priate Requiescat is contained in the words of Luther, in a letter written to their common friend Eoban Hesse: — " As for Diirer, assuredly affection bids us mourn for one who was the best of men, yet you may well hold him happy that he has made so good an end, and that Christ has taken him from the midst of this time of trouble and from greater troubles in store, lest he, that deserved to behold nothing but the best, should be compelled to behold the worst. Therefore may he rest in peace with his fathers: Amen."

The principal extant paintings of Diirer, with the places where they are to be found, have been mentioned above. Of his drawings, which for students are the most vitally interesting part of his works, the richest collections are in the Albertina at Vienna, the Berlin Museum and the British Museum. The Louvre also possesses some good examples, and many others are dispersed in various public

collections, as in the Musee Bonnat at Bayonne, at Munich, Hamburg, Bremen, Frankfort, Dresden, Basel, Milan, Florence and Oxford, as well as in private hands all over Europe.

The principal editions of Durer's theoretical writings are these : —

Geometry and Perspective. — Underweysung der Messung mit dem Zirckel und Richtscheyt, in Linien, Ebnen und ganzen Corporen (Nuremberg, 1525, 1533, 1538). A Latin translation of the same, with a long title (Paris, Weichel, 1532) and another ed. in 1535, Again in Latin, with the title Institutionum geometricarum libri qualuor (Arnheim, 1605).

Fortification. — Etliche Underricht zu Befestigung der Stett, Schloss und Flecken (Nuremberg, 1527), and other editions in 1530, 1538 and 1603 (Arnheim). A Latin translation, with the title De urbibus, arcibus, castellisque muniendis ac condendis (Paris, Weichel, 1535). See the article Fortification.

Human Proportion. — Hierinnen sind begriffen vier Biicher von menschlicher Proportion (Nuremberg, 1582, and Arnheim, 1603). Latin translation : De symetria partium in rectis formis humanorum corporum libri in latinum conversi, de varietate figurarum, &c. libri ii. (Nuremberg, 1528, 1532 and 1534); (Paris, 1535, 1537, 1557). French translation (Paris, 1557, Arnheim, 1613, 1614). Italian translation (Venice, 1591, 1594); Portuguese translation (1599); Dutch translation (Arnheim, 1622, 1662).

The private literary remains of Diirer, his diary, letters, &c, were first published, partially in Von Murr's Journal zur Kunstgeschichte (Nuremberg, 1785-1787); afterwards in Campe's Reliquien von A. Diirer (Nuremberg, 1827); again, edited by Thausing, in the Quellenschriften fur Kunstgeschichte und Kunsttechnik (Vienna, 1872), but most completely in Lange and Fuhse's Diirers schriftlicher Nachlass (Halle, 1893); W. M. Conway's Literary Remains of A. Diirer (London, 1889) contains extensive transcripts from the MSS. in the British Museum.

The principal remaining literature of the subject will be found in the following books and treatises — Johann Neudorfer, Schreib-und Rechenmeister zu Niirnberg, Nachrichten iiber Kiinstlern und Werkleuten daselbst (Nuremberg, 1547); republished in the Vienna Quellenschrift (1875); C. Scheurl, Vita Antonii Kressen (1515, reprinted in the collection of Pirkheimer's works, Frankfort, 1610); Wimpheling, Epitome rerum Germanicarum, ch. 68 (Strassburg, I 5 (

‘5) ; Joachim von Sandrart, Deutsche Academie (Nuremberg, 1675) ; Doppelmayr, Historische Nachricht von den number gischen Mathematicis und Kiinstlern (Nuremberg, 1730); C. G. von Murr, Journal aur Kunstgeschichte, as above ; Adam Bartsch, Le Peintre-Graveur,

vol. vii. (Vienna, 1808) ; J. P. Passavant, Le Peintre-Graveur, vol. iii. (Leipzig, 1842); J. F. Roth, Leben Albrecht Diirers (Leipzig, 1791); Heller, Das Leben und die Werke Albrecht Diirers, vol. ii. (Bamberg, 1827-1831); B. Hausmann, Diirers Kupferstiche, Radirungen, Holzschnitte und Zeichnungen (Hanover, 1861); R. von Rettberg, Diirers Kupferstiche nnd. Holzschnitte (Munich, 1876); M. Thausing, Diirer, Geschichte seines Lebens und seiner Kunst (Leipzig, 1876, 2nd ed., 1884), English translation (from the 1st ed. by F. A. Eaton, London, 1882); W. Schmidt in Dohme’s Kunst und Kiinstler des Mittelalters und der Neuzeit (Leipzig, 1877) ; (Euvre de Albert Diirer reproduit et public par Amand-Durand, texte par Georges Duplessis (Paris, 1877); C. Ephrussi, A. Diirer et ses dessins (Paris, 1882); F. Lippmann, Zeichnungen von A. Diirer in Nachbiidungen (5 vols. Berlin, 1883-1905); A. Springer, Albrecht Diirer (Berlin, 1892); D. Burckhardt, Diirers Aufenthalt in Basel, 1492-1494 (Munich, 1892); G. von Terey, A Diirers venezianischer Aufenthalt, 1494- 1495 (Strassburg, 1892); S. R. Koehler, A Chronological Catalogue of the Engravings, Dry Points and Etchings of A. Diirer (New York, 1894) ; L. Cust, A. Diirer, a Study of his Life and Works (London, 1897); Diirer Society’s Publications (10 vols., 1898-1907), edited by C. Dodgson and S. M. Peartree; H. Knackfuss, Diirer (Bielefeld and Leipzig, 6th ed., 1899), English translation, 1900; B. Haendcke, Die Chronologie der Landschaften A. Diirers (Strassburg, 1899); M. Zucker, Albrecht Diirer (Halle, 1899-1900) ; L. Justi, Konstruierte Figuren und Kbpfe unter den Werken Albrecht Diirers (Leipzig, 1902); A. Pelzer, A. Diirer und Friedrich II. von der Pfalz (Strassburg, 1905) ; H. Wolfflin, Die Kunst A. Diirers (Munich, 1905); W. Weisbach, Der junge Diirer (Leipzig, 1906) ; V. Scherer, A. Diirer (Klassiker der Kunst, iv.), (2nd ed., Stuttgart, 1906).

Apart from books, a large and important amount of the literature on Diirer is contained in articles scattered through the leading art periodicals of Germany, such as the Jahrbiicher of the Berlin and Vienna museums, Repertorium fur Kunstwissenschaft, Zeitschrift fiir bildende Kunst, &c. A comprehensive survey of this literature is afforded by Prof. H. W. Singer’s Versuch einer Durer-Bibliographie (Strassburg, 1903) ; articles published more recently will be found completely enumerated in A. Jellinek’s Internationale Bibliographic der Kunstwissenschaft (Berlin). (S. C.)

DURESS (through Fr. from Lat. duritia, harshness, severity, durus, hard), in law, constraint or compulsion. Duress may be of two kinds. It may consist in personal restraint or actual violence or imprisonment; or it may be by threats (per minas), as where a person is compelled to an act by threats of immediate death or grievous bodily harm. Duress, in certain cases, may be pleaded as a defence of an act which would otherwise be a crime, but the extent to which the plea of duress can be urged is un- ascertained. At common law a contract entered into under duress is voidable at the option of one of the parties. See Coercion, Contract.

D'URFEY, THOMAS (1653-1723), better known as Tom d'Urfey, English song-writer and dramatist, belonged to a Huguenot family settled at Exeter, where he was born in 1653. Honore d'Urfe, the author of Astree, was his uncle. His first play, The Siege of Memphis, or the Ambitious Queen, a bombastic rhymed tragedy, was produced at the Theatre Royal in 1676. He was much more successful with his comedies, which had brisk, complicated plots carried out in lively dialogue. He had a light touch for fitting words on current topics to popular airs; moreover, many of his songs were set to music by his friends Dr John Blow, Henry Purcell and Thomas Farmer. Many of these songs were introduced into his plays. Addison in the Guardian (No. 67) relates that he remembered to have seen Charles II. leaning on Tom d'Urfey's shoulder and humming a song with him. Even William III. liked to hear him sing his songs, and as a strong Tory he was sure of the favour of Princess Anne, who is said to have given Tom fifty guineas for a song on the Electress Sophia, the next heir in succession to the crown. " The crown's far too weighty, for shoulders of eighty," said d'Urfey, with an indirect compliment to the princess, " So Providence kept her away, — poor old Dowager Sophy." Pope, in an amusing letter to Henry Cromwell (Works, ed. Elwin and Courthope, vi. 91) describes him as " the only poet of tolerable reputation in this country." In spite of the success of his numerous comedies he was poor in his old age. But his gaiety and invincible good humour had made him friends in the craft, and by the influence of Addison his Fond Husband, or The, Plotting Sisters was revived for d'Urfey's benefit at Drury Lane on the 15th of June 1713. This performance, for which Pope wrote a prologue full of rather faint praise, seems to have eased the

poet's difficulties. He died on the 26th of February 1723, and was

buried in St James's Church, Piccadilly.

Collections of his songs with the music appeared during his life- time, the most complete being the 1719-1720 edition (6 vols.) of Wit and Mirth; or Pills to Purge Melancholy. The best known of the twenty-nine pieces of his which actually found their way to the stage were Love for Money; or The Boarding School (Theatre Royal, 1 691), The Marriage-Hater Match' d (1692), and The Comical History of Don Quixote, in three parts (1694, 1694 an d 1696), which earned the especial censure of Jeremy Collier. In his burlesque opera, Wonders in the Sun; or the Kingdom of the Birds (1706, music by G. B. Draghi), the actors were dressed as parrots, crows, &c.

DURFORT, a village of south-western France, formerly in the province of Guienne, now in the department of Tarn-et- Garonne, 18 m. N.W. of Montauban by road. It was at one time the seat of a feudal lordship which gave its name to a family distinguished in French and English history. Though earlier lords are known, the pedigree of the family is only clearly traceable to Arnaud de Durfort (fl. 1305), who acquired the fief of Duras by his marriage with a niece of Pope Clement V. His descendant, Gaillard de Durfort, having embraced the side of the king of England, went to London in 1453, and was made governor of Calais and a knight of the Garter.

The greatness of the family dates, however, from the 17th century. Guy Aldonce (1605-1665), marquis de Duras and comte de Rozan, had, by his wife Elizabeth de la Tour d'Auvergne, sister of Marshal Turenne, six sons, three of whom played a distinguished part. The eldest, Jacques Henri (1625- 1704), was governor of Franche Comte in 1674 and was created a marshal of France for his share in the conquest of that pro- vince (1675). The second, Guy Aldonce (1630-1702), comte de Lorges and due de Quintin (known as the due de Lorges) , became a marshal of France in 1676, commanded the army in Germany from 1690 to 1695, and captured Heidelberg in 1693. The sixth son, Louis (1640 7-1709), marquis de Blanquefort, came to England in the suite of James, duke of York, in 1663, and was naturalized in the same year. On the 19th of January 1672-1673 he was raised to the English peerage as Baron Duras of Holdenby, his title being derived from an estate in Northamptonshire bought from the duke of York, and in 1676 he married Mary, daughter and elder co-heiress of Sir George Sondes, created in that year Baron Throwley, Viscount Sondes and earl of Fever- sham. On the death of his father-in-law (16th of April 1677), Duras succeeded to his titles under a special remainder. He was appointed by Charles II. successively to the command of the third and second troops of

Horse Guards, was sent abroad on several important diplomatic missions, and became master of the horse (1679) and lord chamberlain to the queen (1680). In 1682 he was appointed a lord of the bed-chamber, and was present at the king's deathbed reconciliation with the Roman Church. Under James II. Feversham became a member of the privy council, and in 1685 was given the chief command against the rebels under Monmouth (q.v.), in which he mainly dis- tinguished himself by his cruelty to the vanquished. He was rewarded with a knighthood of the Garter and the colonelcy of the first troop of Life Guards, and in 1686 he was appointed to the command of the army assembled by King James on Black- heath to overawe the people. On James's flight, Feversham succeeded in making his peace with William, on the intercession of the queen dowager, at whose instance he received the master- ship of the Royal Hospital of St Catherine near the Tower (1698). He died without issue on the 8th of April 1709. [See G. E. C(ockayne), Complete Peerage, and art. in Diet. Nat. Biog.}

Jean Baptiste (1684-1770), due de Duras, son of Jacques Henri, was also a marshal of France. In 1733 he resigned the dukedom of Duras to his son, Emmanuel Felicite, himself receiving the brevet title of due de Durfort. Emmanuel Felicite (17 15-1789), due de Duras, took part in all the wars of Louis XV. and was made a marshal of France in 1775. His grandson, Amedee Bretagne Malo (1771-1838), due de Duras, is mainly known as the husband of Claire Louise Rose Bonne de Coetnempren de Kersaint (1778-1828), daughter of Armand Guy Simon de Coetnempren Kersaint (q.v.), who, as duchesse de Duras, presided

over a once celebrated salon and wrote ;everal novels once widely read.

The family of Durfort is represented in France now by the branch of Durfort-Civrac, dating from the 16th century. Jean Laurent (1746-1826), marquis de Civrac, married his cousin, the daughter of the due de Lorges; his son, Guy Emeric Anne (1767-1837), due de Civrac, became afterwards due de Lorges. Henri, marquis de Durfort-Civrac (1812-1884), was a well-known politician, and was several times elected vice-president of the chamber of deputies.

DURGA, or Devi (Sanskrit for inaccessible), in Hindu myth- ology, the wife of Siva (q.v.) and daughter of Himavat (the Himalayas). She has many names and many characters. As Durga (so named from having slain the demon Durga) she is warlike and ferocious, and to her in this form are offered bloody sacrifices, and such

ceremonies as the Durgapuja and Churruk- puga are held in her honour (see Kali). The chief festival in Bengal — sometimes termed the Christmas of Bengal — celebrates the goddess's birth in the sixth Hindu month (parts of September and October). Durga is pictured, in spite of her fierce nature, with a gentle face. She has ten arms, holding each a weapon, while her attendant lions and giants are grouped on each side.

DURHAM, JOHN GEORGE LAMBTON, ist Earl of (1792- 1840), English statesman, son of William Henry Lambton of Lambton Castle, Durham, was born in London on the 12th of April 1792. His mother was Anne Barbara Villiers, daughter of the 4th earl of Jersey. Lambton was only five years old when by his father's death at Pisa (1797) he succeeded to large estates in the north of England which had been in the uninterrupted possession of his family since the 12 th century. In 1805 he went to Eton, and in 1809 obtained a commission in the 10th Hussars. In 1 81 2, while still a minor, he made a runaway match with Henrietta, natural daughter of Lord Cholmondeley, whom he married at Gretna Green, and who died in 18 15. In 18 13 he was elected to the House of Commons as member for the county of Durham. Whig principles of a pronounced type were tradi- tional in Lambton's family. His grandfather, General John Lambton, had refused a peerage in 1793 out of loyalty to Fox, and his father was not only one of Pitt's keenest opponents, but was chairman of " The Friends of the People " and author of that society's address to the nation in 1792. Lambton adhered to this tradition, and soon developed opinions of an extremely Radical type, which he fearlessly put forward in parlia- ment and in the country with marked ability. His maiden speech in the House of Commons was directed against the foreign policy of Lord Liverpool's government, who had sanctioned, and helped to enforce, the annexation of Norway by Sweden. In 181 5 he vehemently opposed the corn tax, and in general began to take a prominent part in opposition to the Tories. In 1816 he made the acquaintance of Lafayette in Paris, and narrowly escaped arrest for alleged complicity in his escape. In 181 7 he began to speak on every opportunity in favour of parliamentary reform.

His political position was strengthened by his marriage in December 1816 to Louisa Elizabeth, eldest daughter of Lord Grey, and as early as 1818 he was taken into the political con- fidence of his father-in-law and other leaders of the Whigs in matters touching the leadership and policy of the party. But from the first Lambton belonged to the avowedly Radical wing of the party, with whose aims Grey had little sympathy; and when he gave notice of a resolution in 18 19 in

favour of shortening the duration of parliaments, and of a wide extension of the franchise, he found himself discountenanced by old Whigs like Grey, Holland and Fitzwilliam. Having warmly espoused the cause of Queen Caroline, Lambton ably seconded Lord Tavistock's resolution in February 18 21 censuring the government for their conduct towards the queen; and in April he made his first great speech in the House of Commons on parliamentary reform, when he proposed a scheme for the extension of the suffrage to all holders of property, the division of the country into electoral districts and the disfranchisement of rotten boroughs. He was now one of the recognized leaders of

the advanced Liberals, forming a connecting link between the aristocratic Whig leaders and the irresponsible and often violent politicians of the great towns. His opposition to those members of his party who in 1825 were prepared for compromise on the question of Catholic emancipation led to his first conflict with Brougham, with whom he had been on terms of close friendship. While supporting the candidature of his brother-in-law, Lord Howick, for Northumberland in the elections of 1826, Lambton fought a duel with T. W. Beaumont, the Tory candidate, but without bloodshed on either side. Unlike his father-in-law, Lambton supported the ministry of Canning, though he had some grounds for personal grievance against the new prime minister, and after Canning's death that of Lord Goderich. On the advice of the latter Lambton was raised to the peerage in 1828 with the title of Baron Durham. Owing to his Liberal principles Lord Durham was on terms of friendship with the duke of Sussex, and also with Prince Leopold of Saxe- Coburg, who sought his advice in the difficult crisis in 1829 when he was offered the throne of Greece, and who, after he became king of the Belgians as Leopold I., continued to corre- spond with Durham as a trusted confidant; the same confidential relations also existed between Durham and Leopold's sister, the duchess of Kent, and her daughter, afterwards Queen Victoria.

In November 1830 when Grey became prime minister in suc- cession to the duke of Wellington, Lord Durham entered the cabinet as lord privy seal. Parliamentary reform was in the forefront of the new government's policy, and with this question no statesman except Lord Grey himself was more closely indenti- fied than Durham. To ardent reformers in the country the presence in the cabinet of " Radical

Jack," the name by which Lambton had been popularly known in the north of England, was a pledge that thorough-going reform would not be shirked by the Whigs, now in office for the first time for twenty years. And it was to his son-in-law that Lord Grey confided the task of preparing a scheme to serve as the basis of the proposed legislation. Full justice has not generally been done to the leading part played by Lord Durham in preparing the great Reform Act. He was the chief author of the proposals which, after being defeated in 1831, became law with little alteration in 1832. He was chairman of the famous committee of four, which met at his house in Cleveland Row and drew up the scheme submitted by the government to parliament. His colleagues, who were appointed rather as his assistants than as his equals, were Lord John Russell, Sir James Graham and Lord Duncannon; and it was Durham who selected Lord John Russell, not then in the cabinet, to introduce the bill in the House of Commons; a selection that was hotly opposed by Brougham, whose later vindictive animosity against Durham is to be traced to his having been passed over in the selection of the committee of four. Durham was present with Grey at an audience of the king which led to the sudden dissolution of parliament in March 1831; and when the deadlock between the two Houses occurred over the second Reform Bill, he was the most eager in pressing on the prime minister the necessity for a creation of peers to overcome the resistance of the house of Lords.

After the passing of the Reform Act, Durham, whose health was bad and who had suffered the loss of two of his children, accepted a special and difficult diplomatic mission to Russia, which he carried out with much tact and ability, though without accomplishing its main purpose. On his return he resigned office in March 1833, ostensibly for reasons of health, but in reality owing to his disagreement with the government's Irish policy as conducted by Lord Stanley; in the same month he was created earl of Durham and Viscount Lambton. His advanced opinions, in the assertion of which he was too little disposed to consider the convictions of others, gradually alienated the more moderate of his late colleagues, such as Melbourne and Pal- mers ton, and even Lord Grey often found his son-in-law in- tractable and self-assertive; but the growing hostility of the treacherous Brougham was mainly due to Durham's undoubted popularity in the country, where he was regarded by many, Viii. 23

including J. S. Mill, as Grey's probable successor in the leadership of the Liberal party. Durham was at this time courted by the youthful Disraeli, who, when Melbourne became prime minister in succession to Grey in 1834, declared that the Whigs could not exist as a party

without Lord Durham. Brougham's animosity became undisguised at the great banquet given to Lord Grey at Edinburgh in September 1834, where he made a venomous attack on Durham, repeated shortly afterwards at Salisbury, and anonymously in the Edinburgh Review. On the other hand ■ the strength of Durham's position in the country was shown on the occasion of his visit to Glasgow in October to receive the freedom of the city, when a concourse of more than a hundred thousand persons assembled to hear him speak at Glasgow Green, and where he replied to Brougham's attacks at a great banquet held in his honour. Brougham had over-reached himself; and although Durham was no favourite with William IV. the king's disgust with the lord chancellor was one of the principal reasons for his summary dismissal of the Whig ministry in 1834. When Melbourne returned to power after Peel's short administration, Durham's radicalism and impatient temper excluded him from the cabinet; and again in 1837, on his return from an appointment as ambassador extraordinary in St Peters- burg (1835-1837), when there was some idea of his joining the ministry, Lord John Russell wrote: " Everybody, after the experience we have had, must doubt whether there can be peace or harmony in a cabinet of which Lord Durham is a member."

In July 1837 he resisted the entreaty of Lord Melbourne that he should undertake the government of Canada, where the condition of affairs had become alarming; but a few months later, giving way to the urgent insistence of the prime ministel who promised him " the firmest and most unflinching support " of the government, he accepted the post of governor-general and lord high commissioner, with the almost dictatorial powers conferred on him by an act passed in February 1838, by which the constitution of Lower Canada was suspended for two years. Having secured the services of Charles Buller (q.v.) as first secretary, and having with more doubtful wisdom appointed Thomas Turton and Edward Gibbon Wakefield (q.v.) to be his unofficial assistants, Durham arrived at Quebec on the 28th of May 1838. Papineau's rebellion had been quelled, but the French Canadians were sullen, the attitude of the United States equivocal, and the general situation dangerous, especially in the Lower Province ■ where government was practically in abeyance. Durham at once issued a conciliatory proclamation. His next, step was to dismiss the executive council of his pre- decessor and to appoint a new one consisting of men uncommitted to any existing faction, a step much criticized at home but generally commended on the spot. On the 28th of June, the day of Queen Victoria's coronation, he issued a proclamation of amnesty, from the benefit of

which eight persons only of those who had taken part in the rebellion were excepted; while an accompanying ordinance provided for the transference of these eight excepted persons from Montreal to Bermuda, where they were to be imprisoned without trial. Papineau and fifteen other fugitives were forbidden on pain of death to return to Canada. In a letter of congratulation to the queen, Durham took credit for the clemency of his policy towards the rebels, and it was defended on the same ground by Charles Buller and by public opinion in the colony.

In England, however, as soon as these proceedings became known, Brougham seized the opportunity for venting his malice against both Durham and the ministry. He had already raised objections to the appointment of Turton and Wakefield; he now attacked the ordinance in the House of Lords, challenging the legality of the clause transporting prisoners to Bermuda, where Durham had no jurisdiction. Melbourne and his colleagues, with the honourable exception of Lord John Russell, made little effort to defend the public servant to whom they had promised " the most unflinching support "; and, although both the prime minister and the colonial secretary when first fully informed of the governor-general's proceedings had hastened to assure him of their "entire approval," three weeks later, cowed by Brougham's

ri

jo6

DURHAM

malignant invective, they disallowed the ordinance, and carried an Act of Indemnity the terms of which were insulting to Durham. The latter immediately resigned; but before returning to England he put himself in the wrong by issuing a proclamation in which he not only justified his own conduct in detail, but made public complaint of his grievances against the ministers of the Crown, a step that alienated much sympathy which his unjust treatment by the government would otherwise have called forth, though it was defended by men like Charles Buller and J. S. Mill. The usual official honours given to a returning plenipotentiary were not accorded to Durham on his arrival at Plymouth on the 30th of November 1838, but the populace received him with acclamation. He immediately set about preparinghismemorable " Report on the Affairs of British North America," which was laid before parliament on the 3 1st of January 1839. This report, >ne of the greatest state papers in the English

language, laid down the principles, then unrecognized, which have guided British colonial policy ever since. It was not written or composed by Charles Buller, as Brougham was the first to suggest, and the credit for the statesmanship it exhibits is Lord Durham's alone, though he warmly acknowledged the assistance he had derived from Buller, Wakefield and others in preparing the materials on which it was based. With regard to the future government of British North America, Durham had at first inclined towards a federation of all the colonies on that continent, and this aim, afterwards achieved, remained in his eyes an ideal to be striven for; but as a more immediately practical policy he advised the legislative union of Upper and Lower Canada, his avowed aim being to organize a single state in which the British inhabitants would be in a majority. He further urged the creation of an executive council responsible to the colonial legislature; he advised state-aided emigration on the broadest possible scale, and the formation of an intercolonial railway for the development of the whole country. Meantime Durham, who almost alone among the statesmen of his time saw the importance of imperial expansion, interested himself in the emigration schemes of Gibbon Wakefield (q.v.) ; he became chairman of the New Zealand Company, and was thus concerned in the enterprise which forestalled France in asserting sovereignty over the islands of New Zealand in September 1839. Hishealth,however,hadlong been failing, and he died at Cowes on the 28th of July 1840, just five days after the royal assent had been given to the bill giving effect to his project for uniting Upper and Lower Canada.

Lord Durham filled a larger place in the eyes of his contem- poraries than many statesmen who have been better remembered. He was in his lifetime regarded as a great popular leader; and his accession to supreme political power was for some years considered probable by many; his opinions were, however, too extreme to command the confidence of any considerable party in parliament before 1840. That Brougham hated him and Melbourne feared him, is a tribute to his abilities; and in the first Reform Act, of which he was the chief author, and in the famous Report on the >rinciples of colonial policy, he left an indelible mark on English aistory. His personal defects of character did much to mar the success of a career, which, it must be remembered, terminated it the age of forty-eight. He was impatient, hot-tempered, hypersensitive to criticism, vain and prone to take offence at fancied slights; but he was also generous and unvindictive, and while personally ambitious his care for the public interest was genuine and untiring.

By his first wife Durham had three daughters; by his second, who was a lady of the bedchamber to Queen Victoria but resigned on her husband's return from Canada, he had two sons and three daughters. The eldest son, Charles William, the " Master Lambton " of Sir Thomas Lawrence's celebrated picture, died in 1831; the second, George Frederick d'Arcy (1828-1879), succeeded his father as 2nd earl of Durham. The latter's son, John George Lambton (b. 1855), became 3rd earl in 1879.

See Stuart J. Reid, Life and Letters of the First Earl of Durham (2 vols., London, 1906) ; The Greville Memoirs, parts i. and ii. (London, 1874-1887); Richard, duke of Buckingham and Chandos, Memoirs of the Courts and Cabinets of William IV. and Victoria \2 vols., London, 1861); William Harris. History of the Radical

I Party in Parliament (London, 1885); Harriet Martineau, History of the Thirty Years' Peace (4 vols., London, 1877); William Kingsford, History of Canada, vol. x. (10 vols., Toronto, 1887-1898); H. E. Egerton, Short History of British Colonial Policy (London, 1897). (R- J. M.)

DURHAM, a northern county of England, bounded N. by Northumberland, E. by the North Sea, S. by Yorkshire, and W. by Westmorland and Cumberland. Its area is 1014-6 sq. m. It is wholly on the eastern slope, the western angle being occupied by spurs of the Pennine chain, exceeding 2300 ft. in height at some points on the Cumberland border. West of a line from Barnard Castle by Wolsingham to the neighbourhood of Consett the whole of the land, excepting narrow valleys, lies at elevations exceeding 1000 ft. This area represents roughly one quarter of the total. The principal rivers rising in these hills are the Derwent, tributary to the Tyne, forming part of the county boundary with Northumberland, the Wear and the Tees, which forms almost the whole of the boundary with Westmorland and Yorkshire. The dales traversed by these rivers in their upper parts, though sufficiently strongly contrasted with the dark, barren moors surrounding them, yet partake of somewhat the same wild character. Lower down, however, are beautiful and fertile valleys, the main rivers flowing between steep, well- wooded banks; while the lesser streams of the coastal district have carved out denes or ravines on the steep flanks of which vegeta- tion is luxuriant. Castle Eden Dene, 7 m. N.W. of Hartlepool, is famous for its beautiful trees and wild flowers. The coastward slope is fairly steep in the northern half of the county, but it is steady, and the coast itself has no striking scenic features, save where the action of the waves upon the magnesian limestone has separated great masses,

leaving towering fragments standing, and fretting the face of the rock with caverns and arches. The cluster of rocks named the Black Halls, 6 m. N.W. of Hartle- pool, best exhibits these features. Other natural phenomena include the Linnkirk caves near Stanhope in Weardale in which numerous fossils and bones, with evidence of habitation by man, have been discovered; and the Hell Kettles, S. of Darlington, near the junction of the Tees and the Skerne, four cavities filled with water, reputed to be unfathomable, and measuring from 80 to 1 20 ft. in diameter. The water is sulphurous.

Except in the moorlands of the west only a few scraps of the county have been left in their natural state; but these portions are of great interest to the student of natural history. The ballast-hills at Shields, Jarrow and Hartlepool, formed by the discharge of material from ships arriving in ballast from foreign countries, are overgrown with aliens, many of which are elsewhere unknown in this country. Nearly fifty different species have been found. Stockton was almost the last retreat in England of the native black rat. Of the former abundance of deer, wild, ox and boar every peat bog testifies by its remains ; the boar appears to have existed in the reign of Henry VIII. , and records of red deer in the county may be traced down to the middle of the 18th century.

Geology. — The uplift of the Pennine hills causes nearly all the stratified rocks of Durham to dip towards the east or south-east. Thus the oldest rocks are to be found in the west, while in passing eastward younger rocks are continually met. In the hilly district of Weardale and Teesdale the Carboniferous Limestone series pre- vails ; this is a succession of thick beds of limestone with intervening sandstones and shales. Some of the calcareous beds are highly f ossiliferous ; those at Frosterley near Stanhope are full of the remains of corals and the stone is polished as a marble. Much of the higher ground in the west is capped by Millstone Grit, as at Muggleswick and Walsingham commons. The outcrop of this formation broadens eastward until it is covered by the Durham coalfield which occupies the centre of the county from Newcastle and South Shields to Barnard Castle. The Coal Measures are about 2000 ft. thick and contain upwards of 100 seams of coal, including many of great importance — the Brockwell coal, Low Main coal and High Main coal are some of the well-known seams. Fireclays of great value are obtained from beneath many of the coal seams. Apart from the coals, the Coal Measures are made up of beds of sandstone and shale, the former called " post " and the latter " plate" by the local miners. Permian magnesian limestone succeeds the Coal Measures on the east, it reaches from the Tees to South Shields in a broad tract

and occupies the coast between that town and Hartlepool. Remarkable concretionary forms are found in the Fulwell Quarries simulating honeycomb and coral structures. The

stone is quarried at Marsden for the manufacture of Epsom salts ; it is also used for lime-making and building. Fish remains are not uncommon in it. The sandstones and marls seen between the magnesian limestone and the Coal Measures at South Shields, Newbottle and several miles farther south are usually classed as Permian, but they may possibly prove to belong to the lower series. In the south-east corner of the county, by Darlington, Stockton and Seaton Carew, the low ground is made of Triassic rocks, red marls and sandstones with beds of gypsum and rock salt. Coal Measures undoubtedly underlie the Permian and Triassic strata. Normal faults traverse the district, mostly from east to west. Great dykes and sills of basalt lie in the Tees valley above Middleton and one, the Great Whin Sill, may be followed in an easterly direction for over 120 m. The Cockfield dyke and Little Whin Sill are similar intrusions of basalt. Lead mines have been extensively worked in the limestone districts of Weardale and Teesdale ; the limestone itself is quarried on a large scale for fluxing in the ironworks. Glacial deposits obscure the older rocks over much of the county, they contain travelled stones from the Pennines and Cheviots. Submerged forests appear off the coast at West Hartlepool and other

Eoints. A small patch of Silurian occurs near Cronkley on the Tees ; ere slate pencils were formerly made.

Agriculture. — Near the river Tees, and in some places bordering on the other rivers, the soil is loam or a rich clay. At a farther distance from these rivers it is of inferior quality, with patches of gravel interspersed. The hills east of the line from Barnard Castle to Consett are covered with a dry loam, the fertility of which varies with its depth. West of the line the summits and flanks of the hills are in great part waste moorland. Only some two-thirds of the total area of the county are under cultivation, and nearly two-thirds of this are in permanent pasture. There are also nearly 60,000 acres of hill-pasture. Of the diminished area under corn crops oats occupy more than one-half, and barley much exceeds wheat. Nearly two-thirds of the average under green crops are occupied by turnips, as many cattle are raised and have a long-standing reputation. The cows are

especially good yielders of milk. The sheep are also highly esteemed, particularly the Teesdale breed. Those of Weardale are small, but their mutton is finely flavoured.

Mining. — The mountain limestone contains veins of lead ore and zinc ore. The beds of coal in the Coal Measures have long been a source of enormous wealth. The mines are among the most extensive and productive in the kingdom. At Sunderland the coal trade furnishes employment for hundreds of vessels, independently of the " keels " or lighters which convey the coal from the termini of the railways and tramways to the ships. The seams worked extend horizontally for many miles, and are from 20 to 100 fathoms beneath the surface. The Frosterley marble has been quarried for many centuries near Stanhope for decorative purposes, in Durham cathedral and elsewhere taking the place of Purbeck marble, while in modern houses it is used chiefly for chimney-pieces. Ironstone is worked in the neighbour- hood of Whickham and elsewhere. Excellent slate is quarried at several places. The neighbourhood of Wolsingham abounds in fine millstones. The Newcastle grindstones are procured at Gateshead Fell; and firestone for building ovens, furnaces and the like is obtained in various parts of Durham, and exported in considerable quantity.

Other Industries. — The manufacturing industries are extensive, and all are founded upon the presence of coal, of which, more- over, large quantities are exported. The industrial and mining districts may be taken to lie almost wholly east of a line from Darlington through Bishop Auckland to Consett. Textile indus- tries are not carried on to any great extent, but a large number of hands are employed in the manufacture of machines, appliances, conveyances, tools, &c. Of this manufacture the branch of ship- building stands first; the yards on the Tyne are second only to those on the Clyde, and the industry is prosecuted also at Sunder- land, the Hartlepools and Stockton-on-Tees. The founding and conversion of metal stands next in importance; and other industries include the manufacture of paper, chemicals (chiefly on the Tyne), glass and bottles and earthenware (at Gateshead and Sunderland). The output of limestone is greater than that of any other county in the United Kingdom. As regards iron, the presence of the coal and the proximity of the Cleveland iron district of North Yorkshire enable the county to produce over

one million tons of pig-iron annually, though the output of iron from within the county itself is inconsiderable. There is a large production of salt from brine. The sea fisheries of Sunderland and Hartlepool

are valuable.

Communications.— Railway communication is provided en tirely by the North Eastern company. The main line runs northward through Darlington, Durham and Gateshead, and there are a large number of branches through the mining and industrial districts, while the company also owns some of the docks. From Stockton to Darlington ran the railway engineered by George Stephenson and opened in 1825. The chief ports of Durham are Jarrow and South Shields on the Tyne, Sunderland at the mouth of the Wear, Seaham Harbour, Hartlepool East and West and Stockton-on-Tees.

Administration and Population.— Durham is one of the Counties Palatine, the others being Lancashire and Cheshire. The area of the ancient county is 649,352 acres, and that of the administrative county 649,244 acres. There were formerly three outlying portions of the county, known as North Durham (including Norhamshire and Islandshire), Bedlingtonshire and Crayke. These were attached to the county as having formed parcels of the ancient " patrimony of St Cuthbert," of which the land between Tyne and Tees was the chief portion. The popula- tion in 1891 was 1,016,454 and in 1901 1,187,361. The birth- rate is much above, the death-rate also above, but the percentage of illegitimacy considerably below, the average. The county is divided into 4 wards. The following are municipal boroughs: Darlington (pop. 44,511), Durham, city (14,679), Gateshead, county borough (109,888), Hartlepool (22,723), Jarrow (34,295), South Shields, county borough (97,263), Stockton-on-Tees (51,478), Sunderland, county borough (146,077), West Hartlepool (62,627). The other urban districts may be distributed so as to indicate roughly the most populous and industrial districts:

1. In the Tyne district (where Gateshead, Jarrow and South Shields are the chief centres) — Blaydon (19,623), Felling (22,467), Hebburn (20,901), Ryton (8452), Whickham (12,852).

2. North-western district — Annfield Plain (12,481), Benfield- side (7457), Consett (9694), Leadgate (4657), Tanfield (8276), Stanley (i3,554)-

3. Durham and Bishop Auckland district (continuation south of the preceding) — Bishop Auckland (11,969), Brandon and Byshottles (15,573), Crook (11,471), Shildon and East Thickley (11,759), Spennymoor (16,665), Tow Law (4371), Willington

(7887).

4. Durham and Sunderland district (N.E. of preceding) — Hetton (13,673), Houghton-le-Spring (7858), Seaham Harbour (10,163), Southwick-on-Wear (12,643). The township of Chester- le-Street (11,753) is also in this district.

The only other urban districts are Barnard Castle (4421) in Teesdale and Stanhope (1964) in Weardale. Durham is in the north-eastern circuit, and assizes are held at Durham. It has one court of quarter sessions and is divided into 16 petty sessional divisions. All the boroughs have separate commissions of the peace. The ancient

county, which is in the diocese of Durham, excepting part of one parish in that of York, contains 243 ecclesi- astical parishes wholly or in part. There are 288 civil parishes. The county is divided into eight parliamentary divisions, each returning one member — Jarrow, Chester-le-Street, Houghton-le- Spring, Mid, North-west, Barnard Castle, Bishop Auckland, South-east. It also includes the parliamentary borough of Sunderland, returning two members, and the boroughs of Darlington, Durham, Gateshead, Hartlepool, South Shields and Stockton-on-Tees, returning one member each. Among educational establishments there may be mentioned the uni- versity and the grammar school in the city of Durham, and the Roman Catholic college of Ushaw near Durham.

History. — After the death of Ida in the 6th century the kingdom of Northumbria was divided into the two states of Bernicia and Deira, separated from each other by the Tees, the latter including the district afterwards known as Durham. The post-conquest palatinate arose by a process of slow growth from the grant of land made by Egfrith to St Cuthbert on his

election to the see of Lindisfarne in 684. On the transference of the see to Chester-le-Street in the 9th century, Guthred the Dane endowed it with the whole district between the Tyne and the Wear, stretching west as far as Watling Street, a grant confirmed by Alfred; and when in 995 the see was finally established at Durham, the endowment was again largely enriched by various donations. Durham continued, however, to form part of the earldom of Northumbria, and not until after the purchase of the earldom by Bishop Walcher in 1075 did the bishops begin to exercise regal rights in their territory. The term palatinus is applied to the bishop in 1293, and from the 13th century on- wards the bishops frequently claim such rights in their lands as the king enjoys in his kingdom. At the time of the Conquest the bishop's possessions included nearly all the district between the Tees and the Tyne, except Sadberge, and also the outlying districts of Bedlingtonshire,Norhamshire,IsIandshireandCrayke, together with Hexhamshire, the city of Carlisle, and partof Teviot- dale. Henry I. deprived the bishopric of the last three, but in compensation made over to it the vills of Burdon, Aycliffe and Carlton, hitherto included in the earldom of Northumberland. The wapentake of Sadberge also formed part of the earldom of Northumberland; it was purchased for

the see by Bishop Pudsey in 1189, but continued an independent franchise, with a separate sheriff, coroner and court of pleas. In the 14th century Sadberge was included in Stockton ward and was itself divided into two wards. The division into the four wards of Chester-le-Street, Darlington, Easington and Stockton existed in the 13th century, each ward having its own coroner and a three-weekly court corresponding to the hundred court. The diocese was divided into the archdeaconries of Durham and Northumberland. The former is mentioned in 107 2, and in 1 291 included the deaneries of Chester-le-Street, Auckland, Lanchester and Darlington.

Until the 15th century the most important administrative officer in the palatinate was the steward. Other officers were the sheriff, the coroners, the chamberlain and the chancellor. The palatine exchequer was organized in the 12th century. The palatine assembly represented the whole county, and dealt chiefly with fiscal questions. The bishop's council, consisting of the clergy, the sheriff and the barons, regulated the judicial affairs, and later produced the Chancery and the courts of Admiralty and Marshalsea. The prior of Durham ranked first among the bishop's barons. He had his own court, and almost exclusive jurisdiction over his men. The quo warranto proceed- ings of 1 293 exhibit twelve lords enjoying more or less extensive franchises under the bishop. The repeated efforts of the crown to check the powers of the palatinate bishops culminated in 1536 in the Act of Resumption, which deprived the bishop of the power to pardon offences against the law or to appoint judicial officers; indictments and legal processes were in future to run in the name of the king, and offences to be described as against the peace of the king, not against that of the bishop. In 1596 restrictions were imposed on the powers of the chancery, and in 1646 the palatinate was formally abolished. It was revived, however, after the Restoration, and continued with much the same power until the act of 1836, which provided that the palatine jurisdic- tion should in future be vested in the crown. There were ten palatinate barons in the 12th century, the most important being the Hiltons of Hilton Castle, the Buhners of Brancepeth, the Conyers of Sockburne, the Hansards of Evenwood, and the Lumleys of Lumley Castle. The Nevilles owned large estates in the county; Raby Castle, their principal seat, was built by John de Neville in 1377. Owing to its isolated position the palatinate took little part or interest in any of the great rebellions of the Norman and Plantagenet period. During the Wars of the Roses Henry VI. passed through Durham, and the novelty of a royal visit procured him an enthusiastic reception. On the outbreak of the Great Rebellion Durham inclined to support the

cause of the parliament, and in 1640 the high sheriff of the palatinate guaranteed to supply the Scottish army with provisions during their stay in the county. In 1642 the earl of Newcastle formed the western counties into an association for the king's service, but

in 1644 the palatinate was again overrun by the Scottish army, and after the battle of Marston Moor fell entirely into the hands of the parliament.

Durham has never possessed any manufactures of importance, and the economic history of the county centres round the growth of the mining industry, which employed almost the whole of the non-agricultural population. Stephen possessed a mine in Durham which he granted to Bishop Pudsey, and in the same century colliers are mentioned at Coundon, Bishopwearmouth and Sedgefield. Cockfield Fell was one of the earliest Landsale collieries in Durham. Edward III. issued an order allowing coal dug at Newcastle to be taken across the Tyne, and Richard II. granted to the inhabitants of Durham licence to export the produce of the mines, without paying dues to the corporation of Newcastle. Among other early industries lead-mining was carried on in the western part of the county, and mustard was extensively cultivated. Gateshead had a considerable tanning trade and shipbuilding was carried on at Jarrow.

In 1614 a bill was introduced in parliament for securing representation to the county and city of Durham and the borough of Barnard Castle. The movement was strongly opposed by the bishop, as an infringement of his palatinate rights, and the county was first summoned to return members to parliament in 1654. After the Restoration the county and city returned two members each. By the Reform Act of 1832 the county returned two members for two divisions, and the boroughs of Gateshead, South Shields and Sunderland acquired representation. The boroughs of Darlington, Stockton and Hartlepool returned one member each from 1868 until the Redistribution Act of 1885.

Antiquities. — To the Anglo-Saxon period are to be referred portions of the churches of Monk Wearmouth (Sunderland), Jarrow, Escomb near Bishop Auckland, and numerous sculptured crosses, two of which are in situ at Aycliffe. The best remains of the Norman period are to be found in Durham cathedral and in the castle, also in some few parish churches, as at Pittington and Norton near Stockton. Of the Early English period are the eastern portion of the cathedral, the fine churches of Darlington, Hartlepool, and St Andrew, Auckland, Sedgefield, and portions of a few other churches. The Decorated and

Perpendicular periods are very scantily represented, on account, as is supposed, of the incessant wars between England and Scotland in the 14th and 15th centuries. The principal monastic remains, besides those surrounding Durham cathedral, are those of its subordinate house or " cell," Finchale Priory, beautifully situated by the Wear. The most interesting castles are those of Durham, Raby, Brancepeth and Barnard. There are ruins of castelets or peel-towers at Dalden, Ludworth and Langley Dale. The hospitals of Sherburn, Greatham and Kepyer, founded by early bishops of Durham, retain but few ancient features. <

See W. Hutchinson, History and Antiquities of the County^ Palatine of Durham (3 vols., Newcastle, 1785-1794) ; R. Surtees, History and Antiquities of the County Palatine of Durham (4 vols., London, 1816- 1840); B. Bartlet, The Bishoprick Garland, Collection of Legends, Songs, Ballads. . . of Durham (London, 1834); J. Raine, History and Antiquities of North Durham (London, 1852); Perry and Herman, Illustrations of the Medieval Antiquities of the County of Durham (Oxford, 1867); G. T. Lapsley, The County Palatine of Durham (New York, &c., 1900) ; Victoria County History, Durham. See also the Surtees Society's Publications, and Transactions of the A rchitectural Society of Durham and Northumberland.

DURHAM, a city and muncipal and parliamentary borough, and the county town of Durham, England, 256 m. N. by W. from London, on the North Eastern railway. Pop. (1901) 14,679. The nucleus of the site is a narrow, bold peninsula formed by a bend of the river Wear, on which stand the cathedral and the castle. The city, however, extends both E. and W. of this.

The position of the cathedral of St Cuthbert, its west end rising immediately from the steep wooded bank of the river, is surpassed in beauty by no other English cathedral. Its foundation arose from the fact that here, after wandering far over the north of England, the monks of Lindis- farne rested with the body of St Cuthbert, which they had removed from its tomb in fear of Danish invaders. This was in 995. Soon afterwards a church was built by Bishop Ealdhune,

and the see was removed hither from Lindisf arne. The peninsula was called Dunholme (Hill Island), which in Norman times was softened to Duresme, whence Durham. It is said that the monks of

Lindisfarne, knowing the name of the place where they should find retreat, but ignorant of its situation, were guided hither by a woman searching for her cow, and the bas-relief of a cow on the north wall of the church commemorates this incident. In 1093 Ealdhune's church was rebuilt by Bishop Carilef, who changed the early establishment of married priests into a Bene- dictine abbey. The grand Norman building in which his designs were carried out remains with numerous additions. The stone- vaulting is particularly noteworthy. The choir contains the earliest work, but Carilef's eastern apses made way for the exquisite chapel of the Nine Altars, with its rose windows and beautiful carving, of late Early English workmanship. The nave is massive Norman, with round pillars ornamented with surface-carving of various patterns. The western towers are Norman with an Early English superstructure. The famous Galilee chapel, of the finest late Norman work, projects from the west end. The central tower is a lofty and graceful Perpendicular structure. Other details especially worthy of notice are the altar screen of c. 1380, and the curious semi-classical font-cover of the 17 th century. There is a fine sanctuary-knocker on the north door. The cloisters are of the early part of the 15th century. The chapter-house is a modern restoration of the original Norman structure, a very fine example, which was destroyed by James Wyatt c. 1796, in the course of restoration of which much was ill-judged. The cathedral library, formerly the dormitory and refectories of the abbey, contains a number of curious and interesting printed books and MSS., and the portable altar, vestments and other relics found in St Cuthbert's grave. The Galilee contains the supposed remains of the Venerable Bede. The total length of the cathedral within is 4965 ft., the greatest height within (except the lantern) 74! ft., and the height of the central tower 218 ft. The diocese of Durham covers the whole county excepting a small fragment, and also very small parts of Northumberland and Yorkshire.

The naturally strong position selected for the resting-place of St Cuthbert's remains was possibly artificially fortified also, but it was not until 1072 that William the Conqueror caused the erection of a castle to the north of the cathedral across the neck of the peninsula. Of this there remain a beautiful crypt-chapel, and a few details incorporated in later work. Other interesting portions are the Norman gallery, with its fine arcade, Bishop Hatfield's hall of c. 1350, a recon- struction of the previous Norman one by Bishop Pudsey, and the Black Staircase of fine woodwork of the 17th century. The keep is a modern reconstruction. The castle, with the exception of some apartments used by the judges of assize, is

appropriated to the uses of Durham University. On the peninsula are also the churches of St Mary le Bow in the North Bailey and St Mary the Less, the one a 17th-century building on a very ancient site, possibly that on which the first church rose over St Cuthbert's remains; the other possessing slight traces of Norman work, but almost completely modernized. Of other churches in Durham, the site of St Oswald is apparently pre-Norman, and the building contains Norman work of Bishop Pudsey, also some fine early 15th-century woodwork. St Margaret's and St Giles' churches show work of the same period, and the second of these has earlier portions.

Several of the streets of Durham preserve an appearance of antiquity. Three of the bridges crossing the Wear are old, that of Framwellgate having been built in the 13th century and rebuilt in the 15th. In the neighbourhood of the city certain sites are of interest as adding detail to its history. To the south on Maiden Hill there is an encampment, occupied, if not con- structed, by the Romans. Immediately W. of Durham is Neville's Cross, of which little remains. The battle of Neville's Cross was fought in 1346, resulting in the defeat of the invading Scots by the English under Lord Neville and Henry Percy. The Scots had encamped at Beaurepaire or Bearpark, where a few ruins mark the site of the county residence of the priors of

Castle.

Durham, which had suffered from previous invaders. On the Wear below Durham is the priory of Finchale (1 196), of which there are considerable remains of Early English date and later, but in the main Decorated. The valley of the Wear in the neighbourhood of Durham is well wooded and picturesque, but there are numerous collieries on the uplands above it, and the beauty of the county is marred.

Among educational establishments in Durham the university stands first. The earliest connexion of the ecclesiastical founda- tion at Durham with an actual educational foundation was made by Prior Richard de Hoton (1 290-1308), ^" irer " who erected a hall in Oxford for students from Durham, who had previously enjoyed no such provision. In 1380 Bishop Hatfield refounded this hall as Durham College, which became Trinity College (see Oxford) on a new foundation (1555) when the possessions of the abbey of Durham had been surrendered in 1540, after which Durham College survived as a secular foundation only for a few years. Henry VIII. had the unful- filled intention of founding a college in Durham, and a similar attempt failed in the time of the Commonwealth. In 1831 the scheme

for a college was projected by the chapter; an act of 1 83 2 specified the foundation as a university, and in Michaelmas 1833 its doors were opened. The first warden, and a prime mover in the scheme of foundation, was Archdeacon Charles Thorp (d. 1862). In 1837 the university received its charter from William IV. The dean and chapter of the cathedral are governors, and the bishop of Durham is visitor, but the active management is in the hands of the warden, senate and convoca- tion. The system and life of the university are broadly similar to those of the greater universities of Oxford and Cambridge. Proctorial administration is carried on by two proctors annually nominated by the warden. Among the various residential divisions of the university may be mentioned Bishop Hatfield's Hall (1846), which, through its endowment, by means of such methods of economy as provision for all- meals in common, permits men of limited means to become students. The degree for bachelor of arts is awarded after two public examinations, and may be taken in two years, with a total of six months' residence in each year. Special examinations are provided for candidates who seek honours, and those who obtain honours are admissible, after a certain period, to the mastership of arts without further examination, but in other cases further examination must have been taken, or an essay presented as a qualification for this degree. A theological course is provided for bachelors of the university, those who have passed a similar course elsewhere, or non-graduates aged nineteen who have passed a certain standard of examination. Instruction in civil engineering and mining was established as early as 1837, but was subsequently given up; and in 1871 the university and the North of England Institute of Mining and Mechanical Engineers co-operated to found the college of physical science at Newcastle- upon-Tyne, which provides such instruction and was incor- porated with the university in 1874. The college of medicine at Newcastle has been in connexion with Durham University since 1852, and the professors there are professors of the univer- sity. In 1895 degrees for women were established, and in 1889 a hostel was opened for the accomodation of women, who may take any course of instruction except the theological. In 1889 musical degrees were instituted, and a professorship was founded in 1897. Among other subjects may be mentioned the granting of degress in hygiene, and of diplomas in public health and education (see J. T. Fowler, Durham University, uniform with series of College Histories; London, 1904).

The grammar school was refounded by Henry VIII. out of the monastic school. It is a flourishing institution on the lines of the public schools, and has " king's scholarships " tenable in the school,

and scholarships and exhibitions tenable at the universities. There are also a diocesan training college for school- masters and mistresses, and a high school for girls; and 4 m. W. of the city is the great Roman Catholic College of St Cuthbert, Ushaw, the representative of the old college at Douai. Here are preserved the magnificent natural history collections of Charles

Waterton. Other buildings worthy of notice in Durham are the town-hall, a 16th-century building reconstructed in 1851, the police station, and the guildhall, the shire hall and county buildings, and the county hospital. There are ironworks and manufactures of hosiery, carpets and mustard in the city. The parliamentary borough returnsone member. The corporation con- sists of a mayor, 6 aldermen and 18 councillors. Area, 1070 acres.

History of the City. — The foundation of the city followed on that of the church by the monks of Lindisfarne at the close of the 10th century. The history of the city is closely associated with that of the palatinate of Durham. The bishop of Durham among other privileges claimed a mint in the city, which, accord- ing to Boldon Book, rendered ten marks yearly until its value was reduced by that established by Henry II. at Newcastle, and it was temporarily abolished by the same king. The earliest charter, dated n 79 or n 80, is a grant of exemption from toll merchet and heriot made by Bishop Hugh Pudsey and confirmed by Pope Alexander. Before that time, however, the monks had a little borough at Elvet, which is divided from Durham by the Wear and afterwards became part of the city. In 1183 the city was at farm and rendered sixty marks. It was at first governed by & bailiff appointed by the bishop, but in 1565 Bishop Pilking- ton ordained that the government should consist, in addition to the bailiff, of one alderman and twelve assistants, the latter to continue in office for life, and the former to be chosen every year from among their number. This form of government was re- placed in 1 602, under the charter of Bishop Matthew, by that of a mayor, 12 aldermen and 24 burgesses, the aldermen and bur- gesses forming a common council and electing a mayor every year from among the aldermen. This was confirmed by James I., but in 1684 the corporation were obliged to resign their charters to Bishop Crew, who granted them a new one, probably reserving to himself a right of veto on the election of the mayor and alder- men. At the time of the Revolution, however, Bishop Matthew's charter was revived, and

continued to be the governing charter of the city until 1770, when, owing to dissensions as to the election of the common council, the number of aldermen was reduced to four and the charter became void. No mayor or aldermen were elected for ten years, but in 1780 Bishop Egerton, on the petition of the burgesses, granted them a new charter, which was practically a confirmation of that of 1602, and remained in force until the Municipal Reform Act of 1835. Being within the county palatine, the city of Durham sent no members to parliament, until, after several attempts beginning in 1614, it was enabled by an act of 1673 to return two members, which it continued to do until 1885, when by the Redistribution of Seats Act the number was reduced to one.

The corporation of Durham claim their fair and market rights under Bishop Pudsey's charter of 1179, confirmed in 1565, as a weekly market on Saturday and three yearly fairs on the feasts of St Cuthbert in September and March and on Whit Monday, each continuing for two days. In 1610 the bishop of Durham brought a suit in chancery against the burgesses and recovered from them the markets and fairs, which he afterwards leased to the corporation for a rent of £20 yearly until they were pur- chased from the Ecclesiastical Commissioners in i860. Durham has never been noted for any particular trade; and the attempts to introduce the manufacture of cloth and wool in the 17th and 1 8th centuries were failures. The manufacture of carpets was begun in 1814.

DURHAM, a city and the county-seat of Durham county, North Carolina, U.S.A., in a township of the same name, 25 m. N.W. of Raleigh. Pop. (1900) 6679, of whom 2241 were ne- groes; (1910) 18,241; of the township (1900) 19,055; (1910) 27,606. Adjacent to the city and also in the township are East Durham and West Durham (both unincorporated), which industrially are virtually part of the city. Durham is served by the Southern, the Seaboard Air Line, the Norfolk & Western, and the Durham & Southern railways, the last a short fine connecting at Apex and Dunn, N.C., respectively with the main line of the Seaboard and the Atlantic Coast Line railways. Durham is nearly surrounded by hills. Its streets are shaded by elms. The city

is the seat of Trinity College (Methodist Episcopal, South), opened in 1851 as a normal college, growing out of an academy called. Union Institute, which was established in the north- western part of Randolph county in 1838 and was incorporated in 1841. In 1852 the college was empowered to grant degrees; in 1856 it became the property of the North Carolina Conference of the Methodist

Episcopal Church, South; in 1859 it received its present name; and in 1892 it was removed to a park near Durham, included in 1901 in the corporate limits of the city. A new charter was adopted in 1903, and a law school was organ- ized in 1904. The college has received many gifts from the Duke family of Durham. In 1908 its endowment and property were valued at about $1,198,400, and the number of its students was 288. Although not officially connected with the college, the South Atlantic Quarterly, founded by a patriotic society of the college and published at Durham since 1902, is controlled and edited by members of the college faculty. The North Carolina Journal of Education and the Papers of the Trinity College Historical Society also are edited by members of the college faculty. The Trinity Park school is preparatory for the college. Near the city are Watts hospital (for whites) and Lincoln hospital (for negroes). Durham's chief economic interest is in the manu- facture of granulated smoking tobacco, for which it became noted after the Civil War. In the city are two large factories and store houses of the American Tobacco Company. The tobacco industry was founded by W. T. Blackwell (1839-1904) and Washington Duke (1820-1905). The city also manufactures cigars, cigarettes, snuff, a fertilizer having tobacco dust as the base, cotton goods, lumber, window sashes, blinds, drugs and hosiery. Durham has a large trade with the surrounding region. The town of Durham was incorporated in i860, and became the county-seat of the newly-erected county in 1881, and in 1899 was chartered as a city. Its growth is due to the tobacco and cotton industries. In the Bennett house, at Durham Station, near the city, General J. E. Johnston surrendered on the 26th of April 1865 the Confederate army under his command to General W. T. Sherman.

DURIAN (Malay, duri, a thorn), the fruit of Durio zibethinus, a tree of the natural order Bombaceae, which attains a height of 70 or 80 ft., has oblong, tapering leaves, rounded at the base, and yellowish-green flowers, and bears a general resemblance to the elm. The durio is cultivated in Sumatra, Java, Celebes and the Moluccas, and northwards as far as Mindanao in the Philippines; also in the Malay Peninsula, in Tenasserim, on the Bay of Bengal, to 14 N. lat., and in Siam to the 13th and 14th parallels. The fruit is spherical, and 6 to 8 in. in diameter, approaching the size of a large coco-nut; it has a hard external husk or shell, and is completely armed with strong pyramidal tubercles, meeting one another at the base, and terminating in sharp thorny points; these sometimes inflict severe injuries on persons upon whom the fruit may chance to fall when ripe. On dividing the fruit at the joins of the carpels, where the spines arch a little, it is found to contain five oval cells, each filled with a

cream-coloured, glutinous, smooth pulp, in which are em- bedded from one to five seeds about the size of chestnuts. The pulp and the seeds, which latter are eaten roasted, are the edible parts of the fruit. With regard to the taste of the pulp, A. R. Wallace remarks, " A rich butter-like custard, highly flavoured with almonds, gives the best idea of it, but intermingled with it come wafts of flavour that call to mind cream-cheese, onion-sauce, brown sherry and other incongruities; ... it is neither acid, nor sweet, nor juicy, yet one feels the want of none of these qualities, for it is perfect as it is." The fruit, especially when not fresh from the tree, has, notwithstanding, a most offensive smell, which has been compared to that of rotten onions or of putrid animal matter. The Dyaks of the Sarawak river in Borneo esteem the durian above all other fruit, eat it unripe both cooked and raw, and salt the pulp for use as a relish with rice.

See Linschoten, Discottrs of Voyages, bk. i. chap. 57, p. 102, fol. (London, 1598); Bickmore, Travels in the East Indian Archi- pelago, p. 91 (1868); Wallace, The Malay Archipelago (3rd ed.,

1872).

DURIS, of Samos, Greek historian, according to his own account a descendant of Alcibiades, was born about 340 B.C. He must have been born and passed his early years in exile, since from 352 to 324 Samos was occupied by Athenian cleruchs, who had expelled the original inhabitants. He was a pupil of Theophrastus of Eresus, whom he met at Athens. When quite young, he obtained a prize for boxing at the Olympic games; a statue by Hippias was set up in commemoration of his victory (Pausanias vi. 13. 5). He was for some time despot of his native island. Duris was the author of a comprehensive historical work Cloroptcu) on Hellenico-Macedonian history, from the battle of Leuctra (371) down to the death of Lysimachus (281), which was largely used by Diodorus Siculus. Other works by him included a life of Agathocles of Syracuse, the annals (£>poi) of Samos chronologically arranged according to the lists of the priests of Hera, and a number of treatises on literary and artistic subjects. Ancient authorities do not appear to have held a very high opinion of his merits as a historian. Plutarch (Pericles, 28) expresses doubt as to his trustworthiness, Dionysius of Halicarnassus (De compos, verborum, 4) speaks disparagingly of his style, and Photius (cod. 176) regards the arrangement of his work as altogether

faulty. Cicero (ad Alt. vi. 1) accords him qualified praise as an industrious writer.

Fragments in C. W. Miiller, Frag. Hist. Graec. ii. 446, where the passage of Pausanias referred to above and the date of Duris's victory at Olympia are discussed.

DURKHEIM, a town of Germany, in the Bavarian Palatinate, near the foot of the Hardt Mountains, and at the entrance of the valley of the Isenach, 15 m. N.W. of Spires on the railway Monsheim-Neustadt. Pop. 6300. It possesses two Evangelical churches and one Roman Catholic, a town hall occupying the site of the castle of the princes of Leiningen-Hartenburg, an antiquarian and a scientific society, a public library and a high school. It is well known as a health resort, for the grape cure and for the baths of the brine springs of Philippshalle, in the neighbourhood, which not only supply the bathing establishment, but produce considerable quantities of marketable salt. There is a brisk trade in wine and oil; tobacco, glass and paper are manufactured.

As a dependency of the Benedictine abbey of Limburg, which was built and endowed by Conrad II., Diirkheim or Thurnigheim came into the possession of the counts of Leiningen, who in the 14th century made it the seat of a fortress, and enclosed it with wall and ditch. In the three following centuries it had its full share of the military vicissitudes of the Palatinate; but it was rebuilt after the French invasion of 1689, and greatly fostered by its counts in the beginning of next century. In 1794 its new castle was sacked by the French, and in 1849 it was the scene of a contest between the Prussians and the insurrectionists. The ruins of the Benedictine abbey of Limburg lie about 1 m. S.W. of the town ; and in the neighbourhood rises the Kastanienberg, with the ancient rude stone fortification of the Heidenmauer or Heathen's Wall.

DURLACH, a town of Germany, in the grand-duchy of Baden, 25 m. by rail from Carlsruhe, with which it is connected by a canal and an avenue of poplars, on the left bank of the Pfinz, at the foot of the vineyard-covered Thurmberg, which is crowned by a watch-tower and to the summit of which a funicular railway ascends. Pop. (1905) 6207. It possesses a castle erected in 1565 and now used as barracks, an ancient town hall, a church with an excellent organ, a high-grade school, an orphan asylum, and in the market-place a statue of the margrave Charles II. It has manufactures of sewing-machines, brushes, chemicals, tobacco, beer, vinegar and chicory; and considerable trade in market produce.

Durlach was bestowed by the emperor Frederick II. on the margrave Hermann V. of Zahringen as an allodial possession, but afterwards came into the hands of Rudolph of Habsburg. It was chosen as his residence by the margrave Charles II. in 1565, and retained this distinction till the foundation of Carlsruhe in 171 5, though it was almost totally destroyed by the French in 1688. In 1846 it was the seat of a congress of the Liberal

party of the Baden parliament; and in 1849 it was the scene of an encounter between the Prussians and the insurgents. Reichenbach the mechanician, and E. L. Posselt (1 763-1804) the historian, were natives of the town. See Fecbt, Geschichte der Stadt Durlach (Heidelberg, 1869).

DUROC, GERAUD CHRISTOPHE MICHEL, due de Frioul (1772-1813), French general, was born at Pont a. Mousson (Meurthe et Moselle) on the 25th of October 1772. The son of an officer, he was educated at the military schools of his native town and of Chalons. He was gazetted second lieutenant (artillery) in the 4th regiment in 1793, and advanced steadily in the service. Captain Duroc became aide-de-camp to Napoleon in 1 796, and distinguished himself at Isonzo, Brenta and Gradisca in the Italian campaigns of 1796-97. He served in Egypt, and was seriously wounded at Aboukir. His devotion to Napoleon was rewarded by complete confidence. He became first aide-de- camp (1798), general of brigade (1800), and governor of the Tuileries. After the battle of Marengo he was sent on missions to Vienna, St Petersburg, Stockholm and Copenhagen. As grand marshal of the Tuileries he was responsible for the measures taken to secure Napoleon's personal safety whether in France or on his campaigns, and he directed the minutest details of the imperial household. After Austerlitz, where he commanded the grenadiers in the absence of General Oudinot, he was em- ployed in a series of important negotiations with Frederick William of Prussia, with the elector of Saxony (December 1806), in the incorporation of certain states in the Confederation of the Rhine, and in the conclusion of the armistice of Znaim (July 1808). In 1808 he was created duke of Friuli, and after the Russian campaign he became senator (1813). He was in attendance on Napoleon at the battle of Bautzen (20th-2ist May 1813) in Saxony, when he was mortally wounded, and died in a farmhouse near the battlefield on the 23rd of May. Napoleon bought the farm and erected a monument to his memory. Duroc was buried in the Invalides.

The chief source for Duroc's biography is the Moniteur (31st of May 1797, 24th of October 1798, 30th of May 1813, &c).

DUROCHER, JOSEPH MARIE ELISABETH (1817-1858), French geologist, was born at Rennes on the 31st of May 1817. Educated at the Ecole Polytechnique and Ecole des Mines in Paris, he qualified as a mining engineer. Early in his career he travelled in the northern parts of Europe to study the metalli- ferous deposits, and he contributed the articles on geology, mineralogy, metallurgy and chemistry to Paul Gaimard's Voyages de la Commission scientifique du nord, en Scandinavie, en Laponie, au Spitzberg et aux Feroe, pendant les annees 1838- 1840. In 1844 he became professor of geology and mineralogy at Rennes. His attention was now largely directed to the study of the artificial production of minerals, to the metamorphism of rocks, and to the genesis of igneous rocks. In 1857 he published his famous Essai de petrologie comparee, in which he expressed the view that the igneous rocks have been derived from two magmas which coexist beneath the solid crust, and are respect- ively acid and basic. He died at Rennes on the 3rd of December

1858.

DURRA (also written dourah, dhura, &c; Arabic for a pearl, hence a grain of corn), a cereal grass, Sorghum vulgare, extensively cultivated in tropical and semi-tropical countries, where the grain, made into bread, forms an important article of diet. In non- Arabic-speaking countries it is known by other names, such as Indian or African millet, pearl millet, Guinea corn and Kaffir corn. In India it is called jowari, jowaree, jawari, &c. (Hindi, jawarl).

DURUY, JEAN VICTOR (1811-1894), French historian and statesman, was born in Paris on the nth of September 1811. The son of a workman at the factory of the Gobelins, he was at first intended for his father's trade, but succeeded in passing brilliantly through the Ecole Normale Superieure, where he studied under Michelet, whom he accompanied as secretary in his travels through France, supplying for him at the Ecole Normale in 1836, when only twenty-four. Ill-health forced him to resign, and poverty drove him to undertake that extensive series of school textbooks which first brought him into public notice.

He devoted himself with ardour to secondary school education, holding his chair in the College Henri IV. at Paris for over a quarter of a century. Already known as a historian by his Histoire des

Remains et des peuples soumis a leur domination (2 vols., 1843-1844), he was chosen by Napoleon III. to assist him in his life of Julius Caesar, and his abilities being thus brought under the emperor's notice, he was in 1863 appointed minister of education. In this position he displayed incessant activity, and a desire for broad and liberal reform which aroused the bitter hostility of the clerical party. Among his measures may be cited his organization of higher education (" enseignement special "), his foundation of the " conferences publiques," which have now become universal throughout France, and of a course of secondary education for girls by lay teachers, and his introduc- tion of modern history and modern languages into the curriculum both of the lycSes and of the colleges. He greatly improved the state of primary education in France, and proposed to make it compulsory and gratuitous, but was not supported in this project by the emperor. In the new cabinet that followed the elections of 1869, Duruy was replaced by Louis Olivier Bourbeau, and was made a senator. After the fall of the Empire he took no part in politics, except for an unsuccessful candidature for the senate in 1876. From 1881 to 1886 he served as a member of the Conseil Sup6rieur de l'lnstruction Publique. In 1884 he was elected to the Academy in succession to Mignet. He died in Paris on the 25th of November 1894.

As a historian Duruy aimed in his earlier works at a graphic and picturesque narrative which should make his subject popular. His fame, however, rests mainly on the revised edition of his Roman history, which appeared in a greatly enlarged form in 7 vols, under the title of Histoire des Romains depuis les temps les plus recules jusqu'a la mart de Theodose (1879-1885), a really great work; a magnificent illustrated edition was published from 1879 to 1885 (English translation by W. J. Clarke, in 6 vols., 1883-1886). His Histoire des Grecs, similarly illustrated, appeared in 3 vols, from 1886 to 1891 (English translation in 4 vols., 1892). He was the editor, from its commencement in 1846, of the Histoire universelle, publiee par une socielS de professeurs et de savants, for which he himself wrote a " Histoire sainte d'apres la Bible," " Histoire grecque," " Histoire romaine," " Histoire du moyen age," " Histoire des temps modernes," and " Abrege de l'histoire de France." His other works include Atlas hisiorique de la France accompagne d'un volume de texte (1849); Histoire de France de 1453 a 181 5 (1856), of which an expanded and illustrated edition appeared as Histoire de France depuis I'invasion des barbares dans la Gaule romaine jusqu'a nos jours (1892); Histoire populaire de la France (1862-1863); Histoire populaire contemporaine de la France (1864-1866);

Causeries de voyage (1864) ; and Introduction generate a l'histoire de France (1865).

A memoir by Ernest Lavisse appeared in 1895 under the title of Un Ministre: Victor Duruy. See also the notice by Jules Simon (!895), and Portraits et souvenirs by S. Monod (1897).

DU RYER, PIERRE (1606-1658), French dramatist, was born in Paris in 1606. His earlier comedies are in the loose style of Alexandre Hardy, but after the production of the Cid (1636) he copied the manner of Corneille, and produced his masterpiece ScSvole, probably in 1644 (the date generally given is 1646). AlcionSe (1638) was so popular that the abbe d' Aubignac knew it by heart, and Queen Christina is said to have had it read to her three times in one day. Du Ryer was a prolific dramatist. Among his other works may be mentioned Saul (printed 1642), and a comedy, Les Vendanges de Suresnes (1635 or 1636). He died in Paris on the 6th of November 1658.

DUSE, ELEANORA (1859-), Italian actress, was born at Vigevano of a family of actors, and made her first stage appear- ance at a very early age. The hardships incident to touring with travelling companies unfavourably affected her health, but by 1885 she was recognized at home as Italy's greatest actress, and this verdict was confirmed by that of all the leading cities of Europe and America. In 1893 she made her first appearances in New York and in London. For some years she was closely

associated with the romanticist Gabriele d' Annunzio, and several of his plays, notably La Citla morta (1898) and Francesca da Rimini (1901), provided her with important parts. But some of her great successes during the 'eighties and early 'nineties — the days of her chief triumphs — were in Italian versions of such plays as La Dame aux camelias, in which Sarah Bernhardt was already famous; and Madame Duse's reputation as an actress was founded less on her " creations " than on her magnificent individuality. In contrast to the great French actress she avoided all "make-up "; her art depended on intense natural- ness rather than stage effect, sympathetic force and poignant intellectuality rather than the theatrical emotionalism of the French tradition. Her dramatic genius gave a new reading to the parts, and during these years the admirers of the two leading actresses of Europe practically constituted two rival schools of appreciation. Ill-health kept Madame Duse off the stage for some time; but though, after 1900, it was no longer possible for her to avoid " make-up," her rank among the great actresses of history

remained indisputable.

See also a biography by'L. Rasi (1901); A. Symons, Studies in Seven Arts (1906).

DUSSEK, JOHANN LUDWIG (1761-1812), Bohemian pianist and composer, was born at Czaslau, in Bohemia, on the 9th of February 1761. His father, Johann Joseph Dussek, a musician of high reputation, was organist and choir-master in the collegiate church of Czaslau, and several other members of the family were distinguished as organists. Under the careful instruction of his father he made such rapid progress that he appeared in public as a pianist at the age of six. A year or two later he was placed as a choir boy at the convent of Iglau, and he obtained his first instruction in counterpoint from Spenar, the choir-master. When his voice broke he entered on a course of general study, first at the Jesuits' college, and then at the university of Prague, where he took his bachelor's degree in philosophy. During his curriculum of two and a half years he had paid unremitting attention to the practice and study of his art, and had received further instruction in composition from a Benedictine monk. In 1779 he was for a short time organist in the church of St Rombaut at Mechlin. At the close of his engagement he pro- ceeded to Holland, where he attained great distinction as a pianist, and was employed by the stadtholder as musical in- structor to his family. While at the Hague he published his first works, several sonatas and concertos for the piano. He had already composed at the age of thirteen a solemn mass and several small oratorios. In 1783 he visited Hamburg, and placed himself under the instruction of Philip Emmanuel Bach. After spending two years in Lithuania in the service of Prince Radziwill, he went in 1786 to Paris, where he remained, with the exception of a short period spent at Milan, until the outbreak of the Revolution, enjoying the special patronage of Marie Antoinette and great popularity with the public. In Milan he appeared not only as a pianist but also as a player of the harmonica, an instrument which was much sought after on account of its novelty in those days. Towards the close of 1789 he removed to London, where on the 2nd of March 1790 he appeared at Salomon's concerts, and he married a daughter of Dominico Corri, herself a clever harpist and pianist. Unfortunately he was tempted by the large sale of his numerous compositions to open a music-publishing warehouse in partnership with Montague Corri, a relative of his wife. The result was injurious to his fame and disastrous to his fortune. Writing solely for the sake of sale, he composed many pieces that were quite unworthy of his genius; and, as he was entirely destitute of business capacity, bankruptcy was inevitable. In 1800 he was obliged to flee

to Hamburg to escape the claims of his creditors. Some years later he was attached in the capacity of musician to the household of Prince Louis Ferdinand of Prussia, with whom he formed an intimate friendship. On the death of his patron in 1806 he passed into the service of the prince of Isenburg as court musician. In 1809 he went to Paris to fill a similar situation in the household of Prince Talleyrand, which he held until his death on the 20th of March

Dussek had an important influence on the development of pianoforte music. As a performer he was distinguished by the purity of his tone, the combined power and delicacy of his touch, and the facility of his execution. His sonatas, known as The Invocation, The Farewell and The Harmonic Elegy, though not equally sustained throughout, contain movements that have scarcely been surpassed for solemnity and beauty of idea.

See also Alexander W.' Thayer's articles in Dwight's Journal of Music (Boston, 1861).

DUSSELDORF, a town of Germany, in the Prussian Rhine province, on the right bank of the Rhine, 24 m. by rail N. by W. from Cologne. Pop. (1885) 115,190; (1895) 175,985; (1905) 252,630. Diisseldorf is one of the handsomest cities of western Germany. Its situation on the great mid-European waterway and as the junction of several main lines of railway has largely favoured its rapid growth and industrial development. It is the principal banking centre of the Westphalian coal and iron trade, and the favourite residence of the leading merchants of the lower Rhine.

The city consists of five main portions — the Altstadt , the original town with narrow, irregular streets; the Karlstadt, dating from 1787 and so called after the electoral prince Charles Theodore; the Neustadt, laid out between 1690 and 1716; and the Fried- richstadt and the Konigstadt, of recent formation. In addition, the former villages of Pempelfort, Oberbilk, Unterbilk, Flingern and Derendorf have been incorporated and form the outer suburbs of the town proper. On the south side the town has been completely metamorphosed by the removal of the Koln-Mindner and Bergisch-Maerkisch stations to a central station lying to the east. The site thus gained was converted into new boulevards, while the railway to Neuss and Aix-la-Chapelle was diverted through the suburb of Bilk

and thence across the Rhine by an iron bridge. A road bridge (completed 1898, 2087 ft. long), replacing the old bridge of boats, carries the electric tram-line to Crefeld. The town, with the exception of the Altstadt, is regularly built, but within its area are numerous open grounds and public squares, which prevent the regularity of its plan degenerating into monotony: the market-place, with the colossal bronze statue of the elector John William, the parade, the Allee Strasse, the Konigs Allee, and the Konigs Platz may be specially mentioned. Of the thirty-seven churches, of which twenty-six are Roman Catholic, the most noticeable are: — St Andrew's, formerly the Jesuit and court church, with frescoes by J. Hubner (1806-1882), E. Deger (1809-1885), and H. Miicke (1806-1891), and the embalmed bodiesof several Rhenish electors; St Lambert's, with a tower 180 ft. high and containing a monu- ment to Duke William (d. 1592); Maximilians, with frescoes by J. A. N. Settegast (1813-1890); the Romanesque St Martin's, and the new Gothic church of St Mary. Besides the old ducal palace, laid in ruins by the French in 1794, but restored in 1846, the secular buildings comprise the government offices, the post- office in Italian style, the town hall on the market square, the law courts, the municipal music hall, the municipal theatre, the assembly hall of the Rhenish provincial diet, an Italian Renaissance edifice erected in 1879, the academy of art (1881; in pure Renaissance), the industrial art museum (1896), the his- torical museum, and the industrial art school. The town also possesses a library of 50,000 volumes, several high-grade schools, and is the seat of a great number of commercial and intellectual associations; but to nothing is it more indebted for its celebrity than to the Academy of Painting. This famous institution, originally founded by the elector Charles Theodore in 1 767, was re- organized by King Frederick William III. in 1822, and has since attained a high degree of prosperity as a centre of artistic culture. From 1822 till 1826 it was under the direction of Cornelius, a native of the town, from 1826 to 1859 under Schadow, and from 1859 to 1864 under E. Bendemann (1811-1889). From Bendemann's resignation it continued in the hands of a body of curators till 1873, when Hermann Wislicenus (1825-1899) of Weimar was chosen director. The noble collection of paintings which formerly adorned the Diisseldorf gallery was removed to Munich in 1805, and has not since been restored; but there

is no lack of artistic treasures in the town. The academy possesses 14,000 original drawings and sketches by the great masters, 24,000 engravings, and 248 water-colour copies of Italian originals; the municipal gallery contains valuable specimens of the local school;

and the same is the case with the Schulte collection. The principal names are Cornelius, Lessing, the brothers Andreas and Oswald Achenbach, A. Baur (b. 1835), A. Tidemand (1814-1876), and L. Knaus (b. 1829). An annual exhibition is held under the auspices of the Art Union; and the members of the Artists' Society, or Malkasten, as they are called, have annual festivals and masquerades.

The town is embellished with many handsome monuments — notably a bronze statue of Cornelius, by A. Donndorf (b. 1835), an equestrian statue of the emperor William I. (1896), and a large bronze group in front of the assembly hall of the diet, representing the river Rhine and its chief tributaries. In the suburb of Bilk there are the Floragarten and Volksgarten, the astronomical observatory and the harbour. Extensive quays afford accommodation for vessels of deep draught, and the trade with the Dutch cities and with London has been thereby greatly enhanced. Within recent years Diisseldorf has made remarkable progress as an industrial centre. The first place is occupied by the iron industries, embracing foundries, furnaces, engineering and machine shops, &c. Next come cotton spinning and weaving, calico printing, yarn-spinning, dyeing and similar textile branches, besides a variety of other industries.

A little to the north of the town lies the village of Diisselthal, with Count von der Recke-Volmerstein's establishment for homeless children in the former Trappist monastery, and in the suburb of Pempelfort is the Jagerhof, the residence at one time of Prince Frederick of Prussia, and afterwards of the prince of Hohenzollern-Sigmaringen.

Diisseldorf, as the form of the name — the village on the Diissel — clearly indicates, was long a place of small consideration. In 1288 it was raised to the rank of a town by Count Adolf of Berg; from his successors it obtained various privileges, and in 1385 was chosen as their residence. After it had suffered greatly in the Thirty Years' War and the War of the Spanish Succession, it recovered its prosperity under the patronage of the electoral prince John William of the Palatinate, who dwelt in the castle for many years before his death in 1716. In 1795 the town, after a violent bombardment, was surrendered to the French; and after the peace of Luneville it was deprived of its fortifications. In 1805 it became the capital of the Napoleonic duchy of Berg; and in 181 5 it passed with the duchy into Prussian possession. Among its celebrities are Johann Georg and Friedrich Heinrich Jacobi, Heinrich Heine, Varnhagen von Ense, Peter von Cor- nelius, Wilhelm Camphausen and Heinrich von Sybel.

See H. Ferber, Historische Wanderung durch die alte Stadi Diisseldorf (Diisseldorf, 1 889-1 890); Brandt, Studien zur Wirtschafts- und Ver- waltungsgeschichte der Stadt Diisseldorf (Diisseldorf, 1902) ; and local Guide by Bone.

DUSSERAH, or Dasara, a Hindu new-moon festival (some- times called Maha-navami), held in October, and specially connected with ancestral worship. In the native states, such as Mysore, the rajas give public entertainments lasting for ten days, and especially invite European officials to the festivities, which include horse-racing, .athletic contests, and banquets.

See J. A. Dubois, Hindu Manners, Customs and Ceremonies, p. 577.

DUST, earth or other matter reduced to fine dry and powdery particles; the word is Teutonic and appears in such various forms as the Dutch duist, Danish dyst, for the dust of flour or meal, and in the older forms donst; the modern German Dunst, vapour, probably preserves the original form and meaning, that of something which can be blown about by the wind.

Atmospheric Dust. — The presence of dust in the atmosphere has probably been known from the earliest ages, as prehistoric man must have had plenty of opportunities of noticing it lighting up the paths of sunbeams that penetrated his dark caves, yet it is only of recent years that it has become the subject of scientific observation. Formerly it was considered as simply matter in the wrong place, the presence of which had to be tolerated, but

was supposed to serve no useful purpose in nature. It was not till the year 1880 that atmospheric dust came under scientific investigation, when it soon became evident that it played a most important part in nature, and that instead of being a nuisance to be got rid of, it added much to the comforts and pleasures of life.

The atmosphere is composed of a number of gases which have a nearly constant proportion to each other, and of varying proportions of water vapour. This vapour, constantly rising from land and sea, mixes with the gases in the atmosphere and so long as it remains vapour is invisible, but when it becomes cooled by the actual processes in nature the vapour tends to condense to the liquid condition and form cloud particles. Before 1880 it had always been

assumed that when this condensa- tion took place, the vapour molecules simply combined with each other to form the little globules of water, but J. Aitken showed that vapour molecules in the atmosphere do not combine with each other, that before condensation can take place there must be some solid or liquid nucleus on which the vapour mole- cules can combine, and that the dust in the atmosphere forms the nuclei on which the water-vapour molecules condense. Every cloud particle being grown round a dust nucleus thus has a dust particle in it. The presence of dust in the atmosphere allows the condensation "of the vapour to take place whenever the air is cooled to the saturation point, and if there were no dust present the condensation would not take place till the air was cooled far below that point, and become highly super- saturated; and when it did take place the condensation would be violent and result in heavy rain-drops without the formation of what we know as cloud. This might be in some ways an advantage, but living in such supersaturated air would have many disadvantages. The supersaturated air having no dust to condense on would condense on our clothes, the inside and outside walls of our dwellings, and on every solid and liquid surface with which it came in contact.

Many of the dust particles in the atmosphere which form the nuclei of condensation are extremely minute, so small as to be beyond the powers of the microscope, and at first sight it might appear to be impossible to get any reliable information as to their numbers. But Aitken, having shown that water vapour must have a nucleus to condense on, saw that this placed in our hands the means of counting the dust particles in our atmosphere, and in 1888 showed how it could be done. As water vapour in the air condenses on the dust particles present and forms cloud particles, he showed that all that would be necessary would be to cause the dust particles to become centres of con- densation, when they would be so increased in size as to come within the range of an ordinary magnifying lens, and that by counting the cloud particles it would be possible to determine the number of dust particles. To carry out this idea the air under examination was placed in an air-tight receiver and saturated with water vapour. It was then expanded by an air- pump, and in this way cooled and condensation produced. The cloud particles so formed were allowed to fall on a micrometer and their number counted by the aid of an ordinary short- focussed lens. Certain precautions are necessary in carrying out this process. There must not be more than 500 particles per cubic centimetre of air, or all the particles will not form nuclei, and will not therefore be thrown down as cloud particles. When the number in the air tested exceeds that figure, the

dusty air must be mixed with such a quantity of dustless air as will reduce the number below 500 per c.c, and the correct number in the air tested is obtained by allowing for the proportion of dustless air to dusty air, and for the expansion necessary for cooling.

Thousands of tests of the atmospheric dust have been made with this instrument at many places over the world, and in no part of it has dustless air been found; indeed it is very rare to find air with less than 100 particles per c.c, whilst in most country places the numbers rise to thousands, and in cities such as London and Paris the number may be as high as 100,000 to 150,000 per c.c.

The sources of dust particles in the atmosphere are numerous. In nature volcanoes supply a large quantity, and the meteoric matter constantly falling towards the earth and becoming dissipated by the intense heat produced by the friction of the atmosphere keep up a constant supply. Large quantities of dust are also raised from the surface of the earth by strong winds, from dusty roads and dry soil, and there is good reason for supposing that large quantities of sand are carried from the deserts by the wind and transported great distances, the sand, for instance, from the desert of Africa being carried to Europe. It is, however, to artificial causes that most of the dust is due. The burning of coal is the principal source of these, not only when the coal is burned with the production of smoke, but also when smokeless, and even when the coal is first converted into gas and burned in the most perfect forms of combustion. It results from this that while in the air over the uninhabited parts of the earth and over the ocean the number of particles is small, being principally produced by natural causes or carried from distant lands, they are much more numerous in inhabited areas, especially in those where much coal is burned. It is evident that if there were not some purifying process in nature there would be a tendency for the dust particles to increase in numbers, because though some dust particles may fall out of the air, many of them are so small they have but little tendency to settle, but by becoming centres of cloud particles they are carried downwards to the earth, and, further,these when showering down as rain tend to wash the others out of the atmosphere. We may therefore look on all unin- habited areas of the earth as purifying areas, and their purify- ing power seems to depend partly on their extent, but principally on their rainfall. The following table illustrates the purifying effect of some of these areas obtained from the results of hundreds of observations. The areas referred to are: (1) Mediterranean Sea, the observations being made on the south coast of France on the air blowing inshore; (2) the Alps, the observations being made on the Rigi Kulm; (3) the Highlands of

Scotland, the observations being made at various places; and (4) the Atlantic Ocean, the observations being made on the west coast of Scotland, when the wind blew from the ocean.

Mediterranean.

Alps.

Highlands.

Atlantic.

Mean of lowest Mean of number

891 1611

38i

892

141

552

72 338

These numbers are all low for atmospheric dust, much lower than in air from inhabited areas. On the Rigi Kulm, for instance, the number was sometimes over 10,000 per c.c. when the wind was from inhabited areas and the sun causing ascending currents; and at the same place as the Atlantic air was tested the numbers went up to over 5000 per c.c. when the wind blew from the inhabited areas of Scotland, though the distance to the nearest was over 60 m.

E. D. Fridland'er 1 made many observations on the dust of the atmosphere with the same instrument as employed by Aitken. In crossing the Atlantic he got no low numbers, always over 2000 per c.c, but in the Gulf of St Lawrence he got a reading as low as 280 per c.c. In crossing the Pacific the lowest obtained was 245, in the Indian Ocean 243, in the Arabian Sea 280, in the Red Sea 383, and in the Mediterranean 875 per c.c. He has also made observations in Switzerland. The lowest number obtained by him was in the air at the top of the Bieshorn, 13,600 ft. above sea-level, where the number was as low as 157 per c.c. Professor G. Melander 2 of Helsingfors studied the dust in the atmosphere. His observations were made in Switzerland, Biskra in the Sahara, Finland, the borders of Russia,

and in Norway; but in none of these places were low numbers observed. The minimum numbers were over 300 per c.c, while maximum numbers in some cases went high.

Aitken when observing on the Rigi Kulm noticed during some

1 " Atmospheric Dust Observations from various parts of the World," Quart. Journ. Roy. Met. Soc. (July 1896).

2 La Condensation de la vapeur d'eau dans V atmosphere (Helsingfors,

1897)-

conditions of weather that there was a daily variation in the number of particles, a maximum near the hottest part of the day and a minimum in the morning, and attributed the rise in the numbers to the impure air of the valleys rising on the sun-heated slopes of the mountain or driven up by the wind. A. Rankin, at the Ben Nevis observa- tory, also observed this daily variation, and his observations also indicate a yearly variation at that station, the numbers being highest in March, April and May. This may possibly be due to small rainfall in these months, but more probably to the fact that south- easterly winds blow more frequently during these months on Ben Nevis than at any other season, and these winds bring the impure air from the more densely inhabited parts of the country.

Without atmospheric dust not only would we not have the glorious cloud scenery we at present enjoy, but we should have no haze in the atmosphere, none of the atmospheric effects that delight the artist. The white haze, the blue haze, the tender sunset glows of red, orange and yellow, would all be absent, and the moment the sun dipped below the horizon the earth would be in darkness; no twilight, no after-glows, such as those given some years ago by the volcanic dust from Krakatoa; none of the poetry of eventide. Why, it may be asked, is this so ? Simply because all these are due to matter suspended in the air, to dust. Water has no such effects as long as it is a vapour, and if it condensed without the presence of dust, the particles would be far too few to give any appreciable effect and too heavy to remain in suspension.

Turning now to the investigations on this point, Aitken has shown

that there is no evidence to indicate that water vapour has any hazing effect, and shows that the haze is entirely due to dust, the density of the haze increasing with the increase in the number of dust particles in the air, and also with the relative humidity; but the humidity does not act as vapour, but by condensing on the dust and increasing the size of the particles, as it is not the amount of vapour present but the degree of saturation that affects the result; the more saturated the air, the more vapour is condensed on the particles, they so become larger and their hazing effect increased.

The relation of haze or transparency of the air to the number of dust particles was observed on five visits to the Rigi Kulm. The visibility of Hochgerrach, a mountain 70 m. distant from the Rigi, was used for estimating the amount of haze when the air was clear. During the visits this mountain was visible thirteen times, and it was never seen except when the number of particles was low. On eight occasions the mountain was only one-half to one- fifth hazed, and on these days the number of particles was as low as from 326 to 850 per c.c. It was seen five times when the number was from 950 to 2000 per c.c, but the mountain on these occasions was only just visible, and it was never seen when the number was a little over 2000 per c.c.

It has been pointed out that the relative humidity has an effect on the dust by increasing the size of the particles and so increasing the haze. It was therefore necessary in working out the dust and haze observations made at the different places to arrange all the observations in tables according to the wet-bulb depressions at the time. All the observations taken when the wet-bulb depression was between 2° and 4 were put in one table, all those when it was between 4 and 7 in another, and all those when it was over 7 in a third. It should be here noted that when the dust particles were counted and the wet and dry bulb observations taken, an estimate of the amount of haze was also made. This was done by estimating the amount of haze on a mountain at a known distance. Suppose the mountain to be 25 m. distant, and at the time to be one-half hazed, then the limit of visibility of the mountain under the conditions would be 50 m., and that was taken as the number representing the trans- parency of the atmosphere at the time. In the tables above referred to along with the number of particles was entered the limit of visibility at the time; when this was done it was at once

seen that as the number of particles increased the limit of visi- bility decreased, as will be seen from the following short table of the Rigi Kulm observations when the wet-bulb depression was between 2° and 4

Date.

Lowest Number.

Highest Number.

Mean Number.

Limit of

Visibility in

Miles.

C.

19th May 1891 22nd May 1889 1 6th May 1893

428

■*434*

1225

690

850

2600

559

642

1912

ISO

100

40

77,480) 75.170-

When the number of particles is multiplied by the limit of visi- bility in the tables a fairly constant number C. is obtained; see preceding table. All the observations taken at the different places were treated in a similar manner and the means of all the observations at the

different humidities were obtained, and the following table gives the mean values of C. at the different wet- bulb depressions of all the observations made at the different places.

Wet-bulb depression . Mean values of C.

2° to 4

76,058

4° to 7

105,545

7° and over

141,148

From the above table it will be seen that as the dryness of the air increased it required a larger number of particles to produce a complete haze, nearly double the number being required when the wet-bulb depression was over 7 than when it was only from 2° to 4 . To find the number of particles required to produce a complete haze, that is, to render a mountain just invisible, all that is necessary is to multiply the above constant C. by 160,930, the number of centimetres in a mile, when this is done with the observations made in the West Highlands we get the numbers given in the following table: —

Wet-bulb depression.

Number of Particles to produce a complete haze.

2° to 4 4° to 7 °

7° to io°

*. *.. .*

12,500,000,000 17,100,000,000 22,600,000,000

The above table gives the number of particles of atmospheric dust in a column of air having a section of one centimetre square, at the different humidities, required to produce a complete haze, that is, to make a distant object invisible, and is of course quite independent of the length of the column.

In making these dust and transparency observations three things were noted: 1st, the number of particles; 2nd, the humidity ; and 3rd, the limit of visibility. From the results above given, it is evident that if we now know any two of these we can calculate the third. Suppose we know the limit of visibility and the humidity, then the number of particles can be calculated by the aid of the above tables.

To show the hazing effects of dust it is not, however, necessary to use a dust counter. Aitken for some years made observations on the haze in the air at Falkirk by simply noting the direction of the wind, the wet-bulb depression at the time, and the trans- parency of the air. Falkirk is favourably situated for such observations owing to the peculiar distribution of the population surrounding it. The whole area fjom west, north-west to north, is very thinly populated, while in all other directions it is densely populated. It was found that the air from the thinly inhabited parts, that is, the north-west quadrant, was nine times clearer than the air from other directions with the same wet-bulb depression, and that the density of the haze was directly pro- portional to the density of the population of the area from which the wind blew. These observations also showed that the trans- parency of the air increases with the dryness, being 3-7 times clearer when the wet-bulb depression is 8° than when it is only 2 , and that the air coming from the densely inhabited parts is about 10 times more hazed than if there were no inhabitants in the country. (J. A.)*

DUTCH EAST INDIA COMPANY, THE (Oostindische Vereenigde Maatschappij), a body founded by a charter from the Nether- lands states-general on the 20th of March 1602. It had a double purpose: first to regulate and protect the already considerable trade carried on by the Dutch in the Indian Ocean, and then to help in prosecuting the long war of independence against Spain and Portugal. Before the union between Portugal and Spain in 1580-81, the Dutch had been the chief carriers of eastern produce from Lisbon to northern Europe. When they were shut out from the Portuguese trade by the Spanish king they were driven to sail to the East in order to make good their loss. Unsuccessful attempts were made to find a route to the East by the north of Europe and Asia, which would have been free from interference from the Spaniards and Portuguese. It was only when these failed that the Dutch decided to intrude on the already well-known route by the Cape of Good Hope, and to fight their way to the

Spice Islands of the Malay Archipelago. A first expedition, commanded by Cornelius Houtman, a merchant long resident at Lisbon, sailed on the 2nd of April 1595. It was provided with an itinerary or book of sailing instructions drawn up by Jan Huyghen van Linschoten, 1 a Dutchman who had visited Goa. The voyage was marked by many disasters and losses, but the survivors who reached the Texel on their return on the 20th of August 1597 brought back some valuable cargo, and a treaty made with the sultan of Bantam in Java.

These results were sufficient to encourage a great outburst of commercial adventure. Companies described as "Van Feme "• — that is, of the distant seas — were formed, and by 1602 from sixty to seventy Dutch vessels had sailed to Hindustan and the Indian Archipelago. On those distant seas the traders could neither be controlled nor protected by their native government. They fought among themselves as well as with the natives and the Portuguese, and their competition sent up prices in the eastern markets and brought them down at home. Largely at the suggestion of Jan van Oldenbarneveldt, and in full accordance with the economic principles of the time, the states-general decided to combine the existing separate companies into one united Dutch East India Company, which could discharge the functions of a government in those remote seas, prosecute the war with Spain and Portugal, and regulate the trade. A capital estimated variously at a little above and a little under 6,500,000 florins, was raised by national subscription in shares of 3000 florins. The independence of the states which constituted the United Netherlands was recognized by the creation of local boards at Amsterdam, in Zealand, at Delft and Rotterdam, Hoorn and Enkhuizen. The boards directed the trade of their own districts, and were responsible to one another, but not for one another as towards the public. A general directorate of 60 members was chosen by the local boards. Amsterdam was represented by 20 directors, Zealand by 12, Delft and Rotterdam by 14, and Hoorn and Enkhuizen also by 14. The real governing authority was the "Collegium," or board of control of 17 members, of whom 16 were chosen from the general directorate in proportion to the share which each local branch had contri- buted to the capital or joint stock. Amsterdam, which sub- scribed a half, had eight representatives; Zealand, which found a quarter, had four; Delft and Rotterdam, Hoorn and Enkhuizen had two respectively, since each of the pairs had subscribed an eighth. The seventeenth member was nominated in succession by the other members of the United Netherlands. A committee

1 Linschoten was born at Haarlem in or about 1563. He started his travels at the age of sixteen and, after some years in Spain, went with the Portuguese East India fleet to Goa, where he arrived in September 1583, returning in 1589. In 1594 and 1595 he took part in the Dutch Arctic voyages, and in 1598 settled at Enkhuizen, where he died on the 8th of February 161 1. His Navigatio ac itinerarium (1595-1596) is a compilation based partly on his own experiences, partly on those of other travellers with whom he came in contact. It was translated into English and German in 1598; two Latin versions appeared in 1599 and a French translation in 1610. The famous English version was reprinted for the Hakluyt Society in 1885. Large selections, with an Introduction, are pub- lished in C. Raymond Beazley's Voyages and Travels, vol. ii. {English Garner, London, 1903).

of ten was established at the Hague to transact the business of the company with the states-general. The " collegium " of seven- teen nominated the governors-general who were appointed after 1608. The charter, which was granted for twenty-one years, con- ferred great powers on the company. It was endowed with a monopoly of the trade with the East Indies, was allowed to import free from all custom dues, though required to pay 3% on exports, and charged with a rent to the states. It was author- ized to maintain armed forces by sea and land, to erect forts and plant colonies, to make war or peace, to arrange treaties in the name of the stadtholder, since eastern potentates could not be expected to understand what was meant by the states-general, and to coin money. It had full administrative, judicial and legislative authority over the whole of the sphere of operations, which extended from the west of the Straits of Magellan westward to the Cape of Good Hope.

The history of the Dutch East India Company from its formation in 1602 until its dissolution in 1798 is filled, until the close of the 17th century, with wars and diplomatic relations. Its headquarters were early fixed at Batavia in Java. But it extended its operations far and wide. It had to deal diplomatic- ally with China and Japan; to conquer its footing in the Malay Archipelago and in Ceylon; to engage in rivalry with Portuguese and English; to establish posts and factories at the Cape, in the Persian Gulf, on the coasts of Malabar and Coromandel and in Bengal. Only the main dates of its progress can be mentioned here. By 16 19 it had founded its capital in Batavia in Java on the ruins of the native town of Jacatra. It expelled the Portu- guese from Ceylon between 1638 and 1658, and from Malacca in 1641. Its establishment at the Cape of Good Hope, which was its only colony in the strict sense, began in 1652. A treaty

with the native princes established its power in Sumatra in 1667. The flourishing age of the company dates from 1605 and lasted till the closing years of the century. When at the summit of its prosperity in 1669 it possessed 150 trading ships, 40 ships of war, 10,000 soldiers, and paid a dividend of 40%. In the last years of the 1 7th century its fortunes began to decline. Its decadence was due to a variety of causes. The rigid monopoly it enforced wherever it had the power provoked the anger of rivals. When Pieter Both, the first governor-general, was sent out in 1608, his instructions from the Board of Control were to see that Holland had the entire monopoly of the trade with the East Indies, and that no other nation had any share whatever. The pursuit of this policy led the company into violent hostility with the English, who were also opening a trade with the East. Between 1613 and 1632 the Dutch drove the English from the Spice Islands and the Malay Archipelago almost entirely. The English were reduced to a precarious footing at Bantam in Java. One incident of this conflict, the torture and judicial murder of the English factors at Amboyna in 1623, caused bitter hostility in England. The success of the company in the Malay Archi- pelago was counterbalanced by losses elsewhere. It had in all eight governments: Amboyna, Banda, Ternate, Macassar, Malacca, Ceylon, Cape of Good Hope and Java. Commissioners were placed in charge of its factories or trading posts in Bengal, on the Coromandel coast, at Surat, and at Gambroon (or Bunder Abbas) in the Persian Gulf, and in Siam. Its trade was divided into th'e " grand trade " between Europe and the East, which was conducted in convoys sailing from and returning to Amsterdam; and the " Indies to Indies " or coasting trade between its posses- sions and native ports.

The rivalry and the hostilities of French and English gradually drove the Dutch from the mainland of Asia and from Ceylon. The company suffered severely in the War of American Inde- pendence. But it extended and strengthened its hold on the great islands of the Malay Archipelago. The increase of its political and military burdens destroyed its profits. In the early 18th century it was already embarrassed, and was bankrupt when it was dissolved in 1798, though its credit remained un- shaken, largely, if its enemies are to be believed, because it concealed the truth and published false accounts. In the later stages of its history its revenue was no longer derived from trade,

but from forced contributions levied on its subjects. At home, the directors, who were accused of nepotism and corruption, became unpopular at an early date. The company was subject to increasing demands and ever more severe regulation on the successive renewals of its charters at intervals of twenty-one years. The immediate causes of its destruction were the conquest of Holland by the French revolutionary armies, the fall of the government of the stadtholder, and the establishment of the Batavian Republic in 1 798.

Authorities. — The great original work on the history of the Dutch East India Company is the monumental Beschryving van oud en niew oost Indien (Dordrecht and Amsterdam, 1724), by Francois Valentyn, in 8 vols., folio, profusely illustrated. Two modern works of the highest value are: J. K. J. de Jonge, De Opkomst van het Nederlandsch Gezag in oost Indien (The Hague and Amsterdam, 1862-1888), in 13 vols.; J. J. Meinsma, Geschiedenis van de Nederlandsche oost-Indische Bezittingen (3 vols., Delft and the Hague, 1872-1875). See also John Crawford, History of the Indian Archipelago (Edinburgh, 1820); Clive Day, The Dutch in Java (New York, 1904) ; Sir W. W. Hunter, A History of British India (London, 1899); and Pierre Bonnassieux, Les Grandes Compagnies de commerce (Paris, 1892).

DUTCH LANGUAGE. When the Romans reached the territory now forming the kingdom of Holland, they found a number of tribes south of the Rhine, who — though here and there mixed with Germans — belonged to a non-Germanic race, and who, closely related to the Belgian tribes, spoke a language belonging to the Celtic group. Possibly they were also situated on the more elevated grounds north of the Rhine, at least vestiges of them may still be traced. We do not know anything about their being mixed with or subdued by the intruding German tribes. We can only guess it.

At that time the fertile delta of the Rhine was already occupied by German tribes who in language and national customs must have stood in some relation to the tribes living along the Rhine in Germany, later called Franks. The consonantal system of their language was in accordance with the other Low-German dialects, which is proved by the remains we have in the glosses of the Lex Salica, for the greater part handed down in a bad condition. These tribes, whom we shall take together under the name of Low-Franks — the Romans called them Batavi, Caninefates,Chamavi,&c. — werespreadoverGelderland,Overysel, part of Utrecht and South Holland, and the south-western part of North Holland. When in the sixth century allied tribes from the present north Germany, who

named themselves Saxons after one of those tribes living alongside the Elbe, conquered the territory occupied by the Franks a great many retreated from the eastern parts, and then the Franks, who already in the time of the Romans had begun to invade into the territory of the Belgian tribes, continued their wars of conquest in a southward direction and subdued all the land south of the branch of the Rhine that is called the " Waal." Since that time the Frankish dialect came there, and the Celtic-speaking popula- tion of the south suffered its language to be entirely supplanted by that of the conquerors. Hence in the formerly Celtic-speaking parts of Brabant and Limburg we find but Frankish dialects, somewhat corresponding with those of part of Gelderland, Utrecht and Holland. The deviation that is perceptible concerns less the use of words than the way of laying the stress.

In part of Gelderland, east of the Ysel, and in Overysel, the older Frankish dialect (of the Salian Franks) was given up and the language of the victorious Saxons was assumed, perhaps here and there strongly mixed with the older language. The language which is spoken there, and farther to the north through Drente as far as in some parts of Groningen, is called Saxon. Indeed, these dialects correspond in a great many respects with the language of the Old-Saxon poem Heliand (q.v.) and with the North-German dialects — from the latter they deviate considerably in some respects. The chief point of conformity is the formation of the plural of the verb: wi loopt, wi gat, Heliand: wi hlopad, wi gangad, which are wei loopen, wei gaan in the Frankish dialects. In the vocal system, too, there are peculiar differences.

In the north of Holland there lived, and still lives alongside the

coast, a tribe with which Caesar did not come in contact. The Frisians were spread over a large distance along the shore as far as the mouth of the Elbe, and in the west at least as far as the country north of Haarlem. In the time of the Romans they cannot have extended their power farther southward. Later, however, this seems to have been the case. Maerlant and Melis Stoke (13th century) tell us that time was when their power extended even over part of Flanders. About the year 339 they were repelled as far as the mouth of the Meuse, and ever after- wards the Franks, led by their counts, pushed their dominion back farther and farther to the north, as far as the country north of Alkmaar. After all, a great many Frisian peculiarities may be perceived in the language of the country people of the parts which were once in their power.

To begin with the south: in Zeeland the population has quite given up the former probably non -Germanic language. Frisian influence is still perceptible in many words and expressions, but for all that the language has lost the Frisian character and assumed the nature of the neighbouring Frankish dialects in the present Belgium and Brabant. If it was then influenced by the south, later it was influenced rather by the language of Holland. Farther to the north Frisian elements may be perceived in Holland at the seashore and also in many respects still in North Holland. The real Frisian tongue has only been preserved in the province of Friesland, where intrusion of the dialect spoken in Holland is already perceptible since the 13th century. With the Frisian tongue this formed a new dialect in the towns, the " Stadfriesch," whereas the country people in the villages and the peasants have preserved the old Frisian tongue as " Boerenfriesch."

The more eastward dialects of Frisian in Groningen, the eastern part of Friesland (Stellingawerf) and West-Drente were first strongly mixed with Saxon; at the same time we find a strong mixture of Frisian and Saxo-Frankish east of the Zuider Zee. Later the Saxon dialect of the town of Groningen,once thecapital of East-Drente, became prominent over the whole province.

In all parts, however, the language of Holland, mixed with and changed by the living speeches getting more and more influence, issuing from the towns and large villages.

This influence over the whole country began at the opening of the 17th century, and, in connexion with the prevalent written language, gradually produced a colloquial language, deviating from the written language as well as from the native idioms of the country, though assuming elements from both. In this colloquial speech the idiom of Holland forms-the basis, whereas the written language formed itself on quite different principles.

If we compare the colloquial speech and the native idiom with the written language, we find remarkable differences, which are caused by the origin of the Dutch written language.

The first to write in any of the idioms of the Dutch language, if we leave apart the old version of the psalms in East Low Frankish, was an inhabitant of the neighbourhood of Maastricht, Henrik van Veldeke, who wrote a Servatius legend and an Aeneid; the latter we only know by a Mid High German copy. This dialect deviates from the western dialects and has likeness to the Middle- Frankish. His

work had no influence whatever on the written language.

In the west of Belgium, in the districts of Antwerp, East and West Flanders and Brabant, great prosperity and strong develop- ment of commerce caused a vivid intellectual life. No wonder we find there the first writings in the West-Low-Frankish native idiom. This language spread over the neighbouring districts. At least in 1254 we find the same language used in the statute {i.e. privilege) of Middelburg.

In those parts a great deal was written in poetry and prose, and the writings in this language are known under the name of Middle-Dutch literature.

If originally the south took the lead in all departments, later the north gradually surpasses the south, and elements from the northern native idiom begin to intrude into the written language.

North of the Meuse and the Rhine little was written as yet in the 13 th century. Not until about 1300 does literary life begin to develop here (Melis Stoke's Rijmcronijk) , and these writings

were written in the language of the south with slight deviations here and there. Chancery and clergy had taken a written language to the north, deviating considerably from the native idiom in vogue there, which belonged to the Frisio-Frankish idioms. So this written language gradually spread over the west of the Netherlands and Belgium. The east of the Nether- lands agreed in its chancery style more with the districts of Low Germany.

There was a great difference between the written language and the dialect spoken on the banks of the Y. This becomes quite conspicuous if we compare what Roemer Visscher, Coster, Bredero borrow from their native idiom with the language of Huygens or Cats, in the latter of which the southern elements predominate, mixed with the dialects of Zeeland and Holland. Vondel, too, in his first period was influenced by the idiom of Brabant. Only after 1625 does he get on more familiar terms with the Amsterdam dialect. In the various editions of his poems it may be seen how not only loan-words, but also words belonging to the southern idiom, are gradually replaced by other words, belonging to the vocabulary of North Holland, and still to be heard.

The written language passed from the south to the north, and, considerably changed at Amsterdam, was also assumed in the other provinces in the 17th century, after the Union of Utrecht. In the north, in Groningen and Friesland, the official writings and laws were still noted down in a Frisian or Saxo-Frisian idiom as late as the 15th and 16th centuries. When the contact with Holland grew stronger, and the government officials ever and again came in contact with Holland, chancery, too, gradually assumed the Holland idiom. The same took place in the eastern provinces.

This, however, did not yet make the written language popular, which did not happen before the population of the Dutch provinces got its Statenbybel, the well-known authorized version of the Bible, made at Dordrecht between 1626 and 1637.

By the frequent use of this so-called Statenvertaling the language of Holland obtained its vogue in all provinces on the point of religion, and many expressions, borrowed from that Bible, were preserved in the native idiom.

By the remarkable vicissitudes of these parts from the earliest time up to the moment when Holland became an independent kingdom, during which alternately German elements under the Bavarian counts and French influences under the Burgundian princes were predominant, and also later in the 16th and 17th centuries elements from these languages were mixed with the language in common use. Moreover, various words passed from the eastern languages into Dutch by the colonial and commercial connexions, while at the same time many words were borrowed from Latin, the language of the learned people, especially in the 1 6th century, and from French, under the influence of the poetic clubs of the 17th and 18th centuries. In the time of the rhetoricians, in the 16th century, and of Coornhert, as well as in the days of Bredero, Hooft and Vondel, we repeatedly find opposition against these foreign words, often successful, so that in 1650 Vondel could say: " Onze spraak is sederl weinige jaren herwaart van bastaard-woorden en onduitsch allengs geschuimt." 1 Some people, e.g. Hooft, went even so far as to make very clumsy versions of Latin and French bastard words, handed down of old.

Under the influence of the club " Nil Volentibus Arduum " and the predominant literary clubs of the 18th century, people became inclined towards expressing their thoughts as much as possible in pure Dutch. Therefore a large number of rules were given, with respect to prose as well as to poetry, in consequence of which the

written language grew very stiff in choice of words and forms, and remains so till the latter half of the ioth century. The obtrusion of the French language during the reign of Napoleon had no effect. But the subsequent union of Holland and Belgium strengthened the French element, especially in the higher ranks of society. King William I. had tried to make Dutch more popular in Belgium by a general teaching of the

1 i.e. " Within a few years our language has been gradually skimmed of bastard words and non-Dutch elements."

Dutch language. When north and south were separated, Jie French became predominant in the south. Only in the Flemish provinces of Belgium the people tried to preserve the native idiom and to do away with French words. These endeavours, called " De Vlaamsche beweging," begun by F. v. Willems, Heremans and others in the south, were supported in the north by Professor de Vries at Leiden. In order to get a pure Dutch language, the idea of composing a general Dutch dictionary was introduced. M. de Vries and his partner L. te Winkel, however, did not begin this task before having given a new formulation of the rules for spelling. These rules, deviating in many respects from the spelling then in vogue, introduced by Siegenbeek in 1806, have been predominant up to the present moment. Since 1891 Dr R. A. Kollewyn and Dr F. Buitenrust Hettema have been engaged in trying to bring about a simplification in the spelling. As this simplification is not generally considered efficient, their principles are not yet generally adopted; see for instance C. H. den Hertog, Waarom onaannemelyk? (Groningen,

1893).

Excepting Belgium (Flanders, Antwerp, Brabant) the Dutch language is heard outside Holland in Dutch East India and in the West Indies. In East India pure Dutch has been preserved, though some Javanese and Malay bastard words may have slipped in by the habit of speaking to the population in the Malay tongue or in the native idiom. Hence no Indo-Dutch was formed there. This is different in the West Indies, where a great number of negro words and English words as well as English syntactical constructions have slipped in.

In the 17th century a number of Dutchmen, for the greater part from Holland and Zeeland, under Jan van Riebeek, had settled in South Africa, in Cape Town, where the Dutch naviga- tion called into being a Dutch port. In course of time they were joined there by French emigrants (most of them Huguenots who left their country about

1688 and joined with other Hugue- nots from Holland in assuming the Dutch language), perhaps also by Portuguese and by Malay people, who, together with the English who settled there and after 1820 became numerous in Cape Colony, mixed some peculiarities of their language with the Dutch idioms. Thus in the first half of the 18th century the language arose which is now called the South African Dutch. Since 1880 the present Dutch language has became more fre- quently used in official writings, though with certain adaptations agreeably to the native idiom.

In order to offer an example of the Middle-Dutch language beside the present language, we give here a single strophe from Maerlant's Wapene Martyn, with a metrical translation in modern Dutch from the pen of Nikolaas Beets (1880).

God, diet al bi redene doet, Gaf dat wandel ertsche goet

Der menschelt gemene, Dattere mede ware gevoet, Ende gecleet, ende gescoet,

Ende leven soude rene. Nu es gierichеit so verwoet, Dat elc settet sinen moet

Om al te hebbene allene. Hieromme stortmen menschenbloet, Hieromme stichtmen metter spoet

Borge ende hoge stene

Menegen te wene.

God, die het al met wijsheid doet, Gaf dit verganklijk aardsche goed

Den menschen in't gemeen, Op dat zij zouden zijn gevoed, Het lijf gekleed, geschoeid de voet

En leven rein van zeen. Maar zie nu hoe de hebzucht woedt Dat iedereen in arren moed

't Al hebben wil alleen' Hierom vergiet men menschenbloed En bouwt met roekeloozen spoed

Burchtsloten, zwaar van steen.

Tot smart van menigeen.

A Survey of the Sounds used in Dutch. — The Consonants. As regards the consonants, Dutch in the main does not differ from the

other Low German languages. The explosive g and the th are wanting. Instead of the former there is a g with " fricative " pronunciation, and as in High German the th has passed over into d.

The final consonants in Middle Dutch are sharpened, and the sharp sounds are graphically represented ; in Modem Dutch, on the other hand, the historical development of the language being more distinctly kept in view, and the agreement observed with the inflexional forms, the soft consonant is written more frequently than it is sounded; thus we have Middle Dutch dach, Modern Dutch dag, in analogy with the plural dagen.

The gutturals are g, k, ch and h.

G is the soft spirant, not used in English. In Middle Dutch this letter was also indicated by gh. K was pronounced like English k. In Middle Dutch c was sometimes used instead of k; now this is no longer done.

Ch (pronounced as German ch without the i-sound, not as English ch) loses its sound when combined with s to sch at the end of a syllable, for instance, vleesch, but the s-sound is not purely dental as in dans. As an initial consonant sch is nearly pronounced as sg

(schip, English ship); only in Frisian and Saxon dialects the old consonant sk in skip, skool is retained.

H has the same pronunciation as in English. The dentals are d and t. The d is formed by placing the point of the tongue against the upper teeth. At the end of a word d is sharpened into t, but written d, for instance, goed, pronounced gut. In the idiom of the east of the Netherlands final d is preserved. When between two vowels after oe (Engl, d in do), d, or ui, d is not pronounced, though it is written. After it has been left out, a j- sound has developed between the two vowels, so, for instance, goede became first goe:e and then goeje. Thus it is pronounced, though it is still spelled goede. After ou d disappeared and ou became ouw, for instance koude > kouw.

T has the same pronunciation as in English. In some dialects final t is dropped, for instance, heef for heeft, nie for niet.

S has the pronunciation of English 5 in sound, 2 that of English z in hazel ; only in zestig and zeventig 2 has the pronunciation of s. The

labials are b, f, v, p.

At the beginning and in the body of a word b has the same sound as in English. At the end of a word, when shortened from bb, followed by a vowel, it became p in the pronunciation, so older krabbe became krabb, krab (the present spelling), which is now pronounced krap.

F has the same pronunciation as English /. In many cases older initial / passed into v, hence most words which have / in English have initial v in Dutch, for instance vader, vol, vechten.

This v, initial and between vowels, has the pronunciation of English v in lover. Dutch p is the same as English p, also the liquids and nasals.

The w in Dutch is mostly labiodental ; in the eastern parts before vowels bilabial pronunciation is heard.

i Vowels. — -A has in open syllables the sound of English a in father, in closed syllables that of English a in ass, but more open; when there is a clear sound in closed syllables the spelling is aa (jaar), in open syllables a (maken), pronounced as a in ask; in bad, nat, a — a. An original short a and a long a in open syllables are even in Middle Dutch pronounced alike, and may be rhymed with ea.chother(dagen, lagen, a rhyme which was not permitted in Middle High German). In the Saxon dialects d was expressed by ao, a or d in the Frisio-Saxon districts passes into e before r, asjer (jaar). Middle Dutch preserved a in several words where in Modern Dutch it passes into e before r (arg, erg; sarc, zerk; warf, werfj; in others, as aarde, staart, zwaard, the Middle Dutch had e and a (erde, stert, swert, swart, start; Modern Dutch zwaard, staart). In foreign words, likewise, e before r has become a; paars, perse; lantaarn, lanteme (in the dialects e is still frequently retained).

1 E. The sound of the e derived from a does not differ from that of an original e, or of an e derived from i, as they appear in open syllables (steden, vele, pronounced as a in English name). If the e derived from a or i or the original e occurs in closed syllables, it has a short sound, as in English men, end, Modern Dutch stem. The e in closed syllables with a full sound (as English a; Sweet, ei) is spelled ee: veel, week (e from i), beek. The sharp, clear ee is indicated by the same letters in both open and closed syllables: eer, sneeuvi, zee.

In some dialects this ee is pronounced like English ee, not only in the present dialects, but also in the 17th century.

The pronunciation of ei (from ai, or eg: ag, French ai, ei, ee) is that of English i, for instance, Dutch ei, English egg, is pronounced like English /. ,.,..,.

/ is pronounced short (somewhat like i of English pit), for instance in pit, binden, sikkel; it has a clear sound in fabrikant, though it has no stress.

le is pronounced like English ee in see, but somewhat shorter; so, fabriek, fabrieken, Pieter ; also in bieden, stierf, &c. For original long i. Middle Dutch ii and ij, afterwards y, was used. This vowel, though still written y, is pronounced like English i in I, like; so in sysje (English siskin), lyken, &c.

The letter represents three sounds: — (1) the short sharp and (2) the short soft 0, the former like the in English not and French soldat (Dutch bod, belofte, tocht, kolf), the latter like the Englishˆ in don, the French in ballon (Dutch dof, ploffen, ochtend, vol), and (3) the full, clear as in English note, French noter (Dutch kolen, sloten, verloren). The sharp clear 00, in stroom, dood, has almost the same sound as the full 0, in some dialects (among others the Saxon) it is pronounced as o with a glide 0, in others (Flemish and Hollandsch) somewhat like au. In Middle Dutch, the lengthening of the vowels was frequently indicated by e (before r sometimes by i, as in oir) ; hence ae for a, oe for 0. Where oe occurs in the modern language, it has the sound of u (pronounced like the u in High German, and answering to the Gothic 0), which in Middle Dutch was frequently represented by ou. oe is pronounced ou (au; Sweet, p. 6) in West Flemish and the Groningen dialects. Before labials and gutturals oe in Middle Dutch was expressed by ue and oe (bouc, souken, and also guet, but usually goet, soeken, boec). The Saxon dialects still preserve an 6 sound which agrees with the Dutch oe (bok, moder) ; in two words — romer (roemer, however, is also used) and spook — has passed from these dialects into Dutch. As the u (Old German 4), which in the Dutch tongue has passed into ui except before r and w, retains the <2-sound in the Saxon districts, some words have come into Dutch from these dialects, being written with oe from the

similar sound of oe (from 0) in Dutch and 4 in Saxon (snoet, boer, soezen), by the side of which are Frankish words snuit, suizen, &c).

In the language of the people oe before m is often pronounced as 6, for instance bloem and blom.

Eu is not a diphthong, but the modification (Umlaut) of the clear ; it

has the same sound as German 6 in schon; so in vleugel, leugen, keuken.

U before a double consonant or before a consonant in monosyllables has about the same pronunciation as in English stuff, rug; so in kunnen, snurken, put. When used in open syllables it has the same sound as in French nature.

In the 1 6th and 17th centuries, Middle Dutch & passed over through oi into ui by the influence of the Holland dialect. In the Saxon districts A kept the old pronunciation, but only in the lan- guage of the peasants. The common language has everywhere ui, pronounced nearly as German eu, English oy'; so in duizend, tuil, buigen, &c.

Ou and au in vrouw and blauw are nearly pronounced in the same way, very much like English ow in crowd.

Authorities. — For a full survey of a history of the Dutch lan- guage the reader is referred to Jan te Winkel, " Geschichte der niederlandischen Sprache," Grundriss der germ. Philologie, 2, p. 704 (Strassburg, K. Griibner). Here an elaborate account may be found on p. 704 of the different works on the grammar and phonology of the various periods of the Dutch language. For explanation and history of words of the current language see the Woordenboek der Nederlandsche Taal, by De Vries and Te Winkel, continued by A. Kluyver, A. Beets, for a time by J. W. Muller and De Vreese, who left at their nomination as professors at Utrecht and Ghent. The Middle Dutch language may be known from the Middelnederlandsch Woordenboek, first by E. Verwys and J. Verdam, after the death of Verwys by Verdam alone. For the dialects the different grammars and glossaries issued at Martinus Nyhoff (The Hague) and Kemink & Son (Utrecht) are of great importance. The Flemish dialect may be found in De Bo, Westvlaamsch Idioticon; other Belgian dialects are recorded in the publications of the Vlaamsche Academie (Ghent). Phonetic explanations are given in Roorda's or in ten Bruggencate's Phonetic Works, and a survey of the pronunciation in Branco van Dantzig's Dutch Pronunciation and Dykstra's Dutch Grammar.

(J.H.G.)

DUTCH LITERATURE. The languages now known as Dutch and Flemish did not begin to take distinct shape till about the end of the nth century. From a few existing fragments — two incantations from the 8th century, a version of the Psalms from the 9th century, and several charters — a supposed Old Dutch language has been

recognized; but Dutch literature actually commences in the 13th century, as Middle Dutch, the creation of the first national movement in Brabant, Flanders, Holland and Zealand.

From the wreck of Frankish anarchy no genuine folk-tales of Dutch antiquity have come down to us, and scarcely any echoes of German myth. On the other hand, the sagas of Charlemagne and Arthur appear immediately in £ " Middle Dutch forms. These were evidently introduced Minstrel. by wandering minstrels and jongleurs, and translated to gratify the curiosity of the noble women. It is rarely that the name of such a translator has reached us, but we happen to know that the fragments we possess of the French romance of William of Orange were written in Dutch by a certain Klaas van Haarlem, between 1191 and 121 7. The Chanson de Roland was translated about the same time, and considerably later Parthenopeus de Blois. The Flemish minstrel Diederic van Assenede completed his version of Floris et Blanchefleur about 1250. The Arthurian legends appear to have been brought to Flanders by some Flemish colonists in Wales, on their return to their mother-country. About 1250 a Brabantine minstrel translated Walter Map's Lancelot du lac at the command of his liege, Lodewijk van Velthem. The Gauvain was translated by Pennine and Vostaert before 1260, while the first original Dutch writer, the famous Jakob van Maerlant, occupied himself about 1260 with several romances dealing with Merlin and the Holy Grail. The earliest existing fragments of the epic of Reynard the Fox were written in Latin by Flemish priests, and about 1250 the first part of a very important version in Dutch was made by Willem the Minstrel, of whom it is unfortunate that we know no more save that he was the translator of a lost romance, Madoc. In his existing work the author follows Pierre de Saint-Cloud, but not slavishly; and he is the first really admirable writer that we meet with in Dutch literature. Trie second part was added by another hand at the end of the 14th century.

It is not necessary to dwell at any length on the monkish legends and the hymns to the Virgin Mary which were abundantly

produced during the 13th century, and which, though duke of destitute of all literary merit, were of use as exercises Brabant, in the infancy of the language. The first lyrical writer

of Holland was John I., duke of Brabant, who practised the minnelied with success, but whose songs are only known to us through a Swabian version of a few of them. In 1544 the earliest collection of Dutch folk-songs saw the light, and in this volume one or two romances of the 14th century are preserved, of which Het Daghet in den Oosten is the best known. Almost the earliest fragment of Dutch popular poetry, but of later time, is an historical ballad describing the murder of Count Floris V. in 1296. A very curious collection of mystical medieval hymns by Sister Hadewych, a nun of Brabant, was first printed in 1875 by Heremans and Ledeganck.

Hitherto, as we have seen, the Middle Dutch language had placed itself at the service of the aristocratic and monastic orders, flattering the traditions of chivalry and of religion, but scarcely finding anything to say to the bulk of the population. With the close of the 13th century a change came over the face of Dutch literature. The Flemish towns began to prosper and to assert their commercial supremacy over the North Sea. Under such mild rulers as William II. and Floris V., Dort, Amsterdam, and other cities contrived to win such privileges as amounted almost to political independence, and with this liberty there arose a new sort of literary expression. The founder and creator of this original Dutch literature was Jacob van Maerlant Maerhutt il- v) His Naturen Bloeme, written about 1263,

forms an epoch in Dutch literature; it is a collection of moral and satirical addresses to all classes of society. With his Rijmbijbel (Rhyming Bible) he foreshadowed the courage and free-thought of the Reformation. It was not until 1284 that he began his masterpiece, De Spieghel Historiael (The Mirror of History), at the command of Count Floris V. Of his disciples, Boendale. tne mos t considerable in South Holland was Jan van

Boendale (1280-1365), known as Jan de Klerk. He was born in Brabant, and became clerk to the justices at Antwerp in 13 10. He was entrusted with various important missions. His works are historical and moral in character. In him the last trace of the old chivalric and romantic element has disappeared. He completed his famous rhyme chronicle, the Brabantsche Yeesten, in 1350; it contains the history of Brabant down to that date, and was brought down to 1440 by an anonymous later writer. For English readers it is disappointing that Boendale's other great historical work (Van den derden Ede- waerl, coninc van Ingelant . . ., ed. J. F. Willems, Ghent, 1840), an account of Edward III. and his expedition to Flanders in 1338, has survived only in some fragments. The remainder of Boendale's works are didactic poems, pursuing still further the moral

thread first taken up by Maerlant, and founded on medieval scholastic literature. In Ypres the school of Maerlant was represented by Jan de Weert, a surgeon, who died in 1362, and

who was the author of two remarkable works of moral

satire and exhortation, the Nieuwe Doctrinael of Spieghel der Sonden, and a Disputacie van Rogier end van Janne. In the beginning of the 13th century Gielijs van Molhem wrote a Dutch version of part of the Miserere of the Picard poet who concealed his identity under the name of the recluse of Moiliens. The poem consisted of meditations on the origin and destiny of man, and on the sins of pride, envy, &c. The translation, completed later by an author calling himself Heinrec,was critically edited (Groningen, 1893) by P. Leendertz. In North Holland a greater talent than that of Weert or of Boendale was exhibited Stoke- by Melis Stoke, a monk of Egmond, who wrote the

history of the state of Holland to the year 1305; this work, the Rijmkronik, was printed in 1591, and edited in 1885 for the Utrecht Historical Society; and for its exactitude and minute detail it has proved of inestimable service to later historians.

With the middle of the 14th century the chivalric spirit came once more into fashion. A certain revival of the forms of feudal

Weert.

tleela.

life made its appearance under William III. and his successors. Knightly romances came once more into vogue, but the new- born didactic poetry contended vigorously against the supremacy of what was lyrical and epical. It will be seen that from the very first the literary spirit in Holland began to assert itself in a homely and utilitarian spirit. Jan van Heelu, a Brabanter, was the author of an epic poem 1 on the battle of Woeronc (1288), dedicated to Princess Margaret of England, and to him has been attributed the still finer romance of the War of Grimbergen.- Still more thoroughly aristocratic in feeling was Hein van Aken, a priest of Louvain, who Aken lived about 1255-1330, and who combined to a very curious extent the romantic and didactic elements. As early as 1280 he had completed his translation 3 of the Roman de la rose, which he must have commenced in the lifetime of Jean de Meung. More remarkable than any of his translated works, however, is his original romance,

completed in 1318, Heinric en Margriete van Limborch, upon which he was at work for twenty-seven years. During the Bavarian period (1349-1433) very little original writing of much value was produced in Holland. Buo- dewijn van der Loren wrote one excellent piece on the Maid of Ghent, in 1389. Augustijnken van Dordt was a peripatetic minstrel of North Holland, who composed for the sheriff Ael- brecht and for the count of Blois from 1350 to 1370. Such of his verses as have been handed down to us are allegorical and moral. Willem van Hildegaersberch (1350-1408) was another northern poet, of a more strictly political cast. Many of his writings exist still unpublished, and are very rough in style and wanting in form. Towards the end of the 14th century an erotic poet of considerable power arose in the person of the lord of Waddinxsveen and Hubrechtsambacht, Dirk Potter Potter. van der Loo (c. 1365-1428), who was secretary at the court of the counts of Holland. During an embassy in Rome (1411-1412) this eminent diplomatist made himself acquainted with the writings of Boccaccio, and commenced a vast poem on the course of love, Der Minnen Loep, & which is a wonderful mix- ture of classical and Biblical instances of amorous adventures set in a framework of didactic philosophy. In Dirk Potter the last traces of the chivalric element died out of Dutch literature, and left poetry entirely in the hands of the school of Maerlant. Many early songs, with some of later date, are preserved in a Liedekens-Boeck printed by Jan Roulans (Antwerp, 1544). The unique copy in the Wolfenbiittel library was edited by Hoffmann von Fallersleben in Home Belgicae (vol. xi., 1855).

It is now time to consider the growth of prose literature in the Low Countries. The oldest pieces of Dutch prose now in existence are charters of the towns of Flanders and Zealand, dated 1249, 1251 and 1254. A prose translation of the Old Testament was made about 1300, and there exists a Life of Jesus about the same date. Of the mystical preachers whose religious writings have reached us, the Brussels friar, Jan van Ruysbroec (1294- 1381), is the most important. But the most interesting relics of medieval Dutch prose, as far as the formation of the language is concerned, are the popular romances in which the romantic stories of the trouveres and minstrels were translated for the benefit of the unlettered public into simple language. As in most Euro- pean nations, the religious drama takes a prominent place in every survey of medieval literature in Holland, arama" Unfortunately the text of all the earliest mysteries, the language of which would have an extraordinary interest for us, has been lost. We possess records of dramas having been played at various places — Our Lord's Resurrection, at the Hague, in 1400;*

Our Lady the Virgin, at Arnheim, in 1452; and The Three Kings, at Delft, in 1498. The earliest existing fragment, however, is part of a Limburg-Maastricht Passover Play 6 of about 1360. The latest Dutch miracle play was the Mystery of the

1 Edited by J. F. Willems (Brussels, 1836).

2 Edited by C. P. Serrure and Ph. Blommaert (Ghent, 1852-1854).

3 Edited by Dr E. Verwijs (Leiden, 1868).

4 Edited by L. P. C. v. den Bergh (Leiden, 1846-1847). 6 Edited by P. Leendertz (Leiden, 1845-1847).

6 Edited by Dr Jul. Zacher in Haupt's Zeitschrift fur deutsches Altertum, vol. ii. (Leipzig, 1842).

Holy Sacrament, composed by a certain Smeken, at Breda, and performed on St John's day, 1500. This play was printed in 1867. With these purely theological dramas there were acted mundane farces, performed outside the churches by semi-religious companies; these curious moralities were known as " Abele- spelen " and " Sotternieen." In these pieces we discover the first traces of that genius for low comedy which was afterwards to take perfect form in the dramas of Brederoo and the paintings of Teniers.

The theatrical companies just alluded to, " Gesellen van den Spele," formed the germ out of which developed the famous

" Chambers of Rhetoric " ! which united within Chambers themselves all the literary movements that occupied the Rhetoric. Low Countries during the 15th and 16th centuries.

The poets of Holland had already discovered in late medieval times the value of gilds in promoting the arts and industrial handicrafts. The term " colleges de rhetorique " is supposed to have been introduced about 1440 to the courtiers of the Burgundian dynasty, but the institutions themselves existed long before. These literary gilds lasted till the end of the 16th century, and during the greater part of that time preserved a completely medieval character, even when the influences of the Renaissance and the Reformation obliged them to modify in some degree their outward forms. They were in

almost all cases absolutely middle-class in tone, and opposed to aristocratic ideas and tendencies in thought. Of these remarkable bodies the earliest were almost entirely engaged in preparing mysteries and miracle-plays for the populace. Each chamber, and in process of time every town in the Low Countries, possessed one, and took as its title some fanciful or heraldic sign. At Diest " The Eyes of Christ," dated from 1302, and an earlier one, the " Lily," is mentioned. " The Alpha and Omega," at Ypres, was founded about 1398; that of the " Violet," at Antwerp, followed in 1400; the" Book," at Brussels, in 1401; the "Berberry," at Courtrai, in 1427; the " Holy Ghost," at Bruges, in 1428; the " Floweret Jesse," at Middelburg, in 1430; the " Oak Tree," at Vlaardingen, in 1433; and the "Marigold," at Gouda, in 1437. The most celebrated of all the chambers, that of the " Eglantine" at Amsterdam, with its motto In Liefde Bloeyende (Blossoming in Love) , was not instituted until 1496. Among the most influential chambers not above mentioned should be included the " Foun- tain " at Dort, the " Corn Flower " at the Hague, the " White Columbine " at Leiden, the "Blue Columbine " at Rotterdam, the " Red Rose " at Schiedam, the " Thistle " at Zierikzee, " Jesus with the Balsam " at Ghent, and the " Garland of Mary " at Brussels. And not in these important places only, but in almost every little town, the rhetoricians exerted their influence, mainly in what we may call a social direction. Their wealth was in most cases considerable, and it very soon became evident that no festival or procession could take place in a town unless the " Kamer " patronized it. Towards the end of the 15th century the Ghent chamber of " Jesus with the Balsam " began to exercise a sovereign power over the other Flemish chambers, which was emulated later on in Holland by the " Eglantine " at Amsterdam. But this official recognition proved of no conse- quence in literature, and it was not in Ghent, but in Antwerp, that intellectual life first began to stir. In Holland the burghers only formed the chambers, while in Flanders the representatives of the noble families were honorary members, and assisted with their money at the arrangement of ecclesiastical or political pageants. Their pompous landjuwcelen, or tournaments of rhetoric, at which rich prizes were contended for, were .the great occasions upon which the members of the chambers distinguished themselves. Between 1426 and 1620 at least 66 of these festivals were held. There was a specially splendid landjuweel at Antwerp in 1496, in which 28 chambers took part, but the gayest of all was that celebrated at Antwerp on the 3rd of August 1561. To this the " Book " at Brussels sent 340 members, all on horseback, and .dad in crimson mantles. The town of Antwerp gave a ton of gold to be given in prizes, which were shared among 1893

•*See Schotel, Geschiedenis der Rederijkers in Nederland (1862-1864, Amsterdam.*

rhetoricians. This was the zenith of the splendour of the " Kamers van Rhetorica," and after this time they soon fell into disfavour. We can trace the progress of literary composition under the chambers, although none of their official productions has descended to us. Their dramatic pieces were certainly of a didactic cast, with a strong farcical flavour, and continued the tradition of Maerlant and his school. They very rarely dealt with historical or even Biblical personages, but entirely with allegorical and moral abstractions, until the age of humanism introduced upon the stage the names without much of the spirit of mythology. Of the pure farces of the rhetorical chambers we can speak with still more confidence, for some of them have come down to us, and among the authors famed for their skill in this sort of writing are named Cornelis Everaert of Bruges and Laurens Janssen of Haarlem. The material of these farces is extremely raw, consisting of rough jests at the expense of priests and foolish husbands, silly old men and their light wives. Laurens Janssen is also deserving of remembrance for a satire against the clergy, written in 1583. The chambers also en- couraged the composition of songs, but with very little success; they produced no lyrical genius more considerable than Matthijs de Casteleyn (1488-1550), the founder of the Flemish chamber of " Pax Vobiscum " at Oudenarde, and author of De Conste van Rhetorijcken (Ghent, 1573), a personage whose influence as a fashioner of language would have been more healthy if his astounding metrical feats and harlequin tours de force had not been performed in a dialect debased with all the worst bastard phrases of the Burgundian period.

In the middle of the 16th century a group of rhetoricians in Brabant and Flanders attempted to put a little new life into the stereotyped forms of the preceding age by introducing „ in original composition the new-found branches of Latin and Greek poetry. The leader of these men was Jean Baptista Houwaert 2 (1533-1599), a personage of considerable political influence in his generation. Houwaert held the title of " Counsellor and Master in Ordinary of the Exchequer to the Dukedom of Brabant"; he played a prominent part in the revolution of the Low Countries against Spain; and when the prince of Orange entered Brussels victoriously (Sept. 23rd, 1577), Houwaert met him in pomp at the head of the two chambers of rhetoric — the " Book " and the " Garland of Mary." He did not remain faithful to his convictions, for he composed in 1 593 a poem in honour of the cardinal-archduke Ernestof Austria, the governor of the Spanish Netherlands. He considered himself a devout disciple of

Matthijs de Casteleyn, but his great characteristic was his unbounded love of classical and mythological fancy. His didactic poems are composed in a wonderfully rococo style, and swarm with misplaced Latinities. In his bastard Burgundian tongue he boasted of having " poetelijck geinventeert ende rhetorijckelijck ghecomponeert " for the Brussels chamber such dramas as Aeneas and Dido, Mars and Venus, Narcissus and Echo, or Leander and Hero — named together the Commerce of Amorosily (1583). But of all his writings, Pegasides Pleyn (Antwerp, 1 582-1 583), or the Palace of Maidens, is the most remarkable; this is a didactic poem in sixteen books, dedicated to a discussion of the variety of earthly love. Houwaert's contemporaries nicknamed him " the Homer of Brabant "; later criticism has preferred to see in him an important link in that chain of homely didactic Dutch which ends in Cats. His writings are composed in a Burgundian so base that they hardly belong to Flemish literature at all. Into the same miserable dialect Cornelis van Ghistele of Antwerp translated, between 1555 and 1583, parts of Terence, Virgil, Horace, and Ovid, while the painter Karel van Mander (1 547-1609) put a French version of the Iliad and of the Eclogues of Virgil into an equally ill-fitting Flemish dress. In no country of Europe did the humanism of the 16th century at first affect the national literature so slightly or to so little purpose.

The stir and revival of intellectual life that arrived with the Reformation found its first expression in the composition of

! For Houwaert, see a study by K. F. Stallaert in the Nederlandsch Museum (1885).

Battle- songs.

Psalms. The earliest printed collection appeared at Antwerp in 1540, under the title of Souter-Liedekens, and was dedicated to a Dutch nobleman, Willem van Zuylen van Nieuvelt, Psoims ˆ wnose name it i s usually known. This collection, hymns. however, was made before the Reformation in Hol- land really set in. For the Protestant congregations Jan Utenhove printed a volume of Psalms in London in 1566; Lucas de Heere (1534-1585), and immediately after him, with much greater success, Petrus Datheen (1531-1590), translated the hymns of Clement Marot. For printing this last volume, in 1567, Herman Schinkel of Delft was burned to death in 1568. Datheen was

not a rhetorician, but a person of humble origin, who wrote in the vulgar tongue, and his hymns spread far and wide among the people. Until 1773 they were in constant use in the state church of Holland. But the great events of the period of reformation are not marked by psalms only in Dutch literature. Two collections of hymns and lyrical pieces, printed in 1562 and 1569, perpetuate the fervour and despair of the martyrs of the Mennonite Church. Similar utterances of the persecuted Protestants were published at Haarlem and Leeu- warden, at Ghent and at Bruges. Very different in tone were the battle-songs of liberty and triumph sung a genera- tion later by the victorious Reformers, the " Geuzen " or " Gueux " (q.v.) . The famous song-book of 1 588, the Geusen Lieden Boecxken, was full of ardent and heroic sentiment, expressed often in marvellously brilliant phrases. In this collection appeared for the first time such classical snatches of Dutch song as the Ballad of Heiligerlee, the Ballad of Egmond and Horn, and the song of the Storm of Leiden. The political ballads, with their ridicule of the Spanish leaders, form a section of the Boecxken which has proved of inestim- able value to historians. All these lyrics, however, whether of victory or of martyrdom, are still very rough in form and language.

The first writer who used the Dutch tongue with grace and precision of style was a woman and a professed opponent of Lutheranism and reformed thought. Modern Dutch literature practically begins with Anna Bijns (c. 1494- iS7S)- Against the crowd of rhetoricians and psalm- makers of the early part of the 16th century she stands out in relief as the one poet of real genius. The language, oscillating before her time between French and German, formless, corrupt and invertebrate, took shape and comeliness, which none of the male pedants could give it, from the impassioned hands of a woman. Anna Bijns, who is believed to have been born at Antwerp in 1494, was a schoolmistress at that city in her middle life, and in old age she still " instructed youth in the Catholic religion." She died on the 10th of April 1575. Hendrik Peppinck, a Franciscan, who edited her third volume of poems when she was an old woman in 1567, speaks of her as " a maiden small of descent, but great of understanding, and godly of life." Her first known volume bears the date 1528, and displays her as already deeply versed in the mysteries of religion. We gather from all this that she was a lay nun, and she certainly occupied a position of great honour and influence at Antwerp. She was named " the Sappho of Brabant " and the " Princess of all Rhetoricians." She bent the powerful weapon of her verse against the faith and character of Luther. In her volume of 1528 the Lutherans are scarcely mentioned; in that of 1538 every page is occupied with

invectives against them; while the third volume of 1567 is the voice of one from whom her age has passed. All the poems of Anna Bijns which we possess are called refereinen or refrains. 1 Her mastery over verse-form was extremely remarkable, and these refrains are really modified chants-royal. The writings of Anna Bijns offer many points of interest to the philologist. In her the period of Middle Dutch closes, and the modern Dutch begins. In a few grammatical peculiarities — such as the formation of the genitive by some verbs which now govern the accusative, and the use of ghe before the infinitive — her language still belongs to Middle Dutch; but these exceptions are rare, and she really initiated 1 Ed. Dr W. L. van Helten (1875).

Anna Bijns.

that modern speech which Filips van Marnix adopted and made classical in the next generation.

In Filips van Marnix, lord of St Aldegonde (1 538-1 598), a much greater personage came forward in the ranks of liberty and reform. He was born at Brussels in 1538, and began life „ as a disciple of Calvin and B eza in the schools of Geneva. It was as a defender of the Dutch iconoclasts that he first appeared in print, with his tract on The Images thrown down in Holland in August 1566. He soon became one of the leading spirits in the war of Dutch independence, the intimate friend of the prince of Orange, and the author of the glorious Wilhelmuslied. It was in the autumn of 1568 that Marnix composed this, the national hymn of Dutch liberty and Protestantism. In 1569 he com- pleted a no less important and celebrated prose work, the Biencorf or Beehive of the Romish Church. In this satire he was inspired in a great measure by Rabelais, of whom he was an intelligent disciple. It is written in prose that may be said to mark an epoch in the language and literature of Holland. Over- whelmed with the press of public business, Marnix wrote little more until in 1580 he published his Psalms of David newly translated out of the Hebrew Tongue. He occupied the last years of his life in preparing a Dutch version of the Bible, translated direct from the original. At his death only Genesis was found completely revised; but in 1619 the synod of Dort placed the unfinished work in the hands of four divines, who completed it.

In Dirck Volckertsen Coornhert 2 (1522-1590) Holland for the first time produced a writer at once eager to compose in his native tongue and to employ the weapons of „ . humanism. Coornhert was a typical burgher of North Holland, equally interested in the progress of

national emancipa- tion and in the development of national literature. He was a native of Amsterdam, but he did not take part in the labours of the old chamber of the Eglantine, but quite early in life proceeded to Haarlem, and was notary, secretary and finally pensionary of the town. In 1566 he was imprisoned for his support of the Reformers, and in 1572 he became secretary to the states of Holland. He practised the art of etching, and spent all his spare time in the pursuit of classical learning. He was nearly forty years of age before he made any practical use of his attain- ments. In 1 56 1 he printed his translation of the De officiis of Cicero, and in 1562 of the De beneficiis of Seneca. In these volumes he opposed with no less zeal than Marnix had done the bastard forms still employed in prose by the rhetoricians of Flanders and Brabant. During the next decade he occupied himself chiefly with plays and poems, conceived and expressed with far less freedom than his prose, and more in the approved conventional fashion of the rhetoricians; he collected his poems in 1575. The next ten years he occupied in polemical writing, from the evangelical point of view, against the Calvinists. In 1585 he translated Boethius, and then gave his full attention to his original masterpiece, the Zedekunst (1586), or Art of Ethics, a philosophical treatise in prose, in which he studied to adapt the Dutch tongue tothegrace and simplicity of Montaigne's French. His humanism unites the Bible, Plutarch and Marcus Aurelius in one grand system of ethics, and is expressed in a style remarkable for brightness and purity. He died at Gouda on the 29th of October 1590; his works, in three enormous folio volumes, were first collected in 1630.

Towards the end of the period of transition, Amsterdam became the centre of all literary enterprise in Holland. In 1585 two of the most important chambers of rhetoric in Amster- Flanders, the " White Lavender " and the " Fig dam the Tree," took flight from the south, and settled them- centre of selves in Amsterdam by the side of the " Eglantine." ktters – The last-named institution had already observed the new tendency of the age, and was prepared to encourage intellectual reform of every kind, and its influence spread through Holland and Zealand. In Flanders, meanwhile, crushed under the yoke of Parma, literature and native thought absolutely expired. From this time forward, and until the emancipation of the

2 For Coornhert see also J. ten Brink, D. V. Coornhert en zijne wellevenkunst (Amsterdam, i860).

southern provinces, the domain of our inquiry is confined to the district north of the Scheldt

In the chamber of the Eglantine at Amsterdam two men took a very prominent place, more by their intelligence and „ . . . modern spirit than by their original genius. Hendrick Laurenssen Spieghel (1549-1612) was a humanist of a type more advanced and less polemical than Coornhert. He wrote a charming poem in praise of dancing; but his chief contributions to literature were his Tweespraeck van de neder- duytsche letterkunst, a philological exhortation, in the manner of Joachim du Bellay's famous tract, urging the Dutch nation to purify and enrich its tongue at the fountains of antiquity, and a didactic epic, entitled Hertspieghel (1614), 1 which hasbeen greatly praised, but which is now much more antiquated in style and more difficult to enjoy than Coornhert's prose of a similar tendency. That Spieghel was a Catholic prevented him perhaps from exercising as much public influence as he exercised privately among his younger friends. The same may be said of the man who, in 16 14, first collected Spieghel's writings, and published them in a volume with his own verses. Roemer Pieterssen Visscher 2 (1547-1620) proceeded a step further than visscher. Spieghel in the cultivation of polite letters. He was deeply tinged with a spirit of classical learning that was much more genuine and nearer to the true antique than any that had previously been known in Holland. His own dis- ciples called him the Dutch Martial, but he was at best little more than an amateur in poetry, although an amateur whose function it was to perceive and encourage the genius of pro- fessional writers. Roemer Visscher stands at the threshold of the new Renaissance literature, himself practising the faded arts of the rhetoricians, but pointing by his counsel and his conversation to the naturalism of the great period.

It was in the salon at Amsterdam which the beautiful daughters of Roemer Visscher formed around their father and themselves that the new school began to take form. The republic aaJssacce °^ t ^ le United Provinces, with Amsterdam at its head, had suddenly risen to the first rank among the nations of Europe, and it was under the influence of so much new emotion and brilliant ambition that the country no less suddenly asserted itself in a great school of painting and poetry. The intellect of the whole Low Countries was concentrated in Holland and Zealand, while the six great universities, Leiden, Groningen, Utrecht, Amsterdam, Harderwijk and Franeker, were enriched by a flock of learned exiles from Flanders and Brabant. It had occurred, however, to Roemer Visscher only that the path of literary honour lay, not along the utilitarian

road cut out by Maerlant and Boendale, but in the study of beauty and antiquity. In this he was curiously aided by the school of ripe and enthusi- astic scholars who began to flourish at Leiden, such as Drusius, Vossius and Hugo Grotius, who themselves wrote little in Dutch, but who chastened the style of the rising generation by insisting on a pure and liberal Latinity. Out of that generation arose the greatest names in the literature of Holland — Vondel, Hooft, Cats, Huygens — in whose hands the language, so long left barbarous and neglected, took at once its highest finish and melody. By the side of this serious and aesthetic growth there is to be noticed a quickening of the broad and farcical humour which had been characteristic of the Dutch nation from its commencement. For fifty years, and these the most glorious in the annals of Holland, these two streams of influence, one towards beauty and melody, the other towards lively comedy, ran side by side, often in the same channel, and producing a rich harvest of great works. It was in the house of the daughters of Roemer Visscher that the tragedies of Vondel and the comedies of Bredero, the farces of Coster and the odes of Huygens, alike found their first admirers and their best critics.

Of the famous daughters of Roemer, two cultivated literature with marked success. Anna (1584-1651) was the author of

1 The best edition is by P. Vlaming (Amsterdam, 1723).

2 On Visscher and his daughters see N. Beets, Al de gedichten van Anna Roemers Visscher (1881), and E. Gosse, Studies in the Literature of Northern Europe (1879).

Hooft.

Bredero.

a descriptive and didactic poem, De Roemster van den Aemstel (The Glory of the Aemstel), and of various miscellaneous writ- ings; Tesselschade (1594- 1 649) wrote some lyrics which still place her at the head of the female poets of R° emer Holland, and she translated the great poem of Tasso. daughters. They were women of universal accomplishment, graceful manners and singular beauty; and their company attracted to the house of Roemer Visscher all the most gifted youths of the time, several of whom were suitors, but in vain, for the hand of Anna or of Tesselschade.

Of this Amsterdam school, the first to emerge into public notice was Pieter Cornelissen Hooft (1581-1647). His Achilles and Polyxena

(1598) displayed a precocious ease in the use of rhetorical artifices of style. In his pastoral drama of Granida (1605) he proved himself a pupil of Guarini. In tragedy he produced Baeto and Geraad van Velsen; in history he published in 1626 his Life of Henry the Great, while from 1628 to 1642 he was engaged upon his master- work, the History of Holland. Hooft desired to be a severe purist in' style, and to a great extent he succeeded, but, like most of the writers of his age, he permitted himself too many Latinisms. In his poetry, especially in the lyrical and pastoral verse of his youth, he is full of Italian reminiscences both of style and matter; in his noble prose work he has set himself to be a disciple of Tacitus. Motley has spoken of Hooft as one of the greatest historians, not merely of Holland, but of Europe. His influence in purifying the language of his country, and in enlarging its sphere of experience, can hardly be overrated. f

Very different from the long and prosperous career of Hooft was the brief, painful life of the greatest comic dramatist that Holland has produced. Gerbrand Adriaanssen Bredero 3 (1585-1618), the son of an Amsterdam shoemaker, was born on the 16th of March 1585. He knew no Latin; he had no taste for humanism; he was a simple growth of the rich humour of the people. He entered the workshop of the painter Francisco Badens, but accomplished little in art. His life was embittered by a hopeless love for Tesselschade, to whom he dedicated his dramas, and whose beauty he celebrated in a whole cycle of love songs. His ideas on the subject of drama were at first a mere development of the medieval " Abelespelen." The " Oude Kammer," one of the chambers of rhetoric, furnished an opening for his dramatic powers. He commenced by dramatiz- ing the romance of Roderick and Alphonsus, in 161 1, and Griane in 1612, but in the latter year he struck out a new and more characteristic path in his Farce of the Cow. From this time until his death he continued to pour out comedies, farces and romantic dramas, in all of which he displayed a coarse, rough genius not unlike that of Ben Jonson, whose immediate contem- porary he was. His last and best piece was Jerolimo, the Spanish Brabanter, a satire upon the exiles from the south who filled the halls of the Amsterdam chambers of rhetoric with their pompous speeches and preposterous Burgundian phraseology. The piece was based on a Dutch version (Delft, 1609) of an early Spanish picaresque romance, La Vida de Lazarillo de Tormes (Burgos, 1554). Bredero was closely allied in genius to the dramatists of the Shakespearian age, but he founded no school, and stands almost as a solitary figure in the literature of Holland. He died on the 23rd of August 1618. Theodore Rodenburg (d. 1644), ridiculed by Bredero for his pretentiousness, had a wider know- ledge

of contemporary foreign literature than the other drama- tists. He adapted some of the dramas of Lope de Vega, which he had witnessed at Madrid, into Dutch, and in 1618 he adapted Cyril Tourneur's Revenger's Tragedy.

The only individual at all clearly connected with Bredero in talent was Dr Samuel Coster, 4 who was born at Amsterdam on the 1 6th of September 1579. He studied medicine at Leiden, and practised at Amsterdam. He is chiefly remembered for

8 See J. ten Brink, G. A. Brederoo (Utrecht, 1859; 3rd ed. 1887-1888); also J. H. W. Unger, Brederoo, eine Bibliographic (1884). His works were edited (3 vols., 1885-1890) by J. ten Brink and others.

4 See R. A. Kollewijn's edition of Samuel Coster's Werken

(1883).

having been the first to take advantage of the growing dissen- sion in the body of the old chamber of the Eglantine to form a Coster new institution. In 1617 Coster founded what he called the " First Dutch Academy." This was in fact a theatre, where, for the first time, dramas could be publicly acted under the patronage of no chamber of rhetoric. Coster himself had come before the world in 161 2 with his farce of Teuwis the Boor, based on a folk-song in Jan Roulans's Liedekens Boeckh, and he continued this order of composition in direct emulation of Bredero, but with less talent. In 1615 he began a series of " blood-and-thunder " tragedies with his horrible Itys, and he continued this coarse style of tragic writing for several years. He survived at least until after 1648 as a supreme authority in Amsterdam upon all dramatic matters.

The first work of the greatest of all Dutch writers, Joost van den Vondel (1587-1679), was Het Pascha (1612), a tragedy or Voadel tragi-comedy on the exodus of the children of Israel, written, like all his succeeding dramas, on the recognized Dutch plan, in alexandrines, in five acts, and with choral interludes between the acts. There is comparatively little promise in Het Pascha. It was much inferior dramatically to the plays just being produced by Bredero, and metrically to the clear and eloquent tragedies and pastorals of Hooft; but it secured the young poet a position inferior

only to theirs. Yet for a number of years he made no attempt to emphasize the impression he had produced on the public, but contented himself during the years that are the most fertile in a poet's life with translating and imitating portions of du Bartas's popular epic. The short and brilliant life of Bredero, his immediate contem- porary and greatest rival, burned itself out in a succession of dramatic victories, and it was not until two years after the death of that great poet that Vondel appeared before the public with a second tragedy, the Jerusalem laid Desolate. Five years later, in 1625, he published what seemed an innocent study from the antique, his tragedy of Palamedes, or Murdered Innocence. All Amsterdam discovered, with smothered delight, that under the name of the hero was thinly concealed the figure of Barneveldt, whose execution in 1618 had been a triumph of the hated Calvinists. Thus, at the age of forty-one, the obscure Vondel ' became in a week the most famous writer in Holland. For the next twelve years, and till the accession of Prince Frederick Henry, Vondel had to maintain a hand-to-hand combat with the " Saints of Dort." This was the period of his most resolute and stinging satires; Cats took up the cudgels on behalf of the counter-Remonstrants, and there raged a war of pamphlets in verse. A purely fortuitous circumstance led to the next great triumph in Vondel's slowly developing career. The Dutch Academy, founded in 161 7 almost wholly as a dramatic gild, had become so inadequately provided with stage accom- modation that in 1638, having coalesced with the two chambers of the " Eglantine " and the " White Lavender," it ventured on the erection of a large public theatre, the first in Amsterdam. Vondel, as the greatest poet of the day, was invited to write a piece for the first night; on the 3rd of January 1638 the theatre was opened with the performance of a new tragedy out of early Dutch history, the famous Gysbreght van Aemstel. The next ten years were rich in dramatic work from Vondel's hand; he supplied the theatre with heroic Scriptural pieces, of which the general reader will obtain the best idea if we point to the Athalie of Racine. In 1654, having already attained an age at which poetical production is usually discontinued by the most energetic of poets, he brought out the most exalted and sublime of all his works, the tragedy of Lucifer. Very late in life, through no fault of his own, financial ruin fell on the aged poet, and from 1658 to 1668 — that is, from his seventieth to his eightieth year — this venerable and illustrious person, the main literary glory of Holland through her whole history, was forced to earn his bread as a common clerk in a bank, miserably paid, and accused of wasting his masters' time by the writing of verses. The city released him at last from this wretched bondage by a pension, and the wonderful old man went on

writing odes and tragedies almost to his ninetieth year. He died

at last in 1670, of no disease, having outlived all his contemporaries and almost all his friends, but calm, .sane and good-humoured to the last, serenely conscious of the legacy he left to a not too grateful country. Vondel is the typical example of Dutch intelligence and imagination at their highest develop- ment. Not merely is he to Holland all that Camoens is to Portugal and Mickiewicz to Poland, but he stands on a level with these men in the positive value of his writings.

Lyrical art was represented on its more spontaneous side by the songs and ballads of Jan Janssen Starter (b. 1594), an Englishman by birth, who was brought to Amsterdam starter in his thirteenth year. Very early in life he was made a member of the "Eglantine," and he worked beside Bredero for two years; but in 1614 he wandered away to Leeuwarden, in Friesland, where he founded a literary gild, and brought out, in 1618, his plays Timbre de Car done, Fenicie van Messine, the subject of which is identical with that of Shakespeare's Much Ado about Nothing, and Daraida. But his great contribution to literature was his exquisite collection of lyrics, entitled the Friesche Lusthof, or Frisian Pleasance (1621). He returned to Amsterdam, but after 1625 we hear no more of him, and he is believed to have died as a soldier in Germany. The songs of Starter are in close relation to the lyrics of the English Eliza- bethans, and have the same exquisite simplicity and audacity of style.

While the genius of Holland clustered around the circle of Amsterdam, a school of scarcely less brilliance arose in Middel-burg, the capital of Zealand. The ruling spirit of c .

this school was the famous Jakob Cats (15 7 7-1660). In this voluminous writer, to whom modern criticism almost denies the name of poet, the genuine Dutch habit of thought, the utilitarian and didactic spirit which we have already observed in Houwaert and in Boendale, reached its zenith of fluency and popularity. During early middle life he produced the most important of his writings, his pastoral of Galathea, and his didactic poems, the Maechdenplicht and the Sinne- en Minne- Beelden. In 1624 he removed from Middelburg to Dort, where he soon after published his tedious ethical work called Houwelick, or Marriage; and this was followed from time to time by one after another of his monotonous moral pieces. Cats is an exceedingly dull and prosaic writer, whose alexandrines roll smoothly on without any power of riveting the attention or delighting the fancy; Yet his popularity with the middle classes in

Holland has always been immense, and his influence extremely hurtful to the growth of all branches of literary art. Among the disciples of Cats, Jakob Westerbaen (1 599-1670) was the most successful. His works included translations from Virgil, Ovid, Seneca, Terence and Juvenal, besides original poems. The Jesuit AdriaenPoirters(i6o6-i675) closely followed Cats in his remarkable Masquer of the World. A poet of Amster- dam, Jan Hermansz Krul (1602-1644), preferred to follow the southern fashion, and wrote didactic pieces in the Catsian manner.

A poet of dignified imagination and versatile form was Sir Constantijn Huygens (1596-1687), the diplomatist. He threw in his lot with the great school of Amsterdam, and fj uysens became the intimate friend and companion of Vondel, Hooft and the daughters of Roemer Visscher. His famous poem in praise of the Hague, Batava Tempe, appeared in 1622, and was, from a technical point of view, the most accomplished and elegant poem till that time produced in Holland. His collected poems, Otiorum libri sex, were printed in 1625. Oogentroost, or Eye Consolation, was the fantastic title of a remarkable poem dedicated in 1647 to his blind friend, Lucretia van Trello. He printed in 1654 a topographical piece describing his own mansion, Hofwijck. Huygens represents the direction in which it would have been desirable that Dutch literature, now completely founded by Hooft and Vondel, should forthwith proceed, while Cats represents the tame and mundane spirit which was actually adopted by the nation. Huygens had little of the sweetness of Hooft or of the sublimity of Vondel, but his genius was eminently bright and vivacious, and he was a consummate

artist in metrical form. The Dutch language has never proved so light and supple in any hands as in his, and he attempted no class of writing, whether in prose or verse, that he did not adorn by his delicate taste and sound judgment. A blind admiration for John Donne, whose poems he translated, was the greatest fault of Huygens, who, in spite of his conceits, remains one of the most pleasing of Dutch writers. In addition to all this he comes down to us with the personal recommenda- tion of having been " one of the most lovable men that ever lived."

Three Dutchmen of the 1 7th century distinguished themselves very prominently in the movement of learning and philosophic Bekker

thought, but the illustrious names of Hugo Grotius (1583-1645) and of Baruch Spinoza (1632-1677) can scarcely be said to belong to Dutch literature. Balthasar Bekker (1634-1698), on the contrary, a Reformed preacher of Amsterdam, was a disciple of Descartes, who deserves to be remembered as the greatest philosophical writer who has used the Dutch language. His masterpiece, Betoverde Wereld, or the World Bewitched, appeared in 1691-1693. Bekker is popularly remembered most honourably by his determined attacks upon the system of a penal code for witchcraft.

From 1600 to 1650 was the blossoming time in Dutch litera- ture. During this period the names of greatest genius were first made known to the public, and the vigour and grace of literary expression reached their highest development. It happened, however, that three men of particularly commanding talent survived to an extreme old age, and under the shadow of Vondel, Cats and Huygens there sprang up a new generation which sustained the great tradition until about 1680, when the final decline set in. Jan Vos (d. 1667) gained one illustrious success with his tragedy of Aaron and Titus in 1641, and lost still more in 1642 by his obscene farce of Oene. His second tragedy of Medea, in 1665, and his collected poems in 1662, supported his position as the foremost pupil of Vondel. Geeraerdt Brandt (1626-1685), the author of a History " of the Reformation (4 vols., 1671-1704), deserves

remembrance less as a tragic dramatist than as a consummate biographer, whose lives of Vondel and of De Ruyter are among the masterpieces of Dutch prose. Johan Antonides van der Goes _ (1647-1684) followed Vos as a skilful imitator of

Vondel's tragical manner. His Chinese tragedies, Trazil (1665) and Zungchin (1666), scarcely gave promise of the brilliant force and fancy of his Yslroom, a poem in praise of Amsterdam, 1671. He died suddenly, in early life, leaving unfinished an epic poem on the life of St. Paul. Reyer Anslo (1 626-1669) marks the decline of taste and vigour; his once famous descriptive epic, The Plague at Naples, is singularly tame and rococo in style. Joachim Oudaen (1628- 1692) wrote in his youth two promising tragedies, Johanna Gray (1648) and Konradyn (1649). The Amsterdam section of the school of Cats produced Jeremias de Decker (1609-1666), author of The Praise of Avarice, a satirical poem in imitation of Erasmus, and Joannes Vollenhove (1631- 1708), voluminous writers of didactic verse. The engraver Jan Luiken (1 649-1 708) published in 167 1 a very remark- able volume of poems. In lyrical poetry Starter had a single disciple, Daniel Jonctijs (1600-1652), who published a volume of

love songs in 1639 under the affected and untrans- latable title of Rooselijns oochjens ontleed. None of these poets, except in some slight degree Luiken, set before himself any more ambitious task than to repeat with skill the effects of his predecessors.

Meanwhile the romantic and voluminous romances of the French school of Scudery and Honore d'Urfe had invaded Holland and become fashionable. Johan van Heems- kerk. ' kerk (1597-1656), acouncillor of the Hague, set himself to reproduce this product in native form, and published in 1637 his Batavian Arcadia, the first original Dutch romance, in which a party of romantic youths journey from the Hague to Katwijk, and undergo all sorts of romantic adventures. This book was extremely popular, and was imitated by Hendrik

Vos.

Aaslo.

lieinslus.

Zoeteboom in his Zaanlandsche Arcadia (1658), and by Lambertus Bos in his Dordtsche Arcadia (1662). A far more spirited and original romance is the Mirandor (1675) of Nikolaes Heinsius the younger (b. 1655), a book which resembles Gil Bias, and precedes it.

The drama fell into Gallicized hands at the death of Vondel and his immediate disciples. Lodewijck Meijer translated Corneille, and brought out his plays on the stage at Amsterdam, where he was manager of the national theatre or Oallican Schouwburg after Jan Vos. In connexion with ilsts . Andries Pels (d. 1681), author of the tragedy of Dido's Death, Meijer constructed a dramatic club, entitled " Nil Volenti- bus Arduum," the great object of which was to inflict the French taste upon the public. Pels furthermore came forward as the censor of letters and satirist of barbarism in Horace's Art of Poetry expounded, in 1677, and in his Use and Misuse of the Stage, in 1681. Willem van Focquenbroch (1640-1679) was the most voluminous comic writer of this period. The close of the century saw the rise of two thoroughly Gallican dramatists, Jan van Paffenrode (d. 1673) and Pieter Bernagie (1656-1699), who may not unfairly be compared respectively to the Englishmen Farquhar and Shadwell. Thomas Asselijn (1639-1695) was a writer of more considerable talent and more homely instincts. He attempted to resist the dictatorship of Pels, and to follow the national tradition of Bredero. He is the creator of the character- istic Dutch type, the comic lover,

Jan Klaaszen, whom he presented on the stage in a series of ridiculous situations. Abraham Alewijn (b. 1664), author of Jan Los (1721), possessed a coarse vein of dramatic humour ; he lived in Java, and his plays were produced in Batavia. Finally Pieter Langendijk, the author of a farce borrowed from Don Quixote, claims notice among the dramatists of this period, although he lived from 1683 to 1 7 56, and properly belongs to the next century. With him the tradition of native comedy expired.

The Augustan period of poetry in Holland was even more blank and dull than in the other countries of northern Europe. Of the name preserved in the history of literature there are but very few that call for repetition here.

Decline of poetry. ”

Van Effen.

Arnold Hoogvliet (1687-1763) wrote a passable poem in honour of the town of Vlaardingen, and a terrible Biblical epic, in the manner of Blackmore, on the history of Abraham. Hubert Comelissen Poot (1680-1733) showed an unusual love of nature and freshness of observation in his descriptive pieces. Sybrand Feitama(i694-i758),who translated Voltaire’s Henriade (1743), and wrote much dreary verse of the same class himself, is less worthy of notice than Dirk Smits (1702-1752), the mild and elegiac singer of Rotterdam. Tragic drama was more or less capably represented by Lucretia Wilhelmina van Merken (1722- 1789), wife of the very dreary dramatist Nicholaas Simon van Winter (1718-1795).

In the midst of this complete dissolution of poetical style, a writer arose who revived an interest in literature, and gave to Dutch prose the classical grace of the 18th century. Justus van Effen 1 (1684-1735) was born at Utrecht, fell into poverty early in life, and was thrown very much among the company of French emigres, in connexion with whom he began literary life in 1713 by editing a French journal. Coming to London just when the Tatler and Spectator were in their first vogue, Van Effen studied Addison deeply, translated Swift and Defoe into French, and finally determined to transfer the beauties of English prose into his native language. It was not, however, until 1731, after having wasted the greater part of his life in writing French, that he began to publish his Hollandsche Spectator, which his death in 1735 soon brought to a close. Still, what he composed during the last four years of his life, in all its freshness, manliness and versatility, constitutes the most

valuable legacy to Dutch literature that the middle of the 18th century left behind it.

The supremacy of the poetical clubs in every town produced a very weakening and Della-Cruscan effect upon literature, from which the first revolt was made by the famous brothers Van

'See Dr W. Bisschop, Justus van Effen . . . (Utrecht, 1859).

Haren, 1 so honourably known as diplomatists in the history of the Netherlands. Willem van Haren (1 7 10-1 768) wrote verses from Tne his earliest youth, while Onno Zwier van Haren (1713-

brothers 1779), strangely enough, did not begin to do so until he Van had passed middle life. They were friends of Voltaire,

Haren. an(j they were both ambitious of success in epic writing, as understood in France at that period. Willem pub- lished in 1 741 his Gevallen van Friso, a historical epos, and a long series of odes and solemn lyrical pieces. Onno, in a somewhat lighter strain, wrote Piet and Agnietje, or Pandora's Box, and a long series of tragedies in the manner of Voltaire. The baroness Juliana Cornelia de Lannoy (1738-1782) was a writer of Baroness cons iderable talent, also of the school of Voltaire; her Lannoy. poems were highly esteemed by Bilderdijk, and she has a neatness of touch and clearness of penetration that give vivacity to her studies of social life. Jakobus Bellamy (1757- 1786) was the son of a Swiss baker at Flushing; his pompous .. odes (Gezangen tnyner Jeugd, 1782; Vaderlandsche

Gezangen, 1782) struck the final note of the false taste and Gallic pedantry that had deformed Dutch literature now for a century, and were for a short time excessively admired.

The year 1777 has been mentioned as the turning-point in the history of letters in the Netherlands. It was in that year that Elizabeth (Betjen) Wolff 2 (1738-1804), a widow lady w e 1 !?'" e !f in Amsterdam, persuaded her friend Agatha (Aagjen) Deken. Deken (1741-1804), a poor but extremely intelligent governess, to throw up her situation and live with her. For nearly thirty years these women continued together, writing in combination, and when the elder friend died on the 5th of November 1804, her companion survived her only nine days. Madam Wolff had appeared as a poetess so early

as 1762, and again in 1769 and 1772, but her talent in verse was by no means very remarkable. But when the friends, in the third year of their association, published their Letters on Divers Subjects, it was plainly seen that in prose their talent was very remarkable indeed. Since the appearance of Heinsius's Mirandor more than a century had passed without any fresh start in novel- writing being made in Holland. In 1782 the ladies Wolff and Deken, inspired partly by contemporary English writers, and partly by Goethe, published their first novel, Sara Burgerhar. In spite of the close and obvious following of Richardson, this was a masterly production, and it was enthusiastically received. Another novel, Willem Leevend, followed in 1785, and Cornelia Wildschul in 1792. The ladies were residing in France at the breaking out of the Revolution, and they escaped the guillotine with difficulty. After this they wrote no more, having secured for themselves by their three unrivalled romances a place among the foremost writers of their country.

The last years of the 18th century were marked in Holland by a general revival of intellectual force. The romantic move- ment in Germany made itself deeply felt in all branches of Dutch literature, and German lyricism took the place hitherto held by French classicism. Pieter Nieuwland (1764-1794) was a feeble forerunner of the revival, but his short life and indifferent powers gave him no chance of directing the transition that he saw to be inevitable. One volume of poems appeared in 1788, and a second, posthumously, in 1797. The real precursor and creator of a new epoch in letters was the famous Willem Bilderdijk (1756-1831) (q.v.). This remarkable man, whose force of character was even greater than his genius, impressed his personality on his generation so indelibly that to think of a Dutchman of the beginning of the 19th century is to think of Bilderdijk. In poetry his taste was strictly national and didactic; he began as a disciple of Cats, nor could he to the end of his life tolerate what he called " the puer- ilities of Shakespeare." His early love-songs, collected in 1781 and 1785, gave little promise of talent, but in his epic of Elias in 1786, he showed himself superior to all the Dutch poets since Huygens in mastery of form. For twenty years he lived a busy,

1 See Dr J. van Vloten, Leven enwerken van Willem en Onno van Haren (1874), and Busken-Huet, De van Harens (1875).

2 See Dr J. van Vloten, Elisabeth Wolff . . . (1880).

eventful life, writing great quantities of verse, and then com- menced his most productive period with his didactic poem of The Disease of the Learned, in 1807; in 1808 he imitated Pope's Essay on Man, and published the tragedy of Floris V., and in 1809 commenced the work which he designed to be his master- piece, the epic of De Ondergang der eerste Wereld (The Destruction of the First World) , which he never finished, and which appeared as a fragment in 1820. To the foreign student Bilderdijk is a singularly uninviting and unpleasing figure. He unites in himsejf all the unlovely and provincial features which deform the worst of his countrymen. He was violent, ignorant and dull; his view of art was confined to its declamatory and least beautiful side, and perhaps no writer of equal talent has shown so complete an absence of taste and tact. Ten Brink has summed up the character of Bilderdijk's writings in an excellent passage: — " As an artist," he says, " he can perhaps .be best described in short as the cleverest versemaker of the 18th century. His admirable erudition, his power over language, more extended and more colossal than that of any of his predecessors, enabled him to write pithy and thoroughly original verses, although the general tone of his thought and expression never rose above the ceremonious, stagy and theatrical character of the 18th century;" But in spite of his outrageous faults, and partly because these faults were the exaggeration of a marked national failing, Bilderdijk long enjoyed an unbroken and unbounded popularity in Holland. Fortunately, however, a sounder spirit has arisen in criticism, and the prestige of Bilderdijk is no longer preserved so religiously.

Bilderdijk's scorn for the dramas of Shakespeare was almost rivalled by that he felt for the new German poetry. Notwith- standing his opposition, however, the romantic fervour found its way into Holland, and first of all in the persons of Hieronymus van Alphen (1 746-1803) and Pieter Leonard van de Kastiele (1748-1810), who amused themselves by composing funeral poems of the school of Gessner and Blair. Van Alphen at one time was extolled as a writer of verses for children, but neither in this nor in the elegiac line did he

possess nearly so much talent as Rhijnvis Feith (1753-1824), burgomaster of Zwolle, the very type of a prosperous and sentimental Dutchman. In his Julia (1783), a prose romance, Feith proved himself as completely the disciple of Goethe in Werther as Wolff and Deken had been of Richardson in Sara Burgerhart. In Johannes Kinker (1764- 1845) a comic poet arose who, at the instigation of Bilderdijk, dedicated himself to the ridicule of Feith's sentimentalities. The same office was performed with more dignity and less vivacity by Baron W. E. van Perponcher (1741-1819), but Feith continued to hold the popular ear, and achieved an immense success with his poem The Grave in 1792. He then produced tragedies for a while, and in 1803 published Antiquity, a didactic epic. But his popularity waned before his death, and he was troubled by the mirth of such witty scoffers as Arend Fokke Simons (1755-1812), the disciple of Klopstock, and as P. de Wacker van Zon (1758-1818), who, in a series of very readable novels issued under the pseudonym of Bruno Daalberg, sharply ridiculed the sentimental and funereal school.

Under the Batavian republic a historian of great genius arose in the person of Johannes Henricus van der Palm (1 763-1 840), whose brilliant and patriotic Gedenkschrift van Neder- lands Herstelling (18 16) has somewhat obscured pˆfa,' his great fame as a politician and an Orientalist. '* ■

The work commenced by Van der Palm in prose was continued in verse by Cornelis Loots (1765-1834) and Jan Frederik Helmers (1 767-1813). Loots, in his Batavians of the Time of Caesar (1805), read his countrymen a lesson in patriot- ism, which Helmers far exceeded in originality and force by his Dutch Nation in 18 12. Neither of these poets, however, had sufficient art to render their pieces classical, or, indeed, enough to protect them during their lifetime from the sneers of Bilderdijk. Other political writers, whose lyrical energies were stimulated by the struggle with France, were Maurits Cornelis van Hall (1768-1858), Samuel Iperuszoon Wiselius (1769-1845) and Jan ten Brink (1771-1839), the

Loots.

ToIIeas.

second of whom immortalized himseif and won the favour of Bilderdijk by ridiculing the pretensions of such frivolous tragedians as Shakespeare and Schiller.

The healthy and national spirit in which the ladies Wolff and Deken had written was adopted with great spirit by a novelist in the next generation, Adriaan Loosjes (1761-1818), a bookseller at Haarlem. His romantic stories of medieval life, especially his Charlotte van Bourbon, are curiously like shadows cast forward by the Waverley Novels, but he has little of Sir Walter Scott's historical truth of vision. His pro- duction was incessant and his popularity great for many years, but he was conscious all through that he was at best but a disciple of the authoresses of Sara Burgerhart. Another disciple whose name should not be passed over is Maria Jacoba de Neufville (1775-1856), author of Little Duties, an excellent story somewhat in the manner of Mrs Opie.

A remarkable poet whose romantic genius strove to combine the power of Bilderdijk with the sweetness of Feith was Hendrik Tollens (1780-1856), whose verses have shown more vitality than those of most of his contemporaries. He struck out the admirable notion of celebrating the great deeds of Dutch history in a series of lyrical romances, many of which possess a lasting charm. Besides his folk-songs and popular ballads, he succeeded in a long descriptive poem, A Winter in Nova Zembla, 1819. He lacks the full accomplishment of a literary artist, but his inspiration was natural and abundant, and he thoroughly deserved the popularity with which his patriotic ballads were rewarded. Willem Messchert (1700- 1844), a friend and follower of Tollens, pushed the domestic and familiar tone of the latter to a still further point, especially in his genre poem of the Golden Wedding, 1825. Both these writers were natives and residents of Rotter- dam, which also claims the honour of being the birthplace of Adrianus Bogaers (1795-1870), the most considerable °* poetical figure of the time. Without the force and

profusion of Bilderdijk, Bogaers has more truth to nature, more sweetness of imagination, and a more genuine gift of poetry than that clamorous writer, and is slowly taking a higher position in Dutch literature as Bilderdijk comes to take a lower one Bogaers printed his famous poem Jochebed in 1835, but it had then been in existence more than thirteen years, so that it belongs to the second period of imaginative revival in Europe, and connects the name of its author with those of Byron and Heine. Still more beautiful was his

Voyage of Heemskerk to Gibraltar (1836), in which he rose to the highest level of his genius. In 1846 he privately printed his Romances and Ballads. Bogaers had a great objection to publicity, and his reputation was long delayed by the secrecy with which he circulated his writings among a few intimate friends. A poet of considerable talent, whose powers were awakened by personal intercourse with Bogaers and Tollens, was Antoni Christiaan Winand Staring (1767-1840) , who first at the age of fifty-three came before the world with a volume of Poems, but who continued to write till past his seventieth year. His amorous and humorous lyrics recall the best period of Dutch song, and are worthy to be named beside those of Starter and Vondel.

After 1830 Holland took a more prominent position in European thought than she could claim since the end of the 17 th century. In scientific and religious literature her men of letters ”” showed themselves cognizant of the newest shades*

influences. of opinion, and freely ventilated their ideas. The language resisted the pressure of German from the outside, and from within broke through its long stagnation and enriched itself, as a medium for literary expression, with a multitude of fresh and colloquial forms. At the same time, no very great genius arose in Holland in any branch of literature. The vast labours of Jakobus van Lennep (r8o2-i868) consist of innumerable translations, historical novels and national romances, which have gained for him the title of the leader of the Dutch romantic school.

The novels of Sir Walter Scott had a great influence on Dutch literature, and the period was rich in historical novels. J. van

Staring.

der Hage (1806-1854), who wrote under the pseudonym of Jan Frederick Oltmans, was the author of the famous novels, Castle Loevenstein in 1570 (1834), and The Shepherd (1838), both dealing with the national history. Other popular works were the antique romance Charikles and Euphorion (1831) of Petrus van Limburg-Brouwer (1795-1847), author of a history of Greek mythology; the Mejuffrouw Leclerc (1849), and the Portretten van Joost van den Vondel (1876) of the literary historian and critic J. A. A. Alberdingk Thijm (1820-1899); the Jan Faessen (1856) of Lodewijk Mulder (b. .1822); and the Lucretia d’Este of W. P. Walters (1827-1891). Johannes Kneppelhout (1814-1885) sketched university life at Leiden in two amusing volumes of Studententypen (1841) and

Studentenleven (1844). Reinier Cornelis Bakhuizen van den Brink (1810-1865) was the chief critic of the romantic movement, and Everhard Johannes Potgieter (1808-1875) its mystical philosopher and esoteric lyrical poet. The genius and influence of Potgieter were very considerable, but they were exceeded by the gifts of Nicolaes Beets {q.v.), author of the famous Camera Obscura (1836), a masterpiece of humour and character. Johannes Pieter Hase- broek (1812-1896), who has been called the Dutch Charles Lamb, wrote in 1840 an admirable collection of essays entitled Truth and Dreams. Willem Hofdijk (1816-1888) wrote a collection of ballads, Kennemerland (1849-1852), and a series of epic and dramatic poems in the romantic style. Bernard ter Haar (1806- 1881), an Amsterdam pastor and, in the last year of his life, a professor at Utrecht, made a reputation as a poet by his Johannes and Theagenes, alegend of apostolic times (1838). His poems were collected in 1866 and 1879. A poet of unusual power and promise was lost in the early death of Pieter Augustus de Genestet (1803- 1861). His Eve of Saint Nicholas appeared in 1849, and was followed by two volumes of verse in 1851 and 1861, the second of which contains some poems that have attained great popularity. Among the poets should not be forgotten two writers of verse for children, Jan Pieter Heije (1809-1876) and J. J. A. Gouverneur (1809-1889). Criticism was represented by W. J. A. Jonckbloet (1817-1885), author of an excellent History of Dutch Literature (1868-1870), C. Busken Huet, and Jan ten Brink (1834-1901), author of a great number of valuable works on literary history, notably of a history of Dutch literature (1897), and a series of biographies of 19th century Dutch writers (new edition, 1902). His novels were collected in 13 volumes in 1885. With Isaak da Costa (q.v.), W. J. van Zeggelen (1811-1879), a nd J. J. L. Ten Kate (q.v.), the domestic tendency of Cats and Bilderdijk overpowered the influence of romanticism. The romantic drama found its best exponent in H. J. Schimmel (q.v.), who found a disciple in D. F. van Heyst (b. 183 1), whose George van Lalaing was produced in 1873. Hugo Beijerman (ps. Glanor) produced a good play in his Uitgaan (1873), which was followed by other successes. Rosier Faessen (b. 1833) published his dramatic works in 1883.

*The recent literature of Holland presents the interesting phenomenon of an aesthetic revolution, carefully and cleverly planned, crowned with unanticipated success, and dying away in a languor encouraged by the complete * eoe ”’ absence of organized resistance. It would perhaps be meats. difficult to point to another European example so well defined of the vicissitudes which keep the history of literature*

varied and fresh. For the thirty or forty years preceding 1880 the course of belles-lettres in Holland was smooth and even sluggish. The Dutch writers had slipped into a conventionality of treatment and a strict limitation of form from which even the most striking talents among them could scarcely escape. In 1880 the most eminent authors of this early period were ready to pass away, and they appeared to be preparing no successors to take their place. The greatest humorist of Holland, Nicolaas Beets, had drawn his works together. The most interesting novelist, Mrs Gertrude Bosboom-Toussaint, had in her last psychological stories shown an unexpected sympathy with new ideas. M. G. L. van Loghem (b. 1849), known under the pseudonym of " Fiore delle Neve," made a great success by his Een liefde in het Zuiden (1881), followed in 1882 by Liana, and in

1884 by Van eene Sultane. Among the novelists were Gerard Keller (b. 1829), author of From Home (1867); Johan Gram (b. 1833), of whose novels De Familie Schafels (1870) is the best known; Hendrik de Veer (1829-1890), author of Frans Holster (1871) ; Justus van Maurik (b. 1846), who wrote plays and short sketches of Amsterdam life (Uit het Volk, 1879), and Arnold Buning (b. 1846), whose Marine Sketches (1880) won great popularity. The colonial novels of N. Marie C. Sloot, born in Java in 1853, are widely read in Holland and Belgium, and many of them have been translated into German. A number of them were collected (Schiedam, 1900-1902) as Romantische Werken. Adele Opzoomer (b. 1856; pseud. A. C. S. Wallis) made her first success in 1877 with In Days of Strife. The two leading Dutch men of letters, however, besides Beets and Douwes Dekker, were critics, Conrad Busken-Huet (q.v.) and Carel Vosmaer (q.v.). In Huet the principles of the 1840-1880 period were summed up; he had been during all those years the fearless and trusty watch-dog of Dutch letters, as he understood them. He lived just long enough to become aware that a revolution was approaching, not to comprehend its character; but his accomplished fidelity to literary principle and his wide knowledge have been honoured even by the most bitter of the younger school. Vosmaer, although in certain directions more sympathetic than Huet, and himself an innovator, has not escaped so easily, because he has been charged with want of courage in accepting what he knew to be inevitable.

In November 1881 there died a youth named Jacques Perk

(1860-1881), who had done no more than publish a few sonnets in the Spectator, a journal published by Vosmaer. He was no sooner dead, however, than his posthumous poems, and in particular a cycle of sonnets called Mathilde, were published (1882), and awakened extraordinary emotion. Perk had rejected all the formulas of rhetorical poetry, and had broken up the conventional rhythms. There had been heard no music like his in Holland for two hundred years. A group of young men, united in a sort of esoteric adoration of the memory of Perk, collected around his name. They joined to their band a man somewhat older than themselves, Marcellus Emants (born 1848), poet, novelist and dramatist, who had come forward in 1879 with a symbolical poem called Lilith, which had been stigmatized as audacious and meaningless; encouraged by the admiration of his juniors, Emants published in 1881 a treatise on Young Holland, in the form of a novel in which the first open attack was made on the old school. The next appearance was that of Willem Kloos (born 1857), who had been the editor and intimate friend of Perk, and who now undertook to lead the army of rebellion. His violent attacks on recognized authority in aesthetics began in 1882, and created a considerable scandal. For some time, however, the new poets and critics found a great difficulty in being heard, since all the channels of periodical literature were closed to them. But in 1883 Emants expressed his intellectual aspirations in his poem The Twilight of the Gods, and in 1884 the young school founded a review, De Nieuwe Gids, which was able to offer a direct challenge to De Gids, the ultra- respectable Dutch quarterly. In this year a new element was introduced: hitherto the influences of the young Dutch poetry had chiefly come from England; they were those of Shelley, Mrs Browning, the Rossettis. In 1884 Frans Netscher began to imitate with avidity the French naturalists. For some time, then, the new Dutch literature became a sort of mixture of Shelley and Zola, very violent, heady and bewildering. In 1885 the Persephone and other Poems of Albert Verwey (b. 1865) intro- duced a lyrical poet of real merit to Holland; Emants published his novel Goudakker's Illusions. This was the great flowering moment of the new school. It was at this juncture that the principal recent writer of Holland, Louis Couperus (b. 1863), made his first definite appearance. Born in the Hague, the opening years of his boyhood were spent in Java, and he had preserved in all his nature a certain tropical magnificence. In 1884 a little volume of lyrics, and in 1886 the more important Orchids, showed in Couperus a poet whose sympathies were at first entirely with the new school. But he was destined to be

a novelist, and his earliest story, Eline Vere (1889), already took

him out of the ranks of his con temporaries. In 1 890 he published Destiny (known as Footsteps of Fate in the English version), and in 1892 Ecstasy. This was followed in 1894 by Majesty, in 1896 by World-wide Peace, in 1898 by Metamorphosis, a delicate study of character, in 1899 by Fidessa, in 1901 by Quiet Force, and in 1902 by the first volume of a tetralogy called The Books of Small Souls. Of all these later books, some of which have been translated into English, by Couperus, it is perhaps Ecstasy in which the peculiar quality of his work is seen at present to the greatest advantage. This is an extreme sensitiveness to psychological phenomena, expressed in terms of singular delicacy and beauty. The talent of Couperus is like a rich but simple tropical flower laden with colour and odour. He separated himself, as he developed, from the more fanatical members of the group, and addressed himself to the wider public. Another writer, of a totally different class, resembling Couperus only in his defiance of the ruling system of aesthetics, is the prominent Ultramontane politician and bishop, E. J. A. M. Schaepmann (born 1844), whose poem of Aja Sofia originally appeared in 1886. Recent novelists of some polemical vigour are H. Borel and van Hulzen. A very delightful talent was revealed by Frederick van Eeden in Little Johnny (1887), a prose fairy-tale; in Ellen (1891), a cycle of mysterious and musical elegies; and in From the Cold Pools of Death (1901), a very melancholy novel. Another poet of less refinement of spirit, but even greater sumptuousness of form, appeared in Helene Swarth-Lapidoth (born 1859), whose Pictures and Voices belongs to 1887. In that year also, in which Dutch literature reached its height of fecundity, was published the powerful and scandalous naturalistic novel, A Love, by L. van Deyssel (K. J. L. Alberdingk Thijm) who had hitherto been known chiefly as a most uncompromising critic. After 1887 the condition of modern Dutch literature remained comparatively stationary, and within the last decade of the 19th century was definitely declining. In 1889, it is true, a new poet Herman Gorter, made his appearance with a volume of strange verses called May, eccentric both in prosody and in treatment. He held his own without any marked advance towards lucidity or variety. Since the recognition of Gorter, however, no really remarkable talent has made itself prominent in Dutch poetry, unless we except P. C. Boutens, whose Verses in 1898 were received with great respect. Willem Kloos, still the acute and somewhat turbulent leader of the school, collected his poems in 1894 and his critical essays in 1896. L. van Deyssel, though an effective reviewer, continued to lack the erudition which years should have brought to him. Gorter remained tenebrous, Helene Swarth-Lapidoth still gorgeous; the others, with the exception of Couperus, showed symptoms of sinking into silence.

The entire school, now that the struggle for recognition is over, and its members are accepted as little classics and the tyrants of taste, rests on its triumphs and seems to limit itself to a repetition of its old experiments. The leading dramatist of the close of the century was Hermann Heijermans (b. 1864), a Jew of strong realistic and socialistic tendencies, and the author of innumerable gloomy plays. His Ghetto (1898) and Or a et Labor a (1901) particularly display his peculiar talent. Other notable products of drama are those of de Koo, whose Tobias Bolderman (1900) and Vier Ton (1901) are effective comedies. Dutch literature presented features of remarkable interest between 1882 and 1888, but since that time the general heightening of the average of merit, the abandonment of the old dry conventions, and a recognition of the artistic value of words and forms, are more evident to a foreign observer than any very important single expression of the national genius in literary art. An exception should be made in favour of the powerful peasant-stories of Steijn Streuvels (Frank Lateur), a young baker by trade, whose Summer Land (1901) was a most promising production.

Authorities.— Dr W. J. A. Jonckbloet, Geschiedenis der Nederlandsche Letterkunde (4th ed., 1889-1892); Dr J. ten Brink, Kleine Geschiedenis der Nederlandschen Letieren (Haarlem, 1877) ; and the same author's Geschiedenis der Nederlandsche Letterkunde (1897), with elaborate illustrations, facsimiles of MSS. and title pages, &c. ;

Dr J. van Vloten, Schets van de Geschiedenis der Nederlandschen Letteren (1879); L. Schneider, Geschichte der niederldndischen Literatur (Leipzig, 1 887) ; G. Kalff , Literatuur en looneel te Amsterdam in de zeventiende Eeuw (Haarlem, 1895).

Interesting observations on the development of the new school in Dutch literature will be found in Willem Kloos, Veertien Jaar Literatuur-Geschiedenis (2 vols.,, 1 880-1 896), and in L. van Deyssel, Verzamelde Opstelen (4 vols., 1890-1897), and in the series of mono- graphs and bibliographies by Prof. J. ten Brink, Geschiedenis der Noord-Nederlandsche Letteren in de XIX" Eeuw (Rotterdam, new ed. 1902, &c). (E. G.)

DUTCH WARS, a convenient general title for a series of European wars between 1652 and 1678, which centred chiefly upon the political and commercial relations of the Netherlands with England

and France. By Englishmen the term " Dutch Wars " is usually applied to the two purely naval wars of 1652-53 and 1663-67 and to the Anglo-Dutch or naval part of the war that began in 1672. But the last of these was part of a much wider struggle by land, known to Continental historians as the Dutch War of 1672-78, and the second part of this article deals with their struggle on the various frontiers of France, which was illustrated by the genius of Turenne and Conde.

I. Naval Operations First Dutch War {1652-53). — Though political causes were at work, the main incentive to hostility between the peoples was commercial rivalry. It was therefore natural that their first encounters should have taken place between fleets engaged in convoying trade, or in endeavouring to intercept the trade of their enemy. Blows were exchanged before war was formally declared. On the 12th of May 1652 an English officer, Captain Young, stopped a Dutch convoy near the Start in order to enforce the salute to the English flag, which England then demanded from all who used the seas round her coast. The demand was resisted, and was only yielded to after a sharp conflict. Though the Dutch were still endeavouring to negotiate a peace with the Council of State which governed in the British Isles after the execution of King Charles I., they made ready for war. In May forty sail of their war-ships appeared off Dover under command of Martin Harpertzoon Tromp — then the best known of their admirals. There were then 8 British ships in Dover under Rear- Admiral Nicholas Bourne, and 15 near Rye under Robert Blake, a member of parliament, and soldier who had gained a great reputation in the Civil War. Blake came into the Straits of Dover with his ships, and on the 19th of May a sharp collision took place between him and Tromp. Bourne joined his countryman after the action began. The encounter, which the Dutch attributed to the English, and the English to the Dutch, made war inevitable, even if the relations of the two powers had allowed of the maintenance of peace. The first operations on both sides took the form of attacks on trade. Sir George Ayscue, who had lately returned from the West Indies, whither he had been sent to subdue the Royalist party in Barbados, had a sharp encounter with a Dutch convoy while on his way up Channel to the Downs, and had captured several prizes. The Council of State, being mainly anxious to destroy the Dutch trade and fisheries, began by reinforcing Blake, and sending him north to scatter the Dutch herring fleet. He had with him 60 vessels. Ayscue remained in the Downs with 16. Soon after Blake had gone, Tromp appeared in the Downs with a stronger force and threatened an attack on Ayscue. Want of wind prevented the operation. Tromp was also most intent on collecting the home- coming Dutch convoys, and

seeing them safe into port. He therefore also sailed north to meet the Baltic trade. No meeting, however, took place between him and Blake, while bad weather scattered the Dutch. Their herring fishery was ruined for the year, and the outcry against Tromp was loud. He was notori- ously no friend to the Loevenstein party then prevalent in Holland, and was displaced, his place being taken by Cornelius de Witt and Michiel Adriaanzoon de Ruyter. De Ruyter was sent into the Channel to convoy the outward-bound convoys, and meet the home-coming trade. On the 16th of August he had an encounter off Plymouth with Ayscue, whom he worsted, and then cruised at the Land's End. The failure of Ayscue, who

was not employed again in this war, induced the Council of State to send Blake, who had now returned from the north, into the Channel. He was not, however, more successful. His fleet was allowed to become scattered, and the Dutchman brought his convoy back safe after a partial action with Penn, Blake's subordinate, on the 16th of August.

So far the operations had been confined to commerce destroy- ing, or to the protection of trade by convoy. The next moves were more purely warlike. In the 27th of September the Dutch appeared in force off the mouth of the Thames, and Blake, whose fleet was collected in the Downs, stood to sea. On the 28th of September the first real battle of the war was fought off the Kentish Knock, a shoal opposite the coast of Essex. The English fleet standing to the north passed to west of the Dutch, and then turned. In the close engagement which followed, the Dutch were defeated. They did not fight well, and their failure was attributed in part to the discontent of their seamen with the removal of Tromp, and the unpopularity of de Witt. The states-general found it necessary to replace Tromp, who was at once sent to sea, again with the charge of seeing the outward- bound trade down Channel, and waiting for the homeward- bound. Blake had not remained on the coast of Holland, for the Council of State was still almost as intent as the Dutch on convoying trade or molesting the enemy's. It brought its fleet back, and then divided the ships, sending some to the north with Penn, and keeping the others, 40 in all, with Blake in the Downs. Thus when Tromp appeared " at the back of the Goodwins " with a fleet of 80 war-ships and a crowd of merchant vessels on the 29th of November, Blake was not in a position to engage him with any assured prospect of success. But he made the attempt, and a hot engagement took place off Dunge- ness on the 30th. Two English vessels were taken, and the loss would have been greater if some of the English captains had not shown themselves backward. Many of the ships were merchant vessels pressed or hired,

and commanded by their own skippers, who displayed little military spirit. Blake, who offered to resign, complained of the conduct of many of them, and some were punished. The Council of State saw the necessity for making a strong effort against Tromp, who ranged the Channel unopposed. Penn was recalled from the north, Richard Deane and George Monk were united with Blake as " admirals and generals at sea," and a competent force was collected by the middle of February. The legend (for it is nothing more) that Tromp hoisted a broom at his mainmast-head to announce his intention to sweep the English off the sea, refers to this period.

On the 18th of February 1653 the Dutch admiral, who had now collected the homeward-bound convoys, was off Plymouth on his way back to Holland, and was attacked by the English fleet. The encounter, which lasted from the 18th to the 20th of February and ranged from Plymouth to Calais, is commonly named the " Three Days' Battle " and was described by Clarendon as " stupendous." The Dutch admiral brought his charge of merchant ships up Channel between him and the French shore. His war-ships were arranged in what was called a half-moon, and was in fact an obtuse angle with his flagship, the " Brederode," at the apex. During the 18th and 19th, the attacks of the English though fierce were partial, and met with no great success. Tromp had to complain of the conduct of several of his captains. On the 20th his line was broken and some 60 of his merchant ships were captured. He anchored in some confusion in Calais roads. Yet by taking advantage of the dark, and the turn of the tide, he succeeded in carrying the great majority of his merchant ships home. The English fleet had suffered severely, Blake himself was seriously wounded, and his colleague Deane was also hurt. Blake's wound disabled him greatly through the remainder of the war.

The Three Days' Battle was followed by a pause in the war. On the English side much damage had to be repaired. The administration of the navy, called upon as it was to deal with a war of unprecedented magnitude, was overtaxed by the obligation to refit ships, raise crews, and provide for the numerous sick or wounded. The close approach of the great political

crisis in which Cromwell expelled the Long Parliament and established the Protectorate (17th of April 1653), may have had

some influence. The fleet adhered to the new government on the 22nd of April. On the Dutch side much damage had to be repaired, and their complicated administration, by five inde- pendent admiralty boards, rendered rapid work impossible. They had also begun to realize that the quality of their ships was inferior. Reflection had further shown them that to hamper their fleets by imposing the direct protection of a great flock of merchant ships on them was not even an effectual way to protect commerce. When, therefore, Tromp was next sent to sea, it was with an unhampered fleet of war-ships, and for the purpose of bringing the English fleet to battle.

In spite of their heavy losses and their awkward administra- tion, the Dutch were at sea before the end of May, and were close to the mouth of the Thames. The English fleet was not all ready. Part was in the river fitting out under Blake, who had not fully recovered from his wound. The bulk of it was, however, ready for service, and Blake's colleagues, Monk and Deane, attacked Tromp on the 2nd of June. Changes of wind made the battle somewhat confused. At first the English were to windward and they bore down with Rear-Admiral John Lawson in command of the van. Tromp, conscious that his ships were weaker in build, at first drew away, firing at the spars of the English ships in order to cripple them. A shift of the wind having given him the weather-gage, he concentrated a vigorous attack on Lawson. But the wind changed again and transferred the weather-gage to the English. Monk and Deane brought on a general action, in which the Dutch were outmatched, and forced to retreat to their own coast. Deane was slain by a cannon-shot by the side of his colleague Monk, who threw his cloak over the mangled body. Blake, informed by the sound of the cannon, which was audible on the Thames, that an action was in progress, hurried to sea and joined Monk in the pursuit of the Dutch on the 3rd of June. Tromp was driven into port and told the states-general that they must build better ships if they wished to beat the English at sea. Blake was forced by his still unhealed wound to go ashore, and the sole command was left to Monk, who remained cruising on the coast of Holland. The states-general now sought for peace, but Cromwell's demands were excessive, and could not be accepted without a surrender of the independence of Holland. A last effort was therefore made to regain the command of the sea. A great fleet was fitted out, partly at Flushing, partly in the Texel. Between the 26th and the 30th of July Tromp, by a series of skilful manoeuvres, united the divided Dutch squadrons in the face of Monk's fleet, and on the 30th he stood out to sea with the wind in his favour, and gave battle. More than a

hundred vessels were engaged on either side. The Dutch admiral manoeuvred to keep, and Monk to gain, the weather-gage. The fleets passed on opposite tacks, and the Dutch tried to destroy their enemy with fire-ships without success. At last the weatherly qualities of the ships enabled Monk to break through the Dutch line, cutting some of their ships off from the others. The vessels thus cut off fled to the Maas, and Tromp with the others retired to the Texel. He was shot dead by a musket bullet in the retreat. The loss of life had been heavy on both sides. Six captains of Monk's fleet were slain. The Dutch now sought peace, and Cromwell offered better terms. During the fighting in the North Sea the Mediterranean trade of England had suffered severely. A squadron of trading ships and a few war vessels were blocked in Italian ports till some of them were taken and others forced to flee in March 1653 off Leghorn. The battle of the 31st of July was the last serious operation of the war, though peace was not formally made till some months later.

Second Dutch War {1663-67). — Although the formal declara- tion of war was not made by the government of King Charles II. till March 1665, the operations of the second Dutch War began in October 1663. The king and his brother the duke of York (James II.), who were largely interested in the slave-trading Guinea Company, were eager to remove the Dutch ports from the siave coast. They knew that war with the Republic, which had ˆcovered very rapidly from the disasters of the war of 1652-53,

would be popular with the trading classes in England. They relied also on the known reluctance of the Dutch government to go to war. In October 1663, therefore, a squadron was sent out under command of Sir Robert Holmes to attack the Dutch in Gambia and America. Their posts on the African coast were captured and New Amsterdam (now New York) taken. The states- general under the ski'ful management of the Grand Pensionary, John de Witt, retaliated by sending de Ruyter from the Mediter- ranean, where he was cruising against the Barbary pirates, to follow Holmes. De Ruyter re-established the Dutch posts in Gambia, and, though he failed to retake New Amsterdam, did much injury to English trade before he returned to Holland. It may be pointed out that all colonial settlements belonged at that time exclusively to England, and the war was made entirely by her, and in her interest, Scotland and Ireland having no share. Numbers of Scotch sailors and of English deserters served in the Dutch fleet in this war — the bad administration of the navy and the constant ill-treatment of the crews having caused bitter discontent. Other attacks were made on Dutch trade during 1664, but the great operations of war did not begin till May 1665. In that

month the duke of York was on the east coast of England with a fleet of 80 to 90 sail, composed, according to the custom of the time, of vessels of all sizes. A Dutch fleet of corresponding strength was sent to sea, under command of Baron Opdam van Wassenaer. In this war we do not find that the movements of fleets were subordinated to the work of providing convoy. They were sent to sea for the much more intelligent purpose of seeking out the enemy and driving him off. It was understood that the trade of the victor would be secure.

The first battle took place from 30 to 40 m. S.E. of Lowestoft, on the 3rd of June 1665. By the bad conduct of some of the captains in the centre of the Dutch line, the English, who fought with much spirit, were able to win a considerable victory. Opdam's flagship was blown up and he perished. But the pursuit of the English fleet was feeble, and the retreat of the Dutch was ably covered by Cornelius van Tromp, son of Martin Tromp. Much scandal was caused by the mysterious circum- stances in which an order to shorten sail was given in the English flagship, and doubts were expressed of the courage of the duke of York. He withdrew, or was withdrawn, from the active com- mand at sea, and was replaced by the earl of Sandwich. On the Dutch side vigorous measures were taken to enforce good discipline. Four of the captains who had misbehaved on the 3rd of June were shot for cowardice, and others were dismissed. De Ruyter was named commander-in-chief, and John de Witt, or later his brother Cornelius, accompanied the admiral as delegate of the states-general to support his authority. The earl of Sandwich did nothing becoming a capable commander. Under his command the fleet made no attempt to blockade the Dutch coast, but was turned from its proper work to engage in a prize-hunting plot with the king of Denmark. The object was to plunder a Dutch convoy which had taken refuge at Bergen in Norway, then united to Denmark. The mutual interest of the associates led to the failure of the plot. Sir Thomas Teddeman, who was sent by Sandwich to attack the Dutch at Bergen, was suspected by the Danish governor of intending to play false, was fired on by the batteries, and was beaten off. De Ruyter covered the return of the trade to Holland. Sandwich, who had taken some prizes, unlawfully seized part of their cargoes for the benefit of himself and the other flag officers. A loud outcry was raised in the fleet and the country. Sandwich was displaced, and his command was transferred to Monk, with whom was associated the king's cousin, Prince Rupert. The war had so far been unsuccessful for England. The victory of the 3rd of June was barren. Great injury was inflicted on English trade by Dutch cruisers, while the wasteful administration of his officers reduced the king's treasury to much

embarrassment. Winter suspended the movements of the fleets.

The year 1666 (called the annus mirabUis, for it included the plague and the fire of London) was marked by fierce fighting and changes of fortune. The French, who had signed a treaty with Holland in 1662, were reluctantly induced to intervene in

the war as the enemies of England. By May a Dutch fleet of some eighty sail was at sea, preparing to watch the English, and unite with the French. Monk and Rupert were fitting out a fleet of nearly the same strength in the Thames. Under the influence of their fear of a French naval force King Charles's ministers committed a great blunder. They detached Prince Rupert into the Channel with 20 ships, leaving Monk with only 57 to face the Dutch. The English commander put to sea, and found the enemy anchored on the coast of Flanders, in three divisions. He boldly attacked the van, hoping to cripple it before it could be helped by the centre and rear. This daring and well-judged move brought on the Four Days' Battle of the 1st, 2nd, 3rd and 4th of June (O.S.). On the 1st the Dutch van, under Cornelius van Tromp, bore the brunt of the English attack. The fighting was very fierce. One English admiral, Sir William Berkeley, was slain, and another, Sir John Harman, was in great danger. Monk drew off at night without doing all the h arm he had wished to the Dutch. During the 2nd of June the fleets engaged again, and on this day the self-will of Van Tromp, who commanded the rear in the battle, and the misconduct of some of the ships in the van, prevented De Ruyter from making full use of his numbers. Yet Monk was clearly overtaxed, and on the 3rd he prepared to retreat to the Thames. During this movement the " Prince " (100) carrying the flag of Admiral Sir Robert Ayscue, ran on the Galloper Sand, and was lost. In the evening Prince Rupert returned, and by hugging the coast of Kent to the south of the fleets, was able to rejoin his colleague. Monk and Rupert renewed the battle on the 4th. It was fought with extreme fury, and terminated in the retreat of the English to the Thames with a loss of 20 ships and 6000 men.

The Dutch remained masters of the approach to the Thames till the 21st of July. They menaced the coast of Essex, and could easily have covered an invasion of England by a French army if Louis XIV. had been disposed to send one. Danger stimulated the English government to active exertions, and by the 21st of July Monk and Rupert were

enabled by a happy combination of wind and tide to set to sea through the passage called the Swin. A storm which scattered both fleets delayed their meeting till the 25th of July. On that and the two succeed- ing days the Dutch were again defeated and driven into port. The English fleet then burnt the Dutch East India Company's dockyard at Terschelting, inflicting great loss. But the fruits of the victory were less than they would have been if it had been properly followed up. The British fleet withdrew to its own coast and within a month De Ruyter was at sea again, hoping to effect a junction with a French squadron. The French failed to keep tryst, and De Ruyter was watched by Rupert, who was now in sole command, Monk having been recalled to London to take command amid the confusion caused by the fire and the plague. Nor did the failure of King Charles's government to press the war with vigour end here. Embar- rassed by want of money, on bad terms with his parliament, and secretly intent on schemes incompatible with a policy which could earn the approval of his subjects, the king preferred to spend what money he could command on raising troops, and neglected his fleet. Peace negotiations were begun with the Dutch, and the line-of-battle ships were put out of commission. A light squadron was, however, kept at sea to injure the Dutch trade, and as no armistice was arranged the Republic was free to continue warlike operations. The Dutch, being well aware of the disarmed condition of the English coast, sent out a power- ful fleet again under the command of De Ruyter in June. It entered the Thames, forced the entrance of the Medway, and burnt both the dockyard at Chatham and a number of the finest ships in the navy which were lying in the river. A terrible panic prevailed in London, where an attack was expected. The Dutch were content with the injury they had done at Chatham, and dropped down the river. De Ruyter remained cruising in the Channel till the peace of Breda was signed in July. During the last months of the war Sir John Harman had fought a successful campaign in the West Indies against the French on whom he inflicted a severe defeat at Martinique

on the 24th of June. By the terms of the peace England retained possession of New York, but the war, though it contained some passages glorious to her arms, was very disastrous to her commerce.

Third Dutch War {i6j2~j4). — This war differed very materially in its inception and conduct from the first and second. They had been popular in England, and even the second gave Englishmen not a little to be proud of. The third was under- taken by the king in pursuit of a policy arranged between him and his cousin Louis XIV. Their avowed object was a partition of Holland, but there was a secret understanding that King Charles II. was to establish Roman

Catholicism, and to make himself despotic in England, with the help of the French king. This hidden purpose was suspected, and the war became intensely unpopular with the English parliament and nation. Parliament would grant the king no supplies, and he could find the means of fitting out a fleet only by defrauding his creditors. The English fleets were, therefore, comparatively small, were ill- provided and had to co-operate with French squadrons which in the then raw state of King Louis' young navy, proved inefficient allies.

In this as in former wars, attacks on Dutch commerce preceded a formal declaration of hostilities. On the 13th of March 1672 Sir Robert Holmes fell upon a Dutch convoy under the command of Van Ness in the Channel. In the penury of the dockyards Holmes could not be provided with the force he was promised, and the enterprise was but partially successful. It was char- acteristic of the morality of his time and the spirit of the English navy as it had been shaped by the corrupt government of Charles II., that the officers concerned quarrelled violently and accused one another of fraud. A fleet of 60 sail was with difficulty got together under the duke of York, who now went to sea for the second time. The duke was joined in May, and at Ports- mouth, by 40 French ships under the comte d'Estrees, a soldier and noble who had been made an admiral late in life. The allies entered the North Sea but did not take the offensive against the Dutch. The English were ill supplied, and were compelled to anchor at Southwold Bay on the coast of Suffolk in order to obtain water and provisions. The Dutch, who had to contend with an overwhelming French invasion on shore, nevertheless fitted out a fleet of 70 to 80 sail of the line and the command was given to De Ruyter. On the 28th of May 1672 he fell upon the allies in a N.W. wind. D'Estrees, who was stationed with his squadron at the south end of the line, went to sea on the port tack, heading to the S.E. The English, who constituted the centre and rear, stood out on the starboard tack. Thus the allies were at once divided into two widely separated bodies, and the Dutch admiral was able to concentrate nearly his whole force on the centre division, which suffered severely. The flagship of the duke of York, the " Prince " (100), was so shattered that he was compelled to leave her, and go to the " St Michael." The " Royal James " (100), the flagship of his second in com- mand, the earl of Sandwich, after being much shattered by the Dutch artillery, was set alight by a fire-ship, and destroyed with enormous loss of life. The earl himself perished. His body was picked up three days afterwards, so disfigured that it was only recognized by the star on his coat. The ships at the head of the English line at last tacked to the support of the centre, and at evening De Ruyter

drew off. A foolish attempt was made to claim his retreat as a victory, but the allies were too severely damaged to attempt an attack on the Dutch during the rest of the year. The Republic was so hard pressed by the French invasion that it had to'Jand the gunpowder from its ships for the service of its army.

In 1673 the allies made an effort to invade Holland from the sea coast. Prince Rupert replaced the duke of York, who as a Roman Catholic was driven from office by the newly passed Test Act. He was supplied with 54 ships and was joined early in the year by d'Estrees with 27. Soldiers were embarked, and in May the allied fleet stood over to the Dutch coast. The distress of the Republic prevented it from equipping more than 55 ships, but the patriotism of the race was roused to white heat, and in

De Ruyter they possessed an admiral of consummate skill and heroic character. He took up an anchorage at Schooneveld and stood on his guard. On the 28th of May Rupert and d'Estrees, believing that De Ruyter was too much afraid of their superior numbers to venture to sea, sent in a squadron of light vessels and fire-ships to attack him, but he took the offensive at once, scattering the light squadron, and falling with energy on the rest of the fleet, which, not being in expectation of a vigorous assault, was taken at a disadvantage. On this occasion the English placed the French in the centre, in order to avoid such a separa- tion as had taken place in the battle at Southwold Bay. But the disposition made no difference in the result. De Ruyter concen- trated on the van and centre of the allies, and in spite of his great inferiority of numbers was able to be superior at the point of attack. The allies were compelled to retreat, and De Ruyter, satisfied with having averted the invasion of his country, anchored at West-Kappel.

Seven days later, on the 4th of June, a second encounter took place. The French were now placed in the rear of the line as it engaged. The Dutch admiral, who had the advantage of the wind, fell on the English in the van and centre. His inferiority in numbers did not allow him to push his attack quite home, but he inflicted so much injury that the allies were forced to return to the Thames to refit. At the end of July the allies again appeared off the coast of Holland, bringing four thousand soldiers in the war-ships and two thousand in transports. De Ruyter's fleet had been raised to 70 vessels, but the

allies had also been reinforced and were 90 strong. On the nth of August the Dutch admiral kept in the shallow waters of the coast looking for a favourable opportunity to attack. On the nth of August the wind, which had been westerly, turned to the S.E., giving him the weather gage. The French division was leading, and De Ruyter fell furiously upon the English in the centre and rear. The French were kept in play by a small squadron under Bankert, while De Ruyter drove Prince Rupert in the centre out of the line, and in the rear Cornelius van Tromp fought a desperate duel with the English rear division commanded by Sir E. Spragge. The two admirals engaged in a species of personal conflict, and each was compelled to shift his flag to another vessel. While Sir E. Spragge, whose second flagship was shattered by the Dutch fire, was on his way to a third, his boat was sunk by a cannon shot and he was drowned.

The defeat of the allies was undeniable, and a violent quarrel broke out between them. Want of money, and the increasing violence of popular opposition to the French alliance, compelled the king to withdraw from the war. Peace was made in the following spring.

In this war, which presented no features of a creditable kind, the loss to English commerce from Dutch cruisers was so great that it was found necessary to suspend the clause of the naviga- tion act which forbade the purchase of foreign-built vessels.

As England withdrew from her alliance with Louis XIV., the other powers of Europe, frightened by the growth of the aggres- sive French power, began to come forward to the support of Holland. The coalition then formed continued the struggle till 1678. But the war was conducted mainly on the land. The French king, who knew that his fleet was not as yet capable of meeting the Dutch single-handed, was content to withdraw his ships from the North Sea and the ocean. The Dutch, who had to pay subventions to their German allies, and to support a large army, could spare little for their fleet. For some time they willingly confined themselves to efforts to protect their commerce from French privateers. In 1674 a revolt of the people of Sicily against their Spanish rulers gave the French kinganopportunityof seizing the island. Spain, unable to defend its possessionssingle- handed, appealed to the Dutch for naval help. In September 1675 De Ruyter was sent into the Mediterranean with 18 sail of the line and four fire-ships. The force was inadequate, but it was all that Holland could spare. The Dutch admiral, who was hampered rather than helped by his Spanish allies, did his best to make good his weakness by skilful management. He cruised off Messina to intercept the supplies which were being brought to the

French garrison by a fleet of 20 sail under the command of Abraham Duquesne. Conscious that he must spare his small force as much as possible, he abstained from such vigorous attacks as he had made in 1672 and 1673. When Duquesne appeared on the 7th of January 1676 near the Lipari Islands, De Ruyter allowed them to get the weather-gage, and on the 8th of January waited passively for their attack. The French, with more recklessness than was usual with them in later times, bore down on their enemy courageously but in some disorder. Their leading ships were severely mauled, and their whole force so crippled that they could make no pursuit of the Dutch when they drew off, their injured ships being towed by the Spanish galleys, in the late afternoon. Duquesne was able to reach Messina and join the French ships at anchor there. De Ruyter made his way to Palermo, which was in the hands of the Spaniards. One of his vessels sank on the way and he was reduced to 17. It is true that his allies provided him with 10 ships of their own, but the Spanish navy had sunk to abject inefficiency. Their commander, the marquis of Bayona, arrogantly insisted on occupying the centre of the line with his worthless squadron instead of allowing his ships to be scattered among the Dutch for support. When on the 22nd of April the allies, 27 strong, met the fleet of Duquesne, 29 ships, off Agosta, they attacked from windward. De Ruyter, who led the van, was mortally wounded. The Spaniards in the centre behaved very ill, and no victory was gained. The serious fighting was, in fact, confined to the vans of the two fleets. After the battle the allies retired to Syracuse, where De Ruyter died, and where their ships were mostly destroyed by the French a month later. Reinforce- ments sent out from Holland were stopped in the Straits of Gibraltar and blockaded in Cadiz. The French remained masters of the Mediterranean. In the meantime, however,' angry disputes had arisen between France and England. King Louis XIV. enforced his belligerent rights at sea with as much disregard of neutral interests as was shown by England in later times. His naval officers insisted on making prize of all Dutch-built vessels found under the English flag. In 1678 war seemed imminent between France and England. King Louis then withdrew his soldiers from Sicily, and made the peace of Nijmwegen.

Authorities. — For the English side, see Naval History of England, by Thomas Lediard (London, 1735); Memorials of Sir W. Penn, by Grenville Penn (London, 1833); The First Dutch War, 1652- 1054, edited by S. R. Gardiner for the Navy Record Society (1899). For the Dutch side : Het Leven un Bedryf van den Heere Michiel de Ruiter, by Gerard Brandt (Amsterdam, 1687) ; Ceschiedenis van den Nederlandsche Zeewegen, by J. C. de Jongke (Haarlem, 1858);

Annates des Provinces-Unies, by J. Basnages de Beauval (The Hague, 1726). For the French side : Abraham du Quesne et la marine de son temps, by A. Jal (Paris, 1873). F° r the small Spanish share: Armada Espanola, by Captain Cesareo Fernandez Duro (Madrid, 1895-1901). For critical studies of these wars the reader may be referred to Naval Warfare, by Rear-admiral P. H. Colomb (London, 1899), and The Influence of Sea Power upon History, by Captain A. T. Mahan. (D. H.)

II. Operations on Land The contemporary military history of Europe included, first, the war between France and Spain, 1654-59, usually called the Spanish Fronde, of which the most notable incident was the great battle of the Dunes fought on the 14th of June 1658 between the French and English under Turenne and the Spaniards under Conde, in which a contingent of Cromwell's soldiers bore a conspicuous part. About the same time a war was fought in northern Europe (1655-60), celebrated chiefly for the three days' battle of Warsaw (28th, 29th, 30th July 1656), and the successful invasion of Denmark by the Swedes, carried out from island to island over the frozen sea (February 1658), and culminat- ing in a long siege of Copenhagen (1658-59). Between the second and third wars of England and the United Provinces came the short War of Devolution (1667-68) — a war of sieges in the Low Countries in which the French were commanded chiefly by Turenne. In 1668 the French under Conde made a rapid con- quest of Franche-Comte. This was, however, given up at the peace. The war of 1672-78, the first of the three great wars of Louis XIV., was fought on a grander scale.

DUTCH WARS

733

Invasion of Holland, 1672. — The diplomacy of Louis had, before the outbreak of war, deprived Holland of her allies — England (treaty of Dover, 1670), Sweden (treaty of Stockholm, 1672) and the emperor, and when he declared war on the United Provinces in March 1672, it seemed that the Dutch could offer little resistance. The French army under Louis in person started from Charleroi and marched down the Meuse unopposed. The powerful Dutch fortress of Maastricht was masked, and the French then moved towards Dtisseldorf. In the electorate of Cologne they were in friendly country, and the main army soon moved down the Rhine from Dtisseldorf, the corps of Turenne on the left bank, that of Conde on the right. At the same time a corps under Marshal Luxemburg, composed of Louis' German allies (Cologne and Mtinster) moved

from Westphalia towards Over-Yssel and Groningen. The Rhine fortresses offered but little resistance to the advance of Turenne and Conde. William of Orange with a weak field army tried to defend the Yssel- Rhine line, but the French rapidly forced the passage of the Rhine at Tollhuis (June 1 2th) and passed into the Betuwe (between the Leek and the Waal). Conde now advised a cavalry raid on Amsterdam, but Louis, acting on the suggestion of the war minister Louvois, preferred to reduce Nijmwegen, Gorinchem and other places, before entering Utrecht province. Conde's plan was, however, partially carried out by Count Rochefort, who with 1800 troopers captured successively Amersfoort and Naarden. His further progress was checked at Muyden, which the Dutch garrisoned in the nick of time, and he returned to the main army, taking Utrecht en route. Louis now moved on Amsterdam, brushing aside the feeble opposition which was offered, and it seemed that the French must achieve their object in one short campaign. But the Dutch people were roused. The month before, the citizens of Utrecht had refused to raze their suburban villas, and defence of the fortifications had con- sequently been impossible. Now, the dykes were cut and the sluices opened, and Amsterdam was covered by a wide inundation, against which the invader was powerless. At the same time the men of Zealand repulsed a French raid from Ath on Ardenburg, and this infraction of the neutrality of the Spanish Netherlands served but to raise up another enemy for Louis. Luxemburg too, at first successful, was repulsed before Groningen. A revolution placed William of Orange at the head of the government. The alliance of Brandenburg and the Mainz electorate had already been secured, and Spain, justly fearing for the safety of her Flemish possessions, soon joined them. The emperor followed, and Louis was now opposed, not by one state, but by a formidable coalition.

War against the Coalition. — In the autumn the war spread to the Rhine. No attempt could be made on Amsterdam until the ice should cover the floods. Turenne was therefore despatched to Westphalia and Conde to Alsace, while a corps of observation was formed on the Meuse to watch the Spanish Netherlands. But the coalition had not yet developed its full strength, and Turenne's skill checked the advance of the Imperialists under Montecucculi and of the Brandenburgers under the Great Elector. A war of manoeuvre on the middle Rhine ended in favour of the French, and the allies then turned against the territories of Cologne and Munster, while William, disappointed in his hopes of joining forces with his friends, made a bold, but in the end unsuccessful, raid on Charleroi (September-December 1672). The allies in Germany were now not merely

checked but driven from point to point by Turenne, who on this occasion displayed a degree of energy rare in the military history of the period. The troops of Cologne and Munster formed part of his army, other friends of Louis were preparing to take the field, and after a severe winter campaign, the elector, defeated in combat and manoeuvre, was forced back to the Weser, and being but weakly supported by the Imperialists, found himself compelled to make a separate peace (June 6th, 1673). Turenne then turned his attention to the Imperialists who were assembling in Bohemia, and made ready to meet them at Wetzlar. Meanwhile the other French armies were fully employed. Corps of observation were formed in Roussillon and Lorraine. Conde in Holland was to

renew his efforts against the Amsterdam defences; during the winter the demands of the war on the Rhine had reduced the French forces in the provinces to the size of a mere army of occupation. 1 Louis' own army, originally collected for the relief of Charleroi in December, advanced on Maastricht, and after a brief siege, in which Vauban directed the besiegers, captured this most important fortress (June 29th, 1673). But this was the last success of the French armies in the campaign. Conde made no headway against Amsterdam, and William retook Naarden (September 14th). Louis, after the capture of Maas- tricht led his army southwards into Lorraine and overran the electorate of Trier. But nothing of importance was gained, and Turenne's summer campaign was wholly unsuccessful.

Capture of Bonn. — From Wetzlar he moved to Aschaffenburg, Louis at the same time keeping back, for the intended conquest of Franche-Comte, many soldiers who would have been more usefully employed in Germany. Soon the Imperialists advanced in earnest, greatly superior in numbers. Marching via Eger and Nuremberg (September 3rd) on the Main, Montecucculi drew Turenne to the valley of the Tauber; then, having persuaded the bishop of Wiirzburg to surrender the bridge of that place, he passed to the right bank of the Main before Turenne could intervene. The Imperialists soon arrived at Frankfort, and the French position was turned. Montecucculi thus achieved one of the greatest objects of the 17th century strategist, the wearing do wn of the enemy in repeated and useless marches. The French retreat to the Rhine was painful and costly, and Montecucculi then passed that river at Mainz and made for Trier. Turenne followed, unable to do more than conform to his opponent's movements, and took post to defend Trier and Alsace. There- upon Montecucculi turned northward to meet William of Orange, who evaded Conde's weak army and marched rapidly via Venlo (22nd October) on Coblenz. The elector of Trier, who had not forgotten the

depredations of Louis' army in the spring, followed the example of the bishop of Wiirzburg and gave a free passage at Coblenz. William and Montecucculi joined forces in the electorate and promptly besieged Bonn. This fortress fell on the 1 2th of November, and the troops of the coalition gained possession of an unbroken line from Amsterdam to the Breisgau, while Louis' German allies (Cologne and Munster), now isolated, had to make peace at once. William wintered in Holland, Montecucculi in Cologne and Jiilich, and the Spaniards, who had served with William, in their own provinces of the Meuse. A century after the outbreak of the War of Independence the Dutch and the Spaniards are thus found making war as allies, a striking proof of the fact that all questions but those of dynastic interests had been effectually settled by the peace of Westphalia. Louis' allies were leaving him one by one. The German princes and the empire itself rallied to the emperor, Denmark joined the coalition (January 1674), the Great Elector re-entered the war, and soon afterwards England made peace.

1674. — In 1674 therefore Louis reluctantly evacuated those of the United Provinces occupied by his army. He had derived a considerable revenue from the enemy's country, and he had moreover quartered his troops without expense. The resources of the French government were almost intact for the coming campaign; the corps of observation in Roussillon was continued, and its commander, Marshal Schomberg, made a successful campaign against the Spaniards, and the war was carried even into Sicily. Conde, in the Spanish Low Countries, opposed with inferior forces the united army of Spaniards, Dutch and Austrians under William, and held the Meuse from Grave to Charleroi on the Sambre. The war in this quarter was memorable for Conde's last, and William's first, battle, the desperate and indecisive engagement of Seneffe (August nth), in which the two armies lost one-seventh of their strength in killed alone. The

1 Marshal Luxemburg, who was left in command of the army in Holland during the winter of 1672-73, had indeed made a bold attempt to capture Leiden and the Hague by marching a corps from Utrecht across the frozen inundations. But a sudden thaw imperilled his force and he had to make a painful retreat along the ,dykes to Utrecht. Holland was again inundated in 1673.

French, however, in the course of the year lost a few fortresses on the Meuse, including Grave and Huy. The king's part in ' the campaign was, as usual, a war of sieges; an army under his personal command overran Franche-Comte in six weeks, and Louis, aided by the genius of Vauban, reduced Besanc on in nine days. Turenne's Rhine campaign began with an invasion of Germany, undertaken to prevent interference with Louis in Franche-Comte. Bournonville, the imperial commander who now replaced Montecucculi, lay in the Cologne and Trier electorates. An army of South Germans in the Breisgau, after an unsuccessful attempt to invade Alsace, moved northward to the Neckar valley with the intention of uniting with Bournon- ville, who was moving up the Rhine to meet them. Turenne determined to attack the southern army under the duke of Lorraine and Count Caprara before the junction could be effected. He crossed the Rhine at Philipsburg early in June, and on the 16th fell upon the inferior forces of Caprara in their entrenched position of Sinsheim. The result of the battle was a complete victory for the French, who followed up their success by driving a portion of Bournonville's army (on which the duke of Lorraine had rallied his, forces) from the Neckar (action of Ladenburg near Heidelberg, July 7th). Turenne then laid waste the Palatinate, in order that it should no longer support an army, and fell back over the Rhine, ignoring the reproaches of the elector palatine, who vainly challenged him to a duel. This devastation has usually been considered as a grave stain on the character of the commander who ordered it, but Turenne's conception of duty did not differ in this respect from that of Cromwell, Marlborough, Wellington and the generals of the American Civil War. It was held to be necessary and expedient, and it was accordingly carried out. Bournonville's army near Frankfort was still to be dealt with, and the Great Elector and his Brandenburgers were rapidly approaching the Main valley. After a slight attempt to invade Lorraine, which Turenne easily stopped, the Imperialists suddenly recrossed the Rhine and marched rapidly into the neighbourhood of the Strassburg bridge.

Turenne's Winter Campaign in Alsace. — The magistrates of this city were not less amenable than had been the bishop of Wiirzburg in 1673. Bournonville obtained a free passage, and Turenne was too late to oppose him. The French general, however, determined to fight, as he had done at Sinsheim, to prevent the junction of the two hostile armies. The Great Elector was still in the Neckar valley when the battle of Enzheim (8 m. from Strassburg) was fought on the 4th of October. This time it was indecisive, arid Bournonville's superior forces, soon augmented by the arrival of the elector, spread into

Alsace. Turenne steadily retired to his camp of Dettweiler, unable for the moment to do more, and the Germans took up winter quarters in all the towns from Belfort to Strassburg (October- November 1674). But Turenne was preparing for another winter campaign, the most brilliant in the great commander's career.

First he placed the fortresses of middle Alsace in a state of defence, to deceive the enemy. Then he withdrew the whole of the field army quietly into Lorraine. Picking up on his way such reinforcements as were available, he marched southward with all speed behind the Vosges, and in the last stages of the movement he even split up his forces into many small bodies, that the enemy's spies might be misled. After a severe march through hilly country and in the midst of snowstorms, the French reunited near Belfort, and without a moment's delay poured into Alsace from the south. The scattered Imperialists were driven towards Strassburg, every corps which tried to resist being cut off. Bournonville stood to fight at Miilhausen with such forces as he could collect (29th December 1674) but Turenne's men carried all before them. The advance continued to Colmar, where the elector, who was now in command of the Germans, stood On the defensive with forces equal to Turenne's own. The battle of Turkheim (5th of January 1675) nevertheless resulted in another and this time a decisive victory for the French; a few days after the battle Turenne could report that

there was not a soldier of the enemy left in Alsace. His army now went into winter quarters about Strassburg, and drew supplies from the German bank of the Rhine and even from the Neckar valley (January 1675).

1675. — This opening of the campaign promised well, and Louis as usual took the field as early as possible. In the course of the spring (May- June) the king's army recaptured some of the lost fortresses of the Meuse and took in addition Liege and Limburg. The expeditionary corps in Sicily also gained some successes in this campaign, and Schomberg invaded Catalonia. On the Rhine was fought the last campaign of Turenne and Montecucculi. The elector having withdrawn his forces to Brandenburg (see Sweden: History), Montecucculi resumed command, and between Philipsburg and Strassburg the two great commanders manoeuvred for an advantage, each seeking to cover his own country and to live upon that of the enemy. At last Turenne prevailed and had the Imperialists at a dis-advantage on the Sasbach, where, in opening the action, he was killed by a cannon-shot (July 27th). The sequel showed how dependent was even the best organized army of the time upon the

personality of its commander.

All the advantages won were hastily surrendered, and Montecucculi, sharply following up the retreat of the French, drove them over the Rhine and almost to the Vosges. At the same time the duke of Lorraine defeated Marshal Crequi (August nth) at Conzer Briicke on the Moselle, and recaptured Trier (September 6th), which, as a set-off against Bonn, Turenne had taken in the autumn of 1673. The situation was more than alarming for the French, but Conde was destined to achieve a last success — for once a success of careful strategy and prudent manoeuvre. Luxemburg was left in charge in Flanders, and the prince took command of the remnant of Turenne's old army and of the fugitives of Crequi's. Montecucculi's skill failed completely to shake his position, and in the end the prince compelled him to retire over the Rhine. Conde and Montecucculi retired from their commands at the close of the year, Turenne was dead, and a younger generation of commanders henceforward carried on the war.

1676. — In 1676 the naval successes of France in the Mediterranean enabled the corps under Marshal Vivonne in Sicily to make considerable progress, and he won an important victory at Messina on the 25th of March. Vivonne was made viceroy of Sicily. Louis himself, with his marshals and Vauban, conducted the campaign in the north. The town of Conde fell on the 26th of April, and the king then manoeuvred against the prince of Orange in the neighbourhood of Valenciennes. An attempt made by the latter in the summer to besiege Maastricht was frustrated by Marshal Schomberg with a detachment of the king's army (August). Rochefort meanwhile covered the Meuse country and Luxemburg. Crequi, who had now returned from captivity (he had been taken after the battle of Conzer Briicke) opposed the Imperialists in Lorraine, but he was unable to prevent the fall of Philipsburg, which occurred on the 17 th of September. The French now laid waste the land between the Meuse and Moselle for the same reason which brought about the devastation of the Palatinate in 1674, and the year closed with a war of manoeuvre on the upper Rhine between the Im- perialists under the duke of Lorraine and the French under Luxemburg.

167J. — The chief event of the campaign of 1677 in the Netherlands was the siege of Valenciennes, which fortress was invested by Louis in the first weeks of the campaigning season. Five marshals of France served under the king in this enterprise, but their advice was of less value than that of Vauban, whose plans the king followed implicitly, even so far as to order an assault de vive force against the unanimous opinion of the marshals. This succeeded beyond Vauban's

own expectation; the picked troops entrusted with the attack of an outwork forced their way into the town itself (March 17th). The success was followed by the siege of St Omer and the defeat of William's relieving army by the duke of Orleans (battle of Mont Cassel, April nth, 1677). The summer campaign was a contest of skill

between Luxemburg and William, which resulted in favour of the French. The prince of Orange failed in an attempt to take Charleroi, and Marshal D'Humieres captured St Ghislain.

In Germany the credit of the French successes was due to Crequi, who was no longer the defeated general of Conzer Briicke, but the most successful of Turenne's pupils. He began by driving back the duke of Lorraine to the Rhine. Another attempt by the Lorraine family to reconquer their duchy was thus foiled, and at the same time a second imperial army under the duke of Saxe-Eisenach, which had crossed the Rhine by Philipsburg, was shut up in an island of the Rhine and forced to make terms with the French. A large reinforcement sent by the duke of Lorraine to the assistance of Saxe-Eisenach was completely defeated by Crequi in the battle of Kochersberg near Strassburg (October 7th) and the marshal followed up his successes by the capture of Freiburg on the 14th of November. During the year there was a brisk war in the West Indies, and also in Catalonia, where the French maintained the ground won by Schomberg in the previous campaign.

1678. — In 1678 Louis took the field in February. The skilful manoeuvres of the French, whether due to Louis' own generalship or that of his advisers, resulted in the speedy capture of Ghent and Ypres (March), and the retention of the prizes in the usual war of posts which followed. The last battle of the war was fought at St Denis (outside Mons) between William and Luxem- burg on the 14th of August, three days after the peace of Nijm- wegen had been concluded. William sustained another defeat, but the battle was one of the most fiercely contested of the whole war. On the Rhine, Crequi began by winning the battle of Rheinfelden (July 6th), after which he inflicted upon the Im- perialists another defeat at Gengenbach (July 23rd) and took Kehl. In the short campaign of 1670, before France and the empire had concluded peace, he was equally successful.

In Spain the French army under Marshal de Navailles had also made steady progress, and thus the last campaign was wholly in favour of the French. The peace of Nijmwegen gave Louis many of the Netherlands frontier fortresses, and little else. He was threatened by the intervention of England on the side of the coalition, and would have made peace earlier but for his reluctance to abandon his ally Sweden. The French army had, however, well established its reputation. Vauban was unique amongst the officers of his time, and Crequi and Luxem- burg were not unworthy successors of Turenne and Conde. The two marshals added to their reputation in the " Reunion War " of 1680-84. Crequi died in 1684 at the age of sixty-one, Luxemburg's greatest triumph was won ten years later (see Grand Alliance, War of the). Vauban retired from active service as a marshal twenty-five years after the peace of Nijm- wegen. But the interest of the war does not reside wholly in the personalities of the leaders. There were great commanders before Turenne and Conde. It is as the debut of a new method of military organization and training — the first real test of the standing army as created by Louvois — that the Dutch War of 1672-79 is above all instructive. (C. F. A.)

DUTCH WEST INDIA COMPANY, THE {De W estindische Compagnie), a company founded by letters-patent from the Netherlands states-general dated the 3rd of June 1621. The purpose for which the company was formed was to regulate and protect the contraband trade already carried on by the Dutch in the American and African possessions of Spain and Portugal, and to establish colonies on both continents and their islands. By the terms of the charter the company was to be composed of five boards or branches, established in Amsterdam, Zealand, the Meuse (Rotterdam), the North Department (Friesland and Hoorn), and Groningen. Each was to be represented on the general governing board according to the importance of the capital contributed by it. Thus Amsterdam, which contributed four-ninths of the capital, had eight directors on the board. Zealand, which subscribed two-ninths, had four. Rotterdam was represented by two directors, though it only contributed one-ninth. The northern district and Groningen, which each contributed one-ninth, appointed one director each. Another

director was appointed by the states-general. In 1629 a ninth representative was given to Amsterdam, and the strength of the whole board was fixed at nineteen.

The company was granted the monopoly of the trade with America and Africa and between them, from the Arctic regions to the Straits of Magellan, and from the Tropic of Cancer to the Cape of Good

Hope. The policy the company proposed to follow was to use its monopoly on the coast of Africa in order to secure the cheap and regular supply of negro slaves for the possessions it hoped to acquire in America. The trade was thrown open by the voluntary action of the company in 1638. The general board was endowed with ample power to negotiate treaties, and make war and peace with native princes; to appoint its officials, generals and governors; and to legislate in its possessions subject to the laws of the Netherlands. The states- general undertook to secure the trading rights of the company, and to support it by a subvention of one million guilders (about £100,000). In case of war the states-general undertook to con- tribute sixteen vessels of 300 tons and upwards for the defence of the company, which, however, was to bear the expense of maintaining them. In return for these aids the states-general claimed a share in the profits, stipulated that the company must maintain sixteen large vessels (300 tons and upwards) and fourteen " yachts " (small craft of 50 to 100 tons or so) ; required that all the company's officials should take an oath of allegiance to themselves as well as to the board of directors; and that all despatches should be sent in duplicate to themselves and to the board.

The history of the Dutch West India Company is one of less prosperity than that of the Dutch East India Company. In early days the trade was not sufficient to meet the heavy expense of the armaments raised against Spain and Portugal. A com- pensation was found in the plunder of Spanish and Portuguese galleons and carracks. In 1628 the company's admiral Piet Heijn captured a vast booty in the Spanish treasure-ships. But this source of profit was dried up by the success of the company's cruisers, which destroyed their enemy's trade. Profit had to be sought in the development of the colonies established on the continent of America. In this field the successes of the company were counterbalanced by not a few failures. The company was never able to secure the control of the supply of slaves from Africa. Its settlement of New Netherland was lost to England. In the West Indies it gained a valuable footing among the islands. It occupied St Eustatius in 1634, Curacao with Bonaire and Aruba in 1634 and 1635, Saba in 1640 and St Martin in 1648. But its greatest conquests and its greatest losses were alike met on the continent of South America. After a first unsuccessful occupation in 1623 of Bahia, which was immediately retaken by a combined Spanish and Portuguese armament, the company obtained a firm footing in Pernambuco. The story of the wars which arose out of this invasion belongs to the history of Brazil. The company had been largely guided in its policy of assailing the Portuguese

possessions by the advice of the Jews, who were numerous in Brazil, and who found means to communicate with their fellows in religion, the refugees in Amsterdam. The most prosperous period of the company was during the tolerant and liberal administration of Count John Maurice of Nassau-Siegen

(1 636-1 644).

The monopolist tendency of all Dutch colonization, the religious hostility of the Roman Catholic Portuguese, and the support given by France and England to Portugal after her revolt from Spain, combined at last to make the position of the company in Brazil untenable. It resigned all claim on the country by the treaty of 1661. But though deprived of its establishment in Brazil, the company found a compensation in Surinam and Essequibo (Dutch Guiana), where there was no Spanish or Portuguese population to resist it, and where the resources of the country offered great profits. The advantages of the settlement in Guiana were not, however, reaped by the company founded in 162 1 . In 1674 it had become so embarrassed that it was dissolved, and reconstructed in 1675. The newly formed company continued to exploit the Dutch possessions in

America till 1794, when they were all swept into the general reorganization consequent on the French invasion of Holland. The West India Company founded after the Napoleonic epoch in 1828 was only meant to develop trade, and was not successful.

Authorities. — P. M. Nitscher, Les Hollandais au Brisil (the Hague, 1853), the work of a Dutch author writing in French. See also Southey, History of Brazil (London, 1 8 10), and E. B.O'Callaghan, History of New Netherland (New York, 1 846-1 848).

DUTENS, LOUIS (1730-1812), French writer, was born at Tours, of Protestant parents, on the 15th of January 1730. He went to London, where his uncle was a jeweller, and there obtained a situation as tutor in a private family. In this position he learnt Greek and mathematics, and studied oriental languages, also Italian and Spanish. He took orders, and was appointed chaplain and secretary to the English minister at the court of Turin in October 1758. In 1760-1762 he was charge d'affaires at Turin. Lord Bute, before retiring from office in 1763, procured him a pension. He again went

to Turin as charge d'affaires ; and during this second mission he collected and published a complete edition of the works of Leibnitz (Geneva, 6 vols., 1768) and wrote his Recherches sur Forigine des dicouvertes attributes aux modernes (1766). On his return to England the duke of Northumberland procured him the living of Elsdon, in Northumberland, and made him tutor to his son. In 1 7 7 5 he became a member of the French Academy of Inscriptions and a fellow of the Royal Society. Dutens was for a third time charge d'affaires at Turin. He was in Paris in 1783, and returned to London the following year. He died in London on the 23rd of May 1812.

The principal works of Dutens were his Recherches surl'origine des dicouvertes attributes aux modernes (1766, 2 vols.); Appel au bon sens (London, 1777, 8vo), directed in defence of Christianity against the French philosophers, and published anonymously; Explication de quelques medailles de peuples, de rois et de vittes grecques et phiniciennes (London, 1773); Explication de quelques medailles du cabinet de Duane (1774); Troisieme dissertation sur quelques medailles grecques et phiniciennes (1776); Logique, ou Vart de raisonner (1773); Des pierres precieuses et des pierres fines, avec les moyens de les connattre et de les evaluer (Paris, 1776); Itiniraire des routes les plus frequenties, ou journal d'un voyage aux principales villes d' Europe (Paris, 1775), frequently republished; Considerations theologiques sur les moyens de riunir toutes les iglises chritiennes (1798); CEuvres melies, containing his most important works pub- lished up to the date (London, 1797, 4 vols.); V Ami des itrangers qui voyagent en Angleterre (1789, 8vo) ; Histoire de ce qui s'est passe pour le ritablissement d'une regence en Angleterre (1789) ; Recherches sur le tems le plus reculi de V usage des voutes chez les anciens (1795) ; Memoires d'un voyageur qui se repose (Paris, 1786, 3 vols.). The first two volumes of the last-named work contain the life of the author, written in a romantic style: the third bears the title of Dutensiana, and is filled with remarks, anecdotes and bons mots. (See memoir of Dutens in the Gentleman's Magazine for 1812.)

DUTROCHET, RENfi JOACHIM HENRI (1776-1847), French physiologist, was born at Chateau de Neon (Indre) on the 14th of November 1776, and died at Paris on the 4th of February 1847. In 1799 he entered the military marine at Rochefort, but soon left it to join the Vendean army. In 1802 he began the study of medicine at Paris; and he was subsequently appointed chief physician to the hospital at Burgos. After an attack of typhus he returned in 1809 to France, where he devoted himself to the study of the natural sciences. His scientific publications were numerous, and covered a wide field, but his most noteworthy work was embryological. His "

Recherches sur l'accroissement et la reproduction des vegetaux," published in the Memoires du musium d' histoire naturelle for 1821, procured him in that year the French Academy's prize for experimental physiology. In 1837 appeared his Memoires pour servir a I 'histoire anatomique et physiologique des vegStaux et des animaux, a collection of all his more important biological papers.

DUTT, MICHAEL MADHU SUDAN (1824-1873), the greatest native poet of India in the 19th century, was born at Sagandari, in the district of Jessore in Bengal, on the 25th of January 1824. His father was a pleader in Calcutta, and young Madhu Sudan received his education in the Hindu college of Calcutta, and was the foremost among the distinguished young students of his day, many of whom lived to make their mark in the literature and social progress of their country. Madhu Sudan left the college in 1842, and in the following year ran away to avoid a marriage into

which his father wished to force him, and embraced the Christian religion. Continuing his studies now in the Bishop's college, Madhu Sudan learnt Greek and Latin and some modern European languages, and in 1848 went to Madras. There he wrote English verses, and married the daughter of a European indigo-planter, but was soon separated from her. He then united himself with an English lady, the daughter of an educational officer; and she remained true to him through life amidst all his misfortunes, and was the mother of the children he left. With her Madhu Sudan returned to Calcutta in 1856, and soon discovered that the true way for winning literary distinction was by writing in his own language, not by composing verses in English. His three classical dramas — Sarmishtha, Padmavati, and Krishna Kumari — appeared between 1858 and 1861, and were recognized as works of merit. But his great ambition was to introduce blank verse into Bengali. His knowledge of Sanskrit poetry, his appreciation of the Greek and Latin epics, and his admiration of Dante and of Milton, impelled him to break through the fetters of the Bengali rhyme, and to attempt a spirited and elevated style in blank verse. His first poem in blank verse, the Tilottama, was only a partial success; but his great epic which followed in 1861, the Meghanad-Badha, took the Indian world by surprise, and at once established his reputation as the greatest poet of his age and country. He took his story from the old Sanskrit epic, the Ramayana, but the beauty of the poem is all his own, and he imparted to it the pathos and sweetness of Eastern ideas com- bined with the vigour and loftiness of Western thought. In 1862 Madhu Sudan left for Europe. He lived in England for some years, and was called to the bar; and in 1867 returned to his country to practise as

a barrister in Calcutta. But the poet was unfitted for a lawyer's vocation ; his liabilities increased, his health failed, his powers declined. He still wrote much, but nothing of enduring merit. His brilliant but erratic life ended in a Calcutta hospital on the 29th of June 1873.

DUTY (from " due," that which is owing, O. Fr. deu, dti, past participle of devoir; Lat. debere, debitum; cf. " debt "), a term loosely applied to any action or course of action which is regarded as morally incumbent, apart from personal likes and dislikes or any external compulsion. Such action must be viewed in relation to a principle, which may be abstract in the highest sense (e.g. obedience to the dictates of conscience) or based on local and personal relations. That a father and his children have mutual duties implies that there are moral laws regulating their relation- ship; that it is the duty of a servant to obey his master within certain limits is part of a definite contract, whereby he becomes a servant engaging to do certain things for a specified wage. Thus it is held that it is not the duty of a servant to infringe a moral law even though his master should command it. For the nature of duty in the abstract, and the various criteria on which it has been based, see Ethics.

From the root idea of obligation to serve or give something in return, involved in the conception of duty, have sprung various derivative uses of the word; thus it is used of the services performed by a minister of a church, by a soldier, or by any employee or servant. A special application is to a tax, a payment due to the revenue of a state, levied by force of law. Properly a " duty " differs from a " tax " in being levied on specific com- modities, transactions, estates, &c, and not on individuals; thus it is right to talk of import-duties, excise-duties, death- or succes- sion-duties, &c, but of income-tax as being levied on a person in proportion to his income.

DU VAIR, GUILLAUME (1556-1621), French author and lawyer, was born in Paris on the 7th of March 1556. Du Vair was in orders, and, though during the greater part of his life he exercised only legal functions, he was from 1617 till his death bishop of Lisieux. His reputation, however, is that of a lawyer, a statesman and a man of letters. He became in 1584 counsellor of the parlement of Paris, and as deputy for Paris to the Estates of theLeague he pronounced his most famouspolitico-legal discourse, an argument nominally for the Salic law, but in reality directed against the alienation of the crown of France to the Spanish in- fanta, which was advocated by the extreme Leaguers. Henry IV.

a rknowledged his services by entrusting him with a special commission as magistrate at Marseilles, and made him master of requests. In 1595 appeared his treatise De I' Eloquence francaise et des raisons pour quoi elle est demeuree si basse, in which he criticizes the orators of his day, adding by way of example some translations of the speeches of ancient orators, which reproduce the spirit rather than the actual words of the originals. He was sent to England in 1596 with the marshal de Bouillon to negotiate a league against Spain; in 1599 he became first president of the parlement of Province (Aix); and in 1603 was appointed to the see of Marseilles, which he soon resigned in order to resume the presidency. In 1616 he received the highest promotion open to a French lawyer and became keeper of the seals. He died at Tonneins (Lot-et-Garonne) on the 3rd of August 1621. Both as speaker and writer he holds a very high rank, and his character was equal to his abilities. Like other political lawyers of the time, Du Vair busied himself not a little in the study of philo- sophy. The most celebrated of his treatises are La Philosophie morale des Stoiqties, translated into English (1664) by Charles Cotton; De la Constance et consolation es catamite's publiques, 1 which was composed during the siege of Paris in 1589, and applied the Stoic doctrine to present misfortunes; and La Sainte Philosophie, in which religion and philosophy are intimately connected. Pierre Charron drew freely on these and other works of Du Vair. F. de Brunetiere points out the analogy of Du Vair's position with that afterwards developed by Pascal, and sees in him the ancestor of the Jansenists. Du Vair had a great indirect influence on the development of style in French, for in the south of France he made the acquaintance of Malherbe, who conceived a great admiration for Du Vair's writings. The reformer of French poetry learned much from the treatise De VMoquence franqaise, to which the counsels of his friend were no doubt added. Du Vair's works were published in folio at Paris in 1641. See Niceron, Memoires, vol. 43; and monographs by C. A. Sapey (1847 and 1858).

DUVAL, ALEXANDRE VINCENT PINEUX (1767-1842), French dramatist, was born at Rennes on the 6th of April 1767. He was in turn sailor, architect, actor, theatrical manager and dramatist. He is the characteristic dramatist of the Empire, but the least ambitious of his dramas have best stood the test of time. Les Projets de manage (1790), Les Tuteurs venggs (1794) and Les Heritiers (1796) have been revived on the modern French stage. Others among his plays,

which number more than sixty, are Le Menuisier de Livonie (1805), La Manie des grandeurs (18 17) and Le Faux Bonhomme (1821). Ini8i2he was elected to the Academy. He died on the 1st of September 1842.

DUVAL, CLAUDE (1643-1670), a famous highwayman, was born at Domfront, Normandy, in 1643. Having entered domestic service in Paris, he came to England at the time of the Restoration in attendance on the duke of Richmond, and soon became a highwayman notorious for the daring of his robberies no less than for his gallantry to ladies. Large rewards were offered for his capture, and he was at one time compelled to seek refuge in France. In the end he was captured in London, and hanged at Tyburn on the 21st of January 1670. His body was buried in the centre aisle of Covent Garden church, under a stone with the following epitaph: — •

" Here lies Du Vail : Reader if male thou art, Look to thy purse: if female to thy heart."

A full account of his adventures, ascribed to William Pope, was reprinted in the Harleian Miscellany, and Samuel Butler published a satirical ode To the Happy Memory of the Most Renowned Du Val.

DUVENECK, FRANK (1848-), American figure and portrait painter, was born at Covington, Kentucky, on the 9th of October 1848. He was a pupil of Diez in the Royal Academy of Munich, and a prominent member of the group of Americans who in the 'seventies overturned the traditions of the Hudson River School and started a new art movement. His work shown in Boston and elsewhere about 1875 attracted great attention,

1 Translated into English by Andrew Comt in 1622 as A Buckler against Adversitie.

and many pupils flocked to him in Germany and Italy, where he made long visits. After returning from Italy to America, he gave some attention to sculpture, and modelled a fine monument to his wife, now in the English cemetery in Florence.

DU VERGIER DE HAURANNE, JEAN (1581-1643), abbot of St Cyran, father of the Jansenist revival in France, was born of wealthy parents at Bayonne in 1581, and studied theology at the Flemish university of Louvain. After taking holy orders he settled in Paris, where he became known as a mine of miscel- laneous erudition. In

1609 he distinguished himself by his Question royale, an elaborate answer to a problem casually thrown out by King Henry IV. as to the exact circumstances under which a subject ought to give his life for his sovereign. His learning was presently diverted into a more profitable channel. The Louvain of his time was the scene of many conflicts between the Jesuit party, which stood for scholasticism and Church-authority, and the followers of Michael Baius (q.v.), who upheld the mysticism. of St Augustine. Into this con- troversy Du Vergier was presently dragged by his friendship with Cornelius Jansen, a young champion of the Augustinian party, who had come to Paris to study Greek. The two divines went off together to Du Vergier's home at Bayonne, where he became a canon of the cathedral, and Jansen a tutor in the bishop's seminary. Here they remained some years, intently studying the fathers. Eventually, however, Jansen went back to Louvain, while Du Vergier became confidential secretary to the bishop of Poitiers, and was presently made sinecure abbot of St Cyran. Thereafter he was generally called M. de St Cyran. At Poitiers he was brought into contact with Richelieu — as yet unknown to political fame, and simply the zealous young bishop of the neighbouring diocese of Lucon. Western Touraine being the headquarters of French Protestantism, the two prelates turned St Cyran's learning against the Huguenots. He began to dream of reforming Catholicism on Augustinian lines, and thus defeating the Protestants by their own weapons. They appealed to primitive antiquity; he answered that his Church understood antiquity better than theirs. They appealed to the spirit of St Paul; he answered that Augustine had saved that spirit from etherealizing away, by coupling it with a high sacra- mental theory of the Church. They flung practical abuses in the teeth of Rome; he entered on a bold campaign to bring those abuses to an end. Before long, his reforming zeal involved him in many quarrels — so much so that he left Poitiers and settled down in Paris. Here he became widely known as a director of consciences, forming a particular friendship with the influential Arnauld family. But his general projects of reform were by no means allowed to sleep, though here he worked hand in hand with his old friend Jansen. Both traced the evils of their time to the Jesuits and Schoolmen. Their dialectic had corrupted theology; their hand-to-mouth utilitarianism had played havoc with traditional church-institutions. Accordingly, Jansen set to work to remedy one evil by writing a big book on St Augustine, the great master of theological method. St Cyran dealt with the other evil in an equally bulky treatise, the Petrus Aurelius (1633). This indicts the Jesuits for every sort and kind of misdemeanour. It deals much with what Pascal will presently call their divotion aisie; but still more with

crimes of a technical sort, especially their defiance of episcopal authority. Thereby the book gained for its author's projects of reform a great deal of Gallican support. On the other hand, it gave much annoyance to Richelieu, now the all-powerful and extremely Erastian prime minister. After failing more than once to stop St Cyran's mouth with a bishopric, he had him arrested as a disturber of ecclesiastical peace (14th of March 1638). He remained shut up in the castle of Vincennes until Richelieu's death (December 1642). Then he was at once set free; but the long imprisonment had told heavily on his health, and he died of a stroke of apoplexy in October 1643.

St Cyran's character has been always something of a puzzle. Many excellent contemporary judges were profoundly impressed; others, as one of them said, went away bewildered by this strange abbe, who never argued a question out, but leapt from

one point to another in broken, incoherent phrases. Grace of expression he had none; perhaps no man of equal spiritual insight ever found it so hard to make his meaning clear, whether on paper or by word of mouth. On the other hand, Jansenism, considered as a practical religious revival, is altogether his work. He dragged the Augustinian mysticism out of the Louvain class- rooms, and made it a vital spiritual force in France. Without him there would have been no Pascal — no Provincial Letters, and no Pensies.

There is an excellent life of St Cyran by his secretary, Claude Lancelot, published at Cologne in two volumes, 1738. A selection of his Lettres chrestiennes was edited by his disciple, Robert Arnauld d'Andilly (Paris, 1645). An entirely different collection of Lettres spirituelles was printed at Cologne in 1744. (St C.)

DUVEYRIER, HENRI (1840-1892), French explorer of the Sahara, was born in Paris on the 28th of February 1840. His youth was spent partly in London, where he met Heinrich Barth, then preparing the narrative of his travels in the western Sudan. At the age of nineteen Duveyrier, who had already learnt Arabic, began a journey in the northern parts of the Sahara which lasted nearly three years. On returning to France he received, in 1863, the gold medal of the Paris Geographical Society, and in 1864 published Exploration du Sahara: les Touareg du nord. In the war of 1870 he was taken prisoner by the

Germans. Subse- quently he made several other journeys in the Sahara, adding considerably to the knowledge of the regions immediately south of the Atlas, from the eastern confines of Morocco to Tunisia. He also examined the Algerian and Tunisian shats and explored the interior of western Tripoli. Duveyrier devoted special attention to the customs and speech of the Tuareg, with whom he lived for months at a time, and to the organization of the Senussi. In 1881 he published La Tunisie, and in 1884 La Confririe musselmane de Sidi Mohammed Ben Ali-Es-Senousi et son domaine gSographique. He died at Sevres on the 25th of April 1892.

DUX (Czech Duchcov), a town of Bohemia, Austria, 86 m. N.N.W. of Prague by rail. Pop. (1900) 11,921, three-fourths German. It is situated in the centre of an extensive and well- worked lignite deposit and manufactures glass, porcelain and earthenware. In Dux is a castle belonging to Count Waldstein, a kinsman of Wallenstein, which contains a picture gallery with two portraits of Wallenstein by Van Dyck, and a museum with a collection of arms and armour and several relics of the great general.

DUXBURY, a township of Plymouth county, Massachusetts, on Massachusetts Bay, 36 m. S.S.E. of Boston. Pop. (1890) 1908; (1905, state census) 2028. Area, 25-5 sq. m. Duxbury is served by the Old Colony system of the New York, New Haven & Hartford railway. In the township are the villages of Duxbury, South Duxbury, West Duxbury, North Duxbury, Island Creek and Millbrook. The soil is sandy, the surface of the country well wooded and broken by a number of ponds and creeks. Duxbury is a summer resort, with a large hotel at Standish Shore. Duxbury has a public library, and is the seat of the Powder Point school for boys, and Partridge Academy, founded in 1828 by a bequest of $10,000 from George Partridge of Duxbury, and incorporated in 1830. On Captain's Hill is the Standish Monument (begun in 1872), a circular tower, on an octagonal base, of rough Hallowell granite, surmounted by a statue of Miles.Standish, 124 ft. from the ground. The Standish house, built in 1666 by Miles's son, Alexander, is still in existence. In South Duxbury is an old burying ground, in which the oldest marked grave is that of Jonathan Alden (d. 1697), son of John Alden. For many years there were important cod and mackerel fisheries here and Duxbury clams were famous ; there were large shipyards in Duxbury in the 18th century. and in the first half of the 19th. At present cranberries are the only product of import- ance. The first settlement was made here in 163 1 by Miles Standish (to whom Captain's Hill was granted) , William Brewster, John Alden, and a few others. In 1632 a church was organized and the present name was adopted

from Duxbury Hail, Lanca- shire, the old seat of the Standish family; the Indian name had been Mattakeeset, The township was incorporated in 1637; it

originally included Bridgewater and parts of Pembroke and Kingston.

See Justin Winsor, History of Duxbury (Boston, 1849); and Laurence Bradford, Historic Duxbury in Plymouth County (Boston,

1900).

DVINA, the name of two rivers of European Russia.

1. The Northern Dvina, or Dvina Syevernaya, belongs to the basin of the White Sea, and is formed by the junction of the Sukhona and the Yug, which, rising, the former in the south-west and the latter in the south-east of the government of Vologda, meet in the neighbourhood of Velikiy-Ustyug, at a height of 300 ft. above the sea, in 61° 20′ N. and 46° 20′ E. The conjoint stream then flows N. W. to the Gulf of Archangel, which it reaches 50 m. below the city of Archangel. From its mouth to the con- fluence of the co-tributary streams the distance is about 470 m., and to the source of the Sukhona 780 m. The drainage area is estimated at 141,000 sq. m. Except at the rapids the current of the Dvina is comparatively slow, as the average fall per mile is only 9 in. Till its union with the Vychegda, a river which exceeds it in volume, it flows for the most part in a single, well-defined and permanent channel; but below that point it often splits into several branches, and not infrequently alters its course. In the neighbourhood of Archangel it divides into three distinct arms, which form a regular delta; but of these that of Berezov alone is navigable for sea-going vessels, and even it is impeded by a bar at the mouth, with not more than 14ˆ or 1 5! ft. of water at full tide. Just above the point where the delta begins the river is joined by a large tributary, the Pinega, from the right. Above the con- fluence of the Vychegda the breadth is about 1750 ft.; below that point it widens out to 3500 ft.; and near Archangel it attains more than three times that measure. The channel is free from ice for about 174 days in the year. By means of the Duke Alexander of Wiirttemberg Canal, the river is connected with the Neva and the Volga.

2. The Southern Dvina, or Dvina Zapadnaya, in German Diina and in Lettish Daugava, belongs to the Baltic basin, and takes its rise in a small lake about 800 ft. above the level of the sea, in the government of Tver, not far from the sources of the Volga and the Dnieper. After dividing Tver in part from Pskov in part, it skirts the east and south

of the government of Vitebsk, separates part of the latter from Vilna, and then divides Vitebsk and Livonia from Courland, and disembogues in the southern end of the Gulf of Riga. Its length is 640 m. and it drains an area of 32,960 sq. m. From Dvinsk (Dunaburg) to Riga, a distance of 135 m., there is altogether a fall of 295 ft., of which 105 ft. are in the 40 m. from Jakobstadt to Friedrichstadt. In the lower part of its course the river attains an ordinary depth of 3c ft. and an average breadth of 1400 ft.; but during the spring flood it sometimes rises 14 ft. above its usual level, and its waters spread out to a mile in width. Near the mouth the river is . usually free from ice for 245 days in the year, and in the govern- ment of Vitebsk for 229. It is navigable from the confluence of the Mezha (i.e. from Vitebsk) downwards, but the number of rapids and shallows greatly diminishes its value. Navigation can also be carried on by the following tributaries: the Usvyat, Mezha, Kasplya, Ulla, Disna and Bolder-aa. This river was formerly called the Khezin or Turunt, and at the present day it has the name of Polot among the White Russians. Salmon and lampreys abound in its waters. (P. A. K.; J. T. Be.)

DVINSK, the official name since 1893 of Dunaburg, a town and fortress of western Russia, in the government of Vitebsk, 162 m. by rail N.W. of the city of Vitebsk, on the right bank of the Dvina (Diina), in 55° 53′ N. and 26 23′ E., and at the intersection of two main railway lines — Riga-Smolensk and Vilna-St Peters- burg. It is the chief strategic position for the defence of the Dvina. It consists of four portions — the main town, or fortress, the old suburb, the new suburb, and on the left bank of the river the village of Griva. Among the industrial establishments are tanneries and breweries, saw-mills, flour-mills, brick and tile works and limekilns. The town is an important commercial centre, especially for flax, hemp, tallow and timber. The population increased from 25,764 in i860 to 72,231 in 1900,

consisting chiefly of Jews (about 30,000), Lithuanians and Letts.

Dunaburg was originally founded in 1278 by the Livonian Knights of the Sword, about 12 m. farther down the river than its present site, at a spot still known as the Old Castle or Stariy Zamok. In 1559 it was mortgaged by the grand-master of the Knights to Sigismund Augustus, king of Poland. Although captured in 1576 by Ivan the

Terrible of Russia, it was again restored to Poland; and in 1582 Stephen Bathori, king of Poland, transferred the fortress to its present site. In the 17th century it was held alternately by the Swedes and the Russians. It was finally incorporated with Russia in 1772 on the first division of Poland. In July 181 2 the tlte-de-pont was vainly stormed by the French under Oudinot, but a few weeks afterwards the town was captured by them under Macdonald.

DVORAK, ANTON (1841-1904), Bohemian musical composer, born at Nelahozeves (otherwise Muhlhausen) in Bohemia on the 8th of September 1841, was the son of Frantisek Dvofak, a small publican and village butcher. At the door of his father's inn Dvorak first appeared as a practical musician, taking his place among the fiddlers who scraped out their " furiants " and other wild dances for the benefit of the holiday-making local beaux and belles. At the village school he learnt from Josef Spitz both to sing and to play the violin, with so much effect that soon he was able to assist in the parish church services. At twelve years old he was sent by his father to Zlonic, near Schlan, to an uncle, with whom he lived while passing through the higher-grade classes at school. Here, too, he was fortunate enough to find a valuable friend in A. Liehmann, organist and chief musician of the little town, a competent musician, who instructed the boy in elementary theory, organ and pianoforte playing. The theory studies, however, could not long be con- tinued, since Liehmann soon acknowledged in his own dialect that the boy was extraordinarily full of promise (" Aus Tonda, dem Sappermentsbuben 'mal 'was werden konnte "), at the same time realizing that he could not do much to assist. But Dvorak soon left Zlonic for Bohmisch-Kamnitz, where he learnt German and advanced his musical studies under Hancke. A year later he was summoned to return to Zlonic to assist his father, who had set up in business there. But his craving for a musical career was not to be checked, and after considerable trouble with his father consent was obtained to his settling in Prague in order to devote himself entirely to music.

In October 1857 Dvorak entered the organ-school of the Gesellschaft der Kirchenmusik, where he worked for three years. The small financial aid his father was at first able to lend soon ceased, and after being in Prague but a few months Dvorak found himself practically thrown on his own resources. By playing the viola in a private orchestra and in various inns of the town he succeeded in obtaining a precarious livelihood. On the opening in 1862 of the Bohemian Interimstheater, Dvorak, with part of this band, formed the nucleus of the theatrical orchestra, and remained connected with it for eleven years, when he became organist of the church of St

Adalbert. At this time his small stipend was augmented slightly by the fees of a few pupils, though the privations suffered by him and his wife (for he had recently married) must have been great. But in spite of financial worry and of the amount of time he had to devote to his professional duties and private pupils, Dvorak found leisure not only for his own studies of the classics, but also to compose. His work, like his daily life, was beset with difficulties, for he had not the means to provide himself with sufficient music-paper, much less to hire a pianoforte; and it is possible that several of his important early works would never have been written had it not been for the generosity of Karel Bendl, the composer, who helped him in many ways.

Dvorak himself said afterwards that he retained no recollection of much that he then composed. In and about 1864 two sym- phonies, a host of songs, some chamber-music, and an entire ODera, Alfred, lay unheard in his desk. The libretto of this opera was made up from materials found in an old almanack. Most of these works were burnt long ago. In 1873 he made his

first bid for popularity by his patriotic hymn Die Erben des weissen Berges (published many years later as Op. 30). Its reception was enthusiastic, and Dvorak's subsequent works were eagerly awaited and warmly received on production. In 1874 his opera Konig und KBhler resulted in a fiasco at Prague, owing to its mixture of styles. Nothing daunted, DvoMk recomposed the whole work in three months. In 1875, on the recommendation of Brahms and Hanslick, he obtained a stipend from the Kultus-Ministerium at Vienna, which freed him from care and enabled him to indulge in composition to his heart's content. Following on this success came a commission in 1877 for a series of Slavic dances, which took the public by storm. Immediately compositions, old and new, began to pour from the publisher. English sympathy was entirely won by the Stabat Mater in 1883, and increased by the symphonies in D, D mi., and F, G, and E mi. (The American), and the cantata The Spectre's Bride, based on K. J. Erben's elaboration of the Bohemian version of the saga treated in Burger's Leonore. The favourable effect produced by these works was somewhat chilled by the oratorio St Ludmila, a comparatively feeble work written " to suit English taste " for the Leeds Festival of 1886. The three overtures Opp. 91, 92, 93, failed to hold their place, but the pseudo-American symphony has become one of Dvorak's most popular works, and much of his chamber-music, of which there is abundance, seems quite permanent in its place in concert programmes. In 1892, after having frequently visited England, Dvorak became head of the National Conservatory of Music of

America in New York. There he remained till 1895, when he returned to Prague, where he died on the 1st of May

1904.

Dvofak's music is characteristically national, though less purely so than that of Smetana. But in spite of his industry and dramatic talent not one of his operas has been really success- ful. A master of the orchestra and a composer of real individu- ality, he earned and deserved his place among the elect, not only by his great gifts, but by his abnormal energy in their development.

See W. H. Hadow, Studies in Modern Music (second series,

1908).

DWARAKA, Dwarka, or Jigat, a town of British India, in Baroda state, near the extremity of the peninsula of Kathiawar, Bombay. Pop. (1901) 7535. As the birthplace and residence of Krishna, it is the most sacred spot in this part of India, and its principal temple is visited annually by many thousand pilgrims. The approach from the sea is by a fine flight of stone steps, and the great spire rises to a height of 1 50 ft.

DWARF (A.S. dweorg, D. dwerg, Icel. dvergr), the term generally used to describe an extraordinarily under-sized individual of a race of normal stature (for dwarf-races see Pygmy.) In Scandi- navian mythology the word connoted smallness and deformity, and was used of the elfins and goblins who were supposed to live on the mountains or in the bowels of the earth, and to be kings of metals and mines. The later use of the word certainly does not imply deformity, for many of the dwarfs of history have been singularly graceful and well formed. Dwarfishness is, however, often accompanied by disproportion of the limbs.

From the earliest historic times dwarfs attracted attention, and there was much competition on the part of kings and the wealthy to obtain the little folk as attendants. It is certain that members of the tiny Akka race of Equatorial Africa figured at. the courts of the Pharaohs of the early dynasties and were much valued. Philetas of Cos, poet and grammarian (circa 330 B.C.), tutor of Ptolemy Philadelphus, was alleged to be so tiny that he had to wear leaden shoes lest he should be blown away. The Romans practised artificial dwarfing, and the Latin nanus or pumilo were terms alternatively used to describe the natural and unnatural dwarf. Julia, the niece of

Augustus, had a dwarf named Coropas 2 ft. 4 in. high, and a freed-maid Andro- meda who measured the same.

Various recipes for dwarfing children have been from time to time in vogue. The most effective, according to report, was to anoint the backbone with the grease of moles, bats and dormice.

74°

The stunting of the growth of stable-boys who aspire to jockey's honours is in no sense true dwarfing.

In later days there have been many dwarf-favourites at European courts. British tradition has its earliest dwarf mentioned in the old ballad which begins " In Arthur's court Tom Thumb did live "; and on this evidence the prototype of the modern Tom Thumb is alleged to have lived at the court of King Edgar. Of authentic English dwarfs the first appears to be John Jarvis (2 ft. high), who was page to Queen Mary I. Her brother Edward VI. had his dwarf Xit. But the first English dwarf of whom there is anything like an authentic history is Jeffery Hudson (1619-1682). He was the son of a butcher at Oakham, Rutlandshire, who kept and baited bulls for George Villiers, first duke of Buckingham. Neither of Jeffery's parents was under-sized, yet at nine years he measured scarcely 18 in., though he was gracefully proportioned. At a dinner given by the duke to Charles I. and his queen he was brought in to table in a pie out of which he stepped, and was at once adopted by Henrietta Maria. The little fellow followed the fortunes of the court in the Civil War, and is said to have been a captain of horse, earning the nickname of " strenuous Jeffery " for his activity. He fought two duels — one with a turkey-cock, a battle recorded by Davenant, and a second with Mr Crofts, who came to the meeting with a squirt, but who in the more serious encounter which ensued was shot dead by little Hudson, who fired from horseback, the saddle putting him on a level with his antagonist. Twice was Jeffery made prisoner — once by the Dunkirkers as he was returning from France, whither he had been on homely business for the queen; the second time was when he fell into the hands of Turkish pirates. His sufferings during this latter captivity made him, he declared, grow, and in his thirtieth year, having been of the same height since he was nine, he steadily increased until he was 3 ft. 9 in. At the Restora- tion he returned to England, where he lived on a pension granted him by the duke of Buckingham. He was later accused of participation in the " Popish Plot," and was imprisoned in the Gate House. He was released and shortly after died in the sixty-third year of his age.

Contemporary with Hudson were the two other dwarfs of Henrietta Maria, Richard Gibson and his wife Anne. They were married by the queen's wish; and the two together measured only 2 in. over 7 ft. They had nine children, five of whom, who lived, were of ordinary stature. . Edmund Waller celebrated the nuptials, Evelyn designated the husband as the " compendium of a man," and Lely painted them hand in hand. Gibson was miniature painter to Charles I., and drawing-master to the daughters of James II., Queens Mary and Anne, when they were children. This Cumberland pygmy, who began his career as a page, first in a " gentle," next in the royal family, died in 1690, in his seventy-fifth year, and is buried in St Paul's, Covent Garden. The last court dwarf in England was Coppernin, a lively little imp in the service of the princess (Augusta) of Wales, the mother of George III. The last dwarf retainer in a gentle- man's family was the one kept by Mr Beckford, the author of Vathek and builder of Fonthill. He was rather too big to be flung from one guest to another, as used to be the custom at dinners in earlier days when a dwarf was a " necessity " for every noble family.

Of European court dwarfs the most famous were those of Philip IV. of Spain, the hunchbacks whose features have been immortalized by Velazquez. Stanislas, king of Poland, owned Nicholas Ferry (Bebe), who measured 2 ft. 9 in. He was one of three dwarf children of peasant parents in the Vosges. He died in his 23rd year (1764). But Bebe was not so remarkable as Richebourg, who died in Paris in 1858, at the age of 90. He was only 23 in. high. He began life as a servant in the Orleans family. In later years he was their pensioner. He is said to have been put to strange use in the Revolution — passing in and out of Paris as an infant in a nurse's arms, but with despatches, dangerous to carry, in the little man's baby-wrappings !

Of dwarfs exhibited in England, the most celebrated was the Pole, Borulwaski (1739- -%$'))■ At six he measured 17 in., and

he finally in his thirtieth year reached 39 in. He had a sister shorter than himself by the head and shoulders. Borulwaski was a handsome man, a wit, and something of a scholar. He travelled over all Europe; and he — born in the reign of George II. — died in his well-earned retirement near Durham, in the reign of Victoria. Borulwaski lies buried at Durham by the side of the Falstaffian Stephen Kemble. The companionship reminds one of that of the dwarf skeleton of Jonathan Wild by the side of that of the Irish Giant, at the Royal College of Surgeons, London.

In the year in which Borulwaski died, Charles Stratton, better known as " General Tom Thumb," was born. When twenty-five he was 31 in. high. In 1844 he appeared in England, where he had an extraordinary success. One result of his season at the Egyptian Hall, London, was to kill Haydon the painter. The latter presented his great work " The Banishment of Aristides " for exhibition in the same building. The public rushed to see the dwarf. He took £600 the first week, while Haydon's master- piece drew but £7, 13s. The result was that the artist committed suicide in despair. After extensive travel in both hemispheres, Stratton again visited England in 1857, but the dwarf man, despite many personal and intellectual qualities, was less attractive than the dwarf boy. In the year 1863 the " General " married the very minute American lady, Lavinia Warren (born in 1842). He died on the 15th of July 1883.

Other modern dwarfs include Signor Hervio Nano, who played at the Olympic Theatre, London, in 1843; three Highlanders named MacKinlay, children of a Scots shepherd, the shortest of whom was 45 in. ; a Spaniard, Don Francisco Hidalgo (29 in.) ; a Dutchman, Jan Hannema (28 in.); and Mary Jane Youngman (Australia), who at fifteen was 35 in. high. She was called the " dwarf -giantess " because she was 3 ft. 6 in. round the shoulders, 4 ft. 3 in. round the waist, and 2 ft. round the leg. Much interest was aroused by the so-called Aztec dwarfs who were exhibited in London in 1853. In 1867 the pair were married, the ceremony being publicly performed, and the bride's robes are said to have cost no less than £2000. The wedding-breakfast was held at Willis's Rooms. From time to time other dwarfs have been exhibited, among whom the most remarkable has been Che-mah, a Chinese, 42 years old and 25 in. high, who appeared in London in 1880. George Prout (1774-1851), who was less than 3 ft. high, was a well-known character in London in the early Victorian period, as a messenger at the Houses of Parliament.

See E. J. Wood, Giants and Dwarfs (i860).

DWARS, a tract of country in north-east India. It consists of two divisions, the Western Dwars and the Eastern Dwars, both of which belonged to Bhutan prior to the Bhutan War of 1864-65, as a result of which they passed into possession of the British, when the Eastern Dwars were assigned to Assam and the Western to Bengal. Since 1905 both divisions have been in the province of Eastern Bengal and Assam. The five Eastern Dwars, entitled respectively Bijni, Sidli, Chirang, Ripu and Guma, are situated in the Goalpara district of Eastern Bengal and Assam, forming a strip of flat country lying beneath the Bhutan mountains. It is an unhealthy country for natives

as well as Europeans, and is but slightly developed. The Western Dwars form a region lying at the foot of the Himalayas in the north-east of the Jalpaiguri district of Eastern Bengal and Assam, which comprises nine parganas, namely, Bhalka, Bhatibari, Baxa, Chakao-Kshattriya, Madari, Lakshmipur, Maraghat, Mainaguri and Chengmari. The Western Dwars are an important centre of the tea-planting industry.

DWIGHT, JOHN (d. 1703), the first distinguished English potter. One can only surmise as to his parentage, and the date of his birth has been variously given from 1637 to 1640. Appar- ently he was educated at Oxford, and in 1661 was appointed registrar and scribe to the diocese of Chester, and the same year he proceeded to the degree of B.C.L. of Christ Church, Oxford. He resided at Chester for some time and acted as secretary to four successive bishops. One of these, Bishop Hall, also held the rectory of Wigan, Lancashire, and Dwight seems to have resided in that town, for three of his children were baptized there between

1667 and 1671. In 1671, while he still apparently resided in Wigan, he was granted his first patent for " the mistery of transparent earthenware, commonly known by the names of porcelain or china, and of stoneware, vulgarly called Cologne ware." It is not believed that much, if any, work was executed at Wigan, and he probably removed to Fulham in 1672 or 1673, as his name first appears on the rate books of Fulham, where he was rated for a house in Bear Street, in 1674. He died in 1703, and his business was carried on by his descendants for some time, but with gradually diminishing success. It has been claimed that Dwight made the first porcelain in England, but there is no proof of this, though magnificent specimens of stoneware from his hands are in existence. The British Museum contains a number of the best of Dwight's pieces, of which the finest is the bust of Prince Rupert. Other specimens are in the Victoria and Albert Museum, and they are sufficient to establish Dwight's fame as a potter of the first rank. (See Ceramics.)

DWIGHT, JOHN SULLIVAN (1813-1803), American writer on music, was born at Boston and educated at Harvard. He became a Unitarian minister, but abandoned this career and joined the Brook Farm settlement as a teacher of music and other subjects. In 1848 he settled as a musical critic at Boston, being best known as founder

and editor of the Journal of Music (1852- 1881), the most important musical periodical that has been published in America. He died on the 5th of September 1893.

G. W. Cooke edited his letters (1898) and also wrote a memoir

(1899)-

DWIGHT, THEODORE WILLIAM (1822-1892), American jurist and educationalist, cousin of Theodore Dwight Woolsey and of Timothy Dwight, was born on the 18th of July 1822 in Catskill, New York. His father, Benjamin Woolsey Dwight (1780-1850), an abolitionist and reformer, removed to Clinton, New York, in 1831. The son graduated at Hamilton College in 1840, studied physics under S. F. B. Morse and John William Draper, taught classics in Utica Academy in 1840-1841, and studied law for one year at Yale. He was tutor at Hamilton in 1841-1846, at the same time teaching law privately; was made Maynard professor of law, history, civil polity, and political economy in 1846; received recognition of his law school in 1853, and in 1858 accepted an invitation to Columbia to teach law upon his own condition that he should found a law school. He himself was this school for many years and did not retire from it until 1891, about a year before his death, at Clinton, New York, on the 28th of June 1892. A man of broad culture, he was best known as the founder of a famous school of law and a famous method of legal teaching, which was broadly educational and which called for class-room recitation on the text-book studied and opposed mere "taking notes" on lectures. His questioning was illus- trative and its method Socratic. He was a non-resident pro- fessor of law at Cornell (1869-1871) and at Amherst (1870-1872). Dwight was an able jurist, frequently acted as referee in difficult questions, in 1874-1875 was a judge of the New York commission of appeals, appointed to clear the docket of the court of appeals, and in 1886 was counsel for the five Andover professors charged with heresy. He was a prominent figure in political and social (notably prison) reforms; published in 1867 a Report on the Prisons and Reformatories of the United States and Canada, the result of his labours on a New York state prison commission with Enoch Cobb Wines (1806-1879); favoured indeterminate sen- tences; drew up the bill for the establishment of the Elmira Reformatory; and organized the State Charities Aid Association. He edited Sir Henry Maine's Ancient Law (1864); was associate editor of the American Law Register and legal editor of Johnson's Cyclopaedia; and published Charitable Uses: Argu- ment in the Rose Will Case (1863).

DWIGHT, TIMOTHY (1752-1817), American divine, writer, and educationalist, was born at Northampton, Massachusetts, on the 14th of May 1752. His father, Timothy Dwight, a graduate of Yale College (1744), was a merchant, and his mother was the third daughter of Jonathan Edwards. He was re- markably precocious, and is said to have learned the alphabet at a single lesson, and to have been able to read the Bible before he

was four years old. In 1769 he graduated at Yale College, and then for two years taught in a grammar school at New Haven. He was a tutor in Yale College from 1771 to 1777; and then, having been licensed to preach, was a chaplain for a year in a regiment of troops engaged in the War of Independence, inspiring the troops both by his sermons and by several stirring war songs, the most famous of which is " Columbia." From 1778 until 1783 he lived at Northampton, studying, farming, preaching, and dabbling in politics. From 1783 until 1795 he was pastor of the Congregational church at Greenfield Hill, Connecticut, where he opened an academy which at once acquired a high reputation and attracted pupils from all parts of the Union; From 1795 until his death at Philadelphia, Pennsylvania, on the nth of January 1817, he was president of Yale College, and by his judicious management, by his remarkable ability as a teacher — he taught a variety of subjects, including theology, metaphysics, logic, literature and oratory, — and by his force of character and magnetic personality, won great popularity and influence, and restored that institution to the high place from which it had fallen before his appointment. President Dwight was also well known as an author. In verse he wrote an ambitious epic in eleven books, The Conquest of Canaan, finished in 1774, but not published until 1785; a somewhat ponderous and solemn satire, The Triumph of Infidelity (1 788) , directed against Hume, Voltaire and others; Greenfield Hill (1794), the suggestion for which seems to have been derived from John Denham's Cooper's Hill; and a number of minor poems and hymns, the best known of which is that beginning "I love thy kingdom, Lord." Many of his sermons were published posthumously under the titles Theology Explained and Defended (5 vols., 1818-1819), to which a memoir of the author by his two sons, W. T. and Sereno E. Dwight, is prefixed, and Sermons by Timothy Dwight (2 vols., 1828), which had a large circulation both in the United States and in England. Probably his most important work, however, is his Travels in New England and New York (4 vols., 1821-1822), which contains much material of value concerning social and economic New England and New York during the period 1796-1817.

See W. B. Sprague's " Life of Timothy Dwight " in vol. iv. (second

series) of Jared Sparks's Library of American Biography, and especially an excellent chapter in Moses Coit Tyler's Three Men of Letters (New York, 1895).

His fifth son, Sereno Edwards Dwight (1786-1850), born in Greenfield Hill, Connecticut, graduated at Yale in 1803, was a tutor there in 1806-1810, and successfully practised law in New Haven in 1810-1816. Licensed to preach in 1816, he was the chaplain of the United States Senate for one year, was pastor of the Park Street church, Boston, in 1817-1826, and in 1833-1835 was president of Hamilton College, Clinton, New York. His career was wrecked by accidental mercury poisoning, which interfered with his work in Boston and at Hamilton College, and made his life after 1839 solitary and comparatively uninfluential. His publications include Life and Works of Jonathan Edwards (10 vols., 1830); The Hebrew Wife (1836), an argument against marriage with a deceased wife's sister; and Select Discourses (18 51); to which was prefixed a biographical sketch by his brother William Dwight (1795-1865), who was also successively a lawyer and a Congregational preacher.

President Dwight's grandson, Timothy Dwight (1828-), a famous preacher and educationalist, was born at Norwich, Connecticut, on the 16th of November 1828. He graduated at Yale in 1849, continued his studies there and at Bonn and Berlin, was professor of sacred literature and New Testament Greek in the Yale Divinity School from 1858 to 1886, was licensed to preach in 1861, and from 1886 to 1899 was president of Yale, which during his administration greatly prospered and became in name and in fact a university. Dr Dwight was also a member in 1876-1885 of the American committee for the revision of the English Bible, was an editor from 1866 to 1874 of the New Englander, which later became the Yale Review, and besides editing and annotating several volumes of the English translation of H. A. W. Meyer's Kritisch-exegetischer Kommentar zum Neuen Testament, and writing many magazine articles, published a

collection of sermons entitled Thoughts of and for the Inner Life

(1800)-

DYAKS, or Dayaks, the name given to the wild tribes found in

Borneo by the Malays on their first settlement there. Whether they are the aborigines of the island or the successors of a Negrito people whom they expelled is uncertain. If the latter, they are descendants of an early pre-Malayan immigration. In any case, though regarded by the Malays as aliens, the Dyaks are of the same stock as the Malays. For themselves they have no general name; but, broken as they are into numerous tribes, they are distinguished by separate tribal names, many of which seem to be merely those of the rivers on which their settlements are situated. Sir Harry Keppel, who attempted to form a classification of the Dyaks according to their ethnographical affinity, divides them into five principal branches. The first of these, which he calls the north-western, includes the natives of Sadong, Sarawak, Sambas, Landak, Tayan, Melionow and Sangow. They all speak the same language, and are remarkable for their dependence on the Malay princes. The second branch, which is called emphatically the Malayan from its greater retention of Malay characteristics, occupies the north coast in Banting, Batang-Lupar, Rejang and part of the valley of the Kapuas. To the third or Parian branch belong the Dyaks of the rivers Kuti and Passir, who are said to speak a language like that of Macassar. The fourth consists of the Beyadjoes, who are settled in the valley of the Banjermassin; and the fifth and lowest comprises the Manketans and Punans, who are still nomadic and ignorant of agriculture.

Physically the Dyaks differ little from the Malays except in their slimmer figure, lighter colour, more prominent nose and higher forehead. In disposition they are as cheerful as the Malay is morose. The typical Dyak is rather slightly built, but is active and capable of enduring great fatigue. His features are distinctly marked and often well formed. The forehead is generally high, and the eyes are dark; the cheek-bones are broad; the hair is black, and the colour of the skin a pure reddish brown, frequently, in the female, approaching the Chinese complexion. The beard is generally scanty, and in many tribes the men pull out all the hair of the face. Both sexes file, dye, and sometimes bore holes in the teeth and insert gold buttons. In dress there is considerable variety, great alterations having resulted from foreign influence. The original and still prevailing style is simple, consisting of a waistcloth, generally of blue cotton, for the men, and a tight-fitting petticoat for the women, who acquire a peculiar mincing gait from its interference with their walking. The favourite ornaments of both sexes are brass rings for the legs and arms, hoops of rattan decorated in various ways, necklaces of white and black beads, and crescent-shaped ear-rings of a large size. The lobes of the ears are distended sometimes nearly to the shoulders by

disks of metal and bits of stick. Tattooing is practised by most of the tribes, and the skulls of infants are artificially deformed. The men usually go bare- headed, or wear a bright-coloured kerchief. The custom of betel-chewing being most universal, the betel-pouch is always worn at the side. The weapons in use are a curved sword and a long spear. The bow is unknown, but its place among some tribes is partly supplied by the blowpipe, in the boring of which they show great skill. When going to war the Dyak wears a strong padded jacket, which proves no bad defence. A curious custom among some tribes is the imprisonment of young girls for two or three years before puberty, during which time they are not allowed to see even their mothers.

The Dyak is decidedly intelligent, has a good memory and keen powers of observation, is unsuspicious and hospitable, and honest and truthful to a striking degree. The various tribes differ greatly in religious ceremonies and beliefs. They have no temples, priests or regular worship; but the father of each family performs rites. A supreme god, Sang-Sang, seems generally acknowledged, but subordinate deities are supposed to watch over special departments of the world and human affairs. Sacrifices both of animals and fruits — and in some cases even of human beings — are offered to appease or invoke the gods; divination of various kinds is resorted to for the purpose of

deciding the course to be pursued in any emergency; and criminals are subjected to the ordeal by poison or otherwise. Offerings are made to the dead, and there is a very strong belief in the existence of evil spirits, and all kinds of calamities and diseases are ascribed to their malignity. Thus almost the whole medical system of the Dyaks consists in the application of appropriate charms or the offerings of conciliatory sacrifices. Many of those natives who have had much intercourse with the Malays have adopted a kind of mongrel Mahommedanism, with a mixture of Hindu elements. The transmigration of souls seems to be believed in by some tribes; and some have a system of successive heavens rising one above the other very much in the style of the Hindu cosmogony. In the treatment of their dead much variety prevails; they are sometimes buried, sometimes burned, and sometimes elevated on a lofty framework. The Dyaks have no exact calculation of the year, and simply name the months first month, second month, and eo on. They calculate the time of day by the height of the sun, and if asked how far distant a place is can only reply by showing how high the sun would be when you reached it if you set out in the morning.

In agriculture, navigation, and manufactures they have made some progress. In a few districts a slight sort of plough is used, but the usual instrument of tillage is a kind of cleaver. Two crops, one of rice and the other of maize or vegetables, are taken, and then the ground is allowed to lie fallow for eight or ten years. The inland Dyaks collect the forest products, rattan, gutta-percha, beeswax and edible birds' nests, and exchange them for clothing or ornaments, especially brass wire or brass guns in which consists the wealth of every chief. They spin and weave their own cotton, and dye the cloth with indigo of their own growing. Their iron and steel instruments are excellent, the latter far surpassing European wares in strength and fineness of edge. Their houses are neatly built of bamboos, and raised on piles a considerable height from the ground; but perhaps their most remarkable constructive effort is the erection of suspension bridges and paths over rivers and along the front of precipices, in which they display a boldness and ingenuity that surprise the European traveller. In the centre of most villages is the communal house where the unmarried men live, which serves as a general assembly hall. Some have a circuit of no less than iooo ft. One on the banks of the Lundi was 600 ft. long and housed 400 persons.

The Dyaks have always been notorious for head-hunting, a custom which has now been largely suppressed. It is essentially a religious practice, the Dyak seeking a consecration for every important event of his life by the acquisition of one or more skulls. A child is believed ill-fated to whose mother the father has not at its birth presented skulls. The young man is not admitted to full tribal rights, nor can he woo a bride with any hope of success, until he has a skull or more to adorn his hut; a chief's authority would not be acknowledged without such trophies of his prowess. The strictest rules govern head-hunting; a period of fasting and confession, of isolation in a taboo hut, precedes the expedition, for which the Dyak clothes himself in the skins of wild beasts and puts on an animal mask. The Dyak curiously enough prefers the head of a fellow-tribesman, and the hunt is usually one of ambush rather than of open combat. Among some tribes it was not sufficient to kill the victim. He was tortured first, his body sprinkled with his own blood, and even his flesh eaten under the eyes of priests and priestesses who presided over the rites. Skulls, especially those of enemies, were held in great veneration. At meals the choicest morsels were offered them: they were supplied with betel and trbacco: fulsome compliments and prayers for success in battle addressed to them. Head-hunting at one time threatened the very existence of the race; but in spite of their reformation in this respect

the Dyaks are not on the increase, a fact for which A. R. Wallace accounts by the hard life the women lead and their consequent slight fecundity.

The Dyaks speak a variety of dialects, most of which are still very slightly known. The tribes on the coast have adopted a great number of pure Malay words into common use, and it is

often hard to ascertain their own proper synonyms. The American missionaries have investigated the dialects of the west coast (Landak, &c), and their Rhenish brethren have devoted their attention to those of the south, into one of which (that of Pulu Petak) a complete translation of the Bible has been made. Mr Hardeland, the translator, has also published a Dyak-German dictionary.

DYCE, ALEXANDER (1798-1869), English dramatic editor and literary historian, was born in Edinburgh on the 30th of June 1798. After receiving his early education at the high school of his native city, he became a student at Exeter College, Oxford, where he graduated B.A. in 1819. He took holy orders, and became a curate at Lantegloss, in Cornwall, and subsequently at Nayland, in Suffolk; in 1827 he settled in London. His first books were Select Translations from Quintus Smyrnaeus (1821), an edition of Collins (1827), and Specimens of British Poetesses (1825). He issued annotated editions of George Peele, Robert Greene, John Webster, Thomas Middleton, Marlowe, and Beau- mont and Fletcher, with lives of the authors and much illustrative matter. He completed, in 1833, an edition of James Shirley left unfinished by William Gifford, and contributed biographies of Shakespeare, Pope, Akenside and Beattie to Pickering's Aldine Poets. He also edited (1836-1838) Richard Bentley's works, and Specimens of British Sonnets (1833). His carefully revised edition of John Skelton, which appeared in 1843, did much to revive interest in that trenchant satirist. In 1857 his edition of Shakespeare was published by Moxon; and the second edition, a great improvement on the old one, was issued by Chapman & Hall in 1866. He also published Remarks on Collier's and Knight's Editions of Shakespeare (1844); A Few Notes on Shakespeare (1853); and Strictures on Collier's new Edition of Shakespeare (1859), a contribution to the Collier controversy (see Collier, John Payne), which ended a long friendship between the two scholars. He was intimately con- nected with several literary societies, and

undertook the publica- tion of Kempe's Nine Days' Wonder for the Camden Society; and the old plays of Timon and Sir Thomas More were published by him for the Shakespeare Society. He was associated with Halliwell-Phillips, John P%yne Collier and Thomas Wright as one of the founders of the Percy Society, for publishing old English poetry. Dyce also issued Recollections of the Table Talk of Samuel Rogers (1856). He died on the 15th of May 1869. He had collected a valuable library, containing amongst other treasures many rare Elizabethan books, and this collection he bequeathed to the South Kensington Museum. He displayed untiring industry, abundant learning, and admirable critical acumen in his editions of the old English poets. His wide reading in Elizabethan literature enabled him to explain much that was formerly obscure in Shakespeare; while his sound judgment was a check to extravagance in emendation. While preserving all that was valuable in former editions, Dyce added much fresh matter. His Glossary, a large volume of 500 pages, was the most exhaustive that had appeared.

DYCE, WILLIAM (1806-1864), British painter, was born in Aberdeen, where his father, a fellow of the Royal Society, was a physician of some repute. He attended Marischal College, took the degree of M.A. at sixteen years of age, and was destined for one of the learned professions. Showing a turn for design instead, he studied in the school of the Royal Scottish Academy in Edinburgh, then as a probationer (not a full student) in the Royal Academy of London, and thence, in 1825, he proceeded to Rome, where he spent nine months. He returned to Aberdeen in 1826, and painted several pictures; one of these, " Bacchus nursed by the Nymphs of Nysa," was exhibited in 1827. In the autumn of that year he went back to Italy, showing from the first a strong sympathy with the earlier masters of the Florentine and allied schools. A " Virgin and Child " which he painted in Rome in 1828 was much noticed by Overbeck and other foreign artists. In 1829 Dyce settled in Edinburgh, taking at once a good rank in his profession, and showing considerable versatility in subject-matter. Portrait-painting for some years occupied much of his time; and he was particularly prized for

likenesses of ladies and children. In February 1837 he was appointed master of the school of design of the Board of Manu- factures, Edinburgh. In the same year he published a pamphlet on the management of schools of this description, which led to his transfer from Edinburgh, after eighteen months' service there, to London, as superintendent and secretary of the then recently established school of design at Somerset House. Dyce was sent by the Board of Trade to the continent to examine the organization of foreign schools; and a

report which he eventually printed, 1840, led to a remodelling of the London establishment. In 1842 he was made a member of the council and inspector of provincial schools, a post which he resigned in 1844, In this latter year, being appointed professor of fine art in King's College, London, he delivered a remarkable lecture, The Theory of the Fine Arts. In 1835 he had been elected an associate of the Royal Scottish Academy; this honour he relinquished upon settling in London, and he was then made an honorary R.S.A. In 1844 he became an associate, in 1848 a full member, of the London Royal Academy; he also was elected a member of the Academy of Arts in Philadelphia. He was active in the deliberations of the Royal Academy, and it is said that his tongue was the dread of the urbane President, Sir Charles Eastlake, for Dyce was keen in speech as in visage; it was on his proposal that the class of retired Academicians was established. In January 1850 Dyce married Jane, daughter of Mr James Brand, of Bedford Hill, Surrey. He died at Streatham on the 14th of February 1864, leaving two sons and two daughters.

Dyce was one of the most learned and accomplished of British painters — one of the highest in aim, and most consistently self-respecting in workmanship. His finest productions, the frescoes in the robing-room in the Houses of Parliament, did honour to the country and time which produced them. Generally, however, there is in Dyce's work more of earnestness, right conception, and grave, sensitive, but rather restricted powers of realization, than of authentic greatness. He has elevation, draughtsmanship, expression, and on occasion fine colour; along with all these, a certain leaning on precedent, and castigated semi-convention- alized type of form and treatment, which bespeak rather the scholarly than the originating mind in art. The following are among his principal or most interesting works (oil pictures, unless otherwise stated). 1829: " The Daughters of Jethro defended by Moses"; "Puck." 1830: "The Golden Age"; " The Infant Hercules strangling the Serpents " (now in the National Gallery, Edinburgh); " Christ crowned with Thorns." 1835: "A Dead Christ" (large lunette altarpiece). 1836: " The Descent of Venus," from Ben Jonson's Triumph of Love; " The Judgment of Solomon," prize cartoon in tempera for tapestry (National Gallery, Edinburgh). 1837: " Francesca da Rimini " (National Gallery, Edinburgh). 1838, and again 1846: " The Madonna and Child." 1839: " Dunstan separating Edwy and Elgiva." 1844: " Joash shooting the Arrow of Deliverance " (the finest perhaps of the oil-paintings). 1850: "The Meeting of Jacob and Rachel." 1851: "King Lear and the Fool in the Storm." 1855: " Christabel." 1857: "Titian's first essay in Colouring." 1859: "The

Good Shepherd." i860: "St John bringing Home his Adopted Mother "; " Pegwell Bay " (a coast scene of remarkably minute detail, showing the painter's partial adhesion to the " pre-Raphaelite " movement). 1861: " George Herbert at Bemerton." Dyce executed some excellent cartoons for stained glass: — that for the choristers' window, Ely Cathedral, and that for a vast window at Alnwick in memory of a duke of Northumberland; the design of " Paul rejected by the Jews," now at South Kensington, belongs to the latter. In fresco-painting his first work appears to have been the " Con-secration of Archbishop Parker," painted in Lambeth palace. In one of the Westminster Hall competitions for the decoration of the Houses of Parliament, he displayed two heads from this composition; and it is related that the great German fresco- painter Cornelius, who had come over to England to give advice, with a prospect of himself taking the chief direction of the pictorial scheme, told the prince consort frankly that the English ought not to be asking for him, when they had such a painter of

their own as Mr Dyce. The cartoon by Dyce of the " Baptism of Ethelbert " was approved and commissioned for the House of Lords, and is the first of the works done there, 1846, in fresco. In 1848 he began his great frescoes in the Robing-room — subjects from the legend of King Arthur, exhibiting chivalric virtue. The whole room was to have been finished in eight years; but ill-health and other vexations trammelled the artist, and the series remains uncompleted. The largest picture figures " Hos- pitality, the admission of Sir Tristram into the fellowship of the Round Table." Then follow—" Religion," the Vision of Sir Galahad and his Companions; " Generosity," Arthur unhorsed, and spared by the Victor; "Courtesy," Sir Tristram harping to la Belle Yseult; " Mercy," Sir Gawaine's Vow. The frescoes of sacred subjects in All Saints' church, Margaret Street, London; of " Comus," in the summer-house of Buckingham Palace; and of " Neptune and Britannia," at Osborne House, are also by this painter.

Dyce was an elegant scholar in more ways than one. In 1828 he obtained the Blackwell prize at Aberdeen for an essay on animal magnetism. In 1843-1844 he published an edition of the Book of Common Prayer, with a dissertation on Gregorian music, and its adaptation to English words. He founded the Motett Society, for revival of ancient church-music, was a fine organist, and composed a

” non nobis ” which has appropriately been sung at Royal Academy banquets. His last considerable writing relating to his own art was published in 1853, The National Gallery: its Formation and Management.

See Redgrave’s Dictionary of Artists (1878), and Dictionary of National Biography. (W. M. R.)

DYEING (O. Eng. dedgian, dedh ; Mid. Eng. deyen) , the art of colouring textile and other materials in such a manner that the colours will not be readily removed by those influences to which they are likely to be submitted— e.g. washing, rubbing, light, &c. The materials usually dyed are those made from the textile fibres, silk, wool, cotton, &c, and intended for clothing or decoration; but in addition to these may be mentioned straw, fur, leather, paper, &c.

The art of dyeing dates from prehistoric times, and its practice probably began with the first dawn of civilization. Although we

. . cannot trace the successive stages of its development Historical , ., , . ,, r

sketch. from the beginning, we may suppose they were some- what similar to those witnessed among certain un- civilized tribes to-day — e.g. the Maoris of New Zealand. At first the dyes were probably mere fugitive stains obtained by means of the juices of fruits, and the decoctions of flowers, leaves, barks and roots; but in course of time methods were discovered, with the aid of certain kinds of earth and mud containing alumina or iron, whereby the stains could be rendered permanent, and then it was that the true art of dyeing began. There is no doubt that dyeing was, in the early period of its history, a home industry practised by the women of the household, along with the sister arts of spinning and weaving, for the purpose of embellishing the materials manufactured for clothing.

Historical evidence shows that already at a remote period a high state of civilization existed in Persia, India, and China, and the belief is well founded that the arts of dyeing and printing have been practised in these countries during a long succession of ages. In early times the products and manufactures of India were highly prized throughout Southern Asia, and in due course they were introduced by Arabian merchants to Phoenicia and Egypt, with which countries commercial intercourse, by way of the Persian and Arabian Gulfs, seems to have existed from time immemorial. Eventually the Egyptians themselves began to practise the arts of dyeing and

printing, utilizing no doubt both the knowledge and the materials derived from India. Pliny the historian has left us a brief record of the methods employed in Egypt during the first century, as well as of the Tyrian purple dye celebrated already 1000 B.C., while the chemical examination of mummy cloths by Thomson and Schunck testifies to the use by the Egyptian dyers of indigo and madder. The Phoenician and Alexandrian merchants imported drugs and dyestuffs into Greece, but we know little or nothing of the methods of dyeing pursued by

the Greeks and Romans, and such knowledge as they possessed seems to have been almost entirely lost during the stormy period of barbarism reigning in Europe during the 5th and succeed- ing centuries. In Italy, however, some remnants of the art fortunately survived these troublous times, and the importation of Oriental products by the Venetian merchants about the beginning of the 13 th century helped to revive the industry. From this time rapid progress was made, and the dyers formed important guilds in Florence, Venice and other cities. It was about this time, too, that a Florentine named Rucellai redis- covered . the method of making the purple dye orchil from certain lichens of Asia Minor. In 1429 there was published at Venice, under the title of Mariegola dell' arte de tentori, the first European book on dyeing, which contained a collection of the various processes in use at the time. From Italy a knowledge of dyeing gradually extended to Germany, France and Flanders, and it was from the latter country that the English king Edward III. procured dyers for England, a Dyers' Company being in- corporated in 1472 in the city of London.

A new impetus was given to the industry of dyeing by the discovery of America in 1492, as well as by the opening up of the way to the East Indies round the Cape of Good Hope in 1498. A number of new dyestuffs were now introduced, and the dyewood trade was transferred from Italy to Spain and Portugal, for the East Indian products now came direct to Europe round the Cape instead of by the old trade routes through Persia and Asia Minor. Eastern art-fabrics were introduced in increasing quantity, and with them came also information as to the methods of their production. In Europe itself the cultivation of dye-plants gradually received more and more attention, and both woad and madder began to be cultivated, about 1507, in France, Germany and Holland. Under the influence of Spain the Dutch largely developed their industries and made considerable progress in dyeing. The Spaniards, on their first arrival in Mexico (1518), noticed the employment of the red dyestufl cochineal by the natives, and at once imported it to Europe, where

an increasing demand for the new colouring matter gradually developed in the course of the century. A further impetus was given to the trade by the Dutch chemist Drebbel's accidental discovery, in 1630, of the method of dyeing a brilliant scarlet on wool by means of cochineal tnd tin solutions. The secret was soon communicated to other dyers, and the new scarlet was dyed as a speciality at the Gobelin dyeworks in Paris, and some time later (1643) at a dyeworks in Bow, near London.

In 1662 the newly established Royal Society in London took a useful step in advancing the art of dyeing, and in order to inform and assist practical dyers, caused the publication of the first original account, in the English language, of the methods employed in dyeing, entitled " An apparatus to the history of the common practices of Dyeing." Ten years later the French Minister Colbert sought to improve as well as control the opera- tions of dyeing, by publishing a code of instructions for the use of the woollen dyers and manufacturers in France. From this time, too, a succession of eminent chemists were appointed by the French government to devote some of their attention to the study of the industrial arts, including dyeing, with a view to their progress and improvement. Dufay, Hellot, Macquer, Berthollet, Roard and Chevreul (1700-1825) all rendered excellent service to the art, by investigating the chemical principles of dyeing, by publishing accounts of the various processes in vogue, by examin- ing the nature and properties of the dyestuffs employed, and by explaining the cause of the several phenomena connected with dyeing. With the advent of the 18th century, certain old prejudices against the use of foreign dyewoods gradually dis- appeared, and very rapid progress was made owing to the birth of the modern chemistry and the discovery of several useful chemical products and processes— e.g. Prussian Blue (17 10), Saxony Blue or Indigo Extract (1740), sulphuric acid (1774), murexide (1776), picric acid (1788), carbonate of soda (1793), bleaching powder (1798). Experiments on the practical side of bleaching and dyeing were made during this period, in England by Thomas Henry, Home and Bancroft, and in France bv

Dambourney, Gonfreville and others, each of whom has left interesting records of his work.

Down to the middle of the ioth century natural dyestuffs alone, with

but few exceptions, were at the command of the dyer. But already in the year 1834 the German chemist Runge noticed that one of the products obtained by distilling coal-tar, namely, aniline, gave a bright blue coloration under the influence of bleaching powder. No useful colouring matter, however, was obtained from this product, and it was reserved for the English chemist Sir W. H. Perkin to prepare the first aniline dye, namely, the purple colouring matter Mauve (1856). The discovery of other brilliant aniline dyestuffs followed in rapid succession, and the dyer was in the course of a few years furnished with Magenta, Aniline Blue, Hofmann's Violet, Iodine Green, Bismarck Brown, Aniline Black, &c. Investigation has shown that the products of the distillation of coal-tar are very numerous, and some of them are found to be specially suitable for the preparation of colouring matters. Such, for example, are benzene, naphthalene and anthracene, from each of which distinct series of colouring matters are derived. In 1869 the German chemists Graebe and Liebermann succeeded in preparing Alizarin, the colouring matter of the madder-root, from the coal-tar product anthracene, a discovery which is of the greatest historical interest, since it is the first instance of the artificial production of a vegetable dyestuff. Another notable discovery is that of artificial Indigo by Baeyer in 1878. Since 1856, indeed, an ever-increasing number of chemists has been busily engaged in pursuing scientific investigations with the view of preparing new colouring matters from coal-tar products, and of these a few typical colours, with the dates of their discovery, may be mentioned: Cachou de Laval (1873); Eosin (1874); Alizarin Blue (187 j>; Xylidine Scarlet (1878); Biebrich Scarlet (1879); Congo Red (1884); Primuline Red (1887); Rhodamine (1887); Paranitraniline Red (1889); Alizarin Bordeaux (1890); Alizarin Green (1895). At the present time it may truly be said that the dyer is furnished with quite an embarrassing number of. coal-tar dyestuffs which are capable of producing every variety of colour possessing the most diverse properties. Many of the colours produced are fugitive, but a considerable number are permanent and withstand various influences, so that the general result for some years has been the gradual displacement of the older natural dyestuffs by the newer coal-tar colours.

During this period of discovery on the part of the chemist, the mechanical engineer has been actively engaged in devising machines suitable for carrying out, with a minimum of manual labour, all the various operations connected with dyeing. This introduction of improved machinery into the dyeing trade has resulted in the production of better work, it has effected con- siderable economy,

and may be regarded as an important feature in modern dyeing.

The art of dyeing is a branch of applied chemistry in which the dyer is continually making use of chemical and physical principles in order to bring about a permanent union between the material to be dyed and the colouring matter applied. If cotton or wool is boiled in water containing finely powdered charcoal, or other insoluble coloured powder, the material is not dyed, but merely soiled or stained. This staining is entirely due to the entanglement of the coloured powder by the rough surface of the fibre, and a vigorous washing and rubbing suffices to remove all but mere traces of the colour. True dyeing can only result when the colouring matter is presented to the fibre in a soluble condition, and is then, by some means or other, rendered insoluble while it is absorbed by, or is in direct contact with, the fibre. There must always be some marked physical or chemical affinity existing between fibre and colouring matter, and this depends upon the physical and chemical properties of both. It is well known that the typical fibres, wool, silk and cotton, behave very differently towards the solution of any given colouring matter, and that the method of dyeing employed varies with each fibre. As a general rule wool has the greatest attraction for colouring matters,, and dyes most readily; cotton has the least attraction, while silk occupies

General principles.

in this respect an intermediate position. These differences may be to some extent due to differences of physical structure in the fibres, but they are mainly due to their different chemical composition.

On the other hand, a given fibre, e.g. cotton, behaves quite differently in dyeing towards various colouring matters. Some of these are not at all attracted by it, and are incapable of being used as dyestuffs for cotton. For others cotton exhibits a marked attraction, so that it is readily dyed by mere steeping in a hot solution of the colouring matter. Again, for other colouring matters cotton has little or no attraction, and cannot be dyed with them until it has been previously impregnated or prepared with a metallic salt, tannic acid or some other agent which is capable of combining with the colouring matter and precipitating it as an insoluble coloured compound within or upon the fibre. Such differences of behaviour are to be ascribed to differences in the chemical constitution or atomic arrangement of the various colouring matters.

In the case of the coal-tar colours we are, for the most part, well

acquainted with their chemical constitution, and in accord- ance with this knowledge the chemist has arranged ciasslfl- them in the following groups: — (1) Nitro Colours, cation of (2) Azo Colours, including Amido-azo, Oxy-azo, colouring Tetrazo and Polyazo Colours. (3) Hydrazone Colours. martere –

(4) Oxy-quinone Colours, including Quinone-oxime Colours.

(5) Diphenylmethane and Triphenylmethane Colours, includ- ing Rosaniline, Rosolic acid and Phthalei'ne Colours. (6) Quinoneimide Colours, including Indamine, Indophenol, Thia- zime, Thiazone, Oxazime, Oxazone, Azine, Induline, Quinoxa- line and Fluorindine Colours. (7) Aniline Black. (8) Quinoline and Acridine Colours. (9) Thiazol Colours. (10) Oxy-ketone, Xanthone, Flavone and Cumarine Colours, (n) Indigo. (12) Colours of unknown constitution.

This arrangement of the colouring matters in natural chemical groups is well suited for the requirements of the chemist, but another classification is that based on the mode of their applica- tion in dyeing. This is much simpler than the previous one, and being better adapted for the practical purposes of the dyer, as well as for explaining the various methods of dyeing, it is preferred for this article. According to this arrangement colouring matters are classified under the following groups: — (1) Acid Colours. (2) Basic Colours. (3) Direct Colours. (4) Developed Colours. (5) Mordant Colours. (6) Miscellaneous Colours. (7) Mineral Colours. It is well to state that there is no sharp line of division between some of these groups, for many colours are applicable by more than one method, and might quite well be placed in two, or even three, of the above groups. This may be due either to the kind of fibre to which the colouring matter is to be applied, or to certain details in the chemical constitution of the latter which give it a twofold character.

Acid Colours. — These dyestuffs are so called because they dye the animal fibres wool and silk in an acid bath; they do not dye cotton. From a chemical point of yiew the colouring matters themselves are of an acid character, this being due to the presence in the molecule of nitro (N0 2) or sulphonic acid (HSO3) groups. According to their origin and constitution they may be distin- guished as nitro compounds, sulphonated azo compounds and sulphonated basic colours. The acid colours are usually sold in the form of their alkali salts, as variously coloured powders soluble in water. For the alkali salts in neutral or alkaline solution wool and silk have little or no affinity, but dyeing rapidly occurs if the solution is acidified with sulphuric acid whereby the colour-acid is liberated. This addition of

acid, however, is necessary not only to set free the colour-acid of the dyestuff, but also to alter partially the chemical composition of the fibre, and thus render it capable of uniting more readily with the free colour-acid. It has been shown, namely, that if wool is boiled with dilute sulphuric acid, and then thoroughly washed with boiling-water till free from acid, it acquires the property of being dyed with acid colours even in neutral solution. By this treatment a portion of the wool substance is converted into so-called lanuginic acid, which has a strong at- traction for the colour-acid of the dyestuff, with which it forms an insoluble coloured compound. For dyeing wool, the general rule is to charge the dyebath with the amount of dyestuff necessary to give the required colour, say from i to 2 or 6 % on the weight of wool employed, along with 10% sodium sulphate (Glauber's salt) and 4% sulphuric acid (1-84 sp. gr.). The woollen material is then

introduced and continually handled or moved about in the solution, while the temperature of the latter is gradually raised to the boiling point in the course of | to I hour; after boiling for i to § hour longer, the operation is complete, and the material is washed and dried.

In practice, modifications of this normal process may be intro- duced, in order to ensure the dyeing of an even colour, i.e. free from such irregularities as cloudiness, streaks, &c, which may be due to the quality of the material or to the special properties of the acid colour employed. Materials of a firm, close texture, also the existence of a strong affinity between fibre and colouring matter, do not generally lend themselves to the dyeing of even colours, or to a satisfactory penetration of the material. Some acid colours dye even colours without any difficulty; others, however, do not. The addition of sodium sulphate to the dyebath exerts a restraining action ; the dyeing therefore proceeds more slowly and regularly, and a more equal distribution and better absorption of the colouring matter takes place. Other devices to obtain even colours are; the use of old dye- liquors, a diminished amount of acid, the employment of weaker acids, e.g. acetic or formic acid or ammonium acetate, and the entering of the material at a low temperature.

In the application of so-called Alkali Blue the process of dyeing in an acid bath is impossible, owing to the insolubility of the colour- acid in an acid solution. Wool and silk, however, possess an affinity for the alkali salt of the colouring matter in neutral or alkaline solution,

hence these fibres are dyed with the addition of about 5% borax; the material acquires only a pale colour, that of the alkali salt, in this dyebath, but by passing the washed material into a cold or tepid dilute solution of sulphuric acid a full bright blue colour is developed, due to the liberation of the colour-acid within the fibre. In the case of other acid colours, e.g. Chromotrope, Chrome Brown, Chromogen, Alizarin Yellow, &c, the dyeing in an acid bath is followed by a treatment with a boiling solution of bichromate of potash, alum, or chromium fluoride, whereby the colouring matter On the fibre is changed into insoluble oxidation products or colour-lakes. This operation of developing or fixing the colour is effected either in the same bath at the end of the dyeing operation, or in a separate bath. See also Artificial Mordant Colours.

When dyeing with certain acid colours, e.g. Eosine, Phloxine and other allied bright pink colouring matters derived from resorcin, the use of sulphuric acid as an assistant must be avoided, since the colours would thereby be rendered paler and duller, and only acetic acid must be employed.

. The properties of the dyes obtained with the acid colours are extremely varied. Many are fugitive to light; on the other hand, many are satisfactorily fast, some even being very fast in this respect. As a rule, they do not withstand the operations of milling and scouring very well, hence acid colours are generally unsuitable for tweed yarns or for loose wool. They are largely employed, however, in dyeing other varieties of woollen yarn, silk yarn, union fabrics, dress materials, leather, &c. Previous to the discovery of the coal-tar colours very few acid colours were known, the most important one being Indigo Extract. Prussian Blue as applied to wool may also be regarded as belonging to this class, also the purple dyestuff known as Orchil or Cudbear.

The following list includes some of the more important acid colours now in use, arranged according to the colour they yield in dyeing: —
•

Red. — Wool scarlet, brilliant scarlet, erythrine, crocei'n scarlet, brilliant Crocei'n, violamine G, scarlet 3R, crystal scarlet, newcoccine, chromotrope 2R, azo acid magenta, Victoria scarlet, xylidine scarlet, Palatine scarlet, Biebrich scarlet, pyrotine, orchil red, Bordeaux B, milling red, azo carmine, acid magenta, fast acid violet A 2R, naphthylamine red, fast red, claret red, eosine, erythrosine, rose Bengale, phloxine, cyanosine, cloth red, lanafuchsine, rosinduline,

eno carmine.

Orange. — Diphenylamine orange, methyl orange, naphthol orange, crocei'n orange, brilliant orange, orange G, orange N, mandarin G R.

Yellow. — -Picric acid, naphthol yellow S, fast yellow, brilliant yellow S, azoflavine, metaniT yellow, resorcine yellow, tartrazine, quinoline yellow, milling yellow, azo yellow, Victoria yellow, brilliant yellow S, citronine, Indian yellow.

Green. — Acid green, guinea green, fast green, patent green, cyanol green, erio green, brilliant acid green 6 G.

Blue.— Alkali blue, soluble blue, opal blue, methyl blue, Hochst new blue, patent blue, ketone blue, cyanine, thiocarmine, fast blue, induline, violamine 3 B, azo acid blue, wool blue, indigo extract, erio glaurine, erio cyanine, erio blue, lanacyl blue, sulphon-azurine, sulphon-cyanine.

Violet. — Acid violet, red violet, regina violet, formyl violet, violamine B, fast violet, azo acid violet, erio violet, lanacyl violet.

Brown. — Fast brown, naphthylamine brown, acid brown, resorcine brown, azo brown, chrome brown, chromogene.

Black. — Naphthol black, azo black, wool black, naphthylamine black, jet black, anthracite black, Victoria black, azo acid black, brilliant black, union black, brilliant black B.

Basic Colours. — These colouring matters are the salts of organic colour-bases, their name being derived from the fact that their dyeing power resides entirely in the basic part of the salt. In the free state the bases are colourless and insoluble, but in combination

with acids they form salts which are coloured and for the most part soluble in water. They are usually sold in the form of powder or crystals, the latter exhibiting frequently a beautiful metallic lustre. Wool and silk are dyed in a neutral bath, i.e. without any addition, the material not requiring any previous preparation. During the dyeing operation the animal fibres appear to play the part of an acid, for they decompose the colouring matter and unite with the colour-base to form an insoluble coloured salt or lake, while the acid of the colouring matter is liberated and remains in solution. Although, as a rule, a neutral dyebath is employed in dyeing wool, a slight addition (2 %) of soap is sometimes made in order to give a brighter colour, while in other cases, e.g. with Victoria Blue, the dyebath must of

necessity be made distinctly acid with acetic or sulphuric acid. Silk is usually dyed in a bath containing " boiled-off liquor " (i.e. the spent soap-liquor from the operation of scouring) neutralized or slightly acidified with acetic or tartaric acid. For a full colour use 2 or 3 % colouring matter, enter the wool at a low temperature, heat gradually to near the boiling point in the course of f hour, and continue dyeing for J hour. Owing to the slight solubility of many basic colours, it is important to take the pre- caution of filtering the colour solution into the dyebath through a flannel filter, also to neutralize the alkalinity of calcareous water with a little acetic acid, to prevent decomposition of the colouring matter and precipitation of the colour-base.

Unlike the animal fibres, cotton has little or no affinity for the basic colours; hence the cotton dyer makes use of the fact that cotton has a natural attraction for tannic acid, and that the latter forms insoluble lakes with the bases of basic colours. Previous to dyeing, the cotton is prepared with tannic acid by steeping in a cold solution of the latter for several hours ; cotton pieces are run at full width through a solution containing 2 to 6 oz. per gallon of tannic acid, and after being evenly squeezed are dried on steam cylinders. The cotton is then worked in a solution of tartar emetic or stannic chloride, so that the tannic acid absorbed by the fibre may be fixed upon it as insoluble tannate of antimony or tin. Although the tannic acid is thus united with metallic oxide, it still has the power of attracting the base of the colouring matter, and there is fixed upon the fibre an insoluble colour-lake, namely, a tannate of antimony and colour-base, which constitutes the dye. In this process the tannic acid is called the mordant, the tartar emetic acts as the fixing-agent for the tannic acid, and the cotton as finally prepared for dyeing is said to be mordanted. The proportions em- ployed, reckoned on the weight of cotton, may vary from 2 to 10 % tannic acid, or the equivalent in a decoction of sumach, myrabolans, or other tannin matter, and J to 3 % tartar emetic. After mordant- ing and fixing of the mordant, the cotton is well washed and dyed in the cold or at 60 ° C. for | to 1 hour with the necessary colouring matter. Applied in this manner, basic colours are moderately fast to soap, but generally not to the action of light.

Linen is dyed in the same manner as cotton. Jute is dyed without any previous preparation, since it behaves like a tannin-mordanted fibre, attracting the basic colours direct.

The basic colours, to which class most of the earlier coal-tar colours belonged, are remarkable for their great colouring power, and in

most cases for the brilliancy of the colours they yield. With the exception of certain dark colours, they are fugitive to light. It is interesting to note that only one vegetable colouring matter is at present recognized as belonging to this class, namely, the yellow dyestuff barberry bark and root [Berberis vulgaris) which contains the alkaloid berberine.

The following is a list of the more important basic colours derived from coal-tar: —

Red. — Magenta, safranine, rhodamine, pyronine red, rhoduline red, rosazei'n, induline scarlet.

Orange. — Chrysoi'dine, phosphine, acridine orange, tannin orange.

Yellow. — Auramine, benzoflavine, thioflavine T, acridine yellow, homophosphine, rhoduline yellow.

Green. — Malachite green, emerald green, imperial green, China green, brilliant green, Victoria green, diamond green, methylene green, azine green.

Blue.' — Methylene blue, new methylene blue, toluidine blue, thionine blue, indamine blue, Victoria blue, night blue, Nile blue, turquoise blue, marine blue, indoi'ne blue, metamine blue, Capri blue, indazine, metaphenylene blue, paraphenylene blue, toluylene blue, indigene, indol blue, diphene blue, setopaline, setocyanine, setoglaucine, Helvetia blue.

Violet. — Methyl violet, crystal violet, ethyl purple, methylene violet, mauve, paraphenylene violet, rhoduline violet, methylene heliotrope.

Brown. — Bismarck brown.

Black. — Diazine black.

Grey. — Methylene grey, nigrisine, new grey.

Direct Colours. — The characteristic feature of the dyestuffs belonging to this class is that they dye cotton " direct " — i.e. without the aid of mordants. Two distinct series of colouring matters of this group may be distinguished — namely, Direct Cotton Colours and Sulphide Colours.

(a) Direct Cotton Colours. — The colours of this class are frequently called the Substantive Cotton Colours, Benzo Colours, Diamine

Colours, Congo Colours. Considered from the chemical point of

view, they are mostly alkali salts of sulphonated tetrazo colours obtained by diazotizing certain diamido compounds, e.g. benzidine, diamido-stilbene, &c, and uniting the products thus obtained with various amines or phenols. The first colouring matter of this class was the so-called Congo red, discovered in 1884, and since that time a very great number have been introduced which yield almost every variety of colour. The method of dyeing cotton consists in merely boiling the material in a solution of the dyestuff, when the cotton absorbs and retains the colouring matter by reason of a special natural affinity. The concentration of the dyebath is of the greatest importance, since the amount of colour taken up by the fibre is in an inverse ratio to the amount of dye liquor present in the bath. The addition of 1 to 3 oz. sodium sulphate and j' 2 to \ oz. carbonate of soda per gallon gives deeper colours, since it diminishes the solubility of the colouring matter in the water and increases the affinity of the cotton for the colouring matter. An excess of sodium sulphate is to be avoided, otherwise precipitation of the colouring matter and imperfect dyeing result. With many dyestuffs it is preferable to use J to \ oz. soap instead of soda. On cotton the dyed colours are usually not very fast to light, and some are sensitive to alkali or to acid, but their most serious defect is that they are not fast to washing, the colour tending to run and stain neighbouring fibres. Their fastness to light and washing is, however, greatly improved by a short (J hour) after-treatment with a boiling solution of copper sulphate (3 %), with or without the addition of bichromate of potash (1 %). Wool and silk are dyed with the direct colours either neutral or with the addition of a little acetic acid to the dyebath. On these fibres the dyed colours are usually faster than on cotton to washing, milling and light; some are very fast even to light — e.g. Diamine fast red, chrysophenine, Hessian yellow, &c. Many of the Direct Colours are very useful for dyeing plain shades on union fabrics composed of wool and cotton, silk and cotton, or wool and silk. Owing to the facility of their application, they are also very suitable for use as household dyes, especially for cotton goods.

A few vegetable dyestuffs belong to this class, notably Turmeric, saffron, annatto and safflower, but they all yield colours which are fugitive to light, and they are now of little importance. Tur- meric is the underground stem or tuber of Curcuma tinctoria, a plant growing

abundantly in the East Indies. It dyes cotton, wool and silk in a bath acidified with acetic acid or alum, yielding a bright yellow colour which is turned brown by alkalis. Saffron consists of the stigmata of the flower of Crocus sativus, which is grown in Austria, France and Spain. It dyes a bright orange-yellow colour. Annatto is the pulpy mass surrounding the seeds of Bixa orellana, a plant which grows in South America — e.g. Brazil, Cayenne, &c. It dyes cotton and silk in an alkaline or soap bath an orange colour, which is turned red by acids. Safflower consists of the dried florets of Carthamus tinctorius, which is grown in the East Indies, Egypt and southern Europe. Cotton is dyed a brilliant pink colour by working it in a cold alkaline (sodium carbonate) extract of the colouring matter, while gradually acidifying the solution with citric acid (Hme-juice).

The Direct Colours which are derived from coal-tar products are very numerous indeed; they are largely employed, and occupy a very important position among dyestuffs. The following list includes the principal coal-tar colours of this group : —

Red. — Congo red, brilliant Congo, benzopurpurine, brilliant purpurine, deltapurpurine, diamine scarlet, diamine fast red, rosazurine, salmon red, erica, Titan pink, St Denis red, Columbia red, naphthylene red, Congo rubine, acetopurpurine, dianol red, thiamine crimson, geranine, brilliant geranine, Columbia fast scarlet, benzo fast scarlet, thiamine red, diamine rose, Dongola red, rosophenine.

Orange. — Congo orange, benzo orange, toluylene orange, mikado orange, brilliant orange, Columbia orange, diamine orange, pyramine orange, benzo fast orange.

Yellow. — Chrysamine, cresotin yellow, diamine yellow, carbazol yellow, chrysophenine, Hessian yellow, curcumine yellow, thiazol yellow, thioflavine S, oriol, mimosa yellow, Columbia yellow, cotton yellow, chloramine yellow, direct yellow, diamine fast yellow, diamine gold, sun yellow, stilbene yellow, chlorophenine, oxyphenine.

Green. — Benzo olive, Columbia green, benzo green, diamine green, direct green, diphenyl green, oxamine green, eboli green.

Blue. — Azo blue, benzoazurine, brilliant azurine, sulphon-azurine, diamine blue, benzo indigo blue, benzo black blue, Chicago blue, Columbia blue, Erie blue, Zambezi blue, benzo cyanine, Congo blue, diamine sky blue, brilliant benzo blue, benzo chrome black blue,

oxamine blue, diphenyl blue, diamineral blue, diaminogene, benzo fast blue, diazo indigo blue, brilliant chlorazol blue.

Violet. — Hessian purple, Congo Corinth, heliotrope, Congo violet, diamine violet, Hessian violet, azo violet, benzo violet, violet black, diamine Bordeaux, chlorantine lilac, diphenyl violet, triazol violet, Columbia violet.

Brown. — Benzo brown, Congo brown, toluylene brown, diamine brown, cotton brown, Hessian brown, terra-cotta, mikado brown, catechu brown, wool brown, Columbia brown, Zambezi brown, benzo chrome brown, direct fast brown, direct bronze brown, chloramine brown, triazol brown, toluylene brown, dianol brown, Crumpsall direct fast brown.

Black. — Diamine black, Columbia black, Nyanza black, Tabora black, Zambezi black, chromanil black, benzo black, benzo fast

black, direct blue black, Pluto black, oxydiamine black, diamine jet black, polyphenyl black, union black, triazol black, Titan black, cotton black, oxamine black.

Grey. — Benzo grey, benzo black, azo mauve, diaminogene, neutral grey.

(b) Sulphide Colours. — These dyestuffs are only suitable for dyeing the vegetable fibres, since they must be applied in a strongly alkaline bath. The dyestuff Cachou de Laval, discovered in 1873, was the first member of this group, and was obtained by melting a mixture of sodium sulphide and various organic substances — e.g. bran, saw-dust, &c. In recent years numerous other dyestuffs have been added to the list, namely, grey, blue, green, brown, and especially black colours, by submitting certain definite amido compounds of the aromatic series to a similar treatment with sodium sulphide or sodium thiosulphate, and subsequent oxidation. The mode of dyeing with these colours is based on the fact that they are soluble in an alkaline reducing agent, and if the cotton is worked in the solution, subsequent oxidation develops the colour, which is fixed upon the fibre in an insoluble condition. The material is boiled for about one hour in a solution of the colour (10 to 15), with the addition of sodium carbonate (1 to 10), common salt (10 to 20 %), and sodium sulphide (5 to 30 %) ; it is then washed in water, and may be developed by heating in a bath containing 2 to 5 % of bi- chromate of soda, and 3 to 6% acetic acid. A final washing with water containing a little soda to remove acidity is advisable. The sulphide

colours are remarkable for their fastness to light, alkalis, acids and washing, but unless proper care is exercised the cotton is apt to be tendered on being stored for some time.

The following list includes some of the most important of the colours of this class : —

Yellow. — Immedial yellow, pyrogene yellow, sulphur yellow, thion yellow, thiogene yellow.

Orange. — Eclipse phosphine, immedial orange, pyrogene orange, thion orange, thiogene orange.

Green. — Pyrogene green, Italian green, eclipse green, pyrol green, immedial green, katigene green, thionol green.

Blue. — Immedial blue, immedial sky blue, eclipse blue, katigene indigo, pyrogene blue, sulphur blue, thion blue, thiogene blue.

Violet. — Katigene violet, thiogene heliotrope, thiogene purple.

Brown. — Pyrogene brown, pyrogene yellow, Cachou de Laval, thiocatechine, katigene black brown, eclipse brown, immedial. brown, katigene brown, dianol brown.

Grey and Black. — Pyrogene grey, Vidal black, immedial black, katigene black, anthraquinone black, St Denis black, amidazol black, cross dye black, eclipse black, carbide black, thiogene black, sulphaniline black, sulfogene black, pyrogene black, dianol black, sulphur black, thion black, kryogene black.

This class of colours is continually increasing in number, and for certain purposes in cotton dyeing the group has acquired great importance.

Developed Colours. — This group includes certain azo colours which are developed or produced upon the fibre itself (usually cotton) by the successive application of their constituent elements. It may be conveniently divided into the following sub-groups: — In- soluble Azo Colours, Developed Direct Colours, Benzo Nitrol Colours.

(a) The Insoluble Azo Colours are produced as insoluble coloured precipitates by adding a solution of a diazo compound to an alkaline solution of a phenol, or to an acid solution of an amido compound. The necessary diazo compound is prepared by allowing a solution containing mtrous acid to act upon a solution of a primary aromatic

amine. It is usually desirable to keep the solutions cool with ice, owing to the very unstable nature of the diazo compounds produced. The colour obtained varies according to the particular diazo compound, as well as the amine or phenol employed, /3 – naphthol being the most useful among the latter. The same coloured precipitates are produced upon the cotton fibre if the material is first impregnated with an alkaline solution of the phenol, then dried and passed into a cold solution of the diazo solution. The most important of these colours is para-nitraniline red, which is dyed in enormous quantities on cotton pieces. The pieces are first " prepared " by running them on a padding machine through a solution made up of 30 grms. /3 – naphthol, 20 grms. caustic soda, 50 grms. Turkey red oil, and 5 grms. tartar emetic in 1000 grms. (1 litre) water. They are then dried on the drying- machine, and are passed, after being allowed to cool, into the diazo solution, which is prepared as follows: 15 grms. para-nitraniline are dissolved in 53 c.c. hydrochloric acid (34° Tw.) and a sufficiency of water. To the cold solution a solution of 10J grms.' sodium nitrite is added while stirring. The whole is then made up to 1200 c.c, and just before use 60 grms. sodium acetate are added. The colour is developed almost immediately, but it is well to allow the cotton to remain in contact with the solution for a few minutes. The dyed cotton is squeezed, washed, soaped slightly, and finally rinsed in water and dried. A brilliant red is then obtained which is fast to soap but not to light. If the para-nitraniline used in the fore- going process is replaced by meta – nitraniline, a yellowish – orange colour is obtained ; with a-naphthylamine, a claret-red ; with amido- azo – toluene, a brownish red ; with benzidine, a dark chocolate ; with dianisidine, a dark blue; and so on. The dyed colours are fast to washing and are much used in practice, particularly the

paranitraniline red, which serves as a substitute for Turkey-red, although it is not so fast to light as the latter.

(b) Developed Direct Colours. — The primuline colours were the first representatives of this class and are derived from the yellow dyestuff known as primuline, which dyes cotton in the same manner as the direct colours. The primuline yellow thus obtained is fugitive to light and of little practical value, but since the colouring matter is an amido base it can be diazotized in the fibre and then developed in solutions of phenols or amines, whereby azo dyes of various hues

may be obtained, according to the developer employed ; thus, /3-naphthol develops a bright red colour, resorcin develops an orange, phenol a yellow, naphthylamine a brown, &c. The dyeing of the primuline yellow is effected by boiling the cotton for one hour in a solution of primuline (5 %) and common salt (10 to 20 %). The diazotizing operation consists in passing the dyed and rinsed cotton for 5 to 10 minutes into a cold solution of nitrous acid — i.e. a solution of I oz. sodium nitrite per gallon of water, slightly acidified with sulphuric acid. The diazotized material should not be exposed to light, but at once washed in cold water and passed into the developer. The developing process consists in working the diazotized material for 5 to 10 minutes in a cold solution of the necessary phenol, and finally washing with water. The only developer of any practical importance is a solution of (8-naphthol in caustic soda, which produces primuline red. The primuline colours are best adapted for cotton dyeing, and the colours obtained are fast to washing and to moderate soaping, but they are not very fast to light.

If cotton is dyed with other direct colours containing free amido groups, the colour can be diazotized on the dyed fibre exactly in the same manner as in the case of primuline-dyed cotton, and then developed by passing into the solution of an amine or phenol, or by treating it with a warm solution of sodium carbonate. In this manner a new azo dye is produced upon the fibre, which differs from the original one not only in colour, but also by being faster to washing and other influences. A treatment with copper sulphate solution after development is frequently beneficial in rendering the colour faster to light. Some Direct Colours, indeed, are of little value, owing, for example, to their sensibility to acids, until they have been diazotized and developed, the usual developers being /8-naphthol, resorcinol, phenol and phenylene-diamine.

The following Direct Colours, after being applied to cotton, may be submitted to the above treatment, the colours produced being chiefly blue, brown and black : — ■

Blue. — Diazurine, diazo blue, diamine blue, diaminogene.

Red. — Rosanthiene.

Brown. — Diazo brown, diamine cutch, diamine brown, cotton brown.

Grey and Black. — Benzo blue, diazo blue black, diazo black, diamine black, diazo brilliant blaek.

(c) Benzo Nitrol Colours. — These are certain Direct Colours, dyed on cotton in the ordinary manner, which are then developed by passing into a diazo solution — e.g. diazotized para-nitraniline, &c. The dyed colour here plays the part of a phenol or amine, and reacts with the diazo compound to produce a new colour. The process is similar to the production of the Insoluble Azo Colours, the /3-naphthol which is there applied to the fibre being here replaced by a Direct Colour. The colour of the latter is rendered much deeper by the process, and also faster to washing and to the action of acids. The dyestuffs recommended for application in the manner described are : Benzo nitrol brown, toluylene brown, direct fast brown, Pluto black, direct blue black.

" Topping " Direct Colours. — The direct colours possess the remarkable property of precipitating the basic colours from aqueous solution. Use is frequently made of this property for " topping " cotton dyed with direct colours either with a view to obtain compound shades or to brighten the colour. Thus by dyeing cotton first yellow in chrysamine and then dyeing it again in a cold bath of methylene blue a brilliant shade of green results. If, on the other hand, a direct blue is topped with methylene blue, its brilliancy may be enhanced.

Mordant Colours. — The colouring matters of this class include some of the most important dyestuffs employed, since they furnish many colours remarkable for their fastness to light, washing and other influences. Employed by themselves, Mordant Colours are usually of little or no value as dyestuffs, because, with few excep- tions, either they are not attracted by the fibre, particularly in the case of cotton, or they only yield a more or less fugitive stain. Their importance and value as dyestuffs are due to the fact that they act like weak acids and have the property of combining with metallic oxides to form insoluble coloured compounds termed " lakes," which vary in colour according to the metallic oxide or salt employed. The most stable lakes are those in which the colour- ing matter is combined with two metallic oxides, a sesquioxide and a monoxide — e.g. alumina and lime. In applying colouring matters of this class the object of the dyer is to precipitate and fix these coloured lakes upon and within the fibre, for which purpose two operations are necessary, namely, mordanting and dyeing.

The mordanting operation aims at fixing upon the fibre the necessary metallic oxide or insoluble basic salt, which is called the mordant, although the term is also applied to the original metallic salt em- ployed. In the subsequent dyeing operation the mordanted

material

is boiled with a solution of the colouring matter, during which the metallic oxide attracts and chemically combines with the colouring matter, producing the coloured lake in situ on the fibre, which thus becomes dyed. The mode of applying the mordants varies accord- ing to the nature of the fibre and the metallic salt employed, the chief mordants at present in use being salts of chromium, aluminium, tin, copper and iron. The method of mordanting wool depends upon its property of decomposing metallic salts, and fixing upon itself an insoluble metallic compound, when boiled in their solutions. This decomposition is facilitated by the heating and by the dilution of the solution, but it is chiefly due to the action of the fibre itself. The exact nature of the substance fixed upon the fibre has not in all cases been determined ; probably it is a compound of the metallic oxide with the wool-substance itself, which has the character of an amido-acid. The mordant most largely employed for wool is bichromate of potash, since, besides being simply applied, and leaving the wool with a soft feel, it yields with the various mordant-dyestuffs a large variety of fast colours. The wool is boiled for 1 to 1 \ hours in a solution containing 2 to 3 % bichromate of potash on the weight of the wool employed. During this operation the wool at first attracts chromic acid, which is gradually reduced to chromium chromate, so that the mordanted fibre has finally a pale olive-yellow tint. In the dyebath, under the influence of a portion of the dyestuff, further complete reduction to chromic hydrate occurs before it combines with the colouring matter. Not unfrequently ‘ certain so-called ” assistants ” are employed in small amount along with the bichromate of potash — e.g. sulphuric acid, cream of tartar, tartaric acid, lactic acid, &c. The use of the organic acids here mentioned ensures the complete reduction of the chromic acid on the wool to chromic hydrate already in the mordant bath, and the pale greenish mordanted wool is better adapted for dyeing with colours which are susceptible to oxidation — e.g. alizarin blue. For special purposes chromium fluoride, chrome alum, &c, are em- ployed. Alum or aluminium sulphate (8%), along with acid potas- sium tartrate (cream of tartar) (7 %), is used for brighter colours — ■ e.g. reds, yellows, &c. The object of the tartar is to retard the mordanting process and ensure the penetration of the wool by the mordant, by preventing superficial precipitation through the action of ammonia liberated from the wool; it ensures the ultimate pro- duction of clear, bright, full colours. For still brighter colours, notably yellow and red, stannous chloride was at one time largely employed, now it is used less frequently; and the same may be said of copper and ferrous

sulphate, which were used for dark colours. Silk may be often mordanted in the same manner as wool, but as a rule it is treated like cotton. The silk is steeped for several hours in cold neutral or basic solutions of chromium chloride, alum, ferric sulphate, &c, then rinsed in water slightly, and passed into a cold dilute solution of silicate of soda, in order to fix the mordants on the fibre as insoluble silicates. Cotton does not, like wool and silk, possess the property of decomposing metallic salts, hence the methods of mordanting this fibre are more complex, and vary according to the metallic salts and colouring matters employed, as well as the particular effects to be obtained. One method is to impregnate the cotton with a solution of so-called " sulpha ted oil " or " Turkey-red oil "; the oil-prepared material is then dried and passed into a cold solution of some metallic salt— e.g. aluminium acetate, basic chromium chloride, &c. The mordant is thus fixed on the fibre as a metallic oleate, and after a passage through water containing a little chalk or silicate of soda to remove acidity, and a final rinsing, the cotton is ready for dyeing. Another method of mordanting cotton is to fix the metallic salt on the fibre as a tannate instead of an oleate. This is effected by first steeping the cotton in a cold solution of tannic acid or in a cold decoction of some tannin matter, e.g. sumach, in which operation the cotton attracts a consider- able amount of tannic acid ; after squeezing, the material is steeped for an hour or more in a solution of the metallic salt, and finally washed. The mordants employed in this case are various — e.g. basic aluminium or ferric sulphate, basic chromium chloride, stannic chloride (cotton spirits), &c. There are other methods of mordanting cotton besides those mentioned, but the main object in all cases is to fix an insoluble metallic compound on the fibre. It is interesting to note that whether the metallic oxide is united with the substance of the fibre, as in the case of wool and silk, or precipitated as a tannate, oleate, silicate, &c, as in the case of cotton or silk, it still has the power of combining with the colouring matter in the dyebath to form the coloured " lake " or dye on the material.

The dyeing operation consists in working the mordanted material in a solution of the necessary colouring matter, the dyebath being gradually raised to the boiling point. With many colouring matters, e.g. with alizarin, it is necessary to add a small percentage of calcium acetate to the dyebath, and also acetic acid if wool is being dyed. In wool-dyeing, also, the mordanting operation may follow that of dyeing instead of preceding it, in which case the boiling of the wool with dyestuff is termed " stuffing," and the subsequent developing of the colour by applying the mordant is termed "

saddening," • because this method has in the past been usually carried out with iron and copper mordants, which give dull or sad colours. The method of " stuffing and saddening " may, however, be carried out with other mordants, even for the production of bright colours, and it is now frequently employed with certain alizarin dyestuffs

for the production of pale shades which require to be very even and regular in colour. There is still another method of applying Mordant Colours in wool-dyeing, in which the dyestuff and the mordant are applied simultaneously from the beginning; it is known as the " single-bath method. It is only successful, however, in the case of certain colouring matters and mordants, to some of which reference will be made in the following paragraphs.

The Natural Mordant Colours. — It is interesting to note that nearly all the natural or vegetable dyestuffs employed belong to the class of Mordant Colours, the most important of these being included in the following list: — Madder, Cochineal, Peachwood, Sapanwood, Limawood, Camwood, Barwood, Sanderswood, Old Fustic, Young Fustic, Quercitron Bark, Persian Berries, Weld, Logwood.

Madder consists of the dried ground roots of Rubia tinctorum, a plant of Indian origin. Formerly cultivated largely in France and Holland, it was long one of the most important dyestuffs em- ployed, chiefly in the production of Turkey-red and in calico- printing, also in wool-dyeing. With the different mordants it yields very distinct colours, all fast to light and soap, namely, red with aluminium, orange with tin, reddish brown with chromium, purple and black with iron. Madder contains two closely allied colouring matters, namely, alizarin and purpurin. The former, which is by far the more important, is now prepared artificially from the coal-tar product anthracene, and has almost entirely superseded madder.

Cochineal is the dried scale-insect Coccus cacti, which lives on certain of the cactus plants of Mexico and elsewhere. The rearing of cochineal was once a large and important industry, and although still pursued, it has seriously declined, in consequence of the dis- covery of the azo scarlets derived from coal-tar. The colouring matter of cochineal, carminic acid, is believed by chemists to be a derivative of naphthalene, but its artificial production has not yet

been accomplished. Cochineal dyes a purple colour with chromium mordant, crimson with aluminium, scarlet with tin, and grey or slate with iron. Its chief employment is for the purpose of dyeing crimson, and more especially scarlet, on wool. Crimson is dyed by mordanting the wool with alum and tartar and dyeing in a separate bath with ground cochineal. Sca r let on wool is obtained by the single-bath method, namely, by dyeing the wool with a mixture of stannous chloride (or nitrate of tin), oxalic acid, and cochineal. It is usual to add also a small amount of the yellow dyestuff flavine in order to obtain a yellower shade of scarlet. The cochineal colours are very fast to light, but somewhat susceptible to the action of alkalis.

Peachwood, Sapanwood and Limawood are usually referred to as the " soluble red-woods," because of the solubility in water of the colouring principle they contain. They consist of the ground wood of various species of Caesalpinia found in Central America, the East Indies and Peru. They ail yield more or less similar colours with the different mordants — claret-brown with chromium, red with aluminium, bright red with tin, dark slate with iron. Owing to the fugitive character of all the colours to light, these dyewoods are now comparatively little employed in dyeing.

Camwood, Barwood and Sanderswood represent the so-called " insoluble red-woods," their colouring principles being sparingly soluble even in boiling water. They are obtained from certain species of Pterocarpus and Baphia, large trees growing in the interior of West Africa. Their general dyeing properties are similar, a claret-brown being obtained with chromium mordant, a brownish red with aluminium, a brighter red with tin, and purplish brown with iron. Their chief employment is in wool-dyeing, for the pro- duction of various shades of brown, being best applied by the " stuffing and saddening " method above described; but since the colours are fugitive to light, they are now very largely replaced by alizarin. A brown on wool is obtained by first boiling for one to two hours in a decoction of the ground wood (50%), and then boiling in a separate bath in solution of bichromate of potash (2 %) for half an hour. These dye-woods are also employed by the indigo- dyer, in order to give a brownish ground colour to the wool previous to dyeing in the indigo vat, and thus obtain a deeper, fuller blue. The colouring matters contained in these dyewoods have not been exhaustively examined.

Fustic is a yellow dyestuff, and consists of the wood of the dyer's mulberry tree, Morus tinctoria, which grows in Cuba, Jamaica, &c. It is still an important and largely used dyestuff, being cheap, and the

colours obtained from it being satisfactorily fast to light and other influences. With chromium mordant it yields an olive-yellow or " old-gold " shade; with aluminium, yellow; with tin, a brighter yellow; with iron, an olive-green. It is chiefly employed in wool- dyeing along with other dyestuffs, and furnishes the yellow in com- pound shades. Two colouring principles exist in Old Fustic, namely, morin and maclurin, the former being the most important, and generally regarded as the true colouring matter.

Quercitron Bark consists of the inner bark of an oak-tree, Quercus tinctoria, which grows in the North American States. It dyes somewhat like Old Fustic, but gives with aluminium and tin mordants brighter yellows, for which colours it is chiefly used. The colouring principle of Quercitron Bark is called quercitrin, which by the action of boiling mineral acid solutions is decomposed, with the production of the true colouring matter termed quercetin.

So-called Flavine is a commercial preparation of Quercitron Bark consisting of quercitrin or of quercetin; it is much used by wool-dyers for the production of bright yellow and orange colours. Wool is dyed in single bath by boiling with a mixture of Flavine (8%), stannous chloride (4%) and oxalic acid (2%). Flavine is used in small quantity along with cochineal for dyeing scarlet on wool.

Persian Berries are the dried unripe fruit of various species of Rhamnus growing in the Levant. The general dyeing properties are similar to those of Quercitron Bark, the orange colour given with tin mordant being particularly brilliant. The high price of this dyestuff causes its employment to be somewhat limited. The colour- ing matter of Persian Berries is called xanthorhamnin, which by the action of fermentation and acids yields the true dyestuff rhamnetin.

Weld is the dried plant Reseda luteola, a species of wild mignonette, formerly largely cultivated in Europe. Its dyeing properties re- semble those of Quercitron Bark, but the yellows with aluminium and tin mordants are much brighter and purer, and also faster to light. It is still used to a limited extent for dyeing a bright yellow on woollen cloth and braid for the decoration of military uniforms. Quite recently the colouring matter of Weld, namely, luteolin, has been prepared artificially, but the process is too expensive to be of practical use.

Logwood is the heart-wood of Haematoxylon campechianum, a tree growing in Central America. It is the most important natural dyewood at present employed, being largely used for dyeing dark

blues and black on silk, wool and cotton. With chromium and aluminium mordants logwood dyes a dark blue, and even black; with tin, a dark purple; and with iron, black. The colours are only moderately fast to light. On wool the mordant is bichromate of potash ; on cotton and silk an iron mordant is employed. Before use by the dyer the logwood is ground and aged or oxidized, by allowing moistened heaps of the ground wood to ferment slightly, and by frequently turning it over to expose it freely to the air. By this means the colouring principle haematoxylin which logwood contains is changed into the true colouring matter haematei'n. The constitution of this colouring matter has been recently discovered; it is very closely allied to the brazilin of peachwood, sapanwood and limawood, and is also a member of the 7-pyrone group of colouring matters.

The importance of the above-mentioned natural dyestuffs is gradually diminishing in favour of mordant dyestuffs and others derived from coal-tar. Fustic and logwood are perhaps the most largely used, and may continue to be employed for many years, no satisfactory artificial substitutes having hitherto come into the market.

The Artificial Mordant Colours are well represented by alizarin, the colouring matter of the madder root, which was the first natural dyestuff prepared artificially from the coal-tar product anthracene (1868). For this reason many of these colours are frequently referred to as the Alizarin Colours. At the present time, however, there are numerous Mordant Colours which are prepared from other initial materials than anthracene; they are not chemically related to alizarin, and for these the term Alizarin Colours is therefore inappropriate. The property, which Mordant Colours possess in common, of combining with metals and pro- ducing lakes, which readily adhere to the fibre, depends upon their chemical constitution, more particularly upon the general and relative position in the molecule of csrtain side atomic groups. In alizarin there are, for example, two characteristic hydroxyl groups (OH) occupying a special (ortho) position in the molecule, i.e. they are next to each other, and aiso next to one of the so- called ketone groups (C:0). In other Mordant Colours there are carboxyl (COOH) as well as hydroxyl groups, which are all- important in this respect. In addition to this, the general dyeing property is influenced by the constitution of the molecule itself, and by the presence of other side-groups, e.g. NH 2 , HSO3, &c, which modify the colour as to solubility or hue. Hence it is that the members of this group, while possessing the mordant-dyeing property in common, differ materially in other

points. Some, like alizarin, are not in themselves to be regarded as colouring matters, but rather as colouring principles, because they only yield useful dyes in combination with metallic oxides. According to their constitution, these may yield one or many colours with the various metallic oxides employed, and they are used for cotton as well as for wool and silk. Other Mordant Colours, e.g. many of the Direct Colours and others, are capable of dyeing either the vegetable or animal fibres without the aid Tof a mordant ; they are fully developed colouring matters in themselves, and possess the mordant- dyeing property as an additional feature, in consequence of the details of their chemical constitution, to which reference has been made in the foregoing paragraphs. As a rule these yield, at most, various shades of one colour with the different oxides, and are only suitable for the animal fibres, particularly wool.

In the following list, the most important artificial Mordant Colours are arranged according to the colour they give in con- junction with the aluminium mordant, unless otherwise indicated. Some of those named here dye the animal fibres, even without mordants; some are Direct Colours possessing mordant-dyeing

properties, others are sulphonic acid derivatives of Alizarin Colours, suitable for wool but not for cotton.

Red. — Alizarin, anthrapurpurin, flavopurpurin, purpurin, alizarin Bordeaux, alizarin garnet R, alizarin maroon, alizarin S, cloth red, diamine fast red, anthracene red, chrome red, chrome Bordeaux, salicine red, erio chrome red, emin red, milling red.

Orange and Yellow. — Alizarin orange, alizarin orange G, alizarin yellow paste, alizarin yellow A, alizarin yellow- C, anthracene yellow, galloflavin, alizarin yellow GG, alizarin yellow R, diamond flavin G, chrome yellow D, Crumpsall yellow, fast yellow, diamond yellow, benzo orange R, cloth orange, carbazol yellow, chrysamine, milling orange.

Green. — Coerulei'n, coerulein S, alizarin green S, fast green (Fe), naphthol green (Fe), Dioxin (Fe), Gambine (Fe), azo green, gallanil green, alizarin green G and B, acid alizarin green, alizarin cyanine green, alizarin viridine, diamond green, chrome green, Domingo green.

Blue. — Alizarin blue, alizarin blue S, alizarin cyanine, anthracene blue, brilliant alizarin blue, alizarin indigo blue S, gallanilic indigo, acid alizarin blue, brilliant alizarin cyanine, alizarin grisole, alizarin sky blue, alizarin saphirole, gallanilide blue, delphine blue, gallamine blue, celestine blue, chrome blue, gallazine A, phenocyanine, corei'ne.

Purple and Violet. — Gallei'n, alizarin heliotrope, anthraquinone violet, chrome prime, gallocyanine, chrome violet, anthracene chrome violet.

Brown. — Anthracene brown, chromogen, cloth brown, diamond brown, alizarin brown, fast brown, alizarin acid brown, chrome brown, palatine chrome brown, erio chrome brown.

Black. — Alizarin black, diamond black, alizarin blue black, alizarin cyanine black, alizarin fast grey, chromotrope, chrome black, erio chrome black, anthracite black, acid alizarin black, anthracene chrome black.

A brief description of the application of a few of the more important of the above colouring matters will suffice.

Alizarin, Anthrapurpurin and Flavopurpurin give somewhat similar shades with the different mordants, namely, brown with chromium, red with aluminium, orange with tin, and purple with

Iii wool-dyeing they are applied along with other Mordant Colours on chromium mordant for the production of a large variety of compound shades, browns, drabs, greys, &c, the presence of acetic acid in the dyebath being advantageous. When alum and tartar mordant is employed, for the production of reds, it is necessary to add a small amount (4 %) of calcium acetate to the dyebath, in order to neutralize the strong acidity of the mordanted wool, and to furnish the calcium of the colour-lake fixed upon the fibre, which is regarded as an aluminium-calcium compound of the colouring matter.

In cotton-dyeing the above colouring matters are chiefly used for the production of so-called Turkey-red, a colour remarkable for its brilliancy and its fastness to light and soap. These properties are due to the preparation of the cotton with oil, in addition to the ordinary mordanting and dyeing, whereby there is fixed on the fibre a permanent and stable lake, in which aluminium and calcium are combined with alizarin and some form of fatty oxy-acid. In the older

processes employed, the preparation of the cotton with oil was effected by passing the material several times through emulsions of olive oil and potassium carbonate solution; at a later date, and even now in the case of cloth, the cotton is first impregnated with hot oil (Steiner's process), then passed through solutions of alkali carbonate. After the preparation with oil or oil-emulsions, the cotton is " stoved," i.e. heated for several hours in special chambers or stoves to a temperature of about 70° C, during which operation the oil is decomposed and oxidized and becomes indelibly attached to the fibre. The oil-prepared cotton is steeped in cold solutions of basic aluminium sulphate or acetate, washed, dyed with alizarin, and finally boiled for several hours with soap solution under pressure in order to brighten the colour. In the more recent and much more expeditious " sulphated-oil process," castor oil is employed instead of olive oil, and before use it is submitted to a treatment with sulphuric acid, the sulphated oil thus obtained being finally more or less neutralized with alkali. The cotton is impregnated with this sulphated-oil solution, dried, mordanted with aluminium acetate, dyed, dried, steamed and soaped. The operation of steaming plays an important part in brightening and fixing the colour-lake on the fibre. In these and all other Turkey-red processes, the oil, probably in the form of a fatty oxy-acid, acts as a fixing agent for the aluminium and enters into the composition of the red lake, imparting to it both brilliancy and permanency.

Alizarin S is a sulphonic acid derivative of alizarin, and since it is much more soluble, it readily yields level colours. Silk is dyed in a similar manner to wool, the fibre being mordanted by the ordinary methods and then dyed in a separate bath.

Diamine Fast Red is applied to cotton as a Direct Colour, with the addition of soda or soap to the dyebath. By treating the dyed colour with a solution of fluoride of chromium, its fastness to wash- ing is materially increased. Wool is dyed in a similar manner, sodium sulphate being added to the dyebath, and the dyed colour treated with fluoride of chromium or bichromate of potash. On wool, the colour is so extremely fast to light and to milling that it may well serve as a substitute for alizarin.

Alizarin Orange is employed in the same manner as alizarin. In wool-dyeing it is usually applied on chromium mordant for browns and a variety of compound shades in combination with other Alizarin Colours and dyewood extracts, less frequently on aluminium mordant.

Galloflavin is used in wool and silk dyeing on chromium mordant as a substitute for fustic and other yellow dyewoods, to furnish the yellow part of compound shades.

The alizarin yellows, R and GG, anthracene yellow, diamond flavine, chrome yellow, diamond yellow, carbazol yellow, chry- samine, &c, are Direct Colours with mordant-dyeing properties. They also serve as substitutes for fustic in wool or silk dyeing, and are dyed either on a chromium mordant, or first in an acid bath and afterwards saddened with bichromate of potash.

Coerulein is employed in dyeing wool, silk or cotton with aluminium or chromium mordants, either as a self-colour or for compound shades. With aluminium mordant the colour is a moderately bright green, more particularly on silk; with chromium mordant, an olive-green. Coerulein S is the more soluble bisulphite compound of the ordinary coerulein. It is applied in the same manner, care being taken, however, to dye for some time (one hour) at a temperature not exceeding 60° C. until the bath is nearly exhausted, and then only raising the temperature to the boiling point. Without this precaution coerulei'n S is decomposed, and the ordinary insoluble coerulei'n is precipitated. The colours obtained are very fast to light.

Fast Green, Dioxine and Gambine are chiefly of use in calico-printing and in wool-dyeing. With iron mordant they yield olive-greens, which on wool are extremely fast to light. Cotton is im-pregnated with ferrous acetate, dried, aged and fixed with silicate of soda, then dyed in a neutral bath. Wool is mordanted with ferrous sulphate and tartar (3 % of each) and dyed in a neutral bath.

Acid Alizarin Green, Alizarin Cyanine Green and Diamond Green all dye wool direct in a bath acidified with acetic or sulphuric acid, and the dyed colour may be afterwards fixed or saddened with bichromate of potash, or they may be dyed on chromium-mordanted wool. The first method is very useful for pale shades, since the colours are very level or regular.

Alizarin Blue is a dark blue dyestuff which, owing to the fastness of the colours it yields, has for many years been regarded as a worthy substitute for indigo in wool-dyeing. It is applied in the same manner as alizarin, the chromium mordant being alone employed. Alizarin blue S is the soluble sodium bisulphite compound of alizarin blue ; it corresponds, therefore, to the above-mentioned coerulein S, and in its application the same precautions as to the temperature of the dyebath are necessary. The fastness of the dyed colours to light, milling and acid satisfy the highest requirements.

Alizarin Cyanine, Anthracene Blue and Brilliant Alizarin Blue were

discovered later than the above-mentioned alizarin blues, and, owing to their greater solubility and other advantages, they have largely replaced them as substitutes for indigo. They are dyed on chromium-mordanted wool, silk or cotton, and yield dark purplish or greenish blues, according to the particular brand em-, ployed. The fastness of the dyed colours to light, and general durability, are very satisfactory, but in fastness to milling and acids they are to some extent inferior to alizarin blue.

Celestine Blue and Chrome Blue dye purplish blue and bright blue respectively, and are dyed in the ordinary way upon a chromium mordant. The colours they yield are inferior to the Alizarin Colours in fastness to light, but on account of their clear shades they are often used for brightening other colours.

Brilliant Alizarin Cyanine, Alizarin Viridine and Alizarin Saphirole are true Alizarin Colours, and possess the same fastness to light as other colours of this class. Unlike most of the Alizarin Colours, they are capable of dyeing wool satisfactorily without the aid of a metallic mordant — namely, with the addition of sulphuric acid to the dyebath, in the same manner as the Acid Colours. If necessary, the dyed colours may be treated with bichromate of potash. The colours thus produced are very fast to light and very level, hence these dyestuffs are valuable in the production of the most delicate compound shades, such as drabs, slates, greys, &c, which are desired to be fast to light. Alizarin saphirole dyes clear blue, the colour produced being much more brilliant even than those of brilliant alizarin cyanine.

Gallein, Gallocyanine, and especially Chrome Violet, dye some- what bright purple shades, and are hence frequently employed for brightening other colours, but they are only moderately fast to light. They are applied in the usual manner on a chromium mordant.

Anthracene Brown is largely employed in the production of compound shades. It dyes a dark, somewhat reddish, brown on chromium mordant, the colour being very even and extremely fast to light.

Alizarin Black is dyed on chromium mordant in the same manner as alizarin, and is used as a self-colour or in combination with other Alizarin Colours.

Diamond Black is very useful for dyeing good blacks on wool, fast to light and acids. The wool is first dyed with the addition of acetic and

finally sulphuric acid. When the dyebath is exhausted,

bichromate of potash (2 %) is added, and boiling is continued for half an hour longer.

The erio chrome colours (black, brown, red, &c.) are applied in wool dyeing like diamond black.

Chromotrope, of which there are several brands, is an Acid Colour which is applied to wool in an acid bath in the usual manner. The red or purple colours thus obtained are saddened in the same bath with bichromate of potash and changed into black, the colouring matter being oxidized and simultaneously combined with chromium. MiscellaneousColours. — Under thishead there may be arranged a few dyestuffs which, although capable of inclusion under one or other of the foregoing groups, it is more convenient to treat of separately. Indigo, Aniline Black and Catechu, for example, might be placed in the class of Developed Colours, since they are all developed on the fibre, and indeed by the same method, namely, by oxidation.

Indigo is one of our most important blue dyestuffs, which has been employed from the earliest times. Indigo, being insoluble in water, would be of no use in dyeing if it were not capable of being rendered soluble. This is effected in two ways, corresponding to which there are two methods of dyeing with indigo. One method consists in dissolving the indigo in very strong sulphuric acid, where- by it is converted into indigotin-disulphonic acid (Indigo Extract), which is readily soluble in water. This substance belongs to the group of Acid Colours; hence it is applied to the animal fibres, wool and silk, by boiling in a solution of the colouring matter slightly acidified with sulphuric acid. The second and most important method is based on the fact that under the influence of reducing agents (i.e. substances capable of yielding nascent hydrogen) indigo blue is changed into indigo white, which is soluble in alkali, the solution thus obtained being called a " vat." If textile materials are steeped in a clear yellow solution of the reduced indigo and then exposed to air, the indigo white absorbed by the fibre is oxidized and reconverted into indigo blue within and upon the fibre, which thus becomes dyed blue; this is the so-called " indigo-vat " method of dyeing. Comparing the two methods, the "indigo-extract" method is only applicable to the animal fibres, and although it gives brighter colours, they are fugitive

to light and are decolourized by washing with alkaline solutions; the " vat method " is applicable to all fibres, and gives somewhat dull blues, which are very fast to light, washing, &c.

Cotton is dyed by means of the " lime and copperas vat" the " zinc powder vat," or the " hydrosulphite vat." In the first-men- tioned vat the ingredients are quicklime, ferrous sulphate and finely ground indigo; the lime decomposes the ferrous sulphate and precipitates ferrous hydrate; this quickly reduces the indigo to indigo white, which dissolves in the excess of lime present. The ingredients of the zinc powder vat are zinc powder, lime and indigo; in the presence of the lime and indigo the zinc takes up oxygen from the water, liberating the hydrogen necessary to reduce the indigo, as in the previous vat. The constituents of the hydrosulphite vat are hydrosulphite of soda, lime and indigo. The requisite hydro- sulphite of soda is prepared by allowing zinc powder (13 lb) to act upon a cold concentrated solution of bisulphite of soda (17 gallons of sp. gr. 1-225), taking care to avoid, as much as possible, access of air and any heating of the mixture, to prevent decomposition. The solution thus obtained is thoroughly neutralized by the addition of lime; and after settling, the clear liquor is used for the vat, along with indigo and lime. Here again the hydrosulphite takes up oxygen from the water and liberates the necessary hydrogen. It is found convenient to prepare, in the first instance, a very concentrated standard of reduced indigo, and to add as much of this to the dye- vat as may be required, along with lime and a little hyposulphite of soda. The advantages of this vat are that it is easily prepared and that there is very little sediment; moreover, it can be employed in dyeing wool, as well as cotton, and it is now very generally in use. The vat usually employed for dyeing wool is the so-called " woad vat," which differs from the foregoing in that the hydrogen necessary to reduce the indigo and bring it into solution is furnished, not by the action of chemical agents, but by means of fermentation. The ingredients of the woad vat are indigo, woad, bran, madder and lime. The woad here employed is prepared by grinding the leaves of the woad plant (Isatis tinctoria) to a paste, which is allowed to ferment and then partially dried. It serves as the ferment to excite lactic and butyric fermentation with the aid of the bran and madder, the necessary hydrogen being thus evolved. Exces- sive fermentation is avoided by making timely additions of lime; sluggish fermentation is accelerated by additions of bran and slightly raising the temperature. When the reduction and com- plete solution of the indigo is effected, the vat is allowed to settle, and the woollen material is immersed and moved about in the clear liquor for half an hour to two hours, according to

the shade required, then squeezed and exposed to the air in order to develop the blue colour on the fibre.

Thioindigo red is an artificial colouring matter belonging to the indigo series and comes into the market in the form of a paste. It is used in dyeing in exactly the same way as indigo, yielding shades which range from a somewhat dull pink to a full claret shade of red. The colours obtained are remarkable for their fastness. Indanthrene. This colouring matter, which is also sold as a paste,

is an anthracene derivative, being formed by the action of caustic potash on /3-amidoanthraquinone. It is reduced by hydrosulphite of soda yielding a blue vat, in which cotton and other vegetable fibres are dyed in the same way as in the indigo vat. Since a fair amount of caustic soda is necessary for the setting of the vat, the dyestuff is not suitable for animal fibres. Indanthrene yields on cotton reddish shades of blue which are extremely fast to all external influences; in fact the colour is so fast that when once fixed on cotton it cannot be removed again from the fibre by any known means.

Other vat colours belonging to this series, which are similarly applied, are flavanthrene (yellow), viridanthrene (green), fuscan-threne (grey-brown), violanthrene (dull violet) and melanthrene (grey to black). The algol colours resemble the indanthrene colours in their properties and application.

Aniline Black differs from other dyes in that it is not sold as a ready-made dyestuff, but is produced in situ upon the fibre by the oxidation of aniline. It is chiefly used for cotton, also for silk arid cotton-silk union fabrics, but seldom or not at all for wool. Properly applied, this colour is one of the most permanent to light and other influences with which we are acquainted. One method of dyeing cotton is to work the material for about two hours in a cold solution containing aniline (10 parts), hydrochloric acid (20 parts), bichromate of potash (20 parts), sulphuric acid (20 parts), and ferrous sulphate (16 parts). The ferrous sulphate here em- ployed is oxidized by the chromic acid to a ferric salt, which serves as a carrier of oxygen to the aniline. This method of dyeing is easily carried out, and it gives a good black; but since much of the colouring matter is precipitated on the fibre superficially as well as in the bath itself, the colour has the defect of rubbing off. Another method is to impregnate the cotton with a solution con- taining aniline hydrochloride (35 parts), neutralized with addition of a little aniline oil, sodium chlorate (10 parts), ammonium chloride (10 parts). Another mixture is 1.8 part aniline salt, 12 parts potas- sium ferrocyanide, 200 parts water, 3-5

parts potassium chlorate dissolved in water. After squeezing, the material is passed through a special oxidation chamber, the air of which is heated to about 50° C. and also supplied with moisture. This oxidizing or ageing is continuous, the material passing into the chamber at one end in a colourless condition, and after about 20 minutes passing out again with the black fully developed, a final treatment with hot chromic acid solution and soaping being necessary to complete the process. In this method, employing the first-mentioned solution, chlorate of copper is formed, and this being a very unstable com- pound, readily decomposes, and the aniline is oxidized by the liberated chlor-oxygen compounds. The presence in the mixture of a metallic salt is very important in aiding the development of the black, and for this purpose salts of vanadium, cerium and copper have proved to be specially useful. The chemistry of aniline black is still incomplete, but it would appear that there are several oxida- tion products of aniline. The first product is so-called emeraldine, a dark green substance of the nature of a salt, "which by treatment with alkali yields a dark blue base called azurine. The further oxidation of emeraldine yields nigraniline, also a dark green salt, but the free base of which has a violet black colour. The latter becomes greenish under the influence of acids, especially sulphuric acid, and this explains the defect known as " greening " which is developed in ordinary aniline blacks during exposure to air. By a supplementary oxidation with chromic acid such a black is rendered ungreenable, the nigraniline being probably changed into the more stable chromate of nigraniline.

Catechu is a valuable brown dyestuff, obtained from various species of Acacia, Areca and Uncaria growing in India. The wood, leaves and fruit of these plants are extracted with boiling water; the decoction is then evaporated to dryness or to a pasty consistency. Catechu is largely used by the cotton dyer for the production of brown, drab and similar colours. It is seldom employed for wool. Cotton is usually dyed by boiling it for about one hour in a de- coction of catechu (ioo%) containing copper sulphate (5%). After squeezing, the material is boiled for about fifteen minutes in a solution of bichromate of potash (\ oz. per gal.), then washed and dried. By repeating the operations two or three times deeper shades are obtained. During the boiling with catechu the cotton attracts the active principles catechin and catechu-tannic acid, but it thus acquires only a pale brown colour; in the bichromate of potash, however, these are oxidized to form insoluble japonic acid, which permeates the fibre, and a deep brown colour is thus developed. Catechu browns are fast to a variety of influences, e.g. washing,

alkalis, acids, &c, but less so to light. Catechu has been recently much employed, in conjunction with copper sulphate, for dyeing the so-called khaki-brown on woollen material for military clothing. On silk, catechu is much used for weighting purposes in dyeing black.

Mineral Colours. — Those include Chrome Yellow, Iron Buff, Prussian Blue and Manganese Brown.

Chrome Yellow is only useful in cotton-dyeing as a self-colour, or for conversion into chrome orange, or, in conjunction with indigo, for the production of fast green colours. The cotton is first impregnated with a solution of lead acetate or nitrate, squeezed, and then passed through a solution of sodium sulphate or lime water to fix the lead on the fibre as sulphate or oxide of lead. The

material is then passed through a solution of bichromate of potash. The colour is changed to a rich orange by a short, rapid passage through boiling milk of lime, and at once washing with water, a basic chromate of lead being thus produced. The colour is fast to light, but has the defect of being blackened by sulphuretted hydrogen.

Iron Buff is produced by impregnating the cotton with a solution of ferrous sulphate, squeezing, passing into sodium hydrate or carbonate solution, and finally exposing to air, or passing through a dilute solution of bleaching powder. The colour obtained, which is virtually oxide of iron, or iron-rust, is fast to light and washing, but is readily removed by acids.

Prussian Blue is applicable to wool, cotton and silk, but since the introduction of coal-tar blues its employment has been very much restricted. The colour is obtained on cotton by first dyeing an iron buff, according to the method just described, and then passing the dyed cotton into an acidified solution of potassium ferrocyanide, when the blue is at once developed. A similar method is employed for silk. Wool is dyed by heating it in a solution con- taining potassium ferricyanide and sulphuric acid. The colour is developed gradually as the temperature rises; it may be rendered brighter by the addition of stannous chloride. On wool and silk Prussian blue is very fast to light, but alkalis turn it brown (ferric oxide).

Manganese brown or bronze is applied in wool, silk and cotton dyeing. The animal fibres are readily dyed by boiling with a solution

of potassium permanganate, which, being at first absorbed by the fibre, is readily reduced to insoluble brown manganic hydrate. Since caustic potash is generated from the permanganate and is liable to act detrimentally on the fibre, it is advisable to add some magnesium sulphate to the permanganate bath in order to counter- act this effect. Imitation furs are dyed in this manner on wool- plush, the tips or other parts of the fibres being bleached by the application of sulphurous acid. Cotton is dyed by first impregnating it with a solution of manganous chloride, then dyeing and passing into a hot solution of caustic soda. There is thus precipitated on the fibre manganous hydrate, which by a short passage into a cold dilute solution of bleaching powder is oxidized and converted into the brown manganic hydrate. This manganese bronze or brown colour is very susceptible to, and readily bleached by, reducing agents; hence when exposed to the action of an atmosphere in which gas is freely burnt, the colour is liable to be discharged, especially where the fabric is most exposed. In other respects manganese bronze is a very fast colour.

Dyeing on a large Scale. — It is not possible to give here more than a bare outline of the methods which are used on the large scale for dyeing textile fibres, yarns and fabrics. In principle, dyeing is effected by allowing an aqueous 1 solution of the dye- stuff, with or without additions (alkalis, acids, salts, &c), to act, usually at an elevated temperature, on the material to be dyed. During the process it is necessary, in order to ensure the uniform distribution of the dyestuff in the material, that the latter should either be moved more or less continuously in the dye liquor or that the dye liquor should be circulated through the material. The former mode of operation is in general use for hank, warp and piece dyeing, but for textile fibres in the loose condition or in the form of " slubbing," " sliver " or " cops " (see Spinning) the latter method has, in consequence of the introduction of improved machinery, come more and more into vogue within recent years.

Loose Material. — Cotton and wool are frequently dyed in the loose state, i.e. before being subjected to any mechanical treat- ment. The simplest method of effecting this is to treat the material in open vessels (boilers) which can be heated either by means of steam or direct fire. ■ Since, however, a certain amount of felting or matting of the fibres cannot be avoided, it is fre- quently found to be more advantageous to effect these treatments in specially constructed apparatus in which the dye liquors are circulated through the material.

Yarn. — Yarn may be dyed either in the hank, in the warp or in the cop, i.e. in the form in which the yarn leaves the spinning frame. The dyeing in the hank is carried out in rectangular dye- vats constructed of wood or stone like that shown in fig. i, in which the hanks are suspended from smooth wooden poles or rods resting on the sides, and are thus immersed almost entirely in the dye liquor. The heating of the vat is effected either by means of live steam, i.e. by blowing steam into the dye solution from a perforated pipe which runs along the bottom of the vat,

1 The term " dry dyeing," which is carried out only to a very limited extent, relates to the dyeing of fabrics with the dyestuff dissolved in liquids other than water, e.g. benzene, alcohol, &c.

or by means of a steam coil similarly situated. In order to expose the hanks as uniformly as possible to the action of the dye liquor, they are turned by hand at regular intervals until the operation is finished. Washing off is effected in the same or in a similar vessel, after which excess of water is removed by wringing by hand, through squeezing rollers or, what is generally preferred, in a hydro-extractor (centrifugal machine). The drying of the dyed and washed yarn is generally effected by suspending it

Fig. i. — Dye-vat for Yarn.

on poles in steam-heated drying chambers. Yarn in the warp is dyed in vats or " boxes " like that shown in fig. 2, through which it is caused to pass continuously. The warps to be dyed pass slowly up and down over the loose rollers in the first box B, then through squeezing rollers S into the next, and the same thing occurs in the second (also third and fourth in a four-box machine) box A, whence they are delivered through a second pair of squeezing rollers Si into the wagon W. The boxes may contain the same or different liquors, according to the nature of the dyestuff employed. Washing is done in the same machine, while drying is effected on a cylinder drying machine like that shown in figs. 8 and 9 of Bleaching. Latterly, machines have been introduced for dyeing warps on the beam, the dye liquor being caused to circulate through the material, and the system appears to be meeting with considerable success. Large quantities of yarn, especially cotton, are now dyed in the cop. When the dyed yarn is to be used as weft the main advantage of this method is at once apparent, inasmuch as the labour, time and waste of material incurred by reeling into hanks and then winding back into the compact form so as to fit into the shuttle are avoided. On the other hand the number of fast dyestuffs suitable for cop dyeing is

very limited. In the original cop- dyeing machine constructed by Graemiger a thin tapering perforated metallic tube is inserted in the hollow of each cop. The cops are then attached to a perforated disk (which con-

Fig. 2.

stitutes the lid of a chamber or box) by inserting the protruding ends of the tubes into the perforations. The chamber is now immersed in the dye-bath and the hot liquor is drawn through the cops by means of a centrifugal pump and returned continu- ously to the dye-bath. This principle, which is known as the skewer or spindle system, is the one on which most modern cop- dyeing machines are based. In the so-called " compact " system of cop dyeing the cops are packed as closely as possible in a box, the top and bottom (or the two opposite sides) of which are

perforated, the interstices between the cops being filled up with loose cotton, ground cork or sand. The dye liquor is then drawn by suction or forced by pressure through the box, thus permeating and dyeing the cops.

Pieces. — Plain shades are usually dyed in the piece, this being the most economical and at the same time the most expeditious

ˆmeans of obtaining the de- sired effect. The dyeing of piece goods may be effected by running them through the dye liquor either at full breadth or in rope form. The machine in most com- mon use for the first method is the Lancashire " jigger," which is simple in principle and is shown in section in fig. 3. It consists essentially of a dye-vessel constructed of wood or cast iron and containing loose guide rollers,

,- — , r and r, at the top and

\fr***ˆmmmm'ˆyW' bottom. By coupling up the Fig. 3.— Dye-jigger. roller B with the driving gear

the pieces which are batched on A are drawn through the dye liquor and rolled on to B. A band brake (not shown in the figure) applied to the axis of A gives the pieces the required amount of tension in passing through the dye-bath. As soon as the whole of the pieces have passed through in this way from A to B, the machine is reversed, and

roller A draws them back again through the bath in a similar way on to roller A. This alternating process goes on until the dyeing is finished, when the goods are washed off, squeezed and dried. The jigger is especially useful in cotton piece dyeing, one great advantage being that it is suited for what is known as a " short, bath," i.e. a bath containing a minimum amount of dye liquor, this being of great importance in the application of dyestuffs which do not exhaust well, like the direct colours and the sulphide colours. The padding machine is similar in principle to the jigger, the pieces running over loose guide rollers through the mordant or dye solution contained in a trough of suitable shape and size, but on leaving the machine they pass through a

pair of squeezing rol- lers which uniformly express the excess of liquor and cause it to be returned to the bath. The padding machine is used more for preparing (mor- danting, &c.) than for dyeing.

For the dyeing of pieces in rope form a so-called "dye- beck " is used, which is a machine of larger dimensions than the jigger. Across the dye-bath is attached a winch W (see fig. 4), by means of which the pieces, sewn to- gether at the ends so as to form an end-

Fig. 4. — Dye-vat for Piece Goods.

less band, are caused to circulate through the machine, being drawn up on the front side of the machine and allowed to drop back into the dye liquor on the other. This form of machine is particularly suited for the mordanting and dyeing of heavy goods. Washing off may be done in the same machine.

The drying of piece goods is done on steam-heated cylinders like those used for the drying of bleached goods (see Bleaching).

The operations which precede dyeing vary according to the material to be dyed and the effects which it is desired to produce. Loose wool, woollen and worsted yarn and piece goods of the same material are almost invariably scoured (see Bleaching) before dyeing in order to remove the oily or greasy impurities which would otherwise interfere with the penetration of the dye solution. Silk is subjected to the process of discharging or boiling off (see Bleaching) in order to remove the silk gum or sericine. Cotton which is to be dyed in dark shades does not require any preparatory treatment, but for light or very bright shades it is bleached before dyeing. Wool and silk are seldom bleached before dyeing. Cotton, wool and union (cotton warp and worsted weft) fabrics are frequently singed (see Bleaching)

before dyeing. Worsted yarn, especially two-fold yarn, is very liable to curl and become entangled when scoured, and in order to avoid this it is necessary to stretch and " set " it. To this end it is stretched tight on a specially constructed frame, placed in boiling water, and then cooled. Similarly, union fabrics are liable to " cockle " when wetted, and although this defect may be put right in finishing, spots of water or raindrops will give an uneven appearance of a permanent character to the goods; To avoid this, the pieces are subjected previous to dyeing to the so-called " crabbing " process, in which they are drawn under great tension through boiling water and wound on to perforated hollow cylinders. Steam is then blown through the goods and they are allowed to cool.

With respect to the question of colour, we meet with two kinds of substances in nature, those which possess colour and those which do not. Why this difference? The physicist says the former are bodies which reflect all the coloured jyg"^ ° rays of the spectrum composing white light- — if opaque, they appear white; if transparent, they are colourless. The latter are bodies which absorb some of the spectrum rays only, reflecting the remainder, and these together produce the impres- sion of colour. A black substance is one which absorbs all the spectrum rays. The fundamental reason, however, of this difference of action on the part of substances towards light remains still unknown. All substances which possess colour are not necessarily dyestuffs, and the question may .be again asked, Why? It is a remarkable circumstance that most of the dyestuffs at present employed occur among the so-called aromatic or benzene compounds derived from coal-tar, and a careful study of these has furnished a general explanation of the point in question, which briefly is, that the dyeing property of a substance depends upon its chemical constitution. Speaking generally, those colouring matters which have the simplest constitution are yellow, and as the molecular weight increases their colour passes into orange, red, violet and blue. In recent years chemists have begun to regard the constitution of nearly all dyestuffs as similar to that of Quinone, and some even believe that all coloured organic compounds have a quinonoid structure. According to O. N. Witt, a colourless hydrocarbon, e.g. benzene, becomes coloured by the introduction of one or more special groups of atoms, which he terms the colour-bearing or chromo- phorous groups, e.g. NO2, – N:N -, &c. Benzene, for example, is colourless, whereas nitro-benzene and azo-benzene are yellow. Such compounds containing chromophorous groups are termed chromogens, because, although not dyestuffs themselves, they are capable of generating such by the further introduction of salt-forming atomic groups, e.g.

OH, NH>. These Witt terms auxochromous groups. In this way the chromogen tri-nitro- benzene, C 6 H 3 (N02)3, becomes the dyestuff tri-nitro-phenol (picric acid), CsHKNttMOH), and the chromogen azo-benzene, C 6 H 5 -N : N-C 6 H5, is changed into the dyestuff amido-azo-benzene (Fast Yellow), C 6 H 5 -N : N-C 6 rL,(NH 2). These two dyestuffs are typical of a large number which possess either an acid or a basic character according as they contain hydroxyl (OH) or amido (NH2) groups, and correspond to the Acid Colours and Basic Colours to which reference has already been made. Other important atomic groups which frequently occur, in addition to the above, are the carboxyl (COOH) and the sulphonic acid (HSO3) groups; these either increase the solubility of the

colouring matter or assist in causing it to be attracted by the fibre, &c. In many cases the free colour-acid or free colour-base has little colour, this being only developed in the salt. The free base rosaniline, for example, is colourless, whereas the salt magenta (rosaniline hydrochloride) has a deep crimson colour in solution. The free acid Alizarin is orange, while its alumina- salt is bright red. It may be here stated that the scientific classification of colouring matters into Nitro-colours, Azo-colours, &c, already alluded to, is based on their chemical constitution, or the chromophorous groups they contain, whereas the classifica- tion according to their mode of application is dependent upon the character and arrangement of the auxochromous groups. The question of the mordant-dyeing property of certain colouring matters containing (OH) and (COOH) groups has already been explained under the head of Artificial Mordant Colours.

The peculiar property characteristic of dyestuffs, as distin- guished from mere colouring matters, namely, that of being readily attracted by the textile fibres, notably the animal fibres, appears then to be due to their more or less marked acid or basic character. Intimately connected with this is the fact that these fibres also exhibit partly basic and partly acid characters, due to the presence of carboxyl and amido groups. The behaviour of magenta is typical of the Basic Colours. As already indicated, rosaniline, the base of magenta, is colourless, and only becomes coloured by its union with an acid, and yet wool and silk can be as readily dyed with the colourless rosaniline (base) as with the magenta (salt). The explanation is that the base rosaniline has united with the fibre, which here plays the part of an acid, to form a coloured salt. It has also been proved that

in dyeing the animal fibres with magenta (rosaniline hydrochloride), the fibre unites with the rosaniline only, and liberates the hydrochloric acid. Further, magenta will not dye cotton unless the fibre is previously prepared, e.g. with the mordant tannic acid, with which the base rosaniline unites to form an insoluble salt. In dyeing wool it is the fibre itself which acts as the mordant. In the case of the Acid Colours the explanation is similar. In many of these the free colour-acid has quite a different colour from that of the alkali-salt, and yet on dyeing wool or silk with the free colour-acid, the fibre exhibits the colour of the alkali-salt and not of the colour-acid. In this case the fibre evidently plays the part of a base. Another fact in favour of the view that the union between fibre and colouring matter is of a chemical nature, is that by altering the chemical constitution of the fibre its dyeing properties are also altered; oxycellulose and nitrocellulose, for example, have a greater attraction for Basic Colours than cellulose. Such facts and considerations as these have helped to establish the view that in the case of dyeing animal fibres with many colouring matters the operation is a chemical process, and not merely a mechanical absorption of the dyestuff. A similar explanation does not suffice, however, in the case of dyeing cotton with the Direct Colours. These are attracted by cotton from their solutions as alkali salts, apparently without decom- position. The affinity existing between the fibre and colouring matter is somewhat feeble, for the latter can be removed from the dyed fibre by merely boiling with water. The depth of colour obtained in dyeing varies with the concentration of the colour solution, or with the amount of some neutral salt, e.g. sodium chloride, added as an assistant to the dye-bath; moreover, the dye-bath is not exhausted. The colouring matter is submitted to the action of two forces, the solvent power of the water and the affinity of the fibre, and divides itself between the fibre and the water. After dyeing for some time, a state of equilibrium is attained in which the colouring matter is divided between the fibre and the water in a given ratio, and prolonged dyeing does hot intensify the dyed colour.

Some investigators hold the view that in some cases the fibres exert a purely physical attraction towards colouring matters, and that the latter are held in an unchanged state by the fibre. The phenomenon is regarded as one of purely mechanical surface- attraction, and is compared with that exercised by animal char- coal when employed in decolourizing a solution of some colouring matter. Some consider such direct dyeing as mere diffusion of

the colouring matter into the fibre, and others that the colouring matter is in a state of " solid solution " in the fibre, similar to the

solution of a metallic oxide in coloured glass. According to this latter view, the cause of the dyeing of textile fibres is similar to the attraction or solvent action exerted by ether when it with- draws colouring matter from an aqueous solution by agitation. Latterly the view has been advanced that dyeing is due to precipi- tation of the colloid dyestuffs by the colloid substance of the fibre.

In the case of colours which are dyed on mordants, the question is merely transferred to the nature of the attraction which exists between the fibre and the mordant, for it has been conclusively established that the union between the colouring matter and the mordant is essentially chemical in character.

From our present knowledge it will be seen that we are unable to give a final answer to the question of whether the dyeing process is to be regarded as a chemical or a mechanical process. There are arguments and facts which favour both views; but in the case of wool and silk dyeing, the prevailing opinion in most cases is in favour of the chemical theory, whereas in cotton- dyeing, the mechanical theory is widely accepted. Probably no single theory can explain satisfactorily the fundamental cause of attraction in all cases of dyeing, and further investigation is needed to answer fully this very difficult and abstruse question.

The poisonous nature or otherwise of the coal-tar dyes has been frequently discussed, and the popular opinion, no doubt dating from the time when magenta and its derivatives were contaminated with arsenic, seems to be that they are ?"". for the most part really poisonous, and ought to be avoided for colouring materials worn next the skin, for articles of food, &c. It is satisfactory to know that most of the colours are not poisonous, but some few are — namely, Picric acid, Victoria Orange, Aurantia, Coralline, Metanil Yellow, Orange II. and Safranine. Many coal-tar colours have, indeed, been recommended as antiseptics or as medicinal remedies, e.g. Methyl Violet, Auramine and Methylene Blue, because of their special physiological action. In histology and bacteriology many coal-tar colours have rendered excellent service in staining microscopic preparations, and have enabled the investigator to detect differences of structure, &c, previously unsuspected. In photography many of the more fugitive colouring matters, e.g. Cyanine, Eosine, Quinoline Red, &c, are employed in the manufacture of ortho-chromatic plates, by means of which the colours of natural objects can be photographed in the same degrees of light and shade as they appear to the eye — blue, for example, appearing a darker grey, yellow, a lighter grey, in the printed photograph.

Since the year 1856, in which the first coal-tar colour, mauve, was discovered, the art of dyeing has made enormous advances, mainly in consequence of the continued introduction of coal-tar colours having the most varied properties and suitable for nearly every requirement. The old idea that the vegetable dyestuffs are superior in fastness to light is gradually being given up, and, if one may judge from the past, it seems evident that in the future there will come a time when all our dyestuffs will be prepared by artificial means.

Authorities.— Macquer, Hellot and le Pileur d'Apligny, The Art of Dyeing Wool, Silk and Cotton (London, 1789); Bancroft, Philosophy of Permanent Colours (2 vols., London, 1813) ; Berthollet- Ure, Elements of the Art of Dyeing (2 vols., London, 1824) ; Chevreul, Recherches chimiques sur la teinture (Paris, 1835-1861); O'Neill, The Chemistry of Calico Printing, Dyeing and Bleaching (Manchester, i860); Dictionary of Calico Printing and Dyeing (London, 1862); Schiitzenberger, Traite des matieres colorantes (2 vols., Paris, 1867) ; Bolley, Die Spinnfasern und die im Pflanzen- und Thierkbrper vorkommenden Farbstoffe (1867); Crookes, A Practical Handbook of Dyeing and Calico-Printing (London, 1874) '< Jarmain, Wool- Dyeing (1876) ; r O'Neill, Textile Colourist (4 vols., Manchester, 1876) ; Calvert, Dyeing and Calico Printing (Manchester, 1876); Moyret, Traite de la teinture des soies (Lyon, 1877) ; O'Neill, The Practice and Principles of Calico Printing, Bleaching and Dyeing (Manchester, 1878); Girardin, Matieres textiles et matieres tinctoriales (Paris, 1880); Hummel, The Dyeing of Textile Fabrics (London, 1885); Sansone, Dyeing (Manchester, 1888); Witt, Chemische Technologie der Gespinnstfasern (Brunswick, 1888); Benedikt and Knecht, The Chemistry of the Coal-Tar Colours (London, 1889); Hurst, Silk Dyeing, Printing and Finishing (London, 1892) ; Noelting and

Lehne, Anilinschwarz (Berlin, 1892) ; Knecht, Rawson and Loewen-thal, Manual of Dyeing (London, 1908) ; Steinbeck, Bleichen und Fdrben der Seide und Halbseide (Berlin, 1895); Gardner, Wool-Dyeing (Manchester, 1896); Rawson, Gardner and Laycock, A Dictionary of Dyes, Mordants, &c. (London; 1901); Gros-Renaud, Les Mordants en teinture et en impression (Paris, 1898) ; Georgievics, The Chemical Technology of Textile Fabrics (London, 1902) ; Paterson, The Science of Colour Mixing (London, 1900) ; Paterson, Colour Matching on Textiles (London, 1901); Beech, The

Dyeing of Cotton Fabrics (London, 1901); Beech, The Dyeing of Woollen Fabrics (London, 1902) ; The Journal of the Society of Dyers and Colourists (Bradford, 1885-1908) and the publications of the colour manufacturers. (J. J. H.; E. K.)

DYER, SIR EDWARD (d. 1607), English courtier and poet, son of Sir Thomas Dyer, Kt., was born at Sharpham Park, Somersetshire. He was educated, according to Anthony a Wood, either at Balliol College or at Broadgates Hall, Oxford. He left the university without taking a degree, and after some time spent abroad appeared at Queen- Elizabeth's court. His first patron was the earl of Leicester, who seems to have thought of putting him forward as a rival to Sir Christopher Hatton in the queen's favour. He is mentioned by Gabriel Harvey with Sidney as one of the ornaments of the court. Sidney in his will desired that his books should be divided between Fulke Greville (Lord Brooke) and Dyer. He was employed by Elizabeth on a mission (1584) to the Low Countries, and in 1589 was sent to Denmark. In a commission to inquire into manors unjustly alienated from the crown in the west country he did not altogether please the queen, but he received a grant of some forfeited lands in Somerset in 1588. He was knighted and made chancellor of the order of the Garter in 1596. William Oldys says of him that he " would not stoop to fawn," and some of his verses seem to show that the exigencies of life at court oppressed him. He was buried at St Saviour's, Southwark, on the nth of May 1607. Wood says that many esteemed him to be a Rosicrucian, and that he was a firm believer in alchemy. He had a great reputation as a poet among his contemporaries, but very little of his work has survived. Puttenham in the Arte of English Poesie speaks of " Maister Edward Dyar, for Elegie most sweete, solempne, and of high conceit." One of the poems universally accepted as his is " M)' Mynde to me a kingdome is." Among the poems in England's Helicon (1600), signed S.E.D., and included in Dr A. B. Grosart's collection of Dyer's works {Miscellanies of the Fuller Worthies Library, vol. iv., 1876) is the charming pastoral " My Phillis hath the morninge sunne," but this comes from the Phillis of Thomas Lodge. Grosart also prints a prose tract entitled The Prayse of Nothing (1585). The Size Idillia from Theocritus, reckoned by J. P. Collier among Dyer's works, were dedicated to, not written by, him.

DYER, JOHN (c. 1 700-1 758), British poet, the son of a solicitor, was born in 1699 or 1700 at Aberglasney, in Carmarthenshire. He was sent to Westminster school and was destined for the law, but on his father's death he began to study painting. He wandered about South Wales, sketching and occasionally painting portraits. In 1726

his first poem, Grongar i?j7/, appeared in a miscellany published by Richard Savage, the poet. It was an irregular ode in the so-called Pindaric style, but Dyer entirely rewrote it into a loose measure of four cadences, and printed it separately in 1727. It had an immediate and brilliant success. Grongar Hill, as it now stands, is a short poem of only 150 lines, describing in language of much freshness and picturesque charm the view from a hill overlooking the poet's native vale of Towy. A visit to Italy bore fruit in The Ruins of Rome (1740), a descrip- tive piece in about 600 lines of Miltonic blank verse. He was ordained priest in 1741, and held successively the livings of Calthorp in Leicestershire, Belchford (1751), Coningsby (1752), and Kirby-on-Bane (1756), the last three being Lincolnshire parishes. He married, in 1741, a Miss Ensor, said to be descended from the brother of Shakespeare. In 1757 he published his longest work, the didactic blank-verse epic of The Fleece, in four books, discoursing' of the tending of sheep, of the shearing and preparation of the wool, of weaving, and of trade in woollen manufactures. The town took no interest in it, and Dodsley

facetiously prophesied that " Mr Dyer would be buried in woollen." He died at Coningsby of consumption, on the 15th of December 1758.

His peoms were collected by Dodsley in 1770, and by Mr Edward Thomas in 1903 for the Welsh Library, vol. iv.

DYER, THOMAS HENRY (1804-1888), English historical and antiquarian writer, was born in London on the 4th of May 1804. He was originally intended for a business career, and for some time acted as clerk in a West India house; but finding his services no longer required after the passing of the Negro Emanci- pation Act, he decided to devote himself to literature. In 1850 he published the Life of Calvin, a conscientious and on the whole impartial work, though the character of Calvin is somewhat harshly drawn, and his influence in the religious world generally is insufficiently appreciated. Dyer's first historical work was the History of Modern Europe (1861-1864; 3rd ed. revised and continued to the end of the 19th century, by A. Hassall, 1901), a meritorious compilation and storehouse of facts, but not very readable. The History of the City of Rome (1865) down to the end of the middle ages was followed by the History of the Kings of Rome (1868), which, upholding against the German school the general credibility of the account of early Roman history, given in Livy and other classical authors, was violently attacked by J. R. Seeley and the Saturday Review, as showing ignorance of the comparative method. More favourable opinions of

the work were expressed by others, but it is generally agreed that the author's scholarship is defective and that his views are far too conservative. Roma Regalis (1872) and A Plea for Livy (1873) were written in reply to his critics. Dyer frequently visited Greece and Italy, and his topographical works are probably his best; amongst these mention may be made of Pompeii, its History, Buildings and Antiquities (1867, new ed. in Bohn's Illustrated Library), and Ancient Athens, its History, Topography and Remains (1873). His last publication was On Imitative Art (1882). He died at Bath on the 30th of January

1888.

DYMOKE, the name of an English family holding the office of king's champion. The functions of the champion were to ride into Westminster Hall at the coronation banquet, and challenge all comers to impugn the king's title (see Champion). The earliest record of the ceremony at the coronation of an English king dates from the accession of Richard II. On this occasion the champion was Sir John Dymoke (d. 1381), who held the manor of Scrivelsby, Lincolnshire, in right of his wife Margaret, granddaughter of Joan Ludlow, who was the daughter and co-heiress of Philip Marmion, last Baron Marmion. The Mar- mions claimed descent from the lords of Fontenay, hereditary champions of the dukes of Normandy, and held the castle of Tamworth, Leicestershire, and the manor of Scrivelsby, Lincoln- shire. The right to the championship was disputed with the Dymoke family by Sir Baldwin de Freville, lord of Tamworth, who was descended from an elder daughter of Philip Marmion. The court of claims eventually decided in favour of the owners of Scrivelsby on the ground that Scrivelsby was held in grand serjeanty, that is, that its tenure was dependent on rendering a special service, in this case the championship.

Sir Thomas Dymoke (i428?-i47i) joined a Lancastrian rising in 1469, and, with his brother-in-law Richard, Lord Will- oughby and Welles, was beheaded in 1471 by order of Edward IV. after he had been induced to leave sanctuary on a promise of personal safety. The estates were restored to his son Sir Robert Dymoke (d. 1546), champion at the coronations of Richard III., Henry VII. and Henry VIII. , who distinguished himself at the siege of Tournai and became treasurer of the kingdom. His descendants acted as champions at successive coronations. Lewis Dymoke (d. 1820) put in an unsuccessful claim before the House of Lords for the barony of Marmion. His nephew Henry (1801-1865) was champion at the coronation of George IV. He was accompanied on that occasion by

the duke of Wellington and Lord Howard of Effingham. Henry Dymoke was created a baronet; he was succeeded by his brother John, rector of Scrivelsby (1804-1873), whose son Henry Lionel died without

issue in 1875, when the baronetcy became extinct, the estate passing to a collateral branch of the family. After the coronation of George IV. the ceremony was allowed to lapse, but at the coronation of King Edward VII. H. S. Dymoke bore the standard of England in Westminster Abbey.

DYNAMICS (from Gr. SvvafiLs, strength), the name of a branch of the science of Mechanics (q.v.). The term was at one time restricted to the treatment of motion as affected by force, being thus opposed to Statics, which investigated equilibrium or conditions of rest. In more recent times the word has been applied comprehensively to the action of force on bodies either at rest or in motion, thus including " dynamics " (now termed kinetics) in the restricted sense and " statics."

Analytical Dynamics.— The fundamental principles of dynamics, and their application to special problems, are ex- plained in the articles Mechanics and Motion, Laws of, where brief indications are also given of the more general methods of investigating the properties of a dynamical system, independently of the accidents of its particular constitution, which were inaugur- ated by J. L. Lagrange. These methods, in addition to the unity and breadth which they have introduced into the treatment of pure dynamics, have a peculiar interest in relation to modern physical speculation, which finds itself confronted in various directions with the problem of explaining on dynamical principles the properties of systems whose ultimate mechanism can at present only be vaguely conjectured. In determining the properties of such systems the methods of analytical geometry and of the infinitesimal calculus (or, more generally, of mathe- matical analysis) are necessarily employed; for this reason the subject has been named Analytical Dynamics. The following article is devoted to an outline of such portions of general dynami- cal theory as seem to be most important from the physical point of view.

1. General Equations of Impulsive Motion.

The systems contemplated by Lagrange are composed of discrete particles, or of rigid bodies, in finite number, connected (it may be) in various ways by invariable geometrical relations, the fundamental postulate being that the position of every particle of the system at any time can be completely specified by means of the instantaneous values of a finite number of independent variables ?i, ?2,-.3n, each of which admits of continuous variation over a certain range, so that if x, y, z be the Cartesian co-ordinates of any one particle, we have for example

**=/(2i. 2a. 2»). y = &c, z=&c, . . (1) where the functions _/ differ (of course) from particle to particle. In modern language, the variables qi, q 2 ,...q n are generalized co ordinates serving to specify the configuration of the system ; their derivatives with respect to the time are denoted by qi, q 2 ,...qn, and are called the generalized components of velocity. The continuous sequence of configurations assumed by the system in any actual or imagined motion (subject to the given connexions) is called the path.*

For the purposes of a connected outline of the whole subject it is convenient to deviate somewhat from the historical order of Impulsive development, and to begin with the consideration of motion impulsive motion. Whatever the actual motion of the system at any instant, we may conceive it to be generated instantaneously from rest by the application of proper impulses. On this view we have, if x, y, z be the rectangular co-ordinates of any particle m,

mx=X', my = Y', mz = Z', . . (2)

where X', Y', Z' are the components of the impulse on m. Now let ix, by, 52 be any infinitesimal variations of x, y, z which are consistent with the connexions of the system, and let us form the equation

2m(xdx+ii&y+z5z)=Z(X'Sx+Y'Sy+Z'Sz), . (3) where the sign 2 indicates (as throughout this article) a summation extending over all the particles of the system. To transform (3) into an equation involving the variations 5qi, 5q 2 ,... of the generalized co-ordinates, we have

and therefore

i=d £^+^+-' &c -> &c – •

oqi dqf

Sx = pS qi pSq2..., &C, &c, . oqi oqi

2m(x&x+y5y+z8z) = Auq\+Anqi-i-...)dqi

+ (A 2i qi+A 22 qi+...)Sq 2 + ... ,

(4) (5)

(6)

where

**-— i(g)Hf)'+(S)'S' 1*

ˆ-Hii+ggˆfeH- j

(7)

If we form the expression for the kinetic energy T of the system, we find

2T = 2to(2 + !/ 2 M 2) =Au2 1 2 +A 2 22 2 2 +...+2Ai 2 g 1 g 2 +. (8) The coefficients An, A 22 ,...Ai 2l ... are by an obvious analogy called the coefficients of inertia of the system ; they are in general functions of the co-ordinates q u q 2 The equation (6) may now be written*

dT,

Xm(xdx+pdy--zSz) –

8T,

dˆ + eq:

2 + –

(9)

This maybe regarded as the cardinal formula in Lagrange's method. For the right-hand side of (3) we may write

where

2(X'Sx+Y'Sy+Z'Sz) = Q',Sq l +Q' 2 5q 2 +... ,

- *V dq r dq r dqj*

(10)

(n)

Reciprocal theorems,

(16)

(17)

dq r dq r ‘ dq r ,

The quantities Qi, Q 2 , … are called the generalized components of impulse. Comparing (9) and (10), we have, since the variations &Zi, bq%,— are independent,

dqr Qi ‘ wr Q2 ‘ (l2)

These are the general equations of impulsive motion. It is now usual to write

pr = dq r (J 3)

The quantities pi, pi,… represent the effects of the several component impulses on the system, and are therefore called the generalized components of momentum. In terms of them we have

2m(x8x+irSy+i&z)=pi&q l +p2&qi + (14)

Also, since T is a homogeneous quadratic function of the velocities

2T = piqi+p 2 q 2 + (15)

This follows independently from (14), assuming the special variations Sx = xdt, &c, and therefore Sq i =q l dt, hq 2 =q\dt,… .

Again, if the values of the velocities and the momenta in any other motion of the system through the same con- figuration be distinguished by accents, we have the identity

£ig’i+M‘2+ — =p’\q--p’%q--

each side being equal to the symmetrical expression

Aiigig’i+A2222g‘2+…+Ai2(gig’ 2 +2’ig i .)-f-… .

The theorem (16) leads to some important reciprocal relations. Thus,

let us suppose that the momenta pi, p 2 ,... all vanish with the exception of pi, and similarly that the momenta p\, p' 2 ,... all vanish except p'2. We have then piq'i — p'zqz, or

q 2 :pi = q'i:p' 2 (18)

The interpretation is simplest when the co-ordinates qi, q 2 are both of the same kind, e.g. both lines or both angles. We may then conveniently put pi = p\, and assert that the velocity of the first type due to an impulse of the second type is equal to the velocity of the second type due to an equal impulse of the first type. As an example, suppose we have a chain of straight links hinged each to the next, extended in a straight line, and free to move. A blow at right angles to the chain, at any point P, will produce a certain velocity at any other point Q; the theorem asserts that an equal velocity will be produced at P by an equal blow at Q. Again, an impulsive couple acting on any link A will produce a certain angular velocity in any other link B; an equal couple applied to B will produce an equal angular velocity in A. Also if an impulse F applied at P produce an angular velocity a in a link A, a couple Fa applied to A will produce a linear velocity 01a at P. Historically, we may note that reciprocal relations in dynamics were first recognized by H. L. F. Helmholtz in the domain of acoustics; their use has been greatly extended by Lord Rayleigh.

The equations (13) determine the momenta pi, p%,... as linear functions of the velocities q\, q 2 ,... . Solving these, we can express

2i, 22,--- as linear functions of pi, p 2 The resulting y e / oc wju s

equations give us the velocities produced by any given . . .

system of impulses. Further, by substitution in (8), e ms .° we can express the kinetic energy as a homogeneous momea '• quadratic function of the momenta pi, p 2 ,... . The kinetic energy, as so expressed, will be denoted by T" ; thus

2T=A\iPi 1 +A\ 2 pi> + ...+2A'i 2 p-p 2 + ... (19)

where A'u, A' 22, ••• A'u,... are certain coefficients depending on the configuration. They have been called by Maxwell the coefficients of mobility of the system. When the form (19) is given, the values

of the velocities in terms of the momenta can be expressed in a remarkable form due to Sir W. R. Hamilton. The formula (15) may be written

PiSi + Ps& + ... = T + T\ . . •• (20)

where T is supposed expressed as in (8), and T as in (19). Hence if, for the moment, we denote by 8 a variation affecting the velocities, and therefore the momenta, but not the configuration, we have

Pi8q 1 + qi8p + p 2 Sq 2 + q 2 8p 2 + ... = 8T + 8T

= +dJ + – + dp-ˆ + dp~ 2 ‘ In virtue of (13) this reduces to

*qiSpi + q 2 Sp 2 + ... = -fp*Pi + af*Pt + ”” 2 + .-. (21)*

(22)

Since 8p u 8p 2 ,... may be taken to be independent, we infer that

» 1 = aˆ> h = dp! (23)

In the very remarkable exposition of the matter given by James Clerk Maxwell in his Electricity and Magnetism, the Hamiltonian expressions (23) for the velocities in terms of the impulses are obtained directly from first principles, and the formulae (13) are then deduced by an inversion of the above argument.

An important modification of the above process was introduced by E. J. Routh and Lord Kelvin and P. G. Tait. Instead of express- R th’ ‘ n S t ˆ ie kinetic energy in terms of the velocities alone, maiifka- or ‘ n terms of the momenta alone, we may express it in tlon. terms of the velocities corresponding to some of the co-

ordinates, say qi, q 2 ,...q m , and of the momenta corre- sponding to the remaining co-ordinates, which (for the sake of dis- tinction) we may denote by x, x’, x”,—. Thus, T being expressed as a homogeneous quadratic function of q u q 2 ,...q m , x, X, x”

the momenta corresponding to the co-ordinates x, x’. xV written

may be

dT

dT

_dT, ,

K ~dx K ~d x ” ” ~dx

These equations, when written out in full, determine x, x’, x”,--- as linear functions of q\, q 2 ,...q m , K , «■’, k” ,.... We now consider the function

*R = T-*x-k’x’k”x” (25)*

by means of the above relations in terms of Performing the operation 8 on both sides

(24)

supposed expressed,

*9l, S2,—. 4m, k, *’,*

of (25), we have

5R S – j.

•+&+- =

i+...g«..

dT.

-k3x-x5«- (26)

where, for brevity, only one term of each type has been exhibited. Omitting the terms which cancel in virtue of (24), we have

3R E . , , 3R. ,

ˆ r Sq 1 + ...-ˆSK...—

- W Sq l +...- X SK-....

(27)

. may be taken to be

Pi =

aR

“3k”’

Since the variations 5gi, Sq2,... Sq m , 8k, 8k’, 8k”,, independent, we have

_dT = dR _§T = aR

*~dqi~dqi P2 ~dq 2 ~dq 2 3R ., dR .„ and X = ~a7′ X =-£7′ * -■*

An important property of the present transformation is that, when expressed in terms of the new variables, the kinetic energy is the sum of two homogeneous quadratic functions, thus

T=

where S> involves the velocities q\, q 2t ... q m alone, momenta k, k’, k” ‘,... alone. For in virtue of (29) we

(25).

6R , ,9R , „3R

(28) (29)

• (30)

and K the have, from

/strong>(£+«£+«£+■••).•

(31)

and it is evident that the terms in R which are bilinear in respect, of the two sets of variables q u q\,... q m and k, k’, k” ‘,... will dis-appear from the right-hand side.

It may be noted that the formula (30) gives immediate proof of two important theorems due to Bertrand and to Lord Kelvin „ . respectively. Let us suppose, in the first place, that

max mu t ˆ e system ; s startec i by given impulses of certain types, ” but is otherwise free. J. L. F. Bertrand ‘s theorem is to

the effect that the kinetic energy is greater than if by impulses of the remaining types the system were con- strained to take any other

course. We may suppose the co-ordinates to be so chosen that the constraint is expressed by the vanishing

of the velocities q\, q\,... q m , whilst the given impulses are k, k , k"

Hence the energy in the actual motion is greater than in the constrained motion by the amount ©.

minimum energy.

Again, suppose that the system is started with prescribed velocity components q\, &,... q m , by means of proper impulses of the corresponding types, but is otherwise free, so that in the motion actually generated we have k — o, k' = o, k" = o,... and therefore K = o. The kinetic energy is therefore less than in any other motion consistent with the prescribed velocity-conditions by the value which K assumes when k, k', k",... represent the impulses due to the constraints.

Simple illustrations of these theorems are afforded by the chain of straight links already employed. Thus if a point of the chain be held fixed, or if one or more of the joints be made rigid, the energy generated by any given impulses is less than if the chain had possessed its former freedom.

2. Continuous Motion of a System.

We may proceed to the continuous motion of a system. The equations of motion of any particle of the system are of the form «# =X, mi/ = Y, mz = Z . . (1)

Now let x+Sx, y+Sy, z+Sz be the co-ordinates of m in any r g „ anee > s arbitrary motion of the system differing infinitely little equations. from the actual motion, and let us form the equation

Xm(xdx+piy+zSz)=S(Xdx+YSy+ZSz) . . (2)

Lagrange's investigation consists in the transformation of (2) into an equation involving the independent variations Sqi, Sqi,... Sq n .

It is important to notice that the symbols S and djdt are commutative, since

ix=t{x+Sx)-f t =^ t Sx,& C . . . (3)

Hence

Xm{xSx +pSy +'zSz) =^ni (xhx +$8y+i5z) — 2m(x&x+y8y--z8z) = 2j(Pi*Si+P J *22+».)-*T, ... (4)

by § 1 (14). The last member may be written

PiSqi + pMi +piSq 2 + pMi + —

dT.. dT. dT . 3T, , .

-dj^-dq-^-dJ^-dq?**---- (5)

Hence, omitting the terms which cancel in virtue of § 1 (13), we find

Zm(x8x+p8y+z8z) = (fa -^-j Sq t + (fo -~) *&+.... (6) For the right-hand side of (2) we have

Z(X8x+Y8y+Z8z)=Q l 8q l +Q 2 8q 2 + (7)

where Qr = s ^ +Y ^ +Z gj. . . (8)

The quantities Qi, Q2,... are called the generalized components of force acting on the system.

Comparing (6) and (7) we find

(9)

(io)

or, restoring the values of pi, p 2

dt \dqj dq t ~ «'• dt \dq 2) dq 2 ~^ 2

These are Lagrange's general equations of motion. Their number is of course equal to that of the co-ordinates q\, q 2 ,... to be determined.

Analytically, the above proof is that given by Lagrange, but the terminology employed is of much more recent date, having been first introduced by Lord Kelvin and P. G. Tait ; it has greatly promoted the physical application of the subject. Another proof of the equations (10), by direct transformation of co-ordinates, has been given by Hamilton and independently by other writers (see Mechanics), but the variational method of Lagrange is that which stands in closest relation to the subsequent developments of the subject. The chapter of Maxwell, already referred to, is a most instructive commentary on the subject from the physical point of view, although the proof there attempted of the equations (10) is

fallacious.

In a " conservative system " the work which would have to be done by extraneous forces to bring the system from rest in some standard configuration to rest in the configuration (qi, q 2 ,... q n) is independent of the path, and may therefore be regarded as a definite function of q u q 2 ,... qn. Denoting this function (the potential energy) by V, we have, if there be no extraneous force on the system,

and therefore

■S(X8x + Y8y + Z8z) = -SV, .

o – _ˆY o – ˆ

(11)

(12)

Hence the typical Lagrange's equation may be now written in the form / ˆ ˆ

(13)

dt \dq T) dq, dq r '

or, again,

Pr-

-4 (V ~ T) –

(14)

It has been proposed by Helmholtz to give the name kinetic potential to the combination V— T. As shown under Mechanics, § 22, we derive from (10)

5j = Q 1

(15)

and therefore in the case of a conservative system free from ex-

traneous force,

i(T+V)=OorT+V = const., . . (16)

which is the equation of energy. For examples of the application of the formula (13) see Mechanics, § 22.

3. Constrained Systems.

It has so far been assumed that the geometrical relations, if any, which exist between the various parts of the system are of the type § 1 (1), and so do not contain / explicitly. The extension of Lagrange's equations to the case of " varying relations " of the type

x=f(t,q u q2,...q n),y = &c.,z = &c., . . (1)

was made by J. M. L. Vieille. We now have

Case ot varying relations.

. dx , dx . , dx . . „ „ X = Jt + dq-p + dq-p + ~- &C – &C –

*a *=§f 1 ^'+df 2 5 22 + -. &c., &c.*

(2)

(3)

so that the expression § I (8) for the kinetic energy is to be replaced

by

2T = ao+2a 1 gi+2a 2 g 2 +...+Angi 2 +A2222 2 +...+Ai22ig2 + ... 1 (4)

where

a = Zm

ar = Sot and the forms of A„, A,

©'+(s)' + (ri.'

x dy dy . dz dz_) q r + dt dq r + dt dq r S

(5)

dx dx

dt dq,

are as given by § 1 (7). It is to be re- membered that the coefficients a , oi, a 2 , ...An, A22,... A12... will in general involve t explicitly as well as implicitly through the co- ordinates qi, g 2 Again, we find

2m(x&x+!/5y+z&z) = (ai+Auq\+A 12 q2 + ...)&qi

H-(«2+Asift+Aj»g8+...)dg2+... dT. , aT. , =dj^+d4^+-

= pi8qi+p2&q2 +—, ■ ■ • (6) where p, is defined as in § 1 (13). The derivation of Lagrange's equations then follows exactly as before. It is to be noted that the equation § 2 (15) does not as a rule now hold. The proof in- volved the assumption that T is a homogeneous quadratic function of the velocities q\, q... .

It has been pointed out by R. B. Hayward that Vieille's case can be brought under Lagrange's by introducing a new co-ordinate (x) in place of t, so far as it appears explicitly in the relations (1). We have then 2T = oox 2 +2(aig,a2g2...)x+Aii2 1 2 +A22g 2 2 +...2Ai 2 gig2... . (7)

The equations of motion will be as in § 2 (10), with the additional equation

d dT dT v , n

diTx-dH= X >- ■ ■ • < 8 > where X is the force corresponding to the co-ordinate x- We may suppose X to be adjusted so as to make x = o, and in the remaining equations nothing is altered if we write t for x before, instead of after, the differentiations. The reason why the equation § 2 (15) no longer holds is that we should require to add a term Xx on the right-hand side; this represents the rate at which work is being done by the constraining forces required to keep x constant.

As an example, let x, y, z be the co-ordinates of a particle relative to axes fixed in a solid which is free to rotate about the axis of z. If be the angular co-ordinate of the solid, we find without difficulty

2T=m(&+y 2 +z)+2m(xy-yx) + \l+m(x>+y*)\&, . (9)*

where I is the moment of inertia of the solid. The equations of motion, viz.

ddT 3T =Y rf3T 'dy ' dt dz dT

d aj_aT =x

dt dx dx ‘

and

dt dy

dT_„

dt d

‘ ‘

dT _ 7 ~ dz~ L ‘

(10)

become

m(x-24>y — x4? — y$)=~X., m(y+2x — y) =Y, m‘3 = Z,(i2)

and jfi{l+m(x’> +y 1)}+m(xy-yx)]=$. . . (13)

If we suppose $ adjusted so as to maintain <£ = o, or (again) if we suppose the moment of inertia I to be infinitely great, we obtain the familiar equations of motion relative to moving axes, viz.

m(x — 2ay — a’x) =X, m(y--2ux — a> 2 y) =Y, m’i = Z, . (14)

where a has been written for $. These are the equations which we should have obtained by applying Lagrange’s rule at once to the formula

2T = m{x 2 --y 2 --i r)--2ma{xy — yx)--nta 2 (x 2 --y’ i), . (15)

which gives the kinetic energy of the particle referred to axes rotating with the constant angular velocity w. (See Mechanics, § 13.)

More generally, let us suppose that we have a certain group of co-ordinates Xi x’> x”,— whose absolute values do not affect the expression for the kinetic energy, and that by suitable forces of the corresponding types the velocity-components Xi x’i x”>--- are main-tained constant. The remaining co-ordinates being denoted by 2ii g2,. q n , we may write

2T = a 2 22...)x+2(a’ig 1 -|-o‘2g2+...)x’+..., (16)

where JS is a homogeneous quadratic function of the velocities gi, q \,...q n of the type §1 (8), whilst To is a homogeneous quadratic function of the velocities x. x'> x".— alone. The remaining terms, which are bilinear in respect of the two sets of velocities, are indicated more fully. The formulae (10) of § 2 give n equations of the type

where

d /3©\ A© . . , ... dTo ,,.

dAdq-J ^ a...^-Qr

. /da, daA . . /da' r da' A .,

^^ = \djrdq-r) x+ -di:-dqz) x+

(17)

(18)

(19)

'dar_daa

dq 3 dq r . These quantities (r, s) are subject to the relations

(r, s) = , (r, r) = o. The remaining dynamical equations, equal in number to the co ordinates Xi x'> x"i". yield expressions for the forces which must be applied in order to maintain the velocities x. x'i x".— constant ; they need not be written down. If we follow the method by which the equation of energy was established in § 2, the equations (17) lead, on taking account of the relations (19), to

£(®-

di

■T) = Q,g l + Q 2 g 2 |... + Q,,g,,,.

(20)

or, in case the forces Q r depend only on the co-ordinates gi, qs,...qn and are conservative,

5S + V- To = const. . . . (21) The conditions that the equations (17) should be satisfied by zero values of the velocities g\, g 2 ,...g n are

3T0 (22>

Qr_ dq r ‘

or in the case of conservative forces d

dq,

(V-T)=O,

(23)

i.e. the value of V— T must be stationary.

We may apply this to the case of a system whose configuration relative to axes rotating with constant angular velocity (o>) is defined by means of the n co-ordinates gi, g 2 ,...g n . „ . ,. This is important on account of its bearing on the kinetic «< > “»«’« theory of the tides. Since the Cartesian co-ordinates axes – x, y, z of any particle m of the system relative to the moving axes are functions of q u g 2 ,...g„, of the form § I (1), we have, by (15) 2® = -Zm(x 2 +y+i 2), 2T = « 2 Sm(* 2 +y 2), . (24)*

«r = x™(xl% r -y a £), ■ ■ ■ (25)

whence

. . „ B(x, y)

(r, s) =2iv y -” v ‘ J <

1.SOT3

(26)

d(g s , qr, The conditions of relative equilibrium are given by (23).

It will be noticed that this expression V — To, which is to be stationary, differs from the true potential energy by a term which represents the potential energy of the system in relation to fictitious ” centrifugal forces.” The question of stability of relative equili- brium will be noticed later (§ 6).

It should be observed that the remarkable formula (20) may in the present case be obtained directly as follows. From (15) and (14) we find

*g-3j(«+T,)+«.Zw(**-3*) = J(*-T,)+«.Z(*Y-yX).*

(27)

DYNAMICS

759

This must be equal to the rate at which the forces acting on the system do work, viz. to

*a,2(*Y-:yX)+Q 1 g 1 +Q 2 g 2 + ... +Q„g„, where the first term represents the work done in virtue of the rotation.*

We have still to notice the modifications which Lagrange's

Con- equations undergo when the co-ordinates qi, q%,...q H

strained are not a " independently variable. In the first place,

systems. we mav suppose them connected by a number m (

of relations of the type

A{t, 2i, g 2 , ...g„) =o, B(t, gi, g 2> ... g„) =o, &c. (28) These may be interpreted as introducing partial constraints into a previously free system. The variations iq u Sq 2 ,...iq n in the ex- pressions (6) and (7) of § 2 which are to be equated are no longer independent, but are subject to the relations

dA. . dA, dqi oqz

2 +...=0,

j+... =0, &c. (29)

(30)

Introducing indeterminate multipliers X, in,..., one for each of these equations, we obtain in the usual manner n equations of the type

L £F_f!J

dt dq r dq r

in place of § 2 (10). These equations, together with (28), serve to determine the n co-ordinates q h g 2 , ...g„and the m multipliers X,

it,....

When / does not occur explicitly in the relations (28) the system is said to be holonomic. The term connotes the existence of integral (as opposed to differential) relations between the co-ordinates, independent of the time.

Again, it may happen that although there are no prescribed relations between the co-ordinates g t , g 2 ,...g,,, yet from the cir- cumstances of the problem certain geometrical conditions are im- posed on their variations, thus

Ai8g l +A 2 5g 2 +... =0, B^+B^-l- ... =0, &c, (31) where the coefficients are functions of gi, q 2 , ...g,, and (possibly) of t. It is assumed that these equations are "not integrable as regards the variables 01, g 2 , ...g,,; otherwise, we fall back on the previous con- ditions. Cases of the present type arise, for instance, in ordinary dynamics when we have a solid rolling on a (fixed or moving) surface. The six co-ordinates which serve to specify the position of the solid at any instant are not subject to any necessary relation, but the conditions to be satisfied at the point of contact impose three con- ditions of the form (31). The general equations of motion are obtained, as before, by the method of indeterminate multipliers, thus

d dT dT /-. 1 ■. • 1 n 1 , >

5Tag7-ai; = Q' +xAr+uB '+ (32)

The co-ordinates gi, g 2 , ...g,,, and the indeterminate multipliers X, m.. • • , are determined by these equations and by the velocity- conditions corresponding to (3 1) . When t does not appear explicitly in the coefficients, these velocity-conditions take the forms

Aigi+A 2 g 2 |... = o, Bigi + B 2 g 2 + ...=o, &c. (33)

Systems of this kind, where the relations (31) are not integrable, are called non-holonomic.

4. Hamiltonian Equations of Motion.

In the Hamiltonian form of the equations of motion of a con- servative system with unvarying relations, the kinetic energy is supposed expressed in terms of the momenta p u p 2 , ...and the co- ordinates gi, g 2 , ... , as in § 1 (19). Since the symbol S now denotes a variation extending to the co-ordinates as well as to the momenta, we must add to the last member of § 1 (21) terms of the types

ST. .dT. , -K-Sqi+- — 8qi+ ... dg.i dqi

(I)

Since the variations Spi, Sp 2 , ... Sq u 5g 2 , ...may be taken to be inde- pendent, we infer the equations § I (23) as before, together with

§T = _§T 3T = _£T dqi dqi ‘ dq% dq 2 ‘ ”” ‘

Hence the Lagrangian equations § 2 (14) transform into

(2)

which follow at once from § 1 (23), since V does not involve pi, y t , ... we obtain a complete system of differential equations of the first order for the determination of the motion.

The equation of energy is verified immediately by (5) and (6), since these make

dH = 3H,. 3H,

dt dp/ l+ dpz l

, , 3H. , 3H. , ogi <5g 2

= 0.

(7)

^-jLct+v), a—^ct+V),...

(3)

If we write

H=T+V, (4)

so that H denotes the total energy of the system, supposed expressed in terms of the new variables, we get

.... (5)

(6)

If to these

we

join

an' . the equations

dH dqi'

. 3H

dpi

q\—

an

The Hamiltonian transformation is extended to the case of varying relations as follows. Instead of (4) we write

H=Agi+M'2+—T+V, ... (8)

and imagine H to be expressed in terms of the momenta pi, p 2 ,..., the co-ordinates gi, g 2 , ..., and the time. The internal forces of the system are assumed to be conservative, with the potential energy V. Performing the variation & on both sides, we find

BR = q lSP i+...-g S qi + g Sq + .

(9)

terms which cancel in virtue of the definition of pi, pi,... being

omitted. Since Spi, Sp 2 , pendent, we infer

?i =

and

_3H

dpi'

±(j-V) = -^,

dqi dqi'

&Zi, Sg 2 , ... may be taken to be inde- 3H

g 2 =

dpi'

dqi

V) =

an

~a qi '

It follows from (11) that

Pi =

JH dqi'

an

(10)

(II)

(12)

dq-i' '"

The equations (10) and (12) have the same form as above, but H is no longer equal to the energy of the system.

5. Cyclic Systems.

A cyclic or gyrostatic system is characterized by the following properties. In the first place, the kinetic energy is not affected if we alter the absolute values of certain of the co-ordinates, which we will denote by x, x'. x"\—, provided the remaining co-ordinates 2i> g 2 . ...g>n and the velocities, including of course the velocities

X, x\ x" are unaltered. Secondly, there are no forces acting

on the system of the types x, x',x" Thiscase arises, for example,

when the system includes gyrostats which are free to rotate about their axes, the co-ordinates x, x', x"»— then being the angular co-ordinates of the gyrostats relatively to their frames. Again, in theoretical hydrodynamics we have the problem of moving solids in a

frictionless liquid ; the ignored co-ordinates x, x', x", ...then refer to the fluid, and are infinite in number. The same question presents itself in various physical speculations where certain phenomena are ascribed to the existence of latent motions in the ultimate constituents of matter. The general theory of such systems has been treated by E. J. Routh, Lord Kelvin, and H. L. F. Helmholtz.

If we suppose the kinetic energy T to be expressed, as in Lagrange's method, in terms of the co-ordinates and

Routb's

to x. x', x", — reduce, "in virtue of the above hypotheses'^ eqaatioas ' to the forms

the velocities, the equations of motion corresponding

whence

dt d x ~

■0,

*ax' '**

dT

dX~

dT

d dT dt dx"

dx" K

-0,

(1)

(2)

where k, k', k", ... are the constant momenta corresponding to the

cyclic co-ordinates x. x', x" These equations are linear in

*X, x'i *"■•.. I.solving them with respect to these quantities and substituting in the remaining Lagrangian equations, we obtain m*

differential equations to determine the remaining co-ordinates ?i> Qit — qm- The object of the present investigation is to ascertain the general form of the resulting equations. The retained co- ordinates qi, g 2 ,...g m may be called (for distinction) the palpable co-ordinates of the system; in many practical questions they are the only co-ordinates directly in evidence. If, as in § 1 (25), we write

R-T-kx-k'x'k"x" (3)

and imagine R to be expressed by means of (2) as a quadratic function °f

ˆg I+ ... + ˆ + ... + || 5gi + ... = g 5 , + ... + g 5gi +

dq

die

,£T.. , dT.

+ aJ Sx +-+d x i

!+•••— k5x _ Xˆk — .

(4)

760

DYNAMICS

Omitting the terms which cancel by (2), we find

aT = dR dT = d_R dqi~dqi' dq 2 dq 2

aT_a_R dT = a_R

dqi~dqi' dq 2 ~dq 2

dR ., 3R .„ dR

x ~ d'"*

x die' x dx."

Substituting in § 2 (10), we have

*dtdqi dqi~>k' dtdg-i dq 2 *»'*

(5) (6) (7)

(8)

These are Routh's forms of the modified Lagrangian equations. Equivalent forms were obtained independently by Helmholtz at a later date. The function R is made up of three parts, thus

R = R 2 ,o+Ri,i + Rc,2 (9)

where R £ ,o is a homogeneous quadratic function of q u $ 2 ,...q m , R , 2 is a homogeneous quadratic function of k, k', k",..., whilst Ri,i consists of products of the velocities qi, q 2 ,...q m into the momenta k, k', k".... Hence from (3) and (7) we

Kelvin's equations.

have

t r> / dR 1 /3R . „dR . \

= R 2l0 -Ro,2 (10)

If, as in § 1 (30), we write this in the form

T=

R = ©-K+ft?i+ftj 2 + (12)

where ft, ft,... are linear functions of k, k', k",..., say

ft=M+«V+«V+ .. . (13)

the coefficients or, «•'„ a",,... being in general functions of the co-ordinates gi, q^,... q m . Evidently ft denotes that part of the momentum-component dR/dj r which is due to the cyclic motions. Now

• (14)

• (15)

d dRd /a© , \ _d 3© 3ft. 3ft

dt dq r ~dt\dq r ±Pr) ~dtdq r + dq l qi+ dq 1 q2 + –

dR dq r ~

a© aK . aft. .aft. ,

■dq- r “dq~r + 3qr qi+ dq-r q2 + –

Hence, substituting in (8), we obtain the typical equation of motion of a gyrostatic system in the form

■aiJ-S+fc 1Ml+Cr ‘ 2 > + ~ +fc ‘). + - + g-ft» (l6)

where

~dq, dq r ‘

This form is due to Lord Kelvin. When gi, 52,... q m have been determined, as functions of the time, the velocities corresponding to the cyclic co-ordinates can be found, if required, from the relations (7), which may be written

(/■*)

(17)

dK . = -^7 — ai

(18)

X =-gJ-a til-” 2$2—,

&C, &C

It is to be particularly noticed that

(r,r)=o, (r, s)=-(s,r). . . . (19)

Hence, if in (16) we put r = i, 2, 3,... m, and multiply by

j / (S+K)=Qrf 1 Q& (20)

or, in the case of a conservative system

which is the equation of energy.

The equation (16) includes § 3 (17) as a particular case, the eliminated co-ordinate being the angular co-ordinate of a rotating solid having an infinite moment of inertia.

In the particular case where the cyclic momenta k, k’, k”,... are all zero, (16) reduces to

d a < § a?s > n

*dt bq, dq r ~ **”*

(22)

The form is the same as in § 2, and the system now behaves, as regards the co-ordinates q u q 2t … q m , exactly like the acyclic type there contemplated. These co-ordinates do not, however, now fix the position of every particle of the system. For example, if by suitable forces the system be brought back to its initial con-

figuration (so far as this is defined by 51, 52,… qm), after performing any evolutions, the ignored co-ordinates x, x’, x”,— will not in general return to their original values.

If in Lagrange’s equations § 2 (10) we reverse the sign of the time-element dt, the equations are unaltered. The motion is therefore reversible; that is to say, if as the system is passing through any configuration its velocities q\, q\,… q m be all reversed, it will (if the forces be the same in the same configuration) retrace its former path. But it is important to observe that the statement does not in general hold of a gyrostatic system; the terms of (16), which are linear in q\, q 2 ,… q m , change sign with dt, whilst the others do not. Hence the motion of a gyrostatic system is not reversible, unless indeed we reverse the cyclic motions as well as the velocities q\, q 2t … q m . For instance, the precessional motion of a top cannot be reversed unless we reverse the spin.

The conditions of equilibrium of a system with latent cyclic motions are obtained by putting 51 = 0, g 2 = o,… q m = o in (16); viz. they are Klneto-

statics.

n dK n dK / ˆ

Qi = 5r-Q2 = 5Z- (23)

dqi

These may of course be obtained independently. Thus if the system be guided from (apparent) rest in the configuration {q u q 2t … q m) to rest in the configuration (gi + 3gi, q 2 + Sq 2 , …q m + Sq m), the work done by the forces must be equal to the increment of the kinetic energy. Hence

QiZqi+Q 2 Zq 2 + ...=t>K, . . . (24)

which is equivalent to (23). The conditions are the same as for the equilibrium of a system without latent motion, but endowed with potential energy K. This is important from a physical point of view, as showing how energy which is apparently potential may in its ultimate essence be kinetic.

By means of the formulae (18), which now reduce to

x =

dK

X =

dK aZ'

aK

'die'"

■ *(25)*

K may also be expressed as a homogeneous quadratic function of

the cyclic velocities %, X.', x" Denoting it in this form by T ,

we have

b{To+K)=2&K=6{KX+K'x'K"x"...) . . (26)

Performing the variations, and omitting the terms which cancel by (2) and (25), we find

aTg = _aK aTo = _aK

*dqi dgS dq 2 dq 2 ' '"" * • • W>*

so that the formulae (23) become

aT n aT,

Qi = –

dqi

&— 4?'

A simple example is furnished by the top (Mechanics, § 22). cyclic co-ordinates being \j/, , we find

(28)

The

2<§=A9 2 , 2K:

(m~ v COsg) 2 y = A sin 2 + C '*

2To=Asin 2 eˆ+C(+ˆcose) 2 , . (29) whence we may verify that 3T /a9= — dKjdB in accordance with (27). And the condition of equilibrium*

aK av

lo = -dd • (30)

gives the condition of steady precession.

6. Stability of Steady Motion.

The small oscillations of a conservative system about a configuration of equilibrium, and the criterion of stability, are discussed in Mechanics, § 23. The question of the stability of given types of motion is more difficult, owing to the want of a sufficiently general, and at the same time precise, definition of what we mean by "stability." A number of definitions which have been propounded by different writers are examined by F. Klein and A. Sommerfeld in their work tjber die Theorie des Kreisels (1897-1903). Rejecting previous definitions, they base their criterion of stability on the character of the changes produced in the path of the system by small arbitrary disturbing impulses. If the undisturbed path be the limiting form of the disturbed path when the impulses are indefinitely diminished, it is said to be stable, but not otherwise. For instance, the vertical fall of a particle under gravity is reckoned as stable, although for a given impulsive disturbance, however small, the deviation of the particle's position at any time t from the position which it would have occupied in the original motion increases indefinitely with /. Even this criterion, as the writers quoted themselves recognize, is not free from ambiguity unless the phrase ".limiting form," as applied to a path, be strictly defined. It appears, moreover, that a definition which is analytically precise may not in all cases be easy to reconcile with geometrical prepossessions. Thus a particle moving in a circle about a centre of force varying inversely

as the cube of the distance will if slightly disturbed either fall into the centre, or recede to infinity, after describing in either case a spiral with an infinite number o >

convolutions. Each of these spirals has, analytically, the circle as its limiting form, although the motion in the circle is most naturally described as unstable.

A special form of the problem, of great interest, presents itself in the steady motion of a gyrostatic system, when the non-eliminated co-ordinates q u qi, ... q m all vanish (see § 5). This has been discussed by Routh, Lord Kelvin and Tait, and Poincare. These writers treat the question, by an extension of Lagrange's method, as a problem of small oscillations. Whether we adopt the notion of stability which this implies, or take up the position of Klein and Sommerfeld, there is no difficulty in showing that stability is ensured if V+K be a minimum as regards variations of qi, q 2 , ... q m . The proof is the same as that of Dirichlet for the case of statical stability.

We can illustrate this condition from the case of the top, where, in our previous notation.,

T7 . rr «i 7 „ , (/•l-l'COSO) 2 , V 2 . .

To examine whether the steady motion with the centre of gravity vertically above the pivot is stable, we must put n = v. We then find without difficulty that V + K is a minimum provided v 2 $AMgh. The method of small oscillations gave us the condition < >4AMg/j, and indicated instability in the cases v'^j.AMgh. The present criterion can also be applied to show that the steady precessional motions in which the axis has a constant inclination to the vertical are stable.

The question remains, as before, whether it is essential for stability that V + K should be a minimum. It appears that from the point of view of the theory of small oscillations it is not essential, and that there may even be stability when V + K is a maximum. The precise conditions, which are of a somewhat elaborate character, have been formulated by Routh. An important distinction has, however, been established by Thomson and Tait, and by Poincare, between what we may call ordinary or temporary stability (which is stability in the above sense) and permanent or secular stability, which means stability when regard is had to possible dissipative forces called into

play whenever the co-ordinates q u q 2 ,... q m vary. Since the total energy of the system at any instant is given (in the notation of § 5) by an expression of the form JS+V + K, where

There is a similar theory in relation to the constrained systems considered in § 3 above. The equation (21) there given leads to the conclusion that for secular stability of any type of motion in which the velocities ji, q\, ... q\ are zero it is necessary and sufficient that the function V — To should be a minimum.

The simplest possible example of this is the case of a particle at the lowest point of a smooth spherical bowl which rotates with constant angular velocity (u>) about the vertical diameter. This position obviously possesses " ordinary " stability. If a be the radius of the bowl, and 8 denote angular distance from the lowest point, we have

V To = mga(l cos 8) -imu 2 a 2 sin 2 B; (2)

this is a minimum for = only so long as u 2 the only position of " permanent " stability is that in which the particle rotates with the bowl at an angular distance cos _1 (g/ w2 °) from the lowest point. To examine the motion in the neighbourhood of the lowest point, when frictional forces are taken into account, we may take fixed ones, in a horizontal plane, through the lowest point. Assuming that the friction varies as the relative velocity, we have

£= — p 2 x — k(x--ay) y'= —p 2 y — k{y — ux)

:\

(3)

where p 2 = g/a. These combine into

z+kz + (p*-ikw)z = o, . . (4) where z = x--iy, i= V-i- Assuming z = Ce Kt , we find

X=-i£(i=F U /£)±j>, • ■ • (5) if the square of k be neglected. The complete solution is then

x+iy = Cie-P l 'e i >" + C i e-P 1 'e- i '", . . . (6)

where ft = $k{i-wlp\ fo = hk(i + u/p). . . (7)

This represents two superposed circular vibrations, in opposite directions, of period 2-irlp. If u>p the amplitude of that circular

vibration which agrees in sense with the rotation w will continually increase, and the particle will work its way in an ever-widening spiral path towards the eccentric position of secular stability. If the bowl be not spherical but ellipsoidal, the vertical diameter being a principal axis, it may easily be shown that the lowest position is permanently stable only so long as the period of the rotation is

longer than that of the slower of the two normal modes in the absence of rotation (see Mechanics, § 13).

7. Principle of Least Action.

The preceding theories give us statements applicable to the system at any one instant of its motion. We now come to a series of theorems relating to the whole motion of the system _ between any two configurations through which it passes, s ™f lo ""y viz. we consider the actual motion and compare it with a on ' other imaginable motions, differing infinitely little from it, between the same two configurations. We use the symbol S to denote the transition from the actual to any one of the hypothetical motions.

The best-known theorem of this class is that of Least Action, originated by P. L. M. de Maupertuis, but first put in a definite form by Lagrange. The " action " of a single particle in passing from one position to another is the space-integral of the momentum, or the time-integral of the vis viva. The action of a dynamical system is the sum of the actions of its constituent particles, and is accordingly given by the formula

A = 2 Cmvds = 2 Cmv 2 dt = 2 (Tdt.

(1)

The theorem referred to asserts that the free motion of a conservative system between any two given configurations is characterized by the property

SA = o, (2)

provided the total energy have the same constant value in the varied motion as in the actual motion.

If t, t' be the times of passing through the initial and final configurations respectively, we have

SA = 5 C'-Zm(x 2 +y 2 +z 2)dt

5Tdt+2T5t' – 2T&t,

• (3)

since the upper and lower limits of the integral must both be regarded as variable. This may be written

«A= C'sTdt+ C"sm(x5x+ySy+zSz)dt+2T'St' – 2TU

= C"dTdt+ |zm (xSx+ySy+iSz)1 "

- C'zm(xSx+ySy+zSz)dt+2T'it'-2Tit. . . (4)

Now, by dAlembert's principle,

Zm(xdx+ySy+ziz)= -SV, . . . (5) and by hypothesis we have

8(T+V)=o (6)

The formula therefore reduces to

&A=[zm{x&x+y5y+z5z)]"+2T'dl'-2TM. . (7)

Since the terminal configurations are unaltered, we must have at the lower limit

dx+x5t = o, &y+yU — o, Sz+i5t — o, .

(8)

with similar relations at the upper limit. These reduce (7) to the form (2).

The equation (2), it is to be noticed, merely expresses that the variation of A vanishes to the first order; the phrase stationary action has therefore been suggested as indicating more accurately what has been proved. The action in the free path between two given configurations is in fact not invariably a minimum, and even when a minimum it need not be the least possible subject to the given conditions. Simple illustrations are furnished by the case of a single particle. A particle moving on a smooth surface, and free from extraneous force, will have its velocity constant ; hence the theorem in this case resolves itself into

sfds=0, .

(9)

i.e. the path must be a geodesic line. Now a geodesic is not necessarily the shortest path between two given points on it ; for example, on the sphere a great-circle arc ceases to be the shortest path between its extremities when it exceeds 180°. More gener- ally, taking any surface, let a point P, starting from O, move along a geodesic ; this geodesic will be a minimum path from O to P until P passes through a point O' (if such exist), which is the intersection with a consecutive geodesic through O. After this point the minimum property ceases. On an anticlastic surface two geodesies cannot intersect more than once, and each geodesic is therefore a minimum path between any two of its points. These illustrations are due to K. G. J. Jacobi, who has also formulated the general criterion, applicable to all dynamical systems, as follows: — Let O and P denote any two configurations on a natural path of the system. If this be the sole free path from O to P with the prescribed amount of energy, the action from O to P is a minimum. But if

there be several distinct paths, let P vary from coincidence with O along the first-named path; the action will then cease to be a minimum when a configuration O' is reached such that two of the possible paths from O to O' coincide. For instance, if O and P be positions on the parabolic path of a projectile under gravity, there will be a second path (with the same energy and therefore the same velocity of projection from O), these two paths coinciding when P is at the other extremity (O', say) of the focal chord through O. The action from O to P will therefore be a minimum for all positions of P short of O'. Two configurations such as O and O' in the general statement are called conjugate kinetic foci. Cf. Variations, Calculus of.

Before leaving this topic the connexion of the principle of stationary action with a well-known theorem of optics may be noticed. For the motion of a particle in a conservative field of force the principle takes the form

dfvds = 0 (10)

On the corpuscular theory of light v is proportional to the refractive index m of the medium, whence

• • (“)

sfitds = 0. . .

In the formula (2) the energy in the hypothetical motion is pre- scribed, whilst the time of transit from the initial to the final con- figuration is variable. In another and generally more Hamilton- conven i en t theorem, due to Hamilton, the time of transit lanprin- j g p rescr i De(j t De the same as in the actual motion, whilst ciple. t jj e ener g V ma y jjg different and need not (indeed) be

constant. Under these conditions we have

»/;

SI (T-V)<« = 0,

(12)

where t, t' are the prescribed times of passing through the given initial and final configurations. The proof of (12) is simple; we have

« f"(T-V)i/ = P'(8T-SV)<« = C\7}m{±te+m+lte) -SV\dt

— Xm(x&x- s r$&y--zSz)

■/:

-(\2m(xSx+!/8y+z5z)+SV}dl.

(13)

The integrated terms vanish at both limits, since by hypothesis the configurations at these instants are fixed ; and the terms under the integral sign vanish by d'Alembert's principle.

The fact that in (12) the variation does not affect the time of transit renders the formula easy of application in any system of co- ordinates. Thus, to deduce Lagrange's equations, we have

/>V)/r !g g «a...g «. j **

-JTi (-£+©+ (-S+© + -l<«>*

The integrated terms vanish at both limits; and in order that the remainder of the right-hand member may vanish it is necessary that the coefficients of Squ Sq 2 ,... under the integral sign should vanish for all values of /, since the variations in question are inde- pendent, and subject only to the condition of vanishing at the limits of

integration. We are thus led to Lagrange's equation of motion for a conservative system. It appears that the formula (12) is a convenient as well as a compact embodiment of the whole of ordinary dynamics.

The modification of the Hamiltonian principle appropriate to the case of cyclic systems has been given by J. Larmor. Extension If we writei as in § I (25),

to cyclic _ „ . ,

*systems. R =T-**-k''/strong>'*' 05)*

we shall have

• (16)

sf"(R-V)dt = 0, .

provided that the variation does not affect the cyclic momenta k, k', k",..., and that the configurations at times / and /' are un- altered, so far as they depend on the palpable co-ordinates — &»'- The initial and final values of the ignored co-ordinates will in general be affected.

To prove (16) we have, on the above understandings,

*S P' (R – V) d t = P' (ST – kS ± – . . .-*V) dt r>' /ST.. , , 3T. ,*

/;'(Sˆ + – + S 8?i+ — av) d '— (i7)

where terms have been cancelled in virtue of § 5 (2). The last member of (17) represents a variation of the integral

/:

(T-V)<«

on the supposition that SX=o, 5X'=o, 8X" = o,... throughout, whilst Sqi, Sq 2 , Sq m vanish at times t and t' ; i.e. it is a variation in which the initial and final configurations are absolutely unaltered. It therefore vanishes as a consequence of the Hamiltonian principle in its original form.

Larmor has also given the corresponding form of the principle of least action. He shows that if we write

A = f(2T-KX-K'x'~K"x"—)dt,

(18)

Principal function.

(I)

(2)

then

SA-0, (19)

provided the varied motion takes place with the same constant value of the energy, and with the same constant cyclic momenta, between the same two configurations, these .being regarded as defined by the palpable co-ordinates alone.

§ 8. Hamilton's Principal and Characteristic Functions.

In the investigations next to be described a more extended meaning is given to the symbol 5. We will, in the first instance, denote by it an infinitesimal variation of the most general kind, affecting not merely the values of the co- ordinates at any instant, but also the initial and final con- figurations and the times of passing through them. If we put

S=J!'(T-V)«B, . . . we have, then,

*«S = (T'V')«'(T-V)«« + P'(iT-«V)**

= (T'V')St' (T-V)M + ["zmCMx + ^fry + iSa)"! ("*

Let us now denote by x'+bx', y'+Sy', z'+Sz', the final co-ordinates (i.e. at time t'+W) of a particle m. In the terms in (2) which relate to the upper limit we must therefore write Sx'—x'St', Sy'—y'St', dz'—z'St' for Sx, Sy, Sz. With a similar modification at the lower limit, we obtain

SS=-mT+2m(x'Sx'-t-p'5y'+z'5z')

— 2m(xdx+y5y+zSz), . . . (3)

where H(= T+V) is the constant value of the energy in the free motion of the system, and t(= t' — i) is the time of transit. In generalized co-ordinates this takes the form

SS = -H«T+/)'i«g'i+^' 2 «2'2+...

-p 1 Sqi-p2$q2- (4)

Now if we select any two arbitrary configurations as initial and final, it is evident that we can in general (by suitable initial velocities or impulses) start the system so that it will of itself pass from the first to the second in any prescribed time t. On this view of the matter, S will be a function of the initial and final co-ordinates (gi, 32,... and g'i, q\,...) and the time t, as independent variables. And we obtain at once from (4)

as

dg'i

as . as

P'r-

Pi = -

dq,

;P = -*

dq?

(5)

and

H— I 5 "

OT

(6)

S is called by Hamilton the principal function ; if its general form for any system can be found, the preceding equations suffice to determine the motion resulting from any given conditions. If we substitute the values of pi, pi,... and H from (5) and (6) in the expression for the kinetic energy in the form T' (see §1), the equation

Ti + V = H (7)

becomes a partial differential equation to be satisfied by S. It has been shown by Jacobi that the dynamical problem resolves itself into

obtaining a " complete " solution of this equation, involving rc + l arbitrary constants. This aspect of the subject, as a problem in partial differential equations, has received great attention at the hands of mathematicians, but must be passed over here. There is a similar theory for the function

'-/•

™ = S+Ht.

(8)

Character- istic function.

It follows from (4) that

SA = TSH+p'iSq'i+p' 2 &q'2+...

— pi8qi — pi&qi — (9)

This formula (it may be remarked) contains the principle of " least

DYNAMICS

763

action " as a particular case. Selecting, as before, any two arbitrary configurations, it is in general possible to start the system from one of these, with a prescribed value of the total energy H, so that it shall pass through the other. Hence, regarding A as a function of the initial and final co-ordinates and the energy, we find

(10)

_dA

dA

p'l

dq'i!

- _M

/>' =*

"dq

dA

pl—

dqi

P>-

= —

dqi

and

dA

'aw

.(»)

A is called by Hamilton the characteristic function ; it represents, of course, the " action " of the system in the free motion (with prescribed energy) between the two configurations. Like S, it satisfies a partial differential equation, obtained by substitution from (10) in (7).

The preceding theorems are easily adapted to the case of cyclic systems. We have only to write

S=J' l \R-V)dt=f' l '(T-Kx-K'x'-...-V)dt . (12)

in place of (1), and

A=j'(2T-K X K'x'~)dt, . . . (3)

in place of (8) ; cf. § 7 ad fin. It is understood, of course, that in (12) S is regarded as a function of the initial and final values of the palpable co-ordinates q it qi,...q m , and of the time of transit t, the cyclic momenta being invariable. Similarly in (13), A is regarded as a function of the initial and final values of q u gi,...q m , and of the total energy H, with the cyclic momenta invariable. It will be found that the forms of (4) and (9) will be conserved, provided the variations Sqi, 632,... be understood to refer to the palpable co-ordinates alone. It follows that the equations (5), (6) and (10), (11) will still hold under the new meanings of the symbols.

9. Reciprocal Properties of Direct and Reversed Motions.

We may employ Hamilton's principal function to prove a very

, remarkable formula connecting any two slightly disturbed

rraase's natura ' motions of the system. If we use the symbols

*formula. S anc * A . to denote tne corresponding variations, the*

theorem is

ˆ(Sp r .Aq r -Ap r .Sg r) = 0; . or. integrating from / to l',

Z(5p' r Aq' r -Aq' r .5q' r) = 2(5p r .Aq r -Ap,.5q r). If for shortness we write

, . 3-S , ,, 3"S

we have

dq r dq,'

dq r dq','

■ *(I)* ■ *(2)*

• *(3)*

6p r = -Z,(r, s)Sq,-X,(r, s')Sq'. . . .(4)

with a similar expression for Ap r . Hence the right-hand side of (2) becomes

*-2 r j2 s (r, *)5g. + Z s (r, s')Sq',\Aq r + Z r {X,{r, *)A 2 , + 2,(r, s')Aq\]5q r = Z r Z,{r,s'){Sq r .Aq',-Aq r .Sq',. . (5)*

The same value is obtained in like manner for the expression on the left hand of (2); hence the theorem, which, in the form (1), is due to Lagrange, and was employed by him as the basis of his method of treating the dynamical theory of Variation of Arbitrary Constants.

The formula (2) leads at once to some remarkable reciprocal re-lations which were first expressed, in their complete form, by „ . Helmholtz. Consider any natural motion of a con-

boltz's servative system between two configurations O and O' reciprocal throu £ n which it passes at times / and /' respectively, theorems and let l ' ~} = T – As tne system is passing through O let

a small impulse Sp r be given to it, and let the conse- quent alteration in the co-ordinate q, after the time t be Sq' s . Next consider the reversed motion of the system, in which it would, if undisturbed, pass from O' to O in the same time t. Let a small impulse Sp\ be applied as the system is passing through O', and let the consequent change in the co-ordinate q T after a time t be Sq r . Helmholtz's first theorem is to the effect that

Sq r :Sp', = 5q',:Sp r . . . . (6)

To prove this, suppose, in (2), that all the Sq vanish, and likewise all the Sp with the exception of Sp T . Further, suppose all the Aq' to vanish, and likewise all the Ap' except Ap' „ the formula then gives

Sp r .Aq r =~Ap.dq'„ . . . (7)

which is equivalent to Helmholtz's result, since we may suppose the symbol A to refer to the reversed motion, provided we

change the signs of the Ap. In the most general motion of a top (Mechanics, § 22), suppose that a small impulsive couple about the vertical produces after a time t a change SS in the inclination of the axis, the theorem asserts that in the reversed motion an equal im- pulsive couple in the plane of will produce after a time t a change 5i^, in the azimuth of the axis, which is equal to 59. It is under- stood, of course, that the couples have no components (in the generalized sense) except of the types indicated ; for instance, they may consist in each case of a force applied to the top at a point of the axis, and of the accompanying reaction at the pivot. Again, in the corpuscular theory of light let 0, O' be any two points on the axis of a symmetrical optical combination, and let V, V be the correspond- ing velocities of light. At let a small impulse be applied per- pendicular to the axis so as to produce an angular deflection SS, and let /3′ be the corresponding lateral deviation at 0'. In like manner in the reversed motion, let a small deflection 59′ at O' produce a lateral deviation at O. The theorem (6) asserts that

. . . . (8)

or, in optical language, the " apparent distance " of O from O' is to that of O' from O in the ratio of the refractive indices at O' and respectively.

In the second reciprocal theorem of Helmholtz the configuration O is slightly varied by a change Sq r in one of the co- Helm- ordinates, the momenta being all unaltered, and Sq', is holtz's the consequent

variation in one of the momenta after second time t. Similarly in the reversed" motion a change Sp', reciprocal produces after time t a change of momentum Sp r . The theorem. theorem asserts that

5p\:Sq r = Sp T :Sq', ... (9)

This follows at once from (2) if we imagine all the Sp to vanish, and likewise all the Sq save Sq r , and if (further) we imagine all the Ap' to vanish, and all the Aq' save Aq',. Reverting to the optical illustration, if F, F', be principal foci, we can infer that the convergence at F' of a parallel beam from F is to the convergence at F of a parallel beam from F' in the inverse ratio of the refractive indices at F' and F. This is equivalent to Gauss's relation between the two principal focal lengths of an optical instrument. It may be obtained otherwise as a particular case of (8).

We have by no means exhausted the inferences to be drawn from Lagrange's formula. It may be noted that (6) includes as particular cases various important reciprocal relations in optics and acoustics formulated by R. J. E. Clausius, Helmholtz, Thomson (Lord Kelvin) and Tait, and Lord Rayleigh. In applying the theorem care must be taken that in the reversed motion the reversal is complete, and extends to every velocity in the system; in particular, in a cyclic system the cyclic motions must be imagined to be reversed with the rest. Conspicuous instances of the failure of the theorem through incomplete reversal are afforded by the propagation of sound in a wind and the propagation of light in a magnetic medium.

It may be worth while to point out, however, that there is no such limitation to the use of Lagrange's formula (1). In applying it to cyclic systems, it is convenient to introduce conditions already laid down, viz. that the co-ordinates q r are the palpable co-ordinates and that the cyclic momenta are invariable. Special inference can then be drawn as before, but the interpretation cannot be expressed so neatly owing to the non-reversibility of the motion.

Authorities. — The most important and most accessible early authorities are J. L. Lagrange, Mecanique analytique (1st ed. Paris, 1788, 2nd ed. Paris, 181 1 ; reprinted in (Euvres, vols, xi., xii., Paris, 1888-89); Hamilton, "On a General Method in Dynamics, "Phil.Trans. 1834 and 1835; C. G. J. Jacobi, Vorlesungen ilber Dynamik (Berlin, 1866, reprinted in Werke, Supp.Bd., Berlin, 1884). An account of the extensive literature on the differential equations of dynamics and on the theory of variation of parameters is given by A. Cayley, " Report on Theoretical Dynamics," Brit. Assn.

Rep. (1857), Mathe matical Papers, vol. iii. (Cambridge, 1890). For the modern develop- ments reference may be made to Thomson and Tait, Natural Philo- sophy (1st ed. Oxford, 1867, 2nd ed. Cambridge, 1879); Lord Rayleigh, Theory of Sound, vol. i. (1st ed. London, 1877, 2nd ed. London, 1894); E. J. Routh, Stability of Motion (London, 1877), and Rigid Dynamics (4th ed. London, 1884); H. Helmholtz, " Uber die physikalische Bedeutung des Prinzips der kleinsten Action," Crelle, vol. c, 1886, reprinted (with other cognate papers) in Wiss. Abh. vol. iii. (Leipzig, 1895); J- Larmor, "On Least Action," Proc. Lond. Math. Soc. vol. xv. (1884); E. T. Whittaker, Analytical Dynamics (Cambridge, 1904). As to the question of stability, reference may^ be made to H. Poincare, " Sur l'equilibre d'une masse fluide animee d'un mouvement de rotation " Acta math. vol. vii. (1885); F. Klein and A. Sommerfeld, Theorie des Kreisels, pts. 1, 2 (Leipzig, 1897-1898); A. Lioupanoff and J. Hadamard, Liouville, 5me serie, vol. iii. (1897); T. J. I. Bromwich, Proc. Lond. Math. Soc. vol. xxxiii. (1901). A remarkable interpretation of various dynamical principles is given by H. Hertz in his posthumous work Die Prinzipien der Mechanik (Leipzig, 1894), of which an English translation appeared in 1900. (H. Lb.)

DYNAMITE (Gr. Shua/ics, pcwer), the name given to several explosive preparations containing nitroglycerin {q.v.) which are almost exclusively used for blasting purposes. The first practical application of nitroglycerin in this way was made by A. Nobel in 1863. He soaked gunpowder with the liquid and fired the gun- powder by an ordinary fuse. Later he found that nitroglycerin could be detonated by the explosion of several materials such as fulminate of mercury, the use of which as a detonator he patented in 1867. In 1866-1867 he experimented with charcoal and other substances, and found the infusorial earth known as kieselguhr, which consists mainly of silica (nearly 95%), eminently adapted to the purpose, as it was inert, non-combustibie, and after a little heating and preparation very porous, retaining a large amount of nitroglycerin as water is held in a sponge, without very serious exudation on standing. This kieselguhr dynamite is generally made by incorporating three parts of nitroglycerin with one part of the dry earth, the paste being then formed into cylindrical cartridges. This work is done by hand. Generally a small percentage of the kieselguhr is replaced by a mixture containing sodium and ammonium carbonates, talc and ochre. This product is known as dynamite No.

1. Disabilities attaching to kieselguhr dynamite are that when placejd in water the nitroglycerin is liable to be exuded or displaced, also that, like nitroglycerin itself, it freezes fairly easily and thawing the frozen cartridges is a dangerous operation. Other substances, e.g. kaolin, tripoli, magnesia alba (magnesium carbonate), alumina, sugar, charcoal, some powdered salts and mixtures of sawdust and salts, have been shown to be absorbents more or less adapted to the purpose of making a dynamite. Charcoal from cork is said to absorb about 90 % of its weight of nitroglycerin. With the idea of obtaining greater safety, mixtures have been made of nitroglycerin with wood fibre, charcoal and metallic nitrates. Lithofracteur, for instance, consists of 50% nitroglycerin and a mixture of prepared sawdust, kieselguhr and barium nitrate. Car- bonite contains 25% of nitroglycerin, the remainder being a mixture of wood-meal and alkali nitrates, with about 1 % of sulphur. Dualin, atlas 'dynamite and potentite are other modifications.

A convenient form in. which nitroglycerin can be made up for blasting purposes, especially in wet ground, is the gelatinous material obtained by the action of nitroglycerin, either alone or with the help of solvents, on low-grade or soluble gun-cottons. It is known as blasting gelatin, and was first made by Nobel by incorporating 6 or 7% of low nitrated cellulose (collodion cotton or soluble gun-cotton) with slightly warmed nitroglycerin. The result is a transparent plastic material, of specific gravity 1 • 5 to i-6, which may be kept under water for a long time without appreciable change. It is less sensitive to detonation than ordinary dynamite, and although its explosion is slightly slower it is more powerful than dynamite and much superior to the liquid nitroglycerin. Blasting gelatin also freezes and is sensitive to percussion in this state. Camphor and other sub- stances have been added to blasting gelatin to render it more solid and less sensitive. Some modifications of blasting gelatin, e.g. gelignite, contain wood-meal and such oxygen-containing salts as potassium nitrate. Experience has conclusively shown that dynamites are more satisfactory, quicker, and more intense in action than liquid nitroglycerin.

To prevent nitroglycerin and some of the forms of dynamite from freezing it has been proposed to add to them small quantities of either monbchlor-dinitroglycerin or of a nitrated poly-glycerin. The former is obtained by first acting upon glycerin with hydrogen chloride to produce w-chlorhydrin or chlor-propylene glycol, C 3 H 7 2 C1, which is then nitrated as in the case of glycerin. The latter is obtained by heating glycerin for six or seven hours to about 300 C, whereby water is split off in such manner that a diglycerin C 6 Hi 4 6

, for the most part, results. This on nitration in the usual manner gives a product C 6 Hi N 4 Oi3, which burns and explodes in a similar manner to ordinary nitroglycerin, but is less sensitive and does not so easily freeze. The mono- and di-nitrates of glycerin have also been proposed as additions to ordinary nitroglycerin (q.v.) for the same purpose. (W. R.E. H.)

DYNAMO (a shortened form of " dynamo-electric machine," from Gr. Siva/uis, power), a machine for converting mechanical into electrical energy.

The dynamo ranks with the telegraph and telephone as one of the three striking applications of electrical and magnetic science to which the material progress, that marked the second half of the 19th century was in no small measure due. Since the discovery of the principle of the dynamo by Faraday in 183 1 the simple model which he first constructed has been gradually developed into the machines of 5000 horse-power or more which are now built to meet the needs of large cities for electric lighting and power, while at the same time the numbers of dynamos in use have increased almost beyond estimate. Yet such was the insight of Faraday into the fundamental nature of the dynamo that the theory of its action which he laid down has remained essenti- ally unchanged. His experiments on the current which was set up in a coil of wire during its movement across the poles of a magnet led naturally to the explanation of induced electro- motive force as caused by the linking or unlinking of magnetic lines of flux with an electric circuit. For the more definite case of the dynamo, however, we may, with Faraday, make the transition from line-linkage to the equivalent conception of " line-cutting " as the source of E.M.F. — in other words, to the idea of electric conductors "cutting" or intersecting 1 the lines of flux in virtue of relative motion of the magnetic field and electric circuit. On the 28th of October 183 1 Faraday mounted a copper disk so that it could be rotated edgewise between the poles of a permanent horse-shoe magnet. When so rotated, it cut the lines of flux which passed transversely through its lower half, and by means of two rubbing contacts, one on its periphery and the other on its spindle, the circuit was closed through a galvanometer, which indicated the passage of a continuous current so long as the disk was rotated (fig. 1). Thus by the invention of the first dynamo Faraday proved his idea that the E.M.F. induced through the inter- action of a magnetic field and an electric circuit was due to the passage of a portion of the electric circuit across the lines of flux, or vice versa, and so could be maintained if the cutting of the lines were made continuous. 2 In com- parison with Faraday's results, the subsequent advance is to be

regarded as a progressive perfecting of the mechanical and electro-magnetic design, partly from the theoretical and partly from the practical side, rather than as modifying or adding to the idea which was originally present in his mind, and of which he already saw the possibilities.

A dynamo, then, is a machine in which, by means of continuous relative motion, an electrical conductor or system of conduetors forming part of a circuit is caused to cut the lines of a magnetic field or fields; the cutting of the magnetic flux induces an electro- motive force in the conductors, and when the circuit is closed a current flows, whereby mechanical energy is converted into electrical energy.

Little practical use could be made of electrical energy so long as its only known sources were frictional machines and voltaic batteries. The cost of the materials for producing electrical currents on a large scale by chemical action was prohibitive, while the frictional machine only yielded very small currents at extremely high potentials. In thedynamo,on the other hand, electrical energyin a convenient form could _ be_ cheaply and easily obtained by mechanical means, and with its invention the application of electricity to a wide range of commercial purposes became economically possible. As a converter of energy from one form to another it is only surpassed in efficiency by another electrical appliance, namely, the transformer (see Transformers). In this there is merely conversion of electrical energy at a high potential into electrical energy at a low potential, or vice versa, but in the dynamo the mechanical energy which must be applied to maintain the relative movement of magnetic field and conductor is absorbed, and reappears in an electrical form. A true transformation takes place, and the proportion which the rate of

1 Experimental Researches in Electricity, series ii. § 6, pars. 256, 259-260, and series xxviii. § 34.

2 Ibid, series i. § 4, pars. 84-90.

Fig. 1.

delivery of electrical energy bears to the power absorbed, or in other words the efficiency, is the more remarkable. The useful return or " output " at the terminals of a large machine may amount to as much

as 95% of the mechanical energy which forms the " input." Since it needs some prime mover to drive it, the dynamo has not made any direct addition to our sources of energy, and does not therefore rank with the primary battery or oil-engine, or even the steam-engine, all of which draw their energy more immediately from nature. Yet by the aid of the dynamo the power to be derived from waterfalls can be economically and conveniently converted into an electrical form and brought to the neighbouring factory or distant town, to be there reconverted by motors into mechanical power. Over any but very short distances energy is most easily transmitted when it is in an electrical form, and turbine-driven dynamos are very largely and successfully employed for such transmission. Thus by conducing to the utilization of water-power which may previously have had but little value owing to its dis- advantageous situation, the dynamo may almost be said to have added another to our available natural resources.

The two essential parts of the dynamo, as required by its definition, may be illustrated by the original disk machine of Faraday. They are (1) the iron magnet, between the poles of which a magnetic field exists, and (2) the electrical conductors, represented by the rotating copper disk. The sector of the disk cutting the lines of the field forms part of a closed electric circuit, and has an E.M.F. induced in it, by reason of which it is no longer simply a conductor, but has become " active." In its more highly developed form the simple copper disk is elaborated into a system of many active wires or bars which form the " winding," and which are so interconnected as to add up their several E.M.F. 's. Since these active wires are usually mounted on an iron structure, which may be likened to the keeper or " arma- ture " of a magnet rotating between its poles, the term " arma- ture " has been extended to cover not only the iron core, but also the wires on it, and when there is no iron core it is even applied to the copper conductors themselves. In the dynamo of Faraday the " armature " was the rotating portion, and such is the case with modern continuous-current dynamos; in alternators, however, the magnet, or a portion of it, is more commonly rotated while the armature is stationary. It is in fact immaterial to the action whether the one or the other is moved, or both, so long as their relative motion causes the armature conductors to cut the magnetic flux. As to the ultimate reason why an E.M.F. should be thereby induced, physical science cannot as yet yield any surer knowledge than in the days of Faraday. ' For the engineer, it suffices to know that the E.M.F. of the dynamo is due to the cutting of the magnetic flux by the active wires, and, further, is proportional to the rate at which the lines are cut. 2

The equation of the electromotive force which is required in order to render this statement quantitative must contain three factors, namely,- the density of the flux in the air-gap through which the armature conductors move, the active length of these wires, and the speed of their movement. For given values of the first and third factors and a single straight wire moved parallel to itself through a uniform field, the maximum rate of cutting is evidently obtained when the three directions of the lines

of the conductor's length and jt ' of the relative motion are re- I! spectively at right angles to each other, as shown by the three co-ordinate axes of fig. 2. The E.M.F. of the single wire is then E = B„LVXio- 8 volts... (1) where B s is the density of the flux within the air-gap ex- pressed in C.G.S. lines per square centimetre, L is the active length of the conductor within the field in centimetres, and V is the velocity of move- ment in centimetres per second. Further, the direction in which the E.M.F. has the above maximum value is along the length of the conductor, its " sense " being determined by

1 " On the Physical Lines of Magnetic Force," Phil. Mag., June

1852.

2 Faraday, Exp. Res. series xxviii. § 34, pars. 3104, 31 14-31 15.

Fig. 2.

the direction of the movement 3 in relation to the direction of the field.

The second fundamental equation of the dynamo brings to light its mechanical side, and rests on H. C. Oersted's discovery of the interaction of a magnetic field and an electric current. If a straight electric conductor through which a current is passing be so placed in a magnetic field that its length is not parallel to the direction of the lines of flux, it is acted on by a force which will move it, if free, in a definite direction relatively to the magnet; or if the conductor is fixed and the magnet is free, the latter will itself move in the opposite direction. Now in the dynamo the active wires are placed so that their length is at right angles to the field; hence when they are rotated and an electric current begins to flow under the E.M.F. which they induce, a mutual force at once arises between the copper conductors and the magnet, and the direction of this force must by Lenz's law be opposed to the direction of the movement. Thus as soon as the disk of fig. 1 is rotated and its circuit is closed, it experit ences

a mechanical pull or drag which must be overcome by the force applied to turn the disk. While the magnet must be firmly held so as to remain stationary, the armature must be of such mechanical construction that its wires can be forcibly driven through the magnetic field against the mutual pull. This law of electrodynamic action may be quantitatively stated in an equation of mechanical force, analogous to the equation (I.) of electromotive force, which states the law of electromagnetic induction. If a conductor of length L cm., carrying a current C amperes, is immersed in a field of uniform density B s , and the length of the conductor is at right angles to the direction of the lines, it is acted on by a force

F = B LCXio- 1 dynes,

(2)

and the direction of this force is at right angles to the conductor and to the field. The rate at which electrical energy is developed, when this force is overcome by moving the conductor as a dynamo through the field, is EC = B„LVC X io -8 watts, whence the equality of the mechanical power absorbed and the electrical power developed (as required by the law of the conservation of energy) is easily established. The whole of this power is not, however, available at the terminals of the machine; if R a be the resistance of the armature in ohms, the passage of the current C„ through the armature conductors causes a drop of pressure of C a R volts, and a corresponding loss of energy in the armature at the rate of C a 2 R„ watts. As the resistance of the external circuit R e is lowered, the current C = E„/ (R e -l-Ro) is increased. The increase of the current is, however, accompanied by a pro- gressive increase in the loss of energy over the armature, and as this is expended in heating the armature conductors, their tem- perature may rise so much as to destroy the insulating materials with which they are covered. Hence the temperature which the machine may be permitted to attain in its working is of great importance in determining its output, the current which forms one factor therein being primarily limited by the heating which it produces in the armature winding. The lower the resistance of the armature, the less the rise of its temperature for a given current flowing through it; and the reason for the almost universal adoption of copper as the material for the armature conductors is now seen to lie in its high conductivity. 4

Since the voltage of the dynamo is the second factor to which its output is proportional, the conditions which render the in- duced E.M.F. a maximum must evidently be reproduced as far as possible in

practice, if the best use is to be made of a given mass of iron and copper. The first problem, therefore, in the construction of the dynamo is the disposition of the wires and field in such a manner that the three directions of field, length o f active conductors, and movement are at right angles to one another, and so that the relative motion is continuous. Re- ciprocating motion, such as would be obtained by direct attach- ment of the conductors to the piston of a steam-engine, has

3 Id., ib. series i. § 4, pars. 114-119.

4 Id., ib. series ii. § 6, pars. 211, 213; series xxviii. § 34, par.

3152.

7 66

DYNAMO

'a

1

Mil

/

?».

been successfully employed only in the special case of an " oscillator," 1 producing a small current very rapidly changing in direction. Rotary motion is therefore universally adopted, and with this two distinct cases arise. Either (A) the active length of the wire is parallel to the axis of rotation, or (B) it is at right angles to it.

(A) If a conductor is rotated in the gap between the poles of a horse-shoe magnet, and these poles have plane parallel faces opposing one another as in fig. 3, not only is the density of the flux in the interpolar gap small, but the direction of movement is not always at right angles to the direction of the lines, which for the most part pass straight across from one opposing face to the other. When the conductor is midway between the poles (i.e. either at its highest or lowest point), it is at this instant sliding along the lines and does not cut them, so that its E.M.F. is zero. Taking this position as the starting-point, as the conductor moves round, its rate of line-cutting increases to a maximum when it has moved through a right angle

and is oppo- site to the centre of a pole-face (as in fig. 3), from which point onward the rate decreases to zero when it has moved through 180°. Each time the conductor crosses a line drawn sym- metrically through the gap between the poles and at right angles to the axis of rotation, the E.M.F. along its length is reversed in direction, since the motion relatively to the direction of the field is reversed. If the ends of the active conductor are electrically connected to two collecting rings fixed upon, but insulated from, the shaft, two stationary brushes bb can be pressed on the rings so as to make a sliding contact. An external circuit can then be connected to the brushes, which will form the " terminals " of the machine, the periodically reversed or alternating E.M.F. induced in the active conductor will cause an alternating current to flow through conductor and external circuit, and the simplest form of " alternator " is obtained. If the field cut by the straight conductor is of uniform density, and all the lines pass straight across from one pole-face to the other (both of which assumptions are approximately correct), a curve connecting the instantaneous values of the E.M.F. as ordinates with time or degrees of angular movement as abscissae (as shown at the foot of fig. 3), will, if the speed of rotation be uniform, be a sine curve. If, however, the conductor is mounted on an iron cylinder (fig. 4), 2 a sufficient margin being allowed for mechanical clearance between it and the poles, not only will the reluctance of the magnetic circuit be reduced and the total flux and its density in the air-gap B g be thereby increased, but the path of the lines will become nearly radial, except at the " fringe " near the edges of the pole- tips; hence the relative directions of the movement and of the lines will be continuously at right angles. The shape of the E.M.F. curve will then be as shown in fig. 4 — flat-topped, with rounded corners rapidly sloping down to the zero line.

But a single wire cannot thus be made to give more than a few volts, and while dynamos for voltages from 5 to 10 are required for certain purposes, the voltages in common use range from

1 Invented by Nikola Tesla (Elec. Eng. vol. xiii. p. 83. Cf. Brit. Pat. Spec. Nos. 2801 and 2812, 1894). Several early inventors, e.g. Salvatore dal Negro in 1832 (Phil. Mag. third series, vol. i. p. 45), adopted reciprocating or oscillatory motion, and this was again tried by Edison in 1878.

2 The ' advantage to be obtained by making the poles closely embrace the armature core was first realized by Dr Werner von Siemens in his " shuttle-wound " armature (Brit. Pat. No. 2107,

1856).

Fig. 4.

*100 to 10,000. It is therefore necessary to connect a number of such wires in series, so as to form an ” armature winding.” If several similar conductors are arranged along the length of the iron core parallel to the first (fig. 5), the E.M.F. ‘s generated in the conductors which at any moment are under the same pole are similarly directed, and are opposite to the directions of the E.M.F. ‘s in the. conductors under the other pole (cf. ; fig. s where the dotted and crossed ends of the wires indicate E.M.F.‘s directed respectively towards and away from the observer). Two distinct *ig. 5. methods of winding thence arise, the similarity of the E.M.F.‘s under the same pole being taken advantage of in the first, and the opposite E.M.F.‘s under N and S poles in the second.*

1. The first, or ring- winding, was invented by Dr Antonio Pacinotti of Florence 3 in i860, and was subsequently and inde- pendently reintroduced in 1870 4 by the Belgian electrician, Zenobe Theophile Gramme, whence it is also frequently called the ” Gramme”’ winding. By this method the farther end of conductor 1 (fig. 5) is joined in series to the near end of con- ductor 2 ; this latter lies next to it on the surface of the core or immediately above it, so that both are simultaneously under the same pole-piece. For this series connexion to be possible, the armature core must be a hollow cylin- der, supported from the shaft on an open non-magnetic Spider or hub, be- tween the arms of which there is room for the internal wire

completing the loop (fig. 6). The end of one complett loop or turn embracing one side of the armature core thus forms the starting-point for another loop, and the process can be continued if required to form a coil of two or more turns. In the ring armature the iron core serves the double purpose of conducting the lines across from one pole to the other, and also of shielding from the "magnetic flux the hollow interior through which the connecting wires pass. Any lines which leak across the central space are cut by the internal wires, and the direction of cutting is such that the E.M.F. caused thereby opposes the E.M.F. due to the active conductors proper on the external surface. If, however, the section of iron in the core be correctly proportioned, the number of lines which cross the interior will bear but a small ratio to those which pass entirely through the iron, and the counter E.M.F. of the internal wires will become very small; they may then be regarded simply as connectors for joining the external active wires in series.

2. The second or drum method was used in the original " shuttle-wound " armatures invented

by Dr Werner von Siemens in 1856, and

is sometimes called the " Siemens "

winding. The farther end of conductor 1

(fig. s) is joined by a connecting wire to

the farther end of another conductor

2′ situated nearly diametrically opposite

on the other side of the core and under

the opposite pole-piece. The near end of

the complete loop or turn is then brought

across the end of the core, and can be

used as the starting-point for another

loop beginning with conductor 2, which

is situated by the side of the first conductor. The iron

core may now be solid from the surface to the shaft, since

no connecting wires are brought through the centre, and

each loop embraces the entire armature core (fig. 7). By the

formation of two loops in the ring armature and of the single loop

in the drum armature, two active wires are placed in series;

J_ 3 Nuovo Cimento (1865), 19, 378.

1 Brit. Pat. No. 1668 (1870) ; Comptes rendus (1871), 73, 175.

inn

*O- 180**

Fig. 7.

the curves of instantaneous E.M.F. are therefore similar in shape to that of the single wire (fig. 4), but with their ordinates raised throughout to double their former height, as shown at the foot of fig. 6.

Next, if the free ends of either the ring or drum loops, instead of being connected to two collecting rings, are attached to the two halves of a split-ring insulated from the shaft (as shown in fig. 7 in connexion with a drum armature), and the stationary brushes are so set relatively to the loops that they pass over from the one half of the split-ring to the other half at the moment when the loops are passing the centre of the interpolar gap, and so are giving little or no E.M.F., each brush will always remain either positive or negative. The current in the external circuit attached to the brushes will then have a constant direction, although the E.M.F. in the active wires still remains alternating; the curve of E.M.F. obtained at the brushes is thus (as in fig. 7) entirely above the zero line. The first dynamo of H. Pixii, 1 which immediately followed Faraday's discovery, gave an alternating current, but in 1832 2 the alternator was converted into a machine giving a unidirected current by the substitution of a rudimentary " commutator " in place of mercury collecting cups.

(B) So far the length of the active wires has been parallel to the axis of rotation, but they may equally well be arranged perpen- dicularly

thereto. The poles will then have plane faces and the active wires will be disposed with their length approximately radial to the axis of the shaft. In order to add their E.M.F.'s in sertes, two types of winding may be employed, which are precisely analogous in principle to the ring and drum windings, under arrangement (A).

3. The discoidal or flat-ring armature is equivalent to a ring of which the radial depth greatly exceeds the length, with the poles presented to one side of the ring instead of embracing its cylindrical surface. A similar set of poles is also presented to the opposite side of the ring, like poles being opposite to one another, so that in effect each polar surface is divided into two halves, and the groups of lines from each side bifurcate and pass circumferentially through the armature core to issue into the adjacent poles of opposite sign.

4. In the disk machine, no iron core is necessary for the arma- ture, the two opposite poles of unlike sign being brought close together, leaving but a short path for the lines in the air-gap through which the active wires are rotated.

If the above elementary dynamos are compared with fig. 1, it will be found that they all possess a distinctive feature which is not present in the original disk machine of Faraday. In the four types of machine above described each active wire in each revolution first cuts the group of lines forming a field in one direction, and then cuts the same lines again in the opposite direction relatively to the sense of the lines, so that along the length of the wire the E.M.F. alternates in direction. But in the dynamo of fig. 1 the sector of the copper disk which is at any moment moving through the magnetic field and which forms the single active element is always cutting the lines in the same manner, so that the E.M.F. generated along its radial length is continuous and unchanged in direction. This radical distinction differentiates the two classes of heteropolar and homopolar dynamos, Faraday's disk machine of fig. 1 being the type of the latter class. In it the active element may be arranged either

1 Ann. Chim. Phys. 1. 322.

2 Ibid. li. 76. Since in H. Pixii's machine the armature was stationary, while both magnet and commutator rotated, four brushes were used, and the arrangement was not so simple as the split-ring described above, although the result was the same. J. Saxton's machine (1833) and E. M. Clarke's machine (1835, see Sturgeon's Annals of Electricity, i. 145) were similar to one another in that a unidirected current was obtained by utilizing every alter- nate half-

wave of E.M.F., but the former still employed mercury collecting cups, while the latter employed metal brushes. W. Sturgeon in 1835 followed Pixii in utilizing the entire wave of E.M.F., and abandoned the mercury cups in favour of metal brushes pressing on four semicircular disks (Scientific Researches, p. 252). The simple split-ring is described by Sir C. Wheatstone and Sir W. F. Cooke in their Patent No. 8345 (1840).

EE22Hn -ˆHH III

B

parallel or at right angles to the axis of rotation; but in both cases, in order to increase the E.M.F. by placing two or more elements in series, it becomes necessary either (1) to employ some form of sliding contact by which the current may be collected from the end of one active element and passed round a connecting wire into the next element without again cutting the field in the reverse direction, or (2) to form on the armature a loop of which each side is alternately active and inactive. The first method limits the possibilities of the homopolar machine so greatly when large currents and high voltages are required that it is now only used in rare instances, as e.g. occasionally in dynamos driven by steam-turbines which have a very high speed of rotation. The second alternative may be carried into effect with any of the four methods of armature winding, but is practically confined to the drum and disk types. In its drum form the field is divided into two or more projecting poles, all of the same sign, with intervening neutral spaces of equal width, and the span of the loop in the direction of rotation is at least equal to the width of a polar projection, as in fig. 8, where two polar projections are shown. Each side of the loop then plays a dual part; it first cuts the lines of one polar projection and generates an E.M.F., and next becomes an inactive connecting wire, while the action is taken up by the opposite side of the loop which has previously served as a connector but now cuts the lines of the next polar projection. The E.M.F. is thus always in the same direction along the side which is at any moment active, but alternates round the loop as a whole, and the dis- tinctive peculiarity of the homopolar machine, so soon as any form of " winding " is introduced into its armature, is lost. It results that the homo- polar principle, which would prima facie appear specially suitable for the generation of a uni- directional E.M.F. and continuous current, can Fig. 8.

seldom be used for this

purpose and is practically confined to alternators. It may therefore be said that in almost all dynamos, whether they supply an alternating or a continuous current in the external circuit, the E.M.F. and current in the armature are alternating. Ring winding was largely employed in early continuous- current dynamos and also in the alternators of Gramme and H. Wilde, and later of Auguste de Meritens. Disk winding was also successfully introduced for alternators, as in the magneto- machines of Nollet (1849) an(l the alternators of Wilde (1866) and Siemens (1878), and its use was continued in the machines of W. M. Mordey and S. Z. Ferranti. But although the ring, discoidal-ring and disk methods of winding deserve mention from their historical importance, experience has shown that drum winding possesses a marked superiority for both electrical and manufacturing reasons; the three former methods have in fact been practically discarded in its favour, so that the drum method will hereafter alone be considered.

The drum coil, composed of several loops wound side by side, may therefore be regarded as the constituent active element out of which the armature winding of the modern dynamo is de- veloped. Its application to the multipolar machine is easily followed from fig. 9, which illustrates the heteropolar type of dynamo. The span of the loops, which is nearly 180° or across the diameter of the two-pole machine, is reduced approximately to 90° in the four-pole or to 6o° in the six-pole machine and so on, the curvature of the coil becoming gradually less as the number of poles is increased. The passage of a coil through two magnetic fields of opposite direction yields a complete wave of E.M.F., such as is shown in fig. 6, and the time in seconds taken to pass through such a complete cycle is the " period " of the alternating E.M.F. The number of complete periods through which the E.M.F. of the coil passes per second is called the " periodicity " or " frequency " of the machine. In the bipolar machine this

is equal to the number of revolutions per second, and in the multipolar machine it is equal to the number of pairs of fields through which the coil passes in one second; hence in general the periodicity is £N/6c, where N = the number of revolutions per minute and p = the number of pairs of poles, and this holds true of the E.M.F. and current round the coil, even though the

I. Smooth..

Fig. 9.

U. Toothed.

E.M.F. and current furnished to the external circuit may be rendered unidirectional or continuous. The only difference on this point is that in the continuous-current machine the poles are usually fewer than in the alternator, and the periodicity is correspondingly lower. Thus in the former case the number of poles ranges from 2 to 12 and the usual frequencies from 5 to 20; but with alternators the frequencies in commercial use range from 25 to 120, and in large machines driven by slow- speed engines the number of poles may even be as high as 96.

The drum coil may be applied either to the external surface of a rotating armature, the field-magnet being external and stationary (fig. g), or to the internal surface of a stationary armature (fig. 10), the field-magnet being internal and rotat- ing. While the former combination is universally adopted in the continuous-current dynamo, the latter is more usual in

Fig.““io.

the modern alternator. In either case the iron armature core must be “laminated”; the passage of the lines of the field across its surface sets up E.M.F.‘s which are in opposite direc- tions under poles of opposite sign, so that if the core were a solid mass a current-sheet would flow along its surface opposite to a pole, and complete its circuit by passing through the deeper layers of metal or by returning in a sheet under a pole of opposite sign. Such “eddy-currents” can be practically avoided by dividing the metal core into laminations at right angles to the length of the active wires which are themselves arranged to secure the greatest rate of line-cutting and maximum E.M.F. The production of the eddy-current E.M.F. is not thereby prevented, but the paths of the eddy-currents are so broken up that the comparatively high resistance with which they meet ceduces their amount very greatly. The laminae must be lightly insulated from one another, right up to their edges, so that the E.M.F.‘s which still act across their thickness will not be added up along the length of the core, but will only produce extremely

small currents circulating through the interior of the separate laminations. Each thin iron plate is either coated with an insulating

varnish or has one of its sides covered with a sheet of very thin paper; the thickness of the laminae is usually about one-fortieth of an inch, and if this is not exceeded the rate at which energy is dissipated by eddy-currents in the core is so far reduced that it does not seriously impair the efficiency of the machine.

Lastly, the drum coils may be either attached to the surface of a smooth armature core (fig. 9, I.), or may be wound through holes formed close to the periphery of the core, or may be embedded in the slots between projecting iron teeth (figs. 9 [It.] and 10). Originally employed by Antonio Pacinotti in connexion with ring winding, the toothed armature was after some consider- able use largely discarded in favour of the smooth core; it has, how- ever, been reintroduced with a fuller understanding of the special precautions necessitated in its design, and it is now so commonly used that it may be said to have superseded the smooth-surface armature.

Not only does the toothed armature reduce the length of the air-gap to the minimum permitted by mechanical and magnetic considerations, and furnish better mechanical protection to the armature coils, but it also ensures the positive holding of the active wires against the mechanical drag which they experience as they pass through the magnetic field. Further, the active wires in the toothed armature are relieved of a large proportion of this mechanical drag, which is transferred to the iron teeth. The lines of the field, after passing through the air-gap proper, divide between the teeth and the slots in proportion to their relative permeances. Hence at any moment the active wires are situated in a weak field, and for a given armature current the force on them is only proportional to this weak field. This important result is connected with the fact that when the armature is giving current the distribution of the lines over the face of each tooth is distorted, so that they become denser on the " trailing " side than on the " leading " side; 1 the effect of the non-uniform distribution acting on all the teeth is to produce a magnetic drag on the armature core proportional to the current passing through the wires, so that the total resisting force remains the same as if the armature had a smooth core. The amount by which the stress on the active wires is reduced entirely depends upon the degree to which the teeth are saturated, but, since the relative permeability of iron even at a flux density of 20,000 lines per sq. cm. is to that of air approximately as 33 : 1 , the embedded wires are very largely relieved of the driving stress. An additional gain is that solid bars of much greater width can be used in the toothed armature than on a smooth core without appreciable loss from eddy-currents within their mass.

A disadvantage of the slotted core is, however, that it usually necessitates the lamination of the pole-pieces. If the top of the slot is open, and its width of opening is considerably greater than the length of the air-gap from the iron of the pole-face to the surface of the teeth, the lines become unequally distributed not only at the surface of the teeth, but also at the face of the pole-pieces; and this massing of the lines into bands causes the density at the pole- face to be rhythmically varied as the teeth pass under it. No such variation can take place in a solid mass of metal without the pro- duction of eddy-currents within it; hence if the width of the slot- opening is equal to or exceeds twice the length of the single air-gap, lamination of the pole-pieces in the same plane as that of the armature core becomes advisable.

If the wires are threaded through holes or tunnels pierced close to the periphery of the core, the same advantages are gained as with open slots, and lamination of the pole-pieces is rendered un- necessary. But on the other hand, the process of winding becomes laborious and expensive, while the increase in the inductance of

1 By the " leading " side of the tooth or of an armature coil or sector is to be understood that side which first enters under a pole after passing through the interpolar gap, and the edge of the pole under which it enters is here termed the " leading " edge as opposed to the " trailing " edge or corner from under which a tooth or coil emerges into the gap between the poles ; cf . fig. 30, where the leading and trailing pole-corners are marked II and tt.

Fig. 11.

the coils owing to their being surrounded by a closed iron circuit is prejudicial to sparkless commutation in the continuous-current dynamo and to the regulation of the voltage of the alternator. A compromise is found in the half-closed slot, which is not uncommon in alternators, although the open slot is more usual in continuous-current dynamos.

With the addition of more turns to the elementary drum loop or of several complete coils, new questions arise, and in con- nexion therewith the two great classes of machines, viz. alter- nators and continuous-current dynamos, which have above been treated side by

side, diverge considerably, so that they are best considered separately. The electromotive-force equation of

the alternator will be first deduced, and sub- sequently that of the continuous-current machine.

Corresponding to the number of pairs of poles in the multipolar alternator, it is evident that there may also be an equal number of coils as shown dia- grammatically in fig. 1 1 . The additional coils, being similarly situated in respect to other pairs of poles, will exactly reproduce the E.M.F. of the original coil in phase and magnitude, so that when they are connected in series the total E.M.F. will be proportional to the number of coils in series; or if they are connected in parallel, while not adding to the E.M.F., they will proportionately increase the current-carrying capacity of the combination. But within each coil the addition of more loops will not cause an equal increase in the total E.M.F., unless the phases of the component E.M.F.'s due to the several turns are identical, and on this account it becomes necessary to consider the effect of the width of the coil-side.

If the additional loops are wound within the same slots as the original loop, the winding is " concentrated," and each turn will then add the same E.M.F. But if the coil-side is divided between two or more slots, the phase of the E.M.F. yielded by the wires in one slot being different from that of the wires in another neighbouring slot, the sum of all the E.M.F.'s will be less than

the E.M.F. of one component loop multiplied by the number of loops or turns in the coil. The per- centage reduction in the E.M.F. will depend upon the number of the slots in a coil-side and their distance apart, i.e. on the virtual width of the coil-side expressed as . a fraction of the " pole-pitch " or the distance measured along the pitch-line from the centre of one pole to the centre of a neighbour- ing pole of opposite sign (fig. 12). The winding is now to be regarded as " grouped," since a small number of distinct phases corre- sponding to the groups within the two, three or four slots have to be compounded together. As the number of slots per coil- side is increased, an approach is gradually made to the case of " uniform distribution," such as would obtain in a smooth- core armature in which the turns of the coil are wound closely side by side. Thus in the six-turn coil of fig. 12 A, which represents the development of a two- pole armature when the core is cut down to the shaft and opened out flat, there are in effect six phases compounded together, each of which differs but little from that of its next neighbour. With numerous wires lying still closer together a large number of phases

are viii 25

Fig. 12.

compounded until the distribution becomes practically uniform; the decrease in the E.M.F., as compared with that of a single turn multiplied by the number in series, is then immediately dependent upon the width of the coil-side relatively to the pole- pitch.

If the width of the inner loop of fig. 12 A is less than that of the pole-face, its two sides will for some portion of each period be moving under the same pole, and " differential action " results, the net E.M.F. being only that due to the difference between the E.M.F.'s of the two sides. The loop of smallest width must therefore exceed the width of pole-face, if direct differential action is to be avoided. The same consideration also determines the width of the outer loop ; if this be deducted from twice the pole-pitch, the difference should not be less than the width of the pole-face, so that, e.g., in a bipolar machine the outer loop may stand to the S. pole exactly as the inner loop stands to the N. pole (fig. 13). In other words, the width of the coil-side must not ex- ceed the width of the interpolar gap between two fields. Evidently then if the ratio of the pole-width to the pole-pitch approaches unity, the width of the coil-side must be very small, and vice versa. A compromise between these con- flicting considerations is found if the pole is made not much more than half the pole-pitch, and the width of the coil-side is similarly about half the pole-pitch and therefore equal in width to the pole (fig. 13). A single large coil, such as that of fig. 12 A, can, however, equally well be divided into two halves by taking the end-connexions of one half of the turns round the opposite side of the shaft (fig. 12 B), as indeed has already been done in fig. 13. Each sheaf or band of active wires corresponding to a pole is thereby unaffected, but the advantages are gained that the axial length of the end-connexions is halved, and that they have less inductance. Thus if in fig. 1 1 there are four turns per coil, fig. 14 is electrically equivalent to it (save that the coils are here shown divided into two parallel paths, each carrying half the total current). When the large coils are divided as above described, it results that there are as many coils as there are poles, the outer loop of the small coil having a width equal to the pole-pitch, and the inner a width equal to the pole-face.

Such is the form which the " single-phase alternator " takes, but since only one-half of the armature core is now covered with winding, an en- tirely distinct but similar set of coils may be wound to form a second armature circuit between the coils of the first cir-

cuit. The phase of this second circuit will differ b}' 90 or a quarter of a period from that of the first, and it may either be used to feed an en- tirely separate external circuit possibly at a different pressure or, if it be composed of the same number of turns and therefore gives the same voltage, it may be interconnected with the first circuit to form a " quarter-phase alternator," as will be more fully described later. By an exten- sion of the same process, if the width of each side of a coil is reduced to one-sixth of the pole-pitch, three armature circuits can be wound on the same core, and a " three-phase alternator," giving waves of E.M.F. differing in phase by 120°, is obtained.

The fundamental "electromotive-force equation " of the hetero- polar alternator can now be given a more definite form. Let Z,, be the number of C. G. S. lines or the total flux, which issuing from any

Fig. 14.

77°

one pole flows through the armature core, to leave it by another pole of opposite sign. Since each active wire cuts these lines, first as they enter the armature core and then as they emerge from it to enter another pole, the total number of lines cut in one revolution by any one active wire is 2pZ a . The time in seconds taken by one revolution is 60/N. The average E.M.F. induced in each active wire in one revolution being proportional to the number of lines cut divided by the time taken to cut them is therefore 2Z a (pN/6o) X io -8 volts. The active wires which are in series and form one distinct phase may be divided into as many bands as there are poles; let each such band contain t active wires, which as before explained may either form one side of a single large coil or the adjacent sides of two coils when the large coil is divided into two halves. Since the wires are joined up into loops, two bands are best considered together, which with either arrangement yield in effect a single coil of t turns. Thr average E.M.F.'s of all the wires in the two bands when added together will therefore be 8 . But unless each band is concentrated within a single slot, there must be some differential action as they cross the neutral line between the poles, so that the last expression is virtually the gross average E.M.F. of the loops on the assumption that the component E.M.F.'s always act in agree ment round the coil and do not at times partially neutralize one another. The net average

E.M.F. of the coil as a whole, or the arithmetical mean of all the instantaneous values of a half-wave of the actual E.M.F. curve, is therefore reduced to an extent depend- ing upon the amount of differential action and so upon the width of the coil-side when this is not concentrated. Let &' = the co- efficient by which the gross average E.M.F. must be multiplied to give the net average E.M.F.; then k' may be called the " width- factor," and will have some value less than unity when the wires of each band are spread over a number of slots. The net average E.M.F. of the two bands corresponding to a pair of poles is thus e.. = 4'Z«(/>N/6o)*

The shape of the curve of instantaneous E.M.F. of the coil must further be taken into account. The " effective " value of an alter- nating E.M.F. is equal to the square root of the mean square of its instantaneous values, since this is the value of the equivalent uni- directional and unvarying E.M.F., which when applied to a given resistance develops energy at the same rate as the alternating E.M.F., when the effect of the latter is averaged over one or any whole number of periods. Let £" = the ratio of the square root of the

mean square to the average E.M.F. of the coil, i.e. = effective EJVT^- .

average E.M.F. Since it depends upon the shape of the E.M.F. curve, k" is also known as the "form-factor"; thus if the length of gap between pole-face and armature core and the spacing of the wires were so graduated as to give a curve of E.M.F. varying after a sine law, the form-factor would have the particular value of jt/2V2 = i , ii, and to this condition practical alternators more or less conform. The effective E.M.F. of the two bands corresponding to a pair of poles is thus e tll =4&'&"'Z„(£N/6o)/Xio- 8 .

In any one phase there are p pairs of bands, and these may be divided into q parallel paths, where q is one or any whole number of which p is a multiple. The effective E.M.F. of a complete phase is therefore pe e/ //q. Lastly, if m = the number of phases into which the armature winding is divided, and r = the total number of active wires on the armature counted all round its periphery, t = TJ2pm, and the effective E.M.F. per phase is Ea = 2WZ<,(£NT/6omg)Xio~ 8 .

The two factors k' and k" may be united into one coefficient, and the equation then takes its final form

E„ =2KZ<,(£Nt/6o ?»g)Xio _8 volts (la)

In the alternator q is most commonly I, and there is only one circuit per phase; finally the value of K or the product of the width-factor and the form-factor usually falls between the limits of I and 1-25.

We have next to consider the effect of the addition of more armature loops in the case of dynamos which give a unidirectional E.M.F. in virtue of their split-ring collecting device, i.e. of the type shown in 5g. 7 with drum armature or its equivalent ring form. As before, if the additional loops are wound in continua- tion of the first as one coil connected to a single split-ring, this coil must be more or less concentrated into a narrow band; since if the width becomes nearly equal to or exceeds the width of the interpolar gap, the two edges of the coil-side will just as in the alternator act differentially against one another during part of each revolution. The drum winding with a single coil thus gives an armature of the H- or " shuttle " form invented by Dr Werner von Siemens. Although the E.M.F. of such an arrangement may have a much higher maximum value than that of the curve of fig. 7 for a single loop, yet it still periodically varies during each revolution and so gives a pulsating current, which is for most practical uses unsuitable. But such pulsation might be largely reduced if, for example, a second coil were placed at right angles to the original coil and the two were con- nected in series; the crests of the wave of E.M.F. of the second

coil will then coincide with the hollows of the first wave, and although the maximum of the resultant curve of E.M.F. may be no higher fts fluctuations will be greatly decreased. A spacial displacement of the new coils along the pole-pitch, somewhat as in a polyphase machine, thus suggests itself, and the process may be carried still further by increasing the number of equally spaced coils, provided that they can be connected in series and yet can have their connexion with the external circuit reversed as they pass the neutral line between the poles. Given two coils at right angles and with their split-rings displaced through a corresponding angle of 90°, they may be connected in series by joining one brush to the opposite brush of the second coil, the external circuit being applied to the two remaining brushes. 1 The same arrangement may again be re- peated with another pair of coils in parallel with the first, and we thus obtain fig. 15 with four split-rings, their connexions to

Fig. 15.

the loops being marked by corresponding numerals; the four coils will give the same E.M.F. as the two, but they will be jointly capable of carrying twice the current, owing to their division into two

parallel circuits. Now in place of the four split-rings may be employed the greatly simplified four-segment structure shown in fig. 16, which serves precisely the same purpose as the four split-rings but only requires two instead of eight brushes. The effect of joining brush 2 in fig. 15 across to brush 3, brush 4 to brush s, 5 to 6, &c, has virtually been to connect the end of coil A with the beginning of coil B, and the end of coil B with the beginning of coil A', and so on, until they form a continuous closed helix. Each sector of fig. 16 will therefore replace two halves of a pair of adjacent split-rings, if the end and beginning of a pair of adjacent coils are connected to it in a regular order of sequence. The four sectors are insulated from one another and from the shaft, and the whole structure is known as the " commutator,", 2 its function being not simply to collect the current but also to commute its direction in any coil as it passes 1 the interpolar gap. The principle of the " closed- \ coil continuous-current armature " is thus reached, in which there are at least two parallel circuits from brush to brush, and from which a practi- cally steady current can be obtained. Each coil is successively short-circuited, as a brush bridges over the insulation between the two sectors which terminate it; and the brushes must be so set that the period of short-circuit takes place when the coil is generating little or no E.M.F., i.e. when it is moving through the zone between the pole-tips. The effect of the four coils in reducing the percentage fluctuation of the E.M.F. is very marked, as shown at the foot of fig. 15 (where the upper curve is the resultant obtained by adding together the separate curves of coils A and B), and the levelling process may evidently be carried still further by the insertion of more coils and more corresponding sectors in the commutator, until the whole

1 Such was the arrangement of Wheatstone's machine (Brit. Pat. No. 9022) of 1841, which was the first to give a more nearly " con- tinuous " current, the number of sections and split-rings being five.

2 Its development from the split-ring was due to Pacinotti and Gramme (Brit. Pat. No. 1668, 1870) in connexion with their ring armatures.

Fig. 16.

Fig. 17.

Fig. 18.

armature is covered with winding. For example, figs. 17 and 18 show a ring and a drum armature, each with eight coils and eight commutator sectors; their resultant curve, on the assump- tion that a single active wire gives the flat-topped curve of fig. 4,

., will be the upper wavy line

of E.M.F. obtained by adding together two of the resultant curves of fig. 15, with a relative displacement of 45°. The amount of fluctuation for a given number of commutator sectors depends upon the shape of the curve of E.M.F. yielded by the separate small sections of the armature winding; the greater the polar arc, the less the fluctuation. In practice, with a polar arc equal to about 0.75 of the pitch, any number of sectors over 32 per pair of poles yields an E.M.F. which is sensibly constant through- out one or any number of revolutions.

The fundamental electro- motive-force equation of the continuous-current heteropolar machine is easily obtained by analogy from that of the alter- nator. The gross average E.W.F. from the two sides of a drum loop without reference to its direction is as before 4Z„(pN/6o) X 10- 8 volts. But for two reasons its net average E.M.F. may be less; the span of the loop may be less than the pole-pitch, so that even when the brushes are so set that the position of short- circuit falls on the line where the field changes its direction, the two sides of the loop for some little time act against each other; or, secondly, even if the span of the loop be equal to the pole-pitch, the brushes may be so set that the reversal of the direction of its induced E.M.F. does not coincide with reversal of the current by the passage of the coil under the brushes. The net average E.M.F. of the loop is therefore proportional to the algebraic sum of the lines which it cuts in passing from one brush to another, and this is equal to the net amount of the flux which is included within the loop when situated in the position of short-circuit under a brush. The amount of this flux may be expressed as k'Z a where k' is some coefficient, less than unity if the span of the coil be less than the pole-pitch, and also varying with the position of the brushes. The net average E.M.F. of the loop is therefore

4fc'Za(£N/6o)Xio- 8 .

In practice the number of sec- tions of thearmature windingisso large and their distribution round the armature periphery is so uniform, that the sum total of the instantaneous E.M.F.'s of the several sections which are in series becomes at any moment equal to the net average E.M.F. of one loop multiplied by the number which are in series. If the winding is divided into q

f > arallel circuits, the number of oops in series is r/2q, so that the

*total E.M.F. is Ea = 2(*7g)Z„(ˆN/6o)TXio- 8 voits. Thus as compared with the alternator not only is there no division of the winding into separate phases, but the form-factor k" disappears, since the effective and average E.M.F.'s are the same. Further whereas in the alternator q may = 1, in the continuous-current closed-coil armature there can never be less than two circuits in parallel from brush to brush, and if more, their number must always be a multiple of two, so that q can never be less than two and must always be an even number. Lastly, the factor k' is usually so closely equal to 1, that the simplified equation may in practice be adopted, viz.*

E„ = (2/2)Z (£N/6o)tX io-« volts . . (16)

The fundamental equation of the electromotive force of the dynamo in its fully developed forms (1 a) (and 1 6) may be com-

pared with its previous simple statement (I.). The three variable terms still find their equivalents, but are differently expressed, the density B„ being replaced by the total flux of one field Z , the length L of the single active wire by the total number of such wires t, and the velocity of movement V by the number of revolutions per second. Even when the speed is fixed, an endless number of changes may be rung by altering the relative values of the remaining two factors; and in successful practice these may be varied between fairly wide limits without detriment to the working or economy of the machine. While it may be said that the equation of the E.M.F. was implicitly known from Faraday's time onwards, the difficulty under which designers laboured in early days was the problem of choosing the correct relation of Z a or r for the required output; this, again, was due chiefly to the difficulty of predetermining the total flux before the machine was constructed. The general error lay in employing too weak a field and too many turns on the armature, and credit must here be given to the American inventors, E. Weston and T. A. Edison, for their early appreciation of the superiority in practical working of the drum armature, with comparatively few active wires rotating in a strong field.

Continuous-current Dynamos. — On passing to the separate consideration of alternators and continuous-current dynamos, the chief constructive features of the latter will first be taken in greater detail. As already stated in the tun core' continuous-current dynamo the armature is usually the rotating portion, and the necessity of laminating its core has been generally described. The thin iron stampings employed to build up the core take the form of circular washers or " disks," which in small machines are strung directly on the shaft; in larger multipolar machines, in which the required radial depth of iron is small relatively to the diameter, a central cast iron hub supports the disks. Since the driving force is transmitted through the shaft to the disks, they must in the former case be securely fixed by keys sunk into the shaft; when a central hub is employed (fig. 19) it is keyed to the shaft, and its projecting arms engage in notches stamped on the inner circumference of the disks, or the latter have dovetailed projections fitting into the arms. The disks are then tightly compressed and clamped between stout end-plates so as to form a nearly solid iron cylinder of axial length slightly exceeding the correspond- ing dimension of the poles. If the armature is more than 4 ft. in diameter, the disks become too large to be conveniently handled in one piece, and are therefore made in segments, which are built up so as to break joint alternately. Prior to assem- blage, the external circumference of each disk is notched in a stamping machine with the required number of slots to receive the armature coils, and the longitudinal grooves thereby formed in the finished core only require to have their sharp edges

smoothed off so that there may be no risk of injury to the insulation of the coils.

With open slots either the armature coils may be encased with wrappings of oiled linen, varnished paper and thin flexible micanite sheeting in order to insulate them electrically from the iron slots in which they are afterwards em- w i a ai ng . bedded; or the slots may be themselves lined with moulded troughs of micanite, &c, for the reception of the arma- ture coils, the latter method being necessary with half-closed slots. According to the nature of the coils armatures may be divided into the two classes of coil-wound and bar-wound. In the former class, round copper wire, double-cotton covered, is

employed, and the coils are either wound by hand directly on to the

armature core, or are shaped on formers prior to being inserted in the armature slots. Hand-winding is now only employed in very small bipolar machines, the process being expensive and accompanied by the disadvantage that if one section requires to be repaired, the whole armature usually has to be dismantled and re-wound. Former-wound coils are, on the other hand, economical in labour, perfectly symmetrical and interchangeable, and can be thoroughly insulated before they are placed in the slots. The shapers employed in the form- ing process are very various, but are usually arranged to give to the finished coil a lozenge shape, the two straight active sides which fit into the straight slots being joined by V-shaped ends; at each apex of the coil the wire is given a twist, so that the two sides fall into different levels, an upper and a lower, corresponding to the two layers which the coil-sides form on the finished armature. Rectangular wire of comparatively small section may be similarly treated, and if only one loop is required per section, wide and thin strip can be bent into a complete loop, so that the only soldered joints are those at the commutator end where the loops are interconnected. But finally with massive rectangular conductors, the transition must be made to bar-winding, in which each bar is a half-loop, insulated by being taped after it has been bent to the required shape; the separate bars are arranged on the armature in two layers, and their ends are soldered together subsequently to form loops. As a general rule, whether bars or former-wound coils are employed, the armature is barrel-wound, i.e. the end-connexions project out- wards from the slots with but little change of level, so that they form a cylindrical mass supported on projections from the end- plates of the core (fig. 19); but, in certain cases, the end-con- nexions are bent downwards at right angles to the shaft, and they may then consist of separate strips of copper bent to a so-called butterfly or evolute shape.

After the coils or loops have been assembled in the slots on the armature core, and the commutator has been fixed in place on the shaft, the soldering of the ends of the coils proceeds, by which at once the union of the end of one coil with the beginning of the next, and also their connexion to the commutator sectors, is effected, and in this lies the essential part of armature winding.

The development of the modern drum armature, with its numerous coils connected in orderly sequence into a symmetrical winding, , as contrasted with the earlier Siemens armatures, was

wla'dlae initiated by F. von Hefner Alteneck (1871), and the laws governing the interconnexion of the coils have now been elaborated

into a definite system of winding formulae. Whatever the number of wires or bars in each side of a coil, i.e. whether it consist of a single loop or of many turns, the final connexions of its free ends are not thereby affected, and it may be mentally replaced by a single loop with two active inducing sides. The coil-sides in

their final position are thus to be regarded as separate primary elements, even in number, and dis- tributed uniformly round the armature periphery or divided into small, equally spaced groups by 1 being located within the slots of a toothed armature. Attention must v« then be directed simply to the span of the back connexion between the elements at the end of the armature further from the com- mutator, and to the span of the front connexion by which the last turn of a coil is finally connected to the first turn of the next in Lap-loops sequence, precisely as if each coil*

Fig. 20. of many turns were reduced to a

single loop. In order to avoid direct differential action, the span of the back connexion which fixes the width of the coil must exceed the width of the pole- face, and should not be far different from the pole-pitch; it is usually a little less than the pole-pitch. Taking any one element as No. 1 in fig. 20, where for simplicity a smooth-core bipolar armature is shown, the number of winding-spaces, each to be occupied by an element, which must be counted off in order to find the position of the next element in series, is called the " pitch " of the end-connexion, front or back, as the case may be. Thus the back pitch of the winding as marked by the dotted line in fig. 20 is

7, the second side of the first loop being the element numbered 1+7=8! In forming the front end-connexion which completes the loop and joins it to the next in succession, two possible cases present themselves. By the first, or " lap- winding," the front end-connexion is brought backwards, and passing_ on its way to a junction with a commutator sector is led to a third element lying within the two sides of the first loop, i.e. the second loop starts with the element, No. 3, lying next but one to the starting-point of the

- *$111111 ‘ ‘*

V K> V "v J S.

A/vyv

m ˆik Ilk %

Fig. 21.

first loop. The winding therefore returns backwards on itself to form each front end, but as a whole it works continually forwards round the armature, until it finally " re-enters," after every element has been traversed. The development of the completed winding on a flat surface shows that it takes the form of a number of partially overlapping loops, whence its name originates. The firm-line portion of fig. 21 gives the development of an armature similar to that of fig. 18 when cut through at the point marked X and opened out; two of the overlapping loops are marked thereon in heavy lines. The multipolar lap-wound armature is obtained by simply repeating the bipolar winding p times, as indicated by the dotted additions of fig. 21 which convert it from a two-pole to a four-pole machine. The character- ' istic feature of the lap- wound arma- ture is that there are as many parallel paths from brush to brush, and as many points at which the current must be collected, as there are poles. As the bipolar closed-coil continuous-current armature has been shown to consist in reality of two circuits in parallel, each giving the same E.M.F. and carrying half the total current, so the multipolar lap-wound drum consists of p pairs of parallel paths, each giving the same E.M.F. and carrying i/2p of the total current. Thus in equation I. b we have q = 2p, and the special form which the E.M.F. equation of the lap-wound armature takes is Ea = Z a (N/6o)TXlO -8 volts. All the brushes which are of the same sign must be connected together in order to collect the total armature current. The several brush-sets of the multipolar lap-wound machine may again be reduced to two by "cross-connexion" of sectors situated 300 lp

Wave-loops Fig. 22.

Fig. 23.

apart, but this is seldom done, since the commutator must then be lengthened p times in order to obtain the necessary brush contact-surface for the collection of the entire current.

But for many purposes, especially where the voltage is high and the current small, it is advantageous to add together the inductive effect of the several poles of the multipolar machine by Wave- throVing the E.M.F.'s of half the total number of elements winding. into series, the number of parallel circuits being conversely again reduced to two. This is effected by the second method of winding the closed-coil continuous current drum, which is known

as ‘”’ wave- winding.” The front pitch is now in the same direction round the armature as the back pitch (fig. 22), so that the beginning of the second loop, i.e. element No. 15, lies outside the first loop. After p loops have been formed and as many elements have been traversed as there are poles, the distance covered either falls short of or exceeds a complete tour of the armature by two winding-spaces, or the width of two elements. A second and third tour are then made, and so on, until finally the winding again closes upon itself. When the completed winding is developed as in fig. 23, it is seen to work continuously forwards round the armature in zigzag waves, one of which is marked in heavy lines, and the number of complete tours is equal to the average of the back and front pitches. Since the number of parallel circuits from brush to brush is q = 2, the E.M.F. equation of the wave-wound drum is E,, = £Z<,(N/6o) rXio~ s volts. Only two sets of brushes are necessary, but in order to shorten the length of the commutator, other sets may also be added at the point of highest and lowest potential up to as many in number as there are poles. Thus the advantage of the wave-wound armature is that for a given voltage and number of poles the number of active wires is only ijp of that in the lap-wound drum, each being of larger cross-section in order to carry p times as much current; hence the ratio of the room occupied by'the insulation to the copper area is less, and the available space is better utilized. A further advantage is that the two circuits from brush to brush consist of elements influenced by all the poles, so that if for any reason, such as eccen- tricity of the armature within the bore of the pole-pieces, or want of uniformity in the magnetic qualities of the poles, the flux of each field is not equal to that of every other, the equality of the voltage produced by the two halves of the winding is not affected thereby.

In appearance the two classes of armatures, lap and wave, may be distinguished in the barrel type of winding by the slope of the upper layer of back end-connexions, and that of the front connexions at the commutator end being parallel to one another in the latter, and oppositely directed in the former.

After completion of the winding, the end-connexions are firmly bound down by bands of steel or phosphor bronze binding wire, so as to resist the stress of centrifugal force. In the case

Fig. 24.

of smooth-surface armatures, such bands are also placed at intervals along the length of the armature core, but in toothed armatures, although the coils are often in small machines secured in the slots by similar bands of a non-magnetic high-resistance wire, the use of hard-wood wedges driven into notches at the sides of the slots becomes preferable, and in very large machines indispensable. The external appearance of a typical armature with lap-winding is shown in fig. 24.

A sound mechanical construction of the commutator is of vital importance to the good working of the continuous-current

dynamo. The narrow, wedge-shaped sectors of hard- mutator." drawn copper, with their insulating strips of thin

mica, are built up into a cylinder, tightly clamped together, and turned in the lathe; at each end a V-shaped groove is turned, and into these are fitted rings of micanite of corresponding section (fig. 19); the whole is then slipped over a cast iron sleeve, and at either end strong rings are forced into the V-shaped grooves under great pressure and fixed by a number of closely-pitched tightening bolts. In dynamos driven by steam-turbines in which the peripheral speed of the com- mutator is very high, rings of steel are frequently shrunk on the surface of the commutator at either end and at its centre. But in every case the copper must be entirely insulated from the supporting body of metal by the interposition of mica or micanite and the prevention of any movement of the sectors under

Fig. 25.

frequent and long-continued heating and cooling calls for the greatest care in both the design and the manufacture.

On passing to the second fundamental part of the dynamo, namely, the field-magnet, its functions may be briefly recalled as follows: — It has to supply the magnetic flux; to pro- vide for it an iron path as nearly closed as possible ^°r™ s ol

.1 , r , ■ , • , field-

upon the armature, save for the air-gaps which must magne t. exist between the pole-system and the armature core, the one stationary and the other rotating; and, lastly, it has to give the lines such direction and intensity within the air-gaps that they may be cut by the armature wires to the best advan- tage. Roughly corresponding to the three functions above summarized are the three portions which

are more or less differen- tiated in the complete structure. These are: (1) the magnet " cores " or " limbs," carrying the exciting coils whereby the inert iron is converted into an electro-magnet; (2) the yoke, which joins the limbs together and conducts the flux between them; and (3) the pole-pieces, which face the armature and transmit the lines from the limbs through the air-gap to the armature core, or vice versa.

Of the countless shapes which the field magnet may take, it may be said, without much exaggeration, that almost all have been tried ; yet those which have proved economical and successful, and hence have met with general adoption, may be classed under a compara tively small number of types. For bipolar machines the single horse-shoe (fig. 25), which is the lineal successor of the permanent magnet employed in the first magneto-electric machines, was formerly very largely used. It takes two principal forms, according as the pole-pieces and armature are above or beneath the magnet limbs and yoke. The " over-type " form is best suited to small belt-driven dynamos, while the " under-type " is admirably adapted to be directly driven by the steam-engine, the arma- ture shaft being immediately coupled to the crank-shaft of the engine. In the latter case the magnet must be mounted on non-magnetic supports of gun-metal or zinc, so as to hold it at some distance away from the iron bedplate which carries both engine and dynamo ; otherwise a large proportion of the flux which passes through the magnet limbs would leak through the bedplate across from pole to pole without passing through the armature core, and so would not be cut by the armature wires.

Next may be placed the " Manchester " field (fig. 26) — the type of a divided magnetic circuit in which the flux forming one field or pole is divided between two magnets. An exciting coil is placed on each half of the double horse-shoe magnet, the pair being so wound that consequent poles are formed above and below the armature. Each magnet thus carries one-half of the total flux, the lines of the two halves uniting to form a common field where they issue forth into or leave the air-gaps. The pole-pieces may be lighter than in the single horse-shoe type, and the field is much more symmetrical, whence it is well suited to ring armatures of large diameter. Yet these advantages ,— are greatly discounted by the excessive I magnetic leakage, and by the increased ˆ- weight of copper in the exciting coils. Even if the greater percentage which the leakage lines bear to the useful flux is neglected, and the cross sectional area of each magnet core is but half that of the equivalent single horse-shoe, the weight of wire in the double magnet for the same rise of temperature in the coils must be

some 40 % more than in the single horse-shoe, and the rate at which energy is expended in heating the coils will exceed that of the single horse-shoe in the same proportion.

Thirdly comes the two-pole ironclad type, so called from the exciting coil being more or less encased by the iron yoke ; this latter is divided into two halves, which pass on either side of the armature. Unless the yoke be kept well away from the polar edges and armature, the leakage across the air into the yoke becomes considerable, especially if only one exciting coil is used, as in fig. 27 A ; it is better, therefore, to divide the excitation between two coils, as in fig. 27 B, when the field also becomes symmetrical.

From this form is easily derived the multipolar type of fig. 28 or fig. 29, which is by far the most usual for any number of poles from four upwards; its leakage coefficient is but small, and it is economical in weight both of iron and copper.

As regards the materials of which magnets are made, generally speaking there is little difference in the permeability of ” wrought iron” or “mild steel forgings ” and good “cast steel”; typical

Fig. 27.

(B,H) curves connecting the magnetizing force required with different flux-densities for these materialsare given under Elect romagnetism. On the other hand there is a marked inferiority in the ma eras case Q £ ” cas t ; ron) ” which for a flux-density of B = o magne s. g 000 qqs. lines per sq. cm. requires practically the same number of ampere-turns per centimetre length as steel requires for B = 16,000. Whatever the material, if the flux-density be pressed to a high value the ampere-turns are very largely increased owing to its approaching saturation, and this implies either a large amount of copper in the field ceils or an undue expenditure of electrical energy in their excitation. Hence there is a limit imposed by practical considerations to the density at which the magnet should be worked, and this limit may be placed at about B = 16,000 for wrought iron or steel, and at half this value for cast iron. For a given flux, therefore, the cast iron magnet must have twice the sectional area and be twice as heavy, although this disadvantage

is partly’ compensated by its greater cheap- ness. If, however, cast

iron be used for the portion of the magnetic circuit which is covered with the exciting coils, the further disadvan- tage must be added that the weight of cop- per on the field-magnet is much increased, so that it is usual to em- ploy forgings or cast steel for the magnet cores on which the coils are wound. If weight is not a disadvantage, a cast iron yoke may be combined with the wrought iron or cast steel magnet cores. An absence of joints in the magnetic circuit is only desirable from the point of view of economy of expense in machining the component parts during manufacture; when the surfaces which abut against each other are drawn firmly together by screws, the want of homogeneity at the joint, which virtually amounts to the presence of a very thin film of air, produces little or no effect on the total reluctance by comparison with the very much longer air-gaps surrounding the armature. In order to re- duce the eddy-currents in the pole-pieces, due to the use of toothed armatures with relatively wide slots, the poles themselves must be laminated, or must have fixed to them laminated pole-shoes, built up of thin strips of mild steel riveted together (as shown in fig. 29). However it be built up, the mechanical strength of the magnet system must be carefully considered. Any two surfaces between which there exists a field of density B„ experience a force tending to draw them together proportional to the square of the density, and having a value of B„ 2 /(I- 735 X 10 6) lb per sq. in. of surface, over which the density may be regarded as having the uniform value B„. Hence, quite apart from the torque with which the stationary part of the dynamo tends to turn with the rotating part as soon as current is taken out of the armature, there exists a force tending to make the pole-pieces close on the armature as soon as the field is excited. Since both arma- ture and magnet must be capable of resisting this force, they require to be rigidly held ; although the one or the other must be capable of rotation, there should otherwise be no possibility of one part of the magnetic circuit shifting relatively to any other part. An important con- clusion may be drawn from this cir- cumstance. If the armature be placed exactly concentric within the bore of the poles, and the two or more magnetic fields be symmetrical about a line joining their centres, there is no tendency for the armature core to be drawn in one direction more than in another; but if there is any difference between the densities of the several fields, it will cause an unbalanced stress on the armature and its shaft, under which it will bend, and as this bending is continually reversed relatively to the fibres of the shaft, they will eventually become weakened and give way. Especi- ally is this likely to take place in dynamos with short air-gaps, wherein any difference in the lengths of the air-gaps produces a much greater percentage difference in the flux-density

than in dynamos with long air-gaps. In toothed armatures with short air-gaps the shaft must on this account be sufficiently strong to withstand the stress without appreciable bending.

Reference has already been made to the importance in dynamo design of the predetermination of the flux due to a given number of ampere-turns wound on the field-magnet, or, con- versely, of the number of ampere-turns which must be furnished by the exciting coils in order that a certain flux corresponding to one field may flow through the armature core from each pole. An equally important problem

Fig. 28.

The

magnetic

circuit.

is the correct proportioning of the field-magnet, so that the useful flux Z„ may be obtained with the greatest economy in materials and exciting energy. The key to the two problems is to be found in the concept of a magnetic circuit as originated by H. A. Rowland and R. H. M. Bosanquet; 1 and the full solution of both may be especially connected with the name of Dr J. Hopkinson, from his practical application of the concept in his design of the Edison-Hopkinson machine, and in his paper on " Dynamo-Electric Machinery." 2 The publication of this paper in 1886 begins the second era in the history of the dynamo; it at once raised its design from the level of empirical rules-of- thumb to a science, and is thus worthy to be ranked as the necessary supplement of the original discoveries of Faraday. The process of predetermining the necessary ampere-turns is described in a simple case under Electromagnetish. In its extension to the complete dynamo, it consists merely in the division of the magnetic circuit into such portions as have the same sectional area and permeability and carry approximately the same total flux; the difference of magnetic potential that must exist between the ends of each section of the magnet in order that the flux may pass through it is then calculated seriatim for the several portions into which the magnetic circuit is divided, and the separate items are summed up into one

Fig. 29.

magnetomotive force that must be furnished by the exciting coils.

The chief sections of the magnetic circuit are (1) the air-gaps, (2) the armature core, and (3) the iron magnet.

The air-gap of a dynamo with smooth-core armature is partly filled with copper and partly with the cotton, mica, or other materials used to insulate the core and wires; all these substances are, how- ever, sensibly non-magnetic, so that the whole interferric gap between the iron of the pole-pieces and the iron of the armature may be treated as an air-space, of which the permeability is constant for all values of the flux density, and in the C.G.S. system is unity. Hence if /„ and A„ be the length and area of the single air-gap in cm. and sq. cm., the reluctance of the double air-gap is 2/ ? /A„, and the difference of magnetic potential required to pass Z a lines over this reluctance is Zo.2/„/A B = B„.2/ ; or, since one ampere-turn gives 1-257 C.G.S. units of magnetomotive force, the exciting power in ampere-turns required over the two air-gaps is X„ = B„.2/„/l-257 = o-8 B„.2/„. In the determination of the area A, a small allowance must be made for the fringe of lines which extend beyond the actual polar face. In the toothed armature with open slots, the lines are no longer uniformly distributed over the air-gap area, but are graduated into alternate bands of dense and weak induction corre- sponding to the teeth and slots. Further, the lines curve round into the sides of the teeth, so that their average length of path in the air and the air-gap reluctance is not so easily calculated. Allowance must be made for this by taking an increased length of air-gap = ml„, where m is the ratio maximum density/mean density, of which the value is chiefly determined by the ratios of the width of tooth to width of slot and of the width of slot to the air-gap between pole-face and surface of the armature core.

1 And extended by G. Kapp, " On Modern Continuous-Current Dynamo-Electric Machines, Proc, Inst. C.E. vol. lxxxiii. p. 136.

2 Drs J. and E. Hopkinson, " Dynamo-Electric Machinery, Phil. Trans., May 6, 1886; this was further expanded in a second paper on " Dynamo-Electric Machinery," Proc. Roy. Soc, Feb. 15, 1892, and both are reprinted in Original Papers on Dynamo- Machinery and Allied Subjects.

The armature core must be divided into the teeth and the core proper below the teeth. Owing to the tapering section of the teeth, the

density rises towards their root, and when this reaches a high value, such as 18,000 or more lines per sq. cm., the saturation of the iron again forces an increasing proportion of the lines outwards into the slot. A distinction must then be drawn between the " apparent " induction which would hold if all the lines were con- centrated in the teeth, and the " real " induction. The area of the iron is obtained by multiplying the number of teeth under the pole- face by their width and by the net length of the iron core parallel to the axis of rotation. The latter is the gross length of the armature less the space lost through the insulating varnish or paper between the disks or through the presence of ventilating ducts, which are introduced at intervals along the length of the core. The former deduction averages about 7 to 10 % of the gross length, while the latter, especially in large multipolar machines, is an even more important item. After calculating the density at different sections of the teeth, reference has now to be made to a (B,H) or flux-density curve, from which may be found the number of ampere-turns required per cm. length of path. This number may be expressed as a function of the density in the teeth, and if/ (B ( ) be its average value over the length of a tooth, the ampere-turns of excitation required over the teeth on either side of the core as the lines of one field enter or leave the armature is Xt=/(B ( ).2/i, where /< is the length of a single tooth in cm.

In the core proper below the teeth the length of path continually shortens as we pass from the middle of the pole towards the centre line of symmetry. On the other hand, as the lines gradually accumu- late in the core, their density increases from zero midway under the poles until it reaches a maximum on the line of symmetry. The two effects partially counteract one another, and tend to equalize the difference of magnetic potential required over the paths of varying lengths; but since the reluctivity of the iron increases more rapidly than the density of the lines, we may approximately take for the length of path (/„) the minimum peripheral distance between the edges of adjacent pole-faces, and then assume the maximum value of the density of the lines as holding throughout this entire path. In ring and drum machines the flux issuing from one pole divides into two halves in the armature core, so that the maximum density of lines in the armature is B a — Z a /2ab, where a = the radial depth of the disks in centimetres and b — the net length of iron core. The total exciting power required between the pole- pieces is therefore, at no load, X p = X„-|-X(-(-X , where X = ;(B,)./«; in order, however, to allow for the effect of the armature current, which increases with the load, a further term X& must be added.

In the continuous-current dynamo it may be, and usually is, necessary to move the brushes forward from the interpolar line of symmetry through a small angle in the direction of rotation, in order to avoid sparking between the brushes and the commutator (vide infra). When the dynamo is giving current, the wires on either side of the diameter of commutation form a current-sheet flowing along the surface of the armature from end to end, and whatever the actual end-connexions of the wires, the wires may be imagined to be joined together into a system of loops such that the two sides of each loop are carrying current in opposite directions. Thus a number of armature ampere-turns are formed, and their effect on the entire system of magnet and armature must be taken into account. So long as the diameter of commutation coincides with the line of symmetry, the armature may be regarded as a cylindrical electromagnet producing a flux of lines, as shown in fig. 30. The direction of the self-induced flux in the air-gaps is the same as that of the lines of the external field in one quadrant on one side of DC, but opposed to it in the other quadrant on the

same side of DC; hence in the resultant field due to the combined action of the field-magnet and armature ampere-turns, the flux is as much strengthened over the one half of each polar face as it is weakened over the other, and the total number of lines is unaffected, although their distribution is altered. The armature ampere- turns are then called cross-turns, since they produce a cross-field, which, when combined with the sym- metrical field, causes the leading pole-corners 11 to be weakened and the trailing pole-corners tt to be strengthened, the neutral line of zero field being thus twisted forwards in the direction of rotation. But when the brushes and diameter of commutation are shifted forward, as shown in fig. 31, it will be seen that a number of ampere-turns, forming a zone between the lines D« and mC, are in effect wound immediately on the magnetic circuit proper, and this belt of ampere-turns is in direct opposition to the ampere-turns of the field, as shown by the dotted and crossed wires on the pole-pieces. The armature ampere-turns are then divisible into the two bands, the back-turns, included within twice the angle of lead \, weakening the field, and the cross-turns, bounded by the lines Dm, nC, again producing distortion of the weakened sym-

metrical field. If, therefore, a certain flux is to be passed through the armature core in opposition to the demagnetizing turns, the difference of magnetic potential between the pole-faces must include not onlyXo.Xi, andX„, but also an itemX&, in order to balance the ” back ‘ ampere-turns of the armature. The amount by which the

brushes must be shifted forward increases with the armature current, and in corresponding proportion the back ampere-turns are also increased, their value being cr2X/36o°, where c = the current carried by each of the t active wires. Thus the term X& takes into account the effect of the armature reaction on the total flux; it varies as the armature current and angle of lead required to avoid sparking are increased ; and the reason for its introduction in the fourth place (X J , = X -|-X,DYNAMO

adopted, continuous-current machines may be divided into four well-defined classes.'

The simplest method, and that which was first used, is separate excitation from some other source of direct current, which may be either a primary or a secondary battery or another dynamo (fig 32). But since the armature yields a continuous current, it was early suggested (by J. Brett in 1848 and F. Sinsteden in 1851) that this current might be utilized to increase the flux ; combinations of permanent and electromagnets were therefore next employed, acting either on the main armature or on separate armatures, until

in 1867 Dr Werner von Siemens and Sir C. Wheatstone almost simultaneously discovered that the dynamo could be made self-exciting through the residual magnetism retained in the soft iron cores of the electromagnet. The foimer proposed to take the whole of the current round the magnet coils which were in series with the armature and external circuit, while the latter proposed to utilize only a portion derived by a shunt from the main cir- cuit; we thus arrive at the second and third classes, namely, series and shunt machines. The starting of the process of ex- citation in either case is the same; when the brushes are touching the commutator and the armature is rotated, the small amount of flux left in the magnet is cut by the wires, and a very small current begins to flow round the closed circuit; this increases the flux, which in turn further increases the E.M.F. and current, until, finally, the cumulative effect stops through the increasing saturation of the iron cores. Fig. 33, illustrating the series machine, shows the winding of the exciting coils to be composed of a few turns of thick wire. Since the current is undivided throughout the whole circuit, the resistance of both the armature and field-magnet winding must be low as compared with that of the external circuit, if the useful power available at the terminals of the machine is to form a large percentage of the total electrical power — in other words, if the efficiency is to be high. Fig. 34 shows the third method, in which the winding of the field-magnets is a shunt or fine-wire circuit of many turns applied to the

terminals of the machine; in this case the resistance of the shunt

Fig. 32.

s 1

3V~

(

)) N

« ,

- *t*

«

»

‘

*r**

s 1

<~k 1

)) N

Fig. 33.

Fig. 34.

must be high as compared with that of the external circuit, in order that only a small proportion of the total energy may be absorbed in the field.

Since the whole of the armature current passes round the field-magnet of the series machine, any alteration in the resistance of the external circuit will affect the excitation and also the voltage. A curve connecting together corresponding values of external current and terminal voltage for a given speed of rotation is known as the external-characteristic of the machine; in its main features it has the same appearance as a curve of magnetic flux, but when the current exceeds a certain amount it begins to bend downwards and the voltage decreases. The reason for this will be found in the armature reaction at large loads, which gradually produces a more and more powerful demagnetizing effect, as the brushes are shifted forwards to avoid sparking; eventually the back ampere- turns overpower any addition to the field that would otherwise be due to the increased current flowing round the magnet. The " external characteristic " for a shunt machine has an entirely different shape. The field-magnet circuit being connected in parallel with the external circuit, the exciting current, if the applied voltage remains the same, is in no way affected by alterations in the resistance of the latter. As, however, an increase in the external current causes a greater loss of volts in the armature and a greater armature reaction, the terminal voltage, which is also the exciting voltage, is highest at no load and then diminishes. The fall is at first gradual, but after a certain critical value of the armature current is reached, the machine is rapidly demagnetized and loses its voltage entirely.

Fig. 35.

Com- mutation and

sparking at the brushes.

The last method of excitation, namely, compound-winding (fig; 35), is a combination of the two preceding, and was first used by S. A.

Varley and by C. F. Brush. If a machine is in the first instance shunt-wound, and a certain number of series-turns areadded, the latter, since they carry the external current, can be made to counteract the effect which the increased external current would have in lowering the voltage of the simple shunt machine. The ampere-turns of the series winding must be such that they not only balance the increase of the demag- netizing back ampere-turns on the armature, but further increase the useful flux, and compensate for the loss of volts over their own resistance and that of the armature. The machine will then give for a constant speed a nearly constant voltage at its ter-minals, and the curve of the external characteristic becomes a straight line for all loads within its capacity. Since with most prime movers an increase of the load is accompanied by a drop in speed, this effect may also be counteracted ; while, lastly, if the series-turns are still further increased, the voltage may be made to rise with an increasing load, and the machine is " over-compounded."

At the initial moment when an armature coil is first short- circuited by the passage of the two sectors forming its ends under the contact surface of a brush, a certain amount of electromagnetic energy is stored up in its magnetic field as linked with the ampere-turns of the coil when carrying its full share of the total armature current. During the period of short-circuit this quantity of energy has to be dissipated as the current falls to zero, and has again to be re-stored as the current is reversed and raised to the same value, but in the opposite direction. The period of short-circuit as fixed by the widths of the brush and of the mica insulation between the sectors, and by the peripheral speed of the commutator is extremely brief, and only lasts on an average from -ij-J-jj-th to rffWth of a second. The problem of sparkless commutation is therefore primarily a question of our ability to dissipate and to re-store the required amount of energy with sufficient rapidity.

An important aid towards the solution of this problem is found in the effect of the varying contact -resistance between the brush and the surfaces of the leading and trailing sectors which it covers. As the commutator moves under the brush, the area of contact which the brush makes with the leading sector diminishes, and the resistance between the two rises; conversely, the area of contact between the brush and the trailing sector increases and the resistance falls. This action tends automatically to bring the current through each sector into strict proportionality to the amount of its surface which is covered by the brush, and so to keep the Current-density arid the loss of volts over the contacts uniform and constant. As soon as the current-density in the two portions of the brush becomes unequal, a

greater amount of heat is developed at the commutator surface, and this in the first place affords an addi- tional outlet for the dissipation of the stored energy of the coil, while after reversal of the current it is the accompaniment of a re-storage of the required energy. This energy, as well as that which is spent in heating the coil, can in fact, in default of other sources, be derived through the action of the unequal current-density from the electrical output of the rest of the armature winding, and so only indirectly from the prime mover.

In practice, when the normal contact-resistance of the brushes is low relatively to the resistance of the coil, as is the case with metal brushes of copper or brass gauze, but little benefit can be obtained from the action of the varying contact-resistance. It exerts no appreciable effect until close towards the end of the period of short-circuit, and then only with such a high-current- density at the trailing edge of the leaving sector that at the moment of parting the brush-tip is fused, or its metal volatilized, and sparking has in fact set in. With such brushes, then, it becomes necessary to call in the aid of a reversing E.M.F. impressed upon the coil by the magnetic field through which it is moving. If such a reversing field comes into action while

the current is still unreversed, its E.M.F. is opposed to the direction of the current, and the coil is therefore driving the armature forward as in a motor; it thus affords a ready means of rapidly dissipating part of the initial energy in the form of mechanical work instead cf as heat. After the current has been reversed, the converse process sets in, and the prime mover directly expends mechanical energy not only in heating the coil, but also in storing up electromagnetic energy with a rapidity dependent upon the strength of the reversing field. The required direction of external field can be obtained in the dynamo by shifting the brushes forward, so that the short- circuited coil enters into the fringe of lines issuing from the leading pole-tip, i.e. by giving the brushes an " angle of lead." An objection to this process is that the main flux is thereby weakened owing to the belt of back ampere-turns which arises (v. supra). A still greater objection is that the amount of the angle of lead must be suited to the value of the load, the correc- tive power of copper brushes being very small if the reversing E.M.F. is not closely adjusted in proportion to the armature current.

On this account metal brushes have been almost entirely superseded by carbon moulded into hard blocks. With these, owing to their higher specific contact-resistance, a very con- siderable reversing effect can be obtained through the action of unequal current-density, and indeed in favourable cases complete sparklessness can be obtained throughout the entire range of load of the machine with a fixed position of the brushes. Yet if the work which they are called upon to perform exceeds certain limits, they tend to become overheated with consequent glowing or sparking at their tips, so that, wherever possible, it is advisable to reinforce their action by a certain amount of reversing field, the brushes being set so that its strength is roughly correct for, say, half load.

In the case of dynamos driven by steam-turbines, sparkless commutation is especially difficult to obtain owing to the high speed of rotation and the very short space of time in which the current has to be reversed. Special " reversing poles " then become necessary; these are wound with magnetizing coils in series with the main armature current, so that the strength of field which they yield is roughly proportional to the current which has to be reversed. These again may be combined with a " compensating winding " embedded in the pole-faces and carrying current in the opposite direction to the armature ampere-turns, so as to neutralize the cross effect of the latter and prevent distortion of the resultant field.

From the moment that a dynamo begins to run with excited field, heat is continuously generated by the passage of the current Heating through the windings of the field-magnet coils and the effects armature, as well as by the action of hysteresis and

eddy currents in the armature and pole-pieces. Whether the source of the heat be in the field-magnet or in the armature, the mass in which it originates will continue to rise in temperature until such a difference of temperature is established between itself and the surrounding air that the rate at which the heat is carried off by radiation, convection and conduction is equal to the rate at which it is being generated. Evidently, then, the temperature which any part of the machine attains after a prolonged run must depend on the extent and effectiveness of the cooling surface from which radiation takes place, upon the presence or absence of any currents of air set up by the rotation of itself or surrounding parts, and upon the presence of neighbouring masses of metal to carry away the heat by conduction. In the field-magnet coils the rate at which heat is being generated is easily determined, since it is equal to the square of the current passing through them multiplied by their resistance. Further,

the magnet is usually stationary,, and only indirectly affected by draughts of air due to the rotating arma- ture. Hence for machines of a given type and of similar proportions, it is not difficult to decide upon some method of reckoning the cool- ing surface of the magnet coils Sc, such that the rise of temperature above that of the surrounding air may be predicted from an equation of the form t° =&W/St, where W = the rate in watts at which heat is generated in the coils, and k is some constant depending upon the exact method of reckoning their cooling surface. As a general rule the cooling surface of a field-coil is reckoned as equal to the exposed outer surface of its wire, the influence of the end flanges being neglected, or only taken into account in the case of very short bobbins wound with a considerable depth of wire. In the case of the rotating armature a similar formula must be constructed, but

with the addition of a factor to allow for the increase in the effective- ness of any given cooling surface due to the rotation causing con- vection currents in the surrounding air. Only experiment can determine the exact effect of this, and even with a given type of armature it is dependent on the number of poles, each of which helps to break up the air-currents, and so to dissipate the heat. For example, in two-pole machines with drum bar-armatures, if the cool- ing surface be reckoned as equal to the cylindrical exterior plus the area of the two ends, the heating coefficient for a peripheral speed of 1500 ft. per minute is less than half of that for the same armature when at rest. A further difficulty still meets the designer in the correct predetermination of the total loss of watts in an armature before the machine has been tested. It is made up of three separate items, namely, the copper loss in the armature winding, the loss by hysteresis in the iron, and the loss by eddy currents, which again may be divided into those in the armature bars and end- connexions, and those in the core and its end-plates. The two latter items are both dependent upon the speed of the machine; but whereas the hysteresis loss is proportional to the speed for a given density of flux in the armature, the eddy current loss is proportional to the square of the speed, and owing to this differ- ence, the one loss can be separated from the other by testing am armature at varying speeds. Thus for a given rise of temperature, the question of the amount of current which can be taken out of an armature at different speeds depends upon the proportion which the hysteresis and eddy watts bear to the copper loss, and the ratio in which the effectiveness of the cooling surface is altered by the alteration in speed. Experimental data, again, can alone decide upon the amount of eddy currents that may be expected in given armatures, and caution is required in applying

the results of one machine to another in which any of the conditions, such as the number of poles, density in the teeth, proportions of slot depth to width, &c, are radically altered.

It remains to add, that the rise of temperature which may be permitted in any part of a dynamo after a prolonged run is very generally placed at about 70° Fahr. above the surrounding air. Such a limit in ordinary conditions of working leads to a final temperature of about 170 Fahr., beyond which the durability of the insulation of the wires is liable to be injuriously affected. Upon some such basis the output of a dynamo in continuous working is rated, although for short periods of, say, two hours the normal full- load current of a large machine may be exceeded by some 25 % without unduly heating the armature.

For the electro-deposition of metals or the electrolytic treat- ment of ores a continuous current is a necessity; but, apart from such use, the purposes from which the continuous- v of current dynamo is well adapted are so numerous that con- they cover nearly the whole field of electrical engineer- tinuous- ing, with one important exception. To meet these cttrreni various uses, the pressures for which the machine is y" amos – designed are of equally wide range; for the transmission of power over long distances they may be as high as 3000 volts, and for electrolytic work as low as five. Each electrolytic bath, with its leads, requires on an average only some four or five volts, so that even when several are worked in series the voltage of the dynamo seldom exceeds 60. On the other hand, the current is large and may amount to as much as from 1000 to 14,000 amperes, necessitating the use of two commutators, one at either end of the armature, in order to collect the current without excessive heating of the sectors and brushes. The field-magnets are in- variably shunt-wound, in order to avoid reversal of the current through polarization at the electrodes of the bath. For in- candescent lighting by glow lamps, the requirements of small isolated installations and of central stations for the distribution of electrical energy over large areas must be distinguished. For the lighting of a private house or small factory, the dynamo giving from 5 to 100 kilo-watts of output is commonly wound for a voltage of 100, and is driven by pulley and belt from a gas, oil or steam-engine; or, if approaching the higher limit above mentioned, it is often directly coupled to the crank-shaft of the steam-engine. If used in conjunction with an accumulator of secondary cells, it is shunt-wound, and must give the higher voltage necessary to charge the battery; otherwise it is com- pound-wound, in order to maintain the pressure on the lamps constant under all loads within its capacity. The compound- wound dynamo is likewise the

most usual for the lighting of steamships, and is then directly coupled to its steam-engine; its output seldom exceeds 100 kilo- watts, at a voltage of 100 or no. For larger installations a voltage of 250 is commonly used, while for central-station work, economy in the distributing

mains dictates a higher voltage, especially in connexion with a three-wire system; the larger dynamos may then give 500 volts, and be connected directly across the two outer wires. A pair of smaller machines coupled together, and each capable of giving 250 volts, are often placed in series across the system, with their common junction connected to the middle wire; the one which at any time is on the side carrying the smaller current will act as a motor and drive the other as a dynamo, so as to balance the system. The directly-coupled steam dynamo may be said to have practically displaced the belt- or rope-driven sets which were formerly common in central stations. The generating units of the central station are arranged in progressive sizes, rising from, it may be, 250 or 500 horse-power up to 750 or 1000, or in large towns to as much as 5000 horse-power. If for lighting only, they are usually shunt-wound, the regulation of the voltage, to keep the pressure constant on the distributing system under the gradual changes of load, being effected by variable resistances in the shunt circuit of the field-magnets.

Generators used for supplying current to electric tramways are commonly wound for 500 volts at no load and are over-compounded, so that the voltage rises to 550 volts at the maxi- mum load, and thus compensates for the loss of volts over the transmitting lines. For arc lighting it was formerly usual to employ a class of dynamo which, from the nature of its con- struction, was called an "open-coil" machine, and which gave a unidirectional but pulsating current. Of such machines the Brush and Thomson-Houston types were very widely used; their E.M.F. ranged from 2000 to 3000 volts for working a large number of arcs in series, and by means of special regulators their current was maintained constant over a wide range of voltage. But as their efficiency was low and they could not be applied to any other purpose, they have been largely superseded in central stations by closed-coil dynamos or alternators, which can also be used for incandescent lighting. In cases where the central station is situated at some distance from the district to which the electric energy is to be supplied, voltages from 1000 to 2000 are

employed, and these are transformed down at certain distributing centres by continuous-current transformers (see Transformers and Electricity Supply). These latter machines are in reality motor-driven dynamos, and hence are also called motor-generators; the armatures of the motor and dynamo are often wound on the same core, with a commutator at either end, the one to receive the high-pressure motor current, and the other to collect the low-pressure current furnished by the dynamo.

In all large central stations it is necessary that the dynamos should be capable of being run in parallel, so that their outputs may be combined on the same " omnibus bars " and thence dis- tributed to the network of feeders. With simple shunt-wound machines this is easily effected by coupling together terminals of like sign when the voltage of the two or more machines are closely equal. With compound-wound dynamos not only must the external terminals of like sign be coupled together, but the junctions of the brush leads with the series winding must be connected by an " equalizing " lead of low resistance; otherwise, should the E.M.F. of one machine for any reason fall below the voltage of the omnibus bars, there is a danger of its polarity being reversed by a back current from the others with which it is in parallel.

Owing to the necessary presence in the continuous-current dynamo of the commutator, with its attendant liability to sparking at the brushes, and further, owing to the difficulty of insulating the rotating armature wires, a pressure of 3000 volts has seldom been exceeded in any one continuous-current machine, and has been given above as the limiting voltage of the class, if therefore it is required to work with higher pressures in order to secure economy in the trans- mitting lines, two or more machines must be coupled in series by connecting together terminals which are of unlike sign. 1 The stress of the total voltage may still fall on the insulation of the winding

1 Between Moutiers and Lyons, a distance of 115 m., energy is transmitted on the Thury direct-current system at a maximum pressure of 60,000 volts. Four groups of machines in series are employed, each group consisting of four machines in series; the rated output of each component machine is 75 amperes at 3900 volts or 400 h.p. A water turbine drives two pairs of such machines through an insulating coupling, and the sub-base of each pair of machines is separately insulated from earth, the foundation being also of special insulating materials.

from the body of the machine ; hence for high- voltage transmission

of power over very long distances, the continuous-current dynamo in certain points yields in convenience to the alternator. In this there is no commutator, the armature coils may be stationary and can be more thoroughly insulated, while further, if it be thought undesirable to design the machine for the full transmitting voltage, it is easy to wind the armature for a low pressure; this can be subsequently transformed up to a high pressure by means of the alternating-current transformer, which has stationary windings and so high an efficiency that but little loss arises from its use. With these remarks, the transition may be made to the fulle- discussion of the alternator.

Alternators.

The frequency employed in alternating-current systems for

distributing power and light varies between such wide limits

as 25 and 133; yet in recent times the tendency „

*lu i j i j j r • * Frequency.*

has been towards standard frequencies of 25, 50

and 100 as a maximum. High frequencies involve more copper in the magnet coils, owing to the greater number of poles, and a greater loss of power in their excitation, but the alternator as a whole is somewhat lighter, and the transformers are cheaper. On the other hand, high frequency may cause prejudicial effects, due to the inductance and capacity of the distributing lines; and in asynchronous motors used on polyphase systems the increased number of poles necessary to obtain reasonable speeds reduces their efficiency, and is otherwise disadvantageous, especially for small horse-powers. A frequency lower than 40 is, however, not permissible where arc lighting is to form any con- siderable portion of the work and is to be effected by the alter- nating current without rectification, since below this value the eye can detect the periodic alteration in the light as the carbons alternately cool and become heated. Thus for combined lighting and power 50 or 60 are the most usual frequencies; but if the system is designed solely or chiefly for the distribution of power, a still lower frequency is preferable. On this account 25 was selected by the engineers for the Niagara Falls power trans- mission, after careful consideration of the problem, and this frequency has since been widely adopted in similar cases.

The most usual type of heteropolar alternator has an internal rotating field-magnet system, and an external stationary arma- ture,

as in fig. 10. The coils of the armature, which /iaer . must for high voltages be heavily insulated, are then nator not subjected to the additional stresses due to centri- eon- fugal force; and further, the collecting rings which atruction ‘ must be attached to the rotating portion need only transmit the exciting current at a low voltage.

The homopolar machine possesses the advantages that only a single exciting coil is required, whatever the number of polar projections, and that both the armature and field-magnet coils may be stationary. From fig. 8 it will be seen that it is not

essential that the ex-

citing coil should revolve with the in- ternal magnet, but it may be supported from the external stationary armature while still embracing the central part of the rotor. The E.M.F. is set up in the armature coils through the periodic variation of _

*the flux through them *ig. 36.*

as the iron projections sweep past, and these latter may be likened to a number of ” keepers,” which complete the magnetic circuit. From the action of the rotating iron masses they may also be considered as the inducing elements or ” inductors,” and the homopolar machine is thence also known as the ” inductor alternator.” If the end of the rotor marked S in fig. 8 is split up into a number of S polar projections similar to the N poles, a second set of armature coils may be arranged opposite to them, and we obtain an inductor

alternator with double armature. Or the polar projections at the two ends may be staggered, and a single armature winding be passed straight through the armature, as in fig. 36, which shows at the side the appearance of the revolving inductor with its crown of polar projections in one ring opposite to the gaps

may be subjected, its own weight tends to deform it. The segmental core-disks are usually secured to the internal circum- ference of a circular cast iron frame; the latter has a box section of considerable radial depth to give stiffness to it, and the disks are tightly clamped between internal flanges, one being a fixed

Fig. 37.

between the polar projections of the other ring. But in spite of its advantage of the single stationary exciting coil, the in- ductor alternator has such a high degree of leakage, and the effect of armature reaction is so detrimental in it, that the type has been gradually abandoned, and a return has been almost univer- sally made to the heteropolar alternator with internal poles radiating outwards from a circular yoke-ring. The construction of a typical machine of this class is illustrated in fig. 37.

Since the field-magnet coils rotate, they must be carefully designed to withstand centrifugal force, and are best composed of flat copper strip wound on edge with thin insulation between adjacent layers. The coil is secured by the edges of the pole- shoes which overhang the pole and tightly compress the coil against the yoke-ring; the only effect from centrifugal force is then to compress still further the flat turns of copper against the pole-shoes without deformation. The poles are either of cast steel of circular or oblong section, bolted to the rim of the yoke-ring, or are built up of thin laminations of sheet steel. When the peripheral speed is very high, the yoke-ring will be of cast steel or may itself be built up of sheet steel laminations, this material being reliable and easily tested to ensure its sound mechanical strength. If the armature slots are open, the pole- pieces will in any case be laminated to reduce the eddy currents set up by the variation of the flux-density.

Owing to the great number of poles ‘ of the alternator when driven by a reciprocating steam-engine, the diameter of its rotor is usually larger and its length less than in the continuous- current dynamo of corresponding output. The support of the armature core when of large diameter is therefore a more difficult problem, since, apart from any magnetic strains to which it

1 For experiments on high-frequency currents, Nikola Tesla con- structed an alternator having 384 poles and giving a frequency of about 10,000 {Journ. Inst. Elec. Eng. 1892, 21, p. 82). The opposite extreme is found in alternators directly coupled to the Parsons steam- turbine, in which, with a speed of 3000 revs, per min., only two poles are required to give a frequency of 50. By a combination of a Parsons steam-turbine running at 12,000 revs, per min. with an alternator of 140 poles a frequency of 14,000 has been obtained (Engineering, 25th of August 1899). For description of an experi- mental machine for 10,000 cycles per second when running at 3000 revs, per min., see Trans. Amer. Inst. Elect. Eng. vol. xxiii. p. 417.

part of the frame and the other loose, with transverse bolts passing

right through from side to side (fig. 37). In order to lessen the weight of the structure and its expense in material, the cast iron frame has in some cases been entirely dispensed with, and braced tie-rods have been used to render the effective iron of the armature core-disks self-supporting.

Owing to the high speed of the turbo-alternator, its rotor calls for the utmost care in its design to withstand the effect of centrifugal force with- out any shifting of the exciting coils, and to secure a perfect balance.

The appearance of the armature of a typical three – phase alternator is illustrated in fig. 38, which shows a portion of the lower half after removal of the field-magnet.

With open slots the coils, after being wound on formers to the re- quired shape, are thoroughly impreg- nated with insulating compound, dried, and after a further wrapping with several layers of insulating material, finally pressed into the slots together with a sheet of leatheroid or flexible micanite. The end-connexions of each group of coils of one phase project straight out from the slots or are bent upwards alternately with those of the other phases, so that they may clear one another (fig. 37). A wooden wedge driven into a groove at the top of each slot is often used to lock the coil in place. With slots nearly closed at the top, the coils are formed by hand by threading the wire

Fig. 38.

through tubes of micanite or specially prepared paper lining the slots: or with single-turn loops, stout bars of copper of |J -shape can be driven through the slots and closed by soldered connexions at the other end.

The first experimental determination of the shape of the E.M.F. curve of an alternator was made by J. Joubert in 1880. A revolving contact-maker charged a condenser with the E.M.F. b Z?g produced by the armature at a particular instant during E each period. The condenser was discharged through a

*eurre * ballistic galvanometer, and from the measured throw the*

instantaneous E.M.F. could be deduced. The contact-maker was then shifted through a small angle, and the instantaneous E.M.F. at the new position corresponding to a different moment in the period was measured; this process was repeated until the E.M.F. curve for a complete period could be traced. Various modifications of the same principle have since been used, and a form of " oscillo- graph " (q.v.) has been perfected which is well adapted for the purpose of tracing the curves both of E.M.F. and of current. The machine on which Joubert carried out his experiments was a Siemens disk alternator having no iron in its armature, and it was found that the curve of E.M.F. was practically identical with a sine curve. The same law has also been found to hold true for a smooth-core ring or drum armature, but the presence of the iron core enables the armature current to produce greater distorting effect, so that the curves under load may vary considerably from their shape at no load. In toothed armatures, the broken surface of the core, and the still greater reaction from the armature current, may produce wide variations from the sine law, the general tendency being to give the E.M.F. curve a more peaked form. The great convenience of the assumption that the E.M.F. obeys the sine law has led to its being very commonly used as the basis for the mathe- matical analysis of alternator problems; but any deductions made from this premiss require to be applied with caution if they are likely to be modified by a different shape of the curve. Further, the same alternator will give widely different curves even of E.M.F., and still more so of current, according to the nature of the external circuit to which it is connected. As will be explained later, the phase of the current relatively to the E.M.F. depends not only on the in- ductance of the alternator itself, but also upon the inductance and capacity of the external circuit, so that the same current will produce different effects according to the amount by which it lags or leads. The question as to the relative advantages of differently shaped E.M.F. curves has led to much discussion, but can only be answered by reference to the nature of the work that the alternator has to do — i.e. whether it be arc lighting, motor driving, or incandescent lighting through transformers. The shape of the E.M.F. curve is, however, of great importance in one respect, since upon it depends the ratio of the maximum instantaneous E.M.F. to the effective value, and the insulation of the entire circuit, both external and internal, must be capable of withstanding the maximum E.M.F. While the maximum value of the sine curve isV2 or 1-414 times the effective value, the maximum value of aAcurve is 1-732 times the effective value, so that for the same effective E.M.F. thearmature wires must not only be more heavily insulated than in the continuous- current dynamo, but

also the more peaked the curve the better must be the insulation. , .

*Since an alternating current cannot be used for exciting the field-magnet, recourse must be had to some source of a direct current. This is usually obtained from a small auxiliary Bxcita- continuous-current dynamo, called an exciter, which may * be an entirely separate machine, separately driven and*

used for exciting several alternators, or may be driven from the alternator itself; in the latter case the armature of the exciter is often coupled directly to the rotating shaft of the alternator, while its field-magnet is attached to the bed-plate. Although separate excitation is the more usual method, the alternator can also be made self-exciting if a part or the whole of the alternating current is " rectified," and thus converted into a direct current.

The general idea of the polyphase alternator giving two or more E.M.F.'s of the same frequency, but displaced in phase, has been already described. The several phases may be entirely independent, and such was the case with the early poly- phase machines of Gramme, who used four independent circuits, and also in the large two-phase alternators designed by J. E. H. Gordon in 1883. If the phases are thus entirely separate, each requires two collector rings and two wires to its external circuit, i.e. four in all for two-phase and six for three-phase machines. The only advantage of the polyphase machine as thus used is that the whole of the surface of the arma- ture core may be efficiently covered with winding, and the output of the alternator for a given size be thereby increased. It is, how- ever, also possible so to interlink the several circuits of the armature that the necessary number of transmitting lines to the external circuits may be reduced, and also the weight of copper in them for a given loss in the transmission. 1 The condition which obviously

1 As in the historical transmission of energy from Lauffen to Frankfort (1891).

Quarter' phase alter- nators.

must be fulfilled, for such interlinking of the phases to be possible, is that in the lines which are to meet at any common junction the algebraic sum of the instantaneous currents, reckoned as positive if away from such junction and as negative if towards it, must be zero. Thus if the phases be diagrammatically represented by the relative angular position of the coils in fig. 39, the current in the coils A and

B differs in phase from the current in the coils C and D by a quarter of a period or 90 ; hence if the two wires b and d be replaced by the single wire bd, this third wire will serve as a common path for the currents of the two phases either outwards or on their return. At any instant the value of the current in the third wire

;VWVAAA^AAAAA»-I

Fig. 39.

must be the vector sum of the two currents in the other wires, and if the shape of the curves of instantaneous E.M.F. and current are identical, and are assumed to be sinusoidal, the effective value of the current in the third wire will be the vector sum of the effective values of the currents in the other wires; in other words, if the system is balanced.the effective current in the third wire is V 2, or I -414 times the current in either of the two outer wires. Since the currents of the two phases do not reach their maximum values at the same time, the sectional area of the third wire need not be twice that of the others; in. order to secure maximum efficiency by employing the same current density in all three wires, it need only be 40 % greater than that of either of the outer wires. The effective voltage between the external leads may in the same way be calculated by a vector diagram, and with the above star connexion the voltage between the outer pair of wires a and c isV2, or 1-414 times the voltage between either of the outer wires and the common wire bd. Next, if the four coils are joined up into a continuous helix, just as in the winding of a continuous-current machine, four wires may be attached to equidistant points at the opposite ends of two diameters at right angles to each other (fig. 40). Such a method is known as the mesh connexion, and gives a perfectly sym- metrical four-phase system of distribution. Four collecting rings are necessary if the arma- ture rotates, and there is no saving in copper in the transmitting lines ; but the importance of the arrangement lien in its use in connexion with rotary converters, in which it is necessary that the winding of the armature should form a closed circuit. If e = the effective voltage of one phase A, the voltage between any pair of adjacent lines in the diagram is e, and between m and or » and p is e V2. The current in any line is the resultant of the currents in the two phases connected to it, and its effective value is c V2, where c is the current of one phase.

When we pass to machines giving three phases differing by 120 , the same methods of star and mesh connexion find their analogies. If the current in coil A (fig. 41) is flowing away from the centre, and has

its maximum value, the currents in coils B and C are flowing towards the centre, and are each of half the magnitude of the current in A; the algebraic sum of the currents is therefore zero, and this will also be the case for all other instants. Hence the three

Fig. 40.

Three- phase alter- nators.

‘ A

Fig. 41.

coils can be united together at the centre, and three external wires are alone required. In this star or “Y” connexion, if e be the effective voltage of each phase, or the voltage between any one of the three collecting rings and the common connexion, the volts between any pair of transmitting lines will be E = eV 3 (n g- 4 1); if the load be balanced, the effective current C in each of the three lines will be equal, and the total output in watts will be W = 3Ce = 3CE/V3 = 1-732 EC, or 1-732 times the product of the effective voltage between the lines and the current in any single line. Next, if the three coils are closed upon themselves in a mesh or delta fashion (fig. 42), the three transmitting wires may be connected to the junctions of the coils (by means of collecting rings if the armature rotates). The voltage E between any pair of wires is evidently

that generated by one phase, and the current in a line wire is the resultant of that in two adjacent phases; or in a balanced system, if c be the current in each phase, the current in the line wire beyond a collecting ring is C=cV3, hence the watts areW = 3cE = 3CE/V3 = 1-732 EC, as before. Thus any three-phase winding may be changed over from the star to the delta connexion, and will then give 1-732 times as much current, but only 1/1-732 times the voltage, so that the output remains the same.

The ” armature reaction ” of the alternator, when the term is used in its widest sense to cover all the effects of the alternating current in the armature as linked with a magnetic circuit or circuits, may be divided into three items which are different in their origin and

*consequences. In the first place the armature current produces a self-induced flux in local circuits independent of the main magnetic circuit, as e.g. linked with the ends of the coils as they project outwards from the armature core; such lines may be called "secondary leakage," of which the characteristic feature is that its amount is independent of the position of the coils relatively to the poles. The alternations of this flux give rise to an inductive voltage lagging A£ V 90 behind the phase of the current, and this leakage or reactance voltage must be directly counterbalanced electrically by an equal component x in the opposite sense in the voltage from the ** main field. The second and third elements are*

FlG. 42. more immediately magnetic and are entirely de- pendent upon the position of the coils in relation to the poles and in relation to the phase of the current which they then carry. When the side of a drum coil is immediately under the centre of a pole, its ampere-turns are cross-magnetizing, i.e. produce a distortion of the main flux, displacing its maximum density to one or other edge of the pole. When the coil-side is midway between the poles and the axes of coil and pole coincide, the coil stands exactly opposite to the pole and embraces the same magnetic circuit as the field- magnet coils; its turns are therefore directly magnetizing, either weakening or strengthening the main flux according to the direction of the current. In intermediate positions the ampere- turns of the coil gradually pass from cross to direct and vice versa. When the instantaneous values of either the cross or direct mag- netizing effect are integrated over a period and averaged, due account being taken of the number of slots per coil-side and of the different phases of the currents in the polyphase machine, expressions are obtained for the equivalent cross and direct ampere-turns of the armature as acting upon a pair of poles. For a given winding and current, the determining factor in either the one or the other is found to be the relative phase angle between the axis of a" coil in its position when carrying the maximum current and the centre (of a pole, the transverse reaction being proportional to the cosine of this angle, and the direct reaction to its sine. If the external circuit is inductive, the maximum value of the current lags behind the E.M.F. and so behind the centre of the pole; such a negative angle of lag causes the direct magnetizing turns to become back turns, directly weakening the main field and lowering the terminal voltage. Thus, just as in the continuous-current dynamo, for a given voltage under load the excitation between the pole-pieces X,, must not only supply the net excitation required over the air- gaps, armature core and teeth, but must also balance the back ampere-turns X& of the armature.

Evidently therefore the characteristic curve connecting armature current and terminal volts will with a constant exciting current depend on the nature of the load, whether inductive or non-inductive, and upon the amount of inductance already possessed by the arma- ture itself. With an inductive load it will fall more rapidly from its initial maximum value, or, conversely, if the initial voltage is to be maintained under an increasing load, the exciting current will have to be increased more than if the load were non-inductive. In practical working many disadvantages result from a rapid drop of the terminal E.M.F. under increasing load, so that between no load and full load the variation in terminal voltage with constant exci- tation should not exceed 15 %. Thus the output of an alternator is limited either by its heating or by its armature reaction, just as is the output of a continuous-current dynamo; in the case of the alternator, however, the limit set by armature reaction is not due to any sparking at the brushes, but to the drop in terminal voltage as the current is increased, and the consequent difficulty in main- taining a constant potential on the external circuit.

The joint operation of several alternators so that their outputs may be delivered into the same external circuit is sharply dis- The tinguished from the corresponding problem in continuous-

coupllnx current dynamos by the necessary condition that they of alter- must be in synchronism, i.e. not only must they be so oat or s. driven that their frequency is the same, but their E.M.F.'s must be in phase or, as it is also expressed, the machines must be in step. Although in practice it is impossible to run two alternators in series unless they are rigidly coupled together — which virtually reduces them to one machine — two or more machines can be run in parallel, as was first described by H. Wilde in 1868 and subsequently redemonstrated by J. Hopkinson and W. G. Adams in 1884. Their E.M.F.'s should be as nearly as possible in syn-

chronism, but, as contrasted with series connexion, parallel coupling gives them a certain power of recovery if they fall out of step, or are not in exact synchronism when thrown into parallel. In such circumstances a synchronizing current passes between the two machines, due to the difference in their instantaneous pressures; and as this current agrees in phase more nearly with the leading than with the lagging machine, the former machine does work as a generator on the latter as a motor. Hence the lagging machine is accelerated and the leading machine is retarded, until their frequencies and phase are again the same.

*The chief use of the alternator has already been alluded to. Since it can be employed to produce very high pressures either directly or through the medium of transformers, it is specially adapted to the electrical transmission of u * es oi energy over long distances. 1 In the early days of nators. electric lighting, the alternate-current system was adopted for a great number of central stations; the machines, designed to give a pressure of 2000 volts, supplied transformers which were situated at considerable distances and spread over large areas, without an undue amount of copper in the trans- mitting lines. While there was later a tendency to return to the continuous current for central stations, owing to the intro- duction of better means for economizing the weight of copper in the mains, the alternating current again came into favour, as rendering it possible to place the central station in some convenient site far away from the district which it was to serve. The pioneer central station in this direction was the Deptford station of the London Electric Supply Corporation, which fur- nished current to the heart of London from a distance of 7 m. In this case, however, the alternators were single-phase and gave the high pressure of 10,000 volts immediately, while more recently the tendency has been to employ step-up transformers and a polyphase system. The advantage of the latter is that the current, after reaching the distant sub-stations, can be dealt with by rotary converters, through which it is transformed into a continuous current. The alternator is also used for welding, smelting in electric furnaces, and other metallurgical processes where heating effects are alone required; the large currents needed therein can be produced without the disadvan- tage of the commutator, and, if necessary, transformers can be interposed to lower the voltage and still further increase the current. The alternating system can thus meet very various needs, and its great recommendation may be said to lie in the flexibility with which it can supply electrical energy through transformers at any potential, or through rotary converters in continuous-current form.*

Authorities. — Tor the further study of the dynamo, the following may be consulted, in addition to the references already given : —

General: S. P. Thompson, Dynamo-Electric Machinery — Con- tinuous-Current Machines (1904), Alternating-Current Machinery (1905, London) ; G. Kapp, Dynamos, Alternators and Transformers (London, 1893); Id., Electric Transmission of Energy (London, 1894); Id., Dynamo Construction; Electrical and Mechanical (London, 1899) ; H. F. Parshall and H. M. Hobart, Electric Generators (London, 1900) ; C. C. Hawkins and F. Wallis, The Dynamo (London, 1903) ; E. Arnold, Konstruktionstafeln fur den

Dyr.amobau (Stutt- gart, 1902) ; C. P. Steinmetz, Elements of Electrical Engineering (New York, 1901).

Continuous-Current Dynamos: J'. Fischer-Hinnen, Continuous-Current Dynamos (London, 1899); E. Arnold, Die Gleichstrom-maschine (Berlin, 1902); F. Niethammer, Berechnung und Kon-struktion der Gleichstrommaschinen und Gleichstrommotoren (Stuttgart,

1904).

Alternators: D. C. Jackson and J. P. Jackson, Alternating Currents and Alternating Current Machinery (New York, 1903) J. A. Fleming, The Alternate Current Transformer (London, 1899) C. P. Steinmetz, Alternating Current Phenomena (New York, 1900) , E. Arnold, Die Wechselstromtechnik (Berlin, 1904) ; S. P. Thompson, Polyphase Electric Currents (London, 1900) ; A. Stewart, Modern Polyphase Machinery (London, 1906) ; M. Oudin, Standard Polyphase Apparatus and Systems (New York, 1904). (C. C. H.)

1 In the pioneer three-phase transmission between Laufen and Frankfort (Electrician, vol. xxvi. p. 637, and xxvii. p. 548), the three-phase current was transformed up from about 55 to 8500 volts, the distance being no m. A large number of installations driven by water power are now at work, in which energy is transmitted on the alternating-current system over distances of about 100 m. at pressures ranging from 20,000 to 67.000 volts.

DYNAMOMETER (Gr. Mpa/us, strength, and pkrpov, a measure), an instrument for measuring force exerted by men, animals and machines. The name has been applied generally to all kinds of instruments used in the measurement of a force, as for example electric dynamometers, but the term specially denotes apparatus used in connexion with the measurement of work, or in the measurement of the horse-power of engines and motors. If P represent the average value of the component of a force in the direction of the displacement, s, of its point of application, the product Ts measures the work done during the displacement. When the force acts on a body free to turn about a fixed axis only, it is convenient to express the work done by the trans- formed product T0, where T is the average turning moment or torque acting to produce the

displacement radians. The apparatus used to measure P or T is the dynamometer. The factors s or 6 are observed independently. Apparatus is added to some dynamometers by means of which a curve showing the variations of P on a distance base is drawn automatically, the area of the diagram representing the work done; with others, integrating apparatus is combined, from which the work done during a given interval may be read off directly. It is convenient .to distinguish between absorption and transmission dyna- mometers. In the first kind the work done is converted into heat; in the second it is transmitted, after measurement, for use.

Absorption Dynamometers. — Baron Prony's dynamometer (Ann. Chim. Phys. 1821, vol. 19), which has been modified in various ways, consists in its original form of two symmetrically shaped timber beams clamped to the engine-shaft. When these are held from turning, their frictional resistance may be adjusted by means of nuts on. the screwed bolts which hold them together until the shaft revolves at a given speed. To promote smoothness of action, the rubbing surfaces are lubricated. A weight is moved along the arm of one of the beams until it just keeps the brake steady midway between the stops which must be provided to hold it when the weight fails to do so. The general theory of this kind of brake is as follows: — Let F be the whole frictional resistance, r the common radius of the rubbing surfaces, W the force which holds the brake from turning and whose line of action is at a perpendicular distance R from the axis of the shaft, N the revolutions of the shaft per minute, o> its angular velocity in radians per second ; then, assuming that the adjustments are made so that the engine runs steadily at a uniform speed, and that the brake is held still, clear of the stops and without oscillation, by W, the torque T exerted by the engine is equal to the frictional torque Fr acting at the brake surfaces, and this is measured by the statical moment of the weight W about the axis of revolution ; that is —

$$T = Fr = WR \quad (1)$$

Hence WR measures the torque T.

, If more than one force be applied to hold the brake from turning, Fr. and therefore T, are measured by the algebraical sum of their individual moments with respect to the axis. If the brake is not balanced, its moment about the axis must be included. Therefore, quite generally,

$$T = SWR \quad (2)$$

The factor of the product T0 is found by means of a revolution counter. The power of a motor is measured by the rate at which it

works, and this is expressed by Tu = 2 * in foot-pounds per second.

1 2a- IN . horse-power units. The latter is commonly referred to

33,000

as the " brake horse-power." The maintenance of the conditions of steadiness implied in equation (1) depends upon the constancy of F, and therefore of the coefficient of friction m between the rubbing surfaces. The heating at the surfaces, the variations in their smoothness, and the variations of the lubrication make p continuously variable, and necessitate frequent adjustment of W or of the nuts. J. V. Poncelet (1788-1867) invented a form of Prony brake which automatically adjusted its grip as n changed, thereby maintaining F constant.

The principle of the compensating brake devised by J. G. Appold (1800-1865) is shown in fig. I. A flexible steel band, lined with wood blocks, is gripped on the motor fly-wheel or pulley by a screw A, which, together with W, is adjusted to hold the brake steady. Compensation is effected by the lever L inserted at B. This has a slotted end, engaged by a pin P fixed to the framing, and it will be seen that its action is to slacken the band if the load tends to rise and to tighten it in the contrary case. The external forces holding the brake from turning are W, distant R from the axis, and the reaction, Wi say, of the lever against the fixed pin P, dfstant Ri from the axis. The moment of Wi may be positive or negative.

The torque T at any instant of steady running is therefore {WR ± W,Ri|.

Lord Kelvin patented a brake in 1858 (fig. 2) consisting of a rope or cord wrapped round the circumference of a rotating wheel, to one end of which is applied a regulated force, the other end being fixed to a spring balance. The ropes are spaced laterally by the blocks B, B, B, B, which also serve to prevent them from slip- ping sideways. When the wheel is turning in the direc- tion indicated, the forces holding the band still are W, and p, the observed pull on the spring balance. Both these forces usually act at the same radius R, the distance from the axis to the centre line of the rope, in which case the torque T is \y (W-p)R, and consequently the brake horse-power (W-»)RX2 > N when

33,000 _ Fig. 1.

changes the weight W rises or ....

falls against the action of the spring balance until a stable condition

of running is obtained. The ratio — is given by e 1 “, where e = 2 ■ 7 1 8 ;*

H is the coefficient of friction and the angle, measured in radians, subtended by the arc of contact between the rope and the wheel. In fig. 2 =2t. The ratio W/p increases very rapidly as is increased, and therefore, by making sufficiently large, p may conveniently be made a small fraction of W, thereby rendering errors of obser- vation of the spring balance negligible. Thus this kind of brake, though cheap to make, is, when is large enough, an exceedingly accurate measuring instrument, readily applied and easily controlled. It has come into very general use in recent years, and has practically superseded the older forms of block brakes.

It is sometimes necessary to use water to keep the brake wheel cool. Engines specially designed for test- ing are usually provided with a brake wheel having a trough-shaped rim. Water trickles continuously into the trough, and the cen- trifugal action holds it as an j inside lining against the rim, where it slowly evaporates.

Fig. 3 shows a band-brake invented by Professor James Thomson, suitable for test- ing motors exerting a con- stant torque (see Engineer- ing, 22nd October 1880). To maintain e e constant, compensation for variation of m is made by inversely varying 0. A and B are fast and loose pulleys, and the brake band is placed partly over the one and partly over the other. Weights W and w are adjusted to the torque. The band turns with the fast pulley if n increase, thereby slightly turning the loose pulley, otherwise at rest, until is adjusted to the new value of /jl. This form of brake was also invented independently by J. A. M. L. Carpentier, and the prin- ciple has been used in the Raffard brake. A self-com- pensating brake of another kind, by Marcel Deprez, was described with Car- pentier’s in 1880 (Bulletin de la societe a” ‘encourage- ment, Paris). W. E. Ayrton*

Fig. 2.

and J. Perry used a band or rope brake in which compensation is effected by the pulley drawing in or letting out a part of the band or rope which has been roughened or in which a knot has been tied. In

an effective water-brake invented by W. Froude (see Proc. Inst. M. E. 1877), two similar castings, A and B, each consisting

of a boss and circumferential annular channel, are placed face to face on a shaft, to which B is keyed, A being free (fig. 4). A ring tube of elliptical section is thus formed. Each channel is divided into a series of pockets by equally spaced vanes inclined at 45°. When A is held still, and B rotated, centrifugal action sets up vortex currents in the water in the pockets ; thus a continuous circulation is caused between B and A, and the consequent changes of momen- tum give rise to oblique reactions. The moments of the components of these actions and reactions in a plane to which the axis of rotation

is at right angles are the two aspects of the torque acting, and therefore the torque acting on B through the shaft is measured by the torque required to hold A still. Froude constructed a brake to take up 2000 H.P. at 90 revs, per min. by duplicating this apparatus. This replaced the propeller of the ship whose engines were to be tested, and the outer casing was held from turning by a suitable arrangement of levers carried to weighing apparatus conveniently disposed on the wharf. The torque corre- sponding to 2000 H.P. at 90 revs, per min. is 116,772 foot-pounds, and a brake 5 ft. in diameter gave this resistance. Thin metal sluices were arranged to slide be- tween the wheel and casing, and by their means the range of action could be varied from 300 H.P. at 120 revs, per min. to the maximum.

Professor Osborne Reynolds in 1887 patented a water-brake (see Proc. Inst. C.E. 99, p. 167), using Froude's turbine to obtain the highly resisting spiral vortices, and arranging passages in the casing for the entry of water at the hub of the wheel and its exit at the circumference. Water enters at E (fig. 5), and finds its way into the interior of the wheel, A, driving the air in front of it through the air-passages K, K. Then following into the pocketed chambers Vi, V 2 , it is caught into the vortex, and finally escapes at the circumference, flowing away at F. The air-ways k, k, in the fixed vanes establish communication between the cores of the vortices and the atmo- sphere. From \ to 30 H.P. may be measured at 100 revs, per min. by a brake- wheel of this kind 18 in. in diameter. For other speeds the power varies as the cube of the speed. The casing is held from turning by weights hanging on an attached arm. The cocks regu-

Fig. 3.

Fig. 4.

lating the water are connected to the casing, so that any tilting automatically regulates the flow, and therefore the thickness of the film in the vortex. In this way the brake may be arranged to maintain a constant torque, notwithstanding variation of the speed. In G. I. Alden's brake (see Trans. Amer. Soc. Eng. vol. xi.) the resistance is obtained by turning a cast iron disk against the f rictional resistance of two thin copper plates, which are held in a casing free to turn upon the shaft, and are so arranged that the pressure between the rubbing surfaces is controlled, and the heat developed by friction carried away, by the regulated flow of water through the casing. The torque required to hold the casing still against the action of the disk measures the torque exerted by the shaft to which the disk is keyed.

Transmission Dynamometers. — The essential part of many transmission dynamometers is a spring whose deformation indirectly measures the magnitude of the force transmitted through it. For many kinds of spring the change of form is practically proportional to the force, but the relation should always be determined experimentally. General A. J. Morin (see Notice sur divers appareils dynamometriques, Paris, 1841), in his classical experiments on traction, arranged his appar- atus so that the change in form of the spring was con- tinuously recorded on a sheet of paper drawn under a style. For longer experiments he used a " Compteur " or mechanical integrator, sug- gested by J. V. Poncelet, from which the work done during a given displacement could be read off directly. This device consists of a roller of radius r, pressed into contact with a disk. The two are carried on a common frame, so arranged that a change in form of the spring causes a relative displacement of the disk and roller, the point of contact moving radially from or towards the centre of the disk. The radial distance x is at any instant proportional to the force acting through the spring. The angular displacement, 0, of the disk is made proportional to the displacement, s, of the point of application of the force by suitable driving gear. If d$ is the angular displacement of the roller corresponding to displacements, d8 of the disk, and ds of the point of application of P, a, and C constants, then

*d < j, = xdLˆPds = C.Pds, and therefore = C C*Pds; that is, the r r J '1*

angular displacement of the roller measures the work done during the displacement from si to s 2 . The shaft carrying the roller is connected to a counter so that may be observed. The angular velocity of the shaft is proportional to the rate of working. Morin's dynamometer is shown in fig. 6. The transmitting spring is made up of two flat bars linked at their ends. Their centres si, Si, are held respectively by the pieces A, B, which together form a sliding pair. The block A carries the disk D, B carries the roller R and counting gear. The pulley E is driven from an axle of the carriage. In a dynamometer used by F. W. Webb to measure the tractive resistance of trains on the London & North-Western railway, a tractive pull or push compresses two spiral springs by a definite amount, which is recorded to scale by a pencil on a sheet of paper, drawn continuously from a storage drum at the rate of 3 in. per mile, by a roller driven from one of the carriage axles. Thus the diagram shows the tractive force at any instant. A second pencil electrically connected to a clock traces a time line on the diagram with a kick at every thirty seconds. A third pencil traces an obser- vation line in which a kick can be made at will by pressing any one of the electrical pushes placed about the car, and a fourth draws a datum line. The spring of the dynamometer car used by W. Dean on the Great Western railway is made up of thirty flat plates, 7 ft. 6 in. long, 5 in. X fin. at the centre, spaced by distance pieces nibbed into the plates at the centre and by rollers at the ends. The draw-bar is connected to the buckle, which is carried on rollers, the ends of the spring resting on plates fixed to the under-frame. The gear operating the paper roll is driven from the axle of an inde- pendent wheel which is let down into contact with the. rail when required. This wheel serves also to measure the distance travelled. A Morin disk and, roller integrator is connected with the apparatus, so that the work done during a journey may be read off. Five lines are traced on the diagram.

In spring dynamometers designed to measure a transmitted torque, the mechanical problem of ascertaining the change of form of the spring is complicated by the fact that the spring and the whole apparatus are rotating together. In the Ayrton and Perry transmission dynamometer or spring coupling of this type,

?>

the relative angular displacement is proportional to the radius of the

circle described by the end of a light lever operated by mechanism between the spring-connected parts. By a device used by W. E. Dalby {Proc. Inst.C.E. 1897-1898, p. 132) the change in form of the spring is shown on a fixed indicator, which may be placed in any convenient position. Two equal sprocket wheels Qi,Q2, are fastened, the one to the spring pulley, the other to the shaft. An endless band is placed over them to form two loops, which during rotation remain at the same distance apart, unless relative angular

displacement occurs be- tween Qi and Q 2- (fig. 7) due to a change in form of the spring. The change in the distance d is pro- portional to the change in the torque transmitted from the shaft to the pulley. To measure this, guide pulleys are placed in the loops guided by a geometric slide, the one pulley carrying a scale, and the other an index. A recording drum or in- tegrating apparatus may be arranged on the pulley frames. A quick variation, or a periodic variation of the magnitude of the force or torque transmitted through the springs, tends to set up oscillations, and this tendency increases the nearer the periodic time of the force variation approaches a periodic time of the spring. Such vibrations may be damped out to a considerable extent by the use of a- dash-pot, or may be practically prevented by using a relatively stiff spring.

Every part of a machine transmitting force suffers elastic defor- mation, and the force may be measured indirectly by measuring the deformation. The relation between the two should in all cases be found experimentally. G. A. Hirn (see Les PandynamomHres, Paris, 1876) employed this principle to measure the torque trans- mitted by a shaft. Signor Rosio used a telephonic method to effect the same end, and mechanical, optical and telephonic devices have been utilized by the Rev. F. J. Jervis-Smith. (See Phil. Mag. February 1898.)

H. Frahm, 1 during an important investigation on the torsional vibration of propeller shafts, measured the relative angular displace- ment of two flanges on a propeller shaft, selected as far apart as possible, by means of an electrical device (Engineering, 6th of February 1903). These measurements were utilized in combination with appropriate elastic coefficients of the material to find the horse- power transmitted from the engines along the shaft to the propeller. In this way the effective horse-power and also the mechanical efficiency of a number of large marine engines, each of several thousand horse-power, have been determined.

When a belt, in which the maximum and minimum tensions are

respectively P and p ft), drives a pulley, the torque exerted

Fig. 8.

is (P-p)r ib ft., r being the radius'of the~pulley plus half the thickness of the belt. P and p may be measured directly by leading the belt round two freely hanging guide pulleys, one in the tight, the other in the slack part of the belt, and adjusting loads on them until a stable condition of running is obtained. In W. Froude's belt dynamometer (see Proc. InstJA.E., 1858) (fig. 8) the guide pulleys Gi, G 2 are carried upon an arm free to turn about the axis O. H is a pulley to guide the approaching and receding parts of the belt to and from the beam in parallel directions. Neglecting friction, the

1 H. Frahm, " Neue Untersuchungen uber die dynamischen Vorgange in den Wellenleitungen von Schiffsmaschinen mit beson- derer Berucksichtigurtg der Resonanzschwingungen," Zeitschrift des Vereins deutscher Ingenieure, 31st May 1902.

unbalanced torque acting on the beam is Ar{P-p] lb ft. If a force Q acting at R maintains equilibrium, QR/4 = (P-p)r = T. Q is supplied by a spring, the extensions of which are recorded on a drum driven proportionally to the angular displacement of the driving pulley; thus a work diagram is obtained. In the Farcot form the guide pulleys are attached to separate weighing levers placed hori- zontally below the apparatus. In a belt dynamometer built for the Franklin Institute from the designs of Tatham, the weighing levers are separate and arranged horizontally at the top of the apparatus. The weighing beam in the Hefner-Alteneck dynamometer is placed transversely to the belt (see Electrotechnischen Zeitschrift, 1881, 7). The force Q, usually measured by a spring, required to maintain the beam in its central position is proportional to (J?-p). If the angle X = 2 = 120°, Q = (P – p) neglecting friction.

When a shaft is driven by means of gearing the driving torque is measured by the product of the resultant pressure P acting between the wheel teeth and the radius of the pitch circle of the wheel fixed to the shaft. Fig. 9, which has been reproduced from J. White's .4 New Century of Inventions (Manchester, 1822), illus- trates possibly the earliest application of this principle to dynamo- metry. The wheel D, keyed to the shaft overcoming the resistance to be measured, is driven from wheel N by two bevel wheels L, L, carried in a loose pulley K. The two shafts, though in a line, are independent. _ A torque applied to the shaft A can be transmitted to D, neglecting friction, without change only if the central pulley K is held from

turning ; the torque required to do this is twice the torque transmitted.

The torque acting on the armature of an electric motor is necessarily accompanied by an equal and opposite torque acting on the

*^^^^^n\

Fig. 9.

frame. If, therefore, the motor is mounted on a cradle free to turn - about knife-edges, the reacting torque is the only torque tending to turn the cradle when it is in a vertical position, and may therefore be measured by adjusting weights to hold the cradle in a vertical position. The rate at which the motor is transmitting work is then

—— – H.P., where n is the revolutions per second of the armature.

See James Dredge, Electric Illumination, vol. ii. (London, 1885); W. W. Beaumont, " Dynamometers and Friction Brakes," Proc. Inst.C.E. vol. xcv. (London, 1889); E. Brauer, "Uber Brems- dynamometer and verwandte Kraftmesser," Zeitschrift des Vereins deutscher Ingenieure (Berlin, 1888); J. J. Flather, Dynamometers and the Measurement of Power (New York, 1893). (W. E. D.)

DYNASTY (Gr. Swaarda, sovereignty, the position of a hwaorris, lord, ruler, from Svvaodai., to be able, 5vvo.)xis, power), a family or line of rulers, a succession of sovereigns of a country belonging to a single family or tracing their descent to a common ancestor. The term is particularly used in the history of ancient Egypt as a convenient means of arranging the chronology.

DYSART, a royal and police burgh and seaport of Fifeshire, Scotland, on the shore of the Firth of Forth, 2 m. N.E. of Kirk- caldy by the North British railway. Pop. (1901) 3562. It has a quaint old-fashioned appearance, many ancient houses in High Street bearing inscriptions and dates. The public build- ings include a town hall, library, cottage hospital, mechanics' institute and memorial hall. Scarcely anything is left of the old chapel dedicated to St Dennis, which for a time was used as a

Smithy; and of the chapel of St Serf, the patron saint of the burgh,

only the tower remains. The chief industries are the manufacture of bed and table linen, towelling and woollen cloth, shipbuilding and flax-spinning. There is a steady export of coal, and the harbour is provided with a wet dock and patent slip. In smuggling days the " canty carles " of Dysart were professed " free traders." In the 15th and 16th centuries the town was a leading seat of the salt industry (" salt to Dysart " was the equivalent of " coals to Newcastle "), but the salt-pans have been abandoned for a considerable period. Nail-making, once famous, is another extinct industry. During the time of the alliance between Scotland and Holland, which was closer in Fifeshire than in other counties, Dysart became known as Little Holland. To the west of the town is Dysart House, the residence of the earl of Rosslyn. With Burntisland and King- horn Dysart forms one of the Kirkcaldy district group of parlia- mentary burghs. The town is mentioned as early as 874 in connexion with a Danish invasion. Its name is said to be a corruption of the Latin desertum, " a desert," which was applied to a cave on the seashore occupied by St Serf. In the cave the saint held his famous colloquy with the devil, in which Satan was worsted and contemptuously dismissed. From James V. the town received the rights of a royal burgh. In 1 559 it was the headquarters of the Lords of the Congregation, and in 1607 the scene of the meetings of the synod of Fife known as the Three Synods of Dysart. Ravensheugh Castle, on the shore to the west of the town, is the Ravenscraig of Sir Walter Scott's ballad of " Rosabelle."

William Murray, a native of the place, was made earl of Dysart in 1643, and his eldest child and heir, a daughter, Elizabeth, obtained in 1670 a regrant of the title, which passed to the de- scendants of her first marriage with Sir Lionel Tollemache, Bart., of Helmingham; she married secondly the 1st duke of Lauder- dale, but had no children by him, and died in 1698. This countess of Dysart (afterwards duchess of Lauderdale) was a famous beauty of the period, and notorious both for her amours and for her political influence. She was said to have been the mistress of Oliver Cromwell, and also of Lauderdale before her first husband's death, and was a leader at the court of Charles II. Wycherley is supposed to have aimed at her in his Widow Blackacre in the Plain Dealer. Her son, Lionel Tollemache (d. 1727), transmitted the earldom to his grandson Lionel (d. 1770), whose sons Lionel (d. 1799) and Wilbraham (d. 1821) succeeded; they died without issue, and their sister Louisa (d. 1840), who married John Manners, an illegitimate son of the second son of the 2nd duke of Rutland, became countess in her own right, being succeeded by her grandson (d. 1878), and his

grandson, the 8th earl.

The earldom of Dysart must not be confounded with that of Desart (Irish), created (barony 1733) in 1793, and held in the Cuffe family, who were originally of Creech St Michael, Somerset, the Irish branch dating from Queen Elizabeth's time.

DYSENTERY (from the Gr. prefix dva-, in the sense of " bad," and 'ivrtpov, the intestine), also called " bloody flux," an in- fectious disease with a local lesion in the form of inflammation and ulceration of the lower portion of the bowels- Although at one time a common disease in Great Britain, dysentery is now very rarely met with there, and is for the most part confined to warm countries, where it is the cause of a large amount of mortality. (For the pathology see Digestive Organs.)

Recently considerable advance has been made in our know- ledge of dysentery, and it appears that there are two distinct types of the disease: (1) amoebic dysentery, which is due to the presence of the amoeba histolytica (of Schaudinn) in the in- testine; (2) bacillary dysentery, which has as causative agent two separate bacteria, (a) that discovered by Shiga in Japan, (b) that discovered by Flexner in the Philippine Islands. With regard to the bacillary type, at first both organisms were con- sidered to be identical, and the name bacillus dysenteriae was given to them; but later it was shown that these bacilli are different, both in regard to their cultural characteristics and also in that one (Shiga) gives out a soluble toxin, whilst the

other has so far resisted all efforts to discover it. Further, the serum of a patient affected with one of the types has a marked agglutinative power on the variety with which he is infected and not on the other.

Clinically, dysentery manifests itself with varying degrees of intensity, and it is often impossible without microscopical examination to determine between the amoebic and bacillary forms. In well-marked cases the following are the chief symp- toms. The attack is commonly preceded by certain premonitory indications in the form of general illness, loss of appetite, and some amount of diarrhoea, which gradually increases in severity, and is accompanied with griping pains in the abdomen (tormina). The discharges from the bowels succeed each other with great frequency, and the painful feeling of pressure downwards (tenesmus) becomes so intense that the patient is constantly desiring to defecate. .The matters passed from the bowels, which at first resemble those of ordinary diarrhoea, soon change their character, becoming scanty, mucous or slimy, and

subse- quently mixed with, or consisting wholly of, blood, along with shreds of exudation thrown off from the mucous membrane of the intestine. The evacuations possess a peculiarly offensive odour characteristic of the disease. Although the constitutional disturbance is at first comparatively slight, it increases with the advance of the disease, and febrile symptoms come on attended with urgent thirst and scanty and painful flow of urine. Along with this the nervous depression is very marked, and the state of prostration to which the patient is reduced can scarcely be exceeded. Should no improvement occur death may take place in from one to three weeks, either from repeated losses of blood, or from gradual exhaustion consequent on the continuance of the symptoms, in which case the discharges from the bowels become more offensive and are passed involuntarily.

When, on the other hand, the disease is checked, the signs of improvement are shown in the cessation of the pain, in the evacuations being less frequent and more natural, and in relief from the state of extreme depression. Convalescence is, how- ever, generally slow, and recovery may be imperfect — the disease continuing in a chronic form, which may exist for a variable length of time, giving rise to much suffering, and not unfrequently leading to an ultimately fatal result.

The dysentery poison appears to exert its effects upon the glandular structures of the large intestine, particularly in its lower part. In the milder forms of the disease there is simply a congested or inflamed condition of the mucous membrane, with perhaps some inflammatory exudation on its surface, which is passed off by the discharges from the bowels. But in the more severe forms ulceration of the mucous membrane takes place. Commencing in and around the solitary glands of the large in- testine in the form of exudations, these ulcers, small at first, enlarge and run into each other, till a large portion of the bowel may be implicated in the ulcerative process. Should the disease be arrested these ulcers may heal entirely, but occasionally they remain, causing more or less disorganization of the coats of the intestines, as is often found in chronic dysentery. Sometimes, though rarely, the ulcers perforate the intestines, causing rapidly fatal inflammation of the peritoneum, or they may erode a blood vessel and produce violent haemorrhage. Even where they undergo healing they may cause such a stricture of the calibre of the intestinal canal as to give rise to the symptoms of obstruc- tion which ultimately prove fatal. One of the severest compli- cations of the disease is abscess of the liver, usually said to be solitary, and known as tropical abscess of the liver, but probably is more frequently multiple than is usually thought.

Treatment. — Where the disease is endemic or is prevailing epidemically, it is of great importance to use all preventive measures, and for this purpose the avoidance of all causes likely to precipitate an attack is to be enjoined. Exposure to cold after heat, the use of unripe fruit, and intemperance in eating and drinking should be forbidden; and the utmost care taken as to the quality of the food and drinking water. In houses or hospitals where cases of the disease are under treatment, dis- infectants should be freely employed, and the evacuations of the

patients removed as speedily as possible, having previously been sterilized in much the same manner as is employed in typhoid fever. In the milder varieties of this complaint, such as those occurring sporadically, and where the symptoms are probably due to matters in the bowels setting up the dysen- teric irritation, the employment of diaphoretic medicines is to be recommended, and the administration of such a laxative as castor oil, to which a small quantity of laudanum has been added, will often, by removing the source of the mischief, arrest the attack; but a method of treatment more to be recommended is the use of salines in large doses, such as one drachm of sodium sulphate from four to eight times a day. This treatment may with advantage be combined with the internal administration of ipecacuanha, which still retains its reputation in this disease. Latterly, free irrigation of the bowel with astringents, such as silver nitrate, tannalbin, &c, has been attended with success in those cases which have been able to tolerate the injections. In many instances they cannot be used owing to the extreme degree of irritability of the bowel. The operation of appendi- costomy, or bringing the appendix to the surface and using it as the site for the introduction of the irrigating fluid, has been attended with considerable success.

In those cases due to Shiga's bacillus the ideal treatment has been put at our disposal by the preparation of a specific anti- toxin; this has been given a trial in several grave epidemics of late, and may be said to be the most satisfactory treatment and offer the greatest hope of recovery. It is also of great use as a prophylactic.

The preparations of morphia are of great value in the sympto- matic treatment of the disease. They may be applied externally as fomentations, for the relief of tormina; by rectal injection for the relief of the tenesmus and irritability of the bowel; hypodermically in

advanced cases, for the relief of the general distress. In amoebic dysentery, warm injections of quinine per rectum have proved very efficacious, are usually well tolerated, and are not attended with any ill effects. The diet should be restricted, consisting chiefly of soups and farinaceous foods; more especially is this of importance in the chronic form. For the thirst ice may be given by the mouth. Even in the chronic forms, confinement to bed and restriction of diet are the most important elements of the treatment. Removal from the hot climate and unhygienic surroundings must naturally be attended to.

Bibliography. — Allbutt and Rolleston, System of Medicine, vol. ii. part ii. (1907), " Dysentery," Drs Andrew Davidson and Simon Flexner; Davidson, Hygiene and Diseases of Warm Climates (Edinburgh, 1903); Fearnside in Ind. Med. Gaz. (July 1905); Ford in Journal of Tropical Medicine (July 15, 1904); Korentchewsky in Bulletin de I'Institut Pasteur (February 1905); Shiga: Osier and M'Crae's System of Medicine, vol. ii. p. 781 (1907); Skschivan and Stefansky in Berliner klinische Wochenschrift (February 11, 1907); Vaillard and Dopter, on the treatment by antidysenteric serum, Annates de I'Institut Pasteur, No. 5, p. 326 (1906) ; J. A. Pottinger, " Appendicostomy in Chronic Dysentery," Lancet (December 28, 1907); Robert Doerr, Das Dysenterietoxin (Gustav Fischer, Jena, 1907); F. M. Sandwith, " Hunterian Lecture on the Treatment of Dysentery," Lancet (December 7, 1907).

DYSPEPSIA (from the Gr. prefix Sva-, hard, ill, and ireirreiv, to digest), or indigestion, a term vaguely given to a group of pathological symptoms. There are comparatively few diseases of any moment where some of the phenomena of dyspepsia are not present as associated symptoms, and not infrequently these exist to such a degree as to mask the real disease, of which they are only complications. This is especially the case in many organic diseases of the alimentary canal, in which the symptoms of dyspepsia are often the most prominent. In its restricted meaning, however (and it is to this that the present article applies), the term is used to describe a functional derangement of the natural process of digestion, apart from any structural change in the organs concerned in the act.

The causes of this trouble may be divided into (a) those which concern the food, and (b) those which concern the organism. Among the causes connected with the food are not only the indulgence in indigestible articles of diet, but the too common

practice of eating too much of what may be otherwise quite wholesome and digestible; and irregular, too frequent or too

infrequent meals. The quantity of food required by different individuals varies between wide limits, but also the quantity required by the same individual varies considerably according to circumstances, more food being needed in cold than in warm weather, and more in an active open-air occupation than in a sedentary one. The thorough mastication of the food is a very important precursor of digestion, 1 and this only too often fails, either owing to haste over meals or because of painful or deficient teeth. Again, the quality of the food is of importance, some kinds of flesh being harder and more difficult of mastication than others. This is especially the case with meat that has been smoked or salted, and with that cooked too soon after the death of the animal. Drinks are a common source of dyspepsia. Beer when new and its fermentation not completed is especially bad. Vinegar and acid wines, if taken in large quantities, tend to produce gastric catarrh, and tea is a very fruitful source of this trouble. Even too much water at meal-times may cause indigestion, since the food in the mouth is apt to be softened by the water instead of saliva, and also the gastric juice becomes unduly diluted, rendering the digestion in the stomach too slow and prolonged. Carious teeth and oral sepsis, from whatsoevei cause, lead to the same trouble.

Of the causes which concern the organism, nervous influences come first. Bad news may take away all power of digestion and even provoke vomiting, and any worry or mental trouble tends to bring on this condition. General weakness and atony of the body affects the stomach in like degree, and, if the muscles of the abdominal wall be much wasted, they become too weak to support the abdominal viscera in place. Hence results a general tendency for these organs to fall, giving rise to a condition of visceroptosis, of which an obstinate dyspepsia is a very marked feature. Adhesions of the intestines from old inflammatory troubles, floating kidney and bad circulation may each be a cause of painful digestion. Again, a dyspepsia that will not yield to treatment is often one of the symptoms of renal disease, or, in young people of fifteen to twenty years of age, it may be the earliest sign of a gouty diathesis, or even of a more seri- ous condition still — incipient phthisis. Chronic dyspepsia, by weakening the organism, renders it more liable to fall a prey to the attacks of the tubercle bacillus, but, on the other hand, the tuberculous lesion in the lung is often accompanied by a most intractable form of dyspepsia. From this it is clear that any condition which lessens the general well-being of the organism as a whole, apart from its producing any permanent morbid condition in the stomach, may yet interfere with the normal digestive processes and so give rise to

dyspepsia.

The symptoms of dyspepsia, even when due to a like cause, are so numerous and diversified in different individuals that probably no description could exactly represent them as they occur in any given case. All that can be here attempted is to mention some of the more prominent morbid phenomena usually present in greater or less degree.

Very briefly, a furred tongue, foul breath, disturbance of appetite, nausea and vomiting, oppression in the chest, pain, flatulence and distension, acidity, pyrosis and constipation or diarrhoea are a few of the commonest symptoms.

When the attack is dependent on some error in diet, and the dyspepsia consequently more of an acute character, there is often pain followed with sickness and vomiting of the offensive matters, after which the patient soon regains his former healthy state. What are commonly known as " bilious attacks " are frequently of this character. In the more chronic cases of dyspepsia the symptoms are somewhat different. A sensation of discomfort comes on shortly after a meal, and is more of the nature of weight and distension in the stomach than of actual pain, although this too may be present. These feelings may come

1 This aspect of the matter — "buccal digestion "—has been specially emphasized in recent years by Horace Fletcher of the United States, whose experience of the results of systematic " chew- ing," confirmed by Sir M. Foster, Prof. Chittenden and others, has almost revolutionized the science of dietetics.

on after each meal, or only after certain meals, and they may arise irrespective of the kind of food taken, or only after certain articles of diet. As in most of such cases the food is long re- tained in the stomach, it is apt to undergo fermentive changes, one of the results of which is the accumulation of gases which cause flatulence and eructations of an acid or foul character. Occasionally quantities of hot, sour, tasteless or bitter fluid — pyrosis — or mouthfuls of half-digested food, regurgitate from the stomach. Temporary relief may be obtained when another meal is taken, but soon the uncomfortable sensations return as before. The appetite may be craving or deficient,

or desirous of abnormal kinds of food. The tongue registers the gastric condition with great delicacy: — a pasty white fur on the tongue is considered a sign of weakness or atony of the digestive tract; a clean pointed tongue with large papillae, and rather red at the edges and tip, is a sign of gastric irritation; and a pale flabby tongue suggests the need of stimulating treatment. Constipation is more common in the chronic forms of dyspepsia, diarrhoea in the acute.

Numerous disagreeable and painful sensations in other parts are experienced, and are indeed often more distressing than the merely gastric symptoms. Pains in the chest, shortness of breathing, palpitation, headache, giddiness, affections of vision, coldness of the extremities, and general languor are common accompaniments of dyspepsia; while the nervous phenomena are specially troublesome in the form of sleeplessness, irritability, despondency and hypochondriasis.

As regards treatment only a few general observations can be made. The careful arrangement of the diet is a matter of first importance. Quantity must be regulated by the digestive capabilities of the individual, his age, and the demands made upon his strength by work. There is little doubt that the danger is in most instances on the side of excess, and the rule which enjoins the cessation from eating before the appetite is satisfied is a safe one for dyspeptics. Due time, too, must be given for the digestion of a meal, and from four to six hours are in general required for this purpose. Long fasts, however, are nearly as hurtful as too frequent meals. Of no less importance is the kind of food taken, and on this point those who suffer from indigestion must ever exercise the greatest care. It must be borne in mind that idiosyncrasy often plays an important part in digestion, some persons being unable to partake without injury of sub- stances which are generally regarded as wholesome and digestible. In most cases it is found very helpful to separate the protein from the farinaceous food, and the more severe the dyspepsia the more thoroughly should this be done, only relaxing as the dyspepsia yields. No fluid should be drunk at meal-times, but from one to two tumblers of hot water should be drunk from an hour to an hour and a half before food. This washes any remnant of the last meal from the stomach, and also supplies material for the free secretion of saliva and gastric juice, thus promoting and accelerating digestion. The only exception to this is in the case of a dilated stomach, when it is wholly contra-indicated. With regard to mastication, Sir Andrew Clark's rule is a very good one, and is more easily followed than the ideal theory laid down by Horace Fletcher, according to whom any

food is digest- ible if properly treated while still in the mouth. Clark's rule is that as the mouth normally contains thirty-two teeth, thirty-two bites should be given before the food is swallowed. This, of course, is a practical doctor's concession to human weakness. Mr Fletcher would train every one to " chew " till the contents of the mouth were swallowed by reflex action without deliberate act; and he applies this theory of mastication and salivation also to drinks (except water). Again, a lack of warmth being a source of dyspepsia, this should be attended to, the back of the neck, the front of the abdomen and the feet being the parts that require special attention. The feet should be raised on a stool, the ankles protected with warm stockings and a woollen " cummerbund " wound two or three times round the body. Experience has shown that in this complaint no particular kind of food or avoidance of food is absolutely to be relied on, but that in general the best diet is one of a mixed animal and vege-

table kind, simply but well cooked. The partaking of many dishes, of highly-seasoned or salted meats, raw vegetables, newly- baked bread, pastry and confectionery are all well-known common causes of dyspepsia, and should be avoided. When even the simple diet usually taken is found to disagree, it may be necessary to change it temporarily for a still lighter form, such as a milk diet, and that even in very moderate quantity.

The employment of alcoholic stimulants to assist digestion is largely resorted to, both with and without medical advice. While it seems probable that in certain cases of atonic dyspepsia, particularly in the feeble and aged, the moderate administration of alcohol has the effect of stimulating the secretion of gastric juice, and is an important adjuvant to other remedies, the advantages of its habitual use as an aid to digestion by the young and otherwise healthy, is more than questionable, and it will generally be found that among them, those are least troubled with indigestion who abstain from it. Rest should be taken both before and after food, and general hygienic measures are highly important, since whatever improves the state of the health will have a favourable influence on digestion. Hence regular exercise in the open air, early rising and the cold bath are to be strongly recommended .

The medicinal treatment of dyspepsia can only be undertaken by a physician, but the following is a very brief resume of the drugs he depends on to-day. Bicarbonate of soda with some bitter, as quassia, gentian or columba, is much in vogue as a direct gastric stimulant. In irritable dyspepsia some form of bismuth in solution or powder; and,

to assist digestion through the nervous system, nux vomica and strychnine can be relied on. To give directly digestive material, hydrochloric acid, pepsin and rennet are prescribed in many forms, but where there is much vomiting ingluvin is more efficacious than pepsin. When farinaceous food is badly borne, diastase is helpful, given either before or with the meal. To preven t fermentation, phenol, creasote and sulpho-carbolate of soda are all extremely useful in skilled hands; and for intestinal decomposition and flatulent distension, bismuth salicylate with salol or /3-naphthol is much used. Cyllin, and charcoal in many forms, may be taken both for gastric and intestinal flatulence. But all these drugs, of proved value though they are, must be modified and combined to suit the special idiosyncrasy of the patient, and are therefore often worse than useless in inexperienced hands. The condition of the bowels must always have due attention.

See also Digestive Organs; Nutrition and Dietetics.

DYSTELEOLOGY, a modern word invented by Haeckel {Evolution of Man) for the doctrine of purposelessness, as opposed to the philosophical doctrine of design (Teleology).

DZUNGARIA, Dsongaria, or Jungaria, a former Mongolian kingdom of Central Asia, raised to its highest pitch by Kaldan or Bushtu Khan in the latter half of the 17th century, but completely destroyed by Chinese invasion about 1757-1759. It has played an important part in the history of Mongolia and the great migrations of Mongolian stems westward. Now its territory belongs partly to the Chinese empire (east Turkestan and north-western Mongolia) and partly to Russian Turkestan (provinces of Semiryechensk arid Semipalatinsk). It derived its name from the Dsongars, or Songars, who were so called because they formed the left wing {dson, left; gar, hand) of the Mongolian army. Its widest limit included Kashgar, Yarkand, Khotan, the -whole region of the T'ien Shan, or Tian-shan, Mountains, and in short the greater proportion of that part of Central Asia which extends from 35 to 50 N. and from 72 to 97° E. The name, however, is more properly applied only to the present Chinese province of T'ien Shan-pei-lu and the country watered by the Hi. As a political or geographical term it has practically disappeared from the map; but the range of moun- tains stretching north-east along the southern frontier of the Land of the Seven Streams, as the district to the south-east of the Balkhash Lake is called, preserves the name of Dzungarian Range.

E— EABANI

EThe fifth symbol in the English alphabet occupies also the same position in Phoenician and in the other alphabets descended from Phoenician. As the Semitic alphabet did not represent vowels, E was originally an aspirate. Its earliest form, while writing is still from right to left, is ˆ, the upright being continued some distance below the lowest of the cross-strokes. In some of the Greek alphabets it appears as £ with the upright prolonged at both top and bottom, but it soon took the form with which we are familiar, though in the earlier examples of this form the cross-strokes are not horizontal but drop at an angle, £ . In Corinth and places under its early influence like Megara, or colonized from it like Corcyra, the symbol for e takes the form ˆ or B, while at Sicyon in the 6th and 5th centuries B.C. it is represented by X- I n early Latin it was sometimes represented by two perpendicular strokes of equal length, 1 I .

In the earliest Greek inscriptions and always in Latin the symbol E represented both the short and the long e-sound. In Greek also it was often used for the close long sound which arose either by contraction of two short e-sounds or by the loss of a consonant, after a short e-sound, as in ˆtXetre, " you love," for 0tXe«T€, and aecrv6s. The Ionian Greeks of Asia Minor, who had altogether lost the aspirate, were the first to use the symbol H for the long e-sound, and in official documents at Athens down to 403 B.C., when the Greek alphabet as still known was adopted by the state, E represented e, 17 and the sound arising by contraction or consonant loss as mentioned above which henceforth was written with two symbols, ei, and being really a single sound is known as the " spurious diphthong." There were some minor distinctions in usage of the symbols E and H which need not here be given in detail. The ancient Greek name was et, not Epsilon as popularly supposed; the names of the Greek letters are given from Kallias, an earlier contemporary of Euripides, in Athenaeus x. p. 453 d.

In Greek the short e-sound to which E was ultimately limited was a close sound inclining more towards i than a; hence the representation of the contraction of et by ei. Its value in Latin was exactly the opposite, the Latin short e being open, and the long close. In English there has been a gradual narrowing of the long vowels, a becoming approximately ei and e becoming I (Sweet, History of English Sounds, §§ 781,817 ff. 2nd ed.). In languages where the diphthong ai has become a monophthong, the resulting sound is some variety of long e. Often the gradual assimilation can be traced through the inter- mediate stage of ae to e, as in the Old Latin aidilis, which in

classical Latin is aedilis, and in medieval MSS. edilis.

The variety of spelling in English for the long and short e- sounds is conveniently illustrated in Miss Soames's Introduction to the Study of Phonetics, pp. 16 and 20. (P. Gi.)

EA (written by means of two signs signifying " house " and " water"), in the Babylonian religion, originally the patron deity of Eridu, situated in ancient times at the head of the Persian Gulf, but now, by reason of the constant accumulation of soil in the Euphrates valley, at some distance from the gulf. Eridu, meaning " the good city," was one of the oldest settlements in the Euphrates valley, and is now represented by the mounds known as Abu Shahrein. In the absence of excavations on that site, we are dependent for our knowledge of Ea on material found elsewhere. This is, however, sufficient to enable us to state definitely that Ea was a water-deity, and there is every reason to believe that the Persian Gulf was the body of water more particularly sacred to him. Whether Ea (or A-e as some scholars prefer) represents the real pronunciation of his name vre do not know. All attempts to connect Ea with Yah and Yahweh are idle conjectures without any substantial basis. He is figured as a man covered with the body of a fish, and this

representation, as likewise the name of his temple fi-apsu, " house of the watery deep," points decidedly to his character as a god of the waters (see Oannes) . Of his cult at Eridu, which reverts to the oldest period of Babylonian history, nothing definite is known beyond the fact that the name of his temple was E-saggila, " the lofty house " — pointing to a staged tower as in the case of the temple of Bel (q.v.) at Nippur, known as E-Kur, i.e. " mountain house " — and that incantations, involv- ing ceremonial rites, in which water as a sacred element played a prominent part, formed a feature of his worship. Whether Eridu at one time also played an important political r61e is not certain, though not improbable. At all events, the prominence of the Ea cult led, as in the case of Nippur, to the survival of Eridu as a sacred city, long after it had ceased to have any significance as a political centre. Myths in which Ea figures prominently have been found in Assur-bani-pal's library, in- dicating that Ea was regarded as the protector and teacher of mankind. He is essentially a god of civilization, and it was natural that he was also looked upon as the creator of man, and of the world in general. Traces of this view appear in the Marduk epic celebrating the achievements of this god, and the close connexion between the Ea cult at Eridu and that of Marduk also follows from two considerations: (1) that the name of Marduk's sanctu- ary at Babylon bears the same name, E-saggila, as

that of Ea in Eridu, and (2) that Marduk is generally termed the son of Ea, who derives his powers from the voluntary abdication of the father in favour of his son. Accordingly, the incantations originally composed for the Ea cult were re-edited by the priests of Babylon and adapted to the worship of Marduk, and, similarly, the hymns to Marduk betray traces of the transfer of attributes to Marduk which originally belonged to Ea.

It is, however, more particularly as the third figure in the triad, the two other members of which were Anu (q.v.) and Bel (q.v.), that Ea acquires his permanent place in the pantheon. To him was assigned the control of the watery element, and in this capacity he becomes the shar apsi, i.e. king of the Apsu or " the deep." The Apsu was figured as an ocean encircling the earth, and since the gathering place of the dead, known as Aralu, was situated near the confines of the Apsu, he was also designated as En-Ki, i.e. " lord of that which is below," in contrast to Anu, who was the lord of the " above " or the heavens. The cult of Ea extended throughout Babylonia and Assyria. We find temples and shrines erected in his ho»our, e.g. at Nippur, Girsu, Ur, Babylon, Sippar and Nineveh, and the numerous epithets given to him, as well as the various forms under which the god appears, alike bear witness to the popularity which he enjoyed from the earliest to the latest period of Babylonian- Assyrian history. The consort of Ea, known as Damkina, " lady of that which is below," or Nin-Ki, having the same meaning, or Damgal-nunna, " great lady of the waters," represents a pale reflection of Ea and plays a part merely in association with her lord. (M. Ja.)

EABANI, the name of the friend of Gilgamesh, the hero in the Babylonian epic (see Gilgamesh, Epic of). Eabani, whose name signifies " Ea creates," pointing to the tradition which made the god Ea (q.v.) the creator of mankind, is represented in the epic as the type of the primeval man. He is a wild man who lives with the animals of the field until lured away from his surroundings by the charms of a woman. Created to become a rival to Gilgamesh, he strikes up a friendship with the hero, and together they proceed to a cedar forest guarded by Khumbaba, whom they kill. The goddess Irnina (a form of Ishtar, q.v.) in revenge kills Eabani, and the balance of the epic is taken up with Gilgamesh's lament for his friend, his wanderings in quest of a remote ancestor, Ut-Napishtim, from whom he hopes to learn how he may escape the fate of Eabani, and his finally learning from his friend of the sad fate in store for all mortals except the favourites of the god, like

Ut-Napishtim, to whom immortal life is vouchsafed as a special boon. (M. Ja.)

EACHARD, JOHN (i636?-i6o7), English divine, was born in Suffolk, and was educated at Catharine Hall, Cambridge, of which he became master in 1675 in succession to John Lightfoot. He was created D.D. in 1676 by royal mandate, and was twice (in 1679 and 1695) vice-chancellor of the university. He died on the 7th of July 1697, In 1670 he had published anonymously a humorous satire entitled The Ground and Occasions of the Contempt of the Clergy enquired into in a letter to R. L., which excited much attention and provoked several replj.es, one of them being from John Owen. These were met by Some Observations, 6"c, in a second letter to R. L. (167 1) , written in the same bantering tone as the original work. Eachard attributed the contempt into which the clergy had fallen to their imperfect education, their insufficient incomes, and the want of a true vocation. His descriptions, which were somewhat exaggerated, were largely used by Macaulay in his History of England. He gave amusing illustrations of the absurdity and poverty of the current pulpit oratory of his day, some of them being taken from the sermons of his own father. He attacked the philosophy of Hobbes in his Mr Hobb's State of Nature considered; in a dialogue between Philautus and Timothy (1672), and in his Some Opinions of Mr Hobbs considered in a second dialogue (1673). These were written in their author's chosen vein of light satire, and Dryden praised them as highly effective within their own range. Eachard's own sermons, however, were not superior to those he satirized. Swift {Works, xii. 279) alludes to him as a signal instance of a successful humorist who entirely failed as a serious writer.

A collected edition of his works in three volumes, with a notice of his life, was published in 1774. The Contempt of the Clergy was reprinted in E. Arber's English Garner. A Free Enquiry into the Causes of the very great Esteem that the Nonconforming Preachers are generally in with their Followers (1673) has been attributed to Eachard on insufficient grounds.

EADBALD (d. 640), king of Kent, succeeded to the throne on the death of his father ˆEthelberht in 616. He had not been influenced by the teaching of the Christian missionaries, and his first step on his accession was to marry his father's widow. After his subsequent conversion by Laurentius, archbishop of Canterbury, he recalled the bishops Mellitus and Justus, and built a church dedicated to the

Virgin at Canterbury. He arranged a marriage between his sister ˆEthelberg and Edwin of Northum- bria, on whose defeat and death in 633 he received his sister and Paulinus, and offered the latter the bishopric of Rochester. Eadbald married Emma, a Frankish princess, and died on the 20th of January 640.

See Bede, Historia ecclesiastica (ed. C. Plummer, Oxford, 1896) ; Saxon Chronicle (ed. J. Earle and C. Plummer, Oxford, 1899).

EADIE, JOHN (1810-1876), Scottish theologian and biblical critic, was born at Alva, in Stirlingshire, on the 9th of May 18 10. Having taken the arts curriculum at Glasgow University, he studied for the ministry at the Divinity Hall of the Secession Church, a dissenting body which, on its union a few years later with the Relief Church, adopted the title United Presbyterian. In 1835 he became minister of the Cambridge Street Secession church in Glasgow, and for many years he was generally regarded as the leading representative of his denomination in Glasgow. As a preacher, though he was not eloquent, he was distinguished by good sense, earnestness and breadth of sympathy. In 1863 he removed with a portion of his congregation to a new church at Lansdowne Crescent. In 1843 Eadie was appointed professor of biblical literature and hermeneutics in the Divinity Hall of the United Presbyterian body. He held this appointment along with his ministerial charge till the close of his life. Though not a profound scholar, he was surpassed by few biblical com- mentators of his day in range of learning, and in soundness of judgment. In the professor's chair, as in the pulpit, his strength lay in the tact with which he selected the soundest results of biblical criticism, whether his own or that of others, and pre- sented them in a clear and connected form, with a constant view

to their practical bearing. He received the degree of LL.D. from Glasgow in 1844, and that of D.D. from St Andrews in

1850.

His publications were connected with biblical criticism and interpretation, some of them being for popular use and others more strictly scientific. To the former class belong the Biblical Cyclopaedia, his edition of Cruden's Concordance, his Early Oriental History, and his discourses on the Divine Love and on Paul the Preacher; to the latter his commentaries on the Greek text of St Paul's epistles to the Ephesians, Colossians, Philippians and Galatians, published at intervals in four volumes. His last work was the History of the English Bible (2 vols., 1876). He rendered good

service as one of the revisers of the authorized version. He died at Glasgow on the 3rd of June 1876. His valuable library was bought and presented to the United Presby- terian College.

EADMER, or Edmer (c. 1060-c. n 24), English historian and ecclesiastic, was probably, as his name suggests, of English, and not of Norman parentage. He became a monk in the Benedictine monastery of Christ Church, Canterbury, where he made the acquaintance of Anselm, at that time visiting England as abbot of Bee. The intimacy was renewed when Anselm became archbishop of Canterbury in 1093; thence- forward Eadmer was not only his disciple and follower, but his friend and director, being formally appointed to this position by Pope Urban II. In n 20 he was nominated to the arch- bishopric of St Andrews, but as the Scots would not recognize the authority of the see of Canterbury he was never consecrated, and soon afterwards he resigned his claim to the archbishopric. His death is generally assigned to the year 1 1 24.

Eadmer left a large number of writings, the most important of which is his Historiae novorum, a work which deals mainly with the history of England between 1066 and 1122. Although concerned principally with ecclesiastical affairs scholars agree in regarding the Historiae as one of the ablest and most valuable writings of its kind. It was first edited by John Selden in 1623 and, with Eadmer's Vita Anselmi, has been edited by Martin Rule for the " Rolls Series " (London, 1884). The Vila Anselmi, first printed at Antwerp in 1551, is probably the best life of the saint. Less noteworthy are Eadmer's lives of St Dunstan, St Bregwin, archbishop of Canterbury, and St Oswald, archbishop of York; these are all printed in Henry Wharton's Anglia Sacra, part ii. (1691), where a list of Eadmer's writings will be found. The manuscripts of most of Eadmer's works are preserved in the library of Corpus Christi College, Cambridge.

See M. Rule, On Eadmer's Elaboration of the first four Books of " Historiae novorum " (1886) ; and Pere Ragey, Eadmer (Paris, 1892).

EADS, JAMES BUCHANAN (1820-1887), American engineer, was born at Lawrenceburg, Indiana, on the 23rd of May 1820. His first engineering work of any importance was in raising sunken steamers. In 1845 he established glass works in St Louis. During the Civil War he constructed ironclad steamers and mortar boats for the Federal government. His next important engineering achievement was the construction of the great steel arch bridge across the Mississippi at St Louis (see Bridge, fig. 29), upon which he was engaged from 1867

till 1874. The work, however, upon which his reputation principally rests was his deepening and fixing the channel at the mouths of the Mississippi by means of jetties, whereby the narrowed stream was made to scour out its own channel and carry the sediment out to sea. Shortly before his death he projected a scheme for a ship railway across the Isthmus of Tehuantepec, in lieu of an isthmian canal. He died at Nassau, in the Bahamas, on the 8th of March 1887.

EAGLE (Fr. aigle, from the Lat. aquila), the name generally given to the larger diurnal birds of prey which are not vultures; but the limits of the subfamily A quilinae have been very variously assigned by different writers on systematic ornithology, and there are eagles smaller than certain buzzards. By some authorities the Laemmergeier of the Alps, and other high mountains of Europe, North Africa and Asia, is accounted an eagle, but by others the genus Gypaetus is placed with the Vulturidae as its

common English name (bearded vulture) shows. There are also other forms, such as the South American Harpyia and its allies, which though generally called eagles have been ranked as buzzards. In the absence of any truly scientific definition of the family Aquilinae it is best to leave these and many other more or less questionable members of the group — such as the genera Spizaetus,

Fig. i. — Sea-Eagle.

Circaetus, Spilornis, Helotarsus, and so forth — and to treat here of those whose position cannot be gainsaid.

True eagles inhabit all the regions of the world, and some seven or eight species at least are found in Europe, of which two are resident in the British Islands. In England and in the Lowlands of Scotland eagles only exist as stragglers; but in the Hebrides and some parts of the Highlands a good many may yet be found, and their numbers appear to have rather increased of late years than diminished; for the foresters and shepherds, finding that a high price can be got for their eggs, take care to protect the owners of the eyries, which are nearly all well known, and to keep up the stock by allowing them at times to rear their young. There are also now not a few occupiers of Scottish forests who interfere so far as they can to protect the king of birds. 1 In Ireland the extirpation of eagles seems to have been

carried on almost unaffected by the prudent considerations which in the northern kingdom have operated so favourably for the race, and except in the wildest parts of Donegal, Mayo and Kerry, eagles in the sister island are almost birds of the p?st.

Of the two British species the erne (Icel. (Em) or sea-eagle (by some called also the white-tailed and cinereous eagle)— Haliaetus albicilla — affects chiefly the coast and neighbourhood of inland waters, living in great part on the fish and refuse that is thrown up on the shore, though it not unfrequently takes living prey, such as lambs, hares and rabbits. On these last, indeed, young examples mostly feed when they wander southward in

1 Lord Breadalbane (d. 1871) was perhaps the first large landowner who set the example that has been since followed by others. On his unrivalled forest of Black Mount, eagles — elsewhere persecuted to the death — were by him ordered to be unmolested so long as they were not numerous enough to cause considerable depredations on the farmers' flocks. He thought that the spectacle of a soaring eagle was a fitting adjunct to the grandeur of his Argyllshire mountain scenery, and a good equivalent for the occasional loss of a lamb, or the slight deduction from the rent paid by his tenantry in consequence.

autumn, as they yearly do, and appear in England. The adults (fig. 1) are distinguished by their prevalent greyish-brown colour, their pale head, yellow beak and white tail — characters, however, wanting in the immature, which do not assume the perfect plumage for some three or four years. The eyry is commonly placed in a high cliff or on an island in a lake — sometimes on the ground, at others in a tree — and consists of a vast mass of sticks in the midst of which is formed a hollow lined with Luzula sylvatica (as first observed by John Wolley) or some similar grass, and here are laid the two or three white eggs. In former days the sea-eagle seems to have bred in seveial parts of England —as the Lake district, and possibly even in the Isle of Wight and on Dartmoor. This species inhabits all the northern part of the Old World from Iceland to Kamchatka, and breeds in Europe so far to the southward as Albania. In the New World, however, it is only found in Greenland, being elsewhere replaced by the white-headed or bald eagle, II. leucocephalus, a bird of similar habits, and the chosen emblem of the United States of America. In the far east of Asia occurs a still larger and finer sea-eagle, H. pelagicus, remarkable for its white thighs and upper wing-coverts. South-eastern Europe and India furnish a much smaller specieSj-ff./eMcoryˆMiˆhichhasitsrepresentativeˆ.feMcogajter, in the Malay Archipelago and Australia, and, as allies in South Africa and

Madagascar,ˆ . vocifer and II .vociferoides respectively. All these eagles may be distinguished by their scaly tarsi, while the group next to be treated of have the tarsi feathered to the toes.

The golden or mountain eagle, Aquila chrysaetus, is the second

Fig. 2. — Mountain-Eagle.

British species. This also formerly inhabited England, and a nest , found in 1668 in the Peak of Derbyshire, is well described by Willughby, in whose time it was said to breed also in the Snowdon range. It seldom if ever frequents the coast, and is more active on the wing than the sea-eagle, being able to take some birds as they fly, but a large part of its sustenance is the flesh of animals that die a natural death. Its eyry is generally placed and built like that of the other British species, 2 but the neighbourhood of

2 As already stated, the site chosen varies greatly. Occasionally placed in a niche in what passes for a perpendicular cliff to which access could only be gained by a skilful cragsman with a rope, the writer has known a nest to within 10 or 15 yds. of which he rode on a pony. Two beautiful views of as many golden eagles' nests, drawn on the spot by Joseph Wolf, are given in the Ootheca Wolleyana, and a fine series b'f eggs is als'o figured in the same Work.

water is not requisite. The eggs, from two to four in number, vary from a pure white to a mottled, and often highly coloured, surface, on which appear different shades of red and purple. The adult bird (fig. 2) is of a rich dark brown, with the elongated feathers of the neck, especially on the nape, light tawny, in which imagination sees a " golden " hue, and the tail marbled with brown and ashy-grey. In the young the tail is white at the base, and the neck has scarcely any tawny tint. The golden eagle does not occur in Iceland, but occupies suitable situations over the rest of the Palaearctic Region and a considerable portion of the Nearctic — though the American bird has been, by some, considered a distinct species. Domesticated, it has many times been trained to take prey for its master in Europe, and to this species is thought to belong an eagle habitually used by the Kirghiz Tatars, who call it Bergut or Bearcoot, for the capture of antelopes, foxes and wolves. It is carried hooded on horse- back or on a perch between two men, and released when the quarry is in

sight. Such a bird, when well trained, is valued, says P. S. Pallas, at the price of two camels. It is quite possible, however, that more than one kind of eagle is thus used, and the services of A. heliaca (which is the imperial eagle of some writers 1) and of A. mogilnik — both of which are found in central Asia, as well as in south-eastern Europe— may also be employed.

A smaller form of eagle, which has usually gone under the name of A. naevia, is now thought by the best authorities to include three local races, or, in the eyes of some, species. They inhabit Europe, North Africa and western Asia to India, and two examples of one of them — A. clanga, the form which is somewhat plentiful in north-eastern Germany — have occurred in Cornwall. The smallest true eagle is A. pennata, which inhabits southern Europe, Africa and India. Differing from other eagles of their genus by its wedge-shaped tail, though otherwise greatly re- sembling them, is the A audax of Australia. Lastly may be noticed here a small group of eagles, characterized by their long legs, forming the genus Nisaetus, of which one species, N. fasciatus, is found in Europe. (A. N.)

EAGLEHAWK, a borough of Bendigo county, Victoria, Australia, 105 m. by rail N.N.W. of Melbourne and 4 m. from Bendigo, with which it is connected by steam tramway. Pop. (1001) 8130. It stands on the Bendigo gold-bearing reef, and its mines are important.

EAGRE (a word of obscure origin; the earliest form seems to be higre, Latinized as higra, which William of Malmesbury gives as the name of the bore in the Severn; the New English Dictionary rejects the usual derivations from the O. Eng. eagor or egor, which is seen in compounds meaning " flood," and also the connexion with the Norse sea-god Aegir), a tide wave of great height rushing up an estuary (see Bore), used locally of the Humber and Trent.

EAKINS, THOMAS (1844-), American portrait and figure painter, was born at Philadelphia, on the 25th of July 1844. A pupil of J. L. Gerome, in the Ecole des Beaux-Arts, Paris, and Also of Leon Bonnat, besides working in the studio of the sculptor Dumont, he became a prolific portrait painter. He also painted genre pictures, sending to the Centennial Exhibition at Phila- delphia, in 1876, the " Chess Players," now in the Metropolitan Museum of Art, New York. A large canvas, " The Surgical Clinic of Professor Gross," owned by Jefferson Medical College, Philadelphia, contains many life-sized figures. Eakins, with his pupil Samuel Murray (b. 1870), modelled the heroic " Prophets " for the Witherspoon Building, Philadelphia, and his work in painting has a decided sculptural quality. He was for

some years professor of anatomy at the schools of the Penn- sylvania Academy of Fine Arts in Philadelphia. A man of great inventiveness, he experimented in many directions, depicting on canvas modern athletic sports, the negro, and early American life, but he is best known by his portraits. He received awards at the Columbian (1893), Paris (1900), Pan-American (1900), and the St Louis (1904), Expositions; and won the Temple

1 Which species may have been the traditional emblem of Roman power, and the Ales Jovis, is very uncertain.

medal in the Pennsylvania Academy of Fine Arts, and the Proctor prize of the National Academy of Design.

EALING, a municipal borough in the Ealing parliamentary division of Middlesex, England, suburban to London, 9 m. W. of St Paul's cathedral. Pop. (1891) 23,979; iˆ 01) 33,˚3i- The nucleus of the town, the ancient village, lies south of the highroad to Uxbridge, west of the open Ealing Common. The place is wholly residential. At St Mary's church, almost wholly rebuilt c. 1870, are buried John Oldmixon, the historian (d. 1742), and Home Tooke (d.1812). The church of All Saints (1905) com- memorates Spencer Perceval, prime minister, who was assassi- nated in the House of Commons in 181 2. It was erected under the will of his daughter Frederica, a resident of Ealing. Gunners- bury Park, south of Ealing Common, is a handsome Italian mansion. Among former owners of the property was Princess Amelia, daughter of George II., who lived here from 1761 till her death in 1786. The name of Gunnersbury is said to be traceable to the residence here of Gunilda, niece of King Canute. The manor of Ealing early belonged to the see of London; but it is not mentioned in Domesday and its history is obscure.

EAR (common Teut.; O.E. tare, Ger. Ohr, Du. oor, akin to Lat. auris, Gr. oCs), in anatomy, the organ of hearing. The human ear is divided into three parts — external, middle and internal. The external ear consists of the pinna and the external auditory meatus. The pinna is composed of a yellow fibro-cartilaginous framework covered by skin, and has an external and an internal or cranial surface. Round the margin of the external surface in its upper three quarters is a rim called the helix (fig. 1, a), in which is often seen a little prominence

Fig. 1. — The Ear as seen in Section.

0, Helix.

n,

External auditory meatus.

b, Antitragus.

0,

Membrana tympani.

c, Antihelix.

P,

Tympanum.

d, Concha.

1,

points to malleus.

e, Lobule.

2,

to incus.

/, Mastoid process.

3-

to stapes.

g, Portio dura.

4.

to cochlea.

h, Styloid process. “»

5.

6, 7, the three semicircular

k. Internal carotid artery.

canais.

/, Eustachian tube.

8

and 9, facial and auditory

m, Tip of petrous process.

nerves.

known as Darwin's tubercle, representing the folded-over apex of a prick-eared ancestor. Concentric with the helix and nearer the meatus is the antihelix (6), which, above, divides into two. limbs to enclose the triangular fossa of the antihelix. Between the helix and the antihelix is the fossa of the helix. In front of the antihelix is the deep fossa known as the concha (fig. i,d), and from the anterior part of this the meatus passes inward into the skull. Overlapping the meatus from in front is a flap called the tragus, and below and behind this is another smaller flap, the antitragus. The lower part of the pinna is the lobule (e), which contains no cartilage. On the cranial surface of the pinna elevations correspond to the concha and to the fossae

of the helix and antihelix. The pinna can be slightly moved by the anterior, superior and posterior auricular muscles, and in addition to these there are four small intrinsic muscles on the external surface, known as the helicis major and minor, the tragicus and the antitragicus, and two on the internal surface called the obliquus and transversus. The external auditory meatus (fig. i, n) is a tube running at first forward and upward, then a little backward and then forward and slightly downward; of course all the time it is also running inward until the tympanic membrane is reached. The tube is about an inch long, its outer third being cartilaginous and its inner two-thirds bony. It is lined by skin in its whole length, the sweat glands of which are modified to secrete the wax or cerumen.

The middle ear or tympanum (fig. i, p) is a small cavity in the temporal bone, the shape of which may perhaps be realized by imagining a hock bottle subjected to lateral pressure in such a way that its circular section becomes triangular, the base of the triangle

being above. The neck of the bottle, also laterally compressed, will represent the Eustachian tube (fig. i, /), which runs forward, inward and downward, to open into the naso- pharynx, and so admits air into the tympanum. The bottom of the bottle will represent the posterior wall of the tympanum, from the upper part of which an opening leads backward into the mastoid antrum and so into the air-cells of the mastoid process. Lower down is a little pyramid which transmits the stapedius muscle, and at the base of this is a small opening known as the iter chordae posterius, for the chorda tympani to come through from the facial nerve. The roof is formed by a very thin plate of bone, called the tegmen tympani, which separates the cavity from the middle fossa of the skull. Below the roof the upper part of the tympanum is somewhat constricted off from the rest, and to this part the term " attic " is often applied. The floor is a mere groove formed by the meeting of the external and internal walls. The outer wall is largely occupied by the tympanic membrane (fig. i, o), which entirely separates the middle ear from the external auditory meatus; it is circular, and so placed that it slopes from above, downward and inward, and from behind, forward and inward. Externally it is lined by skin, internally by mucous membrane, while between the two is a firm fibrous membrane, convex inward about its centre to form the umbo. Just in front of the membrane on the outer wall is the Glaserian fissure leading to the glenoid cavity, and close to this is the canal of Huguier for the chorda tympani nerve. The inner wall shows a promontory caused by the cochlea and grooved by the tympanic plexus of nerves; above and behind it is the fenestra ovalis, while below and behind the fenestra rotunda is seen, closed by a membrane. Curving round, above and behind the promontory and fenestr.ae, is a ridge caused by the aqueductus Fallopii or canal for the facial nerve. The whole tympanum is about half an inch from before backward, and half an inch high, and is spanned from side to side by three small bones, of which the malleus (fig. i, _Z) is the most external. This is attached by its handle to the umbo of the tympanic mem- brane, while its head lies in the attic and articulates posteriorly with the upper part of the next bone or incus (fig. i, 2). The tong process of the incus runs downward and ends in a little knob called the os orbiculare, which is jointed on to the stapes or stirrup bone (fig. i,3). The two branches of the stapes are anterior and posterior, while the footplate fits into the fenestra ovalis and is bound to it by a membrane. It will thus be seen that the stapes lies nearly at right angles to the long process of the incus. From the front of the malleus a slender process projects forward into the Glaserian fissure, while from the back of the incus the posterior process is directed backward and is attached to the posterior wall of the

tympanum. These two processes form a fulcrum by which the lever action of the malleus and incus is brought about, so that when the handle of the malleus is pushed in by the membrane the head moves out; the top of the incus, attached to it, also moves out, and the os orbiculare moves in, and so the stapes is pressed into the fenestra ovalis. The stapedius and tensor tympanic muscles, the latter of which enters the tympanum in a canal just above the

Fig. 2. — Diagram of the Mem- branous Labyrinth. DC, Ductus cochlearis. dr, Ductus reuniens. Sacculus. Utriculus.

Ductus endolymphaticus. Semicircular canals. (After Waldeyer.)

S, U, dv, SC,

Eustachian tube to be attached to the malleus, modify the movements of the ossicles.

The mucous membrane lining the tympanum is continuous through the Eustachian tube with that of the naso-pharynx, and is reflected on to the ossicles, muscles and chorda tympani nerve. It is ciliated except where it covers the membrana tympani, ossicles and promontory; here it is stratified.

The internal ear or labyrinth consists of a bony and a mem- branous part, the latter of which is contained in the former. The bony labyrinth is composed of the vestibule, the semi- circular canals and the cochlea. The vestibule lies just internal to the posterior part of the tympanum, and there would be a communication between the two, through the fenestra ovalis, were it not that the foot- plate of the stapes blocks the way. The inner wall of the vestibule is separated from the bottom of the internal auditory meatus by a plate of bone pierced by many foramina for branches of the auditory nerve (fig. i, 9), while at the lower part is the opening of the aqueductus vestibuli, by means of which a communication is estab- lished with the posterior cranial fossa. Posteriorly the three semicircular canals open into the vestibule; of these the external (fig. i, 7) has two independent openings, but the superior and posterior (fig. i, 5 and 6) join together at one end and so have a common opening, while at their other ends they open separately. The three canals have therefore five openings into the vestibule instead of six. One end of each canal is dilated to form its ampulla. The superior semicircular canal is vertical, and the two pillars of its arch are nearly external and internal; the external canal is horizontal, its two pillars being anterior and posterior, while the convexity of the arch of the

posterior canal is backward and its two pillars are superior and inferior. Anteriorly the vestibule leads into the cochlea (fig. i, Jf), which is twisted two and a half times round a central pillar called the modiolus, the whole cochlea forming a rounded cone something like the shell of a snail though it is only about S mm. from base to apex. Pro- jecting from the modiolus is a horizontal plate which runs round it from base to apex like a spiral staircase; this is known as the lamina spiralis, and it stretches nearly half-way across the canal of the cochlea. At the summit it ends in a little hook named the hamulus. The modiolus is pierced by canals which transmit branches of the auditory nerve to the lamina spiralis.

The membranous labyrinth lies in the bony labyrinth, but does not fill it; be- tween the two is the fluid called peri- lymph, while inside the membranous nar ce lls covering the labyrinth is the endolymph. In the bony crista acustica ; p, peri- vestibule lie two membranous bags, pheral, and c, central the saccule (fig. 2 , S) in front, and the T -rvetb utricle (fig. 2, U) behind; each of these (After Rudinger.) has a special patch or macula to which

twigs of the auditory nerve are supplied, and in the mucous membrane of which specialized hair cells are found (fig. 3, p).

Attached to the maculae are crystals of carbonate of lime called otoconia. The membranous semicircular canals are very much smaller in section than tbe bony; in the ampulla of each is a ridge, the crista acustica, which is covered by a mucous

Colum-

Hensen's stripe

Membrana tectoria Sulcus spiralis internus Limbus laminae spiral is

membrane containing sensory hair cells like those in the maculae. All the canals open into the utricle. From the lower part of the saccule a small canal called the ductus endolymphaticus (fig. 2, dv) runs into the aqueductus vestibuli; it is soon joined by a small duct from the utricle, and ends, close to the dura mater of the posterior fossa of the cranium, as the saccus endolymphaticus, which may have minute perforations through which the endolymph can pass. Anteriorly the saccule com- municates with the membranous cochlea or scala media

by a short ductus reuniens (fig. 2, dr). A sec- tion through each turn of the cochlea shows the bony lamina spiralis, already noticed, which is continued right across the canal by the basilar mem- brane (fig. 4, bm), thus cutting the canal into an upper and lower half and connected with the outer wall by the strong spiral ligament (fig. 4, si). Near the free end of the lamina spiralis another membrane called the membrane of Reissner (fig. 4, »R) is attached, and runs outward and upward to the outer wall, taking a triangular slice out of the upper half of the section. There are now three canals seen in section, the upper of which is the scala vestibuli (fig. 4,

SV), the middle and outer the scala media, ductus coch- learis or true membranous cochlea (fig. 4> DC), while the lower is the scala tympani (fig. 4, ST). The scala vestibuli and scala tympani communicate at the apex of the cochlea by an opening known as the helicotrema, so that the perilymph can here pass from one canal to the other. At the base of the cochlea the

at the apex of the cochlea, it ends in a blind extremity of consider- able morphological interest called the lagena.

The scala media contains the essential organ of hearing or organ of Corti (fig. 4, oc), which lies upon the inner part of the basilar membrane; it consists of a tunnel bounded on each side of the inner and outer rods of Corti; on each side of these are the inner and outer hair cells, between the latter of which are

Outer rod of Corti Inner rod of Corti Outer hair cells

Inner hair cell

Cells of Hensen

Membrana basilaris

Cells of Claudius

Inner spiral fasciculus Vas spirale

Tunnel of Corti

Cells of Deiters Space of Nuel

(From R. Howden-

Fig.

Cunningham's Text-Book oj Anatomy)

•Transverse Section of Corti's Organ from the Central Coil of Cochlea (Retzius).

found the supporting cells of Deiters. Most externally are the large cells of Hensen. A delicate membrane called the lamina reticularis covers the top of all these, and is pierced by the hairs of the hair cells, while above this is the loose membrana tectoria attached to the periosteum of the lamina spiralis, near its tip, internally, and possibly to some of Deiter's cells externally. The cochlear branch of the auditory nerve enters the lamina spiralis, where a spiral ganglion (fig. 4, sg) is developed on it; after this it is distributed to the inner and outer hair cells.

For further details see Text-Book of Anatomy, edited by D. J. Cunningham (Edinburgh, 1906) ; Quain's Elements of Anatomy (London, 1893); Gray's Anatomy (London, 1905); A Treatise on Anatomy, edited by H. Morris (London, 1902) ; A Text-Book of Human Anatomy, by A. Macalister (London, iS "

Fig. 4. — Transverse Section through the Tube of the Cochlea, m, Modiolus. bm, Basilar membrane.

O, Outer wall of cochlea. cs,

SV, Scala vestibuli. si,

ST, Scala tympani. sg, DC, Ductus cochlearis.

i»R, Membrane of Reissner. oc,

Crista spiralis.

Spiral ligament.

Spiral ganglion of auditory

nerve. Organ of Corti.

perilymph in the scala vestibuli is continuous with that in the vestibule, but that in the scala tympani bathes the inner surface of the membrane stretched across the fenestra rotunda, and also communicates with the subarachnoid space through the aque- ductus cochleae, which opens into the -posterior cranial fossa. The scala media containing endolymph communicates, as has been shown, with

the saccule through the canalis reuniens, while,

Embryology. — The pinna is formed from six tubercles which appear round the dorsal end of the hyomandibular cleft or, more strictly speaking, pouch. Those for the tragus and anterior part of the helix belong to the first or mandibular arch, while those for the antitragus, antihelix and lobule come from the second or hyoid arch. The tubercle for the helix is dorsal to the end of the cleft where the two arches join. The external auditory meatus, tympanum and Eustachian tube are remains of the hyomandibular cleft, the membrana tympani being a remnant of the cleft membrane and therefore lined by ectoderm outside and entoderm inside. The origin of the ossicles is very doubtful. H. Gadow's view, which is one of the latest, is that all three are derived from the hyomandibular plate which connects the dorsal ends of the hyoid and mandibular bars {Anatomischer Anzeiger, Bd. xix., 1901, p. 396). Other papers which should be consulted are those of E. Gaupp, Anatom. Hefte, Ergebnisse, Bd. 8, 1898, p. 991, and J. A. Hammar, Archivf. mikr. Anal, lix., 1902. These papers will give a clue to the immense literature of the subject. The internal ear first appears as a pit from the cephalic ectoderm, the mouth of which in Man and other mammals closes up, so that a pear-shaped cavity is left. The stalk of the pear which is nearest the point of invagination is called the recessus labyrinthi, and this, after losing its connexion with the surface of the embryo, grows backward toward the posterior cranial fossa and becomes the ductus endolymphaticus. The lower part of the vesicle grows forward and becomes the cochlea, while from the upper part three hollow circular plates grow out, the central parts of which disappear, leaving the margin as the semicircu- lar canals. Subsequently constrictions appear in the vesicle marking off the saccule and utricle. From the surrounding

mesoderm the petrous bone is formed by a process of chondrification and ossification.

See W. His, Junr., Archiv f. Anat. und Phys., 1889, supplement, p. 1 ; also Streeter, Am. Journ. of Anat. vi., 1907.

Comparative Anatomy. — The ectodermal inpushing of the internal ear has probably a common origin with the organs of the lateral line of fish. In the lower forms the ductus endolym- phaticus retains its

communication with the exterior on the dorsum of the head, and in some Elasmobranchs the opening is wide enough to allow the passage of particles of sand into the saccule. It is probable that this duct is the same which, taking a different direction and losing its communication with the skin, abuts on the posterior cranial fossa of higher forms (see Rudolf Krause, " Die Entwickelung des Aq. vestibuli seu d. Endelym- phaticus," Anat. Anzeiger, Bd. xix., 1901, p. 49). In certain Teleostean fishes the swim bladder forms a secondary communica- tion with the internal ear by means of special ossicles (see G. Ridewood, Journ. Anat. 6 Phys. vol. xxvi.). Among the Cyclostomata the external semicircular canals are wanting; Petromyzon has the superior and posterior only, while in Myxine these two appear to be fused so that only one is seen. In higher types the three canals are constant. Concretions of carbonate of lime are present in the internal ears of almost all vertebrates; when these are very small they are called otoconia, but when, as in most of the teleostean fishes, they form huge concretions, they are spoken of as otoliths. One shark, Squatina, has sand instead of otoconia (C. Stewart, Journ. Linn. Society, xxix. 409). The utricle, saccule, semicircular canals, ductus endolymphaticus and a short lagena are the only parts of the ear present in fish.*

The Amphibia have an important sensory area at the base of the lagena known as the macula acustica basilaris, which is probably the first rudiment of a true cochlea. The ductus endolymphaticus has lost its communication with the skin, but it is frequently prolonged into the skull and along the spinal canal, from which it protrudes, through the intervertebral foramina, bulging into the coelom. This is the case in the com- mon frog (A. Coggi, Anat. Anz. 5. Jahrg., 1890, p. 177). In this class the tympanum and Eustachian tube are first developed; the membrana tympani lies flush with the skin of the side of the head, and the sound-waves are transmitted from it to the internal ear by a single bony rod — the columella.

In the Reptilia the internal ear passes through a great range of development. In the Chelonia and Ophidia the cochlea is as rudimentary as in the Amphibia, but in the higher forms (Crocodilia) there is a lengthened and slightly twisted cochlea, at the end of which the lagena forms a minute terminal appen- dage. At the same time indications of the scalae tympani and vestibuli appear. As in the Amphibia the ductus endolymphati- cus sometimes extends into the cranial cavity and on into other parts of the body. Snakes have no tympanic membrane. In the birds the cochlea resembles that of the crocodiles, but the posterior semicircular canal is above the superior where they join one another. In certain lizards and birds (owls) a

small fold of skin represents the first appearance of an external ear. In the monotremes the internal ear is reptilian in its arrangement, but above them the mammals always have a spirally twisted cochlea, the number of turns varying from one and a half in the Cetacea to nearly five in the rodent Coelogenys. The lagena is reduced to a mere vestige. The organ of Corti is peculiar to mammals, and the single columella of the middle ear is replaced by the three ossicles already described in Man (see Alban Doran, " Morphology of the Mammalian Ossicula auditus," Proc. Linn. Soc, 1876-1877, xiii. 185; also Trans. Linn. Soc. 2nd Ser. Zool. i. 371). In some mammals, especially Carnivora,' the middle ear is enlarged to form the tympanic bulla, but the mastoid cells are peculiar to Man.

For further details see G. Retzius, Das Gehororgan der Wirbel- thiere (Stockholm, 1881-1884); Catalogue of the Museum of the R. College of Surgeons — Physiological Series, vol. iii. (London, 1906) ; R. Wiedersheim's Vergleichende Anatomie der Wirbeltiere (Jena, 1902). (F. G. P.)

Diseases of the Ear

Modern scientific aural surgery and medicine (commonly known as Otology) dates from the time of Sir William Wilde of Dublin (1843), whose work marked a great advance in the application of anatomical, physiological and therapeutical knowledge to the study of this organ. Less noticeable con- tributions to the subject had not long before been made by Saunders (1827), Kramer (1833), Pilcher (1841) and Yearsley (1841). The next important event in the history of otology was the publication of J. Toynbee's book in i860 containing his valuable anatomical and pathological observations. Von Troltsch of Wiirzburg, following on the lines of Wilde and Toynbee, produced two well-known works in 1861 and 1862, laying the foundation of the study in Germany. In that country and in Austria he was followed by Hermann Schwartze, Politzer, Gruber, Weber-Liel, Riidinger, Moos and numerous others. France produced Itard, de la Charriere, Meniere, Loewenberg and Bonnafont; and Belgium, Charles Delstanche, father and son. In Great Britain the work was carried on by James Hinton (1874), Peter Allen (187 1), Patterson Cassells and Sir William Dalby. In America we may count among the early otologists Edward H. Clarke (1858), D. B. St John Roosa, H. Knapp, Clarence J. Blake, Albert H. Buck and Charles Burnett. Other workers all over the world are too numerous to mention.

Various Diseases and Injuries. — Diseases of the ear may affect any

of the three divisions, the external, middle or internal ear. The commoner affections of the auricle are eczema, various tumours (simple and malignant), and serous and sebaceous cysts. Haematoma auris (othaematoma) , or effusion of blood into the auricle, is often due to injury, but may occur spontaneously, especially in insane persons. The chief diseases of the external auditory canal are as follows: — impacted cerumen (or wax), circumscribed (or furuncular) inflammation, diffuse inflammation, strictures due to inflammatory affections, bony growths, fungi (otomycosis), malignant disease, caries and necrosis, and foreign bodies.

Diseases of the middle ear fall into two categories, suppurative and non-suppurative {i.e. with and without the formation of pus). Suppurative inflammation of the middle ear is either acute or chronic, and is in either case accompanied by perforation of the drum head and discharge from the ear. The chief importance of these affections, in addition to the symptoms of pain, deafness, discharge, &c, is the serious complications which may ensue from their neglect, viz. aural polypi, caries and necrosis of the bone, affections of the mastoid process, including the mastoid antrum, paralysis of the facial nerve, and the still more serious intracranial and vascular infective diseases, such as abscess in the brain (cerebrum or cerebellum), meningitis, with subdural and extradural abscesses, septic thrombosis of the sigmoid and other venous sinuses, and pyaemia. It is owing to the possi- bility of these complications that life insurance companies usually, and rightly, inquire as to the presence of ear discharge before accepting a life. Patterson Cassells of Glasgow urged this special point as long ago as 1877. Acute suppurative disease of the middle ear is often due to the exanthemata, scarlatina, measles and smallpox, and to bathing and diving. It may also be caused by influenza, diphtheria and pulmonary phthisis.

Non-suppurative disease of the middle ear may be acute or chronic. In the acute form the inflammation is less violent than in the acute suppurative inflammation, and is rarely accom- panied by perforation. Chronic non-suppurative inflammation may be divided into the moist form, in which the symptoms are improved by inflation of the tympanum through the Eustachian tube, and the dry form (including sclerosis), which is more in- tractable and in which this procedure has little or no beneficial effect. Diseases of the internal ear may be primary or secondary to an affection of the tympanum or to intracranial disease.

Injuries to any part of the ear may occur, among the commoner being injuries to the auricle, rupture of the drum head (from explosions, blows on the ear or the introduction of sharp bodies into the ear canal) , and injuries from fractured skull. Congenital

malformations of the ear are most frequently met with in the auricle and external canal.

Methods of Examination. — The methods of examining the ear are roughly threefold: — (i) Testing the hearing with watch, voice and tuning-fork. The latter is especially used to distinguish between disease of the middle ear (conducting apparatus) and that of the internal ear (perceptive apparatus). Our knowledge of the subject has been brought to its present state by the labours of many observers, notably Weber, Rinne, Schwabach, Lucae and Gelle. (2) Examination of the canal and drum-head with speculum and reflector, introduced by Kramer, Wilde and von Troltsch. (3) Examination of the drum-cavity through the Eustachian tube by the various methods of inflation.

Symptoms. — The chief symptoms of ear diseases are deafness, noises in the ear (tinnitus aurium), giddiness, pain and discharge. Deafness (or other disturbance of hearing) and noises may occur from disease in almost any part of the ear. Purulent discharge usually comes from the middle ear. Giddiness is more commonly associated with affections of the internal ear.

Treatment. — Ear diseases are treated on ordinary surgical and medical lines, due regard being had to the anatomical and physiological peculiarities of this organ of sense, and especially to its close relationship, on the one hand to the nose and naso-pharynx, and on the other hand to the cranium and its contents. The chief advance in aural surgery in recent years has been in the surgery of the mastoid process and antrum. The pioneers of this work were H. Schwartze of Halle, and Stacke of Erfurt, who have been followed by a host of workers in all parts of the world. This development led to increased attention being paid to the intra- cranial complications of suppurative ear disease, in the treatment of which great strides have been made in the last few years.

Effects of Diseases of the Nose on the Ear. — The influence of diseases of the nose and naso-pharynx on ear diseases was brought out by Loewenberg of Paris, Voltolini of Breslau, and especially by Wilhelm Meyer of Copenhagen, the discoverer of adenoid vegetations of the naso-pharynx (" adenoids "), who recognized the great importance of this disease and gave an inimitable account of it in the Trans, of the Royal Medical and Chirurgical Society of London, 1870, and the Archivfiir Ohrenheilkunde, 1873. Adenoid vegetations, which consist of an abnormal enlargement of Luschka's tonsil in the vault of the pharynx, frequently give rise to ear disease in children, and, if not attended to, lay the foundation of nasal and ear troubles in after life. They are often associated with enlargement of the faucial tonsils.

Journals. — In 1864 the Archiv fur Ohrenheilkunde was started by Politzer and Schwartze, and, in 1867, the Monatsschtift fur Ohrenheilkunde (a monthly publication) was founded by Voltolini, Gruber, Weber-Liel and Riidinger. Appearing first as the Archives of Ophthalmology and Otology, simultaneously in English and German, in 1869, the Archives of Otology became a separate publication under the editorship of Knapp, Moos and Roosa in 1879. Amongst other journals now existing are Annates des maladies de t'oreille et du larynx (Paris), Journal of Laryngology (London), Centralblatt fur Ohrenheilkunde (Leipzig), &c.

Societies. — The earliest society formed was the American Otological Society (1868), which held annual meetings and published yearly transactions. Flourishing societies for the study of otology (sometimes combined with laryngology) exist in almost all civilized countries, and they usually publish transactions consisting of original papers and cases The Otological Society of the United Kingdom was founded in 1900.

International Congresses. — International Otological congresses have been held at intervals of about four years at New York, Milan, Basel, Brussels, Florence, London and Bordeaux (1904). The proceedings of the congresses appear as substantial volumes.

Hospitals. — The earliest record of a public institution for the treatment of ear diseases is a Dispensary for Diseases of the Eye and Ear in London, started by Saunders and Cooper, which existed in 1804; the aural part, however, was soon closed, so that the actual oldest institution appears to be the Royal Ear Hospital, London, which was founded by Curtis in 1816. Four years later there was started the New York Eye and Ear Infirmary. At the present time in every large town of Europe and America ear diseases are treated either in separate departments of general hospitals or in institutions especially devoted to the purpose.

For a history of otology from the earliest times refer to A Practical Treatise on the Diseases of the Ear, by D. B. St John Roosa, M.D., LL.D. (6th edition, New York. 1885). and for a general account of

the present state of otological science to A Text-Book of the Diseases of the Ear for Students and Practitioners, by Professor Dr Adam Politzer, transl. by Milton J. Ballin, Ph.B., M.D., and Clarence J. Heller, M.D. (4th edition, London, 1902). (E. C. B.)*

EARL, a title and rank of nobility (corresponding to Lat. comes; Fr.

comte), now the third in order of the British peerage, and accordingly intervening between marquess and viscount. Earl, however, is the oldest title and rank of English nobles, and was the highest until the year 1337, when the Black Prince was created duke of Cornwall by Edward III.

The nature of a modern earldom is readily understood, since it is a rank and dignity of nobility which, while it confers no official power or authority, is inalienable, indivisible, and descends in regular succession to all the heirs under the limitation in the grant until, on their failure, it becomes extinct.

The title is of Scandinavian origin, and first appears in England under Canute as jarl, which was englished as eorl. Like the ealdorman), whose place he took, the eorl was a great royal officer, who mightbesetoverseveralcounties, but who presided separately in the county court of each with the bishop of the diocese. Although there were counts in Normandy before the Norman Conquest, they differed in character from the English earls, and the earl's position appears to have been but slightly modified by the Conquest. He was still generally entitled to the " third penny " of the county, but his office tended, under Norman influence, to become an hereditary dignity and his sphere was restricted by the Conqueror to a single county. The right to the " third penny " is a question of some obscurity, but its possession seems to have been deemed the distinctive mark of an earl, while the girding with " the sword of the county " formed the essential feature in his creation or investiture, as it continued to do for centuries later. The fact that every earl was the earl of a particular county has been much obscured by the loose usage of early times, when the style adopted was sometimes that of the noble's surname (e.g. the Earls Ferrers), sometimes that of his chief seat (e.g. the Earls of Arundel), and sometimes that of the county. Palatine earldoms, or palatinates, were those which possessed regalia, i.e. special privileges delegated by the crown. The two great examples, which dated from Norman times, were Chester and Durham, where the earl and the bishop respectively had their own courts and jurisdiction, and were almost petty sovereigns.

The earliest known charter creating an earl is that by which Stephen bestowed on Geoffrey de Mandeville, in or about 1140, the earldom of Essex as an hereditary dignity. Several other creations by Stephen and the empress Maud followed in quick succession. From at least the time of the Conquest the earl had a double character; he was one of the " barons," or tenants in chief, in virtue of the fief he held of the crown, as well as an earl in virtue of his " belting " (with the

sword) and his " third penny " of the county. His fief would descend to the heirs of his body; and the earliest charters creating earldoms were granted with the same " limitation." The dignity might thus descend to a woman, and, in that case, like the territorial fief, it would be held by her husband, who might be summoned to parliament in right of it. The earldom of Warwick thus passed through several families till it was finally obtained, in 1449, by the Kingmaker, who had married the heiress of the former earls. But in the case of " co-heiresses " (more daughters than one), the king determined which, if any, should inherit the dignity.

The 14th century saw some changes introduced. The earldom of March, created in 1328, was the first that was not named from a county or its capital town. Under Edward III. also an idea appears to have arisen that earldoms were connected with the tenure of lands, and in 1337 several fresh ones were created and large grants of lands made for their support. The first earldom granted with limitation to the heirs male of the grantee's body was that of Nottingham in 1383. Another innovation was the grant of the first earldom for life only in 1377. The girding with the sword was the only observance at a creation till the first year of Edward VI., when the imposition of the cap

of dignity and a circlet of gold was added. Under James I. the patent of creation was declared to be sufficient without any ceremony. An earl's robe of estate has three bars of ermine, but possibly it had originally four.

Something should be said of anomalous earldoms with Norman or Scottish styles. The Norman styles originated either under the Norman kings or at the time of the conquest of Normandy by the house of Lancaster. To the former period belonged that of Aumale, which successive fresh creations, under the Latinized form " Albemarle " have perpetuated to the present day (see Albemarle, Earls and Dukes or). The so-called earls of Eu and of Mortain, in that period, were really holders of Norman comteS. Henry V. and his son created five or six, it is said, but really seven at least, Norman countships or earldoms, of which Harcourt (1418), Perche (1419), Dreux (1427) and Mortain (? 1430) were bestowed on English nobles, Eu (1410), and Tankerville (1419) on English commoners, and Longueville (1410) oh a foreigner, Gaston de Foix. Of these the

earldom of " Eu " was assumed by the earls of Essex till the death of Robert, the parliament's general (1646), while the title of Tankerville still survives under a modern creation (1714). An anomalous royal licence of 1661 permitted the earl of Bath to use the title of earl of Corbeil by alleged hereditary right. Of Scottish earldoms recognized in the English parliament the most remarkable case is tnat of the Lords Umfraville, who were summoned for three gene- rations (1297-1380), as earls of Angus; Henry, Lord Beaumont, also was summoned as earl of Buchan from 1334 to 1339.

The earldom of Chester is granted to the princes of Wales on their creation, and the Scottish earldom of Carrick is held by the eldest son of the sovereign under act of parliament.

The premier earldom is that of Arundel (q.v.), but as this is at present united with the dukedom ot Norfolk, tli» oldest earldom not merged in a higher title is that of Shrewsbury (1442), the next in seniority being Derby (1485), and Huntingdon (1529). These three have been known as " the catskin earls," a term of uncertain origin. The ancient earldom of Wiltshire (1397) was unsuccessfully claimed in 1869 by Mr Scrope of Danby, and that of Norfolk (1312), in 1906, by Lord Mowbray and Stourton.

The premier earldom of Scotland as recognized by the Union Roll (1707), is that of Crawford, held by the Lindsays since its creation in 1398; but it is not one of the ancient " seven earl- doms." The Decreet of Ranking (1606) appears to have recog- nized the earldom of Sutherland as the most ancient in virtue of a charter of 1347, but the House of Lords' decision of 1771 recognized it as having descended from at least the year 1275, and it may be as old as 1228. It is at present united with the dukedom of Sutherland. The original " seven earldoms " (of which it was one) represented seven provinces, each of which was under a " mormaer." This Celtic title was rendered " jarl " by the Norsemen, and under Alexander I. (c. in 5) began to be replaced by earl (comes), owing to Anglo-Norman influence, which also tended to make these earldoms less official and more feudal.

In Ireland the duke of Leinster is, as earl of Kildare, premier earl as well as premier duke.

■ *An earl is " Right Honourable," and is styled " My Lord." His eldest son bears his father's " second title," and. therefore, that second title being in most cases a viscounty, he generally is styled "*

Viscount "; where, as with Devon and Huntingdon, there is no second title, one may be assumed for convenience; under all circumstances, however, the eldest son of an earl takes precedence immediately after the viscounts. The younger sons of earls are " Honourable," but all their daughters are " Ladies." In formal documents and instruments, the sovereign, when addressing or making mention of any peer of the degree of an earl, usually designates him " trusty and well-beloved cousin," — a form of appellation first adopted by Henry IV., who either by descent or alliance was actually related to every earl and duke in the realm. The wife of an earl is a countess; she is " Right Honourable," and is styled " My Lady." For the earl's coronet see Crown and Coronet.

See Lord's Reports on the Dignity of a Peer; Pike's Constitutional

History of the House of Lords; Selden's Titles of Honour; G. E. C(okayne)'s Complete Peerage; Round's Geoffrey de Mandeville.

(J. H. R.)

EARLE, JOHN (c. 1601-1665), English divine, was born at York about 1601. He matriculated at Christ Church, Oxford, but migrated to Merton, where he obtained a fellowship. In 1 63 1 he was proctor and also chaplain to Philip, earl of Pembroke, then chancellor of the university, who presented him to the rectory of Bishopston in Wiltshire. His fame spread, and in 1641 he was appointed chaplain and tutor to Prince Charles. In 1643 he was elected one of the Assembly of Divines at West- minster, but his sympathies with the king and with the Anglican Church were so strong that he declined to sit. Early in 1643 ne was chosen chancellor of the cathedral of Salisbury, but of this preferment he was soon deprived as a " malignant." After Cromwell's great victory at Worcester, Earle went abroad, and was named clerk of the closet and chaplain to Charles II. He spent a year at Antwerp in the house of Isaac Walton's friend, George Morley, who afterwards became bishop of Winchester. He next joined the duke of York (James II.) at Paris, returning to England at the Restoration. He was at once appointed dean of Westminster, and in 1661 was one of the commissioners for revising the liturgy. He was on friendly terms with Richard Baxter. In November 1662 he was consecrated bishop of Worcester, and was translated, ten months later, to the see of Salisbury, where he conciliated the nonconformists. He was strongly opposed to the Conventicle and Five Mile Acts. During the great plague Earle attended the king and queen at Oxford, and there he died on the 17th of November 1665.

Earle's chief title to remembrance is his witty and humorous work entitled Microcosmographie, or a Peece of the World dis- covered, in Essayes and Characters, which throws light on the manners of the time. First published anonymously in 1628, it became very popular, and ran through ten editions in the lifetime of the author. The style is quaint and epigrammatic; and the reader is frequently reminded of Thomas Fuller by such passages as this: " A university dunner is a gentlemen follower cheaply purchased, for his own money has hyr'd him." Several reprints of the book have been issued since the author's death; and in 1671 a French translation by J. Dymock appeared with the title of Le Vice ridicule, Earle was employed by Charles II. to make the Latin translation of the Eikon Basilike, published in 1649. A similar translation of R. Hooker's Ecclesiastical Polity was accidentally destroyed.

" Dr Earle," says Lord Clarendon in his Life, " was a man of great piety and devotion, a most eloquent and powerful preacher, and of a conversation so pleasant and delightful, so very innocent, and so very facetious, that no man's company was more desired and loved. No man was more negligent in his dress and habit and mien, no man more wary and cultivated in his behaviour and discourse. He was very dear to the Lord Falkland, with whom he spent as much time as he could make his own."

See especially Philip Bliss's edition of the Microcosmographie (London, 181 1), and E. Arber's Reprint (London, 1868).

EARLE, RALPH (1751-1801), American historical and por- trait painter, was born at Leicester, Massachusetts, on the nth of May 1751. Like so many of the colonial craftsmen, Earle was self-taught, and for many years was an itinerant painter. He went with the Governor's Guard to Lexington and made battle sketches, from which in 1775 he painted four scenes, engraved by Amos Doolittle, which are probably the first his- torical paintings by an American. After the War of Independ- ence, Earle went to London, entered the studio of Benjamin' West, and painted the king and many notables. After his return to America in 1786 he made portraits of Timothy Dwight, Governor Caleb Strong, Roger Sherman, and other prominent men. He also painted a large picture of Niagara Falls. He died at Bolton, Connecticut, on the 16th of August 1801.

EARL MARSHAL, in England, a functionary who ranks as the eighth of the great officers of state. He is the head of the college of arms, and has the appointment of the kings-of-arms, heralds and pursuivants at his discretion. He attends the sovereign in opening and

closing the session of parliament,

walking opposite to the lord great chamberlain on his or her right hand. It is his duty to make arrangements for the order of all state processions and ceremonials, especially for coronations and royal marriages and funerals. Like the lord high constable he rode into Westminster Hall with the champion after a coro- nation, till the coronation banquet was abandoned, taking his place on the left hand, and with the lord great chamberlain he assists at the introduction of all newly-created peers into the House of Lords.

The marshal appears in the feudal armies to have been in command of the cavalry under the constable, and to have in some measure superseded him as master of the horse in the royal palace. He exercised joint and co-ordinate jurisdiction with the constable in the court of chivalry, and afterwards became the sole judge of that tribunal till its obsolescence. The marshalship of England was formerly believed to have been inherited from the Clares by the Marshal family, who had only been marshals of the household. It was held, however, by the latter family, as the office of chief (magister) marshal, as early as the days of Henry I. Through them, under Henry III., it passed to the Bigods, as their eldest co-heirs. In 1306 it fell to the crown on the death of the last Bigod, earl of Norfolk, who had made Edward I. his heir, and in 13 16 it was granted by Edward II. to his own younger brother, Thomas " of Brotherton," earl of Norfolk. As yet the style of the office was only " marshal " although the last Bigod holder, being an earl, was sometimes loosely spoken of as the earl marshal. The office, having reverted to the crown, was granted out anew by Richard II., in 1385, to Thomas Mowbray, earl of Nottingham, the representative of Thomas " of Brotherton." In 1386 the style of " earl marshal " was formally granted to him in addition. After several attainders and partial restorations in the reigns of the Tudors and the Stuarts, the earl marshalship was granted anew to the Howards by Charles II. in 1672 and entailed on their male line, with many specific remainders and limitations, under which settlement it has regularly descended to the present duke of Norfolk. [ts holders, however, could not execute the office until the Roman Catholic emancipation, and had to appoint deputies. The duke is styled earl marshal " and hereditary marshal of England," but the double style would seem to be an error, though the Mowbrays, with their double creation (1385, 1386) might

have claimed it. His Grace appends the letters " E.M." to his signature, and bears behind his shield two batons crossed in saltire, the marshal's rod (virga) having been the badge of the office from Norman times. There appear to have been hereditary marshals of Ireland, but their history is not well ascertained. The Keiths were Great Marischals of Scotland from at least the days of Robert Bruce, and were created earls marischal in or about 1458, but lost both earldom and office by the attainder of George, the 10th earl, in 1716. (See also Marshal; State, Great Officers of.)

See " The Marshalship of England," in J. H. Round, Commune of London and Other Studies (London, 1899); G. E. C(okayne)'s Complete Peerage. (J. H. R.)

EARLOM, RICHARD (1742-1822), English mezzotint en- graver, was born and died in London. His natural faculty for art appears to have been first called into exercise by admiration for the lord mayor's state coach, just decorated by Cipriani. He tried to copy the paintings, and was sent to study under Cipriani. He displayed great skill as a draughtsman, and at the same time acquired without assistance the art of engraving in mezzotint. In 1765 he was employed- by Alderman Boydell, then one of the most liberal promoters of the fine arts, to make a series of draw- ings from the pictures at Houghton Hall; and these he afterwards engraved in mezzotint. His most perfect works as engraver are perhaps the fruit and flower pieces after the Dutch artists Van Os and Van Huysum. Amongst his historical and figure subjects are — " Agrippina," after West; " Love in Bondage," after Guido Reni; the " Royal Academy," the " Embassy of Hyder- beck to meet Lord Cornwallis," and a " Tiger Hunt," the last three after Zoffany; and " Lord Heathfield," after Sir Joshua Reynolds. Earlom also executed a series of 200 facsimiles of

the drawings and sketches of Claude Lorraine, which was published in 3 vols, folio, under the title of Liber veritatis

(1777-1819).

EARLSTON (formerly Ercildoune, of which it is a cornn> tion), a parish and market town of Berwickshire, Scotland. Pop. (1901) 1049. It is situated on Leader Water in Lauderdale, 725 m. S.E. of Edinburgh by the North British railway branch line from Reston Junction to St Boswells, and about 4 m. N.E. of Melrose. When the place was a hamlet of rude huts it was called Arcioldun or " Prospect Fort," with reference to Black Hill (1003 ft.), on the top of which

may yet be traced the con- centric rings of the British fort by which it was crowned. It is said to be possible to make out the remains of the cave-dwellings of the Ottadeni, the aborigines of the district. In the 12 th and 13th centuries the Lindsays and the earls of March and Dunbar were the chief baronial families. The particular link with the remote past, however, is the ivy-clad ruin of the ancient tower, " The Rhymer's Castle," the traditional residence of Thomas Learmont, commonly called Thomas of Ercildoune, or Thomas the Rhymer, poet and prophet, and friend of the Fairies, who was born here about 1225. Rhymer's Tower was crumbling to pieces,' and its stones were being used in the erection of dykes, cottages and houses, when the Edinburgh Border Counties Association acquired the relic and surrounding lands in 1895, and took steps to prevent further spoliation and decay. The leading manufactures are ginghams, tweeds and shirtings, and the town is also an important agricultural centre, stock sales taking place at regular intervals and cattle and horse fairs being held every year. Some 3 m. away is the estate of Bemersyde, said to have been in the possession of the Haigs for nearly 1000 years. The prospect from Bemersyde Hill was Sir Walter Scott's favourite view. The castle at Bemersyde was erected in 1535 to secure the peace of the Border.

EARLY, JUBAL ANDERSON (1816-1894), American soldier and lawyer, was born in Franklin county, Virginia, on the 3rd of November 1816, and graduated at the U.S. Military Academy in 1837. He served in the Seminole War of 1837-38, after which he resigned in order to practise law in Franklin county, Va. He also engaged in state politics, and served in the Mexican War as a major of Virginia volunteers. He was strongly opposed to secession, but thought it his duty to conform to the action of his state. As a colonel in the Confederate army, he rendered con- spicuous service at the first battle of Bull Run (q.v.). Promoted brigadier-general, and subsequently major-general, Early served throughout the Virginian campaigns of 1862-63, an d defended the lines of Fredericksburg during the battle of Chancellorsville. At Gettysburg he commanded his division of Ewell's coips. In the campaign of 1864 Early, who had now reached the rank of lieutenant-general, commanded the Confederate forces in the Shenandoah Valley. The action of Lynchburg left him free to move northwards, his opponent being compelled to march away from the Valley. Early promptly utilized his advantage, crossed the Potomac, and defeated, on the Monocacy, all the troops which could be gathered to meet him. He appeared before the lines of Washington, put part of Maryland and Pennsylvania under contribution, and only retired to the Valley when

threatened by heavy forces hurriedly sent up to Washington. He then fought a successful action at Winchester, reappeared on the Potomac, and sent his cavalry on a raid into Pennsylvania. A greatly superior army was now formed under General Sheridan to oppose Early. In spite of his skill and energy the Confederate leader was defeated in the battles of Winchester and Fisher's Hill. Finally, on the 19th of October, after inflict- ing at first a severe blow upon the Federal army in its camps on Cedar Creek, he was decisively beaten by Sheridan. (See Shenandoah Valley Campaigns.) Waynesboro (March 1865) was his last fight, after which he was relieved from his command. General Early was regarded by many as the ablest soldier, after Lee and Jackson, in the Army of Northern Virginia, and one of the ablest in the whole Confederate army. That he failed to make headway against an army far superior in numbers, and led by a general of the calibre of Sheridan, cannot be held to prove the

falsity of this judgment. After the peace he went to Canada, but in 1867 returned to resume the practice of law. For a time he managed in conjunction with General Beauregard the Louisiana lottery. He died at Lynchburg, Va., on the 2nd of March 1894. General Early was for a time president of the Southern Historical Society, and wrote, besides various essays and historical papers, A Memoir of the Last Year of the War, 6"c. (1867).

EARLY ENGLISH PERIOD, in architecture, the term given by Rickman to the first pointed or Gothic style in England, nominally 1 189-1307, which succeeded the Romanesque or Norman period towards the end of the 12th century, and developed into the Decorated period in the commencement of the 14th century. It is chiefly characterized by the almost universal employment of the pointed arch, not only in arches of wide span such as those of the nave arcade, but for doorways and windows. The actual introduction of the pointed arch took place at a much earlier date, as in the nave arcade of the Cis- tercian Abbey of Buildwas (1140), though the clerestory window above has semicircular arches. It is customary, therefore, to make allowance for a transitional epoch from the middle of the 1 2th century. Although the pointed arches used are sometimes equilateral and sometimes drop-arches, the lancet-arch is the most characteristic. The period is best recognized in England by the great depth given to the hollows of the mouldings, alternat- ing with fillets and rolls, by the decoration of the hollows with the dog-

tooth ornament, by the circular abacus of the capitals, and the employment of slender detached shafts of Purbeck marble which are attached to piers by circular moulded shaft- rings (Fr. anneau).

The arches are sometimes cusped; circles with trefoils, quatrefoils, &c, are introduced into the tracery, and large rose windows in the transept or nave, as at Lincoln (1220). The conventional foliage decorating the capitals is of great beauty and variety, and extends to spandrils, bosses, &c. In the spandrils of the arches of the nave, transept or choir arcades, diaper work is occasionally found, as in the transept of Westminster Abbey. The latter is one of the chief examples of the period, to which must be added the cathedral of Salisbury (except the tower); the Galilee at Ely; nave and transept of Wells (1225-1240); nave of Lincoln; west front of Peterborough; and the minster at Beverley. (R. P. S.)

EARN, the name of a loch and river in Perthshire, Scotland. The loch, lying almost due east and west, is 6% m. long and $• m. in maximum breadth, 287 ft. deep, with a mean depth of 138 ft., covers an area of nearly 4 sq. m., has a drainage basin of over 545 sq. m., and stands 317 ft. above the sea. Its waters are said never to freeze. It discharges by the river Earn. The points of interest on its shores are Lochearnhead (at the southern extremity of Glen Ogle), which has a station on the Callander- Oban railway, and the ruins of St Blane's chapel; Edinample Castle, an old turreted mansion belonging to the marquess of Breadalbane, situated in well- wooded grounds near the pretty falls of the Ample; Ardvorlich House, the original of Darlin- varach in Scott's Legend of Montrose, and the village of St Fillans at the foot of the loch, once the terminus of the branch of the Caledonian railway from Perth. The river flows out of Loch Earn, pursues an eastward course with a gentle inclination towards the south, and reaches the Firth of Tay, 6| m. below Perth, after a total run of 49 m. Its chief tributaries on the right are the Ruchil, Machany, Ruthven, May and Farg, and on the left, the Lednock and Turret. It is navigable by vessels of 50 tons as far up as Bridge of Earn, and is a notable fishing stream, abounding with salmon and trout, perch and pike being also plentiful. On the Lednock are the falls of the Devil's Cauldron and on the Turret and its feeders several graceful cascades. The principal places of interest on the banks of the Earn are Dunira, the favourite seat of Henry Dundas, 1st Viscount Melville, who took the title of his barony from the estate and to whose memory an obelisk was raised on the adjoining hill of Dunmore; the village of Comrie; the town of Crieff; the ruined castle of Innerpeffray, founded in 1610 by the 1st Lord Maderty, close to which is the library founded in 1691 by the 3rd Lord Maderty,

containing some rare black-letter books and the Bible that be- longed to the marquess of Montrose; Gascon Hall, now in ruins, but with traditions reaching back to the days of Wallace; Dupplin Castle, a fine Tudor mansion, seat of the earl of Kinnoull, who derives from it the title of his viscounty; Aberdalgie, Forgandenny and Bridge of Earn, a health resort situated amidst picturesque surroundings. Strathearn, as the valley of the Earn is called, extending from the loch to the Firth of Tay, is a beautiful and, on the whole, fertile tract, though liable at times to heavy floods. The earl of Perth is hereditary steward of Strathearn.

EARNEST (probably a corruption of the obsolete arles or erles, adapted from Lat. equivalent arrha, due to a confusion with the adjective " earnest," serious, O. Eng. eornust, cognate with Ger. ernst), the payment of a sum of money by the buyer of goods to the seller on the conclusion of a bargain as a pledge for its due performance. It is almost similar to the arrha of the Roman law, which may be traced back in the history of legal institutions to a period when the validity of a contract depended not so much upon the real intention of the parties, as upon the due observance of a prescribed ceremony. But earnest was never part payment, which arrha might have been. Apart from its survival as a custom, its chief importance in English law is its recognition by the Statute of Frauds as giving validity to contracts for the sale of goods of a value exceeding £10 (see Sale or Goods). It is in that statute clearly distinguished from part payment, con- sequently any sum, however small, would be sufficient as earnest, being given as a token that the contract is binding and should be expressly stated so by the giver. The giving of earnest, or hand-money, as it is sometimes called, has now fallen into very general disuse.

EAR-RING, an ornament worn pendent from the ear, and generally suspended (especially among the more civilized races) by means of a ring or hook passing through the pendulous lobe of the ear. Among savage races the impulse to decorate, or at any rate to modify the appearance of the ear, is almost universal. With such peoples the ear appendage is chiefly remarkable for its extravagant dimensions. Many examples may be seen in the ethnographic galleries of the British Museum. The Berawan people of Borneo use plugs through the lobe of the ear 3! in. in diameter. More extraordinary still is an example of a stone ear-plug worn by a Masai, 4! in. in diameter and weighing 2 lb 14 oz. {Man, 1905, p. 22). It is stated that according to the Masai standard of fashion, the lobes of the ears should be enlarged so as to be capable of meeting above the head. Among the superior races, though ear ornaments of extravagant size and

elaboration are not unknown, moderation in size is com- monly observed, and greater attention is paid to workmanship and fineness of material.

The general usage appears to have been to have ear-rings worn in pairs, the two ornaments in all respects resembling each other; in ancient times, or more recently among Oriental races, a single ear-ring has sometimes been worn. The use of this kind of ornament, which constantly was of great value, dates from the remotest historical antiquity, the earliest mention of ear-rings occurring in the book of Genesis. It appears probable that the ear-rings of Jacob's family, which he buried with his strange idols at Bethel, were regarded as amulets or talismans, such unquestion- ably being the estimation in which some ornaments of this class have been held from a very early period, as they still are held in the East. Thus in New Zealand ear-rings are decorated with the teeth of enemies, and with talismanic sharks' teeth. Among all the Oriental races of whom we have any accurate knowledge, the Hebrews and Egyptians excepted, ear-rings always have been in general use by both sexes; while in the West, as well as by the Hebrews and Egyptians, as a general rule they have been considered exclusively female ornaments. By the Greeks and Romans also ear-rings were worn only by women, and the wearing of them by a man is often spoken of as distinctively oriental.

In archaic art, ear-rings are frequently represented or their traces are left in the perforated ear lobes of early statues. After the 4th century such perforations occur seldom. In one instance,

a Greek inscription records the weight of the detachable gold orna- ments on a statue, among which a pair of ear-rings is included. Ear-rings of characteristic form are frequently discovered by excavation. In Egypt, a system of pendent chains is found hanging from a disk. In Assyria the decoration consists of pendants or knobs attached to a rigid ring. In the early civilization represented by Dr Schliemann's Trojan investigations, pieces of gold plate are suspended by parallel chains. In the Mycenaean period, ear-rings are infrequent in Greece, but have been found in abundance in the Mycenaean finds of Enkomi (Cyprus) in the form of pendent bulls'-heads, or of decorative forms based on the bull's head. In the tombs of the Greek settlers in the Crimea (4th century B.C.), ear-rings are found of marvellous

complexity From La Grande En- and beauty. The lexicographer Pollux, cyclopedic. speaking of the names given to ear-rings,

Fig. 1. — Ear-ring derived from their forms, mentions carya- from an Assyrian bas ^^ hippocamps and centauresses. Jewels re le ‘ of the same class, of exquisite beauty and

of workmanship that is truly wonderful, have been rescued from the sepulchres of ancient Etruria. Ear-rings of compara- tively simple forms, but set with pearls and other stones, were the mode in Rome. In some instances, the stones were of fabulous value. During the Byzantine period they once more attained an extravagant size. Researches among the burial places of Anglo-Saxon Britain have led to the discovery of jewels in con- siderable numbers, which among their varieties include ear-rings executed in a style that proves the Anglo-Saxons to have made no inconsiderable advances in the arts of civilization.

These same ornaments, which never have fallen into disuse, enjoy at the present day a considerable degree of favour, and the tide of fashion has set towards their increased use. Like all other modern jewels, however, the ear- rings of our own times as works of art

From La Grande Encyclo- pedie.

ing the sea, with the can claim no historical attributes, because armour of ‘ Achilles, they consist as well of reproductions from Ear-ring from the a ll p as t ages and of every race as of Crimea, Hermitage f anc i£ul productions that certainly can museum – be assigned to no style of art whatever.

As one of the curiosities of the subject it may be mentioned that Antonia, wife of Drusus, is said by Pliny to have attached a pair of ear-rings to her pet lamprey.

EARTH (a word common to Teutonic languages, cf. Ger. Erie, Dutch aarde, Swed. and Dan. jord; outside Teutonic it appears only in the Gr. apafe, on the ground; it has been connected by some etymologists with the Aryan root ar-, to plough, which is seen in the Lat. arare, obsolete Eng. ” ear,” and Gr. apovv, but this is now considered very doubtful; see G. Curtius, Greek Etymology, Eng. trans., i. 426; Max Muller, Lectures, 8th ed. i. 294). From early times the word ” earth ” has been used in several connexions — from that of soil or ground to that of the planet which we inhabit, but it is difficult to trace the exact historic sequence of the diverse usages. In the cosmogony of

the Pythagoreans, Platonists and other philo- sophers, the term or its equivalent denoted an element or fundamental quality which conferred upon matter the character of earthiness; and in the subsequent development of theories as to the ultimate composition of matter by the alchemists, iatrochemists, and early phlogistonists an element of the same name was retained (see Element). In modern chemistry, the common term " earth " is applied to certain oxides: — the

" alkaline earths " (q.v.) are the oxides of calcium (lime), barium (baryta) and strontium (strontia) ; the " rare earths " (q.v.) are the oxides of a certain class of rare metals.

The Earth

The terrestrial globe is a member of the Solar system, the third in distance from the Sun, and the largest within the orbit of Jupiter. In the wider sense it may be regarded as composed of a gaseous atmosphere (see Meteorology), which encircles the crust or lithosphere (see Geography), and surface waters or hydrosphere (see Ocean and Oceanography) . The descrip- tion of the surface features is a branch of Geography, and the discussions as to their origin and permanence belongs to Physio- graphy (in the narrower sense), physiographical geology, or physical geography. The investigation of the crust belongs to geology and of rocks in particular to petrology.

In the present article we shall treat the subject matter of the Earth as a planet under the following headings: — (1) Figure and Size, (2) Mass and Density, (3) Astronomical Relations, (4) Evolution and Age. These subjects will be treated summarily, readers being referred to the article Astronomy and to the cross-references for details.

1. Figure and Size. — To primitive man the Earth was a flat disk with its surface diversified by mountains, rivers and seas. In many cosmogonies this disk was encircled by waters, un- measurable by man and extending to a junction with the sky; and the disk stood as an island rising up through the waters from the floor of the universe, or was borne as an immovable ship on the surface. Of such a nature was the cosmogony of the Baby- lonians and Hebrews; Homer states the same idea, naming the encircling waters 'Hiceavos; and Hesiod regarded it as a disk midway between the sky and the infernal regions. The theory that the Earth extended downwards to the limit of the universe was subjected to modification when it was seen that the same sun and stars reappeared in the east after their setting in the west. But man slowly realized that the earth was isolated in

space, floating freely as a balloon, and much speculation was associated about that which supported the Earth. Tunnels in the foundations to permit the passage of the sun and stars were suggested; the Greeks considered twelve columns to support the heavens, and in their mythology the god Atlas appears condemned to support the columns; while the Egyptians had the Earth supported by four elephants, which themselves stood on a tortoise swimming on a sea. Earthquakes were regarded as due to a movement of these foundations; in Japan this was considered to be due to the motion of a great spider, an animal subsequently replaced by a cat-fish; in Mongolia it is a hog; in India, a mole; in some parts of South America, a whale; and among some of the North American Indians, a giant tortoise.

The doctrine of the spherical form has been erroneously assigned to Thales; but he accepted the Semitic conception of the disk, and regarded the production of springs after earthquakes as due to the inrushing of the'waters under the Earth into fissures in the surface. His pupil, Anaximander (610-547), according to Diogenes Laertius, believed it to be spherical (see The Observatory, 1804, P. 208); and Anaximenes probably held a similar view. The spherical form is undoubtedly a discovery of Pythagoras, and was taught by the Pythagoreans and by the Eleatic Parmenides. The expositor of greatest moment was Aristotle; his arguments are those which we employ to-day: — the ship gradually disappearing from hull to mast as it recedes from the harbour to the horizon; the circular shadow cast by the Earth on the Moon during an eclipse, and the alteration in the appearance of the heavens as one passes from point to point on the Earth's surface. 1 He records attempts made to determine the circumference; but the first scientific investigation in this

1 Aristotle regarded the Earth as having an upper inhabited half and a lower uninhabited one, and the air on the lower half as tending to flow upwards through the Earth. The obstruction of this passage brought about an accumulation of air within the Earth, and the increased pressure may occasion oscillations of the surface, which may be so intense as to cause earthquakes.

direction was made 150 years later by Eratosthenes. The spherical form, however, only became generally accepted after the Earth's circumnavigation (see Geography).

The historical development of the methods for determining the figure of the Earth (by which we mean a theoretical surface in part indicated by the ocean at rest, and in other parts by the level to which water freely communicating with the oceans by canals traversing the land masses would rise) and the mathe- matical investigation of this problem are treated in the articles Earth, Figure or the, and Geodesy; here the results are summarized. Sir Isaac Newton deduced from the mechanical consideration of the figure of equilibrium of a mass of rotating fluid, the form of an oblate spheroid, the ellipticity of a meridian section being 1/231, and the axes in the ratio 230 : 231. Geodetic measurements by the Cassinis and other French astronomers pointed to a prolate form, but the Newtonian figure was proved to be correct by the measurement of meridional arcs in Peru and Lapland by the expeditions organized by the French Academy of Sciences. More recent work points to an elliptical equatorial section, thus making the earth pear-shaped. The position of the longer axis is somewhat un- certain; it is certainly in Africa, Clarke placing it in longitude 8° 15′ W., and Schubert in longitude 41 4′ E.; W. J. Sollas, arguing from terrestrial symmetry, has chosen the position lat. 6° N., long. 28 E., i.e. between Clarke's and Schubert's positions. For the lengths of the axes and the ellipticity of the Earth, see Earth, Figure of the.

2. Mass and Density. — The earliest scientific investigation on the density and mass of the Earth (the problem is really single if the volume of the Earth be known) was made by Newton, who, mainly from astronomical considerations, suggested the limiting densities 5 and 6; it is remarkable that this prophetic guess should be realized, the mean value from subsequent researches being about 55, which gives for the mass the value 6X10 21 tons. The density of the Earth has been determined by several experi- menters within recent years by methods described in the article Gravitation; the most probable value is there stated to be

5-527-

3. Astronomical Relations. — The grandest achievements of astronomical science are undoubtedly to be associated with the elucidation of the complex motion of our planet. The notion that the Earth was fixed and immovable at the centre of an immeasurable universe long possessed the minds of men; and we find the illustrious Ptolemy accepting this view in the 2nd century a.d.. and rejecting the notion of a rotating Earth — a theory which had been proposed as early as the 5th century B.C. by Philolaus on philosophical grounds, and in the 3rd century B.C. by the astronomer Aristarchus of Samos.

He argued that if the Earth rotated then points at the equator had the enormous velocity of about 1000 m. per hour, and as a consequence there should be terrific gales from the east; the fact that there were no such gales invalidated, in his opinion, the theory. The Ptolemaic theory was unchallenged until 1543, in which year the De Revolutionibus orbium Celestium of Copernicus was published. In this work it was shown that the common astronomical phenomena could be more simply explained by regarding the Earth as annually revolving about a fixed Sun, and daily rotating about itself. A clean sweep was made of the geocentric epicyclic motions of the planets which Ptolemy's theory de- manded, and in place there was substituted a procession of planets about the Sun at different distances. The development of the Copernican theory — the corner-stone of modern astronomy — ■ by Johann Kepler and Sir Isaac Newton is treated in the article Astronomy: History; here we shall summarily discuss the motions of our planet and its relation to the solar system.

The Earth has two principal motions — revolution about the Sun, rotation about its axis.; there are in addition a number of secular motions.

Revolution. — The Earth revolves about the Sun in an elliptical orbit having the Sun at one focus. The plane of the orbit is termed the ecliptic; it is inclined to the Earth's equator at an angle termed the obliquity, and the points of intersection

of the equator and ecliptic are termed the equinoctial points. The major axis of the ellipse is the line of apsides; when the Earth is nearest the Sun it is said to be in perihelion, when farthest it is in aphelion. The mean distance of the Earth from the Sun is a most important astronomical constant, since it is the unit of linear measurement; its value is about 93,000,000 m., and the difference between the perihelion and aphelion distances is about 3,000,000 m. The eccentricity of the orbit is 0-016751. A tabular comparison of the orbital constants of- the Earth and the other planets is given in the article Planet. The period of revolution with regard to the Sun, or, in other words, the time taken by the Sun apparently to pass from one equinox to the same equinox, is the tropical or equinoctial year; its length is 365 d. 5 hrs. 48 m. 46 sees. It is about 20 minutes shorter than the true or sidereal year, which is the time taken for the Sun apparently to travel from one star to it again. The difference in these two years is due to the secular variation termed pre- cession (see below) . A third year is named the anomalistic year, which is the time occupied in the passage from perihelion to perihelion; it is a

little longer than the sidereal.

Rotation. — The Earth rotates about an axis terminating at the north and south geographical poles, and perpendicular to the equator; the period of rotation is termed the day (q.v.), of which several kinds are distinguished according to the body or point of reference. The rotation is performed from west to east; this daily rotation occasions the diurnal motion of the celestial sphere, the rising of the Sun and stars in the east and their setting in the west, and also the phenomena of day and night. The inclination of the axis to the ecliptic brings about the presentation of places in different latitudes to the more direct rays of the sun; this is revealed in the variation in the length of daylight with the time of the year, and the phenomena of seasons.

Although the rotation of the Earth was an accepted fact soon after its suggestion by Copernicus, an experimental proof was wanting until 1851, when F'oucault performed his celebrated pendulum experiment at the Pantheon, Paris. A pendulum about 200 ft. long, composed of a flexible wire carrying a heavy iron bob, was suspended so as to be free to oscillate in any direc- tion. The bob was provided with a style which passed over a table strewn with fine sand, so that the style traced the direction in which the bob was swinging. It was found that the oscillat- ing pendulum never retraced its path, but at each swing it was apparently deviated to the right, and moreover the deviations in equal times were themselves equal. This means that the floor of the Pantheon was moving, and therefore the Earth was rotating. If the pendulum were swung in the southern hemi- sphere, the deviation would be to the left; if at the equator it would not deviate, while at the poles the plane of oscillation would traverse a complete circle in 24 hours.

The rotation of the Earth appears to be perfectly uniform, comparisons of the times of transits, eclipses, &c, point to a variation of less than T"o~tfth of a second since the time of Ptolemy. Theoretical investigations on the phenomena of tidal friction point, however, to a retardation, which may to some extent be diminished by the accelerations occasioned by the shrinkage of the globe, and some other factors difficult to evaluate (see Tide).

We now proceed to the secular variations.

Precession. — The axis of the earth does not preserve an in- variable direction in space, but in a certain time it describes a cone, in much the same manner as the axis of a top spinning out of the vertical. The

equator, which preserves approximately the same inclination to the ecliptic (there is a slight variation in the obliquity which we shall mention later), must move so that its intersections with the ecliptic, or equinoctial points, pass in a retrograde direction, i.e. opposite to that of the Earth. This motion is termed the precession of the equinoxes, and was observed by Hipparchus in the 2nd century B.C.; Ptolemy corrected the catalogue of Hipparchus for precession by adding 2° 40′ to the longitudes, the latitudes-being unaltered by this motion, which at the present time is 50-26″ annually, the complete circuit being made in about 26,000 years. Owing to precession the signs of the zodiac are traversing paths through the constellations, or,

in other words, the constellations are continually shifting with regard to the equinoctial points; at one time the vernal equinox Aries was in the constellations of that name; it is now in Pisces, and will then pass into Aquarius. The pole star, i.e. the star towards which the Earth's axis points, is also shifting owing to precession; in about 2700 B.C. the Chinese observed a Draconis as the pole star (at present a Ursae minoris occupies this position and will do so until 3500) ; in 13600 Vega (a LyraeJ the brightest star in the Northern hemisphere, will be nearest.

Precession is the result of the Sun and the Moon's attraction on the Earth not being a single force through its centre of gravity. If the Earth were a homogeneous sphere the attractions would act through the centre, and such forces would have no effect upon the rotation about the centre of gravity, but the Earth being spheroidal the equatorial band which stands up as it were beyond the surface of a sphere is more strongly attracted, with the result that the axis undergoes a tilting. The precession due to the Sun is termed the solar precession and that due to the Moon the lunar precession; the joint effect (two- thirds of which is due to the Moon) is the luni-solar precession. Solar precession is greatest at the solstices and zero at the equinoxes; the part of luni-solar precession due to the Moon varies with the position of the Moon in its orbit. The obliquity is unchanged by pre- cession (see Precession of the Equinoxes).

Nutation. — In treating precession we have stated that the axis of the Earth traces a cone, and it follows that the pole describes a circle (approximately) on the celestial sphere, about the pole of the

ecliptic. This is not quite true. Irregularities in the attracting forces which occasion precession also cause a slight oscillation backwards and forwards over the mean precessional path of the pole, the pole tracing a wavy line or nodding. Both the Sun and Moon contribute to this effect. Solar nutation depends upon the position of the Sun on the ecliptic; its period is therefore 1 year, and in extent it is only 1-2"; lunar nutation depends upon the position of the Moon's nodes; its period is therefore about 18-6 years, the time of revolution of the nodes, and its extent is 9-2". There is also given to the obliquity a small oscillation to and fro. Nutation is one of the great discoveries of James Bradley (i747)-

Planetary Precession.— So far we have regarded the ecliptic as absolutely fixed, and treated precession as a real motion of the equator. The ecliptic (q.v.) , however, is itself subject to a motion, due to the attractions of the planets on the Earth. This effect also displaces the equinoctial points. Its annual value is 0-13". The term General Precession in longitude is given to the dis- placement of the intersection of the equator with the apparent ecliptic on the latter. The standard value is 50-2453", which prevailed in 1850, and the value at 1850-H, i.e. the constant of precession, is 50-2453" + 0-0002225" t. This value is also liable to a very small change. The nutation of the obliquity at time 1850 + t is given by the formula 23° 27′ 32-0" — 0-47" t. Com- plete expressions for these functions are given in Newcomb's Spherical Astronomy (1908), and in the Nautical Almanac.

The variation of the line of apsides is the name given to the motion of the major axis of the Earth's orbit along the ecliptic. It is due to the general influence of the planets, and the revolu- tion is effected in 21,000 years.

The variation of the eccentricity denotes an oscillation of the form of the Earth's orbit between a circle and ellipse. This followed the mathematical researches of Lagrange and Leverrier. It was suggested by Sir John Herschel in 1830 that this variation might occasion great climatic changes, and James Croll developed the theory as affording a solution of the glacial periods in geology (q.v.).

Variation of Latitude. — Another secular motion of the Earth is due to the fact that the axis of rotation is not rigidly fixed within it, but its polar extremities wander in a circle of about 50 ft. diameter. This oscillation brings about a variability in terrestrial latitudes, hence the name. Euler showed mathe- matically that such an oscillation existed, and, making certain assumptions as to the rigidity of the

Earth, deduced that its period was 305 days; S. C. Chandler, from 1890 onwards, vin. 26

deduced from observations of the stars a period of 428 days; and Simon Newcomb explained the deviation of these periods by pointing out that Euler's assumption of a perfectly rigid Earth is not in accordance with fact. For details of this intricate subject see the articles Latitude and Earth, Figure or the.

4. Evolution and Age. — In its earliest history the mass now consolidated as the Earth and Moon was part of a vast nebulous aggregate, which m the course of time formed a central nucleus — our Sun — which shed its outer layers in such a manner as to form the solar system (see Nebular Theory). The moon may have been formed from the Earth in a similar manner, but the theory of tidal friction suggests the elongation of the Earth along an equatorial axis to form a pear-shaped figure, and that in the course of time the protuberance shot off to form the Moon (see Tide). The age of the Earth has been investigated from several directions, as have also associated questions related to climatic changes, internal temperature, orientation of the land and water (permanence of oceans and continents), &c. These problems are treated in the articles Geology and Geography.

EARTH, FIGURE OF THE. The determination of the figure of the earth is a problem of the highest importance in astronomy, inasmuch as the diameter of the earth is the unit to which all celestial distances must be referred.

Historical.

Reasoning from the uniform level appearance of the horizon, the variations in altitude of the circumpolar stars as one travels towards the north or south, the disappearance of a ship standing out to sea, and perhaps other phenomena, the earliest astrono- mers regarded the earth as a sphere, and they endeavoured to ascertain its dimensions. Aristotle relates that the mathema- ticians had found the circumference to be 400,000 stadia (about 46,000 miles). But Eratosthenes (c. 250 B.C.) appears to have been the first who entertained an accurate idea of the principles on which the determination of the figure of the earth really de- pends, and attempted to reduce them to practice. His results were very inaccurate, but his method is the same as that which is followed at the present day — depending, in fact,on the comparison of a line measured on the earth's surface with the corresponding arc of the

heavens. He observed that at Syene in Upper Egypt, on the day of the summer solstice, the sun was exactly vertical, whilst at Alexandria at the same season of the year its zenith distance was 7 12', or one-fiftieth of the circumference of a circle. He assumed that these places were on the same meridian; and, reckoning their distance apart as 5000 stadia, he inferred that the circumference of the earth was 250,000 stadia (about 29,000 miles). A similar attempt was made by Posidonius, who adopted a method which differed from that of Eratosthenes only in using a star instead of the sun. He obtained 240,000 stadia (about 27,600 miles) for the circumference. Ptolemy in his Geography assigns the length of the degree as 500 stadia.

The Arabs also investigated the question of the earth's mag- nitude. The caliph Abdallah al Mamun (a.d. 814), having fixed on a spot in the plains of Mesopotamia, despatched one company of astronomers northwards and another southwards, measuring the journey by rods, until each found the altitude of the pole to have changed one degree. But the result of this measurement does not appear to have been very satisfactory. From this time the subject seems to have attracted no attention until about 1500, when Jean Fernel (1497-1558), a Frenchman, measured a distance in the direction of the meridian near Paris by count- ing the number of revolutions of the wheel of a carriage. His astronomical observations were made with a triangle used as a quadrant, and his resulting length of a degree was very near the truth.

Willebrord Snell 1 substituted a chain of triangles for actual linear measurement. He measured his base line on the frozen surface of the meadows near Leiden, and measured the angles of his triangles, which lay between Alkmaar and Bergen-op-Zoom, with a quadrant and semicircles. He took the precaution of

1 Eratosthenes Batavus, sen de terrae ambitus vera quantitats suscitatus, a Willebrordo Snellio, Lugduni-Batavorum 1,1617).

comparing his standard with that of the French, so that his result was expressed in toises (the length of the toise is about 6-39 English ft.). The work was recomputed and reobserved by P. von Musschenbroek in 1729. In 1637 an Englishman, Richard Norwood, published a

determination of the figure of the earth in a volume entitled The Seaman's Practice, contayning a Fundamentall Probleme in Navigation experimentally verified, namely, touching the Compasse of the Earth and Sea and the quantity of a Degree in our English Measures. He observed on the nth of June 1633 the sun's meridian altitude in London as 62 1', and on the 6th of June 1635, his meridian altitude in York as 59° 33'. He measured the distance between these places partly with a chain and partly by pacing. By this means, through compensation of errors, he arrived at 367,176 ft. for the degree— a very fair result.

The application of the telescope to angular instruments was the next important step. Jean Picard was the first who in 1669, with the telescope, using such precautions as the nature of the operation requires, measured an arc of meridian. He measured with wooden rods a base line of 5663 toises, and a second or base of verification of 3902 toises; his triangulation extended from Malvoisine, near Paris, to Sourdon, near Amiens. The angles of the triangles were measured with a quadrant furnished with a telescope having cross-wires. The difference of latitude of the terminal stations was determined by observations made with a sector on a star in Cassiopeia, giving i° 22′ 55′ for the amplitude. The terrestrial measurement gave 78,850 toises, whence he inferred for the length of the degree 57,060 toises.

Hitherto geodetic observations had been confined to the determination of the magnitude of the earth considered as a sphere, but a discovery made by Jean Richer (d. 1696) turned the attention of mathematicians to its deviation from a spherical form. This astronomer, having been sent by the Academy of Sciences of Paris to the island of Cayenne, in South America, for the purpose of investigating the amount of astronomical refraction and other astronomical objects, observed that his clock, which had been regulated at Paris to beat seconds, lost about two minutes and a half daily at Cayenne, and that in order to bring it to measure mean solar time it was necessary to shorten the pendulum by more than a line (about iˆjth of an in.). This fact, which was scarcely credited till it had been confirmed by the subsequent observations of Varin and Deshayes on the coasts of Africa and America, was first explained in the third book of Newton's Principia, who showed that it could only be referred to a diminution of gravity arising either from a protuberance of the equatorial parts of the earth and consequent increase of the distance from the centre, or from the counteracting effect of the centrifugal force. About the same time (1673) appeared Christian Huygens' De Horologio Oscillatorio, in which for the first

time were found correct notions on the subject of centrifugal force. It does not, however, appear that they were applied to the theoretical investigation of the figure of the earth before the publication of Newton's Principia. In 1690 Huygens published his De Causa Gravitatis, which contains an investigation of the figure of the earth on the supposition that the attraction of every particle is towards the centre.

Between 1684 and 1718 J. and D. Cassini, starting from Picard's base, carried a triangulation northwards from Paris to Dunkirk and southwards from Paris to Collioure. They measured a base of 7246 toises near Perpignan, and a somewhat shorter base near Dunkirk; and from the northern portion of the arc, which had an amplitude of 2° 12′ 9", obtained for the length of a degree 56,960 toises; while from the southern portion, of which the amplitude was 6° 18′ 57", they obtained 57,097 toises. The immediate inference from this was that, the degree diminishing with increasing latitude, the-earth must be a prolate spheroid. This conclusion was totally opposed to the theoretical investigations of Newton and Huygens, and accordingly the Academy of Sciences of Paris determined to apply a decisive test by the measurement of arcs at a great distance from each other — one in the neighbourhood of the equator, the other in a high latitude. Thus arose the celebrated expeditions of the French

academicians. In May 1735 Louis Godin, Pierre Bouguer and Charles Marie de la Condamine, under the auspices of Louis XV., proceeded to Peru, where, assisted by two Spanish officers, after ten years of laborious exertion, they measured an arc of 3° 7', the northern end near the equator. The second party consisted of Pierre Louis Moreau de Maupertuis, Alexis Claude Clairault, Charles Etienne Louis Camus, Pierre Charles Lemonnier, and Reginaud Outhier, who reached the Gulf of Bothnia in July 1736; they were in some respects more fortunate than the first party, inasmuch as they completed the measurement of an arc near the polar circle of 57′ amplitude and returned within sixteen months from the date of their departure.

The measurement of Bouguer and De la Condamine was executed with great care, and on account of the locality, as well as the manner in which all the details were conducted, it has always been regarded as a most valuable determination. The southern limit was at Tarqui, the northern at Cotchesqui. A base of 6272 toises was measured in the vicinity of Quito, near the northern extremity of the arc, and a second base of 5260 toises near the southern extremity. The mountainous nature of the country made the work very laborious, in

some cases the differ- ence of heights of two neighbouring stations exceeding 1 mile; and they had much trouble with their instruments, those with which they were to determine the latitudes proving untrust- worthy. But they succeeded by simultaneous observations of the same star at the two extremities of the arc in obtaining very fair results. The whole length of the arc amounted to 176,945 toises, while the difference of iatitudeswas3° 7′ 3”. In consequence of a misunderstanding that arose between De la Condamine and Bouguer, their operations were conducted separately, and each wrote a full account of the expedition. Bouguer’s book was published in 1749; that of De la Condamine in 1751. The toise used in this measure was afterwards regarded as the standard toise, and is always referred to as the Toise of Peru.

The party of Maupertuis, though their work was quickly despatched, had also to contend with great difficulties. Not being able to make use of the small islands in the Gulf of Bothnia for the trigonometrical stations, they were forced to penetrate into the forests of Lapland, commencing operations at Tornea, a city situated on the mainland near the extremity of the gulf. From this, the southern extremity of their arc, they carried a chain of triangles northward to the mountain Kittis, which they selected as the northern terminus. The latitudes were determined by observations with a sector (made by George Graham) of the zenith distance of a and 8 Draconis. The base line was measured on the frozen surface of the river Tornea about the middle of the arc; two parties measured it separately, and they differed by about 4 in. The result of the whole was that the difference of latitudes of the terminal stations was 57′ 29″ -6, and the length of the arc 55,023 toises. In this expedition, as well as in that to Peru, observations were made with a pendulum to determine the force of gravity; and these observations coincided with the geodetic results in proving that the earth was an oblate and not prolate spheroid.

In 1740 was published in the Paris Mimoires an account, by Cassini de Thury, of a remeasurement by himself and Nicolas Louis de Lacaille of the meridian of Paris. With a view to determine more accurately the variation of the degree along the meridian, they divided the distance from Dunkirk to Collioure into four partial arcs of about two degrees each, by observing the latitude at five stations. The results previously obtained by J. and D. Cassini were not confirmed, but, on the contrary, the length of the degree derived from these partial arcs showed on the whole an increase with an increasing latitude. Cassini and Lacaille also measured an arc of parallel across the mouth of the Rhone. The difference of time of the extremities was determined by the observers at either end noting the

instant of a signal given by flashing gunpowder at a point near the middle of the arc.

While at the Cape of Good Hope in 1752, engaged in various astronomical observations, Lacaille measured an arc of meridian of i ° 13′ 17”, which gave him for the length of the degree 57,037

toises — an unexpected result, which has led to the remeasurement of the arc by Sir Thomas Maclear (see Geodesy).

Passing over the measurements made between Rome and Rimini and on the plains of Piedmont by the Jesuits Ruggiero Giuseppe Boscovich and Giovanni Battista Beccaria, and also the arc measured with deal rods in North America by Charles Mason and Jeremiah Dixon, we come to the commencement of the English triangulation. In 1783, in consequence of a representa- tion from Cassini de Thury on the advantages that would accrue from the geodetic connexion of Paris and Greenwich, General William Roy was, with the king’s approval, appointed by the Royal Society to conduct the operations on the part of England, Count Cassini, Mechain and Delambre being appointed on the French side. A precision previously unknown was attained by the use of Ramsden’s theodolite, which was the first to make the spherical excess of triangles measurable. The wooden rods with which the first base was measured were replaced by glass rods, which were afterwards rejected for the steel chain of Ramsden. (For further details see A ccount of the Trigonometrical Survey of England and Wales.)

Shortly after this, the National Convention of France, having agreed to remodel their system of weights and measures, chose for their unit of length the ten-millionth part of the meridian quadrant. In order to obtain this length precisely, the re- measurement of the French meridian was resolved on, and deputed to J. B. J. Delambre and Pierre Francois Andre Mechain. The details of this operation will be found in the Base du systeme mttrique decimate. The arc was subsequently extended by Jean Baptiste Biot and Dominique Francois Jean Arago to the island of Iviza. Operations for the connexion of England with the continent of Europe were resumed in 182 1 to 1823 by Henry Kater and Thomas Frederick Colby on the English side, and F. J. D. Arago and Claude Louis Mathieu on the French.

The publication in 1838 of Friedrich Wilhelm BessePs Grad- messung in Ostpreussen marks an era in the science of geodesy. Here we find the method of least squares applied to the cal- culation of a network of triangles and the reduction of the observations generally. The systematic manner in which all the observations were taken with the view of securing final results of extreme accuracy is admirable. The triangulation, which was a small one, extended about a degree and a half along the shores of the Baltic in a N.N.E. direction. The angles were observed with theodolites of 12 and 15 in. diameter, and the latitudes determined by means of the transit instrument in the prime vertical — a method much used in Germany. (The base apparatus is described in the article Geodesy.)

The principal triangulation of Great Britain and Ireland, which was commenced in 1783 under General Roy, for the more immediate purpose of connecting the observatories of Greenwich and Paris, had been gradually extended, under the successive direction of Colonel E. Williams, General W. Mudge, General T. F. Colby, Colonel L. A. Hall, and Colonel Sir Henry James; it was finished in 1851. The number of stations is about 250. At 32 of these the latitudes were determined with Ramsden's and Airy's zenith sectors. The theodolites used for this work were, in addition to the two great theodolites of Ramsden which were used by General Roy and Captain Kater, a smaller theo- dolite of 18 in. diameter by the same mechanician, and another of 24 in. diameter by Messrs Troughton and Simms. Observa- tions for determination of absolute azimuth were made with those instruments at a large number of stations; the stars a, 5, and X Ursae Minoris and 51 Cephei being those observed always at the greatest azimuths. At six of these stations the probable error of the result is under 0-4", at twelve under 0-5", at thirty-four under 0-7": so that the absolute azimuth of the whole network is determined with extreme accuracy. Of the seven base lines which have been measured, five were by means of steel chains and two with Colby's compensation bars (see Geodesy). The triangulation was computed by least squares. The total number of equations of condition for the triangulation is 920; if therefore the whole had been reduced in one mass, as it should have been, the solution of an equation of 920 unknown

quantities would have occurred as a part of the work. To avoid this an approximation was resorted to; the triangulation was divided into twenty-one parts or figures; four of these, not adjacent, were first adjusted by the method explained, and the corrections thus determined in these figures carried into the equations of condition of the adjacent figures. The average number of equations in a figure is

44; the largest equation is one of 77 unknown quantities. The vertical limb of Airy's zenith sector is read by four microscopes, and in the complete observation of a star there are 10 micrometer readings and 12 level readings. The instrument is portable; and a complete determination of latitude, affected with the mean of the declina- tion errors of two stars, is effected by two micrometer readings and four level readings. The observation consists in measuring with the telescope micrometer the difference of zenith distances of two stars which cross the meridian, one to the north and the other to the south of the observer at zenith distances which differ by not much more than 10′ or 1 5', the interval of the times of transit being not less than one nor more than twenty minutes. The advantages are that, with simplicity in the construction of the instrument and facility in the manipulation, refraction is elimi- nated (or nearly so, as the stars are generally selected within 25° of the zenith), and there is no large divided circle. The telescope, which is counterpoised on one side of the vertical axis, has a small circle for finding, and there is also a small horizontal circle. This instrument is universally used in American geodesy.

The principal work containing the methods and results of these operations was published in 1858 with the title " Ordnance Trigono- metrical Survey of Great Britain and Ireland. Account of the observations and calculations of the principal triangulation and of the figure, dimensions and mean specific gravity of the earth as derived therefrom. Drawn up by Captain Alexander Ross Clarke, R.E., F.R.A.S., under the direction of Lieut.-Colonel H. James, R.E., F.R.S., M.R.I.A., &c." A supplement appeared in 1862: " Extension of the Triangulation of the Ordnance Survey into Fiance and Belgium, with the measurement of an arc of parallel in 52° N. from Valentia in Ireland to Mount Kemmel in Belgium. Published by . . . Col. Sir Henry James."

Extensive operations for surveying India and determining the figure of the earth were commenced in 1800. Colonel W. Lambton started the great meridian arc at Punnae in latitude 8° 9', and, following generally the methods of the English survey, he carried his triangulation as far north as 20° 30'. The work was continued by Sir George (then Captain) Everest, who carried it to the latitude of 29° 30'. Two admirable volumes by Sir George Everest, published in 1830 and in 1847, give the details of this undertaking. The survey was afterwards prosecuted by Colonel T. T. Walker, R.E., who made valuable contributions to geodesy. The working out of the Indian chains of triangle by the method of least squares presents peculiar difficulties, but, enormous in extent as the work was, it has been

thoroughly carried out. The ten base lines on which the survey depends were measured with Colby's compensation bars.

The survey is detailed in eighteen volumes, published at Dehra Dun, and entitled Account of the Operations of the Great Trigonometrical Survey of India. Of these the first nine were published under the direction of Colonel Walker; and the remainder by Colonels Strahan and St G. C. Gore, Major S. G. Burrard and others. Vol. i., 1870, treats of the base lines ; vol. ii., 1879, history and general descriptions of the principal triangulation and of its reduction; vol. v., 1879, pendulum operations (Captains T. P. Basevi and W. T. Heaviside) ; vols, xi., 1890, and xviii., 1906, latitudes; vols, ix., 1883, x., 1887, xv., 1893, longitudes; vol. xvii., 1901, the Indo-European longitude-arcs from Karachi to Greenwich. The other volumes con- tain the triangulations.

In i860 Friedrich Georg Wilhelm Struve published his Arc du meridien de 25° 20′ entre le Danube et la Mer Glaciate mesurS depuis 1816 jusqu'en 1855. The latitudes of the thirteen astronomical stations of this arc were determined partly with vertical circles and partly by means of the transit instrument in the prime vertical. The triangulation, a great part of which, however, is a simple chain of triangles, is reduced by the method of least squares, and the probable errors of the resulting distances of parallels is given; the probable error of the whole arc in length is ±6-2 toises. Ten base lines were measured. The sum of the

lengths of the ten measured bases is 29,863 toises, so that the average length of a base line is 19,100 ft. The azimuths were observed at fourteen stations. In high latitudes the determina- tion of the meridian is a matter of great difficulty; nevertheless the azimuths at all the northern stations were successfully determined, — the probable error of the result at Fuglenaes being

- *o"-S3.*

Before proceeding with the modern developments of geodetic measurements and their application to the figure of the earth, we must discuss the " mechanical theory," which is indispensable for a full understanding of the subject.

Mechanical Theory. Newton, by applying his theory of gravitation,

combined with the so-called centrifugal force, to the earth, and assuming that an oblate ellipsoid of rotation is a form of equilibrium for a homogeneous fluid rotating with uniform angular velocity, obtained the ratio of the axes 229 : 230, and the law of variation of gravity on the surface. A few years later Huygens published an investigation of the figure of the earth, supposing the attrac- tion of every particle to be towards the centre of the earth, obtaining as a result that the proportion of the axes should be 578 : 579. In 1740 Colin Maclaurin, in his Be causa physica fluxus et refluxus maris, demonstrated that the oblate ellipsoid of revolution is a figure which satisfies the conditions of equi- librium in the case of a revolving homogeneous fluid mass, whose particles attract one another according to the law of the inverse square of the distance; he gave the equation connecting the ellipticity with the proportion of the centrifugal force at the equator to gravity, and determined the attraction on a particle situated anywhere on the surface of such a body. In 1743 Clairault published his Thiorie de la figure de la terre, which contains a remarkable theorem (" Clairault's Theorem "), estab- lishing a relation between the ellipticity of the earth and the variation of gravity from the equator to the poles. Assuming that the earth is composed of concentric ellipsoidal strata having a common axis of rotation, each stratum homogeneous in itself, but the ellipticities and densities of the successive strata varying according to any law, and that the superficial stratum has the same form as if it were fluid, he proved that

where g, g' are the amounts of gravity at the equator and at the pole respectively, e the ellipticity of the meridian (or " flatten- ing "), and m the ratio of the centrifugal force at the equator to g. He also proved that the increase of gravity in proceeding from the equator to the poles is as the square of the sine of the latitude. This, taken with the former theorem, gives the means of deter- mining the earth's ellipticity from observation of the relative force of gravity at any two places. P. S. Laplace, who devoted much attention to the subject, remarks on Clairault's work that " the importance of all his results and the elegance with which they are presented place this work amongst the most beautiful of mathematical productions " (Isaac Todhunter's History of the Mathematical Theories of Attraction and the Figure of the Earth, vol. i. p. 229).

The problem of the figure of the earth treated as a question of mechanics or hydrostatics is one of great difficulty, and it would be quite impracticable but for the circumstance that the surface differs but little from a sphere. In order to express the forces at any point of the body arising from the attraction of its particles, the form of the

surface is required, but this form is the very one which it is the object of the investigation to discover; hence the complexity of the subject, and even with all the present resources of mathematicians only a partial and imperfect solution can be obtained.

We may here briefly indicate the line of reasoning by which some of the most important results may be obtained. If X, Y, Z be the components parallel to three rectangular axes of the forces acting on a particle of a fluid mass at the point x, y, 2, then, p being the pressure there, and p the density,

$dp = p(Xdx + Ydy + Zdz);$

and for equilibrium the necessary conditions are, that p(Xdx+ Ydy--Zdz) be a complete differential, and at the free surface Xdx-- Ydy--Zdz = 0. This equation implies that the resultant of the forces is normal to the surface at every point, and in a homogeneous fluid it is obviously the differential equation of all surfaces of equal pres- sure. If the fluid be heterogeneous then it is to be remarked that for forces of attraction according to the ordinary law of gravitation, if X, Y, Z be the components of the attraction of a mass whose potential is V, then

$Xdx + Ydy + Zdz = \hat{}dx + \hat{}dy + \hat{}dz,$

which is a complete differential. And in the case of a fluid rotating with uniform velocity, in which the so-called centrifugal force enters as a force acting on each particle proportional to its distance from the axis of rotation, the corresponding part of Xdx + Ydy + Zdz is obviously a complete differential. Therefore for the forces with which we are now concerned Xdx + Ydy--Zdz = dU, where U is some function of x, y, z, and it is necessary for equilibrium that dp = pd\] be a complete differential; that is, p must be a function of U or a functionof p, and so also p a function of U. So that dU = o is the differential equation of surfaces of equal pressure and density.

We may now show that a homogeneous fluid mass in the form of an oblate ellipsoid of revolution having a uniform velocity of rotation can be in equilibrium. It may be proved that the attraction of the ellipsoid x 2 +y 2 z 2 (l

X = -Ax, Y = -Ay, Z = -Cz, where

= 2irk 2 p{-

1 + e 2

•tan”

•»■

C = 4x£ 2 p (— - - i-tan” 1 ej ,

and k 2 the constant of attraction. Besides the attraction of the mass of the ellipsoid, the centrifugal force at P has for components +w ! , -f-yw 2 , o ; then the condition of fluid equilibrium is

(A – w 2) xdx + (A – co 2) ydy + Czdz = o,

which by integration gives

(A – a 2) (x 2 +y 2)+Cz 2 = constant.

This is the equation of an ellipsoid of rotation, and therefore the equilibrium is possible. The equation coincides with that of the surface of the fluid mass if we make

A-u, 2 = C/(l+e 2), which gives

_3 + e !

tan” 1 *—

2tt£ 2 p”

In the case of the earth, which is nearly spherical, we obtain by expanding the expression for w 2 in powers of e 2 , rejecting the higher powers, and remarking that the ellipticity e = J« 2 ,

o> 2 /2rf ! P = 4 C 2 /i5=8e/i5. Now if m be the ratio of the centrifugal force to the intensity of gravity at the equator, and a = c(l+e), then

m = au 2 /§irk 2 pa, .’. &i 2 /2ir£ 2 p = fm.

In the case of the earth it is a matter of observation that m = 1/289, hence the ellipticity

e = 5m/4 = i/23i, so that the ratio of the axes on the supposition of a homogeneous fluid earth is 230 : 231, as stated by Newton.

Now, to come to the case of a heterogeneous fluid, we shall assume that its surfaces of equal density are spheroids, concentric and having a common axis of rotation, and that the ellipticity of these

surfaces varies from the centre to the outer surface, the density also varying. In other words, the body is composed of homogeneous spheroidal shells of variable density and ellipticity. On this supposition we shall express the attraction of the mass upon a particle in its interior, and then, taking into account the centrifugal force, form the equation expressing the condition of fluid equilibrium. The attraction of the homogeneous spheroid x 2 +y 2 -(-z 2 (i +2e) = c 2 (l +2e), where e is the ellipticity (of which the square is neglected), on an internal particle, whose co-ordinates are x=f, y = o, z = h, has for its x and z components

X' = -I rfp/(i -ie), V = fx£VKi +|e) , the Y component being of course zero. Hence we infer that the at traction of a shell whose inner surface has an ellipticity e, and its outer surface an ellipticity e +de, the density being p, is expressed by

dX' = i -Ir&pfde, dZ' = -i-U&ph de. To apply this to our heterogeneous spheroid; if we put Ci for the semiaxis of that surface of equal density on which is situated the attracted point P, and Co for the semiaxis of the outer surface, the attraction of that portion of the body which is exterior to P, namely, of all the shells which enclose P, has for components

X^fakjf^dc, Z =-{Uk'hf c C \f c dc,

both e and p being functions of c. Again the attraction of a homogeneous spheroid of density p on an external point /, h has the components

*X"= fwk i pfr 3 {c s (j+2e)—Kec 5 }, Z"=-JTrk*phr- 3 {c 3 U+2e) -Wec b], where X = f (4/i 2 -/ 2)/r 4 , X' = ! (2^-3/2)/^, and r*=P+hK Now e being considered a function of c, we can at once express the attraction of a shell (density p) contained between the surface defined by c+dc, e+de and that defined by c, e upon an external point ; the differentials with respect to c, viz. dX" dZ", must then be integrated with p under the integral sign as being a function of c. The integra- tion will extend from c = o to c = C. Thus the components of the attraction of the heterogeneous spheroid upon a particle within its mass, whose co-ordinates are /, o, h, are*

*X= -i^f[i i £ 1 P d{cHi+2e)} -pJ^P< *(«)-iJ^P«fe].*

Z- -l*m[±fc P d{c°(i+2e)} -pffpdW+ifyde].

We take into account the rotation of the earth by adding the centrifugal force fo? = F to X. Now, the surface of constant density upon which the point/, o, h is situated gives (1 — 2e) fdf--hdh = o; and the condition of equilibrium is that (X+F)df+Zdh = o. Therefore,

(X+F)A = Z/(i-2e), which, neglecting small quantities of the order e 1 and putting w 2 2 2 = 47r 2 £ 2 , gives

%f^\c°(i+2e)}-^ P d(ec')-lf:°pde^f.

Here we must now put c for c\, c for r; and l+2e under the first integral sign may be replaced by unity, since small quantities of the second order are neglected. Two differentiations lead us to the following very important differential equation (Clairault):

dH, 2pc 2 dc 2+ fpc 2 dc

de . / 2pc 6\ _ ■dc + \fpc 2 dc cV e ~°-

\fpc 2 dc

When p is expressed in terms of c, this equation can be integrated. We infer then that a rotating spheroid of very small ellipticity, composed of fluid homogeneous strata such as we have specified, will be in equilibrium; and when the law of the density is expressed, the law of the corresponding ellipticities will follow.

If we put M for the mass of the spheroid, then

M

-*/> *

l+2e)} ;andm-

47T 2

and putting c = c in the equation expressing the condition of equilibrium, we find

M

(2e-m) =|*—^sj P^(«c 6)-

Making these substitutions in the expressions for the forces at the

surface, and putting r/e = i+e — e(h/c) 2 , we get

- ˆ M£ 2 \ 3 , ($ „\W\t

Gsin

>c 2

Here G is gravity in the latitude , and a the radius of the equator. Since

sec

an expression which contains the theorems we have referred to as discovered by Clairault.

The theory of the figure of the earth as a rotating ellipsoid has been especially investigated by Laplace in his Mecanique celeste. The principal English works are: — Sir George Airy, Mathematical Tracts, a lucid treatment without the use of Laplace's coefficients; Archdeacon Pratt's Attractions and Figure of the Earth; and O'Brien's Mathematical Tracts; in the last two Laplace's coefficients are used.

In 1845 Sir G. G, Stokes (Camb. Trans, viii.; see also Camb. Dub. Math. Journ., 1849, iv.) proved that if the external form of the sea — imagined to percolate the land by canals — be a spheroid with small ellipticity, then the law of gravity is that which we have shown above; his proof required no assumption as to the ellipticity of the internal strata, or as to the past or present fluidity of the earth. This investigation admits of being regarded conversely, viz. as determining the elliptical form of the earth from measurements of gravity; if G, the observed value of gravity in latitude , be expressed in the form G = g(i+ (3 sin 2), where g is the value at the equator and f$ a coefficient. In this investigation, the square and higher powers

of the ellipticity are neglected; the solution was completed by F. R. Helmert with regard to the square of the ellipticity, who showed that a term with sin 2 2<£ appeared (see Helmert, Geodasie, ii. 83). For the coefficient of this term, the gravity measurements give a small but not sufficiently certain value; we therefore assume a value which agrees best with the hypothesis of the fluid state of the entire earth; this assumption is well supported, since even at a depth of only 50 km. the pressure of the superincumbent crust is so great that rocks become plastic, and behave approximately as fluids, and

consequently the crust of the earth floats, to some extent, on the interior (even though this may not be fluid in the usual sense of the word). This is the geological theory of " Isostasis " (cf . Geology) ; it agrees with the results of measurements of gravity (vide infra) , and was brought forward in the middle of the 19th century by J. H. Pratt, who deduced it from observations made in India.

The sin 2 2$ term in the expression for G, and the corresponding deviation of the meridian from an ellipse, have been analytically established by Sir G. H. Darwin and E. Wiechert; earlier and less complete investigations were made by Sir G. B. Airy and O. Callandreau. In consequence of the sin 2 2<£ term, two parameters of the level surfaces in the interior of the earth are to be determined; for this purpose, Darwin develops two differential equations in the place of the one by Clairault. By assuming Roche's law for the variation of the density in the interior of the Earth, viz. p = pi—k(c/ci) 2 , k being a coefficient, it is shown that in latitude 45°, the meridian is depressed about 31 metres from the ellipse, and the coefficient of the term sin 2 $cos 2 $(= i sin 2 2<£) is— 0-0000295. According to Wiechert the earth is composed of a kernel and a shell, the kernel being composed of material, chiefly metallic iron, of density near 8-2, and the shell, about 900 miles thick, of silicates, &c, of density about 3-2. On this assumption the depression in latitude 45° is 2j metres, and the coefficient of sin 2 $cos 2 <£ is, in round numbers, — 0-0000280. 1 To this additional term in the formula for G, there corresponds an extension of Clairault's formula for the calculation of the flattening from /3 with terms of the higher orders; this was first accomplished by Helmert.

For a long time the assumption of an ellipsoid with three unequal axes has been held possible for the figure of the earth, in consequence of an important theorem due to K. G. Jacobi, who proved that for a homogeneous fluid in rotation a spheroid is not the only form of equilibrium; an ellipsoid rotating round its least axis may with certain proportions of the axes and a certain time of revolution be a form of equilibrium. 2 It has been objected to the figure of three unequal axes that it does not satisfy, in the proportions of the axes, the conditions brought out in Jacobi's theorem (c: a

Local Attraction.

In speaking of the figure of the earth, we mean the surface of the sea imagined to percolate the continents by canals. That

1 0. Callendreau, " Memoire sur la theorie de la figure des planetes," Ann. obs. de Paris (1889); G. H. Darwin, " The Theory of the Figure of the Earth carried to the Second Order of Small Quantities," Mon. Not. R.A.S., 1899; E. Wiechert, " tlber die Massenverteilung im Innern der Erde," Nach. d. kon. G. d. W. zu Gbtt., 1897. 2 See I. Todhunter, Proc. Roy. Soc, 1870.

3 J. H. Jeans, " On the Vibrations and Stability of a Gravitating Planet," Proc. Roy. Soc. vol. 71; G. H. Darwin, "On the Figure and Stability of a liquid Satellite," Phil. Trans. 206, p. 161 ; A. E. H. Love, " The Gravitational Stability of the Earth," Phil. Trans. 207, p. 237; Proc. Roy. Soc. vol. 80.

this surface should turn out, after precise measurements, to be exactly an ellipsoid of revolution is a priori improbable. Al- though it may be highly probable that originally the earth was a fluid mass, yet in the cooling whereby the present crust has resulted, the actual solid surface has been left most irregular in form. It is clear that these irregularities of the visible surface must be accompanied by irregularities in the mathematical figure of the earth, and when we consider the general surface of our globe, its irregular distribution of mountain masses, continents, with oceans and islands, we are prepared to admit that the earth may not be precisely any surface of revolution. Nevertheless, there must exist some spheroid which agrees very closely with the mathematical figure of the earth, and has the same axis of rotation. We must conceive this figure as exhibiting slight departures from the spheroid, the two surfaces cutting one another in various lines; thus a point of the surface is defined by its latitude, longitude, and its height above the " spheroid of reference." Calling this height N, then of the actual magnitude of this quantity we can generally have no information, it only obtrudes itself on our notice by its variations. In the vicinity of mountains it may change sign in the space of a few miles; N being regarded as a function of the latitude and longitude, if its differential coefficient with respect to the former be zero at a certain point, the normals to the two surfaces then will lie in the prime vertical; if the differential coefficient of N with respect to the longitude be zero, the two normals will lie in the meridian; if both coefficients are zero, the normals will coincide. The comparisons of terrestrial measurements with the corresponding astronomical observations have always been accompanied with discrepancies. Suppose A and B to be two

trigonometrical stations, and that at A there is a disturbing force drawing the vertical through an angle 8, then it is evident that the apparent zenith of A will be really that of some other place A', whose distance from A is rd, when r is the earth's radius; and similarly if there be a disturbance at B of the amount 5', the apparent zenith of B will be really that of some other place B', whose distance from B is r8'. Hence we have the discrepancy that, while the geodetic measurements deal with the points A and B, the astronomical observations belong to the points A', B'. Should 8, 5′ be equal and parallel, the displacements AA', BB' will be equal and parallel, and no discrepancy will appear. The non-recognition of this circumstance often led to much perplexity in the early history of geodesy. Suppose that, through the unknown variations of N, the probable error of an observed latitude (that is, the angle between the normal to the mathematical surface of the earth at the given point and that of the corresponding point on the spheroid of reference) be e, then if we compare two arcs of a degree each in mean latitudes, and near each other, say about five degrees of latitude apart, the probable error of the resulting value of the ellipticity will be approximately ± zi~t^, « being expressed in seconds, so that if e be so great as 2″ the probable error of the resulting ellipticity will be greater than the ellipticity itself.

It is necessary at times to calculate the attraction of a mountain, and the consequent disturbance of the astronomical zenith, at any point within its influence. The deflection of the plumb-line, caused by a local attraction whose amount is k?A8, is measured by the ratio of k 2 AS to the force of gravity at the station. Expressed in seconds, the deflection A is

A = i2"-447AS/p,

where p is the mean density of the earth, 8 that of the attracting mass, and A = fs- 3 xdv, in which dv is a volume element of the attracting mass within the distance s from the point of deflection, and x the projection of s on the horizontal plane through this point, the linear unit in expressing A being a mile. Suppose, for instance, a table-land whose form is a rectangle of 12 miles by 8 miles, having a height of 500 ft. and density half that of the earth; let the observer be 2 miles distant from the middle point of the longer side. The deflection then is i"-472; but at 1 mile it increases to 2″ -20. At sixteen astronomical stations in the English survey the

disturbance of latitude due to the form of the ground has been computed, and the following will give an idea of the results. At six

stations the deflection is under 2", at six others it is between 2″ and 4", and at four stations it exceeds 4. There is one very exceptional station on the north coast of Banffshire, near the village of Portsoy, at which the deflection amounts to 10", so that if that village were placed on a map in a position to correspond with its astronomical latitude, it would be 1000 ft. out of position ! There is the sea to the north and an undulating country to the south, which, however, to a spectator at the station does not suggest any great disturbance of gravity. A somewhat rough estimate of the local attraction from external causes gives a maximum limit of 5", therefore we have 5″ which must arise from unequal density in the underlying strata in the surrounding country. In order to throw light on this remarkable phenomenon, the latitudes of a number of stations between Nairn on the west, Fraserburgh on the east, and the Grampians on the south, were observed, and the local deflections determined. It is somewhat singular that the deflections diminish in all directions, not very regularly certainly, and most slowly in a south- west direction, finally disappearing, and leaving the maximum at the original station at Portsoy.*

The method employed by Dr C. Hutton for computing the attraction of masses of ground is so simple and effectual that it can hardly be improved on. Let a horizontal plane pass through the given station; let r, 6 be the polar co-ordinates of any point in this plane, and r, d, z, the co-ordinates of a particle of the attracting mass; and let it be required to find the attraction of a portion of the mass contained between the horizontal planes z = o, z=h, the cylindrical surfaces r=r lt r=r 2 , and the vertical planes 6 = d h d = 2 . The component of the attraction at the station or origin along the line = o is r 2 cos9

"£JX

zdr d9 dz

(r 2 +2 2)r

= &Sh(sm62-sm8 1)log{r 2 + (rl+K 1) l h/r l + (r l s+W)i. By taking r 2 -n, sufficiently small, and supposing h also small compared with n+r 2 (as it usually is), the attraction is k?& (r 2 — n) (sin 2 — sin0i) hjr,

where r = % (ri+r 2). This form suggests the following procedure. Draw on the contoured map a series of equidistant circles, concentric with the station, intersected by radial lines so disposed that the sines

of their azimuths are. in arithmetical progression. Then, having estimated from the map the mean heights of the various compartments, the calculation is obvious.

In mountainous countries, as near the Alps and in the Caucasus, deflections have been observed to the amount of as much as 30", while in the Himalayas deflections amounting to 60" were observed. On the other hand, deflections have been observed in flat countries, such as that noted by Professor K. G. Schweizer, who has shown that, at certain stations in the vicinity of Moscow, within a distance of 16 miles the plumb-line varies 16" in such a manner as to indicate a vast deficiency of matter in the underlying strata; deflections of 10" were observed in the level regions of north Germany.

Since the attraction of a mountain mass is expressed as a numerical multiple of 5 : p the ratio of the density of the moun- tain to that of the earth, if we have any independent means of ascertaining the amount of the deflection, we have at once the ratio p:8, and thus we obtain the mean density of the earth, as, for instance, at Schiehallion, and afterwards at Arthur's Seat. Experiments of this kind for determining the mean density of the earth have been made in greater numbers; but they are not free from objection (see Gravitation).

Let us now consider the perturbation attending a spherical subterranean mass. A compact mass of great density at a small distance under the surface of the earth will produce an elevation of the mathematical surface which is expressed by the formula

y = a»{(i —2u cos 0+m 2)- — 1}, where a is the radius of the (spherical) earth, a(i – u) the distance*

*of the disturbing mass below the surface, fi the ratio of the dis- turbing mass to the mass of the earth, and ad the distance of any point on the surface from that point, say Q, which is vertically over the disturbing mass. The maximum value of y is at Q, where it is y = a/x«(i— «). The deflection at the distance ad is h.=ixu sin 6(i — 2U cos 6 + « 2) '» or since 8 is small, putting h+u=i, we have A = / x0(# ! +0 2) *. The maximum deflec- tion takes place at a point whose distance from Q is to the depth of the mass as 1: V2, and its amount is 2^/3 V3A 2 . If, for instance, the disturbing mass were a*

sphere a mile in diameter, the excess of its density above that of the sur- rounding country being equal to half the density of the earth, and the depth of its centre half a mile, the greatest de- flection would be 5", and the greatest value of y only two inches. Thus a large disturbance of gravity may arise from an irregularity in the mathematical surface whose actual magnitude, as regards height at least, is extremely small.

The effect of the disturbing mass n on the vibrations of a pendulum would be a maximum at Q; if v be the number of seconds of time gained per diem by the pendulum at Q, and a the number of seconds of angle_in the maximum deflection, then it may be shown that v/a — iryl 3/ 10.

The great Indian survey, and the attendant measurements of the degree of latitude, gave occasion to elaborate investigations of the deflection of the plumb-line in the neighbourhood of the high plateaus and mountain chains of Central Asia. Archdeacon Pratt (Phil. Trans. ,185$ and 1857), in instituting these investiga- tions, took into consideration the influence of the apparent diminution of the mass of the earth's crust occasioned by the neighbouring ocean-basins; he concluded that the accumulated masses of mountain chains, &c, corresponded to subterranean mass diminutions, so that over any level surface in a fixed depth (perhaps 100 miles or more) the masses of prisms of equal section are equal. This is supported by the gravity measurements at More in the Himalayas at a height of 4696 metres, which showed no deflection due to the mountain chain (Phil. Trans., 187 1); more recently, H. A. Faye (Compt. rend., 1880) arrived at the same conclusion for the entire continent.

This compensation, however, must only be regarded as a general principle; in certain cases, the compensating masses show marked horizontal displacements. Further investigations, especially of gravity measurements, will undoubtedly establish other im- portant facts. Colonel S. G. Burrard has recently recalculated, with the aid of more exact data, certain Indian deviations of the plumb-line, and has established that in the region south of the Himalayas (lat. 24°) there is a subterranean per- turbing mass. The extent of the compensation of the high mountain chains is difficult to recognize from the latitude observations, since the same effect may result from different causes; on the other hand, observations of geographical long : – tude have established a strong compensation. 1

Meridian Arcs.

The astronomical stations for the measurement of the degree of latitude will generally lie not exactly on the same meridian; and it is therefore necessary to calculate the arcs of meridian M which lie between the latitude of neighbouring stations. If S be the geodetic line calculated from the triangulation with the astronomically determined azimuths ai and

cos jAa (li a %)

in which 2a=ai+

The length of the arc of meridian between the latitudes <\>\ and 4> 2 is

,, f«, ,, f» (i-e 2)d0*

2 sin 2 0)j

where a 2 e 2 = a 2 — 6 2 ; instead of using the eccentricity e, put the ratio of the axes b: a=i— n: i+m, then

1 Survey of India, " The Attraction of the Himalaya Mountains upon the Plumb Line in India " (1901), p. 98.

«»

M = p» Mi+ ")(i-w 2)d<» Jfa (i+2ncos2tf>-t-»2)f

This, after integration, gives

M/5 = (1 «|„2 + 5 M s) ao _ (3re+ 3M 2+ˆV) «,-+ (ˆ» 2 +ˆ«»)

where

00 =

ai= sin (i) cos (i) a 2 = sin 2 (<#>2 — i) cos2(02+0i) o s = sin 3(4)2-0!) cos 3(02+01).

The part of M which depends on n s is very small; in fact, if we calculate it for one of the longest arcs measured, the Russian arc, it amounts to only an inch and a half, therefore we omit this term, and put for M/b the value

(1 rc|» 2) a – (3»+3» 2) 01+ (ˆ» 2) a 2 .

Now, if we suppose the observed latitudes to be affected with errors,

*and that the true latitudes are #i+ *i, fa+xa; and if further we suppose that n x --dn is the true value of a—b: a+b, and that n\ itself is merely a very approximate numerical value, we get, on making these substitutions and neglecting the influence of the corrections x on the position of the arc in latitude, i.e. on*

01+ˆ2,

*M/b= (l+»i+ˆ) «0- (3*1 3»[) «i (ˆnty a 2 + I (1 +|»i) «o- (3+6»i) a;+ (ˆm) a 2 I dn + ji+ni- 3 «ˆjda„;*

*here dao = * 2 — X\ and as b is only known approximately, put b = bi(i+u); then we get, after dividing through by the co- efficient of dao, which is =i+«i— 3«i cos(— i) cos(i), an equation of the form x 2 =xi+h+fu+gv, where for con- venience we put v for dn.*

Now in every measured arc there are not only the extreme stations determined in latitude, but also a number of inter- mediate stations so that if there be i+i stations there will be i equations

**2 = *l+/lM+gl»+fcl*

xs = xi --fiii + g 2 v + hi

In combining a number of different arcs of meridian, with the view of determining the figure of the earth, each arc will supply a number of equations in u and v and the corrections to its observed latitudes. Then, according to the method of least squares, those values of u and v are the most probable which render the sum of the squares of all the errors x a minimum. The corrections x which are here applied arise not from errors of observation only. The mere uncertainty of a latitude, as determined with modern instruments, does not exceed a very small fraction of a second as far as errors of observation go, but no accuracy in observing will remove the error that may arise from local attraction. This, as we have seen, may amount to some seconds, so that the corrections x to the observed latitudes are attributable to local attraction. Archdeacon Pratt objected to this mode of applying least squares first used by Bessel; but Bessel was right, and the objection is groundless. Bessel found, in 1 84 1, from ten meridian arcs with a total amplitude of 50°-6:

= 3272077 toises = 6377397 metres.

e (ellipticity) = (a — 6)/o = 1/299-15 (prob. error±3-2).

The probable error in the length of the earth's quadrant is ± 336 m.

We now give a series of some meridian-arcs measurements, which were utilized in 1866 by A. R. Clarke in the Comparisons of the Standards of Length, pp. 280-287; details of the calcula- tions are given by the same author in his Geodesy (1880), pp. 311 et seq.

The data of the French arc from Formentera to Dunkirk are—

Stations.

Astronomical Latitudes.

O / ff

Distance of

Parallels.

Ft.

Formentera . Mountjouy . Barcelona Carcassonne . Pantheon Dunkirk . .

• • 38 39 53-17

41 21 44-96 41 22 47-90 . . 43 12 54-30 . . 48 50 47-98 . . 51 2 8-41

982671-04

988701-92

1657287-93

3710827-13

4509790-84

The distance of the parallels of Dunkirk and Greenwich, deduced from the extension of the triangulation of England into France, in 1862, is 161407-3 ft., which is 3-9 ft. greater than that obtained from Captain Kater's triangulation, and 3-2 ft. less than the distance calculated by Delambre from General Roy's triangulation. The following table shows the data of the English arc with the distances

in standard feet from Formentera.

o , , Ft

Formentera

Greenwich

• 5i

28

38-30

4671198-3

Arbury .

• 52

13

26-59

4943837-6

Clifton . . .

• 53

27

29-50

5394063-4

Kellie Law .

- 56

14

53-6o

6413221-7

Stirling .

• 57

27

49-12

6857323-3

Saxavord

. 60

49

37-21

8086820-7

The latitude assigned in this table to Saxavord is not the directly observed latitude, which is 60° 49′ 38-58”, for there are here a cluster of three points, whose latitudes are astronomic- ally determined; and if we transfer, by means of the geodesic connexion, the latitude of Gerth of Scaw to Saxavord, we get 6o° 49′ 36-59*; and if we similarly transfer the latitude of Balta, we get 6o° 49′ 36-46”. The mean of these three is that entered in the above table.

For the Indian arc in long. 77° 40′ we have the following data : —

Ft.

Punnea

8 9 31-132

Putchapolliam

10 59 42-276

1029174-9

Dodagunta Namthabad .

12 59 52-165

1756562-0

15 5 53-562

2518376-3

Daumergida .

18 3 15292

3591788-4

Takalkhera .

21 5 5I-532

4697329-5

Kalianpur

24 7 11-262

5794695-7

Kaliana .

29 30 48-322

7755835-9

The data of the Russian arc (long. 26° 40') taken from Struve's work are as below : —

Ft.

Staro Nekrasovsk

45

20

2-94

Vodu-Luy

47

1

24-98

616529-81

Suprunkovzy

48

45

3-04

1246762-17

Kremenets .

50

5

49-95

I73755I-48

Byelin

52

2

42-16

2448745-17

Nemesh .

54

39

4-16

3400312-63

Jacobstadt Dorpat .

56

3°

4-97

4076412-28

58

22

47-56

4762421-43

Hogland

60

5

9-84

5386135-39

Kilpi-maki

62

38

5-25

6317905-67

Tornea

65

49

44-57

7486789-97

Stuor-oivi

68

40

58-40

8530517-90

Fuglenaes

70

40

1123

9257921-06

From the arc measured in Cape Colony by Sir Thomas Maclear in long. 1 8° 30', we have

North End . Heerenlogement Berg Royal Observatory . Zwart Kop . Cape Point .

29 31 33 34 34

44 58 56 13 21

17-66 911 3-20

32-13 626

Ft.

811507-7 1526386-8 1632583-3

I678375-7

And, finally, for the Peruvian arc, in long. 281 o',

Ft.

Tarqui 3 4 32-068

Cotchesqui 02 31-387 1131036-3

Having now stated the data of the problem, we may seek that oblate ellipsoid (spheroid) which best represents the observations. Whatever the real figure may be, it is certain that if we suppose it an ellipsoid with three unequal axes, the arithmetical pro- cess will bring out an ellipsoid, which will agree better with all the observed latitudes than any spheroid would, therefore we do not prove that it is an ellipsoid; to prove this, arcs of

The result for the spheroid may

225-8 cos 40

45-2 cos 4

3-94 cos 40

0-39 cos 50

longitude would be required, be expressed thus : —

= 20926062 ft. = 6378206-4 metres.

6 = 20855121 ft. =6356583-8 metres.

6:0 = 293-98 : 294-98.

As might be expected, the sum of the squares of the 40 latitude corrections, viz. 153-99, is greater in this figure than in that of three axes, where it amounts to 138-30. For this case, in the Indian arc the largest corrections are at Dodagunta, + 3-87", and at Kalianpur, – 3-68". In the Russian arc the largest corrections are + 3-76", at Tornea, and-3-3i", at Staro Nekra- sovsk. Of the whole 40 corrections, 16 are under i-o", 10 between i-o" and 2-0", 10 between 2-0″ and 3-0", and 4 over 3-0". The probable error of an observed latitude is + 1-42"; for the spheroidal it would be very slightly larger. This quantity may be taken therefore as approximately the probable amount of local deflection.

If p be the radius of curvature of the meridian in latitude , p' that perpendicular to the meridian, D the length of a degree of the meridian, D' the length of a degree of longitude, r the radius drawn from the centre of the earth, V the angle of the vertical with the radius-vector, then Ft.

p =20890606-6 —106411-5 COS 20 +

p' =20961607-3 – 35590-9 COS 20 4-

D= 364609-87 — 1857-14 COS 20 +

D '= 365538-48 cos – 310-17 cos 30 + Log r/a = 9-9992645 + -0007374 cos 20 —-OOOOOI9COS4

V =700-44″ sin 20 — 1-19″ sin 40.

A. R. Clarke has recalculated the elements of the ellipsoid of the earth; his values, derived in 1880, in which he utilized the measurements of parallel arcs in India, are particularly in practice. These values are : —

= 20926202 ft. =6378249 metres. 6 = 20854895 ft. =6356515 metres.

6 =0 = 292-465 =293-465.

The calculation of the elements of the ellipsoid of rotation from measurements of the curvature of arcs in any given azimuth by means of geographical longitudes, latitudes and azimuths is indicated in the article Geodesy ; reference may be made to Principal Triangulation, Helmert's Geodasie, and the publications of the Kgl. Preuss. Geod. Inst.: — Lotabweichungen (1886), and Die europ. Langengradmessung in 52° Br. (1893). For the calculation of an ellipsoid with three unequal axes see Comparison of Standards, preface; and for non-elliptical meridians, Principal Triangulation, P-733-

Gravitation-Measurements.

According to Clairault's theorem (see above) the ellipticity e of the mathematical surface of the earth is equal to the difference %m — /3, where m is the ratio of the centrifugal force at the equator to gravity at the equator, and /3 is derived from the formula G = g(i +j3sin 2 #). Since the beginning of the 19th century many efforts have been made to determine the constants of this formula, and numerous expeditions undertaken to investigate the intensity of gravity in different latitudes. If m be known, it is only necessary to determine |3 for the evaluation of e; consequently it is unnecessary to determine G absolutely, for the relative values of G at two known latitudes suffice. Such relative measurements are easier and more exact than absolute ones. In some cases the ordinary thread pendulum, i.e. a spherical bob suspended by a wire, has been employed; but more often a rigid metal rod, bearing a weight and a knife- edge on which it may oscillate, has been adopted. The main point is the constancy of the pendulum. From the formula for the ti me o f oscillation of the mathematically ideal pendulum, t = 2Tˆl/G, I being the length, it follows that for two points Gi/G, =

In 1808 J. B. Biot commenced his pendulum observations at several stations in western Europe; and in 181 7-1825 Captain Louis de Freycinet and L. I. Duperrey prosecuted similar observations far into

the southern hemisphere. Captain Henry Kater confined himself to British stations (1818-1819); Captain E. Sabine, from 1819 to 1829, observed similarly, with Kater's pendulum, at seventeen stations ranging frora the West Indies

to <3i«enland and Spitsbergen; and in 1824-1831, Captain Henry Foster (who met his death by drowning in Central America) experimented at sixteen stations; his observations were completed by Francis Baily in London. Of other workers in this field mention may be made of F. B. Ltitke (1826-1829), a Russian rear-admiral, and Captains J. B. Basevi and W. T. Heaviside, who observed during 1865 to 1873 at Kew and at 29 Indian stations, particularly at More in the Himalayas at a height of 4696 metres. Of the earlier absolute determinations we may mention those of Biot, Kater, and Bessel at Paris, London and Konigsberg respectively. The measurements were par- ticularly difficult by reason of the length of the pendulums employed, these generally being second-pendulums over 1 metre long. In about 1880, Colonel Robert von Sterneck of Austria introduced the half-second pendulum, which permitted far quicker and more accurate work. The use of these pendulums spread in all countries, and the number of gravity stations consequently increased: in 1880 there were about 120, in 1900 there were about 1600, of which the greater number were in Europe. Sir E. Sabine 1 calculated the ellipticity to be 1/288-5, a value shown to be too high by Helmert, who in 1884, with the aid of 120 stations, gave the value i/299-26, 2 and in 1901, with about 1400 stations, derived the value i/298-3. 3 The reason for the excessive estimate of Sabine is that he did not take into account the systematic difference between the values of G for continents and islands; it was found that in consequence of the constitution of the earth's crust (Pratt) G is greater on small

H, and g 3 the value at sea-level. This is supposed to take into account the attraction of the elevated strata or plateau; but, from the analytical method, this is not correct; it is also disadvantageous since, in general, the land-masses are compen- sated subterraneously, by reason of the isostasis of the earth's crust.

In 1849 Stokes showed that the normal elevations N of the geoid towards the ellipsoid are calculable from the deviations Ag of the acceleration of gravity, i.e. the differences between the observed g and the value calculated from the normal G formula. The method

assumes that gravity is measured on the earth's surf ace at a sufficient number of points, and that it is conformably reduced. In order to secure the convergence of the expansions in spherical harmonics, it is necessary to assume all masses outside a surface parallel to the surface of the sea at a depth of 21 km. (= RXellipticity) to be condensed on this surface (Hel- mert, Geod. ii. 172). In addition to the reduction with 2gH/R, there still result small reductions with mountain chains and coasts, and somewhat larger ones for islands. The sea-surface generally varies but very little by this condensation. The elevation (N) of the geoid is then equal to

N =

R r'FG-'A^ d+,

where \p is the spherical distance from the point N, and Agj, denotes the mean value of Ag for all points in the same distance \p around; F is a function of \p, and has the following values: —

¥ =

0°

10°

20°

30°

40

50°

6o°

70°

8o°

90°

100°

110°

120°

130°

140°

1 50°

160°

170

180

F =

1

1-22

0-94

0-47

— 0-06

-o-54

-0-90

-1-08

-1-08

—0-91

— 0-62

—0-27

+o-o8

0-36

o-53

0-56

0-46

islands of the ocean than on continents by an amount which may approach to 0-3 cm. Moreover, stations in the neighbourhood of coasts shelving to deep seas have a surplus, but a little smaller. Consequently, Helmert conducted his calculations of 1901 for continents and coasts separately, and obtained G for the coasts 0-036 cm. greater than for the continents, while the value of |3 remained the same. The mean value, reduced to continents, is G=978-03(i +0005302 sin 2 0— 0000007 sin 2 2<#>)cm/sec 2 . The small term involving sin 2 2$ could not be calculated with sufficient exactness from the observations, and is therefore taken from the theoretical views of Sir G. H. Darwin and E. Wiechert. For the constant g = 978-03 cm. another correction has been suggested (1906) by the absolute determinations made by F. Kiihnen and Ph. Furtwangler at Potsdam. 4

A report on the pendulum measurements of the 19th century has been given by Helmert in the Comptes renins des seances de la i3 e conference generate de I' Association Geod. Internationale d, Paris (1900), ii. 139-385.

A difficulty presents itself in the case of the application of measurements of gravity to the determination of the figure of the earth by reason of the extrusion or standing out of the land- masses (continents, &c.) above the sea-level. The potential of gravity has a different mathematical expression outside the masses than inside. The difficulty is removed by assuming (with Sir G. G. Stokes) the vertical condensation of the masses on the sea-level, without its form being considerably altered (scarcely 1 metre radially). Further, the value of gravity (g) measured at the height H is corrected to sea-level by + 2gH/R, where R is the radius of the earth. Another correction, due to P. Bouguer, is — fg5H/pR, where 5 is the density of the strata of height H, and p the m;an density of the earth. These two corrections are represented in " Bouguer's Rule": gH=g s (i — 2H/R-r-35H/2pR), where g u is the gravity at height

1 Account of Experiments to Determine the Figure of the Earth by means of a Pendulum vibrating Seconds in Different Latitudes (1825).

2 Helmert, Theorien d. hoheren Geod. ii., Leipzig, 1884.

3 Helmert, Sitzber. d. kgl. preuss. Ak. d. Wiss. zu Berlin (1901), p-336- .

4 " Bestimmung der absoluten Grosse der Schwerkraft zu Potsdam mit Reversionspendeln " (Veroffentlichung des kgl. preuss. Geod. Inst., N.F., No. 27).

H. Poincare (Bull. Astr., 1901, p. 5) has exhibited N by means of Lame's functions; in this case the condensation is effected on an ellipsoidal surface, which approximates to the geoid. This condensation is, in practice, the same as to the geoid itself.

If we imagine the outer land-masses to be condensed on the sea-level, and the inner masses (which, together with the outer masses, causes the deviation of the geoid from the ellipsoid) to be compensated in the sea-level by a disturbing stratum (which, according to Gauss, is possible), and if these masses of both kinds correspond at the point N to a stratum of thickness D and density 8, then, according to Helmert (Geod. ii. 260) we have approximately

- a TUT N)-

Since N slowly varies empirically, it follows that in restricted regions (of a few 100 km. in diameter) Ag is a measure of the variation of D. By applying the reduction of Bouguer to g, D is diminished by H and only gives the thickness of the ideal disturbing mass which corresponds to the perturbations due to subterranean masses. Ag has positive values on coasts, small islands, and high and medium mountain chains, and occasionally in plains; while in valleys and at the foot of mountain ranges it is negative (up to 0-2 cm.). We conclude from this that the masses of smaller density existing under high mountain chains lie not only vertically underneath but also spread out sideways.

The European Arc of Parallel in 52 Lot.

Many measurements of degrees of longitudes along central parallels in Europe were projected and partly carried out as early as the first half of the 19th century; these, however, only became of importance after the introduction of the electric telegraph, through whicn calculations of astronomical longitudes obtained a much higher degree of accuracy. Of the greatest moment is .the measurement near the parallel of 52 lat., which extended from Valentia in Ireland to Orsk in the southern Ural mountains over 69 long, (about 6750 km.). F. G. W. Struve, who is to be regarded as the father of the Russo-Scandinavian latitude-degree measurements, was the originator of this investi- gation. Having made the requisite arrangements with the

governments in 1857, he transferred them to his son Otto, who, in i860, secured the co-operation of England. A new connexion of England with the continent, via the English Channel, was accomplished in the next two years; whereas the requisite triangulations in Prussia and Russia extended over several decennaries. The number of longitude stations originally arranged for was 15; and the determinations of the differences in longitude were uniformly commenced by the Russian observers E. I. von Forsch, J. I. Zylinski, B. Tiele and others; Feaghmain (Valentia) being reserved for English observers. With the concluding calculation of these operations, newer determinations of differences of longitudes were also applicable, by which the number of stations was brought up to 29. Since local deflections of the plumb-line were suspected at Feaghmain, the most westerly station, the longitude (with respect to Greenwich) of the trigonometrical station Killorglin at the head of Dingle Bay was shortly afterwards determined.

The results (1891-1894) are given in volumes xlvii. and 1. of the memoirs (Zapiski) of the military topographical division of the Russian general staff, volume li. contains a reconnexion of Orsk. The observations made west of Warsaw are detailed in the Die europ. Langengradmessung in 52 ° Br., i. and ii., 1893, 1896, pub- lished by the Kgl. Preuss. Geod. Inst.

The following figures are quoted from Helmert's report " Die Grosse der Erde " {Sitzb. d. Berl. Akad. d. Wiss., 1906,

P- 53 5):—

Easterly Deviation of the Astronomical Zenith.

Name. Longitude.

Feaghmain .

Killorglin .

Haverfordwest .

Greenwich .

Rosendael-Nieuport

Bonn .

Gottingen .

Brocken

Leipzig

Rauenberg-Berlin

Grossenhain

Schneekoppe

Springberg

Breslau-Rosenthal

Trockenberg

Schonsee

Mirov

Warsaw

Grodno

- 10 21

- 9 47

- 4 58

o o

+ 2 35

+ 7 6

+ 9 57

+ 10 37

+ 12 23

+ 13 2 3

+ 13 33

+ 15 45

+ 16 37

+ 17 2

+ 18 53

+ 18 54

+ 19 18

+21 2

+23 50

-3-3

+2-8

+ 1-6

+i-5 -i-7

-4-4 -2-4

+2-3

+2-7

+ i-7

-2-9

+0-1

+o-8

+3-5

-o-5

-2-9

+2-2

+ i-9

-2-8

+o-5

+4-4

+0-2

+6-4

-2-6

+ 1-7 -8-0

Bobruisk +29 14

Orel +36 4

Lipetsk +39 36

Saratov +46 3

Samara +50 5

Orenburg +55 7

Orsk +58 34

These deviations of the plumb-line correspond to an ellipsoid having an equatorial radius (a) of nearly 6,378,000 metres (prob. error = = 70 metres) and an ellipticity 1/299-15. The latter was taken for granted; it is nearly equal to the result from the gravity-measurements ; the value for a then gives 2r; 2 a mini- mum (nearly). The astronomical values of the geographical longitudes (with regard to Greenwich) are assumed, according to the compensation of longitude differences carried out by van de Sande Bakhuyzen (Cotnp. rend, des stances de la commission permanente de V Association GSod. Internationale a Geneve, 1893, annexe A.I.). Recent determinations (Albrecht, Astr. Nach., 3993/4) have introduced only small alterations in the deviations, a being slightly increased.

Of considerable importance in the investigation of the great arc was the representation of the linear lengths found in different countries, in terms of the same unit. The necessity for this had previously

occurred in the computation of the figure of the earth from latitude-degree-measurements. A. R. Clarke instituted an extensive series of comparisons at Southampton (see Com- parisons of Standards of Length of England, France, Belgium, Prussia, Russia, India and Australia, made at the Ordnance Survey Office, Southampton, 1866, and a paper in the Philosophical Transactions for 1873, by Lieut.-Col. A. R. Clarke, C.B., R.E.,

on the further comparisons of the standards of Austria, Spain, the United States, Cape of Good Hope and Russia) and found that 1 toise = 6-39453348 ft., 1 metre =3-28086933 ft.

In 1875 a number of European states concluded the metre convention, and in 1877 an international weights-and-measures bureau was established at Breteuil. Until this time the metre was determined by the end-surfaces of a platinum rod {metre des archives); subsequently, rods of platinum-iridium, of cross-section H, were constructed, having engraved lines at both ends of the bridge, which determine the distance of a metre. There were thirty of the rods which gave as accurately as possible the length of the metre; and these were distributed among the different states (see Weights and Measures). Careful com- parisons with several standard toises showed that the metre was not exactly equal to 443,296 lines of the toise, but, in round num- bers, 1/75000 of the length smaller. The metre according to the older relation is called the " legal metre," according to the new relation the "international metre." The values are (see Europ. Ldngengradmessung, i. p. 230) : —

Legal metre = 3-28086933 ft., International metre =3-2808257 ft.

The values of a given above are in terms of the international metre; the earlier ones in legal metres, while the gravity formulae are in international metres.

The International Geodetic Association {Internationale Erdmessung).

On the proposition of the Prussian lieutenant-general, Johann Jacob Baeyer, a conference of delegates of several European states met at Berlin in 1862 to discuss the question of a " Central European degree-measurement." The first general conference took place at Berlin two years later; shortly afterwards other countries joined the movement, which was then named " The European degree-measurement." From 1866 till 1886 Prussia had borne the expense incident to the central bureau at Berlin; but when in 1886 the operations received further extension and the title was altered to "

The International Earth-measurement " or " International Geodetic Association," the co-operating states made financial contributions to this purpose. The cen tral bureau is affiliated with the Prussian Geodetic Institute, which, since 1892, has been situated on the Telegraphenberg near Potsdam. After Baeyer's death Prof. Friedrich Robert Helmert was appointed director. The funds are devoted to the advancement of such scientific works as concern all countries and deal with geodetic problems of a general or universal nature. During the period 1897-1906 the following twenty-one countries belonged to the association: — Austria, Belgium, Denmark, England, France, Germany, Greece, Holland, Hungary, Italy, Japan, Mexico, Norway, Portugal, Rumania, Russia, Servia, Spain, Sweden, Switzerland and the United States of America. At the present time general conferences take place every three years. 1

Baeyer projected the investigation of the curvature of the meridians and the parallels of the mathematical surface of the earth stretching from Christiania to Palermo for 1 2 degrees of longitude; he sought to co-ordinate and complete the network of triangles in the countries through which these meridians passed, and to represent his results by a common unit of length. This proposition has been carried out, and extended over the greater part of Europe; as a matter of fact, the network has, with trifling gaps, been carried over the whole of western and central Europe, and, by some chains of triangles, over European Russia. Through the co-operation of France, the network has been extended into north Africa as far as the geographical latitude of 32°; in Greece a network, united with those of Italy and Bosnia, has been carried out by the Austrian colonel, Heinrich Hartl; Servia has projected similar triangulations; Rumania has begun to make the triangle measurements, and three base

1 Die Konigl. Observatorien fur Astrophysik, Meteorologie und Geoddsie bei Potsdam (Berlin, 1890); Verhandlungen der I. Allgemeinen Conferenz der Bevollmachtigten zur mitteleurop. Gradmessung, October, 1864, in Berlin (Berlin, 1865) ; A. Hirsch, Verhandlungen der VIII. Allg. Conf. der Internationalen Erdmessung, October, 1886, in Berlin (Berlin, 1887); and Verhandlungen der XI. Allg. Conf. d. I. E., October, 1895, in Berlin (1896).

lines have been measured by French officers with Brunner's apparatus. At present, in Rumania, there is being worked a

connexion between the arc of parallel in lat. 47°/48° in Russia (stretching from Astrakan to Kishinev) with Austria-Hungary. In the latter country and in southBavaria the connecting triangles for this parallel have been recently revised, as well as the French chain on the Paris parallel, which has been connected with the German net by the co-operation of German and French geodesists . This will give a long arc of parallel, really projected in the first half of the 19th century. The calculation of the Russian section gives, with an assumed ellipticity of 1/299-15, the value a = 63773S metres; this is rather uncertain, since the arc embraces only 19 in longitude.

We may here recall that in France geodetic studies have recovered their former expansion under the vigorous impulse of Colonel (afterwards General) Franc ois Perrier. When occupied with the triangulation of Algeria, Colonel Perrier had conceived the possibility of the geodetic junction of Algeria to Spain, over the Mediterranean; therefore the French meridian line, which was already connected with England, and was thus produced to the 60th parallel, could further be linked to the Spanish triangulation, cross thence into Algeria and extend to the Sahara, so as to form an arc of about 30° in length. But it then became urgent to proceed to a new measurement of the French arc, between Dunkirk and Perpignan. In 1869 Perrier was authorized to undertake that revision. He devoted himself to that work till the end of his career, closed by premature death in February 1888, at the very moment when the Depot de la guerre had just been transformed into the Geographical Service of the Army, of which General F. Perrier was the first director. His work was continued by his assistant, Colonel (afterwards General) J. A. L. Bassot. The operations concerning the revision of the French arc were completed only in 1896. Meanwhile the French geodesists had accomplished the junction of Algeria to Spain, with the help of the geodesists of the Madrid Institute under General Carlos Ibanez (1879), and measured the meridian line between Algiers and El Aghuat (1881): They have since been busy in prolonging the meridians of El Aghuat and Biskra, so as to converge towards Wargla, through Ghardaia and Tuggurt. The fundamental co-ordinates of the Pantheon have also been obtained anew, by connecting the Pantheon and the Paris Observatory with the five stations of Bry-sur-Marne, Morlu, Mont Valerien, Chatillon and Montsouris, where the observations of latitude and azimuth have been effected. 1

According to the calculations made at the central bureau of the international association on the great meridian arc extending from the Shetland Islands, through Great Britain, France and Spain to El

Aghuat in Algeria, (1 = 6377935 metres, the ellipticity being assumed as i/299'i5. The following table gives the differ- ence: astronomical-geodetic latitude. The net does not follow the meridian exactly, but deviates both to the west and to the east; actually, the meridian of Greenwich is nearer the mean than that of Paris (Helmert, Grosse d. Erde).

West Europe-Africa Meridian-arc (contd.).

Name.

Latitude.

West Europe-Africa Meridian-arc. 1 Name. Latitude.

Saxavord 60

Balta 60

Ben Hutig 58

Cowhythe 57

Great Stirling 57

Kellie Law ; 56

CaltonHill 55

Durham 54

Burleigh Moor 54

Clifton Beacon 53

A.-G.

49.6

-4-0

45-0

-6-1

33-i

+0-3

41-1

+7-3

27-8

-2-3

14-9

-3-7

57-4

+3‘5

46-1

-o-9

34-3

+2-1

27-5

+ 1-3

1 Ibanez and Perrier, Jonction geod. et astr. de V Algerie avec I’Espagne (Paris, 1886); Memorial du depot general de la guerre, t. xii. : Nouvelle meridienne de France (Paris, 1885, 1902, 1904); Comptes rendus des seances de la l2”-ig” conference generate de V Assoc. Geod. Internat., 1898 at Stuttgart, 1900 at Paris, 1903 at Copenhagen, 1906 at Budapest (Berlin, 1899, 1901, 1904, 1908); A. Ferrero, Rapport sur les triangulalions, pres. d la 12″ conf. gen. l8g8.

2 R. Schumann, C. r. de Budapest, p. 244.

ArburyHill’ 52

Greenwich 51

Nieuport 51

Rosendael 51

Lihons 49

Pantheon 48

Chevry 48

Saligny le Vif 47

Arpheuille 46

Puy de D&me 45

Rodez .44

Carcassonne 43

Rivesaltes 42

Montolar 41

Lerida 41

Javalon .40

Desierto 40

Chinchilla 38

Mola de Formentera 38

Tetica 37

Roldan 36

Conjuros 36

Mt. Sabiha 35

Nemours 35

Bouzareah 36

Algiers (Voirol) 36

Guelt es Stel 35

El Aghuat 33

13-4 28-6

7 ” 2

35

A.-G.

-3-0

-2-5 -0-4 -09 +0-5

— o-o

+ 2-2

+3-0 +6-3 +7-0

+ i-7

+0-7 -07 +3-6

—0-2

— 0-2

-4-5.

+2-2

— 1-2

+3-5 -6-0

— 12-6

+6-5 +7-4

+2-9

-9-1

— i-o

AlgiersrVolrpl

Bousareeh

•Guelt e* Stel

.Bl-Agbuat

“VSSrVSBSSS

8l2

EARTH, FIGURE OF THE

While the radius of curvature of this arc is obviously not uni- form (being, in the mean, about 600 metres greater in the northern than in the southern part), the Russo-Scandinavian meridian arc (from 45° to 70°), on the other hand, is very uniformly curved, and gives, with an ellipticity of 1/299-15, a = 6378455 metres; this arc gives the plausible value 1/298-6 for the ellipticity. But in the case of this arc the orographical circumstances are more favourable.

The west-European and the Russo-Scandinavian meridians indicate another anomaly of the geoid. They were connected at the Central Bureau by means of east-to-west triangle chains (principally by the

arc of parallel measurements in lat. 52); it was shown that, if one proceeds from the west-European meridian arcs, the differences between the astronomical and geodetic latitudes of the Russo-Scandinavian arc become some 4″ greater. 1

The central European meridian, which passes through Germany and the countries adjacent on the north and south, is under review at Potsdam (see the publications of the Kgl. Preuss. Geod. Inst., Lotabweichungen, Nos. 1-3). Particular notice must be made of the Vienna meridian, now carried southwards to Malta. The Italian triangulation is now complete, and has been joined with the neighbouring countries on the north, and with Tunis on the south.

The United States Coast and Geodetic Survey has published an account of the transcontinental triangulation and measure- ment of an arc of the parallel of 39 , which extends from Cape May (New Jersey), on the Atlantic coast, to Point Arena (California), on the Pacific coast, and embraces 48° 46′ of longitude, with a linear development of about 4225 km. (2625 miles). The triangulation depends upon ten base-lines, with an aggregate length of 86 km. the longest exceeding 17 km. in length, which have been measured with the utmost care. In crossing the Rocky Mountains, many of its sides exceed 100 miles in length, and there is one side reaching to a length of 294 km., or 183 miles; the altitude of many of the stations is also considerable, reaching to 4300 metres, or 14,108 ft., in the case of Pike's Peak, and to 14,421 ft. at Elbert Peak, Colo. All geometrical condi- tions subsisting in the triangulation are satisfied by adjustment, inclusive of the required accord of the base-lines, so that the same length for any given line is found, no matter from what line one may start. 2

Over or near the arc were distributed 109 latitude stations, occupied with zenith telescopes; 73 azimuth stations; and 29 telegraphically determined longitudes. It has thus been possible to study in a very complete manner the deviations of the vertical, which in the mountainous regions sometimes amount to 25 seconds, and even to 29 seconds.

With the ellipticity 1/299-15, a= 6377897 =- 65 metres (prob. error) ; in this calculation, however, some exceedingly perturbed stations are excluded; for the employed stations the mean perturbation in longitude is ±4-9″ (zenith-deflection east-to- west ± 3-8").

The computations relative to another arc, the " eastern oblique arc

of the United States," are also finished. 3 It extends from Calais (Maine) in the north-east, to the Gulf of Mexico, and terminates at New Orleans (Louisiana), in the south. Its length is 2612 km. (1623 miles), the difference of latitude 15 1', and of longitude 22° 47'. In the main, the triangulation follows the Appalachian chain of mountains, bifurcating once, so as to leave an oval space between the two branches. It includes among its stations Mount Washington (1920 metres) and Mount Mitchell (2038 metres). It depends upon six base-lines, and the adjustment is effected in the same manner as for the arc of the

1 O. and A. Borsch, " Verbindung d. russ.-skandinav. mit der franz.-engl. Breitengradmessung " {Verhandlungen der Q. Allgem. Conf. d. I. E. in Paris, i88q, Ann. xi.).

2 U.S. Coast and Geodetic Survey; H. S. Pritchett, superin- tendent. The Transcontinental Triangulation and the American Arc of the Parallel, by C. A. Schott (Washington, 1900).

3 U.S. Coast and Geodetic Survey ; O. H. Tittmarm, superin-tendent. The Eastern Oblique Arc of the United States, by C. A. Schctt (1902).

parallel. The astronomical data have been afforded by 71 latitude stations, 1 7 longitude stations, and 56 azimuth stations, distributed over the whole extent of the arc. The resulting dimensions of an osculating spheroid were found to be (1 = 6378157 metres =90 (prob. error), e (ellipticity) = 1/304-5 ±1-9 (prob. error).

With the ellipticity 1/399- 1 5, a = 63 78041 metres ±80 (prob.er.).

During the years 1903-1906 the United States Coast and Geodetic Survey, under the direction of O. H. Tittmann and the special management of John F. Hayford, executed a calculation of the best ellipsoid of rotation for the United States. There were 507 astronomical determinations employed, all the stations being connected through the net-work of triangles. The observed latitudes, longitude and azimuths were improved by the attrac- tions of the earth's crust on the hypothesis of isostasis for three depths of the surface of 114, 121 and 162 km., where the isostasis is complete. The land-masses, within the distance of 4126 km., were taken into consideration. In the derivation of an ellipsoid of rotation, the first case proved itself the most favourable, and there resulted: —

a = 6378283 metres ±74(prob.er.), ellipticity = 1/297-8 ±0-9 (prob.er.).

The most favourable value for the depth of the isostatic surface is approximately 114 km.

The measurement of a great meridian arc, in long. 98° W., has been commenced; it has a range of latitude of 23 , and will extend over 50 when produced southwards and northwards by Mexico and Canada. It may afterwards be connected with the arc of Quito. A new measurement of the meridian arc of Quito was executed in the years 1 901- 1906 by the Service geographique of France under the direction of the Academie des Sciences, the ground having been previously reconnoitred in 1899. The new arc has an amplitude in latitude of 5° 53′ 33”, and stretches from Tulcan (lat. o° 48′ 25”) on the borders of Columbia and Ecuador, through Columbia to Payta (lat. – 5 5′ 8”) in Peru. The end-points, at which the chain of triangles has a slight north-easterly trend, show a longitude difference of 3°. Of the 74 triangle points, 64 were latitude stations; 6 azimuths and 8 longitude-differences were measured, three base-lines were laid down, and gravity was determined from six points, in order to maintain indications over the general deformation of the geoid in that region. Computations of the attraction of the mountains on the plumb-line are also being considered. The work has been much delayed by the hardships and difficulties encountered. It was conducted by Lieut.- Colonel Robert Bourgeois, assisted by eleven officers and twenty-four soldiers of the geodetic branch of the Service giographique. Of these officers mention may be made of Commandant E. Maurain, who retired in 1904 after suffering great hardships; Commandant L. Massenet, who died in 1905; and Captains I. Lacombe, A. Lallemand, and Lieut. Georges Perrier (son of General Perrier) . It is conceivable that the chain of triangles in longitude 98 in North America may be united with that of Ecuador and Peru: a continuous chain over the whole of America is certainly but a question of time. During the years 1899-1902 the measurement of an arc of meridian was made in the extreme north, in Spitzbergen, between the latitudes 76° 38′ and 8o° 50’, according to the project of P. G. Rosen. The southern part was determined by the Russians — O. Backlund, Captain D. D. Sergieffsky, F. N. Tschernychev, A. Hansky and others— during 1899-1901, with the aid of 1 base-line, 15 trigonometrical, n latitude and 5 gravity stations. The northern part, which has one side in common with the southern part, has been determined by Swedes (Professors Rosen, father and son, E. Jaderin, T. Rubin and others), who utilized 1 base-line, 9 azimuth measurements, 18 trigonometrical, 17 latitude and 5 gravity

stations. The party worked under excessive difficulties, which were accentuated by the arctic climate. Consequently, in the first year, little headway was made. 4

4 Missions scientifiques pour la mesure d'un arc de meridien au Spitzberg entreprises en 1899-IQ02 sous les auspices des gouvernements russe et suedois. Mission russe (St Petersbourg, 1904) ; Mission suedoise (Stockholm, 1904).

Sir David Gill, when director of the Royal Observatory, Cape Town, instituted the magnificent project of working a latitude- degree measurement along the meridian of 30 long. This meridian passes through Natal, the Transvaal, by Lake Tangan- yika, and from thence to Cairo; connexion with the Russo- Scandinavian meridian arc of the same longitude should be made through Asia Minor, Turkey, Bulgaria and Rumania. With the completion of this project a continuous arc of 105° in latitude will have been measured. 1

Extensive triangle chains, suitable for latitude-degree measure- ments, have also been effected in Japan and Australia.

Besides, the systematization of gravity measurements is of importance, and for this purpose the association has instituted many reforms. It has ensured that the relative measurements made at the stations in different countries should be reduced conformably with the absolute determinations made at Potsdam; the result was that, in 1906, the intensities of gravitation at some 2000 stations had been co-ordinated. The intensity of gravity on the sea has been determined by the comparison of barometric and hypsometric observations (Mohn's method). The association, at the proposal of Helmert, provided the necessary funds for two expeditions: — English Channel — Rio de Janeiro, and the Red Sea— Australia — San Francisco — Japan. Dr O. Hecker of the central bureau was in charge; he successfully overcame the difficulties of the work, and established the ten- ability of the isostatic hypothesis, which necessitates that the intensity of gravity on the deep seas has, in general, the same value as on the continents (without regard to the proximity of coasts). 2

As the result of the more recent determinations, the ellipticity, compression or flattening of the ellipsoid of the earth may be assumed to be very nearly 1/298.3; a value determined in 1901 by

Helmert from the measurements of gravity. The semi- major axis, a, of the meridian ellipse may exceed 6,378,000 inter, metres by about 200 metres. The central bureau have adopted, for practical reasons, the value 1/299-15, after Bessel, for which tables exist; and also the value 0 = 6377397.155(1 + o-oooi).

The methods of theoretical astronomy also permit the evalua- tion of these constants. The semi-axis a is calculable from the parallax of the moon and the acceleration of gravity on the earth; but the results are somewhat uncertain: the ellipticity deduced from lunar perturbations is i/297-8 ± 2 (Helmert, Geodasie, ii. pp. 460-473); William Harkness (The Solar Parallax and its related Constants, 1891) from all possible data derived the values: ellipticity = i/3oo-2 ± 3, a = 6377972ˆ:125 metres. Harkness also considered in this investigation the rela- tion of the ellipticity to precession and nutation; newer investi- gations of the latter lead to the limiting values 1/296, 1/298 (Wiechert). It was clearly noticed in this method of determina- tion that the influence of the assumption as to the density of the strata in the interior of the earth was but very slight (Radau, Bull. astr. ii. (1885) 157). The deviations of the geoid from the flattened ellipsoid of rotation with regard to the heights (the directions of normals being nearly the same) will scarcely exceed + 100 metres (Helmert). 3

The basis of the degree- and gravity-measurements is actually formed by a stationary sea-surface, which is assumed to be level. However, by the influence of winds and ocean currents the mean surface of the sea near the coasts (which one assumes as the fundamental sea-surface) can deviate somewhat from a level surface. According to the more recent levelling it varies at the most by only some decimeters. 4

1 Sir David Gill, Report on the Geodetic Survey of South Africa, 1833-1892 (Cape Town, 1896), vol. ii. 1901, vol. iii. 1905.

2 O. Hecker, Bestimmung der Schwerkraft a. d. Atlantischen Ozean (Veroffentl. d. Kgl. Preuss. Geod. Inst. No. Ii), Berlin,

1903.

3 F. R. Helmert, " Neuere Fortschritte in der Erkenntnis der math. Erdgestalt " (Verhandl. des VII. Internationalen Geographen-Kongresses, Berlin, 1899), London, 1901.

4 C. Lallemand, " Rapport sur les travaux du service du nivelle- ment genera] de la France, de 1900 a 1903 " (Comp. rend, de la 14' tonf.

gen. de V Assoc. Giod- Intern., 1903, p. 178).

It is well known that the masses of the earth are continually undergoing small changes; the earth's crust and sea-surface reciprocally oscillate, and the axis of rotation vibrates relatively to the body of the earth. The investigation of these problems falls in the programme of the Association. By continued observa- tions of the water-level on sea-coasts, results have already been obtained as to the relative motions of the land and sea (cf. Geology) ; more exact levelling will, . in the course of time, provide observations on countries remote from the sea-coast. Since 1900 an international service has been organized between some astronomical stations distributed over the north parallel of 39 8', at which geographical latitudes are observed whenever possible. The association contributes to all these stations, supporting four entirely: two in America, one in Italy, and one in Japan; the others partially (Tschardjui in Russia, and Cincinnati observatory) . Some observatories, especially Pulkowa, Leiden and Tokyo, take part voluntarily. Since 1906 another station for South America and one for Australia in latitude – 31 55′ have been added. According to the existing data, geographical latitudes exhibit variations amounting to +0-25", which, for the greater part, proceed from a twelve- and a fourteen- month period. 5 (A. R. C; F. R. H.)

EARTH CURRENTS. After the invention of telegraphy it was soon found that telegraph lines in which the circuit is com- pleted by the earth are traversed by natural electric currents which occasionally interfere seriously with their use, and which are known as " earth currents."

1. Amongst the pioneers in investigating the subject were several English telegraphists, e.g. W. H. Barlow (1) and C. V. Walker (2), who were in charge respectively of the Midland and South-Eastern telegraph systems. Barlow noticed the existence of a more or less regular diurnal variation, and the result — confirmed by all subsequent investigators — that earth currents proper occur in a line only when both ends are earthed. Walker, as the result of general instructions issued to telegraph clerks, collected numerous statistics as to the phenomena during times of large earth currents. His results and those given by Barlow both indicate that the lines to suffer most from earth currents in England have the general direction N.E. to S.W. As Walker points out, it is the direction of the terminal plates relative to one another that is the essential thing. At the same time he noticed that whilst at any given instant the currents in parallel lines have with rare exceptions the same direction, some lines show

normally stronger currents than others, and he suggested that differences in the geological structure of the intervening ground might be of importance. This is a point which seems still somewhat obscure.

Our present knowledge of the subject owes much to practical men, but even in the early days of telegraphy the fact that telegraph systems are commercial undertakings, and cannot allow

s T. Albrecht, Resultate des internat. Breitendienstes, i. and ii. (Berlin, 1903 and 1906); F. Klein and A. Sommerfeld, Uber die Theorie des Kreisels, iii. p. 672; R. Spitaler, " Die periodischen Luft-massenverschiebungen und ihr Einfluss auf die Lagenanderung der Erdaxe " (Petermanns Mitteilungen, Erganzungsheft, 137) ; S. New-comb, " Statement of the Theoretical Laws of the Polar Motion " {Astronomical Journal, 1898, xix. 158); F. R. Helmert, "Zur Erklarung der beobachteten Breitenanderungen " (Astr. Nachr. No. 3014) ; J. Weeder, " The 14-monthly period of the motion of the Pole from determinations of the azimuth of the meridian marks of the Leiden observatory " (Kon. Ak. van Wetenschappen to Amster-dam, 1900) ; A. Sokolof," Determination du mouvement du p61e terr. au moyen des mires meridiennes de Poulkovo " (Mel. math, et astr. vii., 1894) ; J. Bonsdorff, " Beobachtungen von d Cassiopejae mit dem grossen Zenitteleskop " (Mitteilungen der Nikolai-IIauptstern- warte zu Pulkowo, 1907) ; J. Larmor and E. H. Hills, " The irregular movement of the Earth's axis of rotation: a contribution towards the analysis of its causes " (Monthly Notices R.A.S., 1906, Ixvii. 22) ; A. S. Cristie, " The latitude variation Tide " (Phil. Soc. of Wash., 1895, Bull. xiii. 103) ; H. G. van de Sande Bakhuysen, " fiber die Anderung der Polhohe " (Astr. Nachr. No. 3261); A. V. Backlund, " Zur Frage nach der Bewegung des Erdpoles " (Astr. Nachr. No. 3787); R. Schumann, "fiber die Polhohenschwankung " (Astr. Nachr. No. 3873); " Numerische Untersuchung " (Ergdn- zungshefte zu den Astr. Nachr. No. 11); Weitere Untersuchungen (No. 4142) ; Bull, astr., 1900, June, report of different theoretical memoirs. .

the public to wait the convenience of science, was a serious obstacle to their employment for research. Thus Walker feelingly says, when regretting his paucity of data during a notable earth current disturbance : " Our clerks were at their wits' end to clear off the

telegrams. … At a time when observa- tions would have been very highly acceptable they were too much occupied with their ordinary duties." Some valuable observa- tions have, however, been made on long telegraph lines where special facilities have been given.

Amongst these may be mentioned the observations on French lines in 1883 described by E. E. Blavier (3), and those on two German lines Berlin-Thorn and Berlin-Dresden during 1884 to 1888 discussed by B. Weinstein (4).

2. Of the experimental lines specially constructed perhaps the best known are the Greenwich lines instituted by Sir G. B. Airy (5), the lines at Pawlowsk due to H. Wild (6), and those at Pare Saint Maur, near Paris (7).

Experimental Lines. — At Greenwich observations were com- menced in 1865, but there have been serious disturbances due to artificial currents from electric railways for many years. There are two lines, one to Dartford distant about 10 m., in a direction somewhat south of east, the other to Croydon distant about 8 m., in a direction west of south.

Information from a single line is incomplete, and unless this is clearly understood erroneous ideas may be derived.. The times at which the current is largest and least, or when it vanishes, in an east-west line, tell nothing directly as to the amplitude at the time of the resultant current. The lines laid down at Pawlowsk in 1883 lay nearly in and perpendicular to the geographical meridian, a distinct desideratum, but were only about 1 km. long. The installation at Pare Saint Maur, discussed by T. Moureaux, calls for fuller description. There are three lines, one having terminal earth plates 14-8 km. apart in the geo- graphical meridian, a second having its earth plates due east and west of one another, also 14-8 km. apart, and the third forming a closed circuit wholly insulated from the ground. In each of the three lines is a Deprez d'Arsonval galvanometer. Light reflected from the galvanometer mirrors falls on photographic paper wound round a drum turned by clockwork, and a con- tinuous record is thus obtained.

3. Each galvanometer has a resistance of about 200 ohms, but is shunted by a resistance of only 2 ohms. The total effective resistances in the N.-S. and E.W. lines are 225 and 348 ohms respectively. If i is the current recorded, L, g and 5 the resist ances of the line, galvanometer and shunt respectively, then E, the difference of potential between the two earth plates, is

given by

$E = i(i+g!s)\{L+gs/(g+s)\}$.

To calibrate the record, a Daniell cell is put in a circuit in- cluding 1000 ohms and the three galvanometers as shunted. If i' be the current recorded, e the E.M.F. of the cell, then e =i'(i+g/s)\iooo +3gsl(g+s)). Under the conditions at Pare Saint Maur we may write 2 for gs/(g + s), and 1-072 for e, and thence we have approximately E = o-24o(i/j') for the N.-S. line, and E = o-37i(j/*') for the E.-W. line.

The method of standardization assumes a potential difference between earth plates which varies slowly enough to produce a practically steady current. There are several causes producing currents in a telegraph wire which do not satisfy this limitation. During thunderstorms surgings may arise, at least in overhead wires, without these being actually struck. Again, if the circuit includes a variable magnetic field, electric currents will be produced independently of any direct source of potential differ- ence. In the third circuit at Pare Saint Maur, where no earth plates exist, the current must be mainly due to changes in the earth's vertical magnetic field, with superposed disturbances due to atmospheric electricity or aerial waves. Even in the other circuits, magnetic and atmospheric influences play some part, and when their contribution is important, the galvanometer deflection has an uncertain value. What a galvanometer records when traversed by a suddenly varying current depends on other things than its mere resistance.

Even when the current is fairly steady, its exact significance is not easily stated. In the first place there is usually an appreci- able E.M.F. between a plate and the earth in contact with it, and this E.M.F. may vary with the temperature and the dryness of the soil. Naturally one employs similar plates buried to the same depth at the two ends, but absolute identity and invaria- bility of conditions can hardly be secured. In some cases, in short lines (8), there is reason to fear that plate E.M.F.'s have been responsible for a good deal that has been ascribed to true earth currents. With deep earth plates, in dry ground, this source of uncertainty can, however, enter but little into the diurnal inequality.

4. Another difficulty is the question of the resistance in the earth itself. A given E.M.F. between plates 10 m. apart may mean very different currents travelling through the earth, according to the chemical constitution and condition of the surface strata.

According to Professor A. Schuster (9), if p and p' be the specific resistances of the material of the wire and of the soil, the current i which would pass along an underground cable formed of actual soil, equal in diameter to the wire connecting the plates, is given by i=i'p/p', where i! is the observed current in the wire. As p' will vary with the depth, and be different at different places along the route, while discontinuities may arise from geological faults, water channels and so on, it is clear that even the most careful observations convey but a general idea as to the absolute intensity of the currents in the earth itself. In Schuster's formula, as in the formulae deduced for Pare Saint Maur, it is regarded as immaterial whether the wire connecting the plates is above or below ground. This view is in accordance with records obtained by Blavier (3) from two lines between Paris and Nancy, the one an air line, the other underground.

5. The earliest quantitative results for the regular diurnal changes in earth currents are probably those deduced by Airy (5) from the records at Greenwich between 1865 and 1867. Airy resolved the observed currents from the two Greenwich lines in and perpendicular to the magnetic meridian (then about 21 to the west of astronomical north). The information given by Airy as to the precise meaning of the quantities he terms " magnetic tendency " to north and to west is somewhat scanty, but we are unlikely to be much wrong in accepting his figures as proportional to the earth currents from magnetic east to west and from magnetic north to south respectively. Airy gives mean hourly values for each month of the year. The corresponding mean diurnal inequality for the whole year appears in Table I., the unit being arbitrary. In every month the algebraic mean of the 24 hourly values represented a current from north to south in the magnetic meridian, and from east to west in the perpendicular direction; in the same arbitrary units used in Table I. the mean values of these two " constant " currents were respectively 777 and S59-

6. Diurnal Variation. — Probably the most complete records of diurnal variation are those discussed by Weinstein (4), which depend on several years' records on lines from Berlin to Dresden and to Thorn. Relative to Berlin the geographical co-ordinates of the other two places are:

Thorn Dresden .

0° 29′ N. lat. 5 12′ E. long. i°28′ S. lat. o°2i'E. long.

Thus the Berlin-Dresden line was directed about 83° east of south,

and the Berlin-Thorn line somewhat more to the north of east. The latter line had a length about 2-18 times that of the former. The resistances in the two lines were made the same, so if we suppose the difference of potential between earth plates along a given direction to vary as their distance apart, the current observed in the Thorn-Berlin line has to be divided by 2-18 to be comparable with the other. In this way, resolving along and perpendicular to the geographical meridian, Weinstein gives as proportional to the earth currents from east to west and from south to north respectively

J = o-i47i' + o-435i, and J' = 0-9891'— o-ioos",

than in a short

where i and i' are the observed currents in the Thorn-Berlin and Dresden-Berlin lines respectively, both being counted positive when flowing towards Berlin.

It. is tacitly assumed that the average earth conductivity is the same between Berlin and Thorn as between Berlin and Dresden. It should also be noticed that local time at Berlin and Thorn differs by fully 20 minutes, while the crests of thediurnal variations in short lines at the two places would probably occur about the same local time. The result is probably a less sharp occurrence of maxima and minima, and a relatively smaller range, line having the same orientation.

It was found that the average current derived from a number of undisturbed days on either line might be regarded as made up of a " constant part " plus a regular diurnal inequality, the con- stant part representing the algebraic mean value of the 24 hourly readings. In both lines the constant part showed a decided alteration during the third year — changing sign in one line — in consequence, it is believed, of alterations made in the earth plates. The constant part was regarded as a plate effect, and was omitted from further consideration. Table I. shows in terms of an arbitrary unit — whose relation to that employed for Greenwich data is unknown — the diurnal inequality in the currents along the two lines, and the inequalities thence cal- culated for ideal lines in and perpendicular to the geographical meridian. Currents are regarded as positive when directed from Berlin to Dresden and from north to south, the opposite point of view to that adopted by Weinstein. The table also shows the

mean numerical value of the resultant current (the " con- stant " part being omitted) for each hour of the day, for the year as a whole, and for winter (November to February), equinox (March, April, September, October) and summer (May to

Table I.

arithmetic means from the several months composing the season in question.

7. The mean of the 24 hourly numerical values of the resultant current for each month of the year a deducible from Weinstein's data — the unit being the same as before — are given in Table II.

Table II. — Mean Numerical Value

of Resultant Current.

Jan.

Feb.

March April

May

June

July

Aug.

Sep.

Oct.

Nov.

Dec.

152

211

293

328

313

314

337

300

258

235

165

132

Mean Diurnal Inequalities for the

year.

Numerical Values of resultant current.

Greenwich.

Thorn-Berlin-

Dresden

Thorn-Berlin-Dresde

n.

North

East

Berlin

Thorn

North

East

Mean hourly values from

Hour.

to

South (Mag.)

to West (Mag.)

to Dresden.

to Berlin.

to South

(Ast.)

to West (Ast.)

Year.

Winter.

Equinox.

Summer.

1

-94

-41

-17

-13

— 20

— 10

81

94

51

98

2

-68

-24

-6

-13

-9

— 11

84

115

39

97

3

-44

-8

— 1

— 1

— 1

— 1

84

113

31

108

4

-18

+9

—20

+ 15

-17

+ 17

IOI

94

58

127

5

-30

— 1

-79

+21

-74

+32

122

58

78

230

6

-63

-33

-139

+5

-136

+26

148

80

139

225

7

— 121

-80

-138

-36

-144

-14

166

155

206

136

8

-175

-123

-7

-98

-28

-92

203

152

185

271

9

-156

-137

+249

-156

+212

-184

305

67

272

575

10

-43

-77

+540

-184

+494

-254

557

232

628

811

11

+82

+ 1

+722

-165

+678

-263

728

411

885

887

Noon

+207

+66

+673

-107

+642

—200

675

441

848

735

1

+24S

+94

+404

—20

+395

-79

400

284

5io

406

2

+205

+ 113

+35

+55

+46

+47

98

68

103

125

3

+ 153

+97

— 261

+99

-237

+ 132

272

136

355

324

4

+ 159

+ 108

-397

+ 114

-368

+ 167

404

218

503

492

5

+ 167

+ 118

-391

+ 108

-363

+ 160

397

206

453

532

6

+ 125

+95

-3″

+96

-287

+ 137

319

176

333

446

7

+43

+55

-237

+85

— 216

+ 115

247

180

250

312

8

— 22

+4

-191

+74

-173

+98

201

207

217

181

9

-115

-49

-168

+59

-153

+81

174

208

194

120

10

-138

. -74

-135

+40

-125

+58

138

155

149

in

11

-136

-70

-84

+ 18

-79

+29

89

64

95

107

Midnight

-147

-80

-43

— 2

-43

+4

9i

42

119

in

August). There is a marked double period in both the N.-S. and E.-W. currents. In both cases the numerically largest currents occur from 10 a.m. to noon, the directions then being from north to south and from west to east. The currents tend to die out and change sign about 2 p.m., the numerical magnitude then rising again rapidly to 4 or 5 p.m. The current in the meridian is notably the larger. The numerical values assigned to the resultant current are

There is thus a conspicuous minimum at mid-winter, and but little difference between the monthly means from April to August. This is closely analogous to what is seen in the daily range of the magnetic elements in similar latitudes (see Magnetism, Terrestrial). There is also considerable resemblance between the curve whose ordinates represent the diurnal inequality in the current passing from north to south, and the curve showing the hourly change in the westerly component of the horizontal magnetic force in similar European latitudes.

8. Relations with Sun-spots, Auroras and Magnetic Storms. — Weinstein gives curves representing the mean diurnal inequality for separate years. In both lines the diurnal amplitudes were notably smaller in the later years which were near sun-spot minimum. This raises a presumption that the regular diurnal earth currents, like the

ranges of the magnetic elements, follow the 1 1 -year sun-spot period. When we pass to the large and irregular earth currents, which are of practical interest in telegraphy, there is every reason to suppose that the sun-spot period applies. These currents are always accompanied by magnetic disturbances, and when specially striking by brilliant aurora. One most conspicuous example of this occurred in the end of August and beginning of September 1859. The magnetic

disturbances recorded were of almost unexampled size and rapidity, the accom- panying aurora was extra- ordinarily brilliant, and E.M.F.'s of 700 and 800 volts are said to have been reached on telegraph lines 500 to 600 km. long. It is doubtful whether the dis- turbances of 1859 have been equalled since, but earth current voltages of the order of 0-5 volts per mile have been recorded by various authorities, e.g. Sir W. H. Preece (10).

It was the practice for several years to publish in the Ann. du bureau central mUiorologique synchronous magnetic and earth current curves from Pare Saint Maur corresponding to the chief disturbances of the year. In most cases there is a marked similarity between the curve of magnetic declination and that of the north-south earth current. At times there is also a distinct resemblance between the horizontal force magnetic curve and that of the east-west earth current, but exceptions to this are not infrequent. Similar phenomena appear in synchronous Greenwich records published by Airy in 1868; these show a close accordance between the horizontal force curves and those of the currents from magnetic east to west. Originally it was supposed by Airy that whilst rapid movements in the declination and north-south current curves sometimes

occurred simultaneously, there was a distinct tendency for the latter to precede the former. More recent examinations of the Greenwich records by W. Ellis (11), and of the Pare St Maur curves by Moureaux, have not confirmed this result, and it is now believed that the two phenomena are practically simultaneous.

There has also been a conflict of views as to the connexion between magnetic and earth current disturbances. Airy's observations tended to suggest that the earth current was the primary cause, and the magnetic disturbance in considerable part at least its effect. Others, on the contrary, have supposed earth currents to be a direct effect of

changes in the earth's magnetic field. The prevailing view now is that both the magnetic and the earth current disturbances are due to electric currents in the upper atmosphere, these upper currents becoming visible at times as aurora.

9. There seems some evidence that earth currents can be called into existence by purely local causes, notably difference of level. Thus K. A. Brander (12) has observed a current flowing constantly for a good many days from Airolo (height 1 160 metres) to the Hospice St Gotthard (height 2094 metres). In an 8-km. line from Resina to the top of Vesuvius L. Palmieri (13) — observing in 1889 at three-hour intervals from 9 a.m. to 9 p.m. — always found a current running uphill so long as the mountain was quiet. On a long line from Vienna to Graz A. Baumgartner (14) found that the current generally flowed from both ends towards intervening higher ground during the day, but in the opposite directions at night. During a fortnight in September and October 1885 hourly readings were taken of the current in the telegraph cable from Fort- William to Ben Nevis Observatory, and the results were discussed by H. N. Dickson (15), who found a marked preponderance of currents up the line to the summit. The recorded mean data, otherwise regarded, represent a " constant " current, equal to 29 in the arbitrary units employed by Dickson, flowing up the line, together with the following diurnal inequality, + denoting current towards Fort-William (i.e. down the hill, and nearly east to west).

Hour

A.M. P.M.

—21

+24

-41 + 18

3 4

+ 13 +23

+ 115I +18

5

6

7

8

9

10

11

+55 +75

-3 ~5

+25 +50

-32 -9

-59 -56

-62 -37

-46 -28

There is thus a diurnal inequality, which is by no means very irregular considering the limited number of days, and it bears at least a general resemblance to that shown by Weinstein's figures for an east-west line in Germany. This will serve to illustrate the uncertainties affecting these and analogous observa- tions. A constant current in one direction may arise in whole or part from plate E.M.F.'s; a current showing a diurnal inequality will naturally arise between any two places some distance apart whether they be at different levels or not. Finally, when records are taken only for a short time, doubts must arise as to the generality of the results. During the Ben Nevis observa- tions, for instance, we are told that the summit was almost constantly enveloped in fog or mist. By having three earth plates in the same vertical plane, one at the top of a mountain, the others at opposite sides of it, and then observing the currents between the summit and each of the base stations, as well as directly between the base stations — during an adequate number of days representative of different seasons of the year and different climatic conditions — many uncertainties would soon be removed.

10. Artificial Currents. — The great extension in the applica- tions of electricity to lighting, traction and power transmission, characteristic of the end of the 19th century, has led to the existence of large

artificial earth currents, which exert a disturb- ing influence on galvanometers and magnetic instruments, and also tend to destroy metal pipes. In the former case, whilst the disturbance is generally loosely assigned to stray or " vaga- bond " earth currents, this is only partly correct. The currents used for traction are large, and even if there were a perfectly insulated return there would be a considerable resultant magnetic field at distances from the track which were not largely in excess of the distance apart of the direct and return currents

(16). At a distance of half a mile or more from an electric tram line the disturbance is usually largest in magnetographs recording the vertical component of the earth's field. The magnets are slightly displaced from the position they would occupy if un- disturbed, and are kept in continuous oscillation whilst the trams are running (17). The extent of the oscillation depends on the damping of the magnets.

The distance from an electric tram line where the disturbance ceases to be felt varies with the system adopted. It also depends on the length of the line and its subdivision into sections, on the strength of the currents supplied, the amount of leakage, the absence or presence of " boosters," and finally on the sensitive- ness of the magnetic instruments. At the U.S. Coast and Geodetic Survey's observatory at Cheltenham the effect of the Washington electric trams has been detected by highly sensitive magnetographs, though the nearest point of the line is 12 m. away (18). Amongst the magnetic observatories which have suffered severely from this cause are those at Toronto, Washing- ton (Naval Observatory), Kew, Paris (Pare St Maur), Perpignan, Nice, Lisbon, Vienna, Rome, Bombay (Colaba) and Batavia. In some cases magnetic observations have been wholly suspended, in others new observatories have been built on more remote sites.

As regards damage to underground pipes, mainly gas and water pipes, numerous observations have been made, especially in Germany and the United States. When electric tramways have uninsulated returns, and the potential of the rails is allowed to differ considerably from that of the earth, very considerable currents are found in neighbouring pipes. Under these condi- tions, if the joints between contiguous pipes forming a main present appreciable resistance, whilst the surrounding earth through moisture or any other cause is a fair conductor, current passes locally from the pipes to the earth causing electrolytic corrosion of the pipes. Owing to the diversity of interests concerned, the extent of the damage thus caused has been very variously estimated. In some instances it has been so

consider- able as to be the alleged cause of the ultimate failure of water pipes to stand the pressure they are

exposed to.

+6

-34 Bibliography. — See Svante August

Arrhenius, Lehrbuch der kosmischen Physik (Leipzig, 1903), pp. 984-990. For lists of references see J. E. Burbank, Terrestrial Magnetism, vol. 10 (1905), p. 23, and P. Bachmetjew (8). For papers descriptive of corrosion of pipes, &c, by artificial currents see Science Abstracts (in recent years in the volumes devoted to engineering) under the heading " Trac- tion, Electric; Electrolysis." The following are the references in the text:— (l) Phil. Trans. R.S. for 1849, pt. i. p. 61; (2) Phil. Trans. R.S. vol. 151 (1861), p. 89, and vol. 152 (1862), p. 203; (3) Etude des courants telluriques (Paris, 1884) ; (4) Die Erdstrbme im deutschen Reichstelegraphengebiet (Braunschweig, 1900) ; (5) Phil. Trans. R.S. vol. 158 (1868), p. 465, and vol. 160 (1870), p. 215; (6) MSm. de VAcademie St-Petersbourg, t. 31, No. 12 (1883); (7) T. Moureaux, Ann. du Bureau Central Met. (Annee 1893), 1 Mem. p. B 23 ; (8) P. Bachmetjew, Mem. de I'AcadSmie St-Petersbourg, vol. 12, No. 3 (1901); (9) Terrestrial Magnetism, vol. 3 (1898), p. 130; (10) Journal Tel. Engineers (1881) ; (11) Proc. R.S. vol. 52 (1892), p. 191 ; (12) Akad. Abhandlung (Helsingfors, 1888); (13) Acad. Napoli Rend. (1890), and Atti (1894, 1895); (14) Pogg. Ann. vol. 76, p. 135; (15) Proc. R.S.E. vol. 13, p. 530; (16) A. Rucker, Phil. Mag. 1 (1901), p. 423, and R. T. Glazebrook, ibid. p. 432; (17) J. Edler, Elektroiech. Zeit. vol. 20 (1899); (18) L. A. Bauer, Terrestrial Magnetism, vol. 11 (1906), p. 53- (C Ch.)

EARTH-NUT, the English name for a plant known botanically as Conopodium denudalum (or Bunium flexuosum) , a member of the natural order Umbelliferae, which has a brown tuber-like root-stock the size of a chestnut. It grows' in woods and fields, has a slender flexuous smooth stem 2 to 3 ft. high, much-divided leaves, and small white flowers in many-rayed terminal compound umbels. Boswell Syme, in English Botany, iv. 114, says: " The common names of this plant in England are various. It is known as earth-nut, pig-nut, ar-nut, kipper-nut, hawk-nut, jar-nut, earth-chestnut and ground-nut. Though really ex- cellent in taste and unobjectionable as food, it is disregarded in England by all but pigs and children, both of whom appreciate it and seek eagerly for it." Dr Withering de- scribes the

roots as little inferior to chestnuts. In Holland

and elsewhere on the continent of Europe they are more generally eaten.

EARTH PILLAR, a pillar of soft rock, or earth, capped by some harder material that has protected it from denudation. The " bad lands " of western North America furnish numerous examples. Here " the formations are often beds of sandstone or shale alternating with unindurated beds of clay. A semi- arid climate where the precipitation is much concentrated seems to be most favourable to the development of this type of formation." The country round the Dead Sea, where loose friable sandy clay is capped by harder rock, produces " bad-land " topography. The cap of hard rock gives way at the joints, and the water making its way downwards washes away the softer material directly under the cracks, which become wider, leaving isolated columns of clay capped with hard sandstone or limestone. These become smaller and fewer as denudation proceeds, the pillars standing a great height at times, until finally they all disappear.

EARTHQUAKE. Although the terrible effects which often accompany earthquakes have in all ages forced themselves upon- the attention of man, the exact investigation of seismic phenomena dates only from the middle of the 19th century. A new science has been thus established under the name of seismology (Gr. a turubs, an earthquake).

History. — Accounts of earthquakes are to be found scattered through the writings of many ancient authors, but they are, for the most part, of little value to the seismologist. There is a natural tendency to exaggeration in describing such phenomena, sometimes indeed to the extent of importing a supernatural element into the description. It is true that attempts were made by some ancient writers on natural philosophy to offer a rational explanation of earthquake phenomena, but the hypotheses which their explanations involved are, as a rule, too fanciful to be worth reproducing at the present day. It is therefore un- necessary to dwell upon the references to seismic phenomena which have come down to us in the writings of

such historians and philosophers as Thucydides, Aristotle and Strabo, Seneca, Livy and Pliny. Nor is much to be gleaned from the pages of medieval and later writers on earthquakes, of whom the most notable are Fromondi (1527), Maggio (1571) and Travagini (1679). In England, the earliest work worthy of mention is Robert Hooke's Discourse on Earthquakes, written in 1668, and read at a later date before the Royal Society. This discourse, though containing many passages of considerable merit, tended but little to a correct interpretation of the phenomena in question. Equally unsatisfactory were the attempts of Joseph Priestley and some other scientific writers of the 18th century to connect the cause of earthquakes with electrical phenomena. The great earthquake of Lisbon in 1755 led the Rev. John Michell, professor of mineralogy at Cambridge, to turn his attention to the subject; and in 1760 he published in the Philosophical Transactions a remarkable essay on the Cause and Phenomena of Earthquakes. A suggestion of much scientific interest was made by Thomas Young, when in his Lectures on Natural Philosophy, published in 1807, he remarked that an earthquake "is probably pro- pagated through the earth nearly in the same manner as a noise is conveyed through the air." The recognition of the fact that the seismologist has to deal with the investigation of wave- motion in solids lies at the very base of his science. In 1846 Robert Mallet communicated to the Royal Irish Academy his first paper "On the Dynamics of Earthquakes"; and in the following year W. Hopkins, of Cambridge, presented to the British Association a valuable report in which earthquake pherfomena were discussed in some detail. Mallet's labours were continued for many years chiefly in the form of Reports to the British Association, and culminated in his great work on the Neapolitan earthquake of 1857. An entirely new impetus, however, was given to the study of earthquakes by an energetic body of observers in Japan, who commenced their investigations about the year 1880, mainly through the influence of Prof. John Milne, then of Tokyo. Their work, carried on by means of new instruments of precision, and since taken up by observers

in many parts of the world, has so extended our knowledge of earthquake-motion that seismology has now become practically a new department of physical science.

It is hardly too much to say, however, that the earliest systematic application of scientific principles to the study of the effects of an earthquake was made by Mallet in his investigation of the Neapolitan earthquake mentioned above. It is true, the great Calabrian earthquake of 1783 had been the subject of careful

inquiry by the Royal Academy of Naples, as also by Deodat Dolomieu and some other scientific authorities; but in consequence of the misconception which at that time prevailed with regard to the nature of seismic activity, the results of the inquiry, though in many ways interesting, were of very limited scientific value. It was reserved for Mallet to undertake for the first time an extensive series of systematic observations in an area of great seismic disturbance, with the view of explaining the phenomena by the application of the laws of wave-motion.

The " Great Neapolitan Earthquake," by which more than 12,300 lives were lost, was felt in greater or less degree over all Italy south of the parallel of 42 . and has been H eapo ij. regarded as ranking third in order of severity among the tan earth- recorded earthquakes of Europe. The principal shock Quake, occurred at about 10 p.m. on the 16th of December ,857 ' 1857; but, as is usually the case, it had been preceded by minor disturbances and was followed by numerous after-shocks which continued for many months. Early in 1858, aided by a grant from the Royal Society, Mallet visited the devastated districts, and spent more than two months in studying the effects of the catastrophe, especially examining, with the eye of an engineer, the cracks and ruins of the buildings. His voluminous report was published in 1862, and though his methods of research and his deductions have in many cases been superseded by the advance of knowledge, the report still remains a memorable work in the history of seismology.

Much of Mallet's labour was directed to the determination of the position and magnitude of the subterranean source from which the vibratory impulses originated. This is known variously as the seismic centre, centrum, hypocentre, origin or focus. It is often convenient to regard this centre theoretically as a point, but practically it must be a locus or space of three dimensions, which in different cases varies much in size and shape, and may be of great magnitude. That part of the surface of the earth which is vertically above the centre is called the epicentre; or, if of considerable area, the epicentral or epifocal tract. A vertical line joining the epicentre and the focus was termed by Mallet the seismic vertical. He calculated that in the case of the Neapolitan earthquake the focal cavity was a curved lamelliform fissure, having a length of about 10 m. and a height of about 3J m., whilst its width was inconsiderable. The central point of this fissure, the theoretical seismic centre, he estimated to have been at a depth of about 65 m. from the surface. Dr C. Davison, in discussing Mallet's data, was led to the conclusion that there were two distinct foci, possibly situated on a fault, or plane of dislocation, running in

a north-west and south-east direction. Mallet located his epicentre near the village of Caggiano, not far from Polla, while the other seems to have been in the neighbourhood of Montemurro, about 25 m. to the south- east.

The intensity, or violence, of an earthquake is greatest in or near the epicentre, whence it decreases in all directions. A line drawn through points of equal intensity forms a curve round the epicentre known as an isoseist, an isoseismal or an isoseismic line. If the intensity declined equally in all directions the isoseismals would be circles, but as this is rarely if ever the case in nature they usually become ellipses and other closed curves. The tract which is most violently shaken was termed by Mallet the meizoseismic area, whilst the line of maximum destruction is known as the meizoseismic line. That isoseismal along which the decline of energy is most rapid was called by K. von Seebach a pleistoseist.

In order to determine the position of the seismic centre, Mallet made much use of the cracks in damaged buildings, especially

in walls of masonry, holding that the direction of such fractures must generally be at right angles to that in which the normal earthquake-wave reached them. In this way he obtained the " angle of emergence " of the wave. He also assumed that free-falling bodies would be overthrown and projected in the direction of propagation of the wave, so that the epicentre might immediately be found from the intersection of such directions. These data are, however, subject to much error, especially through want of homogeneity in the rocks, but Mallet's work was still of great value.

A different method of ascertaining the depth of the focus was adopted by Major C. E. Dutton in his investigation of the Charleston Charleston earthquake of the 31st of August 1886 earth- for the U.S. Geological Survey. This catastrophe quake, was heralded by shocks of greater or less severity a few days previously at Summerville, a village 22 m. north-west of Charleston. The great earthquake occurred at 9.51 p.m., standard time of the 75th meridian, and in about 70 seconds almost every building in Charleston was more or less seriously damaged, while many lives were lost. The epicentral tract was mainly a forest region with but few buildings, and the principal records of seismological value were afforded by the lines of

railway which traversed the disturbed area. In many places these rails were flexured and dislocated. Numerous fissures opened in the ground, and many of these discharged water, mixed sometimes with sand and silt, which was thrown up in jets rising in some cases to a height of 20 ft. Two epicentres were recognized — one near Woodstock station on the South Carolina railway, and the other, being the centre of a much smaller tract, about 14 m. south-west of the first and near the station of Rantowles on the Charleston and Savannah line. Around these centres and far away isoseismal lines were drawn, the relative intensity at different places being roughly estimated by the effects of the catastrophe on various structures and natural objects, or, where visible records were wanting, by personal evidence, which is often vague and variable. The Rossi-Forel scale was adopted. This is an arbitrary scale formulated by Professor M. S. de Rossi, of Rome, and Dr F. A. Forel, of Geneva, based mostly on the ordinary phenomena observed during an earthquake, and consisting of ten degrees, of which the lowest is the feeblest, viz. I. Microseismic shock; II. Extremely feeble shock; III. Very feeble shock; IV. Feeble; V. Shock of moderate intensity; VI. Fairly strong shock; VII. Strong shock; VIII. Very strong shock; IX. Extremely strong shock; X. Shock of extreme intensity. Other conventional scales, some being less detailed, have been drawn up by observers in such earthquake-shaken countries as Italy and Japan. A curve, or theoretical isoseismal, drawn through certain points where the decline of intensity on receding from the epicentre seems to be greatest was called by Dutton an " index-circle "; and it can be shown that the radius of such a circle multiplied by the square root of 3 gives the focal depth theoretically. In this way it was computed that in the Charleston earthquake the origin under Woodstock must have had a depth of about 12 m. and that near Rantowles a depth of nearly 8 m. The determination of the index-circle presents much difficulty, and the conclusions must be regarded as only approximate.

It is probable, according to R. D. Oldham, that local earthquakes may originate in the " outer skin " of the earth, whilst a large world-shaking earthquake takes its origin in the deeper part of the " crust," whence such a disturbance is termed a balhyseism. Large earthquakes may have very extended origins, with no definite centre, or with several foci.

The gigantic disaster known as the "Great Indian Earthquake," which occurred on the 12th of June 1897, was the subject of areat careful investigation by the Geological Survey of

Indian India and was described in detail by the super- earth- intendent, R. D. Oldham. It is sometimes termed ˆ£7°' the Assam earthquake, since it was in that pro- vince that the effects were most severe, but the shocks were felt over a large part of India, and indeed far beyond its boundaries. Much of the area which suffered most disturbance

was a wild country, sparsely populated, with but few buildings of brick or stone from which the violence of the shocks could be estimated. The epicentral tract was of great size, having an estimated area of about 6000 sq. m., but the mischief was most severe in the neighbourhood of Shillong, where the stonework of bridges, churches and other buildings was abso- lutely levelled to the ground. After the main disturbance, shocks of greater or less severity continued at intervals for many weeks. It is supposed that this earthquake was connected with movement of subterranean rock-masses of enormous magnitude along a great thrust-plane, or series of such planes, having a length of about 200 m. and a maximum breadth of not less than 50 m. It is pointed out by Oldham that this may be compared for size with the great Faille du Midi in Belgium, which is known to extend for a distance of 120 m. The depth of the principal focus, though not actually capable of determination, was prob- ably less than 5 m. from the surface. From the focus many secondary faults and fractures proceeded, some reaching the surface of the ground. Enormous landslips accompanied the earthquake, and as an indirect effect of these slides the form of the water-courses became in certain cases modified. Permanent changes of level were also observed.

Eight years after the great Assam earthquake India was visited by another earthquake, which, though less intense, resulted in the loss of about 20,000 lives. This cata- Kangra strophe is known as the Kangra earthquake, since its earth- centre seems to have been located in the Kangra JJjfi 16 ' valley, in the north-west Himalaya. It occurred on the 4th of April 1905, and the first great shocks were felt in the chief epifocal district at about 6.9 a.m., Madras time. Although the tract chiefly affected was around Kangra and Dharmsala, there was a subordinate epifocal tract in Dehra Dun and the neighbourhood of Mussoorie, whilst the effects of the earthquake extended in slight measure to Lahore and other cities of the plain. It is estimated that the earthquake was felt over an area of about 1,625,000 m. Immediately after the calamity a scientific examination of its effects was made by the Geological Survey of India, and a report was drawn up by the superintendent, C. S. Middlemiss.

The great earthquake, which, with the subsequent fire, wrought such terrible destruction in and around San Francisco on the 18th of April 1906, was the most disastrous ever recorded in California California. It occurred between 10 and 15 minutes earth- after 5 a.m., standard time of the 120th meridian. q " ake '

1906

The moment at which the disaster began and the duration of the shock varied at different localities in the great area over which the earthquake was felt. At San Francisco the main shock lasted rather more than one minute.

According to the official Report, the earthquake was due to rupture and movement along the plane of the San Andreas fault, one of a series which runs for several hundred miles approximately in a N.W. and S.E. direction near the coast line. Evidence of fresh movement along this plane of dis- location was traced for a distance of 190 m. from San Juan on the south to Point Arena on the north. There the trace of the fault is lost beneath the sea, but either the same fault or another appears 75 m. to the north at Point Delgada. The belt of disturbed country is notoriously unstable, and part of the fault had been known as the " earthquake crack." The direction is marked by lines of straight cliffs, long ponds and narrow depressions, forming a Rift, or old line of seismic disturbance. According to Dr G. K. Gilbert the earthquake zone has a length of 300 or 400 m. The principal displacement of rock, in 1906, was horizontal, amounting generally to about 10 ft. (maximum 21 ft.), but there was also locally a slight vertical movement, which towards the north end of the fault reached 3 ft. Move- ment was traced for a distance of about 270 m., and it is estimated that at least 175,000 sq. m. of country must have been disturbed. In estimating the intensity of the earthquake in San Francisco a new scale was introduced by H. O. Wood. The greatest structural damage occurred on soft alluvial soil and " made ground." Most of the loss of property in San Francisco was

due to the terrible fire which followed the earthquake and was beyond control owing to the destruction of the system of water-supply.

Immediately after the catastrophe a California Earthquake

Investigation Committee was appointed by the governor of the state; and the American Association for the Advancement of Science afterwards instituted a Seismological Committee. The elaborate Report of the State Investigation Committee, by the chairman, Professor A. C. Lawson, was published in 1908.

On the 17 th of August 1006 a disastrous earthquake occurred at Valparaiso, and the year 1906 was marked generally by exceptional seismic activity.

The Jamaica earthquake of the 14th of January 1907 appears to have accompanied movement of rock along an east and west fracture or series of fractures under the sea a few miles from the city of Kingston. The statue of Queen Victoria at Kingston was turned upon its pedestal the eighth of a revolution.

A terrible earthquake occurred in Calabria and Sicily on

December 28, 1908, practically destroying Messina and Reggio.

„ , According to the official returns the total loss of life

Messina ° ,, T1 .,,...

earth- was 77,283. Whilst the principal centre seems to

quake, have been in the Strait of Messina, whence the dis- 1908. turbance is generally known as the Messina earthquake,

there were independent centres in the Calabrian peninsula, a country which had been visited by severe earthquakes not long previously, namely on September 8, 1905, and October 23, 1907. The principal shock of the great Messina earthquake of 1908 occurred at 5.21 a.m. (4.21 Greenwich time), and had a duration of from 30 to 40 seconds. Neither during nor immedi- ately before the catastrophe was there any special volcanic disturbance at Etna or at Stromboli, but it is believed that there must have been movement along a great plane of weakness in the neighbourhood of the Strait of Messina, which has been studied by E. Cortese. The sea-floor in the strait probably suffered great disturbance, resulting in the remarkable move- ment of water observed on the coast. At first the sea retired, and then a great wave rolled in, followed by others generally of decreasing amplitude, though at Catania the second was said to have been greater than the first. At Messina the height of the great wave was 2.70 metres, whilst at Ali and Giardini it reached 8.40 metres and at San Alessio as much as 11. 7 metres. At Malta the tide-gauge recorded a wave of

0.91 metre. The depth of the chief earthquake-centre was estimated by Dr E. Oddone at about 9 kilometres. The earthquake and accompany- ing phenomena were studied also by Professor A. Riccd, Dr M. Baratta and Professor G. Platania and by Dr F. Omori of Tokyo. After the great disturbance, shocks continued to affect the region intermittently for several months. In certain respects the earthquake of 1908 presented much resemblance to the great Calabrian catastrophe of 1783.

It has been proposed by R. D. Oldham that the disturbance which causes the fracture and permanent displacement of the rocks during an earthquake should be called an "earthshake," leaving the term earthquake especially for the vibratory motion. The movement of the earthquake is molecular, whilst that or the earthshake is molar. Subsequently he suggested the terms mochleusis and orchesis (yuoxXeiw, I heave; opxeojueu, I dance), to denote respectively the molar and the molecular movement, retaining the word earthquake for use in its ordinary sense.

In most earthquakes the proximate cause is generally regarded as the fracture and sudden movement of underground rock- masses. Disturbances of this type are known as " tectonic " earthquakes, since they are connected with the folding and fault- ing of the rocks of the earth's crust. They indicate a relief of the strain to which the rock-masses are subjected by mountain- making and other crustal movements, and they are consequently apt to occur along the steep face of a table-land or the margin of a continent with a great slope from land to sea. In many cases the immediate seat of the originating impulse is located beneath the sea, giving rise to submarine disturbances which have been called " seaquakes." Much attention has been given to these suboceanic disturbances by Professor E. Rudolph.

Professor J. H. Jeans has pointed out that the regions of the earth's crust most affected by earthquakes lie on a great circle corresponding with the equator of the slightly pear-shaped figure that he assigns to the earth. This would represent a belt of weakness, subject to crushing, from the tendency of 'the pear to pass into a spherical or spheroidal form under the action of internal stresses. According to the comte de Montessus de Ballore, the regions of maximum seismic instability appear to be arranged on two great circles, inclined to each other at about 67 . These are the Circumpacific and Mediterranean zones.

Maps of the world, showing the origins of large earthquakes each

year, accompany the Annual Reports of the Seismological Committee of the British Association, drawn up by Professor Milne. It is important to note that Professor Milne has shown a relationship between earthquake-frequency and the wandering of the earth's pole from its mean position. Earthquakes seem to have been most frequent when the displacement of the pole has been comparatively great, or when the change in the direction of movement has been marked. Valuable earthquake catalogues have been compiled at various times by Alexis Perrey, R. and J. W. MaUet, John Milne, T. Oldham, C. W. C. Fuchs, F. de Montessus de Ballore and others.

Such earthquakes as are felt from time to time in Great Britain may generally be traced to the formation of faults, or rather to incidents in the growth of old faults. The East Anglian earthquake of the 22nd of April 1884 — the B ˆh most disastrous that had occurred in the British Isles quakes. for centuries— was investigated by Prof. R. Meldola and W. White on behalf of the Essex Field Club. The shocks probably proceeded from two foci — one near the villages of Peldon and Abberton, the other near Wivenhoe and Rowhedge, in N.E. Essex. It is believed that the superficial disturbance resulted from rupture of rocks along a deep fault. An attempt has been made by H. Darwin, for the Seismological Committee of the British Association, to detect and measure any gradual movement of the strata along a fault, by observation at the Ridgeway fault, near Upway, in Dorsetshire. Dr C. Davison in studying the earthquakes which have originated in Britain since 1889 finds that several have been " twins." A twin earth- quake has two maxima of intensity proceeding from two foci, whereas a double earthquake has its successive impulses from what is practically a single focus. The Hereford earthquake of December 1896, which resulted in great structural damage, was a twin, having one epicentre near Hereford and the other near Ross. Davison refers it to a slip along a fault-plane between the anticlinal areas of Woolhope and May Hill; and according to the same authority the Inverness earthquake of the 18th of September 1901 was referable to movement along a fault between Loch Ness and Inverness. The South Wales earthquake of June 27, 1906, was probably due to movement connected with the Armorican system of folds, striking in an east and west direction.*

It may be noted that when a slip occurs along a fault, the displacement underground may be but slight and may die out before reaching the surface, so that no scarp is formed. In connexion, however, with a seismic disturbance of the first magnitude the superficial features may be markedly affected. Thus, the great Japan earthquake of October 1891 — known often as the Mino-Owari

earthquake — was connected with the formation or development of a fault which, according to Professor B. Koto, was traced on the surface for a distance of nearly 50 m. and presented in places a scarp with a vertical throw of as much as 20 ft., while probably the maximum dis- placement underground was very much greater.

Although most earthquakes seem to be of tectonic type, there are some which are evidently connected, directly or indirectly, with volcanic activity (see Volcano). Such, it is commonly believed, were the earthquakes which disturbed the Isle of Ischia in 1881 and 1883, and were studied by Professor J. Johnston-Lavis and G. Mercalli. In addition to the tectonic and volcanic types, there are occasional earthquakes of minor importance which may be referred to the collapse of the roof of

caverns, or other falls of rock in underground cavities at no great depth. According to Prof. T. J. J. See most earthquakes are due, directly or indirectly, to the explosive action of steam, formed chiefly by the leakage of sea- water through the ocean floor.

*Whatever the nature of the impulse which originates the earthquake, it gives rise to a series of waves which are propagated through the earth's substance and also superficially. In Earth- Qne]ˆ n A k n0 wn as normal or condensational waves, waves. or w *ves of elastic compression, the particles vibrate to and from the centre of disturbance, moving in the direction in which the wave travels, and therefore in a way analogous to the movement of air in a sound-wave. Associated with this type are other waves termed transverse waves, or waves of elastic distortion, in which the particles vibrate across or around the direction in which the wave is propagated. The normal waves result from a temporary change of volume in the medium; the transverse from a change of shape. The distance through which an earth-particle moves from its mean position of rest, whether radially or transversely, is called the amplitude of the wave; whilst the double amplitude, or total distance of movement, to and fro or up and down, like the distance from crest to trough of a water wave, may be regarded as the range of the wave. The period of a wave is the time required for the vibrating particle to complete an oscillation. As the rocks of the earth's crust are very heterogeneous, the earthquake-waves suffer refraction and reflection as they pass from one rock to another differing in density and elasticity. In this*

way the waves break up and become much modified in course of transmission, thus introducing great complexity into the phenomena. It is known that the normal waves travel more rapidly than the transverse.

Measurements of the surface speed at which earthquake-waves travel require very accurate time-measurers, and these are not generally available in earthquake-shaken regions. Observa- tions during the Charleston earthquake of 1886 were at that time of exceptional value, since they were made over a large area where standard time was kept. Lines drawn through places around the epicentre at which the shock arrives at the same moment are called coseismal lines. The motion of the wave is to be distinguished from the movement of the vibrating particles. The velocity of the earth-particle is its rate of movement, but this is constantly changing during the vibration, and the rate at which the velocity changes is technically called the accelera- tion of the particle.

Unfelt movements of the ground are registered in the earthquake records, or seismograms, obtained by the delicate instruments used by modern seismologists. From the study of the records of a great earthquake from a distant source, some- times termed a teleseismic disturbance, some interesting in- ferences have been drawn with respect to the constitution of the interior of the earth. The complete record shows two phases of " preliminary tremors " preceding the principal waves. It is believed that while the preliminary tremors pass through the body of the earth, the principal waves travel along or parallel to the surface. Probably the first phase represents condensational, and the second phase distortional, waves. Professor Milne con- cludes from the speed of the waves at different depths that materials having similar physical properties to those at the surface may extend to a depth of about 30 m., below which they pass into a fairly homogeneous nucleus. From the different rates of propagation of the precursors it has been inferred by R. D. Oldham that below the outer crust, which is probably not everywhere of the same thickness, the earth is of practically uniform character to a depth of about six-tenths of the radius, but the remaining four-tenths may represent a core differ- ing physically and perhaps chemically from the outer part. Oldham also suggests, from his study of oceanic and continental wave-paths, that there is probably a difference in the constitu- tion of the earth beneath oceans and beneath continents.

The surface waves, which are waves of great length and long period and are propagated to great distances with practically a constant velocity, havebeen regarded as quasi-elasticgravitational

waves. Further, in a great earthquake the surface of the ground is sometimes visibly agitated in the epifocal district by undula- tions which may be responsible for severe superficial damage. (See also for elastic waves Elasticity, § 89.)

An old classification of earthquake-shocks, traces of which still linger in popular nomenclature, described them as " undulatory," when the movement of the ground was mainly in a horizontal direction; " subsultory," when the motion was vertical, like the effect of a normal wave at the epicentre; and " vorticose," when the movement was rotatory, apparently due to successive impulses in varying directions.

The sounds which are associated with seismic phenomena, often described as subterranean rumbling and roaring, are not without scientific interest, and have been carefully studied by Davison. " Isacoustic lines " are curves drawn through places where the sound is heard by the same percentage of observers. The sound is always low and often inaudible to many.

The refined instruments which are now used by seismologists for determining the elements of earthquake motion and for recording earthquakes from distant origins are described in the article Seismometer. These instruments were developed as a consequence of the attention given in modern times to the study of earthquakes in the Far East. (F. W. R.)*

Strange as it may appear, the advances that have been made in the study of earthquakes and the world-wide interest shown in their phenomena were initiated in work com- menced in Japan. When the Japanese government, Sels ~ ,

1 • • .1 , ttt ˆ 111 ■ • 1 mology la

desiring to adopt Western knowledge, invited to j apaa% its shores bodies of men to act as its instructors, the attention of the newcomers was naturally attracted to the frequent shakings of the ground. Interest in these phenomena increased more rapidly than their frequency, and at length it was felt that something should be done for their systematic study. At midnight on the 22nd of February 1880 movements more violent than usual occurred; chimneys were shattered or rotated, tiles slid down from roofs, and in the morning it was seen that Yokohama had the appearance of a city that had suffered a bombardment. The excitement was intense, and before the ruins had been removed a meeting was convened and the

Seismological Society of Japan established. The twenty volumes of original papers published by this body summarize to a large extent the results of the later study of seismology. 1

The attention of the students of earthquakes in Japan was at first directed almost entirely to seismometry or earthquake measurement. Forms of apparatus which then existed, as for example the seismographs, seismometers and seismoscopes of Mallet, Palmieri and others, were subjected to trial; but inasmuch as they did little more than indicate that an earthquake had taken place — the more elaborate forms recording also the time of its occurrence — they were rapidly discarded, and instru- ments were constructed to measure earthquake motion. Slightly modified types of the new instruments devised in Japan were adopted throughout the Italian peninsula, and it is fair to say that the seismometry developed in Japan revolutionized the seismometry of the world. The records obtained from the new instruments increased our knowledge of the character of earth- quake motion, and the engineer and the architect were placed in a position to construct so that the effects of known movements could be minimized. It was no doubt the marked success, both practical and scientific, attending these investigations that led the Japanese government to establish a chair of seismology at its university, to organize a system of nearly 1000 observing stations throughout the country, and in 1893 to appoint a committee of scientific and practical men to carry out investigations which might palliate the effects of seismic disturbances. In the first year this committee received a grant of £5000, and as liberal sums for the same purpose appear from time to time in the

1 The publications for 1 880-1 892 were termed the Transactions of the Seismological Society of Japan, and for 1 893-1 895 the Seismo- logical Journal of Japan. The observations are now published by the Earthquake Investigation Committee of Japan, and edited by F. Omori, professor of seismology at the university of Tokyo.

parliamentary estimates, it may be assumed that the work has been fraught with good results. In their publications we find not only records of experiences and experiments in Japan, but descrip- tions and comments upon earthquake effects in other countries. In two of the volumes there are long and extremely well illus- trated accounts of the earthquake which on the 12th of June 1897 devastated

Assam, to which country two members of the above-mentioned committee were despatched to gather such information as might be of value to the architect and builder in earthquake-shaken districts.

A great impetus to seismological investigation in Europe and America was no doubt given by the realization of the fact that

a large earthquake originating in any one part of the f˜f.°" world may be recorded in almost any other. Italy Research. 10r many years past has had its observatories for

recording earthquakes which can be felt, and which are of local origin, but at the present time at all its first-class stations we find instruments to record the unfelt movements due to earthquakes originating at great distances, and as much attention is now paid to the large earthquakes of the world as to the smaller ones originating within Italian territory. 1 The Kaiserliche Akademie der Wissenschaften of Vienna established earthquake observatories in Austria, 2 and the Central Observa- torium of St Petersburg has carried out similar work in Russia. Germany attached a seismological observatory to its university at Strassburg, whilst provision has been made for a professorship of Earth Physics {Geophysik) at Gottingen. 3 In accordance with the recommendation of the British Association, seismographs of a similar character have been installed at stations all over the world. 4 The principal objects of this extended and still extending system of stations are to determine the velocity with which motion is propagated over the surface and through the interior of the earth, to locate the positions of sub-oceanic earth- quake origins, and generally to extend our knowledge respecting the physical nature of the planet on which we live.

We now know that earthquakes are many times more frequent than was previously supposed. In Japan, for example, between

1885 and 1892 no fewer than 8331 were recorded — that F ™?™t Cy is t0 sa y> on tne avera 8 e there were during that time

more than 1000 disturbances per year. Although

many of these did not cause a sensible shaking over areas exceeding a few hundred square miles, many of them were sufficiently intense to propagate vibrations round and through the globe. If we pick out the well-marked earthquake districts of the world, and give to each of them a seismicity or earthquake frequency per unit area one- third

of that in Japan, the conclusion arrived at is that considerable areas of our planet are on the average shaken every half-hour.

The knowledge which we now possess respecting the localities where earthquakes are frequent and the forms of the foci from

which they have spread, enables us to speak definitely Volcanoes res p ec ti n g the originating causes of many of these "quakes. " phenomena. It is found, for example, that although

in many countries there may be displays of volcanic and seismic activity taking place almost side by side, it is only rarely that there is direct relationship between the two. Now and then, however, before a volcano breaks into eruption there may be a few ineffectual efforts to form a vent, each of which

1 The chief Italian station is at Rocca di Papa near Rome. It is equipped with delicate instruments designed by its director, Giovanni Agamennone. The records since 1895 are published in the Bollettino delta Societd Sismologica Italiana, edited by Luigi Palazzo, director of the Central Office for Meteorology and Geodynamics at Rome.

2 The chief Austrian publications are : — Mittheilungen der Erd-bebencommission der k. Akad. der Wissen. in Wien (since 1897); Die Erdbebenwarte (1901-1907) ; and the " Neueste Erdbebennachrichten, Beilage der Monatsschrift " Die Erdbebenwarte."

3 The " International Seismological Association " was founded at Strassburg in 1903, and publishes the Beitrage zur Geophysik, edited by George Gerland, director of the Strassburg station; the papers are printed in several languages.

4 The records of the British Association stations are published (since 1896) in the Reports. Chile has a national earthquake service (founded after the Valparaiso earthquake of August 1906) directed by comte de Montessus de Ballore.

of earth quakes,

is accompanied by no more than a slight local shaking of the ground. This is true even for the largest and most violent eruptions, when mountains have with practically a single effort blown off their heads and shoulders. Thus the earthquake which accompanied the eruption of Bandaisan, in central Japan, in 1888 was felt only over a radius of 25 m. The analyses of the seismic registers of Japan clearly

indicate that comparatively few shakings originate near to the volcanoes of the country, the majority of them, like those of many other countries, coming from regions where volcanic rocks are absent. The greatest number spread inland from the Pacific seaboard, the movement becoming more and more feeble as it approaches the backbone of the country, which is drilled with numerous volcanic vents. What is true for Japan is generally true for the western coasts of North and South America.

Speaking broadly, earthquakes are most frequent along the steeper flexures in the earth's surface, and in those regions where there is geological evidence to show that slow secular movements in the earth's crust are possibly yet in jf.? progress. With a unit distance of 2 degrees, or 120 quakes. geographical m., we find that the slopes running eastwards from the highlands of Japan and westwards from the Andean ridges down into the Pacific vary from 1 in 20 to 1 in 30, and it is on the faces or near to the bottom of these slopes that seismic efforts are frequent. The slopes running from Australia, eastern America and western Europe into the neighbouring oceans vary between 1 in 70 and 1 in 250, and in these regions earthquakes are of rare occurrence. The seismic activity met with in the Himalayas and the Alps finds its best explanation in the fact that these mountains are geologically recent, and there are no reasons to doubt that the forces which brought their folds into existence are yet in action.

This peculiar association of earthquakes with pronounced topographical configuration and certain geological conditions evidently indicates that the origin of many of them is connected with rock folding. Inasmuch as certain large earthquakes have been accompanied by rock fracture, as for example in 1891, when in central Japan a fault some 50 m. in length was created, whilst the origins of others have been distinctly traced to the line of an existing fault or its continuation, we may conclude that the majority of earthquakes are spasmodic accelerations in the secular movements which are creating (and in some instances possibly obliterating) the more prominent features of the earth's surface. These secular movements, which include upheavals, subsidences, horizontal displacements — all of which are explained on the assumption of a crust seeking support on a nucleus gradually contracting by loss of heat, are collectively referred to as bradyseismical (fipodiis, slow) movements. To these may be added movements directly attributable to the influence of gravity. Sub-oceanic districts in a state of seismic strain may be so far loaded by the accumulation of sediments that gentle bending may be accompanied by sudden yieldings. This

possibly accounts for the frequency of earthquakes off the mouth of the Tonegawa on the eastern side of Japan. The distortions so frequently observed, in fossils and pebbles, the varying thickness of contorted strata, and the " creep " in coal-mines, together with other phenomena, indicate that rocks may flow. Observa- tions of this nature lead to the supposition that high plateau-like regions may be gradually subsiding under the influence of their own weight, and that the process of settlement may from time to time be spasmodic in its character. Whether the earthquakes which originate round the submerged basal frontiers of the continents bounding the Pacific are ever attributable to such activities, it is impossible to say. All that we know with certainty is that they are sometimes accompanied by such a vast displace- ment of material that the ocean has been set into a state of oscil- lation for periods of 24 hours, that in some instances there have been marked changes in depth, and that enormous sub-oceanic landslips have occurred. These phenomena are, however, equally well explained on the assumption of sudden faulting accom- panied by violent shaking, which would dislodge steeply inclined beds of material beneath the ocean as it does upon the land.

Although the proximate cause of earthquake motion is traced to sudden yieldings in the crust of the earth brought about T i oes ky some form of bradyseismical action, the exist- ot earth- ence of at least two distinct types of seismic motion quake indicates that the mechanical conditions accompany- motion. j n g t jj e f rac turing of rocks are not always identical. 90 or 95 % of the earthquakes which can be recorded con- sist of elastic or quasi-elastic vibrations. The remainder, including the large earthquakes, not only exhibit the elastic movements, but are accompanied by surface undulations which are propagated most certainly for some hundreds of miles round their origin, and then as horizontal movements sweep over the whole surface of the globe. The former of these may accompany the formation of a new fault or the sudden renewal of movement along an old one; they are cracking or rending effects, without any great displacement. The latter are probably fracturings accompanied by vertical and horizontal displacements of masses of the earth's crust sufficiently great to set up the observed surface undulations. These shocks are so frequently followed a few minutes later by disturbances, which from their similarity to the movements which have preceded them may be called earthquake echoes, that we are led to the speculation that we are here dealing with the caving-in of

ill-supported portions of the earth's crust, the waves from which are radiated to boundaries and then returned to their origin to coalesce and give rise to a second impulse not unlike the primary. Succeeding the first repetition of motion recorded by the seismograph there is often a rhythmical repetition of similar wave groups, suggesting the existence within our earth of phenomena akin to multiple echoes. The introduction of new methods into seismometry quickly revolutionized our ideas respecting the character of earthquake Character m °ti° n – Although an earthquake may be strongly of earth- felt within a distance of 50 m. from its origin, and quake although the movements in the upper storeys of motion. buildings within the shaken area may be large, the actual range of the horizontal motion of the ground is usually less than ˆ of an inch. With such earthquakes ordinary seismo- graphs for recording vertical motion do not show any disturbance. When the movement reaches 5 in. it becomes dangerous, and a back-and-forth movement of an inch is usually accompanied by destructive effects. In this latter case the amplitude of the vertical record which indicates the existence of surface waves will vary between 5 and ˆ-J-g- of an inch. In the earthquake which devastated central Japan on the 26th of October 1891, nearly every building within the epifocal district fell, the ground was fissured, forests slipped down from mountain sides to dam up valleys, whilst the valleys themselves were permanently com- pressed. The horizontal movements seem to have reached 9 in. or 1 ft., and the surface undulations were visible to the eye. The rapidity with which the movements are performed varies throughout a disturbance. A typical earthquake usually com- mences with minute elastic vibrations, the periods Period f w hich vary between f and jV of a second. These duration. are recorded by seismographs, and are noticed by certain of the lower animals like pheasants, which before the occurrence of movement perceptible to human beings scream as if alarmed. When an earthquake is preceded by a sound we have evidence of preliminary tremors even more rapid than those recorded by seismographs. Following these precursors there is a shock or shocks, the period of which will be 1 or 2 seconds. From this climax the movements, although irregular in character, become slower and smaller until finally they are imperceptible. The duration of a small earthquake usually varies from a few seconds to a minute, but large earth quakes, which are accompanied by surface undulations, may be felt for 2 or 3 minutes, whilst an ordinary seismograph indicates a duration of from 6 to 1 2 minutes. A free horizontal pendulum tells us that with severe earthquakes the ground comes to rest by a series of more or less rhythmical surgings. continuing over 1 or 2 hours. Although the maximum displacement has a definite direction, the

successive vibrations are frequently performed in many different azimuths. The predominating

direction at a given station in certain instances is apparently at right angles to the strike of the neighbouring strata, this being the direction ot easiest yielding.

Earthquake motion as recorded at stations several thousands of miles distant from its origin exhibits characteristics strikingly different from those just described. The precursors now show periods of from 1 to 5 seconds, whilst the e oc r ‘ largest movements corresponding to the shocks may have periods of from 20 to 40 seconds. The interval of time by which the first tremors have outraced the maximum movement has also become greater. Within a few hundreds of miles from an origin this interval increases steadily, the velocity of propagation of the first movements being about 2 km. per second, whilst that of the latter may be taken at about i-6 km. per second. Beyond this distance the velocity of transmission of the first movements rapidly increases, and for great distances, as for example from Japan to England, it is higher than we should expect for waves of compression passing through steel or glass. This observation precludes the idea that these pre- liminary tremors have travelled through the heterogeneous crust of the earth, and since the average velocity of their trans- mission increases with the ‘length of the path along which they have travelled, and we but rarely obtain certain evidence that a seismograph has been disturbed by waves which have reached it by travelling in opposite directions round the world, we are led to the conclusion that earthquake precursors pass through our earth and not round its surface. The following table relating to earthquakes, which originated off the coast of Borneo on the 20th and 27th of September 1897, is illustrative of the velocities here considered: —

Distance

Velocity

1 Average

from

in kms.

depth of

origin

per sec. ii

.. /chord in

in degrees.

on chord.

i \ kms.

8i°

8-1

8-0

Potsdam

92

8-4

9-1

Catania, Ischia, Rocca di

Papa, Rome ....

96°

9-0

9-5

Isle of.Wight ....

103

9-8

10-2

The chords referred to here are those joining the earthquake origins and distant observing stations, and it will be noted that one-quarter of the square root of the average depths at which these run closely corresponds to observed average velocities if wave paths followed chords. This increase of velocity with average depth shows that the paths followed through the earth must be curved with their convexity

towards the centre of the earth. These observations do not directly tell us to what ex- tent a true wave path is deflected from the direction of a chord, but they suggest as an extremely plausible assumption that the square of the speed is a linear function of the depth below the surface of the earth. With this assumption Dr C. G. Knott shows that the square of the speed (d 2) can be expressed linearly in terms of the average depth of the chord d, thus: » 2 = 2-9+-026 d, the units being miles and seconds. The formula applies with fair accuracy to moderate and high values of d, but it gives too high a value for short chords. It follows that the square of the speed increases 0-9% per mile of descent in the earth. The conclusion we arrive at is that the preliminary tremors which pass through the earth do so in the vicinity of their origin at the rate of almost 2-3 km. per second. This velocity increases as the wave path plunges downwards, attaining in the central regions a velocity of 16 to 17 kms., whilst the highest average velocity which is across a diameter lies between 10 and 12 kms. per second.

The large surface waves radiating from an origin to a distant place have velocities lying between i>6 and 4 kms. per second, and it has been observed that when the higher velocity has been noted this refers to an observation at a station very remote from the origin. One explanation of this is the assumption that only very large waves indicating a large initial disturbance are capable of travelling to great distances, and as pointed out by

R. D. Oldham, large waves under the influence of gravity will travel faster than small waves. These waves (which may be gravitational or distortional) are recorded as slow tiltings of the ground measured by angles of 0-5 to 10 or 15 seconds of arc, or as horizontal displacements of 0-5 or several millimetres. Their calculated lengths have reached 50 kms. (31 m.).

In thesection of this article relating to thecauseof earthquakes

a little has been said about their frequency or the number of

times these phenomena are repeated during a given

requency. j nterva j f time. It has been shown that all countries are very often moved by earthquakes which have originated at great distances. Great Britain, for example, is crossed about 100 times a

year by earthquake waves having durations of from 3 minutes to 3 hours, whilst the vibratory motions which originate in that country are not only small but of rare occurrence. In the earlier stages of the world's history, because the contraction of its nucleus was more rapid than it is at present, it is commonly inferred that phenomena accompanying bradyseismical activity must have been more pronounced and have shown themselves upon a grander scale than they do at the present time. Now, although the records of our rocks only carry us back over a certain portion of this history, they certainly represent an interval of time sufficiently long to furnish some evidence of such enfeeble- ment if it ever existed. So far from this being the case, however, we meet with distinct evidences in the later chapters of geological history of plutonic awakenings much more violent than those recorded at its commencement. During Palaeozoic times many mountain ranges were formed, and accompanying these orogenic processes there was marked volcanic activity. In the succeeding Secondary period plutonic forces were quiescent, but during the formation of the early Tertiaries, when some of the largest mountain ranges were created, they awoke with a vigour greater than had ever been previously exhibited. At this period it is not improbable that Scotland, was as remarkable for its volcanoes and its earthquakes as Japan is at the present day. If the statement relating to the general decrease in bradyseismical changes referred merely to their frequency, and omitted reference to their magnitude, the views of the geologist and physicist might harmonize. One explanation for this divergence of opinion may rest on the fact that too little attention has been directed to all the conditions which accompany the adaptation of the earth's crust to its shrinking nucleus. As the latter grows smaller the puckerings and foldings of the former should grow larger. Each succeeding geological epoch should be characterized by mountain formations more stupendous than those which preceded them', whilst the fracturing, dislocation, caving-in of ill-supported regions, and creation of lines of freedom for the exhibition of volcanic activity which would accompany these changes, would grow in magnitude. The written records of many countries reflect but on a smaller scale the crystallized records in their hills. In 1844, at Comrie, in Perthshire, as many as twelve earthquakes were recorded in a single month, whilst now there are but one or two per year. Earthquake frequency varies with time. A district under the influence of hypogenic activities reaches a condition of seismic strain which usually is relieved rapidly at first, but subsequently more slowly.

The small shocks which follow an initial large disturbance are known

as after-shocks. The first shock which in 1891 devastated central Japan was accompanied by the formation of a large fault, and the 3364 small shocks which succeeded this during the following two years are regarded as due to intermittent settle- ments of disjointed material. The decreasing frequency with which after-shocks occur may be represented by a curve. Dr F. Omori points out that the continuation of such a curve gives the means of determining the length of time which will probably elapse before the region to which it refers will return to the same seismic quiescence that it had prior to the initial disturbance.

The positive results that we have respecting the periodicity of earthquakes are but few. Generally earthquakes are some- what more frequent during winter than during summer, and this applies to both the northern and southern hemispheres. The annual periodicity, which, however, does not show itself if only

*destructive earthquakes are considered, finds an explanation, according to Dr Knott, in the annual periodicity of long- continued stresses, as for example those due to the accumulation of snow and to barometric gradients. Sˆ *" For certain earthquake regions there appears to be a distinct semi-annual period for which no satisfactory explana- tion has yet been adduced. Although the elaborate registers of Japan, which have enabled us to group earthquakes according to their respective origins and varying intensities, and to separate after-shocks from initial disturbances, have been subjected by Dr Knott to most careful analysis, with the object of discovering periodicities connected with the ebb and flow of the tides, the lunar day or lunar months, nothing of marked character has been found. Certainly there is slight evidence of a periodicity connected with the times of conjunction and opposition of the sun and moon, and a maximum frequency near the time of perigee, but the effect of lunar stresses is comparatively insigni- ficant. Ordinary earthquakes, and especially after-shocks, show a diurnal period, but we cannot say that there are more earth- quakes during the night than during the day.*

Many experiments and investigations have been made to determine a possible relationship between earthquakes and electrical phenomena, but beyond drawing attention to the fact that luminous appearances may accompany •"»"•* the friction of moving masses of rock, and that a P m l n ˆ temporary current may be established in a line by the disturbance of an earth-plate, these inquiries have yielded but little of importance. The inquiries respecting a possible relation- ship between adjustments so frequently taking place within and beneath that region called the crust of the earth and mag- netic phenomena*

are, however, of a more promising nature. We have seen that at or near the origin of earthquakes which for several hours disturb continents, and occasionally cause oceans to oscillate for longer periods, we sometimes have direct evidence of the bodily displacement of many cubic miles of material. When this material is volcanic it is almost invariably magnetic, and we perceive in its sudden rearrangement causes which should produce magnetic effects within an epifocal district. In Japan, where attention is being directed to phenomena of this descrip- tion, not only have such effects been observed, but unusual magnetic disturbances have been noted prior to the occurrence of large earthquakes. These may, of course, be regarded as mare coincidences, but when we consider volcanic and seismic activities as evidences of physical and chemical changes, together with mechanical displacements of a magnetic magma, it is reason- able to suppose that they should have at least a local influence upon magnetic needles. Another form of disturbance to which magnetic needles are subjected is that which accompanies the passage of large earth-waves beneath certain observatories situated at great distances from earthquake origins. At Utrecht, Potsdam and Wilhelmshaven the magnetographs are frequently disturbed by seismic waves, whilst at many other European observatories such effects are absent or only barely appreciable. To explain these marked differences in the behaviour of magnetic needles at different stations we are at present only in a position to formulate hypotheses. They may be due to the fact that different needles have different periodic times of oscillation; it is possible that at one observatory the mechanical movements of the ground are much greater than at others; we may speculate on the existence of materials beneath and around various observa- tories which are different in their magnetic characters; and, lastly, we may picture a crust of varying thickness, which from time to time is caused to rise and fall upon a magnetic magma, the places nearest to this being the most disturbed.

A subject to which but little attention has been directed is the effect which displays of seismic and volcanic activities have had upon the human mind. The effects are distinctly dual and opposite in character. In countries like ˆtlumiin England, where earthquakes are seldom experienced, mind. the prevailing idea is that they are associated with all that is baneful. For certain earthquakes, which fortunately are less than 1 % of those which are annually recorded, this is

partially true. A disastrous shock may unnerve a whole com- munity. Effects of this nature, however, differ in a marked manner with different nationalities. After the shock of 1891, when Japan lost 9960 of its inhabitants, amongst the wounded indications of mental excitement were shown in spinal and other trouble. Notwithstanding the lightheartedness of this particular nation, it is difficult to imagine that the long series of seismic effects chronicled in Japanese history, which culminated in 1896 in the loss of 29,000 lives by sea-waves, has been without some effect upon its mental and moral character. Several earthquakes are annually commemorated by special services at temples. In bygone times governments have recognized earthquakes as visitations of an angry deity, whom they have endeavoured to appease by repealing stringent laws and taxes. In other countries the sermons which have been preached to show that the tremblings of the world were visitations consequent on impiety, and the prayers which have been formulated to ward off disasters in the future, far exceed in number the earth- quakes which gave rise to them. In 1755 many of the English clergy held the view that Lisbon was destroyed because its inhabitants were Catholics, .whilst the survivors from that disaster attributed their misfortune to the fact that they had tolerated a few Protestant heretics in their midst. To avoid a recurrence of disaster certain of these were baptized by force. In the myths relating to underground monsters and personages that are said to be the cause of earthquakes we see the direct effects which exhibitions of seismic and volcanic activity have produced upon the imagination. The beliefs, or more properly, perhaps, the poetical fancies, thus engendered have exhibited themselves in various forms. Beneath Japan there is said to be a catfish, which in other countries is replaced by a mole, a hog, an elephant or other living creature, which when it is restless shakes the globe. The Kamchadales picture a subterranean deity called Tuil, who in Scandinavian mythology is represented by the evil genius Loki. We have only to think of the reference in the Decalogue forbidding the making of graven images of that which is in the earth beneath, to see in early Biblical history evidence of a subterranean mythology; and it seems probable that the same causes which led to the creation of Pluto, Vulcan and Poseidon gave rise to practices condemned by Moses.

Perhaps the greatest practical benefits derived from seismo- logical investigations relate to important changes and new Building P rmc ipl es which have been introduced into the arts of to with- the engineer and builder when constructing in earth- staad quake

countries. The new rules and formulae, rather earth- than being theoretical deductions from hypotheses, are the outcome of observation and experiment. True measures of earthquake motion have been given to us by modern seismometers, with the result that seismic destructivity can be accurately expressed in mechanical units. From observation we now know the greatest acceleration and maximum velocity of an earth particle likely to be encountered; and these are measures of the destructivity. The engineer is therefore dealing with known forces, and he has to bear in mind that these are chiefly applied in a horizontal direction. A formula connecting the acceleration requisite to overturn bodies of different dimen- sions has been given. The acceleration which will fracture or shatter a column firmly fixed at its foundation to the moving earth may be expressed as follows: — ■

1 gFAB 6 fw where

a = the acceleration per sec. per sec.

F = the force of cohesion, or force per unit surface, which when

gradually applied produces fracture. A = area of base fractured. B = thickness of the column. / = height of centre of gravity of column above the fractured

base. w = the weight of the portion broken off.

With this formula and its derivatives we are enabled to state the height to which a wall, for example, may be built capable of resisting any assumed acceleration. Experience has shown

that yielding first shows itself at the base of a pier, a wall or a building, and it is therefore clear that the lower portion of such structures should be of greater dimensions or stronger than that above. Piers having these increased dimensions below, and tapering upwards in a proper manner, so that every horizontal section is sufficiently strong to resist the effects of the inertia of its superstructure, are employed to carry railways in Japan. In that country cast-iron piers are things of the past, whilst piers of masonry, together with their foundations, no longer follow the rules of ordinary engineering practice.

After flood, fire, earthquake, or when opportunity presents itself, changes are introduced in the construction of ordinary buildings. In a so-called earthquake-proof house, although externally it is similar to other dwellings, we find rafters running from the ridge pole to the

floor sills, an exceedingly light roof, iron straps and sockets replacing mortices and tenons, and many other departures from ordinary rules. Masonry arches for bridges or arched openings in walls (unless protected by lintels), heavy gables, ornamental copings, cappings for chimneys, have by their repeated failure shown that they are undesirable features for construction in earthquake countries. As sites for buildings it is well to avoid soft ground, on which the movement is always greater than on hard ground. Excessive movement also takes place along the face of unsupported openings, and for this reason the edges of scarps, bluffs, cuttings and river-banks are localities to be avoided. In short, the rules and precautions which have to be recognized so as to avoid or mitigate the effects of earthquake movement are so numerous that students of engineering and architecture in Japan receive a special course of lectures on this subject. When it is remembered that a large earthquake may entail a loss of life greater than that which takes place in many wars, and that for the reconstruction of ordinary buildings, factories and public works an expenditure of several million pounds sterling is required, the importance of these studies cannot be overrated. Severe earthquakes are fortunately unknown in the British Isles, but we have simply to turn our eyes to earthquake-shaken colonies and lands in close commercial touch with Great Britain to realize the im- portance of mitigating such disasters as much as possible, and any endeavour to obviate the wholesale destruction of life should appeal to the civilized communities of the world.

An unexpected application of seismometry has been to record the vibration of railway trains, bridges and steamships. An instrument of suitable construction will give records Applies- of the more or less violent jolting and vibratory tionsof movements of a train, and so localize irregularities seismo- due to changes in the character of ballast and sleepers, metr y- to variation in gauge, &c. An instrument placed on a locomotive throws considerable light upon the effects due to the methods of balancing the wheels, and by alterations in this respect a saving of fuel of from 1 to 5 lb of coal per mile per locomotive has sometimes been effected.

By mapping the centres from which earthquakes originate off the coast of Japan, we have not only determined districts where geological activity is pronounced, but have placed before the cable engineer well-defined localities which it is advisable to avoid; and in the records of unfelt earthquakes which originate far from land similar information is being collected for the deeper parts of the oceans. Occasionally these records have almost immediately made

clear the cause of a cable failure. From lack of such information in 1888, when the cables connect- ing Australia with the outer world were simultaneously broken, the sudden isolation was regarded as a possible operation of war, and the colonists called out their naval and military reserves. Records of earthquakes originating at great distances have also frequently enabled us to anticipate, to correct, to extend, or to disprove telegraphic accounts of the disasters. Whatever information a seismogram may give is certain, whilst the informa- tion gathered from telegrams may in the process of transit become exaggerated or minimized. Otherwise unaccountable disturbances in records from magnetographs, barographs and other instruments employed in observatories are frequently

explained by reference to the traces yielded by seismometers. Perhaps the greatest triumph in seismological investigation has been the determination of the varying rates at which motion is propagated through the world. These measurements have already thrown new light upon its effective rigidity, and if we assume that the density of the earth increases uniformly from its surface towards its centre, so that its mean density is 5-5, then, according to Knott, the coefficient of elasticity which governs the trans- mission of preliminary tremors of an earthquake increases at a rate of nearly 1-2 % per mile of descent. (J. Mi.)

Authorities. — J. Milne, Seismology (London, 1898), Earthquakes (London, 1898), Bakerian Lecture, " Recent Advances in Seis- mology," Proc. Roy. Soc, 1906, 77, p. 365; J. A. Ewing, Memoir on Earthquake Measurement (Tokyo, 1883) ; C. E. Dutton, Earth- quakes in the Light of the New Seismology (London, 1904); " The Charleston Earthquake of Aug. 31, 1886," Ninth Annual Report of the United States Geological Survey, 1889; W. H. Hobbs, Earth- quakes, an Introduction to Seismic Geology (London, 1908), " The San Francisco Earthquake and Fire, 1906," Bull. U.S. Geol. Surv. No. 324; " The California Earthquake of Ap. 18, 1906," Rep. State Earthq. Com. (Washington, D.C., 1908); R. D. Oldham, " Report on the Great Earthquake of 12 June 1897," Mem. Geol. Surv. India, xxix. 1899, " On the Propagation of Earthquake Motion to great Dis- tances," Phil. Trans., 1900, A, vol. 194, p. 135, " The Constitution of the Interior of the Earth as revealed by Earthquakes," Quar. Jour. Geol. Soc, 1906, 62, p. 456; 1907, 63, p. 344; C. Davison, A Study of Recent Earthquakes (London, 1905) ; The Hereford Earth- quake

of December 17, 1896 (Birmingham, 1899), " The Investiga- tion of Earthquakes," Beitrdge z. Geophysik, Bd. ix., 1908, p. 201, and papers on British earthquakes in Quart. Jour. Geol. Soc. ; T. J. J. See, " The Cause of Earthquakes, Mountain Formation and Kindred Phenomena connected with the Physics of the Earth," Proc. Amer. Phil. Soc, 1906, 45, p. 273; F. Freeh, " Erdbeben und Gebirgsbau," Petermann's Mitteilungen, Bd. 53, 1907, p. 245 (with maps) ; C. G. Knott, The Physics of Earthquake Phenomena (Oxford, 1908) ; Comte F. de Montessus de Ballore, Les Tremblements de terre: geographie seismologique (Paris, 1906), La Science seismologique (1907); Transactions of the Seismological Society of Japan; Seismo- logical Journal (Yokohama) ; Bollettino delta Societct Sismologica Italiana (Rome) ; Reports of the British Association, containing the annual reports of the Committee for Seismological Investigations; papers in the Beitrdge zur Geophysik and the Ergdnzungsbdnde.

EARTH-STAR (Geaster), in botany, a kind of puff-ball, with a distinct outer coat which, on separating from the inner, splits into several divisions, which be- come reflexed and spread like a star. The inner coat enveloping the spores is supported, like a ball, either with or without a stalk on the upper face of the star. The spores escape generally by means of a distinct aperture which ap- From Strasburger's Lehrbuch der pears in the top of the ball. There

Bolanik, by permission of Gustav afe geveral spedes ; n Br j tain f<)und

Geaster 'Granulosus, nat.size. on the ground or on decaying leaves. They are rare or local, but more common in the south or south-east of England than in other parts of Britain.

EARTHWORM, the common name of a chaetopod worm found nearly all over the world. Linnaeus recognized only one species of earthworm and named it Lumbricus terrestris. There are now one thousand well-characterized species known from different parts of the world, and the number increases almost daily. The earthworms of England belong entirely to the three genera Lumbricus, Allolobophora and Allurus, which are further subdivided by some systematists; and these genera form the prevalent earthworm fauna of the Palaearctic region and are also very numerous in the Nearctic region. Elsewhere they do not appear to be indigenous, but are replaced by the numerous other genera of the families enumerated in the article Chaetopoda {q.v.). It is a remarkable fact that these genera, comprizing a separate family Lumbricidae, when introduced into tropical and other countries, thrive abundantly and oust the

indigenous forms. In gatherings of earthworms from various extra-European countries it is always found that if the collections have been made in cultivated ground and near the coast the worms are of European species; farther inland the native forms are met with. Inasmuch as in every case the Lumbricidae from non-European

countries are identical with European species, since it has been shown that these animals are very readily introduced accidentally with plants, &c, and in view of the fact that they are impatient of sea water, it seems clear that the presence of these Lumbricidae in other continents is due to accidental transportation. Most earthworms live in the soil, which they devour as they burrow through it. A few, like their allies the river worms (Limicolae), habitually frequent streams, lakes, &c. One genus, at any rate, viz. Pontodrilus, seeks an unusual environment, and is found in heaps of sea-weed cast up by the sea. The range of this genus is therefore naturally wider than that of other genera which are confined to land masses and cannot cross the sea by their own efforts. It might be inferred, therefore, and the inference is proved by facts, that truly oceanic islands have no indigenous fauna of earthworms, but are inhabited by forms which are identical with those of neighbouring continents, and doubtless, therefore, accidentally introduced.

Like the leeches the earthworms produce cocoons which are a product of the glandular epithelium of the clitellum. In these cocoons are deposited the eggs together with a certain amount of albumen upon which the developing embryos feed. So far as is known, the production of cocoons is. universal among earthworms and the remaining Oligochaetaof aquatic habit. The young leave the cocoon as fully formed earthworms in which, however, the genitalia are not fully developed. There is no free living larval stage. Out of a single cocoon emerge a varying number of young worms, the numbers being apparently char- acteristic of the species. The work of earthworms in aiding in the production of the subsoil and in levelling the surface was first studied by C. Darwin, and has since been investigated by others. This work is partly carried out beneath the surface and partly on the surface, upon which the worms wander at night and eject the swallowed and triturated earth; frequently castings of some height are formed of coiled ropes of agglutinated particles of mould. The indigenous species of Great Britain, about twenty in number, do not grow to a greater length than some 10 in. ; but in several tropical countries there are species which grow to a length of from 3 to 6 ft. Thus we have in Natal the gigantic Microchaeta rappi, in Ceylon Megascolex coeruleus, in Australia Megascolides australis, and an equally large form in South America. (F. E. B.)

EARWIG, an insect belonging to the Forficulidae, a family usually referred to the Orthoptera, but sometimes regarded as typifying a special order, to which the names Dermaptera, Dermatoptera and Euplexoptera have been given, in allusion to certain peculiarities in the structure of the wings in the species that possess them. The front wings are short and horny and when at rest meet without overlapping in the middle line, like the wing-cases of brachelytrous (cocktail) beetles. The hind wings, on the contrary, are for the most part membranous and, when extended, of large size; each consists of two portions, the distal of which, in virtue of the arrangement and jointing of its nervures, is capable of being both doubled up and folded fanwise beneath the proximal, which is partly horny when the wing is tucked away under the front wing-case of the same side. Apart from these characteristics, the most distinctive feature of earwigs is the presence at the end of the abdomen of a pair of pincers which are in reality modified appendages, known as cercopods, and represent the similar limbs of Japyx and the caudal feelers of Campodea and some other insects.

The Forficulidae are almost cosmopolitan; but the various species and genera differ from each other both in structure and size to a comparatively slight extent. The length and armature of the pincers and the presence or absence of wings are perhaps the most important features used by systematists in distinguish- ing the various kinds. Of particular zoological interest in this connexion is a Ceylonese genus Dyscritina, in which the cercopods are long, many-jointed and filiform during the early stages of growth, and only assume at the last moult the forcipate structure characteristic of the family. The best known earwig is the common European species, Forficula auricularia. This insect is gregarious and nocturnal. It hides by day under stones or

the loosened bark of trees or in any crevice or hole sheltered from the light. At night it crawls about in search of food, which consists to a small extent of dead animal or vegetable matter, but principally, as gardeners are aware, of the petals and other parts of flowers of growing shoots and soft ripe fruit. During the winter earwigs lie dormant; but in the early months Of the year females with their eggs may be found in the soil, frequently in deserted earthworm burrows. Maternal instincts are well developed, both the eggs, which number about fifty, and the young being carefully brooded and watched over

by the parent. Except for the absence of wings, the young are miniature models of the adult. As growth proceeds the integument is periodically cast; and at the final moult the perfect winged insect appears. Males and females are like each other in size, but may be dis- tinguished by the difference in the number of visible abdominal segments, the male having nine and the female seven. In the male, moreover, the pincers are caliper-like and toothed at the base, whereas in the female they are untoothed and only lightly curved at the tip. These differences suggest that the pincers aid in the pairing of the sexes. However that may be, they are known to be used in the folding of the wings; and their importance as weapons of defence is attested by the pre- cision and effect with which they are wielded against assailants like ants. (R. I. P.)

EASEMENT (Fr. aise; O. Fr. aisement; Anglo-Lat. aisia- mentum, a privilege or convenience), in English law, a species of " servitude " or limited right of use over land belonging to another. It is distinguished from profits a prendre — another species of servitude which involves a right to participate in the profits of the soil of another — since an easement confers merely a convenience (aisiamentum) to be exercised over the land of another (without any participation in the profits of it), i.e. a right to use the soil or produce of the soil in a way tending to the more convenient enjoyment of another piece of land. Thus a right of way is an easement, a right of common is a profit. An easement is distinguishable also from a licence, which, unless it is coupled with a grant, is personal to both grantor and grantee and is neither binding on the licensor, nor, in general, assignable by the licensee; while both the benefit and the burden of an easement are annexed to land (Gale on Easements, 8th ed. p. 2). With easements are sometimes classed certain closely allied " natural rights," such as a landowner's right to lateral support for his soil in its natural state, and a riparian owner's right to the natural flow of a stream.

The essential features of an easement, in the strict sense of the term, are therefore these: (i.) It is an incorporeal right; a right to the use and enjoyment of land — not to the land itself; (ii.) it is imposed upon corporeal property; (iii.) it is a right without profit; (iv.) it requires for its constitution two distinct tenements — the " dominant tenement " which enjoys the right, and the " servient tenement " which submits to it. This last characteristic excludes from the category of easements the so-called " easements in gross," such as a right of way conferred by. grant independently of the possession of any tenement by the grantee. The true easement is an '.' appendant " or " appur- tenant " right, not a " right in gross."

Further classifications of easements must be noted. They are divided into (a) affirmative or positive, those which authorize the commission of an act by the dominant owner, e.g. rights of way, a right to draw water from a spring, rights of aqueduct, and negative, when the easement restricts the rights of the servient owner over his own property, e.g. prevents him from building on land so as to obstruct ancient lights (cf. also the right to the support of neighbouring soil); (b) continuous, of which the enjoyment may be continual without the interference of man, e.g. access to light, and discontinuous, where there must be a fresh act on each occasion of the exercise of the right, e.g. a right of way, or right to draw water; (c) apparent, where there are visible external signs of the exercise of the right, e.g. a right to dam up a watercourse, and non-apparent, where such signs are absent, e.g. a right to lateral support from land, a prohibition to build above a certain height.

Acquisition of Easements. — Easements may be acquired (a) by express grant, either by statute, or by deed inter vivos, or by will; (b) by an implied grant; (c) by express or implied reserva- tion, e.g. by the owner of land in selling the fee (as to implied reservation, see Gale on Easements. 8th ed. pp. 137 et seq.); (d) by prescription, either at common law or under the Prescrip- tion Act 1832. Anexpressgrant,orexpressreservation,ofanease- ment cannot be effected except by deed. An easement arises by implied grant where a man makes one part of his tenement depend- ent on another, or makes the parts mutually interdependent, and grants any such part with the dependence attaching to it to another person (Innes, Law of Easements, 7th ed. p. 10). For example, a man builds two houses, each of which by the plan of construction receives support from the other; this mutual right of support is a quasi-ea.sem.ent, of which on severance of the tenements the grantee of one will have the benefit; where the enjoyment of the severed tenement could not be had at all without such a right, it is said to be an " easement of necessity."

Easements are acquired by prescription at common law by proof of " immemorial user " by the dominant owner and those through whom he claims. At one time it was thought that such proof must date back to the first year (1189) of Richard I. (see preamble to Prescription Act 1832). The ground, however, on which prescription was admitted as a means of acquiring easements was the fiction of a " lost grant." Long enjoyment of the right pointed to its having had a legal origin in a grant from the servient owner, and so any period of reasonably long use came to be accepted. A " lost grant " may be presumed to have been made (the question is one of fact) if 20 years' uninter- rupted enjoyment is shown. To avoid the difficulties of proof

of prescriptive right at common law, the Prescription Act 1832 established shorter periods of user. In the case of easements, other than light, the periods of prescription are 20 years for a claim that may be defeated, and 40 years for an indefeasible claim (s. 2). The right of access of light is dealt with under s. 3 (see Ancient Lights). The enjoyment to become prescriptive must be open, i.e. of such a character that the owner of the tenement said to be servient has a reasonable opportunity of becoming aware of the adverse claim (Union Lighterage Co. v. London Graving Dock Co., 1902, 2 Ch. 557); and it must be enjoyed as of right (Gardner v. Hodgson's Kingston Brewery Co., 1903, A.C. 229) as against the owner of the tenement affected (Kilgour v. Gaddes, 1904, 1 K.B. 457). The periods of prescrip- tion are to be reckoned backwards from the time" when some suit or matter involving the claim of the dominant owner has arisen (s. 4). Nothing is to be deemed an interruption unless the act of interruption has been submitted to, or acquiesced in, for a year (s. 4).

Easements may be extinguished (i.) by express release — here an instrument under seal is necessary; (ii.) by "merger," i.e. where both tenements become the property of the same owner; (iii.) by abandonment through non-user. In the case of dis- continuous easements, the shortest period of non-user may suffice if there is direct evidence of an intention to abandon.

A word may be added here as to the right to air. It is an actionable nuisance to cause pollution of the air entering a dwelling-house. The owner of a dwelling-house may by pre- scription acquire a right to the passage of air through it by a defined channel; and the enjoyment without interruption of ventilation by means of air flowing in a definite channel, with the knowledge of the owner and occupier of the adjoining premises, creates a presumption of the grant of such an easement (see Gale on Easements, 8th ed. p. 338).

In Scots Law the term " easement " is unknown. Both the name " servitude " and the main species of servitudes existing in Roman law (q.v.) have been adopted. The classification of servitudes into positive and negative, &c, and the modes of their creation and extinction, are similar to those of English law. The statutory period of prescription is 40 years (Scots Acts 1617, c. 12), or 20 years in the case of enjoyment under any ex facie valid irredeemable title duly recorded in the appropriate register of sasines (Conveyancing [Scotland] Act 1874). There are

certain servitudes special to Scots law, e.g. " thirlage," by which lands are " thirled " or bound to a particular mill, and the possessors obliged to grind their grain there, for payment of certain multures (quantities of grain or meal, payable to the mill- owner) and sequels (small quantities given to the mill servants) as the customary price of grinding. Statutory provision has been made for the commutation of these duties (Thirlage Act 1799), and they have now almost disappeared.

The French Code Civil (Arts. 637 et seq.) and the other European codes (e.g. Belgium, arts. 637 et seq.; Holland, arts. 721 et seq.; Italy, arts. 531 et seq.; Spain, arts. 530 et seq.; Germany, arts. 1018 et seq.) closely follow Roman law. French law is in force in Mauritius, and has been followed in Quebec (Civil Code, arts. 499 et seq.) and St Lucia (Civil Code, arts. 449 et seq.). In India the law is regulated, on English lines, by the Easements Act 1882 (Act v. of 1882). The term " ease- ments," however, in India includes profits a prendre. In the South African colonies the law of easements is based on the Roman Dutch law (see Maasdorp, Institutes of Cape Law, 1904; Bk. ii. p. 166 et seq.). In most of the other colonies the law of easements is similar to English law. In some, however, it has been provided by statute that rights to the access and use of light or water cannot be acquired by prescription: e.g. Victoria (Water Act 1890, No. 1156, s. 3), Ontario (Real Property Limita- tion Act, Revised Stats. Ontario, 1897; c. 133, s. 36, light).

In the United States the law of easements is founded upon, and substantially identical with, English law. The English doctrine, however, as to acquisition of right of light and air by prescription is not accepted in most of the States.

Authorities. — English Law. Gale, Law of Easements (8th ed., London, 1908) ; Goddard, Law of Easements (6th ed., London, 1904) ; Innes, Digest of the Law of Easements (7th ed., London, 1903). Indian Law : Peacock, Easements in British India (Calcutta, 1904) ; Hudson and Inman, Law of Light, and Air (2nd ed., London, 1905). Scots Law: Erskine, Principles of the Law of Scotland (20th ed., Edinburgh, 1903). American Law : Jones, Law of Easements (New York, 1898) ; Bouvier, Law Diet. (Boston and London, 1897) ; Ruling Cases, London and Boston, 1894-1901, tit. Easement (American Notes). (A. W. R.)

EAST, ALFRED (1840-), English painter and etcher, was born at

Kettering on the 15th of December 1849. One of the most prominent among modern English landscape painters, he received his art education first at the Glasgow School of Art and then in Paris at the Ecole des Beaux-Arts, and under Robert-Fleury and Bouguereau. His landscapes are remarkable for the lyrical use of colour and for the pleasing rhythm of line which is the result of careful selection and building up of the elements that constitute the scene. Based on keen observation of the colour of nature and on careful studies of the details, they are arranged with a rare and by no means obvious sense of balance and compositional beauty which summarily discards all dis- turbing accidents of nature. He also achieved distinction as an etcher, and published an instructive and useful volume on landscape painting (London, 1906). He began to exhibit at the Royal Academy in 1882, and was elected an associate. In 1906 he became president of the Royal Society of British Artists. Many of his works are to be found in the English provincial galleries; Manchester owns " The Silent Somme " and "Autumn"; Liverpool, "Gibraltar from Algeciras "; Leeds,. "The Golden Valley"; Birmingham, "Hayle from Lelant"; Preston, "Anldyll of Spring"; and Hull, "Evening on the Cotswolds." His " Passing Storm " is at the Luxembourg; " The Nene Valley " at the Venice gallery; and " A Haunt of Ancient Peace " at the National gallery in Budapest. In 1903 he received the order of the Crown of Italy in connexion with his services to the Venice international exhibition; and he was made an honorary member of the Japanese Meiji Bijutsu Kai.

EAST ANGLIA, one of the kingdoms into which Anglo-Saxon Britain was divided. Bede gives no information about its origin except that its earliest settlers were Angles. The kingdom of East Anglia comprised the two counties of Norfolk and Suffolk. With regard to the western boundary we have no accurate information, but it was probably formed by the fens of Cambridgeshire.

This kingdom first appears in Bede's narrative early in the 7th century, when its power was at its height. Towards the end of the reign of iEthelberht, who died about 616, Rsedwald of East Anglia, who had apparently spent some time at the court of Kent, began to win for himself the chief position among the Anglo-Saxon kings of his day. His position was assured, at least temporarily, in 617, when he decided to espouse the cause of the Northumbrian prince Edwin, then a fugitive at his court, and defeated ˆEthelfrith of Northumbria on the banks of the Idle, a tributary of the Trent, in Mercian territory. Ra:dwald had been converted to Christianity in Kent, but after his return home he relapsed, according to Bede, owing to the influence of his wife, and there were to be seen in the same building a

Christian and a pagan altar. Bede states that Raedwald was the son of Tytili, the son of Wuffa, from whom the East Anglian royal family derived their name Wuffingas. According to the Historia Brittonum Guffa (Wuffa) was the son of (Guecha) Wehha, who first ruled the East Angles in Britain. This would put the organi- zation of the kingdom in the first or second quarter of the 6th century. Eorpwald, the son of Rsdwald, was converted to Christianity by Edwin, but was soon afterwards slain by Ricberht (627 or 628), whereupon the kingdom again became pagan for three years, when Sigeberht, the brother of Eorpwald, became king and founded a see for Felix at Dunwich. Sigeberht also founded a school in East Anglia, and on the arrival of an Irish missionary named Furseus he built him a monastery at Cnob- heresburg, perhaps to be identified with Burgh Castle. Before 644, however, Sigeberht resigned the crown in favour of his brother Ecgric and retired to a monastery. Shortly afterwards both brothers were slain by Penda of Mercia in his invasion of East Anglia, and Anna became king. This king was an en- thusiastic Christian, and converted Ccenwalh, king of Wessex, who had fled to his court. Two of his daughters, Saethryth and ˆEthelberg, took the veil; while another, Sexburg, was married to Earconberht, king of Kent; and a fourth, JEihel- thryth, after two marriages, with Tondberht of the South Gyrwe and Ecgfrith of Northumbria, became abbess of Ely. In 654 Anna was slain by Penda of Mercia, and was succeeded by his brother yEthelhere, who was killed in 655 at the Winwaed, fighting for the Mercian king against Oswio of Northumbria. In 673 Archbishop Theodore divided the East Anglian diocese into two, Elmham being the seat of the northern, Dunwich that of the southern bishop. A long blank follows in the history of this kingdom, until in 792 we find Offa of Mercia slaying .

The following is a list of the kings of East Anglia of whom there is record: — Wehha; Wuffa; Rasdwald, son of Tytili and grand- son of Wuffa (reigning 617); Eorpwald, son of Raedwald (d. 627 or 628); Sigeberht, brother of Eorpwald; Ecgric, brother of Sigeberht (both slain before 644) ; Anna, son of Ene and grandson of Tytili (d. 654); ˆEthelhere, brother of Anna (d. 655); ˆthel- wald, a third brother; Aldwulf (succ. 663, d. 713), son of -lEthelric and grandson of Ene; Elfwald, son of Aldwulf (d. 749); Hun Beonna and Alberht; yEthelberht (792); Edmund (870).

After the death of Ragnar LoSbrok's sons East Anglia was occupied by the Danish king Guthrum, who made a treaty with Alfred settling their respective boundaries, probably about 880. Guthrum died in 890. A later king named Eohric took up the cause of /Ethelwald, the son of jEthelred I., and was slain in the fight with the Kentish army

at the Holm in 905. A war broke out with King Edward the Elder in 913; in 921 a king whose name is unknown was killed at the fall of Tempsford, and in the same year the Danes of East Anglia submitted to Edward the Elder. From this time, probably, East Anglia was governed by English earls, the most famous of whom were ˆEthelstan, surnamed Half – King (932-956) and his sons,

iEthelwold (956-962), and /Ethelwine, surnamed Dei amicus

(962-992).

See Bede, Hist. Eccl. (ed. C. Plummer, Oxford, 1896), ii. 5, 15, iii. 7, 8, 18-20, 22, iv. 3, 5, 23; Saxon Chronicle (ed. Earle and Plummer, Oxford, 1899), s. a. 823, 838, 866, 870, 880, 885, 890, 894, 905, 921; Historia Brittonum (San-Marte, 1844), s. 59; H. Sweet, Oldest English Texts, p. 171 (London, 1885). (F. G. M. B.)

EASTBOURNE, a municipal borough (1883) in the Eastbourne parliamentary division of Sussex, England, 61 m. S.S.E. of London by the London, Brighton & South Coast railway. Pop. (1891) 34,969; (1901) 43,344; (local census, 1909) 49,286. It is situated 3 m. N.E. of Beachy Head, the loftiest headland on the English Channel coast. It once consisted of three parts — the village of East Bourne, a mile inland; South Bourne, lying back from the shore; and Seahouses, facing the beach. The church of St Mary, the ancient parish church of East Bourne, is a fine transitional Norman building; and there are numerous modern churches and chapels. The principal buildings and institutions are the town hall and municipal buildings, the Princess Alice Memorial and other hospitals, a free library and, among many high-class schools, Eastbourne College for boys, founded in 1867. There is a fine pier with pavilion, and a marine parade nearly 3 m. in extent, arranged in terraced promenades. Devonshire Park of 13 acres is pleasantly laid out, and contains a pavilion and a theatre. The duke of Devonshire is the principal landowner. Golf links are laid out on the neighbouring downs. A Roman villa was formerly seen close to the shore, but it is not now visible. The corporation consists of a mayor, 8 aldermen and 24 councillors. In 1910 the corporation promoted a bill in parliament to add the Hampden Park district in the parish of Willingdon to the borough and to make Eastbourne, with this extension, a county borough.

EAST CHICAGO, a city of Lake county, Indiana, U.S.A., on Lake Michigan, about 19 m. S.E. of the business centre of Chicago. Pop. (1890) 1255; (1900)3411 (1331 foreign-born); (1910) 19,098. It is served by several railways, including the Pennsylvania, the Wabash, the Chicago Terminal Transfer (whose shops are here), the Lake Shore & Michigan Southern, the Chicago, Indiana & Southern, and the Indiana Harbor railways. East Chicago covers an area whose greatest dimensions are 4 by 35 m. That part of the city along the lake, known as Indiana Harbor, dates from 1 901 and has grown very rapidly because of its position at the southernmost part of the Calumet District, and because of the meeting here of railway and lake commerce. A good harbour has been constructed, a new ship canal connecting the harbour with the Calumet river. East Chicago is industrially virtually a part of " Greater " Chicago; among its manufactures are iron and steel, cement, lumber, boilers, hay presses, chains, chemicals and foundry products. East Chicago was chartered as a city in

1893.

EASTER, the annual festival observed throughout Christen- dom in commemoration of the resurrection of Jesus Christ. The name Easter (Ger. Ostern), like the names of the days of the week, is a survival from the old Teutonic mythology. According to Bede (De Temp. Rat. c. xv.) it is derived from Eostre, or Ostdra, the Anglo-Saxon goddess of spring, to whom the month answering to our April, and called Eostur-monath, was dedicated. This month, Bede says, was the same as the mensis paschalis, " when the old festival was observed with the gladness of a new solemnity."

The name of the festival in other languages (as Fr. pdques; Ital. pasqua; Span, pascua; Dan. paaske; Dutch paasch; Welsh pasg) is derived from the Lat. pascha and the Gr. 7raaxa. These in turn come from the Chaldee or Aramaean form unps pascha', of the Hebrew name of the Passover festival nps pesach, from nps " he passed over," in memory of the great deliverance, when the destroying angel " passed over the houses, of the children of Israel in Egypt when he smote the Egyptians " (Exod. xii. 27).

An erroneous derivation of the word pascha from the Greek irao- xeiv, " to suffer," thus connected with the sufferings or passion of the Lord, is given by some of the Fathers of the Church, as Irenaeus, Tertullian and others, who were ignorant of Hebrew.

St Augustine (In Joann. Tract. 55) notices this false etymology,

shows how similarity of sound had led to it, and gives the correct derivation.

There is no indication of the observance of the Easter festival in the New Testament, or in the writings of the apostolic Fathers. The sanctity of special times was an idea absent from the minds of the first Christians. " The whole of time is a festival unto Christians because of the excellency of the good things which have been given " is the comment of St Chrysostom on 1 Cor. v. 7, which has been erroneously supposed to refer to an apostolic observance of Easter. The ecclesiastical historian Socrates {Hist. Eccl. v. 22) states, with perfect truth, that neither the Lord nor his apostles enjoined the keeping of this or any other festival. He says: " The apostles had no thought of appointing festival days, but of promoting a life of blamelessness and piety "; and he attributes the observance of Easter by the church to the perpetuation of an old usage, " just as many other customs have been established."

This is doubtless the true statement of the case. The first Christians continued to observe the Jewish festivals, though in a new spirit, as commemorations of events which those festivals had foreshadowed. Thus the Passover, with a new conception added to it of Christ as the true Paschal Lamb and the first fruits from the dead, continued to be observed, and became the Christian Easter.

Although the observance of Easter was at a very early period the practice of the Christian church, a serious difference as to the day for its observance soon arose between the Christians of Jewish and those of Gentile descent, which led to a long and bitter controversy. The point at issue was when the Paschal fast was to be reckoned as ending. With the Jewish Christians, whose leading thought was the death of Christ as the Paschal Lamb, the fast ended at the same time as that of the Jews, on the fourteenth day of the moon at evening, and the Easter festival immediately followed, without regard to the day of the week. The Gentile Christians, on the other hand, unfettered by Jewish traditions, identified the first day of the week with the Resurrec- tion, and kept the preceding Friday as the commemoration of the crucifixion, irrespective of the day of the month. With the one the observance of the day of the month, with the other the observance of the day of the week, was the guiding principle.

Generally speaking, the Western churches kept Easter on the first day of the week, while the Eastern churches followed the Jewish rule, and kept Easter on the fourteenth day. St Polycarp, the disciple of St

John the Evangelist and bishop of Smyrna, visited Rome in 159 to confer with Anicetus, the bishop of that see, on the subject; and urged the tradition, which he had received from the apostle, of observing the fourteenth day. Anicetus, however, declined to admit the Jewish custom in the churches under his jurisdiction, but readily communicated with Polycarp and those who followed it. About forty years later (197) the question was discussed in a very different spirit between Victor, bishop of Rome, and Polycrates, metropolitan of pro-consular Asia. That province was the only portion of Christendom which still adhered to the Jewish usage, and Victor demanded that all should adopt the usage prevailing at Rome. This Polycrates firmly refused to agree to, and urged many weighty reasons to the contrary, whereupon Victor proceeded to ex- communicate Polycrates and the Christians who continued the Eastern usage. He was, however, restrained from actually proceeding to enforce the decree of excommunication, owing to the remonstrance of Irenaeus and the bishops of Gaul. Peace was thus maintained, and the Asiatic churches retained their usage unmolested (Euseb. H.E. v. 23-25). We find the Jewish usage from time to time reasserting itself after this, but it never prevailed to any large extent.

A final settlement of the dispute was one among the other reasons which led Constantine to summon the council of Nicaea in 325. At that time the Syrians and Antiochenes were the solitary champions of the observance of the fourteenth day. The decision of the council was unanimous that Easter was to be kept on Sunday, and on the same Sunday throughout the world,

and " that none should hereafter follow the blindness of the Jews " (Socrates, H.E. i. 9). The correct date of the Easter festival was to be calculated at Alexandria, the home of astro- nomical science, and the bishop of that see was to announce it yearly to the churches under his jurisdiction, and also to the occupant of the Roman see, by whom it was to be communicated to the Western churches. The few who afterwards separated themselves from the unity of the church, and continued to keep the fourteenth day, were named Quartodecimani, and the dispute itself is known as the Quarto-deciman controversy. Although measures had thus been taken to secure uniformity of observance, and to put an end to a controversy which had endangered Christian unity, a new difficulty had to be encountered owing to the absence of any authoritative rule by which

the paschal moon was to be ascertained. The subject is a very difficult and complex one (see also Calendar). Briefly, it may be explained here that Easter day is the first Sunday after the full moon following the vernal equinox. This, of course, varies in different longitudes, while a further difficulty occurred in the attempt to fix the correct time of Easter by means of cycles of years, when the changes of the sun and moon more or less exactly repeat themselves. At first an eight years' cycle was adopted, but it was found to be faulty, then the Jewish cycle of 84 years was used, and remained in force at Rome till the year 457, when a more accurate calculation of a cycle of 532 years, invented by Victorius of Acquitaine, took its place. Ultimately a cycle of 19 years was accepted, and it is the use of this cycle which makes the Golden Number and Sunday Letter, explained in the preface to the Book of Common Prayer, necessary. Owing to this lack of decision as to the accurate finding of Easter, St Augustine tells us (Epist. 23) that in the year 387 the churches of Gaul kept Easter on the 21st of March, those of Italy on the 18th of April, and those of Egypt on the 25th of April; and it appears from a letter of Leo the Great (Epist. 64, ad Marcian.) that in 455 there was a difference of eight days between the Roman and the Alexandrine Easter. Gregory of Tours relates that in 577 " there was a doubt about Easter. In Gaul we with many other cities kept Easter on the fourteenth calends of May, others, as the Spaniards, on the twelfth calends of April."

The ancient British and Celtic churches followed the cycle of 84 years which they had originally received from Rome, and their stubborn refusal to abandon it caused much bitter con- troversy in the 8th century between their representatives and St Augustine of Canterbury and the Latin missionaries. These latter unfairly attempted to fix the stigma of the Quartodeciman observance on the British and Celtic churches, and they are even now sometimes ignorantly spoken of as having followed the Asiatic practice as to Easter. This, however, is quite erroneous. The British and Celtic churches always kept Easter according to the Nicene decree on a Sunday. The difference between them and the Roman Church, at this period, was that they still followed the 84 years' cycle in computing Easter, which had been abandoned at Rome for the more accurate cycle of 53 2 years. This difference of calculation led to Easter being observed on different Sundays, in certain years, in England, by the adherents of the two churches. Thus Bede records that in a certain year (which must have been 645, 647, 648 or 651) Queen Eanfleda, who had received her instruction from a Kentish priest of the Roman obedience, was fasting and keeping Palm Sunday, while her husband,

Oswy, king of Northumbria, following the rule of the British church, was celebrating the Easter festival. This diversity of usage was ended, so far as the kingdom of North- umbria was concerned, by the council of Streaneshalch, or Whitby, in 654. To Archbishop Theodore is usually ascribed the credit of ending the difference in the rest of England in 669.

The Gregorian correction of the calendar in 1582 has once more led to different days being observed. So far as Western Christen- dom is concerned the corrected calendar is now universally accepted, and Easter is kept on the same day, but it was not until 1752 that the Gregorian reformation of the calendar was adopted in Great Britain and Ireland. Jealousy of everything emanating from Rome still keeps the Eastern churches from correcting the

calendar according to the Gregorian reformation, and thus their Easter usually falls before, or after, that of the Western churches, and only very rarely, as was the case in 1865, do the two coincide.

Easter, as commemorating the central fact of the Christian religion, has always been regarded as the chief festival of the Christian year, and according to a regulation of Constantine it was to be the first day of the year. This reckoning of the year as beginning at Easter lingered in France till 1565, when, by an ordinance of Charles IX., the 1st of January finally took its place.

Four different periods may be mentioned as connected with the observance of Easter, viz. (1) the preparatory fast of the forty days of Lent; (2) the fifteen days, beginning with the Sunday before and ending with the Sunday after Easter, during which the ceremonies of Holy Week and the services of the Octave of Easter were observed; this period, called by the • French the Quinzaine de Pdques, was specially observed in that country; (3) the Octave of Easter, during which the newly- baptized wore their white garments, which they laid aside on the Sunday after Easter, known as Dominica in albis depositis from this custom; another name for this Sunday was Pascha clausum, or the close of Easter, and from a clipping of the word " close " the English name of " Low " Sunday is believed to be derived; (4) Eastertide proper, or the paschal season beginning at Easter and lasting till Whit Sunday, during the whole of which time the festival character of the Easter season was maintained in the services of the church. ;

Many ecclesiastical ceremonies, growing up from early tirjjes, clustered round the celebration of the Easter festival. One C5l the

most notable of these was the use of the paschal candle. This was a candle of very large dimensions, set in a candlestick big enough to hold it, which was usually placed on the north side, just below the first ascent to the high altar. It was kept alight during each service till Whitsuntide. The Paschal, as it was called at Durham cathedral, was one of the chief sights of that church before the Reformation. It was an elaborate con- struction of polished brass, and, contrary to the usual custom, seems to have been placed in the centre of the altar-step, long branches stretching out towards the four cardinal points, bearing smaller candles. The central stem of the candlestick was about 38 ft. high, and bore the paschal candle proper, and together they reached a combined height of about 70 ft., the candle being lighted from an opening above. Other paschal candles seem to have been of scarcely less size. At Lincoln, c. 1300, the candle was to weigh three stones of wax; at Salisbury in 151 7 it was to be 36 ft. long; and at Westminster in 1558 it weighed no less than 3 cwt. of wax. After Whitsuntide what remained was made into smaller candles for the funerals of the poor. In the ancient churches at Rome the paschal candlesticks were fixtures, but elsewhere they were usually movable, and were brought into the church and set up on the Thursday before Easter. At Winchester the paschal candlestick was of silver, and was the gift of Canute. Others of more or less importance are recorded as having been at Canterbury, Bury St Edmunds, Hereford and York. The burning of the paschal candle still forms part of the Easter cere- monial of the Roman Catholic Church (see Lights, Ceremonial).

The liturgical colour for Easter was everywhere white, as the sign of joy, light and purity, and the churches and altars were adorned with the best ornaments that each possessed. Flowers and shrubs no doubt in early times were also used for this purpose, but what evidence there is goes against the medieval use of such decorations, which are so popular at the present day.

It is not the purpose of this article to enter on the wide subject of the popular observances, such as the giving and sending of Pasch or Easter eggs as presents. For such the reader may con- sult Brand's Popular Antiquities, Hone's Every-Day Book, and Chambers's Book of Days.

Authorities. — Bingham, Antiquities of the Christian Church; Bede, Ecclesiastical History of England; Procter and Frere, A New History of the Book of Common Prayer (London, 1901); Surtees Society, Rites of Durham, ed. J. T. Fowler (1903) ; De Morgan, Companion to the Almanac (1845) ; De Moleon, Voyages liturgiques (Paris,

1718). (T. M. F.)

EASTER ISLAND (Rapanui, i.e. Great Rapa), an island in the eastern part of the South Pacific ocean, belonging to Chile (since 1888), in 27° 8′ S. and 109° 28′ W., 1400 m. E. of Pitcairn, and 2000 m. from the South American coast. It is roughly triangular in shape, with its hypotenuse 12 m. long running north-east and south-west, and its three angles marked by three volcanic peaks, of which the north-eastern reaches 1768 ft. of altitude. The area of the island is 45 sq. m. The coast has no good natural harbour, and landing is difficult. There is no lack of fertile soil, and the climate is moist enough to make up for the absence of running water. Formerly the island appears to have been wooded, but it now presents only a few bushes (Edwardsia, Broussonetia, &c), ferns, grasses, sedges, &c. The natives grow bananas in the shelter of artificial pits, also sugar-canes and sweet potatoes, and keep a few goats and a large stock of domestic fowls, and a Tahitian commercial house breeds cattle and sheep on the island.

It is doubtful whether Rapanui was discovered by Davis in 1686, though it is sometimes marked Davis Island on maps. Admiral Roggeveen reached it on Easter day 1722; in 1774 Captain Cook discovered it anew and called it Teapi or Waihu. It was subsequently visited by La Perouse (1776), Kotzebue (1816), &c. At the time of Roggeveen's discovery the island probably contained from 2000 to 3000 inhabitants of Polynesian race, who, according to their own tradition, came from Rapa Iti (Little Rapa) or Oparo, one of the Tubuai or Austral group. In 1863 a large proportion of the inhabitants were kidnapped by the Peruvians and transported to work at the guano diggings on the Chincha Islands. The next year a Jesuit mission from Tahiti reached the island and succeeded in the task of civilization. The natives, who number scarcely one hundred, are all Christians.

Easter Island is famous for its wonderful archaeological remains. Here are found immense platforms built of large cut stones fitted together without cement. They are generally built upon headlands, and on the slope towards the sea. The walls on the seaside are, in some of the platforms, nearly 30 ft. high and from 200 to 300 ft. long, by about 30 ft. wide. Some of the squared stones are as much as 6 ft. long. On the land side of the platforms there is a broad terrace with large stone pedestals upon which once stood colossal stone images carved somewhat into the shape of the human trunk.

On some of the platforms there are upwards of a dozen images, now thrown from their pedestals and lying in all directions. Their usual height is from 14 to 16ft., but the largest are 37 ft., while some are only about 4 ft. They are formed from a grey trachytic lava found at the east end of the island. The top of the heads of the images is cut flat to receive round crowns made of a reddish vesicular tuff found at a crater about 8 m. distant from the quarry where the images were cut. A number of these crowns still he at the crater apparently ready for removal, some of the largest being over 10 ft. in diameter. In the atlas illustrating the voyage of La Perouse a plan of the island is given, with the position of several of the platforms. Two of the images are also represented in a plate. One statue, 8 ft. in height and weighing 4 tons, was brought to England, and is now in the British Museum. In one part of the island are the remains of stone houses nearly 100 ft. long by about 20 ft. wide. These are built in courses of large fiat stones fitted together without cement, the walls being about 5 ft. thick and over 5 ft. high. They are lined on the inside with upright slabs, on which are painted geometrical figures and representations of animals. The roofs are formed by placing slabs so that each course overlaps the lower one until the opening becomes about 5 ft. wide, when it is covered with flat slabs reaching from one side to the other. The lava rocks near the houses are carved into the resemblance of various animals and human faces, forming, probably, a kind of picture writing. Wooden tablets covered with various signs and figures have also been found. The only ancient implement discovered on the island is a kind of stone chisel, but it seems impossible that such large and numerous works could have been executed with such a tool. The present inhabitants of Easter Island know nothing of the construction of these remarkable works; and the entire

subject of their existence in this small and remote island is a mystery.

EASTERN BENGAL AND ASSAM, a province of British India, which was constituted out of Assam and the eastern portion of Bengal on the 16th of October 1905. Area 111,569 sq. m.; pop. (1901) 30,961,459. It is situated between 20° 45′ and 28 17′ N., and between 87 48′ and 97 5′ E. The province, as thus re- constituted, consists of the Bengal districts of Dacca, Mymen- singh, Faridpur, Backergunje, Tippera, Noakhali, Chittagong, Chittagong Hill Tracts, Rajshahi, Dinajpur, Jalpaiguri, Rang- pur, Bogra, Pabna, Malda, and the native states of Kuch Behar and Hill Tippera; and the whole of the former area of Assam consisting of the districts of Goalpara, Kamrup, Darrang, Nowgong, Sibsagar, Lakhimpur, Sylhet, Cachar,

Garo Hills, Khasi and Jaintia Hills, Naga Hills and Lushai Hills. It is bounded on the N. by Bhutan, on the W. by Burma, on the S. by Burma and the Bay of Bengal, and on the E. by Bengal. The line of demarcation between Bengal and the new province begins at the frontier of Bhutan, east of Darjeeling, runs south-west to Sahibganj on the Ganges and thence follows the course of the Ganges down to the deltaic branch, called the Haringhata, which leaves the main stream above Goalanda, and the course of the latter, which runs south into the Bay of Bengal. The capital of the province is Dacca, and its chief port is Chittagong.

The Bengal districts which were transferred to Eastern Bengal and Assam comprised northern and eastern Bengal, the most prosperous and least overcrowded portion of Bengal. The land there is less densely populated, wages are higher and food cheaper, and the rainfall more copious and more regular, while the staple crops of jute, tobacco and rice command a higher price relative to the rent of the land than in Behar or other parts of Bengal. The population are largely Mahommedans and of a more virile stock than the Bengali proper. Northern Bengal corre- sponds almost exactly with the Rajshahi division and lies within the boundaries of the Ganges and Brahmaputra rivers. It contains much high land of a stiff red clay, with an undulat- ing surface covered for the most part with scrub jungle. The inhabitants are Indo-Chinese, not Indo-Aryans as in Bengal proper, and are Mahommedan by religion instead of Hindu. Eastern Bengal consists of the Dacca and Chittagong divisions which are mainly Bengali in race and Hindu in religion. For the Assamese districts see Assam. The province as a whole contains 18,036,688 Mahommedans and 12,036,538 Hindus. In language 27,272,895 of the inhabitants speak Bengali, 1,349,784 speak Assamese, and the remainder Hindi and various hill dialects, Manipuri, Bodo, Khasi and Garo. The administration is in the hands of a lieutenant-governor, assisted by a legislative council of fifteen members. Under him are five commissioners, and financial matters are regulated by a board of revenue consisting of two members.

The constitution of the new province arose out of the fact that Bengal had grown too unwieldy for the administration of a single lieutenant-governor. In 1868 Sir Stafford Northcote drew attention to the greatly augmented demands that the outlying portions of Bengal made on the time and labour of the govern- ment. At that time the population of the province was between 40 and 50 millions, and the question was left in abeyance until 1903, when the population had risen to 785 millions. In the meantime the importance of rendering Assam a self-contained and independent administration with a

service of its own, and of providing for its future commercial expansion, had arisen. These two considerations led Lord Curzon to propose that Bengal should be lopped of territory both on its eastern and western borders, and that all the districts east of the Brahmaputra should be constituted into a separate province. This proposal was bitterly opposed by the Hindus of Bengal on the ground that it would destroy the unity of the Bengali race; and their agitation was associated with the Swadeshi (own country) movement for the boycott of British goods.

After the constitution of the province in October 1905, the agitation in Eastern Bengal increased. Public meetings of pro- test were held, vernacular broadsheets containing scandalous

attacks on the British authorities were circulated, schoolboys and others were organized and drilled as so-called " national volunteers," and employed as pickets to prevent the sale of British goods. Such was the state of things when Sir J. Bamp- fylde Fuller entered on his office as first lieutenant-governor of Eastern Bengal in January 1906. His reception was ominous. Representative bodies that were dominated by Hindus refused to vote the usual addresses of welcome, and non^official Hindus abstained from paying the customary calls. There were, however, no further overt signs of objection to the lieutenant-governor personally, and after a month or two — in spite of, or perhaps because of, his efforts to restrain sedition and to keep discipline in the schools — there was a decided change in the attitude of Hindu opinion. At Dacca, in July, for instance, the reception at Government House was attended by large numbers of Bengali gentlemen, who assured the lieutenant-governor that " the trouble was nearly ended." The agitation was, in fact, largely artificial, the work of Calcutta lawyers, journalists and schoolmasters; the mass of the people, naturally law-abiding, was unmoved by it so long as the government showed a firm hand; while the Mussulmans, who formed a large proportion of the whole, saw in the maintenance of the partition and of the prestige of the British government the guarantees of their own security.

All seemed to be going well when an unfortunate difference of opinion occurred between the lieutenant-governor and the central government, resulting in the resignation of Sir Bamp- fylde Fuller (August 1906) and in ulterior consequences destined to be of far-

reaching import. The facts are briefly as follows. Acting on a report of Dr P. Chatterji, inspector of schools, dated January 2, 1006, the lieutenant-governor, on the 10th of February, addressed a letter to the registrar of Calcutta University recom- mending that the privilege of affiliation to the university should be withdrawn from the Banwarilal and Victoria high schools at Sirajganj in Pabna, as a punishment for the seditious conduct of both pupils and teachers. Apart from numerous cases of illegal interference with trade and of disorder in the streets reported against the students, two specific outrages of a serious character were instanced as having occurred on the 15th of November: the raiding of a cart laden with English cloth belonging to Marwari traders, and a cowardly assault by some 40 or 50 lads on the English manager of the Bank of Bengal. These outrages " were not the result of thoughtlessness or sudden excitement, but were the outcome of a regularly organized scheme, set on foot and guided by the masters of these schools, for employing the students in enforcing a boycott." All attempts to discover and punish the offenders had been frustrated by the refusal of the school authorities to take action, and in the opinion of the lieutenant-governor the only course open was to apply the remedy suggested in the circular letter addressed to magistrates and collectors (October 10, 1905) by Mr R. W. Carlyle, theofficiat- ing chief secretary to the government of Bengal, directing them, in the event of students taking any part in political agitation, boycotting and the like, to inform the heads of schools or colleges concerned that, unless they prevented such action being taken by the boys attending their institutions, their grant-in-aid and the privilege of competing for scholarships and of receiving scholar- ship-holders would be withdrawn, and that the university would be asked to disaffiliate their institutions.

The reply, dated July 5th, from the secretary in the home department of the . government of India, was — to use Sir Bampfylde's own later expression— to throw him over. It was likely that a difference of opinion in the syndicate of the uni- versity would arise as to the degree of culpability that attached to the proprietors of the schools; in the event of the syndicate taking any " punitive action," the matter was certain to be raised in the senate, and would lead to an acrimonious public discussion, in which the partition of Bengal and the administration of the new province would be violently attacked; and in the actual state of public opinion in Bengal it seemed to the government of India highly inexpedient that such a debate should take place. " Collective punishment," too, " would be liable to be mis-

construed in England," and the government preferred to rely on the

gradual effect of the new university regulations, which aimed "at discouraging the participation of students in political movements by enforcing the responsibility of masters and the managing committees of schools for maintaining discipline."

On receipt of this communication Sir Bampfylde Fuller at once tendered his resignation to the viceroy (July 15). He pointed out that to withdraw from the position taken up would be " concession, not in the interests of education, but to those people in Calcutta who have been striving to render my govern- ment impossible, in order to discredit the partition "; that previous concessions had had merely provocative effects, and that were he to give way in this matter his authority would be so weakened that he would be unable to maintain order in the country. On the 3rd of August, after some days of deliberation, the viceroy telegraphed saying that he was " unable to reconsider the orders sent," and accepting Sir Bampfylde's resignation. By the Anglo-Indian press the news was received with something like consternation, the Times of India describing the resignation as one of the gravest blunders ever committed in the history of British rule in India, and as a direct incentive to the forces of disquiet, disturbance and unrest. Equally emphatic was the verdict of the Mussulman community forming two-thirds of the population of Eastern Bengal. On the 7th of August, the day of Sir Bampfylde Fuller's departure from Dacca, a mass-meeting of 30,000 Mahommedans was held, which placed on record their disapproval of a system of government " which maintains no continuity of policy," and expressed its feeling that the lowering of British prestige must " alienate the sympathy of a numerically important and loyal section of His Majesty's subjects "; and many meetings of Mussulmans subsequently passed resolutions to the same general effect. The Akhbar-i-Islam, the organ of Bombay Mussulman opinion, deplored the " unwise step " taken by the government, and ascribed it to Lord Minto's fear of the Babu press, a display of weakness of which the Babus would not be slow to take advantage.

This latter prophecy was not slow in fulfilling itself. So early as the 8th of August Calcutta was the scene of several large demonstrations at which the Swadeshi vow was renewed, and at which resolutions were passed declining to accept the partition as a settled fact, and resolving on the continuance of the agitation. The tone of the Babu press was openly exultant: " We have read the familiar story of the Russian traveller and the wolves," said a leading Indian newspaper in Calcutta. " The British government follows a similar policy. First the little babies were offered up in the shape of the Bande Mataram circular and the Carlyle circular. Now a bigger boy has gone in the person of our own Joseph. Courage, therefore, O wolves! Press on and the horse will soon be yours to devour ! Afterwards the traveller himself will alone be left." x The task before the new lieutenant-governor of Eastern Bengal, the Hon. L. Hare, was obviously no easy one. The encouragement given to sedition by the weakness of the government in this case was shown by later events in Bengal and elsewhere (see India: History, ad fin.).

For the early history of the various portions of the province see Bengal and Assam.

See Sir James Bourdillonj The Partition of Bengal (Society of Arts, 1905) ; official blue-books on The Reconshtution of the Provinces of Bengal and Assam (Cd. 2658 and 2746), and Resignation of Sir J. Bampfylde Fuller, lieutenant-governor, &c. (Cd. 3242). A lone letter from Sir J. B. Fuller, headed T accuse, attacking the general policy of the Indian government in regard to the seditious propa- ganda, appeared in The Times oi June 6, 1908.

EASTERN QUESTION, THE, the expression used in diplomacy from about the time of the congress of Verona (1822) to compre- hend the international problems involved in the decay of the Turkish empire and its supposed impending dissolution. The essential' questions that are involved are so old that historians commonly speak of the " Eastern Question " in reference to events that happened long before the actual phrase was coined. But, wherever used, it is always the Turkish Question, the

1 Quoted by Mr F. S. P. Lely in The Times of November 23, 1906.

generic term in which subsidiary issues, e.g. the Greek, Armenian or

Macedonian questions, are embraced. That a phrase of so wide and loose a nature should have been stereotyped in so narrow a sense is simply the outcome of the conditions under which it was invented. To the European diplomatists of the first half of the 19th century the Ottoman empire was still the only East with which they were collectively brought into contact. The rivalry of Great Britain and Russia in Persia had not yet raised the question of the Middle East; still less any ambitions of Germany in the Euphrates valley. The immense and incalculable problems involved in the rise of Japan, the awakening of China, and their relations to the European powers and to America — known as the Far Eastern' Question — are comparatively but affairs of yesterday.

The Eastern Question, though its roots are set far back in history — in the ancient contest between the political and intel- lectual ideals of Greece and Asia, and in the perennial rivalry of the powers for the control of the great trade routes to the East — dates in its modern sense from the treaty of Kuchuk Kainarji in 1774, which marked the definitive establishment of Russia as a Black Sea power and formed the basis of her special claims to interfere in the affairs of the Ottoman empire. The compact between Napoleon and the emperor Alexander I. at Tilsit (1807) marked a new phase, which culminated in 181 2 in the treaty of Bucharest, in which Russia definitely appeared as the protector of the Christian nationalities subject to the Ottoman sultan.

The attitude of the various powers in the Eastern Question was now defined. Russia, apart from her desire to protect the Orthodox nationalities subject to the Ottoman power, aimed at owning or controlling the straits by which alone she could find an outlet to the Mediterranean and the ocean beyond. Austria, once the champion of Europe against the Turk, saw in the Russian advance on the Danube a greater peril than any to be feared from the moribund Ottoman power, and made the maintenance of the integrity of Turkey a prime object of her policy. She was thus brought into line with Great Britain, whose traditional friendship with Turkey was strengthened by the rise of a new power whose rapid advance threatened the stability of British rule in India. But though Austria, Great Britain and presently France, were all equally interested in maintaining the Ottoman empire, the failure of the congress of Vienna in 1815 to take action in the matter of a guarantee of Turkey, and the exclusion of the Sultan from the Holy Alliance, seemed to endorse the claim of Russia to regard the Eastern Question as " her domestic concern " in which " Europe " had no right to interfere. The revolt of the Greeks (1821) put this claim to the test; by the treaty of Adrianople (1829)

Russia stipulated for their autonomy as part of the price of peace, but the powers assembled in conference at London refused to recognize this settlement, and the establishment of Greece as an independent kingdom (1832) was really aimed at the pretensions and the influence of Russia. These reached their high-water mark in the treaty of Unkiar Skelessi (July 8th, 1832). It was no longer a question of the partition of Turkey or of a Russian conquest of Constantinople, but of the deliberate degradation by Russia of the Ottoman empire into a weak state wholly dependent upon herself. The ten years' crisis (183 1-1841) evoked by the revolt of Mehemet Ali, pasha of Egypt, thus resolved itself into a diplomatic struggle between Russia and the other powers to. maintainor to recover influence at Constantinople. The Russian experiment of maintaining the integrity of Turkey while practically treating her as a vassal state, ended with the compromise of 1841 ; and the emperor Nicholas I. reverted to the older idea of expelling the Turks from Europe. The Eastern Question, however, slumbered until, in 1851, the matter of the Holy Places was raised by Napoleon III., involving the whole question of the influence in Ottoman affairs of France under the capitulations of 1740 and of Russia under the treaty of 1774. The Crimean War followed and in 1856 the treaty of Paris, by which the powers hoped to stem the tide of Russian advance and establish the integrity of a reformed Ottoman state. Turkey

was now for the first time solemnly admitted to the European concert. The next critical phase was opened in 1871, when Russia took advantage of the collapse of France to denounce the Black Sea clauses of the treaty of 1856. The renewal of an aggressive policy thus announced to the world soon produced a new crisis in the Eastern Question, which had meanwhile become complicated by the growth of Pan-Slav ideals in eastern Europe. In 1875 a rising in Herzegovina gave evidence of a state of feeling in the Balkan peninsula which called for the intervention of Europe, if a disastrous war were to be prevented. But this intervention, embodied in the " Andrassy Note " (December 1875) and the Berlin memorandum (May 1876), met with the stubborn opposition of Turkey, where the " young Turks " were beginning to oppose a Pan-Islamic to the Pan-Slav ideal. The Russo- Turkish War of 1877-78 followed, concluded by the treaty of San Stefano, the terms of which were modified in Turkey's favour by the congress of Berlin (1878), which marks the beginning of the later phase of the Eastern Question. Between Russia and Turkey it interposed, in effect, a barrier of independent (Rumania, Servia) and quasi-independent (Bulgaria) states, erected with the counsel and consent of collective Europe. It thus, while

ostensibly weakening, actually tended to strengthen the Ottoman power of resistance.

The period following the treaty of Berlin is coincident with the reign of Sultan Abd-ul-Hamid II. The international position of the Ottoman empire was strengthened by the able, if Machiavel- lian, statecraft of the sultan; while the danger of disruption from within was lessened by the more effective central control made possible by railways, telegraphs, and the other mechanical im- provements borrowed from western civilization. With the spread of the Pan-Islamic movement, moreover, the undefined authority of the sultan as caliph of Islam received a fresh importance even in countries beyond the borders of the Ottoman empire, while in countries formerly, or nominally still, subject to it, it caused, and promised to cause, incalculable trouble.

The Eastern Question thus developed, in the latter years of the 19th century, from that of the problems raised by the impend- ing break-up of a moribund empire, into the even more complex question of how to deal with an empire which showed vigorous evidence of life, but of a type of life which, though on all sides in close touch with modern European civilization, was incapable of being brought into harmony with it. The belief in the im- minent collapse of the Ottoman dominion was weakened almost to extinction; so was the belief, which inspired the treaty of 1856, in the capacity of Turkey to reform and develop itself on European lines. But the Ottoman empire remained, the mistress of vast undeveloped wealth. The remaining phase of the Eastern Question, if we except the concerted efforts to impose good government on Macedonia in the interests of European peace, or the side issues in Egypt and Arabia, was the rivalry of the progressive nations for the right to exploit this wealth. In this rivalry Germany, whose interest in Turkey even so late as the congress of Berlin had been wholly subordinate, took a leading part, unhampered by the traditional policies or the humanitarian considerations by which the interests of the older powers were prejudiced. The motives of German intervention in the Eastern Question were ostensibly commercial; but the Bagdad railway concession, postulating for its ultimate success the control of the trade route by way of the Euphrates valley, involved political issues of the highest moment and opened up a new and perilous phase of the question of the Middle East.

This was the position when in 1908 an entirely new situation was created by the Turkish revolution. As the result of the patient and masterly organization of the " young Turks," com- bined with the universal discontent with the rule of the sultan and the palace

camarilla, the impossible seemed to be achieved, and the heterogeneous elements composing the Ottoman empire to be united in the desire to establish a unified state on the con- stitutional model of the West. The result on the international situation was profound. Great Britain hastened to re-knit the bonds of her ancient friendship with Turkey; the powers, without exception, professed their sympathy with the new regime.

The establishment of a united Turkey on a constitutional and nationalist basis was, however, not slow in producing a fresh complication in the Eastern Question. Sooner or later the issue was sure to be raised of the status of those countries, still nominally part of the Ottoman empire, but in effect independent, like Bulgaria, or subject to another state, like Bosnia and Herzegovina. The cutting of the Gordian knot by Austria's annexation of Bosnia and Herzegovina, and by the proclamation of the independence of Bulgaria, and of Prince Ferdinand's assumption of the old title of tsar (king), threatened to raise the Eastern Question once more in its acutest form. The inter- national concert denned in the treaty of Berlin had been rudely shaken, if not destroyed; the denunciation by Austria, without consulting her co-signatories, of the clauses of the treaty affecting herself seemed to invalidate all the rest; and in the absence of the restraining force of a united concert of the great powers, free play seemed likely once more to be given to the rival ambitions of the Balkan nationalities, the situation being complicated by the necessity for the dominant party in the renovated Turkish state to maintain its prestige. During the anxious months that followed the Austrian coup, the efforts of diplomacy were directed to calming the excitement of Servians, Montenegrins and the Young Turks, and to considering a European conference in which the fait accompli should be regularized in accordance with the accepted canons of international law. The long delay in announcing the assembly of the conference proved the extreme difficulty of arriving at any satisfactory basis of settlement; and though the efforts of the powers succeeded in salving the wounded pride of the Turks, and restraining the impetuosity of the Serbs and Montenegrins, warlike preparations on the part of Austria continued during the winter of 1008-1909, being justified by the agitation in Servia, Montenegro and the annexed provinces. It was not till April 1909 (see Europe: ad fin.) that the crisis was ended, through the effectual backing given by Germany to Austria; and Russia, followed by England and France,

gave way and assented to what had been done.

See Turkey : History, where cross-references to the articles on the various phases of the Eastern Question will be found, together with a bibliography. See also E. Driault, La Question d 'orient depuis son origine (Paris, 1898), a comprehensive sketch of the whole subject, including the Middle and Far East. (W. A. P.)

EAST GRINSTEAD, a market town in the East Grinstead parliamentary division of Sussex, England, 30 m. S. by E. from London by the London, Brighton & South Coast railway. Pop. of urban district (1901) 6094. St Swithin's church contains, among numerous ancient memorials, one of the iron memorial slabs (1507) peculiar to certain churches of Sussex, and recalling the period when iron was extensively worked in the district. There may be noticed Sackville College (an almshouse founded in 1608), and St Margaret's home and orphanage, founded by the Rev. John Mason Neale (1818-1866), warden of Sackville College. Brewing and brick and tile making are carried on. In the vicinity (near Forest Row station) is the golf course of the Royal Ashdown Forest Golf Club.

*The hundred of East Grinstead (Grenestede, Estgrensted) was in the possession of the count of Mortain in 1086, but no mention of a vill or manor of East Grinstead is made in the Domesday Survey. In the reign of Henry III. the hundred was part of the honour of Aquila, then in the king's hands. The honour was granted by him to Peter of Savoy, through whom it passed to his niece Queen Eleanor. In the next reign the king's mother held the borough of East Grinstead as parcel of the honour of Aquila. East Grinstead was included in a grant by Edward III. to John of Gaunt, duke of Lancaster, and it remained part of the duchy of Lancaster until James I. granted the borough to Sir George Rivers, through whom it was obtained by the Sackvilles, earls of Dorset. East Grinstead was a borough by prescription. In the 16th century it was governed by a*n alderman, bailiff and constable. It returned two members to parliament from 1307 until 1832, but was disenfranchised by the Reform Act. In 1285 the king ordered that his market at Grenestede should be held on Saturday instead of Sunday, and in 1 516 the inhabitants of the town were granted a market each Vill. 27*

week on Saturday and a fair every year on the eve of St Andrew and two days following. Charles I. granted the earl of Dorset a market on Thursday instead of the Saturday market, and fairs on the 16th of April and the 26th of September every year. Thursday is still the market-day, and cattle-fairs are now held on the 21st of April and

the nth of December.

EAST HAM, a municipal borough in the southern parlia- mentary division of Essex, England, contiguous to West Ham, and thus forming geographically part of the eastward extension of London. Pop. (1901) 96,018. Its modern growth has been very rapid, the population being in the main of the artisan class. There are some chemical and other factories. The ancient parish church of St Mary Magdalen retains Norman work in the chancel, which terminates in an eastern apse. There is a monu- ment for Edmund Neville who claimed the earldom of Westmor- land in the 17th century, and William Stukeley, the antiquary, was buried in the churchyard. East Ham was incorporated in 1904, and among its municipal undertakings is a technical college (1905). The corporation consists of a mayor, 6 aldermen and 18 councillors. Area, 3320ˆ acres.

EASTHAMPTON, a township of Hampshire county, Mass., U.S.A., in the Connecticut Valley. Pop. (1900) 5603, of whom 1731 were foreign-born; (1905) 6808; (1910) 8524. Itisservedby the Boston & Maine, and the New York, New Haven & Hartford railways, and by interurban electric railways. The township is generally level, and is surrounded by high hills. In East- hampton are a free public library and Williston Seminary; the latter, one of the oldest and largest preparatory schools in New England, was founded in 1841 by the gifts of Samuel Williston (1795-1874) and Emily Graves Williston (1797-1885); Mr and Mrs Williston built up the industry of covering buttons with cloth, at first doing the work by hand, then (1827) experimenting with machinery, and in 1848 building a factory for making and covering buttons. As the soil was fertile and well watered, the township had been agricultural up to this time. It is now chiefly devoted to manufacturing. Among its products are cotton goods, especially mercerised goods, for the manufacture of which it has one of the largest plants in the country; rubber, thread, elastic fabrics, suspenders and buttons. Parts of Northampton and Southampton were incorporated as the " district " of East- hampton in 1785; it became a township in 1809, and in 1841 and 1850 annexed parts of Southampton.*

EAST HAMPTON, a township of Suffolk county, New York, in the extreme S.E. part of Long Island, occupying the peninsula of Montauk, and bounded on the S. and E. by the Atlantic Ocean, and on the N. by Block Island Sound, Gardiner's Bay and Peconic Bay. Pop. (1900) 3746; (1905) 4303; (1910) 4722. The township, 25 m. long and 8 m. at its greatest width from north to south, has an irregular north coast-line and a very regular south coast-line. The

surface is rougher to the west where there are several large lakes, notably Great Pond, 2 m. long. The scenery is picturesque and the township is much frequented by artists. Montauk Lighthouse, on Turtle Hill, was first built in 1795. At Montauk, after the Spanish-American War, was Camp Wikoff, a large U.S. military camp. The township is served by the southern division of the Long Island railway, the terminus of which is Montauk. Other villages of the township, all summer resorts, are: Promised Land, Amagan- sett, East Hampton and Sag Harbor; the laˆt named, only partly in the township, was incorporated in 1803 and had a population of 1969 in 1900, and 3084 in 1910. Silverware and watch cases are manufactured here. From Sag Harbor, which is a port of entry, a daily steamer runs to New York city. The village received many gifts in 1906-1908 from Mrs Russell Sage. Most of the present township was bought from the Indians (Montauks, Corchaugs and Shinnecocks) in 1648 for about £30, through the governors of Connecticut and New Haven, by nine Massa- chusetts freemen, mostly inhabitants of Lynn, Massachusetts. With twenty other families they settled here in 1649, calling the place Maidstone, from the old home of some of the settlers in Kent; but as early as 1650 the name East Hampton was used in reference to the earlier settlement of South Hampton. Until

1664, when all Long Island passed to the duke of York, the government was by town meeting, autonomous and independent except for occasional appeals to Connecticut. In 1683 Gardiner's Island, settled by Lion Gardiner in 1639 and so one of the first English settlements in what is now New York state, was made a part of Long Island and of East Hampton township. The English settlements in East Hampton were repeatedly threatened by pirates and privateers, and there are many stories of treasure buried by Captain Kidd on Gardiner's Island and on Montauk Point. The Clinton Academy, opened in East Hampton village in 1785, was long a famous school. Of the church built here in 1653 (first Congregational and after 1747 Presbyterian in government), Lyman Beecher was pastor in 1799-1810; and in East Hampton were born his elder children. Whale fishing was begun in East Hampton in 1675, when four Indians were engaged by whites in off-shore whaling; but Sag Harbor, which was first settled in 1730 and was

held by the British after the battle of Long Island as a strategic naval and shipping point, became the centre of the whaling business. The first successful whaling voyage was made from Sag Harbor in 1785, and although the Embargo ruined the fishing for a time, it revived during 1830- 1850. Cod and menhaden fishing, the latter for the manufacture of fish-oil and guano, were important for a time, but in the second half of the ioth century Sag Harbor lost its commercial importance.

EAST INDIA COMPANY, an incorporated company for ex- ploiting the trade with India and the Far East. In the 17th and 18th centuries East India companies were established by England, Holland, France, Denmark, Scotland, Spain, Austria and Sweden. By far the most important of these was the English East India Company, which became the dominant power in India, and only handed over its functions to the British Government in 1858 (see also Dutch East India Company, Ostend Company).

The English East India Company was founded at the end of the 1 6th century in order to compete with the Dutch merchants, who had obtained a practical monopoly of the trade English wit ˆ the gpj ce i s i an ds, and had raised the price of pepper from 3s. to 8s. per lb. Queen Elizabeth incor- porated it by royal charter, dated December 31, 1600, under the title of " The Governor and Company of Merchants of London, trading into the East Indies." This charter conferred the sole right of trading with the East Indies, i.e. with all countries lying beyond the Cape of Good Hope or the Straits of Magellan, upon the company for a term of 15 years. Unauthorized inter- lopers were liable to forfeiture of ships and cargo. There were 125 shareholders in the original East India Company, with a capital of £72,000: the first governor was Sir Thomas Smythe. The early voyages of the company, from 1601 to 1612, are dis- tinguished as the " separate voyages," because the subscribers individually bore the cost of each voyage and reaped the whole profits, which seldom fell below 100%. After 1612 the voyages were conducted on the joint stock system for the benefit of the company as a whole. These early voyages, whose own narra- tives may be read in Purchas, pushed as far as Japan, and estab- lished friendly relations at the court of the Great Mogul. In 1610-1611 Captain Hippon planted the first English factories on the mainland of India, at Masulipatam and at Pettapoli in the Bay of Bengal. The profitable nature of the company's trade had induced James I. to grant subsidiary licences to private traders; but in 1609 he renewed the company's charter " for ever," though with a proviso that it might be revoked on three years' notice if the trade should not prove profitable to the realm. Meanwhile friction

was arising between the English and Dutch East India Companies. The Dutch traders considered that they had prior rights in the Far East, and their English ascendancy in the Indian Archipelago was indeed o&pˆes! nrmI y established on the basis of territorial dominion and authority. In 1613 they made advances to the English company with a suggestion for co-operation, but the offer was declined, and the next few years were fertile in disputes between the armed traders of both nations. In 161 9 was ratified*

East India Co,

Hon of territory.

a " treaty of defence " to prevent disputes between the English and Dutch companies. When it was proclaimed in the East, hostilities solemnly ceased for the space of an hour, while the Dutch and English fleets, dressed out in all their flags and with yards manned, saluted each other; but the treaty ended in the smoke of that stately salutation, and perpetual and fruitless contentions between the Dutch and English companies went on just as before. In 1623 these disputes Culminated in the " mas- sacre of Amboyna," where the Dutch governor tortured and executed the English residents on a charge of conspiring to seize the fort. Great and lasting indignation was aroused in England, but it was not until the time of Cromwell that some pecuniary reparation was exacted for the heirs of the victims. The immediate result was that the English company tacitly admitted the Dutch claims to a monopoly of the trade in the Far East, and confined their operations to the mainland of India and the adjoining countries.

The necessity of good ships for the East Indian trade had led the company in 1609 to construct their dockyard at Deptford, from which, as Monson observes, dates " the increase

of great ships in England." Down to the middle of the ,5,

1 1 «■ it tˆ -r 1. .1 1 1 1 Indlamen.

19th century, the famous East Indiamen held

unquestioned pre-eminence among the merchant vessels of the

world. Throughout the 17th century they had to be prepared

at any moment to fight not merely Malay pirates, but the armed

trading vessels of their Dutch, French and Portuguese rivals.

Many such battles are recorded in the history of the East India

Company, and usually with successful results.

It was not until it had been in existence for more than a century that the English East India Company obtained a practical monopoly of the Indian trade. In 1635, a year after The ac- the Great Mogul had granted it the liberty of trading quisi- throughout Bengal, Charles I. issued a licence to Courten's rival association, known as " the Assada Merchants," on the ground that the company had neglected English interests. The piratical methods of their rivals disgraced the company with the Mogul officials, and a modus vivendi was only reached in 1649. In 1657 Cromwell renewed the charter of 1609, providing that the Indian trade should be in the hands of a single joint stock company. The new company thus formed bought up the factories, forts and privileges of the old one. It was further consolidated by the fostering care of Charles II., who granted it five important charters. From a simple trading company, it grew under his reign into a great chartered company — to use the modern term — with the right to acquire territory, coin money, command fortresses and troops, form alliances, make war and peace, and exercise both civil and criminal jurisdiction. It is accordingly in 1689, when the three presidencies of Bengal, Madras and Bombay had lately been established, that the ruling career of the East India Company begins, with the passing by its directors of the following resolution for the guidance of the local governments in India: — " The increase of our revenue is the subject of our care, as much as our trade; 'tis that must maintain our force when twenty accidents may interrupt our trade; 'tis that must make us a nation in India; without that we are but a great number of interlopers, united by His Majesty's royal charter, fit only to trade where nobody of power thinks it their interest to prevent us; and upon this account it is that the wise Dutch, in all their general advices that we have seen, write ten paragraphs concerning their government, their civil and military policy, warfare, and the increase of their revenue, for one paragraph they write concerning trade." From this moment the history of the transactions of the East India Com- pany becomes the history of British India (see India: History). Here we shall only trace the later changes in the constitution and powers of the ruling body itself.

The great prosperity of the company under the Restoration, and the immense profits of the Indian trade, attracted a number of private traders, both outside merchants and dis- missed or retired servants of

*the company, who came The inter- to be known as ” interlopers.” In 1683 the case of *•/»«. Thomas Sandys, an interloper, raised the whole question of the*

royal prerogative to create a monopoly of the Indian trade. The case was tried by Judge Jeffreys, who upheld the royal prerogative; but in spite of his decision the custom of inter- loping continued and laid the foundation of many great fortunes. By 1691 the interlopers had formed themselves into a new society, meeting at Dowgate, and rivalling the old company; the case was carried before the House of Commons, which de- clared in 1694 that ” all the subjects of England have equal right to trade to the East Indies unless prohibited by act of parliament.” This decision led up to the act of 1698, which created a new East India Company in consideration of a loan of two millions to the state. The old company subscribed £ 31 5,000 and became the dominant factor in the new body; while at the same time it retained its charter for three years, its factories, forts and assured position in India. The rivalry between the two companies continued both in England and in India, until they were finally amalgamated by a tripartite in- denture between the companies and Queen Anne (1702), which was ratified under the Godolphin Award (1708). Under this award the company was to lend the nation £3,200,000, and its exclusive privileges were to cease at three years' notice after this amount had been repaid. But by this time the need for permanence in the Indian establishment began to be felt, while parliament would not relinquish its privilege of ” milking ” the company from time to time. In 1 7 1 2 an act was passed con- tinuing the privileges of the company even after their fund should be redeemed; in 1730 the charter was prolonged until 1766, and in 1742 the term was extended until 1783 in return for the loan of a million. This million was required for the war with France, which extended to India and involved the English and French companies there in long-drawn hostilities, in which the names of Dupleix and Clive became prominent.

So long as the company's chief business was that of trade, it was left to manage its own affairs. The original charter of Tbt Elizabeth had placed its control ill the hands of a

company governor and a committee of twenty-four, and this and the arrangement subsisted in essence down to the time of crowB – George

III. The chairman and court of directors in London exercised unchecked control over their servants in India. But after Clive's brilliant victory at Plassey (1757) had made the company a ruling power in India, it was felt to be necessary that the British government should have some control over the territories thus acquired. Lord North's Regulating Act (1773) raised the governor of Bengal — Warren Hastings — to the rank of governor-general, and provided that his nomination, though made by a court of directors, should in future be subject to the approval of the crown; in conjunction with a council of four, he was entrusted with the power of peace and war; a supreme court of judicature was established, to which the judges were appointed by the crown; and legislative power was conferred on the governor-general and his council. Next followed Pitt's India Bill (1784), which created the board of control, as a department of the English government, to exercise political, military and financial superintendence over the British posses- sions in India. This bill first authorized the historic phrase " governor-general in council." From this date the direction of Indian policy passed definitely from the company to the governor-general in India and the ministry in London. In 1813 Lord Liverpool passed a bill which further gave the board of control authority over the company's commercial transactions, and abolished its monopoly of Indian trade, whilst leaving it the monopoly of the valuable trade with China, chiefly in tea. 'Finally, under Earl Grey's act of 1833, the company was deprived of this monopoly also. Its property was then secured on the Indian possessions, and its annual dividends of ten guineas per £100 stock were made a charge upon the Indian revenue. Hence- forward the East India Company ceased to be a trading concern and exercised only administrative functions. Such a position could not, in the nature of things, be permanent, and the great cataclysm of the Indian Mutiny was followed by the entire transference of Indian administration from the company to the crown, on the 2nd of August 1858.

See Purchas his Pilgrimes (ed. 1905), vols. 2, 3, 4, 5, forthecharter of Elizabeth and the early voyages; Sir W. W. Hunter, History of British India (1899) ; Beckles Willson, Ledger and Sword (1903) ; Sir George Birdwood, Report on the Old Records of the India Office (1879); The East India Company' 's First Letter Book (1895) ; Letters Received by the East India Company from its Servants in the East, ed. Foster, (1896 ff.). See also the interesting memorial volume Relics of the Honourable East India Company (ed. Griggs, 1909), letterpress by Sir G. Birdwood and W. Foster.

EAST INDIES, a name formerly applied vaguely, in its widest sense,

to the whole area of India, Further India and the Malay Archipelago, in distinction from the West Indies, which, at the time of their discovery, were taken to be the extreme parts of the Indian region. The term " East Indies " is still sometimes applied to the Malay Archipelago (q.v.) alone, and the phrase " Dutch East Indies " is commonly used to denote the Dutch possessions which constitute the greater part of that archipelago. The Dutch themselves use the term Nederlandsch-Indie.

EASTLAKE, SIR CHARLES LOCK (1793-1865), English painter, was born on the 17th of November 1793 at Plymouth, where his father, a man of uncommon gifts but of indolent temperament, was solicitor to the admiralty and judge advocate of the admiralty court. Charles was educated (like Sir Joshua Reynolds) at the Plympton grammar-school, and in London at the Charterhouse. Towards 1809, partly through the influence of his fellow-Devonian Haydon, of whom he became a pupil, he determined to be a painter; he also studied in the Royal Academy school. In 1813 he exhibited in the British Institution his first picture, a work of considerable size, " Christ restoring life to the Daughter of Jairus." In 1814 he was commissioned to copy some of the paintings collected by Napoleon in the Louvre; he returned to England in 1815, and practised portrait-painting at Plymouth. Here he saw Napoleon a captive on the " Bellerophon "; from a boat he made some sketches of the emperor, and he afterwards painted, from these sketches and from memory, a life-sized full-length portrait of him (with some of his officers) which was pronounced a good likeness; it belongs to the marquess of Lansdowne. In 181 7 Eastlake went to Italy; in 1819 to Greece; in 1820 back to Italy, where he remained altogether fourteen years, chiefly in Rome and in Ferrara.

In 1827 he exhibited at the Royal Academy his picture of the Spartan Isidas, who (as narrated by Plutarch in the life of Agesilaus), rushing naked out of his bath, performed prodigies of valour against the Theban host. This was the first work that attracted much notice to the name of Eastlake, who in conse- quence obtained his election as A.R.A.; in 1830. when he returned to England, he was chosen R.A. In 1850 he succeeded Shee as president of the Royal Academy, and was knighted. Prior to this, in 1841, he had been appointed secretary to the royal commission for decorating the Houses of Parliament, and he retained this post until the commission was dissolved in 1862. In 1843 he was made keeper of the National Gallery, a post which he resigned in 1847 in consequence of an unfortunate purchase that roused much animadversion, a portrait erroneously ascribed to Holbein; in 1855,

director of the same institution, with more extended powers. During his directorship he pur- chased for the gallery 155 pictures, mostly of the Italian schools. He became also a D.C.L. of Oxford, F.R.S., a chevalier of the Legion of Honour, and member of various foreign academies.

*In 1849 he married Miss Elizabeth Rigby, who had already then become known as a writer (Letters from the Baltic, 1841; Livonian Tales, 1846; The Jewess, 1848) and as a contributor to the Quarterly Review. Lady Eastlake (1809-1893) had for some years been interested in art subjects, and after her marriage she naturally devoted more attention to them, translating Waagen's Treasures of Art in Great Britain (1854-1857), and completing Mrs Jameson's History of our Lord in Works of Art. In 1865 Sir Charles Eastlake fell ill at Milan; and he died at Pisa on the 24th of December in the same year. Lady Eastlake, who sur- vived him for many years, continued to play an active part as a writer on art (Five Great Painters, 1883, &c), and had a large circle of friends among the most interesting men and women of the day. In 1880 she published a volume of Letters from Franc**

describing events in Paris during 1789), written by her father, Edward Rigby (1 747-1 821), a distinguished Norwich doctor who was known also for his practical interest in agriculture, and who is said to have made known the flying shuttle to Norwich manufacturers.

As a painter, Sir Charles Eastlake was gentle, harmonious, diligent and correct; lacking fire of invention or of execution; eclectic, without being exactly imitative; influenced rather by a love of ideal grace and beauty than by any marked bent of individual power or vigorous originality. Among his principal works (which were not numerous, 51 being the total exhibited in the Academy) are: 1828, " Pilgrims arriving in sight of Rome " (repeated in 1835 and 1836, and perhaps on the whole his chef-d'amvre); 1829, " Byron's Dream " (in the Tate Gallery); 1834, the " Escape of Francesco di Carrara " (a duplicate in the Tate Gallery); 1841, " Christ Lamenting over Jerusalem " (ditto); 1843, " Hagar and Ishmael "; 1845, " Comus "; 1849, "Helena"; 1851, " Ippolita Torelli "; 1853, "Violante"; 1855, " Beatrice." These female heads, of a refined semi-ideal quality, with something of Venetian glow of tint, are the most satisfactory

specimens of Eastlake's work to an artist's eye. He was an accomplished and judicious scholar in matters of art, and published, in 1840, a translation of Goethe's Theory of Colours; in 1847 (his chief literary work) Materials for a History of Oil-Painting, especially valuable as regards the Flemish school; in 1848, Contributions to the Literature of the Fine Arts (a second series was edited by Lady Eastlake in 1870, and accompanied by a Memoir from her pen); in 185 1 and 1855, translated editions of Kugler's History of the Italian School of Painting, and Handbook of Painting (new edition, by Lady Eastlake, 1 8 74) .

See W. Cosmo Monkhouse, Pictures by Sir Charles Eastlake, with biographical and critical Sketch (1875). (W. M. R.)

EAST LIVERPOOL, a city of Columbiana county, Ohio, U.S.A., on the Ohio river, about 106 m. S.E. of Cleveland. Pop. (1890) 10,956; (1900) 16,485, of whom 2112 were foreign-born; (1910 census) 20,387. It is served by the Pennsylvania railway, by river steamboats, and by interurban electric lines. Next to Trenton, New Jersey, East Liverpool is the most important place in the United States for the manufacture of earthen- ware and pottery, 4859 out of its 5228 wage-earners, or 92-9%, being employed in this industry in 1905, when $5,373,852 (83-5% of the value of all its factory products) was the value of the earthenware and pottery. No other city in the United States is so exclusively devoted to the manufacture of pottery; in 1908 there were 32 potteries in the city and its immediate vicinity. The manufacture of white ware, begun in 1872, is the most important branch of the industry — almost half of the " cream- coloured," white granite ware and semi vitreous porcelain pro- duced in the United States in 1905 (in value, $4,344,468 out of $9,195,703) being manufactured in East Liverpool. Though there are large clay deposits in the vicinity, very little of it can be used for crockery, and most of the clay used in the city's potteries is obtained from other states; some of it is imported from Europe. After 1872 a large number of skilled English pottery- workers settled in the city. The city's product of pottery, terra-cotta and fireclay increased from $2,137,063 to $4,105,200 from 1890 to 1900, and in the latter year almost equalled that of Trenton, N.J., the two cities together producing more than half (50-9%) of the total pottery product of the United States; in 1905 East Liverpool and Trenton together produced 42-1% of the total value of the country's pottery product. The municipality owns and operates its water-works. East Liverpool was settled in 1798, and was incorporated in 1834.

EAST LONDON, a town of the Cape province, South Africa, at the

mouth of the Buffalo river, in 33 1′ S. 27° 55′ E., 543 m. E.N.E. of Cape Town by sea and 666 m. S. of Johannesburg by rail. Pop. (1904) 25,220, of whom 14,674 were whites. Thetown is picturesquely situated on both sides of the river, which is spanned by a combined road and railway bridge. The railway terminus and business quarter are on the east side on the top of the cliffs, which rise 150 ft. above the river. In Oxford Street, the chief thoroughfare, is the town hall, a handsome building

erected in 1898. Higher up a number of churches and a school are grouped round Vincent Square, a large open space. In conse- quence of the excellent sea bathing, and the beauty of the river banks above the town, East London is the chief seaside holiday resort of the Cape province. The town is the entrepot of a rich agricultural district, including the Transkei, Basutoland and the south of Orange Free State, and the port of the Cape nearest Johannesburg. It ranks third among the ports of the province. The roadstead is exposed and insecure, but the inner harbour, constructed at a cost of over £2,000,000, is protected from all winds. A shifting sand bar lies at the mouth of the river, but the building of training walls and dredging have increased the minimum depth of water to 22 ft. From the east bank of the Buffalo a pier and from the west bank a breakwater project into the Indian Ocean, the entrance being 450 ft. wide, reduced between the training walls to 250 ft. There is extensive wharf accommodation on both sides of the river, and steamers of over 8000 tons can moor alongside. There is a patent slip capable of taking vessels of 1000 tons dead weight. An aerial steel ropeway from the river bank to the town greatly facilitates the delivery of cargo. The imports are chiefly textiles, hardware and provisions, the exports mainly wool and mohair. The rateable value of the town in 1908 was £4,108,000, and the municipal rate if d.

East London owes its foundation to the necessities of the Kaffir war of 1846-1847. The British, requiring a port nearer the scene of war than those then existing, selected a site at the mouth of the Buffalo river, and in 1847 the first cargo of military stores was landed. A fort, named Glamorgan, was built, and the place permanently occupied. Around this military post grew up the town, known at first as Port Rex. Numbers of its in- habitants are descendants of German immigrants who settled in the district in 1857. The prosperity of the town dates from the era of railway and port development in the last decade of the 19th century. In 1875 the value of the exports was £131,803 and that of the imports £552,033. In 1904 the value of the exports was £1,165,938 and that of the imports £4,688,415. In 1907 the exports, notwithstanding a period of severe trade

depression, were valued at £1,475,355, but the imports had fallen to £3,354,633-

EASTON, a city and the county-seat of Northampton county, Pennsylvania, U.S.A., at the confluence of the Lehigh river and Bushkill Creek with the Delaware, about 60 m. N. of Philadelphia. Pop. (1890) 14,481; (1900) 25,238, of whom 2135 were foreign-born; (1910 census) 28,523. Easton is served by the Central of New Jersey, the Lehigh Valley, the Lehigh & Hudson River and the Delaware, Lackawanna & Western railways, and is connected by canals with the anthracite coal region to the north-west and with Bristol, Pa. A bridge across the Delaware river connects it with Phillipsburg, New Jersey, which is served by the Pennsylvania railway. The city is built on rolling ground, commanding pleasant views of hill and river scenery. Many fine residences overlook city and country from the hillsides, and a Carnegie library is prominent among the public buildings. Lafayette College, a Presbyterian institution opened in 1832, is finely situated on a bluff north of the Bushkill and Delaware. The college provides the following courses of instruction: graduate, classical, Latin scientific, general scientific, civil engineering, electrical engineering, mining engineering and chemical; in 1908 it had 38 instructors and 442 students, 256 of whom were enrolled in the scientific and engineering courses. Overlooking the Bushkill is the Easton Cemetery, in which is the grave of George Taylor (1716-1781), a signer of the Declara- tion of Independence, with a monument of Italian marble to his memory. Among the city's manufactures are silk, hosiery and knit goods, flour, malt liquors, brick, tile, drills, lumber and planing mill products and organs; in 1905 the value of all the factory products was $5,654,594, of which $2,290,598, or 40-5%, was the value of the silk manufactures. Easton is the comm ercial centre of an important mining region, which produces, in par- ticular, iron ore, soapstone, cement, slate and building stone. The municipality owns and operates an electric-lighting plant.

Eastern was a garden spot of the Indians, and here, because they would not negotiate elsewhere, several important treaties were made between 1756 and 1762 during the French and Indian War. The place was laid out in 1752, and was made the county-seat of the newly erected county. It was incorporated as a borough in 1789, received a new borough charter in 1823, and in 1887 was chartered

as a city. South Easton was annexed .in 1898.

EAST ORANGE, a city of Essex county, New Jersey, U.S.A., in the north-eastern part of the state, adjoining the city of Newark, and about 12 m. W. of New York city. Pop. (1890) 13,282; (1900) 21,506, of whom 3950 were foreign-born and 1420 were negroes; (1910 census) 34,371. It is served by the Morris & Essex division of the Delaware, Lackawanna & Western railway and by the Orange branch of the Erie (the former having four stations — Ampere, Grove Street, East Orange and Brick Church), and is connected with Newark, Orange and West Orange by electric line. The city covers an area of about 4 sq. m., and has broad, well-paved streets, bordered with fine shade trees (under the jurisdiction of a " Shade Tree Commission "). It is primarily a residential suburb of New York and Newark, and has many beautiful homes; with Orange, West Orange and South Orange it forms virtually one community, popularly known as " the Oranges." The public school system is excellent, and the city has a Carnegie library (1903), with more than 22,000 volumes in 1907. Among the principal buildings are several attractive churches, the city hall, and the club-house of the Woman's Club of Orange. The principal manufactures of East Orange are electrical machinery, apparatus, and supplies (the factory of the Crocker- Wheeler Co. being here— in a part of the city known as " Ampere ") and pharmaceutical materials. The total value of the city's factory products in 1905 was $2,326,552. East Orange has a fine water-works system, which it owns and operates; the water supply is obtained from artesian wells at White Oaks Ridge, in the township of Milburn (about 10 m. from the city hall) ; thence the water is pumped to a steel reinforced reservoir (capacity 5,000,000 gallons) on the mountain back of South Orange. In 1863 the township of East Orange was separated from the township of Orange, which, in turn, had been separated from the township of Newark in 1806. An act of the New Jersey legislature in 1895 created the office of town- ship president, with power of appointment and veto. Four years later East Orange was chartered as a city.

See H. Whittemore, The Founders and Builders of the Oranges (Newark, 1896).

EASTPORT, a city and port of entry of Washington county, Maine, U.S.A., co-extensive with Moose Island in Passamaquoddy Bay, about 190 m. E.N. E. of Portland. Pop. (1890) 4908; (1900) 53 11 (!554 foreign-born); (1910) 4961. It is served by the Washington County railway, and by steamboat lines to Boston, Portland and Calais. It is the most eastern city of the United States, and is

separated from the mainland by a narrow channel, which is spanned by a bridge. The harbour is well protected from the winds, and the tide, which rises and falls here about 25 ft., prevents it from being obstructed with ice. The city is built on ground sloping gently to the water's edge, and commands delightful views of the bay, in which there are several islands. Its principal industry is the canning of sardines ; there are also clam canneries. Shoes, mustard, decorated tin, and shooks are manufactured, and fish and lobsters are shipped from here in the season. The city is the port of entry for the customs district of Passamaquoddy; in 1908 its imports were valued at $994,961, and its exports at $1,155,791. Eastport was first settled about 1782 by fishermen; it became a port of entry in 1790, was incorporated as a town in 1798, and was chartered as a city in 1893. It was a notorious place for smuggling under the Embargo Acts of 1807 and 1808. On the nth of July 18 14, during the war of 181 2, it was taken by the British. As the British government claimed the islands of Passamaquoddy Bay under the treaty of 1783, the British forces retained possession of Eastport after the close of the war and held it under martial law until July 1818, when it was surrendered in accordance with the decision rendered in

November 181 7 by commissioners appointed under Article IV. of the treaty of Ghent (1814), this decision awarding Moose Island, Dudley Island and Frederick Island to the United States and the other islands, including the Island of Grand Manan in the Bay of Fundy, to Great Britain.

EAST PROVIDENCE, a township of Providence county, Rhode Island, U.S.A., on the E. side of Providence river, opposite Providence. Pop. (1890) 8422; (1900) 12,138, of whom 2067 were foreign-born; (1910 census) 15,808. Area, 123 sq. m. It is served by the New York, New Haven & Hartford railway. It has a rolling surface and contains several villages, one of which, known as Rumford, has important manufactories of chemicals and electrical supplies. South of this village, along the river bank, are several attractive summer resorts, Hunt's Mills, Silver Spring, Riverside, Vanity Fair, Kettle Point and Bullock's Point being prominent among them. In 1905 the factory products of the township were valued at $5,035,288. The oyster trade is important. It was within the present limits of this township that Roger Williams established himself in the spring of 1636, until he learned that the place was within the jurisdiction of the Plymouth Colony. About 1644 it was settled by a company from Weymouth as a part of a town of Rehoboth. In 181 2 Rehoboth was divided, and the west part was made the township of Seekonk. Finally, in 1861, it was decided that the west part of

Seekonk belonged to Rhode Island, and in the following year that part was incorporated as the township of East Providence.

EAST PRUSSIA (Ost-Preussen), the easternmost province of the kingdom of Prussia, bounded on the N. by the Baltic, on the E. and S.W. by Russia and Russian Poland, and on the W. by the Prussian province of West Prussia. It has an area of 14,284 sq. m., and had, in 1905, a population of 2,025,741. It shares in the general characteristics of the great north German plain, but, though low, its surface is by no means absolutely flat, as the southern half is traversed by a low ridge or plateau, which attains a height of 1025 ft. at a point near the western boundary of the province. This plateau, here named the Prussian Seenplatte, is thickly sprinkled with small lakes, among which is the Spirding See, 46 sq. m. in extent and the largest inland lake in the Prussian monarchy. The coast is lined with low dunes or sandhills, in front of which lie the large littoral lakes or lagoons named the Frisches Haff and the Kurisches Haff . The first of these receives the waters of the Nogat and the Pregel, and the other those of the Memel or Niemen. East Prussia is the coldest part of Germany, its mean annual temperature being about 44° F., while the mean January temperature of Tilsit is only 25 . The rainfall is 24 in. per annum. About half the province is under tillage; 18% is occupied by forests, and about 23 % by meadows and pastures. The most fertile soil is found in the valleys of the Pregel and the Memel, but the southern slopes of the Baltic plateau and the district to the north of the Memel consist in great part of sterile moor, sand and bog. The chief crops are rye, oats and potatoes, while flax is cultivated in the district of Ermeland, between the Passarge and the upper Alle. East Prussia is the headquarters of the horse-breeding of the country, and contains the principal government stud of Trakehnen; numerous cattle are also fattened on the rich pastures of the river- valleys. The extensive woods in the south part of the province harbour a few wolves and lynxes, and the elk is still preserved in the forest of Ibenhorst, near the Kurisches Haff. The fisheries in the lakes and haffs are of some importance; but the only mineral product of note is amber, which is found in the peninsula of Samland in greater abundance than in any other part of the world. Manufactures are almost confined to the principal towns, though linen-weaving is practised as a domestic industry. Commerce is facilitated by canals connecting the Memel and Pregel and also the principal lakes, but is somewhat hampered by the heavy dues exacted at the Russian frontier. A brisk foreign trade is carried on through the seaports of Konigsberg, the capital of the province, and Memel, the exports consisting mainly of timber and grain.

The population of the province was in 1900 1,996,626, ano

included 1,698,465 Protestants, 269,196 Roman Catholics and 13,877 Jews. The Roman Catholics are mainly confined to the district of Ermeland, in which the ordinary proportions of the confessions are completely reversed. The bulk of the inhabitants are of German blood, but there are above 400,000 Protestant Poles (Masurians or Masovians) in the south part of the province, and 175,000 Lithuanians in the north. As in other provinces where the Polish element is strong, East Prussia is somewhat below the general average of the kingdom in education. There is a university at Konigsberg.

See Lohmeyer, Geschichte von Osl-und West- Preussen (Gotha, 1884); Briinneck, Zur Geschichte des Kirchen-Patronats in Ost- und West-Preussen (Berlin, 1902), and Ost-Preussen, Land und Volk (Stuttgart, 1901-1902.).

EASTWICK, EDWARD BACKHOUSE (1814-1883), British Orientalist, was born in 1814, a member of an Anglo-Indian family. Educated at Charterhouse and at Oxford, he joined the Bombay infantry in 1836, but, owing to his talent for languages, was soon given a political post. In 1843 he translated the Persian Kessahi Sanjdn, or History of the Arrival of the Par sees in India; and he wrote a Life of Zoroaster, a Sindhi vocabulary, and various papers in the transactions of the Bombay Asiatic Society. Compelled by ill-health to return to Europe, he went to Frankfort, where he learned German and translated Schiller's Revolt of the Netherlands and Bopp's Com- parative Grammar. In 1845 he was appointed professor of Hindustani at Haileybury College. Two years later he published a Hindustani grammar, and, in subsequent years, a new edition of the Gulistdn, with a translation in prose and verse, also an edition with vocabulary of the Hindi translation by Lallu Lai of Chatur Chuj Misr's Prem Sagdr, and translations of the Bagh-o- Bahar, and of the Anvdr-i Suhaili of Bidpaf. In 1851 he was elected a Fellow of the Royal Society. In 1857-1858 he edited The Autobiography of Ltitfullah. He also edited for the Bible Society the Book of Genesis in tht Dakhani language. From i860 to 1863 he was in Persia as secretary to the British Legation, publishing on his return The Journal of a Diplomate. In 1866 he became private secretary to the secretary of state for India, Lord Cranborne (afterwards marquess of

Salisbury), and in 1867 went, as in 1864, on a government mission to Venezuela. On his return he wrote, at the request of Charles Dickens, for All the Year Round, " Sketches of Life in a South American Republic." From 1868 to 1874 he was M.P. for Penryn and Falmouth. In 1875 he received the degree of M.A. with the franchise from the university of Oxford, " as a slight recognition of distinguished services." At various times he wrote several of Murray's Indian hand-books. His last work was the Kaisar- namah-i-Hind (" the lay of the empress "), in two volumes (1878-1882). He died at Ventnor, Isle of Wight, on the 16th of July 1883.

EATON, DORMAN BRIDGMAN (1823-1899), American lawyer, was born at Hardwick, Vermont, on the 27th of June 1823. He graduated at the university of Vermont in 1848 and at the Harvard Law School in 1850, and in the latter year was admitted to the bar in New York city. There he became associated in practice with William Kent, the son of the great chancellor, an edition of whose Commentaries he assisted in editing. Eaton early became interested in municipal and civil service reform. He was conspicuous in the fight against Tweed and his followers, by one of whom he was assaulted; he required a long period of rest, and went to Europe, where he studied the workings of the civil service in various countries. From 1873 to 1875 he was a member of the first United States Civil Service Commission. In 1877, at the request of President Hayes, he made a careful study of the British civil service, and three years later published Civil Service in Great Britain. He drafted the Pendleton Civil Service Act of 1883, and later became a member of the new commission established by it. He resigned in 1885, but was almost immediately reappointed by President Cleveland, and served until 1886, editing the 3rd and 4th Reports of the com- mission. He was an organizer (1878) of the first society for the furtherance of civil service reform in New York, of the

National Civil Service Reform Association, and of the National Conference of the Unitarian Church (1865) . He died in New York city on the 23rd of December 1899, leaving $100,000 each to Harvard and Columbia universities for the establishments of professorships in government. He was a legal writer and editor, and a frequent contributor to the leading reviews. In addition to the works rnentioned he published Should Judges be. Elected ? (1873), The Independent Movement in New York (1880), Term and Tenure of Office (1882), The Spoils System and Civil Service Reform (1882), Problems of Police Legislation (1895) and The Government of Municipalities (1899).

See the privately printed memorial volume, Dorman B. Eaton, 1823-1899 (New York, 1900).

EATON, MARGARET O'NEILL (1796-1879), better known as Peggy O'Neill, was the daughter of the keeper of a popular Washington tavern, and was noted for her beauty, wit and vivacity. About 1823, she married a purser in the United States navy, John B. Timberlake, who committed suicide while on service in the Mediterranean in 1828. In the following year she married John Henry Eaton (1790-1856), a Tennessee poli- tician, at the time a member of the United States Senate. Senator Eaton was a close personal friend of President Jackson, who in 1829 appointed him secretary of war. This sudden elevation of Mrs Eaton into the cabinet social circle was resented by the wives of several of Jackson's secretaries, and charges were made against her of improper conduct with Eaton previous to her marriage to him. The refusal of the wives of the cabinet members to recognize the wife of his friend angered President Jackson, and he tried in vain to coerce them. Eventually, and partly for this reason, he almost completely reorganized his cabinet. The effect of the incident on the political fortunes of the vice-president, John C. Calhoun, whose wife was one of the recalcitrants, was perhaps most important. Partly on this account, Jackson's favour was transferred from Calhoun to Martin Van Buren, the secretary of state, who had taken Jack- son's side in the quarrel and had shown marked attention to Mrs Eaton, and whose subsequent elevation to the vice-presi- dency and presidency through Jackson's favour is no doubt partly attributable to this incident. In 1836 Mrs Eaton accom- panied [her •husband to Spain, where he was United States minister in 1836-1840. After the death of her husband she married a young Italian dancing-master, Antonio Buchignani, but soon obtained a divorce from him. She died in Washington on the 8th of November 1879.

See James Parton's Life of Andrew Jackson (New York, i860).

EATON, THEOPHILUS (c. 1590-1658), English colonial gover- nor in America, was born at Stony Stratford, Buckingham- shire, about 1590. He was educated in Coventry, became a successful merchant, travelled widely throughout Europe, and for several years was the financial agent of Charles I. in Denmark. He subsequently settled in London, where he joined the Puritan congregation of the Rev. John Davenport, whom he had known since boyhood. The pressure upon the Puritans increasing, Eaton, who had been one of the original patentees of the Massa- chusetts Bay colony in 1629, determined to use his influence and fortune to establish an independent colony of

which his pastor should be the head. In 1637 he emigrated with Davenport to Massachusetts, and in the following year (March 1638) he and Davenport founded New Haven. In October 1639 a form of government was adopted, based on the Mosiac Law, and Eaton was elected governor, a post which he continued to hold by annual re-election, first over New Haven alone, and after 1643 over the New Haven Colony or Jurisdiction, until his death at New Haven on the 7th of January 1658. His administration was embar- rassed by constantly recurring disputes with the neighbouring Dutch settlements,especially after Stamford(Conn.) and Southold (Long Island) had entered the New Haven Jurisdiction, but his prudence and diplomacy prevented an actual outbreak of hos- tilities. He was prominent in the affairs of the New England Confederation, of which he was one of the founders (1643). In 1655 he and Davenport drew up the code of laws, popularly known as the " Connecticut Blue Laws," which were published

m London in 1656 under the title New Haven's Settling in New England and some Lawes for Government published for the Use of that Colony.

A sketch of his life appears in Cotton Mather's Magnolia (London, 1702) ; see also J. B. Moore's " Memoir of Theophilus Eaton " in the Collections of the New York Historical Society, second series, vol. ii. (New York, 1849).

EATON, WILLIAM (1764-1811), American soldier, was born in Woodstock, Connecticut, on the 23rd of February 1764. As a boy he served for a short time in the Continental army. He was a school teacher for several years, graduated at Dartmouth College in 1790, was clerk of the lower house of the Vermont legislature in 1791-1792, and in 1792 re-entered the army as a captain, later serving against the Indians in Ohio and Georgia. In 1797 he was appointed consul to Tunis, where he arrived in February 1799. In March 1799, with the consuls to Tripoli and Algiers, he negotiated alterations in the treaty of 1797 with Tunis. He rendered great service to Danish merchantmen by buying on credit several Danish prizes in Tunis and turning them over to their original owners for the redemption of his notes. In 1803 he quarrelled with the Bey, was ordered from the country, and returned to the United States to urge American intervention for the restoration of Ahmet Karamanli to the

throne of Tripoli, arguing that this would impress the Barbary States with the power of the United States. In 1804 he returned to the Mediterranean as United States naval agent to the Barbary States with Barron's fleet. On the 23rd of February 1805 he agreed with Ahmet that the United States should undertake to re-establish him in Tripoli, that the expenses of the expedition should be repaid to the United States by Ahmet, and that Eaton should be general and commander-in-chief of the land forces in Ahmet's campaign; as the secretary of the navy had given the entire matter into the hands of Commodore Barron, and as Barron and Tobias Lear (1762-1816), the United States consul- general at Algiers and a diplomatic agent to conduct negotiations, had been instructed to consider the advisability of making arrangements with the existing government in Tripoli, Eaton far exceeded his authority. On the 8th of March he started for Derna across the Libyan desert from the Arab's Tower, 40 m. W. of Alexandria, with a force of about 500 men, including a few Americans, about 40 Greeks and some Arab cavalry. In the march of nearly 600 m. the camel-drivers and the Arab chiefs repeatedly mutinied, and Ahmet Pasha once put himself at the head of the Arabs and ordered them to attack Eaton. Ahmet more than once wished to give up the expedition. There were practically no provisions for the latter part of the march. On the 27 th of April with the assistance of three bombarding cruisers Eaton captured Derna — an exploit commemorated by Whittier's poem Derne. On the 13th of May and on the 10th of June he successfully withstood the attacks of Tripolitan forces sent to dislodge him. On the 1 2 th of June he abandoned the town upon orders from Commodore Rodgers, for Lear had made peace (4th June) with Yussuf, the de facto Pasha of Tripoli. Eaton returned to the United States, and received a grant of 10,000 acres in Maine from the Massachusetts legislature. According to a deposition which he made in January 1807 he was approached by Aaron Burr (q.v.), who attempted to enlist him in his " con-spiracy," and wished him to win over the marine corps and to sound Preble and Decatur. As he received from the government, soon after making this deposition, about $10,000 to liquidate claims for his expense in Tripoli, which he had long pressed in vain, his good faith has been doubted. At Burr's trial at Rich- mond in 1807 Eaton was one of the witnesses, but his testimony was unimportant. In May 1807 he was elected a member of the Massachusetts House of Representatives, and served for one term. He died on the 1st of June 1811 in Brimneld, Massachusetts.

See the anonymously published Life of the Late Gen. William Eaton (Brookrield, Massachusetts, 1813) by Charles Prentiss; C. C. Felton,

" Life of William Eaton " in Sparks's Library of American Biography, vol. ix. (Boston, 1838); and Gardner W. Allen's Our Navy and the Barbary Corsairs (Boston, 1905).

EATON, WYATT (1849-1896), American portrait and figure painter, was born at Philipsburg, Canada, on the 6th of May 1849.

He was a pupil of the schools of the National Academy of Design, New York, and in 1872 went to Paris, where he studied in the Ecole des Beaux-Arts under J. L. Gerome. He made the acquaintance of J. F. Millet at Barbizon, and was also influenced by his friend Jules Bastien-Lepage. After his return to the United States in 1876 he became a teacher in Cooper Institute and opened a studio in New York city. He was one of the organizers (and the first secretary) of the Society of American Artists. Among his portraits are those of William Cullen Bryant and Timothy Cole, the wood engraver (" The Man with the Violin "). Eaton died at Newport, Rhode Island, on the 7 th of June 1896.

EAU CLAIRE, a city and the county-seat of Eau Claire county, Wisconsin, U.S.A., on the Chippewa river, at the mouth of the Eau Claire, about 87 m. E. of St Paul. Pop. (1890) 17,415; (1900) 17,517, of whom 4996 were foreign-born; (1910 census) 18,310. It is served by the Chicago & North-Western, the Chicago, Milwaukee & St Paul, and the Wisconsin Central railways, and is connected by an electric line with Chippewa Falls (12 m. distant). The city has a Carnegie library with 17,200 volumes in 1908, a Federal building, county court house, normal school and insane asylum. It has abundant water- power, and is an important lumber manufacturing centre; among its other manufactures are flour, wooden-ware, agricul- tural machinery, saw-mill machinery, logging locomotives, wood pulp, paper, linen, mattresses, shoes and trunks. The total value of factory products in 1905 was $3,601,558. The city is the principal wholesale and jobbing market for the pros- perous Chippewa Valley. Eau Claire was first settled about 1847, and was chartered as a city in 1872; its growth dates from the development of the north-western lumber trade in the decade 1870-1880. In 1881 a serious strike necessitated the calling out of state militia for its suppression and the protection of property.

EAU DE COLOGNE (Ger. Kolnisches Wasser, "Cologne water "), a perfume, so named from the city of Cologne, where its manufacture was first established by a.n Italian, Johann (or Giovanni) Maria Farina (1685-1766), who settled at Cologne in 1709. The perfume gained a high reputation by 1766, and Farina associated himself

with his nephew, to whose grandson the secret was ultimately imparted; the original perfume is still manufactured by members of this family under the name of the founder. The manufacture is, however, carried on at Cologne, and also in Italy, by other firms bearing the name Farina, and the scent has become part of the regular output of perfumers. The discovery has also been ascribed to a Paul de Feminis, who is supposed to have brought his recipe from Milan to Cologne, of which he became a citizen in 1690, and sold the perfume under the name Eau admirable, leaving the secret at his death to his nephew Johann Maria Farina. Certain of the Farinas claim to use his process. It was originally prepared by making an alcoholic infusion of certain flowers, pot-herbs, drugs and spices, distilling and then adding definite quantities of several vegetable essences. The purity and thorough blending of the ingredients are of the greatest importance. The original perfume is simulated and even excelled by artificial preparations. The oils of lemon, bergamot and orange are employed, together with the oils of neroli and rosemary in the better class. The common practice consists in dissolving the oils, in certain definite proportions based on experience, in pure alcohol and distilling, the distillate being diluted by rose-water.

EAUX-BONNES, a watering-place of south-western France, in the department of Basses-Pyrenees, 35 m. S.E. of the small town of Laruns, the latter being 24 m. S. of Pau by rail. Pop. (1906) 610. Eaux-Bonnes is situated at a height of 2460 ft. at the entrance of a fine gorge, overlooking the confluence of two torrents, the Valentin and the Sourde. The village is well known for its sulphurous and saline mineral waters (first men- tioned in the middle of the 14th century), which are beneficial in affections of the throat and lungs. They vary between 50 and 90 F. in temperature, and are used for drinking and bathing. There are two thermal establishments, a casino and fine promenades.

The watering-place of Les Eaux-Chaudes is 5 m. by road south-west of Eaux-Bonnes,ina wild gorge on the Gave d'Ossau. The springs are sulphurous, varying in temperature from 52 to 07° F., and are used in cases of rheumatism, certain maladies of women, &c. The thermal establishment is a handsome marble building.

There is fine mountain scenery in the neighbourhood of both places, the Pic de Ger near Eaux-Bonnes, commanding an extensive view.

The valley of Ossau, one of the most beautiful in the Pyrenees, before the Revolution formed a community which, though dependent on Beam, had its own legal organization, manners and costumes, the last of which are still to be seen on holidays.

EAVES (not a plural form as is sometimes supposed, but singular; O. Eng. efes, in Mid. High Ger. obse, Gothic ubizwa, a porch; connected with " over "), in architecture, the projecting edge of a sloping roof, which overhangs the face of the wall so as to throw off the water.

EAVESDRIP, or Eavesdrop, that width of ground around a house or building which receives the rain water dropping from the eaves. By an ancient Saxon law, a landowner was forbidden to erect any building at less than 2 ft. from the boundary of his land, and was thus prevented from injuring his neighbour's house or property by the dripping of water from his eaves. The law of Eavesdrip has had its equivalent in the Roman slillicidium, which prohibited building up to the very edge of an estate.

From the Saxon custom arose the term " eavesdropper," i.e. any one who stands within " the eavesdrop " of a house, hence one who pries into others' business or listens to secrets. At common law an eavesdropper was regarded as a common nuisance, and was presentable at the court leet, and indictable at the sheriff's tourn and punishable by fine and finding sureties for good behaviour. Though the offence of eavesdropping still exists at common law, there is no modern instance of a prosecu- tion or indictment.

EBBW VALE, an urban district in the western parliamentary division of Monmouthshire, England, 21 m. N.W. of Newport on the Great Western, London & North- Western and Rhymney railways. Pop. (1891)17,312; (1901) 20,994. It lies near the head of the valley of the river Ebbw, at an elevation of nearly 1000 ft., in a wild and mountainous mining district, which con- tains large collieries and important iron and steel works.

EBEL, HERMANN WILHELM (1820-1875), German phil- ologist, was born at Berlin on the 10th of May 1820. He dis- played in his early years a remarkable capacity for the study of languages, and at the same time a passionate fondness for music and poetry. At the age of sixteen he became a student at the university of Berlin, applying himself especially to philology, and attending the lectures of Bockh. Music continued to be the favourite occupation of his leisure hours, and he pursued the study of it under the direction of Marx. In the spring of 1838 he passed to the university of Halle, and there began

to apply himself to comparative philology under Pott. Returning in the following year to his native city, he continued this study as a disciple of Bopp. He took his degree in 1842, and, after spending his year of probation at the French Gymnasium of Berlin, he resumed with great earnestness his language studies. About 1847 he began to study Old Persian. In 1852 he accepted a professorship at the Beheim-Schwarzbach Institution at Filehne, which post he held for six years. It was during this period that his studies in the Old Slavic and Celtic languages began. In 1858 he removed to Schneidemiihl, and there he discharged the duties of first professor for ten years. He was afterwards called to the chair of comparative philology at the university of Berlin. He died at Misdroy on the 19th of August 1875. The most important work of Dr Ebel in the field of Celtic philology is his revised edition of the Grammatica Celtica of Professor Zeuss, completed in 1 8 7 1 . This had been preceded by his treatises — De verbi Britannici futuro ac conjunctiva (1866), and De Zeussii curis positis in Grammatica Celtica (1869). He made many learned contributions to Kiihn's Zeitschrift fur vergleichende Sprach-forschung, and to A, Schleicher's Beilrage zur vergleichenden

Sprachforschung; and a selection of these contributions was translated into English by Sullivan, and published under the title of Celtic Studies (1863). Ebel contributed the Old Irish section to Schleicher's Indogermanische Chrestomathie (1869). Among his other works must be named Die Lehnworter der deutschen Sprache (18 56).

EBEL, JOHANN GOTTFRIED (1764-1830), the author of the first real guide-book to Switzerland, was born at Ziillichau (Prussia). He became a medical man, visited Switzerland for the first time in 1790, and became so enamoured of it that he spent three years exploring the country and collecting all kinds of information relating to it. The result was the publication (Zurich, 1793) of his Anleitung auf die niitzlichste und genussvollste Art in der Schweitzzu reisen (2 vols.), in which he gave a complete account of the country, the General Information sections being followed by an alphabetically arranged list of places, with descriptions. It at once superseded all other works of the kind, and was the best Swiss guide-book till the appearance of " Murray " (1838). It was particularly strong on the geological and historical sides. The second (1804-1805) and third (1809- 1810) editions filled four volumes, but the following (the 8th appeared in 1843) were in a single volume. The work was trans- lated into French in 1795 (many later editions) and into English (by 1818). Ebel also published a work (2 vols., Leipzig, 1798- 1802) entitled Schilderungen der Gebirgsvolker der Schvjeiz, which deals mainly

with the pastoral cantons of Glarus and Appenzell. In 1801 he was naturalized a Swiss citizen, and settled down in Zurich. In 1808 he issued his chief geo- logical work, Uber den Bau der Erde im Alpengebirge (Zurich, 2 vols.). He took an active share in promoting all that could make his adopted country better known, e.g. Heinrich Keller's map (1813), the building of a hotel on the Rigi (1816), and the preparation of a panorama from that point (1823). From 1 8 10 onwards he lived at Zurich, with the family of his friend, Conrad Escher von der Linth (1767-1823), the celebrated engineer. (W. A. B. C.)

EBER, PAUL (1511-1569), German theologian, was born at Kitzingen in Franconia, and was educated at Nuremberg and Wittenberg, where he became the close friend of Philip Melanchthon. In 1541 he was appointed professor of Latin grammar at Wittenberg, and in 1557 professor of the Old Testa- ment. His range of learning was wide, and he published a handbook of Jewish history, a historical calendar intended to supersede the Roman Saints' Calendar, and a revision of the Latin Old Testament. In the theological conflict of the time he played a large part, doing what he could to mediate between the extremists. From 1559 to the close of his life he was superintendent-general of the electorate of Saxony. He attained some fame as a hymn-writer, his best-known composition being " Wenn wir in hochsten Nothen sein." He died at Wittenberg on the toth of December 1 569.

EBERBACH, a town of Germany, in the grand-duchy of Baden, romantically situated on the Neckar, at the foot of the Katzen- buckel, 19 m. E. of Heidelberg by the railway to Wiirzburg. Pop. (1900) 5857. It contains an Evangelical and a Roman Catholic church, a commercial and a technical school, and, in addition to manufacturing cigars, leather and cutlery, carries on by water an active trade in timber and wine. Eberbach was founded in 1227 by the German king Henry VII., who acquired the castle (the ruins of which overhang the town) from the bishop of Worms. It became an imperial town and passed later to the Palatinate. See Wirth, Geschichte der Stadt Eberbach (Stuttgart, 1864). EBERBACH, a famous Cistercian monastery of Germany, in the Prussian province of Hesse-Nassau, situated near Hattenheim in the Rheingau, 10 m. N.W. from Wiesbaden. Founded in 1 1 1 6 by Archbishop Adalbert of Mainz, as a house of Augustinian canons regular, it was bestowed by him in 1131 upon the Bene- dictines, but was shortly afterwards repurchased and conferred upon the Cistercian order. The Romanesque church (consecrated in 1 186) contains numerous interesting monuments and tombs, notable among them being those

of the archbishop of Mainz,

Gerlach (d. 1371) and Adolph II. of Nassau (d. 1475). It was despoiled during the Thirty Years' War, was secularized in 1803, and now serves as a house of correction. Its cellars contain some of the finest vintages of the Rhine wines of the locality.

See Bar, Diplomatische GeschichtederAbtei Eberbach (Wiesb., 1851-1858 and 1886, 3 vols.), and Schafer, Die Abtei Eberbach im Mittel-alter (Berlin, 1901).

EBERHARD, sumamed Im Bart (Barbatus), count and afterwards duke of Wiirttemberg (144 5-1496), was the second son of Louis I., count of Wurttemberg-Urach (d. 1450), and succeeded his elder brother Louis II. in 1457. His uncle Ulrich V., count of Wurttemberg-Stuttgart (d. 1480) , acted as his guardian, but in 1459, assisted by Frederick I., elector palatine, he threw off this restraint, and undertook the government of the district of Urach as Count Eberhard V. He neglected his duties as a ruler and lived a reckless life until 1468, when he made a pilgrim- age to Jerusalem. He visited Italy, became acquainted with some famous scholars, and in 1474 married Barbara di Gonzaga, daughter of Lodovico III., marquis of Mantua, a lady distin- guished for her intellectual qualities. In 1482 he brought about the treaty of Munsingen with his cousin Eberhard VI., count of Wurttemberg-Stuttgart. By this treaty the districts of Urach and Stuttgart into which Wiirttemberg had been divided in 1437 were again united, and for the future the county was declared indivisible, and the right of primogeniture established. The treaty led to some disturbances, but in 1492 the sanction of the nobles was secured for its provisions. In return for this Eberhard agreed to some limitations on the power of the count, and so in a sense founded the constitution of Wiirttemberg. At the diet of Worms in 1495 the emperor Maximilian I. guaranteed the treaty, confirmed the possessions and prerogatives of the house of Wiirttemberg, and raised Eberhard to the rank of duke. Eberhard, although a lover of peace, was one of the founders of the Swabian League in 1488, and assisted to release Maximilian, then king of the Romans, from his imprisonment at Bruges in the same year. He gave charters to the towns of Stuttgart and Tubingen, and introduced order into the convents of his land, some of which he secularized. He took a keen interes t in the new learning, founded the university of Tubingen in

1476, befriended John Reuchlin, whom he made his private secretary, welcomed scholars to his court, and is said to have learned Latin in later life. In 1482 he again visited Italy and received the Golden Rose from Pope Sixtus IV. He won the esteem of the emperors Frederick III. and Maximilian" I. on account of his wisdom and fidelity, and his people held him in high regard. His later years were mainly spent at Stuttgart, but he died at Tubingen on the 25th of February 1496, and in 1537 his ashes were placed in the choir of the Stiftskirche there. Eberhard left no children, and the succession passed to his cousin Eberhard, who became Duke Eberhard II. '

See Rosslin, Leben Eberhards im Barte (Tubingen, 1793) ; Bossert, Eberhard im Bart (Stuttgart, 1884).

EBERHARD, CHRISTIAN AUGUST GOTTLOB (1769-1845), German miscellaneous writer, was born at Belzig, near Witten- berg, on the 1 2th of January 1769. He studied theology at Leipzig; but, a story he contributed to a periodical having proved successful, he devoted himself to literature. With the exception of Hannchen und die Kiichlein (1822), a narrative poem in ten parts, and an epic on the Creation, Der erste Mensch und die Erde (1828), Eberhard's work was ephemeral in character and is now forgotten. He died at Dresden on the 13th of May

1845.

His collected works (Gesammelte Schriften) appeared in 20 volumes in 1830-1831.

EBERHARD, JOHANN AUGUSTUS (1 739-1809), German theologian and philosopher, was born at Halberstadt in Lower Saxony, where his father was singing-master at the church of St Martin's, and teacher of the school of the same name. He studied theology at the university of Halle, and became tutor to the eldest son of the baron von der Horst, to whose family he attached himself for a number of years. In 1763 he was appointed con-rector of the school of St Martin's, and second preacher in the hospital church of the Holy Ghost; but he soon

afterwards resigned these offices and followed his patron to Berlin. There he met Nicolai and Moses Mendelssohn, with whom he formed a close friendship. In 1768 he became preacher or chaplain to the workhouse at Berlin and the neighbouring fishing village of Stralow. Here he wrote his Neue Apologie des Socrates (1772), a work occasioned by an attack on the fifteenth chapter of Marmontel's

Belisarius made by Peter Hofstede, a clergyman of Rotterdam, who maintained the patristic view that the virtues of the noblest pagans were only splendida peccata. Eberhard stated the arguments for the broader view with dignity, acuteness and learning, but the liberality of the reason- ing gave great offence to the strictly orthodox divines, and is believed to have obstructed his preferment in the church.

In 1774 he was appointed to the living of Charlottenburg. A second volume of his Apologie appeared in 1778. In this he not only endeavoured to obviate some objections which were taken to the former part, but continued his inquiries into the doctrines of the Christian religion, religious toleration and the proper rules for interpreting the Scriptures. In 1778 he accepted the professorship of philosophy at Halle. As an academical teacher, however, he was unsuccessful. His powers as an original thinker were not equal to his learning and his literary gifts, as was shown in his opposition to the philosophy of Kant. In 1786 he was admitted a member of the Berlin Academy of Sciences; in 1805 the king of Prussia conferred upon him the honorary title of a privy-councillor. In 1808 he obtained the degree of doctor in divinity, which was given him as a reward for his theological writings. He died on the 6th of January 1809. He was master of the learned languages, spoke and wrote French with facility and correctness, and understood English, Italian and Dutch. He possessed a just and discriminating taste for the fine arts, and was a great lover of music.

Works: — Neue Apologie des Socrates, &c. (2 vols., 1772-1778); AllgemeineTheoriedesDenkensundEmpjindens,&c. (Berlin, 1776), an essay which gained the prize assigned by the Royal Society of Berlin for that year; Von dem Begriff der Philosophie und ihren Theilen (Berlin, 1778) — a short essay, in which he announced the plan of his lectures on being appointed to the professorship at Halle ; Lobschrift auf Herrn Johann Thunmann Prof, der Weltweisheit und Beredsam- keit auf der Universitdt zu Halle (Halle, 1779) ; Amyntor, eine Geschichte in Briefen (Berlin, 1782) — written with the view of counteracting the influence of those sceptical and Epicurean prin- ciples in religion and morals then so prevalent in France, and rapidly spreading amongst the higher ranks in Germany; ttber die Zeichen der Aufkldrung einer Nation, &c. (Halle, 1783) ; Theorie der schonen Kiinste und Wissenschaften, &c. (Halle, 1783, 3rd ed. 1790) ; Ver- mischle Schriften (Halle, 1784) ; Neue vermischte Schriften (ib. 1786); Allgemeine Geschichte der Philosophie, &c. (Halle, 1788), 2nd ed. with a continuation and chronological tables (1796) ; Versuch einer allgemeinen-deutschen Synonymik (Halle and Leipzig, 1795-1802, 6 vols., 4th ed.

1852-1853), long reckoned the best work on the synonyms of the German language (an abridgment of it was published by the author in one large volume, Halle, 1802); Handbuch der Aesthetik (Halle, 1803-1805, 2nd ed. 1807-1820). He also edited the Philosophisches Magazin (1788-1792) and the Philosophisches Archiv (1 792-1 795).

See F.Nicolai,GeddchtnisscHriftaufJ.A.Eberhard(Berlm and Stettin, 18 10) ; also K. H. JCrdens, Lexicon deutscher Dichter und Prosaisten.

EBERLIN, JOHANN ERNST (1702-1762), German musician and composer, was born in Bavaria, and became afterwards organist in the cathedral at Salzburg, where he died. Most of his compositions were for the church (oratorios, &c), but he also wrote some important fugues, sonatas and preludes; and his pieces were at one time highly valued by Mozart.

EBERS, GEORG MORITZ (1837-1898), German Egyptologist and novelist, was born in Berlin on the 1st of March 1837. At Gottingen he studied jurisprudence, and at Berlin oriental languages and archaeology. Having made a special study of Egyptology, he became in 1865 docent in Egyptian language and antiquities at Jena, and in 1870 he was appointed professor in these subjects at Leipzig. He had made two scientific journeys to Egypt, and his first work of importance, Agypten und die Biicher Moses, appeared in 1867-1868. In 1874 he edited the celebrated medical papyrus (" Papyrus Ebers ") which he had discovered in Thebes (translation by H. Joachim, 1890). Ebers early conceived the idea of popularizing Egyptian lore by means of historical romances. Eine agyptische Konigstochter was

published in 1864, and obtained great success. His subsequent works of the same kind — Uarda (1877), Homo sum (1878), Die Schwestern (1880), Der Kaiser (1881), of which the scene is laid in Egypt at the time of Hadrian, Serapis (1885), Die Nilbraut (1887), and Kleopatra (1894), were also well received, and did much to make the public familiar with the discoveries of Egypt- ologists. Ebers also turned his attention to other fields of historical fiction — especially the 16th century (Die Frau Burger- meisterin, 1882; Die Gred, 1887) — without, however, attaining the success of his Egyptian novels. Apart from their antiquarian and historical interest,

Ebers's books have not a very high literary value. His other writings include a descriptive work on Egypt (Agypten in Wort und Bild, 2nd ed., 1880), a guide to Egypt (1886) and a life (1885) of his old teacher, the Egyptologist Karl Richard Lepsius. The state of his health led him in 1889 to retire from his chair at Leipzig on a pension. He died at Tutzing in Bavaria, on the 7th of August 1898.

Ebers's Gesammelte Werke appeared in 25 vols, at Stuttgart (1893-1895). Many of his books have been translated into English. For his life see his Die Geschichte meines Lebens (Stuttgart, 1893); also R. Gosche, G. Ebers, der Forscher und Dichter (2nd ed., Leipzig,

1887).

EBERSWALDE, a town of Germany, in the kingdom of Prussia, 28 m. N.E. of Berlin by rail; on the Finow canal. Pop. (1905) 23,876. Thte town has a Roman Catholic and two Evangelical churches, a school of forestry, a gymnasium, a higher-grade girls' school and two schools of domestic economy. It possesses a mineral spring, which attracts numerous summer visitors, and has various industries, which include iron-founding and the making of horse-shoe nails, roofing material and bricks. A considerable trade is carried on in grain, wood and coals. In the immediate neighbourhood are one of the chief brass-foundries in Germany and an extensive government paper-mill, in which the paper for the notes of the imperial bank is manufactured.

Eberswalde received its municipal charter in 1257. It was taken and sacked during the Thirty Years' War. In 1747 Frederick the Great brought a colony of Thuringian cutlers to the town, but this branch of industry has entirely died out. About 4 m. to the north lies the old Cistercian monastery of Chorin, the fine Gothic church of which contains the tombs of several margraves of Brandenburg.

EBERT, FRIEDRICH ADOLF (1791-1834), German biblio- grapher, was born at Taucha, near Leipzig, on the 9th of July 1 79 1, the son of a Lutheran pastor. At the age of fifteen he was appointed to a subordinate post in the municipal library of Leipzig. He studied theology for a short time at Leipzig, and afterwards philology at Wittenberg, where he graduated doctor in philosophy in 1812. While still a student he had already pub- lished, in 18 1 1, a work on public libraries, and in 18 12 another work entitled Hierarchiae in religionem ac literas commoda. In

1813 he was attached to the Leipzig University library, and in

1814 was appointed secretary to the Royal library of Dresden. The same year he published F. Taubmanns Leben und Verdienste, and in 18 19 Torquato Tasso, a translation from Pierre Louis Ginguene with annotations. The rich resources open to him in the Dresden library enabled him to undertake the work on which his reputation chiefly rests, the Allgemeines bibliographisch.es Lexikon, the first volume of which appeared in 182 1 and the second in 1830. This was the first work of the kind produced in Germany, and the most scientific published anywhere. From 1823 to 1825 Ebert was librarian to the duke of Brunswick at Wolfenbuttel, but returning to Dresden was made, in 1827, chief librarian of the Dresden Royal library. Among his other works are — Die Bildung des Bibliothekars (1820), Geschichte und Beschreibung der koniglichen offentlichen Bibliothek in Dresden (1822), Zur Hand- schriftenkunde (1825-1827), and Culturperioden des obersach- sischen Miltelalters (1825). Ebert was a contributor to various journals and took part in the editing of Ersch and Gruber's great encyclopaedia. He died at Dresden on the 13 th of November 1834, in consequence of a fall from the ladder in his library.

See the article in Ersch und Grubers Encyclopddie, and that in the Allg. deutschc Biog. by his successor in the post of chief librarian in Dresden, Schnorr von Carolsfeld.

EBINGEN, a town of Germany, in the kingdom of Wurttem- berg, on the Schmiecha, a left-hand tributary of the Danube, 22 m. S. of Tubingen and 37 m. W. of Ulm by rail. It manu- factures velvet and cotton-velvet (" Manchester ") goods, stock- ings, stays, hats, needles, tools, &c. There are also tanneries. Pop. 9000.

EBIONITES (Heb. d:V?n, " poor men "), a name given to the ultra-Jewish party in the early Christian church. It is first met with in Irenaeus {Adv. Haer, i. 26. 2), who sheds no light on the origin of the Ebionites, but says that while they admit the world to have been made by the true God (in contrast to the Demiurge of the Gnostics) , they held Cerinthian views on the person of Christ, used only the Gospel of Matthew (probably the Gospel according to the Hebrews — so Eusebius), and rejected Paul as an apostate from the Mosaic Law, to the customs and ordinances of which, including circumcision, they steadily adhered. A similar account is given by Hippolytus {Haer. vii. 35), who invents a founder named Ebion. Origen (Contra Celsum, v. 61; In Matt. torn. xvi. 12) divides the Ebionites into two classes according to their acceptance or rejection of the virgin birth of Jesus, but says that all alike reject the Pauline epistles. This is confirmed by Eusebius, who adds that even those who admit'ted the virgin birth did

not accept the pre-existence of Jesus as Logos and Sophia. They kept both the Jewish Sabbath and the Christian Lord's day, and held extreme millenarian ideas in which Jerusalem figured as the centre of the coming Messianic kingdom. Epi- phanius with his customary confusion makes two separate sects, Ebionites and Nazarenes. Both names, however, refer to the same people 1 (the Jewish Christians of Syria) , the latter going back to the designation of apostolic times (Acts xxiv. 5), and the former being the term usually applied to them in the ecclesiastical literature of the 2nd and 3rd centuries.

The origin of the Nazarenes or Ebionites as a distinct sect is very obscure, but may be dated with much likelihood from the edict of Hadrian which in 135 finally scattered the old church of Jerusalem. While Christians of the type of Aristo of Pella and Hegesippus, on the snapping of the old ties, were gradually assimilated to the great church outside, the more conservative section became more and more isolated and exclusive. " It may have been then that they called themselves the Poor Men, prob- ably as claiming to be the true representatives of those who had been blessed in the Sermon on the Mount, but possibly adding to the name other associations." Out of touch with the main stream of the church they developed a new kind of pharisaism. Doctrinally they stood not so much for a theology as for a refusal of theology, and, rejecting the practical liberalism of Paul, became the natural heirs of those early Judaizers who had caused the apostle so much annoyance and trouble.

Though there is insufficient justification for dividing the Ebionites into two separate and distinct communities, labelled respectively Ebionites and Nazarenes, we have good evidence, not only that there were grades of Christological thought among them, but that a considerable section, at the end of the 2nd century and the beginning of the 3rd, exchanged their simple Judaistic creed for a strange blend of Essenism and Christianity. These are known as the Helxaites or Elchasaites, for they accepted as a revelation the " book of Elchasai," and one Alcibiades of Apamea undertook a mission to Rome about 220 to propagate its teaching. It was claimed that Christ, as an angel 96 miles, high, accompanied by the Holy Spirit, as a female angel of the same stature, had given the revelation to Elchasai in the 3rd year of Trajan (a.d. 100), but the book was probably quite new in Alcibiades' time. It taught that Christ was an angel born of human parents, and had appeared both before (e.g. in Adam and Moses) and after this birth in Judea. His coming did not annul the Law, for he was merely a prophet and teacher; Paul was wrong and circumcision still necessary. Baptism must be repeated as a means of purification from sin, and proof against disease; the

sinner immerses himself " in the name of the mighty

1 So A. Harnack, Hist, of Dogma, i. 301, and F. J. A. Hort, Judaistic Christianity, p. 199. Th. Zahn and J. B. Lightfoot (" St. Paul and the Three," in Commentary on Galatians) maintain the distinction.

and most high God," invoking the " seven witnesses " (sky, water, the holy spirits, the angels of prayer, oil, salt and earth), and pledging himself to amendment. Abstinence from flesh was also enjoined, and a good deal of astrological fancy was inter- woven with the doctrinal and practical teaching. It is highly probable, too, that from these Essene Ebionites there issued the fantastical and widely read " Clementine " literature (Homilies and Recognitions) of the 3rd century. Ebionite views lingered especially in the country east of the Jordan until they were absorbed by Islam in the 7th century.

In addition to the literature cited see R. C. Ottley, The Doctrine of the Incarnation, part iii. § ii. ; W. Moeller, Hist, of the Christian Church, i. 99; art. in Herzog – Hauck, Realencyklopadie, s.v. " Ebioniten "; also Clementine Literature.

EBNER-ESCHENBACH, MARIE, Freifrau von (1830-), Austrian novelist, was born at Zdislavic in Moravia, on the 13th of September 1830, the daughter of a Count Dubsky. She lost her mother in early infancy, but received a careful intellectual training from two stepmothers. In 1848 she married the Austrian captain, and subsequent field-marshal, Moritz von Ebner-Eschenbach, and resided first at Vienna, then at Klosterbruck, where her husband had a military charge, and after i860 again at Vienna. The marriage was childless, and the talented wife sought consolation in literary work. In her endeavours she received assistance and encouragement from Franz Grillparzer and Freiherr von Munch – Bellinghausen. Her first essay was with the drama Maria Stuart in Schottland, which Philipp Eduard Devrient produced at the Karlsruhe theatre in i860. After some other unsuccessful attempts in the field of drama, she found her true sphere in narrative. Com- mencing with Die Prinzessin von Banalien (1872), she graphic- ally depicts in Bozena (Stuttgart, 1876, 4th ed. 1899) and Das Gemeindekind (Berlin, 1887, 4th ed. 1900) the surroundings of her Moravian home, and in Lotti, die Uhrmacherin (Berlin, 1883, 4th ed. 1900), ZweiComtessen (Berlin, 1885, 5th ed. 1898), TJnsuhnbar (1890, 5th ed. 1900) and

Glaubenslos? (1893) the fife of the Austrian aristocracy in town and country. She also published Neue Erzdhlungen . (Berlin, 1881, 3rd ed. 1894), Aphorismen (Berlin, 1880, 4th ed. 1895) and Parabeln, Marchen und Gedichte (2nd ed., Berlin, 1892). Frau von Ebner-Eschenbach's elegance of style, her incisive wit and masterly depiction of character give her a foremost place among the German women- writers of her time. On the occasion of her seventieth birthday the university of Vienna conferred upon her the degree of doctor of philosophy, honoris causa.

An edition of Marie von EbnerrEschenbach's Gesammelte Schriften began to appear in 1893 (Berlin). See A. Bettelheim, Marie von Ebner-Eschenbach: biographische Blatter (Berlin, 1900), and M. Necker, Marie von Ebner-Eschenbach, nach ihren Werken geschildert (Berlin, 1900).

EBOLI (anc. Eburum), a town of Campania, Italy, in the province of Salerno, from which it is 16 m. E. by rail, situated 470 ft. above sea-level, on the S. edge of the hills overlooking the valley of the Sele. Pop. (1901) 9642 (town), 12,423 (com- mune). The sacristy of St Francesco contains two 14th-century pictures, one by Roberto da Oderisio of Naples. The ancient Eburum was a Lucanian city, mentioned only by Pliny and in inscriptions, not far distant from the Campanian border. It lay above the Via Popillia, which followed the line taken by the modern railway. Some scanty remains of its ancient polygonal walls may still be seen. (T. As.)

EBONY (Gr. tfievos), the wood of various species of trees of the genus Diospyros (natural order Ebenaceae), widely distributed in the tropical parts of the world. The best kinds are very heavy, are of a deep black, and consist of heart-wood only. On account of its colour, durability, hardness and susceptibility of polish, ebony is much used for cabinet work and inlaying, and for the manufacture of pianoforte-keys, knife-handles and turned articles. The best Indian and Ceylon ebony is furnished by D. Ebenum, a native of southern India and Ceylon, which grows in great abundance throughout the flat country west of Trincomalee. The tree is distinguished from others by the inferior width of its trunk, and its jet-black, charred-looking

bark, beneath which the wood is perfectly white until the heart is reached. The wood is stated to excel that obtained from D. reticulata of the Mauritius and all other varieties of ebony in the fineness and intensity of its dark colour. Although the centre of the tree alone is employed, reduced logs 1 to 3 ft. in diameter can readily be

procured. Much of the East Indian ebony is yielded by the species D. Melanoxylon (Coromandel ebony), a large tree attaining a height of 60 to 80 ft., and 8 to 10 ft. in circumference, with irregular rigid branches, and oblong or oblong-lanceolate leaves. The bark of the tree is astringent, and mixed with pepper is used in dysentery by the fiatives of India. The wood of D. tomentosa, a native of north Bengal, is black, hard and of great weight. D. montana, another Indian species, produces a yellowish-grey soft but durable wood. D. quaesita is the tree from which is obtained the wood known in Ceylon by the name Calamander, derived by Pridham from the Sinhalee kalumindrie, black-flowing. Its closeness of grain, great hardness and fine hazel-brown colour, mottled and striped With black, render it a valuable material for veneering and furniture making. D. Dendo, a native of Angola, is a valuable timber tree, 25 to 35 ft. high, with a trunk 1 to 2 ft. in diameter. The heart-wood is very black and hard and is known as black ebony, also as billet-wood, and Gabun, Lagos, Calabar or Niger ebony. What is termed Jamaica or West Indian ebony, and also the green ebony of commerce, are produced by Brya Ebenus, a leguminous tree or shrub, having a trunk rarely more than 4 in. in diameter, flexible spiny branches, and orange-yellow, sweet-scented flowers. The heart-wood is rich dark brown in colour, heavier than water, exceedingly hard and capable of receiving a high polish.

From the book of Ezekiel (xxvii. 15) we learn that ebony was among the articles of merchandise brought to Tyre; and Herodotus states (iii. 97) that the Ethiopians every three years sent a tribute of 200 logs of it to Persia. Ebony was known to Virgil as a product of India (Georg. ii. 116), and was displayed by Pompey the Great in his Mithradatic triumph at Rome. By the ancients it was esteemed of equal value for durability with the cypress and cedar (see Pliny, Nat. 'Hist. xii. 9, xvi. 79). According to Solinus (Polyhistor, cap. Iv. p. 353, Paris, 1621), it was employed by the kings of India for sceptres and images, also, on account of its supposed antagonism to poison, for drink- ing-cups. The hardness and black colour of the wood appear to have given rise to the tradition related by Pausanias, and alluded to by Southey in Thalaba, i. 22, that the ebony tree produced neither leaves nor fruit, and was never seen exposed to the sun.

EBRARD, JOHANNES HEINRICH AUGUST (1818-1888), German theologian, was born at Erlangen on the 18th of January 1818. He was educated in his native town and at Berlin, and after teaching in a private family became Privatdocent at Erlangen (1841) and then professor of theology at Zurich (1844). In 1847 he was appointed professor of theology at Erlangen, a chair which he resigned in 1861;

in 1875 he became pastor of the French reformed church in the same city. As a critic Ebrard occupied a very moderate standpoint; as a writer his chief works were Christliche Dogmatik (2 vols., 1851), Vorlesungen tiber praklische Theologie (1864), Apologetik (1874-1875, Eng. trans. 1886). He also edited and completed H. Olshausen's com- mentary, himself writing the volumes on the Epistle to the Hebrews, the Johannine Epistles, and Revelation. In the department of belles-lettres he wrote a good deal under such pseudonyms as Christian Deutsch, Gottfried Flammberg and Sigmund Sturm. He died at Erlangen on the 23rd o July 1888.*

EBRO (anc. Iberus or Hiberus), the only one of the five great rivers of the Iberian Peninsula (Tagus, Douro, Ebro, Guadal- quivir, Guadiana) which flows into the Mediterranean. The Ebro rises at Fuentibre, a hamlet among the Cantabrian Moun- tains, in the province of Santander; at Reinosa, 4 m. east, it is joined on the right by the Hijar, and thus gains considerably in volume. It flows generally east by south through a tortuous valley as far as Miranda de Ebro, passing through the celebrated Roman bridge known as La Horadada (" the perforated "), near Ona in Burgos. From Miranda it winds south- eastward through

the wide basin enclosed on the right by the highlands of Old Castile and western Aragon, and on the left by the Pyrenees. The chief cities on its banks are Logrofio, Calahorra, Tudela, Saragossa and Caspe. Near Mora in Catalonia it forces a way through the coastal mountains, and, passing Tortosa, falls into the Mediterranean about 8p m. south-west of Barcelona, after forming by its delta a conspicuous projection on the otherwise regular coast line. In its length, approximately 465 m., the Ebro is inferior to the Tagus, Guadiana and Douro; it drains an area of nearly 32,000 sq. m. Its principal tributaries are — from the right hajid the Jalon with its affluent the Jiloca, the Huerva, Aguas, Martin, Guadalope and Matarrana; from the left the Ega, Aragon, Arba, Gallego, and the Segre with its intricate system of confluent rivers. The Ebro and its tributaries have been utilized for irrigation since the Moorish conquest; the main stream becomes navigable by small boats about Tudela; but its value as a means of communication is almost neutralized by the obstacles in its channel, and seafaring vessels cannot proceed farther up than Tortosa. The great Imperial Canal, begun under the emperor Charles V. (1500-1558), proceeds along

the right bank of the river from a point about 3 m. below Tudela, to El Burgo de Ebro, 5 m. below Saragossa; the irrigation canal of Tauste skirts the opposite bank for a shorter distance; and the San Carlos or New Canal affords direct communication between Amposta at the head of the delta and the harbour of Los Alfaques. From Miranda to Mora the Bilbao-Tarragona railway follows the course of the Ebro along the right bank.

EBROlN (d. 681), Frankish " mayor of the palace," was a Neustrian, and wished to impose the authority of Neustria over Burgundy and Austrasia. In 656, at the moment of his accession to power, Sigebert III., the king of Austrasia, had just died, and the Austrasian mayor of the palace, Grimoald, was attempting to usurp the authority. The great nobles, however, appealed to the king of Neustria, Clovis II., and unity was re-established. But in spite of a very firm policy Ebroin was unable to maintain this unity, and while Clotaire III., son of Clovis II., reigned in Neustria and Burgundy, he was obliged in 660 to give the Austrasians a special king, Childeric II., brother of Clotaire III., and a special mayor of the palace, Wulfoald. He endeavoured to maintain at any rate the union of Neustria and Burgundy, but the great Burgundian nobles wished to remain independent, and rose under St Leger (Leodegar), bishop of Autun, defeated Ebroin, and interned him in the monastery of Luxeuil (670). A proclamation was then issued to the effect that each kingdom should keep its own laws and customs, that there should be no ; further interchange of functionaries between the kingdoms, and that no one should again set up a tyranny like that of Ebroin. Soon, however, Leger was defeated by Wulfoald and the Aus- trasians, and was himself confined at Luxeuil in 673 . In the same year, taking advantage of the general anarchy, Ebroin and Leger left the cloister and soon found themselves once more face to face. Each looked for support to a different Merovingian king, Ebroin even proclaiming a false Merovingian as sovereign. In this struggle Leger was vanquished; he was besieged in Autun, was forced to surrender and had his eyes put out, and, on the 12 th of October 678, he was put to death after undergoing prolonged tortures. The church honours him as a saint. After his death Ebroin became sole and absolute ruler of the Franks, imposing his authority over Burgundy and subduing the Austrasians, whom he defeated in 678 at Bois-du-Fay, near Laon. His triumph, however, was short-lived; he was assassinated in 681, the victim of a combined attack of his numerous enemies. He was a man of great energy, but all his actions seem to have been dictated by no higher motives than ambition and lust of power.

See Liber historiae Francorum, edited by B Krusch, in Mon. Germ.

hist, script, rer. Merov. vol. ii.; Vita sancti Leodegarii, by Ursinus, a monk of St Maixent (Migne, Patr. Latina, vol. xcvi.); " Vita metrica " in Poetae Latini aevi Carolini, vol. iii. {Mon. Germ, hist.); J. B. Pitra, Hisloire de Saint Leger (Paris, 1846); and J. Friedrich, " Zur Gesch. des Hausmeiers Ebroin," in the Pro- ceedings of the Academy of Munich (1887, pp. 42-61). (C. Pf.)

EBURACUM, or Eboracum: (probably a later variant), the Roman name of York (q.v.) in England. Established about a.d.

7 5-80 as fortress of the Ninth legion and garrisoned (after the annihilation of that legion about a.d. 118) by the Sixth legion, it developed outside its walls a town of civil life, which later obtained Roman municipal rank and in the 4th century was the seat of a Christian bishop. The fortress and town were separated by the Ouse. On the left bank, where the minster stands, was the fort- ress, of which the walls can still be partly traced, and one corner (the so-called Multangular Tower) survives. The municipality occupied the right bank near the present railway station. The place was important for its garrison and as an administrative centre, and the town itself was prosperous, though probably never very large. The name is preserved in the abbreviated form Ebor in the official name of the archbishop of York, but the philological connexion between Eboracum and the modern name York is doubtful and has probably been complicated by Danish influence. (F. J. H.)

EQA DE QUEIROZ, JOSE MARIA (1843-1900), Portuguese writer, was born at the northern fishing town of Povoa de Varzim, his father being a retired judge. He went through the university of Coimbra, and on taking his degree in law was appointed Administrador de Concelho at Leiria, but soon tired of the narrow mental atmosphere of the old cathedral town and left it. He accompanied the Conde de Rezende to Egypt, where he assisted at the opening of the Suez Canal, and to Palestine, and on his return settled down to journalism in Lisbon and began to evolve a style, at once magical and unique, which was to renovate his country's prose. Though he spent much of his days with the philosopher sonneteer Anthero de Quental, and the critic Jayme Batalha Reis, afterwards consul-general in London, he did not restrict his intimacy to men of letters, but frequented all kinds of society, acquiring a complete acquaint- ance with contemporary Portuguese life and manners. Entering the consular service in 1872, he went to Havana, and, after a tour in the United States, was transferred two years later to Newcastle- on-Tyne and in 1876 to Bristol. In 1888 he became Portuguese consul-general in Paris, and there died in 1900.

Queiroz made his literary debut in 1870 by a sensational story, The Mystery of the Cintra Road, written in collaboration with the art critic Ramalho Ortigao, but the first publication which brought him fame was The Farpas, a series of satirical and humorous sketches of various phases of social life, which, to quote the poet Guerra Junqueiro, contain " the epilepsy of talent." These essays, the joint production of the same partners, criticized and ridiculed the faults and foibles of every class in turn, mainly by a comparison with the French, for the education of Queiroz had made him a Frenchman in ideas and sympathies. His Brazilian friend, Eduardo Prado, bears witness that at this period French literature, especially Hugo's verse, and even French politics, interested Queiroz profoundly, while he alto- gether ignored the belles-lettres of his own country and its public affairs. This phase lasted for some years, and even when he travelled in the East he was inclined to see it with the eyes of Flaubert, though the publication of The Relic and that delightful prose poem Sweet Miracle afterwards showed that he had been directly impressed and deeply penetrated by its scenery, poetry and mysticism. The Franco-German War of 1870, however, by lowering the prestige of France, proved the herald of a national Portuguese revival, and had a great influence on Queiroz, as also had his friend Oliveira Martins (q.v.), the biographer of the patriot kings of the Aviz dynasty. He founded the Portuguese Realist-Naturalist school, of which he remained for the rest of his life the chief exponent, by a powerful romance, The Crime of Father Amaro, written in 187 1 at Leiria but only issued in 1875. Its appearance then led to a baseless charge that he had plagiarized La Faute de l'Abb6 Mouret, and ill-informed critics began to name Queiroz the;Portuguese Zola, though he clearly occupied an altogether different plane in the domain of art. During his stay in England he produced two masterpieces, Cousin Basil and The Maias, but they show no traces of English influence, nor again are they French in tone, for, living near to France, his disillusionment progressed and was completed when he went to Paris and had to live under the regime of the Third

Republic. Settling at Neuilly, the novelist became chronicler, critic, and letter- writer as well, and in all these capacities Queiroz displayed a spontaneity, power and artistic finish unequalled in the literature of his country since the death of Garrett. A bold draughtsman, he excelled in freshness of imagination and careful choice and collocation of words, while his warmth of colouring and

brilliance of language speak of the south. Many of his pages descriptive of natural scenery, such for instance as the episode of the return to Torrhes in The City and the Mountains, have taken rank as classic examples of Portuguese prose, while as a creator of characters he stood unsurpassed by any writer of his generation in the same field. He particularly loved to draw and judge the middle class, and he mocks at and chastises its hypocrisy and narrowness, its veneer of religion and culture, its triumphant lying, its self-satisfied propriety, its cruel egotism. But though he manifested a predilection for middle-class types, his portrait gallery com- prises men and women of all social conditions. The Maias, his longest book, treats olfidalgos, while perhaps his most remark- able character study is of a servant, Juliana, in Cousin Basil. At least two of his books, this latter and The Crime of Father Amaro, are chroniques scandaleuses in their plots and episodes; these volumes, however, mark not only the high-water line of the Realist-Naturalist school in Portugal, but are in themselves, leav- ing aside all accidentals, creative achievements of a high order.

Though Queiroz was a keen satirist of the ills of society, his pages show hardly a trace of pessimism. The City and the Mountains, and in part The Relic also, reveal the apostle of Realism as an idealist and dreamer, a true representative of that Celtic tradition which survives in the race and has permeated the whole literature of Portugal. The Mandarin, a fantastic variation on the old theme of a man self-sold to Satan, and The Illustrious House of Ramires, are the only other writings of his that require mention, except The Correspondence of Fradique Mendes. In conjunction with Anthero de Quental and Jayme Batalha Reis, Queiroz invented under that name a smart man of the world who had something of himself and something of Eduardo Prado, and made him correspond on all sorts of subjects with imaginary friends and relatives to the delight of the public, many of whom saw in him a mysterious new writer whose identity they were eager to discover. These sparkling and humorous letters are an especial favourite with admirers of Queiroz, because they reveal so much of his very attractive personality, and perhaps the cleverest of the number, that on Pacheco, has received an English dress. In addition to his longer and more important works, Queiroz wrote a number of short stories, some of which have been printed in a volume under the title of Contos. The gems of this remarkable collection are perhaps The Peculiarities of a Fair-haired Girl, A Lyric Poet, JosS Matthias, The Corpse, and Sweet Miracle.

Most of his books have gone through many editions, and they are even more appreciated in the Brazils than in Portugal. It should be

mentioned that the fourth edition of Father Amaro is entirely different in form and action from the first, the whole story having been re- written. One of Queiroz's romances and two of his short stories have been published in English. An unsatisfactory version of Cousin Basil, under the title Dragon's Teeth, appeared at Boston, U.S.A., in 1889, while Sweet Miracle has had three editions in England and one in America, and there is also a translation of O Defunto (The Corpse), under the name of Our Lady of the Pillar.

An admirable critical study of the work of Queiroz will be found in A Geracdo Nova — Os Novellistas, by J. Pereira de Sampaio (Bruno), (Oporto, 1886). The Revista moderna of the 20th of November 1897 was entirely devoted to him. Senhor Batalha Reis gives interesting reminiscences of the novelist's early days in his preface to some prose fragments edited by him and named Prosas Barbaras (Oporto, 1903). (E. PR.)

fiCARTll (Fr. for "separated," "discarded"), a game at cards, of modern origin, probably first played in the Paris salons in the first quarter of the 19th century. It is a development of a very old card game called la triomphe or French-ruff, Ecarte is generally played by two persons, but a pool of three may be formed, the player who is out taking the place of the loser, and the winner of two consecutive games winning the pool. At French ecarte (but not at English) bystanders who are betting

may advise the players, but only by pointing to the cards they desire them to play, and the loser of the game goes out, one of the r entrants taking his place, unless the loser is playing la chouette, i. e. playing single-handed against two, and taking all bets.

The small cards (from the two to the six, both inclusive) are removed from an ordinary pack. The players cut for deal, the highest having the choice. The king is the highest card, the ace ranking after the knave. The dealer gives five cards to his adversary, and five to himself, by two at a time to each and by three at a time to each, or vice versa. The eleventh card is turned up for trumps. If it is a king, the dealer scores one, at any time before the next deal. The non-dealer then looks at his cards. If satisfied with them he plays, and there is no dis- carding; if not satisfied he " proposes." The dealer may either accept or refuse. If he accepts, each player discards face down- wards as many cards as he thinks fit, and fresh ones are given from the undealt cards or " stock," first to complete the non dealer's hand to five, then to complete the dealer's. To ask for " a book " is to ask for five cards. Similarly a second proposal may be made, and so*

on, until one player is satisfied with his hand. If the dealer refuses, the hand is played without dis- carding. If the non-dealer announces that he holds the king of trumps, he scores one; and similarly, if the dealer holds the king and announces it, he scores one. The announcement must be made before playing one's first card, or if that card be the king, on playing it. The non-dealer, being satisfied with his hand, leads a card. The dealer plays a card to it, the two cards thus played forming a trick. The winner of the trick leads to the next, and so on. The second to play to a trick must follow suit if able, and must win the trick if he can.

The scores are for the king and for the majority of tricks The player who wins three tricks scores one for the " point "; if he wins all five tricks, he scores two for the " vole." If the non-dealer plays without proposing, or the dealer refuses the first proposal, and fails to win three tricks, the adversary scores two, but no more even if he wins the vole. The game is five up. The points are conveniently marked with a three-card and a two-card, as at euchre. The three is put face upwards with the two face downwards on the top of it. When one or two or three points are scored the top card is moved so as to expose them. At four, one pip of the two-card is put under the other card. Games may be recorded similarly.

Hints to Players. — The following hints may be of service to be- ginners : —

Shuffle thoroughly after every deal.

Do not announce the king until in the act of playing your first card.

The hands which should be played without proposing, called jeux de rqgle (standard hands), ought to be thoroughly known. They are as follows : —

1. All hands with three or more trumps, whatever the other cards.

2. Hands with two trumps which contain also —

(a) Any three cards of one plain suit ;

(b) Two cards of one plain suit, one being as high as a queen ;

(c) Two small cards of one suit, the fifth card being a king

of another suit;

(d) Three high cards of different suits.

3. Hands with one trump, which contain also —

(a) King, queen, knave of one suit, and a small card of another: (6) Four cards of one suit headed by king; (c) Three cards of one suit headed by queen, and queen of another suit.

4. Hands with no trump, which contain three queens or cards of equal value in different suits, e.g., four court cards.

5. Hands from which only two cards can be discarded without throwing a king or a trump.

Holding cards which make the point certain, propose. If you hold a jeu de regie, and one of the trumps is the king, propose, as your adversary cannot then take in the king.

When discarding, throw out all cards except trumps and kings.

If your adversary proposes you should accept, unless you are guarded in three suits (a queen being a sufficient guard), or in two suits with a trump, or in one suit with two trumps. Hence the rule not to discard two cards, unless holding the king of trumps, applies to the dealer.

The hands with which to refuse are the same as those with which to play without proposing, except as follows : —

8 4 6

ECBATANA—ECCELINO

i. Two trumps and three cards of one plain suit should not be played unless the plain suit is headed by a court card.

2. One trump and a tierce major is too weak, unless the fifth card is a court card. With similar hands weaker in the tierce major suit, accept unless the fifth card is a queen.

3. One trump and four cards of a plain suit is too weak to play.

4. One trump and two queens is too weak, unless both queens are singly guarded.

5. One trump, queen of one suit, and knave guarded of another should not be played unless the queen is also guarded, or the card of

the fourth suit is a court card.

6. One trump, a king and a queen, both unguarded, should not be played, unless the fourth suit contains a card as high as an ace.

7. Four court cards without a trump are too weak to play, unless they are of three different suits.

Refuse with three queens, if two are singly guarded ; otherwise, accept.

Lead from your guarded suit, and lead the highest.

If the strong suit led is not trumped, persevere with it, unless with king of trumps, or queen (king not having been announced), or knave ace, when lead a trump before continuing your suit.

You should not lead trumps at starting, unless you hold king or queen, knave, or knave ace, with court cards out of trumps.

The score has to be considered. If the dealer is at four, and the king is not in your hand nor turned up, play any cards without proposing which give an even chance of three tricks, e.g. a queen, a guarded knave, and a guarded ten. The same rule applies to the dealer's refusal.

At the adverse score of four, and king not being in hand or turned up, any hand with one trump should be played, unless the plain cards are very small and of different suits.

If the non-dealer plays without proposing when he is four to three, and the dealer holds the king he ought not to mark it. The same rule applies to the non-dealer after a refusal, if the dealer is four to three.

At the score of non-dealer three, dealer four, the dealer should refuse on moderate cards, as the player proposing at this score must have a very bad hand.

At four a forward game should not be played in trumps, as there is no advantage in winning the vole.

Laws of Hcarte. — The following laws are abridged from the revised code adopted by the Turf Club : — A cut must consist of at least two cards. Card exposed in cutting, fresh cut. Order of distribution of cards, whether by three and two, or vice versa, once selected, dealer must not change it during game. Player announcing king when he has

not got it, and playing a card without declaring error, adversary may correct score and have hand played over again. If offender wins point or vole that hand, he scores one less than he wins. Pro- posal, acceptance, or refusal made cannot be retracted. Cards dis- carded must not be looked at. Cards exposed in giving cards to non-dealer, he has option of taking them or of having next cards; dealer exposing his own cards, no penalty. Dealer turning up top card after giving cards, cannot refuse second discard. Dealer accepting when too few cards in stock to supply both, non-dealer may take cards, and dealer must play his hand. Card led in turn cannot be taken up again. Card played to a lead can only be taken up prior to another lead, to save revoke or to correct error of not winning trick. Card led out of turn may be taken up prior to its being played to. Player naming one suit and leading another, adversary has option of requiring suit named to be led. If offender has none, no penalty. Player abandoning hand, adversary is deemed to win remaining tricks, and scores accordingly. If a player, revokes or does not win trick when he can do so, the adversary may correct score and have hand replayed.

See Academie des jeux (various editions after the first quarter of the 19th century) ; Hoyle's Games (various editions about the same dates); Ch. Van-Tenac et Louis Delanoue, TraitS du jeu de I'ecarte (Paris, 1845; translated in Bohn's Handbook of Games, London, 1850) ; " Cavendish," The Laws of iLcarte, adopted by the Turf Club, with a Treatise on the Game (London, 1878) ; Pocket Guide to Hcarte ("Cavendish," 1897); Foster's Encyclopaedia of Indoor Games

(1903).

ECBATANA (Agbatana in Aeschylus, Hangmatdna in Old Persian, written Agamtanu by Nabonidos, and Agamatanu at . Behistun, mod. Hamaddn), the capital of Astyages (Istuvegii), which was taken by Cyrus in the sixth year of Nabonidos (549 B.C.). The Greeks supposed it to be the capital of Media, confusing the Manda, of whom Astyages was king, with the Mada or Medes of Media Atropatene, and ascribed its foundation to Deioces (the Daiukku of the cuneiform inscriptions), who is said to have surrounded his palace in it with seven concentric walls of different colours. Under the Persian kings, Ecbatana, situated- at the foot of Mount El vend, became a summer residence; and was afterwards the capital of the Parthian kings. Sir H. Rawlinson attempted to prove that there was a second and older Ecbatana in Media Atropatene, on the site of the modern Takht-i-

Suleiman, midway between Hamadan and Tabriz {J.R.G.S, x. 1841), but the cuneiform texts imply that there was only one city of the name, and Takht-i-Suleiman is the Gazaca of classical geography. The Ecbatana at which Cambyses is said by Herodotus (iii. 64) to have died is probably a blunder for Hamath. See Perrot and Chipiez, History of. A rt in Persia (Eng. trans., 1892) ; M. Dieulafoy, L Art antique de la Perse, pt. i. (1884) ; J. de Morgan, Mission scientifique en Perse, ii. (1 894). See Hamadan and Persia : Ancient History, § v. 2. ‘ (A. H. S.)

ECCARD, JOHANN (1553-1611), German composer of church music, was born at Mtihlhausen on the Unstrut, Prussia, in 1553, At the age of eighteen he went to Munich, where he became the pupil of Orlando Lasso. In his company Eccard is said to have visited Paris, but in 1574 we find him again at Mtihlhausen, where he resided for four years, and edited, together with Johann von Burgk, his first master, a collection of sacred songs, called Crepundia sacra Helmboldi (1577). Soon afterwards he obtained an appointment as musician in the house of Jacob Fugger, the Augsburg banker. In 1583 he became assistant conductor, and in 1599 conductor, at Konigsberg, to Georg Friedrich, margrave of Brandenburg- Anspach, the administrator of Prussia. In 1608 he was called by the elector Joachim Friedrich to Berlin as chief conductor, but this post he held only for three years, o.wing to his premature death at Konigsberg in 161 1. Eccard’s works consist exclusively of vocal compositions, such as songs, sacred cantatas and chorales for four or five, and sometimes ior seven, eight, or even nine voices. Their polyphonic structure is a marvel of art, and still excites the admiration of musicians. At the same time his works are instinct with a spirit of true religious feeling. His setting of the beautiful words ” Ein’ feste Burg ist unser Gott ” is still regarded by the Germans as their representa- tive national hymn. Eccard and his school are inseparably con- nected with the history of the Reformation.

Of Eccard’s songs a great many collections are extant; see K. G. A. von Winterfeld, Der Evangelische Kirchengesang (1843); Doring (Choralkunde, p. 47).

ECCELINO [or Ezzelino] DA ROMANO (1 194-1 259), Ghibelline leader, and supporter of the emperor Frederick II., was born on the 25th of April 1 194. He belonged to a family descended from a German knight named Eccelin, who followed the emperor Conrad II. to Italy about 1036, and received the fief of Romano near Padua. Eccelin-‘s grandson was Eccelino III., surnamed the Monk, who divided his lands between his two sons in 1223, and died in 1235.

The elder of these two sons was Eccelino, who in early life began to take part in family and other feuds, and in 1226, at the head of a band of Ghibellines, seized Verona and became podesta of the city. He soon lost Verona, but re- gained it in 1230; and about this time came into relations with Frederick II., who in 1232 issued a charter confirming him in his possessions. In 1236 when besieged in Verona he was saved by the advance of the emperor, who in November of the same year took Vicenza and entrusted its government to Eccelino. In 1237 he obtained authority over Padua and Treviso; and on the 27 th of November in that year he shared in the victory gained by the emperor over the Lombards at Cortenuova. In 1238 he married Frederick's natural daughter, Selvaggia; in 1239 was appointed imperial vicar of the march of Treviso; but in the same year was excommunicated by Pope Gregory IX. He was constantly engaged in increasing his possessions; was present at the siege of Parma in 1247, and after Frederick's death in 1250 he supported his son, the German king Conrad IV. His cruelties had, however, aroused general disgust, and in 1254 he was again excommunicated. In 1256 Pope Alexander IV. proclaimed a crusade against him, and a powerful league was soon formed under the leadership of Philip, archbishop of Ravenna. Padua was taken from Eccelino, but on the ist of September 1258 he defeated his enemies at Torricella. He then made an attempt on Milan, and the rival forces met at Cassano : on the 27th of September 1259, when Eccelino was wounded and taken prisoner. Enraged at his capture, he tore the bandages from his wounds, refused to take nourishment, and died at Soncino on the 7th of October 1259. In the following year his brother Albert was put to death, and the Romano family became

Hi

extinct. Eccelino, who is sometimes called the tyrant, acquired a terrible reputation on account of his cruelties, a reputation that won for him the immortality of inclusion in Dante's Inferno; but his unswerving loyalty to Frederick II. forms a marked contrast to the attitude of many of his contemporaries.

Eccelino is the subject of a novel by Cesare Cantu and of a drama by J. Eichendorff.

See J. M. Gittermann, Ezzelino da Romano (Freiburg, 1890); S. Mitis, Storia a" Ezzelino IV. da Romano (Maddaloni, 1896) ; and F. Stieve, Ezzelino von Romano (Leipzig, 1909).

ECCENTRIC (from Gr. k, out of, and Ktvrpov, centre), literally " out from the centre," and thus used to connote generally any deviation from the normal. In astronomy the word denotes a circle round which a body revolves, but whose centre is displaced from the visible centre of motion. In the ancient astronomy the ellipses in which it is now known that the planets revolve around the sun could not be distinguished from circles, but the unequal angular motion due to ellipticity was observed. The theory of the eccentric was that the centre of the epicycle of each planet moved uniformly in a circle, the centre of which was displaced from that of the earth by an amount double the eccentricity of the actual ellipse, as the case is now understood. When measured around this imaginary centre, which is so situated on the major axis of the ellipse that the focus, or place of the real sun, is midway between it and the centre of the ellipse, the motion is approximately uniform. In engineering, an eccentric is a mechanical device for converting rotary into reciprocating motion (see Steam-Engine). For eccentric angle see Ellipse.

ECCHELLEKSIS (or Echellensis), ABRAHAM (d. 1664), a learned Maronite, whose surname is derived from Eckel in Syria, where he was born towards the close of the 16th century. He was educated at the Maronite college in Rome, and, after taking his doctor's degree in theology and philosophy, returned for a time to his native land. He then became professor of Arabic and Syriac in the college of the Propaganda at Rome. Called to Paris in 1640 to assist Le Jay in the preparation of his polyglot Bible, he contributed to that work the Arabic and Latin versions of the book of Ruth and the Arabic version of the third book of Maccabees. In 1646 he was appointed professor of Syriac and Arabic at the College de France. Being invited by the Congrega- tion of the Propaganda to take part in the preparation of an Arabic version of the Bible, Ecchellensis went again in 1652 or 1653 to Rome. He published several Latin translations of Arabic works, of which the most important was the Chronicon Orientate of Ibnar-Rahib (Paris, 1653), a history of the patriarchs of-Alexandria. He was engaged in an interesting controversy with John Selden as to the historical grounds of episcopacy, in the course of which he published his Eutychius vindicatus, sive Responsio ad Seldeni Origines (Rome, 1661). Conjointly with Giovanni Borelli he wrote a Latin translation of the 5th, 6th and 7th books of the Conies of Apollonius of Perga (1661). He died at Rome in 1664.

ECCLES, a municipal borough in the Eccles parliamentary division of Lancashire, England, 4 m. W. of Manchester, of which it forms practically a suburb. Pop. (1901) 34,369. It is served by the London & North- Western railway and by the Birkenhead railway (North-

Western and Great Western joint). The Man- chester Ship Canal passes through. The church of St Mary is believed to date from the 12th century, but. has been enlarged and wholly restored in modern times. There are several hand- some modern churches and chapels, a town hall, and numerous cotton mills, while silk-throwing and the manufacture of fustians and ginghams are also among the industries, and there are also large engine works. A peculiar form of cake is made here, taking name from the town, and has a wide reputation. Eccles was incorporated in 1 89 2 , and the corporation consists of a mayor, 6 aldermen and 18 councillors. The borough maintains the tramway service, &c, but water and gas are supplied from Manchester and Salford respectively. Area, 2057 acres.

Before the Reformation the monks of Whalley Abbey had a grange here at what is still called Monks' Hall; and in 1864 many thousands of silver pennies of Henry III. and John of

England and William I. of Scotland were discovered near the spot. Robert Ainsworth, the author of the Latin and English dictionary so long familiar to English students, was born at Eccles in 1660; and it was at the vicarage that William Huskisson expired on the 15th of September 1830 from injuries received at the opening of the Liverpool & Manchester railway. From early times " wakes " were held at Eccles, and bull-baiting, bear- baiting and cock-fighting were carried on. Under Elizabeth these festivals, which had become notoriously disorderly, were abolished, but were revived under James I., and maintained until late in the 19th century on public ground. The cockpit remained on the site of the present town hall. A celebration on private property still recalls these wakes.

ECCLESFIELD, a township in the Hallamshire parliamentary division of the West Riding of Yorkshire, England, 5 m. N. of Sheffield, on the Great Central and Midland railways. The church of St Mary is Perpendicular, with a central tower, and con- tains excellent woodwork. It formerly bore, and must have deserved, the familiar title of the " Minster of the Moors." Ecclesfield was the seat of a Benedictine priory, which passed to the Carthusians in the 14th century. Cutlery and tools are largely manufactured, and there are coal-mines, paper mills and iron and fire-clay works. After the inclusion within the county borough of Sheffield of part of the civil parish of Ecclesfield in 1901, the population was 18,324.

ECCLESHALL, a market town in the north-western parlia- mentary division of Staffordshire, England; 7 m. N.W. from Stafford, and 4 W. of Norton Bridge station on the London & North- Western main

line. Pop. (1901)3799. The church of the Holy Trinity, one of the most noteworthy in Staffordshire, is principally Early English, and has fine stained glass. Several bishops of Lichfield are buried here, as Eccleshall Castle was the episcopal residence from the 13th century until 1867. Of this the ancient remains include a picturesque tower and bridge. To the west on the borders of Shropshire is Blore Heath, the scene of a defeat of the Lancastrians by the Yorkists in 1459.

ECCLESIA (Gr. eia

The precise powers which Solon gave the people are not known. It is clear that the executive power in the state (see Archon) was still vested in the Eupatrid class. It is obvious, therefore, that a moderate reformer would endeavour to give to the people some control over the magistracy. Now in speaking of the Thetes (the lowest of the four Solonian classes; see Solon), Aristotle's Constitution of Athens says that Solon gave them merely " a share in the Ecclesia and the Law Courts," and in the Politics we find that he gave them the right of electing the magistrates and receiving their accounts at the end of the official year. Thus it seems that the " mixed " character of Solon's constitution consisted in the fact that though the officials of the state were still necessarily Eupatrid, the Ecclesia elected those of the Eupatrids whom they could trust, and further had the right of criticizing their official actions. Secondly, all our accounts agree that Solon admitted the Thetes to the Ecclesia, thus recognizing them as citizens. Under. Cleisthenes the Ecclesia remained the sovereign power, but the Council seems to have become to some extent a separate administrative body. The relation of Boule and Ecclesia in the Cleisthenic democracy was of the

greatest importance. The Ecclesia alone, a heterogeneous body of untrained citizens, could not have passed, nor even have drawn up intelligible measures; all the preliminary drafting was done by the small committee of the Boule which was in session at any particular time. In the 5th century the functions of the Ecclesia and the popular courts of justice were vastly increased by the exigencies of empire. At the beginning of the 4th century B.C. the system of payment was introduced (see below). In 308 B.C. Demetrius of Phalerum curtailed the power of the Ecclesia by the institution of the N omophylaces (Guardians of the Law), who prevented the Ecclesia from voting on an illegal or injurious motion. Under Roman rule the powers of the

Ecclesia and the popular courts were much diminished, and after 48 B.C. (the franchise being frequently sold to any casual alien) the Demos (people) was of no importance. They still assembled to pass psephisms in the theatre and to elect strategi, and, under Hadrian, had some small judicial duties, but as a governing body the Ecclesia died when Athens became a civitas libera under Roman protection.

Constitution and Functions. — Throughout the period of Athenian greatness the Ecclesia was the sovereign power, not only in practice but also in theory. The assembly met in early times near the sanctuary of Aphrodite Pandemus {i.e. south of the Acropolis), but, in the 5th and 4th centuries, the regular place of meeting was the Pnyx. From the 5th century it met sometimes in the theatre, which in the 3rd century was the regular place. From Demosthenes we learn that in his time special meetings were held at Peiraeus, and, in the last centuries b. c, meetings were held at Athens and Peiraeus alternately. Certain meetings, however, for voting ostracism (q.v.) and on questions affecting individual status took place in the Agora. Meetings were (1) ordinary, (2) extraordinary, and (3) convened by special messengers {icbpiai, avyicXriToi and KarcucXTjroi), these last being called when it was desirable that the country people should attend. At ordinary meetings the attendance was practically confined to Athenian residents. According to Aristotle there were four regular meetings in each prytany (see Boui.fi); prob- ably only the first of these was called Kvpia. It is certain, how- ever, that the four meetings did not fall on regular days, owing to the occurrence of feast days on which no meeting could take place. In the Kopia. e(c/ cXij

After the archonship of Solon all Athenians over the age of eighteen were eligible to attend the assembly, save those who for some reason had suffered aiimia (loss of civil rights). To prevent the presence of any disqualified persons, six lexiarchs with thirty assistants were present with the deme-rolls in their hands. These officers superintended the payment in the 4th century and probably the toxotae (police) also, whose duty it was before the introduction of pay to drive the people out of the Agora into the Ecclesia with a rope steeped in red dye which they stretched out and used as a draw net (see Aristoph. Acharn. 22 and Eccles. 378). The introduction of pay, which belongs to the early years of the 4th century and by the Constitution (c. 41 ad fin.) is attributed to Agyrrhius, a statesman of the restored democracy, was a device to secure a larger attendance. The rate rose from one to two obols and then to three obols (Aristoph. Eccles. 300 sqq.), while at the time of Aristotle it was one and a half drachmas for the icvpia eicKXrjffia and one drachma for

other meetings. Probably those who were late did not receive payment.

Procedure. — The proceedings opened with formalities: the purification by the peristiarchs, who carried round slain sucking pigs; the curse against all who should deceive the people; the appointment (in the 4th century) of the proedri and their epistates (see Boule); the report as to the weather-omens. The assembly was always dismissed if there were thunder, rain or an eclipse. These formalities over, the Prytaneis communicated the probouleuma of the council, without which the Ecclesia could not debate. This recommendation either submitted definite proposals or merely brought the agenda before the assembly. Its importance lay largely in the fact that it explained the busi- ness in hand, which otherwise must often have been beyond the grasp of a miscellaneous assembly. After the reading, a pre- liminary vote was taken as to whether the council's report should be accepted en bloc. If it was decided to discuss, the herald called upon people to speak. Any person, without distinction of age or position, might obtain leave to speak, but it seems probable that the man who had moved the recommendation previously in the council would advocate it in the assembly. The council was, therefore, a check on the assembly, but its powers were to some extent illusory, because any member of the assembly (1) might propose an amendment, (2) might draw up a new resolu- tion founded on the principal motion, (3) might move the rejection of the motion and the substitution of another, (4) might bring in a motion asking the council for a recommendation on a particular matter, (5) might petition the council for leave to speak on a given matter to the assembly. Voting usually was by show of hands, but in special cases (ostracism, &c.) by ballot {i.e. by casting pebbles into one of two urns). The decision' of the assembly was called a psephism and had absolute validity. These decisions were deposited in the Metroon where state documents were preserved; peculiarly important decrees were inscribed also on a column {stele) erected on the Acropolis. It has been shown that the power of the council was far from sufficient. The real check on the vagaries of amateur legislators was the Graphe ParanomSn. Any man was at liberty to give notice that he would proceed against the mover of a given resolution either before or after the voting in the Ecclesia. A trial in a Heliastic court was then arranged, and the plaintiff had to prove that the resolution in question contravened an existing law. If this contention were upheld by the court, when the case was brought to it by the Thesmothetae, the resolution was annulled, and the defendant had to appear in a new trial for the assessment of the penalty, which was usually a fine,

rarely death. Three convictions under this law, however, in- volved a certain loss of rights; the loser could no longer move a resolution in the Ecclesia. After the lapse of a year the mover of a resolution could not be attacked. In the 4th century the Graphe Paranomon took the place of Ostracism {q.v.). In the 5th century it was merely an arrangement whereby the people sitting as sworn juries ratified or annulled their own first decision in the Ecclesia.

Revision of Laws. — In the 4th century, the assembly annually, on the eleventh day of Hecatombaeon (the first day of the official year), took a general vote on the laws, to decide whether revision was necessary. If the decision was in favour of alteration, it was open to any private citizen to put up notice of amendments. The Nomothetae, a panel selected by the Prytaneis from the Heliaea, heard arguments for and against the changes proposed and voted accordingly. Against all new laws so passed, there lay the Graphe Paranomon. Thus the Nomothetae, not the Ecclesia, finally passed the law.

Judicial Functions. — The Ecclesia heard cases of Probole and Eisangelia (see Greek Law). The Probole was an action against sycophants and persons who had not kept their promises to the people, or had disturbed a public festival. The verdict went by show of hands, but no legal consequences ensued; if the plaintiff demanded punishment he had to go to the Heliaea which were not at all bound by the previous vote in the Ecclesia. Cases of Eisangelia in which the penalty exceeded the legal competence of the council came before the Ecclesia in the form of a probouleuma. To prevent vexatious accusations, it was

(at some date unknown) decided that the accuser who failed to obtain one-fifth of the votes should be fined 1000 drachmas (£40). (For the procedure in case of Ostracism see that article.)

Summary. — Thus it will be seen that the Ecclesia, with no formal organization, had absolute power save for the Graphe Paranomon (which, therefore, constituted the dicasteries in one sense the sovereign power in the state). It dealt with all matters home and foreign. Every member could initiate legislation, and, as has been shown, the power of the council was merely formal. As against this it must be pointed out that it was by no means a representative assembly in practice. The phrase used to describe a very special

assembly (/caraxXTjTos backr/aia) shows that ordinarily the country members did not attend (/caroKaXeli' always involving the idea of motion from a distance towards Athens), and Thucydides says that 5000 was the maxi- mum attendance, though it must be remembered that he is speaking of the time when the number of citizens had been much reduced owing to the plague and the Sicilian expedition. From this we understand the necessity of payment in the 4th century, although in that period the Ecclesia was supreme (Constitution of Athens, xli. 2). The functions of the Ecclesia thus differed in two fundamental respects from those which are in modern times associated with a popular assembly. (1) It did not exercise, at least in the period as to which we are best instructed, the power of law-making (vofjoOtaia) in the strict sense. It must be remembered, however, in qualification of this statement that it possessed the power of passing psephismata which would in many cases be regarded as law in the modern sense. (2) The Ecclesia was principally concerned with the supervision of administration. Much of what we regard as executive functions were discharged by the Ecclesia.

With this article compare those on Solon ; Boule ; Areopagus ; Greek Law, and, for other ancient popular assemblies, Apella; Comitia. See also A. H. J. Greenidge, Handbook of Greek Consti- tutional History (1896); Gilbert, Greek Constitutional Antiquities (trans. Brooks and Nicklin, 1895) ; Schomann, De comitiis Athenien- sium ; L. Schmidt, " De Atheniensis reipublicae indole democratica " in Ind. Led. (Marburg, 1865); J. W. Headlam, Eledion by Lot at Athens (Cambridge, 1891). See also the histories of Greece by Meyer, Busolt, Grote, Evelyn Abbott, and J. E. Sandys' edition of the Con- stitution of Athens (1892) ; for a comparative study, E. A. Freeman, Comparative Politics. (J. M. M.)

ECCLESIASTES (Heb. rbnp, Kohelet, " Koheleth "; Sept. kKKKrjaux.aTrjs; Jerome concionator) , one of the Wisdom Books of the Old Testament (see Wisdom Literature). The book, as it stands, is a collection of the discourses, observations and aphorisms of a sage called Koheleth, a term the precise meaning of which is not certain. The Greek ecclesiastes means one who takes part in the deliberations of an assembly (ecclesia), a debater or speaker in an assembly (Plato, Gorgias, 452 e), and this is the general sense of the Hebrew word. Its form (singular feminine) has been supposed to be the adoption or imitation of the Arabic employment of a fem. sing, as the designation of a high official person, as is the case in the title caliph (whence the rendering in the margin of the Revised Version, "Great orator"); but the adoption of an Arabic idiom is not probable. This

usage is not Hebrew; it is not found either in the Old Testament or in the later (Mishnaic) Hebrew. The form may have been suggested by that of the Hebrew word for " wisdom." Koheleth, however, is employed in the book not as a title of wisdom (for " wisdom " is never the speaker), but as the independent name of the sage. It is intended to represent him as a member of an assembly (Kahal) — not the Jewish congregation, but a body of students or inquirers, such as is referred to in xii. 9-1 1, a sort of collegium, of which he was the head; and as instructor of this body he gives his criticism of life. The author begins, indeed, with identifying his sage with King Solomon (i. 12-ii. n, 126); but he soon abandons this literary device, and speaks in his own name. The rendering " preacher " has a misleading connotation.

In the book as we have it there is no orderly exposition of a theory; it rather has the appearance of a collection of remarks jotted down by a pupil (somewhat after the manner of Xeno- phon's Memorabilia), or of extracts from a sage's notebook. It

is, however, characterized throughout (except in some scribal additions) by a definite thought, and pervaded by a definite tone of feeling. The keynote is given in the classic phrase with which the discussion opens and with which it closes: " Vanity of vanities (i.e. absolute vanity), all 1 is vanity ! " Life, says the author, has nothing of permanent value to offer. His attitude is one not of bitterness but of calm hopelessness, with an occa- sional tinge of disgust or contempt. He fancies that he has tried or observed everything in human experience, and his deliberate conclusion is that nothing is worth doing. He believes in an all- powerful but indifferent God, and is himself an observer of society, standing aloof from its passions and ambitions, and interested only in pointing out their emptiness.

This general view is set forth in a number of particular observations.

1. His fundamental proposition is that there is a fixed, unchangeable order in the world, a reign of inflexible law (i. 4-1 1, iii. i-n, 14, 15, vii. 13, viii. 5-9): natural phenomena, such as sunrise and sunset, recur regularly; for everything in human experience a time has been set; birth and death, building up and destroying, laughing and weeping, silence and speech, love and hate, war and peace, are to be regarded not as utterances of a living, self-directing world, but as incidents in the work of a vast machine that rolls on for ever; there is an endless repetition — nothing is new, nothing is lost; if one thinks he has found something new, inquiry shows that it was in existence long ago; God, the author of all, seeks out the past in order to make

it once more present ; it is impossible to add to or take from the content of the world, impossible to change the nature of things, to effect any radical betterment of life; the result is unspeakable weariness — a depressing series of sights and sounds. No goal or purpose is discoverable in this eternal round; if the sun rises and goes on his journey through the sky, it is merely to come back to the place where he rose; rivers flow for ever into the sea without filling it. To what end was the world created ? It is impossible to say. Such is Koheleth's view of life, and it is obvious that such a conception of an aimless cosmos is thoroughly non- Jewish, if we may judge Jewish thought by the great body of the extant literature.

2. Further, says Koheleth, man is impelled to study the world, but under the condition that he shall never comprehend it (iii. 11, vii. 23, 24, viii. 16, 17). As to the meaning of the Hebrew term olam in iii. 11, there are various opinions, but " world " appears to be the rendering favoured by the con- nexion: " God has made everything beautiful in its time, and has put the olam into men's minds, yet so that they cannot under- stand His work": the olam, the sum of phenomena, is God's work. The word is not found in this sense elsewhere in the Old Testament, but it so occurs in the Mishna (Pirke Aboth, iv. 7), and the vocabulary of Ecclesiastes is admittedly similar to that of the Mishna. Only here in the Old Testament does it stand as a simple isolated noun; elsewhere it is the definition of a noun (in " everlasting covenant," &c), or it is preceded by a preposition, in the phrases " for ever," " of old," or it stands alone (sing, or plur.) in the same adverbial sense, " for ever." The word means first a remote point in past or future, then a future point without limit of time, then a period of history, and finally the world considered as a mass of human experiences (cf. al6iv). The renderings "eternity" and " future " in the present passage are unsatisfactory; the former has an inappropriate metaphysical connotation, and yields no distinct sense; the latter does not suit the connexion, though there is reference to the future elsewhere (ix. 1). God, the text here declares, has made the world an object of man's thought, yet so that man can never find out the work that God has done (iii. 11). The reference seems to be not so much to the variety and complexity of phenomena as to the impossibility of constru- ing them rationally or in such a way that man may foresee and provide for his future. Man is in the clutches of fate (ix. 11,12): there is no observable relation between exertion and result in life: the race is not to the swift nor the battle to the strong;

1 The Hebrew has the definite article, " the whole," t& iroc.

success does not attend wisdom, knowledge and skill; men are like fish taken in a net or birds caught in a snare.

3. Human life, Koheleth declares, is unsatisfying. He inquired, he says, into everything that is done by men under the sun (i. 12-16): God has inflicted on men a restless desire for movement and work, 1 yet life is but a catalogue of fruitless struggles. He gives a number of illustrations. In his character of king he tried all the bodily pleasures of life (ii. 1-11): he had houses, vineyards, gardens, parks, ponds, forests, servants, flocks and herds, treasures of gold and silver, singers, wives; all these he set himself to enjoy in a rational way — indeed, he found a certain pleasure in carrying out his designs, but, when all was done, he surveyed it only to see that it was weary and un- profitable. Dropping the role of Solomon and speaking as an observer of life, the author declares (iv. 4) that the struggle for success is the result of rivalry among men, which has no worthy outcome. The securing of riches is a fallacious achievement, for often wealth perishes by some accident (v. 13 f.), or its possessor is unable to enjoy it (vi. i-3«), or he has no one to whom to leave it, and he cannot keep it — naked man comes into the world, naked he goes out. He does not consider the possi- bility of deriving enjoyment from wealth by helping the poor or encouraging learning (this latter, indeed, he looks on as vanity) , and in general he recognizes no obligation on the part of a man to his fellows. A noteworthy survival of an old belief is found in vi. 3: though a man have the great good fortune to live long and to have many children, yet, if he have not proper burial the blank darkness of an untimely birth is better than he: this latter is merely the negation of existence; the former, it appears to be held, is positive misfortune, the loss of a desirable place in Sheol, though elsewhere (ix. 5) existence in Sheol is represented as the negation of real life. It is not necessary to suppose that the writer has here any particular case in mind.

If wealth be thus a vain thing, yet a sage might be supposed to find satisfaction in wisdom, that is, practical good sense and sagacity; but this also the author puts aside as bringing no lasting advantage, since a wise man must finally give up the fruit of his wisdom to someone else, who may be a fool, and in any case the final result for both fools and wise men is the same — both are forgotten (ii. 1 2- 23) . A particular instance is mentioned (ix. 13-15) of a beleagured city saved by a wise man; but the man happened to be poor, and no one

remembered him. The whole constitution of society, in fact, seems to the sage a lament- able thing: the poor are oppressed, the earth is full of their cries, and there is no helper (iv. 1); strange social upheavals may be seen: the poor 2 set in high places, the rich cast down, slaves on horseback, princes on foot (x. 5-7). He permits himself a sweeping generalization (vii. 25-28): human beings as a rule are bad: one may occasionally find a good man, never a good woman — woman is a snare and a curse. He (or an editor) adds (vii. 29) that this condition of things is due to social development: man was created upright (Gen. i. 27; Enoch lxix. n), but in the course of history has introduced corrupting complications into life.

4. The natural outcome of these experiences of the author is that he cannot recognize a moral government of the world. He finds, like Job, that there are good men who die prematurely notwithstanding their goodness, and bad men who live long notwithstanding their badness (vii. 15), though long life, it is assumed, is one of the great blessings of man's lot; and in general there is no moral discrimination in the fortunes of men (viii. 14, ix. 2).

5. There is no sacredness or dignity in man or in human life: man has no pre-eminence over beasts, seeing that he and they have the same final fate, die and pass into the dust, and no one knows what becomes of the spirit, whether in man's case it goes up to heaven, and in the case of beasts goes down into Sheol —

1 In fact, he suggests, a curse, as in Gen. iii. 17-19, though with a wider sweep than that passage has in mind.

2 The text has " folly," but the parallelism and v. 7 point to social, not intellectual, conditions, and a slight change (poo for Saon) gives the sense " poor."

death is practically the end-all; and so poor a thing is life that the dead are to be considered more fortunate than the living, and more to be envied than either class is he who never came into existence (iv. 2, 3). It is a special grievance that the wicked when they die are buried with pomp and ceremony, while men who have acted well are forgotten 3 in the city (viii. 10).

6. That the author does not believe in a happy or active future life appears in the passage (iv. 2, 3) quoted above. The old Hebrew view of the future excluded from Sheol the common activities of life and also the worship of the national god (Isa. xxxviii. 18); he goes even beyond this in his conception of the blankness of existence in the

underworld. The living, he says, at least know that they shall die, but the dead know nothing — the memory of them, their love, hate and envy, perishes, they have no reward, no part in earthly life (ix. 5, 6); there is absolutely no knowledge and no work in Sheol (ix. 10). His conclusion is that men should do now with all their might what they have to do; the future of man's vital part, the spirit, is wholly uncertain.

7. His conception of God is in accord with these views. God for him is the creator and ruler of the world, but hardly more; he is the master of a vast machine that grinds out human destinies without sympathy with man and without visible regard for what man deems justice — a being to be acknowledged as lord, not one to be loved. There can thus be no social contact between man and God, no communion of soul, no enthusiasm of service. Moral conduct is to be regulated not by divine law (of this nothing is said) but by human experience. The author's theism is cold, spiritless, without influence on life.

If now the question be asked what purpose or aim a man can have, seeing that there is nothing of permanent value in human work, an answer is given which recurs, like a refrain, from the beginning to the end of the book, and appears to be from the hand of the original author: after every description of the vanity of things comes the injunction to enjoy such pleasures as may fall to one's lot (ii. 24, 25, iii. 12, 13, 22, v. 18, 19, viii. 15, ix. 7-10, xi. 7-xii. 7). Elsewhere (ii.), it is true, it is said that there is no lasting satisfaction in pleasure; but the sage may mean to point out that, though there is no permanent outcome to life, it is the part of common-sense to enjoy what one has. The opportunity and the power to enjoy are represented as being the gift of God; but this statement is not out of accord with the author's general position, which is distinctly theistic. All the passages just cited, except the last (xi. 7-xii. 7), are simple and plain, but the bearing of the last is obscured by interpolations. Obviously the purpose of the paragraph is to point out the wisdom of enjoying life in the time of youth while the physical powers are fresh and strong, and the impotency of old age has not yet crept in. Omitting xi. 8c, gb, 10b, xii. 1a, the passage will read: " Life is pleasant in the bright sunshine — however long a man may live, he must be cheerful always, only remember- ing that dark days will come. Let the young man enjoy all the pleasures of youth, putting away everything painful, before the time comes when his bodily powers decay and he can enjoy nothing." To relieve the apparent Epicureanism of this passage, an editor has inserted reminders of the vanity of youthful pleasures, and admonitions to remember God and

His judgment. The author, however, does not recommend dissipation, and does not mean to introduce a religious motive — he offers simply a counsel of prudence. The exhortation to remember the Creator in the days of youth, though it is to be retained in the margin as a pious editorial addition, here interrupts the line of thought. In xii. xa some critics propose to substitute for " remember thy Creator " the expression of xi. 9, " let thy heart cheer thee "; but the repetition is improbable. Others would read: " re- member thy cistern " (Bickell), or " thy well " (Haupt), that is, thy wife. The wife is so called in Prov. v. 1 5- 19 in an elaborate poetical figure (the wife as a source of bodily pleasure) , in which the reference is clear from the context; but there is no authority, in the Old Testament or in other literature of this period, for

8 The Septuagint has less well: " They (the wicked) are praised in the city."

taking the term as a simple prose designation of a wife. Nor would this reference to the wife be appropriate in the connexion, since the writer's purpose is simply to urge men to enjoy life while they can. The paragraph (and the original book) concludes with a sustained and impressive figure, in which the failing body of the old man is compared to a house falling into decay: first, the bodily organs (xii. 3, 4a): the keepers of the house (the arms and hands) tremble, the strong men (the legs and perhaps the backbone) are bent, the grinding women (the teeth) cease to work, those that look out of the windows (the eyes) are darkened, the street-doors are shut, the sound of the mill being low (ap- parently a summary statement of the preceding details: com- munication with the outer world through the senses is cut off, the performance of bodily functions being feeble); the rest of v. 4 may refer to the old man's inability to make or hear music: in the house there is no sound of birds 1 or of singers, there are none of the artistic delights of a well-to-do household; further (v. 5a) the inmates of the house fear dangers from all powerful things and persons (the old man is afraid of everything), the almond tree blossoms (perhaps the hair turns white). The two next clauses are obscure.' 2 Then comes the end: man goes to his everlasting home; the dust (the body) returns to the earth whence it came (Gen. ii. 7), and the hreath of life, breathed by God into the body, returns to him who gave it. This last clause does not affirm the immortality of the soul; it is simply an explanation of what becomes of the vital

principle (the " breath of life" of Gen. ii. 7); its positive assertion is not in accord with the doubt expressed in iii. 21 (" who knows whether the spirit of man goes upward ?"), and it seems to be from another hand than that of the author of the original book.

There are other sayings in the book that appear to be at variance with its fundamental thought. Wisdom is praised in a number of passages (iv. 13, vii. 5, n, 12, 19, viii. 1, ix. 16, 17, x. 2, 3), though it is elsewhere denounced as worthless. It may be said that the author, while denying that wisdom (practical sagacity and level-headedness) can give permanent satisfaction, yet admits its practical value in the conduct of life. This may be so; but it would be strange if a writer who could say, " in much wisdom is much grief," should deliberately laud wisdom. The question is not of great importance and may be left un- decided. It may be added that there are in the book a number of aphorisms about fools (v. 3I4], vii. 5, 6, x. 1-3, 12-15) quite in the style of the book of Proverbs, some of them contrasting the wise man and the fool; these appear to be the insertions of an editor. Further, it may be concluded with reasonable certainty that the passages that affirm a moral government of the world are additions by pious editors who wished to bring the book into harmony with the orthodox thought of the time. Such asser- tions as those of ii. 26 (God gives joy to him who pleases him, amd makes the sinner toil to lay up for the latter), viii. 12 (it shall be well with those that fear God, but not with the wicked), xii. 13 f. (man's duty is simply to obey the commands of God, for God will bring everything into judgment) are irreconcilable with the oft-repeated statement that there is no difference in the earthly lots of the righteous and the wicked, and no ethical life after death.

Many practical admonitions and homely aphorisms are scattered through the book : iv. 5, quiet is a blessing ; iv. 9-12, two are better than one; iv. 17 (Eng. v. 1), be reverent in visiting the house of God (the temple and the connected buildings) —

1 The clause is obscure ; literally " he (or, one) rises at (?) the voice of the bird," usually understood to refer to the old man's inability to sleep in the morning; but this is not a universal trait of old age, and besides, a reference to affairs in the house is to be expected ; the Hebrew construction also is of doubtful correctness. A change of the Hebrew text seems necessary; possibly we should read Sp Sde>', " low is the voice," instead of V? oipv "he rises up at the voice."

2 The second is perhaps to be read: "the caper-berry blooms" (white hair); usually "the caper-berry loses its appetizing power"; Eng.

Auth. Vers, "desire shall fail." For the meaning of the word abyona (" caper-berry," not " desire " or " poverty "), see art. by G. F. Moore in Journ. of Bibl. Lit. x. I (Boston, Mass.,

1891).

to listen (to the service of song or the reading of Scripture) is better than to offer a foolish (thoughtless) sacrifice; v. 1 (2), be sparing of words in addressing God; v. 1-5 (2-6), pay your vows — do not say to the priest's messenger that you made a mistake; vii. 2-4, sorrow is better than mirth; vii. 16-18, be not over-righteous (over-attentive to details of ritual and convention) or over-wicked (flagrantly neglectful of established beliefs and customs); here "righteous " and " wicked " appear to be technical terms designating two parties in the Jewish world of the 2nd and 1st centuries B.C., the observers and the non-observers of the Jewish ritual law; these parties represent in a general way the Pharisees and the Sadducees; viii. 2—4, x. 20, it is well to obey kings and to be cautious in speaking about them, for there are talebearers everywhere; vii. 20, no man is free from sin; vii. 21, do not listen to all that you may overhear, lest you hear yourself ill spoken of; ix. 4, a living dog is better than a dead Hon ; xi. 1-6, show prudence and decision in business; do not set all your goods on one venture; act promptly and hope for the best. At the close of the book (xii. 9-12) there are two observations that appear to be editorial recommendations and cautions. First, Koheleth is endorsed as an industrious, discriminating and instructive writer. Possibly this is in reply to objections that had been made to what he had written. There follows an obscure passage (v. n) which seems to be meant as a commendation of the teaching of the sages in general: their words are said to be like goads (inciting to action) and like nails driven in a building (giving firmness to character); they issue from masters of assemblies, 3 heads of academies (but not of the Sanhedrin). The succeeding clause " they are given from one shepherd " may refer to a collection or revision by one authoritative person, but its rele- vancy is not obvious. The " shepherd " cannot be God (Gen. xlix. 24; Ps. xxiii. 1); the poetical use of the word would not be appropriate here. The clause is possibly a gloss, a comment on the preceding expression. A caution against certain books is added (v. 12), probably works then considered harmful (perhaps philosophic treatises), of which, however, nothing further is known.

Composition of the Book.-ˆ-li the analysis given above is correct, the book is not a unit; it contains passages mutually contradictory and not harmonizable. Various attempts have' been made to establish its unity. The hypothesis of " two voices " is now generally abandoned;

there is no indication of a debate, of affirmations and responses. A more plausible theory is that the author is an honest thinker, a keen observer and critic of life, who sees that the world is full of miseries and unsolved problems, regards as futile the attempts of his time to demonstrate an ethically active future life, and, recognizing a divine author of all, holds that the only wise course for men is to abandon the attempt to get full satisfaction out of the struggle for pleasure, riches and wisdom, and to content them- selves with making the best of what they have. This conception of him is largely true, as is pointed out above, but it does not harmonize the contradictions of the book, the discrepancies between the piety of some passages and the emotional indiffer- ence toward God shown in others. Other of the Biblical Wisdom books (Job, Proverbs) are compilations — why not this? It is not necessary to multiply authors, as is done, for example, by Siegfried, who supposes four principal writers (a pessimistic philosopher, an Epicurean glossator, a sage who upholds the value of wisdom, and an orthodox editor) besides a number of annotators; it is sufficient to assume that several conservative scribes have made short additions to the original work. Nor is it worth while to attempt a logical or symmetrical arrangement of the material. It has been surmised (by Bickell) that the sheets of the original codex became disarranged and were rearranged incorrectly; 4 by other critics portions of the book are transferred

8 This is the Talmudic understanding of the Hebrew expression Qerus. Sanhed. 10, 28a, cf. Sanhed. 12a; see Ecclus. xxxix. 2). There is no good authority for the renderings ” collectors of maxims, ” ” collections of maxims.’

4 It is not certain that the codex form was in use in Palestine” or in Egypt as early as the 2nd or the 1st century B. c.

hither and thither; in all cases the critic is guided in these changes by what he conceives to have been the original form of the book. But it is more probable that we have it in the form in which it grew up — a series of observations by the original author with interspersed editorial remarks; and it is better to preserve the existing form as giving a record of the process of growth.

Date. — As to the date of the book, though there are still differences of opinion among scholars, there is a gradual approach to a

consensus. The Solomonic authorship has long since been given up: the historical setting of the work and its atmosphere — the silent assumption of monotheism and monogamy, the non- national tone, the attitude towards kings and people, the picture of a complicated social life, the strain of philosophic reflection — are wholly at variance with what is known of the ioth century B.C. and with the Hebrew literature down to the 5th or 4th century B.C. The introduction of Solomon, the ideal of wisdom, is a literary device of the later time, and probably deceived nobody. The decisive considerations for the determination of the date are the language, the historical background and the thought. The language belongs to the post-classical period of Hebrew. The numerous Aramaisms point to a time certainly not earlier than the 4th century B.C., and probably (though the history of the penetration of Aramaic into Hebrew speech is not definitely known) not earlier than the 3rd century. More than this, there are many resemblances between the dialect of Koheleth and that of Mishna. Not only are new words employed, and old words in new significations, but the grammatical structure has a modern stamp — some phrases have the appear- ance of having been translated out of Aramaic into Hebrew. By about the beginning of our era the Jews had given up Hebrew and wrote in Aramaic; the process of expulsion had been going on, doubtless, for some time; but comparison with the later extant literature {Chronicles, the Hebrew Ecclesiasticus or Ben-Sira, Esther) makes it improbable that such Hebrew as that of Koheleth would have been written earlier than the 2nd century B.C. (for details see Driver's Introduction). The general historical situation, also, presupposed or referred to, is that of the period from the year 200 B.C. to the beginning of our era; in particular, the familiar references to kings as a part of the social system, and to social dislocations (servants and princes changing places, x. 7), suggest the troublous time of the later Greek and the Maccabean rulers, of which the history of Josephus gives a good picture.

The conception of the world and of human life as controlled by natural law, a naturalistic cosmos, is alien not only to the prophetic and liturgical Hebrew literature but also to Hebrew thought in general. Whether borrowed or not, it must be late; and its resemblance to Greek ideas suggests Greek influence. The supposition of such influence is favoured by some critics (Tyler, Plumptre, Palm, Siegfried, Cheyne in his Jewish Religious Life after the Exile, and others), rejected by some (Zeller, Renan, Kleinert and others). This disagreement comes largely from the attempts made to find definitely expressed Greek philo- sophical dogmas in the book; such formulas it

has not, but the general air of Greek reflection seems unmistakable. The the scepticism of Koheleth differs from that of Job in quality and scope: it is deliberate and calm, not wrung out by personal suffering; and it relates to the whole course and constitution of nature, not merely to the injustices of fortune. Such a con- ception has a Greek tinge, and would be found in Jewish circles, probably, not before the 2nd century B.C.

A precise indication of date has been sought in certain supposed references or allusions to historical facts. The mention of persons who do not sacrifice or take oaths (ix. 2) is held by some to point to the Essenes; if this be so, it is not chronologically precise, since we have not the means of determining the beginning of the movement of thought that issued in Essenism. So also the coincidences of thought with Ben-Sira (Ecclesiasticus) are not decisive: cf. iii. 14 with B.S. xviii. 6; v. 2-6 (3.-7) with B.S. xxxiv. 1-7; vii. 19 with B.S. xxxvii. 14; x. 8 with B.S. xxvii. 36a; xi. 10 with B.S. xxx. 21; xii. 10, n with B.S. xxxix. 2 ff.;

xii. 13 with B.S. xliii. 27; if there be borrowing in these passages, it is not clear on which side it lies; and it is not certain that there is borrowing — the thoughts may have been taken independently by the two authors from the same source. In any case, since Ben-Sira belongs to about 180 B.C., the date of Koheleth, so far as these coincidences indicate it, would not be far from 200 B.C. The contrast made in x. 16 f. between a king who is a boy and one who is of noble birth may allude to historical persons. The antithesis is not exact; we expect either " boy and mature man " or " low-born and high-born." The " child " might be Antiochus V. (164 B.C.), or Ptolemy V., Epiphanes (204 B.C.), but the reference is too general to be decisive. The text of the obscure passage iv. 13-16 is in bad condition, and it is only by considerable changes that a clear meaning can be got from it. The two personages — the "old and foolish king " and the " poor and wise youth " — have been supposed (by ■ Winckler) to be Antiochus Epiphanes (175-164 B.C.) and Demetrius (162-150 B.C.), or (by Haupt) Antiochus and the impostor Alexander Balas (150-146 B.C.), or (by others) Demetrius and Alexander; in favour of Alexander as the " youth " it may be said that he was of obscure origin, was at first popular, and was later abandoned by his friends. Such identifications, however, do not fix the date of the book pre- cisely; the author may have referred to events that happened before his time. The reign of Herod, a period of despotism and terror, and of strife between Jewish religious parties, is preferred by some scholars (Gratz, Cheyne and others) as best answering to the social situation depicted in the book, while still others (as Renan) decide for the

reign of Alexander Jannaeus (104- 78 b. c). The data are not numerous and distinct enough to settle the question beyond determining general limits: for reasons given above the book can hardly have been composed before about 200 B.C., and if, as is probable, a Septuagint trans- lation of it was made (though the present Septuagint text shows the influence of Aquila), it is to be put earlier than 50 B.C. Probably also, its different parts are of different dates.

Of the author nothing is known beyond the obvious fact that he was a man of wide observation and philosophic thought, of the Sadducean type in religion, but non- Jewish in his attitude toward life. He was, doubtless, a man of high standing, but neither a king nor a high-priest, certainly riot the apostate priest Alcimus (1 Mace. vii. ix.); nor was he necessarily a physician — there are no details in ch. xii. or elsewhere that any man of good intelligence might not know. The book is written in prose, some of which is rhythmical, with bits of verse here and there: thus i. 2- 1 1 is balanced prose, 12-14 plain prose, 15 a couplet, i. 16— ii. 25 simple prose, vii. contains a number of poetical aphorisms, and so on. Some of the verses are apparently from the author, some from editors.

The fortunes of the book are not known in detail, but it is clear that its merciless criticism of life and its literary charm made it popular, while its scepticism excited the apprehensions of pious conservatives. Possibly the Wisdom of Solomon (c. 50 B.C.) was written partly as a reply to it. The claim of sacredness made for it was warmly contested by some Jewish scholars. In spite of the relief afforded by orthodox additions, it was urged that its Epicurean sentiments contradicted the Torah and favoured heresy. Finally, by some process of reasoning not fully recorded, the difficulties were set aside and the book was received into the sacred canon; Jerome (on Eccl. xii. 13, 14) declares that the decisive fact was the orthodox statement at the end of the book: the one important thing is to fear God and keep His commandments. The probability is that the book had received the stamp of popular approbation before the end of the 1st century of our era, and the leading men did not dare to reject it. It is not certain that it is quoted in the New Testament, but it appears to be included in Josephus' list of sacred books.

Literature. — For the older works see Zockler (in Lange's Comm.) \ for Jewish commentaries see Zedner, Cat. of Heb. books in Libry. of Brit. Mus. (1867), and for the history of the interpretations, C. D. Ginsburg, Coheleth (1861). Introductions of A. Kuenen, S. R. Driver, Cornhill, Konig. Articles in Herzog-Hauck, Realencykl. (by P.

Kleinert) ; Hastings, Diet. Bible (by A. S. Peake) ; T. K. Cheyne,

Encycl. Bibl.(by A. B. Davidson) ; Jew. Encycl. (by D. S. Margoliouth). Commentaries: F. Hitzig (1847); C. D. Ginsburg (1861); H. Gratz (1871); Tyler (1874); Delitzsch (1875); E. H. Plumptre (1881); C. H. H. Wright (1883); Nowack, revision of Hitzig (1883); Volck (in Strack u. Zockler's Kurzgef. Komm., 1889); Wildeboer (in Marti's Kurzer Hand-Comm., 1898); C. Siegfried (in W. Nowack's Handkomm., 1898); Oort (in De Oude Test., 1899). Other works: C. Taylor, Dirge of Koh. (1874); Wunsche, Midrash on Koh. (in his Biblioth. rabbin., 1880); E. Kenan, L'Ecclisiaste (1882); Bickell, Der Prediger (1884) and Kohel.-Untersuchungen (1886; Engl, by E. J. Dillon, Sceptics of Old Test., 1895) ; Schiffer, Das Buck Koh. nach d. Aujfass. d. Weisen d. Talmuds, &c. (1884); A. Palm, Qoh. u. d. nach-aristotel. Philosophic (1885) and Die Qoh.-Lit. (1886); E. Pfleiderer, Die Phil. d. Heraklit, &c. (1886); Cheyne, Job and Solomon (1887) and Jew. Relig. Life, &c. (1898); W. Euringer, Der Masorahtext d. Koh. (1890) ; W. T. Davison, Wisdom-Lit. of Old Test. (1894) ; H. Winckler, in his Altorient. Forschungen (1898) ; J. F. Genung, Words of Koh. (Boston, Mass., 1904) ; P. Haupt, Ecclesiastes (Baltimore, 1905). The rabbinical discussions of the book are mentioned in Shabbath, 306 ; Megilla, ya ; Eduyoth, v. 3 ; Mishna Yadaim, iii. 5, iv. 6; Midrash Koheteth (on xi. 9), Aboth d' Rab. Nathan, i. (C. H. T.)*

ECCLESIASTICAL COMMISSIONERS, in England, a body corporate, whose full title is " Ecclesiastical and Church Estates Commissioners for England," invested with very important powers, under the operation of which extensive changes have been made in the distribution of the revenues of the Established Church. Their appointment was one of the results of the vigorous movements for the reform of public institutions which followed the Reform Act of 1 83 2 . In 1 83 5 two commissions were appointed " to consider the state of the several dioceses of England and Wales, with reference to the amount of their revenues and the more equal distribution of episcopal duties, and the prevention of the necessity of attaching by commendam to bishoprics certain benefices with cure of souls; and to consider also the state of the several cathedral and collegiate churches in England and Wales, with a view to the suggestion of such measures as might render them conducive to the efficiency of the established church, and to provide for the best mode of providing for

the cure of souls, with special reference to the residence of the clergy on their respective benefices." And it was enacted by an act of 1835 that during the existence of the commission the profits of dignities and benefices without cure of souls becoming vacant should be paid over to the treasurer of Queen Anne's Bounty. In consequence of the recommendation of these commissioners, a permanent commission was appointed by the Ecclesiastical Commissioners Act 1836 for the purpose of preparing and laying before the king in council such schemes as should appear to them to be best adapted for carrying into effect the alterations suggested in the report of the original commission and recited in the act. The new commission was constituted a corporation with power to purchase and hold lands for the purposes of the act, notwith- standing the statutes of mortmain. The first members of the commission were the two archbishops and three bishops, the lord chancellor and the principal officers of state, and three laymen named in the act.

The constitution of the commission was amended by the Ecclesiastical Commissioners Act 1840 and subsequent acts, and now consists of the two archbishops, all the bishops, the deans of Canterbury, St Paul's and Westminster, the lord chancellor, the lord president of the council, the first lord of the treasury, the chancellor of the exchequer, the home secretary, the lord chief justice, the master of the rolls, two judges of the admiralty division, and certain laymen appointed by the crown and by the archbishop of Canterbury. The lay commissioners are required to be " members of the Church of England, and to subscribe a declaration to that effect." The crown also appoints two laymen as church estates commissioners, and the archbishop of Canter- bury one. These three are the joint treasurers of the commission, and constitute, along with two members appointed by the com- mission, the church estates committee, charged with all business relating to the sale, purchase, exchange, letting or management of any lands, tithes or hereditaments. The commission has power to make inquiries and examine witnesses on oath. Five commissioners are a quorum for the transaction of business, provided two of them are church estates commissioners; two

ecclesiastical commissioners at least must be present at any proceeding under the common seal, and if only two are present they can demand its postponement to a subsequent meeting. The schemes of the commission having, after due notice to persons affected thereby, been laid before the king in council, may be ratified by orders, specifying the times when they shall take effect, and such orders when published in the London Gazette have the same force

and effect as acts of parliament.

The recommendations of the commission recited in the act of 1836 are too numerous to be given here. They include an extensive rearrangement of the dioceses, equalization of episcopal income, providing residences, &c. By the act of 1840 the fourth report of the original commissioners, dealing chiefly with cathedral and collegiate churches, was carried into effect, a large number of canonries being suspended, and sinecure benefices and dignities suppressed.

The emoluments of these suppressed or suspended offices, and the surplus income of the episcopal sees, constitute the fund at the disposal of the commissioners. By an act of i860, on the avoidance of any bishopric or archbishopric, all the land and emoluments of the see, except the patronage and lands attached to houses of residence, become, by order in council, vested in the commissioners, who may, however, reassign to the see so much of the land as may be sufficient to secure the net annual income named for it by statute or order. All the profits and emoluments of the suspended canonries, &c, pass over to the commissioners, as well as the separate estates of those deaneries and canonries which are not suspended. Out of this fund the expenses of the commission are to be paid, and the residue is to be devoted to increasing the efficiency of the church by the augmentation of the smaller bishoprics and of poor livings, the endowment of new churches, and employment of additional ministers.

The substitution of one central corporation for the many local and independent corporations of the church, so far at least as the manage- ment of property is concerned, was a constitutional change of great importance, and the effect of it undoubtedly was to correct the anomalous distribution of ecclesiastical revenues by equalizing incomes and abolishing sinecures. At the same time it was regarded as having made a serious breach in the legal theory of ecclesiastical property. " The important principle," says Cripps, " on which the inviolability of the church establishment depends, that the church generally possesses no property as a corporation, or which is applicable to general purposes, but that such particular ecclesiastical corporation, whether aggregate or sole, has its property separate, distinct and inalienable, according to the intention of the original endowment, was given up without an effort to defend it " (Law Relating to the Church and Clergy, p. 46).

ECCLESIASTICAL JURISDICTION. This phrase in its pri- mary sense imports not jurisdiction over ecclesiastics, but juris- diction exercised by ecclesiastics over other ecclesiastics and over the laity. "

Jurisdiction " is a word borrowed from the jurists which has acquired a wide extension in theology, wherein, for example, it is frequently used in contradistinction to " order," to express the right to administer sacraments as something superadded to the power to celebrate them. So it is used to express the territorial or other limits of ecclesiastical, executive or legislative authority. Here it is used, in the limited sense defined by an American Court, as " the authority by which judicial officers take cognizance of and decide causes."

Such authority in the minds of lay Roman lawyers who first used this word " jurisdiction " was essentially temporal in its origin and in its sphere. The Christian Church trans- origin of ferred the notion to the spiritual domain as part of eccieslas- the general idea of a Kingdom of God correlative, on ticaijuris- the spiritual side of man upon earth, to the powers, ° ict,oa – also ordained of God, who had dominion over his tem- poral estate (see Canon Law). As the Church in the earliest ages had executive and legislative power in its own spiritual sphere, so also it had "judicial officers," " taking cognizance of and deciding causes." Only before its union with the State, its power in this direction, as in others, was merely over the spirits of men. Coercive temporal authority over their bodies or estates could only be given by concession from the temporal prince. Moreover, even spiritual authority over members of the Church, i.e. baptized persons, could not be exclusively claimed as of right by the Church tribunals, if the subject matter of the cause were purely temporal. On the other hand, it is clear that all the faithful were subject to these courts (when acting within their own sphere), and that, in the earliest times, no distinction was made in this respect between clergy and laity.

The fundamental principle of ecclesiastical jurisdiction with its

" sanction " of excommunication will be found in Christ's words in Matt, xviii. 15-18. Avery early example of criminal spiritual jurisdiction exercised by St Paul is found in the case of the in- cestuous Corinthian (1 Cor. v.). We find later the same apostle exercising like jurisdiction in the cause of Hymenaeus and Alexander (1 Tim. i. 20). After the time of the Apostles, we find this criminal jurisdiction exercised by the bishops individu- ally over their respective " subjects " — doubtless with the advice of their presbyters according to the precept of St Ignatius (c. no). As neighbouring

dioceses coalesced into " provinces " and provinces into larger districts (corresponding to the civil " dioceses " of the later Roman Empire), the provincial synods of bishops and the synods of the larger districts acquired a criminal jurisdiction, still purely spiritual, of their own. At first this was " original " and mainly (although not exclusively) over bishops (of the province or larger district). The beginnings of an appellate jurisdiction in the cases of clerics and laymen may be traced before the conversion of the Empire. The bishop over whom the synod of neighbouring bishops had exercised jurisdic- tion had no formal right of appeal; but sometimes bishops in other parts of the Church would refuse to acknowledge the local synodical sentence and would communicate with a bishop whom they deemed unjustly deposed. The theory, as expressed in legal phrase by St Cyprian in the 3rd century, was that the apostolic power of delegated sovereignty from the Lord, alike legislative and judicial, was held in joint-tenancy by the whole body of Catholic bishops. In both capacities, however, a certain undefined pre-eminence was conceded to the occupants of " Apostolic " sees, i.e. sees traditionally founded by Apostles, or of sees with a special secular position.

Even before the edict of Milan, at least as early as the latter half of the 3rd century, the spiritual sentences of deposition from office had sometimes indirect temporal consequences recognized by the secular courts. The classical example is the case of Paul of Samosata, bishop of Antioch. It would seem that, in the intervals of persecution, some rights of property were recognized in the Christian Church and its officers; although the Church was an illegal society. After some previous abortive trials, Paul of Samosata was deposed and excommunicated, in 269, by a great synod of the Antiochene district. Paul, notwith- standing his deposition, kept possession of the episcopal residence. The local church sought recovery of it before the tribunals of the Empire. The judicial authorities requested a rescript from the emperor Aurelian for the decision of the cause. Aurelian referred the matter to the bishop of Rome and the bishops of Italy, who gave their award in favour of the Antiochene Church.

Side by side with this which we may call criminal jurisdiction — none the less real or coercive because its sanctions were purely Temporal spiritual — there grew up a quasi- jurisdiction in causes jurisdic- entirely temporal, based upon the free consent of the Hon otthe p ar ti e s to accept the arbitration of the bishop. This

"" ' system had also its roots in the New Testament (see Matt, xviii. 15-17 and 1 Cor. vi. 1-8). In the matter of criminal jurisdiction we paused for a moment at the edict of Milan; but we may at once trace

this second or civil branch of episcopal judicature or quasi-judicature down as far as the reign of Charlemagne, when it underwent a fundamental change, and became, if either litigant once chose, no longer a matter of consent but of right.

Constantine decreed that judgment in causes might be passed by bishops when litigants preferred their adjudication to that of the secular courts (see his epistle to the Numidian bishops and Cod. Theodos. Tit. de Episcopis). The episcopal judgment was to be equivalent to that of the emperor and irreversible, and the civil authorities were to see to its execution. Saints Ambrose and Augustine both spent days in deciding temporal causes. Honorius, in the West, at the end of the 4th century, made a constitution providing that if any desired to litigate before the bishops they should not be forbidden, but that in civil matters the prelates should render judgment in the manner of arbitrators by consent (Cod. 1 , Tit. iv.) . Where the faithful had had recourse to the bishop, no appeal was to be allowed, and the judges were

to command execution of the episcopal decree. A quarter of a century later, however, Valentinian III. in the West expressly provided that bishops were hot to be permitted to be judges (that is, of course, in temporal causes), save by the consent of the parties. This legislation was, substantially, adopted by Justinian.'

On the revival of the Western Empire, however, Charlemagne, in the beginning of the 9th century, under the mistaken belief that he was following the authority of Constantine I. and Theodosius I., took a great step forward, by which the bishop ceased to be a mere legally indicated arbitrator by consent in secular causes, and became a real judge. By a capitulary he provided that either litigant, without the consent of the other party, and not only at the beginning of a suit but at any time during its continuance, might take the cause from lay cognizance and transfer it to the bishop's tribunal. He re-enacted the prohibition of appeal.

It should be remembered that, from the latter part of the 3rd century, the leading bishops had generally been trained in secular learning. St Cyprian, St Ambrose and St Augustine, St Paulinus of Nola and St John Chrysostom had practised law as teachers or advocates. St Ambrose and St Paulinus had even held high administrative and judicial offices.

To return to the evolution of ecclesiastical jurisdiction from the time of Constantine. With the " Nicene period " came a great development

on the criminal side. A system Roman begins to be. formed, and the secular arm supports empire the decrees of the Church. The first trace of system fr ? m f f oa ” is in the limited right of appeal given by the first oecumenical council of Nicaea and its provision that episcopal sentences or those of provincial synods on appeal were to be recognized throughout the world. The fifth canon provides that those, whether clerics or laymen, who are cut off from com- munion in any particular province are not to be admitted thereto elsewhere. Still examination must be had whether persons have been expelled from the congregation by any episcopal small-mindedness (pMCpoxpvxlo.) , or contentious spirit, or such-like harshness (ariSLa). That this may be conveniently inquired into, synods are to be held, three in every year, in each province, and questions of this kind examined. There is to be no ” stay of execution “; the episcopal sentence is to prevail until the provincial synod otherwise decide. It will be noticed that as yet no provision is made for appeals by bishops from provincial synods sitting in first instance.

The edicts of Milan had only admitted the Christian Church among the number of lawful religions; but the tendency (except in the time of Julian) was towards making it the only lawful religion. Hence the practice, immediately after Nicaea I., of superadding banishment by the emperor to synodical condemna- tion. The dogmatic decrees of Nicaea I. were at once enforced in this temporal manner. On the other hand, the Arian reaction at court worked its objects (see Pusey, Councils of the Church) by using the criminal spiritual jurisdiction of synods against the Catholics — often packing the synods for the purpose. The acts of councils of this age are full of the trials of bishops not only for heresy but for immorality and common law crimes. The accusa- tions are frequently unfounded; but the trials are already conducted in a certain regular forensic form. The secular authorities follow the precedent of Nicaea I. and intervene to supplement the spiritual sentence by administrative penalties. Sometimes an imperial officer of high rank (as, e.g. a ” count “) is present at the synod, as an assessor to maintain order and advise upon points of procedure. Leading examples may be found in the various prosecutions of St Athanasius, in whose case also there is the germ of an appeal, tanquam ab abusu. It has been contended that, according to later and more formulated jurisprudence, such an appeal would have lain, since the trial at Tyre was not concerned with purely spiritual matters (see the case in Hefele, Councils, in loc).

The trial of St Athanasius led to extensions of the right of appeal. This was favoured by the development of the greater sees into

positions of great administrative dignity, shortly to be called " patriarchal." A synod was held at Rome, attended

by bishops from various regions, which reversed the original judgment of the synod of Tyre which had condemned Athanasius. A much larger synod at Antioch, gathered only from the East, on the other hand, confirmed that judgment. This last synod did something to systematize the criminal procedure of the Church, and its legislation has been always received.

This legislation marks another step forward. Deposition of a bishop by a synod, or of a priest or deacon by his bishop, is to take effect even pending an appeal, and a cleric continuing his functions after sentence in first instance is to lose all right of appeal. The appeal given by Nicaea I. to clerics and laymen from episcopal excommunications is extended. The synod may restore them if convinced of the justice of their cause (and not merely in cases of d»?5ia). A bishop may appeal to a great assembly of bishops. Any bishop, priest or deacon " importun- ing " the emperor, instead of exerting his right of appeal to synods, is to lose all right of appeal and never to be restored or pardoned. If a provincial synod be divided as to the guilt of a bishop, the metropolitan is to convene bishops from the neigh- bouring provinces to decide the cause jointly with the bishops of the original province.

A few years later, in 347, the council of Sardica, a council of practically the whole West save Africa, reversed Tyre and acquitted St Athanasius after a full judicial inquiry. This council endeavoured to set up a system of appeals in the case of bishops, in which the see of Rome was made to play a great part. " Out of honour to the memory of St Peter," a condemned bishop may ask the intervention of Rome. If this be done, the synod of first instance is to send letters to Julius, bishop of Rome. If that prelate think the cause should be heard again, he is to appoint judges; if otherwise, the original judgment is to be confirmed. Pending appeal, the appellant's see is not to be filled up. The judges appointed by the bishop of Rome to hear the appeal are to be from the neighbouring provinces. The appellant may, however, request that bishop to send priests from his side to sit with the synod of appeal. If such priests are sent, they are to preside in the court of appeal. These canons were always repudiated in the East, and when, sixty years afterwards, they were,

for the first time, heard of in Africa, they were repudiated there also.

A rescript of Gratian in 378 empowered the bishop of Rome to judge bishops with the assistance of six or seven other bishops or, in the case of a metropolitan, of fifteen comprovincial bishops. A bishop refusing to come to Rome was to be brought there by the civil power. The rescript, however, was not incorporated in the Codes and perhaps was only a temporary measure.

The tendency to give pre-eminence to Rome appears again in an imperial letter to St Flavian, who, in the judgment of the East, was bishop of Antioch, but who was rejected by the West and Egypt, summoning him to Rome to be there judged by the bishops of the imperial city — a summons which St Flavian did not obey (Tillemont, Mem. Ecc.). In Africa in the beginning of the 5th century Apiarius, a priest who had been deposed by the bishop of Sicca for immorality, and whose deposition had been affirmed by the " provincial synod," instead of further appealing to a general synod of Africa, carried his appeal to Pope Zosimus. The pope received the appeal, absolved him and restored him to the rank of priest, and sent a bishop and two priests as legates to Africa with instructions to them to hear the cause of Apiarius anew and for execution of their sentence to crave the prefect's aid; moreover, they were to summon the bishop of Sicca to Rome and to excommunicate him, unless he should amend those things which the legates deemed wrong. The upshot of a long conflict was that the papal claim to entertain appeals from Africa by priests and deacons was rejected by the African bishops, who in their final synodical epistle also repudiate in terms any right of appeal by African bishops to " parts beyond the seas " (see Hefele, Councils, bk. viii.).

The story of the administrative development of the Church in the 5 th century is mainly the story of the final emergence and constitution of the great " patriarchates," as authorities superior to metropolitans and provincial synods. In consequence of the

occupants of the thrones of Constantinople and Alexandria falling successively into opposite heresies, the question arose how " patriarchs " were to be judged. In both cases, as it seems, an attempt was made by the bishop of Rome to depose the erring patriarch by his authority as primate of Christendom, acting in concert with a Western synod. In both cases, apparently, an oecumenical synod ignored the Roman deposition and judged the alleged offences of the respective patriarchs in first and last instance. The third and fourth oecumenical synods (Ephesus, 431; Chalcedon, 451) were primarily

tribunals for the trials of Nestorius and Dioscorus; it was secondarily that they became organs of the universal episcopate for the definition of the faith, or legislative assemblies for the enactment of canons. Nothing is more remarkable than their minute care as to observance of rules of procedure. In both cases, imperial assessors were appointed. At Ephesus the Count Candidian was commissioned to maintain order, but took little part in the proceedings. At Chalcedon, on the other hand, the imperial commissioners decided points of order, kept the synod to the question, took the votes and adjourned the court. But the synod alone judged and pronounced sentence. No oecumenical synod has tried a patriarch of Old Rome while yet in the flesh. The fifth oecu- menical council came nearest to so doing, in the case of Vigilius. That pope, although in Constantinople, refused to attend the sittings of the council. He was cited three times, in the canonical manner, and upon not appearing was threatened in the third session with anathema (Hefele, Councils, sect. 268 ad fin.). He was not, however, charged with direct heresy, as were Nestorius and Dioscorus, and the synod seems to have hesitated to deal stringently with the primate of Christendom. In the seventh session it accepted the suggestion of Justinian, merely to order the name of Vigilius to be removed from the liturgical prayers, at the same time expressing its desire to maintain unity with the see of Old Rome (Hefele, sect. 273). After the council, Justinian banished the pope to Egypt, and afterwards to an island, until he accepted the council, which he ultimately did (ib. 276). The sixth oecumenical synod decreed that the dead pope Honorius should be " cast out from the holy Catholic Church of God " and anathematized, a sentence approved by the reigning pope Leo II. and affirmed by the seventh oecumenical synod in 787.

The constitution of the patriarchal system resulted in the recognition of a certain right of appeal to Rome from the larger part of the West. Britain remained outside that jurisdiction, the Celtic churches of the British islands, after those islands were abandoned by the Empire, pursuing a course of their own. In the East, Constantinople, from its principality, acquired special administrative pre-eminence, naturally followed, as in the case of " old Rome," by judicial pre-eminence. An example of this is found in the ninth canon of Chalcedon, which also illustrates the enforcement upon a clerical plaintiff in dispute with a brother cleric of that recourse to the arbitration of their ecclesiastical superior already mentioned. The canon provides that any clerk having a complaint against another clerk must not pass by his own bishop and turn to secular tribunals, but first lay bare his cause before him, so that by the sentence of the bishop himself the

dispute may be settled by arbitrators accept- able to both parties. Any one acting against these provisions shall be subject to canonical penalties. If any clerk have a complaint against his own bishop, he shall have his cause ad- judicated upon by the synod of the province. But if a bishop or clerk have a difference with the metropolitan of his province let him bring it before the exarch of the " diocese " (i.e. the larger district answering to the civil " diocese "), or before the royal see of Constantinople, who shall do justice upon it. An " exarch " means properly a superior metropolitan having several provinces under him. In the next century Justinian (Nov. 123, c. 22) put the other patriarchates on the same footing as Con- stantinople. In c. 21 he gives either plaintiff or defendant an appeal within ten days to the secular judge of the locality from the bishop's judgment. If there be no appeal, that judge is to give execution to the episcopal award. The growth of a special " original " jurisdiction at Constantinople, which perhaps

developed earlier than the corresponding institution at Rome, may be traced to the fact that bishops from all parts were constantly in Constantinople. The bishop of Constantinople, even before he became properly " patriarch," would often assemble a synod from these visiting bishops, which acquired the technical name of

The criminal jurisdiction thus exercised was generally speaking unlimited. It must be remembered that the forum externum of the ecclesiastical jurisdiction, in the sense in which we now use the phrase, of a judge deciding causes, was not then clearly marked off from the forum internum, or what afterwards came to be called the " tribunal of penance " (see Van Espen, Jus ecc. unit, pars iii. tit. iv. c. i). Ecclesiastical proceedings by way of prosecution are called " criminal," but they are primarily pro salute animae; whereas temporal criminal proceedings are primarily for the protection of the state and its citizens. Hence a Christian might be first punished in the civil courts and then put to public penance by the ecclesiastical jurisdiction, or vice versa: an apparently double system of punishment which the medieval Church, when the forum externum had become quite separated from the forum internum, sometimes repudiated (see Maitland, English Canon Law, 138, 139, 144).

Theodosius began the system cf giving secular authority to Church tribunals. Thus, in 376, L. 23 Cod. Theodos. de. Episcopis, &c,

subjected clerics for small offences pertaining to the obser- vances of religion to bishops and synods. In 399, L. 1 Cod. de Religione provides that, when it is a matter of religion, it beseems the bishop to judge. A rescript of Constantius, in 355, inserted in Cod. Theod. lxii. de Epis. Ecc. et Cler., excluded bishops from accusations before secular judges and commanded such accusations to be speedily brought before the tribunal of other bishops. This law was probably only intended to be of a temporary character. Then comes the law of Gratian already noticed. Then, in 399, a law of Honorius (Cod. Theod. L. 1 de Religione): " As often as it concerns religion, it is meet that the bishops should judge, but other causes which belong to ordinary jurisdiction or to public law are to be heard in the ordinary courts (legibus oporlet audiri)." L. 3 de Epis. Jud., at the end of the Theodosian Code, seems spurious (see the comment of Gotho- fredus in loco). But a constitution of Honorius in 412 (Cod. Theod. L. xli. de Epis. Ecc. et Cler.) provides that clerks are not to be accused except before the bishop. Bishops, priests, deacons, and every other " minister of the Christian law " of inferior degree, are taken from secular jurisdiction in criminal cases. The words are quite general; but it has been contended that they apply only to crimes of an ecclesiastical character (see Gothofredus in loc; Van Espen, pars iii. tit. iii. c. 1, 10). In 425 a constitution of Theodosius II. provides that a recent decree of the usurper John should be disregarded and that clerks whom he had brought before secular judges should be reserved for the episcopal jurisdictions," since it is not lawful to subject the ministers of the divine office to the arbitrament of temporal powers." Justinian has a clearer perception of the demarcation between the spheres of spiritual and temporal law. The 83rd Novell provides that if the offence be ecclesiastical, needing ecclesiastical correction, the bishop shall take cognizance of it. The 123rd Novell (c. 21) provides that if a clerk be accused of a secular crime he shall be accused before his bishop, who may depose him from his office and order, and then the Competent judge may take him and deal with him according to the laws. If the prosecutor have first brought him before the civil judge, the evidence is to be sent to the bishop, and the latter, if he thinks the crime has been committed, may deprive him of his office and order, and the judge shall apply to him the proper legal punishment. But if the bishop think the evidence insufficient, the affair shall be referred to the emperor, by way of appeal both from bishop and judge. If the cause be ecclesiastical, the civil judges are to take no part in the inquiry. The law includes with clerics, monks, deaconesses, nuns, ascetics; and the word " clerics " covered persons in minor orders, down to doorkeepers.

Anglo- Saxon courts.

It will be noticed that Justinian supposes that the prosecutor may begin the proceedings before the civil judge. A constitution of Alexius Comnenus I. seems to send him to the special forum of the accused.

Certain enactments of later Saxon times in England have been sometimes spoken of as though they united together the temporal and spiritual jurisdictions into one mixed tribunal deriving its authority from the State. In the latter part of the 10th century, laws of Edgar provided that the bishop should be at the county court and also the alderman, and that there each of them should put in use both God's laws and the world's law (Johnson's English Canons, i. 411). This probably was, as Johnson suggests, that the bishop might enforce secular laws by ecclesiastical censure and the alderman ecclesiastical laws with secular punishment. But the two jurisdictions were kept separate; for by another law of Edgar (Leges Edg. c. v.) it was provided that " in the most august assembly the bishop and alderman should be present, and the one should interpret to the people the law of God,' the other the laws of men." Edgar, in a speech to St Dunstan and the bishops in synod (in 969), said, " I hold in my hands the sword of Constantine, you that of Peter. Let us join right hands and unite sword to sword" (Hardouin, Cone. torn. vi. p. 1, col. 675). The juxtaposition of the judicatures may, however, have led to some confusion between them.

As to appeals the mixed council of Cliff at Hoo (747) said they should go to the synod of the province. The only appeal to Rome in Saxon times was that of St Wilfrid, bishop of York, who appealed from the division of his see and his deposition for refusing to consent to it, and was heard in a Roman synod under the presidency of Pope Agatho. The synod found him unlawfully deposed and ordered his restoration. Upon his return to England, the Roman judgment was refused recognition and he was for a time imprisoned. Ten years later he was recalled to York, but refusing to consent to the division of his see was again deposed and again appealed to Rome. The appeal was heard at great length, in a synod of 703 under John VI., deputies from the archbishop of Canterbury being present. St Wilfrid was justified and was sent back to his see, with papal letters to the kings of Northumbria and Mercia. The Roman decree was again disregarded. At the council of " Nid " he was reconciled to the other bishops of the province, but not restored. In the end he was brought back to York, but not to the undivided see. The details of the case will be found in Wilkins, Concilia, in Mansi, Concilia, under the various councils named, and in Haddan & Stubbs, Councils and Eccl.

Documents, vol. iii.

*The penalties which the spiritual, court could inflict, in the period between the edict of Milan and c. 854, were properly excommunication whether generally or as exclusion „ from the sacraments for a term of months or years or inflicted till the day of death and (in the case of clerics) suspen- by ecclesl- sion or deposition. Gradually, however, doubtless by astlcat way of commutation of excommunication and of co ” * penance, temporal penalties were added, as scourging, banish- ment, seclusion in a monastery, fines. It is difficult to say how far some of these temporal penalties were penitential only or how far they could be inflicted in invilos. But the secular arm, from the time of Nicaea I., was in the habit of aiding spiritual decrees, as by banishing deposed bishops, and gradually by other ways, even with laymen. Scourging (although it had been a well-known punishment of the synagogue) was at first forbidden. Can. 28 (26) of the Apostolic Canons imposes deposition on any bishop, priest or deacon striking the delinquent faithful. In Africa, however, a contrary practice early sprang up (see St Augustine, Epist. clix. ad Marcellum al. exxxiii.). The small council of Vannes in Brittany in 465 made it an alternative punishment for clerks convicted of drunkenness (Can. 13). Canon 13 of the first council of Orleans, which has been cited in this matter, seems to have no application. St Gregory the Great seems to assume that scourging and seclusion in a monastery are in the discretion of episcopal tribunals (see Epistles, lib. ii. ep. n, 40, 42, 44, 45; lib. vii. ep. 11, 67; lib. xii. ep. 31, c. 4). The 16th council of Toledo*

(in 693) has been cited as if it visited certain very great sinners with scourging as an ecclesiastical punishment. In fact, it only approves the punishment as ordered by the Visigothic laws. An alleged decree of a council of Autun in 670 is part of a code of discipline for monasteries (see authorities cited by Hefele, Councils, sect. 290, towards the end). Banishment does not seem to have been inflicted by the spiritual court in invitum. Seclusion in a monastery seems first to have been used by the civil power in aid of the spiritual. The fifth canon of the council of Macon, in 584, forbids clergy to dress like laymen and imposes a penalty of thirty days' imprisonment on bread and water; but this may be merely penitential. There is little evidence of the imposition of fines as ecclesiastical penalties; but there are references to the practice in the epistles of St Gregory the Great, notably in his instructions to St Augustine. Gregory III. copies from

St Gregory I. Probably these also were by way of penance. Isolated examples in the early middle ages of metropolitans deal- ing with their suffragan bishops by imprisonment in chains were extra-c- anonical abuses, connected with the perversion of Church law which treated the metropolitan (who originally Was merely convener of the provincial synod and its representative during the intervals of sessions) as the feudal " lord " of his comprovincials.

With the later 9th century we enter upon a new epoch, and by the time of Gregory VII., in the nth century, the tribunals have fallen into the hands of a regular class of canonists who are in fact professional church-lawyers in orders. The changes due to the adoption of the False Decretals by Nicholas I. and the applica- tion of their principles by Hildebrand (afterwards Gregory VII.) are discussed in the article Canon Law. The later medieval system, thus inaugurated, may be considered (1) in its hierarchy, (2) in the subject matter of its jurisdiction, (3) in its penalties.

1. (a) It is a system of courts. Much that had been done by bishops, sine strepitu forensi et figura judicii, is now done in the course of regular judicial procedure. Again, the court medieval takes the place of the synod. The diocesan synod system. ceases to have judicial work. The court of the metro- politan takes the place of the provincial synod, except possibly for the trial of bishops, and even this becomes doubtful.

(b) At first the bishop was the only judge in the diocesan court and he always remains a judge. But just as the king appoints judges to hear plocita coram rege ipso, and the feudal lord appoints his seneschal or steward, so the bishop appoints his official.

(c) The archdeacon acquires a concurrent ordinary jurisdiction with the bishop (see Archdeacon). For some time it was con- sidered that he was a mere office-holder dependent on the will of the bishop with a jurisdiction merely "vicarial"; but by the 13th century it was settled that he held a " benefice " and that his jurisdiction over causes was ordinary and independent of the bishop (Van Espen, pars i. tit. xii. c. 1 ; Fournier, Les OfficialitSs au moyen dge, p. 134). It was partly in order to counterpoise the power of archdeacons that bishops created officials (Fournier, p. 8). Archdeacons in course of time created officials who pre- sided in court in their stead. The extent of jurisdiction of archdeacons depended much upon local customs. In England the custom was generally in their favour. Ordinarily, the appeal from an archdeacon or his official lay to the court of the bishop; but by custom the appeal might be to the court of

the metro- politan: The Constitutions of Clarendon, in 1 164, made the appeal from the court of the archdeacon lie to the court of the bishop.

(d) The official of the bishop might be his official principal, who was his alter ego, or a special officer for a particular locality (officialis foraneus). The latter was treated as a mere delegate, from whom an appeal could be made to the bishop. The former had one consistory with the bishop, so that appeals from him had to be made to the court of the metropolitan. How far the official principal had jurisdiction in criminal matters by virtue of his office, how far it was usual to add this jurisdiction by special commission, and what were the respective limits of his office and that of the vicar-general, are questions of some nicety. The emphasis in Italy was on the vicar-general (Sext. de officio Vicarii). In the Low Countries, France and England the jurisdiction of the official principal was wider (Van Espen,

pars i. tit. xii. cc. 4, 5; Fournier, p. 21). But he could not try criminal matters unless specially committed to him (Lyndwood, Provinciale, lib. ii. tit. 1). Later in Englnd it became usual to appoint one man to the two offices and to call him chancellor, a word perhaps borrowed from cathedral chapters, and not in use for a diocesan officer till the time of Henry VIII. or later (see Chancellor). In Ireland the title, till the church was dis- established, was vicar-general.

The importance of distinguishing the normal functions of an official principal and a vicar-general lies in this: that it was gradually established that as a king should not hear causes but commit them to his judges, so a bishop should not hear causes but appoint an official to hear them (see Ridley, View of the Civil and Eccl. Law, Aylifie, Parergon juris ecclesiastici, p. 161; Godolphin, Abridgement of the Laws Ecclesiastical, p. 8). The " parlements " of France were constantly insisting on the independence and irremovability of the official (Fournier, p. 219). But jurisdiction which was not necessarily incident to the office of the official principal, that is to say voluntary jurisdiction, such as the granting of licences and institution to benefices, and criminal jurisdiction over clerks (and probably over laymen), the bishop could reserve to himself. Reservations of this nature are made in many English patents of chancellors and were held good in R. v. Tristram, 1902, 1 K.B. 816.

(e) The ecclesiastical and temporal courts are kept distinct. The charter of William the Conqueror abrogated the laws of Edgar. No

bishop or archdeacon " shall any longer hold pleas in the Hundred concerning episcopal law nor draw a cause which concerns the rule of such to the judgment of men of the world " (Stubbs, Select Charters, part iii.). In France, where the bishop was a temporal baron, his feudal and his spiritual courts were kept by distinct officers (Fournier, p. 2).

(/) From the bishop, or his official, appeal lay to the metro- politan, who again could hear causes by his official. The Con- stitutions of Clarendon recognize this appeal (c. viii.).

(g) An appeal lay from the court of the metropolitan to that of the primate. There were many disputes as to the existence of these primates (see Maitland, Canon Law in the Church of England, p. 121). In England the dispute between Canterbury and York was settled by making them both primates, giving Canterbury the further honour of being primate of all England. In France the primatial sees and the course of appeals to them were well established (Fournier, p. 219).

(h) Several attempts were made by metropolitans and their officials to take causes arising in the dioceses of their compro- vincials in the first instance and not by way of appeal. The officials of primates in their turn made similar attempts. After long struggles this was hindered, in France by the bull Romana (Fournier, p. 218), in England by the Bill of Citations, 23 Henrˆ VIII. c. 9, and Canon 94 of the Canons of 1603. The preamble of the " Bill of Citations " is eloquent as to the mischief which it is framed to prevent. There are, however, a few cases in which the metropolitan is still allowed to cite in the first instance. One of them was in cases of " perplexity." " Perplexity " arose where the suffragans " could not owing to the geographical limitations of their competence do full justice " (Maitland, pp. 1 1 8- 1 1 9) . Such was the case of probate where notable goods of the deceased lay in more than one diocese. Hence the origin of the " prerogative court " of Canterbury (cf . Van Espen, pars i. tit. xix.; and for Spain, Covarruvias, Pract. Quaest. c. 9).

(i) Gradually there grew up a mass of peculiar and exempt jurisdictions (Ayliffe, pp. 417, 418; Phillimore, Eccl. Law, pp. 214, 927; de Maillane, Diet, du droit canonique, s.v. "Exemp- tions "). Exempt jurisdictions began with the monasteries and were matter of vehement discussion in the later middle ages. There were no true exemptions before the nth century (Van Espen, pars iii. tit. xii.). Peculiar or special jurisdiction, equal to that of the bishop, was given to deans and chapters over the cathedral precincts and in places

where they had corporate property (see Parham v. Templer, 3 Phil. Ecc. R. 22). Sometimes it was given to deans alone or to prebendaries in the parishes whence they derived their prebends. Where the archdeacon

had a jurisdiction co-ordinate with the bishop, it was called a peculiar. The metropolitans had peculiars within the dioceses of their comprovincial wherever they had residences or manors, and some whose origin is uncertain, e.g. thatof the fifteen parishes in the deanery of the Arches. The official administering justice for the metropolitan was usually called a dean. From a peculiar jurisdiction ranking as episcopal the appeal lay to the court of the metropolitan. As to metropolitan peculiars, the metro- politan might give an appeal from the dean to his regular official principal. Thus, in Canterbury there was an appeal from the dean of Arches to the official principal of the Arches court. When peculiars were abolished (vide infra) the dean of Arches disappeared, and his title, in the 19th century, was erroneously given to the official principal. On peculiars in Spain cf. Covar – - ruvias, Works, tit. i. p. 410. The French parlements, after the middle ages, discouraged them. In exempt convents the head of the monastery or priory exercised jurisdiction subject to an appeal to the pope.

(j) It is said that originally a metropolitan had only one official principal, who, like the metropolitan himself, acted both for the diocese and province. Fournier (p. 219) says that in France it was not till the 1 7 th century that there grew up a custom of having different officials for the metropolitan, one for him as bishop, a second as metropolitan, and even a third as primate, with an appeal from one to the other, and that it was an abuse due to the parlements which strove to make the official inde- pendent of the bishop. In England there has been, for a long time, a separate diocesan court of Canterbury held before the " com- missary." The word is significant as showing that there was something special and restricted about the position. In York there are two courts, one called the consistory for the diocese, the other called the chancery for the province. But the same person was often official of both courts.

(k) In England the Constitutions of Clarendon added a pro- vision for appeal to the king, " and if the archbishop shall have failed in doing justice recourse is to be had in the last resort (postremo) to our lord

the king, that by his writ the controversy may be ended in the court of the archbishop; because there must be no further process without the assent of our lord the king." The last words were an attempt to limit further appeal to Rome. It will be observed that the king does not hear the cause or adjudicate upon it. He merely corrects slackness or lack of doing justice (Si arckiepiscopus defecerit in justitia exhibenda) and by his writ (precepto) directs the controversy to be determined in the metropolitan's court. As bishop Stubbs says (Report of Eccl. Comm. vol. i. Hist. App, i.): " The appeal to the king is merely a provision for a rehearing before the archbishop, such failure to do justice being not so much applicable to an unfair decision as to the delays or refusal to proceed common at that time " (cf. Joyce, The Sword and the Keys, 2nd ed. pp. 19-20). The recursus ad principem, in some form or other of appeal or application to the sovereign or his lay judges, was at the end of the middle ages well known over western Europe. This recourse in England sometimes took the form of the appeal to the king given by the Constitutions of Clarendon, just mentioned, and later by the acts of Henry VIII. ; sometimes that of suing for writs of prohibition or mandamus, which were granted by the king's judges, either to restrain excess of jurisdiction, or to compel the spiritual judge to exercise jurisdiction in cases where it seemed to the temporal court that he was failing in his duty. The appellatio tanquam ab abusu (appel comme d'abus) in France was an application of a like nature. Such an appeal lay even in cases where there was a refusal to exercise voluntary jurisdiction (de Maillane, Dictionnaire du droit canonique, tit. " Abus," cf. tit. " Appel "). This writer traces their origin to the 14th century; but the procedure does not seem to have become regularized or common till the reigns of Louis XII. or Francis I. (cf. Diet, eccl., Paris, 1765, titt. "Abus" and " Appel comme d'abus ") . On the recursus ad principem and the practice of " cassation " in Belgium, Germany and Spain, cf. Van Espen's treatise under this title (Works, vol. iv.) and Jus eccles. umv. pars iii. tit. x. c. 4. Louis XIV. forbad

the parlements to give judgment themselves in causes upon an appel comme d'abus. They had to declare the proceedings null and abusive and command the court Christian to render right judgment (Edict of 1695, arts. 34, 36, cited in Gaudry, Trails de la legislation des ctdtes, Paris, 1854, torn. i. pp. 368, 369).

In Catalonia " Pragmatics," letters from the prince, issued to restrain jurisdiction assumed by ecclesiastical judges contrary to the customs of the principality. Thus in 1368 Peter III. evoked to the royal court a prosecution for abduction pending before the archbishop of

Tarragona, declaring that the arch- bishop and the official were incompetent to judge noblemen. See this and other instances collected in Usages y demas derechos de Cataluna, by Vives y Cebria (Barcelona, 1835), torn. iv. p. 137. et seq.

(/) Lastly there was the appeal to the patriarchs, i.e. in the West to Rome. The distinguishing feature of this appeal was that the rule of the other appeals did not apply to it. In the regular course of those appeals an appellant could not leap the intermediate stages; but he could at any stage go to this final appeal, omisso medio, as it was technically called (see de appell. c. Dilect. iii. for general rule, and c. 3 de appell. in 6 for different rule in case of the pope, and authorities, cited in Van Espen, pars iii, tit, x. c. 2, 5). Van Espen says: " The whole right of appeal to the Roman pontiff omisso medio had undoubtedly its origin in this principle, that the Roman pontiff is ordinary of ordinaries, or, in other words, has immediate episcopal authority in all particular churches, and this principle had its own begin- ning from the False Decretals."

Appeals to Rome lay from interlocutory as well as final judgments. Causes could even be evoked to Rome before any judgment and there heard in first instance (Van Espen, pars iii. tit. x. c. 1, 8).

There was an alleged original jurisdiction of the pope, which he exercised sometimes by permanent legates, whom Gregory VII. and his successors established in the chief countries of Europe, and to whom were committed the legislative executive and judicial powers of the spiritual " prince " in the districts assigned to them. These Clement IV. likened to " pro-consuls " and declared to have " ordinary " jurisdiction; because they had jurisdiction over every kind of cause, without any special delegation, in a certain defined area or province (c. ii. de Officio Legati in 6). They were expressed to have not merely appellate but original jurisdiction over causes (iii. c. i. de Officio Legati) . The occupants of certain sees by a kind of prescription became legates without special appointment, legati nati, as in the case of Canterbury. In the 13th century Archbishop Peck- hami, says Maitland (p. 1 17), as archbishop " asserted for himself and his official (1) a general right to entertain in the first instance complaints made against his suffragans' subjects, and (2) a general right to hear appeals omisso medio." It was, for the time, determined that the archbishop might himself, in virtue of his legatine authority, entertain complaints from other dioceses in first instance, but that this legatine jurisdiction was not included in the ordinary jurisdiction of his official principal, even if the archbishop had so willed it in his commission. In fact, however, the official did before

the end of the later medieval period get the same power as the archbishop (Maitland, pp. 118- 120; cf. Lyndwood, lib. v. tit. r), till it was taken from him, by the Bill of Citations.

After legates came special delegates appointed by the pope to hear a particular cause. It was the general practice to appoint two or three to sit together (Van Espen, pars iii. tit. v. c. 2, 37). These might sub-delegate the whole cause or any part of it as they pleased, ibid. 0-18. Dr Maitland (essay on " The Universal Ordinary ") thinks, but without very much foundation, that great numbers especially of the more important causes were tried before these delega tes ; al though the records have largely perished, since they were the records of courts which were dissolved as soon as their single cause had been decided. These courts were con- venient, since it was the custom to appoint delegates resident in the neighbourhood, and the power of sub-delegation, general or limited, simplified questions of distance. In Belgium causes

appealed to Rome had to be committed to local delegates (Van Espen, pars iii. tit. v. c. 3, tit. x. c. 2).

There could be an appe'al from these delegates to the pope and from the pope himself to the pope " better informed " (Van Espen, pars iii. tit. x. c. 2, 12, 13). So personal had the system of jurisdiction become that even the trials of bishops ceased to be necessarily conciliar. Generally they were reserved to the pope (Van Espen, pars iii. tit. iii. c. 5, 17-19); but in England the archbishop, either in synod, or with some of his comprovincial bishops concurring, tried and deposed bishops (see case of Bishop Peacock and the other cases cited in Read v. Bishop of Lincoln, 14 P.D. 148, and Phillimore, Eccl. Law, pp. 66 et seq.).

(m) The jurisdiction of a bishop sede vacante passed, by general law, to the dean and chapter; but in England the metropolitans became " guardians " of the spiritualities and exercised original jurisdiction through the vacant diocese (Phillimore, pp. 62-63), except in'the case of Durham, and with a peculiar arrangement as to Lincoln.

If the metropolitan see were vacant the jurisdiction was exercised by the dean and chapter through an official (Rothery, Return of Cases before Delegates, Nos. 4, 5). As to France see Fournier, p. 294.

(») Officials, even of bishops and metropolitans, need not be :n holy orders, though Bishop Stubbs in his paper in the Report of the Commission on Ecclesiastical Courts seems to say so. They had to be clerics, that is, to have received the tonsure. Even papal delegates might be simple clerks (Van Espen, pars iii. tit. v. c. 2, 20).

It came, however, to be the practice to impose some restrictions, as on clerks twice married. Thus Archbishop Chichele provided that no clerk married or bigamous (that is, having had two wives insuccession) should exercise spiritual jurisdiction (see Lyndwood, lib. iii. tit. 3). Abroad unsuccessful attempts were made by local councils to enact that officials and vicars-general should be in holy orders (Hefele on Councils of Tortosa in 1429 and Sixth of Milan in 1582). These councils, as will be seen, are late.

(0) With or without the- concurrence and goodwill of the national Church, restrictions were imposed by the State on the papal jurisdiction, whether original or appellate. In England the Constitutions of Clarendon (by chap, viii.) prohibited appeals to the pope; but after the murder of St Thomas of Canterbury Henry II. had to promise not to enforce them. The statutes 38 Edw. III. st. 2, 13 Rich. II. st. 2, c. 2, and 16 Rich. II. c. 5 forbid such appeals; but it is suggested that notwithstanding the generality of their language they refer only to cases of temporal cognizanceˆ Cases upon the execution of these statutes are collected in Stillingfieet, On Ecclesiastical Jurisdiction, p. 189; Gibson, Codex, 83. Obstacles were placed in the way of appeals to the pope omisso medio. Thus when a writ of significavit issued on the mandate of a bishop, an appeal to Rome availed not to stay execution; but if there were an appeal to the arch-bishop it was otherwise. It therefore became the custom to lodge a double appeal: one to the archbishop " for defence," and the other to the pope as the real appeal (" Hostiensis," Super Decret. ii. fol. 169; cf. Owen, Institutes of Canon Law, 1884, pt. i. c. 19, 5).

There seems to have been no machinery for assisting the original or appellate jurisdiction of the pope by secular process,— by significavit or otherwise.

The matrimonial cause between Henry VIII. and Catharine of Aragon was the most famous English cause tried by delegates under the " original " jurisdiction of the pope, and was ultimately " evoked " to Rome. The foreseen adverse termination of this long-drawn cause led to Henry's legislation.

When the temporal courts interfered to prevent excess of jurisdiction,

they did so by prohibiting the ecclesiastical court from trying and the suitor from suing in that court. The pope could not be effectively prohibited, and no instance is recorded of a prohibition to papal delegates. But suitors have been prohibited from appealing to the pope (see per Willes, J., in Mayor of London v. Cox, L.R. 2 H.L. 280). Whatever may have been

the' law, it is certain that, notwithstanding the statutes of Edw. III. and Rich. II., appeals to Rome and original, trials by papal delegates did go on, perhaps with the king's licence; for the statute 24 Hen. VIII. c. 12 recites that the hearing of appeals was an usurpation by the pope and a grievous abuse, and proceeds to take away the appeal in matrimonial, testamentary and tithe causes, and to hinder by forbidding citation and process from Rome, all original hearings also. The statute 25 Hen.- VIII. c. 19 follows this up by taking away appeals in all other subjects of ecclesiastical jurisdiction.

In 1438 the council of Basel took away all papal original jurisdiction (save in certain reserved cases — of which infra), evocation of causes to Rome, appeals to Rome omisso medio, and appeals to Rome altogether in many causes. Such appeals when permissible, except the " greater," were to be tried by delegates on the spot (31st Session; Mansi, Concilia, in loco). These proceedings at Basel were regarded at Rome as of no effect. Nevertheless this decree and others were adopted by a French national council at Bourges and promulgated by the king as a " Pragmatic Sanction " (Migne, Diet, du droit canonique, " Pragmatique Sanction"). The parlements registered the Sanction and the effect was permanent in France. Louis XI. and Charles VIII. sought to revoke it; but both parlements and states-general refused to recognize the revoking decrees. In 1499 Louis XII. ordered the Pragmatic to be inviolably observed. The parlements thereupon condemned several private: persons for obtaining bulls from Rome. In 1516 a Concordat between Leo X. and Francis I. settled all these questions in the sense of the Pragmatic, substantially according to the Basei canon. All causes, except the " greater," were to be terminated in the country where the proper cognizance would lie (Migne, op. cit. " Concordat "). By this Concordat, by an ordinance of Francis I. in 1539, by two or three other royal edicts, and (above all) by the practice of the parlements, explanatory of this legisla- tion, and their arrets, the conflict of secular and ecclesiastical jurisdictions was settled until the Revolution (Migne, ubi sup.). " Greater causes " came in France to be restricted to criminal prosecutions of bishops. Even in these the original jurisdiction of the pope was taken away. In first instance they were tried by the provincial synod. Thence there was appeal to

the pope (de Maillane, op. cit. S.v. " Causes majeures "; Diet, eccl., Paris, 1765, s.v. " Cause "). The only original jurisdiction left to the pope was, in the case of the matrimonial causes of princes. But they could only be heard on the spot by judges delegate. Examples are the causes of Louis XII. and Jeanne of France in 1498, and of Henry IV. and Marguerite of Valois in 1 599 (Migne, op. cit. s.v. " Causes "). The prohibition of papal interference was enforced if necessary by the appel comme d'abus (vide supra). Out of respect for the pope this appeal was not brought against his decrees but against their execution (Did. eccl., Paris, 1765, 's.v. " Abus ").

Spain appears to have permitted and recognized appeals to the pope. A royal writ of the 16th century cited by Covarruvias (c. xxxv.) prohibits execution of the sentence of a Spanish court Christian pending an appeal to the pope.

2. The subject matter over which the ecclesiastical courts had jurisdiction was no longer purely " criminal " with a civil quasi-jurisdiction by way of arbitration. In the later middle ages these courts had jurisdiction over most questions, f^?,,, except indeed the then most important ones, those n on , relating to real property. This civil jurisdiction was sometimes concurrent with that of the secular courts, sometimes exclusive. For England it may be thus classified: —

(a) Matrimonial. — This arose naturally from the sacred character of Christian marriage. This jurisdiction was exclusive. From it followed the right of the courts Christian to pronounce upon questions of legitimacy. Upon this right an inroad was early made, in consequence of the question of legitimation by subsequent marriage. In the 12th century the Church's rule, that subsequent mairiage did legitimize previous issue, was settled (c. 6, x. 4, 17). The king's judges then began to ask the ordinary the specific question whether A. B. was born before

or after his parents' marriage. After the inconclusive procee'd- ings at the realm-council of Merton (1236), when spiritual and temporal lords took opposite views, the king's judges went a step further and thenceforward submitted this particular question to a jury. All other questions of legitimacy arising in the king's courts were still sent for trial to the bishop and concluded by his certificate (see Pollock and Maitland, Hist. Eng. Law before Edward I. vol. i. 105-106; Maitland,

ubi supra, pp.

53-56).

(b) Testamentary and in regard to succession from intestates .< — Real property was not the subject of will or testament in the medieval period. But as to personal property, the jurisdiction of the courts Christian became exclusive in England. The Church, East and West, had long asserted a right to supervise those legacies which were devoted to pious uses, a right recog- nized by Justinian (Corf, i. 3.46). The bishop or, failing him, the metropolitan, was to see such legacies properly paid and applied and might appoint persons to administer the funds (Pollock and Maitland, op. cit. ii. 330). This right and duty became a jurisdic- tion in all testamentary causes. Intestacy was regarded with the greatest horror, because of the danger to the intestate's soul from a death without a fitting part given to pious uses (Maine, Ancient Law, ed. 1906, note by Pollock, p. 230; cf. Pollock and Maitland, op. cit. ii. 354). Hence came the jurisdiction of the ordinary in intestacy, for the peace of the soul of the departed. This head of ecclesiastical jurisdiction was in England not transferred to the secular court till 1857.

(c) Church Lands.— It undoubtedly held in frankalmoign or ” free alms,” by a ” spiritual ” tenure only, the claim of juris- diction for the ecclesiastical forum seems to have been at first conceded. But the Constitutions of Clarendon (c. 9) reserved the preliminary question, of ” frankalmoign ” or not, for a jury in the king’s court. Then, if the tenure were found free alms, the plea was to be heard in the court Christian. From the 13th century, however, inclusive, the king’s courts insisted on their exclusive jurisdiction in regard to all realty, temporal or ” spiritual ” (Pollock and Maitland, op. cit. i. 106).

(d) Title to present to and possession of benefices. — As to the title to present to benefices, the courts Christian at one time had concurrent jurisdiction with the temporal courts. ” Advowsons ” were, however, looked upon as a species of ” real ” property in England, and therefore the king’s court early claimed exclusive jurisdiction in disputes where the title to present was involved. The Constitutions of Clarendon provided that these causes should be heard only in the king’s court (c. 1). This rule was applied even where both litigants were ” spiritual.” In the 13th century abbots sue each other in the royal court for advowsons (Selden Soc. Select Civil Pleas, i. pi. 245). In 1231, in such a suit, the bishop of London accepts wager of battle (Pollock and Maitland, op. cit. i. 105). In cases, however, -where the title to present was not in question, but

the fitness of the clerk presented, or, in cases of election to benefices, the validity of the election, there was jurisdiction in the courts Christian.

(e) The recovery of tithes and church dues, including in England church rates levied to repair or improve churches and churchyards.

(/) Questions concerning fabrics, ornaments, ritual and cere- monial of churches.

(g) Administration of pious gifts and revenues given to prelates or convents. — Their right application could be effectively enforced only in the courts Christian; until the rise in England of the equitable jurisdiction of the court of chancery and the develop- ment of the doctrine of " uses " at the end of the middle ages.

(h) Enforcement of contractual promises made by oath or pledge of faith. — The breaking of such a promissory oath was called " perjury " (as in classical Latin and in Shakespeare), contrary to modern usage which confines the word to false evidence before a court of justice. In regard to the execution of these promises, the jurisdiction of the ecclesiastical courts was possibly traversed by c. 15 of the Constitutions of Clarendon; but allowed by the statute 13 Edw. I. st. 4. As just intimated,

besides the enforcement of the promise, the " perjury " was treated as an ecclesiastical crime.

The criminal jurisdiction of courts' Christian over laymen included, besides these " perjuries," (a) all sexual offences not punishable on indictment; (b) Defamation of character (the king's courts came in time to limit this to such defamation as could not be made the subject of a temporal action) ; (c) Offences by laymen against clerks (i.e. against all "tonsured" persons, supra) ; (d) Offences in regard to holy places—" brawling " and such like; (e) Heresy, schism, apostasy, witchcraft.

In regard to " clerks," there was (1) all the criminal juris- diction which existed over laymen, and (2) criminal jurisdiction in regard to professional misconduct. Concerning " felonious " clerks the great questions discussed were whether the courts Christian had exclusive jurisdiction or the king's court, or whether there was a concurrent jurisdiction. The subject was dealt with in the Constitutions of Clarendon, formally revoked after the murder of St Thomas of Canterbury. In the 13th century it was recognized that a " clerk " for

felony was subject only to ecclesiastical trial and punishment; punishment which might involve lifelong imprisonment. For " misdemeanours," as yet unimportant, he had no exemption from secular juris- diction (Pollock and Maitland, op. cit. ch. iv.). At some indeter- minate later period, the " clerk " was tried for felony by a jury in the king's court and then "pleaded his clergy," after conviction there, and was remitted to the ordinary for ecclesiastical punish- ment. " Clerks " for the purpose of "benefitof clergy." included not only persons in minor orders, but all " religious " persons, i.e. monks, friars, nuns, &c. Later the custom arose of taking " clerk " to include any " literate, " even if not in orders or "religious" (cf. Stephen, Hist. Crim. Law, i. 461). The statute 4 Hen. VII. c. 13 took away benefit of clergy, if claimed a second time, from persons not " within orders," in certain bad cases. 4 Hen. VIII. c. 2 (a temporary act) took away "clergy," in certain heinous crimes, from all persons not in " holy " orders. This statute was partly renewed by 22 Hen. VIII. c. 13. Other changes were introduced by 23 Hen. VIII. c. 1 and later acts. In time, " benefit of clergy " became entirely diverted from its original objects.

In France, till 1329, there seems to have been no clear line of demarcation between secular and ecclesiastical jurisdictions. Beaumanoir (Coutume de Baulvoisis, ch. xi., cited Gaudry, op. cit. i. 22) had laid down the principle that spiritual justice should meddle only with spiritual things. In the year named the secular courts complained to the king, Philip of Valois, of the encroachments of the courts Christian. The " cause " was solemnly argued before that monarch, who decided to leave things as they were (Migne, Diet, du droit canon., s.v. " Officia- lites "). In 1371 Charles V. forbade spiritual courts to take cognizance of " real " and "possessory " actions even in regard to clerks (Migne, loc. cit.; cf. Gaudry, ubi sup.). From this period the parlements began the procedure which, after the Pragmatic Sanction of Charles VII., in 1438 took regular shape as the appel comme d' abus (supra ; Migne, loc. cit.). Testamentary causes at first were subject to the concurrent jurisdiction of the spiritual and secular courts. After the 14th century, the latter had exclusive jurisdiction (Van Espen, op. cit. lib. iii. tit. ii. cc. 2, 15, 16). In regard to marriage the secular jurists distin- guished between the civil contract and the sacrament, for purposes of separating the jurisdiction (Diet, eccl., Paris, 1765, s.v. "Mariage"). The voluntary jurisdiction as regards dis- pensations was kept for the Church. The contentious jurisdiction of the courts Christian was confined to promises of marriage, nullity of marriage caused by " diriment " impediments only, validity or invalidity of the

sacrament, divorce a thoro (ibid.). Questions in regard to the property in a benefice were for the courts Christian; in regard to its possession, for the king's courts. But if a " possessory " action had been brought in the latter, a subsequent suit in the courts spiritual for the property was deemed " abusive " and restrained (ib., s.v. " Petitoire ") Breach of faith or of promise confirmed by oath was matter for the court Christian (Fournier, pp. 95, 99, 109, 125). This

branch of jurisdiction was larger and more freely used than in England (cf. Pollock and Maitland, op. cit., as to Normandy). The only other remaining civil jurisdiction of the ecclesiastical courts was in personal actions where clerks were defendants (Migne, op. cit., s.v. " Officialites," Founder, pp. 65-125); or, after the 14th century, where both parties were clerks. In regard to crimes delicts (dSlits) were divided into classes for purposes of jurisdiction. Clerks were punishable only in the court Christian, except in cases of grave crimes such as murder, mutilation (Fournier, p. 72), and cases called " royal cases " (vide infra}. Laymen were punishable in the court Christian for the delits following: injury to sacred or religious places, sacrilege, heresy (except where it was a " royal case "), sorcery, magic, blasphemy (also punishable in the secular court), adultery, simony, usury and infractions of the truce of God (Fournier, pp. 90-93). What were called "privileged delicts" were judged in the case of the clergy conjointly by the spiritual judge and the king's judge. Bishops had no exemption {Diet, ecc., s.v. "Delits," " Cas privilegie," " Causes majeures "). " Royal cases " included such crimes as touched the prince, as all forms of treason; or the dignity of his officers; or the public safety. In this class were also included such heresies as troubled the state, as by forbidden assemblies, or by teaching prohibited doctrine. Among these heresies were reckoned idolatry, atheism, Protes- tantism, relapse (ib. et " Cas royaux," " Heresie "). These were of exclusive royal jurisdiction as against both spiritual courts and the courts of feudal lords. A similar claim was made by Pombal for Portugal (vide infra).

The parlements, in order to have a ready means of enforcing all these restrictions by appel comme d'abus, compelled the bishops to appoint officials, Frenchmen, graduates, and (as it seems) "seculars" (Diet, eccl., Paris, 1765, s.v. "Official"). This last qualification was disputed (see Fevret, Traits de Vabus).

3. Punishments. — Ecclesiastical sanctions were divided into punishments (poenae) , either purely temporal in character or else of a mixed spiritual and temporal character, and censures (cen- surae), purely spiritual and remedial (see Van Espen, pars iii. tit. xl. cc. 1, 3; Phillimore, Ecclesiastical Law, p. 1064). In the book last cited censurae and poenae are classed together as " censures " (which is the modern use).

Poenae. — (a) Fines sprang from the older custom of direct- ing alms by way of penance in the internal forum (Van Espen, ubi sup. c. 1, 5-10). They were to be applied to pious uses.

(b) Reclusion in a monastery continued from former period, and might be either temporary or perpetual (loc. cit. 17-19).

(c) Imprisonment, in the bishop's prison, might be in chains, or on bread and water, and temporary or perpetual. In its severer forms it was only inflicted for more atrocious crimes which the secular law would have punished with death (loc. cit. 21-27). The act 23 Henry VIII. c. 1 1 made special provision for convicted clerks who broke out of the prisons of the ordinary, (d) Fustiga- tion, as in former period, was hardly an ecclesiastical punishment. If given, it was to be of a paternal character (loc. cit. 39-45). Punishments of a mixed nature were: (e) Suspension either from office alone or from office and benefice; (/) Deprivation of benefice; (g) Deposition or Degradation (a more solemn and ceremonial form) from the ministry; (h) Irregularity — not always a punishment — a state of incapacity to be ordained, or, being ordained, to execute the ministry; this might result from some defect of mind and body, but was also incurred by some grave offences.

Censures were as follows: (i) Suspension from attending divine offices or ab ingressu ecclesiae, more appropriate for a layman. A clerk in like case might be suspended from office. (j) Interdict was another form of partial or total suspension from the benefit of the rites and sacraments of the Church. An inter- dict might be personal or local (see Interdict), (k) Excom- munication was either greater or less. The greater separated entirely from the Church. It might be pronounced under anathema. The less deprived of participation in the sacraments, and made a clerk incapable of taking a benefice.

On the European continent the courts Christian often carried

out their decrees by their own apparitors who could levy pecuniary penalties on a defendant's goods (Van Espen, pars iii. tit. ix. c. 4).

They could arrest and imprison. In England, except in the peculiar case of imprisonment pending trial for heresy, or in the case of a clerk convicted of crime, these things could not be. The sentence of the court Christian had in all other cases to be enforced by the secular arm. Early in Henry II. 's time it had become the custom of England for the court Christian to "signify" its sentence of excommunication to the king and to demand from him a writ of significavit to the sheriff, to imprison the person excommunicated. The writ apparently issued for no court inferior to the bishop's, unless upon the bishop's request. In some sense the king's writ of significavit was discretionary; but its issue could be enforced by excommunication or interdict.

In the cases of heresy, apostasy and sorcery, the spiritual courts sought the aid of the secular jurisdiction to superadd the punishment of death. Incorrigible offenders on these matters were "left" to the secular power, to be corrected with due " animadversion." This provision of the fourth Lateran Council in 12 1 5 was always interpreted to mean death (see Van Espen, Observ. in Cone. Lat. I V. Canones, and the decree in the Sext. ul inquisitionis negotium; and, as to English law and practice, Maitland, op. cit., Essay vi., and pp. 161, 176; 2 Hen. IV. c. 15; Fitzherbert, Natura brevium, 269; 2 Hen. V. st. 1, c. 7). The " capital " punishment was generally (always in England) by burning. Burning was an English punishment for some secular offences.

The Concordat with Francis I. by which the pope gave up the right of hearing appeals from France was not many years before the legislation of Henry VIII. in England. Both monarchs proceeded on the same lines; but Francis I. got the pope's con- sent: Henry VIII. acted in invitum, and in time went rather further.

*The Statute of Appeals (24 Hen. VIII. c. 12) takes away appeals to Rome in causes testamentary and matrimonial and in regard to right of tithes, oblations and obventions. Ecckslas- A final appeal is given to the archbishop of the par- ileal juris- ticular province; but in causes touching the king * lctionln a final appeal is given to the Upper House of Con- x "" ' vocation of the province. The statute is aimed at appeals; but the words used in it concerning " citations and all other processes " are wide enough to take away also the " original " jurisdiction of the pope. No appeal was yet given to the crown. Canterbury, York, Armagh, Dublin, Cashel and Tuam are put in the place of Rome. The English and Irish provinces are treated as self-contained. All ends there.*

The " Act of Submission of the Clergy " (25 Hen. VIII. c. 19) took away all appeals to Rome and gave a further appeal, " for lack of justice," from the several courts of the archbishops to the king in chancery. Thence a commission was to issue to persons named therein to determine the appeal definitely. This was copied from the then existent practice in admiralty appeals and was the origin of the so-called court of delegates. It is a moot question whether this statute took away the appeal to the Upper Houses of the various convocations in causes wherein the king was concerned (see Gorham v. Bishop of Exeter, 15 Q.B. 52; Ex parte Bishop of Exeter, 10 C.B. 102; Re Gorham v. Bishop of Exeter, 5 Exch. 630). 37 Hen. VIII. c. 17 provided that married laymen might be judges of the courts Christian if they were doctors of civil law, created in any university. This qualifica- tion even was considered unnecessary in Charles I.'s time (Cro. Car. 258). Canon 127 of 1603 provided that the judges must be learned in the civil and ecclesiastical laws and at least masters of arts or bachelors of laws. Canon Law as a study had been practically prohibited at the universities since 1536 (Merriman, Thomas Cromwell, i. 142-143; Cal. State Papers, vol. ix. p. xxix. 117; Owen, Institutes of Canon Law, viii.). The substitution of "civilians," rather than common lawyers, for canonists (civilians, hitherto, not an important body in England) had important consequences (see Maitland, op. cit. 92 et seq.).

Henry VIII. had exercised his jurisdiction as Supreme Head through a vicar-general. Edward VI. exercised original

jurisdiction in spiritual causes by delegated commissions (see Archdeacon Hale, Precedents in Criminal Cases, p. xlviii.) . Unless the king was to be regarded as an ecclesiastical person, they were not properly ecclesiastical courts; although spiritual persons might sit in them, for they sat only as royal commissioners. The same point has been taken by large bodies of clergy and laity in regard to the court of final appeal created by 25 Hen. VIII. c.io and its present successor the judicial committee of Privy Council (infra: Rep. Com. Ecc. Discipline, pp. 9, 94 et seq.). At any rate the " original " jurisdiction claimed for the monarch personally and his delegates, under Henry VIII. and Edward VI., has not permanently remained. In theory, Hooker's contentions have been conceded that " kings cannot in their own proper persons decide questions about matters of faith and Christian religion " and that " they have not ordinary spiritual power

" (Ecc. Pol. vii. 8, 1, 6; cf. XXXIX. Articles, Art. 37).

Under Henry VIII. a system began of making certain crimes, which previously had been only of spiritual cognizance, felonies (25 Hen. VIII. c. 6), excluding thereby spiritual jurisdiction (Stephen, Hist. Crim. Law, ii. 429). Bigamy (in its modern sense) was thus made felony (1 Jac. I. c. 11). In this reign and the next, temporal courts were sometimes given jurisdiction over purely spiritual offences. A trace of this remains in 1 Edw. VI. c. 1 (still on the statute book; Stephen, Hist. Crim. Law, ii. 439). Other traces occur in the Acts of Uniformity, which make offences of depraving the Book of Common Prayer triable at Assizes (between 23 Eliz. c. 1 and 7 & 8 Vict. c. 102 — also at Sessions) as well as in the courts Christian.

During Edward VI. 's time the courts Christian seem practically to have ceased to exercise criminal jurisdiction (Hale, Precedents in Criminal Cases, p. xlix.). But they sat again for this purpose under Mary and Elizabeth and (save between 1640 and 1661) continued regular criminal sessions till towards the end of the 17th century as continuously and constantly as the king's courts (op. cit.).

The " ordinary " ecclesiastical tribunals of the later middle ages still subsist in England, at least as regards the laity. This is hardly the case elsewhere in the Western Church, though some exceptions are noted below. Nevertheless, their exercise of criminal jurisdiction over the laity is now in practice suspended; although in law it subsists (see Stephen, Hist. Crim. Law; Ray v. Sherwood, 1 Curt. R. 193; 1 Moore P.C.R. 363; the observations of Kelly, C.B., in Mordaunt v. Moncrieffe, L.R. 2 Sc. & Div. 381, and of Lord Coleridge in' Martin v: Mackonochie, L.R. 4 Q.B.D. 770, and, on the other hand, of Lord Penzance in Phillimore v. Machon, L.R. 1 P.D.480). Theoretically still, in cases of sexual immorality, penance may be imposed. Monitions to amend may be decreed and be enforced by significant and writ de con- tumace capiendo, or by excommunication with imprisonment not to exceed six months (53 Geo. III. c. 127). The tribunals thus subsisting are the courts of the bishop and archbishop, the latter sometimes called the court of appeal of the province. Peculiar jurisdictions have been gradually taken away under the operation of the acts establishing the ecclesiastical commissioners. The appeal given to delegates appointed by the crown has been transferred, first by 2 & 3 Will. IV. c. 92 to the privy council, and then by 3 & 4 Will. IV. c. 41 to the judicial committee of the privy council. Bishops may now be summoned as assessors by 39 & 40 Vict. c. 59.

There was in the time of Elizabeth, James I. and Charles I. a " Court of High Commission " with jurisdiction over laity and clergy, based on 1 Eliz. c. i. s. 15, which was reckoned as an ecclesiastical judicature (5 R. 1, Cawdrey's case) concurrent with the ordinary court Christian. It was created by virtue of the royal supremacy, and was taken away by 16 Car. I. c. n. As to its history see Stephen, Hist. Crim. Law, ii. 414-428.

In regard to clerical offences, 3 & 4 Vict. c. 86 (the " Church Discipline Act ") creates new tribunals; and first a commission of inquiry appointed by the bishop of five persons, of whom the vicar-general, or an archdeacon, or a rural dean of the diocese must be one. If they report a prima facie case, the bishop may (with the consent of parties) proceed to sentence. In the absence

of such consent, the bishop may hear the cause with three assessors, of whom one shall be a barrister of seven years' standing and another the dean of the cathedral, or one of the archdeacons, or the chancellor. This court is called the " con- sistory " court, but is not the old consistory. Both these tribunals are new. But the bishop may instead send the cause, in first instance, to the old provincial court, to which appeal lies, if it be not so sent.

The Public Worship Regulation Act (37 & 38 Vict. c. 85) gave criminal jurisdiction over beneficed clerks (concurrent with that of the tribunal under 3 & 4 Vict. c. 86) to the judge under the act in matters of the fabric, ornaments, furniture and decora- tions of churches, and the conduct of divine service, rites and ceremonies. The " judge " under the act is to be a barrister of ten years' standing, or an ex-judge of a superior secular court, appointed by the archbishops of Canterbury and York, with the approval of the crown, or, if they fail to appoint, by the crown. Proceedings under this act are to be deemed to be taken in the appropriate ancient ecclesiastical courts (Green v. Lord Penzance, 6 A. C. 657). The judge under this act became (upon vacancies occurring) ex officio official principal of the arches court of Canterbury and of the chancery court of York. This provision caused grave doubts to be entertained as to the canonical position of this statutory official principal.

Finally, the Clergy Discipline Act 1892 (55 & 56 Vict. c. 32) creates yet a new court of first instance for the trial of clerical offences against morality in the shape of a consistory court, which is not the old court of that name, but is to comprehend the chancellor and five assessors (three clergymen and two laymen chosen from a prescribed list), with equal power with the chancellor on questions of fact. In

many instance? the conviction of a temporal court is made conclusive on the bishop without further trial. In regard to moral offences, jurisdiction under this act is exclusive. But it only applies to clerks holding prefer- ment. Under all these three acts there is a final appeal to the judicial committee of the privy council.

None of these acts applies to the trial of bishops, who are left to the old jurisdictions, or whatever may be held to be the old jurisdictions (with that of the Roman See eliminated). As to suffragan bishops in the province of Canterbury, see Read v. Bishop of Lincoln, 13 P.D. 221, 14 P.D. 88. (On general ques- tions see Phillimore, Ecc. Law, 65, 73.) Despite the bishop of Lincoln's case, the law is in some uncertainty.

Dilapidations are now not made matters of suit before the court, but of administrative action by the bishop.

The subject matter of ecclesiastical jurisdiction has been gradually reduced in England, &c, by various causes. (1) The taking away of all matrimonial, testamentary and aft intestate jurisdiction by 20 & 21 Vict. c. 77 (testamentary, &c, England), c. 79 (testamentary, &c, Ireland), c. 85 (matrimonial, England); 33 & 34 Vict. c. 1 10 (matrimonial, Ireland) . Matrimonial jurisdic- tion was taken from the bishop of Sodor and Man in 1884. (2) Since 6 & 7 Will. IV. c. 71, tithe has become, except in a few rare cases, tithe rent charge, and its recovery has been entirely an operation of secular law. Most kinds of offerings are now recoverable in secular courts. (3) Administration of pious gifts has passed to the court of chancery. (4) The enforcement of contractual promises has long been abandoned by the courts Christian themselves. (5) Church rates can no longer be enforced by suit (31 & 32 Vict. c. 109). (6) Defamation was taken away in England by 18 & 19 Vict. c. 41, and in Ireland by 23 & 24 Vict. c. 32. (7) Laymen can no longer be tried in the spiritual courts for offences against clerks. (8) The jurisdiction for " brawling " in church, &c, is taken away by 23 & 24 Vict. c. 32 in the case of the laity. In the case of persons in holy orders there is a concurrent jurisdiction of the two tribunals (Valancy v. Fletcher, 1897,1 Q.B. 265). This was an offence very frequently prosecuted in the courts Christian (see A. J. Stephens, Ecclesi- astical Statutes, i. 336).

The existing ecclesiastical jurisdiction in England is therefore now confined to the following points. (1) Discipline of the clergy. (2) Discipline of the laity in respect of sexual offences

ECCLESIASTICAL JURISDICTION

as already stated. (3) Control of lay office-bearers, church- wardens, sidesmen, organists, parish clerks, sextons. (4) Pro- tection of the fabrics of churches, of churchyards, ornaments, fittings, &c, sanctioning by licence or faculty any additions or alterations, and preventing or punishing unauthorized dealings by proceedings on the criminal side of the courts. (5) Claims by individuals to particular seats in church or special places of sepulture. (6) Rare cases of personal or special tithes, offerings or pensions claimed by incumbents of benefices. In the Isle of Man and the Channel Islands courts Christian have now jurisdic- tidn substantially as in England. In Jersey and in Guernsey there are courts of first instance with appeal to the bishop of Winchester. Ecclesiastical jurisdiction in Ireland was as in England till the Irish Church was disestablished in 1869 by 32 & 33 Vict. c. 42.

The position of a disestablished or an unestablished Church is comparatively modern, and has given rise to new jural con- ceptions. These Churches are collegia licila and come tlcaf/urls- within the liberty of association so freely conceded in diction la modern times. The relations of their bishops, priests aon-estab- or ther ministers and lay office-bearers inter se and churches. to tn ti r lay folk depend upon contract; and these contracts will be enforced by the ordinary courts of law. A consensual ecclesiastical jurisdiction is thus created, which has to this extent temporal sanction. In foro con- science spiritual censures canonically imposed are as binding and ecclesiastical jurisdiction is as powerful as ever.

Into the British settled colonies no bishops were sent till 1787; and consequently there were no regular courts Christian. The bishop of London was treated as the diocesan bishop of the colonists in North America; and in order to provide for testa mentary and matrimonial jurisdiction it was usual in the letters patent appointing the governor of a colony to name him ordinary. In New York state there is still a court called the surrogates court, surrogate being the regular name for a deputy ecclesi- astical judge. In Lower Canada, by treaty, the Roman Catholic Church remained established.

Throughout the United States, whatever may have been the position in some of them before their independence, the Church has now no position recognized by the State, but is just a body of believers whose relations are governed by contract and with whom ecclesiastical jurisdiction is consensual.

.The position is the same now through all the British colonies (except, as already mentioned, Lower Canada or Quebec) . From i' 787 onwards, colonial bishops and metropolitans were appointed by letters patent which purported to give them jurisdiction for disciplinary purposes. But a series of cases, of which the most remarkable was that Re the Bishop of Natal (3 Moore P.C. N.S. a.d. 1864), decided that in colonies possessing self- governing legislatures such letters patent were of no value; and soon after the crown ceased to issue them, even for crown colonies.

In India the metropolitan of Calcutta and the bishops of Madras and Bombay have some very limited jurisdiction which is conferred by letters patent under the authority of the statutes 53 Geo. III. c. 155 and 3 & 4 Will. IV. c. 85. But the other Indian bishops have no position recognized by the State and no jurisdiction, except consensual.

The Church had the same jurisdiction in Scotland, and exercised it through similar courts to those which she had in Ecclesias- England and France, till about 1570. As late as 1566 thai juris- Archbishop Hamilton of Glasgow, upon his appoint- s!ˆfcf ' na d restitution of his jurisdiction in the probate of testaments and other matters (Keith, History of the Scottish Bishops, Edinburgh, 1824, p. 38). There was an interval of uncertainty, with at any rate titular bishops, till 1502. Then parliament enacted a new system of Church Courts which, though to some extent in its turn superseded by the revival of episcopacy under James VI., was revived or ratified by the act of 1690, c. 7, and stands to this day. It is a Presby- terian system, and the Scottish Episcopal Church is a dis- established and voluntary body since 1690.

The Presbyterian courts thus created are arranged in ascend- ing order :—

(a) Kirk Session consists of the minister of the parish and the " ruling elders " (who are elected by the session). It has cog- nizance of scandalous offences by laymen and punishes them by deprivation of religious privileges. It does not judge ministers (Brodie-Innes, Comparative Principles of the Laws of England and Scotland, 1903, p. 144).

(6) The Presbytery has jurisdiction, partly appellate and partly original, over a number of parishes. There are now eighty- four presbyteries. These courts consist of every parochial minister or professor of divinity of any university within the limits, and of an

elder commissioned from every kirk session. A minister is elected to preside as moderator. These courts judge ministers in first instance for scandalous conduct. As civil courts they judge in first instance all questions connected with glebes and the erection and repair of churches and manses. They regulate matters concerning public worship and ordinances, and have appellate jurisdiction from the kirk session.

(c) The Provincial Synod consists of a union of three or more presbyteries with the same members. There are now sixteen. They meet twice a year to hear appeals from presbyteries. No appeal can go direct to the General Assembly, omisso medio, unless the presbytery have so expressly directed, or unless there be no meeting of synod after the decision of the presbytery before the meeting of General Assembly.

(d) The General Assembly is the supreme ecclesiastical court of this system. It meets annually. The king's " lord high commissioner" attends the sittings; but does not intervene or take part in the court's decisions. The court consists of ministers and elders, elected from the presbyteries in specified proportions, and of commissioners from the four universities, the city of Edinburgh and the royal burghs. The Presbyterian Church in India sends one minister and one elder. The whole Assembly consists of 371 ministers and 333 elders. The juris- diction is entirely appellate. The Assembly appoints a com- mission to exercise some of its functions during the intervals of its session. To this commission may be referred the cognizance of particular matters.

Questions of patronage now (by 37 & 38 Vict. c. 82) belong to the Church courts; but not questions of lapse or stipend. Seats, seat rents, pews, the union and disjunction of parishes and formation of district parishes are of secular jurisdiction. Ques- tions of tithes (or "teinds") and ministers' stipends were referred to commissioners by acts of the Scots parliaments beginning in 1607. The commissioners of teinds became a species of ecclesi- astical court. By Scots act of 1707, c. 9, their powers were transferred to the judges of the court of session, who now con- stitute a " teind court" (Brodie-Innes, op. cit. pp. 138, 139). Matrimonial matters and those relating to wills and succession (called in Scotland " consistorial " causes) were in 1563 taken from the old bishops' courts and given to " commissaries " appointed by the crown with an appeal to the court of session, which by act 1609, c. 6, was declared the king's great consistory. They have remained matters of secular jurisdiction.

The Scots ecclesiastical courts are entitled to the assistance of the secular courts to carry out their jurisdiction by " due assist- ance." Within the limits of their jurisdiction they are supreme. But if a court go outside its jurisdiction, or refuse to exercise powers conferred on it by law, the civil court may " reduce " (i.e. set aside) the sentence and award damages to the party aggrieved.

With the Reformation in the 16th century, Church courts properly speaking disappeared from the non-episcopal religious communities which were established in con ti neB . Holland, in the Protestant states of Switzerland and talBuro- of Germany, and in the then non-episcopal countries P eaa of Denmark and Norway.

Discipline over ministers and other office-bearers was exercised by administrative methods in the form of trials before con- sistories or synods. To this extent ecclesiastical jurisdiction is still exercised in these countries. Consistories and synods have

exercised discipline of a penitential kind over their lay members; but in later times their censures have generally ceased to carry temporal consequences. Ecclesiastical jurisdiction on the civil side for the trial of causes soon disappeared. Heresy has been treated as a crime to be tried in and punished by the ordinary courts of the country, as in the cases of Servetus (q.v.) and Grotius (q.v.).

For the episcopal churches of Sweden and Finland the first constitution or " Church order " was formed in 157 1. It pro- vided for the visitation of the clergy by the bishop, and for the power of the clergy to exclude their lay folk from the Holy Communion, subject to appeal to the bishop. Both minor and major excommunication had been in use, and for a long time public penance was required. The procedure underwent great modification in 1686; but public penance was not taken away till 1855, and then confession to and absolution by the priest in the presence of witnesses was still required. Civil jurisdiction in causes appears to have been given up early (Cornelius, Svenska Kirkaus Historia, Upsala, 1875, pp. 146, 186, 189, 285).

Over the rest of western continental Europe and in the colonies

of Spain, Portugal and France, ecclesiastical jurisdiction remained

generally in the state which we have already described

*Cath'fic ti ˆ near the enc * of the l8t k centurv – The council of countries. Trent took away the jurisdiction of archdeacons in marriage questions. The testamentary jurisdiction disappeared (as already stated) in France. Disputed cases of contract were more often tried in the secular courts. Recourse to the secular prince by way of appel comme d'abus, or otherwise, became more frequent and met with greater encouragement. Kings began to insist upon trying ecclesiastics for treason or other political crimes in secular courts. So under the advice of his minister (the marquis of Pombal), King Joseph of Portugal in 1759-1760 claimed that the pope should give him permission to try in all cases clerics accused of treason, and was not content with the limited permission given to try and execute, if guilty, the Jesuits then accused of conspiring his death (Life of Pombal, by Count da Carnota, 1871, pp. 128, 141). But there was no sudden change in the position of the courts Christian till the French Revolution.*

In France a law of the Revolution (September 1790) purported to suppress all ecclesiastical jurisdictions. On the re-establishing of the Catholic religion on the basis of the new Concordat, promulgated 18 Germinal, year X. (April 8, 1802), no express provision was made for ecclesiastical jurisdictions; but several bishops did create new ecclesiastical tribunals, " officialities " (Migne, Diet, de droit canon., s.v.). The government in some cases recognized these tribunals as capable of judging ecclesi- astical causes (Migne, ubisup.). In 1810 the diocesan official of Paris entertained the cause between Napoleon and Josephine, and pronounced a decree of nullity (Migne, ubi sup. s.v. " Causes "). Such litigation as still continued before the spiritual forum was, however, confined (save in the case of the matrimonial questions of princes) to the professional conduct of the clergy.

Such neighbouring countries as were conquered by France or revolutionized after her pattern took the same course of sup- pressing their ecclesiastical jurisdictions. After 1814, some of these jurisdictions were revived. But the matter is now deter- mined for all countries which have adopted codes, whether after the pattern of the Code Napoleon or otherwise. These countries have created a hierarchy of temporal courts competent to deal with every matter, of which law takes cognizance, and a penal code which embraces and deals with all crimes or delicts which the state recognizes as offences. Hence, even in countries where the Roman Church is established, such as Belgium, Italy, the Catholic states of Germany and cantons of Switzerland, most of the Latin republics of America, and the province of Quebec, and a fortiori where this Church is not

established, there is now no discipline over the laity, except penitential, and no juris- diction exercised in civil suits, except possibly the matrimonial questions of princes (of which there was an example in the case of the reigning prince of Monaco). In Spain causes of nullity and divorce a thoro, in Portugal causes of nullity between

Catholics, are still for the court Christian. In Peru, the old ecclesiastical matrimonial jurisdiction substantially remains (Lehr, Le Manage dans Us principaux pays, 1899, arts. 362, 797, 772, 781). Otherwise these three countries are Code countries. In Austria, the ancient ecclesiastical jurisdiction was taken away by various acts of legislation from 1781 to 1856; even voluntary jurisdiction as to dispensations. The Concordat of 1856 and consequent legislation restored matrimonial jurisdiction to the courts Christian over marriages between Roman Catholics. In 1868 this was taken away. The Austrian bishops, however, maintain their tribunals for spiritual purposes, and insist that such things as divorce a vinculo must be granted by their authority (Aichner, Compendium juris ecclesiastici, pp. 551-553).

By consent and submission of her members, the Roman Church decides in foro conscientiae questions of marriage, betrothal and legitimacy everywhere; but no temporal consequences follow except in Spain, Portugal and Peru.

The position in France was the same as that in Belgium, Italy, &c, till 1906, when the Church ceased to be established. The only Latin countries in which conflict has not arisen appear to be the principality of Andorra and the republic of San Marino (Giron y Areas, Situacidn juridica de la Iglesia CaMica, Madrid, 1905, p. 173 et seq.).

Even as to the discipline of the Roman clergy it is only in certain limited cases that one can speak of ecclesiastical jurisdic- tion. Bishops and beneficed incumbents (cure's) must be regularly tried; and where the Church is established the canonical courts are recognized. But the majority of parishes are served by mere desservants or vicaires, who have no rights and can be recalled and dismissed by mere administrative order without trial (Migne, ubi sup. s.v. "Inamovibilite," "Desservants").

The Napoleonic legislation re-established the appel comme d'abus ("Articles organiques," art. 6). The recourse, was now to the council of state (see Migne, ubi supra, " Officialite ") . But the revocation of

a desservant, and the forbidding him the execu- tion of his ministry in the diocese, was not a case in which the council of state would interfere (Migne, ubi sup. " Appel comme d'abus," "Conseil d'etat").

In those provinces of the Anglican communion where the Church is not established by the state, the tendency is , . rffc _ not to attempt any external discipline over the laity; tioaia but on the other hand to exercise consensual jurisdic- Anglican tion over the clergy and office-bearers through courts nearly modelled on the old canonical patterns.

In the Roman communion, on the other hand, both where the Church is established and where it is not, the tendency is to reduce the status of cur 6 to that of desservant, and to M . deal with all members of the priestly or lower orders jurlsdic- by administrative methods. This practice obtains in tlon of all missionary countries, e.g. Ireland and also in Church of Belgium (S. B. Smith, Elements of Ecclesiastical Law, ° me ' New York, i. 197 et seq.; p. 403 et seq.; Tauber, Manuale juris canonici, Sabariae, 1904, p. 277). In the United States, the 3rd plenary council of Baltimore in 1884 provided that one rector out of ten should be irremovable (Smith, op. cit. i. 197, 419). In England there are few Roman " benefices " (E. Taunton, Law of the Church, London, 1906, s.v. " Benefice "), A desservant has an informal appeal, by way of recourse, to the metropolitan and ultimately to the pope (Smith, op. cit. p. 201). The bishop's " official " is now universally called his vicar- general (except in France, where sometimes an official is appointed eo nomine), and generally exercises both voluntary and con- tentious jurisdiction (op. cit. i. 377). As of old, he must be at least tonsured and without a wife living. At the Vatican Council, a desire was expressed that he should be a priest (ib.). He should be a doctor in theology or a licentiate in canon law (ib. p. 3 78) . Whether a bishop is bound to appoint a vicar-general is still disputed (ib. p. 380; cf. supra; contra, Bouix, Inst. Juris Canon. De Judic. i. 405). In 183 1 the pope enacted that in all the dioceses of the then Pontifical States, the court of first instance for the criminal causes of ecclesiastics should consist of the ordinary and four other judges. In the diocese oi Rome,

com- munion.

the court of the cardinal vicar-general consists of such vicar- general

and four other prelates (Smith , ubi supra). In the Roman communion in England and the United States, there are commissions of investigation appointed to hear in first instance the criminal causes of clerks. They consist of five, or at least three, priests nominated by the bishop in and with the advice of the diocesan synod. In the United States, since 1884, the bishop presides on these commissions. They report their opinions to the bishop, who passes final sentence (ib. ii. 129-131). " Exemptions " now include all the regular religious orders, i.e. those orders which have solemn vows. Over the members of these orders their superiors have jurisdiction and not the bishop. Otherwise if they live out of their monastery, or even within that enclosure so notoriously offend as to cause scandal. In the first case, they may be punished by the ordinary of the place, acting as delegate of the pope without speical appointment {Cone. Trid. Sess. vi. c. 3). In the second case, the bishop may require the superior to punish within a certain time and to certify the punishment to him; in default he himself may punish (Cone. Trid. Sess. xxv. c. 14, cf. Smith, op. cit. i. 204-206). So, regulars having cure of souls are subject to the jurisdiction of the bishop in matters pertaining thereto (ib. p. 206). The exemp- tion of regular religious orders may be extended to religious societies without solemn vows by special concession of the pope, as in the case of the Passionists and Redemptorists (ib. p. 205; Sanguined, Juris ecc. inst., Rome, 1800, pp. 393, 394).

Appeal lies, in nearly all cases, to the metropolitan (Smith, op. cit. pp. 210-223). Metropolitans usually now have a metro- politan tribunal distinct from their diocesan court (ib. ii. 141), but constructed on the same lines, with the metropolitan as judge and his vicar-general as vice- judge. In some " missionary " dioceses, the metropolitan, qua metropolitan, has a separate commission of investigation, to try the criminal causes of clerks, sentence being passed by himself 01 his vicar-general (ib. p. 142).

The next step in the hierarchy, that of "primates" (supra), has " in the present state of the Church " ceased to exist for our purpose (Sanguineti, op. cit. p. 334), as a result of Tridentine legis- lation. The only appellate jurisdiction from the metropolitans is the Roman See. To it also lies a direct appeal from the court of first instance, omisso medio (Smith, op. cit. i. 224). The pope's immediate and original jurisdiction in every diocese is now expressly affirmed by the Vatican Council (ib. p. 239). That original jurisdiction he reserves exclusively to himself in causis majoribus (ib. pp. 249-250). These are (1) causes relating to elections, translations and deprivations of, and criminal pro- secutions against, bishops, and (2) the

matrimonial cases of princes (Taunton, op. cit. s.v. "Cause").

In the Eastern Church, the early system of ecclesiastical judicature long continued. But a sacred character was ascribed to the emperors. They are " anointed lords like the Church. bishops " (Balsamon, in Cone. Ancyr. Can. xii., repre- senting the view of the 12th and 13th centuries). Bishops were often deposed by administrative order of the emperor; synods being expected afterwards to confirm, or rather accept, such order. The germ of this dealing with a major causa may be found in the practice of the Arian emperors in the 4th century. The cause of Ignatius and Photius was dealt with in the 9th century by various synods; those in the East agreeing with the emperor's view for the time being, while those in the West acted with the pope. (The details are in Mansi, Cone, in locis, and in Hefele, Cone, in locis, more briefly. They are sum- marized in Landon, Manual of Councils, s.v." Constantinople," " Rome," and in E. S. Foulkes, Manual of Ecclesiastical History, s.v. "Century IX.") Since these transactions patriarchs have been deposed by the Byzantine emperors; and the Turkish sultans since the 15th century have assumed to exercise the same prerogative.

The spiritual courts in the East have permanently acquired

jurisdiction in the matrimonial causes of baptized persons;

the Mahommedan governments allowing to Christians a personal

law of their own. The patriarch of Constantinople is enabled

vni. 28

to exercise an extensive criminal jurisdiction over Christians (Neale, Hist, of the Eastern Church, i. 30, 31).

The empire of Russia has in the matter of ecclesiastical juris- diction partly developed into other forms, partly systematized 4th century and later Byzantine rules. The provincial system does not exist; or it may be said that all Russia is one province. An exception should be made in the case of Georgia, which is governed by an " exarch," with three suffragans under him. In the remainder of the empire the titles of metropolitan, save in the case of the metropolitan of all Russia, and of archbishop, were and are purely honorary, and their holders have merely a diocesan jurisdiction (see Mouravieff, History of the Russian Church, translated Blackmore, 1842, translator's notes at pp. 370, 390, 416 et seq.). So in Egypt the bishop or " pope " (afterwards patriarch) of Alexandria was the only true metropolitan

(Neale, History of the Eastern Church, Gen. Introd. vol. i. p. in). The metropolitan of Russia from the time of the conversion (a.d. 988) settled at Kiev, and his province was part of the patriarchate of Constantinople, and appeals lay to Constantinople. Many such appeals were taken, notably in the case of Leon, bishop of Rostov (Mouravieff, op. cit. p. 38). The metropolitical see was for a short time transferred to Vladimir and then finally to Moscow (Mouravieff, chs. iv ; , v.). After the taking of Constantinople in 1452, the Russian metropolitans were always chosen and consecrated in Russia, appeals ceased, and Moscow became de facto autocephalous (Joyce, ubi sup. p. 379; Mouravieff, op. cit. p. 126). The tsar Theodore in 1587 exercised the power of the Byzantine emperors by deposing the metropolitan, Dionysius Grammaticus (Mouravieff, p. 125). In 1587 the see of Moscow was raised to patriarchal rank with the consent of Constantinople, and the subsequent concurrence of Alexandria, Antioch and Jerusalem (ib. c. vi.). Moscow became the final court, in theory, as it had long been in practice. Certain religious houses, however, had their own final tribunals and were " peculiars," exempt from any diocesan or patriarchal jurisdiction for at least all causes relating to Church property (ib. p. 131).

! The subject matter of ecclesiastical jurisdiction in Russia during the whole patriarchal period included matrimonial and testamentary causes, inheritance and sacrilege, and many questions concerning the Church domains and Church property, as well as spiritual offences of clergy and laity (ib.). The bishops had consistorial courts; the patriarchs, chanceries and consistories (ib.). Bishops were judged in synod (see, e.g. the case of the archbishop of Polotsk in 1622, ib. p. 179) and only lawfully judged in synod (ib. p. 21.5).

Clerks and the dependants of the metropolitan (afterwards the patriarch) appear to have been immune from secular juris- diction, except in the case of crimes against life, from the time of Ivan the Terrible (ib. pp. 180- 181). The tsar Michael, in the earlier 17th century, confirmed these immunities in the case of the clergy of the patriarch's own diocese, but provided that in country places belonging to his diocese, monasteries, churches and lands should be judged in secular matters by the Court of the Great Palace, theoretically held before the tsar himself (ib. p. 181). This tsar limited the " peculiar " monasteries to three, and gave the patriarch jurisdiction over them (ib.). The next tsar, Alexis, however, by his code instituted a " Monastery Court," which was a secular tribunal composed of laymen, to judge in civil suits against spiritual persons, and in matters arising out of their manors and properties (ib. p.

193). This court was not in opera- tion during the time when the patriarch Nikon was also in effect first minister; but upon his decline exercised its full jurisdiction (ib. p. 216). Nikon was himself tried for abdicating his see, causing disorder in the realm, oppression and violence, first before a synod of Moscow composed of his suffragans and some Greek bishops, and afterwards before another synod in which sat the patriarchs of Alexandria and Antioch, the metropolitans of Servia and Georgia, the archbishops of Sinai and Wallachia, and the metro- politans of Nice, Amasis, Iconium, Trebizond, Varna and Scio, besides the Russian bishops. This synod in 1667 deposed Nikon, degraded him from holy orders, and sentenced him to perpetual penance in a monastery (ib. pp. 2 20- 23 2) . The next tsar, Theodore,

suppressed the secular monastery court," and directed that all suits against spiritual persons should proceed only in the patri- archal " court of requests " (ib. p. 264). There was, however, a species of appel cotnme d'abus. Causes could be evoked to the tsar himself, " when any partiality of the judges in any affair in which they themselves were interested was discovered " (ib.).

The old system was swept away by Peter the Great, who settled ecclesiastical jurisdiction substantially on its present basis. The patriarchate was abolished and its jurisdiction transferred by a council at St Petersburg in 172 1 to a Holy Governing Synod. The change was approved by the four patriarchs of the East in 1723 (ib. chs. xv.xvii.). Peter per manently transferred to the secular forum the testamentary jurisdiction and that concerning inheritance, as also questions of ' ' sacrilege " (ib. p. 264) . As the result of a long series of legislation, beginning with him and ending with Catherine II., all church property of every kind was transferred to secular administration, allowances, according to fixed scales, being made for ministers, monks and fabrics (op. cit. translator's appendix i. p. 413 et seq.). There remain to the spiritual courts in Russia the purely ecclesi- astical discipline of clerks and laity and matrimonial causes.

The court of first instance is the " consistorial court " of the bishop. This consists of a small body of ecclesiastics. Its decisions must be confirmed by the bishop (op. cit. translator's appendix ii. pp. 422-423). In the more important causes, as divorce (i.e. a vinculo), it only gives a provisional decision, which is reported by the bishop,

with his own opinion, for final judgment, to the Most Holy Governing Synod.

The governing synod is the final court of appeal. It consists of a small number of bishops and priests nominated by the tsar, and is assisted by a " procurator," who is a layman, who explains to it the limits of its jurisdiction and serves as the medium of communication between it and the autocrat and secular authorities. It deals with the secular crimes of spiritual persons, if of importance and if not capital (these last being reserved for the secular forum), and with heresy and schism. It is the only court which can try bishops or decree divorce. The tsar formally confirms its judgments; but sometimes reduces penalties in the exercise of the prerogative of mercy (see Moura- vieff, op. cit. ch. xvii. translator's app. ii.).

The governing synod now sits at St Petersburg, but appoints delegated commissions, with a portion of its jurisdiction, in Moscow and Georgia. The latter commission is presided over by the " exarch " (supra).

Since the War of Independence, the kingdom of Greece has been ecclesiastically organized after the model of Russia, as one autocephalous " province," separated from its old patriarchate of Constantinople, with an honorary metropolitan and honorary archbishops (Neale, op. cit. Gen. In trod. vol. i.). The Holy Synod possesses the metropolitical jurisdiction. It sits at Athens. The metropolitan of Athens is president, and there are four other members appointed by the government in annual rotation from the senior bishops. There is attached to it a govern- ment commissioner, with no vote, but affixing his signature to the synodical judgments (Joyce, op. cit. p. 35).

The subject matter of the jurisdiction of Hellenic courts Christian seems to be confined to strictly spiritual discipline, mainly in regard to the professional misconduct of the clergy. Imprisonment may be inflicted in these last cases (ib.). All matrimonial causes are heard by the secular tribunals (Lehr, op. cit. sec. 587).

The bishop's consistorial court, consisting of himself and four priests, has a limited jurisdiction in first instance. Such a court can only suspend for seven days unless with the sanction of the Holy Synod (Joyce, op. cit.).

The Holy Synod can only inflict temporary suspension, or imprisonment for fifteen days, unless with the sanction of the King's

ministry. Deprivation, or imprisonment for more than two months, requires the approval of the king (ib.). The king or the ministry do not, however, rehear the cause by way of appeal, but merely restrain severity of sentence (ib.).

The Church of Cyprus has been autocephalous since at any rate

the oecumenical synod of Ephesus in 431. The episcopate now consists of an archbishop and three suffragans (Hackett, Orthodox Church in Cyprus, 1001, ch. v. et passim). The final court is the island synod, which consists of the archbishop, his suffragans and four dignified priests. It has original and exclusive cogˆ nizance of causes of deposition of bishops (op. cit. pp. 260, 262).

Each bishop is assisted by at least two officers with judicial or quasi-judicial powers, the " archimandrite " who adjudicates upon causes of revenue and the archdeacon who adjudicates on questions between deacons (op. cit. pp. 272-273). The " exarch " of the archbishop, who is a dignitary but not a bishop, has a seat in the provincial synod.

In the Balkan States, the system — inherited from Byzantine and Turkish times — of ecclesiastical jurisdictions prevails, except that they are now autocephalous,and independent of the patriarch > of Constantinople. Matrimonial causes in Servia aire of eccleSiˆ astical cognizance (Lehr, op. cit. sect. 901).

Authorities. — St Augustine, Epistles; Codex Theodosianus, edited by Th. Mommsen and P. M. Meyer (1905) ; Code and Novells of Emperor Justinian, ed. J. Gothofredus (1665); T. Balsamon, "In Cone. Ancyr." in the Corpus juris canonici (1879-1881); " HoSticnSis " Super Decretum; W. Lyndwood, Provinciate (Oxford, 1679); Sir A. Fitzherbert, Natura bnvium (1534); Sir T. Ridley, View of the Civile and Ecclesiastical Law (1607) ; J. Ayliffe, Parergon juris ecclesiastici (1726); J. Godolphin, Abridgement of the Laws. Ecclesiastical (London, 1687) ; E. Gibson, Codex juris ecclesiastici (Oxford, 1761); D. Covarruvias, Opera omnia (Antwerp, 1638); jean Hardouin, Concilia (1715); J. D. Mansi, Concilia (1759-1798);' E. Stillingfleet, Ecclesiastical Jurisdiction (1704) ; L. S. le Nain de Tillemont, Memoires pour servirdl'histoire ecclesiastique (1 701-17 12) ; P. T. Durand de Maillane, Dictionnaire du droit canonique (1761) ; Dictionnaire eccUsiastique et canonique, par une societe de religieux (Paris, 1765) ; Z. B. van Espen, Jus ecclesiasticum universum (Louvain, 1720), De recursu ad Principem, observationes in Con- cilium Lateranense iv.\ L.

Thomassin, Vetus et nova disciplina ecc. (1705-1706); W. Beveridge, Synodicon (Oxford, 1672); J. A. S. da Carnota, Life of Pombal (1843) ; J. P. Migne, Dictionnaire de droit canon. (Paris, 1844); R. Keith, History of the Scottish Bishops (Edinburgh, 1824); P. N. Vives y Cebria, Usages y demas . derechos de Cataluna (1832); C. A. Cornelius, Svenska Kyrkaus Historia (Upsala, 1875); Mouravieff, History of the Russian Church (trans. Blackmore, 1842); Ffoulkes, Manual Of Ecclesiastical History (1851); E. H. Landon, Manual of Councils of the Church (1893); W. H. Hale, Precedents in Criminal Cases (London, 1847) ; E. B. , Pusey, Councils of the Church (Oxford, 1857); C. J. von Hefele, . Conciliengeschichte (Freiburg, 1855-1890); M. Gaudry, Traite de la legislation des cultes (Paris, 1854); W. Stubbs, Select Charters (Oxford, 1895); A. W. Haddan and W; Stubbs, Councils and Ecclesiastical Documents (Oxford, 1869); A. J. Stephens, Ecclesiastical Statutes (1845); H. C. Rothery, Return of Cases before Delegates (1864); J. W. Joyce, The Sword and the Keys (2nd ed., 1881); Report Of Ecclesiastical Courts Commission (1888); P. Fournier, Les Officiality aumoyen&ge (1880); S. B. Smith, Elements of Ecclesiastical Law (New York, 1889-1890); S. Sanguineti, Juris ecc. inst. (Rome, 1890); J. F. Stephen, History of the Criminal Law of England (London, 1883) ; Pollock and Maitland, History of English Law before Edward I. (1898); F. W. Maitland, Roman Canon Law in the Church of England (1898); R. Owen, Canon Law (1884); Sir R. J. Phillimore, Ecclesiastical Law (2nd ed., 1895); J. W. Brodie-Innes, Comparative Principles of the Laws of England and Scotland (1903) ; R. B. Merriman, Life and Letters of Thomas Cromwell (1902) 1 ; S. Aichner, Compendium juris ecclesiasl. (8th ed., Brixen, 1905, especially in regard to Austro-Hungarian Empire) ; J. Hackett, History of the Orthodox Church in Cyprus (1901); Tauber, Manuaie , juris canonici (1906) ; E. L. Taunton, Law of the Church (London, 1906) ; Report of Royal Commission on Ecclesiastical Discipline (1906). (W. G. F. P.)*

ECCLESIASTICAL LAW, in its broadest sense, the sum of the authoritative rules governing the Christian Church, whether in its internal polity or in its relations with the secular power. Since there are various churches, widely differing alike in their principles and practice, it follows that a like difference exists in their ecclesiastical law, which is the outcome of their corporate consciousness as modified by their several relations to the secular authority. At the outset a distinction must be made between churches which are " established " and those that are " free." The ecclesiastical laws of the latter are, like the rules of a private society or club, the concern of

the members of the church only, and come under the purview of the state only in so far as they come in conflict with the secular law (e.g. polygamy among the Mormons, or violation of the trust-deeds under which

the property of a church is held). In the case of " established " Churches, on the other hand, whatever the varying principle on which the system is based, or the difference in its practical application, the essential conditions are that the ecclesiastical law is also the law of the land, the decisions of the church courts being enforced by the civil power. This holds good both of the Roman Catholic Church, wherever this is recognized as the " state religion," of the Oriental Churches, whether closely identified with the state itself (as in Russia), or endowed with powers over particular nationalities within the state (as in the Ottoman empire), and of the various Protestant Churches established in Great Britain and on the continent of Europe.

Writers on the theory of ecclesiastical law, moreover, draw a fundamental distinction between that of the Church of Rome and that of the Protestant national or territorial Churches. This distinction is due to the claim of the Roman Catholic Church to be the only Church, her laws being thus of universal obligation; whereas the laws of the various established Protestant Churches are valid — at least so far as legal obligation is concerned — only within the limits of the countries in which they are established. The practical effects of this distinction have been, and still are, of enormous importance. The Roman Catholic Church, even when recognized as the state religion, is nowhere " established " in the sense of being identified with the state, but is rather an imperium in imperio which negotiates on equal terms with the state, the results being embodied in concordats (q.v.) between the state and the pope as head of the Church. The concordats are of the nature of truces in the perennial conflict between the spiritual and secular powers, and imply in principle no surrender of the claims of the one to those of the other. Where the Roman Catholic Church is not recognized as a state religion, as in the United States or in the British Islands, she is in the position of a " free Church," her jurisdiction is only in foro conscientiae, and her ecclesiastical laws have no validity from the point of view of the state. On the other hand, the root principle of the ecclesiastical law of the established Protestant Churches is the

rejection of alien jurisdiction and the assertion of the supremacy of the state. The theory underlying this may vary. The sovereign may be regarded, as in the case of the Russian emperor or of the English kings from the Reformation to the Revolution, as the vicar of God in all causes spiritual as well as temporal within his realm. As the first fervent belief in the divine right of kings faded, however, a new basis had to be discovered for a relation between the spiritual and temporal powers against which Rome had never ceased to protest. This was found in the so-called "collegial" theory of Church government (Kollegial- system), which assumed a sort of tacit concordat between the state and the religious community, by which the latter vests in the former the right to exercise a certain part of the jus in sacra properly inherent in the Church (see Pufendorf, Samuel). This had great and lasting effects on the development of the theory of Protestant ecclesiastical law on the continent of Europe. In England, on the other hand, owing to the peculiar character of the Reformation there and of the Church that was its outcome, no theory of the ecclesiastical law is conceivable that would be satisfactory at once to lawyers and to all schools of opinion within the Church. This has been abundantly proved by the attitude of increasing opposition assumed by the clergy, under the influence of the Tractarian movement, towards the civil power in matters ecclesiastical, an attitude impossible to justify on any accepted theory of the Establishment (see below).

Protestant ecclesiastical law, then, is distinguished from that of the Roman Catholic Church ® by being more limited in its scope, (2) by having for its authoritative source, not the Church only or even mainly, but the Church in more or less complete union with or subordination to the State, the latter being con- sidered, equally with the Church, as an organ of the will of God. The ecclesiastical law of the Church of Rome, on the other hand, whatever its origin, is now valid only in so far as it has the sanction of the authority of the Holy See. And here it must be noted that the " canon law " is not identical with the " ecclesi- astical law " of the Roman Catholic Church. By the canon law

is meant, substantially, the contents of the Corpus juris canonici, which have been largely superseded or added to by, e.g. the canons of the council of Trent and the Vatican decrees. The long projected codification of the whole of the ecclesiastical law of the Church of Rome, a work of gigantic labour, was not taken in hand until the pontificate of Pius X. (See also Canon Law and Ecclesiastical Jurisdiction.)

The ecclesiastical law of England is in complete dependence upon the authority of the state. The Church of England cannot be said, from a legal point of view, to have a corporate existence or even a representative assembly. The Convocation of York and the Convocation of Canterbury are provincial assemblies possess- ing no legislative or judicial authority; even such purely ecclesiastical questions as may be formally commended to their attention by " letters of business " from the crown can only be finally settled by act of parliament. The ecclesiastical courts are for the most part officered by laymen, whose subordination to the archbishops and bishops is purely formal, and the final court of appeal is the Judicial Committee of the Privy Council. In like manner changes in the ecclesiastical law are made directly by parliament in the ordinary course of legislation, and in point of fact a veiy large portion of the existing ecclesiastical law consists of acts of parliament.

The sources of the ecclesiastical law of England are thus described by Dr. Richard Burn (The Ecclesiastical Law, 9th ed., 1842): — "The ecclesiastical law of England is compounded of these four main ingredients — the civil law, the canon law, the common law, and the statute law. And from these, digested in their proper rank and subordination, to draw out one uniform law of the church is the purport of this book. When these laws do interfere and cross each other, the order of preference is this: — 'The civil law submitteth to the canon law; both of these to the common law; and all three to the statute law. So that from any one or more of these, without all of them together, or from all of them together without attending to their com- parative obligation, it is not possible to exhibit any distinct prospect of the English ecclesiastical constitution.' Under the head of statute law Burn includes ' the Thirty-nine Articles of Religion, agreed upon in Convocation in the year 1562; and in like manner the Rubric of the Book of Common Prayer, which, being both of them established by Acts of Parliament, are to be esteemed as part of the statute law.' "

The first principle of the ecclesiastical law in England is the assertion of the supremacy of the crown, which in the present state of the constitution means the same thing as the supremacy of parliament. This principle has been maintained ever since the Reformation. Before the Reformation the ecclesiastical supremacy of the pope was recognized, with certain limitations, in England, and the Church itself had some pretensions to ecclesiastical freedom. The freedom of the Church is, in fact, one of the standing provisions of those charters on which the English constitution was based. The first provision of Magna Carta is quod ecclesia Anglicana libera sit. By

the various enact- ments of the period of the Reformation the whole constitutional position of the Church, not merely with reference to the pope but with reference to the state, was definitely fixed. The legis- lative power of convocation was held to extend to the clergy only, and even to that extent required the sanction and assent of the crown. The common law courts controlled the jurisdiction of the ecclesiastical courts, claiming to have " the exposition of such statutes or acts of parliament as concern either the extent of the jurisdiction of these courts or the matters depending before them. And therefore if these courts either refuse to allow these acts of parliament, or expound them in any other sense than is truly and properly the exposition of them, the king's great courts of common law may prohibit and control them."

The design of constructing a code of ecclesiastical laws was entertained during the period of the Reformation, but never carried into effect. It is alluded to in various statutes of the reign of Henry VIII., who obtained power to appoint a com- mission to examine the old ecclesiastical laws, with a view of deciding which ought to be kept and which ought to be abolished;

and in the meantime it was enacted that " such canons, institutions, ordinances, synodal or provincial or other ecclesi- astical laws or jurisdictions spiritual as be yet accustomed and used here in the Church of England, which necessarily and con- veniently are requisite to be put in ure and execution for the time, not being repugnant, contrarient, or derogatory to the laws or statutes of the realm, nor to the prerogatives of the royal crown of the same, or any of them, shall be occupied, exercised, and put in ure for the time with this realm " (35 Henry VIII. c. 16, 25 c. 19, 27 c. 8).

The work was actually undertaken and finished in the reign of Edward VI. by a sub-committee of eight persons, under the name of the Reformatio legum ecclesiasticarum, which, however, never obtained the royal assent. Although the powers of the 25 Henry VIII. c. 1 were revived by the 1 Elizabeth c. 1, the scheme was never executed, and the ecclesiastical laws remained on the footing assigned to them in that statute — so much of the old ecclesiastical laws might be used as had been actually in use, and was not repugnant to the laws of the realm.

The statement is, indeed, made by Sir R. Phillimore (Ecclesi- astical Law, 2nd ed., 1895) that the " Church of England has at all times, before and since the Reformation, claimed the right of an independent Church in an independent kingdom, to be governed by the laws which she has deemed it expedient to adopt." This position can only be accepted if it is confined, as the authorities cited for it are confined, to the resistance of inter- ference from abroad. If it mean that the Church, as distinguished from the kingdom, has claimed to be governed by laws of her own making, all that can be said is that the claim has been singularly unsuccessful. From the time of the Reformation no change has been made in the law of the Church which has not been made by the king and parliament, sometimes indirectly, as by confirming the resolutions of convocation, but for the most part by statute. The list of statutes cited in Sir R. Phillimore's Ecclesiastical Law fills eleven pages. It is only by a kind of legal fiction akin to the " collegial " theory mentioned above, that the Church can be said to have deemed it expedient to adopt these laws.

The terms on which the Church Establishment of Ireland was abolished, by the Irish Council Act of 1869, may be mentioned. By sect. 20 the present ecclesiastical law was made binding on the members for the time being of the Church, " as if they had mutually contracted and agreed to abide by and observe the same "; and by section 21 it was enacted that the ecclesiastical courts should cease after the 1st of January 18 71, and that the ecclesiastical laws of Ireland, except so far as relates to matri- monial causes and matters, should cease to exist as law. (See also England, Church of; Establishment; &c.)

Authorities. — The number of works on ecclesiastical law is very great, and it must suffice here to mention a few of the more conspicu- ous modern ones: Ferdinand Walter, Lehrbuch des Kirchenrechts alter christlichen Konfessionen (14th ed., Bonn, 1871); G. Phillips, Kirchenrecht, Bde. i.-vii. (Regensburg, 1845-1872) incomplete; the text-book by Cardinal Hergenrother (q.v.) ; P. Hinschius, Kirchen- recht der Katholiken und Protestanten in Deutschland, 6 Bde. (Berlin, 1869 sqq.), only the Catholic part, a masterly and detailed survey of the ecclesiastical law, finished : Sir Robert Phillimore, Eccl. Law of the Church of England (2nd ed., edited by Sir Walter Phillimore, 2 vols., London, 1895). For further references see Canon Law, and the article " Kirchenrecht " in Herzog-Hauck, Realencyhlo-badie (ed. Leipzig, 1901).

ECCLESIASTICUS (abbreviated to Ecclus.), the alternative title given

in the English Bible to the apocryphal book otherwise called " The Wisdom of Jesus the son of Sirach." The Latin word ecclesiasticus is, properly speaking, not a name, but an epithet meaning " churchly," so that it would serve as a designa- tion of any book which was read in church or received ecclesi- astical sanction, but in practice Ecclesiasticus has become a by-name for the Wisdom of Sirach. The true name of the book appears in the authorities in a variety of forms, the variation affecting both the author's name and the description of his book. The writer's full name is given in 1. 27 (Heb. text) as " Simeon the son of Jeshua (i.e. Jesus) the son of Eleazar the son of Sira." In the Greek text this name appears as " Jesus son of Sirach

Eleazar " (probably a corruption of the Hebrew reading), and the epithet " of Jerusalem " is added, the translator himself being resident in Egypt. The whole name is shortened sometimes to " Son of Sira," Ben Sira in Hebrew, Bar Sira in Aramaic, and sometimes (as in the title prefixed in the Greek cod. B) to Sirach. The work is variously described as the Words (Heb. text), the Book (Talmud), the Proverbs (Jerome), or the Wisdom of the son of Sira (or Sirach).

Of the date of the book we have only one certain indication. It was translated by a person who says that he " came into Egypt in the 38th year of Euergetes the king " (Ptolemy VII.), i.e. in 132 B.C., and that he executed the work some time later. The translator believed that the writer of the original was his own grandfather (or ancestor, tcittos). It is therefore reasonable to suppose that the book was composed not later than the first half of the 2nd century B.C., or (if we give the looser meaning to irawiros) even before the beginning of the century. Arguments for a pre- Maccabean date may be derived (a) from the fact that the book contains apparently no reference to the Maccabean struggles, (b) from the eulogy of the priestly house of Zadok which fell into disrepute during these wars for independence.

In the Jewish Church Ecclesiasticus hovered on the border of the canon; in the Christian Church it crossed and recrossed the border. The book contains much which attracted and also much which repelled Jewish feeling, and it appears that it was necessary to pronounce against its canonicity. In the Talmud (Sanhedrin 100 b) Rabbi Joseph says that it is forbidden to read (i.e. in the synagogue) the book of ben Sira, and further that " if our masters had not hidden the book (i.e. declared it un- canonical), we might interpret the good things which are in it " (Schechter, /. Q. Review, iii. 691-692) . In the Christian Church it was largely used by Clement of Alexandria (c. a.d. 200) and by St Augustine. The lists of the

Hebrew canon, however, given by Melito (c. a.d. 180) and by Origen (c. a.d. 230) rightly exclude Ecclesiasticus, and Jerome(c. a.d. 390-400) writes :"Let the Church read these two volumes (Wisdom of Solomon and Ecclesiasticus) for the instruction of the people, not for establishing the authority of the dogmas of the Church " (Praefatio in libros Salomonis). In the chief MS. of the Septuagint, cod. B, Ecclesiasticus comes between Wisdom and Esther, no distinction being drawn between canonical and uncanonical. In the Vulgate it immediately precedes Isaiah. The council of Trent declared this book and the rest of the books reckoned in the Thirty-nine Articles as apocryphal to be canonical.

The text of the book raises intricate problems which are still far from solution. The original Hebrew (rediscovered in frag- ments and published between 1896 and 1900) has come down to us in a mutilated and corrupt form. The beginning as far as iii. 7 is lost. There is a gap from xvi. 26 to xxx. 11. There are marginal readings which show that two different recensions existed once in Hebrew. The Greek version exists in two forms — (a) that preserved in cod. B and in the other uncial MSS., (b) that preserved in the cursive codex 248 (Holmes and Parsons). The former has a somewhat briefer text, the latter agrees more closely with the Hebrew text. The majority of Greek cursives agree generally with the Latin Vulgate, and offer the fuller text in a corrupt form. The Syriac (Peshitta) version is paraphrastic, but on the whole it follows the Hebrew text. Owing to the mutilation of the Hebrew by the accidents of time the Greek version retains its place as the chief authority for the text, and references by chapter and verse are usually made to it.

Bickell and D. S. Margoliouth have supposed that the Hebrew text preserved in the fragments is not original, but a retranslation from the Greek or the Syriac or both. This view has not com- mended itself to the majority of scholars, but there is at least a residuum of truth in it. The Hebrew text, as we have it, has a history of progressive corruption behind it, and its readings can often be emended from the Septuagint, e.g. xxxvii. n (read Sy ntd! for the meaningless b« -nm). The Hebrew marginal readings occasionally seem to be translations from the Greek or Syriac, e.g. xxxviii. 4 (dw nid for %ktutb > tbapnoKa). More frequently, however, strange readings of the Greek and Syriac

are to be explained as corruptions of our present Hebrew. Substantially our Hebrew must be pronounced original.

The restoration of a satisfactory text is beyond our hopes. Even before the Christian era the book existed in two recensions, for we cannot doubt, after reading the Greek translator's preface, that the translator amplified and paraphrased the text before him. It is probable that at least one considerable omission must be laid to his charge, for the hymn preserved in the Hebrew text after ch. li. 1 2 is almost certainly original. Ancient translators allowed themselves much liberty in their work, and Ecclesiasticus possessed no reputation for canonicity in the 2nd century B.C. to serve as a protection for its text. Much, however, may be done towards improving two of the recensions which now lie before us. The incomplete Hebrew text exists in four different MSS., and the study of the peculiarities of these had already proved fruitful. The Syriac text, made without doubt from the Hebrew, though often paraphrastic is often suggestive. The Greek translation, made within a century or half-century of the writing of the book, must possess great value for the criticism of the Hebrew text. The work of restoring true Hebrew readings may proceed with more confidence now that we have considerable portions of the Hebrew text to serve as a model. For the restoration of the Greek text we have, besides many Greek MSS., uncial and cursive, the old Latin, the Syro-Hexaplar, the Armenian, Sahidic and Ethiopic versions, as well as a consider- able number of quotations in the Greek and Latin Fathers. Each of the two recensions of the Greek must, however, be separately studied, before any restoration of the original Greek text can be attempted. —

The uncertainty of the text has affected both English versions unfavourably. The Authorized Version, following the corrupt cursives, is often wrong. The Revised Version, on the other hand, in following the uncial MSS. sometimes departs from the Hebrew, while the Authorized Version with the cursives agrees with it. Thus the Revised Version (with codd. «, A, B, C) omits the whole of iii. 19, which the Authorized Version retains, but for the clause, " Mysteriesarerevealeduntothemeek," the Authorized Version has the support of the Hebrew, Syriac and cod. 248. Sometimes both versions go astray in places in which the Hebrew text recommends itself as original by its vigour; e.g. in vii. 26, where the Hebrew is,*

Hast thou a wife ? abominate her not. Hast thou a hated wife ? trust not in her.

Again in ch. xxxviii. the Hebrew text in at least two interesting

passages shows its superiority over the text which underlies both

English versions.

Hebrew. Revised Version (similarly

Authorized Version).

ver. 1. Acquaint thyself with a Honour a physician according physician before ihou have to thy need of him with the need of him. honours due unto him.

ver. 15. He that sinneth against He that sinneth before his

his Maker will behave Maker, let him fall into the hands himself proudly against a of the physician, physician.

In the second instance, while the Hebrew says that the man who rebels against his Heavenly Benefactor will a fortiori rebel against a human benefactor, the Greek text gives a cynical turn to the verse, " Let the man who rebels against his true benefactor be punished through the tender mercies of a quack." The Hebrew text is probably superior also in xliv. 1, the opening words of the eulogy of the Fathers: " Let me now praise favoured men," i.e. men in whom God's grace was shown. The Hebrew phrase is " men of grace," as in v. 10. The Greek text of v. 1, " famous men," seems to be nothing but a loose paraphrase, suggested by t. 2, "The Lord manifested in them great glory."

In character and contents Ecclesiasticus resembles the book of Proverbs. It consists mainly of maxims which may be described in turn as moral, utilitarian and secular. Occasionally the author attacks prevalent religious opinions, e.g. the denial of free-will (xv. n-20), or the assertion of God's indifference towards men's actions (xxxv. 12-19). Occasionally, again, Ben Sira

touches the highest themes, and speaks of the nature of God: "He is All" (xliii. 27); "He is One from everlasting" (xlii. 21, Heb. text); " The mercy of the Lord is upon all flesh " (xviii. 13). Though the book is imitative and secondary in character it contains several passages of force and beauty, e.g. ch. ii. (how to fear the Lord); xv. 11-20 (on free-will); xxiv. 1-22 (the song of wisdom); xlii. 15-25 (praise of the works of the Lord); xliv. si- 15 (the well-known praise of famous men). Many detached sayings scattered throughout the book show a

depth of insight, or a practical shrewdness, or again a power of concise speech, which stamps them on the memory. A few examples out of many may be cited. " Call no man blessed before his death " (xi. 28); "He that toucheth pitch shall be defiled" (xiii. 1): " He hath not given any man licence to sin " (xv. 20); " Man cherisheth anger against man; and doth he seek healing from the Lord ? " (xxviii. 3) ; " Mercy is seasonable … as clouds of rain " (xxxv. 20); " All things are double one against another: and he hath made nothing imperfect" (xlii. 24, the motto of Butler's Analogy); " Work your work before the time cometh, and in his time he will give you your reward " (li. 30). In spite, however, of the words just quoted it cannot be said that Ben Sira preaches a hopeful religion. Though he prays, "Renew thy signs, and repeat thy wonders . . . Fill Sion with thy majesty and thy Temple with thy glory" (xxxvi. 6, 14 [19], Heb. text), he does not look for a Messiah. Of the resurrection of the dead or of the immortality of the soul there is no word, not even in xli. 1-4, where the author exhorts men not to fear death. Like the Psalmist (Ps. lxxxviii. 10, n) he asks, " Who shall give praise to the Most High in the grave?" In his maxims of life he shows a somewhat frigid and narrow mind. He is a pessimist as regards women; " From a woman was the beginning of sin; and because of her we all die " (xxv. 24). He does not believe in home-spun wisdom; " How shall he become wise that holdeth the plough ? " (xxxviii. 25). Artificers are not expected to pray like the wise man; " In the handy work of their, craft is their prayer" (v. 34). Merchants are expected to cheat; " Sin will thrust itself in between buying and selling " (xxvii. 2).

Bibliography. — The literature of Ecclesiaticus has grown very considerably since the discovery of the first Hebrew fragment in 1896. A useful summary of it is found at the end of Israel Levi's article, " Sirach," in the Jewish Encyclopedia. Eberhard Nestle's article in Hastings's Dictionary of the Bible is important for its bibliographical information as well as in other respects. A complete edition of the Hebrew fragments in collotype facsimile was published jointly by the Oxford and Cambridge Presses in 1901. J. H. A. Hart's edition of cod. 248 throws much light on some of the problems of this book. It contains a fresh collation of all the chief authorities (Heb., Syr., Syr.-Hex., Lat. and Gr.) for the text, together with a complete textual commentary.

The account given in the Synopsis attributed to Athanasius (Migne, P.G., iv. 375-384) has an interest of its own. The beginning is given in the Authorized V ers i° n as " A prologue made by an uncertain author." (W. E. B.)

ECGBERT, or Ecgberht (d. 839), king of the West Saxons, succeeded to the throne in 802 on the death of Beorhtric. It is said that at an earlier period in his life he had been driven out for three years by Offa and Beorhtric. The accession of Ecgbert seems to have brought about an invasion by /Ethelmund, earl of the Hwicce, who was defeated by Weoxtan, earl of Wiltshire. In 815 Ecgbert ravaged the whole of the territories of the West Welsh, which probably at this time did not include much more than Cornwall. The next important occurrence in the reign was the defeat of Beornwulf of Mercia at a place called Ellandun in 825. After this victory Kent, Surrey, Sussex and Essex sub- mitted to Wessex; while the East Anglians, who slew Beornwulf shortly afterwards, acknowledged Ecgbert as overlord. In 829 the king conquered Mercia, and Northumbria accepted him as overlord. In 830 he led a successful expedition against the Welsh. In 836 he was defeated by the Danes, but in 838 he won a battle against them and their allies the West Welsh at Hingston Down in Cornwall. Ecgbert died in 839, after a reign of thirty-seven years, and was succeeded by his son ˆEthel- wulf. A somewhat difficult question has arisen as to the parentage of Ecgbert. Under the year 825 the Chronicle states

that in his eastern conquests Ecgbert recovered what had been the rightful property of his kin. The father of Ecgbert was called Ealhmund, and we find an Ealhmund, king in Kent, mentioned in a charter dated 784, who is identified with Ecgbert's father in a late addition to the Chronicle under the date 784. It is possible, however, that the Chronicle in 825 refers to some claim through Ine of Wessex from whose brother Ingeld Ecgbert was descended.

See Anglo-Saxon Chronicle, edited by Earle and Plummer (Oxford, 1899); W. de G. Birch, Cartularium Saxonicum (London, 1885-1893). Also a paper by Sir H. H. Howorth in Numismatic Chronicle, third series, vol. xx. pp. 66-87 (reprinted separately, London, 1900), where attention is called to the peculiar dating of several of Ecgbert's charters, and the view is put forward that he remained abroad con- siderably later than the date given by the Chronicle for his accession. On the other hand a charter in Birch, Cart. Sax., purporting to date from 799, contains the curious statement that peace was made between Coenwulf and Ecgbert in that year.

ECGBERT, or Ecgberht (d. 766), archbishop of York, was made

bishop of that see in 734 by Ceolwulf, king of Northumbria, succeeding Wilfrid II. on the latter's resignation. The pall was sent him in 735 and he became the first northern archbishop after Paulinus. He was the brother of Eadberht, who ruled Northumbria 737-758. He was the recipient of the famous letter of Bede, dealing with the evils arising from spurious monasteries. Ecgberht himself wrote a Dialogus Ecclesiasticae Institutionis, a Penitentiale and a Pontificate. He was a corre- spondent of St Boniface, who asks him to support his censure of jEthelbald of Mercia.

See Bede, Continuatio, sub. ann. 732, 735, 766, and Epistola ad Ecgberclum (Plummer, Oxford, 1896): Chronicle, sub ann. 734, 735, 738, 766 (Earle and Plummer, Oxford, 1899) ; Haddan and Stubbs, Councils and Ecclesiastical Documents (Oxford, 1869-1878), iii. 403-431 ; Proceedings of Surtees Society (Durham, 1853).

ECGFRITH (d.685), king of Northumbriaˆsucceeded his father Oswio in 671. He was married to -lEthelthfyth, daughter of Anna of East Anglia, who, however, took the veil shortly after Ecgfrith's accession, a step which possibly led to his long quarrel with Wilfrid archbishop of York. Ecgfrith married a second wife, Eormenburg, before 678, the year in which he expelled Wilfrid from his kingdom. Early in his reign he defeated the Picts who had risen in revolt. Between 671 and 675 Ecgfrith defeated Wulfhere of Mercia and seized Lindsey. In 679, however, he was defeated by yEthelred of Mercia, who had married his sister Osthryth, on the river Trent. Ecgfrith's brother ˆElfwine was killed in the battle, and the province of Lindsey was given up when peace was restored at the intervention of Theodore of Canterbury. In 684 Ecgfrith sent an expedition to Ireland under his general Berht, which seems to have been unsuccessful. In 685, against the advice of Cuthbert, he led a force against the Picts under his cousin Burde, son of Bile, was lured by a feigned flight into their mountain fastnesses, and slain at Nechtanesmere (now Dunnichen) in Forfarshire. Bede dates the beginning of the decline of Northumbria from his death. He was succeeded by his brother Aldfrith.

See Eddius, Vita Wilfridi (Raine, Historians of Church of York, Rolls, Series, London, 1879-1894), 19, 20, 24, 34, 39, 44; Bede, Hist. Eccl. (Plummer, Oxford, 1896), iii. 24, iv. 5, 12, 13, 18, 19, 21, 26.

ECGONINE, in chemistry, C9H15NO3, a cycloheptane derivative with a nitrogen bridge. It is obtained by hydrolysing cocaine with

acids or alkalis, and crystallizes with one molecule of water, the crystals melting at 198 to 199 C. It is laevo-rotatory, and on warming with alkalis gives iso-ecgonine, which is dextro-rotatory. It is a tertiary base, and has also the properties of an acid and an alcohol. When boiled with caustic baryta it gives methyl- amine. It is the carbexylic acid corresponding to tropine, for it yields the same products on oxidation, and by treatment with phosphorus pentachloride 'is converted into anhydroecgonine, C9H13NO2, which, when heated to 280 C. with hydrochloric acid, splits out carbon dioxide and yields tropidine, CsHi 3 N. Anhydroecgonine melts at 235° C, and has an acid and a basic character. It is an unsaturated compound, and on oxidation with potassium permanganate gives succinic acid. It is ap- parently a tropidine monocarboxylic acid, for on exhaustive methylation it yields cycloheptatriene-i-j-s-carboxylic acid-7.

-CHCOOH

NCH 3 CH 2

CHsj— CH CH 2

Hydroecgonidine

(1833-), Spanish

Sodium in amyl alcohol solution reduces it to hydroecgonidine C9H15NO2, while moderate oxidation by potassium perman- ganate converts it into norecgonine. The presence of the hepta- methylene ring in these compounds is shown by the production of suberone by the exhaustive methylation, &c, of hydroecgoni- dine ethyl ester (see Polymethylenes and Tropine). The above compounds may be represented as:

CH 2 — CH— CHCOOH CH 2 CH CHCOOH CHz— CH

I 1 I III II

NCH3CHOH NCH 3 CH

CHz— CH CH 2 CH2— CH CH

Ecgonine Anhydroecgonine

ECHEGARAY Y EIZAGUIRRE, JOSfi

mathematician, statesman and dramatist, was born at Madrid in March 1833, and was educated at the grammar school Of Murcia, whence he proceeded to the Escuela de Caminos at the capital. His exemplary diligence and unusual mathematical capacity were soon noticed. In 18 S3 he passed out at the head of the list of engineers, and, after a brief practical experience at Almeria and Granada, was appointed professor of pure and applied mathematics in the school where he had lately been a pupil. His Problemas de geometric/, analitica (1865) and Teorias modernas de la fisica unidad de las fuerzas materiales (1867) are said to be esteemed by competent judges. He became a member of the Society of Political Economy, helped to found La Revista, and took a prominent part in propagating Free Trade doctrines in the press and on the platform. He was clearly marked out for office, and when the popular movement of 1868 overthrew the monarchy, he resigned his post for a place in the revolutionary cabinet. Between 1867 an d 1874 he acted as minister of educa- tion and of finance; upon the restoration of the Bourbon dynasty he withdrew from politics, and won a new reputation as a dramatist.

As early as 1867 he wrote La Hija natural, which was rejected, and remained unknown till 1877, when it appeared with the title of Para tal culpa tal pena. Another play, La tJltima Noche, also written in 1867, was produced in 1875; but in the latter year Echegaray was already accepted as the successful author of El Libro talonario, played at the Teatro de Apolo on the 18th of February 1874, under the transparent pseudonym of Jorge Hayaseca. Later in the same year Echegaray won a popular triumph with La Esposa del vengador, in which the good and bad qualities — the clever stagecraft and unbridled extra vagance — of his later work are clearly noticeable. From 1874 onwards he wrote, with varying success, a prodigious number of plays. Among the most favourable specimens of his talent may be mentioned En el puno de la espada (1875); O locura 6 sanlidad (1877), which has been translated into Swedish and Italian; En el seno de la muerte (1879), of which there exists an admirable German version by Fastenrath. El gran Galeoto (1881), perhaps the best of Echegaray's plays in conception and execution, has been translated into several languages, and still holds the stage. The humorous proverb, IPiensa mal y acertards? exemplifies the author's limitations, but the attempt is interesting as an instance of ambitious versatility. His susceptibility to new ideas is illustrated in such pieces as Mariana (1892), Mancha que limpia (1895), El Hijo de Don Juan (1892), and El Loco Dios (1900): these indicate a close study of Ibsen, and El Loco Dios more especially might be taken for an

unintentional parody of Ibsen's symbolism.

Echegaray succeeded to the literary inheritance of Lopez de Ayala and of Tamayo y Baus; and though he possesses neither the poetic imagination of the first nor the instinctive tact of the second, it is impossible to deny that he has reached a larger audience than either. Not merely in Spain, but in every land where Spanish is spoken, and in cities as remote from Madrid as Munich and Stockholm, he has met with an appreciation in- comparably beyond that accorded to any other Spanish dramatist of recent years. But it would be more than usually rash to prophesy that this exceptional popularity will endure. There have been signs of a reaction in Spain itself, and Echegaray's return to politics in 1905 was significant enough. He applies

his mathematics to the drama; no writer excels him in artful construction, in the arrangement of dramatic scenes, in mere theatrical technique, in the focusing of attention on his chief personages. These are valuable gifts in their way, andEchegaray has, moreover, a powerful, gloomy imagination, which is moment- arily impressive. In the drawing of character, in the invention of felicitous phrase, in the contrivance of verbal music, he is deficient. He alternates between the use of verse and prose; and his hesitancy in choosing a medium of expression is amply justified, for the writer's prose is not more distinguished than his verse. These serious shortcomings may explain the diminution of his vogue in Spain; they will certainly tell against him in the estimate of posterity. (J. F.-K.)

iCHELON (Fr. from Mtelle, ladder), in military tactics, a formation of troops in which each body of troops is retired on, but not behind, the flank of the next in front, the position of the whole thus resembling the steps of a staircase. To form echelon from line, the parts of the line move off, each direct to its front, in succession, so that when the formation is completed the rightmost body, for example, is farthest advanced, the one originally next on its left is to the left rear, a third is to the left rear of the second, and so on. The word is also used more loosely to express successive lines, irrespective of distances and relative positions, e.g. the " second echelon of ammunition supply," which is fully a day's march behind the first.

ECHIDNA, or Porcupine Ant-Eater {Echidna aculeata), one of the few species of Monotremata, the lowest subclass of Mammalia, forming the family Echidnidae. It is a native of Australia, where it chiefly abounds in New South Wales, inhabit- ing rocky and mountainous districts, where it burrows among the loose sand, or hides itself in crevices of rocks. In size and appearance it bears a considerable resemblance to the hedgehog, its upper surface being covered over with strong spines directed backwards, and on the back inwards, so as to cross each other on the middle line. The spines in the neighbourhood of the tail form a tuft sufficient to hide that almost rudimentary organ. The head is produced into a long tubular snout, covered with skin for the greater part of its length. The opening of the mouth is small, and from it the echidna puts forth its long slender tongue, lubricated with a viscous secretion, by means of which it seizes the ants and other insects on which it feeds. It has no teeth. Its legs are short and strong, and form, with its broad feet and large solid nails, powerful burrowing organs. In common with the other monotremes, the male echidna has its heel provided with a sharp hollow spur, connected with a secret- ing gland, and with muscles capable of pressing the secretion from the gland into the spur. It is a nocturnal or crepuscular animal, generally sleeping during the day, but showing considerable activity by night. When attacked it seeks to escape either by rolling itself into a ball, its erect spines proving a formidable barrier to its capture, or by burrowing into the sand, which its powerful limbs enable it to do with great celerity. " The only mode of carrying the creature," writes G. Bennett (Gatherings of a Naturalist in Australasia), " is by one of the hind legs; its powerful resistance and the sharpness of the spines will soon oblige the captor, attempting to seize it by any other part of the body, to relinquish his hold." In a younger stage of their development, however, the young are carried in a temporary abdominal pouch, to which they are transferred after hatching, and into which open the mammary glands. The echidnas are exceedingly restless in confinement, and constantly endeavour by burrowing to effect their escape. From the quantity of sand and mud always found in the alimentary canal of these animals, it is supposed that these ingredients must be necessary to the proper digestion of their insect food.

There are two varieties of this species, the Port Moresby echidna and the hairy echidna. The last-mentioned is found in south-eastern New Guinea, Australia and Tasmania. In all the spines are mixed with hair; in the Tasmanian race they are nearly hidden by the long harsh fur. Of the three-clawed echidnas (Proechidna) confined to New

Guinea there are two species, Bruijn's echidna (P. bruijnii), discovered in 1877 in the

mountains on the north-east coast at an elevation of 3500 ft., and the black-spined echidna (P. nigroaculeata) of larger size — the type specimen measuring 31 in., as against 24 in. — with shorter claws. . ,,

ECHINODERMA. 1 The exwoiJepjua, or " urchin-skinned " animals, have long been a favourite subject of study with the collectors of sea-animals or of fossils, since the lime deposited in their skins forms hard tests or shells readily preserved in the cabinet. These were described during the 18th and first half of the 19th centuries by many eminent naturalists, such as J. T. Klein, J. H. Linck, C. Linnaeus, N. G. Leske, J. S. Miller, L. v. Buch, E. Desor and L. Agassiz; but it was the researches of Johannes Miiller (1840-1850) that formed the groundwork of scientific conceptions of the group, proving it one of the great phyla of the animal kingdom. The anatomists and embryo- logists of the next quarter of a century confirmed rather than expanded the views of Miiller. Thus, about 1875, the distinction of Echinoderms from such radiate animals as jelly-fish and corals (see Coelentera), by their possession of a body-cavity (" coelom ") distinct from the gut, was fully realized; while their severance from the worms (especially Gephyrea), with which some Echinoderms were long confused, had been necessi- tated by the recognition in all of a radial symmetry, impressed on the original bilateral symmetry of the larva through the growth of a special division of the coelom, known as the " hydrocoel," and giving rise to a set of water-bearing canals — the water- vascular or ambulacral system. There was also sufficient com- prehension of the differences between the main classes of Echinoderms — the sea-urchins or Echinoidea, the starfish or Asteroidea,the brittle-stars and their allies known as Ophiuroidea, the worm-like Holothurians, the feather-stars and sea-lilies called Crinoidea, with their extinct relatives the sac-like Cystidea, the bud-formed Blastoidea, and the flattened Edrioasteroidea — while within the larger of these classes, such as Echinoidea and Crinoidea, fair working classifications had been established. But the study that should elucidate the fundamental similarities or homologies between the several classes, and should suggest the relations of the Echinoderma to other phyla, had scarcely begun. Indeed, the time was not ripe for such discussions, still less for the tracing of lines of descent and their embodiment in a genealogical classification. Since then exploring expeditions have made known a host of new genera, often exhibiting un- familiar types of structure.

Among these the abyssal starfish and holothurians described by W. P. Sladen and H. Theel respectively, in the Report of the " Challenger " Expedition, are most notable. The sea-urchins, ophiuroids and crinoids also have yielded many important novelties to A. Agassiz (" Challenger," " Blake," and " Albatross " Ex- peditions), T. Lyman (" Challenger "), Sladen (" Astrophiura," Ann. Mag. Nat. Hist., 1879), F. J. Bell (numerous papers in Ann. Mag. Nat. Hist, and in Proc. Zool. Soc), E. Perrier (" Travailleur " and " Talisman," Cape Horn and Monaco Expeditions), P. H. Carpenter (" Challenger" Reports), and others. The anatomical researches of these authors, as well as those of S. Lov6n (" On Pourtalesia " and " Echinologica," published by the Swedish Academy of Science), H. Ludwig {Morphologisclie Studien, Leipzig, 1877-1882), O. Hamann (Histologic der Echinodermen, Jena, I 883-1889), L. Cuenot (" fitudes morphologiques," Arch. Biol., 1891, and papers therein referred to), P. M. Duncan (" Revision of the Echinoidea," Journ. Linn. Soc, 1890), H. Prouho (" Sur Dorocidaris," Arch. Zool. Exper., 1888), and many more, need only be mentioned to recall the great advance that has been made. In physiology may be instanced W. B. Carpenter's proof of the nervous nature of the chambered organ and axial cords of crinoids (Proc. Roy. Soc, 1884), the researches of H. Durham (Quart. Journ. Micr. Sci., 1891) and others into the wandering cells of the body-cavity, and the study of the deposition of the skeletal substance (" stereom ") by Theel (in Feslskrift for Lilljeborg, 1896). Knowledge of the development has been enormously extended by numerous embryologists, e.g. Ludwig (op. cit.), E. W. MacBride (" Asterina gibbosa," Quart. Journ. Micr. Sci., 1896), H. Bury (Quart. Journ. Micr. Sci., 1889, 1895), Seeliger (on " Antedon," Zool. Jahrb., 1893), S. Goto (" Asterias pallida," Journ. Coll. Sci. Japan, 1896), C. Grave (" Ophiura," Mem. Johns Hopkins

1 Sometimes called " Echinodermata," a Greek name meaning " sea-urchin-skins," which was invented by J. T Klein (1734) to denote the tests of the Echini or sea-urchins; its later use for the animals themselves, or for the whole phylum, was an error in both history and etymology.

Univ., 1899), Th6el (" Echinocyamus," Nov. Act. Soc. Set. Upsala, 1892), R. Semon (" Synapta," Jena. Zeilschr., 1888), and Loven (opp. citt.) ; and though the theories based thereon may have been fantastic and contradictory, we are now near the time when the

results can be co-ordinated and some agreement reached. But the scattered details of comparative anatomy are capable of manifold arrangement, while the palimpsest of individual development is not merely fragmentary, but often has the fragments misplaced. The morphologist may propose classifications, and the embryologist may erect genealogical trees, but all schemes which do not agree with the direct evidence of fossils must be abandoned; and it is this evidence, above all, that gained enormously in volume and in value during the last quarter of the 19th century. The Silurian crinoids and cystids of Sweden have been illustrated in N. P. Angelin's Iconographia crinoideorum (1878) ; the Palaeozoic crinoids and cystids of Bohemia are dealt with in J. Barrande's Systeme silurien (1887 and 1899); P. H. Carpenter published important papers on fossil crinoids in the Journal of the Geological Society, on Cystidea in that of the Linnean Society, 1891, and, together with R. Etheridge, jun., compiled the large Catalogue of Blastoidea in tlie British Museum, 1886; O. Jaekel, in addition to valuable studies on crinoids and cystids appearing in the Zeitschrift of the German Geological Society, has published the first volume of Die Stammesgeschichte der Pelmato- zoen (Berlin, 1899), a richly suggestive work; the Mesozoic Echino- derms of France, Switzerland and Portugal have been made known by P. de Loriol.G. H. Cotteau, J. Lambert, V. Gauthier and others (see Paleontologie Jrancaise, Mem. Soc. paleontol. de la Suisse, Trabalhos Comm. Geol. Portugal, &c.) ; a beautiful and interesting Devonian fauna from Bundenbach has been described by O. Foll- mann, Jaekel, and especially B. Stiirtz (see Verhandl. nat. Vereins preuss. Rheinlande, Palaont. Abhandl., and Palaeontographica); while the multitude of North American palaeozoic crinoids has been attacked by C. Wachsmuth and F. Springer in the Proceedings (1879, 1881, 1885, 1886), of the Philadelphia Academy and the Memoirs (1897) of the Harvard Museum,

The vast mass of material made known by these and many other distinguished writers has to be included in our classification, and that classification itself must be controlled by the story it revea^ Thus it is that a change, characteristic of modern systematic zoology, is affecting the subdivisions of the classes. It is not long since the main lines of division corresponded roughly to gaps in geological history: the orders were Palaeo- crinoidea and Neocrinoidea, Palechinoidea and Euechinoidea, Palaeasteroidea and Euasteroidea, and so forth. Or divisions were based upon certain modifications of structure which, as we now see, affected assemblages of diverse affinity: thus both Blastoidea and Euechinoidea were divided into Regularia and

Irregularia; the Holothuroidea into Pneumophora and Apneumona; and Crinoids were discussed under the heads " stalked " and " unstalked." The barriers between these groups may be regarded as horizontal planes cutting across the branches of the ascending tree of life at levels determined chiefly by our ignorance; as knowledge increases, and as the conception of a genealogical classification gains acceptance, they are being replaced by vertical partitions which separate branch from branch. The changes may be appreciated by comparing the systematic synopses at the end of this article with the classifica- tion adopted in 1877 in the 9th edition of the Ency. Brit. (vol. vii.) , or in any zoological text-book contemporary therewith. In the present stage of our knowledge these minor divisions are the really important ones. For, whereas to one brilliant suggestion of far-reaching homology another can always be opposed, by the detailed comparison of individual growth-stages in carefully selected series of fossils, and by the minute application to these of the principle that individual history repeats race history, it actually is possible to unfold lines of descent that do not admit of doubt. The gradual linking up of these will manifest the true genealogy of each class, and reconstruct its ancestral forms by proof instead of conjecture. The problem of the interrelations of the classes will thus be reduced to its simplest terms, and even questions as to the nature of the primitive Echinoderm and its affinity to the ancestors of other phyla may become more than exercises for the ingenuity of youth. Work has been and is being done by the laborious methods here alluded to, and though the diversity of opinion as to the broader groupings of classification is still restricted only by the number of writers, we can point to an ever-increasing body of assured knowledge on which all are agreed. Unfortunately such allusion to thesfe disconnected certainties as alone might be introduced here would be too brief

for comprehension, and we are forced to select a few of the broader hypotheses for a treatment that may seem dogmatic and prejudiced.

Calycinal Theory. — The theory which had most influence on the conceptions of Echinoderms in the two concluding decades of the 19th century was that of Loven, elaborated by P. H. Carpenter, Sladen and others. This, which may be called the calycinal theory,

'arms

rat.

(Area.

stem.

race.

000

Vo°O u

o

'•PC,

•"•p'o

Fig. 1. — Diagram of a simple form of Crinoid, with five arms, each forking once ; the one nearest the observer is removed to expose the tegmen of five orals. This crinoid has only two circlets of plates in the cup, but the cup analysed in the adjoining diagram has in addition infrabasals and a centrale C.

will be appreciated by comparing the structure of a simple crinoid with that of some other types. A crinoid reduced to its simplest elements consists of three principal portions — (1.) a theca or test enclosing the viscera; (ii.) five arms stretching upwards or outwards from the theca, sometimes single, sometimes branching; (iii.) a stem stretching downwards from the theca and attaching it to the sea-floor (see fig. 1). That part of the theca below the origins of the free arms is called the " dorsal cup "; the ventral part above the origins of the arms, serving as cover to the cup, is known as the " tegmen." All these parts are supported by plates or ossicles of crystalline carbonate of lime. The cup, in its simplest form, consists of two circlets of five plates. Each plate of the upper circlet supports an arm, and is called a " radial " ; the plates of the lower circlet, the " basals," rest on the stem and alternate with those of the upper circlet, i.e. are interradial in position. Some crinoids have yet another circlet below these, the constituent plates of which are called " infrabasals," and are situated radially. The tegmen in most primitive forms, as well as in the embryonic stages of the living Antedon (fig. 2), con- sists of five large triangular plates, alter- nating with the radials, and called " orals," because they roof over the mouth. In

addition to these three or four circlets of stage" in "the 'deveTopˆ- plates, two other elements were once sup- ment of Antedon, show- posed essential to the ideal crinoid : the ; n g j ne foot-plate or dorso- central and the oro-central. The << dorso-central " fp at former

term was applied to a flattened plate the enc [f the stem observed in the embryonic stage of a single co / Some of the genus (Antedon) at that end of the stem thecal plates infra- attached to the sea-floor, and comparable to basals / B basals B the foot of a wine-glass (fig. 2). In some and ora)s q are form- crinoids which have no trace of a stem mg aroun d the body- (e.g. Marsupites) a pentagonal plate is cav i t ies r.pc and l.pc; found at the bottom of the cup, where the p ; s t he water-pore, stem would naturally have arisen (" cen- (After Seeliger.) trale " in fig. 1) ; and since it was believed that the stem always grew by addition

of ossicles immediately below the infrabasals, it was inferred that this pentagonal plate was the centro-dorsal in its primi- tive position, as though the wine-glass had been evolved from a tumbler by pulling the bottom out to form the foot. The oro- central was, it must be admitted, a theoretical conception due to a desire for symmetry, and was not confirmed by anything

Fig.

COf^jLyip

early

better than some erroneous observations on certain fossils, which were supposed to show a plate at the oral pole between the five orals; but this plate, so far as it exists at all, is now known to be nothing but an oral shifted in position. The theory was that all the plates just described, and more particularly those of the cup, which were termed ” the calycinal system,” could be traced, not merely in all crinoids, but in all Echinoderms, whether fixed forms such as cystids and blastoids, or free forms such as ophiuroids and echinoids, even — with the eye of faith — in holothurians. It was admitted that these elements might atrophy, or be displaced, or be otherwise obscured ; but their complete and symmetrical disposition was regarded as typical and original. Thus the genera exhibiting it were regarded as primitive, and those orders and classes in which it was least obscured were supposed to approach most nearly the ancestral Echinoderm. Every one knows that an ” apical system,” composed of two circlets known as ” genitals ” or basals and ” oculars ” or radials, occurs round the aboral pole of echinoids (fig. 3, A), and

mwdreportfe

lermi.

•genital, ambulacrum:

•pˆVL— -terminal

A

/4 yoral u/itA

/Q \}\ /water pore.

)oCXO'

water

ˆradiat

l/asctl, infra-Oasal

C , D

Fig. 3.— Supposed calycinal systems of free-moving Echinoderms. A, regular sea-urchin (Cidaris); B, sea-urchin with a suranal plate (Salenia); C, developing ophiurid (Amphiura) ; D, young starfish (Zoroaster).

that a few genera (e.g. Salenia, fig. 3, B) possess a sub-central plate (the " suranal "), which might be identified with the centro-dorsal. It is also the case that many asterids (fig. 3, D) and ophiurids (fig. 3, C) have a similar arrangement of plates on the dorsal (i.e. aboral) surface of the disk. Accepting the homology of these apical systems with the calycinal system, the theory would regard the aboral pole of a sea-urchin or starfish as corresponding in everything, except its relations to the sea-floor, with the aboral pole of a fixed echinoderm. The theory has been vigorously opposed, notably by Semon (op. oil.), who saw in the holothurians a nearer approach to the ancestral form than was furnished by any calyculate echinoderm, and by the Sarasins, who derived the echinoids from the holothurians through forms with flexible tests (Echinothuridae, which, however, are now known to be specialized in this respect). The support that appeared to be given to the theory by the presence of supposed calycinal plates in the embryo of echinoids and asteroids has been, in the opinion of many, undermined by E. W. MacBride (op. cit.), who has insisted

that in the fixed stage of the developing starfish, Asterina, the relations of these plates to the stem are quite different from those which they bear in the developing and adult crinoid. But, however correct the observations and the homologies of MacBride may be, they do not, as Bury (op. cit.) has well pointed out, afford sufficient grounds for his inference that the abactinal (i.e. aboral) poles of starfish and crinoids are not comparable with one another, and that all conclusions based on the supposed homo- logy of the dorso-central of echinoids and asteroids with that of crinoids are incorrect. Bury himself, however, has inflicted a severe blow on the theory by his proof that the so-called oculars of Echinoidea, which were supposed to represent the radials, are homologous with the " terminals " (i.e. the plates at the tips of the rays) in Asteroidea and Ophiuroidea, and therefore not homo- logous with the radially disposed plates often seen around the aboral pole of those animals. For, if these radial constituents of the sup- posed apical system in an ophiurid have really some other origin,

why can we not say the same of the supposed basals? Indeed, Bury is constrained to admit that the view of Semon and others may be correct, and that these so-called calycinal systems may not be heir-looms from a calyculate ancestor, but may have been independently developed in the various classes owing to the action of similar causes. That this view must be correct is urged by students of fossils. Palaeontology lends no support to the idea that the dorso- central is a primitive element ; it exists in none of the early echinoids, and the suranal of Saleniidae arises from the minor plates around the anus. There is no reason to suppose that the central apical plate of certain free-swimming crinoids has any more to do with the distal foot-plate of the larval Anledon stem than has the so-called centro- dorsal oiAntedon itself, which js nothing but the compressed proximal end of the stem. As for the supposed basals of Echinoidea, Aste- roidea and Ophiuroidea, they are scarcely to be distinguished among the ten or more small plates that surround the anus of Bothriocidaris, which is the oldest and probably the most ancestral of fossil sea- urchins (fig. 5). A calycinal system may be quite apparent in the later Ophiuroidea and in a few Asteroidea, but there is no trace of it in the older Palaeozoic types, unless we are to transfer the appella- tion to the terminals. Those plates are perhaps constant throughout sea-urchins and starfish (though it would puzzle any one to detect them in certain Silurian echinoids), and they may be traced in some of the fixed echinoderms; but there is no proof that they represent the radials of a simple crinoid, and there are certainly many cystids in which no such plates existed. Lov6n and M. Neumayr adduced the

Triassic sea-urchin Tiarechinus, in which the apical system forms half of the test, as an argument for the origin of Echinoidea from an ancestor in which the apical system was of great importance ; but a genus appearing so late in time, in an isolated sea, under conditions that dwarfed the other echinoid dwellers therein, cannot seriously be thought to elucidate the origin of pre-Silurian Echinoidea, and the recent discovery of an inter- mediate form suggests that we have here nothing but degenerate descendants of a well-known Palaeozoic family (Lepidocentridae). But to pursue the tale of isolated instances would be wearisome. The calycinal theory is not merely an assertion of certain homo- logies, a few of which might be disputed without affecting the rest : it governs our whole conception of the echinoderms, because it implies their descent from a calyculate ancestor — not a " crinoid- phantom," that bogey of the Sarasins, but a form with definite plates subject to a quinqueradiate arrangement, with which its internal organs must likewise have been correlated. To this in- genious and plausible theory the revelations of the rocks are more and more believed to be opposed.

Pentactaea Theory. — In opposition to the calycinal theory has been the Pentactaea theory of R. Semon. There have always been many zoologists prepared to ascribe an ancestral character to the holothurians. The absence of an apical system of plates ; the fact that radial symmetry has not affected the generative organs, as it has in all other recent classes; the well- developed muscles of the body-wall, sup- posed to be directly inherited from some worm-like ancestor; the presence on the inner walls of the body in the family Synaptidae of ciliated funnels, which have been rashly compared to the excretory organs (nephridia) of many worms; the outgrowth from the rectum in other genera of caeca (Cuvierian organs and respiratory trees), which recall the anal glands of the Gephyrean worms; the absence of podia

(tube-feet) in many genera, and even of the P T . p

radial water- vessels in Synaptidae; the , , , 4 : • IT'

absence of that peculiar structure known i ? ctula , stage "1 the . in other echinoderms by the names " axial development of organ," "ovoid gland," &c; the simpler ˆy na P ta – form of the larva— all these features have, T, The five inter- for good reason or bad, been regarded as radial tentacles,

primitive. Some of the more striking of M > The .water -pore, these features are confined to Synaptidae; leading by the

in that family too the absence of the radial stone -canal stc

water-vessels from the adult is correlated t? the water-

with continuity of the circular muscle-layer, » n g> f rom which

while the gut runs almost straight from the hangs a Pohan

anterior mouth to the posterior anus. Early vesicle pb.

in the life-history of Synapta occurs a stage oc ‘ Supposed oto- with five tentacles around the mouth, and cysts.

into these pass canals from the water-ring, m < Longitudinal the radial canals to the body-wall making a muscles,

*subsequent, and only temporary, appearance ˆ> Calcareous spicules, (fig. 4). Semon called this stage the Pen- *t, Stomach. tactula, and supposed that, in its early (After Semon.) history, the class had passed through a similar stage, which he called the Pentactaea,*

and regarded as the ancestor of all Echinoderms. It has since been proved that the five tentacles with their canals are interradial, so that one can scarcely look on the Pentactula as a primitive stage, while the apparent simplicity of the Synaptidae, at least as compared with other holothurians, is now believed to be the result of regressive

changes. The Pentactaea, at all events as it sprang from the brain of Semon, must pass to the limbo of mythological ancestors.

Pelmatozoic Theory. — The rejection of the calycinal and Pentactaea theories need not scatter our conceptions of Echinoderm structure back into the chaos from which they seemed to have emerged. The idea of a ealyculate ancestor, though by no means connoting fixation, turned men’s minds in the direction of the fixed forms, simply because in them the calyx was best developed. The Pentactaea again suggested a search for some primitive type in which quinqueradiate symmetry was exhibited in circumoral appendages, but had not affected the nervous, water-vascular, muscular or skeletal systems to any great extent, and the generative organs not at all. Study of the earliest larval stages has always Jed to the

conclusion that the Echinoderms must have descended from some freely-moving form with a bilateral symmetry, and, connecting this with the ideas just mentioned, we reach the conception that this supposed bilateral ancestor (or Dipleurula) may have become fixed, and may have gradually acquired a radial symmetry in consequence of its sedentary mode of life. The different extent of quinqueradiate symmetry in the different classes would thus depend on the period at which they diverged from the sedentary stock. The tracing of this history, and the explanation of the general characters of Echinoderms and of the differentiating features of the classes in accordance therewith, con- stitutes the Pelmatozoic theory.

The word " Pelmatozoa " literally means " stalked animals," but the name is now used to denote all Cystidea, Blastoidea, Crinoidea and Edrioasteroidea, as opposed to the other classes, which may be called Eleutherozoa. Many Pelmatozoa have, it is true, no stalk, while some are freely-moving, but all agree in the possession of certain characters obviously connected with a fixed mode of life. Thus, the mouth is central and turned away from the sea-floor; the animal does not seize its food by tentacles, limbs or jaws, neither does it move in search of it, but a series of ciliated grooves which radiate from the mouth sweep along currents of water, in the eddies of which minute food-particles are caught up and carried down into the gullet ; the undigested food is driven out through an anus which is on the upper or oral side of the theca, but as far distant as practicable from the mouth and ciliated grooves. Such characters are found in any primitive, sedentary group. More peculiarly Echinoderm features, in which the Pelaiatozoan nature is manifest, are the enclosing of the viscera in a calfffied and plated theca, for protection against those enemies from which a fixed animal Cannot flee ; the development, at the aboral pole of this theca, of a motor nerve-centre giving off branches to the stroma connecting the various plates of the theca and of its brachial, anal, and columnar extensions, and thus co-ordinating the movements of the whole skeleton ; the absence of suckers from the podia, which, when present, are respiratory, not locomotor, in function. There are other features of most, if not all, Pelmatozoa that appear to be due to a fixed existence; but those are also found in the Eleutherozoa. The Pelmatozoic theory thus regards the Pelmatozoa as the more ancestral forms, and the Pelmatozoan stage as one that must have been passed through by all Echinoderms during their evolution from the Dipleurula. It might be possible to prove the origin of all classes from Pelmatozoa, without thereby explaining the origin of such fundamental features as radial symmetry, the developmental metamorphosis, and the torsion that

affects both gut and body-cavities during that process ; but the acceptance of a Dipleurula as the common ancestor necessi- tates an explanation of these features. Such explanation is an integral part of the Pelmatozoic theory, but is provided by no other.

The evidence for the Pelmatozoic theory is supplied by palaeon- tology, embryology, the comparative anatomy of the classes, and a consideration of other phyla. Palaeontology, so far as it goes, is a sure guide, but some of the oldest fossiliferous rocks yield remains of distinctly differentiated crinoids, asteroids and echinoids, so that the problem is not solved merely by collecting fossils. Two lines of argument appear fruitful. First, a comparison of the relative numbers of the representatives of the various classes at different epochs; according to this they may be placed in the following order, with the oldest first : Cystidea, Crinoidea, Blastoidea, Asteroidea, Ophiuroidea, Echinoidea. As for Holothuroidea, the fossil evidence allows us to say no more than that the class existed in early Carboniferous times, if not before. The second method is to work out by slow and sure steps the lines of descent of the different families, orders, and classes, and so either to arrive at the ancestral form of each class, or to plot out the curve of evolution, which may then legitimately be projected into " the dark backward and abysm of time." In this way the many highly modified orders of Cystidea may be traced back to a simple, many-plated ancestor with little or no radiate symmetry (see below). All the complicated structures of Blastoidea are evolved from a fairly simple type, which in its turn is linked on to one of the cystid orders. That the crinoids are all deducible from some such simple form as that above described under the head " calycinal theory," is now generally admitted. Although, in the extreme correlation of the radial food-grooves, nerves, water-vessels, and so forth, with a radiate symmetry of the theca, such a type differs from the Cystidea, while in the possession of jointed processes from the radial plates, bearing the grooves and the various body-systems outwards from the theca, it differs from all other] Echinoderms, nevertheless ancient forms are known which, if they '

are not themselves the actual links, suggest how the crinoid type may have been evolved from some of the more regular cystids. The fourth class of Pelmatozoa — the Edrioasteroidea— -differs from the others in the structure of its ambulacra. As in all Pelmatozoa these seem to have borne ciliated food-grooves protected by movable covering-plates (fig. n). Beneath each food-groove was a radial water-vessel and probably a nerve and blood-vessel, all which structures passed either between certain regularly arranged thecal plates, or along a furrow floored by those plates, which were then in two alternating

series. The important and distinctive feature is the presence of pores between the flooring-plates, on either side of the groove; and these, we cannot doubt, served for the passage of podia. Thus in a highly developed edrioasteroid, such as Edrioaster itself (fig. II), there was a true ambulacrum, apparently constructed like that of a starfish, but differing in the possession of a ciliated food-groove protected by covering-plates. The simpler forms of Edrioasteroidea, with their more sac-like body and undifferentiated plates, may well have been derived from early Cystidea of yet simpler structure, and there seems no reason to follow Jaekel in regarding the class as itself the more primitive 1 . Turning to fossil Asteroidea, we find the earlier ophiurids scarcely distinguishable from the asterids, whilp in the alternation of the ambulacrals, which Undoubtedly correspond to the flooring-plates of Edrioaster, both groups approach the Pelmatozoan type. These facts have been expressed by Stiirtz in his names Encrinasteriae and Ophio-encrinasteriae.. There is no difficulty in de_ducing the highly differentiated asterids and ophiurids of a later day from these simpler types. The evolution of the modern Echinoidea from their Palaeozoic ancestors is also well understood, but in this case the ancestral form to which the palaeon- tologist is led does not at first sight present many resemblances to the Pelmatozoa. It is, however, characterized by simplicity of structure, and a short description of it will serve to clear the problem from unnecessary difficulties. Bothriocidaris (fig. 5), a small echinoid

in (e r ■

lermtna amluiacrum pore pair

\ , . ,tu Oerclcs /or sptn es

moul/i J r

Fig. 5. — Bothriocidaris globulus. A, from the side; B, the plates around the aboral pole. (After Jaekel.) The short spines which were attached to -the tubercles are not drawn.

from the Ordovician rocks of Esthonia, is in essential structure just the form demanded by comparative palaeontology to make a starting-point. It is spheroidal, with the mouth and anus at opposite poles; there are five ambulacra, and the ambulacral plates are large, simple and alternating, each being pierced by two podial pores which lie in a small oval depression; the ambulacrals next the mouth form a closed ring of ten plates; the interambulacrals lie in single columns between the ambulacra, and are separated from the mouth-area by

the proximal ambulacrals just mentioned, and sometimes by the second set of ambulacrals also ; the ambulacra end in the five oculars or terminals, which meet in a ring around the anal area and have no podial pores, but one of them serves as a madreporite; within this ring is a star-shaped area filled with minute irregular plates, none of which can safely be selected as the homologues of the so-called basals or genitals of later forms; within the ring of ambulacrals around the mouth are five somewhat pointed plates, which Jaekel regards as teeth, but which can scarcely be homologous with the interradially placed teeth of later echinoids, since they are radial in position; small spines are present, especially around the podial pores. The position of the pores near the centre of the ambulacrals in Bothriocidaris need not be regarded as primitive, since other early Palaeozoic genera, not to mention the young of living forms, show that the podia originally passed out between the plates, and were only gradually surrounded by their substance ; thus the original structure of the echinoid ambulacra differed from that of the early asteroid in the position of the radial vessels and nerves, which here lie beneath the plates instead of outside them. To this point we shall recur; palaeontology, though it suggests a clue, does not furnish an actual link either between Echinoidea and Asteroidea, or between those classes and Pelmatozoa.

The argument from embryology leads further back. First, as already mentioned, it outlines the general features of the Dipleurula; secondly, it indicates the way in which this free-moving form became fixed, and how its internal organs were modified in conse- quence; but when we seek, thirdly, for light on the relations of the classes, we find the features of the adult coming in so rapidly that such intermediate stages as may have existed are either squeezed out or profoundly modified. The difficulty of rearing the larvae in an

aquarium towards the close of the metamorphosis may account for the slight information available concerning the stages that immedi- ately follow the embryonic. Another difficulty is due to the fact that the types studied, and especially the crinoid A ntedon, are highly specialized, so that some of the embryonic features are not really primitive as regards the class, but only as regards each particular genus. Thus inferences from embryonic development need to be checked by palaeontology, and supplemented by comparison of the anatomy of other living genera.

Minute anatomical research has also aided to establish the Pelmatozoic theory by the gradual recognition in other classes of features formerly supposed to be confined to Pelmatozoa. Thus the elements of the Pelmatozoan ventral groove are now detected in so different a structure as the echinoid ambulacrum, while an aboral nervous system, the diminished representative of that in crinoids, has been traced in all Eleutherozoa except Holothurians. The broader theories of modern zoology might seem to have little bearing on the Echinoderma, for it is not long since the study of these animals was compared to a landlocked sea undisturbed by such storms as rage around the origin of the Vertebrata. This, however, is no more the case.. The conception of the Dipleurula derives its chief weight from the fact that it is comparable to the early larval forms of other primitive coelomate animals, such as Balanoglossus, Phoronis, Chaetognatha, Brachiopoda and Bryozoa. So too the explanation of radial symmetry and torsion of organs as due to a Pelmatozoic mode of life finds confirmation in many other phyla. Instead of discussing all these questions separately, with the details necessary for an adequate presentation of the argument, we shall now sketch the history of the Echinoderms in accordance with the Pelmatozoic theory. Such a sketch must pass lightly over debatable ground, and must consist largely of suggestions still in need of confirmation ; but if it serves as a frame into which more precise and more detailed statements may be fitted as they come to the ken of the reader, its object will be attained,

Evolution of the Echinoderms. — It is reasonable to suppose that the Coelomata — animals in which the body-cavity is divided into a gut passing from mouth to anus and a hollow (coelom) surrounding it — were derived from the simpler Coelentera, in ‘ which the primitive body-cavity (archenteron) is not so divided, and has only one aperture serving as both mouth and > anus. We may, with Sedgwick, suppose the coelom to have originated by the enlargement and separation of pouches that pressed outwards from the archenteron into the thickened body-wall (such structures as the genital pouches of some Coelentera, not yet shut off from the rest of the cavity), and they would probably have been four in number and radially disposed about the central cavity. The evolution of this, cavity into a gut is foreshadowed in some Coelentera by the elliptical shape of the aperture, and by the development at its ends of a ciliated channel along which food is swept; we have only to suppose the approximation of the sides of the ellipse and their eventual fusion, to complete the transformation of the radially symmetrical Coelenterate into a bilaterally symmetrical Coelomate with mouth and anus

at opposite ends of the long axis. We further suppose that of the four coelomic pouches one was in front of the mouth, one behind the anus, and one on each side. Such an animal, if it ever existed, probably lived near the surface of the sea, and even here it may have changed its medusoid mode of locomotion for one in thedirection of its mouth. Thus the bilateral symmetry would have been accentuated, and the organism shaped more definitely into three segments, namely (1) a preoral segment or lobe, containing the anterior coelomic cavity; (2) a middle segment, containing the gut, and the two middle coelomic cavities; (3) a posterior segment, containing the posterior coelomic cavity, which, however, owing to the backward prolongation of the anus, became divided into two — a right and left posterior coelom. Each of these cavities presumably excreted waste products to the exterior by a pore. There was probably a nervous area, with a tuft of cilia, at the anterior end; while, at all events in forms that remained pelagic, the ciliated nervous tracts of the rest of the body may be supposed to have become arranged in bands around the body-segments. Such a form as this is roughly represented to-day by the Actinotrocha larva of Phoronis, the importance of which has been brought out by Masterman. But only slight modifications are required to produce the Tornaria larva of the Enteropneusta and other larvae, including the special type that is inferred from the Dipleurula larval stages of recent forms to have characterized

the ancestor of the Echinoderms. We cannot entei here into all the details of comparison between these larval forms; amid much that is hypothetical a few homologies are widely accepted, and the preceding account will show the kind of relation that the Echinoderms bear to other animals, including what are now usually regarded as the ancestors of the Chordata (to which back-boned animals belong), as well as the nature of the evidence that their study has been, or may be, made to yield. Etow the hypothetical Dipleurula became an Echinoderm, and how the primitive Echinoderms diverged in structure so as to form the various classes, are questions to which an answer is attempted in the following paragraphs : —

Confining our attention to that form of Dipleurula (fig. 6) which, it is supposed, gave rise to the Echinoderma, we infer from embryo-

*hL \ **”*”*■*

,r.poser coelom.

Auiirop ores: pre -oral lolre.

anterior coelom mouth. 'I post; -coelom.

Fig. 6.— Diagrammatic reconstruction of Dipleurula. The creature is represented crawling on the sea-floor, but it may equally well have been a floating animal. The ciliated bands are not drawn.

logical data that its special features were as follow: — The anterior coelomic cavity was wholly or partially divided, and from each half a duct led to the exterior, opening at a pore near the middle line of the back. The middle cavities were smaller, and the ducts from them came to unite with those from the anterior cavities, and no longer opened directly to the exterior; whether these cavities were already specialized as water-sacs cannot be asserted, but they certainly had become so at a slightly later stage. The posterior cavities were the largest, but what had become of their original opening to the exterior is uncertain. The genital products were derived from the lining of the coelomic cavities, but it would not be safe to say that any particular region was as yet specialized for generation. The epi- thelium of the outer surface was probably ciliated, and a portion of it in the preoral lobe differentiated as a sense-organ, with longer cilia and underlying nerve-centre, from which two nerves ran back below the ventral surface. Into the space between the walls of the coelom and the outer body-wall, originally filled with jelly, definite cells now wandered, chiefly derived from the coelomic walls. Some of these cells produced muscles and connective tissue; others absorbed and removed waste products, iron salts, calcium carbonate and the like, and so were ready to be utilized for the deposition of pigment or of skeletal substance. In some of these respects the Dipleurula may have diverged from the ancestor of Enteropneusta and of other animals, but it could not as yet have been recognized as echinoderma! by a zoologist, for it presented none of the structural peculiarities of the modern'adult echinoderm.

_ Now ensued the great event that originated the phylum— -the discovery of the sea-floor. This being apprehended by the sensory

moeUA, left hydrocoel.

put.

stone canal.

i kydropore. Xyonopore.

■*parietal canal.*

riff At posterior coelom.

left

posterior coelom.

anlerior coelom.

pre-oral lobe .- remains of nerve ganglion

Fig. 7. — Diagrammatic reconstruction of primitive Pelmatozocn, seen from the side. The plates of the test are not drawn; their probable appearance may be gathered from fig. 8.

anterior end, it was by that end that the Dipleurula attached itself; not, however, by the pole, since that would have interfered at once with the sensory organ, but a little to one side, the right

aUachmi

Fig. 8. — Aristocystis side-view of the theca.

bohemicus ;

side being the one chosen for a reason we cannot now fathom; it may be that fixation was facilitated by the presence of the pore on that side, and by the utilization of the excretion from it as a cement. The first result was that which is always seen to follow in such cases — the passage of the mouth towards the upper surface (fig. 7). As it passed up along the left side, the gut caught hold of the left water-sac and pulled it upwards, curving it in the process; this being attached to the left duct from the anterior body-cavity, this structure with its water-pore was also pulled up, and the pore came to lie between mouth and anus. The forward portion of the anterior coelom shared in the constriction and elongation of the preoral lobe; but its hinder portion was dragged up along with the water-pore

and formed a canal lying

*moutA -?zrT~r^-u*rferpc>re. along the outer wall (the*

genital pore parietal canal). As the gut coiled, it pressed inwards the middle of the left posterior coelom of the Dipleurula, and drew the whole towards the mouth, while the correspond ing cavity on the right was pressed down by the stomach towards the fixed end of the animal and became involved in the elongation of that region. These changes, which may still be traced in the development of Antedon, re- sulted m the primitive Pelma- tozoon (fig. 7), represented in the rocks by such a genus as Aritocystis (fig. 8). The The internal pear-shaped bod y « encased structure may be gathered from fig. ^^-M X *' and is attached by its*

narrow end. On the broad upper surface are four openings, that nearest the centre being the mouth, which is slit-like, and that nearest the periphery being the anus. The two other openings are minute, and placed between those two; one close to the mouth is almost certainly the water-pore, while that nearer the anus is regarded as a genital aperture. Which of the coelomic cavities this last is connected with is uncertain, for there is considerable doubt as to the origin of the genital glands in the embryonic development of recent echino- derms. It seems clear, however, that there was but a single duct and a single bunch of reproductive cells, as in the holothurians, though perhaps bifurcate, as in some of those animals.

The line between mouth and anus, along which these openings are situate, corresponds with the plane of union between the two horns of the curved left posterior coelom, the united walls of which form the " dorsal mesen- tery." Since this must have, on our theory, enclosed the parietal canal from the anterior coelom, it is possible that the genital products were developed from the lining cells of that cavity, and that the genital pore was nothing but its original pore not yet united with that from the water-sac. The concrescence of these pores can be traced in other cystids; but as the genital organs became affected by radial symmetry the original function of the duct was lost, and the reproductive elements escaped to the exterior in another way.

Aristocystis may have had ciliated a_^ food-grooves leading to its mouth, >y

snxrn. Ht'ift/r J I$1£Sir2sB' type, and the majority may be

grouped under two heads. One group includes those in which the grooves wander outwards from the mouth over the thecal plates, which gradually become arranged regularly on either Fig. 9 — Fungocyshs rarts- s id e f t h e grooves, while further sima, one of the Diploponta, extensions ascend from the grooves

on small jointed processes called " brachioles " (fig. 9). In the other group the grooves do not tend so much to stretch over the theca as to be raised away from it on relatively larger brachioles, arising close around the mouth (fig. 10).

These two types are, in the main, correlated with two gradual differentiations in the minute structure of the thecal plates. Origin- ally the calcareous substance of the plates (stereom) was pierced by irregular canals, more or less vertical, and containing strands of the soft tissue (stroma) that deposited the stereom, as well as spaces filled with fluid. In the former group (fig. 9) these canals became connected in pairs (diplopores) still perpendicular to the surface, and this structure, combined with that of the grooves, characterizes the order — Diploporita. In the latter group (fig. 10) the canals, that is to say, the stroma-strands, came to he parallel to the surface and to cross the sutures between the plates, which Were thus more flexibly and more strongly united: since the canals

in which the thecal plates borderingthefood-groovesare not yet regularly arranged. The brachioles are not drawn.

brachioles,

mff^.?ik fp —pectinirJiom&.

)tAeca.

crossing each suture naturally occupy a rhombic area, the order is called Rhombifera. At first the grooves were three, one proceeding from each end of the mouth-slit, and the third in a direction opposed to the anus ; with reference to the Pelmatozoan structure, the anai side may be termed posterior, and this groove anterior. Eventually each lateral groove forked, so that there were five grooves. These gradually impressed themselves on the theca and influenced the arrangement of the internal organs: it is fairly safe to assume that nerves, blood-vessels and branches from the water-sac stretched out along with these grooves, each system starting from a ring around the gullet. At last a quinqueradiate symmetry influenced the plates of the theca, partly through the development of a plate at the end of each groove (terminal), partly through plates at the aboral pole of the theca (basals and infrabasals) arising in response to mechanical pressure, but soon intimately connected with the cords of an aboral nervous system. Before the latter plates arose, the stem had developed by the elongation and constriction of the fixed end of the theca, the gradual regularization of the plates involved, and their coalescence into rings. The crinoid type was differentiated by the extension of the food-grooves and associated organs along radial outgrowths from the theca itself.. These constituted the arms (brachia), and five definite radial plates of the theca were specialized for their support. These radials may be homologous with the terminals already mentioned, but this is neither necessary nor certain. In this development of brachial extensions of the theca the genital organs were involved, and their ripe products formed at the ends of the brachia or in the branches therefrom. The remains of the original genital gland within the theca became the ” axial organ ” surrounded by the ” axial sinus” derived from the anterior ccelom, and this again by structures derived from the right posterior coelom, which, as explained above, had been depressed to the aboral pole. These last structures formed a nerv- ous sheath around the axial sinus with its blood- vessels, and became divided into five lobes correlated with the five basals (the ” chambered organ “) and forming the aboral nerve-centre. Be- fore these changes were complete the Holothuri- oidea must have diverged, by the assumption of a crawling existence. Thus in them the mouth and anus reverted to opposite poles, and only the torsion of the gut and coelom,

and the radial extensions _ „, . . ,, ,

of the nervous, water- u Fl g- lo.—Chtrocrtnus-alter, one of vascular and blood-vas- the Rhombifera, showing the reduced cular systems, testified n , unlb 1 er , an d regular arrangement of the to their Pelmatozoan ˆ«»1 plates, and the concentration of ancestry. The ciliated the brachioles. (Adapted from Jaekel.) grooves, no longer needed for the collection of food, closed over, and are still traceable as ciliated canals overlying the radial nerves. At the same time the thecal plates degenerated into spicules. The Edrioasteroidea f oUbwed a different line from that of the cystids above mentioned and their descendants. The theca became sessile, and in its later developments much flattened (fig. 11). Mouth, water-pore and anus remained as in Aristocystis, but the five ciliated grooves radiated from the mouth between the thecal plates rather than over them, and were, as usual, protected by covering-plates. The important feature was the extension of radial canals from the water-sac along these grooves, with branches passing between the flooring- plates of the grooves (fig. 12, A). The resemblance of the flooring-plates to the ambulacral ossicles of a starfish is so exact that one can explain it only by supposing similar relations of the water-canals and their branches (podia). On the thinly plated under surface of well-preserved specimens of Edrioaster are seen five interradial swellings (fig. 11, B). These are likely to have been produced by the ripe genital glands, which may have extruded their products directly through the membranous integument of the under side. No other way out for them is apparent, and it is clear that Edrioaster was not permanently and solidly fixed to the sea-floor. Now comes a great change, unfortunately difficult to follow whether in the fossils or in the modern embryos. We suppose some such form as Edrioaster, which appears to have lived near the shore, to have been repeatedly overturned by waves. Those that were able to accommodate themselves to this topsy-turvy

stem.

existence, by taking food in directly through the mouth, survived, and their podia gradually specialized as sucking feet. Such a form as this, when once its covering-plates had atrophied, would be a

flooring plates

interam

bulacrt

piglet

lohe.i offlejr.

ible inleg.

ument

anus

mouth

covering plate: hydroporp frame'

A B

*Fig. 11. — Edrioasler. A, upper or oral surface of E. Bigsbyi, with the covering-plates on the anterior and left posterior food- grooves, but removed from the others, which show only the flooring- plates, between which are pores; B, under surface of E. Buchianus, with covering-plates on right posterior and right anterior food-grooves (left hand in the drawing). The * denotes the position of the anal interradius.*

starfish without more ado (fig. 12, B) ; but the sea-urchins present a more difficult problem, on which Bothriocidaris sheds no light. An Upper Silurian echinoid, however, Palaeodiscus, is believed by W. J. Sollas and W. K. Spencer to have had in its ambulacra an inner as well as an outer series of plates. If this be correct, the only change from Edrioaster, as regards the ambulacra, was that in Palaeodiscus the covering-plates could no longer open, but closed permanently over the whole groove, while the podia issued through slits between them. In more typical echinoids the covering-plates alone remained to form the ordinary ambulacral plates, while the flooring-plates disappeared, the canals and other organs remaining as before. In any case we have to admit a closure of the integument over the ciliated groove (fig. 12, D, e) just as in holothurians, since this is necessitated by anatomical evidence. The genital organs in both Asteroidea and Echinoidea would retain the interradial position they first assumed in Edrioaster; and in Echinoidea their primitive temporary openings to the exterior were converted into definite pores, correlated with five interradially placed plates at the aboral

pole. The anus also naturally moved to this superior and

ciliated

cuter

nerve tract covermo plate .

poUctun

pcetiun

water 1

ccelom A. Edrioasteroid.

cwerinfr plate

deeper, nerve' water vessel!

coelom B. Asteroid.

ambulacral

plate

cuter

nerve

podium

C. Crinoid.

wafer vmssrl

ccelom

D. Echinoid.

Fig. 12. — Diagrammatic sections across the ambulacra of A, C, Pelmatozoa, and B, D, Eleutherozoa, placed in the same position for comparison. 5, Blood-spaces, of which the homology is still uncertain.

aboral position. In the Echinoidea the water-canals and associated structures, ending in the terminal plates, stretched right up to these genital plates ; but in the Asteroidea they never reached the aboral

surface, so that the terminals have always been separated from the aboral pole by a number of plates.

Analysis of Echinoderm Characters. — Regarding the Echino- derms as a whole in the light of the foregoing account, we may

give the following analytic summary of the characters that distinguish them from other coelomate animals: —

They live in salt or brackish water; a primitive bilateral sym- metry is still manifest in the right and left divisions of the coelom; the middle coelomic cavities are primitively transformed into two hydrocoels communicating with the exterior indirectly through a duct or ducts of the anterior coelom ; stereom, composed of crystal- line carbonate of lime, is, with few exceptions, deposited by special amoebocytes in the meshes of a mesodermal stroma, chiefly in the integument; reproductive cejls are derived from the endothelium, apparently of the anterior coelom ; total segmentation of the ovum produces a coeloblastula and gastrula by invagination ; mesenchyme is formed in the segmentation cavity by migration of cells, chiefly from the hypoblast. Known Echinoderms show the following features, imagined to be due to an ancestral pelmatozoic stage: — Increase in the coelomic cavities of the left side, and atrophy of those on the right ; the dextral coil of the gut, recognizable in all classes, though often obscured ; an incomplete secondary bilateral- ism about the plane including the main axis and the water-pore or its successor, the madreporite, often obscured by one or other of various tertiary bilateralisms; the change of the hydrocoel into a circumoral, arcuate or ring canal; development through a free- swimming, bilaterally symmetrical, ciliated larva, of which in many cases only a portion is transformed into the adult Echinoderm (where care of the brood has secondarily arisen, this larva is not developed). All living, and most extinct, Echinoderms show the following features, almost certainly due to an ancestral pelmatozoic stage : — An incomplete radial symmetry, of which five is usually the dominant number, is superimposed on the secondary bilateralism, owing to the outgrowth from the mouth region of one unpaired and two paired ciliated grooves ; these have a floor of nervous epithelium, and are accompanied by subjacent radial canals from the water-ring, giving off lateral podia and thus forming ambulacra, and by a perihae'mal system of canals apparently growing out from coelomic cavities. All living Echinoderms have a lacunar, haemal system of diverse origin; this, the ambulacral system, and the coelomic cavities, contain a fluid holding albumen in solution and carrying numerous amoebocytes, which are developed in special lymph-glands and are

capable of wandering through all tissues. The Echinoderms may be divided into seven classes, whose probable relations are thus indicated : — •

Pelmatozoa

Cystidea-

-Edrioasteroidea

Blastoidea Crinoidea

Holothurioidea”

Stelliformia Echinoidea

-Eleutherozoa

Brief systematic accounts of these classes follow: —

Grade A. PELMATOZOA. — Echinoderma with the viscera en- closed in a calcified and plated theca, of which the oral surface is uppermost, and which is usually attached, either temporarily or permanently, by the aboral surface. Food brought to the mouth by a subvective system of ciliated grooves, radiating from the mouth either between the plates of the theca (endothecal), or over the theca (epithecal), or along processes from the theca (exothecal: arms, pinnules, &c), or, in part, and as a secondary development, below the theca (hypothecal). Anus usually in the upper or oral half of the theca, and never aboral. An aborally-placed motor nerve-centre gives off branches to the stroma connecting the various plates of the theca and of its brachial, anal and columnar extensions, and thus co-ordinates the movements of the whole skeleton. The circum-oesophageal water-ring communicates indirectly with the exterior; the podia, when present, are respiratory, not locomotor, in function.

Class I. Cystidea. — Pelmatozoa in which radial polymeric symmetry of the theca is developed either not at all or not in com- plete correlation with the radial symmetry of the ambulacra (such as obtains in Blastoidea and Crinoidea); in which extensions of the food-grooves are exothecal or epithecal or both combined, bul neither endothecal nor pierced by podia (as in some EdrioasteroideaX All Palaeozoic.

This class shows much greater diversity of organization than any other, and the classifications proposed by recent writers, such as E.

Haeckel, O. Jaekel and F. A. Bather, start from such different points of view that no discussion of them can be attempted here, Following the narrative given above, we recognize a primitive group — Amphoridea — represented by Aristocystis (fig. 8). From this are derived the orders Diploporita (fig. 9) and Rhombifera (fig, 10) and the class Edrioasteroidea, all which have already been described as steps in the evolution of the phylum. But there were also side-branches leading nowhere, and therefore placed in separate orders — Aporita and Carpoidea.

Order 1. Amphoridea. — Radial symmetry has affected neither food-grooves nor thecal plates; nor, probably, nerves, ambulacral vessels, nor gonads. Canals or folds when present in the stereom are irregular. Families : Aristocystidae (fig. 8); Eocystidae.

Order 2. Carpoidea. — Theca compressed in the oro-anal plane and a bilateral symmetry thus induced, affecting the food-grooves and, usually, the thecal plates and stem. Food-grooves in part epithecal and may be continued on one or two exothecal processes. No pores or folds in the stereom. Families: Anomalocystidae, Dendrocystidae. These correspond to Jaekel's Carpoidea Hetero- stelea; he also includes, as Eustelea, our Comarocystidae and Malocystidae.

Order 3. Rhombifera. — Radial symmetry affects the food-grooves and, in the more advanced families, the thecal plates; probably also the nerves and ambulacral vessels, but not the gonads. The food-grooves are exothecal, i.e. are stretched out from the theca on jointed skeletal processes (brachioles). These either are close to the mouth or are removed from it upon a series of ambulacral or sub-ambulacral plates not derived immediately from thecal plates, or are separated from the oral centre by hypothecal passages passing beneath tegminal plates. The stereom and stroma become arranged in folds and strands at right angles to the sutures of the thecal plates; in higher forms the stereom-folds are in part specialized as pectini-rhombs. Families: Echinosphaeridae ; Comarocystidae; Macrocystellidae ; Tiaracrinidae ; Malocystidae; Glyptocystidae, with sub-famm. Echinoencrininae, Callocystinae, Glyptocystinae, of which examples are Cheirocrinus (fig. 10) and Cystoblastus from which Jaekel deduces the blastoids; Caryocrinidae.

Order 4. Aporita. — Pentamerous symmetry affects the food- grooves

and thecal plates; probably also the nerves and ambulacral vessels, but not the gonads. Food-grooves exothecal and circumoral. The stereom shows no trace of canals, folds, rhombs or diplopores. Family: Cryptocrinidae.

Order 5. Diploporita. — Radial symmetry affects the food-grooves, and by degrees the thecal plates connected therewith, but not the interradial thecal plates; probably also the nerves and ambulacral vessels, but not the gonads. The food-grooves are epithecal, i.e. are extended over the thecal plates themselves without intermediate flooring ; they are also prolonged on exothecal brachioles, which line the epithecal grooves. The stereom of the thecal plates may be thrown into folds, but the mesostroma does not so much tend to lie in strands traversing the sutures, nor are pectini-rhombs or pore-rhombs developed; diplopores are always present in the meso-stereom, but often restricted to definite tracts or plates, especially in higher forms. Families: Sphaeronidae ; Glyptosphaeridae, e.g. Fungocystis (fig. 9) ; Protocrinidae ; Mesocystidae ; Gomphocystidae. The Protocrinidae lead up to Proteroblastus, in which the theca is ovoid, sometimes prolonged into a stem, the plates differentiated into (a) smooth, irregular, depressed interambulacrals, (i) trans- versely elongate brachioliferous adambulacrals, to which the diplo- pores, which lie at right angles to the main food-groove, are confined. This leads almost without a break to the Protoblastoidea.

Class II. Blastoidea. — Pelmatozoa in which five (by atrophy four) epithecal ciliated grooves, lying on a lancet-shaped plate (? always), radiate from a central peristome between five interradial deltoid plates, and are edged by alternating side-plates bearing brachioles, to which side-branches pass from the grooves. Grooves and peristome protected by small plates, which can open over the grooves. The generative organs and coelom probably did not send extensions along the rays into the brachioles ; but apparently nerves from the aboral centre, after passing through the thecal plates, met in a circumoral ring, from which branches passed into the plate under each main food-groove, and thence supplied the brachioles. The thecal plates, however irregular in some species, always show defined basals and a distinct plate (" radial ") at the end of each ambulacrum; they are in all cases so far affected by pentamerous symmetry that their sutures never cross the ambulacra. All Palaeozoic.

Division A. Protoblastoidea. — Blastoidea without inter- ambulacral groups of hydrospire-folds hanging into the thecal cavity. Families: Asteroblastidae, Blastoidocrinidae. The former might be placed with

Diploporita, were it not for a greater intimacy of correlation between ambulacral and thecal structures than is found in Cystidea as here defined. They form a link between the Protocrinidae and —

Division B. Eublastoidea. — Blastoidea in which the thecal plates have assumed a definite number and position in 3 circlets, as follows: 3 basals, 2 large and I small; 5 radials, often fork- shaped, forming a closed circlet; 5 deltoids, inter- radial in position, supported on the shoulders or processes of the radials, and often surrounding the peristome with their oral ends. The stereom of the radials and deltoids on each side of the ambulacra is thrown into folds, running across the radio-deltoid Fig. 13. — A suture, and hanging down into the thecal cavity as Eublastoid, respiratory organs (hydrospires). Pentremites. _ These are the forms to which the name Blastoidea is usually restricted. They have been divided into Regulares and Irregulares, but it seems possible to group them according to three series or lines of descent, thus : —

Series a. Codonoblastida. — Families: Codasteridae.Pentremitidae (fig. 13).

Series b. Troostoblastida. — Families: Troostocrinidae, Eleuthero-crinidae.

Series c. Granatoblastida. — Families: Nucleocrinidae, Orbitre-mitidae, Pentephyllidae, Zygocrinidae. '

Class III. Crinoidea.— Pelmatozoa in which epithecal extensions of the food-grooves, ambulacrals, superficial oral nervous system, blood-vascular and water-vascular systems, coelom and genital system are continued exothecally upon jointed outgrowths of the abactinal thecal plates (brachia), carrying with them extensions of the abactinal nerve-system. The number of these processes is primitively and normally five, but may become less by atrophy. The brachia rise from a corresponding number of thecal plates, " radials (RR)." Below these is always a circlet, or traces of a circlet, of plates alternating with the radials, i.e. interradial, and called "basals (BB)." Through all modifications, which are numerous and vastly divergent, these elements persist. A circlet of radially situate infrabasals (IBB) may also be present. Below BB or IBB there follows a stem, which, however, may be atrophied or totally lost (see fig. 1).

The classification here adopted is that of F. A. Bather (1899), which departs from that of Wachsmuth and Springer mainly in the separation of forms with infrabasals or traces thereof from those in

which basals only are present. These two series also differ from each other in the relations of the abactinal nerve-system. O. Jaekel (1894) has divided the crinoids into the orders Cladocrinoidea and Bentecrinoidea, the former being the Camerata of Wachsmuth and Springer (Monocyclica Camerata, Adunata and Dicyclica Camerata of the present classification), and the latter comprising all the rest, in which the arms are either free or only loosely incorporated in the dorsal cup. In minor points there is fair agreement between the American, German and British authors. The families are extinct, except when the contrary is stated.

Sub-class I. Monocyclica. — Crinoidea in which the base consists of BB only, the aboral prolongations of the chambered organ being interradial ; new columnals are introduced at the extreme proximal end of the stem.

Order 1. Monocyclica Inadunata.— Monocyclica in which the dorsal cup is confined to the patina and occasional intercalated anals ; such ambulacrals or interambulacrals as enter the tegmen remain supra-tegminal and not rigidly united. Families: Hybocrinidae, Stephariocrinidae, Heterdcrinidae, Calceocrinidae, Pisocrinidae, Zophocrinidae, Haplocrinidae, Allagecrinidae, Symbathocrinidae, Belemnocrinidae,Plicatocrinidae,Hyocrinidae(recent),Saccocomidae. Order 2. Adunata. — Monocyclica with dorsal cup primitively confined to the patina and an occasional single anal ; tegmen solid ; portions of the proximal brachials and their ambulacrals tend to be rigidly incorporated in the theca. Arms fork once to thrice, and bear pinnules on each or on every other brachial. BB fused to 3, 2 or 1. (Eucladocrinus and Acrocnnidae offer peculiar exceptions to this diagnosis.) Families: Platycrinidae, Hexacrinidae, Acrocrinidae.

Order 3. Monocyclica Camerata. — Monocyclica in which the first, and often the succeeding, orders of brachials are incorporated by interbrachials in the dorsal cup, while the corresponding ambulacrals are either incorporated in, or pressed below, the tegmen by inter-ambulacrals; all thecal plates united by suture, somewhat loose in the earliest forms/ but speedily becoming close, and producing a rigid theca ; mouth ahd tegminal food-grooves closed ; arms pinnulate. Sub-order i. Melocrinoidea. — RR in contact all round ; first brachial usually quadrangular. Families: Glyptocrinidae, Melocrinidae, Patelliocrinidae, Clonocrinidae, Eucalyptocrinidae, Dolato- crinidae. Sub-order ii. Batocrinoidea. — RR separated by a heptagonal anal ; first brachial usually quadrangular. Families: Tanaocrinidae, Xenocrinidae, Carpocrinidae, Barrandeocrinidae, Coelocrinidae, Batocrinidae, Periechocrinidae. Sub-order iii.

Actinocrinoidea. — RR separated by a hexagonal anal; first brachial usually hexagonal. Families: Actino- crinidae, Amphoracrinidae. Sub-class II. Dicyclica. — Crinoidea in which the base consists of BB and IBB, the latter being liable to atrophy or fusion with the proximale, but the aboral prolongations of the chambered organ are-always radial ; new columnals may or may not be introduced at the proximal end of the stem.

Order 1. Dicyclica Inadunata. — Dicyclica in which the dorsal cup primitively is confined to the patina and occasional intercalated anals, and no other plates ever occur between RR (Grade: Distincta) ; Br may be incorporated in the cup, with or without iBr, but never rigidly, and their corresponding ambulacrals remain supra-tegminal (Grade : Articulata) ; new columnals are introduced at the extreme proximal end of the stem.

Sub-order i. Cyathocrinoidea. — Tegmen stout with conspicuous orals. Families: Carabocrinidae, Palaeocrinidae, Euspiro- crinidae, Sphaerocrinidae, Cyathocrinidae, Petalocrinidae, Crotalocrinidae, Codiacrinidae. Cupressocrinidae, Gastero- comidae. Sub-order ii. Dendrocrinoidea.— Tegmen thin, flexible, with in conspicuous orals. Families: Dendrocrinidae, Botryocrinidae, Lophocrinidae, Scaphiocrinidae, Scytalecrinidae, Graphio- crinidae, Cromyocrinidae, Encrinidae (preceding families are Distincta; the rest Articulata), Pentacrinidae, including the recent Isocrinus (fig. 14), Uintacrinidae, Marsupitidae, Bathy- crinidae (recent).

Order 2. Flexibilia. — Dicyclica in which proximal brachials are incorporated in the dorsal cup, either by their own sides, or by interbrachials, or by a finely plated skin, but never rigidly ; plates may occur between RR. Tegmen flexible, with distinct ambulacrals and numerous small interambulacrals; mouth and food-grooves remain supra-tegminal and open. Top columnal a persistent proximale, often fusing with IBB, which are frequently atrophied in the adult.

All the Palaeozoic representatives have non-pinnulate arms, while the Mesozoic and later forms have them pinnulate. There are other points of difference, so that it is not certain whether the latter really descended from the former. But assuming such a relationship we arrange them in two grades.

Grade a. Impinnata. — -Families: Ichthyocrinidae, Sagenocrinidae, and Taxocrinidae, perhaps capable of further division.

Grade b. Pinnata. — Families : Apiocrinidae with the recent Calamo- crinus, Bourgueticrinidae with recent Rhizocrinus, Antedonidae, Atelecrinidae, Actinometridae, Thaumatocrinidae (these four -recent families include free-moving forms with atrophied stem, probably derived from different ancestors), Eugeniacrinidae, Holopodidae (recent), Eudesicrinidae.

Order 3. Dicyclica Camerata. — Dicyclica in whijjh the first, and usually the second, orders of brachials are incorporated in the dorsal cup by intetibrachials, at first loosely, but after- wards by close suture. IBB always the primi- tive 5. An anal plate always rests on the posterior basal ; mouth and tegminai food- grooves closed ; arms pinnulate. Families : Reteocrinidae, Dimero- crinidae, Lamptero- crinidae, Rhodocrinidae, Cleiocrinidae.

Class IV. Edrioas- teroidea. — Pelmatozoa in which the theca is composed of an inde- finite number of irregular plates, some of which are variously differentiated in different genera ; with no subvective skeletal appendages, but with central mouth, from which there radiate through the theca five unbranched ambulacra, composed of a double series of alternating plates (covering-plates), sometimes supported by an outer series of larger alternating plates (side- plates or flooring-plates). In some forms at least, pores between (not through) the ambulacral elements, or between them and the thecal plates, seem > to have Fig. 14— A living Pentacrinid, Jwcn««j permitted the _ passage asteria; the first specimen found, after of extensions from the Guettard's figure published in 1761. perradial water-vessels.

r Anus in posterior mter-

radius, on oral surface, closed by valvular pyramid. Hydropore (usually, if not always, present) between mouth and anus. Families: Agelacrinidae, Cyathocystidae, Edrioasteridae, Steganoblastidae. All Palaeozoic. The structure and importance of Edrioaster have been

discussed above (figs. 11, 12).

Grade B. ELEUTHEROZOA.— Echinoderma in which the theca, which may be but slightly or not at all calcined, is not attached by any portion of its surface, but is usually placed with the oral surface downwards or in the direction of forward locomotion. Food is not conveyed by a subvective system of ciliated grooves, but is taken in directly by the mouth. The anus when present is typically aboral, and approaches the mouth only in a few specialized forms. The aboral nervous system, if indeed it be present at all, is very slightly developed. The circumoesophageal water-ring may lose its connexion with the exterior medium; the podia (absent only in some exceptional forms) may be locomotor, respiratory or sensory in function, but usually are locomotor tube-feet.

The classes of the Eleutherozoa probably arose independently from different branches of the Pelmatozoan stem. The precise relation is not clear, but the order in which they are here placed is believed to be from the more primitive to the more specialized.

Class I. Holothurioidea.— Eleutherozoa normally elongate along the oro-anal axis, which axis and the dorsal hydropore lie in the sagittal plane of a secondary bilateral symmetry. The calcareous skeleton, which may be entirely absent, is usually in the form of minute spicules, sometimes of small irregular plates with no trace of a calycinal or apical system; to these is added a ring of pieces radiately arranged round the oesophagus. Ambulacral appendages take the form of: (1) circumoral tentacles, (2) sucking-feet, (3) papillae; of these (1) alone is always present. The gonads are not radiately disposed.

The comparative anatomy of living forms, combined with the evolutionary hypothesis sketched above, suggests that the early holothurians possessed the following characters : subvective grooves entirely closed; 5 radial canals, proceeding from the water-ring, gave off branches furnished with ampullae to the podia on each side of them, the 10 anterior podia being changed into cylindrical tentacles; the transverse muscles of the body- wall formed a circular layer, probably interrupted at the radii (though Ludwig believes the contrary); longitudinal muscles as paired radial bands, without those special retractors for withdrawing the anterior part of the body which occur in many recent forms; a hydropore connected with the

water-ring by a canal in the dorsal mesentery; a gonopore behind the hydropore connected by a single duct with a bunch of genital pouches on each side of the mesentery; gut dextrally coiled, with a simple blood-vascular system, and with an enlargement at the anus for respiration, this eventually producing branched caeca called " respiratory trees "; skeleton reduced to a ring of 5 radial and 5 interradial plates round the gullet, and small plates, with a hexagonally meshed network, dispersed through the integument. Such a form gave rise to descendants differing inter se as regards the suppression of the radial canals and of the podia, the form of the tentacles, and the development of respiratory trees. These anatomical facts are represented in the following classification by H. Ludwig:—

Order 1. Actinopoda. — Radial canals supplying tentacles and podia.

A. With respiratory trees,

(a) With podia .

(b) Without podia

B. Without respiratory trees.

(a) With podia .

(b) Without podia Order 2. Paractinopoda. — Neither radial

Tentacles supplied from circular canal. Fam. Synaptidae.

It is admitted, however, that this scheme does not represent the

probable descent or relationship of the families. Consideration of

the views of Ludwig himself, of H.

Ostergren, and especially of R. Perrier,

suggests the following as a more natural

if less obvious arrangement.

Order 1. Aspidochirota. — Tentacles

more or less peltate; calcareous ring

when present simple and radially sym- metrical; no retractors; stone-canal

often opens to exterior; genital tubes

sometimes restricted to left side in con- sequence of altered position of gut (Fig.

15.) Families: Elpidiidae (deep-sea

forms, with sub-famm. Synallactinae,

Deimatinae, Elpidiinae, Psychro-

potinae), Holothuriidae (shallow water),

Pelagothuriidae (pelagic).

Order 2. Dendrochirota. — Tentacles

simple or branched, never peltate;

calcareous ring well developed, often

bilaterally symmetrical; retractor

muscles usually present; stone-canal

opens internally; genital tubes in right

and left tufts.

Sub-order i. Apoda. — No tube-feet or papillae, but tentacular ampullae more or less developed. Mostly burrowers. Families : Synaptidae (sub-famm. Synaptinae, Chiro- dotinae, Myriotrochinae), Molpa- diidae. Sub-order ii. Eupoda. — Tube-feet

present, but tentacular ampullae family Hololhuriidae, “show- rudimentary or absent. Families: i ng the mouth surrounded

by tentacles, the anus at

(•Fam. J. Fam. I. Fam.

Fam. Fam.

Holothuriidae. Cucumariidae. Molpadiidae.

Elpidiidae. Pelagothuriidae. canals nor podia.

Fig. 15. — An Aspido- chirote Holothurian of the

the other end of the body, and three of the rows of podia,

Cucumariidae (climbers and crawlers), Rhopalodinidae (burrowers). Class II. Stelliformia (=Aster- oidea sensu lato). — Eleutherozoa with a depressed stellate body composed of a central disk, whence radiate five or more rays; this radiate symmetry affects all the systems of organs, including the genital. The radial water-vessels lie in grooves on the ventral side of flooring-plates (usually called "ambulacrals"); they and their podia are limited to the oral surface of the body and their extremities are separated from the

apical plates by a stretch of dorsal integument containing skeletal elements; the opening of the water- vascular system (madreporite) is not connected with a definite apical plate or system of plates.

The starfish, brittle-stars and their allies (see Starfish) have for the last fifty years usually been divided into two classes — Asteroidea and Ophiuroidea, each equivalent to the Holothurioidea or Echinoidea. Recently, however, some authors, e.g. Gregory, have attempted to show that these classes cannot be distinguished. It is true that some specialized forms, such as the Brisingidae among starfish, A strophiura and Ophioteresis among ophiurans, contravene the usual diagnoses; but this neither obscures their systematic position, nor does it alter the fact that since early Palaeozoic times these two great groups of stellate echinoderms have evolved along separate lines. If then we place these groups in a single class, it is not on account of a few anomalous genera, but because the characters set forth above sharply distinguish them from all other echinoderms, and because we have good reason to believe that the ophiurans did not arise independently but have descended from primitive starfish. For that class Bell's name Stelliformia is selected since it avoids both confusion and barbarism.

Subclass I. Aster ida. — Stelliformia in which the ambulacral groove always remains open and the podia serve as tube-feet (fig. 12, B) ; the rays as a rule pass gradually into the disk, and contain both genital glands and caecal extensions of the digestive system; an anus usually present; respiration is by tubular extensions from the body-

cavity (papulae); skeletal appendages, in addition to small spines, are either small grasping organs (pedicellariae), or clumped spines (paxillae), or branched spines bearing a membrane.

No existing classification of the Asterida is satisfactory even for the recent forms, still less when the older fossils are considered. A separation of the latter as Palasterida, because of their alternating ambulacrals, from the recent Euasterida with opposite ambulacrals, is now discarded and an attempt made to arrange the Palasterida in divisions originally established for Euasterida, Those divisions fall under three schemes. C. Viguier has divided the starfish into : Astiries ambulacraires, with plates of ambulacral origin prominent in the mouth-skeleton, pedicellariae stalked, and straight or crossed, podial pores usually quadriserial ; Asleries adambulacraires, with adambulacrals prominent in the mouth-skeleton, pedicellariae sessile, and forcipiform or valvular, podial pores usually biserial. Perrier, at first laying greater stress on the nature of the pedicellariae and afterwards on the form of the mouth-skeleton, has gradually perfected a scheme of five orders: (1) Forcipulata, with pedicellariae stalked, and straight or crossed; (2) Spinulosa, with pedicellariae sessile and forcipiform; (3) Velata, with membraniferous spines; (4) Paxillosa, pedicellariae represented by an ossicle of the test and the spines covering it, the whole forming a paxilla; (5) Valvata or Granulosa, with pedicellariae sessile and valvular or salt-cellar shaped. A more widely accepted scheme is that of W. P. Sladen, who divided the Euasterida into two orders: (1) Phanerozonia, with marginals large and highly developed, the supero-marginals and infero- marginals contiguous, with papulae confined to the dorsal surface, with ambulacrals well spaced and usually broad, adambulacrals prominent in the mouth-skeleton, with pedicellariae sessile; (2) Cryptozonia, with marginals inconspicuous and somewhat atrophied in the adult, the supero-marginals separated from the infero- marginals by intercalated plates, with papulae distributed over the whole body, with ambulacrals crowded and narrow, either ambu- lacrals or adambulacrals prominent in the mouth-skeleton, with pedicellariae stalked or sessile.

We give here a list of the families separated into Sladen's orders and grouped under Perrier's divisions, extinct families being marked f.

1. Phanerozonia. — Unclassed Famm., t Palaeasteridae, t Pal- asterinidae, t Taeniasteridae, f Aspidosomatidae. Paxillosa,

Luidiidae, Astropectinidae

- —€ (fig. 16), Archasteridae restr.

Verrill, Porcellanasteridae, Chaetasteridae. Valvata,

Benthopectinidae, Goniopec- tinidae, Plutonasteridae,

Odontasteridae, Pentagon- asteridae, Antheneidae, Pen- tacerotidae, Gymnasteriidae. Spinulosa, Poraniidae, Aster- inidae.

2. Cryptozonia. — Un- classed Famm., t Sturtz- asteridae (= Palaeocomidae Greg.), f Lepidasteridae, t Tropidasteridae. Valvata, Linckiidae restr. Perr.

Spinulosa, Echinasteridae, Solasteridae (fig. 17), Kore- thrasteridae. Velata, f.Pal- asteriscidae, Pterasteridae, Pythonasteridae, Myxaster- idae. Forcipulata, Stich

Fig. 16.— Section across the arm- skeleton of a Phanerozonate Asterid, Astropecten.

a, Ambulacral plates.

b, Adambulacral plates. c and d, Inferior and superior lateral

plates. e, Dorsal plates with paxillae. Certain supra- ambulacral plates, which also exist, are not shown.

asteridae, Zoroasteridae (fig. 3, D), Heliasteridae, Pedicellasteridae, Asteriidae, Brisingidae.

Subclass II. Ophiurida.— Stelliformia in which the ambulacral groove, though open in the oldest forms, soon becomes closed, while the podia cease to serve as tube-feet; the rays as a rule spring

Fig. 17. — A Cryptozonate Asterid, Solaster papposus, from the upper or dorsal surface.

abruptly from the disk and contain neither genital glands nor diges- tive caeca ; no anus ; respiration may be through clefts at the bases of the rays, but not by papulae; skeletal appendages confined to spines, usually of simple structure.

There is as yet no satisfactory classification of the Ophiurida into orders expressing lines of descent; even as regards families, leading writers are at variance. The following scheme is based on the attempts of E. Haeckel, F. J. Bell, J. W. Gregory, B. Sttirtz, J. O. E. Perrier, and A. E. Verrill. Extinct families marked |.

Grade A. Palophiurae. — Ambulacrals not yet forming complete vertebrae; plates of disk not yet specialized into mouth, radial or genital shields.

Stages. Allostichia (= Lysophiurae). — Ambulacrals alternating and unfused, groove uncovered by ventral arm-plates. Families: f Protasteridae, f Protophiuridae. Stage b. Zygostichia. — Ambulacrals opposite and, except in Ophi- urinidae, fused; ventral arm -plates developed in some. Families: f Ophiurinidae, f Lapworthuridae, f Furcasteridae, I Palastropectinidae, f Eoluididae, f Palaeophiomyxidae. Grade B. Colophiurae. — Ambulacral pairs fused to form vertebrae with definite articular surfaces; mouth, radial and genital shields developed, though not all need be present in any one form.

Order 1. Streptophiurae. — Rays simple and capable of coiling, since the vertebrae articulate by a ball-and-socket joint ; arm-plates incompletely developed. Families: t Onych- asteridae, Ophiohelidae, Ophioscolecidae, Ophio- myxidae, Hemieuryalidae, Astrophiuridae ; un- classified genera, e.g. Ophioteresis, Ophiosciasma, Ophiogeron.

Order 2. Zygophiurae.—'R.a.ys simple and pre- vented from coiling by processes on the vertebral joints (fig. 18) ; dorsal, ventral and lateral arm- plates present.

Suborder i. Brachyophiurae. — Spines short, simple, pointing towards the end of the arm. Families: Pectinuridae (=Ophioder- matidae), Ophiolepididae. Suborder ii. Nectophiurae. — Spines may be variously elaborated and are set mere at right angles to the arm- axis. Families: Amphiuridae, Ophiacanthidae, Ophio- comidae, Ophiothrichidae. Order 3. Cladophiurae (= Euryalae). Rays

Fig. 18. — A ver- tebral arm-ossicle (fused ambula- crals) of aZygophi- uran, Ophiolepts.

simple or branched, capable of coiling, since the A, Proximaljoint-

B,

c,

joint-

vertebrae articulate by surfaces of hour-glass shape ; ventral arm- plates, and often the others, much reduced ; spines reduced or absent. Fami- lies: Euryalidae, Gorgonocephalidae, Astro- chelidae,

Astroschemidae, Astronycidae.

The Silurian genera Eucladia and Euthemon have the rays greatly reduced and merged in the disk, so that the ambulacrals are unseen. There are a few large dorsal, lateral and ventral arm- plates, and at the angles of the latter emerge huge podia with a granular or plated skin. There are five prominent mouth-shields and a separate madreporite on the ventral surface. These genera attained the Colophiuran grade in respect of external plating, but it is unlikely

face.

Distal face.

Ventral groove, where lies the water vessel, from which branches pass through the ossicle,emerg ing as podia at e and e.

that they or their ancestors had acquired even the Streptophiuran type of vertebra. Sollas has separated them as an order Ophiocistia. Class III. Echinoidea. — Eleutherozoa with a test of roughly circular, subpentagonal or elliptical outline, spheroidal, domed or flattened, of primary pentameric symmetry affecting all systems of organs except the gut. The radial water-vessels lie within the test through which their podia pass (fig. 12, D) ; the ambulacra thus formed are continuous from the peristome to the apical system of plates; the hydropore is connected with a definite plate of that system, and thus marks a secondary bilateral symmetry. An anus is present either within the apical system (endocyclic, fig. 3, A and B), or outside it in an interradius (exocyclic, fig. 19, 7), thus initiating yet another bilateral symmetry. Skeletal appendages are spines (radioles), pedicellariae, and, in some forms, minute sense-organs called sphaeridia.

The echinoids or sea-archins (see Sea-Urchin) may be grouped under the following orders, here named in the sequence of their appearance in the rocks.

Order I. Bothriocidaroida. — Ambulacrals simple, each with two pores vertically superposed, 2 columns to each ambulacrum; inter-ambulacrals multituberculate, in I column, none passing on to or resorbed by the peristome; mouth central, jaws unknown, no external gills or sphaeridia; anus aboral, endocyclic. Sole genus

Bothriocidaris (fig. 5), Ordovician.

Order 2. Melonitoida. — Ambulacrals simple, each with two pores horizontally juxtaposed, in 2 to 18 columns; interambulacrals granulate with occasional tubercles, in 3 to II columns, not more than one row passing on to the peristome; mouth central, with jaws, no external gills or sphaeridia; anus aboral, endocyclic. Families: Palechinidae (fig. 19, 1), Melonitidae and Lepidesthidae, Silurian to Carboniferous.

Order 3. Cystocidaroida. — Ambulacrals simple, each with one or two pores, which sometimes pass between rather than through the plates, in 2 columns; interambulacrals, uni- or multi-tuberculate, in numerous (say 10 or more) columns, none passing on to peristome; mouth central with jaws, no external gills or sphaeridia ; position of anus doubtful, acyclic, i.e. no apical system so far as known. Include only Echinocystis, Palaeodiscus and (?) Myriasliches, all Upper Silurian.

Order 4. Cidaroida. — Ambulacrals simple, each with two pores horizontally juxtaposed, in 2 columns; interambulacrals uni-tuberculate, in 2 to 1 1 columns, some rows may pass on to the peristome; mouth central, with jaws, no external grills or sphaeridia; anus aboral, endocyclic. Families: Lepidocentndae and Archaeocidaridae (fig. 19, 2), Devonian and Carboniferous; Cidaridae (fig. 19, 3, 4), Permian to present; DiplocidaridaeandTiarechinidae, Mesozoic.

Order 5. Diademoida. — Ambulacrals generally compound, with two pores obliquely juxtaposed, in 2 columns as in all subsequent orders; interambulacrals usually with large radioles surrounded by smaller ones, as in Cidaroida, in 2 columns as in all subsequent orders, only one plate resorbed ; mouth central, with jaws and external gills, sphaeridia present; anus aboral endocyclic. J. W. Gregory divides this into four suborders, each representing a distinct evolutionary series; i. Calycina, Saleniidae (fig. 19, 5) and Acrosaleniidae; ii. Arbacina, Hemicidaridae and Arbaciidae; iii. Diademina, Orthopsidae, Diadematidae, Diplopodiidae, Pedinidae,

Denuded tests of some fossil Echinoids.

6, Dysaster; Jurassic.

7, Enallaster; Cretaceous.

8, Catopygus; Cretaceous.

1, Palaeechinus; Carboniferous.

2, A plate and radiole of A rchaeo-

cidaris; Carboniferous.

3, A radiole of Cidaris; Jurassic.

4, Hemicidaris; Mid. Jurassic.

5, Salenia; Cretaceous.

Cyphosomatidae, and Echinothuridae ; iv. EcAimno.Temnopleuridae, Triplechinidae, Strongylocentrotidae and Echinometridae. The order is Triassic to Recent.

Order 6. Holectypoida. — Ambulacrals sometimes compound, with one or two pores to a plate, some dorsal podia begin to assume respiratory function; interambulacrals multi-tuberculate, none resorbed ; mouth central, with jaws weak or wanting, with external

gills and sphaeridia; anus exocyclic. Families: Pygasteridae, Discoidiidae, Galeritidae, Conoclypeidae ; Jurassic to Recent.

Order 7. Spatangoida. — Ambulacrals simple, with two pores juxtaposed, dorsal podia respiratory; interambulacrals bearing numerous small spines, none resorbed; mouth central or shifted forwards, with no jaws or external gills, sphaeridia numerous ; anus exocyclic. As the mouth moves forward and the anus downward, the posterior interambulacrals between them are enlarged and strengthened so as to form a sternum. The order may therefore be divided into: (i.) Asternata, Famm. Echinoneidae, Nucleolitidae and Cassidulidae (fig. 19, 8) ; (ii.) Sternata, Famm. Collyritidae (fig. 19, 6), Echinocorytidae, Spatangidae (fig. 19, 7), Palaeostomidae, and Pourtalesiidae ; Jurassic to Recent.

Order 8. dypeastroida. — Ambulacrals simple or compound, with two pores juxtaposed, dorsal podia respiratory; interambulacrals multi-tuberculate, none resorbed; mouth central with flattened unequal jaws, reduced external gills, and few sphaeridia; anus exocyclic. Families: Fibulariidae, Laganidae, Scutellidae, Clype-astridae ; Cretaceous to Recent.

Cambrian

Ordouician

'I

BOTHRIOCIDAROIDA (jam unkitomn)

Silurian melonitoida »

Oeitonian Carboniferous

Permian

Trias

Jurassic

Cretaceous

Tertiary

Recent

CYSTO- CIDAR- OIDA]

J

SPATANGOIDA

J

— Jaws lofty

abranchiate — "-

jaws flat – reduced — lost – branchiate — ' >—lipobranchiate—>

no sphaeridia — 11

sphaeridia

endocyclic

exocyclic

Fig. 20.

The probable relationship of these orders is shown in the annexed table. Here the Cystocidaroida occupy an isolated position. It is, however, quite possible that Echinocystis may some day be referred to the Cidaroida, and Palaeodiscus to the Melonitoida. This would

leave the Echinoid scheme remarkably simple, with the Melonitoida and Cidaroida as divergent branches from an ancestor like Bothriocidaris; but while the former branch soon decayed, the latter continues to flourish at the present day. To take the Echinoidea now living, and to divide them into Endocyclica and Exocyclica, Branchiate and Abranchiate, Gnathostomata and Atelostomata, is easy and convenient; or again to distinguish as Palechinoidea those pre-Jurassic genera which do not conform to the fixed type of twenty vertical columns found in the later Euechinoidea, is to express an interesting fact ; but all such divisions obscure the true relationships, and the corresponding terms should be recognized as descriptive rather than classificatory.

Authorities. — In addition to the works referred to at the be- ginning of the article, the following deal with the general subject: Bather, Gregory and Goodrich, " Echinoderma," in Lankester's Treatise on Zoology (London, 1900) ; F. J. Bell, Catalogue of the British Echinoderms in the British Museum (London, 1892); P. H. Carpenter, " Notes on Echinoderm Morphology," Quart. Journ. Micr. Sci., 1878-1887; Y. Delage and E. Herouard, TraitS de zoologie concrete, iii., Echinoderm.es (Paris, 1904) ; A. Lang, Text- Book of Comparative Anatomy, transl., part ii. (London, 1896); Ludwig and Hamann, " Echinodermen," in Bronn's Klassen und Ordnungen des Tierreichs (Leipzig, 1889), in progress; M. Neumayr, Die Sttimme des Tierreiches (Wien, 1889); P. B. and C. F. Sarasin, " Uber die Anatomie der Echinothuriden und die Phylogenie der Echinodermen," Ergebnisse naturw. Forsch. auf Ceylon, Bd. i Heft 3 (Wiesbaden, 1888); R. Semon, "Die Homologien innerhalb des Echinodermenstammes," Morph. Jahrb. (1889); W. P. Sladen, " Homologies of the Primary Larval Plates in the Test of Brachiate Echinoderms," Quart. Journ. Micr. Sci., 1884; K. A. v. Zittel, Handbuch der . . . Paldozoologie, i. pp. 308-560 (Munchen, 1879); also Grundziige, translated and revised by C. R. Eastman as Text-

Book of Palaeontology (New York and London, 1899). The larger treatises here mentioned contain very full bibliographies, and a complete analytical index to the annual literature of the Echinoderma has for many years been published in the Zoological Record (London). (F. A. B.)

ECHINUS (Gr. for " hedge-hog " or " sea-urchin "), in archi- tecture,

the convex moulding which supports the abacus of the Doric column. The term is sometimes given to the ovolo of the Ionic capital, especially when curved with the egg-and-tongue enrichment. The origin of this use of the word in architecture, which comes down from ancient times, is uncertain.

ECHIUROIDEA (Gr; ?x«, adder, and ovpa, tail), the zoo- logical name for a small group of marine animals which show in their larval life-history a certain degree of segmentation, and are therefore grouped by some authorities as Annelids. Formerly, together with the Sipunculoidea and Priapuloidea, they made up the class Gephyrea, but on the ground that they retain in the adult a large preoral lobe (the proboscis), that they have anal vesicles, that their anus is terminal, that setae are found, and finally that they are segmented in the larval stage, they have been removed from the class, which by the proposed further separation of the Priapuloidea on account of their unique renal and reproductive organs, has practically ceased to exist.

Echiuroids are animals of moderate size, varying roughly from one to six or seven centimetres in length, exclusive of the proboscis. This organ is capable of very considerable ex- tension, and may attain a length in Bonellia viridis of about a metre and a half (fig. 1). It is grooved ventrally and ciliated.

At its attachment to the body the groove sinks into the mouth. In Bonellia the pro- boscis is forked at its free end; but in the other genera it is short and un- forked. The body is somewhat sausage-shaped, with the anus at the pos- terior extremity, surrounded in Echiurus by a single or double ring of setae. The skin is usually wrinkled, and in B. viridis, Thalassema lankes- teri, Th. baronii, Hamingia arctica, and in the larva of many species, is of a lively green Fig. 1. — A, Bonellia viridis, Rol., 9; B, B. colour. A pair of fuliginosa. Both natural size, a, grooved curved bristles proboscis; b, mouth; c, ventral hooks ; d, formed j true t ˆ

anus. . _,

sacs as m Chaeto-

podaj project from the body a short distance behind the mouth, and are moved by special muscles; they are of use in helping the animal to move slowly about, and they take a large share in the burrowing movements (C. B. Wilson, Biol. Bull., 1900), for some species tunnel in the mud and sand and form more or less permanent burrows, the

walls of which are strengthened by mucus secreted from the skin. The openings of the burrows become silted up, leaving, however, a small aperture through which the proboscis is extruded. This organ carefully searches the neighbourhood for particles of food. When these are found the grooved proboscis folds its walls inwards, and the cilia pass the particles down the tube thus formed to the mouth. Echiu- roids also move by extending the proboscis, which takes hold of some fixed object, and, then contracting, draws the body for- wards. Recently it has been shown that Echiurus swims freely

at night-time, using for locomotion both the proboscis and the contraction of the muscles of its body-wall. The motion is described as " gyratory," and the anterior end is always carried foremost. Those species which do not burrow usually conceal themselves in crevices of the rocks or under stones, or at times in empty Mollusc or Echinid shells. They are occasionally used by fishermen for bait.

Anatomy (fig. 2). — A thin cuticle covers the epidermis, which contains mucus-secreting glands. Beneath the epidermis is a layer

Fig. 2-

-Female Bonellia viridis, Rol. left side.

Opened along the

o, Proboscis cut short.

b, Bristle passing through

the mouth into the pharynx.

c, Coiled intestine.

d, Anal tufts or vesicles.

e, Ventral nerve cord.

/, Ovary borne on ventral vessel

running parallel with e.

g, Position of anus. [nephridium.

h, Position of external opening of

i, Nephridium — the line points

towards, but does not reach,

the internal opening.

of circular muscles, then a layer of longitudinal, and finally in some cases a layer of oblique muscle-fibres. The inner face of this muscular skin is lined by a layer of epithelium. The coelomic body-cavity is spacious. It does not extend into the proboscis, which is a solid organ traversed by the nervous and vascular rings, but otherwise largely built up of muscle fibres and connective tissue. Many sense- cells he in the epidermis. The ciliated ventral groove of the proboscis leads at its base into the simple mouth, which gives access to the thin-walled alimentary canal. This is longer than the body, and to tuck it away it is looped from side to side. The loops are supported by strands of connective tissue, which in some species are united so as to form a dorsal mesentery, whilst traces of a ventral mesentery are met with anteriorly and posteriorly (H. L. Jameson, Zool. Jahrb. Anat., 1899). The alimentary canal is divisible into fore-gut, mid-gut and hind-gut, and the first-named can be further divided into pharynx, oesophagus, gizzard and crop, mainly on histological grounds. The mid-gut is characterized by the presence of a ciliated groove, from which arises the collateral intestine or siphon, a second tube which rejoins the alimentary canal lower down. Similar collateral intestines are familiar in the Echinids and certain Polychaets (Capitellidae). The rectum receives the openings of a pair of very characteristic organs, the anal vesicles. Each consists of a branching tube, the tips of whose twigs terminate in minute ciliated funnels.

The anal vesicles are thought to be excretory ; whether this be so or not, they undoubtedly have some influence on the amount of fluid found in the coelom. The coelomic fluid contains as a rule both amoeboid and rounded corpuscles, and, when ripe, the products of the gonads. A closed system of vessels, usually called the vascular system, is present. There are, however, no capillaries connected with this, and it is confined to certain portions of the body. It can possess few of the functions usually associated with a vascular system, and its main use is probably to assist in the expansion of the proboscis. The system consists of the following parts : — A dorsal vessel applied to the alimentary canal is continued anteriorly into a median vessel, which traverses the proboscis to its tip. Here the

vessel splits, and each half returns along the lateral edge of the pro- boscis; they reunite around the oesophagus and form a single ventral vessel, which lies above the ventral nerve-cord. The ventral vessel, which ends solidly be- hind, sends off a branch which forms a ring around the intestine and opens into the posterior extremity of the dorsal vessels In Echiurus and Thalas- sema the same vessel forms a ring round a stout muscle, which con- nects the bases of the two ventral setae before passing to surround the intestine. Amoeboid corpuscles float in the fluid contents. The nephridia vary in num- ber from a single one in Bonellia to three pairs in many species of Thalassema. Their ex- ternal openings are ven- tral, and on the same level as the ciliated funnel-shaped nephro- stomes. The posterior wall of the organ is produced into a long blind sac, which is lined by secretory cells. The nervous system is a single ventral cord, which starts from a circum- oesophageal ring. This ring is involved in the Fig. 3. — Adult male, Bonellia viridis, growth of the proboscis, Rol. The original was 1-5 mm. long. The and is drawn out with nervous system is not shown. (After it. Thus there is a Selenka.) lateral nerve near each

a, Generative pore with spermatozoa ec jge of the proboscis

coming out. which unites with its

b, Anterior blind end of intestine attached fellow dorsally above

to the parenchymatous tissue by the oesophagus at the muscular strands. tip of the proboscis,

c, Green wandering cells containing and ventrally beneath

chlorophyll.

d, Parenchymatous connective tissue.

*e, Epidermis. *, Intestine. j, Vas deferens.*

/, Internal opening of vas deferens. m. The left anal vesicle. n, Spermatozoa in the body-cavity.

the oesophagus, where they fuse to form the ventral nerve-cord. There are no specialized ganglia, but ganglion- cells are scattered uni- formly along the nerve- cords. The ventral cord gives off rings, which The reproductive cells on the ventral vessel.

run into the skin at regular intervals, are modified coelomic cells,

which lie They escape info the coelomic fluid and there develop. When mature they leave the body through the nephridia. Bonellia and Hamingia are very interesting examples of sexual dimorphism. The female has the normal Echiuroid structure, but the male is reduced to a minute, flattened, planarian-like organism, which passes its life usually in the company of two or three others in a special recess of the nephridia of the female. Its structure may be gathered by a reference to fig. 3.

Larva. — The larva is a typical trochosphere, which, although of a temporary character, shows a distinct segmentation of the mesoblast, of the nervous system, and of the ciliated and pigmented structures in the skin, resembling that of Chaetopods. The preoral lobe persists

as the proboscis. The sexes of the larvae are not determinable in the early stages, but when a certain growth has been reached in Bonellia the males seek the proboscis of the adult females, and passing into the mouth undergo there the transformation into the planarian-like

Carasite which is the fully-formed male. This now creeps along the ody of the female and takes up its home in her nephridia.

Classification and Distribution. — The Echiuroidea consists of the following genera: — (1) Bonellia (Rol.), with, four species, widely distributed, but inhabiting the temperate and warmer waters of each hemisphere. (2) Echiurus (Guerin-Meneville), with four species. This genus reaches from the Arctic waters of both hemispheres into the cooler temperate regions. (3) Hamingia (Kor. and Dan.), with one species, which has been taken in the Arctic Sea and the Hardanger Fjord. (4) Saccosoma (Kor. and Dan.) was described from a single specimen dredged about half-way between Iceland and Norway. (5) Thalassema (Gaertner, Lamarck), with twenty-one species. This genus is in the main a denizen of the warmer waters of the globe. Sixteen species are found only in tropical or subtropical seas, three species are Mediterranean (Mt. Stat. Neapel, 1899), whilst three species are from the eastern Atlantic, where the temperature is modified by the Gulf Stream (Shipley; see Willey's Zoological Results, part iii. 1899; Proc. Zool. Soc. Lond., 1898, 1899; and Cambridge Natural History, ii.). The following are found in the British area: — E. pallasii Guerin-Meneville), Th. nepluni (Gaertner), and Th. lankesteri (Herdman, Q.J. M.S., 1898).

Affinities. — The occurrence of trochosphere larva and the temporary segmentation of the body have led to the belief that the Echiuroids are more nearly allied to the Annelids than to any other

phylum. This view is strengthened by certain anatomical and histological resemblances to the genus Sternaspis, which in one species, 5. spinosa, is said to carry a bifid proboscis resembling that of the Echiuroids. (A. E. S.)

ECHMIADZIN, or Itsmiadsin, a monastery of Russian Transcaucasia, in the government of Erivan, the seat of the Catholicus or primate of the Armenian church. It is situated close to the village of Vagarshapat, in the plain of the Aras, 2840 ft. above the sea, 12 m. W. of Erivan and 40 N. of Mount Ararat. The monastery comprises a pretty extensive complex of buildings, and is surrounded by brick walls 30 ft. high, which with their loopholes and towers present the appearance of a fortress. Its architectural character has been considerably impaired by additions and alterations in modern Russian style. On the western side of the quadrangle is the residence of the primate, on the south the refectory (1 730-1 735), on the east the lodgings for the monks, and on the north the cells. The cathedral is a small but fine cruciform building with a Byzantine cupola at the intersection. Its foundation is ascribed to St Gregory the Illuminator in 302. Of special interest is the porch, built of red porphyry, and profusely adorned with sculptured designs somewhat of a Gothic character. The interior is decorated with Persian frescoes of flowers, birds and scroll-work. It is here that the Catholicus confers episcopal consecration by the sacred hand (relic) of St Gregory; arid here every seven years he prepares with great solemnity the holy oil which is to be used throughout the churches of the Armenian communion. Outside of the main entrance are the alabaster tombs of the primates Alexander I. (1714), Alexander II. (1755), Daniel (1806) and Narses (1857), and a white marble monument, erected by the English East India Company to mark the resting-place of Sir John Macdonald Kinneir, who died at Tabriz in 1830, while on an embassy to the Persian court. The library of the monas- tery is a rich storehouse of Armenian literature (see Brosset's Catalogue de la bibliotheque d' Etchmiadzin, St Petersburg, 1840). Among the more remarkable manuscripts are a copy of the gospels dating from the 10th or nth century, and three bibles of the 13th century. A type-foundry, a printing-press and a bookbinding establishment are maintained by the monks who supply religious and educational works for their co-religionists.

To the east of the monastery is a modern college and seminary. Half a mile to the east stand the churches of St Ripsime and St Gaiana, two of the early martyrs of Armenian Christianity; the latter is the burial-place of those primates who are not

deemed worthy of interment beside the cathedral. From a distance the three churches form a fairly striking group, and accordingly the Turkish name for Echmiadzin is Uch-Kilissi, or the Three Churches. The town of Vagarshapat dates from the 6th century B.C.; it takes its name from King Vagarsh (Vologaeses), who in the 2nd century a.d. chose it as his residence and surrounded it with walls. Here the apostle of Armenia, St Gregory the Illuminator, erected a church in 309 and with it the primacy was associated. In 344 Vagarshapat ceased to be the Armenian capital, and in the 5th century the patriarchal seat was removed to Dvin, and then to Ani. The monastery was founded by Narses II., who ruled 524-533; and a restora- tion was effected in 618. The present name of the monastery was adopted instead of Vagarshapat in the 10th century. At length in 1441 the primate George brought back the see to the original site. (P. A. K.; J. T. Be.)

ECHO (Gr. fa"), in Greek mythology, one of the Oreades or mountain nymphs, the personification of the acoustical pheno- menon known by this name. She was beloved by Pan, but rejected his advances. Thereupon the angry god drove the shepherds of the district mad; they tore Echo in pieces, and scattered her limbs broadcast, which still retained the gift of scng (Longus iii. 23). According to Ovid (Metam. iii. 356-401), Echo by her incessant talking having prevented Juno from surprising Jupiter with the Nymphs, Juno changed her into an " echo " — a being who could not speak till she was spoken to, and then could only repeat the last words of the speaker. While in this condition she fell in love with Narcissus, and in grief at her unrequited affection wasted away until nothing remained but her voice and bones, which were changed into rocks. The legends of Echo are of late, probably Alexandrian, origin, and she is first personified in Euripides.

In acoustics an " echo " is a return of sound from a reflecting surface (see Sound: Reflection).

See F. Wieseler, Die Nymphe Echo (1854), and Narkissos (1856) ; P. Decharme in Daremberg and Saglio's Dictionnaire des antiguites.

ECHTERNACH, a town in the grand duchy of Luxemburg, on the Sure, close to the Prussian frontier. Pop. (1905) 3484. It is the oldest town in Luxemburg, and was the centre from which the English

Saint Willibrord converted the people to Christianity in the 7th century. There are the Benedictine abbey, the hospital almshouse, which is said to be the oldest hospital in Europe except the Hotel-Dieu in Paris, and the church of St Peter and St Paul. The Benedictine abbey has been greatly shorn of its original dimensions, but the basilica remains a fair monument of Romano-Gothic art. The church of St Peter and St Paul stands on an isolated mound, and for the ascent sixty steps have been built in the side, and these are well Worn by the tread of numerous pilgrims who come in each succeeding year. The interior of the church is curious more than imposing, and is specially noteworthy only for its gloom. Under the altar, and below a white marble effigy of himself, lies Saint Willibrord.

Echternach is famous, however, in particular for the dancing procession held on Whit-Tuesday every year. The origin of this festival is uncertain, but it dates at least from the 13th century and was probably instituted during on outbreak of cholera. Nowadays it is an occasion of pilgrimage, among Germans and Belgians as well as Luxemburgers, for all sick persons, but especially for the epileptic and those suffering from St Vitus' dance. The ceremony is interesting, and the Roman Catholic Church lends all its ritual to make it more imposing. The archbishop of Trier attends to represent Germany, and the bishop of Luxemburg figures for the grand duchy. There is a religious ceremony on the Prussian side of the bridge over the Sure, and when it is over the congregation cross into the duchy to join the procession, partly religious, partly popular, through the streets of the town. The religious procession, carrying cross and banners and attended by three hundred singers, comes first, chanting St Willibrord's hymn. Next comes a band of miscellaneous instruments playing as a rule the old German air " Adam had seven sons," and then follow the dancers. Many of these are young and full of life and health and dance for

amusement, but many others are old or feeble and dance in the hope of recovery or of escaping from some trouble, but on all alike the conditions of the dance are incumbent. There are three steps forward and two back; five steps are thus taken to make one in advance. This becomes especially trying at the flight of steps mounting to the little church where the procession ends in front of the shrine of the great saint. There are sixty steps, but it takes three hundred to reach the top for the final time. It is said that those who fall from age or weariness have to be dragged out of the way by onlookers or they would be trampled to death by the succeeding waves of dancers. The procession, although it covers a distance of less than a mile, is said

to take as much as five hours in its accomplishment. In olden days the abbey was the goal of the procession, and King William I. of the Netherlands — great-grandfather of Queen Wilhelmina— changed the day from Tuesday to Sunday so that a working day should not be lost. This reform did not answer, and the ancient order was restored. Some critics see in the dancing procession of Echternach merely the survival of the spring dance of the heathen races, but at any rate it invests the little town with an interest and importance that would otherwise be lacking.

ECHUCA, a borough of the county of Rodney, Victoria, Australia, 156 m. by rail N. of Melbourne. Pop. (1901) 4075. It is situated on the river Murray, across which it is connected by bridge with Moama, on the New South Wales side, whence a railway runs to Deniliquin. The town is the terminus of the Murray River railway and the entrepot of the overland inter- colonial trade; it has large wool stores, saw-mills, coach factories, breweries and soap-works. The rich agricultural district is noted for its vineyards.

£CIJA, a town of southern Spain, in the province of Seville; on the Cadiz-Cordova railway and the left bank of the river Genii. Pop. (1900) 24,372. The river, thus far navigable, is here crossed by a fine old bridge; and the antiquity of the town betrays itself by the irregularity of its arrangement, by its walls and gateways, and by its numerous inscriptions and other relics. Its chief buildings include no fewer than twenty convents, mostly secularized. The principal square is surrounded with pillared porticoes, and has a fountain in the centre; and along the river bank there runs a fine promenade, planted with poplar trees and adorned with statues. From an early period the shoemakers of ficija have been in high repute throughout Spain; woollen cloth, flannel, linen and silks are also manufactured. The vicinity is fertile in corn and wine, and cotton is cultivated. The heat is so great that the spot has acquired the sobriquet of El Sarten, or the " Frying-pan " of Andalusia. Ecija, called Estija by the Arabs, is the ancient Astigis, which was raised to the rank of a Roman colony with the title of Augusta Firma. Ac- cording to Pliny and Pomponius Mela, who both wrote in the 1st century A.D., it was the rival of Cordova and Seville. If local tradition may be believed, it was visited by the apostle Paul, who converted his hostess Santa Xantippa; and, according to one version of his life, it was the see of the famous St Crispin (q.v.) in the 3rd century.

ECK, JOHANN MAIER (1486-1543), German theologian, the most indefatigable and important opponent of Martin Luther, was born on the 13th of November i486 at Eck in Swabia, from which place he

derived his additional surname, which he himself, after 1505, always modified into Eckius or Eccius, i.e. " of Eck." His father, Michael Maier, was a peasant and bailiff (Amtmann) of the village. The boy's education was undertaken by his uncle Martin Maier, parish priest at Rothen- burg on the Neckar, who sent him at the age of twelve to the university of Heidelberg, and subsequently to those of Tubingen, Cologne and Freiburg in the Breisgau. His academic career was so rapidly successful that at the age of twenty-four he was already doctor and professor of theology. During this period he was distinguished for his opposition to the scholastic philosophy; and, though he did not go to all lengths with the " modernists " (Moderni) of his day, his first work — Logices exercitamenta (1 507) — was distinctly on their side. This attitude

brought him into conflict with the senate of the university, a conflict which Eck's masterful temper, increased by an extreme self-confidence perhaps natural in one so young and so success- ful, did not serve to allay. His position in Freiburg becoming intolerable, he accepted in 1510 an invitation from the duke of Bavaria to fill the theological chair at Ingolstadt, where he was destined for thirty years to exercise a profound influence as teacher and vice-chancellor (Prokanzler) .

A ducal commission, appointed to find a means for ending the interminable strife between the rival academic parties, entrusted Eck with the preparation of fresh commentaries on Aristotle and Petrus Hispanus. He had a marvellous capacity for work, and between 1516 and 1520, in addition to all his other duties, he published commentaries on the Summulae of Petrus Hispanus, and on the Dialectics, Physics and lesser scientific works of Aristotle, which became the text-books of the university. During these early years Eck was still reckoned among the " modernists," and his commentaries are inspired with much of the scientific spirit of the New Learning. His aim, however, had been to find a via media between the old and new; his temper was essentially conservative, his imagination held captive by the splendid traditions of the medieval church, and he had no sympathy with the revolutionary attitude of the Reformers. Personal ambition, too, a desire to be conspicuous in the great world of affairs, may have helped to throw him into public opposition to Luther. He had won laurels in a public disputation at Augsburg in 1514, when he had defended the lawfulness of putting out capital at

interest; again at Bologna in 1513, on the same subject and on the question of predestination; and these triumphs had been repeated at Vienna in 151 6. By these successes he gained the patronage of the Fuggers, and found himself fairly launched as the recognized apologist of the estab- lished order in church and state. Distinguished humanists might sneer at him as " a garrulous sophist "; but from this time his ambition was not only to be the greatest scientific authority in Germany but also the champion of the papacy and of the traditional church order. The first-fruits of this new resolve were a quite gratuitous attack on his old friend, the distinguished humanist and jurist Ulrich Zasius (1461-1536), for a doctrine proclaimed ten years before, and a simultaneous assault on Erasmus's Annotationes in Novum Testamentum.

It is, however, by his controversy with Luther and the other reformers that Eck is best remembered. Luther, who had some personal acquaintance with Eck, sent him in 1517 copies of his celebrated 95 theses. Eck made no public reply; but in 1518 he circulated, privately at first, his Obelisci, in which Luther was branded as a Hussite. Luther entrusted his defence to Carlstadt, who, besides answering the insinuations of Eck in 400 distinct theses, declared his readiness to meet him in a public disputation. The challenge was accepted, and the disputation took place at Leipzig in June and July 1519. On June 27 and 28 and on July 1 and 3 Eck disputed with Carlstadt on the subjects of grace, free will and good works, ably defending the Roman Semipelagian standpoint. From July 4 to 14 he engaged with Luther on the absolute supremacy of the papacy, purgatory, penance, &c, showing a brilliant display of patristic and conciliar learning against the reformer's appeals to Scripture. The arbitrators declined to give a verdict, but the general im- pression was that victory rested with Eck. He did, indeed, succeed in making Luther admit that there was some truth in the Hussite opinions and declare himself against the pope, but this success only embittered his animosity against his opponents, and from that time his whole efforts were devoted to Luther's overthrow. He induced the universities of Cologne and Louvain to condemn the reformer's writings, but failed to enlist the German princes, and in January 1520 went to Rome to obtain strict regulations against those whom he called " Lutherans." He was created a protonotary apostolic, and in July returned to Germany, as papal nuncio, with the celebrated bull Exsurge Domine directed against Luther's writings. He now believed himself in a position to crush not only the Lutheran heretics, but also his humanist critics. The effect of the publication of the bull, however,

soon undeceived him. Bishops, universities and humanists were at

one in denunciation of the outrage; and as for the attitude of the people, Eck was glad to escape from Saxony with a whole skin. In his wrath he appealed to force, and his Epistola ad Carolum V. (February 18, 1521) called on the emperor to take measures against Luther, a demand soon to be responded to in the edict of Worms. In 1521 and 1522 Eck was again in Rome, reporting on the results of his nunciature. On his return from his second visit he was the prime mover in the promulgation of the Bavarian religious edict of 1522, which practically established the senate of the university of Ingolstadt as a tribunal of the Inquisition, and led to years of persecution. In return for this action of the duke, who had at first been opposed to the policy of repression, Eck obtained for him, during a third visit to Rome in 1 5 23 , valuable ecclesiastical concessions. Mean- while he continued unabated in his zeal against the reformers, publishing eight considerable works between 1522 and 1526.

His controversial ardour was, indeed, somewhat damped by Luther's refusal to answer his arguments, and with a view to earning fresh laurels he turned his attention to Switzerland and the Zwinglians. At Baden-in-Aargau in May and June 1526 a public disputation on the doctrine of transubstantiation was held, in which Eck and Thomas Murner were pitted against Johann Oecolampadius. Though Eck claimed the victory in argument, the only result was to strengthen the Swiss in their memorial view of the Lord's Supper, and so to diverge them further from Luther. At the Augsburg diet in 1530 Eck was charged by Charles V. to draw up, in concert with twenty other theologians, the refutation of the Protestant Confession, but was obliged to rewrite it five times before it suited the emperor. He was at the colloquy of Worms in 1540 and at the diet of Regensburg (Ratisbon) in 1541. At Worms he showed some signs of a willingness to compromise, but at Regensburg his old violence reasserted itself in opposing all efforts at reconciliation and persuading the Catholic princes to reject the Interim.

Eck died at Ingolstadt on the 10th of February 1543, fighting to the last and worn out before his time. He was undoubtedly the most conspicuous champion produced by the old religion in the age of the Reformation, but his great gifts "were marred by greater faults. His vast learning was the result of a powerful memory and unwearied industry, and he lacked the creative imagination necessary to mould this material into new forms. He was a powerful debater, but his victories were those of a dialectician rather than a convincing reasoner, and in him depth of insight and conviction were ill replaced by the controversial violence characteristic of the age.

Moreover, even after dis- counting the bias of his enemies, there is evidence to prove that his championship of the Church was not the outcome of his zeal for Christianity; for he was notoriously drunken, unchaste, avaricious and almost insanely ambitious. His chief work was De primatu Petri (15 19); his Enchiridion locorum communium adversus Lutherum ran through 46 editions between 1525 and 1576. In 1530-1535 he published a collection of his writings against Luther, Opera contra Ludderum, in 4 vols.

See T. Wiedemann, Dr Johann Eck (Regensburg, 1865).

ECKERMANN, JOHANN PETER (1792-1854), German poet and author, best known owing to his association with Goethe, was born at Winsen in Hanover on the 21st of September 1792, of humble parentage, and was brought up in penury and privation. After serving as a volunteer in the War of Liberation (1813- 1814), he obtained a secretarial appointment under the war department at Hanover. In 18 17, although twenty-five years of age, he was enabled to attend the gymnasium of Hanover and afterwards the university of Gottingen, which, however, after one year's residence as a student of law, he left in 1 8 2 2 . His acquaint- ance with Goethe began in the following year, when he sent to him the manuscript of his Beitrdge zur Poesie (1823). Soon afterwards he went to Weimar, where he supported himself as a private tutor. For several years he also instructed the son of the grand duke. In 1830 he travelled in Italy with Goethe's son. In 1838 he was given the title of grand-ducal councillor and appointed librarian to the grand-duchess. Eckermann is chiefly remembered

for his important contributions to the knowledge of the great poet contained in his Conversations with Goethe (1836-1848). To Eckermann Goethe entrusted the publication of his Nachgelassene Schriften (posthumous works) (1832-1833). He was also joint-editor with Friedrich Wilhelm Riemer (1774-1845) of the com- plete edition of Goethe's works in 40 vols. (1 839-1 840). He died at Weimar on the 3rd of December 1854.

Eckermann's Gesprdche mit Goethe (vols: i. and ii. 1836; vol. iii. 1848; 7th ed., Leipzig, 1899; best edition by L. Geiger, Leipzig, 1902) have been translated into almost all the European languages, not excepting Turkish. (English translations by Margaret Fuller,

Boston, 1839, and John Oxentord, London, 1850.) Besides this work and the Beitrdge zur Poesie, Eckermann published a volume of poems (Gedichte, 1838), which are of little value. See /. P. Ecker- manns Nachlass, herausgegeben von F. Tewes, vol. i. (1905), and an article by R. M. Meyer in the Goethe- Jahrbuch, xvii. (1896).

ECKERNFORDE, a town of Germany, in the Prussian province of Schleswig-Holstein, on a fjord of the Baltic, 20 m. by rail N.W. from Kiel. Pop. (1905) 7088. It has a good harbour, fishing, trade in agricultural products, and manufactures of tobacco, salt and iron goods. There are a technical school of building and a Protestant teachers' seminary. Eckernforde is mentioned as far back as 1197. It was taken by Christian IV. of Denmark in 1628 from the Imperial troops. In 1813 the Danes were defeated here, while in 1849 the harbour was the scene of the blowing up of the Danish line-of-battle ship " Christian VIII." and of the surrender of the frigate " Gefion " after an engagement with the German shore batteries. The place lost most of its trade after the union with Germany in 1864, and suffered severely from a sea-flood in 1872. In the immediate neighbourhood is the village of Borby, much frequented for sea-bathing.

ECKERSBERG, KRISTOFFER (1783-1853), Danish painter, was born in south Jutland. He became successively the pupil of Nikolaj Abildgaard and of J. L. David. From 1810 to 1813 he lived at Paris under the direction of the latter, and then pro- ceeded, as an independent artist, to Rome, where he worked until 1816 in close fellowship with Thorwaldsen. His paintings from this period — " The Spartan Boy," " Bacchus and Ariadne " and ■ ' Ulysses " — testify to the influence of the great sculptor over the art of Eckersberg. Returning to Copenhagen, he found himself easily able to take the first place among the Danish painters of his time, and his portraits especially were in extreme popularity. It is claimed for Eckersberg by the native critics that " he created a Danish colour," that is to say, he was the first painter who threw off conventional tones and the pseudo-classical landscape, in exchange for the clear atmosphere and natural outlines of Danish scenery. But Denmark has no heroic landscape, and Eckersberg in losing the golden commonplaces scarcely succeeds in being delightful. His landscapes, however, are pure and true, while in his figure-pieces he is almost invariably conventional and old- fashioned. He was president of the Danish Academy of Fine Arts in Charlottenburg.

ECKHART.i JOHANNES [" Meister Eckhart "] (? 1260-? 1327), German philosopher, the first of the great speculative mystics. Extremely little is known of his life; the date and place of his birth

are equally uncertain. According to some accounts, he was a native of Strassburg, with which he was afterwards closely connected; according to others, he was born in Saxony, or at Hochheim near Gotha. Trithemius, one of the best authorities, speaks of him merely as " Teutonicus." 1260 has frequently been given as the date of his birth ; it was in all probability some years earlier, for we know that he was advanced in age at the time of his death, about 1327. He appears to have entered the Dominican order, and to have acted for some time as professor at one of the colleges in Paris. His reputation for learning was very high, and in 1302 he was summoned to Rome by Boniface VIII., to assist in the controversy then being carried on with Philip of France. From Boniface he received the degree of doctor. In 1304 he became provincial of his order for Saxony, and in 1307 was vicar-general for Bohemia. In both provinces he was distinguished for his practical reforms and for his power in preaching. Towards 1325 we hear of him as preaching with great effect 1 The name is variously spelled : Eckehart, Eckart, Eckhard.

at Cologne, where he gathered round him a numerous band of followers. Before this time, and in all probability at Strassburg, where he appears to have been for some years, he had come in contact with the Beghards (see Beguines) and Brethren of the Free Spirit, whose fundamental notions he may, indeed, be said to have systematized and expounded in the highest form to which they could attain. In 1327 the opponents of the Beghards laid hold of certain propositions contained in Eckhart's works, and he was summoned before the Inquisition at Cologne. The history of this accusation is by no means clear. Eckhart appears, however, to have made a conditional recantation — that is, he professed to disavow whatever in his writings could be shown to be erroneous. Further appeal, perhaps at his own request, was made to Pope John XXII., and in 1329 a bill was published condemning certain propositions extracted from Eckhart's works. But before its publication Eckhart was dead. The exact date of his death is unknown. Of his writings, several of which are enumerated by Trithemius, there remain only the sermons and a few tractates. Till the middle of the 19th century the majority of these were attributed to Johann Tauler, and it is only from Pfeiffer's careful edition (Deutsche Mystiker d. XIV. J ahrhunderts, vol. ii., 1857) that one has been able to gather a true idea of Eckhart's activity. From his works it is evident that he was deeply learned in all the philosophy of the time. He was a thorough Aristotelian, but by preference appears to have been drawn towards the mystical writings of the Neoplatonists and the pseudo-Dionysius. His style is unsystematic, brief and abounding in symbolical ex-

pression. His manner of thinking is clear, calm and logical, and he has certainly given the most complete exposition of what may be called Christian pantheism.

Eckhart has been called the first of the speculative mystics. In his theories the element of mystical speculation for the first time comes to the front as all-important. By its means the church doctrines are made intelligible to the many, and from it the church dogmas receive their true significance. It was but natural that he should diverge more and more widely from the traditional doctrine, so that at length the relation between his teaching and that of the church appeared to be one of opposition rather than of reconciliation. Eckhart is in truth the first who attempted with perfect freedom and logical consistency to give a speculative basis to religious doctrines. The two most important points in his, as in all mystical theories, are first, his doctrine of the divine nature, and second, his explanation of the relation between God and human thought. (See Mysticism.)

For the German writings of Eckhart see F. Pfeiffer, Deutsche Mystiker, vol. ii. (Leipzig, 1857), and F. Jostes, Meister Eckhart und seine Jilnger (Freiburg, 1895) ; for the Latin works, H. Denifle in Archiv f. Litt- und Kirchengeschichte d. Mittelatters, ii. (1886), pp. 417-652, and v. (1889), pp. 349-364; German translations by G. Landauer, Meister Eckarts mystische 'Schriften (Berlin, 1903), and Biittner (Leipzig, 1903 foil.). See also A. Lasson, Meister Eckhart der Mystiker (1868); H. L. Martensen, Meister Eckhart (1842) ; J. Bach, Meister Eckhart der Voter der deutschen Speculation (1864); C. Ullmann, Reformatoren vor der Reformation (1842); W. Preger, Geschichte d. deutschen Mystik, i. (1874) ; and " Ein neuer Traktat M. Eckharts und d. Grundzuge der Eckhartischen Theo- sophie " in Zeitschr. f. hist. Phil. (1864), pp. 163 foil.; A. Bullinger, Das Christenthum im Lichte der deutschen Philos. (Dillingen, 1895) ; H. Delacroix, Le Mysticisme speculatif en Allemagne au XIV' siicle (Paris, 1900) ; E. Kramm, Meister Eckhart im Lichte der Denifleschen Funde (Bonn, 1889) ; R. Langenberg, Uber die Verhaltnisse Meister Eckharts zur niederdeutschen Mystik (Gottingen, 1896); W. Schopff, Meister Eckhart (Leipzig, 1889) ; A. Jundt, Hist, du pantheisme populaire au moyen dge (Paris, 1875) ; art. in Herzog-Hauck, Real- encyklopadie (S. M. Deutsch); R. M. Jones, Mystical Religion (1909).

ECKHEL, JOSEPH HILARIUS (1737-1798), Austrian numis- matist, was born at Enzersfeld in lower Austria, 1737. His father was farm-steward to Count Zinzendorf, and he received his early education at the Jesuits' College, Vienna, where at the age of fourteen he was

admitted into the order. He devoted himself to antiquities and numismatics. After being engaged as professor of poetry and rhetoric, first at Steyer and afterwards at Vienna, he was appointed in 1772 keeper of the cabinet of coins at the Jesuits' College, and in the same year he went to Italy for the purpose of personal inspection and study of antiquities and coins. At Florence he was employed to arrange the collection of

the grand duke of Tuscany; and the first-fruits of his study of this and other collections appeared in his Numi veteres anecdoti, published ˆ1775. On the dissolution of the order of Jesuits in 1773, Eckhel was appointed by the empress Maria Theresa professor of antiquities and numismatics at the university of Vienna, and this post he held for twenty-four years. He was in the following year made keeper of the imperial cabinet of coins, and in 1779 appeared his Catalogus Vindobonensis numorum veterum. Eckhel's great work is the Doctrina numorum veterum, in. 8 vols., the first of which was published in 1792, and the last in 1798. The author's richlearning, comprehensive grasp of his subject, admirable order and precision of statement in this masterpiece drew from Heyne enthusiastic praise, and the acknowledgment that Eckhel, as the Coryphaeus of numismatists, had, out of the mass of previously loose and confused facts, constituted a true science. A volume of Addenda., prepared by Steinbiichel from Eckhel's papers after his death, was published in 1826. Among his other works are— Ckoix de pierres gravies du Cabinet Imperial des Antiques (1788), a useful school-book on coins entitled Kurzgefasste Anfangsgriinde zur alien Numismatik (1787), of which a French version enlarged by Jacob appeared in 1825, &c. Eckhel died at Vienna on the 16th of May 1798.

ECKMtiHL, or Eggmuhl, a village of Germany, in the kingdom of Bavaria, on the Grosse Laaber, 13 m. S.E. of Regensburg by the railway to Munich. It is famous as the scene of a battle fought here on the 22nd of April 1809, between the French, Bavarians and Wurttembergers under Napoleon, and the Austrians under the Archduke Charles, which resulted in the defeat of the latter. Napoleon, in recognition of Marshal Davout's great share in the victory, conferred on him the title of prince of Eckmuhl. For an account of this action and those of Abensberg and Landshut see Napoleonic Campaigns.

ECLECTICISM (from Gr. &c\kyo), I select), a term used specially in philosophy and theology for a composite system of thought made up of views borrowed from various other systems. Where the characteristic doctrines of a philosophy are not thus merely adopted, but are the modified products of a blending of the systems from which it takes its rise, the philosophy is not properly eclectic. Eclecticism always tends to spring up 'after a period of vigorous constructive speculation, especially in the later stages of a controversy between thinkers of pre-eminent ability. Their respective followers, and more especially cultured laymen, lacking the capacity for original work, seeking for a solution in some kind of compromise, and possibly failing to grasp the essentials of the controversy, take refuge in a com- bination of those elements in the opposing systems which seem to afford a sound practical theory. Since these combinations have often been as illogical as facile, " eclecticism " has generally acquired a somewhat contemptuous significance. At the same time, the essence of eclecticism is the refusal to follow blindly one set of formulae and conventions, coupled with a determina- tion to recognize and select from all sources those elements which are good or true in the abstract, or in practical affairs most useful ad hoc. Theoretically, therefore, eclecticism is a perfectly sound method, and the contemptuous significance which the word has acquired is due partly to the fact that many eclectics have been intellectual trimmers, sceptics or dilettanti, and partly to mere partisanship. On the other hand, eclecticism in the sphere of abstract thought is open to this main objection that, in so far as every philosophic system is, at least in theory, an integral whole, the combination of principles from hostile theories must result in an incoherent patchwork. Thus it might be argued that there can be no logical combination of elements from Christian ethics, with its divine sanction, and purely intuitional or evolutionary ethical theories, where the sanction is essentially different in quality. It is in practical affairs that the eclectic or undogmatic spirit is most valuable, and also least dangerous. In the 2nd century B.C. a remarkable tendency toward eclecticism began to manifest itself. The longing to arrive at the one explanation of all things, which had inspired the older philosophers, became less earnest; the belief, indeed, that any such explanation was attainable began to fail. Thus men came

to adopt from all systems the doctrines which best pleased them. In Panaetius we find one of the earliest examples of the modifica- tion of Stoicism by the eclectic spirit; about the same time the same spirit displayed itself among the Peripatetics. In Rome philosophy never became more than a secondary pursuit; naturally, therefore, the

Roman thinkers were for the most part eclectic. Of this tendency Cicero is the most striking illustration — his philosophical works consisting of an aggregation, with little or no blending, of doctrines borrowed from Stoicism, Peri- pateticism, and the scepticism of the Middle Academy.

In the last stage of Greek philosophy the eclectic spirit pro- duced remarkable results outside the philosophies of those properly called eclectics. Thinkers chose their doctrines from many sources — ■from the venerated teaching of Aristotle and Plato, from that of the Pythagoreans and of the Stoics, from the old Greek mythology, and from the Jewish and other Oriental systems. Yet it must be observed that Neoplatonism, Gnosti- cism, and the other systems which are grouped under the name Alexandrian, were not truly eclectic, consisting, as they did, not of a mere syncretism of Greek and Oriental thought, but of a mutual modification of the two. It is true that several of the Neoplatonists professed to accept all the teaching both of Plato and of Aristotle, whereas, in fact, they arbitrarily interpreted Aristotle so as to make him agree with Plato, and Plato so as to make his teachings consistent with the Oriental doctrines which they had adopted, in the same manner as the schoolmen attempted to reconcile Aristotle with the doctrines of the church. Among the early Christians, Clement of Alexandria, Origen and Synesius were eclectics in philosophy.

The eclectics of modern philosophy are too numerous to name. Of Italian philosophers the eclectics form a large proportion. Among the German we may mention Wolf and his followers, as well as Mendelssohn, J. A. Eberhard, Ernst Platner, and to some extent .Schelling, whom, however, it would be incorrect to describe as merely an eclectic. In the first place, his specula- tions were largely original; and in the second place, it is not so much that his views of any time were borrowed from a number of philosophers, as that his thinking was influenced first by one philosopher, then by another.

In the 19th century the term ” eclectic ” came to be applied specially to a number of French philosophers who differed considerably from one another. Of these the earliest were Pierre Paul Royer-Collard, who was mainly a follower of Thomas Reid, and Maine de Biran; but the name is still more appropriately given to the school of which the most distinguished members are Victor Cousin, Theodore Jouffroy, J. P. Damiron, Barthelemy St Hilaire, C. F. M. de Remusat, Adolphe Gamier and Ravaisson-Mollien. Cousin, whose views varied considerably at different periods of his life, ‘not only adopted freely what pleased him in the doctrines of Pierre Laromiguiere, Royer-

Collard and Maine de Biran, of Kant, Schelling and Hegel, and of the ancient philosophies, but expressly maintained that the eclectic is the only method now open to the philosopher, whose function thus resolves itself into critical selection and nothing more. " Each system," he asserted, " is not false, but incomplete, and in reuniting all imcomplete systems, we should have a com- plete philosophy, adequate to the totality of consciousness." This assumes that every philosophical truth is already contained somewhere in the existing systems. If, however, as it would surely be rash to deny, there still remains philosophical truth undiscovered,' but discoverable by human intelligence, it is evident that eclecticism is not the only philosophy. Eclecticism gained great popularity, and, partly owing to Cousin's position as minister of public instruction, became the authorized system in the chief seats of learning in France, where it has given a most remarkable impulse to the study of the history of philosophy.

ECLIPSE (Gr. k\en/as, falling out of place, failing), the complete or partial obscuration of one heavenly body by the shadow of another, or of the disk of the sun by the inter- position of the moon; then called an eclipse of the sun. Eclipses are of three classes: those of the sun, as just defined; those of the moon, produced by its passage through the

shadow of the earth, and those of the satellites of other planets, produced by their passage through the shadow of their primary. Jupiter (q.v.) is the only planet of whose satellites the eclipses can be observed, unless under very rare circumstances.

The geometrical conditions of an eclipse of the sun or moon are shown in fig. i, which represents the earth E as casting its shadow towards C, and the moon M between the earth and sun as throwing

its shadow towards some part of the earth and eclipsing the sun. The dark conical regions are those within which the sun is entirely hidden from sight. This portion of the shadow is called the umbra. Around the umbra is an enveloping shaded cone with its vertices directly towards the sun. To an observer within this region the sun is partly hidden from view. As the apparent path of the moon may pass to the north or south of the line joining the earth and sun, the axis of its shadow may pass to the north or south of the earth, and not meet' it

at all. An eclipse of the sun is called central when the shadow axis strikes any part of the earth; partial when only the penumbra falls upon the earth. It is evident that an eclipse can be seen as central only at those points of the earth's surface over which the axis of the shadow passes.

A central eclipse is total when the umbra actually reaches the earth; annular when it does not. These two cases are shown in figs. 2 and 3. In the first of these the sun is entirely hidden

fIG. 2.

Fig. 3.

within the region uu' . In fig. 3 within the region aa' the apparent diameter of the sun is slightly greater than that of the moon, and at the moment of greatest eclipse a narrow ring of sunlight is seen surrounding the dark body of the moon. We shall treat the subject in the following sections: —

I. Phenomena of Eclipses of the Sun and conclusions derived from their observation.

II. Eclipses of the Moon.

III. The Laws and Cycles of recurrences of Eclipses of the Sun and Moon.

IV. Chronological list of remarkable eclipses of the Sun, past and future, to the end of the 20th century.

V. Description of the methods of computing eclipses.

I. Phenomena of Eclipses of the Sun.

While an eclipse of the sun, whether partial, annular or total, is in progress, no striking phenomena are to be noted until, in the case of total eclipses, the moment of the total phase approaches. It will, however, be noticed that as the moon advances on the solar disk the sharply defined and ragged edge of the moon's disk contrasts strongly with the soft and uniform outline of the sun's limb. As the total phase approaches, the phenomenon known as shadow bands may sometimes be seen. These consist of seeming vague and rapidly moving wave-like alternations of light and shade flitting over any white surface illuminated by the sun's rays immediately before and after the total phase. They are probably due to a flickering of the

light from the thin crescent, produced by the undulations of the air, in the same way that the twinkling of the stars is produced. The rapid progressive motion sometimes assigned to them may be regarded as the natural result of an optica' illusion. A few seconds before the commence-

ment of the total phase the red light of the chromosphere becomes visible, and will be seen most distinctly as continuations of the solar crescent at its two ends. Owing to the inequalities of the lunar surface, the diminution of the solar crescent does not go on with perfect uniformity, but, just before the last moment, what remains of it is generally broken up into separate portions of light, which, magnified and diffused by the irradiation of the telescope,

present the phenomenon Tmcitme Sum eutt ■»; j ong celebrated under the name of "Baily's beads." These were so called because minutely and vividly described by

Touching San

""MM/IK Auh fcosf T*

Francis Baily as he observed them during the annular eclipse of May 15, 1836, when he compared them to a string of bright beads, irregular in size and distance from each other. The disappearance of the last bead is commonly taken as the beginning of totality. An arc of the chromosphere will then be visible for a few seconds at and on each side of the point of disappearance, the length and duration of which will depend on the apparent diameter of the moon as compared with that of the sun, being greater in length and longer seen as the excess of diameter of the moon is less. The red prominences may now generally be seen here and there around the whole disk of the moon, while the effulgence of soft light called the corona surrounds it on all sides. Before the invention of the spectroscope, observers of total eclipses could do little more than describe in detail the varying phenomena presented by the prominences and the corona. Drawings of the latter showed it to have the appearance Of rays surrounding the dark disk of the moon, quite similar to the glory depicted by the old painters around the head of a saint. The discrepancies between the outlines as thus pictured, not only at different times, but by different observers at the same time and place, are such as to show that little reliance can be placed on the details represented by hand drawings.

During the eclipse of July 8, 1842, the shadow of the moon passed

from Perpignan, France, through Milan and Vienna, over Russia and Central Asia, to the Pacific Ocean. Very detailed physical observations were made, but none which need be specially men- tioned in the present connexion.

The eclipse of July 28, 1851, was total in Scandinavia and Russia. It was observed in the former region by many astro- nomers, among them Sir George B. Airy and W. R. Dawes. It was specially noteworthy for the first attempt to photograph such a phenomenon. A daguerreotype clearly showing the protuberances was taken by Berkowski at the Observatory of Konigsberg. An attempt by G. A. Majocchi to daguerreotype the corona was a failure. Photographs of the eclipse of July 18, i860, were taken by Padre AngeloSecchi and Warren De La Rue, which showed the prominences well, and proved that they were progressively obscured by the edge of the advancing moon. It was thus shown that they were solar appendages, and did not belong to the moon, as had sometimes been supposed. The corona was barely visible on De La Rue's plates, but those of Secchi showed it, with its rifts and the bases of the tall coronal wings, to about 15′ from the sun's limb. The sketches taken at this eclipse proved that the corona extended in some regions i c from the sun's limb. As the sensitiveness of photographic plates has increased, they have gradually been wholly relied upon for information respecting the corona, so that at the present time naked-eye descriptions are regarded as of little or no scientific value. Owing to the great contrast between the brilliancy of the coronal light at its base and its increasing faintness as it extends farther from the sun, no one photograph will bring out all the corona. An exposure of one or two seconds is ample to show the details of inner corona to the best advantage, while longer ex- posures give greater extent of the brighter portions. The most extended streamers are very little brighter than the sky, and must be photographed with long exposures.

The first application of the spectroscope to the phenomenon was made during the total solar eclipse of August 18, 1868, by P. J. C. Janssen and other observers in India. By them was made the capital discovery that the red solar prominences give a spectrum of bright lines, and are therefore immense masses of incandescent gases, chiefly hydrogen and the vapours of calcium and helium. Janssen also found that this bright-line spectrum could be followed after the

eclipse was over, and, in fact, could be observed at any time when the air was sufficiently transparent. By one of those remarkable coincidences which frequently occur in the history of science, this last discovery was made inde- pendently by Sir Norman Lockyer in England before the news of Janssen's success had reached him. It was afterwards found that, by giving great dispersing power to the spectroscope, the prominences could be observed in a wide slit, in their true form. At this eclipse the spectrum of the corona was also observed, and was supposed to be continuous, while polariscopic observa- tion by Lieutenant Campbell showed it polarized in planes passing through the sun's centre. The conclusion from these two observations was that the light was composed, at least in great part, of reflected sunlight.

At the total eclipse of August 7, 1869, it was independently found by Professors C. A. Young of Princeton and W. Harkness of Washington that the continuous spectrum of the corona was crossed by a bright line in the green, which was long supposed to be coincident with 1474 of Kirchhoff 's scale. This coincidence is, however, now found not to be real, and the line cannot be identified with that of any terrestrial substance. The name " coronium " has therefore been given to the supposed gas which forms it. It is now known that 1474 is a double line, one component of which is produced by iron, while the other is of unknown origin. The wave-length of the principal com- ponent is S3 1 7, while that of the coronal line was found at the eclipses of 1896 and 1898 to be 5303.

The eclipse of December 28, 1870, passed over the south- western corner of Spain, Gibraltar, Oran and Sicily. It is memorable for the discovery by Young of the " reversing layer " of the solar atmosphere. This term is now applied to a shallow stratum resting immediately upon the photosphere, the absorp- tion of which produces the principal dark lines of the solar spectrum, but which, being incandescent, gives a spectrum of bright lines by its own light when the light of the sun is cut off. This layer is much thinner than the chromosphere, and may be considered to form the base of the latter. Owing to its thin- ness, the phenomenon of the reversed bright lines is almost instantaneous in its nature, and can be observed for a period exceeding one or two seconds only near the edge of the shadow- path, where the moon advances but little beyond the solar limb. Near the central line it is little more than a flash, thus giving rise to the term " flash spectrum." Young also at this eclipse saw bright hydrogen lines when his spectroscope was directed to the centre of the dark disk of the moon. This can only be attri buted to the reflection of the light of the prominences and chromosphere from

the atmosphere between us and the moon. The coronal light as observed in the spectroscope may thus be regarded as a mixture of true coronal light with chromospheric light reflected from the air, and it is therefore probable that the H and K (calcium) lines of the coronal spectrum are not true coronal lines, but chromospheric.

At the eclipse of December 12, 1871, visible in India and Australia, Janssen observed, as he supposed, some of the dark lines of the solar spectrum in the continuous spectrum of the corona, especially D, b and G. This would show that an im- portant part of the coronal light is due to reflected sunshine. This feature of the spectrum, however, is doubtful in the most recent photographs under the best conditions. At this eclipse the remarkable observation was also made by Colonel John Herschel and Colonel J. F. Tennant that the characteristic line cf the coronal spectrum is as bright in the dark rifts of the corona as elsewhere. This would show that the gas coronium does not form the streamers of the corona, but is spherical in form and distributed uniformly about the sun. Photographs were also

taken on wet plates by a party in Java and by the parties of Lord Lindsay (at Baikul, India) and of Colonel Tennant (at Dodabetta). The Baikul and Dodabetta photographs were of small size (moon's diameter —ˆ in.), but of excellent definition. A searching study was made of them by A. C. Ranyard and W. H. Wesley (Memoirs R.A.S. vol. uli., 1879), and for the first time a satisfactory representation of the corona was obtained. The drawings in the volume quoted show its polar rays, wings, interlacing filaments and rifts as they are now known to be, as well as the forms and details of the prominences.

The eclipse of April 16, 1874, was observed in South Africa by E. J. Stone, H.M. astronomer at the Cape, who traced the coronal line about 30′ (430,000 m.) from the sun's limb. The visual corona was seen to extend in places some 90′ from the limb.

The eclipse of April 6, 1875, was observed in Siam by Sir J. Norman Lockyer and Professor Arthur Schuster. Their photographs showed the calcium and hydrogen lines in the prominence spectrum.

The eclipse of July 29, 1878, was observed by many astronomers in the United States along a line extending from Wyoming to' Texas. A number of the stations were at high altitudes (up to 14,000 ft.), and the sky was generally very clear. The visible corona extended on both sides of the sun along the ecliptic for immense distances — at least twelve lunar diameters, about eleven million miles. Photographs taken by the parties of Professors A. Hall and W. Harkness gave the

details of the inner corona and of the polar rays, showing the filamentous character of the corona, especially at its base in the polar regions. A photograph taken by the party of Professor E. S. Holden showed the outer corona to a distance of 50′ from the moon's limb. The bright- line spectrum of the corona was excessively faint and, as the solar activity (measured by sun-spot frequency) was near a minimum, it was concluded that the brilliancy of the coronium line varied in the sun-spot period, a conclusion which subsequent eclipse observations seem to have verified. It is not yet certain that the other coronal spectrum lines vary in the same way.

The eclipse of May 17, 1882, was observed in Egypt. On the photographs of the corona the image of a bright comet was found, the first instance of the sort. (A faint comet was found on the plates of the Lick Observatory eclipse expedition to Chile in 1 893 .) The slitless spectroscope showed the green line (coronium) and D 3 (helium) in the coronal spectrum.

The eclipse of May 6, 1883, was observed from a small coral atoll in the South Pacific Ocean by parties from America, England, France, Austria and Italy. A thorough search was made by Holden (with a 6 in. telescope) for an intra-Mercurial planet, without success, during an unusually long totality (5 m. 23 s.). J. Palisa also searched for such a planet. Janssen again reported the presence of dark lines in the coronal spectrum. " White " prominences were seen by P. Tacchini.

The eclipse of August 29, 1886, was observed in the West Indies. The English photographs of the corona, taken with a slitless spectroscope, show the hydrogen lines as well as K and /. Tacchini devoted his attention to the spectra of the prominences, and showed that their upper portions contained no hydrogen lines, but only the H and K lines of calcium. He alsc observed a very extensive " white " prominence. It was shown on the photo- graphs of the corona, but could not be seen in the Ha line with the spectroscope. It has been suggested by Professor G. E. Hale that the colour of a " white " prominence may be due to the fact that the H and K lines (calcium) are of their normal intensity, while the less refrangible prominence lines are, from some un- known cause, comparatively faint. It is known that the intensity of such lines does, in fact, vary, though it is not yet certain that the " white " prominences are produced in this way. The subject is one demanding further observation. High prominences are generally " white " at their summits, " red " at their bases. The Harvard College Observatory photographs show the corona out to 90′ from the moon's limb, though no detail is visible

beyond 60'. W. H. Pickering made a series of photographic photometric measures of the corona, some of which are given

below, together with results deduced by Holden from the eclipses of January and December i<

August

January

December

1886.

1889.

1889.

Intrinsic actinic brilliancy of the

brightest parts of the corona .

0-031

0-079

0-029

Do. of the polar rays .

0-053

0-016

Do. of the sky near the sun

0-0007

0-0050

0-0009

Ratio of intrinsic brilliancy of the

brightest parts of the corona to

that of the sky (actinic)

44 to 1

16 to 1

32 to 1

Magnitude of the faintest star

shown on the eclipse negatives

2-3

The results in the first and third columns are derived from plates taken in a very humid climate, and are not very different.

The eclipse of August 10, 1887, was total in Japan and Russia, but cloudy weather prevented successful observations except in Siberia and eastern Russia.

The eclipse of January 1, 1889, was observed in California and Nevada by many American astronomers. The photographs of the corona, especially those by Charoppin and E. E. Barnard, show a wealth of detail. Those of Barnard, of the Lick Ob- servatory party, were studied by Holden, and exhibited the fact that rays, like the "polar-rays," extended all round the sun, instead of being confined to the polar regions only. The outer corona was registered out to 100′ from the moon's limb on Charoppin's negatives, to 130′ on those of Lowden and Ireland; On other plates the outline of the moon is visible projected on the corona before totality began. The spectrum of thecorona showed few bright lines besides those of coronium and hydrogen.

The eclipse of December 22, 1889, was observed in Cayenne, S. America, by a party from the Lick Observatory under rather unfavourable conditions. Expeditions sent to Africa were baffled by cloudy weather. Father Stephen Joseph Perry observed at Salute Jslands, Frerich Guiana, and obtained some photographs of value. The effort cost him his life, for he died of malarial fever five days after the eclipse.

The eclipse of April 16, 1893, was observed by British and French parties in Africa and Brazil, and by Professor J. M. Schaeberle of the

Lick Observatory in Chile. The Chile photo- graphs of the corona were taken with a lens of 40 ft. focus, and are extremely fine.! They show a faint comet near the sun. No great extensions to the corona were shown on any of the negatives, or seen visually, though they were specially looked for by British parties. The neighbourhood of the sun was carefully examined by G. Bigourdan without finding any planet. The spectrum of the corona was the usual one. The following lines were photo- graphed in slitless spectroscopes, and undoubtedly belong to the corona: W. L. 3987; 4086; 4217; 4231; 4240; 4280; 4486; 5303 (the last number is the wave-length of the green coronium line). All of these have been seen in slit spectroscopes also. It is possible that two lines observed by Young in 1869, namely, W. L. (Angstrom) 5450 and 5570, should be added to the list of un- doubted coronal lines. It is not likely that helium or hydrogen or calcium vapour forms part of the corona. The wave-lengths of some 700 lines belonging to the chromosphere and prominences were determined by the British parties.

The eclipse of August 9, 1896, was total in Norway, Novaya. Zemlya and Japan. The day was very unfavourable as to weather, but good photographs of the corona were obtained by Russian parties in Siberia and Lapland. Shackelton, in Novaya Zemlya, with a prismatic camera obtained a photograph of the reversing-layer at the beginning of totality. This photograph completely confirms Young's discovery, and shows the promi- nent Fraunhofer lines bright, the bright lines of the chromosphere spectrum being especially conspicuous.

At the solar eclipse of January 22, 1898, the shadow of the moon traversed India from the western coast to the Himalaya. The duration of totality was about 2 m. The eclipse was very fully observed, more than 100 negatives of the corona being secured. The equatorial extension of the visible corona was.short and faint, and the invisible (spectroscopic) corona was also very

faint. The spectrum of the reversing-layer was successfully photographed; one set of negatives shows the polarization of one of the longest streamers of the corona, and proves the presence of dust particles reflecting solar light. The bright-line spectrum of hydrogen in the chromosphere was followed to the thirtieth point of the series, and the wave-lengths were shown to agree closely with Balmer's formula (see Spectroscopy) , The wave-length of coronium was found to be 5303 (not 5317 as previously supposed), and the brightness of the corona was measured. E. W. Maunder made the curious observation of coronal matter enveloping a prominence in the form

of a hood.

Observations of the eclipse of May 28, 1900, were favoured in a remarkable degree by the absence of clouds. The photographs of the corona obtained by W. W. Campbell extended four diameters of the sun on the west side. The sun's edge was photographed with an objective-prism spectrograph composed of two 6o° prisms in front of a telescope of 2 in. aperture and 60 in. focus. A fine photograph, 6 in. long, of the bright- and dark -line spectra of the sun's edge at the end of totality was thus obtained. It shows 600 bright lines sharply in focus besides the dark-line spectrum, to which the bright lines gave way as the sun re- appeared. The coronal material radiating the green light was found to be markedly heaped up in the sun-spot regions. No dark lines were found in the spectrum of the inner corona. G. E. Hale and E: B. Frost also photographed the combined bright- and dark-line spectra of the solar cusps at the instants before and after totality. On one photograph showing no dark lines 70 bright lines could be measured between 4070 and 4340. On another were 70 bright lines between H6 and Hs. On a third were 266 bright lines between 4026 and 4381, and some dark lines. These lines show a marked dissimilarity from the solar spectrum. . (S. N.)

The eclipse of May 18, 1001, was observable in Mauritius with 35 minutes of totality, and in Sumatra with 65 minutes. Un- fortunately there was cloudy weather in Sumatra, which at some stations prevented observations entirely and at others neutralized the advantages promised by the long duration of totality. Thus spectroscopic observations for the detection of motion of the corona, for which the long totality gave a special opportunity, • failed owing to cloud; and the search for intra-Mercurial planets had only a negative result, though stars down to magnitude 8-8 were photographed on the plates. But though no particular step in advance was taken, successful records of the eclipse were obtained, which will enable comparison to be made with other eclipses and will contribute their share to the discussion of the whole series. These include photographs of the corona, showing that it was of the sun-spot minimum type, and available for measures of its brightness; photographs of the spectra of the chromosphere and corona which are of the same general character as those obtained at previous eclipses; photographs showing the polarization of the corona, available for quantitative measures of polarization at different points. Photographs of the spectrum of the outer corona taken by the Lick Observatory party show a strong Fraunhofer dark-line spectrum, consistent with the view that the light is reflected sunlight. At Mauritius there was no cloud, but the definition was poor. Successful

photographs of the corona were obtained for comparison with those taken in Sumatra one and a half hours later, but nothing of great interest was revealed by the comparison.

The eclipse of August 30, 1905, offered a duration of 35 minutes in Spain, the track running from Labrador through Spain tc North Africa, and affording excellent opportunities for observers, who flocked to the central line in great numbers. Unfortunately it was cloudy in Labrador, so that the special advantages of the long line of possible stations were lost. Exceptionally good weather conditions were enjoyed in Algeria and Tunisia, and full advantage was taken of them by H. F. Newall, C. Trepied and others at Guelma, by the party from Greenwich and G. Bigourdan at Sfax. That G. Newall's spectroscopic photographs for rotation of the corona again gave no result is a clear indication of the faintness of the corona at 3′ from the limb; but F. W. Dyson at Sfax obtained two new lines at 5536 and 5117 in the spectrum

of the corona; and a very large number of photographs of the corona (including many in polarized light on several different plans), of its spectrum, and of the spectrum of the chromosphere, were obtained by the various parties, which will afford copious material for discussion. Newall also obtained a polarized spectrum of the corona. Altogether no less than eighty stations were occupied. There were English, American, Russian and German observers in Egypt; English and French in Algeria and Tunisia; English in Majorca; observers of almost all nation- alities in Spain; and English and American in Labrador. In Egypt the weather was bright, though the sun was low; in Majorca and Spain there were local clouds. Consequently many observations, in addition to those in Labrador, were lost, notably the special spectroscopic observations undertaken by Evershed on the northern limit of totality, and the observations of radia- tion undertaken by H. L. Callendar. A search for intra-Mercurial planets was conducted on an elaborate plan, with similar batteries of telescopes, in Egypt, Spain and Labrador, by three parties from the Lick Observatory, but the examination of the plates showed nothing noteworthy. Pending discussion of the greater part of the material, some interesting preliminary results were published in 1906 by the French observers. C. E. H. Bourget and Montangerand conclude that there is a marked division of the chromosphere into two regions or shells, a lower or "reversing- layer," extending only 1″ from the

limb, and a chromospheric layer extending to 3″ or 4″ ; and that the coronal light contains less blue and violet, but more green and yellow, than sunlight; while Fabry, by visual methods, obtained measures of the total and intrinsic intensity of the light from the corona closely con- firming recent photographic observations, finding the total brightness about equal to that of the full moon, and the intrinsic brightness at 5′ from the limb about one quarter of that of the full moon. (H. H. T.)

II. Eclipses of the Moon.

The physical phenomena attending eclipses of the moon are no longer of a high order of interest either to the layman or scientific observer. A brief statement of them and their causes will there- fore be sufficient. An observer watching such an eclipse from the moon would see the earth, which has nearly four times the apparent diameter of the sun, impinging on the sun's disk and slowly hiding it. The phenomenon would be quite similar to that of an eclipse of the sun seen from the earth, until the sun was completely covered. During the progress of this partial eclipse the moon would be passing into the earth's penumbra. As the moment of total obscuration approached, a red band of light would rapidly form in the neighbourhood of the disappearing limb of the sun, and gradually extend around the earth. This would arise from the refraction of the sun's light by the earth's atmosphere, and the absorption of its blue rays. When the light of the sun was completely hidden, a reddish ring of great brilliancy would, owing to this cause, surround the entire dark body of the earth during the period of the total eclipse.

The aspect of the moon, as seen from the earth, corresponds to this view from the moon. The fading of the moon's light, due to its entrance into the penumbra, is scarcely noticeable without direct photometric determination until near the beginning of the total phase. Then, as the limb of the moon approaches the earth's shadow, it begins to darken. When only a small portion has entered into the shadow, that portion is completely hidden. But, as the total phase approaches, the part of the moon's disk immersed in the penumbra becomes visible by a reddish coppery light — that of the sun refracted through the lower parts of the earth's atmosphere. The brightness of this illumination is different in different eclipses, a circumstance which may be attributed to the greater or less degree of cloudiness in those regions of the earth's atmosphere through which the light of the sun passes in order to reach the moon . Its colour is due to absorp- tion in passing through the earth's atmosphere.

III. Laws and Cycles of Recurrences of Eclipses of the Sun

and Moon. It has been known since remote antiquity that eclipses occur

Eclipse

Sun

Fig. 4.

in cycles. These cycles are known now to be determined principally by the motion of the moon's node and the relations between the revolutions of the earth round the sun and the moon round the earth.

Owing to the inclination of the moon's orbit to the plane of the ecliptic, an eclipse of the sun can occur only when the con- junction of the sun and moon takes place within about 16° of one of the nodes of the moon's orbit. The eclipse can be total only within about 1 1° of the node. An eclipse of the moon can occur only when the line sun-moon- earth makes an angle less than about ir° with the line of nodes; and the eclipse can be total only within about 8° of the node, the average limiting distances varying i° or 2° according to the circumstances. These conditions being understood, the cycles of recurrence of eclipses of either kind can be worked out geo-metrically from the mean motions of the sun, moon, node and perigee by the aid of geometric conceptions shown in their simplest form in fig. 4. Here E is the earth, at the centre of a circle representing the mean orbit of the moon around it. MN is the line of nodes which is moving in the retrograde direction from N towards Si, at a rate of about iO'3° in a year, making a complete revolution in 18-6 years. Let the sun at the moment of some new moon be in the line ESi, continued. If the angle NESi is less than 16° there will probably be an eclipse of the sun, which may be central if the angle is less than 11°. Let the next new moon take place in the line ES2 a month later. The mean value of the angle S1ES2 is about 29°; but as the node N has moved towards Si about 1-4° during the interval, the sum of the angles NESi and NES2 will be somewhat greater than S1ES2 by about i-6°. The result is that if these two angles are nearly equal there may be two small partial eclipses of the sun, after which no more can occur until, by the annual revolution of the earth, the direction of the sun approaches the opposite line of nodes EM, nearly six months later. The result is that there are in the course of any one year two " eclipse seasons " each of about one month in duration, in which at least one eclipse of the sun, or possibly two small partial

eclipses, may occur. One eclipse of the moon will generally, but not always, occur during a season.

Owing to the retrograde motion of the node the direction ES of the sun returns to the node at the end of about 347 days, so that a third eclipse season may commence before the end of a year. In this way there is a possible but very rarje maximum of five eclipses of the sun in a year. Owing to the motion of the line of nodes each eclipse season occurs about 19 days earlier in the year than it did the year before. Another conclusion from the greater eclipse limit for the sun than for the moon is that in the long run eclipses of the sun, as regards the earth generally, occur oftener than those of the moon. But as any eclipse of the sun is visible only from a limited region of the earth's surface, while one of the moon may be seen from an entire hemisphere, more eclipses of the moon are visible at any one place than of the sun.

If, starting with a conjunction along some line ESi, we mark by radial lines from E the successive conjunctions year after year, we shall find that at the end of 18 years and about 11 days the 223rd conjunction will fall once more very near the line ESi, the angle NESi being'about 24′ greater than before. Successive eclipses will then occur very nearly in the same order as they did 18 years and n days before. This period of recurrence has been known from remote antiquity and is called the Saros. What is most remarkable in this period is that in addition to the distance from the node being nearly the same as before, the longitude of the sun increases by only 1 1° and the distance of the moon from its perigee has changed less than 3°. The result of this approach to coincidence is that the recurring eclipse will generally be of the same kind — total, annular or partial — through a number of successive periods.

To see the law of recurrence of corresponding eclipses in the successive periods let us suppose the line of conjunction ESi to be that at which there is a very small eclipse, visible only in high northern or southern latitudes. At the end of 18 years n days a second eclipse will occur along a line nearly half a degree nearer EN, the line of nodes. The successive eclipses will occur at the same interval through about ten periods, or 180 years, when the line of conjunction will pass within 1 1° of EN. Then the eclipse will be central, whether annular or total depending on circum- stances: in

the first one the central lines will pass only over the polar regions; but in successive eclipses of the series it will pass nearer and nearer to the equator until the conjunction line coincides with the node. The path of centrality will then cross in the equatorial region. During 22 or 23 more recurrences the path will continually approach to the opposite pole and finally leave the earth entirely. The entire number of central eclipses in any one series will generally be about forty-five. Then a series of continually diminishing partial eclipses will go on for about ten periods more. The whole series of eclipses will therefore extend through about sixty-five periods; and interval of time of about twelve hundred years.

Another remarkable eclipse period recurs at the end of 358 lunations. At the end of this period the line of mean conjunction ESi falls so near its former position relative to the node that we find each central eclipse visible in our time to be one of an unbroken series extending from the earliest historic times to the present, at intervals equal to the length of the period. The recurring eclipses in this period do not, however, have the remarkable similarity of those belonging to the Saros, but may differ to any extent, owing to the different positions of the line of conjunction with respect to the moon's perigee. Moreover, they recur alternately at the ascending and descending node. The length of the period is 10,571-95 days, or 29 Julian years less 20-3 days. Hence 18 periods make 521 years, so that at the end of this time each eclipse recurs on or about the same day of the year. As an example of this series, starting from the eclipse of Nineveh, June 15, 763 B.C., recorded on the Assyrian tablets, we find eclipses on May 27, 734 B.C., May 7, 705 B.C., and so on in an unbroken series to 1843, 1872 and 1901, the last being the 93rd of the series. Those at the ends of the 521-year intervals occurred on June 15, O.S., of each of the years 763, 242 B.C., a.d. 280, 801, 1322 and 1843. As the lunar perigee moves through 242-4° in a period, the eclipses will vary from total to annular, but at the end of 3 periods the perigee is only 7-1° in advance of its original position relative to the node. Hence in a series including every third eclipse the eclipses will be of the same character through a thousand years or more. Thus the eclipses of 1467, 1554, 1640, 1727, 1814, 1901, 1988, &c, are total.

IV. Chronological Lists of Eclipses of the Sun.

The following is a brief chronological enumeration of those

total eclipses of the sun which are of interest, either from their

historic celebrity or the nature of the conclusions

derived from them. In numbering the years before

the Christian era the astronomical nomenclature is

used, in which the number of the year is one less than that used

by the chronologists. The Chinese eclipses are passed over,

Notable eclipses.

owing to the generally doubtful character of the records per- taining to them.

— 1069 June 20 and —1062 July 31; total eclipses recorded at Babylon.

— 762, June 14; a total eclipse recorded at Nineveh. Computa- tion from the modern tables shows that the path of totality passed about 100 m. or more north of Nineveh.

— 647, April 6; total eclipse at or near Thasos, mentioned by Archilochus.

— 584, May 28; the celebrated eclipse of Thales. For an account of this eclipse see Thales.

— 556, May 19, the eclipse of Larissa. The modern tables show that the eclipse was not total at Larissa, and the connexion of the classical record with the eclipse is doubtful.

—430, August 3; eclipse mentioned by Thucydides, but not total by the tables.

~ 399, June 21 ; eclipse of Ennius. Totality occurred immediately after sunset at Rome. The identity of this eclipse is doubtful.

—309, August 14; eclipse of Agathocles. This eclipse would be one of the most valuable for testing the tables of the moon, but for an uncertainty as to the location of Agathocles, who, at the time of the occurrence, was at sea on a voyage from Syracuse to Carthage.

F. K. Ginzel (Spezieller Kanon der Finsternisse) has collected a great number of passages from classical authors supposed to refer to eclipses of the sun or moon, but the difficulty of identifying the phenomenon is frequently such as to justify great doubt as to the

conclusions. In a few cases no eclipse corresponding to the description can be found by our modern table to have occurred, and in others the latitude of interpretation and the uncertainty of the date are so wide that the eclipse cannot be identified.

Of medieval eclipses we mention only the dates of those visible in England, referring for details to the works mentioned in the bibliography. The letter C following a date shows that the eclipse is mentioned in the Anglo-Saxon Chronicles. The dates in question are: —

a.d. 538, February 15, C. (partial). 540, Tune 12, C. (partial).

594. "July 23-

603, August 12.

639, September 3.

664, May I, C.

733, August 14 (annular).

764, June 4 (annular)

a.d. 878, October 29, C. 885, Tune 15. 1023, January 24. 1133, August I, C. 1 140, March 20, C. 1185, May I, C. 1191, June 23, C. (annular). 1330, July 16.

Besides these, the tables show that the shadow of the moon passed over some part of the British Islands on 1424, June 26; 1433, June 17; 1598, March 6; 1652, April 8; 1715, Ma y 2; 1724, May 22. Of these the eclipse of 1715 is notable for the careful observations made in England, and published by Halley in the Philosophical Transactions. The next dates are 1927, June 29, when a barely total eclipse will be seen soon after sunrise in the northern counties near the Scottish border, and 1999, August II, when the moon's shadow will graze England at Land's End.

We give below, in tabular form, a list of the principal total eclipses during the 19th and 20th centuries, omitting a few visible only in the extreme polar regions, and some others of which the duration is very short. The first column gives the civil date of the point on the earth's surface at which the eclipse is central at noon. The next two columns give the position of this point to the nearest degree. The fourth column shows the Greenwich astronomical time of conjunction in

longitude. The next column gives the duration of the total phase at the noon-point; this is sometimes o-i' less than the absolutely greatest duration at any point. Next is given the node near which the eclipse occurs; and then the number in the Saros. Corresponding eclipses at intervals of 18 y. 11 d. have the same number, and occur near the same node of the noon, which is indicated in the next column.

Date at Noon-Point.

Point where

Central at

Noon.

Greenwich M.T. of con- junction in Longitude.

Duration

of Totality.

Node.

Series.

Regions Swept by Shadow.

Lat.

Long.

d. h. m.

m.

1803, Feb. 21

1804, Aug. 5

1806, June 16

1807, Nov. 29

1 8 10, April 4

181 1, Mar. 24

1814, July 17

1815, July 6

1816, Nov. 19

1817, Nov. 9

II S.

38 s.

42 N.

11 N.

12 N.

39 S. 31 N. 88 N.

43 N. 7 S.

136 W. 66 W. 66 W.

2E.

154 E. 26 W. 84 E.

175 w.

30 E. 149 E.

21 9 20

5 4 6 16 4 22 28 23 48

3 13 41 24 2 19 16 18 33

6 11 52 18 22 9

8 13 53

4-2

1-2

4-6

i-4 Ann.

3-4 6-6

3-2 1-8

4-7

Asc.

Desc.

Desc.

Asc.

Desc.

Desc.

Asc.

Asc.

Desc.

Desc.

1

2 3 4 5 6

7 8

9 10

Pacific Ocean, Mexico.

Pacific Ocean, Chile, Argentina.

New England, Atlantic, Africa.

Central Africa, Areolia.

Pacific Ocean, Borneo.

South Atlantic to and across South Africa.

Africa, Central Asia, China.

Polar Regions, Western Siberia.

Eastern Europe, Central Asia.

Burma. Pacific Ocean.

ECLIPSE

893

Date at Noon-Point

Point where

Central at

Noon.

Lat.

Long.

Greenwich M.T. of con- junction in Longitude.

h. m.

Duration

of Totality.

m.

Node.

Series.

Regions Swept by Shadow.

1821, Mar. 4

1822, Aug. 16

1824, June 26

1825, Dec. 9

1828, April 14

1829, April 3

1832, July 27

1833, July 17

1834, Nov. 30

1835, Nov. 20

1839, Mar. 15

1840, Aug. 27

1842, July 8

1843, Dec. 21

1846, April 25

1847, April 15

1850, Aug. 7

1851, July 28

1852, Dec. II

1857, Mar. 25

1858, Sept. 7 i860, July 18 1861, Dec. 31

1864, May 6

1865, April 25

1868, Aug. 18

1869, Aug. 7

1870, Dec. 22

1871, Dec. 12

1875, April 6

1876, Sept. 17 1878, July 29 1880, Jan. II

1882, May 17

1883, May 6

1886, Aug. 29

1887, Aug. 19 1889, Jan. 1 1889, Dec. 22

1893, April 16

1894, Sept. 29 1896, Aug. 9 1898, Jan, 22

1900, May 28

1901, May 18

1904, Sept. 9

1905, Aug. 30

1907, Jan. 14

1908, Jan. 3

191 1, April 28

1912, Oct. 10 1914, Aug. 21 1916, Feb. 3

1918, June 8

1919, May 29

1922, Sept. 21

1923, Sept. 10

1925, Jan. 24

1926, Jan. 14

1927, June 29

1929, May 9

1930, Oct. 21 1932, Aug. 31 1934, Feb. 14

1936, June 19

1937. June 8

1940, Oct. 1

1941, Sept.- 2 1 1943, Feb. 4

1947, May 20

1948, Nov. 1 1952, Feb. 25

1954. June 30

1955. June 20

1958, Oct. 12

1959, Oct. 2

1961, Feb. 15

1962, Feb. 5

1963, July 20

1965, May 30

1966, Nov. 12 1970, Mar. 7

8 S.

36 S. 47 N.

9N. 18 N.

32 S.

24 N. 78 N. 40 N. 10 S.

6S. 34 S. 51 N.

8N.

25 N. 24 S.

18 N.

70 N.

37 N. 4 S.

33 S. 56 N.

9N.

32 N. 16 S. 10 N.

61 N.

36 N. 12 S.

2 S.

33 S. 60 N. 10 N. 39 N.

oS.

3N.

53 N.

37 N.

12 S. 1 S.

34 S. 65 N.

13 N. 45 N.

2S.

5S. 45 N. 39 N. 12 S.

1 S.

35 S.

71 N. 16 N. 51 N.

4N. 12 S.

38 N. 42 N. 10 S. 78 N.

1 S.

36 s. 78 N.

19 N. 56 N. 10 N. 19 S. 30 N. 47 N.

2 S.

37 S.

22 N.

62 N. 15 N. 26 S.

23 N. 53 N.

4 S.

62 N.

4 S.

38 S. 25 N.

96 E. 176 W.

175 W. 127 w.

39 E. 149 W.

28 w.

76 E. 101W.

20 E. 31 W. 72 E.

77 E.

102 E. 75 W. 90 E.

142 W. 34 W.

127 E.

155 W. 41 W. 31 w.

29 w. 173 E.

30 W.

103 E. 145 W.

5W. 118 E.

83 E.

156 W. 139 W. 160W.

63 E. 147 W.

14 W. 102 E. 138 W.

13 w.

37 W. 86 E. 112 E. 69 E. 45 W.

97 E. 133 W.

12 W. 89 E.

H5 w. 155 w.

33 W. 2 E.

62 W. 152 W.

18 W. 106 E.

128 W. 44 W. 82 E.

84 E. 89 E.

155 w. 109 W. 168 E. 101 E. 131 W. 16 W. 114 E.

176 W. 25 W. 82 E. 39 E.

5W.

117 E.

139 W.

6W.

53 E. 179 E. 126 W. 137 W.

43 W.

88 W.

3 17 50

16 11 22

26 11 43 9 8 27

13 21 18 3 10 24

27 2 2 16 19 16 30 6 48

19 22 31 15 2 14 26 18 45

7 19 2

20 17 10

25 4 49

14 18 22

7 9 34

28 2 41 10 15 32 25 10 30

2 16

2

1

7 18

31 5 25 2 17 17

30 13 3 28 10 21

3 8

29

21 31

20 31

21

55 12 14

13 12

10

o

16

24 21

30 o

18 36

9 54

52 35

7 22 11

5 17

29 9 40

11 10 40

16 19 34 9 58

54 17 39

9

0

2

17 43

17 2

19 24

2 50

17 17 38 9 8 43

1 13 17 57

9 44

10 26

1 41

0 27

4 6 10 1

26 16 38

10 8 53

24 2 46

13 18 35

28 18 32

8 18 8

9 47

7 55

13 12 44

18 17 15 8 8 43

1 o 42

20 16 39

4 ” 31 1

18

3 12

44

3

17

27

16 12

19

12 8 52

2 O 32 14 20 II

4

20 30 12

7

12 11

8 43

9 14 2 27

5 43

4-3 14 4.4

i-5 o-3

4-1 6-8

3-5 1-9 4-6 4.4 1-6 4-1 1-6 0-9

4-7 6-8

3-7

2‘0

4-5

i-7

3-7

i-8

1-4

5-3 6-8 3-8

2-1

4-4 4-7 1-8

3-2

2-1

1-8

6-o

6-6

3-8

2-2 4-2

4-8 1-8 2-7 2-3

2-1

6-5 6-4 3-8 2-3 4-2

5-o

1-8

2-1

2-5 2-4 6-9 6-1 3.6 2-4

4-2

0-7 5-1 1-9

i-5

2-7

2-5

7-i

5-7 3-3 2-5 5‘2 1-9

3-o

2-5 7-2

5-2

3-o

2-6

4-1

i-5

5-3

i-9

3-3

Asc.

Desc.

Desc.

Asc.

Desc.

Desc.

Asc.

Asc.

Desc.

Desc.

Asc.

Desc.

Desc.

Asc.

Desc.

Desc.

Asc’

Asc.

Desc.

Asc.

Desc.

Desc.

Asc.

Desc.

Desc.

Asc.

Asc.

Desc.

Desc.

Asc.

Desc.

Desc.

Asc.

Desc.

Desc.

Asc.

Asc.

Desc.

Desc.

Asc.

Desc.

Desc.

Asc.

Desc.

Desc.

Asc.

Asc.

Desc.

Desc.

Asc.

Desc.

Desc.

Asc.

Desc.

Desc.

Asc.

Asc.

Desc.

Desc.

Asc.

Asc.

Desc.

Desc.

Asc.

Desc.

Desc.

Asc.

Asc.

Desc.

Asc.

Desc.

Asc.

Desc.

Desc.

Asc.

Asc.

Desc.

Desc.

Asc.

Asc.

Desc.

Asc.

1 2 3 4 5 6

7 8

9 10 1 2 3 4 5 6

7 8

9 1

2 3 4 5 6

7 8

9

10

1

2 3 4 5 6

7 8

9 10 1 2 3 4 5 6

7 8

9 10

1

2

3

4

5

• 6

7 8

9 10 11 1 2 3 4 5 6

7 8

9 1

2 4 5 6

7 8

9 10 11

1

2 4

Indian and Pacific Oceans.

Australia, Pacific Ocean.

Pacific Ocean, Japan, China.

Pacific Ocean, Mexico.

Northern Africa, India.

South Pacific Ocean.

West Indies and across Central Africa.

North-eastern Asia and Polar Regions

Southern and Western United States.

Central Africa, Madagascar.

South America, Africa, Egypt.

Africa, Madagascar, Indian Ocean.

Spain, France, Russia to China, and Pacific Ocean.

Indian and North Pacific Oceans and India.

Mexico, West Indies, Africa.

Indian Ocean, Australia.

Pacific Ocean.

Scandinavia, Russia and North America.

China, Pacific Ocean.

Pacific Ocean, Mexico.

Peru, South Brazil, Uruguay.

British America, France, Egypt.

Caribbean Sea to North Africa.

Pacific Ocean.

Brazil to Central Africa.

India to Pacific Ocean.

United States and Alaska.

Gibraltar, Northern Africa, Sicily.

Southern India, Northern Australia.

Indian Ocean, Siani, Pacific.

Pacific Ocean.

United States and Canada.

Pacific Ocean, California.

Egypt, Central Asia, China.

Pacific Ocean, Caroline Islands.

South America, Central Africa.

Northern Europe, Siberia, Japan.

California, Oregon, British America.

Central Africa and South America.

Venezuela to West Africa.

East Africa, Indian Ocean.

North Europe, Siberia, Japan.

East Africa, India, China.

United States, Spain, North Africa.

Sumatra, Borneo.

Pacific Ocean.

Canada, Spain, North Africa.

Russia, Central Asia.

Pacific Ocean. Australia, Polynesia.

Colombia, Ecuador, Brazil.

Scandinavia, Russia, Asia Minor.

Pacific Ocean, Venezuela, West Indies.

British Columbia, United States.

Peru, Brazil, Central Africa.

East Africa, Australia.

California, Mexico, Central America.

United States.

East Africa, Sumatra, Philippines.

England, Scotland, Scandinavia.

Sumatra, Malacca, Philippines.

Pacific Ocean, Patagonia.

Canada.

Borneo, Celebes.

Greece to Central Asia and Japan.

Pacific Ocean, Peru.

Colombia, Brazil, South Africa.

Central Asia, China, Pacific Ocean.

China, Alaska.

Argentina, Paraguay, Central Africa.

Central Africa, Congo.

Nubia, Persia, Siberia.

Canada, Scandinavia, Russia, Persia.

Ceylon, Siam, Philippines.

Chile, Argentina.

Canaries, Central Africa.

France, Italy, Austria, Siberia.

New Guinea.

Alaska, Hudson's Bay Territory.

Pacific Ocean.

Bolivia, Argentina, Brazil.

Mexico, Georgia, ? Florida.

894

ECLIPSE

Date at Noon-Point.

Point where

Central at

Noon.

Lat.

Long.

Greenwich M.T. of con- junction in Longitude.

d. h. m.

Duration

of Totality.

m.

Node.

Series.

Regions Swept by Shadow.

1972, 1973. 1974. 1976. 1977, 1979. 1980,

1981, 1983- 1984,

1987- 1988,

1990.

I99L

1992,

1994- 1995. 1997. 1998,

1999.

uly 10 une 30 une 20 Oct. 23 Oct. 12 Feb. 26 Feb. 16 July 31 June 11 Nov. 22 Mar. 29 Mar. 18 July 22 July 11 June 30 Nov. 3 Oct. 24 Mar. 9 Feb. 26 Aug. 11

67 N. 19 N. 32 S. 31 S.

16 N. 61 N.

1 N. 54 N.

7 S. 39 S.

17 S. 28 N. 72 N. 22 N. 26 S. 36 S. 10 N. 71 N.

6N. 46 N.

in W.

6E.

107 E.

95 E.

127 W.

77 W.

48 E. 127 E. in E. 170 W.

6W. 146 E. 142 E. 105 W.

5W. 31 w. no E. 154 E. 81 W.

18 E.

10 7 40

29 23 39 19 16 56 22 17 10

8 31

4 47

15 20 52

30 15 53

10 16 38

22 10 58

29 o 45

17 14 3 21 14 54

11 7 6

30 o 19

3 1 36

23 16 37 8 13 16

26 5 27

10 23 8

12 26

2-7 7-2 5-3 4-9

2-8

27 4-3

2-2

5-4

2-1

o-3

4-0 26 7-1

5-4 4-6

2-4

2-8

4.4 2-6

Desc.

Desc.

Desc.

Asc.

Asc.

Desc.

Desc.

Asc.

Asc.

Desc.

Asc.

Asc.

Desc.

Desc.

Desc.

Asc.

Asc.

Desc.

Desc.

Asc.

5

6

12

7 8

9

10

n

1

2

13

4

5

6

12

7 8

9 10

North-EastAsia, North-East America and AtlanticOcean.

South America, Africa and Atlantic Ocean.

South- West Australia and Indian Ocean.

Africa, Australia, Indian and Pacific Oceans.

Venezuela, Pacific Ocean.

United States, British America, Pacific Ocean, N.Polar Sea

Africa, Atlantic and Indian Oceans, and India.

Pacific Ocean, Asia.

Java, Atlantic Ocean.

Pacific Ocean, Patagonia.

Atlantic, Equatorial Africa.

Indian and Pacific Oceans, Sumatra.

Finland, North Atlantic.

Pacific Ocean, Hawaii, Central America.

South Atlantic.

Pacific Ocean, South America.

Pacific and Indian Oceans.

North-East Asia, Arctic Sea.

Pacific and Atlantic Oceans, Central America.

Central and Southern Europe touching England.

Recurrence of Remarkable Eclipses.

From the property of the Saros it follows that eclipses remark- able for their duration, or other circumstances depending on the relative positions of the sun and moon, occur at intervals of one saros (18 y. 1 1 d.). Of interest in this connexion is the recurrence of. total eclipses remarkable for their duration. The absolute maximum duration of a total eclipse is about 7′ 30”; but no actual eclipse can be expected to reach this duration. Those which will come nearest to the maximum during the next 500 years belong to the series numbered 4 and 6 and in the list which precedes. These occurring in the years 1937, 1955, &c, will ultimately fall little more than 20″ below the maximum. But the series 4, though not now remarkable in this respect, will become so in the future, reaching in the eclipse of June 25, 2150, a duration of about 7′ 15″ and on July 5, 2168, a duration of 7′ 28”, the longest in human history. The first of these will pass over the Pacific Ocean; the second over the southern part of the Indian Ocean near Madras.

All the national annual Ephemerides contain elements of the eclipses of the sun occurring during the year. Those of England, America and France also give maps showing the path of the central line, if any, over the earth’s surface; the lines of eclipse beginning and ending at sunrise, &c, and the outlines of the shadow from hour to hour. By the aid of the latter the time at which an eclipse begins or ends at any point can be determined by inspection or measurement within a few minutes.

V. Methods of computing Eclipses of the Sun.

The complete computation of the circumstances of an eclipse ab initio requires three distinct processes. The geocentric positions . of the sun and moon have first to be computed from ot eclipses. tne ta M es of the motions of those bodies. The second step is to compute certain elements of the eclipse from these geocentric positions. The third step is from these elements to compute the circumstances of the eclipse for the earth generally or for any given place on its surface. The national Astronomical Ephemerides, or "Nautical Almanacs," give in full the geocentric positions of the sun and moon from at least the early part of the 19th century to an epoch three years in advance of the datˆ of publication. It is therefore unnecessary to undertake the first part of the computation except for dates outside the limits of the published ephemerides, and for many years to come even this computation will be unnecessary, because tables giving the elements of eclipses from the earliest historic periods up to the 22nd century have been published by T. Ritter von Oppolzer and by Simon Newcomb. We shall therefore confine ourselves to a statement of the eclipse problem and of the principles on which such tables rest.

Two systems of eclipse elements are now adopted in the ephemerides and tables; the one, that of F. W. Bessel, is used in the English, American and French ephemerides, the other — P. A. Hansen's — in the German and in the eclipse tables of T. Ritter von Oppolzer. The two have in common certain geometric constructions. The fundamental axis of reference in both systems is the line passing through the centres of the sun and moon; this is the common axis of the shadow cones, which envelopsimultaneously the sun and moon as shown in figs. 1,2,3. The surface of one of these cones, that of the umbra, is tangent to both bodies externally. This cone comes to a point at a distance from the moon nearly equal to that of the earth. Within it the sun is wholly hidden by the moon. Outside the umbral cone is that of the penumbra, within which the sun is partially hidden by the moon. The geometric condition that the two bodies shall appear in contact, or that the eclipse shall begin or end at a certain moment, is that the surface of one of these cones shall pass through the place of the observer at that moment. Let a plane, which we call the fundamental plane, pass through the centre of the earth perpendicular to the shadow axis. On this plane the centre of the earth is taken as an origin of rect angular co-ordinates. The axis of Z is perpendicular to the plane, and therefore parallel to the shadow

axis; that of Y and X lie in the plane. In these fundamental constructions the two methods coincide. They differ in the direction of the axis of Y and X in the fundamental plane. In Bessel's method, which we shall first describe, the intersection of the plane of the earth's equator with the fundamental plane is taken as the axis of X. The axis of Y is perpendicular to it, the positive direction being towards the north. The Besselian elements of an eclipse are then: — x, y, the co-ordinates of the shadow axis on the funda- mental plane; d, the declination of that point in which the shadow axis intersects the celestial sphere; /j, the Greenwich hour angle of this point; I, the radius of the circle, in which the penumbral or outer cone intersects the fundamental plane; and /', the radius of the circle, in which the inner or umbral cone intersects this plane, taken positively when the vertex of the cone does not reach the plane, so that the axis must be produced, and negatively when the vertex is beyond the plane.

Hansen's method differs from that of Bessel in that the ecliptic is taken as the fundamental plane instead of the equator. The axis of X on the fundamental plane is parallel to the plane of the ecliptic ; that of Y perpendicular to it. The other elements are nearly the same in the two theories. As to their relative advantages, it may be remarked that Hansen's co-ordinates follow most simply from the data of the tables, and are necessarily used in eclipse tables, but that the subsequent computation is simpler by Bessel's method.

Several problems are. involved in the complete computation

of an eclipse from the elements. First, from the values of the latter at a given moment to determine the point, if any, at which the shadow-axis intersects the surface of the earth, and the respective outlines of the umbra and penumbra on that surface. Within the umbral curve the eclipse is annular or total; outside of it and within the penumbral curve the eclipse is partial at the given moment. The penumbral line is marked from hour to hour on the maps given annually in the American Ephemeris. Second, a series of positions of the central point through the course of an eclipse gives us the path of the central point along the surface of the earth, and the envelopes of the penumbral and umbral curves just described are boundaries within which a total, annular or partial eclipse will be visible. In particular, we have a certain definite point on the earth's surface on which the edge of the shadow first impinges; this impingement necessarily takes

place at sunrise. Then passing from this point, we have a series of points on the surface at which the elements of the shadow-cone are in succession tangent to the earth's surface. At all these points the eclipse begins at sunrise until a certain limit is reached, after which, following the successive elements, it ends at sunrise. At the limiting point the rim of the moon merely grazes that of the sun at sunrise, so that we may say that the eclipse both begins and ends at that time. Of course the points we have described are also found at the ending of the eclipse. There is a certain moment at which the shadow-axis leaves the earth at a certain point, and a series of moments when, the elements of the penumbral cone being tangent to the earth's surface, the eclipse is ending at sunset. Three cases may arise in studying the passage of the outlines of the shadow over the earth. It may be that all the elements of the penumbral cone intersect the earth. In this case we shall have both a northern and a southern limit of partial eclipse. In the second case there will be no limit on the one side except that of the eclipse beginning or ending at sunrise or sunset. Or it may happen, as the third case, that the shadow-axis does not intersect the earth at all; the eclipse will then not be central at any point, but at most only partial.

The third problem is, from the same data, to find the circum- stances of an eclipse at a given place — especially the times of beginning and ending, or the relative positions of the sun and moon at a given moment. Reference to the formulae for all these problems will be given in the bibliography of the subject.

Authorities. — The richest mine of information respecting eciipses of the sun and moon is T. R. von Oppolzer's " Kanon der Finster- nisse," published by the Vienna Academy of Sciences in the 52nd volume of its Denkschriften (Vienna, 1887). It contains elements of all eclipses both of the sun and moon, from 1207 B.C. to A.D. 2161, a period of more than thirty centuries. Appended to the tables is a series of charts showing the paths of all central eclipses visible in the northern hemisphere during the period covered by the table. The points of the path at which the eclipse occurs, at sunrise, noon and sunset, are laid down with precision, but the intermediate points are frequently in error by several hundred miles, as they were not calculated, but projected simply by drawing a circle through the three.points just mentioned. For this reason we cannot infer from thenf that an eclipse was total at any given place. The correct path can, however, be readily computed from the tables given in the work. Eduard Mahler's memoir, " Die centralen Sonnenfinsternisse • des 20. Jahrhunderts " (Denkschriften, Vienna Academy, vol. xlix.), gives more exact paths of the central eclipses of the 20th century, but

no maps. General tables for computing eclipses are Oppolzer's " Syzygientafeln fur den Mond" (Publications of the Astronomische Gesellschaft, xvi.), and Newcomb's, mPublications of the American Ephemeris, vol. i. part i. Of these, Oppolzer's are constructed with greater numerical accuracy and detail, while New- comb's are founded on more recent astronomical data, and are prefer- able for computing ancient eclipses. F. K. Ginzel's Spezieller Kanon der Sonnen- und Mondfinsternisse (Berlin, 1 899) contains, besides the historical researches already mentioned, maps of the paths of central eclipses visible in the lands of classical antiquity from 900 B.C. to A.D. 500, but computed with imperfect astronomical data. Maguire, " Monthly Notices," R.A.S. xlv. and xlvi., has mapped the total solar eclipses visible in the British Islands from 878 to 1724. General papers of interest on the same subject have been published by Rev. S. J. Johnson. A resume of all the observations on the physical phenomena of total solar eclipses up to 1878, by A. C. Ranyard, is to be found in Memoirs of the Royal Astronomical Society, vol. xli. A very copious development of the computation of eclipses by Bessel's method is found in W. Chauvenet's Spherical

and Practical Astronomy, vol. i. The Theory of Eclipses, by R. Buchanan (Philadelphia, 1904), treats the subject yet more fully. Hansen's method is developed in the Abhandlungen of the Leipzig Academy of Sciences, vol. vi. (Math.Phys. Classe, vol. iv.). The formulae of computation by this method are found in the introduc tions to Oppolzer's two works cited above. (S. N.)

ECLIPTIC, in astronomy. The plane of the ecliptic is that plane in or near which the centre of gravity of the earth and moon revolves round the sun. The ecliptic itself is the great circle in which this plane meets the celestial sphere. It is also defined, but not with absolute rigour, as the apparent path described by the sun around the celestial sphere as the earth performs its annual revolution. Owing to the action of the moon on the earth, as it performs its monthly revolution in an orbit slightly inclined to the ecliptic, the centre of the earth itself deviates from the plane of the ecliptic in a period equal to that of the nodal revolution of the moon. The deviation is extremely slight, its maximum amount ranging between 0-5″ and o-6". Owing to the action of the planets, especially Venus and Jupiter, on the earth, the centre of gravity of the earth and moon deviates by a yet minuter amount, generally one or two tenths of a second, from the plane of the ecliptic proper. Owing to the action of the planets, the position of the ecliptic is subject to a slow secular variation amounting, during our time, to nearly 47″ per century. The rate of this motion is slowly diminishing.

The obliquity of the ecliptic is the angle which its plane makes with that of the equator. Its mean value is now about 23 27'. The motion of,, the ecliptic produces a secular variation in the obliquity which is now diminishing by an amount nearly equal to the entire motion of the ecliptic itself. The laws of motion of the ecliptic and equator are stated in the article Precession of the Equinoxes.

Attempts have been made by Laplace and his successors to fix certain Emits within which the obliquity of the ecliptic shall always be confined. The results thus derived are, however, based on imperfect formulae. When the problem is considered in a rigorous form, it is found that no absolute limits can be set. It can, however, be shown that the obliquity cannot vary more than two or three degrees within a million of years of our epoch.

The formula for the obliquity of the ecliptic, as derived from the laws of motion of it and of the equator, may be developed in a series proceeding according to the ascending powers of the time as follows : we put T, the time from 1900, reckoned in solar centuries as a unit. Then,

Obliquity = 23° 27′ 3i-68-46-837* T-o-oo8s" T 2 +o-ooi7" T 3 .*

From this expression is derived the value of the obliquity at various epochs given in the following table. The left-hand portion of this table gives the values for intervals of 500 years from 2000 B.C. to A.D. 2500 as computed from modern data. For dates more than three or four centuries before or after 1850 the result is necessarily uncertain by one or more tenths of a minute, and is therefore only given to o-i'

2000;

obi

= 23°55'5′

A.D. 1700; obi. =23°

*28′ 41-91**

1500

"

= 23 52-3

1750

, =23

28 18-51

IOOO

,,

=23 48-9

1800

, =23

27 55-10

500

,,

= 23 45-4

1850

, =23

27 31-68

M

= 23 41-7

1900

, =23

27 8-26

500

,,

= 23 38-0

1950

, =23

26 44-84

IOOO

tJ

= 23 34-i

2000

, =23

26 21-41

1500

M

= 23 30-3

2050

, =23

25 57-99

2000

M

= 23 26-4

2100

, =23

25 34-56

2500

”

= 23 22-5

(S. N.)

ECLOGITE (from Gr. &CX0717, a selection), in petrology, a typical member of a small group of metamorphic rocks of special interest on account of the variety of minerals they contain and their microscopic structures and geological relationships. Typic- ally they consist of pale green or nearly colourless augite (ompha- cite), green hornblende and pink garnet. Quartz also is usually present in these rocks,, but felspar is rare. The augite is mostly a variety of diopside and is only occasionally idiomorphic. The garnet sometimes forms good dodecahedra, but may occur as rounded grains, and encloses quartz, rutile, kyanite, and other minerals very frequently. The hornblende is usually pale green and feebly dichroic, but, in some eclogites which are allied to garnet-amphibolites, it is of dark brown colour. Among the commoner accessory minerals are kyanite (of blue or greyish-blue tints), rutile, biotite, epidote and zoisite, sphene, iron oxides, and

pyrites. The rutile is invariably in small brown prisms; the kyanite forms bladed crystals, with perfect cleavage; felspar, if present, belongs to basic varieties rich in lime. Other minerals which have been found in eclogites are bronzite, olivine and glaucophane. The last mentioned is a bright blue variety of hornblende with striking pleochroism. The eclogites in their chemical composition show close affinities to gabbros; they often exhibit relationships in the field which show that they were primarily intrusive rocks of igneous origin, and occasionally con- tact alteration can be traced in the adjacent schists. Examples are known in Saxony, Bavaria, Carinthia, Austria, Norway. A few eclogites also occur in the north-west highlands of Scotland. Glaucophane-eclogites have been met with in Italy and the Pennine Alps. Specimens of rock allied to eclogite have been found in the diamantiferous peridotite breccias of South Africa (the so-called ” blue ground “), and this has given. rise to the theory that these are the parent masses from which the Kimberley diamonds have come. (J. S. F.)

ECLOGUE, a short pastoral dialogue in verse. The word is conjectured to be derived from the Greek verb eKkkyeiv, to choose. An eclogue, perhaps, in its primary signification was a selected piece. Another more fantastic derivation traces it to cu£, goat, and Xˆyos, speech, and makes it a conversation of shepherds. The idea of dialogue, however, is not necessary for an eclogue, which is often not to be distinguished from £he idyll. The grammarians, in giving this

title to Virgil's pastoral conversations (Bucolica), tended to make the term " eclogue " apply exclusively to dialogue, and this has in fact been the result of the success of Virgil's work. Latin eclogues were also written by Calpurnius Siculus and by Nemesianus. In modern literature the term has lost any distinctive character which it may have possessed among the Romans; it is merged in the general notion of pastoral poetry. The French " Eglogues " of J. R. de Segrais (1624- 1701) were long famous, and those of the Spanish poet Garcilasso de La Vega (1503-1536) are still admired.

See also Bucolics; Pastoral.

ECONOMIC ENTOMOLOGY, the name given to the study of insects based on their relation to man, his domestic animals and his crops, and, in the case of those that are injurious, of the prac- tical methods by which they can be prevented from doing harm, or be destroyed when present. In Great Britain little attention is paid to this important branch of agricultural science, but in America and the British colonies the case is different. Nearly every state in America has its official economic entomologists, and nearly every one of the British crown colonies is provided with one or more able men who help the agricultural community to battle against the insect pests. Most, if not all, of the im- portant knowledge of remedies comes from America, where this subject reaches the highest perfection; even the life-histories of some of the British pests have been traced out in the United States and British colonies more completely than at home, from the creatures that have been introduced from Europe.

Some idea of the importance of this subject may be gained from the following figures. The estimated loss by the vine Phylloxera in the Gironde alone was £32,000,000; for all the French wine districts £100,000,000 would not cover the damage. It has been stated on good evidence that a loss of £7,000,000 per annum was caused by the attack of the ox warble fly on cattle in England alone. In a single season Aberdeenshire suffered nearly £00,000 worth of damage owing to the ravages of the diamond back moth on the root crops; in New York state the codling moth caused a loss of $3,000,000 to apple-growers. Yet these figures are nothing compared to the losses due to scale insects, locusts and other pests.

The most able exponent of this subject in Great Britain was John Curtis, whose treatise on Farm Insects, published in i860, is still the standard British work dealing with the insect foes of corn, roots, grass and stored corn. The most important works dealing with fruit and other pests come from the pens of Saunders, Lintner, Riley,

Slingerland and others in America and Canada, from Taschen- berg, Lampa, Reuter and Kollar in Europe, and from French, Froggatt and Tryon in Australia. It was not until the last quarter of the 19th century that any real advance was made in the study of economic entomology. Among the early writings, besides the book

of Curtis, there may also be mentioned a still useful little publication by Pohl and Kollar, entitled Insects Injurious to Gardeners, Foresters and Farmers, published in 1837, and Taschenberg's Praktische Insecktenkunde. American literature began as far back as 1788, when a report on the Hessian fly was issued by Sir Joseph Banks; in 1817 Say began his writings; while in 1856 Asa Fitch started his report on the " Noxious Insects of New York." Since that date the literature has largely increased. Among the most important reports, &c, may be mentioned those of C. V. Riley, published by the U.S. Department of Agriculture, extending from 1878 to his death, in which is embodied an enormous amount of valuable matter. At his death the work fell to Professor L. O. Howard, who constantly issues brochures of equal value in the form of Bulletins of the U.S. Depart- ment of Agriculture. The chief writings of J. A. Lintner extend from 1882 to 1898, in yearly parts, under the title of Reports on the Injurious Insects of the State of New York. Another author whose writings rank high on this subject is M. V. Slingerland, whose investigations are published by Cornell University. Among other Americans who have largely increased the literature and knowledge must be mentioned F. M. Webster and E, P. Felt. In 1883 appeared a work on fruit pests by William Saunders, which mainly applies to the American continent ; and another small book on the same subject was published in 1898 by Miss Ormerod, dealing with the British pests. In Australia Tryon published a work on the Insect and Fungus Enemies of Queensland in 1889. Many other papers and reports are being issued from Australia, notably by Froggatt in New South Wales. At the Cape excellent works and papers are prepared and issued by the government entomologist, Dr Lounsbury, under the auspices of the Agricultural Department; while from India we have Cotes's Notes on Economic Entomology, published by the Indian Museum in 1888, and other works, especially on tea pests.

Injurious insects occur among the following orders : Coleoptera, Hymenoptera, Lepidoptera, Diptera, Hemiptera (both heteroptera and homoptera), Orthoptera, Neuroptera and Thysanoptera. The order Aptera also contains a few injurious species.

Among the Coleoptera or bettles there is a group of world-wide pests, the Elateridae or click beetles, the adults of the various "

wireworms." The insects in the larval or wireworm stage attack the roots of plants, eating them away below the ground. The eggs deposited by the beetle in the ground develop into yellowish-brown wire-like grubs with six legs on the first three segments and a ventral prominence on the anal segment. The life of these subterranean pests differs in the various species; some undoubtedly (Agriotes lineatum) live for three or four years, during the greater part of which time they gnaw away at the roots of plants, carrying wholesale destruction before them. When mature they pass deep into the ground and pupate, appear- ing after a few months as the click beetles (fig. 1) . Most crops are

- *ˆmˆpt tife 3|C *»#;*»*R < * [Wo*

7T '

*:*WN*r-*

B

Fig. 1. — A, Wireworm; B, pupa of Click Beetle; C, adult Click Beetle {Agriotes lineatum).

attacked by them, but they are particularly destructive to wheat and other cereals. With such subterranean pests little can be done beyond rolling the land to keep it firm, and thus preventing them from moving rapidly from plant to plant. A few crops, such as mustard, seem deleterious to them. By growing mustard and ploughing it in green the ground is made obnoxious to the wireworms, and may even be cleared of them. For root-feeders, bisulphide of carbon injected into the soil is of particular value. One ounce injected about 2 ft. from an apple tree on two sides has been found to destroy all the ground form of the woolly aphis. In garden cultivation it is most useful for wireworm, used at the rate of 1 ounce to every 4 sq. yds. It kills all root pests.

In Great Britain the flea beetles {Halticidae) are one of the most serious enemies; one of these, the turnip flea {Phyllotreta nemorum), has in some years, notably 1881, caused more than £500,000 loss in England and Scotland alone by eating the young seedling turnips, cabbage and other Cruciferae. In some years three or four sowings have to be made before a "plant" is produced, enormous loss in

labour and cost of seed alone being thus involved. These beetles, characterized by their skipping movements and enlarged hind femora, also attack the hop (Hallica concinna), the vine in America {Graptodera chalybea, Illig.), and numerous other species of plants, being specially harmful to seedlings and young growth. Soaking the seed in itrong-smelling substances, such as paraffin and turpentine, has been found efficacious, and in some districts paraffin sprayed over the seedlings has been practised with decided success. This oil generally acts as an excellent preventive of this and other insect attacks.

In all climates fruit and forest trees suffer from weevils or Curculionidae. The plum curculio (Conolrachelus nenuphar, Herbst) in America causes endless harm in plum orchards; curculios in Australia ravage the vines and fruit trees {Orthor- rhinus klugii, Schon, and Leptops hopei, Bohm, &c). In Europe a number of " long-snouted " beetles, such as the raspberry weevils {Otiorhynchus picipes), the apple blossom weevil {Antho- nomus pomorum), attack fruit; others, as the " corn weevils " {Calandra oryzae and C. granaria), attack stored rice and corn; while others produce swollen patches on roots {Ceutorhynchus sulcicolUs) , &c. All these Curculionidae are very timid creatures, falling to the ground at the least shock. This habit can be used as a means of killing them, by placing boards or sacks covered with tar below the trees, which are then gently shaken. As many of these beetles are nocturnal, this trapping should take place at night. Larval " weevils " mostly feed on the roots of plants, but some, such as the nut weevil {Balaninus nucum), live as larvae inside fruit. Seeds of various plants are also attacked by weevils of the family Bruchidae, especially beans and peas. These seed-feeders may be killed in the seeds by subjecting them to the fumes of bisulphide of carbon. The corn weevils {Calandra granaria and C. oryzae) are now found all over the world, in many cases rendering whole cargoes of corn useless.

The most important Hymenopterous pests are the sawflies or Tenthredinidae, which in their larval stage attack almost all vegetation. The larvae of these are usually spoken of as " false caterpillars," on account of their resemblance to the larvae of a moth. They are most ravenous feeders, stripping bushes and trees completely of their foliage, and even fruit. Sawfly larvae can at once be recognized by the curious positions they assume, and by the number of pro-legs, which exceeds ten. The female lays her eggs in a slit made by means of her " saw-like " ovipositor in the leaf or fruit of a tree. The pupae in most of these pests are found in an earthen cocoon beneath the ground, or in some cases above ground

(Lophyrus pint). One species, the slugworm (Eriocampa limacina), is common to Europe and America; the larva is a curious slug-like creature, found on the upper surface of the leaves of the pear and cherry, which secretes a slimy coating from its skin. Currant and gooseberry are also attacked by sawfly larvae (Nematus ribesii and N. ventricosus) both in Europe and America. Other species attack the stalks of grasses and corn (Cephus pygmaeus). Forest trees also suffer from their ravages, especially the conifers {Lophyrus pint). Another group of Hymenoptera occasionally causes much harm in fir plantations, namely, the Siricidae or wood- wasps, whose larvae burrow into the trunks of the trees and thus kill them. For all exposed sawfly larvae hellebore washes are most fatal, but they must not be used over ripe or ripening fruit, as the hellebore is poisonous.

The order Diptera contains a host of serious pests. These two-winged insects attack all kinds of plants, and also animals in their larval stage. Many of the adults are bloodsuckers {Tabanidae, Culicidae, &c); others are parasitic in their larval stage {Oestridae, &c). The best-known dipterous pests are the Hessian fly {Cecidomyia destructor), the pear midge {Diplosis pyrivora), the fruit flies {Tephritis Tyroni of Queensland and

Halterophora capitata or the Mediterranean fruit fly), the onion fly {Phorbia cepetorum), and numerous corn pests, such as the gout fly {Chloropstaeniopus) and the frit fly {Oscinis frit). Animals suffer from the ravages of bot flies {Oestridae) and gad flies {Tabanidae); while the tsetse disease is due to the tsetse fly {Glossina morsitans), carrying the protozoa that cause the disease from one horse to another. Other flies act as disease- carriers, including the mosquitoes {Anopheles), which not only carry malarial germs, but also form a secondary host for these parasites. Hundreds of acres of wheat are lost annually in America by the ravages of the Hessian fly; the fruit flies of Australia and South Africa cause much loss to orange and citron growers, often making it necessary to cover the trees in muslin tents for protection. Of animal pests the ox warbles {Hypoderma lineata and H. bovis) axe. the most important (see fig. 2). The "bots" or larvae of these flies live under the skin of cattle, producing large swollen lumps — " warbles " — in which the "bots" mature (fig. 2). These parasites damage the hide,

Fig. 2. — A, Ox Bot Maggot; B, puparium; C, Ox Warble Fly

{Hypoderma bovis).

set up inflammation, and cause immense loss to farmers, herds- men and butchers. The universal attack that has been made upon this pest has, however, largely decreased its numbers. In America cattle suffer much from the horn fly {Haematobia serrata). The dipterous garden pests, such as the onion fly, carrot fly and celery fly, can best be kept in check by the use of paraffin emulsions and the treatment of the soil with gas-lime after the crop is lifted. Cereal pests can only be treated by general cleanliness and good farming, and of course they are largely kept down by the rotation of crops.

Lepidopterous enemies are numerous all over the world. Fruit suffers much from the larvae of the Geometridae, the so- called ‘ ‘ looper-larvae ” or ” cank er- worms. ” Of these geometers the winter moth {Cheimatobiabrumata) is one of the chief culprits in Europe (fig. 3). The females in this moth and in others allied to it are wingless. These insects pass the pupal stage in the ground, and reach the boughs to lay their eggs by crawling up the trunks of the trees. To check them, ” grease-banding ” round the trees has been adopted; but as many other pests eat the leafage, it is best to kill all at once by spraying with arsenical poisons. Among other notable Lepidopterous pests are the ” surface larvae ” or cutworms {Agrotis spp.), the caterpillars of various Noctuae; the codling moth {Carpocapsa pomonella), which causes the maggot in apples, has now become a universal pest, having spread from Europe to America and to most of the British Colonies. In many Fig. 3. — Looper- years quite half the apple crop is lost in larva of Winter England owing to the larvae destroying the Moth {Cheimatobia fruit. Sugar-canes suffer from the sugar- rumaa >- cane borer {Diatioca sacchari) in the West Indies; tobacco from the larvae of hawk moths {Sphingidae) in America; corn and grass from various Lepidopterous pests all over the world. Nor are stored goods exempt, for much loss annually takes

place in corn and flour from the presence of the larvae of the Mediterranean flour moth (Ephestia kuniella) ; while furs and clothes are often ruined by the clothes moth {Tinea trapezella).

By far the most destructive insects in warm climates belong to the Hemiptera, especially to the Coecidae or scale insects. All fruit and forest trees suffer from these curious insects, which in the female sex

always remain apterous and apodal and t live attached to the bark, leaf and fruit, hidden beneath variously formed scale-like coverings. The male scales differ in form from the female; the adult male is winged, and is rarely seen. The female lays her eggs beneath the scaly covering, from which hatch out little active six-legged larvae, which wander about and soon begin to form a new scale. The Coecidae can, and mainly do, breed asexually (parthenogenetically). One of the most important is the San Jose scale (Aspidiotus perniciosus), which in warm climates attacks all fruit and many other trees, which, if unmolested, it will soon kill (fig. 4). These scales breed very rapidly; Howard states one may give rise to a progeny of 3,216,080,400 in one year. Other scale insects of note are the cosmopolitan mussel scale (Mytilaspis pomorum) and the Australian Icerya purchasi. The former attacks apple and pear; the latter, which selects orange and citron, was introduced into America from Australia, and carried ruin before it in some orange districts until its natural enemy, the lady-bird beetle, Vedalia cardinalis, was also imported.

After the Coecidae the next most important insects male; C, ovigerous wingless female; economically are the plant lice or A phididae. These'breed P lum; E . P"Pal stage.

in patches from old apple trees, where the insects live in the rough bark and form cankered growths both above and below ground. Aphides are provided with a mealy skin, which does not allow water to be attached to it, and thus insecticides for destroying them contain soft soap, which fixes the solution to the skin; paraffin is added to corrode the skin, and the

The Hop Aphis (Phorodon humuli). A, Winged female ; B, winged D, viviparous wingless female from

with great rapidity under favourable conditions; one by the end of the year will be accountable, according to Linnaeus, for the enormous number of a quintillion of its species. Aphides are born, as a rule, alive, and the young soon commence to reproduce again. Their food consists mainly of the sap obtained from the leaves and blossom of plants, but some also live oh the roots of plants (Phylloxera vastatrix and Schizoneura lanigera). Aphides often ruin whole crops of fruit, corn, hops, &c, by sucking out the sap, and not only check growth, but may even entail the death of the plant. Reproduction is mainly asexual, the females producing living young without the agency of a male. Males in nearly all species appear once a year, when the last female generation, the ovigerous generation, is

fertilized, and a few large ova are pro- duced to carry on the continuity of the species over the winter. Some aphides live only on one species of plant, others on two or more plants. An example of the latter is seen in the hop aphis

Fig. 4. — San Jose 1 Scale- (Aspidiotus perniciosus).

B, female; C, larva; D, female scale; E, male scale.

(Phorodon humuli), which passes the winter and lives on the sloe and damson in the egg stage until the middle of May or later, and then flies off to the hops, where it causes endless harm all the summer (fig. 5) ; it flies back to the prunes to lay its eggs when the hops are ripe. Another aphis of importance is the woolly aphis (Schizoneura lanigera) of the apple and pear: it secretes tufts of white fiocculent wool often to be seen hanging

soft soap blocks up the breathing pores and so produces asphyxiation.

Amongst Orthoptera we find many noxious insects, notably the locusts, which travel in vast cloud-like armies, clearing the whole country before them of all vegetable life. The most destructive locust is the migratory locust (Locusta migraloria), which causes wholesale destruction in the East. Large pits are dug across the line of advance of these great insect armies to stop them when in the larval or wingless stage, and even huge bonfires are lighted to check their flight when adult. So dense are these " locust clouds " that they sometimes quite darken the air. The commonest and most widely distributed migratory locust is Pachylylus cinerascens. The mole cricket (Gryllotalpa vulgaris) and various cockroaches (Blattidae) are also amongst the pests found in this order.

Of Neuroptera there are but few injurious species, and many, such as the lace wing flies (Hemerobiidae) , are beneficial.

The Treatment of Insect Pests. — One of the most im- portant ways of keeping insect pests in check is by "spraying " or " washing." This method has made great advances in recent years. All the pioneer work has been done in America ; in fact, until the South-Eastern Agricultural College undertook the elucidation of this subject, little was known of it in England except by a few growers. The results and history of this essential method of treatment are embodied in Professor Lode- mann's work on the Spraying of Plants, 1896. In this treatment we have to bear in mind what the entomo- logist teaches

us, that is, the nature, habits and structure of the pest.

For insects provided with a biting mouth, which take nourishment from the whole leaf, shoot or fruit, the poisonous washes used are chiefly arsenical. The two most ... . . useful arsenical sprays are Paris green and arsenate of lead.

A, Male scale insect; r/ ma i ce the former, mix I oz. of the Paris green with 15 gallons of soft water, and add 2 oz. of lime and a small quantity of agricultural treacle; the latter is prepared by dis solving 3 oz. of acetate of lead in a little water,' then 1 oz. of arsenate of soda in water and mixing the two well together, and adding the whole to 16 gallons of soft water; to this is added a small quantity of coarse treacle. For piercing- mouthed pests like Aphides no wash is of use unless it contains a basis of soft soap. This soft-soap wash kills by contact, and may be prepared in the following way :— Dissolve 6 to 8 lb of the best soft soap in boiling soft water and •while still hot (but of course taken off the fire) add 1 gallon of

paraffin oil and churn well together with a force-pump ; the whole may then be mixed with 100 gallons of soft water. The oil readily separates from the water, and thus a perfect emulsion is not obtained : this difficulty has been solved by Mr Cousin's paraffin naphthalene wash, which is patented, but can be made for private use. It is prepared as follows: — Soft soap, 6 lb dissolved in I quart of water; naphthalene, 10 oz. mixed with ii pint of paraffin; the whole is mixed together. When required for use, I lb of the compound is dissolved in 5 to 10 gallons of warm water.

These two washes are essential to the well-being of every orchard in all climates. Not only can we now destroy larval and adult insects, but we can also attack them in the egg stage by the use of a caustic alkali wash during the winter; besides destroying the eggs of such pests as the Psyllidae, red spider, and some aphides, this also removes the vegetal encumbrances which shelter numerous other insect pests during the cold part of the year. Caustic alkali wash is prepared by dissolving I -lt> of crude potash and I lb of caustic soda in soft water, mixing the two solutions together, adding to them I lb of soft soap, and diluting with 10 gallons of soft water when required for use. Another approved insecticide for scale insects is resin wash, which acts in two ways: first, corroding the soft scales, and second,

fixing the harder scales to stop the egress of the hexapod larvae. It is prepared as follows : — First crush 8 ft) of resin in a sack, and then place the resin in warm water and boil in a cauldron until thoroughly dissolved; then melt 10 lb of caustic soda in enough warm water to keep it liquid, and mix with the dissolved resin; keep stirring until the mixture assumes a clear coffee-colour, and. for ten minutes afterwards; then add enough warm water to bring the whole up to 25 gallons, and well stir. Bottle this off, and when required for use dilute with three times its bulk of warm soft water, and spray over the trees in the early spring just before the buds burst. For mites {A cari) sulphur is the essential ingredient of a spray. Liver of sulphur has been found to be the best form, especi- ally when mixed with a paraffin emulsion. Bud mites (Phytoptidae, fig. 6) are of course not affected. Sulphur wash is made by adding to every 10 gallons of warm paraffin emulsion or paraffin-naphthatene- emulsion 7 oz. of liver of sulphur, and stirring until the sulphur is well mixed. This is applied as an, ordinary spray. Nursery stock should always be treated, to kill scale, aphis and other pests which it may carry, by the gas treatment, particularly in the case of stock imported from a foreign climate. This treatment, both out of doors and under glass, is carried out as follows :— Cover the plants in bulk with a light gas-tight cloth, or put them in a special fumigating house, and then place I oz. of cyanide of potassium in lumps in a dish with water beneath the covering, and then pour I oz. of sulphuric acid over it (being careful not to inhale the poisonous fumes) for every 1000 cub. ft. of space beneath the cover. The gas generated, prussic acid, should be left to work for at least an hour before the stock is removed, when all forms of animal life will be destroyed.

For spraying, proper instruments must be used, by means of which the liquid is sent out over the plants in as Arte a mist as possible. Numerous pumps and nozzles are now made by which this end is attained. Both horse and hand machines are employed, the former for hops and large orchards, the latter for bush fruit and gardens. In America, where trees in parks as well as orchards and gardens are treated, steam-power is sometimes used. Among the most important sprayers are the Strawson horse sprayers and

Fig. 6.v— Bud Mites (Phytoptidae). A, Currant Bud Mite (Phytoptus . ribis) ; B, Nut Bud Mite (P. avellanae).

the smaller Eciair and Notus knapsack pumps, carried on the back (fig. 7). The nozzles for " mistifying " the wash most in use are known as the Vermorel and Riley's, which can be fitted to any length of tubing, so as to reach any height, and can be turned in any

direction. The pumps in the machine keep the insecticide constantly mixed, and at the same time force the wash with great

strength through the nozzle, and so to the exterior; as a fine mist; every part of the plant is thus affected.

Beneficial Insects have also to be considered in economic entomology. They are of two kinds — (1) those that help to keep down an excess of other insects by acting either as parasites

Fig. 7 — Knapsack Sprayer for Liquid Insecticides, or by being insectivorous in habit; and (2) insects of economic value, such as the bee and silkworm. Amongst the most im- portant friends to the farmer and gardener are the Hymenop- terous families of ichneumon flies (Ichneumonidae ■- and Braconidae) ; the Dipterous families Syrphidae and Tachinidae; the Coleopterous families Coccinellidae and Carabidae; and the Neuropterous Hemerobiidae, or lace- wing flies. Ichneumon flies lay their eggs either in the larvae or ova of other insects, and the parasites destroy their host. In this way the Hessian fly is doubtless kept in check in Europe, and the aphides meet with serious hindrance to their increase. If a number of plant-lice are examined, a few will be found looking like little pearls; these are the dried skins of those that have been killed by Ichneumonidae. The Syrphidae, or hover flies, are almost exclusively aphis-feeders in their larval stage. Tachina flies attack lepidopterous larvae. One of the most notable examples of the use of insect allies is the case of the Australian lady-bird, Vedalia. cardinalis, which, in common with all lady-birds, feeds off Aphidae and Coccidae. The Icerya scale {I eery a purchasi) imported into America ruined the orange groves, but its enemy, the Vedalia, was also imported from Australia, and counteracted its abnormal increase with such great results that the crippled orange groves are now once more profitable. (F. V. T.)

ECONOMICS (from the Gr. oUovohlkti, sc. rkxv\, from of /cos, a house, and vS/ms, rule, — the " art of household management"), the general term, with its synonym "poli- tical economy," for the science or study of wealth (welfare) and its production, applicable either to the individual, the family, the State, or in the widest sense, the world. How far the same considerations apply to all these sp'heresTs'one of the problems of economic thought in its widest sense. The term " economy " (g.v.) by itself, which should strictly mean the art of applying money (or wealth) wisely, has commonly come to mean the art of saving money, or spending as little as possible. In practice the study of " political " economy is mainly devoted to the sphere of the State; the welfare of the individual as a

member of the State, and of the State in its relation to the world, being internal aspects of the prosperity of the State itself. Economics thus includes the discussion of all the numerous factors which make life profitable, whether to the nation or to the business, or to the individual man. It may be conceived either as an historical science (What principles have in fact paid ?), or as an abstract science ■ (What are the true principles which must pay, presupposing an ideal?). Economists at different times have studied both aspects, according to their lights, and influenced by historical conditions of philosophic thought. A text-book on economics necessarily deals, therefore, with the whole subject in a manner which need not here be lollowed, since separate articles are devoted in this work to the biographies of writers on economics, and also to the principal economic

questions involved, under their own headings. In this article we propose therefore to confine ourselves to discussing the character and subject-matter of the science, indicating its relation to other sciences, and explaining the methods by which economists reach their conclusions.

We understand by economics the science which investigates the manner in which nations or other larger or smaller com- munities, and their individual members, obtain food, clothing, shelter and whatever else is considered desirable or necessary for the maintenance and improvement of the conditions of life. It is thus the study of the life of communities with special reference to one side of their activity. It necessarily involves the scientific examination of the structure and organization of the community or communities in question; their history, their customs, laws and institutions; and the relations between their members, in so far as they affect or are affected by this department of their activity.

At the root of all economic investigation lies the conception of the standard of life of the community. By this expression we do not mean an ideal mode of living, but the habits and requirements of life generally current in a community or grade of society at a given period. The standard of life of the ordinary well-to-do middle class in England, for example, includes not only food, clothing and shelter of a kind different in many respects from that of a similar class in other countries and of other classes in England, but a highly complicated

mechanism, Doth public and private, for ministering to these primary needs, habits of social intercourse, educational and sanitary organization, recreative arrangements and many other elements. Many influences operating for a long period of time on the character and the environment of a class go to determine its standard of life. In a modern industrial community it is possible to express this standard fairly accurately for the purposes of economic investigation in terms of money (g.v.). But it is doubtful whether the most complete investigation would ever enable us to include all the elements of the standard of life in a money estimate. The character, tastes and capacity for management of different individuals and groups differ so widely that equal incomes do not necessarily imply identity of standard. In the investigation of past times, the incommensurate elements of well-being are so numerous that merely money estimates are frequently misleading. The conception of the standard of life involves also some estimate of the efforts and sacrifices people are prepared to make to obtain it; of their ideals and character; of the relative strength of the different motives which usually determine their conduct. But no carefully devised calculus can take the place of insight, observation and experience. The economist should be a man of wide sympathies and practical sagacity, in close touch with men of different grades, and, if possible, experienced in affairs.

It is evident that no permanent classification is possible of what is or is not of economic significance. No general rules, applicable to all times, can be laid down as to what of subject- phenomena must be examined or what may be neglected matter. in economic inquiry. The different departments of human activity are organically connected, and all facts relating to the life of a community have a near or remote economic significance. For short historical periods, indeed, many phenomena are so remotely connected with the ordinary business of life that we may ignore them. But at any moment special causes may bring into the field of economic inquiry whole departments of life which have hitherto been legitimately ignored. In times past, biblical exegesis, religious ideals, and ecclesiastical organization, the purely political aims of statesmen, chance combinations of party politics and the intrigues of diplomatists, class prejudice, social conventions, apparently sudden changes of economic policy, capricious changes of fashion — all these causes and many others have exerted a direct and immediate influence on the economic life of the community. In our own day we have had many illustrations of the manner in which special circumstances may at once bring an almost unnoticed series of scientific investigations into direct and vital relation with the business world. The economist

must, therefore,

not only be prepared to take account of the physical features of the world, the general structure and organization of the industry and commerce of different states, the character of their administra- tion and other important causes of economic change. He must be in touch with the actual life of the community he is studying, and cultivate " that openness and alertness of the mind, that sensitiveness of the judgment, which can rapidly grasp the significance of at first sight unrelated discoveries or events."

Some people are of opinion that the factors to be taken account of in economic investigation are so numerous that progress on these lines is impossible. It would certainly be impossible if we had to begin de novo to construct the whole fabric of economic science. But, as we shall see, it is no more necessary to do this in the world of science than it is in the world of business or politics. There is in existence a vast store of accumulated knowledge, and few, if any, departments of economics have been left quite un- illuminated by the researches of former generations. Progress is the result of adaptation rather than reconstruction. It must be remembered also that economic work in modern times is carried on by consciously or unconsciously associated effort, and although it must always require high qualities of judgment, capacity and energy, many of the difficulties which at first sight appear so insuperable give way when they are attacked. In some ways also the study of highly developed organizations like the modern industrial state is simpler than that of earlier forms of society.

In the earliest times for which we have abundant material the economic life of England had already reached in certain directions a high degree of complexity. Even in the rural districts, manorial records reveal the existence of a great variety of classes and groups of persons engaged in the performance of economic functions. The lord of the manor with his officials and retainers, the peasantry bound to him by ties of personal dependence and mutual rights and obligations, constituted a little world, in which we can watch the play of motives and passions not so dissimilar as we are sometimes led to believe from those of the great modern world. In many a country district the gradations of social rank were and" more continuous, the opportunities of intercourse modern more frequent, and the capacity for organization conditions greater than in modern times. The manorial accounts*

in England.

were kept with precision and detail, and we are told that a skilled official could estimate to the utmost farthing the value of the services due from the villein to his lord. The manor was indeed self-sufficient and independent in the sense that it could furnish everything required by the majority of the in- habitants, and that over the greater part of rural England production was not carried on with a view to a distant market. But in the earliest times the manor was subjected to external influences of great importance. Vast areas of the country were in fact under the single control of a territorial lord or an ecclesi- astical foundation. Every manor composing these great fiefs was likely to be affected by the policy or the character of the administration of the feudal lord, and he, again, by the policy or the difficulties, the strength or the weakness, of the central government. Foreign trade and foreign intercourse were undeveloped, but their influence was in historical times never entirely absent, while the influence of Roman law and the Christian Church constantly tended to modify the manorial organization. In the tpwns the division of labour had proceeded much further than in the rural districts, and there were in existence organized bodies, such as the Gild Merchant and the crafts, whose functions were primarily economic. But one of the most striking characteristics of town life in the middle ages was the manner in which municipal and industrial privileges and responsibilities were interwoven. In modern times the artisan, however well trained, efficient and painstaking he may be,' does not, in virtue of these qualities, enjoy any municipal or political privileges. By means of his trade union, co-operative society or club he may gain some experience in the management of men and business, and in so far as the want of a sufficient income does not constitute an insuperable difficulty, he may share in the public life of the country. But in his character as

artisan he enjoys no municipal or political privileges. In the middle ages this differentiation of the industrial, municipal and political life had not taken place, and in order to understand the working of at first sight purely economic regulations it is necessary to make a close study of the functions of local govern- ment. But this, after all, does not carry us very far. From the very nature of the records in which we study the town life of the middle ages, it follows that we obtain from them only a one- sided view. No one knows what proportion of the industrial population was included in the organized gilds, or how complete was the control exercised by these bodies over their

members. Elaborate regulations were in force, but no one knows how elastic they were in practice. Medieval Englishmen were particularly apt to put their aspirations into a legal form, and then rest satisfied with their achievement. The number of regulations is scarcely to be regarded as a test of their administrative success. Further, as the country became more consolidated and the central government extended its authority over economic affairs, new regulations came into force, new organs of government appeared, which were sometimes in conflict, sometimes in har- mony, with the existing system, and it becomes for a time far more difficult to obtain a clear view of the actual working of economic institutions. Thus the study of the economic life of the middle ages is one of the most complicated subjects which can engage the attention of man. It is impossible to carry the process of isolation very far. The different threads of social activity are so closely interwoven that we cannot follow any one for very long without forming wrong impressions, and it becomes necessary to turn back and study others which seemed at first sight unrelated to the subject of our investigations. Under an apparently uniform and stable system of social regulation there was much variation and movement, the significance of which it is impossible to estimate. Materials for forming such an estimate no doubt exist, but before doing so we have to study in infinite detail a vast number of separate manors, municipalities or other separate economic areas. This involves great industry on the part of many scientific workers. Meanwhile we can illustrate the economic life of the middle ages, describe its main features, indicate the more important measures of public policy and draw attention to some of the main lines of development.

It is only as we approach more modern times that the con- ditions of economic study are realized and economic science, Conditions as we understand it, becomes possible. Those condi- of tions are: (i.) the life of the state or other community

economic or communities we are studying must be so differen- tiated that we can isolate those functions which are wholly or predominantly economic. The " separation of employ- ments " is not only a condition of economic efficiency; it was necessary before we could have an economic science, (ii.) We must be in a position so far to understand and estimate the character and motives of different classes and groups in these communities that we can rightly interpret their action. This condition cannot be realized without great difficulty, for " economic motives " are very different in different periods, nations and classes, and even for short periods of time in the same country are modified by the influence of other motives of an

entirely different order. In studying the economic history of the 1 8th century, for example, it is not enough to assume with Defoe that " gain is the design of merchandise." We have to be saturated, as it were, with 18th-century influences, so that we can realize the conditions in which industry and trade were carried on, before we can rightly explain the course of develop- ment. In our own day labour disputes, to take another example, can scarcely ever be resolved into a question of merely pecuniary gain or loss. The significance of the amount of money involved varies greatly for different trades, and can only be understood by reference to the character and habits of the people concerned. But questions of sentiment, shop-feeling and trade customs invariably play an important part, (iii.) Economics can never lead to anything but hypothetical results unless we not only realize that we must " take account of " other than the purely economic factors, bte also give due weight and significance to

these factors. No explanation of the industrial situation fn Germany, for example, would be intelligible or satisfactory even from the economic point of view which ignored the significance of the political conditions which Germans have to deal with. So, again, it is impossible to make a useful comparative estimate of the advantages and disadvantages of the transport systems of England, the United States and Germany, unless we keep constantly in view the very different geographical, military and political conditions which these systems have to satisfy, (iv.) Sufficient information must be available to enable us to test the validity of our hypotheses and conclusions. Whatever " method " of economic investigation we employ, we must at every stage see how far our reasoning is borne out by the actual experience of life. This obvious condition of scientific inquiry is very far from being completely realized even at the present time. It implies the existence of a well-trained class engaged in the work of collecting information, and much organization both by the state and private bodies. These four conditions can be reduced to two. The community we are studying must have reached such a stage of development that its economic functions and those immediately cognate to them form a well-defined group, and adequate means must be available so that we can, as it were, watch the performance of these functions and test our hypotheses and conclusions by observation and experience.

It is easy to understand, therefore, why we trace the beginnings of economics, so far as England is concerned, in the 16th century, and why the application of strict scientific tests in this subject of human study has become possible only in comparatively recent times. Medieval economics was little more than a casuistical system of

elaborate and somewhat artificial rules of conduct. From the close of the middle ages until the middle of the 1 8th century thousands of pamphlets and other works on economic questions were published, but the vast majority of the writers have little or no scientific importance. Their works frequently contain information given nowhere else, and throw much light on the state of opinion in the age in which they wrote. It is also possible to find in them many anticipations of the views of the economists of later times; but such statements were as a rule generated merely by the heat of controversy on some measure or event of practical importance, and when the con- troversy died down were seldom regarded or incorporated in a scientific system. Trade bias, personal impressions and guess- work took the place of scientific method. This was inevitable in the absence of trustworthy information on an adequate scale, and from the immediately practical aims of the writers. But from the end of the 17th century economics has been definitely recognized as a subject of scientific study.

In modern times the conditions which have made economic science possible have also made it necessary. While it is im- possible to give a strictly economic interpretation Necessity of the earlier history of nations, economic interests 0/ so govern the life and determine the policy of modern • eca "omlc states that other forces, like those of religion and sceace ' politics, seem to play only a subsidiary part, modifying here and there the view which is taken of particular questions, but not changing in any important degree the general course of their development. This may be, in the historical sense, merely a passing phase of human progress, due to the rapid extension of the industrial revolution to all the civilized and many of the uncivilized nations of the world, bringing in its train the con- solidation of large areas, a similarity of conditions within them, and amongst peoples and governments a great increase in. the strength of economic motives. When the world has settled down to the new conditions, if it ever does so, we may be con- fronted with problems similar to those which our forefathers had to solve. But, for the time, if we know the economic interests of nations, classes and individuals, we can tell with more accuracy than ever before how in the long run they will act. Public policy therefore requires the closest possible study of the economic forces which are moulding the destinies of the great nations of the world. In most civilized countries except England this is recognized, and adequate provision is made for the study

of economic science. But the subject is not only of immediate concern to the state in its corporate and public capacity. The neglect of it in the domain of private business can now only lead to disastrous results. To quote from a useful work (National Education: a Symposium, 1901), " the commercial supremacy of England was due to a variety of causes, of which superior intelligence, in the ordinary business sense, was not the most important. Her insular position, continuity of political develop- ment and freedom from domestic broils played ah important part in bringing about a steady and continuous growth of industry and manufactures for several generations before the modern era. The great wars of the 18th and the beginning of the 19th century, which arrested the growth of continental nations, gave England the control of the markets of the world. When peace was restored, England enjoyed something in the nature of a monopoly. The competition of France ce'ased for a time to be an important factor. What is now the German empire was a mere congeries of small states, waging perpetual tariff wars upon each other. In the old Prussian provinces alone there were fifty-three different customs frontiers, and German manufactures could not develop until the growth of the Zollverein brought with it commercial consolidation, internal freedom and greater homogeneity of economic conditions. The industries of the United States were in their infancy. Thus the productive power of England was unrivalled, and her manufactures and business men, under a regime rapidly approximating to complete freedom of trade, could reap the full advantages to be derived from the possession of great national resources and production by machinery. Commercial supremacy required not so much highly trained intelligence amongst manufacturers and merchants as keen business instinct and a certain rude energy. In the last genera- tion all that has changed, and the change is of a permanent character. The struggle of the future must inevitably be between a number of great nations, more or less equally well equipped, carrying on production by the same general methods, each one trying to strengthen its industrial and commercial position by the adoption of the most h'shly developed machinery, and all the methods suggested by scientific research, policy or experience. ' Under these conditions, it is no longer possible for the individual merchant, or for small groups of merchants, to acquaint themselves, by personal experience alone, with more than a fractional part of the causes which affect the business in which they are engaged. The spread of the modern industrial system has brought with it the modern state, with its millions of consumers, its vast area, its innumerable activities, its com- plicated code of industrial and commercial law. At the same time, the revolution in the means of

transport and communication has destroyed, or is tending to destroy, local markets, and closely interwoven all the business of the world. Events in the most distant countries, industrial and commercial movements at first sight unrelated to the concerns of the individual merchant, now exert a direct and immediate influence upon his interests. The technical training of the factory or the office, the experience of business, the discharge of practical duties, necessary as they are, do not infallibly open the mind to the large issues of the modern business world, and can never confer the detailed acquaintance with facts and principles which lie outside the daily routine of the individual, but are none the less of vital importance." Economics, therefore, under modern conditions, is not only a subject which may usefully occupy the attention of a leisured class of scientific men. It should form part of the training of educated men of all classes, on grounds of public policy and administrative and business efficiency.

The relations between economics and other sciences cannot be stated in a very general form. They vary for different

„ , ., periods, and are not the same for all branches of Relations r '. „_, . , ...

between economics. There is no subject of human study which

economics may not be at some time or other of economic signifi- ed other cancC) an d anything which affects the character, the ideals or the environment of man may make it necessary to modify our assumptions and our reasoning with regard to his conduct in economic affairs. But if the economist,

while studying one side of man's activities, must also cultivate all other branches of human learning, it is obvious that no substantial progress can be made. The economist frankly assumes the reality of the existing world and takes men as they are, or as they have been if he is studying past times. His assumptions are based upon ordinary observation and experience, and are usually accurate in proportion to his practical shrewdness and sagacity, so that he is not interested in the speculative flights of philosophy, except in so far as they influence or have influenced conduct. In times past, and to a less extent in our own day, philosophical conceptions have formed the basis of great systems of politics and economics. The historical relations between philosophy and economics are of great importance in tracing the development of the latter, and have done much to determine its present form. But the modern conception of society or

the state owes more to biology than philosophy, and actual research has destroyed more frequently than it has justified the assumptions of the older philosophical school. Experimental psychology may in course of time have an important bearing on economics, but the older science cannot be said to be of much significance except in its historical aspects. Ethics is in much the same position. That is, it is possible to conceive of an ethical science which would extend considerably our knowledge of economic affairs, but no important new principle of original discovery, relevant to economic investigation, has come from that quarter in recent years, and at present ethics has more to learn from economics than the latter has from ethics. It is in the adaptation of biological conceptions and methods, in the positive contributions of jurisprudence, law and history, in the rigorous application, where possible, of quantitative tests, that the explanation of the present position of economics is to" be found. Mathematics has influenced the form and the terminology of the science, and has sometimes been useful in analysis; but mathematical methods of reasoning, in their application to economics, while possessing a certain fascination, are of very doubtful utility.

*There is no method of investigation which is peculiarly economic or of which economics has the monopoly. In every age economists have applied the methods ordinarily jff e t no a „/ in use amongst scientific men. There would probably economic have been no controversy at all on this subject but for '"vesti- the fact that economics was elaborated into systematic * a " oil * form, and made the basis of practical measures of the greatest importance, long before the remarkable development in the 19th century of historical research, experimental science and biology. The application of the a priori method in economics was an accident, due to its association with other subjects and the general backwardness of other sciences rather thanany exceptional and peculiar character in the subject-matter of the science itself. The methods applied to economics in the 18th and the early part of the 19th century were no more invented with a special view to that subject than the principles of early railway legislation, in the domain of practical policy, were devised with a special view to what was then a new means of transport. As a matter of fact, discussions of method and the criticism of hypotheses and assumptions are very rarely found in early economic works. It is only: by reference to the prevailing ideas in philosophy and politics that we can discover what was in the minds of their authors. The growth of a science is much like the growth of a constitution. It proceeds by adaptation and precedent. The scientific and historical*

movement of the 19th century was revolutionary in character. When it began to affect economics, many people were afraid that the whole fabric of science would be destroyed and the practical gains it had achieved, jeopardized. These fears were justified, in so far as those who entertained them shut their eyes to everything new and assumed an attitude of no compromise. Where the newer methods were assimilated, the position of economics was strengthened and its practical utility increased. General discussion of method, however, is rarely profitable. In all branches of economics, even in what is called the pure theory, there is an implied reference to certain historical or existing conditiofjp of a more or less

definite character; to the established order of an organized state or other community, at a stage of development which in its main features can be recognized. In all economic investigation assumptions must be made, but we must see that they are legitimate in view of the actual life and character of the community or communities which are the subject of investigation. In common with other sciences, economics makes use of " abstrac- tions"; but if for some problems we employ symbolic processes of reasoning, we must keep clearly in view the limits of their significance, and neither endow the symbols with attributes they can never possess, nor lose sight of the realities behind them. Every hypothesis must be tested by an appeal to tne facts of life, and modified or abandoned if it will not bear examination, unless we are convinced on genuine evidence that it may for a time be employed as a useful approximation, without prejudice to the later stages of the investigation we are conducting.

We shall best illustrate the character and method of economic reasoning by examples, and for that purpose let us take first of AnlUus- au a purely historical problem, namely, the effect on tratloa of the wage-earners of the wages clauses of the Statute of economic Apprenticeship (1563). It is at once obvious that we me ' are dealing not with an abstract scheme of regulation in a hypothetical world, but with an act of parliament nominally in force for two hundred and fifty years, and applicable to a great variety of trades whose organization and history can be ascertained. The conclusions we reach may or may not modify any opinions We have formed as to the manner in which wages are determined under modern conditions. For the time being such opinions are irrelevant to the question we are

investigating, and the less they are in our mind:, the better. There is no reason why we should apply to this particular act a different method of inquiry from that we should apply to any other of the numerous acts, of more or less economic importance, passed in the same session of parliament. The first step is to see whether there is a prima facie case for inquiry, for many acts of parliament have been passed which have never come into operation at all, or have been administered only for a short time on too limited a scale to have important or lasting results. The justices were authorized to fix wages at the Easter quarter sessions. Did they exercise their powers? To answer this question we must collect the wages assessments sanctioned by the magistrates. This is a perfectly simple and straightforward operation, involving nothing more than familiarity with records and industry in going through them. Without having recourse to any elaborate process of economic reasoning, by confining our attention to one simple question, namely, what happened, we can establish conclusions of the greatest interest to economic historians and, further, define the problem we have to investigate. We can show, for example: (1) that the Statute of Apprenticeship did not stand alone; it was one of a long series of similar measures, beginning more than two centuries before, which in their turn join on to the municipal and gild regulations of the middle ages; one of an important group of statutes, more or less closely interwoven throughout their history, administered by local authorities whose functions had grown largely in connexion with this legislation and the gradual differentiation of the trades and callings to which it related. (2) That wages were regulated with much greater frequency during the reigns of Elizabeth, James I. and Charles I. than at any later period. (3) That they were regulated in some counties and not in others. (4) That in the counties and towns where they were regulated the action of the magistrates was in general spasmodic, and rarely continuous for a long series of years. (5) That the magistrates used their powers sometimes to raise wages, sometimes to force them down. (6) That the local variations of wages and prices were what we should call excessive, so that the standard of comfort in one district was very different from that of others. (7) That the wages assessments group themselves round certain short periods, coincident in many instances with high prices, increase of poverty, and other causes of exceptional action. (8) That what we may call, with the above limitations, the effective period of the act terminates with the outbreak of the Civil War. (9) That

subsequent to that period organic changes in the industries affected, coupled with the incompetence of parliament to adapt the old

legislation to newconditions, and the growing acceptance of the doctrine of laissez faire, brought about a general disuse of the statute, though isolated attempts to enforce it were made and new acts applicable to certain trades were passed in the 18th century. (10) For more than one hundred years before the repeal of the act, trade unions and other forms of voluntary association amongst wage-earners, combinations amongst em- ployers, collective agreements, customary regulations, were established in many of the important trades of the country. But these conclusions, after all, suggest more difficulties than they remove, for they show that our inquiry, instead of presenting certain well-marked features which can be readily dealt with; has to be split up into a number of highly specialized studies: the investigation of rates of wages, prices and the standard of comfort in different localities, bye-industries, regularity of employment, the organization of particular trades, the economic functions of local authorities, apprenticeship and a host of other subjects. Moreover, all these subjects hang together, so that it seems impossible to come to a decision about one of them without knowing all about the others.

It is a comparatively simple thing to state the question to which we want an answer, but extremely difficult to define the exact nature of the evidence which will constitute a good answer; easy enough to say we must try hypothesis after hypothesis, and test each one by an appeal to the facts, but a man may easily spend his life in this sort of thing and still leave to his descendants nothing more than a legacy of rejected hypotheses. Every volume of records we look through contains a mass of detailed information on the economic life of England in the period we are studying. How much of it is relevant to the subject of inquiry? What is to be the principle of selection? How shall we determine the relative weight and importance of different kinds of relevant evidence? As in modern problems, so in those of past times, a man requires for success qualities quite distinct from those conferred by merely academic training and the use of scientific methods. A correct sense of proportion and the faculty of seizing upon the dominant factors in an historical problem are the result partly of the possession of certain natural gifts in which many individuals and some nations are con- spicuously wanting, partly of general knowledge of the working of the economic and political institutions of the period we are studying, partly of what takes the place of practical experience in relation to modern problems, namely, detailed acquaintance with different kinds of original sources and the historical imagina- tion by which we can realize the life and the ideals of past generations. These qualities are required

all the more because, in order to make any further progress with such an inquiry as we have ‘ suggested, we have deliberately to make use of abstraction as an instrument of investigation.

Let us see how this will work out. Suppose we have selected one of the numerous subsidiary problems suggested by the general inquiry, and obtained such full and complete ne ptaa information about one particular industry that we of a can tabulate the wages of the workers for a long series g f° eral of years. We may do the same for other industries, or ^’ some of them coming under the Statute of Apprenticeship, others not. If all the industries belong to one economic area over which, so far as we can tell from general statistics of wages and prices, and other information, fairly homogeneous conditions prevailed, we may be able to reach some useful conclusions as to the operation of the act. But it would be absurd to suppose that we could reach those conclusions by simple reference to the trades themselves. We cannot assume that the fluctuations in wages were due to the action or inaction of magistrates without the most careful examination of the other influences affecting the trades. In economic affairs the argument post hoc propter hoc never leads to the whole truth, and is frequently quite misleading. We cannot suppose that the policy of the Merchant Adventurers’ Company had nothing to do with the woollen industry; that the export trade in woollen cloth was quite independent of the

foreign exchanges and international trade relations in those times; that the effect on wages of the state of the currency, the influx of new silver, the character of the harvests, and many other influences can be conveniently ignored. In studying, therefore, such an apparently simple question as the effect of an act of parliament on wages in a small group of trades we want a general theory which we can use as a kind of index of the factors we have to consider.

Assuming that we have in our minds this safeguard against loose thinking and neglect of important factors, the investigation DIM- °^ t ^ le s P ec ‘ a l problems arising out of the general

cuttles due inquiry resolves itself into a careful definition of each towaatoi problem we wish to deal with, and the collection, evidence, tabulation and interpretation of the evidence. In most cases the interpretation of the facts is far from obvious, and we have to try several hypotheses before we reach one which will bear the strain of a critical examination in the light of further evidence. But at this stage in historical investiga- tion it is generally the want of evidence of a sufficiently complete and continuous character, rather than difficulties of method, which forces us to leave the problem unsolved. It is, for instance, practically impossible to obtain reliable evidence as to the regularity of employment in any industry in the 17th century, and the best approximations and devices we can invent are very poor substitutes for what we really want. For this reason guess-work must continue to play an important part in economic history. But every genuine attempt to overcome its difficulties brings us into closer touch with the period we are examining; and though we may not be able to throw our conclusions into the form of large generalizations, we shall get to know something of the operation of the forces which determined the economic future of England; understand more clearly than our fore- fathers did, for we have more information than they could command, and a fuller appreciation of the issues, the broad features of English development, and be in a position to judge fairly well of the measures they adopted in their time. By comparing England with other countries we may be able in the distant future to reach conclusions of some generality as to the laws of growth, maturity and decay of industrial nations. But like the early statisticians of the 17 th century, economic historians are the " beginners of an art not yet polished, which time may bring to more perfection."

When we come to exclusively modern questions, there is no reason or necessity for a fundamental change of method. We The laves- cannot suppose that there occurred, at or about the tigstloaof commencement of the 19th century, a breach of modem historical continuity of such a character that in- questloas. s titutions, customs, laws and social conventions were suddenly swept away, the bonds of society loosened, and the state and people of England dissolved into an aggregate of competing individuals. The adoption of machinery gradually revolutionized the methods of production; but in the first instance only certain industries were affected, and those not at the same time or in the same degree; old laws grown obsolete were repealed, but other laws affecting wage-earners and em- ployers took their place, more complicated and elaborate than the Elizabethan code. Trade unions, so far from disappearing, were legalized,

gathered strength from the changes in industrial organization, and nowhere became so powerful as in the most progressive industries; while other forms of combination appeared, incomparably stronger, for good or evil, than those of earlier times. But while we recognize these facts, we must not suppose that we have to study the action of men as though they were all enrolled in organized associations, or covered by stringent laws which were always obeyed. There has never been in the history of English industry such licence as we find in certain directions in the earlier part of the 19th century.

It is not in the decay of combination and monopoly or in the growth of competition that we must look for the distinctive characteristics of modern problems. A 17th-century mono- poly was a very weak and ineffective instrument compared with a modern syndicate; the Statute of Apprenticeship was

certainly not so widely enforced as the " common rules " of trade unions; and many of the regulations of past times, which look so complicated to modern eyes, were conditions of free _. enterprise rather than restraints upon it. It is due distinctive to the influence of the laisser faire doctrine that we features 0/ regard law and regulation as a restraint on liberty. mo ˆ n ' As a maxim for guidance in public affairs, laisser faire ems '

was genuinely relevant at the end of the 18th and the beginning of the 19th century, when the Statute Book was cumbered with vexatious and obsolete laws. As an explanation of what has taken pis™ in later years, or of the actual economic life of the present day, it is ludicrously inadequate. Competition, in the sense in which the word is still used in many economic works, is merely a special case of the struggle for survival, and, from its limitation, does not go far towards explaining the actual working of modern institutions. To buy in the cheapest market and sell in the dearest; to secure cheapness by lowering the expenses of production; to adopt the less expensive rather than the more expensive method of obtaining a given result—these and other maxims are as old as human society. Competition, in the Darwinian sense, is characteristic not only of modern industrial states, but of all living organisms; and in the narrower sense of the " higgling of the market " is found on the Stock Exchange, in the markets of old towns, in medieval fairs and Oriental bazaars. In modern countries it takes myriads of forms, from the sweating of parasitic trades to the organization of scientific research. Economic motives, again, are as varied as the forms of competition, and their development is coeval with that of human society. They have to be interpreted in every age in relation to the state of society, the other*

motives or ideals with which they are associated, the kind of action they inspire, and the means through which they operate. Apparently the same economic motives have led in the same age and in the same nation to monopoly and individual enterprise, protection and free trade, law and anarchy. In our own time they have inspired both the formation of trade combinations and attempts to break them up, hostility to all forms of state interference and a belief in collectivism.

The conditions which are peculiar to the modern world are the large numbers we have to deal with, the vast and fairly homogeneous areas in which justice is administered and property secured, and the enormously increased facilities for transport and communication. These . conditions are of course not independent of each other, and they have brought in their train many consequences, some good and some bad. But they supply the bases for that general theory which, as we have seen, is indispensable in economic investigation. From the standpoint of general theory economic movements assume an impersonal character and economic forces operate like the forces of nature. Although economic motives have become more complex, they have just as much and no more to do with general economic reasoning and analysis than the causes of death with the normal expectation of life, or domestic ideals with the birth-rate. So far as we have anything to do with psychology at all, it is the psychology of crowds and not of individuals which we have to consider. If we study the economy of a village, the idiosyn- crasies of every individual in it are of importance. If the village is replaced by a large area, inhabited by millions, with modern facilities of communication, it is a matter of observation and experience that for the purposes of general reasoning the idiosyn- crasies of individuals may be neglected. Whether such large numbers have the character of the " economic man " of the early economists matters very little. All the assumptions we require are furnished by observation of people in the mass and the larger generalizations of statistics. Thus we can construct a kind of envelope of theory, which, by careful testing as we pro- ceed, can be made to indicate in a general manner the reactions of one part of the activities of the economic world upon the others, and the interdependence of the several parts. From its very nature this general theory can never correspond strictly to the actual life and movement of any given state. It is useful and necessary, and plays somewhat the same part in economic

investigation as ton-mile statistics do in the administration of a railway. To express in any language or to illustrate by any images, from a purely Objective standpoint, the infinitely com- plicated movements of the actual world, is a task far beyond human capacity.

With the aid of this general theory the methods we have sketched in relation to historical problems apply with greater Aoollca- f° rce t0 the special problems of modern times, and are tion ti rewarded with results more accurate, more fruitful, modern more relevant to difficulties which all civilized nations problems, have to face, than those of historical research. To many minds the interest and usefulness of economics depend entirely on the application of these methods, for it is the actual working of economic institutions about which the statesman, the publicist, the business man and the artisan wish to know. Under the conditions we have described, many of the most interesting problems of our own time, when they are once defined, resolve themselves into statistical inquiries. But in most cases such an inquiry cannot be successfully carried out by a mere statistician. Definite economic problems can very rarely be dealt with by merely quantitative methods. In the tabulation and interpretation of statistical evidence, as in its collection, it is scarcely possible to overrate the importance of wide knowledge and experience. There is another very important instrument of investigation which can be used in our own time, but cannot be employed in historical research. Historical documents, however detailed, rarely show all the factors we have to deal with or fully explain a given situation. No sane person would suppose that the minutes of a modern legislative body explain the steps by which legislation has been passed, or the issues really involved. The ostensible cause of a modern labour dispute is frequently not the real or the most important cause. In modern problems we can watch the economic machine actually at work, cross-examine our witnesses, see that delicate interplay of passions and interests which cannot be set down or described in a document, and acquire a certain sense of touch in relation to the questions at issue which manuscripts and records cannot impart. We can therefore substitute sound diagnosis for guess- work more frequently in modern than in historical problems.

What then, it may be asked, becomes of the " old Political Economy" ? Of what possible use are the works of the so-called classical writers, except in relation to the history of economics and the practical influence of theory in past times ? If we take the mere popular view of what is meant by the " old Political Economy," that is, that a generation or so ago economics was comprised in a neatly rounded set of general propositions, universally accepted, which

could be set forth in a Domical text-book and learnt like the multiplication table, it economy." is not incumbent on the present generation to define its attitude at all. In this sense of the words, there was no faith delivered to our fathers which we are under any obligation to guard or even explain. If by the " old Political Economy " we mean the methods and conclusions of certain great writers, who stood head and shoulders above their con- temporaries and determined the general character of economic science, we are still under no obligation to define the attitude of the present generation with regard to them. The fact that Adam Smith, with the meagre materials of the 18th century at his disposal, saw his way to important generalizations which later research has established on a firm basis, may enhance greatly the reputation of Adam Smith, but does not strengthen the generalizations. They stand or fall by the strength of the evidence for or against them. In the history of economics or the biography of Ricardo it is of interest to show that he antici- pated later writers, or that his analysis bears the test of modern criticism; but no economist is under any obligation to defend Ricardo's reputation, nor is the fact that a doctrine is included in his works to be taken as a demonstration of its truth. The appeal to authority cannot be permitted in economics any more than in chemistry, physics or astronomy. But the cases stated above suggest more or less false issues. There has been no revolution in economic science, and is not likely to be any. The

question we have really to determine is how we can make the best use of the accumulated knowledge of past generations, and to do that we must look more closely into the economic science of the 19th century.

Any one who has taken the trouble to trace the history of one of the modern schools of economists, or of any branch of economic science, knows how difficult it is to say when it began. " Antici- pations " of method and doctrine can generally be found by the diligent investigator in the economic literature of his own or a foreign country. So that cross-sections of the stream of economic thought will reveal the existence, at different times, in varying proportions and at different stages of development, of most of the modern " schools." Again, the classification of an economic bibliography at once shows how varied has been the character of economic investigation, ranging from the most abstract speculation on the one hand to almost technical studies of particular trades on the other. . Of the great army of writers who flourished in the first half of the 19th century some were closely identified with the utilitarian school, and the majority were influenced in a greater or less degree by the

prevailing ideas of that school. Others, however, were hostile to it. In many works, such as those of a statistical or historical character" there are frequently to be found passages which could have been written in no other period, but are only of the nature of ejaculations and do not affect the argument. In stating the position of economics during this time we cannot ignore all writers, except these who belonged to one group, however eminent that group may have been, simply because they did not represent the dominant ideas of the period, and exercised no immediate and direct influence on the movement of economic thought. We must include the pioneers of the historical school, the economic historians, the socialists, the statisticians, and others whose contributions to economics are now appreciated, and without whose labours the science as we know it now would have been impossible. If we take this broadly historical view of the progress of economics, it is obvious that even in England there was no general agreement, during the 19th century, as to the methods most appropriate to economic investigation.

Suppose, now, we ignore the writers who were inaugurating new methods, investigating special problems or laboriously collecting facts, and concentrate attention on the dominant school, with its long series of writers from Adam Smith to John Stuart Mill. It is the work of these writers which people have in mind when they speak of the " old Political Economy." There are several quite distinct questions we can ask with regard to them. That they must be studied closely by every one who wishes to follow the history of economics goes without saying. That they must be studied by the economic historian is equally clear, owing to their practical influence and the fact that they furnished the theoretical bases of much of the economic policy of the 19th century. This is true whether their method is good or bad, whether their conclusions are true or false. It is not so easy to determine their relevance and usefulness in relation to distinctively modern problems, or to indicate within what limits their work is of permanent value, and we can only deal with these questions in their more general aspects.

It must be clear to every observer that the economists of the classical period, with the one exception of Adam Smith, will speedily share the fate of nearly all scientific writers. They will be forgotten, and their books will not be read. Adams Smith's Wealth of Nations, it it has ever been, has long ceased to be a scientific text-book. Whether a modern economist accepts his views or not is of no importance. There is probably not a single chapter in the Wealth of Nations which would be thoroughly endorsed by any living economist. But the reputation of the book and its author is quite independent of

considerations of this kind. The Wealth of Nations is one of the great books of the world, many of the sayings of which are likely to be more fre- quently quoted in the future than they have been in the 19th century. Malthus is already an author whose name is probably more widely known than that of any other economist, but whose works are rarely read, and studied only by a small proportion oi

the few people who write books on the history of economic theory. Of economic students, many are unaware of the fact that he wrote any other book than the Essay on the Principle of Population, and what is of permanent importance in that work is contained in the generalization which it suggested to Darwin. Moreover, modern economists, while accepting in the main the •general tenor of Malthus's theory of population, would not agree with his statement of it. Like Malthus, Ricardo owes his reputa- tion very largely to the theory associated with his name, though it has long ceased to be stated precisely in the terms he employed. But there are very few people in the world who have made a careful study of his works; and although his theory of rent has a wide and increasing application in economics, it is not compar- able in general scientific importance with Malthus's theory of population. It is already impossible to take J. S. Mill's Principles of Political Economy as a text-book. Important as it was for thirty or forty years, it will soon.be as little read as M'Culloch's Principles. For the rest of the economists of this period, it is difficult tosee how they can escape oblivion. When the generation whose economic training was based upon J. S. Mill has died out, the relevance of the " old Political Economy " is not likely to be a question of any interest to ordinary educated men and women, or even to the great mass of economic students.

The explanation of this decay of interest does not lie upon the surface. It is frequently supposed that the influence of the " old Political Economy " has been gradually undermined by the attacks of the historical school. But great as the achievements of this school have been, it has not developed any scientific machinery which can take the place of theory in economic investigation. If our view is correct that, broadly speaking, the two ways of regarding economic questions are complementary rather than mutually exclusive, there does not seem to be any reason why the growth of the historical school should have been destructive of the " old Political Economy " if it had been well founded. The use of the historical method has, in

fact, raised more reputations than it has destroyed, because by keeping carefully in view the conditions in which economic works have been written, it has shown that many theories hastily condemned as unsound by o priori critics had much to be said for them at the time when they were propounded. This observation is true not only of old-world writers like the Mercantilists, but also of Ricardian economics. No one is concerned to prove that the Ricardian economics applies to the manorial system, and it is generally supposed at any rate that the world has been approxi- mating more arid more nearly during the last century to the conditions assumed in most of the reasoning of that school. On the principles we have explained, therefore, the Ricardian economics should supply just that body of general theory which is required in the investigation of modern economic problems, and the reputation of at any rate the leading writers should be as great as ever. It would be of immense advantage from a scientific point of view if this could be taken for granted, if for a time the work of the classical economists could be considered final so far as it goes, and for the purposes of investigation re- garded as the theoretical counterpart of the modern industrial system. This assumption, however, has been made quite im- possible, not by the historical school, but by the criticism and analysis of economists in the direct line of the Ricardian succession.

Modern eebnornic- criticism and analysis has destroyed the authority of the " old Political Economy " as a scientific system. The assumptions, the definitions, the reasoning, the conclusions of the classical writers hav e been ruthlessly overhauled. Defects in their arguments have been exposed to view by those who are most concerned to defend their reputation. Writers with none of the prejudices of the historical school, but with the cold and remorseless regard for logic of the purely objective critic, have pointed out serious inconsistencies here, the omission of important factors there, until very little of the " old Political Economy " is left unscathed. In fact, there never was a scientific system at aill. What was mistaken for it was fashioned in the heat of controversy by men whose interests were practical rather than scientific, who could not write correct English, and revealed in

their reasoning the usual fallacies of the merely practical man So the " old Political Economy " lies shattered. It is useless to suppose that this destructive criticism from within can be neutralized by generously sprinkling the pages of the classical writers with interpretation clauses. This may serve to show that the ideals of our youth were not without justification; but the younger generation,

which does not care about our ideals, and looks to the future rather than the past, will not read annotated editions of old books, however eminent their authors. If the Ricardian school of economists had been merely philo- sophers, or even a group like the French physiocrats, this state of things might be regarded with equanimity. We might assume that criticism and analysis had separated the wheat from the chaff in their writings, that everything of permanent value had probably been preserved and incorporated in the works of later economists. But the character of much of their work makes this assumption impossible. It is, in fact, quite true that many of them were more interested in practical aims than in the advancement of economic science. We may talk of the- assumptions implicitly involved in Ricardo's »"}!? works. In reality we do not know what those assump- tioas. tions were; we only know what assumptions we should rflake in order to reach the same conclusions, and they may be very different from " the mind of Ricardo." Ricardo's works, in fact, do not explain a theoretical system, but contain the matured reflections, more or less closely reasoned, of a man of great mental power looking out on the world as it appeared to a business man experienced in affairs. The conclusions of such a work are of wider significance than the assumptions we attribute to the author would warrant. They are not expressed in terms which satisfy our canons of scientific accuracy. Dissected sentence by sentence, the book may be shown to be a mass of inconsistencies. If it has the misfortune to be systematized by an enthusiastic but dull and incompetent disciple, it may appear even absurd. But after all the misinterpretation of contempor- aries and the destructive criticism of later times, the book as a whole leaves upon us an- impression of peculiar strength and charm, and imparts a sense of the relations of things truer; because less mechanical, than the laboured reasoning of smaller men. Such is the character of much of the work of Ricardo and some of his contemporaries. We think that the decay of interest in these writers involves a real loss, and that students of modern problems may do worse than read Ricardo and his school. Some of the criticism of their works, necessary and useful as it has been, will probably be corrected later on by that' breadth of view and sense of proportion which has enabled us to appreciate justly the achievements of lesser men in more remote times. But rehabilitation in accordance with the canons cf historical justice will not restore the lost influence of the Ricardian school. Their achievements in the 10th century will be fully acknowledged, but the relevance of their work to the problems of the 20th century will be admitted less than at the present time.

In a subject like economics it must always be very difficult to decide how far a departure from the traditional form and expression of its main doctrines is necessary or de- economic sirable. No one who is really experienced in economic a con- investigation cares to emphasize the originality, still servaitvt less the revolutionary character of his own work. It scleace – is much more likely than riot that some principle which for the moment seems new, some distinction which we may flatter our- selves has not been observed before, has been pointed out over and over again by previous writers, although, owing to special circumstances, it may not have received the notice it deserved. Economics is therefore, on the whole, an intensely conservative science, in which new truths are cautiously admitted or incorpor- ated merely as extensions or qualifications of those enunciated by previous writers. This procedure has its advantages, but it may easily become dangerous by destroying the influence of the science it is meant to preserve. It is not unlike the procedure of the canonists and casuists of the middle ages with regard to the doctrine of usury, by which the doctrine was to all appear- ances preserved intact while in reality it was stripped of all its

original meaning by innumerable distinctions " over-curious and precise." In the same way the doctrines of the classical economists may be adapted by interpretation clauses and qualifications the exact force of which cannot be tested or ex- plained, so that we do not know whether the original proposition is to be considered substantially correct or not. The result will be that while the doctrines are apparently being brought into closer correspondence with the facts of life, they will in reality be made quite useless for practical purposes or economic in- vestigation. It is easier to point out the danger than to suggest how it should be met. The position we have described is no doubt partly due to the unsettlement of economic opinion and the hostile criticism of old-established doctrines which has characterized the last generation. Or it may be the result of economic agnosticism, combined with unwillingness to cut adrift from old moorings. Whatever the cause, the com- plete restatement of economic theory, which some heroic persons demand, is clearly impossible, except on conditions not likely to be realized in the immediate future. The span of life is limited ; the work requires an extensive knowledge of the economic literature of several countries and the general features of all the important departments

of modern economic activity. In general theory special studies by other men cannot play the same part as they do in historical and statistical work. In historical and statistical investigation, or in special studies of particular sub- jects, it is possible, given the pecuniary means, to organize a whole army of skilled assistants, and with ordinary care to combine the results of their separate efforts. In general theory the inverse rule seems to prevail. There the unity of conception and aim, the firm grip of all the different lines of argument and their relation to each other, which are required, can only be given by a single brain. But no one individual can do original work over the whole field. He is lucky if he can throw new light on a few old propositions. For the rest, he can only, with the utmost caution, adopt the suggestions of other minds as qualifica- tions of old doctrines, never feeling quite sure that he is right in doing so. A complete restatement could only be undertaken by a group of men, trained in much the same conditions, accus- tomed to think and work together, each one engaged on a special department, but all acting under the control of one master-mind. This is largely a question of the organization of economic studies, and it is of the greatest importance that, if possible, such an effort should be made to present in a connected form the best results of modern criticism and analysis.

Economics is unlike many other sciences in the fact that its claim to recognition must be based upon its practical utility, on its relevance to the actual life of the economic rea-nt world, on its ability to unravel the social and economic develop- difficulties of each generation, and to contribute to the meats of progress of nations. The very effectiveness of modern 7hoiy' ,C crlt i c i sm an d analysis,which has brought great gains in almost all branches of economic theory, has made the science more difficult as a subject of ordinary study. The extensions, the changes or the qualifications, of old doctrines, which at any rate in the works of responsible writers are rarely made without good if not always sufficient reason, have modified very considerably the whole science, and weakened the confidence of ordinary educated men in its conclusions. In the case of many subjects this would matter very little, but in that of economics, which touches the ordinary life of the community at so many points, it is of great importance, especially at a time like the present, when economic questions determine the policy of great nations. The " economic man " of the earlier writers, with his aversion from labour and his desire of the present enjoyment of costly indulgences, has been abandoned by their successors, with the result that in the opinion of many good people altruistic sentiment

may be allowed to run wild over the whole domain of economics. The " economic man " has, on the other hand, been succeeded by another creation almost as monstrous, if his lineaments are to be supposed to be those of the ordinary individual — a man, that is, who regulates his life in accordance with Gossen's Law of Satiety, and whose main passion is to

discover a money measure of his motives. It is extremely im- portant to consider how far the economic conceptions based upon this view of the action of men in the ordinary business of life — such, for example, as the doctrine of marginal utility — depend for their truth and relevance on the fact that in economics we are dealing with large aggregates. The earlier writers generally assumed perfect mobility of labour and capital. No economist would deliberately make that assumption now unless he were dealing with some purely theoretical problem, for the solution of which it was legitimate at some stage in the reasoning. Many of the questions of the greatest practical importance at the present time, such as the competition between old and new methods of manufacturing commodities substantially the same in kind, and equally useful to the great body of consumers, arise largely from the immobility of capital or labour, or both of them. But it is obvious that if the assumption of perfect mobility is invalid, there is scarcely any economic doctrine identified with the earlier writers which may not require modification, in what degree it is impossible to say without very careful investigation. Much suggestive work on this subject of a general character is incorporated in economic books of the present day, but there is room for a whole series of careful monographs on a question of such fundamental importance. The same may be said of another subject, too frequently neglected by earlier writers, to which due significance has been given in the best recent work, namely, time in relation to value. It would perhaps be too much to say that the full consideration of this point has revolutionized the theory of value, but it has certainly created what seems almost a new science in close contact with the actual life of the modern world.

Some doctrines of the earlier economists, such as the Wages Fund Theory, are now practically abandoned, though it may be said that they contained a certain amount of truth. Others, which were considered of fundamental importance, owe their position in modern economics and the form in which they are stated to the " tradition of the elders." If they could, by some happy chance, have been left for discovery by modern economists, they would without doubt have received different treatment, to the great advantage of economic science. Such a doctrine is the so-called Law of Diminishing Returns,

which Mill con- sidered ” the most important proposition in Political Economy.” ” Unless this one matter,” he says, ” be thoroughly understood, it is to no purpose proceeding any further in our inquiry.” ” Were the law different, nearly all the phenomena of the pro- duction’ and distribution of wealth would be other than they are.” On the other hand, Thorold Rogers, not to speak of earlier objectors, described the law as a ” dismal and absurd theorem.” The opinions of present-day economists appear to fluctuate between these two extremes. The law may apparently be ” a general rule ” or ” a tendency ” which is liable to be ” checked,” or a particular case of the law of the conservation of energy. If we go to Mill to discover what it is, we find that ” it is not pretended that the law of diminishing return was operative from the beginning of society; and though some political economists may have believed it to come into operation earlier than it does, it begins quite early enough to support the conclusions they founded on it.” ” It comes into operation at a certain and not very advanced stage in the progress of agriculture.” But this very important stage in the history of a nation is not defined or clearly illustrated. We are told that we can see ” the law at work underneath the more superficial agencies on which attention fixes itself “; it ” undergoes temporary suspension,” which may last indefinitely; and ” there is another agency, in habitual antagonism ” to it, namely, ” the progress of civilization,” which may include every kind of human improvement. Mill apparently is not content with the confusion between ” law ” and ” agency ” or ” force,” but opposes the one to the other. He is constantly speaking in terms which imply the conquering of one law by another, a habit from which his successors have not freed themselves; and the theory of natural processes which appears to have satisfied him, was that when two forces come into operation there is a partial or complete suspension of one by the

other. In modern economics ” fertility ” has no very definite meaning. It may mean what is ordinarily understood by the word — climate, rainfall, railway rates or anything else except ” indestructible powers of the soil.” To speak of ” additional labour and capital ” without reference to the kind and quality of the labour and capital, and the manner in which they are employed, organized and directed, throws very little light on agriculture. Every improvement involves, from a quantitative point of view, more or less of capital or of labour, so that it is the ” antagonizing ”

influences, which are nearly all qualitative, which appear to be really important. It is therefore extraordi- narily difficult at present to know what happens, or rather what would happen if it were not prevented, when a country reaches " the stage of diminishing returns "; what precisely it is which comes into operation, for obviously the diminishing returns are the results, not the cause; or how commodities " obey " a law which is always " suspended." Possibly the present generation of English industrial history will furnish many illustrations of the law of diminishing returns. We can only say that it requires investigation and restatement.

Closely related to the law of diminishing returns is the Theory of Rent. No economic doctrine so well illustrates the achieve- ments and the defects of modern economic analysis. Ricardo's statement of the theory left upon the world an impression, not wholly just, of singular clearness. He employed the theory with wonderful success in unravelling the problems of his time. Its importance has not been seriously, or at any rate successfully, called in question. Treated at first as a doctrine peculiarly applicable to land, with a certain controverted relevance to other natural agents, it has been so extended that there is scarcely any subject of economic study in which we may not expect to find adaptations or analogies, so that Ricardo seemed to have discovered the key of economic knowledge. But it was discovered that there were no "indestructible powers of the soil"; that the fertility of land in a country like England is almost entirely the result of improvement M some time or other; that " advan- tage of situation " includes very much more than the words in their literal sense imply; that both " fertility " and " advantage of situation " include many kinds of differential advantage; that in some circumstances rent does not enter into the price of agricultural and other produce, and that in others it does. Moreover, the study of the theory of rent has had a very great influence on all branches of economics by destroying the notion that it is possible to draw sharp lines of distinctionˆ or deal with economic conceptions asjhough they were entirely independent categories. That modern economic analysis is incomparably more accurate than that of, earlier times there can be no question. But the net result of the development of the doctrine of rent is that all problems in which this factor appears, and they embrace the whole range of economic theory, must apparently be treated on their merits. In its modern form the doctrine is far too general to be serviceable without the closest scrutiny of all the facts relating to the particular case to which it is applied. To deal adequately with the numerous extensions or qualifications of these and other doctrines in the hands of modern economists would involve

us in an attempt to do what we have already said is impossible except on conditions not at present realized. It is clear that in the interests of general economic theory we require a vast number of special studies before an adequate restatement can be undertaken.

It must be clearly recognized that the functions of economic science in the present requirements of the world cannot possibly be discharged by treatises on economic theory. The between relations between general theory and special studies general conducted on the lines we have indicated have com- ecoaomlcs pletely changed. General theory never has been, and and in the nature of things never can be, the actual reflex*

studies. of the life and movement of the economic world. It never has been, and never can be, more than an indica- tion of the kind of thing which might be expected in a purely hypothetical world. When the aim of the man of affairs and the hypothesis of the economist was unrestricted competition, and

measures were being adopted to realize it, general theory such as the classical economists provided was perhaps a sufficiently trustworthy guide for practical statesmen and men of business. If only people can be got to believe in them, a few abstract principles are quite enough to destroy an institution which it has taken centuries to create. But a new institution cannot be made on the same terms. The modern industrial system has brought with it an immense variety of practical problems which nations must solve on pain of industrial and commercial ruin. For these problems we want, not a few old-established general principles which no one seriously calls in question, but genuine constructive and organizing capacity, aided by scientific and detailed knowledge of particular institutions, industries and classes. Just as the historical school grew up along with the greatest constructive achievement of the 19th century, namely, the consolidation of Germany, so the application to modern problems of the methods of that school has been called forth by the constructive needs of the present generation. We have already shown how these methods, in their turn, require the aid of general theory, but not of a general theory which tries to do their work. In fact, every attempt to make it do so must in- evitably fail. How can such a huge mass of general propositions as are necessarily included in a system of economics ever be thoroughly tested by an appeal to facts ? If they are not so tested, the general theory will remain a general theory, of no practical use in itself, until the end of time. It they are to be tested, an indefinitely large number of special studies must be made, for which the original materials must be collected and

examined. That is, original investigation of special problems has to be carried out on a more gigantic scale than any economist of the historical school ever dreamt of or the world requires, with the certain knowledge that at the end of it all the general theory will not correspond with the facts of life. For there is all the differ- ence in the world between using a body of general theory as an indication of the factors to be considered in the study of a special problem, and undertaking special studies with a view to testing the general theory. If the necessary limitations of general economic theory are recognized, most of the difficulties we have noticed disappear. Now that the "industrial revolution" has extended practically all over the world, so that we have several countries carrying on production by modern methods, it is easily possible to sketch the main features of industrial and commercial organization at the present time, to describe the banking and currency systems of the principal nations, their means of trans- port and communication, their systems of commercial law and finance, and their commercial policy. It is true that at present very little work of this kind has been done in England, but innumerable books, many of them about England, have been written by thoroughly competent economists, in French, German and other languages. So that no great amount of original work is required for a reliable account of those general features of the modern system which should form the introduction to economics. The general theory which we require should be sketched in firm and clear outline, leaving the detailed qualifications of broad principles to special studies, where they can be dealt with if it is necessary or desirable, and examined by statistical and other tests. For such a general theory there is ample material in the economic literature of all civilized countries. It is of the utmost importance that the economic terms, which are also, though in many cases with an entirely different meaning, the terms of business a&d commerce, should as far as possible be used in their common and ordinary English sense: that they should corre- spond in meaning with the same words when used in description, in law, accountancy and ordinary business. This is no doubt a difficult matter. But some change in this direction is necessary both in the interests of the science itself and of its practical utility. All the materials for investigation, all the facts and figures from which illustrations are drawn, all methods of keeping accounts in England, assume the ordinary English tongue; There are few if any conceptions in economics which cannot be expressed in it without depleting the ordinary vocabulary. At present the language of economics is for the ordinary Englishman

like a foreign language of exceptional difficulty, because he is constantly meeting with words which suggest to his mind a whole world of associations quite different form those with which economic theory has clothed them . The refinements of economic analysis, as distinguished from its broader achievements, should be reserved for special studies, in which a technical scientific terminology, specially devised, can be used without danger of misconception. But in a subject like economics obscurity and an awkward terminology are not marks of scientific merit.

Economic studies should be as relevant to existing needs as those of engineering and other applied sciences. The scientific study of practical problems and difficulties is (generally speaking, and with honourable exceptions) far more advanced in almost every civilized country than it is in England, where the limited scale upon which such work is carried on, the indifference of statesmen, officials and business men, and the incapacity of the public to understand the close relation between scientific study and practical success, contrast very unfavourably with the state of affairs in Germany or the United States. The backwardness of economic science has been an index of the danger threatening the industrial and commercial supremacy of the United Kingdom. There are very few questions of public or commercial importance upon which the best and most recent investigations are to be found amongst English works. This would matter very little, perhaps, if Englishmen had a firm belief, established by actual experience, in the soundness of their policy, the present security of their position, and the sufficiency of their methods to strengthen or maintain it. But this is very far from being the case. If we take, for example, the corner-stone of the British commercial system in the 19th century, namely, the policy of “free trade ” (q.v.), the public do not now read the economic works which supplied the theoretical basis of that policy, and, indeed, would Economic not be convinced by them. The great men of the period, problems Cobden and Bright, are merely historical figures. r »T” Long before his death, Bright’s references in public

speeches to the achievements of the Anti-Corn Law League were received with respectful impatience, and Peel’s famous speech on the repeal of the corn laws would not convince the German Reichstag or a modern House of Commons. The result is that free trade had become by the end of the 19th century in the main an old habit, for which the ordinary English manu- facturer could give no very reasonable explanation, whatever may be its influence in commerce

and public affairs. The doctrine of free trade only prevailed in so far as it could be restated in terms which had a direct relevance to the existing position of England and existing conditions of international trade. And it was directly challenged by the representatives of Mr Chamberlain's school of Imperialist thought (see Chamberlain, Joseph). It thus became the work of economic science ruthlessly to analyse the existing situation, explain the issues involved in the commercial policy of different countries, and point out the alternative methods of dealing with present difficulties, with their probable results.

The commercial policy of a state is merely the reflex of its system of public finance (see ^.English Finance). The absence of conviction in regard to British commercial policy naturally had its counterpart in the attitude of many men to the financial system of the country. The eulogies showered upon it in the past were no longer considered adequate. The great increase in recent years in British military and naval expenditure, made necessary by the exceptional demands of a state of war and the great development of foreign powers, was partly responsible for the new difficulties; partly it was due to the great extension of the functions of the state during the latter part of the 19th century. Theformercausesmay beconsidered partly permanent, partly temporary; but those of a permanent character are likely to increase in force, and those of a temporary character will leave

a deposit in the shape of an addition to the normal and”’’’’’ expenditure of the central government. The extension finance. of government functions appeared much more likely*

to continue than to be checked. Normal expenditure might therefore be calculated to rise rather than fall. In spite of the vast increase in national wealth, it was found a matter of

increasing difficulty to meet a comparatively slight strain with- out recourse to measures of a highly controversial character; and the search for new sources of revenue (as in 1909) at once raised, in an acute form, questions of national commercial policy and the relations between the United Kingdom and the colonies.

The development of the powers of the central government has been less than that of the functions of local governing authorities. This, again, is a movement much more likely to extend than to be checked. Local governing authorities now discharge economic functions of enormous importance and complexity, involving sums of money larger than sufficed to run important states a generation ago. The

scientific study of the economics of local administration is, however, in its infancy, and requires to be taken up in earnest by economists. These questions of com- mercial policy and local government are closely bound up with the scientific study of the transport system. Although the British Empire contains within itself every known species of railway enterprise, the study of railways and other means of transport, and their relation to the business, the commerce and the social life of the country, is deplorably backward. It is obvious that no inquiry into commercial policy, or into such social questions as the housing of the poor, can be effective unless this deficiency is remedied.

The whole social and political fabric of the British Empire depends upon the efficiency of its industrial system. On this subject many monographs and larger works have been pub- lished in recent years, but dealing rather with such questions as trade unionism, co-operation and factory legislation, than the structure and organization of particular industries, or the causes and the results of the formation of the great combinations, peculiarly characteristic of the United States, but not wanting in England, which are amongst the most striking economic phenomena of modern times.

These are some of the questions which must absorb the energies of the rising generation of economists. The claim of economics for recognition as a science and as a subject of study must be based on its relevance to the actual life of the economic world, on its ability to unravel the practical difficulties of each genera- tion, and so contribute to the progress of nations.

Literature. — See also Free Trade; Protection; Tariff; Commercial Treaties; Trusts; Money; Finance; &c. The bibliography of economics as a whole would include a history of all the writers 011 the subject, and is beyond our scope here; see the numerous articles on economic subjects throughout this work. The article by Dr J. K. Ingram in the ninth edition of the Encyclo- paedia Britannica is still a valuable historical account. It is only possible to mention here a few of the more recent text-books. The most important general work published in English is Marshall's Principles of Economics, vol. i. (ist edition, 1890; 4th edition, 1898). J. Shield Nicholson's Principles of Political Economy (3 vols.) not only gives a survey of economic principles since Mill's time, but contains much suggestive and original work. The writer of this article is much indebted to the works of Schmoller, particularly his Grundris der allgemeinen Volkswirtschaftslehre (1900), and Adolph Wagner, particularly his Grundlegung der politischen Okonomie. On the history of economic theory, Cannan's

History of the Theories of Production and Distribution (1776-1848) is an admirable criticism, from a purely objective standpoint, of the works of the English classical writers. The most important English works published in recent years on general English economic history are W. Cunning- ham's Growth of Industry and Commerce, and W. J. Ashley's Economic History, while Vinogradoff 's Villenage in England and The Growth of the Manor, as well as Maitland's Domesday Studies, are of great importance to the student of early economic institutions. D'Avenel's Histoire economique de la propriete, &c. (1200-1800), is a monu- mental work on the history of prices in France. Other books dealing with special subjects are likely to take a very high place in economic literature. We may mention particularly Charles Booth's Life and Labour of the People in London, B. S. Rowntree's Poverty, Sidney and Beatrice Webb's History of Trade Unionism and Industrial Democracy, and Dr Arthur Shadwell's Industrial Efficiency (1906). These books are generally regarded as typical of the best English work of recent years in economic investigation. We may also mention Schloss's Methods of Industrial Remuneration, a most im- portant contribution to the study of the wages question; C. F. Bastable's works on International Trade and Public Finance; George Clare on the Money Market and the Foreign Exchanges; and A. T. Hadley's Economics: An Account of the Relations between Private Property and Public Welfare (1896). Studies of particular questions, both concrete and theoretical, in foreign languages are too numerous

to specify, and much of the best modern work is to be found in economic periodicals. (W. A. S. H.)

ECONOMY, a township and, a village of Beaver county, Pennsylvania, U.S.A., on the E. bank of the Ohio river, 17 m. N.W. of Pittsburg. Pop. of township (1000) 1062; (1910) 860. The village is served by the Pennsylvania system. It was owned until 1904, when it was sold to a land company, by the Harmony Society (see Communism), commonly called the Economites, Harmonists or Rappists. The founder, George Rapp, after living with his would-be primitive Christian followers at Harmony, Butler county, Pennsylvania, in 1803-1814, and in 1815-1824 in New Harmony (q.v.), Indiana, which he then sold to Robert Owen, settled here in 1824 and rapidly built up a village, in which each family received a house and garden. The culture of silk, flax, grapes (for wine-making)

and fruits and cereals in general, and the manufacture of flour and of woollen, flannel and cotton fabrics, were carried on under a rule requiring every adult to labour 12 or 14 hours each day in field or mill. Celibacy had been adopted in 1807 as the rule of the community. New members were received after a half-year's probation, and members wno left received their original investment. Three hundred thus separated from Rapp in 1833, with $105,000 as their share of the communal property, to build the millennial kingdom of New Jerusalem at Phillipsburg (now Monaca), Beaver county, Pennsylvania, under the lead of Bernhard Miiller, who had come to Economy in 1831 as a fellow religionist, and was called Count Maximilian de Leon (or Proli); in 1833 Leon went, with his followers, to Louisiana, and established a religious colony 6 m. from Natchitoches. After his death his wife until 187 1 was head of a similar community at Germantown in Webster parish. The Harmonists at Economy flourished under the rule of a tradesman, R. L. Baker, or Romelius Langenbacher, after the death of Rapp in 1847, and during the Civil War had about $500,000 buried away. Their numbers were for a time kept up by the addition of fresh converts, but the employes who ■ were not Harmonists soon greatly outnumbered the members of the community, the basis of which was always religious. Baker died in 1868, and his successor, John Henrici, in 1802, when John S. Duss became first trustee. In 1907 there were only two' or three members in the society. In 185 1 the township of Harmony was set apart from Economy.

See Morris Hillquit, History of Socialism in the United States (New York, 1903); William A. Hinds, American Communities (revised edition, Chicago, 1902); John L. Bole, The Harmony Society (Philadelphia, 1904); Charles Nordhoff, The Communistic Societies 'of the United States (New York, 1875); and among several excellent monographs in German, Karl Knortz, Die christlich- kommunistische Kolonie der Rappisten (Leipzig, 1892), and J. Hanno Deiler, Eine vergessene deutsche Colonie: eine Stimme zur Ver- Uidigung des Grafen de Leon (New Orleans, 1900).

ECONOMY, a word ranging in application from the careful thrift of an individual to the systematic arrangement of an organization. It is derived from the Gr. oiKovofxla, the manage- ment (v&neiv, to control) of an oZkos or house, extended in meaning to the administration of a state. Of its original sense, the art or science of managing a household, the expression " domestic economy " survives, but the principal use in this sense is confined to the thrifty management of the financial resources of a household or of an individual. It is thus used as equivalent to " saving," not only of

money, but of time, labour or effort, and, generally, of the least expenditure of means to attain a required end. It is on the principle of " economy " that many phonetic changes occur in the development of languages, and, in aesthetics, the name has been applied to a principle or law that effects are pleasant in proportion to the smallness of the effort made, and of the means taken to produce the result. The phrase " economy of truth " is due to an in- vidious application of the use, in patristic theology, of the word olnovopXa for the careful presentation of such doctrine as would be applicable to the hearer (see J. H. Newman, History of the Arians of the 4th Century). " Economy " is also used in theology in such expressions as " Mosaic " or " Christian economy " as a synonym of " dispensation," for the administration of the world

by God at particular times or for particular races. From the meaning of organization or administration of a house or state the word is applied more widely to the ordered arrangement of any organized body, and is equivalent almost to "system"; thus the " economy " of nature or of animal or plant life may be spoken of. The most common use, however, of the word is that of " political economy," the science dealing with the production, distribution and consumption of wealth (see Economics).

ECSTASY (Gr. hccrains, from e£urn7/xi, put out of its place, alter), a term applied to a morbid mental condition, in which the mind is entirely absorbed in the contemplation of one dominant idea or object, and loses for the time its normal self- control. With this there is commonly associated the prevalence of some strong emotion, which manifests itself in various ways, and with varying degrees of intensity. This state resembles in many points that of catalepsy (q.v.), but differs from it sufficiently to constitute it a separate affection. The patient in ecstasy may lie in a fixed position like the cataleptic, apparently quite un- conscious, yet, on awaking, there is a distinct recollection of visions perceived during this period. More frequently there is violent emotional excitement which may find expression in impassioned utterances, and in extravagant bodily movements and gesticulations. Ecstasy usually presents itself as a kind of temporary religious insanity, and has frequently appeared as an epidemic. It is well illustrated in the celebrated examples of the dancing epidemics of Germany and Italy in the middle ages, and the Convulsionnaires of St Medard at the grave of the Abbe Paris in the early part of the 18th century, and in more recent times has been witnessed during periods of religious revivalism. (See also Insanity and Neuropathology.)

ECTOSPORA, a homogeneous and natural division of Protozoan parasites included under the Sporozoa; they comprise the three orders, Gregarines, Coccidia and Haemosporidia. The defining character of the Ectospora is that the spore-mother-cells (sporo-blasts) are formed at the periphery of the parent-individual (sporont) ; we may, however, go further, and say that the forma- tion of all the different reproductive elements is uniformly peripheral or exogenous. Two other very general features are (a) that the individual trophozoite is uninuclear, and (b) that growth and trophic activity are finished before the multiplicative or reproductive phase sets in.

There is now little doubt that the Ectospora possess a flagellate ancestry. The principal facts in favour of this view are as follows: the actual ontogenetic connexion known to exist between certain Haemoflagellates and certain Haemosporidia (see Try- panosomes) ; the possession by many Coccidia of biflagellar microgametes (male elements), whose general structure greatly resembles that of a Heteromastigine Flagellate; the possession by various parasitic Flagellates (e.g. Herpetomonas) of an attached, resting phase, when the parasites become gregariniform, which strongly suggests the attached phase of many young, growing Gregarines; the typical gregarinoid and euglenoid movements of Gregarines and of the germs or other stages of Coccidia and Haemosporidia, which are quite comparable with the contractile and metabolic movements of Flagellates; and, lastly, the exogenous type of reproduction, which is easily derivable from the multiple division of certain Haemoflagellates, and this, in turn, from the typical binary longitudinal fission of a Flagellate.

ECUADOR (officially La Republica del Ecuador), a republic of South America, bounded N. and N.E. by Colombia, S.E. and S. by Peru, and W. by the Pacific Ocean. Its boundary lines with Colombia and Peru were in 1909 still un- frf"" settled, large areas of territory being claimed by all three republics. Under an agreement of the 15th of December 1894, the disputes were to be decided by the Spanish sovereign as arbitrator, but nothing was accomplished. On the 5th of November 1904, Colombia and Ecuador agreed to submit their dispute to the German emperor, and a convention of the 12th of September 1905 between Colombia and Peru established a modus vivendi for the settlement' of their conflicting claims, in which Ecuador is likewise interested. The maps of Ecuador, which are very defective, usually describe its territory as*

extending eastward to the Brazilian frontier, but as Peru is in actual occupation of the region east of Huiririma-chico, on the Napo river, 3§ degrees west of that frontier, those maps cannot be considered correct. The Trans-Andine territory occupied by Ecuador is a wedge-shaped area between the Coca and Napo,

the provisional boundary line with Colombia, and a line running nearly west-south-west from Huiririma-chico (about lat. 2° 50′ S., long. 73 20′ W.) to a point on the Santiago river in about lat. 4 12′ S., long. 78 W., which forms the provisional boundary with Peru. The eastern part of this territory is also claimed by Peru, which would have the effect, if allowed, of restricting Ecuador to a comparatively small area covered by the Andes and western Cordillera and the narrow plain on the Pacific coast. From the Santiago river, a western affluent of the Maranon, the boundary line runs south-west and west across the Andes to the head waters of the Macara, down that stream to the Chira, or Achira,whose channel marks the frontier down to about 8o° 1 7′ W., where a small stream (the Rio Alamo) enters from the north. The line then runs almost due north to the south shore of the Gulf of Guayaquil, following the western water parting of the lower Tumbez valley. A small district in the valley of the Chira is claimed by Peru. The northern boundary line is described elsewhere (see Colombia). A small section of this line terminat- ing on the Pacific coast is also in dispute, Ecuador claiming the main channel of the Mira as the dividing line, and Colombia claiming a small district south of that channel, the line running due west from the mouth of the most southern outlet of the Mira opening into Panguapi Bay, to a point of intersection with that river.

Physical Geography. — The surface of Ecuador may be divided into three distinct regions : the Cis-Andine lying between the Western Cordillera and the coast; the Inter-Andine, which includes the two great mountain chains crossing the republic with the elevated plateau lying between; and the Trans-Andine, lying east of the Andes in the great Amazon valley. The first part consists of an alluvial, low-lying plain formed in great part by the detritus brought down by the mountain streams. It is irregular in form and is broken by isolated elevations and spurs from the Cordillera. Large areas are still subject to annual inundations in the rainy season, and the lower river courses are bordered with swamps. This is the most fertile and productive part of Ecuador, especially on the higher lands near the Cordillera. The Trans-Andine region is similar to the neighbour- ing

territories of the upper Amazon basin occupied by Colombia, Brazil and Peru — a great forest-covered plain descending gently toward the east, broken on its western margin by short spurs from

the Andes enclosing highly fertile valleys, and by low, isolated ranges between the larger river courses, and traversed by large rivers flowing into the Napo and Maranon. This region has been only partially explored, and but little is known of the large areas lying between the navigable rivers.

The Inter-Andine or plateau region lies in and between the two

great mountain chains which cross the

greater part of the republic „

between and almost parallel Moun- with the 78th and 79th M s ‘ meridians. The eastern chain is known as the Andes of Ecuador, or the Cor- dillera Oriental, and the western as the Cordillera Occidental (Western Cor- dillera). Starting from the confused grouping on the southern frontier of the two great chains and some trans- verse ranges, they run nearly north by east to the Colombian frontier where another ” knot ” or junction occurs. The summits of the western range form a line of noteworthy regularity, but those of the eastern form a broken irregular line of varying distances from the first. The elevated plateau be- tween the two great chains, which is about 300 m. long and 20 to 30 m. wide, is divided into three great shallow basins or plains by the transverse ridges or paramos of Tiupullo and Azuay. These are known as the Quito, Ambato and Cuenca basins. South of the latter is the irregular and deeply broken Loja basin, which can hardly be considered a part of the great Ecuador plateau. The three great basins, which are broken and subdivided by mountainous spurs and ridges, descend gradually toward the south, the Quito plain having an average elevation of 9500 ft. above the sea, Ambato 8500, and Cuenca 7800. They are also characterized by the in- creasing aridity of the plateau from north to south, the Quito plain being fertile and well covered with vegetation, and the Ambato and Cuenca plains being barren and desolate except in some favoured localities. The volcanic character of the region is likewise responsible for large areas of barren surfaces. Rising from this elevated plateau, along its eastern and western margins, are the Cordilleras with their principal summits culminating far above the line of perpetual snow, which in this region isabout 15,750 ft. above the sea. These summits are remarkable, not only for their great height, but also for their apparent symmetrical

*arrangement in parallel Knes, sometimes in pairs facing each other across this Cyclopean passage. Nowhere in the world can there be found another such assemblage of snow-clad peaks, several of which are active volcanoes. There are 22 of them grouped around these central plains almost within sight of each other. The western chain has the distinction of having the highest summit, the eastern the greatest number of high summits and the highest average elevation. From the time of Humboldt's visit to this re- markable region down to the present time there have been many diverse calculations of the height of these peaks, but with a con- siderable variation. It is estimated that there was a considerable decrease in the elevation of this part of the Andes during the past century, Quito having sunk 26 ft. in 122 years, Pichincha 218 ft. in the same time, and the farm of Antisana, where Humboldt resided for a time, 165 ft. in 64 years. At the same time Cotopaxi and Sangay, the two active volcanoes, have actually increased in elevation since the measurement of La Condamine in 1742. These changes in elevation, if correct, are due to seismic disturbances, a cause that may be partially responsible for the varying computations * of the heights of these well-known peaks. Among modern investi- gatorsareW. Reissand A. Stiibel (i87i-i873),and Edward Whymper (1880), whose measurements of the principal summits were: —*

Effigry Wallter sc

Eastern Cordillera.

Western Cordillera.

Cayambe . (W.) Sara-Urcu . ,, Antisana . ,, Sincholagua . (R. & S.) Ruminagui . ,, Cotopaxi . (W.) Tunguragua . (R. & S.) Altar (Capac-

Urcu) . Sangay . ,,

Ft.

19,186 15.502 19,335 16,365 15,607 19.613 16,690

17.730 17,464

Cotocachi . (W.) Mojanda . (R. & S.) Pichincha . (W.) Atacatzo . (R. & S.) El Corazon

(Chamalari). (W.) Iliniza . . (R. & S.) Carahuairazo. (W.)

Chimborazo . ,,

Ft.

16,301 14,088

I5,9l8

14,892

15,871 17,405 16,515 20,498

912

ECUADOR

The Imbabura volcano, celebrated for its destructive eruptions of mud and water, stands midway between the two ranges at the northern end of the plateau, and belongs to the transverse ridge of knot (nudo) which unites them. It is the most northern of the higher peaks of Ecuador, with the exception of Cotocachi, and possibly of Chiles on the Colombian frontier, and reaches the elevation of f 5,033 ft. Ibarra on the northern flanks of the volcano has suffered severely from its eruptions. The name is derived from imba, fish, and bura, mother, and is said to have originated from the quantities of a fish called " prefladilla " (Pimelodus cyclopum) discharged from its crater during one of its eruptions — a phenomenon which, after a searching investigation, was discredited by Wagner. Cayambe, or Cayembi, the second highest peak of the Ecuadorean Andes, has the noteworthy distinction of standing very nearly on the equator. Its base covers a large area, and its square top, rising far above the snow-line, is one of the sights of Quito. Antisana is crowned with a double dome, and is described as an extinct volcano, though Humboldt saw smoke issuing from it in 1802. On its western side is the famous hacienda (farm) of Antisana, 13,306 ft. above the sea, where Humboldt resided for several months in 1802. Sara-Urcu stands south-east of Antisana in a densely forested region, drenched with rain and only slightly explored. Sincholagua and Rumifiagui are the next two peaks, going southward, and then the unrivalled cone of Cotopaxi (q.v.) — the highest active volcano in the world — from whose summit smoke curls upward unceasingly.

Llanganati or Cerro Hermoso is chiefly known through the tradition that the treasures of the Incas were buried in a lake on its slopes. It consists of a group of summits, the highest being credited with 17,843 ft. Tunguragua, or Tungurahua, has a cone-shaped summit

like that of Cotopaxi, with a slope of 38 °. It rises from a plain somewhat lower than the neighbouring central plateau and stands free from the surrounding elevations, except on the south, which give it an exceptionally imposing appearance. Among its characteristic features is a cataract fed by melting snows, which descends 1500 ft. in three leaps, and an enormous basaltic lava-stream, which crosses the face of the mountain in a north-easterly direction. Its most notable eruption was in 1777. It has been sometimes classed among the extinct volcanoes, but smoke has been seen issuing from it at different dates, and a violent eruption occurred on January 12, 1886. The fertile cultivated valley of Bafios, with its thermal springs, lies at the base of Tunguragua, which F. Hassaurek describes as " the most beautiful of all the snow peaks in the country." The next in line is El Altar, which the natives call Capac-Urcu (" king mountain "), whose broken cone and impressive outlines make it one of the most attractive mountains of Ecuador. Its summit comprises a group of eight snow-clad peaks, and its crater is surrounded by a steep and jagged wall of rocks. There is a tradition that this moun- tain was once higher than Chimborazo, but a series of eruptions caused the cone to fall in and reduced its summit to its present altitude and broken appearance. Altar has shown no signs of activity since the discovery of America. Sangay, or Sangai, the next and last large volcano to the south, is in a state of frequent eruption, however, and is known as one of the most restless volcanoes of the world. Since the Spanish conquest it has been in a state of un- interrupted activity, but no damage has been done, because there are no civilized settlements in its immediate vicinity. Though of great interest to scientific investigators because of this unceasing activity, and of its peculiar position in the Andean system, and because of the difficult and dangerous country by which it is surrounded, Sangay has been but rarely visited by European travellers. Its eruptions are not on a grand scale, but small outbursts of lava and explosions of steam occur at frequent intervals, and at longer intervals more violent explosions in which the molten rock is thrown 2000 ft. above its summit, and ashes are carried away as far as the streets of Guayaquil.

Turning to the Cordillera Occidental and taking the principal peaks in order from south to north, the first to claim attention is Chimborazo (from Chimpu-raza, " mountain of snow "), the highest summit of Ecuador, and once believed to be the culminating point of the Andes. Humboldt, who unsuccessfully attempted its ascent 'in 1802, gives its elevation as 21,425 ft., Reiss and Stiibel as 20,703, and Whymper as 20,498. It stands 76 m. north-east of Guayaquil,

and, according to Spruce, rises majestically from the valley of the Guayas, on the west, without a " positive break from the summit down to the plain." This, however, is erroneous, for Whymper located a detached range running parallel with the Cordillera on the west, for a distance of 65 m. with the Chimbo valley between them. The magnificence of its mass is imposing from almost any point of view, but it can be most fully appreciated from its western or Pacific side, where its base is covered with forest up to the snow-line, above which its pure white cone rises another 5000 ft. An un- obstructed view of the great mountain is rarely obtained, however, because of the mists and clouds which cover its cone. Its summits were reached for the first time in 1880 by Edward Whymper, all previous attempts having failed. It is considered to be an extinct volcano because it makes the plumb-line deviate only 7" to 8", from which it is deduced that the mountain is hollow. Moreover, the calcined matter resembling white sand which covers its sides below the snow-line, extensive beds of lava, and the issue of streams of hot water from its northern side, seem to confirm the deduction that

Chimborazo is an extinct volcano. Immediately north of Chimbo-razo, and separated from it by only a narrow valley, are the lower triple summits of Carahuairazo, or Carguairazo (which the natives call Chimborazo-embra, " Chimborazo's wife "), whose hollow cone collapsed in 1698 during a great earthquake, and left the jagged rim which adds so much to its present picturesque appearance. Mr Whymper's measurement is for the middle peak. Quirotoa, still farther north, is supposed to have suffered a similar catastrophe. Its hollow summit, 13,510 ft. above sea-level, now contains a large lake. Iliniza, which stands west by north of Cotopaxi, has two pyramidal peaks, and is one of the most interesting mountains of the Ecuadorean group. It stands at the western end of the Tiupullo ridge, and overlooks the Quito basin to the north-east. The French academician Bouger, who was chief of the scientific commission sent to Ecuador in 1736 to measure a degree of the meridian on the equator, made a trigonometrical measurement of Iliniza, and Wagner ascended to within 800 ft. of its summit in 1859. The geological structure of the mountain furnishes no evidence of volcanic activity. Chamalari, which the Spaniards called El Corazon from its heart- shaped appearance, is similarly destitute of a crater. It overlooks the Quito basin and has been ascended many times. Among the earlier explorers to reach its summit were Bouger and La Condamine, Humboldt and Bonpland, and Jos6 Caldas, the Granadian naturalist. Atacatzo is an extinct volcano, with nothing noteworthy in its appearance and history. Pichincha, its famous

neighbour, is apparently of later origin, according to Wagner, and of slightly lower elevation. Perhaps no Ecuadorean volcano is better known than Pichincha, the " boiling mountain," because of its destructive eruptions and its proximity to the city of Quito. Its summit com- prises three groups of rocky peaks, of which the most westerly, Rucu-Pichincha (Old Pichincha), contains the crater, a funnel- shaped basin 2460 ft. deep and about 1500 ft. wide at the bottom, whose walls in places rise perpendicularly and in others at an angle of 20 . The exterior of the cone has an angle of 30 °. Bouger and La Condamine were the first to reach its brink in 1 742, after which Humboldt made the ascent in 1802, Boussingault and Hall in 1831, Garcia Moreno and Sebastian Wisse in 1844 an d 1845 (descending into the crater for the first time), Garcia Moreno and Jameson in 1857, Farrand and Hassaurek in 1862, Orton in 1867, and Whymper in 1880. Farrand spent more than a week in the crater trying to get some good photographic views, and Orton has given a graphic description of his experiences in the same place. He found that the real cone of eruption was an irregular heap 250 ft. in height and 800 ft. in diameter, containing about 70 vents. The temperature of the vapour within the fumarole was 184 , and water boiled at 189 . There have been five eruptions of Pichincha since the Spanish conquest — in 1539, 1566, 1575, 1587 and 1660. The second covered Quito 3 ft. deep with ashes and stones, but the last three were con- sidered as the most destructive to that city. The last happily broke down the western side of the crater, which, it is believed, will ensure the city against harm in any subsequent eruption. Since the earth- quake of August 1867 Pichincha has sent forth dense masses of black smoke and great quantities of fine sand. Cotocachi is a double- peaked mountain, rising from an extremely rough country, It was ascended by Whymper in 1880. All the higher summits of Ecuador have true glaciers, the largest being found on Antisana, Cayambe and Chimborazo. Whymper located and named no less than eleven on Chimborazo, and counted twelve on Cayambe.

There are two distinct hydrographic systems in Ecuador — the streams that flow south-eastward to the Marafion, or Amazon, and those which flow westward to the Pacific. The southern Rivers part of the great central plateau is arid and has a very light rainfall; it has no streams, therefore, except from melting snows, and the higher elevations which receive the impact of the easterly winds. Farther north the rainfall becomes heavier, the plateau is covered with vegetation, and a considerable number of small rivers flow westward through the Cordillera to the Pacific. The Eastern Cordillera, or Andes, forms the water-parting between the two systems. The largest

of the eastward-flowing rivers is the Napo, which rises in the eastern defiles of Cotopaxi and Sincholagua — the principal source being the Rio del Valle, which traverses the Valle Vicioso. It at first flows south by east, and at the village of Napo is 1450 ft. above sea-level, at the mouth of the Coca 858 ft., at the mouth of the Aguarico 586 ft., 500 at the mouth of the Curaray, and 385 at its junction with the Marafion. Orton estimates its current at Napo in the month of November as 6 m. an hour; in the next 80 m. the river falls 350 ft. and produces a fine series of rapids; and from Santa Rosa downwards the rate is not less than 4 m. an hour. Its breadth at Napo is only 120 ft., but at Coca it has widened to 1500 ft., and at its mouth to nearly 1 m. Like most of the large Amazon tributaries, its discharge into the Marafion is through several distinct channels. The Napo is navigable for steam- boats for some distance above the mouth of the Coca, and thence for canoes as far as the Cando cataract, 3332 ft. above the sea. Its total length is 920 m. The principal tributaries of the Napo are the Coca and Aguarico from the north, and the Curaray from the south. The Coca rises on the eastern slopes of the Andes near Cayambe and the Guamani range, and flows eastward near the equator to San Rafael (about 76° 30'W. long.), where it turns sharply southward to a junction with the Napo inabout lat. i° S., long. 76° W. Th«

Coca forms the provisional boundary line between Ecuador and Colombia from its source to the Napo. The Aguarico also rises on the eastern slopes of the Andes north of Cayambe and flows south-eastward to a junction with the Napo in about long. 75 W., its length being roughly estimated at 420 m. Little is known of its course, or of the country through which it flows, which is provision- ally occupied by Colombia. The Curaray has its sources in the denies of the Cerros de Llanganati, and flows south-eastward to the Napo, its length being estimated at 490 m. Its lower course is sluggish, where its waters are made unpalatable by a reddish slime. The Napo and its tributaries are celebrated in the early history of South America as the route by which Gonzalo Pizarro and Orellana first reached the Amazon, and it was afterwards the principal route by which the early expeditions across the continent a,t this point connected the Andean Plateau with the Amazon. The other rivers which flow through the Oriente territory of Ecuador into the Marafion are the Tigre, Pastaza, Morona and Santiago. The Tigre, of which little was known until a recent date, is formed by the confluence of the Cunambo and

Huiviyacu, whose sources are on the eastern slopes of the Andes near those of the Curaray. Its length below this confluence is 416 m., into which are received 109 tributaries, the largest of which are the Pucacuro and Corrientes. The Tigre is navigable at all stages up to the Cunambo confluence, and promises to afford one of the most valuable river routes in Ecuador. It enters the Marafion very near the 74th meridian. The Pastaza, or Pastassa, unlike the rivers already described, has its source on the central plateau west of the principal chain of the Andes, within the shadow of Cotopaxi, and breaks through the Cordillera to the north of Tunguragua. After flowing southward along the base of the high Andes for a short distance and receiving a number of torrents from the snowclad heights, it turns south-eastward across the plain and enters the Marafion about 70 m. above the mouth of the Huallaga. The stream is known as the Patate down to its junction with the Chambo, near Bafios, and is not called Pastaza until the Agoyan falls are passed. It was navigated by Don Pedro Maldonado as early as 1741, and is navigable for steamboats of 2 to 4 ft. draft up to the mouth of the Huasaga (about 124 m.) in times of high water, and for canoes nearly 200 m. farther. The Pastaza, however, is subject to irresistible floods caused by the sudden rising of the mountain torrents on its upper course, especially the Toro, which sweep down with such fury that navigation on the river is practically impossible. The shallowness of the lower stream, where the current is sluggish, is probably due to the great quantities of silt brought down by these floods. Many of the rivers of eastern Ecuador are subject to similar floods from the Andean slopes, which have cut away broad, deep channels, through the adjacent plains, leaving long, narrow ridges between their courses which the natives call cuchillas. The Morona is formed by the confluence of the Manhuasisa and Cangaima about 310 m. above its mouth, and is freely navigable for small steamboats to that point. The two confluents just men- tioned have their sources in the Andes, and flow for some distance across the plain before uniting to form the Morona. Both are navigable for considerable distances. The Morona follows a very tortuous course before entering the Marafion, at long. 70 W., and receives a large number of affluents, one of which serves as the outlet for Lake Rimachuma, in Peruvian territory. Very little is definitely known of the affluents of the Morona, Pastaza and Tigre, as the territory through which they run has been but slightly ex- plored. The Santiago, which enters the Marafion near the Pongo de Manseriche, is formed by the confluence of the Paute, which rises in the province of Azuay, and the Zamora, which has its source among the mountains of Loja. According to Alexander Garland (Peru in 1906), the rivers of eastern Ecuador are navigable at low water for

steamers of 2 to 4 ft. draft for an aggregate distance of 1503 m., as follows: —

Miles. Napo, to the mouth of the Aguarico 559

Curaray, up to Canonaco 286

Tigre, up to Cunambo-Huiviyacu confluence . . 416

Pastaza 31

Morona, up to the Rarayacu 211

These same rivers are navigable at high water for steamers of 19ˆ ft. draft for an aggregate distance of 1330 m., including 68 m. of the Aguarico, and for steamers of 2 to 4 ft. draft for an additional 733 m. The last aggregate includes an extension of 93 m. on the Pastaza, 99 on the Morona, 186 on the Napo, and the balance on the Manhuasisa, Cangaima, Pucacuro, Corrientes, Cunambo and Huiviyacu.

On the western versant of the Andes of Ecuador there are three river systems of considerable size — the Mira, the Esmeraldas and the Guayas. The sources of the first — the Rioblanco, Pisco and Puntal — are to be found on the northern slopes of the transverse ridge which culminates in the Imbabura volcano. Its course is north and north-west to the Colombian frontier, thence westward and north-west to the Pacific, breaking through the Western Cor- dillera on its way. It forms the boundary line for some distance between Ecuador and Colombia, but near its mouth where the river turns northward Colombia has taken possession of the left bank and all the territory covered by its large delta. Its principal tribu-

taries on the left are the San Pedro, Paramba, Cachiyacu, Chachavi and Canumbi, and on the right the San Juan, Caiquer and Nulpe. The delta channels of the Mira are navigable, being tributary to the Colombian port of Tumaco. The Esmeraldas drains all that part of the central plateau lying between the transverse ridge of Tiupullo on the south, and the Imbabura ridge on the north, together with the western slopes of the Cordillera between Iliniza and Cotocachi, and a considerable part of the lower plain. It is formed by the confluence of the Quininde and Toachi with the Guaillabamba between 40 and 50 m. above its mouth, and discharges into the Pacific in lat. 1° N., long. 79° 40′ W., through a narrow and pre- cipitous gorge. The volume and current of the river is sufficient to freshen the sea 2 m. from the coast. The Guaillabamba is the larger and more important

tributary, and should be considered the main stream. It rises in the Chillo valley in the vicinity of Cayambe, and flows across the northern end of the central plateau, breaking through the Western Cordillera between Cotocachi and Pichincha. One of its plateau tributaries, Rio Pedregal, rises on the slopes of Cotopaxi and is celebrated for its three beautiful cascades, the highest of which is about 220 ft. The Toachi and Quininde have their sources on the western slopes of the Cordillera. The Guayas or Guayaquil river is in part an estuary extending northward from the Gulf of Guayaquil, bordered by mangrove swamps and mud banks formed by the silt brought down from the neighbouring mountains. All the bordering country on both sides is of the same description, and for a long distance inland extensive areas of swampy country are submerged during the rainy season. Above the mouth of the Daule the river is known as the Bodegas, which in turn is formed by the confluence of the Babahoyo and the Vinces. The Guayas also receives a large tributary from the east called the Yaguachi. All these streams are navigable on their lower courses, regular steamboat communication being maintained on the Guayas and Bodegas to a river port of the latter name, 80 m. above Guayaquil, and for 40 m. on the Daule. The navigable channels of all the rivers are computed at 200 m. The drainage basin of the Guayas, according to Theodor Wolf, covers an area of 14,000 sq. m., and includes the greater part of the lower plain and the western slopes of the Cordillera Occidental as far north as Iliniza. The Babahoyo, which is the main stream, has its sources on the slopes of Chimborazo, the Daule on the Sandomo ridge in the latitude of Pichincha, the Yaguachi on the south-eastern slopes of Chimborazo, whence it flows southward for a considerable distance before breaking through the Cordillera to the western plain. The Guayas is one of the most interesting and varied of the South American river systems, and is of great economic importance to Ecuador. In addition to these three river systems, there are a large number of short streams on the coast flowing into the Pacific and Gulf of Guayaquil, only two of which have any special importance in the present undeveloped state of the country. These are the Santiago, which drains several fertile valleys in northern Esmeraldas and western Carchi, and whose outlet is connected with some navigable tide-water channels, including the Pailon basin and the Caraquez, or Caracas, on which is located the village of Bahia de Caraquez (lat. 0° 34/ S.), the nearest port to the city of Quito.

There are a considerable number of small lakes in Ecuador, but no large ones. These are of two classes — those of the bowl-like valleys and extinct craters of the mountainous region, . .

and the reservoir lakes of the lowland plains caused by es ”

the annual overflow of the rivers. It is impossible to say how many of the latter there may be, for much of the territory where they are found is unexplored. They are usually shallow and malarial. Among the upland lakes, there are some of special interest because of their position and historical association. The Yaguar-cocha (” lake of blood “)• in the province of Imbabura, near Ibarra, which is only I J m. in circumference, is celebrated for the tradition that Huayna-Capac, one of the great conquerors of the Inca dynasty, defeated an army of rebellious Carranquis on its shores, and threw so many of their bleeding corpses into it as to turn its waters to the colour of blood. On the south-east skirt of Cotocachi, 10,200 ft. above the sea, is the beautiful little Cuy-cocha, which originated, it is believed, through the falling in of the mountain’s sides. There are two others of apparently the same origin on the north-west slopes of the Mojanda volcano, but they are less attractive because of their gloomy surroundings. In the deep valley between the mountains of Imbabura and Mojanda is the lake of San Pablo, 8848 ft. above the sea. It is one of the largest of its class, being about 5 m. in cir- cumference, and is situated in an exceptionally fertile region. It drains through the Peguchi into the Rio Blanco, a tributary of the Mira. Other well-known lakes of the plateau region are Quirotoa, about 4600 ft. in diameter; Colta, east of Riobamba, and Colay, south of the same place. Among the many thermal springs through- out the Andean districts, the best known are at Belermos and San Pedro del Tingo, north-east of Quito; at Cachillacta, in the district of Nanegal; at Timbugpoyo, near Latacunga; at Bafios (5906 ft. elevation), near the foot of Tunguragua; and on the slopes of Ruminagui and Chimborazo.

The coast of Ecuador extends from about lat. i° 20′ N. to the vicinity of the Boca Jambeli on the southern shore of the Gulf of Guayaquil, in lat. 3 14′ S., and has an outward curve. Coast

Its more prominent headlands are Punta Galera, Cabo Pasado, Cabo de San Lorenzo and La Puntilla, or Santa Elena

Point. The bays on this coast are commonly broad indentations, and the rivers discharging into them are generally obstructed by bars. The small ports along the coast, therefore, do not afford much protection

to shipping. The most northern of these bays is the Ancon de Sardinas, lying south of the Mira delta. The head of the bay is fringed with islands and reefs, behind which is the mouth of the Santiago river, Poza Harbour, San Lorenzo Bay, Pailon basin and a network of navigable channels, all of which are difficult of access. The small ports of La Tola and Pailon are located on these waters. The port of Esmeraldas, near the mouth of the Esmeraldas river, is located near the southern entrance to this bay. As the mouth of the river is obstructed by a bar and its current is swift, the anchorage is outside in an open roadstead, only slightly protected on the south. Farther south is the broad Bay of Manta, with a small port of the same name at its southern extremity. The most fre- quented port on this part of the coast is that of Bahia de Caraquez, at the mouth of the Caraquez, or Caracas river, which is also obstructed by a bar. There is a fertile, productive country back of this port, and it is the objective point of a road from Quito. Immediately north of the Gulf of Guayaquil is the Bay of Santa Elena, with a small port of the same name, which has a good, well-sheltered anchorage and is the landing-place of the West Coast cable. The Gulf of Guayaquil, which lies between the Ecuadorean and Peruvian coasts, is the largest gulf on the Pacific coast of South America between Panama and Chiloe. Its mouth is 140 m. wide between La Puntilla on the north and Cabo Blanco on the south, and it penetrates the land eastward, with a slight curve northward at its head, for a distance of about 100 m., terminating in the Guayas estuary or river, ori which is located the port of Guayaquil. The upper end of the bay and its northern shores are fringed with swamps through which numerous estuaries penetrate for some distance inland. Immediately west of the Guayas river the Estero Salado, which comprises a great many shallow tide-water channels, or bayous, penetrates as far inland as Guayaquil, but is used only by canoes. The upper end of the gulf is filling up with the silt brought down from the Cordillera. It is divided midway by the large island of Puna, at the eastern end of which is the anchorage for steamers too large to ascend the Guayas. The steamship channel passes between this island and the Peruvian coast, and is known as the Jambeli channel. The passage north of Puna Island is known as the Morro channel, but its entrance is obstructed by shoals and it is considered dangerous for shipping. A small port in the Jambeli channel, on the south-east shore of the gulf, is that of Puerto Bolivar, or Puerto Huaila, the shipping port for the town of Machala and the Zaruma mining region. '■

There are few islands off the coast of Ecuador, and only one of any considerable size — that of Puna in the Gulf of Guayaquil, which ...

is 29 m. long from north-east to south-west and 8 to 14 m.

islands. w ;j e- l t]; es j n t [j e north-east part of the gulf, and is separated from the Ecuadorean mainland by the Morro channel, and from the southern mainland by the wider and deeper Jambeli channel. There is a low, mountainous ridge, called the Zampo Palo, running through it, and its eastern shores have some moderately high bluffs; otherwise the island is low and swampy, and its shores, except the eastern end, are fringed with mud banks. The island is densely wooded (in marked contrast with the opposite Peruvian shore), and is considered unhealthy throughout the greater part. It has a population of 200, chiefly centred in the village of Puna, at its north-east extremity, which is a shipping port and health resort for the city of Guayaquil. Puna island is celebrated for its connexion with Pizarro's invasion of Peru in 153 1. It is said that it had a considerable population at that time, and that the natives resisted the invaders so vigorously that it cost six months to reduce them. Midway in the outer part of the Gulf of Guayaquil is Amorta- jada or Santa Clara island, whose resemblance to a shrouded corpse suggested the name which it bears. It lies 12 m. south-west of Puna island and 80 m. from Guayaquil. It rises to a considerable elevation, and carries a light 256 ft. above sea-level. There are some low, swampy islands, or mud flats, covered with mangrove thickets, in the lower Guayas river, but they are uninhabited – and of no import- ance. North of the Gulf of Guayaquil there are only two small islands on the coast of more than local interest. The first of these is Salango, in lat. i° 25′ S., which is 2 m. in circumference and rises to a height of 524 ft. It is richly wooded, and has a well-sheltered anchorage much frequented by whalers in search of water and fresh provisions. The next is La Plata, in lat. 1° 16′ S., which rises to a height of 790 ft., and has a deep anchorage on its eastern side where Drake is said to have anchored in 1579 to divide the spoils of the Spanish treasure ship " Cacafuego." The Galapagos Islands (q.v.) belong to the republic of Ecuador, and form a part of the province of Guayas.

Geology. 1 — The great longitudinal depression which lies between the eastern and the western branches of the Andes is also the boundary between the ancient rocks of the east and the Mesozoic

1 See J. Siemiradzki, " Geologische Reisenotizen aus Ecuador," Neues Jahrb. f. Min., Beil. Band iv. (1886, pp. 195-227, pi. vii.); Th. Wolf, Geografia y geologia del Ecuador, publicada por or den del Supremo Gobierno de la Republica (Leipzig, 1892); W. Reiss and A. Stiibel, Keisen in Sud- America. Das Hochgebirge der Republik

Ecuador (Berlin, 1892-1902).

beds which form the greater part of the west of the country. The Eastern Cordillera is composed of gneiss, mica and chlorite schist and other crystalline rocks of ancient date; the Western Cordillera, on the other hand, is formed of porphyritic eruptive rocks of Mesozoic age, together with sedimentary deposits containing Cretaceous' fossils; Most of the country between the Andes and the sea is covered by Tertiary and Quaternary beds; but the range of hilts which runs north-west from Guayaquil is formed of Cretaceous and porphyritic rocks similar to those of the Andes. In the intra-andine depression, between the East and West Cordilleras, recent deposits with plant remains occur near Loja, and to the north-east of Cuenca is a sandstone containing mercury ores, somewhat similar to that of Peru. Farther north nearly the whole of the depression is filled with lavas, tuffs and agglomerates, derived from the Tertiary and recent volcanoes which form the most striking feature of the Andes of Ecuador. These volcanoes are most numerous in the northern half of the country, and they stand indifferently upon the folded Mesozoic beds of the Western Cordillera (e.g. Chimborazo, Iliniza, Pichincha), the ancient rocks of the Eastern Cordillera (Altar, Tunguragiia, Cotopaxi, Antisana), or the floor of the great de- pression between. The lavas and ashes are for the most part andesitic.

Climate. — Climatic conditions in Ecuador are very largely con-tingent on altitude, and the transition from one climate to another is a matter of only a few hours' journey. Although the equator crosses the northern part of the republic, only 15 m. north of the city Of Quito, a very considerable part of its area has the temperature of the temperate zone, and snow-crowned summits are to be seen every day in the year from its great central plateau. In addition to the climatic changes due to altitude, there are others caused by local arid conditions, by volcanic influences and by the influence of mountain ranges on the temperature and rainfall of certain districts. These influences are not general; on the contrary, they often affect very limited areas. For instance, Guayaquil has a hot humid climate and mangrove swamps line the shores of Guayas down to the gulf; at Santa Elena, about 60 m. due west, arid conditions prevail and vegetation is scanty and dwarfed; at Salango island, 50 m. north of Santa Elena, there is an abundance of moisture and vegetation is luxuriant; 33 m. farther north, at Manta, the country is a desert; and at Atacames bay, 135 m. north of Manta, the rainfall and vegetation are again favourable. On the plateau similar conditions prevail. There is no great display of arboreal Vegetation anywhere

except in the valleys and lower passes where the rainfall is abundant, but in general terms it may be said that the rainfall and vegetati6n which characterize the Quito basin soon disappear as one proceeds southward, and are substituted by arid conditions. Even here there are local modifications, as at Ambato, where a shallow depression, surrounded by barren, dust-covered ridges exposed to cold winds, is celebrated for its warm, equable climate and its fruit. It is to be noted that the Gulf of Guayaquil separates the humid, forest-covered coastal plain of Ecuador from the arid, barren coast of Peru, the two regions being widely dissimilar. The mean annual temperature, on this plain, according to an official publication, is 82.4 F., and the range is from 66° to 95 . The heat is modified at many points on the coast, however, by the cold Humboldt current which sweeps up the west coast of South America from the Antarctic seas. The year is divided into a wet and dry season — the former running from December to June, and the latter from July to December. The rainy season, or invierno, is broken by a short period of dry weather, called the veranillo (little summer) , shortly after the December solstice; otherwise it rains every day, the streams overflow, land traffic is suspended, and the air is drenched with moisture and becomes oppressive and pestiferous. The dry season, which is called the verano, or summer, is also broken by a short rainy spell called the inviernillo (little winter) or " cordonazo de San Francisco," which follows the September equinox. Apart from these the two seasons are sometimes broken by cloudless skies in winter, and a drizzling mist, called the garila, in summer. In the inter-andine region the variations in temperature are frequent and the averages comparatively low. An official estimate gives the mean annual temperature as 64° to 68° between 6000 and 1 1,000 ft. In Quito the mean annual temperature is 58-8°, the diurnal variation io°, the annual maximum 70°, and the annual minimum 45 °. Other returns give the mean annual temperature at 55°. It is said that pulmonary tuberculosis is unknown in these altitudes, though it is common in the coast districts. Catarrhal complaints are common, however, and leprosy is widely prevalent, it being necessary to maintain three large hospitals for lepers. In the higher altitudes there are wide variations in the snow-fall and intensity of the cold even on the same mountain. The line of permanent snow is much higher on the plateau side in both ranges, the precipitation being greater on the outer sides — those facing the forested lowlands — and the terrestrial radiation being greater from the barren surfaces of the plateau. In some instances the difference in the elevation of the snow-line has been found to be fully 1000 ft. Moreover, no two summits seem to retain the snow permanently at the same altitude. For instance, in 1880

Whymper found permanent snow on Cotocachi at 14,500 ft., while near by Imbabura was bare to its summit (15,033 ft.) ; Antisana was permanently covered at 16,000 ft., and near by Sara-Urcu, which is drenched with rains and mists from the Amazon valley

all the year round, at 14,000 ft. ; Sincholagua had large beds of permanent snow at 15,300 ft., Cotopaxi was permanently covered at 15,500 ft. on its western side, Corazon had daily snowstorms down to 14,500 ft., but no permanent beds of snow on its east side (elevation 15,871 ft.); and Chimborazo had deep snow at 15,600 ft. on its north-east and south sides in June-July. The eastern range was found to receive the heaviest snowfall. The elevation at which human residence is possible seems to be unusually high in Ecuador. Many of the towns and villages of central Ecuador lie at altitudes ranging from 8606 ft. (Ambato) to 9839 ft. (Machachi). The capital city of Quito is 9343 ft. above the sea, and is celebrated for its agreeable temperature, and also for its healthiness in spite of prevail- ing unsanitary conditions. Above these towns are a number of farms and herdsmen's habitations, where men live the whole or a. part of the year with less discomfort from low temperature than is experienced in northern Europe and northern United States. According to Whymper, the tambo of Chuquipoquio, at the foot of Chimborazo, is 11,704 ft., and the hacienda of Pedregal, near Iliniza, 11,629 ft., both being permanently occupied. The hacienda of Antisana, 13,306 ft., and the herdsmen's hut of Cunayaco on Chimborazo, 13,396 ft., are occupied only for a part of the year. The highest elevations are generally covered with ice and snow, and glaciers, according to Whymper, are to be found upon no less than nine of the culminating peaks, and possibly upon two or three more. These serve to modify the temperatures of the plateau, which is swept by cold winds at all seasons of the year. The pre- vailing wind is that of the north-east and south-east trade winds, broken and modified on the plateau and western lowlands by mountain barriers. Westerly and north-west winds are sometimes experienced, but are not permanent.

Flora. — The flora of the Quito basin has been well studied by various European botanists, more especially by Dr William Jameson (1796-1873) of the university of Quito, who began the preparation of a synopsis of the Ecuadorean flora in 1 864-1 865 (Synopsis plan- tafum Quitensium, 2 vols., Quito, 1865). The flora of the forested lowlands on both sides of the Andes has not been studied and

described so fully. From the Pacific coast upward to a height of about 3000 to 4000 ft. the vegetation is distinctively tropical, including among its economic products cacao, cotton, sugar, tobacco, rice, maize, yucca (also known as cassava and mandioca), peanuts, bananas, sweet potatoes, yams, arracacha (Conium moschatum, Hi B. K., or Arracacha esculenta), indigo, rubber (Castilloa) , ivory- nuts, cinchona and bread-fruit. Most of these become rare at 3000 ft., but a few, like sugar-cane, are cultivated as high as 8000 ft. The alluvial valley of the Guayas, above Guayaquil, is celebrated for the richness of its vegetation, which, in fruit alone, includes cacao, coffee, coco-nuts, pine-apples, oranges, lemons, guayavas (Psidium pomiferum),'guavas (Inga spectabilis) , shaddocks (or grape-fruit), pomegranates, apricots, chirimoyas (Anona Chirimolia), granadillas (Passiflora quadrangularis) , paltas (Pcrsea gratissima, otherwise known as " alligator pears "), tunas (Cactus), mangoes (Mangifera Indica), pacays {Prosopis dulcis), aji (Chile pepper), and many others of less importance. Besides rubber, the forests produce a great variety of cabinet and construction woods, ivory-nuts (from the " tagua " palm, Fhytelephas macrocarpa), " toquilla " fibre (Carludovica palmata) for the manufacture of so-called Panama hats, cabbage palms, several species of cinchona, vanilla and dyewoods. Among the large trees which are valued for their timber are red- wood (Humiria balsamifera) , Brazil-wood, algarrobo, palo de cruz (jacquinea ruscifolia), guaiacum or holy wood, rosewood, cedar and walnut. From 6000 to 10,000 ft. above the sea, the indig'.nous species include the potato, maize, oca (Oxalis tuberosa), and quinua (Chenopodium quinoa), and the exotic species, wheat, barley, oats, alfalfa (Medicago sativa), and most of the fruits and vegetables of the northern temperate zone. Wheat does not form a head below 4500 ft., nor ripen above 10,500. The larger forest trees are rarely seen above 10,000 ft., and even there only on the outer slopes of the Cordilleras. The Escallonia myrtalloides, however, is found at an elevation of 13,000 ft., and the shrubby Befarias 400 or 500 ft. higher. A characteristic growth of the open plateau and upland valleys is the cabulla, cabaya or maguey (Agave americana), whose fibre is much used by the natives in the manufacture of cordage, sandals (alpar gatas) and other useful articles. In the treeless region lying between 11,600 and 13,800, or in other places between 12,000 and 14,000 ft., the similarity of the vegetation to that of the corresponding European region, according to Wagner, is especially striking. On the paramos of Chimborazo, Pichincha, Iliniza, &c, the relation of characteristic genera to those identical with genera in the Alpine flora of Europe is as 5 to 4; and the botanist might almost

suppose himself in the Upper Engadine. Of the flora of the highest Andes, Whymper found 42 species, of various orders, above 16,000 ft., almost all of which were from Antisana and Chimborazo; 12 genera of mosses were found above 15,000 ft., and 59 species of flowering plants above 14,000 ft., of which 35 species came from above 15,000 and 20 species from above 16,000 ft. The highest specimen obtained was a lichen (Lecanora subfusca, L.) on the south side of Chimborazo, 18,400 ft. above sea-level. Mosses (Grimmia) were found on Chim- borazo at 16,660 ft., ferns (Polypodium pycnolepis, Kze.) at 14,900, and specimens of Gentiana rupicola, H. B. K., Achyrophorus quitensis, Sz. Bip., Culcitium nivale, H. B. K., at 16,300; Phyllactis inconspicua,

Wedd., at 16,600, Astragalus geminiflorus, H. B. K., at 14-15,000, Geranium diffusum, H. B. K., at 16,000, Malvastrum phyllanthos, Asa Gray, at 16,500, Draba obovata, Benth., at 16,660, and Ranunculus praemorsus, Kth., at 16,500 — all on Chimborazo. Fuchsia loxensis, H. B. K., was found on the slope of Sara-Urcu at 12,779 ft., and currant bushes (Ribes glandulosum, R. & P.), on Chimborazo, at 14,000. On the eastern slopes of the Andes, where the rainfall is continuous throughout the year and the atmosphere is surcharged with moisture, the forest growth is phenomenal. It is similar to that of the Colombian and Peruvian montanas, modified, if at all, by the excessive humidity which prevails in this region.

Fauna. — The fauna of Ecuador is comparatively poor in mammalia, but the birds and still more the insects are very numerous. The. Quadrumana are represented by a large number of species, the eastern forests being very much like the other parts of the great Amazonian basin in this respect. The Carnivora include the puma (Felis concolor), jaguar (F. onca), ocelot (F. grisea), bear (Ursus ornatus), fox, weasel and otter. A small deer and, in southern Ecuador, the llama (Auchenia) with its allied species, the alpaca, guanaco and vicuna, represent the ruminants. The rodents are numerous and include most, if not all, of the Amazonian species — the capybara (Hydrochoerus capybara), cavia (C. aperea), paca (Coelogenys paca) and cutia (Dasypr'octa aguti) , all amphibious and having an extensive range. Tapirs are to be found in the eastern forests, the peccary in more open woodlands, and the opossum in nearly every part of the country. Cattle, horses, asses, sheep and swine were introduced by the Spaniards, and thrive well in some of the provinces. Excellent horses are reared in the uplands, as well as mules and cattle, the pasturage on the mountain slopes being good, and alfalfa being grown in abundance in many districts. The Reptilia include countless numbers of alligators in the Guayas and its

tributaries and in the tide- water channels of many of the smaller rivers; many species of lizards, of which Mr Whymper found three in the Quito basin; snakes of every description from the huge anaconda of the Amazon region down to the beautifully marked coral snake; and a great variety of frogs and toads. Bats also are very numerous, especially in the eastern forest region, where the vampire bat is a serious obstacle to permanent settlement. The avifauna of Ecuador is distinguished for the great variety of its genera and species, among which are many peculiar to the Amazon valley, and others to the colder uplands. Among the Amazon species may be mentioned the parrot, macaw (Macrocercus) , toucan (Ramphastos) , curassow (Crax), penelope, trogon, and horned screamer (Palamedea cornuta). There are also herons, ibises, storks and cranes, including the great black- headed white crane, Mycteria americana, which ranges from northern Argentina to Colombia. One species of ibis, the Theristicus caudatus, is to be found, it is said, only on the slopes of Antisana. Species of the pheasant and partridge are not uncommon, and the " guacharo " (Steatornis caripensis), once believed to inhabit Venezuela only, is found in Ecuador also. The Raptores are well represented by a large number of genera and species, which include the condor, eagle, vulture, falcon, hawk and owl. The condor (Sarcorhamphus gryphus) is commonly found between the elevations of 6000 arid 16,000 ft., rarely, if ever, descending to the lowland plains or rising above the lower peaks. It preys upon the smaller animals and inflicts much loss upon stock farmers through the destruction of calves, lambs, &c, but it very rarely ventures to attack man or any of the larger animals. The eagle common to Ecuador is the Morphnus taeniatus, and possibly the M. guaianensis on the eastern slopes of the Andes. The harrier-eagle (Herpetotheres cachinnans) is also to be found throughout this part of the continent. An eagle with buzzard-like habits, the Leucopternis plumbea, is likewise common in Ecuador. Among the vultures the turkey-buzzard group (Rhiho- gryphus or Cathartes), including the R. aurus, burrovianus and perniger, is common everywhere. The carrion crow, or black vulture (Catharista atrata), is also common to every part of the country, and is the general scavenger. The carrion hawks are represented by the Polyborus tharus, popularly called the " cara-cara," and the Phalcobaenus carunculatus ; the falcons by the Aesalon columbarius ; and the kites by the Gampsonyx swainsoni. The Ecuadorean owl is the Bubo nigrescens. An interesting species of the song birds is popularly known as the " flautero " (flute-bird), which inhabits the eastern forests. Its notes are marvellous imitations of " the most mellow, sweet-sounding flute," but the singer itself, according to Mr Simson, is " a very insignificant-looking little,

greyish-coloured bird," which "always dies in captivity." The most interesting group of the smaller birds is that of the humming- birds, of which the number and variety is astonishing. Some of these have a very wide range, while others are apparently limited to a small district, or to a certain altitude. The best-known fish of Ecuador is the insignificant Pimelodus cyclopum, the only fish found in the streams and lakes of the plateau region. Its fame rests on Humboldt's publication of the tradition that great numbers of this tiny fish had been thrown out during the eruptions of Imbabura and other volcanoes. Mr Whymper's explanation of the phenomenon is that the fish are scattered over the land by the sudden overflow during volcanic eruptions of the rivers and lakes which they inhabit. The rivers of the eastern plains are probably stocked with the fish found in the Amazon. On the coast, the Ancon de Sardinas bay is so named from the multitude of small fish (sardinas) which inhabit its

waters. Elsewhere there are no fisheries of importance, except those of the Galapagos Islands.

The insect inhabitants of Ecuador, like the birds, include a large number of genera and species, but no complete entomological survey of the country has ever been made, and our knowledge in this respect is insufficient to warrant a detailed description. In one ascent of Pichincha in 1880, Mr Whymper collected 21 species of beetles, all new to science, between 12,000 and 15,600 ft. elevation. On Cotopaxi, at elevations of 13,000 to 15,800 ft., 18 species of the genus Colpodes were collected, of which 16 were new. This may be con- sidered a fair illustration of the situation in Ecuador so far as natural history exploration is concerned. Of the Machachi basin, near Quito, which he calls a " zoologist's paradise," Mr Whymper writes {Travels amongst the Great Andes of the Equator) : " Butterflies above, below and around ; now here, now there, by many turns and twists displaying the brilliant tessellation of their under- sides. . . May- flies and dragon-flies danced in the sunlight; lizards darted across the paths; and legions of spiders pervaded the grass, many very beautiful — frosted — silver backs, or curious, like the saltigrades, who took a few steps and then gave a leap. There were crickets in infinite numbers; and flies innumerable, from slim daddy- long-legs to ponderous, black, hairy fellows known to science as Dejeaniae; hymenopterous insects in profusion, including our old friend the bishop of Ambato (possibly Dielis), in company with

another formidable stinger, with chrome antennae, called by the natives ‘ the Devil ‘ ; and occasional Phasmas (caballo de palo) crawling painfully about, like animated twigs.” This description refers to a fertile sub-tropical oasis on the partially barren plateau; below in the forested lowlands, where tropical conditions prevail, the numbers and varieties are many times greater. The Coleoptera are especially numerous; Mr Whymper took home with him 206 species which had been identified and described up to 1892, most of them from the uplands and most of them new to science. The total number of species in Ecuador is roughly estimated to be 8000. The Hymenoptera are also numerous, but less so than the Lepidoptera, with which the mountain slopes and sunny, open spaces seem to be literally covered. Of moths alone Mr Whymper took away with him specimens representing no less than 23 genera, with a probable addition of 13 genera more among his undescribed specimens, the largest of which (an Erebus odora) was 7j in. across the wings. Among the Diptera, which includes a very wide range of genera and species, are some of a highly troublesome character, though on the whole, Mr Whymper did not find the flies and mosquitoes so. His explorations, however, did not extend to the eastern region, where the mosquitoes are usually described by travellers as extremely troublesome. Sand-flies are common, and in the eastern forests the tiny pium fly (Trornbidium, sp.?) is a veritable pest. Of the insects which infest dwellings and prey upon their human inmates, such as fleas, bed-bugs, roaches, &c, Ecuador has more than a bountiful supply. Lice-eating is a widely prevalent habit among the Indians and mestizos, and demonstrates how numerous these parasites are among the people. A good illustration of the prevalence of house- infesting animals and insects is given by Mr Whymper (op. cit. P- 39l). who made a collection of 50 different specimens of the vermin which infested his bedroom in Guayaquil.

Population. — The indigenous population of Ecuador was originally composed of two distinct races — the Quitus and Caras, the former being the older, and the latter presumably of Quichua origin. The Caras, according to tradition, entered the country from the coast, and had thoroughly established themselves there long before the conquest by the Inca rulers Tupac- Yupanqui and his son Huayna-Capac. This conquest was comparatively easy because the Caras spoke a. dialect of the same language, and were not greatly unlike their conquerors in manners and customs. The present Indian population of Ecuador, excepting those of the trans-Andean region, may be considered as descendants of these two races. They are subjected to incredible abuses under Spanish colonial rule, their

numbers being reduced to a fraction of the former population, and even yet they are subjected to a kind of debt-bondage which is slavery in all but the name. Notwithstanding all this they still represent from two-thirds to three-fourths of the actual population of Ecuador. East of the Andes the forests are inhabited by tribes of what are termed " aucas " or " infieles " (infidels) — Indians who are independent of both church and political control. Missions have been estab- lished among some of the tribes, but their influence reaches only a small part of the wild inhabitants of this extensive region.

The principal tribes are the Quijos or Canelos, who are settled about the headwaters of the Napo, on the eastern slopes of the Andes, and are in great part grouped about the missions; the Jivaros who inhabit the valley of the Pastaza; the Zaparos who occupy the forest region between the Pastaza and Napo; the Piojes of the middle Napo, and eastward to the

Putumayo; and the Iquitos and Mazanes of the lower Napo and Tigre, chiefly in territory occupied by Peru. The Jivaros are the best known of these tribes because of their successful resistance to the Spanish invaders. They are still independent of political control, live in permanent settlements, till the soil (producing Indian corn, beans, yucca and plantains), and have developed some rude manufactures. The Zaparos are less homogeneous, some of their hordes living in a state of complete savagery. They are classified with the Guaranis of Brazil, whom they resemble in many particulars. The Piojes live in permanent communities and cultivate the soil. The total number of " aucas " or un- civilized Indians in the republic has been estimated at about 200,000, but this estimate covered a larger area than Ecuador actually occupies and is evidently too high. Their settlements are usually small and very much scattered, and their aggregate number is evidently much under the earlier estimates. An official estimate given to Mr Whymper in 1880, however, places the population of Oriente (the eastern territory) at 80,000, which is probably more nearly correct.

No general census has ever been taken in Ecuador, and estimates are little better than vague conjectures. One of these estimates, that published by P. F. Cevallos for 1889, which has been generally accepted, gave the total population as 1,272, 161, and these figures have been used with but slight changes for various later estimates. A later official estimate appeared in 1900 in La Rtpublique de VEquateur et sa participation a VEx- position Universelle de 1900, which gives for the provinces practically the same figures as those of Cevallos, and at the same time assumes the total for the whole

republic to be 1,500,000. The white population is estimated at 100,000 to 120,000, which probably includes many of mixed ancestry, and the mixed bloods at 300,000 to 450,000. The tendency is for the mestizo who dwells in Indian communities to revert to the Indian type, and it is probable that the larger estimate is nearer the truth. On the Other hand mestizos who live among the whites and form new alliances with them eventually class themselves as whites wher- ever their social condition has been improved. As a rule, the mestizos of Ecuador are ignorant, indolent and non-progressive. As in Colombia they are the artizans and small traders and the Indians are the farm labourers. The land is held by a few pro- prietors, and caste sentiment is strong among those who claim unmixed European descent; consequently the mestizos have limited opportunities to improve their condition.

The whites form an exclusive governing caste, as in Chile. The territory of the republic is divided among a very few of them, and its government is in their hands.

In the hot seaboard districts there are a small number of negroes, and a somewhat larger number of their crosses with the othv-r two races. The majority of these are to be found in the northern provinces. There are comparatively few negroes and mulattoes on the colder plateaus. Villavicencio estimated their numbers at 7831 pure negroes and 36,592 mixed bloods, which is probably not far from the correct totals.

The foreign population is small, the total being estimated at about 6000, of which 5000 are natives of the neighbouring Latin republics, 700 Europeans and Americans, and 300 Chinese.

Territorial Divisions and Towns. — The republic is divided into 15 provinces and one territory. The Galapagos Islands were declared a dependency of the province of Guayas in 1885, but are practically independent and constitute a second territory under the administration of a jefe territorial appointed by the national executive.

The official estimate (La Republique de l'£quateur et sa participation al' Exposition Universelle de iqoo) gives the data -for the provinces and their capitals, which are shown on the next page.

These population figures are very nearly the same as those given by Cevallos for 1889. If the population of the Oriente be taken as 80,000, the aggretate is very nearly the same. The population of the

provincial capitals is in some cases over-estimated, especially for Guayaquil and Quito, neither of which could have had 50,000 at the date of this estimate. The population of Quito in May 1906 was 50,841, of which 1365 were foreigners. As for the areas of the provinces the figures need not be questioned except those for the Oriente territory, which are much too large for the region actually

Provinces.

Area.

Population.

Capital.

Population.

Carchi .

sq. m.

1495

40,000

Tulcan

5,ooo

Imbabura .

2416

68,000

Ibarra

5,000

Pichincha .

6219

205,000

Quito

80,000

Leon

2595

109,600

Latacunga

12,000

Tunguragua

1686

103,000

Ambato

8,000

Chimborazo

2990

122,000

Riobamba

12,000

Bolivar .

1260

43,000

Guaranda

6,000

Canar .

1519

64,000

Azogues

4,000

Azuay .

3874

132,400

Cuenca

30,000

Loja

3707

66,000

Loja

10,000

El Oro . . .

2340

32,600

Machala

3,200

Guayas .

8216

98,100

Guayaquil

60,000

Los Rios

2296

32,800

Babahoyo

3.000

Manabi .

7893

64,100

Porto viejo

5,000

Esmeraldas

5465

14,600

Esmeraldas

6,000

Oriente (ter.) .

unknown

Galapagos Is. .

2865

2,000

occupied by Ecuador, and for the Galapagos Islands which are described by competent authorities as 2400 sq. m. The population of these islands was 400 (principally convicts) on Chatham Island in 1901, about 115 on Albemarle and 3 on Charles Island in 1903. Besides the provincial capitals already noted, there are no large and important towns in the country. The largest of the smaller towns is probably Jipijapa, in the province of Manabi, which is the centre of the Panama hat industry and had in 1900 an estimated population of 6000, nearly all Indians.

Communications. — The first railway to be completed in Ecuador was the line between Guayaquil and Quito, 290 m. in length, the last section of which was formally opened at Quito on the 25th of June 1908. It belongs to an American company, and had been under construction for many years. Lines from Puerto Bolivar to Machala, province of El Oro, and another from Bahia de Caraquez to Chone, were under construction in 1908. Several lines were also projected, two to penetrate the Ecuadorean montana. There is only one highway in the country on which vehicles can be used, the paved road extending southward from Quito 115 m. on the Guayaquil route, which was begun by Garcia Moreno but has been allowed to fall into neglect. Other roads have been projected to the coast and one to the eastern territory. The ordinary roads are rough mule-tracks. These are difficult at all times, and in the rainy season are quite impassable. On the Pacific lowlands the rivers Guayas, Daule, Vinces and Yaguachi have about 200 m. of navigable channels in the rainy season, and are used for the transportation of produce and merchandise. There are also several short river channels along the coast which are used by planters for the same purpose. A great part of the country, however, is still compelled to use the most primitive means of communication — mule paths, fords in the smaller streams in the dry season, and rude suspension bridges across deep gorges and swift mountain torrents. The latter are usually con- structed from the tough fibre of the Agave americana and consist of one or more cables. When of one cable, called the taravita, the passenger and his luggage are drawn across in a rude kind of basket suspended from it ; but when two or more cables are used, transverse sticks of bamboo and reeds are laid upon theni, forming a rude prototype of the regular suspension bridge. Such a bridge is called a chimba-chaca, and is very hazardous for an unpractised foot. In 1907 there were 2564 m. of telegraph lines in operation, connecting Quito with all the principal towns. The national capital is connected with the submarine cable at Santa Elena (via Guayaquil) and at Tumaco, in Colombia. Guayaquil is provided with tramway and telephone lines. These public services are under the general super- vision of the Minister of Public Instruction, Posts and Telegraphs.

Commerce. — Ecuador has no merchant marine beyond a few small vessels engaged in the coastwise traffic, some eighteen or twenty river steamers on the Guayas and its tributaries, and a number of steam launches, towboats and various descriptions of barges engaged in the transportation of produce and goods on the rivers. The ocean-going foreign trade of the country is carried wholly in foreign vessels, for the regular lines of which Guayaquil is a principal port of call!

Less frequent calls are made at Esmeraldas and some of the other small ports on the coast, of which there are nine in all. Most of these are difficult of access and their trade is unimportant. The total trade of the republic in 1905, according to returns published by the Guayaquil Chamber of Commerce, amounted to only £3,429,955, of which £1,573,389 (15,733.891 sucres) were credited to imports, and £1,856,566 (18,565,668 sucres) to exports. Of these totals, all but £127.532 of the imports and £441,679 of the exports passed through the port of Guayaquil. The great poverty of the people has been a serious obstacle to the development of a larger commerce.

Agriculture. — The agricultural industries on which the export trade depends are almost wholly restricted to the western lowlands and include cacao, coffee, cotton, sugar, tobacco, rice, yucca and sweet potatoes. The Guayas basin and the district about Machala are celebrated for their cacao, and produce about one-third of the world s supply. It is the staple product of the country. Coffee is

produced on the lower slopes of the Cordilleras and is of excellent quality. The production is small, but would be increased at remunerative prices. During the American civil war the planters of Ecuador entered largely into the production of cotton, which at that time yielded large profits, but the industry has declined to very insignificant proportions since then because of inability to compete with the lower cost of production in the United States. The output of sugar and tobacco is small, but could be largely increased, as the conditions of soil and climate are favourable. Much of the sugar-cane produced is turned into rum, which is consumed in the country. The tobacco grown is of excellent quality. Efforts have been made to promote the cultivation of indigo, but without much success. On the uplands, wheat, Indian corn, oats, barley, potatoes and vegetables of many kinds are successfully cultivated, but wholly for home consumption. The vine is successfully grown in the warm upland valleys, both for its fruit and for the production of wine. The staple foods for the common people are potatoes on the plateau (which are chiefly consumed in the form of locro, or potato-soup) and yucca- or cassava-meal in the warmer regions. Although cattle and horses were not known before the Spanish conquest, they have become since then important products of the country. The best grazing lands are on the lower elevations west of the Cordilleras in certain districts of the plateau and on the slopes of some of the higher Andes, as on Chimborazo and Antisana. Horses and mules are reared for export on a small scale, and sheep for their wool, which is used in home manufactures.

Forest Products. — The forest and other natural products include rubber, cinchona bark, ivory-nuts, mocora and toquilla fibre for the manufacture of hats, hammocks, &c, cabaya fibre for shoes and cordage, vegetable wool (Bombax ceiba), sarsaparilla, vanilla, cochineal, cabinet woods, fruit, resins, &c. The original source of the Peruvian bark of commerce, the Cinchona calisaya, is completely exhausted, and the " red bark " derived from C. succirubra, is now the principal source of supply from Ecuador. Guaranda is the centre of the industry, but bark gatherers are to be found everywhere in the forest regions. The rubber-gathering industry is comparatively new The product is derived from the Castilloa elastica, the Heveas not being found west of the Andes.

Minerals. — The mineral resources are much inferior to those of Colombia and Peru. Gold is found in the province of El Oro, where the great Zaruma and other companies have opened a number of mines. It is also found in the provinces of Loja, Esmeraldas, and in the river-beds along the eastern slopes of the Andes. Quicksilver has been mined at Azogues, in the province of Canar, and is also to be found in Azuay. Iron ores and lead are credited to several provinces, and platinum has been found in Esmeraldas, where emerald mines have been worked ever since the Spanish conquest. Coal of good quality has been found in Azuay and at other points, and petroleum is known to exist in several localities. Salt springs near Riobamba and at Salinas, in Imbabura, have long been used by the natives in the manufacture of salt.

Manufactures. — The manufacturing industries are chiefly of a primitive character and have been developed to meet local necessities. There are some cotton factories and sugar mills provided with modern machinery, but the cotton and woollen cloths of the country are commonly coarse and manufactured in the most primitive manner. Some of these goods are sent into southern Colombia, but they are chiefly made for the local market. Hats and hammocks are made from the fibres of the mocora and toquilla palms, and sandals from the fibre of the Agave americana. The hats are an article of export and are known abroad as Panama hats. Hand-made laces of admirable workmanship are made in some localities, especially on the plateau about Quito. Among other manufactories, all for the home market, may be mentioned : flour-mills, sugar refineries, rum distilleries, breweries, chocolate factories, a candle factory saw- mills and tanneries. '

Government. — Constitutionally, the government of Ecuador is that of a centralized republic, whose powers are denned by a written

constitution and whose chief organs are an executive consisting of a president and vice-president, and a national congress consisting of two houses, a senate and a chamber of deputies. Revolutionary changes, however, have been very frequent in Ecuador, and no less than eleven constitutions were adopted between 1830 and 1909.

The constitution adopted in 1906 succeeded that of 1884 (amended in 1887 and 1897), and its terms may be given here, subject to what may be regarded as the extra-constitutional powers vested in the executive. Executive power is vested in a president and vice-president elected for periods of four years by a direct vote of the people (Under the constitution of 1884 the official terms of these two officers were not wholly synchronous, the vice-president's term beginning with the president's third year.) These officials cannot be re-elected to succeed themselves. The president, whose salary is 12,000 sucres per annum, has a limited veto power, and may convene extraordinary sessions of Congress for a specified purpose, but he has no further authority over that body. He appoints the diplomatic and consular representatives of the republic and the governors of the provinces, exercises a limited control over the administration of

justice and public instruction through the appointment of bfficials, and is chief of the small military force maintained by the republic. The construction of railways with public funds and under government supervision also places him at the head of a very important public service. The president is assisted by a cabinet of five ministers: — • foreign relations and justice; interior and public works; finance; war; public instruction, posts and telegraphs— all of whom may be impeached by congress. The executive authority is also partially exercised by a council of state composed of 15 members, including the five cabinet ministers, of which the vice-president is ex-officio president. The council has important advisory functions, and must be consulted by the president on every important measure or appointment. The provinces are administered by governors chosen by the national executive; the departments by jefes polilicos (political chiefs) ; and the municipalities by tenientes politicos (political lieutenants). The Galapagos Islands are under a jefe territorial (territorial chief), Chatham Island being a penal colony and governed by special laws.

The congressional organization is similar to that of the majority of South American states. The senate is composed of 32 members (2 from each province) elected for two years, one-half the number being renewed each two years. The chamber is composed of 42 deputies, who are elected by the provinces for a period of two; years, on a basis of one representative for each 30,000 inhabitants and one supplementary representative for an additional 15,000. A senator must be at least 35 years of age, and a deputy 25. The elections are direct, and members of both houses may be re- elected. The immunities of legislators begin 30 days before the opening session of congress, and terminate 30 days after its dis- solution. Congress meets at Quito on the 10th of August, and remains in session for a period of 60 days, but its sessions may be extended or extraordinary sessions called for specified purposes. The right of suffrage is restricted to literate male adults.

The judicial branch of the government is composed of a supreme court, located at Quito, consisting of 5 judges and a fiscal (public prosecutor) appointed by the executive; six superior courts (in Quito, Guayaquil, Cuenca, Riobamba, Loja and Portoviejo) with a total of 9 judges; a Tribunal de Cuentas of seven members at Quito; and various municipal courts, or alcaldes, in the chief towns of the departments. There are civil courts of first and second instance in the larger towns, and consular courts in Quito, Guayaquil and Cuenca with jurisdiction in commercial cases. There are also police commissaries in the departments and justices of the peace in the municipalities, the latter having jurisdiction in civil cases where the amount involved does not exceed 200 sucres. The laws of Ecuador are based on the old Spanish laws and procedure, and include civil, criminal and commercial codes.

Army. — The army, according to an official report of 1900, consisted of 4 battalions of infantry (about 3690 strong), 3 brigades of artillery (1362), and 2 regiments of cavalry (468), in all, about 5520 men, rank and file. In 1908 this force was reported to comprise 4350 men. The national guard is composed of three classes: actives — all en- rolled citizens of 20 to 38 years ; auxiliaries — enrolled citizens of 38 to 44 years; and passives — enrolled citizens of 44 to 50 years. These were estimated at 95,329 men. There is a military school at Quito and a naval school at Guayaquil.

Education.— Although primary instruction is free, and is obligatory for children of 6 to 12 years, a considerable part of the population is unprovided with schools and is indifferent in regard to them. An official report for 1900 gives the number of primary schools as

1297, and the number of pupils in attendance as about 80,000. The secondary schools numbered 37, with 371 teachers and about 4500 pupils. Higher instruction includes the technical and professional schools with the three universities of Quito, Guayaquil and Cuenca, and 6 schools of " trades and professions " (artes y oficios) in as many provinces. The old University of Quito has a staff of 32 professors divided into 5 faculties: Philosophy and Belles-Lettres, Law, Medicine, Physical and Natural Sciences and Mathematics. There are also in Quito a school of agriculture, astronomical observatory, botanical garden, museum and national printing office', all apparently under the supervision of the University.

Church. — According to the constitution of 1884, " the religion of the Republic is the Roman Catholic Apostolic, and all others are excluded." The only opposition which the Church has ever had to encounter has been from the " liberal " element within itself, and thus has arisen, seemingly from political motives, a desire to restrict clerical influence in political affairs. This influence has been exercised to an extreme in Ecuador, so much so, in fact, that its government at times was more nearly a theocracy than a republic. The growth of liberalism finally began to produce results. In 1889 the tithes from which the Church revenues had been derived were abolished, and a tax of 3 per mil. on real estate was substituted. In 1902 a signal victory was won in a law permitting civil marriage, but in 1904 a social revolution was effected by legislation, which placed the Church under State control, forbade the foundation of new religious orders and admission into the country of new religious communities, and provided that the members of the episcopate must be citizens of Ecuador. The higher dignitaries of the Church are an archbishop at Quito, and six suffragan bishops at Cuenca, Loja, Ibarra, Riobamba, Guayaquil and Manabi.

Finance. — The revenues of the republic are derived from import and export duties, liquor, tobacco and stamp taxes, inheritance tax, salt, gunpowder and playing cards monopolies, consular charges, and sundry miscellaneous receipts, including those from posts, telegraphs and railways. Up to 1907 the customs duties were increased by surtaxes amounting at that time to 100%. The minister of finance proposed to abolish these surtaxes and double all the rates of duties involved. On exports, however, all the duties were to be abolished except those on cacao, coffee, hides, rubber, tagua (ivory nuts), hat fibre, hammock fibre and tobacco. For 1907 the revenues were £1,424,770 and the expenditures £1,383,122.

On the 10th of October 1906, when the report of the provisional

government created by the revolution of the preceding January presented its financial report to a national assembly, the total obligations of the country were stated to be: —

Sucres. Railway bonds, 12,282,000 sucres gold at

107% premium . . . ,.' :. 25,423,740

Banco del Ecuador, advances . . . ■. 3,000,000 Banco Comercial y Agricola, idem . . . 2,400,000 Internal debt . . . 739.575

Condor bonds 757,000

French Finance Corporation 887,000

Total . In £ sterling at 10 sucres per £

33,207,315 3.320,731

The foreign debt of the republic, which in 1898 stood at £693,160 in bonds, was assumed by the Guayaquil & Quito Railway Co. under contracts of 1897, 1898, 1899 and 1900, the government guaranteeing interest on the sum of £2,520,000 railway mortgage bonds for 33 years and recognizing the external debt at 35 % of its face value. This debt originated in 1830, when Ecuador seceded from the Colom- bian confederacy and was charged with 21 J %' of the indebtedness of the three states. In 1855 the amount was fixed at £1,824,000, and in 1892 it was converted into a new consolidated debt of £750,000. Payments of interest and amortization had been very irregular,, and its transfer to a foreign company as the price of a railway concession put an end to a transaction which had been a serious discredit to the country. The amount outstanding on the 31st of December 1907 was 10,808,000 sucres (£1,080,800). It should be said that the difficulties in regard to this debt arose from a feeling in Ecuador that the part assigned to it in 1830 was much too large, and that it was contracted alrnost wholly for the benefit of the two northern republics, Colombia and Venezuela.

Money and Measures. — Under the law of 1898, which came into effect on the 4th. of June 1900, gold is made the monetary standard in Ecuador, the legal tender of silver being limited to 10 sucres, and banks of issue being required to hold at least one-half their metallic reserves in gold coin. Previously there had been much confusion in the circulating medium because of the depreciated value of the Quito currency in comparison with that of Guayaquil, but the new law has corrected the anomaly and has giv^n a simple and uniform medium

for the whole country. The coinage under the law of 1898 consists of the gold condor, of 10 sucres, which weighs 8-136 grams, contains 7-3224 grams of fine gold, and is equal to the English pound sterling in value; the silver sucre, of 100 centavos, equivalent to 24d. in value ; and smaller coins of silver, nickel and copper, the denominations being decimal parts of the sucre. The sucre received its name from the portrait of General Sucre engraved on the coin, and is legal tender up to 10 sucres. The paper money circulation consists of the issues of two Guayaquil banks — the Banco del Ecuador, and the Banco Comercial y Agricola, whose united issues on June 30th, 1906, amounted to 7,414,140 sucres (£741,414). The Bank of Quito at one time issued notes which, according to Whymper, were not current at and south of Rio- bamba, but it does not appear that this bank is authorized to issue its notes under the new law. The metallic money nominally in circulation on the 30th of June 1906, amounted to 2,587,667 sucres gold and 2,522,802 sucres silver. Although the metric system was adopted in 1856, the old Spanish weights and measures — the quintal, libra, vara and fanega — are still in use, the quintal being equivalent to about 101 lb.

Antiquities. — Throughout Ecuador there are still considerable remains of the architectural and artistic skill of the ante-European period. At Cafiar, to the north-east of Cuenca, stands the Incapirca, a circular rampart of finely hewn stone, enclosing an open area with a roofless but well-preserved building in the centre; not far off is the Inca-chungana, a very much smaller enclosure, probably the remains of a pavilion ; and in the same neighbourhood the image of the sun and a small cabinet are carved on the face of a rock called Inti-huaicu. On one of the hills running from Pichincha to the Esmeraldas there are remains at Paltatamba of a temple and a conical tower, the buttresses of a bridge composed of stone and bitumen, portions of a great causeway, and numerous tombs from which mummies and plates of silver have been obtained. At Hantuntaqui similar sepulchral mounds, called tolas, may be seen, as well as traces of military structures. On the plain of Callo, near Cotopaxi, at a height of 8658 ft., the ruins of an Incarial palace, Pachusala, are utilized by the hacienda; and a conical hill at its side is supposed to

be of artificial construction. The remains of another fortress and palace are preserved at Pomallacta, and in the neighbouring pueblo

of Achupallas an ancient temple of the sun now serves as parish church. In many localities, especially in Imbabura, pottery and various objects are found belonging to the pre-Colombian period, among which five and six rayed stars (casse-tites) are very numerous. (A. J. L.)

History. — The territory of the republic of Ecuador, when first it becomes dimly visible in the grey dawn of American history, appears to be inhabited by upwards of fifty independent tribes, among which the Quitus seem to hold the most important position. About a.d. 280 a foreign tribe is said to have forced their way inland up the valley of the Esmeraldas; and the kingdom which they founded at Quito lasted for about 1200 years, and was gradually extended, both by war and alliance, over many of the neighbouring dominions. In 1460, during the reign of the fourteenth Car an Shyri, or king of the Cara nation, Hualcopo Duchisela, the conquest of Quito was undertaken by Tupac Yupanqui, the Inca of Peru; and his ambitious schemes were, not long after his death, successfully carried out by his son Huayna-Capac, who inflicted a decisive defeat on the Quitonians in the battle of Hatuntaqui, and secured his position by marrying Pacha, the daughter of the late Shyri. By his will the conqueror left the kingdom of Quito to Atahuallpa, his son by this alliance; while the Peruvian throne was assigned to Huascar, an elder son by his Peruvian consort. War soon broke out between the two kingdoms, owing to Huascar's pretensions to supremacy over his brother; but it ended in the defeat and imprisonment of the usurper, and the establishment of Atahuallpa as master both of Quito and Cuzco. The fortunate monarch, however, had not long to enjoy his success; for Pizarro and his Spaniards were already at the door, and by IS33 the fate of the country was sealed. As soon as the confusions and rivalries of the first occupation were suppressed, the recent kingdom of Quito was made a presidency of the Spanish viceroyalty of Peru, and no change of importance took place till 17 10. In that year it was attached to the viceroyalty of Santa Fe; but it was restored to Peru in 1722. When, towards the close of the century, the desire for independence began to manifest itself throughout the Spanish colonies of South America, Quito did not remain altogether indifferent. The Quitonian doctor Eugenio Espejo, and his fellow-citizen Don Juan Pio Montufar, entered into hearty co- operation with Nariflo and Zea, the leaders of the revolutionary movement at Santa Fe; and it was at Espejo's suggestion that the political association called the Escuela de Concordia was instituted at Quito. It was not till 1809, however, that the Quitonians made a real attempt to throw off the Spanish yoke; and both on that occasion and in 18 12 the royal general

succeeded in crushing the insurrection. In 1820 the people of Guayaquil took up the cry of liberty; and in spite of several defeats they continued the contest, till at length, under Antonio Jos6 de Sucre, who had been sent to their assistance by Bolivar, and reinforced by a Peruvian contingent under Andres de Santa Cruz, they gained a complete victory on May 22, 1822, in a battle fought on the side of Mount Pichincha, at a height of 10,200 ft. above the sea. Two days after, the Spanish president of Quito, Don Melchor de Aymeric, capitulated, and the independence of the country was secured. A political union was at once effected with New Granada and Venezuela on the basis of the republican constitution instituted at Cucuta in July 1821 — the triple con- federation taking the name of Colombia.

A disagreement with Peru in 1828 resulted in the invasion of Ecuador and the temporary occupation of Cuenca and Guayaquil by Peruvian forces; but peace was restored in the following year after the Ecuadorian victory at Tarqui. In the early part of 1830 a separation was effected from the Colombian federation, and the country was proclaimed an independent republic. General Juan Jose Flores was the first president, and in spite of many difficulties, both domestic and foreign, he managed to maintain a powerful position in the state for about 15 years. Succeeded in 1835 by Vicente Rocafuerte, he regained the pre- sidency in 1839, and was elected for the third time in 1843; but shortly afterwards he accepted the title of generalissimo and a

sum of 20,000 pesos, and left the country to his rivals. One of the most important measures of his second presidency was the establishment of peace and friendship with Spain. Roca, who next attained to power, effected a temporary settlement with Colombia, concluded a convention with England against the slave trade, and made a commercial treaty with Belgium. Diego Noboa, elected in 1850 after a period of great confusion, recalled the Jesuits, produced a rupture with New Granada by receiving conservative refugees, and thus brought about his own deposition and exile. The democratic Urbina now became practically dictator, and as the attempt of Flores to reinstate Noboa proved a total failure, he was quickly succeeded in 1856 by General Francisco Robles, who, among other progressive measures, secured the adoption of the French system of coinage, weights and measures. He abdicated in 1859 and left the country, after refusing to ratify the treaty with Peru, by which the defender of Guayaquil had obtained the raising of the siege. Dr Gabriel Garcia Moreno, professor of chemistry, the recognized leader of the conservative party at Quito, was ultimately elected by the national

convention of 1 86 1 . Distrust in his policy, however, was excited by the publication of some of his private correspondence, in which he spoke favourably of a French protectorate, and the army which he sent under Flores to resist the encroachments of Mosquera, the president of New Granada, was completely routed. His first resignation in 1864 was refused; but the despotic acts by which he sought to establish a dictatorship only embittered his opponents, and in September 1865 he retired from office. While he had endeavoured to develop the material resources of the country, he had at the same time introduced retrograde measures in regard to religion and education. The principal event in the short presidency of his successor, Ger6nimo Carridii (May 1865-Nov. 1867), was the alliance with Chile and Peru against Spain, and the banishment of all Spanish subjects. Several important changes were made by congress in the period between his resignation and the election of Xavier Espinosa, January 1868: the power of the president to imprison persons regarded as dangerous to public order was annulled; and the immediate naturalization of Bolivians, Chilians, Peruvians and Colombians was authorized. Espinosa had hardly entered on his office when, in August 1868, the country was visited by an earth- quake, in which 30,000 people are said to have perished through- out South America. The public buildings of Quito were laid in ruins; and Ibarra, Otavalo, Cotacachi and several other towns were completely destroyed. Next year a revolution at Quito, under Moreno, brought Espinosa 's presidency to a close; and though the national convention appointed Carvajal to the vacant office, Moreno succeeded in securing his own election in 1870 for a term of six years. His policy had undergone no alteration since 1865: the same persistent endeavour was made to establish a religious despotism, in which the supremacy of the president should be subordinate only to the higher supremacy of the clergy. President Moreno was eventually assassinated at Quito, in August 1875, and Dr Borrero was elected to the presidency, but his tenure of power was short. A revolution headed by General Veintemilla, the Radical leader, then military commandant at Guayaquil, broke out in 1876, and on the 14th of December of that year the government forces under General Aparicio were completely routed at Galte. Veintemilla was proclaimed presi- dent, and in 1877 was duly elected by the cortes. He altered the constitution in a more Liberal direction, and struck various blows at the Clerical party, among other things abolishing the concordat with Rome. In 1878 Veintemilla caused himself to be declared elected as president for a term of four years. At the expiration of this period the president assumed dictatorial powers and remained in office as chief of the executive. This action on the part of General Veintemilla led to

a union between the Clericals and Moderate Liberals, and resulted in a popular rising throughout the republic, ending in his defeat and overthrow. His power was first restricted to Guayaquil and Esmeraldas, and finally General Rinaldo Flores drove him from Guayaquil, and Veintemilla fled (July 1883) to Peru. Dr Placido Caamafio was then called upon to take charge temporarily, and on the 17 th of

February 1884 was definitely elected for the presidential period terminating in 1888. Several revolutionary outbreaks occurred during the Caamafio administration, but were successfully suppressed. In 1888 Dr Antonio Flores succeeded Caamafio, the four years following being passed in peaceful conditions. In 1892 Dr Luis Cordero was elected, his administration again plunging the country into an epoch of internal disturbance.

The cause of the troubles under President Cordero was the assistance lent by Ecuador to Chile in the matter of the sale of the cruiser Esmeralda to the Japanese government in 1894, in the middle of the Japanese-Chinese War. The government of Chile arranged the sale of the Esmeralda, but wished to be free from all danger of international complications in the affair. To this end the transfer of the vessel was made to Ecuador, and she proceeded to Ecuadorian waters. On arriving at the Galapagos Islands the flag of Ecuador was replaced by that of Japan and the vessel handed over to the representatives of that nation sent for the purpose. When the part played by President Cordero in this transaction became known, an outburst of popular indignation occurred. An insurrection, headed by General Eloy Alfaro, followed; and after desultory skirmishing extending over a period of nearly a year the government forces were finally routed, President Cordero abandoning his office and escaping from the country.

General Alfaro then assumed dictatorial powers as supreme chief of the nation, continuing in this capacity until the 6th of February 1897, on which date he was declared to be elected president of the republic. A series of revolutionary movements against the administration of President Alfaro occurred in the course of the next few years. Many of these risings were due to the intrigues of the Church party, and in view of these circum- stances President Alfaro curtailed the influence of the clergy in several directions. On the 31st

of August 1901 General Alfaro peacefully handed over the presidency to his elected successor, General Leonidas Plaza.

General Plaza continued the anticlerical policy of his pre- decessor. Civil marriage and divorce were introduced, and in 1904 all religions were placed on a position of equality in the eye of the law, and the foundation of new monasteries and convents was forbidden. The final year of Plaza's tenure of office was marked by a still stronger measure, all the property of the church being declared to be national property, and let to the highest bidders. In 1905 the Opposition made an effort to effect a change of policy, and were successful in obtaining the election of Lizaro Garcia, a well-to-do merchant and a director of the Banco com- mercial y Agricola. General Alfaro, however, appealed to arms, ejected Garcia from office, and made himself ruler with practically dictatorial powers.

The more recent history of Ecuador would not be complete without a reference to the work of Mr Archer Harman (b. i860), an American railway builder and financier whose connexion with the construction of the Guayaquil and Quito railway began in 1897. To his personal energy and enterprise, as manager of the railway company, was largely due the continued prosecution of this difficult engineering undertaking, in connexion with which he was responsible for a thorough reconstruction of Ecuador finance. He thus came to exercise a powerful influence on the internal progress of the country.

See C. E. Akers, History of South America, 1854-1904 (London, 1904); H. W. Bates, Central and South America (London, 1882); Pedro F. Cevallos, Resumen de la historia del Ecuador (Guayaquil, 1886) ; Hans Meyer, In den Hoch-Anden von Ecuador (Berlin 1907) ; A. H. Keane, Stanford's Compendium, vol. i. (1904) ; W. Reiss and A. Stiibel, Das Hochgebirge der Republik Ecuador (Berlin, 1892-1898); Edward Whymper, Travels amongst the Great Andes of the Equator (London, 1892); T. Wolf, Geografia y geologia del Ecuador (Leipzig, 1892); A. Stiibel, Skizzen aus Ecuador (Berlin, 1886); Die Vulkanberge von Ecuador (Berlin, 1897); Handbook of Ecuador (Bureau of the American Republics, Washington, 1892) ; The World's Work, vol. ii. pp. 1271-1277; Engineering News (New York), vol. 52, pp. 117-119; Bulletin of Internat. Bureau of American Republics for July 1900, p. 26, and for August 1908, pp. 280-282; Thirty-fifth Annual Report of the Council of Foreign Bondholders, pp. 115, 117.

ECZEMA (Gr. frcfe/ia, a cutaneous eruption), one of the most common and important of all skin diseases, consisting of a catarrhal

inflammation of the skin originating without visible external irritation, and characterized in some stage of its evolution by a serous exudation. This definition excludes all those forms of inflammation of the skin (dermatitis) , which though they may be identical in course and manifestation are yet caused by chemical or mechanical irritants. For an attack of eczema two conditions are necessary: a predisposition or special irrita- bility of the skin, and a directly exciting cause. The first of these conditions is usually inherited or depends on some underlying constitutional state. Thus any organic lesion which may produce oedema and malnutrition of the cutis and epidermis as in kidney diseases, any condition of imperfect metabolism as in dyspepsia or malnutrition, or seborrhoea, may be the predisposing cause. Another influence that has received increasing attention from skin specialists is that of any nervous shock or prolonged mental strain. A " chill " is followed in most people by an ordinary cold, but in some by an attack of eczema. Again, it may be caused by reflex nervous irritation from the uterus, stomach, &c. In some women it always accompanies menstruation, and in others pregnancy. It is of common occurrence in infancy, being attributed by some specialists to dentition, but by others to seborrhoea. Also there is an undoubted relationship between eczema and certain forms of functional neurosis, of which perhaps asthma is the most striking illustration, some physicians con- sidering the latter trouble to be eczema of the bronchial tubes. Sufferers from rheumatism and gout are also specially prone to eczema, though the exact relationship is a much disputed point. There are yet other cases that are undoubtedly microbic, but the micro-organism cannot produce the lesion unless the soil is suitable. As a rule it is net contagious, though when complicated by micro-organisms it may be auto-inoculable, or more rarely inoculable from one patient to another. Except between the ages of ten and twenty years when menstruation is becoming established, and again at the menopause, males are more liable to be attacked than females. In old age the sex influence is lost.

An attack of eczema is usually described as acute or chronic, but the only distinction lies in the greater or less intensity of the inflammation at the time of description : it has nothing to do with the length of time that the disease has lasted. The illness usually begins with a feeling of itching and burning at the site of the lesion. The skin becomes covered with an erythematous blush, on which numerous tiny vesicles form. Swelling, heat, redness and tension are all present. The vesicles grow larger, run together, and either burst or are broken by the patient's scratchr ing, a clear fluid exuding which

stiffens linen. The discharge does not dry up at once, but continues to exude — hence the name of " weeping eczema " when this is a prominent symptom. In mild cases the symptoms begin to subside in a few days, the exudation growing less and scales and scabs forming, under which new skin is formed. But where the attack is more acute fresh crops of vesicles spring up and the process repeats itself. In some cases papules are the predominant lesions, but in others, especially when the face is attacked, the erythematous condition is more marked. A severe attack of eczema is usually accompanied by some slight constitutional disturbance, but the general health seldom suffers appreciably, unless, as occasionally, the itching is so bad as to make sleep impossible. The irritation and local heat may be out of all proportion to visible changes in the skin, and in neurotic patients the nervous excitement may be extreme. The attack may centre itself on any part of the body, but there are certain places where it more usually begins, such as the bends of the elbows, the backs of the knees and the groins; the groove behind the ears, the scalp, the palms or the soles, and the breasts of women. According to its position the form of the eczema is somewhat modified. On the front of the legs and arms, from the uniform redness it exhibits in these positions, it is known as eczema rubrum. On the scalp it is generally of the seborrhoeic type, and in children; especially when pediculi are present, it will become pustular from microbic infection. On the palms and soles it brings about a thickening

of the epidermis which leads to the formation of cracks, and is hence called eczema rimosum.

The disease can best be treated by a combination of internal and external remedies. Internally, when the inflammation is acute, nothing is so good as antimony, since this relieves the arterial tension and thus reduces the local inflammation. But this must never be given when the patient is suffering from depression. In other cases, especially for babies and children, small doses of calomel are very beneficial; strychnine, phosphorus and ergot are all useful at times. When nervous excitement is marked it must be treated with sedatives. Arsenic and iron are both contra- indicated in this disease, since they increase blood formation and hence stimulate the eczematous process. Internal treatment is always best when combined with local treatment, but as a preliminary to this all crusts and scales must first be removed to allow the remedy free access to

the disease. Locally the aim is (1) to overcome any source of irritation, (2) to protect the inflamed surface from the air and from microbic infection, and (3) to relieve the itching. The diet should be simple but nourishing, and all hygienic precautions must be taken.

EDAM, a town of Holland in the province of North Holland, close to the Zuider Zee, about 13 m. N.N.E.. of Amsterdam by steam tramway. It is connected with the Zuider Zee by a fine canal protected by a large sea-lock (1828), and has regular steam-boat communication in various directions. Pop. (1900) 6444. The many quaint old brick houses form the chief feature of interest in the town. The facades are frequently adorned with carvings and inscriptions, one of which records the legend of the capture of a siren in 1403, who lived for some time among the people of Edam, but escaped again to the sea. The Great Church of St Nicholas, probably founded in the 14th century, was largely rebuilt after a fire in 1602, which, originating in the church, destroyed nearly the whole town. It contains some fine stained glass and carved woodwork of this period. The Little Church (15th century) was demolished in 1883, except for a portion of the nave and the old tower and steeple, from which the bells curiously project. The town hall dates from 1737, and there is a museum founded in 1895. Edam has some trade in timber, while shipbuilding, rope-spinning and salt-boiling are also carried on. It gives its name to the descrip- tion of " sweet-milk cheese " (zoetemelks kaas) made throughout North Holland, which is familiar on account of its round shape and red rind.

Edam took its name and origin from the dam built on the little river Ye which joined the great Purmer lake close by. Free access to the Zuider Zee was obtained by the construction of a new dock in 1357, in which year the town also received civic rights from William V. of Bavaria, count of Holland. Owing to the danger of the extension of the Purmer and Beemster lakes, Philip II. of Spain caused a sluice to be built into the dock in 1 567 . In the next century Edam was a great shipbuilding centre, and nearly the whole of Admiral de Ruyter's fleet was built here; but in the same century the harbour began to get blocked up, and the importance and industrial activity of the city slowly waned.

EDDA, the title given to two very remarkable collections of old Icelandic literature. Of these only one bears that title from antiquity; the other is called Edda by a comparatively modern misnomer. The word is unknown to any ancient northern language, and is first met with in Rigspula, a fragmentary poem at the end of Codex Wormianus, dated about 1200, where it is introduced as the name or

title of a great-grandmother. From the 14th to the 17 th century, this word — but no one has formed a reasonable conjecture why — was used to signify the technical laws of Icelandic court metre, Eddu regla, and " Never to have seen Edda " was a modest apology for ignorance of the highest poetic art. The only work known by this name to the ancients was the miscellaneous group of writings put together by Snorri Sturlason (q.v.; 1178-1241), the greatest name in old Scandi- navian literature. It is believed that the Edda, as he left it, was completed about 1222. Whether he gave this name to the work is doubtful; the title first occurs in the Upsala Codex, transcribed about fifty years after his death. The collection

of Snorri is now known as the Prose or Younger Edda, the title of the Elder Edda being given to a book of ancient mythological poems, discovered by the Icelandic bishop of Skalaholt, Brynjulf Sveinsson, in 1643, and erroneously named by him the Edda of Saemund.

1. The Prose Edda, properly known as Edda Snorra Sturlu- sonar, was arranged and modified by Snorri, but actually com- posed, as has been conjectured, between the years 1 140 and 1160. It is divided into five parts, the Preface or Formali, Gylfaginning, BragaraeSur, Skdldskaparmdl and Hdttatal. The preface bears a very modern character, and simply gives a history of the world from Adam and Eve, in accordance with the Christian tradition. Gylfaginning, or the Delusion of Gylfi, on the other hand, is the most precious compendium which we possess of the mythological system of the ancient inhabitants of Scandinavia. Commencing with the adventures of a mythical king Gylfi and the giantess Gefion, and the miraculous formation of the island of Zealand, it tells us that the Aesir, led by Odin, invaded Svithjod or Sweden, the land of Gylfi, and settled there. It is from the Ynglingasaga and from the Gylfaginning that we gain all the information we possess about the conquering deities or heroes who set their stamp upon the religion of the North. Advancing from the Black Sea northwards through Russia, and westward through Esthonia, the Aesir seem to have overrun the south lands of Scandinavia, not as a horde but as an immigrant aristocracy. The Eddaic version, however, of the history of the gods is not so circumstantial as that in the Ynglingasaga; it is, on the other hand, distinguished by an exquisite simplicity and archaic force of style, which give an entirely classical character to its mythical legends of Odin and of Loki. The Gylfaginning is written in prose, with brief poetic insertions. The Bragaraeftur, or sayings of Bragi, are further legends of the deities, attributed to Bragi, the god of poetry, or to a poet of the same name. The Skdldska- parmdl, or Art of Poetry, commonly called Skdlda, contains the instructions

given by Bragi to Aegir, and consists of the rules and theories of ancient verse, exemplified in copious extracts from Eyvindr Skaldaspillir and other eminent Icelandic poets. The word Skdldskapr refers to the form rather than the substance of verse, and this treatise is almost solely technical in character. It is by far the largest of the sections of the Edda of Snorri, and comprises not only extracts but some long poems, notably the Thorsdrapaol Eilifr GuSrtinarsonand iheHaustlaungoi Thjo&olfr. The fifth section of the Edda, the Hdttatal, or Number of Metres, is a running technical commentary on the text of Snorri's three poems written in honour of Haakon, king of Norway. Affixed to some MS. of the Younger Edda are a list of poets, and a number of philological treatises and grammatical studies. These belong, however, to a later period than the life of Snorri Sturlason.

The three oldest MSS. of the prose Edda all belong to the beginning of the 14th century. The Wurm MS. was sent to Ole Wurm in 1628; the Codex Regius was discovered by the indefatigable bishop Brynjulf Sveinsson in 1640. The most important, however, of these MSS. is the Upsala Codex, an octavo volume written probably about the year 1300. There have been several good editions of the Edda Snorra Sturlusonar, of which perhaps the best is that published by the Arne-Magnaean Society in Copenhagen in 1 848-1852, in two vols., edited by a group of scholars under the direction of Jon Sigurdsson. There are English translations by T. Percy, Northern Antiquities, from the French by P. H. Mallet (1770); by G. Webbe Dasent (Stockholm, 1842); by R. B. Anderson (Chicago, 1880).

2. The Elder Edda, Poetic Edda or Saemundar Edda kins frofia was entirely unknown until about 1643, when it came into the hands of Brynjulf Sveinsson, who, puzzled to classify it, gave it the title of EddaSaemundi multiscii. Saemund Sigf usson, who was thus credited with the collection of these poems, was a scion of the royal house of Norway, and lived from about 1055 to 1132 in Iceland. The poems themselves date in all probability from the 10th and nth centuries, and are many of them only fragments of longer heroic chants now otherwise entirely lost. They treat of mythical and religious legends of an early Scandi- navian civilization, and are composed in the simplest and most archaic forms of Icelandic verse. The author of no one of them is mentioned. It is evident that they were collected from oral tradition; and the fact that the same story is occasionally

repeated, in varied form, and that some of the poems themselves bear internal evidence of being more ancient than otners, proves that the present collection is only a gathering made early in the middle ages, long after the composition of the pieces, and in no critical spirit. Sophus Bugge, indeed, one of the greatest authorities, absolutely rejects the name of Saemund, and is of opinion that the poetic Edda, as we at present hold it, dates from about 1240. There is no doubt that it was collected in Iceland, and by an Icelander.

The most remarkable and the most ancient of the poems in this priceless collection is that with which it commences, the Voluspd, or prophecy of the Volva or Sibyl. In this chant we listen to an inspired prophetess, " seated on her high seat, and addressing Odin, while the gods listen to her words."

She sings of the world before the gods were made, of the coming and the meeting of the Aesir, of the origin of the giants, dwarfs and men, of the happy beginning of all things, and the sad ending that shall be in the chaos of Ragnarok. The latter part of the poem is understood to be a kind of necromancy — according to Vigfusson, " the raising of a dead volva "; but the mystical language of the whole, its abrupt transitions and terse condensations, and above all the extinct and mysterious cosmology, an acquaintance with which it presupposes, make the exact interpretation of the Voluspd extremely difficult. The charm and solemn beauty of the style, however, are irresist- ible, and we are constrained to listen and revere as if we were the auditors of some fugual music devised in honour of a primal and long-buried deity. The melodies of this earliest Icelandic verse, elaborate in their extreme and severe simplicity, are wholly rhythmical and alliterative, and return upon themselves like a solemn incantation. Hdvamdl, the Lesson of the High One, or Odin, follows next; this contains proverbs and wise saws, and a series of stories, some of them comical, told by Odin against himself. The Vafprii&nismdl, or Lesson of VafpruSnir, is written in the same mystical vein as Voluspd; in it the giant who gives his name to the poem is visited by Odin in disguise, and is questioned by him about the cosmogony and chronology of the Norse religion. Grimnismdl, or the Sayings of The Hooded One, which is partly in prose, is a story of Odin's im- prisonment and torture by King Geirrod. For Skimis, or the Journey of Skirnir, HarbarSslidft, or the Lay of Hoarbeard, HymiskviSa, or the Song of Hymir, and Aegisdrekka, or the Brewing of Aegir, are poems, frequently composed as dialogue, containing legends of the gods, some of which are so ludicrous that it has been suggested that they were intentionally burlesque. ThrymskviSa, or the Song of Thrym, possesses far more poetic interest ; it recounts in language of

singular force and directness how Thor lost his hammer, stolen by Thrym the giant, how the latter refused to give it up unless the goddess Freyia was given him in marriage, and how Thor, dressed in women's raiment, personated Freyia, and, slaying Thrym, recovered his hammer. Alvissmdl, or the Wisdom of Allwise, is actually a philological exercise under the semblance of a dialogue between Thor and Alvis the dwarf. In VegtamskviSa, or the Song of Vegtam, Odin questions a volva with regard to the meaning of the sinister dreams of Balder. Rigsmdl, or more properly Rigspula, records how the god Heimdall, disguised as a man called Rig, wandered by the sea-shore, where he met the original dwarf pair, Ai and Edda, to whom he gave the power of child-bearing, and thence sprung the whole race of thralls; then he went on and met with An and Amma, and made them the parents of the race of churls; then he proceeded until he came to Faoir and Mooir, to whom he gave Jarl, the first of free men, whom he himself brought up, teaching him to shoot and snare, and to use the sword and runes. It is much to be lamented that of this most characteristic and picturesque poem we possess only a fragment. In HytidluljdS, the Lay of Hyndla, the goddess Freyia rides to question the volva Hyndla with regard to the ancestry of her young paramour Ottar; a very fine quarrel ensues between the prophetess and her visitor. With this poem, the first or wholly mythological portion of the collection closes. What follows is heroic and pseudo-historic. The VolundarkviSa, or Song of Volundr, is

engaged with the adventures of Volundr, the smith-king, during his stay with Nidud, king of Sweden. Volundr, identical with the Anglo-Saxon Weland and the German Wieland (O.H.G. Wiolant), issometimes confusedwithOdin,themaster-smith. This poem contains the beautiful figure of Svanhvit, the swan-maiden, who stays seven winters with Volundr, and then, yearning for her fatherland, flies away home through the dark forest. Helga- hn&a, HidrvarSs sonar, the Song of Helgi, the Son of HiorvarS, which is largely in prose, celebrates the wooing by Helgi of Svava, who, like Atalanta, ends by loving the man with whom she has fought in battle. Two Songs of Helgi the Hunding's Bane, Helgakw&a Hundingsbana, open the long and very im- portant series of lays relating to the two heroic families of the Volsungs and the Niblungs. Including the poems just mentioned, there are about twenty distinct pieces in the poetic Edda which deal more or less directly with this chain of stories. It is hardly necessary to give the titles of these poems here in detail, especially as they are, in their present form, manifestly oniy fragments of a great poetic saga, possibly the earliest coherent form of the story so universal among the Teutonic peoples. We happily possess a

somewhat later prose version of this lost poem in the V olsungasaga, where the story is completely worked out. In many places the prose of the V olsungasaga follows the verse of the Eddaic fragments with the greatest precision, often making use of the very same expressions. At the same time there are poems in the Edda which the author of the saga does not seem to have seen. But if we compare the central portions of the myth, namely Sigurd's conversation with Fafnir, the death of Regin, the speech of the birds and the meeting with the Valkyrje, we are struck with the extreme fidelity of the prose romancer to his poetic precursors in the SigurftarkvvSa Fafnis- bana; in passing on to the death of Sigurd, we perceive that the version in the V olsungasaga must be based upon a poem now entirely lost. Of the origin of the myth and its independent development in medieval Germany, this is not the place for dis- cussion (see Nibelungenlied) . Suffice to say that in no modern- ized or Germanized form does the legend attain such an exquisite colouring of heroic poetry as in these earliest fragments of Ice- landic song. A very curious poem, in some MSS. attributed directly to Saemund, is the Song of the Sun, S6larli&8, which forms a kind of appendix to the poetic Edda. In this the spirit of a dead father addresses his living son, and exhorts him, with maxims that resemble those of Hdvamdl, to righteousness of life. The tone of the poem is strangely confused between Christianity and Paganism, and it has been assumed to be the composition of a writer in the act of transition between the old creed and the new. It may, however, not impossibly, be alto- gether spurious as a poem of great antiquity, and may merely be the production of some Icelandic monk, anxious to imitate the Eddaic form and spirit. Finally Forspjallsljd<5, or the Preamble, formerly known as the Song of Odin's Raven, is an extremely obscure fragment, of which little is understood, although infinite scholarship has been expended on it. With this the poetic Edda closes.

The principal MS. of this Edda is the Godex Regius in the royal library at Copenhagen, written continuously, without regard to prose or verse, on 45 vellum leaves. This is that found by Bishop Brynjulf. Another valuable fragment exists in the Arne-Magnaean collection in the University of Copenhagen, consisting of four sheets, 22 leaves in all. These are the only MSS. older than the 17th century which contain a collection of the ancient mythico-heroic lays, but fragments occur in various other works, and especially in the .Edda of Snorri. It is believed to have been written between 1260 and 1280. The poetic Edda was translated into English verse by Amos Cottle in 1797; the poet Gray produced a version of the VegtamshiUSa; but the first good translation of the whole was that

published by Benjamin Thorpe in 1866. An excellent edition of the Icelandic text has been prepared by Th. Mobius, but the standard of the original orthography will be found in the admirable edition of Sophus Bugge, Norroen FornkvaeSi, published at Christiania in 1867.

The Eddaic poems were rearranged, on a system of their own which differs entirely from that of the early MSS., by Gudbrand Vigfusson and F. York Powell, in their Corpus poeticum boreale (Oxford, 1883). This is a collection, not of Edda only but of all existing fragments of the vast lyrical literature of ancient Iceland. It supplies a prose translation. (E. G.)

EDDIUS (Aeddi), a Kentish choirmaster, summoned by Wilfrid (c. 634-709), bishop of York, to help in organizing church services in Northumbria. He wrote the Life of his patron, and this biography of St Wilfrid is the earliest extant historical work compiled by an Anglo-Saxon author. He is a strong partisan and very credulous, but the Vita Wilfridi is nevertheless invalu- able for the period it treats. Its date is little after the first decade of the 8th century, and it was used by Bede in compiling his Historia.

See Eddius, Vila Wilfridi (Raine, Historians of Church of York, London, 1 879-1 894), 14; Bede, Hist. Eccl. (Plummer, Oxford, 1896), iii. 2.

EDELINCK, GERARD (1640-1707), Flemish copper-plate engraver, was born at Antwerp. The rudiments of the art, which he was to carry to a higher pitch of excellence than it had previously reached, he acquired in his native town under the engraver Cornelisz Galle. But he was not long in reaching the limits of his master's attainments; and then he went to Paris to improve himself under the teaching of De Poilly. This master likewise had soon done all he could to help him onwards, and Edelinck ultimately took the first rank among line engravers. His excellence was generally acknowledged; and having become known to Louis XIV. he was appointed, on the recommendation of Le Brun, teacher at the academy established at the Gobelins for the training of workers in tapestry. He was also entrusted with the execution of several important works. In 1677 he was admitted member of the Paris Academy of Painting and Sculp- ture. The work of this great

engraver constitutes an epoch in the art. His prints number more than four hundred.

Edelinck stands above and apart from his predecessors and contemporaries in that he excelled, not in some one respect, but in all respects, — that while one engraver attained excellence in correct form, and another in rendering light and shade, and others in giving colour to their prints and the texture of surfaces, he, as supreme master of the burin, possessed and displayed all these separate qualities, in so complete a harmony that the eye is not attracted by any one of them in particular, but rests in the satisfying whole. Edelinck was the first to break through the custom of making prints square, and to execute them in the lozenge shape. Among his most famous works are a " Holy Family," after Raphael; a " Penitent Magdalene," after Charles le Brun; " Alexander at -the Tent of Darius," after Le Brun; a " Combat of Four Knights," after Leonardo da Vinci; " Christ surrounded with Angels "; " St Louis praying "; and " St Charles Borromeo before a crucifix," — the last three after Le Brun. Edelinck was especially good as an engraver of portraits, and executed prints of many of the most eminent persons of his time. Among these are those of Le Brun, Rigaud, Philippe de Champagne (which the engraver thought his best), Santeuil, La Fontaine, Colbert, John Dryden, Descartes, &c. He died at Paris in 1707. His younger brother John, and his son Nicholas, were also engravers, but did not attain to his excellence.

EDELWEISS, known botanically as Leonto podium alpinum, a member of the family Compositae, a native of the Alps of Central Europe. It is a small herb reaching about 6 in. high, with narrow white woolly leaves, and terminal flower-heads enveloped in woolly bracts. The woolly covering enables the plant to thrive in the exposed situations in which it is found, by protecting it from cold and from drying up through excessive loss of moisture. It is grown in Britain as a rock- plant.

EDEN, SIR ASHLEY (1831-1887), Anglo-Indian official and diplomatist, third son of Robert John Eden, third Lord Auckland and bishop of Bath and Wells, was born on the 13th of November 183 1, and was educated at Rugby, Winchester and the East India Company's college at Haileybury, entering the Indian civil service in 1852. In 1855 he gained distinction as assistant to the special commissioner for the suppression of the Santal rising, and in i860 was appointed secretary to the Bengal government with an ex officio seat on the legislative council, a position he held for eleven years. In 1861 he negotiated, as

political agent, a treaty with the raja of Sikkim. His success led to his being sent on a similar mission to Bhutan in 1863; but, being unaccompanied by any armed force, his demands were rejected and he was forced under circumstances of personal insult to come to an arrangement highly favourable to the Bhutias. The result was the repudiation of the treaty by the Indian government and the declaration of war against Bhutan. In 1871 Eden became the first civilian governor of British Burma, which post he held until his appointment in 1877 as lieutenant-governor of Bengal. In 1878 he was made a K.C.S.I., and in 1882 resigned the lieutenant-governorship and returned to England on his appointment to the council of the secretary of state for India, of which he remained a member till his death on the 8th of July 1887. The success of his administration of Bengal was attested t>y the statue erected in his honour at Calcutta after his retirement.

EDEN, the name of the region in which, according to the Hebrew paradise-tradition in its present form, God planted a garden (or park), wherein he put the man whom he had formed (Gen. ii. 8). Research into primitive beliefs, guided by the comparative method, leads to the view that the " garden " was originally a celestial locality (see Paradise), and we cannot therefore be surprised if, now that paradise has been brought down to earth, the geographical details given in the Bible are rather difficult to work into a consistent picture. The fantastic geography of the (Indian) Vishnu Purana and the (Iranian) Bundahish will, in this case, be a striking parallel.

Let us now take the details of Eden as they occur. In Gen. ii. 8 we read that the garden lay " in Eden eastward," where " eastward " is generally taken to mean " in the east of theearth." This, however, seems inconsistent with Isa. xiv. 13, where the " mountain of God," which corresponds (see Ezek: xxviii. 13,14 and the article Adam) to the " garden in Eden," is said to have been " in the uttermost parts of the north " (so R.V.). The former statement (" eastward ".) suits Babylonia, where Friedrich Delitzsch 1 places Eden; the latter does not. We are further told (v. 10) that " a river went out from Eden to water the garden," and that " from thence it parted itself (.?), and became four heads (?)," which is commonly understood to mean that the river was so large that, soon after leaving the garden (" from thence " is all that the text says), it could still supply four considerable streams (the text says, not "streams," but "heads," i.e. - perhaps "beginnings" or "starting-points"). In w. n-14 the names of four rivers are given, but in spite of the descriptive supplements attached to three of them, only that one which has no supplement can be identified with much probability. In fact, Perath may without

any obvious difficulty be "Euphrates," except in Jer. xiii., where a more southerly stream seems indicated, but to the identification of " Hiddekel " with " Tigris " (Babylonian Diglat) the presence of the initial Hi in the Hebrew is an objection. Now as to " Pishon " and " Gihon." If a moderately early tradition may be trusted; the " Gihon " is another name for the " Shihor," which was either in or beside " Mizraim " (= Egypt) or Mizrim (= the North Arabian Musri), and indeed according to most scholars means the Nile in Jer. ii. 18, where the Septuagint substitutes for it Geon, i.e. Gihon. For " Pishon " few plausible suggestions have been made; it is not, however, a hopeless problem from the point of view which recognizes Eden in Arabia.

For details of the interesting descriptive supplements of the names Pishon, Gihon, and Hiddekel, on which there is much difference of opinion, it must suffice to refer to the Encyclopaedia Biblica and Has ting's Dictionary of the Bible. We must, however, mention a widely held explanation of the name Eden. Plausible as it is to interpret this name as "delight"— indeed, the Septuagint translates in Gen. iii. 23 f . 6 irapabtiaos rrjs rpvfjs — this cannot have been the original meaning. Hence Delitzsch (Wo lag das Parodies? p. 79) suggested that " Eden " might be a Hebraized form of the Babylonian edinu, " field, plain, desert." But whereas Delitzsch takes " Eden " to be the entire plain of

1 Wo lag das Paradies ? p. 66. A Sumerian name of Babylon was Tin-ter, " dwelling of life." Cf. Babilu, Babili, " gate of God."

Babylonia, Hommel thinks that it is rather the plain about the sacred city of Eridu. It is the latter scholar to whom the " Arabian theory" of Paradise in its best-known form is due. The rivers (apart from Perath, " Euphrates ") he locates in northern and central Arabia, the " Cush " and " Asshur " of Genesis being, according to him, central Arabia and Edom respectively (Ancient Hebrew Traditions, pp. 314-316; Aufsatze u. Abhandlungen, iii. 281-284, 335~3i9>- These rivers, in short, become Arabian wadis, on which see Hast. D.B. i. 132a (foot). Cheyne, on the other hand, rejects the Babylonian explanation of Eden as = " field, plain," on the ground that " Eden " was originally regarded as a mountainous tract.

See further Driver, Book of Genesis (1904), pp. 57-60; Ency. Bib. "

Paradise "; and the commentaries of Gunkel (2nd ed., 1902), and Cheyne (1907). . (T. K. C.)

EDENBRIDGE, a market town in the south-western parlia- mentary division of Kent, England, 26 m. S.S.E. of London, on the South-Eastern & Chatham, and the London, Brighton & South Coast railways. Pop. (1901) 2546. It is pleasantly situated on the river Eden, an affluent of the Medway, in a valley between the Ragstone Hills and the Forest Ridges. The church of St Peter and St Paul is principally Perpendicular. The town, which has considerable agricultural trade, possesses a chalybeate spring, but this is little used. Two miles from the town is Hever Castle, a beautiful moated mansion dating from the 15th and 16th centuries, but occupying the site of an earlier structure. This was rebuilt by Sir Geoffrey Boleyn, whose grandson, Sir Thomas, was father of Anne, second wife of Henry VIII., who here spent much of her life before her marriage, and was visited several times by the king. There is a chapel of her family in the fine parish church of Hever. Not far distant is the modern Chiddingstone Castle, on an ancient site. A block of sandstone in the park is called the " chiding stone," tradition asserting it to be a prehistoric seat of judgment.

EDEN HALL, LUCK OF, an old painted drinking goblet pre- served at Eden Hall, Cumberland, the seat of the Musgrave family. It is of enamelled or painted glass and is believed to date from the 10th century. It is of fair size and has the letters I.H.S. on the top. Round the vase is the famous verse given below. A legend involving the fortunes of the Musgraves attaches to this cup. In the grounds of Eden Hall is a spring called St Cuthbert's Well, and the story- is that one of the earliest of the Musgraves surprised the fairies feasting and making merry round the well. He snatched at the goblet from which the Fairy King was drinking and made off with it. The fairies pursued him to his castle, but failed to catch him. The Fairy King acknow- ledged his defeat and gave the cup as a prize to Musgrave, but warned him that the gift carried with it a condition: — " When this cup shall break or fall, Farewell the luck of Eden Hall."

There are variants of this legend, but substantially they agree. Possessed of the lucky cup the knight of Musgrave is said to have at once prospered in a love-suit which had till then gone against him. There is a curious poem on the cup called " The Drinking Match at Eden Hall," by Philip, duke of Wharton, a parody on the ballad of Chevy Chase. This is reprinted in full in Edward Walford's Tales of Great Families (1877, vol. n), under the heading, " The witty Duke of Wharton." In Longfellow's famous poem the goblet is represented

as having been broken.

EDENKOBEN, a town of Germany, in the Bavarian Palatinate, 6 m. N. from Landau, on the railway to Weissenburg. Pop. 5300. It has a Roman Catholic and a Protestant church, several high-grade schools and a sulphur-spring. Its industries com- prise linen- and damask-weaving, ironworks, and the manu- facture of machinery, furniture and cigars. It has also a considerable trade in wine.

EDENTATA, the name assigned by Cuvier to an order of placental mammals apparently typified by the South American anteater, but likewise including the sloths and armadillos of the same country, and the Old World aard-varks and pangolins. Only the anteaters and pangolins are absolutely without teeth (Lat. e, out, dens, tooth), and the name is strictly applicable

only to those two groups; but in all the existing representatives of the order teeth are absent from the front of the jaws, while, the cheek-teeth are devoid of roots arid of enamel, and only very exceptionally have deciduous predecessors. Practically this is all the definition that can be given to the assemblage, which is possibly an artificial one. It may be mentioned, however, that there is not unfrequently a separate coracoid bone.

Edentates may be divided into three distinct sections or suborders, firstly the Xenarthra, or Edentata Vera, of America, secondly the Tubulidenta, represented by the African aard-varks, and thirdly the Pholidota, which includes only the pangolins : common to Africa and Asia. The Xenarthra are essentially a South and Central American group, some of the members of which have effected an entrance into North America. The three families by which they are now represented are widely sundered, both as regards habits and structure; but two of them— the sloths and the anteaters — are intimately connected by means of the extinct ground-sloths. As regards the presumed relationship of the Old World to the New World types, it is noteworthy that in the early Tertiary deposits of France and Germany are found certain fossil remains apparently referable to armadillos, aard-, varks and pangolins, some of the armadillos coming very close- to South American forms. This assemblage of three groups of edentates in the countries fringing northern Africa is suggestive that the latter continent may have been the original home of the group, which reached South America by means of a direct land connexion.

Xenarthra. — The typical American edentates, or Xenarthra, are

characterized by the circumstance that the last dorsal and all the lumbar vertebrae carry additional articular facets, or abnormal articulations (xenarthral). Teeth may be absent or present, and when developed either all similar (homaeodont) or to some extent differentiated. The bodily covering may take the form either of coarse hairs, or of bony plates, with a larger or smaller intermixture of hairs.

Of the three existing families of this group, the first is that of the Bradypodidae, or sloths, characterized by the presence of five pairs of upper and four of lower teeth, the normally-formed tongue and the rudimentary tail. The species are arboreal and feed on leaves; all being confined to the forests of tropical America. Externally sloths are clothed with long coarse, crisp hair; the head is short and rounded, and the external ears inconspicuous. The teeth are subcylindrical, of persistent

Fig. 1. — Skull of Unau or Two-toed Sloth (Choloepus didactylus).

growth, consisting of a central axis of vasodentine, with a thin investment, of hard dentine, and a thick outer coating of cement; without any succession. Fore-limbs greatly longer than the hind-limbs; the extremities terminating in narrow, curved feet; with the digits never exceeding three in number, and encased for nearly their whole length in a common integument, a,nd armed with long, strong claws. Stomach complex. No caecum. Placenta deciduate and dome-like, composed of an aggregation of numerous discoidal lobes.

A remarkable feature connected with sloths is the development of a green colour in their hair, due to the growth of an. alga.

According to Dr W. G. Ridewood, in the three-toed sloth the hair is invested with a thick extra-cortical layer. "The hair has a tendency to crack in a transverse direction, and in the cracks there come to lodge unicellular algae, to which Kiihn has given the name Pleurococcus bradypi. The moisture of the climate in which Bradypus lives enables the alga to live and propagate in this curious position, and the sloth acquires a general green tint which must render it very difficult to distinguish as it hangs among the green foliage." In the two-toed sloth, on the other hand, the bulk of the hair is composed of an Outer coat, or cortex, which is longitudinally fluted or grooved,

the grooves being filled with strands of extra-cortex in which flourishes an alga (Pleurococcus choloepi) distinct from the one infesting the hairs of the three-toed species. Of quite a different type are the hairs of the extinct ground-sloths (see Mylodon), which are smooth and solid, Dr Ridewood rejecting the idea that they were originally coated with a cortex that has disappeared.

The typical genus Bradypus is represented by the various species of ai, or three-toed sloth, in which none of the teeth project greatly beyond the others; the first in the upper jaw is much smaller than any of the others, while the first in the lower jaw is broad and compressed, and the grinding surfaces of all are much cupped. Vertebrae: C 9, D and L 20 (of which 15 to 17 bear ribs), S 6, Ca 11. All the species present the peculiarity of possessing nine cervical vertebrae; but th? ninth, and sometimes the eighth, bears a pair of short movable ribs. The fore-limbs are considerably longer than the hind-legs, and the bones of the fore-arm are complete, free and capable of pronation and supination. The fore-feet are long, very narrow, habitually curved and terminate in three pointed curved claws, in close apposition to each other; they are, in fact, incapable of being divaricated, so that the foot is reduced to the condition of a triple hook, fit only for the function of suspension from the boughs of trees. The hind-foot closely resembles the fore-foot in general structure and mode of use, and has the sole habitually turned inwards so that it cannot be applied to the ground in walking. The tongue is short and soft, and the stomach large and complex, bearing some resemblance to that of ruminants. The windpipe or trachea has the remarkable peculiarity — not unfrequent among birds and reptiles — of being folded on itself before it reaches the lungs. The two teats are pectoral in position. The premaxilla is rudimentary and loosely attached to the maxilla. Except in B. torguatus, there is no perforation in the lower end of the humerus. Some of the species are covered uniformly with a grey or greyish-brown coat; others have a dark collar of elongated hairs around the shoulders (B. torquatus) ; some have the hair of the face shorter than that of the rest of the head and neck; and others have a remarkable-looking patch of soft, short hair on the back between the shoulders, consisting, when best marked, of a median stripe of glossy black, bordered on each side by bright orange, yellow or white. There are also structural differences in the skulls, as in the amount of inflation of the pterygoid bones. The habits of all are apparently alike. They are natives of Guiana, Brazil and Peru, and two species (B. infuscatus and B. tiastaneiceps) extend north of the Isthmus of Panama as far as Nicaragua. Of the former of these a specimen in captivity uttered a shrill sound like a

monkey when forcibly pulled away from the tree to which it was holding.

In the species of unau, or two-toed sloths, Choloepus, the front tooth in both jaws is separated by an interval from the others, and is large and caniniform, wearing to a sharp bevelled edge against the opposing tooth, the upper shutting in front of the lower when the mouth is closed, unlike true canines. Vertebrae: C 6 or 7, D 23-24, L 3, S 7-8, Ca 4-6. One species (C. didactylus) has the ordinary number of vertebrae in the neck; but an other- wise closely allied form (C. hofmanni) has but six. The tail is very rudimentary. The fore-feet generally resemble those of Bradypus, but there are only two functional digits, with claws; these answering to the second and third of the typical five-toed limb. The structure of the hind-limb generally resembles that of Bradypus, the appellation " two-toed " referring only to the anterior limb, for in the foot the three middle toes are functionally

developed and of nearly equal size. The premaxilla is well developed, and firmly attached to the maxilla; and there is always a perforation, or foramen, on the inner side of the lower end of the humerus. C. didactylus, which has been longest known, and is commonly called by the native name of unau, inhabits the forests of Brazil. C. hojfmanni has a more northern geographical range, extending from Ecuador through Panama to Costa Rica. Its voice, which is seldom heard, is like the bleat of a sheep, and if the animal is seized it snorts violently. Both species are very variable in external coloration (see Sloth).

The second family is that of the anteaters, Myrmecophagidae, distinguished from the last by the absence of teeth, the elongated tongue and the long tail. The long and slender head has a tubular mouth, with a small terminal aperture through which the worm-like tongue, covered with the sticky secretion of the enormous submaxillary salivary glands, is rapidly protruded in feeding, and withdrawn again with the adhering particles of food which are then sucked into the gullet. In the foot the third toe is greatly developed, and has a long sickle-like claw; the others are reduced or suppressed. The hind-foot has four or five subequal digits with claws. The long tail is sometimes pre- hensile. Placenta dome-like or discoidal. Externally the body is covered with hair. Anteaters feed exclusively on animal substances, mostly insects. One species is terrestrial, the others arboreal; none burrow in the ground. They are all inhabitants of tropical America. In the typical genus Myrmecophaga the skull is remarkably elongated and narrow, with its upper surface smooth and

cylindriform. Anteriorly the face is produced into a long tubular rostrum, rounded above and flattened below, with terminal nostrils, and composed of the mesethmoid (ossified for more than half its length), the vomer, the maxillae, and the long and narrow nasal bones, the premaxillae being extremely short and confined to the margin of the nostrils. The zygomatic arch is incomplete, the rod-like jugal only articulating with the maxilla in front, and not reaching the short zygomatic process of the squamosal. The lachrymal foramen is in front of the margin of the orbit. There are no post-orbital processes to the frontals or any other demarcation between the orbits and the temporal fossae. Palate extremely elongated, and produced backwards as far as the level of the external auditory meatus by the meeting in the middle line of the largely developed pterygoids. The glenoid fossa for the lower jaw, a shallow oval facet, with its long diameter from before backwards. Lower jaw long and slender, with an exceedingly short symphysis, no distinct coronoid process, and a slightly elevated, elongated, flattened, condylar articular surface. Vertebrae: C 7, D 15-16, L 3-2, S 6, Ca 31. Clavicles rudimentary. In the fore-foot the first digit is very slender, the second also slender, with compressed phalanges of nearly equal length, but the third is immensely developed, though its first phalanx is extremely short, while the terminal one is so long that the entire length of the digit exceeds that of the second. The fourth has a long and rather slender metacarpal, and three phalanges diminishing in size, the terminal phalange being very small. The fifth has the metacarpal nearly as long, but not so stout as the fourth, and followed by two small phalanges, the last rudimentary and conical. Claws are developed upon all but the fifth. In walking the toes are kept bent, with their points turned upwards and. inwards, the weight being supported on a pad over the end of the fifth digit, and the upper surfaces of the third and fourth digits. The hind feet are short and rather broad, with five subequal claws, the fourth rather longest, the first shortest; the whole sole is placed on the ground in walking. Body rather compressed, clothed with long, coarse hair. Tail about as long as the body, and covered with very long hair; not prehensile. Ears small, oval, erect. Eyes very small. Stomach consisting of a sub-globular, thin-walled, cardiac portion, and a muscular pyloric gizzard with dense epithelial lining. No ileocolic valve; but a short, wide, ill-defined caecum. The two teats are pectoral.

The tamandua anteaters (Tamandua, or Uroleptes), of which several species (or races) are now recognized, are smaller animals than the last, in which the head is much less elongated, the fur

short and bristly, and the tail, tapering, prehensile, with the under side throughout, and the whole of the terminal portion naked and scaly. The stomach is similar to that of Myrmecophaga,

Fig. 2. — Tamandua Anteater {Tamandua tetradactyla).

but with the muscular pyloric gizzard less strongly developed. There is a distinct ileocolic valve and short globular caecum. The fore-foot has a very large claw on the third toe, moderate- sized claws on the second and fourth, a minute one on the first, and none on the fifth, which is entirely concealed within the skin. The hind-foot has five subequal claws. Vertebrae: C 7, D 17, L 2, S 5, Ca 37. There are very rudimentary clavicles.

The last representative of the family is the tiny golden-haired pigmy or two-toed anteater, Cyclopes (or Cycloturus) didactylus, in which the skull is much shorter even than in the preceding genus, and arched considerably in the longitudinal direction. It differs from that of the other members of the family mainly in the long canal for the posterior nostrils not being closed by bone below, as the greater part of the palatines and the pterygoids do not meet in the middle line. The lower jaw has a prominent, narrow, recurved coronoid, and a well-developed angular process, and is strongly decurved in front. Vertebrae: C 7, D 16, L 2, S 4, Ca 40. Ribs remarkably broad and flat. Clavicles well developed. Fore-foot remarkably modified, having the third digit greatly developed at the expense of all the others; it has a short stout metacarpal and but two phalanges, of which the terminal one is large, compressed, pointed and much curved, with a strong hook-like claw. The second digit has the same number of phalanges, and bears a claw, but is much more slender than the third. The fourth is represented only by the metacarpal, and one nailless phalange, the first and fifth only by rudimentary metacarpals. The hind-foot is also modified into a climbing organ, the first toe being rudimentary and con- sisting of a metatarsal and one phalange concealed beneath the skin, but the other four toes subequal and much curved, with long, pointed, compressed claws. The tuberosity of the heel- bone or calcaneum is directed towards the sole, and parallel with it and extending to about double its length is a greatly elongated sesamoid ossicle. These together support a prominent cushion to which the nails are opposed in climbing. Stomach pyriform, with muscular walls, but no distinct gizzard-like portion. The commencement of the colon provided with two small caeca, narrow at the base, but rather dilated at their terminal blind

ends, and communicating with the general cavity by very minute apertures. Tail longer than the body, tapering, bare on the under surface and prehensile. Fur soft and silky.

The third and last existing family of the Xenarthra is that of the armadillos, or Dasypodidae, in which there are at least seven pairs of teeth in each jaw, while the tongue is normal, the tail generally long, and the body covered with an armour of bony plates overlain by horny scales. All the species are terres- trial, and insectivorous or more or less omnivorous.

The union of the numerous polygonal bony shields on the back and sides forms a hard shield, usually consisting of an anterior (scapular) and posterior (pelvic) solid portion (which overhang on each side the parts of the body they respectively cover, forming chambers into which the limbs are withdrawn),

and a variable number of rings between, connected by soft flexible skin so as to allow of curvature of the body. The top of the head has also a similar shield, and the tail is usually encased in bony rings or plates. The outer or exposed surfaces of the limbs are protected by irregular bony plates, not united at their margins; but the skin of the inner surface of the limbs and under side of the body is soft and more or less clothed with hair. Hairs also in many species project through apertures between the bony plates of the back. The bony plates are covered by a layer of horny epidermis. Teeth numerous, simple, of persistent growth and usually without milk predecessors. Zygomatic arch of skull complete. Cervical vertebrae with extremely short, broad and depressed bodies; the first free, but the second and third, and often several of the others united together both by their bodies and arches. Clavicles well developed. A third trochanter on the femur. Tibia and fibula united at their lower extremities. Fore-feet with strongly developed, curved claws, adapted for digging and scratching, three, four or five in number. Hind-feet plantigrade, with five toes, all provided with nails. Tongue long, pointed and extensile, though to a less degree than in the anteaters. Submaxillary glands largely developed. Stomach simple. Placenta discoidal and deciduate.

The typical genus Dasypus, with several others, represents the subfamily Dasypodinae, which usually have all five toes developed and with nails, though the first and fifth may be sup- pressed. The first and second are long and slender, with the normal number and relative length of phalanges, the others stout, with short broad metacarpals, and the phalanges reduced in length and generally in number by coalescence; the terminal phalange of the third being large, that of the others gradually diminishing to the fifth. Dasypus has the most normal form of fore-foot, but the modifications

developed in all the others (culminating in Tolypeutes) are foreshadowed. Ears wide apart. Teats, one pair, pectoral. In Dasypus the teeth are ˆ or f-, of which the first in the upper jaw is usually implanted in the premaxillary bone. The series extends posteriorly some distance behind the anterior root of the zygoma, almost level with the hind edge of the palate. The teeth are large, subcylindrical, slightly compressed, diminishing in size towards each end of the series; the anterior two in the lower jaw smaller and more compressed than the others. Cranial portion of the skull broad and depressed, facial portion triangular, broad in front and depressed. Auditory bulla completely ossified, perforated on the inner side by the carotid canal, and continued externally into an elongated bony meatus auditorius, with its aperture directed upwards and backwards. (In all the other genera of Dasypodinae the tympanic bone is a mere half-ring, loosely attached to the cranium.) Lower jaw with a high ascending branch, broad transversely placed condyle, and high slender coronoid process. Vertebrae: C 7, D n-12, L 3, S 8, Ca 17-18. Head broad and flat above, with the muzzle obtusely pointed. Ears of moderate size or rather small, placed laterally far apart. Body broad and depressed. Armour with six or seven movable bands between the scapular and pelvic shields. Tail shorter than the body, tapering, covered with plates forming distinct rings near the base. Fore-feet with five toes; the first much more slender than the others, and with a smaller ungual phalange and nail ; the second, though the longest, also slender. The third, fourth and fifth gradually diminishing in length, all armed with strong, slightly curved compressed claws, sloping from an elevated, rounded inner border to a sharp, outer and inferior edge. The hind-foot is rather short, and has all five toes armed with stout, compressed, slightly curved, obtusely pointed claws — the third the longest, the second nearly equal to it, the fourth the next, the first and fifth shorter and nearly equal.

To this genus belongs one of the best-known species of the group, the six-banded armadillo or encoubert (D. sexcinctus) of Brazil and Paraguay; a very similar species, D. villosus, the hairy armadillo, replacing it south of the Rio Plata. There are also two small species, D. vellerosus and D. minutus, from the Argentine Republic and North Patagonia; the latter, which differs from the other three in having no tooth implanted in the

premaxillary bone and is often referred to a genus apart, as Zaedius.

In Tatoua (Cabassous or Lysiurus) the teeth are f or f , of moderate size and subcylindrical: the most posterior placed a little way behind the anterior root of the zygoma, but far from the hinder margin of the palate. Skull somewhat elongated, much constricted behind the orbits, and immediately in front of the constriction considerably dilated. Lower jaw slender, with the coronoid process small and sharp pointed, sometimes obsolete. Vertebrae: C 7, D 12-13, L 5, S 10, Ca 18. Head broad behind. Ears rather large and rounded, wide apart. Movable bands of armour 12-13. Tail considerably shorter than the body, and slender, covered with nearly naked skin, with a few small, scattered, bony plates, chiefly on the under surface and near the apex. On the fore-feet the first and second toes are long and slender, with small claws and the normal number of phalanges. The other toes have but two phalanges; the third has an immense sickle-like claw; the fourth and fifth similar but smaller claws. The hind-feet are comparatively small, with five toes, and small, triangular, blunt nails; the third longest, the first shortest. The best-known species of this genus, the tatouay or cabassou, T. unicinctus, is, after Priodon gigas, the largest of the group. It is found, though not abundantly, in Surinam, Brazil and Paraguay. Others, such as T. hispidus and T. lugubris, have been described.

In the giant armadillo {Priodon gigas) the teeth are variable in number, and generally differ on the two sides of each jaw, being usually from 20 to 25 on each side above and below, so that as many as a hundred may be present altogether; but as life advances the anterior teeth fall out, and all traces of their sockets disappear. The series extends as far back as the hinder edge of the anterior root of the zygoma. They are all very small, in the anterior half of each series strongly compressed, with flat sides and a straight free edge, but posteriorly more cylindrical, with flat, truncated, free surfaces. Vertebrae: C 7, D 12, L 3, S 10, Ca 23. Head small, elongated, conical. Ears moderate, ovate. Armour with 12-13 movable bands. Tail nearly equal to the body in length, gradually tapering, closely covered with quadrangular scales, arranged in a quincunx pattern. Fore-feet with five toes, formed on the same plan as those of Tatoua, but with the claw of the third of still greater size, and that of the others, especially the fifth, proportionally reduced. Hind-foot short and rounded, with five very short toes, and short, broad, flat obtuse nails. The giant armadillo is by far the largest existing member of the family, measuring rather more than 3 ft. from the tip of the nose to the root of the tail, the tail being about 20 in. long. It inhabits the forest of Surinam and Brazil. The powerful claws of its fore-feet

enable it to dig with great facility; and its food consists chiefly of termites and other insects, although it is said to attack and uproot newly-made graves for the purpose of devouring the flesh of the bodies contained in them.

The apar (Tolypeutes tricinctus) typifies a genus in which the teeth are | or f , and are rather large in proportion to the size of the skull, with the hinder end of the series reaching nearly to the posterior margin of the palate. Vertebrae: C7, D 11,1,3, Si 2, Ca 13. Ears placed low on the sides of the head, rather large, broadly ovate. Armour with its scapular and pelvic shields very free at the sides of the body, forming large chambers into which the limbs can be readily withdrawn, and only three movable bands. Tail short, conical, covered with large bony tubercles. The fore-feet formed on the same type as in the last genus, but the peculiarities carried to a still greater extent. The claw of the third toe is very long, while those of the first and fifth are greatly reduced and sometimes wanting. On the hind-foot the three middle toes have broad, flat, subequal nails, forming together a kind of tripartite hoof; the first and fifth much shorter, with more compressed nails. •' The armadillos of this genus have the power of rolling them- selves up into a ball, the shield on the top of the head and the tuberculated dorsal surface of the tail exactly fitting into and filling up the apertures left by the notches at either end of the

body-armour. This appears to be their usual means of defence when frightened or surprised, as they do not burrow like the other species. They run very quickly, with a very peculiar gait, only the tips of the claws of the fore-feet touching the ground. In addition to the apar, there are the Argentine and Bolivian T. conurus, and T. muriei from Argentina or Patagonia.

The last group of existing armadillos forms the genus Tatusia and the subfamily Tatusiinae; the subfamily rank being based on the fact that of the seven or eight pairs of small subcylindrical teeth, all but the last, which is considerably smaller than the rest, are preceded by milk-teeth not changed until the animal has nearly attained full size. Vertebrae: C7, D.9-11, L5, S8, Ca 20-27. Head narrow, with a long, narrow, subcylindrical obliquely truncated snout. Ears rather large, ovate and erect, placed close together on the occiput. Armour with seven to nine distinct movable bands. Body generally elongated and narrow. Tail moderate, or long, gradually tapering; its plates forming distinct rings for the greater part of its length. Fore-feet with four visible toes, and a concealed clawless rudiment of the fifth; the claws long, slightly curved, and slender, the third and fourth

subequal and alike, the first and fourth much shorter. Hind- feet with five toes, armed with strong, slightly curved, conical, obtusely pointed nails, and the third longest, then the second and fourth, and the first and fifth much shorter than the others. This genus differs from all the other armadillos in having a pair of inguinal teats in addition to the usual pectoral pair, and in producing a large number (4 to 10) of young at a birth, all the others having usually but one or two. The peba armadillo, T. septemcincta, is a well-known species, having an extensive range from Texas to Paraguay. It is replaced in the more southern regions of South America by a smaller species, with shorter tail, the mulita (T. hybrida) so called from the resemblance of its head and ears to those of a mule. T. kappleri is a large species from Guiana.

Finally we have the pichiciago, or fairy armadillo, Chlamyda- phorus truncatus, typifying the subfamily Cfdamydophorinae. In most anatomical characters, especially the structure of the fore-foot, this group resembles the Dasypodinae, but it differs remarkably from all other known armadillos, living or extinct, in the peculiar modification of the armour.

The teeth, which number g?$, are subcylindrical, somewhat compressed, moderate in size, and smaller at each end (especially in front) than at the middle of the series. Skull broad and rounded behind, pointed in front. Muzzle subcylindrical and depressed. A conspicuous rounded rough prominence on the frontal bone, just before each orbit. Tympanic prolonged into a tubular auditory meatus, curving upwards round the base of the zygoma. Vertebrae: C 7, D n, L3, S 10, Ca 15. Upper part of head and trunk covered with four-sided horny plates (with small thin ossifications beneath) , forming a shield, free and overhanging the sides of the trunk, and attached only along the middle line of the back. The plates are arranged in a series of distinct transverse bands, about twenty in number between the occiput and the posterior truncated end, and not divided into solid scapular and pelvic shields with movable bands between. The hinder end of the body is abruptly truncated and covered by a vertically placed, strong, solid, bony shield, of an oval (trans- versely expended) form, covered by thin horny plates. This shield is firmly welded by five bony processes to the hinder part of the pelvis. Through a notch in the middle of its lower border the tail passes out. The latter is rather short, cylindrical in its proximal half, and expanded and depressed or spatulate in its terminal portion, and covered with horny plates. The dorsal surfaces of the fore and hind- feet are also covered with horny plates. The remainder of the limbs and under surface and sides of the body beneath the overlapping

lateral parts of the back shield are clothed with rather long, soft silky hair. Eyes and ears very small, and concealed by the hair. Extremities short. Feet large, each with five well-developed claws, those on the fore-feet very long, stout and subcompressed, the structure of the digits being essentially the same as those of Tatoua and Priodon. Teats two, pectoral. Visceral anatomy closely

resembling that of Dasypus, the caecum being broad, short and bifid. The pichiciago, a burrowing animal, about 5 in. long, inhabits the sandy plains of western Argentina, especially the vicinity of Mendoza. Its horny covering is pinkish, and its silky hair white. A second species, C. retusus, from Bolivia is rather larger and has the dorsal shield attached to the skin of the back as far as its edge, instead of only along the median line. (See Armadillo;)

Tubididentata. — The second suborder of edentates, namely the Tubulidentata, is represented at the present day only by the aard-varks, or ant-bears, of Africa, constituting the family Orycteropodidae and the genus Orycteropus. Together with the following group, they differ from the Xenarthra in the absence of additional articular facets to the lumbar vertebrae; for which reason the term Nomarthra has been proposed for the Tubulidentata and Pholidota as collectively distinct from the Xenarthra. In the present group the external surface is scantily covered with bristle-like hairs. The teeth are numerous, and traversed by a number of parallel vertical pulp-canals. Femur with a third trochanter. Fore-feet without the first toe, but all the other digits well developed, with strong moderate-sized nails, suited to digging, the plantar surfaces of which rest on the ground in walking. Hind-feet with five subequal toes. Placenta broadly zonular. The brain is very like that of the Ungulata; and there are two pairs of teats, one abdominal, and the other inguinal. Aard-varks feed on animal substances; and are terrestrial and fossorial in habits. The total number of teeth is from eight to ten in each side of the upper, and eight in the lower jaw; but they are never all in place at one time, as the small anterior ones are shed before the series is completed behind. In the adult they number usually five on each side above and below, of which the first two are simple and compressed, the next two larger and longitudinally grooved at the sides, the most posterior simple and cylindrical. Their summits are rounded before they are worn; their bases do not taper to a root, but are evenly truncated and continually growing. Each

tooth is made up of an aggregation of parallel dental systems, having a slender pulp cavity in the centre, from which the dentinal tubes radiate outwards, and being closely packed together each system assumes a polygonal outline as seen in transverse section. A series of milk-teeth is developed. Skull moderately elongated with the facial portion subcylindrical and slightly tapering, and the zygoma complete and slender. The palate ends posteriorly in the thickened transverse border of the palatines, and is not continued back by the pterygoids. The tympanic is annular, and not welded to the surrounding bones. The lower jaw is slender anteriorly, but rises high posteriorly, with a slender recurved coronoid, and an ascending pointed process on the hinder edge below the condyle, which is small, oval, and looks forward as much as upwards. Vertebrae: C 7, D 13, L 8, S 6, Ca 25. The large number of lumbar vertebrae is peculiar among Edentates. The tongue is less worm-like than in Myrmecophaga, being thick and fleshy at the base and gradually tapering to the apex. The salivary apparatus is developed much in the same manner as in that genus, but the duct of the submaxillary gland has no reservoir. The stomach consists of a large subglobular cardaic portion, with a thick, soft, and corrugated lining mem- brane, and a smaller muscular, pyloric part, with a compara- tively thin and smooth lining. There is a distinct ileocaecal valve and a considerable sized caecum; also a gall-bladder. Head elongated, with a tubular snout, terminal nostrils and small mouth-opening. Ears large, pointed, erect. Tail nearly as long as the body, cylindrical, thick at the base, tapering to the extremity.*

According to the researches of Dr E. Lonnberg, the teeth of the aard-varks correspond only to the roots of those of other mammals, the crowns being unrepresented, except to a very small degree when the teeth first cut the gum. This explanation renders the peculiar internal structure of these teeth much less difficult to understand than if they represented both crown and root. In Dr Lonnberg's opinion, the teeth indicate the descent of the aard-vark from an ungulate stock, — a view in harmony

with the evidence of the brain. If this idea pr'ove well founded, and if the aard-varks are rightly classed with the Edentata, the whole order must apparently be regarded as an offshoot from primitive Ungulata. The fact of the frequent distinctness of the coracoid bone requires, however, explanation in connexion with such a descent (see Aard-Vark).

Pholidota.— The Pholidota, constituting the third and last group of the Edentata, are represented by the pangolins, or scaly anteaters, of

Asia and Africa, all of which are included in the family Manidae and the genus Manis. Pangolins differ from all other mammals by the armour of overlapping horny scales (often with hairs growing between them) which invests the whole animal, with the exception of the under surface of the body, and sometimes a small patch near the tip of the under side of the tail. There are no teeth; and although the tongue is long and worm-like, it is not extensile. The scaphoid and lunar bones of the carpus are united. The uterus is bicornuate, and the placenta diffused and non-deciduate. The skull has some- what the form of an elongated cone, with the small end turned forwards, and is smooth and free from crests and ridges. No distinction between the orbits and temporal fossae. The zygo- matic arch usually incomplete, owing to the absence of the jugal bone; no distinct lacrymal bone; and the palate long and narrow. The pterygoids extend backwards as far as the tym- panies, but do not meet in the middle line below. Tympanic welded to the surrounding bones, and more or less bladder-like, but not produced into a tubular auditory meatus. Two halves of lower jaw very slender and straight, without any angle or coronoid process, on the anterior extremity of the upper edge a sharp, conical, tooth-like process projecting upwards and out- wards. No clavicles. No third trochanter to the femur. Ter- minal phalanges cleft at the tip. Caudal vertebrae with very long transverse processes and numerous chevron-bones. Stomach with thick muscular walls and lining membrane, and a special gland near the middle of the great curvature, consisting of a mass of complex secreting follicles, the ducts of which terminate in a common orifice. No caecum, but a gall-bladder. Head small, depressed, narrow, and pointed in front, with a very small mouth-opening. Eyes and ears very small. Body elongated, narrow. Tail more or less elongated, convex above, flat under- neath. Limbs short, and in walking the surface and outer sides of the phalanges of the two outer digits of the front feet alone rest on the ground, with the points of the nails turning upwards and inwards. The third toe the longest, with a powerful compressed curved claw, the second and fourth with similar but smaller claws, but that of the first toe often almost rudi- mentary. Hind-feet plantigrade with the first toe very short, and the four other toes subequal, and carrying moderate, curved, compressed nails; Pangolins are of small or moderate size, terrestrial and burrowing, and feed mainly on termites or white ants; some of the species being more or less arboreal. They can roll themselves up in a ball when in danger. Their peculiar elongated form, short limbs, long tapering tail, and scaly covering give them On a superficial inspection more the appearance of reptiles than of mammals. The species are not numerous and may be divided into two sections, one

comprising the Asiatic species, such as M. javanica, M. aurita of China, and the Indian M. pentadactyla, and the other the African, as represented by the large M. gigantea, M. temminchi, the long-tailed M. macrura, and the small arboreal M . tricuspis'. In the Asiatic group the middle series of scales continues to the tip of the tail; but in the African forms this row splits into two a, few inches from the tail-tip. The latter have also no hairs between the scales and no external ears. The climbing species have a small bare patch on the under side of the tail near the tip (see Pangolin).

Extinct Edentates. Beyond remains of species closely allied to or identical with the existing forms, the sloths and anteaters appear to be unknown in a fossil state. On the other hand the extinct family of ground sloths, Or Megatheriidae, which includes the largest of all edentates, is an exceedingly large one, and extends in South America from

the Miocene to the Pleistocene, and was also represented during the latter epoch in North America. It serves to connect the Bradypodidae with Myrmecophagidae. The alleged occurrence of an allied form in Madagascar is somewhat doubtful (see Megatherium and Mylodon).

Of Dasypodidae numerous representatives occur in the South American Tertiaries. From the higher beds many of the species are referable to existing genera, such as Dasypus and Tatusia, although some are much larger than any living forms, the skull in one case being nearly a foot in length. In other instances^ when lower formations are reached, the genera are also distinct, Eutatus having the whole armour divided into movable bands, and the allied Stegotherium representing the group in the Santa Cruz formation of Patagonia. Even in the Argentine Pleistocene there is an extinct genus, CUamydotherium, represented by a species of the size of a rhinoceros, with grooved teeth approximat- ing to those of the glyptodonts. The latter represent a family {Glyptodontidae) by themselves, and typically may be described as giant solid-shelled armadillos, although some of their smaller Santa Cruz representatives (Propalaeohoplophorus) approximate in some degree to true armadillos (see Glyptodon).

A very remarkable Santa Cruz armadillo, Peltephilus, has an altogether peculiar type of head-shield, developed into horns in front

of the eyes; and, what is still more noteworthy, teeth in the front of the jaws, thereby rendering the ordinary definition of the order Edentata incorrect. It has been made the type of a distinct family, Peltephilidae.

The past history of the armadillo group does not, however, by any means end here. True armadillos, it should be observed, are known in North America as far north as Texas, from the Pleistocene onwards; but in formations of middle Tertiary age are unrepresented. Recent discoveries apparently indicate, however, the occurrence of armadillos of a primitive type in the lower Tertiary or Eocene formations of Wyoming. The first evidence of these Eocene armadillos was afforded by portions of the jaws, which, together with a leg-bone of a totally different animal, were believed to indicate creatures nearly allied to the aye-aye (Chiromys) of Madagascar, and for which the name Metachircmys was consequently proposed. According to modern usage, this name, in spite of its inappropriate nature, is retained for the armadillos, although in the writer's opinion it ought to be replaced. According to Professor H. F. Osborn, by whom their remains have been described, the North American fossil arma- dillos were closely related to the existing members of the group, from which they differ chiefly by the armour, or shield, having probably been formed of tough leathery skin instead of bony plates, by the presence of a single pair of large enamel-capped tusk-like teeth in each jaw, and by the degeneration of the other teeth. If these determinations are trustworthy, the question arises whether we should regard the armadillos of South America as the descendants of North American forms which migrated southwards before that separation of the two continents was established, which lasted for a large portion of the Tertiary period, or whether a migration took place at the same early epoch in the opposite direction.

More interesting still is the occurrence of remains of reputed armadillos (Necrodasypus) from the Oligocene of France and Germany. In the opinion of Dr F. Ameghino these Oligocene armadillos, which had bony shields on both the head and body, were near akin to some of the modern South American forms.

Passing on to the aard-varks (Orycteropodidae) , we find these represented by a species closely allied to the existing ones in the Lower Pliocene formations of Spain, France, Hungary, Samos and Asia Minor. A single tibia from the French Oligocene is identified by Dr Ameghino with the present family, and the genus Archaeorycteropus established for its reception; this genus, in its

founder's opinion, being also represented in the Santa Cruz beds of Patagonia. As regards the pangolins, the only fossils referred to this group (apart from a few discovered in a cave in India) appear to be certain limb-bones from th& Oligocene of France and Germany, for which the names Necromanis and Teutomanis have been proposed. The occurrence of the character- vrrr.30

istic cleft terminal toe-bones among these remains seems to leave little doubt as to the correctness of the determination.

The alleged occurrence of remains of giant pangolins in the upper Tertiary of Europe is due to misidentification (see Ancylopoda). By some authorities the Eocene group of Ganodonta has been affiliated to the Edentata, but this reference is not accepted by Prof. W. B. Scott.

Authorities.— The above article is to some extent based on the articles by Sir W. H. Flower in the 9th edition of this work. See also O. Thomas, " A Milk-dentition in Orycteropus," Proc. Royal Soc. vol. xlvii. (1890) ; R. Lydekker, " The Extinct Edentates of Argen- tina," Palaeont. Argentina, vol. iii., An. M us. (La Plata, 1894); C. W. Andrews, " On a Skull of Orycteropus gaudryi from Samos," Proc. Zool. Soc. London (1.896) ; G, E. Smith, " The Brain in the Edentata," Trans. Linn. Soc. London, vol. vii. (1899) ; W. B. Scott, " Mammalia of the Santa Cruz Beds — Dasypoda," Rep. Princeton Exped. to Patagonia, vol. v. (1903); H. F. Osborn, "An Armadillo from the Middle Eocene of North America," Bull. Amer. Mus. vol. xx. art. 12 (1904); J. A. Allen, " The Tamandua Anteaters," T.C., art. 33 (1904); F. Ameghino, " Les Edentes fossiles de France et d'Allemagne," Ann. Mus. Buenos Aires, vol, xiii. (1905); E. L6nnberg, "On a new Orycteropus," and "Remarks on the dentition of the Tubulidentata," Archiv fur Zoologie, vol. iii. No. 3 (1906). (R.L.)*

EDENTON, a town and the county-seat of Chowan county, North Carolina, U.S.A., on Edenton Bay, an estuary of Albemarle sound, near the mouth of Chowan, river, in the N.E. part of the state. Pop. (1890) 2205; (1900) 3046 (2090 negroes) ; (1910) 2789. It is served by the Norfolk & Southern railway, and by the Albemarle Steam Navigation Co, In 1907 the former projected a great bridge across Albemarle sound near the city, Edenton is an old and: interesting town, has a number of fine old homesteads, and has broad and well-shaded streets. Lumber ing and the shad and herring fisheries are the most important industrial interests, and the town is a shipping point for fish, truck and other farm products, cotton and*

peanuts. There is a Fish Cultural Station here, established by the Federal government The court-house was huilt about 1750.

Edenton was settled about 1658, and was for some time known as the " Towne on Queen Anne's Creek " or the " Port of Roanoke"; in 1722 the present name was adopted in honour of Governor Charles Eden (1673-1722), whose grave is in St Paul's churchyard here. Throughout the 18th century Edenton was a place of considerable social and political importance; the legislative assembly of North Carolina met here occasionally, and here lived the royal governors and various well-known citizens of the province, among them: Joseph Hewes (1730- 1779), a signer of the Declaration of Independence; James Iredell, Sr. (1750-1799), a Federalist leader and after 1790 a justice of the United States Supreme Court, and his son James Iredell, Jr. (1788-1853), a prominent lawyer, for many years a member of the state legislature, governor of North Carolina in 1827-1828, and a member of the United States Senate in 1828- 1831. Near Edenton lived Samuel Johnston (1733-1816), a prominent leader of the American Whigs preceding and during the War of American Independence, a member of the Continental Congress in 1780-1782, governor of North Carolina in 1787-1789, and a Federalist member of the United States Senate in 1790—1793. In 1907 the Hewes, Iredell and Johnston homesteads were still standing. In a house facing the court-house green the famous " Edenton Tea Party " of fifty-one ladies met on the 24th of October 1774 and signed resolutions that they would not conform " to that Pernicious Custom of Drinking Tea " and would not "promote the wear of any manufacture from England" until the tax on tea should be repealed. Near Edenton. the Confederate ram " Albemarle," on emerging from the Roanoke river, was met by the Union " double-enders," " Sassacus," " Mattabesett," and " Miami," on the 5th of May 1864; the battle, which resulted in favour of the Confederates, was a duel between the Confederate ironclad and the Union wooden side- wheeler, the " Sassacus," which rammed the " Albemarle " and had her bows, fitted with a three-ton bronze beak, twisted off and carried away.*

EDESSA (mod. Vodena), the ancient capital of Macedonia, previously known as Aegae, situated 46 m. W. of Thessalonica

on the banks of a beautiful stream in the very centre of the kingdom, and at the head of a defile commanding the approaches from, the coast to the interior. It was the original residence of the Macedonian kings; and even after the seat of government was removed by Philip II. to the more accessible Pella, it continued to be the burial-place of the royal family. At the celebration of his daughter's marriage here, Philip II. was murdered by Pausanias in 336 B.C. His son Alexander was buried at Memphis through the contrivance of Ptolemy; but the bodies of his granddaughter Eurydice and her husband Arrhidaeus were removed by Cassander to the ancestral sepulchre. On the occupation of the town by Pyrrhus the royal tombs were plundered by the Gallic mercenaries. Owing to its position commanding the Via Egnatia, the town retained its importance during the Roman and Byzantine periods. For its present condition, see Vodena,

EDESSA, the Greek name of an ancient city of N.W. Meso- potamia (in 37 '21′ N. lat. and 39° 6′ E. long.), suggested perhaps by a comparison of its site, or its water supply, 1 with that of its Macedonian namesake. It still bears its earlier name, modified since the 1 5th century (by the Turks?) to Urfa.

The oldest certain form is the Aramaic Urhai (" Western " pronunciation Urhoi), which appears in Greek as an adjective as 'Oppojivii, -voP (perhaps also as a fortress with spring, as 'OppA), 4 and in Latin as Orr(n)ei, h and (in the inscription on Abgar's grave) Orrhenoru(m). 6 The Syriac Chronicle ascribed to Dionysius of Tell-mahre derives the name from a first king Urhai, son of rlewya, whom Procopius (De bello persico, i. 17) calls Osroes (cf. below), connected by Bayer 7 with Chosroes, 8 from which G. Hoffmann would also derive the Syriac Urhai (Z.D.M.G. xxxii. 742). The Syriac town name has, however, the form of an ethnic, and we may there- fore with Duval leave it unexplained (Hist. 22). The fact that the Arabic name is Ruha supports the hint of the Graeco-Latin forms that there was a vowel between the R and the H. There is little plausibility in the suggestion of Assemani and others that Ruha comes from pori of CaHirrhoe. A gentilic of the form Ru-u-ai occurs in a letter (of an Assyrian king?) to chiefs in a (Babylonian?) town as the designation of three captives (Harper, Ass. and Bab. Letters, No. 287 [= K 94], line 6; cf. Bezold, Die Achdmenideninschriften, p. xii.), who have Semitic names; and Ru-'-u-a is the name of an Aramaic people mentionec" with other Aramaeans by Tiglath- pileser IV., Sargon and Sennacherib. It is not impossible that some such people may have settled at Urhai and given it their name, although the Ru-'-u-a are always mentioned in connexions that imply seats near the Persian Gulf.' The district name Osroene for 'OASoixiJ, is*

Greek, perhaps due to analogy of Chosroes. It occurs but rarely in, Syriac (Uzroina); e.g. Chronicle of Edessa, § 35 ; 10 elsewhere Beth-Urhaye (e.g. Cureton, Spicileg. Syr. 20). In the time of Tiglath-pileser I. (c. 1100 B.C.) the name seems to have been " District of (not Edessa, but) Harran " (Annals, vi. 71). The Arabs pronounced the name er-Ruha (see above), and that form prevailed till it gave place to Urfa in the 15th century.

The Greek name Edessa appears in the Jerusalem Targum to Gen. x. 10 as Hildas (Dt.i, myrtle) ; it has been proposed (cf. Duval, Hist. d'Edesse, 23) to derive Edessa from Aram, mn, as though = Carthage, New Town; but Syriac writers, when they occasion- ally 11 use the name (Edessa, ndik; so Yaqut, Adasa), show no suspicion of its being Semitic. According to Pliny, v. 86, Edessa was .also called Antioch, and coins of Antiochus IV. Epiphanes with the legend "Antioch on the CaHirrhoe " may imply that he rebuilt and renamed the place (so Ed. Meyer in Pauly-Wissowa, Reat- encyclopadie, col. 1933, 66; otherwise Duval, Hist. 23; cf.' art. Osroene). Pliny indeed seems to call the city itself Callirrhoe, and S. Funk finds it so named in the Talmud (Bab. Mez., 18a mew kt» ddt ˆti: Die Juden in Babylonien 200-500, ii. 148; 1908); but K. Regling (Klio, i. 459 n. I) may ■ be right in his emendation which applies the title in Pliny to the sacred spring.

History: Pre-Hellenistic.- — Until excavation gives us more definite data we can only infer from its position on one of the

1 So Appian, Syr. 57; cp. Steph. Byz., s.v. "E&toaa: 5td ttjv tuv

'Steph. Byz., s.v. Barrett. 3 Dio, passim.

4 Isidore Charac. 1 (Muller, Geog. Gr. Min., i. 246);

'Several times in Pliny, Nat. Hist. 6 C1L. vi. 1 797.

1 7 Hist. Osrhoena et Edessena, p. 33.

8 Written 'Onpo-qs in Dio Cassius, Excerpta, lxviii. 22.

• See the reff. collected by M. Streck, M.V.G., 1906. The name occurs in the same company in the fragmentary tablet K. 1904. The mountain Ru-u-[a], mentioned thrice by Tiglath-pileser IV., is placed by Billerbeck near Hamadan (Sandschak Suleimania, 82, 86, and map, 1898).

,0 See further Payne Smith, Thesaurus no b.

u In translating from the Greek ; also in Ephraim (Duval, Hist. 32, n. 4) and the Acts of Sharbil (Cureton, Anc. Syr. Doc. 41).

main thoroughfares between the Mediterranean and the East (see Mesopotamia) that Urhai-Edessa, possibly bearing some other name, was already a town of some importance in the early Babylonian-Assyrian age. Whatever may have been the ethnographical type of the early inhabitants, it must by the beginning of the second last millennium B.C. have included Hittites in the large sense of the term, probably Aryans, and certainly Semites of some of the types characteristic of early Assyrian history. Most probably its people belonged to the domain of the then more famous Harran-Carrhae, between which and Samosata (on the Euphrates) Urhai lies midway (some 25-30 m. distant from each) in the district watered by the Ballh. Although at Edessa itself no cuneiform documents have yet been found, a little more than four hours journey eastwards, at Anaz (= Gullab?) = Dur of Tiglath-pileser IV. was found in 1901 a slab, with a bas-relief and an inscription; and 15-20 min. W. of Eski-Harran, in 1906 a very interesting 6th-century Assyrian inscription (see Mesopotamia).

In the later Assyrian empire the population was largely Aramaic-speaking; but S. Schiffer's theory (Beiheft I. zur Orientalistischen Litteratur-Zeitung) finds contemporary evidence of Israelites settled in the neighbourhood of Edessa in the second half of the 7th century B.C. At the fall of Nineveh many towns in Mesopotamia suffered severely at the hands of the Medes. The period remains dark, notwithstanding the obscure light that has been thrown on it lately (Pognon, Inscriptions). When Aramaic began to take the place of Assyrian in written documents is not known; but just across the Euphrates the change had occurred as early as the 8th century B.C. (Zenglrli, Hamath; see also Pognon). Certain it is that the earliest documents that have survived in Syriac, or Edessene Aramaic, do not represent an experimental stage. Moreover, although the Syriac of the Story of Ahiqar is of a late type, the sources of the story, traces of which are to be found in the Hebrew Tobit (q.v.), go back to the;pre > -Hellenistic period.

Graeco-Roman Times. — According to a credible tradition found in Eusebius (Excerpta, 179), the Syriac Chronicle ascribed to Dionysius of Tell-mahre (Tullberg, 61), and elsewhere, Urhai was renovated, like other Mesopotamian sites, in 304 B.C. by Seleucus I. Nicator, who gave it its Greek name. 12 It would share in the Hellenistic culture of Syria, although the language of the common people would continue to be Aramaic (E. R. Bevan, House of Seleucus, i. 227 f.

with reff.). With the decay of the Seleucid power, weakened by Rome and Parthia, the old influx from the desert would recommence, and an Arabic element begin to show. Von Gutschmid (Untersuch., cf. Duval, ch. iii. end) argues plausibly that it was in 132 B.C., in the reign of Antiochus VII. Sidetes, that Edessa became the seat of a dynasty of some thirty local kings, whose succession has been preserved in native sources. The name of the first king, however, appears in different forms (cf. above), and one (Osroe's-Orhai) is so like that of the town that Ed. Meyer suspects the historicity of the first reign, of five years. The names of the other kings — Abgar, Ma'nu, Bekr, &c. — are for the most part Arabic, as the people (in whose inscriptions the same mixture of names occurs) are called by classical authors; but the rulers, among whom an occasional Iranian name betrays the influence of the dominant Parthians, 13 would hardly maintain their distinctness from the Aramaic populace. This state which lasted for three centuries and a half, naturally varied in extent." Bounded on the W. and the N. by the Euphrates, it reached at its widest as far as the Tigris. At such times, therefore, it included such towns as Harran (Carrhae), Nisibis, Sarug, Zeugma-Birejik, Resaena, Singara, Tigranocerta, Samosata, Melitene. Its position " on the dangerous verge of two contending empires," Parthia and

12 On a possible restoration under the name of " Antioch on the Callirrhoe ' see above.

13 The Edessans used to call their town " the city," or " the daughter," " of the Parthians " (Cureton, Anc. Syr. Doc, 41 ult., 97 1. 7; 106 I! 12).

14 The portion of the Mesopotamian steppe under Osrho6nic influence was, according to Noldeke (Zeitsch. Ass. xxi. 153, 1908), called Arabh in Syriac.

Rome, determined its changeful fortunes. Parthian pre- dominance yielded for a time to Armenian (Tigranes, 88-86 B.C.). Then, at the time of the expeditions of Lucullus, Pompey and Crassus, Edessa was an ally of Rome, though Abgar II. Ariamnes (68-53) played an ambiguous part. In a.d. 114 Abgar VII. entertained Trajan on his way back to Syria (Dio Cass, xviii. 21); but in 116, in consequence of a general rising, his consul L. Quietus sacked the city, Abgar perhaps dying in the flames, and made the state tributary. Hadrian,

however, abandoning Trajan's forward policy in favour of a Euphrates boundary, restored it as a dependency of Rome. When L. Verus (163-165) recovered Mesopotamia from Parthia, it was not Edessa but Harran that was chosen as the site of a Roman colony, and made the metropolis by Marcus Aurelius (172).

To one of the native kings doubtless is to be ascribed the Syriac inscription 1 on one of the pair of pillars, 50 ft. high, which stood, no doubt, in front of a temple connected with some local cult. Trustworthy data for determining its nature are lacking. One or both of the pools below the citadel containing sacred fish may have been sacred to Atargatis (q.v.), an Ishtar- Venus deity; and according to the Doctrine of Addai, alongside of Venus were worshipped the sun and the moon. 2 Nergal and Sin were known as " twins," and connected with the sign Gemini, under the name ellamme, " the youths " (cf. Zimmern, K.A.T. 363). This makes more plausible than it otherwise would be the suggestion of J. Rendel Harris that the great twin pillars were connected with the cult of the Dioscuri, and that in the Acts of Thomas is to be seen a later attempt to substitute other " twins," viz. Jesus and Judas-Thomas (Addai), whom legend buried " in Britio Edessenorum " (explained by Harnack as the Edessan citadel: Aram, birtka). 3

Whether it was at Edessa that a Jewish translation of the Old Testament into Syriac was made, 4 under the encouragement perhaps of the favour of the royal house of Adiabene (Josephus, Bell. Jttd. u. 19. 4), or whether that work was done in Adiabene, 6 cannot be discussed here. That the translation did not share the fate of the other non-Christian Syriac writings, which did not survive the 13th century (see Syriac Literature),, is due to the fact that it was adopted (after being revised) by the Christians, and thus rescued. Although the beginnings of Christianity at Edessa are enshrouded in the mists of legend, and the first mention of Christian communities in Osrhoene and the towns there is connected with the part they played in the paschal controversy (c. a.d. 192), it has been reasonably urged that the legends imply a fact, namely that Christianity began in the Jewish colony, perhaps by the middle of the 2nd century, although the earliest seat of the Syrian church may have been farther east, in Adiabene. 6 Parts of the New Testament were certainly translated into Syriac in the 2nd century, although whether the " Old Syriac " (so e.g. Hjelt) or the Diatessaron (so Burkitt) came first is uncertain. About the end of the 2nd century Edessene Christianity seems to have made a fresh beginning: the ordination of Palut by Serapion of Antioch may mean that things ecclesiastical took a westward trend, and it is possible (so Burkitt) that the " Old Syriac "

New Testament version was now introduced. A strong man offered himself in Bardaisan (q.v.; Bardesanes), to whom perhaps we owe the finest Syriac poem extant, the " Hymn of the Soul," though orthodoxy rejected him. He was a contemporary of Abgar IX., at whose court Julius Africanus stayed for a while. A Syrian official record from this reign, preserved in the Edessene Chronicle, gives a somewhat detailed account of a violent flood (autumn, 201) of the Daisan river which did much damage, destroying

1 The inscription, which is difficult to read, connects the structure with Shalmat the queen, daughter of Ma'nu, who cannot be identified with certainty, and refers to some image(s), which probably excited the pious vandalism of the Arabs.

2 Nebo and Bel (Doctr. Addai, 31) may come from the Old Testament (Burkitt).

3 S.B.A.W., 1904, 910 ff.

- *So, e.g. F. C. Burkitt, Early Eastern Christianity, 72. 6 Marquart, Ostasiat. und osteurop. Streitzuge, 292 ff.*

• Marquart, op. cit.

amongst other things "the palace of Abgar the Great," rebuilt as a summer palace by Abgar IX., and " the temple of the church of the Christians." The form of this last statement shows that at the time of writing (206) the rulers had not adopted Christianity themselves. Abgar IX, is now commonly supposed to be the ruler to whom the famous legend was first attached (see Abgar); but though he visited Rome there is no proof that he ever became a Christian (Gomperz, in Arch&ologisch-epigraphische Mitteilungen aus Osterreick-Ungam, xix. 154-157). It was at Edessa that Caracalla, who made it a military colony under the style of Colonia Marcia Edessenorum, spent the winter of 216-217, and near there that he was murdered. The religious philosophical treatise preserved under the title of Book of the Laws of the Lands was probably produced at this time by a pupil of Bardesanes, and the Acts of Thomas in its original form may have followed not long after.

Sassanian Period. — In 226 the Parthian empire gave place to the new kingdom of the Sassanidae, whose claim to the ancient Achaemenian empire led to constant struggle with Rome in which Edessa naturally suffered. The native state was restored by Gordian in 242; but in 244 it became again directly subject to Rome. The

Edessan martyrs Sharbel and Barsamya, whose " Acts " in legendary form have come down to us, may have perished in the Decian persecution. In 260 the city was be- sieged by the Persians under Shapur I., and Valerian was defeated and made prisoner by its gates. Odaenathus of Palmyra (d. 267), however, wrested Mesopotamia from the Persians; but Aurelian defeated his successor Zenobia at Emesa (273), and Carus, who died in 283 in an expedition against the Persians, and Galerius (297) carried the frontier again to> the Tigris. Diocletian's persecution secured the martyr's crown for the Edessenes Shamona, Guria (297), and Habblb (309), and shortly thereafter Lucian " the martyr," who though born at Samosata received his training at Edessa; but the bishop Qona, who laid the foundations of " the great church " by the sacred pool, somehow escaped. Edessa can claim no share in "the Persian Sage " Aphrahat or Afrahat (Aphraates) ; but Ephraem, after bewailing in Nisibis the sufferings of the great Persian war under Constantius and Julian, when Jovian in 363 ceded most of Mesopotamia to Shapur II., the persecutor of the Christians, settled in Edessa, which as the seat of his famous school (called "the Persian") grew greatly in importance, and attracted scholars from all directions. He taught and wrote vigorously against the Arians and other heretics, and although just after his death (373) the emperor Valens banished the orthodox from Edessa, they returned on the emperor's death in 378. Under Zenobius, disciple of Ephraem, studied the voluminous writer, Isaac of Antioch (d. circ. 460). Rabbula perhaps owed his elevation to the see of Edessa (411-435), in the year which pro- duced the oldest dated Syriac MS., to his asceticism, and it was to his time that the sojourn there of the " Man of God " (Alexis) was assigned; but he won from the Nestorians the title of the Tyrant of Edessa. In particular he exerted himself to stamp out the use of the Diatessaron in favour of the four Gospels, the Syriac version of which probably now took the form known as the Peshitta. When the popular Nestorianism of the Syrians was condemned at Ephesus (431) it began to gravitate eastwards, Nisibis becoming its eventual headquarters; but Edessa and the western Syrians refused to bow to the Council of Chalcedon (451) when it condemned Monophysitism. In and around Edessa the theological strife raged hotly.' When, however, Zeno's edict (489) ordered the closing of the school of the Persians at Edessa, East and West drifted apart more and more; the ecclesiastical writer Narsai, "the Harp of the Holy Spirit," fled to Nisibis about 489. Till about this time Syriac influence was strong in Armenia, and some Syriac works have survived only in Armenian translations. In the opening years of the 6th century the Persian-Roman War (502-506) found a chronicler in the anonymous

Edessene history known till recently as the Chronicle of Joshua Stylites. Whether Edessa received

7 Some one found time, however, to produce the oldest dated MS. of a portion of the Bible in any language.

*from the emperor Justin I. the additional name of Justinopolis may be uncertain (see Hairier, op. cit. p. 128); but it seems to have been renewed and fortified after the " fourth *' flood in 525 (Procop. Pers. ii. 27; De aedific. ii. 7). About this time, according to Noldeke, an anonymous Edessene wrote the Romance of Julian the Apostate, which so many Arab writers use as a history. Chosroes I. Anushirwan succeeded in 54.0, according to the last entry in the Edessene Chronicle, in exacting a large tribute from Edessa; but in 544 he besieged it in vain. A few years later Jacob Baradaeus, with Edessa as centre of his bishopric, was carrying on the propaganda of Monophysitism which won for the adherents of that creed the name of Jacobites (?.».). The valuable Syriac Chronicle just referred to probably was compiled in the latter half of this century.*

Islarh. — In the first decade of the next century Edessa was taken by Chosroes II., and a large part of the population trans- ported to eastern Persia. Within a score Of years it was recovered by the emperor Heraclius, who reviewed a large army under its walls. The prophet of Islam was now, however, building up his power in Arabia, and although Heraclius paid no heed to the letter demanding his adhesion which he received from Medina (628), and the deputation of fifteen Rahawiyfn who paid homage in 630 were not Edessenes but South Arabians, a few years later (636 ?) Heraclius's attempts, from Edessa as a centre, to effect an organized opposition to the victorious Arabs were defeated by Sa'd, and he fell back on Sam'osata. The terms on which Edessa definitely passed into the hands of the Moslems (638) under Riyad are not certain (Baladhurl). As it now ceased to be a frontier city it lost in importance. In 668 occurred another destructive flood (Theophanes, p. 537), and in 678 an earthquake which destroyed part of the " old church," which the caliph Mo'awiya I. is said to have repaired. To the latter part of the century belongs the activity of Edessa's bishop Jacob, whose chronicle is unfortunately lost. It may have been the impulse given by the final supremacy of the caliphate to the long process which eventually substituted a new branch of Semitic speech for the Aramaic (which had now prevailed for a millennium and a half) , that led Jacob to adopt the Greek vowel signs for use in

Syriac. A century later Theophilus of Edessa (d. 785), author of a lost history, translated into Syriac " the two books of the poet Homer on the Conquest of the city of Iiion." When the Bagdad caliphs lost control of their dominions, Edessa shared the fortunes of western Mesopotamia, changing with the rise and fall of Egyptian dynasties and Arab chieftains. In the 10th century al-Mas'udl, writing in the very year in which it happened, tells how the Mahommedan ruler •of Edessa, with the permission of the caliph, purchased peace of the emperor Romanus Lecapenus by surrendering to him the napkin of Jesus of Nazareth, wherewith he had dried himself after his baptism. The translation of the Holy Icon of Christ from Edessa is commemorated on the 16th of August (Cal. Byzant). A few years later Ibn Jjaukal (978) estimates the number of churches in the city at more than 300, and al-Mokaddasi (985) describes its cathedral, with vaulted ceiling covered with mosaics, as one of the four wonders Of the world. In 1031 the emperor recovered Edessa; but in 1040 it fell into the hands of the Seljuks, whose progress had added a large element of Armenian refugees to the population of Osrhoene. There is no reason, therefore, to discredit Maqrizl's statement that it was three brother architects from Edessa that the Armenian minister Badr al-Gamali employed to build three of the fine city gates of Cairo (1087-1091). The empire soon recovered Edessa, but the resident made himself independent. Thoros applied for help to Baldwin, brother and successor of Godfrey of Bouillon in the First Crusade, who in 1098 took possession of the town and made it the capital of a Burgundian countship, which included Samosata and Saruˆ, and was for half a century the eastern bulwark of the kingdom of Jerusalem. 1 The local Armenian historian, however, Matthew of Edessa, tells of oppression, decrease of population, ruin of churches, neglect of agriculture.

•The counts were: Baldwin I. (1098). Baldwin II. (1160), Joscelin I. (1119), Joscelin II. (1131-1147).

With the campaign of Maudud in 11 10 fortune began to favour the Moslems. Edessa had to endure siege after siege. Finally, in 1 1 44 it was stormed, Matthew being among the slain, by 'Imad ud-Din Zengi, ruler of Mosul, under Joscelin II., an achievement celebrated as " the Conquest of conquests," for laying the responsibility of which not on God but on the absence of the Frankish troops, an Edessan monk, John, bishop of Harran (d. 1165), brought down upon himself the whole bench Of bishops. Edessa suffered still more in 1146 after an attempt to recover it. Churches were now turned into mosques. The consternation produced in Europe by the news of its fate led to " the Second Crusade." In 1182 it fell to Saladin, whose nephew recovered

it when it had temporarily passed (1234) to the sultan of Rum; but the " Eye of Mesopotamia " never recovered the brilliance of earlier days. The names it con- tributed to Arabic literature are unimportant. By timely sur- render (1268) it escaped the sufferings inflicted by Hulaku and his Monguls on Sarflg (Barhebraeus, Chron. Arab., Beirut ed., 486). Mostaufi describes a great cupola of finely worked stone still standing by a court over a hundred yards square (1340). Ali b. Yazd in his account of the campaigns of Timur, who reduced Mesopotamia in 1393, still calls the city (1425) RuhJ. In 1637, when Amurath IV. conquered Bagdad and annexed Mesopotamia, it passed finally into the hands of the Turks, by whom it is called Urfa.

The Modern Town. — Urfa lies north-east of the Nimrud Dagh. It is surrounded by a wall, strengthened by square towers at distances of 18-20 steps, probably dating in its present condition from medieval Mahommedan times. On a height in a corner towards the west, overtopping the town by 100-200 ft., are the remains of the old citadel, and the two famous Corinthian columns' known as "the Throne of Nimrud." In the hollow between this height and the town rise two springs which form ponds, the farther removed of which from the citadel is known as Birket al-Khalil, doubtless the Callirrhoe of the classical writers, and contains the sacred fish, estimated by J. S. Bucking- ham at 20,000, and the nearer as "Ain Zalkha {i.e. Zuleikha, the wife of Potiphar). On the north edge of the Birket al-Khalil (see plan in Sachau, p. 197) is the great mosque of Abraham, the interior of which is described by J. S. Buckingham (Travels, pp. 108-110). Diagonally opposite the mosque is a house with a square tower, which is locally believed to occupy the place of the famous ancient school. The waters of the two pools make their way in a single stream southwards out of the town. The once dangerous stream Daisan (S/apros) no longer flows southwards through the town, but encircles it on the north and east in the channel of the old moat. This stream, now called Kara Kuyun, and the other are exhausted in the irrigation of the gardens lying south-east of the town, except when fuller than usual, when they reach the Ballh. Not far east of the sacred pool is the largest building in the town, the recent Armenian Gregorian cathedral, whose American bells were first heard during Sachau's visit in 1879. About the middle of the town is the largest mosque, Ulu GamI (parts of it probably pre-Islamic), which probably occupies the site of the Christian church reckoned by the early Mahommedan writers as one of the wonders of the world. In the bazaar, which lies between the chief mosque and the sacred pool, and contains several streets, are displayed not only

the native woollen stuffs, pottery and silver work, but also a consider- able variety of European goods, especially cloth stuffs. The principal manufactures are fine cotton stuffs and yellow leather. The streets are of course narrow and winding; but the houses are well built of stone. The outskirts are occupied by melon gardens, vineyards and mulberry plantations. The fertile plain south of the town is noted for its wheat and fine pasture. The climate is healthy except in summer; the " Aleppo button " (see Bagdad, vilayet), a painful boil, is common. The rocky heights south and west of the town, whence the building material is largely obtained, are full of natural and artificial caverns, once used as dwellings, cloisters and graves, where are most of the

1 Pictures in Burkitt, Early East. Christ., frontispiece; P.S.B.A. xxi'iii. 151 f. ; J. R. Harris, The Heavenly Twins.

inscriptions published by Sachau, who also visited and describes (pp. 204-206) the Der Ya'qub, nearly two hours distant.

Urfa is the capital of a sanjak of the same name, in the vilayet of Aleppo. The population was estimated by Olivier in 1796 at 20,000 to 24,000, by Buckingham at 50,000, by Chernik in 1873 at 40,000, by Sachau in 1879 at 50,000, in Baedeker's Handbook in 1906 at 30,000. Vice-Cons ul Fitzmaurice said that before December 1895 it was close on 65,000, of whom about 20,000 were Armenian, 3000 or 4000 Jacobites, Syrian-Catholic, Greek-Catholic, Maronites and Jews, and the remaining 40,000 Turkish, Kurdian and Arab Mahommedans, Two barbarous massacres occurred on the 28th and 29th of October and the 28th and 29th of December 1895; 126 Armenian families were absolutely wiped out. He believes that 8000 Armenians perished in the second massacre. The Deutsche Orient-Mission has its chief seat in Urfa, and there have for years been American and French missions. The Germans have an orphanage with 300 Armenian children, a carpet factory and a medical station. The American school had some years ago 250 pupils.

Authorities. — Inscriptional : H. Pognon, Inscriptions semitiques de la Syrie, de la Mesopotamie et de la region dc Mossoul (1907, 1908) ; Sachau, " Edessenische Inschriften," in Z.D.M.G. xxxvi. 142-167; F. C. Burkitt, " The Throne of Nimrod," in P.S.B.A. xxviii. 149- 155 (1906) ; J. Rendel Harris, The Cult of the Heavenly Twins (1906) ;

Noldeke, " Syrische Inschriften," in Z.A. xxi. I5i-r6i; 375-388 (1908). Literary: Ludwig Hallier, Untersuchungen uber die Edessenische Chronik ntit dem Syrischen Text (1892) ; F. Nau, Analyse des parties inedites de la chronique attribute d Denys de Tellmahre (1898) ; J.-B. Chabot, Chronique de Denys de Tell-MahrS, quatrieme partie (1895) ; W. Wright, The Chronicle of Joshua the Stylite (1882) ; Bayer, Historia Osrhoena et Edessena (St Petersburg, 1784), collects the refer- ences in classical authors ; for the coinage see references in von Gut- schmid (see below). Discussions: A. von Gutschmid, " Untersuch- ungen uber die Geschichte des Konigreichs Osroene " (in Memoires del'acad. imper. des sciences de St-Petersb. vii. ser. tome 35, No. I, 1887); L.J. Tixeront, Les Origines de I'eglise d'£desse et la legende d'Abgar (1888); R. A. Lipsius, Die Edessenische Abgarsage kritisch untersucht (1880); K. C. A. Matthes, Die Edess. Abgarsage auf ihre Fortbildung untersucht (1882); F. Nau, Une Biographie inediie de Bardesane Vastrologue (1897); Bardesane Vastrologue: le lime des Lois des Pays (1899); A. Hilgenfeld, Bardesanes, der letzte Gnostiker (1864) ; A. A. Bevan, " The Hymn of the Soul " (in Texts and Studies, 1897); F. C. Burkitt, Early Eastern Christianity (1904); J. R. Harris, The Dioscuri in Christian Legend (1903), and The Cult of the Heavenly Twins (1906); the histories of Rome, Persia, Crusades, Mongols, &c. ; Rubens Duval, Histoire politique, religieuse et litter aire d'Edesse jusqu'd la premiere croisade (1892), a useful com pilation reprinted from the Journ. As.; the excellent article by E.- Meyer in Pauly-Wissowa, Realencyclopddie, 1933-1938. Topo- §raphy: J. S. Buckingham, Travels in Mesopotamia (1827); E. achau, Reise in Syrien u. Mesopotamien (1883), 189-210; cf. Duval, op. cit. chap, i.; C. Ritter, Erdkunde, xi. 315-356. Map of town in Niebuhr, Voyage en A rabie, reproduced with modifications in Wright, Chron. Josh. Styl. ; also a map in Rectus, Univ. Geog. ix. 232. Four pictures of the town in Burkitt, Early East. Christ. (H. W. H.)

EDFU, in Coptic Atbo, a town of Upper Egypt, 484 rh. S.S.E. of Cairo by rail, on the W. bank of the Nile, the railway station being on the opposite side of the river. Pop. (1907) 19,262. The inhabitants manufacture earthenware, which finds ready sale all through Egypt. The ancient Atbo {Apollinopolis Magna) was capital of the second nome of Upper Egypt. The great sandstone temple is practically complete (see Architecture: Egypt). It was built on the site of an earlier structure entirely in the time of the Ptolemies. The central part of the building, begun by Ptolemy III. Euergetes in 237 B.C., was finished by his successor in 212; the portico, court, pylons and surrounding wall were added by Ptolemy Euergetes II., Soter II.

and Alexander I.; but the decoration was not finished till 57 B.C. in the reign of Ptolemy XIII. Neos Dionysus. The god of Atbo was a form of Horus (Apollo) as the sun-god; his most char- acteristic representation is as the disk of the sun with outspread wings, so often seen over the doors of shrines, at the top of stelae, &c. In the temple, where he is often figured as a falcon- headed man, he is associated with Hathor of Dendera and the child Harsemteus.

See Baedeker's Egypt; Ed. Naville, Textes relatifs au mythe d' Horus recueillis dans le temple d'Edfou. (F. Ll. G.).

EDGAR (Eadgar), king of the English (944-975), was the younger son of Edmund the Magnificent and ˆElfgifu. As early

as 95.5 he signed a charter of his uncle Eadred, and in 957 the Mercian nobles, discontented with the rule of his elder brother Eadwig, made him king of England north of the Thames. On the death of his brother in October 959 Edgar became king of a united England. Immediately on his accession to the throne of Mercia Edgar recalled St Dunstan from exile and bestowed on him first the bishopric of Worcester, and then that of London. In 961 Dunstan was translated to Canterbury, and throughout Edgar's reign he was his chief adviser, and to him must be attributed much of the peace and prosperity of this time.

The reign of Edgar was somewhat uneventful, but two things stand out clearly: his ecclesiastical policy and his imperial position in Britain. Edgar and Dunstan were alike determined to reform the great monastic houses, and to secure that they should be restored once more to their true owners and not remain in the hands of the secular priests or canonici, whose life and discipline alike seem to have been extremely lax. In this reform Edgar was helped not only by St Dunstan but also by Oswald of Worcester and .

The coronation of Edgar was, for some unexplained reason, delayed till the Whitsunday of 973. It took place with much ceremony at Bath, and was followed shortly after by a general submission to Edgar at Chester. Six, or (according to later chroniclers) eight kings, including the kings of Scotland and Strathclyde, plighted their faith that they would be the king's fellow- workers on sea and land. The historical truth of this story has been much questioned; there seems to be little doubt that it is true in its main outlines, though we need not accept the details about Edgar's having been rowed on the Dee by eight kings.

Two isolated and unexplained incidents are also recorded in the chronicle: first, the ravaging of Westmorland by the Scandinavian Thored, son of Gunnere, in 967; and second, the ravaging of Thanet by Edgar's own command in 970.

Edgar's death took place in the year 975, and he was buried at Glastonbury. By his vigorous rule and his statesmanlike policy Edgar won the approval of, his people, and in the Saxon chronicle we have poems commemorating his coronation and death, and describing his general character. The only fault ascribed to him is a too great love for foreigners and for foreign customs. Edgar strengthened the hands of the provincial administration, and to him has been attributed the reorganization of the English fleet. The characteristic feature of his rule was his love of peace, and by efficient administration he secured it.

Edgar formed an irregular union in 961 with Wulfthryth, an inmate of the convent at Wilton, who bore him a daughter Eadgyth. He next married ˆEthelflasd, " the white duck," daughter of Earl Ordmsr, who bore him a son, afterwards known as Edward the Martyr. Finally he was united to ˆElfthryth, daughter of Earl Ordgar, who became the mother of the ˆEtheling Edmund (d. 971) and of ˆEthelred the Unready.

Authorities. — Saxon Chronicle (ed. PlummerandEarle, Oxford), sub. ann. ; Vita Sancti Oswaldi {Historians of the Church of York, ed. Raine, Rolls Series) ; William of Malmesbury, Gesta regum (ed. Stubbs, Rolls Series) ; Birch, Cartularium Saxonicum, vol. iii. Nos. 1047-1319; F. Liebermann, A.-S. Laws, i. 192-216; "Florence of Worcester " (Mon. Hist. Brit.) ; E. W. Robertson, Historical Essays, pp. 189-215. (A. Mw.)

EDGAR, or Eadgar (c. 1050-c. 1130), called the jEtheling, was the son of Edward, a son of the English king Edmund Ironside, by his wife Agatha, a kinswoman of the emperor Henry II., and was born probably in Hungary some time before 1057, the year of his father's death. After the death of Harold in 1066, Archbishop Aldred and the citizens of London desired to make him king, but on the advance of William, Edgar and his supporters made their submission. In 1068, after the failure of the first rising of the north, Edgar retired to Scotland, when his sister Margaret married the Scottish king, Malcolm Canmore.

Next year he returned to take part in the second rising, but, this proving no more successful than the first, he again took refuge in Scotland. In 1074 he went to Normandy and made peace with William. In the struggle between Henry I. and Robert of Normandy, Edgar sided with the latter. He was taken prisoner at the battle of Tinchebrai in 1106, but was subsequently released. The date of his death is uncertain, but he was certainly alive about n 25.

EDGECUMBE, or Edgecombe, the name of a celebrated west of England family, taken from the manor of Edgecumbe in Cornwall. One of its earlier members was Sir Richard Edgecumbe (d. 1489), who was descended from a Richard Edgecumbe who flourished during the reign of Edward I. Richard was a member of parliament in 1467; afterwards he joined Henry, earl of Rich- mond, in Brittany, returned with the earl to England, and fought at Bosworth, where he was knighted. He received rich rewards from Henry, now King Henry VII., who also sent him on errands to Scotland, to Ireland and to Brittany, and he died at Morlaix on the 8th of September 1489. His son and successor, Sir Piers Edgecumbe, went to France with Henry VIII. in 1513, and when he died on the 14th of August 1539 he left with other issue a son, Sir Richard Edgecumbe (1499-1562), a cultured and hospitable man, who is celebrated through Richard Carew's Friendly Remembrance of Sir Richard Edgecumbe. Sir Richard's eldest son, Piers or Peter Edgecumbe (1 536-1607), was a member of parliament under Elizabeth for about thirty years.

Another famous member of this family was Richard, 1st baron Edgecumbe (1680-1758), a son of Sir Richard Edgecumbe. Educated at Trinity College, Cambridge, he was successively member of parliament for St Germans, Plympton and Lostwithiel from 1 701 to 1742; on two occasions he served as a lord of the treasury; and from 1724 to 1742 he was paymaster-general for Ireland, becoming chancellor of the duchy of Lancaster in 1743. Edgecumbe was a faithful follower of Sir Robert Walpole, in whose interests he managed the elections for the Cornish boroughs, and his elevation to the peerage, which took place in 1742, was designed to prevent him from giving evidence about Walpole's expenditure of the secret service money. He died on the 22nd of November 1758. His son and successor, Richard, the 2nd baron (1716-1761), was comptroller of the royal house- hold, a member of parliament, and a major-general in the army. A wit, a writer of verse, a gambler and an intimate friend of Horace Walpole, " Dick Edgecumbe " died unmarried on the 10th of May 1761.

Edgecumbe's brother, George, 1st earl of Mount Edgecumbe (1721-1795), was a naval officer who saw a great deal of service during the Seven Years' War. Succeeding to the barony on the 1st baron's death in 1761 he became an admiral and treasurer of the royal household; he was created Viscount Mount-Edge- cumbe in 1781 and earl of Mount-Edgecumbe in 1789. He died on the 4th of February 1795, his only son being his successor, Richard, the 2nd earl (1764-1839), the ancestor of the present earl and the author of Musical Reminiscences of an Old Amateur. He died on the 26th of September 1839. His son, Ernest Augustus, the 3rd earl (1797-1861), wrote Extracts from Journals kept during the Revolutions at Rome and Palermo.

EDGE HILL, an elevated ridge in Warwickshire, England, near the border of Oxfordshire. The north-western face is an abrupt escarpment of the lias, and the summit of the ridge is almost level for nearly 2 m., at a height somewhat exceeding 700 ft. The escarpment overlooks a rich lowland watered by streams tributary to the Avon; the gentle eastern slope sends its waters to the Cherwell, and the ridge thus forms part of the divide between the basins of the Severn and the Thames. Edge Hill gave name to the first battle of the Great Rebellion (q.v.), fought on the 23rd of October 1642. Charles I., marching on London from the north-west, was here met by the parliamentary forces under Robert Devereux, earl of Essex. The royalists were posted on the hill while the enemy was in the plain before Kineton. But the rash advice of Prince Rupert determined the king to give up the advantage of position; he descended to the attack, and though Rupert himself was successful against the

opposing cavalry, he was checked by the arrival of a regiment with artillery under Hampden, and, in the meantime, the royalist infantry was driven back. The parliamentarians, however, lost the more heavily, and though both sides claimed the advantage, the king was able to advance and occupy Banbury.

EDGEWORTH, MARIA (1 767-1849), Irish novelist, second child and eldest daughter of Richard Lovell Edgeworth (q.v.) and his first wife, Anna Maria Elers, was born in the house of her maternal grandparents at Black Bourton, Oxfordshire, on the 1st of January 1767. Her early efforts in fiction were of a sufficiently melodramatic character; for she recollected one of her schoolgirl compositions, in which the hero wore a mask made of the dried skin taken from a dead man's face. Her holidays were often spent in the house of the eccentric Thomas Day, for whom she entertained a genuine respect. She had ample opportunities for society among her father's

neighbours in Ireland, among whom were the second Lord Longford, whose daughter, " Kitty " Pakenham, became later duchess of Wellington, Lady Moira at Castle Forbes, and Maria's aunt, Margaret Ruxton, at Black Castle. She gained a first-hand experience of the Irish peasantry by acting as her father's assistant in the management of the estate. The Edgeworths were in Ireland from 1793 onwards through that dangerous period, and Maria's letters, always gay and natural, make very light of their anxieties and their real perils.

Mr Edgeworth encouraged his daughter's literary instincts. It has been the fashion to regard his influence over Maria's work as altogether deplorable, but against the disadvantages arising from his interference must be weighed the stimulus she undoubtedly derived from his powerful mind. Her first publica- tion was a plea for female education, Letters to Literary Ladies (1795), and in 1796 appeared the collection of stories known as The Parent's Assistant (2nd ed., 6 vols., 1800), an unpromising title which was not chosen by the author. The stories had been submitted as they were written to the juvenile critics of the Edgeworth nursery. They were therefore children's stories for children, even though the morals were Mr Edgeworth's. In 1798 Mr Edgeworth's fourth marriage threatened the family harmony, but Maria soon became a close friend of her step-mother. Practical Education (2 vols., 1798) was written in con-junction with her father, who also collaborated with her in the Essay on Irish Bulls (1802). Miss Edgeworth's first novel, Castle Rackrent, an Hibernian Tale taken from Facts, and from the Manners of the Irish Squires before the year 1782, was written without her father's supervision, and appeared anonymously in 1800. It is the story of an Irish estate and its owners, the Rackrents, as told by Thady, the steward. Its success was immediate, and a second edition soon appeared with the author's name. Perhaps because of the absence of Richard Lovell Edgeworth's co-operation, the book is the most natural and vigorous of her novels. The course of the story is not altered to suit any moral, and the personages appear to be drawn immediately from the natives of Edgeworthstown, though Miss Edgeworth asserts that only Thady himself was an actual portrait. In her realistic pictures of Irish peasant life she opened up a new vein in fiction, and even if the unquestionable excellences of Castle Rackrent were less, it would still be a noter worthy book. In the " General Preface " to the 1829 edition of his novels Sir Walter Scott, writing of the publication of Waverley, says: " I felt that something might be attempted for my own country, of the same kind with that which Miss Edgeworth so fortunately achieved for Ireland," and in the "

Postscript, which should have been a preface," in the original edition of Waverley, he describes his aim as being " in some distant degree to emulate the admirable Irish portraits of Miss Edgeworth, so different from the ' Teagues ' and ' dear joys ' who so long, with the most perfect family resemblance to each other, occupied the drama and the novel." Belinda (1801) is a society novel, and one of her best books. Mr Saintsbury thinks that Miss Austen's heroines owe something of their naturalness to Belinda, who was one of the earliest to break with the tradition of fainting

and blushing. Moral Tales for Young People (5 vols.) and Early Lessons, which included " Harry and Lucy," " Rosamond " and " Frank," appeared in 1801.

In 1802 the Edgeworths went abroad, first to Brussels and then to Paris. They had already connexions in Paris through their kinsman, the abbe Henri Allen Edgeworth de Firmont, who was, however, then in exile. They met all the notabilities in Paris, and Maria refused an offer of marriage from a Swedish count named Edelcrantz. Although LeoHora,' not published until four years later, is said to have been written to meet his taste, she apparently remained then and always heart-whole; but her stepmother thought otherwise, and maintained that she suffered severely for her decision (Memoir, i. 144). Returning to Edgeworthstown, Miss Edgeworth resumed her writing, which was always done in the rooms commonly used by the whole family. Popular Tales was published in 1804, and The Modern Griselda in the same year; Leonora in 1806; and in 1809 tne first series of Tales of Fashionable Life, three volumes containing " Ennui," " Madame de Fleury," " Almeria," " The Dun " and " Manoeuvring " ; the second series (3 vols., 1812) included " The Absentee," one of her best tales, which was originally designed as a play, "Vivian" and " Emilie de Coulanges." In 1813 Maria and her parents spent a considerable time in London, and her society was much sought after. When Waverley was published, Miss Edgeworth received a copy from the pub- lishers, and at once recognized the authorship. She wrote a long letter of appreciation (23rd of October 1814) to " the author of Waverley" which she began with the phrase aut Scotus, out diabolus, but the letter was merely acknowledged by the" pub- lishers. Patronage (4 vols., 1814), the longest of her novels, and Harrington,,a tale, and Ormond, a tale (3 vols., 1817) complete the list of the works which received what her father called

his imprimatur.

After his death in 1817 Miss Edgeworth occupied herself with completing his Memoirs, which were published in 1820. The book was the excuse for an attack on Mr Edgeworth's reputation in the July number of the Quarterly Review, which Miss Edge- worth had the courage to leave unread. Her life at Edgeworths- town was varied by visits to London, to Lord Lansdowne at Bowood, Wiltshire, to the Misses Sneyd in Staffordshire, and to many other friends. In 1820 she was again in Paris, and in 1823 she spent a happy fortnight with the Scotts at Abbotsford. In 1825 Scott went to Edgeworthstown, and their relations were always cordial.

Miss Edgeworth's production was less after her father's death. Sequels to " Rosamond," " Frank," " Harry and Lucy " in the Early Lessons were published in 1822-1825. Comic Dramas appeared in 181 7, and Helen in 1834. She worked to the last, and in 1846 laboured strenuously for the relief of the famine-stricken Irish peasants. She died on the 22nd of May

1849.

Miss Edgeworth's novels are distinguished by good sense, humour and an easy flowing style. As the construction of a plot is not her strong point, she is generally more successful in tales than in lengthy novels. The vivacity of her dialogues is extraordinary; and in them her characters reveal themselves in the most natural way possible. Her books are character- studies rather than intensely interesting narratives. Sobriety of judgment is seen throughout; and passion, romance and poetry rarely, if ever, shed their lustre on her pages. Three of her aims were to paint national manners, to enforce morality, and to teach fashionable society by satirizing thlf lives of the idle and worldly. She expressly calls some of her stories " Moral Tales "; but they all fall under this category. In her pages the heroic virtues give place to prudence, industry, kindness and sweetness of temper. There are few instances of over- whelming emotions or tumultuous passions in her works; and it is remarkable how little the love of nature appears. She never uses material which does not yield some direct moral lesson. But the freshness of her stories, her insight into character, lively dialogues, originality of invention, and delightfully clear style render it quite possible to read her works in succession

without any sense of weariness. Among the many sweet memories her unsullied pages have bequeathed to the world, not the least precious

is her own noble character, which ever responded to all that is best and most enduring in human nature. See A Memoir of Maria Edgeworth, with a Selection from her Letters (1867), by her stepmother, F. A. Edgeworth, privately printed. A selection from this was made by Augustus J. C. Hare, and printed under the title of The Life and Letters of Maria Edgeworth (2 vols., 1894). See also Maria Edgeworth (1883), by Helen Zimmern, in the " Eminent Women " series; Grace A. Oliver, A Study of Maria Edgeworth . . . (3rd ed., Boston, U.S.A., 1882); and Maria Edge- worth (1904), by the Hon. Emily Lawless in the " English Men of Letters " series. Among the numerous shorter articles dealing with Maria Edgeworth and the family circle at Edgeworthstown may be mentioned a friendly appreciation of Miss Edgeworth 's novels by George Saintsbury in Macmillan's Magazine (July 1895), and a charming description of her family circle and surroundings in the preface supplied by Lady Thackeray Ritchie to Macmillan's edition of the novels (1895).

EDGEWORTH, RICHARD LOVELL (1744-1817), British writer, was born at Bath on the 31st of May 1744. The greater part of his life, however, was spent at Edgeworthtown, or Edgeworthstown, in the county of Longford, Ireland, where the Edgeworth family had been settled for upwards of 150 years. He was of gentle blood — his father being the son of Colonel Francis Edgeworth, and his mother, Jane Lovell, being the daughter of Samuel Lovell, a Welsh judge. Richard's mother taught him to read at a very early age; and from childhood he had a strong love for mechanical science. The Rev. Patrick Hughes initiated him in Lilye's Latin Grammar — -an office he also performed for Goldsmith, who was born on the property of the Edgeworths — and his public education began, in August 1752, in a school at Warwick. He subsequently attended Drogheda school, then reputed the best in Ireland; and, after spending two years at a school in Longford, entered Trinity College, Dublin, in April 1761, but was transferred to Corpus Christi College, Oxford, in October of the same year. While still at college, he made a runaway 'match, marrying at Gretna Green, Anna Maria, one of the daughters of Paul Elers of Black Bourton, Oxfordshire, an old friend of his father. His eldest son was born before Edgeworth reached his twentieth birthday, and his daughter Maria in 1767.

Shortly after the birth of his son, he and his wife went to Edgeworthstown, but in 1765 they took a house at Hare Hatch, near Maidenhead. Edgeworth devoted much time to scientific reading and experiments; and he made an attempt to establish telegraphic communication (Memoirs, 2nd edition, i. 144). He also invented a turnip-cutter, a one-wheeled chaise and other contrivances. In the

pursuit of his mechanical inventions he visited Erasmus Darwin at Lichfield, where he met Anna Seward, and her cousin, Honora Sneyd. His home was now at Hare Hatch, in Berkshire, where he endeavoured to educate his son according to the method explained in Rousseau's &mile. In later life, however, the ill-success of this experiment led him to doubt many of Rousseau's views (Memoirs, ii. 374). At the same time he kept terms at the Temple, and formed the greatest friendship of his life with Thomas Day, the author of Sandford and Merton, which was written at Edgeworth's suggestion. In 1769, on the death of his father, he gave up the idea of being a barrister; but, instead of immediately settling on his Irish estate, he spent a considerable time in England and France, mainly in Day's company. In Lyons, where he resided for about two years, he took an active part in the management of public works intended to turn the course of the Rhone. He was summoned to England by the death of his wife (March 1773), with whom he was far from happy. Edgeworth hurried to Lichfield, to Dr Erasmus Darwin's, and at once declared his passion for Honora Sneyd, which had been the cause of his flight to France two years before. Miss Sneyd had been the object of attention from Thomas Day, but her Views on marriage were not submissive enough to please him. She had other suitors, among them the unfortunate Major Andre. She married Edgeworth (July '773), and after residing at Edgeworthstown for three years, they settled at Northchurch, in Hertfordshire, After six years of domestic happiness, Honora Edgeworth died

(April 1780), recommending her husband to marry her sister Elizabeth; and they were actually married on Christmas Day,

1780.

In 1782 Edgeworth returned to Ireland, determined to improve his estate, educate his seven children, and ameliorate the condition of the tenants. Up to this point Edgeworth has told his own story in his Memoirs. The rest of his life is written by his daughter, who opens with a lengthy panegyric on her father as a model landlord (Memoirs, ii. 12-36). In 1785 he was associated with others in founding the Royal Irish Academy; and, during the two succeeding years, mechanics and agriculture occupied most of his time. In October 1789 his friend Day was killed by a fall from his horse, and this trial was soon followed by the loss of his daughter Honora, who

had just reached her fifteenth year. In 1792 the health of one of Edgeworth's sons took him to Clifton, where he remained with his family for about two yeais, returning in 1794 to Edgeworthstown. Ii eland was, at that time, harassed by internal disturbances, and threats of a French invasion, and Edgeworth offered to establish telegraphic communication of his own invention throughout the country. This offer was declined. A full account of the matter is given in Edgeworth's Letter to Lord Charlemont on the Telegraph; and his apparatus is explained in an " Essay on the art of Conveying Swift and Secret Intelligence," published in the sixth volume of ihe^Transactions of the Royal Irish Academy. In the autumn of 1797 the third Mrs Edgeworth died.

Practical Education (1798) was written in collaboration with his daughter Maria, and embodied the experience of the authors in dealing with children. " So commenced," says Miss Edge- worth, " that literary partnership which, for so many years, was the pride and joy of my life " (Memoirs, ii. 170). This book, generally regarded as old-fashioned, has a real value in the history of education. Mr Edgeworth's interest in the subject had been inspired by the study of Rousseau and by his friendship with Thomas Day. But he went beyond Rousseau, who developed his theories from his own ingenious mind and related an imaginary process. The Edgeworths brought a scientific method to their work. The second Mis Edgeworth (Honora Sneyd) began the collection of actual examples of conversations between the children and their elders. This was continued patiently by the writers of the book; and their reasonings were thus founded on an accurate record of childish methods of thought. They deprecated especially any measures that interrupted the child's own chain of reasoning. The chapters on special subjects of study, chronology, geometry, &c, were written by Richard Lovell Edgeworth; those on toys, on rewards and punishments, on temper, &c, by his daughter.'

In 1798 Edgeworth married Miss Beaufort, and was elected M.P. for the borough of St John's Town, Longford. The same year, too, saw a hostile landing of the French and a formidable rebellion; and for a short time the Edgeworths took refuge in Longford. The winter of 1802 they spent in Paris. In 1804 the government accepted his telegraphic apparatus, but the installation was left incomplete when the fear of invasion was past. In 1802 appeared the Essay on Irish Bulls by Mr and Miss Edgeworth; and in 1806 Edgeworth was elected a member of the board of commissioners to inquire into Irish education. From 1807 till 1809 much of his time was spent on mechanical experi- ments and in writing the story of his life. In 1808 appeared Professional Education, and in 1813 his Essay on the

Construction of Roads and Carriages. He died on the 13th of June 181 7, and was buried in the family vault in Edgeworthstown church- yard.

Many of Edgeworth's works were suggested by his zeal for the education of his own children. Such were Poetry Explained for Young People (1802), Readings in Poetry (1816), A Rational Primer (unpublished), and the parts of Early Lessons contributed by him. His speeches in the Irish parliament have also been published; and numerous essays, mostly on scientific subjects,

1 For an appreciation of the two Edgeworths from the teacher's point of view, see Prof. L. C. Miall in the Journal of Education (August I, 1894).

have appeared in the Philosophical Transactions, the Transactions of the Royal Irish A cademy, the Monthly Magazine and Nicholson's Journal. The story of his early life, told by himself, is fully as entertaining as the continuation by Maria, as it contains less dissertation and more incident. One of his daughters by his first marriage, Anna Maria, married Dr Beddoes and became the mother of T. L. Beddoes, the poet.

See Memoirs of Richard Lovell Edgeworth, Esq., begun by himself and concluded by his daughter, Maria Edgeworth (2 vols., 1820, 3rd and revised ed. 1844). A selection from this, giving an opti- mistic view of him, Richard Lovell Edgeworth (1896), was edited by Mrs Lionel Tollemache.

EDGEWORTH DE FIRMONT, HENRY ESSEX (1745-1807), last confessor to Louis XVI., was the son of Robert Edgeworth, rector of Edgeworthstown in Ireland, his mother being a grand- daughter of Archbishop Ussher. When he was three years old his father became a Roman Catholic, resigned his living and emigrated to Toulouse, where the boy was brought up by the Jesuits. In 1769, after his father's death, he went to Paris to be trained for the priesthood. On taking orders he assumed the additional surname of de Firmont, from the family estate of Firmount near Edgeworthstown. Though originally studying with a view to becoming a missionary, he decided to remain in Paris, devoting himself especially to the Irish and English Roman Catholics. In 1791 he became confessor to the princess Elizabeth, sister of Louis XVI., and earned the respect even of the sans-culottes by his courage and devotion. By Madame Elizabeth he was recommended to the king when his' trial 'was impending; and after Louis' condemnation to death he was able to

obtain permission to celebrate mass for him and attend him on the scaffold, where he recommended the king to allow his hands to be tied, with the words: " Sire, in this new outrage I see only the last trait of resemblance between your Majesty and the God who will be your reward." It is said that at the moment of the execution, the confessor uttered the celebrated words: "Son of St Louis, ascend to heaven." But it is certain that the phrase was never spoken. The abbe himself does riot quote it, either in his memoirs or in a letter written in 1796 to his brother, in which he describes the death of the king. Moreover, Edgeworth declared to several persons who asked him about it, that the words were not his. In spite of the danger he now ran, Edgeworth refused to leave France so long as he could be of any service to Madame Elizabeth, with whom he still managed to correspond. At length, in 1795, his mother having meanwhile died in prison, where his sister was also confined, he succeeded in escaping to England, carrying with him Elizabeth's last message to her brother, the future KingCharlesX. whom he found in Edinburgh. He afterwards went with some papers to Monsieur (Louis XVIII.) at Blankenburg in Brunswick, by whom he was induced to accompany him to Mittau, where, on the 22nd of May 1807, he died of a fever contracted while attending some French prisoners.

Edgeworth's Memories, edited by C. S. Edgeworth, were first published in English (London, 1815), and a French translation (really the letters and some miscellaneous notes, &c.) was published in Paris in 18 1 6. A translation of the Lettres die I'abbi Edgeworth avec des memoires sur sa vie was published by Madame Elizabeth de Bow in Paris in 1818, and Letters from the Abbe Edgeworth to his Friends, with Memoirs of his Life, edited by T. B. England, in London in 1818. See J. B. A. Hanet-Clery, Journal de ce qui s'est passe, &c. (Paris, 1825); A. H. du D. de Beauchesne, Vie de Madame Elisabeth (Paris, 1869); J. C. D. de Lacretelle, Precis historigue de la Revolution francaise (Paris, 1801-1806).

EDGREN tjLEFFLER, ANNE CHARLOTTE, duchess of Cajanello (iSˆo-1892), Swedish author, daughter of the mathe- matician Prof. C. O. Leffler, was born on the 1st of October 1849. Her first volume of stories appeared in 1869, but the first to which she attached her name was Ur Lifvet (" From Life," 1882), a series of realistic sketches of the upper circles of Swedish society, followed by three other collections with the same title. Her earliest plays, SMdespelerskan (" The Actress," 1873), and its successors, were produced anonymously in Stockholm, but in 1883 her reputation was established by the success of Sanna Kvinnor (" True Women "), and En Raddande engel (" An Angel

of Deliverance “)• Sanna Kvinnor is directed against false femininity, and was well received in Germany as well as in Sweden. Anne Leffler had married in 1872 G. Edgren, but about 1884 she was separated from her husband, who did not share her advanced views. She spent some time in England, and in 1885 produced her Hur man gbr godt (” How men do good • ‘), followed in 1888 by Kampenfor lyckan (” The Struggle for Happiness “), in which she had the help of Sophie Kovalevsky. Another volume of the Ur Lifvet series appeared in 1889; and Famil- jelycka (” Domestic Happiness,” 1801) was produced in the year after her second marriage, with the Italian mathematician, Pasquale del Pezzo, duca di Cajanello. She died at Naples on the 21st of October 1892. Her dramatic method forms a con- necting link between Ibsen and Strindberg, and its masculine directness, freedom from prejudice, and frankness gave her work a high estimation in Sweden. Her last book was a biography (1892) of her friend Sophie (Sonya) Kovalevsky, by way of introduction to Sonya ‘s autobiography. An English translation (1895) by A. de Furnhjelm and A. M. Clive Bayley contains a biographical note on Fru Edgren-Leffler by Lily Wolffsohn, based on private sources.

See also Ellen Key, Anne Charlotte Leffler (Stockholm, 1893).

EDHEM PASHA (c. 1815-1893), Turkish statesman, was of Greek origin, and is said to have been taken into a Turkish household at the time of the Chio massacre in 1822, and to have been brought up as a Mussulman. He entered the Turkish government service and rose to high office, being successively minister of public works, grand vizier for eleven months (1878), ambassador at Vienna (1879) and minister of the interior. He was quick-tempered, but of kindly disposition, intelligent and patriotic, and he left a reputation of unblemished honesty and uprightness.

EDICT (Lat. edictum, from e, out, and dicere, toisay, speak), an order or proclamation issued under authority and having the force of law. The word is especially used of the promulgations of the Roman praetor (q.v.), of the Roman emperors, and also of. the kings of France (see also Roman Law).

EDINBURGH, a city and royal burgh, and county of itself, the capital of Scotland, and county town of Edinburghshire or Midlothian, situated to the south of the Firth of Forth, 396 m. by rail

N. of London. The old Royal Observatory on Calton Hill stands in 55° 5/ 23″ N. and 12 43′ 05″ W. Edinburgh occupies a group of hills of moderate height and the valleys between. In the centre is a bold rock, crowned by the castle, between which and the new town lies a ravine that once contained the Nor' Loch, but is now covered with the gardens of Princes Street. To the east rises Calton Hill (355 ft.) with several con- spicuous monuments, the city prison and the Calton cemetery. On the south-east, beyond the Canongate limits, stands the hill of Arthur's Seat (822 ft.). Towards the north the site of the city slopes gently to the Firth of Forth and the port of Leith; while to the south, Liberton Hill, Blackford Hill, Braid Hills and Craiglockhart Hills roughly mark the city bounds, as Corstorphine Hill and the Water of Leith do the western limits. The views of the city and environs from the castle or any of the hills are very beautiful, and it is undoubtedly one of the most picturesque capitals in the world. Its situation, general plan and literary associations suggested a comparison that gave Edinburgh the name of " the modern Athens "; but it has a homelier nickname of " Auld Reekie," from the cloud of smoke (reek) which often hangs over the low-lying quarters.

Chief Buildings. — Of the castle, the oldest building is St Margaret's chapel, believed to be the chapel where Queen Margaret, wife of Malcolm Canmore, worshipped, and belonging at latest to the reign of her youngest son, David I. (1124-1153). Near it is the parliament and banqueting hall, restored (1889- 1892) by the generosity of William Nelson (1817-1887) the publisher, which contains a fine collection of Scottish armour, weapons and regimental colours, while, emblazoned on the windows, are the heraldic bearings -of royal and other figures distinguished in national history. Other buildings in the Palace Yard include the apartments occupied by the regent,

Mary of Guise, and her daughter Mary, queen of Scots, and the room in which James VI. was born. Here also are deposited the Scottish regalia (" The Honours of Scotland "), with the sword of state presented to James IV. by Pope Julius II., and the jewels restored to Scotland on the death (1807) of Cardinal York, the last of the Stuarts. The arsenal, a modern building on the west side of the rock, is capable of storing 30,000 stand of arms. In the armoury is a collection of arms of various dates; and on the Argyll battery stands a huge piece of ancient artillery, called Mons Meg, of which repeated mention is made in Scottish history. Argyll Tower, in which Archibald, 9th earl of Argyll, spent his last days (1685), was also restored in 1892 by Mr William Nelson.

Holyrood Palace was originally an abbey of canons regular of the rule of St Augustine, founded by David I. in 11 28, and the ruined nave of the abbey church still shows parts of the original structure. Connected with this is a part of the royal palace erected by James IV. and James V., including the apart- ments occupied by Queen Mary, the scene of the murder of Rizzio in 1566. The abbey .suffered repeatedly in invasions. It was sacked and burnt by the English under the earl of Hertford in 1544, and again in 1547. In a map of 1544, preserved among the Cotton MSS. in the British Museum, the present north-west tower of the palace is shown standing apart, and only joined to the abbey by a low cloister. Beyond this is an irregular group of buildings, which were replaced at a later date by additions more in accordance with a royal residence. But the whole of this latter structure was destroyed by fire in 1650 while in occupation by the soldiers of Cromwell; and the more modern parts were begun during the Protectorate,, and completed in the reign of Charles II. by Robert Milne, after the designs of Sir William Bruce of Kinross. They include the picture gallery, 150 ft. in length, with 106 mythical portraits of Scottish kings, and a triptych (c. 1484) containing portraits of James HI. and his queen, which is believed to have formed the altar-piece of the collegiate church of the Holy Trinity, founded by the widowed queen of James II. in 1462, demolished in 1848, and afterwards rebuilt, stone for stone, in Jeffrey Street. The picture gallery is associated with the festive scenes that occurred during the short residence of Prince Charles in 1745; and in it the election of representative peers for Scotland takes place. Escaping from France at the revolution of 1789, the comte d'Artois, afterwards Charles X. of France, had apartments granted for the use of himself and the emigrant nobles of his suite, who continued to reside in the palace till August 1799. When driven from the French throne by the revolution of 1830, Charles once more found a home in the ancient palace of the Stuarts. George IV. was received there in 1822, and Queen Victoria and the prince consort occupied the palace for brief periods on several occasions, and in 1903 Edward VII., during residence at Dalkeith Palace, held his court within its walls. A fountain, after the original design of that in the quadrangle of Linlithgow Palace, was erected in front of the entrance by the prince consort. The royal vault in the Chapel Royal, which had fallen into a dilapidated condition, has been put in order; Clockmill House and grounds have been added to the area of the parade ground, and the abbey precincts generally and the approaches to the King's Park have been improved. With the abolition of imprison- ment for debt in 1881 the privileges of sanctuary came to an end.

Parliament House, begun in 1632 and completed in 1640, in which the later assemblies of the Scottish estates took place until the dissolution of the parliament by the Act of Union of 1707, has since been set apart as the meeting-place of the supreme courts of law. The great hall, with its fine open-timbered oak roof, is adorned with a splendid stained-glass window and several statues of notable men, including one (by Louis Francois Rou- biliac) of Duncan Forbes of Culloden, lord president of the court of session (1685-1747), and now forms the ante-room for lawyers and their clients. The surrounding buildings, including the court- rooms, the Advocates' and the Signet libraries, are all modern additions. The Advocates' library is the finest in Scotland.

93»

EDINBURGH

Founded in 1682, at the instance of Sir George Mackenzie, king's advocate under Charles II., and then dean of the faculty, it is regarded as the national library, and is one of the five entitled by the Copyright Act to receive a copy of every work published in Great Britain. ■

The General Register House for Scotland, begun in 1774 from

designs by Robert Adam, stands at the east end of Princes Street. It contains, in addition to the ancient national records, adequate accommodation, in fireproof chambers, for all Scottish title-deeds, entails, contracts and mortgages, and for general statistics, including those of births, deaths and marriages.

The Royal Institution, in the Doric style, surmounted by a colossal stone statue of Queen Victoria by Sir John Steell, formerly furnished official accommodation for the Board of Trustees for Manufactures and the Board of Fishery, and also for the school of art, and the libraries and public meetings of the Royal Society (founded in 1783), and the Society of Anti- quaries of Scotland (founded in 1 780) . In 1 9 1 o it was renamed and appropriated to the uses of the Royal Scottish Academy of Paint- ing, Sculpture and Architecture, which was instituted in 1826, and incorporated by royal charter in 1838, on the model of the Royal Academy in London. It is situated on the Mound close to the National Gallery, of which the prince consort laid the foundation stone in 1850. These collections, especially rich in Raeburn's works,' include also Alexander Nasmyth's portrait of Robert Burns, Gainsborough's "The Hon. Mrs. Graham" (see

Painting, Plate VI.' fig. 20), Sir Noel Paton's "Quarrel" and " Reconciliation of Oberon and Titania," several works by William Etty, Robert Scott Lauder and Sam Bough, Sir Edwin Landseer's "Rent Day in the Wilderness," and the diploma pictures of the academicians, besides many specimens of the modern Scottish school. The National Portrait Gallery and Antiquarian Museum are housed in Queen Street, in a building designed by Sir Rowand Anderson and constructed at the ex- pense of J. R. Findlay of Aberlour (1824-1898), the government providing the site.

Churches. — In conformity with the motto of the city, Nisi Dominus fruslra, there are numerous handsome places of public worship. St Giles's church, which was effectively restored (1879-1883) by the liberality of Dr William Chambers the

publisher, has interesting historical and literary association!. The regent Moray, the marquess of Montrose, and Napier of Merchiston were buried within its walls and are commemorated by monuments, and among the memorial tablets is one to Rˆ L. Stevenson by Augustus St Gaudens. The choir (restored in 1873 by public subscription) is a fine example of 15th-century architecture, and the Gothic crown surmounting the central tower forms one of the most eharao teristic features in every view of the city. Just outside the church in Parliament Square, the supposed grave of John Knox is indicated by a stone set in the pavement bearing his initials, and in the pavement to the west a heart indicates the site of the old Tolbooth, 1 which figures prormV nently in Scott's Heart of Midlothian. Other churches having historical associations ate the two Greyfriars churches, which occupy the two halves of one building; Tron church, the scene of midnight hilarity at the new year; St Cuthbert's church; St Andrew's church in George Street, whence set out, on a memorable day in 1843', that long procession of ministers and elders to Tanfield Hall which ended in the founding of the Free Church; St George's church in Charlotte Square, a good example of the work of Robert Adam. The United Free Church claims no build- ings of much historic interest, but St George's Free was the scene of the ministrations of Dr Robert S. Candlish (1806-1873), Dr Oswald Dykes (b. 1835):, Dr Alexander Whyte (b. 1837), a man of great mark and influence in the city, and his successor Hugh Black (b. 1868). Preachers like Robert Candlish, Thomas Guthrie (1803-1873), Mafcfcus Dods (b. 1834), occupied many pulpits, besides those of the particular congregations whom each served. The most imposing structure belonging to the Scottish Episcopal Church is St Mary's cathedral, built on ground and chiefly from fufcds left by the Misses Walker of Coates, and opened for wor- ship in 1879. It is

in the Early Pointed style, by Sir Gilbert Scott, is 278 ft. long, and is surmounted by a spire 275 ft. high. The old-fashioned mansion of East Coates, dating from the 17th century, still stands in the close, and is occupied by functionaries of the cathedral. St John's Episcopal church at the west end of Princes Street was the scene of the ministrations of Dean Ramsay, and St Paul's Episcopal church of the Rev. Archibald Alison, father of the historian. ,- The Catholic Apostolic church at the foot of Broughton Street is architecturally noticeable, and one of its features is a set of mural paintings executed by MrsTraquair. The Central Hall at Tollcross testifies to Methodist energy. John Knox's house at the east end of High Street is kept in excellent repair, and contains several articles of furniture that belonged to the reformer. The Canon- gate Tolbooth adjoins the parish church, in the burial-ground of which is the tombstone raised by Burns to the memory of Robert Fergusson, and where Dugald Stewart, Adam Smith and other men of note were buried. Almost opposite to it stands Moray House, from the balcony of which the 8th earl of Argyll watched Montrose led to execution (1650). The city gaol, a castellated structure on the black rock of Calton Hill, forms one of the most striking groups of buildings in the town. In the Music Hall in George Street, Carlyle, as lord rector of the university, delivered his stimulating address on books to the students, and Gladstone addressed the electors in his Midlothian campaigns. St Bernard's Well, on the Water of Leith, was embellished and restored (1888) at the cost of Mr William Nelson. A sum of £100,000 was bequeathed by Mr Andrew Usher (1826- 1898) for a hall to be called the Usher Hall and to supplement

'The original Tolbooth was completed in 1501, but a new one took its place in 1563-1564, and was subsequently altered. At first occupied by the parliament and courts of justice, it served later as a prison, and was removed in 1817.

8. National Portrait Gallery

9. National Gallery to University Medical Colteae 11. Donaldson 's Hospital a. Henot's Hospital

13. Gillespie School

14. George Watson's College

15. Royal tnf.rmaru f

16. Post Office {

17. St. Bernard's Well

*18. Waucrley Station * . 29. Caledonian Station so. Register Office*

EmcrvWalfccr ac.

EDINBURGH

939

the municipal buildings. The library of the solicitors to the supreme courts presents to the Cowgate a lofty elevation in red sandstone. The Sheriff Court Buildings stand on George IV. Bridge, and facing them is Mr Andrew Carnegie's free library (1887-1889). At the corner of High Street and George IV. Bridge stand the County buildings. The Scotsman newspaper is housed in an ornate structure in North Bridge Street, the building of which necessitated the demolition of many old alleys and wynds, such as Fleshmarket Close and Milne Square. Ramsay Gardens, a students' quarter fostered by Prof. Patrick Geddes (b. 1854), grew out of the " goose-pie " house where Allan Ramsay lived, and with its red-tiled roof and effective lines adds warmth to the view of the Old Town from Princes Street. Not the least interest- ing structure is the old City Cross (restored at the cost of W. E. Gladstone), which stands in High Street, adjoining St Giles's. Several of the quaint groups of buildings of Auld Reekie have been carefully restored, such as the White Horse Close in the Canongate; the mass of alleys on the north side of the Lawn- market, from Paterson's Close to James's Court have been connected, and here Lord Rosebery acquired and restored the 17th-century dwelling which figures in the legend of My Aunt Margaret's Mirror. Another model restoration of a historic close is found in Riddle's Close, which contains a students' settlement. If these and other improvements have led to the disappearance of such old-world picturesque buildings as Allan Ramsay's shop " at the sign of the Mercury, opposite Niddry Wynd," Cardinal Beaton's palace, the old Cunzie House, or mint, the beautiful timber-fronted " land " that stood at the head of the West Bow, and even such " howffs " as Clerihugh's tavern, where Mr Counsellor Pleydell and the rest played the " high jinks " described in Guy Mannering, it must be conceded that the changes in the Old Town (many of a drastic nature) have been carried out with due regard to the character of their environment.

Monuments. — Edinburgh is particularly rich in monuments of every description and quality. Of these by far the most remarkable is the Scott monument in East Princes Street Gardens, designed by George

Meikle Kemp (1795-1844); it is in the form of a spiral Gothic cross with a central canopy beneath which is a seated statue of Scott with his dog " Maida " at his side, by Sir John Steell, the niches being occupied by characters in Sir Walter's writings. A column, 136 ft. high, surmounted by a colossal figure of Viscount Melville, Pitt's first lord of the Admiralty, rises from the centre of St Andrew Square. At the west end of George Street, in the centre of Charlotte Square, stands the Albert Memorial, an equestrian statue of the prince consort, with groups at each of the four angles of the base. Burns's monument, in the style of a Greek temple, occupies a prominent position on the Regent Road, on the southern brow of the lower terrace of Calton Hill. It was originally intended to form a shrine for Flaxman's marble statue of the poet (now in the National Portrait Gallery), but it proved to be too confined to afford a satisfactory view of the sculptor's work and was at length converted into a museum of Burnsiana (afterwards re- moved to the municipal buildings) . On Calton Hill are a number of finely placed monuments. The stateliest is the national monument to commemorate the victory of Waterloo, originally intended to be a reproduction of the Parthenon. The plan was abandoned for lack of funds, after twelve out of the twenty-four Greek pillars had been erected, but it is perhaps more effective in its unfinished state than if it had been completed. The Nelson monument, an elongated turreted structure, stands on the highest cliff of the hill. Close by is the monument to Dugald Stewart, a copy of the choragic monument of Lysicrates. Sir John Steell's equestrian statue of the duke of Wellington stands in front of the Register House, and in Princes Street Gardens are statues of Livingstone, Christopher North, Allan Ramsay, Adam Black and Sir J. Y. Simpson. In George Street are Chantrey's figures of Pitt and George IV., and a statue of Dr Chalmers; the 5th duke of Buccleuch stands beside St Giles's. Charles II. surveys the spot where Knox was buried; the reformer himself is in the quadrangle of New College: Sir

David Brewster adorns the quadrangle of the university; Dr William Chambers is in Chambers Street, and Frederick, duke of York (1763-182 7), and the 4th earl of Hopetoun are also commemorated.

Cemeteries. — Obviously the churchyards surrounding the older and more important parish churches — such as Greyfriars', St Cuthbert's and the Canongate, contain the greatest number of memorials of the illustrious dead. In Greyfriars' churchyard the Solemn League and Covenant was signed, and among its many monuments are the Martyrs' monument, recording the merits of the murdered covenanters, and the tomb of " Bluidy " Mackenzie. To the three

named should be added the Calton burying-ground, with its Roman tomb of David Hume, and the obelisk raised in 1844 to the memory of Maurice Margarot, Thomas Muir (1765-1798), Thomas Fyshe Palmer (1747-1802), William Skirving and Joseph Gerrald (1765-1796), the political martyrs transported towards the end of the 18th century for advocating parliamentary reform. The Scottish dead in the American Civil War are commemorated in a monument bearing a life-sized figure of Abraham Lincoln and a freed slave. The cemeteries are all modern. In Warriston cemetery (opened in 1843) in the New Town, were buried Sir James Young Simpson, Alexander Smith the poet, Horatio McCulloch, R.S.A., the landscape painter, the Rev. James Millar, the last Presbyterian chaplain of the castle, and the Rev. James Peddie, the pastor of Bristo Street church. In Dean cemetery, partly laid out on the banks of the Water of Leith, and considered the most beauti- ful in the city (opened 1845), were interred Lords Cockburn, Jeffrey and Rutherford; " Christopher North," Professor Aytoun, Edward Forbes the naturalist, John Goodsir the anatomist; Sir William Allan, Sam Bough, George Paul Chalmers, the painters; George Combe, the phrenologist; Playfair, the architect; Alexander Russel, editor of the Scots- man; Sir Archibald Alison, the historian; Captain John Grant, the last survivor of the old Peninsular Gordon Highlanders; Captain Charles Gray, of the Royal Marines, writer of Scottish songs; Lieutenant John Irving, of the Franklin expedition, whose remains were sent home many years after his death by Lieut. Frederick Schwatka, U.S. navy; and Sir Hector Mac- donald, " Fighting Mac " of Omdurman. In the south side are the Grange, Newington or Echobank, and Morningside cemeteries. In the Grange repose the ashes of Chalmers, Guthrie and Lee, Sir Thomas Dick Lauder, Sir Hope Grant, Hugh Miller and the 2nd Lord Dunfermline.

Parks and Open Spaces. — Edinburgh is exceptionally well provided with parks and open spaces. The older are Princes Street Gardens, covering the old Nor' Loch, Calton Hill, the Meadows and the Bruntsfield Links. The municipal golf links are on the Braid Hills. On the southern side Blackford Hill has been set apart for public use. Here stands the Royal Observatory, in which the great Dunecht telescope was erected in 1896. Harrison Park is a breathing spot for the congested district of Fountainbridge, and the park at Saughton Hall, opened in 1905, for the western district of the city. To the north of the Water of Leith lie Inverleith Park, the Arboretum and the Royal Botanical Garden. This institution has undergone four changes of site since its foundation in 1670 by Sir Andrew Balfour and Sir Robert Sibbald, and now occupies an area of 34 acres in

Inverleith Row. It includes a herbarium and palm house, with an extensive range of hot-houses, a museum of economic botany, a lecture-room and other requisites for the study of botany. The most important open spaces, however, surround Arthur's Seat (822 ft.). This basaltic hill, the name of which is believed to commemorat- the British king Arthur, who from its height is said to have watched the defeat of the Picts by his followers, is shaped like a lion couchant, with head towards the north. It is separated from the narrow valley, in which lie the Canongate and Holyrood Palace, by Salisbury Crags, named after Edward III.'s general William Montacute, 1st earl of Salisbury (1301-1344). At their base is the Queen's Drive (3 J m. long), named by Queen Victoria. Adjoining Holyrood Palace is the King's Park, used as a parade ground.

EDINBURGH

Facing the crags on the south-west are the spots familiar to readers of The Heart of Midlothian, where stood Jeanie Deans's cottage, and between the crags and Arthur's Seat lies Hunter's Bog, used as a shooting range. Near here too are three small lakes, Duddingston, Dunsappie and St Margaret's, the last overlooked by the ruins of St Anthony's chapel.

Environs. — In several directions many places once to be described among the environs have practically become suburbs of Edinburgh. Newhaven (population of parish, 7636), so called from the harbour constructed in the reign of James IV., had a shipbuilding yard of some repute in former times. The village has always been a fishing-place of importance, the " fishwives " in their picturesque garb being, till recently, conspicuous figures in the streets of the capital. It used to be a popular resort for fish dinners, and it plays a prominent part in Charles Reade's noveloiChristie Johnstone. To the west lies Granton (pop. 1728), where the 5th duke of Buccleuch constructed a magnificent harbour. Before the building of the Forth Bridge the customary approach to Fifeshire and the north-east of Scotland was by means of a steam ferry from Granton to Burntisland, which is still used to some extent. There is regular communication with Iceland, the continental ports and London. A marine station here was established by Sir John Murray, but has been dis- continued. Still farther west lies the village of Cramond (pop. of parish, 3815), at the mouth of the river Almond, where Roman remains have often been found. It was the birthplace of several well-known persons, among others of John Law (1671-1729), originator of the Mississippi scheme, Lauriston Castle being situated in the parish. Cramond Brig was the scene of one of the " roving " adventures of James V., when the life of the " Gude- man of Ballengeich " was saved by Jock Howieson of the Braehead. Corstorphine (pop. 2725), once noted for its cream and also as a spa, is now to all intents and purposes a western suburb of the capital. The parish church contains the tombs of the Forresters, of old the leading family of the district, with full-length sculptured figures, and at the base of Corstorphine Hill — from one point of which (" Rest and be Thankful ") is to be had one of the best views of Edinburgh — are the seats of several well-known families. Among these are Craigcrook Castle (where Lord Jeffrey spent many happy years, and the gardens of which are said to have given Scott a hint for Tullyveolan in Waverley), and

Ravelston House, the home of the Keiths. To the south of the metropolis are Colin ton (pop. 5490) , on the Water of Leith, with several mansions that once belonged to famous men, such as Dreghorn Castle and Bonally Tower; and Currie (pop. 2513), which was a Roman station and near which are Curriehill Castle (held by the rebels against Queen Mary), the ruins of Lennox Tower, and Riccarton, the seat of the Gibson- Craigs, one of the best-known Midlothian families. At Dal- mahoy Castle, near Ratho (pop. 1946), the seat of the earl of Morton, are preserved the only extant copy of the bible of the Scottish parliament and the original warrant for committing Queen Mary to Lochleven Castle in Kinross-shire. Craigmillar, though situated in the parish of Liberton, is really a part of Edinburgh. Its picturesque castle, at least the oldest portion of it, probably dates from the 12th century. Its principal owners were first the Prestons and latterly the Gilmours. After playing a varied role in local and national story, now as banquet" ing-house and now as prison, it fell gradually into disrepair. It was advertised as to let in 1761, and early in the 19th century, along with the chapel adjoining, was in ruins, but has been restored by Colonel Gordon-Gilmour. It was a favourite residence of Mary Stuart, and its associations with the hapless queen give it a romantic interest. Duddingston (pop. 2023), once a quiet village, has become a centre of the distilling and brewing industries. The parish church, effectively situated on an eminence by the side of the lake, was the scene of the ministra- tion of the Rev. John Thomson (1 7 7 8- 1 840) , the landscape painter, who numbered Sir Walter Scott among his elders. Duddingston House is a seat of the duke of Abercorn. Liberton (pop. of parish, 7233), a name that recalls the previous existence of a leper's hospital, is prominently situated on the rising ground to the south

of Edinburgh, the parish church being a conspicuous landmark. Adjoining is the village of Gilmerton (pop. 1482), which used to supply Edinburgh with yellow sand, when sanded floors were a feature in'the humbler class of houses. Portobello (pop. 9180), being within 3 m. of the capital, must always enjoy a large share of public patronage, though it is not in such favour as a watering- place as it once was. Its beautiful stretch of sands is flanked by a promenade extending all the way to Joppa. The beach was at one time used for the purpose of reviews of the yeomanry. The town dates from the middle of the 18th century, when a cottage was built by a sailor and named Portobello in com- memoration of Admiral Vernon's victory in 1739. The place (toes a considerable trade in the making of bricks, bottles, earthenware, pottery, tiles and paper. Joppa, which

adjoins it, has salt works, but is chiefly a residential neighbourhood. Inveresk (pop. 2939), finely situated on the Esk some 6 m. from Edinburgh, is a quaint village with several old-fashioned mansions and beautiful gardens. Alexander Carlyle, the famous divine (1 772-1805), whose Memorials of his Times still affords fascinating reading, ministered for fifty-five years in the parish church, in the graveyard of which lies David Macbeth Moir (1798-1851), who under the pen-name of " Delta " wrote Mansie Wauch, a masterpiece of Scots humour and pathos. Lasswade (pop. of parish, 9708), partly in the Pentlands, famous for its oatmeal, was often the summer resort of Edinburgh worthies. Here Sir Walter Scott lived for six years and De Quincey for nineteen, and William Tennant (1 784- 1 848) , author of A nster Fair, was the parish dominie. Many interesting mansions were and are in the vicinity, amongst them Melville Castle, the seat of the Dundas Melvilles, and Auchendinny, where Henry Mackenzie, author of The Man of Feeling, resided. The two most celebrated resorts, however, amongst the environs of Edinburgh are Roslin (pop. 1805) and Hawthornden. Roslin Castle is romantically situated on the beautifully wooded precipitous banks of the Esk. It dates from the 12th century and is a plain, massive ruin, architecturally insignificant. Partially destroyed by fire in 1447 and afterwards rebuilt, it was sacked in 1650 and again in 1688, and then gradually fell into decay. The chapel, higher up the bank, a relic of great beauty, was founded in 1446 by William St Clair, 3rd earl of Orkney. It is believed to be the chancel of what was intended to be a large church. Although it suffered at the hands of revolutionary fanatics in 1688, the damage was confined mainly to the external ornament, and the chapel, owing to restoration in judicious taste, is now in perfect condition. The Gothic details are wonderful examples of the carver's skill, the wreathed " Prentice's pillar " being the subject of a well-known legend. The walk to Hawthornden, about ij m. distant, through the lovely glen by the river-side, leads to the mansion of the Drummonds, perched high on a lofty cliff falling sheer to the stream. The caverns in the sides of the precipice are said to have afforded Wallace and other heroes (or outlaws) refuge in time of trouble, but the old house is most memorable as the home of the poet William Drummond, who here welcomed Ben Jonson; the tree beneath which the two poets sat still stands. Near Swanston, on the slopes of the Pentlands, where R. L. Stevenson when a boy used to make holiday occasionally, is a golf-course which was laid out by the Lothianburn Club. The Pentland range contains many points of interest and beauty, but these are mostly accessible only to the pedestrian, although the hills are crossed by roads, of which the chief are those by Glencorse burn and the Cauld Stane Slap. Habbie's

Howe, the scene of Allan Ramsay's pastoral The Gentle Shepherd, is some 2 m. from Carlops, and Rullion Green is noted as the field on which the Covenanters were defeated in 1666. At Penicuik (pop. 5097), where the Clerks were long the ruling family, S. R. Crockett was minister until he formally devoted himself to fiction. The town is, industrially, remarkable for its paper mills and mines of coal and other minerals.

Communications. — The two trunk railways serving Edinburgh are the North British and the Caledonian. The North British station is Waverley, to which the trains of the Great Northern, North Eastern and the Midland systems run from England. The

Caledonian station is Princes Street, where the through trains from the London & North- Western system of England arrive. Leith, Granton and Grangemouth serve as the chief passenger seaports for Edinburgh. Tramways connect the different parts of the city with Leith, Newhaven, Portobello and Joppa; and the Suburban railway, starting from Waverley station, returns by way of Restalrig, Portobello, Duddingston, Morningside andHaymarket. In summer, steamers ply between Leith and Aberdour and other pleasure resorts ; and there is also a service to Alloa and Stirling. In the season brakes constantly run to Queensferry (for the Forth Bridge) and to Roslin, and coaches to Dalkeith, Loanhead and some Pentland villages.

Population. — In 1801 the number of inhabitants was 66,544; in 1851 it was 160,302; in 1881 it was 234,402; and in 1001 it was 316,479. In 1900 the birth-rate was 26-90 per thousand, 7-8% of the births being illegitimate; the death- rate was 19-40 per thousand, and the marriage-rate 10 per thousand.

The area of the city has been enlarged by successive extensions of its municipal boundaries, especially towards the west and south. An important accession of territory was gained in 1896, when portions of the parishes of Liberton and Duddingston and the police burgh of Portobello were incorporated. Under the Edinburgh Corporation Act 1900, a further addition of nearly 1800 acres was made. This embraced portions of South Leith parish (landward) and of Duddingston parish, including the village of Restalrig and the ground lying on both sides of the main road from Edinburgh to Portobello; and also part of Cramond parish, in which is contained the village

and harbour of Granton. The total area of the city is 10,5975 acres. The increase in wealth may best be measured by the rise in assessed valuation. In 1880 the city rental was £1,727,740, in 1890 it was £2,106,395, a &d in 1900-1901 £2,807,122.

Government. — By the Redistribution Act of 1885 the city was divided for parliamentary purposes into East, West, Central and South Edinburgh, each returning one member; the parliament- ary and municipal boundaries are almost identical. The town council, which has its headquarters in the Municipal Buildings in the Royal Exchange, consists of fifty members, a lord provost, seven bailies, a dean of guild, a treasurer, a convener of trades, seven judges of police, and thirty-two councillors. The corporation has acquired the gas-works, the cable tram- ways (leased to a company), the electric lighting of the streets, and the water-supply from the Pentlands (reinforced b)» additional sources in the Moorfoot Hills and Talla Water). Among other duties, the corporation has a share in the management of the university, and maintains the Calton Hill observatory. ,

May Meetings. — During the establishment of Episcopacy in Scotland, Edinburgh was the seat of a bishop, and the ancient collegiate church of St Giles rose to the dignity of a cathedral. But the annual meeting of the General Assembly of the Church of Scotland at Edinburgh is now the public manifestation of the predominance of Presbyterianism as the national church. In May each year the sovereign appoints a representative as lord high commissioner to the General Assembly of the Established Church, who takes up his abode usually in the palace of Holyrood, and thence proceeds to the High Church, and so to the assembly hall on the Castle Hill. The lord provost and magistrates offer to him the keys of the. city, and levees, receptions and state dinners revive in some degree the ancient glories of Holyrood. The General Assembly of the United Free Church is usually held at the same time.

University. — The university of Edinburgh, the youngest of the Scottish universities, was founded in 1583 by a royal charter granted by James IV., and its rights, immunities and privileges have been remodelled, ratified and extended at various periods. In 162 1 an act of the Scottish parliament accorded to the university all rights and privileges enjoyed by other universities in the kingdom, and these were renewed under fresh guarantees in the treaty of union between England and Scotland, and in the Act of Security. Important changes were made in the con-

stitution by acts passed in 1858 and 1889. It was one of the first universities to admit women students to its classes and degrees, and its alumni are brought into close bonds of sympathy and activity by a students' union. The number of students averages nearly three thousand a year. As a corporation it consists of a chancellor, vice-chancellor, lord rector (elected by the students every three years), principal, professors, registered graduates and matriculated students. The chancellor is elected for life by the general council, of which he is head; and the rights of the city as the original founder have been recognized by giving to the town council the election of four of the seven curators, with whom rest the appointment of the principal, the patronage of seventeen of the chairs, and a share in other appointments. Along with that of St Andrews, the university sends one member to parliament. While the college, as such, bears the name of the College of King James, or King's college, and James VI. is spoken of as its founder, it really originated in the liberality of the citizens oi Edinburgh. William Little of Craigmillar, and his brother Clement Little, advocate, along with James Lawson, the colleague and successor of John Knox, may justly be regarded as true founders. In 1580 Clement Little gave all his books, three hundred volumes, for the beginning of a library, and this was augmented by other valuable benefactions, one of the most interesting pf which was the library of Drummond of Hawthornden. The library now contains upwards of 220,000 volumes, and more than 7000 MSS. The buildings of the university occupy the site of the ancient collegiate church of St. Mary in the Field (the "Kirk of Field") , the scene of the murder of Darnley. The present structure, the foundation- stone of which was laid in 1 789, is a classical building, enclosing an extensive quadrangle. The older parts of it, including the east front, are from the design of Robert Adam, his plans being revised and modified by W. H. Playfair (1789-1857), but it was not till 1883 that the building was completed by the dome, crowned by the bronze figure of Youth bearing the torch of Knowledge, on the facade in South Bridge Street. This edifice affords accommodation for the lecture rooms in the faculties of arts, law and theology, and for the museums and library. The opening up of the wide thoroughfare of Chambers Street, on the site of College Wynd and Brown and Argyll Squares, cleared the precincts of unsightly obstructions and unsavoury neighbours. TheRoyal Scottish Museum, structurally united to the university, contains collections illustrative of industry, art, science and natural history; and Minto House college and Heriot-Watt college are practically adjuncts of the university. The library hall was restored and decorated, largely through the generosity of Sir William Priestley (1829-1900), formerly M.P. for

the university; while munificent additions to the academic funds and resources were made by the 15th earl of Moray (1840-1901), Sir William Fraser (1816-1898), and others. The university benefits also, like the other Scottish universities, from Mr Andrew Carnegie's endowment fund. The medical school stands in Teviot Row, adjoining George Square and the Meadows. To this spacious and well-equipped group of buildings the faculty of medicine was removed from the college. The medical school is in the Italian Renaissance style from the designs of Sir Rowand Anderson. The magnificent hall used for academic and public functions was the gift of William M'Ewan, some time M.P. for the Central division of Edinburgh. Closely associated with the medical school, and separated from it by the Middle Meadow Walk, is the Royal Infirmary, designed by David Bryce, R.S.A. (1803-1876), removed hither from Infirmary Street. Its wards, in which nearly ten thousand patients receive treatment annually, are lodged in a series of turreted pavilions, and cover a large space of ground on the margin of the Meadows, from which, to make room for it, George Watson's College — the most important of the Merchant Company schools — was removed to a site farther west, while the Sick Children's hospital was moved to the southern side of the Meadows.

Scientific Institutions. — The old Observatory is a quaint structure on Calton Hill, overlooking the district at the head of Leith Walk. The City Observatory stands close by, and on Blackford Hill is the newer building of the Royal Observatory,

The Astronomer-Royal for Scotland also holds the chair of practical astronomy.

The museum and lecture-rooms of the Royal College of Surgeons occupy a handsome classical building in Nicolson Street. The college is an ancient corporate body, with a charter of the year 1 505, and exercises the powers of instructing in surgery and of giving degrees. Its graduates also give lectures on the various branches of medicine and science requisite for the degree of doctor of medicine, and those extra-academical courses are recognized, under certain restrictions, by the University Court, as qualifying for the degree. The museum contains a valuable collection of anatomical and surgical preparations.

The Royal College of Physicians is another learned body organized, with special privileges, by a charter of incorporation granted by Charles II. in 1681. In their hall in Queen Street are a valuable library and a museum of materia medica. But the college as such takes no part in the educational work of the university.

Educational Institutions. — After the Disruption in 1843, and the formation of the Free Church, New College was founded in connexion with it for training students in theology. Since the amalgamation of the United Presbyterian and the Free Churches, under the designation of the United Free Church of Scotland, New College is utilized by both bodies. New College buildings, designed in the Pointed style of the 16th century, and erected on the site of the palace of Mary of Guise, occupy a prominent position at the head of the Mound.

Edinburgh has always possessed exceptional educational facilities. The Royal high school, the burgh school par excellence, dates from the 16th century, but the beautiful Grecian buildings on the southern face of Calton Hill, opened in 1829, are its third habitation. It was not until 1825, when the Edinburgh Academy was opened, that it encountered serious rivalry. Fettes College, an imposing structure in a 16th-century semi-Gothic style, designed by David Bryce and called after its founder Sir William Fettes (1750-1836), is organized on the model of the great English public schools. Merchiston Academy, housed in the old castle of Napier, the inventor of logarithms, is another institution conducted on English public school lines. For many generations the charitable foundations for the teaching and training of youth were a conspicuous feature in the economy of the city. Foremost among them was the hospital founded by George Heriot — the " Jingling Geordie " of Scott's Fortunes of Nigel — the goldsmith and banker of James VI. At his death in 1624 Heriot left his estate in trust to the magistrates and ministers of Edinburgh for the maintenance and teaching of poor fatherless sons of freemen.. The quadrangular edifice in Lauriston, sometimes ascribed to Inigo Jones, is one of the noblest buildings in the city. Even earlier than Heriot's hospital was the Merchant Maiden hospital, dating from 1605, which gave to the daughters of merchants similar advantages to those which Heriot's secured for burgesses' sons. In 1738 George Watson's hospital for boys was founded; then followed the Trades' Maiden hospital for burgesses' daughters, John Watson's, Daniel Stewart's, the Orphans', Gillespie's, 1 Donaldson's 2 hospitals, and other institu- tions founded by successful merchants of the city, in which poor children of various classes were lodged, boarded and educated. Nearly all

these buildings are characterized by remarkable distinction and beauty of design. This is especially true of Donaldson's hospital at the Haymarket, which has accommoda- tion for three hundred children. As the New Town expanded, the Heriot Trust — whose revenues were greatly benefited thereby — erected day-schools in different districts, in which thousands of infants and older children received a free education, and, in

1 James Gillespie (1 726-1 797) was a tobacco and snuff manu- facturer, and when he set up his carriage Henry Erskine suggested as a motto the homely couplet : — ■

" Wha wad hae thocht it, That noses wad bocht it? "

2 James Donaldson (1751-1830) was a printer who bequeathed nearly the whole of his large fortune for the purposes of a hospital for poor boys and girls, and the trustees have usually selected half of the children admitted from the ranks of the deaf and dumb.

cases of extreme poverty, a money grant towards maintenance. Public opinion as to the " hospital " system of board and education, however, underwent a revolutionary change after the Education Act of 1872 introduced school boards, and the Merchant Company — acting as governors for most of the insti- tutions — determined to board out the children on the founda- tion with families in the town, and convert the buildings into adequately equipped primary and secondary day-schools. This root-and-branch policy proved enormously successful, and George Watson's college, Stewart's college, Queen Street ladies' college, George Square ladies' college, Gillespie's school, and others, rapidly took a high place among the educational institu- tions of the city. Nor did the Heriot Trust neglect the claims of technical and higher education. The Heriot-Watt college is subsidized by the Trust, and Heriot's hospital is occupied as a technical school. Concurrently with this activity in higher branches, the school board provided a large number of handsome buildings in healthy surroundings. The Church of Scotland and the United Free Church have training colleges.

Charities. — Besides the Royal Infirmary there are a consider- able number of more or less specialized institutions, two of the most important being situated at Craiglockhart. On the Easter Hill stands the Royal Edinburgh asylum for the insane, which formerly occupied a site in Morningside, while the City infectious diseases hospital is situated at Colinton Mains. The Royal blind asylum at Powburn in its earlier days tenanted humbler quarters in Nicolson Street.

Chalmers's hospital in Lauriston was founded in 1836 by George Chalmers for the reception of the sick and injured. The home for incurables is situated in Salisbury Place. The infirmary convalescents are sent to the convalescent house in Corstorphine. Other institutions are the Royal hospital for sick children, the home for crippled children, the Royal maternity hospital, and the deaf and dumb asylum. Though Trinity hospital no longer exists as a hospital with resident pensioners, the trustees disburse annually pensions to certain poor burgesses and their wives and children; and the trust controlling the benevolent branch of the Gillespie hospital endowment is similarly administered.

Industries. — Although Edinburgh is a residential rather than a manufacturing or commercial centre, the industries which it has are important and flourishing. From 1507, when Walter Chapman, the Scottish Caxton, set up the first press, to the present day, printing has enjoyed a career of almost continuous vitality, and the great houses of R. & R. Clark, T. & A. Constable, the Ballantyne Press, Morrison & Gibb, Turnbull & Spears, aSd others, admirably maintain the traditional reputation of the Edinburgh press. Publishing, on the other hand, .has drifted away, only a few leading houses — such as those of Blackwood, Chambers and Nelson — still making the Scottish capital their headquarters. Mapmakers, typefounders, bookbinders and lithographers all contribute their share to the prosperity of the city. Brewing is an industry of exceptional vigour, Edinburgh ale being proverbially good. The brewers and distillers, such as M'Ewan, Usher and Ure, have been amongst the most generous benefactors of the city. The arts and crafts associated with furniture work, paper-making and coach-building may also be specified, whilst tanneries, glassworks, india-rubber and vulcanite factories, brass-founding, machinery works, the making of biscuits, tea-bread and confectionery are all prominent. In consequence of the large influx of tourists every year the North British and Caledonian railway companies give employment to an enormous staff. Building and the allied trades are chronic- ally brisk, owing to the constant development of the city. Fine white freestone abounds in the immediate vicinity (as at Craig- leith, from the vast quarry of which, now passing into disuse, the stone for much of the New Town was obtained) and furnishes excellent building material; while the hard trap rock, with which the stratified sandstones of the Coal formation have been extensively broken up and overlaid, supplies good materials for paving and road-making. On this account quarrying is another industry which is seldom dormant. Owing to the great changes effected during the latter part of the 19th century, some of

old markets were demolished and the system of centralizing trade was not wholly revived. The Waverley Market for vegetables and fruit presents a busy scene in the early morning, and is used for monster meetings and promenade and popular concerts. Slaughter-houses, cattle markets and grain markets have been erected at Gorgie, thus obviating the driving of flocks and herds through the streets, which was constantly objected to. An infantry regiment is always stationed in the castle, and there are in addition the barracks at Piers- hill (or " Jock's Lodge "), half-way between Edinburgh and Portobello.

Social Life. — Edinburgh society still retains a certain old- fashioned Scottish exclusiveness. It has been said that the city is " east-windy " and the folk " west-endy." But this criticism needs judicious qualification. The local patriotism and good taste of the citizens have regulated, recreation and have also preserved in pristine vigour many peculiarly Scottish customs and pastimes. Classical concerts and concerts of the better sort, chiefly held in the M'Ewan and Music Halls, are well attended, and lectures are patronized to a degree unknown in most towns. In theatrical matters in the old days of stock companies the verdict of an Edinburgh audience was held to make or mar an actor or a play. This is no longer the case, but the Lyceum theatre in Grindlay Street and the Theatre Royal at the head of Leith Walk give good performances. Variety entertainments are also in vogue, and in Nicolson Street and elsewhere there are good music halls. Outdoor recreations have always been pursued with zest. The public golf-course on Braid Hills and the private courses of the Lothianburn club at Swanston and the Barnton club at Barnton are usually full on Saturdays and holidays. The numerous bowling-greens are regularly frequented and are among the best in Scotland — the first Australian team of bowlers that visited the mother country (in iqoi) pronouncing the green in Lutton Place the finest on which they had played. Cricket is played by the uni- versity students, at the schools, and by private clubs, of which the Grange is the oldest and best. In winter the game of curling is played on Duddingston Loch, and Dunsappie, St Margaret's Loch, Lochend and other sheets of water are covered with skaters. Rugby football is in high favour, Edinburgh being commonly the scene of the international matches when the venue falls to Scotland. Hockey claims many votaries, there

usually being on New Year's day a match at shinty, or camanachd, between opposing teams of Highlanders resident in the city. The central public baths in Infirmary Street, with branch establishments in other parts of the town, including Portobello, are largely lesorted to, and the proximity of the Firth of Forth induces the keener swimmers to visit Granton every morning. Facilities for boating are limited (excepting on the Forth), but rowing clubs find opportunity for practice and races on the Union Canal, where, however, sailing is scarcely possible. Edin- burgh maintains few newspapers, but the Scotsman, which may be said to reign alone, has enjoyed a career of almost uninter- rupted prosperity, largely in consequence of a succession of able editors, like Charles Maclar.n, Alexander Russel, Robert Wallace and Charles Cooper. The Edinburgh Evening News and the Evening Dispatch are popular sheets. In the past the Edinburgh Evening Courant, the chief organ of the Tory party, of which James Hannay was editor for a few years, had a high reputation. The Witness, edited by Hugh Miller, the Daily Review, edited first by J. B. Manson and afterwards by Henry Kingsley, and the Scottish Leader, were conducted more or less as Liberal organs with a distinct bias in favour of the then Free Church, but none of these was long-lived. Volunteering has always attracted the younger men, and the highest awards at Wimbledon and Bisley have been won by the Queen's Edinburgh

History. — In remote times the seaboard from the Tyne to the Forth was occupied by the Ottadeni, a Welsh tribe of the Brigantes, the territory immediately to the west of it being peopled by the Gadeni. It is probable that the Ottadeni built a fort or camp on the rock on which Edinburgh Castle now stands, which was thus the nucleus around which, in course of

time, grew a considerable village. Under the protection of the hill-fort, a native settlement was established on the ridge running down to the valley at the foot of Salisbury Crags, and another hamlet, according to William Maitiand (1693-1757), the earliest historian of Edinburgh, was founded in the area at the north- western base of the rock, a district that afterwards became the parish of St Cuthbert, the oldest in the city. The Romans occupied the country for more than three hundred years, as is evidenced by various remains; but James Grant (1822-1887), in Old and New Edinburgh, doubts whether they ever built on the castle rock. When they withdrew, the British tribes re- asserted their sway, and some authorities go so far as to suggest that Arthur was one of their kings. The southern Picts ulti- mately subdued the Britons, and the castle became their chief stronghold until they were overthrown in 617 (or 629) by the Saxons under

Edwin, king of Northumbria, from whom the name of Edinburgh is derived. Symeon of Durham (854) calls it Edwinesburch, and includes the church of St Cuthbert within the bishopric of Lindisfarne. Its Gaelic name was Dunedin. This name is probably a translation of the Saxon name. James Grant's view that it may have been the earlier name of the castle, from dun ("the fort"), and edin ("on the slope"), conflicts with the more generally received opinion that the Britons knew the fortress as Castelh Mynedh Agnedh (" the hill of the plain "), a designation once wrongly interpreted as the " castle of the maidens " (castrum puellarum), in allusion to the supposed fact that the Pictish princesses were lodged within it during their education. In the 16th century the latinized form Edina was invented and has been used chiefly by poets, once notably by Burns, whose "Address" begins "Edina! Scotia's darling seat." Long after Edwin's conquest the lowland continued to be debatable territory held by uncertain tenure, but at length it was to a large extent settled anew by Anglo-Saxon and Norman colonists under Malcolm Canmore and his sons.

In the reign of Malcolm Canmore the castle included the king's palace. There his pious queen, Margaret, the grand-niece of Edward the Confessor, died in 1093. It continued to be a royal residence during the reigns of her three sons, and hence the first rapid growth of the upper town may oe referred to the 12th century. The parish church of St Giles is believed to have been erected- in the reign of Alexander I., about n 10, and the huge Norman keep of the castle, built by his younger brother, David I., continued to be known as David's Tower till its destruc- tion in the siege of 1572. Soon after his accession to the Scottish throne David I. founded the abbey of Holyrood (1128), which from an early date received the court as its guests. But notwith- standing the attractions of the abbey and the neighbouring chase, the royal palace continued for centuries to be within the fortress, and there both the Celtic and Stuart kings frequently resided. Edinburgh was long an exposed frontier town within a territory only ceded to Malcolm II. about 1020; and even under the earlier Stuart kings it was still regarded as a border stronghold. Hence, though the village of Canongate grew up beside the abbey of David I., and Edinburgh was a place of sufficient importance to be reckoned one of the four principal burghs as a judicatory for all commercial matters, nevertheless, even so late as 1450, when, it became for the first time a walled town, it did not extend beyond the upper part of the ridge which slopes eastwards from the castle. So long, however, as its walls formed the boundary, and space therefore was limited, the citizens had to provide house-

room by building dwellings of many storeys. These tall tenements on both sides of what is now High Street and Canon- gate are still a prominent characteristic of the Old Town. The streets were mostly very narrow, the main street from the castle to Holyrood Palace and the Cowgate alone permitting the passage of wheeled carriages. In the narrow " wynds " the nobility and gentry paid their visits in sedan chairs, and proceeded in full dress to the assemblies and Balls, which were conducted with aristocratic exclusiveness in an alley on the south side of High Street, called the Assembly Close, and in the assembly rooms in the West Bow. Beyond the walls lay the burghs of Calton, Easter and Wester Portsburgh, the villages of St Cuthbert's,

Moutrie'sHill,Broughton,Canonmills, Silvermills andDeanhaugh — all successively swallowed up in the extension of the modern city. The seaport of Leith, though a distinct burgh, governed by its own magistrates, and electing its own representative to parliament, has also on its southern side become practically united to its great neighbour.

The other three royal burghs associated with Edinburgh were Stirling, Roxburgh and Berwick; and their enactments form the earliest existing collected body of Scots law. The determina- tion of Edinburgh as the national capital, and as the most fre- quent scene of parliamentary assemblies, dates from the death of James I. in 1436. Of the thirteen parliaments summoned by that sovereign, only one, the last, was held at Edinburgh, but his assassination in the Blackfriars' monastery at Perth led to the abrupt transfer of the court and capital from the Tay to the Forth. The coronation of James II. was celebrated in Holyrood Abbey instead of at Scone, and the widowed queen took up her residence, with the young king, in the castle. Of fourteen parliaments summoned during this reign, only one was held at Perth, five met at Stirling and the rest at Edinburgh; and, notwithstanding the favour shown for Stirling as a royal residence in the following reign, every one of the parliaments of James III. was held at Edinburgh. James II. conferred on the city various privileges relating to the holding of fairs and markets, and the levying of customs; and by a royal charter of 1452 he gave it pre-eminence over the other burghs. Further immunities and privileges were granted by James III.; and by a precept of 1482, known as the Golden Charter, he bestowed on the provost and magistrates the hereditary office of sheriff, with power to hold courts, to levy fines,

and to impose duties on all merchandise landed at the port of Leith. Those privileges were renewed and extended by various sovereigns, and especially by a general charter granted by James VI. in 1603.

James III. was a great builder, and, in the prosperous era which followed his son's accession to the throne, the town reached the open valley to the south, with the Cowgate as its chief thoroughfare. But the death of James IV. in 15 13, along with other disastrous results of the battle of Flodden, brought this era of prosperity to an abrupt close. The citizens hastened to construct a second line of wall, enclosing the Cowgate and the heights beyond, since occupied by Greyfriars churches and Heriot's hospital, but still excluding the Canongate, as pertaining to the abbey of Holyrood. In the 16th century the movements connected with John Knox and Mary, queen of Scots, made Edinburgh a castle of much activity. With the departure, however, of the sixth James to fill the English throne in 1603, the town lost for a long period its influence and prestige. Matters were not bettered by the Act of Union signed in a cellar in High Street in 1707, amidst the execrations of the people, and it was not till the hopes of the Jacobites were blasted at Culloden (1746) that the townsfolk began to accept the inevitable. This epoch, when grass grew even in High Street, long lingered in the popular memory as the " dark age."

By the accession of George III. (1760), Edinburgh showed signs of revived enterprise. In 1763 the first North Bridge, con- necting the Old Town with the sloping ground on which after- wards stood the Register House and the theatre in Shakespeare Square, was opened; a little later the Nor' Loch was partially drained, and the bridging of the Cowgate in 1785 encouraged expansion southwards. Towards the end of the 18th century the New Town began to take shape on the grand, if formal, lines which had been planned by James Craig (d. 1795), the architect, nephew of the poet Thomson, and the erection of Regent Bridge in Waterloo Place (formally opened in 1819 on the occasion of the visit of Prince Leopold, afterwards king of the Belgians) gave access to Calton Hill. The creation of Princes Street, one of the most beautiful thoroughfares in the world, led to further improvement. The earth and debris from the excavation of the sites for the houses in this and adjoining streets had been " dumped " in the centre of the drained Nor' Loch. This unsightly mass of rubbish lay for a while as an eye- sore, until the happy thought arose of converting it into a broad

way joining the new road at Hanover Street with the Old Town at the Lawnmarket. Upon this street, which divides Princes Street and its

gardens into east and west, and which received the title of the Mound, were erected the National Gallery and the Royal Institution. Speaking generally, the New Town was resorted to by professional men— lawyers, doctors and artists, — and in its principal streets will be found the head offices of the leading banks and insurance offices, all lodged in buildings of remarkable architectural pretensions. The Commercial, the Union and the Clydesdale banks are in George Street, the National Bank of Scotland, the Royal Bank of Scotland, and the British Linen Company's Bank are in St Andrew Square, the Bank of Scotland is at the head of the Mound. The extensive building operations engaged in by the town council in the early part of the 19th century resulted in the insolvency of the city in 1833. The property of the corporation was valued at £271,658 against a debt of £425,195, which was compounded for by the issue of 3 % annuity bonds — the loss to the creditors amounting to 25% of their claims.

Meanwhile the progress of letters, science and learning manifested the recovery of the city. The names of Knox (d. 1572), Buchanan (1582), Alexander Montgomery (1605), Drummond of Hawthornden (1649), Allan Ramsay (1757), Smollett (1771), Fergusson (1774), and Burns (1796), carried on the literary associations of the Scottish capital nearly to the close of the 18th century, when various causes combined to give them new significance and value. The university was served by a body of teachers and investigators who won for it a prominent position among European schools. Then succeeded the era of Scott's Marmion and The Lady of the Lake, followed by the Waverley novels and the foundation of Blackwood's Magazine and the Edinburgh Review.

Modern conditions have changed the character of Edinburgh society. In Scott's early days a journey to London was beset with difficulties and even dangers; but railways have now brought it within a few hours' distance, and Scottish artists and literary men are tempted to seek a wider field. Nevertheless, the influence of the past survives in many ways. Edinburgh is not markedly a manufacturing city, but preserves its character as the Scottish capital.

Authorities. — James Grant, Old and New Edinburgh (London, 1880 et seq.); W. Maitland, History of Edinburgh (1753); Hugo Arnot, History of Edinburgh (1789); B. Chambers, Traditions of Edinburgh (1824) ; D. Wilson, Memorials of Edinburgh in the Olden Time (1846-1848); O. Smeaton, Edinburgh and its Story (1904). The Municipal Buildings of Edinburgh, by Robert Miller, Lord Dean of Guild, printed by order of the town council (Edinburgh, 1895); Royal Edinburgh, by Mrs Oliphant, illustrations by Sir George Reid,

R.S.A. (London, 1890).

EDINBURGHSHIRE, or Midlothian, a county of Scotland, bounded N. by the Firth of Forth, E. by the shires of Haddington, or East Lothian, and Berwick, S.E. by Roxburghshire, S. by Selkirkshire, Peeblesshire and Lanarkshire, S. W. by Lanarkshire, and W. by Linlithgowshire or West Lothian. Its area is 234,339 acres or 3662 sq. m. The island of Cramond belongs to the county. There are no mountains, but the Pentland Hills advance boldly from the south-west to within 5 m. of the sea. The loftiest summits are Scald Law (1898 ft.), Carnethy (1881), West and East Cairn Hill (1844 and 1839), and West Kip (1806). They are generally of rounded form, and covered with heath or grass. The Moorfoot Hills, in the south-east, are a continuation of the Lammermuirs, and attain in Blackhope Scar a height of 2136 ft. Of more or less isolated eminences there are the Braid Hills (698 ft.), Blackford Hill (500), Arthur's Seat (822), Cor- storphine Hill (500) — all practically within Edinburgh — and Dalmahoy Craig (800), 7 m. south-west of the city. Of the rivers the Gala rises on the south-east of the Moorfoot Hills and flows south to join the Tweed, and the Tyne after a course of 7 m. passes into Haddingtonshire. All the others flow into the Firth of Forth. Of these the Esk, which is the longest, drains the district between the Pentlands and the Moorfoot Hills, and empties into the sea at Musselburgh. The southern branch has its source near Blackhope Scar, receives on its right Gore Water

and, on its left, Dalhousie Burn, and flows past Newbattle Abbey; the northern rises in the Pentlands, and proceeds through much picturesque scenery past Penicuik, Roslin, Hawthornden and Lasswade; the two streams uniting within the grounds of Dalkeith Palace. Braid Burn from Capelaw Hill passes between the Braid Hills and Blackford Hill, and reaches the sea at Porto- bello. The Water of Leith, with its head streams on the western slope of the Pentlands, flows past Balerno, Currie, Juniper Green, Colinton, Edinburgh and Leith. The Almond, rising in Lanark- shire, and its right-hand tributary, Breich Water, form the boundary between Midlothian and Linlithgowshire. Several of these streams, especially the Esk and the Water of Leith, furnish much water power. The only loch is that at Duddingston, but there are several large reservoirs connected with the water supply of Edinburgh. Cobbinshaw reservoir, situated at the head of Bog Burn, a tributary of the Almond, is used for the supply

of the Union Canal connecting the Forth with the Clyde.

Geology. — The southern portion of the county, embracing the Moorfoot Hills and a large part of the catchment basin of the Gala Water, lies within the Silurian tableland of the south of Scotland. From Bowland northwards to Crookston in the Gala valley the Silurian strata are mainly of Tarannon age and consist of greywackes, grits, flags and shales, with thin dark seams which yield graptolites sparingly. To the north of this area, older sediments, comprising Arenig cherts, black shales, greywackes and grits of Llandeilo and Caradoc age, rise from underneath the Tarannon strata and spread over the hills north to the margin of the tableland. In some of the folds of Arenig cherts diabase lavas appear, which occupy small lenticular areas. All the Silurian strata are repeated by folds striking north-east and south-west and frequently dipping in one direction, to the north-west as in the Gala valley. North of the Silurian tableland and within the area occupied by_ the younger palaeozoic rocks of the Pentland Hills, there are various inliers of Upper Silurian strata. These isolated patches occur (i) in the North Esk section, (2) at Loganlee reservoir, (3) near Bavelaw Castle, and (4) in Bavelaw Burn. The section in the North Esk is by far the most complete, as the strata embrace Wenlock, Ludlow and Down- tonian rocks with a north-east strike similar to that of the beds in the Silurian tableland. The Wenlock rocks have yielded a rich suite of organic remains. In the Pentland Hills the folded and denuded Silurian strata are covered unconformably by Lower Old Red Sandstone rocks, comprising conglomerates and red sandstones, which are succeeded by a great volcanic series, the latter extending from the West Kip Hill to the Braid Hills. The pebbles of the basal conglomerates are derived chiefly from the underlying platform of greywackes and shales and from the Radiolarian cherts and volcanic rocks in the tableland to the south. The contemporaneous igneous rocks include olivine basalts, andesites, trachytes, rhyolites and tuffs, which are pierced by the microgranite of the Black Hill and by several vents filled with agglomerate, as near Swanston.

The Upper Old Red Sandstone rests unconformably on all older formations. The red sandstones and cornstones of this division form the Cairn Hills, and are traceable north-eastwards along the north-west slope of the Pentland Hills towards the Clubbiedean reservoir, where they are overlapped by Carboniferous strata. They occupy the south part of the city of Edinburgh, they occur in the lower slope of Salisbury Crags, and south by Craigmillar and Liberton towards Mortonhall. Recently the horizon of these beds has been proved by the discovery of fish remains (Holoptychius), a zonal form of the

Upper Old Red Sandstone. The remainder of the county embracing the fertile low ground west of the city of Edinburgh and along the basin of the Esk is occupied by Carboniferous strata and various igneous rocks associated with that formation. The Pentland Hills, formed of older Palaeozoic deposits, appear as a prominent ridge, throwing off the Carboniferous beds to the north-west and south-east. In the former direction only the Calciferous Sandstone series is represented, and in the latter all the Carboniferous divisions are well developed. The lowest subdivision of the Calciferous Sandstone series, consisting of sandstones, red and green shales, marls and cement-stones, appears in the ridge of the old part of the city between the Castle and Holyrood, in the Hunter's Bog and on the north-west side of the Pentland Hills. Intercalated in this series near the top, there are interbedded volcanic rocks, comprising olivine basalts, mugearites, tuffs and agglomerates, which form conspicuous features on Arthur's Seat, on Calton Hill, at Craiglockhart and Corston Hill south of Mid Calder. Next in order come the Granton sandstones and Wardie shales, which are best seen on the shore at Granton, and extend up the Water of Leith in the direction of Colinton, where they are succeeded by the Hailes sandstone. The upper portion of the Calciferous Sandstone series, overlying the Hailes sandstone, embraces the valuable oil-shales, which give rise to one of the chief industries of the Lothians. Recently, however, it has been proved that some of the bands in the Wardie shales give a low yield of oil and sulphate of ammonia. The oil-shale-fields in the county lie partly along its west margin from Mid Calder south to Breich and

also on the south-east "side of the Pentland Hills between Straiton and Carlops along the west side of the Midlothian basin. From an economic point of view the Midlothian coalfield is of special importance, the strata being arranged in a syncline, the long axis of which trends north-north-east and south-south-west. In the centre of the basin lie the Coal-Measures covered by the barren red sandstone of Dalkeith, probably on the same horizon as the red sandstones of Wemyss in Fife (Middle Coal-Measures). The underlying Millstone Grit and Carboniferous Limestone series with its middle-coal-bearing group rise from underneath the Coal-Measures, forming parallel bands curving round the basin. Along the west side of the syncline, the strata dip at high angles to the south-east, are sometimes vertical and even in some cases inverted, while in the centre they become flat and rise at gentle angles towards the east. The Coal Measures and the coal-bearing group of the Carboniferous Limestone series contain numerous valuable coals and ironstones, and there still remains a

large field for development. The intrusive igneous rocks forming prominent features in the county are divisible into two main groups, which are separated from each other by a considerable interval of time. The coarse agglomerate filling the old volcano on the top of Arthur's Seat is associated with the eruption of the volcanic rocks of Calciferous Sandstone age near Edinburgh. The fine grained basalt appearing as a plug on the Castle Rock closely resembles the basalt on the top of Arthur's Seat, and is likewise of the same age. The intrusive sheets of Salisbury Crags and Corstorphine Hill com- posed of olivine-dolerite belong to the saroe general period. But the quartz-dolerites represented by the Ratho sill are in all probability of late Carboniferous age.

Climate and Agriculture. — In the hill country the average rainfall is 37.4 in., but on the coast only 28.4 in. The average temperature ranges from 38° F. in January to 50°. 5 in July, the mean for the year being 47.7. The north-east and easterly winds prevailing in spring are, especially in Edinburgh and its vicinity, remarkable for their cold and blighting character. Excepting in the uplands, snow seldom lies long, but frosts sometimes occur at night as late as the beginning of June, and severe enough to destroy the young shoots of seedling trees in nurseries. But the winter is often astonishingly mild. The common snowdrop (Galanthus nivalis) blossoms as early as the 25th of January, the kidney liverleaf (Hepatica triloba) by the 31st of January and the rhododendron (R. nobleanum) by the 25th of February. On the shores of the Forth along the Almond and the Esk, and on some of the richer flats, grain crops ripen early; 2 m. nearer the hills and 200 ft. higher the harvest is ten days later; and at 600 ft. still another week later. High farming is the rule in the three Lothians. All the area on which wheat can be profitably grown is so occupied; oats, however, is the predominant grain crop, though barley is also raised. Turnips and potatoes are the chief roots, and beans are grown to a limited extent. A large area is occupied by pasture and sown grasses, fallow land having practically disappeared. Near Edinburgh sewage farming has been largely developed. There are 200 acres at Craigentinny between Restalrig and the Forth, besides smaller tracts under similar treatment at Lochend, Dairy and the Grange. The produce consists principally of natural grasses. Sheep and cattle raising is an important pursuit. In the neighbourhood of the capital dairy farming is conducted on an extensive scale. Horse breeding flourishes, several of the studs being of excellent character, Clydesdales predominating. Pig-keeping has grown considerably and poultry-farming is carried on near Edinburgh. The nursery gardens are extensive, and, besides market

gardening, which prospers near the capital, there are many orchards.

Other Industries. — Though as a whole not a mining county, Midlothian possesses some mineral wealth. Coal is extensively mined at various points on the North Esk, like Penicuik, Loanhead, Bonnyrigg, Eskbank and at Gorebridge, Newbattle, Newbigging, Niddrie, Gilmerton, Mid and West Calder. Iron- stone is obtained chiefly at Lasswade and Penicuik and fire-clay occurs at various points. In the vicinity of West Calder there is a large amount of valuable oil-bearing shale. Limestone is of frequent occurrence — at Esperston, Cousland, Crichton near Dalkeith, Burdiehouse, Gilmerton near Edinburgh, the Camps in Kirknewton parish, and at Muirieston and Leven Seat in the south-west. Freestone is quarried at Craigleith, Hailes, Redhall and Craigmillar. It is used for pavements and stairs, and for the great docks at Leith. Barnton Mount supplies large blocks

of whinstone, also used for docks and for fortifications; the causeway stones for the streets of Edinburgh are mainly procured , from the quarries at Ratho; and a number of smaller quarries for the supply of road-material are scattered throughout the county. Owing no doubt to the growth of printing and publish- ing in the metropolis, the chief manufacturing industry in Mid- lothian is paper-making. Most of the mills are extensive and equipped with the most modern processes and have an enormous yearly output. The most important mills, some of them dating from the beginning of the 18th century, are situated on the North Esk between Penicuik and Musselburgh, and on the South Esk at Newbattle. At Balerno, Currie, Colinton and elsewhere on the Water of Leith there are several mills, as well as near Mid Calder and at Portobello. The ancient vat-mill called Peggy's Mill, at Cramond, produces handmade papers. There are carpet factories on the Esk at Roslin and at Lasswade. The manufacture of gunpowder is also carried on at Roslin, the works being distributed in recesses on the Esk. Iron foundries exist at Dalkeith, Westfield, Loanhead, Penicuik, Millerhill and in the suburbs of Edinburgh ; brick and tile works at Portobello, Millerhill, Newbattle, Bonnyrigg and Rosewell; and candle works at Dalkeith and Loanhead. Leather also is tanned at Edinburgh and Dalkeith. The shipping trade is concentrated at Leith and Granton, and Newhaven is still an important fishery centre, while there are also fleets at Fisherrow and Granton.

Population and Government. — The population in 1891 was 434,276, and in 1901 488,796, of whom 5765 spoke both Gaelic and English, and 75 Gaelic only. The chief towns, besides Edinburgh, the capital (pop. in 1901, 316,837), are Bonnyrigg (1924), Dalkeith (6812), Leith (77,439), Loanhead (3071), Musselburgh (11,711), Newton Grange (2406), Penicuik (3574), and West Calder (2652). The county forms a single parlia- mentary constituency, exclusive of Edinburgh city and Leith burghs. It has been divided by the county council into four county districts (Calder, Gala Water, Lasswade, Suburban) for the purposes of the Roads and Bridges Act 1878, and the Public Health Acts. The management of special districts formed for water supply, drainage and other sanitary purposes is entrusted to sub committees appointed by the respective district com- mittees. The grant under the Local Taxation (Customs and Excise) Act is administered by the Technical Education Com- mittee appointed by the Council; and, subject to the same authority, the Secondary Education Committee provides for the distribution of the grant under the Local Taxation (Scotland) Act. In respect of education the shire is under school-board jurisdiction.

History and Antiquities. — Cramond was once a Roman seaport, and various objects of Roman art and workmanship have been discovered in its vicinity and along the banks of the Almond. On several heights are remains of early military works — the most important being that on Dalmahoy Hill, Braidwood Castle in the parish of Penicuik, and Castle Greg on the Harburn estate in Mid Calder parish. Picts' houses are found at Crichton Mains, at Borthwick Castle, near Middleton House and elsewhere, the first being especially interesting from the fact that some of the stones bear marks of Roman masonry. There are hut-circles and a fort on Kaimes Hill, near Ratho; a large tumulus, with three upright stones, at Old Liston; a smaller tumulus at Newbattle; a cistvaen or stone burial chest at Carlowrie; and standing stones at Lochend, at Comiston (the Caiy stone), and the " Cat Stane " near Kirkliston. Temple, on the South Esk, was at one time the chief seat of the Knights Templars in Scotland for whom David I. here built a church, now in ruins.

The history of the county is almost identical with that of the capital. Traces of Celtic occupation are obvious in such names as Inveresk, Almond, Leith, Dairy, Dalmahoy, Dalkeith and others; though most of the villages, hamlets and castles received their present designation from Saxon possessors. The termina- tion ton is very frequent. Following upon the withdrawal of the Romans the land was the scene of intertribal strife, but it was in a measure subdued by the Saxons and passed under the rule of the Northumbrian kings, who held it till

1020, when the

Lothians were handed over to the Scottish king, Malcolm II. The people of the Lothians, however, stipulated that they were to retain their manners and customs, and in this way the south- eastern lowlands became the centre from which Anglo-Saxon and Norman civilization gradually spread throughout Scotland, and hence, too, was assured the pre-eminence of Edinburgh. Within the county lie the battlefields of Roslin, where (in 1303) the English suffered three reverses in one day; Burghmuir, where the English were defeated by the earl of Moray in 1334; Pinkie near Inveresk, where (in 1547) the duke of Somerset inflicted heavy loss upon the Scots; and Rullion Green, on the eastern slopes of the Pentlands, where (in 1666) the Covenanters were routed by the royal troops under General Dalziel.

See James Grant, Old and New Edinburgh (London, i88oetseq.); Miss Warrender, Walks near Edinburgh (Edinburgh, 1890); J. C. Oliphant, Rambles round Edinburgh (Edinburgh, 1892); J. M. Bell, Castles of the Lothians (Edinburgh, 1893); W. Baird, Annals of Duddingston and Portobello (Edinburgh, 1898); J. Geddie, The Water of Leith (Edinburgh, 1896) ; Rev. J. Dickson, Ruined Castles of Midlothian (Edinburgh, 1895); The Islands of the Forth (Edinburgh

1899).

EDISON, THOMAS ALVA (1847-), American inventor, was born on the nth of February 1847, at Milan, Erie county, Ohio, of mixed Dutch and Scottish descent; but his parents moved to Port Huron, Michigan, when he was seven years old. At the age of twelve he became a train news-boy on the railway to Detroit, and managed to gratify his youthful interest in chemistry by performing experiments while travelling. At fifteen he became a telegraph operator, and was employed in many cities in the United States and Canada, but frequently neglected his duties in order to carry on studies and experiments in electrical science. Before he was twenty-one he had constructed an automatic repeater, by means of which a message could be transferred from one wire to another without the aid of an operator; and he had also directed his attention to the problem of duplex telegraphy, of which he later invented a successful system. In 1869 Edison came to New York city, and soon afterwards became connected with the Gold & Stock Company. He invented an improved printing telegraph for stock quotations, for which he received $40,000. He then established a laboratory and factory in Newark, N.J., for further experiments and for the manufacture of his

inventions. In 1876 he removed to Menlo Park, and later to West Orange, N.J., where he continued his experiments. Since then his name has been prominently associ- ated with all kinds of novelties in practical electricity. Among his principal inventions are his system of duplex telegraphy, which he later developed into quadruplex and sextuplex trans- mission; his carbon telephone transmitter; the micro tasimeter, for the detection of small variations in temperature; the phono- graph, which records and reproduces all manner of sounds; the cinematograph, which his improvements made practicable; and his method of preparing carbon filaments for the incandescent electric lamp. In 1878 Edison was made a chevalier of the Legion of Honour by the French government.

EDMONTON, the capital city of the province of Alberta, Canada, which was constituted in 1905. Pop. (1901) 2652; (1906) 11,167. It is picturesquely situated on the north bank of the North Saskatchewan river in 113 37′ W. and 53° 32′ N. It is on a high tableland which rises 200 ft. above the river, and overlooks the thickly wooded valley of the North Saskatchewan river — at this point a mile in width, the river itself being one- eighth of a mile wide. Directly opposite Edmonton on the south bank of the river stands Strathcona, a town with a popula- tion of 2927. The streets of Edmonton are wide and laid out in rectangular form. Its excellent drainage makes street grading an easy matter. In 1896 it was scarcely a village; in 1901 it assumed some importance, but three-quarters of the city were built between 1901 and 1906. Its choice as capital in 1905 gave it a great impetus. The buildings, largely of brick, give a substantial appearance to the place. The public school buildings, high school and Alberta College are attractive. The church buildings, many in number, include several architecturally beautiful. Three well planned and commodious hospital

buildings represent the benevolent work of the community. The banks and the wholesale warehouses are well built, and many beautiful private residences are worthy of note. Its growth may be realized from the fact that during a part of 1906, $806,015 worth of building permits were granted; the customs receipts, $57,994 in 1905, grew to $104,416 in 1906; the mail parcels handled increased from 6800 to 12,079; an d the express parcels handled from 1277 to 2347. Edmonton is the depot of the fur traders for the great region on the north and west. The Hudson's Bay Company has great interest in Edmonton, but is vigorously opposed by a strong French firm, Revillon Fr£res of Paris. These two companies have their posts wide

spread over the north country. The city, being incorporated, is governed by a mayor and a board of aldermen. It operates its own water service, electric light plant, and telephone system. Its schools are managed by an elected public school board.

Edmonton was begun as a post of the North West Company about the year 1778. Early in the 19th century the Hudson's Bay Company also established a fort at this point. On the union of the two companies under the name of the latter, Fort Edmonton sprang into new importance. It became a north- western centre, and in its neighbourhood many employees of the fur company, both Scottish and French, took up land as settlers. As freighters for the Hudson's Bay Company many of these settlers made, with their ox or pony carts, the long journey over the natural prairie roads to Fort Garry, fording or swimming the streams, carrying furs for a thousand miles or more on the eastern trip, and returning brought loads of merchandise for the company. Its inaccessibility made the Edmonton settlement grow very slowly, so that its great increase in population belongs to the period subsequent to 1896.

EDMONTON, an urban district in the Enfield parliamentary division of Middlesex, England, suburban to London, 73 m. N. of London Bridge, on the Old North Road, on the west side of the Lea Valley. Pop. (1891) 25,381; (1901) 46,899. There are numerous factories in the valley, and Edmonton consists largely of the cottages of artisans. The church of All Saints has been extensively restored, but retains part of the ancient fabric of Perpendicular and earlier date. It contains brasses of interest, and in the churchyard is the memorial of Charles Lamb, who lived and died (1834) at Edmonton, and his sister. Cowper and Keats were also residents, and the Bell Inn is famed through Cowper's poem John Gilpin.

EDMUND, SAINT [Edmund Rich] (d. 1240), English saint and archbishop of Canterbury, was born at Abingdon, near Oxford, about 1175. His father was a merchant of that town who retired, with his wife's consent, to the monastery of Eynsham, leaving in her hands the education of their family. Her name was Mabel; she was a devout woman who lived an ascetic life and encouraged her children to do the same. Both her daughters took the veil; three of her sons served the church in different capacities. Edmund, her first-born, began his education in a grammar school at Oxford. Of weak health and a contemplative disposition, he showed, from his earliest years, a remarkable taste for learning and religious exercises. He saw visions while still at school, and at the age of twelve took a vow of perpetual chastity in the Virgin's church at Oxford. Later he was

sent, with his brother Robert, to study the liberal arts at Paris. His mother's death and family affairs recalled him for a time to England; but he afterwards graduated at Paris. For six years he lectured in the liberal arts, partly in Paris and partly in Oxford; his career as an Oxford teacher commenced before 1205, find is noteworthy for the fact that he was the first who lectured there on Aristotle. He then returned to Paris for a course of theological studies, and rapidly made himself proficient in that branch of learning.

After spending a year in retirement with the Augustiniancanons of Merton (Surrey) he became a theological lecturer in Oxford. In this capacity he gained some reputation, and it is related that his audience were often moved to tears by his eloquence. He spent the fees which he received in charity, and refused to spend upon himself the revenues which he derived from several

benefices. He not infrequently retired for solitude to Reading Abbey; it is probable that he would have become a monk if that profession had afforded more scope for his gifts as a preacher and expositor. As his fame increased he became alarmed by the temptations which it threw in his way. He ceased to lecture in Oxford, and about 1222 accepted, at the invitation of Bishop ; Richard Poore, the treasurership of Salisbury cathedral. Little is known of his life for the next ten years. But he attracted the notice of the Roman court, and was appointed in 1227 to preach the Crusade in England; he formed a friendship with Ella, countess of Salisbury, and her husband, William Longsword, and he won general admiration by his works of charity and the austerity of his life.

In 1233 he was elected archbishop of Canterbury at the express suggestion of Gregory IX., after the monks of Canterbury had in vain suggested three other candidates for the pope's approval. Edmund at once leaped into prominence by the outspoken manner in which he rebuked the king for following the advice of foreign favourites. In common with the baronial opposition he treated Henry III. as responsible for the tragic fate of Richard Marshal, earl of Pembroke, and threatened the king with ex- communication. The king bowed before the storm, dismissed the foreign counsellors, made peace with Marshal's adherents, and was publicly reconciled with the barons. But the new ministers were as unpopular as the old; nor was the archbishop allowed that political influence which he claimed in virtue of his office. It was with the object of emancipating himself from Edmund's control that the king asked the pope to send him a legate (1236). On the arrival of Cardinal Otho (1237) the arch-bishop found himself thwarted and insulted at every point. The

marriage between Simon de Montfort and the Princess Eleanor, which Edmund had pronounced invalid, was ratified at Rome upon appeal. The king and legate upheld the monks of Canterbury in their opposition to the archbishop's authority. On all public occasions the legate took precedence of the arch- bishop. By the advice of his suffragans Edmund laid a protest before the king, and excommunicated in general terms all who had infringed the liberties of Canterbury. These measures led to no result; nor could the pope be moved to reverse the legate's decisions. Edmund complained that the discipline of the national church was ruined by this conflict of powers, and began to meditate retiring. He was confirmed in this intention by the papal encroachments of the year 1240, when the English clergy were required to pay a subsidy of a fifth for the war against Frederick II., and simultaneously three hundred Romans were " provided " with English benefices in return for their political services to the Holy See. Edmund withdrew to Pontigny in the summer of 1240. A little later the state of his health com- pelled him to seek the cooler air of Soissy (near Provins). Here he died on the 16th of November 1240.

His canonization was at once demanded by his admirers, and only delayed (till 1247) through the opposition of Henry III. The honour was well deserved. He is one of the most saintly and attractive figures in the history of the English church. It was his misfortune to be placed at the head of the national hierarchy in a crisis for which he had not been prepared by practical training or experience. As archbishop he showed no great capacity or force of character; but the purity of his motives and the loftiness of his ˆeals commanded universal respect.

See the Life printed by Martene and Durand in the Thesaurus novus anecdolorum (1717). Other lives of importance exist in manuscript at the British Museum, in the Cambridge University library and in that of St John's College, Cambridge. The last-named is printed by W. Wallace in the appendix to his Life of St Edmund (1893). An account of the manuscript lives and many extracts (translated) will be found in the Rev. B. Ward's St Edmund (1903). See also St Edmund of Abingdon (1898), by the Baroness Paravicini; and the English Historical Review, xxii. pp. 84 ff. (H. W. C. D.)

EDMUND, king of East Anglia (c. 840-870), succeeded to the East Anglian throne in 855 while he was yet but a boy. According to Abbo, followed by Florence of Worcester, he was " ex antiquorum Saxonum prosapia," which would seem to mean that he was of foreign origin and that he belonged to the Old

Saxons of the continent. This very doubtful tradition was expanded later into a fuller legend which spoke of his Old Saxon parentage, his birth at Nuremberg, his nomination as successor to Offa, king of East Anglia, and his landing at Hunstanton to claim his kingdom. His coronation took place in the next year at " Burna " (i.e. probably Bures St Mary, Suffolk), which was then the royal capital.

Of the life of St Edmund during the next fourteen years we know nothing. In the year 870 the Danes, who had been wintering at York, marched through Mercia into East Anglia and took up their quarters at Thetford. Edward engaged them fiercely in battle, but the Danes under their leaders Ubba and Inguar were victorious and remained in possession of the field of battle. The king himself was slain, whether on the actual field of battle or in later martyrdom is not certain, but the widely current version of the story which makes him fall a martyr to the Danish arrows when he had refused to renounce his faith or hold his kingdom as a vassal from the heathen overlords, may very probably be true. The story is a very old one, and according to Abbo of Fleury (945-1004), St Edmund's earliest biographer, it was told him by Dunstan, who heard it from the lips of Edmund's own standard-bearer. This is chronologically just possible, but that is all. The battle was fought at Hoxne, some 20 m. south-east of Thetford, and the king's body was ultimately interred at Beadoricesworth, the modern Bury St Edmunds. The shrine of Edmund soon became one of the most famous in England and the reputation of the saint was European. The date of his canonization is unknown, but churches dedicated to his memory are found all over England.

See Asset's Life of Alfred, ed. W. H. Stevenson; Annals of St Neots; Saxon Chronicle; Memorials of St Edmund's Abbey (Rolls Series), including the Passio Sancti Edmundi of Abbo of Fleury; and the Corolla Sancti Eadmundi, edited by Lord Francis Hervey (1907). (A. Mw.)

EDMUND I., king of the English (d. 946), was the son of Eadgifu, third wife of Edward the Elder, and half-brother to his predecessor ˆEthelstan. He succeeded to the throne in 940, but had already played an active part in the previous reign, especially when he fought by the side of his half-brother in the great battle of Brunanburh.

In the first year of his reign Edmund had trouble with Olaf or Anlaf

Sihtricsson, called Cuaran. The latter had just crossed from Ireland and had been chosen king by the Northumbrians, who threw off their allegiance to Edmund. Anlaf took York, besieged Northampton and destroyed Tamworth, but was met by Edmund at Leicester. The enemy escaped, but a peaceful settlement was made by the good offices of Odo of Canterbury and Wulfstan of York. Simeon of Durham states that a division of the kingdom was now made, whereby Edmund took England south of Watling Street and Anlaf the rest. This division seems incredible, especially in face of the poem inserted in the chronicle (sub anno 942). There can be little doubt that the story told there of the reconquest of Northern Mercia by Edmund refers to the compact with Anlaf, made as a result of the campaign, and it is probable that Simeon's statement is a wide exaggeration, due in part at least to a confused reminiscence of the earlier pact between Alfred and Guthrum. All Mercia south of a line from Dore (near Sheffield), through Whit well to the Humber, was now in Edmund's hands, and the five Danish boroughs, which had for some time been exposed to raids from the Norwegian kings of Northumbria, were now freed from that fear. The peace was confirmed by the baptism of Kings Anlaf and Raegenald, Edmund standing as sponsor, but in 944 or 945 the peace was broken and Edmund expelled Anlaf and Rasgenald from Northumbria.

In 945 Edmund ravaged Strathclyde, and entrusted it all to Malcolm, king of Scotland, " on condition that he should be his fellow-worker by sea and land," the object of this policy being apparently to detach the king of Scots from any possible con- federacy such as had been formed in 937.

On the 26th of May 946 Edmund's brief but energetic reign came to a tragic conclusion when he was stabbed at the royal villa of Pucklechurch, in Gloucestershire, by an exiled robber

named Liofa, who had returned to the court unbidden. Edmund, the " deed-doer " as the chronicle calls him, " Edmundus magnificus " as Florence of Worcester describes him, perhaps translating the Saxon epithet, was buried at Glastonbury, an abbey which he had entrusted in 943 to the famous Dunstan.

Edmund was twice married; first to ˆElfgifu, the mother of Eadwig and Edgar; 'second to ˆEthelflaed " set Damerhame " (i.e. of Damerham, Co. Wilts). ˆElfgifu died in 944, according to Ethelwerd.

Authorities. — Anglo-Saxon Chronicle (ed. Earle and Plummer, Oxford); Simeon of Durham (Rolls Series); A. S. Laws, ed. Lieber-

mann, pp. 184-191 ; Birch, Cartularium Saxonicum, Nos. 745-817; Dictionary of National Biography, s.v. (A. Mw.)

EDMUND, or Eadmund (c. 980-1016), called Ironside, king of the English, was the son of ˆEthelred II. by his first wife /Elfgifu. When Canute invaded England in 1015, Edmund sought to resist him, but, paralysed by the treachery and deser- tion of the ealdorman Edric, he could do nothing, and Wessex submitted to the Danish king. Next year Canute and Edric together harried Mercia, while Edmund with infinite difficulty gathered an army. Returning into Northumbria, he in his turn harried the districts which' had submitted to the invader, but a march northward by Canute brought about the speedy sub- mission of Northumbria and the return of Edmund to London. The death of ˆEthelred on the 23rd of April 1016 was followed by a double election to the English crown. The citizens of London and those members of the Witan who were present in the city chose Edmund, the rest of the Witan meeting at South- ampton elected Canute. In the warfare which ensued Edmund fought at the severest disadvantage, for his armies dispersed after every engagement, whatever its issue. Canute at once fiercely besieged London, but the citizens successfully resisted all attacks. Edmund meanwhile marched through Wessex and received its submission. At Pen in Somersetshire he engaged the Danes and defeated them. Canute now raised the siege of London and soon afterwards encountered Edmund at Sherston in Wiltshire. The battle was indecisive, but Canute marched back to London and left Edmund in possession of Wessex. Edmund hastened\fter him and relieved London, which he had again besieged. He defeated the Danes at Brentford and again at Otford, and drove them into Sheppey. He was now joined by Edric, in conjunction with whom he followed the Danes into Essex, overtaking them at Assandun (or Ashington). In the battle which ensued Edric again played the traitor, and the English were routed with terrible slaughter. Edmund retired into Gloucestershire, whither he was followed by Canute. He himself was anxious to continue the struggle, but Edric and the Witan persuaded him to accept a reconciliation. At Olney the two rivals swore friendship, and a division of the kingdom was effected — Canute taking the north, Edmund the south. Soon afterwards Edmund died (30th of November 1016), prob- ably from natural causes, though later historians hint at foul play. (C. S. P.)*

EDMUND, king of Sicily and earl of Lancaster (1245-1296), was the second son of Henry III. of England by Eleanor of Provence. At ten years of age Edmund was invested by Pope Alexander IV. with the kingdom of Sicily (April 1255); the pecuniary obligations which Henry III. undertook on his son's behalf were not the least among the

causes which led to the Provisions of Oxford and the Barons' War. Alexander annulled his grant in 1258, but still pressed Henry for the discharge of unpaid arrears of subsidies. In 1265, after Montfort's fall, Edmund received the earldom of Leicester, and two year later was created earl of Lancaster. He joined the crusade of his elder brother, the Lord Edward (1271-1272); and Edward, on his accession, found in Edmund a loyal supporter. In 1275, two years after the death of his first wife, Aveline de Fortibus, Edmund married Blanche of Artois, the widow of Henry III. of Navarre and Champagne. Although the county of Champagne had descended to his wife's infant daughter, Joan, Edmund assumed the title " Count Palatine of Champagne and Brie," and is described in the English patent rolls as earl of Lancaster*

and Champagne. Until 1284 he held, in his wife's right, the custody of Champagne. This he was compelled to renounce upon the marriage of Joan to Philip the Fair, the heir to the crown of France. But he retained the possession of his wife's dower- lands in Champagne, and is described in an official document of Champagne so late as the year 1287, as " the Count Edmund." He was employed by his brother as a mediator with Philip the Fair in 1 293-1 294. When Philip's court pronounced that the king of England had forfeited Gascony, Edmund renounced his homage to Philip and withdrew with his wife to England. He was appointed lieutenant of Gascony in 1296, but died in the same year, leaving a son Thomas to succeed him in his English possessions.

See " Edmund, Earl of Lancaster," by W. E. Rhodes, in the English Historical Review, vol. x. pp. 19, 209.

EDMUNDS, GEORGE FRANKLIN (1828-), American • lawyer and political leader, was born in Richmond, Vermont, on the 1st of February 1828. He began the practice of law in 1849. He was a member of the Vermont House of Representa- tives in 1854, 1855, 1857, 1858 and 1859, acting for the last two years as speaker, and was a member and president pro tern. of the state Senate in 1861-1862. In 1866 he became a member, as a Republican, of the United States Senate, where he remained until 1891, when he resigned in order to have more time for the practice of his profession. He took an active part in the attempt to impeach President Johnson. He was influential in providing for the electoral commission to

decide the disputed presidential election of 1876, and became one of the commissioners. In the national Republican nominating conventions of 1880 and 1884 he was a candidate for the presidential nomination. From 1882 to 1885 he was president pro tern, of the Senate. As senator he was conspicuous on account of his legal and parliamentary attainments, his industry and his liberal opinions. He was the author of the so-called Edmunds Act (22nd of March 1882) for the suppression of polygamy in Utah, and of the anti-trust law of 1890, popularly known as the Sherman Act.

EDOM, the district situated to the south of Palestine, between the Dead Sea and the Gulf of 'Akaba (Aelanitic Gulf), the inhabitants of which were regarded by the Israelites as a " brother " people (see Esau). On the E. it touched Moab, the tribes of the great desert and the northern part of Arabia; on the W. its boundaries were determined by the Sinaitic penin- sula, Egypt and Israel. Both Kadesh and Mt. Hor (perhaps Jebel Madera) are represented as lying on its border (Num. xx.

16, 22), and the modern Wadi el-Fikreh, in which the " Scorpion pass" was probably situated (Judg. i. 36; Num. xxxiv. 4), may have marked its limits from Jebel Madera north-west towards the southern extremity of the Dead Sea. Kadesh {'Ain gadis), however, lies about 50 m. south of Beersheba (the southern end of Israel as opposed to Dan in the north), and the precise borders must always have been determined by political conditions: by the relations between Edom and its neighbours, Judah, the Philistine states, Moab, and the restless desert tribes with which Edom was always very closely allied.

The northern part of Edom became known by a separate name as Gebalene (Gebal in Ps. lxxxiii. 7), the modern Jibal, " mountain country." Seir or Mt. Seir, a synonym for Edom, not to be confused with the Judaean locality (Josh. xv. 10), has been identified with the modern els-Sarah, the hilly region to the south of Petra; though its use probably varied in ancient times as much as that of Edom certainly did. Mt: Halalf , apparently one of its offshoots (Josh. xi.

17, xii. 7), is of uncertain identification, nor can the exact position of Paran (probably desert of et-Tih) or Zin (Sin) be precisely determined. The chief Edomite cities extended from north to south on or adjoining an important trade-route (see below); they include Bozrah (Buseire), Shobek, Petra (the capital), and Ma'an; farther to the south lay the important seaports Ezion-Geber (mod. Ain el-Ghudyan, now 15 m. north of the head of the Aelanitic Gulf) and Elath (whence the gulf derives its name). Petra (q.v.) is usually

identified with the biblical Sela, unless this latter is to be placed at the south end of the Dead Sea (Judg. i. 36). The sites of Teman and Dedan, which also were closely associated with Edom (Jer. xlix. 7 seq. ; Ez. xxv. 13), are uncertain. No doubt, as a general rule, the relations between Edomites and the " sons of the east " (Ezek. xxv. 10; Job i. 3) and the " kingdoms of Hazor " (nomad states; Jer. xlix. 28, 3°i 33) varied considerably throughout the period of O.T. history.

The land of Edom is unfruitful and forbidding, with the notable exception of fertile districts immediately south of the Dead Sea and along its eastern border. It was traversed by an important trade-route from Elath (the junction for routes to Egypt and Arabia) which ran northwards by Ma'an and Moab; but cross-routes turned from Ma'an and Petra to Gaza or up the Ghor (south end of Dead Sea) to Hebron and Jerusalem. l Thus Edom formed a prominent centre for traffic from Arabia and its seats of culture to Egypt, the Philistine towns, Palestine and the Syrian states, and it enjoyed a commercial importance which made it a significant factor in Palestinian history.

The earliest history of Edom is that of the " sand-dwellers," " archers " or Shasu (perhaps " marauders "), whose conflicts with ancient Egypt are not infrequently mentioned. The first clear reference is in the eighth year of Mineptahll. (close of 13th century B.C.), when a tribe of Shasu from Aduma received permission to enter Egypt and feed their flocks. 2 A little more than a century later Rameses III. claims to have overthrown the Saaru among the tribes of the Shasu, and the identification of this nam6 with Seir is usually recognized, although it is naturally uncertain whether the Edomites of Old Testament tradition are meant. According to the latter, the Edomites were a new race who drove out the Horites from Mt. Seir. The designation suggests that these were " cave-dwellers," but although many caves and hollows have been found about Petra (and also in Palestine), this tradition probably " serves only to express the idea entertained by later generations concerning their predecessors " (Nbldeke).

Not only is Edom as a nation recognized as older than Israel, but a list of eight kings, who reigned before the Israelite monarchy, is preserved in Gen. xxxvi.

The first Bela, son of Beor, is often identified with Balaam, but the traditions of the Exodus are not precise enough to warrant the assumption that the seer was the king of a hostile land in Num. xx. 14 sqq., which in Deut. ii. 1-8 appears to have been peaceful; see

Balaam; Exodus. In Husham, the third king, several scholars (Gratz, Klostermann, Marquart, &c.) have recognized the true adversary of Othniel {q.v. ; Judg. iii.). The defeat of Midian in the land of Moab by his successor Hadad has been associated with the Midianite invasion in the time of Gideon (q.v. ; Judg. vi. sqq.). The sixth is Shaul, whose name happens to be identical with Saul, king of Israel, whilst the last Hadad (so 1 Chron. i. 50) of Pau (or Peor in Moab, so the Septuagint) should belong to the time of David. The list, whatever its value, together with the other evidence in Gen. xxxvi., implies that the Edomites consisted of a number of local groups with chieftains, with a monarchy which, however, was not hereditary but due to the supremacy of stronger leaders. The tradition thus finds an analogy in the Israelite " judges " before the time of Saul and David.

Saul, the first king of Israel, conquered Edom (1 Sam. xiv. 47) . 3 Of the conquest of Edom by David, the first king of the united Judah and Israel, several details are given (2 Sam. viii. 13 seq.; 1 Kings xi. 14 sqq.; 1 Chron. xviii. n seq.; cf. Ps. lx. title and ver. 8 seq.), although the account of the slaughter is certainly exaggerated. The scene was the valley of Salt, probably to the south of the Dead Sea. Of the escape of the Edomite prince Hadad, and of his residence in Egypt, a twofold account is

1 See further, E. Robinson, Biblical Researches, vol. ii. ; E. Hull, Mt. Seir; E. H. Palmer, Desert of the Exodus; Baedeker's Palestine and Syria; C. W. Wilson, " Quart. Stat." (Pal. Explor. Fund), 1899, p. 307, and G. A. Smith, Ency. Bib. col. 5162 seq.

2 In the old story of Sinuhit (ascribed to the 12th dyn.) the hero visits the land of Kedem, which, it was suggested, lay to the south-east or south of the Dead Sea; see, however, now A. H. Gardiner, Sitz.- Ber. of the Berlin Academy, 1907, pp. 142 sqq. The suggestion that the city Udumu, in the land of Gar, mentioned in the 15th century (Amarna Tablets, ed. Winckler, No. 237), is Edom, Gar being the Eg. Kharu (Palestine) and the O.T. Horites (see above), is ex- tremely hazardous. That the name Aduma (above) refers to Etham (so Naville, &c.) is improbable.

3 That the Edomites preserved this tradition of Saul's sovereignty and (from their standpoint) enrolled him among their kings (Gen. xxxvi. 37) cannot of course be proved. The account of the ferocious slaughter of the priests of Nob at Saul's command by Doeg the Edomite is a secondary tradition and probably of late origin (I Sam. xxi. 1-9, xxii. 6-23); cf. the hostility of Edom in exilic and post-exilic times (p. 878, col. 1).

preserved. 1 After the death of David he returned to Edom; if, as the narrative implies, he became a troublesome adversary to Solomon, nothing is known of his achievements, and if the royal trading-journeys from Ezion-geber were maintained, Edom could have done little. However, in the first half of the 9th century Edom was under the rule of Jehoshaphat of Judah, and this king together with Israel held Ezion-geber (1 Kings xxii. 47 sqq.; 2 Chron. xx. 35 sqq.). But some catastrophe befell the fleet, and shortly afterwards Jehoshaphat's son Jehoram had to face a revolt in which Edom and the men of Libnah (the Philis- tines) were concerned. It was about this period that Israel had conquered Moab, thrusting it farther south towards Edom, and the subsequent success of Moab in throwing off the yoke, and the unsuccessful attempt of Jehoram of Israel to regain the position, may show that Edom was also in alliance with Moab. 2 In the time of Adad-nirari of Assyria (812-783 B.C.) Edom is mentioned as an independent tributary with Beth-Omri (Israel) and Palashtu (Philistia); the absence of Judah is perplexing. Amaziah of Judah had gained a signal victory over Edom in the valley of Salt (2 Kings xiv. 7), but after his defeat by Jehoash of Israel there is a gap and the situation is obscure. Consequently it is uncertain whether Edom was the vassal of the next great Israelite king Jeroboam II., or whether the Assyrian evidence for its independent position belongs to this later time. However, Uzziah, a contemporary of Jeroboam II., and one of the most successful of Judaean kings, overcame Edom and its natural allies (2 Chron. xxvi. 6 sqq.), and at this stage Edomite history becomes more prominent. It joined the great coalition in which Philistia and Israel were leagued against Assyria, and drove out the Judaeans who had been in possession of Elath. 3 On the events that followed see Ahaz; Hezekiah; Philistines. The Assyrian inscriptions name as tributary kings of Edom, Kaus- melek (time of Tiglath-Pileser IV.), Malik (?)-ram (701 B.C.), and Kaus-gabri (7th century). In the middle of the 7th century both Edom and Moab suffered from the restlessness of the desert tribes, and after another period of obscurity, they joined in the attempt made by Zedekiah of Judah to revolt against Nebuchadrezzar (Jer. xxvii. 3). In the last years before the fall of Jerusalem many of the Jews found a refuge in Edom (Jer. xl. n), although other traditions throw another light upon the attitude of Edom during these disasters.

That Edomites burned the temple after the destruction of Jeru- salem (1 Esd. iv. 45, cf. v. 50) is on a line with the repeated denuncia- tion

of their " unbrotherly " conduct in later writings. Certainly the weak state of Palestine invited attacks from the outlying tribes, but the tone of certain late writings implies a preliminary period of, at least, neutrality (cf. Deut. ii. 4 sqq., xxiii. 7 seq.; the omission of Edom in xxiii. 3; Neh. xiii. 1; and in Ezra ix. I — contrast I Esd. viii. 69). Subsequently Edom is execrated for revengeful attacks upon the Jews, and its speedy destruction is foretold; but the passages appear to be much later than the disaster of 587 B.C., and may even imply conditions after the restoration (Ob. 10 sqq. ; Ezek. xxv. 12-14; J er – x 'ix. 7; Ps. exxxvii. 7; Lam. iv. 21 seq., v. 2 sqq.). But at length the day of reckoning came (cf. Is. xxxiv. 5; lxiii. 1-6), and the fate of Edom is still fresh in the mind of Malachi (i- 1-5)-

The problem is complicated by the possibility that during the ages over which the references can range many changes of fortune could have occurred. The pressure of the Nabataeans (q.v.) forced Edom to leave its former seats and advance into the south of Judah with Hebron as the capital. This had been fully accom- plished by 3 1 2 B.C., but the date of the first occupation cannot be ascertained from the literary evidence alone. Thus the district

1 1 Kings I.e., see the Septuagint and, especially, H. Winckler, Alttest. Untersuch., pp. 1-15 ; C. F. Burney, Kings, pp. 158 sqq.; J. Skinner, Kings, pp. 443 sqq.; Ed. Meyer, Israelites., pp. 358 sqq.

2 On 2 Kings iii. see Jehoram; Jehoshaphat; Moab; and for the biblical traditions relating to this period see Kings (Book) and Jews: History. The chronicler's account of Judaean successes (2 Chron. xvii. 10 seq.; xx.) and reverses (xxi. 16, xxii. 1) may rest originally upon the source from which 1 Kings xxii. 47 seq.; 2 Kings viii. 20, 22, have been abbreviated. It is hardly probable that there was enmity between Edom and Moab as 2 Kings iii. now implies, although hostile relations at other periods are likely (cf. Am. ii. 1) ; for Edom in Moabite territory see above on Gen. xxxvi. and " Quart. Stat." (Pal. Explor. Fund), 1902, pp. 10 sqq.

3 2 Kings xvi. 6 ; on the text see the commentaries.

in question is Jewish in the time of Nehemiah (Neh. xi. 25-30), but it is uncertain whether the Edomite occupation was earlier (a fusion being assumed) or later, or whether the passage may bs untrustworthy. Henceforth, the new home of the Edomites is consequently known as Idumaea. See, for further history, Herod; Jews. 4

Although but little is known of the inhabitants of Edom, their close relationship to Judah and their kinship with the surround- ing tribes invest them with particular interest. The ties which united Lot (the "father" of Ammon and Moab), Ishmae.l, Midian and Edom (Esau) with the southern tribes Judah and Simeon, as manifested in the genealogical lists, are intelligible enough on geographical grounds alone, and the significance of this for the history of Judah and Palestine cannot be ignored. The traditions recording the separation of Lot from Abraham, of Hagar and Ishmael from Isaac, and of Esau from Jacob, although at present arranged in a descending scheme of family relationship, . are the result of systematic grouping and cannot express any chronological order of events (see Genesis) . Many motives have worked to bring these legends into their present form, and while they depict the character of Israel's wilder neighbours, they represent the recurrent alternating periods of hostility and fellowship between it and Edom which mark the history. Esau (Edom) although the older, loses his superiority, and if the oracles declare that the elder shall serve the younger (Jacob, i.e. Israel), the final independence of Esau (Gen. xxv. 23, xxvii. 39 seq.), as foretold, obviously alludes to some successful Edomite revolt. As an enemy, Edom in alliance with the tribes along the trade-routes (Philistines, Moabites, &c.) was responsible for many injuries, and in frequent forays carried away Judaeans as slaves for Gaza and Tyre (Am. i. 6 seq., 9). As an ally or vassal, it was in touch with the wealth of Arabia (Ezek. xxvii. 16, read " Edom " for " Aram "), and Judah and Israel as well as Gaza and Damascus enjoyed the fruits of its commerce. In view of the evidence for the advanced culture of early Arabia, the question of Edom is extremely suggestive, and although speculation at this stage would be premature, it is interesting to observe that Edomite and allied tribes were famed for their wisdom, 6 and that apart from the possibility of Arabian influence upon Israelite culture, the influence of Midian and related tribes is certain from the traditions of Moses and of his work (see Jethro; Kenites; Moses), and the Edomite district was a traditional home of Yahweh himself (Deut. xxxiii. 2; Judg. v. 4; Hab. iii. 3); see Hebrew Re- ligion. It should be added, however, that the Edomite names and other evidence point to the cult of other gods, viz. Baal, Hadad, Malik (cf. Moloch), Kaus, or Kus, and Kozeh (Jos. Ant. xv. 7, 9), who was probably a sky or lightning deity.

The names Esau and Edom are possibly old divine names; see Esau and Ency. Bib. s.v. " Obed edom " (the name appears to mean " servant of Edom "). For Kaus, see Baethgen, Beitr. z. semit. Religionsgeschichte, p. 11 seq.; G. A. Cooke, N. Sem. Inscr. p. 234;

Ency. Bib. col. 2682, n. 2 and 2688 (s.v. " Kushaiah ■") ; and Zimmern, Keilinschr. u. d. alte Test. 3 , pp. 472 seq. On the question of early Arabian civilization see Yemen. That the name Mizraim (Misraim), " Egypt," was extended eastwards of the Delta is in itself probable, but it is still uncertain whether the term (also Ass. Musri) was applied to Edom. The evidence (which is of mixed value) makes the view a plausible one, but the theory has often been exaggerated (see Mizraim). For Edom see, generally, Buhl, Gesch. d. Edomiter (1893); Noldeke's article in Ency. Bib.; W. Libbey and F. E. Hoskins, The Jordan Valley and Petra (1905) ; the conjectural sketch by I. Levy in Rev. d' etudes juives (Jan. 1906). For the history and culture of the latest period, see J. P. Peters and Thiersch, Painted Tombs in the Necropolis of Marissa (1905), ch. i. (S. A. C.)

EDRED (Eadred), king of the English (d. 955), was the youngest son of Edward the Elder and his wife Eadgifu. He succeeded his brother Edmund in the year 946 and at this time received the formal submission both of the Northumbrians and Scots. In the next year Edred himself went to Tanshelf, near

4 For the Jewish hatred of Edom in later times see the book of Enoch Ixxxix. 11-12; Jubilees, xxxvii. 22 seq., and on the Talmudic custom of applying to the Romans the references to Edom or Esau, see Jewish Ency. vol. v. p. 41 .

5 Ob. 8; Jer. xlix. 7 sqq.; Baruch iii. 22, cf. 1 Kings iv. 30; see also Job.

Pontefract, in Yorkshire, where he received from Wulfstan, archbishop of York, and the Northumbrian " witan " confirmation of their submission. Shortly after they threw their pledges to the winds and took the Norwegian Eric Bloodaxe, son of Harold Fairhair (Harald Harfagar), as their king. Edred recklessly ravaged all Northumbria in revenge, burning Ripon during his march. On his return home Edred's rearguard was attacked at Castleford, and the infuriated king once more turned to ravage Northumbria, which was only saved by its abandonment of Eric and by compensation made to Edred. Archbishop Wulfstan seems to have been a centre of disaffection in the north, and in 952 Edred caused him to be

imprisoned in the castle of " Judan- burh," while in the same year the king, in revenge for the slaying of Abbot Eadelm, slew many of the citizens of Thetford. After the brief rule of Anlaf Cuaran in Northumbria, Eric was once more restored, probably in 950, only to be expelled again in 953 or 954, when Edred took the Northumbrian kingdom into his own hands. In the same year Wulfstan was liberated and appointed to the Mercian bishopric of Dorchester. Edred died on the 23rd of November 955 at Frome, in Somersetshire, and was buried in the old minster at Winchester. During the whole of his life Edred was troubled by ill-health, a fact which may help to explain some of the more passionate acts of violence attributed to him. The king was throughout his life on terms of personal intimacy with St Dunstan, and his public policy was largely guided by that prelate and by his own mother Eadgifu. So far as we know, Edred was never married.

Authorities. — The Saxon Chronicle (ed. Earle and Plummer, Oxford), sub ann.; Memorials of_ St Dunstan (Rolls Series, ed. Stubbs); Florence of Worcester; Birch, Cartularium Saxonicum, vol. iii., Nos. 815-834 and 860-931; D.N.B., art. sub voce. (A. Mw.)

EDRIC, or Eadric, STREONA (d. 1017J, ealdorman of the Mercians, was a man of ignoble birth who was advanced to high dignity through the favour of the English king ˆEthelred II. In 1007 he became ealdorman of the Mercians, and subsequently married yEthelred's daughter Eadgyth. In the struggle between the English and the Danes he appears in the character of an arch- traitor. When ˆEthelred in 1009 proposed a great attack on the Danes, Edric dissuaded him from carrying it into effect. Again, on the invasion of England by Canute in 1015 Edric deserted Edmund Ironside and joined him. After the battle of Otford he returned to Edmund, but only by his treachery at the battle of Assandun to secure the utter defeat of the national cause. When peace was at length made, Canute restored to Edric the earldom of Mercia; but at Christmas 1017, fearing further treachery, he had him slain — " very rightly " says the Saxon Chronicle.

EDUCATION. In the following treatment of this subject, the theory and early history of education is first dealt with, and secondly the modern organization of education as a national concern. Many definitions have been given of the word " educa- tion," but underlying them all is the conception that it denotes an attempt on the part of the adult members of a human society to shape the development of the coming generation in accordance with its own ideals of life. It is true that the word has not infrequently been used

in wider senses than this. For example, J. S. Mill included under it everything which " helps to shape the human being "; and, with some poetic licence, we speak of the education of a people or even of the whole human race. But all such usages are rhetorical extensions of the commonly accepted sense of the term, which includes, as an essential element, the idea of deliberate direction and training (Lat. educare, to bring up; educere, to draw out, lead forth). No doubt, all education is effected through the experiences of the educated, and much of it is indirect, consisting mainly in the determination of the form of experiences other than those of direct precept, compulsion and instruction. But it does not follow that all experiences are educative. Whether an experience is part of an individual's education or not is determined by its origin. Whatever be its effect, it is educative in so far as its form has been arranged with greater or less deliberation by those who are concerned with the training of him whose experience it is. It follows that an education may be good or bad, and that its

goodness or badness will be relative to the virtue, wisdom and intelligence of the educator. It is good only when it aims at the right kind of product, and when the means it adopts are well adapted to secure the intended result and are applied intelligently, consistently and persistently.

Education is, thus, a definitely personal work, and will vary between wide extremes of effectiveness and worth in any given society. For in all times and places there are wide differences in virtue, wisdom and capacity among those who have in their hands the care and nurture of the young. But the inference that, therefore, no comparative estimate of the education of different times and places can be made would be fallacious. For, despite all differences in conception and efficiency among individual educators, each expresses, more or less perfectly and clearly, the common conception and energy of his age and country. As these rise or fall the general level of the actual educative practice rises or sinks with them. The first essential for successful educative effort is, then, that the community as a whole should have a true estimate of the nature and value of education.

I. Educational Theory

In any comparative estimate of different places and times, as tested by the standard just given, it must be borne in mind that, except in the most general and abstract form, we cannot speak of an ideally best education. Looking at the individual to be educated, we may say with Plato that the aim of education is " to develop in the body and

in the soul all the beauty and all the perfection of which they are capable," but this leaves quite undecided the nature and form of that beauty and perfection, and on such points there has never been universal agreement at any one time, while successive ages have shown marked differences of estimate. We get nearer to the point when we reflect that individual beauty and perfection are shown, and only shown, in actual life, and that such life has to be lived under definite conditions of time, place, culture, religion, national aspirations and mastery over material conditions. Perfection of life, then, in the Athens of the age of Plato would show a very different form from that which it would take in the London or Paris of to-day. So an individualistic statement of the purpose of education leads on analysis to considerations that are not, in themselves, individualistic. The personal life is throughout a relation between individual promptings to activity and the environment in which alone such promptings can, by being actualized, become part of life. And the perfection of the life is to be sought in the perfection of the relations thus established. So far, then, as any conception of education can give guidance to the actual process it must be relative in every way to the state of development of the society in which it is given. Indeed, looked at in the mass, education may be said to be the efforts made by the community to impose its culture upon the growing generation. Here again is room for difference. The culture in question may be accepted as absolute at least in its essentials, and then the ideal of education will be to secure its stability and perpetuation, or it may be regarded as a stage in a process of development, and then the ideal will be to facilitate the advance of the next generation beyond the point reached by the present. So some ages will show a relatively fixed conception of the educative process, others will be times of unrest and change in this as in other modes of social and intellectual life.

It is in these latter times that the actual work of education is apt to lose touch with the culture of the community. For schools (q.v.) and universities (q.v.), which are the ordinary channels through which adult culture reaches the young, are naturally conservative and bound by tradition. They are slow to leave the old paths which have hitherto led to the desired goal, and to enter on new and untried ways. If the opposition to change is absolute, there must come a time when the instruments of education are out of true relation to the desired end. For change in culture ideals means change in the specific form of the goal of education, and consequently the paths of educative effort need readjustment. When the goal of the past is no longer the goal of the present, to follow the ways which led to

the former is to fail to reach the latter. Continuous readjustment, by small and almost imperceptible degrees, is the ideal at which the educator should aim. When this is not secured, the educa- tional domain is liable to sudden and violent revolutions which are destructive of successful educative effort at the time they occur, however beneficial their results may be in the future.

But the relation of adjustment is not entirely one-sided. The tone of thought and feeling and the direction of will induced by education necessarily affect the common ideals of the next generation, and may make them better or worse than those of the present. Hence, the educator must not blindly accept all current views of life, but rather select the highest. For the average thought of every community is obviously below its best thought; and may, in some points at any rate, be lower than the best thought of a past age. While, then, all true education must be in direct relation with the culture of its age and country, yet, especially on the ethical side, it should aim at transcending the average thought and tone.

Still more does this imply that education strives to transcend the present condition of the educated by making their life more rational, more volitional, and more attracted by goodness and beauty than it would otherwise be. It can never be a passive watching of the child's development. No more fundamental error can be made than the assumption that education can be determined wholly, or even mainly, by the tendencies and im- pulses with which a child is endowed. Its real guiding principle must be a conception of the nature to which the child may attain, not a knowledge of that with which it starts. The educator studies the original endowment of the child and the early stages in the development of that innate nature in order that he may, wisely and successfully, employ appropriate means to direct further development and to accelerate its progress towards a more rational, complete and worthy life; not that he may the more skilfully give facilities to the child to drift about on the unregulated currents of caprice.

Such considerations show the importance of an insight into the theory of education on the part of all who are practically concerned with its direction. But the theory required is no system of abstract

ideas ignoring the real concrete conditions of the life for which the actual education it is to guide is a preparation. To approach the subject only from the standpoint of the mental sciences which underlie it is to run the risk of setting up such a body of abstractions, whose relation to real life is neither very close nor very direct. The most profitable way of developing an educational theory for the present is to trace how in the past education has consciously adapted itself, more or less truly and fully, to the conditions of culture and social life; and by analysis to discover the reasons for comparative success or failure in the degree of clearness with which the end to be sought was apprehended and the nature of the children to be trained was understood.

In all ages the claims of the individual and those of the com- munity have struggled for the mastery as the ultimate principles of life. As one or the other has prevailed the conception of educa- tion has emphasized social service or individual success as the primary end. The true harmony of human life will only be attained when these two impulses, contradictory on their own level, are united in a higher synthesis which sees each as the complement of the other in a life whose purpose is neither simple egoism nor pure altruism. Until that conception of life is attained and held generally there can be no sure and universally accepted conception of the aim and function of education. Much of the interest of the history of education 1 turns on the relation of these two principles as determinants of its aim.

In ancient Greece the supremacy of the state was generally

unquestioned, and, especially in the earlier times, the good man

was identified with the good citizen. No doubt, in

TducaOoa. ˆ ater days philosophers, such as Plato and Aristotle,

saw clearly that the round of the duties of citizenship

did not exhaust the life of the individual. With them the highest

1 For the evolution of the school as such from early times see Schools.

life was one of cultured leisure in which the energies were mainly concentrated on the pursuit of knowledge for its own sake. But this ” diagogic ” life was only for the select few; for the undistinguished many the fulfilment by each of the duties of his station remained the measure of worthy life, though such duties were regarded as affecting

the individual and private relations of the citizens in a much more intimate way than in former and ruder ages. And for those who devoted their lives to the highest culture, the essential preliminary condition was the existence of such a state as would form the most favourable environment for their pursuits and the most stable foundation for their leisured life. Thus Greek thought was saturated with the conception of life as essentially a set of relations between the individual and the city-state of which he formed an integral part. The first aim of education was therefore to train the young as citizens.

This training must, of necessity, be of a specific kind; for, like other small communities, the Greek city-states showed a life fundamentally one in conception, under various specific forms. Each state had its special character, and to this character the education given in it must conform if it were to be an effective instrument for training the citizens. Frcm these fundamental conceptions flowed the demands of Plato and Aristotle that education should be regulated in all its details by the state authority, should be compulsory on all free citizens, and should be uniform — at any rate in its earlier stages — for all. In the Republic and the Laws, Plato shows to what extreme lengths theory may go when it neglects to take account of some of the most pertinent facts of life. For the guardian-citizens of the ideal state family life and family ties are abolished; no lower community is to be allowed to enter into competition with the state. Aristotle, indeed, did not go to these extreme lengths; he allowed the family to remain, but he seems to have regarded it as likely to affect children more for evil than for good.

In the essential principles laid down by both philosophers as to the relation of the state to education, and in the corollaries they drew from that relation, they were not at variance with the accepted Greek theory on the subject. It is true that the actual practice of Greek states departed, and often widely, from this ideal, for, especially in later centuries, the Greek always tended to live his own life. The nearest approach to the theory was found in Sparta, where the end of the state as a military organization was kept steadily in view, and where, after early childhood, the young citizens were trained directly by the state in a kind'of barrack life — the boys to become warriors, the girls the mothers of warriors. It was this feature of Spartan education, together with the rude simplicity of life it enforced, which attracted Plato, and, to a less extent, Aristotle. In Athens there had of old been state laws insisting on the attendance of the children of the free citizens at school, and, in some degree, regulating the schools themselves. But at the time of Plato these had fallen into

desuetude, and the state directly concerned itself only with the training of the ephebi, for which, we learn from Aristotle's Constitution of Athens, somewhat elaborate provisions were made by the appointment of officers, and the regulation of both in- tellectual and physical pursuits. For children and youths under the sphebic age there was no practical regulation of schools or palaestra by the state. Yet there is no doubt that the education really given was in conformity with Athenian ideals of culture and life, and that it was generally received by the children of free citizens, though of course the sons of the wealthy, then as now, could and did continue their attendance at school to a later age than their poorer brethren. The education of girls was essen- tially a domestic training. What Plato and Aristotle, with the theorist's love of official systematic regulation, regarded as the greatest defect of Athenian education was in reality its strongest point. In practice, the harmony between individual liberty and social claims was much more nearly attained under a system of free working out of common thoughts and ideals than would have been the case under one of the irresistible imposition from without of a rigid mould.

The instruments of education everywhere found to be in

harmony with the Greek conception of life and culture were essentially twofold, — " music " (novaiKrf), or literary and artistic culture, for the mind, and systematic gymnastic (yviivaoTixi]) for the body. Plato, in the Republic, shows that the latter, as well as the former, affects the character, and doubtless, though not formulated, this was generally more or less vaguely felt. But Greek gymnastic was really an individual training, and therefore made only indirectly for the aim of cultivating the social bonds of citizenship. Ancient Greece had nothing corresponding in value in this respect to the organized games which form so important a feature in the school life of modern England. The " musical " training was essentially in the national literature and music of Greece, and this could obviously be carried to very different lengths. The elements of mathematical science were also commonly taught. The essential purpose throughout was the development of the character of a loyal citizen of Athens. As Athenian culture advanced, increasing attention was paid to diagogic studies, especially in the ephebic age, with a corresponding decrease

of attention to merely physical pursuits; hence the complaints of such satirists as Aristophanes of a growing luxury, effeminacy and corruption of youths: complaints apparently based on a comparison of the worst features of the actual present with an idealized and imaginative picture of the virtues of the past. Such comparison is, indeed, implicit in much of Plato and Aristotle as well as in Aristophanes.

But a disintegrating force was already at work in the educational system of Greece which Plato and Aristotle vainly opposed. This was the rhetorical training of the Sophists, the narrowly practical and individualistic aim of which was entirely out of harmony with the older Greek v ideals of life and culture. In a democratic city-state the orator easily became a demagogue, and generally oratory was the readiest path to influence and power. Thus oratory opened the way to personal ambition, and young men who were moved by that passion eagerly attended the Sophist schools where their dominant motive was strengthened.

Further, the closer relations between the Greek states, both in nearer and farther Hellas, led naturally to the diminution of differences between civic ideals, and, as a consequence, to a more cosmopolitan conception of higher education. This process was completed by the loss of political independence of the city-states under the Macedonian domination. Henceforth, higher educa- tion became purely intellectual, and its relation to political and social life increasingly remote. This, combined with the growing rhetorical tendency already noticed, accounts for the sterility of Greek thought during the succeeding centuries. The means of higher education were, indeed, more fully organized. The university of Athens was the outcome of a fusion of the private philosophical schools with the state organization for the training of the ephebi, and there were other such centres of higher culture, especially in after years at Alexandria, where the contact of Greek thought with the religions and philosophies of Egypt and the East gave birth in time to the more or less mystical philosophies which culminated in Neo-platonism. But at Athens itself thought became more and more sterile, and education more and more a mere training in unreal rhetoric, till the dissolution of the university by Justinian in a.d. 529.

Thus when Rome conquered Greece, Greek education had lost that reality which is drawn from intimate relation to civic life, and the fashionable individualisticschools of philosophy education! could do nothing to replace the loss. It was, then, an education which had largely lost its life-springs that was transferred to Rome. In the

earlier centuries of the republic, Roman education was given entirely in family and public life. The father had unlimited power over his son's life, and was open to public censure if he failed to train him in the ordinary moral, civic and religious duties. But it is doubtful if there were any schools (q.v.), and it is certain there was no national literature to furnish an instrument of culture. A Roman boy learnt to reverence the gods, to read, to bear himself well in manly exercises, and to know enough of the laws of his country to regulate his conduct. This last he acquired directly by hearing

his father decide the cases of his clients every morning in his hall. The rules of courtesy he . learnt similarly by accompanying his father to the social gatherings to which he was invited. Thus eaily Roman education was essentially practical, civic and moral, but its intellectual outlook was extremely narrow.

*When a wider culture was imported from Greece it was, however, the form rather than the spirit of true Hellenic educa- tion that was transferred. This was, indeed, to some extent inevitable from the decadent state of Greek t ^" ent * elt education at the time, but it was accentuated by the education. essentially practical character of the Roman mind. The instrument of education first introduced was Greek literature, rnuch of which was soon translated into Latin. In time the schools of the grammatici, teaching grammar and literature, were supplemented by schools of rhetoric and philosophy, though the philosophy taught in them was itself little more than rhetorical declamation. These furnished the means of higher culture for those youths who did not study at Alexandria or Athens, and were also preparatory to studies at those universities. Under the Empire the rhetorical schools were gradually organized into a state system, the general principles of administration being laid down by imperial decree, and even such details as the appoint- ment and rate of payment of the professors, at first left to the municipalities, being in time assumed by the central government. There is no evidence of any state regulation or support of the lower schools. This widening of culture affected both boys and girls, the domestic education of the latter being supplemented by a study of literature. But it is the higher training in rhetoric which is especially characteristic of Hellenized Roman education.*

The conception of a rhetorical culture is seen at its best in Quintilian's Institutio oratorio,, the most systematic treatise on education produced by the ancient world. With Quintilian the ideal of an orator was a widely cultured, wise and honourable man. And at first the teaching of rhetoric undoubtedly made for higher and true

culture. But with the autocracy, soon passing into tyranny, of the empire, rhetoric ceased to be a preparation for real life. The true function of oratory is to persuade a free people. When it cannot be applied to this purpose it becomes little more than a means of intellectual frivolity, or, at the best, an exhibition of cultured ingenuity. Under the empire a rhetorical training was, indeed, turned in not a few instances to practical but most unworthy uses by the delators; a result made possible by the legal system which rewarded delation with a considerable portion of the estate of the condemned. Even apart from this, the education in rhetoric had an increasingly evil effect both on the culture and on the character of the higher classes in the Roman empire. Out of real connexion with life as it was, it sought its subjects in the realms of the fanciful and the trivial, and with unreality of topic went of necessity deterioration of style. The vivid presentment of living thought gave way to that inflated and bombastic abuse of meretricious ornament and far-fetched metaphor in which human speech is always involved when it sets forth ideas, or shadows of ideas, which grow out of no con- viction in the speaker and are expected to carry no conviction to the hearer. Imitation of the form of great models, without the substance of thought which underlay them, led to a general unreality and essential falseness of mental life. Further, the continual gazing with admiration on the productions of the past, and the conception of excellence as consisting in closeness of imitation, induced a servile attitude of mind towards authority in all too close agreement with the political servility which marked the Roman court. Such an attitude was essentially hostile to mental initiative, and thus rhetoric became not merely an art of expression but a type of character.

Nor was there anything in the general conditions of society to counterbalance the ill effects of school and university education. Quintilian lamented that, even in his time, the old Roman family education by example was corrupted; and the moral degradation of later times, though it has doubtless been ex- aggerated, was certainly real and widespread. Nor does the

religious revival of Paganism which synchronized with the early centuries of Christianity appear to have effected any reform in life. Alexandria, the birthplace of Neo-platonism and the intellectual centre of the later empire, was also a very sink of moral obliquity.

It was into such a decaying civilization, which by its want of vitality sterilized education, oppressing it under the weight of Chrtsti- a dead tradition, that Christianity brought new life. anityaad Of course, careful instruction in the Faith was given Pagan in catechetical schools, of which that at Alexandria education. was tne mos t famous. But the question as to the attitude of Christians towards the ordinary classical culture was important. On the one hand, literature was saturated with Paganism, and the Pagan festivals formed a regular part of school life. On the other hand, the Pagan education offered the only means of higher culture, and thus furnished the only weapon with which Christians could successfully meet their controversial antagonists. Quite at first, no doubt, when the converts to the new faith were few and obscure, the question scarcely arose; but as men of culture and position were attracted to the Church it became urgent. The answers given by the Christian leaders were various, and largely the outcome of temperament and previous training. The Greek Fathers, especially Clement of Alexandria (i5o-2i7)andOrigen(i8s-253), regarded Christianity as essentially the culmination of philosophy, to which the way must be found through liberal culture. Without a liberal educa- tion the Christian could live a life of faith and obedience but could not attain an intellectual understanding of the mysteries of the Faith. On the other hand, Tertullian (160-240) was very suspicious of Pagan culture; though he granted the necessity of employing it as a means of education, yet he did so with regret, and would forbid Christians to teach it in the public schools, where some recognition of Paganism would be implied. The general practice of the Christians, however, did not conform to Tertullian's exhortations. Indeed, many of the cultivated Christians of the 3rd and 4th centuries were little more than nominal adherents to the Faith, and the intercourse between Christian and Pagan was often close and friendly. The general attitude of Christians towards the traditional education is evidenced by the protest raised against the edict of Julian, which forbade them to teach in the public schools. The ultimate out- come seems to be fairly expressed in the writings of St Augustine (354-430) and St Jerome (346-420), who held that literary and rhetorical culture is good so long as it is kept subservient to the Christian life.

In another way Greek philosophy exercised an abiding in- fluence over the culture of future ages. The early centuries of Christianity felt the need of formulating the Faith to preserve it from disintegration into a mass of fluid opinions, and such formulation was of necessity made under the influence of the philosophy in which the early Fathers had been trained — that Neo-platonism which was the last effort of Paganism to attain a conception of life and of God. In the West, this formulation had to be translated into Latin, for Greek was no longer generally understood in Italy, and thus the juristic trend of Roman thought also became a factor in the exposition of Christian doctrine. This formulation of the Faith was one of the chief legacies the transition centuries passed on to the middle ages.

Had classical culture been less formal than it was during the early centuries of Christianity, the innate antagonism of the Pagan and Christian views of life and character must have been so apparent that the education which prepared for the one could not have been accepted by the other. It was only because rhetorical culture was so emphatically intellectual, and so little, if at all, moral in its aims, that its inherent opposition to the Christian conception of character was not obvious. That its antagonistic influence was not inoperative is shown by the not infrequent perversions of cultured Christians to Paganism. But generally the opposition was so obscured that the ethical writings of St Ambrose (340-397) are largely Stoic in conception and reasoning. Yet the Pagan ideal of life, especially as it had been developed in the individualistic ethics which had prevailed for more than six centuries, was antithetical in essence to that

of the Christian Church. The former was essentially an ethics of self-reliance and self-control showing itself in moderation and proportion in all expressions of life. An essential feature in such a character was high-mindedness and a self-respect which was of the nature of pride. On the contrary, Christian teaching exalted humility as one of the highest virtues, and regarded pride and self-confidence as the deadliest of sins. It recognized no doctrine of limitation; what was to be condemned could not be abhorred too violently, nor could what was good be too strongly desired or too ardently sought. The highest state attainable by man was absorption in loving ecstasy in the mystic contemplation of God. The practical attempt to realize this gave rise to monasticism, with its minutely regulated life expressing un- limited obedience and the renunciation of private will at every moment. The monastic life was regarded as the nearest approach to the ideal which a Christian could make on earth. Naturally, as this conception gathered strength in generations nurtured in it, the value

of classical culture became less and less apparent, and by the time of St Gregory the Great (d. 604) the use of classical literature except as means of an education having quite another end than classical culture was discouraged.

Of course, during these centuries, the gradual subjugation of the western empire by the barbarians had been powerfully operative in the obscuring of culture. Most of the £ / /ed ot public schools disappeared, and generally the light of the learning was kept burning only in monasteries, and in barbarian them more and more faintly as they became more or laroads – less isolated units exposed to attack by ruthless foes or living in continual dread of such attack. Though the barbarians absorbed the old culture in various degrees of imperfection, yet the four centuries following the death of St Augustine were plunged in intellectual darkness, relieved by transitory gleams of light in Britain and by a more enduring flame in Ireland. The utmost that could be done was to preserve to some extent the heritage of the past. This, indeed, was essentially the work of men like Boethius, Cassiodorus, Isidore and Bede.

During these same centuries another process had been advanc- ing with accelerating steps. This was the modification of the Latin language. In the early centuries of Christianity . literary Latin was already very different from colloquial ti ° n Jj" Latin, especially in the provinces; and, as has been Latin. said, the literary output of the last age of Paganism was marked by sterility of thought and meretricious redundancy of expression. On the other hand, the writings of Christianity show a real living force seeking to find appropriate expression in new forms. Thus, with Christian writers, slavish imitation of the past gradually gave way to the evolution of a new and living Latin, which showed itself more and more regardless of classical models. To express the new ideas to which Christianity gave birth fresh words were coined, or borrowed from colloquial speech or from the Hebrew and Greek Scriptures. This Christian Latin was a real living instrument of expression, which conformed itself in its structure much more closely to the mode of thought and expression of actual life than did the artificial imitation of antiquity in which the literary productions of Paganism were clothed. It is the Latin in which St Jerome wrote the Vulgate. But with the obscuring of culture during the barbarian invasions this current Latin became more and more oblivious of even such elements of form as grammatical inflexions and concords.*

It was to the reformation of this corrupt Latin by a return to classical models, and to the more general spread of culture, especially among

clergy and nobles, that the Carolingian revival addressed itself. The movement was essentially lla „ !an practical and conservative. Alcuin (735-804), who revival. was Charlemagne's educational adviser and chief executive officer in scholastic matters, was probably the best scholar of his time, and himself loved the classical writings with which he was acquainted; but the text-books he wrote were but imperfect summaries of existing compendia, and the intellectual condition of his pupils forbade a very generous literary diet even had he thought it desirable, of which there is some doubt. The most valuable outcome of the movement was the establishment

of the palace school, and of bishops' schools and monastic schools throughout the empire. Of these the latter were the most important, and each of the chief monasteries had from the time of Charlemagne an external school for pupils not proposing to enter the order as well as an internal school for novices. Thus, the educational system north of the Alps was pre-eminently ecclesiastical in its organization and profoundly religious in its aims. For two centuries the new intellectual life was obscured by the troubled times which followed the death of Charlemagne, but the learning which the Carolingian revival had restored was preserved here and there in cathedral and monastic schools, and the sequence of well-educated ecclesiastics was never alto- gether interrupted.

The scope of that learning was comprised within the seven liberal arts and philosophy, on the secular side, together with Xhe some dogmatic instruction in the doctrines of the

medieval Church, the early fathers, and the Scriptures. Theology curri- was as y et no t organized into a philosophical system :

cu/um ' that was the great work the middle ages had to perform. The seven liberal arts (divided into the Trillium — grammar, dialectic, rhetoric; and the more advanced Quadrivium — geometry, arithmetic, music, astronomy) were a legacy from old Roman education through the transition centuries. They appear in the Disciplinarum libri IX. of Varro in the 2nd century B.C., where are added to them the more utilitarian arts of medicine and architecture. But they reached the middle ages chiefly through the summaries of

writers in the transition centuries, of which the best known were the De nuptiis Philo- logiae et Mercurii of the Neo-platonist Martianus Capella, who wrote probably early in the 5th century; the De artibus ac disciplinis liberalium liiterarum of the Christian Cassiodorus (468-562); and the Etymologiarum libri XX. of St Isidore of Seville (570-636).

The scope of the arts was wider than their names would suggest in modern times. Under grammar was included the study of the content and form of literature; and in practice the teaching varied from a liberal literary culture to a dry and perfunctory study of just enough grammar to give some facility in the use of Latin. Dialectic was mainly formal logic. Rhetoric covered the study of law, as well as composition in prose and verse. Geometry was rather what is now understood by geo- graphy and natural history, together with the medicinal properties of plants. Arithmetic, with the cumbrous Roman notation, included little more than the simplest practical calculations required in ordinary life and the computation of the calendar. Music embraced the rules of the plain-song of the Church, some theory of sound, and the connexion of harmony and numbers. Astronomy dealt with the courses of the heavenly bodies, and was seldom kept free from astrology. In philosophy the current text-books were the De consolatione philosophiae of Boethius (470-524), an eclectic summary of pagan ethics from the stand- point of the Christian view of life, and the same writer's adapted translations of the Categories and De interpretations of Aristotle and of Porphyry's Introduction to the Categories.

It is evident that though such a scheme of studies might in practice., during ages of intellectual stagnation and general ignorance, be arid in the extreme, it was capable in time of revival of giving scope to the widest extension of culture. It was, indeed, at once comprehensive and unified in conception, and well adapted to educate for the perfectly definite and clear view of life which the Church set before men.

In the nth century Europe had settled down, after centuries

of war and invasion, into a condition of comparative political

stability, ecclesiastical discipline, and social tran-

hoiastic q u iUity : the barbarians had been converted, and, as in revival. the case of the Normans, had pressed to the forefront of civilization ; civic life had developed in the fortified towns of Italy,

raised as defences against the pressure of Saracen and Hungarian invasions. Soon, communication with the East by trade and in the Crusades, and with the highly cultivated Moors in Spain, further stimulated the new burst of intellectual life. Arabic renderings of some of the works of Aristotle and

commentaries on them were translated into Latin and exercised a profound influence on the trend of culture. A new translation of Aristotle's Metaphysics appeared in 1167, and by the beginning of the 13th century all his physical, metaphysical and ethical treatises were available, and during the next half century the translations from Arabic versions were superseded by render- ings direct from the original Greek. As expositions of the real doctrines of Aristotle the translations from the Arabic left much to be desired. Renan calls the medieval edition of the Com- mentaries of Averroes " a Latin translation of a Hebrew transla- tion of a commentary made upon an Arabic translation of a Syriac translation of a Greek text." The study of such works often led to the enunciation of doctrines held heretical by the theologians, and it was only when the real Aristotle was known that it was found possible to bring the Peripatetic philosophy into the service of theology.

There were thus two broad stages in the educational revival commonly known as scholasticism. In the first the controversies were essentially metaphysical, and centred round the question of the nature of universals; the orthodox theological party generally supporting realism, or the doctrine that the universal is the true reality, of which particulars and individuals are only appearances; while the opposite doctrine of nominalism — that universals are " mere sounds " and particulars the only true existences — showed a continual disposition to lapse into heresies on the most fundamental doctrines of the Church. The second stage was essentially constructive; the opposition of philosophy to theology was negated, and philosophy gave a systematic form to theology itself. The most characteristic figure of the former period was Abelard (1079-1142), of the latter St Thomas Aquinas (1225-1274). The former knew little of Aristotle beyond the translations and adaptations of Boethius, but he was essentially a dialectician who applied his logic to investigating the fundamental doctrines of the Church and bringing everything to the bar of reason. This innate rationalism appeared to bring theology under the sway of philosophy, and led to frequent condemnations of his doctrines as heretical. With St Thomas, on the other hand, the essential dogmas of Christianity must be unquestioned. In his Summa theologiae he presents all the doctrines of the Church systematized in a mould derived from the Aristotelian

philosophy.

It is evident, then, that during the period of the scholastic revival, men's interests were specially occupied with questions concerning the spiritual and the unseen, and that the great instrument of thought was syllogistic logic, e a U catioa. by which consequences were deduced from premises received as unquestionably true. There was a general accept- ance of the authority of the Church in matters of belief and conduct, and of that of Aristotle, as approved by the Church, in all that related to knowledge of this world.

Before the rediscovery of Aristotle exerted such a general influence on the form of education, there was a real revival pf classical literary culture at Chartres and a few other schools, and John of Salisbury (d. 1 182) in his Metalogicus advocated literature as an instrument of education and lamented the barrenness of a training confined to the subtleties of formal logic. But the recrudescence of Aristotle accelerated the movement in favour of dialectic, though at the same time it furnished topics on which logic could be exercised which only a bare materialism can esteem unimportant. The weaknesses of the general educational system which grew up within scholasticism were that haste to begin dialectic led to an undue curtailment of previous liberal culture, and that exclusive attention to philosophical and theological questions caused a neglect of the study of the physical world and a disregard of the critical functions of the intellect. Doubtless there were exceptions, of which perhaps the most striking is the work in physical science done at Oxford by Roger Bacon (1214-1204). But Albertus Magnus (1193-1280), the master of St Thomas, was also a student of nature and an authority for his day on both the natural and the physical sciences. And the work of Grosseteste (d. i253),aschancellorof the university of Oxford, shows that care for a liberal literary

culture was by no means unknown. Always there were such examples. But too often boys hastened to enter upon dialectic and philosophy as soon as they had acquired sufficient smattering of colloquial Latin to engage in the disputes of the schools. A deterioration of Latin was the unavoidable consequence of such premature specialization. The seven liberal arts were often not

pursued in their entirety, and students remained satisfied with desiccated compendia of accepted opinions. Thus the encyclo- paedias of general information which were in general use during the middle ages show little or no advance in positive knowledge upon the treatment of similar subjects in Isidore of Seville.

The services of scholasticism to the cause of education, however, cannot well be overestimated, and the content of The scholastic studies was in fundamental harmony with

foundation the intellectual interests of' the time. Above all other oluniver- benefits owed by future ages to scholasticism is the sides. foundation of the universities of western Europe. The

intellectual activity of the nth century led everywhere to a great increase in the number of scholars attending the monastic and cathedral schools. Round famous teachers, such as Abelard, gathered crowds of students from every country. In the 12th century the need for organizing such bodies of teachers and students was imperative, and thus the earlier universities arose in Italy, France and England, not by deliberate foundation of secular or ecclesiastical ruler, but as spontaneous manifestations of the characteristic medieval impulse to organize into institutions. Afterwards, charters conferring powers and privileges were sought from both Church and state, but these only confirmed the self- governing character the universities had borne from the first. Each of the early universities was a specialized school of higher study: Salerno was a school of medicine; Bologna was the centre of that revival of Roman law which wrought so profound an effect upon the legal systems of France and Germany towards the close of the medieval period. But the greatest of medieval universities was that of Paris, emphatically the home of philo- sophy and theology, which was the model upon which many other universities, including Oxford and Cambridge, were organized.

The German universities were of later origin, the earliest being Prague (1348) and Vienna (1365). They indicate the more recognized position the movement had attained; for nearly all were founded by the civic authority, and then obtained the recognition of the Church and charters from the emperor.

The concentration of higher instruction in universities was not antagonistic to the medieval conception of the Church as the teacher of mankind. University life was modelled on University ^^ Q f t ^ e cloister, though the monastic ideal could not Bte- be fully realized, and the scholars not infrequently

exhibited considerable licence in life. This was in- evitable with the very large numbers of the scholars and the great variations of age among them. Moreover students, and to a less extent teachers, passed from university to university, so that the universities of medieval Europe formed a free confederacy of learning in close relation to the Church but untrammelled by state control. Nevertheless, they were less definitely ecclesiastical than the cathedral seminaries which they largely supplanted, and the introduction of studies derived from the Greeks through the Arabians led to an increased freedom of thought, at first within authorized limits, but prepared, when occasion served, to transcend those limits.

The scheme of instruction was arranged on the assumption that special studies should be based on a wide general culture. Thus of the four faculties into which university teaching was organized, that of arts, with its degrees of Baccalaureat and Magister, was regarded as propaedeutic to those of theology, law and medicine. It often included, indeed, quite young boys, for the distinction between grammar school and university was not clearly drawn. Attention was concentrated on those subjects which treat of man and his relations to his fellow-men and to God, and no attempt was made to extend the bounds of knowledge. The aim was to pass on a body of acquired knowledge regarded as embracing all that was possible of attainment, and the authority of Aristotle in physics as well as in philosophy, and of Galen and Hippocrates

in medicine was absolute. The methods of instruction — by lecture, or commentary on received texts; and by disputation, in which the scholars acquired dexterity in the use of the knowledge they had absorbed — were in harmony with this conception, and were undoubtedly thoroughly well suited to the requirements of an age in which the ideal of human thought was not discovery but order, and in which knowledge was regarded as a set of established propositions, the work of reason being to harmonize these propositions in subordination to the authori- tative doctrines of the Church.

Such an extension of the means of higher education as was given by the universities was naturally accompanied by a corresponding increase in schools of lower rank. Not „ .. . only were there grammar schools at cathedral and schools. collegiate churches, but many others were founded in connexion with chantries, and by some of the many gilds into which medieval middle-class life organized itself. The Dominican and Franciscan friars were enthusiastic promoters of learning both in universities and in schools, and in the Netherlands

the Brethren of the Common Life, founded by Gerard Groote and approved by Eugenius IV. in 143 1, regarded school teaching as one of their main functions, and the promotion of learning by the multiplication of manuscripts as another. The curriculum "was represented broadly by the Triviuni. The greatest attention was paid to grammar, which included very various amounts of reading of classical and Christian authors, the most commonly included being Virgil, parts of Ovid and Cicero, and Boethius. The text- books in grammar were the elementary catechism on the eight parts of speech by Donatus, a Roman of the 4th century, said to have been the tutor of St Jerome, and the more advanced treatise of Priscian, a schoolmaster of Constantinople about a.d. 500, which remained the standard text-book for over a thousand years. In rhetoric Cicero's De oratore was read, and dialectic was practised, as in the universities, by means of disputations.

In addition to the grammar schools were writing and song schools of an elementary type, in which instruction was usually in the vernacular. Girls were taught in women's monasteries and in the home, and those of the upper classes at least very generally learned to read, write and keep accounts, as well as fine needle- work, household duties and management, and such elementary surgery and medicine as served in cases of slight daily accidents and illnesses. Even those boys and girls who did not receive formal scholastic instruction were instructed orally by the parish priests in the doctrines and duties of the Faith; while the pictures and statues with which the churches were adorned aided the direct teaching of sermons and catechizing in giving a general knowledge of Bible history and of the legends of the saints.

No doubt, in times of spiritual and intellectual lethargy, the practice fell short of the theory; but on the whole it may be concluded that in medieval times the provision for higher instruction was adequate to the demand, and that, relatively to the culture of the time, the mass of the people were by no means sunk in brutish ignorance. Indeed, especially when the paucity of books before the invention of printing is borne in mind, the number of people who could read the vernacular, as evidenced by the demand for books in the vulgar tongue as soon as printing made them available, is clear proof that the latter part of the middle ages was by no means a time of general illiteracy.

Feudalism, the other characteristic aspect of medieval society, had also its system of education, expressing its own view of life, and preparing for the adequate performance of its duties. This was the

training in chivalry given to Bdacation pages and squires in the halls and castles of the great. ˆ/ va /-„ Hallam has well said: ” There are, if I may so say, three powerful spirits which have from time to time moved over the face of the waters, and given a predominant impulse to the moral sentiments and energies of mankind. These are the spirits of liberty, of religion and of honour. It was the principal business of chivalry to animate and cherish the last of these.” And this was not in opposition to the spirit of religion which animated the scholastic education which went on side by side

with it. Throughout chivalry was sanctified by the offices of the Church. The education of chivalry aimed at fitting the noble youth to be a worthy knight, a just and wise master, and a prudent manager of an estate. Much was acquired by daily experience of a knightly household, but in addition the page received direct instruction in reading and writing; courtly amusements, such as chess and playing the lute, singing and making verses; the rules and usages of courtesy; and the knightly conception of duty. As a squire he practised more assiduously the knightly exercises of war and peace, and in the management of large or small bodies of men he attained the capacity of command.

With the unification of existing knowledge and the systemat- ization of theology the constructive work of scholasticism was done. At the same time the growth of national otscholas- feeling was slowly but surely undermining feudalism. deism. Moreover, deep resentment was accumulating through- out western Europe against the practical abuses which had become prevalent in the Church, and especially in the court of Rome and in the prince-bishoprics of Germany. In short, Europe was out-growing medieval institutions, which appeared more and more as empty forms unable to satisfy the needs and longings of the human soul. In such conditions, the customary and traditional education of school and university tended to lose touch more and more completely with the new aspirations and views of life which were everywhere gathering adherents among the keenest and most active intellects. Had a new cultural movement not begun, the education of Europe threatened to become as arid as the rhetorical education of the last centuries of the Roman empire had been. From this it was saved by the renaissance of classical studies which began

in the 14th century.

Italy, by its greater wealth and its more intimate commerce with the eastern empire, was the seed-plot of this new tree of knowledge. Ever since the nth century the cities natssance. °f northern Italy had been in advance of Europe beyond the Alps both in culture and in material progress. The old classical spirit and the feeling of Roman citizenship had never quite died out, and the Divina Commedia of Dante (1 265-1321) furnishes evidence that the poet of the scholastic philosophical theology was also a. keen student and lover of the old Latin poets. But the greatest impulse to the revived study of the classics was given by Petrarch (1304-1374) and Boccaccio (1313-1375). Generally throughout western Europe the 14th century, though full of war and political unrest, was a time of considerable intellectual activity, shown in the increase of schools and universities, as well as in the literary and artistic revival in Italy, in the social and theological movement in England and Bohemia associated with the names of Wycliffe and Huss, and in the more or less perfect substitution of Roman law everywhere except in England for the law of custom which had hitherto prevailed.

But it was the literary movement which most affected educa- tion, and indeed the whole life of Europe. A decisive step was taken when Manuel Chrysoloras was invited to teach Greek in the university of Florence in 1397. The enthusiasm for classical culture, to which Petrarch had given so great an impetus, gathered force and extended over the whole of Italy, though, of course, felt only by a select few and leaving the mass of the people little, if at all, affected. From Italy it spread gradually to countries north of the Alps. In the old writers men found full expression of that new spirit of self-conscious freedom which was vaguely striving for expression throughout the whole of Christendom. In the free political atmosphere of the Italian communes, with their wealthy and leisured merchant class, that spirit could flourish much more readily than in the feudalized Europe across the Alps. Moreover, the antique spirit was in direct line of ancestry with that of medieval Italy. Thus, for a couple of centuries, Italy stood in the van of European culture.

The stages of the movement cannot be traced here: suffice it to say it showed itself especially in an enthusiastic search for manuscripts, followed bv their multiplication and wider dis-

tribution; in an intense devotion to literary form; in a revival of classic taste in architecture; in a wonderful development of painting and sculpture from symbolism of spiritual qualities towards

naturalism and romanticism; in a return to Platonism in philosophy; in a contempt, often unreasoning and wanting a foundation in knowledge, for the scholastic Aristotelian philosophy itself, and not simply for the trivialities into which its actual exercise had so commonly degenerated. The invention of printing necessarily gave the movement both a stronger and a wider influence than it could otherwise have attained. And in its search after knowledge it was in full harmony with the spirit of adventure which marked the age, and by the discovery of the New World wrought so profound a change in the relative importance and prosperity of the countries of western Europe.

It is the spirit of the movement which is of interest to the student of education. And that spirit was essentially one of opposition to authority and of assertion of individual i a g aeace liberty, which worked itself out in various forms ofth among peoples of different temperaments. In Italy Reaais- the form was literary and artistic, and the full develop- sa f ce ? j " ment of the Renaissance spirit was seen in a practical Paganism which substituted the attractions of art for the claims of religion and morality, and eventuated in deep and widespread immorality and a contemptuous tolerance of the outward observances of religion without faith in the doctrines they symbolized. The movement became an attempt to reconstitute the past intellectual life of Italy, and, as such, was foredoomed to sterility as soon as the work of re-discovery was completed; for the revived forms were not inspired with the vital spirit which had once made them realities, and consequently men's minds once again were occupied with mere verbal subtleties. The really valuable service of the Italian humanists to Europe was the restoration to man of the heritage of knowledge which he had allowed to slip from his grasp, and the leading the way to a freer intellectual atmosphere. In Germany the spirit manifested itself in a rebellion against the doctrinal system of the Church as the only effectual means of attaining reform of ecclesiastical abuses. The Protestant reformation of Luther was the real German outcome of the Renaissance. In no other country of Europe did the movement take so distinctive a form.*

It was, then, not merely the revival of interest in classical studies which so profoundly affected the life and education of western Europe. It was rather that in those literatures men found a response to intellectual and moral cravings which had been blindly gathering force for generations, and which found themselves formulated and objectified in the writings which set forth the Pagan view of life with its assumption of the essential worth and self-reliance of the individual and its frank delight in all the pleasures of existence. It

was, in short, in proportion as men not only found delight in Pagan literature but returned in essence to the Pagan view of individual worth and the supre- macy of the human intellect, that the Church realized the danger to herself which lurked in the new movement.

At first the revival of interest in the classical literatures did not show any antagonism to Catholic faith and practice, and its warmest supporters were faithful sons of the Church. The view of the relation of classical literature to Christianity adopted by the great humanist schoolmaster Vittorino da Feltre (13 78-1446) was broadly that of the early Fathers, and in his school at Mantua he showed that culture was not inconsistent with loyalty to the Church or with purity of life. With him classical literature was not the end and sum of education, but was a means of implanting ideas, of developing taste, and of acquiring knowledge, all as helps and ornaments of a Christian life. Though Pagan literature was the means of education, the Pagan spirit had not supplanted that of Christianity. The school at Mantua may, indeed, be said to have exhibited in practice a Christianized application of the doctrines of Quintilian and Plutarch.

So was it in the other countries of Christendom. In the Netherlands the Brethren of the Common Life introduced humanistic studies into their schools side by side with definite religious teaching and observances and their work was always

dominated by the Christian spirit. The earlier German humanists, such as Nicholas de Cusa, Hegius, Agricola and Wimpheling, adopted the same attitude, and Erasmus himself, bitterly as he attacked the practical abuses of the Church, remained in communion with it, and aimed at harmonizing classical culture with the Christian life. In England the same love of culture combined with devotion to the Church was seen in Selling, prior of Christ Church, Canterbury, the first real English humanist, in Grocyn, Linacre, More, Fisher, Colet and many others whose enthusiasm for culture was as undoubted as was their loyalty to Catholicism. It seemed, then, at first as if the greatest educational effect of the classical revival would be the deepening of literary culture, and the substitution of real inquiry for dialectic subtleties in the courses of schools and universities, without any break with established religious teaching. It is true that the

majority of schools were but little affected, and many of the universities had given but a half-hearted welcome to humanistic studies when the religious revolt in Germany under the leadership of Luther threw the whole of Europe into two hostile camps. But even the conservative university of Paris — the headquarters of scholastic philosophical theology — had permitted the teaching of Greek as early as 1458, and both Oxford and Cambridge had welcomed the new studies. That the influence of the new movement for classical study was gradually permeating the schools is shown not only by the practice of the Brethren of the Common Life but by the curriculum laid down by the statutes of the schools ref ounded by Wolsey at Ipswich and by Colet at St Paul's.

The immediate effect of the religious controversies of the 16th century on education was emphatically, if unintentionally, dis-astrous. The secularization of ecclesiastical property MUtlnce to ° °f ten absorbed the endowments of the schools, of the so that, both in Germany and in England, the majority Reforms- f grammar schools either disappeared or continued tl °" °" a starved existence with diminished funds; the doctrine of salvation by faith alone and the futility of good works dried up the source from which such endow-ments had flowed; the violent fulminafions of the German reformers against the universities as the homes of the hated scholastic theology and philosophy found an echo in minds fired with the renaissance enthusiasm for poetry and oratory, and correlative distaste for the more severe and abstract speculations of logic and philosophy, which expressed itself in abstention from those seats of learning; the preoccupation of men's minds with theological speculations and quarrels led those few who did resort to the universities to neglect their appointed studies and to devote their energies to interminable wrangling over the points in dispute. This decadence in culture was attended by an outbreak of licence and immorality, especially among the young, which called forth violent denunciations from Luther and many of his followers in Germany, and from Latimer and other reformers in England. In some respects these results were only transitory. Humanism and Protestantism, which had so far diverged that Erasmus (1467-1536) had declared that where Lutheranism flourished learning decayed, were brought together again by Melanchthon (1497-1560) under whose influence universities were founded or reorganized and schools re-established in Protestant German states ; and in England the reign of Elizabeth saw many new educational foundations. But this restoration of the means of education was only partial, and the doctrine of the worthless- ness of " carnal knowledge," which led the Barebones Parliament to propose*

the suppression of the English universities, was held by many fervent Protestants both in England and in Germany all through the 17th century.

Moreover, the schools established a tradition of curriculum and instruction which ignored the new directions of men's thoughts and the new view of knowledge as something to be schools." enlarged, and not merely a deposit to be handed down from generation to generation. The later humanist theories of education, which the schools continued to follow generally for over two centuries, and in many cases for another hundred years after that, were drawn mainly from Erasmus and

Melanchthon, who found in the classical languages and literatures, and especially in Latin, the only essential instruments of educa- tion. General knowledge of natural facts might be desirable to the cultured man as ornaments to his rhetoric, but it was to be sought in the writings of antiquity. Even so revolutionary a thinker on education as Rabelais (1495-1553) with all his demand for an encyclopaedic curriculum, held the writings of the ancients as authoritative on natural phenomena. Melanchthon, whose conception of instruction was much narrower, exercised enormous influence in the moulding of Protestant universities and secondary schools, both directly and through such disciples as Trotzendorf and Neander, but especially through his friend Sturm (1507-1589), whose Latin gymnasium at Strassburg became the model which the grammar schools of Protestant Europe strove to imitate. In this school nearly the whole of the energies of the boys was given to acquiring a mastery of the Latin language after the model of Cicero. Sturm, indeed, did not go to the extreme length of the Ciceronians, opposed and satirized by Erasmus, who would allow no word or construction which could not be found in the extant writings of their master, but a like spirit dominated him.

In Catholic countries the Church retained control of education. The practical reformation of abuses by the Council of Trent, and the energy and skill of the Society of Jesus, founded by St Ignatius Loyola, in 1534, brought back most of Tbe south Germany into the fold of the Church. Every- jesusˆ" where Catholic universities were mainly taught by Jesuit fathers; and under their influence, scholasticism, purged from the excretions which had degraded it, was restored, and continued to satisfy the longings of minds which felt the need of an authoritative harmonizing of faith and knowledge. Every- where the society established schools, which, by their success in teaching and the mildness of their discipline, attracted thousands

of pupils who came even from Protestant homes. Their cur- riculum was purely classical, but it was elaborated with much skill, and the methods of instruction and discipline were made the subject of much thought and of long-continued experiment. In the methods thus determined all Jesuit fathers were trained, so that the teachers in Jesuit schools attained a degree of skill in their art which was too generally wanting elsewhere.

So long as Latin remained the language of learning, and new fields of knowledge were not appropriated, the schools remained in harmony with the culture of their time, though, as Mulcastcr (1 530-161 1) pointed out, such a training Barfy was not of value to the majority of boys. For them he forre/o/m, urged an elementary education in the vernacular; but neither in this nor in his advocacy of the training of teachers was his advice followed.

In the 17th century the dislocation between the Latin schools and the needs of life began to be accentuated as Latin gradually ceased to be the language of learning; and, as a consequence, the numbers attending the schools decreased, and the mass of the people sunk continually lower in ignorance. In vain Hoole urged the establishment of a universal system of elementary schools giving instruction in the vernacular, Petty put forth his plan for elementary trade schools, and Cowley proposed the establishment of a college devoted to research. Ideas of reform were in the air, but the main current of scholastic practice flowed on unaffected by them. Some attention was, indeed, paid to the conservative reforms advocated by the Port Royalists, of which the most important was the inclusion of the vernacular as a branch of instruction, but the cry for more fundamental changes based on the philosophy of Bacon was unheeded. Of these, none was a more active propagandist than Comenius (1 5 7 1-1 63 5) . Unfortunately his Great Didactic, in which he set forth his general principles, attracted little attention and won less adherence, though his school books, in which he attempted with very little success to apply his principles, were widely used in schools. But these were little more than bald summaries of real and supposed facts, stated in Latin and the vernacular in parallel columns. In content they differed from such medieval summaries of knowledge as the well-known work of Bartholomew Anglicus, which had been

Theory]

EDUCATION

widely used since the 13th century, chiefly by their greater baldness and aridity of statement.

In the universities, too, the 16th and 17th centuries saw a continuous decadence. The 16th century was not ripe for

real intellectual freedom; and Protestantism, having Decadence jj asec j j(s revo it n the right of private judgment, sMes. soon produced a number of conflicting theological

systems, vying with each other in rigidity and narrow- ness, which, as Paulsen says, " nearly stifled the intellectual life of the German people." Further, the idea of national autonomy, which exercised so great an effect on the politics of the time, included the universal adherence of the citizens to the religion of the state. Hence, till the end of the 17th century the universities of Protestant Europe were regarded mainly as instruments for securing adhesion to the national theological system on the part of future clergy and officials, and the state interfered more and more with their organization and work. Theology occupied the most important place in the higher studies pursued, which for the rest differed little in content and less in spirit from those of preceding centuries, except that more attention was paid to the study of classical literature. Even that decayed into formal linguistics as the Renaissance enthusiasm for poetry and oratory died out, and interest in logical and philosophical questions, fostered by the dominance of dogmatic controversial theology, again became dominant. In Paris, on the other hand, the faculty of theology had decayed through the withdrawal of those preparing for the priesthood into episcopal seminaries, and the higher studies pursued were mainly law and medicine. Thus, generally, the universities were less and less fulfilling the function of providing a general liberal education. Another change, due to the same causes and making for the same results, was the isolation of universities, often directly fostered by the state governments, which for the universal interchange of medieval thought substituted a narrow provincial culture and outlook. It is no wonder that numbers everywhere decayed and that complaints as to the habits of the students were loud and frequent.

At the close of the 17th century, then, universities as well as schools had reached a very low level of efficiency and were Education ne ˆ in little respect by the cultured. Indeed, from of the the middle of the century, the main current of intel-

higher lectual life had drifted away from the orthodox classes. centres f learning. The formation of the Berlin Academy in Germany and of the Royal Society in England, and the refusal of Leibnitz to accept a chair in any German university, were signs of the times. In France, and later in Germany, the education of the noble youth was increasingly carried on apart from the schools, and was really an outgrowth from the education of chivalry. In the 16th century Castiglione and Montaigne had advocated a training directly adapted to prepare for polite life, and Elyot wrote on similar lines. But the most important movement in this direction was the formation of the courtly academies which flourished in France in the 17th century, and were soon imitated in the Rtiterakademien of Germany. In these schools of the nobility French was more honoured than classics, and the other subjects were chosen as directly adapted to prepare for the life of a noble at the court. Milton in his Tractate advocated the foundation of such academies in England, though he proposed a curriculum far more extensive than had ever been found possible. More and more, too, foreign travel had, from the middle of the 16th century, been looked upon as a better mode of finishing the education of a gentleman than a course at a university.

The later years of the 17th century saw a revival of university life in Cambridge, through the work of Newton and the increasing

attention paid to mathematics and the physical university sciences, though the number of students .continued life. very small. In Germany, also, a new era opened

with the foundation of the universities of Halle (1694) and Gottingen (1737), which from the first discarded the old conception that the function of a university is to pass on know- ledge already complete, and so opened the door of the German

education.

universities to the new culture and philosophy. It was soon seen that students could thus be attracted, and the influence spread to the other German universities, which by the end of the 1 8th century had regained their position as homes of the highest German thought.

At Halle, too, was set the example by Francke of providing for the education of the children of the poor, and to his disciple Hecker Germany owes the first Realschule. Simul- taneous movements for the education of the poor were Education made by St Jean-Baptiste de la Salle and the Brothers p,, or f of the Christian Schools in

France, and by the Society for the Promotion of Christian Knowledge in England. But the total results were not great; the mass of the people in every European country remained without schooling throughout the 1 8th century.

The intellectual movements of that century were, indeed, essentially aristocratic. Voltaire and the Encyclopaedists aimed at the enlightenment of the select few, and Rousseau „.. declared baldly that the poor need no education, century That these movements influenced education profoundly thought is undoubted. The individualistic and abstract a _" d _ rationalism of Voltaire, derived from the sensationist philosophy of Locke through the more thorough-going Condillac, and finding its logical outcome in the materialistic atheism of La Mettrie and the refined selfishness of Rochefoucault, infected the more cultured classes. In Lord Chesterfield's Letters to his Son is shown its educational outcome — a veneer of superficial culture and artificial politeness covering, but not hiding, the most cold-blooded selfishness. Against this fashion-able artificiality, as well as against the obvious sociaLand political abuses of the time, Rousseau's call for a return to nature was a needed protest.

Rousseauism, however, was not merely a transitory revolt against a conventionality of life that had become unbearable; it was emphatically the voicing of a view of life and of education which has profoundly influenced Europe i s ˆ sea "' ever since. In that Rousseau (1712-1778) attempted to look at life as a whole he was on truer ground than were the intellectualists of the " Enlightenment "; but in that he found the essence of life in the gratification of the desires and impulses of the moment, he enunciated a doctrine which banished high principle and strenuous effort from life and consequently from education. In the Entile is presented a purely fantastic scheme of education based on a psychology of development so crude as to be absolutely false, and producing a young man utterly unable to guide his own life or to control his emotions and impulses. Rousseauism is, indeed, in its essence the application to education of the doctrines of naturalism — the philosophy which regards human life as a mere continuation of physical process, and consequently as determined wholly by environment. So Rousseau would abolish all moral training and leave the child to the reactions of the physical world upon his actions.

Against this position the educational teaching of Kant (1724-

1804), influenced though he was by the JEmile, is essentially a

protest. The most necessary element in education, „ .

,• -rr • • , • 1 i 1 Kant.

according to Kant, is constraint, which by the

formation of habit prepares the young to receive as principles of conduct the laws at first imposed upon them from without. And the supreme guide of life is the law of duty which is always more or less opposed to the promptings of inclination. Kant exaggerates the dualism: Rousseau would abolish it by ignoring the more important of the two antitheses.

The French Revolution — the natural outcome of the teachings of Voltaire and of Rousseau — was the second stage in the move- ment of which the Reformation was the first. It „ . was essentially the assertion of the natural rights oitional man, and, as a logical sequence, of the right of tw try outcome child to be properly trained for life. The reaction °J the . .. due to the excesses of the revolutionists no doubt delayed the acknowledgment for a time, but its gradual recogni- tion is emphatically the characteristic mark of the educational history of the 19th century.

Preached and practised by Pestalozzi (1 746-1827) in Switzer- land, the general education of the poor was first made a reality by Prussia after the crushing defeat of Jena. In education. France and England it remained for nearly three- quarters of the century the work of the Church and other voluntary agencies, though aided by the state. Finally a state system of schools has been more or less fully set up in every state of western Europe and in America, and subjected to more or less state regulation and control. Equally marked has been the growing care for the scholastic education of girls as well as boys, though only in America are the two regarded as practically identical in form and content.

Thus the 19th century saw the final working out of the idea that the state should be substituted for the Church as the official agent of education, an idea which had its roots in the Renaissance conception of the right of man to direct his life apart from theological determinations. The more direct outcome of the same idea is

apparent in the absolute liberty with which the presuppositions of knowledge are questioned, and the maxim of Descartes — to prove everything by the reason and to accept nothing which fails to stand the test — is acted upon. No greater contrast is possible than that between the medieval student and the modern searcher after truth.

The influence of the same spirit has wrought an equally momentous change in the methods of instruction. The impetus given by the exaggerated doctrine of Rousseau to the Methods v j ew t jj at t jj e na t ure f the child should determine Hon. ‘ trie means of education, led to more thorough-going attempts than had hitherto been made to base educa- tional method on a knowledge of child psychology. Pestalozzi and Froebel (1782-1852), by their insistence on the need of educating a child through his own activity, and by their wide-spread influence, made the new view of method an actuality. The influence of Rousseau has, thus, passed into modern educa- tional practice in a form that, in its essence, is true, though in practice it has shown itself apt to run into the same excess of emphasis on impulse and feeling which vitiated the teaching of Rousseau himself. The influence of Herbart (1776-1841) has tended to counteract this. The essence of Herbartianism is that mental life consists of presentations, or reactions of the mind on the environment, and that will springs from the circle of thought thus developed. The emphasis is therefore placed on intellect and instruction while in Froebelianism it is placed on spontaneous activity and on the arrangement of the environment. Each exaggerates the function of the one factor in concrete experience which it makes the centre of interest, and each is tinged with the individualistic conception of life which characterized the 18th and early 19th century.

The most marked change in the outward aspect of education has been the modification of the curriculum of school and univer- Curri- s i tv by the introduction of various branches of natural

culum of science. Conjointly with this has been much increase instate- of specialization, and that not only in the university Hon. DU (- m tjjg school. There is no longer a universally

recognized circle of knowledge constituting a liberal education preparatory to specialist studies, as there was in the middle ages. Nor is there general agreement as to what such educational in- stitutions as schools and universities should attempt to do, or even as to the end that should be sought by education as a whole. Nor can agreement on such points be expected while men differ widely as to the meaning and purpose of life. The work of the organization of the

material means of education has largely been accomplished by the civilized world: that of determining the true theory and practice of the educative process itself is still incomplete. To that, both discussion of the philosophy of life and of the relative values in life, of various kinds of experience and experiment in the light of the conclusions reached, are needed. The problem will never be absolutely solved, for that would imply an absolutely best education irrespective of conditions, but its practical solution will be reached when a true adjustment is made between the process of education and the life for which that education is intended to be a preparation.

See also the articles Academies; Classics; Co-education; Examinations; Polytechnic; Schools; Technical Education; Universities; Women; &c. (J. Wn.)

II. National Systems of Public Education

A statement of the principles commonly recognized by modern communities as governing the action of the state in relation to education may facilitate at the outset a clearer understanding of the problems which the organization of public education presents. The cardinal doctrine of state interference in the educational domain is universally accepted by all the great nations of the modern world; and in regard to its extent and limits a large measure of agreement has now been reached.

In the first place, it is recognized as the duty of the state to insist upon a certain minimum of education for every future citizen. This does not necessitate a monopoly of Principles education on the part of the state, such as was claimed at state by the Napoleonic despotism under the traditional inter- influence (it would seem) of the old authoritative terence – Gallo-Roman tradition, transformed in its outward manifestation but not in its inward spirit by the French Revolution. Such a monopoly would be plainly repugnant to the spirit of Anglo- Saxon individualism, and it is interesting to note that attempts to reassert it have in recent times been repudiated in republican France by some of the best exponents of modern free thought, as an infringement of personal liberty not calculated to justify itself by any corresponding public gain. Nevertheless, the recognition of this primary duty of the state plainly implies a state system of at least elementary education. The masses of the industrial population cannot afford the necessary minimum of instruction which the public interest demands, and private and voluntary effort cannot efficiently supply the want resulting from the unequal distribution of wealth. But it is in the nature of things that, so far as

private effort attempts anything in this direction, it should be motived in the main by religion and associated with the great historical religious organizations; thus it comes about that the moment the state steps in to make good the deficiency of voluntary effort a fruitful and embittering source of difficulty and friction is disclosed. Hence, in England, the history of public elementary education since the beginning of the 19th century has been very largely the history of what is called the religious difficulty. Here we find ourselves in the region of acute controversy in which it is useless to do more than note empirically the various solutions adopted by different states. Perhaps all that can safely be indicated as commanding universal acceptance is the principle that the state must not impose upon an individual citizen in the person of his child any form of religious instruction to which he conscientiously objects. Modern controversies show the difficulty of applying even this rudimentary principle to the complicated circumstances of a free community split up into a number of groups differing profoundly in religious sentiment, and zealous each for the recognition of its own ideal within the common system. So far, however, as secular instruction {i.e. the teaching of other subjects than religion) is concerned it is now generally accepted that the elementary minimum must be both compulsory and free for every individual child whose parents will not or cannot (as the case may be) provide such instruction for it efficiently elsewhere than in the state-supported schools.

Next, the action of the modern state cannot stop short at elementary education. The principle of " the career open to talent " is no longer a matter of abstract humanitarian theory, a fantastical aspiration of revolutionary dreamers ; for the great industrial communities of the modern world it is a cogent practical necessity imposed by the fierce international competi- tion which prevails in the arts and industries of life. The nation that is not to fail in the struggle for commercial success, with all that this implies for national life and civilization, must needs see that its industries are fed with a constant supply of workers adequately equipped in respect both of general intelligence and technical training.

On political grounds too, the increasing democratization of

institutions renders a wide diffusion of knowledge and the cultivation of a high standard of intelligence among the people a necessary precaution of prudent statesmanship, especially for the great imperial states which confide the most momentous issues of world policy to the arbitrament of the popular voice. The state then must satisfy itself that the means of education are placed within the reach of all, in grades adapted to the varying degrees of intelligence and educational opportunity to be found among a community upon the majority of whose members is imposed the necessity of entering upon the practical business of life at a more or less early age. The organization of the higher grades of education constitutes a task of less formidable magnitude than the organization of elementary education, for the reason that, at any rate in the prevailing social conditions, it is only a minority who can benefit by it, and that of this minority a large proportion can afford the whole or a considerable portion of the cost in each individual case. The class, however, whose education must needs be assisted by the state if it is not to remain inefficient must always be considerable; and account must be taken also of the necessities of the further class whose exceptional mental develop- ment is such as to make it worth while for the state to bestow gratuitously an education higher than elementary at the public expense. University education is distinguished from education of the lower grades by the fact that, being necessarily restricted to an elite of intellect or birth, it cannot, save in very exceptional circumstances, usefully be organized locally. Although uni- versities are the necessary complement of a public educational system they do not in strictness or necessity form part of such a system", and in so far as they are brought within the purview of public authority it must be as a matter of national, rather than municipal or provincial, concern. Accordingly university educa- tion is separately treated (see Universities), and will not be referred to, save incidentally, in the present article.

Reserving to a final section the history of education in the United States of America, a brief description is given here of the educational systems of the leading European countries by way of introduction to a more detailed, but still summary, historical sketch of public education in England. The highly organized educational systems of France and Prussia (as representing Germany) are manifestly suitable for the purposes of a general study of the principles of educational polity as worked out upon logical and consistently thought-out plans by highly centralized states. As to other European countries, a brief mention must suffice of certain features of special interest presented by smaller progressive states of such different

types as Switzerland, Belgium and Holland. Similarly, in the case of the United Kingdom, considerations of space forbid more than a brief notice of the educational systems of Scotland (q.v.) and Ireland (q.v.). For other countries see the sections in the articles under the headings of the respective states.

France.

France(g.».)presents the most complete type of a state system of education organized underastrongly centralized administration in all grades. This centralized administration in education, as in other departments, represents the Napoleonic heritage of the Republic, and, although there has been an increasing tendency of recent years to study local conditions in the internal organiza- tion of schools, anything approaching to local autonomy is unknown in educational affairs. The necessary checks upon bureaucracy are supplied not by popularly elected municipal bodies but by a strong infusion of the pedagogic element in the administrative machinery. The pedagogic element in turn does but represent another side of the collective activities of the state. The teaching profession both in the primary and higher spheres — and the two are sharply marked off from one another — consists of a highly organized body of state functionaries, united by a strong esprit de corps and actuated by ideals and aims which are inspired by the state. The importance of this condition of things lies in the fact that the Republic is something more than a form of govern- ment: it is the social and moral expression of the democratic ideal as conceived by a people profoundly imbued by tradition with the vm. 31

sense of social solidarity, or collectivism; and nowhere has this expression been more characteristic or more complete than in the domain of public education. Yet the educational system of modern France is by no means exclusively the creation of the Third Republic, and the main stages in its development deserve to be traced historically.

*No historical sketch, however slight, of French education can ignore the great Catholic religious educator of the 18th century, Jean Baptiste de la Salle, the founder of Les Freres preresde de la Doctrine chritienne, commonly known as the la Doctrine ” Christian Brothers.” The Brothers were not merely c * re ” pioneers of elementary education, they may also be enne ‘ regarded (as M. Buisson, formerly director of public instruction, has shown) as the originators of higher primary instruction. Under the Restoration they upheld the method of simultaneous teaching against the partisans of*

the mutual (or monitorial) method, successfully demonstrating the superiority of the trained teacher. The unfortunate effects of the monitorial system upon English education show the reality of the service which this religious congregation rendered to the national pedagogy in France.

The Constitution of 1791 decreed that primary instruction should be compulsory and gratuitous. (It may be explained that the term " free education," instruction libre, does not The bear the same meaning in France as in England. In Revolution France a free school means a school not under state and control and not forming part of the state system.) In Na P°' eoa – this as in much else the Revolution was powerless to do more than enunciate general principles which it left for later generations, in the present instance after the lapse of nearly a century, to carry into effect. True to its theories of individualistic liberty, the Revolution admitted liberty of teaching. Napoleon, on the other hand, by the law of 1806, centralized all forms of education in one official teaching body under the name of the Imperial University, thus securing a monopoly of teaching to the state. The Napoleonic idea of the university, doubtless because a true expression of the national genius, has never ceased to exert a profound influence upon French education, an influence which of late years has been revivified and reinforced by the modern ideal of social solidarity.

Under the Restoration education fell inevitably under the control of the church, but under the Liberal Monarchy Guizot in 1833 passed a law which laid the foundations of modern primary instruction, obliging the communes to main- tfauizot. tain schools and pay the teachers. It is also to the credit of Guizot as an educational reformer that he per- ceived the necessity for the higher primary as distinct from the secondary school. The higher primary schools which he founded were unfortunately suppressed by the Loi Falloux; their restoration constitutes one of the great positive services rendered by the Third Republic to the cause of popular education.

The Loi Falloux of 1850, passed by the Second Republic under the influence of the prince president, is chiefly memorable for its restoration of the liberty of teaching, which in a Catholic country means in effect free scope for priestly Falloux. schools. This law also made provision for separate communal schools for girls, for adult classes and for the technical instruction of apprentices. In 1854 France was divided for purposes of educational administration into sixteen academies, each administered by a rector with an academy inspector under him for each department. This organization survives to-day, with the difference that for each academy (except Chambery)

there is now a local teaching university.

The ministry of the well-known educationist M. Duruy (1865- 1869), corresponding to the period of the Liberal Empire, was notable for marked administrative progress. A per- manent memorial of this epoch is the enactment jn" Dura \^ rendering primary schools for girls obligatory in communes of over 500 inhabitants. Duruy also provided for the introduction of gratuitous instruction at the option of the commune.

The Third Republic.

The task of educational reform imposed itself upon the republic by a twofold necessity. The wars of 1866 arid 1870 were victories for the Prussian schoolmaster, and aroused all western Europe to the national importance of popular education. For France then the reform of popular education was an essential part of the work of national restora- tion. For the republic too, menaced by older and hostile traditions, the creation of a national system of education inspired by its own spirit was an essential condition of the permanence and security of its government and the social ideals of which that government was the expression. Hence the energy with which the republican state addressed itself to theorganization of primary instruction, " obligatory, gratuitous, secular."

By the law of June 1, 1878, there was imposed upon the com- munes the obligation of acquiring their school buildings; and . . as a grant in aid a sum of £2,400,000 was set aside for tloa of this purpose by the state. In 1879 a law was passed elementary compelling every department to maintain a training iwM-' college for male and female teachers respectively. and organ- The two higher normal schools of Fontenay and St ization of Cloud were also founded to supply the training colleges teaching with professors. During the same period, among other pro ss on. cer ^ ca (S or professional diplomas, there were estab- lished the cerlificat d'aplitude pedagogique, which qualifies pro- bationer-teachers (stagiaires) for appointment as teachers in full standing (titulaires), and the cerlificat d'aptitude for primary- inspectors and heads of normal schools. The law of June

16, 1 88 1, rendered obligatory for all teachers, whether public or private, the brevet de capacite. It was found impracticable to carry this law into immediate effect, and as late as 1902 only about 60 % of the men and 52 % of the women were provided with the professional certificate necessary for becoming titulaires.

The laws making primary education gratuitous, compulsory and secular, are indissolubly associated with the name of Jules Reforms 0/ Ferry. The ˆ aw ˚f J une l(> > 1881, abolished fees in Jules Ferry, all primary schools and training colleges, the law of Laiclza- I $g 2 established compulsory attendance, and finally

”’ the law of October 30, 1886, enacted that none

but lay persons should teach in the public schools, and abolished in those schools all distinctively religious teaching. In the boys’ schools members of religious communities were to be displaced within five years, but in girls’ schools the religieuses might remain till death or resignation.

Religious teaching was replaced in the state schools under the Ferry law by moral instruction according to official curricula, a change which has been described by M. Seailles struction. (Education ou revolution) as a revolution of the pro- foundest philosophical meaning. The difficult and delicate topics of the relation of the state school to religion and the value of the substituted moral instruction have recently received illuminating and objective treatment from different points of view in the series of reports on Moral Instruction and Training in Schools, edited by Professor M. E. Sadler (1908, vol. ii.) ; the barest reference to the questions at issue must here suffice. As regards the character of the moral instruction, it would appear to have shifted from a Kantian to a purely sociological basis. Roman Catholic opinion is at least not unanimous in regarding the ” lay ” or neutral school as essenti- ally or necessarily anti-religious, and plainly there is no inherent reason why the neutrality should not be a real neutrality, but with the existing relations between the Catholic Church and modern thought in France the influence of the Normalist teachers is in fact apt to be anti-religious, and moreover no system of independent moral doctrine, whether based upon a priori or inductive reasoning, can be acceptable to the Roman Catholic Church. In whatever degree the blame may be rightly apportion- able between church and state, the fact is that the two find themselves in acute conflict, and that from the conflict there has resulted a certain moral confusion which Christian and non- Christian moralists alike vie\7 with alarm. It may be that the mischief would have been

mitigated had more moderate counsels prevailed at the time of the Ferry law, and had the church been

willing to accept (as the Republic might then have been willing to concede) right of entry for the clergy into the schools. But the real causes of the trouble lie deep in the philosophical and religious problems of our time, and in the constant and self- sacrificing devotion of the French to logical ideals on either side. Perhaps it is not too sanguine to discern in the growing tendency to idealism in French philosophy, and to liberal ideas in French and Catholic religious thought, the promise of a happier state of things. In the meantime, the religious difficulty in the schools divides the nation into two hostile camps {les deux Frances, as a Swiss Protestant writer puts it) in the shape of the state secular schools on the one side and the private religious schools on the other.

In the year 1 903-1 904 the total number of pupils in private primary schools was 1,298,591, as against 4,935,000 in the public primary schools, but these figures were liable to be materially affected by the rigorous enforcement of the laws against the religious orders."

In 1889 an important change was made in educational finance by transferring the cost of teachers' salaries in primary schools from the communes to the state, a right consequence of the changes which made the teacher a state official. Financial Thus the state assumed the greater part of the burden 188 g t of primary instruction, leaving to the communes merely the cost of fabric, and to the department the maintenance of the fabric of the normal schools and certain expenses of inspection.*

At this point it will be convenient to describe shortly the various central and local authorities that constitute the official machine. The minister, the head of the entire hier- archy, is assisted by a conseil superieur consisting of Adm,nlsm fifty -seven members, of whom the majority are elected machinery. by the higher teaching profession, while a few are Minister nominated by the president, including a small number aad to represent private schools, and a few are elected ˆZsHeur by the primary teachers. Practically the ordinary work of the council is carried on by a sub-committee consisting of the nine nominees of the president and six others designated for this purpose by the minister. The council has administrative, judicial and disciplinary, as well as advisory, powers which enable it to exert a direct influence upon the internal organization of schools. There is also a pedagogic comite consultalif and a legal comite contentieux,

whose respective functions are purely advisory.

The inspecteurs generaux " act," says Mr Brereton in his official report to the English Board of Education, "as the eyes and ears of the central authority." Their duties are: first to inspect the normal schools; next to supervise las P ec – the work of the ordinary inspectorate; lastly to give generaux. general and comparative information on the progress of primary instruction in the various parts of France. For the purpose of general inspection France is divided into seven districts.

. As already indicated, for the purpose of educational administra- tion, the departments of France are grouped in seventeen divisions called academies. At the head of each R ec t r academy is the rector. He is appointed directly by the and president and must hold the doctor's degree. He is council oi not only the head of the local teaching university, scaden >y- but is also charged in a general way with the oversight of all three departments of education, superior, secondary and primary; in regard to the last, however, his functions are confined to the pedagogic side. The direct share of the rector in administration is mainly confined to the normal schools and the higher primary schools. The rector is assisted by an academic council composed almost exclusively of pedagogic elements.

Each department of France has an academy inspector ap- pointed by the minister. The duties of the academy inspector embrace both higher and primary education. In the latter sphere he is the real head of the local administra- The . tion, and the primary inspectors are his subordinate inspector. officers. He appoints the probationer-teachers and nominates the regular teachers for appointment by the prifet.

The prSfet, the chief administrative officer of each department, not only appoints the teachers upon the proposition of the Preftand academy inspector, he is also as president of the coaseii conseil departemental concerned generally with the departe- externa of school administration, including the supply mental. 0I sc h ols. The conseil departemental with respect to its powers corresponds in some degree to our own local education authorities, but as regards its constitution it is in no sense a municipal body, the representatives of

the conseil general of the department (which corresponds to the county council) being greatly outnumbered by the pedagogical members.

The inspectors of primary schools, as has already been stated, act under the academy inspector. They are appointed upon the result of examination and not by direct nomination Primary ag j n England. The examination is severe, and it is aspec o . ^^ ^ e bo(jy Q £ tne p ro f essors f the normal schools rather than from the ranks of the primary teachers that the successful candidates are chiefly drawn.

Very limited powers are entrusted to certain communal and cantonal authorities. The commission scolaire is a committee „. organized in each commune for the purpose of im-

local proving school attendance, to which end they ad-

author- minister a caisse des Scoles or school fund for supplying ities. clothing and meals to needy children. The make of

the commune has the right of visiting the schools, but neither he nor any of the minor local authorities can interfere with the teaching. Similar duties are assigned to the delegues cantonaux, who are appointed by the conseil departemental for each canton (a wider area than the commune), and can best be described as local visitors or visiting committees rather than managers in our sense of the word. " All this hierarchy of central and local officials," says Mr Brereton, " will doubtless seem complicated to English minds. The extraordinary thing is that, so far as I could learn, the machine, for all its complexity, works smoothly enough. The truth is that the province of each particular functionary is so clearly defined that there is no debateable ground over which ambitious rival authorities can wrangle."

In proceeding to sketch the French system of higher primary and secondary schools, it may be observed that European ' c m systems of higher education have generally been tion of framed upon the view that the divisions of education secondary a re longitudinal, not latitudinal, and that secondary education. ef j uca ti n is a training complete in itself from the preparatory stage to the university, with aims and ideals of general culture which differentiate it radically and at the very outset from education of the elementary type. On the other hand, in the United States the view has prevailed that the divisions of education must be latitudinal, that the secondary school must be complementary to the elementary school, in which even the

elite must receive their preparatory or elementary training. At any rate down to the reform of 1902, which will presently be explained, the French system could be regarded as a typical and even extreme example of the European theory, little consistent as this might seem to be with the broader principles of democracy. This view of the matter is expressed by the French terminology, by which what in England is called " elementary " is in France termed " primary " education.

The thoroughness with which the principle of the autonomous character of the two divisions of education was carried out undoubtedly favoured in a special degree the complete Higher organization given to higher primary instruction in schools tne fcoles primaires sup&rieures under the Third Republic. The aim of these schools is to fill the void which must otherwise exist for those who need a higher education than the primary school can give, but for whose subsequent careers secondary education would be ill-adapted and injudicious. Throughout the organization of primary education the French have kept steadily in view the danger of creating an intellectual proletariate. " Nous poursuivons la culture generale du carac- tere et de l'esprit, mais nous cherchons en meme temps a orienter l'enfant vers la vie pratique," says an official report. The aim of the higher primarv school is to continue education in this

spirit up to the age of sixteen so as to prepare the scholar to take an honourable place in the higher ranks of skilled industry rather than to deflect him towards a professional career or intellectual pursuits for which he is unfitted, not so much by the accidents of birth and social circumstance as by his own natural aptitudes. Within the limits necessarily marked out for them the higher primary schools of France have aimed at imparting what may be termed a general culture as distinct from purely technical or trade teaching, and this development has been greatly furthered by the separate organization given to the latter teaching in the icoles professionnelles. At the same time, prominence is given in the higher primary schools to practical training of an educational character with special reference to the industries and circumstances of the locality, and in the rural districts a special agricultural bias is imparted to the curriculum. It is interesting to note that the institution of the higher primary schools was due in large part to the spon- taneous initiative of the municipalities, and that in the later phases of state organization special care has been taken to avoid anything in the nature of a rigid uniformity in these schools.

A wider extension has been given to higher primary instruction by

the establishment of cours complementaires in certain schools, at centres at which it would be impossible to organize separate higher primary schools. A similar solution Supple- of the continuation school problem has recently com- 'coupe's. mended itself to the consultative committee of the Board of Education for England.

Admission to the higher primary schools in France is only accorded to those who have obtained the elementary school leaving certificate, certificat d'eludes primaires. A feature of importance for continuation work in rural districts is the provision made for boarding scholars in attendance at these schools. The boarding arrangements are generally, as in the case of the secondary schools, left to the head teacher, but in some instances municipal hostels have been provided. No fees may be charged for higher primary instruction, and scholarships {bourses) are provided to a certain extent in the form either of boarding scholarships or maintenance allowances to compensate the parent for the loss of the child's labour. The number of scholars in the public higher primary schools for the year 1903- 1904 was 34,084, and in cours complementaires 21,777, making a total of 55,861. In addition there were 8891 scholars in receipt of higher primary instruction in private schools.

French secondary education is given in the lycies which are first-grade schools maintained and controlled by the state, and the colleges, which are schools of the second grade secondary maintained partly by the state and partly by the schools municipality. A considerable number of scholars fycees and pass annually from the colleges to the lycees. In both co "^ es – grades of schools the teachers are paid by the state and nomin- ated directly or indirectly by the minister of education. They are required to possess certain specified academic qualifications which can only be obtained from the universile, but failing teachers with the prescribed qualifications the classes are taught by teachers styled charges de cours as distinct from professors.

With a view to supplying teachers for the secondary schools, the state maintains the Ecole Normale Superieure, , a college in which instruction, board and lodging are ?? ole given free to a number of scholars selected by com- supciieure. petition from the best secondary school boys, though re- sidence in the institution is no longer compulsory. By the decrees of November 10, 1903, and May 10, 1904, the Ecole Normale became practically the College of Pedagogy of the University of Paris. Its students are entered as students of the university, and study for their qualifying examination as teachers in secondary schools (agregatiori) under university

professors, partly at the Sorbonne, partly at the Ecole Normale, while their professional preparation is entrusted solely to the latter institution.

The Republic has not reorganized secondary education by a comprehensive law; it has, however, introduced by decree, under parliamentary authority, an important reform in the internal organization of the schools which marks a notable

departure from the traditional view of secondary education as a self-contained whole. Article i of the decree of May 31, 1902, declares that secondary education is co-ordinated with and primary education in such a way as to constitute a con-

modern tinuation of a course of primary studies of a normal education, duration of four years. The decree goes on to pro vide for ffeform of a f u jj course f secondary studies of seven years' duration, divided into two cycles of four and three years respectively. In the first cycle the scholar has two options. In section 1 Latin is obligatory and Greek optional from the begin- ning of the third year (classe iv.). In section 2 there is no Latin. At the end of the first cycle the state grants a certificat d'etudes secondaires du premier degrS. In the second cycle one of four courses may be taken; section 1 with Latin and Greek continues the old classical education; section 2 with Latin and modern languages corresponds to the German Realgymnasium; section 3 with Latin and science, and section 4 with modern languages and science, to the Oberrealschule. The baccalaurSat, or secondary school-leaving examination, conducted by the university, is adapted to all the courses on the principle that courses of study of egual length, whether classical or modern, literary or scientific, are entitled to equal advantages. This system of alternative courses with leaving examinations of equal value is mainly German in origin, and may be said to represent the results of the best European thought upon the problem of the organization of secondary education.

It is remarkable in view of the thoroughness with which the principle of laicization has been applied to the primary schools Religious tˆ 3 – 1 l ˆ e lycees still retain their chaplains (aumdniers) instruc- for the

purpose of giving religious instruction. This tion in difference of treatment is apparently based upon the

lycees.

consideration that the gratuitous and compulsory

character of primary education demanded a much stricter interpretation of the principle of the neutrality of the state than was necessary in the case of secondary education, which is neither compulsory nor gratuitous.

In addition to the state schools there have until lately been in France a large number of private secondary schools, the most important of which have been associated with the secondary Catholic religious orders. The enforcement of the laws schools. against these communities has resulted in the closure of a number of these schools, and in the reorganization of others under a lay teaching staff. It is conceivable that the action of the Republic may largely forward the movement, otherwise perceptible in the Roman Catholic Church, to transfer education, even when combined with specific religious teaching, from ecclesiastical to lay hands. Evidence of this tendency is to be found in the boarding-schools (some four in number) founded upon the plan of M. Demolins (author of A quoi tient la superiority des Anglo-Saxons) after the English public school model, but with a distinctly Catholic colouring.

Apart from the position of the religious orders, the future of private education in France is far from secure at the present time. The liberty of teaching secured by the Loi Falloux is regarded as a pseudo-liberty by the advanced republican educa- tionists, and the principle that education is a function of the state and not a matter of supply and demand is deeply rooted in the public mind. Proposals have been mooted for making the bacca- laureat strictly a school leaving examination attached to the state schools. The adoption of any such measure would practically destroy liberty of teaching by reason of the power which the baccalaureat secures to the state as the key to the professions.

The foundation of secondary schools for girls in connexion with the educational reform of Jules Ferry is in its way one of the most notable achievements of the republic. There is little erfwaMuT doubt tnat tne expulsion of the religious orders is for gMs. destined to exercise a profound influence upon the education of women in France. The place of the closed convent schools is being taken either

by new state schools or by Catholic schools under lay teachers, and the number of scholars affected by this process of laicization is far larger in the case of girls than of boys. This change is calculated to produce far-

reaching effects in the social and religious order, by no means necessarily, however, of an anti-Catholic or irreligious kind.

For an account of the resuscitation by the Republic of the local universities under the one great state teaching body collectively known as the University, see Universities.

Germany.

Under the German empire education is left to the exclusive control of each of the federated states. The only point of direct contact between the Empire and education lies in the mutual undertaking of the federated states to bring the law of com- pulsory school attendance to bear upon all subjects of the empire resident within their respective borders. Of far greater moment is the moral influence exerted upon the other states by the Prussian hegemony, in virtue of which the Prussian educational system comes to be in all essential characteristics typical and representative of Germany as a whole. It is remarkable that though, as Matthew Arnold was able to report to the Schools Inquiry Commission in 1866, " the school system of Germany in its completeness and carefulness is such as to excite the foreigner's admiration," neither Prussia herself, nor Bavaria, nor several other of the principal states of the Empire, have found it prac- ticable to pass a comprehensive education law, owing to the religious and political difficulties with which any general legis- lative assertion of principle is attended in Germany as in England. The consequence is that the Prussian system in particular is the result of a long and complicated series of special laws, decrees and administrative regulations. In such circumstances it is inevitable that, especially in secondary education, some considerable local variations and anomalies should remain, but the centralized authority of the state has confined these to questions of patronage and external administration, and ev'en within this sphere has successfully asserted its own ultimate supremacy as the guardian of the educational interests of its citizens. A detailed historical study would bring out clearly the intimate connexion between the development of the educational system and the growth of the Prussian state, and again between these and the expansion of the national life of the German people; incidentally it would exhibit the supremacy of Prussia in the modern Empire as the inevitable result

not merely of military force but of a genuine hegemony of intellect and culture.

Stress is rightly laid by all educational writers upon Luther's famous letter to the German municipalities in 1524, urging upon them the duty of providing schools and upon parents the duty of sending their children to school. ' An SSrfftSi, attempt to give effect to this teaching was at once made by the electoral government of Saxony, which by a school ordinance of 1528 provided for the establishment in every town and village of Latin schools, for in Germany as in England the influence of the Protestant reformers was solidly on the side of classical education as the key to the study of the Scriptures and theological learning. All the more remarkable, therefore, was the initiative of the electorate of Wurttemberg, whose school ordinance of 1559 represents the first systematic attempt to make provision for both elementary and higher education, directing that elementary schools should be set up throughout the country, and P articular schvlen or Latin schools in every considerable centre of population. The educational efforts both of the early Reformers and of the remarkable Jesuit educationists, who con- tributed so largely to the partial reconquest of south Germany for the Catholic Church, were brought to naught amid the troublous times of the Thirty Years' War, and the desolation and national decadence which that calamity brought in its train. To this result the aridity of the Protestant scholastics who succeeded Luther and Melanchthon, and the frivolity, incompetence and petty despotism of the small German courts, contributed in no slight measure. The permanent and positive value of Luther's pronouncement of 1524 consists not so much in the direct effects which it produced as in the hallowed association which it estab- lished for Protestant Germany between the national religion and the educational duties of the individual and the state, and doubtless this association largely contributed to the creation of

that healthy public opinion which in Prussia rendered the principle of compulsory school attendance easy of acceptance at a much earlier date than in England and elsewhere, save only Scotland, where a similar historical religious influence was supplied by John Knox.

State interference in education is almost coincident with the rise of

the Prussian state. Already in 17 17 Frederick William I.

ordered all children to attend school where schools ˆ y l existed, and fixed the fee at 5 pf. (ˆd.) a week. This measures. was followed in 1736 by edicts for the establishment of

schools in certain provinces and by a royal grant of 50,000 thalers for that purpose in the following year. In 1763 the General Landschulreglement of Frederick the Great laid down the broad lines upon which the Prussian state has since proceeded, asserting the principle of compulsory school attend- ance, fixing the fees, with provision for the assistance of very poor children, prescribing the course of instruction, and giving directions for the examination and supervision of teachers. Much progress was made, more especially in the organization of higher education, under Baron von Zedlitz, who was appointed minister for Lutheran church and school affairs by Frederick the Great in 1771, and retired under Frederick William II. in 1788. The last-mentioned year saw the establishment of the Abiturientenexamen, or leaving examinations, which form the determining element in the state organization of secondary education in Germany. As in England, the fear of the French Revolution produced a corresponding reaction in educational affairs, and the policy of Frederick William II. was to bind ever closer school and church in a system practically independent of state control. The first departure from this policy was marked by the Allgemeines Landrecht of 1794, which boldly proclaims that schools and educational institutions may be founded only with the knowledge and consent of the state, and must always be under its supervision and subject to its examination and control. This law also laid upon heads of families in every place the duty of providing and maintaining schools.

It was not till the disaster of Jena and the prostration of Prussia at the feet of Napoleon awoke the dormant spirit of

*patriotism, and concentrated all the intellectual forces *”*°?” of north Germany upon the task of national regenera- afterJena. tion, that the principles of the Allgemeines Landrecht oi*

1 794 bore full fruit. ” The organization of the Prussian school system,” says Dr James E. Russell in his work on German Higher Schools, ” waited on the reorganization of the Prussian State.” One of the first acts of the great patriotic minister von Stein, upon his assuming control of the civil administration in 1807, was to abolish the semi-ecclesiastical Oberschulkollegium which had been set up as the central authority under’ the churchly policy of Frederick William

II., and to place education under the Ministry of the Interior as a special section. Wilhelm von Humboldt was placed at the head of this section in 1809, and the work which this " great master of the science and art of educa- tion " (as Professor Seeley terms him in his Life of Stein) in- augurated in his one year of office entitles him to be ranked among the founders of German unity. Humboldt's greatest positive achievements — the foundation of the university of Berlin and its organization under a professorial staff which included Fichte, Schleiermacher, Savigny, Wolf and Niebuhr, as also the internal reform of secondary schools undertaken with the pedagogical assistance of Wolf and under the inspiration of Fichte — lie beyond the scope of this article. It may, however, be observed that Humboldt's policy in secondary education represents a compromise between the narrow philological pedantry of the old Latin schools and the large demands of the new humanism of the period; and the recent reform of the Prussian secondary schools may be said to represent a return to the spirit of Humboldt in this respect. The measure introduced by Humboldt in 18 10 for the state examination and certification of teachers checked the then common practice of permitting unqualified theological students to teach in the schools, and at once raised the teaching profession to a high level of dignity and efficiency which of itself sufficed to place Prussia in the xxxi a vm.

forefront of educational progress. It was due also to the initiative of Humboldt that the methods of Pestalozzi were introduced into the teachers' seminaries, through them to vitalize the elementary schools. To the period of the national struggle belong the revival in 1 8 1 2 of the Abiturientenexamen which had fallen into abeyance, and the institution about the same time of the local authorities called Schulvorslande for the country and Schuldeputationen for the towns.

Though the period which succeeded the peace of 181 5 was one of political reaction, the cabinet order of Frederick William III. in 1825 strengthened the law of compulsory „ . .

attendance and carried on the work of administrative J82S and organization by defining the duties of the Provinzial- 1834. Abl- Schul-Kollegium and the Regierung. In 1834 an tar,entenm important development was given to secondary educa- tion by making it necessary for candidates for the learned professions as well as for the civil service, and for university studies, to have passed the leaving examination of the gymnasia. Thus through the leaving examination the state holds the key to the liberal careers, and has thereby been able to impose its own standard upon all secondary

schools. Apart from the privileges relative to professional studies, the system of leaving examina- tions has exerted a wide influence upon popular education in connexion with the institution of compulsory military service, in virtue of a regulation which entitles those who pass the leaving examination of any of the recognized kinds of secondary schools to the much-coveted privilege of service for one year as a " volunteer " instead of two years as an ordinary conscript.

The revolutionary and national movement of 1848 was followed by a period of further educational activity. The Act of Constitution of 1850 declared teachers civil servants and elementary education free. In practice, the abolition of school fees did not become general until 1888. Since then the view has more and more prevailed that elementary education must be free, 1 and, broadly speaking, fees in elementary schools are now charged only for children attending from another school district.

In connexion with the Kulturkampf, or struggle between the state and the Roman Catholic Church, the Schulaufsichtsgesetz of 1872 reasserted the absolute right of the state alone „ „ to the supervision of the schools; but the severity kampf and of this law as a measure against Roman Catholic the con- clerical education was considerably modified as a result ˆ ss ‘ oaal of the subsequent reconciliation with the papacy under Leo XIII., and the Prussian system remains to-day both for Catholics and Protestants essentially denominational. All schools, whether elementary or secondary, are Evangelical, Catholic, Jewish or mixed. In the elementary sphere, in particular, recourse is only had to the mixed school {Simul- tanschule or paritatische Schule), where the creeds are so inter- mingled that a confessional school is impracticable. In all cases the teachers are appointed with reference to religious faith; religious instruction is given compulsorily in school hours and is inspected by the clergy. The general purport of the Prussian school law of 1906 is to strengthen the system of separate con- fessional schools, which it extends to certain provinces where it had not previously been in operation.

In financial respects the last-mentioned law effected some readjustment of burdens by charging a proportion of the ex- penditure upon landed property. Other recent changes relate to the reform of secondary education referred to below. The system of educational administration as it stood in 1909 may shortly be described as follows.

Under the ministerium in Berlin stands the Provinzial-Schul- Kollegium, the chairman of which is the Ober-Prasi- dent of the

province, composed of four or five Rate or £. JJ£ councillors, generally selected from the directors of machinery. training colleges and gymnasia. This body is concerned mainly with higher education.

Each province is divided for purposes of general administration into two Regierungen or governments, and in each Regierung

'See especially Das offentliche Unterrichtswesen Deutschlands, by Dr Paul Stotzner (Leipzig, 1901).

there is a section of usually three or four Schulrate, which controls the elementary schools. This council is usually recruited from the ranks of directors of training colleges and from the inspec- torate. The Regierung is divided into Kreise or districts, and in each district an administrative officer, called the Landrat, represents the government. The Landrat is concerned with the provision and repair of elementary school buildings; as regards internal organization, the elementary schools are under the Kreisschulinspektor.

In the Protestant districts the inspectors (Kreisschul- inspektoren) are usually Evangelical clergymen holding the position of superintendent in the Lutheran Church. In the Catholic and certain other exceptional districts inspectors with pedagogical qualifications and the status of full government inspectors are appointed. Every candidate for Lutheran ordination is required to spend six months at a training college, but pedagogical opinion is hostile to the system, which must be regarded as a survival of the traditional union of church and state in educational affairs, retained at the present day from motives of economy and a desire to conciliate the church.

For every school there is an Ortsschulinspektor, usually the clergyman of the parish, who discharges the duties of local manager and correspondent. This local inspector is also chairman of the Schuhorstand or committee, elected by the Schulgemeinde, and charged with questions of attendance and maintenance rather than with internal affairs. The Schulge- meinde need not coincide with the civil parish. Parishes may unite to provide one school, or within one parish different religious communities may form separate school

“parishes.”

Thus the administrative system of Prussia in education as in other matters may be described in general as a decentralized bureaucracy. This bureaucracy is somewhat checked by the rights of patronage attaching to the local boards in certain cases, but the exercise of such rights is in all cases subject to govern- ment approval. As regards higher-grade elementary and secondary schools, the local boards in the towns {Schuldeputa- tionen) are able to exert a considerable influence in the way of selection of the type of school, and even of suggestion for the modification of recognized types, as is shown by the cases of the famous ” reformed ” secondary curricula of Altona and Frankfort. Still, the legal powers of the local board are restricted to the establishment of an approved type of school, the control of externa, and the right of nominating teachers.

Elementary Schools. — The single-class school {Einklassige Schule) and the half day school (Halbtagsschule) are features Pecatt of the Prussian elementary system which require notice. arities of The Einklassige Schule is a school taught by a single elementary teacher, who may teach a maximum number of eighty education. c j 1 ji (j ren< The Halbtagsschule is a single-class school of which half the children are taught in the morning and half in the afternoon. During the summer months, owing to the exigencies of agricultural labour, many single-class schools are taught as half-day schools. The system of course is regarded as a makeshift, but in this, as in the matter of buildings for rural elementary schools, the Prussian administration attaches great weight to the consideration of financial economy. As regards staff, a large measure of economy is rendered possible by the high average standard of merit reached by German elementary teachers, whose powers of oral exposition have struck English observers as specially remarkable, and again by the national readiness to be content with a moderate salary in return for official status. A survival of the old close connexion between church and school is to be found in the Kirchendiensle, the duties of training the choir, playing the organ, &c, which are attached in many cases to the post of schoolmaster, and afford an addi- tional source of emolument, rendered feasible by the practical absence of religious dissent.

For the preliminary training of elementary teachers there are special schools called Prdparanden-Ansiallen, of which most are state institutions, some are municipal, and a few are private. The training colleges themselves are provided by the state and have a three years’ course.

Continuation Schools {Forlbildungsschulen). — Germans have been foremost to realize the truth which is gradually being brought home to English educationists, that adequate value for the heavy expenditure of public funds upon Coatlau ” education can only be obtained by providing for the e ˆ acat i on continued education for two or three years of the children of the working classes who leave school at fourteen years of age. One of the educational results of the war of 1870, with its great lesson of the importance of national education, was the Saxon law of 1873 making attendance at continua- tion schools compulsory for three years {i.e. up to seventeen) in that kingdom- The Saxon law appears to have been justified by the experience of nearly a generation. It must suffice here to note the following features of its v/orking. (1) The schools are taught by the primary teachers, supplemented in the towns by some technical instructors. (2) The school session may be either for the whole year or for only half the year, and may also be held on Sunday, like the old English secular Sunday schools. (3) The schools are brought into close relation with trades, not only for purposes of curriculum, but also with a view to considering the exigencies and meeting the convenience of employers with respect to hours of attendance. (4) The discipline of the continuation school is extended to supervision out of school hours. ” Visits to dancing-halls and all such exhibitions as are dangerous to uprightness and purity are forbidden to scholars of continuation schools.” Further, useful institutions such as savings banks, and also associations for social intercourse and the promotion of esprit de corps, are organized in connexion with continuation schools. There is no doubt that in this matter of continuation schools, as in so many othe/ fields of social organization, the adoption of compulsion has been facilitated by the habituation of the working classes to compulsory military service, which has made the German workman more disciplined, more ” organizable ” as a social unit, more accustomed to subordinate the principle of individual freedom and self-will to the collective claims of the state, than the workman reared in the traditions of Anglo-Saxon in- dividualism.

Attendance at continuation schools is now compulsory by state lawin 12 states, including (besides Saxony) Baden, Wurttem- berg and Bavaria. The city of Munich is notable for its highly organized system of technical continuation schools for apprentices. In Prussia compulsory attendance is still the exception (save in the provinces of Posen and West Prussia, where it is enforced by state law), but the permissive act is being rapidly adopted by the great cities, including Berlin.

Secondary Education. — The official classification or grading according to the type of curriculum of secondary schools in Prussia (and indeed throughout Germany) is very precise. The following are the officially recognized arad,n z of types. I. Classical schools: (a) Gymnasium, with ˆo”/j” y nine years’ course; {b) Progymnasium, with six years’ course. II. Modern schools: (a) with Latin (semi-classical) — (i.) Realgymnasium (nine years’ course), (ii.) Realprogymnasium (six years’ course); (b) without Latin (non-classical) — (i.) Oberrealschule (nine years’ course), (ii.) Realschule (six years’ course). The six-year classical and semi-classical schools are comparatively unimportant subdivisions in smaller towns.

Lower-grade Secondary Education. — Inasmuch as French is taught in the lowest class of the Realschule under the official curriculum (English, on the other hand, beginning in Tertia, the fourth class from the lowest), it follows t “^ of na ” that this, the lowest type of secondary school, is not element- directly co-ordinated with the elementary school. The a v and Realschulen of Berlin, however, form an important S “”“T exception to the general rule; their curriculum, sanctioned by the ministry at the instance of the Berlin municipality, provides for the beginning of French in Quarta (the third class from the bottom) and English in Secunda. The consequence is that in Berlin a very large number of pupils pass from the elementary schools to the Realschulen, which take the place of the Mittelschulen or higher-grade elementary schools that*

are to be found in some towns, though something in the nature of higher elementary education is afforded by the top sections of the elementary schools.

First-grade Schools. — One of the most striking features of German secondary education is the careful differentiation of • p . t schools according to the type of curriculum adopted.

grade Thus, every German school is a homogeneous unit

secondary with a definite educational aim and organization, conforming to a common standard approved by public authority for the particular type to which it belongs. Hence the importance attached by the Germans to nomen- clature; so that in selecting a

Gymnasium, a Realgymnasium or an Oberrealschule, the parent knows exactly the type of education he is going to secure for his son. In England, on the other hand, as has often been observed, a great school tends to multiply within itself different types of curricula in a haphazard way according to the demand of parents, whose original choice of school is based rather on social than on educational grounds. Modern sides, army classes and engineering classes grow up as excrescences upon an originally classical type, with the waste of power that results from loss of consistency and concentration of purpose. The difference between the English and German systems is due ultimately to the adoption in Germany of the day-school system and the absence, very remarkable in an otherwise aristocratically governed country, of the caste spirit in education above the elementary level, thanks to which the nobly born are not ashamed to sit on the school bench side by side with the children of the trading classes. On the other hand, the English boarding-school system, despite all the want of social solidarity, and all the class jealousy and exclusiveness with which it is inevitably associated, has admittedly favoured those ideals of the cultivation of character as distinct from book-learning which give a special value to what is in England called a public school education.

The present differentiation of first-grade schools in Prussia is the result of a natural educational development corresponding Rise of wkh the economic changes which have transformed semi- Prussia and the empire from an agricultural to an

classical industrial state. It was in 1855 that semi-classical schools (teaching Latin without Greek) were first recognized for a nine years' course under the title of Realschule I. Ordnung, and in 1871 pupils possessing their leaving certificates were admitted to mathematical studies in the universities. The Latinless Realschule II. Ordnung is the direct product of the great industrial development of the modern empire. In 1882 the Realschule I. Ordnung received the title of Real-gymnasium, and the Realschule II. Ordnung that of Oberreal- schule, both types being at the same time admitted to certain privileges in the universities, schools of technology and civil service.

About the same period official recognition was obtained for reformed secondary curricula, first at Altona and afterwards (1892) at Frankfort. These two types differ from ' reform each other in detail, but the feature which distin- school" guishes both from the older types is the postponement ' of Latin to Untertertia. The design is to secure for all types of secondary education a common non-classical base coextensive with the first three years of school life, followed by

a trifurcation or threefold choice between the classical, semi-classical and non-classical types, The principle of the " reform-school " has been adopted in a considerable number of German (chiefly Prussian) schools, but it would be premature to see in it at present more than a new variety of Realgymnasium or semi- classical school; it can hardly be said as yet to have affected the course of classical studies in the full sense. The widespread sentiment of discontent with the old philological type of classical school was vigorously expressed in a private letter written by the emperor William II. as crown prince of Prussia in 1885, but not published until some.years later. In December 1890 the Prussian ministry convoked a conference at Berlin of secondary school experts, and the emperor presided in person at the opening session. His majesty delivered a speech criticizing the Gymnasia

The

as wanting a national basis. "It is our duty to educate young men to become young Germans and not young Greeks or Romans " was the keynote of the imperial discourse. The out- come of the conference was a shortening of the hours allowed to Latin in the Gymnasia, a reduction of the hours of study in view of over-pressure, and an expression of official opinion adverse to the Realgymnasium. These changes, introduced in 1892, did not go far enough to satisfy the reformers, whilst the reduc- tion of the hours allowed for Latin caused misgivings among the upholders of the traditional Gymnasium. Moreover, the Real- gymnasium showed greater vitality among the large towns than its official critics anticipated. The ensuing decade witnessed a certain reaction in favour of the classical humanities as a barrier against the materialistic influences of the new industrialism. At the same time the protagonists of the classics came to recog- nize that side by side with the old humanities there must be accorded to modern and scientific subjects that place in the high-grade schools which the practical exigencies of industrial life demanded. Thus, the opinion grew that the best line of defence for the classical schools lay in the concession of equal privileges to the non-classical types; in this way only could the classical schools be kept safe from demands upon their time that could not be conceded without endangering their proper work. It was upon this basis that an agreement was reached between the contending parties at a second school conference that met in Berlin in June 1900. As the result of this conference there was issued a royal decree laying down certain general principles, of which the following are the most important. (1) There must be equality of privileges as between classical, semi-classical and non-classical first-grade schools. The decree recognizes,

however, that this principle must be applied with a certain elasticity and with due regard to the necessity for training in particular branches of knowledge as a preliminary to certain lines of university study and certain professional pursuits. Consequently the Prussian system of privileges has become extremely complicated, and it is truer to speak, as the decree goes on to do, of an extension of the privileges of the non- classical schools, rather than of absolute equality. (2) "In thus acknowledging the equality of the three types of higher institutions, it will be possible more thoroughly to strengthen the special characteristics of each type. In this connexion," the royal decree proceeds, "I shall offer no objection to an increase in the number of hours devoted to Latin in the Gymnasium and Realgymnasium." Thus, both as to the place of Latin in the curriculum of classical schools and as to the status of semi-classical schools, the decree of 1900 involves a reversal of the policy of 1890. (3) The decree expresses approval of the reformed curricula of Altona and Frankfort, and a desire for an extension of the experiment where the conditions are suitable.

Notwithstanding the growing official encouragement of education upon semi-classical or non-classical lines, the upper and professional classes of Germany continue to show a marked preference for the fully classical Gymnasium; hence, in Germany as in England, the tendency for a widening gulf to disclose itself between the education of the directing classes in politics and administration and the bulk of the industrial population, which suggests that the problem of combining in just proportions the liberal and practical elements in a thoroughly national system of education has not yet reached the solution that the needs of the age require.

Switzerland. Switzerland affords perhaps the best type of a democratic system of local authorities. The central authority is the canton, not the federation. The interference of the federal authority is confined to the imposition of certain broad tionaf principles by the constitution, to the indirect influence influence exerted by the examination of recruits for the national of federal army, and to financial grants for technical instruction, ™ its most important direct educational work being the support of the technological university at Zurich. The federal constitution (1) states that primary instruction must be under*

the control of the canton (an important point in view of the strength of ecclesiastical influence in some of the Catholic cantons), and must be compulsory and gratuitous; (2) declares that it must be possible for the public schools to be attended by the adherents of all creeds without hurting their freedom of conscience; (3) forbids the employment of child labour before completion of the fourteenth year, with a provision that in the fifteenth and sixteenth years factory work, together with the time given to school and religious instruction, must not exceed eleven hours a day. (4) All recruits for the federal army (in which service is compulsory on a militia basis) are examined in their twentieth year, and the results are published. This examination affords an instructive index to the state of education in the several cantons and promotes a healthy emulation among them.

The cantonal organization of education presents the variety which the extraordinary diversity of race, language, religion and physical conditions of the component states of the Cantonal federation would lead one to expect. The large canton 22S!""* of Bern may be instanced as the type of a strong central authority. The commune or parish is the unit for elementary education. The communal council nominates a school board of at least five members, whose function is to spend the money voted for school purposes by the general communal council. Several communes in combination form a district authority for the support of what are in reality higher primary schools, though called in Switzerland Sekundarschulen, maintained by the district. The maintenance both of the primary and higher primary schools is aided by grants from the central authority. The true secondary schools, called middle or higher schools, are maintained and controlled by the central or cantonal authority. The existence of separate local authorities for each grade of education is characteristic of Switzerland generally, this system being the opposite to that adopted in England in 1902.

The central grants in Switzerland always take the form of payments to the local authorities of a proportion of the teachers' salaries; they are never, as in England, assessed upon the number of children in attendance, nor are they dependent, as was formerly the case in England, upon the results of examination, nor again are grants made in respect of particular subjects as is the case with the grants for special, i.e. practical, instruction in England.

Religious instruction in the Swiss communal schools generally follows the faith of the majority; in a few cantons separate schools

being provided for minorities if sufficiently numerous. In the town of Lucerne, Catholic instruction is given in school hours and Protestant instruction is provided out of school and out of hours for the Protestant minority.

In 19 out of the 25 cantons attendance at continuation schools is compulsory (at least in some districts) for boys up to 17, and in 3 cantons it is compulsory also wholly or in part for girls.

Belgium.

The interesting feature in Belgian education is the treatment _ . . . of the religious question in successive laws.

treatment i. The law of 1842 obliged the communes to provide 0/ primary instruction, which was to be free in the case of

religious poor children. The state made grants in aid, subject to question. j nS p ect i on _ Subject to a conscience clause, religious instruction was obligatory, and was placed under ecclesiastical inspection.

2. The law of 1879 removed religious instruction from the curriculum, and provided for facilities to the clergy to give such instruction outside school hours. This law furnishes a striking instance of the futility of a parliamentary majority legislating in a sense opposed to the convictions of a considerable section of the community. The law evoked a storm of opposition in the country, still profoundly Catholic and attached to ecclesiastical traditions, and within eighteen months the Catholics founded private elementary schools with 455,000 scholars. In 1883 the Catholic private schools numbered 622,000 scholars, whilst the attendance at the communal schools had sunk to 3 24,000. Their doctrinaire treatment of the education question resulted in the political

annihilation of the Belgian Liberals, and was responsible for the strongest and most persistent Roman Catholic reaction that has been witnessed in western Europe since the beginning of the 19th century.

3. The law of 1884 was the work of the moderate Catholic party. It did not make religious instruction obligatory, but it ‘ gave liberty to the communes to provide for the giving of religious and moral instruction at the beginning or end of school hours, subject to a conscience clause. Power was given to the communes to “adopt” private confessional schools and maintain them. Provision was further made entitling any twenty parents of children of school age

to demand a school of the normal communal type as against a proposal to adopt a confessional school. Power was also given to a like number of parents to compel the adoption of a confessional school in the case of the commune refusing to provide religious instruction of the type demanded by them, or putting obstacles in the way of its being given by the clergy or their representatives.

4. The law of 1895 is the work of the more authoritarian Catholics, and makes religious instruction obligatory, placing it directly under the control of the clergy. It also increased the subsidies to private schools. This law was passed in face of opposition from the moderate section, who saw in it an exaltation of state authority which might be turned by opponents to the disadvantage of the religious interest. It is by no means clear that Belgium has yet attained a final solution of the religious difficulty; the life of the present law is probably to be measured by that of the Catholic political majority.

Holland.

The outstanding feature of public education in Holland is the strength of the private primary schools. Under the law of 1857 secular teaching alone was provided in the primary schools at the public cost. The law of 1878 allowed communes to make grants to private schools on condition of their becoming neutral in the matter of religion. The law of 1889 allowed private denominational schools to receive government grants while retaining their denominational character, but forbade further grants to such schools by the communes.

In 1905 there were 566,460 children in the public and 278,632 in the private schools.

Scotland.

The diverse religious and social conditions of the three con- stituent parts of the United Kingdom must necessarily cause the education problem to assume a different shape and to receive different solutions in England, Scotland and Ireland respect- ively; latterly also the special conditions obtaining in Wales have received partial recognition at the hands both of the legislature and the executive. In Scotland the conditions have been less complex than in England. The practical unanimity of the people in religious faith, which has remained undisturbed by the institutional divisions of recent times, the wider diffusion of a sense of the value of education, the greater simplicity of life which has rendered all classes largely content to

avail themselves of the preparatory education afforded by the common school and favoured the development in the secondary sphere of day rather than boarding schools, are among the causes which have con- tributed to the early building up of a national system which in some respects resembles the continental rather than the English type.

The national appreciation of education is found marked already before the Reformation in a statute of James IV. (1494) requiring all freeholders of substance to send their heirs to school and to keep them there until they had Historical perfect Latin. The Reformation, asserting itself by mea t. common consent under one ecclesiastical form, and free from the divisions of religious organization which tended to neutralize it as an educational force in England, put fresh life into the educational aspirations of the people. As early as 1560 the Church Assembly, largely under the influence of John Knox, put

attendance law.

forth the Book of Discipline, providing that "every several kirk" in a town " of any reputation " was to have its Latin school, that the " upaland " or country parts were to have a teacher of the " first rudiments " in every parish, and that each " notable " town was to have "a college for logic, rhetoric and the tongues." Practical effect was later given to this scheme by an act of the Scottish parliament in 1696, under which parish schools were set up in connexion with the Established Church of Scotland. This system was extended by an act of 1803, which made better provision for teachers' salaries and also confirmed the position of the parish school as an adjunct of the parish church. The system of inspection and state aid introduced in England in 1839 was made applicable to Scotland, thus grafting upon Scotland the English system of voluntary state-aided schools. At the same period another new factor was imported into Scottish education by the ecclesiastical disruption of 1843. As a result of these changes in 1861 a new act was passed which relaxed, though it did not sever, the ties which bound the parish school to the church.

The Education (Scotland) Act of 1872 set up elective school boards for parishes and boroughs, and vested in them the existing parish and

burgh schools. Long prior to the school act it h a(i Deen tne practice of the Church of Scotland boards to allow exemption in the schools from religious in- a ” d j 00/ struction; consequently in imposing a compulsory conscience clause the act did little more than confirm existing usage. The school boards were left full liberty as to the religious instruction to be given in their schools, and in practice school boards universally adopt the Shorter Catechism, which is acceptable to all denominations of Presbyterians. The act made the school boards responsible for the supply of school accommodation, and introduced com- pulsory attendance, for which opinion in England was not at that time ripe. By the act of 1901, the age of compulsory attendance was raised to fourteen, with provision for exemption after twelve.

The experience of the Scottish Education Department, like that of the English, has led to the gradual abandonment of in- dividual examination as the basis for the payment of

Adminis- grants. The institution of the merit certificate is *—— j3 “~ . .1.11 ■

one of the features in which the Scottish system differs

from the English. Prior to the code of 1903 the merit certificate, awarded on examination after the age of twelve, was properly described as the leaving certificate of the elementary school. Under the more recent codes merit certificates are awarded under a system designed to encourage the transference of promising pupils at an early age to supplementary courses or higher-grade departments. Under this system the fitness of the pupil to enter upon a course of higher studies is determined not solely by the results of a single examination, but by the whole character of his work during the preceding school course.

A notable factor historically in Scottish education was the extent to which the parish schools supplied their best pupils

with higher or further education. The administrative grade*” changes last mentioned have led to a remarkable schools. development of organized higher-grade schools and

departments. These departments have now been organized upon the lines of the higher primary schools of France, ” to continue a stage further ” (says the report of the Scottish Education Department) ” the general education of that con- siderable body of pupils who,

under new conditions, may be expected to remain at school till fifteen or sixteen." The function " of giving something of the nature of a specialized education to pupils who will leave school at a comparatively early age " is now discharged by the supplementary courses. Elementary education has generally been rendered free by

the fee grants under the parliamentary vote, and by education. l ˆ e sums accruing under the Local Taxation (Customs

and Excise) Act 1890 and the Education and Local Taxation (Scotland) Act 1892. Voluntary schools are not numerous, being chiefly those of

tratlve progress,

the Roman Catholic Church. The average cost of maintenance per child in average attendance in public schools (according to the official report 1907-1908) was £3, ns. ijd., of which £2, 4s. 43d. was met by government grants for elementary education. In voluntary schools the average cost of main- tenance was £2, 15s. i| d., of which £2, 2s. 7d. was met by elementary grants, including a special aid grant of 3s. per head under the Education (Scotland) Act 1897.

The total number of children (1907-1908) in average attendance in grant-earning schools was 712,076, and the percentage of attendances to numbers on the register was 87-66%. As regards teaching power, 81-52% of the male teachers and 56-71% of the female teachers in the elementary teachers had been trained in training colleges.

Certain miscellaneous additional powers are conferred upon school boards by the Education (Scotland) Act 1908, including powers to provide school meals; in outlying parts, to provide means of conveyance, or pay travelling expenses ˆ"1° of teachers or pupils, or defray the cost of lodging pupils Act 1908. in convenient proximity to a school; to provide for medical inspection; and as to children neglected by reason of the ill-health or poverty of the parent, to supply food, clothing and personal attention.

Perhaps the most noteworthy provision in the act of 1908 is that which enables (not obliges) school boards to make bye- laws reauiring attendance at continuation classes up ~ , to the age of seventeen years. Apart from com- sorycon- pulsory attendance, the act lays upon school boards tinuation the duty of making suitable

provision of continuation classes – classes with reference to the crafts and industries practised in the district.

The Scottish Education Act of 1872 distinguished certain burgh and parish schools as " higher class public " or secondary schools. The act of 1908 deals in some detail with secondary education, modifying and strengthening fZmttou. the framework in various ways, but without introduc- ing organic changes. " Secondary " schools are distinguished from "intermediate," the former being defined as providing at least a five years' course; the latter as providing at least a three years' course in languages, mathematics, science and such other subjects as may from time to time be deemed suitable for the instruction of pupils who have reached a certain standard of attainment in elementary subjects under the code. Inter- mediate and secondary schools may be provided and maintained either by school boards or otherwise, and provision is contained in the act for the transfer of endowed schools to the school board. Thus secondary (as well as elementary and continuative) education is organized upon the basis of the parish or burgh; it receives, however, grants in aid through the agency of county (or large urban) authorities (called district committees) con- stituted under schemes of the Scottish Education Department. For the purpose of such grants in aid the funds available under the various local taxation acts, together with parliamentary grants, other than a fee grant at the rate of 12s. per child in average attendance, form a fund called the Education (Scotland) Fund. After provision has been made for {inter alia) grants for universities, higher technical education and training colleges, the fund is allocated to the district committees according to a scheme laid before parliament and approved by the king in council. Out of the " district education fund " the school board receives (ordinarily) a sum equal to one-half of the amount by which the net cost to the school board (after deducting income from grants made by the department and from fees) exceeds the amount which would be produced by such rate per pound upon the district of the school board as the committee may determine, not being more than a rate of twopence in the pound. Important powers are also conferred upon the district committee for organiz- ing and aiding within their district the provision by the school boards of medical examination and supervision of school children, the supply of bursaries for purposes of all forms of higher educa- tion, and the provision of instruction in special subjects, such as agriculture, &c.

[IRELAND

Ireland,

The full development of a system of public education in Ireland has been hampered and retarded by the general diffi- Speclal culties inherent in the problem of Irish government. difficulties In consequence of the fundamentally different social, of Irish religious and political conditions in the two countries, education. tne j£ n giigh an(j i r j sn systems have developed down to the present time upon divergent lines. In England, popular education was founded in the first instance upon in- dividual initiative combining in organized voluntary effort, and, though the voluntary agencies have been first supplemented and latterly to a large extent supplanted by public action, the tendency has been in the direction of municipalization rather than in that of central state control. In Ireland, on the other hand, education has suffered in the past from the general absence of individual initiative and local interest almost as seriously as from the mistakes of the English government. These causes, more directly perhaps than the prevailing poverty of the country, made it necessary to throw the burden of supporting the schools to an increasing extent upon the state, while the want of local self-government precluded any devolution of powers and duties upon municipal authorities.

State intervention is actually of earlier date in Ireland than in England. From the reign of Elizabeth onwards, English

*Protestant schools were founded by the government Historical [n a sporadic and intermittent fashion in pursuance sped. ˚f * ts Anglicizing policy. To mention briefly one or*

two historical features, the great religious educational enterprise of Edmond Rice in founding the well-known Irish Catholic order of the Christian Brothers in 1802 forms an excep- tion to the general lack of initiative among the people themselves. About the same period the Kildare Place Society (founded in 181 1 while the first commission of inquiry into Irish education was sitting) attempted to grapple with the peculiar difficulties of the religious situation upon lines somewhat similar to those just laid down by Lancaster and his followers in England. This organization comprised both Roman Catholic and Protestant schools upon a common religious basis of Bible reading without note or comment, and received government grants which rose to £30,000 a year before they were discontinued in 1833. The religious compromise which the system embodied broke down in consequence of Catholic dissatisfaction, and that it was at

first fairly successful may seem extraordinary in view of the later attitude of the Catholic Church towards the question of common schools and combined religious instruction.

In 1833, as the result of a second commission of inquiry (1824) and a select committee of the House of Commons (1828),

Mr Stanley inaugurated the national system of element- rhe . ary schools under a board of commissioners nominated system. from the different religious denominations. The

government appears from the outset to have aimed at combined secular and separate religious instruction for Roman Catholics and Protestants. At the same time, an attempt was inconsistently made to provide an ethical basis for the secular instruction by means of Bible extracts. The story of the preparation of these extracts by an ingenious compound of the Protestant Authorized and Douai versions of Scripture is in its way one of the curiosities of religious history. The extracts were designed to meet the recognized Catholic objection to the indiscriminate reading of the Bible without note or comment. In practice they were chiefly used in the Protestant schools (in which their use is now practically extinct), and the growing Catholic objection to the policy of the National Board in this respect found authoritative, though somewhat cautiously worded, expression in a decree of the Roman Congregation De Propaganda Fide of January n, 1846, declaring that non- sectarian religious instruction was dangerous to youth. " Tutius multo esse ut literarum tantummodo humanarum magisterium fiat in scholis promiscuis, quam ut fundamentales, ut aiunt, et communes religionis Christianae articuli restricte tradantur, reservata singulis seˆtis peculiari seorsum eruditione. Ita enim

cum pueris agere periculosum valde videtur." The religious difficulty in Irish elementary education may be said to have been solved in process of time by the conversion of the national system in practice, though not in theory, into a system strongly denominational and therefore widely different from the design of its founders, combined Biblical instruction being discarded, and separate schools for the most part taking the place of common schools for the two creeds. In the : latter respect the like tendency has been noted in the case of Germany.

The following are the chief specific points upon which the Irish system of elementary education differs from the English.

Finance. — The state still makes building grants to the extent of two-thirds of the cost. Such grants are only made to what are called vested schools, that is to say, schools of / r/sft which the premises are vested in trustees or in the element- commissioners themselves. The state further pays ar y in the case of all national schools the entire cost of e ca oa ‘ maintenance except only the upkeep of the building, and the provision of books after the exhaustion of a first free grant.

Appointment and Payment of Teachers. — For the purpose of promotion the state through its inspectors undertakes the duty of classifying the individual teachers in four grades, passage from one grade to another being secured by examination. Appointments of teachers to schools are made by the school managers subject to the approval of the commissioners. Rights of dismissal are reserved to the local managers and also to the commissioners independently. Lastly, the teachers’ salaries are now paid directly by the state. The old system of payment by results was abandoned in 1900, and the teacher is paid (a) a fixed salary according to grade, (b) a continued good service salary which may be increased triennially, (c) a capitation payment.

Convent Schools. — In addition to the national schools supported as above, there are a considerable number of convent or monas- tery schools which receive capitation grants after the English plan, but not direct salaries. There were 308 such schools in 1908, with an average attendance of 70,003. There were also 83 other convent or monastery schools paid by personal salaries, with an average attendance of 11,075.

School Attendance and Free Education. — The Irish Education Act 1892 provided for compulsory attendance in towns and for the adoption of compulsion in other districts. In virtue of the financial sections of this act, which provided an increased grant for salaries, most national schools have become free.

General Elementary-School Statistics. — In 1908 the average number of scholars on the rolls of all the schools was 708,992, and the average daily attendance’ was 494,662, or 69-8% as compared with the number on the rolls. As regards religious denomination, 74-42% of the scholars on the rollt were Roman Catholics; 28-6% were in schools attended by both Roman Catholic and Protestant children and 71-4% in schools attended solely by Roman Catholics or solely by Protestants. The total expenditure on the schools and teaching staffs was £1,591,214, of which £1,451,139, equivalent to

£2,193. 3d. per scholar, was contributed from state grants, and £140,074, equivalent to 5s. gd. per scholar, from local (i.e. voluntary) sources, the rate per scholar from all sources being £3, 5s.

Training of Teachers. — Salaried monitors are employed in the Irish schools, but, unlike the English pupil teachers, are not explicitly recognized as forming part of the school staff. There are now seven training colleges, viz. one undenominational college maintained by the commissioners, five Roman Catholic colleges, and one college in connexion with the Protestant Episcopal Church of Ireland. Of the scholars in the undenomi- national college, 73 out of 3 1 2 were Roman Catholics. The total number of students in training was 1189, viz. 514 men and 675 women. The percentage of trained teachers to the total number of teachers was 64-7. A special training college for the instruc- tion of teachers in Irish has been recognized.

One of the chief desiderata in Irish education is a single central authority for all branches of education, elementary, secondary (or " intermediate ") and technical. There are two

central authorities dealing with secondary education, viz.* the Intermediate Education Board and the Department for Agri- „ . culture and Technical Instruction. The Intermediate education. Board administers sums available under the Inter- mediate Education Act of 1878 from the Irish Church Surplus, and also the sum allocated under the Local Taxation Act 1890. The vice of the system in the opinion of educational experts lies in the statutory obligation to award grants on the result of an individual examination of the scholars. As a result of the vice-regal commission of 1898, power was taken to intro- duce a system of school inspection, though not to dispense with the individual examination as the basis for the award of the grants; this measure of reform was ultimately carried out in 1909. The sum distributed in result grants is about £50,000 per annum.

Prior to the Agriculture and Technical Instruction (Ireland) Act 1899, science and art grants were administered by the Science and Art Department in England; by this act they were transferred to the

new Irish Department for Agriculture and Technical Instruction. This department makes block grants to secondary schools in respect of science and art teaching, and manual instruction or domestic economy. Measures have been taken for the co-ordination of the duties of the Technical Depart- ment and the Intermediate Board, and the impetus given to the teaching of experimental science by grants for the erection of laboratories represents a reform of undoubted value for higher education in Ireland, especially when considered in connexion with the enlistment of the local interest of the technical education committees in the intermediate schools. Nevertheless, in the absence of a reform of the results system of intermediate grants, the special subsidizing of science teaching has tended to put an undue premium upon this subject to the detriment of the rest of the curriculum.

Ireland possesses no such system of scholarships for assisting the passage of scholars from the elementary to the secondary school as England enjoys as a result of the municipalization of the educational system. Nevertheless, Irish children as a fact pass much more freely from the elementary to the secondary school than is the case in England where social prejudices are stronger. The schools of the Christian Brothers are usually organized in two departments, primary and intermediate, and thus supply for the Roman Catholic population the demand for the cheap type of secondary day school represented by the municipal schools in England. It must be added that the Irish intermediate schools are purely denominational. Thewidespreaddemandfor secondary education among the people, to which the report of Messrs Dale and Stephens bears witness, is a gratifying feature of Irish life, while the recent establishment (1908) of thelong-deferrednational university, and the perceptible quickening of intellectual interests throughout the country in connexion with the Celtic revival, point to better conditions for higher education and to the develop- ment of a wider, deeper and truer, because more national, culture.

England. It was justly observed by Sir Joshua Fitch (Ency. Brit., 10th ed., xxvii. p. 655) that " the public provision for the education of the people in England is not the product of any theory or plan formulated beforehand by statesmen or philosophers; it has come into existence through a long course of experiments, compromises, traditions, successes, failures and religious con- troversies. What has been done in this department of public policy is the resultant of many diverse forces and of slow evolution and growth rather than of pure purpose and well-defined national aims. It has been effected in different degrees by philanthropy, by private enterprise, by religious

zeal, by ancient universities and endowed foundations, by municipal and local effort, and only to a small extent by legislation. The genius — or rather character- istic habit — of the English people is averse from the philosophical system, and is disposed to regard education, not as a science, but as a body of expedients to be discovered empirically and amended from time to time as occasion may require." Clearly, then, the English system of public education, as it results from successive

acts of the administration and the legislature, is one which can only adequately be appreciated in the light of an historical survey of the various stages which have led up to it and the social conditions by which they were determined. The history of state education in England begins tardily in 1832, when after a generation of hesitation and controversy a beginning was made upon an exceedingly modest scale with the system of treasury grants in aid of elementary schools. The diverse forces which were at that date at work in the education of the nation as a whole, retarding state interference and marking out the limits within which it was long to be confined, derive their origin from a much remoter period.

The apprenticeship laws of Henry VIII. contain the earliest germ of state interference. These laws obliged children between five and thirteen years of age who were found begging or idle to be bound apprentices to some handicraft. If the immediate object was the prevention of crime rather than education as such, this early legislation is at least significant of the primary and intimate connexion that exists between popular education and industrial and economic needs. Yet in the shaping of the educa- tional system the original influences were religious rather than economic; hence the importance of the canons of 1604, influence which secured the control of education to the Estab- 0/ the lished Church. This of course was no novel doctrine, English but merely the reaffirmation by the Reformed Church R forma ' of the Catholic tradition of religious exclusiveness, presenting itself to the mind of contemporaries rather as the recognition of a national, that was also a religious, duty than as the assumption of an ecclesiastical privilege. Whatever mischief the Tudor statesmen wrought by indiscriminate destruction of chantries and other foundations which combined educational work with observances that the new religion branded as super- stitions, however far the English Reformation fell short of the organized enthusiasm for popular education and culture that marked the first most vigorous and constructive period of Lutheranism in Germany, the Protestant, and especially the Puritan, spirit unquestionably inspired a considerable volume of individual*

educational effort during the latter half of the 16th and the first half of the 17th centuries. Here, as in Germany, the influence of the Reformation was wholly on the side of classicism, the dead languages being the key to the theological learning which was of primary concern to the men of that theological age. The conception of elementary education as a system complete in itself and adapted to the needs of the masses of the people was unfamiliar at this date. The earliest elementary schools were petits schools, which (as the name implies) were really preparatory departments of the grammar-schools. Educa- tion in fact was still regarded as the privilege of an elite, but, as in the middle ages, the elite for whom it was sought to provide a ladder to the university by means of the endowed schools so numerously founded about this time was an elite of intellect and not of mere wealth; the class feeling which became so marked a feature of English higher education was of much later growth.

*Towards the end of the 17 th century elementary education began to differentiate itself, partly by way of reaction against the unnatural classicism of the preceding age, but more m se / especially as the result of the growth of towns and the element- creation of a considerable industrial population. At *w the close of the century the moral evils attendant upon edacatlon – industrialism alarmed the religious conscience and prompted one of the great educational movements that stand to the credit of the national church. In 1699 Dr Bray founded the Society for Promoting Christian Knowledge, and the movement thereby initiated may be traced in the numerous "charity" or "Blue Coat " schools scattered plentifully throughout the country and especially in the' great centres of population. The foundation of these schools, which was pushed forward with vigour during the early years of the 18th century, represents an energetic and well- planned attempt to cope with the social evil of poverty by educational means. The instruction was elementary, the scholars were clothed as well as taught free, and the schools in the first instance were supported not so much by permanent endowment*

as by voluntary effort, so that with this movement the voluntary system may be said to make its appearance. Lastly, all these philanthropic efforts were inspired by a solid but sober piety nurtured by a church which came nearer than at any other period of

its history to enjoying the undivided allegiance of the people. Another notable movement in connexion with the church was one confined to Wales, that of the Welsh " circulating schools " established by Griffith Jones about 1730, consisting of an organized staff of schoolmasters who went round teaching adults to read the Bible in Welsh. In the English rural parishes the com- parative religious unanimity favoured the quiet development of elementary education in a small way upon less specifically religious lines. Numerous small endowments for the element- ary education of poor children were provided by well-to-do parishioners; indeed to such an extent did the practice of making charitable (and largely educational) bequests increase that the legislature intervened in the interest of private inheritance by reviving the law of mortmain in an act of 1736. The village schoolmaster became a feature of rural life, frequently enjoying a schoolhouse provided sometimes by endowment and sometimes even directly by the parishioners at the cost of the rate levied by the vestry, but more often aided only by a little stipend from an endowment for teaching poor children, and eking out an always scanty subsistence by the fees of such paying scholars as he could succeed in getting together.

Towards the end of the 18th century the emergency of the industrial revolution evoked a fresh religious effort upon a more The highly organized scale in the shape of the Sunday-

Suaday- school movement, which may be said to represent the school educational contribution of the Evangelical revival movement Robert R a ik eS) t h e founder of the Sunday School Union, established his first Sunday school in 1782. The idea of the Sunday school did not originate with Raikes; among earlier pioneers in this field were John Wesley, who held Sunday classes at Savannah in 1737; Theophilus Lindsey at Catterick in the North Riding of Yorkshire, about 1769; Hannah Ball at High Wycombe in 1769; and Jenkin Morgan near Llanidloes in 1770. Sunday schools, too, had been founded in England by Joseph Alleine, the Puritan Father, in the 17th century, and in Catholic Italy and France by St Charles Borromeo and Jean Baptiste de la Salle in the 16th and 17th centuries respectively. Nevertheless, in virtue of his achievement in organization, Raikes is rightly regarded as the founder of the English Sunday school. The peculiar value of the Sunday-school system in its early days lay in the combination of secular with religious instruction; in many cases the school was held on Saturday as well as Sunday, and its restriction to the one day or two days was due to the prevalence of child labour under stress of the great industrial expansion. With better economic conditions and with the development of day schools

the Sunday schools gradually became restricted in function to purely religious instruction. Even with this limitation there is no doubt that the great Sunday- school organizations of the various churches still deserve to be reckoned among the educational assets of the nation, and as agencies both of religious instruction and of general culture they may tend, under modern educational and religious developments, to play an increasingly important part.

At the end of the 18th century the development of industry and the social unrest which followed the French Revolution „ combined to bring home to the public mind the need

meats 0/ of a national system of day schools. Unfortunately, Lancaster just at this moment the revival of Nonconformity as a "drf e// ' tne resu ˆ 0I tne religious vitality of the Evangelical of the movement shattered the religious peace of the early religious Hanoverianperiodand divided thenationoncemoreinto contro- hostile camps, to which class distinctions lent additional versy. bitterness. The famous controversy between Andrew Bell and Joseph Lancaster and their respective followers in the opening years of the 19th century served to define the religious difficulty substantially in the form in which it exists after the lapse of a century for the present generation. Both these remarkable men conceived independently the idea of a national

system of popular education upon a voluntary basis; both concurred in extolling the merits of the monitorial system, which each claimed to have originated. The controversy between them, begun upon personal grounds, resolved itself into a national contest of rival principles of religious teaching. Lancaster as a young Quaker schoolmaster, confronted with pupils drawn from various religious bodies, planned his religious instruction upon the lines of doctrine common to all the orthodox Christian denominations. Thus he is the father of the unde- nominational religious teaching which later formed the basis of the Cowper-Temple compromise. But whereas the Cowper- Temple clause is purely negative in form and so seems to point to an undogmatic religion, the Lancasterian teaching was essentially positive and dogmatic within its limits. In 1805 Mrs Trimmer opened the attack upon Lancaster's system with a work bearing the expressive title of A Comparative View of the New Plan of Education promulgated by Mr Joseph Lancaster and of the System of Christian Instruction founded by our Fore- fathers for the initiation of the young members of the Established Church in the Principles of the Reformed Religion. The church as a whole refused to co-operate in religious teaching upon the basis of a common

Christianity, and joined issue with Lancaster and his Whig and Nonconformist following not merely upon the question of the exclusion of dogmatic formularies, but also upon the question ofthe control of whatever religious teach- ing should be given. In fact the vital question at this period was whether the clergy of the Established Church were to control the national education. The religious issue was prominent in connexion with the remarkable attempt at legislation made by the Whig statesman Mr Whitbread in his Parochial Schools Bill of 1807. As originally introduced, the bill proposed to make it compulsory on parochial vestries to levy rates for the support of schools for teaching reading, writing and arithmetic. The compulsory provisions were dropped in the House of Commons, but the bill was rejected by the Lords, mainly on the ground that it did not place education on a religious basis or sufficiently secure control to the minister of the parish.C

The failure of the liberal proposals of Wfiitbiead, and the strength of the Dissenting opposition to any settlement on purely church lines (such as that advocated by Bell in 1808 Founda- for establishing schools under the control of the tlonof parochial clergy), rendered recourse to voluntary effort voluntary inevitable. In 1808 the Royal Lancasterian Society sc oos \ was formed to carry on the work of Lancaster, the name being afterwards changed, owing to personal difficulties due to the wayward character of Lancaster, to the British and Foreign School Society. In the following year the National Society for Promoting the Education of the Poor in the Principles of the Established Church throughout England and Wales was formed, with Bell as its superintendent. In voluntary effort on a grand scale the church easily outdistanced her opponents, and in 1831 the National Society was able to show that there were in all over 13,000 schools in connexion with the church, of which 6470 were both day and Sunday schools, having a total attendance of

409,000.

The rapid development of the voluntary school system was no doubt greatly facilitated by the monitorial plan of teach- ing, upon which Bell and Lancaster equally relied. Probably the first idea of utilizing the older pupils sys tem. to teach the younger presented itself independently to Lancaster in the Borough Road and to Bell in Madras. The monitorial plan never rested upon any educational theory; it was simply a makeshift, a rough-and-ready expedient for overcoming the practical difficulty caused by the dearth of competent teachers. Historically it is important as the pre- cursor of the pupil-teacher system which so long formed the exclusive basis of the

English elementary system.

Meantime a further political move was attempted by Brougham, who included educational reform among his multi- farious activities. In 18 16 he procured the appointment of a general commission of inquiry into endowed charities. The labours of this great inquisition lasted for twenty years and led

to the reformation of many cases of abuse or waste of wealthy endowments, and eventually to the establishment of the Charity

Commission in 1853. In 1820 Brougham introduced a Activities remarkable bill which'proposed to make the magistrates Brougham. in quarter sessions the rating authority, to require ' teachers to be members of the Church of England and to be appointed upon a certificate from the parochial clergy- man, and on the other hand to prohibit religious formularies and to confine religious instruction to Bible reading without comment. The bill naturally failed through the opposition cf the Dissenters, and served only to accentuate the religious impasse.

In 1832 the Whig government which passed the Reform Bill placed on the Estimates a sum of £20,000 for public education,

thus initiating the system of the annual grant voted by Zrlats! 3 ' parliament and dispensed under regulations framed

by administrative act. The grant of 1832 was ad- ministered by the treasury and not by a special department, under certain conditions laid down by treasury minute of August 30, 1833. The chief of these were that grants were confined to the erection of school buildings, and were to be administered only through the National and the British and Foreign School societies; there was a provision for audit, but no condition of inspection.

In 1839 Lord Melbourne's government by means of an order in council established a separate education office under the style Establish- of the Committee of Council on Education, and the went of sum voted by parliament was increased to £39,000. state- The original intention of the government was to estab- mUed lish a state

normal school or training college as the

system. f oun(j a tion of a national system of education. Un- fortunately this design had to be abandoned in view of the religious difficulty, with the result (so fruitful in controversy at the present time) that the training of elementary teachers was left in private hands and became a stronghold of the volun- tary and denominational interests. In view of the limited resources placed at their disposal by parliament, the Committee of Council were at first compelled to confine their assistance to capital grants in aid of the provision of school buildings, but in the distribution of the money three important conditions were at once imposed. In the first place, the continuing right of inspection was required in all cases; secondly, promoters were obliged to conform to a fixed standard of structural efficiency; thirdly, the building must be settled upon trusts permanently securing it to the education of poor children.

By the minute of August 10, 1840, the Committee of Council concluded what came to be known as the concordat with the

church. Under this minute no appointment was to Concordat ˆ e ma(j e f any person to inspect schools in connexion 7hurch. C with the Church of England without the concurrence

of the archbishop of the province, and, what seems still more extraordinary to modern ideas, any such appointment was to be revoked should the archbishop at any time withdraw his concurrence. The inspectors were charged with the duty of inspecting religious teaching, but under instructions to be framed by the archbishop, and their reports were to be trans- mitted in duplicate to the archbishop and the bishop for the information of these authorities. Further, the general instruc- tions of the Committee of Council themselves were to be com- municated to the archbishop before being finally sanctioned. The march of events, and in particular the altered financial relations between the state and the voluntary managers brought about by the institution of maintenance grants, soon rendered this concordat obsolete, but it remains historically important as showing how at the outset the denominational principle was recognized and fostered by the state.

Among the first acts of the Committee of Council was the promulgation of a set of model trusts deeds, one or other of which

applicants for building grants were required to adopt

for the settlement of their school premises. The

necessary conditions were the permanent appropriation of the site to purposes of education, and the permanent right of government inspection; it must, however, be noted that this

Trust deeds.

latter right was generally limited in terms to the inspection provided for by the minute of August 10, 1840. A conscience clause was not obligatory, and indeed was only offered in the limited form of exemption from instruction in formularies and attendance at Sunday school or public worship. A more sys- tematic attempt to promote public control by means of trust deeds in 1846 led the Committee of Council into a controversy with the National Society which extended over a period of three years, turning chiefly upon the management clauses and the question of appeals, and resulting in compromises which constituted a fresh concordat with the church. In point of fact, the management clauses proved to be of little practical consequence, save in a few controversial cases, until the act of 1902, which had the effect of bringing them once more into prominence in connexion with the constitution of statutory bodies of foundation managers. The act of 1902 also dealt specifically with two other points arising upon the old trust deeds, viz. the control of religious instruction and the appeal to the bishop in religious questions. Special facilities for the conveyance of land for school purposes were afforded to limited owners by the School Sites Acts of 1841 and subsequent years. The landed gentry responded with great public spirit to the call thus made upon their generosity by the state, with the result that the vast majority of rural, and many urban, parishes were freely endowed with sites for elementary schools.

The Grammar Schools Act of 1840, which was passed to deal with the case of the decayed " grammar " {i.e. classical) schools which abounded throughout the country, belongs to the history of elementary rather than secondary education. ^%""?? r It expressly empowered the Court of Chancery, where Act 1840. the endowment was insufficient for a classical school, to substitute subjects of useful learning analogous to those con- tained in the original trusts. As a result of this act a considerable number of ancient endowments were reorganized so as to afford an improved elementary instead of an inefficient classical education, and the schemes made under the act constituted an early, but not very successful, experiment in the direction of higher elementary schools.

In 1 843 the Committee of Council decided to make grants in aid of the erection of normal schools or training colleges in connexion with the National Society and the British T ™ fato tf- and Foreign School societies, thus marking the definite gr aa ts. abandonment of the provision of training colleges to voluntary effort.

In 1846 an important step forwards was taken in the founda- tion of the pupil-teacher system. The regulations of this year inaugurated annual maintenance grants in the form of stipends for apprenticed pupil teachers receiving a ˆ a 'her prescribed course of instruction under the head teacher, system. and a lower grade of stipendiary monitors in schools where such instruction could not be provided. These regulations inaugurated the system of Queen's Scholarships to assist pupil teachers to proceed to a training college; they also established capitation grants for the support of such colleges, and annual grants to elementary schools under government inspection of from £15 to £30 in aid of the salary of every trained teacher employed. Provision was at the same time made for retiring pensions to elementary teachers.

Down to 1847 state aid was confined to two religious categories of schools: those giving specifically Church of England teaching, and those in connexion with the British and Foreign School Society giving simple Bible teaching. To f/ˆ ,on facilitate the recognition of other denominational a ˆ t schools the Committee of Council in 1847 issued a Wesley ans, minute dispensing schools not connected with tne *°ˆ a fl cs Established Church from inquiries concerning their aaa -j ews . religious condition, and in the same year state aid was extended to Wesleyan and Roman Catholic schools. The settlement of model trust deeds gave occasion for each of these two great religious bodies to negotiate a kind of concordat with respect to school management, and the Roman Catholic deed was only settled after a controversy, similar to that which had arisen*

with the National Society, as to the rights of ecclesiastical authority. Jewish schools received recognition in 1851 upon condition that the Scriptures of the Old Testament should be daily read in them.

During the middle years of the century various unsuccessful

*legislative attempts were made to establish a national system of elementary schools upon the basis of rate-aid. These *1842?57 attempts began with the education clauses of Sir Robert Peel's Factory Bill of 1842, and were renewed in a series of bills from 1853 to 1857, of which one set was introduced by Lord John Russell on behalf of the Whig government, whilst a second was promoted by an organization called the Manchester and Salford Committee on Education, in the denominational interest, and a third set by an organization called the Lancashire (afterwards the National) Public Schools Association, in the secular interest. The only one of these attempts which calls for notice here is the bill introduced by Lord John Russell (called the Borough Bill, on account of its being restricted to municipal boroughs) in 1853, and forming part of a comprehensive scheme of legislative and administrative reform of which a portion was actually carried into effect. The bill as a measure for elementary education was supplemented by an administrative system of capitation grants for rural areas. The government scheme also comprised a measure dealing with the administration of charitable trusts (which took shape as the Charitable Trusts Act 1853), the constitution of the Department of Science and Art, and university reform upon the lines recommended by the Oxford and Cambridge commissions. The Borough Bill left it optional with municipalities to adopt the act. It provided for the appointment of a school committee, one half of whose members might be non-members of the council. The school committee was merely given power to assist existing voluntary schools out of the rates. No provision was made for public control beyond the requirement of audit; the sole condition as to religious instruction was the acceptance of a conscience clause.*

The failure of the Borough Bill did not affect the new system of capitation grants which was introduced by minute of the Com- mittee of Council dated April 2, 1853. These grants Capitation were g xe(j at a sca i e varying from 3s. to 6s. per head,

payable upon certain conditions, of which the most important were that the school must be under a certifi- cated teacher, and that three-fourths of the children must pass a prescribed examination. In consequence of the failure of the several fresh bills introduced in 1855 by the government, the church party and the secular party respectively amplifying the proposals previously brought forward, the capitation grant was, by minute of January 26, 1856, extended to urban areas. As in the case of all the early grants, the regulations governing the distribution of the capitation grants were framed upon the principle that subventions of public money must be met by local

funds derived from voluntary contributions, endowments and school fees; thus the basis of the denominational system as fostered by the state at this stage was one of financial partnership. In 1856 a purely administrative bill was passed, establishing

the office of vice-president of the Committee of Council Education on Education as a minister responsible to parliament. 1856. ‘ At the same time, the Science and Art Department

was transferred from the Board of Trade to the Com- mittee of Council.

The progress of state-aided education during this period may be measured by the increase of the annual parliamentary grant,

which rose from £30,000 in 1839 to £100,000 in 1846, CoZm S isf i 1 ‘ ‘ 000 is } l8 5 l > £396,ooo in 1855, and £663,400 in sion. 1858. This expansion was viewed with misgiving*

by the friends of the denominational system, and by the strong individualist school of that day, who upon wider grounds clung to the old ideal of voluntary initiative. These sections combined with the advocates of further state interven- tion to press for a commission of inquiry, and at the instance of Sir John Pakington (the eminent Conservative educationist who was responsible for the denominational bills of the ‘fifties) a royal commission was appointed in 1858, under the chairman-

ship, of the duke of Newcastle, to inquire into the state of popular education in England, and to consider and report what measures, if any, were required for the extension of sound and cheap elementary instruction to all classes of the people. The Report of the Newcastle Commission, issued in 1861, contains an ex- haustive account of the existing condition of elementary educa- tion, and, with due allowance for the grave defects revealed, and in particular the glaring inefficiency of the numerous little private-venture schools kept by ” dames ” and others, the graphic picture drawn by the commissioners constitutes a striking tribute to the sterling qualities of self-help and religious earnestness which were so characteristic of the early Victorian period. It was found that in round numbers about 2,500,000 children were attending day schools, the proportion to population being 1 in 7, as compared with 1 in 9 in France, 1 in 8 in Holland, and 1 in 6 in Prussia, where education was compulsory. On the other hand, of this number only 1,675,000 were in public schools of all kinds, only 1,100,000 in schools liable to inspection, and 917,000 in schools receiving annual grant. The result was that only one child in every twenty was attending a school whose efficiency could be in any way guaranteed by the state. In the constructive portion of their work the comments and recom- mendations of the

commissioners reflected the prevailing per- plexity of the public mind, A consistent individualistic minority considered that the annual grant should be withdrawn altogether, and that any further state aid should be confined to building grants, which they would concede not as desirable in themselves but as necessitated out of considerations of fairness to the parishes that had not yet received such aid. The commissioners as a body rejected free and compulsory education in view of the religious difficulty and upon general grounds of individualistic principle. Of the religious difficulty itself the commissioners had some wise words to say which hold good in substance at the present time. In their judgment the considerable evidence they had amassed conclusively proved that the religious difficulty originated with the managers, promoters and organizers of the schools, and not with the parents themselves; yet the indifferent or comparatively passive attitude of the people nowise materially diminished the practical difficulty of introducing a comprehensive system, since it was not with the body of the people but with the founders and supporters of schools that legislators would always have to deal. In view of the solution adopted in 1902 it is of interest to note that the Newcastle Commissioners deliber- ately rejected the parish as unfit to be taken as the unit of elementary education upon the ground that management by parochial ratepayers must tend to be illiberal and niggardly, bent upon economy of the rates to the detriment of educational interests; accordingly they recommended the constitution of county boards (which in the absence, of elective councils must needs originate with quarter sessions) clothed with power to levy a rate for the aid of existing voluntary schools.

The one definite achievement of the Newcastle Commission was the famous system of payment by results, which may be said to have excited a keener and more prolonged controversy than any other measure of a purely by'tvsutts educational character. Impressed by the defects of the existing teaching, the commissioners reported that there was only one way of securing efficiency, and that was to institute a searching examination by competent authority of every child in every school to which grants were to be paid, with the view of ascertaining whether the indispensable elements of knowledge were thoroughly acquired, and to make the prospects and position of the teacher dependent to a considerable extent upon the results of this examination. Thus the commissioners hoped to counteract what appeared to them to be the crying defect of the existing training college system, viz. that it tended mainly to adapt the young schoolmaster to advance his higher, rather than to thoroughly ground his junior, pupils. They recognized that to raise the character

of the children, both morally and intellectually, was and must always be the highest aim of education, and they were far from desiring to supersede this by any plan of a mere examination into the more mechanical

work of elementary education, the reading, writing and arith- metic of young children; but they thought that the importance of this training, which must be the foundation of all other teaching, had been lost sight of, and that there was justice in the common complaint that while a fourth of the scholars were really taught, three-fourths after leaving school forgot everything they had learnt there.

Mr Lowe (Lord Sherbrooke) as vice-president of the Committee of Council (1859-1864) adopted the system of payment by results in what became famous in history as the Revised Code, Code issued in 1862 and so called because it was a revision

of the minutes and regulations of the Committee of Council, which were first collected and issued in the form of a code in i860. The Revised Code provided for the payment of a grant of 4s. upon the old principle and a further grant of not more than 8s. upon the result of examination. Mr Lowe declared of the system in the House of Commons that " if it was costly it should at least be efficient; and if it was inefficient it should at least be cheap." In fact, it proved to be cheap; the grant fell from £813,400 in 1861 to £636,800 in 1865. The upholders of the existing system denounced the Revised Code as an un- deserved slight upon the voluntary managers, and even as a breach of faith with the great religious denominations. On purely educational grounds, which need not be here re- capitulated, it was at once viewed with misgiving by many authorities, including Matthew Arnold. To meet objections, some modifications were introduced in the code under the Conservative government in 1867. The system of paying grant upon the result of individual examination of the scholars was not finally abolished till 1904.

The years immediately preceding 1870 were occupied with discussion and preparation for the great legislative measure for j. . which the time was now felt to have arrived. Good lags pre- work was done in

this direction by the Select Committee Hminary of the House of Commons in 1866, over which Sir io f t . b lf ct John Pakington presided. For reasons connected with the political situation of the moment this com- mittee never reported, but the minutes of evidence and the draft report prepared . by Sir John Pakington contained much valuable material in the way of criticism of the existing system and suggestion for the coming settlement; in particular the draft report insisted upon the inevitableness of an education rate. In 1868 the Conservative government brought in, but did not proceed with, an education bill deliberately discarding the principle of rate-aid on the ground that it would destroy voluntary contributions and gradually starve out the denominational schools. In 1867 and again in 1868 Mr Bruce (afterwards Lord Aberdare), Mr W. E. Forster and Mr Algernon Egerton intro- duced a bill which formed the basis of the measure of 1870. As redrafted in 1868 the bill of Mr Bruce and his coadjutors proposed a universal system of municipal and parochial rating with liberty for voluntary schools to unite themselves to the rate- aided system under their existing management, subject to the acceptance of a conscience clause. The bill also proposed to empower town councils to co-opt outsiders upon their education committees. Thus both in the principle of co-optation and in the extension of rate aid to schools not under public control the bill of these Liberal statesmen in 1868 anticipated certain controverted features of Mr Balfour's Education Act of 1902. In the meantime, in the country the Education League, originated at Birmingham, was carrying on a propaganda in favour of free secular schools, whilst the Education Union, formed to counteract the influence of the league, urged a settlement upon the old lines. As a concession to the popular feeling against secularism, the league proposed to allow Bible reading without doctrinal exposition. Thus opinion was sufficiently focussed to enable Mr Gladstone's administration in 1870 to undertake the com- prehensive measure of educational reform for which the country had had to wait so long.

The Elementary Education Act of 1870 bore in every respect the marks of compromise. As Mr Forster explained in introduc- ing the bill, the object of the government was " to complete

the voluntary system and to fill up gaps," not to supplant it. To this end the Education Department was charged with the duty of ascertaining whether or not there was in every parish a deficiency of public school accommodation, t g 7 g

and provision made for the formation of school boards in every school district {i.e. parish or municipal borough) requiring further

public school accommodation. Such accom- modation might consist either of public elementary schools as defined by the act, or other schools giving efficient and suitable elementary education. The definition of public elementary school contained in section 7. of the act is still in force. Shortly, a public elementary school is a school subject to a conscience clause entitling scholars to complete exemption from all religious instruction and observance whatsoever. Any religious instruc- tion or observance in the school must be either at the beginning or the end cf the school meeting. The school must also be open at all times to the government inspectors and must be conducted in accordance with the conditions required to be fulfilled in order to obtain an annual parliamentary grant. In the same connexion an important change was made in the conditions of inspection b}' declaring that it should be no part of the duties of the in- spector to inquire into religious instruction, whilst a later section of the act provided that no parliamentary grant should be made in respect of any religious instruction.

Three important changes were made in the measure during its passage through parliament. As at first proposed, (1) the school boards were not to be directly elected by the ratepayers, but were to be appointed by the town council or the vestry. (2) These nominated boards were empowered either to provide schools themselves or to assist existing public elementary schools, provided that such assistance was granted on equal terms to all such schools, upon conditions to be approved by the Education Department. Thus the school board, if it exercised the option of assisting denominational schools, would have been obliged to assist all or none. (3) With regard to its own schools, the school board was to settle the form of religious instruction. These proposals raised serious opposition in the country, and when the committee stage of the bill was reached two funda- mental changes were made in the policy of the bill. In the first place, as Mr Gladstone put it, the government had decided " to sever altogether the tie between the local board and the. voluntary schools." In lieu of the suggested rate-aid they proposed an increased grant from the treasury, that is to say, the voluntary schools were left standing as state-aided schools under private management, side by side with the new rate- supported schools.

Next, the character of tne religious instruction in the board schools was determined upon an undenominational basis by a provision which has become known to history after the name of its author, then Mr Cowper-Temple, Cowper- as the Cowper-Temple clause (section 14 of the act), clause directing that "no religious catechism or religious formulary which is distinctive of any particular*

denomination shall be taught in the school." The clause was not intended to exclude doctrinal exposition, and was in fact a compromise not merely between absolute secularism and denominationalism, but between denominationalism and the view of those who would have the Bible read without note or comment. The Apostles' Creed as a symbol common to all denominations of Christians was held by Mr Forster (at the suggestion of Mr Gladstone) not to be excluded under the Cowper-Temple. clause. The result was the establishment in the schools, upon the lines laid down by Joseph Lancaster at the beginning of the 19th century, of what may be termed the common Protestantism of the English nation; and though Mr Disraeli urged that a religion without formularies was in fact a new religion, and that in leaving its exposition to the teachers we were creating a new sacerdotal class, the Cowper-Temple compromise, notwithstanding its in- herent want of logic, stood the test of experience for more than a generation against the consistent denominationalists on the one hand and the party of secular education on the other. It is important to observe that the act of 1870 left the giving of

religious instruction, whether in voluntary schools (in which its inclusion might be assumed as of course) or in board schools, purely permissive. In practice it was only in Wales that school boards availed themselves to any extent of the liberty to abstain from giving religious instruction, and this comparative secularism of Wales certainly argued no lack of religious life among the people.

The third change in the bill was the substitution of the ad hoc school board for the municipally appointed board originally proposed, a change which commended itself in view of the special difficulty presented by the case of London. These boards were elected by the system of cumulative voting under which each elector had as many votes as there were candidates to be elected, with liberty to give all his votes to one candidate or to distribute them amongst the candidates as he thought fit. This system was much criticized as being unduly favourable to minorities, whose representation it was devised to secure; it continued, however, until the supersession of the ad hoc authorities by committees of the county and urban councils under the act of 1902.

School boards were empowered not only to acquire sites for schools under powers of compulsory purchase, but also to take transfers of existing voluntary schools from their managers. The section which enables managers W transfer schools to'the school board or local education authority for the purpose of board or council schools freed from religious trusts unquestion- ably marks an important inroad by the state upon the sanctity of trusts. Thus though the act of 1870 did not itself introduce the principle of compulsory transfer, it formed the point of de- parture for the proposals in this direction which were the basis of the unsuccessful bills of 1906 and 1908. The act of 1870 did not introduce either direct compulsory attendance or free education, but it took a distinct step forward in each direction by enabling school boards to frame by-laws rendering attendance compulsory, and also to pay the school fees in the case of poverty of the parent.

The policy of compromise between the two systems of volun- tary and rate-established schools was carried out in the provisions relating to the future supply of schools. On the one hand, building grants were continued temporarily for the benefit of those who applied (as voluntary managers alone could apply) before the 31st of December 1870. On the other hand, the Education Department was authorized to refuse parliamentary grants to schools established in school board districts after the passing of the act if they thought such schools unnecessary.

The following figures are of interest as showing the progress made under the act of 1870. In the year 1870 there was accom- Progress modation in inspected day schools for about 2,000,000 under the children; the average attendance was 1,168,000, and act of the number on the books about 1,500,000. It was

187(1

computed, however, that there were, exclusive of the well-to-do classes, at least 1,500,000 children who attended no school at all or schools not under inspection. In 1876 accom- modation had been provided for nearly 3,500,000, and of the 1,500,000 new places nearly two- thirds were provided by voluntary agencies. " These voluntary agencies," says Sir H. Craik, " had received grants in aid for about one-third of the schools they had built, the grants defraying about one-fifth of the cost of the aided schools." On the other hand, the growth of school boards was rapid and continuous, notwithstanding the permissive character of the act and the strenuous efforts of the voluntaryists to keep pace with the new

demands. In 1872, 9,700,000 of the population were under school boards, and of these 8,142,000 were under by-laws; in 1876 the numbers were respectively 12,500,000 and 10,400,000. In the same period the annual grants increased from £894,000 in 1870 to £1,600,000 in 1876.

The development evidenced by the above figures, and in particular the fact that 52% of the population were subject to

by-laws, enabled Mr Disraeli's government in 1876 to <876. ta ˆ e a notable step forward in the direction of universal

direct compulsion. The act of 1876 embodied the declaration that " it shall be the duty of the parent of every child to cause such child to receive efficient elementary instruction in

Act of

1880.

reading, writing and arithmetic, and if such parent fail to perform such duty he shall be liable to such orders and penalties as are provided by the Act"; next, it rendered an employer liable to a penalty who took into his employment a child under the age of ten years, or a child between the ages of ten and fourteen years who had not obtained the required certificate of proficiency in reading, writing and arithmetic, or of previous attendance at a certified efficient school. In order to complete the machinery for compulsion, the act directed that, in every district where there was no school board, a school attendance committee should be appointed by the local authority. The law as to school attendance, resting upon this and subsequent enactments, is complicated and in some details obscure. The subject was dealt with in the report of an inter-departmental committee in 1909, who recommended the abolition of the partial exemptions permitted, and the raising of the age of exemption to 13.

In 1880 Mr Mundella, as vice-president of the Council in Mr Gladstone's administration, passed a short act which made the framing of by-laws compulsory upon school boards and school attendance committees, thus completing the system of universal direct compulsion. Under the acts of 1876 and 1880 the average attendance increased from 2,000,000 in 1876 to 3,500,000 in 1878 and 4,000,000 in 1881; in terms of percentage to population, 8-o6 in 1876, 9-60 in 1878, and 10-69 in 1881. In the last-mentioned

year the annual grant rose to £2,200,000, having more than doubled in the decade.

With the passing of the Elementary Education Act 1880 the education question entered upon a new phase. The country was now possessed of a national system of elementary Develop- education, in the sense that provision was made for mentof the supply of efficient schools and for compulsory public attendance. The question of free education was P' nlon – brought within the range of practical politics by the adoption of universal compulsion, but as yet it was advocated only by a small political group of pronounced collectivist tendencies. Whilst opinion was maturing on this topic, there began to force itself upon the public mind the vastly more difficult problem of combining the two systems of voluntary, denominational, state- aided schools on the one hand, and public, undenominational, rate-supported schools on the other. From the denominational point of view the problem presented itself as that of a burden imposed and a danger threatened in ever-increasing degree by the competition of the board schools, a competition that was felt not so much by direct rivalry of school with school as indirectly by the steady raising of the standard of efficiency with respect to buildings, equipment, salaries of teachers and educational attainment which inevitably resulted from the establishment of authorities with power to draw upon the rates. On the other hand, from the purely educational point of view, it was seen that the dual system tended in practice to an illicit but almost inevitable recognition of two standards of efficiency, the lower being conceded to voluntary schools in consideration of their comparative poverty. Experience, too, of the shortcomings of small country school boards was beginning to confirm the mis- givings entertained long before by the Newcastle Commissioners as to the wisdom of entrusting autonomous powers to the parish, when the reform of local government by the creation of popularly elected county authorities turned attention once more to the question of organizing education upon a county basis.

In 1887 a royal commission under the presidency of Viscount Cross was appointed to inquire into the working of the education acts. The labours of this commission produced a cross thorough discussion of the educational problem in all Commls- its aspects, political, administrative, scholastic and s,ot ' religious. For any clear recommendations with regard to the reorganization of education generally the moment was not opportune, inasmuch as the commission just preceded the establishment of the new county authorities and the powers with respect to instruction other than elementary which parlia- ment was shortly to confide to them under

the Technical Instruction Acts. Nevertheless the report of the majority of the

commissioners pointed unmistakably towards the solution adopted in the act of 1902, and their definite recommendation that volun- tary schools should be accorded rate-aid without the imposition of the Cowper-Temple clause, served as the basis of that legislation. The commission brought into strong relief the opposing currents of thought in educational politics, the majority report, represent- ing the principles of denominationalism, being balanced by a strong minority report embodying the views of those who looked for progress along the lines of the school-board system. Taken together, the two reports form a comprehensive survey of the difficulties which still in the main beset public education in this country.

Of the developments which followed the Cross report, it is convenient to mention in the first place, out of chronological sequence, the practical establishment of free education Education by tne act of l8ol > not bv the aDS °l u te prohibition of Act 1891. school fees but by the device of a special grant pay- able by parliament in lieu of fees, called the fee grant. The result of this legislation and of subsequent administrative action was to place free education within the reach of every child, fees being retained (with few exceptions) only where some instruction of a higher elementary type was given.*

The establishment of county councils by the Local Government Act 1888 introduced a new factor which was destined to exert a Education determining influence upon subsequent developments other of public education. In the first place, it at once

ibanele- rendered possible the partial and experimental pro- mentary. yi s { on f or higher education attempted by the Technical Instruction Acts, which affected secondary education as well as technical education in the proper sense of the term. In order to understand the state of secondary education at this period, it is necessary to refer back to the first attempts made to deal with secondary education a generation earlier.

In 1 86 1, that is to say, nearly thirty years after the state began to concern itself with elementary education, the first step in the Public

way of intervention in what is now called secondary or Schools intermediate education was taken by the appointment Commis- f a royal commission, presided over by Lord Clarendon, sion.mi. t0 i n q U i re j n t the condition of nine of the chief endowed schools in the country, viz. Eton, Winchester, West- minster, Charterhouse, St Paul's, Merchant Taylors, Harrow, Rugby and Shrewsbury. The report of this commission led to a statute, the Public Schools Act of 1864, which introduced certain reforms in the administration of seven of these schools, leaving the two great London dayschools, St Paul's and Merchant Taylors, outside its operation. The results achieved were seen to be important enough to call for a further and much wider inquiry.

*Accordingly in 1864 the Schools Inquiry Commission was appointed under the presidency of Lord Taunton to inquire into Schools a ˆ the schools which had not been included either in inquiry the commission of 186 1 or the Popular Education Com- Commis- mission of 1858. It included several men of eminent ***■» distinction, such as Dr Temple (afterwards archbishop*

of Canterbury), Mr W. E. Forster, Dean Hook, and Sir Stafford Northcote; and it was singularly fortunate in its staff of assistant commissioners, among whom were numbered Mr James Bryce, Mr Matthew Arnold, and Mr (afterwards Sir Joshua) Fitch. It thoroughly explored the field of secondary education, discussing all the problems, administrative and pedagogic, which the subject presents, and " its luminous and exhaustive report " (to quote the words of Mr Bryce's Commission of 1894) remains the best introduction to the problem of public secondary educa- tion in England. The existence of numerous and frequently very wealthy endowments arising from private benefactions and bequests has at all times been a feature in education as in other departments of English social life. In the organization of secondary education in particular, private endowments have played and continue still to play a part which cannot be paralleled in any other country. This circumstance has un- doubtedly resulted in a great economy of resources, though in numerous instances the difficulties occasioned by the haphazard distribution of endowments and the local jealousies invariably

aroused by any attempt to readjust their areas to modern conditions have obstructed useful reform and proved a source of misdirected and wasted effort. At the date of the Schools Inquiry Commission the state of the ancient endowments was largely one of abuse. Very many endowments intended for advanced education were applied for

instruction of a purely elementary character, and that of an inferior kind; indeed the possession of an endowment in a rural locality not infrequently operated to prevent the establishment of an efficient state-aided school. The evidence showed that the proportion of scholars in the country grammar-schools who were receiving some tincture of the classical education intended by the founders was steadily decreasing, and nothing had been done to bring the curriculum into harmony with the actual needs of the time. No doubt a small elite of classical scholars were sent to the older universities by these schools, but in the main they were in a feeble and decadent state, giving, more or less inefficiently, an education wholly unsuited to the wants of the class to whom they ministered. In addition to the general inelasticity of the curriculum, the special evils from which the grammar-schools suffered were the want of effective governing bodies and the freehold tenure of the headmasterships.

*The commission was singularly successful in bringing about the reform of these abuses, its report being immediately followed in 1869 by the Endowed Schools Act, which was based Endowed upon its recommendations and conferred upon a special Schools commission (united in 1874 with the Charity Com- Acts mission) very wide and drastic powers of reorganizing M 69 ‘ 7 *- ancient endowments. A direction for extending the benefits of endowments to girls did much to assist the movement for the secondary education of girls. The Endowed Schools Acts 1869-1874 introduced modifications of importance and general interest into the law of trusts. Under the existing rules of the court of chancery, which rules were also binding upon the Charity Commissioners, educational endowments were generally treated, in the absence of evidence to the contrary, as subject to a trust for instruction in the doctrines of the Church of England. Under the Endowed Schools Acts the presumption is reversed, and ancient trusts are treated as free from denominational restrictions, save in virtue of express conditions imposed by or under the authority of the founder. The result was that in framing schemes for the reorganization of ancient endowed schools the com- missioners found themselves able to treat the majority of cases as undenominational. In such cases the general practice was to direct that instruction should, subject to a strict conscience clause, be given in the principles of the Christian faith; this provision corresponded in a way to the Cowper-Temple clause in elementary education, with the important distinction that it was positive, not negative, and did not exclude special doctrinal instruction.*

Besides the recommendations for the reform of endowed schools, to which substantial effect was given directly or in- directly by means of

the Endowed Schools Acts, the Schools Inquiry Commission also submitted proposals /f_˚.˚ s for the general administrative organization of a system commis- si secondary education. They recommended the slon's pro- establishment of three authorities — (1) a central posaistor authority; (2) a local or provincial authority, represent- relormot ing the county or a group of counties, with a certain eJˆltfoiˆ jurisdiction both in proposing schemes for the reform of endowed schools in their area (such as that afterwards con- ferred upon the joint education committees under the Welsh Intermediate Education Act), and in administering these schools; and (3) a central council of education charged with examination duties. Further, it was proposed to raise the level of proprietary and private schools by offering them inspection and examination and by establishing a system of school registra- tion. Lastly, in order that the supply of public secondary schools might not be dependent upon endowments, it was proposed to confer upon towns and parishes powers of rating for the estab- lishment of new schools. For these proposals as a whole the time was not ripe. The bill of 1869 as originally introduced in the House of Commons attempted to give effect, with some variations,

to one of these suggestions, namely, that for the creation of a central council, but exigencies of parliamentary time made it necessary to drop this part of the measure; the result was that the plan of the commissioners was only half carried out. Never- theless, owing to the multiplicity and wealth of endowments, the work accomplished was sufficient to exert a considerable influence upon the secondary education of the country. Thus in 1895 Mr Bryce's Commission was able to report that schemes under the Endowed Schools Acts had been made for 902 endow- ments in England, excluding Wales and Monmouth, leaving only 546 endowments out of the total of 1448 endowments in England known to be subject to the Endowed Schools Acts, which had not felt the reforming hand of the commissioners. The total income of the endowments known to be subject to the En- dowed Schools Acts, and therefore available for purposes of secondary education, according to the estimate of the Secondary Education Commission (still in 1909 the latest available source of complete information), was in 1895 about £735,000 gross.

Twenty years after the Schools Inquiry Commission the creation by

the Local Government Act in 1888 of the repre- Techaical sentative and popular county authorities of which the instate- need had been felt by reformers alike in secondary and tiouActs elementary education, rendered the first step in the 1889, &c cJIrection of the municipalization of secondary instruc- tion at last possible. In 1889 the Technical Instruction Act (extended in some particulars by an act of 1891) empowered the councils of counties, boroughs and urban districts to levy a rate (not exceeding a penny in the pound) for the support or aid of technical or manual instruction. Comparatively few councils were prepared to resort to their rating powers, but progress under these acts was greatly facilitated by the Local Taxation (Customs and Excise) Act of 1890, which mentioned technical instruction as one of the purposes to which the imperial contribution paid to local authorities in respect of the beer and spirit duties might be applied. By virtue of the very liberal interpretation given to technical instruction by these acts the financial assistance afforded under them was extended to cover the whole field of mathematical and physical science, as well as modern languages.

The Department of Science and Art acted as an agency in the development of secondary education upon the same lines as Grants of t ˆ le Technical Instruction Acts, administering a parlia- science mentary grant which was gradually extended with a and art view to encouraging literary studies as well as the scientific and mathematical subjects to the promotion of which it was primarily directed. Thus the com- bined effect of the local resources available under the Techni- cal Instruction Act and the imperial grant administered by the department was gradually to develop a national system of secondary education with a marked bias on the side of physical science.

An undoubted stimulus was given to secondary education in the great centres of industry during the last quarter of the Influence I 9 tn century by the rise of the new university colleges, of new among which must be reckoned those established university expressly for women. In the main the influence of co eges. (-jj ese new institutions made for a non-classical and scientific type of curriculum in the popular secondary schools.

At the same time, the pressure of the school boards influenced secondarjr education in two ways. In the first place, the ele- mentary schools were found to act as feeders for influence sc i 10 ols of a higher type, and the idea of the ” educa- boards. tional ladder ” began to play a leading part in plans for the organization of national education. It was seen that there must be schools to which the more

advanced scholars could pass from the public elementary schools, and scholarships to assist such scholars to continue their education in this way. In the next place, it was recognized that to provide adequately for the further education of public elementary scholars a new type of school was required. Thus there came into being through the initiative of the great school boards what were known as higher-grade elementary schools. These

depart' ment.

were really secondary schools of the third grade, and, as the C6mmission on Secondary Education observed, the school boards simply stepped in to fill the educational void which the Schools Inquiry Commissioners had proposed to fill by schools of that name. The happy obscurity of the legal definition of elementary education left these schools free to develop during the long years of the neglect of secondary education by the state, and when in 1901 the famous judgment in the test case of Rex v. Cockerton pronounced them to be illegal, it was at once recognized that the legislature must without delay step in to secure the educa- tional work which the undoubtedly correct principles of judicial interpretation had placed in jeopardy.

Such were the agencies at work in the domain of secondary education when in 1894 a royal commission was appointed under the presidency of Mr Bryce to inquire into this s „.„„/., branch of education. The terms of reference excluded Education elementary education, and the report may be taken Commis as embodying the views of that school of educational s, °"j statesmen who held that progress would best beattained by keeping elementary and secondary education entirely separate for purposes of local administration, the parish being regarded as the natural unit for elementary and the county for secondary education, a topic to which it will be necessary to revert in con- nexion with the act of 1902. The principal recommendations of the commission were: (1) the unification of the existing central authorities, viz. the Department of Science and Art, the Charity Commission (so far as it dealt with educational endowments), and the Education Department, in one central office, and the establishment of an educational council to advise the minister of education in certain professional matters; (2) the establishment of local authorities, to consist of committees of the county councils with co-opted elements; (3) the formation of a register of teachers with a view to the encouragement of professional training, and a system of school registration upon the basis of inspection and examination. The first of these recommendations was carried out by the Board of Education Act 1899, as mentioned

below, and under the same act an attempt was made to give some effect to the third-named object, which, though it unfortunately fell short of success, may serve as a point of departure for further efforts. The realization of the second, and the most important, of the recommendations was deferred till 1902, when it was brought about as a part of a wider reorganization of the educational system.

*The religious difficulty in elementary education during the period immediately succeeding the report of Mr Bryce's Com- mission in 1895 once more reached an acute stage, and * e u at i oa this circumstance was immediately unfavourable to a on behalf resolute handling of educational problems as such, of public attention being largely concentrated upon the v °l'" liar y demand of the supporters of voluntary schools for relief from the growing financial burden which was laid upon them by that steady raising of the standard to which reference has been made above. In 1896 an endeavour was made to meet the demands of the voluntary managers by means of a bill introduced by Sir John Gorst on behalf of the Conservative government. This bill with its provision for a special aid grant to be administered by county education authorities, which were to exist side by side with the school boards, repre- sented a kind of compromise between the systems of 1870 and 1902. It encountered opposition in all quarters and was with- drawn. In 1897, however, the position of the denominational schools was strengthened by the Voluntary Schools Act, which provided for a special aid grant of five shillings per head of the scholars in average attendance in these schools.*

In view of the difficulties which beset any comprehensive treatment of the education question, partial effect was given to the recommendations of the Secondary Education Board of Commission by the Board of Education Act of 1899, Education which abolished the office of vice-president of the Act council, united the Department of Science and Art with the Education Department in one central office under the title of the Board of Education, with a president and parliamentary

secretary; and provided for the transfer to this board of the powers of the Charity Commissioners in relation to educational endowments;

also for the association with the board of a con- sultative committee, consisting as to not less than two-thirds of persons qualified to represent the views of university and other bodies interested in education, for the purpose (i) of framing a register of qualified teachers, and (2) of advising the Board of Education upon any matters referred to the committee by the board. The administrative reorganization of the Educa- tion Office was completed shortly after the passing of the act of 1902, when a tripartite division was adopted to correspond with the three branches of education with which the Board of Education is concerned, viz. elementary, secondary and technological.

No law of recent years has excited an acuter or more prolonged controversy than the Education Act of 1902, and amid the dust Ad of °f religious and political strife it is not easy for con- 1902, temporaries to view it objectively and in its true

general proportions. Nevertheless,ˆ considered historically, principles. t j, e act becomes intelligible as the product of the forces, partly religious and partly educational, which have been already described. The immediate impulse for this measure must be sought in the agitation that during the preceding decade had been gathering force among the adherents of the Established and Roman Catholic churches for equality of financial treatment as between voluntary and board schools. It must be placed to the credit of the constructive statesmanship of the Conservative party that it availed itself of an ecclesiastical agitation to take an important step forward in the organization of national education. The difficulty inherent in such a measure was the admitted difficulty of securing public control, as a neces- sary concomitant of public maintenance, without jeopardizing or destroying the special religious character of the voluntary schools. The act of 1902 sought to solve this problem, so difficult of solution under democratic conditions, upon the principle of a division of financial responsibility justifying a corresponding division of control between the voluntary managers and the local authority. The constitution of the local authority to be charged not only with the delicate duty of participating in the dual control of the voluntary public elementary schools, but also with the responsible task of co-ordinating public higher with public elementary education, presented features of contro- versy only less formidable than the purely religious question itself. Boldly reversing the settlement of 1870, the act of 1902 abolished the parochial school boards, and with them the system of ad hoc election, and made the county councils, already seised of technical and secondary education under the Technical Instruction Acts, the local authorities for all forms of education, thus

reverting to the solution propounded by Conservative statesmanship in the middle period of the 19th century and endorsed by an important memorandum contributed by Lord Sandford (formerly permanent secretary of the Education Department) to the report of the Cross Commission. The unquestionable niggardliness and inefficiency of many small country school boards, which had been foretold by the prescience of theNewcastle Commissioners, constituted the chief educational argument for the selection of the wider area so far as the interests of elementary education alone were concerned. On the other hand, experience has shown that in the rural districts against the undoubted gain in general efficiency there must be set a certain loss on account of the decay of local and personal interest consequent upon the centralization of authority in the hands of the county councils. Account, too, must be taken of the com- parative heaviness with which a uniform county rate is apt to press upon sparsely populated agricultural parishes, especially in counties which include considerable industrial districts. Notwithstanding these minor drawbacks, it may be said that upon the whole the best opinion has endorsed the policy of 1902 with respect to the area of administration. At any rate it has been necessary to recognize the impracticability of disestablishing' the strongly organized provincial authorities which the act brought into being, and proposals for amendment in this par-

ticular have been confined to schemes, favoured in principle by all parties, for securing some measure of decentralization and delegation of powers calculated to restore and stimulate local interest without derogating from the financial and administrative responsibility of the county council.

The principal provisions of the act of 1902 may be summarized as follows: —

*Part I. Local Education Authority. The council of every county and of every county borough is the local education authority for the purposes of the act, i.e. for both higher ,™ and elementary education, but for the purpose of. ele- **

mentary education autonomous powers are conferred upon s " mma O r boroughs with a population of over 10,000, and urban ° pro ~ districts with a population of over 20,000 (§1). visions.

Part II. Higher Education. " The L.E.A. (local education authority) shall consider the educational needs of their area and take such steps as seem to them desirable, after consultation with the Board of

Education, to supply or aid the supply of education other than elementary, and to promote the general co-ordination of all forms of education." For this purpose the application of the money received by the local authority under the Local Taxation (Customs and Excise) Act 1890, heretofore optional, is made compulsory, and power is given to levy a rate which in the case of a county is not to exceed two pence in the pound, or such higher rate as the county council with the consent of the Local Government Board may fix (§ 2). Concurrent powers are given to the councils of non-county boroughs and urban districts, with the limit of a penny rate (§3). A council must not require any particular form of religious instruction or observance, but the usual conscience clause in schools, colleges, or hostels provided by the council is modified by a provision for facilities for any particular religious instruction to be given at the request of parents of scholars at such times and under such conditions as the council think desirable, otherwise than at the cost of the council (§ 4).

Part III. Elementary Education. (1) Powers and duties. School boards and school attendance committees are abolished and their powers and duties are transferred to the L.E.A. , who are also to be responsible for and have the control of all secular instruction in public elementary schools not provided by them (§5).

(2) Management of schools, (a) For public elementary schools provided by the L.E.A. (now officially styled " council schools "): (1) in counties, there is to be a body of six managers, viz. four appointed by the county council and two by the borough or urban district council, or parish council or parish meeting as the case may be, called in the act the minor local authority; (2) in non-county areas, the L.E.A. (being- the borough or urban district council) may, if they think fit, appoint a body of managers consisting of such number as they may determine (§ 6 [1]).

(6) For schools not provided by the L.E.A. (voluntary schools) the act directs that there shall be a body of six managers, of whom four are to be " foundation managers," and two are to be appointed as follows: in counties, one by the L.E.A. and one by the minor local authority, and in autonomous boroughs or urban districts both by the borough or urban district council (§6 [2]). Directions for the appointment of foundation managers are given by § 11, which in effect declares that, unless the trust deed of the school provides for the appointment of the required number, the foundation managers must be appointed under an order of the Board of Education, in making which the board are to have regard to the ownership of the

school building and to the principles on which the education given in the school had been conducted in the past. It was found necessary for the board to make over 1 1 ,000 of these orders, a heavy task which was rendered the more formidable by the controversial character of the questions arising upon trust deeds as to the mode of appointment and the qualifications of managers.

(3) Maintenance of schools (§ 7). (a) Powers. The L.E.A. are required to maintain and keep efficient all public elementary schools which were necessary (i.e. which, as defined by § 9, have an average attendance of not less than thirty), under certain specified conditions, of which the most material are as follows. The managers must cr.rry out the directions of the L.E.A. as to the secular instruction to be given in the school, including any directions with respect to the number and educational qualifications of the teachers, and for the dismissal of any teacher on educational grounds (§ 7 [1] [a]). The consent of the L.E.A. is required to the appointment of teachers, but that consent may not be withheld except on educational grounds; and the consent of the authority is also required to the dismissal of a teacher unless the dismissal is on grounds connected with the giving of religious instruction (§7 [1] [c]).

(b) Liabilities. The managers are required to provide the school premises to the L.E.A. for use as a public elementary school free of charge, except that a rent is payable for the teacher's residence where one exists; and the managers are further required out of funds provided by them to keep the school premises in good repair and to make such alterations and improvements in the buildings as might reasonably be required by the L.E.A. On the other hand, the L.E.A. are required to make good such damage as they consider to be due to fair wear and tear of rooms used by them (§ 7 [1] [d]).

Thus, byjjvirtue of the teacher's house rent and the wear-and-tear allowance the voluntary managers secured a valuable set-off against the cost of ordinary repairs.

Any question arising under this section (§ 7) between the L.E.A. and the managers of a voluntary school is to be determined by the Board of Education (§ 7 [3]).

It is further provided with respect to teachers in voluntary schools that assistant teachers and pupil teachers may be appointed " if it is thought fit " without reference to religious creed and denomination, and in any case in which there are more candidates for the post of pupil teacher than there are places to be filled, the appointment is to be made by the L.E.A. (§ 7. [5]).

A provision, § 7 (6), known from the name of its author (d. 1908), Colonel Kenyon Slaney, M. P., as the Kenyon-Slaney clause, attracted considerable attention and formed the subject of much ecclesiastical controversy during the passage of the bill through parliament. The Kenyon-Slaney clause requires the religious instruction in voluntary schools to be in accordance with the provisions (if any) of the trust deed, but also to be under the control of the managers as a whole, whereas the common form of trust deed of the National Society reserves the control of religious instruction to the clergyman, whilst the clause was equally in conflict with the well-known sacer- dotal principles of the Roman Catholic Church. Thus the clause represented a revival, as did the questions with respect to foundation managers, of the eariy controversy over the management clauses of the Committee of_ Council on Education. Its special interest lies, not so much in its intrinsic importance, as in the precedent it affords, specially notable as emanating from a Conservative source, for the overruling of trust deeds upon grounds of public policy. By way of saving another familiar provision of the trust deeds, a proviso to the Kenyon-Slaney clause reserves the existing trust-deed rights of appeal to the bishop or other denominational authority as to the character of the religious instruction.

Provision of New Schools. — New schools may be provided either by the L.E.A. or any other persons, subject to the issue of three months' public notice, and to a right of appeal on the part of the managers of any existing school, the L.E.A. (in the case of proposed voluntary schools) or any ten ratepayers of the district, to the Board of Education on the ground that the proposed school is not required, or that a school provided by the L.E.A., or not so provided, as the case might be, is better suited to meet the wants of the district than the proposed school. Any enlargement of a public elementary school which in the opinion of the Board of Education is such as to amount to the provision of a new school is to be so treated for the purposes of the section, and any transfer of a school to or from the L.E.A. must be treated as the provision of a new school. In deciding appeals as to new schools and in determining a case of dispute whether a school was necessary or not, the board are directed to have regard to the

interest of secular instruction, the wishes of parents as to the education of children, and the economy of the rates, but existing schools are not to be considered unnecessary if the average attendance is not less than thirty (§§ 8-9). The last-mentioned canons have played a prominent part in subsequent discussions. Experience of these sections has shown that though it is extremely difficult to set up new voluntary schools in face of opposition from the L.E.A., such opposition is rarely offered or pressed where any really strong local demand is shown to exist.

Aid Grant. — Section 10 provides a new aid grant payable to the L.E.A. in respect of the number of scholars in average attendance in schools maintained by them. This new grant, calculated by an elaborate method which need not here be set out, took the place of the grants under the Voluntary Schools Act 1897, and § 97 of the act of 1870 as amended by the Elementary Education Act 1897.

Education Committees. — The constitution of education committees is dealt with by § 17. All councils having powers under the act, except those having concurrent powers as to higher education only, must establish education committees in accordance with schemes made by the councils and approved by the Board of Education (§ l 7 [1])• A scheme may provide for more than one education committee under a single council, but before approving such a scheme the board must satisfy themselves that due regard is paid to the importance of the general co-ordination of all forms of education (§ 17 [6]). All matters relating to the exercise by a council of their powers under the act, except the power of raising a rate or borrowing money, stand referred to the education committee; the council may also delegate to the education committee any of their powers other than financial powers as above (§ 17 [2]). Every scheme must provide (a) for the appointment of a majority of the committee by the council, the persons so appointed to be persons who are members of the council unless in the case of a county the council otherwise determine ; (b) for the appointment by the council, on the nomination or recommendation, where it appears desirable, of other bodies (including associations of voluntary schools) of persons of experience in education, and of persons acquainted with the needs of the various kinds of schools in the area of the council; (c) for the inclusion of women. Provision was also made (d) for the representation in the first instance of members of existing school boards (§ 17 [3]).

Expenses. — All parliamentary grants are made payable to the L.E.A. instead of as previously to the managers (§ 18 [2]). The

cpunty council must charge a proportion of all capital expenditure

and liabilities, including rent, on account of the provision or improve- ment of any public elementary school on the parish or parishes which in the opinion of the council are served by the school, such proportion to be not less than one-half or more than three-fourths as the council think fit (§ 18 [1] [c] [d]). The county council may also if they think fit charge on the parishes benefited any expenses incurred with respect to education other than elementary (§ 18 [I] [a]).

Endowments. — The act introduced a new principle into the administration of endowments by directing that their income so far as necessarily applicable in any case for those purposes of a public elementary school for which the local authority are liable must be paid to that authority for the relief of the parochial rate (§ 13). As the result of technicalities of legal interpretation the section has been found to have in practice a narrower scope than had been generally anticipated.

Tfte act of 1902 was extended to London by a separate act in 1903, containing certain special provisions of only minor importance.

The hostility of Nonconformists to the extension of rate-aid to denominational schools led to the organization upon a consider- able scale of what became known as the ” Passive „_ . Resistance ” movement, a number of Nonconformist res /s<- rate-payers refusing to pay the education rate on the ance " to ground that their consciences forbade their supporting 1902 acU the religious teaching in denominational schools; ^'

When the liberal party came into power again in 1906, Mr Birrell as president of the Board of Education in Sir Henry Campbell-Bannerman’s administration introduced a bill to amend the Education Acts 1902-1903, with K0 £ m the object of securing full public control of all rate- aided schools and the appointment of teachers without reference to religious belief. The bill was of a highly complex character; its principal features were, — compulsory transfer of existing voluntary schools to the local authority, facilities for the giving of denominational instruction in transferred schools out of school hours by persons other than the regular teachers, and the re- cognition in populous districts, upon the demand of parents, of special publicly maintained schools in which denominational teaching could be included in the curriculum ; the latter schools might (according to the bill as finally amended) in the last resort, i.e.

if the local authority refused to maintain them, be recognized as state-aided schools. The bill encountered strong opposition from Anglicans and Catholics (though the Catholic Irish members finally voted for it as amended) ; it passed the House of Commons by a large majority, but after unavailing attempts at compromise upon the amendments introduced in the House of Lords, the two Houses failed to agree and the measure was lost.

Mr Birrell was soon transferred to another office, and nothing more was done to amend the act of 1902 till early in the session of 1908, his successor Mr McKenna introduced a bill based on what was known as " contracting out." In 1908. single-school parishes the existing schools were to be compulsorily transferred, subject to the grant of denominational facilities out of school hours; elsewhere a sufficiency of places in schools with Cowper-Temple teaching, which the bill proposed to make compulsory in all provided schools, must be supplied by the local authority, while existing voluntary schools might become state-aided schools upon terms of receiving a grant of 47s. per head. The bill was accompanied by a financial scheme for a new system of allocating the parliamentary, grant. In view of the improbability of its passing into law the bill was

not pressed beyond the stage of second reading. Meanwhile, when Mr Asquith reorganized thecabinet, Mr Runcimansucceeded Mr McKenna at the education office, and in the autumn he introduced a fresh measure framed as the result of negotiations between the government and the archbishop of Canterbury (Dr Randall Davidson) and designed to be passed rapidly through parliament by consent of all parties. Mr Runciman's bill, like his predecessor's, was based upon the principle of compulsory transfer in single-school parishes and contracting out elsewhere, but it gave a right of entry for denominational teaching on two days a week during school hours in all council schools whether transferred voluntary schools or otherwise, with liberty to employ for this purpose assistant teachers, but not (save temporarily at first in transferred schools) head teachers. Provision was also made for the payment of a small rent which would be applicable for or towards the cost of the denominational instruction. Unfortunately, the compromise failed at the last moment for want of agreement as to the financial terms of "*

contracting out," the government offering 50s. per head and the Church demanding 7s. more. It is obvious that " contracting out " is open to serious objection upon educational and economic grounds, and that if resorted to upon any very considerable scale it would involve a disruption of the public elementary system, and a duplication of schools which would constitute a wasteful drain upon the national exchequer. Upon such a system, therefore, some check is necessary, and, once decided that the check should take the form of financial pressure, rather than request of parents as in Mr Birrell's bill, or some form of administrative control, the question of pecuniary terms became one of principle and not merely of financial detail. Moreover, the difficulty of adjusting differences was intensified by the opposition of the extremists on either side, which daily gathered force, and the bill was withdrawn by the government when in committee of the House of Commons. The conciliatory efforts of Mr Runciman and Dr Randall Davidson revealed the existence of a considerable body of influential opinion among all schools of thought in favour of a national compromise, and the proposals embodied in the bill marked on the part both of Churchmen and Nonconformists important concessions to each other's views, engendering reasonable hopes of an ultimate settlement being reached at no distant date.

Two subsidiary points as regards educational machinery have to be noted. The Education (Provision of Meals) Act 1906

enabled local education authorities to aid voluntary school ° a g enc i es m the provision of meals for children attending children, public elementary schools, and in certain cases with*

the consent of the Board of Education to defray the cost of the food themselves. In 1007-1908 forty, and in 1908-1909 seventy- five authorities in England and Wales were authorized by the board to expend moneys from the rates on food under this act. In addition, a number of authorities expended funds on equipment and service.

In 1907 an uncontroversial act entitled the Education (Administrative Provisions) Act, besides dealing with various matters

of technical and administrative detail, laid upon local 'inspec- education authorities the new duty of providing for tloa. the medical inspection of all children attending public

elementary schools. In connexion with this act the Board of Education established a medical department to advise and assist

them in supervising local education authorities in carrying out their statutory duties in this regard. The whole departure is significant of the new sense of the importance of physical culture and hygiene which has been one of the remarkable features in recent educational developments.

Sir Joshua Fitch, in his article on education in the 10th edition of this work, describes how experience had led the General Education Department to abandon the system of progress payment by results, to establish " in place of testing in ele- th.e proficiency of individual scholars, . . . one sum- education. ™ aT y estimate of the work of the school; in place of

an annual examination, occasional inspection without notice; in place of a variable grant dependent on a report in

detail on the several subjects of instruction and on particular educational merits and defects, one block grant payable to all schools alike." He at the same time expressed some misgiving as to the effect of " so large a relaxation of the conditions by which it had hitherto been sought to secure accuracy and thoroughness in teaching." The act of 1902, by placing secular education in public elementary schools under the control of strongly organized local education authorities may be said to have largely removed such dangers as were to be apprehended from the relaxation in question. Thus it was possible for the Board of Education in the code of 1904 to abolish the last traces of the system of payment by results, by setting forth (in the language of their report for 1903-1904) " a properly co-ordinated curriculum suitable to the needs of the children, with an indica- tion of the relation which the various subjects of instruction should bear to each other, in place of the relatively haphazard list of, possible branches of knowledge which were formerly presented to the choice of individual schools or authorities." In the new code also the board for the first time endeavoured to state for the guidance of teachers and parents the proper aim of the public elementary school, laying stress upon that element of the training of character which the system of payment by results had so unfortunately obscured. The new spirit was strikingly manifested in the volume of Suggestions for the Con- siderations of Teachers, issued by the Board of Education in 1905. This volume represented a notable attempt to connect admini- stration with educational theory, without in any way seeking to crush individual initiative, or to impose a bureaucratic uniformity of method upon those engaged in the actual work of the schools. Apprehension of the true aim of elementary education as essentially and primarily a

preparation for practical life has led to a corresponding development of instruction of a practical character, observation lessons and nature study being treated as a necessary element in the curriculum, while handicraft and gardening, and domestic subjects (for girls), are encouraged by special grants. Particular attention has been bestowed both by the central and local authorities upon the problem of rural instruction, and much has been done in many areas to bring the schools into closer relations with the needs of agricultural and rural life generally. In this way the old and perhaps not alto- gether ill-founded distrust of popular education as tending to unfit the working classes for industrial pursuits is being broken down and a public opinion more favourable to educational progress in the widest sense is being created.

According to the official returns for 1907-1908, the total num- ber of scholars on the registers (England only) was as follows: — council schools, 2,991,741; voluntary schools, 2,566,030; total, 5,557,771, and the total attendance upon which grant was paid was 4,928,659. The percentage of actual average attendance to average number on the registers was 88-50%. The parliamentary grant (England and Wales) for elementary schools, other than higher elementary, amounted to £11,023,433.

The development of higher elementary education in England is now proceeding very much upon the lines that have been noted in France. The old higher-grade board-schools Higher (declared illegal under the Elementary Education Acts element- by the judgment in the case of Rex v. Cockerton in ary 1901, and legalized temporarily by an act passed for the purpose in the same year) were mostly converted into municipal secondary schools under the act of 1902. In the succeeding years provision was made in the code for higher elementary schools of a specialized and technical type intended only for industrial districts. In 1906, as the result of the re- commendations of the Consultative Committee, a new type of higher elementary school was admitted for children over twelve, corresponding generally to the French Scole primaire supSrieure, described as having " for its object the development of the education given in the ordinary public elementary school, and the provision of special instruction bearing on the future occupa- tions of the scholars, whether boys or girls." It may be possible to supplement this system in the rural areas to some extent by " higher tops " to the ordinary elementary schools in cases

[ENGLAND

where it is not practicable to establish a fully organized higher elementary school; but for such " higher tops " no central grant is available. The total number of scholars upon the registers of higher elementary schools (England) in 1907-1908 was: New Type, 3178 (against 2715 in the previous year); Old Type, 4492 (against 5866 in the previous year).

The total expenditure (exclusive of capital outlay) of the local authorities (1906-1907) in England only upon elementary Expeadi- education, including " industrial " and " special " tore on e/e- schools, was £i9,776,733> 0I which (a) £10,408,242 mentary was me t by the ordinary parliamentary grant, and education. ˆ £8,930,468 was the balance required to be met by rates, the difference being represented by receipts from various sources. The average cost per child of elementary schools in England and Wales (excluding London) may be taken at £3 (including London £3, 4s. iod.), and the average central grant (excluding grants for special purposes) at 41s., leaving 19s. to be raised locally.

The training of teachers for the two great branches ef public education, elementary and secondary respectively, is an import-

„ ant part of the general administrative problem.

aty train- Since the middle of the 19th century there has been ingot a great development of public opinion with regard

elementary t0 their professional qualifications. Sir Joshua Fitch (Ency. Brit. 10th ed.) pointed out that the full apprecia- tion of the importance of training began at the lower end of the social scale. Shuttleworth and Tufnell in 1846 urged the necessity of special training for the primary teacher, and hoped to establish State Training Colleges to supply this want; but the one college at Battersea which was founded as an experiment was soon transferred to the National Society (the " National Society for educating the poor in the principles of the Estab- lished Church": founded in 1S11). Before this, Bell and Lancaster had made arrangements in their model schools for the reception of a few young people to learn the system by practice. In Glasgow, David Stow, who founded in 1826 the Normal Seminary which afterwards became the Free Church College, was one of the first to insist on the need of

systematic professional preparation. The religious bodies in England, notably the Established Church, availed themselves promptly of the failure of the central government, and a number o.f diocesan colleges for men, and separately for women, were gradually established. In 1854 the British and Foreign School Society (founded 1808) placed their institutes at the Borough Road and Stockwell on a collegiate footing, and subsequently founded other colleges at Swansea, Bangor, Darlington and Saffron Walden; the Roman Catholic Church provided two for women and one for men; and the Wesleyans two, one for each sex. The new provincial colleges of university rank were invited by the Education Department to attach normal classes to their ordinary course and to make provision for special training and suitable practice in schools for those students who desired to become teachers. Thus the government came to recognize two kinds of training schools — the residential colleges of the old type and the day colleges attached to institutions of university rank; both were subsidized by grants from the Treasury, and regularly inspected. As the need of special training for teachers became further recognized by the consideration of the same question as regards teachers in higher and intermediate schools (Cambridge instituting in 1879 examinations for a teacher's diploma, and other universities providing courses for secondary as well as primary teachers, and establishing professorships of education), the attitude of the government, i.e. the Board of Education, towards the problem gradually became more and more a subject of controversy and of public interest, as indicated by the clause in the Act of 1899 providing for a public registration of qualified teachers and for the gradual elimination from the profession of those who were unqualified. And meanwhile the increased solidarity of the National Union of Teachers (founded in 1870), the trade union, so to speak, of the teachers, brought an im- portant body of professional opinion to bear on the discussion of their own interests.

The question of the preliminary education of elementary teachers had after some years of discussion reached a critical stage in 1909. The history of pupil teachership as a method of concurrent instruction and employment shows that it was in its inception something in the nature of a makeshift; the ideal placed before local education authorities in the recent regulations and reports of the Board of Education is the alternative system whereby with the aid of national bursaries (instituted in 1907) " the general education of future teachers may be continued in secondary schools until the age of seventeen or eighteen, and all attempts to obtain a practical experience of elementary school work may be deferred until the

training college is entered, or at least until an examination making a natural break in that general education and qualifying for an admission to a train- ing college has been passed." Under the revised pupil-teacher system established by the regulations of 1903 provision is made for the instruction of pupil teachers in centres which as far as possible are attached to secondary schools receiving grants from the Board of Education under the regulations for secondary schools, about two-thirds of the secondary schools on the grant list undertaking this work. Accordingly, the result of recent changes is to modify the old system in two ways: first by pro- viding the alternative of a full course of secondary education, secondly by associating pupil teachership itself as far as possible with part-time attendance at a secondary school. The total number of pupil teachers recognized during the year 1907-1908 was 20,571, and of these 9770 were in centres forming integral parts of secondary schools. The number of bursars who passed the leaving examination was i486.

One of the principal difficulties which confronted the state and the local authorities in their task of organizing an improved system of public education under the act of 1902 lay in the deficiency of training colleges in view of co/feses the increased number of teachers. Local authorities naturally hesitated to burden themselves with the cost of providing such institutions in view of the fact that there is nothing to prevent teachers trained at great expense by one authority taking service under a less public-spirited authority who had contributed nothing to such training; hence a wide- spread feeling that the provision of training colleges should be undertaken by the state as a matter of national concern. Under these circumstances a new system of building grants in aid of the establishment of training colleges was instituted in 1905. In 1906 these grants were raised from 25 to 75 % of the capital expenditure, but were limited to colleges provided by local authorities. A further difficulty in view of the municipalization of education arose from the fact that the majority of the re- sidential colleges were in the hands of denominational trusts which did not admit a conscience clause. Under the presidency of Mr McKenna in 1907, the Board of Education, in regulations which excited much controversy, " .with a view to throwing open as far as possible the advantages of a course of training in colleges supported mainly by public funds to all students who are qualified to profit by it irrespective of religious creed or social status," laid down that the application of a candidate might in no circum- stances he rejected on any religious ground, nor on the ground of social antecedents or the like. The same regulations*

provided that no new training colleges would be recognized except on terms of compliance with certain conditions as to freedom from denominational restrictions or requirements. The obligation as to religious exemptions has since been limited to 50 % of the admissions. There were in attendance {Statistics, England, 1907-1908) in the various colleges, 6561 women and 2835 men, of whom 1619 women and 335 men were in colleges provided by local education authorities. The grants made by the Board of Edu- cation for training colleges were as follows: maintenance grants £383,851 ; building grants £45,000. These figures include Wales. The fear has been widely entertained that a considerable part of the national expenditure upon elementary education is wasted for want of an effective system cf continuative instruction to be given out of working hours to adolescents engaged in industrial employment. The whole subject was exhaustively

treated by the report in 1909 of the Consultative Committee of the Board of Education. This report seeks to base an efficient

continuative system upon the improvement of Contiaua- elementary education by reducing the size of the 'education, classes in the elementary schools upon the lines

now laid down by the new staffing regulations of 1909; by increasing the amount of instruction in hand-work with a view to rendering the curriculum less bookish and more efficient as a training for industrial and agricultural life; and by legislation to reform the system of half-time attendance and raise the age of compulsory attendance to thirteen and ulti- mately fourteen. Upon the foundation of an improved and prolonged elementary education there would be reared a super- structure of continuative schools or classes, attendance at which up to seventeen would be compulsory under bye-laws adoptive locally at the option of the local education authorities. In 1906-1907 about 2 1 per thousand of the population of England and Wales attended evening schools and classes inspected by the Board of Education, and grant amounting to £361,596 was paid in respect of 440,718 regular attendants.

The most marked progress has undoubtedly been in secondary

education, and in no direction has the act of 1902 proved more

fruitful. At the end of the 19th century secondary edacatiom instruction in England was still provided chiefly by

endowed grammar-schools, by proprietary schools established by religious bodies or joint-stock companies, and by private enterprise. No public provision was made for secondary education as such; what financial assistance was forthcoming from municipal sources was given indirectly Under cover of the grants under the Technical Instruction Acts, while in the ad- ministration of central grants for the first years of the working of the Board of Education Act 1899, no absolute differentiation between secondary and technological functions was recognized. The establishment of local authorities with direct duties in respect of secondary education, and the reorganization of the central office with reference to the three branches of education, ele- mentary, secondary and technological, rendered possible for the first time an adequate treatment of the problem of public secondary education as a whole. " The regulations for secondary schools," says the prefatory memorandum to the regulations of the Board of Education, " grew up round the old provisions of the Directory of the Science and Art Department. Detached science classes were gradually built up into schools of science. Schools of science were subsequently widened into schools of what was known as the ' Division A ' type, providing a course of instruction in science in connexion with, and as part of, a course of general education. Aid was afterwards extended to schools of the ' Division B ' type in which science did not form the preponderating element of the instruction given. In 1904 the board recast the regulations so as to bring all schools aided by grants within the general definition of a school offering a general education up to and beyond the age of sixteen through a complete graded course of instruction, the object of which should be to develop all the faculties, and to form the habit of exercising them." Two main tendencies distinguish the recent development: on the one hand the tendency to municipalization, or at least to the establishment of public control; on the other hand the tendency (marked especially by the regulations of 1907) to greater elasticity in regard to curricula, and so to the freer encouragement of local initiative and local effort.

In 1907 the government of Sir Henry Campbell-Bannerman placed greatly increased funds at the disposal of the Board of Education for the purpose of secondary education. The regula- tions under which the increased grant was administered imposed conditions in respect of freedom from denominational restrictions or requirements,

representative local control, and accessibility to all classes of the people, which, like the' analogous rules with regard to training colleges, roused considerable controversy. With regard to religious instruction, the requirement was made that no catechism or formulary distinctive of any particular religious denomination might be taught in the school except upon the request in writing of the parent or guardian and at the cost of

funds other than grants of public money. Power was at the same time reserved to the board to waive the new conditions in the event of the local education authority passing a resolution that the school was in their view required as part of the secondary school provision for their area, and that the conditions, or one or more of them, might be waived with advantage in view of the educational needs of the area. It will be noticed that one effect of the regulations (as of the training college regulations) was to recognize as a kind of established religion those elements of Christianity which are shared in common by the various Protestant churches, according to the system of Lancaster and the Cowper-Temple compromise. Normally schools are required to provide 25% of free places for scholars from public elementary schools, and, with a view to encouraging the transference of children from the public elementary school at an early age, a grant of £2 was made payable on account of ex-public elementary scholars between ten and twelve years of age. The full scale of grants is £2 for ex-public elementary scholars between ten and twelve, and £5 for scholars between twelve and eighteen. To schools previously recognized and failing to comply with the new conditions, grant may be paid on the lower scale of £2 and £2, 10s. respectively.

Secondary school grants are assessed upon average attendance, and efficiency is guaranteed by inspection and not by individual examination. All recognized schools must provide at least the substantial equivalent of the four-years' course formerly required, and recognition is' withheld or withdrawn if an adequate number of the scholars do not remain at least four years in the school, or do not remain up to sixteen; in rural areas, however, and small towns, a school life of three years and a leaving age of fifteen may be accepted. " The board are now in a position, through their inspectorate, to keep a watch and exercise a guidance which were previously impossible over the planning and working of school curricula. Detailed reports following upon full inspections, and the more constant if less obvious influence exercised through informal visits, conferences, reports and suggestions, may now be relied upon to guard against the risks of one-sided education, of ill-balanced schemes of instruction, and of premature or excessive specialization

" (Report of Board of Education, 1906-1907, page 68). The curriculum must provide instruction duly graded and duly continuous, in the English language and literature, in geography and history, in mathematics, science and drawing, and in at least one language other than English. Where two languages other than English are taken, Latin must ordin- arily be one. Provision must be made for organized games, physical exercises and manual instruction, and in girls' schools science and mathematics other than arithmetic may be replaced by an approved scheme of practical housewifery for girls over fifteen. The total number of secondary schools recognized for grant (Statistics, 1907-1908) was 736, of which only 220 were directly provided by local authorities. The number of pupils in attendance was 68,104 boys and 56,359 girls, total 124,463. The government grants for 1907-1908 amounted to £320,873 besides grants from local authorities.

Wales. Notwithstanding the important differences which exist between the social and especially the religious conditions of England and Wales respectively, Wales continued to be treated as one with England for purposes of educational administration down to quite recent years. Towards the end of the 19th century the striking revival of Welsh nationality, in itself largely an educational and a literary movement, led to a spontaneous demand among the Welsh people for the organization of a national system of higher education. In accordance with the recommendations of a special royal commission the Welsh Intermediate Education Act passed in 1889 provided for the creation in every county in Wales (including Monmouthshire) of joint education committees consisting of three nominees of the county council and two nominees of the lord president of the council. To these com- mittees were entrusted the duties of framing (under the Charity Commissioners) schemes for the establishment of intermediate

and technical schools and for the application of endowments, and for administering a §d. county rate, which was supplemented by a treasury grant not exceeding the amount raised by the rate. Certain supervisory functions were entrusted to a Central Educa- tion Board, to which are committed the duties of inspection and examination. The joint education committees have now (except for the purpose of

framing schemes for endowments) been super- seded by the local education authorities under the act of 1902. The public assistance afforded to secondary educaton in Wales under the Intermediate Act is supplemented by the grants of the Board of Education, and the Board's revised Secondary School Regulations were applied to Wales in 1908. There were (1907- 1908) 92 county secondary schools in Wales administered under schemes made under the Welsh Intermediate Act, attended by 6235 boys and 6727 girls, total 12,962; and 12 other secondary schools, of which 8 were provided by local authorities. The total attendance at all secondary schools was 13,615, viz. 6819 boys and 6796 girls. The Board of Education grant amounted to £31,090. The expenditure of the local authorities for the year 1906-1907 was £85,242.

The number of scholars on the registers of ordinary public elementary schools in Wales was (Statistics, 1 907-1 908), in council schools 330,413, and in voluntary schools 100,290, total 430,703. The percentage of average attendance was 86-98. The ordinary parliamentary grant (1906-1907) was £794,161, and the net expenditure of local authorities £561,234.

In 1907 a Welsh department of the Board of Education was established with a permanent secretary and a chief inspector, each responsible directly to the president. A movement was in progress in Wales in 1908-1909 for the creation of a national council of education under an independent minister, but this change could in any case only be effected by legislation; and meanwhile the special religious and social conditions in Wales caused administra- tive difficulties in working an act (that of 1902) primarily designed to meet those prevailing in England. (G. B. M. C.)

United States. History. — The first white settlers who came to North America were typical representatives of those European peoples who had

*made more progress in civilization than any other aiags'. * n tne wor ld. Those settlers, in particular those*

from England and from Holland, brought with them the most advanced ideas of the time on the subject of education. The conditions of life in the New World emphasized the need of schools and colleges, and among the earliest public acts of the settlers were provisions to establish them. The steps taken between 1619 and 1622 to provide schools for the colony of Virginia were frustrated by the Indian war which broke out in the latter year, and were never

successfully renewed during the colonial period. In New York, where the influence of the Dutch was at first predominant, elementary schools were maintained at the public expense, and were intended for the education of all classes of the population. This policy reflected the very advanced views as to public elementary education which were then held in the Netherlands. The assumption of control in the colony of New York by the English was a distinct check to the development of public elementary education, and little or no further progress was made until after the Revolution. The most systematic educational policy was pursued in the colony of Massachusetts. As early as 1635, five years after it was founded, the town of Boston took action to the end that " our brother Philemon Pormort shall be entreated to become school- master for the teaching and nurturing children with us. " The General Court of the colony in 1636 made the first appropriation for what was to become Harvard College, taking its name in honour of the minister, John Harvard, who died in 1638, leaving his library and one-half of his property, having a value of £800, to the new institution. The amount of this appropriation of 1636 (£400) was remarkable in that it was probably equal to the whole colony tax far a year. In 1642 followed a legislative act which, while saying nothing of schools, gave to the selectmen in every town power to oversee both the education and the

employment of children. It is made the duty of the selectmen to see that the children can read and understand the principles of religion and the capital laws of the country, and that they are put to some useful work.

Five years later, in 1647, was enacted the law which is not only the real foundation of the Massachusetts school system, but the type of later legislation throughout the United States. This epoch-making act, the first of its kind in the world, repre- sented the public opinion of a colony of about 20,000 persons, living in thirty towns. It required every town of fifty house- holders to establish a school, the master of which should be paid either by the parents of the children taught or by public tax, as the majority of the town committee might decide; and it further required every town of one hundred families or house- holders to set up a grammar school in which pupils might be prepared for the " University," as the new institution at Cam- bridge was designated. Moreover, a penalty was attached to neglect of this legislative requirement, in the form of a fine to be devoted to the maintenance of the nearest school. Horace Mann said of the act of 1647: " It is impossible for us adequately to conceive the boldness of the measure, which aimed at universal education through the establishment of free schools. As a fact it had no precedent in the

world's history; and, as a theory, it could have been refuted and silenced by a more formidable array of argument and experience than was ever marshalled against any other institution of human origin. But time has ratified its soundness. Two centuries of successful operation now proclaim it to be as wise as it was courageous, and as beneficent as it was disinterested." The significance of these acts of 1642 and 1647 is that they foreshadow the whole American system of education, including elementary schools, secondary schools and colleges, and that they indicate the principles upon which that system rests. These principles as summarized by George H. Martin in his Evolution of the Massachusetts Public School System are the following: — (1) The universal education of youth is essential to the well-being of the state. (2) The obliga- tion to furnish this education rests primarily upon the parent. (3) The state has a right to enforce this obligation. (4) The state may fix a standard which shall determine the kind of education and the minimum amount. (5) Public money raised by general tax may be used to provide such education as the state requires. The tax may be general, though the school attendance is not. (6) Education higher than the rudiments may be supplied by the state. Opportunity must be provided at the public expense for youths who wish to be fitted for college. These principles have now found expression in the public acts of every state, and upon them education in the United States is founded.

Despite the praiseworthy attempts made in New York, New Jersey and Pennsylvania to develop schools and school systems, very little was accomplished in those colonies which was permanent. The sentiment in the more southern menuˆ colonies was, as a rule, unfriendly to free schools, and nothing of importance was attempted in that section of the country until the time of Thomas Jefferson. Through religious zeal or philanthropy colleges were founded as far south as Virginia, and no fewer than ten of these institutions were in operation in 1776. Their present names and the dates of their foundation are: Harvard University, Massachusetts (1636); College of William and Mary, Virginia (1693); Yale University, Connecticut (1701); Princeton University, New Jersey (1746); Washington and Lee University, Virginia (1749); University of Pennsylvania, Pennsylvania (1749); Columbia University, New York (1754); Brown University, Rhode Island (1764); Rutgers College, New Jersey (1766); and Dartmouth College, New Hampshire (1769). In the colleges the ecclesiastical spirit was at first almost uniformly dominant. The greater number of their students were preparing for the ministry in some one of the branches of the Protestant Church.

These facts caused the grammar schools to take on more and more the character of college-preparatory schools; and when this was brought about they supplied the educational needs of but one portion of the com- munity. As time passed, the interdependence of governmental

and ecclesiastical interests began to weaken in the colonies, and there arose among those who represented the new secularizing tendency a distrust of the colleges and their influence. This gave rise to a new and influential type of school, the academy, which took its name from the secondary schools established in England by the dissenting religious bodies during the latter part of the seventeenth century at the suggestion of Milton. These academies were intended to give an education which was thought to be more practical than that offered by the colleges, and they drew their students from the so-called middle classes of society. The older academies were usually endowed institutions, organized under the control of religious organizations or of self – perpetuating boards of trustees. Their programme of studies was less restricted than that of the grammar schools, and they gave new emphasis to the study of the English language and its literature, of mathematics and of the new sciences of nature. For two generations the academies were a most bene-ficent factor in American education, and they supplied a large number of the better-prepared teachers for work in other schools. These schools were in a sense public in that they were chartered, but they were not directly under public control in their manage- ment. Early in the 19th century there arose a well-defined demand for public secondary schools — high schools, as they are popularly known. They were the direct outgrowth of the elementary school system. Boston, Philadelphia, Baltimore and New York were the first of the large cities to establish schools of this type, and they spread rapidly. These public secondary schools met with opposition, however, springing partly from the friends of the academies, and partly from those who held that governmental agency should be restricted to the field of elementary education. The legal questions raised were settled by a decision of the supreme court of Michigan, which contained these words: " Neither in our state policy, in our constitution, nor in our laws do we find the primary school districts restricted in the branches of knowledge which their officers may

cause to be taught, or the grade of instruction that may be given, if their voters consent, in regular form, to bear the expense and raise the taxes for the purpose." This decision gave marked impetus to the development of public secondary or high schools, and they have increased rapidly in number. The academies have relatively declined, and in the Western states are almost unknown.

Meanwhile the elementary school system had grown rapidly. The school district, the smallest civil division, was created in Connecticut in 1701, in Rhode Island about 175°) and in Massa- chusetts in 1780. From the point of view of efficient, well- supported schools, it has been felt since the time of Horace Mann that the substitution of the small school district for the town as the unit of school administration was a mistake. Yet the school district has exercised a profound influence for good upon the American people. In New York state, for example, there were in 1900 over eleven thousand school districts, and in Illinois over twelve thousand. The districts are small in extent and often sparsely settled. Their government is as democratic as possible. The resident legal voters, often including women, hold a meeting at least once a year. They elect trustees to represent them in the employment of the teacher and the manage- ment of the school. They determine whether a new schoolhouse shall be built, whether repairs shall be made, and what sum of money shall be raised for school purposes. In the rural districts this system has often been itself a school in patriotism and in the conduct of public affairs. Recently the tendency is to merge the school districts into the township, in order that larger and better schools may be maintained, and that educational advantages may be distributed more evenly among the people. Most of the southern states have the county system of school administration. This is because the county, rather than the township, has been the political unit in the south from the beginning. Special laws have been made for the school system in cities, and the form of these laws differs very much. In nearly every city there is a separate board of education, some- times chosen by the voters, sometimes appointed by the mayor

or other official, which board has full control of the schools. The city board of education has as its executive officer a superin- tendent of schools, who has become a most important factor in American educational administration. He exerts great influence in the selection of teachers, in the choice of text-books, in the arrangement of the programme of studies, and in the determina- tion of questions of policy. Sometimes he is charged by law with the initiative in some or all of these matters. He is usually a trained administrator as well as an experienced teacher. The first superintendent was appointed in

1837 a t Buffalo. Provi- dence followed in 1839, New Orleans in 1841, Cleveland in 1844, Baltimore in 1849, Cincinnati in 1850, Boston in 1851, New York, San Francisco and Jersey City in 1852, Newark and Brooklyn in 1853, Chicago and St Louis in 1854, and Philadelphia in 1883. In general, it may be said that the progress of public education in the United States is marked by (1) compulsory schools, (2) compulsory licensing of teachers, (3) compulsory school attendance, and (4) compulsory school supervision, and by the increasingly efficient administration of these provisions. The compulsion comes in each case from the state government, which alone, in the American system, has the power to prescribe it and to enforce it. Each state is therefore an independent educational unit, and there . is no single, uniform American system of education in any legal sense. In fact, however, the great mass of the American people are in entire agreement as to the principles which should control public education; and the points in which the policies of the several states are in agreement are greater, both in number and in importance, than those in which they differ. An American educational system exists, therefore, in spirit and in substance, even though not in form.

Neither in the Declaration of Independence nor in the Con- stitution of the United States is there any mention of education. The founders of the nation were by no means indifferent to education, but they shared the common view of po/fcv' their time, which was that the real responsibility for the maintenance of schools and the expense of maintaining them should fall upon the several local communities. The relation of government to education was not then a subject of ordinary consideration or discussion. Later, when this question did arise and the power of taxation was involved, the several states assumed control of education, as it was necessary that they should do. Nevertheless, from the very beginning the national government has aided and supported education, while not controlling it. This policy dates from the 13th of July 1 787, when there was passed the famous " Ordinance for the Govern- ment of the Territory of the United States North-West of the River Ohio," meaning the territory north and west of the Ohio river now represented by the states of Ohio, Indiana, Illinois, Michigan, Wisconsin, and the eastern side of Minnesota, em- bracing more than 265,000 sq. m. of territory. This ordinance contains this declaration: " Religion, morality, and knowledge being necessary to good government and the happiness of man- kind, schools and the means of education shall for ever be encouraged." The Ordinance of 1787 also reaffirmed the pro- visions of the so-called Land Ordinance of 1785, by which section No. 16 in

every township (a township consists of 36 numbered sections of 1 sq. m. each), or one thirty-sixth of the entire north-west territory, was set aside for the maintenance of public schools within the township. The funds derived from the sale and lease of these original " school lands " form the major portion of the public school endowment of the states formed out of the north-west territory. The precedent thus estab- lished became the policy of the nation. Each state admitted prior to 1848 reserved section No. 16 in every township of public land for common schools. Each state admitted since 1848 (Utah being an exception, and having four sections) has reserved sections No. 16 and No. 36 in every township of public lands for this purpose. In addition, the national government has granted two townships in every state and territory containing public lands for seminaries or universities. A third land grant is that made in 1862 for colleges of agriculture and the mechanical arts. The sum total of these three land grants amounted in

i goo to 78,659,439 acres, to which there must be added various special grants made from time to time to the states and devoted to education. The portion of the public domain so set apart in 1900 amounted in all to 86,138,473 acres, or 134,591 English sq. m. This is an area greater than those of the six New England states, New York, New Jersey, Maryland and Delaware added together. It is a portion of the earth's surface as great as the kingdom of Prussia, about seven-tenths as great as France, and considerably greater than the combined areas of Great Britain (including the Channel Islands) and the kingdom of Holland. Besides the enormous grants of land in aid of education, the national government has maintained since 1802 a military academy at West Point, New York, for the training of officers for the army, and since 1845 a naval academy at Annapolis, Maryland, for the training of officers for the navy. It has also taken charge of the education of the children of uncivilized Indians, and of all children in Alaska. It has voted, by act of 1887, a perpetual endowment of $15,000 a year for each agricul- tural experiment station connected with a state agricultural college, and, by act of 1890, an additional endowment of $25,000 a year for each of the agricultural colleges themselves. The aggregate value of land and money given by the national govern- ment for education in the several states and territories is about

$300,000,000.

In 1867 the Congress established a bureau of education, presided over by a commissioner who is under the jurisdiction

of the secretary of the interior, the purpose of which edition. is declared to be to collect " such statistics and facts

as shall show the condition and progress of education in the several states and territories, and of diffusing such infor- mation respecting the organization and management of school systems and methods of teaching as shall aid the people of the United States in the establishment and maintenance of efficient school systems, and otherwise promote the cause of education throughout the country." The bureau has therefore no direct power over the educational policy of the several states. It has, however, exercised a potent influence for good in its advisory capacity. Up to 1900 this bureau had published 360 separate volumes and pamphlets, including 31 annual reports, covering from 800 to 2300 pages each; and the number has since been much increased. The annual reports alone of the Commissioner of Education are mines of information. These standard works of reference are distributed gratuitously in large numbers to libraries, school officials and other persons interested, and to foreign governments. The several commissioners of education have been: Henry Barnard, 1867-1870; John Eaton, 1870-1886; Nathaniel H. R. Dawson, 1886-1889; William T. Harris, 1 1889-1906; Elmer Ellsworth Brown, 1906-

In the United States the sovereign powers are not all lodged in one place. Such of those powers as are not granted by the state Constitution to the national government are reserved

govern- to the states respectively, or to the people. The power meats and to levy taxes for the support of public education has education. k een almost universally held to be one of the powers so reserved. The inhabitants of the several local communities, however indisposed they may have been to relinquish absolute control of their own schools, have been compelled to yield to the authority of the state government whenever it has been asserted, for except under such authority no civil division — county, city, township, or school district — possesses the power to levy taxes for school purposes. Moreover, since the exercise of state authority has uniformly improved the quality of the schools, it has usually been welcomed, not resisted. In general, it may be said that the state has used its authority to prescribe a minimum of efficiency which schools and

teachers must reach, and it enforces this minimum through inspection and the with- holding of its proper share of the state school fund from any locality where schools or teachers are permitted to fall below the required standard. In extreme cases the state authorities

1 A valuable bibliography of Mr Harris's contributions to educational literature is given in the Report of the Commissioner of Education for 1907 (Washington, 1908).

have interfered directly to prevent the evil results of local inefficiency or contumacy. In addition, the states, almost without exception, maintain at their own expense schools for the training of teachers, known as normal schools. Many of the states also offer inducements to the cities, towns and districts to exceed the prescribed minimum of efficiency. Through the steady exercise of state supervision the school buildings have improved, the standard for entrance upon the work of teaching has been raised, the programme of studies has been made more effective and more uniform, and the length of the school term has increased. The Constitution of every state now contains some provision as to public education. Each state has an executive officer charged with the enforcement of the state school laws. Sometimes, as in New York, this official has plenary powers; sometimes, as in Massachusetts and Ohio, he is little more than an adviser. In twenty-nine states this official is known as the superintendent of public instruction; in Massachusetts and Connecticut he is called secretary of the state board of education; other titles used are commissioner of public schools, superintendent of common schools, and superintendent of public schools. The schools are administered, on behalf of the taxpayers, by an elected board of school trustees in rural school districts, and by an elected (though sometimes appointed) board of education or school committee in cities and towns. In 836 cities and towns there is a local superintendent of schools, who directs and supervises the educational work and acts as the executive officer of the board of education. The schools in the rural districts are under the direct supervision of a county superintendent of schools or similar official, who is often chosen by the people, but who sometimes is named by the state authorities. The county and city superintendents are often charged with the duty of holding examinations for entrance upon the work of teaching, and of issuing licences to those persons who pass the examinations. This system works best where it is carefully regulated by state law. Thirty states, one territory, and the District of Columbia have enacted compulsory education laws, but the enforcement of them is usually very

lax. In fifteen states and territories there are no compulsory education laws, although there are in existence there fully organized school systems free to all children. The usual age during which school attendance is required is from 8 to 14. Provision is made in Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Penn- sylvania, Indiana, Minnesota and Michigan, for sending habitual truants to some special institution. Laws forbidding the employ- ment of children under a specified minimum age in any mercantile or manufacturing establishment are in force in twelve states, and are usually administered in connexion with the compulsory education laws.

The universal establishment in America of public secondary schools (high schools), and the existence of state universities in all of the states south and west of Pennsylvania, have brought into existence a system of state education which reaches from the . kindergarten and the elementary school to the graduate instruction offered at state colleges and universities. This sys- tem includes (1) about 1500 free public kindergartens scattered over fifteen states; (2) free public elementary schools within reach of almost every home in the land; (3) free public secondary schools (high schools) in every considerable city or town and in not a few rural communities; (4) free land grant colleges, sup- ported in large part by the proceeds of the nation's endowment of public lands, paying particular attention to agriculture and the mechanical arts, in all the states; (5) state universities, free or substantially so, in all the states south and west of Penn- sylvania; (6) free public normal schools, for the professional training of teachers, in nearly every state; (7) free schools for the education of defectives in nearly all the states; and (8) the national academies at West Point and Annapolis for the professional training of military and naval officers respectively.

Miss Susan E. Blow, herself the leading exponent of kinder- garten principles in the United States, has pointed out that the history of the kindergarten movement reveals four distinct

Kinder- gartens.

stages in its development: the pioneer stage, having Boston as its

centre; the philanthropic stage, which began in the village of Florence, Mass., and reached its climax at San Fran- cisco, California; the national or strictly educational stage, which began at St Louis; and the so-called maternal stage, which from Chicago as a centre is spreading over the entire country. During the first stage public attention was directed to a few of the most important aspects of Froebel's teaching. During the second stage the kindergarten was valued largely as a reformatory and redemptive influence. During the third stage the fundamental principles underlying kindergarten training were scientifically studied and expounded, and the kindergarten became part of the public school system of the country. The fourth stage, which, like the third, is fortunately still in existence, aims at making the kindergarten a link between the school and the home, and so to use it to strengthen the foundations and elevate the ideals of family life. By 1898 there were 4363 kindergartens in the United States (1365 of which were public), employing 9937 teachers (2532 in the public kindergartens) and enrolling 189,604 children (95,867 in the public kindergartens). Of the 164 public normal schools, 36 made provision for training kindergarten teachers. The scientific and literary activity of some of the private kindergarten training classes is very great, and they exert a beneficial and stimulating effect on teaching in the elementary schools. It is generally admitted that from the point of view of the children, of the teachers, of the schools, and of the community at large, the kindergarten has been and is an inspiration of incalculable value. The elementary school course is from six to nine years in length, the ordinary period being eight years. The pupils enter at about six years of age. In the cities the elementary Element- sc hools are usually in session for five hours daily, "schools. except Saturday and Sunday, beginning at 9 a.m. There is an intermission, usually of an hour, at midday, and short recesses during the sessions. In the small rural schools the pupils are usually ungraded, and are taught singly or in varying groups. In the cities and towns there is a careful gradation of pupils, and promotions from grade to grade are made at intervals of a year or of a half-year. The best schools have the most elastic system of gradation and the most frequent promotions. In a number of states there are laws authorizing the conveyance of children to school at the public expense, when the schoolhouse is unduly distant from the homes of a portion of the school population. Co-education (q.v.) in the elementary school has been the salutary and almost uniform practice in the United States. The programme of studies in the elementary school includes English (reading, writing, spelling, grammar, composition), arithmetic (sometimes elementary algebra also, or plane geometry in the upper grades), geography,

history of the United States, and elementary natural science, including human physiology and hygiene. Physical training, vocal music, drawing and manual training are often taught. Sometimes a foreign language (Latin, German or French) and the study of general history are begun. Formal instruction in manners and morals is not often found, but the discipline of the school offers the best possible training in the habits of truthfulness, honesty, obedience, regularity, punctuality and conformity to order. Religious teaching is not permitted, although the exercises of the day are often opened with reading from the Bible, the repetition of the Lord's Prayer and the singing of a hymn. Corporal punishment is not infrequent, but is forbidden by law in New Jersey, and in many states may be used only under restrictions. Text-books are used as the basis of the instruction given, and the pupils " recite " in class to the teacher, who, by use of illustration and comment, makes clear the subject-matter of the prescribed lesson. The purpose of the recitation method is to make the work of each pupil help that of his companion. Skilfully used, it is the most effectual instrument yet devised for elementary school instruction.

The secondary school course is normally four years in length. The principal subjects studied are Latin, Greek, French, German, algebra, geometry, physics, chemistry, physical geography,

physiology, rhetoric, English literature, civics and history. Although but 11-36% of the students in public high schools and 2 5′ 36% of those in private secondary schools are preparing for a college or scientific school, yet the con- slhoohu 7 ditions prescribed by the colleges for admission to their courses affect powerfully both the secondary school programme and the methods of teaching. Of late years no educational topic has been more widely discussed than that as to the proper relations of secondary schools and colleges. As a result, special examinations for admission to college are either greatly simplified or entirely abolished, and the secondary studies are much more substantial and better taught than formerly. An increasing proportion of secondary school teachers are college graduates. The most extraordinary characteristic of secondary education in recent years is the rapid increase in the number of students taking Latin as a school subject. Meanwhile the proportion of those studying physics and chemistry has fallen off slightly. The rate of increase in the number of pupils who study Latin is fully twice as great as the rate of increase in the number of secondary school students. Between 1890 and 1896, while the number of students in private secondary schools increased 12%, the number of students in public secondary schools increased 87%. Since 1894 the number of

students in private secondary schools has steadily declined.

The American college, although it is the outgrowth of the English colleges of Oxford and of Cambridge, has developed into an institution which has no counterpart in Europe. The college course of study, at first three years in colleges. length, was soon extended to four years, and the classes are uniformly known as the freshman, the sophomore, the junior and the senior. The traditional degree which crowns the college course is that of Bachelor of Arts (A.B .) . The studies ordinarily insisted on in the case of candidates for this degree are Latin, Greek, mathematics, English, philosophy, political economy, history, at least one modern European language (French or German), and at least one natural science. The degrees of Bachelor of Science (B.S.), Bachelor of Philosophy (Ph.B.), and Bachelor of Letters (B.L.) are often conferred by colleges upon students who have pursued systematic courses of study which do not include Greek or the amount of Latin required for the degree of Bachelor of Arts. The best colleges give instruc- tion which is similar in character to that given in Germany in the three upper classes of the gymnasium and in the introductory courses at the universities, in France in the two upper classes of the lycee and in the first two years of university study, and in England in the upper form of the public schools and during the years of undergraduate residence at Oxford and Cambridge. Since 1870 the colleges have developed enormously. Their resources have multiplied, the number of their students has increased by leaps and bounds, the programme of studies has broadened and deepened, the standards have been raised, and the efficiency of the instruction has greatly increased. Rigidly prescribed courses of study have given way to elective courses, and a knowledge of Greek is no longer required for the degree of A.B. at such influential colleges as Harvard, Columbia, Cornell and Williams. A strong effort is being made to have the leading colleges give but one degree, that of Bachelor of Arts, and to confer that upon those who complete any sub- stantial course of college studies. A marked change has taken place in the attitude of the college authorities toward the students. In 1870 the college president was a paterfamilias. He knew each student and came into direct personal contact with him. The president and the faculty had supervision not only of the studies of the students, but of their moral and religious life as well. The older type of college professor was not always a great scholar, but he was a student of human nature, with keen intuitions and shrewd insight. The new type, which had come into existence at the opening of the 20th century, was more scholarly in some special direction, often regarded teaching as a check upon

opportunities for investigation, and disdained troubling himself with a student's personal concerns or intel- lectual and moral difficulties. The change was not altogether

for the. better, and a desirable reaction has been observable. Each college, however small or ill-equipped, exercises a helpful local influence. Ninety per cent of all college students attend an institution not more than one hundred miles from their own homes. Few colleges have a national constituency, and even in these cases an overwhelming preponderance of the students come from the immediate neighbourhood. This explains, in a measure, the powerful influence which the college has exercised in the life of the nation. While hardly more than one in a hundred of the white male youth of the country has had a college education, yet the college graduates have furnished one-half of all the presidents of the United States, most of the justices of the Supreme Court, about one-half of the cabinet officers and United States senators, and nearly one-third of the House of Representatives. Before the Revolution eleven colleges were founded. From 1776 to 1800, twelve more were added; from 1800 to 1830, thirty-three; from 1830 to 1865, one hundred and eighty; from 1865 to 1898, two hundred and thirty-six. Their standards, efficiency and equipment are very diverse, many of the so-called colleges being less effective than some of the better organized secondary schools. Except in New York and Pennsyl- vania, there is no statutory restriction upon the use of the name " college." This is an abuse to which public attention has in recent yeais been increasingly called. 1

In the United States the title " university " is used indis- criminately of institutions which are in reality universities, of

institutions which are colleges, and of institutions The which are so ill-equipped as not to take rank with

stties. good secondary schools. Only time and a greatly

increased capacity to distinguish the various types of higher schools will remedy this error. Putting aside tentative and unsuccessful attempts to develop genuine university instruc- tion much earlier, it may safely be said that the opening of the Johns Hopkins University

at Baltimore in 1876 began the present movement to organize carefully advanced study and research, requiring a college education of those who wish to enter upon it. This is university instruction properly so called, and though found elsewhere, it is given chiefly at fourteen institu- tions: California University, Catholic University of America, Chicago University, Clark University, Columbia University, Cornell University, Harvard University, Johns Hopkins Uni- versity, Michigan University, Pennsylvania University, Princeton University, Leland Stanford Jr. University, Wisconsin Univer- sity and Yale University. All of these institutions, except the Catholic University of America, are also colleges. The com- bination of collegiate and university instruction under one corporation and one executive administration is distinctive of higher education in the United States, and its chief source of strength. The crowning honour of the university student is the degree of Ph.D., although that of A.M. — obtainable in less time and much easier conditions — is also sought. The minimum period of study accepted for the degree of Ph.D. is two years after obtaining the bachelor's degree; but in practice, three, and even four, years of study are found necessary. In addition to carrying on an investigation in the field of his main subject of study, the candidate for the degree of Ph.D. is usually required to pass examinations on one or two subordinate subjects, to possess a reading knowledge of French and German (often of Latin as well), and to submit — usually in printed form — the dissertation which embodies the results of his researches. The methods of instruction in the universities are the lecture, dis- cussion and work in laboratory or seminary — the latter trans- planted from the German universities. The degree of Master of Arts is conferred upon students who, after one year of university residence and study, pass certain prescribed examinations. This degree, like those of D.D., S.T.D. and LL.D., is often conferred by colleges and universities as a purely honorary distinction. The degree of Ph.D. is not so conferred any longer by the best universities. Not a few of the universities maintain

1 See especially the second Annual Report of the President of the Carnegie Foundation for the Advancement of Teaching (pp. 76-80), quoted in the Report for 1907 of the Commissioner of Education.

schools of law and medicine. Harvard and Yale universities maintain schools of theology as well. The learned publications issued by the universities, or under the direction of university professors, are of great importance, and constitute an imposing body of scientific literature. The national and state governments make increasing use of university officials for public service requiring special training or expert knowledge. In 1871-1872 there were only 198 resident

graduate (or university) students in the United States. In 1887 this number had risen to 1237, and in 1897 to 4392. These figures are exclusive of professional students, and include only those who are studying in what would be called, in Germany, the philosophical faculty. (See also Universities.)

Most extensive provision is made in America for professional, technical and special education of all kinds, and for the care and training of the dependent and defective classes (see Blindness and Deaf and Dumb), as well as for the education of the Indian (see Indians, North American), and — in the Southern states — of the negro (q.v.). (N. M. B.)

Statistics. — Details as to education in each state of the Ameri- can Union are given in the articles under state headings. But a more comprehensive view may be obtained here from the general statistics. The introduction to the statistical tables in vol. ii. of the Commissioner of Education's Report foi 1907 may usefully be quoted. Mr Edward L. Thorndike, of the Teachers' College, Columbia University, there summarizes the national account as follows: —

" We use in formal school education a material plant valued at from twelve to thirteen hundred million dollars, the labour of 550,000 teachers or other educational officers, and more or less of the time of some eighteen million students. . . . We pay for the labour of these teachers, many of whom work for only part of the normal city-school year, about $300,000,000. We pay for fuel, light, janitorial services, repairs, depreciation of books, school supplies, insurance and the like, about $90,000,000. For depreciation of the plant not so charged we should properly provide during the year a sinking fund of perhaps $25,000,000. Adding an interest charge of 5% on the investment in the plant, our annual bill for formal school education comes to over $475,000,000. Additions to the plant were made [in 1906-1907] to the extent of from ninety to a hundred million dollars. As a partial estimate of the returns from this investment we may take the number of students whose education has been carried to a specified standard of accomplishment and power. Thus I estimate that, in 1907, 3000 students reached the stanferd denoted by three years or more of academic, technical or professional study in advance of a reputable college degree; that 25,000 students reached the standard denoted by at least three and not over four years of such study in advance of a four-year high-school course; than an eighth of a million students reached the standard denoted by at least three and not over four years of study in advance of an eight-year elementary-school course; and that three-quarters of a

million students reached the standard of completionof an elementary- school course of seven or eight years or its equivalent. . . Roughly, nine-tenths of elementary education and the education of teachers, over two-thirds of secondary education, and over a third of college and higher technical education are provided and controlled by the public. Professional education, other than the training of teachers and engineers, is still largely a function of private provision and control.

" The following rough comparison may serve to define further the status of education in the country at large. The plant used for formal education is valued at 1 % of our entire national wealth, or twice the value of our telephone systems, or ten times the value of our Pullman and private cars, or one-tenth the value of our railroads. The number of teachers is approximately that of the clergymen, engineers, lawyers and physicians together, five times that of the regular army and navy, and about twice that of the saloon-keepers and bar-tenders and their assistants. The annual expenditure for education, exclusive of additions to the plant, is somewhat over twice the expenditure for the war and navy departments of the national government. It is three and a half times the expenditure of the national government in 1907 for pensions. It is about one and a fourth times the cost (New York wholesale prices) of the sugar and coffee we consume annually."

The above comparison indicates perhaps, not inadequately, the " business " conception of the value of education prevailing in the United States, where its practical advantages are realized as in no other- country, not even Germany.

From the same report the following statistics may be cited for 1906-1907.

Common Schools (including Elementary and Secondary Public

Schools only). Total number of pupils of all ages . . 16,820,386 1 Average number of days schools open . . 151-2 Average number of days attended by each

pupil 106-2

Number of male teachers .... 105,773 Number of female teachers ....

369,465 Number of school houses .... 259,115 Average monthly wage of male teachers . $56- 10 Average monthly wage of female teachers . $43-67 Value of all school property .... $843,309,410 Income from permanent funds and rents $16,579,551

Income from State taxes .... $46,281,501 Income from local taxes .... $230,424,554 Income from other sources . . . $50,317,132

Expenditure on sites, buildings, furniture,

libraries and apparatus $65,817,870

Expenditure on salaries $196,980,919

Expenditure on other purposes . . . $67,882,012 Expenditure per head of population . . $3-90

Expenditure per pupil $27-98

The Bureau of Education in 1907 received reports from 606 universities, colleges and technological schools ; they had a teaching force of 24,679, and an enrolment of 293,343 students. The number of public and private normal schools reporting was 259, with an enrolment of 70,439 students in the regular training courses for teachers, 12,541 graduates and 3660 instructors. There were 148 manual and industrial training schools (independently of the manual training taught in the public schools and in 66 Indian schools), with 1692 teachers and an enrolment of 68,427 students; and 445 independent commercial and business schools, with 2856 instructors and 137,364 students. (X.)

Bibliography. — For the study of education as an aspect of religious, social, moral and intellectual development, the material is practically inexhaustible, and much of the most valuable does not treat specifically of the education given in schools and colleges. The most useful guide is E. P. Cubberley's Syllabus of Lectures on the History of Education (1902), which consists of an analytic outline of topics with copious and detailed references to authorities. See also W. S. Monroe's Bibliography of Education (1897). The best general history in English is P. Monroe's Text-Book in the History of Education (1905), which, like Davidson's much briefer History of Education, treats the subject broadly and in relation to other aspects of life. Williams's History of Ancient, Medieval, and Modern Education is a useful statement of the main facts of educational progress taken somewhat by itself. In German the standard work is K. A. Schmid's Geschichte der Eniehung, a comprehensive and detailed

treatment in which each period is dealt with by a specialist. Ziegler's Geschichte der Pddagogik is a good short history. In French, Letourneau's V Evolution de t 'education is especially good on ancient and non-European education. Draper's Intellectual Development of Europe is vigorous and interesting, but marred by its depreciation of the work of the Church. Guizot's History of Civilization is still of value, as are parts of Hallam's Literary History. Lecky's History of the Rise and Influence of the Spirit of Rationalism in Europe, and Buckle's History of Civilization in England, contain much that is of value. The best encyclopaedias are W. Rein's Encyklopddisches Handbuch der Pddagogik, and F. Buisson's Dictionnaire de pedagogie, premiere partie. Sir Henry Craik's The State and Education (1883) is an excellent text-book on national education.

Of books dealing with special periods and topics, S. Laurie's Historical Sketch of Pre-Christian Education, Freeman's Schools of Hellas, pirard's L' Education athenienne au V' el au IV" Steele avant J.-C., Davidson's Education of the Creek People, Mahaffy's Old Greek Education and, Greek Life and Thought, Nettleship's article on " Education in Plato's Republic " in Hellenica, Capes's University Life in Athens, Hobhouse's Theory and Practice of Ancient Education, Grasberger's Erziehung und Unterricht im classischen Alterthum, Wilkin's Roman Education, and Clarke's Education of Children at Rome, are valuable for classical times.

For the somewhat obscure transition centuries there is much of value in Taylor's Classical Heritage of the Middle Ages, Dill's Roman Society in the Last Century of the Western Empire, especially the chapter on " Culture in the 4th and 5th centuries," Boissier's La Fin du paganisme, and Hatch's Influence of Greek Thought upon the Christian Church.

The best general account of medieval education is in Drane's Christian Schools and Scholars; and J. B. Mullinger's Schools of Charles the Great treats well of the Carolingian Revival. G. B. Adams's Civilization during the Middle Ages is excellent; and Sandys' s History of Classical Scholarship is a valuable book of reference. On the scholastic philosophy Turner's History of Philosophy, and Haureau's Histoire de la philosophic scolastique, are useful. Medieval schools are described in Furnivall's preface to The Babees Book, which deals with " Education in Early England,"

1 In private schools there were also 1,304,547 pupils.

and in Leach's Old Yorkshire Schools and History of Winchester College. The most important books on the universities are Rashdall's Universities of Europe in the Middle Ages, Jourdain's Histoire de I'universite de Paris aux XVIP et XV I IP siecles, Lyte's History of the University of Oxford to 1530, and Mullinger's History of the University of Cambridge to the Accession of Charles I. Paulsen's Geschichte des gelehrten Unterrichts auf den deutschen Schulen und Universitdten is the best history of education in Germany.

On the Renaissance in Italy, Villari's Introduction to his Life and Times of Machiavelli, and Burckhardt's Die Kultur der Renais- sance in Ilalien (translated into English), are of the first importance. Other valuable books are the first volume of the Cambridge Modern History and Symonds's great work on The Renaissance in Italy, especially the volume on The Revival of Learning. Dealing more specifically with education are Woodward's excellent monographs on Education during the Renaissance, Vittorino da Feltre and Erasmus. Janssen's Geschichte des deutschen Volkes (translated into English) gives a good account of the social and intellectual condition of Germany in the 14th, 15th and 16th centuries. Christie's Life of ILtienne Dolet is of value for the Renaissance in France. For the movement in England Seebohm's Oxford Reformers, Gasquet's Eve of the Reformation in England, Einstein's The Italian Renaissance in England, and Leach's English Schools at the Reformation, 1546-1548, are particularly important.

For later times the material is chiefly in the form of monographs, of which the following, among others, are of value: Adamson's Pioneers of Modern Education, Laas's Die Pddagogik des Johannes Sturm, Beard's Port Royal, vol. ii., Kuno Fischer's Fr. Bacon und seine Nachfolger, Laurie's John Amos Comenius, Morley's Rousseau, Pinloche's La Reforme de I'iducation en Allemagne au dix-huitieme siicle, Biedermann's Deutschlands geistige, sittliche, und gesellige Zustdnde im XVIII. Jahrhundert.

For the 19th century and after, the best sources of information are the official Reports, such as those of the Royal Commissions on the English Universities, the Public Schools, and the other English secondary schools; the " Special Reports," issued by the English Board of Education; the encyclopaedic annual Reports of the American Commissioner of Education (dealing not only with the United States, but with progress in other countries); monographs in the French Musee pSdagogique, and various German Reports.

For education in the United States, see also Boone's History of

Education in U.S.A. (1889); N. M. Butler (editor), Education in the U.S.A. (1900), a series of monographs prepared for the Paris Exposition; £. G. Dexter's History of Education in the United States (1904) ; and the Proceedings of the National Educational Association.

On the leading writers on education the monographs in the Great Educator Series are useful, and editions and translations of the best known of these writers are available. The greatest systematic collection is the Monumenta Germaniae paedagogica. On the development of the means of education, Montmorency's two books on State Intervention in English Education from the Earliest Times to 18 j j , and ThetProgress of Education in England, Balfour's Educational Systems of Great Britain and Ireland, Allain's L' Instruction primaire en France avant la Revolution, Lantoine's Histoire de V enseignement secondaire en France au XVI IP et au debut du XV IIP siicle, and Konrad Fischer's Geschichte des deutschen Volkschullehrerstands , may be mentioned. (J. Wn.)

EDWARD, " The Elder " (d. 924), king of the Angles and Saxons, was the second son of Alfred the Great, and with his sister ˆEthelfted was carefully educated at the court of his father. During his father's lifetime he took an active part in the campaigns against the Danes, especially in that of 894, and as early as 898 he signs a charter as " rex," showing that he was definitely associated with his father in the kingship. He suc- ceeded his father in October 899, 1 but not without opposition. The yEtheling ˆEthelwold, son of Alfred's elder brother ˆthelred, seized Wimborne and Christchurch. Edward advanced against him, and ˆEthelwold took refuge among the Danes in Northumbria. In 904 ˆEthelwold landed in Essex, and in the next year he enticed the East Anglian Danes to revolt. They ravaged all southern Mercia and, in spite of Edward's activity, returned home victorious, though ˆEthelwold fell in the battle of the Holme. In 905 or 906 Edward made a peace with the East Anglian and Northumbrian Danes at " Yttingaford," near Linslade in Buckinghamshire, perhaps the peace known as " the Laws of Edward and Guthrum." In 909 and 910 fresh campaigns took place owing to southerly raids by the Danes, and victories were won at Tettenhall and Wednesfield in Stafford- shire. 2 From 907 onwards Edward and his sister ˆEthelflaed,

1 See Stevenson's article in Eng. Hist. Rev. vol. xiii. pp. 71-77. The whole chronology of this reign is very difficult and certainly is often impossible of attainment.

2 It is possible that these battles are one and the same ; the places are within 2 to 3 m. of each other.

the Lady of the Mercians, were busy strengthening their hold on Mercia and Wessex. Forts were built at Lincoln (907), " Bremesbyrig " (910), " Scergeat " and Bridgenorth (912), and when in the year 911 ˆEthelflasd's husband /Ethelred died, Edward took over from Mercia the government of London and Oxford, with the lands belonging to them, i.e. probably Oxford- shire and Middlesex. The policy of constructing " burns " or fortified towns was continued. Hertford was fortified in 911, Witham in 91 2, while jEthelflaed fortified Cherbury in Shropshire, " Weardbyrig " and Runcorn (all in 915). In 913 the Danes in Eastern Mercia gave considerable trouble, and in 914 a fresh horde of pirates, coming from Brittany, sailed up the Severn. They raided southern Wales, but were hemmed in by the English forces and besieged until they promised to leave the king's territory. Edward watched the southern shores of the Bristol Channel so carefully that the Danes failed to secure a hold there, and were ultimately forced to sail to Ireland. In the same year Edward fortified Buckingham and received the submission of the jarls and chief men of Bedford. In 915 he fortified Bedford itself, Maldon in 916, and Towcester and " Wigingamere " in 917. In the last-mentioned year Edward captured and destroyed the Danish stronghold of Tempsford, and later in the year he took Colchester. An attack by the Danes on Maldon failed, and in 915 Edward went to Passenham and received the submission of the men of the " borough " of Northampton. The Danish strongholds of Huntingdon and Colchester were now restored and repaired, and Edward received the submission of the whole of the East Anglian Danes. Before midsummer of this year Edward had fortified Stamford, and on the death of his sister he received the submission of the Mercians at Tamworth. There also three kings of the North Welsh took Edward as their lord. Nottingham was now fortified; Thelwall in Cheshire (919) and Manchester soon followed; Nottingham was strengthened by a second fort; Bakewell was fortified and garrisoned, and then came the greatest triumph of Edward's reign. He was " chosen as father and lord " by the Scottish king and nation, by Rae- genald, the Norwegian king of Northumbria, by Ealdred of Bamborough, and by the English, Danes or Norwegians in Northumbria, and by the Strathclyde Welsh.

With the conclusion of his wars Edward's activity ceased, and we hear no more of him until in 924 he died at Farndon in Cheshire and

was buried in the " New Minster " at Winchester. He was thrice married: (1) to Ecgwyn, a lady of rank, by whom he had a son ˆEthelstan, who succeeded him, and a daughter Eadgyth, who married Sihtric of Northumbria in 924. This marriage was probably an irregular one. (2) To yElflasd, by whom he had two sons — ˆElfweard, who died a fortnight after his father, and Eadwine, who was drowned in 933 — an d six daughters, ˆEthelflaed and ˆEthelhild nuns, and four others (see /Ethelstan). (3) To Eadgifu, the mother of Kings Edmund and Edred, and of two daughters.

Authorities. — Anglo-Saxon Chronicle (ed. Plummer and Earle, Oxford); Florence of Worcester (Mon. Hist. Brit.); William of Malmesbury, Gesta regum (Rolls Series); Simeon of Durham (Rolls Series); Ethelweard (Mon. Hist. Brit.); Birch, Cartularium Saxonicum, Nos. 588-635; D.N.B., s.v. (A. Mw.)

EDWARD, " The Martyr " (c. 926-978), king of the English, was the son of Edgar by his wife .ˆEthelflaed. Edward's brief reign was marked by an anti-monastic reaction. ˆElfhere, earl of Mercia, once more expelled many of the monks whom Bishop /Ethelwold had installed. There seems also to have been some change in administrative policy, perhaps with regard to the Danes, for Earl Oslac, whom Edgar had appointed to North- umbria, was driven from his province. In ecclesiastical matters there were two parties in the kingdom, the monastic, which had its chief hold in Essex and East Anglia, and the anti-monastic, led by ˆElfhere of Mercia. Conferences were held at Kirtlington in Oxfordshire and at Calne in Wiltshire in 977 and 978, but nothing definite seems to have been decided. On the 18th of March 978 Edward's reign was suddenly cut short by his assassina- tion at Corfe Castle in Dorsetshire. The crime was probably inspired by his stepmother, ˆElfthryth, who was anxious to secure

the succession of her son /Elthelred. The body was hastily interred at Wareham and remained there till 980, when Arch- bishop Dunstan and ˆElfhere of Mercia united in transferring it with great ceremony to Shaftesbury. Edward seems to have been personally popular, and the poem on his death in the chronicle calls his murder the worst deed in English history. Very shortly after his death he was popularly esteemed to be both saint and martyr.

See Saxon Chronicle; Vita S. Oswaldi (Hist, of Ch. of York, Rolls Series) ; Memorials of St Dunstan (ed. Stubbs, Rolls Series). (A. Mw.)

EDWARD, " The Confessor " (d. 1066), so called on account of his reputation for sanctity, king of the English, was the son of iEthelred II. and Emma, daughter of Richard, duke of Normandy, and was born at Islip in Oxfordshire. On the recognition of Sweyn as king of England in 1013, yEthelred, with his wife and family, took refuge in Normandy, and Edward continued to reside at the Norman court until he was recalled in 1041 by Hardicanute. He appears to have been formally recognized as heir to the throne, if not actually associated in the kingship, and on the death of Hardicanute in 1042 " all folk received him to be king," though his actual coronation was delayed until Easter 1043. A few months later Edward, in conjunction with the three great earls of the kingdom, made a raid on the queen- mother jElfgifu, or Emma, seized all her possessions and com- pelled her to live in retirement.

In the earlier years of the reign the influence of Earl Godwine was predominant, though not unopposed. His daughter Edith or Eadgyth became Edward's queen in 1045. But the king's personal tastes inclined much more to foreigners than to English- men, and he fell more and more into the hands of favourites from beyond the sea. Between Godwine, representing the spirit of nationalism, and these favourites (especially their leader Robert of Jumieges, successively bishop of London and archbishop of Canterbury) there was war to the knife. In 1046 Magnus, king of Norway, who had succeeded Hardicanute in Denmark and claimed to succeed him in England as well, threatened an invasion, but the necessity of defending Denmark against his rival Sweyn Estrithson prevented him from carrying it into effect. In 1049, Godwine's son Sweyn, who had been outlawed for the seduction of the abbess of Leominster, returned and demanded his restoration. This was refused and Sweyn returned into exile, but not before he had with foulest treachery murdered his young kinsman Beorn. He was, however, inlawed next year. The influence of Godwine, already shaken, received a severe blow in 105 1 in the appointment of Robert of Jumieges to the archbishopric of Canterbury, and the same year saw the triumph of the foreigners for the moment complete. Edward, indignant at the resistance offered by the men of Dover to the insolence of his brother-in-law Eustace of Boulogne and his French followers, ordered Godwine to punish the town. Godwine refused. The king at the prompting of the archbishop then summoned a meeting of the witan, at which the old charge against Godwine of complicity in the murder of the ˆEtheling Alfred was to be revived. About the same time came news of a fresh outrage by the foreigners. Godwine gathered his forces and demanded redress, while the earls Leofric of Mercia and Siward of Northumbria

hastened to the side of the king. Civil war seemed imminent, but at length a compromise was effected by which the matter was referred to a meeting of the witan to be held at London. At the appointed time Godwine presented himself at Southwark. But his followers were rapidly deserting him, nor would the king give hostages for his security. Alarmed for his safety, he fled to Flanders, while his son Harold went to Ireland. But their exile was brief. The tale of Godwine excited universal sympathy, for it was realized that he represented the cause of national independence. Encouraged by assurances from England, he sailed thither, and joining forces with Harold sailed along the south coast and up the Thames. The king would have resisted but found no support. Yielding to circumstances, he allowed himself to be reconciled, and Godwine and his house were restored to their old position. The queen at the same time was brought back from the monastery of Wherwell, whither she had been despatched after her father's flight. The foreigners had

already ignominiously fled the country, and henceforth the influence of Godwine, and, after his death, of Harold, was supreme. In 1063 Harold made a great expedition into Wales, in which he crushed the power of King Gruffyd, who was killed by his own people. But despite his prowess and his power, he was the minister of the king rather than his personal favourite. This latter position belonged to his younger brother Tostig, who on the death of Siward in 1055 was appointed earl of Northumbria. Here his severity and arbitrary temper rendered him intensely unpopular, and in 1065 his subjects broke into revolt. They elected Morkere as their earl, then marching south demanded Tostig's banishment. Edward desired to crush the revolt by force of arms, but he was overborne and forced to submit. The election of Morkere was recognized, and Tostig went into exile. Intensely mortified at this humiliation, the king fell sick, and henceforth his health failed rapidly. He was unable to gratify his intense desire to be present at the consecration of his new abbey of Westminster, the foundation of which had been the chief interest of his closing years, and on the 5th of January 1066 he died.

The virtues of Edward were monkish rather than kingly. In the qualities of a ruler he was conspicuously deficient; always dependent on others, he ever inclined to the unworthier master. But the charm of his character for the monastic biographer, and the natural tendency to glorify the days before the Norman oppression began,

combined to cast about his figure a halo which had not attached to it in life. Allowed to keep her property by William the Conqueror, his widow, Edith, passed the remainder of her life at Winchester, dying on the 19th of December 1075.

Sources. — A number of lives of Edward are brought together in a volume of the Rolls Series entitled Lives of Edward the Confessor, and edited by Dr H. R. Luard (London, 1858). Of these by far the most valuable is the contemporary Vita Edwardi, which would appear from internal evidence to have been written by an unknown writer soon after the Norman Conquest — some time between 1066 and 1074. The other chief authorities for the reign are (1) the Saxon Chronicle, (C. Plummer, Oxford, 1 892-1 899); (2) Florence of Worcester, ed. B. Thorpe, English Historical Society (London, 1848-1849). Refer- ence may also be made to J. M. Kemble, Codex diplomaticus aevi Saxonici (London, 1839-1848). (C. S. P.)*

EDWARD I. (1239-1307), king of England, born at West- minster on the 17th of June 1239, was the eldest son of Henry III. and Eleanor of Provence. He was baptized Edward after Edward the Confessor, for whom Henry had special veneration, and among his godfathers was Simon de Montfort,earlof Leicester, his aunt Eleanor's husband. His political career begins when the conclusion of a treaty with Alphonso X. of Castile, by which he was to marry the Spanish king's half sister Eleanor, necessitated the conferring on him of an adequate establishment. His father granted him the duchy of Gascony, the earldom of Chester, the king's lands in Wales and much else. The provision made was so liberal that Henry's subjects declared he was left no better than a mutilated king. In May 1254 Edward went to Gascony to take possession of his inheritance. He then crossed the Pyrenees, and in October was dubbed knight by Alphonso and married to Eleanor at the Cistercian convent of Las Huelgas, near Burgos. He remained in Gascony till November 1255, but his father was too jealous to allow him a free hand in its administration. After his return, the attempts of his agents to establish English laws in his Welsh possessions brought Edward into hostile relations with the Welsh. Here also his father would give him no help, and his first campaign brought him little result. Edward became extremely unpopular through his association with his Lusignan kinsfolk, his pride and violence, and the disorders of his household. In 1258 his strenuous opposition to the Provisions of Oxford further weakened his position, but, after the banishment of the foreigners, he began to take up a wiser line. In 1259 he led the young nobles who insisted that the triumphant oligarchy should carry out the reforms to which it was pledged. For a moment it looked as if

Edward and Leicester might make common cause, but Edward remained an enemy of Montfort, though he strove to infuse his father's party with a more liberal and national spirit. He was the soul of the reconstituted royalist party formed about 1263. In 1264 he took a prominent part in the fighting between

the king and the barons. At the battle of Lewes his rash pursuit of the Londoners contributed to his father's defeat. Two days later Edward surrendered to Leicester as a hostage for the good behaviour of his allies. He was forced to give up his earldom of Chester to Leicester, but at Whitsuntide 1265 he escaped from his custodians, and joined the lords of the Welsh march who were still in arms. With their aid he defeated and slew Leicester at Evesham on the 4th of August 1265.

For the rest of Henry III.'s reign Edward controlled his father's policy and appropriated enough of Leicester's ideals to make the royalist restoration no mere reaction. So peaceful became the outlook of affairs that in 1268 Edward took the cross, hoping to join the new crusade of St Louis. Want of money delayed his departure till 1270, by which time St Louis was dead, and a truce concluded with the infidel. Refusing to be a party to such treason to Christendom, Edward went with his personal followers to Acre, where he abode from May 1271 to August 1272. Despite his energy and valour he could do little to prop up the decaying crusading kingdom and he narrowly escaped assassina- tion. At last the declining health of his father induced him to return to the West. He learned in Sicily the death of Henry III. on the 1 6th of November 1272. On the 20th of November, the day of Henry's funeral, he was recognized as king by the English barons, and from that day his regnal years were subse- quently computed. Affairs in England were so peaceful that Edward did not hurry home. After a slow journey through Italy and France he did homage to his cousin Philip III. at Paris, on the 26th of July 1273. He then went to Gascony, where he stayed nearly a year. At last he landed at Dover on the 2nd of August 1274, and was crowned at Westminster on the 18th of the same month.

Edward was thirty-five years old when he became king, and the rude schooling of his youth had developed his character and suggested the main lines of the policy which he was to carry out as monarch. He was a tall, well-proportioned and hand- some man, extravagantly devoted to military exercises, tourna- ments and the rougher and more dangerous forms of hunting. He had learned to restrain the hot temper of his youth, and was proud of his love of justice and strict regard to his plighted word. His domestic life was unstained, he was

devoted to his friends, and loyal to his subordinates. Without any great originality either as soldier or statesman, he was competent enough to appro- priate the best ideas of the time and make them his own. His defects were ahardness of disposition which sometimesapproached cruelty and a narrow and pedantic temper, which caused him to regard the letter rather than the spirit of his promises. His effectiveness and love of strong government stand in strong contrast to his father's weakness. Though he loved power, and never willingly surrendered it, he saw that to be successful he must make his policy popular. Thus he continued the system which Montfort had formed with the object of restraining the monarchy, because he saw in a close alliance with his people the best means of consolidating the power of the crown.

The first years of Edward's reign were mainly occupied by his efforts to establish a really effective administration. In carrying out this task he derived great help from his chancellor, Robert Burnell, bishop of Bath and Wells. Administrative reform soon involved legislation, and from 1275 to 1290 nearly every year was marked by an important law. Few of these con- tained anything that was very new or original. They rather illustrate that policy which caused Dr Stubbs to describe his reign as a " period of definition." Yet the results of his con- servative legislation were almost revolutionary. In particular he left the impress of his policy on the land laws of England, notably by the clause De Donis of the Westminster statute of 1285, and the statute Quia Emptores of 1 290. The general effect of his work was to eliminate feudalism from political life. At first he aimed at abolishing all franchises whose holders could not produce written warranty for them. This was the policy of the statute of Gloucester of 1278, but the baronial opposition was so resolute that Edward was forced to permit many immunities to remain. Though the most orthodox of churchmen, his dislike

of authority not emanating from himself threatened to involve him in constant conflict with the Church, and notably with John Peckham, the Franciscan friar, who was archbishop of Canterbury from 1279 to 1292. The statute of Mortmain of 1279, which forbade the further grant of lands to ecclesiastical corporations without the royal consent, and the writ Circum- specte Agatis of 1285, which limited the church courts to strictly ecclesiastical business, both provoked strong clerical opposition. However, Peckham gave way to some

extent, and Edward prudently acquiesced in many clerical assumptions which he disliked. He was strong enough to refuse to pay the tribute to Rome which John had promised, and his reign saw the end of that papal overlordship over England which had greatly complicated the situation under his father.

Besides administration and legislation, the other great event of the first fifteen years of Edward's reign was the conquest of the principality of Wales. It was part of Edward's policy of reconciliation after the battle of Evesham that in the treaty of Shrewsbury of 1267 he had fully recognized the great position which Llewelyn ab Gruffyd, prince of Wales, had gained as the ally of Simon de Montfort. However, Llewelyn's early successes had blinded the Welsh prince to the limitations of his power, and he profited by Edward's early absences from England to delay in performing his feudal obligations to the new king. Even after Edward's return Llewelyn continued to evade doing homage. At last Edward lost patience, and in 1277 invaded north Wales. He conducted his campaign like a great siege, blocking all the avenues to Snowdon, and forcing Llewelyn to surrender from lack of supplies. He thereupon reduced the Welsh prince to the position of a petty north Welsh chieftain strictly dependent on the English. For the next five years Edward did his best to set up the English system of government in the ceded districts. The Welsh resentment of this soon gave Llewelyn another chance, and compelled Edward to devote the years 1 282-1 283 to completing his conquest. In 1284 he issued the statute of Wales, which provided for a scheme for the future government of the principality. Edward is often called the conqueror of Wales, but in truth he only effected the conquest of Llewelyn's dominions. The march of Wales was only indirectly affected by his legislation, and remained subject to its feudal marcher lords until the 16th century.

Edward was very careful in his foreign policy. Though preserving nominal peace with his cousin Philip III. of France, his relations with that country were constantly strained. After Philip III.'s death in 1285, Edward crossed the Channel in 1286, to perform homage to his successor, Philip the Fair. He remained abroad till 1289, busied in attempts to improve the administration of Gasconj', and making repeated and finally successful efforts to end by his mediation the still continuing struggle between the houses of Anjou and Aragon. His long absence threw the govern- ment of England into confusion, and on his return in 1289 he was compelled to dismiss most of his judges and ministers for corrup- tion. In 1 290 he expelled all Jews from England.

The affairs of Scotland furnished Edward with his chief pre-occupation for the rest of his reign. After the death of Alexander III., in 1286, Scotland was governed in the name of his grand- daughter Margaret, the Maid of Norway. The English king had suggested that Edward of Carnarvon, his eldest surviving son, should marry the little queen of Scots, and thus bring about the union of the two countries. Unluckily the death of Margaret in 1290 frustrated the scheme. The Scottish throne was now disputed by many claimants, and the Scots asked Edward to arbitrate between them. Edward accepted the position, but insisted that, before he acted, the Scots shoidd recognize him as their overlord. The claimants set the example of submission, and soon the chief Scots nobles followed. Thereupon Edward undertook the arbitration, and in 1292 adjudged the throne to John Baliol. The new king did homage to Edward, but his subjects soon began to resent the claims of jurisdiction over Scotland, which Edward declared were the natural results of his feudal supremacy. At last the Scots deprived John of nearly all his power, repudiated Edward's claims, and made an alliance

with the French. During the years of the Scottish arbitration Edward had slowly been drifting into war with France. The chronic difficulties caused by French attempts to confine Edward's power in Gascony were now accentuated by the quarrels between the sailors and merchants of the two countries. In 1293 Edward was persuaded by his brother, Edmund, earl of Lancaster, to yield up Gascony temporarily to Philip the Fair. But Philip refused to restore the duchy, and Edward, seeing that he had been tricked, declared war against France, at the very moment when the Scottish resistance gave the French a firm ally in Britain. To make matters worse, the Welsh rose in rebellion. It was therefore quite impossible for Edward to recover Gascony.

The most critical years of Edward's reign now began. He saw that he could only meet his difficulties by throwing himself on the support of his own subjects, and convoked, in 1295, a representative parliament of the three estates, which has been called in later times the Model Parliament, because it first illustrated the type which was to be perpetuated in all subsequent parliaments. " What touches all," ran Edward's writ of summons, " should be approved of all, and it is also clear that common dangers should be met by measures agreed upon in common." The parliamentary constitution of England was established as the result of Edward's action.

Secure of his subjects' allegiance, Edward put down the Welsh revolt, and conquered Scotland in 1296. When quiet was restored to

Britain, he hoped to throw all his energy into the recovery of Gascony, but new troubles arose at home which once more diverted him from his supreme purpose. Led by Archbishop Winchelsea, Peckham's successor, the clergy refused to pay taxes in obedience to the bull of Pope Boniface VIII. , called Clericis Laicos. Edward declared that if the clergy would not contribute to support the state, the state could afford them no protection. But the clerical opposition was soon joined by a baronial opposition. Headed by the earls of Hereford and Norfolk, many of the barons declined to join in an expedition to Gascony, and Edward was forced to sail to the French war, leaving them behind. Thereupon the recalcitrant barons forced upon the regency a fresh confirmation of the charters, to which new articles were added, safeguarding the people from arbitrary taxation. Edward at Ghent reluctantly accepted this Confirmatio Cartarum, but even his submission did not end the crisis. In the same year (1297), all Scotland rose in revolt under the popular hero William Wallace, and next year (1298), Edward was forced to undertake its reconquest. The battle of Falkirk, won on the 22nd of July, was the greatest of Edward's military triumphs; but, though it destroyed the power of Wallace, it did not put an end to Scottish resistance. Bitter experience taught Edward that he could not fight the French and the Scots at the same time, and in 1299 he made peace with Philip, and, Eleanor having died in November 1290, he married the French king's sister Margaret (c. 1282-13 18), an d some years later obtained the restitution of Gascony. In the same spirit he strove to destroy the clerical and baronial opposition. He did not succeed in the former task until a complacent pope arose in his own subject, Clement V., who abandoned Winchelsea to his anger, and suffered the archbishop to be driven into exile. The baronial leaders could not be wholly overthrown by force, and Edward was compelled to make them fresh concessions.

It was not until 1303 that Edward was able to undertake seriously the conquest of Scotland. By 1305 the land was subdued, and Wallace beheaded as a traitor. But Edward had hardly organized the government of his new conquest when a fresh revolt broke out under Robert Bruce, grandson of the chief rival of Baliol in 1290. Bruce was soon crowned king of Scots, and at the age of seventy Edward had to face the prospect of conquering Scotland for the third time. He resolved to take the field in person; but the effort was too great, and on the 7th of July 1307 he died at Burgh-on-Sands, near Carlisle. His death destroyed the last faint hope of conquering Scotland, and showed that the chief ambition of his life was a failure. Yet his conquest of Wales, his legislation, his triumph over

his barons, his ecclesiastics, and the greatest of French medieval kings

indicate the strength and permanence of his work. He was buried at Westminster under a plain slab on which was inscribed Edwardus primus Scottorum malleus hie est. Pactum serva.

By Eleanor of Castile Edward had four sons, his successor Edward II. and three who died young, and nine daughters, including Joan, or Joanna (1272-1307), the wife of Gilbert de Clare, earl of Gloucester (d. 1295), and then of Ralph de Monthermer; Margaret (1275-1318), the wife of John II., duke of Brabant; and Eleanor (1282-1316), who married John I., count of Holland, and then Humphrey Bohun, earl of Hereford (d. 1322). By Margaret of France the king had two sons: Thomas of Brotherton, earl of Norfolk, and Edmund of Woodstock, earl of Kent.

The principal modern authorities for this reign are: W. Stubbs, Constitutional History of England, vol. ii. chaps, xiv. and xv. (1896); T. F. Tout, Edward I. (1893), and Political History of England, 1216- I 377< PP- !36-235 (1905); R. B. Seeley, Life and Reign of Edward I. (1872); R. Pauli, Geschichte von England, iv. pp. 1-198 (Ham- burg, 1864-1875); W. Hunt, article on "Edward I." in Diction- ary of National Biography; J. E. Morris, Welsh Wars of Edward I. (Oxford, 1901); and C. V. Langlois's Philippe le Hardi (Paris, 1887). (T. F. T.)

EDWARD II. (1284-1327), ” of Carnarvon,” king of England, the fourth son of Edward I. by his first wife Eleanor of Castile, was born at Carnarvon Castle on the 25th of April 1284. The story that the king presented the new-born child to the Welsh as their future native prince is quite unfounded, for Edward was only made prince of Wales in the Lincoln parliament of 1301. When a few months old, he became by his elder brother’s death the heir to the throne, and Edward I. took great pains to train him in warfare and statecraft. He took part in several Scots campaigns, but all his father’s efforts could not prevent his acquiring the habits of extravagance and frivolity which he retained all through his life. The old king attributed his son’s defects to the bad influence of his friend, the Gascon knight Piers Gaveston, and drove the favourite into exile. When Edward I. died, on the 7th of July 1307, the first act of the prince, now Edward

II., was to recall Gaveston. His next was to abandon the Scots campaign on which his father had set his heart.

The new king was physically almost as fine a man as Edward I. He was, however, destitute of any serious purpose, and was, as Dr Stubbs says, " the first king after the Conquest who was not a man of business." He cared for nothing but amusing him- self, and found his chief delight in athletics and in the practice of mechanical crafts. He was not so much vicious as foolish, and wanting in all serious interests. He had so little confidence in himself that he was always in the hands of some favourite who possessed a stronger will than his own. In the early years of his reign Gaveston held this role, acting as regent wBen Edward went to France — where, on the 25th of January 1308, he married Isabella, the daughter of Philip the Fair — and receiving the earldom of Cornwall with the hand of the king's niece, Margaret of Gloucester. The barons soon grew indignant at Edward's devotion to his " brother Piers," and twice insisted on his banishment. On each occasion Edward soon recalled his friend, whereupon the barons, headed by the king's cousin Thomas, earl of Lancaster, went to war against king and favourite, and in 13 1 2 treacherously put Gaveston to death. Edward was not strong enough even to avenge his loss. He was forced to stand aside and suffer the realm to be governed by the baronial com- mittee of twenty-one lords ordainers, who, in 13 11, had drawn up a series of ordinances, whose effect was to substitute ordainers for the king as the effective government of the country. But in all the ordinances nothing was said about the commons and lower clergy. Parliament meant to the new rulers an assembly of barons just as it had done to the opponents of Henry III. in 1258. The effect of their triumph was to change England from a monarchy to a narrow oligarchy.

During the quarrels between Edward and the ordainers, Robert Bruce was steadily conquering Scotland. His progress was so great that he had occupied all the fortresses save Stirling, which he closely besieged. The danger of losing Stirling shamed Edward and the barons into an attempt to retrieve their lost

ground. In June 1314 Edward led a great army into Scotland in the hope of relieving Stirling. On the 24th of June his ill- disciplined and badly led host was completely defeated by Robert Bruce at Bannockburn. Henceforth Bruce was sure of his position as king of Scots, and his pitiless devastation of the northern counties of England was his wild vengeance for the sufferings his land had previously experienced from the English. Edward's disgraceful defeat made him more dependent on his barons than ever. His kinsman,

Thomas of Lancaster, had now an opportunity of saving England from the consequences of the king's incompetence. He had shown some capacity as a leader of opposition, but though he had great wealth, and was lord of five earldoms, he had small ability and no constructive power. In his desire to keep the king weak, he was suspected to have made a secret understanding with Robert Bruce. Before long the opposition split up under his incompetent guidance into fiercely contending factions. Under Aymer of Valence, earl of Pembroke, a middle party arose, which hated Lancaster so much that it supported the king to put an end to Lancaster's rule. After 1318 the effect of its influence was to restore Edward to some portion of his authority. However, the king hated Pembroke almost as much as Lancaster. He now found a competent adviser in Hugh le Despenser, a baron of great experience. What was more important to him, he had in Despenser's son, Hugh le Despenser the younger, a personal friend and favourite, who was able in some measure to replace Gaveston. The fierce hatred which the barons manifested to the Despensers showed that they could hate a deserter as bitterly as they had hated the Gascon adventurer. They were indignant at the favours which Edward lavished upon the favourite and his father, and were especially alarmed when the younger Despenser strove to procure for himself the earldom of Gloucester in right of his wife, Edward's niece.

At last, in 13 21, the barons met in parliament, and under Lancaster's guidance procured the banishment of the Despensers. The disasters of his friends inspired Edward to unwonted activity. In 1322 he recalled them from exile, and waged war against the barons on their behalf. Triumph crowned his exertions. Lancaster, defeated at Boroughbridge, was executed at Pontefract. For the next five years the Despensers ruled England. Unlike the ordainers, they took pains to get the Commons on their side, and a parliament held at York in 1322 revoked the ordinances because they trenched upon the rights of the crown, and were drawn up by the barons only. From this time no statute was technically valid unless the Commons had agreed to it. This marks the most important step forward in Edward II. 's reign. But the rule of the Despensers soon fell away from this wise beginning. They thought only of heaping up wealth for themselves, and soon stirred up universal indignation. In particular, they excited the ill-will of the queen, Isabella of France. Craftily dissembling her indignation, Isabella kept silence until 1325, when she went to France in company with her eldest son, Edward of Windsor, who was sent to do homage for Aquitaine to her brother, the new French king. When her business was over, Isabella declined to return to her

husband as long as the Despensers remained his favourites. She formed a criminal connexion with Roger Mortimer of Wigmore, one of the baronial exiles, and in September 1326 landed in Essex accompanied by Mortimer and her son, declaring that she was come to avenge the murder of Lancaster, and to expel the Despensers. Edward's followers deserted him, and on the 2nd of October he fled from London to the west, where he took refuge in the younger Despenser's estates in Glamorgan. His wife followed him, put to death both the Despensers, and, after a futile effort to escape by sea, Edward was captured on the 1 6th of November. He was imprisoned at Kenil worth Castle, and a parliament met at Westminster in January 1327, which chose his son to be king as Edward III. It was thought prudent to compel the captive king to resign the crown, and on the 20th of January Edward was forced to renounce his office before a committee of the estates. The government of Isabella and Mortimer was so weakly established that it dared

not leave the deposed king alive. On the 3rd of April he was secretly removed from Kenilworth and entrusted to the custody of two dependants of Mortimer. After various wanderings he was imprisoned at Berkeley Castle in Gloucestershire. Every indignity was inflicted upon him, and he was systematically ill-treated in the hope that he would die of disease. When his strong constitution seemed likely to prevail over the ill-treatment of his enemies he was cruelly put to death on the 2 1 st of September. It was announced that he had died a natural death, and he was buried in St Peter's Abbey at Gloucester, now the cathedral, where his son afterwards erected a magnificent tomb. . .

Edward's wife, Isabella (c. 1292-1358), bore him two sons, Edward III. and John of Eltham, earl of Cornwall (1316-1336), and two daughters, Isabella and Joanna (1321-1362), wife of David II., king of Scotland. After the execution of her paramour, Roger Mortimer, in 1330, Isabella retired from public life; she died at Hertford on the 23rd of August 1358.

See R. Pauli, Geschichte von England, iv. pp. 199-306; T. F. Tout, Political History of England, 1210-1307, pp. 236-304', and article in Dictionary of National Biography; W. Stubbs, Constitutional History, vol. ii. pp. 319-386, and Introductions to Chronicles of the Reigns of Edward I. and Edward II. in Rolls series. (T. F. T.)

EDWARD III. (1312-1377), "of Windsor," king of England, eldest son of Edward II. and Isabella of France, was born at Windsor on the 13 th of November 13 12. In 1320 he was made earl of Chester, and in 1325 duke of Aquitaine, but he never received the title of prince of Wales. Immediately after his appointment to Aquitaine, he was sent to France to do homage to his uncle Charles IV., and remained abroad until he accom- panied his mother and Mortimer in their expedition to England. To raise funds for this he was betrothed to Philippa, daughter of the count of Hainaut. On the 26th of October 1326, after the fall of Bristol, he was proclaimed warden of the kingdom during his father's absence. On the 13th of January 1327 parliament recognized him as king, and he was crowned on the 29th of the same month.

For the next four years Isabella and Mortimer governed in his name, though nominally his guardian was Henry, earl of Lancaster. In the summer he took part in an abortive campaign against the Scots, and was married to Philippa at York on the 24th of January 1328. On the 15th of June 1330 his eldest child, Edward, the Black Prince, was born. Soon after, Edward made a successful effort to throw off his degrading depend- ence on his mother and her paramour. In October 1330 he entered Nottingham Castle by night, through a subterranean passage, and took Mortimer prisoner. On the 29th of November the execution of the favourite at Tyburn completed the young king's emancipation. Edward discreetly drew a veil over his mother's relations with Mortimer, and treated her with every respect. There is no truth in the stories that henceforth he kept her in honourable confinement, but her political influence was at an end.

Edward III.'s real reign now begins. Young, ardent and active, he strove with all his might to win back for England something of the position which it had acquired under Edward I. He bitterly resented the concession of independence to Scot- land by the treaty of Northampton of 1328, and the death of Robert Bruce in 1329 gave him a chance of retrieving his position. The new king of Scots, David, who was his brother-in-law, was a mere boy, and the Scottish barons, exiled for their support of Robert Bruce, took advantage of the weakness of his rule to invade Scotland in 1332. At their head was Edward Baliol, whose victory at Dupplin Moor established him for a brief time as king of Scots. After four months Baliol was driven out by the Scots, whereupon Edward for the first time openly took up his cause. In 1333 the king won in person the battle of Halidon Hill over the Scots, but his victory did not restore Baliol to power. The Scots despised him as a puppet of the English king, and after a few years David was finally established in Scotland. During these years

England gradually drifted into hostility with France. The chief cause of this was the impossible situation which resulted from Edward's position as duke of Gascony. Contributing causes were Philip's support

of the Scots and Edward's alliance with the Flemish cities, which were then on bad terms with their French overlord, and the revival of Edward's claim, first made in 1328, to the French crown. War broke out in 1337, and in 1338 Edward visited Coblenz, where he made an alliance with the emperor Louis the Bavarian. In 1339 and 1340 Edward endeavoured to invade France from the north with the help of his German and Flemish allies, but the only result of his campaigns was to reduce him to bankruptcy.

In 1340, however, he took personal part in the great naval battle off Sluys, in which he absolutely destroyed the French navy. In the same year he assumed the title of king of France. At first he did this to gratify the Flemings, whose scruples in fighting their overlord, the French king, disappeared when they persuaded themselves that Edward was the rightful king of France. However, his pretensions to the French crown gradually became more important. The persistence with which he and his successors urged them made stable peace impossible for more than a century, and this made the struggle famous in history as the Hundred Years' War. Till the days of George III. every English king also called himself king of France.

Despite his victory, at Sluys, Edward was so exhausted by his land campaign that he was forced before the end of 1340 to make a truce and return to England. He unfairly blamed his chief minister, Archbishop Stratford, for his financial distress, and immediately on his return vindictively attacked him. Before the truce expired a disputed succession to the duchy of Brittany gave Edward an excuse for renewing hostilities with France. In 1342 he went to Brittany and fought an indecisive campaign against the French. He was back in England in 1343. In the following years he spent much time and money in rebuilding Windsor Castle, and instituting the tarder of the Garter, which he did in order to fulfil a vow that he had taken to restore the Round Table of Arthur. His finances, therefore, remained embarrassed despite the com- parative pause in the war, although in 1339 he had repudiated his debt to his Italian creditors, a default that brought about widespread misery in Florence.

A new phase of the French war begins when in July 1346 Edward landed in Normandy, accompanied by his eldest sori, Edward, prince of Wales, a youth of sixteen. In a memorable campaign Edward

marched from La Hogue to Caen, and from Caen almost to the gates of Paris. It was a plundering expedition on a large scale, and like most of Edward's campaigns showed some want of strategic purpose. But Edward's decisive victory over the French at Crecy, in Ponthieu, on the 26th of August, where he scattered the army with which Philip VI. attempted to stay his retreat from Paris to the northern frontier, signally demonstrated the tactical superiority of Edward's army over the French. Next year Edward effected the reduction of Calais. This was the most solid and lasting of his conquests, and its execution compelled him to greater efforts than the Crecy campaign. Other victories in Gascony and Brittany further emphasized his power. In 1346, David, king of Scots, was also defeated and taken prisoner at Neville's Cross, near Durham. In the midst of his successes, however, want of money forced Edward to make a new truce in 1347. He was as far from the conquest of France as ever.

Edward returned to England in October 1347. He celebrated his triumph by a series of splendid tournaments, and completed his scheme for the establishment of the order of the Garter. In 1348 he rejected an offer of the imperial throne. In the same year the Black Death first appeared in England, and raged until 1349. Yet the horrors which it wrought hardly checked the magnificent revels of Edward's court, and neither the plague nor the truce stayed the course of the French war, though what fighting there was was indecisive and on a small scale. Edward's martial exploits during the next years were those of a gallant knight rather than those of a responsible general. Conspicuous among them were his famous combat with Eustace de Ribemont, near Calais, in 1349, and the hard-fought naval vicUry over the Spaniards off Winchelsea, in 1350. Efforts

to make peace, initiated by Pope Innocent VI., came to nothing, though the English commons were now weary of the war. The result of this failure was the renewal of war on a large scale. In 1355 Edward led an unsuccessful raid out of Calais, and in January and February 1356 harried the Lothians, in the ex- pedition famous as the Burned Candlemas. His exploits sank into insignificance as compared with those of his son, whose victory at Poitiers, on the 19th of September 1356, resulted in the captivity of King John, and forced the French to accept a new truce. Edward entertained his royal captive very magnificently, and in 1359 concluded with him

the treaty of London, by which John surrendered so much that the French repudiated the treaty. Edward thereupon resolved to invade France afresh and compel its acceptance. On the 28th of October he landed at Calais, and advanced to Reims, where he hoped to be crowned king of France. The strenuous resistance of the citizens frustrated this scheme, and Edward marched into Burgundy, whence he made his way back towards Paris. Failing in an attack on the capital, he was glad to conclude, on the 8th of May 1360, preliminaries of peace at Bretigny, near Chartres. This treaty, less onerous to France than that of London, took its final form in the treaty of Calais, ratified by King John on the 9th of October. By it Edward renounced his claim to France in return for the whole of Aquitaine.

The treaty of Calais did not bring rest or prosperity either to England or France. Fresh visitations of the Black Death, in 1362 and 1369, intensified the social and economic disturbances which had begun with the first outbreak in 1348. Desperate, but not very successful, efforts were made to enforce the statute of Labourers, of 1351, by which it was sought to maintain prices and wages as they had been before the pestilence. Another feature of these years was the anti-papal, or rather anti-clerical, legislation embodied in the statutes of Provisors and Praemunire. These measures were first passed in 13 51 and 1353, but often repeated. In 1366 Edward formally repudiated the feudal supremacy over England, still claimed by the papacy by reason of John's submission. Another feature of the time was the strenuous effort made by Edward to establish his numerous family without too great expense. In the end the estates of the houses of Lancaster, Kent, Bohun, Burgh and Mortimer swelled the revenues of Edward's children and grandchildren, in whose favour also the new title of duke was introduced.

In 1369 the French king, Charles V., repudiated the treaty of Calais and renewed the war. Edward's French dominions gladly reverted to their old allegiance, and Edward showed little of his former vigour in meeting this new trouble. He resumed the title and arms of king of France, but left most of the fighting and administration of his foreign kingdoms to his sons, Edward and John. While the latter were struggling with little success against the rising tide of French national feeling, Edward's want of money made him a willing participator in the attack on the wealth and privileges of the Church. In 1371 a clerical ministry was driven from office, and replaced by laymen, who proved, however, less effective administrators than their predecessors. Meanwhile Aquitaine was gradually lost; the defeat of Pembroke off La Rochelle deprived England of the command of the

sea, and Sir Owen ap Thomas, a grand-nephew of Llewelyn ab Gruffyd, planned, with French help, an abortive invasion of Wales. In 1371 the Black Prince came back to England with broken health, and in 1373 John of Lancaster marched to little purpose through France, from Calais to Bordeaux. In 1372 Edward made his final effort to lead an army, but contrary winds prevented his even landing his troops in France. In 1375 he was glad to make a truce, which lasted until his death. By it the only important possessions remaining in English hands were Calais, Bordeaux, Bayonne and Brest.

Edward was now sinking into his dotage. After the death of Queen Philippa he fell entirely under the influence of a greedy mistress named Alice Perrers, while the Black Prince and John of Gaunt became the leaders of sharply divided parties in the court and council of the king. With the help of Alice Perrers John of Gaunt obtained the chief influence with his father,

but his administration was neither honourable nor successful. His chief enemies were the higher ecclesiastics, headed by William of Wykeham, bishop of Winchester, who had been excluded from power in 1371. John further irritated the clergy by making an alliance with John Wycliffe. The opposition to John was led by the Black Prince and Edmund Mortimer, earl of March, the husband of Edward's grand-daughter, Philippa of Clarence. At last popular indignation against the courtiers came to a head in the famous Good Parliament of 1376. Alice Perrers was removed from court, and Duke John's subordinate instruments were impeached. But in the midst of the parliament the death of the Black Prince robbed the commons of their strongest support. John of Gaunt regained power, and in 1377 a new parliament, carefully packed by the courtiers, reversed the acts of the Good Parliament. Not long after Edward III. died, on the 21st of June 1377.

Edward III. was not a great man like Edward I. He was, however, an admirable tactician, a consummate knight, and he possessed extraordinary vigour and energy of temperament. His court, described at length in Froissart's famous chronicle, was the most brilliant in Europe, and he was himself well fitted to be the head of the magnificent chivalry that obtained fame in the French wars. Though his main ambition was military glory, he was not a bad ruler of England. He was liberal, kindly, good-tempered and easy of access, and his yielding to his subjects' wishes in order to obtain supplies for carrying on the French war contributed to the consolidation of the constitu- tion. His weak points were his wanton

breaches of good faith, his extravagance, his frivolity and his self-indulgence. Like that of Edward I. his ambition transcended his resources, and before he died even his subjects were aware of his failure.

Edward had twelve children, seven sons and five daughters. Five of his sons played some part in the history of their time, these being Edward the Black Prince, Lionel of Antwerp, duke of Clarence, John of Gaunt, duke of Lancaster, Edmund of Langley, afterwards duke of York, and Thomas of Woodstock, afterwards duke of Gloucester. John and Edmund are also important as the founders of the rival houses of Lancaster and York. Each of the last four was named from the place of his birth, and for the same reason the Black Prince is sometimes called Edward of Woodstock. The king's two other sons both died in infancy. Of his daughters, three died unmarried; the others were Isabella, who married into the family of Coucy, and Mary, who married into that of Montfort.

Authorities. — The two chief modern lives of Edward III. are W. Longman's Life and Times of Edward III., and J. Mackinnon's History of Edward III. Neither work can be regarded as adequate, and in some ways J. Barnes's quaint History of Edward III. (1688) is less unsatisfactory. The general history of the time can be read in W. Stubbs's Constitutional History of England, vol. ii. chapters xvi. and xvii. ; in T. F. Tout's Political History of England, 1216-1377, pp. 301-441; in R. Pauli's Geschichte von England, iv. pp. 307-504; and in Edward's life by W. Hunt in the Dictionary of National Biography. For the Hundred Years' War, see E. Deprez's Les Preliminaires de la guerre de cent ans, 1328-1342, and H. Denifie's La Desolation des eglises, monasteres et kopitaux en France pendant la guerre de cent ans. For economic and social history see W. J. Ashley's English Economic History, and W. Cunningham's Growth of English Industry and Commerce during the Early and Middle Ages. For the end of the reign see S. Armitage Smith's John of Gaunt, J. Lechler's Wiclif und die Vorgeschichte der Reformation, translated as Wycliffe and his English Precursors, R. L. Poole's Wycliffe and Movements for Reform, and G. M. Trevelyan's England in the Age of Wycliffe. (T. F. T.)

EDWARD IV. (1442-1483), king of England, son of Richard, duke of York, by Cicely Neville, was born at Rouen on the 28th of April 1442. As a boy he was styled earl of March, and spent most of his time at Ludlow. After the Yorkist failure at Ludlow field in October 1459, Edward fled with the earls of Salisbury and Warwick, his uncle and cousin, to Calais. Thence in the following July he

accompanied them in their successful invasion of England, to be welcomed in London, and to share in the victory over the Lancastrians at Northampton. After the acceptance of Richard of York as heir to the crown, Edward returned to the Welsh marches, where early in the new

year he heard of his father's defeat and death at Wakefield. Hastily gathering an army he defeated the earls of Pembroke and Wiltshire at Mortimer's Cross on the 2nd of February 1 46 1, and then marched on London. He was acclaimed by the citizens in an assembly at Clerkenwell, declared king by a Yorkist council, and took possession of the regality on the 4th of March. Soon after the new king and the earl of Warwick went north, and on the 28th of March won a decisive victory at Towton.

Edward owed his throne to his kinsmen the Nevilles, and he was content for the time to be guided by them. For himself he was young and fond of pleasure. Still he made frequent progresses, and took some part in the fighting that went on in the north during 1462 and 1463. But he was absent from the final victory at Hexham on the 14th of May 1464, and was at the very time engaged in contracting a secret marriage with Elizabeth, daughter of Richard Woodville, Lord Rivers, and widow of Sir John Grey of Groby (d. 1461). The marriage was disclosed at Michaelmas, much to the vexation of Warwick, who in pursuit of his foreign policy had projected a match with a French princess. Edward heaped favours on his new relatives; his father-in-law was made treasurer, and great marriages were found for his wife's sisters and brothers. In foreign affairs also Edward thwarted Warwick's plans by favour- ing an alliance with Burgundy rather than France. There was, however, no open breach till 1469, when Warwick, taking advantage of the unpopularity of the Woodvilles, and supported by the king's next brother George, duke of Clarence, appeared in arms. Edward was surprised and made prisoner at Middle- ham, and Rivers was beheaded. For six months Edward had to submit to Warwick's tutelage; then on the occasion of a rising in Lincolnshire he gathered an army of his own. Sir Robert Welles, the leader of this rebellion, made a confession implicating Warwick, who fled with Clarence to France. The king thought himself secure, but when Warwick and Clarence made terms with the Lancastrian exiles, Edward in his turn had to seek refuge in Holland (September 1470). His brother-in-law, Charles of Burgundy, at first

refused him any assistance, but at last furnished him with money, and on the 14th of March 147 1 Edward and his brother Richard landed with a small force at Ravenspur near Hull. Marching south he was welcomed at London on the nth of April, defeated Warwick at Barnet three days later, and the Lancastrians at Tewkesbury on the 4th of May. From thenceforth Edward's possession of the crown was secure. His position was strengthened by the birth of a son (2nd of November 1470, during his exile), and by the wealth which he acquired through the confiscation of the estates of his opponents. Clarence had made his peace with Edward, but was at enmity with his other brother Richard of Gloucester, who now married Warwick's second daughter and claimed a share in the Neville inheritance. Their rivalry and Clarence's continued intrigues furnished Edward with his chief domestic difficulty; the trouble was ended by the judicial murder of Clarence in 1478.

The only serious enterprise of these latter years was the short French war of 1475, from which Edward was bought out by the treaty of Pecquigny. As foreign policy it was inglorious, and involved a departure from Edward's earlier plan of a Burgundian alliance. However, it shows a certain recognition of England's need to concentrate her energies on her own develop- ment. The annual subsidy which Louis XL agreed to pay further served Edward's purposes by providing him with money for home government, and enabled him to avoid possible trouble through the necessity for too frequent parliaments and heavy taxation. So Edward's personal rule became in its character autocratic; but it was in the art of courting popularity and concealing despotism that he most shows himself as a type of tyranny. He lacked neither ambition nor capacity, but was indolent and only exerted himself spasmodically. He could be ruthless, but was not habitually cruel. His strongest weapons were the fine presence, the affable manners (even with citizens), and the love of pleasure and entertainments which secured his personal popularity. In his last years he was given to self-

indulgence and scandalous excesses, which did not, however, alienate the London citizens, with whose wives he was too familiar. Most of the power at court was in the hands of the Woodvilles, in spite of their unpopularity; the more arduous work of administration in the north was left to Richard of Gloucester. If as a prince of the Renaissance Edward was the first to rule tyrannically in England, he also deserves credit as a patron of the new culture and friend of Caxton; he further resembles his Italian contemporaries in the commercial purposes to which he applied his wealth in partnership with London merchants.

Edward died at Westminster on the 9th of April 1483, and was buried at Windsor. By Elizabeth Woodville, who died on the 8th of June 1492, he had two sons, Edward V. and Richard of York, who were murdered in the Tower; and five daughters, of whom the eldest, Elizabeth, married Henry VII. Of his numerous mistresses the most notorious was Jane Shore. Before his marriage he had been contracted to Lady Eleanor Butler, and this was alleged by Richard III. to have made his children by Elizabeth Woodville illegitimate.

Bibliography. — Of original authorities for Edward's reign the chief are the Continuation of the Cropland Chronicle in Fulman's Scriptores; the various London Chronicles, especially for the early years Gregory's Chronicle; Warkworth's Chronicle, and the Arrivall of King Edward IV. (a partisan account of events in 1470-1471), published by the Camden Society; the Paston Letters with Dr Gairdner's valuable Introduction; and for foreign affairs the Memoires of Philippe de Comines; the collection called Chronicles of the White Rose is useful. For modern authors, consult Sir James Ramsay's Lancaster and York (1892), and the Political History of England, vol. iv. (1906), by Prof. C. Oman. (C. L. K.)

EDWARD V. (1470-1483), king of England, was the elder son of Edward IV. by his wife Elizabeth Woodville, and was born, during his father's temporary exile, in the sanctuary of West- minster Abbey on the 2nd of November 1470. In June 1471 he was created prince of Wales. When Edward IV. died in April 1483 a struggle for power took place between the young king's paternal uncle, Richard, duke of Gloucester, who had been appointed as his guardian by Edward IV., and his maternal uncle, Richard Woodville, Earl Rivers. Gloucester obtained possession of the king's person, and, having arrested Rivers and some of his supporters, assumed the crown himself after a very slight and feigned reluctance, on the ground that the marriage of Edward and Elizabeth Woodville was invalid, and consequently its issue was illegitimate. At this time Edward and his brother Richard, duke of York, were living in the Tower of London. Shortly after- wards a movement was organized to free them from captivity, and then it became known that they were already dead; but, though it was the general conviction that they had been murdered, it was twenty years before the manner of this deed was dis- covered. According to the narrative of Sir Thomas More, Sir Robert Brackenbury, the constable of the Tower, refused to obey Richard's command to put the young princes to death; but he complied with a warrant ordering him to give up his keys for one night to Sir James Tyrell, who had arranged for the assassination. Two men, Miles Forest and John Dighton, then smothered the youths under pillows

while they were asleep. The murder was committed most probably in August or September 1483. Horace Walpole has attempted to cast doubts upon the murder of the princes, and Sir C. R. Markham has argued that the deed was committed by order of Henry VII. Both these views, however, have been traversed by James Gairdner, and there seems little doubt that Sir Thomas More's story is substantially correct.

See Richard III.; and in addition, Sir Thomas More, History of Richard HI., edited by J. R. Lumby (Cambridge, 1883); Horace Walpole, Historic Doubts on the Life and Reign of Richard III. (London, 1768); J. Gairdner, Richard III. (Cambridge, 1898); J. Gairdner and C. R. Markham in the English Historical Review, vol. vi. (London, 1891) ; Sir C. R. Markham, Richard III. (1907).

EDWARD VI. (1537-1553), king of England and Ireland, born at Greenwich on the 12th of October 1537, was the only child of Henry VIII. by his third wife, Jane Seymour, who died of puerperal fever twelve days later. The story that the mother's life was deliberately sacrificed by the performance of Caesarean

section is unfounded, although Jane's death was little noticed amid the rejoicings which greeted the advent of a male heir to the throne. But in spite of Holbein's vivacious portrait of Edward at the age of two (now at Hanover), he was a frail child, and a short life was anticipated for him from his early years. This did not prevent a strenuous education; until the age of six he was naturally left in the charge of women, but when he was only seven his tutor Dr Coxe, afterwards bishop of Ely, writes that he could decline any Latin noun and conjugate any regular verb (L. and P., 1544, ii. 726); " every day in the mass-time he readeth a portion of Solomon's Proverbs, wherein he delighteth much." Sir John Cheke, Sir Anthony Cooke and Roger Ascham all helped to teach him Latin, Greek and French; and by the age of thirteen he had read Aristotle's Ethics in the original and was himself translating Cicero's De philosophia into Greek.

Edward was duke of Cornwall from his birth, but he was never prince of Wales, and he was only nine when he succeeded his father as king of England and Ireland and supreme head of the church (28th of January 1546/7). His nonage threw power into the hands of

Somerset and then of Northumberland, and enabled Gardiner and Bonner to maintain that the royal supremacy over the church was, or should be, in abeyance. Projects for his marriage were hardly even the occasion, but only the excuse, for Somerset's war on Scotland and Northumberland's subsequent alliance with France. All factions sought to control his person, not because of his personality but because of his position; he was like the Great Seal, only more so, an indispensable adjunct to the wielder of authority. The Protector's brother tried to bribe him with pocket-money; Northumberland was more' subtle and established a complete dominion over his mind, and then put him forward at the age of fourteen as entitled to all the power of Henry VIII. But he was only Northumberland's mask; of his individual influence on the course of history during his reign there is hardly a trace. A posthumous effort was made to give him the credit of a humane desire to save Joan Bocher from the flames; but he recorded with apparently cold-blooded in- difference the execution of both his uncles, and he certainly made no attempt to mitigate the harassing attentions which the council paid his sister Mary. This passed for piety with the zealots, and the persecutions of Mary's reign reflected a halo on that of the Protestant Josiah. So strong was the regret that rumours of his survival persisted, and hare-brained youths were found to personate him throughout Mary's and even far into Elizabeth's reign.

It was well that they were false, for Edward showed signs of all the Tudor obstinacy, and he was a fanatic into the bargain, as no other Tudor was except Mary. The combination would probably have involved England in disasters far greater than any that ensued upon his premature death; and it was much better that the Anglican settlement of religion should have been left to the compromising temper of Elizabeth. As it was, he bequeathed a legacy of woe; his health began to fail in 1552, and in May 1553 it was known that he was dying. But his will and the various drafts of it only betray the agitated and illogical efforts of Northumberland to contrive some means whereby he might continue to control the government and prevent the administra- tion of justice. Mary and Elizabeth were to be excluded from the throne, as not sufficiently pliant instruments; Mary Stuart was ignored as being under Scottish, Catholic and French influence; the duchess of Suffolk, Lady Jane's mother, was excluded because she was married, and the duke her husband might claim the crown matrimonial. In fact, all females were excluded, except Jane, on the ground that no woman could reign; even she was excluded in the first draft, and the crown was left to " the Lady Jane's heirs male." But this draft was manipulated so as to read "

the Lady Jane and her heirs male." That Edward himself was responsible for these delirious provisions is improbable. But he had been so impregnated with the divine right of kings and the divine truth of Protestantism that he thought he was entitled and bound to override the succession as established by law and exclude a Catholic from the throne; and his last recorded words were vehement injunctions to Cranmer to sign the will.

He died at Greenwich on the 6th of July 1553, and was buried in Henry VII. 's chapel by Cranmer with Protestant rites on the 8th of August, while Mary had Mass said for his soul in the Tower.

J. G. Nichols collected almost all that is known of Edward VI. in his excellent edition of the king's Journal. A few additional facts and suggestions can be gleaned from the Letters and Papers of Henry VIII. vols, xii.-xxi. ; Acts of the Privy Council, ed. Dasent, vols, i.-iv. ; Domestic, Spanish, Venetian and Foreign Calendars of State Papers; Froude's History; Dixon's Hist. Church of England; A. F. Pollard 'sEngland under Somerset and Life of Cranmer ; and English Historical Review, xxiii. 286, &c. Sir Clements Markham's Edward VI. (1907) emphasizes his interest in geography. (A. F. P.)

EDWARD VII. (Albert Edward) (1841-1010), king of Great Britain and Ireland, and of the British Dominions beyond the Seas, emperor of India, the eldest son and second child of Queen Victoria and of Albert, prince consort, was born at Buckingham Palace on the 9th of November 1841. He was created prince of Wales and earl of Chester on the 4th of December following, and was baptized on the 25th of January 1842. In his childhood he was educated by the dowager Lady Lyttelton; and in his boy- hood successively by the Rev. Henry Mildred Birch, Mr F. W. Gibbes, the Rev. C. F. Tarver and Mr Herbert W. Fisher. He afterwards resided at Edinburgh, studying chemistry in its industrial applications under Professor (afterwards Lord) Play- fair at the university; at Christ Church, Oxford; and at Trinity College, Cambridge. In November 1 858 he was made a knight of the Garter and a colonel in the army. In 1859 he travelled in Italy and Spain, and in i860 paid a visit as " Lord Renfrew " to the United States and Canada.

Upon the completion of his Cambridge course in June 1861 he joined the camp at the Curragh. The prince consort died on the 13th of December, and in 1862 the prince of Wales went for a tour in the Holy Land (February- June) under the guidance of Arthur Penrhyn Stanley, afterwards dean of Westminster. Early in 1863 he was sworn of the privy council, and took his seat in the House of Lords as

duke of Cornwall. The estate of Sandring- ham, in Norfolk, was purchased for him out of the savings of his minority, and his town residence was fixed at Marlborough House.

His impending marriage to the princess Alexandra, daughter of Christian IX., king of Denmark (b. December 1, 1844), had already been announced, and took place on the 10th of March at Windsor, the beauty and grace of the princess captivating the heart of the nation. Parliament granted the prince an income of £40,000 a year, exclusive of the revenues of the duchy of Cornwall, and he relinquished his right of succession to the duchy of Saxe-Coburg-Gotha. Prince Albert Victor, afterwards duke of Clarence, was the first offspring of the marriage, being born on the 8th of January 1864. The births followed of Prince George Frederick Ernest Albert, afterwards duke of York (see George V.), on the 3rd of June 1865; Princess Louise Victoria Alexandra Dagmar, by marriage duchess of Fife, princess royal, on the 20th of February 1867; Princess Victoria Alexandra Olga Mary, on the 6th of July 1868; and Princess Maud Charlotte Mary Victoria, afterwards queen of Norway, on the 26th of November 1869.

From the time of their marriage the prince and princess were prominently before the country. Queen Victoria remained in retirement, but they filled her place at important public functions. The prince's readiness to promote every worthy cause was most marked ; no one was a more constant attendant at meetings for objects of public utility of a non-political nature, and his speeches were always characterized by excellent sense. The most important external event . of these years was a tour to Egypt, undertaken in 1869 in company with the duke of Sutherland, Sir Samuel Baker and others, an account of which was published by Mrs William Grey. The prince also visited Ireland more than once, and opened the International Exhibition of 1871.

On the 23rd of November 1871 it was announced that the prince would be prevented from paying a visit which had been arranged to the Maharajah Dhuleep Singh by a feverish attack. It soon appeared that the malady was typhoid, contracted

as was supposed, on a visit to Scarborough. The case became so serious that on November 20 the queen and Princess Alice hurried to

Sandringham. On the 1st of December there was a slight rally, but on the 8th so serious a relapse occurred that for some days the prince's life was despaired of. Under the skilful treatment of Sir William Jenner, Sir William Gull and Sir James Paget, however, the crisis was surmounted by December 16, and by Christmas day the danger was regarded as virtually over. On the 27th of February 1872 a thanksgiving was held at St Paul's, amid imposing demonstrations of public joy.

In January 1874 the prince of Wales attended the marriage at St Petersburg of his brother, the duke of Edinburgh, with the grand-duchess Marie of Prussia. In the same year he paid a historic visit to Birmingham, where Mr Joseph Chamberlain, not yet a member of parliament, received him officially as mayor. In March 1875 it was officially announced that he would make a visit to India, carrying out an idea originally conceived by the first Indian viceroy, Earl Canning. He was supposed to travel as heir-apparent, not as representative of the queen; but the characters could not be kept apart, and in fact the prince's visit was a political event of great importance. Leaving England on October n, he was received at Bombay by the viceroy, Lord Northbrook. Here he met a very large number of Indian feudatory princes, whose acquaintance he subsequently improved by visiting at their courts during the seventeen weeks which he spent in the country. During these four months the prince travelled nearly 8000 m. by land and 2500 m. by sea, became acquainted with more rajahs than had all the viceroys who had reigned over India, and saw more of the country than any living Englishman. The visit led up to the queen's assumption of the title of empress of India in the following year.

The prince's life after this date was full of conspicuous public appearances. In 1885 he visited Ireland at a time of much political excitement, and was received enthusiastically in many quarters and without symptoms of ill-will in any. In 1886 he filled the presidency of the Indian and Colonial Exhibition, opened the Mersey Tunnel, and laid the first stone of the Tower Bridge. In 1887 a large share of the arrangements for the queen's Jubilee devolved upon him. On the 27th of July 1889 his eldest daughter, Princess Louise, was married to the duke of Fife. In the autumn he paid a semi-incognito visit to Paris, where he was always highly popular, viewed the Exhibition, and ascended the Eiffel Tower. In 1890 he opened the Forth Bridge. On the 14th of January 1892, however, a heavy blow fell upon him and his house by the death of his eldest son, Prince Albert Victor, duke of Clarence, after a brief illness. The young prince, who with his brother George had made the tour of the world (1879- 1882) in

H.M.S. "Bacchante," and after a short career at Oxford and Cambridge Was just settling down to play his part in public life, had recently become engaged to Princess Victoria Mary of Teck (b. May 26, 1867), and the popularity of the heir to the crown had been increased by the expression of his satisfaction at his son's bride being an English princess. On the 6th of July 1893 the broken thread was reunited by her marriage to Prince George, duke of York.

The year 1894 was a busy one for the prince of Wales, who became a member of the royal commission on the housing of the poor, opened the Tower Bridge, attended the Welsh Eisteddfod and was duly initiated, and paid two visits to Russia — one for the marriage of the grand-duchess Xenia, the other for the funeral of the tsar, his brother-in-law. In 1896 he became first chancellor of the university of Wales, and his first act after his installation at Aberystwyth was to confer an honorary degree upon the princess. He had already been for some years a trustee of the British Museum. On the 22nd of July 1896 his daughter, Princess Maud, was married to Prince Charles of Denmark, who in 1905 was offered and accepted the crown of the new kingdom of Norway. The arrangements for the queen's 'jubilee of 1897 depended upon the prince even more than those of the corresponding celebration in 1887: he rode on the queen's right at the great procession to St Paul's, and as an admiral of the fleet presided at the naval

review at Spithead. In July 1898 the prince had the misfortune to fracture his knee-cap while on a visit to Baron Ferdinand de Rothschild, but completely recovered from the effects of the accident. In December 1899, while passing through Brussels on his way to St Petersburg, he was fired at by a miserable lad named Sipido, crazed by reading anarchist literature. Fortunately no injury was done.

It was the especial distinction of Albert Edward, while prince of Wales, to have been a substantial support of the throne before he was called upon to fill it. This cannot be said of any of his predecessors except Edward the Black Prince. He was exemplary in the discharge of his public duties, and in his scrupulous detachment from party politics. He was a keen patron of the theatre, and his thoroughly British taste for sport was as pronounced asjiis inclination for most of the contemporary amusements of society. The " Tranby Croft Case "(1890), in which Sir William Gordon Cumming brought an unsuccessful libel action for having been accused of cheating at a game of baccarat, caused some comment in connexion with the prince's appearance in the witness-box on behalf of the defendants. But it did him no disservice with the people to have twice won the

Derby with his horses Persimmon (1896) and Diamond Jubilee (1900)— his third victory, in 1909, with Minoru, being the first occasion on which the race had been won by a reigning sovereign; and his interest in yacht-racing was conspicuously shown at all the important fixtures, his yacht " Britannia " being one of the best of her day. His activity in the life of the nation may be illustrated by his establishment (1897) of the Prince of Wales's (afterwards King Edward's) Hospital Fund, his devotion t«j, the cause of Masonry (he was first elected grand master of tljfe Freemasons of England in 1874), and his position as a bencher of the Middle Temple, where he also became (1887) treasurer.

On the death of Queen Victoria on the 22nd of January 1901, the question what title the new king would assume was speedily set at rest by the popular announcement that he would be called Edward the Seventh. The new reign began auspiciously by the holding of a privy council at St James's Palace, at which the king announced his intention to follow in his predecessor's footsteps and to govern as a constitutional sovereign, and received the oaths of allegiance. On the 14th of February the king and queen opened parliament in state. Shortly afterwards it was announced that the visit of the duke and duchess of York to Australia, in order to inaugurate the new Commonwealth, which had been sanctioned by Queen Victoria, would be proceeded with; and on the 16th of March they set out on board the " Ophir " with a brilliant suite. The tour lasted till November 1, the duke and duchess having visited Australia, New Zealand, the Cape and Canada; and on their return the king, on November 9, created the duke prince of W T ales and earl of Chester. Meanwhile parliament had settled the new civil list at £470,000 a year, and the royal title had been enlarged to include the colonial empire by an act enabling the king to style him- self " Edward VII., by the grace of God, of the United Kingdom of Great Britain and Ireland, and of all the British Dominions beyond the Seas, King, Defender of the Faith, Emperor of India." At the end of May 1902 the long-drawn-out war in South Africa came at last to an end, and the corona- tion was fixed for the 26th of June. But on the 24th, amid general consternation, the king was announced to be suffering from perityphlitis, necessitating the immediate performance of an operation; and the coronation, for which unprecedented preparations had been made, had to be postponed. The opera- tion — performed by Sir Frederick Treves — was, however, so marvellously successful, and the king's progress towards recovery so rapid and uninterrupted, that within a fortnight he was pronounced out of danger, and soon afterwards it was decided to hold the coronation service on August 9.

Though shorn of much of the magnificence which would have been added to it in June by the presence of foreign royalties and the prepara- tions for a great procession through London, the solemnity duly took place on that date in Westminster Abbey amid great

rejoicings. The king spent several weeks (partly in a yachting trip round the coast and up to Stornoway) in recruiting his health, and on the 25th of October he went in procession through the main streets of south London, when he was most enthusi- astically received. Next day the king and queen attended St Paul's cathedral in state to return thanks for his restoration to health. On New Year's day 1903 the coronation was proclaimed in India at a magnificent durbar at Delhi.

At home the king opened parliament in person in February 1903, and on the 31st of March he sailed from Portsmouth to pay a visit to the king of Portugal at Lisbon, leaving Lisbon for Gibraltar on the 7th of April. On the nth he held a review of the garrison troops and next day left for Malta, and the tour was continued to Naples (23rd of April). On the 27th of April he was received at Rome by the king of Italy — the first time an English king as such had been there; and two days later he paid a visit to Leo XIII. at the Vatican. On May day he was received in Paris by President Loubet. Later in the year return visits were paid to England by President Loubet (July) and the king and queen of Italy (November). On the 1 ith of May His Majesty paid his first formal visit to Edinburgh, and held courts at Holyrood. In July the king and queen went to Ireland, and though the Dublin corporation refused to vote a loyal address the reception was generally cordial. In September the king took his annual " cure " at Marienbad, and paid a visit to Vienna, where he was received by the Austrian emperor. In 1904 again the king and queen went to Ireland; in June the king was cordially received by the German emperor at the yacht-races at Kiel, and he included a visit to Hamburg, where the welcome was hearty. In November the king and queen of Portugal were entertained at Windsor and at the Guildhall.

The success of King Edward as a promoter of international friendliness, and the advantage of so efficient a type of kingship, attracted universal attention, and treaties of arbitration were concluded by Great Britain with France, Spain, Italy, Germany and Portugal in 1903 and 1904. In his first two years the king had already earned the title of Edward the Peacemaker, and established his position as a source of new strength to the state. This reputation

was confirmed in the years which followed, during which the royal hand was to be seen in the progress of foreign affairs in a manner somewhat new to old- fashioned politicians. The entente with France was promoted by his influence, notably by his reception of President Fallieres in England in 1908. It was noticed that the permanent under- secretary . for foreign affairs, Sir Charles Hardinge, generally accompanied the king, as one of his suite, on his visits abroad: and the conclusion of the Anglo-Russian agreement (1907) — which was attributed with some reason to royal policy — was hotly criticized in Radical quarters. It was pointed out that neither the foreign secretary (Sir E. Grey) nor any other secretary of state accompanied the king on his foreign visits. These objec- tions were, however, scouted by the government, and undeniably public opinion approved of the sovereign's personal activity in a sphere peculiarly his own. The strengthening of British in- fluence in Europe, which was the marked result of the Anglo- French and Anglo-Russian ententes, and of the closer ties between England and countries like Portugal and Spain (whose young king Alfonso married Princess Ena of Battenberg, King Edward's niece), had, indeed, temporarily the effect of rousing German suspicion, the view taken being that the object of British foreign policy was to isolate Germany; and during 1907 and 1908 the political situation was coloured by the discussions in the press with regard to Anglo-German rivalry. But in February 1909 the king and queen paid a state visit to the Kaiser in Berlin, where the greatest cordiality was displayed on all sides; the event was prepared for, in both countries, as a means of dispelling the clouds which had gathered over the relations between England and Germany, and the success of the visit proved once more how powerful King Edward's personality could be as an agency for peace and international amity.

During the year 1909, however, the political situation at home was developing into an acute constitutional crisis, which seemed

likely to involve the Crown in serious difficulties. Mr Lloyd- George's budget convulsed the House of Commons and the country, and was eventually rejected by the House of Lords ; and the Liberal government now put in the forefront of its programme the abolition of the Peers' " veto." As was hinted, not obscurely, later by the doctors, King Edward, although certainly not prejudiced against a Liberal ministry, was seriously disturbed in mind and health by the progress of events, which culminated in the return of Mr Asquith to office after the elections of January 1910, and in his statement that, if necessary, guaran- tees would be sought from the Crown for the

purpose of enforcing the will of the representative chamber. A remarkable sign of the king's discomfort was his insertion, in the official "King's Speech" at the opening of parliament, of the words "in the opinion of my advisers," in connexion with the passage dealing with the House of Lords. The king had been far from robust for some little time, and while he was taking change and rest at Biarritz in the early spring of 1910 he had a bronchial attack which caused some anxiety, although the public heard nothing of it. When he returned to England there is no doubt that he was acutely affected by the prospect of being forcibly dragged into the political conflict. In the country at large there was indeed considerable confidence that the king's tact and experi- ence would help to bring order out of chaos; but this was not to be. Within two days the public heard with consternation that he was ill, and then was dead. On May 5 it was announced that he had bronchitis; and he died at 11.45 P – M – on the 6th, of heart failure. On May 17, 18 and 19 there was an impressive lying-in-state in Westminster Hall, attended by unprecedented crowds; and on May 20 the burial took place at Windsor, after a great funeral procession through London, the coffin being followed by the new king, George V., and by eight foreign sovereigns — the German emperor, the kings of Greece, Spain, Portugal, Denmark, Norway, Belgium and Bulgaria — besides the archduke Franz Ferdinand of Austria (heir to the throne of Austria-Hungary), the prince consort of Holland and many other royalties, and a number of special ambassadors, including Mr Roosevelt as representative of the United States. Mourning was as sincere as it was universal; for not only England and the British Empire, but the world, had lost a king who was both a very human man and a tried and trusted statesman.

Queen Victoria's long reign had solidly established the con- stitutional monarchy; it remained for her son to rehabilitate the idea of English kingship by showing how the sovereign could be no less constitutional but personally more monarchical. While prince of Wales he had had little real training in state- craft, but when he became king his genuine capacity for affairs was shown. Ably advised by such men as Lord Knollys and Lord Esher, he devoted himself to the work of removing the Throne from its former isolation, and bringing it into touch with all sections of the community for the promotion of social happi- ness and welfare. His own love of pageantry and his interest in the stately ordering of court functions responded, moreover, to a marked inclination on the part of the public and of " society " for such things. It was significant that even Radicals and Socialists began to advocate extensions of the

prerogative, and to insist on the active part which the Crown should play in public life. The king won the genuine affection and confidence of the people; and in Queen Alexandra he had an ideal consort, to whom all hearts went out. (H. Ch.)

EDWARD, prince of Wales, known as " The Black Prince " (1330-1376), the eldest son of Edward III. and Philippa of Hainaut, was born at Woodstock on the 15th of June 1330. Contemporaries called him Edward of Woodstock, and his surname of the Black Prince cannot be traced back earlier than the 1 6th century. It is supposed to have been derived from his wearing black armour. In 1333 he was made earl of Chester, and in 1337 duke of Cornwall, being the first duke ever created in England. Nominal warden of England during his father's absences abroad in 1338 and 1342, he was created prince of Wales in 1343, and in 1345 he first accompanied his father on a foreign expedition.

IOOO

EDWARD, THE BLACK PRINCE

His real career begins, however, with Edward III.'s Norman campaign of 1346. On landing at La Hogue he was knighted by his father, and took a prominent part in the whole of the campaign. He commanded the right wing of the English forces at Crecy, and, though hard pressed for a time by the French, took his full share in gaining the victory. Next year he was at the siege of Calais, and returned to England in October 1347 with his father. He was one of the original knights of the Garter, and participated in his father's chivalrous adventures at Calais in 1349 and in the battle off Winchelsea in 1350. In September 1355 he was sent to Gascony at the head of an English army, having been appointed his father's lieutenant there in July. He was warmly welcomed by the Gascons, and at once led a foray through Armagnac and Languedoc. By November he had got as far as Narbonne, whence he returned to Bordeaux, where he kept his Christmas court. In August 1356 he started from Bergerac on another marauding expedition, this time in a northerly direction. He penetrated as far as the Loire, but was there compelled to retire before the superior forces of King John of France. On the 19th of September the two armies met in the battle of Poitiers, fought about 6 m. south-east of the city. It was the hardest-fought and most important battle of the Hundred Years' War, and Edward's victory was due both to the excellence of his tactical disposition of his forces and to the superior fighting capacity of his army. The flank march of the Captal de Buch, which decided the fate

of the day, was of Edward's own devising, and the captivity of King John attested the complete- ness of his triumph. He treated his prisoner with almost ostentatious magnanimity, and took him to Bordeaux, whence they sailed to England in May 1357. On the 24th of that month he led his prisoner in triumph through the streets of London. In 1359 he took part in his father's invasion of northern France, and had a large share in the negotiations at Bretigny and Calais.

In October 1361 Edward married his cousin Joan, countess of Kent (1328-1385), the daughter and heiress of Edmund of Woodstock, earl of Kent, the younger son of Edward I. by his second wife Margaret of France. The lady, who enjoyed a great reputation for beauty, was in her thirty-third year, and the widow of Sir Thomas Holand, by whom she had had three children. Froissart says that the marriage was a love match, and that the king had no knowledge of it. However, Edward III. approved of his son's choice, and in July 1362 handed over to him all his dominions in southern France, with the title of prince of Aquitaine. In February 1363 Edward and Joan took ship for Gascony, which became his ordinary place of residence for the next eight years. He maintained a brilliant court at Bordeaux and Angouleme, and did his best to win the support of the Gascons. He was not, however, successful in winning over the greater nobles, who, with John, count of Armagnac, at their head, were dissatisfied with the separation from France, and looked with suspicion upon Edward's attempts to reform the administra- tion as being likely to result in the curtailment of their feudal rights. Edward was better able to conciliate the towns, whose franchises he favoured and whose trade he fostered, hoping that they would prove a counterpoise to the aristocracy. He kept the chief posts of the administration mainly in English hands, and never really identified himself with the local life and traditions of

his principality. He succeeded in clearing Aquitaine of the free companies, and kept good peace for nearly six years.

In 1367 Jeter the Cruel, the deposed king of Castile, visited Edward at Bordeaux, and persuaded him to restore him to his throne by force. In February 1367 Edward led an army into Spain over the pass of Roncesvalles. After a difficult and dangerous march Edward reached the Ebro, and on the 3rd of April defeated Bertrand du Guesclin at Najera, the last of his great victories. He then proceeded to Burgos, and restored Peter to the throne of Castile. He remained in Castile for four months, living principally at Valladolid. His army wasted away during the hot Spanish summer, and Edward himself

contracted the beginnings of a mortal disease. In August 1367 Edward led the remnant of his troops back through the pass of Roncesvalles, and returned to Bordeaux early in September. He had exhausted all his resources on the Spanish expedition, and was forced to seek from the estates of Aquitaine extraordinary sources of supply. A hearth tax for five years was willingly granted to him, and generally paid. The greater barons, however, found in this im- post a pretext for revolt. The count of Armagnac, who had already made a secret understanding with Charles V., appealed against the hearth tax to the parlement of Paris. Cited before this body in January 1369, Edward declared that he would answer at Paris with sixty thousand men behind him. War broke out again, and Edward III. resumed the title of king of France. Thereupon Charles V. declared that all the English possessions in France were forfeited, and before the end of 1369 all Aquitaine was in full revolt. With weak health and impaired resources, the Black Prince showed little activity in dealing with his insurgent subjects, or in warding off French invasion. Though too ill to ride on horseback, he insisted upon commanding his troops, and on the 19th of September 1370 won his last barren success, by capturing the revolted city of Limoges and putting the population to the sword. Early in 13 71 he returned to England, leaving the impossible task of holding Gascony to his brother John of Gaunt. In August 1372 he joined his father in an abortive expedition to France, but contrary winds prevented their landing, and he now abandoned military life for good. In October he resigned his principality on the ground that he could not afford to retain any longer so expensive a charge. His health now rapidly declined, but he still followed politics with interest, and did what he could to support the constitutional opposition of the great ecclesiastics to the administration of John of Gaunt and the anti-clerical courtiers. His last public act was to inspire the attack on Lancaster's influence made by the Good Parliament in the spring of 1376. The famous parliament was still in session when he died at Westminster on the 8th of July. He was buried in the east end of Canterbury cathedral on the 29th of September, where his magnificent tomb, erected in accordance with the instructions in his will, may still be seen. By Joan, " the fair maid of Kent," who died on the 7th of August 1385, the Black Prince left an only son, afterwards King Richard II.

For authorities see Edward III. To these may be added W. Hunt's article in the Diet. Nat. Biog. ; A. Collins's Life of Edward, Prince of Wales (1740) ; G. P. R. James's Life of Edward the Black Prince (1839) ; J. Moisant's Le Prince Noir en Aquitaine (1894) ; and R. P.

Dunn-Pattison's The Black Prince (1910). (T. F. T.)

PRINTED IN U.S.A.

VOL09_EDWARDES-EVANGELICAL_AS

Britannica

THE

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

FIRST edit

ion, published in three volumes, 1768 — 1771.

SECOND ,

> » ten ,

1777—1784-

THIRD ,

, „ eighteen ,

, 1788— 1797.

FOURTH ,

, „ twenty ,

, 1801— 1810.

FIFTH ,

, „ twenty ,

, 1815—1817.

SIXTH ,

, „ twenty ,

, 1823 — 1824.

SEVENTH ,

, „ twenty-one ,

, 1830 — 1842.

EIGHTH ,

, „ twenty-two ,

» 1853—1860.

NINTH ,

, „ twenty-five ,

, 1875— 1889.

TENTH ,

, ninth edition and eleven

supplementary volumes,

1902 — 1903.

ELEVENTH ,

, published in twenty-nine volume

■s, 1910 — 1911.

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the UNIVERSITY OF CAMBRIDGE

All rtghts resented

THE

ENCYCLOPEDIA BRITANNICA

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME IX EDWARDES to EVANGELICAL ASSOCIATION

New York

Encyclopaedia Britannica, Inc. 342 Madison Avenue

Copyright, in the Unhed States of America, 1910,

by

The EncyclopEedia Britannica Company.

INITIALS USED IN VOLUME IX. TO IDENTIFY INDIVIDUAL

CONTRIBUTORS,! WITH THE HEADINGS OF THE

ARTICLES IN THIS VOLUME SO SIGNED.

A. A. T.

A. Ca. A. C. MeG.

A. E. G.*

A. E. H. A. E. H. L.

A. Fi.*

A.

F. K.

A.

F, P.

A.

Go.*

A.

HI.

A.H. G.

A. H. S. A. H.-S. A. J. G.

A. Mw.

Arthur Augustus Tilley, M.A.

Fellow and Lecturer in Modern Languages, King's College, Cambridge. Author of -\ Estienne. The Literature of the French Renaissance ; &c.

Arthur Cayley, LL.D., F.R.S.

See the biographical article: Cayley, Arthur.

Arthur Cushman McGiffert, M.A., Ph.D., D.D.

Professor of Church History, Union Theological Seminary, New York. Author of _

-j Equation.

History of Christianity in the Apostolic Age; &c. Eusebius.

Editor of the Historia Ecclesia of 1 Euseblus – of Caesarea.

Rev. Alfred Ernest Garvie, M.A., D.D.

Principal of New College, Hampstead. Member of the Board of Theology and. the Board of Philosophy, London University. Author of Studies in the Inner Life of Jesus ; &c.

A. E. Houghton.

Formerly Correspondent of the Standard in Spain. Author of Restoration of the ~ Bourbons in Spain.

Augustus Edward Hough Love, M.A., D.Sc, F.R.S.

Sedleian Professor of Natural Philosophy in the University of Oxford. Hon. . Fellow of Queen's College. Formerly Fellow of St John's College, Cambridge. Secretary of the London Mathematical Society.

Alexander Fisher.

Expert Examiner to the Board of Education, London. Gold Medallist, Barcelona. . Hon. Associate, Royal College of Art. Author of The Art of

Enamelling on Metals; &c. I

A. F. Kendrick. (J”

Keeper of the Victoria and Albert Museum, South Kensington. \

Albert Frederick Pollard, M.A., F.R.Hist.Soc. f

Fellow of All Souls’ College, Oxford. Professor of English History in the University J of London. Assistant Editor of the Dictionary of National Biography, 1893-1901. 1 Author of England under the Protector Somerset ; Life of Thomas Cranmer ; &c. [

Rev. Alexander Gordon, M.A. f

Lecturer on Church History in the University of Manchester. |_

Arthur Hassall, M.A.

Student and Tutor of Christ Church, Oxford. Author of A Handbook of European History; The Balance of Power; &c. Editor of the 3rd edition of T. H. Dyer’s History of Modern Europe.

Alan Henderson Gardiner, M.A.

Joint Editor of the New Hieroglyphic Dictionary, Berlin. Formerly Worcester Reader in Egyptology, University of Oxford.

Rev. A. H. Sayce, Litt.D., LL.D.

See the biographical article: Sayce, A. H.

Sir A. Houtum-Schindler, CLE.

General in the Persian Army. Author of Eastern Persian Irak.

Rev. Alexander James Grieve, M.A., B.D. r

Professor of New Testament and Church History at the United Independent) College, Bradford. Sometime Registrar of Madras University and Member of 1 Mysore Educational Service. L

Allen Mawer, M.A. r

Professor of English Language and Literature, Armstrong College, Newcastle-on- J Tyne. Fellow of Gonville and Caius College, Cambridge. Formerly Lecturer in 1 English at the University of

Sheffield. L

Eschatology.

Espartero.

Elasticity.

Enamel.

Embroidery {in part).

Elizabeth, Queen; Eraser; Englefleld; English History (VII. and XIII.).

Erastus.

Europe: History {in part).

Egypt: Ancient, Religion,

Elam; Esar-haddon.

Elburz.

Epistle (m part).

England (V.).

1 A complete list, showing all individual contributors, appears in the final volume.

VI

A. HcM.

A. m: c.

A. M. CI

A.N.

A. So.”

INITIALS AND HEADINGS OF ARTICLES

A. S. C.

A.

W.

H*

A.

W.

R.

C.

B.

C.

EI.

C. E. N. R. C. F. B.

C. H. Ha. C. W. C. 0.

C. W. W.

D. G. H.

D.H. D. J. M. D. M. W.

D. S. M *

Alexander Macmorran, K.C., M.A.

Bencher of the Middle Temple. Author of works on the Local Government Act 1888; Local Government Act 1894; London Government Act 1899; & c –

Agnes Mary Clerke.

See the biographical article: Clerke, A. M.

{

England: X. (in part).

Encke.

Agnes Muriel Clay (Mrs Wilde). f

Formerly Resident Tutor of Lady Margaret Hall, Oxford. Joint Author of Sources i Eupatridae. of Roman History, 133-70 B.C. I

Alfred Newton, F.R.S. f Eider;

See the biographical article : Newton, Alfred. I Emeu.

Adam Sedgwick, M.A., F.R.S. f

Professor of Zoology at the Imperial College of Science and Technology, London. J Embryology Fellow, and formerly Tutor, of Trinity College, Cambridge. Professor of Zoology | in the University of Cambridge, 1907-1909. I

Alan Summerly Cole, C.B. f

Assistant Secretary for Art, Board of Education, 1900-1908. Author of Ancient -J Embroidery (in part). Needle Point and Pillow Lace; Embroidery and Lace; Ornament in European Silks; &c. L

Bacon Scholar of Gray's Inn, 1900. Editor of Encyclopaedia of the Laws

Arthur William Holland.

Formerly Scholar of St John's College, Oxford.

Alexander Wood Renton, M.A., LL.B.

Puisne Judge of the Supreme Court of Ceylon. of England.

Rev. Charles Boutell, M.A. (1812-1877).

Author of English Heraldry; A Manual of British Archaeology ; &c.

Sir Charles Norton Edgcumbe Eliot, K.C.M.G., C.B., M.A., LL.D., D.C.L. Vice-Chancellor of Sheffield University. H.M.'s Commissioner and Ccmmander-in- Chief for the British East Africa Protectorate ; Agent and Consul-General at „ Zanzibar; Consul-General for German East Africa, 1900-1904. Formerly Fellow of Trinity College, Oxford. Author of Turkey in Europe; Letters from the Far East ; &c.

Charles Edmund Newton Robinson, M.A.

Trinity College, Cambridge. Barrister-at-Law, Inner Temple. Epfe Club,

London. Author of The Golden Hind ; &c.

Einhard,

Ejectment; Emblements; [Eminent Domain.

I Effigies (in part).

Ephthalites; Esthonia (in part).

.1

Member -j Eugenius III. and IV.

English History (I., II., III. IV., V., VI.).

Founder of the ˆ Epee de Combat.

Charles Francis Bastable, M.A., LL.D. r

Regius Professor of Laws and Professor of Political Economy in the University of J r-no-ijct, r;..... Dublin. Author of Public Finance; Commerce of Nations; Theory of International] r

Carlton Huntley Hayes, A.M., Ph.D.

Assistant Professor of History in Columbia University, New York City. of the American Historical Association.

Charles William Chadwick Oman, M.A., F.S.A.

Chichele Professor of Modern History, Oxford University. Fellow of All Souls' College. Fellow of the British Academy. Corresponding Member of the Madrid • Academia de la Historia. Author of The Art of War in the Middle Ages; The Great Revolt of 138 1 ; Warwick the King-maker; &c.

Sir Charles William Wilson, K.C.B., K.C.M.G., F.R.S. (1836-1907).

Major-General, Royal Engineers. Secretary to the North American Boundary Commission, 1858-1862. British Commissioner on the Servian Boundary Commis- sion. Director-General of the Ordnance Survey, 1886-1894. Director-General of Military Education, 1895-1898. Author of From Korti to Khartoum; Life of Lord Clive; &c.

David George Hogarth, M.A.

Keeper of the Ashmolean Museum, and Fellow of Magdalen College, Oxford. Fellow of the British Academy. Excavated at Paphos, 1888; Naukratis, 1899 and 1903; Ephesus, 1904-1905; Assiut, 1906-1907. Director, British School at Athens, 1897-1900; Director, Cretan Exploration Fund, 1899.

David Hannay.

Formerly British Vice-Consul at Barcelona. Author of Short History of Royal Navy, – 1217-1688; Life of Emilio Castelar; &c.

D. J. Matthews.

Hydrographer, Laboratory of the Marine Biological Association of the United – Kingdom, Plymouth.

Sir Donald Mackenzie Wallace, K.C.I.E., K.C.V.O.

Extra Groom of the Bedchamber to H.M. King George V. Director of the Foreign Department of The Times, 1891-1899. Member of Institut de Droit International and Officer de l'lnstruction Publique of France. Joint Editor of New Volumes" (10th ed.) of the Encyclopaedia Britannica. Author of Russia; Egypt and the Egyptian Question ; The Web of Empire ; &c.

David Samuel Margoliouth, M.A., D.Litt.

Laudian Professor of Arabic, Oxford. Fellow of New College. Author of Arabic j Papyri of the Bodleian' Library; Mohammed and the Rise of Islam; Cairo, Jerusalem)

Erzerum (in part); Erzingan (in part); Euphrates (in part).

Egin; Ephesus.

Ensenada; Espagnols sur Mer.

English Channel (in part).

Egypt: Modern History

(in part); Europe: History (in part).

and Damascus.

f Egypt: History (Mahommedan Period) ; Ethiopia.

INITIALS AND HEADINGS OF ARTICLES

Vll

E. A. S*

E. Br.

Edward Anthony Spitzka. C

Professor of General Anatomy, Jefferson Medical College and Hospital, Philadelphia. J Electrocution

Member of Association of American Anatomists, American Anthropologists'] Association, &c. I

E.

B. T.

E.

C. B.

E.

G.

E.

Ga.

E.

Go.

E.

Gr.

E.

He.

Ernest Barker, M.A.

Fellow of, and Lecturer in Modern History at, St John's College, Oxford. Fellow and Tutor of Merton College. Craven Scholar, 1895.

Edward Burnett Tylor, D.C.L., LL.D., F.R.S. See the biographical article: Tylor, E. B.

Rt. Rev. Edward Cuthbert Butler, O.S.B., M.A., D.Litt. (Dublin).

Abbot of Downside Abbey, Bath. Author of ” The Lausiac History of Palladius in Cambridge Texts and Studies, vol. vi.

Edmund Gosse, LL.D.

See the biographical article : Gosse, Edmund W.

r Electors; Formerly < Emperor; I Empire.

{

Eunuch.

Elias.

Ed. M.

Emile Garcke, M.Inst.E.E.

Managing Director of British Electric Traction Co., Ltd. Electrical Undertakings; &c.

Sir Eldon Gorst, K.C.B.

See the biographical article: Gorst, Sir John Eldon.

Ernest Arthur Gardner, M.A.

See the biographical article : Gardner, Percy.

Edward Heawood, M.A.

Gonville and Caius College, Cambridge. Librarian of Society, London.

Eduard Meyer, Ph.D., D.Litt. (Oxon.), LL.D.

Professor of Ancient History in the University of Berlin.

Author of Manual of

f Elegy; Epic Poetry; Epilogue; ■I Epistle: Poetry; Essay; [Etheredge; Euphuism.

Electricity Supply:

Commercial.

Egypt: Finance (in part).

{

the Royal Geographical i

Author of Geschichte des

E. S. P.

E. V.

E. Wo.

F. C. C.

F. G. M.

B

F. J. H.

Eleusis; Elis; Epidaurus; Erechtheum; Eretria.

Elgon.

Eucratides; Euthydemus.

Egypt: History (II. in part).

Ember Days and Ember Weeks.

Egypt: Modern, Army.

Epiphany; Eucharist.

Edwin;

Essex, Kingdom of.

Ermine Street.

F. LI. G.

F. R. C. F. R. M.

F. W. M.

F. W. R.*

G. C. W.

G. E.

G, G. C,

Alterthums; Geschichte des alien Agyptens; Die Israeliten und ihre Nachbarstdmme.

Edward Stanley Poole.

See the biographical article: Poole, Reginald Stuart.

Rev. Edmund Venables (1819-1805).

Canon and Precentor of Lincoln. Author of Episcopal Palaces of England.

Field-Marshal Sir Evelyn Wood, V.C., G.C.M.G. See the biographical article : Wood, Sir Evelyn.

Frederick Cornwallis Conybeare, M.A., D.Th. (Giessen).

Fellow of the British Academy. Formerly Fellow of University College, Oxford. Author of The Ancient Armenian Texts of Aristotle; Myth, Magic and Morals; &c.

Frederick George Meeson Beck, M.A.

Fellow and Lecturer in Classics, Clare College, Cambridge.

Francis John Haverfield, M.A., LL.D. (Aberdeen), F.S.A.

Camden Professor of Ancient History in the University of Oxford. Fellow of Brasenose College, Oxford. Fellow of the British Academy. Member of the German Imperial Archaeological Institute. Formerly Senior Censor, Student, Tutor and Librarian of Christ Church, Oxford. Ford's Lecturer, 1906. Author of Monographs on Roman History; &c.

Francis Llewelyn Griffith, M.A., Ph.D.

Reader in Egyptology, Oxford University. Formerly Scholar of Queen's College, 1 T? a „ n i- A • t Oxford. Editor of the Archaeological Survey and Archaeological Reports of the] J! *yP»- Anc ˆni. Egypt Exploration Fund. Fellow of Imperial German Archaeclogical Institute. I

Frank R. Cana.

Author of South Africa from the Great Trek to the Union.

Francis Richard Maunsell, C.M.G. r

Lieutenant-Colonel, R.A. Military Vice-Consul, Sivas, Trebizond, Van (Kurdistan), J Erzerum [in part) ; 1897-1898. Military Attache, British Embassy, Constantinople, 1901-1905. 1 Erzingan (in part). Author of Central Kurdistan ; &c. L

Frederick William Maitland, LL.D.

See the biographical article : Maitland, F. W.

Frederick William Rudler, I.S.O., F.G.S.

Curator and Librarian of the Museum of Practical Geology, London, 1879-1902. President of the Geologists' Association, 1887-1889.

Egypt: Modern (in part).

I English Law.

Emerald; Emery.

George Charles Williamson, Litt.D. r

Chevalier of the Legion of Honour. Author of Portrait Miniatwes; Life of Richard] Rneleheart Cos-ivay, R.A.: George Engleheart; Portrait Drawings; &c. Editor of new edition 1 of Bryan's Dictionary of Painters and Engravers', [_

Rev. George Edmundson, M.A., F.R. Hist. S. r

Formerly Fellow and Tutor of Brasenose College, Oxford. Ford's Lecturer, 1909-1910. Employed by British Government in preparation of the British 1 Egmont, Count of.

arbitrations.

case in the British Guiana- Venezuelan and British Guiana-Brazilian boundary I

George Goudie Chisholm, M.A, r

Lecturer on Geography in the University of Edinburgh. Secretary of the Royal J Euro P e: Geography and Scottish Geographical Society. Author of Handbook of Commercial Geography. 1 Statistics. Editor of Longman's Gazetteer of the World. {,

Vlll

G. H. C.

G. S. C.

H. A. E.

D

H.Br.

H. Ch.

H. C. R.

H. F. T.

Author of Insects: i Entomology

Egypt : Military Operations,

INITIALS AND HEADINGS OF ARTICLES

George Herbert Carpenter, B.Sc.

Professor of Zoology in the Royal College of Science, Dublin. Their Structure and Life.

Sir George Sydenham Clarke, G.C.M.G., G.C.I.E., F.R.S.

Governor of Bombay. Author of Imperial Defence; Russia's Great Sea Power; The Last Great Naval War ; &c.

Hans A. E. Driesch, Ph.D., LL.D. r

Gifford Lecturer at the University of Aberdeen, 1907-1908. Author of Die Or- J Embryology : Physiology of ganischen Regulationen ; Der

Vitalismus als Geschichte und als Lehre; The Science 1 Development, and Philology of the Organism ; &c. L

Henry Bradley, M.A., Ph.D. f

Fellow of the British Academy. Joint Editor of the New English Dictionary A English Literature (I.). (Oxford). Author of The Story of the Goths; The Making of English; &c. L

Hugh Chisholm, M.A. r

Formerly Scholar of Corpus Christi College, Oxford. Editor of the nth edition 4 English History: XII. {in part). of the Encyclopaedia Britannica. Co-Editor of the 10th edition. (_

Major-General Sir Henry Creswicke Rawlinson, Bart., G.C.B. See the biographical article: Rawlinson, Sir H. C.

Rev. Henry Fanshawe Tozer, M.A., F.R.G.S. f

Hon. Fellow and formerly Tutor of Exeter College, Oxford. Fellow of the British 1 Academy. Corresponding Member of the Historical Society of Greece. Author of -\ Euboea. History of Ancient Geography; Classical Geography; Lectures on the Geography of Greece; &c.

Euphrates {in part).

H. Ha. H. H. W.

H. M. R.

H. M. R. M. H. $. G.

H. R. M.

Heber Hart, LL.D.

Barrister-at-Law, Middle Temple.

Estate and House Agents.

Rev. Henry Herbert Williams, M.A.

Fellow, Tutor and Lecturer in Philosophy, Hertford College, Oxford. Examining^ Ethics {in pdri). Chaplain to the Bishop of Llandaff.

Hugh Munro Ross.

Formerly Exhibitioner of Lincoln College, Oxford. Supplement. Author of British Railways.

Editor of The Times Engineering < English Channel {in part).

Hilda Mary R. Murray, M.A.

Lecturer on English at Royal Holloway College.

English Language {in part).

England : Physical Geography (II., IV.).

H.

s.

H.

Sw.

H.

van D.

H.

W. C. D

r.

A.

■j Ethics {in part).

Harry Norman Gardiner, A.M. f”

Professor of Philosophy, Smith College, Northampton, U.S.A. Editor of Jonathan ■< Edwards, Jonathan {in part). ■Edwards — a Retrospect. [_

Hugh Robert Mill, D.Sc, LL.D.

Director of British Rainfall Organization. Formerly President of the Royal Meteoro- logical Society. Hon. Member of Vienna Geographical Society. Hon. Correspond- ing Member of Geographical Societies of Paris, Berlin, Budapest, St Petersburg, Amsterdam, &c. British Delegate to International Conference on the Exploration of the Sea at

Christiania, 1901. Author of The Realm of Nature; The Clyde Sea Area; The English Lakes; The International Geography. Editor of British Rainfall,

Henry Sidgwick, LL.D.

See the biographical article: Sidgwick, H.

Henry Sweet, M.A., Ph.D., LL.D.

University Reader in Phonetics, Oxford. Member of the Academies of Munich, J Wcneranto Berlin, Copenhagen and Helsingfors. Author of A History of English Sounds since 1 the Earliest Period; A Handbook of Phonetics; &c. [_

Henry van Dyke, A.M., D.D., LL.D.

Professor of English Literature, Princeton University, U.S.A. Author of The Poetry ■ of Tennyson; The Ruling Passion; The Spirit of America; &c.

Henry William Carless Davis, M.A.

Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls' College, Oxford, – 1895-1902. Author of England under the Normans and Angevins; Charlemagne.

Israel Abrahams, M.A.

Reader in Talmudic and Rabbinic Literature, University of Cambridge. President, Jewish Historical Society of England. Author of A Short History of Jewish Litera- ” ture; Jewish Life in the Middle Ages; &c.

Emerson.

J. A. F.

J. A. H.

J. A. H. M. J. G. C. A.

John Ambrose Fleming, M.A., D.Sc, F.R.S.

Pender Professor of Electrical Engineering in the University of London. Fellow of University College, London. Formerly Fellow of St John's College, Cambridge. Vice-President of the Institution of Electrical Engineers. Author of The Principles of Electric Wave Telegraphy ;

Magnets and Electric Currents ; &c.

John Allen Howe, B.Sc.

Curator and Librarian of the Museum of Practical Geology, London. Author of – Geology of Building Stones.

Sir James Augustus Henry Murray, LL.D., D.C.L., Litt.D. Seethe biographical article: Murray, Sir James A. H.

John George Clark Anderson, M.A.

Censor and Tutor of Christ Church, Oxford. Formerly Fellow of Lincoln College; – Craven Fellow, Oxford, 1896. Conington Prizeman, 1893.

Eleanor of Aquitaine.

Einhorn, David ; Elijah Wilna ; Elisha ben Abuyah. Electrical Machine ; Electricity ; Electricity Supply ; Electrokinetics ; Electromagnetism ; Electrometer ; Electrophorus ; . Electroscope ; Electrostatics.

England : Geology (III.) ; Eocene.

English Language. Euyuk.

INITIALS AND HEADINGS OF ARTICLES

UE

J

6.

M.

J.

G.

R.

J.

H.

F.

J.

H.

Rs

Eulenspiegel.

Equites.

J. HI. R. J. J. T.

J.L.*

J. L. M.

J. M. M. J. M. Ma.

J. P. Pe.

J. S. F.

J. S. M.

J. T. Be. J. T. C.

J. W. He.

K. S.

L. D.* L. J. S.

L. V>

John Gray McKendrick, M.D., LL.D., F.R.S., F.R.S. (Edin.). J

Emeritus Professor of Physiology at the University of Glasgow. Professor of “j Equilibrium. Physiology, 1876-1906. Author of Life in Motion; Life of Helmholtz; Sec. I

John George Robertson, M.A., Ph.D. f

Professor of German Language and Literature, University of London. Editor of the Modern Language Journal. Author of History of German Literature; Schiller after a Century ; &c.

John Henry Freese, M.A.

Formerly Fellow of St John's College, Cambridge.

Rev. James Hardy Ropes, D.D. (

Bussey Professor of New Testament Criticism and Interpretation, and Dexter J Lecturer on Biblical Literature, Harvard University. Author of The Apostolic \ Age in the Light of Modern Criticism; &c. I

John Holland Rose, M.A., Litt.D.

, Lecturer on Modern History to the Cambridge University Local Lectures Syndicate. Author of Life of Napoleon I. ; Napoleonic Studies ; The Development of the European Nations ; The Life of Pitt ; &c. I

Sir Joseph John Thomson, D.Sc., LL.D., Ph.D., F.R.S. r

Cavendish Professor of Experimental Physics, Cambridge. Fellow of Trinity College. President of the British Association, 1909-1910. Author of A Treatise < Electric Waves

on the Motion of Vortex Rings; Application of Dynamics to Physics and Chemistry; Recent Researches in Electricity and Magnetism ; &c. I

Sir Joseph Larmor, M.A., D.Sc, LL.D., F.R.S.

Fellow of St John's College, Cambridge. Lucasian Professor of Mathematics in Cambridge University. Secretary of the Royal Society. Professor of Natural Philosophy, Queen's College, Galway, and in the Queen's University of Ireland, 1 880-1 885. Author of Ether and Matter, and various memoirs on Mathematics and Physics.

John Linton Myres, M.A., F.S.A. r

Wykeham Professor of Ancient History in the University of Oxford. Formerly] Gladstone Professor of Greek and Lecturer in Ancient Geography, University of 1

Ephesians, Epistle to the,

Enghien, Due d\

Energetics ; Energy {in part).

Liverpool, and Lecturer on Classical Archaeology, University of Oxford.

John Malcolm Mitchell.

Sometime Scholar of Queen's College, Oxford. Lecturer in Classics, East London ■ College (University of London). Joint Editor of Grote's History of Greece.

John Matthews Manly, A.M., Ph.D.

Professor and Head of the Department of English in the University of Chicago. Managing Editor of Modern Philology. Author of The Language of Chaucer's Legend ■ of Good Women; &c. Editor of Specimens of the Pre-Shakespearean Drama; English Prose, 1 137-1890; English Poetry, 1170-1802; &c.

Rev. John Punnett Peters, Ph.D., D.D.

Canon Residentiary, Cathedral of New York. Formerly Professor of Hebrew in the University of Pennsylvania. Director of the University Expedition to Babylonia, 1888-1895. Author of Nippur, or Explorations and Adventures on the Euphrates.

John Smith Flett, D,Sc, F.G.S.

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in Edin- burgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby " Medallist of the Geological Society of London.

John Sturgeon Mackay, M.A., LL.D., F.R.S. (Edin.).

Chief Mathematical Master at Edinburgh Academy, 1873-1904. First President of the Edinburgh Mathematical Society. Author of Arithmetical Exercises;' Elements of Euclid.

John T. Bealby.

Joint Author of Stanford's Europe. Formerly Editor of the Scottish Geographical ■ Magazine. Translator of Sven Hedin's Through Asia, Central Asia and Tibet; &c,

Joseph Thomas Cunningham, M.A., F.Z.S.

Lecturer on Zoology at the South-Western Polytechnic, London. Formerly Fellow of University College, Oxford. Assistant Professor of Natural History in the" University of Edinburgh. Naturalist to the Marine Biological Association.

James Wycliffe Headlam, M.A.

Staff Inspector of Secondary Schools under the Board of Education.

Formerly Fellow of King's College, Cambridge, and Professor of Greek and Ancient History – at Queen's College, London. Author of Bismarck and the Foundation of the German Empire; &c.

Kathleen Schlesinger.

Author of The Instruments of the Orchestra ; &c. Archaeology.

Louis Duchesne.

See the biographical article: Duchesne, L. M. 0.

Leonard James Spencer, M.A.

Assistant in the Department of Mineralogy, British Museum. Formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar. Editor of the Mineral- ogical Magazine.

LUIGI VlLLARI.

Italian Foreign Office (Emigration Department). Formerly Newspaper Corre- spondent in East of Europe. Italian Vice-Consul in New Orleans, 1906; Phil- adelphia, 1907; and Boston, U.S.A., 1907-1910. Author of Italian Life in Town and Country; &c.

Editor of the Portfolio of Musical ■

Epirus.

Erigena {in part).

English Literature (II.).

Erech ; Eridu ; Euphrates {in part).

Epidiorite ; Epidosite.

Euclid.

Esthonia {in part).

Eel.

Ernest II.

Epigonion ; Euphonium.

J" Eleutherius ;

I Eugenius I. and II.

f Enstatite ; 1 Epidote; I Erubescite.

Este.

X

M. G.

M. H. S.

INITIALS AND HEADINGS OF ARTICLES

M. Ja.

M. 0. B.

C

M. N. T.

M.P.

N. M.

O.E.*

Moses Gaster, Ph.D. (Leipzig).

Chief Rabbi of the Sephardic Communities of England. Vice-President, Zionist Congress, 1898, 1899, 1900. Ilchester Lecturer at Oxford op Slavonic and By- zantine Literature, 1886 and 1891. President, Folklore Society of England. Vice- President, Anglo-Jewish Association. Author of History of Rumanian Popular Literature; &c.

Marion H. Spielmann, F.S.A.

Formerly Editor of the Magazine of Art. Member of Fine Art Committee of Inter- national Exhibitions of Brussels, Paris, Buenos Aires, Rome, and the Franco-British . Exhibition, London. Author of History of “Punch ” ; British Portrait Painting to the Opening of the Nineteenth Century ; Works of G. F. Watts, R.A . ; British Sculpture and Sculptors of To-day ; Henriette Ronner ; &c.

Morris Jastrow, Ph.D. (Leipzig).

Professor of Semitic Languages, University of Pennsylvania, U.S.A. Author of Religion of the Babylonians and A ssyrians ; &c.

Maximilian Otto Bismarck Caspari, M.A.

Reader in Ancient History at London University. Lecturer in Greek at Birming- ham University, 1 905-1 908.

Marcus Niebuhr Tod, M.A.

Fellow and Tutor of Oriel College, Oxford. University Lecturer in Epigraphy. Joint Author of Catalogue of the Sparta Museum.

Mark Pattison.

See the biographical article : Pattison, Mark.

Norman McLean, M.A.

Lecturer in Aramaic, Cambridge University. Fellow and Hebrew Lecturer, Christ's College, Cambridge. Joint Editor of the larger Cambridge Septuagint.

Oliver Elton, M.A.

Professor of English Literature at the University of Liverpool. Author of Modern Studies; The Augustan Ages; Michael Drayton; &c.

Eminescu, Michail.

Effigies (in part).

1 Ereshkigal. Epaminondas.

Ephor.

Erasmus (in pari).

Ephraem Syrus.

0.

J. R. H.

A.K.

La.

P. M. T. C.

P.

S. A.

R.

Ad.

R.

A. S. M

R.

C.J.

R.

H. C.

Osbert John Radcliffe Howarth, M.A.

Christ Church, Oxford. Geographical Scholar, British Association.

1901. Assistant Secretary of the

{

{

j English Literature (III., IV.).

England: Topography, Popu- lation and Industries (I., I VI., VIII., IX.);
[English Channel (in part).

\ Esthonia (in part).

Prince Peter Alexeivttch Kropotkin.

See the biographical article: Kropotkin, Prince P. A.

Philip Lake, M.A., F.G.S. r

Lecturer on Physical and Regional Geography in Cambridge

University. Formerly J Enrone* Geoloev

of the Geological Survey of India. Author of Monograph of British Cambrian 1 * ˆeoiogy.

Trilobites. Translator and Editor of Kayser's Comparative Geology. [_

Mrs Craigie (" John Oliver Hobbes ").

See the biographical article : Craigie, P. M. T.

Percy Stafford Allen, M.A.

Fellow of Merton College, Oxford.

Editor of the Letters of Erasmus.

Robert Adamson, LL.D.

See the biographical article : Adamson, R.

Robert Alexander Stewart Macalister, M.A., F.S.A. Director of Excavations for the Palestine Exploration Fund.

Sir Richard Claverhouse Jebb, D.C.L., LL.D. See the biographical article: Jebb, Sir Richard C.

Eliot, George. J Erasmus (in part).

S Erigena (in part).

J Ekron;

\ Eleutheropolis.

4 Euripides.

R. H. V.

Egypt: Military Operations,

1885-1900.

R.J.M.

R.L.*

R.N.

R.N.B.

Rev. Robert Henry Charles, M.A. , D.D., D.Litt. f_, . _ . .

Grinfield Lecturer, and Lecturer in Biblical Studies, Oxford. Fellow of the British J *- nocn > B00K . 0I » Academy. Formerly Professor of Biblical Greek, Trinity College, Dublin. Author] Esther: Additions to. of Critical History of the Doctrine of a Future Life ; Book of Jubilees ; &c. I

Colonel Robert Hamilton Vetch, R.E., C.B.

Employed on defences of Bermuda, Bristol Channel, Plymouth Harbour and Malta, 1861-1876. Secretary of R.E. Institute, Chatham, 1877-1883. Commanded R.E. Submarine Mining Batt., 1884. Deputy Inspector-General of Fortifications, 1889- 1894. Author of Gordon's Campaign in China; Life of Lieutenant-General Sir Gerald Graham. Editor of the Professional Papers of the Corps of R.E. ; also the R.E. Journal, 1 877-1 884.

Ronald John McNeill, M.A. f" Emmet, Robert;

Christ Church, Oxford. Barrister-atˆLaw. Formerly Editor of the St James's -l Emmet, Thomas Addis. Gazette, London. [

Richard Lydekker, F.R.S., F.Z.S., F.G.S.

Formerly Member of the Staff of the Geological Survey of India. Author of Catalogues of Fossil Mammals, Reptiles and Birds in British Museum ; The Deer of " all Lands ; &c.

Richard Norton.

Formerly Director of the American School of Classical Studies in Rome, and Pro- – fessor of History of Art and Archaeology, Bryn Mawr College, Pennsylvania. t

Robert Nisbet Bain (d. 1909). f Elizabeth Petrovna;

Assistant Librarian, British Museum. Author of Scandinavia: the Political History J pjotvos Baron* Eric XIV * of Denmark, Norway and Sweden, 1513-ˆ1900; The First Romanovs, 1613 to 1725; 1 _ . .1 . J ., ., *'

Slavonic Europe: the Political History of Poland and Russia from 1469 to 1796 ; &e. I fcsternazy 01 uaianma.

Eland; Elephant;

Elk;

Equidae.

Etruria (in part).

R. S. C.

R. S. P.

R. W.* R. We.

S. A. C.

St G. S. S. L.-P.

s.

R.

G.

s.

W.

T.

A.

I.

r.

Ba

T.

F.

C.

T.

G.

Br.

T.

K.

T.

K.

C.

T.

L.

H.

T

R.

R,S

T. Se.

W. A. B. C.

W. A. P. W. Ba. W. C. D. W. W. C. T.

INITIALS AND HEADINGS OF ARTICLES

Robert Seymour Conway, M. A., D.Litt. (Cantab.). . ,.„,.'['

Professor of Latin and Indo-European Philology in the University of Manchester J Etrurja: Language. -ofessor of Latin, University College, Cardiff, and Pellow of Gonville and

XI

Formerly Professor <_ Caius College, Cambridge*

Reginald Stcjart Poole.

See the biographical article: Poole, Reginald Stuart.

Richard Williams.

Richard Webster, A.M.

Formerly Fellow in Classics, Maximianus ; &c.

Stanley Arthur Cook. . .

Editor for Palestine Exploration Fund. Lecturer in Hebrew and byriac, and formerly Fellow, Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904-1908. Council of Royal Asiatic Society, 1904- 1905. Author of Glossary of Aramaic Inscriptions; The Laws of Moses and the Code of Hammurabi; Critical Notes on Old Testament History; Religion of Ancient Palestine; &c.

-j Egypt: History, I. {in part). \ Eisteddfod.

Princeton University. Editor of The Elegies of J Edwards, Jonathan (in pari)

Eli (in part); Elijah (in part) ; Elisha (in part) ; Ephod; Esau.

Essenes (in part).

Lecturer in Greek in the University of Birmingham.

St George Stock, M.A- Pembroke College, Oxford

Stanley Lane-Poole, M.A., Litt.D.

Formerly Professor of Arabic, Dublin University, and Examiner in the University of Wales. Corresponding Member of the Imperial Russian

Archaeological Society. Member of the Khedivial Commission for the Preservation of the Monuments of * Arab Art, &c. Author of Life of Lord Stratford de Redcliffe; Life of Sir Harry Parkes; Cairo; Turkey; &c. Edited The Koran; The Thousand and One Nights; &c.

Samuel Rawson Gardiner; LL.D., D.C.L. See the biographical article: Gardiner, S. R.

Sir Spencer Walpole, K.C.B.

See the biographical article: Walpole, Sir Spencer.

Egypt: History, II. (in pari).

{ English History(VIII., IX.,X.). I English History: XII. (in part).

LL.D.

C England: Local |_ X. (in part).

Government,

Embargo.

f Elvira, Synod of; I Ephesiis, Council of.

f Epithelial, Endothelial, Glan- °fy dular Tissues.

Essenes (in part).

Esther.

{

Thomas Allan Ingram, M.A Trinity College, Dublin.

Sir Thomas Barclay, M.P.

Member of the Institute of International Law. Member of the Supreme Council : of the Congo Free State. Officer of the Legion of Honour. Author of Problems of International Practice and Diplomacy; &c. M.P. for Blackburn, 1910.

Dr' Theodore Freylinghuysen Collier, Ph.D.

Assistant Professor of History, Williams College, Williamstown, Mass., U.S.A.

Thomas Gregor Brodie, M.D., F.R.S.

Professor of Physiology in the University of Toronto. Author of Essentials Experimental Physiology.

Thomas Kirkup, M.A., LL.D.

Author of An Inquiry into Socialism; Primer of Socialism; &c.

Rev. Thomas Kelly Cheyne, LL.D., D.D., D.Litt.

See the biographical article : Cheyne, T. K.

Sir Thomas Little Heath, K.C.B., M.A., D.Sc (Cantab.). f

Assistant Secretary to the Treasury. Formerly Fellow of Trinity College, Cam- -\ Erathosthenes of Alexandria, bridge. Author, of Treatise on Conic Sections ; &c. . . ■ l

Rev. Thomas Roscoe Rede Stebbing, M.A., F.R.S. , F.L.S., F.Z.S. f

Fellow of King's College, London. Hon. Fellow, and formerly Tutor, of Worcester. College, Oxford, Zoological Secretary of Linnaean Society, 1903-1907. Author of A History of Crustacea ; The Naturalist of Cumbrae ; &c.

Thomas Seccombe, M.A.

Balliol College, Oxford. Lecturer in History, East London and Birkbeck Colleges, . University of London. Stanhope Prizeman, Oxford, 1887. Assistant Editor of Dictionary of National Biography, 1891-1901. Author of The Age of Johnson; &c.

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D. (Bern). Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880-1881. Author of Guide du Haut Dauphine; The [Range- of the T'ddi; Guide to Grindehvald; Guide to Switzerland; The Alps in Nature and in History; &c. Editor of the Alpine Journal, 1880-1889; &c.

Walter Alison Phillips, M.A.

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, – Oxford. Author of Modern Europe ; &c.

Entomostraca.

William Bacher, Ph.D.

Professor of Biblical Science at the Rabbinical Seminary, Budapest. Die exegetische Terminologie der jiidischen Traditionslitteratur ; &c.

William Cecil Dampier Whetham, M.A., F.R.S.

Fellow and Tutor of Trinity College, Cambridge. Author of Theory of Solution; Recent Development of Physical Science ; The Family and the Nation ; &c.

English Literature (V., VI.).

Einsiedeln; Embrun: Engadine; Engelberg.

English History (XL); Episcopacy; Esquire; . Europe: History (in part).

Author of \ EHas Levita.

W. Cave Thomas.

Author of Symmetrical Education ; Theory of Light.

I Electrolysis.

Mural or Monumental Decoration ; Revised -j Encaustic Painting.

Xll W. E. Co.

W. G.

W. G. M.

W. Hu.

W. M. F. P. W. 0.

W. P. A.

W. P. P.

W. R. S. W. W. W. Wr.

INITIALS AND HEADINGS OF ARTICLES

Rt. Rev. William Edward Collins, M.A., D.D. . f _ . .

Bishop of Gibraltar. Formerly Professor of Ecclesiastical History,

King’s College, J Establishment; London. Lecturer of Selwyn and St John’s Colleges, Cambridge. Author of The 1 Eucharist: Reservation. Study of Ecclesiastical History; Beginnings of English Christianity; &c. I

William Garnett, M.A., D.C.L. r

Educational Adviser to the London County Council. Formerly Fellow and Lecturer J . . ..

of St John’s College, Cambridge. Principal and Professor of Mathematics, Durham 1 Energy (m part). College of Science, Newcastfe-on-Tyne. Author of Elementary Dynamics ; &c. [

Walter G. M’Millan, F.C.S., M.I.Mech.E. (d. 1904. fpionfrnoh.mic*™.

Formerly Secretary of the Institute of Electrical Engineers, and Lecturer on-! fjwowooneinisiry, Metallurgy, Mason College, Birmingham. Author of A Treatise on Electrometallurgy. (_ Electrometallurgy.

Rev. William Hunt, M.A., Litt.D. |”

President of Royal Historical Society, 1 905-1909. Author of History of the English < England, Church of. Church, 597-1066; The Church of England in the Middle Ages; &c. [

William Matthew Flinders Petrie, F.R.S., D.C.L., Lttt.D. See the biographical article: Petrie, W. M. F.

Egypt: Art and Archaeology.

WlLHELM OSTWALD, D.Sc, LL.D. f

Formerly Professor of Chemistry at the University of Leipzig. Nobel Prizeman in J Element Chemistry, 1909. Author of Energetische Grundlagen der Kulturwissenschafl; Die A Energie ; Prinzipien der Chemie ; &c. [

Lieut.-Colonel William Patrick Anderson, M.Inst.CE., F.R.G.S. r

Chief Engineer, Department of Marine and Fisheries of Canada. Member of J g-s- Lake the Geographic Board of Canada. Past President of Canadian Society of Civil 1 ‘

Engineers. L

William Plane Pycraet, F.Z.S. r

Assistant in the Zoological Department, British Museum. Formerly Assistant J jj_ Linacre Professor of Comparative Anatomy, Oxford. Vice-President of the] *’ Selborne Society. Author of A History of Birds ; &c. [

(-EH (in part); J Elijah (in part); [Elisha (in part). rEmpedocles (in part);

William Robertson Smith, LL.D.

See the biographical article : Smith, W. R.

William Wallace.

See the biographical article : Wallace, William (1844-1897).

Williston Walker, Ph.D., D.D.

Professor of Church History, Yale University. Author of History of the Congre- gational Churches in the United States ; The Reformation ; John Calvin ; &c.

J. Epictetus (in part) ; I Epicurus (in part).

Eliot, John.

PRINCIPAL UNSIGNED ARTICLES

Egoism.

Ely.

Engrossing.

Essex.

Elbe.

Elzevir.

Epigram.

Estate.

Election.

Embalming.

Epilepsy.

Etching.

Electoral Commission.

Embezzlement.

Epitaph.

Ethnology and

Ethnography

Electroplating.

Employers' Liability and

Equity.

Etna.

Electrotherapeutics.

Workmen's Compensa-

Ericaceae.

Eton.

Elevators.

tion.

Eritrea.

Eucalyptus.

Elginshire.

Encyclopaedia.

Erysipelas.

Euchre.

Elis.

Endospora.

Escorial.

Euler.

Ellipse.

Engineers: Military.

Eskimo.

Euphorbiaceae.

Elm.

Engraving.

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

VOLUME IX

EDWARDES, SIR HERBERT BENJAMIN (1819-1868), English soldier-statesman in India, was born at Frodesley in Shropshire on the 12th of November 1819. His father was Benjamin Edwardes, rector of Frodesley, and his grandfather Sir John Edwardes, baronet, eighth holder of a title conferred on one of his ancestors by Charles I. in 1644. He was educated at a private school and at King's College, London. Through the influence of his uncle, Sir Henry Edwardes, he was nominated in 1840 to a cadetship in the East India Company; and on his arrival in India, at the beginning of 1841, he was posted as ensign in the 1st Bengal Fusiliers. He remained with this regiment about five years, during which time he mastered the lessons of his profession, obtained a good knowledge of Hindustani, Hindi and Persian, and attracted attention by the political and literary ability displayed in a series of letters which appeared in the Delhi Gazette.

In November 1845, on the breaking out of the first Sikh War, Edwardes was appointed aide-de-camp to Sir Hugh (afterwards Viscount) Gough, then commander-in-chief in India. On the 1 8th of December he was severely wounded at the battle of Mudki. He soon recovered, however, and fought by the side of his chief at the decisive battle of Sobraon (February 10, 1846). He was soon afterwards

appointed third assistant to the com- missioners of the trans-Sutlej territory; and in January 1847 was named first assistant to Sir Henry Lawrence, the resident at Lahore. Lawrence became his great exemplar and in later years he was accustomed to attribute to the influence of this ” father of his public life ” whatever of great or good he had himself achieved. He took part with Lawrence in the suppression of a religious disturbance at Lahore in the spring of 1846, and soon afterwards assisted him in reducing, by a rapid movement to Jammu, the conspirator Imam-ud-din. In the following year a more difficult task was assigned him — the conduct of an expedition to Bannu, a district on the Waziri frontier, in which the people would not tolerate the presence of a collector, and the revenue had consequently fallen into arrear. By his rare tact and fertility of resource, Edwardes succeeded in completely conquering the wild tribes of the valley without firing a shot, a victory which he afterwards looked back upon with more satis- faction than upon others which brought him more renown. His fiscal arrangements were such as to obviate all difficulty of

collection for the future. In the spring of 1848, in consequence of the murder of Mr vans Agnew and Lieutenant Anderson at Mu’.tan, by order of the diwan Mulraj, and of the raising of the standard of revolt by the latter, Lieutenant Edwardes was authorized to march against him. He set out immediately with a small force, occupied Leiah on the left bank of the Indus, was joined by Colonel van Cortlandt, and, although he could not attack Multan, held the enemy at bay and gave a check at the critical moment to their projects. He won a great victory over a greatly superior Sikh force at Kinyeri (June 18), and received in acknowledgment of his services the local rank of major. In the course of the operations which followed near Multan, Edwardes lost his right hand by the explosion of a pistol in his belt. On the arrival of a large force under General Whish the siege of Multan was begun, but was suspended for several months in consequence of the desertion of Shere Singh with his army and artillery. Edwardes distinguished himself by the part he took in the final operations, begun in December, which ended with the capture of the city on the 4th of January 1849. For his services he received the thanks of both houses of parliament, was promoted major by brevet, and created C.B. by special statute of the order. The directors of the East India Company conferred on him a gold medal and a good service pension of £100 per annum.

After the conclusion of peace Major Edwardes returned to England for

the benefit of his health, married during his stay there, and wrote and published his fascinating account of the scenes in which he had been engaged, under the title of A Year on the Punjab Frontier in 1848-1849. His countrymen gave him fitting welcome, and the university of Oxford conferred on him the degree of D.C.L. In 1851 he returned to India and resumed his civil duties in the Punjab under Sir Henry Lawrence. In November 1853 he was entrusted with the responsible post of commissioner of the Peshawar frontier, and this he held when the Mutiny of 1857 broke out. It was a position of enormous difficulty, and momentous consequences were involved in the way the crisis might be met. Edwardes rose to the height of the occasion. He saw as if by inspiration the facts and the needs, and by the prompt measures which he adopted he rendered a service of incalculable importance, by effecting a reconciliation with Afghanistan, and securing the neutrality of the amir and

the frontier tribes during the war. So effective was his procedure for the safety of the border that he was able to raise a large force in the Punjab and send it to co-operate in the siege and capture of Delhi. In 1859 Edwardes once more went to England, his health so greatly impaired by the continual strain of arduous work that it was doubtful whether he could ever return to India. During his stay he was created K.C.B., with the rank of brevet colonel; and the degree of LL.D. was conferred upon him by the university of Cambridge. Early in 1862 he again sailed for India, and was appointed commissioner of Umballa and agent for the Cis-Sutlej states. He had been offered the governor-ship of the Punjab, but on the ground of failing health had declined it. In February 1865 he was compelled to finally resign his post and return to England. A second good service pension was at once conferred on him; in May 1866 he was created K.C. of the Star of India; and early in 1868 was promoted major-general in the East Indian Army. He had been for some time engaged on a life of Sir Henry Lawrence, and high expecta- tions were formed of the work; but he did not live to complete it, and after his death it was put into the hands of Mr Herman Merivale. He died in London on the 23rd of December 1868. Great in council and great in war, he was singularly beloved by his friends, generous and unselfish to a high degree, and a man of deep religious convictions.

See Memorials of the Life and Letters of Sir Herbert Benjamin Edwardes, by his wife (2 vols., London, 1886); T. R. E. Holmes,, Four

Soldiers (London, 1889); J. Ruskin, Bill, pastorum, iv. “A Knight’s Faith ” (1885), passages from the life, of Edwardes.

EDWARDS, AMELIA ANN BLANDFORD (1831-1892), English author and Egyptologist, the daughter of one of Wellington’s officers, was born in London on the 7th of June 1831. At a very early age she displayed considerable literary and artistic talent. She became a contributor to various magazines and newspapers, and besides many miscellaneous works she wrote eight novels, the most successful of which were Debenham’s Vow (1870) and Lord Brackenbury (1880). In the winter of 1873-1874 she visited Egypt, and was profoundly impressed by the new openings for archaeological research. She learnt the hieroglyphic characters, and made a considerable collection of Egyptian antiquities. In • 1877 she published A Thousand Miles up the Nile, with illustra- tions by herself. Convinced that only by proper scientific investigations could the wholesale destruction of Egyptian antiquities be avoided, she devoted herself to arousing public opinion on the subject, and ultimately, in 1882, was largely instrumental in founding the Egypt Exploration Fund, of which she became joint honorary secretary with Reginald Stuart Poole. For the business of this Fund she’ abandoned her other literary work, writing only on Egyptology. In 1 889-1 890 she went on a lecturing tour in the United States. The substance of her lectures was published in volume form in 1891 as Pharaohs, Fellahs, and Explorers. She died at Weston-super-Mare, Somerset, on the 15th of April 1892, bequeathing her valuable collection of Egyptian antiquities to University College, London, together with a sum to found a chair of Egyptology. Miss Edwards received, shortly before her death, a civil list pension from the British government.

EDWARDS, BELA BATES (1802-1852), American man of letters, was born at Southampton, Massachusetts, on the 4th of July 1802. He graduated at Amherst College in 1824, was a tutor there in 1827-1828, graduated at Andover Theological Seminary in 1.830, and was licensed to preach. From 1828 to 1833 he was assistant secretary of the American Education Society (organized in Boston in 1815 to assist students for the ministry), and from 1828 to 1842 was editor of the society’s organ, which after 1831 was called the American Quarterly Register. He also founded (in 1833) and edited the American Quarterly Observer; in 1836-1841 edited the Biblical Repository (after 1837 called the American Biblical Repository) with which the Observer was merged in 1835; and was editor-in-chief of the Bibliotheca Sacra from 1844 to 1851. In 1837 he became pro- fessor of Hebrew at Andover, and from 1848 until his death was associate professor of sacred literature there. He died at Athens.

Georgia, on the 20th of April 1852. Among his numerous publications were A Missionary Gazetteer (1832), A Biography of Self-Taught Men (1832), a once widely known Eclectic Reader (1835), a translation, with Samuel Harvey Taylor (1807-1871), of Kuhner's Sdndgrammatik der Griechischen Sprache and Classical Studies (1844), essays in ancient literature and art written in collaboration with Barnas Sears and C. C. Felton.

Edwards' Addresses and Sermons, with a memoir by Rev. Edwards A. Park, were published in two volumes at Boston in 1853.

EDWARDS, BRYAN (1743-1800), English politician and historian, was born at Westbury, Wiltshire, on the 21st of May 1743. His father died in 1756, when his maintenance and educa- tion were undertaken by his maternal uncle, Zachary Bayly, a wealthy merchant of Jamaica. About 1759 Bryan went to Jamaica, and joined his uncle, who engaged a private tutor to complete his education, and when Bayly died his nephew inherited his wealth, succeeding also in 1773 to the estate of anothen'Jamaica resident named ITume.ˆ Edwards-soon became a leading member of the. colonial assembly of Jamaica, .but in a few years he returned to England, and in 1782 failed to secure a seat in parliament as member for Chichester. He was again in Jamaica jrom.i 787 to 1792, when he settled in England as a West Indja merchant, making in 1795 another futile attempt to enter parliament, on this occasion as the representative of South- ampton. In 1796, however, he became member of parliament for Grampound, retaining his seat until his death at Southampton on the 15th or 16th of July 1800. In general Edwards was a supporter of the slave trade, and was described by William Wilber- force as a powerful opponent. By his wife, Martha, daughter of Thomas Phipps of Westbury, he left an only son, Hume.

In 1784 Edwards wrote Thoughts on the late Proceedings of Government respecting the Trade of the West India Islands with the United States of America, in which he attacked the restrictions placed by the government upon trade with the United States. In 1793 he published in two volumes his great work, History, Civil and Commercial, of the British Colonies in the West Indies, and in 1797 published his Historical Survey of the French Colony in the Island of St Domingo. In 1801 a new edition of both these works with certain additions was published in three volumes under the title of History of the British Colonies in the West Indies. This has been translated into German and parts of it into French and Spanish, and a fifth edition was issued in 1819. When Mungo Park returned in 1796 from his celebrated journey in Africa, Edwards, who was secretary of the

Association for Promoting the Discovery of the Interior Parts of Africa, drew up from Park's narrative an account of his travels, which was published by the association in their Proceedings; and when Park wrote an account of his journeys he availed himself of Edwards' assistance. Edwards also wrote some poems and some, other works relating to the history of the West Indies.

He left a short sketch of his life which was prefixed to the edition of the History of the West Indies, published in 1 801.

EDWARDS, GEORGE (1693-1773), English naturalist, was born at Stratford, Essex, on the 3rd of April 1693. In his early years he travelled extensively over Europe, studying natural history, and gained some reputation for his coloured drawings of animals, especially birds. In 1733, on the recommendation of Sir Hans Sloane, he was appointed librarian to the Royal College of Physicians in London. In 1 743 he published the first volume of his History of Birds, the fourth volume of which appeared in 1751, and three supplementary volumes, under the title Glean- ings of Natural History, -were issued in ij $&, 1760 and 1764. The two works contain engravings and descriptions of more than 600 subjects in natural history not before described or delineated. He likewise added a general index in French and English, which was afterwards supplied with Linnaean names by Linnaeus himself, with whom he frequently corresponded. About 1764 he retired to Plaistow, Essex, where he died on the 23 rd of July 1773. He also wrote Essays of Natural History (1770) and Elements of Fossilogy (1776).

EDWARDS, HENRY THOMAS (1837-1884), Welsh divine, was born on the 6th of September 1837 at Llan ym Mawddwy,

Merioneth, where his father was vicar. He was educated at Westminster and at Jesus College, Oxford (B.A., i860), and after teaching for two years at Llandovery went to Llangollen as his father's curate. He became vicar of Aberdare in 1866 and of Carnarvon in 1869. Here he began his lifelong controversy with Nonconformity, especially as represented by the Rev. Evan Jones (Calvinistic Methodist) and Rev. E. Herber Evans (Congrega- tionalist). In 1870 he fought in vain for the principle of all- round denominationalism in the national education system, and in the same year addressed a famous letter to Mr Gladstone on " The Church of the Cymry," pointing out that the success of Nonconformity in Wales was largely due to " the withering effect of an alien episcopate." One immediate result of this

was the appointment of the Welshman Joshua Hughes (1807-1889) to the vacant see of St Asaph. Edwards became dean of Bangor in 1876 and at once set about restoring the cathedral, and he promoted a clerical education society for supplying the diocese with educated Welsh-speaking clergy. He was a popular preacher and an earnest patriot ; his chief defect was a lack of appreciation of the theological attainments of Nonconformity, and a Welsh commentary on St Matthew, which he had worked at for many years and published in two volumes in 1882, was severely handled by a Bangor Calvinistic Methodist minister. Edwards suffered from overwork and insomnia and a Mediterranean cruise in 1883 failed to restore his health; and he died by his own hand on the 24th of May 1884 at Ruabon.

See V. Morgan, Welsh Religious Leaders in the Victorian Era.

EDWARDS, JONATHAN (1703-1758), American theologian and philosopher, was born on the 5th of October 1703 at East (now South) Windsor, Connecticut. His earliest known ancestor was Richard Edwards, Welsh by birth, a London clergyman in Elizabeth's reign. His father Timothy Edwards (1 669-1 758), son of a prosperous merchant of Hartford, had graduated at' Harvard, was minister at East Windsor, and eked out his salary by tutoring boys for college. His mother, a daughter of the Rev. Solomon Stoddard, of Northampton, Mass., seems to have been a woman of unusual mental gifts and independence of character. Jonathan, the only son, was the fifth of eleven children. The boy was trained for college by his father and by his elder sisters, who all received an excellent education. When ten years old he wrote a semi-humorous tract on the immateriality of the soul; he was interested in natural history, and at the age of twelve wrote a remarkable essay on the habits of the " flying spider." He entered Yale College in 17 16, and in the following year became acquainted with Locke's Essay, which influenced him profoundly. During his college course he kept note books labelled " The Mind," " Natural Science " (containing a discussion of the atomic theory, &c), "The Scriptures " and " Miscellanies," had a grand plan for a work on natural and mental philosophy, and drew up for himself rules for its composition. Even before his graduation in September 1720 as valedictorian and head of his class, he seems to have had a well formulated philosophy. The two years after his graduation he spent in New Haven studying theology. In 1722-1723 he was for eight months stated supply of a small Presbyterian church in New York city, which invited him to remain, but he declined the call, spent two months in study at home, and then in 17 24-1 7 26 was one of the two tutors at Yale, earning for himself the name of a " pillar tutor " by his steadfast loyalty to the college and its orthodox teaching at the time when Yale's rector

(Cutler) and one of her tutors had gone over to the Episcopal Church.

The years 1720 to 1726 are partially recorded in his diary and in the resolutions for his own conduct which he drew up at this time. He had long been an eager seeker after salvation and was not fully satisfied as to his own ” conversion ” until an experience in his last year in college, when he lost his feeling that the election of some to salvation and of others to eternal damnation was ” a horrible doctrine,” and reckoned it ” exceedingly pleasant, bright and sweet. ” He now took a great and new joy in the beauties of nature, and deliehted in the aiiegorical in- terpretation of the Song of Solomon. Balancing these mystic joys is the stern tone of his Resolutions, in which he is almost

ascetic in his eagerness to live earnestly and soberly, to waste no time, to maintain the strictest temperance in eating and drinking. On the 15th of February 1727 he was ordained minister at Northampton and assistant to his grandfather, Solomon Stoddard. He was a student minister, not a visiting pastor, his rule being thirteen hours of study a day. In the same year he married Sarah Pierrepont, then aged seventeen, daughter of James Pierrepont (1659-17 14), a founder of Yale, and through her mother great-granddaughter of Thomas Hooker. Of her piety and almost nun-like love of God and belief in His personal love for her, Edwards had known when she was only thirteen, and had written of it with spiritual enthusiasm; she was of a bright and cheerful disposition, a practical housekeeper, a model wife and the mother of his twelve children. Solomon Stoddard died on the nth of February 1729, leaving to his grandson the difficult task of the sole ministerial charge of one of the largest and wealthiest congregations in the colony, and one proud of its morality, its culture and its reputation.

In 1731 Edwards preached at Boston the ” Public Lecture ” afterwards published under the title God Glorified in Man’s Dependence. This was his first public attack on Arminianism. The leading thought was God’s absolute sovereignty in the work of redemption: that while it behoved God to create man holy, it was of His ” good pleasure ” and ” mere and arbitrary grace ” that any man was now made holy, and that God might deny this grace without any disparagement to any of His perfections. In 1733 a revival of religion began in Northampton, and reached such intensity in the winter of 1734 and the following spring as to threaten the business of the town. In six months nearly three hundred were admitted to the church. The revival gave Edwards an opportunity of studying the process of conversion in all its phases and varieties, and he recorded his observations with psychological minuteness and discrimination in A Faithful Narrative of the

Surprising Work of God in the Conversion of Many Hundred Souls in Northampton (1737). A year later he published Discourses on Various Im- portant Subjects, the five sermons which had proved most effective in the revival, and of these none, he tells us, was so immediately effective as that on the Justice of God in the Damnation of Sinners, from the text, ” That every mouth may be stopped.” Another sermon, published in 1734, on the Reality of Spiritual Light set forth what he regarded as the inner, moving principle of the revival, the doctrine of a ” special ” grace in the immediate and supernatural divine illumination of the soul. In the spring of 1735 the movement began to subside and a reaction set in. But the relapse was brief, and the Northampton revival, which had spread through the Connecticut valley and whose fame had reached England and Scotland, was followed in 1 739-1 740 by the Great Awakening, distinctively under the leadership of Edwards. The movement met with no sympathy from the orthodox leaders of the church. In 1741 Edwards published in its defence The Distinguishing Marks of a Work of the Spirit of God, dealing particularly with the phenomena most criticized, the swoonings, outcries and convulsions; These ” bodily effects,” he insisted, were not ” distinguishing marks ” of the work of thejSpirit of God ; but so bitter was the feeling against the revival in the more strictly Puritan churches that in 1742 he was forced to write a second apology, Thoughts on the Revival in New England, his main argument being the great moral improvement of the country. In the same pamphlet he defends an appeal to the emotions, and advocates preaching terror when necessary, even to children, who in God’s sight ” are young vipers … if not Christ’s.” He considers ” bodily effects ” incidentals to the real work of God, but his own mystic devotion and the experiences of his wife during the Awakening (which he gives in detail) make him think that the divine visitation usually overpowers the body, a view in support of which he quotes Scripture. In reply to Edwards, Charles Chauncy anonymously wrote The Late Religious Com- motions in New England Considered (1743), urging conduct as the sole test of conversion; and the general convention of Congrega- tional ministers in the Province of Massachusetts Bay protested ” against disorders in practice which have of late obtained in

various parts of the land.” In spite of Edwards’s able pamphlet, the impression had become widespread that ” bodily effects ” were recognized by the promoters of the Great Awakening as the true tests of conversion To offset this feeling Edwards 1 preached at Northampton during the years 1742 and 1743 a series of sermons published under the title of Religious Affections (1 746), a restatement

in a more philosophical and general tone of his ideas as to ” distinguishing marks.” In 1747 he joined the movement started in Scotland called the ” concert in prayer,” and in the same year published An Humble Attempt to Promote Explicit Agreement and Visible Union of God’s People in Extraordinary Prayer for the Revival of Religion and the Advancement of Christ’s Kingdom on Earth. In 1749 he published a memoir of David Brainerd; the latter had lived in his family for several months, had been constantly attended by Edwards’s daughter Jerusha, to whom he had been engaged to be married, and had died at Northampton on the 7th of October 1747; and he had been a case in point for the theories of conversion held by Edwards, who had made elaborate notes of Brainerd’s conversations and confessions.

In 1 748 there hadcome a crisis in his relations with his congregation. The Half Way Covenant adopted by the synods of 1657 and 1662 had made baptism alone the condition to the civil privileges of church membership, but not of participation in the sacrament of the Supper. Edwards’s grandfather and predecessor, Solomon Stoddard, had been even more liberal, holding that the Supper was a converting ordinance and that baptism was a sufficient title to all the privileges of the church. As early as 1 744 Edwards, in his sermons on the Religious Affections, had plainly intimated his dislike of this practice. In the same year he had published in a church meeting the names of certain young people, members of the church, who were suspected of reading improper books, 2 and also the names of those who were to be called as witnesses in the case. But witnesses and accused were not distinguished on this list, and the congregation was in an uproar. A great many, fearing a scandal, now opposed an investigation which all had previously favoured . Edwards ‘s preaching became unpopular ; for four years no candidate presented himself for admission to the church ; and when one did in 1748, and was met with Edwards’s formal but mild and gentle tests, as expressed in the Distinguishing Marks and later in Qualifications for Full Communion (1749) the candidate refused to submit to them; the church backed him and the break was complete. Even permission to discuss his views in the pulpit was refused him. The ecclesiastical council voted by 10 to 9 that the pastoral relation be dissolved. The church by a vote of more than 200 to 23 ratified the action of the council, and finally a town meeting voted that Edwards should not be allowed to occupy the Northampton pulpit, though he did this on occasion as late as May 1755. He evinced no rancour or spite; his ” Farewell Sermon ” was dignified and temperate; nor is it to be ascribed to chagrin that in a letter to Scotland after his dismissal he expresses his preference for

Presbyterian to Con gregational church government. His position at the time was not unpopular throughout New England, and it is needless to say that his doctrine that the Lord's Supper is not a cause of regeneration and that communicants should be professing Christians has since (very largely through the efforts of his pupil Joseph Bellamy) become a standard of New England Congregationalism.

Edwards with his large family was now thrown upon the world, but offers of aid quickly came to him. A parish in Scotland could have been procured, and he was called to a Virginia church. He declined both, to become in 1750 pastor of the church in Stockbridge and a missionary to the Housatonic Indians To the Indians he preached through an interpreter, and their interests he boldly and successfully defended by attacking the whites

1 Edwards recognized the abuse of impulses and impressions, opposed itinerant and lay preachers, and defended a well-ordered and well-educated clergy.

2 These were probably not fiction like Pamela, as Sir Leslie Stephen suggested, for Edwards listed several of Richardson's novels for his own reading, and considered Sir Charles Grandison a very moral and excellent work.

who were using their official position among them to increase their private fortunes. In Stockbridge he wrote the Humble Relation, also called Reply to Williams (1752), which was an answer to Solomon Williams (1700-1776), a relative and a bitter opponent of Edwards as to the qualifications for full communion; and he there composed the treatises on which his reputation as a philosophical theologian chiefly rests, the essay on Original Sin, the Dissertation concerning the Nature of True Virtue, the Dissertation concerning the End for which God created the World, and the great work on the Will 4 written in four months and a half, and published in 1754 under the title, An Inquiry into the Modern Prevailing Notions Respecting that Freedom of the Will which is supposed to be Essential to Moral Agency.

In 1757, on the death of President Burr, who five years before had married Edwards's daughter Esther, he reluctantly accepted the presidency of the College of New Jersey (now Princeton University), where he was installed on the 16th of February 1758. Almost immediately afterwards he was inoculated for smallpox, which was raging in Princeton and vicinity, and, always feeble, he died of the inoculation on the 28th of March 1758. He was buried in the old

cemetery at Princeton. He was slender and fully six feet tall, and with his oval, gentle, almost feminine face looked the scholar and the mystic.

The Edwardean System. — It is difficult to separate Edwards's philosophy from his theology, except as the former is contained in the early notes on the Mind, where he says that matter exists only in idea ; that space is God ; that minds only are real ; that in meta- physical strictness there is no being but God; that entity is the greatest and only good; and that God as infinite entity, wherein the agreement of being with being is absolute, is the supreme ex- cellency, the supreme good. It seems certain that these conclusions were independent of Berkeley and Malebranche, and were not drawn from Arthur Collier's Clavis universalis (1713), with which they have much in common, but were suggested, in part at least, by Locke's doctrine of ideas, Newton's theory of colours, and Cudworth's Platonism, with all of which Edwards was early familiar. But they were never developed systematically, and the conception of the material universe here contended for does not again explicitly re- appear in any of his writings. The fundamental metaphysical postulate that being and God are ultimately identical remained, however, the philosophical basis of all his thinking, and reverence for this being as the supreme good remained the fundamental dis- position of his mind. That he did not interpret this idea in a Spino- zistic sense was due to his more spiritual conception of " being " and to the reaction on his philosophy of his theology. The theo- logical interest, indeed, came in the end to predominate, and philosophy to appear as an instrument for the defence of Calvinism. Perhaps the best criticism of Edwards's philosophy as a whole is that, instead of being elaborated on purely rational principles, it is mixed up with a system of theological conceptions with which it is never thoroughly combined, and that it is exposed to all the disturbing effects of theological controversy. Moreover, of one of his most central convictions, that of the sovereignty of God in election, he confesses that he could give no account.

Edwards's reputation as a thinker is chiefly associated with his treatise on the Will, which is still sometimes called " the one large contribution that America has made to the deeper philosophic thought of the world." The aim of this treatise was to refute the doctrine of free- will, since he considered it the logical, as distinguished from the sentimental, ground of most of the Arminian objections to Calvinism. He defines the will as that by which the " mind chooses anything." To act voluntarily, he says, is to act electively. So far he and his opponents are agreed. But choice, he holds, is not arbitrary; it is

determined in every case by ” that motive which as it stands in the view of the mind is the strongest,” and that motive is strongest which presents in the immediate object of volition the ” greatest apparent good,” that is, the greatest degree of agreeable- ness or pleasure. What this is in a given case depends on a multitude of circumstances, external and internal, all contributing to form the ” cause ” of which the voluntary act and its consequences are the ” effect.” Edwards contends that the connexion between cause and effect here is as “sure and perfect ” as in the realm of physical nature and constitutes a ” moral necessity.” He reduces the opposite doctrine to three assumptions, all of which he shows to be untenable: (1) ” a self-determining power in the will “; (2) ” in- difference , . . . that the mind previous to the act of volition (is) in equilibrio “; (3) ” contingence … as opposed to . . . any fixed and certain connexion (of the volition) with some previous ground or reason for its existence.” Although he denies liberty to the will in this sense — indeed, strictly speaking, neither liberty nor necessity, he says, is properly applied to the will, ” for the will itself is not an agent that has a will ” — he nevertheless insists that the subject willing is a free moral agent, and argues that without the

determinate connexion between volition and motive which he asserts and the libertarians deny, moral agency would be impossible. Liberty, he holds, is simply freedom from constraint, ” the power . . . that any one has to do as he pleases.” This power man pos- sesses. And that the right or wrong of choice depends not on the cause of choice but on its nature, he illustrates by the example of Christ, whose acts were necessarily holy, yet truly virtuous, praise- worthy and rewardable. Even God Himself, Edwards here main- tains, has no other liberty than this, to carry out without constraint His will, wisdom and inclination.

There is no necessary connexion between Edwards’s doctrine of the motivation of choice and the system of Calvinism with which it is congruent. Similar doctrines have more frequently perhaps been associated with theological scepticism. But for him the alternative was between Calvinism and Arminianism, simply because of the historical situation, and in the refutation of Arminianism on the assumptions common to both sides of the controversy, he must be considered completely successful. As a general argument his account of the determination of the will is defective, notably in his abstract conception of the will and in his inadequate, but suggestive, treatment of causation, in regard to which he anticipates in important respects the doctrine of Hume. Instead of making the motive to choice a factor

within the concrete process of volition, he regards it as a cause antecedent to the exercise of a special mental faculty. Yet his conception of this faculty as functioning only in and through motive and character, inclination and desire, certainly carries us a long way beyond the abstraction in which his opponents stuck, that of a bare faculty without any assignable content. Modern psycho- logy has strengthened the contention for a fixed connexion between motive and act by reference to subconscious and unconscious pro- cesses of which Edwards, who thought that nothing could affect the mind which was unperceived, little dreamed ; at the same time, at least in some of its developments, especially in its freer use ol genetic and organic conceptions, it has rendered much in the older forms of statement obsolete, and has given a new meaning to the idea of self-determination, which, as applied to an abstract power, Edwards rightly rejected as absurd.

Edwards's controversy with the Arminians was continued in the essay on Original Sin, which was in the press at the time of his death. He here breaks with Augustine and the Westminster Con- fession by arguing, consistently with his theory of the Will, that Adam had no more freedom of will than we have, but had a special endowment, a supernatural gift of grace, which by rebellion against God was lost, and that this gift was withdrawn from his descendants, not because of any fictitious imputation of guilt, but because of their real participation in his guilt by actual identity with him in his transgression.

The Dissertation on the Nature of True Virtue, posthumously published, is justly regarded as one of the most original works on ethics of the 18th century, and is the more remarkable as reproducing, with no essential modification, ideas on the subject written in the author's youth in the notes on the Mind. Virtue is conceived as the beauty of moral qualities. Now beauty, in Edwards's view, always consists in a harmonious relation in the elements involved, an agree- ment of being with being. He conceives, therefore, of virtue, or moral beauty, as consisting in the cordial agreement or consent to intelligent being. He defines it as benevolence (good-will), or rather as a disposition to benevolence, towards being in general. _ This disposition, he argues, has no regard primarily to beauty in the object, nor is it primarily based on gratitude. Its first object is being, " simply considered," and it is accordingly proportioned, other things being equal, to the object's " degree of existence." He admits, however, benevolent being as a second objection the ground that such an object, having a like virtuous propensity, " is, as it were, enlarged, extends to, and in some sort comprehends being in general." ' In brief, since God

is the ” being of beings ” and com- prehends, in the fullest extent, benevolent consent to being in general, true virtue consists essentially in a supreme love to God. Thus the principle of virtue — Edwards has nothing to say of ” morality ” — is identical with the principle of religion. From this standpoint Edwards combats every lower view. He will not admit that there is any evidence of true virtue in the approbation of virtue and hatred of vice, in the workings of conscience or in the exercises of the natural affections ; he thinks that these may all spring from self-love and the association of ideas, from ” instinct ” or from a ” moral sense of a secondary kind ” entirely different from ” a sense or relish of the essential beauty of true virtue.” Nor does he recog- nize the possibility of a natural development of true virtue out of the sentiments directed on the ” private systems ” ; on the contrary, he sets the love of particular being, when not subordinated to being in general, in opposition to the latter and as equivalent to treating it with the greatest contempt. All that he allows is that the percep- tion of natural beauty may, by its resemblance to the primary spiritual beauty, quicken the disposition to divine love in those who are already under the influence of a truly virtuous temper.

Closely connected with the essay on Virtue is the boldly specu- lative Dissertation on the End for which God Created the World. As, according to the doctrine of virtue, God’s virtue consists primarily in love to Himself, so His final end in creation is conceived to be, not as the Arminians held, the happiness of His creatures, but His

own glory. Edwards supposes in the nature of God an original disposition to an ” emanation ” of His being, and it is the excellency of this divine being, particularly in the elect, which is, in his view, the final cause and motive of the world.

Edwards makes no attempt to reconcile the pantheistic element in his philosophy with the individuality implied in moral government. He seems to waver between the opinion that finite individuals have no independent being and the opinion that they have it in an infinitesimal degree; and the conception of ” degrees of existence ” in the essay on Virtue is not developed to elucidate the point. His theological conception of God, at any rate, was not abstractly pantheistic, in spite of the abstractness of his language about ” being,” but frankly theistic and trinitarian. He held the doctrine of the trinitarian distinctions indeed to be a necessity of reason. His Essay on the Trinity, first printed in 1903, was long supposed to have been withheld from publication because of its containing Arian or Sabellian tendencies. It contains in fact nothing more questionable than an

attempted deduction of the orthodox Nicene doctrine, unpalatable, however, to Edwards's immediate disciples, who were too little speculative to appreciate his statement of the subordination of the " persons " in the divine " oeconomy," and who openly derided the doctrine of the eternal generation of the Son as "eternal nonsense"; and this perhaps was the original reason why the essay was not published.

Though so typically a scholar and abstract thinker on the one hand and on the other a mystic, Edwards is best known to the present generation as a preacher of hell fire. The particular reason for this seems to lie in a single sermon preached at Enfield, Con- necticut, in July 1741 from the text, " Their foot shall slide in due time," and commonly known from its title, Sinners in the Hands of an Angry God. The occasion of this sermon is usually overlooked. It was preached to a congregation who were careless and loose in their lives at a time when " the neighbouring towns were in great distress for their souls." A contemporary account of it says that in spite of Edwards's academic style of preaching, the assembly was " deeply impressed and bowed down, with an awful conviction of their sin and danger. There was such a breathing of distress and weeping, that the preacher was obliged to speak to the people and desire silence, that he might be heard." Edwards preached other sermons of this type, but this one was the most extreme. The style of the imprecatory sermon, however, was no more peculiar to him than to his period. He was not a great preacher in the ordinary meaning of the word. His gestures were scanty, his voice was not powerful, but he was desperately in earnest, and he held his audience whether his sermon contained a picturesque and de- tailed description of the torments of the damned, or, as was often the case, spoke of the love and peace of God in the heart cf man. He was an earnest, devout Christian, and a man of blameless life. His insight into the spiritual life was profound. Certainly the most able metaphysician and the most influential religious thinker of America, he must rank in theology, dialectics, mysticism and philo- sophy with Calvin and Fenelon, Augustine and Aquinas, Spinoza and Novalis; with Berkeley and Hume as the great English philo- sophers of the 1 8th century; and with Hamilton and Franklin as the three American thinkers of the same century of more than provincial importance.

Edwards's main aim had been to revivify Calvinism, modifying it for the needs of the time, and to promote a warm and vital Christian piety. The tendency of his successors was — to state the matter roughly — to take some one of his theories and develop it to an extreme. Of hip immediate followers Joseph Bellamy is distinctly Edwardean in the keen logic and in the spirit of his True Religion

Delineated, but he breaks with his master in his theory of general (not limited) atonement. Samuel Hopkins laid even greater stress than Edwards on the theorem that virtue consists in disinterested benevolence; .but he went counter to Edwards in holding that unconditional resignation to God's decrees, or more concretely, willingness to be damned for the glory of God, was the test of true regeneration; for Edwards, though often quoted as holding this doctrine, protested against it in the strongest terms. Hopkins, moreover, denied Edwards's identity theory of original sin, saying that our sin was a result of Adam's and not identical with it ; and he went much further than Edwards in his objection to " means of grace," claiming that the unregenerate were more and more guilty for continual rejection of the gospel if they were outwardly righteous and availed themselves of the means of grace. Stephen West (1735- 18 19), too, out-Edwardsed Edwards in his defence of the treatise on the Freedom of the Will, and John Smalley (1734-1820) developed the idea of a natural (not moral) inability on the part of man to obey God. Emmons, like Hopkins, considered both sin and holiness " exercises " of the will. Timothy Dwight (1752-1847) urged the use of the means of grace, thought Hopkins and Emmons pan- theistic, and boldly disagreed with their theory of " exercises," reckon- ing virtue and sin as the result of moral choice or disposition, a position that was also upheld by Asa Burton (1752-1836), who thought that on regeneration the disposition of man got a new relish or " taste."

Jonathan Edwards 1 the younger (1745-1801), second son of

1 Besides the younger Jonathan many of Edwards's descendants

the philosopher, born at Northampton, Massachusetts, on the 26th of May 1745, also takes an important place among his followers. He lived in Stockbridge in 1 751-1755 and spoke the language of the Housatonic Indians with ease, for six months studied among the Oneidas, graduated at Princeton in 1765, studied theology at _Bethlehem,Connecticut, under Joseph Bellamy.was licensed to preach in 1766, was a tutor at Princeton in 1766-1769, and was pastor of the White Haven Church, New Haven, Connecticut, in 1769-1795, being then dismissed for the nominal reason that the church could not support him, but actually because of his opposition to the Half-Way Covenant as well as to slavery and the slave trade. He preached at Colebrook, Connecticut, in 1796-1799 and then became president of Union College, Schenectady, New York, where he died on the 1st of August 1801. His studies of the Indian dialects were scholarly and

valuable. He edited his father's incomplete History of the Work of Redemption, wrote in answer to Stephen West, A Dissertation Concerning Liberty and Necessity (1797), which defended his father's work on the Will by a rather strained interpretation, and in answer to Chauncy on universal salvation formulated what i« known as the " Edwardean," New England or Governmental theory of the atonement in The Necessity of the Atonement and its Consistency with Free Grace in Forgiveness (1785). His collected works were edited by his grandson Tryon Edwards in two volumes, with memoir (Andover, 1842). His place in the Edwardean theo- logy _ is principally due to his defence against the Universalists of his father's doctrine of the atonement, namely, that Christ's death, being the equivalent of the eternal punishment of sinners, upheld the authority of the divine law, but did net pay any debt, and made the pardon of all men a possibility with God, but not a necessity.

Bibliography. — There have been various editions of Edwards's works. His pupil, Samuel Hopkins, in 1765 published two volumes from manuscript containing eighteen sermons and a memoir; the younger Jonathan Edwards with Dr Erskine published an edition in 4 volumes (1744 sqq.), and Samuel Austin in 1808 edited an edition in 8 volumes. In 1829 Sereno E. Dwight, a great-grandson of Edwards, published the Life and Works in 10 volumes, the first volume containing the memoir, which is still the most complete and was the standard until the publication (Boston, 1889) of Jonathan Edwards, by A. V. G. Allen, who attempts to "distinguish what he (Edwards) meant to affirm from what he actually teaches." In 1865 the Rev. Alexander B. Grosart edited from original manu- scripts Selections from the Unpublished Writings of Jonathan Edwards of America (Edinburgh, 1865, printed for private circulation). This was the only part of a complete edition planned by Grosart that ever appeared. It contained the important Treatise on Grace, Anno- tations on the Bible, Directions for Judging of Persons' Experiences, and Sermons, the last for the most part merely in outline. E, C. Smyth published from a copy Observations Concerning the Scripture Oeconomy of the Trinity and Covenant of Redemption (New York, 1880), a careful edition from the manuscript of the essay on the Flying Spider (in the Andover Review, January 1890) and " Some Early Writings of Jonathan Edwards," with specimens from the manuscripts (in Proceedings of the American Antiquarian Society, October, 1895). In 1900 on the death of Prof. Edwards A. Park, the entire collection of Edwards's manuscripts loaned to him by Tryon Edwards was transferred to Yale University. Professor Park, like Mr. Grosart before him, had been unable to accomplish the great task of editing this mass of manuscript. " A Study

of the Manuscripts of Jonathan Edwards ” was published by F. B. Dexter in the Proceedings of the Massachusetts Historical Society, series 2, vol. xv. (Boston, 1902), and in the same volume of the Proceedings appeared ” A Study of the Shorthand Writings of Jonathan Edwards,” by W. P. Upham. The long sought for essay on the Trinity was edited (New York, 1903) with valuable introduction and appendices by G. P. Fisher under the title, An Unpublished Essay of Edwards’s on the Trinity. The only other edition of Edwards (in whole or in part) of any importance is Selected Sermons of Jonathan Edwards (New York, 1904), edited by H. N. Gardiner, with brief biographical sketch and annotations on seven sermons, one of which had not previously been published.

For estimates of Edwards consult: The Volume of the Edwards Family Meeting at Stockbridge, Massachusetts, September 6-f, A.D. 1870 (Boston, 1871); Jonathan Edwards, a Retrospect, Being the Addresses Delivered in Connecticut with the Unveiling of a Memorial

were great, brilliant or versatile men. Among them were: his son Pierrepont (1750-1826), a brilliant but erratic member of the Connecticut bar, tolerant in religious matters and bitterly hated by stern Calvinists, a man whose personal morality resembled greatly that of Aaron Burr; his grandsons. William Edwards (1770-1851), an inventor of important leather rolling machinery ; Aaron Burr the son of Esther Edwards; Timothy Dwight (1752-1817), son of Mary Edwards, and his brother Theodore Dwight, a Federalist politician, a member, the secretary and the historian of the Hartford Con- vention; his great-grandsons, Tryon Edwards (1809-1894) and Sereno_ Edwards Dwight, theologian, educationalist and author; and his great-great-grandsons, Theodore William Dwight, the jurist, and Timothy Dwight, second of that name to be president of Yale.

in the First Church of Christ in Northampton, Massachusetts, on the One Hundred and Fiftieth Anniversary of his Dismissal from the Pastorate of that Church, edited by H. N. Gardiner (Boston, 1901); Exercises Commemorating the Two Hundredth Anniversary of the Birth of Jonathan Edwards, held at Andover Theological Seminary. October 4-5, IQ03 (Andover, 1904) ; and among the addresses de- livered at Stockbridge in October 1903, John De Witt, ” Jonathan Edwards: A Study,” in the Princeton Theological Review (January, 1904). ˆ Also H. C. King, ” Edwards as Philosopher and Theo- logian,” in Hartford Theological Seminary Record, vol. xiv (1903) PP- 23-57; . H. N. Gardiner, ” The Early Idealism of Jonathan Edwards, in the Philosophical Review, vol. ix. (1900), pp. 573-596; E. C. Smyth, American Journal of Theology, vol. i. (1897), pp 960-964 ‘ Samuelˆ P.

Hayes, ” An Historical Study of the Edwardean Re- vivals, in American Journal of Psychology, vol. xiii. (1902), pp. 550 ff.; J. H. MacCracken, “Philosophical Idealism of Edwards” in Philosophical Review, vol. xi. (1902), pp. 26-42, suggesting that Edwards did not know Berkeley, but Collier, and the same author’s Jonathan Edwards’ Idealismus (Halle, 1899) ; F. J. E. Woodbridge, ” Jonathan Edwards,” in Philosophical Review, vol. xiii. (1904) PP- 393-4 08 ; W. H. Squires, Jonathan Edwards und seine Willens- lehre (Leipzig, 1901); Samuel Simpson, “Jonathan Edwards, A Historical Review,” in Hartford Seminary Record, vol. xiv. (1903), pp. 3-22 ; and The Edwardean, a Quarterly Devoted to the History of Thought in America (Clinton, New York, 1903-1904), edited by W. H. Squires, of which only four parts appeared, all devoted to Edwards and all written by Squires. (H. N. G. ; R. We.)

EDWARDS, LEWIS (1809-1887), Welsh Nonconformist divine, was born in the parish of Llanbadarn Fawr, Cardigan- shire, on the 27th of October 1809. He was educated at Aberystwyth and at Llangeitho, and then himself kept school in both these places. He had already begun to preach for the Calvinistic Methodists when, in December 1830, he went to London to take advantage of the newly-opened university. In 1832 he settled as minister at Laugharne in Carmarthenshire, and the following year went to Edinburgh, where a special resolution of the senate allowed him to graduate at the end of his third session. He was now better able to further his plans for providing a trained ministry for his church. . Previously, the success of the Methodist preachers had been due mainly to their natural gifts. Edwards made his home at Bala, and there, in 1837, with David Charles, his brother-in-law, he opened a school, which ultimately became the denominational college for north Wales. He died on the 19th of July 1887.

Edwards may fairly be called one of the makers of modern Wales. Through his hands there passed generation after genera- tion of preachers, who carried his influence to every corner of the principality. By fostering competitive meetings and by his writings, especially in Y Traethodydd (“The Essajist “), a quarterly magazine which he founded in 1845 and edited for ten years, he did much to inform and educate his countrymen on literary and theological subjects. A new college was built at Bala in 1867, for which he raised £10,000. His chief publica- tion was a noteworthy book on The Doctrine of the Atonement, cast in the form of a dialogue between master and pupil; the treat- ment is forensic, and emphasis is laid on merit. , It was due to him that the North and South Wales Calvinistic Methodist Associa- tions united to form an annual General Assembly; he was its moderator in 1866 and again in 1876. He was successful in

bringing the various churches of the Presbyterian order into closer touch with each other, and unwearying in his efforts to promote education for his countrymen.

See Bywyd a Llythyrau y Parch, {i.e. Life and Letters of the Rev) Lewis Edwards, D.D., by his son T. C. Edwards.

EDWARDS, RICHARD (c. 15 23-1 566), English musician and playwright, was born in Somersetshire, became a scholar of Corpus Christi College, Oxford, in 1540, and took his M. A. degree in 1547. He was appointed in 1561 a gentleman of the chapel royal and master of the children, and entered Lincoln's Inn in 1564, where at Christmas in that year he produced a play which was acted by his choir boys. On the 3rd of September 1566 his play, Palamon and Arcite, was performed before Queen Elizabeth in the Hall of Christ Church, Oxford. Another play, Damon and Pithias, tragic in subject but with scenes of vulgar farce, entered at Stationers' Hall in 1567-8, appeared in 1571 and was reprinted in 1582; it may be found in Dodsley's

Old Plays, vol. i., and Ancient British Drama, vol. i. It is written in rhymed lines of rude construction, varying in length and neglecting the caesura. A number of the author's shorter pieces are preserved in the Paradise of Dainty Devices, first published in 1 575, and reprinted in the British Bibliographer, vol. iii.; the best known are the lines on May, the A mantium Irae, and the Commendation of Music, which has the honour of furnishing a stanza to Romeo and Juliet. The Historie of Damocles and Dionise is assigned to him in the 1578 edition of the Paradise. Sir John Hawkins credited him with the part song " In going to my lonely bed"; the words are certainly his, and probably the music. In his own day Edwards was highly esteemed. The fine poem, " The Soul's Knell," is supposed to have been written by him when dying.

See Grove's Diet, of Music (new edition); the Shakespeare Soc. Papers, vol. ii. art. vi. ; Ward, English Dram. Literature, vol. i.

EDWARDS, THOMAS CHARLES (1837-1900), Welsh Non- conformist divine and educationist, was born at Bala, Merioneth, on the 22nd of September 1837, the son of Lewis Edwards (q.v.). His resolve to become a minister was deepened by the revival of 1858-1859. After taking his degrees at London (B.A. 1861, M.A. 1862), he matriculated at St Alban Hall, Oxford, in October 1862, the university having just been opened to dissenters. He obtained a scholarship at Lincoln

College in 1864, and took a first class in the school of Literae Humaniores in 1866. He was especially influenced byMarkPattison and Jowett,who counselled him to be true to the church of his father, in which he had already been ordained. Early in 1867 he became minister at Windsor Street, Liverpool, but left it to become first principal of the University College of Wales at Aberystwyth, which had been established through the efforts of Sir Hugh Owen and other enthusiasts. The college was opened with a staff of three pro- fessors and twenty-five students in October 1872, and for some years its career was chequered enough. Edwards, however, proved a skilful pilot, and his hold on the affection of the Welsh people enabled him to raise the college to a high level of efficiency. When it was destroyed by fire in 1885 he collected £25,000 to rebuild it ; the remainder of the necessary £40,000 being given by the government (£10,000) and by the people of Aberystwyth (£5000). In 1 89 1 he gave up what had been the main work of his life to accept an undertaking that was even nearer his heart, the principalship of the theological college at Bala. A stroke of paralysis in 1894 fatally weakened him, but he continued at work till his death on the 22nd of March 1900. The Calvinistic Methodist Church of Wales bestowed on him every honour in their possession, and he received the degree of D.D. from the universities of Edinburgh (1887) and Wales (1898). His chief works were a Commentary on 1 Corinthians (1885), the Epistle to the Hebrews (" Expositor's Bible " series, 1888), and The God-Man (" Davies Lecture," 1895).

EDWARDSVILLE, a city and the county-seat of Madison county; Illinois, U.S.A., in the south-western part of the state, on Cahokia Creek, about 18 m. N.E. of St Louis. Pop. (1890) 3561 ; (igoo) 4157 (573 forei.en-born) ; (1910) 5014. Edwardsville is served by the Toledo, St Louis & Western, the Wabash, the Litchfield & Madison, and the Illinois Terminal railways, and is connected with St Louis by three electric lines. It has a Carnegie library. The city's principal manufactures are carriages, ploughs, brick, machinery, sanitary ware and plumber's goods. Bitu- minous coal is extensively mined in the vicinity. Adjoining Edwardsville is the co-operative village Leclaire (unincorporated), with the factory of the N.O.Nelson Manufacturing Co., makers of plumber's supplies, brass goods, sanitary fixtures, &c; the village was founded in 1890 by Nelson O. Nelson (b. 1844), and nearly all of the residents are employed by the company of which he is the head; they share to a certain extent in its profits, and are encouraged to own their own homes. The company supports a school, Leclaire Academy, and has built a club-house, bowling alleys, tennis-courts, base-ball grounds, &c. The first settlement on the site of

Edwardsville was made in 1812, and in 1815 the town was laid out and named in honour of Ninian Edwards (1775-1833), the governor of the Illinois Territory (1809-1818),

/

and later United States senator (1818-1824) and governor of the state of Illinois (1826-1830). Edwardsville was incorporated in 1819 and received its present charter in 1872.

EDWARDSVILLE, a borough of Luzerne county, Pennsyl- vania, U.S.A., on the north branch of the Susquehanna river, adjoining Kingston and close to the north-western limits of Wilkes-Barre (on the opposite side of the river), in the north- eastern part of the state; the official name of the post office.is Edwardsdale. Pop. (1890), 3284; (1900), 5165, of whom 2645 were foreign-born; (1910 census), 8407. It is served by the electric line of the Wilkes-Barre & Wyoming Valley Traction Co. Coal mining and brewing are the chief industries. Edwardsville was incorporated in 1884.

EDWIN, Aeduini or Edwine (585-633), king of Northumbria, was the son of Ella of Deira. On the seizure of Deira by .(Ethel- frith of Bernicia (probably 605), Edwin was expelled and is said to have taken refuge with Cadfan, king of Gwynedd. After the battle of Chester, in which ˆEtheifrith defeated the Welsh, Edwin fled to Rcedwald, the powerful king of East Anglia, who after some wavering espoused his cause and defeated and slew /Ethelfrith at the river Idle in 617. Edwin thereupon succeeded to the Northumbrian throne, driving out the sons of ˆEthelfrith. There is little evidence of external activity on the part of Edwin before 6 2 5 . It is probable that the conquest of the Celtic kingdom of Elmet, a district in the neighbourhood of the modern Leeds, ruled over by a king named Cerdic (Ceredig) is to be referred to this period, and this may have led to the later quarrel with Cadwallon, king of Gwynedd. Edwin seems also to have annexed Lindsey to his kingdom by 625. In this year he entered upon negotiations with Eadbald of Kent for a marriage with his sister yEthelberg. It was made a condition that Christianity should be tolerated in Northumbria, and accordingly Paulinus was con- secrated bishop by Justus in 625, and was sent to Northumbria with iEthelberg. According to Bede, Edwin was favourably disposed towards Christianity owing to a vision he had seen at the court of Rcedwald, and in 626 he allowed Eanfled, his daughter by jEthelberg, to be baptized. On the day of the birth of his daughter, the king’s life had been attempted by Eomer, an emissary of C wichelm, king of Wessex. Preserved by the devotion of his thegn Lilla, Edwin vowed to become a Christian if victorious over his

treacherous enemy. He was successful in the ensuing campaign, and abstained from the worship of the gods of his race. A letter of Pope Boniface helped to decide him, and after con- sulting his friends and counsellors, of whom the priest Coifi afterwards took a prominent part in destroying the temple at Goodmanham, he was baptized with his people and nobles at York, at Easter 627. In this town he granted Paulinus a see, built a wooden church and began one of stone. Besides York, Yeavering and Maelmin in Bernicia, and Catterick in Deira, were the chief scenes of the work of Paulinus. It was the influence of Edwin which led to the conversion of Eorpwald of East Anglia. Bede notices the peaceful state of Britain at this time, and relates that Edwin was preceded on his progresses by a kind of standard like that borne before the Roman emperors. In 633 Cadwallon of North Wales and Penda of Mercia rose against Edwin and slew him at Hatfield near Doncaster. His kinsman Osric succeeded in Deira, and Eanfrith the son of jEthelfrith in Bernicia. Bede tells us that Edwin had subdued the islands of Anglesey and Man, and the Annates Cambriae record that he besieged Cadwallon (perhaps in 63 2) in the island of Glannauc (Puffin Island) . He was definitely recognized as overlord by all the other Anglo-Saxon kings of his day except Eadbald of Kent.

See Bede, Hist. Eccl. (ed. Plummer, Oxford, 1896), ii. 5, 9, 11, 12, 13, 15, 16, 18, 20; Nennius (ed. San Marte, 1844), § 63; Vita S. Oswaldi, ix. Simeon of Durham (ed. Arnold, London, 1882-1885, vol. i. R.S.). (F. G. M. B.)

EDWIN, JOHN (1 749-1 790), English actor, was born in London on the 10th of August 1749, the son of a watchmaker. As a youth, he appeared in the provinces, in minor parts; and at Bath in 1768 he formed a connexion with a Mrs Walmsley, a milliner, who bore him a son, but whom he afterwards deserted. His first London appearance was at the Haymarket in 1776 as

Flaw in Samuel Foote's The Cozeners, but when George Colman took over the theatre he was given better parts and became its leading actor. In 1779 he was at Covent Garden, and played there or at the Haymarket until his death on the 31st of October 1790. Ascribed to him are The Last Legacy of John Edwin, 1780; Edwin's Jests and Edwin's Pills to Purge Melancholy.

His son, John Edwin (1768-1805), made a first appearance on the stage at the Haymarket as Hengo in Beaumont and Fletcher's Bonduca in 1778, and from that time acted frequently with his father, and

managed the private theatricals organized by his intimate friend Lord Barrymore at Wargrave, Berks. In 1791 he married Elizabeth Rebecca Richards, an actress already well known in juvenile parts, and played at the Hay- market and elsewhere thereafter with her. He died in Dublin on the 22nd of February 1805. His widow joined the Drury Lane company (then playing, on account of the fire of 1809, at the Lyceum), and took all the leading characters in the comedies of the day. She died on the 3rd of August 1854.

EDWY (Eadwig), “The Fair” (c. 940-959), king of the English, was the eldest son of King Edmund and /Elfgifu, and succeeded his uncle Eadred in 955, when he was little more than fifteen years old. He was crowned at Kingston by Archbishop Odo, and his troubles began at the coronation feast. He had retired to enjoy the company of the ladies jEthelgifu (perhaps his foster-mother) and her daughter ˆElfgifu, whom the king intended to marry. The nobles resented the king’s withdrawal, and he was induced by Dunstan and Cynesige, bishop of Lichfield, to return to the feast. Edwy naturally resented this interference, and in 957 Dunstan was driven into exile. By the year 956 / Elfgifu had become the king’s wife, but in 958 Archbishop Odo of Canterbury secured their separation on the ground of their being too closely akin. Edwy, to judge from the dis- proportionately large numbers of charters issued during his reign, seems to have been weakly lavish in the granting of privileges, and soon the chief men of Mercia and Northumbria were disgusted by his partiality for Wessex. The result was that in the year 957 his brother, the jEtheling Edgar, was chosen as king by the Mercians and Northumbrians. It is probable that no actual conflict took place, and in 959, on Edwy’s death, Edgar acceded peaceably to the combined kingdoms of Wessex, Mercia and Northumbria.

Authorities. — Saxon Chronicle (ed. Earle and Plummer, Oxford), sub ann. ; Memorials of St Dunstan (ed. Stubbs, Rolls Series) ; William of Malmesbury, Gesta regum (ed.- Stubbs, Rolls Series) ; Birch, Cartularium Saxonicum, vol. ii. Nos. 932-1046; Florence of Worcester.

EECKHOUT, GERBRAND VAN DEN (1621-1674), Dutch painter, born at Amsterdam on the 19th of August 1621, entered early into the studio of Rembrandt. Though a companion pupil to F. Bol and Govaert Flinck, he was inferior to both in skill and in the extent of his practice; yet at an early period he assumed Rembrandt’s manner with such success that his pictures were confounded with those of his master; and, even in modern days, the ” Resurrection of the Daughter of Jairus,” in the Berlin museum, and the ” Presentation in the Temple,” in the Dresden gallery, have been held to represent worthily the style

of Rembrandt. As evidence of the fidelity of Eeckhout's imitation we may cite his " Presentation in the Temple," at Berlin, which is executed after Rembrandt's print of 1630, and his " Tobit with the Angel," at Brunswick, which is composed on the same background as Rembrandt's " Philosopher in Thought." Eeckhout not merely copies the subjects; he also takes the shapes, the figures, the Jewish dress and the pictorial effects of his master. It is difficult to form an exact judgment of Eeckhout's qualities at the outset of his career. His earliest pieces are probably those in which he more faithfully reproduced Rembrandt's peculiarities. Exclusively his is a tinge of green in shadows marring the harmony of the work, a certain gaudiness of jarring tints, uniform surface and a touch more quick than subtle. Besides the pictures already mentioned we should class amongst early productions on this account the "Woman taken in Adultery," at Amsterdam; " Anna presenting her Son to the

High Priest," in the Louvre; the " Epiphany," at Turin; and the " Circumcision," at Cassel. Eeckhout matriculated early in the Gild of Amsterdam. A likeness of a lady at a dressing- table with a string of beads, at Vienna, bears the date of 1643, and proves that the master at this time possessed more imitative skill than genuine mastery over nature. As he grew older he succeeded best in portraits, a very fair example of which is that of the historian Dappers (1669), in the Stadel collection. Eeck- hout occasionally varied his style so as to recall in later years th< " small masters " of the Dutch school. Waagen justly draws attention to his following of Terburg in " Gambling Soldiers,' 1 at Stafford House, and a " Soldiers' Merrymaking," in the collec . tion of the marquess of Bute. A " Sportsman with Hounds," probably executed in 1670, now in the Vander Hoo gallery, and a " Group of Children with Goats " (1671), in the Hermitage, hardly exhibit a trace of the artist's first education. Amongst the best of Eeckhout's works " Christ in the Temple " (1662), at Munich, and the " Haman and Mordecai " of 1665, at Luton House, occupy a good place. Eeckhout died at Amsterdam on the 22nd of October 1674.

EEL. The common freshwater eel (Lat. anguilla; O. Eng. od) belongs to a group of soft-rayed fishes distinguished by the presence of an opening to the air-bladder and the absence of the pelvic fins. With its nearest relatives it forms the family Muraenidae, all of which are of elongated cylindrical form. The peculiarities of the eel are the rudimentary scales buried in the skin, the well-developed pectoral fins, the rounded tail fin continuous with the dorsal and ventral fins. Only one other species of the family occurs in British waters, namely, the conger, which is usually much larger and lives in the sea. In the conger the eyes are larger than in the eel, and the upper jaw overlaps

the lower, whereas in the eel the lower jaw projects beyond the upper. Both species are voracious and predatory, and feed on almost any animal food they can obtain, living or dead. The conger is especially fond of squid or other Cephalopods, while the eel greedily devours carrion. The common eel occurs in all the rivers and fresh waters of Europe, except those draining towards the Arctic Ocean, the Black Sea and the Caspian Sea. It also occurs on the Atlantic side of North America. The conger has a wider range, extending from the western and southern shores of Britain and Ireland to the East Indian Archipelago and Japan. It is common in the Mediterranean.

The ovaries of the eel resemble somewhat those of the salmon in structure, not forming closed sacs, as in the majority of Teleostei, but consisting of laminae exposed to the body cavity. The laminae in which the eggs are produced are very numerous, and are attached transversely by their inner edges to a membranous band running nearly the whole length of the body-cavity. The majority of the eels captured for market are females with the ovaries in an immature condition. The male eel was first dis- covered in 1873 by Syrski at Trieste, the testis being described by him as a lobed elongated organ, in the same relative position as the ovary in the female, surrounded by a smooth surface without laminae. He did not find ripe spermatozoa. He discovered the male by examining small specimens, all the larger being female. L. Jacoby, a later observer, found no males exceeding 19 in. in length, while the female may reach a length of 39 in. or more. Dr C. G. J. Petersen, in a paper published in 1896, states that in Denmark two kinds of eels are distinguished by the fishermen, namely, yellow eels and silver eels. The silver eels are further distinguished by the shape of the snout and the size of the eyes. The snout in front of the eyes is not flat, as in the yellow eels, but high and compressed, and therefore appears more pointed, while the eyes are much larger and directed outwards. In both kinds there are males and females, but Petersen shows that the yellow eels change into silver eels when they migrate to the sea. The sexual organs in the silver eels are more developed than in the yellow eels, and the former have almost or entirely ceased to take food. The male silver eels are from 11ˆ to 19 in. in length, the females from i6| to about 39 in. It is evident, therefore, that if eels only spawn once, they do not all reach the same size when they become sexually mature. The male conger was first

EFFENDI

described in 1879 by Hermes, who obtained a ripe specimen in the Berlin Aquarium. This specimen was not quite 25 ft. in length, and of

the numerous males which have been identified at the Plymouth Laboratory, none exceeded this length. The large numbers of conger above this size caught for the market are all immature females. Female conger of 5 or 6 ft. in length and weighing from 30 to 50 lb are common enough, and occasion- ally they exceed these limits. The largest recorded was 8 ft. 3 in. long, and weighed 128 lb.

There is every reason to believe that eels and conger spawn but once in their lives, and die soon after they have discharged their generative products. When kept in aquaria, both male and female conger are vigorous and voracious. The males sooner or later cease to feed, and attain to the sexually mature condition, emitting ripe milt when handled and gently squeezed. They live in this condition five or six months, taking no food and showing gradual wasting and disease of the bodily organs. The eyes and skin become ulcerated, the sight is entirely lost, and the bones become soft through loss of lime. The females also after a time cease to feed, and live in a fasting condition for five or six months, during which time the ovaries develop and reach great size and weight, while the bones become soft and the teeth disappear. The female, however, always dies in confinement before the ova are perfectly ripe and before they are liberated from the ovarian tissue. The absence of some necessary condition, perhaps merely of the pressure which exists at the bottom of the sea, evidently prevents the complete development of the ovary. The invariable death of the fish in the same almost ripe condition leads to the conclusion that under normal conditions the fish dies after the mature ova have been discharged. G. B. Grassi states that he obtained ripe male eels, and ripe specimens of Muraena, another genus of the family, in the whirlpools of the Strait of Messina. A ripe female Muraena has also been described at Zanzibar. Gravid female eels, i.e. specimens with ovaries greatly enlarged, have been occasionally obtained in fresh water, but there is no doubt that, normally, sexual maturity is attained only in the sea.

Until recent years nothing was known from direct observation concerning the reproduction of the common eel or any species of the family. It was a well-known fact that large eels migrated towards the sea in autumn, and that in the spring small trans- parent eels of 2 in. in length and upwards were common on the shore under stones, and ascended rivers and streams in vast swarms. It was reasonable, therefore, to infer that the mature eels spawned in the sea, and that there the young were developed.

A group of peculiar small fishes were, however, known which were called Leptocephali, from the small proportional size of

Leptocephali. (By permission of J. & A, Churchill.)

the head. The first of these described was captured in 1703 near Holyhead, and became the type of L. Morrisii, other specimens of which have been taken either near the shore or at the surface of the sea. Other forms placed in the same genus had been taken by surface fishing in the Mediterranean and in

tropical ocean currents. The chief peculiarities of Leptocephali, in addition to the smallness of the head, are their ribbon-like shape and their glassy transparency during life. The body is flattened from side to side, and broad from the dorsal to the ventral edge. Like the eels, they are destitute of pelvic fins, and no generative organs have been observed in them (see fig.).

In 1864 the American naturalist, T. N. Gill, published the con- clusion that L. Morrisii was the young or larva of the conger, and Leptocephali generally the young stages of species of Muraenidae. In 1886 this conclusion was confirmed from direct observation by Yves Delage, who kept alive in a tank at Roscoff a specimen of L. Morrisii, and saw it gradually transformed into a young conger. From 1887 to 1892 Professor Grassi and Dr Calandruccio carried on careful and successful researches into the development of the Leptocephali at Catania, in Sicily. The specimens were captured in considerable numbers in the harbour, and the transformation of L. Morrisii into young conger, and of various other forms of Leptocephalus into other genera of Muraenidae, such as Muraena, Congro-muraena and Ophichthys, was observed. In 1894 the same authors published the announcement that another species of Leptocephalus, namely, L. brevirostris, was the larva of the common eel. This larval form was captured in numbers with other Leptocephali in the strong currents of the Strait of Messina. In the metamorphosis of all Leptocephali a great reduction in size occurs. The L. brevirostris reaches a length of 8 cm., or a little more than 25 in., while the perfectly- formed young eel is 2 in. long or a little more.

The Italian naturalists have also satisfied themselves that certain pelagic fish eggs originally described by Raffaele at Naples are the eggs of Muraenidae, and that among them are the eggs of Conger and Anguilla. They believe that these eggs, although free in the water, remain usually near the bottom at great depths, and that fertilization takes place under similar conditions. No fish eggs of the kind to which reference is here made have yet been obtained on the British coasts, although conger and eels are so abundant there. Raffaele described and figured the larva newly hatched from one of the eggs under

consideration, and it is evident that this larva is the earliest stage of a Leptocephalus.

Although young eels, some of them more or less flat and transparent, are common enough on the coasts of Great Britain and north-western Europe in spring, neither eggs nor specimens of Leptocephalus brevirostris have- yet been taken in the North Sea, English Channel or other shallow waters in the neighbour- hood of the British Islands, or in the Baltic. Marked eels have been proved to migrate from the inmost part of the Baltic to the Kattegat. Recently, however, search has been made for the larvae in the more distant and deeper portions of the Atlantic Ocean. In May 1904 a true larval specimen was taken at the surface south-west of the Faeroe Islands, arid another was taken 40 m. north by west of Achill Head, Ireland. In 1905 numbers were taken in deep water in the Atlantic. The evidence at present available indicates that the spawning of mature eels takes place beyond the 100 fathom line, and that the young eels which reach the coast are already a year old. As eels, both young and old, are able to live for a long time out of water and have the habit of travelling at night over land in wet grass and in damp weather, there is no difficulty in explaining their presence in wells, ponds or other isolated bodies of fresh water at any distance from the sea.

See ” The Eel Question,” Report U.S. Commissioner of Fisheries for 1879 (Washington, 1882); J. T. Cunningham, ” Reproduction and Development of the Conger,” Journ. Mar. Biol. Assn. vol. ii.; C. G. J. Petersen, Report Dan. Biol. Station, v. (1894) ; G. B. Grassi, Quart. Journ. Mic. Sci. vol. xxxix. (1897). (J. T. C.)

EFFENDI (a Turkish word, corrupted from the Gr. av6’am)s, a lord or master), a title of respect, equivalent to the English ” sir,” in the Turkish empire and some other eastern countries. It follows the personal name, when that is used, and is generally given to members of the learned professions, and to government officials who have no higher rank, such as Bey, Pasha, &c. It may also indicate a definite office, as Hakim effendi,chiei physician

io

EFFIGIES, MONUMENTAL

to the sultan. The possessive form effendim (my master) is used by servants and in formal intercourse.

EFFIGIES, MONUMENTAL. An ” effigy ” (Lat. effigies, from effingere,

to fashion) is, in general, a material image or likeness of a person; and the practice of hanging or burning people ” in effigy,” i.e. their semblance only, preserves the more general sense of the word. Such representations may be portraits, caricatures or models. But, apart from general usages of the term (see e.g. Wax Figures), it is more particularly applied in the history of art to a particular class of sculptured figures, in the flat or the round, associated with Christian sepulchral monuments, dating from the 12th century. The earliest of these attempts at commemorative portraiture were executed in low relief upon coffin-lids of stone or purbeck marble, some portions of the designs for the most part being executed by means of incised lines, cut upon the raised figure. Gradually, with the increased size and the greater architectural dignity of monu- mental structures, effigies attained to a high rank as works of art, so that before the close of the 13th century very noble examples of figures of this order are found to have been executed in full relief; and, about the same period, similar figures also began to be engraved, either upon monumental slabs of stone or marble, or upon plates of metal, which were affixed to the surfaces of slabs that were laid in the pavements of churches.

Engraved plates of this class, known as ” Brasses ” (see Brasses, Monumental), continued in favour until the era of the Reformation, and in recent times their use has been revived. It seems probable that the introduction and the prevalence of flat engraved memorials, in place of commemorative effigies in relief, was due, in the first instance, to the inconvenience re- sulting from increasing numbers of raised stones on the pavement of churches; while the comparatively small cost of engraved plates, their high artistic capabilities, and their durability, combined to secure for them the popularity they unquestionably enjoyed. If considerably less numerous than contemporary incised slabs and engraved brasses, effigies sculptured in relief — with some exceptions in full relief — continued for centuries to constitute the most important features in many medieval monuments. In the 13th century, their origin being apparently derived from the endeavour to combine a monumental effigy with a monumental cross upon the same sepulchral stone (whether in sculpture or by incised lines), parts only of the human figure sometimes were represented, such as the head or bust, and occasionally also the feet; in some of the early ex- amples of this curious class the cross symbol was not introduced, and after awhile half-length figures became common.

Except in very rare instances, that most important element, genuine face-portraiture, is not to be looked for, in even the finest sculptured effigies, earlier than about the middle of the 15th century. In works of

the highest order of art, indeed, the memorials of personages of the most exalted rank, effigies from an early period in their existence may be considered occasionally to have been portraits properly so called; and yet even in such works as these an approximately correct general resemblance but too frequently appears to have been all that was contemplated or desired. At the same time, in the earliest monumental effigies we possess contemporary examples of vestments, costume, 1 armour, weapons, royal and knightly insignia, and other personal appointments and accessories, in all of which accurate fidelity has been certainly observed with scrupulous care and minute exactness. Thus, since the monumental effigies of England are second to none in artistic merit, while they have been pre- served in far greater numbers, and generally in better condition than those in other countries, they represent in unbroken continuity an unrivalled series of original personal representa- tions of successive generations, very many of them being, in

1 It is well known that the costume of effigies nearly always represented what was actually worn by the remains of the person commemorated, when prepared for interment and when lying in state; and, in like manner, the aspect of the lifeless countenance, even if not designedly reproduced by medieval ” image ” makers, may long have exercised a powerful influence upon their ideas of consistent monumental portraiture.

the most significant acceptation of that term, veritable con- temporaneous portraits.

Once esteemed to be simply objects of antiquarian curiosity, and either altogether disregarded or too often subjected to injurious indignity, the monumental effigies in England long awaited the formation of a just estimate of their true character and their consequent worth in their capacity as authorities for face-portraiture. In the original contract for the construction of the monument at Warwick to Richard Beauchamp, the fifth earl, who died in 1439, it is provided that an effigy of the deceased noble should be executed in bronze gilt, with all possible care, by the most skilful and experienced artists of the time; and the details of the armour and the ornaments of the figure are specified with minute precision. It is remarkable, however, that the effigy itself is described only in the general and inde- finite terms — ” an image of a man armed. ” There is no provision that the effigy should be ” an image ” of the earl; and much less is anything said as to its being such a “counterfeit pre- sentment “of the features and person of the living man, as the contemporaries of Shakespeare had learned to expect in what they would accept as true

portraiture. The effigy, almost as perfect as when it left the sculptor's hands, still bears witness, as well to the conscientious care with which the conditions of the contract were fulfilled, as to the eminent ability of the artists employed. So complete is the representation of the armour, that this effigy might be considered actually to have been equipped in the earl's own favourite suit of the finest Milan steel. The cast of the figure also was evidently studied from what the earl had been when in life, and the countenance is sufficiently marked and endowed with the unmistakable attributes of personal character. Possibly such a resemblance may have been the 'highest aim in the image-making of the period, some- what before the middle of the 15th century. Three-quarters of a century later, a decided step towards fidelity in true portraiture is shown to have been taken, when, in his will (1510 a.d.), Henry VII. spoke of the effigies of himself and of his late queen, Elizabeth of York, to be executed for their monument, as " an image of our figure and another of hers." The existing effigies in the Beauchamp chapel and in Henry VII. 's chapel, with the passages just quoted from the contract made by the executors of the Lancastrian earl, strikingly illustrate the gradual development of the idea of true personal portraiture in monu- mental effigies, during the course of the 15th and at the commencement of the 16th century in England.

Study of the royal effigies still preserved must commence in Worcester Cathedral with that of King John. This earliest example of a series of effigies of which the historical value has never yet been duly appreciated is rude as a work of art, and yet there is on it the impress of such individuality as demonstrates that the sculptor did his best to represent the king. Singularly fine as achievements of the sculptor's art are the effigies of Henry III., Queen Eleanor of Castile, and her ill-fated son Edward II., the two former in Westminster Abbey, the last in Gloucester cathedral; and of their fidelity also as portraits no doubt can be entertained. In like manner the effigies of Edward III. and his queen Philippa, and those of their grandson Richard II. and his first • consort, Anne of Bohemia (all at Westminster), and of their other grandson, Henry of Lancaster, with his second consort, Joan of Navarre, at Canterbury — all convince us that they are true portraits. Next follow the effigies of Henry VII. and Elizabeth of York, — to be succeeded, and the royal series to be completed, by the effigies of Queen Elizabeth and Mary Stuart, all of them in Westminster Abbey. Very instructive would be a close comparison between the two last-named works and the painted portraits of the rival queens, especially in the case of Mary, the pictures of whom differ so rernarkably frpj»>"v> another.

As the 15m century advanced, the rank of the personage represented and the character of the art that distinguishes any effigy goes far to determine its portrait qualities. Still later, when more exact face-portraiture had become a recognized element, sculptors must be supposed to have aimed at the

production of such resemblance as their art would enable them to give to their works; and accordingly, when we compare effigies with painted portraits of the same personages, we find that they corroborate one another. The prevalence of por- traiture in the effigies of the 16th and 17th centuries, when their art generally underwent a palpable decline, by no means raises all works of this class, or indeed the majority of them, to the dignity of true portraits; on the contrary, in these effigies, as in those of earlier periods, it is the character of the art in each particular example that affects its merit, value and authority as a portrait. In judging of these latter effigies, however, we must estimate them by the standard of art of their own era; and, as a general rule, the effigies that are the best as works of art in their own class are the best also and the most faithful in their portraiture. The earlier effigies, usually produced without any express aim at exact portraiture, as we now employ that expression, have nevertheless strong claims upon our veneration. Often their sculpture is very noble; and even when they are rudest as works of art, there is rarely lacking a rough grandeur about them, as exhibited in the fine bold figure of Fair Rosamond's son, Earl William of the Long Sword, which reposes in such dignified serenity in his own cathedral at Salisbury. These effigies may not bring us closely face to face with remote generations, but they do place before us true images of what the men and women of those generations were.

Observant students of monumental effigies will not fail to appreciate the singular felicity with which the medieval sculptors adjusted their compositions to the recumbent position in which their " images " necessarily had to be placed. Equally worthy of notice is the manner in which many monumental effigies, particularly those of comparatively early date, are found to have assumed an aspect neither living nor lifeless, and yet impressively life-like. The sound judgment also, and the good taste of those early sculptors, were signally exemplified in their excluding, almost without exception, the more extravagant fashions in the costume of their era from their monumental sculpture, and introducing only the simpler but not less

characteristic styles of dress and appointments. Monumental effigies, as commonly understood, represent recumbent figures, and the accessories of the effigies themselves have been adjusted to that position. With the exceptions when they appear on one side resting on the elbow (as in the case of Thomas Owen (d. 1598) and Sir Thomas Heskett (d. 1605), both in Westminster Abbey), these effigies he on their backs, and as a general rule (except in the case of episcopal figures represented in the act of benediction, or of princes and warriors who sometimes hold a sceptre or a sword) their hands are uplifted and conjoined as in supplication. The crossed-legged attitude of numerous armed effigies of the era of mail-armour has been supposed to imply the personages so represented to have been crusaders or Knights of the Temple; but in either case the supposition is unfounded and inconsistent with unquestionable facts. Much beautiful feeling is conveyed by figures of ministering angels being introduced as in the act of supporting and smoothing the pillows or cushions that are placed in very many instances to give support to the heads of the re- cumbent effigies. The animals at the feet of these effigies, which frequently have an heraldic significance, enabled the sculptors, with equal propriety and effectiveness, to overcome one of the special difficulties inseparable from the recumbent position. In general, monumental effigies were carved in stone or marble, or cast in bronze, but occasionally they were of wood: such is the effigy of Robert Curthose, son of William I. (d. 1135), whose altar tomb in Gloucester cathedral was probably set up about 1320.

In addition to recumbent statues, upright figures must receive notice here, especially those set in wall-monuments in churches mainly. These usually consisted in half-length figures, seen full-face, placed in a recess within an architectural setting more or less elaborate. They belong mainly to the 16th and 17th centuries. Among the many examples in old St Paul's cathedral (destroyed in the Great Fire of 1666) were those of Dean Colet (d. kiq), William Aubrey 'iˆsJand Alexander Nowell(d. 1601).

In St Giles's, Cripplegate, is the similarly designed effigy of John Speed (d. 1629); while that of John Stow (d. 1605) is a full- length, seated figure. This, like the figure of Thomas Owen, is in alabaster, but since its erection has always been described as terra-cotta — a material which came into considerable favour for the purpose of busts and half-lengths towards the end of the 1 6th century, imported, of course, from abroad. Sometimes the stone monuments were painted to resemble life, as in the monuments to Shakespeare and John Combe (the latter now over-painted white), in Holy Trinity Church, Stratford-on-Avon.

Bibliography. — Among the more noteworthy publications are the following: Monumental Effigies in Great Britain (Norman Conquest to Henry VIII.), by C. A. Stothard, folio (London, 1876); The Recumbent Monumental Effigies in Northamptonshire, by A. Hartshorne (4to, London, 1867-1876); Sepulchral Memorials (Northamptonshire), by W. H. Hyett (folio, London, 1817); Ancient Sepulchral Effigies and Monumental Sculpture of Devon, by W. H. H. Rogers (4to, Exeter, 1877); The Ancient Sepulchral Monuments of Essex, ed. by C. M. Carlton (4to, Chelmsford, 1890) ; and other works dealing with the subject according to counties. Of particular value is the Report of the Sepulchral Monuments Committee of the Society of Antiquaries, laboriously compiled at the request of the Office of Works, arranged (1) personally and chronologically, and (2) locally (1872). (C. B.;M. H. S.)

EGAN, PIERCE (1772-1849), English sporting writer, was born in London in 1772., He began life as sporting reporter for the newspapers, and was soon recognized as the best of his day. In 1814 he wrote, set and printed a book about the relations ofthe prince regent (afterwards George IV.) and Miss Robinson, called The Mistress of Royalty, or the Loves of Florizel and Perdita. But his best-known work is Life in London, or Days and Nights of Jerry Hawthorne and his Elegant Friend Corinthian Tom (1821), a book x describing the amusements of sporting men, with illustrations by Cruikshank. This book took the popular fancy and was one of Thackeray's early favourites (see his Roundabout Papers). It was repeatedly imitated, and several dramatic versions were produced in London. A sequel containing more of country sports and misadventures probably suggested Dickens's Pickwick Papers. In 1824 Pierce Egan's Life in London and Sporting Guide was started, a weekly newspaper afterwards incorporated with Bell's Life. Among his numerous other books are Boxiana (1818), Life of an Actor (1824), Book of Sports (1832), and the Pilgrims of the Thames (1838). Egan died at Pentonville on the 3rd of August 1849.

His son, Pierce Egan (1814-1880), illustrated his own and his father's books, and wrote a score of novels of varying merit, of which The Snake in the Grass (1858) is perhaps the best.

EGBO, a secret society flourishing chiefly among the Efiks of the Calabar district, West Africa. Egbo or Ekpe is a mysterious spirit who lives in the jungle and is supposed to preside at the ceremonies of the society. Only males can join, boys being initiated about the age of puberty. Members are bound by oath of secrecy, and fees on entrance are payable. The Egbo-men are ranked in seven or nine grades, for

promotion to each of which fresh initiation ceremonies, fees and oaths are necessary. The society combines a kind of freemasonry with political and law- enforcing aims. For instance any member wronged in an Egbo district, that is one dominated by the society, has only to address an Egbo-man or, beat the Egbo drum in the Egbo-house, or " blow Egbo " as it is called, i.e. sound the Egbo horn before the hut of the wrong-doer, and the whole machinery of the society is put in force to see justice done. Formerly the society earned as bad a name as most secret sects, from the barbarous customs mingled with its rites; but the British authorities have been able to make use of it in enforcing order and helping on civilization. The Egbo-house, an oblong building like the nave of a church, usually stands in the middle of the villages. The walls are of clay elaborately painted inside and ornamented with clay figures in relief. Inside are wooden images, sometimes of an obscene nature, to which reverence is paid. Much social importance attaches to the highest ranks of Egbo-men, and it is said that very large sums, sometimes more than a thousand pounds, are paid to attain these dignities. At certain festivals in the year the

Egbo-men wear black wooden masks with horns which it is death for any woman to look on.

See Mary H. Kingsley, West African Studies (1901); Rev. Robt. H. Nassau, Fetichism in West Africa (1904) ; C. Partridge, Cross River Natives (1905).

EGEDE, HANS (1686-1758), Norwegian missionary, was born in the vogtship of Senjen, Norway, on the 31st of January 1686. He studied at the university of Copenhagen, and in 1706 became pastor at Vaagen in the Lofoten islands, but the study of the chronicles of the northmen having awakened in him the desire to visit the colony of Northmen in Greenland, and to convert them to Christianity, he resigned his charge in 17 17; and having, after great difficulty, obtained the sanction and help of the Danish government in his enterprise, he set sail with three ships from Bergen on the 3rd of May i72r, accompanied by his wife and children. He landed on the west coast of Greenland on the 3rd of July, but found to his dismay that the Northmen were entirely superseded by the Eskimo, in whom he had no particular interest, and whose language he would be able to master, if at all, only after years of study. But, though compelled to endure for some years great privations, and at one time to see the

result of his labours almost annihilated by the ravages of small-pox, he remained resolutely at his post. He founded the colony of Godthaab, and soon gained the affections of the people. He converted many of them to Christianity, and established a considerable commerce with Denmark. Ill-health compelling him to return home in 1736, he was made principal of a seminary at Copenhagen, in which workers were trained for the Greenland mission; and from 1740 to 1747 he was superintendent of the mission. He died on the 5th of November 1758. He is the author of a book on the natural history of Greenland.

His work in Greenland was continued, on his retirement, by his son Paul Egede (1708-1789), who afterwards returned to Denmark and succeeded his father as superintendent of the Greenland mission. Paul Egede also became professor of theology in the mission seminary. He published a Greenland- Danish-Latin dictionary (1750), Greenland grammar (1760) and Greenland catechism (1756). In 1766 he completed the transla- tion begun by his father of the New Testament into, the Green- land tongue; and in 1787 he translated Thomas a. Ke'mpis. In 1789 he published a journal of his life in Greenland.

EGER, AQIBA (1761-1837), Jewish scholar, was for the last twenty-five years of his life rabbi of Posen. He was a rigorous casuist of the old school, and his chief works were legal notes on the Talmud and the code of Qaro (q.v.). He believed that religious education was enough, and thus opposed the party which favoured secular schools. He was a determined foe of the reform movement, which began to make itself felt in his time.

EGER (Czech, Cheb), a town of Bohemia, Austria, 148 m. W.N.W. of Prague by rail. Pop. (1900) 23,665. It is situated on the river Eger, at the foot of one of the spurs of the Fichtel- gebirge, and lies in the centre of a German district of about 40,000 inhabitants, who are distinguished from the surrounding population by their costumes, language, manners and customs. On the rock, to the N.W. of the town, lies the Burg or Castle, built probably in the 12th century, and now in ruins. It possesses a massive black tower, built of blocks of lava, and in the courtyard is an interesting chapel, in Romanesque style with fantastic ornamentations, which was finished in the 13th century. In the banquet-room of this castle Wallenstein's officers Terzky, Kinsky, Mo and Neumann were assassinated a few hours before Wallenstein himself was murdered by Captain Devereux. The murder took place on the 25th of February 1634 in .the town- house, which was at that time the burgomaster's house. The rooms occupied by Wallenstein have been transformed since 1872 into a museum, which contains many historical relics and antiquities of the town of Eger. The handsome and

imposing St Nicholas church was built in the 13th century and restored in 1892. There is a considerable textile industry, together with the manufacture of shoes, machinery and milling. Eger was the birthplace of the novelist and playwright Braun von Braunthal

(1802-1866). About 3 m. N.W. of Eger is the well-known watering place of Franzensbad {q.v.).

The district of Eger was in 870 included in the new margraviate of East Franconia, which belonged at first to the Babenbergs, but from 906 to the counts of Vohburg, who took the title of margraves of Eger. By the marriage, in 1149, of Adela of Vohburg with the emperor Frederick I., Eger came into the possession of the house of Swabia, and remained in the hands of the emperors until the 13th century. In 1265 it was taken by Ottakar II. of Bohemia, who retained it for eleven years. After being repeatedly transferred from the one power to the other, according to the preponderance of Bohemia or the empire, the town and territory were finally incorporated with Bohemia in 1350, after the Bohemian king became the emperor Charles IV. Several im- perial privileges, however, continued to be enjoyed by the town till 1849. It suffered severely during the Hussite war, during the Swedish invasion in 1631 and 1647, an d in the War of the Austrian . Succession in 1742.

See Drivok, Altere Geschichte der deutschen Reichstadt Eger und des Reichsgebietes Egerland (Leipzig, 1875).

EGER (Ger. Erlau, Med. Lat. Agria), a town of Hungary, capital of the county of Heves, 90 m. E.N.E. of Budapest by rail. Pop. (1900) 24,650. It is beautifully situated in the valley of the river Eger, an affluent of the Theiss, and on the eastern outskirts of the Matra mountains. Eger is the see of an archbishopric, and owing to its numerous ecclesiastical buildings has received the name of ” the Hungarian Rome.” Amongst the principal buildings are the beautiful cathedral in the Italian style, with a handsome dome 130 ft. high, erected in 1831-1834 by the arch- bishop Ladislaus Pyrker (1772-1847); the church of the Brothers of Mercy, opposite which is a handsome minaret, 115 ft. high, the remains of a mosque dating from the Turkish occupation, other Roman Catholic churches, and an imposing Greek church. The archiepiscopal palace; the lyceum, with a good library and an astronomical observatory; the seminary for Roman priests; and the town-hall are all noteworthy. On an eminence N.E. of the town, laid out as a park, are the ruins of the old fortress, and a monument of Stephen Dobo, the heroic defender of the town against the assaults of the Turks in 1 5 5 2 . The chief occupation of the inhabitants is the

cultivation of the vineyards of the surround- ing hills, which produce the red Erlauer wine, one of the best in Hungary. To the S.W. of Eger, in the same county of Heves, is situated the town of Gyongyos (pop. 15,878). It lies on the south-western outskirts of the Matra mountains, and carries on a brisk trade in the Erlauer wine, which is produced throughout the district. The Hungarians defeated the Austrians at Gyongyos on the 3rd of April 1849. To the S.W. of Gyongyos is situated the old town of Hatvan (pop. 9698), which is now a busy railway junction, and possesses several industrial establishments.

Eger is an old town, and owes its importance to the bishopric created by King Stephen in 1010, which was one of the richest in the whole of Hungary. In 1552 Eger resisted the repeated assaults of a large Turkish force; in 1596, however, it was given up to the Turks by the Austrian party in the garrison, and remained in their possession until 1687. It was created an arch- bishopric in 1814. During the revolution of 1848-1849, Eger, was remarkable for the patriotic spirit displayed by its in- habitants; and it was here that the principal campaigns against the Austrians were organized.

EGERIA, an ancient Italian goddess of springs. Two distinct localities were regarded as sacred to her, — the grove of Diana Nemorensis at Aricia, and a spring in the immediate neighbour- hood of Rome at the Porta Capena. She derives her chief importance from her legendary connexion with King Numa, who had frequent interviews with her and consulted her in regard to his religious legislation (Livy i. 19; Juvenal iii. 12). These meetings took place on the spot where the sacred shield had fallen from heaven, and here Numa dedicated 3 grove to the Camenae, like Egeria deities of springs. After the death of Numa, Egeria was said to have fled into the grove of Aricia, where she was changed into a spring for having interrupted the rites of Diana by her lamentations (Ovid, Metam.. xv. 479). At Aricia

*3

there was also a Manius Egerius, a male counterpart of Egeria. Her connexion with Diana Nemorensis, herself a birth goddess, is confirmed by the fact that her aid was invoked by pregnant women. She also possessed the gift of prophecy; and the statement (Dion. Halic. ii. 60) that she was one of the Muses is due to her connexion with the Camenae, whose worship was displaced by them.

EGERTON, SIR PHILIP DE MALPAS GREY, Bart. (1806- 1881), English palaeontologist, was born on thei3th of November 1806, the son of the 9th baronet. He was educated at Eton and Christ Church, Oxford, where he graduated B.A. in 1828. While at college his interest in geology was aroused by the lectures of W. Buckland, and by his acquaintance with W. D. Conybeare. Subsequently when travelling in Switzerland with Lord Cole (afterwards 3rd earl of Enniskillen) they were introduced to Prof. L. Agassiz at Neufchatel, and determined to make a special study of fossil fishes. During the course of fifty years they gradually gathered together two of the largest and finest of private collections — that of Sir Philip Grey Egerton being at Oulton Park, Tarporley, Cheshire. He described the structure and affinities of numerous species in the publications of the Geological Seciety of London, the Geological Magazine and the Decades of the Geological Survey; and in recognition of his services the Wollaston medal was awarded to him in 1873 by the Geological Society. He was elected F.R.S. in 1831, and was a trustee of the British Museum. As a member of Parliament he represented the city of Chester in 1830, the southern division of Cheshire from 1835 until 1868, and the western division from 1868 to 1881. He died in London on the 6th of April 1881. His collection of fossil fishes is now in the British Museum.

EGG, AUGUSTUS LEOPOLD (1816-1863), English painter, was born on the 2nd of May 18 16 in London, where his father carried on business as a gun-maker. He had some schooling at Bexley, and was not at first intended for the artistic profession; but, developing a faculty in this line, he entered in 1834 the drawing class of Mr Sass, and in 1836 the school of the Royal Academy. His first exhibited picture appeared in 1837 at the Suffolk Street gallery. In 1838 he began exhibiting in the Academy, his subject being a ” Spanish Girl “; altogether he sent twenty-seven works to this institution. In 1848 he became an associate and in i860 a full member of the Academy: he had considerable means, apart from his profession. In 1857 he took a leading part in selecting and arranging the modern paintings in the Art-Treasures Exhibition in Manchester. His constitution being naturally frail, he went in 1853, with Dickens and Wilkie Collins, to Italy for a short trip, and in 1863 he visited Algeria. Here he benefited so far as his chronic lung-disease was concerned; but exposure to a cold wind while out riding brought on an attack of asthma, from which he died on the 26th of March 1863 at Algiers, near which city his remains were buried.

Egg was a gifted and well-trained painter of genre, chiefly in the way of historical anecdote, or of compositions from the poets and novelists.

Among his principal pictures may be named: 1843, the ” Introduction of Sir Piercie Shafton and Halbert Giendinning” (from Scott’s Monastery); 1846, “Buckingham Rebuffed “; 1848, ” Queen Elizabeth discovers she is no longer young”; 1850, “Peter the Great sees Catharine for the first time “; 1854, ” Charles I. raising the Standard at Nottingham ” (a study); 1855, the ” Life and Death of Buckingham “; 1857 and 1858, two subjects from Thackeray’s Esmond; 1858, “Past and Present, a triple picture of a faithless wife ” ; 1859, the ” Night before Naseby “; i860, his last exhibited work, the Dinner Scene from The Taming of the Shrew. The Tate Gallery contains one of his earlier pictures, Patricio entertaining two Ladies, from the Diable boiteux; it was painted in 1844.

Egg was rather below the middle height, with dark hair and a handsome well-formed face; the head of Peter the Great (in the picture of Peter and Catharine, which may be regarded as his best work, along with the Life and Death of Buckingham) was studied, but of course considerably modified, from his own countenance. He was manly, kind-hearted, pleasant, and very genial and serviceable among brother-artists; social and com-

panionable, but holding mainly aloof from fashionable circles. As an actor he had uncommon talent. He appeared among Dickens’s company of amateurs in 1832 in Lord Lytton’s comedy Not so Bad as we Seem, and afterwards in Wilkie Collins’s Frozen Deep, playing the humorous part of Job Want.

EGG (O.E. aeg, cf. Ger. Ei, Swed. aegg, and prob. Gr. i>6v, Lat. ovum), the female reproductive cell or ovum of animals, which gives rise generally only after fertilization to the young. The largest eggs are those of birds; and this because, to the minute, essential portion of the egg, or germ, from which the young bird grows, there is added a large store of food-material — the yolk and white of the egg — destined to nourish the growing embryo while the whole is enclosed within a hard shell.

The relative sizes of eggs depend entirely on the amount of the food-yolk thus enclosed with the germ; while the form and texture of the outer envelope are determined by the nature of the environment to which the egg is exposed. Where the food material is infinitesimal in quantity the egg Is either not ex- truded — the embryo being nourished by the maternal tissues, — or it passes out-of the parental body and gives rise at once to a free-living organism or ” larva ” (see Larval Forms), as in the case of many lowly freshwater and marine animals. In such cases no ” egg ” in the usual sense of the term is

produced.

The number of eggs periodically produced by any give,. individual depends on the risks of destruction to which they, and the young to which they give rise, are exposed: not more than a single egg being annually laid by some species, while with others the number may amount to millions.

Birds' Eggs. — The egg of the bird affords, for general purposes, the readiest example of the modifications imposed on eggs by the external environment. Since it must be incubated by the warmth of the parent's body, the outer envelope has taken the form of a hard shell for the protection of the growing chick from pressure, while the dyes which commonly colour the surface of this shell serve as a screen to hide it from egg-eating animals.

Carbonate of lime forms the principal constituent of this shell; but in addition phosphate of lime and magnesia are also present. In section, this shell will be found to be made up of three more or less distinct crystalline layers, traversed by vertical canals, whereby the shell is made porous so as to admit air to the developing chick.

The outermost, or third, layer of this shell often takes the form of a glaze, as of procelain, as for example in the burnished egg of the ostrich: or it may assume the character of a thick, chalky layer as in some cuckoos (Guira, Crotophaga ani), cormorants, grebes and flamingoes: while in some birds as in the auks, gulls and tinamous, this outer layer is wanting; yet the tinamous have the most highly glazed eggs of all birds, the second layer of the shell developing a surface even more perfectly burnished than that formed by the outermost, third layer in the ostrich.

While the eggs of some birds have the shell so thin as to be translucent, e.g. kingfisher, others display considerable thickness, the maximum being reached in the egg of the extinct Aepyornis.

Though in shape differing but little from that of the familiar hen's egg, certain well-marked modifications of form are yet to be met with. Thus the eggs of the plover are pear-shaped, of the sand-grouse more or less cylindrical, of the owls and titmice spherical and of the grebes biconical.

In the matter of coloration the eggs of birds present a remark- able range. The pigments to which this coloration is due have been shown, by means of their absorption spectra (Sorby, Proc. Zool. Soc, 1875), to

be seven in number. The first of these, oorhodeine, is brown-red in tone, and rarely absent: the second and third, oocyanin, and banded oocyanin, are of a beautiful blue, and though differing spectroscopically give rise to the same product when oxidized: the fourth and fifth are yellow, and rufous ooxanthine, the former combining with oocyanin gives rise to the wonderful malachite green of the emu's egg, while the latter occurs only in the eggs of tinamous: the sixth is lichenoxanthine, a pigment not yet thoroughly known but present in the shells of all eggs having a peculiar brick-red colour. Still less is known of

the seventh pigment which is, as yet, nameless. It is a substance giving a banded absorption spectrum, and which, mixed with other pigments, imparts an abnormally browner tint. The origin of these pigments is yet uncertain, but it is probable that they are derived from the haemoglobin or red colouring matter of the blood. This being so, then the pigments of the egg-shell differ entirely in their nature from those which colour the yolk or the feathers.

While many eggs are either colourless or of one uniform tint, the majority have the surface broken up by spots or hjies, or a combination of both, of varying tints: the pigment being deposited as the egg passes down the lower portion of the oviduct. That the egg during this passage turns slowly on its long axis is shown by the fact that the spots and lines have commonly a spiral direction; though some of the markings are made during periods of rest, as is shown by their sharp outlines, movement giving a blurred effect. Where the egg is pyriform, the large end makes way for the smaller. Many eggs display, in addition to the strongly marked spots, more or fewer fainter spots embedded in a deeper layer of the shell, and hence such eggs v are said to be " double-spotted 1 ," e.g. rails and plovers.

Among some species, as in birds of prey, the intensity of this coloration is said to increase with age up to a certain point, when it as gradually decreases. Frequently, especially where but two eggs are laid (Newton) , all the dye will be deposited, sometimes on the first, sometimes on the last laid, leaving the other colour- less. But although of a number of eggs in a " clutch " — as the full complement of eggs in a nest is called — no two are exactly alike, they commonly bear a very close resemblance. Among certain species, however, which lay several eggs, one of the number invariably differs markedly from the

rest, as for example in the eggs of the house-sparrow or in those of the sparrow-hawk, where, of a clutch of six, two generally differ conspicuously from the rest. Differing though these eggs do from the rest of the clutch, all yet present the characters common to the species. But the eggs of some birds, such as the Australian swamp quail, Synoecus australis, present a remarkably wide range of variation in the matter of coloration, no two clutches being alike, the ex- tremes ranging from pure white to eggs having a greenish ground colour and rufous spots or blotches. But a still more interesting illustration of variation equally marked is furnished by the chikor partridge (Caccabis chukar), since here the variation appears to be correlated with the geographical distribution of the species. Thus eggs taken in Greece are for the most part cream- coloured and unspotted; those from the Grecian Archipelago are generally spotted and blotched; while more to the eastward spots are invariably present, and the blotches attain their maximum development.

But in variability the eggs of the guillemot (Lomvia troile) exceed all others: both in the hue of the ground colour and in the form of the superimposed markings, these eggs exhibit a wonderful range for which no adequate explanation has yet been given.

Individual peculiarities of coloration are commonly repro- duced, not only with this species but also in others, year after year.

The coloration of the egg bears no sort of relation to the coloration of the bird which lays it; but it bears on the other Stgalfl- hand a more or less direct relation to the nature of the caaceof environment during incubation. colour. White eggs may generally be regarded as repre-

senting the primitive type of egg, since they agree in this particular with the eggs of reptiles. And it will generally be found that eggs of this hue are deposited in holes or in domed nests. So long indeed as nesting-places of this kind are used will the eggs be white. And this because coloured eggs would be invisible in dimly lighted chambers of this description, and therefore constantly exposed to the risk of being broken by the sitting bird, or rolling out of reach where the chamber was large enough to admit of this, whereas white eggs are visible so long as they can be reached by the faintest rays of light. Pigeons invariably lay white eggs; and while some deposit them in holes

others build an open nest, a mere platform of sticks. These exceptions to the rule show that the depredations of egg-eating animals are sufficiently guarded against by the overhanging foliage, as well as by the great distance from the ground at which the nest is built. Birds

which have reverted to the more ancient custom of nesting in holes after having developed pigmented eggs, have adopted the device of covering the shell with a layer of chalky matter (e.g. puffins) , or, to put the case more correctly, they have been enabled to maintain survival after their return to the more ancient mode of nidification, because this reversion was accompanied by the tendency to cover the pigmented surface of the shell with this light-reflecting chalky incrustation.

Eggs which are deposited on the bare ground, or in other exposed situations, are usually protectively coloured: that is to say, the hue of the shell more or less completely harmonizes with the ground on which the egg is placed. The eggs of the plover tribe afford the most striking examples of this fact.

But the majority of birds deposit their eggs in a more or less elaborately constructed nest, and in such cases the egg, so far from being protectively coloured, often displays tints that would appear calculated rather to attract the attention of egg-stealing animals; bright blue or blue spotted with black being commonly met with. It may be, however, that coloration of this kind is less conspicuous than is generally supposed, but in any case the safety of the egg depends not so much on its coloration as on the character of the nest, which, where protective devices are necessary, must harmonize sufficiently with its surroundings to escape observation from prowling egg-stealers of all kinds.

The size of the egg depends partly on the number produced and partly on the conditions determining the state of the young bird at hatching: hence there is a great disparity in the relative sizes of the eggs of different birds. Thus it will be found that young birds which emerge in the world blind, naked and helpless are the product of relatively small eggs, while on the contrary young hatched from relatively large eggs are down-clad and active from birth.

The fact that the eggs must be brooded by the parent is also a controlling factor in so far as number is concerned, for no more can be hatched than can be covered by the sitting bird. Other factors, however, less understood, also exercise a controlling influence in this matter. Thus the ostrich lays from 1 2 to 1 6, the teal 15, the partridge 12-20, while among many other species the number is strictly limited, as in the case of the hornbills and guillemots, which lay but a single egg; the apteryx, divers, petrels and pigeons never lay more than 2, while the gulls and plovers never exceed 4. Tropical species are said to lay fewer eggs than their representatives in temperate regions, and

further immature birds lay more and smaller eggs than when fully adult.

Partly owing to the uniformity of shape, size and texture of the shell, the eggs of birds are by no means easy to distinguish, except in so far as their family resemblances are concerned: that is to say, except in particular cases, they cannot be specifically distinguished, and hence they are of but little or no value for the purposes of classification.

Save only among the megapodes, all birds brood their eggs, the period of incubation varying from 1 3 days, as in small passerine birds, to 8 weeks, as in the cassowary, though eggs of the rhea and of Struthio hatch in from 5 to 6 weeks. But the megapodes deposit their eggs in mounds of decaying vegetable matter or in sand in the neighbourhood of hot springs, and there without further apparent care leave them. Where the nestling is active from the moment of hatching the eggs have a relatively longer incubation period than in cases where the nestlings are for a long while helpless.

Eggs of Mammals. — Only in the spiny ant-eater, or Echidna, and the duck-billed platypus, or Ornithorhynchus, among the Mammalia, are the eggs provided with a large store of yolk, enclosed within a shell, and extruded to undergo development apart from the maternal tissues. In the case of the echidna the eggs, two in number, are about as large as those of a sparrow,

similar in shape, and have a white, parchment-like shell. After expulsion they are transferred by the beak of the mother to a pouch resembling that of the marsupial kangaroos, and there they undergo development. The Otnithorhynchus, on the other hand, lays from two to four eggs, which in size and general appearance resemble those of the echidna. They are, how- ever, deposited in a loosely constructed nest at the end of a long burrow and there brooded. In Marsupials, the eggs are smaller than those of Echidna and Omithorhynchus, and they contain a larger proportion of yolk than occurs in higher mammals.

Eggs of Reptiles. — The eggs of reptiles are invariably provided with a large amount of food yolk and enclosed with a firm test or shell, which though generally parchment-like in texture may be calcareous as in birds, as, for example, in many of the tortoises and turtles and in the crocodiles.

Among reptiles the egg is always white or yellowish, while the number laid often far exceeds that in the case of birds. The tuatara of New Zealand, however, lays but ten — white hard- shelled, long and

oval — at intervals between November and January. The long intervals between the appearance of the successive eggs is a characteristic feature of the reptiles, but is met with among the birds only in the megapodes, which, like the reptiles, do not ” brood ” their eggs.

Among the Chelonia the number of eggs varies from two to four in some of the tortoises, to 200 in some of the turtles : while in the crocodiles between 20 and 30 are produced, hard-shelled and white.

The eggs of the lizards are always white or yellowish, and generally soft-shelled; but the geckos and the green lizard lay •hard-shelled eggs. Many of the soft-shelled eggs are remarkable for the fact that they increase in size after extrusion, owing to the stretching of the membranous shell by the growing embryo. In the matter of number lizards are less prolific than many of the Chelonia, a dozen eggs being the general number, though as many as thirty may be produced at a time, as in the case of the common chameleon.

While as a general rule the eggs of lizards are laid in burrows or buried, some are retained within the body of the parent until the young are ready to emerge; or they may even hatch within the oviduct. This occurs with some chameleons and some lizards, e. g. the slow-worm. The common English lizard is also viviparous. Normally the young leaves the egg immediately after its ex- trusion, but if by any chance this extrusion is delayed they escape while yet in the oviduct.

The majority of the snakes lay eggs, but most of the vipers and the aquatic snakes are viviparous, as also are a few terrestrial species. The shell of the egg is always soft and parchment-like. As a rule the number of eggs produced among the snakes is not large, twenty or thirty being common, but some species of python lay as many as a hundred. Generally, among the oviparous snakes the eggs are buried, but some species of boas jealously guard them, enclosing them within the coils of the body.

Eggs of Amphibia. — Among the amphibia a greater variety obtains in the matter of the investment of the egg, as well as in the number, size and method of their disposal. The outer covering is formed by a toughening of the surface of a thick gelatinous coat which surrounds the essential parts of the egg. This coat in many species of salamander — using this name in the wide sense — is produced into threads which serve either to anchor the eggs singly or to bind them together in bunches.

Viviparity occurs both among the limbless and the tailed Amphibia, the eggs hatching before they leave the oviduct or immediately after extrusion. The number of young so produced is generally not large, but the common salamander {Salamandra maculosa) may produce as many as fifty at a birth, though fifteen is the more normal figure. When the higher number is reached the young are relatively small and weak.

As a rule among the Amphibia the young leave the egg in the form of larvae, generally known as “tadpoles”; but many

species produce eggs containing a sufficient amount of food material to enable the whole of the larval phase to be completed before hatching.

Among the tailless Amphibia (frogs and toads) there are wide differences in the number of eggs produced, while the methods by which these eggs are disposed of present a marvellous variety.

As a rule vast quantities of eggs are shed by the female into the water in the form of ” spawn.” In the common toad as many as 7000 eggs may be extruded at a time. These leave the body in the form of two long strings — one from each oviduct — of trans- lucent globules, gelatinous in texture, and enclosing a central sphere of yolk, the upper pole of which is black. The spawn of the common frog differs from that of the toad in that the eggs all adhere to form a huge jelly-like mass. But in many species the number of eggs produced are few; and these may be sufficiently stored with food-yolk to allow of the tadpole stage being passed before hatching, as in frogs of the genus Hylodes. In many cases the eggs are deposited out of the water and often in quite remarkable ways.

Eggs of Fishes. — The eggs of fishes present an extremely wide range of form, and a no less extensive range in the matter of number. Both among the cartilaginous and bony fishes vivi- parity occurs. Most of the sharks and rays are viviparous, but in the oviparous species the eggs present some interesting and peculiar forms. Large in size, the outer coat or ” shell ” is in all cases horn-like and flexible, but differs greatly in shape. Thus in the egg of the larger spotted dog-fish it is oblong in shape, flattened from side to side, and has the angles produced into long, slender tendrils. As the egg is laid the lower tendrils project from the vent, and the mother rubs herself against some fixed body. The tendrils soon catch fast in some slight

projection, when the egg is dragged forth there to remain till hatching takes place. A couple of narrow slits at each corner of the upper end serve to admit fresh water to the imprisoned embryo during the later stages of development; when development is complete escape is made through the end of the shell. In the rays or " skates," long spines take the place of tendrils, the egg simply resting at the bottom of the sea. The empty egg-cases of the rays are often found on the seashore, and are known as "Mermaids' purses." The egg of the Port Jackson shark (Cestracion) is of enormous size, pear-shaped, and provided with a spiral flange extending along the whole length of the capsule. In the Chimaera the egg is long, more or less spindle-shaped, and produced on each side into a broad flange having a fringed edge, so that the whole bears a close resemblance to a long leaf, broad and notched at one end, pointed at the other. This likeness to the seaweed among which it rests is doubtless a protective device, akin to that of protectively coloured birds' eggs.

Among the bony fishes the eggs generally take the form of small spheres, enclosed within a tough membrane or capsule. But they present many important differences, being in some fishes heavy and remaining at the bottom of the water, in other light and floating on the surface. While in some species they are distributed separately, in others they adhere together in masses. The eggs of the salmon, for example, are heavy, hard and smooth, and deposited separately in a trough dug by the parent and afterwards covered to prevent them from being carried away by the stream. In the perch they are adhesive and form long band- like masses of spawn adhering to water-plants. In the gobies the egg is spindle-shaped, and attached by one end by means of a network of fibres, resembling rootlets; while in the smelt the egg is loosely suspended by a membrane formed by the peeling off of a part of the outer sheath of the capsule. The eggs of the garfish (Belone vulgaris) and of the flying-fish of the genus Exocoetus, attach themselves to foreign objects, or to one another, by means of threads or cords developed at opposite poles of the egg.

Among a number of fishes the eggs float at the surface of the sea, often in enormous masses, when they are carried about at the mercy of tides 'and currents. An idea of the size which such

masses attain may be gathered from the fact that the spawn of the angler-fish, Lophius piscatorius, takes the form of a sheet from 2 to 3

ft. wide, and 30 ft. long. Another remarkable feature of these floating eggs is their transparency, inasmuch as they are extremely difficult to see, and hence they probably escape the rapacious maws of spawn-eating animals. The cod tribe and flat-fishes lay floating eggs of this description.

The maximum number of eggs laid by fishes varies greatly, some species laying relatively few, others an enormous number. But in all cases the number increases with the weight and age of the fish. Thus it has been calculated that the number laid by the salmon is roughly about 1000 to every pound weight of the fish, a 15 lb salmon laying 15,000 eggs. The sturgeon lays about 7,000,000; the herring 50,000; the turbot 14,311,000; the sole 134,000; the perch 280,000. Briefly, the number is greatest where the risks of destruction are greatest.

The eggs of the degenerate fishes known as the lampreys and hag-fishes are remarkable for the fact that in the latter they are large in size, cylindrical in shape, and provided at each end with hooklets whereby they adhere one to another; while in the lampreys they are extremely small and embedded in a jelly.

Molluscs. — Among the Mollusca, Crustacea and Insecta yolk- stored eggs of very remarkable forms are commonly produced.

In variety, in this connexion, the Mollusca must perhaps be given the first place. This diversity, indeed, is strikingly illus- trated by the eggs of the Cephalopoda. In the squids (Loligo), for example, the eggs are enclosed in long cylindrical cases, of which there are several hundreds, attached by one end to a common centre; the whole series looking strangely like a rough mop-head. Each case, in such a cluster, contains about 250 eggs, or about 40,000 in all. By way of contrast the eggs of the true cuttle-fish (Sepia) are deposited separately, each enclosed in a tough, black, pear-shaped capsule which is fastened by a stalk to fronds of sea-weed or other object. They appear to be extruded at short intervals, till the full complement is laid, the whole forming a cluster looking like a bunch of grapes. The octopus differs yet again in this matter, its eggs being very small, berry- like, and attached to a stalk which runs through the centre of the mass.

The eggs of the univalve Mollusca are hardly less varied in the shapes they take. In the common British Purpura lapillus they resemble delicate pink grains of rice set on stalks; in Busy con they are disk-shaped, and attached to a band nearly 3 ft. long. The eggs of the shell-bearing slugs (Testacella) are large, and have the outer coat so elastic that if dropped on a stone floor they will rebound several inches;

while some of the snails (Bulimus) lay eggs having a white calcareous and slightly iridescent shell, in size and shape closely resembling the egg of the pigeon. Some are even larger than the egg of the wood-pigeon. The beautiful violet-snail (Ianthina) — a marine species — carries its eggs on the under side of a gelatinous raft. No less remarkable are the eggs of the whelk; since, like those of the squids, they are not laid separately but enveloped in capsules, and these to the number of many hundreds form the large, ball-like masses so commonly met with on the seashore. When the eggs in these capsules hatch, tb* crowd of embryos proceed to establish an internecine warfare, devouring one another till only the strongest survives !

With the Mollusca, as with other groups of animals, where the eggs are exposed to great risks they are small, produced in great numbers, and give rise to larvae. This is well illustrated by the common oyster which annually disperses about 60,000,000 eggs. But where the risk of destruction is slight, the eggs are large and produce young differing from the parent only in size, as in the case of the pigeon-like eggs of Bulimus.

Crustaceans. — Among the higher Crustacea, as a rule, the eggs are carried by the female, attached to special appendages on the under side of the body. But in some — Squillas — they are de- posited in burrows. Generally they are relatively small so that the young which emerge therefrom differ markedly in appearance from the parents, but in deep-sea and freshwater species the eggs

are large, when the young, on emerging, differ but little from the adults in appearance.

Insects, &°c. — The eggs 0/ insects though minute, are also remarkable for the great variety of form which they present, while they are frequently objects of great beauty owing to the sculptured markings of the shell. They are generally laid in clusters, either on the ground, on the leaves of plants, or in the water. Some of the gnats (Culex) lay them on the water. Cylindrical in shape they are packed closely together , set on end, the whole mass forming a kind of floating raft. Frequently, as in the case of the stick and leaf insect, the eggs are enclosed in capsules of very elaborate shapes and highly ornamented.

As to the rest of the Invertebrata — above the Protozoa the eggs are laid in water, or in damp places. In the former case they are as a rule small, and give rise to larvae; while eggs hatched on land are sometimes enclosed in capsules, ” cocoons,” as in the case of the

earthworm, where this capsule is filled with a milky white fluid, of a highly nutritious character, on which the embryos feed.

Among some invertebrates two different kinds of eggs are laid by the same individual. The water-flea, Daphnia (a crustacean) , lays two kinds of eggs known as ” summer ” and ” winter ” eggs. The summer eggs are carried by the female in a ” brood-pouch ” on the back. The ” winter ” eggs, produced at the approach of winter, differ markedly in appearance from the summer eggs, being larger, darker in colour, thicker shelled, and enclosed in a capsule formed from the shell or carapace, of the parent’s body. ” Winter eggs,” however, may be produced in the height of summer. While the ” summer eggs ” are unfertilized, the winter eggs are fertilized by .the male, and possess the remarkable power of lying dormant for months or even years before they develop. The production of these two kinds of eggs is a device to overcame the cold of winter, or the drying up of the pools in which the species lives, during the heat of the summer. The power of resistance which such eggs possess may be seen in the fact that a sample of mud which had been kept dry for ten years still con- tained living eggs. In deep water where neither drought nor winter cold can seriously affect the Daphnias, they propagate all the year round by unfertilized ” summer ” eggs.

Bibliography. — For further details on this subject the following authors should be consulted: — Mammals: F. E. Beddard, “Re- marks on the Ovary of Echidna,” Proc. Roy. Phys. Soc. Edin. vol. viii. (1885) ; W. H. Caldwell, ” The Embryology of Monotre- mata and Marsupialia,” Phil. Trans. Roy. Soc. vol. 178 (1887); E. B. Poulton, ” The Structures connected with the Ovarian Ovum of the Marsupialia and Monotremata,” Quart. Journ. Micros. Sci. vol. xxiv. (1884). Birds, Systematic: — H. Seebohm, Coloured Figures of the Eggs of British Birds (1896); A. Newton, Ootheca Wooleyana (1907); E. Oates, Cat. Birds’ Eggs Brit. Mus. (appearing), vols, i.-iv. published. General: — A. Newton, Dictionary of Birds (1896). Colouring matter: — Newbegin, Colour in Nature (1898). Reptiles and Amphibia: — H. Gadow, ” Reptiles,” Camb. Nat. Hist. (1901) ; G. A. Boulenger, ” The Tailless Batrachians of Europe,” Ray Soc. (1896). Fishes : — Bridge and Boulenger, ” Fishes, Ascidians, <&c," Camb. Nat. Hist. (1904) ; B. Dean, Fishes Living and Fossil (1895); J. T. Cunningham, Marketable Marine Fishes (1896). Invertebrate: — G. H Carpenter, Insects, Their Structure and Life (1899); L. C. Miall, A History of Aquatic Insects (1895); T. R. R. Stebbing, Crustacea, Internat. Sci. series (1893); M. C. Cooke, " Mollusca," Camb. Nat. Hist. (1906). For further references to the above and other Invertebrate groups see various text-books on Entomology, Zoology. (W. P. P.)

EGGENBERG, HANS ULRICH VON, Prince (1568-1634), Austrian statesman, was a son of Siegfried von Eggenberg (d. 1594), and began life as a soldier in the Spanish service, becoming about 1596 a trusted servant of the archduke of Styria, after- wards the emperor Ferdinand II. Having become a Roman Catholic, he was soon the chancellor and chief adviser of Ferdinand, whose election as emperor he helped to secure in 1619. He directed the imperial policy dnring the earlier part of the Thirty Years' War, and was in general a friend and supporter of Wallenstein, and an opponent of Maximilian I., duke of Bavaria, and of Spain. He was largely responsible for Wallenstein's return to the imperial service early in 1632, and retired from public life just after the general's murder in February 1634, dying

at Laibach, on the 18th of October 1634. Eggenberg's influence with Ferdinand was so marked that it was commonly said that Austria rested upon three hills (Berge): Eggenberg, Questenberg and Werdenberg. He was richly rewarded for his services to the emperor. Having received many valuable estates in Bohemia and elsewhere, he was made a prince of the Empire in 1623, and duke of Krumau in 1625.

See H. von Zwiedineck-Siidenhorst, Hans Ulrich, Fiirst von Eggenberg (Vienna, 1880) ; and F. Mares, Beitrdge zur Geschichte der Beziehungen des Fiirsten J. U. von Eggenberg zu Kaiser Ferdinand II und zu Waldstein (Prague, 1 893).

EGGER, EMILE (1813-1885), French scholar, was born in Paris on the 18th of July 1813. From 1840 till 1855 he was assistant professor, and from 1855 till his death professor of Greek literature in the Faculte des Lettres at Paris University. In 1854 he was elected a member of the Academie des Inscriptions and in 1873 of the Conseil superieur de l'instruction publique. He was a voluminous writer, a sound and discerning scholar, and his influence was largely responsible for the revival of the study of classical philology in France. His most important works were Essai sur I'histoire de la critique chez les Grecs (1849), Notions iUmentaires de grammaire comparee (1852), Apollonius Dyscole, essai sur I'histoire des theories grammalicales dans I'antiquite (1854) , Memoires de litterature ancienne (1862), MSmoires d'histoire ancienne et de philologie (1863), Les Papyrus grecs du Musie du Louvre et de la Bibliotheque Imperiale (1865), Etudes sur les traiUs publics chez les Grecs et les Romains (1866),

L'Hellenisme en France (1869), La Litterature grecque (1890). He was also the author of Observations et reflexions sur le dtveloppement de I'in- telligence et du langage chez les enfants (1879). Egger died in Paris on the 1st of September 1885.

EGGLESTON, EDWARD (1837-1902), American novelist and historian, was born in Vevay, Indiana, on the 10th of December 1837, of Virginia stock. Delicate health, by which he was more or less handicapped throughout his life, prevented his going to college, but he was naturally a diligent student. He was a Methodist circuit rider and pastor in Indiana and Minnesota (1857-1866); associate editor (1866-1867) of The Little Corporal, Chicago ; editor of The National Sunday School Teacher, Chicago (1867 -1870); literary editor and later editor-in-chief of The Independent, New York (1870-1871); and editor of Hearth and Home in 1871-1872. He was pastor of the church of Christian Endeavour, Brooklyn, in 1874-1879. From 1880 until his death on the 2nd of September 1902, at his home on Lake George, New York, he devoted himself to literary work. His fiction includes Mr Blake's Walking Stick (1869), for children; The Hoosier Schoolmaster (1871); The End of the World (1872); The Mystery of Metro polisville (1873); The Circuit Rider (1874); Roxy (1878); The Hoosier Schoolboy (1883); The Book of Queer Stories (1884), for children; The Gray sons (1888), an excellent novel; The Faith Doctor (1891); and Duffels (1893), short stories. Most of his stories portray the pioneer manners and dialect of the Central West, and the Hoosier Schoolmaster was one of the first examples of American local realistic fiction; it was very popular, and was translated into French, German and Danish. During the last third of his life Eggleston laboured on a History of Life in the United States, but he lived to finish only two volumes — The Beginners of a Nation (1896) and The Transit of Civilization (1900). In addition he wrote several popular compendiums of American history for schools and homes.

See G. C. Eggleston, The First of the Hoosiers (Philadelphia, 1903), and Meredith Nicholson, The Hoosiers (1900).

His brother George Cary Eggleston (1839-), American journalist and author, served in the Confederate army; was managing editor and later editor-in-chief of Hearth and Home (1871-1874); was literary editor of the New York Evening Post (1875-1881), literary editor and afterwards editor-in-chief of the New York Commercial Advertiser (1884-1889), and editorial writer for The World (New York) from 1889 to 1900. Most of his books are stories for boys; others, and his best, are romances dealing with life in the South especially in the Virginias and the Carolinas — before and during the Civil War.

Among his publi- cations may be mentioned: A Rebel's Recollections (1874);

The Last of the Flalboats (1900) ; Camp Venture (1900) ; A Carolina Cavalier (1901); Dorothy South (1902); The Master of Warlock (1903) ; Evelyn Byrd (1904) ; A Daughter of the South (1905) ; Blind Alleys (1906) ; Love is the Sum of it all (1907) ; History of the Con- federate War (1910); and Recollections of a Varied Life (1910).

EGHAM, a town in the Chertsey parliamentary division of Surrey, England, on the Thames, 21m. W.S.W. of London by the London & South Western railway. Pop. (1901) 11,895. The church of St John the Baptist is a reconstruction of 1817; it contains monuments by John Flaxman. Above the right bank of the river a low elevation, Cooper's Hill, commands fine views over the valley, and over Windsor Great Park to the west. On the hill was the Royal Indian Civil Engineering College, commonly called Cooper's Hill College, of which Sir George Tomkyns Chesney was the originator and first president (1871). It educated men for the public works, accounts, railways and telegraph departments of India, and included a school of forestry; but it was decided, in the face of some opposition, to close it in 1906, on the theory that it was unnecessary for a college with such a specialized object to be maintained by the government, in view of the readiness with which servants for these departments could be recruited elsewhere. Part of the organization, including the school of forestry, was transferred to Oxford University.. Cooper's Hill gives name to a famous poem of Sir John Denham (1642). A large and handsome building houses the Royal Holloway College for Women (1886), founded by Thomas Hollo way; in the neighbourhood is the sanatorium of the same founder (1885) for the treatment of mental ailments, accommo- dating about 2 50 patients. The college for women, surrounded by extensive grounds, commands a wide view from the wooded slope on which it stands. The recreation hall, with its fine art collec- tion, is the most notable room in this handsome building, which can receive 2 50 students. Within the parish, bordering the river, is the field of Runnymede, which, with Magna Charta Island lying off it, is famous in connexion with the signature of the charter by King John. Virginia Water, a large and picturesque artificial lake to the south of Windsor Great Park, is much frequented by visitors. It was formed under the direction of the duke of Cumberland, about 1750, and was the work of the brothers Thomas and Paul Sandby.

EGIN (Armenian Agn, " the spring "), an important town in the Mamuret el- Aziz vilayet of Asiatic Turkey (altitude 3300 ft.). Pop.

about 20,000, fairly equally divided between Armenian Christians and Moslems. It is picturesquely situated in a theatre of lofty, abrupt rocks, on the right bank of the western Euphrates, which is crossed by a wooden bridge. The stone houses stand in terraced gardens and orchards, and the streets are mere rock ladders. Egin was settled by Armenians who emigrated from Van in the nth century with Senekherim. On the 8th of November 1895 and in the summer of 1896 many Armenians were massacred here. (D. G. H.)

EGLANTINE (E. Frisian, egelliere; Fr. aiglantier), a plant- name of which Dr R. C. A. Prior (Popular Names of British Plants, p. 70) says that it " has been the subject of much dis- cussion, both as to its exact meaning and as to the shrub to which it properly belongs." The eglantine of the herbalists was the sweet-brier, Rosa rubiginosa. The signification of the word seems to be thorn-tree or thorn-bush, the first two syllables probably representing the Anglo-Saxon egla, egle, a prick or thorn, while the termination is the Dutch tere, taere, a tree. Eglantine is frequently alluded to in the writings of English poets, from Chaucer downwards. Milton, in L' Allegro, is thought by the term " twisted eglantine " to denote the honeysuckle, Lonicera Periclymenum, which is still known as eglantine in north-east Yorkshire.

EGLINTON, EARLS OF. The title of earl of Eglinton has been held by the famous Scottish family of Montgomerie since 1508. The attempts made to trace the descent of this house to Roger of Montgomery, earl of Shrewsbury (d. 1094), one of William the Conqueror's followers, will not bear examination, and the sure pedigree of the family only begins with Sir John Montgomerie, lord of Eaglesham, who fought at the battle of Otterbourne in

i 88 and died about 1398. His grandson, Sir Alexander Mont- gomTie (d. c. 1460), was made a lord of the Scottish parliament about 1445 as Lord Montgomerie, and Sir Alexander's great- grandson Hugh, the 3rd lord (c. 1460-1545), was created earl of Eglinton, or Eglintoun, in 1508. Hugh, who was a person of importance during the minority of James V., was succeeded by his grandson Hugh (d. 1546), and then by the latter's son Hugh (c. 1 53 1-1585) , who became 3rd earl of Eglinton. This nobleman was a firm supporter of Mary queen of Scots, for whom he fought at Langside, and of the Roman Catholic Church; his son and successor,"Hugh,was murdered in April 1 586 by the

Cunninghams, a family with which his own had an hereditary blood feud. In 161 2, by the death of Hugh, the 5th earl, the male line of the Montgomeries became extinct.

Having no children Earl Hugh had settled his title and estates on his cousin, Sir Alexander Seton of Foulstruther (1588-1661), a younger son of Robert Seton, 1st earl of Wintoun (c. 1550-1603), and his wife Margaret, daughter of the 3rd earl of Eglinton. Alexander, who thus became the 6th earl of Eglinton and took the name of Montgomerie, was commonly called Greysteel; he was a prominent Covenanter and fought against Charles I. at Marston Moor. Later, however, he supported the cause of Charles II. , and • fell into the hands of Cromwell, who imprisoned him. His fifth son, Robert Montgomerie (d. 1684) , a soldier of distinction, fought against Cromwell at Dunbar and at Worcester, afterwards escaping from the Tower of London and serving in Denmark. Robert's elder brother, Hugh, 7th earl of Eglinton (1613-1660), who also fought against Cromwell, was the grandfather of Alexander, the 9th earl (c. 1660-17 29), wno married, for his third wife, Susannah (1689-1780), daughter of Sir Archibald Kennedy, Bart., of Culzean, a lady celebrated for her wit and beauty. Alexander, the 10th earl (1723-1769), a son of the 9th earl, was one of the first of the Scottish landowners to carry out improve- ments on his estates. He was shot near Ardrossan by an excise officer named Mungo Campbell on the 24th of October 1769. His brother and successor, Archibald, the nth earl (1726-1796), raised a regiment of Highlanders with which he served in America during the Seven Years' War. As he left no male issue he was succeeded in the earldom by his kinsman Hugh Montgomerie (1739-1819), a descendant of the 6th earl, who was created a peer of the United Kingdom as Baron Ardrossan in 1806. Before succeeding to the earldom Hugh had served in the American war and had been a member of parliament ; after this event he began to rebuild Eglinton castle on a magnificent scale and to construct a harbour at Ardrossan.

This earl's successor was his grandson, Archibald William, the 13th earl (1812-1861), who was born at Palermo in the 29th of September 1812. His father was Archibald, Lord Montgomerie (1773-1814), the eldest son of the 12th earl, and his mother was Mary (d. 1848), a daughter of the nth earl. Educated at Eton, the young earl's main object of interest for some years was the turf; he kept a large racing stud and won success and reputation in the sporting world. In 1839 his name became more widely known in connexion with the famous tournament which took place at Eglinton castle and is said to have cost him £30,000 or £40,000. This was made the subject of much ridicule and was partly spoiled by the unfavourable weather, the rain

falling in torrents. Yet it was a real tournament and the ” knights ” broke their spears in the orthodox way. Prince Louis Napoleon (Napoleon III.) took part in it, and Lady Seymour, a daughter of Thomas Sheridan and the wife of Lord Seymour, afterwards 12th duke of Somerset, was the queen of beauty. A list of the challengers with an account of the jousts and the melee will be found in the volume on the tournament written by John Richardson, with drawings by J. H. Nixon. It is also described by Disraeli in Endymion. Eglinton was a staunch Tory, and in February 1852 he became lord-lieutenant of Ireland under the earl of Derby. He retired with the ministry in the following December, having by his princely hospitality made himself one of the most popular of Irish viceroys. When Derby returned to office in February 1858 he was again appointed lord-lieutenant, and he discharged the duties of this post until June 1859. In this

year he was created earl of Winton, an earldom which had been held by his kinsfolk, the Setons, from 1600 until 1716, when George Seton, the 5th earl (c. 1678-1749), was deprived of his honours for high treason. The earl died on the 4th of October 1861, and was succeeded by his eldest son Archibald William (1841-1892). When this earl died in 1892 his younger brother George Arnulph (b. 1848) became 15th earl of Eglinton and 3rd earl of Winton.

See Sir W. Fraser, Memorials of the Montgomeries, earls of Eglinton

(1859)-

EGMONT, EARLS OF. John Perceval, 1st earl of Egmont (1683-1748), Irish politician, and partner with J. E. Oglethorpe in founding the American colony of Georgia, was created earl in 1733. He claimed descent from the Egmonts of Flanders, but his title was taken from the place in County Cork where the family residence stood. Its name of Burton House, and that of Burton manor which formed part of the family estates, were a reminiscence of Burton in Somerset, where was the earlier English family property of his great-great-grandfather Richard Perceval (1 550-1620), Burghley’s secret agent, and author of a Spanish dictionary published in 1591, whose son Sir Philip Perceval (1605-1647) acquired the Irish estates by judicious use of his opportunities as commissioner for land titles and of his interest at court. Sir Philip’s son John, grandfather of the 1st earl, was made a baronet in 1661. The first earl of Egmont (who had been made Baron Perceval in 1715, and Viscount Perceval in 1723) is chiefly important for his connexion with the colonization of Georgia, and for his voluminous letters and writings on biography and genealogy.

John Perceval, 2nd earl of Egmont (1711-1770), his eldest son, was an active politician, first lord of the admiralty (1763- 1766), and political pamphleteer, and like his father an ardent genealogist. He was twice married, and had eight sons and eight daughters. One of his younger sons was Spencer Perceval, prime minister of England. His eldest son succeeded as 3rd earl, and the eldest by his second marriage (with Catherine Compton, baroness of Arden in Ireland) was in 1802 created Baron Arden of the United Kingdom, a title which subsequently became merged in the Egmont earldom.

EGMONT (Egmond), LAMORAL, Count or, prince of Gavre (1522-1568), was born in Hainaut in 1522. He was the younger of the two sons of John IV., count of Egmont, by his wife Francoise of Luxemburg, princess of Gavre. On the death of his elder brother Charles, about 1541, he succeeded to his titles and estates. In this year he served his apprenticeship as a soldier in the expedition of the emperor Charles V. to Algiers, distinguishing himself in the command of a body of cavalry. In 1544 he married Sabina, sister of the elector palatine Frederick III., and the wedding was celebrated at Spires with, great pomp in the presence of the emperor and his brother Y&rdi-nand, afterwards emperor. Created knight of the GolfkffFleece in 1546, he accompanied Philip of Spain in his tour through the Netherlarid towns, and in 1554 he went to England at the head of a special embassy to ask the hand of Mary of England for Philip, and was afterwards present at the wedding ceremony at Winchester. In the summer of 1557 Egmont was appointed commander of the Flemish cavalry in the war between Spain and France; and it was by his vehement persuasion that the battle of St Quentin was fought. The victory was determined by the brilliant charge that he led against the French. The reputation which he won at St Quentin was raised still higher in 1 558, when he encountered the French army under de Thermes at Gravelines, on its march homewards after the invasion of Flanders, totally defeated it, and took Marshal de Thermes prisoner. The battle was fought against the advice of the duke of Alva, and the victory made Alva Egmont's enemy. But the count now became the idol of his countrymen, who looked upon him as the saviour of Flanders from the devastations of the French. He was nominated by Philip stadtholder of Flanders and Artois. At the conclusion of the war by the treaty of Cateau Cambresis, Egmont was one of the four hostages selected by the king of France as pledges for its execution.

EGOISM

The attempt made by King Philip to convert the Netherlands into a Spanish dependency and to govern it by Spanish ministers excited the resentment of Egmont and other leading members of the Netherlands aristocracy. Between him and Cardinal Granvella, the all-powerful minister of the regent Margaret of Parma, there was no love lost. As a member of the council of state Egmont joined the prince of Orange in a vigorous protest addressed to Philip (1561) against the autocratic proceedings of the minister; and two years later he again protested in conjunction with the prince of Orange and Count Horn. In the spring of 1 564 Granvella left the Netherlands, and the malcontent nobles once more took their places in the council of state. The resolve, however, of Philip to enforce the decrees of the council of Trent throughout the Netherlands once more aroused their resentment. Although himself a good Catholic, Egmont had no wish to see the Spanish Inquisition established in his native country. Orange, Egmont and others were convinced that the enforcement of the decrees in the Netherlands was impossible, and, in January 1665, Egmont accepted a special mission to Spain to make known to Philip the state of affairs and the disposition of the people. At Madrid the king gave him an ostentatiously cordial reception, and all the courtiers vied with one another in lavishing professions of respect upon him. They knew his vain and somewhat unstable character, and hoped to win him over without conceding anything to the wishes of the Netherlanders. The king gave him plenty of flatteries and promises, but steadily evaded any serious discussion of the object of his mission, and Egmont finally returned home without having accomplished anything. At the same time Philip sent further instructions to the regent to abate nothing of the severity of the persecution.

Egmont was naturally indignant at the treatment he had received, while the terrors of the Inquisition were steadily rousing the people to a state of frenzied excitement. In 1566 a confederacy of the lesser nobility was formed (Les Gueux) whose principles were set out in a document known as the Compromise. From this league Egmont held aloof; he declined to take any step savouring of actual disloyalty to his sovereign. He withdrew to his government of Flanders, and as stadtholder took active measures for the persecution of heretics. But in the eyes of Philip he had long been a marked man. The Spanish king had temporized only until the moment arrived when he could crush opposition by force. In the summer of 1567 the duke of Alva was despatched to the Netherlands at the head of an army of veterans to supersede the regent Margaret and restore order in the discontented provinces. Orange fled to Germany after having vainly warned Egmont and Horn of the dangers that threatened them. Alva was at

pains to lull their suspicions, and then suddenly seized them both and threw them in the castle of Ghent. Their trial was a farce, for their fate had already been determined before Alva left Spain. After some months of imprisonment they were removed to Brussels, where sentence was pronounced upon them (June 4) by the infamous Council of Blood erected by Alva. They were condemned to death for high treason. It was in vain that the most earnest intercessions were made in behalf of Egmont by the emperor Maximilian, by the knights of the order of the Golden Fleece, by the states of Brabant, and by several of the German princes. Vain, too, was the pathetic pleading of his wife, who with her eleven children was reduced to want, and had taken refuge in a convent. Egmont was beheaded at Brussels in the square before the town hall on the day after his sentence had been publicly pronounced (June 5, 1568). He met his fate with calm resignation; and in the storm of terror and exasperation to which this tragedy gave rise Egmont's failings were forgotten, and he and his fellow-victim to Spanish tyranny were glorified in the popular imagination as martyrs of Flemish freedom. From this memorable event, which Goethe made the theme of his play Egmont (1788), is usually dated the beginning of the famous revolt of the Netherlands. In 1865 a monument to Counts Egmont and Horn, by Fraiken, was erected on the spot where they were beheaded.

Bibliography. — T. Juste, Le Comte d' Egmont el le comle de Homes (Brussels, 1862), Les Pays-Bas sous Philippe II, 1555-1565 (2 vols., Brussels, 1855); J. L. Motley, Rise of the Dutch Republic, 1555-1ˆ84 (3 vols., London, 1856); J. P. Blok, History of the People of the Netherlands (tr. from Dutch), vol. iii. (New York, 1900); R. Fruin, Het voorspel van den tastigjarigen oorlag (Amsterdam, 1866) ; E. Marx, Siudien zur Geschichte des niederldndischen Aufstandes (Leipzig, 1902). (G. E.)

EGOISM (from Gr. and Lat. ego, I, the 1st personal pronoun), a modern philosophical term used generally, in opposition to " Altruism," for any ethical system in which the happiness or the good of the individual is the main criterion of moral action. Another form of the word, " Egotism," is really interchangeable, though in ordinary language it is often used specially (and similarly " egoism," as in George Meredith's Egoist) to describe the habit of magnifying one's self and one's achievements, or regarding all things from a selfish point of view. Both these ideas derive from the original meaning of ego, myself, as opposed to everything which is outside myself. This antithesis of ego and non-ego, self and not-self, may be understood in several senses according to the connexion in which it is used. Thus the self may be held to include one's family, property, business, and an

indefinitely wider range of persons or objects in which the individual's interest is for the moment centred, i.e.. everything which I can call " mine." In this, its widest, sense " a man's Self is the sum total of all that he can call his " (Wrn. James, Principles of Psychology, chap x.). This self may be divided up in many ways according to the various forms in which it may be expressed. Thus James (ibid.) classifies the various " selves " as the material, the spiritual, the social and the " pure." Or again the self may be narrowed down to a man's own person, consisting of an individual mind and body. In the true philosophical sense, however, the conception of the ego is still further narrowed down to the individual consciousness as opposed to all that is outside it, i.e. can be its object. This conception of the self belongs mainly to metaphysics and involves the whole problem of the relation between subject and object, the nature of reality, and the possibility of knowledge of self and of object. The ordinary idea of the self as a physical entity, obviously separate from others, takes no account of the problem as to how and in what sense the individual is conscious of himself; what is the relation between subject and object in the phenomenon of self-conscious- ness, in which the mind reflects upon itself both past and present ? The mind is in this case both subject and object, or, as William James puts it, both " I " and " me." The phenomenon has been described in various ways by different thinkers. Thus Kant distinguished the two selves as rational and empirical, just as he distinguished the two egos as the noumenal or real and the phenomenal from the metaphysical standpoint. A similar distinction is made by Herbart. Others have held that the self has a complex content, the subject self being, as it were, a fuller expression of the object-self (so Bradley) ; or again the subject self is the active content of the mind, and the object self the passive content which for the moment is exciting the attention. The most satisfactory and also the most general view is that consciousness is complex and unanalysable.

The relation of the self to the not-self need not to be treated here (see Metaphysics). It may, however, be pointed out that in so far as an object is cognized by the mind, it becomes in a sense part of the complex self-content. In this sense the individual is in himself his own universe, his whole existence being, in other words, the sum total of his psychic relations, and nothing else being for him in existence at all. A similar idea is prominent in many philosophico-religious systems wherein the idea of God or the Infinite is, as it were, the union of the ego and the non-ego, of subject and object. The self of man is regarded as having limitations, whereas the Godhead is infinite and all-inclusive. In many mystical Oriental religions the perfection of the human self is absorption in the infinite, as a ripple dies away on

the surface of water. The problems of the self may be summed up as follows. The psychologist investigates the ideal construction of the self, i.e. the way in which the conception of the self arises, the different aspects or contents of the self and the relation of

the subject to the object self. At this point the epistemologist takes up the question of empirical knowledge and considers the kind of validity, if any, which it can possess. What existence has the known object for the knowing subject ? The result of this inquiry is generally intellectual scepticism in a greater or less degree, namely, that the object has no existence for the knower except a relative one, i.e. in so far as it is ” known ” (see Relativity of Knowledge). Finally the metaphysician, and in another sphere the theologian, consider the nature of the pure or transcendental self apart from its relations, i.e. the absolute self.

In ethics, egoistic doctrines disregard the ultimate problems of selfhood, and assume the self to consist of a man’s person and those things in which he is or ought to be directly interested. The general statement that such doctrines refer all moral action to criteria of the individual’s happiness, preservation, moral per- fection, raises an obvious difficulty. Egoism merely asserts that the self is all-important in the application of moral principles, and does not in any way supply the material of these principles. It is a purely formal direction, and as such merely an adjunct to a substantive ethical criterion. A practical theory of ethics seeks to establish a particular moral ideal; if it is an absolute criterion, then the altruist would place first the attainment of that ideal by others, while the egoist would seek it for himself. The same is true of ethical theories which may be described as material. Of the second type are those, e.g. of Hobbes and Spinoza, which advocate self-preservation as the ideal, as con- trasted with modern evolutionist moralists who advocate race- preservation. Again, we may contrast the early Greek hedonists, who bade each man seek the greatest happiness (of whatever kind), with modern utilitarian and social hedonists, who prefer the greatest good or the greatest happiness of the greatest number. It is with hedonistic and other empirical theories that egoism is generally associated. As a matter of fact, however, egoism has been no less prominent in intuitional ethics. Thus the man who seeks only or primarily his own moral perfection is an egoist par

excellence. Such are ascetics, hermits and the like, whose whole object is the realization of their highest selves.

The distinction of egoistical and altruistic action is further complicated by two facts. In the first place, many systems combine the two. Thus Christian ethics may be said to insist equally on duty to self and duty to others, while crudely egoistic systems become unworkable if a man renders himself obnoxious to his fellows. On the other hand, every deliberate action based on an avowedly altruistic principle necessarily has a reference to the agent; if it is right that A should do a certain action for the benefit of B, then it tends to the moral self-realization of A that he should do it. Upon whatsoever principle the Tightness of an action depends, its performance is right for the agent. The self- reference is inevitable in every action in so far as it is regarded as voluntary and chosen as being of a particular moral quality.

It is this latter fact which has led many students of human character to state that men do in fact aim at the gratification of their personal desires and impulses. The laws of the state and the various rules of conduct laid down by religion or morality are merely devices adopted for general convenience. The most remarkable statement of this point of view is that of Friedrich Nietzsche, who went so far as to denounce all forms of self-denial as cowardice: — let every one who is strong seek to make himself dominant at the expense of the weak.

EGORIEVSK, a town of Russia, in the government of Ryazan, 70 m. by rail E.S.E. of Moscow, by a branch line (15 m.) connect- ing with the Moscow to Ryazan main line. The cotton mills and other factories give occupation to 6000 persons. Egorievsk has important fairs for grain, hides, &c, which are exported. Pop. (1897) 23,932.

EGREMONT, EARLS OF. In 1749 Algernon Seymour, 7th duke of Somerset, was created earl of Egremont, and on his childless death in February 1750 this title passed by special remainder to his nephew, Sir Charles Wyndham or Windham, Bart. (1710-1763), a son of Sir William Wyndham of Orchard

Wyndham, Somerset. Charles, who had succeeded to his father’s baronetcy in 1740, inherited Somerset’s estates in Cumberland and Sussex. Jle was a member of parliament from 1734 to 1750, and in October 1761 he was appointed secretary of state for the southern department in succession to William Pitt. His term of office, during which he acted in concert with his brother-in-law, George Grenville, was mainly occupied with the declaration of war on Spain and with

the negotiations for peace with France and Spain, a peace the terms of which the earl seems to have disliked. He was also to the fore during the proceedings against Wilkes, and he died on the 21st of August 1763. Horace Walpole perhaps rates Egremont's talents too low when he says he " had neither knowledge of business, nor the smallest share of parliamentary abilities."

The 2nd earl's son and successor, George O'Brien Wyndham (1751-1837), was more famous as a patron of art and an agricul- turist than as a politician, although he was not entirely indifferent to politics. For some time the painter Turner lived at his Sussex residence, Petworth House, and in addition to Turner, the painter Leslie, the sculptor Flaxman and other talented artists received commissions from Egremont, who filled his house with valuable works of art. Generous and hospitable, blunt and eccentric, the earl was in his day a very prominent figure in English society. Charles Greville says, " he was immensely rich and his munificence was equal to his wealth "; and again that in his time Petworth was " like a great inn." The earl died un- married on the nth of November 1837, and on the death of his nephew and successor, George Francis Wyndham, the 4th earl (1785-1845), the earldom of Egremont became extinct. Petworth, however, and the large estates had already passed to George Wyndham (1 787-1869), a natural son of the 3rd earl, who was created Baron Leconfield in 1859.

EGREMONT, a market town in the Egremont parliamentary division of Cumberland, England, 5 m. S.S.E. of Whitehaven, on a joint line of the London & North Western and Furness railways. Pop. of urban district (1901) 5761. It is pleasantly situated in the valley of the Ehen. Ruins of a castle command the town from an eminence. It was founded c. n 20 by William de Meschines; it is moated, and retains a Norman doorway and some of the original masonry, as well as fragments of later date. The church of St Mary is a modern reconstruction em- bodying some of the Norman features of the old church. Iron ore and limestone are raised in the neighbourhood.

It seems impossible to find any history for Egremont until after the Norman Conquest, when Henry I. gave the barony of Coupland to William de Meschines, who erected a castle at Egremont around which the town grew into importance. The barony afterwards passed by marriage to the families of Lucy and Multon, and finally came to the Percys, earls of Northumber- land, from whom are descended the present lords of the manor of Egremont, The earliest evidence that Egremont was a borough occurs in a charter, granted by Richard de Lucy in the reign of King John, which gave the burgesses right to

choose their reeve, and set out the customs owing to the lord of the manor, among which was that, of providing twelve armed men at his castle in the time of war. The borough was represented by two members in the parliament of 1 295, but in the following year was disfranchised, on the petition of the burgesses, on account of the expense of sending members. In 1267 Henry III. granted Thomas de Multon a market every Wednesday at Egremont, and a fair every year on the eve, day and morrow of the Nativity of the Virgin Mary. In the Quo Warranto rolls he is found to have claimed by prescription another weekly market on Saturday. The market rights were purchased from Lord Leconfield in 1885, and the market on Saturday is still held. Richard de Lucy's charter shows that dyeing, weaving and fulling were carried on in the town in his time.

EGRESS (Lat. egressus, going out), in astronomy, the end of the apparent transit of a small body over the disk of a larger one; especially of a transit of a satellite of Jupiter over the disk of that planet. It designates the moment at which the smaller body is seen to leave the limb of the other.

MODERN: GEOGRAPHY]

EGYPT

21

EGYPT, a country forming the N.E. extremity of Africa. 1 In the following account a division is made into (I.) Modem Egypt, and (II.) Ancient Egypt; but the history from the earliest times is given as a separate section (III.).

Section I. includes Geography, Economics, Government, Inhabi- tants, Finance and Army. Section II. is subdivided into: — (A) Exploration and Research; (B) The Country in Ancient Times; (C) Religion; (D) Language and Writing; (E) Art and Archae- ology; (F) Chronology. Section III. is divided into three main periods: — (i) Ancient History; (2) the Mahommedan Period; (3) Modern History (from Mehemet Ali).

I. Modern Egypt

Boundaries and Areas. — Egypt is bounded N. by the Mediter- ranean, S. by the Anglo-Egyptian Sudan, N.E. by Palestine, E. by the Red Sea, W. by Tripoli and the Sahara. The western frontier is ill-defined. The boundary line between Tripoli and Egypt is usually taken to start from a point in the Gulf of Solium and to run S. by E. so as to leave the oasis of Siwa to Egypt. South of Siwa the frontier, according to the

Turkish firman of 1841, bends eastward, approaching the cultivated Nile-land near Wadi Haifa, i.e. the southern frontier. This southern frontier is fixed by agreement between Great Britain and Egypt at the 22 N. The N.E. frontier is an almost direct line drawn from Taba, near the head of the Gulf of Akaba, the eastern of the two gulfs into which the Red Sea divides, to the Mediterranean at Rafa in 34 15′ E. The peninsula of Sinai, geographically part of Asia, is thus included in the Egyptian dominions. The total area of the country is about 400,000 sq. m., or more than three times the size of the British Isles. Of this area rfths is desert. Canals, roads, date plantations, &c, cover 1900 sq. m.; 2850 sq. m. are comprised in the surface of the Nile, marshes, lakes, &c. A line corresponding with the 30 N., drawn just S. of Cairo, divides the country into Lower and Upper Egypt, natural designations in common use, Lower Egypt being the Delta and Upper Egypt the Nile valley. By the Arabs Lower Egypt is called Er-Rif , the cultivated or fertile ; Upper Egypt Es Sa'id, the happy or fortunate. Another division of the country is into Lower, Middle and Upper Egypt, Middle Egypt in this classification being the district between Cairo and Assiut.

General Character. — The distinguishing features of Egypt are the Nile and the desert. But for the river there would be nothing to differentiate the country from other parts of the Sahara. The Nile, however, has transformed the land through which it passes. Piercing the desert, and at its annual overflow depositing rich sediment brought from the Abyssinian highlands, the river has created the Delta and the fertile strip in Upper Egypt. This cultivable land is Egypt proper ; to it alone is applicable the ancient name — " the black land." The Misr of the Arabs is restricted to the same territory. Beyond the Nile valley east and west stretch great deserts, containing here and there fertile oases. The general appearance of the country is remarkably uniform. The Delta is a level plain, richly cultivated, and varied alone by the lofty dark-brown mounds of ancient cities, and the villages set in groves of palm-trees, standing on mounds often, if not always, ancient. Groves of palm-trees are occasionally seen besides those around the villages, but other trees are rare. In Upper Egypt the Nile valley is very narrow and is bounded by mountains of no great height. They form the edge of the desert on either side of the valley, of which the bottom is level rock. The mountains rarely take the form of peaks. Sometimes they approach the river in bold promontories, and at others are divided by the dry beds of ancient water- courses. The bright green of the fields, the reddish-brown or dull green of the great river, contrasting with the bare yellow rocks, seen beneath a brilliant sun and a deep-blue sky, present views of great beauty. In form the landscape varies little and is not remarkable; in colour its qualities are

always splendid, and under a general uniformity show a continual variety.

1 By the Greek and Roman geographers Egypt was usually assigned to Libya (Africa), but by some early writers the Nile was thought to mark the division between Libya and Asia. The name occurs in Homer as Myvirros, but is of doubtful origin.

The Coast Region. — Egypt has a coast-line of over 600 m. on the Mediterranean and about 1200 m. on the Red Sea. The Mediterranean coast extends from the Gulf of Solium on the west to Rafa on the east. From the gulf to the beginning of the Delta the coast is rock-bound, but slightly indented, and possesses no good harbourage. The cliffs attain in places a height of 1000 ft. They are the ter- mination of a stony plateau, containing several small oases, which southward joins the more arid and uninhabitable wastes of the Libyan Desert. The Delta coast-line, composed of sandhills and, occasionally, limestone rocks, is low, with cape-like projections at the Nile mouths formed by the river silt. Two bays are thus formed, the western being the famous Bay of Aboukir. It is bounded W. by a point near the ancient Canopic mouth, eastward by the Rosetta mouth. Beyond the Delta eastward the coast is again barren and without harbours. It rises gradually southward, merging into the plateau of the Sinai peninsula. The Red Sea coast is everywhere mountainous. The mountains are the northern continuation of the Abyssinian table-land, and some of the peaks are over 6000 ft. above the sea. The highest peaks, going from north to south, are Jebels Gharib, Dukhan, Es Shayib, Fatira, Abu Tiur, Zubara and Ham- mada (Hamata). The coast has a general N.N.W. and S.S.E. trend, and, save for the two gulfs into which it is divided by the massif of Sinai, is not deeply indented. Where the frontier between Egypt and the Sudan reaches the sea is Ras Elba (see further Fed Sea).

The Nile Valley (see also Nile). — Entering Egypt proper, a little north of the Second Cataract, the Nile flows through a valley in sandstone beds of Cretaceous age as far as 25° N., and throughout this part of its course the valley is extremely narrow, rarely exceed- ing 2 m. in width. At two points, namely, Kalabsha — the valley here being only 170 yds. wide and the river over 100 ft. deep- — and Assuan (First Cataract), the course of the river is interrupted by outcrops of granites and other crystalline rocks, which have been uncovered by the erosion of the overlying sandstone, and to-day form the mass of islands, with numerous small rapids, which are described not very accurately as cataracts ; no good evidence exists in support of the view that they are the remains of a massive barrier, broken down and carried away by some sudden convulsion. From 25 N. northwards for 518 m. the valley

is of the ” rift-valley ” type, a level depression in a limestone plateau, enclosed usually by steep cliffs, except where the tributary valleys drained into the main valley in early times, when there was a larger rainfall, and now carry off the occasional rainstorms that burst on the desert. The cliffs are highest between Esna and Kena, where they reach 1800 ft. above sea-level. The average width of the cultivated land is about 10 m., of which the greater part lies on the left (western) bank of the river; and outside this is a belt, varying from a few hundred yards to 3 or 4 m., of stony and sandy ground, reaching up to the foot of the limestone cliffs, which rise in places to as much as 1000 ft. above the valley. This continues as far as 29 N., after which the hills that close in the valley become lower, and the higher plateaus lie at a distance of 10 or 15 m. back in the desert.

The Fayum. — The fertile province of the Fayum, west of the Nile and separated from it by some 6 m. of desert, seems to owe its exist- ence to movements similar to those which determined the valley itself. Lying in a basin sloping in a series of terraces from an altitude of 65 ft. above sea-level in the east to about 140 ft. below sea-level on the north-west, at the margin of the Birket-el-Kerun, this pro- vince is wholly irrigated by a canalized channel, the Bahr Yusuf, which, leaving the Nile at Derut esh Sherif in Upper Egypt, follows the western margin of the cultivation in the Nile valley, and at length enters the Fayum through a gap in the desert hills by the Xllth Dynasty pyramids of Lahun and Hawara (see Fayum).

The Delta. — About 30 N., where the city of Cairo stands, the hills which have hitherto run parallel with the Nile turn W.N.W. and E.N.E., and the triangular area between them is wholly deltaic. The Delta measures 100 m. from S. to N., having a width of 155 m. on the shore of the Mediterranean between Alexandria on the west and Port Said on the east. The low sandy shore of the Delta, slowly increasing by the annual deposit of silt by the river, is mostly a barren area of sand-hills and salty waste land. This is the region of the lagoons and marshes immediately behind the coast-line. Southwards the quality of the soil rapidly improves, and becomes the most fertile part of Egypt. This area is watered by the Damietta and the Rosetta branches of the Nile, and by a network of canals. The soil of the Delta is a dark grey fine sandy soil, becoming at times almost a stiff clay by reason of the fineness of its particles, which consist almost wholly of extremely small grains of quartz with a few other minerals, and often numerous flakes of mica. This deposit varies in thickness, as a rule, from 55 to 70 ft., at which depth it is underlain by a series of coarse and fine yellow quartz sands, with occasional pebbles, or even banks of gravel, while here and there thin beds of clay occur. These sand-beds are

sharply distinguished by their colour from the overlying Nile deposit, and are of considerable thickness. A boring made in 1886 for the Royal Society at Zagazig attained a depth of 375 ft. without reaching rock, and another, subsequently sunk near Lake Aboukir (close to Alexandria), reached a depth of 405 ft. with the same result. Numerous other borings to depths of 100 to 200 ft. have given similar results, showing the Nile deposit to rest generally on these yellow sands, which provide a constant though not a very large supply of good water; near the

northern limits of the Delta this cannot, however, be depended on, since the well water at these depths has proved on several occasions to be salt. The surface of the Delta is a wide alluvial plain sloping gently towards the sea, and having an altitude of 29 ft. above it at its southern extremity. Its limits east and west are determined bv the higher ground of the deserts, to which the silt-laden waters of the Nile in flood time cannot reach. This silt consists largely of alumina (about 48) and calcium carbonate (18) with smaller quantities of silica, oxide of iron and carbon. Although the Nile water is abundantly charged with alluvium, the annual deposit bv the river, except under extraordinary circumstances, is smaller than might be supposed. The mean ordinary rate of the increase of the soil of Egypt is calculated as about 4i in. in a century.

lhe Lakes— The lagoons or lakes of the Delta, going from west to east, are Mareotis (Manut), Edku, Burlus and Menzala. The land separating them from the Mediterranean is nowhere more than 10 m. wide. East of the Damietta mouth of the Nile this strip is in places not more than 200 yds. broad. All the lakes are shallow and the water in them salt or brackish. Mareotis, which bounds Alexandria on the south side, varies considerably in area according to the rise or fall of the Nile ; when the Nile is low there is a wide expanse of marsh, when at its highest the lake covers about 100 sq. m. In ancient times Mareotis was navigable and was joined by various canals to the Nile. The coun- try around was culti- vated and produced the famous Mareotic wine. The canals being neg- lected, the lake de- creased in size, though it was still of consider- able area in the 15th and 16th centuries, and was then noted for the value of its fisheries. When the French army occupied Egypt in 1798, Mareotis was found to be largely a sandy plain. In April 1801 the British army besieging Alexan- dria cut through the land between Aboukir and the lake, admitting the waters of the sea into the ancient

bed of Mareotis and laying under water a large area then in cultivation. This precedent

[MODERN : GEOGRAPHY

Z RHH h™ fs ed ‘ ˆ by th e Turks in 1803 and a second time by the British in 1807. Mareotis has no outlet, and the water is kept lfft\ M *T m Y i n y meai F 0f P° werful P u mps which neutralize the fit i ˆe Nile flood A western arm has been cut off from the

fj? 7 t a ˆ ke ‘ and ln – thls arm a thick crust °f salt is formed each year after the evaporation of the flood water. Near the shores of the

M* JT- k ei ˆ g !”° W •’,”, r r ich , Profusion. Like all the Delta lakes, Mareotis abounds in wild-fowl. North-east of Mareotis was Lake P»=, U ˆf r Vt Sraa “. sheet ° f wate r, now dry, lying S.W. of Aboukir Bay. h-ast ot this reclaimed marsh and reaching to within 4 m. of the Rosetta branch of the Nile, lies Edku, 22 m. long and in places 16 n? (+ P W Nn a ” °r n ll S ‘ ? u PP° sed to be the ancient Canopic mouth

o thP R« V nt °i. b °l lklr J Bay – Burlus b ‘ e S ins a Httle eastward ot the Kosetta channel, and stretches bow-shaped for 64 m. Its

SSv m« h i S ab °f l6 , m – Ad J oi »ing ; t S.E. is an expanse of sandy marsh. Several canals or canalized channels enter the lake.

ffi*ˆM 5v POt Where ˆ- he Bahr – mit Yezir enters is an opening the anriˆS h erran v n u Cai ?’ and °P enin S indicate the course of ™tˆM Sebennytic branch of the Nile. Burlus is noted for its

thnˆP “ˆ4? ‘ W ,- h i! Cl L at T ye low within and come int o season after those grown on the banks of the Nile

nJrX greatl T y exceeds the other D ˆta lakes in size, covering the NnttnPˆl’Q -!i eXt f nds f r om Y er y “ear the Damietta branch of which were nn? aid h t re ? e . lves t he waters of the canalized channels The nJtlil u e ˆ e Tanm c, Mendesian and Pelusiac branches, strfn ofl.nT 6 1S s t p \ rated from the sea by an extremely narrow the Ufa full a if OSS . W 1Gh ‘ when T the Mediterranean is stormy and the lake full, the waters meet. Its average length is about 40 m

of the o a w a . g t bread 5 h about IS, The depth is greater than that It contˆinf, f 6S ‘ and f he W ˆ7 is J salt ‘ thou gh mixed with fresh. It contains a large number of islands, and the whole lake abounds in reeds of various kinds. Of the islands Tennis (anciently Tennesus)

contains ruins of the Roman period. The lake supports a consider- able population of fishermen, who dwell in villages on the shore and islands and live upon the fish of the lake. Thl reeds are cove, for waterfowl of various kinds, which the traveller see ?n great numbers and w.ld boars are found in the marshes to the south. TheSuez

Ufa Th S J n a fTˆT for 20 , m – alon S the eastern edge of the lake. That part of the lake east of where the canal was elcavated » now marshy plain and the Tanitic and Pelusiac mouths of he Nile are dry. East : of Menzala is the site of Serbonis, another dried! In he\7h h ha f d Q he gener f 1 characteristics of the Delta Ugoons. rUp • T ■ t mUS – CZ arC La ¥ Timsa and the Great and Little

Bitter Lakes, occupying part of the ancient bed of the Red Sea All three were dry or marshy depressions previously to the cuttfng of the Suez Canal at which time the waters of the Mediterranean and Red Sea were let into them (see Suez Canal) meaiterranean A chain of natron lakes (seven in number) lies in a vallev in the western desert, 70 to 90 m. W.N.W. of Cairo. In the Favum orovince farther south is the Birket-el-Kerun, a lake, lying below tˆeTvel of theNile, some 30 m. long and 5 wide at its broadest part Rerun

, is all that is left of the Lake of Moeris, an ancient artificial sheet of water which played an important part in the irrigation schemes of the Pharaohs. The water of el-Kerun is brackish, though de- rived from the Nile, which has at all seasons a much higher level. It is bounded on the north by the Libyan Desert, above which rises a bold range of mountains ; and it has a strange and pic- turesque wildness. Near the lake are several sites of ancient towns, and the temple called Kasr-Karun, dating from Roman times, distin- guishes the most im- portant of these. South-west of the Fayum is the Wadi Rayan, a large and deep depression, utiliz- able in modern schemes for re-creating the Lake of Moeris (q.v.).

The Desert Plateaus. — From the southern borders of Egypt to the Delta in the north, the desert plateaus ex- tend on either side of the Nile valley. The the Red Sea, varies in

EnuryWalfccr sc

Nile and

wldthToToo tHf n the .”—”« -e *ea sea, varies in

the ArabUn 9 neˆr, 35 T™- anC l ” kn °ˆ” l n its northe ™ P a « as tne Arabian Desert. The western region has no natural barrier

east™n n e2e n i r , dS ° f T^” ‘* ^ ° f the vast Saha ^’ On it InT^tr-‘u few -, m ‘les west of Cairo, stand the great pyramids

Desert Inl!’ ^ ^ ? f AsSUan k is ca « ed theLibyan Uesert. _ In the north the desert plateaus are comparatively low, but from Cairo southwards they rise to 1000 and even 1500 ft. above sea- level. Formed mostly of horizontal strata of varying hardnesJ thev present a series of terraces of minor plateaus, rising one above the

«o?L an iTu Se T d t ! y – Sma1 – 1 ravine * worn b V the occasional^! storms which burst in their neighbourhood. The weatherine of this desert area is probably fairly rapid, and the agents at work are nlX 1P fl a n^h he rai?ld heating and’ cooling of therocks by day and thlse aided hvth Ve aCt ‘° n ° f ^-laden wind on the softer kyers; these, aided by the occasional rain, are ceaselessly at work, and CM uohv ^11^7 Ve f? ea ” s : d °tted with small isolated hill and thus Forming 17/ ^ &d . ls \ whlch occasionally become deep ravines, thk if I™! K g 6 P” ncl P al ^Pe °f scenery of these deserts. From this it will be seen that the desert in Egypt is mainly a rock desert

of which hf rfa h Ce 1S £0n ?^ ° f dis [nt egrated rock, the finer P artcTe ot which have been carried away by the wind; and east of the Nile

of mo„nl mpSt e f)T vdy th£ C , aS f- Here the desert meets the line L m i ?u Whlch run , s paral,el to the Red Sea and the Gulf of latfnn, Ih.Vlf WeSt6rn S*’ h . owev er, those large sand accumu- lations which are usually associated with a desert are met with.

he In XY S ‘V” 63 ° f f du ? 6S f0rm ^ d of rounded S rains of quartz, and hrearU L ,- eCtl °V f ^ P r< ? va!e "t wind, usually being of mall as th a Mvfnf< m ^f red 7A t . h ^T length; but in certain ar eas, such fines of H,fn g P T- and W ',? f , th e oases of Farafra and Dakhla these ™°„ d "' ^'"g P ara 'lel to each other and about half a mile apart, cover immense areas, rendering them absolutely impassable

MODERN: CLIMATE]

EGYPT

23

except in a direction parallel to the lines themselves. East of the oases of Baharia and Farafra is a very striking line of these sand dunes; rarely more than 3 miles wide, it extends almost continu- ously from Moghara in the north, passing along the west side of Kharga Oasis to a

point near the Nile in the neighbourhood of Abu Simbel — having thus a length of nearly 550 m. In the northern part of this desert the dunes lie about N.W.-S.E., but farther south incline more towards the meridian, becoming at last very nearly north and south.

Oases. — In the western desert lie the five large oases of Egypt, namely, Siwa, Baharia, Farafra, Dakhla and Kharga or Great Oasis, occupying depressions in the plateau or, in the case of the last three, large indentations in the face of limestone escarpments which form the western versant of the Nile valley hills. Their fertility is due to a plentiful supply of water furnished by a sandstone bed 300 to 500 ft. below the surface, whence the water rises through natural fissures or artificial boreholes to the surface, and sometimes to several feet above it. These oases were known and occupied by the Egyptians as early as 1600 B.C., and Kharga (q.v.) rose to special importance at the time of the Persian occupation. Here, near the town of Kharga, the ancient Hebi, is a temple of Ammon built by Darius I., and in the same oasis are other ruins of the period of the Ptolemies and Caesars. The oasis of Siwa (Jupiter Ammon) is about 150 m. S. of the Mediterranean at the Gulf of Solium and about 300 m. W. of the Nile (see Siwa). The other four oases lie parallel to and distant 100 to 150 m. from the Nile, between 25° and 29° N., Baharia being the most northerly and Kharga the most southerly.

Besides the oases the desert is remarkable for two other valleys. The first is that of the natron lakes already mentioned. It contains four monasteries, the remains of the famous anchorite settlement of Nitriae. South of the Wadi Natron, and parallel to it, is a sterile valley called the Bahr-bela-Ma, or ” River without Water.”

The Sinai Peninsula. — The triangular-shaped Sinai peninsula has its base on the Mediterranean, the northern part being an arid plateau, the desert of Tih. The apex is occupied by a massif of crys- talline rocks. The principal peaks rise over 8500 ft. Owing to the slight rainfall, and the rapid weathering of the rocks by the great range of temperature, these hills rise steeply from the valleys at their feet as almost bare rock, supporting hardly any vegetation. In some of the valleys wells or rock-pools filled by rain occur, and furnish drinking-water to the few Arabs who wander in these hills (see also Sinai).

[Geology. — Just as the Nile valley forms the chief geographical feature of Egypt, so the geology of the country is intimately related to it. The north and south direction of the river has been largely determined by faults, though the geologists of the Egyptian Survey are finding that the influence of faulting in determining physical outline

has, in some cases, been overestimated. The oldest rocks, consisting of crystalline schists with numerous intrusions of granite, porphyry and diorite, occupy the eastern portion of the country between the Nile south of Assuan and the Red Sea. The intrusive rocks predominate over the schists in extent of area covered. They furnished the chief material for the ancient monuments. At Assuan (Syene) the well-known syenite of Werner occurs. It is, however, a hornblende granite and does not possess the mineralogical com- position of the syenites of modern petrology. Between Thebes and Khartum the western banks of the Nile are composed of Nubian Sandstone, which extends westward from the river to the edge of the great Libyan Desert, where it forms the bed rock. The age of this sandstone has given rise to much dispute. The upper part certainly belongs to the Cretaceous formation ; the lower part has been con- sidered to be of Karroo age by some geologists, while others regard the whole formation to be of Cretaceous age. In the Kharga Oasis the upper portion consists of variously coloured unfossiliferous clays with intercalated bands of sandstone containing fossil silicified woods (Nicolia Aegyptiaca and Araucarioxylon Aegypticum) . They are Conformably overlain by clays and limestones with Exogyra Overwegi belonging to the Lower Danian, and these by clays and white chalk with Ananchytes ovata of the Upper Danian. In many instances the Tertiary formation, which occurs between Esna and Cairo, unconformably overlies the Cretaceous, the Lower Eocene being absent. The fluvio-marine deposits of the Upper Eocene and Oligocene formations contain an interesting mammalian fauna, proving that the African continent formed a centre of radiation for the mammalia in early Tertiary times. Arsinoitherium is the pre- cursor of the homed Ungulata; while Moeritherium and Palaeo- rnastodon undoubtedly include the oldest known elephants. Miocene strata are absent in the southern Tertiary areas, but are present at Moghara and in the north. Marine Pliocene strata occur to the south of the pyramids of Giza and in the Fayum province, where, in addition, some gravel terraces, at a height of 500 ft. above sea-level, are attributed to the Pliocene period. The Lake of Moeris, as a large body of fresh water, appears to have come into existence in Pleisto- cene times. It is represented now by the brackish-water lake of the Birket-el-Kerun. The superficial sands of the deserts and the Nile mud form the chief recent formations. The Nile deposits its inud over the valley before reaching the sea, and consequently the Delta receives little additional material. At Memphis the alluvial deposits are over 50 ft. thick. The superficial sands of the desert region, derived in large part from the disintegration of the Nubian

Sandstone, occupy the most extensive areas in the Libyan Desert. The

other desert regions of Egypt are elevated stony plateaus, which are diversified by extensively excavated valleys and oases, and in which sand frequently plays quite a subordinate part. These regions present magnificent examples of dry erosion by wind-borne sand, which acts as a powerful sand blast etching away the rocks and producing most beautiful sculpturing. The rate of denudation in exposed positions is exceedingly rapid ; while spots sheltered from the sand blast suffer a minimum of erosion, as shown by the preser- vation of ancient inscriptions. Many of the Egyptian rocks in the desert areas and at the cataracts are coated with a highly polished film, of almost microscopic thinness, consisting chiefly of oxides of iron and manganese with salts of magnesia and lime. It is supposed to be due to a chemical change within the rock and not to deposition on the surface.]

Minerals. — Egypt possesses considerable mineral wealth. In ancient times gold and precious stones were mined in the Red Sea hills. During the Moslem period mining was abandoned, and it was not until the beginning of the 20th century that renewed efforts were made to develop the mining industry. The salt obtained from Lake Mareotis at Meks, a western suburb of Alexandria, supplies the salt needed for the country, except a small quantity used for curing fish at Lake Menzala; while the lakes in the Wadi Natron, 45 m. N.W. of the pyramids of Giza, furnish carbonate of soda in large quantities. Alum is found in the western oases. Nitrates and phos- phates are also found in various parts of the desert and are used as manures. The turquoise mines of Sinai, in the Wadi Maghara, are worked regularly by the Arabs of the peninsula, who sell the stones in Suez ; while there are emerald mines at Jebel Zubara, south of Kosseir. Petroleum occurs at Jebel Zeit, on the west shore of the Gulf of Suez. Considerable veins of haematite of good quality occur both in the Red Sea hills and in Sinai. At Jebel ed-Dukhan are porphyry quarries, extensively worked under the Romans, and at Jebel el-Fatira are granite quarries. At El-Hammamat, on the old way from Coptos to Philoteras Portus, are the breccia verde quarries, worked from very early times, and having interesting hieroglyphic inscriptions. At the various mines, and on the routes to them and to the Red Sea, are some small temples and stations, ranging from the Pharaonic to the Roman period. The quarries of Syene (Assuan) are famous for extremely hard and durable red granite (syenite), and have been worked since the days of the earliest Pharaohs. Large quantities of this syenite were used in building the Assuan dam (1898-1902). The cliffs bordering the Nile are largely quarried for limestone and sandstone.

Gold-mining recommenced in 1905 at Um Rus, a short distance inland from the Red Sea and some 50 m. S. of Kosseir, where milling

operations were started in March of that year. Another mine opened in 1905 was that of Um Garaiat, E.N.E. of Korosko, and 65 m. distant from the Nile.

Climate. — Part of Upper Egypt is within the tropics, but the greater part of the country is north of the Tropic of Cancer. Except a narrow belt on the north along the Mediterranean shore, Egypt lies in an almost rainless area, where the temperature is high by day and sinks quickly at night in consequence of the rapid radiation under the cloudless sky. The mean temperature at Alexandria and Port Said varies between 57 F. in January and 81 ° F. in July; while at Cairo, where the proximity of the desert begins to be felt, it is 53 ° F. in January, rising to 84 F. in July. January is the coldest month, when occasionally in the Nile valley, and more frequently in the open desert, the temperature sinks to 32 F., or even a degree or two below. The mean maximum temperatures are 99 F. for Alexandria and 1 io° F. for Cairo. Farther south the range of temperature becomes greater as pure desert conditions are reached. Thus at Assuan the mean maximum is Il8° F., the mean minimum 42 ° F. At Wadi Haifa the figures in each case are one degree lower.

The relative humidity varies greatly. At Assuan the mean value for the year is only 38 %, that for the summer being 29 %, and for the winter 51 ; while for Wadi Haifa the mean is 32, and 20% and 42% are the mean values for summer and winter re- spectively. A white fog, dense and cold, sometimes rises from the Nile in the morning, but it is of short duration and rare occurrence. In Alexandria and on all the Mediterranean coast of Egypt rain falls abundantly in the winter months, amounting to 8 in. in the year; but southwards it rapidly decreases, and south of 31 ° N. little rain falls.

Records at Cairo show that the rainfall is very irregular, and is furnished by occasional storms rather than by any regular rainy season; still, most falls in the winter months, especially December and January, while, on the other hand, none has been recorded in June and July. The average annual rainfall does not exceed 1-50 in. In the open desert rain falls even more rarely, but it is by no means Unknown, and from time to time heavy storms burst, causing sudden floods in the narrow ravines, and drowning both men and animals These are more common in the mountainous region of the Sinai peninsula, where they are much dreaded by the Arabs. Snow is unknown Li the Nile valley, but on the mountains of Sinai and the Red Sea hills it is not uncommon, and a temperature of 18° F. at an altitude of 2000 ft. has been recorded in January.

The atmospheric pressure varies between a maximum in January and a minimum in July, the mean difference being about 029 in.

In a series of records extending over 14 years the mean pressure varied between 29-84 and 29-90 in.

The most striking meteorological factor in Egypt is the persistence of the north wind throughout the year, without which the climate would be very trying. It is this ” Etesian ” wind which enables sailing boats constantly to ascend the Nile, against its strong and rapid current. In December, January and February, at Cairo, the north wind slightly predominates, though those from the south and west often nearly equal it, but after this the north blows almost continuously for the rest of the year. In May and June the prevailing direction is north and north-north-east, and for July, August, September and October north and north-west. From the few observations that exist, it seems that farther south the southern winter winds decrease rapidly, becoming westerly, until at Assuan and Wadi Haifa the northerly winds are almost invariable through- out the year. The khamsin, hot sand-laden winds of the spring months, come invariably from the south. They are preceded by a rapid fall of the barometer for about a day, until a gradient from south to north is formed, then the wind commences to blow, at first gently, from the south-east; rapidly increasing in violence, it shifts through south to south-west, finally dropping about sunset. The same thing is repeated on the second and sometimes the third day, by which time the wind has worked round to the north again. During a khamsin the temperature is high and the air extremely dry, while the dust and sand carried by the wind form a thick yellow fog obscuring the sun. Another remarkable phenomenon is the zobaa, a lofty whirlwind of sand resembling a pillar, which moves with great velocity. The southern winds of the summer months which occur in the low latitudes north of the equator are not felt much north of Khartum.

One of the most interesting phenomena of Egypt is the mirage, which is frequently seen both in the desert and in the waste tracts of uncultivated land near the Mediterranean ; and it is often so truthful in its appearance that one finds it difficult to admit the illusion.

Flora. — Egypt possesses neither forests nor woods and, as practically the whole of the country which will support vegetation is devoted to agriculture, the flora is limited. The most important tree is the date-palm, which grows all over Egypt and in the oases. The lower branches being regularly cut, this tree grows high and assumes a much more elegant form than in its natural state. The dom-palm is first seen a little north of 26° N., and extends south- wards. The vine grows well, and in ancient times was largely cultivated for wine; oranges, lemons and pomegranates also abound. Mulberry trees are common in Lower Egypt. The sunt tree {Acacia nilotica) grows everywhere, as well as the tamarisk and the sycamore. In the deserts halfa grass and several kinds of thorn bushes grow; and wherever rain or springs have moistened the ground, numerous wild flowers thrive. This is especially the case where there is also shade to protect them from the midday sun, as in some of the narrow ravines in the eastern desert and in the palm groves of the oases, where various ferns and flowers grow luxuriantly round the springs. Among many trees which have been imported, the ” lebbek ” {Albizzia lebbek), a thick-foliaged mimosa, thrives especially, and has been very largely employed. The weeping-willow, myrtle, elm, cypress and eucalyptus are also used in the gardens and plantations.

The most common of the fruits are dates, of which there are nearly thirty varieties, which are sold half-ripe, ripe, dried, and pressed in their fresh moist state in mats or skins. The pressed dates of Siwa are among the most esteemed. The Fayum is celebrated for its grapes, and chiefly supplies the market of Cairo. The most common grape is white, of which there is a small kind far superior to the ordinary sort. The black grapes are large, but comparatively tasteless. The vines are trailed on trelliswork, and form agreeable avenues in the gardens of Cairo. The best-known fruits, besides dates and grapes, are figs, sycamore-figs and pomegranates, apricots and peaches, oranges and citrons, lemons and limes, bananas, which are believed to be of the fruits of Paradise (being always in season), different kinds of melons (including some of aromatic flavour, and the refreshing water-melon), mulberries, Indian figs or prickly pears, the fruit of the lotus and olives. Among the more usual cultivated flowers are the rose (which has ever been a favourite among the Arabs), the jasmine, narcissus, lily, oleander, chrysanthemum, convolvulus, geranium, dahlia, basil, the henna plant (Lawsonia alba, or Egyptian privet, which is said to be a flower of Paradise), the helianthus and the violet. Of wild flowers the most common are yellow daisies, poppies, irises, asphodels and ranunculuses. The Poinsettia pulcherrima is a bushy tree with leaves of brilliant red.

Many kinds of reeds are found in Egypt, though they were formerly much more common. The famous byblus or papyrus no longer exists in the country, but other kinds of cyperi are found. The lotus, greatly prized for its flowers by the ancient inhabitants, is still found in the Delta, though never in the Nile itself. There are two varieties of this water-lily, one with white flowers, the other with blue.

Fauna. — The chief quadrupeds are all domestic animals. Of these the camel and the ass are the most common. The ass, often a tall and handsome creature, is indigenous. When the camel was first introduced into Egypt is uncertain — it is not pictured on the ancient monuments. Neither is the buffalo, which with the sheep is very numerous in Egypt. The horses are of indifferent breed, apparently

of a type much inferior to that possessed by the ancient Egyptians. Wild animals are few. The principal are the hyena, jackal and fox. The wild boar is found in the Delta. Wolves are rare. Numerous gazelles inhabit the deserts. The ibex is found in the Sinaitic penin- sula and the hills between the Nile and the Red Sea, and the mouflon, or maned sheep, is occasionally seen in the same regions. The desert hare is abundant in parts of the Fayum, and a wild cat, or lynx, frequents the marshy regions of the Delta. The ichneumon (Pharaoh's rat) is common and often tame; the coney and jerboa are found in the eastern mountains. Bats are very numerous. The crocodile is no longer found in Egypt, nor the hippopotamus, in ancient days a frequenter of the Nile. The common or pariah dog is generally of sandy colour; in Upper Egypt there is a breed of wiry rough-haired black dogs, noted for their fierceness. Among reptiles are several kinds of venomous snakes — the horned viper, the hooded snake and the echis. Lizards of many kinds are found, in- cluding the monitor. There are many varieties of beetle, including a number of species representing the scarabaeus of the ancients. Locusts are comparatively rare. The scorpion, whose sting is some- times fatal, is common. There are many large and poisonous spiders and flies; fleas and mosquitoes abound. Fish are # plentiful in the Nile, both scaled and without scales. The scaly fish include members of the carp and perch kind. The bayad, a scaleless fish commonly eaten, reaches sometimes 3i ft. in length. A somewhat rare fish is the Polypterus, which has thick bony scales and 16 to 18 long dorsal fins. The Tetrodon, or ball fish, is found in the Red Sea, as well as in the Nile.

Some 300 species of birds are found in Egypt, and one of the most striking features of a journey up the Nile is the abundance of bird life. Many of the species are sedentary, others are winter visitants, while others again simply pass through Egypt on their way to or from

warmer or colder regions. Birds of prey are very numerous, including several varieties of eagles — the osprey, the spotted, the golden and the imperial. Of vultures the black and white Egyptian variety (Neophron percnopterus) is most common. The griffon and the black vulture are also frequently seen. There are many kinds of kites, falcons and hawks, kestrel being numerous. The long- legged buzzard is found throughout Egypt, as are owls. The so- called Egyptian eagle owl {Bubo ascalaphus) is rather rare, but the barn owl is common. The kingfisher is found beside every water- course, a black and white species (Ceryle rudis) being much more numerous than the common kingfisher. Pigeons and hoopoes abound in every village. There are various kinds of plovers — the black- headed species (Pluvianus Aegyptius) is most numerous in Upper Egypt; the golden plover and the white-tailed species are found chiefly in the Delta. The spurwing is supposed to be the bird mentioned by Herodotus as eating the parasites covering the inside of the mouth of the crocodile. Of game-birds the most plentiful are sandgrouse, quail (a bird of passage) and snipe. Red-legged and other partridges are found in the eastern desert and the Sinai hills. Of aquatic birds there is a great variety. Three species of pelican exist, including the large Dalmatian pelican. Storks, cranes, herons and spoonbills are common. The sacred ibis is not found in Egypt, but the buff-backed heron, the constant companion of the buffalo, is usually called an ibis. The glossy ibis is occasionally seen. The flamingo, common in the lakes of Lower Egypt, is not found on the Nile. Geese, duck and teal are abundant. The most common goose is the white-fronted variety ; the Egyptian goose is more rare. Both varieties are depicted on the ancient monuments; the white-fronted goose being commonly shown. Several birds of gorgeous plumage come north into Egypt in the spring, among others the golden oriole, the sun-bird, the roller and the blue-cheeked bee-eater.

Egypt as a Health Resort. — The country is largely resorted to during the winter months by Europeans in search of health as well as pleasure. Upper Egypt is healthier than Lower Egypt, where, especially near the coast, malarial fevers and diseases of the re- spiratory organs are not uncommon. The least healthy time of the year is the latter part of autumn, when the inundated soil is drying. In the desert, at a very short distance from the cultivable land, the climate is uniformly dry and unvaryingly healthy. The most suitable places for the residence of invalids are Helwan, where there are natural mineral springs, in the desert, 14 m. S. of Cairo, and Luxor and Assuan in Upper Egypt.

The diseases from which Egyptians suffer are very largely the result of insanitary surroundings. In this respect a great improvement has taken place since the British occupation in 1882. Plague, formerly one of the

great scourges of the country, seems to have been stamped out, the last visitation having been in 1844, but cholera epidemics occasionally occur. 1 Cholera rarely extends south of Cairo. In 1848 it is believed that over 200,000 persons died from cholera, but later epidemics have been much less fatal. Smallpox is not un- common, and skin diseases are numerous, but the two most prevalent diseases among the Egyptians are dysentery and ophthalmia. The objection entertained by many natives to entering hospitals or to altering their traditional methods of ” cure ” renders these diseases much more malignant and fatal than they would be in other circum- stances. The government,however,enforces certain health regulations, and the sanitary service is under the direction of a European official.

1 A vivid description of Cairo during the prevalence of plague in 1835 will be found in A. W. Kinglake’s Eothen.

MODERN: TOWNS]

EGYPT

25

Chief Towns. — Cairo (q.v.) the capital, a city of Arab foundation, is built on the east bank of the Nile, about 12 m, above the point where the river divides, and in reference to its situation at the head of the Delta has been called by the Arabs ” the diamond stud in the handle of the fan of Egypt.” It has a population (1007) of 654,476 and is the largest city in Africa. Next in importance of the cities of Egypt and the chief seaport is Alexandria (q.v.), pop. (with Ramleh) 370,009, on the shore of the Mediterranean at the western end of the Delta. Port Said (q.v.), pop. 49,884, at the eastern end of the Delta, and at the north entrance to the Suez Canal, is the second seaport. Between Alexandria and Port Said are the towns of Rosetta (q.v.), pop. 16,810, and Damietta (q.v.), pop. 29,354, each built a few miles above the mouth of the branch of the Nile of the same name. In the middle ages, when Alexandria was in decay, these two towns were busy ports ; with the revival of Alexandria under Mehemet Ali and the foundation of Port Said (c. i860), their trade declined. The other ports of Egypt are Suez (q.v.), pop. 18,347, at tne south entrance of the canal, Kosseir (794) on the Red Sea, the seat of the trade carried on between Upper Egypt and Arabia, Mersa Matruh, near the Tripolitan frontier, and El-Arish, pop. 5897, on the Mediterranean, near the frontier of Palestine, and a halting-place on the caravan route from Egypt to Syria. In the interior of the Delta are many flourishing towns, the largest being Tanta, pop. 54,437, which occupies a central position. Damanhur (38,752) lies on

the railway between Tanta and Alexandria; Mansura (40,279) is on the Damietta branch of the Nile, to the N.E. of Tanta; Zagazig (34,999) is the largest town in the Delta east of the Damietta branch; Bilbeis (13,485) lies N.N.E. of Cairo, on the edge of the desert and in the ancient Land of Goshen. Ismailia (10,373) is situated midway on the Suez Canal. All these towns, which depend largely on the cotton industry, are separately noticed.

Other towns in Lower Egypt are: Mehallet el-Kubra, pop. 47,955, 16 m. by rail N.E. of Tanta, with manufactories of silk and cottons; Salihia (6100), E.N.E. of and terminus of a railway from Zagazig, on the edge of the desert south of Lake Menzala, and the starting-point of the caravans to Syria; Mataria (15,142) on Lake Menzala and headquarters of the fishing industry; Zifta (15,850) on the Damietta branch and the site of a barrage; Samanud (14,408), also on the Damietta branch, noted for its pottery, and Fua (14,515), where large quantities of tarbushes are made, on the Rosetta branch. Shibin el-Kom (21 ,576), 16 m. S. of Tanta, is a cotton centre, and Menuf (22,316), 8 m. S.W. of Shibin, in the fork between the branches of the Nile, is the chief town of a rich agricultural district. There are many other towns in the Delta with populations between 10,000 and

20,000.

In Upper Egypt the chief towns are nearly all in the narrow valley of the Nile. The exceptions are the towns in the oases comparatively unimportant, and those in the Fayum province. The capital of the Fayum, Medinet el-Fayum, has a population (1907) of 37,320. The chief towns on the Nile, taking them in their order in ascending the river from Cairo, are Beni Suef, Minia, Assiut, Akhmim, Suhag, Girga, Kena, Luxor, Esna, Edfu, Assuan and Korosko. Beni Suef (23,357) is 77 m. from Cairo by rail. It is on the west bank of the river, is the capital of a mudiria and a centre for the manufacture of woollen goods. Minia (27,221) is 77 m. by rail farther south. It is also the capital of a mudiria, has a considerable European colony, possesses a large sugar factory and some cotton mills. It is the starting-point of a road to the Baharia oasis. Assiut (q.v.), pop. 39,442, is 235 m. S. of Cairo by rail, and is the most im- portant commercial centre in Upper Egypt. At this point a barrage is built across the river. Suhag (17,514) is 56 m. by rail S. of Assiut and is the headquarters of Girga mudiria. The ancient and celebrated Coptic monasteries El Abiad (the white) and El Ahmar (the red) are 3 to 4 m. W. and N. W. respectively of Suhag. A few miles above Suhag, on the opposite (east) side of the Nile is Akhmim (q.v.) or Ekhmim (23,795), where silk and cotton goods are made. Girga (q.v.), pop. 19,893, is 22 m. S. by rail of Suhag, and on the same

(the west) side of the river. It is

noted for its pottery. Kena (q.v.), pop. 20,069, is on the east bank of the Nile, 145 m. by rail from Assiut. It is the chief seat of the manufacture of the porous earthenware water-bottles used all over Egypt. Luxor (q.v.), pop. (with Karnak) 25,229, marks the site of Thebes. It is 418 m. from Cairo, and here the gauge of the railway is altered from broad to narrow. Esna (q.v.), pop. 19,103, is another place where pottery is made in large quantities. It is on the west bank of the Nile, 36 m. by rail S. of Luxor. Edfu (q.v.), pop. 19,262, is also on the west side of the river, 30 m. farther south. It is chiefly famous for its ancient temple. Assuan (q.v.), pop. 12,618, is at the foot of the First Cataract and 551 m. S. of Cairo by rail. Three miles farther south, at Sheila], the Egyptian railway terminates. Korosko, 118 m. by river above Assuan, is a small place notable as the northern terminus of the caravan route from the Sudan across the Nubian desert. Since the building of the railway — which starts 96 m. higher up, at Wadi Haifa — to Khartum, this route is little used, and Korosko has lost what importance it had.

Ancient Cities and Monuments. — Many of the modern cities of Egypt are built on the sites of ancient cities, and they generally contain some monuments of the time of the Pharaohs, Greeks or Romans. The sites of other ancient cities now in complete ruin may be indicated. Memphis, the Pharaonic capital, was on the west bank of the Nile, some 14 m. above Cairo, and Heliopolis lay some 5 m. N.N.E. of Cairo. The pyramids of Giza or Gizeh, on the edge Of the desert, 8 m. west of Cairo, are the largest of the many pyramids and other monuments, including the famous Sphinx, built in the neighbourhood of Memphis. The site of Thebes has already been indicated. Syene stood near to where the town of Assuan now is; opposite, on an island in the Nile, are scanty ruins of the city of Elephantine, and a little above, on another island, is the temple of Philae. The ancient Coptos (Keft) is represented' by the village of Kuft, between Luxor and Kena. A few miles north of Kena is Dendera, with a famous temple. The ruins of Abydos, one of the oldest places in Egypt, are 8 m. S.W. of Balliana, a small town in Girga mudiria. The ruined temples of Abu Simbel are on the west side of the Nile, 56 m. above Korosko. On the Red Sea, south of Kosseir, are the ruins of Myos Hormos and Berenice. Of the ancient cities in the Delta there are remains, among others, of Sais, Iseum, Tanis, Bubastis, Onion, Sebennytus, Pithom, Pelusium, and of the Greek cities Naucratis and Daphnae. There are, besides the more ancient cities and monuments, a number of Coptic towns, monasteries and churches in almost every part of Egypt, dating from the early centuries of Christianity. The monasteries, or ders, are generally fort-

like buildings and are often built in the desert. Tombs of Mahommedan saints are also numerous, and are often placed on the summit of the cliffs overlooking the Nile. The traveller in Egypt thus views, side by side with the activities of the present day, where Occident and orient meet and clash, memorials of every race and civilization which has flourished in the valley of the Nile.

Trade Routes and Communications. — Its geographical position gives Egypt command of one of the most important trade routes in the world. It is, as it were, the fort which commands the way from Europe to the East. This has been the case from time immemorial, and the provision, in 1869, of direct maritime communication between the Mediterranean and the Red Sea, by the completion of the Suez Canal, ensured for the Egyptian route the supremacy in sea-borne traffic to Asia, which the discovery of the passage to India by way of the Cape of Good Hope had menaced for three and a half centuries. The Suez Canal is 87 m. long, 66 actual canal and 21 lakes. It has sufficient depth to allow vessels drawing 27 ft. of water to pass through. It is administered by a company whose headquarters are in Paris, and no part of its revenue reaches the Egyptian exchequer (see Suez Canal). Besides the many steamship lines which use the Suez Canal, other steamers run direct from European ports to Alexandria. There is also a direct mail service between Suez and Port Sudan.

The chief means of internal communication are, in the Delta the railways, in Upper Egypt the railway and the river. The railways

are of two kinds: (i) those state-owned and state-worked, (2) agricultural light railways owned and worked by private companies. Railway construction dates from 1852, when the line from Alexandria to Cairo was begun, by order of Abbas I. The state railways, unless otherwise indicated, have a gauge of 4 ft. 8| in. The main system is extremely simple. Trunk lines from Alexandria (via Damanhur and Tanta) and from Port Said (via Ismailia) traverse the Delta and join at Cairo. From Cairo the railway is continued south up the valley of the Nile and close to the river. At first it follows the west bank, crossing the stream at Nag Hamadi, 354 m. from Cairo, by an iron bridge 437 yds. long. Thence it continues on the east bank to Luxor, where the broad gauge ceases. From Luxor the line continues

on the standard African gauge (3 ft. 6 in.) to Shellal, 3 m. above Assuan and 685 m. from Alexandria. This main line service is supplemented by a steamer service on the Nile from Shellal to Wadi Haifa, on the northern frontier of the Anglo- Egyptian Sudan, whence there is direct railway communication with Khartum and the Red Sea (see Sudan).

Branch lines connect Cairo and Alexandria with Suez and with almost every town in the Delta. From Cairo to Suez via Ismailia is a distance of 160 m. Before the Suez Canal was opened passengers and goods were taken to Suez from Cairo by a railway 84 m. long which ran across the desert. This line, now disused, had itself superseded the ” overland route ” organized by Lieut. Thomas Waghorn, R.N., c. 1830, for the conveyance of passengers and mails to India. In Upper Egypt a line, 40 m. long, runs west from Wat-ta, a station 56 m. S. of Cairo, to Abuksa in the Fayum mudiria. Another railway goes from Kharga Junction, a station on the main line 24 m. S. of Girga, to the oasis of Kharga. These lines are privately owned.

In the Delta the light railways supplement the ordinary lines and connect the villages with the towns and seaports. There are over 700 m. of these lines. The railway development of Egypt has not been very rapid. In 1880 944 m. of state lines were open; in 1900 the figure was 1393, and in 1905, 1688. For several years before 1904 the administration of the railways was carried on by an international or mixed board for the security of foreign creditors. In the year named the railways came directly under the control of the Egyptian government, which during the next four years spent £E. 3,000,000 on improving and developing the lines. In the five years 1902-1906 the capital value of the state railways increased from ££.20,383,000 to £E. 23, 200,000 and the net earnings from £E. 1,059,000 to £E. 1,475,000. The number of passengers carried in the same period rose from 12J to over 22 millions, and the weight of goods from slightly under 3,000,000 to nearly 6,750,000 tons. In 1906 the light railways carried nearly a million tons of goods and over 6,800,000 passengers.

Westward from Alexandria a railway, begun in 1904 by the khedive, Abbas II., runs parallel with the coast, and is intended to be continued to Tripoli. The line forms the eastern end of the great railway system which will eventually extend from Tangier to Alexandria.

The Nile is navigable throughout its course in Egypt, and is largely used as a means of cheap transit of heavy goods. Lock and bridge tolls were abolished in 1899 and 1901 respectively. As a result, river traffic greatly increased. Above Cairo the Nile is the favourite tourist route,

while between Shellal (Assuan) and the Sudan frontier it is the only means of communication. Among the craft using the river the dahabiya is a characteristic native sailing vessel, some- what resembling a house-boat. From the Nile, caravan routes lead westward to the various oases and eastward to the Red Sea, the shortest (120 m.) and most used of the eastern routes being that from Kena to Kosseir. Roads suitable for wheeled vehicles are found in Lower Egypt, but the majority of the tracks are bridle-paths, goods being conveyed on the backs of donkeys, mules and camels.

Posts and Telegraphs. — The Egyptian postal system is highly organized and efficient, and in striking contrast with its condition in 1870, when there were but nineteen post-offices in the country. All the branches of business transacted in European post-offices are carried on by the Egyptian service, Egypt being a member of the Postal Union. It was the first foreign country to establish a penny postage with Great Britain, the reduction from 2§d. being made in 1905. The inland letters and packages carried yearly exceed 20,000,000 and foreign letters (30 % to England) number over 4,000,000. Over £17,000,000 passes yearly through the post. A feature of the service are the travelling post-offices, of which there are some 200.

All the important towns are connected by telegraph, the telegraphs being state-owned and worked by the railway administration. Egypt is also connected by cables and land-lines with the outside world. One land-line connects at El-Arish with the line through Syria and Asia Minor to Constantinople. Another line connects at Wadi Haifa with the Sudan system, affording direct telegraphic communication via Khartum and Gondokoro with Uganda and Mombasa. The Eastern Telegraph Company, by concessions, have telegraph lines across Egypt from Alexandria via Cairo to Suez, and from Port Said to Suez, connecting their cables to Europe and the East. The principal cables are from Alexandria to Malta, Gibraltar and England; from Alexandria to Crete and Brindisi; from Suez to Aden,- Bombay, China and Australia.

The telephone is largely used in the big towns, and there is a trunk telephone line connecting Alexandria and Cairo.

Standard Time. — The standard time adopted in Egypt is that of the longitude of Alexandria, 30 E., i.e. two hours earlier than Greenwich time. It thus corresponds with the standard time of British South Africa.

Agriculture and Land Tenure. — The chief industry of Egypt is agriculture. The proportions of the industry depend upon the area of land capable of cultivation. This again depends upon the fertilizing sediment brought down by the Nile and the measure in which lands beyond the natural reach of the flood water can be rendered productive by irrigation. By means of canals* ” basins,” dams and barrages, the Nile flood is now utilized to a greater extent than ever before (see Irrigation: Egypt) . The result has been a great increase in the area of cultivated or cultivable land.

At the time of the French occupation of Egypt in 1798, it was found that the cultivable soil covered 4,429,400 acres, but the quantity actually under cultivation did not exceed 3,520,000 acres, or six-elevenths of the entire surface. Under improved conditions the area of cultivated land, or land in process of reclamation, had risen in 1906 to 5,750,000 acres, while another 500,000 acres of waste land awaited reclamation.

Throughout Egypt the cultivable soil does not present any very great difference, being always the deposit of the river; it contains, however, more sand near the river than at a distance from it. Towards the Mediterranean its quality is injured by the salt with which the air is impregnated, and therefore it is not so favourable to vegetation. Of the cultivated land, some three- fourths is held, theoretically, in life tenancy. The state, as ultimate proprietor, imposes a tax which is the equivalent of rent. These lands are Kharaji lands, in distinction from the Ushuri or tithe-paying lands. The Ushuri lands were originally granted in fee, and are subject to a quit-rent. All tenants are under obliga- tion to guard or repair the banks of the Nile in times of flood, or in any case of sudden emergency. Only to this extent does the corvie now prevail. The land-tax is proportionate, i.e. land under perennial irrigation pays higher taxes than land not so irrigated (see below, Finance) . The unit of land is the feddan, which equals i-03acre. Outof 1,153, 759 proprietors of land in 1905, 1,005,705 owned less than 5 feddans. The number of proprietors owning over so feddans was 12,475. The acreage held by the first class was 1,264,084, that by the second class, 2,356,602. Over 1,600,000 feddans were held in holdings of from 5 to 50 feddans. The state domains cover over 2 40, 000 feddans, and about 600, 000 feddans are owned by foreigners. The policy of the government is to main- tain the small proprietors, and to do nothing tending to oust the native in favour of European landowners.

The kind of crops cultivated depends largely on whether the land is under perennial, flood or ” basin ” irrigation. Perennial irrigation is

possible where there are canals which can be supplied with water all the year round from the Nile. This condition exists throughout the Delta and Middle Egypt, but only in parts of Upper Egypt. Altogether some 4,000,000 acres are under perennial irrigation. In these regions two and sometimes three crops can be harvested yearly. In places where perennial irrigation is impossible, the land is divided by rectangular dikes into ” basins.” Into these basins — which vary in area from 600 to 50,000 acres — water is led by shallow canals when the Nile is in flood. The water is let in about the middle of August and the basins are begun to be emptied about the 1st of October. The land under basin irrigation covers about 1,750,000 acres. In the basins only one crop can be grown in the year. This basin system is of immemorial use in Egypt, and it was not until the time of Mehemet AH (c. 1820) that perennial irrigation began. High land near the banks of the Nile which cannot be reached by canals is irrigated by raising water from the Nile by steam-pumps, water-wheels (sakias) worked by buffalo s, or water-lifts (shadufs) worked by hand. There are several thousand steam-pumps and over 100,000 sakias 01 shadufi m Egypt. The fellah divides his land into little square plots by ridges of earth, and from the small canal which serves his hold ing he lets the water into each plot as needed. The same system obtains on large estates (see further Irrigation: Egypt).

MODERN: PRODUCTS]

EGYPT

27

There are three agricultural seasons: (i) summer (sefi), ist of April to 31st of July, when crops are grown only on land under perennial irrigation; (2) flood (NUi), ist of August to 30th of November; and (3) winter (shetwi), ist of December to 31st of March. Cotton, sugar and rice are the chief summer crops; wheat, barley, flax and vegetables are chiefly winter crops; maize, millet and ” flood ” rice are NUi crops; millet and vegetables are also, but in a less degree, summer crops. The approximate areas under cultivation in the various seasons are, in summer, 2,050,000 acres; in flood, 1,500,000 acres; in winter, 4,300,000 acres. The double-cropped area is over 2,000,000 acres. Although on the large farms iron ploughs, and threshing and grain-cleaning machines, have been introduced, the small cultivator prefers the simple native plough made of wood. Corn is threshed by a norag, a machine resembling a chair, which moves on small iron wheels or thin circular plates fixed to axle-trees, and is drawn in a circle by oxen.

Crops. — Egypt is third among the cotton-producing countries of the world. Its production per acre is the greatest of any country but, owing to the restricted area available, the bulk raised is not more than one-tenth of that of the United States and about half that of India. Some 1,600,000 acres of land, five-sixths being in Lower Egypt, are devoted to cotton growing. The climate of Lower Egypt being very suitable to the growth of the plant, the cotton produced there is of excellent quality. The seed is sown at the end of February or beginning of March and the crop is picked in Sep- tember and October. The cotton crop increased from 1,700,000 kantars l in 1878 to 4,100,000 in 1890, had reached 5,434,000 in 1900, and was 6,750,000 in 1905. Its average value, 1897-1905, was over £14,060,000 a year. The cotton exported was valued in 1907 at £E. 23, 598,006, in 1908 at ££.17,091,612.

While cotton is grown chiefly in the Delta, the sugar plantations, which cover about 100,000 acres, are mainly in Upper Egypt. The canes are planted in March and are cut in the following January or February. Although since 1884 the production of sugar has largely increased, there has not been a corresponding increase in its value, owing to the low price obtained in the markets of the world. Beetroot is also grown to a limited extent for the manufacture of sugar. The sugar exported varied in annual value in the period 1884-1905 from £400,000 to £765,000.

A coarse and strong tobacco was formerly extensively grown, but its cultivation was prohibited in 1890. Flax and hemp are grown in a few places.

Maize in Lower Egypt and millet (of which there are several varieties) in Upper Egypt are largely grown for home consumption, these grains forming a staple food of the peasantry. The stalk of the maize is also a very useful article. It is used in the building of the houses of the fellahin, as fuel, and. when green, as food for cattle. Wheat and barley are important crops, and some 2,000,000 acres are sown with them yearly. The barley in general is not of good quality, but the desert or ” Mariut ” barley, grown by the Bedouins in the coast region west of Alexandria, is highly prized for the making of beer. Beans and lentils are extensively sown, and form an important article of export. The annual value of the crops is over £3,000,000. Rice is largely grown in the northern part of the Delta, where the soil is very wet. Two kinds are cultivated : Sultani, a summer crop, and Sabaini, a flood crop. Sabaini is a favourite food of the fellahin, while Sultani rice is largely exported. In the absence of grass, the chief green food for cattle and horses is clover, grown largely in the basin lands of Upper Egypt. To a

less extent vetches are grown for the same purpose.

Vegetables and Fruit. — Vegetables grow readily, and their cultivation is an important part of the work of the fellahin. The onion is grown in great quantities along the Nile banks in Upper Egypt, largely for export Among other vegetables commonly raised are tomatoes (the bulk of which are exported), potatoes (of poor quality), leeks, marrows, cucumbers, cauliflowers, lettuce, asparagus and spinach.

The common fruits are the date, orange, citron, fig, grape, apricot, peach and banana. Olives, melons, mulberries and strawberries are also grown, though not in very large numbers. The olive tree flourishes only in the Fayum and the oases. The Fayum also possesses extensive vineyards. The date is a valuable economic asset. There are some 6,000,000 date-palms in the country, 4,000,000 being in Upper Egypt. The fruit is one of the chief foods of the people. The value of the crop is about £1,500,000 a year.

Roses and Dyes. — There are fields of roses in the Fayum, which supply the market with rose-water, Of plants used for dyeing, the principal are bastard saffron, madder, woad and the indigo plant. The leaves of the henna plant are used to impart a bright red colour to the palms of the hands, the soles of the feet, and the nails of both hands and feet, of women and children, the hair of old ladies and the tails of horses. Indigo is very extensively employed to dye the

1 A kantar equals 99 In.

shirts of the natives of the poorer classes; and is, when very dark, the colour of mourning ; therefore, women at funerals, and generalh after a death, smear themselves with it.

Domestic Animals. — The Egyptians are not particularly a pastors people, though the wealth of the Bedouin in the Eastern or Arabia .1 Desert consists in their camels, horses, sheep and goats. In t'.ie Niie valley the chief domestic animals are the camel, donkey, mule, ox, buffalo, sheep and goat. Horses are comparatively few, and are seldom seen outside the large towns, the camel and donkey being the principal beasts of burden. The cattle are short-horned, rather small and well formed. They are quiet in disposition, and much valued for agricultural labour by the people, who therefore very rarely slaughter them for meat. Buffaloes of an uncouth appearance and of a dark slaty colour, strikingly contrasting with the neat cattle, abound in Egypt. They are very docile, and the little children of the villagers often ride them to or from the river. The buffaloes are largely employed for

turning the sakias. Sheep (of which the greater number are black) and goats are abundant, and mutton is the. ordinary butcher's meat. The wool is coarse and short. Swine are very rarely kept, and then almost wholly for the European inhabi- tants, the Copts generally abstaining from eating their meat. Poultry is plentiful and eggs form a considerable item in the exports. Pigeons are kept in every village and their flesh is a common article of food.

Fishing. — The chief fishing-ground is Lake Menzala, where some 4000 persons are engaged in the industry, but fish abound in the Nile also, and are caught in large quantities along the coast of the Delta. The salting and curing of the fish is done chiefly at Mataria, on Lake Menzala, and at Damietta. Dried and salted fish eggs, called batarekh, command a ready market. The average annual value of the fisheries is about £200,000.

Canals. — The irrigation canals, which are also navigable by small craft, are of especial importance in a country where the rainfall is very slight. The Delta is intersected by numerous canals which derive their supply from four main channels. The Rayya Behera, known in its lower courses first as the Khatatba and afterwards as the Rosetta canal, follows the west bank of the Rosetta branch of the Nile and has numerous offshoots. The most important is the Mahmudia (50 m. long) .which connects Alexandria with the Rosetta branch, taking a similar direction to that of the ancient canal which it succeeded. This canal supplies Alexandria with fresh water.

The Rayya Menufia, or Menuf canal, connects the two branches of the Nile and supplies water to the large number of canals in the central part of the Delta. Following the right (eastern) bank of the Damietta branch is the Rayya Tewfiki, known below Benha as the Mansuria, and below Mansura as the Fareskur, canal. This canal has many branches. Farther east are other canals, of which the 'most remarkable occupy in part the beds of the Tanitic and Pelusiac branches. That following the old Tanitic channel is called the canal of Al-Mo'izz, the first Fatimite caliph who ruled in Egypt, having been dug by his orders, and the latter bears the name of the canal of Abu-1-Muneggi, a Jew who executed this work, under the caliph Al-Amir, in order to water the province called the Sharkia. From this circumstance this canal is also known as the Sharkawia. _ From a town on its bank it is called in its lower course the Shibini canal. The superfluous water from all the Delta canals is drained off by bahrs (rivers) into the coast lakes. The Ismailia or Fresh-water canal branches from the Nile at Cairo and follows, in the main, the course of the canal which anciently joined the Nile and the Red Sea. It dates from Pharaonic times, having

been begun by ” Sesostris,” continued by Necho II. and by Darius Hystaspes, and at length finished by Ptolemy Philadelphus. This canal, having fallen into disrepair, was restored in the 7th century A.D. by the Arabs who conquered Egypt, but appears not long afterwards to have again become unserviceable. The existing canal was dug in 1863 to supply fresh water to the towns on the Suez Canal. Although designed for irrigation purposes, the Delta canals are also used for the transport of passengers and goods.

In Upper Egypt the most important canals are the Ibrahimia and the Bahr Yusuf (the River of Joseph). They are both on the west side of the Nile. The Ibrahimia takes its water from the Nile at Assiut, and runs south to below Beni Suef. It now supplies the Bahr Yusuf, which runs parallel with and west of the Ibrahimia, until it diverges to supply the Fayum — a distance of some 350 m. It leaves the Ibrahimia at Derut near its original point of departure from the Nile. Although the Joseph whence it takes its name is the celebrated Saladin, it is related that he merely repaired it, and it is not doubted to be of a much earlier period. Most probably it was executed under the Pharaohs. By some authorities it is believed to be a natural channel canalized. Besides supplying the canals of, the Fayum with summer water, it fills many of the ” basins ” of I Upper Egypt with water in flood time.

Manufactures and Native Industries. — Although essentially an agricultural country, Egypt possesses several manufactures. In connexion with the cotton industry there are a few mills where calico is made or oil crushed, and ginning-mills are numerous. In Upper Egypt there are a number of factories for sugar-crushing and refining, and one or two towns of the Delta

possess rice mills. Flour mills are found in every part of the country, the maize and other grains being ground for home consumption. Soap-making and leather-tanning are carried on, and there are breweries at Alexandria and Cairo. The manu- facture of tobacco into cigarettes, carried on largely at Alexandria and Cairo, is another important industry. Native industries include the weaving of silk, woollen, linen and cotton goods, the hand- woven silk shawls and draperies being often rich and elegant. The silk looms are chiefly at Mehallet el-Kubra,

Cairo and Damietta. The Egyptians are noted for the making of pottery of the commoner kinds, especially water-jars. There is at Cairo and in other towns a considerable industry in orna- mental wood and metal work, inlaying with ivory and pearl, brass trays, copper vessels, gold and silver ornaments, &c. At Cairo and in the Fayum, attar of roses and other perfumes are manufactured. Boat-building is an important trade.

Commerce. — The trade of Egypt has developed enormously since the British occupation in 1882 ensured to all classes of the com- munity the enjoyment of the profit of their labour. The total value of the exterior trade increased in the 20 years 1882 to 1902 from £19,000,000 to £32,400,000. The wealth of Egypt lying in the culti- vation of its soil, almost all the exports are agricultural produce, while the imports are mostly manufactured goods, minerals and hardware. The chief exports in order of importance are: raw cotton, cotton seed, sugar, beans, cigarettes, onions, rice and gum- arabic. The gum is not of native produce, being in transit from the Sudan. Of less importance are the exports of hides and skins, eggs, wheat and other grains, wool, quails, lentils, dates and Sudan produce in transit. The principal articles imported are: cotton goods and other textiles, coal, iron and steel,, timber, tobacco, machinery, flour, alcoholic liquors, petroleum, fruits, coffee and live animals. There is an ad valorem duty of 8 % on imports and of about I % on exports. Tobacco and precious stones and metals pay heavier duties. The tobacco is imported chiefly from Turkey and Greece, is made into cigarettes in Egypt, and in this form exported to the value of about £500,000 yearly.

In comparison with cotton, all other exports are of minor account. The cotton exported, of which Great Britain takes more than half, is worth over three-fourths of the total value of goods sent abroad. Next to cotton, sugar is the most important article exported. A large proportion of the sugar manufactured is, however, consumed in the country and does not figure in the trade returns. Of the imports the largest single item is cotton goods, nearly all being sent from England. Woollen goods come chiefly from England, Austria and Germany, silk goods from France. Large quantities of ready-made clothes and fezes are imported from Austria. Iron and steel goods, machinery, locomotives, &c, come chiefly from England, Belgium and Germany, coal from England, live stock from Turkey and the Red Sea ports, coffee from Brazil, timber from Russia, Turkey and Sweden.

A British consular report (No. 3121, annual series), issued in 1904, shows that in the period 1887-1902 the import trade of Egypt nearly doubled. In the same period the proportion of imports from the United

Kingdom fell from 39-63 to 36-76 . Though the percentage decreased, the value of imports from Great Britain increased in the same period from £2,500,000 to £4,500,000. In addition to imports from the United Kingdom, British possessions took 6-0 of the import trade. Next to Great Britain, Turkey had the largest share of the import trade, but it had declined in the sixteen years from 19 to 15%. France about 10%, and Austria 6-72%, came next, but their import trade was declining, while that of Germany had risen from less than I to over 3%, and Belgium imports from 1-74 to

4-27%-

In the same period (1887-1902) Egyptian exports to Great Britain decreased from 63-25 to 52-30%, Germany and the United States showing each an increase of over 6-o%. Exports to Germany had increased from 0-13 to 6-75%, to the United States from 0-26 to 6-70%. Exports to France had remained practically stationary at 8-0%; those to Austria had dropped from 6-30 to 4-0 , to Russia from 9-11 to 8-43.

For the quinquennial period 1901-1905, the average annual value of the exterior trade was: — imports £17,787,296; exports £18,811,588; total £36,598,884. In 1907 the total value of the merchandise imported and exported, exclusive of transit, re- exportation and specie, was ££.54,134,000 — constituting a record trade return. The value of the imports was £E.26,l2l,ooo, of the exports £E. 28,013,000.

Shipping. — More than 90% of the external trade passes through the port of Alexandria. Port Said, which in consequence of its position at the northern entrance of the Suez Canal has more frequent and regular communication with Europe, is increasing in importance and is the port where mails and passengers are landed. Over 3000 ships enter and clear harbour at Alexandria every year. The total tonnage entering the port increased in the five years 1901-1905 from 2,555,259 to 3,591,281. In the same period the percentage of British

shipping, which before 1900 was nearly 50, varied from 40 to 45, No other nation had more than 12 % of the tonnage, Italy, France, Austria and Turkey each having 9 to 12 %. The tonnage of German ships increased in the five years mentioned from 3 to 7 %. In number of steamships entering the harbour Great Britain is first, with some 800 yearly, or about 50 % of all steamers entering. The sailing boats entering the harbour are almost entirely Turkish. They are vessels of small tonnage.

The transit trade with the East, which formerly passed overland through Egypt, has been diverted to the Suez Canal, the traffic through which has little to do with the trade or shipping of Egypt. The number of ships using the canal increased in the 20 years 1880- 1900 from 2000 to 4000, while in the same period the tonnage rose from 4,300,000 to 14,000,000. In 1905 the figures were; — Number of ships that passed through the canal, 41 16 (2484 being British and 600 German), net tonnage 13,134,105 (8,356,940 British and 2,113,484 German). Next to British and German the nationality of ships using the canal in order of importance is French, Dutch, Austrian, Italian and Russian. About 250,000 passengers (includ- ing some 40,000 pilgrims to Mecca) pass through the canal in a year (see further Suez).

Currency. — The monetary system in force dates from 1885, when through the efforts of Sir Edgar Vincent the currency was placed on a sound basis. The system is based on the single gold standard. The unit is a gold coin called a pound and equal to £1, os. 6d. in English currency. The Egyptian pound (£E.) is divided into 100 piastres, of which there are coins in silver of 20,10,5 and 2 piastres. One, i, J and ˆ piastre pieces are coined in nickel and ˆ and ˆ piastre pieces in bronze. The one piastre piece is worth a fraction over 2§d. The ˆ of a piastre is popularly called a para and the native population generally reckon in paras. The legal piastre is called the piastre tariff (P.T.), to distinguish it from the J piastre, which in local usage in Cairo and Alexandria is called a piastre. Officially the J piastre is known as 5 milliemes, and so with the coins of lower denomination, the para being \ millieme. The old terms his or ” purse ” (500 piastres) and khazna or ” treasury ” (1000 purses) are still occasionally used. Formerly European coins of all kinds were in general circulation, now the only foreign coins current are the English sovereign, the French 20 franc piece and the Turkish mejidie, a gold coin worth 18 shillings. For several years no Egyptian gold pieces have been coined. Egyptian silver money is minted at Birmingham, and nickel and bronze money at Vienna. Bank-notes, of the National Bank, are issued for £E.ioo, JE.50, £E.I0, £E.5 and £E.i, and for 50 piastres. The notes are not legal tender, but are accepted by the government in payment of taxes.

The history of the currency reform in Egypt is interesting as affording a practical example of a system much discussed in con- nexion with the currency question in India, namely, a gold standard without a gold coinage. The Egyptian pound is practically non- existent, nearly all that were coined having been withdrawn from circulation. Their place has been taken by foreign gold, principally the English sovereign, which circulates at a value of 97I piastres. In practice the system

works perfectly smoothly, the gold flowing in and out of the country through the agency of private banking estab- lishments in proportion to the requirements of the circulation. It is, moreover, very economical for the government. As in most agri- cultural countries, there is a great expansion of the circulation in the autumn and winter months in order to move the crops, followed by a long period of contracted circulation throughout the rest of the year. Under the existing system the fluctuating requirements of the currency are met without the expense of alternately minting and melting down.

Weights and Measures. — The metrical system of weights and measures is in official but not in popular use, except in the foreign quarters of Cairo, Alexandria, &c. The most common Egyptian measures are the fitr, or space measured by the extension of the thumb and first finger; the shibr, or span; and the cubit (of three kinds = 22§ , 25 and 26J in.). The measure of land is the feddan, equal to 1-03 acres, subdivided into 24 kirats. The ardeb is equal to about 5 bushels, and is divided into 6 waybas, and each wayba into 24 rubas. The okieh equals 1-32 oz., the rotl -99 ft>, the oke 2-75 lb, the kantar (or 100 roils or 36 okes) 99-04 lb.

Constitution and Administration. — Egypt is a tributary state of the Turkish empire, and is ruled by an hereditary prince with the style of khedive, a Persian title regarded as the equiva- lent of king. The succession to the throne is by primogeniture. The central administration is carried on by a council of ministers, appointed by the khedive, one of whom acts as prime minister. To these is added a British financial adviser, who attends all meetings of the council of ministers, but has not a vote; on the other hand, no financial decision may be taken without his consent. The ministries are those of the interior, finance, public works, justice, war, foreign affairs and public instruction, 1 and in each of these are prepared the drafts of decrees, which are

1 To the ministry of public instruction was added in 1906 a depart- ment of agriculture and technical instruction.

then submitted to the council of ministers for approval, and on being signed by the khedive become law. No important decision, however,

has been taken since 1882 without the concurrence of the British minister plenipotentiary. With a few exceptions, laws cannot, owing to the Capitulations, be enforced against foreigners except with the consent of the powers.

While the council of ministers with the khedive forms the legislative authority, there are various representative bodies with strictly limited powers. The legislative council is a con- sultative body, partly elective, partly nominative. It examines the budget and all proposed administrative laws, but cannot initiate legislation, nor is the government bound to adopt its suggestions. The general assembly consists of the legislative council and the ministers of state, together with popularly elected members, who form a majority of the whole assembly. It has no legislative functions, but no new direct personal tax nor land tax can be imposed without its consent. It must meet at least once in every two years.

For purposes of local government the chief towns constitute governorships (moafzas), the rest of the country being divided into mudirias or provinces. The governors and mudirs (heads of provinces) are responsible to the ministry of the interior. The provinces are further divided into districts, each of which is under a matnur, who in his turn supervises and controls the ontda, mayor or head-man, of each village in his district.

The governorships are: Cairo; Alexandria, which includes an area of 70 sq. m.; Suez Canal, including Port Said and Ismailia; Suez and El-Arish. Lower Egypt is divided into the provinces of: Behera, Gharbia, Menufia, Dakahlia, Kaliubia, Sharkia. The oasis of Siwa and the country to the Tripolitan frontier are dependent on the province of Behera. Upper Egypt: Giza, Beni Suef, Fayum, Minia, Assiut, Girga, Kena, Assuan. The peninsula of Sinai is administered by the war office.

Justice. — There are four judicial systems in Egypt: two applicable to Egyptian subjects only, one applicable to foreigners only, and one applicable to foreigners and, to a certain extent, natives also. This multiplicity of tribunals arises from the fact that, owing to the Capitulations, which apply to Egypt as part of the Turkish empire, foreigners are almost entirely exempt from the jurisdiction of the native courts. It will be convenient to state first the law as regards foreigners, and secondly the law which concerns Egyptians. Criminal jurisdiction over foreigners is exercised by the consuls of the fifteen powers possessing such right by treaty, according to the law of the country of the offender. These consular courts also judge civil cases

between foreigners of the same nationality.

Jurisdiction in civil matters between natives and foreigners and between foreigners of different nationalities is no longer exercised by the consular courts. The grave abuse to which the consular system was subject led to the establishment, in February 1876, at the instance of Nubar Pasha and after eight years of negotiation, of International or ” Mixed ” Tribunals to supersede consular jurisdiction to the extent indicated. The Mixed Tribunals employ a code based on the Code Napoleon with such additions from Mahommedan law as are applicable. There are three tribunals of first instance, and an appeal court at Alexandria. These courts have both foreign and Egyptian judges — the foreign judges forming the majority of the bench. In certain designated matters they enjoy criminal jurisdiction, including, since 1900, offences against the bankruptcy laws. Cases have to be conducted in Arabic, French, Italian and English, English having been admitted as a “judicial language” by khedivial decree of the 17th of April 1905. Besides their judicial duties, the courts practically exercise legislative func- tions, as no important law can be made applicable to Europeans without the consent of the powers, and the powers are mainly guided by the opinions of the judges of the Mixed Courts.

The judicial systems applicable solely to Egyptians are supervised by the ministry of justice, to which has been attached since 1890 a British judicial adviser. Two systems of laws are administered: — (1) the Mehkemehs, (2) the Native Tribunals. The mehkemehs, or courts of the cadis, judge in all matters of

personal status, such as marriage, inheritance and guardianship, and are guided in their decisions by the code of laws founded on the Koran. The grand cadi, who must belong to the sect of the Hanifis, sits at Cairo, and is aided by a council of Ulema or learned men. This council consists of the sheikh or religious chief of each of the four orthodox sects, the sheikh of the mosque of Azhar, who is of the sect of the Shafi’is, the chief (nakib) of the Sherifs, or descendants of Mahomet, and others. The cadis are chosen from among the students at the Azhar university. (In the same manner, in matters of personal law, Copts and other non-Moslem Egyptians are, in general, subject to the jurisdiction of their own religious chiefs.)

For other than the purposes indicated, the native judicial system, both civil and criminal, was superseded in 1884 by tribunals administering a jurisprudence modelled on that of the French code. It is, in the words of Lord Cromer, ” in many respects ill adapted to meet the special needs of the country ” (Egypt, No. 1, 1904, p. 33). The system

was, on the advice of an Anglo-Indian official (Sir John Scott), modified and simplified in 1891, but its essential character remained unaltered. In 1904, however, more important modifications were introduced. Save on points of law, the right of appeal in criminal cases was abolished, and assize courts, whose judgments were final, established. At the same time the penal code was thoroughly revised, so that the Egyptian judges were ” for the first time provided with a sound working code” (Ibid. p. 49). The native courts have both native and foreign judges. There are courts of summary juris- diction presided over by one judge, central tribunals (or courts of first instance) with three judges, and a court of appeal at Cairo. A committee of judicial surveillance watches the working of the courts of first instance and the summary courts, and endeavours, by letters and discussions, to maintain purity and sound law. There is a procureur-general, who, with other duties, is entrusted with criminal prosecutions. His representatives are attached to each tribunal, and form the parquet under whose orders the police act in bringing criminals to justice. In the markak (dis- trict) tribunals, created in 1904 and presided over by magistrates with jurisdiction in cases of misdemeanour, the prosecution is, however, conducted directly by the police. Special Children’s Courts have been established for the trial of juvenile offenders.

The police service, which has been subject to frequent modifica- tion, was in 1895 put under the orders of the ministry of the interior, to which a British adviser and British inspectors are attached. The provincial police is under the direction of the local authorities, the mudirs or governors of provinces, and the mamurs or district officials; to the omdas, or village head-men, who are responsible for the good order of the villages, a limited criminal jurisdiction has been entrusted.

Religion. — The great majority of the inhabitants are Mahom- medans. In 1907 the Moslems numbered over ten millions, or 91-8% of the entire population. The Christians in the same year numbered 880,000, or 8% of the population. Of these the Coptic Orthodox church had some 667 ,000 adherents. Among other churches represented were the Greek Orthodox, the Ar- menian, Syrian and Maronite, the Roman Catholic and various Protestant bodies. The last-named numbered 37,000 (including 24,000 Copts). There were in 1907 over 38,000 Jews in Egypt.

The Mahommedans are Sunnites, professing the creed com- monly termed ” orthodox,” and are principally of the persuasion of the Shafi’is, whose celebrated founder, the imam ash-Shafi’i, is buried in

the great southern cemetery of Cairo. Many of them are, however, Hanifis (to which persuasion the Turks chiefly belong), and in parts of Lower, and almost universally in Upper, Egypt, Malikis. Among the Moslems the Sheikh-el- Islam, appointed by the khedive from among the Ulema (learned class), exercises the highest religious and, in certain subjects, judicial authority. There is also a grand cadi, nominated by the sultan of Turkey from among the Ulema of Stamboul. Valuable property is held by the Moslems in trust for the promotion of religion and for charitable purposes, and is known as the Wakfs administration. The revenue derived is over £250,000 yearly.

The Coptic organization includes in Egypt three metropolitans

and twelve bishops, under the headship of the patriarch of Alexandria. The minor orders are arch-priests, priests, arch- deacons, deacons, readers and monks (see Copts: Coptic Church).

Education. — Two different systems of education exist, one founded on native lines, the other European in character. Both systems are more or less fully controlled by the ministry of public instruction. The government has primary, secondary and technical schools, training" colleges for teachers, and schools of agriculture, engineering, law, medicine and veterinary science. The government system, which dates back to a period before the British occupation, is designed to provide, in the main, a European education. In the primary schools Arabic is the medium of instruction, the use of English for that purpose being confined to lessons in that language itself. The school of law is divided into English and French sections according to the language in which the students study law. Besides the govern- ment primary and secondary schools, there are many other schools in the large towns owned by the Moslems, Copts, Hebrews, and by various missionary societies, and in which the education is on the same lines. A movement initiated among the leading Moslems led in 1908 to the establishment as a private enterprise of a national Egyptian university devoted to scientific, literary and philosophical studies. Political and religious subjects are excluded from the curriculum and no discrimination in regard to race or religion is allowed.

Education on native lines is given in kuttabs and in the Azhar

university in Cairo. Kuttabs are schools attached to mosques, found in every village and in every quarter of the larger towns. In these schools the instruction given before the British occupation was very slight. All pupils were taught to recite portions of the Koran, and a proportion of the scholars learnt to read and write Arabic and a little simple arithmetic. Those pupils who succeeded in committing to memory the whole of the Koran were regarded as fiki (learned in Mahommedan law), and as such escaped liability to military conscription. The government has improved the education given in the kuttabs, and numbers of them have been taken under the direct control of the ministry of public instruction. In these latter schools an excellent elementary secular education is given, in addition to the instruction in the Koran, to which half the school hours are devoted. The number of pupils in 1905 was over 12,000 boys and 2000 girls. Grants-in-aid are given to other schools where a sufficiently good standard of instruction is maintained. No grant is made to any kuttab where any language other than Arabic is taught. In all there are over 10,000 kuttabs, attended by some 250,000 scholars. The number of pupils in private schools under government inspection was in 1898, the first year of the grant-in-aid system, 7536; in 1900, 12,315; in 1905, 145,691. The number of girls in attendance rose from 598 in 1898 to 997 in 1900 and„96n in 1905. The Copts have about 1000 primary schools, in which the teaching of Coptic is compulsory, a few industrial schools, and one college for higher instruction.

Cairo holds a prominent place as a seat of Moslem learning, and its university, the Azhar, is considered the first of the eastern world. Its professors teach ” grammatical inflexion and syntax, rhetoric, versification, logic, theology, the exposition of the Koran, the traditions of the Prophet, the complete science of jurisprudence, or rather of religious, moral, civil and criminal law, which is chiefly founded on the Koran and the traditions, together with arithmetic as far as it is useful in matters of law. Lectures are also given on algebra and on the calculations of the Mahommedan calendar, the times of prayer, &c.” (E. W. Lane, Modern Egyptians). The students come from all parts of the Mahommedan world. They number about 8000, of whom some 2000 are resident. The students pay no fees, and the professors receive no salaries. The latter main- tain themselves by private teaching and by copying manuscripts, and the former in the same manner, or by reciting the Koran. To meet the demand for better qualified judges for the Moslem courts a training college for cadis was established in 1907. Besides the subjects taught at the Azhar university, instruction is given in literature, mathematics and physical science. The necessity for a reorganization of the Azhar system itself

being also recognized by the high Moslem dignitaries in Egypt, a law was passed in 1907 creating a superior board of control under the presidency of the Sheikh el-Azhar to supervise the proceedings of the university and other similar establishments. This attempt to reform the Azhar met, however, with so much opposition that in 1909 it was, for the time, abandoned.

In 1907, of the sedentary Egyptian population over seven years of age, some 12 % of the Moslems could read and write, female literacy having increased 50 % since 1 897 ; of the foreign population over seven years of age 75 % could read and write. Of the Coptic community about 50 % can read and write.

Literature and the Press. — Since the British occupation there has been a marked renaissance of Arabic learning and literature in Egypt. Societies formed for the encouragement of Arabic literature have brought to light important texts bearing on Mahommedan history, antiquities and religion. Numbers of magazines and reviews are published in Arabic which cater both for the needs of the moment and the advancement of learning. Side by side with these literary organs there exists a vernacular press largely devoted to nationalist propaganda. Prominent among these papers is At Lewa {The Standard), founded in 1900. Other papers of a similar character are A I Omnia, Al Moayad and Al Gerida. The Mokattam represents the views of the more enlightened and con- servative section of the native population. In Cairo and Alexandria there are also published several newspapers in English and French.

Authorities. — (a) General descriptions, geography, travel, &c. : Description de VlLgypte, 10 folio vols, and atlas of 10 vols. (Paris, 1809-1822), compiled by the scientific commission sent to Egypt by Bonaparte; Clot Bey, Apercu general sur VEgypte, 2 vols. (Paris, 1840); Boinet Bey, Dictionnaire geographique de VEgypte (Cairo, 1899); Murray's and Baedeker's handbooks and Guide Joanne; G. Ebers, Egypt, Descriptive, Historical and Picturesque, translated from the German edition of 1879 by Clara Bell, new edition, 2 vols. (London, 1887) ; Sir Gardiner Wilkinson, Modern Egypt and Thebes (2 vols., London, 1843); Lady Duff Gordon, Letters from Egypt, complete edition (London, 1902), an invaluable account of social conditions in the period 1862-1869; A. B. Edwards, A Thousand Miles up the Nile (2nd edition, London, n.d. [1889]); Pharaohs, Fellahs and Explorers (London, 1892); H. W. Mardon, Geography of Egypt . . . (London, 1902), an excellent elementary text-book; D. G. Hogarth, The Nearer East (London, 1902), contains brief but suggestive chapters on Egypt; S. Lane Poole, Egypt (London, 1881) ; A. B. de Guerville, New Egypt,

translated from the French (London, 1905); R. T. Kelly, Egypt Painted and Described (London, 1902). The best maps are those of the Survey Department, Cairo, on the scale of 1 : 50000 (1-3 in. to the mile).

(b) Administration: Sir John Bowring's Report on Egypt … to Lord Palmerston (London, 1840) shows the system obtaining at that period. For the study of the state of Egypt at the time of the British occupation, 1882, and the development of the country since, the most valuable documents 1 are:

I. Official. — The Reports on the Finances, Administration and Condition of Egypt, issued yearly since 1892 (the reports 1888-1891 were exclusively financial). Up to 1906 the reports were by Lord Cromer (Sir Evelyn Baring). They clearly picture the progress of the country. The following reports are specially valuable as ex- hibiting the difficulties which at the outset confronted the British administrators: — Correspondence respecting the Reorganization of Egypt (1883) ; Reports by Mr Villiers Stuart respecting Reorganization of Egypt (1883 and 1895); Despatch from Lord Dufferin forwarding the Decree constituting the New Political Institutions of Egypt (1883) ; Reports on the State of Egypt and the Progress of Administrative Reforms (1885); Reports by Sir H. D. Wolff on the Administration of Egypt (1887). Annual returns are published in Cairo in English or French by the various ministries, and British consular reports on the trade of Egypt and of Alexandria and of the tonnage and shipping of the Suez Canal are also issued yearly.

II. Non-official. — -Lord Cromer, .Modern Egypt (2 vols., 1 908), an authoritative record; Alfred (Lord) Milner, England in Egypt, first published in 1892, the story being brought up to 1904 in the nth edition; Sir A. Colvin, The Making of Modern Egypt (1906); J. Ward, Pyramids and Progress (1900) ; A. S. White, The Expansion of Egypt (1899) ; and F. W. Fuller, Egypt and the Hinterland (1901). See also the works cited in History, last section.

(c) Law: H.ˆLamba, De revolution de la condition juridique des Europeens en Egypte (Paris, 1896); J. H. Scott, The Law affecting Foreigners in Egypt . . . (Edinburgh, 1907) ; The Egyptian Codei (London, 1892).

(d) Irrigation, agriculture, geology, &c. : Despatch from Sir Evelyn Baring enclosing Report on the Condition of the Agricultural Population in Egypt (1888); Notes on Egyptian Crops (Cairo, 1896); Yacub Artin Bey, La Piopriete fonciere en ligyple (Bulak, 1885) ; Report on Perennial Irrigation and Flood Protection for Egypt, I vol.

and atlas (Cairo, 1894). The reports (Egypt, No. 2, 1901, and Egypt, No. 2, 1904), by Sir William Garstin on irrigation projects on the Upper Nile are very valuable records — notably the 1904 report. W. Will- cocks, Egyptian Irrigation (2nd ed., 1899); H. G. Lyons, The Physiography of the River Nile and its Basin (Cairo, 1906) ; Leigh Canney, The Meteorology of Egypt and its Influence on Disease (1897). Annual meteorological reports are issued by the Public Works Department, Cairo. The same department issues special irrigation reports. See for geology Carl von Zittel, Beitrage zur Geologie und Paldontologie der libyschen Wiiste (Cassel, 1883); Reports of the Geological Survey of Egypt (Cairo, 1900, et seq.).

(e) Natural history, anthropology, &c. : F. Pruner, Agyptens Naturgeschichte und Anthropologic (Erlangen, 1848) ; R. Hartmann, Naturgeschichtliche Skizze der Nilldnder (Berlin, 1866); Captain G. E. Shelley, Birds of Egypt (London, 1872). (F. R. C.)

1 The place of publication is London unless otherwise stated.

MODERN: INHABITANTS]

EGYPT

3 1

Inhabitants.

The population enumerated at the census taken in April 1907 was 11,189,978. In these figures nomad Arabs or Bedouins, esti- mated to number 97,381, are not included. The total population was thus returned at 11,287,359, or some 16% more than in 1897 when the inhabitants numbered 9,734,405. The figures for 1897 compared with 6,813,919 in 1882, an increase of 43.5% in fifteen years. Thus, during the first twenty-five years of the British occupation of the country the population in- creased by nearly 4,500,000. In 1800 the French estimated the population at no more than 2,460,000; the census of 1846 gave the figures at 4,476,440. From that year to 1882 the average annual increase was 1.25%. If the desert regions be excluded, the population of Egypt is extremely dense, being about 939 per sq. m. This figure may be compared with that of Belgium, the most densely populated country in Europe, 589 per sq. m., and with that of Bengal, 586 per sq. m. In parts of Menufia, a Delta province, the density rises to 1352 per sq. m., and in the Kena province of Upper Egypt to 1308. The population is generally divisible into — I The fellahin or peasantry and the native townsmen.

2. The Bedouins or nomad Arabs of the desert.

3. The Nuba, Nubians or Berberin, inhabitants of the Nile valley

between Assuan and Dongola.

4. Foreigners.

The first of these divisions • includes both the Moslem and Coptic inhabitants. The Bedouins, or the Arabs of the desert, are of two different classes: first, Arabic-speaking tribes who range the deserts as far south as 26 N.; secondly, the tribes inhabiting the desert from Kosseir to Suakin, namely the Hadendoa, Bisharin and the Ababda tribes. This group speak a language of their own, and are probably descendants of the Blemmyes, who occupied these parts in ancient times (see Arabs; Bedouins; Hadendoa; Bisharin; &c). The Nubas are of mixed negro and Arab blood. They are mainly agri- culturists, though some are keen traders (see Nubia).

Foreigners number over 150,000 and form 15% of the total population. They are chiefly Greeks — of whom the majority live in Alexandria — Italians, British and French. Syrians and Levantines are numerous, and there is a colony of Persians. The Turkish element is not numerically strong — a few thousands only — but holds a high social position.

Of the total population, about 20% is urban. In addition to the 97,000 pure nomads, there are half a million Bedouins described as ” semi-sedentaries,” i.e. tent-dwelling Arabs, usually encamped in those parts of the desert adjoining the cultivated land. The rural classes are mainly engaged in agriculture, which occupies over 62% of the adults. The professional and trading classes form about 10% of the whole population, but 50% of the foreigners are engaged in trade. Of the total population the males exceed the females by some 46,000.

The Coptic inhabitants are described in the article Copts, and the rural population under Fellah. It remains here to describe char- acteristics and customs common to the Moslem Egyptians Physical am j particularly to those of the cities. In some respects character- t ˆ e manner of life of the natives has been modified by Istlcs of con tact with Europeans, and what follows depicts in p general the habits of the people where little affected by

Egyptians. western culture. With regard to physical characteristics the Egyptians are of full average height (the men are mostly 5 ft. 8 in. or 5 ft. 9 in), and both sexes are remarkably well proportioned and of

strong physique. The Cairenes and the inhabitants of Lower Egypt generally have a clear complexion and soft skin of a light yellowish colour; those of Middle Egypt have a tawny skin, and the dwellers in Upper Egypt a deep bronze or brown complexion. The face of the men is of a fine oval, forehead prominent but seldom high, straight nose, eyes deep set, black and brilliant, _ mouth well formed, but with rather full lips, regular teeth beautifully made, and beard usually black and curly but scanty. Moustaches are worn, while the head is shaved save for a small tuft (called shusheh) upon the crown. As to the women, ” from the age of about fourteen to that of eighteen or twenty, they are generally models of beauty in body and limbs; and in countenance most of them are pleasing, and many exceedingly lovely; but soon after they have attained their perfect growth, they rapidly decline.” There are few Egyptian women over forty who retain either good looks or good figures. ” The forms of womanhood begin to develop themselves about the

ninth and tenth year : at the age oi fifteen or sixteen they gener- ally attain their highest degree of perfection. With regard to their complexions, the same remarks apply to them as to the men, with only this difference, that their faces, being generally veiled when they go abroad, are not quite so much tanned as those of the men. They are characterized, like the men, by a fine oval countenance, though in some instances it is rather broad. The eyes, with very few exceptions, are black, large and of a long almond-form, with long and beautiful lashes, and an exquisitely soft, bewitching ex- pression — eyes more beautiful can hardly be conceived : their charming effect is much heightened by the concealment of the other features (however pleasing the latter may be), and is rendered still more striking by a practice universal among the females of the higher and middle classes, and very common among those of the lower orders, which is that of blackening the edge of the eyelids both above and below the eye, with a black powder called ‘ kohl’ ” (Lane, Modern Egyptians). Both sexes, but especially the women, tattoo several parts of the person, and the women stain their hands and feet with the red dye of the henna.

The dress of the men of the upper and middle classes who have not adopted European clothing — a practice increasingly common — consists of cotton drawers, and a cotton or silk shirt with n .

very wide sleeves. Above these are generally worn a s ˆanu e waistcoat without sleeves, and a long vest of silk, called kaftan, which has hanging sleeves, and reaches nearly to the ankles. The kaftan is confined by the girdle, which is a silk scarf, or cash- mere or other woollen shawl. Over all is worn a long cloth robe, the gibbeh (or

jibbeh) somewhat resembling the kaftan in shape, but having shorter sleeves, and being open in front. The dress of the lower orders is the shirt and drawers, and waistcoat, with an outer shirt of blue cotton or brown woollen stuff; some wear a kaftan. The head-dress is the red cloth fez or tarbush round which a turban is usually worn. Men who have otherwise adopted European costume retain the tarbush. Many professions and religions, &c, are distinguished by the shape and colour of the turban, and various classes, and particularly servants, are marked by the form and colour of their shoes; but the poor go usually barefoot. Many ladies of the upper classes now dress in European style, with certain modifications, such as the head-veil. Those who retain native costume wear a very full pair of silk trousers, bright coloured stockings (usually pink), and a close-fitting vest with hanging sleeves and skirts, open down the front and at the sides, and long enough to turn up and fasten into the girdle, which is generally a cashmere shawl ; a cloth jacket, richly embroidered with gold, and having short sleeves, is commonly worn over the vest. The hair in front is combed down over the fore- head and cut across in a straight line ; behind it is divided into very many small plaits, which hang down the back, and are lengthened by silken cords, and often adorned with gold coins and ornaments. A small tarbush is worn on the back of the head, sometimes having a plate of gold fixed on the crown, and a handkerchief is tastefully bound round the temples. The women of the lower orders have trousers of printed or dyed cotton, and a close waistcoat. All wear the long and elegant head-veil. This is a simple ” breadth ” of muslin, which passes over the head and hangs down behind, one side, being drawn forward over the face in the presence of a man. A lady’s veil is of white muslin, embroidered at the ends in gold and colours; that of a person of the lower class is simply dyed blue. In going abroad the ladies wear above their indoor dress a loose robe of coloured silk without sleeves, and nearly open at the sides, and above it a large enveloping piece of black silk, which is brought over the head, and gathered round the person by the arms and hands on each side. A face-veil entirely conceals the features, except the eyes; it is a long and narrow piece of thick white muslin, reaching to a little below the knees. The women of the lower orders have the same out-door dress of different materials and colour. Ladies use slippers of yellow morocco, and abroad, inner boots of the same material, above which they wear, in either case, thick shoes, having only toes. The poor wear red shoes, very like those of the men. The women, especially in Upper Egypt, not infrequently wear nose-rings.

Children, though often neglected, are not unkindly treated, and reverence for their parents and the aged is early inculcated. They are

also well grounded in the leading doctrines of Islam. Boys are circumcised at the age of five or six years, when the boy is paraded, generally with a bridal procession, on a gaily caparisoned horse and dressed in woman's clothes. Most parents send their boys to school where a knowledge of reading and writing Arabic — the common tongue of the Egyptians — is obtainable, and from the closing years of the 19th century a great desire for the education of girls has arisen (see § Education).

It is deemed disreputable for a young man not to marry when he has attained a sufficient age; there are, therefore, few unmarried men. Girls, in like manner, marry very young, some at ten years of age, and few remain single beyond the age of sixteen; they are

Generally very prolific. The bridegroom never sees his future wife efore the wedding night, a custom rendered more tolerable than it otherwise might be by the facility of divorce. A dowry is always given, and a simple marriage ceremony performed by a fiki (a school-master, or one who recites the Koran, properly one learned in fiqh, Mahommedan law) in the presence of two witnesses. The bridal of a virgin is attended with great festivity and rejoicing, a grandee's

wedding sometimes continuing eleven days and nights. On the last day, which should be that terminating with the eve of Friday, or of Monday, the bride is taken in procession to the bridegroom's house, accompanied by her female friends, and a band of musicians, jugglers, wrestlers, &c. As before stated, a boy about to be circumcised joins in such a procession, or, frequently, a succession of such boys. Though allowed by his religion four wives, most Egyptians are monogamists. A man may, however, possess any number of con- cubines, who, though objects of jealousy to the legal wife, are tolerated by her in consideration of her superior position and power over them, a power which she often uses with great tyranny; but certain privileges are possessed by concubines, especially if they have borne sons to their master. A divorce is rendered obligatory by the simple words " Thou art divorced." Repudiation may take place twice without being final, but if the husband repeats thrice " Thou art divorced " the separation is absolute. In that case the dowry must be returned to the wife.

Elaborate ceremonies are observed at funerals. Immediately on death the corpse is turned towards Mecca, and the women of the household, assisted by hired mourners, commence their peculiar wailing, while fikis recite portions of the Koran. The funeral takes place on the day of the death, if that happen in the morning; other- wise on the next day. The corpse, having been washed and shrouded, is placed in an open bier, covered with a cashmere shawl, in the case of a man; or in a closed bier, having a post in front, on which are placed feminine ornaments, in that of a woman or child. The funeral procession is headed by a number of poor, and generally blind, men, chanting the profession of the faith, followed by male friends of the deceased, and a party of schoolboys, also chanting, generally from a poem descriptive of the state of the soul after death. Then follows the bier, borne on the shoulders of friends, who are relieved by the passers-by, such an act being deemed highly meritorious. Behind come the women relatives and the hired wailers. On the way to the cemetery the corpse is generally carried to some revered mosque. Here the funeral service is performed by the imam, and the pro- cession then proceeds to the tomb. In the burials of the rich, water and bread are distributed to the poor at the grave; and sometimes a buffalo or several buffaloes are slaughtered there, and the flesh given away. The tomb is a vault, surmounted by an oblong stone monument, with a stele at the head and feet; and a cupola, sup- ported by four walls, covers the whole in the case of sheikhs' tombs and those of the wealthy. During the night following the interment, called the Night of Desolation, or that of

Solitude, the soul being believed to remain with the body that one night, fikis are engaged at the house of the deceased to recite various portions of the Koran, and, commonly, to repeat the first clause of the profession of the faith, ” There is no God but God,” three thousand times. The women alone put on mourning attire, by dyeing their veils, shirts, &c, dark blue, with indigo; and they stain their hands, and smear the walls, with the same colour. Everything in the house is also turned upside down. The latter customs are not, however, observed on the death of an old man. At certain periods after the burial, a khatmeh, or recitation of the whole of the Koran, is performed, and the tomb is visited by the women relations and friends of the deceased. The women of the peasants of Upper Egypt perform strange dances, &c, at funerals, which are regarded partly as relics of ancient Egyptian customs.

The harem system of appointing separate apartments to the women, and secluding them from the gaze of men, is observed in Egypt as in other Moslem countries, but less strictly. The women of an Egyptian household in which old customs are maintained never sit in the presence of the master, but attend him at his meals, and are treated in every respect as inferiors. The mother, however, forms a remarkable exception to this rule; in rare instances, also, a wife becomes a companion to her husband. On the other hand, if a pair of women’s shoes are placed outside the door of the harem apartments, they are understood to signify that female visitors are within, and a man is sometimes thus excluded from the upper portion of his own house for many days. Ladies of the upper or middle classes lead a life of extreme inactivity, spending their time at the bath, which is the general place of gossip, or in receiving visits, embroidering, and the like, and in absolute dolce far niente. Both sexes are given to licentiousness.

The principal meals are breakfast, about an hour after sunrise; dinner, or the mid-day meal, at noon; and supper, which is the chief meal of the day, a little after sunset. Pastry, sweetmeats and fruit are highly esteemed. Coffee is taken at all hours, and is, with a pipe, presented at least once to each guest. Tobacco is the great luxury of the men of all classes in Egypt, who begin and end the day with it, and generally smoke all day with little intermission. Many women, also, especially among the rich, adopt the habit. The smok- ing of hashish, though illegal, is indulged in by considerable numbers of people. Men. who can afford to keep a horse, mule or ass are very seldom seen to walk. Ladies ride asses and sit astride. The poorer classes cannot fully observe the harem system, but the women are in general carefully veiled. Some of them keep small shops, and all fetch water, make fuel, and cook for their households. Domestic slavery lingers but is

moribund. The majority of the slaves are negresses employed in household duties.

In social intercourse the Egyptians observe many forms of salu-

tation and much etiquette ; they are very affable, and readily enter into conversation with strangers. Their courtesy and dignity of manner are very striking, and are combined with ease and a fluency of discourse. They have a remarkable quickness of apprehension, a ready wit, a retentive memory, combined, however, with religious pride and hypocrisy, and a disregard for the truth. Their common discourse is full of asseverations and expressions respecting sacred things. They entertain reverence for their Prophet ; and the Koran is treated with the utmost respect — never, for example, being placed in a low situation — and this is the case with everything they esteem holy. They are fatalists, and bear calamities with surprising resig- nation. Their filial piety and respect for the aged have been men- tioned, and benevolence and charity are conspicuous in their char- acter. Humanity to animals is another virtue, and cruelty is openly discountenanced in the streets. Their affability, cheerfulness and hospitality are remarkable, as well as frugality and temperance in food and drink, and honesty in the payment of debt. Their cupidity is mitigated by generosity; their natural indolence by the necessity, especially among the peasantry, to work hard to gain a livelihood. Egyptians, however, are as a rule suspicious of all not of their own creed and country. Murders and other grave crimes are rare, but petty larcenies are very common.

The amusements of the people are generally not of a violent kind, being in keeping with their sedentary habits and the heat of the climate. The bath is a favourite resort of both sexes and all classes. They are acquainted with chess, draughts, backgammon, and other games, among which is one peculiar to themselves, called Mankalah, and played with cowries. Notwithstanding its condemnation by Mahomet, music is the most favourite recreation of the people ; the songs of the boatmen, the religious chants, and the cries in the streets are all musical. There are male and female musical per- formers; the former are both instrumental and vocal, the latter (called ‘Almeh, pi. ‘Awalim) generally vocal. The ‘Awalim are, as their name (” learned “) implies, generally accomplished women, and should not be confounded with the Ghawazi, or dancing-girls. There are many kinds of musical instruments. The music, vocal and instrumental, is generally of little compass, and in the minor key; it is therefore plaintive, and strikes a European ear as some- what monotonous, though often possessing a simple beauty, and the charm of antiquity,

for there is little doubt that the favourite airs have been handed down from remote ages. The Ghawazi (sing. Ghazia) form a separate class, very similar to the gipsies. They inter- marry among themselves only, and their women are professional dancers. Their performances are often objectionable and are so regarded by many Egyptians. They dance in public, at fairs and religious festivals, and at private festivities, but, it is said, not in respectable houses. Mehemet Ali banished them to Esna, in Upper Egypt; and the few that remained in Cairo called themselves ‘Awalim, to avoid punishment. Many of the dancing-girls of Cairo to-day are neither Awalim nor Ghawazi, but women of the very lowest class whose performances are both ungraceful and indecent. A most objectionable class of male dancers also exists, who imitate the dances of the Ghawazi, and dress in a kind of nondescript female attire. Not the least curious of the public performances are those of the serpent-charmers, who are generally Rifa’ia (Saadia) dervishes. Their power over serpents has been doubted, yet their performances remain unexplained; they, however, always extract the fangs of venomous serpents. Jugglers, rope-dancers and farce-players must also be mentioned. In the principal coffee-shops of Cairo are to be found reciters of romances, surrounded by interested audiences.

The periodical public festivals are exceedingly interesting, but many of the remarkable observances connected with them are passing away. The first ten days of the Mahommedan year are held to be blessed, and especially the tenth; Z* }■ . and many curious practices are observed on these days, f es >’ vals – particularly by the women. The tenth day, being the anniversary of the martyrdom of Hosain, the son of Ali and grandson of the Prophet, the mosque of the Hasanen at Cairo is thronged to excess, mostly by women. In the evening a procession goes to the mosque, the principal figure being a white horse with white trappings, upon which is seated a small boy, the horse and the lad, who represents Hosain, being smeared with blood. From the mosque the procession goes to a private house, where a mullah recites the story of the martyr- dom. Following the order of the lunar year, the next festival is that of the Return of the Pilgrims, which is the occasion of great rejoicing, many having friends or relatives in the caravan. The Mahmal, a kind of covered litter, first originated by Queen Sheger-ed-Dur, is brought into the city in procession, though not with as much pomp as when it leaves with the pilgrims. These and other processions have lost much of their effect since the extinction of the Mamelukes, and the gradual disuse of gorgeous dress for the retainers of the officers of state. A regiment of regular infantry makes but a sorry substitute for the splendid

cavalcade of former times. The Birth of the Prophet (Molid en-Nebi), which is celebrated in the beginning of the third month, is the greatest festival of the whole year. For nine days and nights Cairo has more the aspect of a fair than of a city keeping a religious festival. The chief ceremonies take place in some large open spot round which are erected the tents of the khedive, of great state officials, and of the dervishes. Next in time, and also in importance, is the Molid El-Hasanen, commemorative

of the birth of Hosain, and lasting fifteen days and nights; and at the same time is kept the Molid of al-Salih Ayyub, the last sovereign but two of the Ayyubite dynasty. In the seventh month occur the Molid of the sayyida Zenab, and the commemoration of the Miarag, or the Prophet's miraculous journey to heaven. Early in the eighth month (Sha'ban), the Molid of the imam Shafi'i is ob- served ; and the night of the middle of that month has its peculiar customs, being held by the Moslems to be that on which the fate of all living is decided for the ensuing year. Then follows Ramadan, the month of abstinence, a severe trial to the faithful; and the Lesser Festival (Al-'id as-saghir), which commences Shawwal, is hailed by them with delight. A few days after, the Kiswa, or new covering for the Ka'ba at Mecca, is taken in procession from the citadel, where it is always manufactured, to the mosque of the Hasanen to be completed; and, later, the caravan of pilgrims departs, when the grand procession of the Mahmal takes place. On the tenth day of the last month of the year the Great Festival (Al-'id al-kablr), or that of the Sacrifice (commemorating the willing- ness of Ibrahim to slay his son Ismail — according to the Arab legend), closes the calendar. The Lesser and Great Festivals are those known in Turkish as the Bairam (q.v.).

The rise of the Nile is naturally the occasion of annual customs, some of which are doubtless relics of antiquity; these are observed according to the Coptic calendar. The commencement of the rise is commemorated on the night of the nth of Bauna, the 17th of June, called that of the Drop (Lelet-en-Nukta), because a miraculous drop is then supposed to fall and cause the swelling of the river. The real rise begins at Cairo about the summer solstice, or a few days later, and early in July a crier in each district of the city begins to go his daily rounds, announcing, in a quaint chant, the increase of water in the

nilometer of the island of Roda. When the river has risen 20 or 21 ft., he proclaims the Wefa en-Nil, ” Completion ” or ” Abundance of the Nile.” On the following day the dam which closed the canal of Cairo was cut with much ceremony. The canal having been filled up in 1897 the ceremony has been much modified, but a brief description of what used to take place may be given. A pillar of earth before the dam is called the ” Bride of the Nile,” and Arab historians relate that this was substituted, at the Moslem conquest, for a virgin whom it was the custom annually to sacrifice, to ensure a plentiful inundation. A large boat, gaily decked out, representing that in which the victim used to be conveyed, was anchored near, and a gun on board fired every quarter of an hour during the night. Rockets and other fireworks were also let off, but the best, strangely, after daybreak. The governor of Cairo attended the ceremony, with the cadi and others, and gave the signal for the cutting of the dam. As soon as sufficient water had entered, boats ascended the canal to the city. The crier continues his daily rounds, with his former chant, excepting on the Coptic New Year’s Day, when the cry of the Wefa. is repeated, until the Salib, or Discovery of the Cross, the 26th or 27th of September, at which period, the river having attained its greatest height, he con- cludes his annual employment with another chant, and presents to each house some limes and other fruit, and dry lumps of Nile mud.

The period of the hot winds, called the khamsin, that is, ” the fifties,” is calculated from the day after the Coptic Easter, and ter- minates on the day of Pentecost, and the Moslems observe the Wednesday preceding this period, called ” Job’s Wednesday,” as well as its first day, when many go into the country from Cairo, ” to smell the air.” This day is hence called Shem en-Nesim, or ” the smelling of the zephyr.” The Ulema observe the same custom on the first three days of the spring quarter.

Tombs of saints abound, one or more being found in every town and village; and no traveller up the Nile can fail to remark how every prominent hill has the sepulchre of its patron saint. The great saints of Egypt are the imam Ash-Shafi’i, founder of the per- suasion called after him, the sayyid Ahmad al-BaidawI, and the sayyid Ibrahim Ed-Desuki, both of whom were founders of orders of dervishes. Al-Baidawi, who lived in the 13th century A.D., is buried at the town of Tanta, in the Delta, and his tomb attracts many thousands of visitors at each of the three festivals held yearly in his honour; Ed-Desuki is also much revered, and his festivals draw together, in like manner, great crowds to his birthplace, the town of Desuk. But, besides the graves of her native saints, Egypt boasts of those of several members of the Prophet’s family, the tomb of the sayyida Zeyneb, daughter of

‘Ali, that of the sayyida Sekeina, daughter of Hosain, and that of the sayyida Nefisa, great-grand- daughter of Hasan, all of which are held in high veneration. The mosque of the Hasanen (or that of the ” two Hasans “) is the most reverenced shrine in the country, and is believed to contain the head of Hosain. Many orders of Dervishes live in Egypt, the following being the most celebrated: — (1) the Rifa’ia, and their sects the ‘Ilwania and Saadia; (2) the Qadiria (Kahirla), or howling dervishes; (3) the Ahmedla, or followers of the sayyid Ahmad al-Baidawl, and their sects the Beyumia (known by their long hair), Shinnawia, Sharawia and many others; and (4) the Baramia, or followers of the sayyid Ibrahim Ed-Desuki. These are all presided over by a direct descendant of the caliph Abu Bekr, called the Sheikh El-Bekri. The Saadia are famous for charming and eating live serpents, &c, and the ‘Ilwania for eating fire, glass, &c. The Egyptians firmly believe in the efficacy of charms, a belief associated

with that in an omnipresent and over-ruling providence. Thus the doors of houses are inscribed with sentences from the Koran, or the like, to preserve from the evil eye, or avert the dangers of an unlucky threshold ; similar inscriptions may be observed over most shops, while almost every one carries some charm about his person. The so-called sciences of magic, astrology and alchemy still flourish.

Authorities. — The standard authority for the Moslem Egyptians is E. W. Lane’s Manners and Customs of the Modern Egyptians, first published in 1836. The best edition is that of i860, edited, with additions, by E. S. Poole. See also B. Saint-John, Village Life in Egypt (2 vols., 1852); S. Lane Poole, Social Life in Egypt (1884); P. Arminjon, V Enseignement, la doctrine, et la vie dans les universitds musulmanes d’Hgypte (Paris, 1907). For the language see J. S. Willmore, The Spoken Arabic of Egypt (2nd ed., London,,. 1905); Spitta Bey, Grammatik des arabischen Vulgardialektes von Agypten, Conies arabes modernes (Leiden, 1883). For statistical information consult the reports on the censuses of 1897 and 1907, published by the Ministry of the Interior, Cairo, in 1898 and 1909.

(E.S. P.; S. L.-P.; F. R. C.)

Finance.

The important part which the financial arrangements have played in the political and social history of Egypt since the accession of Ismail Pasha in 1863 is shown in the section History of this article. Here it is proposed to trace the steps by which Egypt, after having been brought to a state of bankruptcy, passed through a period of great stress, and

finally attained prosperity and a large measure of financial autonomy.

In 1862 the foreign debt of Egypt stood at £3,292,000. With the accession of Ismail (q.v.) there followed a period of wild extravagance and reckless borrowing accompanied by the extortion of every piastre possible from the fellahin. The real state of affairs was disclosed in the report of Mr Stephen Cave, a well-known banker, who was sent by the British government in December 1875 to inquire into the situation. The Cave report showed that Egypt suffered from ” the ignorance, dishonesty, waste and extravagance of the East ” and from ” the vast expense caused by hasty and inconsiderate endeavours to adopt the civilization of the West.” The debtor and creditor account of the state from 1864 to 1875 showed receipts amounting to £148,215,000. Of this sum over £94,000,000 had been obtained from revenue and nearly £4,000,000 by the sale of the khedive’s shares in the Suez Canal to Great Britain. The rest was credited to: loans £31,713,000, floating debt £18,243,000. The cash which reached the Egyptian treasury from the loans and floating debt was far less than the nominal amount of such loans, none of which cost the Egyptian government less than 12% per annum. When the expenditure during the same period was examined the extraordinary fact was disclosed that the sum raised by revenue was only three millions less than that spent on administration, tribute and public works, including a sum of £10,500,000, described as ” expenses of questionable utility or policy.” The whole proceeds of the loans and floating debt had been absorbed in payment of interest and sinking funds, with the exception of £16,000,000 debited to the Suez Canal. In other words, Egypt was burdened with a debt of £91,000,000 — funded or floating — for which she had no return, for even from the Suez Canal she derived no revenue, owing to the sale of the khedive’s shares.

Soon after Mr Cave’s report appeared (March 1876), default took place on several of the loans. Nearly the whole of the debt, it should be stated, was held in England or France, and at the instance of French financiers the stoppage of payment was followed by a scheme to unify the debt. This scheme included the distribution of a bonus of 25% to holders of treasury bonds. These bonds had then reached a sum exceeding £20,000,000 and were held chiefly by French firms. The unification scheme was elaborated in a khedivial decree of the 7th of May 1876, but was rendered abortive by the opposition of the British bondholders. Its place was taken by another scheme drawn up by Mr (afterwards Lord) Goschen and M. Joubert, who represented the British and French bondholders respectively. The details of this settlement, promulgated by decree of the 1 7th of November 1876, need not be given, as it was superseded in 1880. One of the securities

devised for the benefit of the bend holders in the abortive scheme of May 1876 was retained in the

Goschen-Joubert settlement, and being continued in later settle- ments grew to be one of the most important institutions in Egypt. This security was the establishment of a Treasury of the Public Debt, known by its French title of Caisse de la Dettc, and commonly spoken of simply as '"the Caisse." The duty of this body was to act as receivers of the revenues assigned to the service of the debt. To render their powers effective they were given the right to sue the Egyptian government in the Mixed Tribunals for any breach of engagement to the bondholders.

The Goschen-Joubert settlement was accompanied by guar- antees against maladministration by the appointment of an Englishman and a Frenchman to superintend the ™ uJfrT ° /revenue and expenditure — the "Dual Control"; tlon. while a commission was appointed in 1878 to investi-

gate the condition of the country. The settlement of 1880 was effected on the basis of the proposals made by this commission, and was embodied in the Law of Liquidation of July 1880 — after the deposition of Ismail. For the purposes of the new settlement the loans raised by Ismail on his private estates, those known as the Daira {i.e. " administrations ") and Domains loans, were brought into account. By the Law of Liquidation the floating debt was paid off, the whole debt being consolidated into four large loans, upon which the rate of interest was reduced to a figure which it was considered Egypt was able to bear. The Egyptian debt under this composition was:

Privileged debt £22,609,000

Unified debt 58,018,000

Daira Sanieh loan 9,513,000

Domains loan 8,500,000

£98,640,000

The rate of interest was, on the Privileged debt and Domains loan, 5%; on the Unified debt and Daira loan, 4%. Under this settlement the total annual charges on the country amounted to £4,500,000, about half the then revenue of Egypt. These charges included the services of the Privileged and Unified debts, the tribute to Turkey and the interest on the Suez Canal shares held by Great Britain, but excluded the interest on the Daira and Domains loans, expected to be defrayed by the revenues from the estates on which those loans were secured. The general revenue of Egypt was divided between the bond- holders and the government, any surplus on the bondholders' share being devoted to the redemption of the capital.

The 1880 settlement proved little more lasting than that of 1876. After a brief period of prosperity, the Arabi rising, the riots at Alexandria, and the events generally which led to the British occupation of Egypt in 1882, followed by the losses incurred in the Sudan in the effort to prevent it falling into the hands of the Mahdi, brought Egypt once more to the verge of financial disaster. The situation was an anomalous one. While the revenue assigned to the service of the debt was more than sufficient for the payment of interest and the sinking fund was in full operation, the government found that their share of the revenue was altogether inadequate for the expenses of administra- tion, and they were compelled to borrow on short loans at high rate of interest. Moreover, to make good the losses incurred at Alexandria, and to get money to pay the charges arising out of the Sudan War and the Arabi rebellion, a new loan was essential. On the initiative of Great Britain a conference between the representatives of the great powers and Turkey was held in London, a*nd resulted in the signing of a convention in March 1885. The terms agreed upon in this instrument, known as the London Convention, were embodied in a khedivial decree, which, with some modification in detail, remained for twenty years the organic law under which the finances of Egypt were administered.

The principle of dividing the revenue of the country between the Caisse, as representing the bondholders, and the government was maintained by the London Convention. The revenue assigned to the service of the debt, namely, that derived from the railway, telegraphs, port of Alexandria, customs (including

tobacco) and from four of the provinces, remained as before. It was recognized, however, that the non-assigned revenue was insufficient to meet the necessary expenses of govern- pft, v / s / ons ment, and a scale of administrative expenditure was of the drawn up. This was originally fixed at ££.5,237,000/ London but subsequently other items

were allowed, and ~° ayea ‘ in 1904, the last year in which the system described existed, it was ££.6,300,600. The Caisse was authorized, after payment of the coupons on the debt, to make good out of their balance in hand the difference between the authorized expenditure and the non-assigned revenue. If a surplus remained to the Caisse after making good such deficit the surplus was to be divided equally between the Caisse and the government; the government to be free to spend its share as it pleased, while the Caisse had to devote its share to the reduc- tion of the debt. This limitation of administrative expenditure was the cardinal feature and the leading defect of the convention. Those responsible for this arrangement — the most favourable for Egypt that Great Britain could secure — failed to recognize the complete change likely to result from the British occupation of Egypt, and probably regarded that occupation as temporary. The system devised might have been justifiable as a check on a retrograde government, but was wholly inapplicable to a reform- ing government and a serious obstacle to the attainment of national prosperity. In practice administrative expenditure always exceeded the amount fixed by the convention. Any excess could, however, only be met out of the half-share of the eventual surplus reached in the manner described. Consequently, in order to meet new expenditure necessitated by the growing wants of a country in process of development, just double the amount of revenue had to be raised.

To return to the provisions of the London Convention. The convention left the permanent rate of interest on the debt, as fixed by the Law of Liquidation, unchanged, but to afford temporary relief to the Egyptian exchequer a reduction of 5% on the interest of the debt was granted for two years, on condition that if at the end of that period payment, including the arrears of the two years, was not resumed in full, another international commission was to be appointed to examine into the whole financial situation. Lastly, the convention empowered Egypt to raise a loan of nine millions, guaranteed by all the powers, at a rate of interest of 3 %. For the service of this loan — known as the Guaranteed loan — an annuity of £315,000 was provided in the Egyptian budget for interest and sinking fund. The £9,000,000 was sufficient to pay the Alexandria indemnities, to wipe out the deficits of the preceding years, to give the Egyptian treasury a working balance of £E. 500,000 and thereby avoid the creation of a fresh floating debt, and to provide a million for new irrigation works. To the wise foresight which, at a moment when the country was sinking beneath a weight of debt, did not hesitate to add this million for expenditure on productive works, the present prosperity of Egypt is largely due.

The provisions of the London Convention did not exhaust the

restrictions placed upon the Egyptian government in respect of financial autonomy. These restrictions were of two categories, (1) those independent of the London Convention, (2) those dependent upon that instrument. In the first category came (a) the prohibition to raise a loan without the consent of the Porte. The right to raise loans had been granted to the khedive Ismail in 1873, but was taken away in 18 79 by the firman appoint- ing Tewfik khedive. (b) Next came the inability to levy taxes on foreigners without the consent of their respective governments. This last obligation was, in virtue of the Capitulations, applicable to Egypt as part of the Ottoman empire. The only exception, resulting from the Ottoman law under which foreigners are allowed to acquire and hold real property, is the land tax. (All taxes formerly paid by natives and not by foreigners have been abolished in Egypt, but the immunity described constitutes a most serious obstacle to the redistribution of the burden of taxation in a more equitable manner.)

J The figures of the debt are always given in £ sterling. The budget figures are in £E. (pounds Egyptian), equal to £1, os. 6d.

From the purely Egyptian point of view the most powerful restriction in this first category remains to be named. In 1883 the supervision exercised over the finances by French and British controllers was replaced by that of a British official called the financial adviser. The British government has declared that ” no financial decision shall be taken without his consent,” a declaration never questioned by the Egyptian government. This restriction, therefore, is at the same time the chief safeguard for the purity of Egypt’s finances.

In the second category of restrictions, namely, those dependent on the London Convention, were the various commissions or boards known as Mixed Administrations and having relations of a quasi-independent character with the ministry of finance. Of these boards by far the most important was the Caisse. As first constituted it consisted of a French, an Austrian, and an Italian member; a British member was added in 1877 and a German and a Russian member in 1885. The revenue assigned to the debt charges was paid direct to the Caisse without passing through the ministry of finance. The assent of the Caisse (as well as that of the sultan) was necessary before any new loan could be

issued, and in the course of a few years from its creation this body acquired very extensive powers. Besides the Caisse there was the Railway Board, which administered the railways, telegraphs and port of Alexandria for the benefit of the bondholders, and the Daira and Domains commissions, which administered the estates mortgaged to the holders of those loans. Each of the three boards last named consisted of an Englishman, a Frenchman and an Egyptian.

During the two years that followed the signing of the London Convention, the financial policy of the Egyptian government was The race directed to placing the country in a position to resume against full payment of the interest on the debt in 1887, and bank- thereby to avoid the appointment of an international ruptcy. commission. By the exercise of the most rigid economy in all branches this end was attained, though budgetary equi- librium was only secured by a variety of financial expedients, justified by the vital importance of saving Egypt from further international interference. By such means this additional complication was averted, but the struggle to put Egypt in a genuinely solvent position was by no means over. It was not until his report on the financial results of 1888 that Sir Evelyn Baring (afterwards Lord Cromer) was able to inform the British government that the situation was such that " it would take a series of untoward events seriously to endanger the stability of Egyptian finance and the solvency of the Egyptian government." From this moment the corner was turned, and the era of financial prosperity commenced. The results of the labours of the preced-, ing six years began to manifest themselves with a rapidity which surprised the most sanguine observers. The principal feature of the successive Egyptian budgets of 1890-1894 was the fiscal relief afforded to the population. From 1894 onward more attention was paid than had hitherto been possible to the legitimate demands of the spending departments and to the prosecution of public works. Of these the most notable was the construction (1898-1902) of the Assuan dam, which by bringing more land under cultivation permanently increased the resources of the country and widened the area of taxation.

With the accumulating proofs of the financial stability of the country various changes were made in connexion with the debt charges. With the consent of the powers a General funds. Reserve Fund was created by decree of the 1 2th of July 1888, into which was paid the Caisse's half-share in the eventual surplus of revenue. This fund, primarily intended as a security for the bondholders, might be drawn upon for extra- ordinary expenditure with the consent of the commissioners of the Caisse. Large sums were so advanced for the purposes of drainage and irrigation and other public works, and in relief of taxation. The

defect of this arrangement consisted in the necessity of obtaining the consent of the commissioners — a con- sent sometimes withheld on purely political grounds. At the same time it is believed that but for the faculty given by the decree of 1888 to spend the General Reserve Fund on public works, the financial system elaborated by the London Convention would

have broken down altogether. Between 1888 and 1904 about £10,000,000 was devoted from this fund to public works.

In June 1890 the assent of the powers was obtained to th« conversion of the Preference (Privileged), Domains and Daira loans on the following conditions, imposed at the initiative of the French government: —

1. The employment of the economies resulting from the conver- sion was to be the subject of future agreement with the powers.

2. The Dai'ra loan was to be reimbursed at 85 %, instead of 80 %, as provided by the Law of Liquidation.

3. The sales of Domains and Dai'ra lands were to be restricted to £E. 300,000 a year each, thus prolonging the period of liquidation of those estates.

The interest on the Preference stock was reduced from 5 to 3 1 %, and on the Domains from 5 to 4! . As regards the Da'ira loan, there was no apparent reduction in the rate of interest, which remained at 4, but the bondholders received £85 of the new stock for every £100 of the old. The capital of the debt was increased by £1,945,000 by these conversions, while the annual economy to the Egyptian government amounted at the time of the conversion to ££.348,000. Further, an engagement was entered into that there should be no reimbursement of the loans till 1905 for the Preference and Da'ira, and 1908 for the Domains. Byan arrangement concluded in June 1898, between the Egyptian government and a syndicate, the unsold balance of the Daira estates was taken over by the syndicate in October 1905, for the amount of the debt remaining, when the Da'ira loan ceased to exist. The fund formed by the accumulation of the economies re- sulting from the conversion of the Privileged, Da'ira and Domains loan was known as the Conversion Economies Fund. The fund could not be used for any purpose without the consent of the powers, and the money paid into it was invested by the Caisse in Egyptian stock. The fund therefore acted as a very expensive sinking fund, the market price of the stock purchased being above par. Up to 1904 the consent of the

powers to the employment of this fund for any purpose of public utility was withheld. On the 31st of December of that year the fund amounted to £E. 6, 031,000. It may be added that besides the General Reserve Fund and the Conversion Economies Fund, there existed another fund called the Special Reserve Fund. This was constituted in 1886 and was chiefly made up of the net savings of the Egyptian government on its share of the annual surpluses from revenue. Of the three funds this last-named was the only one at the absolute disposal of the government. The whole of the extraordinary expenditure of the Sudan campaigns of 1896-1898, with the exception of £800,000 granted by the British government, was paid out of this fundˆ — a sum amounting in round figures to £1,500,000.

Notwithstanding all the hampering conditions stated, the prosperity of the country became more manifest each succeeding year. During the four years 1883-1886, both inclusive, the aggregate deficit amounted to £E. 2, 606,000. In ˆgˆJˆ

1887 there was practical equilibrium in the budget, in

1 888 there was a deficit of £E. 53 ,000. In 1889 there was a surplus of £E. 218,000, and from that date onward every year has shown a surplus. In 1895 the surplus exceeded, for the first time, £E.i,ooc,ooo. The growth of revenue was no less marked. ” In 1883 — the first complete year after the British occupation — the revenue was slightly under 9 millions. This sum was collected with difficulty. The revenue steadily rose until, in 1890, the figure of 10 millions was exceeded. In 1897 a figure of over 11 millions was attained. Continuing to rise with ever-increasing rapidity, a revenue of close on 12 millions was collected in 1901 and 1902, in spite of the fact that during the latter of these two years the Nile flood was one of the lowest on record. In 1903 the revenue amounted to 125 millions, and in 1904 the unprecedented figure of £E. 13,906,000 was reached.” 1 Yet during this period the amount of direct taxation remitted reached £E. 1,900,000 a year. Arrears of land tax to the extent of ££.1,245,000 were cancelled. In indirect taxation the salt tax had been reduced by 40%, the postal, railway and telegraph rates lowered, octroi duties and bridge and lock dues abolished. The only increase of taxation had been on tobacco, on which the duty was raised from

1 Egypt, No. 1 (1905), p. 20.

P.T. 14 to P.T. 20 per kilogramme. At the same time the house duty, with the consent of the powers, had been imposed on European residents. The fact that during the period under review Egypt suffered very severely from the general fall in the price of commodities makes the prosperity of the country the more remarkable. Had it not been for the great increase of production as the result of improved irrigation and the fiscal relief afforded to landowners, the agricultural depression would have impaired the financial situation. In this connexion it should be stated that during 1899 the reassessment of the land tax, a much-needed reform, was seriously taken in hand. The existing assessment, made before the British occupation, had long been condemned by all competent authorities, but the inherent intricacies and difficulties of the problem had hitherto postponed a solution. After careful study and a preliminary examination of the land, a scheme was passed which has given satisfaction to the landowning community, and which distributes the tax equitably in proportion to the fertility of the soil. Thereassessmentwascompletedini907. While the country thus prospered it also suffered greatly from the restrictions imposed by the system of international control. The cost This system produced a great disproportion between of later- the sums available for capital and those available for national- administrative expenditure. Although the money for *”’ public works could be obtained out of grants from

the General Reserve Fund, there was no fund from which to provide a sufficient sum to keep those works in order. Moreover, to avoid having to pay half the amount received into the General Reserve Fund the government was compelled to keep certain items of revenue and expenditure out of the accounts altogether — a violation of the principles of sound finance. Then there was the glaring anomaly of allowing the Conversion Economies to accumulate at compound interest in the hands of the commis- sioners of the Caisse, instead of using the money for remunerative purposes. The net result of internationalism was to impose an extra charge of about £1 ,7 50,000 a year on the Egyptian treasury. All these cumbersome restrictions were swept away by the khedivial decree of the 28th of November 1904, a decree which Bgygf received the assent of the powers and was the result gains of the Anglo-French agreement of April 1904 (see

tinamdal § History). The decree did not affect the inability UDert y- of Egypt to tax foreigners without their consent nor remove the right of Turkey to veto the issue of new loans, but in other respects the financial changes made by it were of a radical character. The main

effect was to give to the Egyptian government a free hand in the disposal of its own resources so long as the punctual payment of interest on the debt was assured. The plan devised by the London Convention of fixing a limit to administrative expenditure was abolished. The consent of the Caisse to the raising of a new loan was no longer required. The Caisse itself remained, but shorn of all political and adminis- trative powers, its functions being strictly limited to receiving the assigned revenues and to ensuring the due payment of the coupon. The nature of the assigned revenue was altered, the land tax being substituted for those previously assigned, that tax being chosen as it had a greater character of stability than any other source of revenue. By this means Egypt gained com- plete control of its railways, telegraphs, the port of Alexandria and the customs, and as a consequence the mixed administration known as the Railway Board ceased to exist. Moreover, it was provided that when the Caisse had received from the land tax the amount needed for the service of the debt, the balance of the tax was to be paid direct to the Egyptian treasury. The Con- version Economies Fund was also placed at the free disposal of the Egyptian government. The General Reserve Fund ceased to exist, but for the better security of the bondholders a reserve fund of £1,800,000 was constituted and left in the hands of the Caisse to be used in the highly improbable event of the land tax being insufficient to meet the debt charges. Moreover, the Caisse started under the new arrangement with a cash balance of £1,250,000. The interest of the money lying in the hands of the Caisse goes towards meeting the debt charges and thus reduces the amount needed from the land tax. The

bondholders gained a further material advantage by the consent of the Egyptian government to delay the conversion of the loans, which under previous arrangements they would have been free to do in 1905. It was agreed that there should be no con- version of the Guaranteed or Privileged debts before 1910 and no conversion of the Unified debt until 1912. Such were the chief provisions of the khedivial decree, and in 1905, for the first time, it was possible to draw up the Egyptian budget in accord- ance with the needs of the country and on perfectly sound principles.

In the system adopted in 1905 and since maintained, recurring and non-recurring expenditure were shown separately, the non-recurring expenditure being termed ” special.” At the same time a new General Reserve Fund was created, made up chiefly of the surpluses of the old General Reserve, Special Reserve, and Conversion Economies funds. This new fund started with a capital of £13.376,000 and was replenished by the surpluses of subsequent years, by the interest

earned by its temporary investment, and by the sums accruing by the liquidation of the Dai'ra and Domains loans. During 1905 and 1506 about £3,000,000 was paid into the fund through the liquidation of the Dai'ra loan. From this fund, which had a balance of over £12,000,000 in 1906, is taken capital expendi- ture on remunerative public works in Egypt and the Sudan, and while the fund lasts the necessity for any new loan is avoided. The greater freedom of action attained as the result of the Anglo-French declaration of 1904 enabled the Egyptian government to advance simultaneously along the lines of fiscal reform and increased ad- ministrative expenditure. Thus in 1906 the salt monopoly was abolished at a cost to the revenue of £175,000, while the reduction of import duties on coal and other fuels, live-stock, &c, involved a further loss of £118,000, and an increase of over £1,000,000 in expenditure was budgeted for. The accounts for 1907 showed a total revenue of £E. 16,368,000 and a total expenditure of £E.i4,28o,ooo, a surplus of £E.2,o88,ooo. The annual growth of revenue for the previous five years averaged over £6.500,000. About one-third of the annual revenue is derived from the land tax ; customs and tobacco duties yield about £3,000,000, and an equal or larger amount is received from railways and other revenue-earning departments. The chief items of ordinary expenditure are tribute and debt charges, the expenses of the civil administration, of the Egyptian army (between £500,000 and £600,000 yearly), of the revenue-earning departments and of pensions.

It will be convenient here to summarize the position of the Egyptian debt at the close of 1905, that is at the period immediately following the liquidation of the Dai'ra loan. In a previous table it has been shown that under the Law of Liquidation of 1880 the total debt was £98,640,000. In 1883, the first complete year after the British occupation, the capital of the debt — then exclusively held by the public — was £96,457,000. In 1885 the Guaranteed loan, the nominal capital of which was £9,424,000, was issued, and in 1891 the debt reached its maximum figure of £106,802,000. At that period the charge for interest and sinking fund was £4,127,000. On the 31st of December 1905 the total capital of the debt was as follows : —

Guaranteed 3% £7,849,000

Preference 3j% 31,128,000

Unified 4% 55,972,000

Domains 4$% ii535.˚oo

Total . . £96,484,000 The charge on account of interest and sinking fund was £3,709,000. Thus the capital of the debt in 1905 stood at almost the exact figure it did in 1883, although by borrowing and conversion operations nearly £17,000,000 had in the meantime. been added to the capital. This reduction was brought about by surplus revenue, and by the operation of the sinking fund in the case of the Guaranteed loan, while £15,729,000 had been wiped out by the sale of Dai'ra and Domains property. These figures do not, however, indicate fully the prosperity of the country, for although the nominal amount of the capital was practically identical in 1883 and 1905, in the latter year the Egyptian government or the Caisse held stock (bought with surplus revenue) to the value of £8,770,000. The amount of debt in the hands of the public was therefore only £87,714,000, that is to say £8,743,000 less than in 1883, while the interest charge to be borne by the taxpayer of Egypt was £3,378,000, being £890,000 less than in 1 883. The charge amounts to about 40 % of the national expenditure. On the other hand, Egypt is not now weighed down with a huge warlike expenditure. There is no navy to support, and the army costs but 7 % of the total expenditure.

Authorities. — A concise view of the financial situation in 1877 will be found in J. C. McCoan's Egypt as it is (London n.d.). Mr Cave's report is printed in an appendix. The subsequent history of Egyptian finance is told in the following blue-books, &c. : — Correspondence respecting the State Domains of Egypt (1883); State- ment of the Revenue and Expenditure of Egypt, together viiih a List of the Egyptian Bonds and the Charges for their Services (1885);

Reports on the Finances of Egypt, by the British agent, yearly from 1888; Convention . . . relative to the Finance of Egypt, signed at London, March 18, 1885 ; Khedivial decree of the 28th November 1904 ; Compte gSnSral de I' administration des finances, issued yearly at Cairo. Consult also the works of Lord Cromer, Lord Milner, and Sir A. Colvin cited under § History, last section. (E. Go. ; F. R. C.)

The Egyptian Army. The fellah soldier has been aptly likened to a bicycle, which although incapable of standing up alone, is very useful while

under the control of a skilful master. It is generally history. believed that the successes gained in the time of the

Pharaohs were due to foreign legions; and from Cambyses to Alexander, from the Ptolemies to Antony (Cleo- patra), from Augustus to the 7 th century, throughout the Arab period, and from Saladin's dynasty down to the middle of the 13th century, the military power of Egypt was dependent on mercenaries. The Mamelukes (slaves), imported from the eastern borders of the Black Sea and then trained as soldiers, usurped the government of Egypt, and held it till 1517, when the Ottomans began to rule. This form of government, speaking generally, endured till the French invasion at the end of the 18th century. British and Turkish troops drove the French out after an occupation of two years, the British troops remaining till 1803. Then Mehemet Ali, a small tobacconist of Kavala, Macedonia, coming with Albanian mercenaries, made himself governor, and later (18 n), by massacring the Mamelukes, became the actual master of the country, and after seven years' war brought Arabia under Egypt's rule. He subdued Nubia and Sennar in 1820-22; and then, requiring a larger army, he obtained instructors from France. To them were handed over 1000 Turks and Circassians to be trained as officers, who later took command of 30,000 Sudanese. These died so rapidly in Egypt from pneumonia 1 that Mehemet Ali conscripted over 250,000 fellahin, and in so arbitrary a fashion that many peasants mutilated themselves to avoid the much-dreaded service. The common practice was to place a small piece of nitrate of silver into the eye, which was then kept tightly bandaged till the sight was destroyed. Battalions were then formed of one-eyed men, and of soldiers who, having cut off their right-hand fingers, were made to shoot from the left shoulder. Every man who could not purchase exemption, with the exception of those living in Cairo, Alexandria and Suez, on becoming 19 years old was liable nominally to 12 years' service; but many men were kept for 30 or 40 years, in spite of constant appeals. Nevertheless the experiment succeeded. The docile, yet robust and hardy peasants, under their foreign leaders, gained an unbroken series of successes in the first Syrian War; and after the bloody battle of Konia (1832), where the raw Turkish army was routed and the grand vizier taken prisoner, it was only European intervention which prevented the Egyptian general, Ibrahim Pasha, from marching unopposed to the Bosphorus. The defeat of the Turkish army at Nizib (Nezeeb or Nisib), in the second Syrian War (1839), showed that it was possible to obtain favourable military results with Egyptians" when stiffened by foreigners and well commanded. Ibrahim, the hero of Konia, declared, however, that no native Egyptian ought to rise higher than the rank of

sergeant; and in the Syrian campaigns nearly all the officers were Turks or Circassians, as were several non-commissioned officers. In the cavalry and artillery many of the privates were foreigners, numbers of the janissaries who escaped the massacre at Stamboul (1832) having joined Mehemet Ali's army.

In the reign of Abbas, who succeeded Mehemet Ali, the Egyptian troops were driven from Nejd, and the Wahhabi state recovered its independence. The next viceroy, Said, began as an ardent soldier, but took to agriculture, and at his death (1863) 3000 men only were retained under arms. Ismail, on succeeding, immediately added 27,000 men, and in seven years was able to put 100,000 men, well equipped, in the field. He sent 10,000 men to help to suppress a rebellion in Crete, and

1 Similar mortality, though on a smaller scale, recurred in 1889, when Sudanese battalions coming from Suakin were detained temporarily in Cairo.

conquered the greater part of the (Nile) Sudan; but an ex- pedition of 11,000 men, sent to Abyssinia under Prince Hasan and Rateb Pasha, well equipped with guns and all essentials, was, in two successive disasters (1875 and 1876), practically destroyed. The education of Egyptians in continental cities had not produced the class of leaders who led the fellahin to victory at Konia.

Ismail's exactions from the Egyptian peasantry reacted on the army, causing discontent; and when he was tottering on the throne he instigated military demonstrations against his own government, and, by thus sapping the foundations of discipline, assisted Arabi's revolution; the result was the battle of Tell el-Kebir, the British occupation, and the disbandment of the army, which at that time in Egypt proper consisted of 18,000 men, Ismail had collected 500 field-guns, 200 Arm- strong cannon, and had created factories of warlike and other stores. These latter were conducted extravagantly, and badly administered.

In January 1883, Major-General Sir Evelyn Wood, V.C., was given £200,000, and directed to spend it in raising a fellahin force of 6000 men for the defence of Egypt. He was assisted at first by 26 officers, amongst whom were Nation ~ two who later became successively sirdars — Colonel F. Grenfell, commanding a brigade, and Lieutenant H. Kitchener, R.E., second in command of the cavalry regiment. There were four batteries, eight battalions, and a camel company. Each battalion of the 1st infantry brigade had three British mounted

officers, Turks and Egyptians holding the corresponding positions in the battalions of the 2nd Brigade. The sirdar selected these native officers from those of Arabi's followers who had been the least prominent in the recent mutiny; non-commissioned officers who had been drill-instructors in the old army were recalled temporarily, but all the privates were conscripted from their villages. The earlier merciless practice had been in theory abolished by a decree based on the German system, published in 1880; but owing to defective organization, and internal disturbances induced by Khedive Ismail's follies, the law had not been applied, and the 6000 recruits collected at Cairo in January 1883 represented the biggest and strongest peasants who could not purchase exemption by bribing the officials concerned. The difficulties experienced in applying the 1880 decree were great, but the perseverance of British officers gave the oppressed peasants, in 1885, an equitable law, which has been since improved by the decree of 1900. General considera- tions later caused the sirdar to allow exemption by payment of (Badalia) £20 before ballot. This tax, which is popular amongst the peasantry, produced in 1906 £E. 150,000, and over £250,000 in 1908. This is a marked indication of the increasing prosperity of the fellahin. A portion of the badalia is expended in the betterment of the soldier's position. He is no longer drafted into the police on completing his army service, but goes free at the end of five years with a gift of £E.20. The sirdar is allowed, moreover, to use £20,000 per annum of the badalia for the improvement of the education of the rank and file. As an experiment the police is now a voluntary service, except in Alexandria and Cairo, for which cities peasants are conscripted for the police under army conditions. The recruiting super- intending committee, travelling through districts, supervise every ballot, and work under stringent rules which render systematic bribery difficult. The recruits who draw unlucky numbers at 19 years of age are seldom called up till they are 23, when they are summoned by name and escorted by a police- man to Cairo. To prevent substitution on the journey each recruit wears a string girdle sealed in lead. The periods of service are: with the colours, 5 years; in the reserve, 5 years, during which time they may be called up for police service, manoeuvres, &c. The pay is £E.3, 14s. per annum for all services, and the liberal scale of rations of meat, bread and rice remains as before in theory, but in practice the value of pay and food received is greatly enhanced. So also with the pension and promotion regulations. They were in 1882 sufficiently liberal on paper, but had never been carried into effect.

The efforts of 48 American officers, who under Gen. C. P. Stone zealously served Ismail, had entirely failed to overcome Egyptian venality and intrigue; and in spite of the military schools, with 3 {.ompiehensive syllabus, the only perceptible difference between the Egyptian officer and private in 1879 consisted, according to one of the Americans, in the fact that the first was the product of the harem, and the second of the field. Marshal Marmont, writing in 1839, mentions the capacity of the Egyptians for endurance; and it was tested in 1883, especially in the 2nd Brigade, since its officers (Turks and Egyptians), anxious to excel as drill-masters, worked their men not only from morn till eve, but also by lamplight in the corridors of the barracks. On the 31st March 1883, ten weeks after the arrival of the first draft of recruits, about 5600 men went through the ceremonial parade movements as practised by the British guards in Hyde Park, with unusual precision. The British officers had acquired the words of command in Turkish, as used in the old army, an attempt to substitute Egyptian words having failed owing to lack of crisp, sharp-sounding words. As the Egyptian brigadier, who had spent some years in Berlin, spoke German fluently, and it was also understood by the senior British officers, that language was used for all commands given by the sirdar on that special parade. The British drill-book, minus about one-third of the least serviceable movements, was translated by an English officer, and by 1900 every necessary British official book had been published in English and Arabic, except the new Recruiting Law (1885) and a manufacturing manual, for which French and Arabic editions are in use. The discipline of the old army had been regulated by a translation of part of the Code Napoleon, which was inadequate for an Eastern army, and the sirdar replaced it by the British Army Act of 1881, slightly modified, and printed in Arabic.

The task undertaken by the small body of British officers was difficult. There was not one point in the former administra- tion of the army acceptable to English gentlemen. That there had been no adequate auxiliary departments, without which an army cannot move or be efficient, was comparatively a minor difficulty. To succeed, it was essential that the fellah should be taught that discipline might be strict without being oppressive, that pay and rations would be fairly distributed, that brutal usage by superiors would be checked, that complaints would be thoroughly investigated, and impartial justice meted out to soldiers of all ranks. An epidemic of cholera in the summer of 1883 gave the British officers their first chance of acquiring the esteem and confidence of their men, and the opportunity was nobly utilized. While the patient fellah, resigned to the decrees of

the Almighty, saw the ruling Egyptian class hurry away from Cairo, he saw also those of his comrades who were stricken tenderly nursed, soothed in death's struggles, and in many cases actually washed, laid out and interred by their new self-sacrificing and determined masters. The regeneration of the fellahin army dates from that epidemic.

When the Egyptian Army of the Delta was dispersed at Tell el-Kebir, the khedive had 40,000 troops in the Sudan, scattered from Massawa on the Red Sea to 1 200 m. towards the west, and from Wadi Haifa, 1500 m. southward to Wadelai, near Albert Nyanza. These were composed of Turks, Albanians, Circassians and some Sudanese. Ten thousand fellahin, collected in March 1883, mainly from Arabi's former forces, set out from Duem, 100 m. south of Khartum, in September 1883, under Hicks Pasha, a dauntless retired Indian Army officer, to vanquish the Mahdi. They disappeared in the deserts of Kordofan, where they were destroyed by the Mahdists about 50 m. south of El Obeid. In the wave of successful rebellion, except at Khartum, few of the Egyptian garrisons were killed when the posts fell, long residence and local family ties rendering easy their assimilation in the ranks of the Mahdists.

Baker Pasha, with about 4000 constabulary, who were old soldiers, attempted to relieve Tokar in February 1884. He was attacked by 1200 tribesmen and utterly routed, losing 4 Krupp guns, 2 machine guns and 3000 rifles. Only 1400 Egyptians escaped the slaughter.

The sirdar made ail attempt to raise a battalion of Albanians, but the few men obtained mutinied when ordered to proceed to the Sudan, and it was deemed advisable, after the ringleaders had been executed, to abandon the idea, and rely on blacks to stiffen the fellahin. Then the 9th (Sudanese) Battalion was created for service at Suakin, and four others having been successively added, these (with one exception — at Gedaref) have since borne the brunt of all the fighting which has been done by the khedivial troops. The Egyptian troops in the operations near Suakin behaved well; and there were many instances of personal gallantry by individual soldiers. In the autumn of 1884, when a British expedition went up the Nile to endeavour to relieve the heroic Gordon, besieged in Khartum, the Egyptians did remarkably good work on the line of com- munication from Assiut to Korti, a distance of 800 m., and the training and experience thus gained were of great value in all subsequent operations. The honesty and discipline of the fellah were shown to be undoubtedly of a high order. When the crews of the whale-boats were conveying stores, the forwarding officers tried to keep brandy and such like medical comforts from the European crews, coffee and tea from Canadian voyageurs and sugar

from Kroo boys. The only immaculate carrier was the Egyptian. A large sum of specie having failed under British escort to reach Dongola, an equivalent sum was handed to an Egyptian lieutenant of six months' service, with 10 men, and duly reached its destination.

Twelve years later the standard of honesty was unimpaired, and the British officers had imparted energy and activity into Egyptians of all ranks. The intelligent professional knowledge of the native officers, taught under British gentlemen, and the constant hard work cheerfully rendered by the fellah soldiers, were the main factors of the success achieved at Omdurman on the 2nd of September 1898. The large depots of stores at Assuan, Haifa and Dongola could only be cursorily supervised by British officers, and yet when the stores were received at the advance depot the losses were infinitesimal.

By nature the fellah is unwarlike. Born in the valley of a great river, he resembles in many respects the Bengali, who exists under similar conditions; but the Egyptian character has proved capable of greater improvement. He is ofEgyp- stronger in frame, and can undergo greater exertion. t,a " JS Singularly unemotional, he stood steady at Tell el- Kebir after Arabi Pasha and all his officers, from general to sub- altern, had fled, and gave way only when decimated by the British field artillery firing case shot. At El Teb, however, in 1884 he allowed himself to be slaughtered by tribesmen formerly despised, and only about one-fourth of the force under General Valentine Baker escaped. Baker Pasha's force was termed constabulary, yet his men were all old soldiers, though new to their gallant leader and to the small band of their brave but strange British officers. Since that fatal day, however, many of the fellahin have shown they are capable of devoted conduct, and much has been done to raise in the soldiers a sense of self- respect, and, in spite of centuries of oppression, of veracity. The barrack-square drill was smart under the old system, but there was no fire discipline, and all individuality was crushed.' Now both are encouraged, and the men, receiving their full rations, are unsurpassable in endurance at work and in marching. All the troops present in the surprise fight when the Dervish force was destroyed at Firket in June 1896 had covered long distances, and one battalion (the 10th Sudanese) accomplished 90 m. within 72 hours, including the march back to railhead immediately after the action. The troops under Colonel Parsons, Royal Artillery, who beat the Dervishes at Gedaref, were so short of British officers that all orders were necessarily given in Arabic and carried to commanders of units by Arabs. While an Egyptian battalion was attacking in line, it was halted to repel a rush from the rear, and front and rear ranks were simul- taneously engaged, firing in opposite directions — yet the fellahin were

absolutely steady; they shot well and showed no signs of trepidation. On the other hand, neither was there any exultation after their victory. It has been aptly said ” the fellah would

soldier.

make an admirable soldier if he only wished to kill some one!” The fellahin furnish three squadrons, five batteries, three garrison artillery companies and nine battalions.

The well-educated Egyptian officer, with his natural aptitude for figures, does subordinate regimental routine carefully, and works well when supervised by men of stronger character. The ordinary Egyptian is not self-reliant or energetic by nature, and, like most Eastern people, finds it difficult to be impartial where duty and family or other personal relations are in the balance. The black soldier has, on the other hand, many of the finest fighting qualities. This was observed by British officers, from the time of the preliminary operations about Kosha and at the action near Ginnis in December 1885 down to the brilliant operations in the pursuit of the Mahdists on the Blue Nile after the action of Gedaref (subsequent to the battle of Omdurman), and the fighting in Kordofan in 1890, which resulted in the death of the khalifa and his amirs.

Black soldiers served in the army of Mehemet AH, but their fighting value was not then duly appreciated. Prior to the death of the khalifa, many of his soldiers deserted to join their brethren who had been captured by the sirdar’s troops, during the gradual advance up the Nile. After 1899 many more enlisted: the greater number were Shilluks and Dinkas coming from the country between Fashoda and the equatorial provinces, but a proportion came from the western borders of the Sudan, and some from Wadai and Bornu. Many were absolute savages, difficult to control, wayward and thoughtless like children. Sudanese are very excitable and apt to get out of hand; unlike the fellahs they are not fond of drill, and are slow to acquire it; but their dash, pugnacious instincts and desire to close with an enemy, are valuable military qualities. The Sudanese, moreover, shoot better than the fellahin, whose eyesight is often defective. The Sudanese captain can seldom read or write, and is therefore in the hands of the

Egyptian-born company quartermaster- sergeant as regards pay and clothing accounts. He is slow, and as a rule has little knowledge of drill. Nevertheless he is self- reliant, much respected by his men, and can be trusted in the field to carry out any orders received from his British officer. The most efficient companies in the Sudanese battalions are apparently those in which the captain is a black and the lieu- tenants are Egyptians.

In 1908 the Egyptian army, with a total establishment of 18,000, consisted of three squadrons of cavalry (one composed of Sudanese) each numbering 116 men; four batteries of field artillery and a Maxim battery, horses and mules being used, with a total strength of 1257 of all ranks; the camel corps, 626 of all ranks (fellahin and Sudanese) ; and nine fellahin and six Sudanese infantry battalions, 10,631 of all ranks. Every battalion receives two additional com- panies on mobilization and takes the field with six companies.

The armament of the infantry is Martini-Henry rifle and bayonet ; of the cavalry, lance, sword and carbine.

There are seven gunboats on the Nile. .

The medical department (reorganized in 1883 by Surgeon-Major J. G. Rogers at the time of the cholera epidemic) controls in peace fourteen station hospitals, and in war furnishes a mobile field hos- pital to each brigade. There are also veterinary station hospitals. The supply department controls mills at Tura, Haifa and Khartum.

The stringent system of selecting British officers, originated by the first sirdar in 1883, is shown by the fact that of the 24 employed in creating the army, 14 rose to be generals. The competition for employment in the army is still severe. In 1908 there were 140 British warrant and non-commissioned officers. Four of the fellahin battalions were officered by Orientals; in the other five, British officers commanded. Seven officers were employed with the artillery, six with the camel corps. Each of the Sudanese battalions had four British officers, and each squadron of cavalry one. Twelve medical and two veterinary officers are also employed departmentally, as well as officers acting as directors of supply, &c. Since the assump- tion of command by the third sirdar, Colonel (afterwards Lord) Kitchener, the ordnance, supply and engineer services have been separately administered, and a financial secretary is charged with the duty of preparing the budget, making contracts, &c. The total annual expenditure is £500,000.

The reorganized military school system under British control, for supplying officers, dates from 1887. The course lasts for about two years, and two hundred students can be accommodated. After the reconquest of the Sudan one-fourth of the cadets in the military school of Cairo were Sudanese. Later, however, the Sudanese cadets were transferred to a branch school at Khartum.

The army raised by the first sirdar in January 1883 was highly commended for its work on the line of communication in 1 884-1 885, and its artillery and camelry distinguished themselves in the action at Kirbekan in February 1885. Colonel Sir Francis Grenfell suc- ceeded General Sir Evelyn Wood in March 1885, and while under his command the army continued to improve, and fought successful actions at Gemaiza, Argin, Toski and Tokar. At Toski the Dervish force was nearly annihilated. In March 1892 Colonel Kitchener succeeded General Sir Francis Grenfell, and four years later began his successful reconquest of the Sudan. In June 1896, owing to the indefatigable exertions of Major Wingate, a perfected system of . secret intelligence enabled the sirdar to bring an overwhelming force of 6 to 1 against the Dervish outpost at Firket and destroy it. In September 1896 a skirmish at Hafir, with similarly successful tactics, gave the British commander the possession of Dongola. On the 7th of August 1897 Colonel Hunter surprised and annihilated a weak Dervish garrison at Abu Hamed, to which place, by the 31st of October 1897, a railway had been laid across the Nubian desert from Wadi Haifa, a distance of 230 m., the ” record ” construction of 5300 yds surveyed, embanked and laid in one day having been attained. On the 26th of December 1897 the Italian troops handed over Kassala to Colonel Parsons, R.A. On the 8th of April 1898 a British division, with the Egyptian army, destroyed the Dervish force under the amir Mahmud Ahmed, on the Atbara river. On the 2nd of September the khalifa attacked the British-Egyptian troops at Kerreri (near Omdurman), and being routed, his men dispersed; Khartum was occupied, and on the 19th of September the Egyptian flag was rehoisted at Fashoda. On the 22 nd of September 1898 Gedaref was taken from the amir Ahmed Fedil by Colonel Parsons, and on the 26th of December the army of Ahmed Fedil was finally defeated and dispersed near Roseires. The khalifa’s army, reduced to an insignificant number, after several unsuccessful engagements withdrew to the west of the Nile, where it was attacked, on the 24th of November 1899, after a forced march by Colonel Wingate, and annihilated. The khalifa himself was killed ; while the victor, who had joined the Egyptian army in 1883 as aide-de-camp to the first sirdar, in December 1899 became the fourth sirdar, as Major-General Sir F. R. Wingate, K.C.B., K.C.M.G., D.S.O., &c. (E. Wo.) –

II. Ancient Egypt

A. Exploration and Research— Owing to its early develop ment of a high civilization with written records, its wealth, and its preservative climate, Egypt is the country which most amply repays archaeological research. It is especially those long ages during which Egypt was an independent centre of culture and government, before its absorption in the Persian empire in the 6th century B.C., that make the most powerful appeal to the imagination and can often justify this appeal by the splendour of the monuments representing them. Later, however, the history of Hellenism, the provincial history of the Roman empire, the rise of Christianity and the triumph of Islam successively receive brilliant illustration in Egypt.

As early as the 17th century travellers began to bring home specimens of ancient Egyptian handiwork: a valuable stele from Sakkara of the beginning of the Old Kingdom was presented to the Ashmolean Museum at Oxford in 1683. In the following century the Englishman R. Pococke (1704-1765), the Dane F. L. Norden (1708-1742), both travelling in 1737, and others later, planned, described or figured Egyptian ruins in a primitive way and identified many of the sites with cities named in classical authors. Napoleon's great military expedition in 1798 was accompanied by a scientific commission including artists and archaeologists, the results of whose labours fill several of the magnificent volumes of the Description de I'Egypte. The antiquities collected by the expedition, including the famous Rosetta stone, were ceded to the British government at the capitulation of Alexandria, in 1801. Thereafter Mehemet Ali threw Egypt freely open to Europeans, and a busy traffic in antiquities began, chiefly through the agency of the consuls of different powers. From the year 1820 onwards the growth of the European collections was rapid, and Champollion's decipher- ments (see below, § " Language and Writing") of the hiero- glyphic inscriptions, dating from 1821, added fresh impetus to the fashion of collecting, in spite of doubts as to their trust- worthiness. In 1827 a combined expedition led by Champolhon and Rosellini was despatched by the governments of France and Tuscany, and accomplished a great deal of valuable work in copying scenes and inscriptions. But the greatest of such expeditions was that of Lepsius, under the auspices of the

Prussian government, in 1842-1845. Its labours embraced not only Egypt and Nubia (as far as Khartum) but also the Egyptian monuments in Sinai and Syria; its immense harvest of material is of the highest value, the new device of taking paper impres- sions or ” squeezes ” giving Lepsius a great advantage over his predecessors, similar to that which was later conferred by the photographic camera.

A new period was opened in Egyptian exploration in 1858 when Mariette was appointed director of archaeological works in Egypt, his duties being to safeguard the monuments and prevent their exploitation by dealers. As early as 1835 Mehemet Ali had given orders for a museum to be formed; little however, was accomplished before the whole of the resulting collection was given away to the Archduke Maximilian of Austria in 1855. Mariette, who was appointed by the viceroy Said Pasha at the instance of the French government, succeeded in making his office effective and permanent, in spite of political intrigues and the whims of an Oriental ruler; he also secured a building on the island of Bulak (Bulaq) for a viceregal museum in which the results of his explorations could be permanently housed. Supported by the French interest, the established character of this work as a department of the Egyptian government (which also claims the ancient sites) has been fully recognized since the British occupation. The ” Service of Antiquities ” now boasts a large annual budget and employs a number of European and native officials — a director, curators of the museum, European inspectors and native sub-inspectors of provinces (at Luxor for Upper Egypt and Nubia, at Assiut for Middle Egypt and the Fayum, at Mansura for Lower Egypt, besides a European official in charge of the government excavations at Memphis) . The museum, no lo’nger the property of an individual, was removed in 1889 from the small building at Bulak to a disused palace at Giza, and since 1902 has been established at Kasr-en-Nil, Cairo, in a special building, of ample size and safe from fire and flood. In the year 1881 the directorship of the museum was temporarily undertaken by Prof. Maspero, who resumed it in 1899. The admirably conducted Archaeological Survey of the portion of Nubia threatened by the raising of the Assuan dam is in the charge of another department — the Survey department, directed for many years up to 1909 by Captain H. G. Lyons. Non-official agencies (supported by voluntary contributions) for exploration in Egypt comprise the Egypt Exploration Fund, started in London in 1881, with its two branches, viz. the Archaeo- logical Survey (1890) for copying and publishing the monuments above ground, and the Graeco-Roman Branch (1897), well known through the brilliant work in Greek papyri of B. P. Grenfell and A. S. Hunt; and the separate Research Account founded by Professor

W. M. Flinders Petrie in London (University College) in 1896, and since 1905 called the British School of Archaeology in Egypt (see especially Memphis). The Mission archSologique fratiQaise au Caire, established as a school by the French govern- ment in 1881, was re-organized in 1901 on a lavish scale under the title Institut fratiQais d'archeologie orientate du Caire, and domi- ciled with printing-press and library in a fine building near the museum. As the result of an excellent bargain, it was afterwards removed to the Munira palace in the south-east part of the city. An archaeologist is attached to the German general consulate to look after the interests of German museums, and is director of the German Institute of Archaeology. The Orient-Gesellschaft (German Orient-Society) has worked in Egypt since 1901 with brilliant results. Excavations and explorations are also con- ducted annually by the agents of universities and museums in England, America and Germany, and by private explorers, concessions being granted generally on the terms that the Egyptian government shall retain half of the antiquities dis- covered, while the other half remains for the finders.

The era of scientific excavation began with Flinders Petrie's work at Tanis in 1883. Previous explorers kept scientific aims in view, but the idea of scientific archaeology was not realized by them. The procedure in scientific excavation is directed to collecting and interpreting all the information that can be obtained from the excavation as to the history and nature of

the site explored, be it town, temple, house, cemetery or individual grave, wasting no evidence that results from it touching the endless problems which scientific archaeology affords — whether in regard to arts and crafts, manners and customs, language, history or beliefs. This is a totally different thing from mere hunting for inscriptions, statues or other portable objects which will present a greater or less value in themselves even when torn from their context. Such may, of course, form the greater part of the harvest and working material of a scientific excavator; their presence is most welcome to him, but their complete absence need be no bar to his attainment of important historical results. The absence of scientific excavation in Egypt was deplored by the Scottish archaeologist Alexander Henry Rhind (1833-1863), as early as 1862. Since Flinders Petrie began, the general level of research has gradually risen, and, while much is shamefully bad and destructive, there is a certain proportion that fully realizes the requirements of scientific archaeology.

Antiquities, Sites, &*c. — The remains for archaeological in- vestigation in Egypt may be roughly classified as material and literary:

to the latter belong the texts on papyri and the inscriptions, to the former the sites of ancient towns with the temples, fortifications and houses; remains of roads, canals, quarries and other matters falling within the domain of ancient topography; the larger monuments, as obelisks, statues, stelae, &c. ; and finally the small antiquities — utensils, clothes, weapons, amulets, &c. Where moisture can reach the antiquities their preservation is no better in Egypt than it would have been in other countries; for this reason all the papyri in the Delta have perished unless they happen to have been charred by fire. A terrible pest is a kind of termite which is locally abundant and has probably visited most parts of Egypt at one time or another, destroying all dead vegetable or animal material in the soil that was not specially protected.

In Lower Egypt the cities built of crude brick were very numerous, especially after the 7th century B.C., but owing to the value of stone very few of their monuments have escaped destruction: even the mounds of rubbish which marked their sites furnish a valuable manure for the fields and in consequence are rapidly disappearing. Granite and other hard stones, having but a limited use (for millstones and the like), have the best chance of survival. At Bubastis, Tanis, Behbeit (Iseum) and Heliopolis considerable stone remains have been discovered. In the north of the Delta wherever salt marshes have prevented cultivation in modern times, the mounds, such as those of Pelusium, still stand to their full height, and the more important are covered with ruins of brjck structures of Byzantine and Arab date.

Middle and Upper Egypt were less busy and prosperous in the later ages than Lower Egypt. There was consequently somewhat less consumption of the old stone-work. Moreover, in many places equally good material could be obtained without much difficulty from the cliffs on both sides of the Nile. Yet even the buried portions of limestone buildings have seldom been permitted to survive on the cultivated land; the Nubian sand- stone of Upper Egypt was of comparatively little value, and, generally speaking, buildings in that material have fallen into decay rather than been destroyed by quarrying.

Starting from Cairo and going southward we have first the great pyramid-field, with the necropolis of Memphis as its centre; stretching from Abu Roash on the north to Lisht on the south, it is followed by the pyramid group of Dahshur, the more isolated pyramids of Medum and Illahtin, and that of Hawara in the Fayum. On the east bank are the limestone quarries of Turra and Masara opposite Memphis. South of the Fayum on the western border of the desert are the tombs of

Deshasha, Meir and Assiut, and on the east bank those of Beni Hasan, the rock- cut temple of Speos Artemidos, the tombs of El Bersha and Sheikh Said, the tombs and stelae of El Amarna with the alabaster quarries of Hanub in the desert behind them, and the tombs of Deir el Gebrawi. Beyond Assiut are the tombs of Dronka and Rifa, the temples of Abydos and Dendera, and the tombs, &c, at Akhmlm and Kasr es Saiyad. Farther south are the stupendous

S y

r 1 a

n

*.D e

s e r

t

Longitude East 30 of Greenwich

Emtry W*l)tcr •&

ANTIQUITIES]

EGYPT

4i

ruins of Thebes on both sides of the river, the temple of Esna, the ruins and tombs of El Kab, the temple of Edfu, the quarries of Silsila and the temple of Ombos, followed by the inscribed rocks of the First Cataract, the tombs and quarries of Assuan and the temples of Philae.

In Nubia, owing to the poverty of the country and its scanty population, the proportion of monuments surviving is infinitely greater than in Egypt. Here are the temples of Debod, the temple and quarries of Kertassi, the temples of Kalabsha, Bet el Wali, Dendur, Gerf Husen, Dakka, Maharaka, Es-Sebu'a, 'Amada and Derr, the grottos of Elles ya, the tombs of Anlba, the temple of Ibrlm, the great rock-temples of Abu-Simbel, the temples at Jebel Adda and Wadi Haifa, the forts and temples of Semna, the temples of Amara (Meroitic) and Soleb. Beyond are the Ethiopian temples and pyramids of Jebel Barkal and the other pyramids of Napata at Tangassi, &c, the still later pyramids of Meroe at Begerawia, and the temples of Mesauwarat and

Naga reaching to within 50 m. of Khartum.

Outside the Nile valley on the west are temples- in the Great and Little Oases and the Oasis of Ammon: on the east quarries and stelae on the Hammamat road to the Red Sea, and mines and other remains at Wadi Maghara and Serabit el Khadim in the Sinai peninsula. In Syria there are tablets of conquest on the rocks at the mouth of the Nahr el Kelb.

Of the collections of Egyptian antiquities in public museums, those of the British Museum, Leiden, Berlin, the Louvre, Turin were already very important in the first half of the 19th century, also in a less degree those of Florence, Bologna and the Vatican. Most of these have since been greatly increased and many others have been created. By far the largest collection in the world is that at Cairo. In America the museums and universities of Boston, Chicago, Philadelphia, San Francisco and New York have collections of greater or less interest. Besides these the museums of Edinburgh, Liverpool, Manchester and Oxford are noteworthy in Great Britain for their Egyptian antiquities, as are those of St Petersburg, Vienna, Marseilles, Munich, Copenhagen, Palermo and Athens; there are also collections in most of the British colonies. Private collections are numerous.

Literary Records. — In estimating the sources of information regarding pre-Christian Egypt, the native sources, first opened to us by Champollion, are infinitely the most important. With very few exceptions they are contemporary with the events which they record. Of the composition of history and the description of their own manners and customs by the Egyptians for posterity, few traces have reached our day. Consequently the information derived from their monuments, in spite of their great abundance, is of a fortuitous character. For one early papyrus that survives, many millions must have perished. If the journals of accounts, the letters and business documents, had come down to us en masse, they would no doubt have yielded to research the history and life of Egypt day by day; but those that now represent a thousand years of the Old Kingdom and Middle Kingdom together would not half fill an ordinary muni- ment chest. A larger proportion of the records on stone have survived, but that an event should be inscribed on stone depends on a variety of circumstances and not necessarily on its importance. There may seem to be a great abundance of Egyptian monuments, but they have to cover an enormous space of time, and even in the periods which are best represented, gravestones recording the names of private persons with a prayer or two are scarcely material for history. A scrap of annals has been found extending from the earliest times to the Vth Dynasty, as well as a very fragmentary list of kings reaching nearly to

the end of the Middle Kingdom, to help out the scattered data of the other monuments. As to manners and customs, although we possess no systematic descriptions of them from a native source, the native artists and scribes have presented us with exceptionally rich materials in the painted and sculptured scenes of the tombs from the Old and Middle Kingdoms and the New Empire. For the Deltaic dynasties these sources fail absolutely, the scenes being then either purely religious or conventional imitations of the earlier ones.

Fortunately the native records are largely supplemented by others: valuable information comes from cuneiform literature, belonging to two widely separated periods. The first group is contemporary with the XVIIIth and XlXth Dynasties and consists in the first place of the Tell el Amarna tablets with others related to them, containing the reports of governors of the Syrian possessions of Egypt, and the correspondence of the kings of Babylon, Assur, Mitanni and Khatti (the Hittites) with the Pharaohs. The sequel to this is furnished by Winckler's discovery of documents relating to Rameses II. of the XlXth Dynasty in the Hittite capital at Boghaz Keui (see also Hittites and Pteria). The other group comprises the annals and iiK scriptions of the Assyrian kings Esarhaddon and Assur-bani-pal, recording their invasions of Egypt under the XXVth Dynasty. There are also a few references to Egypt of later date down to the reign of Darius. In Hebrew literature the Pentateuch, the historical books and the prophets alike contain scanty but precious information regarding Egypt. Aramaic papyri written principally by Jews of the Persian period (5th century B.C.)' have been found at Syene and Memphis.

Of all the external sources the literary accounts written in Greek are the most valuable. They comprise fragments of the native historian Manetho, the descriptions of Egypt in Herodotus and Diodorus, the geographical accounts of Strabo and Ptolemy, the treatise of Plutarch on Isis and Osiris and other monographs or scattered notices of less importance. Our knowledge of the history of Alexander's conquest, of the Ptolemies and of the Roman occupation is almost entirely derived from Greek sources, and in fact almost the same might be said of the history of Egypt as far back as the beginning of the XXVIth Dynasty. The non-literary Greek remains in papyri and inscriptions which are being found in great abundance throw a flood of light on life in Egypt and the administration of the country from the time of Ptolemy Philadelphus to the Arab conquest. On the other hand, papyri and inscriptions in Latin are of the greatest rarity, and the literary remains in that language are of small importance for Egypt.

Arabic literature appears to be entirely barren of authentic

information regarding the earlier condition of the country. Two centuries of unchallenged Christianity had broken almost completely the traditions of paganism, even if the Moslems had been willing to consider them, either in their fanciful accounts of the origins of cities, &c, or elsewhere.

B. The Country in Ancient Times. — The native name of Egypt was Kemi (KMT), clearly meaning ” the black land,” Egypt being so called from the blackness of its alluvial soil (cf. Plut. Dels, el Os. cap. 33): in poetical inscriptions Kemi is often opposed to Toskri, ” the red land,” referring to the sandy deserts around, which however, would probably be included in the term Kemi in its widest sense. Egypt is called in Hebrew Mizraim, d;i?p, possibly a dual form describing the country in reference to its two great natural and historical divisions of Upper Egypt and Lower Egypt: but Mizraim (poetically sometimes Mazor) often means Lower Egypt, Upper Egypt being named Pathros, ” the south land.” In Assyrian the name

o

was Musri, Misri: in Arabic it is Misr, j~»-s, pronounced Masr in

the vulgar dialect of Egypt. These names are certainly of Semitic origin and perhaps derive from the Assyrian with the meaning “frontier-land” (see Mizraim). Winckler’s theory of a separate Musri immediately south of Palestine is now generally rejected (see, for instance, Ed. Meyer, Die Israeliten und ihre Nachbarstdmme, 455). The Greek Alyvirros (Aegyptus) occurs as early as Homer; in the Odyssey it is the name of the Nile (masc.) as well as of the country (fern.) : later it was con- fined to the country. Its origin is very obscure (see Pietsch- mann in Pauly-Wissowa, Realencyclopddie, s.v. “Aigyptos”). Brugsch’s derivation from Hakeptah, a name of the northern capital, Memphis, though attractive, is taconfirmed.

Egypt normally included the whole of the Nile valley from the First Cataract to the sea; pure Egyptians, however, formed the population of Lower Nubia above the Cataract in prehistoric

times; at some periods also the land was divided into separate kingdoms, while at others Egypt stretched southward into Nubia, and

it generally claimed the neighbouring Libyan deserts and oases on the west and the Arabian deserts on the east to the shore of the Red Sea, with Sinai and the Mediterranean coast as far as Rhinocorura (El Arlsh). The physical features in ancient times were essentially the same as at the present day. The bed of the -Nile was lower: it appears to have risen by its own deposits at a rate of about 4 in. in a century. In the north of the Delta, however, there was a sinking of the land, in consequence of which the accumulations on some of the ancient sites there extend below the present sea-level. On the other hand at the south end of the Suez canal the land may have risen bodily, since the head of the Gulf of Suez has been cut off by a bank of rock from the Bitter lakes, which were probably joined to it in former days. The banks of the Nile and the islands in it are subject to gradual but constant altera- tion — indeed, several ancient sites have been much eroded or 'destroyed — and the main volume of the stream may in course of time be diverted into what has previously been a secondary channel. According to the classical writers, the mouths or branches of the Nile in the Delta were five in number (seven including two that were artificial): now there are only two. In Upper Egypt the main stream tended as now to flow along the eastern edge of the valley, while to the west was a parallel stream corresponding to the Bahr Yusuf. From the latter a canal or branch led to the Lake of Moeris, which, until the 3rd century B.C., filled the deep depression of the Fayum, but is now represented only by the strongly brackish waters of the Birket eLKerun, left in the deepest part. The area of alluvial land has probably not changed greatly in historic times. The principal changes that have occurred are due to the grip which civilization has taken upon the land in the course of thousands of years, often weakening but now firmer than ever. In early days no doubt the soil was cultivated in patches, but gradually a great system of canals was organized under the control of the central government, both for irrigation and for transport. The wild flora of the alluvial valley was probably always re- stricted and eventually was reduced almost to the " weeds of cultivation," when every acre of soil, at one period of the year under water, and at another roasted under the burning heat of a semi-tropical sun, was carefully tilled. The acacia abounded on the borders of the valley, but the groves were gradually cut down for the use of the carpenter and the charcoal-burner. The desert was full of wild life, the balance of nature being preserved by the carnivorous animals preying on the herbivorous; trees watered by soakage from the Nile protected the under- growth and encouraged occasional rainfall. But this balance was upset by the early introduction of the goat and later of the Camel, which destroyed the sapling trees, while the grown ones fell to the axe of the woodcutter. Thus in all

probability the Egyptian deserts have become far poorer in animals and trees than they were in primitive times. Much of Lower Egypt was left in a wilder state than Upper Egypt. The marshy lands in the north were the resort of fishermen and fowlers, and the papyrus, the cultivation of which was a regular industry, pro- tected an abundance of wild life. The abandonment of papyrus culture in the 8th century a.d., the neglect of the canals, and the inroads of the sea, have converted much of that country into barren salt marsh, which only years of draining and washing can restore to fertility.

The rich alluvial deposits of the Nile which respond so readily to the efforts of the cultivator ensured the wealth of the country. Moulded into brick, without burning, this black clay also supplied the common wants of the builder, and even the palaces of the greatest kings were constructed of crude brick. For more lasting and ambitious work in temples and tombs the materials could be obtained from the rocks and deserts of the Nile valley. The chief of these was limestone of varying degrees of fineness, com- posing the cliffs which lined the valley from the apex of the Delta to the neighbourhood of El Kab; the best quality was obtained on the east side opposite Memphis from the quarries of Turra

and Masara. From El Kab southward its place was taken by Libyan sandstone, soft and easily worked, but unsuitable for fine sculpture. These two were the ordinary building stones. In the limestone was found the flint or chert used for weapons and instruments in early times. For alabaster the principal quarry was that of Hanub in the desert 10 m. behind El Amarna, but it was obtained elsewhere in the limestone region, including a spot near Alexandria. A hard and fine-grained quartzite sandstone was quarried at Jebel Ahmar behind Heliopolis, and basalt was found thence along the eastern edge of the Delta to near the Wadi Tumilat. Red granite was obtained from the First Cataract, breccia and diorite were quarried from very early times in the Wadi Hammamat, on the road from Coptos to the Red Sea, and porphyry was brought, chiefly in Roman times but also in the prehistoric age, from the same region at Jebel Dokhan.

Egypt was poor in metals. Gold was obtained chiefly from Nubia: iron was found in small quantities in the country and at one time was worked in the neighbourhood of Assuan. Some copper was obtained in Sinai. Of stones that were accounted precious Sinai produced turquoise and the Egyptian deserts garnet, carnelian and jasper.

The native supply of wood for industrial purposes ‘was ex- ceedingly bad: there was no native wood long enough and straight enough to be

used in joiners' work or sculpture without fitting and patching: palm trees were abundant, and if the trees could be spared, their split stems could be used for roofing. For boatbuilding papyrus stems and acacia wood were employed, and for the best work cedar-wood was imported from Lebanon.

Egypt was isolated by the deserts and the sea. The Nile valley afforded a passage by ship or on foot into Nubia, where, however, little wealth was to be sought, though gold and rarities from the Sudan, such as ivory and ebony, came that way and an armed raid could yield a good spoil in slaves and cattle. The poverty-stricken and barbarous Nubians were strong and courageous, and gladly served in Egypt as mercenary soldiers and police. Through the oases also ran paths to the Sudan by which the raw merchandise of the southern countries could be brought to Egypt. Eastward, roads led through the Arabian mountains to the Red Sea, whence ships made voyages to the incense-bearing land of Puoni (Punt) on the Somali coast of Africa, rich also in gold and ivory. Thymines of Sinai could be reached either by sea or by land along the route of the Exodus. The roads to Syria skirted the east border of the Delta and then followed the coast from near Pelusium through El Arlsh and Gaza. A secondary road branched off through the Wadi Tumilat, whence the ways ran northwards to Syria and southwards to Sinai. On the Libyan side the oasis of Slwa could be reached from the Lake of Moeris or from Terrana (Terenuthis) , or by the coast route which also led to the Cyrenaica. The Egyptians had some traffic on the Mediterranean from very remote times, especially with Byblus in Phoenicia, the port for cedar-wood.

Of the populations surrounding Egypt the negroes (Nehsi) in the south (Cush) were the lowest in the scale of civilization: 1 the people of Puoni and of Libya (the Tehen, &c.) were pale in colour and superior to the negroes, but still show no sign of a high culture. The Syrians and the Keftiu, the latter now identified with the Cretans and other representatives of the Aegean civilization, are the only peoples who by their elaborate clothing and artistic products reveal themselves upon the ancient Egyptian monuments as the equals in culture of the Egyptian nation.

The Egyptians seem to have applied no distinctive name to themselves in early times : they called themselves proudly romi (RMTW), i.e. simply " men," " people," while the despised races around them, collectively S'SWT, " desert-peoples," were dis- tinguished by special appellations. The races of mankind, including the Egyptians, were often called the Nine Archers. Ultimately the Egyptians, when their insularity disappeared under the successive dominations of Ethiopia,

Assyria and Persia, described themselves as rem-n-Kemi, ” men of Egypt.” Whence the population of Egypt as we trace it in prehistoric and historic times came, is not certain. The early civilization

of Egypt shows remarkable coincidences with that of Babylonia, the language is of a Semitic type, the religion may well be a compound of a lower African and a higher Asiatic order of ideas. According to the evidence of the mummies, the Egyptians were of slender build, with dark hair and of Caucasian type. Dr Elliott Smith, who has examined thousands of skeletons and mummies of all periods, finds that the prehistoric population of Upper Egypt, a branch of the North African-Mediterranean- Arabian race, changed with the advent of the dynasties to a stronger type, better developed than before in skull and muscle. This was apparently due to admixture with the Lower Egyptians, who themselves had been affected by Syrian immigration. There- after little further change is observable, although the rich lands of Egypt must have attracted foreigners from all parts. The Egyptian artists of the New Empire assigned distinctive types of feature as well as of dress to the different races with which they came into contact, Hittites, Syrians, Libyans, Bedouins, negroes, &c.

The people of Egypt were not naturally fierce or cruel. In- tellectually, too, they were somewhat sluggish, careless and unbusinesslike. In the mass they were a body of patient labourers, tilling a rich soil, and hating all foreign lands and ways. The wealth of their country gave scope for ability within the population and also attracted it from outside: it enabled the kings to organize great monumental enterprises as well as to arm irresistible raids upon the inferior tribes around. Urged on by necessity and opportunity, the Egyptians possessed sufficient enterprise and originating power to keep ahead of their neighbours in most departments of civilization, until the more warlike empires of Assyria and Persia overwhelmed them and the keener intellects of the Greeks outshone them in almost every department. The debt of civilization to Egypt as a pioneer must be considerable, above all perhaps in religious thought. The moral ideals of its nameless teachers were high from an early date: their conception of an after-life was ex- ceedingly vivid: the piety of the Egyptians in the later days was a matter of wonder and scoffing to their contemporaries; it is generally agreed that certain features in the

development of Christianity are to be traced to Egypt as their birthplace and nidus.

For researches into the ethnography of Egypt and the neigh- bouring countries, see W. Max Miiller, Asien und Europa nachden altdg. Inschriften (Leipzig, 1893), Egyptological Researches (Washing- ton, 1906); for measurements of Egyptian skulls, Miss Fawcett in Biometrika (1902) ; A. Thomson and D. Randall-Maclver, The Ancient Races of the Thebaid (Oxford, 1905) (cf. criticisms in Man, 1905 ; and for comparisons with modern measurements, C. S. Myers, Journ. Anthropological Institute, 1905, 80). W. Flinders Petrie has collected and discussed a series of facial types shown in prehistoric and early Egyptian sculpture, Journal Anthropological Institute, 1901 , 248. For Elliott Smith's results see The Cairo Scientific Journal, No. 30, vol. iii., March 1909.

Divisions. — In ancient times Egypt was divided into two regions, representing the kingdoms that existed before Menes. Lower Egypt, comprising the Delta and its borders, formed the " North Land," To-meh, and reached up the valley to include Memphis and its province or " nome," while the remainder of the

'}£}

Egyptian Nile valley was " the South,' Shema \ SM'W

The south, if only as the abode of the sun, always had the preced- ence over the north in Egypt, and the west over the east. Later the two regions were known respectively as P-to-res (Pathros), " the south land," and P-to-meh, " the north land." In practical administration this historic distinction was sometimes observed, at others ignored, but in religious tradition it had a firm hold. In Roman times a different system marked off a third region, namely Middle Egypt, from the point of the Delta southward.' Theoretically, as its name Heptanomis implies, this division contained seven nomes, actually from the Hermopolite on the south to the Memphite on the north (excluding the Arsinoite according to the papyri). Some tendency to this existed earlier. Egypt to the south of the Heptanomis was the Thebais, called P-tesh-en-Ne, " the province of Thebes," as early as the XXVIth

Dynasty. The Thebais was much under the influence of the Ethiopian kingdom, and was separated politically in the troubled times of the XXIIIrd Dynasty, though the old division into Upper and Lower Egypt was resumed in the XXVIth Dynasty. If Upper and Lower Egypt represented ancient kingdoms, the nomes have been thought to carry

on the traditions of tribal settlements. They are found in inscriptions as early as the end of the IHrd Dynasty, and the very name of Thoth, and that of another very ancient god, are derived from those of two con- tiguous nomes in Lower Egypt. The names are written by special

emblems placed on standards, such as an ibis

2ˆ, a hare r~* , a feathered crown M v sir > ” ˆ T”’

a jackal

ˆf' ,r T' «‘ a Slstn »n JL_ >

a blade v-ˆ-, &c, suggesting tribal badges. Some nomes having

a common badge but distinguished as ” nearer ” or ” further,” i.e ” northern ” or ” southern,” have simply been split, as they are contiguous: in one case, however, corresponding ” eastern ” and ” western ” Harpoon nomes are widely separated on opposite sides of the Delta. In a few cases, such as ” the West,” ” the Beginning of the East,” it is obvious that the names are derived solely from their geographical situation. It is quite possible that the divisions are geographical in the main, but it seems likely that there were also religious, tribal and other historical reasons for them. How their boundaries were determined is not certain: in Upper Egypt in many cases a single nome embraced both sides of the river. The number and nomenclature of the nomes were never absolutely fixed. In temples of Ptolemaic and Roman age the full series is figured presenting their tribute to the god, and this series approximately agrees with the scattered data of early monuments. The normal number of the nomes in the sacred lists appears to be 42, of which 22 belonged to Upper Egypt and 20 to Lower Egypt. In reality again these nome-divisions were treated with considerable freedom, being split or reunited and their boundaries readjusted. Each nome had its metropolis, normally the seat of a governor or nomarch and the centre of its religious observances. During the New Empire, except at the beginning, the nomes seem to have been almost entirely ignored: under the Deltaic dynasties (except of course in the traditions of the sacred writing) they were named after the metropolis, as ” the province (tosh) of Busiris,” ” the province of Sais,” &c: hence the Greek names Bouo-ipirrjs voixos, &c. The Arsinoite nome was added by the Ptolemies after the draining of the Lake of Moeris (q.v.), and in the later Ptolemaic and the Roman times many changes and additions to the list must have been made. In Christian texts the ” provinces ” appear to have been very numerous.

See H. Brugsch, Geographische Inschriften altagyptischer Denk- mdler (3 vols., Leipzig, 1 857-1 860), and for the nomes on monuments of the Old Kingdom, N. de G. Davies, Mastaba of Ptahhetep and Akhethetep (London, 1901), p. 24 et sqq.

King and Government. — The government of Egypt was monarchical. The king (for titles see Pharaoh) was the head of the hierarchy: he was himself divine and is often styled ” the good god,” and was the proper mediator between gods and men. He was also the dispenser of office, confirmer of hereditary titles and estates and the fountain of justice. Oaths were generally sworn by the ” life ” of the king. The king wore special head- dresses and costumes, including the crowns of Upper A an(j

Lower Egypt V (often united fV), and the cobra upon his

forehead. Females were admitted to the succession, but very few instances occur before the Cleopatras. The most notable Pharaonic queen in her own right was Hatshepsut in the XVIIIth Dynasty, but her reign was ignored by the later rulers even of her own family. A certain Nitocris of about the VHIth Dynasty and Scemiophris of the Xllth Dynasty are in the lists, but are quite obscure. Yet inheritance through the female line was fully recognized, and marriage with the heiress princess was sought by usurpers to legitimate the claims of their offspring.

Often, especially in the Xllth Dynasty, the king associated his heir on the throne with him to ensure the succession.

From time to time feudal conditions prevailed: the great landowners and local princes had establishments of their own on the model of the royal court, and were with difficulty kept in order by the monarch. In rare cases during the Middle Kingdom (inscriptions in the tomb of Ameni at Beni Hasan, graffiti in the quarries of Hanub) documents were dated in the years of reign of these feudatory nobles. Under the Empire all power was again centralized in the hands of the Pharaoh. The apportion- ment of duties amongst the swarm of officials varied from age to age, as did their titles. Members of the royal family generally held high office. Under the Empire Egypt was administered by a vast bureaucracy, at the head of which, responsible to the king,

was the vizier, or sometimes two viziers, one for Upper Egypt, the other for Lower Egypt (in which case the former, stationed at Thebes, had the precedence). The duties of the vizier and the procedure in his court are detailed in a long inscription which is repeated in three tombs of the XVIIIth Dynasty at Thebes (Breasted, Records, ii. § 663 et seqq.). The strictest impartiality was enjoined upon him, and he was advised to hold aloof from the people in order to preserve his authority. The office of vizier was by no means a sinecure. All the business of the country was overlooked by him — treasury, taxation, army, law-courts, expeditions of every kind. Egypt was the vast estate of Pharaoh, and the vizier was the steward of it.

Army. — The youth of Egypt was liable to be called upon for service in the field under the local chiefs. Their training consisted of gymnastic and warlike exercises which developed strength and discipline that would be as useful in executing public works and in dragging large monuments as in strictly military service. They were armed in separate companies with bows and arrows, spears, daggers and shields, and the officers carried battle-axes and maces. The army, commanded in chief by Una under the Vlth Dynasty for raids in Sinai or Palestine, comprised levies from every part of Egypt and from Nubia, each under its own leader. Under the New Empire, when Egypt was almost a military state, the army was a more specialized institution, the art of war in siege and strategy had developed, divisions were formed with special standards, there were regiments armed with battle-axes and scimitars, and chariots formed an essential part of the host. Egyptian cavalry are not represented upon the monuments, and we hear little of such at any time. Herodotus divides the army into two classes, the Calasiries and the Hermotybies; these names, although he was not aware of it, mean respectively horse- and foot-soldiers, but it is possible that the former name was only traditional and had charac- terized those who fought from chariots, a mode of warfare that was obsolete in Herodotus's own day: as a matter of fact both classes are said to have served on the warships of Xerxes' fleet.

Arms and Armour. — From the contents of graves and other remains, and the sculptured and painted scenes, an approximate idea can be obtained of the weapons of the Egyptians at all periods from the prehistoric age onwards. Only a few points are here noted. Stone mace-heads are found in the earliest cemeteries, together with flint implements that may be the heads of lances, &c, and thin leaf -shaped daggers of bronze. Stone arrow-heads are common on the surface of the desert. Thin bronze arrow-heads appear at an early date; under the Empire they are stouter and furnished with a tang, and later still,

towards the Greek period, they are socketed (often three-sided), or, if of iron, still tanged. The wooden club, a somewhat primi- tive weapon, seems to have been considered characteristic of foreigners from very early times, and, in scenes dating from the Middle Kingdom, belong principally to the levies from the surrounding barbarians. The dagger grew longer and stouter, but the sword made its appearance late, probably first in the hands of the Sherdana (Sardinian?), mercenaries of the time of

Rameses II. A peculiar scimitar, khopsh J) , is characteristic of the Empire. Slings are first heard of in Egyptian warfare in the

8th century B.C. The chariot was doubtless introduced with the horse in the Hyksos period; several examples have been discovered in the tombs of the New Kingdom. Shields were covered with ox-hide and furnished with round sighting-holes above the middle. Cuirasses of bronze scales were worn by the kings and other leaders. The linen corslets of the Egyptian soldiery at a later" time were famous, and were adopted by the Persian army. According to the paintings of the Middle Kingdom in the tombs of Beni Hasan, the battlements of brick fortresses were attacked and wrenched away with long and massive spears. No siege engines are depicted, even in the time of the Empire,, and the absence of original representations after the XXth Dynasty renders it difficult to judge the advances made in the art of war during the first half of the last millennium B.C. The inscription of Pankhi, however, proves that in the 8th century approaches and towers were raised against the walls of besieged cities.

Priesthood. — The priesthood was in a great degree hereditary, though perhaps not essentially so. In each temple the priests were divided into four orders (until Ptolemy Euergetes added a fifth) , each of which served in turn for a lunar month under the chief priest or prophet. They received shares of the annual revenues of the temple in kind, consisting of linen, oil, flesh, bread, vegetables, wine, beer, &c. The " divine servants " or " prophets " had residences assigned them in the temple area In late times the priests were always shaven, and paid the greatest attention to cleanliness and ceremonial purity already implied in their ancient name. Fish and beans then were abhorred by them. Among the priests were the most learned men of Egypt, but probably many were illiterate. For the Hellenistic period see W. Otto, Priester und Tempel im hellenistichen Agypten (Leipzig, 1905 foil).

For ancient Egyptian life and civilization in all departments, the principal work is Ad. Erman, Life in Ancient Egypt, translated by H.

M. Tirard (London, 1894), (the original Agypten und dgypti- schss Leben im Altertum, 2 vols., was published in 1885 at Tubingen) ; G. Maspero, Life in Ancient Egypt and Assyria, translated by A. P. Morton (London, 1892), {Lectures historiques, Paris, 1890); also J. G. Wilkinson, Manners and Customs of the Ancient Egyptians, new ed. by S. Birch (3 vols., London, 1878). The annual Archaeological Reports of the Egypt Exploration Fund contain summaries of the work done each year in the several departments of research.

Of the innumerable publications of Egyptian monuments, scenes and inscriptions, C. R. Lepsius, Denkmaler aus Agypten und Athiopien (Berlin, 1849-1859), and Memoirs of the Archaeological Survey of the Egypt Exploration Fund, may be specified. For antiquities in museums there is the sumptuous Catalogue general des antiquites egyptiennes du musee de Caire; for excavations the Memoirs of the Egypt Exploration Fund, of the Research Account, of the British School of Archaeology, of the Liverpool School of Archaeology, of the Deutsche Orient-Gesellschaft, of the Hearst Egyptian Expedition, of the Theodore M. Davis excavations (Tombs of the Kings).

Trade and Money. — There is little evidence to show how buying and selling were carried on in ancient Egypt. A unique scene in a tomb of the IVth Dynasty, however, shows men and women exchanging commodities against each other — fish, fish-hooks, fans, necklaces, &c. Probably this was a market in the open air such as is held weekly at the present time in every considerable village. Rings of metal, gold, silver and bronze played some part in exchange, and from the Hyksos period onwards formed the usual standards by which articles of all kinds might be valued. In the XVIIIth Dynasty the value of meat, &c, was reckoned in gold; somewhat later copper seems the commonest standard, and under the Deltaic dynasties silver. But barter must have prevailed much longer. The precious metals were kept in the temples under the tutelage of the deities. During the XXVth and XXVIth Dynasties silver of the treasury of Harshafe (at Heracleopolis Magna) was commonly prescribed in contracts, and in the reign of Darius we hear of silver of the treasury of Ptah (at Memphis). Aryandes, satrap of Egypt, is said by Herodotus to have been punished by Darius for coining money of equal fineness with that of the king in Persia: thus coinage had then begun in Egypt. But the early coins that have been found there are mainly Greek, and especially Athenian, and it was not until the introduction of a regular currency in the three

metals under the Ptolemies that much use was made of coined money.

Corn was the staple produce of Egypt and may have been exported regula'rly, and especially when there was famine in other countries. In the Tell el-Amarna letters the friendly kings ask Pharaoh for " much gold." Papyrus rolls and fine linen were good merchandise in Phoenicia in the ioth century B.C. From the earliest times Egypt was dependent on foreign countries to supply its wants in some degree. Vessels were fashioned in foreign stone as early as the 1st Dynasty. All silver must have been imported, and all copper except a little that the Pharaohs obtained from the mines of Sinai. Cedar wood was brought from the forests of Lebanon, ivory, leopard skins and gold from the south, all kinds of spices and ingredients of incense from Somaliland and Arabia, fine linen and beautifully worked vessels from Syria and the islands. Such supplies might be obtained by forcible raiding or as tribute of conquered countries, or perhaps as the free offerings of simple savages awed by the arrival of ships and civilized well-armed crews, or again by royal missions in which rich gifts on both sides were exchanged, or lastly by private trading. For deciding how large a share was due to trade, there is almost no evidence. But there are records of expeditions sent out by the king to obtain the rarities of different countries, and the hero of the Story of the Shipwrecked Sailor was upon this quest. Egyptian objects of the age of the XVIIIth Dynasty are found in the Greek islands and on the mainland among remains of the Mycenaean epoch, and on the other hand the products of the workshops of Crete and other centres of that culture are found in Egypt and are figured as " tribute of the Keftiu " in the tomb-paintings, though we have no information of any war with or conquest of that people. It must be a case of trade rather than tribute here and in like instances. According to the papyrus of Unamun at the end of the weak XXth Dynastypaymentforcedarwasinsisted on by the king of Byblus from the Egyptian commissioner, and proofs were shown to him of payment having been made even in the more glorious times of Egypt. Trade both internal and external must have been largely in the hands of foreigners. It is impossible to say at what period Phoenician traffic by sea with Egypt began, but it existed as early as the Illrd Dynasty. In the time of Herodotus much wine was imported from Syria and Greece. Amasis II. (c. 570 B.C.) established Naucratis as the centre of Greek trade in Egypt. Financial transactions by Jews settled at the southern extremity of Egypt, at Assuan, are found as early as the reign of Artaxerxes.

Hunting, Fishing, &*c. — In the desert hunting was carried on by

hunters with bows and arrows, dogs and nets to check the game. Here in ancient times were found the oryx, addax, ibex, gazelle, bubale, ostrich, hyena and porcupine, more rarely the wild ox and wild sheep (O. tragelaphus) . All of these were considered fit for the table. The lion, leopard and jackal were not eaten. Pigeons and other birds were caught in traps, and quails were netted in the fields and on the sea-shore. In the papyrus marshes the hippopotamus was slain with harpoons, the wild boar, too, was probably hunted, and the sportsman brought down wild-fowl with the boomerang, or speared or angled for fish. Enormous quantities of wild-fowl of many sorts were taken in clap-nets, to be preserved in jars with salt. Fish were taken sometimes in hand-nets, butthe professional fisher- men with their draw-nets caught them in shoals. The fishing industry was of great importance: the annual catch in the Lake of Moeris and its canal formed an important part of the Egyptian revenue. The fish of the Nile, which were of many kinds (includ- ing mullets, &c, which came up from the sea), were split and dried in the sun: others were salted and so preserved. A supply of sea fish would be obtained off the coast of the Delta and at the mouth of the Lake Serbonis.

Farming, Horticulture, &c. — The wealth of Egypt lay in its agriculture. The regular inundations, the ease of irrigating the rich alluvial flats, and the great heat of the sun in a cloudless sky, while limiting the natural flora, gave immense opportunities to the industrious farmer. The normal rise of the Nile was

sixteen cubits at the island of Roda, and two cubits more or less caused a failure of the harvest. In the paintings we see gardens ‘ irrigated by handbuckets and shadufs; the latter (buckets hung on a lever-pole) were probably the usual means of raising water for the fields in ancient times, and still are common in Egypt and Nubia, although water-wheels have been known since the Ptolemaic age, if not earlier. Probably a certain amount of cultivation was possible all the year round, and there was perhaps a succession of harvests; but there was a pause after the main harvests were gathered in by the end of April, and from then till June was the period in which taxes were collected and loans were repaid. Under the Ptolemaic regime the records show a great variety of crops, wheat and barley being probably the largest (see B. P. Grenfell and A. S. Hunt, Tebtunis Papyri, i. 560; J. P. Mahaffy and J. G. Smyly, Petrie Papyri, iii. p. 205). Earlier the boti, in Greek b\bpa (spelt? or durra ?) was the main crop, and earlier again inferior varieties of wheat and barley took the lead, with boti apparently in the second place. The bread was mainly made of boti, the beer of barley. There were green crops such as clover, and lentils, peas, beans, radishes, onions, lettuces (as a

vegetable and for oil), castor oil and flax were grown. The principal fruit trees were the date palm, useful also for its wood and fibre, the pomegranate, fig and fig-sycamore. The vine was much cultivated in early times, and the vintage is a subject frequently depicted. Later the wine of the Mareotic region near Alexandria was celebrated even amongst Roman epicures. Papyrus, which grew wild in the marshes, was also cultivated, at least in the later ages: its stems were used for boat-building, and according to the classical authors for rope-making, as well as for the famous writing material. About the 8th century a.d. paper drove the latter out of use, and the papyrus plant quickly became extinct. The Indian lotus described by Herodotus is found in deposits of the Roman age. Native lotuses, blue and white, were much used for decoration in garlands, &c, also the chrysanthemum and the corn-flower.

See chapters on plant remains by Newberry in W. M. F. Petrie, Hawara, Biakmu, and Arsinoe (London, 1889); Kahun, Gurob and Hawara (1890) ; V. Loret, La Flore pharaonique (2nd ed., Paris, 1892), and the authorities there cited.

Domestic Animals and Birds.— The farmer kept up a large stock of animals: in the houses there were pets and in the temples sacred creatures of many kinds. Goats browsed on the trees and herbage at the edge of the desert. Sheep of a peculiar breed with horizontal twisted horns and hairy coat are figured on the earliest monuments: a more valuable variety, woolly with curved horns, made its appearance in the Middle Kingdom and pushed out the older form: sheep were driven into the ploughed fields to break the clods and trample in the seed. The oxen were long-horned, short-horned and polled. They drew the plough, trampled the corn sheaves round the circular threshing floor, and were sometimes employed to drag heavy weights. The pig is rarely figured and was less and less tolerated as the Egyptians grew in ceremonial purity. A [variety of wild animals caught in the chase were kept alive and fed for slaughter. Geese and ducks of different sorts were bred in countless numbers by the farmers, also pigeons and quails, and in the early ages cranes. The domestic fowl was unknown in Egypt before the Deltaic dynasties, but Diodorus in the first century B.C. describes how its eggs were hatched artificially, as they are at the present day. Bee-keeping, too, must have been a considerable industry, though dates furnished a supply of sweetening material.

The farm lands were generally held at a rent from an overlord, who might according to times and circumstances be the king, a feudal prince, or a temple-corporation. The stock also might be similarly held, or might belong to the farmers. The ordinary beast of burden,

even in the desert, was the ass. The horse seems to have been introduced with the chariot during the Hyksos period. It is thought that the camel is shown in rude figures of the earliest age, but it is scarcely traceable again before the XXVIth Dynasty. In the Ptolemaic period it was used for desert transport and gradually became common. Strange to say,

it is only very rarely that men are depicted riding on animals, and never before the New Kingdom.

The dog was of many varieties as early as the Xllth Dynasty, when the greyhound and turnspit and other well-marked forms are seen. The cat was sometimes trained by the sportsman to catch birds. Monkeys were commonly kept as pets. The sacred beasts in the various temples, tame as far as possible, were of almost every conceivable variety, from the vulture to the swallow or the goose, from the lion to the shrew-mouse, from the hippo- potamus to the sheep and the monkey, from the crocodile to the tortoise and the cobra, from the carp to the eel; the scorpion and the scarab beetle were perhaps the strangest in this strange company of deities.

For agriculture see J. J. Tylor and F. LI. Griffith, The Tomb of Paheri at El Kab, in the Xlth Memoir of the Egypt Exploration Fund. Together with hunting and fishing it is illustrated in many of the Memoirs of the Archaeological Survey of the same society. See also Lortet and M. C. Gaillard, La Faune momifi.ee de Vancienne Egypte (Lyons, 1905).

Law. — No code of Egyptian laws has come down to us. Diodorus names a series of Egyptian kings who were law-givers, ending with Amasis (Ahmosi II.) and Darius. Frequent reference is made in inscriptions to customs andlawswhich were traditional, and perhaps had been codified in the sacred books. From time to time regulations on special points were issued by royal decree : a fragment of such a decree, directed by Horemheb of theXVIIIth Dynasty against oppression of the peasantry by officials and prescribing penalties, is preserved on a stela in the temple of Karnak, and enactments of Ptolemy Philadelphus and Euergetes II. are known from papyri. In the Ptolemaic age matters arising out of native contracts were decided according to native law by XaoKptrat, while travelling courts of

xpt]na.TioTa.i representing the king settled litigation on Greek contracts and most other disputes. Affairs were decided in accordance with the code of the country, tjjs x&pas vofioi, the Greek code, ttoXltlkoI vojuoi, modelled, it would seem, on Athenian law or royal decrees, irpocrayfiara. ” Native ” law was still quoted in Roman times, but the significance of the expression remains to be ascertained. In ancient Egypt petitions were sent to the king or the great feudal landowners in whose territory the petitioner or his adversary dwelt or the injury was committed: courts were composed of royal or feudal officials, or in the New Kingdom of officials or responsible citizens. The right of appeal to the king probably existed at all times. The statement of the case and the evidence were frequently ordered to be put in writing. the evidence was supported by oath: in criminal cases, such as the harem conspiracy against Rameses III., torture of the accused was resorted to to extract evidence, the bastinado being applied on the hands and the feet. Penalties in the New Kingdom were death (by starvation or self-inflicted), fines, beating with a certain number of blows so as to open a specified number of wounds on as many different parts of the body {e.g. five wounds, i.e. on hands, feet and back?) , also cutting off the nose with banishment to Nubia or the Syrian frontier. In the times of the OldKingdom decapitation was in use, and a decree exists of the Middle King- dom degrading a nomarch of Coptos and his family for ever from his office and from the priesthood on account of services to a rival pretender.

As to legal instruments: contracts agreed to in public or before witnesses and written on papyrus are found as early as the Middle Kingdom and perhaps belong to all historic times, but are very scarce until the XXVth Dynasty. Two wills exist on papyrus of the Xllth Dynasty, but they are isolated, and such are not again found among native documents, though they occur in Greek in the Ptolemaic age. The virtual will of a high priest of Ammon under the XXIInd Dynasty is put in the form of a decree of the god himself.

From the time of the XXVth Dynasty there is a great increase in written documents of a legal character, sales, loans, &c, apparently due to a change in law and custom; but after the reign of Darius I. there is again almost a complete cessation until the reign of Alexander, probably only because of the dis- turbed condition of the country. Under Ptolemy Philadelphus

Greek documents begin to be numerous: under Euergetes II. (Physcon) demotic contracts are particularly abundant, but they cease entirely after the first century of Roman rule.

Marriage contracts are not found earlier than the XXVIth Dynasty. Women had full powers of inheritance (though not of dealing with their property), and succession through the mother was of importance. In the royal line there are almost certain instances of the marriage of a brother with an heiress-sister in Pharaonic times: this was perhaps helped by the analogy of Osiris and Isis: in the Ptolemaic dynasty it was an established custom, and one of the stories of Khamois, written in the Ptolemaic age, assumes its frequency at a very remote date. It would be no surprise to find examples of the practice in other ranks also at an early period, as it certainly was prevalent in the Hellenistic age, but as yet it is very difficult to prove its occur- rence. The native contracts with the wife gave to her child all the husband's property, and divorce or separation was pro- vided for, entailing forfeiture of the dowry. The " native law " of Roman times allowed a man to take his daughter away from her husband if the last quarrelled with him.

Slavery is traceable from an early date. Private ownership of slaves, captured in war and given by the king to their captor or otherwise, is certainly seen at the beginning of the XVIIIth Dynasty. Sales of slaves occur in the XXVth Dynasty, and contracts of servitude are found in the XXVIth Dynasty and in the reign of Darius, appearing as if the consent of the slave was then required. Presumably at this late period there were eunuchs in Egypt, though adequate evidence of their existence there is not yet forthcoming. They must have originated among a more cruel people. That circumcision (though perhaps not till puberty) was regularly practised is proved by the mummies (agreeing with the testimony of Herodotus and the indications of the early tomb sculptures) until an edict of Hadrian forbade it: after that, only priests were circumcised.

See A. H. Gardiner, The Inscription of Mes (frorn Sethe's Unter- suchungen zur Geschichte und Altertumskunde Agyptens, iv.) ; J. H. Breasted, Ancient Records, Egypt, passim, esp. i. § 190, 535 et seqq., 773, ii. 54, 671, iii. 45, 367, iv. 416, 499, 795; F. LI. Griffith, Catalogue of the John Rylands Demotic Papyri; B. P. Grenfell and J. P. Mahaffy, Revenue Laws of Philadelphus (Oxford, 1896); B. P. Grenfell and A. S. Hunt, Tebtunis Papyri, part i. (London, 1902) ; Bouche-Leclercq, Histoire des Lagides, tome iv. (Paris,

1907).

Science.— The Egyptians sought little after knowledge for its own sake: they might indulge in religious speculation, but their science was no more than the knowledge of practical methods. Undoubtedly the Egyptians acquired great skillinthe application of simple means to the

fulfilment of the most difficult tasks. But the books that have come down to us prove how greatly their written theoretical knowledge fell short of their practical accomplishment. The explanation of the fact may partly be that the mechanical and other discoveries of the most ingenious minds among them, when not in constant requisition by later generations, were misunderstood or forgotten, and even in other cases were preserved only as rules of thumb by the craftsmen and experts, who would jealously hide them as secrets of trade. Men of genius were not wanting in the long history of Egypt; two doctors, Imhotp (Imuthes), the architect of Zoser, in the IHrd Dynasty, and Amenophis (Amenhotp), son of Hap, the wise scribe under Amenophis III. in the XVIIIth, eventually received the honours of deification; and Hardadf under Cheops of the IVth Dynasty was little behind these two in the estimation of posterity. Such men, who, capable in every field, designed the Great Pyramids and bestowed the highest monumental fame on their masters, must surely have had an insight into scientific principles that would hardly be credited to the Egyptians from the written documents alone.

Mathematics. — The Egyptian notation for whole numbers was decimal, each power of 10 up to 100,000 being represented by a different figure, on much the same principle as the Roman numerals. Fractions except f were all primary, i.e. with the numerator unity: in order to express such an idea as j% the Egyptians were obliged to reduce it to a series of primary

fractions through double fractions t"+t\+A+A+tV=4(t+ A +rb)+TV = 5+A+TS-=5+|+-^+T?+TiT; this opera- tion was performed in the head, only the result being written down, and to facilitate it tables were drawn up of the division of 2 by odd numbers. With integers, besides adding and subtracting, it was easy to double and to multiply by 10: multiplying and dividing by 5 and finding the i £ value were also among the fundamental instruments of calculation, and all multiplication proceeded by repetitions of these processes with addition, e.g. oX7 = (oX2X2) + (oX2)+o. Division was accom- plished by multiplying the divisor until the dividend was reached; the answer being the number of times the divisor was so multi- plied. Weights and measures proceeded generally on either a decimal or a doubling system or a combination of the two. Apart from a few

calculations and accounts, practically all the materials for our knowledge of Egyptian mathematics before the Hellenistic period date from the Middle Kingdom.

The principal text is the Rhind Mathematical Papyrus in the British Museum, written under a Hyksos king c. 1600 B.C.; un- fortunately it is full of gross errors. Its contents fall roughly into the following scheme, but the main headings are not shown in the original : —

I. Arithmetic. — A. Tables and rule to facilitate the employment of fractions.

(a) Table of the divisions of 2 by odd numbers from 3 to 99

(e.g. 2 -Mi =J+-j l B), see above. (6) Conversions of compound fractions (e.g. |Xi = i+fV)i with

rule for finding f of a fraction.

B. The ” bread ” calculation — a division by 10 of the units 1 to 9.

C. ”’ Completing ” calculations.

(a) Adding multiples of a fraction to produce a more convenient

fraction (perhaps connected with the use of palms and cubits in decoration in a proportion based on the number 8) .

(b) Finding the difference between a given fraction and a given

whole number.

D. Ahe 1 or ” mass “-problems (of the form x+~=a, to find the ahe x).

E. Tooun- problems (tooun, ” rising,” seems to be the difference between the shares of two sets of persons dividing an amount between them on a lower and a higher scale).

II. Geometry. — A. Measurement of volume (amounts of grain in cylindrical and rectangular spaces of different dimensions and vice versa).

B. Measurement of area (areas of square, circular, triangular, &c, fields).

C. Proportions of pyramids and other monuments with sloping sides.

III. Miscellaneous problems (and tables) such as are met with in bread-making, beer-making, food of live-stock, &c. &c.

The method of estimating the area of irregular fields and the cubic contents of granaries, &c, is very faulty. It would be inter- esting to find material of later date, such as Pythagoras is reported to have studied.

See A. Eisenlohr, Ein mathematisches Handbuch der alten Agypter (Leipzig, 1877) ; F. LI. Griffith, ” The Rhind Mathematical Papyrus” in Proceedings of the Soc. of Biblical Archaeology, Nov. 1891, March, May and June 1894.

Astronomy.— The brilliant skies of day and night in Egypt favoured the development of astronomy. A papyrus of the Roman period in the British Museum attributes the invention of horoscopes to the Egyptians, but no early instance is known. Professor Petrie has indeed suggested, chiefly on chronological grounds, that a table of stars on the ceiling of the Ramesseum temple and another in the tomb of Rameses VI. (repeated in that of Rameses IX. without alteration) were horoscopes of Rameses II. and VI.; but Mahler’s interpretation of the tables on which this would rest appears to be false. Astronomy played a considerable part in religious matters for fixing the dates of festivals and determining the hours of the night. The titles of several temple books are preserved recording the movements and phases of the sun, moon and stars. The rising of Sothis (Sirius) at the beginning of the inundation was a particularly important point to fix in the yearly calendar (see below, § ” Chronology “). The primitive clock 2 of the temple time- keeper (horoscopus), consisting of a o>po\6yiov /cat oivua (Clemens Alex. Strom., vi. 4. 35), has been identified with two

1 Formerly transcribed hau or ” heap “-problems.

2 Clepsydras inscribed in hieroglyphic are found soon after the Macedonian conquest.

inscribed objects in the Berlin Museum; these are a palm branch with a sight-slit in the broader end, and a short handle from which a plummet line was hung. The former was held close to the eye, the latter in the other hand, perhaps at arm’s length. From the above-mentioned tables of culmination in the tombs of Rameses VI. and IX. it seems that for fixing the hours of the night a man seated on the ground faced the horoscopus in such a position that the line of observation of the Pole-star passed over the middle of his head. On the different days of the year each hour was determined by a fixed star

culminating or nearly culminating in it, and the position of these stars at the time is given in the tables as ” in the centre,” ” on the left eye,” ” on the right shoulder,” &c. According to the texts, in founding or rebuilding temples the north axis was determined by the same apparatus, and we may conclude that it was the usual one for astronomical observations. It is conceivable that in ingenious and careful hands it might give results of a high degree of accuracy.

See L. Borchardt, ” Ein altagyptisches astronomisches Instru- ment in Zeitschrift fur dgyptische Sprache, xxxvii. (1899), p. 10 • Ed. Meyer, Agyptische Chronologie, p. 36. Besides the sun and moon, five planets, thirty-six dekans, and constellations to which animal and other forms are given, appear in the early astronomical texts and paintings. The zodiacal signs were not introduced till the Ptolemaic period. See H. Brugsch, Die Agyptologie (Leipzig, 1891), pp. 315 et seqq., for a full account of all these.

_ Medicine.— Except that splints are sometimes found on the limbs of bodies of all periods, at present nothing is known, from texts or otherwise, of the existence of Egyptian surgery or dentistry. For historical pathology the examination of mummies and skeletons is yielding good results. There is little sign of the existence of gout or of syphilitic diseases until late times (see Mummy) . A number of papyri have been discovered containing medical prescriptions. The earliest are of the XHth Dynasty from Kahun, one being veterinary, the other gynaecological. The finest non-religious papyrus known, the Ebers Papyrus, is a vast collection of receipts. One section, giving us some of ” the mysteries of the physician,” shows how lamentably crude were his notions of the constitution of the body. It teaches little more than that the pulse is felt in every part of the body, that there are vessels leading from the heart to the eyes, ears^ nose and all the other members, and that ” the breath entering the nose goes to the heart and the lungs.” The prescriptions are for a great variety of ailments and afflictions— diseases of the eye and the stomach, sores and broken bones, to make the hair grow, to keep away snakes, fleas, &c. Purgatives and diuretics are particularly numerous, and the medicines take the form of pillules, draughts, liniments, fumigations, &c. The prescriptions are often fanciful and may thus bear some absurd relation to the disease to be cured, but generally they would be to some extent effective. Their action was assisted by spells, for general use in the preparation or application, or for special diseases. In most cases several ingredients are prescribed together: when the amounts are indicated it is by measure not by weight, and evidently no very potent drugs were employed, for the smallest measure specified is equal to about half of a cubic inch. Little has yet been accomplished in

identifying the diseases and the substances named in the medical papyri.

/v S J??i?L 7 Vi Reisner ‘ The Hearst Medical Papyrus (Leipzig, 1905), (A V 11 1th Dynasty), and for a great magical text of the Roman period (3rd century a.d.) with some prescriptions, F. LI. Griffith and H. Ihompson, The Demohc Magical Papyrus of London and Leiden (London, 1904).

Literature.— The vast mass of writing which has come down to us from the ancient Egyptians comprises documents of almost every conceivable kind, business documents and correspondence, legal documents, memorial inscriptions, historical, scientific, didactic, magical and religious literature; also tales and lyrics and other compositions in poetical language. Most of these classes are dealt with in this article under special headings. In addition there should be mentioned the abundant explanatory inscriptions attached to wall-scenes as a secondary element in those compositions. As early as the Middle Kingdom, papyri are found containing classified lists of words, titles, names of cities,

&c, and of nomes with their capitals, festivals, deities and sacred things, calendars, &c.

To a great extent the standard works in all classes date from an early age, not later than the Middle Kingdom, and subsequent works of religion and learning like the later additions were largely written in the same style. Several books of proverbs or ” instructions ” were put in circulation during the Middle King- dom. Kagemni and Ptahhotp of the Old Kingdom were nomin- ally or really the instructors in manners: King Amenemhe I. laid down the principles of conduct in government for his son Senwosri I., preaching on the text of beneficence rewarded by treachery; Kheti points out in detail to his schoolboy son Pepi the advantages enjoyed by scribes and the miseries of all other careers. Some of these books are known only in copies of the New Kingdom. The instructions of Ani to his son Khenshotp are of later date. In demotic the most notable of such works is a papyrus of the first century a.d. at Leiden.

A number of Egyptian tales are known, dating from the Middle

Kingdom and later. Some are so sober and realistic as to make it doubtful whether they are not true biographies and narratives of actual events. Such are the story of Sinuhi, a fugitive to Syria in the reign of Sesostris [Senwosri] I., and perhaps the narrative of Unamun of his expedition in quest of cedar wood for the bark of the Theban Ammon in the XXIst Dynasty. Others are highly imaginative or with miraculous incidents, like the story of the Predestined Prince and the story of the Two Brothers, which begins with a pleasing picture of the industrious farmer, and, in demotic of the Ptolemaic and Roman periods, two stories of the learned Sethon Khamois,sonofRameses II. and high priest of Ptah, with his rather tragical experiences at the hands of magicians. The stories of the Middle Kingdom were in choice diction, large portions of them being rhetorical or poetical compositions attributed to the principal characters. The story of Sinuhi is of this description and was much read during the New Kingdom. Another, of the Eloquent Peasant whose ass had been stolen, was only a framework to the rhetoric of endless petitions. The tale of the Shipwrecked Sailor in the Red Sea was a piece of simpler writing, not unpicturesque, of the marvellous type of a Sindbad story. If all these are deficient in literary merit, they are deeply interesting as revelations of primitive mind and manners. Of New Kingdom tales, the story of the Two Brothers is frankly in the simplest speech of everyday life, while others are more stilted. The demotic stories of Khamois are simple, but the ” Rape of Inaros’ Cuirass ” (at Vienna) is told in a stiff and high-flown style.

In general it may be said of Egyptian literary compositions that apart from their interest as anthropological documents they possess no merit which would entitle them to survive. They are more or less touched by artificiality, but so far as we are able to appreciate them at present they very seldom attain to any degree of literary beauty. Most of the compositions in the literary language, whether old or archaistic, are in a stilted style and often with parallelisms of phrase like those of Hebrew poetry. Simple prose narrative is here quite exceptional. Some few hymns contain stanzas of ten lines, each line with a break in the middle. There is no sign of rhyming in Egyptian poetry, and the rhythm is not yet recognizable owing to our ignorance of the ancient vocalization. In old Egyptian tales the narrative portions are frequently in prose; New Egyptian and demotic contain as a rule little else. Hymns exist in both of these later forms of the language, and a few love songs in Late Egyptian.

See W. M. F. Petrie, Egyptian Tales (2 vols., London, 1895); G. Maspero, Les Contss populaires de I’Egypte ancienne (3rd edition, Paris, 1906) ; W. Max Miiller, Die Liebespoesie der alien Agypter

(Leipzig, 1899). (F. Ll. G.)

C. Religion. — 1. Introductory. — Copious as are the sources of information from which our knowledge of the Egyptian religion is drawn, there is nevertheless no aspect of the ancient civilization of Egypt that we really so little understand. While the youth of Egyptological research is in part responsible for this, the reason lies still more in the nature of the religion itself and the character

of the testimony bearing upon it. For a true appreciation of the chaotic polytheism that reveals itself even in the earliest texts it would be necessary to be able to trace its development, stage by stage, out of a number of naive primitive cults; but the period of growth lies behind recorded history, and we are here reduced to hypotheses and a posteriori reconstructions. The same criticism applies, no doubt, to other religions, like those of Greece and Rome. • In Egypt, however, the difficulty is much aggravated by the poor quality of the evidence. The religious books are textually very corrupt, one-sided in their subject- matter, and distributed over a period of more than two thousand years. The greatest defect of all is their relative silence with regard to the myths. For the story of Isis and Osiris we have indeed the late treatise ascribed to Plutarch, and a few fragments of other myths may be culled from earlier native sources. But in general the tales that passed current about the gods are referred to only in mysterious and recondite allusions; as Herodotus for his own times explicitly testifies, a reticence in such matters seems to have been encouraged by the priests. Thus with regard to Egyptian theology we are very imperfectly informed, and the account that is here given of it must be looked upon as merely provisional. The actual practices of the cult, both funerary and divine, are better known, and we are tolerably familiar with the doctrines as to the future state of the dead. There is good material, too, for the study of Egyptian magic, though this branch has been somewhat neglected hitherto.

2. Main Sources. — (a) The Pyramid texts, a vast collection of incantations inscribed on the inner walls of five royal tombs of the Vth and Vlth Dynasties at Sakkara, discovered and first published by Maspero. Much of these texts is of extreme antiquity; one incantation at least has been proved to belong to an age anterior to the unification of the Northern and Southern kingdoms. Later copies also exist, but possess little independent critical value. The subject-matter is funerary, i.e. it deals with the fate of the dead king in the next life. Some chapters describe the manner in which he passes from earth to heaven and becomes a star in the firmament, others deal with the food and drink necessary for his continued existence after death, and others

again with the royal prerogatives which he hopes stiL' to enjoy; many are directed against the bites of snakes and stings of scorpions. It is possible that these incantations were recited as part of the funerary ritual, but there is no doubt that their mere presence in the tombs was supposed to be magically effective for the welfare of the dead. Originally these texts had an application to the king alone, but before the beginning of the XHth Dynasty private individuals had begun to employ them on their own behalf. They seem to be relatively free from textual corruption, but the vocabulary still occasions much difficulty to the translator.

(J>) The Book of the Dead is the somewhat inappropriate name applied to a large similar collection of texts of various dates, certain chapters of which show a tendency to become welded together into a book of fixed content and uniform order. A number of chapters contained in the later recensions are already found on the sarcophagi of the Middle Kingdom, together with a host of funereal texts not usually reckoned as belonging to the Book of the Dead; these have been published by Lepsius and Lacau. The above-mentioned nucleus, combined with other chapters of more recent origin, is found in the papyri of the XVIIIth-XXth Dynasties, and forms the so-called Theban recension, which has been edited by Naville inan important work. Here already more or less rigid groups of chapters may be noted, but individual manuscripts differ greatly in what they include and exclude. In the Saite period a sort of standard edition was drawn up, consisting of 165 chapters in a fixed order and with a common title " the book of going forth in the day "; this recen- sion was published by Lepsius in 1842 from a Turin papyrus Like the Pyramid texts, the Book of the Dead served a funerary purpose, but its contents are far more heterogeneous; besides chapters enabling the dead man to assume what shape he will, or to issue triumphant from the last judgment, there are lists

Khnum the god of Esna, while in the next minute and without any conscious sense of contradiction the two might be looked upon as entirely separate beings. In order that there might be no ambiguity as to what divinity was meant, it became usual, in speaking of any local deity, to specify the place of which he was " lord." The tendency to create new forms of a god by instituting his worship in new local

centres persisted through- out the whole course of Egyptian history, unhindered by the opposite tendency which made national out of local gods. Some of the cosmic gods, like the sun-god Re of Heliopolis and of Hermonthis, early acquired a local in addition to their cosmic aspect.

In the innermost principle of their existence, as patrons and protectors of restricted communities, the primitive tribal gods did not differ from one another. But externally they were dis- tinguishable by the various shapes that their worshippers ascribed to them; and there can be little doubt that even in the beginning each had his own special attributes and particular mythical traits. These, however, may have borne little resemblance to the later conceptions of the same gods with which we are made familiar by the Pyramid texts. Thus we have no means of ascertaining what the earliest people of Sais thought about their goddess Neith, though her fetish would seem to point to her warlike nature. Nor are we much wiser in respect of those primitive tribal gods that are represented on the oldest monu- ments in animal form. For though we may be sure that the shape of an animal was that in which these gods were literally visible to their worshippers, yet it is impossible to tell whether some one living animal was chosen to be the earthly tenement of the deity, or whether he revealed himself in every individual of a species, or whether merely the cult-image was roughly hewn into the shape of an animal, Not too much weight must be attached to later evidence on this point; for the New Kingdom and still more the Graeco-Roman period witnessed a strange recrudescence of supposed primitive cults, to which they gave a form that may or may not have been historically exact. In some places whole classes of animals came to be deemed sacred. Thus at Bubastis, where the cat-headed Bast (Ubasti) was worshipped, vast ceme- teries of mummified cats have been found; and elsewhere similar funerary cults were accorded to crocodiles, lizards, ibises and many other animals. In Elephantine Khnum was supposed to become incarnate in a ram, at whose death the divinity left him and took up his abode in another. So too the bull of Apis (a black animal with white spots) was during its lifetime regarded as a reincarnation of Ptah, the local god of Memphis, and similarly the Mnevis and Bacis bulls were accounted to be ” the living souls ” of Etom of Heliopolis and of Re of Hermonthis respec- tively; these latter cults are certainly secondary, for Ptah himself was never, either early or late, depicted otherwise than in human form, as a mummy or as a dwarf; and Etom and Re are but different names of the sun-god. The form of a snake, attributed to many local goddesses, especially in later times (e.g. Meresger of the Theban necropolis), was borrowed from the very ancient deity Outo (Buto) ; the semblance of a

snake became so characteristic of female divinities that even the word ” goddess ” was written with the hieroglyph of a snake. Other animal shapes particularly affected by goddesses were those of a lioness (Sakhmi, Pakhe) or a cow (Hathor, Isis). The primitive animal gods are not to be confused with the animal forms ascribed to many cosmic deities; thus when the sun-god Re was pictured as a scarabaeus, or dung-beetle, rolling its ball of dung behind it, this was certainly mere poetical imagery. Or else a cosmic god might assume an animal shape through assimilation with some tribal god, as when Re was identified with Horus and therefore depicted as a falcon.

With the advance of civilization and the transformation of the tribal gods into national divinities, the beliefs held about them must have become less crude. At a very early date the anthropo- morphizing tendency caused the animal deities to be represented with human bodies, though as a rule they retained their animal heads; so in the case of Seth as early as the Ilnd Dynasty. The other gods carry their primitive fetishes in their hands (like

Neith, who is depicted holding arrows) or on their heads (so Nefertem [Iphthimis] with his lotus-flower’). At the same time the gods began to acquire human personalities. In a few instances this may have come about by the emphasizing of a really primitive trait; as when the wolf Ophois, in consonance with the predatory nature of that animal, developed into a god of war. In other cases the transitional steps are shrouded in mystery; we do not know, for example, why the ibis Thoth subsequently became the patron of the fine arts, the inventor of writing, and the scribe of the gods. But the main factor in this evolutionary process was undoubtedly the formation of myths, which brought gods of independent origin into relation with one another, and thus imbued them with human passions and virtues. Here dim historic recollections often determined the features of the story, and in one famous legend that knits together a group of gods all seemingly local in origin we can still faintly trace how the tale arose, was added to, and finally crystallized in a Coherent form.

Osiris was a wise and beneficent king, who reclaimed the Egyptians from savagery, gave them laws and taught them handi- crafts. The prosperous reign of Osiris was brought to a premature close by the machinations of his wicked brother Seth, who with seventy-two fellow-conspirators invited him to a banquet, in- duced him to enter a cunningly-wrought coffin made exactly to his measure, then shut down the lid and cast the chest into the Nile. Isis, the faithful wife of Osiris, set forth in search of her dead husband’s body, and after long and adventure-fraught wanderings, succeeded in recovering it and

bringing it back to Egypt. Then while she was absent visiting her son Horus in the city of Buto, Seth once more gained possession of the corpse, cut it into fourteen pieces, and scattered them all over Egypt. But Isis collected the fragments, and wherever one was found, buried it with due honour; or, according to a different account, she joined the limbs together by virtue of her magical powers, and the slain Osiris, thus resurrected, henceforth reigned as king of the dead in the nether world. When Horus grew up he set out to avenge his father's murder, and after terrible struggles finally conquered and dispossessed his wicked uncle; or, as another version relates, the combatants were separated by Thoth, and Egypt divided between them, the northern part falling to Horus and the southern to Seth. Such is the story as told by Plutarch, with certain additions and modifications from older native sources. There existed, however, a very ancient tradition according to which Horus and Seth were hostile brothers, not nephew and uncle; and many considerations may be urged in support of the thesis which regards their struggles as reminis- cences of wars between two prominent tribes. or confederations of tribes, one of which worshipped the falcon Horus while the other had the okapi (?) Seth as its patron and champion. The Horusˆtribes were the victors, and it was from them that the dynastic line sprang; hence the Pharaoh always bore the name of Horus, and represented in his own hallowed person the ancient tribal deity. Of Osiris we can only state that he was originally the local god of Busiris, whatever further characteristics he primitively possessed being quite obscure. Isis was perhaps the local goddess of Buto, a town not far distant from Busiris; this geographical proximity would suffice to explain her con- nexion with Osiris in the tale. A legend now arose, we know not how or why, which made Seth the brother and murderer of Osiris; and this led to a fusion of the Horus-Seth and the Seth- Isis-Osiris motifs. The relationships had now to be readjusted, and the most popular view recognized Horus as the son and avenger of Osiris. The more ancient account survived, however, in the myth that Osiris, Horus, Seth, Isis and Nephthys (a goddess who plays but a minor part in the Osiris cycle) were all children of the earth-god Keb and the sky-goddess Nut, born on the five consecutive days added on at the end of the year (the so-called epagomenal days). Later generations reconciled these contradictions by assuming the existence of two Ho ruses, one, the brother of Osiris, Seth and Isis, being named Haroeris, i.e. Horus the elder, while the other, the child of Isis and Osiris, was called Harpocrates, i.e. Horus the child.

Cosmic deities.

The second main class of divinities that entered into the composition of the Egyptian pantheon was due to that innate and universal speculative bent which seeks, and never fails to find, an explanation of the facts of the external world. Behind the great natural phenomena that they perceived all around them, the Egyptians, like other primitive folk, postulated the existence of divine wills not dissimilar in kind to their own, though vastly superior in power. Chief among these cosmic deities was the sun-god Re, whose supremacy seemed predestined under the cloudless sky of Egypt. The oldest conceptions represented Re as sailing across the heavens in a ship called ” Manzet,” ” the bark of the dawn “; at sunset he stepped aboard another vessel named ” Mesenktet,” ” the bark of the dusk,” which bore him back from west to east during the night. Later theories symbolized Re in many different ways. For some he was identical with Horus, and then he was falcon-headed and was called Hor-akhti, the Horus of the horizons. Others pictured him to themselves as a tiny infant in the early dawn, as full-grown at noon, and as an infirm old man in the evening. When the sky was imagined as a cow, he was a calf born anew every morning. The moon was a male deity, who likewise fared across the heavens in a boat; hence he was often named Chons, ” the sailor.” The ibis-god Thoth was early identified with the moon. The stars and planets were likewise gods. Among them the bright star Sirius was held in special esteem; it was a goddess Sothis (Sopde), often identified by the Egyptians with Isis. The constellations that seemed unceasingly to speed across the sky were named ” the never-resting ones,” and the circumpolar stars, which never sink beneath the horizon, were known as ” the imperishables.” Concerning earth and sky there were many different opinions. Some thought that the sky was a goddess Nut, whom the god Show held aloof from her husband Keb the earth, on whose back the plants and trees grew. Others believed in a celestial ocean, personified under the name of Nun, over which the heavenly bodies sailed in boats. At a later date the sky was held to be a cow (Hathor) whose four feet stood firm upon the soil; or else a vast face, in which the right eye was the sun and the left eye the moon. Alongside these fanciful conceptions there existed a more sober view, according to which the earth was a long oval plain, and the sky an iron roof supported by the tops of

mountains or by four pillars] j jj at the cardinal points.

Beneath the ground lay a dark and mysterious region, now con- ceived

as an inverse heaven (Nenet), now as a vast series of caverns whose gates were guarded by demons. This nether world was known as the Duat (Dat, Tei), and through it passed the sun on his journey during the hours of night; here too, as many thought, dwelt the dead and their king Osiris. That great natural feature of Egypt, the Nile, was of course one of the gods; his name was Hapi, and as a sign of his fecundity he had long pendulous breasts like a woman. In contradistinction to the tribal gods, it rarely happened that the cosmic deities enjoyed a cult. But there are a few important exceptions: Re in Heliopolis (here identified with a local god Etom) and in Hermonthis; Hathor at Dendera and elsewhere. Certain of the .tribal gods early became identified with cosmic divinities, and the latter thus became the objects of a cult; so, for instance, the Horus of Edfu was a sun-god, and Thoth in Hermopolis Magna was held to be the moon.

An extension of the principle that created the cosmic gods gave rise to a large number of minor deities and demons. Day minor ano< n ight> the year, the seasons, eternity, and many deities similar conceptions were each represented by a god and or goddess of their own, who nevertheless possessed

demons. ˆ u(. a sna(j OW y an(j doubtful existence. Human attributes like Taste, Knowledge, Joy and so forth were likewise personified, no less than abstract ideas such as Fate, Destiny and others; rather more clearly defined than the rest was Maat, the goddess of Truth and Right, who was fabled to be the daughter of Re and may even have had a cult. Certain gods were purely functional, that is to say, they appeared at special times to

perform some appointed task, at the completion of which they vanished. Such were Nepri, the god of the corn-harvest ; Meskhonit, the goddess who attended every child-bed; Tait, the goddess of weaving. Numberless semi-divine beings had no other purpose than to fill out the myths, as, for instance, the chattering apes that greeted the sun-god Re as he rose above the eastern horizon, and the demons who opened the gates of the nether world at the approach of the setting sun.

We take this opportunity of mentioning sundry other divinities who were later introduced to swell the already overcrowded ranks of the pantheon. Contact with. foreign lands brought with it several new deities, Baal, Ahat and aemes". Resheph from Syria, and the misshapen dwarf Bes from the south; earlier than these, the Astarte of Byblus, whom the Egyptians identified with Hathor. In Thebes Amenophis I. and his spouse Nefertari were worshipped as patron gods of the

necropolis many centuries after their death. Two men of exceptional wisdom received divine honours, and had temples of their own in the Ptolemaic period; these were Imouthes, who had lived under Zoser of the IHrd Dynasty, and Amenophis son of Hapu, a contemporary of the third king of the same name (XVIIIth Dyn.). The hill of Sheikh Abd-el-gurna at Thebes was looked upon as a particularly holy place, and was revered as a goddess. Almost anything that was regarded with awe, any object used in the divine ritual could at a given moment be envisaged as a deity. Thus the boat of Osiris (Neshemet) and those of the sun-god were goddesses; and various wands and sceptres belonging to certain gods were imagined as harbour- ing the divine being. Truly it might have been said in ancient Egypt: of the making of gods there is no end !

For such order as can be discerned in the mythological con- ceptions of the Egyptians the priesthood was largely responsible. At a very early date the theological school of Heliopolis •

undertook the task of systematizing the gods and the combina- myths, and it is mainly to them that is due the Egyptian ti ons . religion as we find it in the Pyramid texts. Their in- fluence is particularly conspicuous in the prominent place accorded to the sun-god Re, and in the creation-legend that made him the father of gods and men. First of all living things was Re; legend told how he arose as a naked babe from a lotus-flower that floated on the primeval ocean Nun. Others held the view that he crept from an egg that lay on a hill in the midst of a lake called Desdes; and a third, more barbarous, tale related his obscene act of self -procreation. Re became the father of the pair of gods Show and Tefnut (Tphenis), who emanated from his spittle. They again gave birth to Keb and Nut, from whom in their turn sprang Osiris and Seth, Isis and Nephthys. These nine gods were together known as the great Ennead or cycle of nine. A second series of nine deities, with Horus as its first member, was invented at the same time or not long afterwards, and was called the Lesser Ennead. In later times the theory of the Ennead became very popular and was adopted by most of the local priesthoods, who substituted their own favourite god for Re, sometimes retaining and sometimes changing the names of the other eight deities. Thus locally many different gods came to be viewed as the creators of the world. Only in two instances, however, did a local god ever obtain wide acceptance in the capacity of demiurge: Ptah of Memphis, who was famed as : an artist and master-builder, and Khnum of Elephantine, who was said to have moulded mankind on the potter’s wheel.

Already in the Pyramid texts the importance of Osiris almost rivals

that of Re. His worship does not seem to have been due to Heliopolitan influence, and may possibly have been propagated by active missionary effort. It is apparently through the funeral cult that Osiris so early took a firm hold on the imagination of the people; for at a very ancient date he was identified with every dead king, and it needed but a slight extension of this idea to make him into a king of the dead. In later times the moral aspect of his tale was doubtless the main cause of its continued popularity; Osiris was named Onnophris, “the good Being” par excellence,, and Seth was contrasted with him as the author and the root of all evil. Still the Egyptians themselves seem

of gates to be passed and demons to be encountered in the nether world, formulae such as are inscribed on sepulchral figures and amulets, and even hymns to the sun-god. These texts are for the most part excessively corrupt, and despite the transla- tions of Pierret, Renouf and Budge, much labour must yet be expended upon them before they can rank as a first-rate source.

(c) The texts of the Tombs of the Kings at Thebes (XVIIIth- XXth Dyn.) consist of a series of theological books compiled at an uncertain date; they have been edited by Naville and Lefebure. The chief of these, extant in a longer and a shorter version, is called The book of that which is in the Nether World (familiarly known as the Am Duat) and deals with the journey of the sun during the twelve hours of the night. The Book of Gates treats of the same topic from a more theological stand- point. The Litanies of the Sun contain the acclamations with which the sun-god Re was greeted, when at eventide his bark reached the entrance of the nether world. Another treatise relates the destruction of mankind, and the circumstances that led to the creation of the heavens in the form of a cow.

(d) Among the later religious books one or two deserve a special mention, such as The Overthrowing of Apophis, the serpent enemy of the sun-god; The Lamentations of I sis and Nephthys over their murdered brother Osiris; The Book of Breathings, a favourite book among the later Theban priests. Several of these books were used in the ritual of feast days, but all have received a secondary funerary employment, and are therefore found buried with the dead in their tombs.

(e) The Ritual texts have survived only in copies not earlier than the New Kingdom. The temple ritual employed in the daily cult is illustrated by the scenes depicted on the inner walls of the great temples: the formulae recited during the perform- ance of the ceremonies are recorded at length in the temple of Seti I. (XlXth Dyn.) at Abydos, as well as in some later papyri in Berlin. The whole material has been collected and studied by Moret. The funerary ritual is known from texts in the Theban tombs (XVIIIth-XXth Dyn.) and papyri and sarcophagi of later date; older versions are contained in the Pyramid texts and The Book of the Dead. Schiaparelli has done much towards gathering together this scattered material. The ritual observed during the process of embalmment is preserved in late papyri in Paris and Cairo published by Maspero.

(j) The magical documents have been comparatively little studied, in spite of their great interest. They deal for the most part with the hearing of diseases, the bites of snakes and scorpions, &c, but incidentally cast many sidelights on the mythology and superstitious beliefs. The best-known of these books is the Papyrus Harris published by F. J. Chabas, but other papyri of as great or greater importance are to be found in the Leiden, Turin and other collections. A curious book published by A. Erman contains spells to be used by mothers for the protection of their children. A papyrus in London contains a calendar of lucky and unlucky days. A late class of stelae, of which the best specimen has been published by Golenischeff, consists of spells of various kinds originally intended for the use of the living, but later employed for funerary purposes.

(g) Under the heading Miscellaneous we must mention a number of sources of great value: the grave-stones, or stelae, especially those from Abydos, which throw much light on funerary beliefs; the great Papyrus Harris, the longest of all papyri, which enumerates the gifts of Rameses III. (XXth Dyn.) to the various temples of Egypt; the hymns to the gods preserved in Cairo and Leiden papyri; and the inscriptions of the Ptolemaic temples (Dendera, Edfu, &c), which teem with good religious material. Nor can any attempt here be made to summarize the remaining native Egyptian sources, literary and archaeo- logical, that deserve notice.

(h) Among the classical writers, Plutarch in his treatise Concerning Isis and Osiris is the most important. Diodorus also is useful. Herodotus, owing to his religious awe and dread of divulging sacred mysteries, is only a second-rate source.

3. The Gods. — The end of the pre-dynastic period, in which

we dimly descry a number of independent tribes in constant warfare with one another, was marked by the rise of a united Egyptian state with a single Pharaonic ruler at its head. The era of peace thus inaugurated brought with it a rapid progress in all branches of civilization; and there soon emerged not only a national art and a condition of material prosperity shared by the entire land in common, but also a state religion, which gathered up the ancient tribal cults and floating cosmica! conceptions, and combining them as best it could, imposed them on the people as a whole. By the time that the Pyramid texts were put into writing, doubtless long before the Vth Dynasty, this religion had assumed a stereotyped appearance that clung to it for ever afterwards. But the multitude of the deities and the variety of the myths that it strove to incorporate prevented the development of a uniform theological system, and the heterogeneous origin of the religion remained irretrievably stamped upon its face. Written records were few at the time when the pantheon was built up, so that the process of construc- tion cannot be followed historically from stage to stage; but it is possible by arguing backwards from the later facts .to discern the main tendencies at work, and the principal elementary cults that served as the materials.

The gods of the pre-dynastic period may be divided into two chief groups, the tribal or local divinities and the cosmic or explanatory deities. At the beginning each tribe had ciasslfl- its own particular god, who in essence was nothing cation of but the articulate expression of the inner cohesion and P«*- of the outward independence of the tribe itself, but a y° astlc who outwardly manifested himself in the form of some animal or took up his abode in some fetish of wood or stone. In times of peace this visible emblem of the god's presence was housed in a rude shrine, but in war-time it was taken thence and carried into the battlefield on a standard. We find such divine standards *J often depicted on the earliest monuments, and among the symbols placed upon them may be detected the images of many deities destined to play an important part in the

later national pantheon, such as the falcon Horus jss. , the wolf Wepwawet (Ophois))f^\ , the goddess Neith SL, symbolized

by a shield transfixed with arrows, and the god Min v ^ , the

nature of whose fetish is obscure. In course of time the tribes became localized in particular districts, under the influence of a growing central authority, and their gods then passed from tribal into local deities. Hence it came about that the provincial districts or nomes, as they were called, often derived their names from the gods of tribes

that settled in them, these names being hieroglyphically written with the sign for ” district ” surmounted

by standards of the type above described, e.g. pˆ \, “the nome

of the dog Anubis," the 17th or Cynopolite nome of Upper Egypt. In this way a large number of deities came to enjoy

special reverence in restricted territories, e.g. the ram ˆfca

Khnum in Elephantine, the jerboa or okapi (?) £v] Seth in

Ombos, the ibis _2Js Thoth in Hermopolis Magna, and of the

gods named above, Horus in Hieraconpolis, Wepwawet in Assiut, Neith in Sais, and Min in Coptos. As towns and villages gradu- ally sprang up, they too adopted as their patron some one or other of the original tribal gods, so that these came to have different seats of worship all over Egypt. For this reason it is often hard to tell where the primitive cult-centre of a particular deity is to be sought; thus Horus seems equally at home both at Buto in the Delta and at Hieraconpolis in Upper Egypt, and the earliest worship of Seth appears to have been claimed no less by Tanis in the north than by Ombos in the south. The effect of the localization of gods in many different places was to give them a double aspect; so, for instance, Khnum the god of Elephantine could in one minute be regarded as identical with

to have been somewhat at a loss to account for the great venera- tion that they paid to Osiris. Successive theories interpreted him as the god of the earth, as the god of the Nile, as a god of vegetation, as a moon-god and as a sun-god; and nearly every one of these theories has been claimed to be the primitive truth by some scholar or another.

Nowhere is the conservatism of the Egyptians more clearly displayed than in the tenacity with which they clung to the old forms of the theology, such as -we have essayed to describe. Neither the influx of new deities nor the diligence of the priestly authors and commentators availed to break down the cast-iron traditions with which the compilers of the Pyramid texts were already familiar. It is true that with the displacement of the capital town certain local deities attained a degree of power that, superficially regarded, seems to alter the entire perspective of the religion. Thus Ammon, originally the obscure local god of Thebes, was raised by the Theban monarchs of the Xllth

and of the XVIIIth to XXIst Dynasties to a predominant position never equalled by any other divinity; and, by similar means, Suchos of the Fayum, Ubasti of Bubastis, and Neith of Sais, each enjoyed for a short space of time a consideration that no other cause would have secured to them. But precisely the example of Ammon proves the hopelessness of any attempt to change the time-honoured religious creed; his priests identified him with the sun-god Re, whose cult-centre was thus merely transferred a few hundred miles to the South. Nor could even the violent religious revolution of Akhenaton (Amenophis IV.), of which we shall later have occasion to speak, sweep away for ever beliefs that had persisted for so many generations.

But if the facts of the religion, broadly viewed, never under- went a change, the interpretation of those facts did so in no small degree. The religious books were for the most part written in archaic language, which was only imperfectly understood by the priests of later times; and hence great scope was given to them to exercise their ingenuity as commentators. By the time of the XVIIIth Dynasty some early chapters of the Book of the Dead had been provided with a triple commentary. Un- fortunately the methods pursued were as little reasonable as those adopted by the medieval Jewish Rabbis; instead of the context being studied as a whole, with a view to the recovery of its literal sense, each single verse was considered separately, and explained as an allusion to some obscure myth or as em- bodying some mystical meaning. Thus so far from simplifying or really elucidating the religion, these priestly labours tended rather to confuse one legend with another and to efface the personality of individual gods. The ease with which one god could be identified with another is perhaps the most striking characteristic of later Egyptian theology. There are but few of the greater deities who were not at some time or another identified with the solar god Re. His fusion with Horus and Etom has already been noted; further we find an Ammon-Re, a Sobk-Re, a Khnum-Re; and Month, Onouris, Show and Osiris are all described as possess- ing the attributes of the sun. Ptah was early assimilated to the sepulchral gods Sokaris and Osiris. Pairs of deities whose personalities are often blended or interchanged are Hathor and Nut, Sakhmi and Pakhe, Seth and Apophis. So too in Abydos, his later home, Osiris was identified with Khante-Amentiu (Khentamenti, Khentamenthes), ” the chief of those who are in the West,” a name that was given to a vaguely-conceived but widely- venerated divinity ruler of the dead. Many factors helped in the process of assimilation. The unity of the state was largely influential in bringing about the suppression of local differences of belief. The less important priesthoods were glad to enhance the reputation of the deity they served by identifying him

with some more important god. And the mystical bent of the Egyptians found satisfaction in the multiplicity of forms that their gods could assume; among the favourite epithets which the hymns apply to divinities are such as “mysterious of shapes,” “multiple of faces.”

The goal towards which these tendencies verged was mono- theism; and though this goal was only once, and then quite ephemerally, reached, still the monotheistic idea was at most

periods, so to speak, in the air. Sometimes the qualities com- mon to all the gods were abstracted, and the resultant notion spoken of as “the god.” At other times, and especially in the hymns addressed to some divinity, all other ta °e”ˆu e gods were momentarily forgotten, and he was eulogized tendency. as ” the only one,” ” the supreme,” and so forth. Or else several of the chief deities were consciously combined and regarded as different emanations or aspects of a Sole Being; thus a Ramesside hymn begins with the words ” Three are all the gods, Ammon, Re and Ptah,” and then it is shown how these three gods, each in his own particular way, gave expression and effect to a single divine purpose.

For a brief period at the end of the XVIIIth Dynasty a real monotheism, as exclusive as that of Judaism or of Islam, was adopted as the state religion of Egypt. The young Pharaoh Amenophis IV. seems to have been fired by toa% genuine fanatical enthusiasm, though political motives, as well as doctrinal considerations, may have prompted him in the planning of his religious revolution (see also § History). The Theban god Ammon-Re was then supreme, and the ever-growing power of his priesthood may well have inflamed the jealousy of their Heliopolitan rivals. Amenophis began his reign in Thebes as an adherent of the traditional faith, but after a few years he abandoned that town and built a new capital for his god Aton 200 m. farther north, at a place now called El Amarna. The new deity was a personification of the sun’s disk. The name Re was suppressed, as too intimately associated with that of Ammon; and Ammon, together with all the other gods, was put to the ban. Amenophis even changed his own name, of which the name of Ammon formed an element, to Akhenaton, ” the brilliancy of the Aton,” and the capital was called Khitaton, ” The Horizon of the Aton.” The new dogmas were known as ” the Teaching,” and their tenets, as revealed in the poems composed in honour of the Aton, breathe the purest and most exalted monotheistic spirit. The movement had, no doubt, met with serious opposition from the very start, and the reaction soon set in. The immediate successors of Akhenaton strove to follow in his footsteps,

but the conservative nature of Egypt quickly asserted itself. Not sixty years after the accession of Akhenaton, his city was abandoned, its rulers branded as heretics, and the old religion restored in Thebes as completely as if the Aton had never existed.

Having thus failed to become rational, Egyptian theology took refuge in learning. The need for a more spiritual and intel- lectual interpretation of the pantheon still remained, and gave rise to a number of theological sciences. The names of the gods and the places of their worship were catalogued and classified, and manuals were devoted to the topography of mythological regions. Much ingenuity was expended on the development of a history of the gods, the groundwork of which had been laid in much earlier times. Re was not only the creator of the world, but he was also the first king of Egypt. He was followed on the throne by the other eight members of his Ennead, then by the lesser Ennead and by other gods, and finally by the so-called ” worshippers of Horus.” The latter were not wholly mythical personages, though they were regarded as demigods (Manetho calls them ” the dead,” vkmes) ; they have been shown to be none other than the dim rulers of the predynastic age. The Pharaohs of the historic period were thus divine, not only by virtue of their connexion with Horus (see above), but also as descendants of Re; and the king of Egypt was called ” the good god ” during his lifetime, and ” the great god ” after his death. The later religious literature is much taken up with the mythical and semi-mythical dynasties of kings, and the priests compiled, with many newly-invented details, the chronicles of the wars they were supposed to have waged.

In a similar manner, the ethical and allegorical methods of interpretation came into much greater prominence towards the end of the New Kingdom. The Osirian legend, as we have already seen, was early accepted as symbolizing the conflict between good and evil. So too the victories of Re over the serpent named Apophis were more or less clearly understood as a simile of

the antithetical nature of light and darkness. In one text at least as ancient as the XVIIIth Dynasty (the copy that we have dates

only from the Ethiopian period) an ingenious attempt Later ˆ j s ma(j

e to represent Ptah as the source of all life: menu!' irom Kim, it is said, emanated Horus as " heart " or

" mind " and Thoth as " tongue," and through the conjoint action of these two, the mind conceiving the design and the tongue uttering the creative command, all gods and men and beasts obtained their being. Of this kind of speculation much more must have existed than has reached us. It is doubtless such explanations as these that the Greeks had in view when they praised the wisdom of the ancient Egyptians; and in the classical period similar semi-philosophical interpreta- tions altogether supplanted, among the learned at least, the naive literal beliefs of earlier times. Plutarch in his treatise on Isis and Osiris well exemplifies this standpoint: for him every god and every rite is symbolic of some natural or moral truth. . The final stages of the Egyptian religion are marked by a renewed popularity of all its more barbarous elements. Despair- ing, as it would seem, of discovering the higher wisdom that the more philosophic of the priests supposed that religion to conceal, the simpler-minded sought to work out their own salvation by restoring the worship of the gods to its most primitive forms. Hence came the fanatical revival of animal-worship which led to feud and bloodshed between neighbouring towns — a feature of Egyptian religion that at once amused and scandalized con- temporary Greek and Latin authors (Plut. De Iside, 72; Juv. xv. 33). Nevertheless Egyptian cults, and particularly those of Serapis and Isis, found welcome acceptance on European soil; and the shrines of Egyptian deities were established in all the great cities of the Roman Empire. Serapis was a god imported by the first Ptolemy from Sinope on the Black Sea, who soon lost his own identity by assimilation with Osiris-Apis, the bull revered in Memphis. Far down into the Roman age the worship of Serapis persisted and flourished, and it was only when the Serapeum of Alexandria was razed to the ground by order of Theodosius the Great (a.d. 391) that the death-blow of the old Egyptian religion was struck.

Notes are here added on some divinities who have received in- adequate or no attention in the preceding pages. For information as to Ammon, Anubis, Apis, Bes, Bubastis, Buto, Isis and Thoth, reference must be made to the special articles on these gods.

Arsaphes, in Egyptian Harshafe, " he who is upon his lake," the ram-headed god of Heracleopohs Magna, gained an ephemeral importance during the IXth Dynasty, which arose from his town. Outwardly, he resembles Khnum. Little is known about him, and he is seldom mentioned. The burial-place of his priests in later times was in 1904 discovered at Abusir el Meleq.

Chons, ” he who travels by boat,” perhaps originally a mere epithet of the moon-god Ioh or Thoth, is chiefly familiar as the third member of the Theban triad. As such he is represented as a youthful god, wearing a skull-cap surmounted by the moon. His cult was revived and became popular in Ptolemaic times. A curious story about the sending of his statue to Mesopotamia to heal a daughter of the king of Bakhtan is related upon a stele that purports to date from the Ramesside period : it has been proved to be a pious fraud invented by the priests not earlier than the Greek period.

Hathor, whose name means ” house of Horus,’ was at all times a very important deity. She is depicted as a cow, or with a broad human countenance, the cow’s ears just showing from under a massive wig. Probably at first a goddess of the sky, she is early mentioned in connexion with Re. Later she was often identified with Isis, and her name was used to designate foreign goddesses like those of Puoni and Byblus. Unlike most cosmic deities, she was worshipped in many localities, chief among which was Dendera, where her magnificent temple, of Ptolemaic date, still stands. ” The seven Hatfiors ” is a name given to certain fairies, who appeared shortly after the birth of an infant, and predicted his future.

Khnum or Khnoum, a ram-headed god, whose principal place of worship was the island of Elephantine (there associated with Satis and Anukis), but also revered elsewhere, e.g. together with Nebtu in Esna. He enjoyed great repute as a creator, and was supposed to use the potter’s wheel for the purpose. In this capacity he is sometimes accompanied by the frog-headed goddess Heket. _

Month, a hawk-headed god of the Thebaid: in Thebes itself his cult was superseded by that of Ammon, but it persisted in Her- monthis. He was often given the solar attributes, and was credited as a great warrior.

MlN, the god of Coptos and Panopolis (Akhmim), seems to have been early looked upon as a deity of the harvest and crops. His

cult dates from the earliest times. Represented as ithyphallic, with two tall plumes on his head, the right arm upraised and bearing a scourge. In old times he is identified with Horus: later Ammon was confused with him, and depicted in his image.

Nechbet (Nekhbi, Nekhebi),. the vulture-goddess of El Kab, called Eileithyia by the Greeks. She gained an ascendancy as patroness of the south at the time when the two kingdoms were striving for the

mastery. It is as such, in opposition to Buto the goddess of the north, that she is most often named on the monuments.

Neith, the very ancient and important goddess of Sais, the Greek Athene. On the earliest monuments she is represented by a shield transfixed by arrows. Later she wears the crown of Lower Egypt, and carries in her hands a bow and arrows, a sign of her warlike character. In the XXVIth Dynasty, when a line of Pharaohs sprang from Sais, she regained a prominent position, and was given many cosmogonic attributes, including the title of mother of Re.

Nephthys, the sister oi Osiris and wife of Seth, daughter of Keb and Nut, plays a considerable r61e in the Osiris story. She sided with Isis and aided her to bring Osiris back to life. Isis and Nephthys are often mentioned together as protectresses of the dead.

Onouris, Egyptian En-huri, ” sky-bearer,” the god of Thinis. Later identified with Shu (Show), who holds heaven and earth apart.

Ptah, the Hephaestus of the Greeks, a demiurgic and creative god, special patron of hand-workers and artisans. Worshipped in Memphis, he perhaps owed his importance more to the political prominence of that town than to anything else. He was early identified with an ancient but obscure god Tenen, and further with the sepulchral deity Sokaris. He is represented either as a closely enshrouded figure whose protruding hands grasp a composite sceptre, the whole standing on a pedestal within a shrine; or else as a misshapen dwarf.

Sakhmi, a lion-headed goddess of war and strife, whose name signifies the mighty. She was worshipped at Latopolis (Esna), but also at a late date as a member of the Memphite triad, with Ptah as husband and Nefertem (Iphthimis) as son : often, too, confounded with Ubasti.

Seth (Egyptian Set, Sth or Sts), by the Greeks called Typhon,

was depicted as an animal pvj that has been compared with the

jerboa by some, and with the okapi by others, but which the Egyptians themselves occasionally conceived to be nothing but a badly drawn ass. In historic times his cult was celebrated at Tanis and Ombos. He regained a certain prestige as god of the Hyksos rulers, and two Pharaohs of the XlXth Dynasty derived their name Sethos (Seti) from him. But, generally speaking, he was abominated as a power of evil, and his figure was often obliterated on the monu- ments. He is named in similes as a great warrior, and as such and ” son of Nut ” he is identified with the Syrian Baal.

4. The Divine Cull. — In the midst of every town rose the temple of the local god, a stately building of stone, strongly contrasting with the mud and plaster houses in which even the wealthiest Egyptians dwelt. It was called the “house of the god ”

(| J), and in it the deity was supposed to reside, attended

by his ” servants ” (| y) the priests. There was indeed a certain

justification for this contention, even when a contrary theory assigned to the divinity a place in the sky, as in the case of the lunar divinity Thoth; for in the inmost sanctuary stood a statue of the god, which served as his representative for the purposes of the cult. Originally each temple was dedicated to one god only; but it early became usual to associate with him a mate of the opposite sex, besides a third deity who might be represented either as a second wife or as a child. As examples of such triads, as they are called, may be mentioned that of Thebes, consisting of Ammon, Mut and Chons, father, mother and child; and as typical of the other kind, where a god was accompanied by two goddesses, that of Elephantine, consisting of Khnum, Satis and Anukis. The needs of the god were much the same as those of mortals; no more than they could he dispense with food and drink, clothes for his apparel, ointment for his limbs, and music and dancing to rejoice his heart. The only difference w’as that the divine statue was half-consciously recognized as a lifeless thing that required carefully regulated rites and ceremonies to enable it to enjoy the good things offered to it. Early every morning the officiating priest proceeded to the holy of holies, after the preliminaries of purification had cleansed him from any miasma that might interfere with the efficacy of the rites. Then with the prescribed gestures, and reciting appropriate formulae all the while, he broke the seal upon the door of the shrine, loosed the bolts, and at last stood face to face with the

god. Thtre followed a series of prostrations and adorations, culminating in the offering of a small image of Maat, the goddess of Truth. This seems to have been the psychological moment of the entire service: hitherto the statue had been at best a god in posse; now the symbolical act placed him in possession of all his faculties, he was a god in truth, and could participate like any mortal in the food and

luxuries that his servants put before him. The daily ceremony closed with ablutions, anoint- ings and a bountiful feast of bread, geese, beer and oxen; having taken his fill of these, the god returned to his shrine until the next morning, when the ritual was renewed. The words that accompanied the manual gestures are, in the rituals that have come down to us, wholly dominated by the myth of Osiris: it is often hard to discern much connexion between the acts and the formulae recited, but the main thought is clearly that the priest represents Horus, the pious son of the dead divinity Osiris. That this conception is very old is proved by the fact that even in the Pyramid texts ” the eye of Horus ” is a synonym for all offerings: an ancient tale of which only shreds have reached us related how Seth had torn the eye of Horus from him, though not before he himself had suffered a still more serious mutilation; and by some means, we know not how, the restoration of the eye was instrumental in bringing about the vindication of Osiris. As to the manual rites of the daily cult, all that can here be said is that incense, purifications and anoint- ings with various oils played a large part; the sacrifices consisted chiefly of slaughtered oxen and geese; burnt offerings were a very late innovation.

At an early date the rites practised in the various temples were conformed to a common pattern. This holds good not only for the daily ritual, but also for many festivals that were cele- brated on the same day throughout the whole length of the land. Such were the calendrical feasts, called “. the beginnings of the seasons,” and including, for example, the monthly and half- monthly festivals, that of the New Year and that of the rising of Sirius (Sothis). But there were also local feast days like that of Neith in Sais (Hdt. ii. 62) or that of Ammon in southern Opi (Luxor). These doubtless had a more individual character, and often celebrated some incident supposed to have occurred in the lifetime of the god. Sometimes, as in the case of the feast of Osiris in Abydos, a veritable drama would be enacted, in which the whole history of the god, his sufferings and final triumph were represented in mimic form. At other times the ceremonial was more mysterious and symbolical, as in the feast of the

raising of the Ded-column u when a column of the kind was

drawn by cords into an upright position. But the most common feature of these holy days was the procession of the god, when he was carried on the shoulders of the priests in his divine boat far beyond the precincts of his temple; sometimes, indeed, even to another town, where he paid a visit to the god of the place. These occasions were public holidays, and passed amid great rejoicings. The climax was reached when at a given’ moment the curtains of the shrine placed on

the boat were withdrawn, and the god was revealed to the eyes of the awe-struck multitude. Music and dancing formed part of the festival rites.

As with the rites and ceremonies, so also the temples were early modelled upon a common type. Lofty enclosure walls, adorned with scenes from the victorious campaigns of the Pharaoh, shut off the sacred buildings from the surrounding streets. A small gateway between two massive towers or pylons gave admittance to a spacious forecourt open to the sky, into which the people were allowed to enter at least on feast days. Farther on, separated from the forecourt by smaller though still massive pylons, lay a hypostyle hall, so called from its covered colonnades; this hair was used for all kinds of processions. Behind the hypostyle hall, to which a second similar one might or might not be added, came the holy of holies, a dark narrow chamber where the god dwelt; none but the priests were admitted to it. All around lay the storehouses that contained the treasures of the god and the appurtenances of the divine ritual. The temples of the earliest times were of course

Temples.

far more primitive than this: from the pictures that are all that is now left to indicate their nature, they seem to have been little more than huts or sheds in which the image of the god was kept. One temple of a type different from that above described has survived at Abusir, where it has been excavated by German explorers. It was a splendid edifice dedicated to the sun-god Re by a king of the Vth Dynasty, and was probably a close copy of the famous temple of Heliopolis. The most conspicuous

feature was a huge obelisk on a broad superstructure fl : the

en

obelisk always remained closely connected with the solar worship, and probably took the place of the innermost shrine and statue of other temples. The greater part of the sanctuary was left uncovered, as best befitted a dwelling-place of the sun. Outside its walls there was a huge brick model of the solar bark in which the god daily traversed the heavens.

As the power of the Pharaohs increased, the maintenance of the cult became One of the most important affairs of state. The most illustrious manarchs prided themselves no less on the build- ings they raised in

honour of the gods than on the successful wars they waged: indeed the wars won a religious significance through the gradual elevation of the god of the capital to god of the nation, and a large part of the spoils was considered the rightful perquisite of the latter. Countless were the riches that the kings heaped upon the gods in the hope of being requited with long life and prosperity on the throne of the living. It became the theory that the temples were the gifts of the Pharaoh to his fathers the gods, and therefore in the scenes of the cult that adorn the inner walls it is always he who is depicted as performing the ceremonies. As a matter of fact the priesthoods were much more independent than was allowed to appear. Successive grants of land placed no small P° wer ot portion of the entire country in their hands, and the priests. administration of the temple estates gave employment to a large number of officials and serfs. In the New Kingdom the might of the Theban god Ammon gradually became a serious menace to the throne: in the reign of Rameses III. he could boast of more than 80,000 dependants, and more than 400,000 cattle. It is not surprising that a few generations later the high priests of Ammon supplanted the Pharaohs altogether and founded a dynasty of their own.

At no .period did the priests form a caste that was quite distinctly separated from the laity. In early times the feudal lords were themselves the chief priests of the local temples. Under them stood a number of subordinate priests, both pro- fessional and lay. Among the former were the kher-heb, a learned man entrusted with the conduct of the ceremonies, and the ” divine fathers,” whose functions are obscure. The lay priests were divided into four classes that undertook the manage- ment of the temple in alternate months; their collective name was the ” hour-priesthood.” Perhaps it was to them that the often recurring title oueb, ” the pure,” should properly be restricted, though strict rules as to personal purity, dress and diet were demanded of all priests. The personnel of the temple was completed by various subordinate officials, doorkeepers, attendants and slaves. In the New Kingdom the leading priests were more frequently mere clerics than theretofore, though for instance the high priest of Ammon was often at the same time the vizier of southern Egypt. In some places the highest priests bore special names, such as the Ouer maa, ” the Great Seer,” of Re in Heliopolis, or the Khorp himet, ” chief artificer,” of the Memphite Ptah. Women could also hold priestly rank, though apparently in early times only in the service of goddesses; ” priestess of Hathor ” is a frequent title of well-born ladies in the Old Kingdom. At a later date many wealthy dames held the office of ” musicians ” (shemat) in the various temples. In the service of the Theban Ammon two priestesses called ” the Adorer of the God ” and

the ” Wife of the God ” occupied very influential positions, and towards the Saite period it was by no means unusual for the king to secure these offices for his daughters and so to strengthen his own royal title.

5. The Dead and their Cult. — While the worship of the gods

tended more and more to become a monoply of the state and the priests, and provided no adequate outlet for the religious cravings of the people themselves, this deficiency was amply supplied by the care which they bestowed upon their dead: the Egyptians stand alone among the nations of the world in the elaborate precautions which they took to secure their own welfare beyond the tomb. The belief in immortality, or perhaps rather the incapacity to grasp the notion of complete annihilation, is traceable from the very earliest times: the simplest graves of the prehistoric period, when the corpses were committed to the earth in sheepskins and reed mats, seldom lack at least a few poor vases or articles of toilet for use in the hereafter. In proportion as the prosperity of the land increased, and the advance of civilization afforded the technical means, so did these primitive burials give place to a more lavish funereal equipment. Tombs of brick with a single chamber were suc- ceeded by tombs of stone with several chambers, until they really merited the name of ” houses of eternity ” that the Egyptians gave to them. The conception of the tomb as the residence of the dead is the fundamental notion that underlies all the ritual observances in connexion with the dead, just as the idea of the temple as the dwelling-place of the god is the basis of the divine cult. The parallelism between the attitude of the Egyptians towards the dead and their attitude towards the gods is so striking that it ought never to be lost sight of: nothing can illustrate it better than the manner in which the Osirian doctrines came to permeate both kinds of cult.

The general scheme of Egyptian tombs remained the same throughout the whole of the dynastic period, though there were Tombs many variations of detail. By preference they were built in the Western desert, the Amente, near the place where the sun was seen to go to rest, and which seemed the natural entrance to the nether world. A deep pit led down to the sepulchral chamber where the dead man was

deposited amid the funereal furniture destined for his use; and no device was neglected that might enable him to rest here undisturbed. This aim is particularly conspicuous in the pyramids, the gigantic tombs which the Pharaohs of the Old Kingdom constructed for themselves: the passages that lead to the burial chamber were barred at intervals by vast granite blocks, and the narrow opening that gave access to them was hidden from view beneath the stone casing of the pyramid sides. Quite separate from this part of the tomb lay the rooms employed for the cult of the dead: their walls were often adorned with pictures from the earthly life of the deceased, which it was hoped he might still continue to enjoy after death. The innermost chamber was the chapel proper: on its western side was sculptured an imitation door for the dead man to pass through, when he wished to participate in the offerings brought by pious relatives. It was of course only the few who could afford elaborate tombs of the kind: the poor had to make shift with an unpretentious grave, in which the corpse was placed enveloped only by a few rags or enclosed in a rough wooden coffin.

The utmost care was taken to preserve the body itself from decay. Before the time of the Middle Kingdom it became usual for the rich to have their bodies embalmed. The inlaad' intestines were removed and placed in four vases (the burial. so-called Canopic jars) in which they were supposed to enjoy the protection of the four sons of Horus, the man-headed Mesti, the ape-headed Hapi, the jackal Duamutef and the falcon Kebhsenuf. The corpse was treated with natron and asphalt, and wound in a copious swathing of linen bandage, with a mask of linen and stucco on the face. The " mummy " thus prepared was then laid on its side like a sleeper, the head supported by a head-rest, in a sarcophagus of wood or stone. The operations in connexion with the mummy grow more and more elaborate towards the end of the Pharaonic period: already in the New Kingdom the wealthiest persons had their mummies laid in several coffins, each of which was gaudily painted with mythological scenes and inscriptions. The costliest process of embalmment lasted no less than seventy days. Many superstitious rites had to be observed in the course of the process:

a late book has preserved to us the magical formulae that were repeated by the wise kher-heb priest (who in the necropolis performed the functions of taricheutes, "embalmer"), as each bandage was applied.

A large number of utensils, articles of furniture and the like were placed in the burial-chamber for the use of the dead — jars, weapons, mirrors, and even chairs, musical instruments and wigs. In the early

times statuettes of servants, representing them as engaged in their various functions (brewers, bakers, &c), were included for the same purpose; they were supposed to perform their menial functions for their deceased lord in the future life. In the Middle Kingdom these are gradually replaced by small models of the mummy itself, and the belief arose that when their owner was called upon to perform any distasteful work in the nether world, they would answer to his name and do the task for him. The later ushebti-figures, little statuettes of wood, stone or faience, of which several hundreds are often found in a single tomb, are confused survivals of both of the earlier classes of statuettes. Still more important than all such funereal objects are the books that were placed in the grave for the use of the dead: in the pyramids they are written on the walls of the sepulchral chamber and the passages leading to it; in the Middle Kingdom usually inscribed on the inner sides of the sarcophagus; in later times contained in rolls of papyrus. The Pyramid texts and the Book of the Dead are the most important of these, and teach us much about the dangers and needs that attended the dead man beyond the tomb, and about the manner in which it was thought they could be counteracted.

The burial ceremony itself must have been an imposing spectacle. In many cases the mummy had to be conveyed across the Nile, and boats were gaily decked out for this purpose. On the western bank a stately procession conducted the deceased to his last resting-place. At the door of the tomb the final ceremonies were performed; they demanded a considerable number of actors, chief among whom were the sem-piiest and the kher-heb priest. It was a veritable drama that was here enacted, and recalled in its incidents the story of Osiris, the divine proto- type of all successive generations of the Egyptian dead.

However carefully the preliminary rites of embalmment and burial might have been performed, however sumptuous the tomb wherein the dead man reposed, he was never- xhesoal theless almost entirely at the mercy of the living for his welfare in the other world: he was as dependent on a con- tinued cult on the part of the surviving members of his family as the gods were dependent on the constant attendance of their priests. That portion of a man's individuality which required, even after death, food and drink, and the satisfaction of sensuous needs, was called by the Egyptians the ka, and represented in

hieroglyphs by the uplifted hands [_]. This ka was supposed

to be born together with the person to whom it belonged, and on the very rare occasions when it is depicted, wears his exact semblance. The conception of this psychical entity is too vaguely formulated by

the Egyptians and too foreign to modern thought to admit of exact translation: of the many renderings that have been proposed, perhaps ” double ” is the most suitable. At all events the ka has to be distinguished from the soul, the bai

(in hieroglyphs^^ or^.), which was of more tangible nature,

and might be descried hovering around the tomb in the form of a bird or in some other shape; for it was thought that the soul might assume what shape it would, if the funerary rites had been duly attended to. The gods had their ka and bai, and the forms attributed to the latter are surprising; thus we read that the soul of the sky Nun is Re, that of Osiris the Goat of Mendes, the souls of Sobk are crocodiles, and those ” of all the gods are snakes “; similarly the soul of Ptah was thought to dwell in the Apis bull, so that each successive Apis was during its lifetime the reincarnation of the god. Other parts of a man’s being to which at given moments and in particular contexts the Egyptians assigned a certain degree of separate existence are the ” name ”

ran, the ” shadow

‘•?’

khaibel, and the ” corpse ‘

^ , khat.

It was, however, the ka alone to which the cult of the dead was directly addressed. This cult was a positive duty binding on the children of a dead man, and doubtless as a rule discharged by them with some regularity and conscientiousness; at least, on feast-days offerings would be brought to the tomb, and the ceremonies of purification and opening the mouth of the deceased would be enacted. But there could be little guarantee that later generations would perpetuate the cult. It therefore became usual under the Old Kingdom for the wealthiest persons to make testamentary dispositions by which certain other persons agreed for a consideration to observe the required rites at stated periods: they received the name of ” servants of the ka,” and stood in the same relation to the deceased as the priests to the gods. Or again, contracts might be made with a

neighbouring temple, the priesthood of which bound itself to reserve for the contracting party some portion of the offerings that had already been used for the divine cult. There is probably a superstitious reason for the preference shown by the dead for offerings of this kind; no wish is commoner than that one may receive ” bread and beer that had gone up on to the altar of the local god,” or ” with which the god had been sated ” ; something of the divine sanctity still clung about such offerings and made them particularly desirable. In spite of all the precautions they took and the contracts they made, the Egyptians could never quite rid them- selves of the dread that their tombs might decay and their cult be neglected; and they sought therefore to obtain by prayers and threats what they feared they might lose altogether. The occasional visitor to the tomb is reminded by its inscriptions of the many virtues of the dead man while he yet lived, and is charged, if he be come with empty hands, at least to pronounce the funerary formula; it will indeed cost him nothing but ” the breath of his mouth”! Against the would-be desecrator the wrath of the gods is invoked: ” with him shall the great god reckon there where a reckoning is made.”

The funerary customs that have been described are meaning- less except on the supposition that the tomb was the regular dwelling-place of the dead. But just as the Egyptians found no contradiction between the view of the temple as the residence of the god and the conception of him as a cosmic deity, so too they often attributed to the dead a continued existence quite apart from the tomb. According to a widely-spread doctrine of great age the deceased Egyptian was translated to the heavens, where he lived on in the form of a star. This theme is elaborated with great detail in the Pyramid texts, where it is the dead king to whom this destiny is promised. It was perhaps only a restricted aristocracy who could aspire to such high

honour: the ^\ ikh, or ” glorified being,” who has his place in

the sky seems often to hold an intermediate position between the gods and the rank and file of the dead. But in a few early passages the required qualification appears to be rather moral integrity than exalted station. The life of the dead man in the sky is variously envisaged in different texts: at one moment he is spoken of as accompanying the sun-god in his celestial bark, at another as a mighty king more powerful than Re himself; the crudest fancy of all pictures him as a hunter who catches the stars and gods, and cooks and eats them. According to another conception that persisted in the imagination of the Egyptians longer than any of the ideas just mentioned, the home of the dead in the heavens was a fertile region

not very different form Egypt itself, intersected by canals and abounding in corn and fruit; this place was called the Sokhet Earu or ” field of Reeds.”

Even in the oldest texts these beliefs are blended inextricably with the Osirian doctrines. It is not so much as king of the dead that Osiris here appears, but every deceased Egyptian was regarded as himself an Osiris, as having undergone all the

indignities inflicted upon the god, but finally triumphant over the powers of death and evil impersonated by Seth. This notion became so popular, that beside it all other views of the dead sink into insignificance; it permeates the funerary cult in all its stages, and from the Middle Kingdom onwards the dead man is regularly called ” the Osiris so-afcd-so,” just as though he were completely identical with the god. One incident of the tale of Osiris acquired a deep ethical meaning in connexion with the dead. It was related how Seth had brought an accusation against Osiris in the great judgment hall of Heliopolis, and how the latter, helped by the skilful speaker Thoth, had emerged from the ordeal acquitted and triumphant. The belief gradually grew up that every dead man would have to face a similar trial before he could be admitted to a life of bliss in the other world. A well- known vignette in the Book of the Dead depicts the scene. In a shrine sits Osiris, the ruler and judge of the dead, accompanied by forty-two assessors; and before him stands the balance on which the heart of the deceased man is to be weighed against Truth; Thoth stands behind and registers the result. The words that accompany this picture are still more remarkable : they form a long negative confession, in which the dead man declares that he has sinned neither against man nor against the gods. Not all the sins named are equally heinous according to modern conceptions; many of them deal with petty offences against religious usages that seem to us but trifling. But it is clear that by the time this chapter was penned it was believed that no man could attain to happiness in the hereafter if he had not been upright, just and charitable in his earthly existence. The date at which these conceptions became general is not quite certain, but it can hardly be later than the Middle Kingdom, when the dead man has the epithet ” justified ” appended to his name in the inscriptions of his tomb.

It was but a natural wish on the part of the Egyptians that they should desire to place their tombs near the traditional burying-place of Osiris. By the time of the Xllth Dynasty it was thought that this lay in Abydos, the town where the kings of the earliest times had been interred. But it was only in a few cases that such a wish could be

literally fulfilled. It therefore became customary for those who possessed the means to dedicate at least a tombstone in the neighbourhood of ” the staircase of the great god,” as the sacred spot was called. And those who had found occasion to visit Abydos in their lifetime took pleasure in recalling the part that they had there taken in the ceremonies of Osiris. Such pilgrims doubtless believed that the pious act would stand to their credit when the day of death arrived.

6. Magic. — Among the rites that were celebrated in the temples or before the statues of the dead were many the mystical meaning of which was but imperfectly understood, though their efficacy was never doubted. Symbolical or imitative acts, accompanied by spoken formulae of set form and obscure content, accom- plished, by some peculiar virtues of their own, results that were beyond the power of human hands and brain. The priests and certain wise men were the depositaries of this mysterious but highly useful art, that was called hik or ” magic “; and one of the chief differences between gods and men was the superior degree in which the former were endowed with magical powers. It was but natural that the Egyptians should wish to employ magic for their own benefit or self-gratification, and since religion put no veto on the practice so long as it was exercised within legal bounds, it was put to a widespread use among them. When magicians made figures of wax representing men whom they desired to injure, this was of course an illegal act like any other, and the law stepped in to prevent it: one papyrus that has been preserved records the judicial proceedings taken in such a case in connexion with the harem conspiracy against Rameses III.

One of the chief purposes for which magic was employed was to avert diseases. Among the Egyptians, as in other lands, illnesses were supposed to be due to evil spirits or the ghosts of dead men who had taken up their abode in the body of the sufferer, and they could only be driven thence by charms and spells. But out of these primitive notions arose a real medical

science: when the ailment could be located and its nature roughly determined, a more materialistic view was taken of it; and many herbs and drugs that were originally used for some superstitious reason, when once they had been found to be actually effective, easily lost

their magical significance and were looked upon as natural specifics. It is extremely hard to draw any fixed line in Egypt between magic and medicine; but it is curious to note that simple diagnoses and prescriptions were employed for the more curable diseases, while magical formulae and amulets are reserved for those that are harder to cope with, such as the bites of snakes and the stings of scorpions.

The formulae recited for such purposes are not purely cabalistic, though inasmuch as mystery is of the very essence of magic, foreign words and outlandish names occur in them by preference. Often the magician relates some mythical case where a god had been afflicted with a disease similar to that of the patient, but had finally recovered: a number of such tales were told of Horus, who was usually healed by some device of his mother Isis, she being accounted as a great enchantress. The mere recitation of such similar cases with their happy issue was supposed to be magically effective; for almost unlimited power was supposed to be inherent in mere words. Often the demon is directly invoked, and commanded to come forth. At other times the gods are threatened with privations or even destruction if they refuse to aid the magician: the Egyptians seem to have found little impiety in such a use of the divine name, though to us it would seem the utmost degree of profanity when, for instance, a magician declares that if his spell prove ineffective, he ” will cast fire into Mendes and burn up Osiris.”

The verbal spells were always accompanied by some manual performance, the tying of magical knots or the preparation of an amulet. In these acts particular significance was attached to certain numbers: a sevenfold knot, for example, was more efficacious than others. Often the formula was written on a strip of rag or a scrap of papyrus and tied round the neck of the person for whom it was intended. Beads and all kinds of amulets could be infused with magical power so as to be potent phylacteries to those who wore them.

In conclusion, it must be emphasized that in Egypt magic stands in no contrast or opposition to religion, at least as long as it was legitimately used. The religious rites and ceremonies are full of it. When a pretence was made of opening, with an iron instrument, the mouth of the divine statue, to the accom- paniment of recited formulae, this can hardly be termed anything but magic. Similarly, the potency attributed to ushebti-figures and the copies of the Book of the Dead deposited in the tombs is magical in quality. What has been considered under this heading, however, is the use that the same principles of magic were put to by men in their own practical life and

for their own advantage.

Authorities. — An excellent list of books and articles on the various topics connected with Egyptian Religion will be found in H. O. Lange's article on the subject in P.D. Chantepie de la Saussaye, Lehrbuch der Religions geschichte (Tubingen, 1905), vol. i. pp. 172- 245. Among general works may be especially recommended A. Erman, Die agyptische Religion (Berlin, 1905) ; and chapters 2 and 3 in G. Maspero, Histoire ancienne des peuples de VOrient, les origines, vol. i. (Paris, 1895). (A. H. G.)

D. Egyptian Language and Writing. — Decipherment. — Although attempts were made to read Egyptian hiero- glyphs so far back as the 17th century, no promise of success appeared until the discovery of the Rosetta stone in 1799 by the French engineers attached to Napoleon's expedition to Egypt. This tablet was inscribed with three versions, in hieroglyphic, demotic and Greek, of a long decree of the Egyptian priests in honour of Ptolemy V., Epiphanes and his wife Cleopatra. The Greek and demotic versions were still almost perfect, but most of the hieroglyphic text had been broken away with the top of the tablet; portions of about half of the lines remained, but no single line was complete. In 1802 J. D. Akerblad, a Swedish orientalist attached to the embassy in Paris, identified the proper names of persons which occurred in the demotic text, being guided to them by the position of

their equivalents in the Greek. These names, all of them foreign, were written in an alphabet of a limited number of characters, and were therefore analysed with comparative ease.

The hieroglyphic text upon the Rosetta stone was too frag- mentary to furnish of itself the key to the decipherment. But the study of this with the other scanty monuments and imperfect copies of inscriptions that were available enabled the celebrated physicist Thomas Young (1773-1829) to make a beginning. In an article completed in 1819 and printed (over the initials I. J.) in the supplement to the 4th, 5th and 6th editions of the Encyclopaedia Britannica (vol. iv., 1824), he published a brief account of Egyptian research, with five plates containing the " rudiments of an Egyptian vocabulary." It appears that Young could place the hieroglyphic, demotic and Greek texts of the Rosetta stone very correctly parallel; but he could not accur- ately break up the Egyptian sentences into words, much less could he attribute to the words their proper sounds. Yet he recognized correctly the names of Apis and Re, with many groups for words such as " assembly," " good," " name," and important signs such as those which

distinguish feminine words. In a bad copy of another monument he rightly guessed the royal name of Berenice in its cartouche by the side of that of Ptolemy, which was already known from its occurrence on the Rosetta stone. He considered that these names must be written in phonetic characters in the hieroglyphic as in demotic, but he failed to analyse them correctly. It was clear, nowever, that with more materials and perseverance such efforts after decipher- ment must eventually succeed.

Meanwhile J. F. Champollion ” le Jeune ” (see Champollion; and Hartleben, Champollion, sein Leben und sein Werk, Berlin, 1906) had devoted his energies whole-heartedly since 1802, when he was only eleven years old, to preparing himself for the solution of the Egyptian problem, by wide linguistic and historical studies, and above all by familiarizing himself with every scrap of Egyptian writing which he could find. By 1818 he made many equations between the demotic and the hieroglyphic characters, and was able to transcribe the demotic names of Ptolemy and Cleopatra into hieroglyphics. At length, in January 1822, a copy of the hieroglyphic inscription on the Bankes obelisk, which had long been fruitlessly in the hands of Young, reached the French savant. On the base of this obelisk was engraved a Greek inscription in honour of Ptolemy Euergetes II. and Cleopatra; of the two cartouches on the obelisk one was of Ptolemy, the other was easily recognized as that of Cleopatra, spelt nearly as in Champollion’s experimental transcript of the demotic name, only more fully. This discovery, and the recog- nition of the name Alexander, gave fourteen alphabetic signs, including homophones, with ascertained values. Starting from these, by the beginning of September Champollion had analysed a long series of Ptolemaic and Roman cartouches. His next triumph was on the 14th of September, when he read the names of the ancient Pharaohs Rameses and Tethmosis in some drawings just arrived from Egypt, proving that his alphabetic characters were employed, in conjunction with syllabic signs, for spelling native names; this gave him the assurance that his discovery touched the essential nature of the Egyptian writing and not merely, as had been contended, a special cipher for the foreign words which might be quite inapplicable to the rest of the inscriptions. His progress continued unchecked, and before the end of the year the connexion of ancient Egyptian and Coptic was clearly established. Subsequently visits to the museums of Italy and an expedition to Egypt in 1828-1829 fur- nished Champollion with ample materials. The Pricis du systlme hiiroglyphique (1st ed. 1823, 2nd ed. 1828) contained the philo- logical results of his decipherments down to a certain point. But his MS. collections were vast, and his illness after the strenuous

labours of the expedition and his early death in 1832 left all in confusion. The Grammaire egyptienne and Dictionnavre Sgyptien, edited from these MSS. by his brother, precious as they were, must be a very imperfect register of the height of his attainments. In his last years he was able to translate long texts in hieroglyphic and in hieratic of the New Kingdom and

of the later periods with some accuracy, and his comprehension of demotic was considerable.. Champollion outdistanced all his competitors from the first, and had practically nothing to thank them for except material to work on, and too often that had been intentionally withheld from him. In eleven years he broke ground in all directions; if the ordinary span of life had been allowed him, with twenty or thirty more years of labour he might have brought order into the chaos of different ages and styles of language. and writing; but, as it was, the task of co-ordination remained to be done by others. For one year, before his illness incapacitated him, Champollion held a professorship in Paris; but of his pupils and fellow-workers, F. P. Salvolini, insincere and self-seeking, died young, and IppolitoRosellini (1800- 1843) showed little original power. From 1832 to 1837 there was a pause in the march of Egyptology, and it seemed as if the young science might be overwhelmed by the storm of doubts and detrac- tion that was poured upon it by the enemies of Champollion. Then, however, Lepsius in Germany and Samuel Birch in England took up the thread where the master had dropped it, and E. de Roug6, H. Brugsch, Francois Joseph Chabas and a number of lesser lights quickly followed. Brugsch (q.v.) was the author of a hieroglyphic and demotic dictionary which still holds the field, and from time to time carried forward the study of demotic by a giant's stride. De Rouge (d. 1872) in France was a brilliant translator of hieroglyphic texts and the author of an important grammatical work. Chabas (1817-1882) especially addressed himself to the reading of the hieratic texts' of the New Kingdom. By such labours after forty years the results attained by Cham- pollion in decipherment were entirely superseded. Yet, while the values of the signs were for the most part well ascertained, and the meanings of most works fixed with some degree of accuracy, few grammatical rules had as yet been established, the varieties of the language at different periods had not been defined, and the origins of the hieroglyphs and of their values had not been investigated beyond

the most obvious points. At this time a rare translator of Egyptian texts in all branches was arising in G. Maspero (q.v.), while E. Revillout addressed himself with success to the task of interpreting the legal docu- ments of demotic which had been almost entirely neglected for thirty years. But the honour of inaugurating an epoch marked by greater precision belongs to Germany. The study of Coptic had begun in Europe early in the 17 th century, and reached a high level in the work of the Dane Georg Zoega (1 755-1809) at the end of the 18th century. In 1835, too late for Champollion to use it, Amadeo Peyron (1 785-1870) of Turin published a Coptic lexicon of great merit which is still standard, though far from satisfying the needs of scholars of the present day. In 1880 Ludwig Stern (Koptische Grammatik) admirably classified the grammatical forms of Coptic. The much more difficult task of recovering the grammar of Egyptian has occupied thirty years of special study by Adolf Erman and his school at Berlin, and has now reached an advanced stage. The greater part of Egyptian texts after the Middle Kingdom having been written in what was even then practically a dead language, as dead as Latin was to the medieval monks in Italy who wrote and spoke it, Erman selected for special investigation those texts which really represented the growth of the language at different periods, and, as he passed from one epoch to another, compared and consolidated his results.

The Neuagyptische Grammatik (1880) dealt with texts written in the vulgar dialect of the New Kingdom (Dyns. XVIII. to XX.). Next followed, in the Zeitschrift fur agyptische Sprache und Alter- thumskunde, studies on the Old Kingdom inscription of Una, and the Middle Kingdom contracts of Assiut, as well as on an ” Old Coptic ” text of the 3rd century a.d. At this point a papyrus of stories written in the popular language of the Middle Kingdom provided Erman with a stepping-stone from Old Egyptian to the Late Egyptian of the Neuagyptische Grammatik, and gave the connexions that would bind solidly together the whole structure of Egyptian grammar (see Sprache des Papyrus Westcar, 1889). The very archaic pyramid texts enabled him to sketch the grammar of the earliest known form of Egyptian (Zeitschrift d. Deutsch. Morgenl. Gesellschaft, 1892), and in 1894 he was able to write a little manual of Egyptian for beginners (Agyptische Grammatik, 2nd ed., 1902), centring on the language of the standard inscriptions of the Middle and New

Kingdoms, but accompanying the main sketch with references to earlier and later forms. Of the work of Erman’s pupils we may mention G. Steindorff’s little Koptische Grammatik (1894, ed. 1904), improving greatly on Stern’s standard work in regard to phonology and the relationship of Coptic forms to Egyptian, and K. Sethe’s Das

Agyptische Verbum (1899). The latter is an extensive monograph on the verb in Egyptian and Coptic by a brilliant and laborious philologist. Owing to the very imperfect notation of sound in the writing, the highly important subject of the verbal roots and verbal forms was perhaps the obscurest branch of Egyptian grammar when Sethe first attacked it in 1895. The subject has been reviewed by Erman, Die Flexion des dgyptischen Verbums in the Sitzungsberichle of the Berlin Academy, 1900. The Berlin school, having settled the main lines of the grammar, next turned its attention to lexicography. It has devised a scheme, founded on that for the Latin Thesaurus of the Berlin Academy, which almost mechanically sorts the whole number of occurrences of every word in any text examined. Scholars in England, America and Denmark, as well as in Germany, have taken part in this great enterprise, and though the completion of it may be far off, the collections of classified material already made are very valuable for consultation. 1 At present Egyptologists depend on Heinrich Brugsch's admirable but somewhat antiquated Worlerbuch and on Levi's useful but entirely uncritical Vocabolario. Though demotic has not yet received serious attention at Berlin, the influence of that great school has made itself felt amongst demotists, especially in Switzerland, Germany, America and England. The death of Heinrich Brugsch in 1895 was a very severe blow to demotic studies; but it must be admitted that his brilliant gifts lay in other directions than exact grammatical analysis. Apart from their philological interest, as giving the history of a remarkable language during a period of several thousand years, the grammatical studies of the last quarter of the 19th century and afterwards are beginning to bear fruit in regard to the exact interpretation of historical documents on Egyptian monuments and papyri. Not long ago the supposed meaning of these was extracted chiefly by brilliant guessing, and the published translations of even the best scholars could carry no guarantee of more than approximate exacti- tude, where the sense depended at all on correct recognition of the syntax. Now the translator proceeds in Egyptian with some of the sureness with which he would deal with Latin or Greek. The meaning of many words may be still unknown, and many constructions are still obscure; but at least he can distinguish fairly between a correct text and a corrupt text. Egyptian writing lent itself only too easily to misunderstanding, and the writings of one period were but half intelligible to the learned scribes of another. The mistaken readings of the old inscriptions by the priests at Abydos (Table of Abydos), when attempting to record the names of the kings of the 1st Dynasty on the walls of the temple of Seti I., are now admitted on all sides; and no palaeographer, whether his field be Greek, Latin, Arabic, Persian or any other class of MSS., will be surprised to hear that the Egyptian

papyri and inscriptions abound in corruptions and mistakes. The translator of to-day can, if he wishes, mark where certainty ends and mere conjecture begins, and it is to be hoped that advantage will be taken more widely of this new power. The Egyptologist who has long lived in the realm of conjecture is too prone to consider any series of guesses good enough to serve as a translation, and forgets to insert the notes of interrogation which would warn workers in other fields from implicit trust.

Language and Writing. — The history of the Egyptian language is evidenced by documents extending over a very long range of time. They begin with the primitive inscriptions of the 1st Dynasty (not later than 3300 B.C.) and end with the latest Coptic compositions of about the 14th century a.d. The bulk of the hieroglyphic inscriptions are written in a more or less artificial literary language; but in business documents, letters, popular tales, &c, the scribes often adhered closely to the living form of the tongue, and thus reveal its progressive changes.

The stages of the language are now distinguished as follows: — Old Egyptian. — This is properly the language of the Old Kingdom. In it we have (a) the recently discovered inscriptions of the 1st Dynasty, too brief and concise to throw much light on the language of that time; and the great collections of spells and ritual texts found inscribed in the Pyramids of the Vth and Vlth Dynasties, which must even then have been of high antiquity, though they contain later additions made in the same style, (b) A few historical texts and an abundance of short inscriptions representing the language of the IVth, Vth and Vlth Dynasties. The ordinary literary language of the later monu- ments is modelled on Old Egyptian. It is often much affected

1 Annual reports of the progress of the work are printed in the Sitzungsberichte of the Berlin Academy of Sciences ; see also Erman, Zur dgyptischen Spro.chforschung, ib. for 1907, p. 400, showing the general trend of the results.

by contemporary speech, but preserves in the main the character- istics of the language of the Old Kingdom.

Middle and Late Egyptian. — These represent the vulgar speech of the

Middle and New Kingdoms respectively. The former is found chiefly in tales, letters, &c, written in hieratic on papyri of the XIII th Dynasty to the end of the Middle Kingdom; also in some inscriptions of the XVIIIth Dynasty. Late Egyptian is seen in hieratic papyri of the XVIIIth to the XXIst Dynasties. The spelling of Late Egyptian is very extraordinary, full of false etymologies, otiose signs, &c, the old orthography being quite unable to adapt itself neatly to the profoundly modified language; nevertheless, this clumsy spelling is expressive, and the very mistakes are instructive as to the pronunciation.

Demotic. — Demotic Egyptian seems to represent approximately the vulgar speech of the Saite period, and is written in the ” demotic ” character, which may be traced back to the XXVIth Dynasty, if not to a still earlier time. With progressive changes, this form of the language is found in documents reaching down to the fall of Paganism in the 4th century a.d. 1 Under the later Ptolemies and the Roman rule documents in Greek are more abundant than in demotic, and the language of the ruling classes must have begun to penetrate the masses deeply.

Coptic. — This, in the main, represents the popular language of early Christian Egypt from the 3rd to perhaps the 10th century a.d., when the growth of Coptic as a literary language must have ceased. The Greek alphabet, reinforced by a few signs borrowed from demotic, rendered the spoken tongue so accurately that four distinct, though closely allied, dialects are readily distinguishable in Coptic MSS.; ample remains are found of renderings of the Scriptures into all these dialects. The distinctions between the dialects consist largely in pronunciation, but extend also to the vocabulary, word-formation and syntax. Such interchanges are found as I for r, (5~ (k, ch) for 2C (dj), final i for final e, a for e, a for 0. Early in the and century a.d., pagan Egyptians, or perhaps foreigners settled in Egypt, essayed, as yet unskilfully, to write the native language in Greek letters. This Old Coptic, as it is termed, was still almost entirely free from Greek loan-words, and its strong archaisms are doubtless accounted for by the literary language, even in its most ” vulgar ” forms, having moved more slowly than the speech of the people. Christian Coptic, though probably at first contemporary with some docu- ments of Old Coptic, contrasts strongly with the latter. The monks whose task it was to perfect the adaptation of the alphabet to the dialects of Egypt and translate the Scriptures out of the Greek, flung away all pagan traditions. It is clear that the basis which they chose for the new literature was the simplest language of daily life in the monasteries, charged as it was with expressions taken from Greek, pre-eminently

the language of patristic Christianity. There is evidence that the amount of stress on syllables, and the consequent length of vowels, varied greatly in spoken Coptic, and that the variation gave much trouble to the scribes; the early Christian writers must have taken as a model for each dialect the deliberate speech of grave elders or preachers, and so secured a uniform system of accentuation. The remains of Old Coptic, though very instructive in their marked peculiarities, are as yet too few for definite classification. The main divisions of Christian Coptic as recognized and named at present are: Sahidic (formerly called Theban), spoken in the upper Thebais; Akhmimic, in the neighbourhood of Akhmim, but driven out by Sahidic about the 5th century; Fayumic, in the Fayum (formerly named wrongly " Bashmuric," from a province of the Delta); Bohairic, the dialect of the "coast district" (formerly named "Memphite"), spoken in the north-western Delta. Coptic, much alloyed with Arabic, was spoken in Upper Egypt as late as the 15th century, but it has long been a dead language. 2 Sahidic and Bohairic are the most important

1 In the temple of. Philae, where the worship of Isis was permitted to continue till the reign of Justinian, Brugsch found demotic inscriptions with dates to the end of the 5th century.

2 The Arabic dialects, which gradually displaced Coptic as Mahommedanism supplanted Christianity, adopted but few words)(the old native stock.

dialects, each of these having left abundant remains; the former spread over the Whole of Upper Egypt, and the latter since the 14th century has been the language of the sacred books of Christianity throughout the country, owing to the hierarchical importance of Alexandria and the influence of the ancient monasteries established in the north-western desert.

The above stages of the Egyptian language are not defined with absolute clearness. Progress is seen from dynasty to dynasty or from century to century. New Egyptian shades off almost imperceptibly into demotic, and it may be hoped that gaps which now exist in the development will be filled by further discovery.

Coptic is the only stage of the language in which the spelling gives a clear idea of the pronunciation. It is therefore the mainstay of the scholar in investigating or restoring the word- forms of the ancient language. Greek transcriptions of Egyptian names and words are valuable as evidence for the vocalization of Egyptian. Such are found from the 6th century B.C. in the inscription of Abu Simbel, from the

5th in Herodotus, &c, and abound in Ptolemaic and later documents from the beginning of the 3rd century B.C. onwards. At first sight they may seem inaccurate, but on closer examination the Graecizing is seen to follow definite rules, especially in the Ptolemaic period. A few cuneiform transcriptions, reaching as far back as the XVIIIth Dynasty, give valuable hints as to how Egyptian was pronounced in the 15th century B.C. Coptic itself is of course quite inadequate to enable us to restore Old Egyptian. In it the Old Egyptian verbal forms are mostly replaced by periphrases; though the strong roots are often preserved entire, the weaker consonants and the * have largely or entirely disappeared, so that the language appears as one of biliteral rather than triliteral roots. Coptic is strongly impregnated with Greek words adopted late; moreover, a certain number of Semitic loan-words flowed into Egyptian at all ages, and especially from the 16th century B.C. onwards, displacing earlier words. It is only by the most careful scrutiny, or the exercise of the most piercing insight, that the imperfectly spelled Egyptian has been made to yield up one grammatical secret after another in the light brought to bear upon it from Coptic. Demotic grammar ought soon to be thoroughly comprehensible in its forms, and the study of Late Egyptian should not stand far behind that of demotic. On the other hand, Middle Egyptian, and still more Old Egyptian, which is separated from Middle Egyptian by a wide gap, will perhaps always be to us little more than consonantal skeletons, the flesh and blood of their vocalization being for the most part irretrievably lost. 3

In common with the Semitic languages, the Berber languages of North Africa, and the Cushite languages of North-East Africa, Egyptian of all periods possesses grammatical gender,- expressing masculine and feminine. Singularly few language groups have this peculiarity; and our own great Indo-European group, which possesses it, is distinguished from those above mentioned by having the neuter gender in addition. The characteristic triliteral roots of all the Semitic languages seemed to separate them widely from others; but certain traits have caused the Egyptian, Berber and Cushite groups to be classed together as three subfamilies of a Hamitic group, remotely related to the Semitic. The biliteral character of Coptic, and the biliteralism which was believed to exist in Egyptian, led philologists to suspect that Egyptian might be a surviving witness to that far-off stage of the Semitic languages when triliteral roots had not yet been formed from presumed original biliterals; Sethe's investigations, however, prove that the Coptic biliterals are themselves derived from Old Egyptian triliterals, and that the triliteral roots enor- mously preponderated in Egyptian of the earliest known form; that view is,

therefore, no longer tenable. Many remarkable

3 In the articles referring to matters of Egyptology in this edition, Graecized forms of Old Egyptian names, where they exist, are commonly employed ; in other cases names are rendered by their actual equivalents in Coptic or by analogous forms. Failing all such means, recourse is had to the usual conventional renderings of hieroglyphic spelling, a more precise transcription of the con- sonants in the latter being sometimes added.

resemblances have been observed in the grammatical struc- ture of the Berber and Cushite groups with Semitic (cf . H. Zimmern, Vergleichende Grammatik d. semitischen Sprachen, Berlin, 1898, especially pronouns and verbs); but the relation- ship must be very distant, and there are no ancient documents that can take back the history of any one of those languages more than a few centuries. Their connexion with Semitic and Egyptian, therefore, remains at present an obscure though probable hypothesis. On the other hand, Egyptian is certainly related to Semitic. Even before the triliterality of Old Egyptian was recognized, Erman showed that the so-called pseudo-participle had been really in meaning and in form a precise analogue of the Semitic perfect, though its original employment was almost obsolete in the time of the earliest known texts. Triliteralism is considered the most essential and most peculiar feature of Semitic. But there are, besides, many other resem- blances in structure between the Semitic languages and Egyptian, so that, although the two vocabularies present few points of clear contact, there is reason to believeThat Egyptian was origin- ally a characteristic member of the Semitic family of languages. See Erman, ” Das Verhaltnis d. agyptischen zu d. semitischen Sprachen” (Zeitschrift d. deutschen morgenl. Gesellschaft, 1892); Zimmern, Vergl. Gram., 1898; Erman, ” Flexion d. agyptischen Verbums ” (Sitzungsberichte d. Berl. Akad., 1900). The Egyptians proper are not, and so far as we can tell never were, Semitic in physical feature. As a possible explanation of the facts, Erman supposes that a horde of conquering Semites, like the Arabs of a later day, imposed their language on the country, but dis- appeared, being weakened by the climate or absorbed by the native population. The latter acquired the Semitic language imperfectly from their conquerors; they expressed the verbal conjugations by

periphrases, mispronounced the consonants, and so changed greatly the appearance of the vocabulary, which also would certainly contain a large proportion of native non- Semitic roots. Strong consonants gave place to weak consonants (as O has done to], in the modern Arabic of Egypt), and then the weak consonants disappearing altogether produced biliterals from the triliterals. Much of this must have taken place, according to the theory, in the prehistoric period; but the loss of weak consonants, of v, and of one of two repeated consonants, and the development of periphrastic conjugations continued to the end. The typical Coptic root thus became biliteral rather than triliteral, and the verb, by means of periphrases, developed tenses of remarkable precision. Such verbal resemblances as exist between Coptic and Semitic are largely due to late exchanges with Semitic neighbours.

The following sketch of the Egyptian language, mainly in its earliest form, which dates from some three or four thousand years B.C., is founded upon Erman's works. It will serve to contrast with Coptic grammar on the one hand and Semitic grammar on the other.

The Egyptian Alphabet

(J =/; so conventionally transcribed since it unites two values, ‘ being sometimes y but often x (especially at the beginning

of words), and from the earliest times used in a manner corresponding to the Arabic hamza, to indicate a pros- thetic vowel. Often lost.

» * and j](] are frequently employed for y.

J

= •(«); easily lost or changes to y.

= ‘(y); lost in Coptic. This rare sound, well known in Semitic, occurs also in Berber and Cushite languages.

= w; often changes to y.

= 6.

D

=P-

>c=_

-/•

k

= m

•

=n.

ra

» = r; often lost, or changes to y. r and I are distinguished in later demotic and in Coptic. *

>■ distinction lost in Coptic.

= h\ in Coptic ty (sh) or I) (kh) correspond to it.

= £; generally written withCZ3(s) in the Old Kingdom, but »—= > corresponds to kh in Coptic.

P

a

^

distinction lost at the end of the Old Kingdom. =i ‘

= f (sh).

= g; Coptic K.

= £] Coptic K;or(!f”’,2C. according to dialect. = gj Coptic K; or g m

= t; often lost at the end of words.

= * (0); often changes to (, otherwise Coptic “T ; or X. <5~.

= d; in Coptic reduced to t.

— i (2) ; often changes to d, Coptic 7″ ; otherwise in Coptic jS..

ROOTS Egyptian roots consist of consonants and semi-consonants only, the inflexion being effected by internal vowel-change and the

addition of consonants or vowels at the beginning or end. The Egyptian system of writing, as opposed to the Coptic, showed only the consonantal skeletons of words: it could not record internal vowel-changes; and semi-consonants, even when radicals, were often omitted in writing.

PERSONAL PRONOUNS Sing. 1. c. Iw (?) later wi. PI. 1. c. n. Du.

2. m. kui. 2. c. tn. 2. c. tny.

I. tn.

3. m. *fy, surviving only 3. m. in, early lost, 3. c. iny.

in a special except as

verbal form. suffix,

f. iy. f . *il surviving

as 3. c. From these are derived the suffixes, which are shortened forms attached to nouns to express the possessor, and to verbs to express the subject. In the latter case the verb was probably in the participle, so that idm'd-in, " they hear," is literally " hearing are they." The singular suffixes are: (1) c.-i; (2) m. -k, f. -t; (3) m. -/, f. -i; — the dual and plural have no special forms.

Another series of absolute pronouns is: (2) m. iwt, ta>; f. tmt, tm; (3) m. iwt, iw; f. itt, it. Of these hut, tmt, &c, are emphatic forms.

Many of the above absolute pronouns were almost obsolete even in the Old Kingdom. In ordinary texts some survive, especially as objects of verbs, namely, wi, tw, In, sw, si. The suffixes of all numbers and persons except the dual were in full use throughout, to Coptic; sn, however, giving way to a new suffix, -w, which developed first in the New Kingdom.

Another absolute pronoun of the first person is ink, A-ltOKi like Heb. "33N. It is associated with a series for the second and third persons: nt-k, nt-t, nt-f, nt-sn, &c. ; but from their history, use and form, it seems probable that the last are of later formation, and are not to be connected with the Semitic pronouns (chiefly of the 2nd person) resembling them.

DEMONSTRA TIVE PRONO UNS

There are several series based on m. p; i. I; pi. n; but n as a plural seems later than the other two. From them are developed a weak demonstrative to which possessive suffixes can be attached, producing the definite and possessive articles (J», t>, w>, ” the,” P*y-f< "his," P'y-s " her," &c.) of Middle Egyptian and the later language.

NOUNS

Two genders, m. (ending w, or nothing), f. (ending t). Three numbers: singular, dual (m. wi, f. ti, gradually became obsolete), plural (m. w; f. wi). No case-endings are recognizable, but con- struct forms — to judge by Coptic — were in use. Masculine and feminine nouns of instrument or material are formed from verbal roots by prefixing m; e.g. m-sdm-t, ” stibium,” from sdm, ” paint the eye.” Substantives and adjectives are formed from substan- tives and prepositions by the addition of y in the masculine; e.g. n-t, ” city, ‘ nt-y, ” belonging to a city,” ” citizen “; hr, ” upon,” hr-y (f. hr-t; pi. hr-w), ” upper.” This is not unlike the Semitic nisbe ending iy, ay (e.g. Ar. beled, ” city,” beledi, ” belonging to a city “). Adjectives follow the nouns they qualify.

ANCIENT WRITING]

EGYPT

61

NUMERALS

1, w; 2, in; 3, h,mt\ 4, fdw; 5, dw’; 6, sis (or ot«?); 7, sfh; 8, £m»; 9, ^2; 10, mt. 2, 6, 7, 8 and 9 (?) resemble Semitic numerals. 20 and 30 (m

VERBS

The forms observable in hieroglyphic writing lead to the following classification : —

. Often showing traces of an original in. inf.; in early times very

Strong Verbs. Biliteral

Weak Verbs.

Triliteral

Buadriliteral J uinqueliteral 1

11. geminatae

in. gem. in. inf.

iv. inf.

Very numerous. (“Generally formed by reduplication. In Late Egyptian they were no longer inflected, and were con- jugated with the help of Iry,

” do -” Properly triliterals, but, with the

2nd or 3rd radical alike, these

coalesced in many forms where

no vowel intervened, and gave

the word the appearance of a

biliteraL

Rare.

Numerous, in. iv, and ill. i were unified early. Some very common verbs, ” do,” ” give,” ” come,” ” bring ” are irregular.

Partly derived from adjectival formations in y, from nouns and infinitives: — e.g. i-lp, inf. sipt; adj. Upty; verb (4 lit.), sipty.

Many verbs with weak consonants — iy, iw, 11. inf. (m[w]t), and those with n — are particularly difficult to trace accurately, owing to defective writing.

It seems that all the above classes may be divided into two main groups, according to the form of the infinitive :— with masculine in- finitive the strong triliteral type, and with feminine infinitive the type of the III. inf. The former group includes all except ill. inf., iv. inf., and the causative of the biliterals, which belong to the second group.

It is probable that the verb had a special form denoting condition, as in Arabic. There was a causative form prefixing £, and traces of forms resembling Pi’d and Niphal are observed. Some roots are re- duplicated wholly or in part with a frequentative meaning, and there are traces of gemination of radicals.

Pseudo-Participle. — In very early texts this is the past indicative, but

more commonly it is used in sentences such as, gm-n-f wl ‘b’kwl, ” he found me I stood,” i.e. ” he found me standing.” The in dicative use was soon given up and the pseudo-participle was employed only as predicate, especially indicating a state ; e.g. ntr-t Sm-ti, ” the goddess goes “; Iw-k wd>-tl, ” thou art prosperous.” The endings were almost entirely lost in New Egyptian. For early times they stand thus : —

Sing. 3. masc. I, late w. Dual wil. PI. w.

fem. tl. t’dw tl.

2. masc. tl tlwny.

fern. tl

I. c. kwl. wyn.

The pseudo-participle seems, by its inflexion, to have been the perfect of the original Semitic conjugation. The simplest form being that of the 3rd person, it is best arranged like the correspond- ing tense in Semitic grammars, beginning with that person. There is no trace of the Semitic imperfect in Egyptian. The ordinary conjugation is formed quite differently. The verbal stem is here followed by the subject-suffix or substantive— Sdm-f, ” he hears “; ” sdmw stn, ” the king hears.” It is varied by the addition of particles, &c, n, In, jtr, tw, thus: —

sdm-f, ” he hears ” ; sdm-w-f, ” he is heard ” (pi. sˆm-‘ii-sn, ” they are heard “) ; sdm-tw-f, “he is heard “; kdm-n-f, ” he heard ‘ ; idm-n-tw-f, “he was heard”; also, Jdm-ln-f, s&m-far-f, s”£m-k>-f. Each form has special uses, generally difficult to define. Sdm-f seems rather to be imperfect, sdm-n-f perfect, and generally to express the past. Later, sdm-f is ordinarily expressed by periphrases ; but by the loss of n, sim-n-f became itself sdm-f, which is the ordinary past in demotic. Coptic preserves sdm-f forms of many verbs in its causative (e.g. TAMljOtJ ” cause him to live,” from Egyptian dX4’nji-f), and, in its periphrastic conjugation, the same forms of wn, ” be,” and iry, ” do.” With sdm-f (sedmo-f) was a more emphatic form (esdomef), at any rate in the weak verbs.

The above, with the relative forms mentioned below, are supposed by Erman to be derived from the participle, which is placed first for emphasis: thus, s&m-w Stn, “hearing is the king”; Sdm-f, for fdm-fy, ” hearing he is.” This Egyptian paraphrase of Semitic is just like the Irish paraphrase of English, ” It is hearing he is.”

The imperative shows no ending in the singular; in the plural it has y,

and later 10; cf. Semitic imperative.

The infinitive is of special importance on account of its being preserved very fully in Coptic. It is generally of masculine form, but feminine in III. inf. (as in Semitic), and in causatives of biliterals.

There are relative forms of Sdm-f and sdm-n-f, respectively Sdm-w-f (masc.), Sdm-t-n-f (fem.), &c. They are used when the relative is the object of the relative sentence, or has any other position than the subject. Thus Sdm-t-f may mean ” she whom he hears,” ” she who[se praises] he hears,” ” she [to] whom he hears [someone speaking],” &c. There are close analogies between the function of the relative particles in Egyptian and Semitic; and the Berber languages possess a relative form of the verb.

Participles.— These are active and passive, perfect and imperfect, in the old language, but all are replaced by periphrases in Coptic.

Verbal Adjectives. — There is a peculiar formation, Sdm-ty-fy, ” he who shall hear,” probably meaning originally ” he is a hearer,” Sdm-ty being an adjective in y formed from a feminine (/) form of the infinitive, which is occasionally found even in triliteral verbs; the endings are: sing., masc. ty-fy, fem. ty-Sy; pi., masc. ty-sn, fem, ty-st. It is found only in Old Egyptian.

Particles.— There seems to be no special formation for adverbs, and little use is made of adverbial expressions. Prepositions, simple and compound, are numerous. Some of the commonest simple prepositions are n ” for,” r ” to,” m ” in, from,” h,r ” upon.” A few enclitic conjunctions exist, but they are indefinite in meaning — swt a vague ” but,” grt a vague ” moreover,” &c.

Coptic presents a remarkable contrast to Egyptian in the pre- cision of its periphrastic conjugation. There are two present tenses, an imperfect, two perfects, a pluperfect, a present and a past fre- quentative, and three futures besides future perfect ; there are also conjunctive and optative forms. The negatives of some of these are expressed by special prefixes. The gradual growth of these new forms can be traced through all the stages of Egyptian. Throughout the history of the language we note an increasing tendency to periphrasis ; but there was no great advance towards precision before demotic. In demotic there are distinguishable a present tense, imperfect, perfect, frequentative, future, future perfect, conjunctive and optative; also present, past and future negatives, &c. The passive was extinct before demotic ; demotic and Coptic express it, clumsily it must be confessed,

by an impersonal ” they,” e.g. ” they bore him ” stands for ” he was born.”

It is worth noting how, in other departments besides the verb, the Egyptian language was far better adapted to practical ends during and after the period of the Deltaic dynasties (XXII.XXX.) than ever it was before. It was both simplified and enriched. The inflexions rapidly disappeared and little was left of the distinctions between masculine and feminine, singular, dual and plural — except in the pronouns. The dual number had been given up entirely at an earlier date. The pronouns, both personal and demonstrative, retained their forms very fully. As prefixes, suffixes and articles, they, together with some auxiliary verbs, provided the principal mechanism of the renovated language. An abundant supply of useful adverbs was gradually accumulated, as well as conjunctions, so far as the functions of the latter were not already performed by the verbal prefixes. These great improvements in the language correspond to great changes in the economic condition of the country they were the result of active trade and constant inter course of all classes of Egyptians with foreigners from Europe and Asia. Probably the best stage of Egyptian speech was that which immediately preceded Coptic. Though Coptic is here and there more exactly expressive than the best demotic, it was spoilt by too much Greek, duplicating and too often expelling native expressions that were already adequate for its very simple requirements. Above all, it is clumsily pleonastic.

The Writing

The ancient Egyptian system of writing, so far as we know, originated, developed and finally expired strictly within the limits of the Nile Valley. The germ of its existence may have come from without, but, as we know it, it is essentially Egyptian and intended for the expression of the Egyptian language. About the 1st century B.C., however, the semi-barbarous rulers of the Ethiopian kingdoms of Meroe and Napata contrived the ” Meroitic ” alphabet, founded on Egyptian writing, and comprising both a hieroglyphic and a cursive form (see Ethiopia). As yet both of these kinds of Nubian writing are undeciphered. Egyptian hieroglyphic was carried by eonquest into Syria, certainly under the XVIIIth Dynasty, and again under the XXVlth for the engraving of Egyptian inscriptions; but in the earlier period the cuneiform syllabary, and in the later the ” Phoenician alphabet, had obtained a firm hold there, and we may be sure that no attempt was made to substi- tute the Egyptian system for the latter. Cuneiform tablets in Syria, however, seem almost confined to the period of the XVIIIth Dynasty. Although it cannot be proved it seems quite possible that the

traders of Phoenicia and the Aegean adopted the papyrus and Egyptian hieratic writing together, before the end of the New Kingdom, and developed their ” Phoenician ” alphabet from the latter about 1000 B.C. In very early times a number of systems of writing: already

reigned in different countries forming a compact and not very large area — perhaps from South Arabia to Asia Minor, and from Persia to Crete and Egypt. Whether they all sprang from one common stock of picture-writing we shall perhaps never know, nor can we as yet trace the influence which one great system may have had on another, owing to the poverty of documents from most of the countries concerned.

It is certain that in Egypt from the IVth Dynasty onwards the mode of writing was essentially the same as that which was ex- tinguished by the fall of paganism in the 4th century a.d. Its elements in the hieroglyphic form are pictorial, but each hieroglyph had one or more well-defined functions, fixed by convention in such a manner that the Egyptian language was expressed in writing word by word. Although a picture sign may at times have embarrassed the skilled native reader by offering a choice of fixed values or functions, it was never intended to convey merely an idea, so as to leave to him the task of putting the idea into his own words. How far this holds good for the period before the IVth Dynasty it is difficult to say. The known inscriptions of the earlier times are so brief and so limited in range that the system on which they were written cannot yet be fully investigated. As far back as the 1st Dynasty, phonograms (see below) were in full use. But the spelling then was very concise : it is possible that some of the slighter words, such as prepositions, were omitted in the writing, and were intended to be supplied from the context. As a whole, we gain the impression that a really distinct and more primitive stage of hieroglyphic writing by a substantially vaguer notation of words lay not far behind the time of the 1st Dynasty.

The employment of the signs are of three kinds: any given sign represents either (1) a whole word or root ; or (2) a sound as part of a word ; or (3) pictorially defines the meaning of a word the sound of which has already been given by a sign or group of signs preceding. The number of phonograms is very restricted, but some signs have all

these powers. For instance, i”*”” 1 ! is the conventional picture of a draughtboard (shown in plan) with the draughtsmen (shown in elevation) on its edge: — this sign (1) signifies the root mn, ” set,”

_lll”1*f%

“firm”; or (2) in the group ˆ , represents the same sound as

part of the root mn]}, ” good ” ; or (3) added to the group snt (thus :

«w>m C3) P shows that the meaning intended is ” draught-

board,” or ” draughts,” and not any of the other meanings of snt. Thus signs, according to their employment, are said to be (1) ” word-signs,” (2) ” phonograms,” or (3) ” determinatives.”

Word-signs. — The word-sign value of a sign is, in the first place, the name of the object it represents, or of some material, or quality,

or action, or idea suggested by it. Thus ˆ is hr, ” face ” ; u , a vase

of ointment, is mrh-t, ” ointment ” ; < ■> is wdb, , ” turn,” Much

investigation is still required to establish the origins of the values of the signs; in some cases the connexion between the pictures and the primary values seems to be curiously remote. Probably all the signs in the hieroglyphic signary can be employed in their primary sense. The secondary value expresses the consonantal root of the name or other primary value, and any, or almost any, derivative from that root: as when 1 ft 1, a mat with a cake upon it, is not only htp, an ” offering-mat,” but also htp in the sense of ” concilia- tion,” ” peace,” ” rest,” ” setting ” (of the sun), with many de- rivatives. In the third place, some signs may be transferred to express another root having the same consonants as the first: thus £) , the ear, by a play upon words can express not only sdm, ” hear,” but also s”dm, ” paint the eyes.”

Phonograms. — Only a limited number of signs are found with this use, but they are of the greatest importance. By searching through- out the whole mass of normal inscriptions, earlier than the periods of Greek and Roman rule when great liberties were taken with the writing, probably no more than one hundred different phonograms can be found. The number of those commonly employed in good writing is between seventy and eighty. The most important phono-grams are the uniliteral or alphabetic signs, twenty-four in number in the Old Kingdom and without any homophones : later these were increased by homophones to thirty. Of biliteral phonograms — each

expressing a combination of two consonants — there were about fifty commonly used: some fifteen or twenty were rarely used. As Egyptian roots seldom exceeded three letters, there was no need for triliteral phonograms to spell them. There is, however, one triliteral

phonogram, the eagle, jjˆ> tyw, or tiu (?), used for the plural ending

of adjectives in y formed from words ending in t (whether radical or the feminine ending).

The phonetic values of the signs are derived from their word-sign values and consist usually of the bare root, though there are rare examples of the retention of a flexional ending ; they often ignore also the weaker consonants of the root, and on the same principle reduce a repeated consonant to a single one, as when the hoe [\ , hnn, has the phonetic value hn. The history of some of the alphabetic signs is still very obscure, but a sufficient number of them have been explained

to make it nearly certain that the values of all were obtained on the same principles. 1 Some of the ancient words from which the phonetic values were derived probably fell very early into disuse, and may never be discoverable in the texts that have come down to us. The following are among those most easily explained : —

(I, reed flower, value y and k ; from (J \ vYy, y, ” reed.”

(It seems as if the two values y and n were obtained by choosing first one and then the other of the two semi-consonants composing the name. They are much confused, and a conventional symbol /

has to be adopted for rendering (J.) forearm, value “(S)

from

>, mouth,

value r; from

I

,‘00, ” hand.” , r, ” mouth.”

, belly and teats, value &; from ˆ ., h.t, “belly.’

(The feminine ending is here, as usual, neglected.)

tank, valued; from “— T -1 , J, ” tank.”

slope of earth value q; ,,

or brickwork, d

(The doubled weak consonant is here neglected.)

„ 2”, “slope,” * > ” height.”

n

hand, cobra,

value d; from value z; from

ˆ

d.t, ” hand.”

z.t, ” cobra.”

For some, alphabetic signs more than one likely origin might be found, while for others, again, no clear evidence of origin is yet forthcoming.

It has already been explained that the writing expresses only consonants. In the Graeco-Roman period various imperfect attempts were made to render the vowels in foreign names and

words by the semi – vowels as also by j, the consonant V

which – n originally represented having been reduced in speech by that time to the power of x, only. Thus, TlroKencuos is spelt Ptwrmys, Antoninus, ‘Nt’nynws or Intnyns, &c. &c. Much earlier, throughout the New Kingdom, a special ” syllabic ” orthography, in which the alphabetic signs for the consonants are generally replaced by groups or single signs having the value of a consonant followed by a semi-vowel, was used for foreign names and words, e.g.

ma-io, ” chariot,” was written

TJ’lfl

in Coptic JiepetfouoYT.

hue,

tower, was written

11TD

-^ ffl Ik^ * = T®’ Coptic Ate

•ms, ” harp,” was written ■

I I I

[I A/VWVA (I ^\

non, ” Hamath,” was written

According to W. Max Muller (Asien und Europa, 1893, chap, v.), this represents an endeavour to express the vocalization; but, if so, it was carried out with very little system. In practice, the semi- vowels are generally negligible. This method of writing can be traced back into the Middle Kingdom, if not beyond, and it greatly affected the spelling of native words in New Egyptian and demotic. Determinatives. — Most signs can on occasion be used as deter- minatives, but those that are very commonly employed as phono- grams_ or as secondary word-signs are seldom employed as deter- minatives; and when they are so used they are often somewhat differentiated. Certain generic determinatives are very common, e.g. :—

J\ ; of motion.

; of acts involving force. ; of divinity.

1 It seems that ” acrophony ” (giving to a sign the value of the first letter of its name) was indulged in only by priests of the latest age, inventing fantastic modes of writing their ” vain repetitions” on the temple walls.

PALAEOGRAPHY]

i ; of a person or a man’s name.

] ; of buildings.

of inhabited places. fvw> : of foreign countries.

] ; club ; of foreigners.

$\ ; of all actions of the mouth — eating and speaking, likewise S>{] silence and hunger.

www

www ; ripple-lines ; of liquid.

vwwv

EGYPT

63

i-^ ; hide ; of animals, also leather, &c.

vjj ; of plants and fibres. 9 ; of flesh.

a sealed papyrus-roll ; of books, teaching, law, and of abstract ideas generally. In the earliest inscriptions the use of determinatives is restricted

to the ‘

V, &c, after proper names, but it developed im-

mensely later, so that few words beyond the particles were written without them in the normal style after the Old Kingdom.

Some few signs ideographic of a group of ideas are made to express particular words belonging to that group by the aid of phonograms which point out the special meaning. In such cases the ideogram is not merely a determinative nor yet quite a word – sign.

Thus

“Libyan,” &c, but | cannot stand by itself for the name of any particular foreign people. So also in monogram C3Z1 is sm “go,”]\ is ” conduct.”

Orthography. — The most primitive form of spelling in the hiero-glyphic system would be by one sign for each word, and the monu-ments of the 1st Dynasty show a decided tendency to this mode. Examples of it in later times are preserved in the royal cartouches, for here the monumental style demanded special consciseness. Thus, for instance, the name of Tethmosis III. — M’N-IJPR-R> — is spelled

I 6 D M } (as R’ is the name of the sun-god, with customary

deference to the deity it is written first though pronounced last). A number of common words — prepositions, &c. — with only one consonant are spelled by single alphabetic signs in ordinary writing. Word-signs used singly for the names of objects are

generally marked with I in classical writing, as — “,

lb, “heart,”

9

, hr, ” face,” &c.

But the use of bare word-signs is not common. Flexional con- sonants are almost always marked by phonograms, except in very

early times; as when the feminine word ^^ =z./, “cobra,” is

spelled ^°Y Also, if a sign had more than one value, a phono- gram

would be added to indicate which of its values was intended : thus I in 1 V\ is sw, “he,” but in =f it is sin, “king.” Further,

owing to the vast number of signs employed, to prevent confusion of one with another in rapid writing they were generally provided with ” phonetic complements,” a group being less easily misread

than a single letter. E.g. V, viz, ” command,” is regularly written

i YV ws (10) ; but I, hz, ” white,” is written Y |, hz(z). This

practice had the advantage also of distinguishing determinatives from phonograms. Thus the root or syllable hn is regularly written

to avoid confusion with the determinative ‘Uj. Redundance: in writing is the rule ; for instance, b is often spelled]! <^^ ^\

I

(b)b> (>). Biliteral phonograms are very rare as phonetic complements, nor are two biliteral phonograms employed together in writing the radicals of a word.

Spelling of words purely in phonetic or even alphabetic characters is not uncommon, the determinative being generally added. Thus

in the pyramidal texts we find hpr, “become,” written Vf in one

copy of a text, in another ˆ u . Such variant spellings are very

important for fixing the readings of word-signs. It is noteworthy that though words were so freely spelled in alphabetic characters, especially in the time of the Old Kingdom, no advance was ever made towards excluding the cumbersome word-signs and biliteral phonograms, which, by a judicious use of determinatives, might well have been rendered quite superfluous.

Abbreviations. — We find -¥— A II, strictly

ceremonial viva! ˆnji viz, snb. ” Life, Prosperity and Health,”

and in course of time w j was used in accounts instead of

dmz, ” total.”

Monograms are frequent and are found from the earliest times.

Thus ‘ /(‘, T5 mentioned above are monograms, the association

of

monogram is

and J\ having no pictorial meaning. Another common

and

for H-t-Hrw ” Hathor.’

A word-sign may be compounded with its phonetic complement, as’HK hz ” white,” or with its determinative, as fiyT] hz “silver.”

The table on the opposite page shows the uses of a few of the commoner signs.

The decorative value of hieroglyphic was fully appreciated in Egypt. The aim of the artist-scribe was to arrange his variously shaped characters into square groups, and this could be done in great measure by taking advantage of the different ways in which many

words could be spelt. Thus hs could be written ˆ , hsy

hs-f

,bs-n-f

But some words in the classical writing

and

were intractable from this point of view. It is obvious that the alphabetic signs played a very important part in the formation of the groups, and many words could only be written in alphabetic signs. A great advance was therefore made when several homophones were introduced into the alphabet in the Middle and New Kingdoms, partly as the result of the wearing away of old phonetic distinctions,

giving the choice between — h— and I, c» ■ > and A

■’ , *~ww and V> \N and (§.. In later times the number of

homophones in use increased greatly throughout the different classes, the tendency being much helped by the habit of fanciful writing; but few of these homophones found their way into the cursive script.

Occasionally a scribe of the old times indulged his fancy in ■" sportive " or " mysterious " writing, either inventing new signs or employing old ones in unusual meanings. Short sportive inscriptions . are found in tombs of the Xllth Dynasty; some groups are so written cursively in early medical papyri, and certain' religious inscriptions in the royal tombs of the XlXth and XXth Dynasties are in secret writing. Fanciful writing abounds on the temples of the Ptolemaic and Roman periods.

Palaeography

Hieroglyphic. — The main division is into monumental or epigraphic hieroglyphs and written hieroglyphs. The former may be rendered by the sculptor or the painter in stone, on wood, &c, with great delicacy of detail, or may be simply sunk or painted in outline. When finely rendered they are of great value to the student in- vestigating the origins of their values. No other system of writing hears upon its face so clearly the history of its development as the Egyptian; yet even in this a vast amount of work is still required to detect, an d disentangle the details. Monumental hieroglyphic did not cease till the 3rd century a.d. (Temple of Esna). The written hieroglyphs, formed by the scribe with the reed pen on papyrus, leather, wooden tablets, &c, have their outlines more or less abbrevi- ated, producing eventually the cursive scripts hieratic and demotic. The written hieroglyphs were employed at all periods, especially for religious texts.

Hieratic. — A kind of cursive hieroglyphic or hieratic writing is found even in the 1st Dynasty. In the Middle Kingdom it is well

Sign.

Description.

Name.

Word-sign Value.

Phonetic Value.

Determinative Value.

t

child

hrd (khrod)

youth

•

face

hr (hor)

br

tbr]

•cgs-

eye

Ir.t (yori.t)

!r

tr

see, &c.

mouth

r (ro)

r

r

a

forearm

arm with stick

•(•ei) njjt ” be strong ”

nfct

[action of hand

or arm] violent action

*i

man with stick

njjt ” be strong ”

nfet

violent action

I

lungs and windpipe

sm;

sm;

0-

heart

ib

heart

J

heart and windpipe

?

nfr

ˆ

¥

sparrow widgeon

?

s;.t

sr

s;

s,’

evil, worthless- ness, smallness

<ˆ

bolti-fish

tn.t

in

in

tusk

cut branch

(i) ibh ” tooth ” (2) hw ” taste ”

bt

bb tjw

bh

[bt]

bite, &c. wood, tree

©

G era

i

threshing- floor sun

chamber,

house fiat land

libation vase

sp.t

(i)r«“sun” (2) hrw ” day ”

P > ”

t >

hs.t

sp

pr t. hs

t. bs

(1) sun

ta) division of time

(boundless hori- zon, eternity

I

cord on stick basket

wz nb.t

wz

nb

wz

“CZJ*

looped basket

?

k

k

sickle

composite hoe

? [mr?]

m > mr

m > mr

tillage

1

fire-drill

z-.t(?)

Z’

Z’

il

attendant’s equipment

sms ” follow ”

sms

^^

knife

ds

ds

cut, prick, cut- ting instrument

[HIEROGLYPHICS, ETC.

Rosetta stone itself. One of the most char- acteristic distinctions of later demotic is the minuteness of the writing.

Hieroglyphic is normally written from right to left, the signs facing to the commencement of the line; hieratic and demotic follow the same direction. But monumental hieroglyphic may also be written from left to right, and is constantly so arranged for purposes of sym- metry, e.g. the inscriptions on the two jambs of a door are frequently turned in opposite directions; the same is frequently done with the short inscriptions scattered over a scene amongst the figures, in order to distinguish one label from another.

In modern founts of type, the hieroglyphic signs are made to run from left to right, in order to facilitate the setting where European text is mixed with the Egyptian. The table on next page shows them in their more cor- rect position, in order to display more clearly their relation to the hieratic and demotic equivalents.

Clement of Alexandria states that in the Egyptian schools the pupils were first taught the ” epistolographic ” style of writing (i.e. demotic), secondly the ” hieratic ” employed by the sacred scribes, and finally the ” hiero- glyphic ” (Strom, v. 657). It is doubtful whether they classified the signs of the huge hieroglyphic syllabary with any strictness. The only native work on the writing that has come to light as yet is a fragmentary papyrus of Roman date which has a table in parallel columns of hieroglyphic signs, with their hieratic equivalents and words written in hieratic de- scribing them or giving their values or mean- ings. The list appears to have comprised about 460 signs, including most of those that occur commonly in hieratic. They are to some

extent classified. The bee f l// heads the list

as a royal sign, and is followed by figures of nobles and other human figures in various atti- tudes, more or less grouped among themselves, animals, reptiles and fishes, scorpion, animals again, twenty-four alphabetic characters, parts of the human body carefully arranged from

@ to J\, thirty-two in number, parts of

animals, celestial signs, terrestrial signs, vases. The arrangement down to this point is far from strict, and beyond it is almost impossible to describe concisely, though there is still a rough grouping of characters according to resem- blance of form, nature or meaning. It is a curious fact that not a single bird is visible on the fragments, and the trees and plants, which might easily have been collected in a compact and well-defined section, are widely scattered. Why the alphabetic characters are introduced where they are is a puzzle ; the order

of these is:- < =» J U ˆ (?) f] (?)

f (?) -*-i (?) J m ‘l (?)

(?)

characterized, and in its most cursive form seems hardly to retain any definable trace of the original hieroglyphic pictures. The style varies

much at different periods.

Demotic. — Widely varying degrees of cursiveness are at all periods observable in hieratic; but, about the XXVIth Dynasty, which inaugurated a great commercial era, there was something like a definite parting between the uncial hieratic and the most cursive form afterwards known as demotic. The employment of hieratic was thenceforth almost confined to the copying of religious and other traditional texts on papyrus, while demotic was used not only for all business but also for writing literary and even religious texts in the popular language. By the time of the XXVth Dynasty the cursive of the conservative Thebais had become very obscure. A better form from Lower Egypt drove this out completely in the time of Amasis II. and is the true demotic. Before the Macedonian con- quest thecursiveligaturesof theolddemoticgave birth to new symbols which were carefully and distinctly formed, and a little later an epigraphic variety was engraved on stone, as in the case of the

Three others, “°

I-i

D

‘Z3®’

(?4

and

had already occurred

amongst the fish and reptiles. There seems to be no logical aim in this arrangement of the alphabetic characters and the series is incomplete. Very probably the Egyptians never constructed a really systematic list of hieroglyphs. In modern lists the signs are classified according to the nature of the objects they depict, as human figures, plants, vessels, instruments, &c. Horapollon’s Hieroglyphica may be cited as a native work, but its author, if really an Egyptian, had no knowledge of good writing. His pro- duction consists of two elaborate complementary lists: the one describing sign-pictures and giving their meanings, the other cata- loguing ideas in order to show how they could be expressed in hieroglyphic. Each seems to us to be made up of curious but per- verted reminiscences eked out by invention ; but they might some day prove to represent more truly the usages of mystics and magicians in designing amulets, &c, at a time approaching the middle

ages.

i. TATOOED FEMALE, LIMESTONE SLAG.

6. IVORY HAWK.

7. LIMESTONE LION.

12. SHIP ON A VASE.

EGYPT

EARLIEST EGYPTIAN ART

Plate I,

r.

:fl

/

^>

y

1 1 (1 in.‘iiji <'.«<

L.;,i.uv v “WW”***”

II »

4. ANIMALS ON BONE COMBS. 5.

8. IVORY DOG AND GAZELLE.

9. IVORY HANDLE OF KNIFE.

10 > WHITE ON RED VASES; 11-) MEN AND ANIMALS.

15. ARCHAIC KING’S HEAD, STUDY IN LIMESTONE. 16.

17. HEAD OF KHASEKHEM.

Plate II.

EGYPT

EARLY EGYPTIAN ART.

LLF.S AND PALM, SLATE 22. ANIMALS, SLATE. 23. KING NARMER, SLATE PALETTE.

28. WOODEN FIGURE.

ANCIENT ART]

EGYPT

65

ent, “who” . .

Perso (“Pharaoh”)

ybt, ” father ”

iSnkh, “live”

- ekh, ” know ” . ahe, ” stand ” eine, ” carry ” ms (phon.) . i (alph.) . i (alph.) ... m (alph.) n (alph.)

Demotic.

4uf* + J Ml

Hieratic.

Hieroglyphic.

IffeKE)

A.

ffi

1

AWvˆ

nty Per*o mh wz, §nb Itf <«!}

In

Mastaba of Ptahhetep and Akhethetep, pt. i. (1900); M. A. Murray,

Saqqara Mastabas (London, 1905); also Petrie and Griffith, Two Hieroglyphic Papyri from Tanis (London, 1889) (native sign-list) ; G. Moller, Hiera- tische Paltiographie (Leipzig, 1909) ; Griffith, Catalogue of Demotic Papyri in the J. Rylands Collection (Manchester, 1909). (F. Ll. G.)

E. Art and Archaeology. — In the following sections a general history of the characteristics of Ancient Egyptian art is first given, showing the variation of periods and essentials of style; and this is followed by an account of the use made of material products, of the tools and instru- ments employed, and of the monuments. For further details see also the separate topographical headings (for excavations, &c), and the general articles on the various arts and art- materials (for references to Egypt); also Pyramids; Mummy, &c.

The early scribe's outfit, often carried slung over his shoulder,

is seen in the hieroglyph

It consisted of frayed reed pens

or brushes, a small pot of water, and a palette with two circular cavities in which black and red ink were placed, made of finely powdered colour solidified with gum. In business and literary documents red ink was used for contrast, especially in headings; in demotic, however, it is very rarely seen. The pen became finer in course of time, enabling the scribe to write very small. The split reed of the Greek penman was occasionally adopted by the late demotic scribes. Egypt had long been bilingual when, in papyri of the 2nd century A.D., we begin to find transcripts of the Egyptian language into Greek letters, the latter reinforced by a few signs borrowed from the demotic alphabet: so written we have a magical text and a horoscope, probably made by foreigners or for their use. The infinite superiority of the Greek alphabet with its full notation of vowels was readily seen, but piety and custom as yet barred the way to its full adoption. The triumph of Christianity banished the old system once and for all ; even at the beginning of the 4th century the native Egyptian script scarcely survived north of the Nubian frontier at Philae; a little later it finally expired. The following eight signs, however, had been taken over from demotic by the Copts :

H) =$, from JjLJ *;, dem. ˆ ˆ.

& =h, probably from w ˆ(orˆjj* ftp, dem. O.

Ij (Boh.) = {t, from T h\, dem. *y.

Z (Akhm.) = 6,from®' ® hy, hi, dem. T CJ = /, from 2 C = *_ /, dem. _Jf . 6 = l, from ˆT* k (or @ §), dem. «— , S- X = 1, from A d; (or ^^J «).dem. | \ˆ..

i" -«,

from

dy-t, dem. – / .

For origins of hieroglyphs, see Petrie's Medum (1892); F. Ll. Griffith, A Collection of Hieroglyphs (1898); N. de G. Davies, The

IX. 3

General Characteristics.

The wide and complex subject of Egyptian art will be treated here in six periods: Prehistoric, Early Kings, Pyramid Kings, Xllth Dynasty, XVIIIth-XXth Dynasties, XXVIth Dynasty and later. In each age will be considered the (A) statuary, (B) reliefs, (C) painting.

Prehistoric. — The earliest civilized population of Egypt was highly skilled in mechanical accuracy and regularity, but had little sense of organic forms. They kept the unfinished treatment of the limbs and extremities which is so characteristic of most barbaric art ; and the action was more considered than the form.

(A) In the round there are in the earlier graves female figures of two races, the Bushman type and European, both probably representing servants or slaves. These have the legs always united, sloping to a point without feet (Plate I. fig. 1) ; the arms are qnly stumps. The face has a beaky nose and some indication of eyes. Upon the surface is colouring; red for the Bushman, with black whisker though female; white for the European type, with black tattoo patterns. Other female figures are modelled in a paste, upon a stick, and the black hair is sometimes made separately to fit on as a wig over the red head, showing that wigs were then used. Male figures are generally only heads in the earlier times. Tusks with carved heads (Plate I. figs. 2, 3) are the earliest, beginning at S.D. (sequence date) 33; ' heads on the top of combs are found, from S.D. 42 to the close of such combs in the fifties. All of these heads show a high forehead and a pointed beard; and such expression as may be discovered is grave but not savage. In later times whole figures of ivory, stone and clay are found, with the legs united, and the arms usually joined to the body. A favourite way of indicating the eyes was by drilling two holes and inserting a white

shell bead in each. The figures of animals (Plate I. figs. 4, 5) are quite as rude as the human figures: they only summarily indicate the

1 In the prehistoric age when absolute dating is out of reach a " sequence dating " by means of the sequence of types in pottery, , tools, &c, has been proposed in Petrie's Diospolis Parva, pp. 4 et sqq. The earliest prehistoric graves yet known are placed at S.D. 30, and shortly before S.D. 80 the period of the first historic dynasty is entered.

mature, and often hardly express the genus. They are most usual on combs and pins; but sacred animals are also found. The lion is the most usual (Plate I. fig. 7), but the legs are roughly marked, if at all: the leonine air is given, but the attitude is more distinct than the form. The hawk (Plate I. fig. 6) is modelled in block without any legs. The slate palettes in the form of animals are even more summary, and continually degraded until they lost all trace of their origin. There are also curious figures of animals chipped in flint, which show someˆ character, but no detail.

(B) Reliefs with animal figures belong to the later part of tl>e/ prehistoric age. The relief is low, and the form hatched acr.oss with lines (Plate I. fig. 8), a style copied from drawing. There is more animation than in the round figures. At the close of this age the fashion of long processions of animals appears (Plate I. fig. 9) ; some character is shown in these, but no sense of action.

(C) Drawing is found from the earliest civilization, done in white slip on red vases. Figures of men are very rare (Plate I. fig. 10); they have the body triangular, the waist being very narrow; the legs are two lines linked by a zigzag, as if to express that they move to and fro. The usual figures are goats and hippopotami; always having the body covered with cross lines to express the connexion of the outlines (Plate I. fig. n). This technique is in every way closely akin to that of the modern Kabyle. An entirely different mode is common at a later time when designs were painted in thin red colour on a light brown ware. The subjects of the earlier of these examples are imitations of cordage, of marbling, and of basket-work; later there are rows of men and

animals, and ships (Plate I. figs. 12, 13), with various minor signs. The figures are never cross-hatched as in earlier drawing, but always filled in altogether. The fact that the ships have oars and not sails makes it probable that they were rather for the sea than for Nile traffic, and a starfish among the motives on such pottery also points to the sea connexion. The ulterior meaning of the decoration is probably religious and funereal, but the objects which are figured must have been familiar.

For this whole period see Jean Capart, Debuts dg I' art en ligypte (1904; trans. Primitive Art in Ancient Egypt).

The Early Kings. — The dynastic race wrought an entire transformation in the art of Egypt; in place of the clumsy and undetailed representations, there suddenly appears • highly artistic work, full of character, action and anatomical detail.

(A) The earliest statues of this age are the colossi of the god Min from Coptos; that they belong to the artistic race is evident from the spirited reliefs upon them (see below, B), but the figures were very rude, the legs and arms being joined all in the mass. The main example of this early art is a limestone head of a king (Plate I. figs. 15, 16), which is a direct study from life, to serve as a model. For the accuracy of the facial curves, and the grasp of character and type, it is equal to any later work; and in its entire absence of conventions and its pure naturalism there is no later sculpture so good: as Prof. A. Michaelis says, " it renders the race type with astounding keenness, and shows an excellent power of observation in the exact representation of the eyes." By the portrait, it is probably of King Narmer or some king related to him, that is, about the beginning of the 1st Dynasty. The ivory statuette of an aged king (Plate I. fig. 14) is probably slightly later. It shows the same subtle sense of character, and is unsurpassed in its reality. Many ivory figures of men, women and animals are known from Nekhen (Hieraconpolis) and Abydos; and they all show the same school of work, simple, dignified, observant, and with an air which places them on a higher plane of truthfulness .and precision than later art. There is none of the mannerism of a long tradition, but a nobility pervades them which has no self-consciousness. The lower class of work of this age is shown by great numbers . of glazed pottery figures both human and animal. Later in the Ilnd Dynasty, the head of Khasekhem (Plate I. fig.' 17) shows the beginning of convention, but yet has a delicacy about the mouth which surpasses later works.

(B) Reliefs abound at this age, and include the most important

evidences of the development of the art. The earliest examples are those of animals (Plate II. fig. 18) and shells on the colossi of Coptos. They show a keen sense of form, and the stag's head, which is probably the earliest, already bears an artistic feeling wholly different to that of any of the prehistoric works (P.K. iii. ivl). , The Carvings on. Slate palettes appear to begin with work crudely accurate and forceful, the heavy limbs being ridged with tendons and muscles (Plate II. fig. 19), but there is more pro- portion, with the same massive strength (Plate II. fig. 20). Soon after, with a leap, the artist produced the first pure work of art that is known (Plate II. fig. 21), a design for its own sake without the tie of "symbolism or history. The group of two long- necked gazelles facing a palm tree is of extraordinary refinement, and shows the, artistic consciousness in every part; the sym- metric rendering of the palm tree, reduced to fit the scale of the animals, the dainty grace of the smooth gazelles contrasted with the rugged stem, the delicacy of the long flowing curves and the fine indications of the joints, all show a sense of design which has rarely been equalled in the ceaseless repetitions of the tree and supporters motive during every age since. Passing the various palettes with hunting scenes and animals (Plate II. fig. 22), we come to the great historical carving of King Narmer (Plate II. fig. 23). Here the anatomy has reached its limits for such work; the precision of the muscles on the inner and outer sides of the leg, of the uniform grip in the left arm, and the tense muscle upholding the right arm, prove that the artist knew that part of his work perfectly. The large ceremonial mace-heads recording the Sed festivals of the king Narmer and another, belong also to this school; but owing to their smaller size they have not such artistic detail. With them were found many reliefs in ivory, on tusks, wands and cylinders. The main motive in these is a long procession of animals (Plate II. figs. 24, 25) often grotesquely crowded; but there is much observation shown and the figures are expressive. No drawing of this age has survived.

The Pyramid Kings. — A different ideal appears in the pyramid times; in place of the naturalism of the earlier work there is more regularity, some convention, and the sense of a school in the style. The prevailing feeling is a noble spaciousness both in scale and in form, an equanimity based upon knowledge and character, a grandeur of conception expressed by severely simple execution. There is nothing superfluous, nothing common, nothing trivial. The smallest as well as the largest work seems complete, inevitable, immutable, without limitations of time, or labour or thought.

(A) The statuette of Khufu or Cheops (Plate III. fig. 29) though only a minute figure in ivory, shows the character of immense energy and

will; the face is an astonishing portrait to be expressed in a quarter of an inch. The life-size statue of Khafre or Chephren (Plate III. fig. 30) is a majestic work, serene and powerful; carved in hard diorite, yet unhesitating in execution. The muscular detail is full, but yet kept in harmony with the massive style of the figure. The private persons have entirely different treatment according to the character of their position. In place of the awful dignity of the kings there is the placid high-bred Princess Nofri (Plate II. fig. 27, Plate III. fig. 31), the calm conscientious dignitary Hemset (Plate III. fig. 32), the bustling, active, middle-class official, Ka-aper (Plate II. fig. 28, Plate III. fig. 33), and the kneeling figure of a servitor. The differences of character are very skilfully rendered in all the sculpture of this age. The whole figures are stiff in the earlier time, as the figure of Nes; then square and massive, but true in form, as Rahotp and Nofri (Plate II. fig. 27); and afterwards easier and less monumental, as Ka-aper (Plate II. fig. 28). The skill in beaten copper work is shown by the portrait of the Prince Mer-en-ra (Plate III. fig. 35).

(B) The reliefs are quite equal to the statuary. The wooden panels of Hesi (Plate II. fig. 26) show the archaic style of great detail, with a bold, stark vigour of attitude. Later work is abundant in the tomb-sculptures of this age, with a fulness of variety and detail which makes them the most interesting of all

EGYPT

PYRAMID PERIOD.

Plate III.

32. HEMSET: LIMESTONE. 33. WOOD (see Fig. 28). 34. SCRIBE: LIMESTONE. 35. MER-EN-RA: COPPER.

! ■,.!0jh.^

wjumm%

P».J!

feiiL v’ ‘;

if*?

36. LIMESTONE SLAB OF KHENT-ER-KA.

Plwto, I

37. THE OXHERDS: LIMESTONE.

HI

*J

A

Hp3p|

i

Br

38. GRANITE SPHINX. 39. AMENEMHE III. 40. SENWOSRI I.: LIMESTONE RELIEFS: HOTEPA. 41

IX. 66.

Plate IV.

EGYPT

1400 B. C. TO ROMAN.

+S ‘ EBONY SS ‘ 4<5 – Q UEEN HATSHEPSL’T.

47. KHA-EM-HAT.

6d

\ •■;• \

/

‘-Pi?/ y’M A. 1W

.

52. SCENE IN XXVI. DYNASTY.

ITE.

53. PTOLEMAIC RELIEF.

54. MODELLED HEAD AND SKULL.

ANCIENT ART]

branches of the art. The general effect cannot be judged without a large scene, but the figures of two men and an ox (Plate III. fig. 37) show the freshness and vigour of the style, which is even higher than this in some examples. The clear, noble spacing of the surface work is well shown by a group of offerings and inscribed titles (Plate III. fig. 36).

(C) Flat drawings of this age are rare. Some fine examples, such as the geese from Medum, show that such work kept pace with the reliefs; but most of the fresco-work has perished, and there are few instances of line drawing.

The Xllth Dynasty. — This age overlaps the previous in its style. The end of the last age was in the very degraded tomb work of the early Xlth Dynasty.

(A) The new style begins with the royal statues, which it seems we must attribute to the foreign kings from whom the Xllth Dynasty was descended. These statues were later appropriated by the Hyksos, and so came to be called by their name, which is a mis- nomer. The type of face (Plate III. fig. 38) is thick-featured, full of force, with powerful masses of facial muscle covering the skull. The style is very vigorous and impassioned, without any trace of relenting towards conventional work. The surfaces are not in the least subdued by a general breadth of style, as in the last period; but, on the contrary, revel in the full detail of variety. There is perhaps no age where nature is so little controlled by convention in either the living character or its sculptured expression. One of these kings might well be the founder of the IXth Dynasty, ” Achthoes (Kheti), who did much injury to all the inhabitants,” ” Khuther Taurus the tyrant “; the expression is that of a Chlodwig or an Alboin. From this type evidently descended the milder and more civilized kings of the Xllth Dynasty, the resemblance being so strong that the fierce figures have even been identified with that dynasty by some. A good example is that of the statue of Amenemhat (Amenemhe) III. (Plate III. fig. 39). The style of the Xllth Dynasty may be summed up as clean, highly-finished work, strong in facial detail; but with neither the grandeur of the IVth nor the vivacity of the XVIIIth Dynasty. This passed in the XHIth Dynasty into a graceful but weak manner, as in the statues of Sebkhotp (Sebek-hotep) III. and Neferhotp.

(B) The relief work shows most clearly the rise of the new style. In the middle of the Xlth Dynasty an entirely fresh treatment appears; the Old Kingdom work had died out in very bad sunk-reliefs, the fresh style (Plate III. fig. 41) was a low relief with sharp edges above the field. It was full of delicate variety in the surfaces, and of elaborated close-packed lines of hair and ornaments. By the time of the early Xllth Dynasty, this reached a perfection of refinement in the detail of facial curves, with an ostentatiously low relief (P.K. ix. i.), rather on the lines of modern French work; but the whole with clean, firm outlines, severely restrained in the expression, and without any trace of emotion. It is the work of a school, in which high training took the place of the reliance on nature. Sunk relief was also well used, as by Senusert (Senwosri) I. (Plate III. fig. 40). There was a steady decline during the Xllth Dynasty and onward, but the same tone was followed.

(C) In some tombs painting only was used, and it followed the general character of the relief treatment, being more rigid, de- tailed, and scholastic than the older style.

The XVIIIth-XXth Dynasties. — The obvious, not to say superficial, character of this age has rendered it one of the most popular in Egyptian art. The older breadth, fulness, and vigour have vanished, those great qualities which stamp the immortal works of early times. The difference is much like that between the Parthenon and the Niobids, or between Jacopo Avanzi and Caracci. In this change is the whole difference between the art of character and the art of emotion; and though the emotional side is the more popular, as needing less thought to understand it, yet the unfailing canon is that in every age and land the true quality of art is proportionate to the expression of character as apart from transient emotion. This may perhaps apply to other arts as well as to sculpture and painting. If we accept frankly the emotional nature of this age, we may admire its graceful outlines,

its vivacious manner, its romantic style, with an occasional sauciness which is amusing and attractive. It revelled in rich detail, and close masses of lines, as in wigs and ribbed dresses. It sported with a seductive Syrian type of face, especially under Amenophis (Amenhotep) III.; but we find the anatomy giving way to mere smoothness of surface, for the sake of contrast with the masses of detail. The romantic element increased, solemn funereal statues show husband and wife hand in hand; and it culminated under Akhenaton, who is seen kissing his wife in the chariot, or dancing her on his knee. An overwhelming naturalism swamped the older reserves of Egyptian art, and the expression of the postures, actions and familiarities of daily life, or the instan- taneous attitudes of animals, became the

dernier cri of fashion. It was all charming and wonderful, but it was the end, — nothing could come after it. The XlXth Dynasty, at its best under Seti I., could only excel in high finish of smoothness and graceful curves; life, character, meaning, had vanished. And soon after, under Rameses II., mere mechanical copying, hard lifeless routine of stone-cutting, regardless of truth and of nature, dominated the whole.

(A) In sculpture there is a certain baldness of style at first, as in the Amenophis I. at Turin or Mutnefert at Cairo. More fulness and richness of character succeeded, as in Tahutmes (Tethmosis) III. and Amenophis III. (Plate IV. fig. 42, British Museum). And the feeling of the age finds greater scope in private statues, many of which have a personal fascination about them, as in the seated figures at Cairo and Florence, and the freer work in wood, of which the ebony negress (Plate IV. fig. 45) is the best example. The burst of naturalism under Akhenaton resulted in some marvellous portraiture, of which the fragment of a queen's head (Plate IV. fig. 43) is perhaps the most brilliant instance; the fidelity in the delicate curves of the nose and around the mouth is enhanced by the touch of artistic convention in the facing of the lips. The only work of ability in the XlXth Dynasty is the black granite figure (Plate IV. fig. 44) of Rameses II. at Turin. The ordinary statuary of his reign is painfully stiff and poor, and there is no later work in the period worth notice.

(B) The reliefs of the early XVIIIth Dynasty are closely like the scenes of the tombs in the pyramid age, but soon carving was superseded by the cheaper painting, and but few tombs in relief are known. The temples were the principal places for reliefs; and they steadily deteriorate from the first great example, Deir el Bahri (see Architecture: Egyptian), down to the late Ramessides. The portraiture is strong and clear-cut (Plate IV. fig. 46), but somewhat mechanical and without muscular detail: the sameness is rather more than is probable. There is a good deal of repetition for mere effect, even in the fine work of Kha- em-hat (Plate IV. fig. 47), under Amenophis III. That the artists were conscious of their poverty of thought is shown by some precise imitations of the style of early monuments. On reaching the age of Akhenaton, the peculiar style of that school is obvious in every relief; the older conventions were deserted, and, for good or for bad, a new start from nature was attempted. After that the smooth finish of the Seti reliefs at Abydos (Plate IV. fig. 48) shows no life or observation; and only occasionally the artist triumphed over the stone-worker, as in the portrait of Bantanta at Memphis, which is precisely like another head of her found in Sinai. The innumerable reliefs of the XlXth- XXth Dynasty temples are only of historic interest, and are all

despicable in comparison with earlier works.

(C) Painting was the art most congenial to this age; the lightness of touch, abundance of incident, and even comedy, of the scenes are familiar in the frescoes in the British Museum. And under Akhenaton this was pervaded by an entire natural- ism of posture, as seen in the two little princesses (Plate IV. fig. 49). Drawing continued to be the strong point of the art after the more laborious sculpture had lost all vitality. The tomb of Seti shows exquisitely firm line drawing; and the heads of four races (Plate IV. fig. 50), Western, Syrian, and two Negro, here show the unfailing line- work which has never been matched in later times. The artist habitually drew the long lines of whole

limbs without a single hesitation or revoke; and the drawing of a tumbling girl (Plate IV. rig. 51) shows how credibly such contortions could be represented. The comic papyri of the XXth Dynasty have also a very strong sense of character, even through coarse drawing and some childish combinations. • The subsequent centuries show continuous decline, and in whatever branch we compare the work, we see that each dynasty was poorer than that which preceded it. The XXVIth Dynasty is often looked on as a renaissance; but when we compare similar work we see that it was poorer than the XXIInd, as that was poorer than the XlXth. The alabaster statue of Amenardus of the XXVth is faulty in pose, and perfunctory in modelling; the resemblance between this and the head of her nephew Tirhaka is perhaps the best evidence of truthful work. After this there was a strong archaistic fashion, much like that under Hadrian; in both cases it may have arrested decay, but it did not lift the art up again. The work of this age can always be detected by the faulty jointing (Plate IV. fig. 52) and muscular treatment. The elements are right enough, but there was not the vital sense to combine them properly. Hence the monstrous protuberances (Plate IV. fig. 53) on relief figures of this age; a fault which the Greek fell into in his decline, as shown in the Farnese Hercules.

Portraiture, with its limited demand on imagination and lack of ideals, w is the form of art which flourished latest. The Saitic heads in basalt show a school of close observation, with fair power of rendering the personal character; and even in Roman times there still were

provincial artists who could model a face very truthfully, as is shown in one case in which the stucco head (Plate IV. fig. 54) from a coffin is here superposed on the view of the actual skull to show the accuracy of the work. The school of portrait-painting belongs entirely to Greek art, and is therefore not touched upon here. (See Edgar, Catalogue of Graeco- Egyptian Coffins, 48 plates, for this subject.)

Lastly we must recognize the different schools of Egyptian sculpture which are as distinct as those of recent painting. The black-granite school in every age is the finest; its seat we do not know, but its vitality and finish always exceed those of contemporary works. The limestone school was probably the next best, to judge from the reliefs, but hardly any statues of this school have survived; it probably was seated at Memphis. The quartzite work from Jebel Ahmar near Cairo stands next, as often very fine design is found in this hard material. The red granite school of Assuan comes lower, the work being usually clumsy and with unfinished corners and details. And the lowest of all was the sandstone school of Silsila, which is always the worst. Broadly speaking, the Lower Egyptian was much better than the Upper Egyptian; a conclusion also evident in the art of the tombs done on the spot. But the secret of the black granite school, and its excellence, is the main problem unsolved in the history of the art. (W. M. F. P.)

Tools and Material Products.

Tools (see Illustrations 1 to in). — The history of tools is a very large subject which needs to be studied for all countries; the various details of form are too numerous to specify here, but the general outline of tools used in Egypt may be briefly stated under general and special types. The general include tools for striking, slicing and scraping; the special tools are for fighting, hunting, agriculture, building and thread-work.

Striking Tools. — The wooden mallet of club form (1) was used in the Vlth and XHth Dynasties; of the modern mason's form (2) in the Xllth and XVIIIth. The stone mace head was a sharp-edged disk (3) , in the prehistoric from 3 1-40 sequence date ; of the pear shape (4) from S.D. 42, which was actually in use till the IVth Dynasty, and represented down to Roman time. The metal or stone hammer with a long handle was unknown till Greek or Roman times; but, for beating out metal, hemi- spherical stones (5) were held in the hand, and swung at arm's length overhead. Spherical hard stone hammers (6) were held in the hand for dressing down granite. The axe was at the close of the prehistoric age a square slab of copper (7) with one sharp

edge; small projecting tails then appeared at each end of the back (8), and increased until the long tail for lashing onto the handle is more than half the length of the axe in an iron one of Roman (?) age (13). Flint axes were made in imitation of metal in the XHth Dynasty (9). Battle-axes with rounded outline started as merely a sharp edge of metal (10) inserted along a stick (10, n); they become semicircular (12) by the Vlth Dynasty, lengthen to double their width in the XHth, and then thin out to a waist in the middle by the XVIIIth Dynasty. Flint hoes (14) are common down to the XHth Dynasty. Small copper hoes (15) with a hollow socket are probably of about the XXIInd Dynasty. Long iron picks (16), like those of modern navvies, were made by Greeks in the XXVIth Dynasty.

Slicing Tools.— The knife was originally a flint saw (17), havinj minute teeth; it must have been used for cutting up animals, fresh or dried, as the teeth break away on soft wood. The double edged straight flint knife dates from S.D. 32-45. The single- edged knife (18) is from 33-65. The flint knives of the time of Menes are finely curved (19), with a handle-notch; by the end of the Hnd Dynasty they were much coarser (20) and almost straight in the back. In the Xlth-XIIth Dynasty they were quite straight in the back (21), and without any handle-notch. The copper knives are all one-edged with straight back (22) down to the XVIIIth Dynasty, when two-edged symmetrical knives (23) become usual. Long thin one-edged knives of iron begin about 800 B.C. Various forms of one-edged iron knives, straight (24) and curved (25), belong to Roman times. A cutting- out knife, for slicing through textiles, began double-edged (26) in the 1st Dynasty, and went through many single-edged forms (27-29) until it died out in the XXth Dynasty (Man, 1901, 123). A small knife hinged on a pointed backing of copper (31) seems to have been made for hair curling and toilet purposes. Razors (30) are known of the XHth Dynasty, and became common in the XVIIIth. A curious blade of copper (32), straight sided, and sharpened at both ends, belongs to the close of the prehistoric age. Shears are only known of Roman age and appear to have been an Italian invention: there is a type in Egypt with one blade detachable, so that each can be sharpened apart. Chisels of bronze began of very small size (33) at S.D. 38, and reached a full size at the close of the prehistoric age. In historic times the chisels are about 1 X I, X 6 to 8 in. long (34) . Small chisels set in wooden handles are found (35) of the XHth and XVIIIth Dynasties. Ferrules first appear in the Assyrian iron of the 7th century B.C. The rise of stone work led to great importance of heavy chisels (36) for trimming limestone and Nubian sandstone; such chisels are usually round rods about f in. thick and 6 in. long. The cutting edge was about | in. wide for flaking tools

(36), which were not kept sharp, and 1 in. wide for facing tools (37) which had a good edge. In Greek times the iron chisels are shorter and merge into wedges (39). The socketed or mortising chisel (38) is unknown till the Italian bronze of the 8th century B.C., and the Naucratis iron of the 6th century. Adzes begin in S.D. 56, as plain slips of copper (40) 4 to 6 in. long, about 1 wide and £th thick. The square end was rounded in the early dynastic times, and went through a series of changes down to the XlXth Dynasty. Adzes of iron are probably of Greek times. A fine instance of a handle about 4 ft. long is represented in the Illrd Dynasty (P.M. XL). The adze (41) was used not only for wood- work but also for dressing limestone.

Scraping Tools. — Flint scrapers are found from S.D. 40 and onward. The rectangular scraper (42) began in S.D. 63, and continued into the Hnd Dynasty: the flake with rounded ends (43) was used from the 1st to the IVth Dynasty (P. Ab. i. xiv., xv.). Round scrapers were also made (44). Flint scrapers were used in dressing down limestone sculpture in the Illrd Dynasty. Rasps of conical form (45), made of a sheet of bronze punched and coiled round, were common in the XVIIIth Dynasty, apparently as personal objects, possibly used for rasping dried bread. In the Assyrian iron tools of the 7th century B.C. the long straight rasp (46) is exactly of the modern type. The saw is first found as a notched bronze knife of the Illrd Dynasty. Larger toothed saws (47) are often represented in thelVth-VIthDynasty,

as used by carpenters. There are no dated specimens till the Assyrian iron saws (48) of the 7th century B.C. Drills were of flint (49) for hard material and bead-making, of bronze for wood- work. In the Assyrian tools iron drills are of slightly twisted scoop form (50), and of centre-bit type with two scraping edges (51). In Roman times the modern V drill (52) is usual. The drill was worked by a stock with a loose cap (53), rotated by a drill bow', in the Xllth to Roman dynasties. The pump drill with cords twisted round it was in Roman use. The bow drill (56) was used as a fire drill to rotate wood (55) on wood (57); and the cap (54) for such use was of hard stone with a highly polished hollow. The drill brace appears to have been used by Assyrians in the 7th century B.C. Piercers of bronze tapering (58), to enlarge holes in leather, &c, were common in all ages.

Fighting Weapons. — The battle-axe has been described above with axes. The flint-dagger (59) is found from S.D. 40-56. A very finely made copper dagger (60) with deep midrib is dated to between 55 and 60 S.D. Copper daggers with parallel ribbing (61) down the middle are common in the Xlth-XIVth Dynasties; and in the XVIIIth-XXth Dynasties they are often shown in scenes and on figures. The falchion with a curved blade (62) belongs to the XVIIIth-XXth Dynasty. The rapier (63) or lengthened dagger is rarely found, and is probably of prehistoric Greek origin. The sword is of Greek and Roman age, always double-edged and of iron. The spear is not commonly found in Egypt, until the Greek age, but it is represented from the Xlth Dynasty onward ; it belonged to the Semitic people (L.D.ii. 133). The bow was always of wood, in one piece in the prehistoric and early times, also of two horns in the 1st Dynasty; but the compound bow of horn is rarely found, only as an importation, in the XVIIIth Dynasty. The arrow-heads of flint (64-66) and of bone (68-69) were pointed, and also square-ended (67) for hunting (P.R.T. ii. vi.; vii. A., 7 ; xxxiv.). The copper arrow- heads appear in the XlXth Dynasty, of blade form with tang (70); the triangular form (72), and leaf form with socket (71), are of the XXVIth Dynasty. Triangular iron arrows with tang are of the same age. Tangs show that the shaft was a reed, sockets show that it was of wood. Many early arrows (Xllth) have only hard wood points of conical form. The sling is rarely shown in the XlXth-XXth Dynasties; and the only known example is probably of the XXVIth.

Hunting Weapons. — The forked lance of flint was at first wide with sfight hollow (73) from S.D. 32-43; then the hollow became a V notch (74) in 38 S.D. and onward. The lance was fixed in a wooden shaft for throwing, and held in by a check- cord from flying too far if it missed the animal (P.N. LXXIIL). The harpoon for fishing was at first of bone (7 5) , and was imitated in copper (76, 77) from S.D. 36 onwards. The boomerang or throw-stick (78) was used from the 1st to the XXIInd Dynasty, and probably later. Fish-hooks of copper (79-82) are found from the 1st Dynasty to Roman times. A trap for animals' legs, formed by splints of palm stick radiating round a central hole, is figured in S.D. 60, and one was found of probably the XXth Dynasty. Fishing nets were common in all historic times, and the lead sinkers (83) and stone sinkers (84) are often found under the XVIIIth-XXth Dynasties.

Agricultural Tools. — The hoe of wood (85) is the main tool from the late prehistoric time, and many have been found of the XVIIIth Dynasty. With the handle lengthened (86) and turned forward, this became the plough (87 is the hieroglyph, 88 the drawing, of a plough) ; this was always sloping, and never the upright post of the Italic type. The rake of wood (89) is usual in the Xllth and XVIIIth Dynasties. The

fork (90), used for tossing straw, was common in the Old Kingdom, but none has been found. The sickle was of wood (92), with flints (91) inserted, apparently a copy of the ox-jaw and teeth. The notched flints for it are common from the 1st to the XVIIIth Dynasty. In Roman times the same principle was followed, by making an iron sickle with a deep groove, in which was inserted the cutting blade of steel (P. E. XXIX.). Shovel-boards, to hold in right (93) or left hand for scraping up the grain in winnowing, are usual in the XVIIIth Dynasty, and are figured in use in the Old Kingdom

Pruning knives with curved blades (94) are Italic, and were made of iron by the Romans. Corn grinders were flat oval stones, with a smaller one lying cross-ways (95), and slid from end to end. Such were used from the Old Kingdom down to late times. In the Roman period a larger stone was used, with a rectangular slab (96) sliding on it, in which a long trough held the grain and let it slip out below for grinding. The quern with rotary motion is late Roman, and still used by Arabs. The large circular mill- stones of Roman age worked by horse-power are usually made from slices of granite columns.

Building Tools. — The adze described above was used for dressing blocks of limestone. The brick-mould was an open frame, with one side prolonged into a handle (97), exactly as the modern mould. The plasterers' floats (98) were entirely cut out of wood. The mud rake for mixing mortar is rather narrower than the modern form. The square (99) and plummet (100,101) have remained unchanged since the XlXth Dynasty. For dressing flat surfaces three wooden pegs (102) of equal length were used; a string was stretched between the tops of two, and the third peg was set on the point to be tested and tried against the string.

Thread-Work: — Stone spindle whorls (103) are common in the prehistoric age; wooden ones were usual, of a cylindrical form (104) in the Xllth, and conical (105) in the XVIIIth Dynasty. The thread was secured by a spiral notch in the stick. In Roman times an iron hook on the top held the thread (106) as in modern spindles. Needles of copper were made in the prehistoric, as early as S.D. 48, and very delicate ones by S.D. 71. Gold needles are found of the 1st Dynasty. Fine ones of bronze are common in the XVIIIth Dynasty, and some with two eyes at right angles, one above the other, to carry two different threads. The copper bodkin is found in S.D. 70. Netters are common, of rib bones, pointed (107); the thread was wound round them. Long netting needles were probably brought in by the dynastic people as they figure in the hiero- glyphs. Finely-made ones are found in the XVIIIth Dynasty and later. Reels were also commonly used for net making, of

pottery (108) or even pebbles (109) with a groove chipped around. The flint vase-grinders were used in the early dynasties (no), and also sandstone grinders for hollowing larger vases (in).

Stone-Work. — In the prehistoric ages stone building was unknown, but many varieties of stones were used for carving into vases, amulets and ornaments. The stone vases were at first of cylindrical forms, with a foot, and ears for hanging. These are worked in brown basalt, syenite, porphyry, alabaster and limestone. In the second prehistoric civilization barrel- shaped vases became usual; and to the former materials were added slate, grey limestone and breccia. Serpentine appears later, and diorite towards the close of the prehistoric ages. Flat dishes were used in earlier times; gradually deeper forms appear, and lastly the deep bowl with turned-in edge belongs to the close of the prehistoric time and continued common in the earlier dynasties (P.D.P. 19). This stone-work was usually formed on the outside with rotary motion, but sometimes the vase was rotated upon the grinder (Q. H. 17). The interior was ground out by cutters (figs. 110,111) fixed in the end of a stick and revolved with a weight on the top, as shown in scenes on the tombs of the Vth Dynasty. The cutters were sometimes flints of a crescent shape (P. Ab. ii. liii. 24), but more usually grinders blocks of quartzite sandstone (26-34), and occasionally of diorite (Q. H. xxxii. lxii.). These blocks were fed with sand and water to give the bite on the stone (P. Ab. i. 26). The outsides of the vases were entirely wrought by handwork, with the polishing lines crossing diagonally. Probably the first forming was done by chipping and hammer-dressing, as in later times; the final facing of the hard stones was doubtless by means of emery in block or powder, as emery grinding blocks are found.

In the early dynasties the hard stones were still worked, and the 1st dynasty was the most splendid age for vases, bowls, and dishes of the finest stones. The royal tombs have preserved an enormous quantity of fragments, from which five hundred

varied forms have been drawn (P.R.T. ii. xlvi.liii. 6). The materials are quartz crystal, basalt, porphyry, syenite, granite, volcanic ash, various metamqrphics, serpentine, slate, dolomite marble, alabaster, many coloured marbles, saccharine marble, grey and white limestones. The

most splendid vase is one from Nekhen (Hieraconpolis), of syenite, 2 ft. across and 16 in. high, hollowed so as to be marvellously light and highly polished (Q. H. xxxvii). Another branch of stone work, surface carving, was early developed by the artistic dynastic race. The great palettes of slate covered with elaborate reliefs are probably all of the pre-Menite kings; the most advanced of them having the figure of Narmer, who preceded Menes. Other carving full of detail is on the great mace-heads of Narmer and the Scorpion king, where scenes of ceremonials are minutely engraved in relief. In the 1st Dynasty the large tombstones of the kings are of bold work, but the smaller stones of private graves vary much in the style, many being very coarse. All of this work was by hammer-dressing and scraping. The scrapers seem to have always been of copper.

The earliest use of stone in buildings is in the tomb of King Den (1st Dynasty), where some large flat blocks of red granite seem to have been part of the construction. The oldest stone chamber known is that of Khasekhemui (end of the Ilnd Dynasty) . This is of blocks of limestone whose faces follow the natural cleavages, and only dressed where needful; part is hammer-dressed, but most of the surfaces are adze-dressed. The adze was of stone, probably flint, and had a short handle (P.R.T. ii. 13). The same king also wrought granite with inscriptions in relief. In the close of the Illrd Dynasty a great impetus was given to stone-work, and the grandest period of refined masonry is at the beginning of the IVth Dynasty under Cheops. The tombs of Medum under Snefru are built with immense blocks of limestone of 20 and 33 tons weight. The dressing of the face between the hieroglyphs was done partly with copper and partly with flint scrapers (P.M. 27). The most splendid masonry is that of the Great Pyramid of Cheops. The blocks of granite for the roofing are 56 in number, of an average weight of 54 tons each. These were cut from the water-worn rocks at the Cataract — the soundest source for large masses, as any incipient flaws are well exposed by wear. The blocks were quarried by cleavage; a groove was run along the line intended, and about 2 ft. apart holes about 4 in. wide were jumped downward from it in the intended plane; this prevented a skew fracture (P.T. 93). In shallower masses a groove was run, and then holes, apparently for wedges, were sunk deeper in the course of it; whether wetted wood was used for the expansive force is not known, but it is probable, as no signs are visible of crushing the granite by hard wedges. The facing of the cloven surfaces was done by hammer-dressing, using rounded masses of quartzose hornstone, held in the hand without any handle. In order to get a hold for moving the blocks without bruising the edges, projecting lumps or bosses were left on the faces, about 6 or 8 in.

across and 1 or 2 in. thick. After the block was in place the boss was struck off and the surface dressed and polished (P.T. 78, 82). In the pyramid of Cheops the blocks were all faced before building; but the later granite temple of Chephren and the pyramid of Mycerinus (Menkaura, Menkeure) show a system of building with an excess of a few inches left rough on the outer surface, which was dressed away when in position (P.T. no, 132).

The flatness of faces of stone or rock (both granite and lime- stone) was tested by placing a true-plane trial plate, smeared with red ochre, against the dressed surface, as in modern engineer- ing. The contact being thus reddened showed where the face had to be further dressed away; and this process was continued until the ochre touched points not more than an inch apart all over the joint faces, many square feet in area. On stones too large for facing-plates a diagonal draft was run, so as to avoid any wind in the plane (P.T. 83).

The cutting of granite was not only by cleavage and hammer dressing, but also by cutting with harder materials than quartz wen as emery. Long saws of copper were fed with emery powder,

and used to saw out blocks as much as 75 ft. long (P.T. Plate XIV.). In other cases the very deep scores in the sides of the saw-cut suggest that fixed cutting points were inserted in the copper saws ; and this would be parallel to the saw-cuts in the very hard limestone of the Palace of Tiryns, in which a piece of a copper saw has been broken, and where may be yet found large chips of emery, too long and coarse to serve as a powder, but suited for fixed teeth. A similar method was common for circular holes, which were cut by a tube, either with powder or fixed teeth. These tubular drills were used from the IVth Dynasty down to late times, in all materials from alabaster up to carnelian. The resulting cores are more regular than those of modern rock-drilling.

Limestone in the Great Pyramid, as elsewhere, was dressed by chopping it with an adze, a tool used from prehistoric to Roman times for all soft stones and wood. This method was carried on up to the point of getting contact with the facing- plate at every inch of the surface; the cuts cross in various directions. For removing rock in reducing a surface to a level, or in quarrying, cuts were made with a pick, forming straight trenches, and the blocks were then broken out between these. In quarrying the cuts are generally 4 or 5 in. wide, just enough for the workman’s arm to reach in; for cutting away rock the grooves are 20 in. Wide, enough to stand in, and the squares of rock about 9 ft. wide between the grooves (P.T. 100). The accuracy of the

workmanship in the IVth Dynasty is astonishing. The base of the pyramid of Snefru had an average variation of 6 in. on- 5765 and 10′ of squareness. But, immediately after, Cheops improved on this with a variation of less than 6 in. on 9069 in. and 12″ of direction. Chephren fell off, having 1-5 error on 8475, and 33″ of variation; and Mycerinus (Menkeure) had 3 in. error on 4154 and 1′ 50″ variation of direction (P.M. 6; P.T. 39, 97, in). Of perhaps later date the two south pyramids of Dahshur show errors of 3-7 on 7459 and i-i on 2065 in., and variation of direction of 4′ and 10′ (P.S. 28, 30). The above smallest error of only 1 in 16,000 in lineal measure, and 1 in 17,000 of angular measure, is that of the rock-cutting for the foundation of Khufu, and the masonry itself (now destroyed) was doubtless more accurate. The error of flatness of the joints from a straight line and a true square is but rJ-oth in. on 75 in. length; and the error of level is only ˆth in. along a course, or about 10″ on a long length (P.T. 44). We have entered thus fully on the details of this period, as it is the finest age fo”r work- manship in every respect. But in the Xllth Dynasty the granite sarcophagus of Senwosri II. is perhaps the finest single piece of cutting yet known; the surfaces of the granite are all dull- ground, the errors from straight lines and parallelism are only about -yj-g-th inch (P. 1,3).

In later work we may note that copper scrapers were used for facing the limestone work in the Vlth, the Xllth and the XVIIIth Dynasties. In the latter age granite surfaces were ground, hieroglyphs were chipped out and polished by copper tools fed with emery; outlines were graved by a thick sheet of copper held in the hand, and sawed to and fro with emery. Corners of signs and intersections of lines were first fixed by minute tube-drill holes, into which the hand tool butted, so that it should not slip over the outer surface.

The marking out of work was done by fine black lines ; and supplemental lines at a fixed distance from the true one were put in to guard against obliteration in course of working (P.T. 92) ; similarly in building a brick pyramid the axis was marked, and there were supplemental marks two cubits to one side (P.K. 14). When cutting a passage in the rock a rough drift- way was first made, the roof was smoothed, a red axis line was drawn along it, and then the sides were cut parallel to the axis. For setting out a mastaba with sloping sides, on an irregular foundation at different levels, hollow corner walls were built outside the place of each corner; the distances of the faces at the above-ground level were marked on the inner faces of the walls; the above-ground level was also marked; then sloping lines at the intended angle of the face were drawn downward from the ground-level measures, and each face was set out so as to

TOOLS]

EGYPT

7.1

MALLETS

MACES

HAMMERS

6

\^ r^-^^^ry^

HOES

PICK

FLINT KNIVES

22 23

METAL KNIVES

%* 27 28 29

CUTTING

-OUT KNIVES

RAZORS J “fl^?

32

*!_ >

W

CHISELS

33

34 35 36 37 ‘38

a

H

SCRAPERS

46

ˆ£3

D.43

44 45

Y

ADZES

/Vote.

The objects are drawn to a scale

of-g- unless otherwise described.

SAWS

Ancient Egyptian Tools.

72

EGYPT

FTOOLS. &c.

FIGHTING

12 13

flu,.

HUNTING

,.74 .

75 76

AGRICULTURE •■■ &

v85′

U V9 !° I 1 82 J^L -e= =fc 84

Note. The objects are drawn to a scale of g unless otherwise described.

102 THREAD

n

WOR

K Of

105 106 1107

VASE J° 8 GRINDING

“1 101

110

109

Ancient Egyptian Tools.

ANCIENT ART]

EGYPT

73

lie in the plane thus defined by two traces at the ends (P.M.

VIII.).

Metal-Work.— Copper was wrought into pins, a couple of inches long, with loop heads, as early as the oldest prehistoric graves, before the use of weaving, and while pottery was scarcely developed. The use of harpoons and small chisels of copper next arose, then broad flaying knives, needles and adzes, lastly the axe when the metal was commoner. On these prehistoric tools, when in fine condition, the original highly-polished surface remains. It shows no trace of grinding lines or attrition, nor yet of the blows of a hammer. Probably it was thus highly finished by beating between polished stone hammers which were almost flat on the face. Most likely the forms of the tools were cast to begin with, and then finished and polished by fine hammering. A series of moulds for casting in the Xllth Dynasty show that the forms were carved out in thick pieces of pottery, and then lined

with fine ashy clay. The mould was single, so that one side of the tool was the open face of metal. As early as the pyramid times solid casting by cire perdue was already used for figures: but the copper statues of Pepi and his son seem, by their thinness and the piecing together of the parts, to have been entirely hammered out. The portraiture in such hammer work is amazingly life-like. By the time of the Xllth Dynasty, and perhaps earlier, cire perdue casting over an ash core became usual. This was carried out most skilfully, the metal being often not gˆth in. thick, and the core truly centred in the mould. Casting bronze over iron rods was also done, to gain more stiffness for thin parts.

In gold work the earliest jewelry, that of King Zer of the 1st Dynasty, shows a perfect mastery of working hollow balls with minute threading holes, and of soldering with no trace of excess nor difference of colour. Thin wire was hammered out, but there is no ancient instance of drawn wire. Castings were not trimmed by filing or grinding, but by small chisels and hammering (P.R.T. ii. 1 7) . In the Xllth Dynasty the soldering of the thin cells for the cloisonnee inlaid pectorals, on to the base plate, is a marvellous piece of delicacy; every cell has to be perfectly true in form, and yet all soldered, apparently simul- taneously, as the heat could not be applied to successive portions (M.D. i.). Such work was kept up in the XVIIIth and XXVIth Dynasties. There is nothing distinctive in later jewelry different from Greek and Roman work elsewhere.

Glaze and Glass. — From almost the beginning of the prehistoric age there are glazed pottery beads found in the graves : and glazing on amulets of quartz or other stones begins in the middle of the prehistoric. Apparently then glazing went together with the working of the copper ores, and probably accidental slags in the smelting gave the first idea of using glaze intentionally. The development of glazing at the beginning of the dynasties was sudden and effective. Large tiles, a foot in length, were glazed completely all over, and used to line the walls of rooms; they were retained in place by deep dovetails and ties of copper wire. Figures of glazed ware became abundant ; a kind of visiting card was made with the figure of a man and his titles to present in temples which he visited; and glazed ornaments and toggles for fastening dresses were common (P. Ab. ii.) . Further, besides thus using glaze on a large scale, differently coloured glazes were used, and even fused together. A piece of a large tile, and part of a glazed vase, have the royal titles and name of Menes, originally in violet inlay in green glaze. There was no further advance in the art until the great variety of colours came into use about 4000 years later. In the Xllth Dynasty a very thin smooth glaze was used, which became rather thicker in the XVIIIth. The most brilliant age of glazes was under

Amenophis III. and his son Akhenaton. Various colours were used; beside the old green and blue, there were purple, violet, red, yellow and white. And a profusion of forms is shown by the moulds and actual examples, for necklaces, decorations, inlay in stone and applied reliefs on vases. Under Seti II. cartouches of the king in violet and white glaze are common; and under Rameses III. there were vases with relief figures, with painted figures, and tiles with coloured reliefs of captives of many races. The latter development of

glazing was in thin delicate apple-green ware with low relief designs, which seem to have originated under Greek influence at Naucratis. The Roman glaze is thick and coarse, but usually of a brilliant Prussian blue, with dark purple and apple-green; and high reliefs of wreaths, and sometimes figures, are common.

Though glaze begins so early, the use of the glassy matter by itself does not occur till the XVIIIth Dynasty; the earlier reputed examples are of stone or frit. The first glass is black and white under Tethmosis (Tahutmes) III. It was not fused at a high point, but kept in a pasty state when working. The main use of it was for small vases; these were formed upon a core of sandy paste, which was modelled on a copper rod, the rod being the core for the neck. Round this core threads of glass were wound of various colours; the whole could be reset in the furnace to soften it for moulding the foot or neck, or attaching handles, or dragging the surface into various patterns. The colours under later kings were as varied as those of the glazes. Glass was also wheel-cut in patterns and shapes under Akhenaton. In later times the main work was in mosaics of extreme delicacy. Glass rods were piled together to form a pattern in cross-section. The whole was then heated until it perfectly adhered, and the mass was drawn out lengthways so as to render the design far more minute, and to increase the total length for cutting up. The rod was then sliced across, and the pieces used for inlaying. Another use of coloured glass was for cutting in the shapes of hieroglyphs for inlaying in wooden coffins to form inscriptions. Glass amulets were also commonly placed upon Ptolemaic mummies. Blown glass vessels are not known until late Greek and Roman times, when they were of much the same manufacture as glass elsewhere. The supposed figures of glass-blowers in early scenes are really those of smiths, blowing their fires by means of reeds tipped with clay. The variegated glass beads belonging to Italy were greatly used in Egypt in Roman times, and are like those found elsewhere. A distinctively late Egyptian use of glass was for weights and vase-stamps, to receive an impress stating the amount of the weight or measure. The vase-stamps often state the name of the contents (always seeds or fruits), probably not to show what was in

them, but to show for what kind of seed the vessel was a true measure. These measure stamps bear names dating them from a.d. 680 to about 950. The large weights of ounces and pounds are disks or cuboid blocks; they are dated from 720 to 785 for the lesser, and to a.d. 915 for larger, weights. The greater number are, however, small weights for testing gold and silver coins of later caliphs from a.d. 952 to 1171. The system was not, however, Arab, as there are a few Roman vase- stamps and weights. Of other medieval glass may be noted the splendid glass vases for lamps, with Arab inscriptions fused in colours on the outsides. No enamelling was ever done by Egyptians, and the few rare examples are all of Roman age due to foreign work.

The manufacture of glass is shown by examples in the XVIIIth Dynasty. The blue or green colour was made by fritting to- gether silica, lime, alkaline carbonate and copper carbonate; the latter varied from 3% in delicate blues to 20% in deep purple. blues. The silica was needed quite pure from iron, in order to get the rich blues, and was obtained from calcined quartz pebbles; ordinary sand will only make a green frit. These materials were heated in pans in the furnace so as to combine in a pasty, half -fused condition. The coloured frit thus formed was used as paint in a wet state, and also used to dissolve in glass or to fuse over a surface in glazing. The brown tints often seen in glazed objects are almost always the result of the decomposition of green glazes containing iron. The blue glazes, on the other hand, fade into white. The essential colouring materials are, for blue, copper; green, copper and iron; purple, cobalt; red, haematite; white, tin. An entirely clear colourless glass was made in the XVIIIth Dynasty, but coloured glass was mainly used. After fusing a panful of coloured glass, it was sampled by taking pinches out with tongs; when perfectly combined it was left to cool in the pan, as with modern optical glass. When cold the pan was chipped away, and the cake of glass broken up into convenient pieces, free of sediment and of

scum. A broken lump would then be heated to softness in the furnace; rolled out under a bar of metal, held diagonally across the roll; and when reduced to a rod of a quarter of an inch thick, it was heated and pulled out into even rods about an eighth of an inch thick. These were used to wind round glass vases, to form lips, handles, &c. ; and to twist together for spiral patterns. Glass tube was similarly drawn out.

Beads were made by winding thin threads of glass on copper wires, and the greater contraction of the copper freed the bead when cold. The coiling of beads can always be detected by (i) the little tails left at the ends, (2) the streaks, (3) the bubbles, seen with a magnifier. Roman glass beads are always drawn out, and nicked off hot, with striation lengthways; except the large opaque variegated beads which are coiled. Modern Venetian beads are similarly coiled. In the XXIIIrd Dynasty beads of a rich transparent Prussian blue glass were made, until the XXVIth. About the same time the eyed beads, with white and brown eyes in a blue mass, also came in (P.A. 25-27, Plate XIII.).

Pottery (see fig. 112). — The earliest style of pottery is entirely hand made, without any rotary motion; the form being built up with a flat stick inside and the hand outside, and finally scraped and burnished in a vertical direction. The necks of vases were the first part finished with rotation, at the middle and close of the prehistoric age. Fully turned forms occur in the 1st Dynasty; but as late as the XII th Dynasty the lower part of small vases is usually trimmed with a knife. In the earlier part of the prehistoric age there was a soft brown ware with haematite facing, highly burnished. This was burnt mouth-down in the oven, and the ashes on the ground reduced the red haematite to black magnetic oxide of iron; some traces of carbonyl in the ash helped to rearrange the magnetite as a brilliant mirror-like surface of intense black. The lower range of jars in the oven had then black tops, while the upper ranges were entirely red. A favourite decoration was by lines of white clay slip, in crossing patterns, figures of animals, and, rarely, men. This is exactly of the modern Kabyle style in Algeria, and entirely disappeared from Egypt very early in the prehistoric age. Being entirely hand made, various oval, doubled and even square forms were readily shaped.

The later prehistoric age is marked by entirely different pottery, of a hard pink-brown ware, often with white specks in it, without any applied facing beyond an occasional pink wash, and no polishing. It is decorated with designs in red line, imitating cordage and marbling, and drawings of plants, ostriches and ships. The older red polished ware still survived in a coarse and degraded character, and both kinds together were carried on into the next age (P.D.P.).

The early dynastic pottery not only shows the decadent end of the earlier forms, but also new styles, such as grand jars of 2 or 3 ft. high which were slung in cordage, and which have imitation lines of cordage marked on them. Large ring-stands also were brought in, to support jars, so that the damp surfaces should not touch the dusty ground. The pyramid times show the great jars reduced to short rough

pots, while a variety of forms of bowls are the most usual types (P.R.T.;. P.D.; P. Desh.)

In the Xllth Dynasty a hard thin drab ware was common, like the modern qulleh. water flasks. Drop-shaped jars with spherical bases are typical, and scrabbled patterns of incised lines. Large jars of light brown pottery were made for storing liquids and grain, with narrow necks which just admit the hand (P.K.).

The XVIIIth Dynasty used a rather softer ware, decorated at first with a red edge or band around the top, and under Tethmosis (Tahutmes) III. black and red lines were usual. Under Amenophis III. blue frit paint was freely used, in lines and bands around vases; it spread to large surfaces under Amenophis IV., and continued in a poor style into the Ramesside age. In the latter part of the XVIIIth and the XlXth Dynasties a thick hard light pottery, with white specks and a polished drab-white facing, was generally used for all fine purposes. The XlXth and XXth Dynasties only show a degradation of the

types of the XVIIIth; and even through to the XXVth Dynasty there is no new movement (P.K.; P.I; P. A.; P.S.T.).

The XXVIth Dynasty was largely influenced by Greek amphorae imported with wine and oil. The native pottery is of a very fine paste, smooth and thin, but poor in forms. Cylin- drical cups, and jars with cylindrical necks and no brim, are typical. The small necks and trivial handles begin now, and are very common in Ptolemaic times (P.T. ii.).

The great period of Roman pottery is marked by the ribbing on the outsides. The amphorae began to be ribbed about a.d. 1 50, and then ribbing extended to all the forms. The ware is generally rather rough, thick and brown for the amphorae, thin and red for smaller vessels. At the Constantine age a new style begins, of hard pink ware, neatly made, and often with ” start-patterns ” made by a vibrating tool while the vessel rotated: this was mainly used for bowls and cups (P.E.). Of the later pottery of Arab times we have no precise knowledge. The abbreviations used above refer to the following sources of information : —

M.D. Morgan, Dahshur;

P.A. Petrie, Tell el Amarna;

P. Ab. „ Abydos;

P.D. ,, Dendereh;

P. Desh. „ Deshasheh;

P.D. P. ,, Diospolis Parva;

P.E. ,, Ehnasya;

P.I. ,, Illahun;

P.K. „ Kahun;

P.M. ,, Medum;

P.N. „ Naqada;

P.R.T. „ Royal Tombs;

P.S. „ Season in Egypt;

P.S.T. ,, Six Temples;

P.T. ,, Pyramids and Temples of Gizeh;

P.T. ii. ,, Tanis, ii.;

Q.H. Quibell, Hieraconpolis. (W. M. F. P.)

Monuments. — The principal monuments that are yet remaining to illustrate the art and history of Egypt may be best taken in historical order. Of the prehistoric age there are many rock carvings, associated with others of later periods: they principally remain on the sandstone rocks about Silsila, and their age is shown by the figures of ostriches which were extinct in later times. One painted tomb was found at Nekhen (Hieraconpolis) , now in the Cairo Museum; the brick walls were colour-washed and covered with irregular groups of men, animals and ships, painted with red, black and green. The cemeteries otherwise only contain graves, cut in gravel or brick lined, and formerly roofed with poles and brushwood. The 1st to Illrd Dynasties have left at Abydos large forts of brickwork, remains of two successive temples, and the royal tombs (see Abydos). Else- where are but few other monuments; at Wadi Maghara in Sinai is a rock sculpture of Semerkhet of the 1st Dynasty in perfect state, at Giza is a group of tombs of a prince and retinue of the 1st Dynasty, and at Giza and Bet Khallaf are two large brick mastabas with extensive passages closed by trap-doors, of kings of the Illrd Dynasty. The main structure of this age is the step-pyramid of Sakkara, which is a mastaba tomb with eleven successive coats of masonry, enlarging it to about 350 by 390 ft. and

200 ft. high. In the interior is sunk in the rock a chamber 24X23 ft. and 77 ft. high, with a granite sepulchre built in the floor of it, and various passages and chambers branching from it. The doorway of one room (now in Berlin Museum) was decorated with polychrome glazed tiles with the name of King Neterkhet. The complex original work and various alterations of it need thorough study, but it is now closed and research is forbidden.

The IVth to Vlth Dynasties are best known by the series of pyramids (see Pyramid) in the region of Memphis. Beyond these tombs, and the temples attached to them, there are very few fixed monuments; of Cheops and Pepi I. there are temple foundations at Abydos (q.v.), and a few blocks on other sites; of Neuserre (Raenuser) there is a sun temple at Abuslr; and of several kings there were tablets in Sinai, now inthe Cairo Museum. A few tablets of the IXth Dynasty have been found at Sakkara, and a tomb of a prince at Assiut. Of the Xlth Dynasty is the

POTTERY]

EGYPT

75

EARLY PREHISTORIC 7000-6000 8.C.

rVfltf'!:*

LATER PREHISTORIC _|»

6000- 5000 b.c. SB H a of ^^ Mm Am ML ■ •

fill?!t ft f?***

l sr DYNASTY 4800-4500 B.C,

IV™ -vr DYNASTY 4000-3300 B.C.

Fig. ii2. — Principal Types of Pottery of Ancient Egypt. (Scale i : 20.)

7 6

EGYPT

[ANCIENT ART

terrace-temple of Menthotp III. recently excavated at Thebes: also

foundations of this king and of Sankhkere at Abydos. In the Xllth Dynasty there is the celebrated red granite obelisk of Heliopolis, one of a pair erected by Senwosri (Senusert) I. in front of his temple which has now vanished. Another large obelisk of red granite, 41 ft. high, remains in the Fayum. The most importarft pictorial tombs of Beni Hasan belong to this age; the great princes appear to have largely quarried stone for their palaces, and to have cut the quarry in the form of a regular chamber, which served for the tomb chapel. These great rock chambers were covered with paintings, which show a large range of the daily life and civilization. The pyramids and temples of Senwosri II. and III. and Amenemhe III. remain at Illahun, Dahshur and Hawara. The latter was the celebrated Labyrinth, which has been entirely quarried away, so that only banks of chips and a few blocks remain. At the first of these sites is the most perfect early town, of which hundreds of houses still remain. Of Senwosri III. there are the forts and temples above the second cataract at Semna and Kumma. Of the Hyksos age there are the scanty remains of a great fortified camp at Tell el-Yehudia.

In the XVTIIth to XXth Dynasties we reach the great period of monuments. Of Amasis (Aahmes) and Amenophis I. there are but fragments left in later buildings; and of the latter a great quantity of sculpture has been recovered at Karnak. The great temple of Karnak had existed since the Xlth Dynasty or earlier, but the existing structure was begun under Tethmosis (Tahutmes) I., and two of the great pylons and one obelisk of his remain in place. He also built the simple and dignified temple of Medinet Habu at Thebes, which was afterward over- shadowed by the grandiose work of Rameses III. The next generation — Tethmosis II. and Hatshepsut — added to their father's work; they also built another pylon and some of the existing chambers at Karnak, set up the great obelisks there and carved some colossi. The obelisks are exquisitely cut in red granite, each sign being sawn in shape by copper tools fed with emery, and the whole finished with a perfection of pro- portion and delicacy not seen on other granite work. One obelisk being overthrown and broken we can examine the minute treatment of the upper part, which was nearly a hundred feet from the ground. The principal monument of this period is the temple of Deir el Bahri, the funeral temple of Hatshepsut, on which she recorded the principal event of her reign, the expedi- tion to Punt. The erasures of her name by Tethmosis III., and reinsertions of names under later kings, the military scenes, and the religious groups showing the sacred kine of Hathor, all add to the interest of the remarkable temple. It stands on three successive terraces, rising to the base of the high limestone cliffs behind it. The rock-cut shrine at Speos Artemidos, and

the temple of Serablt in Sinai are the only other large monuments of this queen yet remaining. Tethmosis III. was one of the great builders of Egypt, and much remains of his work, at about forty different sites. The great temple of Karnak was largely built by him ; most of the remaining chambers are his, including the beautiful botanical walls showing foreign plants. Of his work at Heliopolis there remain the obelisks of London and New York; and from Elephantine is the obelisk at Sion House. On the Nubian sites his work may still be seen at Amada, Ellesla, Ibrim, Semna and in Sinai at Serablt el Khadem. Of Amenophis II. and Tethmosis IV. there are no large monuments, they being mainly known by additions at Karnak. The well known stele of the sphinx was cut by the latter king, to com- memorate his dream there and his clearing of the sphinx from sand. Amenophis III. has left several large buildings of his magnificent reign. At Karnak the temple had a new front added as a great pylon, which was later used as the back of the hall of columns by Seti I. But three new temples at Karnak, that of Month (Mentu), of Mut and a smaller one, all are due to this reign, as well as the long avenue of sphinxes before the temple of Khons; these indicate that the present Ramesside temple of Khons has superseded an earlier one of this king. The great temple ef Luxor was built to record the

divine origin of the king as son of Ammon; and on the western side of Thebes the funerary temple of Amenophis was an immense pile, of which the two colossi of the Theban plain still stand before the front of the site, where yet lies a vast tablet of sand- stone 30 ft. high. The other principal buildings are the temples of Sedenga and of Solib in Nubia. Akhenaton has been so consistently eclipsed by the later kings who destroyed his work, that the painted pavement and the rock tablets of Tell el Amarna are the only monuments of his still in position, beside a few small inscriptions. Harmahib (Horemheb) resumed the work at Karnak, erecting two great pylons and a long avenue of sphinxes. The rock temple at Silsila and a shrine at Jebel Adda are also his.

In the XlXth Dynasty the great age of building continued, and the remains are less destroyed than the earlier temples, because there were subsequently fewer unscrupulous rulers to quarry them away. Seti I. greatly extended the national temple of Karnak by his immense hall of columns added in front of the pylon of Amenophis III. His funerary temple at Kurna is also in a fairly complete condition. The temple of Abydos is celebrated owing to its completeness, and the perfect condition of its sculptures, which render it one of the most interesting buildings as an artistic monument; and the variety of religious subjects adds to its importance. The very long reign and

vanity of Rameses II. have combined to leave his name at over sixty sites, more widely spread than that of any other king. Yet very few great monuments were originated by him; even the Ramesseum, his funerary temple, was begun by his father. Additions, appropriations of earlier works and scattered inscrip- tions are what mark this reign. The principal remaining build- ings are part of a court at Memphis, the second temple at Abydos, and the six Nubian temples of Bet el-Wali, Jerf Husein, Wadi es-Sebua, Derr, and the grandest of all — the rock-cut temple of Abu Simbel, with its neighbouring temple of Hathor. Mineptah has left few original works; the Osireum at Abydos is the only one of which much remains, his funerary temple having been destroyed as completely as he destroyed that of Amenophis III. The celebrated Israel stele from this temple in his principal inscription. The rock shrines at Silsila are of small importance. There is no noticeable monument of the dozen troubled years of the end of the dynasty.

The XXth Dynasty opened with the great builder Rameses III. Probably he did not really exceed other kings in his activity; but as being the last of the building kings at the western side of Thebes, his temple has never been devastated for stone by the claims of later work. The whole building of Medinet Habu is about 500 ft. long and 160 wide, entirely the work of one reign. The sculptures of it are mainly occupied with the campaigns of the king against the Libyans, the Syrians and the negroes, and are of the greatest importance for the history of Egypt and of the Mediterranean lands. Another large work was the clearance and rebuilding of much of the city of Tell el Yehudia, the palace hall of which contained the cele- brated coloured tiles with figures of captives. At Karnak three temples, to Ammon, Khonsu and Mut, all belong to this reign. The blighted reigns of the later Ramessides and the priest -kings did not leave a single great monument, and they are only known by usurpations of the work of others. The Tanite kings of the XXIst Dynasty rebuilt the temple of their capital, but did little else. The XXIInd Dynasty returned to monumental work. Sheshonk I. added a large wall at Karnak, covered with the record of his Judaean war. Osorkon (Uasarkon) I. built largely at Bubastis, and Osorkon II. added the great granite pylon there, covered with scenes of his festival; but at Thebes these kings only inscribed previous monuments. The Ethiopian (XXVth) dynasty built mainly in their capital under Mount Barkal, and Shabako and Tirhaka (Tahrak) also left chapels and a pylon at Thebes; and the latter added a great colonnade leading up to the temple of Karnak, of which one column is still standing.

Of the Saite kings there are very few large monuments. Their work

was mainly of limestone and built in the Delta, and

hence it has been entirely swept away. The square fort of brick- work at Daphnae (q.v.) was built by Psammetichus I. Of Apries (Haa-ab-ra, Hophra) an obelisk and two monolith shrines are the principal remains. Of Amasis (Aahmes) II. five great shrines are known; but the other kings of this age have only left minor works. The Persians kept up Egyptian monuments. Darius I. quarried largely, and left a series of great granite decrees along his Suez canal; he also built the great temple in the oasis of Kharga.

The XXXth Dynasty renewed the period of great temples. Nekhtharheb built the temple of Behbet, now a ruinous heap of immense blocks of granite. Beside other temples, now destroyed, he set up the great west pylon of Karnak, and the pylon at Kharga. Nekhtnebf built the Hathor temple and great pylon at Philae, and the east pylon of Karnak, beside temples elsewhere, now vanished. Religious building was continued under the Ptolemies and Romans; and though the royal impulse may not have been strong, yet the wealth of the land under good government supplied means for many places to rebuild their old shrines magnificently. In the Fayum the capital was dedicated to Queen Arsinoe, and doubtless Ptolemy rebuilt the temple, now destroyed. At Sharona are remains of a temple of Ptolemy I. Dendera is one of the most complete temples, giving a noble idea of the appearance of such work anciently. The body of the temple is of Ptolemy XIII. , and was carved as late as the XVIth (Caesarion), and the great portico was in building from Augustus to Nero. At Coptos was a screen of the temple of Ptolemy I. (now at Oxford), and a chapel still remains of Ptolemy XIII. Karnak was largely decorated; a granite cella was built under Philip Arrhidaeus, covered with elaborate carving; a great pylon was added to the temple of Khonsu by Ptolemy III.; the inner pylon of the Ammon-temple was carved by Ptolemy VI. and IX; and granite doorways were added to the temples of Month and Mut by Ptolemy II. At Luxor the entire cella was rebuilt by Alexander. At Medlnet Habu the temple of Tethmosis III. had a doorway built by Ptolemy X., and a forecourt by Antoninus. The smaller temple was built under Ptolemy X. and the emperors. South of Medlnet Habii a small temple was built by Hadrian and Antoninus. At Esna the great temple was rebuilt and inscribed during a couple of centuries from

Titus to Decius. At El Kab the temple dates from Ptolemy IX. and X. The great temple of Edfu, which has its enclosure walls and pylon complete, and is the most perfect example remaining, was gradually built during a century and a half from Ptolemy III. to XL The monuments of Philae begin with the wall of Nekht- nebf. Ptolemy II. began the great temple, and the temple of Arhesnofer (Arsenuphis) is due to Ptolemy IV., that of Asclepius to Ptolemy V., that of Hathor to Ptolemy VI., and the great colonnades belong to Ptolemy XIII. and Augustus. The beautiful little riverside temple, called the "kiosk," was built by Augustus and inscribed by Trajan; and the latest building was the arch of Diocletian.

Farther south, in Nubia, the temples of Dabod and Dakka were built by the Ethiopian Ergamenes, contemporary of Ptolemy IV.; and the temple of Dendur is of Augustus. The latest building of the temple style is the White Monastery near Suhag. The external form is that of a great temple, with windows added along the top; while internally it was a Christian church. The modern dwellings in it have now been cleared out, and the interior admirably preserved and cleaned by a native Syrian architect.

Beside the great monuments, which we have now noticed, the historical material is found on several other classes of remains. These are: (i) The royal tombs, which in the Vth, Vlth, XVIIIth, XlXth and XXth Dynasties are fully inscribed; but as the texts are always religious and not historical, they are less important than many other remains. (2) The royal coffins and wrappings, which give information by the added graffiti recording their removals; (3) Royal tablets, which are of the highest value for history, as they often describe or imply historical events; (4) Private tombs and tablets, which are in many cases

biographical. (5) Papyri concerning daily affairs which throw light on history; or which give historic detail, as the great papyrus of Rameses III., and the trials under Rameses X. (6) The added inscriptions on buildings by later restorers, and alterations of names for misappropriation. (7) The statues which give the royal portraits, and sometimes historical facts. (8) The ostraca, or rough notes of work accounts, and plans drawn on pieces of limestone or pottery. (9) The scarabs bearing kings' names, which under the Hyksos and in some other dark periods, are our main source of information. (10) The miscellaneous small remains of toilet objects, ornaments, weapons, &c, many of which bear royal names.

Every object and monument with a royal name will be found catalogued under each reign in Petrie's History of Egypt, 3 vols., the

last editions of each being the fullest. (W. M. F. P.)

F. Chronology. — 1. Technical. — The standard year of the Ancient Egyptians consisted of twelve months of thirty days 1 each, with five epagomenal days, in all 365 days. It was thus an effective compromise between the solar year and the lunar month, and contrasts very favourably with the intricate and clumsy years of other ancient systems. The leap-year of the Julian and Gregorian calendars confers the immense benefit of a fixed correspondence to the seasons which the Egyptian year did not possess, but the uniform length of the Egyptian months is enviable even now. The months were grouped under three seasons of four months each, and were known respectively as

the first, second, third and fourth month of TYfyr ® O Q-‘b-t) ” inundation ” or ” verdure,” pro) ” seed-time,” ” winter,” and

I , II , III ,1111

crzi o-

p r -t

A/VW* (7) AA/W\A w

aa/wv\

; harvest,” ” summer,” the — rr

— §■

mw (shdm)

: five (days)

over the year ” being outside these seasons and the year itself, according to the Egyptian expression, and counted either at the beginning or at the end of the year. Ultimately the Egyptians gave names to the months taken from festivals celebrated in them, in order as follows: — Thoth, Paophi, Athyr, Choiak, Tobi, Mechir, Phamenoth, Pharmuthi, Pachons, Payni, Epiphi, Mesore, the epagomenal days being then called ” the short year.” In Egypt the agricultural seasons depend more immediately on the Nile than on the solar movements; the first day of the first month of inundation, i.e. nominally the beginning of the rise of the Nile, was the beginning of the year, and as the Nile commences to rise very regularly at about the date of the

annual heliacal rising of the conspicuous dog-star Sothis (Sirius} (which itself follows extremely closely the slow retrogression of the Julian year), the primitive astronomers found in the heliacal rising of Sothis as observed at Memphis (on July 19 Julian) a very correct and useful starting-point for the seasonal year. But the year of 365 days lost one day in four years of the Sothic or Julian year, so that in 121 Egyptian years New Year's day fell a whole month too early according to the seasons, and in 1461 years a whole year was lost. This " Sothic period " or era of 1460 years, during which the Egyptian New Year's day travelled all round the Sothic year, is recorded by Greek and Roman writers at least as early as the 1st century B.C. The epagomenal days appear on a monument of the Vth Dynasty and in the very ancient Pyramid texts. They were considered unlucky, and perhaps this accounts for the curious fact that, although they are named in journals and in festival lists, &c, where precise dating was needed, no known monument or legal document is dated in them. It is, however, quite possible that by the side of the year of 365 days a shorter year of 360 was employed for some purposes. Lunar months

1 Ten-day periods as subdivisions of the month can be traced as far back as the Middle Kingdom. The day consisted of twenty- four hours, twelve of day (counted from sunrise to sunset) and twelve of night ; it began at sunrise.

were observed in the regulation of temples, and lunar years, &c, have been suspected. To find uniformity in any department in Egyptian practice would be exceptional. By the decree of Canopus, Ptolemy III.Euergetes introduced through the assembly of priests an extra day every fourth year, but this reform had no acceptation until it was reimposed by Augustus with the Julian calendar. Whether any earlier attempt was made to adjust the civil to the solar or Sothic year in order to restore the festivals to their proper places in the seasons temporarily or otherwise, is a question of great importance for chronology, but at present it remains unanswered. Probably neither the Sothic nor any other era was employed by the ancient Egyptians, who dated solely by regnal years (see below). An inscription of Rameses II. at Tanis is dated in the 400th year of the reign of the god Seth of Ombos, probably with reference to some religious ordinance during the rule of the Seth-worshipping Hyksos; Rameses II. may well

have celebrated its quater- centenary, but it is wrong to argue from this piece of evidence alone tha* an era of Seth was ever observed.

From the Middle Kingdom onward to the Roman period, the dates upon Egyptian documents are given in regnal years. On the oldest monuments the years in a reign were not numhered consecutively but were named after events; thus in the 1st Dynasty we find ” the year of smiting the Antiu-people,” in the beginning of the Illrd Dynasty ” the year of fighting and smiting the people of Lower Egypt.” But under the Ilnd Dynasty there was a census of property for taxation every two years, and the custom, ‘continuing (with some irregularities) for a long time, offered a uniform mode of marking years, whether current or past. Thus such dates are met with as ” the year of the third time of numbering ” of a particular king, the next being desig- nated as ” the year after the third time of numbering.” Under the Vth Dynasty this method was so much the rule that the words ” of numbering ” were commonly omitted. It would seem that in the course of the next dynasty the census became annual instead of biennial, so that the ” times ” agreed with the actual years of reign; thenceforward their consecutive designation as “first time,” “second time,” for “first year,” “second year,” was as simple as it well could be, and lasted unchanged to the fall of paganism. The question arises from what point these regnal dates were calculated. Successive regnal years might begin (1) on the anniversary of the king’s accession, or (2) on the calendrical beginning in each year (normally on the first day of the nominal First month of inundation, i.e. 1st Thoth in the later calendar). In the latter case there would be a further consideration: was the portion of a calendar year following the accession of the new king counted to the last year of the outgoing king, or to the first year of the new king? In Dynasties I., IV.-V., XVIII. there are instances of the first mode (1), in Dynasties II., VI. (?), XII., XXVI. and onwards they follow the second (2). It may be that the practice was not uniform in all documents even of the same age. In Ptolemaic times not only were Macedonian dates sometimes given in Greek documents, but there were certainly two native modes of dating current; down to the reign of Euergetes there was a ” fiscal ” dating in papyri, according to which the year began in Paophi, besides a civil dating probably from Thoth; later, all the dates in papyri start from Thoth.

The Macedonian year is found in early Ptolemaic documents. The fixed year of the Canopic decree under Euergetes (with 1st Thoth on Oct. 22) was never adopted. Augustus estab- lished an ” Alexandrian ” era with the fixed Julian year, retaining the Egyptian months, with a sixth epagomenal day every fourth year. The capture of Alexandria having taken place on the 1st of August 30 B.C., the era began

nominally in 30 B.C., but it was not actually introduced till some years later, from which time the 1st Thoth corresponded with the 29th of August in the Julian year. The vague ” Egyptian ” year, however, continued in use in native documents for some centuries along with the Alexandrian ” Ionian ” year. The era of Dio- cletian dates from the 29th of August 284, the year of his reforms; later, however, the Christians called it the era of the Martyrs

(though the persecution was not until 302), and it survived the Arab conquest. The dating by indictions, i.e. Roman tax- censuses, taking place every fifteenth year, probably originated in Egypt, in a.d. 312, the year of the defeat of Maxentius. The indictions began in Payni of the fixed year, when the harvest had been secured.

See F. K. Ginzel, Handbuch der mathematischen und technischen Chronologie, Bd. i. (Leipzig, 1906), and the bibliography in the following section.

2. Historical. 1 — As to absolute chronology, the assigning of a regnal year to a definite date B.C. is clear enough (except in occasional detail) from the conquest by Alexander onwards. Before that time, in spite of successive efforts to establish a chronology, the problem is very obscure. The materials for reconstructing the absolute chronology are of several kinds: (1) Regnal dates as given on contemporary monuments may indicate the lengths of individual reigns, but not with accuracy, as they seldom reach to the end of a reign and do not allow for co-regencies. Records of the time that has elapsed between two regnal dates in the reigns of different kings are very helpful; thus stelae from the Serapeum recording the ages of the Apis bulls with the dates of their birth and death have fixed the chronology of the XXVIth Dynasty. Traditional evidence for the lengths of reigns exists in the Turin Papyrus of kings and in Manetho’s history; unfortunately the papyrus is very frag- mentary and preserves few reign-lengths entire, and Manetho’s evidence seems very untrustworthy, being known only from late excerpts. (2) The duration of a period may be calculated by generations ot the probable average lengths of reigns, but such calculations are of little value, and the succession of generations even when the evidence seems to be full is particularly difficult to ascertain in Egyptian, owing to adoptions and the repetition of the same name even in one family of brothers and sisters.

(3) Synchronisms in the histories of other countries furnish reliable dates—Greek, Persian, Babylonian and Biblical dates for the XXVIth Dynasty, Assyrian for the XX Vth; less precise are the Biblical date of Rehoboam, contemporary with the invasion of Shishak (Sheshonk) in

the XXIInd Dynasty, and the date of the Babylonian and Assyrian kings contemporary with Amenhotp IV. in the XVTIIth Dynasty. The last, about 1400 B.C., is the earliest point to which such coincidences reach.

(4) Astronomical data, especially the heliacal risings of Sothis recorded by dates of their celebration in the vague year. These are easily calculated on the assumption first that the observations were correctly made, secondly that the calendrical dates are in the year of 365 days beginning on 1st Thoth, and thirdly that this year subsequently underwent no readjustment or other alteration before the reign of Euergetes. The assumption may be a reasonable one, and if the results agree with probabilities as deduced from the rest of the evidence it is wise to adopt it; if on the other hand the other evidence seems in any serious degree contrary to those results it may be surmised that the assumption is faulty in some particular. The harvest date referred to below helps to show that the first part of the assumption is justified.

The duration of the reigns in several dynasties is fairly well known from the incontrovertible evidence of contemporary monuments. The XXVIth Dynasty, which lasted 139 years, is particularly clear, and synchronisms fix. its regnal dates to the years B.C. within an error of one or two years at most. The lengths of several reigns in the Xllth, XVIIIth and XlXth Dynasties are known, and the sum total for the Xllth Dynasty is preserved better than any other in the Turin Papyrus, which was written under the XlXth Dynasty. The succession and number of the kings are also ascertained for other dynasties, together with many regnal dates, but very serious gaps exist in the records of the Egyptian monuments, the worst being between the Xllth and the XVIIIth Dynasties, between the Xlth and the Vlth, and at Dynasties I. - III. For the chronology before the time of the XXVIth Dynasty Herodotus's history

1 For the "sequence" dating (S.D.) used by archaeologists for the prehistoric period see above (§ Art and Archaeology, ad init. note).

is quite worthless. Manetho alone of all authorities offers a complete chronology from the 1st Dynasty to the XXXth. In the case of the six

kings of the XXVIth Dynasty, Africanus, the best of his excerptors, gives correct figures for five reigns, but attributes six instead of sixteen years to Necho; the other excerptors have wrong numbers throughout. For the XlXth

Meyer 1887

Petrie

Meyer

Sethe

Breasted

Petrie

Dynasty.

(minimum date).

1894, &c.

1 904- 1 908.

1905.

1906.

1906.

I.

)

4777

3315

3360

3400

5510

II.

[3i8o

4514

31 10

5247

III.

)

4212

2895

2810

2980

4945

IV.

2830

3998

2840

2720

2900

4731

V.

3721

2680

2630

2750

. 4454

VJ.

2530

3503

2540

2480

2625

4206

VII.

3322

2300

2475

4003

VIII.

3252

3933

IX.

3106

2360

2445

3787

X.

3006

3687

XI.

2821

2160

2100

2160

3502

XII.

2130

2778

2OO0

2000

2000

3459

XIII.

1930

2565

1791

1788

3246

XIV.

2112

2793

XV.

1780

1680 »

2533

XVI.

1928

2249

XVII.

1738

1731

XVIII.

1530

1587

1580

1580

1580

XIX.

1320

1327

132 1

1350

1322

Dynasty Manetho's figures are wrong wherever we can check them; the names, too, are seriously faulty. In the XVIIIth Dynasty he has too many names and few are clearly identifiable, while the numbers are incomprehensible. In the Xllth Dynasty the number of the kings is correct and many of the names can be justified, but the reign-lengths are nearly, if not quite, all wrong. The summations of years for the Dynasties XII. and XVIII. are likewise wrong. It seems, therefore, that the known texts of Manetho, serviceable as they have been in the recon- struction of Egyptian history, cannot be employed as a serious guide to the early chronology, since they are faulty wherever we can check them, even in the XXVIth Dynasty whose kings were so celebrated among the Greeks. There remain the astronomical data. Of these, the Sothic date furnished by a calendar in the Ebers Papyrus of the gth year of Amenophis I. (when interpreted on the assump- tion stated above) , and another at Elephantine of an uncertain year of Tethmosis III., tally well with each other (1 550-1 546, 1474-1470 B.C.) and with the Babylonian synchronism (not yet accurately determined) under Amenhotp IV. (Akhenaton). Another Sothic date of the 7th year of Senwosri III. on a Berlin papyrus from Kahun, similarly interpreted (1882-1878 B.C.), gives for the Xllth Dynasty a range from 2000 to 1788 B.C. This (discovered by L. Borchardt in 1899) seems to offer a welcome ray, piercing the obscurity of early Egyptian chronology; guided by it the historian Ed. Meyer, and K. Sethe have framed systems of chronology in close agreement with each other, reaching back to the 1st Dynasty at about 3400 B.C. To Meyer is further due a calculation that the Egyptian calendar was introduced in 4241-4238 B.C. 2 Their results in general have been adopted by the " Berlin school," including Erman, Steindorff (in Baedeker's Egypt) and Breasted in America. Never- theless many Egyptologists are unwill- ing to accept the new chronology, the chief obstacle being that it allows

so short an interval for the six dynasties between the Xllth and the XVIIIth. If the Xllth Dynasty ended about 1790 B.C. and the XVIIIth

1 Meyer makes XIII. overlap XV. (Hyksos), and XIV. (Xoite), contemporary vAth XVI. (Hyksos) and XVII. (Theban).

2 Reisner (Early Dynastic Cemeteries, p. 126), from his work in the prehistoric cemeteries, believes that Egypt was too uncivilized at that early date to have performed this scientific feat.

began about 1570 B.C., taking what seems to be the utmost interval that it permits, 220 years have to contain a crowd of kings of whom nearly 100 are already known by name from monuments and papyri, while fresh names are being added annually to the long list; the shattered fragments of the last columns in the Turin Papyrus show space for 150 or perhaps 180 kings of this period, apparently without reaching the XVIIth Dynasty. An estimate of 160 to 200 kings would there- fore not be excessive. The dates that have come down to us are very few; the only ones known from the Hyksos period are of a 1 2th and a 33rd year. In the Turin Papyrus two reign-lengths of less than a year, seven others of less than five years each, one of ten years and one of thirteen seem attributable to the XIHth and XlVth Dynasties. Prob- ably most of the reigns were short, as Manetho also decidedly indicates. It is possible that the compiler of the Turin Papyrus, who excluded contemporary reigns in the period between the Vlth and the Xllth Dynasties, here admitted such; nor is a correspondingly large number of kings in so short a period without analogies in history. Professor Petrie, however, thinks it best, while accepting the evidence of the Sirius date, to suppose further that a whole Sothic period of 1460 years had passed in the interval, making a total of 1650 years for the six dynasties in place of 220 years. This, however, seems greatly in excess of probability, and several Egyptologists familiar with excavation are willing to accept Meyer's figures on archaeological grounds. To the present writer it seems that Meyer's chronology provides a convenient working theory, but involves such an improbability in regard to the interval between the Xllth and the XVIIIth Dynasties that the interpretation of the Sothic date on which it is founded must be viewed with suspicion until clear facts are found to corroborate it. Corroboration has been sought by Mahler, Sethe and Petrie in the dates of new moons, of warlike and other expeditions, and of high Nile, but their evidence so far is too vague and uncertain to affect the question seriously. It is remarkable that no records of eclipses are known from Egyptian documents. The interesting date of the harvest at El Bersha, quoted by Meyer in Breasted, Records, i. p. 48, confirms the Sothic date for the Xllth Dynasty in some measure,

but it belongs to the same age, and therefore its evidence would be equally vitiated with the other by any subsequent alteration in the Egyptian calendar. Before the discovery of the Kahun Sothic date, Professor Petrie

Dynasty.

Wiedemann

Meyer

Petrie

Breasted

Maspero

1884.

1884.

1905- 1906.

1906.

1904.

XIX.

1490

1320

(1328), 1322

1350

XX.

1280

1180

1202

1200

XXI.

1 100

1060

1 102

1090

XXII.

975

930

952

945

XXIII.

810

755

745

XXIV.

720

721

718

XXV.

715

728

715

712

XXVI.

664

663

664

663

XXVII.

525

525

525

.525

425

XXVIII.

415

405

c. 405

XXIX.

408

399

399

XXX.

387

378

380

Ochus

35o

342

put the end of the Xllth Dynasty at 2565 B.C.; in 1884 even Meyer had suggested 1930 B.C. as its minimum date, thus allowing 400 years at the least for the period from the XIHth Dynasty to the XVIIth.

Beyond the Xllth Dynasty estimates must again be vague The spacing of the years on the Palermo stone has given rise to some calculations for the early dynasties. Others are grounded on the dates of certain operations which are likely to have

taken place at particular seasons of the year so that they can be roughly calculated on the Sothic basis, others on Manetho's figures, average lengths of reigns, evidence of the Turin Papyrus,

&c.

Table I. page 79 shows the chronology of the first nineteen dynasties, according to recent authorities, before and after the discovery of the Kahun Sothic date.

The dates of the earlier dynasties in this table are always intended to be only approximate; for instance, Meyer in 1904 allowed an error of 100 years either of excess or deficiency in the dates he assigned to the dynasties from the Xth upwards.

The other dynasties are dated as in Table II. by different authorities.

See Ed. Meyer, Geschichte des Altertums, Bd. i. (Stuttgart, V Geschichte des alten Agyptens (1887), Agyptische Chronologie {Abhandl. of Prussian Academy) (Berlin, 1904, with the supplement Nachtrdge zur agypt. Chronologie, ib. 1907); K. Sethe, " Beitrage zur altesten Geschichte Agyptens " (in his Untersuchungen, Bd. iii.) (Leipzig, 1905); J. H. Breasted, Ancient Records of Egypt, " Historical Documents," vol. i. (Chicago, 1906); W. M. F. Petrie, A History of Egypt, vol. i. (London, 1884), vol. iii. (1905), Researches in Sinai (London, 1906) ; G. Maspero, Histoire ancienne des peuples de V orient (Paris, 1904) ; A. Wiedemann, Agyptische Geschichte (Gotha, 1884); articles by Mahler and others in the Zeitschrift fur agyptische Sprache and Orientalistische Literaturzeitung (recent years). (F- Ll –

G.)

III. History

1. From the Earliest Times to the Moslem Conquest.

In the absence of a strict chronology, the epochs of Pharaonic history are conveniently reckoned in dynasties according to Manetho's scheme, and these dynasties are grouped into longer periods:— the Old Kingdom (Dynasties I. to VIII.), including the Earliest Dynasties (I. to III.) and the Pyramid Period (Dynasties IV. to VI.); the Middle Kingdom (Dynasties IX. to XVII.), including the Heracleopolite Dynasties (IX. to X.) and the Hyksos Period (Dynasties XV. to XVII.); the New Empire (Dynasties XVIII. to XX.) ; the Deltaic Dynasties (Dynasties XXI. to XXXI.), including the Saite and Persian Periods (Dynasties XXVI. to XXXI.). The conquest by Alexander ushers in the Hellenistic age, comprising the periods of Ptolemaic and Roman rule.

The Prehistoric Age. — One of the most striking features of recent Egyptology is the way in which the earliest ages of the civilization, before the conventional Egyptian style was formed, have been illustrated by the results of excavation. Until 1895 there seemed little hope of reaching the records of those remote times, although it was plain that the civilization had developed in the Nile valley for many centuries before the IVth Dynasty, beyond which the earliest known monuments scarcely reached. Since that year, however, there has been a steady flow of dis- coveries in prehistoric and early historic cemeteries, and, partly in consequence of this, monuments already known, such as the annals of the Palermo stone, have been made articulate for the beginnings of history in Egypt.

It is probable that certain rudely chipped flints, so-called eoliths, in the alluvial gravels (formed generally at the mouth of wadis opening on to the Nile) at Thebes and elsewhere, are the work of primitive man; but it has been shown that such are produced also by natural forces in the rush of torrents. On the surface of the desert, at the borders of the valley, palaeo- lithic implements of well-defined form are not uncommon, and bear the marks of a remote antiquity. In some cases they appear to lie where they were chipped on the sites of flint factories. Geologists and anthropologists are not yet agreed on the question whether the climate and condition of the country have under- gone large changes since these implements were deposited. As yet none have been found in such association with animal remains as would help in deciding their age, nor have any implements been discovered in rock-shelters or in caves.

Of neolithic remains, arrowheads and other implements are found in some numbers in the deserts. In the Fayum region, about the borders of the ancient Lake of Moeris and beyond, they

are particularly abundant and interesting in their forms. But their age is uncertain; some may be contemporary with the advanced culture of the XHth Dynasty in the Nile valley. Definite history on the other hand has been gained from the wonderful series of ” prehistoric ” cemeteries excavated by J. de Morgan, Petrie, Reisner and others on the desert edgings of the cultivated alluvium. The succession of archaeological types revealed in them has been tabulated by Petrie in his Diospolis Parva; and the detailed publication of Reisner’s unusually careful researches is bringing much new light on the questions involved, amongst other things showing the exact point at which the ” prehistoric ” series merges into the 1st Dynasty, for, as might be surmised, in many cases the prehistoric cemeteries continued in use under the earliest dynasties. The finest pottery, often painted but all hand-made without the wheel, belongs to the prehistoric period; so also do the finest flint implements, which, in the delicacy and exactitude of their form and flaking, surpass all that is known from other countries. Metal seems to be entirely absent from the earliest type of graves, but immediately thereafter copper begins to appear (bronze is hardly to be found before the XHth Dynasty) . The paintings on the vases show boats driven by oars and sails rudely figured, and the boats bear emblematic standards or ensigns. The cemeteries are found throughout Upper and Middle Egypt, but as yet have not been met with in the Delta or on its borders. This might be accounted for by the inhabitants of Lower Egypt having practised a different mode of dis- posing of the dead, or by their cemeteries being differently placed.

Tradition, mythology and later customs make it possible to recover a scrap of the political history of that far-off time. Menes, the founder of the 1st Dynasty, united the two kingdoms of Upper and Lower Egypt. In the prehistoric period, therefore, these two realms were separate. The capital of Upper Egypt was Nekheb, now represented by the ruins of El Kab, with the royal residence across the river at Nekhen (Hieraconpolis) ; that of Lower Egypt was at Buto (Puto or Dep) in the marshes, with the royal residence in the quarter called Pe. Nekhebi, goddess of El Kab, represented the Upper or’ Southern Kingdom, which was also under the tutelage of the god Seth, the goddess Buto and the god Horus similarly presiding over the Lower Kingdom. The royal god in the palace of each was a hawk or Horus. The spirits of the deceased kings were honoured respectively as the jackal-headed spirits of Nekhen and the hawk-headed spirits of Pe. As we hear also of the ”

spirits of On ” it is probable that Heliopolis was at one time capital of a kingdom. In after days the prehistoric kings were known as ” Worshippers of Horus ” and in Manetho’s list they are the veuves ” Dead,” and r/pwes ” Heroes,” being looked upon as intermediate between the divine dynasties and those of human kings. It is impossible to esti mate the duration of the period represented by the pre- historic cemeteries; that the two kingdoms existed throughout unchanged is hardly probable.

According to the somatologist Elliott Smith, the most im- portant change in the physical character of the people of Upper Egypt, in the entire range of Egyptian archaeology, took place at the beginning of the dynastic period; and he accounts for this by the mingling of the Lower with the Upper Egyptian popula- tion, consequent on the uniting of the two countries under one rule. From remains of the age of the IVth Dynasty he is able to define to some extent the type of the population of Lower Egypt as having a better cranial and muscular development than that of Upper Egypt, probably through immigration from Syria. The advent of the dynasties, however, produced a quickening rather than a dislocation in the development of civilization.

It is doubtful whether we possess any writing of the prehistoric age. A few names of the kings of Lower Egypt are preserved in the first line of the Palermo stone, but no annals are attached to them. Petrie considers that one of the kings buried at Abydos, provisionally called Nar-mer and whose real name may be Mer or Beza, preceded Menes; of him there are several inscribed records, notably a magnificent carved and inscribed

slate palette found at Hieraconpolis, with figures of the king and his vizier, war-standards and prisoners. To identify him with Bezau (Boethos) of the Ilnd Dynasty runs counter to much archaeological evidence. Sethe places him next after Menes and some would identify him with that king. Another inscribed palette may be pre-dynastic; it perhaps mentions a king named ” Scorpion.”

The Old Kingdom. — The names of a number of kings attribut- able to the 1st Dynasty are known from their tombs at Abydos. Unfortunately,

they are almost exclusively Horus

earliest titles V\ |j|i|i|i| , in place of the personal names by

which they were recorded in the lists of Abydos and Manetho; some, however, of the latter are found, and prove that the scribes of the New Kingdom were unable to read them correctly. Important changes and improvements took place in the writing even during the 1st Dynasty. The personal name of Menes p”’”’”! is given by one only of many relics of a king whose Horus-name was Aha, ” the Fighter.” Doubts have been expressed about the identification with Menes, but it is strongly corroborated by the very archaic style of the remains. The name of Aha (Menes) was found in two tombs, one at Nagada north of Thebes and nearly opposite the road to the Red Sea, the other at Abydos. Manetho makes the 1st Dynasty Thinite, this being the capital of the nome in which Abydos lay. Upper Egypt always had precedence over Lower Egypt, and it seems clear that Menes came from the former and conquered the latter. According to tradition he founded Memphis which lay on the frontier of his conquest; probably he resided there as well as at Abydos; at any rate relics of one of the later kings of the 1st Dynasty have already been recognized in its vast necropolis. Of the eight kings of the 1st Dynasty, three — the fifth, sixth and seventh in the Ramesside list of Abydos — are positively identified by tomb-remains from Abydos, and others are scarcely less certain. Two of the kings have also left tablets at the copper and turquoise mines of Wadi Maghara in Sinai. The royal tombs are built of brick, but one of them, that of Usaphais, had its floor of granite from Elephantine. They must have been filled with magnificent furniture and provisions of every kind, including annual record-tablets of the reigns, carved in ivory and ebony. From a fragment on the Palermo stone it is clear that material-existed as late as the Vth Dynasty for a brief note of the height of the Nile and other particulars in each year of the reign of these kings.

The Ilnd Dynasty of Manetho appears to have been separated from the 1st even on the Palermo stone; it also was Thinite, and the tombs of several of its nine (?) kings were found at Abydos. The Illrd Dynasty is given as Memphite by Manetho. Two of the kings built huge mastaba-tombs at Bet Khallaf near Abydos, but the architect and learned scribe Imhotp designed for one of these two kings, named Zoser, a second and mightier monument at Memphis, the great step-pyramid of Sakkara. In Ptolemaic times Imhotp was deified, and the traditional import- ance of Zoser is shown by a forged grant of the Dodecaschoenus to the cataract god Khnum, purporting to be from his reign, but in reality dating from the Ptolemaic age. With Snefru, at the end of this dynasty, we reach the beginning of Egyptian history as it

was known before the recent discoveries. Monuments and written records are henceforth more numerous and important, and the Palermo annals show a fuller scale of record. The events in the three years that are preserved include a successful raid upon the negroes, and the construction of ships and gates of cedar-wood which must have been brought from the forests of the Lebanon. Snefru also set up a tablet at Wadi Maghara in Sinai. He built two pyramids, one of them at Medum in steps, the other, probably in the perfected form, at Dahshur, both lying between Memphis and the Fayum.

Pyramids did not cease to be built in Egypt till the New Kingdom; but from the end of the Illrd to the Vlth Dynasty is pre-eminently the time when the royal pyramid in stone was the chief monument left by each successive king. Zoser and Snefru have been already noticed. The personal name enclosed

in a cartouche CH is henceforth the commonest title of the king. We now reach the IVth Dynasty containing the famous nanies of Cheops (q.v.), Chephren (Khafre) and Mycer- inus (Menkeure), builders respectively of the Great,

The pyramid

the Second and the Third Pyramids of Giza. In the period. best art of this time there was a grandeur which was never again attained. Perhaps the noblest example of Egyptian sculpture in the round is a diorite statue of Chephren, one of several found by Mariette in the so-called Temple of the Sphinx. This ” temple ” proves to be a monumental gate at the lower end of the great causeway leading to the plateau on which the pyramids were built. A king Dedefrg, between Cheops and Chephren, built a pyramid at Abu-Roash. Shepseskaf is one of the last in the dynasty. Tablets of most of these kings have been found at the mines of Wadi Maghara. In the neighbourhood of the pyramids there are numerous mastabas of the court officials with fine sculpture in the chapels, and a few decorated tombs from the end of this centralized dynasty of absolute monarchs are known in Upper Egypt. A tablet which describes Cheops as the builder of various shrines about the Great Sphinx has been shown to be a priestly forgery, but the Sphinx itself may have been carved out of the rock under the splendid rule of the IVth Dynasty.

The Vth Dynasty is said to be of Elephantine, but this must be a mistake. Its kings worshipped Re, the sun, rather than

Horus, as their ancestor, and the title

1 son of the Sun :

began to be written by them before the cartouche containing the personal name, while another ” solar ” cartouche, containing

a name compounded with Re, followed the title 4?Ss ” king

of Upper and Lower Egypt.” Sahure’ and the other kings of the dynasty built magnificent temples with obelisks dedicated to Re, one of which, that of Neuserre at Abuslr, has been thoroughly explored. The marvellous tales of the Westcar Papyrus, dating from the Middle Kingdom, narrate how three of the kings were born of a priestess of Re. The pyramids of several of the kings are known. The early ones are at Abuslr, and the best preserved of the pyramid temples, that of Sahure, excavated by the German Orient-Gesellschaft, in its architecture and sculptured scenes has revealed an astonishingly complete development of art and architecture as well as of warlike enterprise by sea and land at this remote period; the latest pyramid belonging to the Vth Dynasty, that of Unas at Sakkara, is inscribed with long ritual and magical texts. Exquisitely sculptured tombs of this time are very numerous at Memphis and are found throughout Upper Egypt. Of work in the traditional temples of the country no trace remains, probably because, being in limestone, it has all perished. The annals of the Palermo stone were engraved and added to during this dynasty; the chief events recorded for the time are gifts and endowments for the temples. Evidently priestly influence was strong at the court. Expeditions to Sinai and Puoni (Punt) are commemorated on tablets.

The Vlth Dynasty if not more vigorous was more articulate; inscribed tombs are spread throughout the country. The most active of its kings was the third, named Pepi or Phiops, from whose pyramid at Sakkara the capital, hjtherto known as ” White Walls,” derived its later name of Memphis (mn-nfr, Mempi); a tombstone from Abydos celebrates the activity of a certain Una during the reigns of Pepi and his successor in organiz- ing expeditions to the Sinai peninsula and south Palestine, and in transporting granite from Elephantine and other quarries. Herkhuf, prince of Elephantine and an enterprising leader of caravans to the south countries both in Nubia and the Libyan oases, flourished under Merenre and Pepi II. called Neferkere. On one occasion he brought home a dwarf dancer from the Sudan, described as being like one brought from Puoni in the time of the fifth-dynasty king Assa; this drew from the youthful Pepi II. an enthusiastic letter which was engraved in full upon the facade of Herkhuf’s tomb. The reign of the last-named king, begun early, lasted over ninety years, a fact so long

remembered that even Manetho attributes to him ninety-four years; its length probably caused the ruin of the dynasty. The local princelings and monarohs had been growing in culture, wealth and power, and after Pepi II. an ominous gap in the monuments, pointing to civil war, marks the end of the Old Kingdom. The Vllth and VHIth Dynasties are said to have been Memphite, but of them no record survives beyond some names of kings in the lists.

The Middle Kingdom. — The long Memphite rule was broken by the IXth and Xth Dynasties, of Heracleopolis Magna (Hnes)

in Middle Egypt. Kheti or Achthoes was apparently Heracleo- a f avour £te name with the kings, but they are very period. obscure. They may have spread their rule by conquest

over Upper Egypt and then overthrown the Memphite dynasty. The chief monuments of the period are certain inscribed tombs at Assiiit; it appears that one of the kings, whose praenomen was Mikere, supported by a fleet and army from Upper Egypt, and especially by the prince of Assiut, was restored to his paternal city of Heracleopolis, from which he had probably been driven out; his pyramid, however, was built in the old royal necropolis at Memphis. Later the princes of Thebes asserted their independence and founded the Xlth Dynasty, which pushed its frontiers northwards until finally it occupied the whole country. Its kings were named Menthotp, from Mont, one of the gods of Thebes; others, perhaps sub-kings, were named Enyotf (Antef). They were buried at Thebes, whence the coffins of several were obtained by the early collectors of the 10th century. Nibhotp Menthotp I. probably established his rule over all Egypt. The funerary temple of Nebhepre Menthotp III., the last but one of these kings, has been excavated by the Egypt Exploration Fund at Deir el Bahri, and must have been a magnificent monument. His successor Sankhkere Menthotp IV. is known to have sent an expedition by the Red Sea to Puoni. ‘

The XHth Dynasty is the central point of the Middle King- dom, to which the decline of the Memphite and the rise of the Heracleopolite – dynasty mark the transition, while the growth of Thebes under the Xlth Dynasty is its true starting-point. Monuments of the XHth

Dynasty are abundant and often of splendid design and workmanship, whereas previously there had been little produced since the Vlth Dynasty that was not half barbarous. Although not much of the history of the XHth Dynasty is ascertained, the Turin Papyrus and many dated inscriptions fix the succession and length of reign of the eight kings very accurately. The troubled times that the kingdom had passed through taught the long-lived monarchs the pre- caution of associating a competent successor on the throne. The nomarchs and the other feudal chiefs were inclined to strengthen themselves at the expense of their neighbours; a firm hand was required to hold them in check and distribute the honours as they were earned by faithful service.. The tombs of the most favoured and wealthy princes are magnificent, par- ticularly those of certain families in Middle Egypt at Beni Hasan, El Bersha, Assiut and Deir Rlfa, and it is probable that each had a court and organization within his nome like that of the royal palace in miniature. Eventually, in the reigns of Senwosri III. and Amenemhe III., the succession of strong kings appears to have centralized all authority very completely. The names in the dynasty are Amenemhe (Ammenemes) and Senwosri (formerly read Usertesen or Senusert). The latter seems to be the origin of the Sesostris (q.v.) and Sesoosis of the legends. Amenemhe I., the first king, whose connexion with the previous dynasty is not known, reigned for thirty years, ten of them being in partnership with his son Senwosri I. He had to fight for his throne and then reorganize the country, removing his capital or residence from Thebes to a central situation near Lisht about 25 m. south of Memphis. His monuments are widespread in Egypt, the quarries and mines in the desert as far as Sinai bear witness to his great activity, and we know of an expedition which he made against the Nubians. The ” Instructions of Amenemhe to his son Senwosri,” whether really his own or a later composi- tion, refer to these things, to his care for his subjects, and to the

ingratitude with which he was rewarded, an attempt on his life having been made by the trusted servants in his own palace. The story of Sinuhi is the true or realistic history of a soldier who. having overheard the secret intelligence of Amenemhe’s death, fled in fear to Palestine or Syria and there became rich in the favour of the prince of the land; growing old, however, he successfully sued for pardon from Senwosri and permission to return and die in Egypt.

Senwosri I. was already the executive partner in the time of the co-regency, warring with the Libyans and probably in the Sudan. After Amenemhe’s death he fully upheld the greatness of the dynasty in his long reign of forty-five years. The obelisk of Heliopolis is amongst his best-known monuments, and the damming of the Lake of Moeris (q.v.)

must have been in progress in his reign. He built a temple far up the Nile at Wadi Haifa and there set up a stela commemorating his victories over the tribes of Nubia. The fine tombs of Ameni at Beni Hasan and of Hepzefa at Assiut belong to his reign. The pyramids of both father and son are at Lisht.

Amenemhe II. was buried at Dahshur; he was followed by Senwosri II., whose pyramid is at Illahun at the mouth of the, Fayum. In his reign were executed the fine paintings in the tomb of Khnemhotp at Beni Hasan, which include a remarkable scene of Semitic Bedouins bringing eye-paint to Egypt from the eastern deserts. In Manetho he is identified with Sesostris (see, above), but Senwosri I., and still more Senwosri III., have a better claim to this distinction. The latter warred in Palestine and in Nubia, and marked the south frontier of his kingdom by a statue and stelae at Semna beyond the Second Cataract. Near his pyramid was discovered the splendid jewelry of some princesses of his family (see Jewelry ad init.). The tomb of. Thethotp at El Bersha, celebrated for the scene of the transport of a colossus amongst its paintings, was finished in this reign.

Amenemhe III. completed the work of Lake Moeris and began a series of observations of the height of the inundation at Semna which was continued by his successors. In his long reign of forty-six years he built a pyramid at Dahshur, and at Hawara near the Lake of Moeris another pyramid together with the Labyrinth which seems to have been an enormous funerary temple attached to the pyramid. His name was remembered in the Fayum during the Graeco-Roman period and his effigy worshipped there as Pera-marres, i.e. Pharaoh Marres (Marres being his praenomen graecized). Amenemhe IV.'s reign was short, and the dynasty ended with a queen Sebeknefru (Scemiophris), whose name is found in the scanty remains of the Labyrinth. The XHth Dynasty numbered eight rulers and lasted for 213 years. Great as it was, it created no empire outside the Nile valley, and its most imposing monument, which according to the testimony of the ancients rivalled the pyramids, is now represented by a vast stratum of chips.

The history of the following period down to the rise of the New Empire is very obscure. Manetho gives us the XIHth (Dios- polite) Dynasty, the XlVth (Xoite from Xois in Lower Egypt), the XVth and XVIth (Hyksos) and the XVIIth (Diospolite), but his names are lost except for the Hyksos kings. The Abydos tablet ignores all between the XHth and XVIIIth Dynasties. The Turin Papyrus preserves many names on its shattered fragments, and the monuments are for ever adding to the list, but it is difficult to assign them accurately to their places. The Hyksos names can in some cases be recognized by their foreign aspect,

the peculiar style of the scarabs on which they are en- graved or by resemblances to those recorded in Manetho. The kings of the XVIIth Dynasty too are generally recognizable by the form of their name and other circumstances. Manetho indicates marvellous crowding for the XIHth and XlVth Dynasties, but it seems better to suggest a total duration of joo or 400 years for the whole period than to adopt Meyer's estimate of about 210 years (see above, Chronology).

Amongst the kings of the XIHth Dynasty (including perhaps the XlVth), not a few are represented by granite statues of colossal size and fine workmanship, especially at Thebes and Tarn's, some by architectural fragments, some by graffiti on the

rocks about the First Cataract. Some few certainly reigned over all Egypt. Sebkhotp (Sekhotp, Soxwrˆs) is a favourite name, no doubt to be connected with the god of the Fayum. Several of the Theban kings named Antef (Enyotf) must be placed here rather than in the Xlth Dynasty. A decree of one of them degrading a monarch who had sided with his enemies was found at Coptos engraved on a doorway of Senwosri I.

In its divided state Egypt would fall an easy prey to the foreigner. Manetho says that the Hyksos (q.v.) gained Egypt

without a blow. Their domination must have lasted Tf"*. a considerable time, the Rhind mathematical papyrus

period. having been copied in the thirty-third year of a king

Apophis. The monuments and scarabs of the Hyksos kings are found throughout Upper and Lower Egypt; those of Khian somehow spread as far as Crete and Bagdad. The Hyksos, in whom Josephus recognized the children of Israel, worshipped their own Syrian deity, identifying him with the Egyptian god Seth, and endeavoured to establish his cult throughout Egypt to the detriment of the native gods. It is to be hoped that definite light may one day be forthcoming on the whole of this critical episode which had such a profound effect on the character and history of the Egyptian people. The spirited overthrow of the Hyksos ushered in the glories in arms and arts which marked the New Empire. The XVIIth Dynasty probably began the struggle, at first as semi-

independent kinglets at Thebes. Seqenenre is here a leading name; the mummy of the third Seqenenre, the earliest in the great find of royal mummies at Deir el Bahri, shows the head frightfully hacked and split, perhaps in a battle with the Hyksos.

The New Empire. — The epithet ” new ” is generally attached to this period, and ” empire ” instead of ” kingdom ” marks its

wider power. The glorious XVIIIth Dynasty seems Dynasty. to nave been closely related to the XVIIth. Its first

task was to crush the Hyksos power in the north-east of the Delta; this was fully accomplished by its founder Ahmosi (dialectieally Ahmasi, Amosis or Amasis I.) capturing their great stronghold of Avaris. Amasis next attacked them in S.W. Palestine, where he captured Sharuhen after a siege of three years. He fought also in Syria and in Nubia, besides overcoming factious opposition in his own land. The principal source for the history of this time is the biographical inscription at El Kab of a namesake of the king, Ahmosi son of Abana, a sailor and warrior whose exploits extend to the reign of Tethmosis I. Amenophis I. (Amenhotp), succeeding Amasis, fought in Libya and Ethiopia. Tethmosis I. (c. 1 540 B.C.) was perhaps of another family, but obtained his title to the throne through his wife Ahmosi. After some thirty years of settled rule uninterrupted by revolt, Egypt was now strong and rich enough to indulge to the full its new taste for war and lust of conquest. It had become essentially a military state. The whole of the adminis- tration was in the hands of the king with his vizier and other court officials; no trace of the feudalism of the Middle King- dom survived. Tethmosis thoroughly subdued Cush, which had already been placed under the government of a viceroy. This province of Cush extended from Napata just below the Fourth Cataract on the south to El Kab in the north, so that it included the first three nomes of Upper Egypt, which agriculturally were not greatly superior to Nubia. Turning next to Syria, Tethmosis carried his arms as far as the Euphrates. It is possible that his predecessor had also reached this point, but no record survives to prove it. These successful campaigns were probably not very costly, and prisoners, plunder and tribute poured in from them to enrich Egypt. Tethmosis I. made the first of those great additions to the temple of the Theban Ammon at Karnak by which the Pharaohs of the Empire rendered it by far the greatest of the existing temples in the world. The temple of Deir el Bahri also was designed by him. Towards the end of his reign,

his elder sons being dead, Tethmosis associated Hatlhep- Hatshepsut, his daughter by Ahmosi, with himself sat. upon the throne. Tethmosis

I. was the first of the

long line of kings to be buried in the Valley of the Tombs of the Kings of Thebes. At his death another son Teth-

mosis II. succeeded as the husband of his half-sister, but reigned only two or three years, during which he warred in Nubia and placed Tethmosis III. , his son by a concubine Esi, upon the throne beside him ic. 1 500 B.C.) . After her husband's death the ambitious Hatshepsut assumed the full regal power; upon her monuments she wears the masculine garb and aspect of a king though the feminine gender is retained for her in the inscriptions. On some monuments of this period her name appears alone, on others in conjunction with that of Tethmosis III., while the latter again may appear without the queen's; but this extraordinary woman must have had a great influence over her stepson and was the acknowledged ruler of Egypt. Tethmosis, to judge by the evidence of his mummy and the chronology of his reign, was already a grown man, yet no sign of the immense powers which he displayed later has come down to us from the joint reign. Hatshepsut cultivated the arts of peace. She restored the worship in those temples of Upper and Lower Egypt which had not yet recovered from the religious oppression and neglect of the Hyksos. She completed and decorated the temple of Deir el Bahri, embellishing its walls with scenes calculated to establish her claims, representing her divine origin arid upbringing under the protection of Ammon, and her association on the throne by her human father. The famous sculptures of the great expedition by water to Puoni, the land of incense on the Somali coast, are also here, with many others. At Karnak Hatshepsut laboured chiefly to complete the works projected in the reigns of Tethmosis I. and II., and set up two obelisks in front of the entrance as it then was. One of these, still standing, is the most brilliant ornament of that wonderful temple. A date of the twenty-second year of her reign has been found at Sinai, no doubt counted from the beginning of the co-regency with Tethmosis I. Not much later, in his twenty-second year, Tethmosis III. is reigning alone in full vigour. While she lived, the personality of the queen secured the devotion of her servants and held all ambitions in check. Not long after her death there was a violent reaction. Prejudice against the rule of a woman, particularly one who had made her name and figure so conspicuous, was probably the cause of this outbreak, and perhaps sought justifica- tion in the fact that, however complete was her right, she had in some degree usurped a place to which her stepson (who was also her nephew) had been appointed. Her cartouches began to be defaced or her monuments hidden up by other buildings, and the same rage pursued some of her most faithful servants in their tombs. But the beauty of

the work seems to have restrained the hand of the destroyer. Then came the religious fanaticism of Akhenaton, mutilating all figures of Ammon and all inscriptions containing his name; this made havoc of the exquisite monuments of Hatshepsut; and the restorers of the XlXth Dynasty, refusing to recognize the legitimacy of the queen, had no scruples in replacing her names by those of the associate kings Tethmosis I., II. or III. These acts of vandalism took place throughout Egypt, but in the distant mines of Sinai the cartouches of Hatshepsut are untouched. In the royal lists of Seti I. and Rameses II. Hatshepsut has no place, nor is her reign referred to on any later monument. 1

The immense energy of Tethmosis III. now found its outlet in war. Syria had revolted, perhaps on Hatshepsut's death, but by his twenty-second year the monarch was ready to lead his army against the rebels. The revolt , headed rethmosls by the city of Kadesh on the Orontes, embraced the ///. whole of western Syria. The movements of Tethmosis in this first campaign, including a battle with the Syrian chariots and infantry at Megiddo and the capture of that city, were chronicled from day to day, and an extract from this chronicle is engraved on the walls of the sanctuary of Karnak, together with a brief record of the subsequent expeditions. In a series

1 The history of Hatshepsut has been very obscure, and the mutilations of her cartouches have been variously accounted for. Recent discoveries by M. Legrain at Karnak and Prof. Petrie at Sinai have limited the field of conjecture. The writer has followed M. Naville's guidance in his biography of the queen (in T. M. Davis, The Tomb of HatshopsM, London, 1906, pp. 1 et seq.)> made with very full knowledge of the complicated data.

of five carefully planned campaigns he consolidated his conquests in southern Syria and secured the ports of Phoenicia (q.v.). Kadesh fell in the sixth campaign. In the next year Tethmosis revisited the Phoenician ports, chastised the rebellious and received the tribute of Syria, all the while preparing for further advance, which did not take place until another year had gone by. Then, in the thirty-third year of his reign, he marched through Kadesh, fought his way to Carchemish, defeated the forces that opposed him there and crossed over the Euphrates into the territory of the king of Mitanni. He set up a tablet

by the side of that of Tethmosis I. and turned southward, following the river as far as Niy. Here he stayed to hunt a herd of 120 elephants, and then, marching westwards, received the tribute of Naharina and gifts from the Hittites in Asia Minor and from the king of Babylon. In all he fought seventeen campaigns in Syria until the spirit of revolt was entirely crushed in a second capture of Kadesh. The wars in Libya and Ethiopia were of less moment. In the intervals of war Tethmosis III. proved to be a wonderfully efficient administrator, with his eye on every corner of his dominions. The Syrian expeditions occupied six months in most of his best years, but the remaining time was spent in activity at home, repressing robbery and injustice, rebuilding and adorning temples with the labour of . his captives and the plunder and tribute of conquered cities, or designing with his own hand the gorgeous sacred vessels of the sanctuary of Amnion. In his later years some expeditions took place into Nubia. Tethmosis died in the fifty-fourth year of his reign. His mummy, found in the cachette at Deir el Bahri, is said to be that of a very old man. He was the greatest Pharaoh in the New Empire, if not in all Egyptian history.

Tethmosis III. was succeeded by his son Amenophis II., whom he had associated on the throne at the end of his reign. One of the first acts of the new king was to lead an army into Syria, where revolt was again rife; he reached and perhaps crossed the Euphrates and returned home to Thebes with seven captive kings of Tikhsi and much spoil. The kings he sacrificed to Ammon and hanged six bodies on the walls, while the seventh was carried south to Napata and there exposed as a terror to the Ethiopians. Amenophis reigned twenty-six years and left his throne to his son Tethmosis IV., who is best remembered by a granite tablet recording his clearance of the Great Sphinx. He also warred in northern Syria and in Cush. His son Amenophis III., c. 1400 B.C., was a mighty builder, especially at Thebes, where his reign marks a new epoch in the history of the great temples, Luxor being his creation, while avenues of rams, pylons, &c, were added on a vast scale to Karnak. He married a certain Taia, who, though apparently of humble parentage, was held in

great honour by her husband as afterwards by her son. n’” s Amenophis III. warred in Ethiopia, but his sway was

long unquestioned from Napata to the Euphrates. Small objects with his name and that of Taia are found on the mainland and in the islands of Greece. Through the fortunate discovery of cuneiform tablets deposited by his successor in the archives at Tell el-Amarna, we can see how the rulers of the great kingdoms beyond the river, Mitanni, Assyria and even Babylonia, corresponded with Amenophis,

gave their daughters to him in marriage, and congratulated themselves on having his friendship. The king of Cyprus too courted him; while within the empire the descendants of the Syrian dynasts con- quered by his father, having been educated in Egypt, ruled their paternal possessions as the abject slaves of Pharaoh. A constant stream of tribute poured into Egypt, sufficient to defray the cost of all the splendid works that were executed. Amenophis caused a series of large scarabs unique in their kind to be engraved with the name and parentage of his queen Taia, followed by varying texts commemorating like medals the boundaries of his kingdom, his secondary marriage with Gilukhipa, daughter of the king of Mitanni, the formation of a sacred lake at Thebes, a great hunt of wild cattle, and the number of lions the king si :w in the first ten years of his reign. The colossi known to the Greeks by the name of the Homeric hero Memnon, which look over the western plain of Thebes, represent this king and were

placed before the entrance of his funerary temple, the rest of which has disappeared. His palace lay farther south on the west bank, built of crude brick covered with painted stucco. Towards the end of his reign of thirty-six years, Syria was invaded by the Hittites from the north and the people called the Khabiri from the eastern desert; some of the kinglets conspired with the invaders to overthrow the Egyptian power, while those who remained loyal sent alarming reports to their sovereign.

Amenophis IV., son of Amenophis III. and Taia, was perhaps the most remarkable character in the long line of the Pharaohs. He was a religious fanatic, who had probably been high priest of the sun-god at Heliopolis, and had come to lv e op view the sun as the visible source of life, creation, growth and activity, whose power was demonstrated in foreign lands almost as clearly as in Egypt. Thrusting aside all the multitudinous deities of Egypt and all the mythology even of Heliopolis, he devoted himself to the cult of the visible sun-disk, applying to it as its chief name the hitherto rare word Aton, meaning “sun “; the traditional divine name Harakht (Horus of the horizon), given to the hawk-headed sun-god of Heliopolis, was however allowed to subsist and a temple was built at Karnak to this god. The worship of the other gods was officially recog- nized until his fifth year, but then a sweeping reform was initiated by which apparently the new cult alone was permitted. Of the old deities Ammon represented by far the wealthiest and most powerful interests, and against this long favoured deity the Pharaoh hurled himself with fury. He changed his own name from Amenhotp, ” Ammon is satisfied,” to Akhenaton, ” pious to Aton,” erased the name and figure of Ammon from the monuments,

even where it occurred as part of his own father's name, abandoned Thebes, the magnificent city of Ammon, and built a new capital at El Amarna in the plain of Hermopolis, on a virgin site upon the edge of the desert. This with a large area around he dedicated to Aton in the sixth year, while splendid temples, palaces, houses and tombs for his god, for himself and for his courtiers were rising around him; apparently also this " son of Aton " swore an oath never to pass beyond the boundaries of Aton's special domain. There are signs also that the polytheistic word " gods " was obliterated on many of the monu- ments, but other divine names, though almost entirely excluded from Akhenaton's work, were left untouched where they already existed. In all local temples the worship of Aton was instituted. The confiscated revenues of Ammon and the tribute from Syria and Cush provided ample means for adorning Ekhaton (Akhe-taton), " the horizon of Aton," the new capital, and for richly rewarding those who adopted the Aton teaching fervently. But meanwhile the political needs of the empire were neglected; the dangers which threatened it at the end of the reign of Amenophis III. were never properly met; the dynasts in Syria were at war amongst themselves, intriguing with the great Hittite advance and with the Khabiri invaders. Those who relied on Pharaoh and remained loyal as their fathers had done sent letter after letter appealing for aid against their foes. But though a general was despatched with some troops, he seems to have done more harm than good in misjudging the quarrels. At length the tone of the letters becomes one of despair, in which flight to Egypt appears the only resource left for the adherents of the Egyptian cause. Before the end of the reign Egyptian rule in Syria had probably ceased altogether. Akhenaton died in or about the seventeenth year of his reign, c. 1350 B.C. He had a family of daughters, who appeared constantly with him in all ceremonies, but no son. Two sons-in-law followed him with brief reigns; but the second, Tutenkhaton, soon changed his name to Tuten- khamun, and, without abandoning Ekhaton entirely, began to restore to Karnak its ancient splendour, with new monuments dedicated to Ammon. Akhenaton's reform had not reached deep amongst the masses of the population; they probably retained all their old religious customs and superstitions, while the priesthoods throughout the country must have been fiercely opposed to the heretic's work, even if silenced during his lifetime by force and bribes. One more adherent of his named Ay, a priest, ruled for a short time, but now Aton was only one of many

gods. At length a general named Harmahib, who had served under Akhenaton,came to the throne as a whole-hearted supporter of the old religion; soon Aton and his royal following suffered the fate that they had imposed upon Ammon; their monuments were destroyed and their names and figures erased, while those of Ammon were restored. From the time of Rameses II. onwards the years of the reigns of the heretics were counted to Harmahib, and Akhenaton was described as " that criminal of Akhetaton." Harmahib had to bring order as a practical man into the long- neglected administration of the country and to suppress the extortions of the official classes by severe measures. His laws to this end were engraved on a great stela in the temple of Karnak, of which sufficient remains to bear witness to his high aims, while the prosperity of the succeeding reigns shows how well he realized the necessities of the state. He probably began also to re-establish the prestige of Egypt by military expeditions in the surrounding countries.

Harmahib appears to have legitimated his rule by marriage to a royal princess, but it is probable that Rameses I., who suc- ceeded as founder of the XlXth Dynasty, was not Dynasty, closely related to him. Rameses in his brief reign of two years planned and began the great colonnaded hall of Karnak, proving that he was a man of great ideas, though probably too old to carry them out; this task he left to his son Seti I., who reigned one year with his father and on the latter's death was ready at once to subdue the Bedouin Shasu, who had invaded Palestine and withheld all tribute. This task was quickly accomplished and Seti pushed onward to the Lebanon. Here cedars were felled for him by the Syrian princes, and the Phoe- nicians paid homage before he returned home in triumph. The Libyans had also to be dealt with, and afterwards Seti advanced again through Palestine, ravaged the land of the Amorites and came into conflict with the Hittites. The latter, however, were now firmly established in the Orontes valley, and a treaty with Mutallu, the king of Kheta, reigning far away in Cappadocia, probably ended the wars of Seti. In his ninth year he turned his attention to the gold mines in the eastern desert of Nubia and improved the road thither. Meanwhile the great work at Karnak projected by his father was going forward, and throughout Egypt the injuries done to the monuments by Akhenaton were thoroughly repaired; the erased inscriptions and figures were restored, not without many blunders. Seti's temple at Abydos and his galleried tomb in the Valley of the Tombs of the Kings stand out as the most splendid examples of their kind in design and in decoration. Rameses II. succeeded at an early age and reigned sixty-seven years, during

which he finished much that was begun by Seti and filled all Egypt and Nubia with his own monuments, some of them beauti- ful, but most, necessarily entrusted to inferior workmen, of coarse execution. The excavation of the rock temple of Abu Simbel and the completion of the great hall of Karnak were his greatest achievements in architecture. His wars began in his second year, their field comprising the Nubians, the Libyans, the Syrians and the Hittites. In his fifth year, near Kadesh on the Orontes, his army was caught unprepared and divided by a strong force of chariots of the Hittites and their allies, and Rameses himself was placed in the most imminent danger; but through his personal courage the enemy was kept at bay till reinforcements came up and turned the disaster into a victory. The incidents of this episode were a favourite subject in the sculp- tures of his temples, where their representation was accompanied by a poetical version of the affair and other explanatory inscrip- tions. Kadesh, however, was not captured, and after further contests, in his twenty-first year Rameses and the Hittite king Khattusil (Kheta-sar) made peace, with a defensive alliance against foreign aggression and internal revolt (see Hittites). Thanks to Winckler's discoveries, the cuneiform text of this treaty from Boghaz Keui can now be compared with the hiero- glyphic text at Karnak. In the thirty-fourth year, c. 1250 B.C., Khattusil with his friend or subject the king of Kode came from his distant capital to see the wonders of Egypt in person, bringing one of his daughters to be wife of the splendid Pharaoh.

Rameses II.

Rameses II. paid much attention to the Delta, which had been neglected until the days of Seti I., and resided there constantly; the temple of Tanis must have been greatly enlarged and adorned by him; a colossus of the king placed here was over 90 ft. in height, exceeding in scale even the greatest of the Theban colossi which he had erected in his mortuary temple of the Ramesseum. Towards the end of the long reign the vigilance and energy of the old king diminished. The military spirit awakened in the struggle with the Hyksos had again departed from the Egyptian nation; mercenaries from the Sudan, from Libya and from the northern nations supplied the armies, while foreigners settled in the rich lands of the Delta and harried the coasts. It was a time too when the movements of the nations that so frequently occurred in the ancient world were about to be particularly active. Mineptah, c. 1225 B.C., succeeding his father Rameses II., had to fight many battles for the preservation of- his kingdom and empire. Apparently most of the fighting was finished by the fifth year of his reign; in his mortuary temple at Thebes he set up a stela of that date recording a great victory over the Libyan immigrants and invaders,

which rendered the much harried land of Egypt safe. The last lines picture this condition with the crushing of the surrounding tribes. Libya was wasted, the Hittites pacified, Canaan, Ashkelon (Ascalon), Gezer, Yenoam sacked and plundered: ” Israel is desolated, his seed is not, Khor (Palestine) has become a widow (without protector) for Egypt.” The Libyans are accompanied by allies whose names, Sherden, Shekelesh, Ekwesh, Lukku, Teresh, suggest identifica- tions with Sardinians, Sicels, Achaeans, Lycians and Tyrseni or Etruscans. The Sherden had been in the armies of Rameses II., and are distinguished by their remarkable helmets and apparently body armour of metal. The Lukku are certainly the same as the Lycians. Probably they were all sea-rovers from the shores and islands of the Mediterranean, who were willing to leave their ships and join the Libyans in raids on the rich lands of Egypt. Mineptah was one of the most unconscion- able usurpers of the monuments of his predecessors, including those of his own father, who, it must be admitted, had set him the example. The coarse cutting of his cartouches contrasts with the splendid finish of the Middle Kingdom work which they disfigure. It may be questioned whether it was due to a wave of enthusiasm amongst the priests and people, leading them to rededicate the monuments in the name of their deliverer, or a somewhat insane desire of the king to perpetuate his own memory in a singularly unfortunate manner. Mineptah, the thirteenth son in the huge family of Rameses, must have been old when he ascended the throne; after his first years of reign his energies gave way, and he was followed by a quick succession of inglorious rulers, Seti II., the queen Tuosri, Amenmesse, Siptah; the names of the last two were erased from their monuments.

A great papyrus written after the death of Rameses HI. and recording his gifts to the temples briefly reviews the conditions of these troublous times. ” The land of Egypt was in the hands of chiefs and rulers of towns, great and Dynasty. small slaying each other; afterwards a certain Syrian made himself chief; he made the whole land tributary before him; he united his companions and plundered their property (i.e. of the other chiefs). They made the gods like men, and no offerings were presented in the temples. But when the gods inclined themselves to peace . . . they established their son Setenkhot (Setnekht) to be ruler of every land.” Of the Syrian occupation we know nothing further. Setenkhot, c. 1200 B.C., had a very short reign and was not counted as legitimate, but he established a lasting dynasty (probably by conciliating the priesthood). He was father of Rameses III., who revived the glories of the empire. The dangers that menaced Egypt now were similar to those which Mineptah had to meet at his accession. Again the Libyans and the ” peoples of the sea ”

were acting in concert. The latter now comprised Peleset (the Cretans, ancestors of the Philistines), Thekel, Shekelesh, Denyen (Danaoi?) and Weshesh; they had invaded Syria from Asis Minor, reaching the Euphrates, destroying the Hittite cities and progressing southwards, while their ships gathered plunder

from the coasts of the Delta. This fleet joined the Libyan invaders, but was overthrown with heavy loss by the Egyptians, in whose ranks there actually served many Sherden and Kehaka, Sardinian and Libyan mercenaries. Egypt itself was thus clear of enemies; but the chariots and warriors of the Philistines and their associates were advancing through Syria, their families and goods following in ox-carts, and their ships accompanying them along the shore. Rameses led out his army and fleet against them and struck them so decisive a blow that the migrat- ing swarm submitted to his rule and paid him tribute. In his eleventh year another Libyan invasion had to be met, and his suzerainty in Palestine forcibly asserted. His vigour was equal to all these emergencies and the later years of his reign were spent in peace. Rameses III., however, was not a great ruler. He was possessed by the spirit of decadence, imitative rather than originating. • It is evident that Rameses II. was the model to which he endeavoured to conform, and he did not attempt to preserve himself from the weakening influences of priestcraft. To the temples he not only restored the property which had been given to them by former kings, but he also added greatly to their wealth; the Theban Ammon naturally received by far the greatest share, more than those of all the other gods together. The land held in the name of different deities is estimated at about 15% of the whole of Egypt; various temples of Ammon owned two-thirds of this, Re of Heliopolis and Ptah of Memphis being the next in wealth. His palace was at Medinet Habu on the west bank of Thebes in the south quarter; and here he built a great temple to Ammon, adorned with scenes from his victories and richly provided with divine offerings. Although Egypt probably was prosperous on the whole, there was un- doubtedly great distress amongst certain portions of the popula- tion. We read in a papyrus of a strike of starving labourers in the Theban necropolis who would not work until corn was given to them, and apparently the government storehouse was empty at the time, perhaps in consequence of a bad Nile. Shortly before the death of the old king a plot in the harem to assassinate him,

and apparently to place one of his sons on the throne, was discovered and its investigation ordered, leading after his death to the condemnation of many high-placed men and women. Nine kings of the name of Rameses now followed each other ingloriously in the space of about eighty years to the end of the XXth Dynasty, the power of the high priests of Ammon ever growing at their expense. At this time the Theban necropolis was being more systematically robbed than ever before. Under Rameses IX. an investigation took place which showed that one of the royal tombs before the western cliffs had been completely ransacked and the mummies burnt. Three years later the Valley of the Tombs of the Kings was attacked and the sepulchres of Seti I. and Rameses II. were robbed.

The authority of the last king of the XXth Dynasty, Rameses XII., was shadowy. Hrihor, the high priest in his reign, gradually gathered into his own hands all real Deltaic power, and succeeded him at Thebes, c. noo B.C., Dynasties; while a prince at Tanis named Smendes (Esbent £ti) ub ˆ a ” founded a separate dynasty in the Delta (Dynasty ˆ “.’ XXL). From this period dates a remarkable papyrus containing the report of an envoy named Unamun, sent to Syria by Hrihori to obtain cedar timber from Byblus. He took with him an image of Ammon to bestow life and health on the prince of Byblus, but apparently no other provision for the journey or for the negotiations beyond a letter of recommendation to Smendes and a little gold and silver. Smendes had trading ships in the Phoenician ports, but even his influence was not greater than that of other commercial or pirate centres, while Hrihor was of no account except in so far as he might pay well for the cedar wood he required. Unamun was robbed on the voyage, the prince of Byblus rebuffed him, and when at last the latter agreed to provide the timber it was only in exchange for substantial gifts hastily sent for from Egypt (including rolls of papyrus) and the promise of more to follow. The prince, however, seems to have acknowledged to some extent the divinity of Ammon and the debt owed by Phoenicia to Egyptian culture, and pitied the many

misfortunes of Unamun. The narrative shows the feebleness of Egypt abroad. The Tanite line of kings generally had the over- lordship of the high priests of Thebes; the descendants of Hrihor, however, sometimes by marriage with princesses of the other line, could assume cartouches and royal titles, and in some cases perhaps ruled the whole of Egypt. Ethiopia may have been ruled with the Thebais, but the records of the time are very scanty. Syria was wholly lost to Egypt. The mummies from the despoiled tombs of the kings were the object of much anxious care to the kings of this dynasty; after being removed from one tomb to another, they were finally deposited in a shaft near

the temple of Deir el Bahri, where they remained for nearly three thousand years, until the demand for antiquities at last brought the plunderer once more to their hiding-place; eventually they were all secured for the Cairo museum, where they may now be seen.

Libyan soldiers had long been employed in the army, and . their military chiefs settled in the large towns and acquired wealth and power, while the native rulers grew weaker and weaker. The Tanite dynasty may have risen from a Libyan stock, though there is nothing to prove it; the XXIInd Dynasty are clearly from their names of foreign extraction, and their genealogy in- dicates distinctly a Libyan military origin in a family of rulers of Heracleopolis Magna, in Middle Egypt. Sheshonk (Shishak) I., the founder of the dynasty, c. 950 B.C., seems to have fixed his residence at Bubastis in the Delta, and his son married the daughter of the last king of the Tanite dynasty. ‘ Heracleopolis seems henceforth for several centuries to have been capital of Middle Egypt, which was considered as a more or less distinct province. Sheshonk secured Thebes, making one of his sons high priest of Ammon, and whereas Solomon appears to have dealt with a king of Egypt on something like an equal footing, Sheshonk re-established Egyptian rule in Palestine and Nubia, and his expedition in the fifth year of Rehoboam subdued Israel as well as Judah, to judge by the list of city names which he inscribed on the wall of the temple of Karnak. Osorkon I. inherited a prosperous kingdom from his father, but no further progress was made. It required a strong hand to curb the Libyan chieftains, and divisions soon began to show themselves in the kingdom. The XXIInd Dynasty lasted through many generations; but there were rival kings, and M. Legrain thinks that he has proof that the XXIIIrd Dynasty was contempor- aneous with the end of the XXIInd. The kings of the XXIIIrd Dynasty had little hold upon the subject princes, who spent the resources of the country in feuds amongst themselves. A native kingdom had meanwhile been established in Ethiopia. Our first knowledge of it is at this moment, when the Ethiopian king Pankhi already held the Thebais. The energetic prince of Sais, Tefnakht, followed by most of the princes of the Delta, subdued most of Middle Egypt, and by uniting these forces threatened the Ethiopian border. Heracleopolis Magna, however, with its petty king Pefteuaubasti, held out against Tefnakht, and Pankhi coming to its aid not only drove Tefnakht out of Middle Egypt, but also captured Memphis and received the submission of the princes and chiefs; in all these included four ” kings ” and fourteen other chiefs. According to Diodorus the Ethiopian state was theocratic, ruled through the 1 “ing by the priests of Ammon. The account is probably exaggerated; but even in Pankhi’s record the piety of the king,

especially towards Ammon, is very marked.

The XXIVth Dynasty consisted of a single Saite king named Bocchoris (Bekerrinf), son of Tefnachthus, apparently the above Tefnakht. Another Ethiopian invader, Shabako (Sabacon), is said to have burnt Bocchoris alive. The Dynasty? Ethiopian rule of the XXVth Dynasty was now firmly established, and the resources of the two countries together might have been employed in conquest in Syria and Phoenicia; but at this very time the Assyrian empire, risen to the highest pitch of military greatness, began to menace Egypt. The Ethiopian could do no more than encourage or support the Syrians in their fight for freedom against Sargon and Sennacherib. Shabako was followed by Shebitku and Shebitku by Tirhaka

(Tahrak, Taracos). Tirhaka was energetic in opposing the Assyrian advance, but in 670 B.C. Esarhaddon defeated his army on the border of Egypt, captured Memphis with the royaf harem and took great spoil. The Egyptian resistance to the Assyrians was probably only half-hearted; in the north especi- ally there must have been a strong party against the Ethiopian rule. Tirhaka laboured to propitiate the north country, and probably rendered the Ethiopian rule acceptable throughout Egypt. Notwithstanding, the Assyrian king entrusted the government and collection of tribute to the native chiefs; twenty princes in all are enumerated in the records, including one Assyrian to hold the key of Egypt at Pelusium. Scarcely had Esarhaddon withdrawn before Tirhaka returned from his refuge in the south and the Assyrian garrisons were massacred. Esar- haddon promptly prepared a second expedition, but died on the way to Egypt in 668 B.C. ; his son Assur-bani-pal sent it forward, routed Tirhaka and reinstated the governors. At the head of these was Necho (Niku), king of Sais and Memphis, father of Psammetichus, the founder of the XXVIth Dynasty. We next hear that correspondence with Tirhaka was intercepted, and that Necho, together with Pekrur of Psapt (at the entrance to the Wadi Tumilat) and the Assyrian governor of Pelusium, was taken to Nineveh in chains to answer the charge of treason. Whatever may have occurred, it was deemed politic to send Necho back loaded with honours and surrounded by a retinue of Assyrian officials. Upper Egypt, however, was loyal to Tirhaka, and even at Memphis the burial of an Apis bull was dated by the priests as in his

reign. Immediately afterwards he died. His nephew Tandamane, received by the Upper country with acclamations, besieged and captured Memphis, Necho being probably slain in the encounter. But in 661 (?) Assur-bani-pal drove the Ethiopian out of Lower Egypt, pursued him up the Nile and sacked Thebes. This was the last and most tremendous visitation of the Assyrian scourge.

Psammetichus (Psammetk), 664-610 B.C., the son of Necho, succeeded his father as a vassal of Assyria in his possessions of Memphis and Sais, allied himself with Gyges, king of Dyaasty. Lydia, and aided by Ionian and Carian mercenaries, extended and consolidated his power. 1 By the ninth year of his reign he was in full possession of Thebes. Assur- bani-pal's energies throughout this crisis were entirely occupied with revolts nearer home, in Babylon, Elam and Arabia. The Assyrian arms again triumphed everywhere, but at the cost of complete exhaustion. Under the firm and wise rule of Psam- metichus, Egypt recovered its prosperity after the terrible losses inflicted by internal wars and the decade of Assyrian invasions. The revenue went up by leaps and bounds. Psammetichus guarded the frontiers of Egypt with three strong garrisons, placing the Ionian and Carian mercenaries especially at the Pelusiac Daphnae in the N.E., from which quarter the most formidable enemy was likely to appear. The Assyrians did not move against him, but a great Scythian horde, destroying all before it in its southward advance, is said by Herodotus to have been turned back by presents and entreaties. Diplomacy backed up by vigorous preparations may have deterred the Scythians from the dangerous enterprise of crossing the desert to Egypt. Before his death Psammetichus had advanced into southern Palestine and captured Azotus.

When Psammetichus began to reign the situation of Egypt was very different from what it had been under the Empire. The development of trade in the Mediterranean and contact with new peoples and new civilizations in peace and war had given birth to new ideas among the Egyptians and at the same time to a loss of confidence in their own powers. The Theban supremacy was gone and the Delta was now the wealthy and progressive part of Egypt; piety increased amongst the masses, unenterprising and unwarlike, but proud of their illustrious antiquity. Thebes and Ammon and the traditions of the Empire savoured too much now of the Ethiopian; the priests of/ the Memphite and Deltaic dynasty thereupon turned deliberately

1 This, it may be remarked, is the time vaguely represented by the Dodecarchy of Herodotus.

for their models to the times of the ancient supremacy of Memphis, and the sculptures and texts on tomb and temple had to conform as closely as possible to those of the Old Kingdom. In other than religious matters, however, the Egyptians were inventing and perhaps borrowing. To enumerate a few examples of this which are already definitely known: we find that the forms of legal and business documents became more precise; the mechanical arts of casting in bronze on a core and of moulding figures and pottery were brought to the highest pitch of excel- lence; and portraiture in the round on its highest plane was better than ever before and admirably lifelike, revealing careful study of the external anatomy of the individual.

Psammetichus died in the fifty-fourth year of his reign and was succeeded by his son Necho, 610-594 B.C. Taking advantage of the helpless state of the Assyrians, whose capital was assailed by the Medes and the Babylonians, the new Pharaoh prepared an expedition to recover the ancient possessions of the Empire in Syria. Josiah alone, faithful to the king of Assyria, opposed him with his feeble force at Megiddo and was easily overcome and slain. Necho went forward to the Euphrates, put the land to tribute, and, in the case of Judah at any rate, filled the throne with his own nominee (see Jehoiakim). The fall of Nineveh and the division of the spoil gave to Nabopolasser, king of Babylon, the inheritance of the Assyrians in the west, and he at once despatched his son Nebuchadrezzar to fight Necho. The Babylonian and Egyptian forces met at Carchemish (605), and the rout of the latter was so complete that Necho relinquished Syria and might have lost Egypt as well had not the death of Nabopolasser recalled the victor to Babylon. Herodotus relates that in Necho's reign a Phoenician ship despatched from Egypt actually circumnavigated Africa, and the attempt was made to complete a canal through the Wadi Tumilat, which connected the Mediterranean and Red Seas by way of the Lower Egyptian Nile. (See Suez.) The next king, Psammetichus II., 594- 589 B.C., according to one account made an expedition to Syria or Phoenicia, and apparently sent a mercenary force into Ethiopia as far as Abu Simbel. Pharaoh Hophra (Apries), 589-570 B.C., fomented rebellion against the Babylonian suzerainty in Judah, but accomplished little there. Herodotus, however, describes his reign as exceedingly prosperous. The mercenary troops at Elephantine mutinied and attempted to desert to Ethiopia, but were brought back and punished. Later, however, a dis- astrous expedition sent to aid the Libyans against the Greek colony of Cyrene roused the suspicion and anger of the native soldiery at favours shown to the mercenaries, who of course had taken no part in it. Amasis (Ahmosi) II. was chosen king by the former (570-525 B.C.), and his swarm of

adherents overcame the Greek troops in Apries' pay (see Amasis). None the less Amasis employed Greeks in numbers, and cultivated the friend- ship of their tyrants. His rule was confined to Egypt (and perhaps Cyprus), but Egypt itself was very prosperous. At the beginning of his long reign of forty-four years he was threatened by Nebuchadrezzar; later he joined the league against Cyrus and saw with alarm the fall of his old enemy. A few months after his death, 525 B.C., the invading host of the Persians led by Cambyses reached Egypt and dethroned his son Psam- metichus III.

Cambyses at first conciliated the Egyptians and respected their religion; but, perhaps after the failure of his expedition into Ethiopia, he entirely changed his policy, and his rh memory was generally execrated. He left Egypt so Persian completely crushed that the subsequent usurpation period, of the Persian throne was marked by no revolt in that xxvuth quarter. Darius, 521-486 B.C., proved himself a beneficent ruler, and in a visit to Egypt displayed his considera- tion for the religion of the country. In the Great Oasis he built a temple to Ammon. The annual tribute imposed on the satrapy of Egypt and Cyrene was heavy, but it was probably raised with ease. The canal from the Nile to the Red Sea was completed or repaired, and commerce flourished. Documents dated in the thirty-fourth and thirty-fifth years of Darius are not uncommon, but apparently at the very end of his reign,

some years after the disaster of Marathon, Egypt was induced to rebel. Xerxes, 486-467 B.C., who put down the revolt with severity, and his successor Artaxerxes, 466-425 B.C., like Cambyses, were hateful to the Egyptians. The disorders which marked the accession of Artaxerxes gave Egypt another oppor- tunity to rebel. Their leaders were Inaros the Libyan of Marea and the Egyptian Amyrtaeus. Aided by an Athenian force, Inaros slew the satrap Achaemenes at the battle of Papremis and destroyed his army; but the garrison of Memphis held out. and a fresh host from Persia raised the siege and in turn besieged the Greek and Egyptian forces on the island of Papremis. At last, after two years, having diverted the river from its channel, they captured and burnt the Athenian ships and quickly ended the rebellion. The reigns of Xerxes II. and Darius II. are marked by no recorded incident in Egypt until a successful revolt about 405 B.C. interrupted the

Persian domination.

Monuments of the Persian rule in Egypt are exceedingly scanty. The inscriptions of Pefteuauneit, priest of Neith at Sais, and from his position the native authority who was most likely to be consulted by Cambyses and Darius, tells of his relations with these two kings. For the following reigns Egyptian documents hardly exist, but some papyri written in Aramaic have been found at Elephantine and at Memphis. Those from the former locality show that a colony of Jews with a temple dedicated to Yahweh (Jehovah) had established themselves at that garrison and trading post (see Assuan). Herodotus visited Egypt in the reign of Artaxerxes, about 440 B.C. His description of Egypt, partly founded on Hecataeus, who had been there about fifty years earlier, is the chief source of information for the history of the Saite kings and for the manners of the times, but his statements prove to be far from correct when they can be checked by the scanty native evidence. (F. Ll. G.)

Amyrtaeus (Amnertais) of Sais, perhaps a son of Pausiris and grandson of the earlier Amyrtaeus, revolted from Darius II. c. 405 B.C., and Egypt regained its independence for xxvfu- 3 aD0U t sixty years. The next king Nefeuret xxxi.' (Nepherites I.) was a Mendesian and founded the XXIXth Dynasty. After Hakor and Nefeuret II. the sovereignty passed to Dynasty XXX., the last native Egyptian line. Monuments of all these kings are known, and art flourished particularly under the MendesiankingsNekhtharheb(Nectanebes or Nectanebus I.) and Nekhtnebf (Nectanebes II.). The former came to the throne when a Persian invasion was imminent, 378 B.C. Hakor had already formed a powerful army, largely composed of Greek mercenaries. This army Nekhtharheb entrusted to the Athenian Chabrias. The Persians, however, succeeded in causing his recall and in gaining the services of his fellow-countryman Iphicrates. The invading army consisted of 200,000 barbarians under Pharnabazus and 20,000 Greeks under Iphicrates. After the Egyptians had experienced a reverse, Iphicrates counselled an immediate advance on Memphis. His advice was not followed by Pharnabazus; the Egyptian king collected his forces and won a pitched battle near Mendes. Pharnabazus retreated and Egypt was free.

Nekhtharheb was succeeded by Tachos or Teos, whose short reign was occupied by a war with Persia, in which the king of Egypt secured the services of a body of Greek mercenaries under the Spartan king Agesilaus and a fleet under the Athenian general Chabrias. He entered Phoenicia with every prospect of success, but having offended Agesilaus he was dethroned in a military revolt which gave the crown

to Nekhtnebf or Nectanebes II., the last native king of Egypt. At this moment a revolt broke out. The prince of Mendes almost succeeded in overthrowing the new king. Agesilaus defeated the rival pretender and left Nekhtnebf established on the throne. But the opportunity of a decisive blow against Persia was lost. The new king, Artaxerxes III. Ochus, determined to reduce Egypt. A first expedition was defeated by the Greek mercenaries of Nekhtnebf, but a second, commanded by Ochus himself, subdued Egypt rrith no further resistance than that of the Greek garrison of Pelusium. Nekhtnebf, instead of endeavouring to relieve them, retreated to Memphis and fled thence to Ethiopia, 340 (?) B.C.

Thus miserably fell the monarchy of the Pharaohs, after an unexampled duration of 3000 years, or as some think far longer. •More than 2000 years have since passed, and though Egypt has from time to time been independent, not one native prince has sat on the throne of the Pharaohs. ” There shall be no more a prince of the land of Egypt ” (Ezek. xxx. 13) was prophesied in the days of Apries as the final state of the land.

Ochus treated his conquest barbarously. From this brief re-establishment of Persian dominion (counted by Manetho as Dynasty XXXI.) no document survives except one papyrus that appears to be dated in the reign of Darius III.

See J. H. Breasted, A History of Egypt from the Earliest Times to the Persian Conquest (New York and London, 1905) ; A History of the Ancient Egyptians (New York and London, 1908) ; Ancient Records of Egypt: Historical Documents from the Earliest Times to the Persian Conquest, collected, edited and translated (5 vols., Chicago, 1906-1907) ; W. M. F. Petrie, A History of Egypt (from the earliest times to the XXXth Dynasty) (3 vols., London, 1899-1905); E. A. W. Budge, A History of Egypt, vols, i-vii. (London, 1902) ; G. Maspero, Hisloire ancienne des peuples de V orient (6th ed., 1904), The Dawn of Civiliza- tion, The Struggle of the Nations, The Passing of the Empires (London, 1904, &c); P. E. Newberry and J. Garstang, A Short History of Ancient Egypt (London, 1904) ; G. Steindorff, Die Bliitezeit des Pharaonenreich.es (Dyn. XVIII.) (Bielefeld and Leipzig, 1900); H. Winckler, The Tell el Amarna Letters (Berlin, London and New York, 18 ‘-

The Conquest by Alexander. — When, in 332 B.C., after the battle of Issus, Alexander entered Egypt, he was welcomed as a deliverer. The Persian governor had not forces enough to oppose him, and he nowhere experienced even the show of resistance. He visited

Memphis, founded Alexandria, and went on pilgrimage to the oracle of Ammon (Oasis of Siwa). The god declared him to be his son, renewing thus an old Egyptian con- vention or belief; Olympias was supposed to have been in converse with Ammon, even as the mothers of Hatshepsut and Amenophis III. are represented in the inscriptions of the Theban temples to have received the divine essence. At this stage of his career the treasure and tribute of Egypt were of great importance to the Macedonian conqueror. He conciliated the inhabitants by the respect which he showed for their religion; he organized the government of the natives under two officers, who must have been already known to them (of these Petisis, an Egyptian, soon resigned his share into the charge of his colleague Doloaspis, who bears a Persian name.) But Alexander designed his Greek foundation of Alexandria to be the capital, and entrusted the taxation of Egypt and the control of its army and navy to Greeks. Early in 331 B.C. he was ready to depart, and led his forces away to Phoenicia. A granite gateway to the temple of Khnum at Elephantine bears his name in hieroglyphic, and demotic docu- ments are found dated in his reign.

The Ptolemaic Period. — On the division of Alexander's dominions in 323 B.C., Egypt fell to Ptolemy the son of Lagus, the founder of the' Ptolemaic dynasty (see Ptolemies). Under these rulers the rich kingdom was heavily taxed to supply the sinews of war and to support every kind of lavish expenditure. Officials, and the higher ones were nearly all Greeks, were legion, but the whole system was so judiciously worked that there was little discontent amongst the patient peasantry. During the reign of Philadelphus the land gained from the bed of the lake of Moeris was assigned to veteran soldiers; the great armies of the Ptolemies were rewarded or supported by grants of farm lands, and men of Macedonian, Greek and Hellenistic extraction were planted in colonies and garrisons or settled themselves in the villages throughout the country. Upper Egypt, farthest! from the centre of government, was probably least affected by the new influences, though the first Ptolemy established the Greek colony of Ptolemais to be its capital. Intermarriages, however, gradually had their effect; after the revolt of the natives in the reign of Ptolemy V., we find the Greek and Egyptian elements closely intermingled. Ptolemy I. had established the cult of the Memphite Serapis in a Graeco- Egyptian form, affording a common ground for native and Hellenistic worshippers. The greater number of the temples to the native deities in Upper Egypt and in Nubia (to 50 m. south

of the Cataract, within the Dodecaschoenus) were built under the Ptolemies. No serious effort was made to extend the Ptole- maic rule into Ethiopia, and Ergamenes, the Hellenizing king of Ethiopia, was evidently in alliance with Philopator; in the next reign two native kings, probably supported by Ethiopia, reigned in succession at Thebes. That famous city lost all except its religious importance under the Ptolemies; after the ” de- struction ” or dismantling by Lathyrus it formed only a series of villages. The population of Egypt in the time of Ptolemy I. is put at 7,000,000 by Diodorus, who also says that it was greater then than it ever was before; at the end of the dynasty, in his own day, it was not much less though somewhat diminished. Civil wars and revolts must have greatly injured both Upper and Lower Egypt. It is remarkable that, while the building and decoration of temples continued in the reigns of Ptolemy Auletes and the later Ptolemies and Cleopatra, papyri of those times whether Greek or Egyptian are scarcely to be found.

The Roman Period. — In 30 B.C. Augustus took Egypt as the prize of conquest. He treated it as a part of his personal domain, free from any interference by the senate. In the main lines the’ Ptolemaic organization was preserved, but Romans were gradually introduced into the highest offices. On Egypt Rome depended for its supplies of corn; entrenched there, a revolting general would be difficult to attack, and by simply holding back the grain ships could threaten Rome with starvation. No senator therefore was permitted to take office or even to set foot in the country without the emperor’s special leave, and by way of pre- caution the highest position, that of prefect, was filled by a Roman of equestrian rank only. As the representative of the emperor, this officer assumed the place occupied by the king under the old order, except that his power was limited by the right of appeal to Caesar. The first prefect, Cornelius Gallus, tamed the natives of Upper Egypt to the new yoke by force of arms, and meeting ambassadors from Ethiopia at Philae, estab- lished a nominal protectorate of Rome over the frontier district, which had been abandoned by the later Ptolemies. The third prefect, Gaius Petronius, cleared the neglected canals for irriga- tion; he also repelled an invasion of the Ethiopians and pursued them far up the Nile, finally storming the capital of Napata. But no attempt was made to hold Ethiopia. In succeeding reigns much trouble was caused by jealousies and quarrels between the Greeks and the Jews, to whom Augustus had granted privileges as valuable as those accorded to the Greeks. Aiming at the spice trade, Aelius Gallus, the second prefect of Egypt under Augustus, had made an unsuccessful expedition to conquer Arabia

Felix; the valuable Indian trade, however, was secured by Claudius for Egypt at the expense of Arabia, and the Red Sea routes were improved. Nero's reign especially marks the commencement of an era of prosperity which lasted about a century. Under Vespasian the Jewish temple at Leonto- polis in the Delta, which Onias had founded in the reign of Ptolemy Philometor, was closed; worse still, a great Jewish revolt and massacre of the Greeks in the reign of Trajan resulted, after a stubborn conflict of many months with the Roman army under Marcius Livianus Turbo, in the virtual extermination of the Jews in Alexandria and the loss of all their privileges. Hadrian, who twice visited Egypt (a.d. 130, 134), founded Antinoe in memory of his drowned favourite. From this reign onwards buildings in the Graeco-Roman style were erected throughout the country. A new Sothic cycle began in a.d. 139. Under Marcus Aurelius a revolt of the Bucolic or native troops recruited for home service was taken up by the whole of the native population and was suppressed only after several years of fighting. The Bucolic war caused infinite damage to the agriculture of the country and marks the beginning of its rapid decline under a burdensome taxation. The province of Africa was now of equal importance with Egypt for the grain supply of the capital. Avidius Cassius, who led the Roman forces in the war, usurped the purple, and was acknowledged by the armies of Syria and Egypt. On the approach of Marcus Aurelius, the adherents of Cassius slew him, and the clemency of the emperor restored peace. After the downfall of the house of the Antonines,

Pescennius Niger, who commanded the forces in Egypt, was proclaimed emperor on the death of Pertinax (a.d. 103). Severus overthrew his rival (a.d. 194) and, the revolt having been a military one, did not punish the province; in 202 he gave a constitution to Alexandria and the nome capitals. In his reign the Christians of Egypt suffered the first of their many persecu- tions. When Christianity was planted in the country we do not know, but it must very early have gained adherents among the learned Jews of Alexandria, whose school of thought was in some respects ready to welcome it. From them u s afl " it rapidly passed to the Greeks. Ultimately the new religion spread to the Egyptians; their own creed was worn out, and they found in Christianity a doctrine of the future life for which their old belief had made them not unready; while the social teaching of Christianity came with special fitness to a subject race. The history of the Coptic Version has yet to be written. It presents some features of great antiquity, and, unlike all others, has the truly popular character of being written in the three dialects of the language. Side by side there grew up an Alexandrian church, philosophic, disputative,

ambitious, the very centre of Christian learning, and an Egyptian church, ascetic, contemplative, mystical. The two at length influenced one another; still we can generally trace the philosophic teachers to a Greek origin, the mystics to an Egyptian.

Caracalla, in revenge for an affront, massacred all the men capable of bearing arms in Alexandria. His granting of the Roman citizenship to all Egyptians in common with the other provincials was only to extort more taxes. Under Decius, a.d. 250, the Christians again suffered from persecution. When the empire broke up in the weak reign of Gallienus, the prefect Aemilianus, who took the surname Alexander or Alexandrinus, was made emperor by the troops at Alexandria, but was con- quered by the forces of Gallienus. In his brief reign of only a few months he had driven back an invasion of the Blemmyes. This predatory tribe, issuing from Nubia, was long to be the terror of Upper Egypt. Zenobia, queen of Palmyra, after an unsuccess- ful invasion, on a second attempt conquered Egypt, which she added to her empire, but lost it when Aurelian made war upon her (a.d. 272). The province was, however, unsettled, and the conquest of Palmyra was followed in the same year by the suppression of a revolt in Egypt (a.d. 273). Probus, who had governed Egypt for Aurelian and Tacitus, was subsequently chosen by the troops to succeed Tacitus, and is the first governor of this province who obtained the whole of the empire. He expelled the Blemmyes, who were dominating the whole of the Thebaid. Diocletian invited the Nobatae to settle in the Dodeca- schoenus as a barrier against their incursions, and subsidized both Blemmyes and Nobatae. The country, however, was still disturbed, and in a.d. 296 a formidable revolt broke out, led by Achilleus, who as emperor took the name Domitius Domitianus. Diocletian, finding his troops unable to determine the struggle, came to Egypt, captured Alexandria and put his rival to death (296). He then reorganized the whole province, and the well- known ” Pompey’s Pillar ” was set up by the grateful and repentant Alexandrians to commemorate his gift to them of part of the corn tribute.

The Coptic era of Diocletian or of the Martyrs dates from the accession of Diocletian (a.d. 284). The edict of a.d. 303 against the Christians, and those which succeeded it, were rigorously carried out in Egypt, where Paganism was stil) strong and face to face with a strong and united church. Galerius, who succeeded Diocletian in the government of the East, implacably pursued his policy, and this great persecution did not end until the persecutor, perishing, it is said, of the dire malady of Herod and Philip II. of Spain, sent out an edict of toleration (a.d. 311).

By the edict of Milan (a.d. 313), Constantine, with the agree ment of his colleague Licinius, acknowledged Christianity a* having at least equal rights withotherreligions,and whenhe gained sole power he wrote to all his subjects advising them, like him, to become Christians (a.d. 324). The Egyptian Church, hitherto free from schism, was now divided by a fierce controversy,

in which we see two Greek parties, rather than a Greek and an Egyptian, in conflict. The council of Nicaea was called together (a.d. 325) to determine between the Orthodox and the party of the Alexandrian presbyter Arius. At that council the native Egyptian bishops were chiefly remarkable for their manly protest against enforcing celibacy on the clergy. The most conspicuous controversialist on the Orthodox side was the young Alexandrian deacon Athanasius, who returned home to be made archbishop of Alexandria (a.d. 326). After being four times expelled by the Arians, and once by the emperor Julian, he died, a.d. 373, at the moment when an Arian persecution began. So large a proportion of the population had taken religious vows that under Valens it became necessary to abolish the privilege of monks which exempted them from military service. The reign of Theodosius I. witnessed the overthrow of Arianism, and this was followed by the suppression of Pagan- ism, against which a final edict was promulgated a.d. 390. In Egypt, the year before, the temple of Serapis at Alexandria had been captured after much bloodshed by the Christian mob and turned into a church. Generally the Coptic Christians were content to build their churches within the ancient temples, plastering over or effacing the sculptures which were nearest to the ground and in the way of the worshippers. They do not seem to have been very zealous in the work of destruction; the native religion was already dead and they had no fear of it. The prosperity of the church was the sign of its decay, and before long we find persecution and injustice disgracing the seat of Athanasius. Cyril, the patriarch of Alexandria (a.d. 415), expelled the Jews from the capital with the aid of the mob, and by the murder of the beautiful philosopher Hypatia marked the lowest depth to which ignorant fanaticism could descend. A schism now produced lengthened civil war and alienated Egypt from the empire. The distinction between religion and politics seemed to be lost, and the government grew weaker and weaker. The system of local government

by citizens had now entirely dis- appeared. Offices, with new Byzantine names, were now almost hereditary in the wealthy land-owning families. The Greek rulers of the Orthodox faith were unable to protect the tillers of the soil, and these being of the Monophysite persuasion and having their own church and patriarch, hated the Orthodox patriarch (who from the time of Justinian onwards was identical with the prefect) and all his following. Towards the middle of the 5th century, the Blemmyes, quiet since the reign of Diocletian, recommenced their incursions, and were even joined in them by the Nobatae. These tribes were twice brought to account severely for their misdoings, but not effectually checked. It was in these circumstances that Egypt fell without a conflict when attacked by Chosroes (a.d. 616). After ten years of Persian dominion the success of Heraclius restored Egypt to the empire, and for a time it again received a Greek governor. The Monophysites, who had taken advantage of the Persian occupation, were persecuted and their patriarch expelled. The Arab conquest was welcomed by the native Christians, but with it they ceased to be the Egyptian nation. Their language is still used in their churches, but it is no longer spoken, and its literature, which is wholly ecclesiastical, has been long unproductive.

The decline of Egypt was due to the purely military govern- ment of the Romans, and their subsequent alliance with the Greek party of Alexandria, which never represented the country. Under weak emperors, the rest of Egypt was exposed to the inroads of savages, and left to fall into a condition of barbarism. Ecclesiastical disputes tended to alienate both the native popula- tion and the Alexandrians. Thus at last the country was merely held by armed force, and the authority of the governor was little recognized beyond the capital, except where garrisons were stationed. There was no military spirit in a population unused to arms, nor any disinclination to be relieved from an arbitrary and persecuting rule. Thus the Moslem conquest was easy.

Bibliography. — Hellenistic Period. — See the special articles Alexandria, &c, and especially Ptolemies; J. P. Mahaffy, The Empire of the Ptolemies (London, 1895), A History of Egypt under

the Ptolemaic Dynasty (London, 1899) ; A. Bouche-Leclercq, Histoire des Lagides (4 vols., Paris, 1903-) ; E. A. W. Budge, A History of Egypt, vols, vii.-viii. (London, 1902) ; J. G. Miine, A History of Egypt under Roman Rule (London, 1898); E. Gibbon, Decline and Fall of the Roman Empire (edited by J. B. Bury) (London, 1900). The administration and condition of Egypt under the Ptolemaic and Roman rules are abundantly illustrated in recently discovered papyri, see especially the English publications of B. P. Grenfell and A. S. Hunt

(Memoirs of the Graeco-Roman Branch of the Egypt Exploration Fund) and F. G. Kenyon (British Museum Catalogues); also Mr Kenyon's annual summaries in the Archaeological Report of the Egypt Exploration Fund. An ample selection of the Greek in- scriptions from Egypt is to be found in W. Dittenberger, Orientis Graeci inscriptiones selectae (2 vols., Leipzig, 1903-1905).

(R. S. P. ; F. Ll. G.)

2. Mahommedan Period.

(1) Moslem Conquest of Egypt. — In accordance with the scheme of universal conquest conceived by the founder of Islam, an army of some 4000 men was towards the end of the year a.d. 639 sent against Egypt under the command of 'Amr (see 'Amr-ibn- el-Ass), by the second caliph, Omar I., who had some doubt as to the expediency of the enterprise. The commander marched from Syria through El-'Arlsh, easily took Farama or Pelusittm, and thence proceeded to Bilbeis, where he was delayed for a month; having captured this place, he proceeded to a point on the Nile called Umm Dunain, the siege of which also occasioned him some difficulty. After taking it, he crossed the Nile to the Fayum. On the 6th of June of the following year (640) a second army of 12,000 men, despatched by Omar, arrived at Heliopolis (On). 'Amr recrossed the river and joined it, but presently was confronted by a Roman army, which he defeated at the battle of Heliopolis (July 640) ; this victory was followed by the siege of Babylon, which after some futile attempts at negotiation was taken partly by storm and partly by capitulation on Good Friday, the 6th of April 641. 'Amr next proceeded in the direction of Alexandria, which was surrendered to him by a treaty signed on the 8th of November 641, under which it was to be occupied by the Moslems on the 29th of September of the following year. The interval was spent by him in founding the city Fostat (Fusˆat), near the modern Cairo, and called after the camp (Fossatum) occupied by him while besieging Babylon; and in reducing those coast towns that still offered resistance. The Thebaid seems to have surrendered with scarcely any opposition.

The ease with which this valuable province was wrenched from the Roman empire appears to have been due to the treachery of the governor of Egypt, Cyrus, patriarch of Alexandria, and the incompetence of the generals of the Roman forces. The former, called by the Arabs Mukaukis (Muqauqis) from his Coptic name Pkauchios, had for ten years before the arrival of 'Amr maintained a fierce persecution of the Jacobite sect, to which the bulk of the Copts belonged. During the siege of Babylon he had been recalled and

exiled, but after the death of Heraclius had been reinstated as patriarch by Heraclonas, and been welcomed back to Alexandria with general rejoicing in September 641. Since Alexandria could neither have been stormed nor starved out by the Arabs, his motives for surrender- ing it, and with it the whole of Egypt, have been variously interpreted, some supposing him to have been secretly a convert to Islam. The notion that the Arab invaders were welcomed and assisted by the Copts, driven to desperation by the persecu- tion of Cyrus, appears to be refuted by the fact that the invaders treated both Copts and Romans with the same ruthlessness; but the dissensions which prevailed in the Christian communities, leading to riots and even civil war in Alexandria and elsewhere, probably weakened resistance to the common enemy. An attempt was made in the year 645 with a force under Manuel, commander of the Imperial forces, to regain Alexandria for the Byzantine empire; the city was surprised, and held till the summer of 646, when it was again stormed by ‘Amr. In 654 a fleet was equipped by Constans with a view to an invasion, but it was repulsed, and partly destroyed by storm. From that time no serious effort was made by the Eastern Empire to regain pos- session of the country. And it would appear that at the time of the attempt by Manuel the Arabs were actually assisted by the

Copts, who at the first had found the Moslem lighter than the Roman yoke.

A question often debated by Arabic authors is whether Egypt was taken by storm or capitulation, but, so far as the transfer- ence of the country was accomplished by the first JHZHJfa. taking of Alexandria, there seems no doubt that the tioa. latter view is correct. The terms were those on

which conquered communities were ordinarily taken under Moslem protection. In return for a tribute of money (jizyah) and food for the troops of occupation (daribat-al-ta’am) , the Christian inhabitants of Egypt were to be excused military service, and to be left free in the observance of their religion and the administration of their affairs.

From 639 to 968 Egypt was a province of the Eastern Caliph- ate, and was ruled by governors sent from the cities which at different times

ranked as capitals. Like other provinces of the later Abbasid Caliphate its rulers were, during this period, able to establish quasi-independent dynasties, such being those of the Tulunids who ruled from 868 to 905, and the Ikshidis from 935-969. In 969 the country was conquered by Jauhar for the Fatimite caliph Mo'izz, who transferred his capital from Mahdia (q.v.) in the Maghrib to Cairo. This dynasty lasted till 11 7 1, when Egypt was again embodied in the Abbasid empire by Saladin, who, however, was himself the founder of a quasi-independent dynasty called the Ayyubites or Ayyubids, which lasted till 1252. The Ayyubites were followed by the Mameluke dynasties, usually classified as Bahri from 1252-1382, and Burji from 1382-1517; these sovereigns were nominally under the suzerainty of Abbasid caliphs, who were in reality instruments of the Mameluke sultans, and resided at Cairo. In 151 7 Egypt became part of the Ottoman empire and was governed by pashas sent from Constantinople, whose influence about 1707 gave way to that of officials chosen from the Mamelukes who bore the title Sheik al-balad. After the episode of the French occupation, government by pashas was restored; Mehemet Ali (appointed pasha in 1805) obtained from the Porte in 1841 the right to bequeath the sovereignty to his descendants, one of whom, Ismail Pasha, received the title Khedive, which is still held by Mehemet Ali's descendants.

(2) The following is a list of the governors of Egypt in these successive periods: —

(a) During the undivided Caliphate.

'Amr-ibn-el-Ass, a.h. 18-24 (a.d. 639-645).

'Abdallah b. Sa'd b. Abi Sarh, 24-36 (645-656).

Qais b. Sa'd b. 'Ubadah, 36 (657-658).

Mahommed b. Abu Bekr, 37-38 (658).

Ashtar Malik b. al-Harith appointed, but never governed).

"Amr-ibn-el-Ass, 38-43 (658-663).

'Utbah b. Abu Sofian, 43-44 (664-665).

'Utbah b. 'Amir, 44-45 (665).

Maslama b. Mukhallad, 45-62 (665-682).

Sa’id b. Yazid b. ‘Alqamah, 62-64 (682-684).

Abdarrahman b. ‘Utbah b. Jahdam, 64-65 (684).

Abdalaziz (‘Abd al-‘Aziz) b. Merwan, 65-86 (685-705).

‘Abdallah b. ‘Abd al-Malik, 86-90 (705-708).

Qurrah b. Sharlk al-‘Absi, 90-96 (709-714).

‘Abd al-Malik b. Rifa’ah al-Fahmi, 96-99 (715-717).

Ayyub b. Shurahbil al-Asbahi, 99-101 (717-720).

Bishr b. Safwan al-Kalbi, 101-102 (720-721).

Hanzalah b. Safwan, 102-105 (721-724).

Mahommed b. ‘Abd al-Malik, 105 (724).

Hurr b. Yusuf, 105-108 (724-727).

Hafs b. al-Walid, 108 (727).

‘Abd al-Malik b. Rifa’ah, 109 (727).

Walid b. Rifa’ah, 109-117 (727-735).

‘Abd al-Rahman b. Khalid, 117-118 (735).

Hanzalah b. Safwan, 1 18-124 (735-742).

Hafs b. al-Walid, 124-127 (742-745).

Hassan b. ‘Atahiyah al-Tu’jibi, 127 (745).

Hafs b. al-Walid, 127 (745).

Hautharah b. Suhail al-Bahili, 128-131 (745-749).

Mughirah b. ‘Ubaidallah al-Fazari, 131-132 (749);

‘Abd al-Malik b. Marwan al-Lakhmi, 132 (750).

Salih b. ‘AH, 133 (750-751).

Abu ‘Aun ‘Abdalmalik b. Yazid, 133-136 (751-753).

Salih b. ‘Ali, 136-137 (753-755) — second time.

Abu ‘Aun, 1 37-1 41 (755-758) — second time.

Musa b. Ka’b b. ‘Uyainah al-Tamimi, 141 (758-759).

Mahommed b. al-Ash’ath b. ‘Uqbah al-Khuza i, 141-143 (759-

760).

Humaid b. Qahjabah b. Shabib al-Ta’i, 143-144 (760-762). Yazid b. Hatim b. Kabisah al-Muhallabi, 144-152 (762-769). ‘Abdallah b. ‘Abdarrahman b. Moawiya b. Hudaij, 152-155

(769-772).

Mahommed b. Abdarrahman b. Moawiya b. Hudaij, 155 (772). Musa b. ‘Ulayy b. Rabah al-Lakhmi, 155-161 (772-778). ‘Isa b. Luqman b. Mahommed al-Jumahi, 161-162 (778). Wadih, 162 (779).

Mansur b. Yazid b. Mansur al-Ru’aini, 162 (779). Abu Salih Yahya b. DawGd b. Mamdud, 162-164 (779~78o). Salim b. Sawadah al-Tamimi, 164 (780-781). Ibrahim b. Salih b. ‘Ali, 165-167 (781-784). Musa b. Mus’ab b. al-Rabi al-Khath’ami, 167-168 (784-785). Usamah b. ‘Amr b. ‘Alqamah al-Ma’afiri, 168 (785). al Fadl b. Salih b. ‘Ali al-‘Abbasi, 168-169 (785-786). ‘Alib. Sulaiman b. ‘Ali al-‘Abbasi, 169-171 (786-787). Musab. ‘Isab. Musa al-‘Abbasi, 171-172 (787-789). Maslamah b. Yahya b. Qurrah al-Bajili, 172-173 (789-790). Mahommed b. Zuhair al-Azdi, 173 (790). Dawud b.. Yazid b. Hatim al-Muhallabi, 174-175 (790). Musa b. ‘Isa al-‘Abbasi, 175-176 (790-792). Ibrahim b. Salih, 176 (792). Salih b. Ibrahim, 176 (792). Abdallah b. al-Musayyib b. Zuhair al Dabbi, 176-177 (792-

793)-

Ishaq b. Sulaiman b. ‘All al-‘Abbasi, 177-178 (793-794). Harthamah b. A’yan, 178 (794-795). ‘Obaidallahb. al-Mahdi, 179 (795). Musa b. ‘Isa al-‘Abbasi, 179-180 (795-796). ‘Obaidallah b. al-Mahdi, 180-181 (796-797) — second time. Isma’il b. Salih b. ‘Ali al-‘Abbasi, 181-182 (797-798). Isma’il b. ‘Isa b. Musa al-‘Abbasi, 182-183 (798). Laith b. al-Fadl al-Abiwardi, 183-187 (798-803). Ahmad b. Isma’il b. ‘Ali al-‘Abbasi, 187-189 (803-805). ‘Obaidallah b. Mahommed b. Ibrahim al-‘Abbasi, 189-190

(805-806).

Husain b. Jamil, 190-192 (806-808). Malik b. Dalhamb. ‘Isa al-Kalbi, 192-193 (808). Hasan b. al-Tahtah, 193-194 (808-809). Hatim b. Harthamah b. A’yan, 194-1195 (809-811). Jabir b. al-Ash’ath b. Yahya al-Ta’i, 195-196 (811-812). ‘Abbadb. Mahommedb. Hayyan al-Balkhi, 196-198 (812-813). Mottalib b. ‘Abdallah b. Malik al-Khuza’i, 198 (813-814). ‘Abbas b. Musa b. ‘Isa al-‘Abbasi, 198-199 (814). Mottalib b. ‘Abdallah, 199-200 (814-816) — second time. Sari b. al-Hakam b. Yusuf, 200-201 (816). Sulaiman b. Ghalib b. Jibril al-Bajili, 201 (816-817). Sari b. al Hakam, 201-205 (817-820). Abu Nasr Mahommed b. al-Sari, 205 (820-821). ‘Obaidallah b. al-Sari, 205-211 (821-826). ‘Abdallah b. Tahir, 21 1-2 13 (826-829). Mahommed b. Harun (al-Mo’tasim), 213-214 (829). “Umair b. Al-Walid al-Tamimi al-Badhaghisi, 214 (829). ‘Isa b. Yazid, 214 (829). ‘Abduyah b. Jabalah, 215-216 (830-831). ‘Isa b. Mansur b. Musa al-Rafi’i, 216-217 (831-832). Nasr b. Abdallah Kaidar al-Safadi, 217-219 (832-834). Muzaffar b. Kaidar, 219 (834).

Musa b. Abi’l- ‘Abbas Thabital HanafI, 219-224 (834-839). Malik b. Kaidar al Safadi, 224-226 (839-841). ‘Ali b. Yahya abu 1-Hasan al-Armanl, 226-228 (841-842). ‘Isa b. Mansur al-Rafi’i, 229-233 (843-847). Harthamah b. al-Nadir al Jabali, 233-234 (848-849). Hatim b. Harthamah, 234 (849). ‘Alib. Yahya, 234-235 (849-850). Ishaq b. Yahya al-Khatlani, 235-236 (850-851). ‘Abd al-Wahid b. Yahya b. Mansur, 236-238 (851-852). ‘Anbasa b. Ishaq b. Shamir, 238-242 (852-856). Yazid b. ‘Abdallah b. Dinar, 242-253 (856-867). Muzahim b. Khaqan al-Turki, 253-254 (867-868). Ahmad b. Muzahim b. Khaqan, 254 (868). Urjuz b. UlughTarkhan al-Turki, 254 (868).

Tulunid house.

Ahmad b. Tulun, 254-270 (868-884). Khomaruya b. Ahmad, 270-282 (884-896). Jaish b. Khomaruya, 282 (896). Harun b. Khomaruya, 283-292 (896-904).

Shaiban b. Ahmad, 292 (905).

‘Isa b. Mahommed al-Naushari, 292 (905).

Mahommed b. ‘Ali al-Khalanji, 292-293 (905-906).

‘Isa al-Naushari, 293-297 (906-910) — second time.

Takin b. Abdallah al-Khazari, 297-302 (910-915).

Dhuka al-Rumi, 303-307 (915-919).

Takin b. ‘Abdallah, 307-309 (919-921) — second time.

Abu Qabus Mahmud b. Hamal, 309 (921).

Hilal b. Badr, 309-311 (921-923).

Ahmad b. Kaighlagh, 311 (923).

Takin b. Abdallah, 311-321 (923-933) — third time.

Mahommed b. Takin, 321 (933).

Ikshidi house.

Mahommed b. Tughj al-Ikshid, 321 (933).

[Ahmad b. Kaighlagh, 321-322 (933-934)].

Mahommed b. Tughj, 323-334 (934-946) — second time.

Onjur b. al-Ikshid, 334-349 (946-961).

‘Ali b. al-Ikshid, 349-355 (961-966).

Kafur b. Abdallah al-Ikshidi, 355-357 (966-968).

Abu'l-Fawaris Ahmad b. Ali b. al-Ikshid, 357 (968).

(b) Fatimite Caliphs, 357-567 (969-1171).

Mo'izz Abu Tamim Ma'add (or li-din allah), 357-365 (969-975).

'Aziz Abu Mansur Nizar (al-'Aziz billah), 365-386 (975-996).

Hakim [Abu "Ali Mansur], 386-411 (996-1020).

Zahir [Abu'l-Hasan 'All], 411-427 (1020-1035).

Mostansir [Abu Tamim Ma'add], 427-487 (1035-1094).

Mosta'li [Abu'l-Qasim Ahmad], 487-495 (1094-1101).

Amir [Abu 'All Mansur], 495-524 (1101-1130).

Hafiz [Abu'l-Maimun 'Abd al-Majid], 524-544 (1130-1149).

Zafir [Abu'l-Mansur Isma'il], 544-549 (1149-1154).

Fa'iz [Abu'l-Qasim 'Isa], 549-555 (1154-1160').

'Adid [Abu Mahommed 'Abdallah], 555-567 (1160-1171).

(c) Ayyubite Sultans, 564-648 (1 169-1250).

Malik al-Nasir Salah al-din Yusuf b. Ayyub (Saladin), 564-589

(1169-1193). '

Malik al-'Aziz 'Imad al-din Othman, 589-595 (1193-1198). Malik al-Mansur Mahommed, 595-596 (1198-1199). Malik al-'Adil Saif al-din Abu Bakr, 596-615 (1199-1218). Malik al-Kamil Mahommed, 615-635 (1218-1238). Malik al-'Adil II. Saif al-din Abu Bakr, 635-637 (1238-1240). Malik al-Salih Najm al-din Ayyub, 637-647 (1240-1249). Malik al-Mo'azzam Tiiranshah, 647-648 (1249-1250). Malik al-Ashraf Musa, 648-650 (1250-1252).

(d) Bahri Mamelukes, 648-792 (1250-1390).

Shajar al-durr, 643 (1250).

Malik al-Mo'izz 'Izz al-din Aibek, 648-655 (1250-1257).

Malik al-Mansur Nureddin 'Ali, 655-657 (1257-1259).

Malik al-Mozaffar 9eif al-din Kotuz, 657-658 (1259-1260).

Malik al-Zahir [Rukn al-din (Rukneddin) Bibars Bundukdari],

658-676 (1260-1277).

Malik al-Sa'Id Nasir al-din Barakah Khan, 676-678 (1277-

Malik ai-'Adil Badr al-din Salamish, 678 (1279). Malik al-Mansur Saif al-din Qala'un, 678-689 (1279-1290). Malik al-Ashraf [Salah al-din Khalil], 689-693 (1290-1293). > Malik al-Nasir [Nasir al-din Mahommed], 693-694 (1293-1294). Malik al-'Adil [Zain al-din Kitboga], 694-696 (1294-1296). Mansur [rlusam al-din Lajin], 696-698 (1296-1298). Nasir Mahommed (again), 698-708 (1298-1308). Mo?affar [Rukn al-din Bibars Jashengir], 708-709 (1308-1310). Nasir Mahommed (third time), 709-741 (1310-1341). Mansur [Saif al-din Abu Bakr], 741-742 (1341). Ashraf [Ala'u '1-din Kuchuk], 742 (1341-1342). Nasir [Shihab al-din Ahmad], 742-743 (1342). Salih 'Imad al-din Isma'il], 743-746 (1342-1345). Kamil [Saif al-din Sha'ban], 746-747 (1345-1346). Mozaffar [Saif al-din Hatti], 747-748 (1346-1347). Nasir [Nasir al-din Hasan], 748-752 (1347-1351). Salih [Salah al-din Salih], 752-755 (I35I-I354)- Nasir [Hasan] (again), 755~762 1,1354-1361). Mansur [Salah al-din Mahommed], 762-764 (1361-1363). Ashraf [Nasir al-din Sha'ban], 764-778 (1363-1377). Mansur ['Ala'u '1-din 'Ali], 778-783 (1377-1381). Salih. [Salah al-din Hajji], 783-784 (1381-1382). Barkuk' or Barquq (see below), 784-791 (1382-1389). Hajji again, with title of Mozaffar, 791-792 (1389-1390).

(e) Burji Mamelukes, 784-922 (1382-1517).

Zahir [Saif al-din Barquq], 784-801 (1382-1398) [interrupted

by Hajji, 791-792]. Nasir [Nasir al-din Faraj], 801-808 (1398-1405). Mansur ['Izz al-din Abdalaziz ('Abd al-'Aziz)], 808-809 (1405-

1406).

Nasir Faraj (again), 809-815 (1406-1412). 'Adil Mosta'in (Abbasid caliph), 815 (1412). Mu'ayyad [Sheikh], 815-824 (1412-1421). Mozaffar [Ahmad], 824 (1421). Zahir [Saif al-din Tatar], 824 (1421). Salih [Nasir al-din Mahommed], 824-825 (1421-1422). Ashraf [Saif al-din Barsbai], 825-842 (1422-1438). 'Aziz []amal al-din YOsuf], 842 (1438). Zahir [Saif al-din Jakmak], 842-857 (1438-1453). Mansur [Fakhr al-din Othman], 857 (1453). Ashraf [Saif al-din Inal], 857-865 (1453-1461). Mu'ayyad [Shihab al-din Ahmad], 865 (1461).

Zahir [Saif al-din Khoshkadam], 865-872 (1461-1467).

Zahir [Saif al-din Yelbai or Bilbai], 872 (1467).

Zahir [Timurbogha], 872-873 (1467-1468).

Ashraf [Saif al-din (Kait Bey)], 873-901 (1468-1495).

Nasir [Mahommed], 901-904 (1495-1498).

Zahir [Kansuh], 904-905 (1498-1499).

Ashraf Qanbalat or Jan Belat], 905-906 (1499-1501).

‘Adil Tumanbey (1501).

Ashraf [Kansuh Ghuri], 906-922 (1501-1516).

Ashraf [Tumanbey], 922 (1516-1517).

(/) Turkish Governors after the Ottoman Conquest.

Khair Bey, 923 (1517).

Mustafa Pasha, 926 (1520). #

Ahmad, 929 (1523).

Qasim, 930 (1524).

Ibrahim, 931 (1525).

Suleiman, 933 (1527).

Dawud, 945 (1538).

‘All, 956 (1549)-

Mahommed, 961 (1554).

Iskandar, 963 (1556).

‘AH al-Khadim, 968 (1561).

Mustafa, 969 (1561).

‘All al-Sufi, 971 (1563).

Mahmtid, 973 (1566).

Sinan, 975 (1567).

Hosain, 980 (1573).

Masih, 982 (1575).

Hasan al-KhSdim, 988 (1580).

Ibrahim, 991 (1583).

Sinan, 992 (1584).

Uwais, 994 (1585).

Hafiz Ahmad, 99Q (1591).

Kurt, 1003 (1595).

Sayyid Mahommed, 1004 (1596).

Khidr, 1006 (1598).

‘AH al-Silahdar, 1009 (1601).

Ibrahim, 1012 (1604).

Mahommed al-Kurji, 1013 (1605).

Hasan, 1014 (1605).

Mahommed al-Sufi, 1016 (1607).

Ahmad al-Daftardar, 1022 (1613).

Mustafa Lafakli, 1026 (1617).

la’far, 1027 (1618).

Mustafa, 1028 (1619).

Hosain, 1028 (1619).

Mahommed, 1031 (1622).

Ibrahim, 1031 (1622).

Mustafa, 1032 (1623).

‘Ali, ‘1032 (1623).

Mustafa, 1032 (1624).

Bairam, 1036 (1626).

Mahommed, 1037 (1627).

Musa, 1040 (1631).

Khalllal-Bustanji, 1041 (1631).

Ahmad al-Kurji, 1042 (1633).

Hosain, 1045 (1636).

Mahommed b. Ahmad, 1047

(1638).

Mustafa al-Bustanji, 1049 (1639). Maqsfid, 1050 (1641). Suyan Bey, 1054 (1644). Ayyub, 1055 (1645). Mahommed b. Haidar, 1057

(1647). ■ Ahmad, 1058 (1648). ‘Abd al-Rahman, 1061 (1651). Mahommed al-Silahdar, 1062

(1652).

Ghazi, 1066 (1655). Omar, 1067 (1652). Ahmad, 1077 (1666). Ibrahim, 1078 (1667).

Ahmad,

1 1 16 (1704). (1706). 1119 (1707). 1121 (1709).

Hosain, 1085 (1674).

Hasan al-Janbalaˆ, 1087 (1676).

Othman, 1091 (1680).

Hasan al-Silahdar, 1099 (1688).

Ahmad, 1101 (1690).

‘Ali Qilij, 1 102 (1691).

Isma'il, 1107 (1696).

Hosain, 1109 (1697).

Qara Mahommed or

mi (1699). Mahommed Rami 'All Muslim, 1 1 18 Hosain Ketkhuda, Ibrahim Qabudan, Khalil, 1122 (1710). Wall, 1 123 (171 1). 'Abidin, 1127 (1715). 'All Izmirli, 1129 (1717). Rajab, 1130 (1718). Mahommed al-Bashimi, 1 132

(1720).

'AH, 1 138 (1728). Bakir, 1141 (1729). 'Abdallah Kuburhi, 1142 (1729). Mahommed Silahdar.i 144(1732). Othman HalabI, 1146 (1733). Bakir, 1 148 (1735). Mustafa, 1149 (1736). Sulaiman b.al-'Azim. 1 1 52(1 739) . 'AH Hakim Oghlu,f 153 (1740). Yahy'a, 1154 (1741). Mahommed Yedkeshi, 1 156

(1743)-

Mahommed Raghib,ll58 (1745). Ahmad Kuruzir, 1161 (1748). Sharif 'Abdallah, 1163 (1750). Mahommed Amin, 1166 (1753). Mustafa, 1166 (1753). 'Ali Hakim Oghlu, 1169 (1756). Mahommed Sa'id, 1 171 (1758). Mustafa, 1173 (1759). Ahmad Kamil, 1174 (1761). Bakir, 1175 (1761). Hasan, 1 176 (1761). Hamzah, 1179 (1765). Mahommed Raqim, 1181 (1767). Mahommed Urflu, 1 182 (1768). Ahmad, 1183 (1770). Qara Khalil, 1184 (1770). Mustafa Nabulsi, 1188 (1774). Ibrahim 'Arabgirli, 1189 (1775). Mahommed 'Izzet, 1 190 (1776). Isma'il, 1193 (I779)- Mahommed Malik, 1195 (1781). Sharif 'All Qassab, 1196 (1782). Mahommed Silahdar, 1 1 98 (1 783). Mahommed Yeyen, 1200 (1785). 'Abidin Sharif, 1201 (1787). Isma'il TunisI, 1203 (1788). $alih Qaisarli, 1209 (1794). Abu Bakr Tarabulsi, 1211

(1796).

French Occupation. Khosrev, 1216 (1802). Ali Jaza'irll or Tarabulsi, 1218

Tahir, 1218 (1803). (1803).

Khorshid, 1219 (1804).

(g) Hereditary Pashas {later Khedives), from 1220 (from 1805). Mehemet 'Ali, 1220-1264 (1805- Sa'id, 1270-1280 (1854-1863).

1848). Isma'il, 1280-1300 (1863-1882).

Ibrahim, 1264 (1848). Tewfik, 1300-1309 (1882-1892).

'Abbas I., 1264-1270 (1848-1854). Abbas II., 1309 (1892).

(3) Period under Governors sent from the Metropolis of the eastern Caliphate. — The first governor of the newly acquired province was the conqueror 'Amr, whose jurisdiction was

presently restricted to Lower Egypt; Upper Egypt, which was divided into three provinces, being assigned to Abdallah b. Sa'd, on whom the third caliph conferred the government of Lower Egypt also, 'Amr being recalled, owing to his unwillingness to extort from his subjects as much money as would satisfy the caliph. In the troubles which overtook the Islamic empire with the accession of Othman, Egypt was greatly involved, and it had to be reconquered from the adherents of Ali for Moawiya (Mo'awiyah) by 'Amr, who in a.h. 38 was rewarded for his ser- vices by being reinstated as governor, with the right to appro- priate the surplus revenue instead of sending it as tribute to the metropolis. In the confusion which followed on the death of the Omayyad caliph Yazld the Egyptian Moslems declared themselves for Abdallah b. Zobair, but their leader was defeated in a battle near Ain Shams (December 684) by Merwan b. Bakam (Merwan I.), who had assumed the Caliphate, and the conqueror's son Abd al-'AzIz was appointed governor. They also declared themselves against the usurper Merwan II. in 745, whose lieu- tenant al-Bautharah had to enter Fostat at the head of an army. In 750 Merwan II. himself came to Egypt as a fugitive from the Abbasids, but found that the bulk of the Moslem population had already joined with his enemies, and was defeated and slain in the neighbourhood of Giza in July of the same year. The Abbasid general, Salih b. Ali, who had won the victory, was then appointed governor.

During the period that elapsed between the Moslem conquest and the end of the Omayyad dynasty the nature of the Arab occupation had changed from what had originally been intended, the establishment of garrisons, to systematic colonization. Conversions of Copts to Islam were at first rare, and the old system of taxation was maintained for the greater part of the first Islamic century. This was at the rate of a

dinar per feddan, of which the proceeds were used in the first place for the pay of the troops and their families, with about half the amount in kind for the rations of the army. The process by which the first of these contributions was turned into coin is still obscure; it is clear that the corn when threshed was taken over by certain public officials who deducted the amount due to the state. In general the system is well illustrated by the papyri forming the Schott-Reinhardt collection at Heidelberg (edited by C.H. Becker, 1906), which contain a number of letters on the subject from Qurrah b. Shank, governor from a.h. 00 to 96. The old division of the country into districts (nomoi) is maintained, and to the inhabitants of these districts demands are directly addressed by the governor of Egypt, while the head of the community, ordinarily a Copt, but in some cases a Moslem, is responsible for compliance with the demand. An official called ” receiver ” (qabbdl) is chosen by the inhabitants of each district to take charge of the produce till it is delivered into the public magazines, and receives 5% for his trouble. Some further details are to be found in documents preserved by the archaeologist Maqrlzi, from which it appears that the sum for which each district was responsible was distributed over the unit in such a way that artisans and tradesmen paid at a rate similar to that which was enforced on those employed in agriculture. It is not known at what time the practice of having the amount due settled by the community was altered into that according to which it was settled by the governor, or at what time the practice of deducting from the total certain expenses necessary for the maintenance of the community was abandoned. The researches of Wellhausen and Becker have made it clear that the difference which is marked in later Islam between a poll-tax (jizyah) and a land-tax (khardj) did not at first exist: the papyri of the 1st century know only of the jizyah, which, however, is not a poll-tax but a land-tax (in the main). The development of the poll-tax imposed on members of tolerated cults seems to be due to various causes, chief of them the acquisition of land by Moslems, who were not at first allowed to possess any, the conversion of Coptic landowners to Islam, and the enforcement (towards the end of the 1st century of Islam) of the poll-tax on monks. The treasury could not afford to lose the land-tax, which it would naturally forfeit by the first two of the above occurrences, and we read of

various expedients being tried to prevent this loss. Such were making the Christian community to which the proselyte had belonged pay as much as it had paid when his lands belonged to it, making proselytes pay as before their conversion, or com- pelling them to abandon their lands on conversion. Eventually the theory spread that all land paid

land-tax, whereas members of tolerated sects paid a personal tax also; but during the evolution of this doctrine the relations between conquerors and conquered became more and more strained, and from the time when the control of the finance was separated from the admin- istration of the country (a.d. 715) complaints of extortion became serious; under the predecessor of Qurrah, ‘Abdallah b. ‘Abd al-Malik, the country suffered from famine, and under this ruler it was unable to recover. Under the finance minister Obaidallah b. Habhab (720-734) the first government survey by Moslems was made, followed by a census; but before this time the higher administrative posts had been largely taken out of the hands of Copts and filled with Arabs. The resentment of the Copts finally expressed itself in a revolt, which broke out in the year 725, and was suppressed with difficulty. Two years revolt after, in order that the Arab element in Egypt might be strengthened, a colony of North Arabians (Qaisites) was sent for and planted near Bilbeis, reaching the number of 3000 persons; this immigration also restored the balance between the two branches of the Arab race, as the first immigrants had belonged almost exclusively to the South Arabian stock. Mean- while the employment of the Arabic language had been steadily gaining ground, and in 706 it was made the official language of the bureaux, though the occasional use of Greek for this purpose is attested by documents as late as the year 780. Other revolts of the Copts are recorded for the year 739 and 750, the last year of Omayyad domination. The outbreaks in all cases are attributed to increased taxation.

The Abbasid period was marked at its commencement by the erection of a new capital to the north of Fostat, bearing the name ‘Askar or ” camp.” Apparently at this time the practice of farming the taxes began, which naturally led to even greater extortion than before; and a fresh rising of the Copts is recorded for the fourth year of Abbasid rule. Governors, as will be seen from the list, were frequently changed. The three officials of importance whose nomination is mentioned by the historians in addition to that of the governor were the commander of the bodyguard, the minister of finance and the judge. Towards the beginning of the 3rd Islamic century the practice of giving Egypt in fief to a governor was resumed by the caliph Mamun, who bestowed this privilege on ‘Abdallah b. Tahir, who in 827 was sent to recover Alexandria, which for some ten years had been held by exiles from Spain. ‘Abdallah b. Tahir decided to reside at Bagdad, sending a deputy to Egypt to govern for him; and this example was afterwards followed. In 828, when Mamun’s brother Motasim was feudal lord, a violent insurrection broke out in the IJauf, occasioned, as usual, by excessive taxa- tion; it was partly quelled in

the next year by Motasim, who marched against the rebels with an army of 4000 Turks. The rebellion broke out repeatedly in the following years, and in 831 the Copts joined with the Arabs against the government; the state of affairs became so serious that the caliph Mamun himself visited Egypt, arriving at Fostat in February 832; his general Afshin fought a decisive battle with the rebels at Bashariid in the Hauf region, at which the Copts were compelled to sur- render; the males were massacred and the women and children sold as slaves.

This event finally crushed the Coptic nation, which never again made head against the Moslems. In the following year the caliph Motasim, who surrounded himself with a foreign body- guard, withdrew the stipends of the Arab soldiers in Egypt; this measure caused some of the Arab tribes who had been long settled in Egypt to revolt, but their resistance was crushed, and the domination of the Arab element in the country from this time gave way to that of foreign mercenaries, who, belonging to one nation or another, held it for most of its subsequent history. Egypt was given in fief to a Turkish general Ashnas

(Ashinas), who never visited the country, and the rule of in- dividuals of Turkish origin prevailed till the rise of the Fatimites, who for a time interrupted it. The presence of Turks in Egypt is attested by documents as early as 808. While the governor t ki h was a PP om ted by the feudal lord, the finance minister governors continued to be appointed by the caliph. On the appointed, death f Ashnas in 844 Egypt was given in fief to another Turkish general Itakh, but in 850 this person fell out of favour, and the fief was transferred to Montasir, son of the caliph Motawakkil. In 856 it was transferred from him to the vizier Fath b. Khaqan, who for the first time appointed a Turkish governor. The chief places in the state were also filled with Turks. The period between the rise of the Abbasids and the quasi-independent dynasties of Egypt was marked by much religious persecution, occasioned by the fanaticism of some of the caliphs, the victims being generally Moslem sec- tarians. (For Egypt under Motawakkil see Caliphate, § c. par. 10.)

The policy of these caliphs also led to severe measures being taken against any members of the Alid family or adherents of their cause who were to be found in Egypt.

In the year 868 Egypt was given in fief to a Turkish general Bayikbeg, who sent thither as his representative his stepson n Ahmad b. Tulun, the first founder of a quasi-inde-

bynasty. P en dent dynasty. This personage was himself the son of a Turk who, originally sent as a slave to Bagdad, had risen to high rank in the service of the caliphs. Ahmad b. Tulun spent some of his early life in Tarsus, and on his return distinguished himself by rescuing his caravan, which conveyed treasure belonging to the caliph, from brigands who attacked it; he afterwards accompanied the caliph Mosta'In into exile, and displayed some honourable qualities in his treatment of the fallen sovereign. He found a rival in Egypt in the person of Ibn al-Modabbir, the finance minister, who occupied an inde- pendent position, and who started the practice of surrounding himself with an army of his own slaves or freedmen; of these Ibn Tulun succeeded in depriving the finance minister, and they formed the nucleus of an army by which he eventually secured his own independence. Insurrections by adherents of the Alids gave him the opportunity to display his military skill; and when in 870 his stepfather died, by a stroke of luck the fief was given to his father-in-law, who retained Ahmad in the lieutenancy, and indeed extended his authority to Alexandria, which had till that time been outside it. The enterprise of a usurper in Syria in the year 872 caused the caliph to require the presence of Ahmad in that country at the head of an army to quell it ; and although this army was not actually employed for the purpose, it was not disbanded by Ahmad, who on his return founded a fresh city called Kata'i', " the fiefs," S.E. of modern Cairo, to house it. On the death of Ahmad's father-in-law in the same year, when Egypt was given in fief to the caliph's brother Mowaffaq (famous for his defeat of the Zanj), Ahmad secured himself in his post by extensive bribery at headquarters; and in the following year the administration of the Syrian frontier was conferred on him as well. By 875 he found himself strong enough to refuse to send tribute to Bagdad, preferring to spend the revenues of Egypt on the maintenance of his army and the erection of great buildings, such as his famous mosque; and though Mowaffaq advanced against him with an army, the project of reducing Ahmad to submission had to be abandoned for want of means. In 877 and 878 Ahmad advanced into Syria and obtained the submission of the chief cities, and at Tarsus entered into friendly relations with the representatives of the Byzantine emperor. During his absence his son 'Abbas revolted in Egypt; on the news of his father's return he fled to Barca, whence he endeavoured to conquer the Aghlabite dominions in the Maghrib; he was, however, defeated by the Aghlabite ruler, and returned to Barca, where he was again

defeated by his father's forces and taken prisoner.

In 882 relations between Ahmad and Mowaffaq again became strained, and the former conceived the bold plan of getting the caliph Mo'tamid into his power, which, however, was frustrated

by Mowaffaq's vigilance; but an open rupture was the result, as Mowaffaq formally deprived Ahmad of his lieutenancy, while Ahmad equally formally declared that Mowaffaq had forfeited the succession. A revolt that broke out at Tarsus caused Ahmad to traverse Syria once more in 883, but illness compelled him to return, and on the 10th of May 884 he died at his residence in Katp.T. He was the first to establish the claim of Egypt to govern Syria, and from his time Egypt grew more and more independent of the Eastern caliphate. He appears to have invented the fiction which afterwards was repeatedly employed, by which the money spent on mosque-building was supposed to have been furnished by discoveries of buried treasure.

He was succeeded by his son Khomaruya, then twenty years of age, who immediately after his accession had to deal with an attempt on the part of the caliph to recover Syria; this attempt failed chiefly through dissensions between the caliph's officers, but partly through the ability of Khomaruya's general, who succeeded in winning a battle after his master had run away from the field. By 886 Mowaffaq found it expedient to grant Khomaruya the possession of Egypt, Syria, and the frontier towns for a period of thirty years, and ere long, owing to the disputes of the provincial governors, Khomaruya found it possible to extend his domain to the Euphrates and even the Tigris. On the death of Mowaffaq in 891 the Egyptian governor was able to renew peaceful relations with the caliphs, and receive fresh confirmation in his possessions for thirty years. The security which he thereby gained gave him the opportunity to indulge his taste for costly buildings, parks and other luxuries, of which the chroniclers give accounts bordering on the fabulous. After the marriage of his daughter to the caliph, which was celebrated at enormous expense, an arrangement was made giving the Tulunid sovereign the viceroyalty of a region extending from Barca on the west to Hit on the east; but tribute, ordinarily to the amount of 300,000 dinars, was to be sent to the metropolis. His realm enjoyed peace till his death in 896, when he fell a victim to some palace intrigue at Damascus.

His son and successor Abu'l-'Asakir Jaish was fourteen years old at his accession, and being without adequate guidance soon revealed his incompetence, which led to his being murdered after a reign of six months by his troops, who gave his place to his brother Harun, who

was of about the same age. In the eight years of his government the Tulunid empire contracted, owing to the revolts of the deputies which Harun was unable to quell, though in 898 he endeavoured to secure a new lease of the sovereignty in Egypt and Syria by a fresh arrangement with the caliph, involving an increase of tribute. The following years witnessed serious troubles in Syria caused by the Carmathians, which called for the intervention of the caliph, who at last succeeded in defeating these fanatics; the officer Mahommed b. Solaiman, to whom the victory was due, was then commissioned by the caliph to reconquer Egypt from the Tulflnids, and after securing the allegiance of the Syrian prefects he invaded Egypt by sea and land at once. Before the arrival of these troops Harun had met his death at the hands of an assassin, or else in an affray, and his uncle Shaiban, who was placed on the throne, found himself without the means to collect an army fit to grapple with the invaders. Fostat was taken by Mahommed b. Solaiman after very slight resistance, at the beginning of 905, and after the infliction of severe punishment on the inhabitants Egypt was once more put under a deputy, ‘Isa al-Naushari, appointed directly by the caliph.

The old regime was not restored without an attempt made by an adherent of the Tulunids to reconquer Egypt ostensibly for their benefit, and for a time the caliph’s viceroy had to quit the capital. The vigorous measures of the authorities at Bagdad speedily quelled this rebellion, and the Tulunid palace at Kata’i’ was then destroyed in order that there might be nothing to remind the Egyptians of the dynasty. In the middle of the year 914 Egypt was invaded for the first time by a Fatimite force sent by the caliph al-Mahdi ‘Obaidallah, now established at Kairawan. The Mahdi’s son succeeded in taking Alexandria, and advancing as far as the Fayiim; but once more the Abbasid

lkshldlte Dynasty.

caliph sent a powerful army to assist his viceroy, and the invaders were driven out of the country and pursued as far as Barca; the Fatimite caliph, however, continued to maintain active propaganda in Egypt. In 919 Alexandria was again seized by the Mahdi’s son, afterwards the caliph al-Qaim, and while his forces advanced

northward as far as Ushmunain (Eshmunain) he was reinforced by a fleet which arrived at Alexandria. This fleet was destroyed by a far smaller one sent by the Bagdad caliph to Rosetta; but Egypt was not freed from the invaders till the year 921, when reinforcements had been repeatedly sent from Bagdad to deal with them. The extortions necessitated by these wars for the maintenance of armies and the incompetence of the viceroys brought Egypt at this time into a miserable condition; and the numerous political crises at Bagdad prevented for a time any serious measures being taken to improve it. After a struggle between various pretenders to the vice- royalty, in which some pitched battles were fought, Mahommed b. Tughj, son of a Tulunid prefect of Damascus, was sent by the caliph to restore order; he had to force his entrance into the country by an engagement with one of the pretenders, Ibn Kaighlagh, in which he was victorious, and entered Fostat in August 935. ■

Mahommed b. Tughj was the founder of the Ikshldl dynasty, so called from the title Ikshld, conferred on him at his request by the caliph shortly after his appointment to the governorship of Egypt; it is said to have had the sense of ” king ” in Ferghana, whence this person’s ancestors had come to enter the service of the caliph Motasim. He had himself served under the governor of Egypt, Takln, whose son he displaced, in various capacities, and had afterwards held various governorships in Syria. One of the historians represents his appointment to Egypt as effected by bribery and even forgery. He united in his person the offices of governor and minister of finance, which had been separate since the time of the Tulunids. He endeavoured to replenish the treasury not only by extreme economy, but by inflicting fines on a vast scale on persons who had held offices under his predecessor and others who had rendered themselves suspect. The disaffected in Egypt kept up communications with the Fatimites, against whom the Ikshld collected a vast army, which, however, had first to be employed in resisting an invasion of Egypt threatened by Ibn Raiq, an adventurer who had seized Syria; after an indecisive engagement at Lajun the Ikshld decided to make peace with Ibn Raiq, undertaking to pay him tribute. The favour after- wards shown to Ibn Raiq at Bagdad nearly threw the Ikshld into the arms of the Fatimite caliph, with whom he carried on a friendly correspondence, one letter of which is preserved. He is even said to have given orders to substitute the name of the Fatimite caliph for that of the Abbasid in public prayer, but to have been warned of the unwisdom of this course. In 941, after the death of Ibn Raiq, the Ikshld took the opportunity of invading Syria, which the caliph permitted him to hold with the addition of the sacred cities of Mecca

and Medina, which the Tulunids had aspired to possess. He is said at this time to have started (in imitation of Ahmad Ibn Tulun) a variety of vexatious enactments similar to those afterwards associated with the name of Hakim, e.g. compelling his soldiers to dye their hair, and adding to their pay for the purpose.

In the year 944 he was summoned to Mesopotamia to assist the caliph, who had been driven from Bagdad by Tuzun and was in the power of the Hamdanids; and he proposed, though unsuccessfully, to take the caliph with him to Egypt. At this time he obtained hereditary rights for his family in the govern- ment of that country and Syria. The Hamdanid Saif addaula shortly after this assumed the governorship of Aleppo, and became involved in a struggle with the Ikshid, whose general, Kafur, he defeated in an engagement between Homs and Hamah (Hamath). In a later battle he was himself defeated by the Ikshld, when an arrangement was made permitting Saif addaula to retain most of Syria, while a prefect appointed by the Ikshld was to remain in Damascus. The Buyid ruler, who was now supreme at Bagdad, permitted the Ikshld to remain in

possession of his viceroyalty, but shortly" after receiving this confirmation he died at Damascus in 946.

The second of this dynasty was the Ikshld's son tJnjur, who had been proclaimed in his father's time, and began his govern- ment under the tutelage of the negro Kafur. Syria was immedi- ately overrun by Saif addaula, but he was defeated by Kafur in two engagements, and was compelled to recognize the over- lordship of the Egyptian viceroy. At the death of tJnjur in 961 his brother Abu'l-gasan 'All was made viceroy with the caliph's consent by Kafur, who continued to govern for his chief as before. The land was during this period threatened at once by the Fatimites from the west; the Nubians from the south, and the Carmathians from the east; when the second Ikshldl died in 965, Kafur at first made a pretence of appointing his young son Ahmad as his successor, but deemed it safer to assume the viceroyalty himself, setting an example which in Mameluke times was often followed. He occupied the post little more than three years, and on his death in 968 the afore- mentioned Ahmad, called Abu'l-Fawaris, was appointed suc- cessor, under the tutelage of a vizier named Ibn Furat, who had long served under the Ikshidls. The accession of this prince was followed by an incursion of the Carmathians into Syria, before whom the Ikshldl governor fled into Egypt, where he had for a time to undertake the management of affairs, and arrested Ibn Furat, who had proved himself incompetent.

The administration of Ibn Furat was fatal to the Ikshidls and momentous for Egypt, since a Jewish convert, Jacob, son of Killis, who had been in the Ikshld's service, and was ill-treated by Ibn Furat, fled to the Fatimite sovereign, and persuaded him that the time for invading Egypt with a prospect of success had arrived, since there was no one in Fostat capable of organiz- ing a plan of defence, and the dissensions between the Buyids at Bagdad rendered it improbable that any succour would arrive from that quarter. The Fatimite caliph Mo'izz li-dln allah was also in correspondence with other residents in Egypt, where the Alid party from the beginning of Abbasid times had always had many supporters; and the danger from the Carmathians rendered the presence of a strong government necessary. The Fatimite general Jauhar (variously represented as of Greek, Slav and Sicilian origin), who enjoyed the complete confidence of the Fatimite sovereign, was placed at the head of an army of 100,000 men — if Oriental numbers are to be trusted— and started from Rakkada at the beginning of March 969 with the view of seizing Egypt.

Before his arrival the administration of affairs had again been committed to Ibn Furat, who, on hearing of the threatened invasion, at first propos'ed to treat with Jauhar for the peaceful surrender of the country; but though at first there was a prospect of this being carried out, the majority of the troops at Fostat preferred to make some resistance, and an advance was made to meet Jauhar in the neighbourhood of Giza. He had little difficulty in defeating the Egyptian army, and on the 6th of July 969 entered Fostat at the head of his forces. The name of Mo'izz was immediately introduced into public prayer, and coins were struck in his name. The Ikshldl governor of Damascus, a cousin of Abu'l-Fawaris Ahmad, endeavoured to save Syria, but was defeated at Ramleh by a general sent by Jauhar and taken prisoner. Thus the Ikshldl Dynasty came to an end, and Egypt was transferred from the Eastern to the Western caliphate, of which it furnished the metropolis.

(4) The Fatimite period begins with the taking of Fostat by Jauhar, who immediately began the building of a new city, al-Kahira or Cairo, to furnish quarters for the army which he had brought. A palace for the caliph and a mosque for the army were immediately constructed, the latter still famous as al-Azhar, and for many Centuries the centre of Moslem learning. Almost immediately after the conquest of Egypt, Jauhar found himself engaged in a struggle with the Carmathians (q.v.), whom the Ikshldl prefect of Damascus had pacified by a promise of tribute; this promise was of course not held binding by the Fatimite general (Ja'far b. Falah) by whom Damascus was taken, and the Carmathian leader al-Hasan b. Ahmad al-A'sam received

aid from Bagdad for the purpose of recovering Syria to the Abbasids. The general Ja'far, hoping to deal with this enemy independently of Jauhar, met the Carmathians without waiting for reinforcements from Egypt, and fell in battle, his army being defeated. Damascus was taken by the Carmathians, and the name of the Abbasid caliph substituted for that of Mo'izz in public worship. Hasan al-A'sam advanced from Damascus through Palestine to Egypt, encountering little resistance on the way; and in the autumn of 971 Jauhar found himself besieged in his new city. By a timely sortie, preceded by the administration of bribes to various officers in the Carmathian host, Jauhar succeeded in inflicting a severe defeat on the besiegers, who were compelled to evacuate Egypt and part of Syria.

Meanwhile Mo'izz had been summoned to enter the palace that had been prepared for him, and after leaving a viceroy to take charge of his western possessions he arrived in Alexandria on the 31st of May 973, and proceeded to instruct his new subjects in the particular form of religion (Shl'ism) which his family represented. As this was in origin identical with that professed by the Carmathians, he hoped to gain the submission of their leader by argument; but this plan was unsuccessful, and there was a fresh invasion from that quarter in the year after his arrival, and the caliph found himself besieged in his capital. The Carmathians were gradually forced to retreat from Egypt and then from Syria by some successful engagements, and by the judicious use of bribes, whereby dissension was sown among their leaders. Mo'izz also found time to take some active measures against the Byzantines, with whom his generals fought in Syria with varying fortune. Before his death he was acknowledged as caliph in Mecca and Medina, as. well as Syria, Egypt and North Africa as far as Tangier.

In the reign cf the second Egyptian Fatimite 'Aziz billah, Jauhar, who appears to have been cashiered by Mo'izz, was again employed at the instance of Jacob b. Killis, who had been raised to the rank of vizier, to deal with the situation in Syria, where a Turkish general Aftakln had gained possession of Damascus, and was raiding the whole country; on the arrival of Jauhar in Syria the Turks called the Carmathians to their aid, and after a campaign of many vicissitudes Jauhar had to return to Egypt to implore the caliph himself to take the field. In August 977 'Aziz met the united forces of Aftakln and his

Carmathian ally outside Ramleh in Palestine and inflicted a crushing defeat on them, which was followed by the capture of Aftakln; this able officer was taken to Egypt, and honourably treated by the caliph, thereby incurring the jealousy of Jacob b. Killis, who caused him, it is said, to be poisoned. This vizier had the astuteness to see the necessity of codifying the doctrines of the Fatimites, and himself undertook this task; in the newly-established mosque of el-Azhar he got his master to make provision for a perpetual series of teachers and students of his manual. It would appear, however, that a large amount of toleration was conceded by the first two Egyptian Fatimites to the other sects of Islam, and to other communities. Indeed at one time in ‘Aziz’s reign the vizierate of Egypt was held by a Christian, Jesus, son of Nestorius, who appointed as his deputy in Syria a Jew, Manasseh b. Abraham. These persons were charged by the Moslems with unduly favouring their co-religionists, and the belief that the Christians of Egypt were in league with the Byzantine emperor, and even burned a fleet which was being built for the Byzantine war, led to some persecution. Aziz attempted without success to enter into friendly relations with the Buyid ruler of Bagdad, ‘Adod addaula, who was disposed to favour the ‘Alids, but caused the claim of the Fatimites to descend from ‘Ali to be publicly refuted. He then tried to gain possession of Aleppo, as the key to ‘Irak, but this was prevented by the intervention of the Byzantines. His North African possessions were maintained and extended by ‘Ali, son of Bulukkln, whom Mo’izz had left as his deputy; but the recognition of the Fatimite caliph in this region was little more than nominal.

His successor Abu ‘Ali al-Mansur, who reigned under the

title al-Hakim bi’amr alldh, came to the throne at the age of eleven, being the son of ‘Aziz by a Christian mother. He was at first under the tutelage of the Slav Burjuwan, whose policy it was to favour the Turkish element in the army as against the Maghribine, on which the strength of the Fatimites had till then rested; his conduct of affairs was vigorous and successful, and he concluded a peace with the Greek emperor. After a few years’ regency he was assassinated at the instance of the young sovereign, who at an early age developed a dislike for control and jealousy of his rights as caliph. He is branded by historians as the Caligula of the East, who took a delight in imposing on his subjects a variety of senseless and capricious regulations, and persecuting different sections of them by cruel and arbitrary measures. It is observable that some of those with which Hakim is credited are also ascribed to Ibn Tulun and the Ikshid (Mahommed b. Tughj). He is perhaps best remembered by his destruction of the church of the Holy Sepulchre at Jerusalem (1010), a

measure which helped to provoke the Crusades, but was only part of a general scheme for converting all Christians and Jews in his dominions to his own opinions by force. A more reputable expedient with the same end in view was the construction of a great library in Cairo, with ample provision for students; this was mpdelled on a similar institution at Bagdad. It formed part of the great palace of the Fatimites, and was intended to be the centre of their propaganda. At times, however, he ordered the destruction of all Christian churches in Egypt, and the banishment of all who did not adopt Islam. It is strange that in the midst of these persecutions he continued to employ Christians in high official positions. His system of persecution 'was not abandoned till in the last year of his reign (1020) he thought fit to claim divinity, a doctrine which is perpetuated by the Druses (q.v.), called after one DarazI, who preached the divinity of Hakim at the time; the violent opposition which this aroused among the Moslems probably led him to adopt milder measures towards his other subjects, and those who had been forcibly converted were permitted to return to their former religion and rebuild their places of worship. Whether his disappearance at the beginning of the year 102 1 was due to the resentment of his outraged subjects, or, as the historians say, to his sister's fear that he would bequeath the caliphate to a distant relative to the exclusion of his own son, will never be known. In spite of his caprices he appears to have shown competence in the management of external affairs; enterprises of pretenders both in Egypt and Syria were crushed with promptitude; and his name was at times mentioned in public worship in Aleppo and Mosul.

His son Abu'l-Iiasan 'Ali, who succeeded him with the title al-Zdhir li'izdz din alldh, was sixteen years of age at the time, and for four years his aunt Sitt al-Mulk acted as regent; she appears to have been an astute but utterly unscrupulous woman. After her death the caliph was in the power of various ministers, under whose management of affairs Syria was for a time lost to the Egyptian caliphate, and Egypt itself raided by the Syrian usurpers, of whom one, Salih b. Mirdas, succeeded in establishing a dynasty at Aleppo, which maintained itself after Syria and Palestine had been recovered for the Fatimites by Anushtakin al-Dizbarl at the battle of Ukhuwanah in 1029. His career is said to have been marked by some horrible caprices similar to those of his father. After a reign of nearly sixteen years he died of the plague.

His successor, Abu Tamim Ma add, who reigned with the title al-Mostansir, was also an infant at the time of his accession, being little more than seven years of age. The power was largely in the hands of his mother, a negress, who promoted the interests of her kinsmen at

court, where indeed even in Hakim's time they had been used as a counterpoise to the Maghribine and Turkish elements in the army. In the first years of this reign affairs were administered by the vizier al-Jarjara'I, by whose mismanage- ment Aleppo was lost to the Fatimites. At his death in 1044 the chief influence passed into the hands of Abu Sa'd, a Jew, and the former master of the queen-mother, and at the end of

four years he was assassinated at the instance of another Jew (Sadakah, perhaps Zedekiah, b. Joseph al-Falahl), whom he had appointed vizier. In this reign Mo'izz b. Badis, the 4th ruler of the dependent Zeirid dynasty which had ruled in the Maghrib since the migration of the Fatimite Mo'izz to Egypt, definitely abjured his allegiance (1049) and returned to Sunnite principles and subjection to the Bagdad caliphate. The Zeirids maintained Mahdia (see Algiers), while other cities of the Maghrib were colonized by Arab tribes sent thither by the Cairene vizier. This loss was more than compensated by the enrolment of Yemen among the countries which recognized the Fatimite caliphate through the enterprise of one 'Ali b. Mahommed al-Sulaihi, while owing to the disputes between the Turkish generals who claimed supremacy at Bagdad, Mostansir's name was men- tioned in public prayer at that metropolis on the 12 th of January 1058, when a Turkish adventurer Basaslrl was for a time in power. The Egyptian court, chiefly owing to the jealousy of the vizier, sent no efficient aid to Basaslrl, and after a year Bagdad was retaken by the Seljuk Toghrul Beg, and the Abbasid caliph restored to his rights. In the following years the troubles in Egypt caused by the struggles between the Turkish and negro elements in Mostansir's army nearly brought the country into the dominion of the Abbasids. After several battles of various issue the Turkish commander Nasir addaula b. Hamdan got possession of Cairo, and at the end of 1068 plundered the caliph's palace; the valuable library which had been begun by Hakim was pillaged, and an accidental fire caused great destruction. The caliph and his family were reduced to destitution, and Nasir addaula began negotiations for restoring the name of the Abbasid caliph in public prayer; he was, however, assassinated before he could carry this out, and his assassin, also a Turk, appointed vizier. Mostansir then summoned to his aid Badr al-Jamali, an Armenian who had displayed competence in various posts which he had held in Syria, aˆd this

person early in 1074 arrived in Cairo accompanied by a bodyguard of Armenians; he contrived to massacre the chiefs of the party at the time in possession of power, and with the title Amir al-Juyush (" prince of the armies ") was given by Mostansir complete control of affairs. The period of internal disturbances, which had been accompanied by famine and pestilence, had caused usurpers to spring up in all parts of Egypt, and Badr was compelled practically to reconquer the country. During this time, however, Syria was overrun by an invader in league with the Seljuk Malik Shah, and Damascus was permanently lost to the Fatimites; other cities were recovered by Badr himself or his officers. He rebuilt the walls of Cairo, of more durable material than that which had been employed by Jauhar — a measure rendered necessary partly by the growth of the metropolis, but also by the repeated sieges which it had undergone since the commencement of Fatimite rule. The time of Mostansir is otherwise memorable for the rise of the Assassins (q.v.), who at the first supported the claims of his eldest son Nizar to the succession against the youngest Ahmed, who was favoured by the family of Badr. When Badr died in 1094 his influence was inherited by his son al-Afdal Shahinsbah, and this, at the death of Mostansir in the same year, was thrown in favour of Ahmed, who succeeded to the caliphate with the title al-Mosta'li billah.

Mosta'li's succession was not carried through without an attempt on the part of Nizar to obtain his rights, the title which

he chose being al-Mostafd lidin allah; for a time he Crusades, maintained himself in Alexandria, but the energetic

measures of his brother soon brought the civil war to an end. The beginning of this reign coincided with the beginning of the Crusades, and al-Afdal made the fatal mistake of helping the Franks by rescuing Jerusalem from the Ortokids, thereby facilitating its conquest by the Franks in 1099. He endeavoured to retrieve his error by himself advancing into Palestine, but he was defeated in the neighbourhood of Ascalon, and compelled to retire to Egypt. Many of the Palestinian possessions of the Fatimites then successively fell into the hands of the Franks. After a reign of seven years Mosta'li died and the caliphate was given by al-Afdal to an infant son, aged five years at the time,

who was placed on the throne with the title al-Amir biahkdm allah, and for twenty years was under the tutelage of al-Afdal. He made repeated attempts to recover the Syrian and Pales- tinian cities from

the Franks, but with poor success. In n 18 Egypt was invaded by Baldwin I., who burned the gates and the mosques of Farama, and advanced to Tinnis, whence illness compelled him to retreat. In August 1 1 2 1 al-Afdal was assas- sinated in a street of Cairo, it is said, with the connivance of the caliph, who immediately began the plunder of his house, where fabulous treasures were said to be amassed. The vizier's offices were given to one of the caliph's creatures, Mahommed b. Fatik al-Bata'ihi, who took the title al-Ma'tnun. His external policy was not more fortunate than that of his predecessor, as he lost Tyre to the Franks, and a fleet equipped by him was defeated by the Venetians. On the 4th of October 1125 he with his followers was seized and imprisoned by order of the Caliph Amir, who was now resolved to govern by himself, with the assistance of only subordinate officials, of whom two were drawn from the Samaritan and Christian communities. The vizier was after- wards crucified with his five brothers. The caliph's personal government appears to have been incompetent, and to have been marked by extortions and other arbitrary measures. He was assassinated in October 1 1 29 by some members of the sect who believed in the claims of Nizar, son of Mostansir.

The succeeding caliph, Abu'l-Maimun 'Abd al-Majld, who took the title al-fldfiz lidin allah, was not the son but the cousin of the deceased caliph, and of ripe age, being about fifty-eight years old at the time; for more than a year he was kept in prison by the new vizier, a son of al-Afdal, whom the army had placed in the post; but towards the end of 1131 this vizier fell by the hand of assassins, and the caliph was set free. The reign of Hafiz was disturbed by the factions of the soldiery, between which several battles took place, ending in the subjection of the caliph for a time to various usurpers, one of these being his own son Hasan, who had been provoked to rebel by the caliph nominating a younger brother as his successor. For some months the caliph was under this son's control; but the latter, who aimed at conciliating the people, speedily lost his popularity with the troops, and his father was able to get possession of his person and cause him to be poisoned (beginning of 113 5).

His son Abu'l-Man$ur Ismd'U, who was seventeen years old at the time of Hafiz's death, succeeded him with the title al-Zdfir lia'dd allah. From this reign to the end of the Fatimite period we have the journals of two eminent men, Usamah b. Muniqdh and Umarah of Yemen, which throw light on the leading characters. The civil dissensions of Egypt were notorious at the time. The new reign began by an armed struggle between two commanders for the post of vizier , which in January 1 1 50 was decided in favour of the Amir Ibn Sallar. This

vizier was presently assassinated by the direction of his stepson ‘Abbas, who was raised to the vizierate in his place. This event was shortly followed by the loss to the Fatimites of Ascalon, the last place in Syria which they held; its loss was attributed to dissensions between the parties of which the garrison consisted. Four years later (April 1 1 54) the caliph was murdered by his vizier ‘Abbas, according to Usamah, because the caliph had suggested to his favourite, the vizier’s son, to murder his father; and this was followed by a massacre of the brothers of Zafir, followed by the raising of his infant son Abu’l-Qdsim *Isd to the throne.

The new caliph, who was not five years old, received the title al-Fd’iz bina$r allah, and was at first in the power of ‘Abbas. The women of the palace, however, summoned to their aid Tala’i’ b. Ruzzlk, prefect of Ushmunain, at whose arrival in Cairo the troops deserted ‘Abbas, who was compelled to flee into Syria, taking his son and Usamah with him. “Abbas was killed by the Franks near Ascalon, his son sent in a cage to Cairo where he was executed, while Usamah escaped to Damascus,

The infant Fa’iz, who had been permanently incapacitated by the scenes of violence which accompanied his accession, died in 1160. Tala’i’ chose to succeed him a grandson of Zafir, who was nine years of age, and received the title al-‘Adid lidin allah Tala’i”, who had complete control of affairs, introduced the

practice of farming the taxes for periods of six months instead of a year, which led to great misery, as the taxes were demanded twice. His death was brought on by the rigour with which he treated the princesses, one of whom, with or without the con- nivance of the caliph, organized a plot for his assassination, and he died in September 1160. His son Ruzzlk inherited his post and maintained himself in it for more than a year, when another prefect of Upper Egypt, Shawar b. Mujlr, brought a force to Cairo, before which Ruzzlk fled, to be shortly afterwards captured and beheaded. SJiawar’s entry into Cairo was at the beginning of 1 163; after nine months he was compelled to flee before another adventurer, an officer in the army

named pirgham. Shawar's flight was directed to Damascus, where he was favour- ably received by the prince Nureddin, who sent with him to Cairo a force of Kurds under Asad al-din Shirguh. At the same time Egypt was invaded by the Franks, who raided and did much damage on the coast. Dirgham was defeated and killed, but a dispute then arose between Shawar and his Syrian allies for the possession of Egypt. Shawar, being unable to Invasion. C0 P e w ˆ t ˆ ie Syrians, demanded help of the Frankish king of Jerusalem Amalric (Amauri) I., who hastened to his aid with a large force, which united with Shawar's and besieged Shirguh in Bilbeis for three months; at the end of this time, owing to the successes of Nureddin in Syria, the Franks granted Shirguh a free passage with his troops back to Syria, on condition of Egypt being evacuated (October 1164). Rather more than two years later Shirguh persuaded Nured- din to put him at the head of another expedition to Egypt, which left Syria in January 1167, and, entering Egypt by the land route, crossed the Nile at Itfih (Atfih), and encamped at Giza; a Frankish' army hastened to Shawar's aid. At the battle of Babain (April nth, 1167) the allies were defeated by the forces commanded by Shirguh and his nephew Saladin, who was presently made prefect of Alexandria, which sur- rendered to Shirguh without a struggle. Saladin was soon besieged by the allies in Alexandria; but after seventy-five days the siege was raised, Shirguh having made a threatening movement on Cairo, where a Frankish garrison had been admitted by Shawar. Terms were then made by which both Syrians and Franks were to quit Egypt, though the garrison of Cairo remained; the hostile attitude of the Moslem population to this garrison led to another invasion at the beginning of 11 68 by King Amalric, who after taking Bilbeis advanced to Cairo. The caliph, who up to this time appears to have left the adminis- tration to the viziers, now sent for Shirguh, whose speedy arrival in Egypt caused the Franks to withdraw. Reaching Cairo on the 6th of January 1169, he was soon able to get possession of Shawar's person, and after the prefect's execution, which happened some ten days later, he was appointed vizier by the caliph. After two months Shirguh died of indigestion (23rd of March 11 69), and the caliph appointed Saladin as successor to Shirguh; the new vizier professed to hold office as a deputy of Nureddin, whose name was mentioned in public worship after that of the caliph. By appropriating the fiefs of the Egyptian officers and giving them to his Kurdish followers he stirred up much ill-feeling, which resulted in a conspiracy, of which the object was to recall the Franks with the view of overthrowing the new regime; but this conspiracy was revealed by a traitor and crushed. Nureddin loyally aided his deputy in dealing with Frankish invasions of Egypt, but the anomaly by which he, ' being a Sunnite, was made in

Egypt to recognize a Fatimite caliph could not long continue, and he ordered Saladin to weaken the Fatimite by every available means, and then substitute the name of the Abbasid for his in public worship. Saladin and his ministers were at first afraid lest this step might give rise to disturbances among the people; but a stranger undertook to risk it on the 17th of September 1171, and the following Friday it was repeated by official order; the caliph himself died during the interval, and it is uncertain whether he ever heard of his deposition. The last of the Fatimite caliphs was not quite twenty-one years old at the time of his death.

(5) Ayyubite Period. — Saladin by the advice of his chief

Nureddin cashiered the Fatimite judges and took steps to encourage the study of orthodox theology and jurisprudence in Egypt by the foundation of colleges and chairs. On the death of the ex-caliph he was confirmed in the prefecture of Egypt as deputy of Nureddin; and on the decease of the latter in 1174 (12th of April) he took the title sultan, so that with this year the Ayyubite period of Egyptian history properly begins. During the whole of it Damascus rather more than Cairo counted as the metropolis of the empire. The Egyptian army, which was motley in character, was disbanded by the new sultan, whose troops were Kurds. Though he did not build a new metropolis he fortified Cairo with the addition of a citadel, and had plans made for a new wall to enclose both it and the double city; this latter plan was never completed, but the former was executed after his death, and from this time till the French occupation of Egypt the citadel of Cairo was the political centre of the country. It was in n 83 that Saladin's rule over Egypt and North Syria was consolidated. Much of Saladin's time was spent in Syria, and his famous wars with the Franks belong to the history of the Crusades and to his personal biography. Egypt was largely governed by his favourite Karakush, who lives in popular legend as the " unjust judge," though he does not appear to have deserved that title.

Saladin at his death divided his dominions between his sons, of whom 'Othman succeeded to Egypt with the title Malik al- Aziz t Imal al-ain. The division was not satisfactory to the heirs, and after three years (beginning of 1196) the Egyptian sultan conspired with his uncle Malik al-'Adil to deprive Saladin's son al-Afdal of Damascus, which had fallen to his lot. The war between the brothers was continued with intervals of peace, during which al-'Adil repeatedly changed sides: eventually he with al-'Aziz besieged and took Damascus, and sent al-Afdal to Sarkhad, while al-'Adil remained in possession of Damascus. On the death of al-'Aziz on the 29th of November 1198 in

consequence of a hunting accident, his infant son Mahommed was raised to the throne with the title Malik al-Manˆur Napr al-din, and his uncle al-Afdal sent for from Sarkhad to take the post of regent or Atabeg. So soon as al-Afdal had got possession of his nephew's person, he started on an expedition for the recovery of Damascus: al-'Adil not only frustrated this, but drove him back to Egypt, where on the 25th of January 1200 a battle was fought between the armies of the two at Bilbeis, resulting in the defeat of al-Afdal, who was sent back to Sarkhad, while al-'Adil assumed the regency, for which after a few months he substituted the sovereignty, causing his nephew to be deposed. He reigned under the title Malik al- Adil Saif al-din. His name was Abu Bakr. 1

Though the early years of his reign were marked by numerous disasters, famine, pestilence and earthquake, of which the second seems to have been exceedingly serious, he reunited under his sway the whole of the empire which had belonged to his brother, and his generals conquered for him parts of Mesopotamia and Armenia, and in 121 5 he got possession of Yemen. He followed the plan of dividing his empire between his sons, the eldest Mahommed, called Malik al-K3.mil, being his viceroy in Egypt, while al-Mu'azzam 'Isa governed Syria, al-Ashraf Musa his eastern and al-Malik al-Auhad Ayyiib his northern possessions. His attitude towards the Franks was at the first peaceful, but later in his reign he was compelled to adopt more strenuous measures. His death occurred at Alikin (12 18), a village near Damascus, while the Franks were besieging Damietta — the first operation of the Fifth Crusade — which was defended by al-Kamil,- to whom his father kept sending reinforcements. The efforts of al-Kamil after his accession to the independent sovereignty were seriously hindered by the endeavour of an amir named Ahmed b. Mashtub to depose him and appoint in his place a brother called al-Fa'iz Sabiq al-din Ibrahim: this attempt was frustrated by the timely interposition of al-Mu'azzam 'Isa, who came to Egypt to aid his brother in February 12 19, and com- pelled al-Fa'iz to depart for Mosul. After a siege of sixteen and a half months Damietta was taken by the Franks on Tuesday the 6th of November 12 19; al-Kamil thereupon proclaimed the

Jihad, and was joined at his fortified camp, afterwards the site of

Mansura, by troops from various parts of Egypt, Syria and Mesopotamia, including the forces of his brothers Tsa and Musa. With these allies, and availing himself of the advantages offered by the inundation of the Nile, al-Kamil was able to cut off both the advance and the retreat of the invaders, and on the 31st of August 1221 a peace was concluded, by which the Franks evacuated Egypt.

For some years the dominions of al-'Adil remained divided between his sons: when the affairs of Egypt were settled, al-Kamil determined to reunite them as before, and to that end brought on the Sixth Crusade. Various cities in Palestine and Syria were yielded to Frederick II. as the price of his help against the son of Mu'azzam "Isa, who reigned at Damascus with the title of Malik al-Nasir. About 1 231-32 Kamil led a confederacy of Ayyubite princes against the Seljuk Kaikobad into Asia Minor, but his allies mistrusted him and victory rested with Kaikobad (see Seljuks) . Before Kamil's death he was mentioned in public prayer at Mecca as lord of Mecca (Hejaz), Yemen, Zabld, Upper and Lower Egypt, Syria and Mesopotamia.

At his death (May 8th, 1238) at Damascus, hisson Abu Bakr was appointed to succeed with the title Malik al-'Adil Saif al-din; but his elder brother Malik al-Salih Najm al-din Ayyiib, having got possession of Damascus, immediately started for Egypt, with the view of adding that country to his dominions: mean- while his uncle Isma'il, prince of Hamath, with the prince of Horns, seized Damascus, upon hearing which the troops of Najm al-din deserted him at Nablus, when he fell into the hands of Malik al-Nasir, prince of Kerak, who carried him off to that city and kept him a prisoner there for a time; after which he was released and allowed to return to Nablus. On the 31st of May 1240 the new sultan was arrested at Bilbeis by his own amirs, who sent for Najm al-din to succeed him; and on the 19th of June of the same year Najm al-din entered Cairo as sultan, and imprisoned his brother in the citadel, where he died in 1248. Meanwhile in 1244 Jerusalem had been finally wrested from the Franks. The administration of Najm al-din is highly praised by Ibn Khallikan, who lived under it. He made large purchases of slaves (Mamelukes) for his army, and when the inhabitants of Cairo complained of their lawlessness, he built barracks for them on the island of Roda (Rauda), whence they were called Bahri or Nile Mamelukes, which became the name of the first dynasty that originated from them. Much of his time was spent in cam- paigns in Syria, where the other Ayyubites allied themselves against him with the Crusaders, whereas he accepted the services of the Khwarizmians: eventually he succeeded in recovering most of the Syrian cities. His name is commemorated by the town of Salihia, which he built in the year 1 246 as a resting-place for his

armies on their marches through the desert from Egypt to Palestine. In 1249 he was recalled from the siege of Homs by the news of the invasion of Egypt by Louis IX. (the Seventh Crusade), and in spite of illness he hastened to Ushmum Tanna, in the neighbourhood of Damietta, which he provisioned for a siege. Damietta was taken on the 6th of June 1249, owing to the desertion of his post by the commander Fakhr ud-dln, and the Banu Kinanah, to whom the defence of the place had been entrusted : fifty-four of their chieftains were afterwards executed by the sultan for this proceeding. On the 22nd of November the sultan died of disease at Mansura, but his death was carefully concealed by the amirs Lajin and Aktai, acting in concert with the Queen Shajar al-durr, till the arrival from Syria of the heir to the throne, Turdnshah, who was proclaimed some four months later. At the battle of Fariskur, 6th of April 1250, the invaders were utterly routed and the French king fell into the hands of the Egyptian sultan. The Egyptian authorities now resolved to raze Damietta, which, however, was rebuilt shortly after. The sultan, who himself had had no share in the victory, advanced after it from Mansura to Fariskur, where his conduct became menacing to the amirs who had raised him to the throne, and to Shajar al-durr; she in revenge organized an attack upon him which was successful, fire, water, and steel contributing to his end.

(6) Period of Bahri Mamelukes. — The dynasties that succeeded the Ayyubites till the conquest of Egypt by the Ottomans bore the title Dynasties of the Turks, but are more often called Mameluke dynasties, because the sultans were drawn from the enfranchised slaves who constituted the court, and officered the army. The family of the fourth of these sovereigns, Ka'a'un (Qala'un), reigned for no years, but otherwise no sultan was able to found a durable dynasty: after the death of a sultan he was usually succeeded by an infant son, who after a short time was dethroned by a new usurper.

After the death of the Sultan Turanshah, his step-mother at first was raised to the vacant throne, when she committed the administration of affairs to the captain of the retainers, Aibek; but the rule of a queen caused scandal to the Moslem world, and Shajar al-durr gave way to this sentiment by marrying Aibek and allowing the title sultan to be conferred on him instead of herself. For policy's sake, however, Aibek nominally associated with himself on the throne a scion of the Ayyubite house, Malik al-Ashraf Musa, who died in prison (1252 or 1254). Aibek meanwhile immediately became involved in war with the Ayyubite Malik al-Nasir, who was in possession of Syria, with whom the caliph induced him after some indecisive actions to make peace: he then successfully quelled a mutiny of Mame- lukes, whom

he compelled to take refuge with the last Abbasid caliph Mostasim in Bagdad and elsewhere. On the 10th of April 1257 Aibek was murdered by his wife Shajar al-durr, who was indignant at his asking for the hand of another queen: but Aibek's followers immediately avenged his death, placing on the throne his infant son Malik al-Mansur, who, however, was almost immediately displaced by his guardian Kotuz, on the plea that the Mongol danger necessitated the presence of a grown man at the head of affairs. In 1260 the Syrian kingdom of al- Nasir was destroyed by Hulaku (Hulagu), the great Mongol chief, founder of the Ilkhan Dynasty (see Mongols) , who, having finally overthrown the caliph of Bagdad (see Caliphate, sect. c. §37), also despatched a threatening letter to Kotuz; but later in the same year Syria was invaded by Kotuz, who defeated Hulagu's lieutenant at the battle of 'Ain Jalut (3rd of September 1260), in consequence of which event the Syrian cities all rose ' against the Mongols, and the Egyptian sultan became master of the country with the exception of such places as were still held by the Crusaders.

Before Kotuz had reigned a year he was murdered at Salihia by his lieutenant Bibars (October 23rd, 1260), who was piqued, it is said, at the governorship of Aleppo being with- held from him. The sovereignty was seized by this Bibars. person with the title of Malik al-Qdhir, presently altered to al-Zahir. He had originally been a slave of Malik al-Salih, had distinguished himself at the battle after which Louis IX. was captured, and had helped to murder Turanshah. Sultan Bibars, who proved to be one of the most competent of the Bahri Mamelukes, made Egypt the centre of the Moslem world by re-establishing in theory the Abbasid caliphate, which had lapsed through the taking of Bagdad by Hulagu, followed by the execution of the caliph. Bibars recognized the claim of a certain Abu'l-Qasim Ahmed to be the son of Zahir, the 35th Abbasid caliph, and installed him as Commander of the Faithful at Cairo with the title al-Mostansir billdh. Mostansir then proceeded to confer on Bibars the title sultan, Caliphate and to address to him a homily, explaining his duties, revived. This document is preserved in the MS. life of Bibars, and translated by G. Weil. The sultan appears to have con- templated restoring the new caliph to the throne of Bagdad: the force, however, which he sent with him for the purpose of reconquering Irak was quite insufficient for the purpose, and Mostansir was defeated and slain. This did not prevent Bibars from maintaining his policy of appointing an Abbasid for the purpose of conferring legitimacy on himself; but he encouraged no further attempts at re-establishing the Abbasids at Bagdad, and his principle, adopted by successive sultans, was that the caliph should not leave Cairo except when accompanying the sultan

on an expedition.

too

EGYPT

[HISTORY

KaU’Bn.

The reign of Bibars was spent largely in successful wars against the Crusaders, from whom he took many cities, notably Safad, Caesarea and Antioch; the Armenians, whose territory he re- peatedly invaded, burning their capital Sis; and the Seljukids of Asia Minor. He further reduced the Isma’ilians or Assassins, whose existence as a community lasted on in Syria after it had nearly come to an end in Persia. He made Nubia tributary, therein extending Moslem arms farther south than they had been extended by any previous sultan. His authority was before his death recognized all over Syria (with the exception of the few cities still in the power of the Franks), over Arabia, with the exception of Yemen, on the Euphrates from Birah to Kerkesia (Circesium) on the Chaboras (Khabur), whilst the amirs of north-western Africa were tributary to him. His successes were won not only by military and political ability, but also by the most absolute unscrupulousness, neither flagrant perjury nor the basest treachery being disdained. He was the first sultan who acknowledged the equal authority of the four schools of law, and appointed judges belonging to each in Egypt and Syria; he was thus able to get his measures approved by one school when condemned by another.

On the ist of July 1277 Bibars died, and the events that followed set an example repeatedly followed during the period of the Mamelukes. The sultan’s son Malik al-Sa’id ascended the throne; but within little more than two years he was compelled to abdicate in favour of his father-in- law Kala’un, a Mameluke who had risen high in the former sovereign’s service. The accession of Kala’un was also marked by an attempt on the part of the governor of Damascus to form Syria into an independent kingdom, an attempt frequently imitated on similar occasions. The Syrian forces were defeated at the battle of Jazurah (April 26th, 1280) and Kala’un re- sumed possession of the country; but the disaffected Syrians entered into relations with the Mongols, who proceeded to invade Syria, but were finally defeated by Kala’un on the 30th of October 1281 under the walls of Horns (Emesa).

The conversion to Islam of Nikudar Ahmad, the third of the Ilkhan

rulers of Persia, and the consequent troubles in the western • Mongol empire, let to a suspension of hostilities between Egypt and the Ilkhans (see Persia: History, § B), though the latter did not cease to agitate in Europe for a renewal of the Crusades, with little result. Kala'un, without pursuing any career of active conquest, did much to consolidate his dominions, and especially to extend Egyptian commerce, for which purpose he started passports enabling merchants to travel with safety through Egypt and Syria as far as India. After the danger from the Mongols had ceased, however, Kala'un directed his energies towards capturing the last places that remained in the hands of the Franks, and proceeded to take Markab, Latakia, and Tripoli (April 26th, 1289). In 1290 he planned an attack on Acre, but died (November 10th) in the middle of all his pre- parations. Under Kala'un we first hear of the Burjite Mame- lukes, who owe their name to the citadel (Burj) of Cairo, where 37c o of the whole number of 12,000 Mamelukes maintained by this sovereign were quartered. He also set an example, frequently followed, of the practice of dismissing all non-Moslems from government posts: this was often done by his successors with the view of conciliating the Moslems, but it was speedily found that the services of the Jewish and Christian clerks were again required. He further founded a hospital for clinical research on a scale formerly unknown.

Kala'un was followed by his son Khalil {Malik al-Ashraf Salah al-diri), who carried out his father's policy of driving the Franks out of Syria and Palestine, and proceeded with the siege of Acre, which he took (May 18th, 1291) after a siege of forty- three days. The capture and destruction of this important place were followed by the capture of Tyre, Sidon, Haifa, Athlit and Beirut, and thus Syria was cleared of the Crusaders. He also planned an expedition against the prince of Lesser Armenia, which was averted by the surrender of Behesna, Marash and Tell Hamdun. The disputes between his favourite, the vizier Ibn al-Sa'lus, and his viceroy Baidara. led to his being murdered by

the latter (December 12th, 1293), who was proclaimed sultan, but almost immediately fell a victim to the vengeance of the deceased sultan's party, who placed a younger son of Kala'un, Mahommed Malik al-Nasir, on the throne. This prince had the singular fortune of reigning three times, al-Nasir. being twice dethroned: he was first installed on the 14th of December 1293, when he was nine years old, and the affairs of the kingdom were undertaken by a cabinet, consisting of a vizier ("Alam al-dln Sinjar), a viceroy (Kitboga), a war minister (Husam al-dln Lajln al-Rumi), a prefect of the palace (Rokneddin Bibars Jashengir) and a secretary of state (Rok- neddin Bibars Mansuri). This cabinet naturally split into rival camps, in

consequence of which Kitboga, himself a Mongol, with the aid of other Mongols who had come into Egypt after the battle of Horns, succeeded in ousting his rivals, and presently, with the aid of the surviving assassins of the former sultan, compelling Malik al-Nasir to abdicate inhis favour (December ist, 1294). The usurper was, however, able to maintain himself for two years only, famine and pestilence which prevailed in Egypt and Syria during his reign rendering him unpopular, while his arbitrary treatment of the amirs also gave offence. He was dethroned in 1296, and one of the murderers of Khalil, Husam al-dln Lajln, son-in-law of the sultan Bibars and formerly governor of Damascus, installed in his palace (November 26th, 1296). It had become the practice of the Egyptian sultans to bestow all offices of importance on their own freedmen (Mame- lukes) to the exclusion of the older amirs, whom they could not trust so well, but who in turn became still more disaffected. Husam al-din fell a victim to the jealousy of the older amirs whom he had incensed by bestowing arbitrary power on his own Mameluke Mengutimur, and was murdered on the 16th of January 1299. His short reign was marked wars! by some fairly successful incursions into Armenia, and the recovery of the fortresses Marash and Tell Hamdun, which had been retaken by the Armenians. He also instituted a fresh survey and division of land in Egypt and Syria, which occasioned much discontent. After his murder the deposed sultan Malik al-Nasir, who had been living in retirement at Kerak, was recalled by the army and reinstated as sultan in Cairo (February 7th, 1299), though still only fourteen years of age, so that public affairs were administered not by him, but by Salar the viceroy, and Bibars Jashengir, prefect of the palace. The 7th Ilkhan, Ghazan Mahmud, took advantage of the disorder in the Mameluke empire to invade Syria in the latter half of 1299, when his forces inflicted a severe defeat on those of the new sultan, and seized several cities, including the capital Damascus, of which, however, they were unable to storm the citadel; in 1300, when a fresh army was collected in Egypt, the Mongols evacuated Damascus and made no attempt to secure their other conquests. The fear of further Mongolian invasion led to the imposition of fresh taxes in both Egypt and Syria, including one of 33% on rents, which occasioned many complaints. The invasion did not take place till 1303, when at the battle of Marj al-Saffar (April 20th) the Mongols were defeated. This was the last time that the Ilkhans gave the Egyptian sultans serious trouble; and in the letter written in the sultan’s name to the Ilkhan announcing the victory, the former suggested that the caliphate of Bagdad should be restored to the titular Abbasid caliph who had accom- panied the Egyptian expedition, a suggestion which does not appear to have led to any actual steps being taken. The fact that the

Mongols were in ostensible alliance with Christian princes led to a renewal by the sultan of the ordinances against Jews and Christians which had often been abrogated, as often renewed and again fallen into abeyance; and their renewal led to missions from various Christian princes requesting milder terms for their co-religionists. The amirs Salar and Bibars having usurped the whole of the sultan's authority, he, after some futile attempts to free himself of them, under the pretext of pilgrimage to Mecca, retired in March 1309 to Kerak, whence he sent his abdication to Cairo; in consequence of which, on the 5th of April 1309, Bibars Jashengir was proclaimed sultan, with the title Malik al-Mozaffar. This prince was originally a freedman

of Kala'un, and was the first Circassian who ascended the throne of Egypt. Before the year was out the new sultan had been rendered unpopular by the occurrence of a famine, and Malik al-Nasir was easily able to induce the Syrian amirs to return to his allegiance, in consequence of which Bibars in his turn abdi- cated, and Malik al-Nasir re-entered Cairo as sovereign on the 5th of March 13 10. He soon found the means to execute both Bibars and Salar, while other amirs who had been eminent under the former regime fled to the Mongols. The relations between their Ilkhan and the Egyptian sultan continued strained, and the 8th Ilkhan Oeljeitu (1304-1316) addressed letters to Philip the Fair and the English king Edward I. (answered by Edward II. in 1307), desiring aid against Malik al-Nasir; and for many years the courts of the sultan and the Ilkhan continued to be the refuge of malcontents from the other kingdom. Finally in 1322 terms of peace and alliance were agreed on between the sultan and Abu Sa'Id the 9th Ilkhan. The sultan also entered into relations with the Mongols of the Golden Horde and in 1319 married a daughter of the reigning prince Uzbeg Khan (see Mongols: Golden Horde). Much of Malik al-Nasir's third administration was spent in raids into Nubia, where he en- deavoured to set up a creature of his own as sovereign, in attempts at bringing the Bedouins of south-eastern Egypt into subordination, and in persecuting the Nosairls, whose heresy became formidable about this time. Like other Egyptian sultans he made considerable use of the Assassins, 124 of whom were sent by him into Persia to execute Kara Sonkor, at one time governor of Damascus, and one of the murderers of Malik al-Ashraf; but they were all outwitted by the exile, who was finally poisoned by the Ilkhan in recompense for

a similar service rendered by the Egyptian sultan. For a time Malik al-Nasir was recognized as suzerain in north Africa, the Arabian Irak, and Asia Minor, but he was unable to make any permanent conquests in any of these countries. He brought Medina, which had previously been governed by independent sherlfs, to acknow- ledge his authority. His diplomatic relations were more extensive than those of any previous sultan, and included Bulgarian, Indian, and Abyssinian potentates, as well as the pope, the king of Aragon and the king of France. He appears to have done his utmost to protect his Christian subjects, incurring thereby the reproaches of the more fanatical Moslems, especially in the year 1320 when owing to incendiarism in Cairo there was danger of a general massacre of the Christian population. His internal administration was marked by gross extravagance, which led to his viziers being forced to practise violent extortion for which they afterwards suffered. He paid considerable attention to sheep-breeding and agriculture, and by a canal which he had dug from Fuah to Alexandria not only assisted commerce but brought 100,000 feddans under cultivation. His taste for building and street improvement led to the beautifying of Cairo, and his example was followed by the governors of other great cities in the empire, notably Aleppo and Damascus. He paid exceptionally high prices for Mamelukes, many of whom were sold by their Mongol parents to his agents, and accustomed them to greater luxury than was usual under his predecessors. In 1315 he instituted a survey of Egypt, and of the twenty-four parts into which it was divided ten were assigned to the sultan and fourteen to the amirs and the army. He took occasion to abolish a variety of vexatious imposts, and the new budget fell less heavily on the Christians than the old. Among the literary ornaments of his reign was the historian and geographer Isma'Il Abulfeda (q.v.), to whom Malik al-Nasir restored the government of Hamath, which had belonged to his ancestors, and even gave the title sultan. He died on the 7th of June 1341. The son, Abu Bakr, to whom he had left the throne, was able to maintain himself only a few months on it, being compelled to abdicate on the 4th of August 1341 in favour of his infant brother Kuchuk; the revolution was brought about by Kausun, a powerful Mame- luke of the preceding monarch. This person's authority was, however, soon overthrown by a party formed by the Syrian prefects, and on the nth of January Malik al-N&sir Ahmad, an elder son of the former sultan of the same title, was installed

in his place, though he did not actually arrive in Cairo till the 6th of November, being unwilling to leave Kerak, where he had been living in retirement. After a brief sojourn in Cairo he speedily returned thither, thereby forfeiting his throne, which was conferred by the

amirs on his brother Ismail al-Malik al- Salih (June 27th, 1342). This sultan was mainly occupied during his short reign with besieging and taking Kerak, whither Ahmad had taken refuge, and himself died on the 3rd of August i34Si when another son of Malik al-Nasir, named Sha'ban, was placed on the throne. The constant changes of sultan led to great disorder in the provinces, and many of the subject principalities endeavoured to shake off the ˆf c/ {? e .˚(Egyptian yoke. Sha ban proved no more competent power. than his predecessors, being given to open debauchery and profligacy, an example followed by his amirs; and fresh discontent led to his being deposed by the Syrian amirs, when his brother Hajji was proclaimed sultan in his place (September 1 8th, 1346). Hiljjl was deposed and killed on the 10th of December 1347, and another infant son of Malik al-Na$ir, Hasan, who took his father's title, was proclaimed, the real power being shared by three amirs, Sheikhun, Menjek and Yelbogha Arus. During this reign (1348-1349) Egypt was visited by the " Black Death," which is said' to have carried off 000,000 of the inhabit- ants of Cairo and to have raged as far south as Assuan. Towards the beginning of 1351 the sultan got rid of his guardians and attempted to rule by himself; but though successful in war, his arbitrary measures led to his being dethroned on the 21st of August 1351 by the amirs, who proclaimed his brother Salih with the title of Malik al-Salih. He too was only fourteen years of age. The power was contested for by various groups of amirs, whose struggles ended with the deposition of the sultan Salih on the 20th of October 1354, and the reinstatement of his brother Hasan, who was again dethroned on the 16th of March 1361 by an amir Yelbogha, whom he had offended, and who, having got possession of the sultan's person, murdered him. The next day a son of the dethroned sultan Hajji was proclaimed sultan with the title Malik al-Mansur. On the 29th of May 1363 this sultan was also dethroned on the ground of incompetence, and his place was given to another grandson of Malik al-Nasir, Sha'bdn, son of Hosain, then ten years old. The amir Yelbogha at first held all real power and is said to have acquired a degree of authority which no other subject ever held. During this reign, on the 8th of October 1365, a landing was effected at Alexandria by a Frankish fleet under Peter I. of Cyprus, which presently took possession of the city; the .Franks were speedily compelled to embark again after plundering the city, for which compen- sation was afterwards demanded by Yelbogha from the Christian population of Egypt and Syria. Alexandria was further made the seat of a viceroy, having previously only had a prefect. On the nth of December 1366 Yelbogha was himself attacked by the sultan, captured and slain. His successor in the office of first minister was a mere tool in the hands of his Mamelukes, who compelled him to

institute and depose governors, &c, at their pleasure. In 1374 the Egyptians raided Cilicia and cap- tured Leo VI., prince of Lesser Armenia, which now became an Egyptian province with a Moslem governor. On the 15th of March 1377 the sultan was murdered by the Mamelukes, owing to his refusing a largess of money which they demanded. The infant son of the late sultan ‘All, a lad of eight years, was pro- claimed with the title Malik al-Mansur; the power was in the hands of the ministers Kartai and Ibek, the latter of whom over- threw the former with the aid of his own Mamelukes, Berekeh and Barkuk. An insurrection in Syria which spread to Egypt presently caused the fall of Ibek, and led to the occupation of the highest posts by the Circassian freedmen Berekeh and Barkuk, of whom the latter ere long succeeded in ousting the former and usurping the sultan’s place; on the 19th of May 1381, when the sultan ‘All died, his place was given to an infant brother Hajji, but on the 26th of November 1382, Barkuk set this child aside and had himself proclaimed sultan (with the title Malik al- Zahir), thereby ending the Bahrl dynasty and commenc- ing that of the Circassians. For a short period, however, Hajji

was restored, when on the ist of June 1389 Cairo was taken by Yelbogha, governor of Damascus, and Barkuk expelled; Hajji reigned at first under the guardianship of Yelbogha, who was then overthrown by Mintash; Barkuk, who had been relegated to Kerak, succeeded in again forming a party, and in a battle fought at Shakhab, January 1390, succeeded in gaining posses- sion of the person of the sultan Hajji, and on the 21st of January he was again proclaimed sultan in Cairo.

(7) Period of Burji Mamelukes. — Barkuk presently entered into relations with the Ottoman sultan Bayezld I., and by slaying an envoy of Timur incurred the displeasure of the world- conqueror; and in 1394 led an army into Syria with the view of restoring the Jelairid Ilkhan Ahmad to Bagdad (as Barkiik’s vassal), and meeting the Mongol invasion. Barkuk, however, died (June 20th, 1399) before Timur had time to invade Syria. According to the custom that had so often proved disastrous, a young son of Barkuk, Faraj, then aged thirteen, was appointed sultan under the guardianship of two amirs. Incursions

were immediately made by the Ottoman sultan into the territory of Egyptian vassals at Derendeh and Albistan (Ablestin), and Malatia was besieged by his forces. Timur, who was at this time beginning his campaign against Bayezld, turned his atten- tion first to Syria, and on the 30th of October 1400 defeated the Syrian amirs near Aleppo, and soon got possession of the city and the citadel. He proceeded to take Hamah, Homs (Emesa) and other towns, and on the 20th of December started for Damascus. An endeavour was made by the Egyptian sultan to relieve Damascus, but the news of an insurrection in Cairo caused him to retire and leave the place to its fate. In the first three months of 1401 the whole of Northern Syria suffered from Timur's marauders. In the following year (September 29th, 1402) Timur who had in the interval inflicted a crushing defeat on the Ottoman sultan, sent to demand homage from Faraj, and his demand was readily granted, together with the delivery of the princes who had sought refuge from Timur in Egyptian territory. The death of Timur in February 1405 restored Egyptian authority in Syria, which, however, became a rendezvous for all who were discontented with the rule of Faraj and his amirs, and two months after Timur's death was in open rebellion against Faraj. Although Faraj succeeded in defeating the rebels, he was compelled by insubordination on the part of his Circassian Mamelukes to abdicate (September 20th, 1405), when his brother Abd al-aziz was proclaimed with the title Malik al-Mansiir; after two months this prince was deposed, and Faraj, who had been in hiding, recalled. Most of his reign was, however, occupied with revolts on the part of the Syrian amirs, to quell whom he repeatedly visited Syria; the leaders of the rebels were the amirs Newruz and Sheik MahmudI, afterwards sultan. Owing to disturbances and misgovernment the population of Egypt and Syria is said to have shrunk to a third in his time, and he offended public sentiment not only by debauchery, but by having his image stamped on his coins. On the 23rd of May 141 2, after being defeated and shut up in Damascus, he was compelled by Sheik MahmudI to abdicate, and an Abbasid caliph, Mosta'in, was proclaimed sultan, only to be forced to abdicate on the 6th of November of the same year in Sheik's favour, who took the title Malik al-Muayyad, his colleague Newruz having been previously sent to Syria, where he was to be autocrat by the terms of their agreement. In the struggle which naturally followed between the two, Newruz was shut up in Damascus, defeated and slain. Sheik himself invaded Asia Minor and forced the Turkoman states to acknowledge his suzerainty. After the sultan's return they soon rebelled, but were again brought into subjection by Sheik's son Ibrahim; his victories excited the envy of his father, who is said to have poisoned him. Sheik himself died a few months after the decease of his son (January 13th, 1421), and

another infant son, Ahmad, was proclaimed with the title Malik al-Mozajfar, the proclamation being followed by the usual dissensions between the amirs, ending with the assumption of supreme power by the amir Tatar, who, after defeating his rivals, on the 29th of August

1421 had himself proclaimed sultan with the title Malik al-Zahir. This usurper, however, died on the 30th of November of the same year, leaving the throne to an infant son Mohammed, who was given the title Malik al-Salih ; the regular intrigues between the amirs followed, leading to his being dethroned on the following ist of April 1422, when the amir appointed to be his tutor, Barsbai, was proclaimed sultan with the title Malik al-Ashraf. This sultan avenged the attacks on Alexandria re- peatedly made by Cyprian ships, for he sent a fleet 2ˆ™ wt % which burned Limasol, and another which took powers. Famagusta (August 4th, 1425), but failed in the endeavour to annex the island permanently. An expedition sent in the following year (1426) succeeded in taking captive the king of Cyprus, who was brought to Cairo and presently released for a ransom of 200,000 dinars, on condition of acknowledging the suzerainty of the Egyptian sultan and paying him an annual tribute. Barsbai appears to have excelled his predecessors in the invention of devices for exacting money from merchants and pilgrims, and in juggling with the exchange. This led to a naval demonstration on the part of the Venetians, who secured better terms for their trade, and to the seizure of Egyptian vessels by the king of Aragon and the prince of Catalonia. In a census made during Barsbai's reign, it was found that the total number of towns and villages in Egypt had sunk to 2170, whereas in the 4th century a.h. it had stood at 10,000. Much of Barsbai's attention was occupied with raids into Asia Minor, where the Dhu '1-Kadiri Turkomans frequently rebelled, and with wars against Kara Yelek, prince of Amid, and Shah Rokh, son of Timur. Barsbai died on the 7th of June 1438. In accord- ance with the custom of his predecessors he left the throne to a son still in his minority, Abul-Mahasin Yusuf, who took the title Malik al- Aziz, but as usual after a few months he was displaced by the regent Jakmak, who on the 9th of September 1438 was proclaimed sultan with the title Malik al-Zahir. In the years 1442-1444 this sultan sent three fleets against Rhodes, where the third effected a landing, but was unable to make any permanent conquest. In consequence of a lengthy illness Jakmak abdicated on the ist of February 1453, when his son 'Othman was pro-claimed sultan with the title Malik al-Mansiir. Though not a minor, he had no greater success than the sons of the usurpers who preceded him, being dethroned after six weeks (March 15th, 1453) in favour of the amir Inal al-'Ala'i, who took the title Malik al-Ashraf. His reign

was marked by friendly relations with the Ottoman sultan Mahommed II., whose capture of Constantinople (1453) was the cause of great rejoicings in Egypt, but also by violent excesses on the part of the Mamelukes, who dictated the sultan's policy. On his death on the 26th of February 1461 his son Ahmad was proclaimed sultan with the title Malik al-Mu'ayyad; he had the usual fate of sultans' sons, earned in his case by an attempt to bring the Mamelukes under disci- pline; he was compelled to abdicate on the 28th of June 1461, when the amir Khoshkadam, who had served as a general, was proclaimed sultan. Unlike the other Mameluke sovereigns, who were Turks or Circassians, this man had originally been a Greek slave.

In his reign (1463) there began the struggle between the Egyptian and the Ottoman sultanates which finally led to the incorporation of Egypt in the Ottoman empire. The Early dispute began with a struggle over the succession in relations the principality of Karaman, where the two sultans £ˆ?L favoured rival candidates, and the Ottoman sultan Mahommed II. supported the claim of his candidate with force of arms, obtaining as the price of his assistance several towns in which the suzerainty of the Egyptian sultan had been acknow- ledged. Open war did not, however, break out between the two states in Khoshkadam's time. This sultan is said to have taken money to permit innocent persons to be ill-treated or executed. He died on the 9th of October 1467, when the Atabeg Yelbai was selected by the Mamelukes to succeed him, and was proclaimed sultan with the title of Malik al-Zahir. This person, proving incompetent, was deposed by a revolution of the Mame- lukes on the 4th of December 1467, when the Atabeg Timurbogha

was proclaimed with the title Malik al-Zahir, In a month's time, however, there was another palace revolution, and the new Atabeg Kail Bey or Kaietbai (January 3 ist, 1468) was proclaimed sultan, the dethroned Timurbogha being, however, permitted to go free whither he pleased. Much of Kait Bey's reign was spent in struggles with Uzun Hasan, prince of Diarbekr, and Shah Siwar, chief of the Dhu'l-Kadiri Turkomans. He also offended the Ottoman sultan Bayezid II. by entertaining his brother Jem, who was afterwards poisoned in Europe.

Owing to this, and also to the fact that an Indian embassy to the Ottoman sultan was intercepted by the agents of Kait Bey, Bayezid II. declared war against Egypt, and seized Adana, Tarsus and other places within Egyptian territory; extraordinary efforts were made by Kait Bey, whose generals inflicted a severe defeat on the Ottoman invaders. In 1491, however, after the Egyptians had repeatedly defeated the Ottoman troops, Kait Bey made proposals of peace which were accepted, the keys of the towns which the Ottomans had seized being restored to the Egyptian sultan. Kait Bey endeavoured to assist his co-religionists in Spain who were threatened by King Ferdinand, by threatening the pope with reprisals on Syrian Christians, but without effect. As the consequence of a palace intrigue, which Kait Bey was too old to quell, on the 7th of August 1496, a day before his death, his son Mahommed was proclaimed sultan with the title Malik al-Nasir; this was in order to put the supreme power into the hands of the Atabeg Kansuh, since the new sultan was only fourteen years old. An attempt of the Atabeg to oust the new sultan, however, failed. After a reign of little more than two years, filled mainly with struggles between rival amirs, Malik al-Na§ir was murdered (October 31st, 1498), and his uncle and vizier Kansuh proclaimed sultan with the title Malik al-Zahir. His reign only lasted about twenty months; on the 30th of June 1500 he was dethroned by Tiimanbey, who caused Jan Beldt, the Atabeg, to be proclaimed sultan. A few months later Tiimanbey, at the suggestion of Kasrawah, governor of Damascus, whom he had been sent to reduce to subjection, ousted Jan Belat, and was himself proclaimed sultan with the title Malik al-‘Adil (January 25th, 1501). His reign lasted only one hundred days, when he was displaced by Kansuh al-Ghuri (April 20th, 1501). His reign was remarkable for a naval conflict between the Egyptians and the Portuguese, whose fleet interfered with the pilgrim route from India to Mecca, and also with the trade between India and Egypt; Kansuh caused a fleet to be built which fought naval battles with the Portuguese with varying results.

In 1515 there began the war with the Ottoman sultan Selim I. which led to the close of the Mameluke period, and the incorpora- tion of Egypt and its dependencies in the Ottoman Tbe empire (see Turkey: History). Kansuh was charged

conquest by Selim with giving the envoys of the Safawid Isma’il passage through Syria on their way to Venice to form a confederacy against the Turks, and with harbouring various refugees. The actual declaration of war was not made by Selim till May 1515, when the Ottoman sultan had made all his preparations; and at the battle of Merj Dabik, on the 24th of August 1515, Kansuh was defeated by the

Ottoman forces and fell fighting. Syria passed quickly into the possession of the Turks, whose advent was in many places welcome as meaning deliverance from the Mamelukes. In Cairo, when the news of the defeat and death of the Egyptian sultan arrived, the governor who had been left by Kansuh, Tiimanbey, was proclaimed sultan (October 17th, 1516). On the 20th of January 1517 Cairo was taken by the Ottomans, and Selim shortly after declared sultan of Egypt. Tiimanbey continued the struggle for some months, but was finally defeated, and after being captured and kept in prison seventeen days was executed on the 15th of April 15 17.

(8) The Turkish Period. — The sultan Selim left with his viceroy Khair Bey a guard of 5000 janissaries, but otherwise made few changes in the administration of the country. The register by which a great portion of the land was a fief of the Mamelukes was left unchanged, and it is said that a proposal made by the sultan's vizier to appropriate these estates was punished with

with the army.

death. The Mameluke amirs were to be retained in office as heads of twelve sanjaks into, which Egypt was divided; and under the next sultan, Suleiman I., two chambers were created, called respectively the Greater and the Lesser Divan, in which both the army and the ecclesiastical authorities were represented, to aid the pasha by their deliberations. Six regiments altogether were constituted by the conqueror Selim for the protection of Egypt; to these Suleiman added a seventh, of Circassians. As will be seen from the tables, it was the practice of the Porte to change the governor of Egypt at very short intervals-rafter a year or even some months. The third governor, Ahmad Pasha, hearing that orders for this execution had come from Constantinople, endeavoured to make himself an independent ruler and had coins struck in his own name. His schemes were frustrated by two of the amirs whom he had imprisoned and who, escaping from their confinement, attacked him in his bath and killed him. In 1527 the first survey of Egypt under the Ottomans was made, in consequence of the official copy of the former registers having perished by fire; yet this new survey did not come into use until 1605. Egyptian lands were divided in it into four classes — the sultan's domain, fiefs, land for the main- tenance of the army, and lands settled on religious foundations. It would seem that the constant changes in the government caused the army to get out of control at an early period of the Ottoman occupation, and at the beginning of the nth Islamic century mutinies became common; in 1013 Troubles (1604) the governor Ibrahim Pasha was murdered by the soldiers, and

his head set on the Bab Zuwela. The reason for these mutinies was the attempt made by successive pashas to put a stop to the extortion called Tulbah, a forced payment exacted by the troops from the inhabitants of the country by the fiction of debts requiring to be discharged, which led to grievous ill-usage. In 1609 something like civil war broke out between the army and the pasha, who had on his side some loyal regiments and the Bedouins. The soldiers went so far as to choose a sultan, and to divide provisionally the regions of Cairo between them. They were defeated by the governor Mahommed Pasha, who on the 5th of February 1610 entered Cairo in triumph, executed the ringleaders, and banished many others to Yemen. The contemporary historian speaks of this event as a second conquest of Egypt for the Ottomans. A great financial reform was now effected by Mahommed Pasha, who readjusted the burdens imposed on the different communities of Egypt in accordance with their means. With the troubles that beset the metropolis of the Ottoman empire, the governors appointed thence came to be treated by the Egyptians with continually decreasing respect. In July 1623 there came an order from the Porte dismissing Mustafa Pasha and appointing 'All Pasha governor in his place. The officers met and demanded from the newly-appointed governor's deputy the customary gratuity; when this was refused they sent letters to the Porte declaring that they wished to have Mustafa Pasha and not "All Pasha as governor. Meanwhile 'All Pasha had arrived at Alex- andria, and was met by a deputation from Cairo telling him that he was not wanted. He returned a mild answer; and, when a rejoinder came in the same style as the first message, he had the leader of the deputation arrested and imprisoned. Hereupon the garrison of Alexandria attacked the castle and rescued the prisoner; whereupon 'All Pasha was compelled to embark. Shortly after a rescript arrived from Constantinople confirming Mustafa Pasha in the governorship. Similarly in 163 1 the army took upon themselves to depose the governor Must Pasha, in indignation at his execution of Kitas Bey, an officer who was to have commanded an Egyptian force required for service in Persia. The pasha was ordered either to hand over the execu- tioners to vengeance or to resign his place; as he refused to do the former he was compelled to do the latter, and presently a rescript came from Constantinople, approving the conduct of the army and appointing one Khalil Pasha as Musa's successor. Not only was the governor unsupported by the sultan against the troops, but each new governor regularly inflicted a fine upon his outgoing predecessor, under the name of money due to the

treasury; and the outgoing governor would not be allowed to leave Egypt till he had paid it. Besides the extortions to which this practice gave occasion the country suffered greatly in these centuries from famine and pestilence. The latter in the spring of 1619 is said to have carried off 635,000 persons, and in 1643 completely desolated 230 villages.

By the 18th century the importance of the pasha was quite superseded by that of the beys, and two offices, those of Sheik al-Balad and Amir al-Hajj, which were held by these BeY8° ,tbe persons, represented the real headship of the com- munity. The process by which this state of affairs came about is somewhat obscure, owing to the want of good chronicles for the Turkish period of Egyptian history. In 1707 the Sheik al-Balad, Qasim Iywaz, is found at the head of one of two Mameluke factions, the Qasimites and the Fiqarites, between whom the seeds of enmity were sown by the pasha of the time, with the result that a fight took place between the factions outside Cairo, lasting eighty days. At the end of that time Qasim Iywaz was killed and the office which he had held was given to his son Isma'il. Isma'Il held this office for sixteen years, while the pashas were constantly being changed, and succeeded in reconciling the two factions of Mamelukes. In 1 724 this person was assassinated through the machinations of the pasha, and Shirkas Bey, of the opposing faction, elevated to the office of Sheik al-Balad in his place. He was soon driven from his post by one of his own faction called Dhu'l-Fiqar, and fled to Upper Egypt. After a short time he returned at the head of an army, and some engagements ensued, in the last of which Shirkas Bey met his end by drowning; Dhu'l-Fiqar was himself assassinated in 1730 shortly after this event. His place was filled by Othman Bey, who had served as his general in this war. In 1743 Othman Bey, who had governed with wisdom and moderation, was forced to fly from Egypt by the intrigues of two adventurers, Ibrahim and Ridwan Bey, who, when their scheme had succeeded, began a massacre of beys and others thought to be opposed to them; they then proceeded to govern Egypt jointly, holding the two offices mentioned above in alternate years. An attempt made by one of the pashas to rid himself of these two persons by a coup d'etat signally failed owing to the loyalty of their armed supporters, who released Ibrahim and Ridwan from prison and compelled the pasha to fly to Constantinople. An attempt made by a subsequent pasha in accordance with secret orders from Constantinople was so far successful that some of the beys were killed. Ibrahim and Ridwan escaped, and compelled the pasha to resign his governor- ship and return to Constantinople. Ibrahim shortly

afterwards fell by the hand of an assassin who had aspired to occupy one of the vacant beyships himself, which was conferred instead on ‘All, who as ‘All Bey was destined to play an important part in the history of Egypt. The murder of Ibrahim Bey took place in 1755, and his colleague Ridwan perished in the disputes that followed upon it.

‘All Bey, who had first distinguished himself by defending a caravan in Arabia against bandits, set himself the task of avenging the death of his former master Ibrahim, and ey ‘ spent eight years in purchasing Mamelukes and winning other adherents. He thereby excited the suspicions of the Sheik al-Balad Khalll Bey, who organized an attack upon him in the streets of Cairo, in consequence of which he fled to Upper Egypt. Here he met one Salih Bey, who had injuries to avenge on Khalll Bey, and the two organized a force with which they returned to Cairo and defeated Khalll, who was forced to fly to Tanta, where for a time he concealed himself; eventually, however, he was discovered, sent to Alexandria and finally strangled. The date of ‘All Bey’s victory was 11 64 a.h. (a.d. 1750), and after it he was made Sheik al-Balad. In that capacity he exe- cuted the murderer of his former master Ibrahim; but the resentment which this act aroused among the beys caused him to leave his post and fly to Syria, where he won the friendship of the governor of Acre, Zahir b. Omar, who obtained for him the goodwill of the Porte and reinstatement in his post as Sheik al-Balad. In 1766, after the death of his supporter the grand

vizier Raghib Pasha, he was again compelled to fly from Egypt to Yemen, but in the following year he was told that his party at Cairo was strong enough to permit of his return. Resuming his office he raised eighteen of his friends to the rank of bey, among them Ibrahim and Murad, who were afterwards at the head of affairs, as well as Mahommed Abu’l-Dhahab, who was closely connected with the rest of ‘All Bey’s career. He appears to have done his utmost to bring Egyptian affairs into order, and by very severe measures repressed the brigandage of the Bedouins of Lower Egypt. He appears to have aspired to found an in- dependent monarchy, and to that end endeavoured to disband all forces except those which were exclusively under his own control. In 1769 a demand came to ‘All Bey for a force of 12,060 men to be employed by the Porte in the Russian war. It was suggested, however, at Constantinople that ‘All would employ this force when he collected it for securing his own independence, and a messenger was sent by the Porte to the pasha with orders for his execution. ‘All, being apprised by his agents at the metropolis of the despatch of this messenger, ordered him to be waylaid and killed; the despatches were seized and read by ‘All before an assembly of the

beys, who were assured that the order for execution applied to all alike, and he urged them to fight for their lives. His proposals were received with enthusiasm by the beys whom he had created. Egypt was declared independent and the pasha given forty-eight hours to quit the country. Zahir Pasha of Acre, to whom was sent official information of the step taken by ‘All Bey, promised his aid and kept his word by compelling an army sent by the pasha of Damascus against Egypt to retreat.

The Porte was not able at the time to take active measures for the suppression of ‘All Bey, and the latter endeavoured to consolidate his dominions by sending expeditions against maraud- ing tribes, both in north and south Egypt, reforming the finance, and improving the administration of justice. His son-in-law, Abu’l-Dhahab, was sent to subject the Hawwarah, who had occupied the land between Assuan and Assiut, and a force of 20,000 was sent to conquer Yemen. An officer named Isma’Il Bey was sent with 8000 to acquire the eastern shore of the Red Sea, and one named Hasan Bey to occupy Jidda. In six months the greater part of the Arabian peninsula was subject to ‘All Bey, and he appointed as sherif of Mecca a cousin of his own, who bestowed on ‘All by an official proclamation the titles Sultan of Egypt and Khakan of the Two Seas. He then, in virtue of this authorization, struck coins in his own name (1185 a.h.) and ordered his name to be mentioned in public worship.

His next move turned out fatally. Abu’l-Dhahab was sent with a force of 30,000 men in the same year (a.d. 1771) to conquer Syria; and agents were sent to negotiate alliances with Venice and Russia. Abu’l-Dhahab’s progress through Palestine and Syria was triumphant. Reinforced by ‘All Bey’s ally Zahir, he easily took the chief cities, ending with Damascus; but at this point he appears to have entered into secret negotiations with the Porte, by which he undertook to restore Egypt to Ottoman suzerainty. He then proceeded to evacuate Syria, and marched with all the forces he could collect to Upper Egypt, occupying Assiut in April 1772. Having collected some additional troops from the Bedouins, he marched on Cairo. Isma’Il Bey was sent by ‘All Bey with a force of 3000 to check his advance; but at Basatln Isma’Il with his troops joined Abu’l- Dhahab. ‘All Bey intended at first to defend himself so long as possible in the citadel at Cairo; but receiving information to the effect that his friend Zahir of Acre was still willing to give him refuge, he left Cairo for Syria (8th of April 1772), one day before the entrance of Abu’l-Dhahab.

At Acre ‘All’s fortune seemed to be restored. A Russian vessel anchored outside the port, and, in accordance with the agreement

which he had made with the Russian empire, he was supplied with stores and ammunition, and a force of 3000 Albanians. He sent one of his officers, ‘All Bey al-TantawI, to recover the Syrian towns evacuated by Abu’l-Dhahab, and now in the possession of the Porte. He himself took Jaffa and Gaza,

the former of which he gave to his friend ?ahir of Acre. On the ist of February 1773 he received information from Cairo that Abu’l-Dhahab had made himself Sheik al-Balad, and in that capacity was practising unheard-of extortions, which were making Egypt with one voice call for the return of ‘All Bey. He accordingly started for Egypt at the head of an army of 8000 men, and on the 19th of April met the army of Abu’l- Dhahab at Salihia. ‘All’s forces were successful at the first engagement; but when the battle was renewed two days later he was deserted by some of his officers, and prevented by illness and wounds from himself taking the conduct of affairs. The result was a complete defeat for his army, after which he declined to leave his tent; he was captured after a brave resistance, and taken to Cairo, where he died seven days later.

After ‘All Bey’s death Egypt became once more a dependency of the Porte, governed by Abu’l-Dhahab as Sheik al-Balad with the title pasha. He shortly afterwards received permission from the Porte to invade Syria, with the view of punishing ‘All Bey’s supporter Zahir, and left as his deputies in Cairo Isma’il Bey and Ibrahim Bey, who, by deserting ‘All at the battle of Salihia, had brought about his downfall. After taking many cities in Palestine Abu’l-Dhahab died, the cause being unknown; and Murad Bey (another of the deserters at Salihia) brought his forces back to Egypt (26th of May 1775).

Isma’il Bey now became Sheik al-Balad, but was soon involved in a dispute with Ibrahim and Murad, who after a time succeeded in driving Isma’il out of Egypt and establishing a joint rule (as Sheik al-Balad and Amir al-Hajj respectively) similar to that which had been tried previously. The two were soon involved in quarrels, which at one time threatened to break out into open war; but this catastrophe was averted, and the joint rule was maintained till 1786, when an expedition was sent by the Porte to restore Ottoman supremacy in Egypt. Murad Bey attempted to resist, but was easily defeated; and he

with Ibrahim decided to fly to Upper Egypt and await the trend of events. On the ist of August 1782 the Turkish commander entered Cairo, and, after some violent measures had been taken for the restoration of order, Isma'il Bey was again made Sheik al-Balad and a new pasha installed as governor. In January 1791 a terrible plague began to rage in Cairo and elsewhere in Egypt, to which Isma'il Bey and most of his family fell victims. Owing to the need for competent rulers Ibrahim and Murad Bey were sent for from Upper Egypt and resumed their dual government. These two persons were still in office when Bonaparte entered Egypt.

Moslem Authorities. — Arabic literature being cosmopolitan, and Arabic authors accustomed to travel from place to place to collect traditions and obtain oral instruction from contemporary authorities, or else to enjoy the patronage of Maecenates, the literary history of Egypt cannot be dissociated from that of the other Moslem countries in which Arabic was the chief literary vehicle. Hence the list of authors connected with Egypt, which occupies pages 161-275 of SuyQti's work, Husn al-muha&arah ji akhbiri Misr wal-Qdhirah (Cairo, 1321 A.H.), contains the names of persons like Mutanabbi, who stayed there for a short time in the service of some patron; Abu Tammam, who lived there before he acquired fame as a poet ; 'Umara of Yemen, who came there at a mature age to spend some years in the service of Fatimite viziers; each of whom figures in lists of authors belonging to some other country also. So long as the centre of the Islamic world was not in Egypt, the best talent was attracted elsewhere; but after the fall of Bagdad, Cairo became the chief seat of Islamic learning, and this rank, chiefly owing to the university of Azhar, it has ever since continued to maintain. The following composed special histories of Egypt: Ibn 'Abd al-Hakam, d. 257 A.H.; 'Abd al-Rahim b. Yunus, d. 347; Mahommed b. Yusuf al-Kindi, d. somewhat later; Ibn Zulaq, d. 387; 'Izz al-Mulk Mahommed al-Musabbihi, d. 420; Mahommed b. Salamah al- Qoda'I, d. 454; Jamal al-din 'All al-Qifti, d. 568; Jamal al-dln al-rlalabi, d. 623; 'Abd al-Laˆif al-Baghdadi, d. 629 ; Mahommed b. 'Abd al-Aziz al-Idrisi (history of Upper Egypt), d. 649; his son Ja'far (history of Cairo), d. 676; Ibn Sa'id, d. 685; Ibrahim b. Wasif Shah; Ibn al-Mutawwaj, d. 703; Mahommed b. Dani'al, d. 710; Ja'far b. Tha'lab Kamal al-din al-Adfu'i (history of Upper Egypt), d. 730; 'Abd al-Qarun al-Halabi, d. 735; Ibn Hablb, d. 779; Ibn Duqmaq, d. 790; Ibn Tughan, Shihab al-din al- Auhadi, d. 790; Ibn al-Mulaqqin, d. 806; Maqrlzi, Taqiyy al-din Ahmad, d. 840; Ibn Hajar al-'Asqalani, d. 852 ; al-Sakhawi, d. 902 ; Abu'l-Mahasin b. Taghribirdl, d. 874; Jalal al-din al-Suyuti, d. 911 ; Ibn Zunbul al-Rammal; Ibn Iyas, d. after 928; Mahommed b. Abi Surflr, d. after 1017; Zain al-din al Karami, d.

al-Rahman Jabarti, d. after 1236. Of many of the Mameluke sultans there are special chronicles preserved in various European and Oriental libraries. The works of many of the authors enumerated are topographical and biographical as well as purely historical. To these there should be added the Survey of Egypt, called al- tuhfah al-saniyyah of Ibn Ji’an, belonging to the time of Kait Bey; the treatise on the Egyptian constitution called Zubdat Kashf al-Mamalik, by Khalil al-Zahiri, of the same period; and the encyclopaedic work on the same subject called Subh al-Insha, by al-Qalqashandi, d. 821.

Arabic poetry is in the main encomiastic and personal, and from the beginning of the Omayyad period sovereigns and governors paid poets to celebrate their achievements; of those of importance who are connected with Egypt we may mention Nusaib, encomiast of ‘Abd al-Aziz b. Merwan, d. 180; the greater Nashi (Abu 1- Abbas ‘Abdallah), d. 293; Ibn Tabataba, d.345; Abu’l-Raqa’maq, encomiast of al-Mo’izz, d. 399; Sari’ al-Dila (“All b. ‘Abd al-Wahid), encomiast of the Fatimite al-Zahir, d. 412; Sanajat al-dauh (Mahommed b. al-Qasim), encomiast of Hakim; ‘AH b. ‘Abbad al-Iskandari, encomiast of the vizier al-Af(jal, executed by Hafiz; Ibn Qalaqis al-Iskandari, encomiast of the Ayyubites, d. 607 ; Muhaddhab b. Mameti, encomiast of the Ayyubites, d. 616; Ibn Sana’ al-Mulk, encomiast of the Ayyubites, d. 658 ; Ibn al-Munajjim, d. 626; Ibn Matrflh, encomiast of the Ayyubites, d. 654; Baha’ al- din Zuhair, encomiast of al-§alih, d. 656; Ibn ‘Ammar, d. 675; al-Mi’mar, d. 749; Ibn Nubatah,’ d. 768 ; Ibn Abi Hajalah, d. 776; Burhan al-din al-QIrati, d. 801; Ibn Mukanis, d. 864; Ibn Hijjah al-Hamawi, d. 837. Poets distinguished for special lines are al- Hakim b. Dani’ al, d. 608, author of the Shadow-play; and al-Busiri (Mahommed b. Sa’id), d. 694, author of the ode in praise of the prophet called Burdah. The poets of Egypt are reckoned with those of Syria in the Yatlmah of Tha’ alibi; a special work upon them was written by Ibn Fadl allah (d. 740) ; and a list of poets of the nth century is given by KhafajHn his Raihanat al-alibba.

The needs of the Egyptian court produced a number of elegant letter-writers, of whom the most famous were ‘Abd al-Rahim b. ‘All al-Baisani, ordinarily known as al-Qadl’ al-Fadil, d. 596, secretary of state to Saladin and other Ayyubite sultans; Tmad al-din al- Ispahani, d. 597, also secretary of state and official chronicler; and Ibn ‘Abd al-Zahir, d. 692, secretary of state to Bibars I. and succeed- ing sultans; he was followed by his son Fath al-din, to whom “the title ” Secret writer ” was first given.

In the subject of law Egypt boasts that the Imam Shafi'I, founder of one of the schools, resided at Fostat from 195 till his death in 204; his system, though displaced for a time by that invented by the Fatimites, and since the Turkish conquest by the Hanifite system, has always been popular in Egypt: in Ayyubite times it was dominant, whereas in Mameluke times all four systems were officially recognized. The eminent jurists who flourished in Moslem Egypt form a very lengthy list. Among the Egyptian traditionalists the most eminent is Daraqutni, d. 385.

Among Egyptian mystics the most famous as authors are the poet Ibn al-Farid, d. 632, and Abd al-Wahhab Sha rani, d. 973. Abu'l- Hasan al-Shadhili (d. 656) is celebrated as the founder of the Shadhili order; but there were many others of note. The dictionary of physicians, compiled in the 7th century, enumerates nearly sixty men of science who resided in Egypt ; the best-known among them are Sa'id b. Bitrlq, Moses Maimonides and Ibn Baitar. Of Egyptian miscellaneous writers two of the most celebrated are Ibn Daqiq al'-Id, d. 702, and Jalal al-din Suyut;!.

European Authorities. — For the Moslem conquest, A. J. Butler, The Arab Conquest of Egypt (Oxford, 1902) ; for the period before the Fatimites, Wustenfeld, " Die Statthalter von Agypten," in Abhandlungen der koniglichen Gesellschaft der Wissenschaften zu Gottingen, vols. xx. and xxi. ; for the Fatimite period, Wustenfeld, " Geschichte der Fatimiden-Chalifen," ibid. vols. xxvi. and xxvii. ; for the Ayyubite period, Ibn Khallikan's Biographical Dictionary, translated by M'G. de Slane (London, 1842-1871) ; for the Mameluke period, Weil, Geschichte der Chalifen, vols. iv. and v. (also called Geschichte des Abbasidenchalifats in Agypten), (Stuttgart, 1860-1862); Sir W. Muir, The Mameluke or Slave Dynasty of Egypt (London, 1896); for the Turkish period, G. Zaidan, History of Modern Egypt (Arabic), vol. ii. (Cairo, 1889). See also Maqrizi, Description topographique et historique de I'Ugypte, translated by Bouriant (Pans, 1895, &c.) ; C. H. Becker, Beitrage zur Geschichte Agyptens (Strassburg, 1902). ' (D. S. M.*)

(9) From the French Occupation to the Rise of Mehemet Ali. — ■ The ostensible object of the French expedition to Egypt was to reinstate the authority of the Sublime Porte, and suppress the Mamelukes; and in the proclamation printed with the Arabic types brought from the Propaganda press, and issued shortly after the taking of Alexandria, Bonaparte declared that he reverenced the prophet Mahomet and the Koran far more than the Mamelukes reverenced either, and argued that all men were equal except so far as they were distinguished by

their intellectual and moral excellences, of neither of which the Mamelukes had

any great share. In future all posts in Egypt were to be open to all classes of the inhabitants; the conduct of affairs was to be committed to the men of talent, virtue, and learning; and in proof of the statement that the French were sincere Moslems the overthrow of the papal authority in Rome was alleged. That there might be no doubt of the friendly feeling of the French to the Porte, villages and towns which capitulated to the invaders were required to hoist the flags of both the Porte and the French republic, and in the thanksgiving prescribed to the Egyptians for their deliverance from the Mamelukes, prayer was to be offered for both the sultan and the French army. It does not appear that the proclamation convinced many of the Egyptians of the truth of these professions. After the battle of Ambabah, at which the forces of both Murad Bey and Ibrahim Bey were dispersed, the populace readily plundered the houses of the beys, and a deputation was sent from al-Azhar to Bonaparte to ascertain his intentions; these proved to be a repetition of the terms of his proclamation, and, though the combination of loyalty to the French with loyalty to the sultan was unintelligible, a good understanding was at first established between the invaders and the Egyptians. A municipal council was estab- lished in Cairo, consisting of persons taken from the ranks of the sheiks, the Mamelukes and the French; and presently delegates from Alexandria and other important towns were added. This council did little more than register the decrees of the French commander, who continued to exercise dictatorial power. The

destruction of the -French fleet at the battle of the th Nile Nile, and the failure of the French forces sent to Upper

Egypt (where they reached the first cataract) to obtain possession of the person of Murad Bey, shook the faith of the Egyptians in their invincibility; and in consequence of a series of unwelcome innovations the relations between conquerors and conquered grew daily more strained, till at last, on the occasion of the introduction of a house tax, an insurrection broke out in Cairo on the 22nd of October 1798, of which the headquarters were in the Moslem university of Azhar. On

this occasion the French general Dupuy, lieutenant-governor of Cairo, was killed. The prompt measures of Bonaparte, aided by the arrival from Alexandria of General J. B. Kleber, quickly suppressed this rising; but the stabling of the French cavalry in the mosque of Azhar gave great and permanent offence. In consequence of this affair, the deliberative council was suppressed, but on the 25th of December a fresh proclamation was issued, reconstituting the two divans which had been created by the Turks ; the special divan was to consist of 14 persons chosen by lot out of 60 govern- ment nominees, and was to meet daily. The general divan was to consist of functionaries, and to meet on emergencies.

In consequence of despatches which reached Bonaparte on the 3rd of January 1799, announcing the intention of the Porte to invade the country with the object of recovering it by force, Bonaparte resolved on his Syrian expedition, and appointed governors for Cairo, Alexandria, and Upper Egypt, to govern during his absence. From that ill-fated expedition he returned at the beginning of June. Advantage had been taken of this opportunity by Murad Bey and Ibrahim Bey to collect their forces and attempt a joint attack on Cairo, but this Bonaparte arrived in time to defeat, and in the last week of July he inflicted a crushing defeat on the Turkish army that had landed at Aboukir, aided by the British fleet commanded by Sir Sidney Smith. Shortly after his victory Bonaparte left Egypt, having appointed Kleber to govern in his absence, which he informed the sheiks of Cairo was not to last more than three months. Kleber himself regarded the condition of the French invaders as extremely perilous, and wrote to inform the French republic of the facts. A double expedition shortly after Bonaparte's departure was sent by the Porte for the recovery of Egypt, one force being despatched by sea to Damietta, while another under Yusuf Pasha took the land route from Damascus by al-Arish. Over the first some success was won, in consequence of which the Turks agreed to a convention (signed January 24, 1800), by virtue of which the French were to quit Egypt. The Turkish iroops advanced to Bilbeis, where they were received by the

sheiks from Cairo, and the Mamelukes also returned to that city from their hiding-places. Before the preparations for the departure of the French were completed, orders came to Sir Sidney Smith from the British government, forbidding the carrying out of the convention unless the French army were treated as prisoners of war; and when these were communicated to Kleber he cancelled the orders previously given to the troops, and proceeded to put the country in a state of defence. His departure with most of the army to attack the Turks at Mataria led to riots in Cairo, in the course of which many Christians

were slaughtered; but the national party were unable to get possession of the citadel, and Kleber, having defeated the Turks, was soon able to return to the capital. On the 14th of April he bombarded Bulak, and proceeded to bombard Cairo itself, which was taken the following night. Order was soon restored, and a fine of twelve million francs imposed on the rioters. Murad Bey sought an interview with Kleber and succeeded in obtaining from him the government of Upper Egypt. He died shortly afterwards and was succeeded by Osman Bey al-BardlsI.

On the 14th of June Kleber was assassinated by a fanatic named Suleiman of Aleppo, said to have been incited to the deed by a Janissary refugee at Jerusalem, who had brought letters to the sheiks of the Azhar, who, however, refused to give him any encouragement. Three of these, nevertheless, were executed by the French as accessories before the fact, and the assassin himself was impaled, after torture, in spite of a promise of pardon having been made to him on condition of his naming his associates. The command of the army then devolved on General J. F. (Baron de) Menou (1750-1810), a man who had professed Islam, and who endeavoured to conciliate the Moslem population by various measures, such as excluding all Christians (with the exception of one Frenchman) from the divan, replacing the Copts who were in government service by Moslems, and subjecting French residents to taxes. Whatever popularity might have been gained by these measures was counteracted by his declara- tion of a French protectorate over Egypt, which was to count as a French colony.

In the first weeks of March 1801 the English, under Sir R. Abercromby, effected a landing at Aboukir, and proceeded to invest Alexandria, where on the 2 1st they were attacked by Menou ; the French were repulsed, but the English French commander was mortally wounded in the action. On tiom the 25th fresh reinforcements arrived under Husain, the Kapudan Pasha, or high admiral; and a combined English and Turkish force was sent to take Rosetta. On the 30th of May, General A. D. Belliard, who had been left in charge at Cairo, was assailed on two sides by the British forces under General John Hely Hutchinson (afterwards 2nd earl of Donough- more), and the Turkish under Yusuf Pasha; after negotiations Belliard agreed to evacuate Cairo and to sail with his 13,734 troops to France. On the 30th of August, Menou at Alexandria was compelled to accept similar conditions, and his force of 10,000 left for Europe in September. This was the termination of the French occupation of Egypt, of which the chief permanent monument was the Description de l’£gypte, compiled by the French savants who accompanied the expedition. Further than this, ” it brought to the

attention of a few men in Egypt a keen sense of the great advantage of an orderly government, and a warm appreciation of the advance that science and learning had made in Europe ” (Hajji Browne, Bonaparte in Egypt and the Egyptians of to-day, 1907, p. 268).

Soon after the evacuation of Egypt by the French, the country became the scene of more severe troubles, in consequence of the attempts of the Turks to destroy the power of the Mamelukes. In defiance of promises to the British government, orders were transmitted from Constantinople to Husain Pasha, the Turkish high admiral, to ensnare and put to death the principal beys. Invited to an entertainment, they were, according to the Egyptian contemporary historian al-Jabarti, attacked on board the flag-ship; Sir Robert Wilson and M. F. Mengin, however, state that they were fired on, in open boats, in the Bay of Aboukir. They offered an heroic resistance, but were overpowered, and

some killed, some made prisoners; among the last was Osman Bey al-Bardisi, who was severely wounded. General Hutchinson, British informed of this treachery, immediately assumed Turks and threatening measures against the Turks, and in name- consequence the killed, wounded and prisoners were lukes. given up to him. At the same time Ytisuf Pasha

arrested all the beys in Cairo, but was shortly compelled by the British to release them. Such was the beginning of the disastrous struggle between the Mamelukes and the Turks.

Mahommed Khosrev was the first Turkish governor of Egypt after the expulsion of the French. The form of government, however, was not the same as that before the French invasion, for the Mamelukes were not reinstated. The pasha, and through him the sultan, endeavoured on several occasions either to ensnare them or to beguile them into submission; but these efforts failing, Mahommed Khosrev took the field, and a Turkish detachment 7000 strong was despatched against them to Damanhur, whither they had descended from Upper Egypt, and was defeated by a small force under al-Alfl; or, as Mengin says, by 800 men commanded by al-Bardlsi, when al-Alfl had left the field. Their ammunition and guns fell into the hands of the Mamelukes.

In March 1803 the British evacuated Alexandria, and Ma- hommed Bey al-Alfl accompanied them to England to consult respecting the means to be adopted for restoring the former power of the Mamelukes, who meanwhile took Minia and inter- rupted communication between Upper and Lower Egypt. About six weeks after, the Arnaut (or Albanian) soldiers in the service of Khosrev tumultuously demanded their pay, and surrounded the house of the defterdar (or finance minister), who in vain appealed to the pasha to satisfy their claims. The latter opened fire from the artillery of his palace on the insurgent soldiery in the house of the defterdar, across the Ezbekia. The citizens of Cairo, accustomed to such occurrences, immediately closed their shops, and every man who possessed any weapon armed himself. The tumult continued all the day, and the next morning a body of troops sent out by the pasha failed to quell it. Tahir, the commander of the Albanians, then repaired to the citadel, gained admittance through an embrasure, and, having obtained posses- sion of it, began to cannonade the pasha over the roofs of the intervening houses, and then descended with guns to the Ezbekia and laid close siege to the palace. On the following day Mahommed Khosrev made good his escape, with his women and servants and his regular troops, and fled to Damietta by the river. This revolt marks the beginning in Egypt of the breach between the Albanians and Turks, which ultimately led to the expulsion of the latter, and of the rise to power of the Albanian Mehemet Ah (q.v.) , who was destined to rule the country for nearly forty years and be the cause of serious European complications. ,

Tahir Pasha assumed the government, but in twenty-three days he met with his death from exactly the same cause as that First °^ l ^ e overthrow of his predecessor. He refused the

appear- pay of certain of the Turkish troops, and was immedi- aticeof ately assassinated. A desperate conflict ensued between Mehemet ^e Albanians and Turks; and the palace was set on fire and plundered. The masters of Egypt were now split into these two factions, animated with the fiercest animosity against each other. Mehemet Ali, then in command of an Albanian regiment, became the head of the former, but his party was the weaker, and he therefore entered into an alliance with the Mameluke leaders Ibrahim Bey and ‘Osman Bey al-Bardisi. A certain Ahmed Pasha, who was about to proceed to a province in Arabia, of which he had been appointed governor, was raised to the important post of pasha of Egypt, through the influence of the Turks and the favour of the sheiks; but Mehemet Ali, who with his Albanians held the citadel, refused to assent to their choice; the Mamelukes moved over from El-Giza, whither they had been invited

by Tahir Pasha, and Ahmed Pasha betook himself to the mosque of al-Zahir, which the French had con- verted into a fortress. He was compelled to surrender by the Albanians; the two chiefs of the Turks who killed Tahir Pasha

were taken with him and put to death, and he himself was de- tained a prisoner. In consequence of the alliance between Mehemet Ali and a]-Bardisi, the Albanians gave the citadel over to the Mamelukes; and soon after, these allies marched against Khosrev Pasha, who having been joined by a considerable body of Turks, and being in possession of Damietta, was enabled to offer an obstinate resistance. After much loss on both sides, he was taken prisoner and brought to Cairo; but he was treated with respect. The victorious soldiery sacked the town of Damietta, and were guilty of the barbarities usual with them on such occasions.

A few days later, Ali Pasha Jazairli landed at Alexandria with an imperial firman constituting him pasha of Egypt, and threatened the beys, who now were virtual masters of Upper Egypt, as well as of the capital and nearly the whole of Lower Egypt. Mehemet Ali and al-Bardisi therefore descended to Rosetta, which had fallen into the hands of a brother of Ali Pasha, and having captured the town and its commander, al- Bardisi purposed to proceed against Alexandria; but the troops demanded arrears of pay which it was not in his power to give, and the pasha had cut the dyke between the lakes of Aboukir and Mareotis, thus rendering the approach to Alexandria more difficult. Al-Bardlsi and Mehemet Ali therefore returned to Cairo. The troubles of Egypt were now increased by an in- sufficient inundation, and great scarcity prevailerl, aggravated by the taxation to which the beys were compelled to resort in order to pay the troops; while murder and rapine prevailed in the capital, the riotous soldiery being under little or no control. Meanwhile, Ali Pasha, who had been behaving with violence towards the Franks in Alexandria, received a hatt-i- sherif from the sultan, which he sent by his secretary to Cairo. It announced that the beys should live peaceably in Egypt, with an annual pension each of fifteen purses (a “purse “ = 500 piastres) and other privileges, but that the government should be in the hands of the pasha. To this the beys assented, but with considerable misgivings; for they had intercepted letters from Ali to the Albanians, endeavouring to alienate them from their side to his own. Deceptive answers were returned to these, and Ali was induced by them to advance towards Cairo at the head of 3000 men. The forces \ uk e es *™J’ of the beys, with the Albanians, encamped near him Ail Pasha. at Shalakan, and he fell back on a place called Zufeyta. They next seized his boats conveying soldiers, servants, and his ammunition and

baggage; and, following him, they demanded wherefore he brought with him so numerous a body of men, in opposition to usage and to their previous warning. Finding they would not allow his troops to advance, forbidden himself to retreat with them to Alexandria, and being surrounded by the enemy, he would have hazarded a battle, but his men refused to fight. He therefore went to the camp of the beys, and his army was compelled to retire to Syria. In the hands of the beys Ali Pasha again attempted treachery. A horseman was seen to leave his tent one night at full gallop; he was the bearer of a letter to Osman Bey Hasan, the governor of Kine. This offered a fair pretext to the Mamelukes to rid themselves of a man proved to be a perfidious tyrant. He was sent under a guard of forty-five men towards the Syrian frontier; and about a week after, news was received that in a skirmish with some of his own soldiers he had fallen mortally wounded.

The death of Ali Pasha produced only temporary tranquillity; in a few days (February 12, 1804) the return of Mahommed Bey al-Alfl (called the Great) from England was the signal for fresh disturbances, which, by splitting the Mamelukes into two parties, accelerated their final overthrow. An ancient jealousy existed between al-Alfl and the other most powerful bey, al-Bardisi. The latter was now supreme among the Mamelukes, and this fact considerably heightened their old enmity. While the guns of the citadel, those at Old Cairo, and even those of the palace of al-Bardisi, were thrice fired in honour of al-Alfi, preparations were immediately begun to oppose him. His partisans were collected opposite Cairo, and al-Alfi the Less held Giza; but treachery was among them; Husain Bey (a relative of al-Alfi)

was assassinated by emissaries of al-Bardlsi, and Mehemet Ali, with his Albanians, gained possession of Giza, which was, as usual, given over to the troops to pillage. In the meanwhile al-Alfi the Great embarked at Rosetta, and not apprehending opposition, was on his way to Cairo, when a little south of the town of Manuf he encountered a party of Albanians, and with difficulty made his escape. He gained the eastern branch of the Nile, but the river had become dangerous, and he fled to the desert. There he had several hairbreadth escapes, and at last secreted himself among a tribe of Arabs at Ras al-Wadi. A change in the fortune of al-Bardlsi, however, favoured his plans for

the future. That chief, in order to satisfy the demands of the Albanians for their pay, gave orders to levy heavy contri- butions from the citizens of Cairo; and this new oppression roused them to rebellion. The Albanians, alarmed for their safety, assured the populace that they would not allow the order to be executed; and Mehemet Ali himself caused a proclamation to be made to that effect. Thus the Albanians became the favourites of the people, and took advantage of their oppor- tunity. Three days later (March 1 2th, 1804) they beset the house of the aged Ibrahim Bey, and that of al-Bardisi, both of whom effected their escape with difficulty. The Mamelukes in the citadel directed a fire of shot and shell on the houses of the Albanians which were situated in the Ezbekla; but, on hearing of the flight of their chiefs, they evacuated the place; and Mehemet Ali, on gaining possession of it, once more proclaimed Mahommed Khosrev pasha of Egypt. For one day and a half he enjoyed the title; the friends of the late Tahir Pa-sha then accomplished his second degradation, 1 and Cairo was again the scene of terrible enormities, the Albanians revelling in the houses of the Mameluke chiefs, whose hareems met with no mercy at their hands. These events were the signal for the reappearance of al-Alfl.

The Albanians now invited Ahmed Pasha Khorshld to assume the reins of government, and he without delay proceeded from Alexandria to Cairo. The forces of the partisans of al-BardisI were rava dng the country a few miles south of the capital and intercepting the supplies of corn by the river; a little later they passed to the north of Cairo and successively took Bilbeis and Kalyub, plundering the villages, destroying the crops, and slaughtering the herds of the inhabitants. Cairo was itself in a state of tumult, suffering severely from a scarcity of grain, and the heavy exactions of the pasha to meet the demands of his turbulent troops, at that time augmented by a Turkish detach- ment. The shops were closed, and the unfortunate people assembled in great crowds, crying ” Ya Latlf ! Ya Latif! ” (“O Gracious [God] ! “) Al-Alf I and Osman Bey Hasan had professed allegiance to the pasha; but they soon after declared against him, and they were now approaching from the south; and having repulsed Mehemet Ali, they took the two fortresses of Tura. These Mehemet Ali speedily retook by night with 4000 infantry and cavalry; but the enterprise was only partially successful. On the following day the other Mamelukes north of the metropolis actually penetrated into the suburbs; but a few days later were defeated in a battle fought at Shubra, with heavy loss on both sides. This reverse in a measure united the two great Mameluke parties, though their chiefs remained at enmity. Al-Bardisi passed to the south of Cairo, and the Mame- lukes gradually retreated towards

Upper Egypt. Thither the pasha despatched three suacessive expeditions (one of which was commanded by Mehemet Ali), and many battles were fought, but without decisive result.

At this period another calamity befell Egypt; about 3000 Delis (Kurdish troops) arrived in Cairo from Syria. These troops had been sent for by Khorshld in order to strengthen himself against the Albanians; and the events of this portion of the history afford sad proof of their ferocity and brutal enormities,

1 Khosrev Pasha afterwards filled several of the highest offices at Constantinople. He died on the 1st of February 1855. He was a bigot of the old school, strongly opposed to the influences of Western civilization, and consequently to the assistance of France and Great Britain in the Crimean Wa*.

in which they far exceeded the ordinary Turkish soldiers and even the Albanians. Their arrival immediately recalled Mehemet Ali and his party from the war, and instead of aiding Khorshld was the proximate cause of his overthrow.

Cairo was ripe for revolt; the pasha was hated for his tyranny and extortion, and execrated for the deeds of his troops, especi- ally those of the Delis: the sheiks enjoined the people to close their shops, and the soldiers clamoured for pay. At this juncture a firman arrived from Constantinople conferring on Mehemet Ali the pashalic of Jedda; but the occurrences of a few days raised him to that of Egypt.

On the 1 2th of Safar 1220 (May 12th, 1805) the sheiks, with an immense concourse of the inhabitants, assembled in the house of the kadi; and the ulema, amid the prayers and cries of the people, wrote a full statement of the heavy bJtweea wrongs which they had endured under the administra- Khorshld tion of the pasha. The ulema, in answer, were desired **”’ to go to the citadel; but they were apprised of Mehemet treachery; and on the following day, having held another council. at the house of the kadi, they proceeded to Mehemet Ali and informed him that the people would no longer submit to Khorshld. ” Then whom will ye have? ” said he. ” We will have thee,” they replied, ” to govern us according to the laws; for we see in thy countenance that thou art possessed of justice and goodness.” Mehemet Ali seemed to hesitate, and then complied, and was at once invested. On this, a bloody struggle began between the two pashas. Khorshld, being informed of the insurrection, immediately prepared to stand a siege in the citadel. Two chiefs of the Albanians joined his party, but many of his soldiers deserted. Mehemet Ali’s great strength lay in the devotion of the citizens of Cairo, who looked on him as a deliverer from their afflictions; and great numbers armed themselves, advising constantly with Mehemet Ali, having the sayyid Omar and the sheiks at their head, and guarding the town at night. On the 19th of the same month Mehemet Ali began to besiege Khorshld. After the siege had continued many days, Khorshld gave orders to cannonade and bombard the town; and for six days his commands were executed with little interruption, the citadel itself also lying between two fires. Mehemet Ali’s position at this time was very critical: his troops

became mutinous for their pay; the silahdar, who had commanded one of the expeditions against the Mamelukes, advanced to the relief of Khorshld; and the latter ordered the Delis to march to his assistance. The firing ceased on the Friday, but began again on the eve of Saturday and lasted until the next Friday. On the day following (May 28th) news came of the arrival at Alexandria of a messenger from Constantinople. The ensuing night in Cairo presented a curious spectacle; many of the inhabitants, believing that this envoy would put an end to their miseries, fired off their weapons as they paraded the streets with bands of music. The silahdar, imagining the noise to be a fray, marched in haste towards the citadel, while its garrison sallied forth and began throwing up entrenchments in the quarter of Arab al-Yesar, but were repulsed by the armed inhabitants and the soldiers stationed there; and during all this time the cannonade and bombardment from the citadel, and on it from the batteries on the hill, continued unabated.

The envoy brought a firman confirming Mehemet Ali and ordering Khorshld to go to Alexandria, there to await further orders; but this he refused to do, on the ground that he had been appointed by a hatt-i-sherlf. The firing jjj emet ceased on the following day, but the troubles of the granted people were rather increased than assuaged; murders the and robberies were daily committed by the soldiery, pasha ” c – the shops were all shut and some of the streets barricaded. While these scenes were being enacted, al-Alfl was besieging Damanhur, and the other beys were returning towards Cairo, Khorshld having called them to his assistance: but Mehemet Ali forced them to recreat.

Soon after this, a squadron under the command of the Turkish high admiral arrived at Aboukir Bay, with despatches confirming tfee &rman brought by .the former envoy, and authorizing

Mehemet Ali to continue to discharge the functions of governor. Khorshld at first refused to yield; but at length, on condition that his troops should be paid, he evacuated the citadel and embarked for Rosetta.

Mehemet Ali now possessed the title of Governor of Egypt, but beyond the walls of Cairo his authority was everywhere disputed by the beys,

who were joined by the army of the silahdar of Khorshld; and many Albanians deserted from his ranks. To replenish his empty coffers he was also compelled to levy exactions, principally from the Copts. An attempt was made to ensnare certain of the beys, who were encamped north of Cairo. On the 17th of August 1805 the dam of the canal of Cairo was to be cut, and some chiefs of Mehemet Ali's party wrote, informing them that he would go forth early on that morning with most of his troops to witness the ceremony, inviting them to enter and seize the city, and, to deceive them, stipulating for a certain sum of money as a reward. The dam, however, was cut early in the preceding night, without any ceremony. On the following morning, these beys, with their Mamelukes, a very numerous body, broke open the gate of the suburb al-Husainia, and gained admittance into the city from the north, through the gate called Bab el-Futtih. They marched along the principal street for some distance, with kettle-drums behind each company, and were received with apparent joy by the citizens. At the mosque called the Ashrafia they separated, one party proceeding to the Azhar and the houses of certain sheiks, and the other continuing along the main street, and through the gate called Bab Zuwela, where they turned up towards the citadel. Here they were fired on by some soldiers from the houses; and with this signal a terrible massacre began. Falling back towards their companions, they found the bye-streets closed; and in that part of the main thoroughfare called Bain al- Kasrain they were suddenly placed between two fires. Thus shut up in a narrow street, some sought refuge in the collegiate mosque Barkukia, while the remainder fought their way through their enemies and escaped over the city-wall with the loss of their horses. Two Mamelukes had in the meantime succeeded, by great exertions, in giving the alarm to their comrades in the quarter of the Azhar, who escaped by the eastern gate called Bab al-Ghoraib. A horrible fate awaited those who had shut themselves up in the Barkukia. Having begged for quarter

and surrendered, they were immediately stripped nearly massacre naked, and about fifty were slaughtered on the spot; of the and about the same number were dragged away, with Mame- every brutal aggravation of their pitiful condition, to

Mehemet Ali. Among them were four beys, one of whom, driven to madness by Mehemet Ali's mockery, asked for a drink of water; his hands were untied that he might take the bottle, but he snatched a dagger from one of the soldiers, rushed at the pasha, and fell covered with wounds. The wretched captives were then chained and left in the court of the pasha's house; and on the following morning the heads of their com- rades who had perished the day before were skinned and

stuffed with straw before their eyes. One bey and two others paid their ransom and were released; the rest, without exception, were tortured and put to death in the course of the ensuing night. Eighty-three heads (many of them those of Frenchmen and Albanians) were stuffed and sent to Constantinople, with a boast that the Mameluke chiefs were utterly destroyed. Thus ended Mehemet Ali's first massacre of his too confiding enemies. The beys, after this, appear to have despaired of regaining their ascendancy; most of them retreated to Upper Egypt, and an attempt at compromise failed. Al-Alfi offered his sub- mission on the condition of the cession of the Fayum and other provinces; but this was refused, and that chief gained two successive victories over the pasha's troops, many of whom deserted to him.

At length, in consequence of the remonstrances of the English, and a promise made by al-Alfl of 1 500 purses, the Porte consented to reinstate the twenty-four beys and to place al-Alf! at their head; but this measure met with the opposition of Mehemet Ali and the determined resistance of the majority of the Mamelukes,

who, rather than have al-Alfl at their head, preferred their present condition; for the enmity of al-Bardisi had not subsided, and he commanded the voice of most of the other beys. In pursuance of the above plan, a squadron under Salih Pasha, shortly before appointed high admiral, arrived at Alexandria on the 1st of July 1806 with 3000 regular troops and a successor to Mehemet Ali, who was to receive the pashalik of Salonica. This wily chief professed his willingness to obey the commands of the Porte, but stated that his troops, to whom he owed a vast sum of money, opposed his departure. He induced the ulema to sign a letter, praying the sultan to revoke the command for reinstating the beys, persuaded the chiefs of the Albanian troops to swear allegiance to him, and sent 2000 purses con- tributed by them to Constantinople. Al-Alfi was at that time besieging Damanhur, and he gained a signal victory over the pasha's troops; but the dissensions of the beys destroyed their last chance of a return to power. Al-Alfi and his partisans were unable to pay the sum promised to the Porte; SaUh Pasha received plenipotentiary powers from Constantinople, in con- sequence of the letter from the ulema; and, on the condition of Mehemet Ali's paying 4000 purses to the Porte, it was decided that he should continue in his post, and the reinstatement of the beys was abandoned. Fortune continued to favour the pasha. In the following month al-Bardisi died, aged forty-eight years; and soon after, a scarcity of provisions excited the troops of al-Alfi to revolt. That bey very reluctantly raised the siege of Damanhur, being in daily expectation of the arrival of an English army; and at the village of

Shubra-ment he was attacked by a sudden illness, and died on the 30th of January 1807, at the age of fifty-five. Thus was the pasha relieved of his two most formidable enemies; and shortly after he defeated Shahin Bey, with the loss to the latter of his artillery and baggage and 300 men killed or taken prisoners.

On the 17th of March 1807 a British fleet appeared off Alex- andria, having on board nearly 5000 troops, under the command of General A. Mackenzie Fraser; and the place, The being disaffected towards Mehemet Ali, opened its British gates to them. Here they first heard of the death expedition of al-Alfl, upon whose co-operation they had founded otl80T – their chief hopes of success; and they immediately despatched messengers to his successor and to the other beys, inviting them to Alexandria. The British resident, Major Missett, having repre- sented the importance of taking Rosetta and Rahmanieh,to secure supplies for Alexandria, General Fraser, with the concurrence of the admiral, Sir John Duckworth, detached the 31st regiment and the Chasseurs Britanniques, accompanied by some field artillery under Major-General Wauchope and Brigadier-General Meade, on this service; and these troops entered Rosetta without encountering any opposition; but as soon as they had dispersed among the narrow streets, the garrison opened a deadly fire on them from the latticed windows and the roofs of the houses. They effected a retreat on Aboukir and Alexandria, after a very heavy loss of 185 killed and 281 wounded, General Wauchope and three officers being among the former, and General Meade and nineteen officers among the latter. The heads of the slain were fixed on stakes on each side of the road crossing the Ezbekla in Cairo.

Mehemet Ali, meanwhile, was conducting an expedition against the beys in Upper Egypt, and he had defeated them near Assiut, when he heard of the arrival of the British. In great alarm lest the beys should join them, especially as they were far north of his position, he immediately sent messengers to his rivals, promising to comply with all their demands if they should join in expelling the invaders; and this proposal being agreed to, both armies marched towards Cairo on opposite sides of the river.

To return to the unfortunate British expedition. The posses- sion of Rosetta being deemed indispensable, Brigadier-Generals Sir William Stewart and Oswald were despatched thither with 2500 men. For thirteen days a cannonade of the town was continued without effect; and on the 20th of April, news having come in from the advanced guard at Hamad of large

reinforcements to the besieged, General Stewart was compelled to retreat; and a dragoon was despatched to Lieutenant-colonel Macleod, commanding at Hamad, with orders to fall back. The messenger, however, was unable to penetrate to the spot; and the advanced guard, consisting of a detachment of the 31st, two companies of the 78th, one of the 35th, and De Roll's regiment, with a picquet of dragoons, the whole mustering 733 men, was surrounded, and, after a gallant resistance, the survivors, who had expended all their ammunition, became prisoners of war. General Stewart regained Alexandria with the remainder of his force, having lost, in killed, wounded and missing, nearly 900 men. Some hundreds of British heads were now exposed on stakes in Cairo, and the prisoners were marched between these mutilated remains of their countrymen.

The beys became divided in their wishes, one party being desirous of co-operating with the British, the other with the pasha. These delays proved ruinous to their cause; and General Fraser, despairing of their assistance, evacuated Alex- andria on the 14th of September. From that date to the spring of 181 1 the beys from time to time relinquished certain of their demands; the pasha on his part granted them what before had been withheld; the province of the Fayum, and part of those of Giza and Beni-Suef, were ceded to Shahln; and a great portion of the Sa'id, on the condition of paying the land-tax, to the others. Many of them took up their abode in Cairo, but tranquillity was not secured; several times they met the pasha's forces in battle and once gained a signal victory. Early in the year 1811, the preparations for an expedition against the Wah- habls in Arabia being complete, all the Mameluke beys then in Cairo were invited to the ceremony of investing Mehemet Ali's favourite son, Tusun, with a pelisse and the command of the army. As on the former occasion, the unfortunate Mamelukes fell into the snare. On the 1st of March, Shahln Bey and the other chiefs (one only excepted) repaired with their retinues to the citadel, and were courteously received by the pasha. Having taken coffee, they formed in procession, and, preceded and followed by the pasha's troops, slowly descended the steep and narrow road leading to the great gate of the citadel; but as soon as the Mamelukes arrived at the gate it was suddenly closed before them. The last of those to leave before the gate was shut were Albanians under Salih Kush. To these troops their chief now made known the

pasha's orders to massacre all the Mamelukes within the citadel; therefore, having returned by another way, they gained the summits of the walls matsacre and houses that hem in the road in which the Mame- ofthe lukes were confined, and some stationed themselves Mame- upon tne em i ne nces of the rock through which that lukes. road . g partly cut _ Thus secure iy placed, they began

a heavy fire on their victims; and immediately the troops who closed the procession, and who had the advantage of higher ground, followed their example. Of the betrayed chiefs, many were laid low in a few moments; some, dismounting, and throwing off their outer robes, vainly sought, sword in hand, to return, and escape by some other gate. The few who regained the summit of the citadel experienced the same fate as the rest, for no quarter was given. Four hundred and seventy Mamelukes entered the citadel; and of these very few, if any, escaped. One of these is said to have been a bey. According to some, he leapt his horse from the ramparts, and alighted uninjured, though the horse was killed by the fall; others say that he was prevented from joining his comrades, and discovered the treachery while waiting without the gate. He fled and made his way to Syria. This massacre was the signal for an indiscriminate slaughter of the Mamelukes throughout Egypt, orders to this effect being transmitted to every governor; and in Cairo itself the houses of the beys were given over to the soldiery. During the two following days the pasha and his son Tusun rode about the streets and tried to stop the atrocities; but order was not restored until 500 houses had been completely pillaged. The heads of the beys were sent to Constantinople.

A remnant of the Mamelukes fled to Nubia, and a tranquillity was restored to Egypt to which it had long been unaccustomed.

In the year following the massacre the unfortunate exiles were attacked by Ibrahim Pasha, the eldest son of Mehemet Ali, in the fortified town of Ibrim, in Nubia. Here the want of provisions forced them to evacuate the place; a few who surrendered were beheaded, and the rest went farther south and built the town of New D f ongola (correctly Dunkulah), where the venerable Ibrahim Bey died in 1816, at the age of eighty. As their numbers thinned, they endeavoured to maintain their little power by training some hundreds of blacks; but again, on the approach of Ismail, another son of the pasha of Egypt, sent with an army in 1820 to subdue Nubia and Sennar, some returned to Egypt and settled in Cairo, while the rest, amounting to about 100 persons, fled in dispersed parties to the countries adjacent to Sennar.

See A. A Paton, History of the Egyptian Revolution (2 vols., 2nd ed., enlarged 1870) ; and French Revolutionary Wars.

(E. S. P.; S. L.-P.; D. S. M.*)

3. Modern History.

(1) Rule of Mehemet Ali. — Mehemet Ali was now undisputed master of Egypt, and his efforts henceforth were directed prim- arily to the maintenance of his practical independence. The suzerainty of the sultan he acknowledged, and at the reiterated commands of the Porte he despatched in 181 1 an army of 8000 men, including 2000 horse, under the command of his son Tusiin, a youth of sixteen, against the Wahhabls (q.v.). After a success- ful advance, this force met with a serious repulse at the pass of Jedeida, near Safra, and retreated to Yembo' (Yambu). In the following year Tusun, having received reinforcements, again assumed the offensive, and captured Medina after a prolonged siege. He next took Jidda and Mecca, defeating the Wahhabls beyond the latter place and capturing their general. But some mishaps followed, and Mehemet Ali, who had determined to conduct the war in person, left Egypt for that purpose in the summer of 1813. In Arabia he encountered serious obstacles from the nature of the country and the harassing mode of warfare adopted by his adversaries. His arms met with various fortunes; but on the whole his forces Arabia. proved superior to those of the enemy. He deposed and exiled the sharif of Mecca, and after the death of the Wahhabi leader Saud II. he concluded in 1815 a treaty with Saud's son and successor, Abdullah. Hearing of the escape of Napoleon from Elba — and fearing danger to Egypt from the plans of France or Great Britain — Mehemet Ali returned to Cairo by way of Kosseir and Kena. He reached the capital on the day of the battle of Waterloo. His return was hastened by reports that the Turks, whose cause he was upholding in Arabia, were treacherously planning an invasion of Egypt.

During Mehemet Ali's absence in Arabia his representative at Cairo had completed the confiscation, begun in 1808, of almost all the lands belonging to private individuals, who were forced to accept instead inadequate pensions. By this revolutionary method of land "nationalization" Mehemet Ali became pro- prietor of nearly all the soil of Egypt, an iniquitous measure against which the Egyptians had no remedy. The attempt which in this year (181 5) the pasha made to reorganize his troops on European lines led, however, to a formidable mutiny in Cairo. Mehemet Ali's life was endangered, and he sought refuge by night in the citadel, while the Soldiery committed many acts of plunder. The revolt was reduced by presents to the chiefs of the

insurgents, and Mehemet Ali ordered that the sufferers by the disturbances should receive compensation from the treasury. The project of the Nizam Gedid (New System), as the European system was called, was, in consequence of this mutiny, abandoned for a time.

Tusun returned to Egypt on hearing of the military revolt at Cairo, but died in 1816 at the early age of twenty. Mehemet Ali, dissatisfied with the treaty concluded with the Wahhabls, and with the non-fulfilment of certain of its clauses, determined to send another army to Arabia, and to include in it the soldiers who had recently proved unruly. This expedition, under his eldest son Ibrahim Pasha, left in the autumn of 1816. The war was long and arduous, but in 1818 Ibrahim captured the Wahhabi capital of Deraiya. Abdullah, their chief, was made prisoner,

and with his treasurer and secretary was sent to Constantinople, where, in spite of Ibrahim's promise of safety, and of Mehemet Ali's intercession in their favour, they were put to death. At the close of the year 1810, Ibrahim returned to Cairo, having subdued all present opposition in Arabia.

Meanwhile the pasha had turned his attention to the improve- ment of the manufactures of Egypt, and engaged very largely in commerce. He created for himself a monopoly in the chief products of the country, to the further impoverishment of the people, and set up and kept going for years factories which never paid. But some of his projects were sound. The work of digging (1810-1820) the new canal of Alexandria, called the Mahmudiya (after the reigning sultan of Turkey), was specially important. The old canal had long fallen into decay, and the necessity of a safe channel between Alexandria and the Nile was much felt. Such was the object of the canal then excavated, and it answered its purpose; but the sacrifice of life was enormous (fully 20,000 workmen perished) , and the labour of the unhappy fellahin was forced. Another notable fact in the economic progress of the country was the development of the cultivation of cotton in the Delta in 1822 and onwards. The cotton grown had been brought from the Sudan by Maho Bey, and the organization of the new industry — from which in a few years Mehemet Ali was enabled to extract considerable revenues — was entrusted to a Frenchman named Jumel.

In 1820 Mehemet Ali ordered the conquest of the eastern Sudan to be undertaken. He first sent an expedition westward Conquest (Feb-1820) which conquered and annexed the oasis of ofthe Siwa. Among the pasha's reasons for wishing to

Sudan extend his rule southward were the desire to capture begun. ˆe valuable caravan trade then going towards the Red Sea, and to secure the rich gold mines which he believed to exist in Sennar. He also saw in the campaign a means of getting rid of the disaffected troops, and of obtaining a sufficient number of captives to form the nucleus of the new army. The forces destined for this service were led by Ismail, then the youngest son of Mehemet Ali; they consisted of between 4000 and 5000 men, Turks and Arabs, and left Cairo in July 1820. Nubia at once submitted, the Shagia Arabs immediately beyond the province of Dongola were worsted, the remnant of the Mamelukes dispersed, and Sennar reduced without a battle. Mahommed Bey, the defterdar, with another force of about the same strength, was then sent by Mehemet Ali against Kordofan with a like result, but not without a hard-fought engagement. In October 1822 Ismail was, with his retinue, burnt to death by Nimr, the mek (king) of Shendi ; and the defterdar, a man infamous for his cruelty, assumed the command of those provinces, and exacted terrible retribution from the innocent inhabitants. Khartu m was founded at this time, and in the following years the rule of the Egyptians was largely extended and control obtained of the Red Sea ports of Suakin and Massawa (see Sudan: History).

In 1824 a native rebellion of a religious character broke out in Upper Egypt headed by one Ahmad, an inhabitant of Es- Salimiya, a village situated a few miles above Thebes. He pro- claimed himself a prophet, and was soon followed by between 20,000 and 30,000 insurgents, mostly peasants, but some of them deserters from the " Nizam Gedid," for that force was yet in a half-organized state, and in part declared for the impostor. The insurrection was crushed by Mehemet Ah, and about one- fourth of Ahmad's followers perished, but he himself escaped and was never after heard of. Few of these unfortunates possessed any other weapon than the long staff (nebbut) of the Egyptian peasant; still they offered an obstinate resistance, and the combat in which they were defeated resembled a massacre. This movement was the last internal attempt to destroy the pasha's authority.

The fellahin, a patient, long-suffering race save when stirred

by religious fanaticism, submitted to the kurbash,

Sufferings freely used by the Tur]ji sn and Basri ; Bazuk tax-

fettabln. gatherers employed by Mehemet Ali to enforce his system of taxation, monopolies, corvee and conscrip- tion. Under this regime the resources of the country were

impoverished, while the finances fell into complete and incom- prehensible chaos.

A vivid picture of the condition to which Egypt was reduced is painted in the report drawn up in 1838 by the British consul- general, Colonel Campbell: —

” The government (he wrote), possessing itself of the necessaries- of life at prices fixed by itself, disposes of them at arbitrary prices. The fellah is thus deprived of his harvest and falls into arrears with his taxes, and is harassed and bastinadoed to force him to pay his debts. This leads to deterioration of agriculture and lessens the production. The pasha having imposed high taxes has caused the high prices of the necessaries of life. It would be difficult for a foreigner how coming to Egypt to form a just idea of the actual state of the country as compared with its former state. In regard to the general rise in prices, all the ground cultivated under the Mamelukes was employed for producing food — wheat, barley, beans, &c. — in immense quantities. The people reared fowls, sheep, goats, &c., and the prices were one-sixth, or even one-tenth, of those at present. This continued until Mehemet Ali became viceroy in 1805. From that period until the establishment of monopolies prices have gradually increased ; but the great increase has chiefly taken place since 1824, when the pasha established his regular army, navy and factories. ‘ ‘

The conclusion in 1838 of a commercial treaty with Turkey, negotiated by Sir Henry Bulwer (Lord Dalling) , struck a death- blow to the system of monopolies, though the application of the treaty to Egypt was delayed for some years. The picture of Egypt under Mehemet Ali is nevertheless not complete without regard being had to the beneficent side of his rule. Public order was rendered perfect; the Nile and the highways were secure to all travellers, Christian or Moslem; the Bedouin tribes were won over to peaceful pursuits, and genuine efforts were’ made to promote education and the study of medicine. To European merchants, on whom he was dependent for the sale of his exports, Mehemet Ali showed much favour, and under his influence the port of Alexandria again rose into importance. It was also under Mehemet Ali’s encouragement that the overland transit of goods from Europe to India via Egypt was resumed.

Mehemet Ali was fully conscious that the empire which he had so laboriously built up might at any time have to be defended by force of arms against his master Sultan Mahmud II., whose whole policy had been directed to curbing the power of his too ambitious valis, and who was under the; influence of the personal enemies of the pasha of Egypt, notably of Khosrev, the grand vizier, who had never forgiven his humiliation in Egypt in 1803. Mahmud also was already planning reforms borrowed from the West, and Mehemet Ali, who had had plenty of opportunity of observing the superiority of European methods of warfare, was determined to anticipate the sultan in the creation of a fleet and an army on modern lines, partly as a measure of precaution, partly as an instrument for the realization of yet wider schemes of ambition. Before the outbreak of the War of Greek Independence in 1 82 1 he had already expended much time and energy in organizing a fleet and in training, under the supervision of French instructors, native officers and artificers; though it was not till 1829 that the opening of a dockyard and arsenal at Alex- andria enabled him to build and equip his own vessels. By 1823, moreover, he had succeeded in carrying out the reorganization of his army on European lines, the turbulent Turkish and Albanian elements being replaced by negroes and fellahin. 1 His foresight was rewarded by the invitation of the sultan to help him in the task of subduing the Greek insurgents, offering as reward the pashaliks of the Morea and of Syria. Mehemet Ali had already, in 182 1, been appointed Ibrahim governor of Crete, which he had occupied with a small Morea. Egyptian force. In the autumn of 1824 a fleet of sixty Egyptian war-ships carrying a large force of disciplined troops concentrated in Suda Bay, and, in the following March, Ibrahim as commander-in-chief landed in the Morea. But for the action of European powers the intervention of Mehemet Ali would have

1 The work was carried out under the supervision of the French- man, Colonel Seve, who had turned Mahommedan and was known in Islam as Suleiman Pasha. The effectiveness of the new force was first tried in the suppression of a revolt of the Albanians in Cairo (1823) by six disciplined Sudanese regiments; after which Mehemet Ali was no more troubled with military ententes.

been decisive. His naval superiority wrested from the Greeks the

command of the sea, on which the fate of the insurrection ultimately depended, while on land the Qreek irregular bands were everywhere routed by Ibrahim's disciplined troops. The history of the events that led up to the battle of Navarino and the liberation of Greece is told elsewhere (see Navarino and Greek Independence, War or); the withdrawal of the Egyptians from the Morea was ultimately due to the action of Admiral Sir Edward Codrington, who early in August 1828 appeared before Alexandria and induced the pasha, by no means sorry to have a reasonable excuse, by a threat of bombardment, to sign a convention undertaking to recall Ibrahim and his army. Before the final establishment of the new kingdom of Greece, the Eastern question had late in 183 1 entered into a new and more perilous phase, owing to the revolt of Mehemet campaigns. ˆ against the sultan on pretext of chastising the ex-slave Abdullah, pasha of Acre, for refusing to send back Egyptian fugitives from the effects of Mehemet Ali's " reforms." The true reason was the refusal of Sultan Mahmud to hand over Syria according to agreement, and Mehemet Ali's determination to obtain at all hazards what had been from time immemorial an object of ambition to the rulers of Egypt. For ten years from this date the relations of sultan and pasha remained in the forefront of the questions which agitated the diplomatic world. It was not only the very existence of the Ottoman empire that seemed to be at stake, but Egypt itself had become more than ever an object of attention, to British statesmen especially, and in the issue of the struggle were in- volved the interests of Great Britain in the two routes to India by the Isthmus of Suez and the valley of the Euphrates. The diplomatic and military history of this period will be found sketched in the article on Mehemet Ali. Here it will suffice to say that the victorious career of Ibrahim, who once more com- manded in his father's name, beginning with the storming of Acre on the 27 th of May 1832, and culminating in the rout and capture of Reshid Pasha at Konia on the 21st of December, was arrested by the intervention of Russia. As the result of endless discussions between the representatives of the powers, the Porte and the pasha, the convention of Kutaya was signed on the 14th of May 1833, by which the sultan agreed to bestow on Mehemet Ali the pashaliks of Syria, Damascus, Aleppo and Itcheli, together with the district of Adana. The announcement of the pasha's appointment had already been made in the usual way in the annual firman issued on the 3rd of May. Adana, reserved for the moment, was bestowed on Ibrahim under the style of muhassil, or collector of the crown revenues, a few days later.

Mehemet Ali now ruled over a virtually inde- pendent empire, subject only to a moderate tribute,

stretching from the Sudan to the Taurus Moun-

tains. But though he was hailed, especially in France, as the pioneer of European civilization in the East, the unsound foundations of his authority were not long in revealing themselves. Scarcely a year from the signing of the convention of Kutaya the application by Ibrahim of Egyptian methods of government, notably of the monopolies and conscription, had driven Syrians, Druses and Arabs, who had welcomed him as a deliverer, into revolt. The unrest was suppressed by Mehemet Ali in person, and the Syrians were terrorized and Ahmed, disarmed. But their discontent encouraged Sultan d. 1858. Mahmud to hope for revenge, and a renewal of the conflict was only staved off by the anxious efforts of the powers. At last, in the spring of 1839, the sultan ordered his army, concentrated under Reshid in the border district of Bir on the Euphrates, to advance over the Syrian frontier. Ibrahim, seeing his flank menaced, attacked it at Nezib on the 24th of June. Once more the Otto- mans were utterly routed. Six days later, before the news reached Constantinople, Mahmud died.

(ii.) Ibrahim b. 1789, d. 1848.

Once more the Ottoman empire lay at the feet of Mehemet Ali; but the powers were now more prepared to meet a contingency which had been long foreseen. Their intervention was prompt; and the dubious attitude of France, which led to her exclusion from the concert and encouraged Mehemet Ali to resist, only led to his obtaining less favourable terms. (See Mehemet Ali.) The end was reached early in 1841. New firmans were issued which confined the pasha's authority to Egypt, the Sinai pen- insula and certain places on the Arabian side of the Red Sea, and to the Sudan. The most important of these documents are dated the 13th of February 1841. The government of the pashalik of Egypt was made hereditary in the family of Mehemet Ali. 1 A map showing the boundaries of Egypt accompanied the firman granting Mehemet Ali the pashalik, a duplicate copy being retained by the Porte. The Egyptian copy is supposed to have been lost in a fire which destroyed a great part of the Egyptian archives. The Turkish copy has never been produced and its existence now appears doubtful. The point is of import- ance, as in 1892 and again in 1906 boundary disputes arose between Turkey and Egypt (see below). Various restrictions were laid upon Mehemet Ali, emphasizing his position of vassal- age. He was forbidden to maintain a fleet, and his army was not to exceed 18,000 men. The pasha was no longer a figure in Europeanpolitics,buthecontinued to occupy himself with his improvements, real or imaginary, in Egypt. The condition of the country was deplorable; in 1842 a murrain of cattle was followed by a

destructive Nile flood; in 1843 there was a plague of locusts, whole villages were depopulated. Meantime the uttermost farthing was wrung from the wretched fellahin, while they were forced to the building of magnificent public works by unpaid labour. In 1844-1845 there was some improvement in the condition of the country as a result of financial reforms the pasha was compelled to execute. Mehemet Ali, who had been granted the honorary rank of grand vizier in 1842, paid a visit to Stamboul in 1846, where he became reconciled to his old enemy Khosrev Pasha, whom he had not seen since he spared his life at Cairo in 1803. In 1847 Mehemet Ali laid the foundation stone of the great barrage across the Nile at the beginning of the Delta. He was barely persuaded from ordering the barrage to be built with stone from the pyramids! Towards the end of 1847 the aged pasha's mind began to give way, and by the following June he was no longer capable of administering the government . In September 1848 Ibrahim was acknowledged by the Porte as ruler of the pashalik, but he died in the November

1 The Dynasty of Mehemet Ali.

(i.) Mehemet Ali, b. 1769, d. 1849.

Mehemet All's authority confined to Egypt.

Tusun, b. 1796, d. 1816.

(iii.) Abbas I., b. i8i3,d. 1854

El Hami.

Ismail, b. 1798, d. 1822.

(iv.) Said, b. 1823, d. 1863.

Tusun, d. 1876.

Abdul Halim, b. 1831, d. 1894.

Mehemet Ali,

the Younger,

and other

children.

Amina (married the Khedive Tewfik).

(v.) Ismail (Khedive), b. 1830, d. 1895.

Mustapha Fazil, d. 1875.

(vi.) Tewfik, Hussein Kamil. b. 1853, d. 1892.

Hassan. 8 other children.

(vii.) Abbas II., b. 1874.

I

I

Mehemet Ali. 2 daughters.

Mahommed Abdul, b. 1800.

Abdul Kader, b. 1902.

4 daughters.

.HISTORY]

EGYPT

ii3

following. Mehemet Ali survived another eight months, dying on the 2nd of August 1849, aged eighty. He had done a great work in Egypt; the most permanent being the weakening of the tie binding the country to Turkey, the starting of the great cotton industry, the recognition of the advantages of European science, and the conquest of the Sudan. (F. R. C.)

(2) From, the Death of Mehemet Ali to the British Occupation. — On Ibrahim's death in November 1848 the government of Egypt fell to his nephew Abbas I. (q.v.), the son of Tusun. Abbas I. Abbas put an end to the system of commercial mono- Pasha. polies, and during his reign the railway from Alexandria to Cairo was begun at the instigation of the British government. Opposed to European ways, Abbas lived in great seclusion, and after a reign of less than six years he was murdered (July 1854) by two of his slaves. He was succeeded by his uncle Said Pasha, the favourite son of Mehemet Ali, who lacked the strength of mind or physical health needed to execute the beneficent projects which he conceived. His endeavour, for instance, to put a stop to the slave raiding which devastated the Sudan provinces was wholly

ineffectual. He had a genuine regard for the welfare of the fellahin, and a land law of 1858 secured to them an acknowledgment of freehold as against the crown. The pasha was much under French influence, and in 1856 was induced to grant to Ferdinand de Lesseps a concession for the construction of the Suez Canal. Lord Palmerston was opposed to this project, and the British opposition delayed the ratification of trie concession by the Porte for two years. To the British Said also made concessions — one to the Eastern Telegraph Company, and another (1854) allowing the establish- ment of the Bank of Egypt. He also began the national debt by borrowing £3,293,000 from Messrs Friihling & Goschen, the actual amount received by the pasha being £2,640,000. In January 1863 Said Pasha died and was succeeded by his nephew Ismail, a son of Ibrahim Pasha.

The reign of Ismail (q.v.), from 1863 to 1879, was for a while hailed as introducing a new era into modern Egypt. In spite of his vast schemes of reform and the Sclat of his /smalt's Europeanizing innovations, his oriental extravagance "mania' led to bankruptcy, and his reign is historically im- portant simply for its compelling European interven- tion in the internal affairs of Egypt. Yet in its earlier years much was done which seemed likely to give Ismail a more important place in history. In 1 866′ he was granted by the sultan a firman — obtained on condition of the increase of the tribute from £376,000 to £720,000 — by which the succession to the throne of Egypt was made to descend " to the eldest of thy male children and in the same manner to the eldest sons of thy suc- cessors," instead of, after Turkish law, to the eldest male of the family. In the following year another firman bestowed upon him the title of khedive in lieu of that of vali, borne by Mehemet Ali and his immediate successors. In 1873 a further firman placed the khedive in many respects in the position of an independent sovereign. Ismail re-established and improved the administra- tive system organized by Mehemet Ali, and which had fallen into decay under Abbas's indolent rule; he caused a thorough remodelling of the customs system, which was in an anarchic state, to be made by English officials; in 1865 he established the Egyptian post office; he reorganized the military schools of his grandfather, and gave some support to the cause of education. Railways, telegraphs, lighthouses, the harbour works at Suez, the breakwater at Alexandria, were carried out by some of the best contractors of Europe. Most important of all, the Suez Canal was opened in 1869. But the funds required for these public works, as well as the actual labour, were remorse- lessly extorted from a poverty-stricken population.

A striking picture of the condition of the people at this period is given by Lady Duff Gordon in Last Letters from Egypt. Writing in 1867 she

said: ” I cannot describe the misery here now— every day some new tax. Every beast, camel, cow, sheep, donkey and horse is made to pay. The fellaheen can no longer eat bread ; they are living on barley-meal mixed with water, and raw green stuff, vetches, &c. The taxation makes life almost impossible: a tax on every crop, on every animal first, and again when it is sold in the market;

on every man, on charcoal, on butter, on salt. . . . The people in Upper Egypt are running away by wholesale, utterly unable to pay the new taxes and do the work exacted. Even here (Cairo) the beating for the year’s taxes is awful.”

In the years that followed the condition of things grew worse. Thousands of lives were lost and large sums expended in extending Ismail’s dominions in the Sudan (q.v.) and in futile conflicts with Abyssinia. In 1875 the leading to impoverishment of the fellah had reached such a <*e de- point that the ordinary resources of the country no JJ'^^tf longer sufficed for the most urgent necessities of administration; and the khedive Ismail, having repeatedly broken faith with his creditors, could not raise any more loans on the European market. The taxes were habitually collected many months in advance, and the colossal floating debt was increasing rapidly. In these circumstances Ismail had to realize his remaining assets, and among them sold 176,602 Suez Canal shares to the British government for £3,976,582 1 (see Beaconsfield). This comparatively small financial operation brought about the long-delayed crisis and paved the way for the future prosperity of Egypt, for it induced the British govern- ment to inquire more carefully into the financial condition of the country. In December 1875 Mr Stephen Cave, M.P., and Colonel (afterwards Sir John) Stokes, R.E., were sent to Egypt to in- quire into the financial situation ; and Mr Cave's report, made public in April 1876, showed that under the existing administra- tion national bankruptcy was inevitable. Other commissions of inquiry followed, and each one brought Ismail more under European control. The establishment of the Mixed Tribunals in 1876, in place of the system of consular jurisdiction in civil actions, made some of the courts of justice international. The Caisse de la Dette, instituted in May 1876 as a result of the Cave mission, led to international control over a large portion of the revenue. Next came (in November 1876) the mission of Mr (afterwards Lord) Goschen and M. Joubert on behalf of the British and French bondholders, one result being the establish- ment of Dual Control, i.e. an English official to superintend the revenue and a French official the expenditure of the country. Another result was the internationalization of the railways and the port of Alexandria. Then came (May 1878) a commission of inquiry of which the principal

members were Sir Rivers Wilson, Major Evelyn Baring (afterwards Lord Cromer) and MM. Kremer-Baravelli and de Blignieres. One result of that inquiry was the extension of international control to the enormous landed property of the khedive. Driven to desperation, Ismail made a virtue of necessity and accepted, in September 1878, in lieu of the Dual Control, a constitutional ministry, under the presidency of Nubar Pasha (q.v.), with Rivers Wilson as minister of finance and de Blignieres as minister of public works. Professing to be quite satisfied with this arrangement, he pompously announced that Egypt was no longer in Africa, but a part of Europe; but before seven months had passed he found his constitutional position intolerable, got rid of his irksome cabinet by means of a secretly-organized military riot in Cairo, and reverted to his old autocratic methods of govern- ment. England and France could hardly sit still under this affront, and decided to administer chastisement by the hand of the suzerain power, which was delighted to have an oppor- tunity of asserting its authority. On the 26th of June 1879 Ismail suddenly received from the sultan a curt telegram, addressed to him as ex-khedive of Egypt, informing him that his son Tewfik was appointed his successor. Taken unawares, he made no attempt at resistance, and Tewfik was at once proclaimed khedive.

After a short period of inaction, when it seemed as if the change might be for the worse, England and France summoned up courage to look the situation boldly in the face, and, in November 1879, re-established the Dual Control in the persons of Major Baring and M. de Blignieres. For two years the Dual Control governed Egypt, and initiated the work of progress

1 Part of this money was devoted to an expedition sent against Abyssinia in 1876 to avenge losses sustained in the previous year. The new campaign was, however, equally unsuccessful.

that England was to continue alone. Its essential defect was what might be called insecurity of tenure. Without any Re-estab- efficient means of self-protection and coercion at its lishment disposal, it had to interfere with the power, privileges of Dual an(j perquisites of a class which had long mis- governed the country. This class, so far as its civilian members were concerned, was not very formidable, because

these were not likely to go beyond the bounds of intrigue and* passive resistance; but it contained a military element who had more courage, and who had learned their power when Ismail employed them for overturning his constitutional ministry. Among the mutinous soldiers on that occasion was a Srabl and f e n an officer calling himself Ahmed Arabi the Egyptian. of 1882. He was not a man of exceptional intelligence or remarkable powers of organization, but he was a fluent speaker, and could exercise some influence over the masses by a rude kind of native eloquence. Behind him were a group of men, much abler than himself, who put him forward as the figurehead of a party professing to aim at protecting the Egyptians from the grasping tyranny of their Turkish and European oppressors. The movement began among the Arab officers, who complained of the preference shown to the officers of Turkish origin; it then expanded into an attack on the privi- leged position and predominant influence of foreigners, many of whom, it must be confessed, were of a by no means respectable type; finally, it was directed against all Christians, foreign and native. 1 The government, being too weak to suppress the agita- tion and disorder, had to make concessions, and each concession produced fresh demands. Arabi was first promoted, then made under-secretary for war, and ultimately a member of the cabinet. The danger of a serious rising brought the British and French fleets in May 1882 to Alexandria, and after a massacre (nth of June) had been perpetrated by the Arab mob in that city, the British admiral bombarded the forts (nth of July 1882). The leaders of the national movement prepared to resist further aggression by force. A conference of ambassadors was held in Constantinople, and the sultan was invited to quell the revolt; but he hesitated to employ his troops against Mussulmans who were professing merely to oppose Christian aggression.

(3) Egypt occupied by the British.— At last the British govern- ment determined to employ armed force, and invited France to co-operate. The French government declined, and a similar invitation to Italy met with a similar refusal. England therefore, having to act alone, landed troops at Ismailia under Sir Garnet Wolseley, and suppressed the revolt by the battle of Tell-el-Kebir on the 13th of September 1882. The khedive, who had taken refuge in Alexandria, returned to Cairo, and a ministry was formed under Sherif Pasha, with Riaz Pasha as one of its leading members. On assuming office, the first thing it had to do was to bring to trial the chiefs of the rebellion. Had the khedive and Riaz been allowed a free hand, Arabi and his colleagues would have found little mercy. Thanks to the intervention of the British government, their lives were spared. Arabi pleaded guilty, was

sentenced to death, the sentence being commuted by the khedive to banishment; and Riaz resigned in disgust. This solution of the difficulty was brought about by Lord Dufferin, then British ambassador at Constantinople, who had been sent to Egypt as high commissioner to adjust affairs and report on the situation. One of his first acts, after preventing the application of capital punishment to the ring- leaders of the revolt, was to veto the project of protecting the khedive and his government by means of a Praetorian guard recruited from Asia Minor, Epirus, Austria and Switzerland, and to insist on the principle that Egypt must be governed in a truly liberal spirit. Passing in review all the departments of the administration, he laid down the general lines on which the country was to be restored to order and prosperity, and endowed, if possible, with the elements of self-government for future use.

•Lord Cromer, writing in 1905, declared that the movement ” was, in its essence, a genuine revolt against misgovernment,” and ” was not essentially anti-European ” (vide Egypt No. 1, 1905, p. 2).

The laborious task of putting these general indications into a practical shape fell to Sir Evelyn Baring {Lord Cromer), who arrived as consul-general and diplomatic agent, in succession to Sir Edward Malet, in January 1884. Baring At that moment the situation was singularly like that appointed which had existed on two previous occasions: firstly, wsui- when Ismail was deposed; and secondly, when the f|gj ‘ ‘ Dual Control had undermined the existing authority without having any power to enforce its own. For the third time in little more than three years the existing authority had been destroyed and a new one had to be created. But there was one essential difference: the power that had now to reorganize the country possessed in the British army of occupation a support sufficient to command respect. Without that support Sir Evelyn Baring could have done little or nothing; with it he did perhaps more than any other single man could have done. His method may be illustrated by an old story long current in Cairo. Mehemet Ali was said to have appointed as mudir or governor in a turbulent district a young and inexperienced Turk, who asked, ” But how am I to govern these people? ” ” Listen,” replied the pasha; ” buy the biggest and heaviest kurbash you can find; hang it up in the centre of the mudirieh, well within your reach, and you will very seldom require to use it.” The British army of occupation was Sir Evelyn’s kurbash; it was well within his reach, as all the world knew, and its simple presence sufficed to prevent disorder and enforce obedience. He had one other advantage over previous English reformers in Egypt: his position towards France was more independent. The Dual Control had been abolished by a khedivial decree of 1 8th January 1883,

andjreplaced by an English financial adviser. France naturally objected; but having refused to co-operate with England in suppressing the revolt, she could not reasonably complain that her offer of co-operation in the work of reorganiza- tion was declined. But though Dual Control was at an end, the Caisse de la Dette remained, and this body was to prove a constant clog on the financial measures of the Egyptian government.

At first the intention of the British government was simply to restore the power of the khedive, to keep his highness for some time in the right path by friendly advice, and to withdraw the British troops as soon as possible. As ™eva!»iaˆ Lord Granville explained in a circular to the powers, tion. the position of England in Egypt imposed on her ” the duty of giving advice with the object of securing that the order of things to Be established shall be of a satisfactory character and possess the elements of stability and progress.” But there was to be no embarking on a general scheme of reforms, which would increase unnecessarily the responsibilities of the protecting power and necessitate the indefinite prolongation of the military occupation. So far, therefore ˆ-‘ as the British government had a definite policy in Egypt, it was a politique de repldtrage. Even this policy was not strictly adhered to. Mr Gladstone’s cabinet was as unstable as the public opinion it sought to conciliate. It had its hot fits and its cold fits, and it gave orders now to advance and now to retreat. In the long run circumstances proved too strong for it, and it had to undertake a great deal more than it originally intended. Each little change in the administration engendered a multitude of others, so that the modest attempts at reform were found to be like the letting out of water. A tiny rill gradually became a boisterous stream, and the boisterous stream grew into a great river, which spread to all sections of the administration and ended by inundating the whole country.

Of the numerous questions awaiting solution, the first to claim immediate attention was that of the Sudan. The British government had begun by excluding it from the problem, and by declaring that for events in these aaes ti oa . outlying territories it must not be held responsible. In that sphere of activity, therefore, the Egyptian government might do as it thought fit. The principle of limited liability which this attitude assumed was soon found to be utterly untenable. The Sudan was an integral part of the khedive’s dominions, and caused, even in ordinary times, a deficit of

£200,000 to the Egyptian treasury. At that moment it was in a state of open rebellion, stirred up by a religious fanatic who proclaimed himself a mahdi of Islam. An army of 10,000 men under an English officer, Colonel William Hicks, formerly of the Bombay army, otherwise Hicks Pasha, had been sent to suppress the revolt, and had been annihilated in a great battle fought on the 5th of November 1883, near Obeid. The Egyptian government wished to make a new attempt to recover the lost province, and the idea was certainly very popular among the governing class, but Sir Evelyn Baring vetoed the project on the ground that Egypt had neither soldiers nor money to carry it out. In vain the khedive and his prime minister, Sherif Pasha, threatened to resign, and the latter actually carried out his threat. The British representative remained firm, and it was decided that the Sudan should be, for the moment at least, abandoned to its fate. Nubar, though as strongly opposed to the abandon- ment policy as Sherif, consented to take his place and accepted somewhat reluctantly the new regime, which he defined as ” the administration of Egypt under the government of Baring.” By this time the Mahdi was master of the greater part of the Sudan, but Khartum and some other fortified points still held out. The efforts made to extricate the garrisons, including the mission of General Gordon, the fall of Khartum, and the Nile Expedition under Lord Wolseley, are described below separately in the section of this article dealing with the military operations. The practical result was that the khedive’s authority was limited to the Nile valley north of Wadi Haifa.

With the internal difficulties Sir Evelyn Baring had been struggling bravely ever since his appointment, trying to evolve out of the ever-changing policy and contradictory internalˆ orders of the British government some sort of coherent izatioa. line of action, and to raise the administration to a higher standard. For two or three years it seemed doubtful whether he would succeed. All over Egypt there was a feeling of unrest, and the well-meant but not very successful efforts of the British to improve the state of things were making them very unpopular. The introduction of English officials and English influence into all the administrative departments was resented by the native officials, and the action of the irrigation officers in preventing the customary abuses of the distribution of water was resented by the great landowners, who had been, from time immemorial, in the habit of taking as much as they wanted, to the detriment of the fellahin. Even these latter, who gained most by the reforms, considered that they had good reason to complain, for the defeat of Arabi and the re-establish- ment of order had enabled the Christian money-lenders to

return and insist on the payment of claims, which were supposed to have been extinguished by the rebellion. Worst of all, the government was drifting rapidly towards insolvency, being quite unable to fulfil its obligations to the bondholders and meet the expenses of administration. All departments were being starved, and even the salaries of poorly paid officials were in arrear. To free itself from its financial difficulties the government adopted a heroic remedy which only created fresh troubles. On the advice of Lord Northbrook, who was sent out to Cairo in September 1884 to examine the financial situation, certain revenues which should have been paid into the Caisse for the benefit of the bondholders were paid into the treasury for the ordinary needs of the adminis- tration. Immediately the powers protested against this in- fraction of the law of liquidation, and the Caisse applied for a writ to the Mixed Tribunals. In this way the heroic remedy failed, and to the internal difficulties were added international complications.

Fortunately for Egypt, the British government contrived to solve the international difficulty by timely concessions to the powers, and succeeded in negotiating the London Convention of March 1885, by which the Egyptian government was relieved from some of the most onerous stipulations of the law of liquida- tion, and was enabled to raise a loan of £9,000,000 for an annual payment of £135,000. After paying out of the capital the sums required for the indemnities due for the burning of Alexandria and the deficits of the years 1882 and 1883, it still had a million

sterling, and boldly invested it in the improvement of irrigation. The investment proved most remunerative, and helped very materially to save the country from bankruptcy and inter- nationalism. The danger of being again subjected to the evils of an international administration was very great, for the London Convention contained a stipulation to the effect that if Egypt could not pay her way at the end of two years, another inter- national commission would be appointed.

To obviate this catastrophe the British reformers set to work most energetically. Already something in the way of retrench- ment and reform had been accomplished. The public accounts had been put in order, and the abuses in the collection of the land tax removed. The constant drain of money and men for the Sudan had been stopped. A beginning had been made for creating a new army to replace the one that had been disbanded and to allow of a portion of the British garrison being withdrawn. In this work Sir Evelyn Wood had shown much sound judgment as well as great capacity for military organization, and had formed an efficient force out of very

unpromising material (see the section above on the Egyptian Army). His colleague in the department of public works, Sir Colin Scott-Moncrieff, had been not less active. By mitigating the hardships of the corvee, and improving the irrigation system, on which the pros- perity of the country mainly depends, he had conferred enormous benefits on the fellahin, and had laid the foundation of permanent budgetary equilibrium for the future. Not less active was Sir Edgar Vincent, the financial adviser, who kept a firm hold on the purse-strings and ruthlessly cut down expenditure in all departments except that of irrigation (see § Finance).

The activity of the British officials naturally produced a certain amount of discontent and resistance on the part of their Egyptian colleagues, and Lord Granville was obliged to declare very plainly that such resistance could not be tolerated. Writing (January 1884) to Sir Evelyn Baring, he said:

" It should be made clear to the Egyptian Ministers and Governors of Provinces that the responsibility which for the time rests on England obliges H.M. Government to insist on the adoption of the policy which they recommend; and that it will be necessary that those Ministers and Governors who do not follow this course should cease to hold their offices."

Nubar Pasha, who continued to be prime minister, resisted occasionally. What he chiefly objected to was direct inter- ference in the provincial administration and the „ , .,

, ., 11, , , , Relations

native tribunals, and he succeeded for a time in between

preventing such interference. Sir Benson Maxwell British and Mr Clifford Lloyd, who had been sent out to and BBi ‘ ve reform the departments of justice and the interior, ° after coming into conflict with each other were both recalled, and the reforming activity was for a time restricted to the departments of war, public works and finance. Gradually the tension between natives and foreigners relaxed, and mutual confidence was established. Experience had evolved the working principle which was officially formulated at a much later period : " Our task is not to rule the Egyptians, but as far as possible to teach the Egyptians to rule themselves. . . . European initiative suggests measures to be executed by Egyptian agency, while European supervision controls the manner in which they are executed." If that principle had been firmly laid down and clearly understood at the

beginning, a good deal of needless friction would have been avoided.

The international difficulty remained. The British position in Egypt was anomalous, and might easily give rise to inter- national complications. The sultan might well protest against the military occupation of a portion of his Int *F~ . empire by foreign troops. It was no secret that France problems. was ready to give him diplomatic support, and other powers might adopt a similar attitude. Besides this, the British government was anxious to terminate the occupation as soon as possible. With a view to regularizing the situation and accelerating the evacuation, Sir Henry Drummond Wolff was sent to Constantinople in August 1885 on a special mission. On the 24th of October of that year he concluded a preliminary

convention by which an Ottoman and a British high commis- sioner, acting in concert with the khedive, should reorganize the Egyptian army, tranquillize the Sudan by pacific means, and consider what changes might be necessary in the civil administra- tion. When the two commissioners were assured of the security of the frontier and the good working and stability of the Egyptian government, they should present reports to their respective governments, and these should consult as to the conclusion of a convention regulating the withdrawal of the English troops. Mukhtar Pasha and Sir Henry Drummond Wolff were appointed commissioners, and their joint inquiry lasted till the end of 1886, when the former presented his report and the latter went home to report orally. The remaining stipulations of the preliminary convention were duly carried out. Sir Henry Drummond Wolff proceeded to Constantinople and signed on the 22nd of May 1887 the definitive convention, according to which the occupation should come to an end in three years, but England should have a right to prolong or renew it in the event of internal peace or external security being seriously threatened. The sultan authorised the signature of this convention, but under pressure of France and Russia he refused to ratify it. Technically, therefore, the preliminary convention still remains in force, and in reality the Ottoman commissioner continued to reside in Cairo till the close of 1908.

The steadily increasing prosperity of the country during the years 1886 and 1887 removed the danger of national bank- ruptcy and

international interference, and induced o/reftwvn Sir Evelyn Baring to widen the area of administrative reforms. In the provinces the local administration and the methods of dispensing justice were still scandalously unsatisfactory, and this was the field to which the British repre- sentative next directed his efforts. Here he met with unexpected opposition on the part of the prime minister, Nubar Pasha, and a conflict .ensued which ended in Nubar's retirement in June 1888. Riaz Pasha took his place, and remained in office till May 1891. During these three years the work of reform and the prosperity of the country made great progress. The new Egyptian army was so far improved that it gained successes over the forces of the Mahdi; the burden of the national debt was lightened by a successful conversion; the corvee was abolished; 1 the land tax was reduced 30% in the poorest provinces, and in spite of this and other measures for lightening the public burdens, the budgetary surplus constantly increased; the quasi-judicial special commissions for brigandage, which were at once barbarous and inefficient, were abolished; the native tribunals were im- proved, and Mr (afterwards Sir John) Scott, an Indian judge of great experience and sound judgment, was appointed judicial adviser to the khedive. This appointment was opposed by Riaz Pasha, and led to his resignation on the plea of ill-health. His successor, Mustafa Pasha Fehmi, continued the work and co- operated cordially with the English officials. The very necessary reform of the native tribunals was then taken seriously in hand. The existing procedure was simplified and accelerated; the working of the courts was greatly improved by a carefully organized system of inspection and control; the incompetent judges were eliminated and replaced by men of better education and higher moral character; and for the future supply of Well- qualified judges, barristers, and law officials, an excellent school of law was established. Later on the reforming activity was extended to prisons, public health, and education, and has attained very satisfactory results.

In January 1892 the khedive Tewfik, who had always main" tained cordial relations with Sir Evelyn Baring, died suddenly, and was succeeded by his son, Abbas Hilmi, a young otAbbaf man without political experience, who failed at first to understand the peculiar situation in which a khedive ruling under British protection is necessarily placed. Aspiring to liberate himself at once from foreign control, he summarily dismissed Mustafa Pasha Fehmi (15th January 1893), whom he considered too amenable to English influence, and appointed

1 Except in so far as it was necessary to call out men to guard the banks of the Nile in the season of high flood.

in his place Fakhri Pasha, who was not a persona grata at the British Agency. Such an incident, which might have constituted a precedent for more important acts of a similar kind, could hardly be overlooked by the British representative. He had always maintained that what Egypt most required, and would require for many years to come, was an order of things which would render practically impossible any return to that personal system of government which had well-nigh ruined the country. In this view the British agent was warmly supported by Lord Rosebery, then secretary of state for foreign affairs. The young khedive was made therefore to understand that he must not make such changes in the administration without a previous agreement with the representative of the protecting power; and a compromise was effected by which Fakhri Pasha retired, and the post of premier was confided once more to Riaz. With this compromise the friction between the khedive and Sir Evelyn Baring, who had now become Lord Cromer, did not end. For some time Abbas Hilmi clung to his idea of liberating himself from all control, and secretly encouraged a nationalist and anti- British agitation in the native press; but he gradually came to perceive the folly, as well as the danger to himself, of such a course, and accordingly refrained from giving any overt occasion for complaint or protest. In like manner the relations between the British officials and their Egyptian colleagues gradually became more cordial, so that it was found possible at last to reform the local administration in the provinces according to the recommendations of Mr (afterwards Sir) Eldon Gorst, who had been appointed adviser to the ministry of the interior. Nubar Pasha, it is true, who succeeded Riaz as prime minister in April 1894, objected to some of Mr Gorst's recommendations, and in November 1895 resigned. He was succeeded by Mustafa Fehmi, who had always shown a conciliatory spirit, and who had been on that "account, as above stated, summarily dismissed by the khedive in January 1893. After his reinstatement the Anglo- Egyptian condominium worked without serious friction.

The success of the Anglo-Egyptian condominium, and the consequent economic and financial prosperity of Egypt proper, rendered it possible, during 1896-1898, to recover „ . . from the Mahdists the Sudanese provinces (see Military Operations) , and to delimit in that part of Africa, in accordance with Anglo-Egyptian interests, the respective spheres of influence of Great Britain and France. The arrangement was not effected without serious danger of a European conflict. Taking advan- tage of the temporary weakness of Egypt, the French govern- ment formed the project of seizing the Upper Nile valley and uniting her possessions in West Africa with those at the

entrance to the Red Sea. With this object a small force under Major Marchand was sent from the French Congo into the Bahr-el- Ghazal, with orders to occupy Fashoda on the Nile; whilst a Franco-Abyssinian Expedition was despatched from the east- ward, to join hands with Major Marchand. The small force from the French Congo reached its destination, and a body of Abys- sinian troops, accompanied by French officers, appeared for a short time a little higher up the river; but the grand political scheme was frustrated by the victorious advance of an Anglo- Egyptian force under General Kitchener and the resolute attitude of the British government. Major Marchand had to retire from Fashoda, and as a concession to French susceptibilities he was allowed to retreat by the Abyssinian route. By an agreement signed by Lord Salisbury and the French ambassador on the 21st of March 1899, and appended to Art. IV. of the Anglo- French convention of June 14th, 1898, which dealt with the British and French spheres of influence in the region of the Niger, France was excluded from the basin of the Nile, and a line marking the respective spheres of influence of the two countries was drawn on the map from the northern frontier of the Congo Free State to the southern frontier of the Turkish province of Tripoli.

The administration of the Sudan (q.v.) was organized on the basis of an agreement between the British and Egyptian govern- ments signed on the 19th of January 1899. According to that agreement the British and Egyptian flags are used together,

and the supreme military and civil command is vested in a governor-general, who is appointed by the khedive on the recom- The mendation of the British government, and who cannot

Anglo- be removed without the British government's con- Egyptian &tn t. Neither consular jurisdiction, nor that of the Sudan. m i X ed tribunals, was permitted, the Sudan being made absolutely free of the international fetters which bound Egypt. Sir Reginald Wingate, the sirdar of the Egyptian army (in which post he succeeded Lord Kitchener at the close of 1899) was named governor-general, and in the work of regeneration of the country, the officials, British, Egyptian and Sudanese, had the cordial co-operation of the majority of the inhabitants.

The growing prosperity of Egypt in the opening years of the 20th century was very marked, and is reflected in the annual reports on the country supplied to the British foreign ˆ yp ” s office by Lord Cromer. Thus, in 1901 he was able to prosperity, declare that ” the foundations on which the well-being and material prosperity of a civilized community should rest have been laid. . . . The institution of slavery is virtually defunct. The corvee has been practically abolished. Law and order everywhere reign supreme. The curbash is no longer employed as an instrument of government.” So little danger to internal peace was apprehended that during this year Arabi Pasha, who had been in exile in Ceylon since 1882, was permitted to return to Egypt. This happy condition had been brought about largely as the result of giving fiscal reform, accom- panied by substantial relief to the taxpayers, the first place in the government’s programme, and with the abolition of octroi duties in 1902 disappeared the last of the main defects in the fiscal system as existing at the time of the British occupation. In these conditions the machinery of government, despite its many imperfections and anomalies, worked smoothly. Land increased in value as irrigation schemes were completed, and European capital was increasingly eager to find employment in the country. The bulk of the fellahin enjoyed a material prosperity to which they had been strangers for centuries. In the midst of this return of plenty Lord Cromer (in his report for 1903) sounded a note of warning: —

” As regards moral progress (he wrote), all that can be said is that it must necessarily be slower than advance in a material direction. I hope and believe, however, that some progress is being made. In any case the machinery which will admit of progress has been created. The schoolmaster is abroad. . . . Every possible facility and every encouragement are afforded for the Egyptians to advance along the path of moral improvement. More than this no govern- ment can do. It remains for the Egyptians to take advantage of the opportunities offered to them.”

The facilities enjoyed by the British and Egyptian govern- ments for securing the material if not the moral development The Anglo- °ˆ Egypt were greatly enlarged in 1904, as the result French of the understanding then come to between France under- and Great Britain. The natural irritation in France St fiQ04 g arising from the British occupation of the Nile valley, and the non-fulfilment of the pledge to withdraw the British garrison from Egypt, which had grown less acute with the passing of years, flamed out afresh at the time of the Fashoda crisis, while the Anglo-Boer war of 1899-1902 led to another access of irritation against England. During 1903 a great change came over public opinion on both sides of the Channel, with the result that the

statesmen of both countries were enabled to complete negotiations settling many points in dispute between the two nations. On the 8th of April 1904 a declaration was signed by the representatives of France and Great Britain which virtually recognized the dominant position of France in Morocco and of Britain in Egypt. The chief provisions concerning Egypt were: —

” His Britannic Majesty’s government declare that they have no intention of altering the political status of Egypt.

” The government of the French Republic, for their part, declare that they will not obstruct the action of Great Britain in that country by asking that a limit of time be fixed for the British occupation, «r in any other manner.

” His Britannic Majesty’s government, for their part, will respect the rights which France, in virtue of treaties, conventions and usage, enjoys in Egypt.”

Similar declarations and engagements were made by Germany, Austria and Italy. Annexed to the Anglo-French agreement was the text of a proposed khedivial decree altering the relations between Egypt and the foreign bond-holders. With the consent of the powers this decree (promulgated on the 28th of November 1904) came into operation on the 1st of January 1905. The combined effect of the declaration and the khedivial decree was great. The first-named put an end to an anomalous situation and gave a practically valid sanction to the presence of Britain in Egypt, removing all ground for the reproach that Great Britain was not respecting its international obligations. In effect it was a European recognition that Britain was the pro- tecting power in Egypt. It put a period to a question which had long embittered the relations between England and France, and locally it caused the cessation of the systematic opposition of the French agents in Cairo to everything tending to strengthen the British position — however beneficial to Egypt the particular scheme opposed might be. Scarcely less important were the results of the khedivial decree. By it Egypt achieved in effect financial independence. The power of the Caisse de la Dette, which had virtually controlled the execution of the international agreements concerning the finances, was swept away, together with almost all the other financial fetters binding Egypt. The Railway and Port of Alexandria Board ceased to exist. For the first time since 1875 Egypt was free to control her own revenue. In return she pledged the greater part of the land tax to the service of the debt. The functions of the Caisse were restricted to the receipt of the funds necessary for this service. It was entirely deprived of its former power

to interfere in the machinery of government. Moreover, some £10,000,000, being accumulated surpluses in the hands of the Caisse after meeting the charges of the debt, were handed over to the Egyptian treasury. The Egyptian government was henceforth free to take full advantage of the financial prosperity of the country.

In one respect the Anglo-French agreement made no alteration • — it left untouched the extra-territoriality enjoyed by Europeans in Egypt in virtue of the treaties with Turkey, i.e. Brlls the system of Capitulations. One of the anomalies of the under that system had, it is true, been got rid of, for, Capituia- as has been stated, consular jurisdiction in civil matters t,ons – had been replaced in 1876 by that of the Mixed Tribunals. In criminal cases, however, foreign consuls still exercised juris- diction, but the main evil of the Capitulations regime was the absence of any proper machinery for enacting laws applicable to the whole of the inhabitants of Egypt. No change could be made in any law applicable to Europeans without the unanimous consent of fifteen foreign powers — a state of affairs wholly incompatible with the condition of Egypt in the 20th century, ” an oriental country which has assimilated a very considerable portion of European civilization and which is mainly governed by European methods.” It was, however, far easier to acknow- ledge that the Capitulations regime was defective and had out- lived its time than to devise a remedy and get all the nations interested to accept it. The solution favoured by Lord Cromer (vide Blue-books, Egypt No. 1 (1906), pp. 1-8, and Egypt No. 1 (1907), pp. 10-26) was the creation of a council — distinct from the existing native legislative council and assembly — composed of Europeans, which should have the power to pass legislation which when promulgated by the Egyptian government, with the assent of the British government, would bind all foreigners resident in Egypt. Every reservation for the benefit of British subjects should enure for the benefit of subjects of other powers. The jurisdiction exercised by consuls in civil and criminal affairs Lord Cromer proposed should cease pari passu with the provision by the Egyptian government, under the powers conferred by the treaty required to set up the new council, of courts having competence to deal with such matters, various safeguards being introduced to prevent injustice in criminal cases. As to civil cases the proposal was to make permanent the Mixed Tribunals, hitherto appointed for quinquennial periods (so that if not reappointed consular jurisdiction in civil cases would revive).

n8

EGYPT

While the removal of ancient jealousies among the European powers interested in Egypt helped to smooth the path pursued

by the Egyptian administration under the guiding Thepan- jj anc j f Great Britain, the intrigues of the Turks and movement, the danger of a revival of Moslem fanaticism threatened

during 1905-1006 to disturb the peace of the country. A party had also arisen, whose best-known leader was Mustafa Kamel Pasha (1874-1008), which held that Egypt was ready for self-government and which saw in the presence of the British a hindrance to the attainment of their ideal. This ” national ” party lent what weight it had to the pan-Islamic agitation which arose in the summer and autumn of 1905, regardless of the fact that a pan-Islamic triumph meant the re-assertion of direct Turkish rule in Egypt and the end of the liberty the Egyptians enjoyed. The pan-Islamic press, allowed full licence by the Cairo authorities, spread abroad rumours that the Egyptian government intended to construct fortifications in the Sinai peninsula with the design of menacing the railway, under construction by Turkey, from Damascus to Mecca. This baseless report led to what is known as the Taba incident (see below). This incident inflamed the minds of many Egyptians, and almost all the opposition elements in the country were united by the appeal to religious fanaticism, of which the incident was partly the effect and partly the cause. The inflammatory writing of the newspapers indicated, encouraged by many persons holding high positions both inside and outside Egypt, created, by every process of misrepresentation, an anti-Christian and anti-European feeling among the mass of the people. After more than a quarter of a century of just rule, i.e. since the accession of Tewfik, the tyranny of the Turkish system was apt to be forgotten, while the appeal to rally in support of their khalif found a response in the hearts of many Egyptians. The feeling entertained by large numbers even of the educated class of Egyptians was strikingly illustrated by the terms of an anonymous letter received by Lord Cromer in May 1906. The writer, probably a member of the Ulema class, addressing the British agent as the reformer of Egypt, said: —

“... He must be blind who sees not what the English have wrought in Egypt; the gates of justice stand open to the poor; the streams flow through the land and are not stopped by order of the strong; the poor man is lifted up and the rich man pulled down, the hand of the oppressor and the briber is struck when outstretched to do evil. Our eyes see these things and they know from whom they come. . . . While

peace is in the land the spirit of Islam sleeps. ... But it is said, ‘ There is war between England and Abdul Hamid Khan.’ If that be so a change must come. Thewords of the Imam are echoed in every heart, and every Moslem hears only the cry of the Faith. . . . Though the Khalif were hapless as Bayezid, cruel as Murad, or mad as Ibrahim, he is the shadow of God, and every Moslem must leap up at his call. . . . You will say, ‘ The Egyptian is more ungrateful than a dog, which remembers the hand that fed him. He is foolish as the madman who pulls down the roof-tree of his house upon himself.’ It may be so to worldly eyes, but in the time of danger to Islam the Moslem turns away from the things of this world and thirsts only for the service of his Faith, even though he looks in the face of death. ...”

To establish confidence in the minds of the Egyptian public that the authorities could maintain order and tranquillity, it was determined to increase permanently the strength of the British garrison. An incident occurred in June 1906 which illustrated the danger which might arise if anything happened to beget the idea that the protecting power had weakened its hold. While mounted infantry of the British army were marching from Cairo to Alexandria, five officers went (on the 13 th of

June) to the village of Denshawai to shoot pigeons. 1

An attack was made on the party by the villagers.

The officers were told by their guide that they might shoot, but the villagers had not given permission and were incensed at the shooting of their pigeons by other officers in the previous year. A premeditated attack was made on the officers; a gun seized from one of them went off and slightly injured four natives — one a woman. The attack had been preceded by a

1 The Egyptians keep large numbers of pigeons, which are allowed to be shot only by permission of the village omdeh (head-man). After the occurrence here related, officers were prohibited from shooting pigeons in any circumstances.

Den- shawai.

trifling fire at a threshing floor, either accidentally caused (but not by the officers’ shots) or lit as a signal for the assault. Captain S. C. Bull of the 6th Dragoons received serious injuries and died a few hours later, and two other officers were seriously injured. A number of persons were arrested and tried by a special tribunal created in 1895 to deal with offences against the army of occupa- tion. On the 27th of

the same month four, of the ringleaders were sentenced to death, others received various terms of imprisonment, 2 and seven were sentenced to fifty lashes. The executions and floggings were carried out the next day at the scene of the outrage and in the presence of some five hundred natives. The quieting effect that this drastic action might have had was marred by the fact that certain members of the British parliament called in question the justice of the sentences — passed unanimously by a court of which the best English and the best native judge were members. For a time there was considerable ferment in Egypt. The Anglo-Egyptian authorities received, however, the firm support of Sir Edward Grey, the foreign secretary in the liberal administration formed in December 1905. As far as responsible statesmen were concerned the change of government in Great Britain made no difference in the conduct of Egyptian affairs.

The Taba incident, to which reference has been made, arose in the beginning of 1906 over the claim of the sultan of Turkey to jurisdiction in the Sinai peninsula. The origin of the dispute dated back, however, to 1892, when Abbas inˆuenu Hilmi became khedive. Mehemet Ali and his suc- cessors up to and including Tewfik had not only administered the Sinai peninsula but certain posts on the Hejaz or Arabian side of the gulf of Akaba. The firman of investiture issued by the sultan on the occasion of the succession of Abbas differed, however, from the text of former firmans, the intention being, apparently, to exclude Egypt from the administration of the Sinai peninsula. The British government intervened and after considerable pressure upon Turkey obtained a telegram (dated the 8th of April 1892) from the grand vizier in which it was declared that the status quo was maintained in the Sinai peninsula, but that the sultan resumed possession of the posts in the Hejaz heretofore garrisoned by Egypt. To this last course Great Britain raised no objection. As officially stated by the British government at the time, the eastern frontier of the Sinai peninsula was taken to be a line running in a south-easterly direction from Rafa, a place on the Mediterranean, east of El Arish, to the head of the gulf of Akaba. The fort of Akaba and other posts farther east Egypt abandoned. So matters rested until in 1905 in con- sequence of lawlessness among the Bedouins of the peninsula a British official was appointed commandant and inspector of the peninsula and certain administrative measures taken. The report was spread by pan-Islamic agents that the intention of the Egyptian government was to construct fortifications on the frontier near Akaba, to which place the Turks were building a branch railway from the Damascus-Mecca line. In January 1906 the sultan complained to the British ambassador at Con- stantinople of Egyptian

encroachments on Turkish territory, whereupon the khedive asked that the frontier should be delimited, a request which Turkey rejected. A small Egyptian force was then directed to occupy Taba, a port near Akaba but on the western side of the gulf. Before this force could reach Taba that place had been seized by the Turkish commandant at Akaba. A period of considerable tension ensued, the Turks removing the boundary posts at Rafa and sending strong reinforcements to the frontier. The British government inter- vened on behalf of the khedive and consistently maintained that the Rafa-Akaba line must be the frontier. In April a conference was held between the khedive and Mukhtar Pasha, the Ottoman commissioner. It then appeared that Turkey was unwilling to recognize the British interpretation of the telegram of the 8th of April 1892. Turkey claimed tha t the peninsula of Sinai consisted

2 On the 8th of January 1908, the anniversary of the khedive's accession, the whole of the Denshawai prisoners were pardoned and released. For the Denshawai incident see the British parliamentary papers, Egypt No. j and Egypt No. 4 of 1906.

only of the territory south of a straight line from Akaba to Suez, and that Egyptian territory north of that line was traced from Rafa to Suez. As a compromise Mukhtar Pasha suggested as the frontier a line drawn direct from Rafa to Ras Mahommed (the most southern point of the Sinai peninsula), which would have left the whole of the gulf of Akaba in Turkish territory. In other words the "claim of the Porte was, to quote Lord Cromer: —

" to carry the Turkish frontier and strategical railways to Suez on the banks of the canal ; or that if the Ras Mahommed line were adopted, the Turkish frontier would be advanced to the neigh- bourhood of Nekhl, i.e. within easy striking distance of Egypt, and that . . . the gulf of Akaba . . . would practically become a mare clausum in the possession of Turkey and a standing menace to the security of the trade route to the East."

Such proposals could not be entertained by Great Britain; and as the sultan remained obstinate the British ambassador on the 3rd of May presented a note to the Porte requiring com- pliance with the British

proposals within ten days. The Turkish ambassador in London was informed by Sir Edward Grey, foreign secretary, that if it were found that Turkish suzerainty in Egypt were incompatible with the rights of the British government to interfere in Egyptian affairs, and with the British occupation, the British position in Egypt would be upheld by the whole force of the empire. Thereupon the sultan gave way and agreed (on the 14th of May) that the line of demarcation should start at Rafa and run towards the south-east " in an approximately straight line as far as a point on the gulf of Akaba at least 3 m. distant from Akaba." 1 The Turkish troops were withdrawn from Taba, and the delimitation of the frontier was undertaken by a joint Turco-Egyptian commission. An agreement was signed on the 1st of October finally settling the frontier line.

With the ending of this dispute and the strengthening of the British garrison in Egypt a demonstration was given of the ability of the protecting power to maintain its position. At the same time encouragement was given to that section of Egyptian society which sought the reform of various Moslem institutions without injury to the principles underlying the faith of Islam: a more truly national movement than that of the agitators who clamoured for parliamentary government.

In April 1907, a few days after the appearance of his report for 1906, in which the " Nationalist " and pan-Islamic move- Reslxaa- ments were shown to be detrimental to the welfare of Hon of Egypt, Lord Cromer resigned his post of British agent Lord and consul-general. His resignation, dictated by

Cromer. re asons of health, was described by Sir Edward Grey as " the greatest personal loss which the public service of this country (Britain) could suffer." Lord Cromer's work was in a sense complete. He left the country in a state of unexampled material prosperity, free from the majority of the international fetters with which it was bound when he took up his task in 1883, and with the legitimate expectation that the work he had done would endure. The magnitude of the task he had accom- plished is shown by the preceding pages, and it need only be added that the transformation effected in Egypt and the Sudan, during his twenty-four years' occupancy of the British Agency, was carried out in every department under his guidance and inspiration. Lord Cromer was succeeded by Sir Eldon Gorst, who had served in Egypt eighteen years under him, and was at the time of his appointment to Cairo an assistant under secretary of state for foreign affairs.

Notwithstanding, or, rather, as a consequence of, the un- exampled

material prosperity of the country, 1907 was a year of severe financial crisis, due to over-trading, excessive credit and the building mania induced by the rapid economic progress of Egypt, and aggravated by the unfavourable monetary conditions existing in America and Europe during the latter part of the year. Though the crisis had results disastrous to the speculators, the position of the fellahin was hardly affected; the cotton crop was marketed with regularity and at an average price higher than that of 1906, while public revenue showed a satisfactory

1 See Egypt No. 2 (1906), Correspondence respecting the Turco-Egyptian Frontier in the Sinai Peninsula (with a map).

increase. The noisy ” Nationalist ” agitation which was main- tained during this period of financial stringency reacted un- favourably on public order. Although the degree of insecurity prevailing in the provinces was greatly exaggerated — serious crime in 1907 being less than in the preceding year — an increas- ing number of crimes were left untraced to their authors. The release of the Denshawai prisoners in January 1908 and the death of Mustafa Kamel in the following month had a quieting effect on the public mind; while the fact that in the elections (December 1907) for the legislative council and the general assembly only 5 % of the electors went to the polls, afforded a striking commentary alike on the appreciation of the average Egyptian of the value of parliamentary institutions and of the claims of the ” Nationalist ” members of the assembly to represent the Egyptian people. The ” Nationalists ” were, too, divided into many warring sections — Mahommed Bey Ferid, chosen as successor to Mustafa Kamel, had to contend with the pretensions of several other ” leaders.” The khedive, moreover, markedly abstained from any association with the agitation of the Nationalists, who viewed with disfavour his highness’s personal friendship with Sir Eldon Gorst. The agitators gained their chief strength from the support accorded them by certain Radical politicians in England. A number of members of the council and assembly visited England in July 1908 and were received by Sir Edward Grey, who gave them assurances that Great Britain would always strive to remedy the legitimate grievances of Egyptians.

The establishment of constitutional rule in Turkey in the summer of 1908 excited the hopes of the Egyptian Nationalists, and a deputation was sent to Constantinople to confer with the Young Turk committee. From the Young Turks, however, the deputation received no encouragement for their agitation and returned with the advice to work in co-operation with the British. In view of the rumours current, Sir Eldon Gorst, in the form of an interview in El Mokattam, a widely

read native paper, restated (October 1908) the British view as to the occupation of the country and the demand for a parliament. Great Britain, he declared, had no intention of proclaiming a protectorate over Egypt; on the other hand, recent events in Turkey in no way affected the question of self-government in Egypt. It would be folly to think of introducing unrestricted parliamentary government at present, the conditions for its successful working not existing. The " wild and foolish " agitation on this question only served to confirm the impression that the Egyptians were not yet fit to govern themselves. At the same time steps were being taken to give them a much greater part in the manage- ment of local affairs. If the Egyptians showed that the existing institutions and the new provincial councils could do useful work, it would prove the best argument for extending their powers. Sir Eldon Gorst 's statements were approved by the British government.

In November 1908 Mustafa Fehmi, who had been premier since 1895, resigned, and was succeeded by Boutros Pasha, a Copt of marked ability, who had been for several years foreign minister. Boutros incurred the enmity of the " Nationalists " and was murdered in February 1910. (D. M. W.; F. R. C.)

Authorities. — D. A. Cameron, Egypt in the Nineteenth Century (London, 1898), a clear and useful summary of events up to 1882; E. Dicey, The Story of the Khedivate (London, 1902) ; J. C. McCoan, Egypt under Ismail (London, 1899) ; P. Mouriez, Histoire de Mehemet-Ali (4 vols., Paris, 1855-1858); L. Brehier, L'Egypte de 1789 a iqco (Paris, 1901); C. de Freycinet, La Question d'Egypte (Paris, 1905). See also MehemetAli.

For the period immediately preceding and during the British occupation the standard authority is Lord Cromer's Modern Egypt (2 vols., London, 1908). In this invaluable work the history of Egypt from 1875 to 1892 and that of the Anglo- Egyptian Sudan from 1882 to 1907 is treated fully. Lord Cromer's annual reports (1888-1906) to the British government on the affairs of Egypt should also be consulted. Next in interest are Alfred (Lord) Milner's England in Egypt (nth ed., London, 1904), and Sir A. Colvin's The Making of Modern Egypt (London, 1906). Consult also Khedives and Pashas (London, 1884), by C. F. Moberly Bell (published anony- mously); D. M. Wallace, Egypt and the Egyptian Question (London, 1883) ; W. S. Blunt, Secret History of the English Occupation of Egypt (2nd ed., London, 1907), a partisan record; C. v. Malortie, Egypt,

[MILITARY OPERATIONS 1882-85

Native Rulers and Foreign Interference, 2 vols. (London, 1883); O. Borelli, Choses politiques d'Egypte, 1883-1895 (Paris, 1895); H. Resener, Agypten unter englischer Okkupation (Berlin, 1896). Morley's Life of Gladstone and Fitzmaurice's Life of Granville throw consider- able light on the inner history of the period 1 880-1 893. See further the historical works cited in Sudan: Anglo-Egyptian, and those given at the end of the first section of this article.

For military operations 1 882-1 899 see C. Royle, The Egyptian Campaigns 1882 to 1899, revised ed. (London, 1906); H. Bracken- bury, Narrative of the Advance of the River Column of the Nile Expe- ditionary Force (Edinburgh, 1885); Sir W. F. Butler, Campaign of the Cataracts (London, 1887) ; Count A. E. W. Gleichen, With the Camel Corps up the Nile (London, 1888) ; Gordon's Last Journal (London, 1885); Sir C. W. Wilson, From Korti to Khartum (Edin- burgh, 1886) ; J. Grant, Cassell's History of the War in the Soudan, 6 vols. (London, 1885 et seq.); "An Officer," Sudan Campaigns 1896-1899 (London, 1899); G. W. Steevens, With Kitchener to Khartum (Edinburgh, 1898) ; W. S. Churchill, The River War, new edition (London, 1902).

Bibliographical notes for each section of this article are given in their several places. The following bibliographies may be consulted : Ibrahim Hilmi, Literature of Egypt and the Soudan, 2 vols. (London, 1886-1888); H. Jolowicz, Bibliotheca aegyptiaca (Leipzig, 1858; supplement, 1861); M. Hartmann, The Arabic Press of Egypt (London, 1899). (F. R. C.)

Military Operations of 1882-1885 In February 1879 a slight outbreak of discharged officers and soldiers occurred at Cairo, which led to the despatch of British and French ships to Alexandria. On the 26th of June of that year Ismail Pasha was removed from Egypt, and Tewfik assumed the khediviate, becoming practically the protege of the two western powers. On the 1st of February 1881 a more serious disturbance arose at Cairo from the attempt to try three colonels, Ahmed Arabi, Ali Fehmy, and Abd-el-Al, who had been arrested as the ringleaders of the military party. The prisoners were re- leased by force, and proceeded to dictate terms to the khedive. Again British and French warships were despatched to Alexan- dria, and were quickly withdrawn, their presence having pro- duced no apparent impression. It soon became clear that the khedive was powerless, and that the military party, headed by Arabi, threatened to dominate the

country. The ” dual note,” communicated to the khedive on the 6th of January 1881, con- tained an intimation that Great Britain and France were pre- pared to afford material support if necessary; but the fall of Gambetta’s ministry produced a reaction, and both governments proceeded to minimize the meaning of their language. The khedive was practically compelled to form a government in which Arabi was minister of war and Mahmud Sami premier, and Arabi took steps to extend his influence throughout his army. The situation now became critically serious: for the third time ships were sent to Alexandria, and on the 25th of May 1882 the consuls- general of the two powers made a strong representation to Mahmud Sami which produced the resignation of the Egyptian ministry, and a demand, to which the khedive yielded, by the military party for the reinstatement of Arabi. The attitude of the troops in Alexandria now became threatening; and on the 29th the British residents pointed out that they were ” absolutely defenceless. ” This warning was amply justified by the massacres of the 1 ith of June, during which more than one hundred persons, including an officer and two seamen, were killed in the streets of Bombard- Alexandria, almost under the guns of the ships in meat of harbour. It was becoming clear that definite action Alexan- would have to be taken, and on the 15th the channel

twenty-six warships, representing the navies of Great Britain, France, Germany, Italy, Austria, Russia, the United States, Spain, Greece and Turkey, lay off the port of Alexandria, and large numbers of refugees were embarked. The order received by Admiral Sir Beauchamp Seymour (afterwards Lord Alcester) on the 3rd of July was as follows: —

” Prevent any attempt to bar channel into port. If work is resumed on earthworks, or fresh guns mounted, inform military commander that you have orders to prevent it; and if not immediately dis- continued, destroy earthworks and silence batteries if they open fire, having given sufficient notice to population, shipping and foreign men-of-war.”

On the 9th the admiral received a report that working parties had been seen in Fort Silsileh ” parbuckling two smooth- bore guns — apparently 32-pounders — towards their respective carriages and slides, which were facing in the direction of the harbour.” Fort Silsileh was an old work at the extreme east of the defences of Alexandria, and its guns do not bear on the harbour. On the 10th an ultimatum was sent to Toulba Pasha, the military commandant, intimating that the bombardment would commence at sunrise on the following morning unless ” the batteries on the isthmus of Ras-el-Tin and the southern

shore of the harbour of Alexandria ” were previously surrendered ” for the purpose of disarming.” The fleet prepared for action, and the bearer of the reply, signed by the president of the council, and offering to dismount three guns in the batteries named, only succeeded in finding the flagship late at night. This proposal was rejected, and at 7 a.m. on the nth of July the ” Alexandra ” opened fire and the action became general. The attacking force was disposed in three groups: (1) the “Alex- andra,” ” Sultan ” and ” Superb,” outside the reef, to engage the Ras-el-Tin and the earthworks under weigh; (2) the ” Monarch,” ” Invincible ” and ” Penelope,” inside the harbour, to engage the Meks batteries; and (3) the “Inflexible ” and ” Temeraire,” to take up assigned stations outside the reef and to co-operate with the inshore squadron. The gunboats ” Beacon,” ” Bittern,” ” Condor,” ” Cygnet ” and ” Decoy ” were to keep out of fire at first and seek opportunities of engaging the Meks batteries. Meks fort was silenced by about 12.45 p – M -> and a party from the ” Invincible ” landed and disabled the guns. As the fire delivered under weigh was not effective, the offshore squadron anchored at about 10.30 a.m., and succeeded in silencing Fort Ras-el-Tin at about 12.30 p.m., and Fort Adda, by the explosion of the main magazine, at 1.35 p.m. The ” In- flexible ” weighed soon after 8 a.m. and engaged Ras-el-Tin, afterwards attacking Forts Pharos and Adda. The ” Condor,” followed by the ” Beacon,” ” Bittern ” and ” Decoy,” engaged Fort Marabout soon after 8 a.m. till n a.m., when the gunboats were recalled. After the works were silenced, the ships moved in closer, with a view to dismount the Egyptian guns. The bombardment ceased at 5 p.m.; but a few rounds were fired by the ” Inflexible ” and ” Temeraire ” on the morning of the 1 2th at the right battery in Ras-el-Tin lines.

The bombardment of the forts of Alexandria is interesting as a gauge of the effect to be expected from the fire of ships under specially favourable conditions. The Egyptians at different times during the day brought into action about 33 R.M.L. guns (7-in. to io-in.), 3 R.B.L. guns (40 prs.), and 120 S.B. guns (65-in. and io-in.), with a few mortars. These guns were disposed over a coast-line of about 10 sea miles, and were in many cases indifferently mounted. The Egyptian gunners had been little trained, and many of them had never once practised with rifled ordnance. Of seventy-five hits on the hulls of the ships only five can with certainty be ascribed to projectiles from rifled guns, and thirty were unquestionably due to the old smoothbores, which were not provided with sights. The total loss inflicted was 6 killed and 27 wounded. The British ships engaged fired 1 741 heavy projectiles (7-in. to 16-in.) and 1457 light (7-prs. to 64-prs.), together

with 33,493 machine-gun and rifle bullets. The result was comparatively small. About 8 rifled guns and 19 smoothbores were dismounted or disabled and 4 and I temporarily put out of action respectively. A considerable portion of this injury was inflicted, after the works had been silenced, by the deliberate fire of the ships. As many as twenty-eight rifled guns and 140 smoothbores would have opened fire on the following day. The Egyptians made quite as good a stand as could be expected, but were driven from their guns, which they were unable to use with adequate effect; and the bombardment of Alexandria confirms previous experience that the fire of ships cannot really compete with that of well-mounted and well-handled guns on shore.

In the afternoon of the 12th, fires, which were the work of incendiaries, began to break out in the best quarters of Alex- andria; and the town was left to murder and pillage till the following day, when a party of bluejackets and marines was landed at about 3 p.m.

Military intervention being now imperatively demanded, a vote of credit for £2,300,000 was passed in the British House of Commons on the 27 th of July. Five days later the French government failed to secure a similar vote, and Great Britain was left to deal with the Egyptian question alone. An

expeditionary force detailed from home stations and from Malta was organized in two divisions, with a eavalry division, corps British troops, and a siege train, numbering in all about expedition 25,000 men. An Indian contingent numbering about under sir 7000 combatants, complete in all arms and with its own Ganiei transport, was prepared for despatch to Suez. General o se ey. g. f Q arnet – \y lseley was appointed commander-in- chief, with Lieutenant – General Sir J. Adye as chief of the staff. The plan of operations contemplated the seizure of Ismailia as the base for an advance on Cairo, Alexandria and its suburbs to be held defensively, and the Egyptian forces in the neighbour- hood to be occupied by demonstrations. The expeditionary force having rendezvoused at Alexandria, means were taken by Rear-Admiral Hoskins and Sir W. Hewett for the seizure of the Suez canal. Under orders from the former, Captain Fairfax, R.N., occupied Port Said on the night of 19th August, and Commander Edwards, R.N.,

proceeded down the canal, taking possession of the gates and dredgers, while Captain Fitzroy, R.N., occupied Ismailia after slight opposition. Before nightfall on the 20th of August the canal was wholly in British hands. Meanwhile, leaving Sir E. Hamley in command at Alexandria, Sir G. Wolseley with the bulk of the expeditionary force arrived at Port Said on the 20th of August, a naval demonstration having been made at Abukir with a view to deceive the enemy as to the object of the great movement in progress. The advance from Ismailia now began. On the 21st Major-General Graham moved from Ismailia with about 800 men and a small naval force, occupying Nefiche, the junction with the Suez line, at 1.30 a.m. without opposition. On the 22nd he made a recon- naissance towards Suez, and on the 23rd another to El-Magfar, 4 m. from Nefiche. It now appeared that the enemy had dammed the sweet-water canal and blocked the railway at Tell-el-Mahuta, where entrenchments had been thrown up and resistance seemed to be contemplated. At 4 a.m. on the 24th Sir Garnet Wolseley advanced with 3 squadrons of cavalry, 2 guns, and about 1000 infantry, placed under the orders of Lieutenant-General Willis. The enemy showed in force, estimated at 7000 with 12 guns, and a somewhat desultory action ensued. Reinforcements from Ismailia were ordered up, and the British cavalry, operating on the right, helped to check the enemy's attack, which showed little vigour. At night the troops, now reinforced by the Guards Brigade, an infantry battalion, 2 cavalry regiments and 10 guns, bivouacked on the ground. Early on the morning of the 25th the advance was continued to Tell-el-Mahuta, which the enemy evacuated, while the mounted troops and horse artillery pressed on to Mahsama, capturing the Egyptian camp, with 7 guns and large quantities of ammunition and supplies. On the same evening Major-General Graham, with about 1200 marines (artillery and light infantry), reached Mahsama, and on the following day he occupied Kassassin without opposition. The advance guard had now outrun its communications and was actually short of food, while a considerable force was distributed at intervals along the line Ismailia-Kassassin. The situatioh on the 27th tempted attack by an enterprising enemy, and Major-General Graham's force, consisting of a squadron of the ioth Hussars, the York and Lancaster Regiment, the duke of Cornwall's Light Infantry, the Marine Artillery Battalion and two R.H.A. guns, short of ammunition, was in danger of being overwhelmed by vastly superior numbers from Tell-el-Kebir. On the 28th Major-General Graham's troops were attacked, and after repulsing the enemy, made a general advance about 6.45 p.m. The cavalry, summoned by heliograph from Mahsama, co-operated, and in a moonlight charge inflicted considerable loss. The British casualties amounted to 14 killed and 83 wounded. During the lull which

followed the first action of Kassassin, strenuous efforts were made to bring up supplies and troops and to open up railway communication to the front. On the 9th of September the Egyptians again attacked Kassassin, but were completely repulsed by 9 a.m., with a loss of 4 guns, and were pursued to within extreme range of the guns of Tell-el-Kebir. The British casualties were 3 killed and 78 wounded. The three following days were occupied in concentrating troops

at Kassassin for the attack on Tell-el-Kebir, held by about 38,000 men with 60 guns. The Egyptian defences consisted of a long line of trench (25 m.) approximately at right T 11 1 angles to the railway and the sweet-water canal. At Keb'ir. ' 11 p.m. on the 12th of September the advance of about 15,000 men commenced; the 1st division, under Lieu- tenant-General Willis, was on the right, and the 2nd division, under Lieutenant-General Hamley, was on the left. Seven batteries of artillery, under Brigadier-General Goodenough, were placed in the centre. The cavalry, under Major-General Drury Lowe, was on the right flank, and the Indian contingent, under Major-General Macpherson, starting one hour later, was ordered to move south of the sweet- water canal. The night was moonless, and the distance to be covered about 6| m. The ground was perfectly open, slightly undulating, and generally firm gravel. The conditions for a night march were thus ideal; but during the movement the wings closed towards each other, causing great risk of an outbreak of firing. The lin e was, however, rectified, and after a halt the final advance began. By a for- tunate accident the isolated outwork was just missed in the darkness by the left flank of the 2nd Division; otherwise a premature alarm would have been given, which must have changed all the conditions of the operation. At dawn the Highland Brigade of the 2nd Division struck the enemy's trenches, and carried them after a brief struggle. The 1st Division attacked a few minutes later, and the cavalry swept round the left of the line of entrenchments, cutting down any fugitives who attempted resistance and reaching the enemy's camp in rear. The Indian contingent, on the south of the canal, co- operated, intercepting the Egyptians at the canal bridge. The opposition encountered at some points was severe, but by 6 a.m. all resistance was at an end. The British loss amounted to 58 killed, 379 wounded and 22 missing; nearly 2000 Egyptians were killed, and more than 500 wounded were treated in hospital. An immediate pursuit was ordered, and the Indian contingent, under Major-General Macpherson, reached Zagazig, while the cavalry, under Major-General Drury Lowe, occupied Belbeis and pushed on to Cairo, 65 m. from Tell-el-Kebir, next day. On the evening of the 14th the 10,000 troops occupying Abbasia barracks, and 5000 in the citadel of Cairo,

surrendered. On the 15th General Sir Garnet Wolseley, with the brigade of Guards under H.R.H. the duke of Connaught, entered the city.

The prompt following up of the victory at Tell-el-Kebir saved Cairo from the fate of Alexandria and brought the rebellion to an end. The Egyptian troops at Kafr Dauar, Abukir and Rosetta surrendered without opposition, and those at Damietta followed on the 23rd of September, after being threatened with attack. On the 25th the khedive entered Cairo, where a review of the British troops was held on the 30th. The expeditionary force was now broken up, leaving about 10,000 men, under Major-General Sir A. Alison, to maintain the authority of the khedive. In twenty-five days, from the landing at Ismailia to the occupation of Cairo, the rebellion was completely suppressed, and the operations were thus signally successful.

The authority of the khedive and the maintenance of law and order now depended absolutely on the British forces left in occupation. Lord Dufferin, who had been sent to _ Cairo to draw up a project of constitutional reforms, qae stion. advocated the re-establishment of a native army, not to exceed 5000 to 6000 men, with a proportion of British officers, for purely defence purposes within the Delta; and on the 13th of December 1882 Sir Evelyn Wood left England to undertake the organization of this force, with the title of sirdar. Lord Dufferin further advised the formation of a gendarmerie, which ” should be in a great measure a mounted force and empowered with a semi-military character ” (despatch of January 1st, 1883). The strength of this military police force was fixed at 4400 men with 2562 horses, and Baker Pasha (General Valentine Baker) was entrusted with its formation, with the title of inspector- general.

In a despatch of the 6th of February 1883 Lord Dufferin dealt

with the Sudan, and stated that Egypt ” could hardly be expected to acquiesce ” in a policy of withdrawal from her Southern territories. At the same time he pointed out that,

‘ ‘Unhappily, Egyptian administration in the Sudan had been almost uniformly unfortunate. The success of the present mahdi in raising the tribes and extending his influence over great tracts of country was a

sufficient proof of the government's inability either to reconcile the inhabitants to its rule or to maintain order. The consequences had been most disastrous. Within the last year and a half the Egyptians had lost something like 9000 men, while it was estimated that 40,000 of their opponents had perished."

Moreover, to restore tranquillity in the Sudan,

" the first step necessary was the construction of a railway from Suakin to Berber, or what, perhaps, would be more advisable, to Shendi, on the Nile. The completion of this enterprise would at once change all the elements of the problem."

The immense responsibilities involved were most imperfectly understood by the British government. Egyptian sovereignty in the Sudan dates from 1820, when Mehemet AH sent a large force into the country, and ultimately established his authority over Sennar and Kordofan. In 1865 Suakin and Massawa were assigned to Egyptian rule by the sultan, and in 1870 Sir Samuel Baker proceeded up the Nile to the conquest of the Equatorial provinces, of which General Gordon was appointed governor- general in 1874. In the same year Darfur and Harrar were annexed, and in 1877 Gordon became governor-general of the Sudan, where, with the valuable assistance of Gessi Pasha, he laboured to destroy the slave trade and to establish just govern- ment. In August 1879 he returned to Cairo, and was succeeded by Raouf Pasha. Misrule and oppression in every form now again prevailed throughout the Sudan, while the slave traders, exasperated by Gordon's stern measures, were ready to revolt. The authority of Egypt was represented by scattered garri- sons of armed men, badly officered, undisciplined and largely demoralized. In such conditions a leader only was required to ensure widespread and dangerous rebellion. A leader appeared in the person of Mahommed Ahmed, born in 1848, who had taken up his abode on Abba Island, and, acquiring great reputation for sanctity, had actively fomented insurrection. In August 1881 a small force sent by Raouf Pasha to arrest Mahommed Ahmed was destroyed, and the latter, proclaiming himself the mahdi, stood forth as the champion of revolt. Thus, at the time when the Egyptian army was broken up at Tell-el-Kebir, the Sudan was already in flames. On the 7th of June 1882, 6000 men under Yusef Pasha, advancing from Fashoda, were nearly annihilated by the mahdists. Payara and Birket in Kordofan quickly fell, and a few days before the battle of Tell-el-Kebir was fought, the mahdi, with a large force, was besieging El Obeid. That town was captured, after an obstinate defence, on the 17th of January 1883, by which time almost the whole of the Sudan south of Khartum was in open rebellion,

except the Bahr-el- Ghazal and the Equatorial provinces, where for a time Lupton Bey and Emin Pasha were able to hold their own. Abd-el-Kader, who had succeeded Raouf, telegraphed to Cairo for 10,000 addi- tional troops, and pointed out that if they were not sent at once four times this number would be required to re-establish the authority of the government in the Sudan. After gaining some small successes, Abd-el-Kader was superseded by Suliman Niagi on the 20th of February 1883, and on the 26th of March Ala-ed- din Pasha was appointed governor-general. Meanwhile 5000 men, who had served in the Egyptian army, were collected and forcibly despatched to Khartum via Suakin. In March

1883 Colonel William Hicks, late of the Bombay army, Disaster to w jj m j anuar y h a d been appointed by the khedive Pasha. chief of the staff of the army of the Sudan, found

himself at Khartum with nine European officers and about 10,000 troops of little military value. The reconquest of the Sudan having been determined upon, although Sir E. Malet reported that the Egyptian government could not supply the necessary funds, and that there was great risk of failure, Colonel Hicks, who had resigned his post on the 23rd of July, and had been appointed commander-in-chief, started from Khartum on 9th September, with a total force of about 10,000 men, including

non-combatants, for Kordofan. On the 22nd of May Sir E. Malet had informed Sherif Pasha that,

” although Colonel Hicks finds it convenient to communicate with Lord Dufferin or with me, it must not be supposed that we endorse in any way the contents of his telegrams. . . . Her Majesty’s government are in no way responsible for his operations in the Sudan, which have been undertaken under the authority of His Highness’s government.”

Colonel Hicks was fully aware of the unfitness of his rabble forces for the contemplated task, and on the 5th of August he telegraphed: ” I am convinced it would be best to keep the two rivers and province of Sennar, and wait for Kordofan to settle itself.” Early in November the force from Khartum was caught by the mahdists short of water at Kashgil, near El Obeid, and was almost totally destroyed, Colonel Hicks, with all his European officers, perishing. Sinister rumours having reached Cairo, Sir E. Baring (Lord Cromer), who had succeeded Sir E. Malet, telegraphed that ” if Colonel Hicks’s army is destroyed, the Egyptian government will lose the whole of the Sudan, unless some assistance from the outside is given,” and advised the

withdrawal to some post on the Nile. On the following day Lord Granville replied: ” We cannot lend English or Indian troops; if consulted, recommend abandonment of the Sudan within certain limits “; and on the 25th he added that “Her Majesty’s government can do nothing in the matter which would throw upon them the responsibilities for operations in the Sudan.” In a despatch of the 3rd of December Sir E. Baring forcibly argued against British intervention in the affairs of the Sudan, and on the 13th of December Lord Granville telegraphed that ” Her Majesty’s government recommend the ministers of khedive to come to an early decision to abandon all territory south of Assuan, or, at least, of Wadi Haifa.” On the 4th of January 1884 Sir E. Baring was directed to insist upon the policy of evacuation, and on the 18th General Gordon left London to assist in its execution.

The year 1883 brought a great accession of power to the mahdi, who had captured about 20,000 rifles, 19 guns and large stores of ammunition. On the Red Sea littoral Osman Digna, a slave dealer of Suakin, appointed amir of the {J^J^J’ Eastern Sudan, raised the local tribes and invested Baker. Sinkat and Tokar. On the 16th of October and the 4th of November Egyptian reinforcements intended for the former place were destroyed, and on the 2nd of December a force of 700 men was annihilated near Tamanieb. On the 23rd of December General Valentine Baker, followed by about 2500 men, gendarmerie, blacks, Sudanese and Turks, with 10 British officers, arrived at Suakin to prepare for the relief of Sinkat and Tokar. The khedive appears to have been aware of the risks to be incurred, and in a private letter he informed the general that ” I rely upon your prudence and ability not to engage the enemy except under the most favourable circumstances.” The tragedy of Kashgil was repeated on the 4th of February 1884, when General Baker’s heterogeneous force, on the march from Trinkitat to Tokar, was routed at El Teb by an inferior body of tribesmen. Of 3715 men, 2375, with 11 European officers, were killed. Suakin was now in danger, and on the 6th of February British bluejackets and marines were landed for the defence of the town.

Two expeditions in the Sudan led by British officers having thus ended in disaster, and General Gordon with Lieutenant- Colonel J. D. Stewart having reached Khartum on British the 18th of February, the policy of British non-inter- expedition vention in regard to Sudan affairs could no longer be “°* r maintained. Public opinion in England was strongly Qrabam: impressed by the fact that the Egyptian garrisons of buttles of Tokar and Sinkat were perishing within striking dis- El Teb and tance of the Red Sea littoral. A British force about 4400 ama ” e •

strong, with 22 guns, made up of troops from Egypt and from units detained on passage from India, was rapidly concentrated at Suakin and placed under the orders of Major-General Sir G. Graham, with Major-Generals Sir R. Buller and J. Davis as brigadiers. News of the fall of Sinkat, where the starving garrison, under Tewfik Bey, made a gallant sortie and was cut.

to pieces, reached Suakin on the 12th of February. On the 24th General Graham's force disembarked at Trinkitat and received information of the surrender of Tokar. At 8 a.m. on the 29th the force advanced towards Tokar in square, and came under fire at 11.20 a.m. from the enemy entrenched at El Teb. The tribes- men made desperate efforts to rush the square, but were repulsed, and the position was taken by 2 p.m. The cavalry, 10th and 19th Hussars, under Brigadier-General Sir H. Stewart, became in- volved in a charge against an unbroken enemy, and suffered somewhat severely. The total British loss was 34 killed and 155 wounded; that of the tribesmen was estimated at 1500 killed. On the following day Tokar was reached, and on the 2nd of March the force began its return to Suakin, bringing away about 700 people belonging to the late garrison and the civil population, and destroying 1250 rifles and a quantity of am- munition found in a neighbouring village. On the 9th of March the whole force was back at Suakin, and on the evening of the nth an advance to Tamai began, and the force bivouacked and formed a zeriba in the evening. Information was brought by a native that the enemy had assembled in the Khor Ghob, a deep ravine not far from the zeriba. At about 8.30 a.m. on the 13th the advance began in echelon of brigade squares from the left. The left and leading square (2nd Brigade) moved towards the khor, approaching at a point where a little ravine joined it. The enemy showing in front, the leading face of the square was ordered to charge up to the edge of the khor. This opened the square, and a mass of tribesmen rushed in from the small ravine. The brigade was forced back in disorder, and the naval guns, which had been left behind, were temporarily captured. After a severe hand-to-hand struggle, in which the troops behaved with great gallantry, order was restored and the enemy repulsed, with the aid of the fire from the 1st Brigade square and from dismounted cavalry. The 1st Brigade square, having a sufficient field of fire, easily repelled all attempts to attack, and advancing as soon as the situation had been restored,

occupied the village of Tamai. The British loss was 109 killed and 104 wounded; of the enemy nearly 2000 were killed. On the following day the force returned to Suakin.

Two heavy blows had now been inflicted on the followers of Osman Digna, and the road to Berber could have been opened, as General Graham and Brigadier- General Sir H. Stewart suggested. General Gordon, questioned on the point, telegraphed from Khartum, on the 7th of March, that he might be cut off by a rising at Shendi, adding, ” I think it, therefore, most important to follow up the success near Suakin by sending a small force to Berber.” He had previously, on the 29th of February, urged that the Suakin-Berber road should be opened up by Indian troops. This, and General Gordon’s proposal to send 200 British troops to Wadi Haifa, was opposed by Sir E. Baring, who, realizing soon afterwards the gravity of the situation, tele- graphed on the 1 6th of March: — •

” It has now become of the utmost importance not only to open the road between Suakin and Berber, but to come to terms with the tribes between Berber and Khartum.”

The government refused to take this action, and Major-General Graham’s force was employed in reconnaissances and small skirmishes, ending in the destruction of the villages in the Tamanieb valley on 27th March. On the 28th the whole force was reassembled at Suakin, and was then broken up, leaving one battalion to garrison the town.

The abrupt disappearance of the British troops encouraged the tribesmen led by Osman Digna, and effectually prevented the formation of a native movement, which might have been of great value. The first attempt at intervention in the affairs of the Sudan was made too late to save Sinkat and Tokar. It resulted only in heavy slaughter of the tribesmen, which afforded no direct or indirect aid to General Gordon or to the policy of evacuation. The public announcement of the latter was a grave mistake, which increased General Gordon’s difficulties, and the situation at Khartum grew steadily worse. On the 24th of March Sir E. Baring telegraphed: —

Entangle- ment ot General Gordon at Khartum.

” The question now is, how to get General Gordon and Colonel

Stewart away from Khartum. . . . Under present circumstances, I think an effort should be made to help General Gordon from Suakin, if it is

at all a possible military operation. . . . We all consider that, however difficult the operations from Suakin may be, they are more practicable than any operations from Korosko and along the Nile.”

A telegram from General Gordon, received at Cairo on the 19th of April, stated that

” We have provisions for five months and are hemmed in. . . . Our position will be much strengthened when the Nile rises. . . . Sennar, Kassala and Dongola are quite safe for the present.”

At the same time he suggested ” an appeal to the millionaires of America and England ” to subscribe money for the cost of ” 2000 or 3000 nizams ” (Turkish regulars) to be sent to Berber. A cloud now settled down upon Khartum, and subsequent communications were few and irregular. The foreign office and General Gordon appeared to be somewhat at cross purposes. The former hoped that the garrisons of the Sudan could be ex- tricated without fighting. The latter, judging from the tenor of some of his telegrams, believed that to accomplish this work entailed the suppression of the mahdi’s revolt, the strength of which he at first greatly underestimated. He had pressed strongly for the employment of Zobeir as ” an absolute necessity for success ” (3rd of March) ; but this was refused, since Sir H. Gordon advised at this time that it would be dangerous. On the 9th of March General Gordon proposed, ” if the immediate evacuation of Khartum is determined upon irrespective of out- lying towns,” to send down the “Cairo employes” and the garrison to Berber with Lieutenant-Colonel J. D. Stewart, to resign his commission, and to proceed with the stores and the steamers to the equatorial provinces, which he would consider as placed under the king of the Belgians. On the 13th of March Lord Granville gave full power to General Gordon to ” evacuate Khartum and save that garrison by conducting it himself to Berber without delay,” and expressed a hope that he would not resign his commission.

By the end of March 1884 Sir E. Baring and the British officers in Egypt were convinced that force would have to be employed, and the growing danger of General Gordon, with the x enetex . grave national responsibility involved, began to be peaition: realized in Great Britain. Sir Henry Gordon, however, question who was in personal communication with Mr Glad- otroaie – stone, considered that his brother was in no peril, and for some time disbelieved in the need for a relief expedition. Meanwhile it was at least necessary to evolve some plan of action, and on the 8th of April the adjutant-general addressed a memorandum to the secretary of state for war detailing the measures required for placing 6500 British troops ” in the

neighbourhood of Shendi.” The battle of the routes began much earlier, and was continued for some months. Practically the choice lay between the Nile and the Suakin-Berber road. The first involved a distance of 1650 m. from Cairo along a river strewn with cataracts, which obstructed navigation to all but small boats, except during the period of high water. So great was this obstruction that the Nile had never been a regular trade route to the Sudan. The second entailed a desert march of about 250 m., of which one section, Obak-Bir Mahoba (52 m.), was waterless, and the rest had an indifferent water supply (except at Ariab, about half-way to Berber), capable, however, of considerable development. From Berber the Nile is followed (210 m.) to Khartum. This was an ancient trade route with the Sudan, and had been used without difficulty by the reinforcements sent to Hicks Pasha in 1883, which were accompanied by guns on wheels. The authorities in Egypt, headed by General Stephenson, subsequently supported by the Admiral Lord John Hay, who sent a naval officer to examine the river as far as Dongola, were unanimous in favour of the Suakin-Berber route. From the first Major- General Sir A. Clarke, then inspector-general of fortifications, strongly urged this plan, and proposed to begin at once a metre gauge railway from Suakin, to be constructed by Indian labour under officers skilled in laying desert lines. Some preliminary arrangements were made , and on the 14th of June the government

sanctioned certain measures of preparation at Suakin. On the other side were the adjutant-general (Lord Wolseley) and a small number of officers who had taken part in the Red River ex- pedition of 1870. The memorandum of the adjutant-general above referred to was based on the hypothesis that Khartum could not hold out beyond the 15th of November, and that the expedition should reach Berber by the 20th of October. Steamers were to be employed in such reaches as proved practicable, but the force was to be conveyed in special whale-boats, by which ” the difficulty of transport is reduced to very narrow limits.” The mounted force was to consist of 400 men on native horses and 450 men on horses or camels. The question of routes con- tinued to be the subject of animated discussion, and on the 29th of July a committee of three officers who had served in the Red River expedition reported: —

” We believe that a brigade can easily be’Conveyed in small boats from Cairo to Dongola in the time stated by Lord Wolseley; and, further, that should it be necessary to send a still larger force by water to Khartum, that operation will present no insuperable difficulties.”

‘This most irtconclusive report, and the baseless idea that the adoption of the Nile route would involve no chance of bloodshed, . which the government was anxious to avoid, seem to

Wolseley have decided the question. On the 8th of August the seat out; secretary of state for war informed General Stephen- Nih route gon t j lat ” t ˆ e time had arrived when some further

op e ‘ measures for obtaining accurate information as to his (General Gordon’s) position, and, if necessary, for rendering him assistance, should be adopted.” General Stephenson still urged the Suakin-Berber route, and was informed on the 26th of August that Lord Wolseley would be appointed to take over the command in Egypt for the purposes of the expedition, for which a vote of credit had been taken in the House of Commons on the 5th of August. On the 9th of September Lord Wolseley arrived at Cairo, and the plan of operations was somewhat modified. A camel corps of 1 100 men selected from twenty-eight regiments at home was added, and the “fighting force to be placed in line somewhere in the neighbourhood of Shendi ” was fixed at S4°°- The construction of whale-boats began on the 1 2th of August, and the first batch arrived at Wadi Haifa on the 14th of October, and on the 25th the first boat was hauled through the second cataract. The mounted forces proceeded up the banks, and the first half-battalion embarked at Gemai, 870 m. from Khartum, on the 5th of November, ten days before the date to which it had been assumed General Gordon could hold out. In a straggling procession the boats worked their way up to Korti, piloted by Canadian voyageurs. The labour was very great, and the troops, most of whom were having their first lesson in rowing, bore the privations of their unaccustomed conditions with admirable cheerfulness. By the 25th of December 2220 men had reached Korti, of whom about 800 only had been conveyed by the whale-boats, the last of which did not arrive till the 27th of January. Beyond Korti lay the very difficult section of the river to Abu Hamed, which was quite unknown. Meanwhile news of the loss of the ” Abbas ” and of the murder of Colonel J. D. Stewart and his party on the 18th of September had been received. A letter from Gordon, dated the 4th of November and received on the 17th of November, stated that his steamers would await the expedition at Metemma, and added, ” We can hold out forty days with ease; after that it will be difficult.” In his diary, on the 13th of December, when

his difficulties had become extreme, he noted that ” if the expeditionary force does not come in ten days, the town may fall.”

It was clear at Korti that something must be done at once; and on the 13th of December 1100 men, with 2200 camels, under General Sir H. Stewart, were despatched to occupy Jakdul wells, 96 m. on the desert route to Metemma. Stewart returned on the 5th of January, and started again on the 8th, with orders to establish a fort at Abu Klea and to occupy Metemma. The Desert Column, 1800 men, with 2880 camels in poor condition and 153 horses, found the enemy in possession of Abu Klea wells

on the 16th, and was desperately attacked on the 17th. The want of homogeneity of the force, and the unaccustomed tactics imposed upon the cavalry, somewhat hampered the de- fence, and the square was broken at the left rear corner. Besert Driven back upon the camels in the centre, the troops Column; fought hand to hand with the greatest gallantry. Order battle ol was quickly restored, and the attack was repulsed, with w “nf “* a loss of 74 killed and 94 wounded. At least 1100 of the enemy were killed. The wells being occupied and a zeriba formed, the column started on the evening of the 18th. The wrong road was taken, and great confusion occurred, during the night, but at dawn this was rectified; and after forming a rough fort under fire, by which General Sir H. Stewart was fatally wounded, an advance was made at 3 p.m. The square was again heavily attacked, but the Arabs could not get to close quarters and in the evening a bivouac was formed on the Nile. The British losses on this day were 23 killed and 98 wounded. The Desert Column was now greatly exhausted. On the 20th the village of Gubat was occupied; and on the following day Sir C. Wilson, on whom the command had devolved, advanced against Metemma, which was found too strong to assault. On this day General Gordon’s four steamers arrived; and on the morning of the 24th Sir C. Wilson, with 20 British soldiers in red coats and about 280 Sudanese, started in the ” Bordein ” and ” Telahawiyeh ” for Khartum. The ” Bordein ” grounded on the following day, and again on the 26th, by which twenty-four hours were lost. At 1 1 a.m. on the 28th Khartum was sighted, and it soon became clear that the town was in the hands of the enemy. After reconnoitring farther, the steamers turned and proceeded down stream under a heavy fire, the Sudanese crews showing signs of disaffection. The ” Tela- hawiyeh ” was wrecked on the 29th of January and the ” Bordein ” on the 31st, Sir C. Wilson’s party being rescued on the 4th of February by Lord C. Beresford in the ” Safieh,” which had come up from Gubat on receipt of news carried there by Lieutenant Stuart Wortley in a row-boat. Khartum had been taken and General Gordon killed on the morning of the 26th of

January 1885, having thus held out thirty-four days beyond the date when he had expected the end. The garrison had been reduced to starvation; and the arrival of twenty British soldiers, with orders to return at once, Fa ”^ °j could not have affected the situation. The situation petition. of the Desert Column and of its transport was most imperfectly understood at Korti, where impossible plans were formed. Fortunately Major-General Sir R. Buller, who arrived at Gubat on the nth of February, decided upon withdrawal, thus averting impending disaster, and by the 16th of March the Desert Column had returned to Korti.

The advance from Korti of the River Column, under Major- General Earle, began on the 28th of December, and great diffi- culties of navigation were encountered . On the 10th of February an action was fought at Kirbekan with about 800 of the enemy, entailing a loss of 10 killed, including Major-General Earle, and 47 wounded. The column, now commanded by Brigadier- General Brackenbury, continued its slow advance, and on the morning of the 24th of February it was about 26 m. below Abu Hamed, a point where the Korosko desert route strikes the Nile, 350 m. from Khartum. Here it received orders to retire, and it reached Korti on the 8th of March.

The verbal message received from General Gordon on the 30th of December 1884 rendered the extreme danger of the position at Khartum painfully apparent, and the secretary of state for war, acting on Sir E. Baring’s pe ra

” I have from first endeavoured to impress on government that I am strong enough to relieve Khartum, and believe in being able to send a force, when returning by way of Berber, to Suakin, to open road and crush Osman Digna.”

On this very day the small Desert Column started from Korti on its hazardous mission to the relief of a town fully 276 in. distant, held by a starving garrison, and invested by 30,000 fighting men, mostly armed with good rifles. Before reaching the Nile the Desert Column had lost 300 men and was unable to take Metemma, while its transport had completely broken down. On the 8th of February Lord Wolseley telegraphed, ” The sooner you can now deal with Osman

Digna the better," and recommended the despatch of Indian troops to Suakin, to " co-operate with me in keeping road to Berber open." On the nth of February, the day on which Sir R. Buller most wisely decided to withdraw the Desert Column from a position of extreme danger, it was determined at Korti that the River Column should proceed to attack Berber, and Lord Wolseley accepted the proposal of the government to make a railway from Suakin, telegraphing to Lord Hartington: —

" By all means make railway by contract to Berber, or as far as you can, during summer. It will be invaluable as a means of supply, and I recommend it being begun immediately. Contract to be, if possible, for so much per ton military stores and supplies and men carried, per mile."

Every effort was now concentrated upon sending an expedi- tionary force to Suakin, and before the end of March about 13,000 men, including a brigade from India and a field battery from New South Wales, with nearly 7000 camels and 1000 mules, were there assembled. Lieutenant-General Sir G. Graham was placed in command of this force, with orders to break down the power of Osman Digna and to press the construction of the railway towards Berber. The troops at Suakin, on arrival, were much harassed by small night attacks, which ceased as soon as the scattered camps were drawn together. On the 19th of March Sir G. Graham, with the cavalry brigade and the infantry of the Indian contingent, reconnoitred as far as Hashin, finding the country difficult on account of the dense mimosa scrub. The enemy occupied the hills and fired upon the cavalry. On the 20th Sir G. Graham, with about 9000 men, again advanced to Hashin, and Dehilbat hill was taken by the Berk- tiashla. shire regiment and the Royal Marines. A squadron of the 9th Royal Lancers, which was dismounted in the thick bush, was driven back with the loss of 9 men; but elsewhere the Arabs never succeeded in closing, and the troops returned to Suakin in the afternoon, leaving the East Surrey regiment in a zeriba covering some low hills near Hashin village. The total British loss was 9 killed and 39 wounded.

On the 22nd of March a force, consisting of two British and three Indian battalions, with a naval brigade, a squadron of lancers, two companies of engineers, and a large zeriba. convoy of camels carrying water and supplies, under Major-General Sir J. McNeill, started from Suakin for Tamai, with orders to form a half-way zeriba. The advance was much impeded by the dense bush, and the force halted at Tofrik, about 6 m. out, at 10.30 a.m. A native had brought information that the enemy intended to attack while the zeriba was being formed, and

this actually occurred. The force was caught partly unprepared soon after 2.30 p.m., arid severe fighting took place. The enemy were repulsed in about twenty minutes, the naval brigade, the Berkshire regiment, the Royal Marines, and the 15th Sikhs showing the greatest gallantry. The casualties, including those among non-combatants, were 150 killed, 148 missing, and 174 wounded. More than 500 camels were killed. The tribesmen lost more than 1000 killed. As soon as firing was heard at Suakin, Sir G. Graham, with two battalions of Guards and a battery of horse artillery, started for Tofrik, but returned on being assured that reinforcements were not required. On the 24th and 26th convoys proceeding in square to Tofrik were attacked, the enemy being repulsed without difficulty. On the 2nd of April a force exceeding 7000 men, with 14 guns and 1600 transport animals, started from Suakin

at 4.30 a.m., and bivouacked twelve hours later at Tesela Hill. Next morning an advance was made towards Tamai, and a number of huts in the Khor Ghob were burned. The force then returned to Suakin. The railway was now pushed on without interruption, reaching Otao on the 30th. On the night of the 6th of May a combined movement was made from Suakin and Otao, which resulted in the surprise and break-up of a force of the enemy under Mahommed Sardun, and the capture of a large number of sheep and goats. The moral effect of this operation was marked, and large numbers of tribesmen placed themselves unconditionally at the disposal of Sir G. Graham. A great native movement could now have been organized, which would have kept the route to Berber and enabled the railway to be rapidly pushed forward.

Meanwhile many communications had passed between the war office and Lord Wolseley, who at first believed that Berber could be taken before the summer. In a long despatch of the 6th of March he discussed the general situation, snd and pointed out that although the force at his disposal military ” was amply sufficient ” for raising the siege of Khartum situation and defeating the mahdi, the conditions were changed „pera«oos. by the fall of the town. It was now “impossible . . . to undertake any offensive operations until about the end of the summer,” when twelve additional British battalions, four strong squadrons of British cavalry, and two R.H.A. batteries, together with a large extension of the Wadi Haifa railway, eleven steamers, and three hundred more whale-boats, would be required. He considered it necessary to hold Dongola, and he reported that he was ” distributing this army along the left bank of the Nile, on the open reach of water ” between the Hannek cataract and Abu Dom, opposite Merawi. On the 30th of March Lord Wolseley quitted the army and proceeded to

Cairo. A cloud having arisen on the frontiers of Afghanistan, the withdrawal of the troops from the Sudan was ordered on the nth of May. On the formation of Lord Salisbury's cabinet, the new secretary of state for war, Mr W. H. Smith, inquired whether the retirement could be arrested, but Major-General Sir R. Buller reported that the difficulties of reoccupation would be great, and that if Dongola was to be held, a fresh expedition would be required. On the 22nd of June, before the British rearguard had left Dongola, the mahdi died. The withdrawal of the Suakin force began on the 17th of May, and the friendly tribes, deprived of support, were compelled to make terms with Osman Digna, who was soon able to turn his attention to Kassala, which capitulated in August, nearly at the same time as Sennar.

The failure of the operations in the Sudan had been absolute and complete, and the reason is to be sought in a total miscon- ception of the situation, which caused vacillation and delay, and in the choice of a route by which, having regard to the date of the decision, the relief of General Gordon and Khartum was impossible. (G. S. C.)

Military Operations in Egypt and the Sudan, 1885 to 1896

The operations against Mahdism during the eleven years from the end of the Nile expedition and the withdrawal from the Sudan to the commencement of the Dongola campaign will be more easily understood if, instead of narrating them in one chronological sequence, the operations in each province are considered separately. The mahdi, Mahommed Ahmed, died at Omdurman on the 22nd of June 1885. He was succeeded by the principal khalifa, Abdullah el Taaisha, a Baggara Arab, who for the next thirteen years ruled the Sudan with despotic power. Cruel, vicious, unscrupulous and strong, the country groaned beneath his oppression. He removed all possible rivals, concentrated at Omdurman a strong military force composed of men of his own tribe, and maintained the ascendancy of that tribe over all others. As the British troops retired to Upper Egypt, his followers seized the evacuated country, and the khalifa cherished the idea, already formulated by the mahdi, of the conquest of Egypt, but for some years he was too much

occupied in quelling risings, massacring tne Egyptians in the Sudan,

and fighting Abyssinia, to move ˆseriously in the matter.

Upper Egypt. — Mahommed el Kheir, dervish amir of Dongola, however, advanced towards the fronti'er in the autumn of 1885, and at the end of November came in touch with the frontier field force, a body of some 3000 men composed in nearly equal parts of British and Egyptian troops. A month of harassing skirmishes ensued, during which the Egyptian troops showed their mettle at Mograka, where 200 of them held the fort against a superior number of dervishes, and in combats at Ambigol, Kosha and Firket. Sir Frederick Stephenson, commanding the British army of occupation in Egypt, then con- centrated the frontier field force at Firket, and attacked the main body of the enemy at Ginnis on the 30th of December 1885, completely defeating it and capturing two guns and twenty banners. It was here the new Egyptian army received its baptism of fire and acquitted itself very creditably. Although checked, the dervishes were not discouraged, and continued to press upon the frontier in frequent raids, and thus in many bloody skirmishes the fighting qualities of the Egyptian troops were developed. In April 1886 the frontier was drawn back to Wadi Haifa, a fortified camp at the northern end of the desolate defile, Batn-el-Hagar, through which the Nile tumbles amid black, rocky hills in a succession of rapids, and debouches on a wide plain. The protection of the frontier was now left in the hands of the Egyptian army, a British force remaining at Assuan, 200 m. to the north, as a reserve in case of emergency, and two years later even this precaution was deemed unnecessary.

In October 1886 Wad en Nejumi, the amir who had defeated Hicks Pasha in Kordofan three years before, and led the assault at Khartum when General Gordon was slain in January 1885, replaced Mahommed el Kheir as " commander of the force for the conquest of Egypt," and brought large reinforcements to Dongola. An advanced column under Nur-el-Kanzi occupied Sarras in April 1887, was attacked by the Egyptian force under Colonel H. Chermside on the 28th of that month, and after a stubborn resistance was defeated with great loss. Nur-el-Kanzi was killed and ten standards taken.

The troubles in Darfur and with Abyssinia (q.v.) induced the khalifa to reduce the garrisons of the north; nevertheless, the dervishes reoccupied Sarras, continued active in raids and skir- mishes, and destroyed the railway south of Sarras, which during the Nile expedition of 1884 and 1885 had been carried as far as Akasha. It was not until May 1889 that an invasion of the frontier on a large scale was attempted. At this time the power and prestige of the khalifa were at their height: the rebellions in Darfur and Kordofan had been

stamped out, the anti-mahdi was dead, and even the dervish defeat by the Abyssinians had been converted by the death of King John and the capture of his body into a success. It was therefore an opportune time to try to sweep the Turks and the British into the sea. On the 22nd of June Nejumi was at Sarras with over 6000 fighting men and 8000 followers. On the 2nd of July Colonel J. Wodehouse headed off a part of this force from the river at Argin, and, after a sharp action, completely defeated it, killing 900, among whom were many important amirs, and taking 500 prisoners and 12 banners, with very small loss to his own troops. A British brigade was on its way up stream, but the sirdar, who had already arrived to take the command in person, decided not to wait for it. The Egyptian troops, with a squadron of the 20th Hussars, concentrated at Toski, and thence, on the 3rd of August, General Grenfell, with slight loss, gained a decisive victory. Wad en Nejumi, most of his amirs, and more than 1200 Arabs were killed; 4000 prisoners and 147 standards were taken, and the dervish army practically destroyed. No further serious attempts were made to disturb the frontier, of which the most southerly outpost was at once advanced to Sarras.

The escape from Omdurman of Father Ohrwalder and of two of the captive nuns in December 1891, of Father Rossignoli in October 1894, and of Slatin Bey in February 1895, revealed the condition of the Sudan to the outside world, threw a vivid light

Battle of Toskl.

on the rule of the khalifa, and corroborated information already received of the discontent which existed among the tribes with the oppression and despotism under which they lived.

The Eastern Sudan. — In 1884 Colonel Chermside, governor of the Red Sea littoral, entered into arrangements with King John of Abyssinia for the relief of the beleaguered Egyptian garrisons. Gera, Amadib, Senhit and Gallabat were, in con- sequence, duly succoured, and their garrisons and Egyptian populations brought away to the coast by the Abyssinians in 1885. Unfortunately famine compelled the garrison of Kassala to capitulate on the 30th of July of that year, and Osman Digna hurried there from Tamai to raise a force with which to meet the Abyssinian general, Ras Alula, who was preparing for its relief. By the end of August Osman Digna had occupied Kufit, in the Barea country, with 10,000 men and entrenched himself. On the 23rd of September Ras Alula attacked him there with an equal number of men and routed him with great slaughter. Over 3000 dervishes with their principal amirs, except Osman Digna, lay dead on the field, and

many more were killed in the pursuit. The Abyssinians lost 40 officers and 1500 men killed, besides many more wounded. Instead of marching on to Kassala, Ras Alula, who at this time was much offended by the transfer of Massawa by the Egyptians to Italy, made a triumphant entry into Asmara, and absolutely refused to make any further efforts to extricate Egyptian garrisons from the grip of the khalifa. Meanwhile Osman Digna, who had fled from Kufit to Kassala, wreaked his vengeance upon the unhappy captives at Kassala.

In the neighbourhood of Suakin there were many tribes disaffected to the khalifa's cause, and in the autumn of 1886 Colonel H. Kitchener, who was at the time governor of the Red Sea littoral, judiciously arranged a combination of them to overthrow Osman Digna, with the result that his stronghold at Tamai was captured on the 7th of October, 200 of his men killed, and 50 prisoners, 17 guns and a vast store of rifles and ammuni- tion captured. For about a year there was comparative quiet. Then at the end of 1887 Osman Digna again advanced towards Suakin, but his force at Taroi was routed by the " Friendlies," and he fell back on Handub. Kitchener unsuccessfully endeavoured to capture Osman Digna on the 17th of January 1888, but in the attack was himself severely wounded, and was shortly after invalided. Later in the year Osman Digna collected a large force and besieged Suakin. In December the sirdar arrived with reinforcements from Cairo, and on the 20th sallied out and attacked the dervishes in their trenches at Gemaiza, clearing the whole line and inflicting considerable loss on the enemy, who retired towards Handub, and the country was again fairly quiet for a time. During 1889 and 1890 Tokar became the centre of dervish authority, while Handub continued to be occupied for the khalifa. In January 1891 Osman Digna showed signs of increased activity, and Colonel (afterwards Sir Charles) Holled Smith, then governor of the Red Sea littoral, attacked Handub successfully on the 27th and occupied it, then seized Trinkitat and Teb, and on the 19th of February fought the decisive action of Afafit, occupied Tokar, and drove Osman Digna back to Temrin with a loss of 700 men, including all his chief amirs. This action proved the final blow ^/a«f °' to the dervish power in the neighbourhood of Suakin, for although raiding continued on a small scale, the tribes were growing tired of the khalifa's rule and refused to support Osman Digna.

In the spring of 189 1 an agreement was made between England and Italy by which the Italian forces in Eritrea were at liberty, if they were able, to capture and occupy Kassala, which lay close to the western boundary of their new colony, on condition that they restored it to Egypt at a future day when required to do so. Three years passed before they availed themselves of this agree- ment. In 1893 the

dervishes, 12,000 strong, under Ahmed Ah, invaded Eritrea, and were met on the 29th of December at Agordat by Colonel Arimondi with 2000 men of a native force. Ahmed Ali's force was completely routed and himself killed, and in the following July Colonel Baratieri, with 2500 men, made a fine forced march from Agordat, surprised and captured

Handub.

Kassala on the 17th of that month, and continued to hold it for three years and a half.

The Abyssinian Frontier. — On the Abyssinian frontier Ras Adal was in command of a considerable force of Abyssinians early in 1886, and in June of that year he invaded Gallabat and defeated the dervishes on the plain of Madana; the dervish amir Mahommed Wad Ardal was killed and his camp captured. In the following year the amir Yunis ed Dekeim made two successful raids into Abys- sinian territory, upon which Ras Adal collected an enormous army, said to number 200,000 men, for the invasion of the Sudan. The khalifa sent the amir Hamdan Abu Angar, a very skilful leader, with an army of over 80,000 men against him. Abu Angar entered Abyssinia and, in August 1887, attacked Ras Adal in the plain of Debra Sin and, after a prolonged battle, defeated the Abyssinians, captured their camp, and marched on Gondar, the ancient capital of Abyssinia, which he sacked, and then returned into Gallabat. King John, the negus of Abyssinia, burning to avenge this defeat, marched, in February 1889, with an enormous army to Gallabat, where the amir Zeki Tumal commanded the khalifa's forces, some 60,000 strong, and had strongly fortified the town and the camp. On the 9th of March 1889 the Abyssinians made a terrific onslaught, stormed and burnt the town, and took thousands of prisoners. A small party of dervishes still held a zeriba when King John was struck by a stray bullet. The Abyssinians decided to retire, fighting ceased, and they moved off with their prisoners and the wounded negus. That night the king died, and the greater part of the army having gone ahead with the prisoners, a party of Arabs pursued the rearguard, which consisted of the king's bodyguard, routed them, and captured the king's body, which was sent to Omdurman to confirm the report of a brilliant victory sent by Zeki Tumal to the

khalifa. Internal strife prevented the new negus of Abyssinia from prosecuting the war, which thus, in spite of the Abyssinian success, resulted in the increased prestige of the khalifa. From this time, however, the dervishes ceased to trouble the Abyssinians.

Darfur and Kordojan. — On the outbreak of the mahdi's rebellion Slatin Bey was governor of the province, and when Madibbo, the insurgent sheikh of Rizighat, attacked and occupied Shakka and was following up his success, Slatin twice severely defeated him, and, having concentrated his forces at El Fasher, repulsed the enemy again at Om Shanga. Mahdism, however, spread over Darfur in spite of Slatin's efforts to stay it. He fought no fewer than twenty-seven actions in various parts of his province, but his own troops, in course of time, became infected with the new faith and deserted him. He was obliged to surrender at Dara in December 1883, and was a prisoner, first at Obeid and then at Omdurman, until he escaped in 1895. In January 1884 Zogal, the new dervish amir of the province, attacked El Fasher, where Said Bey Guma and an Egyptian garrison 1000 strong with 10 guns was still holding out, and captured it. He also reduced the Jebel Marra district, where the loyal hill-people gave him some trouble.

After the death of the mahdi in 1885, Madibbo revolted against the khalifa, but was defeated by Karamalla, the dervish amir of the Bahr-el-Ghazal, and was caught and executed. A war then sprang up between Karamalla and Sultan Yusef, who had succeeded Zogal as amir of Darfur. Yusef was joined in 1887 by Sultan Zayid, the black ruler of Jebel Marra, and Karamalla's trusted general, Ketenbur, was defeated with great slaughter at El Towaish on the 29th of June 1887. Osman wad Adam (Ganu), amir of Kordofan, was sent by the khalifa to Karamalla's assistance. He forced back the Darfurians near Dara on the 26th of December, routed Zayid in a second battle, entered El Fasher, and, in 1888, became complete master of the situation,- the two sultans being killed. The Darfurian chiefs then allied themselves with Abu Gemaiza, sheikh of the Masalit Arabs, who had proclaimed himself " Khalifa Osman," and was known as the anti-mahdi. The revolt assumed large proportions, and became the more dangerous to Abdullah, the khalifa, by reason of its religious character, wild rumours spreading over the country and reaching to Egypt and Suakin of the advent to power of an opposition mahdi. Abu Gemaiza attacked a portion of Osman Adam's force, under Abd-el- Kader, at Kebkebia, 30 m. from EI Fasher, and almost annihilated it on the 1 6th of October 1888; and a week later another large force of Osman Adam met with the same fate at the same place. Instead of following up his victories, Abu Gemaiza retired to Dar Tama to augment his army, to

which thousands flocked as the news of his achievements spread far and wide. He again advanced to El Fasher in February 1889, but was seized with smallpox. His army, however, under Fiki Adam, fought a fierce battle close to El Fasher on the 22nd, which resulted in its defeat and dispersion, and Abu Gemaiza himself dying the following day, the movement collapsed.

In 1891 Darfur and Kordofan were again disturbed, and Sultan Abbas succeeded in turning the dervishes out of the Jebel Marra district. Two years later a saint of Sokoto, Abu Naal Muzil el Muhan, collected many followers and for a time threatened the khalifa's power, but the revolt gradually died out.

The Bahr-el-Ghazal. — The first outbreak in favour of Mahdism in the Bahr-el-Ghazal took place at Liffi in August 1882, when the Dinka tribe, under Jango, revolted and was defeated by Lupton Bey with considerable slaughter at Tel Gauna, and again in 1883

near Liffi. In September of that year Lupton's captain, Rufai Aga, was massacred with all his men at Dembo, and Lupton, short of ammunition, was forced to retire to Dem Suliman, where he was completely cut off from Khartum. After gallantly fighting for eighteen months he was compelled by the defection of his troops to surrender on the 21st of April 1884 to Karamalla, the dervish amir of the province. He died at Omdurman in 1888.

In 1890 the Shilluks in the neighbourhood of Fashoda rose against the khalifa, and the dervish amir of Gallabat, Zeki Tumal, was engaged for two years in suppressing the rebellion. He got the upper hand in 1892, and was recalled to oppose an Italian force said to be advancing from Massawa; but on reporting that it was impossible to invade Eritrea, as the khalifa wished him to do, he was summoned to Omdurman and put to death. The country then relapsed into its original barbarous condition, and dervish influence was nominal only. In 1892 the Congo State expedition established posts up to the seventh parallel of north latitude. In 1893 the dervish amir, Abu Mariam, fought with the Dinka tribe and was killed and his force destroyed, the fugitives taking refuge in Shakka. In the following year the Congo expedition established further posts, and in conse- quence the khalifa sent 3000 men, under the amir Khatem Musa, from Shakka to reoccupy the Bahr-el-Ghazal. The Belgians at LifK retired before him, and he entered Faroga. Famine and disease broke out in Khatem Musa's camp in 1895, and a retreat was made towards Kordofan.

Equatoria. — In the Equatorial Province, which extended from the

Albert Nyanza to Lado, Emin Bey, who had a force of 1300 Egyptian troops and 3000 irregulars, distributed among many stations, held out, hoping for reinforcements. In March 1885, however, Amadi fell to the dervishes, and on the 1 8th of April Karamalla arrived near Lado, the capital, and sent to inform Emin of the fall of Khartum. Emin and Captain Casati, an Italian, moved south to Wadelai, giving up the northern posts, and opened friendly relations with Kabarega, king of Unyoro. On the 26th of February 1886 Emin received despatches from Cairo via Zanzibar, from which he learned all that had occurred during the previous three years, and that ” he might take any step he liked, should he decide to leave the country.” He determined to remain where he was and ” hold together, as long as possible, the remnant of the last ten years.” His troops were in a mutinous state, wishing to go north rather than south, as Emin had ordered them to do, and unsuccessfully endeavoured to carry him with them by force.

His communications to Europe through Zanzibar led to the relief expedition under H. M. Stanley, which went to his rescue by way of the Congo in 1887, and after encountering incredible dangers and experiencing innumerable sufferings, met with Emin and Casati at Nsabe, on the Albert Nyanza, on the 29th of April 1888. Stanley went back in May to pick up his belated rearguard, leaving Mounteney Jephson and a small escort to accompany Emin round his province. The southern garrisons decided to go with Emin, but the troops at Lahore mutinied, and a general revolt broke out, headed by Fadl-el-Maula, governor of Fabbo. On arriving at Dufile in August 1888, Emin and Jephson were made prisoners by the Egyptian mutineers. In the meantime the arrival of Stanley at Lake Albert had caused rumours, which quickly spread to Omdurman, of a great invading white pasha, with the result that in July the khalifa sent up the river three steamers and six barges, containing 4000 troops, to oppose this new-comer. In October Omar-Saleh, the Mahdist commander, took Rejaf and sent messengers to Dufile to summon Emin to surrender; but on the 15th of November the mutineers released both Emin and Jephson, who returned to Lake Albert with some 600 refugees, and joined Stanley in February 1889. The expedition arrived at Zanzibar at the end of the year.

Emin’s mutinous troops kept the dervishes at bay between Wadelai and Rejaf, and eventually severely defeated them, driving them back to Rejaf. They did not, however, follow up their victory, and under the leadership of Fadl-el-Maula Bey remained ab,out Wadelai, while the dervishes strengthened their post at Rejaf. In 1893 Fadl-el-Maula Bey and many of his men took service with Baert of the Congo State expedition. The bey was killed fighting the dervishes at Wandi in

January 1894, and the remnant of his men eventually were found by Captain Thruston from Uganda on the 23rd of March 1894 at Mahagi, on the Albert Nyanza, whither they had drifted from Wadelai in search of supplies. They were enlisted by Thruston and brought back under the British flag to Uganda.

In consequence of the Franco-Congolese Treaty of 1 894, Major Cunningham and Lieutenant Vandeleur were sent from Uganda to Dufile, where they planted the British flag on the 15th of January

1895-

Sudan Operations, 1896- 1900 The wonderful progress — political, economical and social — which Egypt had made during British occupation, so ably set forth in Sir Alfred Milner's England in Egypt (published in 1892), together with the revelation in so strong a light of the character of the khalifa's despotism in the Sudan and the miserable con- dition of his misgoverned people, as detailed in the accounts

of their captivity at Omdurman by Father Ohrwalder and Slatin Bey (published in 1892 and 1896), stirred public opinion in Great Britain, and brought the question of the recovery of the Qanfoahm Sudan into prominence. A change of ministry took 1896. place in 1895, and Lord Salisbury's cabinet, which had

consistently assailed the Egyptian policy of the old, was not unwilling to consider whether the flourishing condition of Egyptian finance, the prosperity of the country and the settled state of its affairs, with a capable and proved little army ready to hand, did not warrant an attempt being made to recover gradually the Sudan provinces abandoned by Egypt in 1885 on the advice of Mr Gladstone's government.

Such being the condition of public and official sentiment, the crushing defeat of the Italians by the Abyssinians at the battle of Adowa on the 1st of March 1896, and the critical state of Kassala — held by Italy at British suggestion, and now closely invested by the dervishes — made it not only desirable but necessary to take immediate action.

On the 14th of March 1896 Major-General Sir H. Kitchener, who succeeded Sir Francis Grenfell as sirdar of the Egyptian army in 1892, received orders to reoccupy Akasha, 50 m. south of Sarras, and to carry the railway on from Sarras. Subsequent operations were to depend upon the amount of resistance he encountered. On the 20th of March Akasha was occupied without opposition by an advanced column of Egyptian troops under Major J. Collinson, who formed an entrenched camp there. The reserves of the Egyptian army were called out, and responded with alacrity. The troops were concentrated at Wadi Haifa; the railway reconstruction, under Lieutenant E. P. Girouard, R.E., pushed southward; and a telegraph line followed the advance. At the commencement of the campaign the Egyptian army, including reserves, consisted of 16 battalions of infantry, of which 6 were Sudanese, 10 squadrons of cavalry, 5 batteries of artillery, 3 companies of garrison artillery, and 8 companies of camel corps, and it possessed 13 gunboats for river work. Colonel H. M. L. Rundle was chief of the staff; Major F. R. Wingate was head of the intelligence department, with Slatin Bey as his assistant; and Colonel A. Hunter was in command of Sarras, and south. The 1st battalion of the North Stafford- shire regiment moved up from Cairo to join the Egyptian army.

In the meantime the advance to Akasha had already relieved the pressure at Kassala, Osman Digna having withdrawn a considerable force from the investing army and proceeded with it to Suakin. , To meet Osman Digna's movement Lieutenant- Colonel G. E. Lloyd, the Suakin commandant, advanced to the Taroi Wells, 19 m. south of Suakin, on the 15th of April to co-operate with the " Friendlies," and with Major H. M. Sidney, advancing with a small force from Tokar. His cavalry, under Major M. A. C. B. Fen wick, went out to look for Sidney's force, and were surprised by a large number of dervishes. Fenwick, with some 40 officers and men, seized an isolated hill and held it through the night, repulsing the dervishes, who were the same night driven back with such heavy loss in attacking Lloyd's zeriba that they retired to the hills, and comparative quiet again reigned at Suakin. At the end of May an Indian brigade arrived for garrison duty, and the Egyptian troops were released for service on the Nile.

The dervishes first came in contact with the Egyptian cavalry on the Nile near Akasha, on the 1st of May, and were repulsed. The army concentrated at Akasha early in June, and on the 6th Kitchener moved to the attack of Firket 16 m. away, where the amir Hanuada, with 3000 men, was encamped. The attack was made in two columns: one, under Colonel Hunter, marching along the river-bank, approached Firket from the north; while the other, under Major Burn-Murdoch,

making a detour through the desert, approached it from the south. The co-operation of the two columns was admirably timed, and on the morning of the 7 th the dervish camp was surrounded, and, after a sharp fight, Hamuda and many amirs and about 1000 men were killed, and 500 prisoners taken. The dash and discipline of the Egyptian troops in this victory were a good augury for the future.

By the end of June the railway was advanced beyond Akasha. and headquarters were at Kosha, 10 m. farther south. Cholera and fever were busy both with the North Staffordshire regiment at Gemai, whither they had been moved on its approach, and with the Egyptian troops at the front, and carried off many officers and men. The railway reached Kosha early in August; the cholera disappeared, and stores were collected and arrange- ments steadily made for a farther advance. The North Stafford- shire moved up to the front, and in September the army moved on Kerma, which was found to be evacuated, the dervishes having crossed the river to Hafir. There they were attacked by the gun- boats and Kitchener's artillery from the opposite bank, and forced to retire, with their commander, Wad Bishara, seriously wounded. Dongola was bombarded by the gunboats and captured by the army on the 23rd of September. Bishara and his men retreated, but were pursued by the Egyptians until the retreat became a hopeless rout. Guns, small arms and ammunition, with large stores of grain and dates, were captured, many prisoners taken, while hundreds surrendered voluntarily, among them a brother of the amir Wad en Nejumi. The dervish Dongola army had practically ceased to exist. Debba was seized on the 3rd October, Korti and Merawi occupied soon after, and the principal sheiks came in and submitted to the sirdar. The Dongola campaign was over, and the province recovered to Egypt. The Indian brigade at Suakin returned to India, and was replaced by Egyptians. The North Staffordshire returned to Cairo. The work of consolidation began, and preparations were made for a farther advance when everything should be ready.

The railway up the right bank of the Nile was continued to Kerma, in order to evade the difficulties of the 3rd cataract; but the sirdar had conceived the bold project of cutting off the great angle of the Nile from Wadi Haifa to Abu ™^£%£° Hamed, involving nearly 600 m. of navigation and 1397. including the 4th cataract, by constructing a railway across the Nubian desert, and so bringing his base at Wadi Haifa within a few hours of his force, when it should have advanced to Abu Hamed, instead of ten days. Early in 1897 this new line of railway was commenced from Wadi Haifa across the great Nubian desert 230 m. to Abu Hamed. The first-mentioned line reached Kerma in May, and by July the second had advanced 130 m. into the desert

towards Abu Hamed, when it became necessary, before it was carried farther, to secure that terminus by an advance from Merawi.

In the meantime the khalifa was not idle. He occupied Abu Klea wells and Metemma; recalled the amir Ibrahim Khalil, with 4000 men, from the Ghezira; brought to Omdurman the army of the west under Mahmud — some 10,000 men; entrusted the line of the Atbara— Ed Darner, Adarama, Asubri and El Fasher — to Osman Digna ; constructed defences in the Shabluka gorge; and personally superintended the organization and drill of the forces gathered at Omdurman, and the collection of vast stores of food and supplies of camels for offensive expeditions.

Towards the end of June the chief of the Jaalin tribe, Abdalla wad Said, who occupied Metemma, angered by the khalifa, made his submission to Kitchener and asked for support, at the same time foolishly sending a defiant letter to the khalifa. The sirdar sent him rifles and ammunition across the desert from Korti; but before they arrived, Mahmud ‘s army, sent by the khalifa, swept down on Metemma on the 1st of July and mas- sacred Abdalla wad Said and his garrison.

On the 29th of July, after several reconnaissances, Major- General Hunter, with a flying column, marched up the Nile from near Merawi to Abu Hamed, 133 m. distant, along the edge of the Monassir desert. He arrived on the 7th of August and captured it by storm, the dervishes losing 250 killed and 50 prisoners. By the end of the month the gunboats had sur- mounted the 4th cataract and reached Abu Hamed. Berber was found to be deserted, and occupied by Hunter on the 5th of September, and in the following month a large force was en- trenched there. The khalifa, fearing an attack on Omdurman, moved Osman Digna from Adarama to Shendi. In the 23rd of October Hunter, with a flying column lightly equipped, left

Berber for Adarama, which he burned on the 2nd of November, and after reconnoitring for 40 m. up the Atbara, returned to Berber. The Nile was falling, and Kitchener decided to keep the gunboats above the impassable rapid at Um Tuir, 4 m. north of the confluence of the Atbara with the Nile, where he constructed a fort. The gunboats made

repeated reconnaissances up the river, bombarding Metemma with effect. The railway reached Abu Hamed on the 4th of November, and was pushed rapidly forward along the right bank of the Nile towards Berber.

The forces of the khalifa remaining quiet, the sirdar visited Kassala and negotiated with the Italian General Caneva for its restoration to Egypt. The Italians were anxious to leave it; and on Christmas day 1897 Colonel (afterwards General Sir Charles) Parsons, with an Egyptian force from Suakin, took it formally over, together with a body of Arab irregulars employed by the Italians. These troops were at once despatched to capture the dervish posts at Asabri and El Fasher, which they did with small loss.

On his return from Kassala to Berber the sirdar received information of an intended advance of the khalifa northward. He at once ordered a concentration of Egyptian troops Sudan towards Berber, and telegraphed to Cairo for a British 1898. ‘ brigade. By the end of January the concentration was complete, and the British brigade, under Major- General Gatacre, was at Dakhesh, south of Abu Hamed. Dis- agreement among the khalifa’s generals postponed the dervish advance and gave Kitchener much-needed time. But at the end of February, Mahmud crossed the Nile to Shendi with some 12,000 fighting men, and with Osman Digna advanced along the right bank of the Nile to Aliab, where he struck across the . desert to Nakheila, on the Atbara, intending to turn Kitchener’s left flank at Berber. The sirdar took up a position at Ras el Hudi, on the Atbara. His force consisted of Gatacre’s British brigade (1st Warwicks, Lincolns, Seaforths and Camerons) and Hunter’s Egyptian division (3 brigades under Colonels Maxwell, MacDonald and Lewis respectively), Broadwood’s cavalry, Tudway’s camel corps and Long’s artillery. The dervish army reached Nakheila on the 20th of March, and entrenched them- selves there in a formidable zeriba. After several reconnaissances in which fighting took place with Mahmud’s outposts, it was ascertained from prisoners that their army was short of pro- visions and that great leakage was going on. Kitchener, there- fore, did not hurry. He sent his flotilla up the Nile and captured Shendi, the dervish depot, on the 27th of March. On the 4th of April he advanced to Abadar. A final reconnaissance was made on the 5th. On the following day he bivouacked at Umdabia, where he constructed a strong zeriba, which was garrisoned by an Egyptian battalion, and on the night of the 7th he marched to the attack of Mahmud’s zeriba, which, after an hour’s bombardment on the morning of the 8th of April, was stormed with complete success. Mahmud and several hundred dervishes were captured, 40 amirs and 3000 Arabs killed, and many more wounded; the rest escaped to Gedaref. The sirdar’s casualties were 80 killed and 472 wounded.

Preparations were now made for the attack on the khalifa’s force at Omdurman; and in the meantime the troops were camped in the neighbourhood of Berber, and the railway carried on to the Atbara. At the end of July reinforcements were forwarded from Cairo; and on the 24th of August the following troops were concentrated for the advance at Wad Hamad, above Metemma, on the western bank of the 6th cataract: — British division, under Major-General Gatacre, consisting of 1st Brigade, commanded by Colonel A. G. Wauchope (1st Warwicks, Lincolns, Seaforths and Camerons), and 2nd Brigade, commanded by Colonel the Hon. N. G. Lyttelton (1st Northumberlands

and Grenadier Guards, 2nd Lancashire and Rifle Brigade); Egyptian division, under Major-General Hunter, consisting of four brigades, commanded by Colonels MacDonald, Maxwell, Lewis and Collinson; mounted troops — 21st Lancers, camel corps, and Egyptian cavalry; artillery, under Colonel Long, 2 British batteries, 5 Egyptian batteries, and 20 machine guns; detach- ment of Royal Engineers. The flotilla, under Commander

Keppel, R.N., consisted of 10 gunboats and 5 transport steamers. The total strength was nearly 26,000 men.

While the army moved along the west bank of the river, a force of Arab irregulars or ” Friendlies ” marched along the east bank, under command of Major Stuart-Wortley and Lieutenant Wood, to clear it of the enemy as far as omdur^* the Blue Nile; and on the 1st of September the gun- man , boats bombarded the forts on both sides of the river and breached the great wall of Omdurman. Kitchener met with no opposition; and on the 1st of September the army bivouacked in zeriba at Egeiga, on the west bank of the Nile, within 4 m. of Omdurman. Here, on the morning of the 2nd of September, the khalifa’s army, 40,000 strong, attacked the zeriba, but was repulsed with slaughter. Kitchener then moved out and marched towards Omdurman, when he was again twice fiercely attacked on the right flank and rear, MacDonald’s brigade bearing the brunt. MacDonald distinguished himself by his tactics, and completely repulsed the enemy. The 21st Lancers gallantly charged a body of 2000 dervishes which was unexpectedly met in a khor on the left flank, and drove them westward, the Lancers losing a fifth of their number in killed and wounded. The khalifa was now in full retreat, and the sirdar, sending his cavalry in pursuit, marched into Omdurman. The dervish loss was over 10,000 killed, as many wounded, and 5000 prisoners. The khalifa’s black flag was captured and sent home to Queen Victoria. The British and Egyptian casualties together were under 500. The European prisoners of the khalifa found in Omdurman — Charles Neufeld, Joseph Ragnotti, Sister Teresa Grigolini, and some 30 Greeks — were released; and on Sunday the 4th of September the sirdar, with representatives from every regiment, crossed the river to Khartum, where the British and Egyptian flags were hoisted, and a short service held in memory of General Gordon, near the place where he met his death.

The results of the battle of Omdurman were the practical destruction of the khalifa’s army, the extinction of Mahdism in the Sudan, and the

recovery of nearly all the country formerly under Egyptian authority.

The khalifa fled with a small force to Obeid in Kordofan. The British troops were quickly sent down stream to Cairo, and the sirdar, shortly afterwards created Lord Kitchener of Khartum, was free to turn his attention to the reduction of the country to some sort of order.

He had first, however, to deal with a somewhat serious matter — the arrival of a French expedition at Fashoda, on the White Nile, some 600 m. above Khartum. He started for the captain south on the 10th of September, with 5 gunboats and Marchand a small force, dispersed a body of 700 dervishes at ** Reng on the 15th, and four days later arrived at Fashoda, to find the French Captain Marchand, with 1 20 Sene- galese soldiers, entrenched there and the French flag flying. He arranged with Marchand to leave the political question to be settled by diplomacy, and contented himself with hoisting the British and Egyptian flags to the south of the French flag, and leaving a gunboat and a Sudanese battalion to guard them. He then steamed up the river and established a post at Sobat; and after sending a gunboat up the Bahr-el-Ghazal to establish another post at Meshra-er-Rek, he returned to Omdurman. The French expedition had experienced great difficulties in the swampy region of the Bahr-el-Ghazal, and had reached Fashoda on the 10th of July. It had been attacked by a dervish force on the 25th of August, and was expecting another attack when Kitchener arrived and probably saved it from destruction. The Fashoda incident was the subject of important diplomatic negotiations, which at one time approached an acute phase; but ultimately the French position was found to be untenable, and on the nth of December Marchand and his men returned to France by the Sobat, Abyssinia and Jibuti. In the following March the spheres of interest of Great Britain and France in the Nile basin were defined by a declaration making an addition to Article IV, of the Niger convention of the previous year.

During the sirdar's absence from Omdurman Colonel Hunter commanded an expedition up the Blue Nile, and by the end of

Fashoda.

September had occupied and garrisoned Wad Medani, Sennar, Karkoj and Roseires. In the meantime Colonel Parsons marched with 1400

men from Kassala on the 7th of September, to capture Gedaref . He encountered 4000 dervishes under the amir Saadalla outside the town, and after a desperate fight, in which he lost 50 killed and 80 wounded, defeated them and occupied the town on the 22nd. The dervishes left 500 dead on the field, among whom were four amirs. Having strongly entrenched himself, Parsons beat off, with heavy loss to the dervishes, two impetuous attacks made on the 28th by Ahmed Fedil. But the garrison of Gedaref suffered from severe sickness, and Colonel Collinson was sent to their aid with reinforcements from Omdur- man. He steamed up the Blue Nile and the Rahad river to Ain-el-Owega, whence he struck across the desert, reaching Gedaref on the 21st of October, to find that Ahmed Fedil had gone south with his force of 5000 men towards Roseires. Colonel Lewis, who was at Karkoj with a small force, moved to Roseires, where he received reinforcements from Omdurman, and on the 26th of December caught Ahmed Fedil's force as it was crossing the Blue Nile at Dakheila, and after a very severe fight cut it up. The dervish loss was 500 killed, while the Egyptians had 24 killed and 118 wounded. Two thousand five hundred fighting men surrendered later, and the rest escaped with Ahmed Fedil to join the khalifa in Kordofan.

On the 25th of January 1899 Colonel Walter Kitchener was despatched by his brother, in command of a flying column of Operations 200 ° Egyptian troops and 1 700 Friendlies, which had in the been concentrated at Faki Kohi, on the White Nile, Sudan, some 200 m. above Khartum, to reconnoitre the m9m khalifa's camp at Sherkela, 130 m. west of the river,

in the heart of the Baggara country in Kordofan, and if possible to capture it. The position was found to be a strong one, occupied by over 6000 men; and as it was not considered prudent to attack it with an inferior force at such a distance from the river base, the flying column returned. No further attempt was made to interfere with the khalifa in his far-off retreat until towards the end of the year, when, good order having been generally established throughout the rest of the Sudan, it was decided to extend it to Kordofan.

In the autumn of 1899 the khalifa was at Jebel Gedir, a hill in southern Kordofan, about 80 m. from the White Nile, and was contemplating an advance. Lord Kitchener concentrated 8000 men at Kaka, on the river, 380 m. south of Khartum, and moved inland on the 20th of October. On arriving at Fongor it was ascertained that the khalifa had gone north, and the cavalry and camel corps having reconnoitred Jebel Gedir, the ex- pedition returned. On the 13th November the amir Ahmed Fedil debouched on the river at El Alub,

but retired on finding Colonel Lewis with a force in gunboats. Troops and transport were then concentrated at Faki Kohi, and Colonel Wingate sent with reinforcements from Khartum to take command of the expedition and march to Gedid, where it was anticipated the khalifa would be obliged to halt. A flying column, comprising a squadron of cavalry, a field battery, 6 machine guns, 6 companies of the camel corps, and a brigade of infantry and details, in all 3700 men, under Wingate, left Faki Kohi on the 21st of November. The very next day he encountered Ahmed Fedil at Abu Aadel, drove him from his position with great loss, and captured his camp and a large supply of grain he was convoying to the khalifa. Gedid was reached on the 23rd, and the khalifa was ascertained to be at Om Debreikat. Wingate marched at midnight of the 24th, and was resting his troops on high ground in front of the khalifa's position, when at daybreak of the 25th his picquets were driven in and the dervishes attacked. They were repulsed with great slaughter, and Wingate ffte "" ° f advancing, carried the camp. The khalifa Abdullah khalifa. e l Taaisha, unable to rally his men, gathered many of his principal amirs around him, among whom were his sons and brothers, Ali Wad Helu, Ahmed Fedil, and other well-known leaders, and they met their death unflinchingly from the bullets of the advancing Sudanese infantry. Three thousand men and 29 amirs of importance, including Sheik-ed-

din, the khalifa's eldest son and intended successor, surrendered. The dervish loss in the two actions was estimated at 1000 killed and wounded, while the Egyptian casualties were only 4 killed and 29 wounded. Thus ended the power of the khalifa and of Mahdism.

On the 19th of January 1900 Osman Digna, who had been so great a supporter of Mahdism in the Eastern Sudan, and had always shown great discretion in securing the safety of his own person, was surrounded and captured at Jebel Warriba, as he was wandering a fugitive among the hills beyond Tokar.

The reconquest of Dongola and the Sudan provinces during the three years from March 1896 to December 1898, considering the enormous extent and difficulties of the country, was achieved at an unprecedentedly small cost, while the main item of expenditure — the railway — remains a permanent benefit to the country. The figures are : —

Railways £E. 1,181,372

Telegraphs …… 21,825

Gunboats …... 154,934

Military …... 996,223

Total . . £E.2 ,354,354

Towards this expense the British government gave a grant-in-aid of £800,000, and the balance was borne by the Egyptian treasury. The railway, delayed by the construction of the big bridge over the Atbara, was opened to the Blue Nile opposite Khartum, 187 m. from the Atbara, at the end of 1899. (R. H. V.)

EHRENBERG, CHRISTIAN GOTTFRIED (1795-1876), German naturalist, was born at Delitzsch in Saxony on the 19th of April 1795. After studying at Leipzig and Berlin, where he took the degree of doctor of medicine in 1818, he was appointed professor of medicine in the university of Berlin (1827). Mean- while in 1820 he was engaged in a scientific exploration conducted by General von Minutoli in Egypt. They investigated parts of the Libyan desert, the Nile valley and the northern coasts of the Red Sea, where Ehrenberg made a special study of the corals. Subsequently parts of Syria, Arabia and Abyssinia were ex- amined. Some results of these travels and of the important collections that had been made were reported on by Humboldt in 1826; and afterwards Ehrenberg was enabled to bring out two volumes Symbclae physicae (1828-1834), in which many particulars of the mammals, birds, insects, &c, were made public. Other observations were communicated to scientific societies. In 1829 he accompanied Humboldt through eastern Russia to the Chinese frontier. On his return he gave his attention to micro- scopical researches. These had an important bearing on some of the infusorial earths used for polishing and other economic purposes; they added, moreover, largely to our knowledge of the microscopic organisms of certain geological formations, especially of the chalk, and of the modern marine and freshwater accumulations. Until Ehrenberg took up the study it was not known that considerable masses of rock were composed of minute forms of animals or plants. He demonstrated also that the phosphorescence of the sea was due to organisms. He continued until late in life to investigate the microscopic organ- isms of the deep sea and of various geological formations. He died in Berlin on the 27th of June 1876.

Publications. — Die Infusionsthierchen ah vollkommene Organis- men (2 vols, fol., Leipzig, 1838) ; Mikrogeologie (2 vols, fol., Leipzig, 1854); and ” Fortsetzung der mikrogeologischen Studien,” in Abhandl. der k. Akad. der Wissenschaft (Berlin, 1875).

EHRENBREITSTEIN, a town of Germany, in the Prussian Rhine province, on the right bank of the Rhine, facing Coblenz, with which it is connected by a railway bridge and a bridge of boats, on the main line of railway Frankfort-on-Main-Cologne. Pop. (including the garrison) 5300. It has an Evangelical and two Roman Catholic churches, a Capuchin monastery, tanneries, soap-works and a considerable trade in wine. Above the town, facing the mouth of the Mosel, on a rock 400 ft. high, lies the magnificent fortress of Ehrenbreitstein, considered practically impregnable. The sides towards the Rhine and the south and south-east are precipitous, and on the south side, on which is the winding approach, strongly defended. The central fort or citadel is flanked by a double line of works with three tiers of casemate batteries. The works towards the north and north-east

end in a separate outlying fort. The whole forms a part of the system of “fortifications which surround Coblenz.

The site of the castle is said to have been occupied by a Roman fort built in the time of the emperor Julian. In the nth century the castle was held by a noble named Erembert, from whom it is said to have derived its name. In the 12th century it came into the possession of Archbishop Hillin (de Fallemagne) of Trier, who strengthened the defences in 1153. These were again extended by ; Archbishop Henry II. (de Fenetrange) in 1286, and by Archbishop John II. of Baden in 1481. In 1631 it was surrendered by the archbishop elector Philip Christopher von Soetern to the French, but was recovered by the Imperialists in 1637 and given to the archbishop elector of Cologne. It was restored to the elector of Trier in 1650, but was not strongly fortified until 1672. In 1688 the French bombarded it in vain, but in 1759 they took it and held it till 1762. It was again blockaded in 1795, 1796 and 1797, in vain; but in 1799 they starved it into surrender, and at the peace of Luneville in 1801 blew it up before evacuating it. At the second peace of Paris the French paid 15,000,000 francs to the Prussian government for its restoration, and from 1816 to 1826 the fortress was reconstructed by General E. L. Aster (1778-1855).

EHUD, in the Bible, a ” judge ” who delivered Israel from the Moabites (Judg. iii. 12-30). He was sent from Ephraim to bear tribute to Eglon king of Moab, who had crossed over the Jordan and seized the district

around Jericho. Being, like the Benjamites, left-handed (cf. xx. 16), he was able to conceal a dagger and strike down the king before his intentions were sus- pected. He locked Eglon in his chamber and escaped. The men from Mt Ephraim collected under his leadership and by seizing the fords of the Jordan were able to cut off the Moabites. He is called the son of Gera a Benjamite, but since both Ehud and Gera are tribal names (2 Sam. xvi. 5, 1 Chron. viii. 3, 5 sq.) it has been thought that this notice is not genuine. The tribe of Benjamin rarely appears in the old history of the Hebrews before the time of Saul. See further Benjamin; Judges.

EIBENSTOCK, a town of Germany, in the kingdom of Saxony, near the Mulde, on the borders of Bohemia, 17 m. by rail S.S.E. of Zwickau. Pop. (1905) 7460. It is a principal seat of the tambour embroidery which was introduced in 1775 by Clara Angermann. It possesses chemical and tobacco manufactories, and tin and iron works. It has also a large cattle market. Eiben- stock, together with Schwarzenberg, was acquired by purchase in 1533 by Saxony and was granted municipal rights in the following year.

EICHBERG, JULIUS (1824-1893), German musical composer, was born at Diisseldorf on the 13th of June 1824. When he was nineteen he entered the Brussels Conservatoire, where he took first prizes for violin-playing and composition. For eleven years he occupied the post of professor in the Conservatoire of Geneva. In 1857 he went to the United States, staying two years in New York and then proceeding to Boston, where he became director of the orchestra at the Boston Museum. In 1867 he founded the Boston Conservatory of Music. Eichberg published several educational works on music; and his four operettas, The Doctor of Alcantara, The Rose of Tyrol, The Two Cadis and A Night in Rome, were highly popular. He died in Boston on the 18th of January 1893.

EICHENDORFF, JOSEPH, FREIHERR VON (1788-1857), German poet and romance-writer, was born at Lubowitz, near Ratibor, in Silesia, on the 10th of March 1788. He studied law at Halle and Heidelberg from 1805 to 1808. After a visit to Paris he went to Vienna, where he resided until 1813, when he joined the Prussian army as a volunteer in the famous Lutzow corps. When peace was concluded in 181 5, he left the army, and in the following year he was appointed to a judicial office at Breslau. He subsequently held similar offices at Danzig, Konigsberg and Berlin. Retiring from public service in 1844, he lived successively in Danzig, Vienna, Dresden and Berlin. He died at Neisse on the 26th of November 1857. Eichendorff was one of the most distinguished of the later members of the German romantic school. His

genius was essentially lyrical.

Thus he is most successful in his shorter romances and dramas, where constructive power is least called for. His first work, written in 18 n, was a romance, A hnung und Gegemvart (18 15). This was followed at short intervals by several others, among which the foremost place is by general consent assigned to Aus dem Leben eines Taugenichts (1826), which has often been reˆ printed. Of his dramas may be mentioned Ezzelin von Romano (i828);and Der letzte Held von Marienburg (1830), both tragedies; and a comedy, Die Freier (1833). He also translated several of Calderon's religious dramas (Geislliche Schauspiele, 1846). It is, however, through his lyrics (Gedichte, first collected 1837) that Eichendorff is best known; he is the greatest lyric poet of the romantic movement. No one has given more beautiful expression than he to the poetry of a wandering life; often, again, his lyrics are exquisite word pictures interpreting the mystic meaning of the moods of nature, as in Nachts, or the old-time mystery which yet haunts the twilight forests and feudal castles of Germany, as in the dramatic lyric Waldesgesprdch or Auf einer Burg. Their language is simple and musical, which makes them very suitable for singing, and they have been often set, notably by Schubert and Schumann.

In the later years of his life Eichendorff published several works on subjects in literary history and criticism such as Uber die ethische und religiose Bedeutung der neuen romantischen Poesie in Deutschland (1847), Der deutsche Roman des 18. Jahrhunderts in seinem Verhdltniss zum Christenthum (185 1), and Geschichte der poetischen Litteratur Deutschlands (1856), but the value of these works is impaired by the author's re- actionary standpoint. An edition of his collected works in six volumes, appeared at Leipzig in 1870.

Eichendorff 's Sdmtliche Werke appeared in 6 vols., 1864 (reprinted 1869-1870); his Sdmtliche poetische Werke in 4 vols. (1883). The latest edition is that edited by R. von Gottschall in 4 vols. (1901). A good selection edited by M. Koch will be found in vol. 145 of Kiirschner's Deutsche Nationalliteratur (1893). Eichendorff 's critical writings were collected in 1866 under the title Vermischte Schriften (5 vols.). Cp. H. von Eichendorff 's biographical introduction to the Sdmtliche Werke; also H. Keiter, Joseph von Eichendorff (Cologne, 1887); H. A. Kriiger, Der junge Eichendorff (Oppeln, 1898).

EICHHORN, JOHANN GOTTFRIED (1752-1827), German theologian, was born at Dorrenzimmern, in the principality of Hohenlohe-Oehringen, on the 16th of October 1752. He was educated at the state school in Weikersheim, where his father was superintendent, at the

gymnasium at Heilbronn and at the university of Gottingen (1770-1774), studying under J. D. Michaelis. In 1 774 he received the rectorship of the gymnasium at Ohrdruf, in the duchy of Gotha, and in the following year was made professor of Oriental languages at Jena. On the death of Michaelis in 1788 he was elected professor ordinarius at Gottingen, where he lectured not only on Oriental languages and on the exegesis of the Old and New Testaments, but also on politi- cal history. His health was shattered in 1825, but he continuer" his lectures until attacked by fever on the 14th of June 1827. He died on the 27th of that month. Eichhorn has been called " the founder of modern Old Testament criticism." He first properly recognized its scope and problems, and began many of its most important discussions. " My greatest trouble," he says in the preface to the second edition of his Einleitung, " I had to bestow on a hitherto unworked field — on the investigation of the inner nature of the Old Testament with the help of the Higher Criticism (not a new name to any humanist)." His investigations led him to the conclusion that " most of the writings of the Hebrews have passed through several hands." He took for granted that all the so-called supernatural facts relating to the Old and New Testaments were explicable on natural principles. He sought to judge them from the standpoint of the ancient world, and to account for them by the superstitious beliefs which were then generally in vogue. He did not perceive in the biblical books any religious ideas of much importance for modern times; they interested him merely historically and for the light they cast upon antiquity. He regarded many books of the Old Testament as spurious, questioned the genuineness of 2 Peter and Jude, denied the Pauline authorship of Timothy and Titus,

and suggested that the canonical gospels were based upon various translations and editions of a primary Aramaic gospel. He did not appreciate as sufficiently as David Strauss and the Tubingen critics the difficulties which a natural theory has to surmount, nor did he support his conclusions by such elaborate discussions as they deemed necessary.

His principal works were — Geschichte des Ostindischen Handels vor Mohammed (Gotha, 1775); Allgemeine Bibliothek der biblischen Literatur (10 vols., Leipzig, 1787-1801) ; Einleitung in das Alte Testa- ment (3 vols., Leipzig, 1780-1783) ; Einleitung in das Neue Testament (1804-1812); Einleitung in die apokryphischen Biicher des Alten Testaments (Gott., 1795); Gommentarius in apocalypsin Joannis (2 vols., Gott., 1 791); Die Hebr. Propheten (3 vols., Gott., 18 16- 18 19);

Allgemeine Geschichte der Cultur und Literatur des neuern Europa (2 vols., Gott., 1796-1799); Liter dr geschichte (1st vol., Gott., 1799, 2nd ed. 1813, 2nd vol. 1814); Geschichte der Literatur von ihrem Anfange bis auf die neuesten Zeiten (5 vols., Gott., 1805-1812) ; tfbersicht der Franzbsischen Revolution (2 vols., Gott., 1797); Welt- geschichte (3rd ed., 5 vols., Gott., 1819-1820); Geschichte der drei letzten Jahrhunderle (3rd ed., 6 vols., Hanover, 1817-1818); Ur- geschichte des erlauchten Hauses der Welfen (Hanover, 1817).

See R. W. Mackay, The Tubingen School and its Antecedents (1863), pp. 103 ff. ; Otto Pfleiderer, Development of Theology (1890), p. 209; T. K. Cheyne, Founders of Old Testament Criticism (1893), pp. 138".

EICHHORN, KARL FRIEDRICH (1781-1854), German jurist, son of the preceding, was born at Jena on the 20th of November 1781. He entered the university of Gottingen in 1797. In 1803 he obtained the professorship of law at Frankfort-on-Oder, holding it till 1811, when he accepted the same chair at Berlin. On the call to arms in 1813 he became a captain of horse, and received at the end of the war the decoration of the Iron Cross. In 18 1 7 he was offered the chair of law at Gottingen, and, pre- ferring it to the Berlin professorship, taught there with great success till ill-health compelled him to resign in 1828. His successorin the Berlin chair having diedin 1832, he again entered on its duties, but resigned two years afterwards. In 1832 he also received an appointment in the ministry of foreign affairs, which, with his labours on many state committees and his legal re- searches and writings, occupied him till his death at Cologne on the 4th of July 1854. Eichhorn is regarded as one of the principal authorities on German constitutional law. His chief work is Deutsche Staats- und Rechts geschichte (Gottingen, 1808- 1823, 5th ed. 1843-1844). In company with Savigny and J. F. L. Goschen he founded the Zeitschrijt fur geschicktliche Rechtswissenschaft. He was the author besides of Einleitung in das deutsche Privatrecht mil Einschluss des Lehnrechts (Gott., 1823) and the Grundsdtze des Kirchenrechts der Katholischen und der Evangelischen Religionsparteiin Deutschland, 2 Bde. (ib., 1831-

1833)-

See Schulte, Karl Friedrich Eichhorn, sein Leben und Wirken

(1884).

EICHSTATT, a town and episcopal see of Germany, in the kingdom of Bavaria, in the deep and romantic valley of the Altmuhl, 35 m. S. of

Nuremberg, on the railway to Ingolstadt and Munich. Pop. (1905) 7701. The town, with its numerous spires and remains of medieval fortifications, is very picturesque. It has an Evangelical and seven Roman Catholic churches, among the latter the cathedral of St Wilibald (first bishop of Eichstatt), — with the tomb of the saint and numerous pictures and relics, — the church of St Walpurgis, sister of Wilibald, whose remains rest in the choir, and the Capuchin church, a copy of the Holy Sepulchre. Of its secular buildings the most noticeable are the town hall and the Leuchtenberg palace, once the residence of the prince bishops and later of the dukes of Leuchtenberg (now occupied by the court of justice of the district) , with beautiful grounds. The Wilibaldsburg, built on a neighbouring hill in the 14th century by Bishop Bertold of Hohenzollern, was long the residence of the prince bishops of Eichstatt, and now contains an historical museum. There are an episcopal lyceum, a clerical seminary, a classical and a modern school, and numerous religious houses. The industries of the town include bootmaking, brewing and the production of lithographic stones.

Eichstatt (Lat. Aureatum or Rubilocus) was originally a Roman station which, after the foundation of the bishopric by Boniface in 74S, developed into a considerable town, which was surrounded

with walls in 908. The bishops of Eichstatt were princes of the Empire, subject to the spiritual jurisdiction of th'e archbishops of Mainz, and ruled over considerable territories in the Circle of Franconia. In 1802 the see was secularized and incorporated in Bavaria. In 181 7 it was given, with the duchy of Leuchten- berg, as a mediatized domain under the Bavarian crown, by the king of Bavaria to his son-in-law Eugene de Beauharnais, ex-viceroy of Italy, henceforth styled duke of Leuchtenberg. In 1855 it reverted to the Bavarian crown.

EICHWALD, KARL EDUARD VON (1795-1876), Russian geologist and physician, was born at Mitau in Courland on the 4th of July 1795. He became doctor of medicine and professor of zoology in Kazan in 1823 ; four years later professor of zoology and comparative anatomy at Vilna; in 1838 professor of zoology, mineralogy and medicine at St Petersburg; and finally professor of palaeontology in the institute of mines in that city. He travelled much in the Russian empire, and was a keen observer of its natural history and geology. He died at St Petersburg on the 10th of November 1876. His published works include Reise auf dent Caspischen Meere und in den Caucasus, 2 vols. (Stuttgart and Tubingen, 1834-1838); Die Urwelt Russ- lands (St

Petersburg, 1840-1845); Lethaea Rossica, ou paUonto- logie de la Russie, 3 vols. (Stuttgart, 1852-1868), with Atlases.

EIDER, a river of Prussia, in the province of Schleswig- Holstein. It rises to the south of Kiel, in Lake Redder, flows first north, then west (with wide-sweeping curves), and after a cou rse of 1 1 7 m. enters the North Sea at Tonning. It is navigable up to Rendsburg, and is embanked through the marshes across which it runs in its lower course. Since the reign of Charlemagne, the Eider (originally Agyr Dor — Neptune's gate) was known as Romani terminus imperii and was recognized as the boundary of the Empire in 1027 by the emperor Conrad II., the founder of the Salian dynasty. In the controversy arising out of the Schleswig-Holstein Question, which culminated in the war of Austria and Prussia against Denmark in 1864, the Eider gave its name to the "Eider Danes," the intransigeant Danish party which maintained that Schleswig (Sdnderjylland, South Jutland) was by nature and historical tradition an integral part of Den- mark. The Eider Canal (Eider-Kanal) , which was constructed between 1777 and 1784, leaves the Eider at the point where the river turns to the west and enters the Bay of Kiel at Holtenau. It was hampered by six sluices, but was used annually by some 4000 vessels, and until its conversion in 1887-1895 into the Kaiser Wilhelm Canal afforded the only direct connexion between the North Sea and the Baltic.

EIDER (Icelandic, jEdur), a large marine duck, the Somateria mollissima of ornithologists, famous for its down, which, from its extreme lightness and elasticity, is in great request for filling bed-coverlets. This bird generally frequents low rocky islets near the coast, and in Iceland and Norway has long been afforded every encouragement and protection, a fine being inflicted for killing it during the breeding-season, or even for firing a gun near its haunts, while artificial nesting-places are in many localities contrived for its further accommodation. From the care thus taken of it in those countries it has become exceedingly tame at its chief resorts, which are strictly regarded as property, and the taking of eggs or down from them, except by authorized persons, is severely punished by law. In appearance the eider is some- what clumsy, though it flies fast and dives admirably. The female is of a dark reddish-brown colour barred with brownish- black. The adult male in spring is conspicuous by his pied plumage of velvet-black beneath, and white above: a patch of shining sea-green on his head is only seen on close inspection. This plumage he is considered not to acquire until his third year, being when young almost exactly like the female, and it is certain that the birds which have not attained their full dress remain in flocks by themselves without going to the breeding-stations. The nest is

generally in some convenient corner among large stones, hollowed in the soil, and furnished with a few bits of dry grass, seaweed or heather. By the time that the full number of eggs (which rarely if ever exceeds five) is laid the down is added. Generally the eggs and down are

taken at intervals of a few days by the owners of the ” eider- fold,” and the birds are thus kept depositing both during the whole season; but some experience is needed to ensure the greatest profit from each commodity. Every duck is ultimately allowed to hatch an egg or two to keep up the stock, and the down of the last nest is gathered after the birds have left the spot. The story of the drake’s furnishing down, after the duck’s supply is exhausted is a fiction. He never goes near the nest. The eggs have a strong flavour, but are much relished by both Icelanders and Norwegians. In the Old World the eider breeds in suitable localities from Spitsbergen to the Fame Islands off the coast of Northumberland — where it is known as St Cuthbert’s duck. Its food consists of marine animals (molluscs and crus- taceans), and hence the young are not easily reared in captivity. The eider of the New World differs somewhat, and has been described as a distinct species (S. dresseri). Though much diminished in numbers by persecution, it is still abundant on the coast of Newfoundland and thence northward. In Greenland also eiders are very plentiful, and it is supposed that three-fourths of the supply of down sent to Copenhagen comes from that country. The limits of the eider’s northern range are not known, but the Arctic expedition of 1875 did not meet with it after leaving the Danish settlements, and its place was taken by an allied species, the king-duck (S. spectabilis) , a very beautiful bird which sometimes appears on the British coast. The female greatly resembles that of the eider, but the male has a black chevron on his chin and a bright orange prominence on his forehead, which last seems to have given the species its English name. On the west coast of North America the eider is repre- sented by a species (S. v-nigrum) with a like chevron, but other- wise resembling the Atlantic bird. In the same waters two other fine species are also found (S. fischeri and S. stelleri), one of which (the latter) also inhabits the Arctic coast of Russia and East Finmark and has twice reached England. The Labra- dor duck (S. labradoria), now extinct, also belongs to this group. (A. N.)

EIFEL, a district of Germany, in the Prussian Rhine Province, between the Rhine, the Moselle and the frontier of the grand duchy of

Luxemburg. It is a hilly region, most elevated in the eastern part (Hohe Eifel), where there are several points from 2000 up to 2410 ft. above sea-level. In the west is the Schneifels or Schnee-Eifel ; and the southern part, where the most pictur- esque scenery and chief geological interest is found, is called the Vorder Eifel.

The Eifel is an ancient massif of folded Devonian rocks upon the margins of which, near Hillesheim and towards Bitburg and Trier, rest unconformably the nearly undisturbed sandstones, marls and limestones of the Trias. On the southern border, at Wittlich, the terrestrial deposits of the Permian Rothliegende are also met with. The slates and sandstones of the Lower Devonian form by far the greater part of the region; but folded amongst these, in a series of troughs running from south-west to north-east lie the fossiliferous limestones of the Middle Devonian, and occasionally, as for example near Biidesheim, a few small patches of the Upper Devonian. Upon the ancient floor of folded Devonian strata stand numerous small volcanic cones, many of which, though long extinct, are still very perfect in form. The precise age of the eruptions is uncertain. The only sign of any remaining volcanic activity is the emission in many places of carbon dioxide and of heated waters. There is no historic or legendary record of any eruption, but nevertheless the eruptions must have continued to a very recent geological period. The lavas of Papenkaule are clearly posterior to the excavation of the valley of the Kyll, and an outflow of basalt has forced the Uess to seek a new course. The volcanic rocks occur both as tuffs and as lava-flows. They are chiefly leucite and nepheline rocks, such as leucitite, leucitophyre and nephelinite, but basalt and trachyte also occur. The leucite lavas of Niedermendig con- tain hattyne in abundance. The most extensive and continuous area of volcanic rocks is that surrounding the Laacher See and extending eastwards to Neuwied and Coblenz and even beyond the Rhine.

The numerous so-called crater-lakes or maare of the Eifel present several features of interest. They do not, as a rule, lie in true craters at the summit of volcanic cones, but rather in hollows which have been formed by explosions. The most remarkable group is that of Daun, where the three depressions of Gemiind, Weinfeld and Schalkenmehren have been hollowed out in the Lower Devonian strata. The first of these shows no sign of either lavas or scoriae, but volcanic rocks occur on the margins of the other two. The two largest lakes in the Eifel region, however, are the Laacher See in the hills west of Ander- nach on the Rhine, and the Pulvermaar S.E. of the Daun group, with its shores of peculiar volcanic sand, which also appears in its waters as a black powder (pulver).

EIFFEL TOWER. Erected for the exposition of 1889, the Eiffel Tower, in the Champ de Mars, Paris, is by far the highest artificial structure in the world, and its height of 300 metres (984 ft.) surpasses that of the obelisk at Washington by 429 ft., and that of St Paul's cathedral by 580 ft. Its framework is composed essentially of four uprights, which rise from the corners of a square measuring 100 metres on the side; thus the area it covers at its base is nearly 2§ acres. These uprights are supported on huge piers of masonry and concrete, the foundations for which were carried down, by the aid of iron caissons and compressed air, to a depth of about 15 metres on the side next the Seine, and about 9 metres on the other side. At first they curve upwards at an angle of 54 ; then they gradually become straighter, until they unite in a single shaft rather more than half-way up. The first platform, at a height of 57 metres, has an area of 5860 sq. yds., and is reached either by staircases or lifts. The next, accessible by lifts only, is 115 metres up, and has an area of 32 sq. yds; while the third, at 276, supports a pavilion capable of holding 800 persons. Nearly 25 metres higher up still is the lantern, with a gallery 5 metres in diameter- The work of building this structure, which is mainly composed of iron lattice-work, was begun on the 28th of January 1887, and the full height was reached on the 13th of March 1889. Besides being one of the sights of Paris, to which visitors resort in order to enjoy the extensive view that can be had from its higher galleries on a clear day, the tower is used to some extent for scientific and semi-scientific purposes; thus meteorological observations are carried on. The engineer under whose direction the tower was constructed was Alexandre Gustave Eiffel (born at Dijon on the 15th of December 1832), who had already had a wide experience in the construction of large metal bridges, and who designed the huge sluices for the Panama Canal, when it was under the French company.

EILDON HILLS, a group of three conical hills, of volcanic origin, in Roxburghshire, Scotland, r m. S. by E. of Melrose, about equidistant from Melrose and St Boswells stations on the North British railway. They were once known as Eldune — the Eldunum of Simeon of Durham (fl. 1 130)' — probably derived from the Gaelic aill, " rock," and dun, " hill "; but the name is also said to be a corruption of the Cymric moeldun, " bald hill." The northern peak is 1327 ft. high, the central 1385 ft. and the southern 1216 ft. Whether or not the Roman station of Tri- montium was situated here is matter of controversy. According to General William Roy (1726-1790) Trimontium — so called, according to this theory, from the triple Eildon heights — was Old Melrose; other authorities incline to place the station on the northern shore of the Solway Firth. The Eildons have been the subject

of much legendary lore. Michael Scot (1175-1234), acting as a confederate of the Evil One (so the fable runs) cleft Eildon Hill, then a single cone, into the three existing peaks. Another legend states that Arthur and his knights sleep in a vault beneath the Eildons. A third legend centres in Thomas of Erceldoune. The Eildon Tree Stone, a large moss-covered boulder, lying on the high road as it bends towards the west within 2 m. of Melrose, marks the spot where the Fairy Queen led him into her realms in the heart of the hills. Other places associated with this legend may still be identified. Huntly Banks, where " true Thomas " lay and watched the queen's approach, is half a mile west of the Eildon Tree Stone, and on the

west side of the hills is Bogle Burn, a streamlet that feeds the Tweed and probably derives its name from his ghostly visitor. Here, too, is Rhymer's glen, although the name was invented by Sir Walter Scott, who added the dell to his Abbotsford estate. Bowden, to the south of the hills, was the birthplace of the poets Thomas Aird (1802-1876) and James Thomson, and its parish church contains the burial-place of the dukes of Roxburghe. Eildon Hall is a seat of the duke of Buccleuch.

EILENBURG, a town of Germany, in the Prussian province of Saxony, on an island formed by the Mulde, 31 m. E. from Halle, at the junction of the railways Halle-Cottbus and Leipzig- Eilenburg. Pop. (1905) 15,145. There are three churches, two Evangelical and one Roman Catholic. The industries of the town include the manufacture of chemicals, cloth, quilting, calico, cigars and agricultural implements, bleaching, dyeing, basket-making, carriage-building and trade in cattle. In the neighbourhood is the iron foundry of Erwinhof. Opposite the town, on the steep left bank of the Mulde, is the castle from which it derives its name, the original seat of the noble family of Eulenburg. This castle (Ilburg) is mentioned in records of the reigns of Henry the Fowler as an important outpost against the Sorbs and Wends. The town itself, originally called Mildenau, is of great antiquity. It is first mentioned as a town in 081, when it belonged to the house of Wet tin and was the chief town of the East Mark. In 1386 it was incorporated in the margraviate of Meissen. In 181 5 it passed to Prussia.

SeeGundermann, ChronikderStadtEilenburg (Eilenburg, 1879).

EINBECK, or Eimbeck, a town of Germany, in the Prussian province of

Hanover, on the Ilm, 50 m. by rail S. of Hanover. Pop. (1905) 8709. It is an old-fashioned town with many quaint wooden houses, notable among them the ” Northeimhaus,” a beautiful specimen of medieval architecture. There are several churches, among them the Alexanderkirche, containing the tombs of the princes of Grubenhagen, and a synagogue. The schools include a Realgymnasium (i.e. predominantly for ” modern ” subjects), technical schools for the advanced study of machine-making, for weaving and for the textile industries, a preparatory training-college and a police school. The industries include brewing, weaving and the manufacture of cloth, carpets, tobacco, sugar, leather-grease, toys and roofing- felt.

Einbeck grew up originally round the monastery of St Alexander (founded 1080), famous for its relic of the True Blood. It is first recorded as a town in 1274, and in the 14th century was the seat of the princes of Grubenhagen, a branch of the ducal house of Brunswick. The town subsequently joined the Hanseatic League. In the 15th century it became famous for its beer (” Eimbecker,” whence the familiar ” Bock “)• In 1540 the Reformation was introduced by Duke Philip of Brunswick- Saltzderhelden (d. 1551), with the death of whose son Philip II. (1596) the Grubenhagen line became extinct. In 1626, during the Thirty Years’ War, Einbeck was taken by Pappenheim and in October 1641 by Piccolomini. In 1643 it was evacuated by the Imperialists. In 1761 its walls were razed by the French.

See H. L. Harland, Gesch. der Stadt Einbeck, 2 Bde. (Einbeck, 1854-1859; abridgment, ib. 1881).

EINDHOVEN, a town in the province of North Brabant, Holland, and a railway junction 8 m. by rail W. by S. of Helmond. Pop. (1900) 4730. Like Tilburg and Helmond it has developed in modern times into a flourishing industrial centre, having linen, woollen, cotton, tobacco and cigar, matches, &c, factories and several breweries.

EINHARD (c. 770-840), the friend and biographer of Charle- magne; he is also called Einhartus, Ainhardus or Heinhardus, in some of the early manuscripts. About the 10th century the name was altered into Agenardus, and then to Eginhardus, or Eginhartus, but, although these variations were largely used in the English and French languages, the form Einhardus, or Einhartus, is unquestionably the right one.

According to the statement of Walafrid Strabo, Einhard was born in the district which is watered by the river Main, and his birth has been fixed at about 770. His parents were of noble

birth, and were probably named Einhart and Engilfrit; and their son was educated in the monastery of Fulda, where he was certainly residing in 788 and in 791. Owing to his intelligence and ability he was transferred, not later than 796, from Fulda to the palace of Charlemagne by abbot Baugulf; and he soon became very intimate with the king and his family, and under- took various important duties, one writer calling him domesticus palatii regalis. He was a member of the group of scholars who gathered around Charlemagne and was entrusted with the charge of the public buildings, receiving, according to a fashion then prevalent, the scriptural name of Bezaleel (Exodus xxxi. 2 and xxxv. 30-3 5) owing to his artistic skill. It has been supposed that he was responsible for the erection of the basilica at Aix-la- Chapelle, where he resided with the emperor, and the other buildings mentioned in chapter xvii. of his Vita Karoli Magni, but there is no express statement to this effect. In 806 Charle- magne sent him to Rome to obtain the signature of Pope Leo III. to a will which he had made concerning the division of his empire; and it was possibly owing to Einhard's influence that in 813, after the death of his two elder sons, the emperor made his remaining son, Louis, a partner with himself in the imperial dignity. When Louis became sole emperor in 814 he retained his father's minister in his former position; then in 817 made him tutor to his son, Lothair, afterwards the emperor Lothair I. ; and showed him many other marks of favour. Einhard married Emma, or Imma, a sister of Bernharius, bishop of Worms, and a tradition of the 1 2th century represented this lady as a daughter of Charlemagne, and invented a romantic story with regard to the courtship which deserves to be noticed as it frequently appears in literature. Einhard is said to have visited the emperor's daughter regularly and secretly, and on one occasion a fall of snow made it impossible for him to walk away without leaving footprints, which would lead to his detection. This risk, however, was obviated by the foresight of Emma, who carried her lover across the courtyard of the palace; a scene which was witnessed by Charlemagne, who next morning narrated the occurrence to his counsellors, and asked for their advice. Very severe punishments were suggested for the clandestine lover, but the emperor rewarded the devotion of the pair by consenting to their marriage. This story is, of course, improbable, and is further discredited by the fact that Einhard does not mention Emma among the number of Charlemagne's children. Moreover, a similar story has been told of a daughter of the emperor Henry III. It is uncertain whether Einhard had any children. He addressed a letter to a person named Vussin, whom he calls fill and mi nate, but, as Vussin is not mentioned in documents in which his interests as Einhard's son would have been concerned, it is possible that he was only a young

man in whom he took a special interest. In January 815 the emperor Louis I. bestowed on Einhard and his wife the domains of Michelstadt and Mulinheim in the Odenwald, and in the charter conveying these lands he is called simply Einhardus, but, in a document dated the 2nd of June of the same year, he is referred to as abbot. After this time he is mentioned as head of several monasteries: St Peter, Mount Blandin and St Bavon at Ghent, St Servais at Maastricht, St Cloud near Paris, and Fontenelle near Rouen, and he also had charge of the church of St John the Baptist at Pavia.

During the quarrels which took place between Louis I. and his sons, in consequence of the emperor's second marriage, Einhard's efforts were directed to making peace, but after a time he grew tired of the troubles and intrigues of court life. In 818 he had given his estate at Michelstadt to the abbey of Lorsch, but he retained Mulinheim, where about 827 he founded an abbey and erected a church, to which he transported some relics of St Peter and St Marcellinus, which he had procured from Rome. To Mulinheim, which was afterwards called Seligenstadt, he finally retired in 830. His wife, who had been his constant helper, and whom he had not put away on becoming an abbot, died in 836, and after receiving a visit from the emperor, Einhard died on the 14th of March 840. He was buried at Seligenstadt, and his epitaph was written by Hrabanus Maurus. Einhard

was a man of very short stature, a feature on which Alcuin wrote an epigram. Consequently he was called Nardulus, a diminutive form of Einhardus, and his great industry and activity caused him to be likened to an ant. He was also a man of learning and culture. Reaping the benefits of the revival of learning brought about by Charlemagne, he was on intimate terms with Alcuin, was well versed in Latin literature, and knew some Greek. His most famous work is his Vila Karoli Magni, to which a prologue was added by Walafrid Strabo. Written in imitation of the De vitis Caesarum of Suetonius, this is the best contemporary account of the life of Charlemagne, and could only have been written by one who was very intimate with the emperor and his court. It is, moreover, a work of some artistic merit, although not free from inaccuracies. It was written before 821, and having been very popular during the middle ages, was first printed at Cologne in 1521. G. H. Pertz collated more than sixty manuscripts for his edition of 1829, and others have since come to light. Other works by Einhard are: Epistolae, which are of considerable importance for the history of

the times; Historia translationis beatorum Christi martyrum Marcellini et Petri, which gives a curious account of how the bones of these martyrs were stolen and conveyed to Seligenstadt, and what miracles they wrought; and De adoranda cruce, a treatise which has only recently come to light, and which has been published by E. Dummler in the Neues Archiv der Gesellschaft fur dllere deutsche Geschicktskunde, Band xi. (Hanover, 1886). It has been asserted that Einhard was the author of some of the Frankish annals, and especially of part of the annals of Lorsch (Annates Lauris- senses majores), and part of the annals of Fulda (Annates Fuldenses). Much discussion has taken place on this question, and several of the most eminent of German historians, Ranke among them, have taken part therein, but no certain decision has been reached.

The literature on Einhard is very extensive, as nearly all those who deal with Charlemagne, early German and early French litera- ture, treat of him. Editions of his works are by A. Teulet, Einhardi omnia quae extant opera (Paris, 1840-1843), with a French translation; P. Jaffe, in the Bibliotheca rerum Germanicarum, Band iv. (Berlin, 1867) ; G. H. Pertz in the Monumenta Germaniae historica, Bande i. and ii. (Hanover, 1826-1829), and J. P. Migne in the Patrologia Latina, tomes 97 and 104 (Paris, 1866). The Vita Karoli Magni, edited by G. H. Pertz and G. Waitz, has been published separately (Hanover, 1880). Among the various translations of the Vita may be mentioned an English one by W. Glaister (London, 1877) and a German one by O. Abel (Leipzig, 1 893) . For a complete bibliography of Einhard, see A. Potthast, Bibliotheca historica, pp. 394-397 (Berlin, 1896), and W. Wattenbach, Deutschlands Geschichtsquellen, Band i. (Berlin, 1904). (A. W. H.*)

EINHORN, DAVID (1809-1879), leader of the Jewish reform movement in the United States of America, was born in Bavaria. He was a supporter of the principles of Abraham Geiger (q.v.), and while still in Germany advocated the introduction of prayers in the vernacular, the exclusion of nationalistic hopes from the synagogue service, and other ritual modifications. In 1855 he migrated to America, where he became the acknowledged leader of reform, and laid the foundation of the regime under which the mass of American Jews (excepting the newly arrived Russians) now worship. In 1858 he published his revised prayer book, which has formed the model for all subsequent revisions. In 1861 he strongly supported the anti-slavery party, and was forced to leave Baltimore where he then ministered. He continued his work first in Philadelphia and later in New York. (I. A.)

EINSIEDELN* the most populous town in the Swiss canton of Schwyz. It is built on the right bank of the Alpbach (an affluent of the Sihl), at

a height of 2908 ft. above the sea level on a rather bare moorland, and by rail is 25 m. S.E. of Zurich, or by a round about railway route about 38 m. north of Schwyz, with which it communicates directly over the Hacken Pass (4649 ft.) or the Holzegg Pass (4616 ft.). In 1900 the population was 8496, all (save 75) Romanists and all (save in) German-speaking. The town is entirely dependent on the great Benedictine abbey that rises slightly above it to the east. Close to its present site Meinrad, a hermit, was murdered in 861 by two robbers, whose crime was made known by Meinrad's two pet ravens. Early

in the 10th century Benno, a hermit, rebuilt the holy man's cell, but the abbey proper was not founded till about 934, the church having been consecrated (it is said by Christ Himself) in 948. In 1274 the dignity of a prince of the Holy Roman Empire was confirmed by the emperor to the reigning abbot. Originally under the protection of the counts of Rapperswil (to which town on the lake of Zurich the old pilgrims' way still leads over the Etzel Pass, 3146 ft., with its chapel and inn), this position passed by marriage with their heiress in 1295 to the Laufenburg or cadet line of the Habsburgs, but from 1386 was permanently occupied by Schwyz. A black wooden image of the Virgin and the fame of St Meinrad caused the throngs of pilgrims to resort to Einsiedeln in the middle ages, and even now it is much frequented, particularly about the 14th of September. The existing buildings date from the 18th century only, while the treasury and the library still contain many precious objects, despite the sack by the French in 1798. There are now about 100 fully professed monks, who direct several educational institutions. The Black Virgin has a special chapel in the stately church. Zwingli was the parish priest of Einsiedeln 1516-1518 (before he became a Protestant), while near the town Paracelsus (1493-1541), the celebrated philosopher, was born.

See Father O. Ringholz, Geschichte d. furstl. Benediktinerstiftes Einsiedeln, vol. i. (to 1526), (Einsiedeln, 1904). (W. A. B. C.)

EISENACH, a town of Germany, second capital of the grand- duchy of Saxe-Weimar-Eisenach, lies at the north-west foot of the Thuringian forest, at the confluence of the Nesse and Horsel, 32 m. by rail W. from Erfurt. Pop. (1905) 35,123. The town mainly consists of a long street, running from east to west. Off this are the market square, containing the grand- ducal palace, built in 1742, where the duchess Helene of Orleans long resided, the town-hall, and the late Gothic St Georgen- kirche; and the square on which stands the Nikolaikirche, a fine Romanesque building, built about n 50 and restored in 1887. Noteworthy are also the Klemda, a small castle dating from 1260; the Lutherhaus, in which the reformer stayed with the Cotta family in

1498; the house in which Sebastian Bach was born, and that (now a museum) in which Fritz Reuter lived (1S63-1874). There are monuments to the two former in the town, while the resting-place of the latter in the cemetery is marked by a less pretentious memorial. Eisenach has a school of forestry, a school of design, a classical school (Gymnasium) and modern school (Real gymnasium) , a deaf and dumb school, a teachers' seminary, a theatre and a Wagner museum. The most important industries of the town are worsted-spinning, carriage and wagon building, and the making of colours and pottery. Among others are the manufacture of cigars, cement pipes, iron-ware and machines, alabaster ware, shoes, leather, &c, cabinet-making, brewing, granite quarrying and working, tile-making, and saw- and corn-milling.

The natural beauty of its surroundings and the extensive forests of the district have of late years attracted many summer residents. Magnificently situated on a precipitous hill, 600 ft. above the town to the south, is the historic Wartburg (q.v.), the ancient castle of the landgraves of Thuringia, famous as the scene of the contest of Minnesingers immortalized in Wagner's Tannhauser, and as the place where Luther, on his return from the diet of Worms in 1521, was kept in hiding and made his translation of the Bible. On a high rock adjacent to the Wart- burg are the ruins of the castle of Madelstein.

Eisenach (Isenacum) was founded in 1070 by Louis II. the Springer, landgrave of Thuringia, and its history during the middle ages was closely bound up with that of the Wartburg, the seat of the landgraves. The Klemda, mentioned above, was built by Sophia (d. 1284), daughter of the landgrave Louis IV., and wife of Duke Henry II. of Brabant, to defend the town against Henry III., margrave of Meissen, during the succession contest that followed the extinction of the male line of the Thuringian landgraves in 1247. The principality of Eisenach fell to the Saxon house of Wettin in 1440, and in the partition of 1485 formed part of the territories given to the Ernestine line. It was a separate Saxon duchy from 1596 to 1638, from 1640

to 1644, and again from 1662 to 1741, when it finally fell to Saxe-Weimar. The town of Eisenach, by reason of its associations, has been a favourite centre for the religious propaganda of Evangelical Germany, and since 1852 it has been the scene of the annual conference of the German Evangelical Church, known as the Eisenach

conference.

See Trinius, Eisenach und Umgebung (Minden, 1900) ; and H. A. Daniel, Deutschland (Leipzig, 1895), and further references in U. Chevalier, ” Repertoire des sources,” &c, Topo-bibliogr. (Mont-beliard, 1 894-1 899), s.v.

EISENBERG (Isenberg), a town of Germany, in the duchy of Saxe-Altenburg, on a plateau between the rivers Saale and Elster, 20 m. S.W. from Zeitz, and connected with the railway Leipzig-Gera by a branch to Crossen. Pop. (1905) 8824. It possesses an old castle, several churches (and monuments to Duke Christian of Saxe-Eisenberg (d. 1707), Bismarck, and the philosopher Karl Christian Friedrich Krause (q.v.) . Its principal industries are weaving, and the manufacture of machines, ovens, furniture, pianos, porcelain and sausages.

See Back, Chronik der Sladt und des Amies Eisenberg (Eisenb., 1843).

EISENERZ (” Iron ore “), a market-place and old mining town in Styria, Austria, 68 m. N.W. of Graz by rail. Pop. (1900) 6494. It is situated in a deep valley, dominated on the east by the Pfaffenstein (6140 ft.), on the west by the Kaiser- schild (6830 ft.), and on the south by the Erzberg (5030 ft.). It has an interesting example of a medieval fortified church, a Gothic edifice founded by Rudolph of Habsburg in the 13th century and rebuilt in the 16th. The Erzberg or Ore Mountain furnishes such rich ore that it is quarried in the open air like stone, in the summer months. There is documentary evidence of the mines having been worked as far back as the 12th century. They afford employment to two or three thousand hands in summer and about half as many in winter, and yield’ some 800,000 tons of iron per annum. Eisenerz is connected with the mines by the Erzberg railway, a bold piece of engineering work, 14 m. long, constructed on the Abt’s rack-and-pinion system. It passes through some beautiful scenery, and descends to Vordernberg (pop. 3111), an important centre of the iron trade situated on the south side of the Erzberg. Eisenerz possesses, in addition, twenty-five furnaces, which produce iron, and particularly steel, of exceptional excellence. A few miles to the N.W. of Eisenerz lies the castle of Leopoldstein, and near it the ■ beautiful Leopoldsteiner Lake. This lake, with its dark-green water, situated at an altitude of 2028 ft., and surrounded on all sides by high peaks, is not big, but is very deep, having a depth of 520 ft.

EISLEBEN (Lat. Islebia), a town of Germany, in the Prussian province of Saxony, 24 m. W. by N. from Halle, on the railway to Nordhausen

and Cassel. Pop. (1905) 23,898. It is divided into an old and a new town (Altstadt and Neustadt). Among its principal buildings are the church of St Andrew (Andrea's- kirche), which contains numerous monuments of the counts of Mansf eld ; the church of St Peter and St Paul (Peter-Paulkirche) , containing the font in which Luther was baptized; the royal gymnasium (classical school), founded by Luther shortly before his death in 1546; and the hospital. Eisleben is celebrated as the place where Luther was born and died. The house in which he was born was burned in 1689, but was rebuilt in 1693 as a free school for orphans. This school fell into decay under the regime of the kingdom of Westphalia, but was restored in 1817 by King Frederick William III. of Prussia, who, in 1819, transferred it to a new building behind the old house. The house in which Luther died was restored towards the end of the 19th century, and his death chamber is still preserved. A bronze statue of Luther by Rudolf Siemering (1835-1905) was unveiled in 1883. Eisleben has long been the centre of an important mining district (Luther was a miner's son), the principal products being silver and copper. It possesses smelting works and a school of mining.

The earliest record of Eisleben is dated 974. In 1045, at which time it belonged to the counts of Mansfeld, it received the right to hold markets, coin money, and levy tolls. From

1 53 1 to 1710 it was the seat of the cadet line of the counts of Mansfeld-Eisleben. After the extinction of the main line of the counts of Mansfeld, Eisleben fell to Saxony, and, in the partition of Saxony by the congress of Vienna in 181 5, was assigned to Prussia.

See G. Grossler, Urkundliche Gesch. Eislebens bis zum Ende des 12. Jahrhunderts (Halle, 1875); Chronicon Islebiense; Eisleben Stadt-chronik aus den Jahren 1530-1738, edited from the original, with notes by Grossler and Sommcr (Eisleben, 1882).

EISTEDDFOD (plural Eisteddfodau) , the national bardic con- gress of Wales, the objects of which are to encourage bardism and music and the general literature of the Welsh, to maintain the Welsh language and customs of the country, and to foster and cultivate a patriotic spirit amongst the people. This institution, so peculiar to Wales, is of very ancient origin. 1 The term Eisteddfod, however, which means "a session" or "sitting," was probably not applied to bardic congresses before the 12th century.

The Eisteddfod in its present character appears to have originated in the time of Owain ap Maxen Wledig, who at the close of the 4th

century was elected to the chief sovereignty of the Britons on the departure of the Romans. It was at this time, or soon afterwards, that the laws and usages of the Gorsedd were codified and remodelled, and its motto of ” Y gwir yn erbyn y byd ” (The truth against the world) given to it. ” Chairs ” (with which the Eisteddfod as a national institution is now inseparably connected) were also established, or rather perhaps resuscitated, about the same time. The chair was a kind of convention where disciples were trained, and bardic matters discussed preparatory to the great Gorsedd, each chair having a distinctive motto. There are now existing four chairs in Wales, — namely, the ” royal ” chair of Powys, whose motto is ” A laddo a leddir ” (He that slayeth shall be slain) ; that of Gwent and Glamorgan, whose motto is ” Duw a phob daioni ” (God and all goodness); that of Dyfed, whose motto is ” Calon wrth galon ” (Heart with heart) ; and that of Gwynedd, or North Wales, Nvhose motto is “Iesu,” or “O Iesu! na’d gamwaith” (Jesus, or Oh Jesus! suffer not iniquity).

The first Eisteddfod of which any account seems to have descended to us was one held on the banks of the Conway in the 6th century, under the auspices of Maelgwn Gwynedd, prince of North Wales. Maelgwn on this occasion, in order to prove the superiority of vocal song over instrumental music, is recorded to have offered a reward to such bards and minstrels as should swim over the Conway. There were several competitors, but on their arrival on the opposite shore the harpers found themselves unable to play owing to the injury their harps had sustained from the water, while the bards were in as good tune as ever. King Cadwaladr also presided at an Eisteddfod about the middle of the 7 th century.

Griffith ap Cynan, prince of North Wales, who had been born in Ireland, brought with him from that country many Irish musicians, who greatly improved the music of Wales. During his long reign of 56 years he offered great encouragement to bards, harpers and minstrels, and framed a code of laws for their better regulation. He held an Eisteddfod about the beginning of the 12th century at Caerwys in Flintshire, “to which there repaired all the musicians of Wales, and some also from England and Scotland.” For many years afterwards the Eisteddfod appears to have been held triennially, and to have enforced the rigid observance of the enactments of Griffith ap Cynan. The places at which it was generally held were Aberffraw, formerly the royal seat of the princes of North Wales; Dynevor, the royal castle of the princes of South Wales; and Mathrafal, the royal palace of the princes of Powys: and in later times

1 According to the Welsh Triads and other historical records, the Gorsedd or assembly (an essential part of the modern Eisteddfod, from which indeed the latter sprung) is as old at least as the time of Prydain the son of iEdd the Great, who lived many centuries before the Christian era. Upon the destruction of the political ascendancy of the Druids, the Gorsedd lost its political importance, though it seems to have long afterwards retained its institutional character as the medium for preserving the laws, doctrines and traditions of bardism.

EJECTMENT

r 37

Caerwys in Flintshire received that honourable distinction, it having been the princely residence of Llewelyn the Last. Some of these Eisteddfodau were conducted in a style of great magni- ficence, under the patronage of the native princes. At Christmas 1 107 Cadwgan, the son of Bleddyn ap Cynfyn, prince of Powys, held an Eisteddfod in Cardigan Castle, to which he invited the bards, harpers and minstrels, ” the best to be found in all Wales “; and ” he gave them chairs and subjects of emulation according to the custom of the feasts of King Arthur.” In 1176 Rhys ab Gruffydd, prince of South Wales, held an Eisteddfod in the same castle on a scale of still greater magnificence, it having been proclaimed, we are told, a year before it took place, ” over Wales, England, Scotland, Ireland and many other countries.”

On the annexation of Wales to England, Edward I. deemed it politic to sanction the bardic Eisteddfod by his famous statute of Rhuddlan. In the reign of Edward III. If or Hael, a South Wales chieftain, held one at his mansion. Another was held in 145 1, with the permission of the king, by Griffith ab Nicholas at Carmarthen, in princely style, where Dafydd ab Edmund, an eminent poet, signalized himself by his wonderful powers of versification in the Welsh metres, and whence ” he carried home on his shoulders the silver chair ” which he had fairly won. Several Eisteddfodau, were held, one at least by royal mandate, in the reign of Henry VII. In 1523 one was held at Caerwys before the chamberlain of North Wales and others, by virtue of a commission issued by Henry VIII. In the course of time, through relaxation of bardic discipline, the profession was assumed by unqualified persons, to the great detriment of the regular bards. Accordingly in 1567 Queen Elizabeth issued a commission for holding an Eisteddfod at Caerwys in the following year, which was duly held, when degrees were conferred on 55 candidates, including 20 harpers. From the terms of the royal proclamation we find that it was then customary to bestow ” a silver harp ” on the chief of the faculty of musicians, as it

had been usual to reward the chief bard with ” a silver chair.” This was the last Eisteddfod appointed by royal commission, but several others of some importance were held during the 16th and 17th centuries, under the patronage of the earl of Pembroke, Sir Richard Neville, and other influential persons. Amongst these the last of any particular note was one held in Bewper Castle, Glamorgan, by Sir Richard Basset in 1681.

During the succeeding 130 years Welsh nationality was at its lowest ebb, and no general Eisteddfod on a large scale appears to have been held until 181 9, though several small ones were held under the auspices of the Gwy’neddigion Society, established in 1771, — the most important being those at Corwen (1789), St Asaph (1790) and Caerwys (1798).

At the close of the Napoleonic wars, however, there was a general revival of Welsh nationality, and numerous Welsh literary societies were established throughout Wales, and in the principal English towns. A large Eisteddfod was held under distinguished patronage at Carmarthen in 18 19, and from that time to the present they have been held (together with numerous local Eisteddfodau), almost without intermission, annually. The Eisteddfod at Llangollen in 1858 is memorable for its archaic character, and the attempts then made to revive the ancient ceremonies, and restore the ancient vestments of druids, bards and ovates.

To constitute a provincial Eisteddfod it is necessary that it should be proclaimed by a graduated bard of a Gorsedd a year and a day before it takes place. A local one may be held without such a proclamation. A provincial Eisteddfod generally lasts three, sometimes four days. A president and a conductor are appointed for each day. The proceedings commence with a Gorsedd meeting, opened with sound of trumpet and other ceremonies, at which candidates come forward and receive bardic degrees after satisfying the presiding bard as to their fitness. At the subsequent meetings the president gives a brief address; the bards follow with poetical addresses; adjudications are made, and prizes and medals with suitable devices are given to the successful competitors for poetical, musical and prose compositions, for the best choral and solo singing, and singingwith

the harp or ” Pennillion singing ‘ n as it is called, for the best play- ing on the harp or stringed or wind instruments, as well as occasionally for the best specimens of handicraft and art. In the evening of each day a concert is given, generally attended by very large numbers. The great day of the Eisteddfod is the ” chair ” day — usually the third or

last day — the grand event of the Eisteddfod being the adjudication on the chair subject, and the chairing and investiture of the fortunate winner. This is the highest object of a Welsh bard's ambition. The ceremony is an imposing one, and is performed with sound of trumpet. (See also the articles Bard, Celt: Celtic Literature, and Wales.) (R. W.*)

EJECTMENT (Lat. e, out, and jacere, to throw), in English law, an action for the recovery of the possession of land, together with damages for the wrongful withholding thereof. In the old classifications of actions, as real or personal, this was known as a mixed action, because its object was twofold, viz. to recover both the realty and personal damages. It should be noted that the term " ejectment " applies in law to distinct classes of proceedings — ejectments as between rival claimants to land, and ejectments as between those who hold, or have held, the relation of landlord and tenant. Under the Rules of the Supreme Court, actions in England for the recovery of land are commenced and proceed in the same manner as ordinary actions. But the historical interest attaching to the action of ejectment is so great as to render some account of it necessary.

The form of the action as it prevailed in the English courts down to the Common Law Procedure Act 1852 was a series of fictions, among the most remarkable to be found in the entire body of English law. A, the person claiming title to land, delivered to B, the person in possession, a declaration in eject- ment in which C and D, fictitious persons, were plaintiff and defendant. C stated that A had devised the land to him for a term of years, and that he had been ousted by D. A notice signed by D informed B of the proceedings, and advised him to apply to be made defendant in D's place, as he, D, having no title, did not intend to defend the suit. If B did not so apply, judgment was given against D, and possession of the lands was given to A. But if B did apply, the Court allowed him to defend the action only on condition that he admitted the three fictitious averments — the lease, the entry and the ouster — which, together with title, were the four things necessary to maintain an action of ejectment. This having been arranged the action proceeded, B being made defendant instead of D. The names used for the fictitious parties were John Doe, plaintiff, and Richard Roe, defendant, who was called " the casual ejector." The explanation of these mysterious fictions is this. The writ de ejectione firmae was invented about the beginning of the reign of Edward III. as a remedy to a lessee for years who had been ousted of his term. It was a writ of trespass, and carried damages, but in the time of Henry VII., if not before that date, the courts of common law added thereto a species of remedy neither warranted by the original writ nor

demanded by the declaration, viz. a judgment to recover so much of the term as was still to run, and a writ of possession thereupon. The next step was to extend the remedy — limited originally to leaseholds — to cases of disputed title to freeholds. This was done indirectly by the claimant entering on the land and there making a lease for a term of years to another person; for it was only a term that could be recovered by the action, and to create a term required actual possession in the granter. The lessee remained on the land , and the next person who entered even by chance was accounted an ejector of the lessee, whb then served upon him a writ of trespass and ejectment. The case then went to trial as on a

1 According to Jones's Bardic Remains, " To sing ' Pennillion with a Welsh harp is not so easily accomplished as may be imagined. The singer is obliged to follow the harper, who may change the tune, or perform variations ad libitum, whilst the vocalist must keep time, and end precisely with the strain. The singer does not commence with the harper, but takes the strain up at the second, third or fourth bar, as best suits the ' pennill ' he intends to sing. . . . Those are considered the best singers who can adapt stanzas of various metres to one melody, and who are acquainted with the twenty-four measures according to the bardic laws and rules of composition."

common action of trespass; and the claimant's title, being the real foundation of the lessee's right, was thus indirectly deter- mined. These proceedings might take place without the know- ledge of the person really in possession; and to prevent the abuse of the action a rule was laid down that the plaintiff in ejectment must give notice to the party in possession, who might then come in and defend the action. When the action came into general use as a mode of trying the title to freeholds, the actual entry, lease and ouster which were necessary to found the action were attended with much inconvenience, and accord- ingly Lord Chief Justice Rolle during the Protectorate (c. 1657) substituted for them the fictitious averments already described. The action of ejectment is now only a curiosity of legal history. Its fictitious suitors were swept away by the Common Law Procedure Act of 1852. A form of writ was prescribed, in which the person in possession of the disputed premises by name and all persons entitled to defend the possession were informed that the plaintiff claimed to be entitled to possession, and required to appear in court to defend the possession of the property or such part of it as

they should think fit. In the form of the writ and in some other respects ejectment still differed from other actions. But, as already mentioned, it has now been assimilated (under the name of action for the recovery of lands) to ordinary actions by the Rules of the Supreme Court. It is commenced by writ of summons, and — subject to the rules as to summary judgments (v. inf.) — proceeds along the usual course of pleadings and trial to judgment; but is subject to one special rule, viz: that except by leave of the Court or a judge the only claims which may be joined with one for recovery of land are claims in respect of arrears of rent or double value for holding over, or mesne profits (i.e. the value of the land during the period of illegal possession), or damages for breach of a contract under which the premises are held or for any wrong or injury to the premises claimed (R.S.C., O. xviii. r. 2). • These claims were formerly recoverable by an independent action.

With regard to actions for the recovery of land — apart from the relationship of landlord and tenant — the only point that need be noted is the presumption of law in favour of the actual possessor of the land in dispute. Where the action is brought by a landlord against his tenant, there is of course no presumption against the landlord's title arising from the tenant's possession. By the Common Law Procedure Act 1852 (ss. 210-212) special provision was made for the prompt recovery of demised premises where half a year's rent was in arrear and the landlord was entitled to re-enter for non-payment. These provisions are still in force, but advantage is now more generally taken of the summary judgment procedure introduced by the Rules of the Supreme Court (Order 3, r. 6.). This procedure may be adopted when (a) the tenant's term has expired, (b) or has been duly determined by notice to quit, or © has become liable to forfeiture for non-payment of rent, and applies not only to the tenant but to persons claiming under him. The writ is specially en- dorsed with the plaintiff's claim to recover the land with or without rent or mesne profits, and summary judgment obtained if no substantial defence is disclosed. Where an action to recover land is brought against the tenant by a person claiming adversely to the landlord, the tenant is bound, under penalty of forfeiting the value of three years' improved or rack rent of the premises, to give notice to the landlord in order that he may appear and defend his title. Actions for the recovery of land, other than land belonging to spiritual corporations and to the crown, are barred in 12 years (Real Property Limitation Acts 1833 (s. 29) and 1874 (s. 1). A landlord can recover possession in the county court (i.) by an action for the recovery of possession, where neither the value of the premises nor the rent exceeds £100 a year, and the

tenant is holding over (County Courts Acts of 1888, s. 138, and 1903, s. 3) ; (ii.) by ” an action of ejectment,” where (a) the value or rent of the premises does not exceed £100, (b) half a year’s rent is in arrear, and © no sufficient distress (see Rent) is to be found on the premises (Act of 1888, s. 139; Act of 1903, s. 3; County Court Rules 1903, Ord. v. rule 3). Where a tenant at a rent not exceeding £20 a year of premises

at will, or for a term not exceeding 7 years, refuses nor neglects, on the determination or expiration of his interest, to deliver up possession, such possession may be recovered by proceedings before justices under the Small Tenements Recovery Act 1838, an enactment which has been extended to the recovery of allot- ments. Under the Distress for Rent Act 1737, and the Deserted Tenements Act 181 7, a landlord can have himself put by the order of two justices into premises deserted by the tenant where half a year’s rent is owing and no sufficient distress can be found.

In Ireland, the practice with regard to the recovery of land is regulated by the Rules of the Supreme Court 1891, made under the Judicature (Ireland) Act 1877; and resembles that of England. Possession may be recovered summarily by a special indorsement of the writ, as in England; and there are analogous provisions with regard to the recovery of small tenements (see Land Act, i860 ss. 84 and 89). The law with regard to the ejectment or eviction of tenants is consolidated by the Land Act i860. (See ss. 52-66, 68-71, and further under Landlord and Tenant.)

In Scotland, the recovery of land is effected by an action of ” removing ” or summary ejection. In the case of a tenant ” warning ” is necessary unless he is bound by his lease to remove without warning. In the case of possessors without title, or a title merely precarious, no warning is needed. A summary process of removing from small holdings is provided for by Sheriff Courts (Scotland) Acts of 1838 and 1851.

In the United States, the old English action of ejectment was adopted to a very limited extent, and where it was so adopted has often been superseded, as in Connecticut, by a single action for all cases of ouster, disseisin or ejectment. In this action, known as an action of disseisin or ejectment, both possession of the land and damages may be recovered. In some of the states a tenant against whom an action of ejectment is brought by a stranger is bound under a penalty, as in England, to give notice of the claim to the landlord in order that he may appear and defend his title.

In French law the landlord's claim for rent is fairly secured by the hypothec, and by summary powers which exist for the seizure of the effects of defaulting tenants. Eviction or annul- ment of a lease can only be obtained through the judicial tribunals. The Civil Code deals with the position of a tenant in case of the sale of the property leased. If the lease is by authentic act (acte authentique) or has an ascertained date, the purchaser cannot evict the tenant unless a right to do so was reserved on the lease (art. 1743), and then only on payment of an indemnity (arts. 1744-1747). If the lease is not by authentic act, or has not an ascertained date, the purchaser is not liable for indemnity (art. 1750). The tenant of rural lands is bound to give the landlord notice of acts of usurpation (art. 1768). There are analogous provisions in the Civil Codes of Belgium (arts. 1743 et seq.), Holland (arts. 1613, 1614), Portugal (art. 1572); and see the German Civil Code (arts. 535 et seq.). In many of the colonies there are statutory provisions for the recovery of land or premises on the lines of English law (cf. Ontario, Rev. Stats. 1897, c. 170. ss. 19 et seq.; Manitoba, Rev. Stats. 1902, c. 1903). In others (e.g. New Zealand, Act. No. 55 of 1893, ss. 175-187; British Columbia, Revised Statutes, 1897, c. 182: Cyprus, Ord. 15 of 1895) there has been legislation similar to the Small Tenements Recovery Act 1838.

Authorities. — English Law: Cole on Ejectment; Digby, History of Real Property (3rd ed., London, 1884); Pollock and Maitland, History of English Law (Cambridge, 1895); Foa, Landlord and Tenant (4th ed., London, 1907) ; Fawcett, Landlord and Tenant (London, 1905). Irish Law. Nolan and Kane's Statutes relating to the Law of Landlord and Tenant (5th ed., Dublin, 1898) ; Wylie's Judicature Acts (Dublin, 1900). Scots Law: Hunter on Landlord and Tenant (4th ed., Edin., 1878); Erskine's Principles (20th ed., Edin., 1903). American Law: Two Centuries' Growth of American Law (New York and London, 1901); Bouvier's Law Dictionary (Boston and London, 1897) ; Stimson, American Statute Law (Boston, 1886). (A. W. R.)

EKATERINBURG, a town of Russia, in the government of Perm, 311 m. by rail S.E. of the town of Perm, on the Iset river, near the E. foot of the Ural Mountains, in 56 49′ N. and

6o° 35′ E., at an altitude of 870 ft. above sea-level. It is the most important town of the Urals. Pop. (i860) 19,830; (1897) 55,488. The streets are broad and regular, and several of the houses of palatial

proportions. In 1834 Ekaterinburg was made the see of a suffragan bishop of the Orthodox Greek Church. There are two cathedrals — St Catherine's, founded in 1758, and that of the Epiphany, in 1774 — and a museum of natural history, opened in 1853. Ekaterinburg is the seat of the central mining administration of the Ural region, and has a chemical laboratory for the assay of gold, a mining school, the Ural Society of Naturalists, and a magnetic and meteorological observatory. Besides the government mint for copper coinage, which dates from 1735, the government engineering works, and the imperial factory for the cutting and polishing of malachite, jasper, marble, porphyry and other ornamental stones, the industrial establishments comprise candle, paper, soap and machinery works, flour and woollen mills, and tanneries. There is a lively trade in cattle, cereals, iron, woollen and silk goods, and colonial products; and two important fairs are held annually. Nearly forty gold and platinum mines, over thirty iron-works, and numerous other factories are scattered over the district, while wheels, travelling boxes, hardware, boots and so forth are extensively made in the villages. Ekaterinburg took its origin from the mining establishments founded by Peter the Great in 1721, and received its name in honour of his wife, Catherine I. Its development was greatly promoted in 1763 by the diversion of the Siberian highway from Verkhoturye to this place.

EKATERINODAR, a town of South Russia, chief town of the province of Kuban, on the right bank of the river Kuban, 85 m. E.N.E. of Novo-rossiysk on the railway to Rostov-on-Don, and in 45 3′ N. and 38 50′ E. It is badly built, on a swampy site exposed to the inundations of the river; and its houses, with few exceptions, are slight structures of wood and plaster. Founded by Catherine II. in 1794 on the site of an old town called Tmutarakan, as a small fort and Cossack settlement, its population grew from 9620 in i86q to 65,697 in 1897. It has various technical schools, an experimental fruit-farm, a military hospital, and a natural history museum. A considerable trade is carried on, especially in cereals.

EKATERINOSLAV, a government of south Russia, having the governments of Poltava and Kharkov on the N., the territory of the Don Cossacks on the E., the Sea of Azov and Taurida on the S., and Kherson on the W. Area, 24,478 sq. m. Its surface is undulating steppe, sloping gently south and north, with a few hills reaching 1200 ft. in the N.E., where a slight swelling (the Don Hills) compels the Don to make a great curve eastwards. Another chain of hills, to which the eastward bend of the Dnieper is due, rises in the west. These hills have a crystalline core (granites, syenites and diorites), while the surface strata belong to the Carboniferous, Permian, Cretaceous and Tertiary

forma- tions. The government is rich in minerals, especially in coal — ■ the mines lie in the middle of the Donets coalfield — iron ores, fireclay and rock-salt, and every year the mining output increases in quantity, especially of coal and iron. Granite, limestone, grindstone, slate, with graphite, manganese and mercury are found. The government is drained by the Dnieper, the Don and their tributaries (e.g. the Donets and Volchya) and by several affluents (e.g. the Kalmius) of the Sea of Azov. The soil is the fertile black earth, but the crops occasionally suffer from drought, the average annual rainfall being only 1 5 in. Forests are scarce. Pop. (i860) 1,138,750; (1897) 2,118,946, chiefly Little Russians, with Great Russians, Greeks (48,740), Germans (80,979), Rumanians and a few gypsies. Jews constitute 4-7% of the population. The estimated population in 1906 was 2,708,700.

Wheat and other cereals are extensively grown; other note- worthy crops are potatoes, tobacco and grapes. Nearly 40,000 persons find occupation in factories, the most imporant being iron-works and agricultural machinery works, though there are also tobacco, glass, soap and candle factories, potteries, tanneries and breweries. In the districts of Mariupol the making of agricultural implements and machinery is carried on extensively

as a domestic industry in the villages. Bees are kept in very con- siderable numbers. Fishing employs many persons in the Don and the Dnieper. Cereals are exported in large quantities via the Dnieper, the Sevastopol railway, and the port of Mariupol. The chief towns of the eight districts, with their populations in 1897, are Ekaterinoslav (135,552 inhabitants in 1900), Alex- androvsk (28,434), Bakhmut (30,585), Mariupol (31,772), Novomoskovsk (12,862), Pavlograd (17,188), Slavyanoserbsk (3120), and Verkhne-dnyeprovsk (11,607).

EKATERINOSLAV, a town of Russia, capital of the govern- ment of the same name, on the right bank of the Dnieper above the rapids, 673 m. by rail S.S.W. of Moscow, in 48 21′ N. and 35 4′ E., at an altitude of 210 ft. Pop. (1861) 18,881, without suburbs; (1900) 135,552. If the suburb of Novyikoindak be included, the town extends for upwards of 4 m. along the river. The oldest part lies very low and is much exposed to floods. Con- tiguous to the towns on the N.W. is the royal village of Novyi- maidani or the New Factories. The bishop’s palace, mining academy, archaeological museum and library are the principal public buildings. The house now occupied by the Nobles Club was formerly inhabited by the author and statesman Potemkin. Ekaterinoslav is a rapidly growing city, with a number of technical schools, and is an important depot for timber floated down the

Dnieper, and also for cereals. Its iron-works, flour-mills and agricultural machinery works give occupation to over 5000 persons. In fact since 1895 the city has become the centre of numerous Franco-Belgian industrial undertakings. In addition to the branches just mentioned, there are tobacco factories and breweries. Considerable trade is carried on in cattle, cereals, horses and wool, there being three annual fairs. On the site of the city there formerly stood the Polish castle of Koindak, built in 1635, and destroyed by the Cossacks. The existing city was founded by Potemkin in 1 786, and in the following year Catherine II. laid the foundation-stone of the cathedral, though it was not actually built until 1830-1835. On the south side of it is a bronze statue of the empress, put up in 1846. Paul I. changed the name of the city to Novo-rossiysk, but the original name was restored in 1802.

EKHOF, KONRAD (1720-1778), German actor, was born in Hamburg on the 12th of August 1720. In 1739 he became a member of Johann Friedrich Schonemann's (1704-1782) company in Luneburg, and made his first appearance there on the 15th of January 1740 as Xiphares in Racine's Mithridate. From 1 7 51 the Schonemann company performed mainly in Hamburg and at Schwerin, where Duke Christian Louis II. of Mecklenburg- Schwerin made them comedians to the court. During this period Ekhof founded a theatrical academy, which, though short-lived, was of great importance in helping to raise the standard of German acting and the status of German actors. In 1757 Ekhof left Schonemann to join Franz Schuch's company at Danzig; but he soon returned to Hamburg, where, in con- junction with two other actors, he succeeded Schonemann in the direction of the company. He resigned this position, however, in favour of H. G. Koch, with whom he acted until 1764, when he joined K. E. Ackermann's company. In 1767 was founded the National Theatre at Hamburg, made famous by Lessing's Hamburgische Dramaturgic, and Ekhof was the leading member of the company. After the failure of the enterprise Ekhof was for a time in Weimar, and ultimately became co-director of the new court theatre at Gotha. This, the first permanently estab- lished theatre in Germany, was opened on the 2nd of October 1775. Ekhof 's reputation was now at its height; Goethe called him the only German tragic actor; and in 1777 he acted with Goethe and Duke Charles Augustus at a private performance at Weimar, dining afterwards with the poet at the ducal table. He died on the 16th of June 1778. His versatility may be judged from the fact that in the comedies of Goldoni and Moliere he was no less successful than in the tragedies of Lessing and Shakespeare. He was regarded by his contemporaries as an unsurpassed exponent of naturalness on the stage; and in this

respect he has been not unfairly compared with Garrick. His fame, however, was rapidly eclipsed by that of Friedrich U. L.

Schroder. His literary efforts were chiefly confined to transla- tions from French authors.

See H. Uhde, biography of Ekhof in vol. iv. of Der neue Plutarch (1876), and J. Ruschner, K. Ekkofs Leben und Wirken (1872). Also H Devrient, J. F. Schbnemann und seine Schauspielergesellschaft

(1895)-

EKRON (better, as in the Septuagint and Josephus, Accaeon, ‘Annapcov), a royal city of the Philistines commonly identified with the modern Syrian village of ‘Akir, 5 m. from Ramleh, on the southern slope of a low ridge separating the plain of Philistia from Sharon. It lay inland and off the main line of traffic. Though included by the Israelites within the limits of the tribe of Judah, and mentioned in Judges xix. as one of the cities of Dan, it was in Philistine possession in the days of Samuel, and apparently maintained its independence. Accord- ing to the narrative of the Hebrew text, here differing from the Greek text and Josephus (which read Askelon), it was the last town to which the ark was transferred before its restoration to the Israelites. Its maintenance of a sanctuary of Baal Zebub is mentioned in 2 Kings i. From Assyrian inscriptions it has been gathered that Padi, king of Ekron, was for a time the vassal of Hezekiah of Judah, but regained his independence when the latter was hard pressed by Sennacherib. A notice of its history in 147 B.C. is found in 1 Mace. x. 89; after the fall of Jerusalem a.d. 70 it was settled by Jews. At the time of the crusades it was still a large village. Recently a Jewish agri- cultural colony has been settled there. The houses are built of mud, and in the absence of visible remains of antiquity, the identification of the site is questionable. The neighbourhood is fertile. (R. A. S. M.)

ELABUGA, a town of Russia, in the government of Vyatka, on the Kama river, 201 m. by steamboat down the Volga from Kazan and then up the Kama. It has flour-mills, and carries on a brisk trade in exporting corn. Pop. (1897) 9776.

The famous Ananiynskiy Mogilnik (burial-place) is on the right bank of the Kama, 3 m. above the town. It was discovered in 1858, was excavated by Alabin, Lerch and Nevostruyev, and has since supplied

extremely valuable collections belonging to the Stone, Bronze and Iron Ages. It consisted of a mound, about 500 ft. in circumference, adorned with decorated stories (which have disappeared), and contained an inner wall, 65 ft. in circumference, made of uncemented stone flags. Nearly fifty skeletons were discovered, mostly lying upon charred logs, surrounded with cinerary urns filled with partially burned bones. A great variety of bronze decorations and glazed clay pearls were strewn round the skeletons. The knives, daggers and arrowpoints are of slate, bronze and iron, the last two being very rough imitations of stone implements. One of the flags bore the image of a man, without moustaches or beard, dressed in a costume and helmet recalling those of the Circassians.

ELAM, the name given in the Bible to the province of Persia called Susiana by the classical geographers, from Susa or Shushan its capital. In one passage, however (Ezra iv. 9), it is confined to Elymais, the north-western part of the province, and its inhabitants distinguished from those of Shushan, which else- where (Dan. viii. 2) is pla.ced in Elam. Strabo (xv. 3. 12, &c.) makes Susiana a part of Persia proper, but a comparison of his account with those of Ptolemy (vi. 3. 1, &c.) and other writers would limit it to the mountainous district to the east of Baby- lonia, lying between the Oroatis and the Tigris, and stretching from India to the Persian Gulf. Along with this mountainous district went a fertile low tract of country on the western side, which also included the marshes at the mouths of the Euphrates and Tigris and the north-eastern coast land of the Gulf. This low tract, though producing large quantities of grain, was intensely hot in summer; the high regions, however, were cool and well watered.

The whole country was occupied by a variety of tribes, speaking agglutinative dialects for the most part, though the western districts were occupied by Semites. Strabo (xi. 13. 3, 6), quoting from Nearchus, seems to include the Susians under the Elymaeans, whom he associates with the Uxii. and Dlaces on the frontiers

of Persia and Susa; but Pliny more correctly makes the Eulaeus the boundary between Susiana and Elymais (N.H. vi. 29-31). The Uxii are described as a robber tribe in the mountains adjacent to Media, and their name is apparently to be identified with the title given to the whole of Susiana in the Persian cuneiform inscriptions, Uwaja, i.e. ” Aborigines.” Uwaja is probably the origin of the modern Khuzistan, though Mordtmann would derive the latter from jjˆ- ” a sugar-reed.” Immediately bordering on the Persians were the Amardians or Mardians, as well as the people of Khapirti (Khatamti, according to Scheil), the name given to Susiana in the Neo-Susian texts. Khapirti

appears as Apir in the inscriptions of Mai-Amir, which fix the locality of the district. Passing over the Messabatae, who inhabited a valley which may perhaps be the modern Mah- Sabadan, as well as the level district of Yamutbal or Yatbur which separated Elam from Babylonia, and the smaller districts of Characene, Cabandene, Corbiana and Gabiene mentioned by classical authors, we come to the fourth principal tribe of Susiana, the Cissii (Aesch. Pers. 16; Strabo xv. 3. 2) or Cossaei (Strabo xi. 5. 6, xvi. 11. 17; Arr. Ind. 40; Polyb. v. 54., &c), the Kassi of the cuneiform inscriptions. So important were they, that the whole of Susiana was sometimes called Cissia after them, as by Herodotus (iii. 91, v. 49, &c). In fact Susiana was only a late name for the country, dating from the time when Susa had been made a capital of the Persian empire. In the Sumerian texts of Babylonia it was called Numma, ” the Highlands,” of which Elamtu or Elamu, ” Elam,” was the Semitic translation. Apart from Susa, the most important part of the country was Anzan (Anshan, contracted Assan), where the native population maintained itself unaffected by Semitic intrusion. The exact position of Anzan is still disputed, but it probably included originally the site of Susa and was distinguished from it only when Susa became the seat of a Semitic government. In the lexical tablets Anzan is given as the equivalent of Elamtu, and the native kings entitle them- selves kings of ” Anzan and Susa,” as well as ” princes of the Khapirti.”

The principal mountains of Elam were on the north, called Charbanus and Cambalidus by Pliny (vi. 27, 31), and belong- ing to the Parachoathras chain. There were numerous rivers flowing into either the Tigris or the Persian Gulf. The most important were the Ulai or Eulaeus {Kuran) with its tributary the Pasitigris, the Choaspes (Kerkhah), the Coprates (river of Diz called Itite in the inscriptions) , the Hedyphon or Hedypnus (Jerrdki), and the Croatis (Hindyan) , besides the monumental Surappi and Ukni, perhaps to be identified with the Hedyphon and Oroatis, which fell into the sea in the marshy region at the mouth of the Tigris. Shushan or Susa, the capital now marked by the mounds of Shush, stood near the junction of the Choaspes and Eulaeus (see Susa); and Badaca, Madaktu in the inscrip- tions, lay between the Shapur and the river of Diz. Among the other chief cities mentioned in the inscriptions may be named Naditu, Khaltemas, Din-sar, Bubilu, Bit-imbi, Khidalu and Nagitu on the sea- coast. Here, in fact, lay some of the oldest and wealthiest towns, the sites of which have, however, been removed inland by the silting up of the shore. J. de Morgan’s excavations at Susa have thrown a flood of light on the early history of Elam and its relations to Babylon. The earliest settle- ment there goes back to neolithic times, but it was

already a fortified city when Elam was conquered by Sargon of Akkad (3800 B.C.) and Stisa became the seat of a Babylonian viceroy. From this time onward for many centuries it continued under Semitic suzerainty, its high-priests, also called " Chief Envoys of Elam, Sippara and Susa," bearing sometimes Semitic, some- times native " Anzanite " names. One of the kings of the dynasty of Ur built at Susa. Before the rise of the First Dynasty of Babylon, however, Elam had recovered its independence, and in 2280 B.C. the Elamite king Kutur-Nakhkhunte made a raid in Babylonia and carried away from Erech the image of the goddess Nana. The monuments of many of his successors have been discovered by de Morgan and their inscriptions deciphered by v. Scheil. One of them was defeated by Ammi-zadoq

of Babylonia (c. 2100 b.c); another would have been the Chedor-laomer (Kutur-Lagamar) of Genesis xiv. One of the greatest builders among them was Untas-GAL (the pronunciation of the second element in the name is uncertain). About 1330 B.C. Khurba-tila was captured by Kuri-galzu III., the Kassite king of Babylonia, but a later prince Kidin-Khutrutas avenged his defeat, and Sutruk-Nakhkhunte (1220 B.C.) carried fire and sword through Babylonia, slew its king Zamama-sum-iddin and carried away a stela of Naram-Sin and the famous code of laws of Khammurabi from Sippara, as well as a stela of Manistusu from Akkuttum or Akkad. He also conquered the land of Asnunnak and carried off from Padan a stela belonging to a refugee from Malatia. He was succeeded by his son who was followed on the throne by his brother, one of the great builders of Elam. In 750 B.C. Umbadara was king of Elam; Khumban- igas was his successor in 742 B.C. In 720 B.C. the latter prince met the Assyrians under Sargon at Dur-ili in Yamutbal, and though Sargon claims a victory the result was that Babylonia recovered its independence under Merodach-baladan and the Assyrian forces were driven north. From this time forward it was against Assyria instead of Babylonia that Elam found itself compelled to exert its strength, and Elamite policy was directed towards fomenting revolt in Babylonia and assisting the Babylonians in their struggle with Assyria. In 7 16 B.C. Khumban- igas died and was followed by his nephew, Sutruk-Nakhkhunte. He failed to make head against the Assyrians; the frontier cities were taken by Sargon and Merodach-baladan was left to his fate. A few years later (704 B.C.) the combined forces of Elam and Babylonia were overthrown at Kis, and in the following year the Kassites were reduced to subjection. The Elamite king was dethroned and imprisoned in 700 B.C. by his

brother Khallusu, who six years later marched into Babylonia, captured the son of Sennacherib, whom his father had placed there as king, and raised a nominee of his own, Nergal-yusezib, to the throne. Khallusu . was murdered in 694 B.C., after seeing the maritime part of his dominions invaded by the Assyrians. His successor Kudur-Nakhkhunte invaded Babylonia; he was repulsed, however, by Sennacherib, 34 of his cities were destroyed, and he himself fled from Madaktu to Khidalu. The result was a revolt in which he was killed after a reign of ten months. His brother Umman- menan at once collected allies and prepared for resistance to the Assyrians. But the terrible defeat at Khalule broke his power; he was attacked by paralysis shortly afterwards, and Khumba- Khaldas II. followed him on the throne (689 B.C.) . The new king endeavoured to gain Assyrian favour by putting to death the son of Merodach-baladan, but was himself murdered by his brothers Urtaki and Teumman (681 B.C.), the first of whom seized the crown. On his death Teumman succeeded and almost immediately provoked a quarrel with Assur-bani-pal by demand- ing the surrender of his nephews who had taken refuge at the Assyrian court. The Assyrians pursued the Elamite army to Susa, where a battle was fought on the banks of the Eulaeus, in which the Elamites were defeated, Teumman captured and slain, and Umman-igas, the son of Urtaki, made king, his younger brother Tammaritu being given the district of Khidalu. Umman- igas afterwards assisted in the revolt of Babylonia under Samas- sum-yukin, but his nephew, a second Tammaritu, raised a rebellion against him, defeated him in battle, cut off his head and seized the crown. Tammaritu marched to Babylonia; while there, his officer Inda-bigas made himself master of Susa and drove Tammaritu to the coast whence he fled to Assur-bani-pal. Inda-bigas was himself overthrown and slain by a new pretender, Khumba-Khaldas III., who was opposed, however, by three other rivals, two of whom maintained themselves in the mountains until the Assyrian conquest of the country, when Tammaritu was first restored and then imprisoned, Elam being utterly devastated. The return of Khumba-Khaldas led to a fresh Assyrian invasion; the Elamite king fled from Madaktu to Dur-undasi; Susa and other cities were taken, and the Elamite army almost exterminated on the banks of the Itite. The whole country was reduced to a desert, Susa was plundered and razed to the ground, the royal sepulchres were desecrated,

and the images of the gods and of 32 kings ” in silver, gold, bronze and alabaster,” were carried away. All this must have happened about 640 B.C. After the fall of the Assyrian empire Elam was occupied by the Persian Teispes, the forefather of Cyrus, who, accordingly, like his immediate successors, is called in the inscriptions ” king of Anzan.”

Susa once more became a capital, and on the establishment of the Persian empire re- mained one of the three seats of government, its language, the Neo-Susian, ranking with the Persian of Persepolis and the Semitic of Babylon as an official tongue. In the reign of Darius, however, the Susianians attempted to revolt, first under Assina or Atrina, the son of Umbadara, and later under Martiya, the son of Issainsakria, who called himself Immanes; but they gradually became completely Aryanized, and their agglutinative dialects were supplanted by the Aryan Persian from the south-east.

Elam, ” the land of the cedar-forest,” with its enchanted trees, figured largely in Babylonian mythology, and one of the adventures of the hero Gilgamesh was the destruction of the tyrant Khumbaba who dwelt in the midst of it. A list of the Elamite deities is given by Assur-bani-pal; at the head of them was In-Susinak, ” the lord of the Susians,” — a title which went back to the age of Babylonian suzerainty, — whose image and oracle were hidden from the eyes of the profane. Nakhkhunte, according to Scheil, was the Sun-goddess, and Lagamar, whose name enters into that of Chedorlaomer, was borrowed from Semitic Babylonia.

See W. K. Loftus, Chaldaea and Susiana (1857) ; A. Billerbeck, Susa (1893) ; J. de Morgan, Memoires de la Delegation en Perse (9 vols., 1899-1906). (A. H. S.)

ELAND (= elk), the Dutch name for the largest of the South African antelopes (Taurotragus oryx) , a species near akin to the kudu, but with horns present in both sexes, and their spiral much closer, being in fact screw-like instead of corkscrew-like. There is also a large dewlap, while old bulls have a thick forelock. In the typical southern form the body-colour is wholly pale fawn, but north of the Orange river the body is marked by narrow vertical white lines, this race being known as T. oryx livingstonei. In Senegambia the genus is represented by T. derbianus, a much larger animal, with a dark neck; while in the Bahr-el-Ghazal district there is a gigantic local race of this species (T. derbianus giganteus). (R. L.*)

ELASTICITY. 1. Elasticity is the property of recovery of an original size or shape. A body of which the size, or shape, or both size and shape, have been altered by the application of forces may, and generally does, tend to return to its previous size and shape when the forces cease to act. Bodies which exhibit this tendency are said to be elastic (from Greek, eXavveiv, to drive). All bodies are more or less elastic as regards size; and all solid bodies are more or less elastic as regards shape. For example: gas contained in a vessel, which is closed

by a piston, can be compressed by additional pressure applied to the piston; but, when the additional pressure is removed, the gas expands and drives the piston outwards. For a second example: a steel bar hanging vertically, and loaded with one ton for each square inch of its sectional area, will have its length increased by about seven one-hundred-thousandths of itself, and its sectional area diminished by about half as much; and it will spring back to its original length and sectional area when the load is gradually removed. Such changes of size and shape in bodies subjected to forces, and the recovery of the original size and shape when the forces cease to act, become conspicuous when the bodies have the forms of thin wires or planks; and these properties of bodies in such forms are utilized in the construction of spring balances, carriage springs, buffers and so on.

It is a familiar fact that the hair-spring of a watch can be coiled and uncoiled millions of times a year for several years without losing its elasticity; yet the same spring can have its shape permanently altered by forces which are much greater than those to which it is subjected in the motion of the watch. The incompleteness of the recovery from the effects of great forces is as important a fact as the practical completeness of the recovery from the effects of comparatively small forces.

The fact is referred to in the distinction between ” perfect ” and ” imperfect ” elasticity; and the limitation which must be imposed upon the forces in order that the elasticity may be perfect leads to the investigation of ” limits of elasticity ” (see §§ 31, 32 below). Steel pianoforte wire is perfectly elastic within rather wide limits, glass within rather narrow limits; building stone, cement and cast iron appear not to be perfectly elastic within any limits, however narrow. When the limits of elasticity are not exceeded no injury is done to a material or structure by the action of the forces. The strength or weakness of a material, and the safety or insecurity of a structure, are thus closely related to the elasticity of the material and to the change of size or shape of the structure when subjected to forces. The ” science of elasticity ” is occupied with the more abstract side of this relation, viz. with the effects that are produced in a body of definite size, shape and constitution by definite forces; the ” science of the strength of materials ” is occupied with the more concrete side, viz. with the application of the results obtained in the science of elasticity to practical questions of strength and safety (see Strength of

Materials).

2. Stress. — Every body that we know anything about is always under the action of forces. Every body upon which we can experiment is subject to the force of gravity, and must, for the purpose of experiment, be supported by other forces. Such forces are usually applied by way of pressure upon a portion of the surface of the body; and such pressure is exerted by another body in contact with the first. The supported body exerts an equal and opposite pressure upon the supporting body across the portion of surface which is common to the two. The same thing is true of two portions of the same body. If, for example, we consider the two portions into which a body is divided by a (geometrical) horizontal plane, we conclude that the lower portion supports the upper portion by pressure across the plane, and the upper portion presses downwards upon the lower portion with an equal pressure. The pressure is still exerted when the plane is not horizontal, and its direction may be obliquely inclined to, or tangential to, the plane. A more precise meaning is given to ” pressure ” below. It is important to distinguish between the two classes of forces: forces such as the force of gravity, which act all through a body, and forces such as pressure applied over a surface. The former are named ” body forces ” or ” volume forces,” and the latter ” surface tractions. ‘ ‘ The action between two portions of a body separated by a geometrical surface is of the nature of surface traction. Body forces are ultimately, when the volumes upon which they act are srnall enough, proportional to the volumes; surface tractions, on the other hand, are ultimately, when the surfaces across which they act are small enough, proportional to these surfaces. Surface tractions are always exerted by one body upon another, or by one part of a body upon another part, across a surface of contact; and a surface traction is always to be regarded as one aspect of a ” stress,” that is to say of a pair of equal and opposite forces; for an equal traction is always exerted by the second body, or part, upon the first across the surface.

3. The proper method of estimating and specifying stress is a matter of importance, and its character is necessarily mathe- matical. The magnitudes of the surface tractions which compose a stress are estimated as so much force (in dynes or tons) per unit of area (per sq. cm. or per sq. in.). The traction across an assigned plane at an assigned point is measured by the mathe- matical limit of the fraction F/S, where F denotes the numerical measure of the force exerted across a small portion of the plane containing the point, and S denotes the numerical measure of the area of this portion, and the limit is taken by diminishing S indefinitely. The traction may act as ” tension,” as it does in the case of a horizontal section of a bar

supported at its upper end and hanging vertically, or as ” pressure,”ˆ as it does in the case of a horizontal section of a block resting on a horizontal plane, or again it may act obliquely or even tangentially to the separating plane. Normal tractions are reckoned as positive when they are tensions, negative when

they are pressures. Tangential tractions are ‘often called “shears” (see § 7 below). Oblique tractions can always be resolved, by the vector law, into normal and tangential tractions. In a fluid at rest the traction across any plane at any point is normal to the plane, and acts as pressure. For the complete specification of the ” state of stress ” at any point of a body, we should require to know the normal and tangential components of the traction across every plane drawn through the point. Fortunately this requirement can be very much simplified (see §§ 6, 7 below).

4. In general let v denote the direction of the normal drawn in a specified sense to a plane drawn through a point O of a body; and let Tv denote the traction exerted across the plane, at the point O, by the portion of the body towards which v is drawn upon the remaining portion. Then T v is a vector quantity , which has a definite magnitude (estimated as above by the limit of a fraction of the form F/S) and a definite direction. It can be specified completely by its components X„, Yj/, Z v , referred to fixed rectangular axes of x, y, z- When the direction of v is that of the axis of x, in the positive sense, the components are denoted by Xˆ, Yˆ, Z x ; and a similar notation is used when the direction of v is that of y or z, the suffix x being replaced by y or z.

5. Every body about which we know anything is always in a state of stress, that is to say there are always internal forces acting between the parts of the body, and these forces are exerted as surface tractions across geometrical surfaces drawn in the body. The body, and each part of the body, moves under the action of all the forces (body forces and surface tractions) which are exerted upon it; or remains at rest if these forces are in equilibrium. This result is expressed analytically by means of certain equations — the ” equations of motion ” or ” equations of equilibrium ” of the body.

Let p denote the density of the body at any point, X, Y, Z, the components parallel to the axes of x, y, z of the body forces, estimated as so much force per unit of mass; further let f x , fy, fz denote the components, parallel to the same axes, of the acceleration of the particle which is momentarily at the point {x, y, z). The equations of motion express the result that the rates of change of the momentum,

and of the moment of momentum, of any portion of the body are those due to the action of all the forces exerted upon the portion by other bodies, or by other portions of the same body. For the changes of momentum, we have three equations of the type

tffpXdx dy dz + ffX„dS * = jffpf x dx dy dz, . (1)

in which the volume integrations are taken through the volume of the portion of the body, the surface integration is taken over its surface, and the notation X v is that of § 4, the direction of v being that of the normal to this surface drawn outwards. For the changes of moment of momentum, we have three equations of the type

fffp(yZ-zY)dxdyds + ff(yZy-zY v)dS = ffjp(yfz-zf»)dx dy dz. (2)

The equations (1) and (2) are the equations of motion of any kind of body. The equations of equilibrium are obtained by replacing the right-hand members of these equations by zero.

6. These equations can be used to obtain relations between the values of X p , Y„, . . . for different directions p. When the equations are applied to a very small volume, it appears that the terms ex- pressed by surface integrals would, unless they tend to zero limits in a higher order than the areas of the surfaces, be very great com pared with the terms expressed by volume integrals. We conclude that the surface tractions on the portion of the body which is bounded by any very small closed surface, are ultimately in equilibrium. When this result is interpreted for a small portion in the shape of a tetrahedron, having three of its faces at right angles to the co- ordinate axes, it leads to three equations of the type

X J , = X I cos(x,x) + X„cos(;y, > 0 + X s cos(z,!'), . (1) where v is the direction of the normal (drawn outwards) to the remaining face of the tetrahedron, and (*, v) . . . denote the angles which this normal makes with the axes. Hence X y , ... for any

direction v are expressed in terms of X* When the above

result is interpreted for a very small portion in the shape of a cube, having its edges parallel to the co-ordinate axes, it leads to the

equations Y, = Z Vl Z X = X., X„ = Y X . . . . (2)

When we substitute in the general equations the particular results which are thus obtained, we find that the equations of motion take such forms as

dX x 1 dX v . dZ x ,

PJx,

pX+ ir + “a3T + az

(3)

and the equations of moments are satisfied identically. The equa- tions of equilibrium are obtained by replacing the right-hand members by zero.

ELASTICITY

H3

+T

7- A state of stress in which the traction across any plane of a set of parallel planes is normal to the plane, and that across any perpendicular plane vanishes, is described as a state of ” simple tension ” (” simple pressure ” if the traction is negative) . A state of stress in which the traction across any plane is normal to the plane, and the traction is the same for all planes passing

through any point, is de- scribed as a state of ” uni- form tension ” (” uniform pressure ” if the traction is negative) . Sometimes the phrases ” isotropic tension ” and ” hydro- static pressure ” are used instead of ” uniform ” tension or pressure. The

ˆr

/

¥■

/

+T

“T

Fig. i.

distinction between the two states, simple tension and uniform tension, is illustrated in fig. i .

A state of stress in which there is purely tangential traction on a plane, and no normal traction on any perpendicular plane, is described as a state of ” shearing stress.” The result (2) of § 6 shows that tangential tractions occur in pairs. If, at any point, there is tangential traction, in any direction, on a plane

parallel to this direction, and if we draw through the point a plane at right angles to the direction of this traction, and therefore containing the normal to the first plane, then there is equal tangential traction on this second plane in the direction of the normal to the first plane. The result is illustrated in fig. 2, where a rectangular block is sub- jected on two opposite faces to opposing tangential trac-

s*

Fig. 2.

tions, and is held in equilibrium by equal tangential tractions applied to two other faces.

Through any point there always pass three planes, at right angles to each other, across which there is no tangential traction. These planes are called the “principal planes of stress,” and the (normal) tractions across them the ” principal stresses.” Lines, usually curved, which have at every point the direction of a principal stress at the point, are called “lines of stress.”

8. It appears that the stress at any point of a body is com- pletely specified by six quantities, which can be taken to be the X x , Y y , Z z and Y z , Z x , X y of § 6. The first three are tensions (pressures if they are negative) across three planes parallel to fixed rectangular directions, and the remaining three are tangen- tial tractions across the same three planes. These six quantities are called the ” components of stress.” It appears also that the components of stress are connected with each other, and with the body forces and accelerations, by the three partial differential equations of the type (3) of § 6. These equations are available for the purpose of determining the state of stress which exists in a body of definite form subjected to definite forces, but they are not sufficient for the purpose (see § 38 below). In order to effect the determination it is necessary to have information concerning the constitution of the body, and to introduce sub- sidiary relations founded upon this information.

0. The definite mathematical relations which have been found to connect the components of stress with each other, and with other

quantities, result necessarily from the formation of a clear conception of the nature of stress. They do not admit of experi- mental verification, because the stress within a body does not admit of direct measurement. Results which are deduced by the aid of these relations can be compared with experimental results. If any discrepancy were observed it would not be inter- preted as requiring a modification of the concept of stress, but

as affecting some one or other of the subsidiary relations which must be introduced for the purpose of obtaining the theoretical result.

10. Strain.- — For the specification of the changes of size and shape which are produced in a body by any forces, we begin by defining the ” average extension ” of any linear element or ” filament ” of the body. Let l„ be the length of the filament before the forces are applied, / its length when the body is subjected to the forces. The average extension of the filament is measured by the fraction {l-l)ll . If this fraction is negative there is ” contraction.” The ” extension at a point ” of a body in any assigned direction is the mathematical limit of this fraction when one end of the filament is at the point, the filament has the assigned direction, and its length is diminished indefinitely. It is clear that all the changes of size and shape of the body are known when the extension at every point in every direction is known.

The relations between the extensions in different directions around the same point are most simply expressed by introducing the extensions in the directions of the co-ordinate axes and the angles between filaments of the body which are initially parallel to these axes. Let e xx , e yy , e zz denote the extensions parallel to the axes of x, y, z, and let e vz , e zx , e xv denote the cosines of the angles between the pairs of filaments which are initially parallel to the axes of y and z, 3 and x, x and y. Also let e denote the extension in the direction of a line the direction cosines of which are /, m, n. Then, if the changes of size and shape are slight, we have the relation e = e xx P --eyyni 1 --e lz tf +e yz mn --e zx nl--e ly lm.

The body which undergoes the change of size or shape is said to be ” strained,” and the ” strain ” is determined when the quantities e xx , e yy , e zz and e yz , e zx , e xy defined above are known at every point of it. These quantities are called ” components of strain.” The three of the type e xx are extensions, and the three of the type e yz are called ” shearing strains ” (see § 12 below).

11. All the changes of relative position of particles of the body are known when the strain is known, and conversely the strain can be

determined when the changes of relative position are given. These changes can be expressed most simply by the introduction of a vector quantity to represent the displacement of any particle.

When the body is deformed by the action of any forces its particles pass from the positions which they occupied before the action of the forces into new positions. If x, y, z are the co-ordinates of the position of a particle in the first state, its co-ordinates in the second state may be denoted by x + u, y--v, z + tti. The quantities, u, v, w are the " components of displacement." When these quantities are small, the strain is connected with them by the equations

e xx = du/dx, e n = dvldy, e zz = dwjdz,

_ dw . dv ‘ dy + dz’

_du dw dz dx’

_dv du ^”-dx’ + W

(l)

12. These equations enable us to determine more exactly the nature of the " shearing strains " such as e X y. Letw, for example, be of the form sy, where s is constant, and let v and w vanish. Then e xy = s, and the remaining components of strain vanish. The nature of the strain (called " simple shear “) is simply appreciated by imagining the body to consist of a series of thin sheets, like the leaves of a book, which lie one over another and are all parallel to a plane (that of x, z) ; and the displacement is seen to consist in the shifting of each sheet relative to the sheet below in a direction (that of x) which is the same for all the sheets. The displacement of any sheet is proportional to its distance y from a particular sheet, which remains undisplaced. The shearing strain has the effect of distorting the shape of any portion of the body without altering its volume. This is shown in fig. 3, where a square ABCD is distorted by simple shear (each point moving parallel to the line marked xx)mto a rhombus A’B’C’D’, as if by an extension of the diagonal BD and a con- traction of the diagonal AC, which extension and contraction are adjusted so as to leave the area unaltered. In the general case, where u is not of the form sy and v and w do not vanish, the shearing strains such as e xy result from the composition of pairs of simple shears of the type which has just been explained.

13. Besides enabling us to express the extension in any direction and the changes of relative direction of any filaments of the body, the components of strain also express the changes of size of volumes and areas. In particular, the ” cubical dilatation,” that is to say, the increase of volume per unit of volume, is expressed by the

quantity e xx +e yy +e Z! orˆ-. ˆzˆr- When this quantity is negative

there is ” compression.’

l dx~dy~dz

14. It is important to distinguish between two types of strain: the “rotational” type and the ” irrotational ” type. The distinction is illustrated in fig. 3, where the figure A”B”C”D” is obtained from the figure ABCD by contraction parallel to AC and extension parallel to BD, and the figure A’B’C’D’ can be obtained from ABCD by the same con- traction and extension followed by a rotation through the angle A”OA’. In strains of the irrotational type there are at any point three filaments at right angles to each other, which are such that the particles which lie in them before strain continue to lie in them after strain. A small spherical element of the body with its centre at the point becomes a small ellipsoid with its axes in the directions of these three filaments. In the case illustrated in the figure, the lines of the filaments in question, when the figure ABCD is strained into the figure A”B”C”D”, are OA, OB and a line through O at right angles to their plane. In strains of the rotational type, on the other hand, the single existing set of three filaments (issuing from a point) which cut each other at right angles both before and after strain do not retain their directions after strain, though one of them may do so in certain cases. In the figure, the lines of the filaments in question, when the figure ABCD is strained into A’B’C’D’, are OA, OB and a line at right angles to their plane before strain, and after strain they are OA’, OB’, and the same third line. A rotational strain can always be analysed into an irrotational strain (or ” pure ” strain) followed by a rotation.

Analytically, a strain is irrotational if the three quantities

dw dv du dw dv du

dy dz’ 3a dx ‘ dx dy vanish, rotational if any one of them is different from zero. The halves of these three quantities are the components of a vector quantity called the ” rotation.”

15. Whether the strain is rotational or not, there is always one set of three linear elements issuing from any point which cut each other at right angles both before and after strain. If these directions are chosen as axes of x, y, 2, the shearing strains e„*, e iX , e xy vanish at this point. These directions are called the ” principal ax;s of strain,” and the extensions in the directions of these axes the ” principal extensions.”

16. It is very important to observe that the relations between components of strain and components of displacement imply relations between the components of strain themselves. If by any process of reasoning we arrive at the conclusion that the state of strain in a body is such and such a state, we have a test of the possibility or impossibility of our conclusion. The test is that, if the state of strain is a possible one, then there

must be a displacement which can be associated with it in accordance with the equations (1) of § 11.

We may eliminate u, v, w from these equations. When this is

done we find that the quantities e. two sets of equations

d% dz’

‘■ +

d 2 e zl

dy’ d 2 ˆ

dx 2 ‘ dz- C e X x I Q*“y-\t

dy 2 dx’ 1

d*-e yz ‘ dydz

d 2 e ix ~d z dx

d 2 e xy ‘ dxdy

e yt are connected by the

(1)

and

d 2 e xx

‘= =— (de„ g de zx de xy \

“dydz dx\ dx ‘ dy ‘ dz)

d 2 e yy d I de V i_ de tx de xy \

dzdx ~ dy \ dx dy ‘ dz /

d_(de V g de zx de xy \

~ dz \ dx ‘ dy dz I

• (2)

These equations are known as the conditions of compatibility of strain-components. The components of strain which specify any possible strain satisfy them. Quantities arrived at in any way, and intended to be components of strain, if they fail to satisfy these equations, are not the components of any possible strain; and the theory or speculation by which they are reached must be modified or abandoned.

When the components of strain have been found in accordance with these and other necessary equations, the displacement is to be found by solving the equations (1) of § 11, considered as differential equations to determine u, v, w. The most general possible solution will differ from any other solution by terms which contain arbitrary constants, and these terms represent a possible displacement. This ” complementary displacement ” involves no strain, and would be a possible displacement of an ideal perfectly rigid body,

17. The relations which connect the strains with each other and with the displacement are geometrical relations resulting from the definitions of the quantities and not requiring any experimental verification. They do not admit of such verifica- tion, because the strain within a body cannot be measured. The quantities (belonging to the same category) which can be measured are displacements of points on the surface of a body. For example, on the surface of a bar subjected to tension we may make two fine transverse scratches, and measure the distance between them before and after the bar is stretched. For such measurements very refined instruments are required. Instru- ments for this purpose are called barbarously ” extensometers,” and many different kinds have been devised. From measure- ments of displacement by an extensometer we may deduce

the average extension of a filament of the bar terminated by the two scratches. In general, when we attempt to measure a strain, we really measure some displacements, and deduce the values, not of the strain at a point, but of the average extensions of some particular linear filaments of a body containing the point ; and these filaments are, from the nature of the case, nearly always superficial filaments.

18. In the case of transparent materials such as glass there is available a method of studying experimentally the state of strain within a body. This method is founded upon the result that a piece of glass when strained becomes doubly refracting, with its optical principal axes at any point in the directions of the principal axes of strain (§ 15) at the point. When the piece has two parallel plane faces, and two of the principal axes of strain at any point are parallel to these faces, polarized light transmitted through the piece in a direction normal to the faces can be used to determine the directions of the principal axes of the strain at any point. If the directions of these axes are known theoretic- ally the comparison of the experimental and theoretical results yields a test of the theory.

19. Relations between Stresses and Strains. — The problem of the extension of a bar subjected to tension is the one which has been most studied experimentally, and a6 a result of this study it is found that for most materials, including all metals except cast metals, the measurable extension is proportional

to the applied tension, provided that this tension is not too great. In interpreting this result it is assumed that the tension is uni- form over the cross-section of the bar, and that the extension of longitudinal filaments is uniform throughout the bar; and then the result takes the form of a law of proportionality connect- ing stress and strain: The tension is proportional to the exten- sion. Similar results are found for the same materials when other methods of experimenting are adopted, for example, when a bar is supported at the ends and bent by an attached load and the deflexion is measured, or when a bar is twisted by an axial couple and the relative angular displacement of two sections is measured. We have thus very numerous experimental verifications of the famous law first enunciated by Robert Hooke in 1678 in the words ” Ut Tensio sic vis “; that is, ” the Power of any spring is in the same proportion as the Tension (— stretching) thereof.” The most general statement of Hooke’s Law in modern

language would be: — Each of the six components of stress at any point of a body is a linear function of the six components of strain at the point. It is evident from what has been said above as to the nature of the measurement of stresses and strains that this law in all its generality does not admit of complete experimental verification, and that the evidence for it consists largely in the agreement of the results which are deduced from it in a theoretical fashion with the results of experiments. Of such results one of a general character may be noted here. If the law is assumed to be true, and the equations of motion of the body (§ 5) are transformed by means of it into differential equations for determining the components of displacement, these differential equations admit of solutions which represent periodic vibratory displacements (see § 85 below). The fact that solid bodies can be thrown into states of isochronous vibration has been emphasized by G. G. Stokes as a peremptory proof of the truth of Hooke's Law.

20. According to the statement of the generalized Hooke's Law the stress-components vanish when the strain-components vanish. The strain-components contemplated in experiments upon which the law is founded are measured from a zero of reckoning which corresponds to the state of the body subjected to experiment before the experiment is made, and thi stress- components referred to in the statement of the law are those which are called into action by the forces applied to the body in the course of the experiment. No account is taken of the stress which must already exist in the body owing to the force of gravity and the forces by which the body is supported. When it is desired to take account of this stress it is usual to suppose that the strains which would be produced in the body if it could be freed from the action of gravity and from the pressures of supports are so small that the strains produced by the forces which are applied in the course of the experiment can be compounded with them by simple superposition. This supposition comes to the same thing as measuring the strain in the body, not from the state in which it was before the experiment, but from an ideal state (the " unstressed " state) in which it would be entirely free from internal stress, and allowing for the strain which would be produced by gravity and the supporting forces if these forces were applied' to the body when free from stress. In most prac- tical cases the initial strain to be allowed for is unimportant (see §§ 91-93 below).

21. Hooke's law of proportionality of stress and strain leads to the introduction of important physical constants: the moduluses of elasticity of a body. Let a bar of uniform section (of area w) be stretched with tension T, which is distributed uniformly over the

section, so that the stretching force is Tw, and let the bar be unsupported at the sides. The bar will undergo a longitudinal extension of magnitude T/E, where E is a constant quantity depending upon the material. This constant is called Young's modulus after Thomas Young, who introduced it into the science in 1807. The quantity E is of the same nature as a traction, that is to say, it is measured as a force estimated per unit of area. For steel it is about 2-o4Xio 12 dynes per square centimetre, or about 13,000 tons per sq. in.

22. The longitudinal extension of the bar under tension is

not the only strain in the bar. It is accompanied by a lateral contraction by which all the transverse filaments of the bar are shortened. The amount of this contraction is oT/E, where it is a certain number called Poisson's ratio, because its importance was at first noted by S. D. Poisson in 1828. Poisson arrived at the existence of this contraction, and the corresponding number c, from theoretical considerations, and his theory led him to assign to a the value |. Many experiments have been made with the view of determining a, with the result that it has been found to be different for different materials, although for very many it does not differ much from J. For steel the best value (Amagat's) is 0-268. Poisson's theory admits of being modified so as to agree with the results of experiment.

23. The behaviour of an elastic solid body, strained within the limits of its elasticity, is entirely determined by the constants E and a if the body is isotropic, that is to say, if it has the same quality in all diuctions around any point. Nevertheless it is convenient to introduce other constants which are related to the action of particular sorts of forces. The most important of these are the " modulus of compression " (or " bulk modulus ") and the " rigidity " (or "modulus of shear"). To define the modulus of compression, we suppose that a solid body of any form is subjected to uniform hydrostatic pressure of amount p. The state of stress within it will be one of uniform pressure, the same at all points, and the same in all directions round any point. There will be compression, the same at all points, and propor- tional to the pressure; and the amount of the compression can be expressed as pjk. The quantity k is the modulus of com- pression. In this case the linear contraction in any direction is p/}k; but in general the linear extension (or contraction) is not one-third of the cubical dilatation (or compression) .

24. To define the rigidity, we suppose that a solid body is subjected to forces in such a way that there is shearing stress within it. For example, a cubical block may be subjected to opposing tractions on

opposite faces acting in directions which are parallel to an edge of the cube and to both the faces. Let S be the amount of the traction, and let it be uniformly distri- buted over the faces. As we have seen (§ 7), equal tractions must act upon two other faces in suitable directions in order to maintain equilibrium (see fig. 2 of § 7). The two directions involved may be chosen as axes of x, y as in that figure. Then the state of stress will be one in which the stress-component denoted by X„ is equal to S, and the remaining stress-components vanish; and the strain produced in the body is shearing strain of the type denoted by eˆ. The amount of the shearing strain is S/jU, and the quantity n is the " rigidity."

25. The modulus of compression and the rigidity are quantities of the same kind as Young's modulus. The modulus of com- pression of steel is about i-43Xio 12 dynes per square centi- metre, the rigidity is about 8-i9Xio u dynes per square centi- metre. It must be understood that the values for different specimens of nominally the same material may differ consider- ably.

The modulus of compression k and the rigidity p. of an isotropic material are connected with the Young's modulus E and Poisson's ratio

£-E/3(l-2

26. Whatever the forces acting upon an isotropic solid body may be, provided that the body is strained within its limits of elasticity, the strain-components are expressed in terms of the stress-com- ponents by the equations

e xx = (X x — oY„ —

«»» = (Yk — • ■ (1)

e„ =(Z S — jX,-

If we introduce a quantity X, of the same nature as E or m, by the equation

A = E«r/(l-)-o-)(l-2<7), ... (2) we may express the stress-components in terms of the strain-Com- ponents by the equations

X. x =\(e xx +e U y+ez l)+2pe xx , Yz = ne V! , "J Y y =\{e xx +ey U +e zz)+2 l ie. :/y , Z x =ixe m , > ■ (3) Z x =\{e xx +e y y+e a)+2)ie 2X , X v =iie xv ; J and then the behaviour of the body under the action of any forces

depends upon the two constants X and p. These two constants were introduced by G. Lame in his treatise of 1852. The importance of the quantity m had been previously emphasized by L. J. Vicat and G. G. Stokes.

27. The potential energy per unit of volume (often called the ” resilience “) stored up in the body by the strain is equal to \{\+2ˆ{eˆ x +e yy +cˆy + Me\ i +e\ x +e xy -\e vy e a -Aeˆ xx -Ae xx e m),

or the equivalent expression

M(XL+Yt+22) – 2 „(Y,Z, f Z.X. +X.Y.J+af.i + <0(Y* +Zl+X 2 *)]/ E.

The former of these expressions is called the ” strain-energy-function ‘ ‘

28. The Young’s modulus E of a material is often determined experimentally by the direct method of the extensometer (§ 17), but more frequently it is determined indirectly by means of a result obtained in the theory of the flexure of a bar (see §§ 47) S3 below). The rigidity ju is usually determined indirectly by means of results obtained in t’he theory of the torsion of a bar (see §§ 41, 42 below). The modulus of compression k may be determined directly by means of the piezometer, as was done by E. H. Amagat, or it may be determined indirectly by means of a result obtained in the theory of a tube under pressure, as was done by A. Mallock (see § 78 below). The value of Poisson’s ratio a is generally inferred from the relation connecting it with E and y. or with E and k, but it may also be determined indirectly by means of a result obtained in the theory of the flexure of a bar (§ 47 below), as was done by M. A. Cornu and A. Mallock, or directly by a modification of the extensometer method, as has been done recently by J. Morrow.

29. The elasticity of a fluid is always expressed by means of a single quantity of the same kind as the modulus of compression of a solid body. To any increment of pressure, which is not too great, there corresponds a proportional cubical compression, and the amount of this compression for an increment 8p of pressure can be expressed as 5p]k. The quantity that is usually tabulated is the reciprocal of k, and it is called the coefficient of compressibility. It is the amount of compression per unit increase of pressure. As a physical quantity it is

of the same dimensions as the reciprocal of a pressure (or of a force per unit of area). The pressures concerned are usually measured in atmospheres (1 atmosphere = 1-014 x Io6 dynes per sq. cm.). For water the coefficient of compressibility, or the compression per atmosphere, is about 4-5 X io -5 . This gives for k the value 2-22 X io 10 dynes per sq. cm. The Young's modulus and the rigidity of a fluid are always zero.

30. The relations between stress and strain in a material which is not isotropic are much more complicated. In such a material the Young's modulus depends upon the direction of the tension, and its variations about a point are expressed by means of a surface of the fourth degree. The Poisson's ratio depends upon the direction of the contracted lateral filaments as well as upon that of the longitudinal extended ones. The rigidity depends upon both the directions involved in the specification of the shearing stress. In general there is no simple relation between the Young's moduluses and Poisson's ratios and rigidities for assigned directions and the modulus of compression. Many materials in common use, all fibrous woods for example, are actually aeolotropic (that is to say, are not isotropic), but the materials which are aeolotropic in the most regular fashion are natural crystals. The elastic behaviour of crystals has been studied exhaustively by many physicists, and in particular by W. Voigt. The strain-energy-function is a homogeneous quadratic function of the six strain-components, and this function may have as many as 21 independent co- efficients, taking the place in the general case of the 2 coefficients X, p which occur when the material is isotropic — a result first obtained by George Green in 1837. The best experimental determinations of the coefficients have been made indirectly by Voigt by means of results obtained in the theories of the torsion and flexure of aeolotropic bars.

31. Limits of Elasticity. — A solid body which has been strained by considerable forces does not in general recover its original size and shape completely after the forces cease to act. The strain that is left is called set. If set occurs the elasticity is

said to be " imperfect," and the greatest strain (or the greatest load) of any specified type, for which no set occurs, defines the " limit of perfect elasticity " corresponding to the specified type of strain, or of stress. All fluids and many solid bodies, such as glasses and crystals, as well as some metals (copper, lead, silver) appear to be perfectly elastic as regards change of volume within wide limits; but malleable metals and alloys can have their densities permanently increased by considerable pressures. The limits of perfect elasticity as regards

change of shape, on the other hand, are very low, if they exist at all, for glasses and other hard, brittle solids; but a class of metals including copper, brass, steel, platinum are very perfectly elastic as regards distortion, provided that the distortion is not too great. The question can be tested by observation of the torsional elasticity of thin fibres or wires. The limits of perfect elasticity are somewhat ill-defined, because an experiment cannot warrant us in asserting that there is no set, but only that, if there is any set, it is too small to be observed.

32. A different meaning may be, and often is, attached to the phrase" limits of elasticity " in consequence of the following experimental result: — Let a bar be held stretched under a moderate tension, and let the extension be measured; let the tension be slightly increased and the extension again measured; let this process be continued, the tension being increased by equal increments. It is found that when the tension is not too great the extension increases by equal increments (as nearly as experiment can decide), but that, as the tension increases, a stage is reached in which the extension increases faster than it would do if it continued to be proportional to the tension. The beginning of this stage is tolerably well marked. Some time before this stage is reached the limit of perfect elasticity is passed; that is to say, if the load is removed it is found that there is some permanent set. The limiting tension beyond which the above law of proportionality fails is often called the " limit of linear elasticity." It is higher than the limit of perfect elasticity. For steel bars of various qualities J. Bauschinger found for this limit values varying from 10 to 17 tons per square inch. The result indicates that, when forces which produce any kind of strain are applied to a solid body and are gradually increased, the strain at any instant increases proportionally to the forces up to a stage beyond that at which, if the forces were removed, the body would completely recover its original size and shape, but that the increase of strain ceases to be proportional to the increase of load when the load surpasses a certain limit. There would thus be, for any type of strain, a limit of linear elasticity, which exceeds the limit of perfect elasticity.

33. A body which has been strained beyond the limit of linear elasticity is often said to have suffered an "over-strain. " When the load is removed, the set which can be observed is not entirely permanent; but it gradually diminishes with lapse of time. This phenomenon is named " elastic after-working." If, on the other hand, the load is maintained constant, the strain is gradually increased. This effect indicates a gradual flowing of solid bodies under great stress; and a similar effect was observed in the experiments of H. Tresca on

the punching and crushing of metals. It appears that all solid bodies under sufficiently great loads become ” plastic,” that is to say, they take a set which gradually increases with the lapse of time. No plasticity is observed when the limit of linear elasticity is not exceeded.

34. The values of the elastic limits are affected by overstrain. If the load is maintained for some time, and then removed, the limit of linear elasticity is found to be higher than before. If the load is not maintained, but is removed and then reapplied, the limit is found to be lower than before. During a period of rest a test piece recovers its elasticity after overstrain.

35. The effects of repeated loading have been studied by A. Wohler, J. Bauschinger, O. Reynolds and others. It has been found that, after many repetitions of rather rapidly alter- nating stress, pieces are fractured by loads which they have many times withstood. It is not certain whether the fracture

is in every case caused by the gradual growth of minute flaws from the beginning of the series of tests, or whether the elastic quality of the material suffers deterioration apart from such flaws. It appears, however, to be an ascertained result that, so long as the limit of linear elasticity is not exceeded, repeated loads and rapidly alternating loads do not produce failure of the material.

36. The question of the conditions of safety, or of the condi- tions in which rupture is produced, is one upon which there has been much speculation, but no completely satisfactory result has been obtained. It has been variously held that rupture occurs when the numerically greatest principal stress exceeds a certain limit, or when this stress is tension and exceeds a certain limit, or when the greatest difference of two principal stresses (called the ” stress-difference “) exceeds a certain limit, or when the greatest extension or the greatest shearing strain or the greatest strain of any type exceeds a certain limit. Some of these hypotheses appear to have been disproved. It was held by G. F. Fitzgerald {Nature, Nov. 5, 1896) that rupture is not produced by pressure symmetrically applied all round a body, and this opinion has been confirmed by the recent experi- ments of A. Foppl. This result disposes of the greatest stress hypothesis and also of the greatest strain hypothesis. The fact that short pillars can be crushed by longitudinal

pressure disposes of the greatest tension hypothesis, for there is no tension in the pillar. The greatest extension hypothesis failed to satisfy some tests imposed by H. Wehage, who experimented with blocks of wrought iron subjected to equal pressures in two directions at right angles to each other. The greatest stress- difference hypothesis and the greatest shearing strain hypothesis would lead to practically identical results, and these results have been held by J. J. Guest to accord well with his experi- ments on metal tubes subjected to various systems of combined stress; but these experiments and Guest's conclusion have been criticized adversely by O. Mohr, and the question cannot be regarded as settled. The fact seems to be that the conditions of rupture depend largely upon the nature of the test (tensional, torsional, flexural, or whatever it may be) that is applied to a specimen, and that no general formula holds for all kinds of tests. The best modern technical writings emphasize the importance of the limits of linear elasticity and of tests of dynamical resistance (§87 below) as well as of statical resistance.

37. The question of the conditions of rupture belongs rather to the science of the strength of materials than to the science of elasticity (§1); but it has been necessary to refer to it briefly here, because there is no method except the methods of the theory of elasticity for determining the state of stress or strain in a body subjected to forces. Whatever view may ultimately be adopted as to the relation between the conditions of safety of a structure and the state of stress or strain in it, the calculation of this state by means of the theory or by experimental mˆans (as in § 18) cannot be dispensed with.

38. Methods of determining the Stress in a Body subjected to given Forces. — To determine the state of stress, or the st"te of strain, in an isotropic solid body strained within its limits of elasticity by given forces, we have to use (i.) the equations of equilibrium, (ii.) the conditions which hold at the bounding surface, (iii.) the relations between stress-components and strain-components, (iv.) the rela- tions between strain-components and displacement. The equations of equilibrium are (with notation already used) three partial differ- ential equations of the type

The conditions which hold at the bounding surface are three equations of the type _

Xi cos (x, v)--"Ky cos (y, v) + Z x cos (z, v) = Xj,, (2)

where v denotes the direction of the outward-drawn normal to the bounding surface, and X y denotes the x-component of the applied

surface traction. The relations between stress-components and strain-components are expressed by either of the sets of equations (1) or (3) of § 26. The relations between strain-components and displacement are the equations (1) of § 11, or the equivalent con- ditions of compatibility expressed in equations (1) and (2) of § 16.

39. We may proceed by either of two methods In one method wk eliminate the strtss-components and the strain-components and

retain only the components of displacement. This method leads (with notation already used) to three partial differential equations of the type

. fl (du dv dw\ , fd 2 u . d*u , d 2 u\ . v

and three boundary conditions of the type

\ „„„(•». \ftu,dv,dw\ . (, -.du . . ./dv t du\

XC0S + + —j +„ j 2C08(x,p) 5i +C08 (ax +ˆ)

(3)

‘fc’)(g+g)i-X-,. (4)

In the alternative method we eliminate the strain-components and the displacements. This method leads to a system of partial differ- ential equations to be satisfied by the stress-components. In this system there are three equations of the type

three of the type

«, «, yx,

dx 2 “*” df i ~ dz 2

dX; dX„ dZ x y

dx

(1 bis)

+

1

a 2

I+

i(X I +Y„+Z z) =

and three of the type

• /3X . 3Y . 3Z\ 3X , .

dx 2

+

d’-Y, , d 2 Y z

a 2

+1 + TT^ X * + Y “ + Z *) = -” (l+S) • < 6 >

df ‘ dz 2 r i + odydz the equations of the two latter types being necessitated by the conditions of compatibility of strain-components. The solutions of these equations have to be adjusted so that the boundary conditions of the type (2) may be satisfied.

40. It is evident that whichever method is adopted the mathe- matical problem is in general very complicated. It is also evident that, if we attempt to proceed by help of some intuition as to the nature of the stress or strain, our intuition ought to satisfy the tests provided by the above systems of equations. Neglect of this precaution has led to many errors. Another source of frequent error lies in the neglect of the conditions in which the above systems of equations are correct. They are obtained by help of the supposition that the relative displacements of the parts of the strained body are small. The solutions of them must therefore satisfy the test of smallness of the relative displacements.

41. Torsion. — As a first example of the application of the theory we take the problem of the torsion of prisms. This problem, considered first by C. A. Coulomb in 1784, was finally solved by B. de Saint-Venant in 1855. The problem is this: — A cylindrical or prismatic bar is held twisted by terminal couples; it is required to determine the state of stress and strain in the interior. When the bar is a circular cylinder the problem is easy. Any section is displaced by rotation about the central-line through a small angle, which is proportional to the distance z of the section from a fixed plane at right angles to this line. This plane is a terminal section if one of the two terminal sections is not displaced. The angle through which the section z rotates is tz, where t is a constant, called the amount of the twist; and this constant t is equal to G/piI, where G is the twisting couple, and I is the moment of inertia of the cross-section about the central-line. This result is often called ” Coulomb’s law.” The stress within the bar is shearing stress, consisting, as it must, of two sets of equal tangential tractions on two sets of planes which are at right angles to each other. These planes are the cross-sections and the axial planes of the bar. The tangential traction at any point of the cross- section is directed at right angles to the axial plane through the point, and the tangential traction on the axial plane is directed parallel to the length of the bar. The amount of either at a distance r from the axis is fj.rr or Gr/I. The result that G = ;utI can be used to determine /x experimentally, for t may be measured and G and I are known.

42. When the cross-section of the bar is not circular it is clear that this solution fails; for the existence of tangential traction, near the

prismatic bounding surface, on any plane which does not cut this surface at right angles, implies the existence of traction applied to this surface. We may attempt to modify the theory by retaining the supposition that the stress consists of shearing stress, involving tangential traction distributed in some way over the cross-sections. Such traction is obviously a necessary constituent of any stress-system which could be produced by terminal couples around the axis.

14.8

ELASTICITY

We should then know that there must be equal tangential traction directed along the length of the bar, and exerted across some planes or other which are parallel to this direction. We should also know that, at the bounding surface, these planes must cut this surface at right angles. The corresponding strain would be shearing strain which could involve (i.) a sliding of elements of one cross-section relative to another, (ii.) a relative sliding of elements of the above mentioned planes in the direction of the length of the bar. We could conclude that there may be a longitudinal displacement of the elements of the cross- sections. We should then attempt to satisfy the conditions of the problem by supposing that this is the character of the strain, and that the corresponding displacement consists of (i.) a rotation of the cross-sections in their planes such as we found in the case of the circle, (ii.) a distortion of the cross- sections into curved surfaces by a displacement (w) which is directed normally to their planes and varies in some manner from point to point of these planes. We could show that all the conditions of the problem are satisfied by this assumption, provided that the longitudinal displacement (w), considered as a function of the position of a point ix,y) in the cross-section, satisfies the equation

dHt> d-w . .

and the boundary condition

(M~ Ty) cos (*’”) + \~5y +TX) cos ‘ =0 ‘ • (2) where r denotes the amount of the twist, and v the direction of the normal to the boundary. The solution is known for a great many forms of section. (In the particular case of a circular section w vanishes.) The tangential traction at any point of the cross-section is directed along the tangent to that curve of the family \p = const, which passes through the point, \p being the function determined by the equations

dx \3y +3 / dy T W + / The amount of the twist r produced by terminal couples of magnitude G is G/C, where C is a constant, called the ” torsional rigidity ” of the prism, and expressed by the formula

the integration being taken over the cross-section. When the coefficient of n in the expression for C is known for any section, /j. can be determined by experiment with a bar of that form of section.

43. The distortion of the cross-sections into curved surfaces is shown graphically by drawing the contour lines (w — const.). In general the section is divided into a number of compartments, and the portions that lie within two adjacent compartments

are respectively concave -*~^ and convex. This result

*~ is illustrated inthe

accompanying figures (fig. 4 for the ellipse, given by x 2 /b 2 --y^lc i =i; fig. s for the equilateral triangle, given by (x+^a) {x % — 331 2 — iax+ia*) =0; fig. 6 for the square).

44. The distribution of the shearing stress over the cross-section is determined by the function \f/ already introduced. If we draw the curves \j/ = const., corresponding to any form of section, for equidifferent values of the constant, the tangential traction at any point on the cross-section is directed along the tangent to that curve of the family which passes through the point, and the magnitude of it is inversely proportional to the distance between consecutive curves of the family. Fig. 7 illustrates the result in the case of the equilateral triangle. The boundary is, of course, one of the lines. The ” lines of shearing

Fig. 4.

stress ” which can thus be drawn are in every case identical with the lines of flow of frictionless liquid filling a cylindrical vessel of the same cross-section as the bar, when the liquid circulates in the plane of the section with uniform spin. They are also the same as the contour lines of a flexible and slightly extensible membrane, of which the edge has the same form as the bounding curve of the cross-section of the bar, when the mem- brane is fixed at the edge and slightly deformed by uniform pressure.

45. Saint- Venant’s theory shows that the true tor- sional rigidity is in general less than that which would be obtained by extending Coulomb’s law (G=;utI) to sections which are not circular. For an

elliptic cylinder of sectional area ai and moment of inertia I about its central-line the torsional rigidity is /xo) 4 /4ir 2 I, and this formula is not far from being correct for a very large number of sections. For a bar of square section of side a centimetres, the torsional rigidity in C.G.S. units is (o-iˆo6)fia 4 approximately, y. being expressed in dynes per square centi- metre. How great the defect of the true value from that

Fig. 5.

Fig. 6.

given by extending Coulomb's law may be in the case of sections with projecting corners is shown by the diagrams (fig. 8 especially no. 4). In these diagrams the upper of the two numbers under each figure indicates the fraction which the true torsional rigidity corresponding to the section is of that value which would be obtained by extending Coulomb's law; and the lower of the two numbers indicates the ratio which the torsional rigidity for a bar of the corresponding section bears to that of a bar of circular section of the same material and of equal sec- tional area. These results have an important practical application, inas- much as they show that strengthening ribs and projections, such as are intro- duced in engineering to give stiff- Fig. 7. ness to beams, have the reverse of

a good effect when torsional stiffness is an object, although they are of great value in increasing the resistance to bending. The theory shows further that the resistance to torsion is very seriously diminished when there is in the surface any dent approaching to a re-entrant angle. At such a place the shearing strain tends to become infinite, and some

permanent set is produced by torsion. In the case of a section of any form, the strain and stress are greatest at points on the contour, and these points are in many cases the points of the contour which are nearest to the centroid of the section. The theory has also been applied to show that a longitudinal flaw

w

(3)

(l)

Square with

Square with

Rectilineal

curved corners

acute angles

square.

and hollow

and hollow

sides.

sides.

(4)

Star with four

rounded points,

being a curve

of the eighth

degree.

(5)

Equilateral

triangle.

•S4346. -8186. : 7/83. “5374. “60000.

■88326. S666. ˆ8276. “6745. ‘72552

Fig. 8. — Diagrams showing Torsional Rigidities.

Fig. 9.

near the axis of a shaft transmitting a torsional couple has little influence on the strength of the shaft, but that in the neighbourhood

of a similar flaw which is much nearer to the surface than to the axis the shearing strain may be nearly doubled, and thus the possibility of such flaws is a source of weakness against which special provision ought to be made.

46. Bending of Beams. — As a second example of the applica- tion of the general theory we take the problem of the flexure of a beam. In this case also we begin by forming a simple intuition as to the nature of the strain and the stress. On the side of the beam towards the centre of curvature the longi- tudinal filaments must be contracted, and on the other side they must be extended. If we assume that the cross-sections remain plane, and that the central-line is unaltered in length, we see (at once from fig. 9) that the extensions (or contractions)

are given by the formula y/R, where y denotes the distance of a longitudinal filament from the plane drawn through the unstrained central-line at right- angles to the plane of bending, and R is the radius of curvature of the curve into which this line is bent (shown by the dotted line in the figure). Corresponding to this strain there must be traction acting across the cross- sections. If we assume that there is no other stress, then the magnitude of the traction in question is Ey/R, where E is Young's modulus, and it is tension on the side where the filaments are extended and pressure on the side where they are contracted. If the plane of bending contains a set of principal axes of the cross-sections at their centroids, these tractions for the whole cross-section are equivalent to a couple of moment EI/R, where I now denotes the moment of inertia of the cross-section about an axis through its centroid at right angles to the plane of bending, and the plane of the couple is the plane of bending. Thus a beam of any form of section can be held bent in a "principal plane" by terminal couples of moment M, that is to say by a "bending moment" M; the central-line will take a curvature M/EI, so that it becomes an arc of a circle of radius EI/M; and the stress at any point will be tension of amount My/I, where y denotes distance (reckoned positive towards the side remote from the centre of curvature) from that plane which initially contains the central-line and is at right angles to the plane of the couple. This plane is called the " neutral plane." The restriction that the beam is bent in a principal plane means that the plane of bending contains one set of principal axes of the cross-sections at their centroids; in the case of a beam of rect- angular section the plane would bisect two opposite edges at right angles. In order that the theory may hold good the radius of curvature must be very large.

47. In this problem of the bending of a beam by terminal couples the stress is tension, determined as above, and the corresponding strain

consists therefore of longitudinal extension of amount My/EI or y/R (contraction if y is negative), accom- panied by lateral contraction of amount crMy/EI or

Fig. 10.

sion if y is negative), a being Poisson's ratio for the material. Our intuition of the nature of the strain was imperfect, inas- much as it took no account of these lateral strains. The necessity for introducing them was pointed out by Saint-Venant. The effect of them is a change of shape of the cross- sections in their own planes. This is shown in an exaggerated way in fig. 10, where the rectangle ABCD represents the cross-section of the un- strained beam, or a rect- angular portion of this cross-section, and the curvilinear figure A'B'C'D' represents in an exaggerated fashion the cross-section (or the corresponding por- tion of the cross-section) of the same beam, when bent so that the centre of curvature of the central-line (which is at right angles to the plane of the figure) is on the line EF produced beyond F. The lines A'B' and CD' are approximately circles of radii R/

about an axis drawn through the cen- troid of the section p at right angles to the plane of bend- ing. This moment is called the " bend- ing moment " at the section, it is the product of the load

W and the distance Tyy

of the section from the loaded end, so that it varies uni- formly along the F IG – I2 – length of the beam. The stress that suffices in the simpler problem gives rise to no vertical force, and it is clear that in addition to longitudinal tensions and pressures there must be tangential tractions on the cross-sections. The resultant of these tangential tractions must be a force equal to W, and directed vertically;

Fig. 11.

but the direction of the traction at a point of the cross-section need not in general be vertical. The existence of tangential traction on the cross-sections implies the existence of equal tangential traction, directed parallel to the central-line, on some planes or other which are parallel to this line, the two sets of tractions forming a shearing stress. We conclude that such shearing stress is a necessary constituent of the

stress-system in the beam bent by terminal transverse load. We can develop a theory of this stress-system from the assumptions (i.) that the tension at any point of the cross-section is related to the bending moment at the section by the same law as in the case of uniform bending by terminal couples; (ii.) that, in addition to this tension, there is at any point shearing stress, involving tangential tractions acting in appropriate directions upon the elements of the cross-sections. When these assumptions are made it appears that there is one and only one distribution of shearing stress by which the conditions of the problem can be satisfied. The determination of the amount and direction of this shearing stress, and of the corresponding strains and displacements, was effected by Saint-Venant and R. F. A. Clebsch for a number of forms of section by means of an analysis of the same kind as that employed in the solution of the torsion problem.

49. Let / be the length of the beam, x the distance of the section p from the fixed end A, y the distance of any point below the horizontal plane through the centroid of the section at A, then the bending moment at p is W(Z— x), and the longitudinal tension P or X, at any p6int on the cross-section is — ‘W(l—x)yfl, and this is related to the bending moment exactly as in the simpler problem.

50. The expressions for the shearing stresses depend on the shape of the cross-section. Taking the beam to be of isotropic material and the cross-section to be an ellipse of semiaxes a and b (fig. 13), the a axis being vertical in the unstrained state, and drawing the axis 2 at right angles to the plane of flexure, we find that the vertical shearing stress U or X„ at any point (y, 2) on any cross-section is 2W[(a 2 -y 2)j2a 2 (l +o) +6*} -s 8 a 8 (l 2a)}. ˆra 3 ˆ>(l|-c7)(3a 2 r■& ,) The resultant of these stresses is W, but the amount at the centroid, which is the maxi mum amount, exceeds the average amount, W/W&, in the ratio

(4 o 2 (i -M +2& 2 | /(3a 2 +& 2) (1 +„).

If tr = i, this ratio is 1 for a circle, nearly f for a flat elliptic bar with the longest diameter vertical, nearly | for a flat elliptic bar with the longest diameter horizontal.

In the same problem the horizontal shearing stress T or Z x at any point on any cross-section is of amount

4Wyzjo i! (l+°-)+&M xo 3 6(l+

The resultant of these stresses vanishes; but, taking as before a = \, and putting for the three cases above a = b, = 106, 6 = ioa, we find

that the ratio of the maximum of this stress to the average vertical shearing stress has the values §, nearly -,' 5l and nearly 4. Thus the stress T is of considerable importance when the beam is a plank.

As another example we may consider a circular tube of external radius m and internal radius n. Writing P,U,T forXx, X„, Z*, we find

Fig. 13

P = -

4W „ ,

„ (f ,i_ ri 4)('-*)y.

T = -

nT – 5 W_ j 1 + 2ff + (3 + 2ff) _^ j yz;

and for a tube of radius r and small thickness t the value of P and the maximum values of U and T reduce approximately to

p = -W(/-*)y/w 3 < Uma*. = W/jrr/, T ma *. = W/2jrrf.

The greatest value of U is in this case approximately twice its average value, but it is possible that these results for the bending of very thin tubes may be seriously at fault if the tube is not plugged,

and if the load is not applied in the manner contemplated in the theory (cf. § 55). In such cases the extensions and contractions of the longitudinal filaments may be practically confined to a small part of the material near the ends of the tube, while the rest of the tube is deformed without stretching.

51. The tangential tractions U, T on the cross-sections are necessarily accompanied by tangential tractions on the longi- tudinal sections, and on each such section the tangential traction is parallel to the central line; on a vertical section z = const, its amount at any point is T, and on a horizontal section y = const, its amount at any point is U.

The internal stress at any point is completely determined by the components P, U, T, but these are not principal stresses (§ 7). Clebsch has given an elegant geometrical construction for determining the principal stresses at any point when the values of P, U, T are known.

From the point O (fig. 14) draw lines OP, OU, OT, to represent the stresses P, U, T at O, on the cross-section through O, in magni- tude,

direction and sense, and compound U and T into a resultant represented by OE; the plane EOP is a principal plane of stress at O, and the principal stress at right angles to this plane vanishes. Take M the middle point of OP, and with centre M and radius ME describe a circle cutting the line OP in A and B ; then OA and OB represent the magni- tudes of the two remaining principal stresses. On AB describe a rectangle ABDC so that DC passes through E ; then OC is the direction of the princi- pal stress represented in magnitude by OA, and OD is the direction of the principal stress represented in magnitude by OB.

52. As regards the strain in the beam, the longitudinal and lateral extensions and contractions depend on the bending moment in the same way as in the simpler problem; but, the bending moment being variable, the anticlastic curvature produced is also variable. In addition to these extensions and contractions there are shearing strains corresponding to the shearing stresses T, U. The shearing strain corresponding to T consists of a relative sliding parallel to the central-line of different longitudinal linear elements combined with a relative sliding in a transverse horizontal direction of elements of different cross-sections; the latter of these is concerned in the production of those displacements by which the variable anticlastic curvature is brought about; to see the effect of the former we may most suitably consider, for the case of an elliptic cross-section, the distortion of the shape of a rectangular portion of a plane of the material which in the natural state was horizontal; all the boundaries of such a portion become parabolas of small curvature, which is variable along the length of the beam, and the par- ticular effect under consideration is the change of the transverse horizontal linear elements from straight lines such as HK to parabolas such as H'K' (fig. 15); the lines HL and KM are parallel to the central-line, and the FlG- I5- figure is drawn for a plane above the neutral plane. When the cross-section is not an ellipse the character of the strain is the same, but the curves are only approximately parabolic.

The shearing strain corresponding to U is a distortion which has the effect that the straight vertical filaments become curved lines which cut the longitudinal filaments obliquely, and thus the cross-sections do not remain plane, but become curved surfaces, and the tangent plane to any one of these surfaces at the centroid cuts the central line obliquely (fig. 16). The angle between these tangent planes and the central-line is the same at all points of the line; and, if it is denoted by Jir+j 9 , the value of s is expressible as

shearing stress at centroid rigidity of material '

and it thus depends on the shape of the cross-section; for the elliptic section of § 50 its value is

4W 2a'(l +)+&' Eirab 3

for a circle (with a = j) this becomes 7W/2E7ra 2 . The vertical filament through the centroid of any cross-section becomes a cubical parabola, as shown in fig. 16, and the contour lines of the curved surface into which any cross-section is distorted are shown in fig. 17 for a circular section.

53. The deflection of the beam is determined from the equation curvature of central line = bending moment -^-flexural rigidity,

and the special conditions at the supported end; there is no alteration of this statement on account of the shears. As regards

the special condition at an end which is encastrie, or built in, Saint- Venant proposed to assume that the central tangent plane of the cross-section at the end is vertical; with this assumption the tan- gent to the central line at the end is inclined downwards and makes an angle s with the hori- zontal (see fig. 18); it is, however, improbable that this condition is exactly realized in practice. In the application of the theory to the experimental determination of Young's modulus, the small angle which the central-line at the support makes with the horizontal is an unknown quantity, to be eliminated by observa- tion of the deflection at two or more points.

54. We may suppose the displacement in a bent beam to be produced by the following operations: (1) the central-line is deflected into its curved form, (2) the cross-sections are rotated about axes through their centroids at right angles to the plane of flexure so as to make angles equal to \ir--s with the central- line, (3) each cross-section is distorted in its own plane in such a way that the appropriate valuable anticlastic curvature is produced, (4) the cross-sections are further distorted into curved surfaces. The contour lines of fig. 17 show the disturbance from the central tangent plane, not from the original vertical plane.

55. Practical Application of Saint- Venant' s Theory. — The

theory above described is exact provided the forces applied to

the loaded end, which have W for resultant, are distributed over the terminal section in a par- ticular way,not likely to be realized in practice; and the application to practical problems de- pends on a principle due to Saint- Venant, to the effect that, except for comparatively small por- tions of the beam near to the loaded and fixed ends, the resultant only is effective, and its mode of distribution does not seriously affect the in-

Fig. 17.

ternal strain and stress. In fact, the actual stress is that due to forces with the required resultant distributed in the manner contemplated in the theory, superposed upon that due to a certain distribution of forces on each terminal section which, if applied to a rigid body, would keep it in equilibrium; according to Saint- Venant's principle, the stresses and strains due to such distributions of force are unimportant except near the ends. For

this principle to be exactly applicable it is necessary that the length of the beam should be very great compared with any linear dimension of its cross-section; for the practical applica- tion it is sufficient that the length should be about ten times the greatest diameter.

56. In recent years the problem of the bending of a beam by loads distributed along its length has been much advanced. It is now practically solved for the case of a load distributed uniformly, or according to any rational algebraic law, and it is also solved for the case where the thickness is small compared with the length and depth, as in a plate girder, and the load is distributed in any way. These solutions are rather complicated and difficult to interpret. The case which has been worked out most fully is that of a transverse load distributed uniformly along the length of the beam. In this case two noteworthy results have been obtained. The first of these is that the central- line in general suffers extension. This result had been found experimentally many years before. In the case of the plate girder loaded uniformly along the top, this extension is just half as great as the extension of the central-line of the same girder when free at the ends, supported along the base, and carrying the same load along the top. The second note- worthy result is that the curvature of the strained central- line is not proportional to the bending moment. Over and above the curvature which would be found from the

ordinary relation —

curvature of central-line = bending moment -rflexural rigidity,

there is an additional curvature which is the same at all the cross-sections. In ordinary cases, provided the length is large compared with any linear dimension of the cross-section, this additional curvature is small compared with that calculated from the ordinary formula, but it may become important in cases like that of suspension bridges, where a load carried along the middle of the roadway is supported by tensions in rods attached at the sides.

57. When the ordinary relation between the curvature and the bending moment is applied to the calculation of the deflection of con- tinuous beams it must not be forgotten that a correction of the , kind just mentioned may possibly / be requisite. In the usual method of treating the problem such cor- rections are not considered, and the ordinary relation is made the basis of the theory. In order to apply this relation to the calculation of the deflection, it is necessary to know the bending moment at every point; and, since the pressures of the supports are not among the data of the problem, we require a method of determining the bending moments at the supports either by calculation or in some other way. The calculation of the bending moment can be replaced by a method of graphical construction, due to Mohr, and depending on the two following theorems: —

(i.) The curve of the central-line of each span of a beam, when the bending moment M is given, 1 is identical with the catenary or funicular curve passing through the ends of the span under a (fictitious) load per unit length of the span equal to M/EI, the horizontal tension in the funicular being unity.

(ii.) The directions of the tangents to this funicular curve at the ends of the span are the same for all statically equivalent systems of (fictitious) load.

When M is known, the magnitude of the resultant shearing stress at any section is dM/dx, where x is measured along the beam.

1 The sign of M is shown by the arrow-heads in fig. 19, for which, with y downwards,

Elg + M-0.

Fig. 18.

:>**

ELASTICITY

58. Let I be the length of a span of a loaded beam (fig. 19), Mi and M 2 the bending moments at the ends, M the bending moment at a section distant x from the end (Mi), M' the bending moment at

M,(

A

M

Fig. 19

J^L.

r\

!>•

the same section when the same span with the same load is simply supported ; then M is given by the formula

M = M'+Mi / – : p + M 2 j,

and thus a fictitious load statically equivalent to M/EI can be easily found when M' has been found. If we draw a curve (fig. 20) to pass through the ends of the span, so that its ordinate represents the value of M'/EI, the corresponding fictitious loads are statically equivalent to a single load, of amount represented by the area of the curve, placed at the point of the span vertically above the centre of gravity of this area. If PN is the ordinate of this curve, and if at the ends of the span we erect ordinatesin the proper sense to represent Mi/EI and M2/EI, the bending moment at any point is represented

by the length PQ.* For a uniformly distributed load the curve of M' is a

M (" /em>- *M 2 parabola M' = %wx(l — x),*

where w is the load per unit of length; and the statically equivalent

*fic- titious load is ˆjw/'/EI placed at the middle point G of the span; also the loads statically equivalent to the fictitious loads Fig 20 Mi(l~x)/lEl and M 2 */ /EI*

' ' _ are JMi//EI and JM 2 //EI

placed at the points g, g' of trisection of the span. The funi- cular polygon for the fictitious loads can thus be drawn, and the direction of the central-line at the supports is determined when the bending moments at the supports are known.

59. When there is more than one span the funiculars in question may be drawn for each of the spans, and, if the bending moments at the ends of the extreme spans are known, the intermediate ones can be determined. This determination depends on two considera- tions: (1) the fictitious loads corresponding to the bending moment at any support are proportional to the lengths of the spans which abut on that support; (2) the. sides of two funiculars that end at any support coincide in direction. Fig. 21 illustrates the method for the case of a uniform beam on three supports A, B, C, the ends A and C being freely supported. There will be an unknown bending moment Mo at B, and the system 2 of fictitious loads is iVAB 3 /EI at G the middle point of AB, ˆaiBC'/EI at G' the middle point of BC, – JMoAB/EI at g and -f M BC/EI at g', where g and g' are the points of trisection nearer to B of the spans AB, BC. The centre of

N

\ 9 G] f

u

/

/B

/

T7

)

'

si

yˆ-

G'

W

Fig. 21.

gravity of the two latter is a fixed point independent of Mo, and the line VK of the figure is the vertical through this point. We draw AD and CE to represent the loads at G and G' in magnitude ; then D and E are fixed points. We construct any triangle UVW whose sides UV, UW pass through D, B, and whose vertices lie on the verticals gU, VK, g'W; the point F where VW meets DB is a fixed

1 The figure is drawn for a case where the bending moment has the same sign throughout.

2 Mo is taken to have, as it obviously has, the opposite sense to that shown in fig. 19.

point, and the lines EF, DK are the two sides (2, 4) of the required funiculars which do not pass through A, B or C. The remaining sides (1, 3, 5) can then be drawn, and the side 3 necessarily passes through B; for the triangle UVW and the triangle whose sides are 2, 3, 4 are in perspective.

The bending moment Mo is repre- sented in the figure by the vertical line BH where H is on the con- tinuation of the side 4, the scale being given by

BH jMoBC

CE" "

Fig. 22. the sides of the funiculars to

Fig. 23.

jjjwBC 3 ' this appears from the diagrams of forces, fig. 22, in which the oblique lines are marked to correspond to which they are parallel.

In the application of the method to more complicated cases there are two systems of fixed points corresponding to F, by means of which the sides of the funiculars are drawn.

60. Finite Bending of Thin Rod. — The equation

curvature = bending moment ˆfiexural rigidity may also be applied to the problem of the flexure in a principal plane of a very thin rod or wire, for which the curvature need not be small. When the forces that pro duce the flexure are applied at the ends only, the curve into which the central-line is bent is one of a definite family of curves, to which the name elastica has been given, and there is a division of the family into two species according as the external forces are applied directly to the ends or are. applied to rigid arms attached to the ends; the curves of the former species are characterized by the presence of inflections at all the points at which they cut the line of action of the applied forces.

We select this case for consideration. The problem of determining the form of the curve (cf. fig. 23) is mathematically identical with the problem of determining the motion of a simple circular pendulum oscillating through a finite angle, as is seen by comparing the differential equation of the curve

Elf£ + Wsin =*

with the equation of motion of the pendulum

l Jf + 9 sin = 0.

The length L of the curve between two inflections corresponds to the time of oscillation of the pendulum from rest to rest, and we thus have

LV(W/EI) = 2K,

where K is the real quarter period of elliptic functions of modulus

sin fa, and a is the angle at which the curve cuts the line of action

of the applied forces. Unless

the length of the rod exceeds

xV(EI/W) it will not bend under

the force, but when the length is

great enough there may be more

than two points of inflection and

more than one bay of the curve;

for n bays (» + i inflections) the

length must exceed rax-V (EI/W).

Some of the forms of the curve

are shown in fig. 24.

For the form d, in which two bays make a figure of eight, we have

LV(W/EI) = 4-6, a = 130° approximately. It is noteworthy that whenever the length and force admit of a sinuous form, such as a or b, with more than two in- flections, there is also possible a crossed form, like e, with two inflections only; the latter form is stable and the former unstable.

61. The particular case of the above for which a is very small is a curve of sines of small amplitude, and the result in this case has been applied to the problem of the buckling of struts under thrust. When the strut, of length L', is

KJ

Fig. 24.

Fig. 25.

maintained upright at its lower end, and loaded at its upper end, it is simply contracted, unless L' 2 W > jir 2 EI, for the lower end corresponds to a point at which the tangent is vertical on an elastica for which the line of inflections is also vertical, and thus the length must be half of one bay (fig. 25, a).

For greater lengths or loads the strut tends to bend or buckle under the load. For a very slight excess of L' 2 W above jir 2 EI, the theory on which the above discussion is founded, is not quite adequate, as it assumes the central-line of the strut to be free from extension or con- traction, and it is probable that bending without exten- sion does not take place when the length or the force exceeds the critical value but slightly. It should be noted also that the formula has no application to short struts, as the theory from which it is derived is founded on the assump- tion that the length is great compared with the diameter

(cf. § 56).

The condition of buckling, corresponding to the above, for a long strut, of length L', when both ends are free to turn is L' 2 W>tt 2 EI; for the central-line forms a complete bay (fig. 25, b); if both ends are maintained in the same vertical line, the condition is L' 2 W > 47T 2 EI, the central-line forming a complete bay and two half bays (fig. .25, c).

62. In our consideration of flexure it has so far been supposed that the bending takes place in a principal plane. We may remove this restriction by resolving the forces that tend to produce bending into systems of forces acting in the two principal planes. To each plane there corresponds a particular flexural rigidity, and the systems of forces in the two planes give rise to inde- pendent systems of stress, strain and displacement, which must be superposed in order to obtain the actual state. Applying this process to the problem of §§ 48-54, and supposing that one principal axis of a cross-section at its centroid makes an angle 6 with the vertical, then for any shape of section the

Fig. 26.

neutral surface or locus of unextended fibres cuts the section in a line DD', which is conjugate to the vertical diameter CP with respect to any ellipse of inertia of the section. The central- line is bent into a plane curve which is not in a vertical plane,

but is in a plane through the line CY which is perpendicular toDD'(fig. 26).

63. Bending and Twisting of Thin Rods. — When a very thin rod or wire is bent and twisted by applied forces, the forces on any part of it limited by a normal section are balanced by the tractions across the section, and these tractions are statically equivalent to certain forces and couples at the centroid of the section; we shall call them the stress-resultants and the stress- couples. The stress-couples consist of two flexural couples in the two principal planes, and the torsional couple about the tangent to the central-line. The torsional couple is the product of the torsional rigidity and the twist produced; the torsional rigidity is exactly the same as for a straight rod of the same material and section twisted without bending, as in Saint- Venant's torsion problem (§ 42). The twist r is connected with the deformation of the wire in this way: if we suppose a very small ring which fits the cross-section of the wire to be provided with a pointer in the

direction of one principal axis of the section at its centroid, and to move along the wire with velocity v, the pointer will rotate about the central-line with angular velocity tv. The amount of the flexural couple for either principal plane at any section is the product of the flexural rigidity for that plane, and the resolved part in that plane of the curvature of the central line at the centroid of the section; the resolved part of the curvature along the normal to any plane is obtained by treating the curvature as a vector directed along the normal to the oscu- lating plane and projecting this vector. The flexural couples reduce to a single couple in the osculating plane proportional to the curvature when the two flexural rigidities are equal, and in this case only.

The stress-resultants across any section are tangential forces in the two principal planes, and a tension or thrust along the central-line; when the stress-couples and the applied forces are known these stress-resultants are determinate. The existence, in particular, of the resultant tension or thrust parallel to the central-line does not imply sensible extension or contraction of the central filament, and the tension per unit area of the cross- section to which it would be equivalent is small compared with the tensions and pressures in longitudinal filaments not passing through the centroid of the section; the moments of the latter tensions and pressures constitute the flexural couples.

64. We consider, in particular, the case of a naturally straight spring or rod of circular section, radius c, and of homogeneous isotropic material. The torsional rigidity is |E7rc 4 /(i+«f); and the flexural rigidity, which is the same for all planes through the central-line, is | E7rc 4 ; we shall denote these by C and A respectively. The rod may be held bent by suitable forces into a curve of double curvature with an amount of twist r, and then the torsional couple is Cr,and the flexural couple in the osculating plane is A/p, where p is the radius of circular curvature. Among the curves in which the rod can be held by forces and couples applied at its ends only, one is a circular helix; and then the applied forces and couples are equivalent to a wrench about the axis of the helix.

Let a be the angle and r the radius of the helix, so that p is r sec 2 o ; and let R and K be the force and couple of the wrench (fig. 27).

Then the couple formed by R and an equal and opposite force at any section and the couple K are equivalent to the torsional and flexural couples at the section, and this gives the equations for R and K

R

.sinacos'u „ cos a = A C7 ,

v 4 C09 a , _, . K = A f-(_T sin a.

The thrust across any section is R sin a

parallel to the tangent to the helix, and

the shearing stress-resultant is R cos a at right angles to the

osculating plane.

When the twist is such that, if the rod were simply unbent, it

would also be untwisted, r is (sin o cos a)jr, and then, restoring the values of A and C, we have

EttC

R =

ir 2 l+o-

sin a cos'a,

, T Etc 4 l+

K = — ■ i— — 5— r cos a.

65. The theory of spiral springs affords an application of these results. The stress-couples called into play when a naturally helical spring (a, r) is held in the form of a helix (a', r'), are equal to the differences between those called into play when a straight rod of the same material and section is held in the first form, and those called into play when it is held in the second form. Thus the torsional couple is

r / sin a' cos a' sin a cos a \ H 7 r)'

and the flexural couple is

*. / cos 2 a' cos 2 a *

A y-p ~) ■

The wrench (R, K) along the axis by which the spring can be held in the form (a', r') is given by the equations

„ . sin a' /cos 2 0′ cos 2 a\ „cos a' /sin a' cos a' sin a cos a

r=a- F t- {—p —) -c-p- { — ? – r —) .

x , . , /cos 2 a' cos 2 a\ , „ . , /sin a' cos 0′ sin a cos a\ K = Acosa'(v — -p —J +Csino (^p J .

*When the spring is slightly extended by an axial force F, = — R, and there is no couple, so that K vanishes, and a', r' differ very little from a, r, it follows from these equations that the axial elonga- tion, Sx, is connected with the axial length * and the force F by the equation*

F _ Etc 4 sin a Sx ~ if 1 l-f-c cos 2 a X ' and that the loaded end is rotated about the axis of the helix through a small angle

iaFxr cos a EttC 4 '

the sense of the rotation being such that the spring becomes more tightly coiled.

66. A horizontal pointer attached to a vertical spiral spring would be made to rotate by loading the spring, and the angle through which it turns might be used to measure the load, at any rate, when the load is not too great; but a much more sensitive contrivance is the twisted strip devised by W. E. Ayrton and J. Perry. A very thin, narrow rectangular strip of metal is given a permanent twist about its longitudinal middle line, and a pointer is ttached to it at right angles to this line. When the strip is subjected to' longitudinal tension the pointer rotates through a considerable angle. G. H. Bryan {Phil. Mag., December 1890) has succeeded in constructing a theory of the action of the strip, according to .vhich it is re garded as a strip of plating in the form of a right helicoid, which, after extension of the middle line, becomes a portion of a slightly different helicoid; on account of the thinness of the strip, the change of curvature of the surface is considerable, even when the extension is small, and the pointer turns with the generators

of the helicoid.

If 6 stands for the breadth and t for the thickness of the strip, and t for the permanent twist, the approximate formula for the angle

through which the strip is untwisted on the application of a load W was found to be

Wfer(l + g)

2Et (1 +*

(1+g) fr"r 2 N 30 ~ fi ,

The quantity br which occurs in the formula is the total twist in a length of the strip equal to its breadth, and this will generally be very small ; if it is small of the same order as tjb, or a higher order, the formula becomes iWf>7-(l-|-

67. Thin Plate under Pressure. — The theory of the deforma- tion of plates, whether plane or curved, is very intricate, partly because of the complexity of the kinematical relations involved. We shall here indicate the nature of the effects produced in a thin plane plate, of isotropic material, which is slightly bent by pressure. This theory should have an application to the stress produced in a ship's plates. In the problem of the cylinder under internal pressure (§ 77 below) the most important stress

is the circumferential tension, counteracting the tendency of the circular filaments to expand under the pressure; but in the problem of a plane plate some of the filaments parallel to the plane of the plate are extended and others are contracted, so that the tensions and pressures along them give rise to result- ant couples but not always to resultant forces. W T hatever forces are applied to bend the plate, these couples are always expressible, at least approximately in terms of the principal curvatures produced in the surface which, before strain, was the middle plane of the plate. The simplest case is that of a rect- angular plate, bent by a distribution of couples applied to its edges, so that the middle surface becomes a cylinder of large radius R; the requisite couple per unit of length of the straight edges is of amount C/R, where C is a certain constant; and the requisite couple per unit of length of the circular edges is of amount Ccr/R, the latter being required to resist the tendency to anticlastic curvature (cf. §47). If normal sections of the plate are supposed drawn through the generators and circular sections of the cylinder, the action of the neighbouring portions on any portion so bounded involves flexural couples of the above amounts. When the plate is bent in any manner, the curvature produced at each section of the middle surface may be regarded as arising from the superposition of two cylindrical curvatures; and the flexural couples

across normal sections through the lines of curvature, estimated per unit of length of those lines, are C(i/Ri+o-/R 2) and C(i/R2+c/ Ri), where Ri and R2 are the principal radii of curvature. The value of C for a plate of small thickness 2 A is fEA 8 /(I ~ ‘ 2)- Exactly as in the problem of the beam (§§ 48, 56), the action between neighbouring portions of the plate generally involves shearing stresses across normal sections as well as flexural couples; and the resultants of these stresses are determined by the conditions that, with the flexural couples, they balance the forces applied to bend the plate.

68. To express this theory analytically, let the middle plane of the plate in the unstrained position be taken as the plane of (x, y), and let normal sections at right angles to the axes of x and y be drawn through any point. After strain let w be the displacement of this point in the direction perpendicular to the plane, marked p in fig. 28. If the axes of x and y were parallel to the lines of

Fig. 28.

curvature at the point, the flexural couple acting across the section normal to x (or y) would have the axis of y (or x) for its axis; but when the lines of curvature are inclined to the axes of co-ordinates, the flexural couple across a section normal to either axis has a component about that axis as well as a component about the per-pendicular axis. Consider an element ABCD of the section at right angles to the axis of x, contained between two lines near together and perpendicular to the middle plane. The action of the portion of the plate to the right upon the portion to the left, across the element, gives rise to a couple about the middle line (y) of amount, estimated per unit of length of that line, equal

=T+ °^t)» = < -«, say, and to a couple, similarly estimated, about the normal (x) of amount — C(l— ")q^z< =H, say. The

axis of y is given by the equation S2 = –

If the plate

corresponding couples on an element of a section at right angles to the axis of y, estimated per unit of length of the axis of x, are

of amounts — C -ˆ{+ a jps) . «=G 2 say, and -H. The resultant

Si of the shearing stresses on the element ABCD, estimated as

before, is given by the equation Si = ˆ— '=— (cf. § 57), and the

corresponding resultant S2 for an element perpendicular to the

dU dG dx By

is bent by a pressure p per unit of area, the equation of equilibrium

;s as 1+ ˆ2 = in terms of

dx dy

*d*w , d A w . g d'w _p dx i+ dy i+ dx 2 dyt~C This equation, together with the special conditions at the rim, suffices for the determination of w, and then all the quantities here introduced are determined. Further, the most important of the stress-components are those which act across elements of normal sections: the tension in direction x, at a distance z from the middle plane measured in the direction of p, is of amount*

*~9p (a – *"""""ˆ – ?/ ' an(* ˆere is a corresponding tension in direction y; the shearing stress consisting of traction parallel to y on planes z = const., and traction parallel to x on planes y = const., is of*

amount — X , , _ _ ; these tensions and shearing stresses are 2# 3 dxdy

equivalent to two principal tensions, in the directions of the lines of curvature of the surface into which the middle plane is bent, and they give rise to the flexural couples.

69. In the special example of a circular plate, of radius a, supported at the rim, and held bent by a uniform pressure p, the value of w at a point distant r from the axis is

UC (a 'Hl+

64

and the most important of the stress components is the radial tension, of which the amount at any point is &(3+

70. General Theorems. — Passing now from these questions of flexure and torsion, we consider some results that can be deduced from the general equations of equilibrium of an elastic solid body.

The form of the general expression for the potential energy (§ 27) stored up in the strained body leads, by a general property of quadratic functions, to a reciprocal theorem relating to the effects produced in the body by two different systems of forces, viz.: The whole work done by the forces of the first system, acting over the displacements produced by the forces of the second system, is equal to the whole work done by the forces of the second system, acting over the displacements produced by the forces of the first system. By a suitable choice of the second system of forces, the average values of the component stresses and strains produced by given forces, considered as

constituting the first system, can be obtained, even when the dis- tribution of the stress and strain cannot be determined.

Taking for example the problem presented by an isotropic body of any form 1 pressed between two parallel planes distant / apart (fig. 29), and denoting the resultant pres- sure by p, we find that the diminu- tion of volume -8v is given by the equation

-Sv = ipfik,

where k is the modulus of compres- sion, equal to JE/(l — 2a). Again, p IG „ take the problem of the changes

”’ _ produced in a heavy body by dif-

ferent ways of supporting it; when the body is suspended from one or more points in a horizontal plane its volume is increased by

where W is the weight of the body, and h the depth of its centre of gravity below the plane ; when the body is supported by upward

1 The line joining the points of contact must be normal to the planes.

vertical pressures at one or more points in a horizontal plane the volume is diminished by

where h’ is the height of the centre of gravity above the plane ; if the body is a cylinder, of length / and section A, standing with its base on a smooth horizontal plane, its length is shortened by an amount

-«J = WJ/2EA; if the same cylinder lies on the plane with its generators horizontal, its length is increased by an amount

«/ =

•

71. In recent years important results have been found by considering the effects produced in an elastic solid by forces applied at isolated points.

Taking the case of a single force F applied at a point in the interior, we may show that the stress at a distance r from the point consists of

(1) a radial pressure of amount

2-g JF cos e 1 -a \ir r 1 '

(2) tension in all directions at right angles to the radius of amount

1-2(7 F cos 2(f-

(3) shearing stress consisting of traction acting along the radius dr on the surface of the cone 8 = const, and traction acting along the meridian d6 on the surface of the sphere r = const, of amount

1-2

Thus the lines of stress are in and perpendicular to the meridian plane, and the direc- tion of one of those in the meridian plane is inclined to the radius vector r at an angle

The corresponding displace- ment at any point is com- pounded of a radial displace- ment of amount

14-

(3-4

at different points and in different directions can be obtained by summation, and the effect of continuously distributed forces can be obtained by integration.

72. The stress system considered in § 71 is equivalent, on the plane through the origin at right angles to the line of action of F, to a resultant pressure of magnitude ˆF at the origin and a

radial traction of amount „,. _ ff \ — — 1, and, by the application

of this system of tractions to a solid bounded by a plane, the displacement just described would be produced. There is also another stress system for a solid so bounded which is equivalent, on the same plane, to a resultant pressure at the origin, and a radial traction proportional to i/r 2 ,but these are in the ratio 27r:r 2 , instead of being in the ratio 4ir(i<_i-2_r_r _del="">2 . The second stress system (see fig 31) consists of:

(1) radial pressure FV~ 2 ,

(2) tension in the meridian plane across the radius vector of amount

F'r- 2 _cos"9/(i + cose),

(3) tension across the me- ridian plane of amount

FV~ 2 /(i + cos

(4) shearing stress as in § 71 of amount

FV" 2 sin 0/(i+ cos 0), and the stress across the plane boundary consists of a resultant pressure of magnitude 2irF' and a radial traction of amount FV -2 . If

then we superpose the component stresses of the last section multi- plied by 4(1 —

In the stress system thus arrived at the traction across any plane parallel to the boundary is directed away from the place where W is supported, and its amount is 3Wcos 2 0/27iy 2 . The corresponding displacement consists of

(1) a horizontal displacement radially outwards from the vertical through the origin of amount

W(l+tr) sine/ „ l-2

2jr"Er I,"" " l+cos0/

(2) a vertical displacement downwards of amount

3m + ˆ l 2(i- < ,) + cos«9).

The effects produced by a system of loads on a solid bounded by a plane can be deduced.

The results for a solid body bounded by an infinite plane may be interpreted as giving the local effects of forces applied to a small part of the surface of a body. The results show that pressure is transmitted into a body from the boundary in such a way that the traction at a point on a section parallel to the boundary is the same at all points of any sphere which touches the boundary at the point of pressure, and that its amount at any point is inversely proportional to the square of the radius of this sphere, while its direction is that of a line drawn from the point of pressure to the point at which the traction is estimated. The transmission of force through a solid body indicated by this result was strikingly demonstrated in an attempt that was made to measure the lunar deflexion of gravity; it was found that the weight of the observer on the floor of the laboratory produced a disturbance of the instrument sufficient to disguise completely the effect which the instrument had been designed to measure (see G. H. Darwin, The Tides and Kindred Phenomena in the Solar System, London, 1898).

73. There is a corresponding theory of two-dimensional systems, that is to say, systems in which either the displacement is parallel to a fixed plane, or there is no traction across any plane of a system of parallel planes. This theory shows that, when pressure is applied at a point of the edge of a plate in any direction in the plane of the plate, the stress developed in the plate consists exclusively of radial pressure across any circle having the point of pressure as centre, and the magnitude of this pressure is the same at all points of any circle which touches the edge at the point of pressure, and its amount at any point is inversely proportional to the radius of this circle. This result leads to a number of interesting solutions of problems relating to plane systems; among these may be mentioned the problem of a circular plate strained by any forces applied at its edge.

74. The results stated in § 72 have been applied to give an account of the nature of the actions concerned in the impact of two solid bodies. The dissipation of energy involved in the impact is neglected, and the resultant pressure between the bodies at any instant during the impact is equal to the rate of destruction of momentum of either along the normal to the plane of contact drawn towards the interior of the other. It has been shown that in general the bodies come into contact over a small area bounded by an ellipse, and remain in

contact for a time which varies inversely as the fifth root of the initial relative velocity.

For equal spheres of the same material, with a — \, impinging directly with relative velocity », the patches that come into contact are circles of radius

/45j\ i (v\ i V256y W/

where r is the radius of either, and V the velocity of longitudinal waves in a thin bar of the material. The duration of the impact is approximately

, .. /202,Sir 2 \ 1/5 r

(2-9432) (-gˆ-j «p

For two steel spheres of the size of the earth impinging with a velocity of I cm. per second the duration of the impact would be about twenty-seven hours. The fact that the duration of impact is, for moderate velocities, a considerable multiple of the time

taken by a wave of compression to travel through either of two impinging bodies has been ascertained experimentally, and constitutes the reason for the adequacy of the statical theory here described.

75. Spheres and Cylinders. — Simple results can be found for spherical and cylindrical bodies strained by radial forces.

For a sphere of radius c, and of homogeneous isotropic material of density p, strained by the mutual gravitation of its parts, the stress at a distance r from the centre consists of

(1) uniform hydrostatic pressure of amount ˆ gpa($—

(2) radial tension of amount T 1 „gp(r 2 /a)(3 — o-)/(i — o-),

(3) uniform tension at right angles to the radius vector of amount

hgp(r 2 /a)(l+3)/(i-*),*

where g is the value of gravity at the surface. The corresponding strains consist of

(1) uniform contraction of all lines of the body of amount

3 1 o£~ 1 gpa(3-°-)/(l—o-),

(2) radial extension of amount j , £~ 1 gp(r 2 /a)(i-f-o')/'(i — a),

(3) extension in any direction at right angles to the radius vector of amount

s ' B - 1 gp(/o)(l+a)/(l-

where k is the modulus of compression. The volume is diminished by the fraction gpafek of itself. The parts of the radii vectores within the sphere r = a{(ˆ — a)/($+ˆ

76. In a spherical shell of homogeneous isotropic material, of internal radius n and external radius r , subjected to pressure p on the outer surface, and pi on the inner surface, the stress at any point distant r from the centre consists of

(1) uniform tension in all directions of amountˆ — 2ˆ2.

r 3 -n 3

(2) radial pressure of amount

pi— pa r 3 ri :

ro —fi° r>

(3) tension in all directions at right angles to the radius vector of amount

iPi — po ro'Vi 3 2 r 3 — fi 3 r 3 The corresponding strains consist of

(1) uniform extension of all lines of the body of amount

1 piri s — p r 3

(2) radial contraction of amount

J_ pi — pc r/ri 3 2m r s — ri 3 r 3

(3) extension in all directions at right angles to the radius vector of amount

1 pi— Pa foVi 3 4-jj. ro 3 — ri 3 r 3 where n is the modulus of rigidity of the material, = $E/(l+

creased by the fraction

pin 3 ~ pan 3

k(r t 3 —n 3)

b of itself, and the volume within

the inner surface is increased by the fraction

S(pi-po) 4/t r Q 3

i +

piri 3 —p c ro 3

rS ‘ k(r 3 — ri 3)

of itself. For a shell subject only to internal pressure p the greatest extension is the extension at right angles to the radius at the inner surface, and its amount is

Pri 3 /l 1 1 r

the greatest tension is the transverse tension at the inner surface, and its amount is / > (J-ro 3 4-ri 3)/(r c 3 — n 3).

77. In the problem of a cylindrical shell under pressure a complication may arise from the effects of the ends; but when the ends are free from stress the solution is very simple. With notation similar to that in § 76 it can be shown that the stress at a distance r from the axis consists of

(1) uniform tension in all directions at right angles to the axis of amount

*pirf — ptin**

r a – — ri’

(2) radial pressure of amount r4tr?1

(3) hoop tension numerically equal to this radial pressure.

r-

The corresponding strains consist of

(1) uniform extension of all lines of the material at right angles to the axis of amount

1 –

(2) radial contraction of amount

E r 2 -ri 2 r 2 ‘

(3) extension along the circular filaments numerically equal to this radial contraction,

(4) uniform contraction of the longitudinal filaments of amount

‘2a- piri 2 -p r –

E n 2 -ri % ‘ For a shell subject only to internal pressure p the greatest extension is the circumferential extension at the inner surface, and its amount is

E \r 2 -r-i z /

the greatest tension is the hoop tension at the inner surface, and its amount is p(ro 2 --ri 2)/(r 2 -ri’).

78. When the ends of the tube, instead of being free, are closed by disks, so that the tube becomes a closed cylindrical vessel, the longitudinal extension is determined by the condition that the resultant longitudinal tension in the walls balances the resultant normal pressure on either end. This condition gives the value of the extension of the longitudinal filaments as

(pirf-por&fckirf-n 1),

where k is the modulus of compression of the material. The result may be applied to the experimental determination of k, by measuring the increase of length of a tube subjected to internal pressure (A. Mallock, Proc. R. Soc. London, lxxiv., 1904, and C. Chree, ibid.).

79. The results obtained in § 77 have been applied to gun construction; we may consider that one cylinder is heated so as to slip over another upon which it shrinks by cooling, so that the two form a single body in a condition of initial stress.

We take P as the measure of the pressure between the two, and p for the pressure within the inner cylinder by which the system is afterwards strained, and denote by r' the radius of the common surface. To obtain the stress at any point we superpose the

system consisting of radial pressure p

P r 2 n

r 2 +r 2

r rtf-fi*

- and hoop tension

upon a system which, for the outer cylinder, consists

of radial pressure P-

; U'

and hoop tension P—

fo 2 +r 2

and

and

r'-n' inner surface

for the inner cylinder consists of radial pressure P-j

hoop tension P— ^ ■■ ,^ . The hoop tension at the

is less than it would be for a tube of equal thickness without initial stress in the ratio

1 P 2r' 2 r 2 -ri 2 _ p »'o 2 +rr c' 2 -ri 2 ' ' This shows how the strength of the tube is increased by the initial stress. When the initial stress is produced by tightly wound wire, a similar gain of strength accrues.

80. In the problem of determining the distribution of stress and strain in a circular cylinder, rotating about its axis, simple solutions have been obtained which are sufficiently exact for the two special cases of a thin disk and a long shaft.

Suppose that a circular disk of radius a and thickness 7.1, and of density p, rotates about its axis with angular velocity a, and consider the following systems of superposed stresses at any point distant r from the axis and z from the middle plane :

(1) uniform tension in all directions at right angles to the axis of amount Jw 2 pa 2 (3+

(2) radial pressure of amount lo> 2 pr 2 ($ + a),

(3) pressure along the circular filaments of amount §w 2 pr 2 (i-f 3

(4) uniform tension in all directions at right angles to the axis of amount Ju 2 p(/ 2 3Z 2)a(i+a-)/(i -

The corresponding strains may be expressed as

(1) uniform extension of all filaments at right angles to the axis of amount

-jy-S'U-pa-() + o),

(2) radial contraction of amount

l-a 2 3 , , — g-fw-p)—,

(3) contraction along the circular filaments of amount

(4) extension of all filaments at right angles to the axis of amount

!»'P(P'*

-3^(1 +

(5) contraction of the filaments normal to the plane of the disk of amount

icoW(3 + .

The greatest extension is the circumferential extension near the centre, and its amount is

The longitudinal contraction is required to make the plane faces of the disk free from pressure, and the terms in I and z enable us to avoid tangential traction on any cylindrical surface. The system of stresses and strains thus expressed satisfies all the con- ditions, except that there is a small radial tension on the bounding surface of

amount per unit area ˆ 2 p(/ 2 3z 2)o(i+a)/(i rff). The re- sultant of these tensions on any part of the edge of the disk vanishes, and the stress in question is very small in comparison with the other stresses involved when the disk is thin; we may conclude that, for a thin disk, the expres- sions given represent the actual condition at all points which are not very close to the edge (cf. § 55). The effect to the longitudinal con- traction is that the plane faces become slightly concave (fig. 32).

81. The corresponding solution for a disk with a circular axle-hole (radius b) will be obtained from that given in the last section by superposing the following system of additional stresses:

(1) radial tension of amount §M 2 p& 2 (l-a 2 /r !)(3 + a),

(2) tension along the circular filaments of amount

|co 2 p6 2 (l+a 2 /r 2)(3 +

The corresponding additional strains are (1) radial contraction of amount

” 2 (l<0 \o?r>V,

(C=

=3

Fig. 32.

ˆic

+ ’)-.

(2) extension along the circular filaments of amount

3 +

8E i (i+ˆ+a-)*

?pb

(3) contraction of the filaments parallel to the axis of amount

Again, the greatest extension is the circumferential extension at the inner surface, and, when the hole is very small, its amount is nearly double what it would be for a complete disk.

82. In the problem of the rotating shaft we have the following stress-system :

(1) radial tension of amount \a 2 p{a 2 -r T }{2) -2a)l{l -a),

(2) circumferential tension of amount

!Vp{o 2 (3 -2t)/(w) -rˆi +2

(3) longitudinal tension of amount io) 2 p(a 2 -2r 2)

The resultant longitudinal tension at any normal section vanishes, and the radial tension vanishes at the bounding surface; and thus the expressions here given may be taken to represent the actual condition at all points which are not very close to the ends of the shaft. The contraction of the longitudinal filaments is uniform and equal to Jw'paV/E. The greatest extension in the rotating shaft is the circumferential extension close to the axis, and its amount is iu 2 pa 2 (3-5o-)/E(l-o-).

The value of any theory of the strength of long rotating shafts founded on these formulae is diminished by the circumstance that at sufficiently high speeds the shaft may tend to take up a curved form, the straight form being unstable. The shaft is then said to whirl. This occurs when the period of rotation of the shaft is very nearly coincident with one of its periods of lateral vibration. The lowest speed at which whirling can take place in a shaft of length I, freely supported at its ends, is given by the formula

« 2 p = iEo 2 (x/0 4 . As in § 61, this formula should not be applied unless the length of the shaft is a considerable multiple of its diameter. It implies that whirling is to be expected whenever u approaches this critical value.

83. When the forces acting upon a spherical or cylindrical body are not radial, the problem becomes more complicated. In the case of the sphere deformed by any forces it has been completely solved, and the solution has been applied by Lord Kelvin and

Sir G. H. Darwin to many interesting questions of cosmical physics. The nature of the stress produced in the interior of the earth by the weight of continents and mountains, the spher- oidal figure of a

rotating solid planet, the rigidity of the earth, are among the questions which have in this way been attacked. Darwin concluded from his investigation that, to support the weight of the existing continents and mountain ranges, the materials of which the earth is composed must, at great depths (1600 kilometres), have at least the strength of granite. Kelvin concluded from his investigation that the actual heights of the tides in the existing oceans can be accounted for only on the supposition that the interior of the earth is solid, and of rigidity nearly as great as, if not greater than, that of steel.

84. Some interesting problems relating to the strains produced in a cylinder of finite length by forces distributed symmetrically round the axis have been solved. The most important is that of a cylinder crushed between parallel planes in contact with its plane ends. The solution was applied to explain the discrepancies that have been observed in different tests of crushing strength according as the ends of the test specimen are or are not prevented from spreading. It was applied also to explain the fact that in such tests small conical pieces are sometimes cut out at the ends subjected to pressure.

85. Vibrations and Waves. — When a solid body is struck, or otherwise suddenly disturbed, it is thrown into a state of vibra- tion. There always exist dissipative forces which tend to destroy the vibratory motion, one cause of the subsidence of the motion being the communication of energy to surrounding bodies. When these dissipative forces are disregarded, it is found that an elastic solid body is capable of vibrating in such a way that the motion of any particle is simple harmonic motion, all the particles completing their oscillations in the same period and being at any instant in the same phase, and the displacement of any selected one in any particular direction bearing a definite ratio to the displacement of an assigned one in an assigned direction. When a body is moving in this way it is said to be vibrating in a normal mode. For example, when a tightly stretched string of negligible flexural rigidity, such as a violin string may be taken to be, is fixed at the ends, and vibrates transversely in a normal mode, the displacements of all the particles have the same direction, and their magnitudes are proportional at any instant to the ordinates of a curve of sines. Every body possesses an infinite number of normal modes of vibration, and the frequencies (or numbers of vibrations per second) that belong to the different modes form a sequence of increasing numbers. For the string, above referred to, the fundamental tone and the various overtones form an harmonic scale, that is to say, the frequencies of the normal modes of vibration are proportional to the integers 1, 2, 3, . . . In all these modes except the first the string vibrates as if it were divided into a

number of equal pieces, each having fixed ends; this number is in each case the integer defining the frequency. In general the normal modes of vibration of a body are distin- guished one from another by the number and situation of the surfaces (or other loci) at which some characteristic displacement or traction vanishes. The problem of determining the normal modes and frequencies of free vibration of a body of definite size, shape and constitution, is a mathematical problem of a similar character to the problem of determining the state of stress in the body when subjected to given forces. The bodies which have been most studied are strings and thin bars, mem- branes, thin plates and shells, including bells, spheres and cylinders. Most of the results are of special importance in their bearing upon the theory of sound.

86. The most complete success has attended the efforts of mathe- maticians to solve the problem of free vibrations for an isotropic sphere. It appears that the modes of vibration fall into two classes : one characterized by the absence of a radial component of displace- ment, and the other by the absence of a radial component of rotation (§ 14). In each class there is a doubly infinite number of modes. The displacement in any mode is determined in terms of a single spherical harmonic function, so that there are modes of each class corresponding to spherical harmonics of every integral degree; and for each degree there is an infinite number of modes, differing from one another in the number and position of the concentric spherical surfaces at which some characteristic displacement vanishec The most interesting modes are those in which the sphere becomes

slightly spheroidal, being alternately prolate and oblate during the course of a vibration; for these vibrations tend to be set up in a spherical planet by tide-generating forces. In a sphere of the size of the earth, supposed to be incompressible and as rigid as steel, the period of these vibrations is 66 minutes.

87. The theory of free vibrations has an important bearing upon the question of the strength of structures subjected to sudden blows or shocks. The stress and strain developed in a body by sudden applications of force may exceed considerably those which would be produced by a gradual application of the same forces. Hence there arises the general question of dynami- cal resistance, or of the resistance of a body to forces applied • so quickly that the inertia of the body comes sensibly into play. In regard to this question we have two chief theoretical results. The first is that the strain produced by a force suddenly applied may be as much as twice the statical strain, that is to say, as the strain which would be produced by the same

force when the body is held in equilibrium under its action; the second is that the sudden reversal of the force may produce a strain three times as great as the statical strain. These results point to the importance of specially strengthening the parts of any machine (e.g. screw propeller shafts) which are subject to sudden applica- tions or reversals of load. The theoretical limits of twice, or three times, the statical strain are not in general attained. For example, if a thin bar hanging vertically from its upper end is suddenly loaded at its lower end with a weight equal to its own weight, the greatest dynamical strain bears to the greatest statical strain the ratio 1-63:1; when the attached weight is four times the weight of the bar the ratio becomes 1-84:1. The method by which the result just mentioned is reached has recently been applied to the question of the breaking of winding ropes used in mines. It appeared that, in order to bring the results into harmony with the observed facts, the strain in the supports must be taken into account as well as the strain in the rope (J. Perry, Phil. Mag., 1906 (vi.), vol. ii.).

88. The immediate effect of a blow or shock, locally applied to a body, is the generation of a wave which travels through the body from the locality first affected. The question of the propagation of waves through an elastic solid body is historically of very great importance; for the first really successful efforts to construct a theory of elasticity (those of S. D. Poisson, A. L. Cauchy and G. Green) were prompted, at least in part, by Fresnel's theory of the propagation of light by transverse vibrations. For many years the luminiferous medium was identified with the isotropic solid of the theory of elasticity. Poisson showed that a disturbance communicated to the body gives rise to two waves which are propagated through it with different velocities; and Sir G. G. Stokes afterwards showed that the quicker wave is a wave of irrotational dilatation, and the slower wave is a wave of rotational distortion accompanied by no change of volume. The velocities of the two waves in a solid of density p are V {(X+2a0/p! and V (m/p), X and yu being the constants so denoted in § 26. When the surface of the body is free from traction, the waves on reaching the surface are reflected; and thus after a little time the body would, if there were no dissipative forces, be in a very complex state of motion due to multitudes of waves passing to and fro through it. This state can be expressed as a state of vibration, in which the motions belonging to the various normal modes; (§ 85) are superposed, each with an appropriate amplitude and phase. The waves of dilatation and distortion do not, however, give rise to different modes of vibration, as was at one time supposed, but any mode of vibration in general

involves both dilatation and rotation. There are exceptional results for solids of revolution; such solids possess normal modes of vibration which involve no dilatation. The existence of a boundary to the solid body has another effect, besides reflexion, upon the propagation of waves. Lord Rayleigh has shown that any disturbance originat- ing at the surface gives rise to waves which travel away over the surface as well as to waves which travel through the interior; and any internal disturbance, on reaching the surface, also gives rise to such superficial waves. The velocity of the super- ficial waves is a little less than that of the waves of distortion:

0-9554 V (ju/p)when the material is incompressible 0-9194 V (p/p) when the Poisson's ratio belonging to the material is |.

89. These results have an application to the propagation of earthquake shocks (see also Earthquake). An internal dis- turbance should, if the earth can be regarded as solid, give rise to three wave-motions: two propagated through the interior of the earth with different velocities, and a third propagated over the surface. The results of seismographic observations have independently led to the recognition of three phases of the recorded vibrations: a set of "preliminary tremors" which are received at different stations at such times as to show that they are transmitted directly through the interior of the earth with a velocity of about 10 km. per second, a second set of preliminary tremors which are received at different stations at such times as to show that they are transmitted directly through the earth with a velocity of about 5 km. per second, and a " main shock," or set of large vibrations, which becomes sensible at different stations at such times as to show that a wave is transmitted over the surface of the earth with a velocity of about 3 km. per second. These results can be interpreted if we assume that the earth is a solid body the greater part of which is practically homogeneous, with high values for the rigidity and the resistance to compression, while the superficial portions have lower values for these quantities. The rigidity of the central portion would be about (i-4)io 12 dynes per square cm., which is considerably greater than that of steel, and the resistance to compression would be about (3-8) 10 n dynes per square cm. which is much greater than that of any known material. The high value of the resistance to compression is not surprising when account is taken of the great pressures, due to gravitation, which must exist in the interior of the earth. The high value of the

rigidity can be regarded as a confirmation of Lord Kelvin's estimate founded on tidal observations (§83).

90. Strain produced by Heat. — The mathematical theory of elasticity as at present developed takes no account of the strain which is produced in a body by unequal heating. It appears to be impossible in the present state of knowledge to form as in § 39 a system of differential equations to determine both the stress and the temperature at any point of a solid body the temperature of which is liable to variation. In the cases of isothermal and adiabatic changes, that is to say, when the body is slowly strained without variation of temperature, and also when the changes are effected so rapidly that there is no gain or loss of heat by any element, the internal energy of the body is sufficiently expressed by the strain-energy-function (§§ 27, 30). Thus states of equilibrium and of rapid vibration can be determined by the theory that has been explained above. In regard to thermal effects we can obtain some indications from general thermodynamic theory. The following passages extracted from the article " Elasticity " contributed to the 9th edition of the Encyclopaedia Britannica by Sir W. Thomson (Lord Kelvin) illustrate the nature of these indications: — " From thermodynamic theory it is concluded that cold is pro- duced whenever a solid is strained by opposing, and heat when it is strained by yielding to, any elastic force of its own, the strength of which would diminish if the temperature were raised; but that, on the contrary, heat is produced when a solid is strained against, and cold when it is strained by yielding to, any elastic force of its own, the strength of which would increase if the temperature were raised. When the strain is a condensa- tion or dilatation, uniform in all directions, a fluid may be included in the statement. Hence the following propositions: —

" (1) A cubical compression of any elastic fluid or solid in an ordinary condition causes an evolution of heat; but, on the contrary, a cubical compression produces cold in any substance, solid or fluid, in such an abnormal state that it would contract if heated while kept under constant pressure. Water below its temperature(3-9°Cent.)of maximum density is a familiar instance.

" (2) If a wire already twisted be suddenly twisted further, always, however, within its limits of elasticity, cold will be produced; and if it be allowed suddenly to untwist, heat will

be evolved from itself (besides heat generated externally by any work allowed to be wasted, which it does in untwisting). It is assumed that the torsional rigidity of the wire is diminished by an elevation of

temperature, as the writer of this article had found it to be for copper, iron, platinum and other metals.

" (3) A spiral spring suddenly drawn out will become lower in temperature, and will rise in temperature when suddenly allowed to draw in. [This result has been experimentally verified by Joule (' Thermodynamic Properties of Solids,' Phil. Trans., 1858) and the amount of the effect found to agree with that calculated, according to the preceding thermodynamic theory, from the amount of the weakening of the spring which he found by experiment.]

" (4) A bar or rod or wire of any substance with or without a weight hung on it, or experiencing any degree of end thrust, to begin with, becomes cooled if suddenly elongated by end pull or by diminution of end thrust, and warmed if suddenly shortened by end thrust or by diminution of end pull; except abnormal cases in which with constant end pull or end thrust elevation of temperature produces shortening; in every such case pull or diminished thrust produces elevation of temperature, thrust or diminished pull lowering of temperature.

" (5) An india-rubber band suddenly drawn out (within its limits of elasticity) becomes warmer; and when allowed to contract, it becomes colder. Any one may easily verify this curious property by placing an india-rubber band in slight contact with the edges of the lips, then suddenly extending it — it becomes very perceptibly warmer: hold it for some time stretched nearly to breaking, and then suddenly allow it to shrink — it becomes quite startlingly colder, the cooling effect being sensible not merely to the lips but to the fingers holding the band. The first published statement of this curious observa- tion is due to J. Gough {Mem. Lit. Phil. Soc. Manchester, 2nd series, vol. i. p. 288), quoted by Joule in his paper on ' Thermo-dynamic Properties of Solids' (cited above). The thermo- dynamic conclusion from it is that an india-rubber band,stretched by a constant weight of sufficient amount hung on it, must, when heated, pull up the weight, and, when cooled, allow the weight to descend: this Gough, independently of thermo- dynamic theory, had found to be actually the case. The ex- periment any one can make with the greatest ease by hanging a few pounds weight on a common india-rubber band, and taking a red-hot coal in a pair of tongs, or a red-hot poker, and moving it up and down close to the band. The way in which the weight rises when the red-hot body is near, and falls when it is removed, is quite startling. Joule experimented on the amount of shrinking per degree of elevation of temperature, with different weights hung on a band of vulcanized india-rubber, and found that

they closely agreed with the amounts calculated by Thomson's theory from the heating effects of pull, and cool- ing effects of ceasing to pull, which he had observed in the same piece of india-rubber."

91. Initial Stress. — It has been pointed out above (§ 20) that the " unstressed " state, which serves as a zero of reckon- ing for strains and stresses is never actually attained, although the strain (measured from this state), which exists in a body to be subjected to experiment, may be very slight. This is the case when the " initial stress," or the stress existing before the experiment, is small in comparison with the stress developed during the experiment, and the limit of linear elasticity (§32) is not exceeded. The existence of initial stress has been corre- lated above with the existence of body forces such as the force of gravity, but it is not necessarily dependent upon such forces. A sheet of metal rolled into a cylinder, and soldered to maintain the tubular shape, must be in a state of considerable initial stress quite apart from the action of gravity. Initial stress is utilized in many manufacturing processes, as, for example, in the construction of ordnance, referred to in § 79, in the winding of golf balls by means of india-rubber in a state of high tension (see the report of the case The Haskell Golf Ball Company V; Hutchinson & Main in The Times of March 1, 1906). In the case of a body of ordinary dimensions it is such internal stress*

as this which is especially meant by the phrase " initial stress." Such a body, when in such a state of internal stress, is sometimes described as " self-strained." It would be better described as " self-stressed." The somewhat anomalous behaviour of cast iron has been supposed to be due to the existence within the metal cf initial stress. As the metal cools, the outer layers cool more rapidly than the inner, and thus the state of initial stress is produced. When cast iron is tested for tensile strength, it shows at first no sensible range either of perfect elasticity or of linear elasticity; but after it has been loaded and unloaded several times its behaviour begins to be more nearly like that of wrought iron or steel. The first tests probably diminish the initial stress.

92. From a mathematical point of view the existence of initial stress in a body which is " self-stressed " arises from the fact that the equations of equilibrium of a body free from body forces or surface tractions, viz. the equations of the type

*dX x dX y dZ x dx i ” dy * dz ‘ possess solutions which differ from zero. If, in fact, fa, fa, fa denote any arbitrary functions of x, y, z, the equations are satisfied by putting*

*Al ~ dy’ + dz •■■••**- dydz*

and it is clear that the functions fa, fa, fa can be adjusted in an infinite number of ways so that the bounding surface of the body may be free from traction.

93. Initial stress due to body forces becomes most important in the case of a gravitating planet. Within the earth the stress that arises from the mutual gravitation of the parts is very great. If we assumed the earth to be an elastic solid body with moduluses of elasticity no greater than those of steel, the strain (measured from the unstressed state) which would correspond to the stress would be much too great to be calculated by the ordinary methods of the theory of elasticity (§ 75). We require therefore some other method of taking account of the initial stress. In many investigations, for example those of Lord Kelvin and Sir G. H. Darwin referred to in § 83, the difficulty is turned by assuming that the material may be treated as practically incompressible ; but such investigations are to some extent incomplete, so long as the corrections due to a finite, even though high, resistance to compression remain unknown. In other investigations, such as those relating to the propagation of earthquake shocks and to gravitational instability, the possibility of compression is an essential element of the problem. By gravitational instability is meant the tendency of gravitating matter to condense into nuclei when slightly disturbed from a state of uniform diffusion; this tendency has been shown by J. H. Jeans {Phil. Trans. A. 201, 1903) to have exerted an important influence upon the course of evolution of the solar system. For the treatment of such questions Lord Rayleigh {Proc. R. Soc. London, A. 77, 1906) has advocated a method which amounts to assuming that the initial stress is hydrostatic pressure, and that the actual state of stress is to be obtained by superposing upon this initial stress a stress related to the state of strain (measured from the initial state) by the same formulae as hold for an elastic solid body free from initial stress. The development of this method is likely to lead to results of great interest.

Authorities. — In regard to the analysis requisite to prove the results set forth above, reference may be made to A. E. H. Love, Treatise on the Mathematical Theory of Elasticity (2nd ed., Cambridge, 1906), where citations of the original authorities will also be found. The

following treatises may be mentioned : Navier, Resumi des lecons stir V application de la mecanique (3rd ed., with notes by Saint- Venant, Paris, 1864); G. Lame, Lecons sur la theorie maihematique de V elasticity des corps solides (Paris, 1852); A. Clebsch, Theorie der Elasticitdt fester Korper (Leipzig, 1862; French translation with notes by Saint-Venant, Paris, 1883),- F. Neumann, Vorlesungen iiber die Theorie der Elasticitdt (Leipzig, 1885); Thomson and Tait, Natural Philosophy (Cambridge, 1879, 1883); Todhunter and Pearson, History of the Elasticity and Strengthof Materials(Ca.mbridge, 1886-1893). The article " Elasticity " by Sir W. Thomson (Lord Kelvin) in 9th ed. of Encyc. Brit, (reprinted in his Mathematical and Physical Papers, iii., Cambridge, 1890) is especially valu- able, not only for the exposition of the theory and its practical applications, but also for the tables of physical constants which are there given. (A. E. H. L.)

ELATERITE, also termed Elastic Bitumen and Mineral Caoutchouc, a mineral hydrocarbon, which occurs at Castleton in Derbyshire, in the lead mines of Odin and elsewhere. It varies somewhat in consistency, being sometimes soft, elastic and sticky; often closely resembling india-rubber; and occasion- ally hard and brittle. It is usually dark brown in colour and slightly translucent. A substance of similar physical character is found in the Coorong district of South Australia, and is hence termed coorongite, but Prof. Ralph Tate considers this to be a vegetable product.

ELATERIUM, a drug consisting of a sediment deposited by the juice of the fruit of Ecballium Elaterium, the squirting cucumber, a native of the Mediterranean region. The plant, which is a member of the natural order Cucurbitaceae, resembles the vegetable marrow in its growth. The fruit resembles a small cucumber, and when ripe is highly turgid, and separates almost at a touch from the fruit stalk. The end of the stalk forms a stopper, on the removal of which the fluid contents of the fruit, together with the seeds, are squirted through the aperture by the sudden contraction of the wall of the fruit. To prepare the drug the fruit is sliced lengthwise and slightly pressed; the greenish and slightly turbid juice thus obtained is strained and set aside; and the deposit of elaterium formed after a few hours is collected on a linen filter, rapidly drained, and dried on porous tiles at a gentle heat. Elaterium is met with in commerce in light, thin, friable, flat or slightly incurved opaque cakes, of a greyish-green colour, bitter taste and tea-like smell.

The drug is soluble in alcohol, but insoluble in water and ether. The official dose is j-Vl grain, and the British pharmacopeia directs that

the drug is to contain from 20 to 25% of the active principle elaterinum or elaterin. A resin in the natural product aids its action. Elaterin is extracted from elaterium by chloro- form and then precipitated by ether. It has the formula C20H28O5. It forms colourless scales which have a bitter taste, but it is highly inadvisable to taste either this substance or elaterium. Its dose is ˆV \~a grain, and the British pharmacopeia contains a useful preparation, the Pulvis Elaterini Compositus, which contains one part of the active principle in forty.

The action of this drug resembles that of the saline aperients, but is much more powerful. It is the most active hydragogue purgative known, causing also much depression and violent griping. When injected subcutaneously it is inert, as its action is entirely dependent upon its admixture with the bile. The drug is undoubtedly valuable in cases of dropsy and Bright's disease, and also in cases of cerebral haemorrhage, threatened or present. It must not be used except in urgent cases, and must invariably be employed with the utmost care, especially if the state of the heart be unsatisfactory.

ELBA (Gr. AWaKla; Lat. Ilva), an island off the W. coast of Italy, belonging to the province of Leghorn, from which it is 45 m. S., and 7 m. S.W. of Piombino, the nearest point of the mainland. Pop. (1901) 25,043 (including Pianosa). It is about 19 m. long, 6f m. broad, and 140 sq. m. in area; and its highest point is 3340 ft. (Monte Capanne). It forms, like Giglio and Monte Cristo, part of a sunken mountain range extending towards Corsica and Sardinia.

The oldest rocks of Elba consist of schist and serpentine which in the eastern part of the island are overlaid by beds containing Silurian and Devonian fossils. The Permian may be represented, but the Trias is absent, and in general the older Palaeozoic rocks are overlaid directly by the Rhaetic and Lias. The Liassic beds are often metamorphosed and the limestones contain garnet and wollastonite. The next geological formation which is represented is the Eocene, consisting of nummulitic limestone, sandstone and schist. The Miocene and Pliocene are absent. The most remarkable feature in the geology of Elba is the extent of the granitic and ophiolitic eruptions of the Tertiary period. Serpentines, peridotites and diabases are interstratified with the Eocene deposits. The granite, which is intruded through the Eocene beds, is associated with a pegmatite containing toui- maline and cassiterite. The celebrated iron ore of Elba is of

Tertiary age and occurs indifferently in all the older rocks. The deposits are superficial, resulting from the opening out of veins at the surface, and consist chiefly of haematite. These ores were worked by the ancients, but so inefficiently that their spoil- heaps can be smelted again with profit. This process is now gone through on the island itself. The granite was also quarried by the Romans, but is not now much worked.

Parts of the island are fertile, and the cultivation of vines, and the tunny and sardine fishery, also give employment to a part of the population. The capital of the island is Portoferraio — pop. (iooi) 5987 — in the centre of the N. coast, enclosed by an amphitheatre of lofty mountains, the slopes of which are covered with villas and gardens. This is the best harbour, the ancient Portus Argous. The town was built and fortified by Cosimo I. in 1548, who called it Cosmopolis. Above the harbour, between the forts Stella and Falcone, is the palace of Napoleon I., and 4 m. to the S.W. is his villa; while on the N. slope of Monte Capanne is another of his country houses. The other villages in the island are Campo nell' Elba, on the S. near the W. end, Marciana and Marciana Marina on the N. of the island near the W. extremity, Porto Longone, on the E. coast, with picturesque Spanish fortifications, constructed in 1602 by Philip III.; Rio dell' Elba and Rio Marina, both on the E. side of the island, in the mining district. At Le Grotte, between Portoferraio and Rio dell' Elba, and at Capo Castello, on the N.E. of the island, are ruins of Roman date.

Elba was famous for its mines in early times, and the smelting furnaces gave it its Greek name of A' Bahla (" soot island "). In Roman times, and until 1900, however, owing to lack of fuel, the smelting was done on the mainland. In 453 B.C. Elba was devastated by a Syracusan squadron. From the nth to the 14th century it belonged to Pisa, and in 1399 came under the dukes of Piombino. In 1548 it was ceded by them to Cosimo I. of Florence. In 1596 Porto Longone was taken by Philip III. of Spain, and retained until 1709, when it was ceded to Naples. In 1802 the island was given to France by the peace of Amiens. On Napoleon's deposition, the island was ceded to him with full sovereign rights, and he resided there from the 5th of May 1814 to the 26th of February 1815. After his fall it was restored to Tuscany, and passed with it to Italy in i860.

See Sir R. Colt Hoare, A Tour through the Island of Elba (London,

1814).

ELBE (the Alois of the Romans and the Labe of the Czechs), a river of Germany, which rises in Bohemia not far from the frontiers of Silesia, on the southern side of the Riesengebirge, at an altitude of about 4600 ft. Of the numerous small streams (Seifen or Flessen as they are named in the district) whose con- fluent waters compose the infant river, the most important are the Weisswasser, or White Water, and the Elbseifen, which is formed in the same neighbourhood, but at a little lower elevation. After plunging down the 140 ft. of the Elbfall, the latter stream unites with the steep torrential Weisswasser at Madelstegbaude, at an altitude of 2230 ft., and thereafter the united stream of the Elbe pursues a southerly course, emerging from the mountain glens at Hohenelbe (1495 ft.), and continuing on at a soberer pace to Pardubitz, where it turns sharply to the west, and at Kolin (730 ft.), some 27 m. farther on, bends gradually towards the north-west. A little above Brandeis it picks up the Iser, which, like itself, comes down from the Riesengebirge, and at Melnik it has its stream more than doubled in volume by the Moldau, a river which winds northwards through the heart of Bohemia in a sinuous, trough-like channel carved through the plateaux. Some miles lower down, at Leitmeritz (433 ft.), the waters of the Elbe are tinted by the reddish Eger, a stream which drains the southern slopes of the Erzgebirge. Thus augmented, and swollen into a stream 140 yds. wide, the Elbe carves a path through the basaltic mass of the Mittelgebirge, churning its way through a deep, narrow rocky gorge. Then the river winds through the fantastically sculptured sandstone mountains of the " Saxon Switzerland," washing successively the feet of the lofty Lilienstein (932 ft. above the Elbe), the scene of one of Frederick the Great's military exploits in the Seven Years' War, Konigstein ix. 5

(797 ft. above the Elbe), where in times of war Saxony has more than once stored her national purse for security, and the pinnacled rocky wall of the Bastei, towering 650 ft. above the surface of the stream. Shortly after crossing the Bohemian-Saxon frontier, and whilst still struggling through the sandstone defiles, the stream assumes a north-westerly direction, which on the whol/ it preserves right away to the North Sea. At Pirna the Elbe leaves behind it the stress and turmoil of the Saxon Switzerland, rolls through Dresden, with its noble river terraces, and finally, beyond Meissen, enters on its long journey across the North German plain, touching Torgau, Wittenberg, Magdeburg, Wittenberge, Hamburg, Harburg and Altona on the way, and gathering into itself the waters of the Mulde and Saale from the left, and those of the Schwarze Elster, Havel and Elde

from the right. Eight miles above Hamburg the stream divides into the Norder (or Hamburg) Elbe and the Suder (or Harburg) Elbe, which are linked together by several cross-channels, and embrace in their arms the large island of Wilhelmsburg and some smaller ones. But by the time the river reaches Blankenese, 7 m. below Hamburg, all these anastomosing branches have been reunited, and the Elbe, with a width of 4 to 9 m. between bank and bank, travels on between the green marshes of Holstein and Hanover until it becomes merged in the North Sea off Cuxhaven. At Kolin the width is about 100 ft., at the mouth of the Moldau about 300, at Dresden 960, and at Magdeburg over 1000. From Dresden to the sea the river has a total fall of only 280 ft., although the distance is about 430 m. For the 75 m. between Hamburg and the sea the fall is only 3ˆ ft. One consequence of this is that the bed of the river just below Hamburg is obstructed by a bar, and still lower down is choked with sandbanks, so that navigation is confined to a relatively narrow channel down the middle of the stream. But unremitting efforts have been made to maintain a sufficient fairway up to Hamburg {q.v.). The tide advances as far as Geesthacht, a little more than 100 m. from the sea. The river is navigable as far as Melnik, that is, the confluence of the Moldau, a distance of 525 m., of which 67 are in Bohemia. It total length is 725 m., of which 190 are in Bohemia, 77 in the kingdom of Saxony, and 350 in Prussia, the remaining 108 being in Hamburg and other states of Germany. The area of the drain- age basin is estimated at 56,000 sq. m.

Navigation. — Since 1842, but more especially since 1871, im- provements have been made in the navigability of the Elbe by all the states which border upon its banks. As a result of these labours there is now in the Bohemian portion of the river a minimum depth of 2 ft. 8 in., whilst from the Bohemian frontier down to Magdeburg the minimum depth is 3 ft., and from Magdeburg to Hamburg, 3 ft. 10 in. In 1896 and 1897 Prussia and Hamburg signed covenants whereby two channels are to be kept open to a depth of 9! ft., a width of 656 ft., and a length of 550 yds. between Bunthaus and Ortkathen, just above the bifurcation of the Norder Elbe and the Slider Elbe. In 1869 the maximum burden of the vessels which were able to ply on the upper Elbe was 250 tons; but in 1899 it was increased to 800 tons. The large towns through which the river flows have vied with one another in building harbours, providing shipping accommodation, and furnishing other facilities for the efficient navigation of the Elbe. In this respect the greatest efforts have naturally been made by Hamburg; but Magdeburg, Dresden, Meissen, Riesa, Tetschen, Aussig and other places have all done their relative

shares, Magdeburg, for instance, providing a commercial harbour and a winter harbour. In spite, however, of all that has been done, the Elbe remains subject to serious inundations at periodic intervals. Among the worst floods were those of the years 1774, 1799, 1815, 1830, 1843, 1862, 1890 and 1909. The growth of traffic up and down the Elbe has of late years become very considerable. A towing chain, laid in ttie (>ed of the river, extends from Hamburg to Aussig, and bv this means, as by paddle-tug haulage, large barges are brougnt from the port of Hamburg into the heart of Bohemia. The fleet of steamers and barges navigating the Elbe is in point of fact greater than on any other German river. In addition to goods thus conveyed, enormous quantities of timber are floated down the Elbe; the

weight of the rafts passing the station of Schandau on the Saxon Bohemian frontier amounting in 1901 to 333,000 tons.

A vast amount of traffic is directed to Berlin, by means of the Havel-Spree system of canals, to the Thuringian states and the Prussian province of Saxony, to the kingdom of Saxony and Bohemia, and to the various riverine states and provinces of the lower and middle Elbe. The passenger traffic, which is in the hands of the Sachsisch-Bohmische Dampfschifffahrtsgesellschaft is limited to Bohemia and Saxony, steamers plying up and down the stream from Dresden to Melnik, occasionally continuing the journey up the Moldau to Prague, and down the river as far as Riesa, near the northern frontier of Saxony, and on the average 15 million passengers are conveyed.

In 1877-1879, and again in 1888-1895, some 100 m. of canal were dug, 5 to 6| ft. deep and of various widths, for the purpose of connecting the Elbe, through the Havel and the Spree, with the system of the Oder. The most noteworthy of these connexions are the Elbe Canal (14.J m. long), the Reek Canal (95 m.), the Rudersdorfer Gewasser (1 1£ m.), the Rheinsberger Canal (1 1 \ m.), and the Sacrow-Paretzer Canal (10 m.), besides which the Spree has been canalized for a distance of 28 m., and the Elbe for a distance of 70 m. Since 1896 great improvements have been made in the Moldau and the Bohemian Elbe, with the view of facilitating communication between Prague and the middle of Bohemia generally on the one hand, and the middle and lower reaches of the Elbe on the other. In

the year named a special commission was appointed for the regulation of the Moldau and Elbe between Prague and Aussig, at a cost estimated at about £1,000,000, of which sum two-thirds were to be borne by the Austrian empire and one-third by the kingdom of Bohemia. The regulation is effected by locks and movable dams, the latter so designed that in times of flood or frost they can be dropped flat on the bottom of the river. In 1901 the Austrian government laid before the Reichsrat a canal bill, with proposals for works estimated to take twenty years to complete, and including the construction of a. canal between the Oder, starting at Prerau, and the upper Elbe at Pardubitz, and for the canalization of the Elbe from Pardubitz to Melnik (see Austria: Waterways). In 1900 Liibeck was put into direct communication with the Elbe at Lauenburg by the opening of the Elbe-Trave Canal, 42 m. in length, and constructed at a cost of £1,177,700, of which the state of Liibeck contributed £802,700, and the kingdom of Prussia £375,000. The canal has been made 72 ft. wide at the bottom, 105 to 126 ft. wide at the top, has a minimum depth of 85 ft., and is equipped with seven locks, each 262J ft. long and 39I ft. wide. It is thus able to accommodate vessels up to 800 tons burden ; and the passage from Liibeck to Lauenburg occupies 18 to 21 hours. In the first year of its being open (June 1900 to June 1901) a total of 115,000 tons passed through the canal. 1 A gigantic project has also been put forward for providing water communication between the Rhine and the Elbe, and so with the Oder, through the heart of Germany. This scheme is known as the Midland Canal. Another canal has been projected for con- necting Kiel with the Elbe by means of a canal trained through the Plon Lakes.

Bridges. — The Elbe is crossed by numerous bridges, as at Koniggratz, Pardubitz, Kolin, Leitmeritz, Tetschen, Schandau, Pirna, Dresden, Meissen, Torgau, Wittenberg, Rosslau, Barby, Magdeburg, Rathenow, Wittenbergc, Domitz, Lauenburg, and Hamburg and Harburg. At all these places there are railway bridges, and nearly all, but more especially those in Bohemia, Saxony and the middle course of the river — these last on the main lines between Berlin and the west and south-west of the empire — possess a greater or less strategic value. At Leitmeritz there is an iron trellis bridge, 600 yds long. Dresden has four bridges, and there is a fifth bridge at Loschwitz, about 3 m. above the city. Meissen has a railway bridge, in addition to an old road bridge. Magdeburg is one of the most important railway centres in northern Germany; and the Elbe, besides being bridged— it divides there into three arms— several times for vehicular traffic,

1 See Der Ban des Elbe-Trave Canals und seine Vorgeschichte '(Lubeck, £900}.

is also spanned by two fine railway bridges. At both Hamburg and Harburg, again, there are handsome railway bridges, the one (1868-1873 and 1894) crossing the northern Elbe, and the other (1900) the southern Elbe; and the former arm is also crossed by a fine triple-arched bridge (1888) for vehicular traffic.

Fish. — The river is well stocked with fish, both salt-water and fresh-water species being found in its waters, and several varieties of fresh-water fish in its tributaries. The kinds of greatest economic value are sturgeon, shad, salmon, lampreys, eels, pike and whiting.

Tolls. — In the days of the old German empire no fewer than thirty-five different tolls were levied between Melnik and Ham- burg, to say nothing of the special dues and privileged exactions of various riparian owners and political authorities. After these had been de facto, though not dejure, in abeyance during the period of the Napoleonic wars, a commission of the various Elbe states met and drew up a scheme for their regulation, and the scheme, embodied in the Elbe Navigation Acts, came into force in 1822. By this a definite number of tolls, at fixed rates, was substituted for the often arbitrary tolls which had been exacted previously. Still further relief was afforded in 1844 and in 1850, on the latter occasion by the abolition of all tolls between Melnik and the Saxon frontier. But the number of tolls was only reduced to one, levied at Wittenberge, in 1863, about one year after Hanover was induced to give up the Stade or Brunsbiittel toll in return for a compensation of 2,857,340 thalers. Finally, in 1870, 1,000,000 thalers were paid to Mecklenburg and 85,000 thalers to Anhal, which thereupon abandoned all claims to levy tolls upon the Elbe shipping, and thus navigation on the river became at last entirely free.

History. — The Elbe cannot rival the Rhine in the picturesque- ness of the scenery it travels through, nor in the glamour which its romantic and legendary associations exercise over the imagi- nation. But it possesses much to charm the eye in the deep glens of the Riesengebirge, amid which its sources spring, and in the bizarre rock-carving of the Saxon Switzerland. It has been indirectly or directly associated with many stirring events in the history of the German peoples. In its lower course, what- ever is worthy of record clusters round the historical vicissitudes of Hamburg — its early prominence as a missionary centre (Ansgar) and as a bulwark against Slav and marauding Northman, its commercial prosperity as a leading

member of the Hanseatic League, and its sufferings during the Napoleonic wars, especially at the hands of the ruthless Davout. The bridge over the river at Dessau recalls the hot assaults of the condottiere Ernst von Mansfeld in April 1626, and his repulse by the crafty generalship of Wallenstein. But three years later this imperious leader was checked by the heroic resistance of the " Maiden " fortress of Magdeburg; though two years later still she lost her reputation, and suffered unspeakable horrors at the hands of Tilly's law- less and unlicensed soldiery. Muhlberg, just outside the Saxon frontier, is the place where Charles V. asserted his imperial authority over the Protestant elector of Saxony, John Frederick, the Magnanimous or Unfortunate, in 1547. Dresden, Aussig and Leitmeritz are all reminiscent of the fierce battles of the Hussite wars, and the last named of the Thirty Years' War. But the chief historical associations of the upper {i.e. the Saxon and Bohemian) Elbe are those which belong to the Seven Years' War, and the struggle of the great Frederick of Prussia against the power of Austria and her allies. At Pirna (and Lilienstein) in 1756 he caught the entire Saxon army in his fowler's net, after driving back at Lobositz the Austrian forces which were hasten- ing to their asistance; but only nine months later he lost his reputation for " invincibility " by his crushing defeat at Kolin, where the great highway from Vienna to Dresden crosses the Elbe. Not many miles distant, higher up the stream, another decisive battle was fought between the same national antagon- ists, but with a contrary result, on the memorable 3rd of July

1866.

See M. Buchheister, " Die Elbe u. der Hafen von Hamburg," in Mitteil. d. Geog. Gesellsch. in Hamburg (1899), vol. xv. pp. 131-188; V. Kurs, "Die kiinstlichen Wasserstrassen des deutschen

Reichs," in Geog. Zeitschrift (1898), pp. 601-617; and (the official) Der Elbstrom (1900) ; B. Weissenborn, Die Elbzblle und Elbstapel-platze im Mittelalter (Halle, 1900); Daniel, Deutschland; and A. Supan, Wasserstrassen und Binnenschifffahrt (Berlin, 1902).

ELBERFELD, a manufacturing town of Germany, in the Prussian Rhine province, on the Wupper, and immediately west of and contiguous to Barmen (?.».)• P°P- (1816) 2i,7io;(i84o) 31,514;

(1885) 109,218; (1905) 167,382. Elberfeld-Barmen, although administratively separate, practically form a single whole. It winds, a continuous strip of houses and factories, for 9 m. along the deep valley, on both banks of the Wupper, which is crossed by numerous bridges, the engirdling hills crowned with woods. Local intercommunication is provided by an electric tramway line and a novel hanging railway — on the Langen mono-rail system — suspended over the bed of the river, with frequent stations. In the centre of the town are a number of irregular and narrow streets, and the river, polluted by the refuse of dye-works and factories, constitutes a constant eyesore. Yet within recent years great alterations have been effected; in the newer quarters are several handsome streets and public buildings; in the centre many insanitary dwellings have been swept away, and their place occupied by imposing blocks of shops and business premises, and a magnificent new town-hall, erected in a dominant position. Among the most recent improvements must be mentioned the Brausenwerther Platz, flanked by the theatre, the public baths, and the railway station and administrative offices. There are eleven Evangelical and five Roman Catholic churches (noticeable among the latter the Suitbertuskirche), a synagogue, and chapels of various other sects. Among other public buildings may be enumerated the civic hall, the law courts and the old town-hall.

The town is particularly rich in educational, industrial, philanthropic and religious institutions. The schools include the Gymnasium (founded in 1592 by the Protestant community as a Latin school), the Realgymnasium (founded in 1830, for " modern " subjects and Latin), the Oberrealschule and Real- schule (founded 1893, the latter wholly " modern "), two girls' high schools, a girls' middle-class school, a large number of popular schools, a mechanics' and polytechnic school, a school of mechanics, an industrial drawing school, a commercial school, and a school for the deaf and dumb. There are also a theatre, an institute of music, a library, a museum, a zoological garden, und numerous scientific societies. The town is the seat of the Berg Bible Society. The majority of the inhabitants are Protestant, with a strong tendency towards Pietism; but the Roman Catholics number upwards of 40,000, forming about one-fourth of the total population. The industries of Elberfeld are on a scale of great magnitude. It is the chief centre in Germany of the cotton, wool, silk and velvet manufactures, and of upholstery, drapery and haberdashery of all descriptions, of printed calicoes, of Turkey-red and other dyes, and of fine chemicals. Leather and rubber goods, gold, silver and aluminium wares, machinery, wall-paper, and

stained glass are also among other of its staple products. Commerce is lively and the exports to foreign countries are very considerable. The railway system is well devised to meet the requirements of its rapidly increasing trade. Two main lines of railway traverse the valley; that on the south is the main line from Aix-la-Chapelle, Cologne and Dtisseldorf to central Germany and Berlin, that on the north feeds the important towns of the Ruhr valley.

The surroundings of Elberfeld are attractive, and public grounds and walks have been recently opened on the hills around with results eminently beneficial to the health of the population.

In the 1 2th century the site of Elberfeld was occupied by the castle of the lords of Elverfeld, feudatories of the archbishops of Cologne. The fief passed later into the possession of the counts of Berg. The industrial development of the place started with a colony of bleachers, attracted by the clear waters of the Wupper, who in 1532 were granted the exclusive privilege of bleaching yarn. It was not, however, until 1610 that Elberfeld was raised to the status of a town, and in 1640 was surrounded with walls. In 1760 the manufacture of silk was introduced, and dyeing with

Turkey-red in 1780; but it was not till the end of the century that its industries developed into importance under the influence of Napoleon's continental system, which barred out British competition. In 181 5 Elberfeld was assigned by the congress of Vienna, with the grand-duchy of Berg, to Prussia, and its prosperity rapidly developed under the Prussian Zollverein.

See Coutelle, Elberfeld, topographisch-statistischeDarstellung (Elber-feld, 1853) ; Schell, Geschichte der Stadt Elberfeld (1900) ; A. Shadwell, Industrial Efficiency (London, 1906) ; and Jorde, Fiihrer durch Elber- feld und seine Umgebung (1902).

ELBEUF, a town of northern France in the department of Seine-Inferieure, 14 m. S.S.W. of Rouen by the western railway. Pop. (1906) 17,800. Elbeuf, a town of wide, clean streets, with handsome houses and factories, stands on the left bank of the Seine at the foot of hills over which extends the forest of Elbeuf. A tribunal and chamber of commerce, a board of trade-arbitrators, a lycee, a branch of the Bank of France, a school of industry, a school of cloth manufacture and a museum of natural history are among its institutions. The churches of St fitienne and St Jean, both of the Renaissance period with later additions, preserve stained glass of the 16th century. The h6tel-de-ville and the Cercle du Commerce are the

chief modern buildings. The town with its suburbs, Orival, Caudebec-les-Elbeuf, St Aubin and St Pierre, is one of the principal and most ancient seats of the woollen manufacture in France; more than half the inhabitants are directly maintained by the staple industry and numbers more by the auxiliary crafts. As a river-port it has a brisk trade in the produce of the surrounding district as well as in the raw materials of its manufactures, especially in wool from La Plata, Australia and Germany. Two bridges, one of them a suspension-bridge, communicate with St Aubin on the opposite bank of the Seine, and steamboats ply regularly to Rouen.

Elbeuf was, in the 13th century, the centre of an im- portant fief held by the house of Harcourt, but its previous history goes back at least to the early years of the Norman occupation, when it appears under the name of Hollebof. It passed into the hands of the houses of Rieux and Lorraine, and was raised to the rank of a duchy in the peerage of France by Henry III. in favour of Charles of Lorraine (d. 1605), grandson of Claude, duke of Guise, master of the hounds and master of the horse of France. The last duke of Elbeuf was Charles Eugene of Lorraine, prince de Lambesc, who distinguished himself in 1789 by his energy in repressing risings of the people at Paris. He fought in the army of the Bourbons, and later in the service of Austria, and died in 1825.

ELBING, a seaport town of Germany, in the kingdom of Prussia, 49 m. by rail E.S.E. of Danzig, on the Elbing, a small river which flows into the Frische Haff about 5 m. from the town, and is united with the Nogat or eastern arm of the Vistula by means of the Kraffohl canal. Pop. (1905) 55,627. By the Elbing-Oberlandischer canal, no m. long, constructed in 1845- 1860, Lakes Geserich and Drewenz are connected with Lake Drausen, and consequently with the port of Elbing. The old town was formerly surrounded by fortifications, but of these only a few fragments remain. There are several churches, among them the Marienkirche (dating from the 15th century and restored in 1887), a classical school (Gymnasium) founded in 1536, a modern school (Realschule), a public library of over 28,000 volumes, and several charitable institutions. The town-hall (1894) contains a historical museum.

Elbing is a place of rapidly growing industries. At the great Schichau iron-works, which employ thousands of workmen, are built most of the torpedo-boats and destroyers for the German, navy, as well as larger craft, locomotives and machinery. In addition to this there are at Elbing important iron foundries, and manufactories of machinery, cigars, lacquer and metal ware, flax and hemp yarn, cotton, linen,

organs, &c. There is a considerable trade also in agricultural produce.

The origin of Elbing was a colony of traders from Liibeck and Bremen, which established itself under the protection of a castle of the Teutonic Knights, built in 1 23 7. In 1 246 the town acquired " Liibeck rights," i.e. the full autonomy conceded by the charter

of the emperor Frederick II. in 1226 (see Lubeck), and it was early admitted to the Hanseatic League. In 1454 the town repudiated the overlordship of the Teutonic Order, and placed itself under the protection of the king of Poland, becoming the seat of a Polish voivode. From this event dates a decline in its prosperity, a decline hastened by the wars of the early 18th century. In 1698, and again in 1703, it was seized by the elector of Brandenburg as security for a debt due to him by the Polish king. It was taken and held to ransom by Charles XII. of Sweden, and in 1710 was captured by the Russians. In 1772, when it fell to Prussia through the first partition of Poland, it was •ltterly decayed.

See Fuchs, Gesch. der Stadt Elbing (Elbing, 1818-1852); Rhode, Der Elbinger Kreis in topographischer , historischer, und statistischer Hinsicht (Danzig, 1871); Wernick, Elbing (Elbing, 1

ELBOW, in anatomy, the articulation of the humerus, the bone of the upper arm, and the ulna and radius, the bones of the fore- arm (see Joints). The word is thus applied to things which are like this joint in shape, such as a sharp bend of a stream or river, an angle in a tube, &c. The word is derived from the 0. Eng. elnboga, a combination of eln, the forearm, and boga, a bow or bend. This combination is common to many Teutonic languages, cf. Ger. Ellbogen. Eln still survives in the name of a linear measure, the " ell," and is derived from the O. Teut. alina, cognate with Lat. ulna and Gr. coKevr}, the forearm. The use of the arm as a measure of length is illustrated by the uses of ulna, in Latin, cubit, and fathom.

ELBURZ, or Alburz (from O. Pers. Hara-bere-zaiti, the " High Mountain "), a great chain of mountains in northern Persia, separating the Caspian depression from the Persian highlands, and extending without any break for 650 m. from the western shore of the Caspian Sea to north-eastern Khorasan. According to the

direction, or strike, of its principal ranges the Elburz may be divided into three sections: the first 120 m. in length with a direction nearly N. to S., the second 240 m. in length with a direction N.W. to S.E., and the third 290 m. in length strik- ing S.W. to N.E. The first section, which is connected with the system of the Caucasus, and begins west of Lenkoran in 39 N. and 45° E., is known as the Talish range and has several peaks 9000 to 10,000 ft. in height. It runs almost parallel to the western shore of the Caspian, and west of Astara is only 10 or 12 m. distant from the sea. At the point west of Resht, where the direction of the principal range changes to one of N.W. to S.E. , the second section of the Elburz begins, and extends from there to beyond Mount Demavend, east of Teheran. South of Resht this section is broken through at almost a right angle by the Safid Rud (White river) ,and along it runs the principal commercial road between the Caspian and inner Persia, Resht-Kazvin-Teheran. The Elburz then splits into three principal ranges running parallel to one another and connected at many places by secondary ranges and spurs. Many peaks of the ranges in this section have an altitude of 11,000 to 13,000 ft., and the elevation of the passes leading over the ranges varies between 7000 and 10,000 ft. The highest peaks are situated in the still unexplored district of Talikan, N.W. of Teheran, and thence eastwards to beyond Mount Demavend. The part of the Elburz immediately north of Teheran is known as the Kuh i Shimran (mountain of Shimran, from the name of the Shimran district on its southern slopes) and culminates in the Sar i Tochal (12,600 ft.). Beyond it, and between the border of Talikan in the N.W. and Mount Demavend in the N.E., are the ranges Azadbur, Kasil, Kachang, Kendevan, Shahzad, Varzeh, Derbend i Sar and others, with elevations of 12,000 to 13,500 ft., while Demavend towers above them all with its altitude of 19,400 ft. The eastern foot of Demavend is washed by the river Herhaz (called Lar river in its upper course), which there breaks through the Elburz in a S.N. direction in its course to the Caspian, past the city of Amol. The third section of the Elburz, with its principal ranges striking S.W. to N.E., has a length of about 290 m., and ends some distance beyond Bujnurd in northern Khora san, where it joins the Ala Dagh range, which has a direction to the S.E., and, continuing with various appellations to northern Afghanistan, unites with the Paropamisus. For about two-

thirds of its length — from its beginning to Khush Yailak — the third section consists of three principal ranges connected by lateral ranges and spurs. It also has many peaks over 10,000 ft. in height, and the Nizva mountain on the southern border of the unexplored district of Hazarjirib, north of Semnan, and the Shahkuh, between Shahrud

and Astarabad, have an elevation exceeding 13,000 ft. Beyond Khush Yailak (meaning "pleasant summer quarters"), with an elevation of 10,000 ft., are the Kuh i Buhar (8000) and Kuh i Suluk (8000), which latter joins the Ala Dagh (11,000).

The northern slopes of the Elburz and the lowlands which lie between them and the Caspian, and together form the provinces of Gilan, Mazandaran and Astarabad, are covered with dense forest and traversed by hundreds (Persian writers say 1362) of perennial rivers and streams. The breadth of the lowlands between the foot of the hills and the sea is from 2 to 25m., the greatest breadth being in the meridian of Resht in Gilan, and in the districts of Amol, Sari and Barfurush in Mazandaran. The inner slopes and ranges of the Elburz south of the principal watershed, generally the central one of the three principal ranges which are outside of the fertilizing influence of the moisture brought from the sea, have little or no natural vegetation, and those farthest south are, excepting a few stunted cypresses, completely arid and bare.

" North of the principal watershed forest trees and general verdure refresh the eye. Gurgling water, strips of sward and tall forest trees, backed by green hills, make a scene completely un- like the usual monotony of Persian landscape. The forest scenery much resembles that of England, with fine oaks and greensward. South of the watershed the whole aspect of the landscape is as hideous and disappointing as scenery in Afghanistan. Ridge after ridge of bare hill and curtain behind curtain of serrated mountain, certainly sometimes of charming greys and blues, but still all bare and naked, rugged and arid " (Beresford Lovett, Proc. R.G.S., Feb. 1883).

The higher ranges of the Elburz are snow-capped for the greater part of the year, and some, which are not exposed to the refracted heat from the arid districts of inner Persia, are rarely without snow. Water is plentiful in the Elburz, and situated in well-watered valleys and gorges are innumerable flourishing villages, embosomed in gardens and orchards, with extensive cultivated fields and meadows, and at higher altitudes small plateaus, under snow until March or April, afford cool camping grounds to the nomads of the plains, and luxuriant grazing to their sheep and cattle during the summer. (A. H.-S.)

ELCHE, a town of eastern Spain, in the province of Alicante, on the river Vinalapo. Pop. (1 900) 2 7 ,308. Elche is the meeting- place of three railways, from Novelda, Alicante and Murcia. It contains no building of high architectural merit, except, perhaps, the collegiate

church of Santa Maria, with its lofty blue-tiled dome and fine west doorway. But the costume and physiognomy of the inhabitants, the narrow streets and flat- roofed, whitewashed houses, and more than all, the thousands of palm-trees in its gardens and fields, give the place a strikingly Oriental aspect, and render it'unique among the cities of Spain. The cultivation of the palm is indeed the principal occupation; and though the dates are inferior to those of the Barbary States, upwards of 22,500 tons are annually exported. The blanched fronds are also sold in large quantities for the processions of Palm Sunday, and after they have received the blessing of the priest they are regarded throughout Spain as certain defences against lightning. Other thriving local industries include the manufacture of oil, soap, flour, leather, alcohol and esparto grass rugs. The harbour of Elche is Santa Pola (pop. 4100), situated 6 m.E.S.E., where the Vinalapo enters the Mediterranean, after forming the wide lagoon known as the Albufera de Elche.

Elche is usually identified with the Iberian Helike, afterwards the Roman colony of Ilici or Illici. From the 8th century to the 13th it was held by the Moors, who finally failed to recapture it from the Spaniards in 1332.

ELCHINGEN, a village of Germany, in the kingdom of Bavaria, not far from the Danube, 5 m. N.E. from Ulm. Here, on the 14th of October 1805, the Austrians under Laudon were

defeated by the French under Ney, who by taking the bridge decided the day and gained for himself the title of duke of Elchingen.

ELDAD BEN MAHLI, also surnamed had-Dani, Abu-Dani, David-had-Dani, or the Danite, Jewish traveller, was the sup- posed author of a Jewish travel-narrative of the oth century a.d., which enjoyed great authority in the middle ages, especially on the question of the Lost Ten Tribes. Eldad first set out to visit his Hebrew brethren in Africa and Asia. His vessel was wrecked, and he fell into the hands of cannibals; but he was saved by his leanness, and by the opportune invasion of a neigh- bouring tribe. After spending four years with his new captors, he was ransomed by a fellow-countryman, a merchant of the tribe of Issachar. He then (according to his highly fabulous narrative) visited the territory of Issachar, in the mountains of Media and Persia; he also describes the abodes of Zabulon, on the "

other side " of the Paran Mountains, extending to Armenia and the Euphrates; of Reuben, on another side of the same mountains; of Ephraim and Half Manasseh, in Arabia, not far from Mecca; and of Simeon and the other Half of Manasseh, in Chorazin, six months' journey from Jerusalem. Dan, he declares, sooner than join in Jeroboam's scheme of an Israelite war against Judah, had migrated to Cush, and finally, with the help of Naphthali, Asher and Gad, had founded an independent Jewish kingdom in the Gold Land of Havila, beyond Abyssinia. The tribe of Levi had also been miraculously guided, from near Babylon, to Havila, where they were enclosed and protected by the mystic river Sambation or Sabbation, which on the Sabbath, though calm, was veiled in impenetrable mist, while on other days it ran with a fierce untraversable current of stones and sand.

Apart from these tales, we have the genuine Eldad, a celebrated Jewish traveller and philologist; who flourished c. a.d. 830-890; to whom the work above noticed is ascribed; who was a native either of S. Arabia, Palestine or Media; who journeyed in Egypt, Mesopotamia, North Africa, and Spain; who spent several years at Kairawan in Tunis; who died on a visit to Cordova, and whose authority, as to the lost tribes, is supported by a great Hebrew doctor of his own time, Zemah Gaon, the rector of the Academy at Sura (a.d. 889-898). It is possible that a certain relationship exists (as suggested by Epstein and supported by D. H. Miiller) between the famous apocryphal Letter of Prester John (of c. a.d. 1165) and the narrative of Eldad; but the affinity is not close. Eldad is quoted as an authority on linguistic difficulties by the leading medieval Jewish grammarians and lexicographers.

The work ascribed to Eldad is in Hebrew, divided into six chapters, probably abbreviated from the original text. The first edition appeared at Mantua about 1480; the second at Constantinople in 1516; this was reprinted at Venice in 1544 and 1605, and at Jessnitz in 1722. A Latin version by Gilb. Genebrard was published at Paris in 1563, under the title of Eldad Danius . . . de Judaeis clausis eorumque in Aethiopia . . . imperio, and was afterwards incorporated in the translator's Chronologia Hebraeorum of 1584; a German ver- sion appeared at Prague in 1695, and another at Jessnitz in 1723. In 1838 E. Carmoly edited and translated a fuller recension which he had found in a MS. from the library of Eliezer Ben Hasan, for- warded to him by David Zabach of Morocco (see Relation d' Eldad le Danite, Paris, 1838). Both forms are printed by Dr Jellinek in his Bet-ha-Midrasch, vols. ii. p. 102, &c, and iii. p. 6, &c. (Leipzig, 1853- 1855). See also Bartolocci, Bibliotheca magna

Rabbinica, i. 101-130; Fiirst, Bibliotheca Judaica, i. 30, &c. ; Hirsch Graetz, Geschichte der Juden (3rd ed. , Leipzig, 1895), v. 239-244; Rossi, Dizionario degli Ebrei; Steinschneider, Cat. librorum Hebraeorum in bibliotheca Bodleiana, cols. 923-925; Kitto's Biblical Cyclopaedia (3rd edition, sub nomine); Abr. Epstein, Eldad ha-Dani (Pressburg, 1891); D. H. Miiller, " Die Recensionen und Versionen des Eldad had-Dani," in Denkschriften d. Wiener Akad. (Phil. -Hist. CI.), vol. xli. (1892), pp. 1-80.

ELDER (Gr. irpeafivrepos), the name given at different times to a ruler or officer in certain political and ecclesiastical systems of government.

1. The office of elder is in its origin political and is a relic of the old patriarchal system. The unit of primitive society is always the family; the only tie that binds men together is that of kinship. " The eldest male parent," to quote Sir Henry

Maine, 1 " is absolutely supreme in his household. His dominion extends to life and death and is as unqualified over his children and their houses as over his slaves." The tribe, which is a later development, is always an aggregate of families or clans, not a collection of individuals. " The union of several clans for common political action," as Robertson Smith says, " was produced by the pressure of practical necessity, and always tended towards dissolution when this practical pressure was withdrawn. The only organization for common action was that the leading men of the clans consulted together in time of need, and their influence led the masses with them. Out of these conferences arose the senates of elders found in the ancient states of Semitic and Aryan antiquity alike." 2 With the development of civilization there came a time when age ceased to be an indispensable condition of leadership. The old title was, however, generally retained, e.g. the yepovres so often mentioned in Homer, the ytpovcia. of the Dorian states, the senalus and the patres conscripli of Rome, the sheikh or elder of Arabia, the alderman of an English borough, the seigneur (Lat. senior) of feudal France.

2. It was through the influence of Judaism that the originally political office of elder passed over into the Christian Church and became ecclesiastical. The Israelites inherited the office from their Semitic ancestors (just as did the Moabites and the Midianites,of whose elders we read in Numbers xxii. 7), and traces of it are found throughout their history. Mention is made in Judges viii. 14 of the elders of Succoth whom " Gideon taught with thorns of the

wilderness and with briers." It was to the elders of Israel in Egypt that Moses communicated the plan of Yahweh for the redemption of the people (Exodus iii. 16). During the sojourn in the wilderness the elders were the inter- mediaries between Moses and the people, and it was out of the ranks of these elders that Moses chose a council of seventy " to bear with him the burden of the people " (Numbers xi. 16). The elders were the governors of the people and the administrators of justice. There are frequent references to their work in the latter capacity in the book of Deuteronomy, especially in relation to the following crimes — the disobedience of sons; slander against a wife; the refusal of levirate marriage; man- slaughter; and blood-revenge. Their powers were gradually curtailed by (a) the development of the monarchy, to which of course they were in subjection, and which became the court of appeal in questions of law; 3 (b) the appointment of special judges, probably chosen from amongst the elders themselves, though their appointment meant the loss of privilege to the general body; (c) the rise of the priestly orders, which usurped many of the prerogatives that originally belonged to the elders. But in spite of the rise of new authorities, the elders still retained a large amount of influence. We hear of them frequently in the Persian, Greek and Roman periods. In the New Testament the members of the Sanhedrin in Jerusalem are very frequently termed " elders " or irpeofibrepoi, and from them the name was taken over by the Church.

3. The name " elder " was probably the first title bestowed upon the officers of the Christian Church — since the word deacon does not occur in connexion with the appointment of the Seven in Acts vi. Its universal adoption is due not only to its currency amongst the Jews, but also to the fact that it was frequently used as the title of magistrates in the cities and villages of Asia Minor. For the history of the office of elder in the early Church and the relation between elders and bishops see Presbyter.

4. In modern times the use of the term is almost entirely confined to the Presbyterian church, the officers of which are always called elders. According to the Presbyterian theory of church government there are two classes of elders — " teaching elders," or those specially set apart to the pastoral office, and " ruling elders," who are laymen, chosen generally by the con- gregation and set apart by ordination to be associated with the pastor in the oversight and government of the church. When

1 Ancient Law, p. 12b. 2 Religion of the Semites, p. 34.

3 There is a hint at this even in the Pentateuch, " every great, matter they shall bring unto thee, but every small matter they shali judge themselves."

the word is used without any qualification it is understood to apply to the latter class alone. For an account of the duties, qualifications and powers of elders in the Presbyterian Church see Presbyterianism.

See W. R. Smith, History of the Semites; H. Maine, Ancient Law; E. Schiirer, The Jewish People in the Time of Christ; J. Wellhausen, History of Israel and Judah; G. A. Deissmann, Bible Studies, p. 154.

ELDER (0. Eng. ellarn; Ger. Holunder; Fr. sureau), the popular designation of the deciduous shrubs and trees constitut- ing the genus Sambuctis of the natural order Caprifoliaceae. The Common Elder u S. nigra, the bourtree of Scotland, is found in Europe, the north of Africa, Western Asia, the Caucasus, and Southern Siberia; in sheltered spots it attains a height of over 20 ft. The bark is smooth; the shoots are stout and angular, and the leaves glabrous, pinnate, with oval or elliptical leaflets. The flowers, which form dense flat-topped clusters (corymbose cymes), with five main branches, have a cream-coloured, gamo- petalous, five-lobed corolla, five stamens, and three sessile stigmas; the berries are purplish-black, globular and three- or four-seeded, and ripen about September. The elder thrives best in moist, well-drained situations, but can be grown in a great diversity of soils. It grows readily from young shoots, which after a year are fit for transplantation. It is found useful for making screen-fences in bleak, exposed situations, and also as a shelter for other shrubs in the outskirts of plantations. By clipping two or three times a year, it may be made close and compact in growth. The young trees furnish a brittle wood, containing much pith; the wood of old trees is white, hard and close-grained, polishes well, and is employed for shoemakers' pegs, combs, skewers, mathematical instruments and turned articles. Young elder twigs deprived of pith have from very early times been in request for making whistles, popguns and other toys.

The elder was known to the ancients for its medicinal properties, and in England the inner bark was formerly administered as a cathartic. The flowers (sambuci flores) contain a volatile oil, and serve for the distillation of elder-flower water {aqua sambuci), used in

confectionery, perfumes and lotions. The leaves of the elder are employed to impart a green colour to fat and oil (un~ guentum sambuci foliorum and oleum viride) , and the berries for making wine, a common adulterant of port. The leaves and bark emit a sickly odour, believed to be repugnant to insects. Christopher Gullet {Phil. Trans., 1772, Ixii. p. 348) recommends that cabbages, turnips, wheat and fruit trees, to preserve them from caterpillars, flies and blight, should be whipped with twigs of young elder. According to German folklore, the hat must be doffed in the presence of the elder-tree ; and in certain of the English midland counties a belief was once prevalent that the cross of Christ was made from its wood, which should therefore never be used as fuel, or treated with disrespect (see Quart. Rev. cxiv. 233). It was, however, a common medieval tradition, alluded to by Ben Jonson, Shakespeare and other writers, that the elder was the tree on which Judas hanged himself; and on this account, probably, to be crowned with elder was in olden times accounted a disgrace. In Cymbeline (act iv. s. 2) " the stinking elder " is mentioned as a symbol of grief. In Denmark the tree is supposed by the superstitious to be under the protection of the " Elder-mother ": its flowers may not be gathered without her leave; its wood must not be employed for any household furniture; and a child sleeping in an elder- wood cradle would certainly be strangled by the Elder-mother.

Several varieties are known in cultivation: aurea, golden elder, has golden-yellow leaves; laciniata, parsley-leaved elder, has the leaflets cut into fine segments; rotundifolia has rounded leaflets; forms also occur with variegated white and yellow leaves, and virescens is a variety having white bark and green-coloured berries. The scarlet-berried elder, S. racemosa, is the handsomest species of the genus. It is a native of various parts of Europe, growing in Britain to a height of over 15 ft., but often producing no fruit. The dwarf elder or Danewort (supposed to have been introduced into Britain by the Danes), 5. Ebulus, a common European species, reaches a height of about 6 ft. Its cyme is hairy, has three principal branches, and is smaller than that of 5. nigra; the

flowers are white tipped with pink. All parts of the plant are cathartic and emetic.

ELDON, JOHN SCOTT, 1st Earl of (175 1- 183 8), lord high chancellor of England, was born at Newcastle on the 4th of June 1751. His grandfather, William Scott of Sandgate, a suburb of Newcastle, was clerk to a " fitter " — a sort of water-carrier and broker of coals. His father, whose name also was William, began life

as an apprentice to a fitter, in which service he obtained the freedom of Newcastle, becoming a member of the gild of Hoastmen (coal-fitters) ; later in life he became a principal in the business, and attained a respectable position as a merchant in Newcastle, accumulating property worth nearly £20,000.

John Scott was educated at the grammar school of his native town. He was not remarkable at school for application to his studies, though his wonderful memory enabled him to make good progress in them; he frequently played truant and was whipped for it, robbed orchards, and indulged in other questionable school- boy freaks; nor did he always come out of his scrapes with honour and a character for truthfulness. When he had finished his education at the grammar school, his father thought of apprenticing him to his own business, to which an elder brother Henry had already devoted himself; and it was only through the interference of his elder brother William (afterwards Lord Stowell, q.v.) , who had already obtained a fellowship at University College, Oxford, that it was ultimately resolved that he should continue the prosecution of his studies. Accordingly, in 1766, John Scott entered University College with the view of taking holy orders and obtaining a college living. In the year following he obtained a fellowship, graduated B.A. in 1770, and in 1771 won the prize for the English essay, the only university prize open in his time for general competition.

His wife was the eldest daughter of Aubone Surtees, a New- castle banker. The Surtees family objected to the match, and attempted to prevent it; but a strong attachment had sprung up between them. On the 18th November 1772 Scott, with the aid of a ladder and an old friend, carried off the lady from her father's house in the Sandhill, across the border to Blackshiels, in Scotland, where they were married. The father of the bride- groom objected not to his son's choice, but to the time he chose to marry; for it was a blight on his son's prospects, depriving him of his fellowship and his chance of church preferment. But while the bride's family refused to hold intercourse with the pair, Mr Scott, like a prudent man and an affectionate father, set himself to make the best of a bad matter, and received them kindly, settling on his son £2000. John returned with his wife to Oxford, and continued to hold his fellowship for what is called the year of grace given after marriage, and added to his income by acting as a private tutor. After a time Mr Surtees was reconciled with his daughter, and made a liberal settlement on her.

John Scott's year of grace closed without any college living falling vacant; and with his fellowship he gave up the church and turned to

the study of law. He became a student at the Middle Temple in January 1773. In 1776 he was called to the bar, intending at first to establish himself as an advocate in his native town, a scheme which his early success led him to abandon, and he soon settled to the practice of his profession in London, and on the northern circuit. In the autumn of the year in which he was called to the bar his father died, leaving him a legacy of £1000 over and above the £2000 previously settled on him.

In his second year at the bar his prospects began to brighten. His brother William, who by this time held the Camden pro- fessorship of ancient history, and enjoyed an extensive acquaint- ance with men of eminence in London, was in a position materially to advance his interests. Among his friends was the notorious Andrew Bowes of Gibside, to the patronage of whose house the rise of the Scott family was largely owing. Bowes having contested Newcastle and lost it, presented an election petition against the return of his opponent. Young Scott was retained as junior counsel in the case, and though he lost the petition he did not fail to improve the opportunity which it afforded for display- ing his talents. This engagement, in the commencement of his

second year at the bax, ami the dropping in of occasional fees, must have raised his hopes; and he now abandoned the scheme of becoming a provincial barrister. A year or two of dull drudgery and few fees followed, and he began to be much depressed. But in 1780 we find his prospects suddenly improved, by his appear- ance in the case of Ackroyd v. Smithson, which became a leading case settling a rule of law; and young Scott, having lost his point in the inferior court, insisted on arguing it, on appeal, against the opinion of his clients, and carried it before Lord Thurlow, whose favourable consideration he won by his able argument. The same year Bowes again retained him in an election petition; and in the year following Scott greatly increased his reputation by his appearance as leading counsel in the Clitheroe election petition. From this time his success was certain. In 1782 he obtained a silk gown, and was so far cured of his early modesty that he declined accepting the king's counselship if precedence over him were given to his junior, Thomas (afterwards Lord) Erskine, though the latter was the son of a peer and a most accomplished orator. He was now on the high way to fortune. His health, which had hitherto been but indifferent, strengthened with

the demands made upon it; his talents, his power of endurance, and his ambition all expanded together. He enjoyed a considerable practice in the northern part of his circuit, before parliamentary committees and at the chancery bar. By 1787 his practice at the equity bar had so far increased that he was obliged to give up the eastern half of his circuit (which embraced six counties) and attend it only at Lancaster.

In 1782 he entered parliament for Lord Weymouth's close borough of Weobley, which Lord Thurlow obtained for him without solicitation. In parliament he gave a general and independent support to Pitt. His first parliamentary speeches were directed against Fox's India Bill. They were unsuccessful. In one he aimed at being brilliant; and becoming merely laboured and pedantic, he was covered with ridicule by Sheridan, from whom he received a lesson which he did not fail to turn to account. In 1788 he was appointed solicitor-general, and was knighted, and at the close of this year he attracted attention by his speeches in support of Pitt's resolutions on the state of the king (George III., who then laboured under a mental malady) and the delegation of his authority. It is said that he drew the Regency Bill, which was introduced in 1789. In 1793 Sir John Scott was promoted to the office of attorney-general, in which it fell to him to conduct the memorable prosecutions for high treason against British sympathizers with French republicanism, — amongst others, against the celebrated Home Tooke. These prosecutions, in most cases, were no doubt instigated by Sir John Scott, and were the most important proceedings in which he was ever professionally engaged. He has left on record, in his Anecdote Book, a defence of his conduct in regard to them. \ full account of the principal trials, and of the various legislative measures for repressing the expressions of popular opinion for which he was more or less responsible, will be found in Twiss's Public and Private Life of the Lord Chancellor Eldon, and in the Lives of the Lord Chancellors, by Lord Campbell.

In 1799 the office of chief justice of the Court of Common Pleas falling vacant, Sir John Scott's claim to it was not over- looked; and after seventeen years' service in the Lower House, he entered the House of Peers as Baron Eldon. In February 1801 the ministry of Pitt was succeeded by that of Addington, and the chief justice now ascended the woolsack. The chancellor- ship was given to him professedly on account of his notorious anti-Catholic zeal. From the peace of Amiens (1802) till 1804 Lord Eldon appears to have interfered little in politics. In the latter year we find him conducting the negotiations which resulted in the dismissal of Addington and the recall of Pitt to office as prime minister. Lord Eldon was continued in

office as chancellor under Pitt; but the new administration was of short duration, for on the 23rd of January 1806 Pitt died, worn out with the anxieties of office, and his ministry was succeeded by a coalition, under Lord Grenville. The death of Fox, who became foreign secretary and leader of the House of Commons,

soon, however, broke up the Grenville administration; and in the spring of 1807 Lord Eldon once more, under Lord Liverpool's administration, returned to the woolsack, which, from that time, he continued to occupy for about twenty years, swaying the cabinet, and being in all but name prime minister of England. It was not till April 1827, when the premiership, vacant through the paralysis of Lord Liverpool, fell to Canning, the chief advocate of Roman Catholic emancipation, that Lord Eldon, in the seventy-sixth year of his age, finally resigned the chancellorship. When, after the two short administrations of Canning and Goderich, it fell to the duke of Wellington to construct a cabinet, Lord Eldon expected to be included, if not as chancellor, at least in some important office, but he was overlooked, at which he was much chagrined. Notwithstanding his frequent protests that he did not covet power, but longed for retiremem , we find him again, so late as 1835, within three years of his death, in hopes of office under Peel. He spoke in parliament for the last time in July 1834.

In 18 2 1 Lord Eldon had been created Viscount Encombe and earl of Eldon by George IV., whom he managed to conciliate, partly, no doubt, by espousing his cause against his wife, whose advocate he had formerly been, and partly through his reputation for zeal against the Roman Catholics. In the same year his brother William, who from 1798 had filled the office of judge of the High Court of Admiralty, was raised to the peerage under the title of Lord Stowell.

Lord Eldon's wife, his dear " Bessy, " his love for whom is a beautiful feature in his life, died before him, on the 28th of June 1 83 1. By nature she was of simple character, and by habits acquired during the early portion of her husband's career almost a recluse. Two of their sons reached maturity — John, who died in 1805, and William Henry John, who died unmarried in 1832. Lord Eldon himself survived almost all his immediate relations. His brother William died in 1836. He himself died in London on the 13th of January 1838, leaving behind him two daughters, Lady Frances Bankes and Lady Elizabeth Repton, and a grandson John (1805-1854), who succeeded him as second earl, the title subsequently passing to the latter's son John (b. 1846).

Lord Eldon was no legislator — his one aim in politics was to keep in office, and maintain things as he found them; and almost the only laws he helped to pass were laws for popular coercion. For nearly forty years he fought against every improvement in law, or in the constitution — calling God to witness, on the smallest proposal of reform, that he foresaw from it the downfall of his country. Without any political principles, properly so called, and without interest in or knowledge of foreign affairs, he main- tained himself and his party in power for an unprecedented period by his great tact, and in virtue of his two great political properties — of zeal against every species of reform, and zeal against the Roman Catholics. To pass from his political to his judicial character is to shift to ground on which his greatness is universally acknowledged. His judgments, which have received as much praise for their accuracy as abuse for their clumsiness and uncouthness, fill a small library. But though intimately acquainted with every nook and cranny of the English law, he never carried his studies into foreign fields, from which to enrich our legal literature; and it must be added that against the excellence of his judgments, in too many cases, must be set off the hardships, worse than injustice, that arose from his protracted delays in pronouncing them. A consummate judge and the narrowest of politicians, he was doubt on the bench, and promptness itself in the political arena. For literature, as for art, he had no feeling. What intervals of leisure he enjoyed from the cares of office he filled up with newspapers and the gossip of old cronies. Nor were his intimate associates men of refinement and taste ; they were rather good fellows who quietly enjoyed a good bottle and a joke; he uniformly avoided en- counters of wit with his equals. He is said to have been parsimonious, and certainly he was quicker to receive than to reciprocate hospitalities; but his mean establishment and mode of life are explained by the retired habits of his wife, and her

dislike of company. His manners were very winning and courtly, and in the circle of his immediate relatives he is said to have always been lovable and beloved.

" In his person," says Lord Campbell, " Lord Eldon was about the middle size, his figure light and athletic, his features regular and handsome, his eye bright and full, his smile remarkably benevolent, and his whole appearance prepossessing. The advance of years rather increased than detracted from these personal advantages. As he sat

on the judgment-seat, ‘ the deep thought betrayed in his furrowed brow — the large eyebrows, overhanging eyes that seemed to regard more what was taking place within than around him — his calmness, that would have assumed a character of sternness but for its perfect placidity — his dignity, repose and venerable age, tended at once to win confidence and to inspire respect ‘ (Townsend). He had a voice both sweet and deep-toned, and its effect was not injured by his Northumbrian burr, which, though strong, was entirely free from harshness and vulgarity.”

Authorities. — Horace Twiss, Life of Lord Chancellor Eldon (1844); W. E. Surtees, Sketch of the Lives of Lords Stowell and Eldon (1846); Lord Campbell, Lives of the Chancellors; W. C. Townsend, Lives of Twelve Eminent Judges (1846) ; Greville Memoirs.

EL DORADO (Span. ” the gilded one “), a name applied, first, to the king or chief priest of a South American tribe who was said to cover himself with gold dust at a yearly religious festival held near Santa Fe de Bogota; next, to a legendary city called Manoa or Omoa; and lastly, to a mythical country in which gold and precious stones were found in fabulous abundance. The legend, which has never been traced to its ultimate source, had many variants, especially as regards the situation attributed to Manoa. It induced many Spanish explorers to lead expeditions in search of treasure, but all failed. Among the most famous were the expedition undertaken by Diego de Ordaz, whose lieutenant Martinez claimed to have been rescued from shipwreck, conveyed inland, and entertained at Omoa by ” El Dorado ” himself (1 53 1) ; and the journeys of Orellana (1540—154 1), who passed down the Rio Napo to the valley of the Amazon; that of Philip von Hutten (1541-1545), who led an exploring party from Coro on the coast of Caracas; and of Gonzalo Ximenes de Quesada (1569), who started from Santa Fe de Bogota. Sir Walter Raleigh, who resumed the search in 1595, described Manoa as a city on Lake Parima. in Guiana. This lake was marked on English and other maps until its existence was disproved by A. von Humboldt (1769-1859). Meanwhile the name of El Dorado came to be used metaphorically of any place where wealth could be rapidly acquired. It was given to a county in California, and to towns and cities in various states. In literature frequent allusion is made to the legend, perhaps the best-known references being those in Milton’s Paradise Lost (vi. 411) and Voltaire’s Candide (chs. 18, 19).

See A. F. A. Bandelier, The Gilded Man, El Dorado (New York,

1893)-

ELDUAYEN, JOSfi DE, 1st Marquis del Pazo de la Merced (1823-1898), Spanish politician, was born in Madrid on the 22nd of June 1823. He was educated in the capital, took the degree of civil engineer, and as such directed important works in Asturias and Galicia, entered the Cortes in 1856 as deputy for Vigo, and sat in all the parliaments until 1867 as member of the Union Liberal with Marshal O'Donnell. He attacked the Miraflores cabinet in 1864, and became under-secretary of the home office when Canovas was minister in 1865. He was made a councillor of state in 1866, and in 1868 assisted the other members of the Union Liberal in preparing the revolution. In the Cortes of 1872 he took much part in financial debates. He accepted office as member of the last Sagasta cabinet under King Amadeus. On the proclamation of the republic Elduayen very earnestly co-operated in the Alphonsist conspiracy, and endeavoured to induce the military and politicians to work together. He went abroad to meet and accompany the prince after the pronuncia- miento of Marshal Campos, landed with himat Valencia, wasmade governor of Madrid, a marquis, grand cross of Charles III., and minister for the colonies in 1878. He accepted the portfolio of foreign affairs in the Canovas cabinet from 1883 to 1885, and was made a life senator. He always prided himself on having been

one of the five members of the Cortes of 1870 who voted for Alphonso XII. -when that parliament elected Amadeus of Savoy. He died at Madrid on the 24th of June 1898.

ELEANOR OF AQUITAINE (c. n 22-1 204), wife of the English king Henry II., was the daughter and heiress of Duke William X. of Aquitaine, whom she succeeded in April 1137. In accordance with arrangements made by her father, she at once married Prince Louis, the heir to the French crown, and a month later her husband became king of France under the title of Louis VII. Eleanor bore Louis two daughters but no sons. This was prob- ably the reason why their marriage was annulled by mutual con- sent in 1 1 51, but contemporary scandal-mongers attributed the separation to the king's jealousy. It was alleged that, while accompanying her husband on the Second Crusade (1146-1149), Eleanor had been unduly familiar with her uncle, Raymond of Antioch. Chronology is against this hypothesis, since Louis and she lived on good terms together for two years after the Crusade. There is still less ground for the supposition that Henry of Anjou, whom she married immediately after the divorce, had been her lover before it. This second marriage, with a youth some years her junior, was purely political. The duchy of Aquitaine required a strong ruler, and the union with Anjou was eminently desirable. Louis, who had hoped that Aquitaine would descend to his daughters, was mortified and alarmed by the Angevin marriage; all the more so when Henry of Anjou succeeded to the English crown in n 54. From this event dates the beginning of the secular strife between England and France which runs like a red thread through medieval history.

Eleanor bore to her second husband five sons and three daughters; John, the youngest of their children, was born in 1 167. But her relations with Henry passed gradually through indifference to hatred. Henry was an unfaithful husband, and Eleanor supported her sons in their great rebellion of 11 73. Throughout the latter years of the reign she was kept in a sort of honourable confinement. It was during her captivity that Henry formed his connexion with Rosamond Clifford, the Fair Rosa- mond of romance. Eleanor, therefore, can hardly have been responsible for the death of this rival, and the romance of the poisoned bowl appears to be an invention of the next century.

Under the rule of Richard and John the queen became a political personage of the highest importance. To both her sons the popularity which she enjoyed in Aquitaine was most valuable. But in other

directions also she did good service. She helped to frustrate the conspiracy with France which John concocted during Richard's captivity. She afterwards reconciled the king and the prince, thus saving for John the succession which he had forfeited by his misconduct. In 1199 she crushed an Angevin rising in favour of John's nephew, Arthur of Brittany. In 1201 she negotiated a marriage between her grand-daughter, Blanche of Castile, and Louis of France, the grandson of her first husband. It was through her staunch defence of Mirabeau in Poitou that John got possession of his nephew's person. She died on the 1st of April 1204, and was buried at Fontevrault. Although a woman of strong passions and great abilities she is, historically, less important as an individual than as the heiress of Aquitaine, a part of which was, through her second marriage, united to England for some four hundred years.

See the chronicles cited for the reigns of Henry II., Richard I. and John. Also Sir J. H. Ramsay, Angevin Empire (London, 1903) ; K. Norgate, England under the Angevin Kings (London, 1887); and A. Strickland, Lives of the Queens of England, vol. i. (1841).

(H. W. C. D.)

ELEATIC SCHOOL, a Greek school of philosophy which came into existence towards the end of the 6th century B.C., and ended with Melissus of Samos (fl. c. 450 B.C.). It took its name from Elea, a Greek city of lower Italy, the home of its chief exponents, Parmenides and Zeno. Its foundation is often attributed to Xenophanes of Colophon, but, although there is much in his speculations which formed part of the later Eleatic doctrine, it is probably more correct to regard Parmenides as the founder of the school. At all events, it was Parmenides who gave it its fullest development. The main doctrines of the Eleatics were evolved in opposition, on the one hand, to the

physical theories of the early physical philosophers who explained all existence in terms of primary matter (see Ionian School), and, on the other hand, to the theory of Heraclitus that all existence may be summed up as perpetual change. As against these theories the Eleatics maintained that the true explanation of things lies in the conception of a universal unity of being. The senses with their changing and inconsistent reports cannot cognize this unity; it is by

thought alone that we can pass beyond the false appearances of sense and arrive at the knowledge of being, at the fundamental truth that " the All is One." There can be no creation, for being cannot come from not-being; a thing cannot arise from that which is different from it. The errors of common opinion arise to a great extent from the ambiguous use of the verb " to be," which may imply existence or be merely the copula which connects subject and predicate.

In these main contentions the Eleatic school achieved a real advance, and paved the way to the modern conception of meta- physics. Xenophanes in the middle of the 6th century had made the first great attack on the crude mythology of early Greece, including in his onslaught the whole anthropomorphic system enshrined in the poems of Homer and Hesiod. In the hands of Parmenides this spirit of free thought developed on metaphysical lines. Subsequently, whether from the fact that such bold speculations were obnoxious to the general sense of propriety in Elea, or from the inferiority of its leaders, the school de- generated into verbal disputes as to the possibility of motion, and similar academic trifling. The best work of the school was absorbed in the Platonic metaphysic (see E. Caird, Evolution of Theology in the Greek Philosophers, 1904).

See further the articles on Xenophanes; Parmenides; Zeno (of Elea) ; Melissus, with the works there quoted ; also the histories of philosophy by Zeller, Gomperz, Windelband, &c.

ELECAMPANE (Med. Lat. Enula Campana), a perennial composite plant, the Inula Helenium of botanists, which is common in many parts of . Britain, and ranges throughout central and southern Europe, and in Asia as far eastwards as the Himalayas. It is a rather rigid herb, the stem of which attains a height of from 3 to 5 ft.; the leaves are large and toothed, the lower ones stalked, the rest embracing the stem; the flowers are yellow, 2 in. broad, and have many rays, each three- notched at the extremity. The root is thick, branching and mucilaginous, and has a warm, bitter taste and a camphoraceous odour. For medicinal purposes it should be procured from plants not more than two or three years old. Besides inulin, C12H20O10, a body isomeric with starch, the root contains helenin, C 6 H 8 0, a stearoptene, which may be prepared in white acicular crystals, insoluble in water, but freely soluble in alcohol. When freed from the accompanying inula-camphor by repeated crystallization from alcohol, helenin melts at no° C. By the ancients the root was employed both as a medicine and as a condiment, and in England it was formerly in great repute as an aromatic tonic and stimulant of the secretory organs. " The fresh roots of elecampane preserved with

sugar, or made into a syrup or conserve," are recommended by John Parkinson in his Theatrum Botanicum as " very effectual to warm a cold and windy stomack, and the pricking and stitches therein or in the sides caused by the Spleene, and to helpe the cough, shortnesse of breath, and wheesing in the Lungs." As a drug, however, the root is now seldom resorted to except in veterinary practice, though it is undoubtedly possessed of antiseptic properties. In France and Switzerland it is used in the manufacture of absinthe.

ELECTION (from Lat. eligere, to pick out), the method by which a choice or selection is made by a constituent body (the electors or electorate) of some person to fill a certain office or dignity. The procedure itself is called an election. Election, as a special form of selection, is naturally a loose term covering many subjects; but except in the theological sense (the doctrine of election), as employed by Calvin and others, for the choice by God of His " elect," the legal sense (see Election, in law, below) , and occasionally as a synonym for personal choice (one's own " election "), it is confined to the selection by the pre- ponderating vote of some properly constituted body of electors

of one of two or more candidates, sometimes for admission only to some private social position (as in a club), butmoreparticularly in connexion with public representative positions in political government. It is thus distinguished from arbitrary methods of appointment, either where the right of nominating rests in an individual, or where pure chance (such as selection by lot) dictates the result. The part played by different forms of election in history is alluded to in numerous articles in this work, dealing with various countries and various subjects. It is only necessary here to consider certain important features in the elections, as ordinarily understood, namely, the exercise of the right of voting for political and municipal offices in the United Kingdom and America. See also the articles Parliament; Representation; Voting; Ballot, &c, and United States: Political Institutions. For practical details as to the conduct of political elections in England reference must be made to the various text-books on the subject; the candidate and his election agent require to be on their guard against any false step which might invalidate his return.

Law in the United Kingdom. — Considerable alterations have been made in recent years in the law of Great Britain and Ireland relating to the procedure at parliamentary and municipal elections, and to election petitions.

As regards parliamentary elections (which may be either the " general election," after a dissolution of parliament, or " by-elections," when casual vacancies occur during its continuance), the most important of the amending statutes is the Corrupt and Illegal Practices Act 1883. This act, and the Parliamentary Elections Act 1868, as amended by it, and other enactments dealing with corrupt practices, are . temporary acts requiring annual renewal. As regards municipal elections, the Corrupt Practices (Municipal Elections) Act 1872 has been repealed by the Municipal Corporations Act 1882 for England, and by the Local Government (Ireland) Act 1898 for Ireland. The governing enactments for England are now the Municipal Corporations Act 1882, part iv., and the Municipal Elections (Corrupt and Illegal Practices) Act 1884, the latter annually renewable. The provisions of these enactments have been applied with necessary modifications to municipal and other local government elections in Ireland by orders of the Irish Local Government Board made under powers conferred by the Local Government (Ireland) Act 1898. In Scotland the law regulating municipal and other local government elections is now to be found in the Elections (Scotland) (Corrupt and Illegal Practices) Act 1890.

The alterations in the law have been in the direction of greater strictness in regard to the conduct of elections, and increased control in the public interest over the proceedings on election petitions. Various acts and payments which were previously lawful in the absence of any corrupt bargain or motive are now altogether forbidden under the name of " illegal practices " as distinguished from " corrupt practices." Failure on the part of a parliamentary candidate or his election agent to comply with the requirements of the law in any particular is sufficient to invalidate the return (see the articles Bribery and Corrupt Practices). Certain relaxations are, however, allowed in consideration of the difficulty of absolutely avoiding all deviation from the strict rules laid down. Thus, where the judges who try an election petition report that there has been treating, undue influence, or any illegal practice by the candidate or his election agent, but that it was trivial, unimportant and of a limited character, and contrary to the orders and without the sanction or connivance of the candidate or his election agent, and that the candidate and his election agent took all reasonable means for preventing corrupt and illegal practices, and that the election was otherwise free from such practices on their part, the election will not be avoided. The court has also the power to relieve from the consequences of certain innocent contraven- tions of the law caused by inadvertence or miscalculation.

Xhe inquiry into a disputed parliamentary election was formerly conducted before a committee of the House of Commons, chosen as nearly as possible from both sides of the House for that particular business. The decisions of these tribunals laboured

under the suspicion of being prompted by party feeling, and by an act of 1868 the jurisdiction was finally transferred to judges of the High Court, notwithstanding the general unwillingness of the bench to accept a class of business which they feared might bring their integrity into dispute. Section 1 1 of the act ordered, inter alia, that the trial of every election petition shall be conducted before a puisne judge of one of the common law courts at West- minster and Dublin; that the said courts shall each select a judge to be placed on the rota for the trial of election petitions; that the said judges shall try petitions standing for trial according to seniority or otherwise, as they may agree; that the trial shall take place in the county or borough to which the petition refers, unless the court should think it desirable to hold it elsewhere. The judge shall determine " whether the member whose return is complained of, or any and what other person, was duly returned and elected, or whether the election was void," and shall certify his determination to the speaker. When corrupt practices have been charged the judge shall also report (1) whether any such practice has been committed by or with the knowledge or consent of any candidate, and the nature thereof; (2) the names of persons proved to have been guilty of any corrupt practice; and (3) whether corrupt practices have extensively prevailed at the election. Questions of law were to be referred to the decision of the court of common pleas. On the abolition of that court by the Judicature Act 1873, the jurisdiction was transferred to the common pleas division, and again on the abolition of that

*division was transferred to the king's bench division, petitions. * n whom it is now vested. The rota of judges for*

the trial of election petitions is also supplied by the king's bench division. The trial now takes place before two judges instead of one; and, when necessary, the number of judges on the rota may be increased. Both the judges who try a petition are to sign the certificates to be made to the speaker. If they differ as to the validity of a return, they are to state such difference in their certificate, and the return is to be held good; if they differ as to a report on any other

matter, they are to certify their difference and make no report on such matter. The director of public prosecutions attends the trial personally or by representative. It is his duty to watch the proceedings in the public interest, to issue summonses to witnesses whose evidence is desired by the court, and to prosecute before the election court or elsewhere those persons whom he thinks to have been guilty of corrupt or illegal practices at the election in question. If an application is made for leave to withdraw a petition, copies of the affidavits in support are to be delivered to him; and he is entitled to be heard and to call evidence in opposition to such application. Witnesses are not excused from answering criminat- ing questions; but their evidence cannot be used against them in any proceedings except criminal proceedings for perjury in respect of that evidence. If a witness answers truly all questions which he is required by the court to answer, he is entitled to receive a certificate of indemnity, which will save him from all proceedings for any offence under the Corrupt Practices Acts committed by him before the date of the certificate at or in relation to the election, except proceedings to enforce any incapacity incurred by such offence. An application for leave to withdraw a petition must be supported by affidavits from all the parties to the petition and their solicitors, and by the election agents of all of the parties who were candidates at the election. Each of these affidavits is to state that to the best of the de- ponent's knowledge and belief there has been no agreement and no terms or undertaking made or entered into as to the with- drawal, or, if any agreement has been made, shall state its terms. The applicant and his solicitor are also to state in their affidavits the grounds on which the petition is sought to be withdrawn. If any person makes an agreement for the withdrawal of a petition in consideration of a money payment, or of the promise that the seat shall be vacated or another petition withdrawn, or omits to state in his affidavit that he has made an agreement, lawful or unlawful, for the withdrawal, he is guilty of an indictable misdemeanour. The report of the judges to the speaker is to contain particulars as to illegal practices similar to those

previously required as to corrupt practices; and they are to report further whether any candidate has been guilty by his agents of an illegal practice, and whether certificates of indemnity have been given to persons reported guilty of corrupt or illegal practices.

The Corrupt Practices Acts apply, with necessary variations in details, to parliamentary elections in Scotland and Ireland.

The amendments in the law as to municipal elections are generally

similar to those which have been made in parliamentary election law. The procedure on trial of petitions is substantially the same, and wherever no other provision is made by the acts or rules the procedure on the trial of parliamentary election petitions is to be followed. Petitions against municipal elections were dealt with in 35 & 36 Vict. c. 60. The election judges appoint a number of barristers, not exceeding five, as commissioners to try such petitions. No barrister can be appointed who is of less than fifteen years' standing, or a member of parliament, or holder of any office of profit (other than that of recorder) under the crown; nor can any barrister try a petition in any borough in which he is recorder or in which he resides, or which is included in his circuit. The barrister sits without a jury. The provisions are generally similar to those relating to parliamentary elections. The petition may allege that the election was avoided as to the borough or ward on the ground of general bribery, &c, or that the election of the person petitioned against was avoided by corrupt practices, or by personal disqualification, or that he had not the majority of lawful votes. The commissioner who tries a petition sends to the High Court a certificate of the result, together with reports as to corrupt and illegal practices, &c, similar to those made to the speaker by the judges who try a parliamentary election petition. The Municipal Elections (Corrupt and Illegal Practices) Act 1884 applied to school board elections subject to certain variations, and has been extended by the Local Govern- ment Act 1888 to county council elections, and by the Local Government Act 1894 to elections by parochial electors. The law in Scotland is on the same lines, and extends to all non- parliamentary elections, and, as has been stated, the English statutes have been applied with adaptations to all municipal and local government elections in Ireland.

United States. — Elections are much more frequent in the United States than they are in Great Britain, and they are also more complicated. The terms of elective officers are shorter; and as there are also more offices to be filled, the number of persons to be voted for is necessarily much greater. In the year of a presidential election the citizen may be called upon to vote at one time for all of the following: (1) National candidates — president and vice-president (indirectly through the electoral college) and members of the House of Representatives; (2) state candidates ■ — governor, members of the state legislature, attorney-general, treasurer, &c; (3) county candidates — sheriff, county judges, district attorney, &c. ; (4) municipal or town candidates — mayor, aldermen, selectmen, &c. The number of persons actually voted for may therefore be ten or a dozen, or it may be many more. In addition, the citizen is often

called upon to vote yea or nay on questions such as amendments to the state constitutions, granting of licences, and approval or disapproval of new municipal undertakings. As there may be, and generally is, more than one candidate for each office, and as all elections are now, and have been for many years, conducted by ballot, the total number of names to appear on the ballot may be one hundred or may be several hundred. These names are arranged in different ways, according to the laws of the different states. Under the Massa- chusetts law, which is considered the best by reformers, the names of candidates for each office are arranged alphabetically on a " blanket " ballot, as it is called from its size, and the elector places a mark opposite the names of such candidates as he may wish to vote for. Other states, New York for example, have the blanket system, but the names of the candidates are arranged in party columns. Still other states allow the grouping on one ballot of all the candidates of a single party, and there would be therefore as many separate ballots in such states as there were parties in the field.

ELECTION

171

The qualifications for voting, while varying in the different states in details, are in their main features the same throughout the Union. A residence in the state is required of from three months to two years. Residence is also necessary, but for a shorter period, in the county, city or town, or voting precinct. A few states require the payment of a poll tax. Some require that the voter shall be able to read and understand the Constitu- tion. This latter qualification has been introduced into several of the Southern states, partly at least to disqualify the ignorant coloured voters. In all, or practically all, the states idiots, convicts and the insane are disqualified; in some states paupers; in some of the Western states the Chinese. In some states women are allowed to vote on certain questions, or for the candidates for certain offices, especially school officials; and in four of the Western states women have the same rights of suffrage as men. The number of those who are qualified to vote, but do not avail themselves of the right, varies; greatly in the different states and according to the interest taken in the election. As a general rule, but subject to exceptions, the national elections call out the largest number, the state elections next, and the local elections the smallest number of voters. In an exciting national election between 80 and 90% of the qualified voters actually vote, a proportion considerably greater than in Great Britain or Germany.

The tendency of recent years has been towards a decrease both in the number and in the frequency of elections. A president and vice-president are voted for every fourth year, in the years divisible by four, on the first Tuesday following the first Monday of November. Members of the national House of Representa- tives are chosen for two years on the even-numbered years. State and local elections take place in accordance with state laws, and may or may not be on the same day as the national elections. Originally the rule was for the states to hold annual elections; in fact, so strongly did the feeling prevail of the need in a democratic country for frequent elections, that the maxim " where annual elections end, tyranny begins," became a political proverb. But opinion gradually changed even in the older or Eastern states, and in 190a Massachusetts and Rhode Island were the only states in the Union holding annual elections for governor and both houses of the state legislature. In the Western states especially state officers are chosen for longer terms — in the case of the governor often for four years — and the number of elections has correspondingly decreased. Another cause of the decrease in the number of elections is the growing practice of holding all the elections of any year on one and the same day. Before the Civil War Pennsylvania held its state elections several months before the national elections. Ohio and Indiana, until 1885 and 1881 respectively, held their state elections early in October. Maine, Vermont and Arkansas keep to September. The selection of one day in the year for all elections held in that year has resulted in a considerable decrease in the total number.

Another tendency of recent years, but not so pronounced, is to hold local elections in what is known as the " off " year; that is, on the odd-numbered year, when no national election is held. The object of this reform is to encourage independent voting. The average American citizen is only too prone to carry his national political predilections into local elections, and to vote for the local nominees of his party, without regard to the question of fitness of candidates and the fundamental difference of issues involved. This tendency to vote the entire party ticket is the more pronounced because under the system of voting in use in many of the states all the candidates of the party are arranged on one ticket, and it is much easier to vote a straight or unaltered ticket than to change or " scratch " it. Again, the voter, especially the ignorant one, refrains from scratching his ticket, lest in some way he should fail to comply with the technicalities of the law and his vote be lost. On the other hand, if local elections are held on the " off " or odd year, and there be no national or state candidates, the voter feels much more free to select

only those candidates whom he considers best qualified for the various offices.

On the important question of the purity of elections it is

difficult to speak with precision. In many of the states, especi- ally those with an enlightened public spirit, such as most of the New England states and many of the North-Western, the elections are fairly conducted, there being no intimidation at all, little or no bribery, and an honest count. It can safely be said that through the Union as a whole the tendency of recent yea^s has been decidedly towards greater honesty of elections. This is owing to a number of causes: (i)The selection of a single day for all elections, and the consequent immense number voting on that day. Some years ago, when for instance the Ohio and Indiana elections were held a few weeks before the general election, each party strained every nerve to carry them, for the sake of prestige and the influence on other states. In fact, presidential elections were often felt to turn on the result in these early voting states, and the party managers were none too scrupulous in the means employed to carry them. Bribery has decreased in such states since the change of election day to that of the rest of the country. (2) The enactment in most of the states of the Australian or secret ballot (q.v.) laws. These have led to the secrecy of the ballot, and hence to a greater or less extent have prevented intimidation and bribery. (3) Educational or other such test, more particularly in the Southern states, the object of which is to exclude the coloured, and especially the ignorant coloured, voters from the polls. In those southern states in which the coloured vote was large, and still more in those in which it was the majority, it was felt among the whites that intimidation or ballot-box stuffing was justified by the necessity of white supremacy. With the elimination of the coloured vote by educational or other tests the honesty of elections has increased. (4) The enactment of new and more stringent registration laws. Under these laws only those persons are allowed to vote whose names have been placed on the rolls a certain number of days or months before election. These rolls are open to public inspection, and the names may be challenged at the polls, and " colonization " or repeating is therefore almost impossible. (5) The reform of the civil service and the gradual elimination of the vicious principle of " to the victors belong the spoils." With the reform of the civil service elections become less a scramble for office and more a contest of political or economic principle. They bring into the field, therefore, a better class of candidates. (6) The enactment in a number of states of various other laws for the prevention of corrupt practices, for the publication of campaign expenses, and for the

prohibition of party workers from coming within a certain specified distance of the polls. In the state of Massachusetts, for instance, an act passed in 1892, and subsequently amended, provides that political committees shall file a full statement, duly sworn to, of all campaign expenditures made by them. The act applies to all public elections except that of town officers, and also covers nominations by caucuses and conventions as well. Apart from his personal expenses such as postage, travelling expenses, &c, a candidate is prohibited from spending anything himself to promote either his nomination or his election, but he is allowed to contribute to the treasury of the political committee. The law places no limit on the amount that these committees may spend. The reform sought by the law is thorough publicity, and not only are details of receipts and expenditures to be published, but the names of contributors and the amount of their contributions. In the state of New York the act which seeks to prevent corrupt practices relies in like manner on the efficacy of publicity, but it is less effective than the Massachusetts law in that it provides simply for the filing by the candidates themselves of sworn statements of their own expenses. There is nothing to prevent their contributing to political committees, _ and the financial methods and the amounts expended by such committees are not made public. But behind all these causes that have led to more honest elections lies the still greater one of a healthier public spirit. In the reaction following the Civil War all reforms halted. In recent years, however, a new and healthier interest has sprung up in things political; and one result of this improved civic spirit is seen in the various laws for purification of elections. It may now be safely affirmed that in the majority of states the elections are honestly conducted; that intimidation, bribery,

stuffing of the ballot boxes or other forms of corruption, when they exist, are owing in large measure to temporary or local causes; and that the tendency of recent years has been towards a decrease in all forms of corruption.

The expenses connected with elections, such as the renting and preparing of the polling-places, the payment of the cleiks and other officers who conduct the elections and count the vote, are borne by the community. A candidate therefore is not, as far as the law is concerned, liable to any expense whatever. As a matter of fact he does commonly contribute to the party treasury, though in the case

of certain candidates, particularly those for the presidency and for judicial offices, financial contributions are not general. The amount of a candidate's contribution varies greatly, according to the office sought, the state in which he lives, and his private wealth. On one occasion, in a district in New York, a candidate for Congress is credibly believed to have spent at one election $50,000. On the other hand, in a Congressional election in a certain district in Massachusetts, the only ex- penditure of one of the candidates was for the two-cent stamp placed on his letter of acceptance. No estimate of the average amount expended can be made. It is, however, the conclusion of Mr Bryce, in his American Commonwealth, that as a rule a seat in Congress costs the candidate less than a seat for a county division in the House of Commons. (See also Ballot.)

ELECTION, in English law, the obligation imposed upon a party by courts of equity to choose between two inconsistent or alternative rights or claims in cases where there is a clear intention of the person from whom he derives one that he should not enjoy both. Thus a testator died seized of property in fee simple and in fee tail — he had two daughters, and devised the fee simple property to one and the entailed property to the other; the first one claimed to have her share of the entailed property as coparcener and also to retain the benefit she took under the will. It was held that she was put to her election whether she would take under the will and renounce her claim to the entailed property or take against the will, in which case she must renounce the benefits she took under the will in so far as was necessary to compensate her sister. As the essence of the doctrine is compensation, a person electing against a document does not lose all his rights under it, but the court will sequester so much only of the benefit intended for him as will compensate the persons disappointed by his election. For the same reason it is necessary that there should be a free and disposable fund passing by the instrument from which compensation can be made in the event of election against the will. If, therefore, a man having a special power of appointment appoint the fund equally between two persons, one being an object of the power and the other not an object, no question of election arises, but the appointment, to the person not an object is bad.

Election, though generally arising in cases of wills, may also arise in the case of a deed. There is, however, a distinction to be observed. In the case of a will a clear intention on the part of the testator that he meant to dispose of property not his own must be shown, and parol evidence is not admissible as to this. In the case of a deed, however, no such intention need be shown, for if a deed confers a benefit and

imposes a liability on the same person he cannot be allowed to accept the one and reject the other, but this must be distinguished from cases where two separate gifts are given to a person, one beneficial and the other onerous. In such a case no question of election arises and he may take the one and reject the other, unless, indeed, there are words used which make the one conditional on the acceptance of the other.

Election is either express, e.g. by deed, or implied; in the latter case it is often a question of considerable difficulty whether there has in fact been an election or not; each case must depend upon the particular circumstances, but quite generally it may be said that the person who has elected must have been capable of electing, aware of the existence of the doctrine of election, and have had the opportunity of satisfying himself of the relative value of the properties between which he has elected. In the case of infants the court will sometimes

elect after an inquiry as to which course is the most advantageous, or if there is no immediate urgency, will allow the matter to stand over till the infant attains his majority. In the cases of married women and lunatics the courts will exercise the right for them. It sometimes happens that the parties have so dealt with the property that it would be inequitable to disturb it; in such cases the court will not interfere in order to allow of election.

ELECTORAL COMMISSION, in United States history, a commission created to settle the disputed presidential election of 1876. In this election Samuel J. Tilden, the Democratic candidate, received 184 uncontested electoral votes, and Ruther- ford B. Hayes, the Republican candidate, 163. 1 The states of Florida, Louisiana, Oregon and South Carolina, with a total of 22 votes, each sent in two sets of electoral ballots, 2 and from each of these states except Oregon one set gave the whole vote to Tilden and the other gave the whole vote to Hayes. From Oregon one set of ballots gave the three electoral votes of the state to Hayes; the other gave two votes to Hayes and one to Tilden.

The election of a president is a complex proceeding, the method being indicated partly in the Constitution, and being partly left to Congress and partly to the states. The manner of selecting the electors is left to state law; the electoral ballots are sent to the president of the Senate, who " shall, in the presence of the Senate and House of Representatives, open all certificates, and the votes shall then be counted." Concerning this provision many questions of vital

importance arose in 1876: Did the pre- sident of the Senate count the votes, the houses being mere witnesses; or did the houses count them, the president's duties being merely ministerial ? Did counting imply the determination of what should be counted, or was it a mere arithmetical process; that is, did the Constitution itself afford a method of settling disputed returns, or was this left to legislation by Congress? Might Congress or an officer of the Senate go behind a state's certificate and review the acts of its certifying officials ? Might it go further and examine into the choice of electors? And if it had such powers, might it delegate them to a commission? As regards the procedure of Congress, it seems that, although in early years the president of the Senate not only performed or overlooked the electoral count but also exercised discretion in some matters very important in 1876, Congress early began to assert power, and, at least from 182 1 onward, controlled the count, claiming complete power. The fact, however, that the Senate in 1876 was controlled by the Republicans and the House by the Democrats, lessened the chances of any harmonious settlement of these questions b}r Congress. The country seemed on the verge of civil war. Hence it was that by an act of the 29th of January 1877, Congress created the Electoral Commission to pass upon the contested returns, giving it " the same powers, if any " possessed by itself in the premises, the decisions to stand unless rejected by the two houses separately. The commission was composed of five Democratic and five Republican Congress- men, two justices of the Supreme Court of either party, and a fifth justice chosen by these four. As its members of the com- mission the Senate chose G. F. Edmunds of Vermont, O. P. Morton of Indiana, and F. T. Frelinghuysen of New Jersey (Republicans) ; and A. G. Thurman of Ohio and T. F. Bayard of Delaware (Democrats). The House chose Henry B. Payne of Ohio, Eppa Hunton of Virginia, and Josiah G. Abbott of Massachusetts (Democrats) ; and George F. Hoar of Massa- chusetts and James A. Garfield of Ohio (Republicans). The Republican judges were William Strong and Samuel F. Miller; the Democratic, Nathan Clifford and Stephen J. Field. These four chose as the fifteenth member Justice Joseph P. Bradley,

1 The election of a vice-president was, of course, involved also. William A. Wheeler was the Republican candidate, and Thomas A. Hendricks the Democratic.

2 A second set of electoral ballots had also been sent in from Vermont, where Hayes had received a popular majority vote of 24,000. As these ballots had been transmitted in an irregular manner, the president of the Senate refused to receive them, and was

sustained in this action by the upper House.

ELECTORS

!73

a Republican but the only member not selected avowedly as a partisan. As counsel for the Democratic candidate there ap- peared before the commission at different times Charles O' Conor of New York, Jeremiah S. Black of Pennsylvania, Lyman Trumbull of Illinois, R. T. Merrick of the District of Columbia, Ashbel Green of New Jersey, Matthew H.Carpenter of Wisconsin, George Hoadley of Ohio, and W. C. Whitney of New York. W. M. Evarts and E. W. Stoughton of New York and Samuel Shellabarger and Stanley Matthews of Ohio appeared regularly in behalf of Mr Hayes.

The popular vote seemed to indicate that Hayes had carried South Carolina and Oregon, and Tilden Florida and Louisiana. It was evident, however, that Hayes could secure the 185 votes necessary to elect only by gaining every disputed ballot. As the choice of Republican electors in Louisiana had been accom- plished by the rejection of several thousand Democratic votes by a Republican returning board, the Democrats insisted that the commission should go behind the returns and correct in- justice; the Republicans declared that the state's action was final, and that to go behind the returns would be invading its sovereignty. When this matter came before the commission it virtually accepted the Republican contention, ruling that it could not go behind the returns except on the superficial issues of manifest fraud therein or the eligibility of electors to their office under the Constitution; that is, it could not investigate antecedents of fraud or misconduct of state officials in the results certified. All vital questions were settled by the votes of eight Republicans and seven Democrats; and as the Republican Senate would never concur with the Democratic House in over- riding the decisions, all the disputed votes were awarded to Mr Hayes, who therefore was declared elected.

The strictly partisan votes of the commission and the adoption by prominent Democrats and Republicans, both within and without the commission, of an attitude toward states-rights principles quite inconsistent with party tenets and tendencies, have given rise to much severe criticism. The Democrats and the country, however, quietly accepted the decision. The judgments underlying it were two: (1) That Congress rightly claimed the power to settle such contests within the limits set; (2) that, as Justice Miller said regarding these

limits, the people had never at any time intended to give to Congress the power, by naming the electors, to " decide who are to be the president and vice-president of the United States."

There is no doubt that Mr Tilden was morally entitled to the presidency, and the correction of the Louisiana frauds would certainly have given satisfaction then and increasing satisfaction later, in the retrospect, to the country. The commission might probably have corrected the frauds without exceeding its Con- gressional precedents. Nevertheless, the principles of its decisions must be recognized by all save ultra-nationalists as truer to the spirit of the Constitution and promising more for the good of the country than would have been the principles necessary to a contrary decision.

By an act of the 3rd of February 1887 the electoral procedure is regulated in great detail. Under this act determination by a state of electoral disputes is conclusive, subject to certain formalities that guarantee definite action and accurate certifica- tion. These formalities constitute " regularity," and are in all cases judgable by Congress. When Congress is forced by the lack or evident inconclusiveness of state action, or by conflicting state action, to decide disputes, votes are lost unless both houses concur.

Authorities. — J. F. Rhodes, History of the United States, vol. 7, covering 1872-1877 (New York, 1906); P. L. Haworth, The Hayes-Tilden disputed Presidential Election of 1876 (Cleveland, 1906) ; J. W. Burgess, Political Science Quarterly, vol. 3 (1888), pp. 633-653, " The Law of the Electoral Count "; and for the sources, Senate Miscellaneous Document No. 5 (vol. 1), and House Miscel. Doc. No. 13 (vol. 2), 44 Congress, 2 Session, — Count of the Electoral Vote. Proceedings of Congress and Electoral Commission, — the latter identical with Congressional Record, vol. 5, pt. 4, 44 Cong., 2 Session ; also about twenty volumes of evidence on the state elections in- volved. The volume called The Presidential Counts (New York, 1877) was compiled by Mr Tilden and his secretary.

ELECTORS (Ger. Kurfursten, from Kiiren, O.H.G. kiosan, choose, elect, and Fiirst, prince), a body of German princes, originally seven in number, with whom rested the election of the German king, from the 13 th until the beginning of the 19th century. The German kings, from the time of Henry the Fowler (919-936) till the middle of the 13 th century, succeeded to their position partly by heredity, and partly by election. Primitive Germanic practice had emphasized the element oi heredity. Reges ex nobilitate sumunt: the man whom a

German tribe recognized as its king must be in the line of hereditary descent from Woden; and therefore the genealogical trees of early Teutonic kings (as, for instance, in England those of the Kentish and West Saxon sovereigns) are carefully constructed to prove that descent from the god which alone will constitute a proper title for his descendants. Even from the first, however, there had been some opening for election; for the principle of primogeniture was not observed, and there might be several competing candidates, all of the true Woden stock. One of these competing candidates would have to be recognized (as the Anglo-Saxons said, geceosan); and to this limited extent Teutonic kings may be termed elective from the very first. In the other nations of western Europe this element of election dwindled, and the principle of heredity alone received legal recognition; in medieval Germany, on the contrary, the principle of 'heredity, while still exercising an inevitable natural force, sank formally into the background, and legal recognition was finally given to the elective principle. De facto, therefore, the principle of heredity exercises in Germany a great influence, an influence never more striking than in the period which follows on the formal recognition of the elective principle, when the Habsburgs (like the Metelli at Rome) fato imperatores fiunt: de jure, each monarch owes his accession simply and solely to the vote of an electoral college.

This difference between the German monarchy and the other monarchies of western Europe may be explained by various considerations. Not the least important of these is what seems a pure accident. Whereas the Capetian monarchs, during the three hundred years that followed on the election of Hugh Capet in 987, always left an heir male, and an heir male of full age, the German kings again and again, during the same period, either left a minor to succeed to their throne, or left no issue at all. The principle of heredity began to fail because there were no heirs. Again the strength of tribal feeling in Germany made the monarchy into a prize, which must not be the apanage of any single tribe, but must circulate, as it were, from Franconian to Saxon, from Saxon to Bavarian, from Bavarian to Franconian, from Franconian to Swabian; while the growing power of the baronage, and its habit of erecting anti-kings to emphasize its opposition to the crown (as, for instance, in the reign of Henry IV.), coalesced with and gave new force to the action of tribal feeling. Lastly, the fact that the German kings were also Roman emperors finally and irretrievably consolidated the grow- ing tendency towards the elective principle. The principle of heredity had never held any great sway under the ancient Roman Empire (see under Emperor); and the medieval Empire, instituted as it was by the papacy, came

definitely under the influence of ecclesiastical prepossessions in favour of election. The church had substituted for that descent from Woden, which had elevated the old pagan kings to their thrones, the conception that the monarch derived his crown from the choice of God, after the manner of Saul; and the theoretical choice of God was readily turned into the actual choice of the church, or, at any rate, of the general body of churchmen. If an ordinary king is thus regarded by the church as essentially elected, much more will the emperor, connected as he is with the church as one of its officers, be held to be also elected; and as a bishop is chosen by the chapter of his diocese, so, it will be thought, must the emperor be chosen by some corresponding body in his empire. Heredity might be tolerated in a mere matter of king- ship: the precious trust of imperial power could not be allowed to descend according to the accidents of family succession. To Otto of Freising (Gesta Frid. ii. 1) it is already a point of right

vindicated for itself by the excellency of the Roman Empire, as a matter of singular prerogative, that it should not descend per sanguinis propaginem, sed per principum electionem.

The accessions of Conrad II. (see Wipo, Vita Cuonradi, c. 1-2), of Lothair II. (see Narratio de electione Lotharii, M.G.H.. Scriptt. xii. p. 510), of Conrad III. (see Otto of Freising, Chronicon, vii. 22) and of Frederick I. (see Otto of Freising, Gesta Frid. ii. 1) had all been marked by an element, more or less pronounced, of election. That element is perhaps most considerable in the case of Lothair, who had no rights of heredity to urge. Here we read of ten princes being selected from the princes of the various duchies, to whose choice the rest promise to assent, and of these ten selecting three candidates, one of whom, Lothair, is finally chosen (apparently by the whole assembly) in a some- what tumultuary fashion. In this case the electoral assembly would seem to be, in the last resort, the whole diet of all the princes. But a de facto pre-eminence in the act of election is already, during the 12th century, enjoyed by the three Rhenish archbishops, probably because of the part they afterwards played at the coronation, and also by the dukes of the great duchies — possibly because of the part they too played, as vested for the time with the great offices of the household, at the corona- tion feast. 1 Thus at the election of Lothair it is the archbishop of Mainz who conducts the proceedings; and the election is not held to be final until the duke of

Bavaria has given his assent. The fact is that, votes being weighed by quality as well as by quantity (see Diet), the votes of the archbishops and dukes, which would first be taken, would of themselves, if unanimous, decide the election. To prevent tumultuary elections, it was well that the election should be left exclusively with these great dignitaries; and this is what, by the middle of the 13th century, had eventually been done.

The chaos of the interregnum from n 98 to 121 2 showed the way for the new departure; the chaos of the great interregnum (1250-1273) led to its being finally taken. The decay of the great duchies, and the narrowing of the class of princes into a close corporation, some of whose members were the equals of the old dukes in power, introduced difficulties and doubts into the practice of election which had been used in the 12th century. The contested election of the interregnum of 1198-1212 brought these difficulties and doubts into strong relief. The famous bull of Innocent III. (Venerabilem), in which he decided for Otto IV. against Philip of Swabia, on the ground that, though he had fewer votes than Philip, he had a majority of the votes of those ad quos principaliter spectat electio, made it almost imperative that there should be some definition of these principal electors. The most famous attempt at such a definition is that of the Sachsenspiegel, which was followed, or combated, by many other writers in the first half of the 13 th century. Eventually the contested election of 1257 brought light and definition. Here we find seven potentates acting — the same seven whom the Golden Bull recognizes in 1356; and we find these seven described in an official letter to the pope, as principes vocem in hujusmodi electione habentes, qui sunt septem numero. The doctrine thus enunciated was at once received. The pope acknowledged it in two bulls (1263) ; a cardinal, in a commentary on the bull Venerabilem of Innocent III., recognized it about the same time; and the erection of statues of the seven electors at Aix-la-Chapelle gave the doctrine a visible and outward expression.

By the date of the election of Rudolph of Habsburg (1273) the seven electors may be regarded as a definite body, with an acknowledged right. But the definition and the acknowledgment were still imperfect. (1) The composition of the electoral body was uncertain in two respects. The duke of Bavaria claimed as his right the electoral vote of the king of Bohemia; and the practice of partitio in electoral families tended to raise further

1 This is the view of the Sachsenspiegel, and also of Albert of Stade (quoted in Schroder, p. 476, n. 27) : Palatinus eligit, quia dapif er

est ; dux Saxoniae, quia marescalcus," &c. Schroder points out (p. 479, n. 45) that " participation in the coronation feast is an express recognition of the king " ; and those who are to discharge their office in the one must have had a prominent voice in the other.

difficulties about the exercise of the vote. The Golden Bull of 1356 settled both these questions. Bohemia (of which Charles IV., the author of the Golden Bull, was himself the king) was assigned the electoral vote in preference to Bavaria; and a provision annexing the electoral vote to a definite territory, declaring that territory indivisible, and regulating its descent by the rule of primogeniture instead of partition, swept away the old difficulties which the custom of partition had raised. After 1356 the seven electors are regularly the three Rhenish arch- bishops, Mainz, Cologne and Trier, and four lay magnates, the palatine of the Rhine, the duke of Saxony, the margrave of Brandenburg, and the king of Bohemia; the three former being vested with the three archchancellorships, and the four latter with the four offices of the royal household (see House- hold). (2) The rights of the seven electors, in their collective capacity as an electoral college, were a matter of dispute with the papacy. The result of the election, whether made, as at first, by the princes generally or, as after 1257, by the seven electors exclusively, was in itself simply the creation of a German king — an electio in regem. But since 962 the German king was also, after coronation by the pope, Roman emperor. Therefore the election had a double result: the man elected was not only electus in regem, but also promovendus ad imperium. The difficulty was to define the meaning of the term promovendus. Was the king elect inevitably to become emperor? or did the promotio only follow at the discretion of the pope, if he thought the king elect fit for promotion? and if so, to what extent, and according to what standard, did the pope judge of such fitness? Innocent III. had already claimed, in the bull Venerabilem, (1) that the electors derived their power of election, so far as it made an emperor, from the Holy See (which had originally " trans- lated " the Empire from the East to the West), and (2) that the papacy had a jus et auctoritas examinandi personam electam in regem et promovendam ad imperium. The latter claim he had based on the fact that he anointed, consecrated and crowned the emperor — in other words, that he gave a spiritual office according to spiritual methods, which entitled him to inquire into the fitness of the recipient of that office, as a bishop inquires into the fitness of a candidate for ordination. Innocent had put forward this claim as a ground for deciding between competing candidates: Boniface VIII. pressed the claim against Albert I. in 1298, even though his election

was unanimous; while John XXII. exercised it in its harshest form, when in 1324 he ex- communicated Louis IV. for using the title and exerting the rights even of king without previous papal confirmation. This action ultimately led to a protest from the electors themselves, whose right of election would have become practically meaning- less, if such assumptions had been tolerated. A meeting of the electors (Kurverein) at Rense in 1338 declared (and the declara- tion was reaffirmed by a diet at Frankfort in the same year) that postquam aliquis eligitur in Imperatorem sive Regem ab Electoribus Imperii concorditer, vel majori parte eorundem, statim ex sola electione est Rex verus et Imperator Romanus censendus . . . nee Papae sive Sedis Apostolicae . . . approbatione . . . indiget. The doctrine thus positively affirmed at Rense is negatively reaffirmed in the Golden Bull, in which a significant silence is maintained in regard to papal rights. But the doctrine was not in practice followed: Sigismund himself did not venture to dispense with papal approbation.

By the end of the 14th century the position of the electors, both individually and as a corporate body, had become definite and precise. Individually, they were distinguished from all other princes, as we have seen, by the indivisibility of their territories and by the custom of primogeniture which secured that indivisibility; and they were still further distinguished by the fact that their person, like that of the emperor himself, was protected by the law of treason, while their territories were only subject to the jurisdiction of their own courts. They were independent territorial sovereigns; and their position was at once the envy and the ideal of the other princes of Germany. Such had been the policy of Charles IV. ; and thus had he, in the Golden Bull, sought to magnify the seven electors, and himself

as one of the seven, in his capacity of king of Bohemia, even at the expense of the Empire, and of himself in his capacity of emperor. Powerful as they were, however, in their individual capacity, the electors showed themselves no less powerful as a corporate body. As such a corporate body, they may be con- sidered from three different points of view, and as acting in three different capacities. They are an electoral body, choosing each successive emperor; they are one of the three colleges of the imperial diet (see Diet); and they are also an electoral union (Kurfiirstenverein) , acting as a separate and independent political organ even after the election, and during the reign, of the monarch. It was in this last capacity that they had met

at Rense in 1338; and in the same capacity they acted repeatedly during the 15th century. According to the Golden Bull, such meetings were to be annual, and their deliberations were to concern "the safety of the Empire and the world." Annual they never were; but occasionally they became of great im- portance. In 1424, during the attempt at reform occasioned by the failure of German arms against the 'Hussites, the Kurfiirsten- verein acted, or at least it claimed to act, as the predominant partner in a duumvirate, in which the unsuccessful Sigismund was relegated to a secondary position. During the long reign of Frederick III. — a reign in which the interests of Austria were cherished, and the welfare of the Empire neglected, by that apathetic yet tenacious emperor — the electors once more attempted, in the year 1453, to erect a new central government in place of the emperor, a government which, if not conducted by themselves directly in their capacity of a Kurfiirstenverein, should at any rate be under their influence and control. So, they hoped, Germany might be able to make head against that papal aggression, to which Frederick had yielded, and to take a leading part in that crusade against the Turks, which he had neglected. Like the previous attempt at reform during the Hussite wars, the scheme came to nothing; the forces of disunion in Germany were too strong for any central government, whether monarchical and controlled by the emperor, or oligarchical and controlled by the electors. But a final attempt, the most strenuous of all, was made in the reign of Maximilian I., and under the influence of Bertold, elector and archbishop of Mainz. The council of 1500, in which the electors (with the exception of the king of Bohemia) were to have sat, and which would have been under their control, represents the last effective attempt at a real Reichsregiment. Inevitably, however, it shipwrecked on the opposition of Maximilian; and though the attempt was again made between 1521 and 153°, the idea of a real central government under the control of the electors perished, and the development of local administration by the circle took its place.

In the course of the 16th century a new right came to be exercised by the electors. As an electoral body (that is to say, in the first of the three capacities distinguished above), they claimed, at the election of Charles V. in 1519 and at subsequent elections, to impose conditions on the elected monarch, and to determine the terms on which he should exercise his office in the course of his reign. This Wahlcapitulation, similar to the Pacta Conventa which limited the elected kings of Poland, was left by the diet to the discretion of the electors, though after the treaty of Westphalia an attempt was made, with some little success, 1 to turn the capitulation into a matter of

legislative enactment by the diet. From this time onwards the only fact of importance in the history of the electors is the change which took place in the composition of their body during the 17 th and 18th centuries. From the Golden Bull to the treaty of Westphalia (1356-1648) the composition of the electoral body had remained unchanged. In 1623, however, in the course of the Thirty Years' War, the vote of the count palatine of the Rhine had been transferred to the duke of Bavaria; and at the treaty of Westphalia the vote, with the office of imperial butler which it carried, was left to Bavaria, while an eighth vote, along with the new office of imperial treasurer, was created for the count palatine. In 1708 a ninth vote, along with the office of imperial standard-bearer, was created for Hanover; while

1 See Schroder's Lehrbuch der deutschen Rechtsgeschichte, p. 820.

finally, in 1778, the vote of Bavaria and the office of imperial butler returned to the counts palatine, as heirs of the duchy, on the extinction of the ducal line, while the new vote created for the Palatinate in 1648, with the office of imperial treasurer, was transferred to Brunswick-Liineburg (Hanover) in lieu of the one which this house already held. In 1806, on the dissolution of the Holy Roman Empire, the electors ceased to exist.

Literature. — T. Lindner, Die deutschen Konigswahlen und die Entstehung des Kurfiirstentums (1893), and Der Hergang bet den deutschen Konigswahlen (1899); R. Kirchhofer, Zur Entstehung des Kurkollegiums (1893); W. Maurenbrecher, Geschichte der deutschen Konigswahlen (1889); and G. Blondel, Etude sur Frederic II, p. 27 sqq. See also J. Bryce, Holy Roman Empire (edition of 1904), c. ix. ; and R. Schroder, Lehrbuch der deutschen Rechtsgeschichte, pp. 471-481 and 819-820. (E. Br.)

ELECTRA ('HXkrpa), " the bright one," in Greek mythology. (1) One of the seven Pleiades, daughter of Atlas and Ple'ione. She is closely connected with the old constellation worship and the religion of Samothrace, the chief seat of the Cabeiri (q.v.), where she was generally supposed to dwell. By Zeus she was the mother of Dardanus, Iasion (or Eetion), and Harmonia; but in the Italian tradition, which represented Italy as the original home of the Trojans, Dardanus was her son by a king of Italy named Corythus. After her amour with Zeus, Electra fled to the Palladium as a suppliant, but Athena, enraged that it had been touched by one who was no longer a maiden, flung Electra and the image from heaven to earth, where it was found by Ilus, and taken by him to Ilium;

according to another tradition, Electra herself took it to Ilium, and gave it to her son Dardanus (Schol. Eurip. Phoen. 1136). In her grief at the destruction of the city she plucked out her hair and was changed into a comet; in another version Electra and her six sisters had been placed among the stars as the Pleiades, and the star which she represented lost its brilliancy after the fall of Troy. Electra's connexion with Samothrace (where she was also called Electryone and Strategis) is shown by the localization of the carrying off of her reputed daughter Harmonia by Cadmus, and by the fact that, according to Athenicon (the author of a work on Samothrace quoted by the scholiast on Apollonius Rhodius i. 917), the Cabeiri were Dardanus and Iasion. The gate Electra at Thebes and the fabulous island Electris were said to have been called after her (Apollodorus iii. 10. 12; Servius on Aen. iii. 167, vii. 207, x. 272, Georg. i. 138).

(2) Daughter of Agamemnon and Clytaemnestra, sister of Orestes and Iphigeneia. She does not appear in Homer, although according to Xanthus (regarded by some as a fictitious personage) , to whom Stesichorus was indebted for much in his Oresteia, she was identical with the Homeric Laodice, and was called Electra because she remained so long unmarried ('A-XeM-pa). She was said to have played an important part in the poem of Stesichorus, and subsequently became a favourite figure in tragedy. After the murder of her father on his return from Troy by her mother and Aegisthus, she saved the life of her brother Orestes by sending him out of the country to Strophius, king of Phanote in Phocis, who had him brought up with his own son Pylades. Electra, cruelly ill-treated by Clytaemnestra and her paramour, never loses hope that her brother will return to avenge his father. When grown up, Orestes, in response to frequent messages from his sister, secretly repairs with Pylades to Argos, where he pretends to be a messenger from Strophius bringing the news of the death of Orestes. Being admitted to the palace, he slays both Aegisthus and Clytaemnestra. According to another story (Hyginus, Fab. 122), Electra, having received a false report that Orestes and Pylades had been sacrificed to Artemis in Tauris, went to consult the oracle at Delphi. In the meantime Aletes, the son of Aegisthus, seized the throne of Mycenae. Her arrival at Delphi coincided with that of Orestes and Iphigeneia. The same messenger, who had already communicated the false report of the death of Orestes, informed her that he had been slain by Iphigeneia. Electra in her rage seized a burning brand from the altar, intending to blind her sister; but at the critical moment Orestes appeared, recognition took place, and the brother and sister returned to Mycenae. Aletes was slain by Orestes, and

Electra became the wife of Pylades. The story of Electra is the subject of the Choephori of Aeschylus, the Electra of Sophocles and the Electra of Euripides. It is in the Sophoclean play that Electra is most prominent.

There are many variations in the treatment of the legend, for which, as also for a discussion of the modern plays on the subject by Voltaire and Alfieri, see Jebb's Introduction to his edition of the Electra of Sophocles.

ELECTRICAL (or Electrostatic) MACHINE, a machine operating by manual or other power for transforming mechanical work into electric energy in the form of electrostatic charges of opposite sign delivered to separate conductors. Electrostatic machines are of two kinds: (1) Frictional, and (2) Influence machines.

Frictional Machines. — A primitive form of frictional electrical machine was constructed about 1663 by Otto von Guericke (1602-1686). It consisted of a globe of sulphur fixed on an axis and rotated by a winch, and it was electrically excited by the friction of warm hands held against it. Sir Isaac Newton appears to have been the first to use a glass globe instead of sulphur (Optics, 8th Query). F. Hawksbee in 1709 also used a revolving glass globe. A metal chain resting on the globe served to collect the charge. Later G. M. Bose (1710-1761), of Witten- berg, added the prime conductor, an insulated tube or cylinder supported on silk strings, and J. H. Winkler (1 703-1 770), professor of physics at Leipzig, substituted a leather cushion for the hand. Andreas Gordon (1712-1751) of Erfurt, a Scotch Benedictine monk, first used a glass cylinder in place of a sphere. Jesse Ramsden (1735-1800) in 1768 constructed his well-known form of plate electrical machine (fig. 1). A glass plate fixed to a wooden or metal shaft is rotated by a winch. It passes between two rubbers made of leather, and is partly covered with two silk aprons which extend over quadrants of its surface. Just below the places where the aprons terminate, the glass is embraced by two insulated metal forks having the sharp points projecting towards the glass, but not quite touching it. The glass is excited positively by friction with the rubbers, and the charge is drawn off by the action of the points which, when acted upon inductively, discharge negative electricity against it. The insulated conductor to which the points are connected therefore

becomes positively electri- fied. The cushions must be connected to earth to remove the negative elec- tricity which accumulates on them. It was found that the machine acted better if the rubbers were covered with bisulphide of tin or with F. von Kien- mayer's amalgam, consist- ing of one part of zinc, one of tin and two of mer- cury. The cushions were greased and the amalgam in a state of powder spread over them. Edward Nairne's electrical machine (1787) consisted of a glass cylinder with two insu- lated conductors, called prime conductors, on glass legs placed near it. One of these carried the leather exacting cushions and the other the collecting metal points, a silk apron extending over the cylinder from the cushion almost to the points. The rubber was smeared with amalgam. The function of the apron is to prevent the escape of electrification from the glass during its passage from the rubber to the collecting points. Nairne's machine could give either positive or negative electricity, the first named being collected from the prime conductor carrying the collecting

Fig. 1. — Ramsden's electrical machine.

points and the second from the prime conductor carrying the cushion.

Influence Machines.— Frictions! machines are, however, now quite superseded by the second class of instrument mentioned above, namely, influence machines. These operate by electro- static induction and convert mechanical work into electrostatic energy by the aid of a small initial charge which is continu- ally being replenished or reinforced. The general principle of all the machines de- scribed below will be best understood by considering a simple ideal case. Imagine two Leyden jars with large brass knobs, A and B, to stand on the ground (fig. 2). Let one jar be initially Fig. 2.

charged with positive electricity on its inner coating and the other with negative, and let both have their outsides connected to earth. Imagine two insulated balls A' and B' so held that A' is near A and B'is near B. Then the positive charge on A induces two charges on A', viz.: a negative on the side nearest and a positive on the side most removed. Likewise the negative charge on B induces a positive charge on the side of B' nearest to it and repels negative electricity to the far side. Next let the balls A' and B' be connected together for a moment by a wire N called a neutralizing conductor which is subsequently removed. Then A' will be left negatively electrified and B' will be left positively electrified. Suppose that A' and B' are then made to change places. To do this we shall have to exert energy to remove A' against the attraction of A and B' against the attraction of B. Finally let A'

be brought in contact with B and B' with A. The ball A' will give up its charge of negative electricity to the Leyden jar B, and the ball B' will give up its positive charge to the Leyden jar A. This transfer will take place because the inner coatings of the Leyden jars have greater capacity with respect to the earth than the balls. Hence the charges of the jars will be increased. The balls A' and B' are then practically discharged, and the above cycle of operations may be repeated. Hence, however small may be the initial charges of the Leyden jars, by a principle of accumulation resembling that of compound interest, they can be increased as above shown to any degree. If this series of operations be made to depend upon the continuous rotation of a winch or handle, the arrangement constitutes an electrostatic influence ihachine. The principle therefore somewhat resembles that of the self-exciting dynamo.

The first suggestion for a machine of the above kind seems to have grown out of the invention of Volta's electrophorus. Abraham Bennet, the inventor of the gold leaf electro- scope, described a doubler or machine for multiplying electric charges (Phil. Trans., 1787).

The principle of this apparatus may be explained thus. Let A and C be two fixed disks, and B a disk which can be brought at will within a very short distance of either A or C. Let us suppose all the plates to be equal, and let the capacities of A and C in presence of B be each equal to p, and the coefficient of induction between A and B, or C and B, be 3. Let us also suppose that the plates A and C are so distant from each other that there is no mutual influence, and that p' is the capacity of one of the disks when it stands alone. A small charge Q is communicated to A, and A is insulated, and B, un- insulated, is brought up to it; the charge on B will be — (glp)Q. B is now uninsulated and brought to face C, which is uninsulated; the charge on C will be (qlp)~Q- C is now insulated and connected with A, which is always insulated. B is then brought to face A and uninsulated, so that the charge on A becomes rQ, where

p+p>V + pi)-

A is now disconnected from C, and here the first operation ends. It is obvious that at the end of n such operations the charge on A will be r"Q, so that the charge goes on increasing in geometri- cal progression. If the distance between the disks could be made

Beanet's Doubler.

infinitely small each time, then the multiplier r would be 2, and the charge would be doubled each time. Hence the name of the apparatus.

Erasmus Darwin, B. Wilson, G. C. Bohnenberger and J. C. E.

Peclet devised various modifications of Bennet's instrument

(see S. P. Thompson, " The Influence Machine from

sfn's'" J 7 88 t0 l888 '" Journ – Soc – TeL En S; 1888, 17, p. 569).

doubler. Bennet's doubler appears to have given a suggestion to William Nicholson {Phil. Trans., 1788, p. 403) of " an instrument which by turning a winch produced the two states of electricity without friction or communication with the earth." This " revolving doubler," according to the description of Professor S. P. Thompson (loc. cit.), consists of two fixed plates of brass A and C (fig. 3), each two inches in diameter and separately supported on insulating arms in the same plane, so that a third revolving plate B may pass very near them without touching. A brass ball D two inches in diameter is fixed on the end of the axis that carries the plate B, and is loaded within at one side, so as to act as a counterpoise to the revolving plate B. The axis P N is made of varnished glass, and so are the axes that join the three plates with the brass axis N O. The axis N O passes through the brass piece M, which stands on an insulating pillar of glass, and supports the plates A and C. At one extremity of this axis is the ball D, and the other is connected with a rod of glass, N P, upon which is fixed the handle L, and also the piece G H, which is separately insulated. The pins E, F rise out of the back of the fixed plates A and C, at unequal distances from the axis. The piece K is parallel to G H, and both of them are furnished at their ends with small pieces of flexible wire that they may touch the pins E, F in certain points of their revolution.

From the brass piece M there stands out a pin I, to touch against a small flexible wire or spring which projects sideways from the rotating plate B when it comes op- posite A. The wires are so adjusted by bending that B, at the moment when it is opposite A, communicates with the ball D, and A communicates with C through GH;

and half a revolution later C, when B comes opposite to it, communicates with the ball D through the contact of K with F. In all other positions A, B, C and D are completely disconnected from each other. Nicholson thus described the operation of his machine: —

" When the plates A and B are opposite each other, the two fixed plates A and C may be considered as one mass, and the revolving plate B, together with the ball D, will constitute another mass. All the experiments yet made concur to prove that these two masses will not possess the same electric state. .. .The redundant elec- tricities in the masses under consideration will be unequally distri- buted ; the plate A will have about ninety-nine parts, and the plate C one; and, for the same reason, the revolving plate B will have ninety-nine parts of the opposite electricity, and the ball D one. The rotation, by destroying the contacts, preserves this unequal distribution, and carries B from A to C at the same time that the tail K connects the ball with the plate C. In this situation, the elec- tricity in B acts upon that in C, and produces the contrary state, by virtue of the communication between C and the ball; which last must therefore acquire an electricity of the same kind with that of the revolving plate. But the rotation again destroys the contact and restores B to its first situation opposite A. Here, if we attend to the effect of the whole revolution, we shall find that the electric states of the respective masses have been greatly increased; for the ninety-nine parts in A and B remain, and the one part of electricity in C has been increased so as nearly to compensate ninety-nine parts of the opposite electricity in the revolving plate B, while the com- munication produced an opposite mutation in the electricity of the ball. A second rotation will, of course, produce a proportional augmentation of these increased quantities; and a continuance of

Fig. 3. — Nicholson's Revolving Doubler.

Fig. 4. — Belli's Doubler.

turning will soon bring the intensities to their maximum, which is limited by an explosion between the plates" (Phil. Trans. ,1788, p. 405).

Nicholson described also another apparatus, the " spinning condenser," which worked on the same principle. Bennet and Nicholson were followed by T. Cavallo, John Read, Bohnenberger, C. B. Desormes and J. N. P. Hachette aoubllt. and others in the invention of various forms of rotating doubler. A simple and typical form of doubler, devised in 183 1 by G. Belli (fig. 4), consisted of

two curved metal plates between which revolved a pair of balls carried on an insulat- ing stem. Following the nomenclature usual in con- nexion with dynamos we may speak of the conduc- tors which carry the initial charges as the field plates, and of the moving conduc- tors on which are induced the charges which are sub- sequently added to those on the field plates, as the carriers. The wire which connects two armature plates for a moment is the neutralizing conductor. The two curved metal plates constitute the field plates and must have original charges imparted to them of opposite sign. The rotating balls are the carriers, and are connected together for a moment by a wire when in a position to be acted upon inductively by the field plates, thus acquiring charges of opposite sign. The moment after they are separated again. The rotation continuing the ball thus negatively charged is made to give up this charge to that negatively electrified field plate, and the ball positively charged its charge to the positively electrified field plate, by touching little contact springs. In this manner the field plates accumulate charges of opposite sign.

Modern types of influence machine may be said to date from i860 when C. F. Varley patented a type of influence machine which has been the parent of numerous subsequent forms {Brit. Pat. Spec. No. 206 of i860). In it the ˆchiae. field plates were sheets of tin-foil attached to a glass plate (fig. 5). In front of them a disk of ebonite or glass, having carriers of metal fixed to its edge, was rotated by a winch. In the course of their rotation two diametrically opposite carriers touched against the ends of a neutralizing conductor so as to form for a moment one conductor, and the moment afterwards these two carriers were insulated, one carrying away a positive charge and the other a negative. Continuing their rotation, the positively charged carrier gave up its positive charge by touching a little knob attached to the positive field plate, and similarly for the negative charge carrier. In this way the charges on the field plates were continually replenished and reinforced. Varley also con- structed a multiple form of influence machine having six rotating disks, each having a number of carriers and rotating between field plates. With this apparatus he obtained sparks 6 in. long, the initial source of electrification being a single Daniell cell.

Varley was followed by A. J. I. Toepler, who in 1865 constructed ‘ ‘

an influence machine consisting of FlG – 5-— Varley ‘s Machine. two disks fixed on the same shaft and rotating in the same direction. Each disk carried two strips of tin-foil extending nearly over a semi- circle, and there were two field plates, one behind each disk; one of the plates was ˆ t positively and the other negatively electrified. The

carriers which were touched under the influence of the. positive field plate passed on and gave up a portion of their negative charge to increase that of the negative field plate; in the same

way the carriers which were touched under the influence of the negative field plate sent a part of their charge to augment that of the positive field plate. In this apparatus one of the charging rods communicated with one of the field plates, but the other with the neutralizing brush opposite to the other field plate. Hence one of the field plates would always remain charged when a spark was taken at the transmitting terminals.

Between 1864 and 1880, W. T. B. Holtz constructed and described a large number of influence machines which were for a long time considered the most advanced development of this type of electrostatic machine. In one form the Holtz machine consisted of a glass disk mounted on a horizontal axis F (fig. 6) which could be made to rotate at a considerable speed by a multiplying gear, part of which is seen at

Holtz machine.

Fig. 6. — Holtz's Machine.

X. Close behind this disk was fixed another vertical disk of glass in which were cut two windows B, B. On the side of the fixed disk next the rotating disk were pasted two sectors of paper A, A, with short blunt points attached to them which projected out into the windows on the side away from the rotating disk. On the other side of the rotating disk were placed two metal combs C, C, which consisted of sharp points set in metal rods and were each connected to one of a pair of discharge balls E, D, the distance between which could be varied. To start the machine the balls were brought in contact, one of the paper armatures electrified, say, with positive electricity, and the disk set in motion. Thereupon very shortly a hissing sound was heard and the machine became harder to turn as if the disk were moving through a resisting medium. After that the discharge balls might be separated a little and a continuous series of sparks or brush discharges would take place between them. If two Leyden jars L, L were hung upon the conductors which supported the combs, with their outer coatings put in connexion with one another by M, a series

of strong spark discharges passed between the discharge balls. The action of the machine is as follows: Suppose one paper armature to be charged positively, it acts by induction on the right hand comb, causing negative electricity to issue from the comb points upon the glass revolving disk; at the same time the positive electricity passes through the closed discharge circuit to the left comb and issues from its teeth upon the part of the glass disk at the opposite end of the diameter. This positive electricity electrifies the left paper armature by induction, positive electricity issuing from the blunt point upon the side farthest from the rotating disk. The charges thus deposited on the glass disk are carried round so that the upper half is electrified negatively on both sides and the lower half positively on both sides, the sign of the electrification being reversed as the disk passes between the combs and the armature by discharges issuing from them respectively. If it were not for leakage in various ways, the electrification would go on every- where increasing, but in practice a stationary state is soon attained. Holtz's machine is very uncertain in its action in a

moist climate, and has generally to be enclosed in a chamber in which the air is kept artificially dry.

Robert Voss, a Berlin instrument maker, in 1880 devised a form of machine in which he claimed that the principles of Toepler and Holtz were combined. On a rotating glass or ebonite disk were placed carriers of tin-foil or metal buttons maC hiae against which neutralizing brushes touched. This armature plate revolved in front of a field plate carrying two pieces of tin-foil backed up by larger pieces of varnished paper. The studs on the armature plate were charged inductively by being connected for a moment by a neutralizing wire as they passed in front of the field plates, and then gave up their charges partly to renew the field charges and partly to collecting combs connected to discharge balls. In general design and construction, the manner of moving the rotating plate and in the use of the two Leyden jars in connexion with the discharge balls, Voss borrowed his ideas from Holtz.

All the above described machines, however, have been thrown into the shade by the invention of a greatly improved type of in- fluence machine first constructed by James Wimshurst about 1878. Two glass disks are mounted on two shafts Wlms- in such a manner that, by means of two belts and pulleys machine. worked from a winch shaft, the disks can be rotated rapidly in opposite directions close to each other (fig. 7). These glass disks carry on them a certain number (not less than 16 or 20) tin-foil carriers which may or may not have

brass buttons upon them. The glass plates are well varnished, and the carriers are placed on the outer sides of the two glass plates. As therefore the disks revolve, these carriers travel in opposite directions, coming at intervals in opposition to each other. Each upright bearing carrying the shafts of the revolving disks also carries a neutralizing conductor or wire ending in a little brush of gilt thread. The neutralizing conductors for each disk are placed at right angles to each other. In addition there are collecting combs which occupy an intermediate position and have sharp points projecting inwards, and coming near to but not touching the carriers. These combs on opposite sides are connected respectively to the inner coatings of two Leyden jars whose outer coatings are in connexion with one another.

The operation of the machine is as follows: Let us suppose that one of the studs on the back plate is positively electrified and one at the opposite end of a diameter is negatively electrified, and that at that moment two corresponding studs on the front plate passing opposite to these back studs are momentarily connected together by the neutralizing wire belonging to the front plate. The positive stud on the back plate will act inductively on the front stud and charge it negatively, and similarly for the other stud, and as the rotation continues these charged studs will pass round and give up most of their charge through the combs to the Leyden jars. The moment, however, a pair of studs on the front plate are charged, they act as field plates to studs on the back plate which are passing at the moment, provided these last are connected by the back neutralizing wire. After a few revolutions of the disks half the studs on the front plate at any moment are charged negatively and half positively and the same on the back plate, the neutralizing wires forming the boundary between the positively and negatively charged studs. The diagram in fig. 8, taken by permission from S. P. Thompson's paper (loc. cit.), represents a view of the distribution of these charges on the front and back plates respectively. It will be

Fig. 7. — Wimshurst's Machine.

Fig. 8. — Action of the Wimshurst Machine.

work.

seen that each stud is in turn both a field plate and a carrier having a charge induced on it, and then passing on in turn induces further charges on other studs. Wimshurst constructed numerous very powerful machines of this type, some of them with multiple plates, which operate in almost any climate, and rarely fail to charge themselves and deliver a g torrent of sparks between the dis- ij charge balls whenever the winch is turned. He also devised an alter- nating current electrical machine in which the discharge balls were alternately positive and negative. Large Wimshurst multiple plate influence machines are often used instead of induction ‘ coils for ex- citing Rontgen ray tubes in medical They give very steady illumination on fluorescent screens.

In 1900 it was found by F. Tudsbury that if an influence machine is enclosed in a metallic chamber containing compressed air, or better, carbon dioxide, the insulating properties of com- pressed gases enable a greatly improved effect to be obtained owing to the diminution of the leakage across the plates and from the supports. Hence sparks can be obtained of more than double the length at ordinary atmospheric pressure. In one case a machine with plates 8 in. in diameter which could give sparks 25 in. at ordinary pressure gave sparks of 5, 7, and 8 in. as the pressure was raised to 15, 30 and 45 lb above the normal atmosphere.

The action of Lord Kelvin’s replenisher (fig. 9) used by him in connexion with his electrometers for maintaining their charge, closely resembles that of Belli’s doubler and will be understood from fig. 9. Lord Kelvin also devised an influence machine, commonly called a ” mouse mill,” for electrifying the ink in connexion with his siphon recorder. It was an electrostatic and electromagnetic machine combined, driven by an electric current and producing in turn electrostatic charges of electricity.

Fig. 9. — Lord Kelvin’s Replenisher.

C, C, Metal carriers, fixed to a, a, Receiving springs.

ebonite cross-arm. n, n, Connecting springs or F, F, Brass field-plates or con- neutralizing brushes.

ductors.

In connexion with this subject mention must also be made of the water dropping influence machine of the same inventor. 1

The action and efficiency of influence machines have been

investigated by F. Rossetti, A. Righi and F. W. G. Kohlrausch. The electromotive force is practically constant no matter what the velocity of the disks, but according to some observers the inter- nal resistance decreases as the velocity increases. Kohlrausch, using a Holtz machine with a plate 16 in. in diameter, found that the current given by it could only electrolyse acidulated water in 40 hours sufficient to liberate one cubic centimetre of mixed gases. E. E. N. Mascart, A. Roiti, and E. Bouchotte have

1 See Lord Kelvin, Reprint of Papers on Electrostatics and Magnet- ism (1872); " Electrophone Apparatus and Illustrations of Voltaic Theory," p. 319; "On Electric Machines Founded on Induc- tion and Convection," p. 330; "The Reciprocal Electrophorus," P- 337-

also examined the efficiency and current producing power of influence machines.

Bibliography.— In addition to S. P. Thompson's valuable paper on influence machines (to which this article is much indebted) and other references given, see J. Clerk Maxwell, Treatise on Electricity and Magnetism (2nd ed., Oxford, 1881), vol. i. p. 294; J. D. Everett, Electricity (expansion of part iii. of Deschanel's Natural Philosophy) (London, 1901), ch. iv. p. 20; A. Winkelmann, Handbuck der Physik (Breslau, 1905), vol. iv. pp. 50-58 (contains a large number of references to original papers) ; J. Gray, Electrical Influence Machines, their Development and Modern Forms /London, 1903). (J. A. F.)

ELECTRIC EEL {Gymnotus electricus), a member of the family of fishes known as Gymnotidae. In spite of their external similarity the Gymnotidae have nothing to do with the eels (Anguilla). They resemble the latter in the elongation of the body, the large number of vertebrae (240 in Gymnotus), and the absence of pelvic fins; but they. differ in all the more important characters of internal structure. They are in fact allied to the carps or Cyprinidae and the cat-fishes or Siluridae. In common with these two families and the Characinidae of Africa and South America, the Gymnotidae possess the peculiar structures called ossicula auditus or Weberian ossicles. These are a chain of small bones belonging to the first four vertebrae, which are much modified, and connecting the air-bladder with the auditory organs. Such an agreement in the structure of so complicated and specialized an apparatus can only be the result of a com- munity of descent of the families possessing it. Accordingly these families are now placed together in a distinct sub-order, the Ostariophysi. The Gymnotidae are strongly modified and degraded

Characinidae. In them the dorsal and caudal fins are very rudimentary or absent, and the anal is very long, extending from the anus, which is under the head or throat, to the end of the body.

Gymnotus is the only genus of the family which possesses electric organs. These extend the whole length of the tail, which is four-fifths of the body. They are modifications of the lateral muscles and are supplied with numerous branches of the spinal nerves. They consist of longitudinal columns, each composed of an immense number of " electric plates." The posterior end of the organ is positive, the anterior negative, and the current passes from the tail to the head. The maximum shock is given when the head and tail of the Gymnotus are in contact with different points in the surface of some other animal. Gymnotus electricus attains a length of 3 ft. and the thickness of a man's thigh, and frequents the marshes of Brazil and the Guianas, where it is regarded with terror, owing to the formidable electrical apparatus with which it is provided. When this natural battery is discharged in a favourable position, it is sufficiently powerful to stun the largest animal; and according to A. von Humboldt, it has been found necessary to change the line of certain roads passing through the pools frequented by the electric eels. These fish are eaten by the Indians, who, before attempting to capture them, seek to exhaust their electrical power by driving horses into the ponds. By repeated discharges upon these they gradually expend this marvellous force; after which, being defenceless, they become timid, and approach the edge for shelter, when they fall an easy prey to the harpoon. It is only after long rest and abundance of food that the fish is able to resume the use of its subtle weapon. Humboldt's description of this method of capturing the fish has not, however, been verified by recent travellers.

ELECTRICITY. This article is devoted to a general sketch of the history of the development of electrical knowledge on both the theoretical and the practical sides. The two great branches of electrical theory which concern the phenomena of electricity at rest, or " frictional " or " static " electricity, and of electricity in motion, or electric currents, are treated in two separate articles, Electrostatics and Electrokinetics. The pheno- mena attendant on the passage of electricity through solids, through liquids and through gases, are described in the article Conduction, Electric, and also Electrolysis, and the propa- gation of electrical vibrations in Electric Waves. The inter- connexion of magnetism (which has an article to itself) and

electricity is discussed in Electromagnetism, and these manifestations in nature in Atmospheric Electricity; Aurora Polaris and Magnetism, Terrestrial. The general principles of electrical engineering will be found in Electricity Supply, and further details respecting the generation and use of electrical power are given in such articles as Dynamo; Motors, Electric; Transformers; Accumulator; Power Transmission: Electric; Traction; Lighting: Electric; Electrochemistry and Electrometallurgy. The principles of telegraphy (land, submarine and wireless) and of telephony are discussed in the articles Telegraph and Telephone, and various electrical instruments are treated in separate articles such as Ampere- meter; Electrometer; Galvanometer; Voltmeter; Wheatstone's Bridge; Potentiometer; Meter, Electric; Electrophorus; Leyden Jar; &c.

The term " electricity " is applied to denote the physical agency which exhibits itself by effects of attraction and repulsion when particular substances are rubbed or heated, also in certain chemical and physiological actions and in connexion with moving magnets and metallic circuits. The name is derived from the word electrica, first used by William Gilbert (i 544-1603) in his epoch-making treatise De magnete, magneticisque corporibus, et de magno magnete tellure, published in 1600/ to denote substances which possess a similar property to amber (= electrum, from rfkzuTpov) of attracting light objects when rubbed. Hence the phenomena came to be collectively called electrical, a term first used by William Barlowe, archdeacon of Salisbury, in 1618, and the study of them, electrical science.

Historical Sketch.

Gilbert was the first to conduct systematic scientific experi- ments on electrical phenomena. Prior to his date the scanty knowledge possessed by the ancients and enjoyed in the middle ages began and ended with facts said to have been familiar to Thales of Miletus (600 B.C.) and mentioned by Theophrastus (321 B.C.) and Pliny (a.d. 70), namely, that amber, jet and one or two other substances possessed the power, when rubbed, of attracting fragments of straw, leaves or feathers. Starting with careful and accurate observations on facts concerning the mysterious properties of amber and the lodestone, Gilbert laid the foundations of modern electric and magnetic science on the true experimental and inductive basis. The subsequent history of electricity may be divided into four well-

marked periods. The first extends from the date of publication of Gilbert's great treatise in 1600 to the invention by Volta of the voltaic pile and the first production of the electric current in 1799. The second dates from Volta's discovery to the discovery by Faraday in 183 1 of the induction of electric currents and the creation of currents by the motion of conductors in magnetic fields, which initiated the era of modern electrotechnics. The third covers the period between 183 1 and Clerk Maxwell's enunciation of the electromagnetic theory of light in 1865 and the invention of the self-exciting dynamo, which marks another great epoch in the development of the subject; and the fourth comprises the modern development of electric theory and of absolute quantitative measurements, and above all, of the applications of this knowledge in electrical engineering. We shall sketch briefly the historical progress during these various stages, and also the growth of electrical theories of electricity during that time.

First Period. — Gilbert was probably led to study the phenomena of the attraction of iron by the lodestone in conse- quence of his conversion to the Copernican theory of the earth's motion, and thence proceeded to study the attractions produced by amber. An account of his electrical discoveries is given in the De magnete, lib. ii. cap. 2." He invented the versorium or

1 Gilbert's work, On the Magnet, Magnetic Bodies and the Great Magnet, the Earth, has been translated from the rare folio Latin edition of 1600, but otherwise reproduced in its original form by the chief members of the Gilbert Club of England, with a series of valu- able notes by Prof. S. P. Thompson (London, 1900). See also The Electrician, February 21, 1902.

2 See The Intellectual Rise in Electricity, ch. x., by Park Benjamin (London, 1895).

electrical needle and proved that innumerable bodies he called electrica, when rubbed, can attract the needle of the versorium (see Electroscope). Robert Boyle added many new facts and gave an account of them in his book, The Origin of Electricity. He showed that the attraction between the rubbed body and the test object is mutual. Otto von Guericke (1602-1686) con- structed the first electrical machine with a revolving ball of sulphur (see Electrical Machine), and noticed that light objects were repelled after being attracted by excited electrics. Sir Isaac Newton substituted a ball of glass for sulphur in the electrical machine and made other not unimportant additions to electrical knowledge. Francis Hawksbee (d.

17 13) published in his book Physico-Mechanical Experiments (1 709) , and in several Memoirs in the Phil. Trans, about 1707, the results of his electrical inquiries. He showed that light was produced when mercury was shaken up in a glass tube exhausted of its air. Dr Wall observed the spark and crackling sound when warm amber was rubbed, and compared them with thunder and lightning {Phil. Trans., 1708, 26, p. 69). Stephen Gray (1696-1736) noticed in 1720 that electricity could be excited by the friction of hair, silk, wool, paper and other bodies. In 1 729 Gray made the important discovery that some bodies were conductors and others non- conductors of electricity. In conjunction with his friend Granville Wheeler (d. 1770), he conveyed the electricity from rubbed glass, a distance of 886 ft., along a string supported on silk threads (Phil. Trans., 1735-1736, 39, pp. 16, 166 and 400). Jean Theophile Desaguliers (1683-1744) announced soon after that electrics were non-conductors, and conductors were non- electrics. C. F. de C. du Fay (1699-1739) made the great dis- covery that electricity is of two kinds, vitreous and resinous {Phil. Trans., 1733, 38, p. 263), the first being produced when glass, crystal, &c. are rubbed with silk, and the second when resin, amber, silk or paper, &c. are excited by friction with flannel. He also discovered that a body charged with positive or negative electricity repels a body free to move when the latter is charged with electricity of like sign, but attracts it if it is charged with electricity of opposite sign, i.e. positive repels positive and negative repels negative, but positive attracts negative. It is to du Fay also that we owe the abolition of the distinction between electrics and non-electrics. He showed that all substances could be electrified by friction, but that to electrify conductors they must be insulated or supported on non-conductors. Various improvements were made in the electrical machine, and thereby experimentalists were provided with the means of generating strong electrification; C. F. Ludolff (1707-1763) of Berlin in 1744 succeeded in igniting ether with the electric spark {Phil. Trans., 1744/43, p. 167).

For a very full list of the papers and works of these early electrical philosophers, the reader is referred to the bibliography on Electricity in Dr Thomas Young's Natural Philosophy, vol. ii. p. 415.

In 1 74s the important invention of the Leyden jar or condenser was made by E. G. von Kleist of Kammin, and almost simultane- ously by Cunaeus and Pieter van Musschenbroek (1692-1761) of Leiden (see Leyden Jar). Sir William Watson (1715-1787) in England first observed the flash of light when a Leyden jar is discharged, and he and Dr John Bevis (1695-1771) suggested coating the jar inside and outside with tinfoil. Watson carried out elaborate experiments to

discover how far the electric discharge of the jar could be conveyed along metallic wires and was able to accomplish it for a distance of 2 m., making the important observation that the electricity appeared to be transmitted instantaneously.

Franklin's Researches. — Benjamin Franklin (1 706-1 790) was one of the great pioneers of electrical science, and made the ever-memorable experimental identification of lightning and electric spark. He argued that electricity is not created by friction, but merely collected from its state of diffusion through other matter by which it is attracted. He asserted that the glass globe, when rubbed, attracted the electrical fire, and took it from the rubber, the same globe being disposed, when the friction ceases, to give out its electricity to any body which has less. In the case of the charged Leyden jar, he asserted that the inner coating of tinfoil

had received more than its ordinary quantity of electricity, and was therefore electrified positively, or plus, while the outer coating of tinfoil having had its ordinary quantity of electricity diminished, was electrified negatively, or minus. Hence the cause of the shock and spark when the jar is discharged, or when the superabundant or plus electricity of the inside is transferred by a conducting body to the defective or minus electricity of the outside. This theory of the Leyden phial Franklin supported very ingeniously by showing that the outside and the iiˆide coating possessed electricities of opposite sign, and that, in charging it, exactly as much electricity is added on one side as is subtracted from the other. The abundant discharge of electricity by points was observed by Franklin is his earliest experiments, and also the power of points to conduct it copiously from an electrified body. Hence he was furnished with a simple method of collecting electricity from other bodies, and he was enabled to perform those remarkable experiments which are chiefly connected with his name. Hawksbee, Wall and J. A. Nollet (1700-17 70) had successively suggested the identity of lightning and the electric spark, and of thunder and the snap of the spark. Previously to the year 1750, Franklin drew up a statement, in which he showed that all the general phenomena and effects which were produced by electricity had their counter- parts in lightning. After waiting some time for the erection of a spire at Philadelphia, by means of which he hoped to bring down the electricity of a thunderstorm, he conceived the idea of sending up a kite among thunder-clouds. With this view

he made a small cross of two small light strips of cedar, the arms being sufficiently long to reach to the four corners of a large thin silk handkerchief when extended. The corners of the handkerchief were tied to the extremities of the cross, and when the body of the kite was thus formed, a tail, loop and string were added to it. The body was made of silk to enable it to bear the violence and wet of a thunderstorm. A very sharp pointed wire was fixed at the top of the upright stick of the cross, so as to rise a foot or more above the wood. A silk ribbon was tied to the end of the twine next the hand, and a key suspended at the junction of the twine and silk. In company with his son, Franklin raised the kite like a common one, in the first thunderstorm, which happened in the month of June 1752. To keep the silk ribbon dry, he stood within a door, taking care that the twine did not touch the frame of the door; and when the thunder-clouds came over the kite he watched the state of the string. A cloud passed without any electrical indications, and he began to despair of success. At last, however, he saw the loose filaments of the twine standing out every way, and he found them to be attracted by the approach of his finger. The suspended key gave a spark on the application of his knuckle, and when the string had become wet. with the rain the electricity became abundant. A Leyden jar was charged at the key, and by the electric fire thus obtained spirits were inflamed, and many other experiments performed which had been formerly made by excited electrics. In subse- quent trials with another apparatus, he found that the clouds were sometimes positively and sometimes negatively electrified, and so demonstrated the perfect identity of lightning and electricity. Having thus succeeded in drawing the electric fire from the clouds, Franklin conceived the idea of protecting buildings from lightning by erecting on their highest parts pointed iron wires or conductors communicating with the ground. The electricity of a hovering or a passing cloud would thus be carried off slowly and silently; and if the cloud was highly charged, the lightning would strike in preference the elevated conductors. 1 The most important of Franklin's electrical writings are his Experiments and Observations on Electricity made at Philadelphia, 1 751-1754; his Letters on Electricity; and various memoirs and letters in the Phil. Trans, from 1756 to 1760. About the same time that Franklin was making his kite

1 See Sir Oliver Lodge, " Lightning, Lightning Conductors and Lightning Protectors," Journ. Inst. Elec. Eng. (1889), 18, p. 386, and the discussion on the subject in the same volume; also the book by the same author on Lightning Conductors and Lightning Guards (London, 1892).

experiment in America, T. F. Dalibard (1703-1779) and others in France had erected a long iron rod at Marli, and obtained results agreeing with those of Franklin. Similar investigations were pursued by many others, among whom Father G. B. Beccaria (1716-1781) deserves especial mention. John Canton (17.18- 1772) made the important contribution to knowledge that electricity of either sign could be produced on nearly any body by friction with appropriate substances, and that a rod of glass roughened on one half was excited negatively in the rough part and positively in the smooth part by friction with the same rubber. Canton first suggested the use of an amalgam of mercury and tin for use with glass cylinder electrical machines to improve their action. His most important discovery, however, was that of electrostatic induction, the fact that one electrified body can produce charges of electricity upon another insulated body, and that when this last is touched it is left electrified with a charge of opposite sign to that of the inducing charge (Phil. Trans., 1753- 1 7 54) . We shall make mention lower down of Canton's contribu- tions to electrical theory. Robert Symmer (d. 1763) showed that quite small differences determined the sign of the electrification that was generated by the friction of two bodies one against the other. Thus wearing a black and a white silk stocking one over the other, he found they were electrified oppositely when rubbed and drawn off, and that such a rubbed silk stocking when deposited in a Leyden jar gave up its electrification to the jar (Phil. Trans., 1759). Ebenezer Kinnersley (1711-1778) of Philadelphia made useful observations on the elongation and fusion of iron wires by electrical discharges (Phil. Trans., 1763). A contemporary of Canton and co-discoverer with him of the facts of electrostatic induction was the Swede, Johann Karl Wilcke (1732-1796), then resident in Germany, who in 1762 published an account of experiments in which a metal plate held above the upper surface of a glass table was subjected to the action of a charge on an electrified metal plate held below the glass (Kon. Schwedische Akad. Abhandl., 1762, 24, p. 213).

Pyro-electricity. — The subject of pyro-electricity, or the power possessed by some minerals of becoming electrified when merely heated, and of exhibiting positive and negative electricity, now began to attract notice. It is possible that the lyncurium of the ancients, which according to Theophrastus attracted light bodies, was tourmaline, a mineral found in Ceylon, which had been christened by the Dutch with the name of aschentrikker, or the attractor of ashes. In 171 7 Louis Lemery exhibited to the Paris Academy of Sciences a stone from Ceylon which attracted light bodies; and Linnaeus in

mentioning his experiments gives the stone the name of lapis electricus. Giovanni Caraffa, duca di Noja (1715-1768), was led in 1758 to purchase some of the stones called tourmaline in Holland, and, assisted by L. J. M. Daubenton and Michel Adanson, he made a series of experiments with them, a description of which he gave in a letter to G. L. L. Buffon in 1759. The subject, however, had already engaged the attention of the German philosopher, F. U. T. Aepinus, who published an account of them in 1756. Hitherto nothing had been said respecting the necessity of heat to excite the tourmaline; but it was shown by Aepinus that a temperature between 995° and 212° Fahr. was requisite for the development of its attractive powers. Benjamin Wilson (Phil. Trans., 1763, &c), J. Priestley, and Canton continued the investigation, but it was reserved for the Abbe Hauy to throw a clear light on this curious branch of the science (Traite de mineralogie, 1801). He found that the electricity of the tourmaline decreased rapidly from the summits or poles towards the middle of the crystal, where it was imper- ceptible; and he discovered that if a tourmaline is broken into any number of fragments, each fragment, when excited, has two opposite poles. Hauy discovered the same property in the Siberian and Brazilian topaz, borate of magnesia, mesotype, prehnite, sphene and calamine. He also found that the polarity which minerals receive from heat has a relation to the secondary forms of their crystals — the tourmaline, for example, having its resinous pole at the summit of the crystal which has three faces. In the other pyro-electric crystals above mentioned, Hauy detected the same deviation from the rules of symmetry

in their secondary crystals which occurs in tourmaline. C. P. Brard (1788-1838) discovered that pyro-electricity was a property of axinite; and it was afterwards detected in other minerals. In repeating and extending the experiments of Haiiy much later, Sir David Brewster discovered that various artificial salts were pyro-electric, and he mentions the tartrates of potash and soda and tartaric acid as exhibiting this property in a very strong degree. He also made many experiments with the tourmaline when cut into thin slices, and reduced to the finest powder, in which state each particle preserved its pyro-electricity; and he showed that scolezite and mesolite, even when deprived of their water of crystallization and reduced to powder, retain their property of becoming electrical by heat. When this white powder is heated and stirred about by any substance whatever, it collects in masses like new-fallen snow, and

adheres to the body with which it is stirred.

For Sir David Brewster's work on pyro-electricity, see Trans. Roy. Soc. Edin., 1845, also Phil. Mag., Dec. 1847. The reader will also find a full discussion on the subject in the Treatise on Electricity, by A. de la Rive, translated by C. V. Walker (London, 1856), vol. ii. part v. ch. i.

Animal electricity. — The observation that certain animals could give shocks resembling the shock of a Leyden jar induced a closer examination of these powers. The ancients were acquainted with the benumbing power of the torpedo-fish, but it was not till 1676 that modern naturalists had their attention again drawn to the fact. E. Bancroft was the first person who distinctly suspected that the effects of the torpedo were electrical. In 1773 John Walsh (d. 1795) and Jan Ingenhousz (1730-1700) proved by many curious experiments that the shock of the torpedo was an electrical one {Phil. Trans., 1773-1775); and John Hunter (id. 1773, 1775) examined and described the anatomical structure of its electrical organs. A. von Humboldt and Gay-Lussac (Ann. Chim., 1805), and Etienne Geoffroy Saint- Hilaire (Gilb. Ann., 1803) pursued the subject with success; and Henry Cavendish (Phil. Trans., 1776) constructed an artificial torpedo, by which he imitated the actions of the living animal. The subject was also investigated (Phil. Trans., 181 2, 1817) by Dr T. J. Todd (1789-1840), Sir Humphry Davy (id. 1829), John Davy (id. 1832, 1834, 1841) and Faraday (Exp. Res., vol. ii.). The power of giving electric shocks has been discovered also in the Gymnotus eleclricus (electric eel), the Malapterurus electricus, the Trichiurus electricus, and the Tetraodon electricus. The most interesting and the best known of these singular fishes is the Gymnotus or Surinam eel. Hum- boldt gives a very graphic account of the combats which are carried on in South America between the gymnoti and the wild horses in the vicinity of Calabozo.

Cavendish's Researches. — The work of Henry Cavendish (1731-1810) entitles him to a high place in the list of electrical investigators. A considerable part of Cavendish's work was rescued from oblivion in 1879 and placed in an easily accessible form by Professor Clerk Maxwell, who edited the original manuscripts in the possession of the duke of Devonshire. 1 Amongst Caven- dish's important contributions were his exact measurements of electrical capacity. The leading idea which distinguishes his work from that of his predecessors was his use of the phrase " degree of electrification " with a clear scientific definition which shows it to be equivalent in meaning to the modern term " electric potential." Cavendish

compared the capacity of different bodies with those of conducting spheres of known diameter and states these capacities in " globular inches," a globular inch being the capacity of a sphere 1 in. 'in diameter. Hence his measurements are all directly comparable with modern electrostatic measurements in which the unit of capacity is that of a sphere 1 centimetre in radius. Cavendish measured the capacity of disks and condensers of various forms, and proved that the capacity of a Leyden pane is proportional to the surface of the tinfoil and inversely as the thickness of the glass. In connexion with this subject he anticipated one of Faraday's

1 The Electrical Researches of the Hon. Henry Cavendish 1771-1781, edited from the original manuscripts by J. Clerk Maxwell, F.R.S. (Cambridge, 1879).

greatest discoveries, namely, the effect of the dielectric or in- sulator upon the capacity of a condenser formed with it, in other words, made the discovery of specific inductive capacity (see Electrical Researches, p. 183). He made many measurements of the electric conductivity of different solids and liquids, by comparing the intensity of the electric shock taken through his body and various conductors. He seems in this way to have educated in himself a; very precise " electrical sense," making use of his own nervous system as a kind of physiological galvano- meter. One of the most important investigations ha»made in this way was to find out, as he expressed it, " what power of the velocity the resistance is proportional to." Cavendish meant by the term " velocity " what we now call the current, and by " resistance, " the electromotive force which maintains the current. By various experiments with liquids in tubes he found this power was nearly unity. This result thus obtained by Cavendish in January 1781, that the current varies in direct proportion to the electromotive force, was really an anticipation of the fundamental law of electric flow, discovered independently by G. S. Ohm in 1827, and since known as Ohm's Law. Cavendish also enunciated in 1776 all the laws of division of electric current between circuits in parallel, although they are generally supposed to have been first given by Sir C. Wheatstone. Another of his great investigations was the determination of the law according to which electric force varies with the distance. Starting from the fact that if an electrified globe, placed within two hemi- spheres which fit over it without touching, is brought in contact with these hemispheres, it gives up the whole of its charge to them— in other words, that the charge on an electrified body is wholly on the surface — he was able to deduce by most ingenious reasoning the law that electric force varies inversely as the square of the distance. The accuracy of his

measurement, by which he established within 2 % the above law, was only limited by the sensibility, or rather insensibility, of the pith ball electro- meter, which was his only means of detecting the electric charge. 2 In the accuracy of his quantitative measurements and the range of his researches and his combination of mathematical and physical knowledge, Cavendish may not inaptly be described as the Kelvin of the 18th century. Nothing but his curious in- difference to the publication of his work prevented him from securing earlier recognition for it.

Coulomb's Work. — Contemporary with Cavendish was C. A. Coulomb (i736-i8o6), # who in France addressed himself to the same kind of exact quantitative work as Cavendish in England. Coulomb has made his name for ever famous by his invention and application of his torsion balance to the experimental verification of the fundamental law of electric attraction, in which, however, he was anticipated by Cavendish, namely, that the force of attraction betweerrtwo small electrified spherical bodies varies as the product of their charges and inversely as the square of the distance of their centres. Coulomb's work received better publication than Cavendish's at the time of its accomplish- ment, and provided a basis on which mathematicians could operate. Accordingly the close of the 18th century drew into the arena of electrical investigation on its mathematical side P. S. Laplace, J. B. Biot, and above all, S. D. Poisson. Adopting the hypothesis of two fluids, Coulomb investigated experimentally and theoretically the distribution of electricity on the surface of bodies by means of his proof plane. He determined the law of distribution between two conducting bodies in contact; and measured with his proof plane the density of the electricity at different points of two spheres in contact, and enunciated an important law. He ascertained the distribution of electricity among several spheres (whether equal or unequal) placed in contact in a straight line; and he measured the distribution of

2 In 1878 Clerk Maxwell repeated Cavendish's experiments with improved apparatus and the employment of a Kelvin quadrant electrometer as a means of detecting the absence of charge on the inner conductor after it had been connected to the outer case, and was thus able to show that if the law of electric attraction varies inversely as the nth power of the distance, then the exponent n must have a value of 2 =fc al | 00 . See Cavendish's Electrical Researches, p. 419.

electricity on the surface of a cylinder, and its distribution between a sphere and cylinder of different lengths but of the same diameter. His experiments on the dissipation of electricity possess also a high value. He found that the momentary dissipation was proportional to the degree of electrification at the time, and that, when the charge was moderate, its dissipation was not altered in bodies of different kinds or shapes. The temperature and pressure of the atmosphere did not produce any sensible change; but he concluded that the dissipation was nearly proportional to the cube 'of the quantity of moisture in the air. 1 In examining the dissipation which takes place along imperfectly insulating substances, he found that a thread of gum-lac was the most perfect of all insulators; that it insulated ten times as well as a dry silk thread; and that a silk thread covered with fine sealing-wax insulated as powerfully as gum-lac when it had four times its length. He found also that the dissipation of electricity along insulators was chiefly owing to adhering moisture, but in some measure also to a slight conduct- ing power. For his memoirs see Mem. de math, et phys. de Vacad. de sc, 1785, &c.

Second Period. — We now enter upon the second period of electrical research inaugurated by the epoch-making discovery of Alessandro Volta (1745-1827). L. Galvani had made in 1790 his historic observations on the muscular contraction produced in the bodies of recently killed frogs when an electrical machine was being worked in the same room, and described them in 1791 {De viribus electricitatis in motu musculari commen- tarius, Bologna, 1791). Volta followed up these observations with rare philosophic insight and experimental skill. He showed that all conductors liquid and solid might be divided into two classes which he called respectively conductors of the first and of the second class, the first embracing metals and carbon in its conducting form, and the second class, water, aqueous' solutions of various kinds, and generally those now called electrolytes. In the case of conductors of the first class he proved by the use of the condensing electroscope, aided probably by some form of multiplier or doubler, that a difference of potential (see Electrostatics) was created by the mere contact of two such conductors, one of them being positively electrified and the other negatively. Volta showed, however, that if a series of bodies of the first class, such as disks of various metals, are placed in contact, the potential difference between the first and the last is just the same as if they are immediately in contact. There is no accumulation of potential. If, however, pairs of metallic disks, made, say, of zinc and copper, are alternated with disks of cloth wetted with a conductor of the second

class, such, for instance, as dilute acid or any electrolyte, then the effect of the feeble potential difference between one pair of copper and zinc disks is added to that of the potential difference between the next pair, and thus by a sufficiently long series of pairs any required difference of potential can be accumulated.

The Voltaic Pile.— This led him about 1799 to devise his famous voltaic pile consisting of disks of copper and zinc or other metals with wet cloth placed between the pairs. Numerous examples of Volta's original piles at one time existed in Italy, and were collected together for an exhibition held at Como in 1899, but were unfortunately destroyed by a disastrous fire on the 8th of July 1899. Volta's description of his pile was communicated in a letter to Sir Joseph Banks, president of the Royal Society of London, on the 20th of March 1800, and was printed in the Phil. Trans., vol. 00, pt. 1, p. 405. It was then found that when the end plates of Volta's pile were connected to an electroscope the leaves diverged either with positive or negative electricity. Volta also gave his pile another form, the couronne des tasses (crown of cups), in which connected strips of copper and zinc were used to bridge between cups of water or dilute acid. Volta then proved that all metals could be arranged in an electromotive

1 Modern researches have shown that the loss of charge is in fact dependent upon the ionization of the air, and that, provided the atmospheric moisture is prevented from condensing on the insulating supports, water vapour in the air does not per se bestow on it conductance for electricity.

series such that each became positive when placed in contact with the one next below it in the series. The origin of the electromotive force in the pile has been much discussed, and Volta's discoveries gave rise to one of the historic contro- versies of science. Volta maintained that the mere contact of metals was sufficient to produce the electrical difference of the end plates of the pile. The discovery that chemical action was involved in the process led to the advancement of the chemical theory of the pile and this was strengthened by the growing insight into the principle of the conservation of energy. In 1851 Lord Kelvin (Sir W. Thomson), by the use of his then newly-invented electrometer, was able to confirm Volta's obser- vations on contact electricity by irrefutable evidence, but the contact theory of the voltaic pile was then placed on a basis consistent with the principle of the conservation of energy. A. A. de la Rive and Faraday were ardent supporters of the chemical theory of the pile, and even at the present time opinions of physicists can hardly be said to be in

entire accordance as to the source of the electromotive force in a voltaic couple or pile. 2

Improvements in the form of the voltaic pile were almost immediately made by W. Cruickshank (1745-1800), Dr W. H. Wollaston and Sir H. Davy, and these, together with other eminent continental chemists, such as A. F. de Fourcroy, L. J. Thenard and J. W. Ritter (1776-1810), ardently prosecuted research with the new instrument. One of the first discoveries made with it was its power to electrolyse or chemically decom- pose certain solutions. William Nicholson (1753-1815) and Sir Anthony Carlisle (1768-1840) in 1800 constructed a pile of silver and zinc plates, and placing the terminal wires in water noticed the evolution from these wires of bubbles of gas, which they proved to be oxygen and hydrogen. These two gases, as Cavendish and James Watt had shown in 1784, were actually the constituents of water. From that date it was clearly recog- nized that a fresh implement of great power had been given to the chemist. Large voltaic piles were then constructed by Andrew Crosse (1784-1855) and Sir H. Davy, and improvements initiated by Wollaston and Robert Hare (1 781-1858) of Phila- delphia. In 1806 Davy communicated to the Royal Society of London a celebrated paper on some " Chemical Agencies of Electricity," and after providing himself at the Royal Institution of London with a battery of several hundred cells, he announced in 1807 his great discovery of the electrolytic decomposition of the alkalis, potash and soda, obtaining therefrom the metals potassium and sodium. In July 1808 Davy laid a request before the managers of the Royal Institution that they would set on foot a subscription for the purchase of a specially large voltaic battery; as a result he was provided with one of 2000 pairs of plates, and the first experiment performed with it was the production of the electric arc light between carbon poles. Davy followed up his initial work with a long and brilliant series of electrochemical investigations described for the most part in the Phil. Trans, of the Royal Society.

Magnetic Action of Electric Current. — Noticing an analogy between the polarity of the voltaic pile and that of the magnet, philosophers had long been anxious to discover a relation between the two, but twenty years elapsed after the invention of the pile before Hans Christian Oersted (1777-1851), professor of natural philosophy in the university of Copenhagen, made in 1819 the discovery which has immortalized his name. In the Annals of Philosophy (1820, 16, p. 273) is to be found an English translation of Oersted's original Lf tin essay (entitled " Experiments on the Efifect of a Current of Electricity on the Magnetic Needle "), dated the 21st of July 1820,

describing his discovery. In it Oersted describes the action he considers is taking place around

2 Faraday discussed the chemical theory of the pile and arguments in support of it in the 8th and 16th series of his Experimental Researches on Electricity. De la Rive reviews the subject in his large Treatise on Electricity and Magnestism, vol. ii. ch. iii. The writer made a contribution to the discussion in 1874 in a paper on " The Contact Theory of the Galvanic. Cell," Phil. Mag., 1874, 47, p. 401. Sir Oliver Lodge reviewed the whole position in a paper in 1885. " On the Seat of the Electromotive Force in a Voltaic Cell," Journ. Inst. Elec. Eng., 1885, 14, p. 186.

the conductor joining the extremities of the pile; he speaks of it as the electric conflict, and says: " It is sufficiently evident that the electric conflict is not confined to the conductor, but is dispersed pretty widely in the circumjacent space. We may likewise conclude that this conflict performs circles round the wire, for without this condition it seems impossible that one part of the wire when placed below the magnetic needle should drive its pole to the east, and when placed above it, to the west." Oersted's important discovery was the fact that when a wire joining the end plates of a voltaic pile is held near a pivoted magnet or compass needle, the latter is deflected and places itself more or less transversely to the wire, the direction depending upon whether the wire is above or below the needle, and on the manner in which the copper or zinc ends of the pile are connected to it. It is clear, moreover, that Oersted clearly recognized the existence of what is now called the magnetic field round the conductor. This discovery of Oersted, like that of Volta, stimu- lated philosophical investigation in a high degree.

Electrodynamics. — On the 2nd of October 1820, A. M. Ampere presented to the French Academy of Sciences an important memoir, 1 in which he summed up the results of his own and D. F. J. Arago's previous investigations in the new science of electromagnetism, and crowned that labour by the announcement of his great discovery of the dynamical action between conductors conveying the electric currents. Ampere in this paper gave an account of his discovery that conductors conveying electric currents exercise a mutual attraction or repulsion on one another, currents flowing in the same direction in parallel conductors attracting, and those in opposite directions

repelling. Respecting this achievement when developed in its experimental and mathematical completeness, Clerk Maxwell says that it was " perfect in form and unassailable in accuracy." By a series of well-chosen experiments Ampere established the laws of this mutual action, and not only explained observed facts by a brilliant train of mathematical analysis, but predicted others subsequently experimentally realized. These investigations led him to the announcement of the fundamental law of action between elements of current, or currents in infinitely short lengths of linear conductors, upon one another at a distance; summed up in compact expression this law states that the action is proportional to the product of the current strengths of the two elements, and the lengths of the two elements, and inversely proportional to the square of the distance between the two elements, and also directly proportional to a function of the angles which the line joining the elements makes with the directions of the two elements respectively. Nothing is more remarkable in the history of discovery than the manner in which Ampere seized upon the right clue which enabled him to disentangle the complicated phenomena of electrodynamics and to deduce them all as a consequence of one simple fundamental law, which occupies in electrodynamics the position of the Newtonian law of gravitation in physical astronomy.

In 1821 Michael Faraday (1791-1867), who was destined later on to do so much for the science of electricity, discovered electromagnetic rotation, having succeeded in causing a wire conveying a voltaic current to rotate continuously round the pole of a permanent magnet. 2 This experiment was repeated in a variety of forms by A. A. De la Rive, Peter Barlow (1776-1862), William Ritchie (1790-18.37), William Sturgeon (1 783-1850), and others; and Davy (Phil. Trans., 1823) showed that when two wires connected with the pole of a battery were dipped into a cup of mercury placed on the pole of a powerful magnet, the fluid rotated in opposite directions about the two electrodes.

Electromagnetism. — In 1820 Arago (Ann. Chim. Phys., 1820, 15, p. 94) and Davy (Annals of Philosophy, 1821) discovered independently the power of the electric current to magnetize

1 " Memoire sur la theorie mathematique des phenomenes electro-dynamiques," Memoirts de Vinstitut, 1820, 6; see also Ann. de Chim., 1820, 15.

' See M. Faraday, " On some new Electro-Magnetical Motions and on the Theory of Magnetism," Quarterly Journal of Science, 1822, 12,

p. 74; or Experimental Researches on Electricity, vol. ii. p. 127.

iron and steel. Felix Savary (1797-1841) made some very curious observations in 1827 on the magnetization of steel needles placed at different distances from a wire conveying the discharge of a Leyden jar (Ann. Chim. Phys., 1827, 34). W. Sturgeon in 1824 wound a copper wire round a bar of iron bent in the shape of a horseshoe, and passing a voltaic current through the wire showed that the iron became powerfully magnetized as long as the connexion with the pile was maintained (Trans. Soc. Arts, 1825). These researches gave us the electromagnet, almost as potent an instrument of research and invention as the pile itself (see Electromagnetism).

Ampere had already previously shown that a spiral conductor or solenoid when traversed by an electric current possesses magnetic polarity, and that two such solenoids act upon one another when traversed by electric currents as if they were magnets. Joseph Henry, in the United States, first suggested the construction of what were then called intensity electro- magnets, by winding upon a horseshoe-shaped piece of soft iron many superimposed windings of copper wire, insulated by covering it with silk or cotton, and then sending through the coils the current from a voltaic battery. The dependence of the intensity of magnetization on the strength of the current was subsequently investigated (Pogg. Ann. Phys., 1839, 47) by H. F. E. Lenz (1804-1865) and M. H. von Jacobi (1801-1874). J. P. Joule found that magnetization did not increase proportion- ately with the current, but reached a maximum (Sturgeon's Annals of Electricity, 1839, 4). Further investigations on this subject were carried on subsequently by W. E. Weber (1804- 1891), J. H. J. Miiller (1809-1875), C. J. Dub (1817-1873), G. H. Wiedemann (1826-1899), and others, and in modern times by H. A. Rowland (1848-1901), Shelford Bidwell (b. 1848), John Hopkinson (1849-1898), J. A. Ewing (b. 1855) and many others. Electric magnets of great power were soon constructed in this manner by Sturgeon, Joule, Henry, Faraday and Brewster. Oersted's discovery in 1819 was indeed epoch-making in the degree to which it stimulated other research. It led at once to the construction of the galvanometer as a means of detecting and measuring the electric current in a conductor. In 1820 J. S. C. Schweigger (1779-1857) with his "multiplier" made an advance upon Oersted's discovery, by winding the wire conveying the electric current many times round the pivoted magnetic needle and thus increasing the deflection; and L. Nobili (1784-1835) in 1825 conceived the ingenious idea of neutralizing the directive effect of the earth's magnetism by employing a pair of magnetized steel needles fixed to one axis, but

with their magnetic poles pointing in opposite directions. Hence followed the astatic multiplying galvanometer.

Electrodynamic Rotation. — The study of the relation between the magnet and the circuit conveying an electric current then led Arago to the discovery of the " magnetism of rotation." He found that a vibrating magnetic compass needle came to rest sooner when placed over a plate of copper than otherwise, and also that a plate of copper rotating under a suspended magnet tended to drag the magnet in the same direction. The matter was investigated by Charles Babbage, Sir J. F. W. Herschel, Peter Barlow and others, but did not receive a final explanation until after the discovery of electromagnetic induction by Faraday in 1 83 1 . Ampere's investigations had led electricians to see that the force acting upon a magnetic pole due to a current in a neighbouring conductor was such as to tend to cause the pole to travel round the conductor. Much ingenuity had, however, to be expended before a method was found of exhibiting such a rotation. Faraday first succeeded by the simple but ingenious device of using a light magnetic needle tethered flexibly to the bottom of a cup containing mercury so that one pole of the magnet was just above the surface of the mercury. On bringing down on to the mercury surface a wire conveying an electric current, and allowing the current to pass through the mercury and out at the bottom, the magnetic pole at once began to rotate round the wire (Exper. Res., 1822, 2, p. 148). Faraday and others then discovered, as already mentioned, means to make the conductor conveying the current rotate round a

magnetic pole, and Ampere showed that a magnet could be made to rotate on its own axis when a current was passed through it. The difficulty in this case consisted in discovering means by which the current could be passed through one half of the magnet without passing it through the other half. This, however, was overcome by sending the current out at the centre of the magnet by means of a short length of wire dipping into an annular groove containing mercury. Barlow, Sturgeon and others then showed that a copper disk could be made to rotate between the poles of a horseshoe magnet when a current was passed through the disk from the centre to the circumference, the disk being rendered at the same time freely movable by making a contact with the circumference by means of a mercury trough. These experiments furnished the first elementary

forms of electric motor, since it was then seen that rotatory motion could be produced in masses of metal by the mutual action of conductors conveying electric current and magnetic fields. By his discovery of thermo- electricity in 1822 {Pogg. Ann. Phys., 6), T. J. Seebeck (1770- 1831) opened up a new region of research (see Thermo-elec- tricity). James Cumming (1777-1861) in 1823 {Annals of Philosophy, 1823) found that the thermo-electric series varied with the temperature, and J. C. A. Peltier (1785-1845) in 1834 discovered that a current passed across the junction of two metals either generated or absorbed heat.

Ohm's Law. — In 1827 Dr G. S. Ohm (1787-1854) rendered a great service to electrical science by his mathematical investiga- tion of the voltaic circuit, and publication of his paper, Die galvanische Ketle mathematisch bearbeitet. Before his time, ideas on the measurable quantities with which we are concerned in an electric circuit were extremely vague. Ohm introduced the clear idea of current strength as an effect produced by electromotive force acting as a cause in a circuit having resistance as its quality, and showed that the current was directly propor- tional to the electromotive force and inversely as the resistance. Ohm's law, as it is called, was based upon an analogy with the flow of heat in a circuit, discussed by Fourier. Ohm introduced the definite conception of the distribution along the circuit of " electroscopic force " or tension (Spannung), corresponding to the modern term potential. Ohm verified his law by the aid of thermo-electric piles as sources of electromotive force, and Davy, C. S. M. Pouillet (1791-1868), A. C. Becquerel (1788-1878), G. T. Fechner (1801-1887), R. H. A. Kohlrausch (1809-1858) and others laboured at its confirmation. In more recent times, 1876, it was rigorously tested by G. Chrystal (b. 1851) at Clerk Maxwell's instigation (see Brit. Assoc. Report, 1876, p. 36), and although at its original enunciation its meaning was not at first fully apprehended, it soon took its place as the expression of the fundamental law of electrokinetics.

Induction of Electric Currents. — In 1831 Faraday began the investigations on electromagnetic induction which proved more fertile in far-reaching practical consequences than any of those which even his genius gave to the world. These advances all centre round his supreme discovery of the induction of electric currents. Fully familiar with the fact that an electric charge upon one conductor could produce a charge of opposite sign upon a neighbouring conductor, Faraday asked himself whether an electric current passing through a conductor could not in any like manner induce an electric current in some neighbouring conductor. His first

experiments on this subject were made in the month of November 1825, but it was not until the 29th of August 1 83 1 that he attained success. On that date he had provided himself with an iron ring, over which he had wound two coils of insulated copper wire. One of these coils was con- nected with the voltaic battery and the other with the galvano- meter. He found that at the moment the current in the battery circuit was started or stopped, transitory currents appeared in the galvanometer circuit in opposite directions. In ten days of brilliant investigation, guided by clear insight from the very first into the meaning of the phenomena concerned, he established experimentally the fact that a current may be induced in a conducting circuit simply by the variation in a magnetic field, the lines of force of which are linked with that circuit. The

whole of Faraday's investigations on this subject can be summed up in the single statement that if a conducting circuit is placed in a magnetic field, and if either by variation of the field or by movement or variation of the form of the circuit the total magnetic flux linked with the circuit is varied, an electromotive force is set up in that circuit which at any instant is measured by the rate at which the total flux linked with the circuit is changing.

Amongst the memorable achievements of the ten days which Faraday devoted to this investigation was the discovery that a current could be induced in a conducting wire simply by moving it in the neighbourhood of a magnet. One form which this experiment took was that of rotating a copper disk between the poles of a powerful electric magnet. He then found that a con- ductor, the ends of which were connected respectively with the centre and edge of the disk, was traversed by an electric current. This important fact laid the foundation for all subsequent inventions which finally led to the production of electromagnetic or dynamo-electric machines.

Third Period. — With this supremely important discovery of Faraday's we enter upon the third period of electrical research, in which that philosopher himself was the leading figure. He not only collected the facts concerning electromagnetic induction so industriously that nothing of importance remained for future discovery, and embraced them all in one law of exquisite sim- plicity, but he introduced his famous conception of lines of force which changed entirely the mode of regarding electrical phenomena. The French mathematicians, Coulomb, Biot, Poisson and Ampere, had been content to accept the fact that electric charges or currents in conductors could exert forces on other charges or conductors at a distance without inquiring into the means by which this action at a

distance was produced. Faraday's mind, however, revolted against this notion; he felt intuitively that these distance actions must be the result of unseen operations in the interposed medium. Accordingly when he sprinkled iron filings on a card held over a magnet and revealed the curvilinear system of lines of force (see Magnetism), he regarded these fragments of iron as simple indicators of a physical state in the space already in existence round the magnet. To him a magnet was not simply a bar of steel; it was the core and origin of a system of lines of magnetic force attached to it and moving with it. Similarly he came to see an electrified body as a centre of a system of lines of electrostatic force. All the space round magnets, currents and electric charges was therefore to Faraday the seat of corresponding lines of magnetic or electric force. He proved by systematic experiments that the electromotive forces set up in conductors by their motions in magnetic fields or by the induction of other currents in the field were due to the secondary conductor cutting lines of magnetic force. He invented the term " electrotonic state " to signify the total magnetic flux due to a conductor conveying a current, which was linked with any secondary circuit in the field or even with itself.

Faraday's Researches. — Space compels us to limit our account of the scientific work done by Faraday in the succeeding twenty years, in elucidating electrical phenomena and adding to the knowledge thereon, to the very briefest mention. We must refer the reader for further information to his monumental work entitled Experimental Researches on Electricity, in three volumes, reprinted from the Phil. Trans, between 1831 and 1851. Faraday divided these researches into various series. The 1st and 2nd concern the discovery of magneto-electric induction already mentioned. The 3rd series (1833) he devoted to discussion of the identity of electricity derived from various sources, frictional, voltaic, animal and thermal, and he proved by rigorous experi- ments the identity and similarity in properties of the electricity generated by these various methods. The 5th series (1833) is occupied with his electrochemical researches. In the 7th series (1834) he defines a number of new terms, such as electrolyte, electrolysis, anode and cathode, &c, in connexion with electro- lytic phenomena, which were immediately adopted into the vocabulary of science. His most important contribution at

this date was the invention of the voltameter and his enunciation of

the laws of electrolysis. The voltameter provided a means of measuring quantity of electricity, and in the hands of Faraday and his successors became an appliance of fundamental im- portance. The 8th series is occupied with a discussion of the theory of the voltaic pile, in which Faraday accumulates evidence to prove that the source of the energy of the pile must be chemical. He returns also to this subject in the 16th series. In the oth series (1834) he announced the discovery of the important property of electric conductors, since called their self-induction or inductance, a discovery in which, however, he was anticipated by Joseph Henry in the United States. The nth series (1837) deals with electrostatic induction and the statement of the important fact of the specific inductive capacity of insulators or dielectrics. This discovery was made in November 1837 when Faraday had no knowledge of Cavendish's previous researches into this matter. The 1 oth series (1845) contains an account of his brilliant discovery of the rotation of the plane of polarized light by transparent dielectrics placed in a magnetic field, a relation which established for the first time a practical connexion between the phenomena of electricity and light. The 20th series (1845) contains an account of his researches on the universal action of magnetism and diamagnetic bodies. The 22 nd series (1848) is occupied with the discussion of magneto- crystallic force and the abnormal behaviour of various crystals in a magnetic field. In the 25th series (1850) he made known his discovery of the magnetic character of oxygen gas, and the important principle that the terms paramagnetic and dia- magnetic are relative. In the 26th series (1850) he returned to a discussion of magnetic lines of force, and illuminated the whole subject of the magnetic circuit by his transcendent insight into the intricate phenomena concerned. In 1855 he brought these researches to a conclusion by a general article on magnetic philosophy, having placed the whole subject of magnetism and electromagnetism on an entirely novel and solid basis. In addition to this he provided the means for studying theiphenomena not only qualitatively, but also quantitatively, by the profoundly ingenious instruments he invented for that purpose.

Electrical Measurement. — Faraday's ideas thus pressed upon electricians the necessity for the quantitative measurement of electrical phenomena. 1 It has been already mentioned that Schweigger invented in 1820 the " multiplier," and Nobili in 1825 the astatic galvanometer. C. S. M. Pouillet in 1837 contri- buted the sine and tangent compass, and W. E. Weber effected great improvements in them and in the construction and use of galvanometers. In 1849 H. von Helmholtz devised a tangent

galvanometer with two coils. The measurement of electric resistance then engaged the attention of electricians. By his Memoirs in the Phil. Trans, in 1843, Sir Charles Wheatstone gave a great impulse to this study. He invented the rheostat and improved the resistance balance, invented by S. H. Christie (1784-1865) in 1833, and subsequently called the Wheatstone Bridge. (See his Scientific Papers, published by the Physical Society of London, p. 129.) Weber about this date invented the electrodynamometer, and applied the mirror and scale method of reading deflections, and in co-operation with C. F. Gauss introduced a system of absolute measurement of electric and magnetic phenomena. In 1846 Weber proceeded with improved apparatus to test Ampere's laws of electrodynamics. In 1845 H. G. Grassmann (1809-1877) published (Pogg. Ann. vol. 64) his " Neue Theorie der Electrodynamik," in which he gave an elementary law differing from that of Ampere but leading to the same results for closed circuits. In the same year F. E. Neumann published another law. In 1846 Weber announced his famous hypothesis concerning the connexion of electrostatic and electrodynamic phenomena. The work of Neumann and Weber had been stimulated by that of H. F. E. Lenz (1804-1865),

1 Amongst the most important of Faraday's quantitative re- searches must be included the ingenious and convincing proofs he provided that the production of any quantity of electricity of one sign is always accompanied by the production of an equal quantity of electricity of the opposite sign. See Experimental Researches on Electricity, vol. i. § 1177.

whose researches (Pogg. Ann., 1834, 31; 1835, 34) among other results led him to the statement of the law by means of which the direction of the induced current can be predicted from the theory of Ampere, the rule being that the direction of the induced current is always such that its electrodynamic action tends to oppose the motion which produces it.

Neumann in 1845 did for electromagnetic induction what Ampere did for electrodynamics, basing his researches upon the experimental laws of Lenz. He discovered a function, which has been called the potential of one circuit on another, from which he deduced a theory of induction completely in accordance with experiment. Weber at the same time deduced the mathe- matical laws of induction from his elementary law of electrical action, and with his improved instruments arrived at accurate verifications of the law of induction, which by this time had been developed mathematically by Neumann and himself. In 1849 G. R. Kirchhoff determined experimentally in a

certain case the absolute value of the current induced by one circuit in another, and in the same year Erik Edland (1819-1888) made a series of careful experiments on the induction of electric currents which further established received theories. These labours laid the foundation on which was subsequently erected a complete system for the absolute measurement of electric and magnetic quantities, referring them all to the fundamental units of mass, length and time. Helmholtz gave at the same time a mathematical theory of induced currents and a valuable series of experiments in support of them (Pogg. Ann., 1851). This great investigator and luminous expositor just before that time had published his celebrated essay, Die Erhaltung der Kraft (" The Conservation of Energy "), which brought to a focus ideas which had been accumulating in consequence of the work of J. P. Joule, J. R. von Mayer and others, on the trans-formation of various forms of physical energy, and in particular the mechanical equivalent of heat. Helmholtz brought to bear upon the subject not only the most profound mathematical attainments, but immense experimental skill, and his work in connexion with this subject is classical.

Lord Kelvin's Work. — About 1842 Lord Kelvin (then William Thomson) began that long career of theoretical and practical discovery and invention in electrical science which revolutionized every department of pure and applied electricity. His early contributions to electrostatics and electrometry are to be found described in his Reprint of Papers on Electrostatics and Magnetism (1872), and his later work in his collected Mathematical and Physical Papers. By his studies in electrostatics, his elegant method of electrical images, his development of the theory of potential and application of the principle of conservation of energy, as well as by his inventions in connexion with electro- metry, he laid the foundations of our modern knowledge of electrostatics. His work on the electrodynamic qualities of metals, thermo-electricity, and his contributions to galvanometry, were not less massive and profound. From 1842 onwards to the end of the 19th century, he was one of the great master workers in the field of electrical' discovery and research. 2 In 1853 he published a paper " On Transient Electric Currents " (Phil. Mag., 1853 [4], 5, p. 393), in which he applied the principle of the conservation of energy to the discharge of a Leyden jar. He added definiteness to the idea of the self-induction or induct-ance of an electric circuit, and gave a mathematical expression for the current flowing out of a Leyden jar during its discharge. He confirmed an opinion already previously expressed by Helmholtz and by Henry, that in some circumstances this dis- charge is oscillatory in

nature, consisting of an alternating electric current of high frequency. These theoretical predictions were confirmed and others, subsequently, by the work of B. W. Feddersen (b. 1832), C. A. Paalzow (b. 1823), and it was then seen that the familiar phenomena of the discharge of a Leyden

2 In this connexion the work of George Green (1793-1841) must not be forgotten. Green's Essay on the Application of Mathematical Analysis to the Theories of Electricity and Magnetism, published in 1828, contains the first exposition of the theory of potential. An important theorem contained in it is known as Green's theorem, and is of great value.

jar provided the means of generating electric oscillations of very high frequency.

Telegraphy. — Turning to practical applications of electricity, we may note that electric telegraphy took its rise in 1820, beginning with a suggestion of Ampere immediately after Oersted's discovery. It was established by the work of Weber and Gauss at .Gottingen in 1836, and that of C. A. Steinheil (1801-1870) of Munich, Sir W. F. Cooke (1806-1870) and Sir C. Wheatstone in England, Joseph Henry and S. F. B. Morse (1791-1872) in the United States in 1837. In 1845 submarine telegraphy was inaugurated by the laying of an insulated con- ductor across the English Channel by the brothers Brett, and their temporary success was followed by the laying in 1851 of a permanent Dover-Calais cable by T. R. Crampton. In 1856 the project for an Atlantic submarine cable took shape and the Atlantic Telegraph Company was formed with a capital of £350,000, with Sir Charles Bright as engineer-in-chief and E. O. W. Whitehouse as electrician. The phenomena connected with the propagation of electric signals by underground insulated wires had already engaged the attention of Faraday in 1854, who pointed out the Leyden-jar-like action of an insulated subterranean wire. Scientific and practical questions connected with the possibility of laying an Atlantic submarine cable then began to be discussed, and Lord Kelvin was foremost in develop- ing true scientific knowledge on this subject, and in the invention of appliances for utilizing it. One of his earliest and most useful contributions (in 1858) was the invention of the mirror galvano- meter. Abandoning the long and somewhat heavy magnetic needles that had been used up to that date in

galvanometers, he attached to the back of a very small mirror made of micro- scopic glass a fragment of magnetized watch-spring, and sus- pended the mirror and needle by means of a cocoon fibre in the centre of a coil of insulated wire. By this simple device he provided a means of measuring small electric currents far in advance of anything yet accomplished, and this instrument proved not only most useful in pure scientific researches, but at the same time was of the utmost value in connexion with sub- marine telegraphy. The history of the initial failures and final success in laying the Atlantic cable has been well told by Mr. Charles Bright(see The Story of the Atlantic Cable, London, 1903). 1 The first cable laid in 1857 broke on the nth of August during laying. The second attempt in 1858 was successful, but the cable completed on the 5th of August 1858 broke down on the 20th of October 1858, after 732 messages had passed through it. The third cable laid in 1865 was lost on the 2nd of August 1865, but in 1866 a final success was attained and the 1865 cable also recovered and completed. Lord Kelvin's mirror galvanometer was first used in receiving signals through the short-lived 1858 cable. In 1867 he invented his beautiful siphon-recorder for receiving and recording the signals through long cables. Later, in conjunction with Prof. Fleeming Jenkin, he devised his auto- matic curb sender, an appliance for sending signals by means of punched telegraphic paper tape. Lord Kelvin's contributions to the science of exact electric measurement' 2 were enormous. His ampere-balances, voltmeters and electrometers, and double bridge, are elsewhere described in detail (see Amperemeter; Electrometer, and Wheatstone's Bridge).

Dynamo. — The work of Faraday from 183 1 to 1851 stimulated and originated an immense mass of scientific research, but at the same time practical inventors had not been slow to perceive that it was capable of purely technical application. Faraday's copper disk rotated between the poles of a magnet, and pro- ducing thereby an electric current, became the parent of

1 See also his Submarine Telegraphs (London, 1 ,

2 The quantitative study of electrical phenomena has been enormously assisted by the establishment of the absolute system of electrical measurement due originally to Gauss and Weber. The British Association for the advancement of science appointed in

1861 a committee on electrical units, which made its first report in

1862 and has existed ever since. In this work Lord Kelvin took a

leading part. The popularization of the system was greatly assisted by the publication by Prof. J. D. Everett of The C.G.S. System of Units (London, 1891).

innumerable machines in which mechanical energy was directly converted into the? energy of electric currents. Of these machines, originally called magneto-electric machines, one of the first was devised in 1832 by H. Pixii. It consisted of a fixed horseshoe armature wound over with insulated copper wire in front of which revolved about a vertical axis a horseshoe magnet. Pixii, who invented the split tube commutator for converting the alternating current so produced into a continuous current in the external circuit, was followed by J. Saxton, E. M. Clarke, and many others in the development of the above-described magneto-electric machine. In 1857 E. W. Siemens effected a great improvement by inventing a shuttle armature and improv- ing the shape of the field magnet. Subsequently similar machines with electromagnets were introduced by Henry Wilde (b. 1833), Siemens, Wheatstone, W. Ladd and others, and the principle of self-excitation was suggested by Wilde, C. F. Varley (1828- 1883), Siemens and Wheatstone (see Dynamo). These machines about 1866 and 1867 began to be constructed on a commercial scale and were employed in the production of the electric light. The discovery of electric-current induction also led to the pro- duction of the induction coil (q.v.), improved and brought to its present perfection by W. Sturgeon, E. R. Ritchie, N. J. Callan, H. D. Riihmkorff (1803-1877), A. H. L. Fizeau, and more recently by A. Apps and modern inventors. About the same time Fizeau and J. B. L. Foucault devoted attention to the invention of automatic apparatus for the production of Davy's electric arc (see Lighting: Electric), and these appliances in conjunction with magneto-electric machines were soon employed in lighthouse work. With the advent of large magneto-electric machines the era of electrotechnics was fairly entered, and this period, which may be said to terminate about 1867 to 1869, was consummated by the theoretical work of Clerk Maxwell.

Maxwell's Researches. — James Clerk Maxwell (1831-1879) entered on his electrical studies with a desire to ascertain if the ideas of Faraday, so different from those of Poisson and the French mathematicians, could be made the foundation of a mathematical method and brought under the power of analysis. 3 Maxwell started with the conception that all electric and magnetic phenomena are due to effects taking place in the dielectric or in the ether if the space be vacuous. The phenomena of light had compelled physicists to postulate a space-filling medium, to which the name ether had been given, and Henry and Faraday had long previously suggested the idea

of an electromagnetic medium. The vibrations of this medium constitute the agency called light. Maxwell saw that it was unphilosophical to assume a multiplicity of ethers or media until it had been proved that one would not fulfil all the requirements. He formulated the con- ception, therefore, of electric charge as consisting in a displace- ment taking place in the dielectric or electromagnetic medium (see Electrostatics). Maxwell never committed himself to a precise definition of the physical nature of electric displacement, but considered it as defining that which Faraday had called the polarization in the insulator, or, what is equivalent, the number of lines of electrostatic force passing normally through a unit of area in the dielectric. A second fundamental conception of Maxwell was that the electric displacement whilst it is changing is in effect an electric current, and creates, therefore, magnetic force. The total current at any point in a dielectric must be considered as made up of two parts: first, the true conduction current, if it exists; and second, the rate of change of dielectric displacement. The fundamental fact connecting electric cur- rents and magnetic fields is that the line integral of magnetic force taken once round a conductor conveying an electric current is equal to 4 x- times the surface integral of the current density, or to 4 ir-times the total current flowing through the closed line round which the integral is taken (see Electrokinetics).' A second relation connecting magnetic and electric force is

- *The first paper in which Maxwell began to translate Faraday's conceptions into mathematical language was " On Faraday's Lines of Force," read to the Cambridge Philosophical Society on the 10th of December 1855 and the nth of February 1856. See Maxwell'" Collected Scientific Papers, i. 155.*

based upon Faraday's fundamental law of induction, that the rate of change of the total magnetic flux linked with a conductor is a measure of the electromotive force created in it (see Electro- kinetics). Maxwell also introduced in this connexion the notion of the vector potential. Coupling together these ideas he was finally enabled to prove that the propagation of electric and magnetic force takes place through space with a certain velocity determined by the dielectric constant and the magnetic permeability of the medium. To take a simple instance, if we consider an electric current as flowing in a conductor it is, as Oersted discovered, surrounded by closed

lines of magnetic force. If we imagine the current in the conductor to be in- stantaneously reversed in direction, the magnetic force surround- ing it would not be instantly reversed everywhere in direction, but the reversal would be propagated outwards through space with a certain velocity which Maxwell showed was inversely as the square root of the product of the magnetic permeability and the dielectric constant or specific inductive capacity of the medium.

These great results were announced by him for the first time in a paper presented in 1864 to the Royal Society of London and printed in the Phil. Trans, for 1865, entitled " A Dynamical Theory of the Electromagnetic Field." Maxwell showed in this paper that the velocity of propagation of an electromagnetic impulse through space could also be determined by certain experi- mental methods which consisted in measuring the same electric quantity, capacity, resistance or potential in two ways. W. E. Weber had already laid the foundations of the absolute system of electric and magnetic measurement, and proved that a quantity of electricity could be measured either by the force it exercises upon another static or stationary quantity of electri- city, or magnetically by the force this quantity of electricity exercises upon a magnetic pole when flowing through a neighbour- ing conductor. The two systems of measurement were called respectively the electrostatic and the electromagnetic systems (see Units, Physical). Maxwell suggested new methods for the determination of this ratio of the electrostatic to the electro- magnetic units, and by experiments of great ingenuity was able to show that this ratio, which is also that of the velocity of the propagation of an electromagnetic impulse through space, is identical with that of light. This great fact once ascertained, it became clear that the notion that electric phenomena are affections of the luminiferous ether was no longer a mere specula- tion but a scientific theory capable of verification. An immediate deduction from Maxwell's theory was that in transparent dielec- trics, the dielectric constant or specific inductive capacity should be numerically equal to the square of the refractive index for very long electric waves. At the time when Maxwell developed his theory the dielectric constants of only a few transparent insulators were known and these were for the most part measured with steady or unidirectional electromotive force. The only refractive indices which had been measured were the optical refractive indices of a number of transparent substances. Maxwell made a comparison between the optical refractive index and the dielectric constant of paraffin wax, and the approximation between the numerical values of the square of the first and that of the last was sufficient to show that there was a

*basis for further work. Maxwell's electric and magnetic ideas were gathered together in a great mathematical treatise on electricity and magnetism which was published in 1873. * This book stimulated in a most remarkable degree theoretical and practical research into the phenomena of electricity and magnetism. Experi- mental methods were devised for the further exact measurements of the electromagnetic velocity and numerous determinations of the dielectric constants of various solids, liquids and gases, and comparisons of these with the corresponding optical re- fractive indices were conducted. This early work indicated that whilst there were a number of cases in which the square*

1 A Treatise on Electricity and Magnetism (2 vols.), by James Clerk Maxwell, sometime professor of experimental physics in the university of Cambridge. A second edition was edited by Sir W. D. Niven in 1881 and a third by Prof. Sir J. J. Thomson in 1891.

of optical refractive index for long waves and the dielectric constant of the same substance were sufficiently close to afford an apparent confirmation of Maxwell's theory, yet in other cases there were considerable divergencies. L. Boltzmann (1844-1907) made a large number of determinations for solids and for gases, and the dielectric constants of many solid and liquid substances were determined by N. N. Schiller (b. 1848), P. A. Silow (b. 1850), J. Hopkinson and others. The accumu- lating determinations of the numerical value of the electro- magnetic velocity (v) from the earliest made by Lord Kelvin (Sir W. Thomson) with the aid of King and M°Kichan, or those of Clerk Maxwell, W. E. Ayrton and J. Perry, to more recent ones by J. J. Thomson, F. Himstedt, H. A. Rowland, E. B. Rosa, J. S. H. Pellat and H. A. Abraham, showed it to be very close to the best determinations of the velocity of light (see Units, Physical). On the other hand, the divergence in some cases between the square of the optical refractive index and the dielectric constant was very marked. Hence although Maxwell's theory of electrical action when first propounded found many adherents in Great Britain, it did not so much dominate opinion on the continent of Europe.

Fourth Period. — With the publication of Clerk Maxwell's treatise in 1873, we enter fully upon the fourth and modern period of electrical research. On the technical side the invention of a new form of armature for dynamo electric machines by Z. T. Gramme (1826-1901) inaugurated a departure from which we may date modern electrical engineering. It will be convenient to deal with technical development first.

Technical Development. — As far back as 1841 large magneto-electric machines driven by steam power had been constructed, and in 1856 F. H. Holmes had made a magneto machine with multiple permanent magnets which was installed in 1862 in Dungeness lighthouse. Further progress was made in 1867 when H. Wilde introduced the use of electromagnets for the field magnets. In i860 Dr Antonio Pacinotti invented what is now called the toothed ring winding for armatures and described it in an Italian journal, but it attracted little notice until reinvented in 1870 by Gramme. In this new form of bobbin, the armature consisted of a ring of iron wire wound over with an endless coil of wire and connected to a commutator consisting of copper bars insulated from one another. Gramme dynamos were then soon made on the self-exciting principle. In 1873 at Vienna the fact was discovered that a dynamo machine of the Gramme type could also act as an electric motor and was set in rotation when a current was passed into it from another similar machine. Henceforth the electric transmission of power came within the possibilities of engineering.

Electric Lighting. — In 1876, Paul Jablochkov (1847-1894), a Russian officer, passing through Paris, invented his famous electric candle, consisting of two rods of carbon placed side by side and separated from one another by an insulating material. This invention in conjunction with an alternating current dynamo provided a new and simple form of electric arc lighting. Two years afterwards C. F. Brush, in the United States, produced another efficient form of dynamo and electric arc lamp suitable for working in series (see Lighting: Electric), and these inven- tions of Brush and Jablochkov inaugurated commercial arc lighting. The so-called subdivision of electric light by incan- descent lighting lamps then engaged attention. E. A. King in 1845 and W. E. Staite in 1848 had made incandescent electric lamps of an elementary form, and T. A. Edison in 1878 again attacked the problem of producing light by the incandescence of platinum. It had by that time become clear that the most suitable material for an incandescent lamp was carbon contained in a good vacuum, and St G. Lane Fox and Sir J. W. Swan in England, and T. A. Edison in the United States, were engaged in struggling with the difficulties of producing a suitable carbon incandescence electric lamp. Edison constructed in 1879 a successful lamp of this type consisting of a vessel wholly of glass containing a carbon filament made by carbonizing paper or some other carbonizable material, the vessel being exhausted and the current led into the filament through platinum wires.

In 1879 and 1880, Edison in the United States, and Swan in conjunction with C. H. Steam in England, succeeded in com- pletely solving the practical problems. From and after that date incandescent electric lighting became commercially possible, and was brought to public notice chiefly by an electrical exhibi- tion held at the Crystal Palace, near London, in 1882. Edison, moreover, as well as Lane-Fox, had realized the idea of a public electric supply station, and the former proceeded to establish in Pearl Street, New York, in 1881, the first public electric supply station. A similar station in England was opened in the basement of a house in Holborn Viaduct, London, in March 1882. Edison, with copious ingenuity, devised electric meters, electric mains, lamp fittings and generators complete for the purpose. In 1881 C. A. Faure made an important improvement in the lead secondary battery which G. Plante (1834-1889) had invented in 1859, and storage batteries then began to be developed as commercial appliances by Faure, Swan, J. S. Sellon and many others (see Accumulator). In 1882, numerous electric lighting companies were formed for the conduct of public and private lighting, but an electric lighting act passed in that year greatly hindered commercial progress in Great Britain. Nevertheless the delay was utilized in the completion of inventions necessary for the safe and economical distribution of electric current for the purpose of electric lighting.

Telephone. — Going back a few years we find the technical applications of electrical invention had developed themselves in other directions. Alexander Graham Bell in 1876 invented the speaking telephone (

Electric Power. — Following on the discovery in 1873 of the reversible action of the dynamo and its use as a motor, efforts began to be made to apply this knowledge to transmission of power, and S. D. Field, T. A. Edison, Leo Daft, E. M. Bentley and W. H. Knight, F. J. Sprague, C. J. Van Depoele and others between 1 880 and 1 884 were the pioneers of electric traction. One of the earliest electric tram cars was exhibited by E. W. and W. Siemens in Paris in 1881. In 1883 Lucien Gaulard, following a line of thought opened by Jablochkov, proposed to employ high pressure alternating currents for electric distributions over wide areas by means of transformers. His ideas were improved by Carl Zipernowsky and 0. T. Blathy in Hungary and by S. Z. de Ferranti in England, and the alternating current transformer (see Transformers) came into existence. Polyphase alternators were first exhibited at the Frankfort electrical

exhibition in 1891, developed as a consequence of scientific researches by Galileo Ferraris (1847-1897), Nikola Tesla,M.O.vonDolivo-Dobrowolsky and C. E. L. Brown, and long distance transmission of electrical power by polyphase electrical currents (see Power Trans- mission: Electric) was exhibited in operation at Frankfort in 1 89 1. Meanwhile the early continuous current dynamos devised by Gramme, Siemens and others had been vastly improved in scientific principle and practical construction by the labours of Siemens, J. Hopkinson, R. E. B. Crompton, Elihu Thomson, Rudolf Eickemeyer, Thomas Parker and others, and the theory of the action of the dynamo had been closely studied by J. and E. Hopkinson, G. Kapp, S. P. Thompson, C. P. Steinmetz and J. Swinburne, and great improvements made in the alternating current dynamo by W. M. Mordey, S. Z. de Ferranti and Messrs Ganz of Budapest. Thus in twenty years from the invention of the Gramme dynamo, electrical engineering had developed from small beginnings into a vast industry. The amendment, in 1888, of the Electric Lighting Act of 1882, before long caused a huge development of public electric lighting in Great Britain. By the end of the 19th century every large city in Europe and in North and South America was provided with a public electric supply for the purposes of electric lighting. The various improve- ments in electric illuminants, such as the Nernst oxide lamp, the tantalum and osmium incandescent lamps, and improved forms

of arc lamp, enclosed, inverted and flame arcs, are described under Lighting: Electric.

Between 1890 and 1900, electric traction advanced rapidly in the United States of America but more slowly in England. In 1902 the success of deep tube electric railways in Great Britain was assured, and in 1904 main line railways began to abandon, at least experimentally, the steam locomotive and sub- stitute for it the electric transmission of power. Long distance electrical transmission had been before that time exemplified in the great scheme of utilizing the falls of Niagara. The first projects were discussed in 1891 and 1892 and completed practic- ally some ten years later. In this scheme large turbines were placed at the bottom of hydraulic fall tubes 150 ft. deep, the turbines being coupled by long shafts with 5000 H.P. alternating current dynamos on the surface. By these electric current was generated and transmitted to towns and factories around, being sent overhead as far as Buffalo, a distance of 18 m. At the end of the 19th century electrochemical industries began to be developed which depended on the possession of cheap electric energy. The production of aluminium in Switzerland and

Scotland, carborundum and calcium carbide in the United States, and soda by the Castner-Kellner process, began to be conducted on an immense scale. The early work of Sir W. Siemens on the electric furnace was continued and greatly extended by Henri Moissan and others on its scientific side, and electro-chemistry took- its place as one of the most promising departments of technical research and invention. It was stimulated and assisted by improvements in the construction of large dynamos and increased knowledge concerning the control of powerful electric currents.

In the early part of the 20th century the distribution in bulk of electric energy for power purposes in Great Britain began to assume important proportions. It was seen to be uneconomical for each city and town to manufacture its own supply since, owing to the intermittent nature of the demand for current for lighting, the price had to be kept up to 4d. and 6d. per unit. It was found that by the manufacture in bulk, even by steam engines, at primary centres the cost could be considerably reduced, and in numerous districts in England large power stations began to be erected between 1903 and 1905 for the supply of current for power purposes. This involved almost a revolution in the nature of the tools used, and in the methods of working, and may ultimately even greatly affect the factory system and the concentration of population in large towns which was brought about in the early part of the 19th century by the invention of the steam engine.

Development of Electric Theory.

Turning now to the theory of electricity, we may note the equally remarkable progress made in 300 years in scientific insight into the nature of the agency which has so recast the face of human society. There is no need to dwell upon the early crude theories of the action of amber and lodestone. In a true scientific sense no hypothesis was possible, because few facts had been accumulated. The discoveries of Stephen Gray and C. F. de C. du Fay on the conductivity of some bodies for the electric agency and the dual character of electrification gave rise to the first notions of electricity as an imponderable fluid, or non-gravitative subtile matter, of a more refined and pene- trating kind than ordinary liquids and gases. Its duplex char- acter, and the fact that the electricity produced by rubbing glass and vitreous substances was different from that produced by rubbing sealing-wax and resinous substances, seemed to necessitate the assumption of two kinds of electric fluid; hence there arose the conception of positive and negative electricity, and the two-fluid theory came into existence.

Single-fluid Theory. — The study of the phenomena of the Leyden jar and of the fact that the inside and outside coatings possessed opposite electricities, so that in charging the jar as much positive electricity is added to one side as negative to the other, led Franklin about 1750 to suggest a modification called the single fluid theory, in which the two states of electrification

were regarded as not the results of two entirely different fluids but of the addition or subtraction of one electric fluid from matter, so that positive electrification was to be looked upon as the result of increase or addition of something to ordinary matter and negative as a subtraction. The positive and negative electrifications of the two coatings of the Leyden jar were therefore to be regarded as the result of a transformation of something called electricity from one coating to the other, by which process a certain measurable quantity became so much less on one side by the same amount by which it became more on the other. A modification of this single fluid theory was put forward by F. U. T. Aepinus which was explained and illustrated in his Tentamen theoriae electricitatis et magnetismi, published in St Petersburg in 1759. This theory was founded on the following principles: — (1) the particles of the electric fluid repel each other with a force decreasing as the distance increases; (2) the particles of the electric fluid attract the atoms of all bodies and are attracted by them with a force obeying the same law; (3) the electric fluid exists in the pores of all bodies, and while it moves without any obstruction in conductors such as metals, water, &c, it moves with extreme difficulty in so-called non-conductors such as glass, resin, &c; (4) electrical phenomena are produced either by the transference of the electric fluid of a body containing more to one containing less, or from its attraction and repulsion when no transference takes place. Electric attractions and repulsions were, however, regarded as differential actions in which the mutual repulsion of the particles of electricity operated, so to speak, in antagonism to the mutual attraction of particles of matter for one another and of particles of elec- tricity for matter. Independently of Aepinus, Henry Cavendish put forward a single : fiuid theory of electricity {Phil. Trans., 1771, 61, p. 584), in which he considered it in more precise detail.

Two-fluid Theory. — In the elucidation of electrical phenomena, however, towards the end of the 18th century, a modification of the two-fluid theory seems to have been generally preferred. The notion

then formed of the nature of electrification was something as follows: — All bodies were assumed to contain a certain quantity of a so-called neutral fluid made up of equal quantities of positive and negative electricity, which when in this state of combination neutralized one another's properties. The neutral fluid could, however, be divided up or separated into its two constituents, and these could be accumulated on separate conductors or non-conductors. This view followed from the discovery of the facts of electric induction of J. Canton U753, I754)- When, for instance, a positively electrified body was found to induce upon another insulated conductor a charge of negative electricity on the side nearest to it, and a charge of positive electricity on the side farthest from it, this was explained by saying that the particles of each of the two electric fluids repelled one another but attracted those of the positive fluid. Hence the operation of the positive charge upon the neutral fluid was to draw towards the positive the negative constituent of the neutral charge and repel to the distant parts of the con- ductor the positive constituent.

C. A. Coulomb experimentally proved that the law of attraction and repulsion of simple electrified bodies was that the force between them varied inversely as the square of the distance and thus gave mathematical definiteness to the two-fluid hypo- thesis. It was then assumed that each of the two constituents of the neutral fluid had an atomic structure and that the so-called particles of one of the electric fluids, say positive, repelled similar particles with a force varying inversely as a square of the distance and attracted those of the opposite fluid according to the same law. This fact and hypothesis brought electrical phenomena within the domain of mathematical analysis and, as already mentioned, Laplace, Biot, PoiSson, G. A. A. Plana (1781-1846), and later Robert Murphy (1806-1843), made them the subject of their investigations on the mode in which elec- tricity distributes itself on conductors when in equilibrium.

Faraday's Views. — The two-fluid theory may be said to have held the field until the time when Faraday began his researches

on electricity. After he had educated himself by the study of the phenomena of lines of magnetic force in his discoveries on electromagnetic induction, he applied the same conception to electrostatic phenomena, and thus created the notion of lines of electrostatic force and of the important function of the di- electric or non-conductor in sustaining them. Faraday's notion as to the nature of electrification, therefore, about the middle of the 19th century came to be something as follows: — He considered that the so-called

charge of electricity on a conductor was in reality nothing on the conductor or in the conductor itself, but consisted in a state of strain or polarization, or a physical change of some kind in the particles of the dielectric surrounding the conductor, and that it was this physical state in the dielectric which constituted electrification. Since Faraday was well aware that even a good vacuum can act as a dielectric, he recognized that the state he called dielectric polarization could not be wholly dependent upon the presence of gravitative matter, but that there must be an electromagnetic medium of a supermaterial nature. In the 13th series of his Experimental Researches on Electricity he discussed the relation of a vacuum to electricity. Furthermore his electrochemical investigations, and particularly his discovery of the important law of electrolysis, that the movement of a certain quantity of electricity through an electrolyte is always accompanied by the transfer of a certain definite quantity of matter from one electrode to another and the liberation at these electrodes of an equivalent weight of the ions, gave foundation for the idea of a definite atomic charge of electricity. In fact, long previously to Faraday's electrochemical researches, Sir H. Davy and J. J. Berzelius early in the 19th century had advanced the hypothesis that chemical combination was due to electric attractions between the electric charges carried by chemical atoms. The notion, however, that electricity is atomic in structure was definitely put forward by Hermann von Helmholtz in a well-known Faraday lecture. Helmholtz says: "If we accept the hypothesis that elementary substances are composed of atoms, we cannot well avoid concluding that electricity also is divided into elementary portions which behave like atoms of electricity." 1 Clerk Maxwell had already used in 1873 the phrase, "a molecule of electricity." 2 Towards the end of the third quarter of the 19th century it therefore became clear that electricity, whatever be its nature, was associated with atoms of matter in the form of exact multiples of an in- divisible minimum electric charge which may be considered to be " Nature's unit of electricity." This ultimate unit of electric quantity Professor Johnstone Stoney called an electron. 3 The formulation of electrical theory as far as regards operations in space free from matter was immensely assisted by Maxwell's mathematical theory. Oliver Heaviside after 1880 rendered much assistance by reducing Maxwell's mathematical analysis to more compact form and by introducing greater precision into terminology (see his Electrical Papers, 1892). This is perhaps the place to refer also to the great services of Lord Rayleigh to electrical science. Succeeding Maxwell as Cavendish professor of physics at Cambridge in 1880, he soon devoted himself especi- ally to the exact redetermination of the

practical electrical units in absolute measure. He followed up the early work of the British Association Committee on electrical units by a fresh determination of the ohm in absolute measure, and in conjunction with other work on the electrochemical equivalent of silver and the absolute electromotive force of the Clark cell may be said to have placed exact electrical measurement on a new basis. He also made great additions to the theory of alternating electric currents, and provided fresh appliances for other electrical measurements (see his Collected Scientific Papers, Cambridge,

1900).

Electro-optics. — For a long time Faraday's observation on the rotation of the plane of polarized light by heavy glass in a

1 H. von Helmholtz, " On the Modern Development of Faraday's Conception of Electricity," Journ. Chem. Soc, 1881, 39, p. 277.

2 See Maxwell's Electricity and Magnetism, vol. i. p. 350 (2nd ed.,

1881).

3 " On the Physical Units of Nature," Phil. Mag., 18S1, [5], 11, p. 381. Also Trans. Roy. Soc. (Dublin, 1891), 4. P- 583-

magnetic field remained an isolated fact in electro-optics. Then M. E. Verdet (1824-1860) made a study of the subject and discovered that a solution of ferric perchloride in methyl alcohol rotated the plane of polarization in an opposite direction to heavy glass (Ann. Chim. Pkys., 1854, 41, p. 370; 1855, 43, p. 37; Com. Rend., 1854, 39, p. 548). Later A. A.E.E. Kundt prepared metallic films of iron, nickel and cobalt, and obtained powerful negative optical rotation with them (Wied. Ann., 1884, 23, p. 228; 1886, 27, p. 191). John Kerr (1824-1907) discovered that a similar effect was produced when plane polarized light was reflected from the pole of a powerful magnet (Phil. Mag., 1877, [5]> 3> P- 3 2I > an d I 878, 5, p. 161). Lord Kelvin showed that Faraday's discovery demonstrated that some form of rotation was taking place along lines of magnetic force when passing through a medium. 1 Many observers have given attention to the exact determination of Verdet's constant of rotation for standard substances, e.g. Lord Rayleigh for carbon bisulphide, 2 and Sir W. H. Perkin for an immense range of inorganic and organic

bodies. 3 Kerr also discovered that when certain homo- geneous dielectrics were submitted to electric strain, they became birefringent (Phil. Mag., 1875, 50, pp. 337 and 446). The theory of electro-optics received great attention from Kelvin, Maxwell, Rayleigh, G. F. Fitzgerald, A. Righi and P. K. L. Drude, and experimental contributions from innumerable workers, such as F. T. Trouton, 0. J. Lodge and J. L. Howard, and many others.

Electric Waves. — In the decade 1880-1890, the most important advance in electrical physics was, however, that which originated with the astonishing researches of Heinrich Rudolf Hertz (1857-1894). This illustrious investigator was stimulated, by a certain problem brought to his notice by H. von Helmholtz, to undertake investigations which had for their object a demonstration of the truth of Maxwell's principle that a variation in electric displace- ment was in fact an electric current and had magnetic effects. It is impossible to describe here the details of these elaborate experiments; the reader must be referred to Hertz's own papers, or the English translation of them by Prof. D. E. Jones. Hertz's great discovery was an experimental realization of a suggestion made by G. F. Fitzgerald (1851-1901) in 1883 as to a method of producing electric waves in space. He invented for this purpose a radiator consisting of two metal rods placed in one line, their inner ends being provided with poles nearly touching and their outer ends with metal plates. Such an arrangement constitutes in effect a condenser, and when the two plates respectively are connected to the secondary terminals of an induction coil in operation, the plates are rapidly and alternately charged, and discharged across the spark gap with electrical oscillations (see Electrokinetics). Hertz then devised a wave detecting apparatus called a resonator. This in its simplest form consisted of a ring of wire nearly closed terminating in spark balls very close together, adjustable as to distance by a micrometer screw. He found that when the resonator was placed in certain positions with regard to the oscillator, small sparks were seen between the micrometer balls, and when the oscillator was placed at one end of a room having a sheet of zinc fixed against the wall at the other end, symmetrical positions could be found in the room at which, when the resonator was there placed, either no sparks or else very bright sparks occurred at the poles. These effects, as Hertz showed, indicated the establishment of stationary electric waves in space and the propagation of electric and magnetic force through space with a finite velocity. The other additional phenomena he observed finally contributed an all but conclusive proof of the truth of Maxwell's views. By profoundly ingenious methods Hertz showed that these

invisible electric waves could be reflected and refracted like waves of light by mirrors and

1 See Sir W. Thomson, Proc. Roy. Soc. Lond., 1856, 8, p. 152; or Maxwell, Elect, and Mag., vol. ii. p. 831.

2 See Lord Rayleigh, Proc. Roy. Soc. Lond., 1884, 37, p. 146; Gordon, Phil. Trans., 1877, 167, p. 1; .H. Becquerel, Ann. Chim. Phys., 1882, [3], 27, p. 312.

3 Perkin's Papers are to be found in the Journ. Chem. Soc. Lond., 1884, p. 421; 1886, p. 177; 1888, p. 561; 1889, p. 680; 1891, p. 981; 1892, p. 800; 1893, p. 75.

prisms, and that familiar experiments in optics could be repeated with electric waves which could not affect the eye. Hence there arose a new science of electro-optics, and in all parts of Europe and the United States innumerable investigators took possession of the novel field of research with the greatest delight. O. J. Lodge, 4 A. Righi, 6 J. H. Poincare," V. F. K. Bjerknes, P. K. L. Drude, J. J. Thomson, 7 John Trowbridge, Max Abraham, and many others, contributed to its elucidation.

In 1892, E. Branly of Paris devised an appliance for detecting these waves which subsequently proved to be of immense importance. He discovered that they had the power of affecting the electric conductivity of materials when in a state of powder, the majority of metallic filings increasing in conductivity. Lodge devised a similar arrangement called a coherer, and E. Rutherford invented a magnetic detector depending on the power of electric oscillations to demagnetize iron or steel. The sum total of all these contributions to electrical knowledge had the effect of establishing Maxwell's principles on a firm basis, but they also led to technical inventions of the very greatest utility. In 1896 G. Marconi applied a modified and improved form of Branly's wave detector in conjunction with a novel form of radiator for the telegraphic transmission of intelligence through space without wires, and he and others developed this new form of telegraphy with the greatest rapidity and success into a startling and most useful means of communicating through space electrically without connecting wires.

Electrolysis. — The study of the transfer of electricity through liquids had meanwhile received much attention. The general facts and laws of electrolysis (q.v.) were determined experiment- ally by Davy and Faraday and confirmed by the researches of J. F. Daniell, R. W.

Bunsen and Helmholtz. The modern theory of electrolysis grew up under the hands of R. J. E. Clausius, A. W. Williamson and F. W. G. Kohlrausch, and received a great impetus from the work of Svante Arrhenius, J. H. Van't Hoff, W. Ostwald, H. W. Nernst and many others. The theory of the ionization of salts in solution has raised much discussion amongst chemists, but the general fact is certain that electricity only moves through liquids in association with matter, and simultaneously involves chemical dissociation of molecular groups.

Discharge through Gases. — Many eminent physicists had an instinctive feeling that the study of the passage of electricity through gases would shed much light on the intrinsic nature of electricity. Faraday devoted to a careful examination of the phenomena the XIII th series of his Experimental Researches, and among the older workers in this field must be particularly mentioned J. Pliicker, J. W. Hittorf, A. A. de la Rive, J. P. Gassiot, C. F. Varley, and W. Spottiswoode and J. Fletcher Moulton. It has long been known that air and other gases at the pressure of the atmosphere were very perfect insulators, but that when they were rarefied and contained in glass tubes with platinum electrodes sealed through the glass, electricity could be passed through them under sufficient electromotive force and produced a luminous appearance known as the electric glow discharge. The so-called vacuum tubes constructed by H. Geissler (1815-1879) containing air, carbonic acid, hydrogen, &c, under a pressure of one or two millimetres, exhibit beautiful appearances when traversed by the high tension current produced by the secondary circuit of an induction coil. Faraday discovered the existence of a dark space round the negative electrode which is usually known as the " Faraday dark space." De la Rive added much to our knowledge of the subject, and J. Pliicker and his disciple J. W. Hittorf examined the phenomena exhibited in so-called high vacua, that is, in exceedingly rarefied gases. C. F. Varley discovered the interesting fact that no current could be sent through the rarefied gas unless a certain minimum potential difference of the electrodes was excited. Sir William Crookes took up in 1872 the study of electric discharge through

4 The Work of Hertz (London, 1894).

6 L 'Ottica delle oscillazioni elettriche (Bologna, 1897).

6 Les Oscillations electriques (Paris, 1894).

*7 Recent Researches in Electricity and Magnetism (Oxford. *5q2>.*

high vacua, having been led to it by his researches on the radiometer: The particular details of the phenomena observed will be found described in the article Conduction, Electric (§ III.). The main fact discovered by researches of Plucker, Hittorf and Crookes was that in a vacuum tube containing extremely rarefied air or other gas, a luminous discharge takes place from the negative electrode which proceeds in lines normal to the surface of the negative electrode and renders phosphorescent both the glass envelope and other objects placed in the vacuum tube when it falls upon them. Hittorf made in 1869 the discovery that solid objects could cast shadows or intercept this cathode discharge. The cathode discharge henceforth engaged the attention of many physicists. Varley had advanced tentatively the hypothesis that it consisted in an actual projection of electri- fied matter from the cathode, and Crookes was led by his re- searches in 1870, 1871 and 1872 to embrace and confirm this hypothesis in a modified form and announce the existence of a fourth state of matter, which he called radiant matter, demon- strating by many beautiful and convincing experiments that there was an actual projection of material substance of some kind possessing inertia from the surface of the cathode. German physicists such as E. Goldstein were inclined to take another view. Sir J. J. Thomson, the successor of Maxwell and Lord Rayleigh in the Cavendish chair of physics in the university of Cambridge, began about the year 1899 a remarkable series of investigations on the cathode discharge, which finally enabled him to make a measurement of the ratio of the electric charge to the mass of the particles of matter projected from the cathode, and to show that this electric charge was identical with the atomic electric charge carried by a hydrogen ion in the act of electrolysis, but that the mass of the cathode particles, or " corpuscles " as he called them, was far less, viz. about juVirth part of the mass of a hydrogen atom. 1 The subject was pursued by Thomson and the Cambridge physicists with great mathe- matical and experimental ability, and finally the conclusion was reached that in a high vacuum tube the electric charge is carried by particles which have a mass only a fraction, as above mentioned, of that of the hydrogen atom, but which carry a charge equal to the unit electric charge of the hydrogen ion as found by electrochemical researches. 2 P. E. A. Lenard made in 1894 (Wied. Ann. Phys., 51, p. 225) the discovery that these cathode particles or corpuscles could pass through a window of thin sheet aluminium placed in the wall of the vacuum tube and give rise to a class of radiation called the

Lenard rays. W. C. Rontgen of Munich made in 1896 his remarkable discovery of the so-called X or Rontgen rays, a class of radiation produced by the impact of the cathode particles against an impervious metallic screen or anticathode placed in the vacuum tube. The study of Rontgen rays was ardently pursued by the principal physicists in Europe during the years 1897 and 1898 and subsequently. The principal property of these Rontgen rays which attracted public attention was their power of passing through many solid bodies and affecting a photographic plate. Hence some substances were opaque to them and others transparent. The astonishing feat of photographing the bones of the living animal within the tissues soon rendered the Rontgen rays indispensable in surgery and directed an army of investigators to their study.

Radioactivity. — One outcome of all this was the discovery by H. Becquerel in 1896 that minerals containing uranium, and particularly the mineral known as pitchblende, had the power of affecting sensitive photographic plates enclosed in a black paper envelope when the mineral was placed on the outside, as

'See J. J. Thomson, Proc. Roy. Inst. Lond., 1897, 15, p. 419; also Phil. Mag., 1899, [5], 48, p. 547.

2 Later results show that the mass of a hydrogen atom is not far from 1 -3 Xio -24 gramme and that the unit atomic charge or natural unit of electricity is i-3Xio~ 20 of an electromagnetic C.G.S. unit. The mass of the electron or corpuscle is 7-oXio -28 gramme and its diameter is 3 X io~ 13 centimetre. The diameter of a chemical atom is sf the order of io -7 centimetre.

See H. A. Lorentz, " The Electron Theory," Eleklrotechnische Zjitschrift, 1905, 26, p. 584; or Science Abstracts, 1905, 8, A, p. 603.

well as of discharging a charged electroscope {Com. Rend., iSgfr 122, p. 420). This research opened a way of approach to the phenomena of radioactivity, and the history of the steps by which P. Curie and Madame Curie were finally led to the discovery of radium is one of the most fascinating chapters in the history of science. The study of radium and radioactivity (see Radio- activity) led before long to the further remarkable knowledge that these so-called radioactive materials project into surround- ing space particles or corpuscles, some of which are identical with those projected from the cathode in a high vacuum tube, together with others of a different nature. The study of radio- activity was pursued with great ability

not only by the Curies and A. Debierne, who associated himself with them, in France, but by E. Rutherford and F. Soddy in Canada, and by J. J. Thomson, Sir William Crookes, Sir William Ramsay and others in England.

Electronic Theory. — The final outcome of these investigations was the hypothesis that Thomson's corpuscles or particles composing the cathode discharge in a high vacuum tube must be looked upon as the ultimate constituent of what we call negative electricity; in other words, they are atoms of negative electricity, possessing, however, inertia, and these negative electrons are components at any rate of the chemical atom. Each electron is a point-charge of negative electricity equal to 3-9Xio -10 of an electrostatic unit or to i-3Xio 20 of an electro magnetic unit, and the ratio of its charge to its mass is nearly 2 Xio 7 using E.M. units. For the hydrogen atom the ratio of charge to mass as deduced from electrolysis is about io 4 . Hence the mass of an electron is ■% fo o th of that of a hydrogen atom. No one has yet been able to isolate positive electrons, or to give a complete demonstration that the whole inertia of matter is only electric inertia due to what may be called the inductance of the electrons. Prof. Sir J. Larmor developed in a series of very able papers (Phil. Trans., 1894, 185; 1895, 186; 1897, 190), and subsequently in his book Aether and Matter (1900), a remarkable hypothesis of the structure of the electron or cor- puscle, which he regards as simply a strain centre in the aether or electromagnetic medium, a chemical atom being a collection of positive and negative electrons or strain centres in stable orbital motion round their common centre of mass (see Aether) . J. J. Thomson also developed this hypothesis in a profoundly interesting manner, and we may therefore summarize very briefly the views held on the nature of electricity and matter at the beginning of the 20th century by saying that the term electricity had come to be regarded, in part at least, as a collective name for electrons, which in turn must be considered as con- stituents of the chemical atom, furthermore as centres of certain lines of self-locked and permanent strain existing in the universal aether or electromagnetic medium. Atoms of matter are com- posedof congeries of electrons and the inertia of matter is probably therefore only the inertia of the electromagnetic medium.' Electric waves are produced wherever electrons are accelerated or retarded, that is, whenever the velocity of an electron is changed or accelerated positively or negatively. In every solid body there is a continual atomic dissociation, the result of which is that mixed up with the atoms of chemical matter composing them we have a greater or less percentage of free electrons. The operation called an electric current

consists in a diffusion or movement of these electrons through matter, and this is controlled by laws of diffusion which are similar to those of the diffusion of liquids or gases. Electromotive force is due to a difference in the density of the electronic population in different or identical conducting bodies, and whilst the electrons can move freely through so-called conductors their motion is much more hindered or restricted in non.-conductors. Electric charge consists, therefore, in an excess or deficit of negative electrons in a body. In the hands of H. A. Lorentz, P. K. L. Drude, J. J, Thomson, J. Larmor and many others, the electronic hypothesis of matter and of electricity has been developed in great detail and may be said to represent the outcome of modern researchei upon electrical phenomena.

*1 See J. J. Thomson, Electricity and Matter (London, 19ˆ**

The reader may be referred for an admirable summary of the theories of electricity prior to the advent of the electronic hypothesis to J. J. Thomson's " Report on Electrical Theories " (Brit. Assoc. Report, 1885), in which he divides electrical theories enunciated during the 19th century into four classes, end summarizes the opinions and theories of A. M. Ampere, H. G. Grassman, C. F. Gauss, W. E. Weber, G. F. B. Riemann, R. J. E. Clausius, F. E. Neumann and H. von Helmholtz.

Bibliography. — M. Faraday, Experimental Researches in Electricity (3 vols., London, 1839, 1844, 1855) ; A. A. De la Rive, Treatise on Electricity (3 vols., London, 1853, 1858); J. Clerk Maxwell, A Treatise on Electricity and Magnetism (2 vols., 3rd ed., 1892); id., Scientific Papers (2 vols., edited by Sir W. J. Niven, Cambridge, 1890); H. M. Noad, A Manual of Electricity (2 vols., London, 1855, '857) ", J. J. Thomson, Recent Researches in Electricity and Magnetism (Oxford, 1893); id.. Conduction of Electricity through Gases (Cam- bridge, 1903); id., Electricity and Matter (London, 1904); O. Heaviside, Electromagnetic Theory (London, 1893); O. J. Lodge, Modern Views of Electricity (London, 1889); E. Mascart and J. Joubert, A Treatise on Electricity and Magnetism, English trans, by E. Atkinson (2 vols., London, 1883); Park Benjamin, The Intellectual Rise in Electricity (London, 1895) ; G. C. Foster and A. W. Porter, Electricity and Magnetism (London, 1903) ; A. Gray, A Treatise on Magnetism and Electricity (London,

1898) ; H. W. Watson and S. H. Burbury, The Mathematical Theory of Electricity and Magnetism (2 vols., 1885); Lord Kelvin (Sir William Thomson), Mathematical and Physical Papers (3 vols., Cambridge, 1882) ; Lord Rayleigh, Scientific Papers (4 vols., Cambridge, 1903); A. Winkelmann, Handbuch der Physik, vols. iii. and iv. (Breslau, 1903 and 1905; a mine of wealth for references to original papers on electricity and magnetism from the earliest date up to modern times). For particular information on the modern Electronic theory the reader may consult W. Kaufmann, " The Developments of the Electron Idea." Physikalische Zeitschrift (1st of Oct. 1901), or The Electrician (1901), 48, p. 95; H. A. Lorentz, The Theory of Electrons (1909); E. E. Fournier d'Albe, The Electron Theory (London, 1906) ; H. Abraham and P. Langevin, Ions, Electrons, Corpuscles (Paris, 1905) ; J. A. Fleming, " The Electronic Theory of Electricity," Popular Science Monthly (May 1902) ; Sir Oliver J. Lodge, Electrons, or the Nature and Properties of Negative Electricity (London, 1907). (J.A.F.)

ELECTRICITY SUPPLY. I. General Principles— The im- provements made in the dynamo and electric motor between 1870 and 1880 and also in the details of the arc and incandescent electric lamp towards the close of that decade, induced engineers to turn their attention to the question of the private and public- supply of electric current for the purpose of lighting and power. T. A. Edison 1 and St G. Lane Fox 2 were among the first to see the possibilities and advantages of public electric supply, and to devise plans for its practical establishment. If a supply of electric current has to be furnished to a building the option exists in many cases of drawing from a public supply or of generating it by a private plant.

Private Plants. — In spite of a great amount of ingenuity devoted to the development of the primary battery and the thermopile, no means of generation of large currents can compete in economy with the dynamo. Hence a private electric generating plant involves the erection of a dynamo which may be driven either by a steam, gas or oil engine, or by power obtained by means of a turbine from a low or high fall of water. It may be either directly coupled to the motor, or driven by a belt; and it may be either a continuous-current machine or an alternator, and if the latter, either single-phase or polyphase. The con- venience of being able to employ storage batteries in connexion with a private-supply system is so great that unless power has to be transmitted long distances, the invariable rule is to employ a continuous-current dynamo. Where space is valuable this is always coupled direct to the motor; and if a steam-engine is employed, an enclosed engine is most cleanly and compact. Where coal or heating

gas is available, a gas-engine is exceedingly convenient, since it requires little attention. Where coal gas is not available, a Dowson gas-producer can be employed. The oil-engine has been so improved that it is extensively used in combination with a direct-coupled or belt-driven dynamo and thus forms a favourite and easily-managed plant for private electric lighting. Lead storage cells, however, as at present made, when charged by a steam-driven dynamo deteriorate less

1 British Patent Specification, No. 5306 of 1878, and No. 602 of 1880. 2 Ibid. No. 3988 of 1878.

rapidly than when an oil-engine is employed, the reason being that the charging current is more irregular in the latter case, since the single cylinder oil-engine only makes an impulse every other revolution. In connexion with the generator, it is almost the invariable custom to put down a secondary battery of storage cells, to enable the supply to be given after the engine has stopped. This is necessary, not only as a security for the continuity of supply, but because otherwise the costs of labour in running the engine night and day become excessive. The storage battery • gives its supply automatically, but the dynamo and engine require incessant skilled attendance. If the building to be lighted is at some distance from the engine-house the battery should be placed in the basement of the building, and under- ground or overhead conductors, to convey the charging current, brought to it from the dynamo.

It is usual, in the case of electric lighting installations, to reckon all lamps in their equivalent number of 8 candle power (c.p.) incandescent lamps. In lighting a private house or building, the first thing to be done is to settle the total number of incan- descent lamps and their size, whether 32 c.p., 16 c.p. or 8 c.p. Lamps of 5 c.p. can be used with advantage in small bedrooms and passages. Each candle-power in the case of a carbon filament lamp can be taken as equivalent to 3-5 watts, or the 8 c.p. lamp as equal to 30 watts, the 16 c.p. lamp to 60 watts, and so on. In the case of metallic filament lamps about i-o or 1-25 watts. Hence if the equivalent of 100 carbon filament 8 c.p. lamps is required in a building the maximum electric power-supply avail- able must be 3000 watts or 3 kilowatts. The next matter to consider is the pressure of supply. If the battery can be in a position near the building to be lighted, it is best to use 100- volt incandescent lamps and enclosed arc lamps, which can be worked singly off the 100-volt circuit. If, however, the lamps are scattered over a wide area, or in separate buildings somewhat far apart, as in a college or hospital, it may be better to select 200 volts as the

supply pressure. Arc lamps can then be worked three in series with added resistance. The third step is to select the size of the dynamo unit and the amount of spare plant. It is desir- able that there should be at least three dynamos, two of which are capable of taking the whole of the full load, the third being reserved to replace either of the others when required. The total power to be absorbed by the lamps and motors (if any) being given, together with an allowance for extensions, the size of the dynamos can be settled, and the power of the engines required to drive them determined. A good rule to follow is that the indicated horse-power (I.H.P.) of the engine should be double the dynamo full-load output in kilowatts; that is to say, for a 10-kilowatt dynamo an engine should be capable of giving 20 indicated (not nominal) H.P. From the I.H.P. of the engine, if a steam engine, the size of the boiler required for steam production becomes known. For small plants it is safe to reckon that, including water waste, boiler capacity should be pro- vided equal to evaporating 40 lb of water per hour for every I.H.P. of the engine. The locomotive boiler is a convenient form; but where large amounts of steam are required, some modification of the Lancashire boiler or the water-tube boiler is generally adopted. In settling the electromotive force of the dynamo to be employed, attention must be paid to the question of charging secondary cells, if these are used. If a secondary battery is employed in connexion with 100-volt lamps, it is usual to put in 53 or 54 cells. The electromotive force of these cells varies between 2-2 and i-8 volts as they discharge; hence the above number of cells is sufficient for maintaining the necessary electromotive force. For charging, however, it is necessary to provide 2-3 volts per cell, and the dynamo must therefore have an electromotive force of 135 volts, plus any voltage required to overcome the fall of potential in the cable connecting the dynamo with the secondary battery. Supposing this to be 10 volts, it is safe to install dynamos having an electro- motive force of 150 volts, since by means of resistance in the field circuits this electromotive force can be lowered to no or 115 if it is required at any time to dispense with the battery. The size of the secondary cell will be determined by the nature

of the supply to be given after the dynamos have been stopped. It is usual to provide sufficient storage capacity to run all the lamps for three or four hours without assistance from the dynamo. As an example taken from actual practice, the following figures give the

capacity of the plant put down to supply 500 8 c.p. lamps in a hospital. The dynamos were 15-unit machines, having a full- load capacity of 100 amperes at 150 volts, each coupled direct to an engine of 25 H.P. ; and a double plant of this description was supplied from two steel locomotive boilers, each capable of evaporating 800 lb of water per hour. One dynamo during the day was used for charging the storage battery of 54 cells ; and at night the discharge from the cells, together with the current from one of the dynamos, supplied the lamps until the heaviest part of the load had been taken ; after that the current was drawn from the batteries alone. In working such a plant it is necessary to have the means of varying the electro- motive force of the dynamo as the charging of the cells proceeds. When they are nearly exhausted, their electromotive force is less than 2 volts; but as the charging proceeds, a counter-electromotive force is gradually built up, and the engineer-in-charge has to raise the voltage of the dynamo in order to maintain a constant charging current. This is effected by having the dynamos designed to give normally the highest E.M.F. required, and then inserting resistance in their field circuits to reduce it as may be necessary. The space and attendance required for an oil-engine plant are much less than for a steam-engine.

Public Supply. — The methods at present in successful operation for public electric supply fall into two broad divisions: — (1) continuous-current systems and (2) alternating-current systems. Continuous-current systems are either low- or high-pressure. In the former the current is generated by dynamos at some pressure less than 500 volts, generally about 460 volts, and is supplied to users at half this pressure by means of a three-wire system (see below) of distribution, with or without the addition of storage batteries.

The general arrangements of a low-pressure continuous-current town supply station are as follows: — If steam is the motive power selected, it is generated under all the best conditions of economy by a battery of boilers, and supplied to engines which are now almost invariably coupled direct, each to its own dynamo, on one common bedplate; a multipolar dynamo is most usually employed, coupled direct to an enclosed engine. Parsons or Curtis steam turbines (see Steam-Engine) are frequently selected, since experience has shown that the costs of oil and attendance are far less for this type than -for the reciprocating engine, whilst the floor space and, therefore, the building cost are greatly reduced. In choosing the size of unit to be adopted, the engineer has need of considerable experience and discretion, and also a full knowledge of the nature of the public demand for electric current. The rule is to choose as large units as

possible, consistent with security, because they are proportionately more economical than small ones. The over-all efficiency of a steam dynamo — that is, the ratio between the electrical power output, reckoned say in kilowatts, and the I. H.P. of the engine, reckoned in the same units — is a number which falls rapidly as the load decreases, but at full load may reach some such value as 80 or 85 . It is common to specify the efficiency, as above defined, which must be attained by the plant at full- load, and also the efficiencies at quarter- and half-load which must be reached or exceeded. Hence in the selection of the size of the units the engineer is guided by the consideration that whatever units are in use shall be as nearly as possible fully loaded. If the demand on the station is chiefly for electric lighting, it varies during the hours of the day and night with tolerable regularity. If the output of the station, either in amperes or watts, is represented by the ordinates of a curve, the abscissae of which represent the hours of the day, this load diagram for a supply station with lighting load only, is a curve such as is shown in fig. 1, having a high peak somewhere between 6 and 8 p.m. The area enclosed by this load-diagram compared with the area of the circumscribing rectangle is called the load- . factor of the station. This varies from day to day during the year, but on the average for a simple lighting load is not generally above 10 or 12, and may be lower. Thus the total output from the station is only some 10% on an average of that which it would be if the supply were at all times equal to the maximum

Low- pressure con- tinuous supply.

demand. Roughly speaking, therefore, the total output of an electric supply station, furnishing current chiefly for electric lighting, is at best equal to about two hours' supply during the day at full load. Hence during the greater part of the twenty- four hours a large part of the plant is lying idle. It is usual to provide certain small sets of steam dynamos, called the daylight

310 r

280

ˆ200

I.

o

120

eo

*J2v_*

1

1

ˆs.

/

*♦ 6 A t**

10 12

MOM

Fig. 1.

‘0 12

machines, for supplying the demand during the day and later part of the evening, the remainder of the machines being called into requisition only for a short time. Provision must be made for sufficient reserve of plant, so that the breakdown of one or more sets will not cripple the output of the station.

Assuming current to be supplied at about 460 volts by different and separate steam dynamos, Dyi, Dy 2 (fig. 2), the machines are connected through proper amperemeters and volt- meters with omnibus bars, Oi, 2 , 3 , on a main switch- w ilˆ” board, so that any dynamo can be put in connexion system. or removed. The switchboard is generally divided into three parts — one panel for the connexions of the positive feeders, Fi, with the positive terminals of the generators; one for the negative feeders, F 3 , and negative generator terminals; while from the third (or middle-wire panel) proceed an equal number of middle-wire feeders, F 2 . These sets of conductors are led out into the district to be supplied with current, and are there connected into a distributing system, consisting of three separate insulated conductors, Di, D 2 , D 3 , respectively called the positive, middle and negative distributing mains. The lamps in the houses, Hi, H 2 , &c, are connected between the middle and negative, and the middle and positive, mains by smaller supply and service wires. As far as possible the numbers of lamps installed on the two sides of the system are kept equal; but since it is not possible to control the consumption of current, it becomes necessary

to provide at the station two small dynamos called the balancing machines, Bi, B 2 , connected respectively between

Fig. 2.

the middle and positive and the middle and negative omnibus bars. These machines may have their shafts connected together, or they may be driven by separate steam dynamos; their function is to supply the difference in the total current circulating through the whole of the lamps respectively on the two opposite sides of the middle wire. If storage batteries are employed in the station, it is usual to install two complete batteries, Si, S2,

which are placed in a separate battery room and connected between the middle omnibus bar and the two outer omnibus bars. The extra electromotive force required to charge these batteries is supplied by two small dynamos bi, b2, called boosters. It is not unusual to join together the two balancing dynamos and the two boosters on one common bedplate, the shafts being coupled and in line, and to employ the balancing machines as electromotors to drive the boosters as required. By the use of reversible boosters, such as those made by the Lancashire Dynamo & Motor Company under the patents of Turnbull & M c Leod, having four field windings on the booster magnets (see The Electrician, 1904, p. 303), it is possible to adjust the relative duty

of the dynamos and battery so that the load on the supply dynamos is always constant. Under these conditions the main engines can be worked all the time at their maximum steam economy and a smaller engine plant employed. If the load in the station rises above the fixed amount, the batteries discharge in parallel with the station dynamos; if it falls below, the batteries are charged and the station dynamos take the external load.

The general arrangements of a low-pressure supply station are shown in figs. 3 and 4. It consists of a boiler-house containing a bank of boilers, either Lancashire or Babcock & Wilcox being generally used (see Boiler), which furnish steam to the engines

*mj-mwuˆMm*ˆm»*ˆMiMiˆ»jˆ ,vj.ij~ r:.\ps,i>q..,> llf) r ~.—*

switchboard platform “cable subway ” ;

§ i

Ui DC

3

K

o

Ik

UI

i

WORKSHOP & 8T0RES

JMEJT8 MESS KICHU « CHECK fj mom*

.£.

60

ao

Scaie of Feet.

30 40 50

I , ,1

60

70

80

-I

From The Electrician.

Figs. 3 and 4.— Low-pressure Supply Station.

and dynamos, provision being made by duplicate steam-pipes or a ring main so that the failure of a single engine or dynamo does not cripple the whole supply. The furnace stations. S g ases are taken through an economizer (generally Green's) so that they give up their heat to the cold feed water. If condensing water is available the engines are worked condensing, and this is an essential condition of economy when steam turbines are employed. Hence, either a condensing water pond or a cooling tower has to be provided to cool the condensing water and enable it to be used over and over again. Preferably the station should be situated near a river or canal and a railway siding. The steam dynamos are generally arranged in an engine-room so as to be overlooked from a switchboard gallery (fig. 3), from which all the control is carried out. The boiler furnaces are usually stoked by auto- matic stokers. Owing to the relatively small load factor (say 8 or 10%) of a station giving electric supply for lighting only, the object of every station engineer is to cultivate a demand for electric current for power during the day-time by encouraging the use of electric motors for lifts and other purposes, but above all to create a demand for traction purposes. Hence most urban stations now supply current not only for electric lighting but for running the town tramway system, and this traction load being chiefly a daylight load serves to keep the plant employed and remunerative. It is usual to furnish a continuous current supply for traction at 500 or 600 volts, although some station engineers are advocating the use of higher voltages. In those stations which supply current for traction, but which have a widely scattered lighting load, double current dynamos are often employed, furnishing from one and the same armature a continuous current for traction purposes, and an alternating current for lighting purposes.

In some places a high voltage system of electric supply by continuous current is adopted. In this case the current is High- generated at a pressure of 1000 or 2000 volts, and

pressure transmitted from the generating station by conductors, continuous called high-pressure feeders, to certain sub-centres supply. or transformer centres, which are either buildings above ground or cellars or excavations under the ground. In these transformer centres are placed machines, called continuous- current transformers, which transform the electric energy and create a secondary electric current at a lower pressure, perhaps 100 or 150 volts, to be supplied by distributing mains to users (see Transformers). From these sub-centres insulated con- ductors are run back to the generating station, by which the engineer can start or stop the continuous-current rotatory transformers, and at the same

time inform himself as to their proper action and the electromotive force at the secondary terminals. This system was first put in practice in Oxford, England, and hence has been sometimes called by British engineers " the Oxford system." It is now in operation in a number of places in England, such as Wolverhampton, Walsall, and Shoreditch in London. It has the advantage that in con- nexion with the low-pressure distributing system secondary batteries can be employed, so that a storage of electric energy is effected. Further, continuous-current arc lamps can be worked in series off the high-pressure mains, that is to say, sets of 20 to 40 arc lamps can be operated for the purpose of street lighting by means of the high-pressure continuous current.

The alternating current systems in operation at the present time are the single-phase system, with distributing transformers or transformer sub-centres, and the polyphase systems, in which the alternating current is transformed down into an alternating current of low pressure, or, by means of rotatory transformers, into a continuous current. The general arrangement of a single-phase alternating-current system is as follows: The generating station contains a number of alternators, Ai Aj (fig. 5), producing single-phase alternating current, either at 1000, 2000, or sometimes, as at Deptford and other places, 10,000 volts. This current is distributed from the station either at the pressure at which it is generated, or after being transformed up to a higher pressure by the transformer T.

Alter- nating supply.

The alternators are sometimes worked in parallel, that is to say, all furnish their current to two common omnibus bars on a high-pressure switchboard, and each is switched into circuit at the moment when it is brought into step with the other machines, as shown by some form of phase-indicator. In some cases, instead of the high-pressure feeders starting from omnibus bars, each alternator works independently and the feeders are grouped

Fig. 5.

together on the various alternators as required. A number of high-pressure feeders are carried from the main switchboard to various transformer sub-centres or else run throughout the district to which current is to be furnished. If the system laid down is the transformer sub-centre system, then at each of these sub-centres is placed a battery of alternating-current transformers, Tj T2 T3, having their primary circuits all joined in parallel to the terminals of the high-

pressure feeders, and their secondary circuits all joined in parallel on a distributing main, suitable switches and cut-outs being interposed. The pressure of the current is then transformed down by these transformers to the required supply pressure. The secondary circuits of these transformers are generally provided with three terminals, so as to supply the low-pressure side on a three- wire system. It is not advisable to connect together directly the secondary circuits of all the different sub-centres, because then a fault or short circuit on one secondary system affects all the others. In banking together transformers in this manner in a sub-station it is necessary to take care that the transformation ratio and secondary drop (see Transformers) are exactly the same, otherwise one transformer will take more than its full share of the load and will become overheated. The transformer sub- station system can only be adopted where the area of supply is tolerably compact. Where the consumers lie scattered over a large area, it is necessary to carry the high-pressure mains throughout the area, and to place a separate transformer or transformers in each building. From a financial point of view, this " house-to-house system " of alternating-current supply, generally speaking, is less satisfactory in results than the trans- former sub-centre system. In the latter some of the transformers can be switched off, either by hand or by automatic apparatus, during the time when the load is light, and then no power is expended in magnetizing their cores. But with the house-to- house system the whole of the transformers continually remain connected with the high-pressure circuits; hence in the case of supply stations which have only an ordinary electric lighting load, and therefore a load-factor not above 10%, the efficiency of distribution is considerably diminished.

The single-phase alternating-current system is defective in that it cannot be readily combined with secondary batteries for the storage of electric energy. Hence in many places preference is now given to the polyphase system. In such a system a poly- phase alternating current, either two- or three-phase, is trans- mitted from the generating station at a pressure of 5000 to 10,000 volts, or sometimes higher, and at various sub-stations is transformed down, first by static transformers into an alter- nating current of lower pressure, say 500 volts, and then by

means of rotatory transformers into a continuous current of 500 volts or lower for use for lighting or traction.

In the case of large cities such as London, New York, Chicago, Berlin and Paris the use of small supply stations situated in the interior of the city has gradually given way to the establishment of large supply stations outside the area; in these alternating current is generated on the single or polyphase system at a high voltage and transmitted by underground cables to sub-stations in the city, at which it is transformed down for distribution for private and public electric lighting and for urban electric traction.

Owing to the high relative cost of electric power when generated in small amounts and the great advantages of generating it in proximity to coal mines and waterfalls, the supply of electric power in bulk to small towns and manufacturing districts has become a great feature in modern electrical engineering. In Great Britain, where there is little useful water power but abundance of coal, electric supply stations for supply in bulk have been built in the coal-producing districts of South Wales, the Midlands, the Clyde valley and Yorkshire. In these cases the current is a polyphase current generated at a high voltage, 5000 to 10,000 volts, and sometimes raised again in pressure to 20,000 or 40,000 volts and transmitted by overhead lines to the districts to be supplied It is there reduced in voltage by trans- formers and employed as an alternating current, or is used to drive polyphase motors coupled to direct current generators to reproduce the power in continuous current form. It is then distributed for local lighting, street or railway traction, driving motors, and metallurgical or electro-chemical applications. Experience has shown that it is quite feasible to distribute in all directions for 25 miles round a high-pressure generating station, which thus supplies an area of nearly 2000 sq. m. At such stations, employing large turbine engines and alternators, electric power may be generated at a works cost of o-37sd. per kilowatt (K.W.), the coal cost being less than o-i2sd. per K.W., and the selling price to large load-factor users not more than o-5d. per K.W. The average price of supply from the local generating stations in towns and cities is from 3d. to 4d. per unit, electric energy for power and heating being charged at a lower rate than that for lighting only.*

We have next to consider the structure and the arrangement of the conductors employed to convey the currents from their place of creation to that of utilization. The conductors themselves for the most part consist of copper having a conductivity of not less than 98% according to Matthiessen's standard. They are distinguished as (1) External conductors, which are a part of the public supply and belong to the corporation or company supplying the electricity; (2) Internal conductors, or house wiring, forming a part of the structure

of the house or building supplied and usually the property of its owner.

The external conductors may be overhead or underground. Overhead conductors may consist of bare stranded copper cables carried on porcelain insulators mounted on stout iron Bˆteraai or w00c ; en poles. If the current is a high-pressure tors. ” one, these insulators must be carefully tested, and are preferably of the pattern known as oil insulators. In and near towns it is necessary to employ insulated overhead conductors, generally india-rubber-covered stranded copper cables, suspended by leather loops from steel bearer wires which take the weight The British Board of Trade have issued elaborate rules for the construction of overhead lines to transmit large electric currents. Where telephone and telegraph wires pass over such overhead electric lighting wires, they have to be protected from falling on the latter by means of guard wires.

By far the largest part, however, of the external electric distribution is now carried out by underground conductors, which are either bare or insulated. Bare copper conductors may be carried underground in culverts or chases, air being in this case the insulating material, as in the overhead system. A culvert and covered chase is constructed under the road or side-walk, and properly shaped oak crossbars are placed in it carrying

Conduc- tors.

glass or porcelain insulators, on which stranded copper cables, or, preferably; copper strips placed edgeways, are stretched and supported. The advantages of this method of construction are cheapness and the ease with which connexions can be made with service-lines for house supply; the disadvantages are the somewhat large space in which coal-gas leaking out of gas-pipes can accumulate, and the difficulty of keeping the culverts at all times free from rain-water. Moisture has a tendency to collect on the negative insulators, and hence to make a dead earth on the negative side of the main; while unless the culverts are well ventilated, explosions from mixtures of coal-gas and air are liable to occur. Insulated cables are insulated either with a material which is in itself waterproof, or with one which is only waterproof in so far as it is enclosed in a waterproof tube, e.g. of lead. Gutta-percha and india-rubber are examples of materials of the former kind. Gutta-percha, although practically everlasting when in darkness and laid under water, as in the case of submarine cables, has not been found satisfactory for use with large systems of electric distribution,

although much employed for telephone and telegraph work. Insulated under- ground external conductors are of three types: — (a) Insulated Cables drawn into Pipes. — In this system of distribution cast-iron or stoneware pipes, or special stoneware conduits, or conduits made of a material called bitumen concrete, are first laid under- ground in the street. These contain a number of holes or " ways," and at intervals drawing-in boxes are placed which consist of a brick or cast-iron box having a water-tight lid, by means of which access is gained to a certain section of the conduit. Wires are used to draw in the cables, which are covered with either india- rubber or lead, the copper being insulated by means of paper, impregnated jute, or other similar material. The advantages of a drawing-in system are that spare ways can be left when the conduits are put in, so that at a future time fresh cables can be added without breaking up the roadway, (b) Cables in Bitumen. — One of the earliest systems of distribution employed by T. A. Edison consisted in fixing two segment-shaped copper conductors in a steel tube, the interspace between the conductors and the tube being filled in with a bitumen compound. A later plan is to lay down an iron trough, in which the cables are supported by wooden bearers at proper distances, and fill in the whole with natural bitumen. This system has been carried out extensively by the Callendar Cable Company. Occasionally concentric lead- covered and armoured cables are laid in this way, and then form an expensive but highly efficient form of insulated conductor. In selecting a system of distribution regard must be paid to the nature of the soil in which the cables are laid. Lead is easily attacked by soft water, although under some conditions it is apparently exceedingly durable, and an atmosphere containing coal-gas is injurious to india-rubber, (c) Armoured Cables. — In a very extensively used system of distribution armoured cables are employed. In this case the copper conductors, two, three or more in number, may be twisted together or arranged concen- trically, and insulated by means of specially prepared jute or paper insulation, overlaid with a continuous tube of lead. Over the lead, but separated by a hemp covering, is put a steel armour consisting of two layers of steel strip, wound in opposite directions and kept in place by an external covering. Such a cable can be laid directly in the ground without any preparation other than the excavation of a simple trench, junction-boxes being inserted at intervals to allow of branch cables being taken off. The armoured cable used is generally of the concentric pattern (fig. 6). It consists of a stranded copper cable composed of a number of wires twisted together and overlaid with an insulating material. Outside this a tubular arrangement of copper wires and a second layer of insulation, and finally a protective

covering of lead and steel wires or armour are placed. In some cases three concentric cylindrical conductors are formed' by twisting wires or copper strips with insulating material between. In others two or three cables of stranded copper are embedded in insulating material and included in a lead sheath. This last type of cable is usually called a two- or three-core pattern cable (fig. 7)-

The arrangement and nature of the external conductors depends on the system of electric supply in which- they are used. In the case of continuous-current supply for incandescent electric lighting and motive power in small units, when the external conductors are laid down on the three-wire system,

rCffiQCrv

Fig. 6.— Armoured Concentric Fig. 7. — Triple Conductor Cable (Section). Armoured Cable (Section).

IC,

Inner conductor.

c,

Copper conductor

oc

, Outer conductor.

I,

Insulation.

I,

Insulation.

L,

Lead sheath.

L,

Lead sheath.

H,

Hemp covering.

s,

Steel armour.

s,

Steel armour.

H,

Hemp covering.

each main or branch cable in the street consists of a set of three conductors called the positive, middle and negative. Of these triple conductors some run from the supply station to various points in the area of supply without being tapped, and are called the feeders; others, called the distributing mains, are used for making connexions with the service lines of the consumers, one service line, as already explained, being connected to the middle conductor, and the other to either the positive or the negative one. Since the middle conductor serves to convey only the difference between the currents being used on the two sides of the system, it is smaller in section than the positive and negative ones. In laying out the system great judgment has to be exercised as to the selection of the points of attachment of the feeders to the distributing mains, the object being to keep a constant electric pressure or voltage between the two service-lines in all the houses independently of the varying demand for current. Legally the suppliers are under regulations to keep the supply voltage constant within 4% either way above or below the standard pressure. As a matter of fact very few stations do maintain such good regulation. Hence a considerable variation in the light given by the incandescent lamps is observed, since the candle-power of carbon glow lamps varies as the fifth or sixth power of the voltage of supply, i.e. a variation of only 2% in the supply pressure affects the resulting candle-power of the lamps to the extent of 10 or 1 2 %. This variation is, how- ever, less in the case of metallic filament lamps (see Lighting: Electric). In the service-lines are inserted the meters for measur- ing the electric energy supplied to the customer (see Meter, Electric).

In the interior of houses and buildings the conductors generally consist of india-rubber-covered cables laid in wood casing.

The copper wire must be tinned and then covered, wiring. ˆ r ˆ t w ˆ-k a ˆ a y er ˚f unvulcanized pure india-rubber,

then with a layer of vulcanized rubber, and lastly with one or more layers of protective cotton twist or tape. No conductor of this character employed for interior house-wiring should have a smaller insulation resistance than 300 megohms per mile when tested with a pressure of 600 volts after soaking 24 hours in water. The wood casing should, if placed in damp positions or under plaster, be well varnished with waterproof varnish. As far as possible all joints in the run of the cable should be avoided by the use of the so-called looping-in system, and after the wiring is complete, careful tests for insulation should be made. The Institution of Electrical Engineers of Great Britain have drawn up rules to be followed in interior house-wiring, and the principal Fire Insurance offices, following the lead of the Phoenix Fire Office, of London, have made

regulations which, if followed, are a safeguard against bad workmanship and resulting possibility of damage by fire. Where fires having an electric origin have taken place, they have in- variably been traced to some breach of these rules. Opinions differ, however, as to the value and security of this method of laying interior conductors in buildings, and two or three alter- native systems have been much employed. In one of these, called the interior conduit system, highly insulating waterproof and practically fireproof tubes or conduits replace the wooden casing; these, being either of plain insulating material, or covered with brass or steel armour, may be placed under plaster or against walls. They are connected by bends or joint-boxes. The insulated wires being drawn into them, any short circuit or heating of the wire cannot give rise to a fire, as it can only take place in the interior of a non-inflammable tube. A third system of electric light wiring is the safety concentric system, in which concentric conductors are used. The inner one, which is well insulated, consists of a copper-stranded cable. The outer may be a galvanized iron strand, a copper tape or braid, or a brass tube, and is therefore necessarily connected with the earth. A fourth system consists in the employment of twin- insulated wires twisted together and sheathed with a lead tube; the conductor thus formed can be fastened by staples against walls, or laid under plaster or floors. «

The general arrangement for distributing current to the different portions of a building for the purpose of electric lighting is to run up

one or more rising mains, from which branches are taken off to distributing boxes on each floor, and from these boxes to carry various branch circuits to the lamps. At the distributing boxes are collected the cut-outs and switches controlling the various circuits. . When alternating currents are employed, it is usual to select as a type of conductor either twin-twisted conductor or concentric; and the employment of these types of cable, rather than two separate cables, is essential in any case where there are telephone or telegraph wires in proximity, for otherwise the alternating current would create inductive disturbances in the telephone circuit. The house-wiring also comprises the details of switches for controlling the lamps, cut-outs or fuses for preventing an excess of current passing, and fixtures or supports for lamps often of an ornamental character. For the details of these, special treatises on electric interior wiring must be consulted.

For further information the reader may be referred to the following books: — C H. Wordingham, Central Electrical Stations (London, 1901) ; A. Gay and C. Y. Yeaman, Central Station Electricity Supply (London, 1906); S. P. Thompson, Dynamo Electric Machinery (2 vols., London, 1905); E. Tremlett Carter and T. Davies, Motive Power and Gearing (London, 1906) ; W. C. Clinton, Electric Wiring (2nd ed., London, 1906); W. Perren Maycock, Electric Wiring, Fitting, Switches and Lamps (London, 1899) ; D. Salomons, Electric Light Installations (London, 1894); Stuart A. Russell, Electric Light Cables (London, 1901); F. A. C. Perrine, Conductors for Electrical Distribution (London, 1903); E. Rosenberg, W. W. Haldane Gee and C. Kinzbrunner, Electrical Engineering (London, 1903) ; E. C. Metcalfe, Practical Electric Wiring for Lighting Installations (London, 1905) ; F. C. Raphael, The Wtreman's Pocket Book (London, 1903). (J. A. F.)

II. Commercial Aspects. — To enable the public supply enter- prises referred to in the foregoing section to be carried out in England, statutory powers became necessary to break up the streets. In the early days a few small stations were established for the supply of electricity within " block " buildings, or by means of overhead wires within restricted areas, but the limitatons proved uneconomical and the installations were for the most part merged into larger undertakings sanc- tioned by parliamentary powers. In the year 1879 the British government had its attention directed for the first time to electric lighting as a possible subject for legislation, and the consideration of the then existing state of electric lighting was referred to a select committee of the House of Commons. No legislative action, however, was taken at that time. In fact the

invention of the incandescent lamp was incomplete — Edison's British master-patent was only filed in Great Britain in November 1879. In 1881 and 1882 electrical exhibitions were held in Paris and at the Crystal Palace, London, where the improved electric

incandescent lamp was brought before the general public. In 1882 parliament passed the first Electric Lighting Act, and considerable speculation ensued. The aggregate capital of the companies registered in 1882-1883 to carry out the public supply of electricity in the United Kingdom amounted to £15,000,000, but the onerous conditions of the act deterred investors from proceeding with the enterprise. Not one of the sixty- two provisional orders granted to companies in 1883 under the act was carried out. In 1884 the Board of Trade received only four applications for provisional orders, and during the subsequent four years only one order was granted. Capitalists declined to go on with a business which if successful could be taken away from them by local authorities at the end of twenty-one years upon terms of paying only the then value of the plant, lands and buildings, without regard to past or future profits, goodwill or other considerations. The electrical industry in Great Britain ripened at a time when public opinion was averse to the creation of further monopolies, the general belief being that railway, water and gas companies had in the past received valuable concessions on terms which did not sufficiently safe- guard the interests of the community. The great development of industries by means of private enterprise in the early part of the 19th century produced a reaction which in the latter part of the century had the effect of discouraging the creation by private enterprise of undertakings partaking of the nature of monopolies; and at the same time efforts were made to strengthen local and municipal institutions by investing them with wider functions. There were no fixed principles governing the relations between the state or municipal authorities and commercial companies rendering monopoly services. The new conditions imposed on private enterprise for the purpose of safeguarding the interests of the public were very tentative, and a former permanent secretary of the Board of Trade has stated that the efforts made by parliament in these directions have sometimes proved injurious alike to the public and to investors. One of these tentative measures was the Tramways Act 1870, and twelve years later it was followed by the first Electric Lighting Act.

It was several years before parliament recognized the harm that had been done by the passing of the Electric Lighting Act 1882. A select committee of the House of Lords sat in 1886 to consider the question of reform, and as a result the Electric Lighting Act 1888 was passed. This amending act altered the period of purchase from twenty-one to forty-two years, but the terms of purchase were not materially altered in favour of investors. The act, while stipulating for the consent of local authorities to the granting of provisional orders, gives the Board of Trade power in exceptional cases to dispense with the consent, but this power has been used very sparingly. The right of vetoing an undertaking, conferred on local authorities by the Electric Lighting Acts and also by the Tramways Act 1870, has frequently been made use of to exact unduly onerous conditions from promoters, and has been the subject of complaint for years. Although, in the opinion of ministers of the Crown, the exercise of the veto by local authorities has on several occasions led to considerable scandals, no government has so far been able, owing to the very great power possessed by local authorities, to modify the law in this respect. After 1888 electric lighting went ahead in Great Britain for the first time, although other countries where legislation was different had long previously enjoyed its benefits. The developments pro- ceeded along three well-defined lines. In London, where none of the gas undertakings was in the hands of local authorities, many of the districts were allotted to companies, and competition was permitted between two and sometimes three companies. In the provinces the cities and larger towns were held by the municipalities, while the smaller towns, in cases where consents could be obtained, were left to the enterprise of companies. Where consents could not be obtained these towns were for some time left without supply.

Some statistics showing the position of the electricity supply business respectively in 1896 and 1906 are interesting as .indicating

the progress made and as a means of comparison between these two periods of the state of the industry as a whole In 1896 thirty-eight companies were at work with an aggregate capital of about £6,000,000, and thirty-three municipalities with electric lighting loans of nearly £2,000,000. The figures for 1906, ten years later, show that 187 electricity supply companies were in operation with a total invest- ment of close on £32,000,000, and 277 municipalities with loans amounting to close on £36,000,000. The average return on the capital invested in the companies at the later period was 5-1 % per annum. In 1896 the average capital expenditure was about £100 per kilowatt of plant installed; and £50 per kilowatt was

regarded as a very low record. For 1906 the average capital expenditure per kilowatt installed was about £81. The main divisions of the average expenditure are : —

1896.

Land and buildings . . .22-3°

36-7

32-2

4-6

3-2

1906.

17-8% 36-5 35-5 5-7

2-8

Plant and machinery

Mains

Meters and instruments

Provisional orders, &c

The load connected, expressed in equivalents of eight candle-power lamps, was 2,000,000 in 1896 and 24,000,000 in 1906 About one-third of this load would be for power purposes and about two-thirds for lighting. The Board of Trade units sold were 30,200,000 in 1896 arll d 533,600,000 in 1906, and the average prices per unit obtained were 5-7d. and 2-7d. respectively., or a revenue of £717,250 in 1896 and over £6,000,000 in 1906. The working expenses per Board of Trade unit sold, excluding depreciation, sinking fund and interest were as follows : —

Generation and distribution Rent, rates and taxes Management Sundries .

Total . . . 4-07d. i-33d.

In 1896 the greatest output at one station was about 55 million units, while in 1906 the station at Manchester had the largest output

of over 40 million units.

The capacity of the plants installed in the United Kingdom in 1906 was: —

K.W.

1896.

1906.

2-8ld.

•99d.

•35

•14

•81

•18

•10

•02

Continuous current

Alternating current

Continuous current and alternating current combined

417,000 132,000

> 480,000 j

{ Provinces I London 4 Provinces \ London

Provinces London

333,000 84,000 83,000 49,000

366.000 1 14,000

*Eco- nomics**

1,029,000 k.w.

The economics of electric lighting .were at first assumed to be similar to those of gas lighting. Experience, however, soon proved that there were important differences, one being that gas may be stored in gasometers without appreciable loss and the work of production carried on steadily without reference to fluctuations of demand. Electri- city cannot be economically stored to the same extent, and for the most part it has to be used as it is generated. The demand for electric light is practically confined to the hours between sunset and midnight, and it rises sharply to a " peak " during this period. Consequently the generating station has to be equipped with plant of sufficient capacity to cope with the maximum load, although the peak does not persist for many minutes — a condition which is very uneconomical both as re- gards capital expenditure and working costs (see Lighting: Electric). In order to obviate the unproductiveness of the generating plant during the greater part of the day, electricity supply undertakings sought to develop the " daylight " load. This they did by supplying electricity for traction purposes, but more particularly for industrial power purposes. The difficulties in the way of this line of development, however, were that electric power could not be supplied cheaply enough to compete with steam, hydraulic, gas and other forms of power, unless it was generated on a very large scale, and this large demand could not be developed within the restricted areas for which provisional orders were granted and under the restrictive conditions of these orders in regard to situation of power-house and other matters.

The leading factors which make for economy in electricity supply are the magnitude of the output, the load factor, and

the diversity factor, also the situation of the power house, the means of distribution, and the provision of suitable, trustworthy and efficient plant. These factors become more favourable the larger the area and the greater and more varied the demand to be supplied. Generally speaking, as the output increases so the cost per unit diminishes, but the ratio (called the load factor) which the output during any given period bears to the maximum possible output during the same period has a very important influence on costs. The ideal condition would be when a power station is working at its normal maximum output continuously night and day. This would give a load-factor of 100%, and represents the ultimate ideal towards which the electrical engineer strives by increasing the area of his

operations and consequently also the load and the variety of the overlapping demands. It is only by combining a large number of demands which fluctuate at different times — that is by achieving a high diversity factor — that the supplier of electricity can hope to approach the ideal of continuous and steady output. Owing to the dovetailing of miscellaneous demands the actual demand on a power station at any moment is never anything like the aggregate of all the maximum demands. One large station would require a plant of 36,000 k.w. capacity if all the demands came upon the station simultaneously, but the maximum demand on the generating plant is only 1 5,000 kilowatts. The difference between these two figures may be taken to represent the economy effected by combining a large number of demands on one station. In short, the keynote of progress in cheap electricity is increased and diversified demand combined with concentration of load. The average load-factor of all the British electricity stations in 1907 was 14-5% — a figure which tends to improve.

Several electric power supply companies have been established in the United Kingdom to give practical effect to these principles.

The Electric Lighting Acts, however, do not provide Pow ˆ r for the establishment of large power companies, and panies. special acts of parliament have had to be promoted

to authorize these undertakings. In 1898 several bills were introduced in parliament for these purposes. They were referred to a joint committee of both Houses of Parliament presided over by Lord Cross. The committee concluded that, where sufficient public advantages are shown, powers should be given for the supply of electricity over areas including the districts of several local authorities and involving the use of exceptional plant; that the usual conditions of purchase of the undertakings by the local authorities did not apply to such undertakings; that the period of forty-two years was " none too long " a tenure; and that the terms of purchase should be reconsidered. With regard to the provision of the Electric Lighting Acts which requires that the consent of the local authority should be obtained as a condition precedent to the granting of a provisional order, the committee was of opinion that the local authority should be entitled to be heard by the Board of Trade, but should not have the power of veto. No general legislation took place as a result of these recommendations, but the undermentioned special acts constituting power supply companies were passed.

In 1902 the president of the Board of Trade stated that a bill had

been drafted which he thought " would go far to meet all the reasonable objections that had been urged against the present powers by the local authorities." In 1904 the government introduced the Supply of Electricity Bill, which provided for the removal of some of the minor anomalies in the law relating to electricity. The bill passed through all its stages in the House of Lords but was not proceeded with in the House of Commons. In 1905 the bill was again presented to parliament but allowed to lie on the table. In the words of the president of the Board of Trade, there was " difficulty of dealing with this question so long as local authorities took so strong a view as to the power which ought to be reserved to them in connexion with this enterprise." In the official language of the council of the Institution of Electrical Engineers, the development of electrical science in the United Kingdom is in a backward condition as compared with other countries in respect of the practical application to the industrial and social requirements of the nation,

notwithstanding that Englishmen have been among the first in inventive genius. The cause of such backwardness is largely due to the conditions under which the electrical industry has been carried on in the country, and especially to the restrictive character of the legislation governing the initiation and develop- ment of electrical power and traction undertakings, and to the powers of obstruction granted to local authorities. Eventually The Electric Lighting Act 1 909 was passed. This Act provides : — (1) for the granting of provisional orders authorizing any local authority or company to supply electricity in bulk; (2) for the exercise of electric lighting powers by local authorities jointly under provisional order; (3) for the supply of electricity to railways, canals and tramways outside the area of supply with the consent of the Board of Trade; (4) for the compulsory acquisition of land for generating stations by provisional order; (5) for the exemption of agreements for the supply of electricity from stamp duty; and (6) for the amendment of regulations relating to July notices, revision of maximum price, certification of meters, transfer of powers of undertakers, auditors' reports, and other matters.

The first of the Power Bills was promoted in 1898, under which it was proposed to erect a large generating station in the Midlands from which an area of about two thousand square miles would be supplied. Vigorous opposition was organized against the bill by the local authorities and it did not pass. The bill was revived in 1899, but was finally crushed. In 1900 and following years several power bills were successfully promoted, and the following are the areas over which the powers of these acts extend:

In Scotland, (1) the Clyde Valley, (2) the county of Fife, (3) the districts described as " Scottish Central," comprising Linlithgow, Clackmannan, and portions of Dumbarton and Stirling, and (4) the Lothians, which include portions of Mid- lothian, East Lothian, Peebles and Lanark.

In England there are companies operating in (1) Northumber- land, (2) Durham county, (3) Lancashire, (4) South Wales and Carmarthenshire, (5) Derbyshire and Nottinghamshire, (6) Leicestershire and Warwickshire, (7) Yorkshire, (8) Shropshire, Worcestershire and Staffordshire, (9) Somerset, (10) Kent, (11) Cornwall, (12) portions of Gloucestershire, (13) North Wales, (14) North Staffordshire, Derbyshire, Denbighshire and Flint- shire, (15) West Cumberland, (16) the Cleveland district, (17) the North Metropolitan district, and (18) the West Metro politan area. An undertaking which may be included in this category, although it is not a Power Act company, is the Midland Electric Corporation in South Staffordshire. The systems of generation and distribution are generally 10,000 or 11,000 volts three-phase alternating current.

The powers conferred by these acts were much restricted as a result of opposition offered to them. In many cases the larger towns were cut out of the areas of supply altogether, but the general rule was that the power company was prohibited from supplying direct to a power consumer in the area of an authorized distributor without the consent of the latter, subject to appeal to the Board of Trade. Even this restricted power of direct supply was not embodied in all the acts, the power of taking supply in bulk being left only to certain authorized distributors and to authorized users such as railways and tramways. Owing chiefly to the exclusion of large towns and industrial centres from their areas, these power supply companies did not all prove as successful as was expected.

In the case of one of the power companies which has been in a favourable position for the development of its business, the theoretical conclusions in regard to the economy of large pro- duction above stated have been amply demonstrated in practice. In 1 90 1, when this company was emerging from the stage of a simple electric lighting company, the total costs per unit were i'05d. with an output of about 2\ million units per annum. In 1905 the output rose to over 30 million units mostly for power and traction purposes, and the costs fell to o-56d. per unit.

An interesting phase of the power supply question has arisen in London. Under the general acts it was stipulated that the power-

house should be erected within the area of supply, and

amalgamation of undertakings was prohibited. After less than a decade of development several of the companies in London found themselves obliged to make considerable additions to their generating plants. But their existing buildings were full to their utmost capacity, and the difficulties of generating cheaply on crowded sites had increased instead of diminished during the interval. Several of the companies had to promote special acts of parliament to obtain relief, but the idea of a general combina- tion was not considered to be within the range of practical politics until 1905, when the Administrative County of London Electric Power Bill was introduced. Compared with other large cities, the consumption of electricity in London is small. The output of electricity in New York for all purposes is 971 million units per annum or 282 units per head of population. The output of electricity in London is only 42 units per head per annum. There are in London twelve local authorities and fourteen companies carrying on electricity supply undertakings. The capital expenditure is £3,127,000 by the local authorities and £12,530,000 by the companies, and their aggregate capacity of plant is 165,000 k.w. The total output is about 160,000,000 units per annum, the total revenue is over £2,000,000, and the gross profit before providing for interest and sinking fund charges is £1,158,000. The general average cost of production is i-55d. per unit, and the average price per unit sold is 3-i6d., but some of the undertakers have already supplied electricity to large power consumers at below id. per unit. By generating on a large scale for a wide variety of demands the promoters of the new scheme calculated to be able to offer electrical energy in bulk to electricity supply companies and local authorities at prices substantially below their costs of production at separate stations, and also to provide them and power users with electricity at rates which would compete with other forms of power. The authorized capital was fixed at £6,666,000, and the initial outlay on the first plant of 90,000 k.w., mains, &c, was estimated at £2,000,000. The costs of generation were estimated at o-i5d. per unit, and the total cost at o-52d. per unit sold. The output by the year 1911 was estimated at 133,500,000 units at an average selling price of o-7d. per unit, to be reduced to o-55d. by 1916 when the output was estimated at 600,000,000 units. The bill underwent a searching examination before the House of Lords committee and was passed in an amended form. At the second reading in the House of

Commons a strong effort was made to throw it out, but it was allowed to go to committee on the condition — contrary to the general recommendations of the parliamentary committee of 1898 — that a purchase clause would be inserted; but amendments were proposed to such an extent that the bill was not reported for third reading until the eve of the prorogation of parliament. In the following year (1906) the Administrative Company's bill was again introduced in parliament, but the London County Council, which had previously adopted an attitude both hostile and negative, also brought forward a similar bill. Among other schemes, one known as the Additional Electric Power Supply Bill was to authorize the transmission of current from St Neots in Hunts. This bill was rejected by the House of Commons because the promoters declined to give precedence to the bill of the London County Council. The latter bill was referred to a hybrid committee with instructions to consider the whole question of London power supply, but it was ultimately rejected. The same result attended a second bill which was promoted by the London County Council in 1907. The question was settled by the London Electric Supply Act 1908, which constitutes the London County Council the purchasing authority (in the place of the local authorities) for the electric supply companies in London. This Act also enabled the Companies and other authorized undertakers to enter into agreements for the exchange of current and the linking-up of stations.

The general supply of electricity is governed primarily by the two acts of parliament passed in 1882 and 1888, which apply to the whole of the United Kingdom. Until 1899 the other statutory provisions relating to electricity supply were incor- porated in provisional orders granted by the Board of Trade

and confirmed by parliament in respect of each undertaking, but in that year an Electric Lighting Clauses Act was passed by which the clauses previously inserted in each order Legisia- were standardized. Under these acts the Board of tion and Trade made rules with respect to applications for reguia- licences and provisional orders, and regulations for t,ons – the protection of the public, and of the electric lines and works of the post office, and others, and also drew up a model form for provisional orders.

Until the passing of the Electric Lighting Acts, wires could be placed wherever permission for doing so could be obtained, but persons breaking up streets even with the consent of the local authority were liable to indictment for nuisance. With regard to overhead wires crossing the streets, the local authorities had no greater power than

any member of the public, but a road authority having power to make a contract for lighting the road could authorize others to erect poles and wires for the purpose. A property owner, however, was able to prevent wires from being taken over his property. The act of 1888 made all electric lines or other works for the supply of electricity, not entirely enclosed within buildings or premises in the same occupation, subject to regulations of the Board of Trade. The postmaster-general may also impose conditions for the protection of the post office. Urban authorities, the London County Council, and some other corporations have now powers to make by-laws for prevention of obstruction from posts and overhead wires for telegraph, telephone, lighting or signalling purposes; and electric lighting stations are now subject to the provisions of the Factory Acts.

Parliamentary powers to supply electricity can now be obtained by (A) Special Act, (B) Licence, or © Provisional order.

A. Special Act. — Prior to the report of Lord Cross's joint committee of 1898 (referred to above), only one special act was passed. The provisions of the Electric Power Acts passed subsequently are not uniform, but the following are some of the usual provisions: —

The company shall not supply electricity for lighting purposes except to authorized undertakers, provided that the energy supplied to any person for power may be used for lighting any premises on which the power is utilized. The company shall not supply energy (except to authorized undertakers) in any area which forms part of the area of supply of any authorized dis- tributors without their consent, such consent not to be unreason- ably withheld. The company is bound to supply authorized undertakers upon receiving notice and upon the applicants agreeing to pay for at least seven years an amount sufficient to yield 20% on the outlay (excluding generating plant or wires already installed). Other persons to whom the company is authorized to supply may require it upon terms to be settled, if not agreed, by the Board of Trade. Dividends are usually restricted to 8 %, with a provision that the rate may be increased upon the average price charged being reduced. The maximum charges are usually limited to 3d. per unit for any quantity up to 400 hours' supply, and 2d. per unit beyond. No preference is to be shown between consumers in like circumstances. Many pro- visions of the general Electric Lighting Acts are excluded from these special acts, in particular the clause giving the local authority the right to purchase the undertaking compulsorily.

B. Licence. — The only advantages of proceeding by licence are that it can be expeditiously obtained and does not require confirmation by parliament; but some of the provisions usually inserted in provisional orders would be ultra vires in a licence, and the Electric Lighting Clauses Act 1899 does not extend to licences. The term of a licence does not excegd seven years, but is renewable. The consent of the local authority is necessary even to an application for a licence. None of the licences that have been granted is now in force.

C. Provisional Order. — An intending applicant for a pro- visional order must serve notice of his intention on every local authority within the proposed area of supply on or before the 1st of July prior to the session in which application is to be made to the Board of Trade. This provision has given rise to much com- plaint, as it gives the local authorities a long time for bargaining

and enables them to supersede the company's application by themselves applying for provisional orders. The Board of Trade generally give preference to the applications of local authorities.

In 1905 the Board of "Trade issued a memorandum stating that, in view of the revocation of a large number of provisional orders which had been obtained by local authorities, or in regard to which local authorities had entered into agreements with companies for carrying the orders into effect (which agreements were in many cases ultra vires or at least of doubtful validity) , it appeared undesirable that a local authority should apply for a provisional order without having a definite intention of exercising the powers, and that in future the Board of Trade would not grant an order to a local authority unless the board were satisfied that the powers would be exercised within a specified period.

Every undertaking authorized by provisional order is subject to the provision of the general act entitling the local authority to purchase compulsorily at the end of forty-two years (or shorter period), or after the expiration of every subsequent period of ten years (unless varied by agreement between the parties with the consent of the Board of Trade), so much of the undertaking as is within the jurisdiction of the purchasing authority upon the terms of paying the then value of all lands, buildings, works, materials and plant, suitable to and used for the purposes of the undertaking; provided

that the value of such lands, &c, shall be deemed to be their fair market value at the time of purchase, due regard being had to the nature and then condition and state of repair thereof, and to the circum- stance that they are in such positions as to be ready for immediate working, and to the suitability of the same to the purposes of the undertaking, and where a part only of the undertaking is purchased, to any loss occasioned by severance, but without any addition in respect of compulsory purchase or of goodwill, or of any profits which may or might have been or be made from the undertaking or any similar consideration. Subject to this right of purchase by the local authority, a provisional order (but not a licence) may be for such period as the Board of Trade may think proper, but so far no limit has been imposed, and unless purchased by a local authority the powers are held in perpetuity. No monopoly is granted to undertakers, and since 1889 the policy of the Board of Trade has been to sanction two undertakings in the same metropolitan area, preferably using different systems, but to discourage competing schemes within the same area in the provinces. Undertakers must within two years lay mains in certain specified streets. After the first eighteen months they may be required to lay mains in other streets upon conditions specified in the order, and any owner or occupier of premises within 50 yds. of a distributing main may require the undertakers to give a supply to his premises; but the consumer must pay the cost of the lines laid upon his property and of so much outside as exceeds 60 ft. from the main, and he must also contract for two and in some cases for three years' supply. But undertakers are prohibited in making agreements for supply from showing any undue preference. The maximum price in London is 13s. 4d. per quarter for any quantity up to 20 units, and beyond that 8d. per unit, but 1 is. 8d. per quarter up to 20 units and 7d. per unit beyond is the more general maximum. The " Bermondsey clause " requires the undertakers (local authority) so to fix their charges (not exceeding the specified maximum) that the revenue shall not be less than the expenditure.

There is no statutory obligation on municipalities to provide for depreciation of electricity supply undertakings, but after providing for all expenses, interest on loans, and sinking fund instalments, the local authority may create a reserve fund until it amounts, with interest, to one-tenth of the aggregate capital expenditure. Any deficiency when not met out of reserve is payable out of the local rates.

The principle on which the Local Government Board sanctions municipal loans for electric lighting undertakings is that the period of

the loan shall not exceed the life of the works, and that future ratepayers shall not be unduly burdened. The periods of the loans vary from ten years for accumulators and arc lamps

The elec- trical

to sixty years for lands. Within the county of London the loans raised by the metropolitan borough councils for electrical purposes are sanctioned by the London County Council, and that body allows a minimum period of twenty years for repayment. Up to 1904-1905, 245 loans had been granted by the council amounting in the aggregate to £4,045,067.

In 1 901 the Institution of Civil Engineers appointed a com- mittee to consider the advisability of standardizing various kinds of iron and steel sections. Subsequently the w rf _• original reference was enlarged, and in 1902 the izatton. Institution of Electrical Engineers was invited to co-operate. The treasury, as well as railway companies, manu- facturers and others, have made grants to defray the expenses. The committee on electrical plant has ten sub-committees. In August 1904 an interim report was issued by the sub-committee on generators, motors and transformers, dealing with pressures and frequencies, rating of generators and motors, direct-current generators, alternating-current generators, and motors.

In 1903 the specification for British standard tramway rails and fish-plates was issued, and in 1904 a standard specification for tubular tramway poles was issued. A sectional committee was formed in 1904 to correspond with foreign countries with regard to the formation of an electrical international commission to study the question of an international standardization of nomenclature and ratings of electrical apparatus and machinery.

The electrical manufacturing branch, which is closely related to the' electricity supply and other operating departments of the electrical industry, only dates from about 1880. Since that time it has undergone many vicissitudes. It began with .the manufacture of small arc lighting industry. equipments for railway stations, streets and public buildings. When the incandescent lamp became a commercial article, ship-lighting sets and installations for theatres and mansions constituted the major portion of the electrical work. The next step was the organization of house-to-house distribu- tion of electricity from small " central stations," ultimately leading to the comprehensive public supply in large towns, which involved the manufacture of generating and distributing plants of considerable

magnitude and complexity. With the advent of electric traction about 1896, special machinery had to be produced, and at a later stage the manufacturer had to solve problems in connexion with bulk supply in large areas and for power purposes. Each of these main departments involved changes in ancillary manufactures, such as cables, switches, transformers, meters, &c, so that the electrical manufacturing industry has been in a constant state of transition. At the beginning of the period referred to Germany and America were following the lead of England in theoretical developments, and for some time Germany obtained electrical machinery from England. Now scarcely any electrical apparatus is exported to Germany, and considerable imports are received by England from that country and America. The explanation is to be found mainly in the fact that the adverse legislation of 1882 had the effect of restricting enterprise, and while British manufacturers were compulsorily inert during periods of impeded growth of the two most important branches of the industry — electric lighting and traction — manufacturers in America and on the continent of Europe, who were in many ways encouraged by their governments, devoted their resources to the establishment of factories and electrical undertakings, and to the development of efficient selling organizations at home and abroad. When after the amendment of the adverse legislation in 1888 a demand for electrical machinery arose in England, the foreign manu- facturers were fully organized for trade on a large scale, and were further aided by fiscal conditions to undersell English manufacturers, not only in neutral markets, but even in their own country. Successful manufacture on a large scale is possible only by standardizing the methods of production. English manufacturers were not able to standardize because they had not the necessary output. There had been no repetitive demand, and there was no production on a large scale. Foreign manu- facturers, however, were able to standardize by reason of the

large uniform demand which existed for their manufactures. Statistics are available showing the extent to which the growth of the electrical manufacturing industry in Great Britain was delayed. Nearly twenty years after the inception of the industry there were only twenty-four manufacturing companies registered in the United Kingdom, having an aggregate subscribed capital of under £7,000,000. But in 1907 there were 292 companies with over £42,000,000 subscribed capital. The cable and in- candescent lamp

sections show that when the British manu- facturers are allowed opportunities they are not slow to take advantage of them. The cable-making branch was established under the more encouraging conditions of the telegraph industry, and the lamp industry was in the early days protected by patents. Other departments not susceptible to foreign competition on account of freightage, such as the manufacture of storage batteries and rolling stock, are also fairly prosperous. In departments where special circumstances offer a prospect of success, the technical skill, commercial enterprise and general efficiency of British manufacturers manifest themselves by positive progress and not merely by the continuance of a struggle against adverse conditions. The normal posture of the British manufacturer of electrical machinery has been described as one of desperate defence of his home trade; that of the foreign manufacturer as one of vigorous attack upon British and other open markets. In considering the position of English manu- facturers as compared with their foreign rivals, some regard should be had to the patent laws. One condition of a grant of a patent in most foreign countries is that the patent shall be worked in those countries within a specified period. But a foreign inventor was until 1907 able to secure patent protection in Great Britain without any obligation to manufacture there. The effect of this was to encourage the manufacture of patented apparatus in foreign countries, and to stimulate their exportation to Great Britain in competition with British products. With regard to the electro-chemical industry the progress which has been achieved by other nations, notably Germany, is very marvellous by comparison with the advance made by England, but to state the reasons why this industry has had such extra- ordinary development in Germany, notwithstanding that many of the fundamental inventions were made in England, would require a statement of the marked differences in the methods by which industrial progress is promoted in the two countries.

There has been very little solidarity among those interested in the commercial development of electricity, and except for the discussion of scientific subjects there has been very little organization with the object of protecting and promoting common interests. (E. Ga.)

ELECTRIC WAVES. § 1. Clerk Maxwell proved that on his theory electro-magnetic disturbances are propagated as a wave motion through the dielectric, while Lord Kelvin in 1853 (Phil. Mag. [4] 5, p. 393) proved from electro-magnetic theory that the discharge of a condenser is oscillatory, a result which Feddersen (Pogg. Ann. 103, p. 69, &c.) verified by a beautiful series of experiments. The oscillating discharge of a condenser had been inferred by Henry as

long ago as 1842 from his experiments on the magnetization produced in needles by the discharge of a condenser. From these two results it follows that electric waves must be passing through the dielectric surrounding a condenser in the act of discharging, but it was not until 1887 that the existence of such waves was demonstrated by direct experiment. This great step was made by Hertz (Wied. Ann. 34, pp. iS5> 551, 609; Ausbreitung der elektrischen Kraft, Leipzig, 1892), whose experiments on this subject form one of the greatest contributions ever made to experimental physics. The difficulty which had stood in the way of the observations of these waves was the absence of any method of detecting electrical and magnetic forces, reversed some millions of times per second, and only lasting for an exceedingly short time. This was removed by Hertz, who showed that such forces would produce small sparks between pieces of metal very nearly in contact, and that these sparks were sufficiently regular to be used to detect electric waves and to investigate their properties. Other and more

delicate methods have subsequently been discovered, but the results obtained by Hertz with his detector were of such signal importance, that we shall begin our account of experiments on these waves by a description of some of Hertz's more fundamental experiments.

To produce the waves Hertz used two forms of vibrator. The first is represented in fig. 1. A and B are two zinc plates about

40 cm. square; to these brass rods, C, D, each about 30 cm. long, are soldered, terminating in brass balls E and F. To get good results it is necessary that these balls should be very brightly polished, and as they get roughened by the sparks which pass between them it is necessary to repolish them at short intervals ; they should be shaded from light and from sparks, or other source of ultra-violet light. In order to excite the waves, C and D are connected to the two poles of an induction coil; sparks cross the air-gap which becomes a conductor, and the charges on the plates oscillate backwards and forwards like the charges on the coatings of a Leyden jar when it is short-circuited. The object of polishing the balls and screening off light is to get a sudden and sharp discharge; if the balls are rough there will be sharp points from which the charge will gradually leak, and the discharge will not be abrupt enough to start electrical vibrations, as these have an exceedingly short period. From the open form of this vibrator we should expect the radiation to be very large and the rate of decay of the amplitude very rapid. Bjerknes (Wied. Ann. 44, p. 74) found that the amplitude fell to i/e of the original value, after a time 4T where T was the period of the electrical

vibrations. Thus after a few vibrations the amplitude becomes inappreciable. To detect the waves produced by this vibrator Hertz used a piece of copper wire bent into a circle, the ends being furnished with two balls, or a ball and a point connected by a screw, so that the distance between them admitted of very fine adjustment. The radius of the circle for use with the vibrator just described was 35 cm., and was so chosen that the free period of the detector might be the same as that of the vibrator, and the effects in it increased by resonance. It is evident, however, that with a primary system as greatly damped as the vibrator used by Hertz, we could not expect very marked resonance effects, and as a matter of fact the accurate timing of vibrator and detector in this case is not very important. With electrical vibrators which can maintain a large number of vibrations, resonance effects are very striking, as is beautifully shown by the following experiment due to Lodge (Nature, 41, p. 368), whose researches have greatly advanced our knowledge of electric waves. A and C (fig. 2) are

Fig. 2.

two Leyden jars, whose inner and outer coatings are connected by wires, B and D, bent so as to include a considerable area. There is an air-break in the circuit connecting the inside and outside of one of the jars, A, and electrical oscillations are started in A by joining the inside and outside with the terminals of a coil or electrical machine. The circuit in the jar C is provided

with a sliding piece, F, by means of which the self-induction of the discharging circuit, and, therefore, the time of an electrical oscillation of the jar, can be adjusted. The inside and outside of this jar are put almost, but not quite, into electrical contact by means of a piece of tin-foil, E, bent over the lip of the jar. The jars are placed face to face so that the circuits B and D are parallel to each other, and approximately at right angles to the line joining their centres. When the electrical machine is in action sparks pass across the air-break in the circuit in A, and by moving the slider F it is possible to find one position for it in which sparks pass from the inside to the outside of C across the tin-foil, while when the slider is moved a short distance on either side of this position the sparks cease.

Hertz found that when he held his detector in the neighbour- hood of

the vibrator minute sparks passed between the balls. These sparks were not stopped when a large plate of non-conduct- ing substance, such as the wall of a room, was interposed between the vibrator and detector, but a large plate of very thin metal stopped them completely.

To illustrate the analogy between electric waves and waves of light Hertz found another form of apparatus more convenient. The, vibrator consisted of two equal brass cylinders, 12 cm. long and 3 cm. in diameter, placed with their axes coincident, and in the focal line of a large zinc parabolic mirror about 2 m. high, with a focal length of 1 2 • 5 cm. The ends of the cylinders nearest each other, between which the sparks passed, were carefully polished. The detector, which was placed in the focal line of an equal parabolic mirror, consisted of two lengths of wire,

Fig. 3.

each having a straight piece about 50 cm. long and a curved piece about 1 5 cm. long bent round at right angles so as to pass through the back of the mirror. The ends which came through the mirror were connected with a spark micrometer, the sparks being observed from behind the mirror. The mirrors are shown in fig. 3.

§ 2. Reflection and Refraction. — To show the reflection of the waves Hertz placed the mirrors side by side, so that their openings looked in the same direction, and their axes converged at a point about 3 m. from the mirrors. No sparks were then observed in the detector when the vibrator was in action. When, however, a large zinc plate about 2 m. square was placed at right angles to the line bisecting the angle between the axes of the mirrors sparks became visible, but disappeared again when the metal plate was twisted through an angle of about 15 to either side. This experiment showed that electric waves are reflected, and that, approximately at any rate, the angle of incidence is equal to the angle of reflection. To show refraction Hertz used a large prism made of hard pitch, about 1-5 m. high,-with a slant side of 1-2 m. and an angle of 30°. When the waves from the vibrator passed through this the sparks in the detector were not excited when the axes of the two mirrors were parallel, but appeared when the axis of the mirror containing the detector made a certain angle with the axis of that containing the vibrator. When the system was adjusted for minimum deviation the sparks were most vigorous when the angle between the axes of the mirrors was 22 . This corresponds to an index of refraction of 1-69.

§ 3.' Analogy to a Plate of Tourmaline. — If a screen be made by winding wire round a large rectangular framework, so that

the turns of the wire are parallel to one pair of sides of the frame, and if this screen be interposed between the parabolic mirrors when placed so as to face each other, there will be no sparks in the detector when the turns of the wire are parallel to the focal lines of the mirror; but if the frame is turned through a right angle so that the wires are perpendicular to the focal lines of the mirror the sparks will recommence. If the framework is sub- stituted for the metal plate in the experiment on the reflection of electric waves, sparks will appear in the detector when the wires are parallel to the focal lines of the mirrors, and will dis- appear when the wires are at right angles to these lines. Thus the framework reflects but does not transmit the waves when the electric force in them is parallel to the wires, while it transmits but does not reflect waves in which the electric force is at right angles to the wires. The wire framework behaves towards the electric waves exactly as a plate of tourmaline does to waves of light. Du Bois and Rubens (Wied. Ann. 49, p. 593), by using a framework wound with very fine wire placed very close together, have succeeded in polarizing waves of radiant heat, whose wave length, although longer than that of ordinary light, is very small compared with that of electric waves.

§ 4. Angle of Polarization. — When light polarized at right angles to the plane of incidence falls on a refracting substance at an angle tan – V, where n is the refractive index of the sub- stance, all the light is refracted and none reflected; whereas when light is polarized in the plane of incidence, some of the light is always reflected whatever the angle of incidence. Trouton (Nature, 39, p. 391) showed that similar effects take place with electric waves. From a paraffin wall 3 ft. thick, reflection always took place when the electric force in the inci- dent wave was at right angles to the plane of incidence, whereas at a certain angle of incidence there was no reflection when the vibrator was turned, so that the electric force was in the plane of incidence. This shows that on the electromagnetic theory of light the electric force is at right angles to the plane of polarization.*

§ 5. Stationary Electrical Vibrations. — Hertz (Wied. Ann. 34, p. 609) made his experiments on these in a large room about 15 m. long. The vibrator, which was of the type first described, was placed at one end of the room, its plates being parallel to the wall, at the other end a piece of sheet zinc about 4 m. by 2 m. was placed vertically against the wall. The detector — the circular ring previously described — was held so that its plane was parallel to the

metal plates of the vibrator, its centre on the line at right angles to the metal plate bisecting at right angles the spark gap of the vibrator, and with the spark gap of the detector parallel to that of the vibrator. The following effects were observed when the detector was moved about. When it was close up to the zinc plate there were no sparks, but they began to pass feebly as soon as it was moved forward a little way from the plate, and increased rapidly in brightness until it was about i-8 m. from the plate, when they attained their maximum. When its distance was still further increased they diminished in brightness, and vanished again at a distance of about 4 m. from the plate. When the distance was still further increased they reappeared, attained another maximum, and so on. They thus exhibited a remarkable periodicity similar to that which occurs when stationary vibrations are produced by the interference of direct waves with those reflected from a surface placed at right angles to the direction of propaga tion. Similar periodic alterations in the spark were observed by Hertz when the waves, instead of passing freely through the air and being reflected by a metal plate at the end of the room, were led along wires, as in the arrangement shown in fig. 4. L and K are metal plates

placed parallel to the plates of the vibrator, long parallel wires being attached to act as guides to the waves which were reflected from the isolated end. (Hertz used only one

Fig. 4.

plate and one wire, but the double set of plates and wires introduced by Sarasin and De la Rive make the results more definite.) In this case the detector is best placed so that its plane is at right angles to the wires, while the air space is parallel to the plane containing the wires. The sparks instead of vanish- ing when the detector is at the far end of the wire are a maximum in this position, but wax and wane periodically as the detector is moved along the wires. The most obvious interpretation of these experiments was the one given by Hertz — that there was interference between the direct waves given out by the vibrator and those reflected either from the plate or from the ends of the wire, this interference giving rise to stationary waves. The places where the electric force was a maximum were the places where the sparks were brightest, and the places where the electric force was zero were the places where the sparks vanished. On this

explanation the distance be- tween two consecutive places where the sparks vanished would be half the wave length of the waves given out by the vibrator.

Some very interesting experiments made by Sarasin and De la Rive {Comptes rendus, 115, p. 489) showed that this explana- tion could not be the true one, since by using detectors of different sizes they found that the distance between two consecutive places where the sparks vanished depended mainly upon the size of the detector, and very little upon that of the vibrator. With small detectors they found the distance small, with large de- tectors, large; in fact it is directly proportional to the diameter of the detector. We can see that this result is a consequence of the large damping of the oscillations of the vibrator and the very small damping of those of the detector. Bjerknes showed that the time taken for the amplitude of the vibrations of the vibrator to sink to i/e of their original value was only 4T, while for the detector it was 500T', when T and T' are respectively the times of vibration of the vibrator and the detector. The rapid decay of the oscillations of the vibrator will stifle the interference between the direct and the reflected wave, as the amplitude of the direct wave will, since it is emitted later, be much smaller than that of the reflected one, and not able to annul its effects completely; while the well-maintained vibra- tions of the detector will interfere and produce the effects observed by Sarasin and De la Rive. To see this let us consider the extreme case in which the oscillations of the vibrator are absolutely dead- beat. Here an impulse, starting from the vibrator on its way to the reflector, strikes against the detector and sets it in vibra- tion; it then travels up to the plate and is reflected, the electric force in the impulse being reversed by reflection. After reflection the impulse again strikes the detector, which is still vibrating from the effects of the first impact; if the phase of this vibration is such that the reflected impulse tends to produce a current round the detector in the same direction as that which is circulat- ing from the effects of the first impact, the sparks will be increased, but if the reflected impulse tends to produce a current in the opposite direction the sparks will be diminished. Since the electric force is reversed by reflection, the greatest increase in the sparks will take place when the impulse finds, on its return, the detector in the opposite phase to that in which it left it; that is, if the time which has elapsed between the departure and return of the impulse is equal to an odd multiple of half the time of vibration of the detector. If d is the distance of the detector from the reflector when the sparks are brightest, and V the velocity of propagation of electromagnetic disturbance, then 2d/V = (211 + i)(T'/2) ; where n

is an integer and T' the time of vibration of the detector, the distance between two spark maxima will be VT'/2, and the places where the sparks are a minimum will be midway between the maxima. Sarasin and De la Rive found that when the same detector was used the distance between two spark maxima was the same with the waves through air reflected from a metal plate and with those guided by wires and reflected from the free ends of the wire, the inference being that the velocity of waves along wires is the same as that through the air. This result, which follows from Maxwell's theory, when the wires are not too fine, had been

questioned by Hertz on account of some of his experiments oh wires.

§ 6. Detectors. — The use of a detector with a period of vibration of its own thus tends to make the experiments more complicated, and many other forms of detector have been employed by subsequent experimenters. For example, in place of the sparks in air the luminous discharge through a rarefied gas has been used by Dragoumis, Lecher (who used tubes without electrodes laid across the wires in an arrangement resembling that shown in fig. 7) and Arons. A tube containing neon at a low pressure is especially suitable for this purpose. Zehnder (Wied. Ann. 47 > P- 777) use d an exhausted tube to which an external electro- motive force almost but not quite sufficient of itself to produce a discharge was applied; here the additional electromotive force due to the waves was sufficient to start the discharge. Detectors depending on the heat produced by the rapidly alternating currents have been used by Paalzow and Rubens, Rubens and Ritter, and I. Klemencic. Rubens measured the heat produced by a bolometer arrangement, and Klemencic used a thermo-electric method for the same purpose; in con- sequence of the great increase in the sensitiveness of galvanometers these methods are now very frequently resorted to. Boltzmann used an electroscope as a detector. The spark gap consisted of a ball and a point, the ball being connected with the electro- scope and the point with a battery of 200 dry cells. When the spark passed the cells charged up the electroscope. Ritter utilized the contraction of a frog's leg as a detector, Lucas and Garrett the explosion produced by the sparks in an explosive mixture of hydrogen and oxygen; while Bjerknes and Franke used the mechanical attraction between oppositely charged conductors. If the two sides of the spark gap are connected with the two pairs of quadrants of a very delicate electrometer, the needle of which is connected with one pair of quadrants, there will be a deflection of the electrometer when the detector is struck by electric waves. A very efficient detector is that in- vented by E. Rutherford (Trans. Roy. Soc. A. 1897, 189, p. 1); it consists of a bundle of fine

iron wires magnetized to saturation ■ and placed inside a small magnetizing coil, through which the electric waves cause rapidly alternating currents to pass which demagnetize the soft iron. If the instrument is used to detect waves in air, long straight wires are attached to the ends of the demagnetizing coil to collect the energy from the field; to investigate waves in wires it is sufficient to make a loop or two in the wire and place the magnetized piece of iron inside it. The amount of demagnetization which can be observed by the change in the deflection of a magnetometer placed near the iron, measures the intensity of the electric waves, and very accurate determinations can be made with ease with this apparatus. It is also very delicate, though in this respect it does not equal the detector to be next described, the coherer; Rutherford got. indications in 1895 when the vibrator was f of a mile away from the detector, and where the waves had to traverse a thickly populated part of Cambridge. It can also be used to measure the coefficient of damping of the electric waves, for since the wire is initially magnetized to saturation, if the direction of the current when it first begins to flow in the magnetizing coil is such as to tend to increase the magnetization of the wire, it will produce no effect, and it will not be until the current is reversed that the wire will lose some of its magnetization. The effect then gives the measure of the intensity half a period after the commencement of the waves. If the wire is put in the coil the opposite way, i.e. so that the magnetic force due to the current begins at once to demagnetize the wire, the demagnetiza- tion gives a measure of the initial intensity of the waves. Com- paring this result with that obtained when the wires were reversed, we get the coefficient of damping. A very convenient detector of electric waves is the one discovered almost simultane- ously by Fessenden (Electrotech. Zeits., 1903, 24, p. 586) and Schlomilch (ibid. p. 959). This consists of an electrolytic cell in which one of the electrodes is an exceedingly fine point. The electromotive force in the circuit is small, and there is large polarization in the circuit with only a small current. When the*

*circuit is stn*ck by electric waves there is an increase in the currents due to the depolarization of the circuit. If a galvano- meter is in the circuit, the increased deflection of the instrument will indicate the presence of the waves.*

§ 7. Coherers.— The most sensitive detector of electric waves is the " coherer," although for metrical work it is not so suitable as that just

described. It depends upon the fact discovered by Branly (Comptes rendus, in, p. 785; 112, p. 90) that the resistance between loose metallic contacts, such as a pile of iron turnings, diminishes when they are struck by an electric wave. One of the forms made by Lodge (The Work of Hertz and some of his Successors, 1894) on this principle consists simply of a glass tube containing iron turnings, in contact with which are wires led into opposite ends of the tube. The arrangement is placed in series with a galvanometer (one of the simplest kind will do) and a battery; when the iron turnings are struck by electric waves their resistance is diminished and the deflection of the galvanometer is increased. Thus the deflection of the galvano- meter can be used to indicate the arrival of electric waves. The tube must be tapped between each experiment, and the deflection of the galvanometer brought back to about its original value. This detector is marvellously delicate, but not metrical, the change produced in the resistance depending upon so many things besides the intensity of the waves that the magnitude of the galvanometer deflection is to some extent a matter of chance. Instead of the iron turnings we may use two iron wires, one resting on the other; the resistance of this contact will be altered by the incidence of the waves. To get greater regularity Bose uses, instead of the iron turnings, spiral springs, which are pushed against each other by means of a screw until the most sensitive state is attained. The sensitiveness of the coherer depends on the electromotive force put in the galvanometer circuit. Very sensitive ones can be made by using springs of very fine silver wire coated electrolytically with nickel. Though the impact of electric waves generally produces a diminution of resistance with these loose contacts, yet there are exceptions to the rule. Thus Branly showed that with lead peroxide, Pb0 2 , there is an increase in resistance. Aschkinass proved the same to be true with copper sulphide, CuS; and Bose showed that with potassium there is an increase of resistance and great power of self-recovery of the original resistance after the waves have ceased. Several theories of this action have been proposed. Branly (Lumiere ilectrique, 40, p. 511) thought that the small sparks which certainly pass between adjacent portions of metal clear away layers of oxide or some other kind of non-conducting film, and in this way improve the contact. It would seem that if this theory is true the films must be of a much more refined kind than layers of oxide or dirt, for the coherer effect has been observed with clean non-oxidizable metals. Lodge explains the effect by supposing that the heat produced by the sparks fuses adjaeent portions of metal into contact and hence diminishes the resist- ance; it is from this view of the action that the name coherer is applied to the detector. Auerbeck thought that the effect was a

mechanical one due to the electrostatic attractions between the various small pieces of metal. It is probable that some or all of these causes are at work in some cases, but the effects of potassium make us hesitate to accept any of them as the complete explanation. Blanc (Ann. chim. phys., 1905, [8] 6, p. 5), as the result of a long series of experiments, came to the conclusion that coherence is due to pressure. He regarded the outer layers as different from the mass of the metal and having a much greater specific resistance. He supposed that when two pieces of metal are pressed together the molecules diffuse across the surface, modifying the surface layers and increasing their conductivity.

§ 8. Generators of Electric Waves. — Bose (Phil. Mag. 43, p. 55) designed an instrument which generates electric waves with a length of not more than a centimetre or so, and therefore allows their properties to be demonstrated with apparatus of moderate dimensions. The waves are excited by sparking between two platinum beads carried by jointed electrodes; a platinum sphere is placed between the beads, and the distance between the beads and the sphere can be adjusted by bending the electrodes. The diameter of

the sphere is 8 mm., and the wave length of the shortest electrical waves generated is said to be about 6 mm. The beads are connected with the terminals of a small induction coil, which, with the battery to work it and the sparking arrangement, are enclosed in a metal box, the radiation passing out through a metal tube opposite to the spark gap. The ordinary vibrating break of the coil is not used, a single spark made by making and breaking the circuit by means of a button outside the box being employed instead. The detector is one of the spiral spring coherers previously described ; it is shielded from external disturbance by being enclosed in a metal box provided with a funnel-shaped opening to admit the radiation. The wires

leading from the coherers to the galvanometer are also surrounded by metal tubes to protect them from stray radiation. The radiat- ing apparatus and the receiver are mounted on stands sliding in an optical bench. If a parallel beam of radiation is required, a cylindrical lens of ebonite or sulphur is mounted in a tube fitting on to the radiator tube and stopped by a guide when the spark is at the principal focal line of the lens. For experiments requiring angular measurements a spectrometer circle is mounted on one of the sliding stands, the receiver being carried on a radial arm and pointing to the centre of the circle. The arrangement is represented in fig. 5.

With this apparatus the laws of reflection, refraction and polariza-

tion can readily be verified, and also the double refraction of crystals, and of bodies possessing a fibrous or laminated structure such as jute or books. (The double refraction of electric waves seems first to have been observed by Righi, and other researches on this subject have been made by Garbasso and Mack.) Bose showed the rotation of the plane of polarization by means of pieces of twisted jute rope; if the pieces were arranged so that their twists were all in one direction and placed in the path of the radiation, they rotated the plane of polarization in a direction depending upon the direction of twist; if they were mixed so that there were as many twisted in one direction as the other, there was no rotation.

A series of experiments showing the complete analogy between electric and light waves is described by Righi in his book L'Oltica delle oscillazioni elettriche. Righi's exciter, which is especially convenient when large statical electric machines are used instead of induction coils, is shown in fig. 6. E and F are balls connected with the terminals of the machine, and AB and CD are conductors insulated from each other, the ends B, C, between which the sparks pass, being immersed in vaseline oil. The period of the vibrations given out by the system is adjusted by means of metal plates M and N attached to AB and CD. When the waves are produced by in- duction coils or by electrical machines the intervals between the emission of different sets of waves occupy by far the largest part of the time. Simon (Wied. Ann., 1898, 64, p. 293; Phys. Zeit., 1901, 2, p. 253), Duddell (Electrician, 1900, 46, p. 269) and Poulsen (Electrotech. Zeits., 1906, 27, p. 1070) reduced these intervals very considerably by using the electric arc to excite the waves, and in this way produced electrical waves possessing great energy. In these

Fig. 6.

methods the terminals between which the arc is passing are connected through coils with self-induction L to the plates of a condenser of capacity C. The arc is not steady, but is continually varying. This is especially the case when it passes through hydrogen. These variations excite vibrations with a period 2ir V (LC) in the circuit containing the capacity of the self-induction. By this method Duddell produced waves with a frequency of 40,000. Poulsen, who cooled the terminals of the arc, produced waves with a frequency of 1,000,000, while Stechodro (Ann. der Phys. 27, p. 225) claims to have produced waves with three hundred times this frequency, i.e. having a wave length of about a metre. When the self-induction

and capacity are large so that the frequency comes within the limits of the frequency of audible notes, the system gives out a musical note, and the arrangement is often referred to as the singing arc.

§ 9. Waves in Wires. — Many problems on electric waves along wires can readily be investigated by a method due to Lecher (Wied. Ann. 41, p. 850), and known as Lecher's bridge, which furnishes us with a means of dealing with waves of a definite and determinable wave-length. In this arrangement (fig. 7) two large plates A and B are, as in Hertz's exciter, connected with the terminals of an induction coil; opposite these and insulated from them are two

q m

Fig. 7.

smaller plates D, E, to which long parallel wires DFH, EGJ are attached. These wires are bridged across by a wire LM, and their farther ends H, J, may be insulated, or connected together, or with the plates of a condenser. To detect the waves in the circuit beyond the bridge, Lecher used an exhausted tube placed across the wires, and Rubens a bolometer, but Rutherford's detector is the most convenient and accurate. If this detector is placed in a fixed position at the end of the circuit, it is found that the deflections of this detector depend greatly upon the position of the bridge LM, rising rapidly to a maximum for some positions, and falling rapidly away when the bridge is displaced. As the bridge is moved from the coil end towards the detector the deflections show periodic variations, such as are represented in fig. 8 when the ordinates represent the deflections of the detector and the abscissae the distance of the bridge from the ends D, E. The maximum deflections of the detector correspond to the positions in which the two circuits DFLMGE, HLMJ (in which the vibrations are but slightly damped) are in resonance. For since the self-induction and resistance of the bridge LM is very small compared with that of the circuit beyond, it follows from the theory of circuits in parallel that only a small part of the current will in general flow round the longer circuit ; it is only when the two circuits DFLMGE, HLMJ are in resonance that a considerable current will flow round the latter. Hence when we get a maximum effect in the detector we know that the waves we are dealing with are those corresponding to the free periods of the system HLMJ, so that if we know the free periods of this circuit we know the wave length of the electric waves under consideration. Thus if the ends of the wires H, J are free and

have no capacity, the current along them must vanish at H and J, which must be in opposite electric condition. Hence half the wave length must be an odd submultiple of the length of the circuit HLMJ. If H and J are connected together the wave length must be a submultiple of the length of this circuit. When the capacity at the ends is appreciable the wave length of the circuit is

1

ft

A

1

k

1

1

1

1

A

f

A

1

\

/>

f \

1

1

\

/

L >

V

\

ir

\

/

V

\

,

f

\

/

>

A.

/

55

\

ii’

‘

\

s

J

M

J

\,

H

L'

BOO TOO 790 660 04O BOO 560 520 480 440 400 360 320 280 240 200 1G0 120 80 40

distances in centimetres along wires

Fig. 8.

determined by a somewhat complex expression. To facilitate the determination of the wave length in such cases, Lecher introduced a second bridge L'M', and moved this about until the deflection of the detector was a maximum ; when this occurs the wave length is one of those corresponding to the closed circuit LMM'L', and must therefore be a submultiple of the length of the circuit. Lecher showed that if instead of using a single wire LM to form the bridge, he used two parallel wires PQ, LM, placed close together, the currents in the

further circuit were hardly appreciably diminished when the main wires were cut between PL and QM. Blondlot used a modification of this apparatus better suited for the production of short waves. In his form (fig. 9) the exciter consists of two semicircular arms connected with the terminals of an induction coil, and the long wires, instead of being connected with the small plates, form a circuit round the exciter.

As an example of the use of Lecher's arrangement, we may quote Drude's application of the method to find the specific induction capacity of dielectrics under electric oscillations of varying frequency. In this application the ends of the wire are connected to the plates of a condenser, the space between _ whose plates can be filled with the liquid whose specific inductive capacity is required, and the bridge is moved until the detector at the end of the circuit gives the maxi- mum deflection. Then if X is the wave length of the waves, X is the wave length of one of the free vibrations of the system HLMJ ; hence if C is the , capacity of the condenser < at the end in electrostatic measure we have

cot •

2irl

2irl

*c_*

~C'l

Fig. 9. where I is the distance of the condenser from the bridge and C is the capacity of unit length of the wire. In the condenser part of the lines of force will pass through air and part through the dielectric; hence C will be of the form C0+KC1 where K is the specific inductive capacity of the dielectric. Hence if / is the distance of maximum deflection when the dielectric is replaced by air, /' when filled with a dielectric whose specific inductive capacity is known to be K', and /" the distance when filled with the dielectric whose specific inductive capacity is required we easily see that—*

2itl 2id'

cot— 7 — c °t~r"

-K'

2-wl cot— r — cot

2irl" X

l-K

an equation by means of which K can be determined. It was in this way that Drude investigated the specific inductive capacity with varying frequency, and found a falling off in the specific in- ductive capacity with increase of frequency when the dielectrics contained the radicle OH. In another method used by him the wires were led through long tanks filled with the liquid whose specific inductive capacity was required ; the velocity of propagation of the electric waves along the wires in the tank being the same as the velocity of propagation of an electromagnetic disturbance through the liquid filling the tank, if we find the wave length of the waves along the wires in the tank, due to a vibration of a given frequency, and compare this with the wave lengths corresponding to the same frequency when the wires are surrounded by air, we obtain the velocity of propagation of electromagnetic disturbance through the fluid, and hence the specific inductive capacity of the fluid.

§ 10. Velocity of Propagation of Electromagnetic Effects through Air. — The experiments of Sarasin and De la Rive already described (see § 5) have shown that, as theory requires, the velocity of propa- gation of electric effects through air is the same as along wires. The

same result had been arrived at by J. J. Thomson, although from the method he used greater differences between the velocities might have escaped detection than was possible by Sarasin and De la Rive's method. The velocity of waves along wires has been directly determined by Blondlot by two different methods. In the first the detector consisted of two parallel plates about 6 cm. in diameter placed a fraction of a millimetre apart, and forming a condenser whose capacity C was determined in electromagnetic measure by Maxwell's method. The plates were connected by a rectangular circuit whose self-induction L was calculated from the dimensions of the rectangle and the size of the wire. The time of vibration T is equal to 2W (LC). (The wave length corresponding to this time is long compared with the length of the circuit, so that the use of this formula is legitimate.) This detector is placed between two parallel wires, and the waves produced by the exciter are reflected from a movable bridge. When this bridge is placed just beyond the detector vigorous sparks are observed, but as the bridge is pushed away a place is reached where the sparks disappear; this place is distance 2/X from the detector, when X is the wave length of the vibration given out by the detector. The sparks again dis- appear when the distance of the bridge from the detector is 3X/4. Thus by measuring the distance between two consecutive positions of the bridge at which the sparks disappear X can be determined,

and v, the velocity of propagation, is equal to X/T. As the means of a number of experiments Blondlot found f to be 3-02 Xio 10 cm. /sec, which, within the errors of experiment, is equal to 3X10 10 cm./sec., the velocity of light. A second method used by Blondlot,

and one which does not in- volve the calculation of the period, is as follows:— A and A' (fig. 10) are two equal Leyden jars coated inside and outside with tin-foil. The outer coatings form two separate rings a, 01 ; a', a\, and the inner coatings are connected with the poles of the induction coil by means of the metal pieces b, b'. The sharply pointed conductors p and p', the points of which are about f mm. apart, are connected with the rings of the tin-foil a and a', and two long copper wires pcai, p'c'a'i, 1029 cm. long, connect these points with the other rings aj, 01'. The rings aa', a-jii ', are connected by wet strings so as to charge up the jars. When a spark passes between b and b', a spark at once passes between pp', and this is followed by another spark when the waves travelling by the paths ai cp, a\c'p' reach p and p'. The time between the passage of these sparks, which is the time taken by the waves to travel 1029 cm., was observed by means of a rotating mirror, and the velocity measured in 15 experiments varied between 2-92 Xio 10 and 3-03 Xio 10 cm./sec, thus agreeing well with that deduced by the preceding method. Other determinations of the velocity of electro- magnetic propagation have been made by Lodge and Glazebrook, and by Saunders.

On Maxwell's electromagnetic theory the velocity of propagation of electromagnetic disturbances should equal the velocity of light, and also the ratio of the electromagnetic unit of electricity to the electrostatic unit. A large number of determinations of this ratio have been made: —

W

c'

Fig. 10.

Observer.

Date.

Ratio io 10 X

Klemencic

1884

3-019 cm./sec.

Himstedt . .

1888

3-009 cm./sec.

Rowland . .

1889

2-9815 cm./sec

Rosa ....

1889

2-9993 cm./sec

J. J. Thomson and Searle

1890

2-9955 cm./sec

Webster.

1891

2-987 cm./sec.

Pellat ....

1891

3-009 cm./sec.

Abraham . .

1892

2-992 cm./sec.

Hurmuzescu

1895

3-002 cm./sec.

Rosa ....

1908

2-9963 cm./sec

The mean of these determinations is 3-001 Xio 10 cm./sec, while the mean of the last five determinations of the velocity of light in air is given by Himstedt as 3-002 Xio 10 cm./sec. From these ex- periments we conclude that the velocity of propagation of an electro- magnetic disturbance is equal to the velocity of light, and to the velocity required by Maxwell's theory.

In experimenting with electromagnetic waves it is in general more difficult to measure the period of the oscillations than their wave length. Rutherford used a method by which the period of the vibration can easily be determined ; it is based upon the theory of the distribution of alternating currents in two circuits ACB, ADB in parallel. If A and B are respectively the maximum currents in the circuits ACB, ADB, then

J S 2 + (N-M)y ~\R 2 r(L-M) 2 /> 2

when R and S are the resistances, L and N the coefficients of self-induction of the circuits ACB, ADB respectively, M the coefficient of mutual induction between the circuits, and p the frequency of the currents. Rutherford detectors were placed in the two circuits, and the circuits adjusted until they showed that A = B; when this is the case

R 2 -S 2

N 2 -L 2 -2M(N-L)

If we make one of the circuits, ADB, consist of a short length of a high liquid resistance, so that S is large and N small, and

the other circuit ACB of a low metallic resistance bent to have considerable self-induction, the preceding equation becomes ap- proximately p = S/L, so that when S and L are known p is readily

determined. (J. J. T.)

ELECTROCHEMISTRY. The present article deals with processes that involve the electrolysis of aqueous solutions, whilst those in which electricity is used in the manufacture of chemical products at furnace temperatures are treated under Electrometallurgy, although, strictly speaking, in some cases {e.g. calcium carbide and phosphorus manufacture) they are not truly metallurgical in character. For the theory and elemental laws of electro-deposition see Electrolysis; and for the construction and use of electric generators see Dynamo and Battery: Electric. The importance of the subject may be gauged by the fact that all the aluminium, magnesium, sodium, potassium, calcium carbide, carborundum and artificial graphite, now placed on the market, is made by electrical pro- cesses, and that the use of such processes for the refining of copper and silver, and in the manufacture of phosphorus, potassium chlorate and bleach, already pressing very heavily on the older non-electrical systems, is every year extending. The convenience also with which the energy of waterfalls can be converted into electric energy has led to the introduction of chemical industries into countries and districts where, owing to the absence of coal, they were previously unknown. Norway and Switzerland have become important producers of chemicals, and pastoral districts such as those in which Niagara or Foyers are situated manu- facturing centres. In this way the development of the electro- chemical industry is in a marked degree altering the distribution of trade throughout the world.

Electrolytic Refining of Metals.- — The principle usually followed in the electrolytic refining of metals is to cast the impure metal into plates, which are exposed as anodes in a suitable solvent, commonly a salt of the metal under treatment. On passing a current of electricity, of which the volume and pressure are adjusted to the conditions of the electrolyte and electrodes, the anode slowly dissolves, leaving the insoluble impurities in the form of a sponge, if the proportion be considerable, but otherwise as a mud or slime which becomes detached from the anode surface and must be prevented from coming into contact with the cathode. The metal to be refined passing into solution is concurrently deposited at the cathode. Soluble impurities which are more electro-negative than the metal under treatment must, if present, be removed by a preliminary process, and the voltage and other conditions must be so selected that none of the more electro-positive metals are co-deposited with the metal to be refined. From these and other considerations it is obvious that (1) the electrolyte must be such as will freely dissolve the metal to be refined; (2) the electrolyte must be able to dissolve

the major portion of the anode, otherwise the mass of insoluble matter on the outer layer will prevent access of electrolyte to the core, which will thus escape refining; (3) the electrolyte should, if possible, be incapable of dissolving metals more electro-negative than that to be refined; (4) the proportion of soluble electro-positive impurities must not be excessive, or these substances will accumulate too rapidly in the solution and necessitate its frequent purification; (5) the current density must be so adjusted to the strength of the solution and to other conditions that no relatively electro-positive metal is deposited, and that the cathode deposit is physically suitable for sub- sequent treatment; (6) the current density should be as high as is consistent with the production of a pure and sound deposit, without undue expense of voltage, so that the operation may be rapid and the " turnover " large; (7) the electrolyte should be as good a conductor of electricity as possible, and should not, ordinarily, be altered chemically by exposure to air; and (8) the use of porous partitions should be avoided, as they increase the resistance and usually require frequent renewal. For details of the practical methods see Gold; Silver; Copper and head- ings for other metals.

Electrolytic Manufacture of Chemical Products. — When an aqueous solution of the salt of an alkali metal is electrolysed, the

metal reacts with the water, as is well known, forming caustic alkali, which dissolves in the solution, and hydrogen, which comes off as a gas. So early as 1851 a patent was taken out by Cooke for the production of caustic alkali without the use of a separate current, by immersing iron and copper plates on opposite sides of a porous (biscuit-ware) partition in a suitable cell, containing a solution of the salt to be electrolysed, at 2i°-65° C. (7o°-i5o° F.). The solution of the iron anode was intended to afford the necessary energy. In the same year another patent was granted to C. Watt for a similar process, involving the employment of an externally generated current. When an alkaline chloride, say sodium chloride, is electrolysed with one electrode immersed in a porous cell, while caustic soda is formed at the cathode, chlorine is deposited at the anode. If the latter be insoluble, the gas diffuses into the solution t'.nd, when this becomes saturated, escapes into the air. If, however, no porous division be used to prevent the intermingling by diffusion of the anode and cathode solutions, a complicated set of subsidiary reactions takes place. The chlorine reacts with the caustic soda, forming sodium

hypochlorite, and this in turn, with an excess of chlorine and at higher temperatures, becomes for the most part converted into chlorate, whilst any simultaneous electrolysis of a hydroxide or water and a chloride (so that hydroxyl and chlorine are simultaneously liberated at the anode) also produces oxygen-chlorine compounds direct. At the same time, the diffusion of these compounds into contact with the cathode leads to a partial reduction to chloride, by the removal of combined oxygen by the instrumentality of the hydrogen there evolved. In proportion as the original chloride is thus reproduced, the efficiency of the process is of course diminished. It is obvious that, with suitable methods and apparatus, the electrolysis of alkaline chlorides may be made to yield chlorine, hypochlorites (bleaching liquors) , chlorates or caustic alkali, but that great care must be exercised if any of these products is to be obtained pure and with economy. Many patents have been taken out in this branch of electro- chemistry, but it is to be remarked that that granted to C. Watt traversed the whole of the ground. In his process a current was passed through a tank divided into two or three cells by porous partitions, hoods and tubes were arranged to carry off chlorine and hydrogen respectively, and the whole was heated to 1 20 F. by a steam jacket when caustic alkali was being made. Hypochlorites were made, at ordinary temperatures, and chlorates at higher temperatures, in a cell without a partition in which the cathode was placed horizontally immediately above the anode, to favour the mixing of the ascending chlorine with the descending caustic solution.

The relation between the composition of the electrolyte and the various conditions of current-density, temperature and the like has been studied by F. Oettel (Zeitschrift f. Elektrochem., 1894, vol. i. pp- 354 an d 474) in connexion with the production of hypochlorites and chlorates in tanks without diaphragms, by C. Haussermann and W. Naschold (Chemiker Zeitung, 1894, vol. xviii. p. 857) for their production in cells with porous diaphragms, and by F. Haber and S. Grinberg (Zeitschrift f. anorgan. Chem., 1898, vol. xvi. pp. 198, 329, 438) in connexion with the electrolysis of hydrochloric acid. Oettel, using a 20 % solution of potassium chloride, obtained the best yield of hypochlorite with a high current-density, but as soon as ii% of bleaching chlorine (as hypochlorite) was present, the formation of chlorate commenced. The yield was at best very low as compared with that theoretically possible. The best yield of chlorate was obtained when from I to 4% of caustic potash was present. With high current-density, heating the solution tended to increase the proportion of chlorate to hypochlorite, but as the proportion of water

decomposed is then higher, the amount of chlorine produced must be less and the total chlorine efficiency lower. He also traced a connexion between alkalinity, temperature and current-density, and showed that these conditions should be mutually adjusted. With a current-density of 130 to 140 amperes per sq. ft., at 3 volts, passing between platinum electrodes, he attained to a current-efficiency of 52 %, and each (British) electrical horse-power hour was equivalent to a production of 1378-5 grains of potassium chlorate. In other words, each pound of chlorate would require an expenditure of nearly 5-1 e.h.p. hours. One of the earliest of the more modern processes was that of E. Hermite, which consisted in the production of bleach-liquors by the electro- lysis (according to the 1st edition of the 1884 patent) of magnesium or calcium chloride between platinum anodes carried in wooden frames, and zinc cathodes. The solution, containing hypochlorites

and chlorates, was then applied to the bleaching of linen, paper-pulp or the like, the solution being used over and over again. Many modifications have been patented by Hermite, that of 1895 specifying the use of platinum gauze anodes, held in ebonite or other frames. Rotating zinc cathodes were used, with scrapers to prevent the accumulation of a layer of insoluble magnesium compounds, which would otherwise increase the electrical resistance beyond reasonable limits. The same inventor has patented the application of electrolysed chlorides to the purification of starch by the oxidation of less stable organic bodies, to the bleaching of oils, and to the purification of coal gas, spirit and other substances. His system for the disinfection of sewage and similar matter by the electrolysis of chlorides, or of sea-water, has been tried, but for the most part abandoned on the score of expense. Reference may be made to papers written in the early days of the process by C. F. Cross and E.J. Bevan (Journ. Soc. Chem. Industry, 1887, vol. vi. p. 170, and 1888, vol. vii. p. 292), and to later papers by P. Schoop [Zeitschrift f. Elektrochem., 1895, vol. ii. pp. 68, 88, 107, 209, 289).

E. Kellner, who in 1886 patented the use of cathode (caustic soda) and anode (chlorine) liquors in the manufacture of cellulose from wood-fibre, and has since evolved many similar processes, has produced an apparatus that has been largely used. It consists of a stoneware tank with a thin sheet of platinum-iridium alloy at either end forming the primary electrodes, and between them a number of glass plates reaching nearly to the bottom, each having a platinum gauze sheet on either side; the two sheets belonging to each plate are in metallic connexion, but insulated from all the others, and form intermediary or bi-polar electrodes. A 10-12 % solution of sodium

chloride is caused to flow upwards through the apparatus and to overflow into troughs, by which it is conveyed (if necessary through a cooling apparatus) back to the circulating pump. Such a plant has been reported as giving 0-229 gallon of a liquor containing 1 % of available chlorine per kilowatt hour, or 0-171 gallon per e.h.p. hour. Kellner has also patented a " bleach- ing-block," as he terms it, consisting of a frame carrying parallel plates similar in principle to those last described. The block is immersed in the solution to be bleached, and may be lifted in or out as required. O. Knofler and Gebauer have also a system of bi-polar electrodes, mounted in a frame in appearance resembling a filter-press.

Other Electrochemical Processes. — It is obvious that electrolytic iodine and bromine, and oxygen compounds of these elements, may be produced by methods similar to those applied to chlorides (see Alkali Manufacture and Chlorates), and Kellner and others have patented processes with this end in view. Hydrogen and oxygen may also be produced electrolytically as gases, and their respective reducing and oxidizing powers at the moment of deposition on the electrode are frequently used in the laboratory, and to some extent industrially, chiefly in the field of organic chemistry. Similarly, the formation of organic halogen products may be effected by electrolytic chlorine, as, for example, in the production of chloral by the gradual introduc- tion of alcohol into an anode cell in which the electrolyte is a strong solution of potassium chloride. Again, anode reactions, such as are observed in the electrolysis of the fatty acids, may be utilized, as, for example, when the radical CH3CO2 — deposited at the anode in the electrolysis of acetic acid — is dissociated, two of the groups react to give one molecule of ethane, C 2 H 6 , and two of carbon dioxide. This, which has long been recognized as a class-reaction, is obviously capable of endless variation. Many electrolytic methods have been proposed for the purifica- tion of sugar; in some of them soluble anodes are used for a few minutes in weak alkaline solutions, so that the caustic alkali from the cathode reaction may precipitate chemically the hydroxide of the anode metal dissolved in the liquid, the pre- cipitate carrying with it mechanically some of the impurities present, and thus clarifying the solution. In others the current is applied for a longer time to the original sugar-solution with insoluble {e.g. carbon) anodes. F. Peters has found that with these methods the best results are obtained when ozone is em- ployed in addition to electrolytic oxygen. Use has been made of electrolysis in tanning operations, the current being passed through the tan-liquors containing the hides. The current, by endosmosis, favours the passage of the solution into

the hide-substance, and at the same time appears to assist the chemical combinations there occurring; hence a great reduction in the time required for the completion of the process. Many patents have been taken out in this direction, one of the best known being that of Groth, experimented upon by S. Rideal and A. P. Trotter {Journ. Soc. Chem. Indust., 1891, vol. x. p. 425),

who employed copper anodes, 4 sq. ft. in area, with current-densities of 0-375 t° 1 (ranging in some cases to 7-5) ampere per sq. ft., the best results being obtained with the smaller current- densities. Electrochemical processes are often indirectly used, as for example in the Villon process (Elec. Rev., New York, 1899, vol. xxxv. p. 375) applied in Russia to the manufacture of alcohol, by a series of chemical reactions starting from the pro- duction of acetylene by the action of water upon calcium carbide. The production of ozone in small quantities during electrolysis, and by the so-called silent discharge, has long been known, and the Siemens induction tube has been developed for use industri- ally. The Siemens and Halske ozonizer, in form somewhat resembling the old laboratory instrument, is largely used in Germany; working with an alternating current transformed up to 6500 volts, it has been found to give 280 grains or more of ozone per e. h. p. hour. E. Andreoli (whose first British ozone patent was No. 17,426 of 1891) uses flat aluminium plates and points, and working with an alternating current of 3000 volts is said to have obtained 1440 grains per e.h.p. hour. Yarnold's process, using corrugated glass plates coated on one side with gold or other metal leaf, is stated to have yielded as much as 2700 grains per e.h.p. hour. The ozone so prepared has numerous uses, as, for example, in bleaching oils, waxes, fabrics, &c, sterilizing drinking-water, maturing wines, cleansing foul beer-casks, oxidizing oil, and in the manufacture of vanillin.

For further information the following books, among others, may be consulted : — Haber, Grundriss der technischen Elektrochemie (Miinchen, 1898); Borchers and M'Millan, Electric Smelting and Refining (London, 1904) ; E. D. Peters, Principles of Copper Smelting (New York, 1907) ; F. Peters, Angewandte Elektrochemie, vols. ii. and iii. (Leipzig, 1900); Gore, The Art of Electrolytic Separation of Metals (London, 1890) ; Blount, Practical Elettro-Chemistry (London, 1906) ; G. Langbein, Vollstdndiges Handbuch der galvanischen Metall-Niederschlage (Leipzig, 1903), Eng. trans,

by W. T. Brannt (1909) ; A. Watt, Electro-Plating and Electro-Refining of Metals (London, 1902) ; W. H. Wahl, Practical Guide to the Gold and Silver Electroplater, &fc. (Philadelphia, 1883) ; Wilson, Stereotyping and Electrotyping (London) ; Lunge, Sulphuric Acid and Alkali, vol. iii. (London, 1909). Also papers in various technical periodicals. The industrial aspect is treated in a Gartside Report, Some Electro- Chemical Centres (Manchester, 1908), by J. N. Pring. (W. G. M.)

ELECTROCUTION (an anomalous derivative frotn " electro-execution"; syn. " electro thanasia "), the popular name, in- vented in America, for the infliction of the death penalty on criminals (see Capital Punishment) by passing through the body of the condemned a sufficient current of electricity to cause death. The method was first adopted by the state of New York, a law making this method obligatory having been passed and approved by the governor on the 4th of June 1888. The law provides that there shall be present, in addition to the warden, two physicians, twelve reputable citizens of full age, seven deputy sheriffs, and such ministers, priests or clergymen, not exceeding two, as the criminal may request. A post-mortem examination of the body of the convict is required, and the body, unless claimed by relatives, is interred in the prison cemetery with a sufficient quantity of quicklime to consume it. The law became effective in New York on the 1st of January 1889. The first criminal to be executed by electricity was William Kemmler, on the 6th of August 1890, at Auburn prison. The validity of the New York law had previously been attacked in regard to this case (Re Kemmler, 1889; 136 U.S. 436), as providing " a cruel and unusual punishment " and therefore being contrary to the Constitution; but it was sustained in the state courts and finally in the Federal courts. By 1906 about one hundred and fifteen murderers had been successfully executed by electricity in New York state in Sing Sing, Auburn and Dannemora prisons. The method has also been adopted by the states of Ohio (1896), Massachusetts (1898), New Jersey (1906), Virginia (1908) and North Carolina (1910).

The apparatus consists of a stationary engine, an alternating dynamo capable of generating a current at a pressure of 2000 volts, a " death-chair " with adjustable head-rest, binding straps and adjustable electrodes devised by E. F. Davis, the state electrician of New York. The voltmeter, ammeter and

switch-board controlling the current are located in the execution-room; the dynamo-room is communicated with by electric signals. Before each execution the entire apparatus is thoroughly tested.

When everything is in readiness the criminal is brought in and seats himself in the death-chair. His head, chest, arms and legs are secured by broad straps; one electrode thoroughly moistened with salt-solution is affixed to the head, and another to the calf of one leg, both electrodes being moulded so as to secure good contact. The application of the current is usually as follows: the contact is made with a high voltage (1700- 1800 volts) for 5 to 7 seconds, reduced to 200 volts until a half minute has elapsed; raised to high voltage for 3 to 5 seconds, again re duced to low voltage for 3 to 5 seconds, again reduced to a low voltage until one minute has elapsed, when it is again raised to the high voltage for a few seconds and the contact broken. The ammeter usually shows that from 7 to 10 amperes pass through the criminal's body. A second or even a third brief contact is sometimes made, partly as a precautionary measure, but rather the more completely to abolish reflexes in the dead body. Cal- culations have shown that by this method of execution from 7 to 10 h. p. of energy are liberated in the criminal's body. The time consumed by the strapping-in process is usually about 45 seconds, and the first contact is made about 70 seconds after the criminal has entered the death-chamber.

When properly performed the effect is painless and instan- taneous death. The mechanism of life, circulation and respira- tion cease with the first contact. Consciousness is blotted out instantly, and the prolonged application of the current ensures permanent derangement of the vital functions beyond recovery. Occasionally the drying of the sponges through undue generation of heat causes desquamation or superficial blistering of the skin at the site of the electrodes. Post-mortem discoloration, or post-mortem lividity, often appears during the first contact. The pupils of the eyes dilate instantly and remain dilated after death.

The post-mortem examination of " electrocuted " criminals reveals a number of interesting phenomena. The temperature of the body rises promptly after death to a very high point. At the site of the leg electrode a temperature of over 12 8° F. was registered within fifteen minutes in many cases. After the removal of the brain the temperature recorded in the spinal canal was often over 120 F. The development of this high temperature is to be regarded as resulting from the active metabolism of tissues not (somatically) dead within a body where all vital mechanisms have been abolished, there being no circulation to carry off the generated heat. The heart, at first flaccid when exposed soon after death, gradually contracts and assumes a tetanized con- dition; it empties itself of all blood arid takes the form of a heart in systole. The lungs are usually devoid of blood and weigh

only 7 or 8 ounces (avoird.) each. The blood is profoundly altered biochemically; it is of a very dark colour and it rarely coagulates. (E. A. S.)*

ELECTROKINETICS, that part of electrical science which is concerned with the properties of electric currents.

Classification of Electric Currents. — Electric currents are classified into (a) conduction currents, (b) convection currents, (c) displacement or dielectric currents. In the case of conduc- tion currents electricity flows or moves through a stationary material body called the conductor. In convection currents electricity is carried from place to place with and on moving material bodies or particles. In dielectric currents there is no continued movement of electricity, but merely a limited displace- ment through or in the mass of an insulator or dielectric. The path in which an electric current exists is called an electric circuit, and may consist wholly of a conducting body, or partly of a conductor and insulator or dielectric, or wholly of a dielectric. In cases in which the three classes of currents are present together the true current is the sum of each separately. In the case of conduction currents the circuit consists of a conductor immersed in a non-conductor, and may take the form of a thin wire or cylinder, a sheet, surface or solid. Electric conduction currents may take place in space of one, two or three dimensions, but for

the most part the circuits we have to consider consist of thin cylindrical wires or tubes of conducting material surrounded with an insulator; hence the case which generally presents itself is that of electric flow in space of one dimension. Self-closed electric currents taking place in a sheet of conductor are called " eddy currents."

Although in ordinary language the current is said to flow in the conductor, yet according to modern views the real pathway of the energy transmitted is the surrounding dielectric, and the so-called conductor or wire merely guides the transmission of energy in a certain direction. The presence of an electric current is recognized by three qualities or powers: (i) by the production of a magnetic field, (2) in the case of conduction currents, by the production of heat in the conductor, and (3) if the conductor is an electrolyte and the current unidirectional, by the occurrence of chemical decomposition

in it. An electric current may also be regarded as the result of a movement of electricity across each section of the circuit, and is then measured by the quantity conveyed per unit of time. Hence if dq is the quantity of electricity which flows across any section of the conductor in the element of time dt, the current i = dq/dt.

Electric currents may be also classified as constant or variable and as unidirectional or " direct," that is flowing always in the same direction, or " alternating," that is reversing their direction at regular intervals. In the last case the variation of current may follow any particular law. It is called a " periodic current " if the cycle of current values is repeated during a certain time called the periodic time, during which the current reaches a certain maximum value, first in one direction and then in the opposite, and in the intervals between has a zero value at certain instants. The frequency of the periodic current is the number of periods or cycles in one second, and alternating currents are described as low frequency or high frequency, in the latter case having some thousands of periods per second. A periodic current may be represented either by a wave diagram, or by a polar diagram. 1 In the first case we take a straight line to represent the uniform flow of time, and at small equidistant intervals set up perpendiculars above or below the time axis, representing to scale the current at that instant in one direction or the other; the extremities of these ordinates then define a wavy curve which is called the wave form of the current (fig. 1) . It is obvious that this curve can only be a single valued curve. In one par- ticular and important case the form of the current curve is a simple harmonic curve or simple sine curve. If T represents the periodic time in which the cycle of current values takes

Fig. i.

Fig. 2.

place, whilst n is the frequency or number of periods per second and p stands for 21m, and i is the value of the current at any instant t, and I its maximum value, then in this case we have j = I sin pt. Such a current is called a " sine current " or simple periodic current.

In a polar diagram (fig. 2) a number of radial lines are drawn from a point at small equiangular intervals, and on these lines are set off lengths proportional to the current value of a periodic current at corresponding intervals during one complete period represented by four right angles. The extremities of these radii delineate a polar curve. The polar form of a simple sine current is obviously a circle

drawn through the origin. As a consequence of Fourier's theorem it follows that any periodic curve having any wave form can be imitated by the super-

1 See J. A. Fleming, The Alternate Current Transformer, vol. i. P-519-

position of simple sine currents differing in maximum value and in phase.

Definitions oj U nit Electric Current. — In electrokinetic investigations we are most commonly limited to the cases of unidirectional continuous and constant currents (C.C. or D.C.), or of simple periodic currents, or alternating currents of sine form (A.C.). A continuous electric current is measured either by the magnetic effect it produces at some point outside its circuit, or by the amount of electrochemical decomposition it can perform in a given time on a selected standard electrolyte. Limiting our consideration to the case of linear currents or currents flowing in thin cylindrical wires, a definition may be given in the first place of the unit electric current in the centimetre, gramme, second (C.G.S.) of electromagnetic measurement (see Units, Physical). H. C. Oersted discovered in 1820 that a straight wire conveying an electric current is surrounded by a magnetic field the lines of which are self -closed lines embracing the electric circuit (see Electricity and Electro-magnetism). The unit current in the electromagnetic system of measurement is defined as the current which, flowing in a thin wire bent into the form of a circle of one centimetre in radius, creates a magnetic field having a strength of air units at the centre of the circle, and therefore would exert a mechanical force of 2x dynes on a unit magnetic pole placed at that point (see Magnetism). Since the length of the circumference of the circle of unit radius is 27T units, this is equivalent to stating that the unit current on the electromagnetic C.G.S. system is a current such that unit length acts on unit magnetic pole with a unit force at a unit of distance. Another definition, called the electrostatic unit of current, is as follows: Let any conductor be charged with electricity and discharged through a thin wire at such a rate that one electrostatic unit of quantity (see Electrostatics) flows past any section of the wire in one unit of time. The electromagnetic unit of current defined as above is 3X10 10 times larger than the electrostatic unit.

In the selection of a practical unit of current it was considered that the electromagnetic unit was too large for most purposes, whilst the electrostatic unit was too small; hence a practical unit of current

called 1 ampere was selected, intended originally to be 1/10 of the absolute electromagnetic C.G.S. unit of current as above defined. The practical unit of current, called the international ampere, is, however, legally defined at the present time as the continuous unidirectional current which when flowing through a neutral solution of silver nitrate deposits in one second on the cathode or negative pole 0-001118 of a gramme of silver. There is reason to believe that the international unit is smaller by about one part in a thousand, or perhaps by one part in 800, than the theoretical ampere defined as 1/10 part of the absolute electromagnetic unit. A periodic or alternating current is said to have a value of 1 ampere if when passed through a fine wire it produces in the same time the same heat as a unidirectional continuous current of 1 ampere as above electro-chemically defined. In the case of a simple periodic alternating current having a simple sine wave form, the maximum value is equal to that of the equiheating continuous current multiplied by V 2 . This equiheating continuous current is called the effective or root-mean-square (R.M.S.) value of the alternating one.

Resistance. — A current flows in a circuit in virtue of an electro-motive force (E.M.F.), and the numerical relation between the current and E.M.F. is determined by three qualities of the circuit called respectively, its resistance ®, inductance (L), and capacity ©. If we limit our consideration to the case of con- tinuous unidirectional conduction currents, then the relation between current and E.M.F. is defined by Ohm's law, which states that the numerical value of the current is obtained as the quotient of the electromotive force by a certain constant of the circuit called its resistance, which is a function of the geometrical form of the circuit, of its nature, i.e. material, and of its temperature, but is independent of the electromotive force or current. The resistance ® is measured in units called ohms and the electro- motive force in volts (V); hence for a continuous current the value of the current in amperes (A) is obtained as the quotient

of the electromotive force acting in the circuit reckoned in volts by the resistance in ohms, or A = V/R. Ohm established his law by a course of reasoning which was similar to that on which J. B. J. Fourier based his investigations on the uniform motion of heat in a conductor. As a matter of fact, however, Ohm's law merely states the direct proportionality of steady current to steady electromotive force

in a circuit, and asserts that this ratio is governed by the numerical value of a quality of the con- ductor, called its resistance, which is independent of the current, provided that a correction is made for the change of temperature produced by the current. Our belief, however, in its universality and accuracy rests upon the close agreement between deductions made from it and observational results, and although it is not derivable from any more fundamental principle, it is yet one of the most certainly ascertained laws of electrokinetics.

Ohm's law not only applies to the circuit as a whole but to any part of it, and provided the part selected does not contain a source of electromotive force it may be expressed as follows: — The difference of potential (P.D.) between any two points of a circuit including a resistance R, but not including any source of electromotive force, is proportional to the product of the re- sistance and the current i in the element, provided the conductor remains at the same temperature and the current is constant and unidirectional. If the current is varying we have, however, to take into account the electromotive force (E.M.F.) produced by this variation, and the product Ri is then equal to the difference between the observed P.D. and induced E.M.F.

*We may otherwise define the resistance of a circuit by saying that it is that physical quality of it in virtue of which energy is dissipated as heat in the circuit when a current flows through it. The power communicated to any electric circuit when a current * is created in it by a continuous unidirectional electromotive force E is equal to Ei, and the energy dissipated as heat in that circuit by the conductor in a small interval of time dt is measured by Ei dt. Since by Ohm's law E = Ri, where R is the resistance of the circuit, it follows that the energy dissipated as heat per unit of time in any circuit is numerically represented by Ri 2 , and therefore the resistance is measured by the heat produced per unit of current, provided the current is unvarying.*

Inductance. — As soon as we turn our attention, however, to alternating or periodic currents we find ourselves compelled to take into account another quality of the circuit, called its " inductance." This may be defined as that quality in virtue of which energy is stored up in connexion with the circuit in a magnetic form. It can be experimentally shown that a current cannot be created instantaneously in a circuit by any finite electromotive force, and that when once created it cannot be annihilated instantane- ously. The circuit possesses a quality analogous to the inertia of matter. If a

current i is flowing in a circuit at any moment, the energy stored up in connexion with the circuit is measured by 5LJ 2 , where L, the inductance of the circuit, is related to the current in the same manner as the quantity called the mass of a body is related to its velocity in the expression for the ordinary kinetic energy, viz. jMs 2 . The rate at which this conserved energy varies with the current is called the " electrokinetic momentum " of this circuit (= Li). Physically interpreted this quantity signifies the number of lines of magnetic flux due to the current itself which are self-linked with its own circuit.

Magnetic Force and Electric Currents. — In the case of every circuit conveying a current there is a certain magnetic force (see Magnetism) at external points which can in some instances be calculated. Laplace proved that the magnetic force due to an element of length dS of a circuit conveying a current I at a point P at a distance r from the element is expressed by IdS sin d/r 2 , where is the angle between the direction of the current element and that drawn between the element and the point. This force is in a direction perpendicular to the radius vector and to the plane containing it and the element of current. Hence the determination of the magnetic force due to any circuit is reduced to a summation of the effects due to all the elements of length.' For instance, the magnetic force at the centre of a circular circuit of radius r carrying a steady current I is 2irl/r, since all

elements are at the same distance from the centre. In the same manner, if we take a point in a line at right angles to the plane of the circle through its centre and at a distance d, the magnetic force along this line is expressed by 27ir 2 I/(H-|-

It is possible to make use of this last formula, coupled with an experimental fact, to prove that the magnetic force due to an element of current varies inversely as the square of the distance. If a 4iat circular disk is suspended so as to be free to rotate round a straight current which passes through its centre, and two bar magnets are placed on it with their axes in line with the current, it is found that the disk has no tendency to rotate round the current. This proves that the force on each magnetic pole is inversely as its distance from the current. But it can be shown that this law of action of the whole infinitely long straight current is a mathematical consequence of the fact that each element of the current exerts a magnetic force which varies inversely as the square of the distance. If the current flows N times round the circuit instead of once, we have to insert NA/10 in place of I in all the above formulae. The quantity NA is called the "

ampere-turns " on the circuit, and it is seen that the magnetic field at any point outside a circuit is proportional to the ampere- turns on it and to a function of its geometrical form and the distance of the point.

There is therefore a distribution of magnetic force in the field of every current-carrying conductor which can be delineated by lines of magnetic force and rendered visible to the eye by iron filings (see Magnetism). If a copper wire is passed vertically through a hole in a card on which iron filings are sprinkled, and a strong electric current is sent through the circuit, the filings arrange themselves in concentric circular lines making visible the paths of the lines of magnetic force (fig. 3). In the same manner, by passing a circular wire through a card and sending a strong current through the wire we can employ iron filings to delineate for us the form of the lines of magnetic force (fig. 4).

/ ‘: ;ifi?- :- ‘

Fig. 3. Fig. 4.

In all cases a magnetic pole of strength M, placed in the field of aD electric current, is urged along the lines of force with a mechanical force equal to MH, where H is the magnetic force. If then we carry a unit magnetic pole against the direction in which it would naturally move we do work. The lines of magnetic force em- bracing a current-carrying conductor are always loops or endless lines.

The work done in carrying a unit magnetic pole once round a circuit conveying a current is called the " line integral of magnetic force " along that path. If, for instance, we carry a unit pole in a circular path of radius r once round an infinitely long straight filamentary current I, the line integral is 411-I. It is easy to prove that this is a general law, and that if we have any currents flowing in a conductor the line integral of magnetic force taken once round a path linked with the current circuit is 4ir times the total current flowing through the circuit. Let us apply this to the case of an endless solenoid. If a copper wire insulated or covered with cotton or silk is twisted round a thin rod so as to make a close spiral, this

forms a " solenoid," and if the solenoid is bent round so that its two ends come together we have an endless solenoid. Consider such a

solenoid of mean length / and N turns of wire. If it is made endless, the magnetic force H is the same everywhere along the central axis and the line integral along the axis is HI. If the current is denoted by I, then NI is the total current, and accordingly 4xNI = H/, or H = 47rNI//. For a thin endless solenoid the axial magnetic force is therefore 47r times the current-turns per unit of length. This holds good also for a long straight solenoid provided its length is large compared with its diameter. It can be shown that if insulated wire is wound round a sphere, the turns being all parallel to lines of latitude, the magnetic force in the interior is constant and the lines of force therefore parallel. The magnetic force at a point outside a conductor conveying a current can by various means be measured or compared with some other standard magnetic forces, and it becomes then a means of measuring the current. Instruments called galvanometers and ammeters for the most part operate on this principle.

Thermal Effects of Currents. — J. P. Joule proved that the heat produced by a constant current in a given time in a wire having a constant resistance is proportional to the square of the strength of the current. This is known as Joule's law, and it follows, as already shown, as an immediate consequence of Ohm's law and the fact that the power dissipated electrically in a conductor, when an electromotive force E is applied to its extremities, producing thereby a current I in it, is equal to EI.

If the current is alternating or periodic, the heat produced in any time T is obtained by taking the sum at equidistant intervals of time of all the values of the quantities Rp it, where dt represents a small interval of time and i is the current at that instant. The

quantity T _1 f'pdt is called the mean-square-value of the variable

current, i being the instantaneous value of the current, that is, its value at a particular instant or during a very small interval of time dt. The square root of the above quantity, or

*M >]**

is called the root-mean-square-value, or the effective value of the current, and is denoted by the letters R.M.S.

Currents have equal heat-producing power in conductors of identical resistance when they have the same R.M.S. values. Hence periodic or alternating currents can be measured as regards their R.M.S. value

by ascertaining the continuous current which produces in the same time the same heat in the same conductor as the periodic current considered. Current measuring instru- ments depending on this fact, called hot-wire ammeters, are in common use, especially for measuring alternating currents. The maximum value of the periodic current can only be deter- mined from the R.M.S. value when we know the wave form of the current. The thermal effects of electric currents in conductors are dependent upon the production of a state of equilibrium between the heat produced electrically in the wire and the causes operative in removing it. If an ordinary round wire is heated by a current it loses heat, (1) by radiation, (2) by air convection or cooling, and (3) by conduction of heat out of the ends of the wire. Generally speaking, the greater part of the heat removal is effected by radiation and convection.

If a round sectioned metallic wire of uniform diameter d and length I made of a material of resistivity p has a current of A amperes passed through it, the heat in watts produced in any time / seconds is represented by the value of 4A 2 pltllo 9 ird 2 , where d and / must be measured in centimetres and p in absolute C.G.S. electromagnetic units. The factor io 9 enters because one ohm is 10′ absolute electro-magnetic C.G.S. units (see Units, Physical). If the wire has an emissivity e, by which is meant that e units of heat reckoned in joules or watt-seconds are radiated per second from unit of surface, then the power removed by radiation in the time / is expressed by irdlet. Hence when thermal equilibrium is established we have ˆA i plt/io ! >Tvd 2 = Tdkt, or A 2 = io 9 × 2 erf 3 /4P- If the diameter of the wire is reckoned in mils (1 mil = -ooi in.), and if we take e to have a value o-i, an emissivity which will generally bring the wire to about 60° C, we can put the above formula in the following forms for circular sectioned copper, iron or platinoid wires, viz.

A = Vˆ 3 /5oo for copper wires

A = V <2 3 /4000 for iron wires

A = V d 3 j 5000 for platinoid wires.

These expressions give the ampere value of the current which will bring bare, straight or loosely coiled wires of d mils in diameter to about 6o° C. when the steady state of temperature is reached.

Thus, for instance, a bare straight copper wire 50 mils in diameter (=0-05 in.) will be brought to a steady temperature of about 6o° C. if a current of V50 3 /500 = \/250 = i6 amperes (nearly) is passed

through it, whilst a current of V25 = 5 amperes would bring a platinoid wire to about the same temperature.

A wire has therefore a certain safe current-carrying capacity which is determined by its specific resistance and emissivity, the latter being fixed by its form, surface and surroundings. The emissivity increases with the temperature, else no state of thermal equilibrium could be reached. It has been found experimentally that whilst for fairly thick wires from 8 to 60 mils in diameter the safe current varies approximately as the 1 ■ 5th power of the diameter, for fine wires of 1 to 3 mils it varies more nearly as the diameter.

Action of one Current on Another. — The investigations of Ampere in connexion with electric currents are of fundamental importance in electrokinetics. Starting from the discovery of Oersted, Ampere made known the correlative fact that not only is there a mechanical action between a current and a magnet, but that two conductors conveying electric currents exert mechanical forces on each other. Ampere devised ingenious methods of making one portion of a circuit movable so that he might observe effects of attraction or repulsion between this circuit and some other fixed current. He employed for this purpose an astatic circuit B, consisting of a wire bent into a double rectangle round which a current flowed first in one and then in the opposite direction (fig. 5). In this way the circuit was removed from the action of the earth's magnetic field, and yet one portion of it could be submitted to the action of any other circuit C. The astatic circuit was pivoted by suspend- ing it in mercury cups q, p, one of which was in elec- trical connexion with the tubular support A, and the other with a strong insu- lated wire passing up it.

Ampere devised certain crucial experiments, and the theory deduced from them is based upon four facts and one assumption. 1 He showed (1) that wire conveying a current bent back on itself produced no action upon a proximate portion of a movable astatic circuit; (2) that if the return wire was bent zig-zag but close to the outgoing straight wire the circuit produced no action on the movable one, showing that the effect of an element of the circuit was proportional to its projected length; (3) that a closed circuit cannot cause motion in an element of another circuit free to move in the direction of its length; and (4) that the action of two circuits on one and the same movable circuit was null if one of the two fixed circuits was n times greater than the other but n times further removed from the movable circuit. From this last experiment by an ingenious line of reasoning he proved that the action of an element of current on another element of current varies inversely as a square of their distance.

These experiments enabled him to construct a mathematical expression of the law of action between two elements of conductors conveying currents. They also enabled him to prove that an element of current may be resolved like a force into components in different directions, also that the force produced by any element of the circuit on an element of any other circuit was perpendicular to the line joining the elements and inversely as the square of their distance. Also he showed that this force was an attraction if the currents in the elements were in the same direction, but a repulsion if they were in opposite directions. From these experiments and deductions from them he built up a complete formula for the action of one element of a current of length dS 1 See Maxwell, Electricity and Magnetism, vol. ii. chap. u.

Fig. 5-

of one conductor conveying a current I upon another element dS' of another circuit conveying another current I' the elements being at a distance apart equal to r.

If 8 and 8′ are the angles the elements make with the line joining them, and <£ the angle they make with one another, then Ampere's expression for the mechanical force / the elements exert on one another is

/=2lIV- 2 {cos -$ cos 8 cos 8'}dSdS'.

This law, together with that of Laplace already mentioned, viz. that the magnetic force due to an element of length dS of a current I at a distance r, the element making an angle 8 with the radius vector o is IdS sin 8/r 2 , constitute the fundamental laws of electrokinetics.

Ampere applied these with great mathematical skill to elucidate the mechanical actions of currents on each other, and experi- mentally confirmed the following deductions: (i) Currents in parallel circuits flowing in the same direction attract each other, but if in opposite directions repel each other. (2) Cur- rents in wires meeting at an angle attract each other more into parallelism if both flow either to or from the angle, but repel each other more widely apart if they are in opposite directions. (3) A current in a small circular conductor exerts a magnetic force in its centre perpendicular to its plane and is in all respects equivalent to a magnetic shell or a thin circular disk of

steel so magnetized that one face is a north pole and the other a south pole, the product of the area of the circuit and the current flowing in it determining the magnetic moment of the element. (4) A closely wound spiral current is equivalent as regards external magnetic force to a polar magnet, such a circuit being called a finite solenoid. (5) Two finite solenoid circuits act on each other like two polar magnets, exhibiting actions of attraction or repulsion between their ends.

Ampere's theory was wholly built up on the assumption of action at a distance between elements of conductors conveying the electric currents. Faraday's researches and the discovery of the fact that the insulating medium is the real seat of the operations necessitates a change in the point of view from which we regard the facts discovered by Ampere. Maxwell showed that in any field of magnetic force there is a tension along the lines of force and a pressure at right angles to them; in other words, lines of magnetic force are like stretched elastic threads which tend to contract. 1 If, therefore, two conductors lie parallel and have currents in them in the same direction they are im- pressed by a certain number of lines of magnetic force which pass round the two conductors, and it is the tendency of these to contract which draws the circuits together. If, however, the currents are in opposite directions then the lateral pressure of the similarly contracted lines of force between them pushes the conductors apart. Practical application of Ampere's discoveries was made by W. E. Weber in inventing the electrodynamometer, and later Lord Kelvin devised ampere balancer for the measure- ment of electric currents based on the attraction between coils conveying electric currents.

Induction of Electric Currents. — Faraday 2 in 1831 made the important discovery of the induction of electric currents (see Electricity). If two conductors are placed parallel to each other, and a current in one of them, called the primary, started or stopped or changed in strength, every such alteration causes a transitory current to appear in the other circuit, called the secondary. This is due to the fact that as the primary current increases or decreases, its own embracing magnetic field alters, and lines of magnetic force are added to or subtracted from its fields. These lines do not appear instantly in their place at a distance, but are propagated out from the wire with a velocity equal to that of light; hence in their outward progress they cut through the secondary circuit, just as ripples made on the surface of water in a lake by throwing a stone on to it expand and cut through a stick held vertically in the water at a distance from the place of origin of the ripples. Faraday confirmed this view

of the phenomena by proving that the mere motion of a wire transversely to the lines of magnetic force of a permanent magnet gave rise to an induced electromotive force in the wire.

1 See Maxwell, Electricity and Magnetism, vol. ii. 642. 2 Experimental Researches, vol. i. ser, !■

He embraced all the facts in the single statement that if there be any circuit which by movement in a magnetic field, or by the creation or change in magnetic fields round it, experiences a change in the number of lines of force linked with it, then an electromotive force is set up in that circuit which is proportional at any instant to the rate at which the total magnetic flux linked with it is changing. Hence if Z represents the total number of lines of magnetic force linked with a circuit of N turns, then -N(dZ/dt) represents the electromotive force set up in that circuit. The operation of the induction coil (q.v.) and the transformer (q.v.) are based on this discovery. Faraday also found that if a copper disk A (fig. 6) is rotated between the poles

Fig. 6.

of a magnet NO so that the disk moves with its plane perpendi- cular to the lines of magnetic force of the field, it has created in it an electromotive force directed from the centre to the edge or vice versa. The action of the dynamo (q.v.) depends on similar processes, viz. the cutting of the lines of magnetic force of a constant field produced by certain magnets by certain moving conductors called armature bars or coils in which an electro- motive force is thereby created.

In 1834 H. F. E. Lenz enunciated a law which connects together the mechanical actions between electric circuits discovered by Ampere and the induction of electric currents discovered by Faraday. It is as follows: If a constant current flows in a primary circuit P, and if by motion of P a secondary current is created in a neighbouring circuit S, the direction of the secondary current will be such as to oppose the relative motion of the circuits. Starting from this, F. E. Neumann founded a mathematical theory of induced currents, discovering a quantity M, called the " potential of one circuit on another," or generally their " coefficient of mutual inductance." Mathematically M is obtained by taking the sum of all such quantities a.sffdSdS' cos /r, where dS and dS' are the elements of length of the two circuits, r is their distance, and 4 > is the angle which they make with one another; the summation or integration must be extended over every possible pair of elements. If we take pairs of elements in the same circuit, then Neumann's formula gives us the coefficient of self-

induction of the circuit or the potential of the circuit on itself. For the results of such calculations on various forms of circuit the reader must be referred to special treatises.

H. von Helmholtz, and later on Lord Kelvin, showed that the facts of induction of electric currents discovered by Faraday could have been predicted from the electrodynamic actions discovered by Ampere assuming the principle of the conservation of energy. Helmholtz takes the case of a circuit of resistance R in which acts an electromotive force due to a battery or thermopile. Let a magnet be in the neighbourhood, and the potential of the magnet on the circuit be V, so that if a current I existed in the circuit the work done on the magnet in the time dt is I(dV/dt)dt. The source of electro- motive force supplies in the time dt work equal to Eldt, and according to Joule's law energy is dissipated equal to RVdt. Hence, by the conservation of energy,

EIdt = RPdt + l(dVldt)dl. If then E = 0, we have I = — (dVldt)l~R, or there will be a current due to an induced electromotive force expressed by —dV/dt. Hence if the magnet moves, it will create a current in the wire provided that such motion changes the potential of the magnet with respect to the circuit. This is the effect discovered by Faraday. 3

Oscillatory Currents. — In considering the motion of electricity in conductors we find interesting phenomena connected with the discharge of a condenser or Leyden jar (q.v.). This problem was first mathematically treated by Lord Kelvin in 1853 (Phil. Mag., 1853, 5, p. 292).

If a conductor of capacity C has its terminals connected by a wire of resistance R and inductance L, it becomes important to consider

3 See Maxwell, Electricity and Magnetism, vol. ii. § 542, p. 178.

the subsequent motion of electricity in the wire. If Q is the quantity of electricity in the condenser initially, and q that at any time / after completing the circuit, then the energy stored up in the con- denser at that instant is JgVC, and the energy associated with the circuit is iL{dqldty, and the rate of dissipation of energy by resistance is R(dq/dty, since dq/dt=i is the discharge current. Hence we can construct an equation of energy which expresses the fact that at any

instant the power given out by the condenser is partly stored in the circuit and partly dissipated as heat in it. Mathematically this is expressed as follows : —

or

dt 1 + L dt + LC q ~°- The above equation has two solutions according as RV4L 2 is greater or -less than i/LC. In the first case the current i in the circuit can be expressed by the equation

-Q'

2 +P,

Bt-e-l"),

/ R 2 1 where o = R/2L, / 3 = \/ 7T2 – Fr' Q ' s t ' ie vame °^ 2 when t = o,

and e is the base of Napierian logarithms; and in the second case by the equation ,

i = Q-

—LJZ-p—ai

<8 e

sin/32

where

= R/2L, and/3 = -y £T

R EC 4L 2 '*

These expressions show that in the first case the discharge current of the jar is always in the same direction and is a transient uni-directional current. In the second case, however, the current is an oscillatory current gradually decreasing in amplitude, the frequency n of the oscillation being given by the expression

n= hvn

LC

R?

In those cases in which the resistance of the discharge circuit is very small, the expression for the frequency n and for the time period of osc illa tion R take the simple forms n — l, 21VLC, or T = l/«=2irVLC-

The above investigation shows that if we construct a circuit consisting of a condenser and inductance placed in series with one another, such circuit has a natural electrical time period of its own in which the electrical charge in it oscillates if disturbed. It may therefore be compared with a pendulum of any kind which when displaced oscillates with a time period depending on its inertia and on its restoring force.

The study of these electrical oscillations received a great impetus after H. R. Hertz showed that when taking place in electric circuits of a certain kind they create electromagnetic waves (see Electric Waves) in the dielectric surrounding the oscillator, and an additional interest was given to them by their application to telegraphy. If a Leyden jar and a circuit of low resistance but some inductance in series with it are connected across the secondary spark gap of an induction coil, then when the coil is set in action we have a series of bright noisy sparks, each of which consists of a train of oscillatory electric discharges from the jar. The condenser becomes charged as the secondary electromotive force of the coil is created at each break of the primary current, and when the potential difference of the condenser coatings reaches a certain value determined by the spark-ball distance a discharge happens. This discharge, how- ever, is not a single movement of electricity in one direction but an oscillatory motion with gradually decreasing amplitude. If the oscillatory spark is photographed on a revolving plate or a rapidly moving film, we have evidence in the photograph that such a spark consists of numerous intermittent sparks gradually becoming feebler. As the coil continues to operate, these trains of electric discharges take place at regular intervals. We can cause a train of electric oscillations in one circuit to induce similar oscillations in a neighbouring circuit, and thus construct an oscillation transformer or high frequency induction coil.

Alternating Currents. — The study of alternating currents of electricity began to attract great attention towards the end of the 19th century by reason of their application in electrotechnics

and especially to the transmission of power. A circuit in which a simple periodic alternating current flows is called a single phase circuit. The important difference between such a form of current flow

and steady current flow arises from the fact that if the circuit has inductance then the periodic electric current in it is not in step with the terminal potential difference or electromotive force acting in the circuit, but the current lags behind the electro- motive force by a certain fraction of the periodic time called the " phase difference." If two alternating currents having a fixed difference in phase flow in two connected separate but related circuits, the two are called'a two-phase current. If three or more single-phase currents preserving a fixed difference of phase flow in various parts of a connected circuit, the whole taken together is called a polyphase current. Since an electric current is a vector quantity, that is, has direction as well as magnitude, it can most conveniently be represented by a line denoting its maximum .value, and if the alternating current is a simple periodic current then the root-mean-square or effective value of_the current is obtained by dividing the maximum value by V2. Accordingly when we have an electric circuit or circuits in which there are simple periodic currents we can draw a vector diagram, the lines of which represent the relative magnitudes and phase differences of these currents.

A vector can most conveniently be represented by a symbol such as a--ib, where a stands for any length of a units measured horizon-tally and b for a length b units measured vertically, and the smybol 1 is a sign of perpendicularity, and equivalent analytically 1 to V — I. Accordingly if E represents the periodic electromotive force (maxi-mum value) acting in a circuit of resistance R and inductance L and frequency n, and if the current considered as a vector is represented by I, it is easy to show that a vector equation exists between these quantities as follows : —

E = RI+i27rnLI.

Since the absolute magnitude of a vector a+ib is V(a ! -r-Z> 2), it follows that considering merely magnitudes of current and electromotive force and denoting them by symbols (E) (I), we have the following equation connecting (I) and (E) : —

(I) = (E)/VRHˆL7,

*where p stands for 2 irn. If the above equation is compared with the symbolic expression of Ohm's law, it will be seen that the quantity V (R 2 + * 2 L 2) takes the place of resistance R in the expression of Ohm. This quantity V (R 2 +£ 2 L 2) is called the " impedance " of the alternating circuit. The quantity ph is called the " reactance " of the alternating circuit, and it is therefore obvious that the current in*

such a circuit lags behind the electromotive force by an angle, called the angle of lag, the tangent of which is ph/R.

Currents in Networks of Conductors. — In dealing with problems connected with electric currents we have to consider the laws which govern the flow of currents in linear conductors (wires), in plane conductors (sheets), and throughout the mass of a material conductor. 2 In the first case consider the collocation of a number of linear conductors, such as rods or wires of metal, joined at their ends to form a network of conductors. The network consists of a number of conductors joining certain points and forming meshes. In each conductor a current may exist, and along each conductor there is a fall of potential, or an active electromotive force may be acting in it. Each conductor has a certain resistance. To find the current in each conductor when the individual resistances and electromotive forces are given, proceed as follows: — Consider any one mesh. The sum of all the electromotive forces which exist in the branches bounding that mesh must be equal to the sum of all the products of the resist- ances into the currents flowing along them, or 2(E) = 2(C.R.). Hence if we consider each mesh as traversed by imaginary currents all circulating in the same direction, the real currents are the sums or differences of these imaginary cyclic currents in each branch. Hence we may assign to each mesh a cycle symbol x, y, z, &c, and form a cycle equation. Write down the cycle symbol for a mesh and prefix as coefficient the sum of all the resistances which bound that cycle, then subtract the cycle symbols of each adjacent cycle, each multiplied by the value of the bounding or common resistances, and equate this sum to the total electromotive force acting round the cycle. Thus if x y z are the cycle currents, and a b c the resistances bounding the mesh x, and b and c those separating it from the meshes y and 2, and E an electromotive force in the branch a, then

1 See W. G. Rhodes, An Elementary Treatise on Alternating Currents (London, 1902), chap. vii.

2 See J. A. Fleming, " Problems on the Distribution of Electric Currents in Networks of Conductors," Phil. Mag. (1885), or Proc. Phys. Soc. Lond. (1885), 7; also Maxwell, Electricity and Magnetism (2nd ed.), vol. i. p. 374, § 280, 2826.

we have formed the cycle equation x (a--b--c) — by — ez = E. For

each mesh a similar equation may be formed. Hence we have as many linear equations as there are meshes, and we can obtain the solution for each cycle symbol, and therefore for the current in each branch. The solution giving the current in such branch of the network is therefore always in the form of the quotient of two deter- minants. The solution of the well- known problem of finding the current in the galvanometer circuit of the arrangement of linear conductors called Wheatstone's Bridge is thus easily ob- tained. For if we call the cycles (see fig- 7) (x+y), y and z, and the resist- ances P, Q, R, S, G and B, and if E be the electromotive force in the battery circuit, we have the cycle equations (P+G+R)(a;+3')-Gy-Rz = 0, (Q+G+S)y-G(+y)-Sz = 0, (R+S+B)z-R(+y)-Sy = E. From these we can easily- obtain the x, which is the current through the galvano-

solution for (x+y)—y meter circuit in the form

- = E(PS-RQ)A.

where A is a certain function of P, Q, R, S, B and G.

Currents in Sheets. — In the case of current flow in plane sheets, we have to consider certain points called sources at which the current flows into the sheet, and certain points called sinks at which it leaves. We may investigate, first, the simple case of one source and one sink in an infinite plane sheet of thickness 8 and conductivity k. Take any point P in the plane at distances R and r from the source and sink respectively. The potential V at P is obviously given by

where Q is the quantity of electricity supplied by the source per second. Hence the equation to the equipotential curve is rir 2 = a constant.

If we take a point half-way between the sink and the source as the origin of a system of rectangular co-ordinates, and if the distance between sink and source is equal to p, and the line joining them is taken as the axis of x, then the equation to the equipotential line is

, . / r4 = a constant.

y i + (x-pf

This is the equation of a family of circles having the axis of y for a common radical axis, one set of circles surrounding the sink and another set of circles surrounding the source. In order to discover the form of the stream of current lines we have to determine the orthogonal trajectories to this family of coaxial circles. It is easy to

show that the orthogonal trajectory of the system of circles is another system of circles all passing through the sink and the source, and as a corollary of this fact, that the electric resistance of a circular disk of uniform thickness is the same between any two points taken anywhere on its circumference as sink and source. These equipotential lines may be delineated experimentally by attaching the terminals of a battery or batteries to small wires which touch at various places a sheet of tinfoil. Two wires attached to a galvanometer may then be placed on the tinfoil, and one may be kept stationary and the other may be moved about, so that the galvanometer is not traversed by any current. The moving terminal then traces out an equipotential curve. If there are n sinks and sources in a plane conducting sheet, and if r, r', r" be the distances of any point from the sinks, and t, t', t" the distances of the sources, then

• *f r*

■ *= a constant,*

is the equation to the equipotential lines. The orthogonal trajectories or stream lines have the equation

2(9-0') = a constant, where 6 and $' are the angles which the lines drawn from any point in the plane to the sink and corresponding source make with the line joining that sink and source. Generally it may be shown that if there are any number of sinks and sources in an infinite plane- conducting sheet, and if r, 6 are the polar coordinates of any one, then the equation to the equipotential surfaces is given by the equation

2 (A log„r) = a constant, • #

where A is a constant; and the equation to the stream or current lines is

2(0) = a constant.

In the case of electric flow in three dimensions the electric potential must satisfy Laplace's equation, and a solution is therefore found in the form 2(A/r) = a constant, as the equation to an equipotential surface, where r is the distance of any point on that surface from a source or sink.

Convection Currents. — The subject of convection electric currents has risen to great importance in connexion with modern electrical investigations. The question whether a statically electrified body in

motion creates a magnetic field is of funda- mental importance. Experiments to settle it were first under- taken in the year 1876 by H. A. Rowland, at a suggestion of H. von Helmholtz. 1 After preliminary experiments, Rowland's first apparatus for testing this hypothesis was constructed, as follows: — An ebonite disk was covered with radial strips of gold- leaf and placed between two other metal plates which acted as screens. The disk was then charged with electricity and set in rapid rotation. It. was found to affect a delicately suspended pair of astatic magnetic needles hung in proximity to the disk just as would, by Oersted's rule, a circular electric current coincident with the periphery of the disk. Hence the statically- charged but rotating disk becomes in effect a circular electric current.

The experiments were repeated and confirmed by W. C. Rontgen (Wied. Ann., 1888, 35, p. 264; 1890, 40, p. 03) and by F. Himstedt (Wied. Ann., 1889, 38, p. 560). Later V. Cremieu again repeated them and obtained negative results (Com. rend., 1900, 130, p. 1544, and 131, pp. 578 and 79751901, 132, pp. 327 and 1 108). They were again very carefully reconducted by H. Pender (Phil. Mag., 1901, 2, p. 179) and by E. P. Adams (id. ib., 285). Pender's work showed beyond any doubt that electric convec- tion does produce a magnetic effect. Adams employed charged copper spheres rotating at a high speed in place of a disk, and was able to prove that the rotation of such spheres produced a magnetic field similar to that due to a circular current and agree- ing numerically with the theoretical value. It has been shown by J. J. Thomson (Phil. Mag., 1881, 2, p. 236) andO. Heaviside (Electrical Papers, vol. ii. p. 205) that an electrified sphere, moving with a velocity v and carrying a quantity of electricity q, should produce a magnetic force H, at a point at a distance p from the centre of the sphere, equal to qv sin 0/ p 2 , where is the angle between the direction of p and the motion of the sphere. Adams found the field produced by a known electric charge rotating at a known, speed had a strength not very different from that predetermined by the above formula. An observation recorded by R. W. Wood (Phil. Mag., 1902, 2, p. 659) provides a confirmatory fact. He noticed that if carbon-dioxide strongly compressed in a steel bottle is allowed to escape suddenly the cold produced solidifies some part of the gas, and the issuing jet is full of particles of carbon-dioxide snow. These by friction against the nozzle are electrified positively. Wood caused the jet of gas to pass through a glass tube 2-5 mm. in diameter, and found that these particles of electrified snow were blown through it with a velocity of 2000 ft. a second. Moreover, he found that a magnetic needle hung near the

tube was deflected as if held near an electric current. Hence the positively electrified particles in motion in the tube create a magnetic field round it.

Nature of an Electric Current. — The question, What is an electric current ? is involved in the larger question of the nature of electricity. Modern investigations have shown that negative electricity is identical with the electrons or corpuscles which are components of the chemical atom (see Matter and Electricity). Certain lines of argument lead to the conclusion that a solid conductor is not only composed of chemical atoms, but that there is a certain proportion of free electrons present in it, the electronic density or number per unit of volume being determined by the material, its temperature and other physical conditions. If any cause operates to add or remove electrons at one point there is an immediate diffusion of electrons to re-establish equilibrium, and this electronic movement constitutes an electric current. This hypothesis explains the reason for the identity between the laws of diffusion of matter, of heat and of electricity. Electro- motive force is then any cause making or tending to make an inequality 'of electronic density in conductors, and may arise from differences of temperature, i.e. thermoelectromotive force

1 See Berl. Acad. Ber., 1876, p. 211; also H. A. Rowland and C. T. Hutchinson, " On the Electromagnetic Effect of Convection Cur- rents," Phil. Mag., 1889, 27, p. 445.

(see Thermoelectricity), or from chemical action when part of the circuit is an electrolytic conductor, or from the movement of lines of magnetic force across the conductor.

Bibliography. — For additional information the reader may be referred to the following books : M. Faraday, Experimental Researches in Electricity (3 vols., London, 1839, 1844, 1855); J. Clerk Maxwell, Electricity and Magnetism (2 vols., Oxford, 1892); W. Watson and S. H. Burbury, Mathematical Theory of Electricity and Magnetism, vol. ii. (Oxford, 1889); E. Mascart and J. Joubert, A Treatise on Electricity and Magnetism (2 vols., London, 1883) ; A. Hay, Alternat- ing Currents (London, 1905) ; W. G. Rhodes, An Elementary Treatise on Alternating Currents (London, 1902) ; D. C. Jackson and J. P. Jackson, Alternating Currents and Alternating

Current Machinery (1896, new ed. 1903); S. P. Thompson, Polyphase Electric Currents (London, 1900) ; Dynamo-Electric Machinery, vol. ii., " Alternating Currents " (London, 1905) ; E. E. Fournier d'Albe, The Electron Theory (London, 1906). (J. A. F.)

ELECTROLIER, a fixture, usually pendent from the ceiling, for holding electric lamps. The word is analogous to chandelier, from which indeed it was formed.

ELECTROLYSIS (formed from Gr. \bav, to loosen). When the passage of an electric current through a substance is accom- panied by definite chemical changes which are independent of the heating effects of the current, the process is known as electrolysis, and the substance is called an electrolyte. As an example we may take the case of a solution of a salt such as copper sulphate in water, through which an electric current is passed between copper plates. We shall then observe the follow- ing phenomena. (1) The bulk of the solution is unaltered, except that its temperature may be raised owing to the usual heating effect which is proportional to the square of the strength of the current. (2) The copper plate by which the current is said to enter the solution, i.e. the plate attached to the so-called positive terminal of the battery or other source of current, dis- solves away, the copper going into solution as copper sulphate. (3) Copper is deposited on the surface of the other plate, being obtained from the solution. (4) Changes in concentration are produced in the neighbourhood of the two plates or electrodes. In the case we have chosen, the solution becomes stronger near the anode, or electrode at which the current enters, and weaker near the cathode, or electrode at which it leaves the solution. If, instead of using copper electrodes, we take plates of platinum, copper is still deposited on the cathode; but, instead of the anode dissolving, free sulphuric acid appears in the neighbouring solution, and oxygen gas is evolved at the surface of the platinum plate.

With other electrolytes similar phenomena appear, though the primary chemical changes may be masked by secondary actions. Thus, with a dilute solution of sulphuric acid and platinum electrodes, hydrogen gas is evolved at the cathode, while, as the result of a secondary action on the anode, sulphuric acid is there re-formed, and oxygen gas evolved. Again, with the solution of a salt such as sodium chloride, the sodium, which is primarily liberated at the cathode, decomposes the water and evolves hydrogen, while the chlorine may be evolved as such, may dissolve the anode, or may liberate oxygen from the water, according to the nature of the plate and the concentration of the solution.

Early History of Electrolysis. — Alessandro Volta of Pavia discovered the electric battery in the year 1800, and thus placed the means of maintaining a steady electric current in the hands of investigators, who, before that date, had been restricted to the study of the isolated electric charges given by frictional electric machines. Volta's cell consists essentially of two plates of different metals, such as zinc and copper, connected by an electrolyte such as a solution of salt or acid. Immediately on its discovery intense interest was aroused in the new invention, and the chemical effects of electric currents were speedily detected. W. Nicholson and Sir A. Carlisle found that hydrogen and oxygen were evolved at the surfaces of gold and platinum wires connected with the terminals of a battery and dipped in water. The volume of the hydrogen was about double that of the oxygen, and, since this is the ratio in which these elements are combined in water, it was concluded that the process con-

sisted essentially in the decomposition of water. They also noticed that a similar kind of chemical action went on in the battery itself. Soon afterwards, William Cruickshank decom- posed the magnesium, sodium and ammonium chlorides, and precipitated silver and copper from their solutions — an observa- tion which led to the process of electroplating. He also found that the liquid round the anode became acid, and that round the cathode alkaline. In 1804 W. Hisinger and J. J. Berzelius stated that neutral salt solutions could be decomposed by electricity, the acid appearing at one pole and the metal at the other. This observation showed that nascent hydrogen was not, as had been supposed, the primary cause of the separation of metals from their solutions, but that the action consisted in a direct decomposition into metal and acid. During the earliest investigation of the subject it was thought that, since hydrogen and oxygen were usually evolved, the electrolysis of solutions of acids and alkalis was to be regarded as a direct decomposition of water. In 1806 Sir Humphry Davy proved that the formation of acid and alkali when water was electrolysed was due to saline impurities in the water. He had shown previously that decomposition of water could be effected although the two poles were placed in separate vessfcls connected by moistened threads. In 1807 he decomposed potash and soda, previously considered to be elements, by passing the current from a powerful battery through the moistened solids, and thus isolated the metals potassium and sodium.

The electromotive force of Volta's simple cell falls off rapidly when the cell is used, and this phenomenon was shown to be due to the accumulation at the metal plates of the products of chemical changes in the cell itself. This reverse electromotive force of polarization is

produced in all electrolytes when the passage of the current changes the nature of the electrodes. In batteries which use acids as the electrolyte, a film of hydrogen tends to be deposited on the copper or platinum electrode; but, to obtain a constant electromotive force, several means were soon devised of preventing the formation of the film. Constant cells may be divided into two groups, according as their action is chemical (as in the bichromate cell, where the hydrogen is converted into water by an oxidizing agent placed in a porous pot round the carbon plate) or electrochemical (as in Daniell's cell, where a copper plate is surrounded by a solution of copper sulphate, and the hydrogen, instead of being liberated, replaces copper, which is deposited on the plate from the solution).

Faraday's Laws. — The first exact quantitative study of electro- lytic phenomena was made about 1830 by Michael Faraday {Experimental Researches, 1833). When an electric current flows round a circuit, there is no accumulation of electricity any- where in the circuit, hence the current strength is every- where the same, and we may picture the current as analogous to the flow of an incompressible fluid. Acting on this view, Faraday set himself to examine the relation between the flow of electricity round the circuit and the amount of chemical decomposition. He passed the current driven by a voltaic battery ZnPt (fig. 1) through two branches containing the two electrolytic cells A and

B. The reunited cur- STSfi

rent was then led through another cell C, in which the strength of the current must be the sum of those in the arms A and B . Faraday found that the mass of substance liberated at the electrodes in the cell C was equal to the sum Fig. i.

of the masses liberated

in the cells A and B. He also found that, for the same current, the amount of chemical action was independent of the size of the electrodes and proportional to the time that the current flowed. Regarding the current as the passage of a certain amount of electricity per second, it will be seen that the results

of all these experiments may be summed up in the statement that the amount of chemical action is proportional to the quantity of

electricity which passes through the cell.

Faraday's next step was to pass the same current through different electrolytes in series. He found that the amounts of the substances liberated in each cell were proportional to the chemical equivalent weights of those substances. Thus, if the current be passed through dilute sulphuric acid between hydrogen electrodes, and through a solution of copper sulphate, it will be found that the mass of hydrogen evolved in the first cell is to the mass of copper deposited in the second as i is to 31-8. Now this ratio is the same as that which gives the relative chemical equivalents of hydrogen and copper, for 1 gramme of hydrogen and 31.- 8 grammes of copper unite chemically with the same weight of any acid radicle such as chlorine or the sulphuric group, S0 4 . Faraday examined also the electrolysis of certain fused salts such as lead chloride and silver chloride. Similar relations were found to hold and the amounts of chemical change to be the same for the same electric transfer as in the case of solutions.

We may sum up the chief results of Faraday's work in the statements known as Faraday's laws: The mass of substance liberated from an electrolyte by the passage of a current is proportional (1) to the total quantity of electricity which passes through the electrolyte, and (2) to the chemical equivalent weight of the substance liberated.

Since Faraday's time his laws have been confirmed by modern Tesearch, and in favourable cases have been shown to hold good with an accuracy of at least one part in a thousand. The principal object of this more recent research has been the determination of the quantitative amount of chemical change associated with the passage for a given time of a current of strength known in electromagnetic units. It is found that the most accurate and convenient apparatus to use is a platinum bowl filled with a solution of silver nitrate containing about fifteen parts of the salt to one hundred of water. Into the solution dips a silver plate wrapped in filter paper, and the current is passed from the silver plate as anode to the bowl as cathode.. The bowl is weighed before and after the passage of the current, and the increase gives the mass of silver deposited. The mean result of the best determinations shows that when a current of one ampere is passed for one second, a mass of silver is deposited equal to o-ooin8 gramme. So accurate and convenient is this determination that it is now used conversely as a practical definition of the ampere, which (defined theoretically in terms of magnetic force) is defined practically as the current which in one second deposits i-ii8 milligramme of silver.

Taking the chemical equivalent weight of silver, as determined by chemical experiments, to be 107-92, the result described gives as the electrochemical equivalent of an ion of unit chemical equivalent the value i-o36Xio~ 6 . If, as is now usual, we take the equivalent weight of oxygen as our standard and call it 16, the equivalent weight of hydrogen is 1-008, and its electro- chemical equivalent is i-o44Xio~ 5 . The electrochemical equiva- lent of any other substance, whether element or compound, may be found by multiplying its chemical equivalent by i-036Xio~ 6 . If, instead of the ampere, we take the C.G.S. electromagnetic unit of current, this number becomes i-o36Xio -4 .

Chemical Nature of the Ions.— A study of the products of decomposition does not necessarily lead directly to a knowledge of the ions actually employed in carrying the current through the electrolyte. Since the electric forces are active throughout the whole solution, all the ions must come under its influence and therefore move, but their separation from the electrodes is determined by the electromotive force needed to liberate them. Thus, as long as every ion of the solution is present in the layer of liquid next the electrode, the one which responds to the least electromotive force will alone be set free. When the amount of this ion in the surface layer becomes too small to carry all the current across the junction, other ions must also be used, and either they or their secondary products will appear also at the electrode. In aqueous solutions, for instance, a few hydrogen

(H) and hydroxyl (OH) ions derived from the water are always present, and will be liberated if the other ions require a higher decomposition voltage and the current be kept so small that hydrogen and hydroxyl ions can be formed fast enough to carry all the current across the junction between solution and electrode. The issue is also obscured in another way. When the ions are set free at the electrodes, they may unite with the substance of the electrode or with some constituent of the solution to form secondary products. Thus the hydroxyl mentioned above decomposes into water and oxygen, and the chlorine produced by the electrolysis of a chloride may attack the metal of the anode. This leads us to examine more closely the part played by water in the electrolysis of aqueous solutions. Distilled water is a very bad conductor, though, even when great care is taken to remove all dissolved bodies, there is evidence to show that some part of the trace of conductivity remaining is due to the water itself. By careful redistillation F. Kohlrausch has prepared water of which the conductivity compared with that of mercury was only 0-40 Xio -11 at 18 C. Even here some little impurity was present, and the

conductivity of chemically pure water was estimated by thermodynamic reasoning as o-36Xio~ 11 at 18 C. As we shall see later, the conductivity of very dilute salt solutions is proportional to the concentration, so that it is probable that, in most cases, practically all the current is carried by the salt. At the electrodes, however, the small quantity of hydrogen and hydroxyl ions from the water are liberated first in cases where the ions of the salt have a higher decomposition voltage. The water being present in excess, the hydrogen and hydroxyl are re-formed at once and therefore are set free continuously. If the current be so strong that new hydrogen and hydroxyl ions cannot be formed in time, other substances are liberated ; in a solution of sulphuric acid a strong current will evolve sulphur dioxide, the more readily as the concentration of the solution is increased. Similar phenomena are seen in the case of a solution of hydrochloric acid. When the solution is weak, hydrogen and oxygen are evolved; but, as the concentration is increased, and the current raised, more and more chlorine is liberated.

An interesting example of secondary action is shown by the common technical process of electroplating with silver from a bath of potassium silver cyanide. Here the ions are potassium and the group Ag(CN) 2 . x Each potassium ion as it reaches the cathode precipitates silver by reacting with the solution in accordance with the chemical equation

K+KAg(CN) 2 =2KCN+Ag, while the anion Ag(CN) 2 dissolves an atom of silver from the anode, and re-forms the complex cyanide KAg(CN) 2 by combining with the 2KCN produced in the reaction described in the equation. If the anode consist of platinum, cyanogen gas is evolved thereat from the anion Ag(CN) 2 , and the platinum becomes covered with the insoluble silver cyanide, AgCN, which soon stops the current. The coating of silver obtained by this process is coherent and homogeneous, while that deposited from a solution of silver nitrate, as the result of the primary action of the current, is crystalline and easily detached.

In the electrolysis of a concentrated solution of sodium acetate, hydrogen is evolved at the cathode and a mixture of ethane and carbon dioxide at the anode. According to H. Jahn, 2 the processes at the anode can be represented by the equations

2CH 3 -COO+H 2 0=2CH 3 -COOH+0 2CH3-COOH+0 = C 2 H 6 +2C0 2 +H 2 0.

The hydrogen at the cathode is developed by the secondary action

$2Na + 2H_2O = 2NaOH + H_2$.

Many organic compounds can be prepared by taking advantage of secondary actions at the electrodes, such as reduction by the cathodic hydrogen, or oxidation at the anode (see Electrochemistry).

It is possible to distinguish between double salts and salts of compound acids. Thus J. W. Hittorf showed that when a current was passed through a solution of sodium platino-chloride, the platinum appeared at the anode. The salt must therefore be derived from an acid, chloroplatinic acid, H_2PtCl_6, and have the formula NajPtCle, the ions being Na and PtCle", for if it were a double salt it would decompose as a mixture of sodium chloride and platinum chloride and both metals would go to the cathode.

1 See Hittorf, Pogg. Ann. cvi. 517 (1859).

2 Grundriss der Elektrochemie (1895), p. 292; and C. Herzog, Ber., 1909, 42, p. 3858.

see also F. Kaufler

ELECTROLYSIS

219

Early Theories of Electrolysis. — The obvious phenomena to be explained by any theory of electrolysis are the liberation of the products of chemical decomposition at the two electrodes while the intervening liquid is unaltered. To explain these facts, Theodor Grotthus (1785-1822) in 1806 put forward an hypothesis which supposed that the opposite chemical constituents of an electrolyte interchanged partners all along the line between the electrodes when a current passed. Thus, if the molecule of a substance in solution is represented by AB, Grotthus considered a chain of AB molecules to exist from one electrode to the other. Under the influence of an applied electric force, he imagined that the B part of the first molecule was liberated at the anode, and that the A part thus isolated united with the B part of the second molecule, which, in its turn, passed on its A to the B of the third molecule. In this manner, the B part of the last molecule of the chain was seized by the A of the last molecule but one, and the A part of the last molecule liberated at the surface of the cathode.

Chemical phenomena throw further light on this question. If two solutions containing the salts AB and CD be mixed, double

decomposition is found to occur, the salts AD and CB being formed till a certain part of the first pair of substances is transformed into an equivalent amount of the second pair. The proportions between the four salts AB, CD, AD and CB, which exist finally in solution, are found to be the same whether we begin with the pair AB and CD or with the pair AD and CB- To explain this result, chemists suppose that both changes can occur simultaneously, and that equilibrium results when the rate at which AB and CD are transformed into AD and CB is the same as the rate at which the reverse change goes oh. A freedom of interchange is thus indicated between the opposite parts of the molecules of salts in solution, and it follows reasonably that with the solution of a single salt, say sodium chloride, continual interchanges go on between the sodium and chlorine parts of the different molecules.

These views were applied to the theory of electrolysis by R. J. E. Clausius. He pointed out that it followed that the electric forces did not cause the interchanges between the opposite parts of the dissolved molecules but only controlled their direc- tion. Interchanges must be supposed to go on whether a current passes or not, the function of the electric forces in electrolysis being merely to determine in what direction the parts of the molecules shall work their way through the liquid and to effect actual separation of these parts (or their secondary products) at the electrodes. This conclusion is supported also by the evidence supplied by the phenomena of electrolytic conduction (see Conduction, Electric, § II.). If we eliminate the reverse electromotive forces of polarization at the two electrodes, the con- duction of electricity through electrolytes is found to conform to Ohm's law; that is, once the polarization is overcome, the current is proportional to the electromotive force applied to the bulk of the liquid. Hence there can be no reverse forces of polarization inside the liquid itself, such forces being confined to the surface of the electrodes. No work is done in separating the parts of the molecules from each other. This result again indicates that the parts of the molecules are effectively separate from each other, the function of the electric forces being merely directive.

Migration of the Ions. — The opposite parts of an electrolyte, which work their way through the liquid under the action of the electric forces, were named by Faraday the ions — the travellers. The changes of concentration which occur in the solution near the two electrodes were referred by W. Hittorf (1853) to the unequal speeds with which he supposed the two opposite ions to travel. It is clear that, when two opposite streams of ions move past each other, equivalent quantities are liberated at the two ends of the system. If

the ions move at equal rates, the salt which is decomposed to supply the ions liberated must be taken equally from the neighbourhood of the two electrodes. But if one ion, say the anion, travels faster through the liquid than the other, the end of the solution from which it comes will be rrore exhausted of salt than the end towards which it goes.

If we assume that no other cause is at work, it is easy to prove that, with non-dissolvable electrodes, the ratio of salt lost at the anode to the salt lost at the cathode must be equal to the ratio of the velocity of the cation to the velocity of the anion. This result may be illustrated by fig. 2. The black circles repre- sent one ion and the white

circles the other. If the black ooooooooroooo"oo';ooooo< >6 ions move twice as fast as the ˆI'.ZllI.'

white ones, the state of things » flOOO «;°;jj;°;;~i:;S!S !..'.,.. after the passage of a current Fig 2

will be represented by the

lower part of the figure. Here the middle part of the solution is unaltered and the number of ions liberated is the same at either end, but the amount of salt left at one end is less than that at the other. On the right, towards which the faster ion travels, five molecules of salt are left, being a loss of two from the original seven. On the left, towards which the slower ion moves, only three molecules remain — a loss of four. Thus, the ratio of the losses at the two ends is two to one — the same as the ratio of the assumed ionic velocities. It should be noted, however, that another cause would be competent to explain the unequal dilution of the two solutions. If either ion carried with it som6 of the unaltered salt or some of the solvent, concentration or dilution of the liquid would be produced where the ion was liberated. There is reason to believe that in certain cases such complex ions do exist, and interfere with the results of the differing ionic velocities.

Hittorf and many other observers have made experiments to determine the unequal dilution of a solution round the two electrodes when a current passes. Various forms of apparatus have been used, the principle of them all being to secure efficient separation of the two volumes of solution in which the changes occur. In some cases porous diaphragms have been employed; but such diaphragms introduce a new complication, for the liquid as a whole is pushed through them by the action of the current, the phenomenon being

known as electric endosmose. Hence experiments without separating diaphragms are to be preferred, and the apparatus may be considered effective when a considera- able bulk of intervening solution is left unaltered in composition. It is usual to express the results in terms of what is called the migration constant of the anion, that is, the ratio of the amount of salt lost by the anode vessel to the whole amount lost by both vessels. Thus the statement that the migration constant or transport number for a decinormal solution of copper sulphate is 0-632 implies that of every gramme of copper sulphate lost by a solution containing originally one-tenth of a gramme equivalent per litre when a current is passed through it between platinum electrodes, 0-632 gramme is taken from the cathode vessel and 0-368 gramme from the anode vessel. For certain concentrated solutions the transport number is found to be greater than unity; thus for a normal solution of cadmium iodide its value is 1-12. On the theory that the phenomena are wholly due to unequal ionic velocities this result would mean that the cation like the anion moved against the conventional direction of the current. That a body carrying a positive electric charge should move against the direction of the electric intensity is con- trary to all our notions of electric forces, and we are compelled to seek some other explanation. An alternative hypothesis is given by the idea of complex ions. If some of the anions, instead of being simple iodine ions represented chemically by the symbol I, are complex structures formed by the union of iodine with un- altered cadmium iodide — structures represented by some such chemical formula as I(CdI 2), the concentration of the solution round the anode would be increased by the passage of an electric current, and the phenomena observed would be explained. It is found that, in such cases as this, where it seems necessary to imagine the existence of complex ions, the transport number changes rapidly as the concentration of the original solution is changed. Thus, diminishing the concentration of the cadmium iodine solution from normal to one-twentieth normal changes the transport number from 1-12 to 0-64. Hence it is probable that in cases where the transport number keeps constant with

changing concentration the hypothesis of complex ions is un- necessary, and we may suppose that the transport number is a true migration constant from which the relative velocities of the two ions may be calculated in the matter suggested by Hittorf and illustrated

in fig. 2. This conclusion is confirmed by the results of the direct visual determination of ionic velocities (see Conduction, Electric, § II.), which, in cases where the transport number remains constant, agree with the values calculated from those numbers. Many solutions in which the transport numbers vary at high concentration often become simple at greater dilution. For instance, to take the two solutions to which we have already referred, we have —

of ions between molecules at the instants of molecular collision only; during the rest of the life of the ions they were regarded as linked to each other to form electrically neutral molecules.

In 1887 Svante Arrhenius. professor of physics at Stockholm, put forward a new theory which supposed that the freedom of the opposite ions from each other was not a mere momentary freedom at the instants of molecular collision, but a more or less permanent freedom, the ions moving independently of each other through the liquid. The evidence which led Arrhenius to this conclusion was based on van 't HofPs work on the osmotic pressure of solutions (see Solution). If a solution, let us say of sugar, be confined in a closed vessel through the walls of

Copper sulphate transport numbers Cadmium iodide „ „

2-0 0-72

1-22

1-5

0-714

1-18

1-0

0-696

1-12

o-5

0-668

I-OO

0-2

0-643

0-8 3

0-1 0-632

0-71

0-05

0-626

0-64

0-02

0-62

o-59

o-oi normal

0-56

It is probable that in both these solutions complex ions exist at fairly high concentrations, but gradually gets less in number and finally disappear as the dilution is increased. In such salts as potassium chloride the ions seem to be simple throughout a wide range of concentration since the transport numbers for the same Series of concentrations as those used above run — Potassium chloride — 0-5I5. 0-5.15. o-5H. 0-513. 0-509, 0-508, 0-507, 0-507, 0-506.

*The next important step in the theory of the subject was made by F. Kohlrausch in 1879. Kohlrausch formulated a theory of electrolytic conduction based on the idea that, under the action of the electric forces, the oppositely charged ions moved in opposite directions through the liquid, carrying their charges with them. If we eliminate the polarization at the electrodes, it can be shown that an electrolyte possesses a definite electric resistance and therefore a definite conductivity. The con- ductivity gives us the amount of electricity conveyed per second under a definite electromotive force. On the view of the process * of conduction described above, the amount of electricity conveyed per second is measured by the product of the number of ions, known from the concentration of the solution, the charge carried by each of them, and the velocity with which, on the average, they move through the liquid. The concentration is known,*

and the conductivity can be measured experimentally; thus the average velocity with which the ions move past each other under the existent electromotive force can be estimated. The velocity with which the ions move past each other is equal to the sum of their individual velocities, which can therefore be calculated. Now Hittorf 's transport number, in the case of simple salts in moderately dilute solution, gives us the ratio between the two ionic velocities. Hence the absolute velocities of R the two ions can be determined, and we can calculate the actual speed with which a certain ion moves through a given liquid under the action of a given potential gradient or electro- motive force. The details of the calculation are given in the article Conduction, Electric, § II., where also will be found an account of the methods which have been used to measure the velocities of many ions by direct visual observation. The results go to show that, where the existence of complex ions is not indicated by varying transport numbers, the observed velocities agree with those calculated on Kohlrausch's theory.

Dissociation Theory. — The verification of Kohlrausch's theory of ionic velocity verifies also the view of electrolysis which regards the electric current as due to streams of ions moving in opposite directions through the liquid and carrying their opposite electric charges with them. There remains the question how the necessary migratory freedom of the ions is secured. As we have seen, Grotthus imagined that it was the electric forces which sheared the ions past each other and loosened the chemical bonds holding the opposite parts of each dissolved molecule together. Clausius extended to electrolysis the chemical ideas which looked on the opposite parts of the molecule as always changing partners independently of any electric force, and re- garded the function of the current as merely directive. Still, the necessary freedom was supposed to be secured by interchanges

which the solvent can pass but the solution cannot, the solvent will enter till a certain equilibrium pressure is reached. This equilibrium pressure is called the osmotic pressure of the solution, and thermodynamic theory shows that, in an ideal case of perfect separation between solvent and solute, it should have the same value as the pressure which a number of molecules equal to the number of solute molecules in the solution would exert if they could exist as a gas in a space equal to the volume of the solu- tion, provided that the space was large enough (i.e. the solution dilute enough) for the intermolecular forces between the dissolved particles to be inappreciable. Van 't HofT pointed out that measurements of osmotic pressure confirmed this value in the case of dilute solutions of cane

sugar.

Thermodynamic theory also indicates a connexion between the osmotic pressure of a solution and the depression of its freezing point and its vapour pressure compared with those of the pure solvent. The freezing points and vapour pressures of solu- tions of sugar are also in conformity with the theoretical numbers. But when we pass to solutions of mineral salts and acids — to solutions of electrolytes in fact — we find that the observed values of the osmotic pressures and of the allied phenomena are greater than the normal values. Arrhenius pointed out that these exceptions would be brought into line if the ions of electrolytes were imagined to be separate entities each capable of producing its own pressure effects just as would an ordinary dissolved molecule.

Two relations are suggested by Arrhenius' theory. (1) In very dilute solutions of simple substances, where only one kind of dissociation is possible and the dissociation of the ions is complete, the number of pressure-producing particles necessary to produce the observed osmotic effects should be equal to the numDer of ions given by a molecule of the salt as shown by its electrical properties. Thus the osmotic pressure, or the depression of the freezing point of a solution of potassium chloride should, at extreme dilution, be twice the normal value, but of a solution of sulphuric acid three times that value, since the potassium salt contains two ions and the acid three. (2) As the concentra- tion of the solutions increases, the ionization as measured electrically and the dissociation as measured osmotically might decrease more or less together, though, since the thermodynamic theory only holds when the solution is so dilute that the dissolved particles are beyond each other's sphere of action, there is much doubt whether this second relation is valid through any appreci- able range of concentration.

At present, measurements of freezing point are more con- venient and accurate than those of osmotic pressure, and we may test the validity of Arrhenius' relations by their means. The theoretical value for the depression of the freezing point of a dilute solution per gramme-equivalent of solute per litre is 1-857° C. Completely ionized solutions of salts with two ions should give double this number or 3-714°, while electrolytes with three ions should have a value of 5 ■ 57°.

The following results are given by H. B. Loomis for the concentration of o-oi gramme-molecule of salt to one thousand grammes of water. The salts tabulated are those of which the

equivalent conductivity reaches a limiting value indicating that complete ionization is reached as dilution is increased. With such salts alone is a valid comparison possible.

Molecular Depressions of the Freezing Point. Electrolytes with two Ions. Potassium chloride . 3-60 Nitric acid . . . 3-73 Sodium chloride . . 3-67 Potassium nitrate . 3-46 Potassium hydrate . 371 Sodium nitrate . 3 55

Hydrochloric acid . 3-61 Ammonium nitrate . 3-58

Electrolytes with three Ions. Sulphuric acid . 4-49 Calcium chloride . . 5-04

Sodium sulphate . . 5-09 Magnesium chloride . 5-08

At the concentration used by Loomis the electrical con- ductivity indicates that the ionization is not complete, particu- larly in the case of the salts with divalent ions in the second list. Allowing for incomplete ionization the general concordance of these numbers with the theoretical ones is very striking.

The measurements of freezing points of solutions at the extreme dilution necessary to secure complete ionization is a matter of great difficulty, and has been overcome only in a research initiated by E. H. Griffiths. 1 Results have been obtained for solutions of sugar, where the experimental number is 1-858, and for potassium chloride, which gives a depression of 3-720. These numbers agree with those indicated by theory, viz. 1-857 and 3-714, with astonishing exactitude. We may take Arrhenius' first relation as established for the case of potassium chloride.

The second relation, as we have seen, is not a strict consequence of theory, and experiments to examine it must be treated as an investigation of the limits within which solutions are dilute within the thermodynamic sense of the word, rather than as a test of the soundness of the theory. It is found that divergence has begun before the concentration has become great enough to enable freezing points to be measured with any ordinary apparatus. The freezing point curve usually lies below the electrical one, but approaches it as dilution is increased. 2

Returning once more to the consideration of the first relation, which deals with the comparison between the number of ions and the number of pressure-producing particles in dilute solution, one caution is necessary. In simple substances like potassium chloride it seems evident that one kind of dissociation only is possible. The electrical phenomena show that there are two ions to the molecule, and that these ions are electrically charged. Corresponding with this result we find that the freezing point of dilute solutions indicates that two pressure-producing particles per molecule are present. But the converse relation does not necessarily follow. It would be possible for a body in solution to be dissociated into non-electrical parts, which would give osmotic pressure effects twice or three times the normal value, but, being uncharged, would not act as ions and impart electrical conductivity to the solution. L. Kahlenberg (Jour. Phys. Chem., 1901, v. 344, 1002, vi. 43) has found that solutions of diphenyl- amine in methyl cyanide possess an excess of pressure-producing particles and yet are non-conductors of electricity. It is possible that in complicated organic substances we might have two kinds of dissociation, electrical and non-electrical, occurring simultaneously, while the possibility of the association of mole- cules accompanied by the electrical dissociation of some of them into new parts should not be overlooked. It should be pointed out that no measurements on osmotic pressures or freezing points can do more than tell us that an excess of particles is present; such experiments can throw no light on the question whether or not those particles are electrically charged. That question can only be answered by examining whether or not the particles move in an electric field.

The dissociation theory was originally suggested by the osmotic pressure relations. But not only has it explained satisfactorily the electrical properties of solutions, but it seems to be the only known hypothesis which is consistent with the experimental relation between the concentration of a solution and its electrical conductivity (see Conduction, Electric,

1 Brit. Ass. Rep., 1906, Section A, Presidential Address.

2 See Theory of Solution, by W. C. D. Whetham (1902), p. 328.

§ II., " Nature of Electrolytes "). It is probable that the electrical effects constitute the strongest arguments in favour of the theory. It is necessary to point out that the dissociated ions of such a body as potassium chloride are not in the same condition as potassium and chlorine in the free state. The ions are associated with very large electric charges, and, whatever their exact relations with those

charges may be, it is certain that the energy of a system in such a state must be different from its energy when unelectrified. It is not unlikely, therefore, that even a compound as stable in the solid form as potassium chloride should be thus dissociated when dissolved. Again, water, the best electrolytic solvent known, is also the body of the highest specific inductive capacity (dielectric constant), and this property, to whatever cause it may be due, will reduce the forces between electric charges in the neighbourhood, and may therefore enable two ions to separate.

This view of the nature of electrolytic solutions at once explains many well-known phenomena. Other physical properties of these solutions, such as density, colour, optical rotatory power, &c, like the conductivities, are additive, i.e. can be calculated by adding together the corresponding properties of the parts. This again suggests that these parts are independent of each other. For instance, the colour of a salt solution is the colour obtained by the superposition of the colours of the ions and the colour of any undissociated salt that may be present. All copper salts in dilute solution are blue, which is therefore the colour of the copper ion. Solid copper chloride is brown or yellow, so that its concentrated solution, which contains both ions and undissociated molecules, is green, but changes to blue as water is added and the ionization becomes complete. A series of equivalent solutions all containing the same coloured ion have absorption spectra which, when photographed, show identical absorption bands of equal intensity. 3 The colour changes shown by many sub- stances which are used as indicators (q.v.) of acids or alkalis can be explained in a similar way. Thus para-nitrophenol has colour- less molecules, but an intensely yellow negative ion. In neutral, and still more in acid solutions, the dissociation of the indicator is practically nothing, and the liquid is colourless. If an alkali is added, however, a highly dissociated salt of para-nitrophenol is formed, and the yellow colour is at once evident. In other cases, such as that of litmus, both the ion and the undissociated molecule are coloured, but in different ways.

Electrolytes possess the power of coagulating solutions of colloids such as albumen and arsenious sulphide. The mean values of the relative coagulative powers of sulphates of mono-, di-, and tri-valent metals have been shown experimentally to be approximately in the ratios 1:35:1023. The dissociation theory refers this to the action of electric charges carried by the free ions. If a certain minimum charge must be collected in order to start coagulation, it will need the conjunction of 6n monovalent, or 3» divalent, to equal the effect of 2» trivalent ions. The ratios of the coagulative powers can thus be

calculated to be i:x:x 2 , and putting ˆ = 32 we get 1 :32 11024, a satis- factory agreement with the numbers observed. 4

The question of the application of the dissociation theory to the case of fused salts remains. While it seems clear that the conduction in this case is carried on by ions similar to those of solutions, since Faraday's laws apply equally to both, it does not follow necessarily that semi-permanent dissociation is the only way to explain the phenomena. The evidence in favour of dissociation in the case of solutions does not apply to fused salts, and it is possible that, in their case, a series of molecular interchanges, somewhat like Grotthus's chain, may represent the mechanism of conduction.

An interesting relation appears when the electrolytic con- ductivity of solutions is compared with their chemical activity. The readiness and speed with which electrolytes react are in

3 W. Ostwald, Zeits. physikal. Chemie, 1892, vol. ix. p. 579; T. Ewan, Phil. Mag. (5), 1892, vol. xxxiii. p. 317; G. D. Liveing, Cambridge Phil. Trans., 1900, vol. xviii. p. 298.

4 See W. B. Hardy, Journal of Physiology, 1899, vol. xxiv. p. 288; and W. C. D. Whetham Phil. Mag., November 1899.

sharp contrast with the difficulty experienced in the case of non-electrolytes. Moreover, a study of the chemical relations of electrolytes indicates that it is always the electrolytic ions that are concerned in their reactions. The tests for a salt, potassium nitrate, for example, are the tests not for KN0 3 , but for its ions K and N0 3 , and in cases of double decomposition it is always these ions that are exchanged for those of other substances. If an element be present in a compound otherwise than as an ion, it is not interchangeable, and cannot be recognized by the usual tests. Thus neither a chlorate, which contains the ion C10 3 , nor monochloracetic acid, shows the reactions of chlorine, though it is, of course, present in both substances; again, the sulphates do not answer to the usual tests which indicate the presence of sulphur as sulphide. The chemical activity of a substance is a quantity which may be measured by different methods. For some substances it has been shown to be independent of the particular reaction used. It is then possible to assign to each body a specific coefficient of affinity. Arrhenius has

pointed out that the coefficient of affinity of an acid is proportional to its electrolytic ionization.

The affinities of acids have been compared in several ways. W. Ostwald (Lehrbuch der attg. Ckcmie, vol. ii., Leipzig, 1893) investigated the relative affinities of acids for potash, soda and ammonia, and proved them to be independent of the base used. The method employed was to measure the changes in volume caused by the action. His results are given in column I. of the following table, the affinity of hydrochloric acid being taken as one hundred. Another method is to allow an acid to act on an insoluble salt, and to measure the quantity which goes into solution. Determinations have been made with calcium oxalate, CaC204+H 2 0, which is easily decomposed by acids, oxalic acid and a soluble calcium salt being formed. The affinities of acids relative to that of oxalic acid are thus found, so that the acids can be compared among themselves (column II.). If an aqueous solution of methyl acetate be allowed to stand, a slow decomposition goes on. This is much quickened by the presence of a little dilute acid, though the acid itself remains unchanged. It is found that the influence of different acids on this action is proportional to their specific coefficients of affinity. The results of this method are given in column III. Finally, in column IV. the electrical conductivities of normal solutions of the acids have been tabulated. A better basis of comparison would be the ratio of the actual to the limiting conductivity, but since the conductivity of acids is chiefly due to the mobility of the hydrogen ions, its limiting value is nearly the same for all, and the general result of the comparison would be unchanged.

Acid.

Hydrochloric . Nitric _. Sulphuric Formic . Acetic Propionic Monochloracetic Dichloracetic . Trichloracetic . Malic Tartaric Succinic

I.

100 102 68 4-0

1-2

I-I

7-2

34 82

3-o

5-3

o-i

II.

100

no

67

2-5

1-0

5”i

18

63 5-0 6-3

0-2

III.

100

92

74

i-3 o-3 o-3

4-3 23-0 68-2

1-2

2 ‘3

o-5

It must be remembered that, the solutions not being of quite the same strength, these numbers are not strictly comparable, and that the experimental difficulties involved in the chemical measurements are considerable. Nevertheless, the remarkable general agreement of the

numbers in the four columns is quite enough to show the intimate connexion between chemical activity and electrical con- ductivity. We may take it, then, that only that portion of these bodies is chemically active which is electrolytically active — that ionization is necessary for such chemical activity as we are dealing with here, just as it is necessary for electrolytic conductivity.

The ordinary laws of chemical equilibrium have been applied to the case of the dissociation of a substance into its ions. Let x be the number of molecules which dissociate per second when the number of undissociated molecules in unit volume is unity, then in a dilute solution where the molecules do not interfere with each other, xp is the number when the concentration is p. Recombination can ˆnly occur when two ions meet, and since the frequency with which this will happen is, in dilute solution, proportional to the square of the ionic concentration, we shall get for the number of molecules re-formed in one second yif where g is the number of dis- sociated molecules in one cubic centimetre. When there is equili- brium, xp = y

m/moo . which we may write as o, The number of undissociated mole- cules is then 1 — a, so that if V be the volume of the solution containing 1 gramme-molecule of the dissolved substance, we get

q = a/V and £ = (l-a)/V, hence x (1 – a) V = ya?l V

and

7^= - = constant:

—k.

This constant k gives a numerical value for the chemical affinity, and the, equation should represent the effect of dilution on the molecular conductivity of binary electrolytes.

In the case of substances like ammonia and acetic acid, where the dissociation is very small, I— a is nearly equal to unity, and only varie s slo wly with dilution. The equation then becomes a 2 /V = k, or a = V Vk, so that the molecular conductivity is proportional to the square root of the dilution. Ostwald has confirmed the equation by observation on an enormous number of weak acids (Zeits. physikal. Chemie, 1888, ii. p. 278; 1889, iii. pp. 170, 241, 369). Thus in the case of cyanacetic acid, while the volume V changed by doubling from 16 to 1024 litres, the values of k were o-oo (376, 373, 374, 361, 362, 361, 368). The mean values of k for other common

acids were — formic, 0-0000214; acetic, 0-0000180; monochlor-acetic, 0-00155; dichloracetic, 0-051; trichloracetic, 1-21; propionic, 0-0000134. From these numbers we can, by help of the equation, calculate the conductivity of the acids for any dilution. The value of k, however, does not keep constant so satisfactorily in the case of highly dissociated substances, and empirical formulae have been constructed to represent the effect of dilution on them. Thus the values of the expressions o 2 /(l — o V V) (Rudolphi, Zeits. physikal. Chemie, 1895, vol. xvii. p. 385) and a 3 /(i — &) 2 V (van 't Hoff, ibid., !895, vol. xviii. p. 300) are found to keep constant as V changes. Van 't Hoff's formula is equivalent to taking the frequency of dis- sociation as proportional to the square of the concentration of the molecules, and the frequency of recombination as proportional to the cube of the concentration of the ions. An explanation of the failure of the usual dilution law in these cases may be given if we remember that, while the electric forces between bodies like Un- dissociated molecules, each associated with equal and opposite charges, will vary inversely as the fourth power of the distance, the forces between dissociated ions, each carrying one charge only, will be inversely proportional to the square of the distance. The forces between the ions of a strongly dissociated solution will thus be con- siderable at a dilution which makes forces between undissociated molecules quite insensible, and at the concentrations necessary to test Ostwald's formula an electrolyte will be far from dilute in the thermodynamic sense of the term, which implies no appreciable intermolecular or interionic forces.

When the solutions of two substances are mixed, similar considerations to those given above enable us to calculate the resultant changes in dissociation. (See Arrhenius, loc. cit.) The simplest and most important case is that of two electrolytes having one ion 'in common, such as two acids. It is evident that the undis- sociated part of each acid must eventually be in equilibrium with the free hydrogen ions, and, if the concentrations are not such as to secure this condition, readjustment must occur. In order that there should be no change in the states of dissociation on mixing, it is necessary, therefore, that the concentration of the hydrogen ions should be the same in each separate solution. Such solutions were called by Arrhenius " isohydric." The two solutions, then, will so act on each other when mixed that they become isohydric. Let us suppose that we have one very active acid like hydrochloric, in which dissociation is nearly complete, another like acetic, in which it is very small. In order that the solutions of these should be isohydric and the concentrations of the hydrogen ions the same, we must have a very

large quantity of the feebly dissociated acetic acid, and a very small quantity of the strongly dissociated hydro- chloric, and in such proportions alone will equilibrium be possible. This explains the action of a strong acid on the salt of a weak acid. Let us allow dilute sodium acetate to react with dilute hydrochloric acid. Some acetic acid is formed, and this process will go on till the solutions of the two acids are isohydric: that is, till the dis- sociated hydrogen ions are in equilibrium with both. In order that this should hold, we have seen that a considerable quantity of acetic acid must be present, so that a corresponding amount of the salt will be decomposed, the quantity being greater the less the acid is dissociated. This " replacement " of a " weak " acid by a " strong " one is a matter of common observation in the chemical laboratory. Similar investigations applied to the general case of chemical equilibrium lead to an expression of exactly the same form as that given by C. M. Guldberg and P.Waage, which is universally accepted as an accurate representation of the facts.

The temperature coefficient of conductivity has approximately the same value for most aqueous salt solutions. It decreases both as the temperature is raised and as the concentration is increased, ranging from about 3-5% per degree for extremely dilute solutions (i.e. practically pure water) at o° to about 1-5

for concentrated solutions at 18 . For acids its value is usually rather less than for salts at equivalent concentrations. The influence of temperature on the conductivity of solutions depends on (1) the ionization, and (2) the frictional resistance of the liquid to the passage of the ions, the reciprocal of which is called the ionic fluidity. At extreme dilution, when the ionization is complete, a variation in temperature cannot change its amount. The rise of conductivity with temperature, therefore, shows that the fluidity becomes greater when the solution is heated.

As the concentration is increased and un-ionized molecules are formed, a change in temperature begins to affect the ionization as well as the fluidity. But the temperature coefficient of conductivity is now generally less than before; thus the effect of temperature on ionization must be of opposite sign to its effect on fluidity. The ionization of a solution, then, is usually diminished by raising the temperature, the rise in conductivity being due to the greater increase in fluidity. Nevertheless, in certain cases, the temperature coefficient of conductivity becomes negative at high temperatures, a solution of phosphoric acid, for example, reaching a maximum conductivity at 75 C.

The dissociation theory gives an immediate explanation of the fact that, in general, no heat-change occurs when two neutral salt solutions are mixed. Since the salts, both before and after mixture, exist mainly as dissociated ions, it is obvious that large thermal effects can only appear when the state of dissociation of the products is very different from that of the reagents. Let us consider the case of the neutralization of a base by an acid in the light of the dissociation theory. In dilute solution such substances as hydrochloric acid and potash are almost completely dissociated, so that, instead of representing the reaction as

$HC1 + K0H = KC1 + HA$

we must write

$+ - + - + -$

H+C1+K+OH = K+C1+H 2 0.

The ions K and CI suffer no change, but the hydrogen of the acid and the hydroxyl (OH) of the potash unite to form water, which is only very slightly dissociated. The heat liberated, then, is almost exclusively that produced by the formation of water from its ions. An exactly similar process occurs when any strongly dissociated acid acts on any strongly dissociated base, so that in all such cases the heat evolution should be approxi- mately the same. This is fully borne out by the experiments of Julius Thomsen, who found that the heat of neutralization of one gramme-molecule of a strong base by an equivalent quantity of a strong acid was nearly constant, and equal to 13,700 or 13,800 calories. In the case of weaker acids, the dissociation of which is less complete, divergences from this constant value will occur, for some of the molecules have to be separated into their ions. For instance, sulphuric acid, which in the fairly strong solutions used by Thomsen is only about half dissociated, gives a higher value for the heat of neutralization, so that heat must be evolved when it is ionized. The heat of formation of a substance from its ions is, of course, very different from that evolved when it is formed from its elements in the usual way, since the energy associated with an ion is different from that possessed by the atoms of the element in their normal state. We can calculate the heat of formation from its ions for any substance dissolved in a given liquid, from a knowledge of the temperature coefficient of ionization, by means of an application of the well-known tliermodynamical process, which also gives the latent heat of evaporation of a liquid when the temperature coefficient of its vapour pressure is known. The heats of formation thus obtained may be either positive or negative, and by using them to supple- ment the heat of formation of water, Arrhenius calculated the total heats of neutralization of soda by different acids, some of them only slightly dissociated, and found values agreeing well with observation (Zeits. physikal. Chemie, 1889, 4, p. 96; and 1892, 9, p. 339).

Voltaic Cells. — When two metallic conductors are placed in an electrolyte, a current will flow through a wire connecting them provided that a difference of any kind exists between the two conductors in the nature either of the metals or of the

portions of the electrolyte which surround them. A current can be obtained by the combination of two metals in the same electrolyte, of two metals in different electrolytes, of the same metal in different electrolytes, or of the same metal in solutions of the same electrolyte at different concentrations. In accord- ance with the principles of

energetics (q.v.), any change which involves a decrease in the total available energy of the system will tend to occur, and thus the necessary and sufficient condition for the production of electromotive force is that the available energy of the system should decrease when the current flows.

In order that the current should be maintained, and the electromotive force of the cell remain constant during action, it is necessary to ensure that the changes in the cell, chemical or other, which produce the current, should neither destroy the difference between the electrodes, nor coat either electrode with a non-conducting layer through which the current cannot pass. As an example of a fairly constant cell we may take that of Daniell, which consists of the electrical arrangement — zinc | zinc sulphate solution | copper sulphate solution | copper, — the two solutions being usually separated by a pot of porous earthen- ware. When the zinc and copper plates are connected through a wire, a current flows, the conventionally positive electricity passing from copper to zinc in the wire and from zinc to copper in the cell. Zinc dissolves at the anode, an equal amount of zinc replaces an equivalent amount of copper on the other side of the porous partition, and the same amount of copper is deposited on the cathode. This process involves a decrease in the available energy of the system, for the dissolution of zinc gives out more energy than the separation of copper absorbs. But the internal rearrangements which accompany the produc- tion of a current do not cause any change in the original nature of the electrodes, fresh zinc being exposed at the anode, and copper being deposited on copper at the cathode. Thus as long as a moderate current flows, the only variation in the cell is the appearance of zinc sulphate in the liquid on the copper side of the porous wall. In spite of this appearance, however, while the supply of copper is maintained, copper, being more easily separated from the solution than zinc, is deposited alone at the cathode, and the cell remains constant.

It is necessary to observe that the condition for change in a system is that the total available energy of the whole system should be decreased by the change. We must consider what change is allowed by the mechanism of the system, and deal witn the sum of all the alterations in energy. Thus in the Daniell cell the dissolution of copper as well as of zinc would increase the loss in available energy. But when zinc dissolves, the zinc ions carry their electric charges with them, and the liquid tends to become positively electrified. The electric forces then soon stop further action unless an equivalent quantity of positive ions are removed from the solution. Hence zinc can only dissolve when some more easily separable substance is

present in solution to be removed pari passu with the dissolution of zinc. The mechanism of such systems is well illustrated by an experiment devised by W. Ostwald. Plates of platinum and pure or amal- gamated zinc are separated by a porous pot, and each sur- rounded by some of the same solution of a salt of a metal more oxidizable than zinc, such as potassium. When the plates are connected together by means of a wire, no current flows, and no appreciable amount of zinc dissolves, for the dissolution of zinc would involve the separation of potassium and a gain in available energy. If sulphuric acid be added to the vessel containing the zinc, these conditions are unaltered and still no zinc is dissolved. But, on the other hand, if a few drops of acid be placed in the vessel with the platinum, bubbles of hydrogen appear, and a current flows, zinc dissolving at the anode, and hydrogen being liberated at the cathode. In order that positively electrified ions may enter a solution, an equivalent amount of other positive ions must be removed or negative ions be added, and, for the process to occur spontaneously, the possible action at the two electrodes must involve a decrease in the total avail- able energy of the system.

Considered thermodynamically, voltaic cells must be divided

into reversible and non-reversible systems. If the slow pro- cesses of diffusion be ignored, the Daniell cell already described may be taken as a type of a reversible cell. Let an electromotive force exactly equal to that of the cell be applied to it in the reverse direction. When the applied electromotive force is diminished by an infinitesimal amount, the cell produces a current in the usual direction, and the ordinary chemical changes occur. If the external electromotive force exceed that of the cell by ever so little, a current flows in the opposite direction, and all the former chemical changes are reversed, copper dissolving from the copper plate, while zinc is deposited on the zinc plate. The cell, together with this balancing electromotive force, is thus a reversible system in true equilibrium, and the thermodynamical reasoning applicable to such systems can be used to examine its properties.

Now a well-known relation connects the available energy of a reversible system with the corresponding change in its total internal energy.

The available energy A is the amount of external work obtainable by an infinitesimal, reversible change in the system which occurs at a constant temperature T. If I be the change in the internal energy, the relation referred to gives us the equation A = I+T(

where dA/dT denotes the rate of change of the available energy of the system per degree change in temperature. During a small electric transfer through the cell, the external work done is Ee, where E is the electromotive force. If the chemical changes which occur in the cell were allowed to take place in a closed vessel without the performance of electrical or other work, the change in energy would be measured by the heat evolved. Since the final state of the system would be the same as in the actual processes of the cell, the same amount of heat must give a measure of the change in internal energy when the cell is in action. Thus, if L denote the heat corresponding with the chemical changes associated with unit electric transfer, Le will be the heat corresponding with an electric transfer e, and will also be equal to the change in internal energy of the cell. Hence we get the equation

Ee = Le+Te(dEldT) or E = L+T(dE/dT), as a particular case of the general thermodynamic equation of available energy. This equation was obtained in different ways by J. Willard Gibbs and H. von Helmholtz.

It will be noticed that when dE/dT is zero, that is, when the electromotive force of the cell does not change with temperature, the electromotive force is measured by the heat of reaction per unit of electrochemical change. The earliest formulation of the subject, due to Lord Kelvin, assumed that this relation was true in all cases, and, .calculated in this way, the electromotive force of Daniell's cell, which happens to possess a very small temperature coefficient, was found to agree with observation.

When one gramme of zinc is dissolved in dilute sulphuric acid, 1670 thermal units or calories are evolved. Hence for the electro- chemical unit of zinc or 0-003388 gramme, the thermal evolution is 5-66 calories. Similarly, the beat which accompanies the dissolution of one electrochemical unit of copper is 3-00 calories. Thus, the thermal equivalent of the unit of resultant electrochemical change in Daniell's cell is 5-66— 3-00 = 2-66 calories. The dynamical equivalent of the calorie is 4- 18 X io 7 ergs or C.G.S. units of work, and therefore the electromotive force of the cell should be I -1 12 Xio 8 C.G.S. units or I -112 volts — a close agreement with the experimental result of about 1 -08 volts. For cells in which the

electromotive force varies with temperature, the full equation given by Gibbs and Helmholtz has also been confirmed experimentally.

As stated above, an electromotive force is set up whenever there is a difference of any kind at two electrodes immersed in electrolytes. In ordinary cells the difference is secured by using two dissimilar metals, but an electromotive force exists if two plates of the same metal are placed in solutions of different substances, or of the- same substance at different concentrations. In the latter case, the tendency of the metal to dissolve in the more dilute solution is greater than its tendency to dissolve in the more concentrated solution, and thus there is a decrease in available energy when metal dissolves in the dilute solution and separates in equivalent quantity from the concentrated solution. An electromotive force is therefore set up in this direction, and, if we can calculate the change in available energy due to the processes of the cell, we can foretell the value of the electro- motive force. Now the effective change produced by the action of the current is the concentration of the more dilute solution by the dissolution of metal in it, and the dilution of the originally

stronger solution by the separation of metal from it. We may imagine these changes reversed in two ways. We may evaporate some of the solvent from the solution which has become weaker and thus reconcentrate it, condensing the vapour on the solu- tion which had become stronger. By this reasoning Helmholtz showed how to obtain an expression for the work done. On the other hand, we may imagine the processes due to the electrical transfer to be reversed by an osmotic operation. Solvent may be supposed to be squeezed out from the solution which has become more dilute through a semi-permeable wall, and through another such wall allowed to mix with the solution which in the electrical operation had become more concentrated. Again, we may calculate the osmotic work done, and, if the whole cycle of operations be supposed to occur at the same temperature, the osmotic work must be equal and opposite to the electrical work of the first operation.

The result of the investigation shows that the electrical work Ee is given by the equation

Ee = I vdp,

J pi

where v is the volume of the solution used and p its osmotic pressure.

When the solutions may be taken as effectively dilute, so that the

gas laws apply to the osmotic pressure, this relation reduces to

„ wRT, d E= log,—

where n is the number of ions given by one molecule of the salt, r the transport ratio of the anion, R the gas constant, T the absolute temperature, y the total valency of the anions obtained from one molecule, and £1 and d the concentrations of the two solutions.

If we take as an example a concentration cell in which silver plates are placed in solutions of silver nitrate, one of which is ten times as strong as the other, this equation gives

E = 0-060X108 C.G.S. units = 0-060 volts.

W. Nernst, to whom this theory is due, determined the electromotive force of this cell experimentally, and found the value 0-055 volt.

The logarithmic formulae for these concentration cells in- dicate that theoretically their electromotive force can be increased to any extent by diminishing without limit the concentration of the more dilute solution, log ci/c 2 then becoming very great. This condition may be realized to some extent in a manner that throws light on the general theory of the voltaic cell. Let us consider the arrangement — silver | silver chloride with potassium chloride solution | potassium nitrate solution | silver nitrate solution I silver. Silver chloride is a very insoluble substance, and here the amount in solution is still further reduced by the presence of excess of chlorine ions of the potassium salt. Thus silver, at one end of the cell in contact with many silver ions of the silver nitrate solution, at the other end is in contact with a liquid in which the concentration of those ions is very small indeed. The result is that a high electromotive force is set up, which has been calculated as 0-52 volt, and observed as 0-51 volt. Again, Hittorf has shown that the effect of a cyanide round a copper electrode is to combine with the copper ions. The con- centration of the simple copper ions is then so much diminished that the copper plate becomes an anode with regard to zinc. Thus the cell — copper | potassium cyanide solution | potassium sulphate solution — zinc sulphate solution | zinc — gives a current which carries copper into solution and deposits zinc. In a simil&- way silver could be made to act as anode with respect to cadmium.

It is now evident that the electromotive force of an ordinary chemical cell such as that of Daniell depends on the concentration of the

solutions as well as on the nature of the metals. In ordinary cases possible changes in the concentrations only affect the electromotive force by a few parts in a hundred, but, by means such as those indicated above, it is possible to produce such immense differences in the concentrations that the electro- motive force of the cell is not only changed appreciably but even reversed in direction. Once more we see that it is the total impending change in the available energy of the system which controls the electromotive force.

Any reversible cell can theoretically be employed as an accumulator, though, in practice, conditions of general con- venience are more sought after than thermodynamic efficiency.

The effective electromotive force of the common lead accumu- lator (q.v.) is less than that required to charge it. This drop in the electromotive force has led to the belief that the cell is not reversible. F. Dolezalek, however, has attributed the difference to mechanical hindrances, which prevent the equalization of acid concentration in the neighbourhood of the electrodes, rather than to any essentially irreversible chemical action. The fact that the Gibbs-Helmholtz equation is found to apply also indicates that the lead accumulator is approximately reversible in the thermodynamic sense of the term.

Polarization and Contact Difference of Potential. — If we connect together in series a single Daniell's cell, a galvanometer, and two platinum electrodes dipping into acidulated water, no visible chemical decomposition ensues. At first a considerable current is indicated by the galvanometer; the deflexion soon diminishes, however, and finally becomes very small. If, instead of using a single Daniell's cell, we employ some source of electromotive force which can be varied as we please, and gradually raise its intensity, we shall find that, when it exceeds a certain value, about 1-7 volt, a permanent current of considerable strength flows through the solution, and, after the initial period, shows no signs of decrease. This current is accompanied by chemical decomposition. Now let us disconnect the platinum plates from the battery and join them directly with the galvanometer. A current will flow for a while in the reverse direction; the system of plates and acidulated water through which a current has been passed, acts as an accumulator, and will itself yield a current in return. These phenomena are explained by the existence of a reverse electromotive force at the surface of the

platinum plates. Only when the applied electromotive force exceeds this reverse force of polarization, will a permanent steady current pass through the liquid, and visible chemical decomposition proceed. It seems that this reverse electromotive force of polarization is due to the deposit on the electrodes of minute quantities of the products of chemical decomposition. Differences between the two electrodes are thus set up, and, as we have seen above, an electromotive force will therefore exist between them. To pass a steady current in the direction opposite to this electromotive force of polarization, the applied electromotive force E must exceed that of polarization E', and the excess E – E' is the effective electromotive force of the circuit, the current being, in accordance with Ohm's law, proportional to the applied electromotive force and represented by (E – E')/R, where R is a constant called the resistance of the circuit.

When we use platinum electrodes in acidulated water, hydrogen and oxygen are evolved. The opposing force of polarization is about 1-7 volt, but, when the plates are disconnected and used as a source of current, the electromotive force they give is only about 1-07 volt. This irreversibility is due to the work required to evolve bubbles of gas at the surface of bright platinum plates. If the plates be covered with a deposit of platinum black, in which the gases are absorbed as fast as they are pro- duced, the minimum decomposition point is 1-07 volt, and the process is reversible. If secondary effects are eliminated, the deposition of metals also is a reversible process; the decomposi- tion voltage is equal to the electromotive force which the metal itself gives when going into solution. The phenomena of polariza- tion are thus seen to be due to the changes of surface produced, and are correlated with the differences of potential which exist at any surface of separation between a metal and an electrolyte.

Many experiments have been made with a view of separating the two potential-differences which must exist in any cell made of two metals and a liquid, and of determining each one in- dividually. If we regard the thermal effect at each junction as a measure of the potential-difference there, as the total thermal effect in the cell undoubtedly is of the sum of its potential- differences, in cases where the temperature coefficient is negligible, the heat evolved on solution of a metal should give the electrical potential-difference at its surface. Hence, if we assume that, in the Daniell's cell, the temperature coefficients are negligible at the individual contacts as well as in the cell as a whole, the sign of the potential-difference ought to be the same at the surface

of the zinc as it is at the surface of the copper. Since zinc goes into solution and copper comes out, the electromotive force of the cell will be the difference between the two effects. On the other hand, it is commonly thought that the single potential- differences at the surface of metals and electrolytes have been determined by methods based on the use of the capillary electro- meter and on others depending on what is called a dropping electrode, that is, mercury dropping rapidly into an electrolyte and forming a cell with the mercury at rest in the bottom of the vessel. By both these methods the single potential-differences found at the surfaces of the zinc and copper have opposite signs, and the effective electromotive force of a Daniell's cell is the sum of the two effects. Which of these conflicting views repre- sents the truth still remains uncertain.

Diffusion of Electrolytes and Contact Difference of Potential between Liquids. — An application of the theory of ionic velocity due to W. Nernst 1 and M. Planck 2 enables us to calculate the diffusion constant of dissolved electrolytes. According to the molecular theory, diffusion is due to the motion of the molecules of the dissolved substance through the liquid. When the dissolved molecules are uniformly distributed, the osmotic pressure will be the same everywhere throughout the solution, but, if the concentration vary from point to point, the pressure will vary also. There must, then, be a relation between the rate of change of the concentration and the osmotic pressure gradient, and thus we may consider the osmotic pressure gradient as a force driving the solute through a viscous medium. In the case of non- electrolytes and of all non-ionized molecules this analogy com- pletely represents the facts, and the phenomena of diffusion can be deduced from it alone. But the ions of an electrolytic solution can move independently through the liquid, even when no current flows, as the consequences of Ohm's law indicate. The ions will therefore diffuse independently, and the faster ion will travel quicker into pure water in contact with a solution. The ions carry- their charges with them, and, as a matter of fact, it is found that water in contact with a solution takes with respect to it a positive or negative potential, according as the positive or negative ion travels the faster. This process will go on until the simultaneous separation of electric charges produces an electrostatic force strong enough to prevent further separation of ions. We can therefore calculate the rate at which the salt as a whole will diffuse by examining the conditions for a steady transfer, in which the ions diffuse at an equal rate, the faster one being restrained and the slower one urged forward by the electric forces. In this manner the diffusion constant can be calculated in absolute units (HCl = 2-4o,

HN0 3 = 2-27, NaCl=i-i2), the unit of time being the day. By experiments on diffusion this constant has been found by Scheffer, and the numbers observed agree with those calculated (HCl = 2-3o, HN0 3 =2-22, NaCl=i-n).

As we have seen above, when a solution is placed in contact with water the water will take a positive or negative potential with regard to the solution, according as the cation or anion has the greater specific velocity, and therefore the greater initial rate of diffusion. The difference of potential between two solutions of a substance at different concentrations can be calcu- lated from the equations used to give the diffusion constants. The results give equations of the same logarithmic form as those obtained in a somewhat different manner in the theory of con- centration cells described above, and have been verified by experiment.

The contact differences of potential at 'the interfaces of metals and electrolytes have been co-ordinated by Nernst with those at the surfaces of separation between different liquids. In contact with a solvent a metal is supposed to possess a definite solution pressure, analogous to the vapour pressure of a liquid. Metal goes into solution in the form of electrified ions. The liquid thus acquires a positive charge, and the metal a negative charge. The electric forces set up tend to prevent further separation, and finally a state of equilibrium is reached, when no

1 Zeits. physikal. Chem. 2, p. 613.

2 Wied. Ann., 1890, 40, p. 561.

more ions can go into solution unless an equivalent number are removed by voltaic action. On the analogy between this case and that of the interface between two solutions, Nernst has arrived at similar logarithmic expressions for the difference of potential, which becomes proportional to log (P1/P2) where P 2 is taken to mean the osmotic pressure of the cations in the solution, and Pi the osmotic pressure of the cations in the sub- stance of the metal itself. On these lines the equations of con- centration cells, deduced above on less hypothetical grounds, may be regained.

Theory of Electrons. — Our views of the nature of the ions of electrolytes have been extended by the application of the ideas of the

relations between matter and electricity obtained by the Study of electric conduction through gases. The interpretation of the phenomena of gaseous conduction was rendered possible by the knowledge previously acquired of conduction through liquids; the newer subject is now reaching a position whence it can repay its debt to the older.

Sir J. J. Thomson has shown (see Conduction, Electric, § III.) that the negative ions in certain cases of gaseous con- duction are much more mobile than the corresponding positive ions, and possess a mass of about the one-thousandth part of that of a hydrogen atom. These negative particles or corpuscles seem to be the ultimate units of negative electricity, and may be identified with the electrons required by the theories of H. A. Lorentzand Sir J. Larmor. A body containing an excess of these particles is negatively electrified, and is positively electrified if it has parted with some of its normal number. An electric current consists of a moving stream of electrons. In gases the electrons sometimes travel alone,, but in liquids they are always attached to matter, and their motion involves the movement of chemical atoms or groups of atoms. An atom with an extra corpuscle is a univalent negative ion, an atom with one corpuscle detached is a univalent positive ion. In metals the electrons can slip from one atom to the next, since a current- can pass without chemical action. When a current passes from an electrolyte to a metal, the electron must be detached from the atom it was accompanying and chemical action be manifested at the electrode.

Bibliography. — Michael Faraday, Experimental Researches in Electricity (London, 1844 and 1855); W. Ostwald, Lehrbuch der allgemeinen Chemie, 2te Aufl. (Leipzig, 1891) ; Elektrochemie (Leipzig, 1896); W Nernst, Theoretische- Chemie, 3te Aufl; (Stuttgart, 1900; English translation, London, 1904); F. Kohlrausch and L. Holborn, Das Leitvermogen der Elektrolyle (Leipzig, 1898) ; W. C. D. Whetham, The Theory of Solution and Electrolysis (Cambridge, 1902) ; M. Le Blanc, Elements of Electrochemistry (Eng. trans., London, 1896); S. Arrhenius, Text-Book of Electrochemistry (Eng. trans., London, 1902); H. C. Jones, The Theory of Electrolytic Dissociation (New York, 1900) ; N. Munroe Hopkins, Experimental Electrochemistry (London, 1905); Liiphe, Grundzuge der Elektrochemie (Berlin, 1896).

Some of the more important papers on the subject have been reprinted for Harper's Series of Scientific Memoirs in Electrolytic Conduction (1899) and the Modern Theory of Solution (1899). Several journals are published specially to deal with physical

chemistry, of which electrochemistry forms an important part. Among them may be mentioned the Zeitschrift fur physikalische Chemie (Leipzig) ; and the Journal of Physical Chemistry (Cornell University). In these periodicals will be found new work on the subject and abstracts of papers which appear in other physical and chemical publications. (W. C. D. W.)

ELECTROMAGNETISM, that branch of physical science which is concerned with the interconnexion of electricity and magnetism, and with the production of magnetism by means of electric currents by devices called electromagnets.

History. — The foundation was laid by the observation first made by Hans Christian Oersted (1777-1851), professor of natural philosophy in Copenhagen, who discovered in 1820 that a wire uniting the poles or terminal plates of a voltaic pile has the property of affecting a magnetic needle 1 (see Electricity).

1 In the Annals of Philosophy for November 1821 is a long article entitled " Electromagnetism " by Oersted, in which he gives a detailed account of his discovery. He had his thoughts turned to it as far back as 1813, but not until the 20th of July 1820 had he actually made his discovery. He seems to have been arranging a compass needle to observe any deflections during a storm, and placed near it a platinum wire through which a galvanic current was passed.

Oersted carefully ascertained that the nature of the wire itself did not influence the result but saw that it was due to the electric conflict, as he called it, round the wire; or in modern language, to the magnetic force or magnetic flux round the conductor. If a straight wire through which an electric current is flowing is placed above and parallel to a magnetic compass needle, it is found that if the current is flowing in the conductor in a direction from south to north, the north pole of the needle under the con- ductor deviates to the left hand, whereas if the conductor is placed under the needle, the north pole deviates to the right hand; if the conductor is doubled back over the needle, the effects of the two sides of the loop are added together and the deflection is increased. These results are summed up in the mnemonic rule: Imagine yourself swimming in the conductor with the current, that is, moving in the direction of the positive electricity, with your face towards the magnetic needle; the north pole will then deviate to your left hand. The deflection of the magnetic needle can there- fore reveal the existence of an electric current in a neighbouring circuit, and this fact was soon utilized in

the construction of instruments called galvanometers (q.v.).

Immediately after Oersted's discovery was announced, D. F. J. Arago and A. M. Ampere began investigations on the subject of electromagnetism. On the 18th of September 1820, Ampere read a paper before the Academy of Sciences in Paris, in which he announced that the voltaic pile itself affected a magnetic needle as did the uniting wire, and he showed that the effects in both cases were consistent with the theory that electric current was a circulation round a circuit, and equivalent in magnetic effect to a very short magnet with axis placed at right angles to the plane of the circuit. He then propounded his brilliant hypothesis that the magnetization of iron was due to molecular electric currents. This suggested to Arago that wire wound into a helix carrying electric current should magnetize a steel needle placed in the interior. In the Ann. Chim. (1820, i5,p.94), Arago published a paper entitled " Experiences relatives a l'aimantation du fer et de l'acier par Taction du courant volta'ique," announcing that the wire conveying the current, even though of copper, could magnetize steel needles placed across it, and if plunged into iron filings it attracted them. About the sa-me time Sir Humphry Davy sent a communication to Dr W. H. Wollaston, read at the Royal Society on the 16th of November 1820 (reproduced in the Annals of Philosophy for August 1821, p. 81), " On the Magnetic Phenomena produced by Electricity," in which he announced his independent discovery of the same fact. With a large battery of 100 pairs of plates at the Royal Institution, he found in October 1820 that the uniting wire became strongly magnetic and that iron filings clung to it; also that steel needles placed across the wire were permanently magnetized. He placed a sheet of glass over the wire and sprinkling iron filings on it saw that they arranged themselves in straight lines at right angles to the wire. He then proved that Leyden jar discharges could produce the same effects. Ampere and Arago then seem to have experimented together and magne- tized a steel needle wrapped in paper which was enclosed in a helical wire conveying a current. All these facts were rendered intelligible when it was seen that a wire when conveying an electric current becomes surrounded by a magnetic field. If the wire is a long straight one, the lines of magnetic force are circular and concentric with centres on the wire axis, and if the wire is bent into a circle the lines of magnetic force are endless loops surrounding and linked with the electric circuit. Since a magnetic pole tends to move along a line of magnetic force it was obvious that it should revolve round a wire conveying a current. To exhibit this fact involved, however, much ingenuity. It was first accomplished by Faraday in October 182 1

(Exper. Res. ii. p. 127). Since the action is reciprocal a current free to move tends to revolve round a magnetic pole. The fact is most easily shown by a small piece of apparatus made as follows: In a glass cylinder (see fig. 1) like a lamp chimney are fitted two corks. Through the bottom one is passed the north end of a bar magnet which projects up above a little mercury lying in the cork-. Through the top cork is passed one end of a wire from a

Fig. 1.

battery, and a piece of wire in the cylinder is flexibly connected to it, the lower end of this last piece just touching the mercury. When a current is passed in at the top wire and out at the lower end of the bar magnet, the loose wire revolves round the magnet pole. All text-books on physics contain in their chapters on electromagnetism full accounts of various forms of this experiment.

In 1825 another important step forward was taken when William Sturgeon (1783-1850) of London produced the electromagnet. It con- sisted of a horseshoe-shaped bar of soft iron, coated with varnish, on which was wrapped a spiral coil of bare copper wire, the turns not touching each other. When a voltaic current was passed through the wire the iron became a powerful magnet, but on severing the con- nexion with the battery, the soft iron lost immediately nearly all its magnetism. 1

At that date Ohm had not announced his law of the electric circuit, and it was a matter of some surprise to investigators to find that Sturgeon's electromagnet could not be operated at a distance through a long circuit of wire with such good results as when close to the battery. Peter Barlow, in January 1825, published in the Edinburgh Philosophical Journal, a description of such an experiment made with a view of applying Sturgeon's electro- magnet to telegraphy, with results which were unfavourable. Sturgeon's experiments, however, stimulated Joseph Henry (q.v.) in the United States, and in 1831 he gave a description of a method of winding electromagnets which at once put a new face upon matters (Silliman's Journal, 1831, 19, p. 4°o)- Instead of insulating the iron core, he wrapped the copper wire round with silk and wound in numerous turns and many layers upon the iron horseshoe in such fashion that the current went round the iron always in the same direction. He then found that such

an electromagnet wound with a long fine wire, if worked with a battery consisting of a large number of cells in series, could be operated at a considerable distance, and he thus produced what were called at that time intensity electromagnets, and which subsequently rendered the electric telegraph a possibility. In fact, Henry established in 1831, in Albany, U.S.A., an electro- magnetic telegraph, and in 1835 at Princeton even used an earth return, thereby anticipating the discovery (1838) of C. A. Steinheil (1801-1870) of Munich.

Inventors were then incited to construct powerful electro- magnets as tested by the weight they could carry from their armatures. Joseph Henry made a magnet for Yale College, U.S.A., which lifted 3000 lb {Silliman's Journal, 1831, 20, p. 201), and one for Princeton which lifted 3000 with a very small battery. Amongst others J. P. Joule, ever memorable for his investigations on the mechanical equivalent of heat, gave much attention about 1838-1840 to the construction of electromagnets and succeeded in devising some forms remarkable for their lifting power. One form was constructed by cutting a thick

soft iron tube longitudinally into two equal parts. Insu- lated copper wire was then wound longitudinally over one of both parts (see fig. 2) and a current sent through the wire. In another form p IG , 2. two iron disks with teeth at

right angles to the disk had insulated wire wound zigzag between the teeth; when a current was sent through the wire, the^ teeth were so magnetized that they were alternately N. and S. poles. If two such similar disks were placed with teeth of opposite polarity in contact, a very large force was required to detach them, and with a magnet and

1 See Trans. Soc.Arts, 1825, 43, p. 38, in which a figure of Sturgeon's electromagnet is given as well as of other pieces of apparatus for which the Society granted him a premium and a silver medal.

armature weighing in all 11-575 lb Joule found that a weight of 2718 was supported. Joule's papers on this subject will be found in his Collected Papers published by the Physical Society of London, and in Sturgeon's Annals of Electricity, 1838-1841,

vols. 2-6.

The Magnetic Circuit. — The phenomena presented by the electro-magnet are interpreted by the aid of the notion of the magnetic

circuit. Let us consider a thin circular sectioned ring of iron wire wound over with a solenoid or spiral of insulated copper wire through which a current of electricity can be passed. If the solenoid or wire windings existed alone, a current having a strength A amperes passed through it would create in the interior of the solenoid a magnetic force H, numerically equal to 471-/10 multiplied by the number of windings N on the solenoid, and by the current in amperes A, and divided by the mean length of the solenoid /, or H = 47tAN/ io/. The product AN is called the " ampere-turns " on the solenoid. The product HI of the magnetic force H and the length / of the magnetic circuit is called the " magnetomotive force " in the magnetic circuit, and from the above formula it is seen that the magnetomotive force denoted by (M.M.F.) is equal to 4.ˆ io(= i-25 nearly) times the ampere-turns (A.N.) on the exciting coil or solenoid. Otherwise (A.N.) =o-8(M.M.F.). The magnetomotive force is regarded as creating an effect called magnetic flux (Z) in the magnetic circuit, just as electromotive force E.M.F. produces electric current (A) in the electric circuit, and as by Ohm's law (see Electrokinetics) the current varies as the E.M.F. and inversely as a quality of the electric circuit called its " resistance," so in the magnetic circuit the mag- netic flux varies as the magnetomotive force and inversely as a quality of the magnetic circuit called its " reluctance." The great difference between the electric circuit and the magnetic circuit lies in the fact that whereas the electric resistance of a solid or liquid conductor is independent of the current and affected only by the temperature, the magnetic reluctance varies with the magnetic flux and cannot be defined except by means of a curve which shows its value for different flux densities. The quotient of the total magnetic flux, Z, in a circuit by the cross section, S, of the circuit is called the mean " flux density," and the reluctance of a magnetic circuit one centimetre long and one square centimetre in cross section is called the " reluctivity " of the material. The relation between reluctivity p = i/m magnetic force H, and flux density B, is defined by the equation H = pB, from which we have Hl = Z(pl/S) = M.M.F. acting on the circuit. Again, since the ampere-turns (AN) on the circuit are equal to 0-8 times the M.M.F., we have finally AN// = o-8(Z/mS). This equation tells us the exciting force reckoned in ampere-turns, AN, which must be put on the ring core to create a total magnetic flux Z in it, the ring core having a mean perimeter / and cross section S and reluctivity p=i/m corresponding to a flux density Z/S. Hence before we can make use of the equation for practical purposes we need to possess a curve for the particular material showing us the value of the reluctivity corresponding to various values of the possible flux density. The reciprocal of p is

usually called the " permeability " of the material and denoted by ji. Curves showing the relation of i/p and ZSorji and B, are called " permeability curves." For air and all other non-magnetic matter the permeability has the same value, taken arbitrarily as unity. On the other hand, for iron, nickel and cobalt the permeability may in some cases reach a value of 2000 or 2500 for a value of B =5000 in C.G.S. measure (see Units, Physical). The process of taking these curves consists in sending a current of known strength through a solenoid of known number of turns wound on a circular iron ring of known dimensions, and observing the time-integral of the secondary current produced in a secondary circuit of known turns and resistance R wound over the iron core N times. The secondary electromotive force is by Faraday's law (see Electrokinetics) equal to the time rate of change of the total flux, or E = N

RQ = NZorZ = RQ/N.

The measurement of the total quantity of electricity Q can be made by means of a ballistic galvanometer (q.v.), and the resistance R of the secondary circuit includes that of the coil wound on the iron core and the galvanometer as well. In this manner the value of the total flux Z and therefore of Z/S = B or the flux density, can be found for a given magnetizing force H, and this last quantity is determined when we know the magnetizing current in the solenoid and its turns and dimensions. The curve which delineates the relation of H and B is called the magnetization curve for the material in question. For examples of these curves see Magnetism.

The fundamental law of the non-homogeneous magnetic circuit traversed by one and the same total magnetic flux Z is that the sum of all the magnetomotive forces acting in the circuit is numerically equal to the product Of the factor 0-8, the total flux in the circuit, and the sum of all the reluctances of the various parts of the circuit. If then the circuit consists of materials of different permeability

and it is desired to know the ampere-turns required to produce a given total of flux round the circuit, we have to calculate from the magnet- ization curves of the material of each part the necessary magneto- motive forces and add these forces together. The practical applica- tion of this principle to the predetermination of the field windings of dynamo magnets was first made by Drs J. and E.

Hopkinson (Phil. Trans., 1886, 177, p. 331).

We may illustrate the principles of this predetermination by a simple example. Suppose a ring of iron has a mean diameter of 10 cms. and a cross section of 2 sq. cms., and a transverse cut on air gap made in it 1 mm. wide. Let us inquire the ampere-turns to be put upon the ring to create in it a total flux of 24,000 C.G.S. units. The total length of the iron part of the circuit is (1071- — o-i) cms., and its section is 2 sq. cms., and the flux density in it is to be 12,000. From Table II. below we see that the permeability of pure iron corresponding to a flux density of 12,000 is 2760. Hence the reluctance of the iron circuits is equal to

I07T — o-i 220 „ _ _ 2760X2 ˆp6i5 CG ‘ S – ” mtS –

The length of the air gap is o-i cm., its section 2 sq. cms., and its permeability is unity. Hence the reluctance of the, air gap is

7ˆ7-=— -C.G.S. unit. 1X2 20

Accordingly the magnetomotive force in ampere-turns required to

produce the required flux is equal to

0-8(24,000) (ˆ+pˆ7j) =1070 nearly.

It follows that the part of the magnetomotive force required to overcome the reluctance of the narrow air gap is about nine times that required for the iron alone.

In the above example we have for simplicity assumed that the flux in passing across the air gap does not spread out at all. In dealing with electromagnet design in dynamo construction we have, however, to take into consideration the spreading as well as the leakage of flux across the circuit (see Dynamo). It will be seen, therefore, that in order that we may predict the effect of a certain kind of iron or steel when used as the core of an electromagnet, we must be provided with tables or curves showing the reluctivity or permeability corresponding to various flux densities or — which comes to the same thing — with (B, H) curves for the sample.

Iron and Steel for Electromagnetic Machinery. — In connexion with the technical application of electromagnets such as those used in the field magnets of dynamos (q.v.), the testing of different kinds of iron and steel for magnetic permeability has therefore become very important. Various instruments called permea- meters and hysteresis

meters have been designed for this purpose, but much of the work has been done by means of a ballistic galvanometer and test ring as above described. The " hysteresis ' ' of an iron or steel is that quality of it in virtue of which energy is dissipated as heat when the magnetization is reversed or carried through a cycle (see Magnetism), and it is generally measured either in ergs per cubic centimetre of metal per cycle of magnetization, or in watts per lb per 50 or 100 cycles per second at or corresponding to a certain maximum flux density, say 2500 or 600 C.G.S. units. For the details of various forms of permeameter and hysteresis meter technical books must be consulted. 1

An immense number of observations have been carried out on the magnetic permeability of different kinds of iron and steel, and in the following tables are given some typical results, mostly from experiments made by J. A. Ewing (see Proc. Inst. C.E., 1896, 126, p. 183) in which the ballistic method was employed to determine the flux density corresponding to various magnetizing forces acting upon samples of iron and steel in the form of rings.

The figures under heading I. are values given in a paper by A. W.S. Pocklington and F. Lydall {Proc. Roy. Soc, 1892-1893, 52, pp. 164 and 228) as the results of a magnetic test of an exceptionally pure iron supplied for the purpose of experiment by Colonel Dyer, of the Elswick Works. The substances other than iron in this sample were stated to be: carbon, trace; silicon, trace; phosphorus, none; sulphur, o-oi3%; manganese, o-l%. The other five specimens, II. to VI., are samples of commercial iron or steel. No. II. is a sample of Low Moor bar iron forged into a ring, annealed and turned. No. III. is a steel forging furnished by Mr R. Jenkins as a

'See S. P. Thompson, The Electromagnet (London, 1891): J. A. Fleming, A Handbook for the Electrical Laboratory and Testing Room, vol. 2 (London, 1903) ; J. A. Ewing, Magnetic Induction in Iron and Other Metals (London, 1903, 3rd ed.).

sample of forged ingot-metal for dynamo magnets. No. IV. is a steel casting for dynamo magnets, unforged, made by Messrs Edgar Allen & Company by a special pneumatic process under the patents of Mr A. Tropenas. No. V. is also an unforged steel casting for dynamo

Table I. — Magnetic Flux Density corresponding to various Magnetizing Forces in the case of certain Samples of Iron and Steel (Ewing).

Magnetiz-

ing p orce H (C.G.S.

Magnetic Flux Density B (C.G.S. Units).

Units).

I.

II.

III.

IV.

V.

VI.

5

12,700

10,900

12,300

4,700

9,600

10,900

10

14,980

13,120

14,920

12,250

13,050

13,320

15

15,800

14,010

15,800

14,000

14,600

14,350

20

16,300

14,580

16,280

15,050

15,310

14,950

3°

16,950

15,280

16,810

16,200

16,000

15,660

40

17.35°

i5 > 76o

17,190

16,800

16,510

16,150

50

16,060

17,500

17,140

16,900

16,480

60

16,340

17-750

17,450

17,180

16,780

70

16,580

17,970

17,750

17,400

17,000

80

16,800

18,180

18,040

17,620

17,200

90

17,000

18,390

18,230

17,830

17,400

100

17,200

18,600

18,420

18,030

17,600

magnets, made by Messrs Samuel Osborne & Company by the Siemens process. No. VI. is also an unforged steel casting for dynamo magnets, made by Messrs Fried. Krupp, of Essen.

It will be seen from the figures and the description of the materials that the steel forgings and castings have a remarkably high permeability under small magnetizing force.

Table II. shows the magnetic qualities of some of these materials as found by Ewing when tested with small magnetizing forces.

Table II. — Magnetic Permeability of Samples of Iron and Steel under Weak Magnetizing Forces.

Magnetic Flux

Density B.

1

III.

VI.

(C.G.S. Units).

Pure Iron.

Steel Forging.

Steel Casting.,

H

n

H u

H M

2,000

0-90

2220

1-38 1450

1-18 1690

4,000

1-40

2850

1-91 2090

1-66 2410

6,000

1-85

3240

2-38 2520

2-15 2790

8,000

2-30

3480

292 2740

2-83 2830

10,000

3-10

3220

3-62 2760

4-05 2470

12,000

4-40

2760

4-80 2500

6-65 1810

The numbers I., III. and VI. in the'above table refer to the samples mentioned in connexion with Table I.

It is a remarkable fact that certain varieties of low carbon steel (commonly called mild steel) have a higher permeability than even annealed Swedish wrought iron under large magnetiz- ing forces. The term steel, however, here used has reference rather to the mode of production than the final chemical nature of the material. In some of the mild-steel castings used for dynamo electromagnets it appears that the total foreign matter, including carbon, manganese and silicon, is not more than 0.3 % of the whole, the material being 99.7 % pure iron. This valuable magnetic property of steel capable of being cast is, however, of great utility in modern dynamo building, as it enables field magnets of very high permeability to be constructed, which can be fashioned into shape by casting instead of being built up as formerly out of masses of forged wrought iron. The curves in fig. 3 illustrate the manner in which the flux density or, as it is usually called, the magnetization curve of this mild cast steel crosses that of Swedish wrought iron, and enables us to obtain a higher flux density corresponding to a given magnetizing force with the steel than with the iron.

From the same paper by Ewing we extract a number of results relating to permeability tests o thin sheet iron and sheet steel, such as is used in the construction of dynamo armatures and transformer cores.*

No.VII. is a specimen of good transformer-plate, 0-301 millimetre thick, rolled from Swedish iron by Messrs Sankey of Bilston. No. VIII. is a specimen of specially thin transformer-plate rolled from scrap iron. No. IX. is a specimen of transformer-plate rolled from

ingot-steel. No. X. is a specimen of the wire which was used by J. Swinburne to form the core of his " hedgehog " transformers. Its diameter was 0-602 millimetre. All these samples were tested in the

toooo .

16000 .

it’

‘9

3

it’

J

nf

lO

^

nft

^ /

rfl/

1

*•*ooo _*

w

~0 L

“7”

/

.if

d’

j” 1

12000

r

”

1

10000

,

//

£000 J

€000 .

4000

J

2000 1

H

so eo to so

Fig. 3.

form of rings by the ballistic method, the rings of sheet-metal being stamped or turned in the flat. The wire ring No. X. was coiled and annealed after coiling.

Table III. — Permeability

Tests of Transformer Plate and Wire.

Magnetic

Flux Density B

(C.G.S.

Units).

VII.

Transformer- plate of

VIII. Transformer- plate of

IX.

Transformer- plate of

X.

Transformer-

Swedish Iron.

Scrap

Iron.

Steel.

H M

H

M

H M

H

M

1,000

o-8i 1230

1

08

920

o-6o 1470

1

71

590

2,000

1-05 1900

1

46

1370

0-90 2230

2

10

950

3,000

1-26 2320

1

77

1690

1-04 2880

2

30

I300

4,000

1-54 2600

2

10

1900

1 -19 3360

2

50

1600

5,000

1-82 2750

2

53

1980

1-38 3620

2

70

1850

6,000

2-14 2800

3

04

1970

1-59 3770

2

92

2070

7,000

2-54 2 76o

3

62

1930

1-89 3700

3

16

2210

8,000

3-09 2590

4

37

1830

2-25 3600

3

43

2330

9,000

3-77 2390

5

3

1700

2-72 3310

3

77

2390

10,000

4-6 2170

6

5

1540

3-33 3000

4

17

24OO

1 1 ,000

5-7 1930

7

9

1390

4-15 2650

4

70

234O

12,000

7-0 1710

9

8

1220

5-40 2220

5

45

2200

13,000

8-5 1530

II

9

1 190

7-1 1830

6

5

2000

14,000

ii-o 1270

15

930

IO'O 1400

8

4

1670

15,000

15- 1 990

19

5

770

II

9

1260

16,000

21-4 750

27-5

5«°

21-0

760

Some typical flux-density curves of iron and steel as used in dynamo and transformer building are given in fig. 4.

*us 120 ijsao its ttoi*a no*

Fig. 4. The numbers in Table III. well illustrate the fact that the permeability m = B/H has a maximum value corresponding to a certain flux density. The tables are also explanatory of the fact

that mild steel has gradually replaced iron in the manufacture of dynamo electromagnets and transformer-cores.

Broadly speaking, the materials which are now employed in the manufacture of the cores of electromagnets for technical purposes of various kinds may be said to fall into three classes, namely, forgings, castings and stampings. In some cases the iron or steel core which is to be magnetized is simply a mass of iron hammered or pressed into shape by hydraulic pressure; in other cases it has to be fused and cast; and for certain other purposes it must be rolled first into thin sheets, which are sub- sequently stamped out into the required forms.

For particular purposes it is necessary to obtain the highest possible magnetic permeability corresponding to a high, or the highest attainable flux density. This is generally the case in the electromagnets which are employed as the field magnets in dynamo machines. It may generally be said that whilst the best wrought iron, such as annealed Low Moor or Swedish iron, is more permeable for low flux densities than steel castings, the cast steel may surpass the wrought metal for high flux density. For most electro-technical purposes the best magnetic results are given by the employment of

forged ingot-iron. This material is probably the most permeable throughout the whole scale of attainable flux densities. It is slightly superior to wrought iron, and it only becomes inferior to the highest class of cast steel when the flux density is pressed above 18,000 C.G.S. units (see fig. 5). For flux densities above 13,000 the forged ingot-iron

Permeability Cams of/ro\ ana Steel

§ § 1 S§ggsgg.5gg§*

Maqnttic Flu Oinsity ar Induction 8 in CS.$ u"it$ "**

Fig. 5.

has now practically replaced for electric engineering purposes the Low Moor or Swedish iron. Owing to the method of its production, it might in truth be called a soft steel with a very small percentage of combined carbon. The best description of this material is conveyed by the German term " Flusseisen," but its nearest British equivalent is " ingot-iron." Chemically speaking, the material is for all practical purposes very nearly pure iron. The same may be said of the cast steels now much employed for the production of dynamo magnet cores. The cast steel which is in demand for this purpose has a slightly lower permeability than the ingot-iron for low flux densities, but for flux densities above 16,000 the required result may be more cheaply obtained with a steel casting than with a forging. When high tensile strength is required in addition to considerable magnetic permeability, it has been found advantageous to employ a steel containing 5 % of nickel. The rolled sheet iron and sheet steel which is in request for the construction of magnet cores, especially those in which the exciting current is an alternating current, are, generally speaking, produced from Swedish iron. Owing to the mechanical treatment necessary to reduce the material to a thin sheet, the permeability at low flux densities is rather higher than, although at high flux densities it is inferior

to, the same iron and steel when tested in bulk. For most purposes, however, where a laminated iron magnet core is required, the flux density is not pressed up above 6000 units, and it is then more important to secure small hysteresis loss than high permeability. The magnetic permeability of cast iron is much inferior to that of

wrought or ingot-iron, or the mild steels taken at the same flux densities.

The following Table IV. gives the flux density and perme- ability of a typical cast iron taken by J. A. Fleming by the ballistic method: —

Table IV. — Magnetic Permeability and Magnetization Curve of Cast Iron.

Table VII. — Observations on the Magnetic Hysteresis of Cast Iron-

H

B

M

H

B

M

H

B

m

•19

27

139

8-84

4030

456

44-65

8,071

181

•41

62

1,50

io-6o

4491

424

56-57

8,548

I5i

i-ii

206

I76

12-33

4884

396

71-98

9.097

126

2-53

768

303

13-95

5276

37«

88-99

9,600

108

3-41

1251

367

15-61

5504

353

106-35

10,066

95

4-45

1898

427

18-21

5829

320

120-60

io,375

86

5-67

2589

456

26-37

6814

258

HO-37

10,725

76

7-16

3350

468

36-54

.7580

207

152-73

10,985

72

The metal of which the tests are given in Table IV. contained 2% of silicon, 2-85% of total carbon, and 0-5% of manganese. It will be seen that a magnetizing force of about 5 C.G.S. units is sufficient to impart to a wrought-iron ring a flux density of 18,000 C.G.S. units, but the same force hardly produces more than one-tenth of this flux density in cast iron.

The testing of sheet iron and steel for magnetic hysteresis loss has developed into an important factory process, giving as it does a means of ascertaining the suitability of the metal for use in the manufacture of transformers and cores of alter- nating-current electromagnets.

In Table V. are given the results of hysteresis tests by Ewingon samples of commercial sheet iron and steel. The numbers VII., VIII., IX. and X. refer to the same samples as those for which permeability results are given in Table III.

Table V. — Hysteresis Loss in Transformer-iron.

Loop.

B (max.)

Hysteresis Loss.

Ergs per cc. per Cycle.

Watts per lb per . 100 Cycles per see.

I.

II.

III.

IV.

V.

1475 2545 3865 5972 8930

466

1,288

2,997

7,397

13,423

•300

•829

1-934

4-765

8-658

Maxi- mum Flux Density B.

Ergs per Cubic Centimetre per Cycle.

Watts per lb at a Frequency of 100.

VII.

Swedish Iron

VIII.

Forged Scrap- iron

IX.

Ingot- steel.

X.

Soft Iron Wire.

VII.

VIII.

IX.

X.

2000 3000 4000 5000 6000 7000 8000 9000

240 520 830 1 190 1600 2020 2510 3050

400 790 1220 1710 2260 2940 3710 4560

215

43°

700 1000 1350 1730 2150 2620

600 1 150 1780 2640 3360 4300 5300 6380

0-141 0306 0-490 0700 0-940

1-200 1-480

I-8O0

0-236 0-465 0-720

I-OIO

1-330 1-730 2-180 2-680

0-127 0-253 0-410 0-590 0-790

1-020

I-270

1-540

0-356 0-630 1-050 1-550 1-980 2-530 3-120 3-750

In Table VI. are given the results of a magnetic test of some exceedingly good transformer-sheet rolled from Swedish iron.

Table VI.-

-Hysteresis Loss in Strip of Transformer-plate rolled Swedish Iron.

Maximum Flux

Ergs per Cubic Centimetre

Watts per lb at a

Density B.

per Cycle.

Frequency of 100.

2000

220

0-129

3000

410

0-242

4000

640

0-376

5000

910

0-535

6000

1200

0-710

7000

1520

0-890

8000

1900

I-I20

9000

2310

1,360

In Table VII. are given some values obtained by Fleming for the hysteresis loss in the sample of cast iron, the permeability test of which is recorded in Table IV.

For most practical purposes the constructor of electromagnetic machinery requires his iron or steel to have some one of the following characteristics. If for dynamo or magnet making, it should have the highest possible permeability at a flux density corre- sponding to practically maximum magnetization. If for trans- former or alternating-current magnet building, it should have the smallest possible hysteresis loss at a maximum flux density of 2500 C.G.S. units during the cycle. If required for permanent magnet making, it should have the highest possible coercivity combined with a high retentivity. Manufacturers of iron and steel are now able to meet these demands in a very remarkable manner by the commercial production of material of a quality which at one time would have been considered a scientific curiosity.

It is usual to specify iron and steel for the first purpose by naming the minimum permeability it should possess corre- sponding to a flux density of 18,000 C.G.S. units; for the second, by stating the hysteresis loss in watts per lb per 100 cycles per second, corresponding to a maximum flux density of 2500 C.G.S. units during the cycle; and for the third, by mentioning the coercive force required to reduce to zero magnetization a sample of the metal in the form of a long bar magnetized to a stated magnetization. In the cyclical reversal of magnetization of iron we have two modes to consider. In the first case, which is that of the core of the alternating transformer, the magnetic force passes through a cycle of values, the iron remaining stationary, and the direction of the magnetic force being always the same. In the other case, that of the dynamo armature core, the direction of the magnetic force in the iron is constantly changing, and at the same time undergoing a change in magnitude.

It has been shown by F. G. Baily (Proc. Roy. Soc, 1896) that if a mass of laminated iron is rotating in a magnetic field which remains constant in direction and magnitude in any one experiment, the hysteresis loss rises to a maximum as the magni- tude of the flux density in the iron is increased and then falls away again to nearly zero value. These observations have been confirmed by other observers. The question has been much debated whether the values of the hysteresis loss obtained by these two different methods are identical for magnetic cycles in which the flux density reaches the same maximum value. This question is also connected with another one, namely, whether the hysteresis loss per cycle is or is not a function of the speed with which the cycle is traversed. Early experiments by C. P. Steinmetz and others seemed to show that there was a difference between slow- speed and high-speed hysteresis cycles, but later experiments by J. Hopkinson and by A. Tanakadate, though not absolutely exhaustive, tend to prove that up to 400 cycles per second the hysteresis loss per cycle is practically unchanged.

Experiments made in 1896 by R. Beattie and R. C. Clinker on magnetic hysteresis in rotating fields were partly directed to determine whether the hysteresis loss at moderate flux densities, such as are employed in transformer work, was the same as that found by measurements made with alternating-current fields on the same iron and steel specimens (see The Electrician, 1896.

37> P- 7 2 3)- These experiments showed that over moderate ranges of induction, such as may be expected in electro-technical work, the hysteresis loss per cycle per cubic centimetre was practically the same when the iron was tested in an alternating field with a periodicity of 100, the field remaining constant in direction, and when the iron was tested in a rotating field giving the same maximum flux density.

With respect to the variation of hysteresis loss in magnetic cycles having different maximum values for the flux density, Steinmetz found that the hysteresis loss (W), as measured by the area of the complete (B, H) cycle and expressed in ergs per centimetre-cube per cycle, varies proportionately to a constant called the hysteretic constant, and to the i-6th power of the maximum flux density (B), or W=rj B 1 ‘ 6 .

The hysteretic constants (tj) for various kinds of iron and steel are given in the table below: —

Metal. Hysteretic Constant.

Swedish wrought iron, well annealed . . -ooio to -0017 Annealed cast steel of good quality ; small

percentage of carbon .... -0017 to -0029 Cast Siemens-Martin steel .... -0019 to -0028

Cast ingot-iron -002 1 to -0026

Cast steel, with higher percentages of carbon, or inferior qualities of wrought iron -0031 to -0054

Steinmetz’s law, though not strictly true for very low or very high maximum flux densities, is yet a convenient empirical rule for obtaining approximately the hysteresis loss at any one maximum flux density and knowing it at another, provided these values fall within a range varying say from 1 to 9000 C.G.S. units. (See Magnetism.)

The standard maximum flux density which is adopted in electro-technical work is 2500, hence in the construction of the cores of alternating-current electromagnets and transformers iron has to be employed having a known hysteretic constant at the standard flux density. It is generally expressed by stating the number of watts per lb of metal which would be dissipated for a frequency of 100 cycles, and a maximum flux density (B max.) during the cycle of 2500. In

the case of good iron or steel for transformer-core making, it should not exceed 1-25 watt per lb per 100 cycles per 2500 B (maximum value).

It has been found that if the sheet iron employed for cores of alternating electromagnets or transformers is heated to a temperature somewhere in the neighbourhood of 200 C. the hysteresis loss is very greatly increased. It was noticed in 1894 by G. W. Partridge that alternating-current transformers which had been in use some time had a very considerably augmented core loss when compared with their initial condition. O. T. Blathyand W. M. Mordeyin 1895 showed that this augmentation in hysteresis loss in iron was due to heating. H. F. Parshall investigated the effect up to moderate temperatures, such as 140 C, and an extensive series of experiments was made in 1898 by S. R. Roget (Proc. Roy. Soc, 1898, 63, p. 258, and 64, p. 150). Roget found that below 40° C. a rise in temperature did not produce any augmentation in the hysteresis loss in iron, but if it is heated to between 40 C. and 135 C. the hysteresis loss increases continuously with time, and this increase is now called " ageing " of the iron. It proceeds more slowly as the temperature is higher. If heated to above 135 C, the hysteresis loss soon attains a maximum, but then begins to decrease. Certain specimens heated to 160 C. were found to have their hysteresis loss doubled in a few days. The effect seems to come to a maximum at about 180° C. or 200 C. Mere lapse of time does not remove the increase, but if the iron is reannealed the ■augmentation in hysteresis disappears. If the iron is heated to a higher temperature, say between 300 C. and 700 C, Roget found the initial rise of hysteresis happens more quickly, but that the metal soon settles down into a state in which the hysteresis loss has a small but still augmented constant value. The augmentation in value, however, becomes more nearly zero as the temperature approaches 700 C. Brands of steel are now obtainable which do not age in this manner, but these non-ageing varieties of steel have not generally such low initial hysteresis

values as the " Swedish Iron," commonly considered best for the cores of transformers and alternating-current magnets.

The following conclusions have been reached in the matter: — (1) Iron and mild steel in the annealed state are more liable to change their hysteresis value by heating than when in the harder condition; (2) all changes are removed by re-annealing; (3) the changes thus produced by heating affect not only the amount of the hysteresis loss, but also the form of the lower part of the (B,H) curve.

Forms of Electromagnet— The form which an electromagnet must take will greatly depend upon the purposes for which it is to be used. A design or form of electromagnet which will be very suitable for some purposes will be useless for others. Supposing it is desired to make an electromagnet which shall be capable of undergoing very rapid changes of strength, it must have such a form that the coercivity of the material is overcome by a self-demagnetizing force. This can be achieved by making the magnet in the form of a short and stout bar rather than a long thin one. It has already been explained that the ends or poles of a polar magnet exert a demagnetizing power upon the mass of the metal in the interior of the bar. If then the electromagnet has the form of a long thin bar, the length of which is several hundred times its diameter, the poles are very far removed from the centre of the bar, and the demagnetizing action will be very feeble; such a long thin electromagnet, although made of very soft iron, retains a considerable amount of magnetism after the magnetizing force is withdrawn. On the other hand, a very thick bar very quickly demagnetizes itself, because no part of the metal is far removed from the action of the

Fig. 6. — Du Bois's Electromagnet.

free poles. Hence when, as in many telegraphic instruments, a piece of soft iron, called an armature, has to be attracted to the poles of a horseshoe-shaped electromagnet, this armature should be prevented from quite touching the polar surfaces of the magnet. If a soft iron mass does quite touch the poles, then it completes the magnetic circuit and abolishes the free poles, and the magnet is to a very large extent deprived of its self -demagnetizing power. This is the explanation of the well-known fact that after exciting the electromagnet and then stopping the current, it still requires a good pull to detach the " keeper "; but when once the keeper has been detached, the magnetism is found to have nearly disappeared. An excellent form of electromagnet for the pro- duction of very powerful fields has been designed by H. du Bois (fig. 6).

Various forms of electromagnets used in connexion with

dynamo machines are considered in the article Dynamo, and there is, therefore, no necessity to refer particularly to the numerous different shapes and types employed in electrotechnics.

Bibliography. — For additional information on the above subject the reader may be referred to the following works and original papers : —

H. du Bois, The Magnetic Circuit in Theory and Practice; S. P. Thompson, The Electromagnet; J. A. Fleming, Magnets and Electric Currents; J. A. Ewing, Magnetic Induction in Iron and other Metals; J. A. Fleming, " The Ferromagnetic Properties of Iron and Steel," Proceedings of Sheffield Society of Engineers and Metallurgists (Oct. 1897); J. A. Ewing, "The Magnetic Testing of Iron and Steel," Proc. Inst. Civ. Eng., 1896, 126, p. 185; H. F. Parshall, "The Magnetic Data of Iron and Steel," Proc. Inst. Civ. Eng., I896, 126, p. 220; J. A. Ewing, " The Molecular Theory of Induced Magnetism," Phil. Mag., Sept. 1800; W. M. Mordey, "Slow Changes in the Permeability of Iron," Proc. Roy. Soc. 57, p. 224; J. A. Ewing, " Magnetism," James Forrest Lecture, Proc. Inst. Civ. Eng. 138; S. P. Thompson, " Electromagnetic Mechanism," Electrician, 26, pp. 238, 269, 293; J. A. Ewing, " Experimental Researches in Magnetism," Phil. Trans., 1885, part ii. ; Ewing and Klassen, " Magnetic Qualities of Iron," Proc. Roy. Soc, 1893. (J. A. F.)

ELECTROMETALLURGY. The present article, as explained under Electrochemistry, treats only of those processes in which electricity is applied to the production of chemical re- actions or molecular changes at furnace temperatures. In many of these the application of heat is necessary to bring the substances used into the Liquid state for the purpose of electrolysis, aqueous solutions being unsuitable. Among the earliest experiments in this branch of the subject were those of Sir H. Davy, who in 1807 (Phil. Trans., 1808, p. 1), produced the alkali metals by passing an intense cur- rent of electricity from a platinum wire to a platinum dish, through a mass of fused caustic alkali. The action was started in the cold, the alkali being slightly moistened to render it a conductor; then, as the current passed, heat was produced and the alkali fused, the metal being deposited in the liquid condition. Later, A. Matthiessen (Quarterly Joum. Chem. Soc. viii. 30) obtained potassium by the electrolysis of a mixture of potassium and calcium chlorides fused over a lamp. There are here foreshadowed two types of electrolytic furnace-opera- tions: (a) those in which external heating maintains the electrolyte in the fused condition, and (b) those in which a current- density is applied sufficiently high to develop the heat necessary to effect this object unaided. Much of the earlier electrometal- lurgical work was done with furnaces of the (a) type, while nearly all the later developments have been with those of class (b). There is a third class of operations, exemplified by the manufacture of calcium carbide, in

which electricity is employed solely as a heating agent; these are termed electrothermal, as distinguished from electrolytic. In certain electrothermal processes (e.g. calcium carbide production) the heat from the current is employed in raising mixtures of substances to the temperature at which a desired chemical reaction will take place between them, while in others (e.g. the production of graphite from coke or gas-carbon) the heat is applied solely to the production of molecular or physical changes: In ordinary electrolytic work only the continuous current may of course be used, but in electrothermal work an alternating current is equally available.

Electric Furnaces. — Independently of the question of the application of external heating, the furnaces used in electro- metallurgy may be broadly classified into (i.) arc furnaces, in which the intense heat of the electric arc is utilized, and (ii.) resistance and incandescence furnaces, in which the heat is generated by an electric current overcoming the resistance of an inferior conductor.

Excepting such experimental arrangements as that of C. M. Despretz (C.R., 1849, 29) for use on a small scale in the laboratory, A Pichou in France and J. H. Johnson in England

furnaces, appear, in 1853, to have introduced the earliest practical form of furnace. In these arrangements, which were similar if not identical, the furnace charge was crushed to a fine powder and passed through two or more electric arcs in succession. When vsed for ore smelting, the reduced

metal and the accompanying slag were to be caught, after leaving the arc and while still liquid, in a hearth fired with ordinary fuel. Although this primitive furnace could be made to act, its efficiency was low, and the use of a separate fire was disadvan- tageous. In 1878 Sir William Siemens patented a form of furnace ‘ which is the type of a very large number of those designed by later inventors.

In the best-known form a plumbago crucible was used with a hole cut in the bottom to receive a carbon rod, which was ground in so as to make a tight joint. This rod was connected with the positive pole of the dynamo or electric generator. The crucible was fitted with a cover in which were two holes; one at the side to serve at once as sight-hole and charging door, the other in the centre to allow a second carbon rod to pass freely (without touching) into the interior. This rod was connected with the negative pole of the generator, and was suspended from one arm of a balance-beam, while from the other end of the beam was suspended a vertical hollow iron cylinder,

which could be moved into or out of a wire coil or solenoid joined as a shunt across the two carbon rods of the furnace. The solenoid was above the iron cylinder, the supporting rod of which passed through it as a core. When the furnace with this well-known regulating device was to be used, say, for the melting of metals or other conductors of electricity, the fragments of metal were placed in the Crucible and the positive electrode was brought near them. Immediately the current passed through the solenoid it caused the iron cylinder to rise, and, by means of its supporting rod, forced the end of the balance beam upwards, so depressing the other end that the negative carbon rod was forced downwards into contact with the metal in the crucible. This action completed the furnace-circuit, and current passed freely from the positive carbon through the fragments of metal to the negative carbon, thereby reducing the current through the shunt. At once the attractive force of the solenoid on the iron cylinder was automatically reduced, and the falling of the latter caused the negative carbon to rise, starting an arc between it and the metal in the crucible. A counterpoise was placed on the solenoid end of the balance beam to act against the attraction of the solenoid, the position of the counterpoise determin- ing the length of the arc in the crucible. Any change in the resist- ance of the arc, either by lengthening, due to the sinking of the charge in the crucible, or by the burning of the carbon, affected the pro- portion of current flowing in the two shunt circuits, and so altered the position of the iron cylinder in the solenoid that the length of arc was, within limits, automatically regulated. Were it not for the use of some such device the arc would be liable to constant fluctuation and to frequent extinction. The crucible was surrounded with a bad conductor of heat to minimize loss by radiation. The positive carbon was in some cases replaced by a water-cooled metal tube, or ferrule, closed, of course, at the end inserted in the crucible. Several modifications were proposed, in one of which, intended for the heating of non-conducting substances, the electrodes were passed horizontally through perforations in the upper part of the crucible walls, and the charge in the lower part of the crucible was heated by radiation.

The furnace used by Henri Moissan in his experiments on reactions at high temperatures, on the fusion and volatilization of refractory materials, and on the formation of carbides, silicides and borides of various metals, consisted, in its simplest form, of two superposed blocks of lime or of limestone with a central cavity cut in the lower block, and with a corresponding but much shallower inverted cavity in the upper block, which thus formed the lid of the furnace. Horizontal channels were cut on opposite walls, through which the

carbon poles or electrodes were passed into the upper part of the cavity. Such a furnace, to take a current of 4 H.P. (say, of 60 amperes and 50 volts), measured externally about 6 by 6 by 7 in., and the electrodes were about 0-4 in. in diameter, while for a current of 100 H.P. (say, of 746 amperes and 100 volts) it measured about 14 by 12 by 14 in., and the electrodes were about 1-5 in. in diameter. In the latter case the crucible, which was placed in the cavity immediately beneath the arc, was about 3 in. in diameter (internally), and about si in. in height. The fact that energy is being used at so high a rate as 100 H.P. on so small a charge of material sufficiently indicates that the furnace is only used for experi- mental work, or for the fusion of metals which, like tungsten or chromium, can only be melted at temperatures attainable by electrical means. Moissan succeeded in fusing about \ lb of either of these metals in 5 or 6 minutes in a furnace similar to that last described. He also arranged an experimental tube- furnace by passing a carbon tube horizontally beneath the arc

1 Cf. Skmens's account of the use of this furnace for experimental purposes in British Association Report for 1882.

in the cavity of the lime blocks. When prolonged heating is required at very high temperatures it is found necessary to line the furnace-cavity with alternate layers of magnesia and carbon, taking care that the lamina next to the lime is of magnesia; if this were not done the lime in contact with the carbon crucible would form calcium carbide and would slag down, but magnesia does not yield a carbide in this v/ay. Chaplet has patented a muffle or tube furnace, similar in principle, for use on a larger scale, with a number of electrodes placed above and below the muffle-tube. The arc furnaces now widely used in the manu- facture of calcium carbide on a large scale are chiefly develop- ments of the Siemens furnace. But whereas, from its construc- tion, the Siemens furnace was intermittent in operation, necessitating stoppage of the current while the contents of the crucible were poured out, many of the newer forms are specially designed either to minimize the time required in effecting the withdrawal of one charge and the introduction of the next, or to ensure absolute continuity of action, raw material being constantly charged in at the top and the finished substance and by-products (slag, &c.) withdrawn either continuously or at intervals, as sufficient quantity shall have accumulated. In the King furnace, for

example, the crucible, or lowest part of the furnace, is made detachable, so that when full it may be removed and an empty crucible substituted. In the United States a revolving furnace is used which is quite continuous in action.

The class of furnaces heated by electrically incandescent materials has been divided by Borchers into two groups: (1)

those in which the substance is heated by contact iacan- w ith a substance offering a high resistance to the furnaces, current passing through it, and (2) those in which the

substance to be heated itself affords the resistance to the passage of the current whereby electric energy is converted into heat. Practically the first of these furnaces was that of Despretz, in which the mixture to be heated was placed in a carbon tube rendered incandescent by the passage of a current through its substance from end to end. In 1880 W. Borchers introduced his resistance-furnace, which, in one sense, is the converse of the Despretz apparatus. A thin carbon pencil, forming a bridge between two stout carbon rods, is set in the midst of the mixture to be heated. On passing a current through the carbon the small rod is heated to incandescence, and imparts heat to the surrounding mass. On a larger scale several pencils are used to make the connexions between carbon blocks which form the end walls of the furnace, while the side walls are of fire-brick laid upon one another without mortar. Many of the furnaces now in constant use depend mainly on this principle, a core of granular carbon fragments stamped together in the direct line between the electrodes, as in Ache3on's carborundum furnace, being substituted for the carbon pencils. In other cases carbon fragments are mixed throughout the charge, as in E.H. and A.H. Cowles's zinc-smelting retort. In practice, in these furnaces, it is possible for small local arcs to be temporarily set up by the shifting of the charge, and these would contribute to the heating of the mass. In the remaining class of furnace, in which the electrical resistance of the charge itself is utilized, are the continuous-current furnaces, such as are used for the smelting of aluminium, and those alternating-current furnaces, {e.g. for the production of calcium carbide) in which a portion of the charge is first actually fused, and then maintained in the molten condition by the current passing through it, while the reaction between further portions of the charge is proceeding.

For ordinary metallurgical work the electric furnace, requiring as it does (excepting where waterfalls or other cheap sources

of power are available) the intervention of the boiler u ˆ es ˆ° d and steam-engine, or of the gas or oil engine, with a tagts. consequent loss of energy, has not usually proved so

economical as an ordinary direct fired furnace. But in some cases in which the current is used for electrolysis and for the production of extremely high temperatures, for which the calorific intensity of ordinary fuel is insufficient, the electric furnace is employed with advantage. The temperature of the electric furnace, whether of the arc or incandescence type, is

practically limited to that at which the least easily vaporized material available for electrodes is converted into vapour. This material is carbon, and as its vaporizing point is (estimated at) over 3500° C, and less than 4000 C, the temperature of the electric furnace cannot rise much above 3500 C. (633o°F.); but H. Moissan showed that at this temperature the most stable of mineral combinations are dissociated, and the most refractory elements are converted into vapour, only certain borides, silicides and metallic carbides having been found to resist the action of the heat. It is not necessary that all electric furnaces shall be run at these high temperatures; obviously, those of the incan- descence or resistance type may be worked at any convenient temperature below the maximum. The electric furnace has several advantages as compared with some of the ordinary types of furnace, arising from the fact that the heat is generated from within the mass of material operated upon, and (unlike the blast- furnace, which presents the same advantage) without a large volume of gaseous products of combustion and atmospheric nitrogen being passed through it. In ordinary reverberatory and other heating furnaces the burning fuel is without the mass, so that the vessel containing the charge, and other parts of the plant, are raised to a higher temperature than would otherwise be necessary, in order to compensate for losses by radiation, convection and conduction. This advantage is especially observed in some cases in which the charge of the furnace is liable to attack the containing vessel at high temperatures, as it is often possible to maintain the outer walls of the electric furnace relatively cool, and even to keep them lined with a protecting crust of unfused charge. Again, the construction of electric furnaces may often be exceedingly crude and simple; in the carborundum furnace, for example, the outer walls are of loosely piled bricks, and in one type of furnace the charge is simply heaped on the ground around the carbon resistance used for heating, without containing-walls of any kind. There is, however, one (not insuperable) drawback in the use of the electric furnace for the smelting of pure metals. Ordinarily

carbon is used as the electrode material, but when carbon comes in contact at high temperatures with any metal that is capable of forming a carbide a certain amount of combination between them is in- evitable, and the carbon thus introduced impairs the mechanical properties of the ultimate metallic product. Aluminium, iron, platinum and many other metals may thus take up so much carbon as to become brittle and unforgeable. It is for this reason that Siemens, Borchers and others substituted a hollow water- cooled metal block for the carbon cathode upon which the melted metal rests while in the furnace. Liquid metal coming in contact with such a surface forms a crust of solidified metal over it, and this crust thickens up to a certain point, namely, until the heat from within the furnace just overbalances that lost by conduction through the solidified crust and the cathode material to the flow- ing water. In such an arrangement, after the first instant, the melted metal in the furnace does not come in contact with the cathode material.

Electrothermal Processes. — In these processes the electric current is used solely to generate heat, either to induce chemical reactions between admixed substances, or to produce a physical (allotropic) modification of a given substance. Borchers pre- dicted that, at the high temperatures available with the electric furnace, every oxide would prove to be reducible by the action of carbon, and this prediction has in most instances been justified. Alumina and lime, for example, which cannot be reduced at ordinary furnace temperatures, readily give up their oxygen to carbon in the electric furnace, and then combine with an excess of carbon to form metallic carbides. In 1885 the brothers Cowles patented a process for the electrothermal reduction of oxidized ores by exposure to an intense current of electricity when admixed with carbon in a retort. Later in that year they patented a process for the reduction of aluminium by carbon, and in 1886 an electric furnace with sliding carbon rods passed through the end walls to the centre of a rectangular furnace. The impossibility of working with just sufficient carbon to reduce the alumina, without using any excess which would be free ta

form at least so much carbide as would suffice, when diffused through the metal, to render it brittle, practically restricts the

use of such processes to the production of aluminium Alumla- a u y S . Aluminium bronze (aluminium and copper) alloys. and ferro-

aluminium (aluminium and iron) have

been made in this way; the latter is the more satis- factory product, because a certain proportion of carbon is expected in an alloy of this character, as in ferromanganese and cast iron, and its presence is not objectionable. The furnace is built of fire-brick, and may measure (internally) 5 ft. in length by 1 ft. 8 in. in width, and 3 ft. in height. Into each end wall is built a short iron tube sloping downwards towards the centre, and through this is passed a bundle of five 3-in. carbon rods, bound together at the outer end by being cast into a head of cast iron for use with iron alloys, or of cast copper for aluminium bronze. This head slides freely in the cast iron tubes, and is connected by a copper rod with one of the terminals of the dynamo supplying the current. The carbons can thus, by the application of suitable mechanism, be withdrawn from or plunged into the furnace at will. In starting the furnace, the bottom is prepared by ramming it with charcoal-powder that has been soaked in milk of lime and dried, so that each particle is coated with a film of lime, which serves to reduce the loss of current by conduction through the lining when the furnace becomes hot. A sheet iron case is then placed within the furnace, and the space between it and the walls rammed with limed charcoal; the interior is filled with fragments of the iron or copper to be alloyed, mixed with alumina and coarse charcoal, broken pieces of carbon being placed in position to connect the electrodes. The iron case is then removed, the whole is covered with charcoal, and a cast iron cover with a central flue is placed above all. The current, either continuous or alternating, is then started, and continued for about 1 to 15 hours, until the operation is complete, the carbon rods being gradually withdrawn as the action proceeds. In such a furnace a continuous current, for example, of 3000 amperes, at 50 to 60 volts, may be used at first, increasing to 5000 amperes in about half an hour. The reduction is not due to electrolysis, but to the action of carbon on alumina, a part of the carbon in the charge being consumed and evolved as carbon monoxide gas, which burns at the orifice in the cover so long as reduction is taking place. The reduced aluminium alloys itself immediately with the fused globules of metal in its midst, and as the charge becomes reduced the globules of alloy unite until, in the end, they are run out of the tap-hole after the current has been diverted to another furnace. It was found in practice (in 1889) that the expenditure of energy per pound of reduced aluminium was about 23 H. P. -hours, a number considerably in excess of that required at the present time for the production of pure aluminium by the electrolytic process described in the article Aluminium. Calcium

carbide, graphite (g.v.), phosphorus (q.v.) and carborundum (q.v.) are now extensively manufactured by the operations outlined above.

'Electrolytic Processes. — The isolation of the metals sodium and potassium by Sir Humphry Davy in 1807 by the electrolysis of the fused hydroxides was one of the earliest applications of the electric current to the extraction of metals. This pioneering work showed little development until about the middle of the 19th century. In 1852 magnesium was isolated electrolytically by R. Bunsen, and this process subsequently received much attention at the hands of Moissan and Borchers. Two years later Bunsen and H. E. Sainte Claire Deville working indepen- dently obtained aluminium (g.v.) by the electrolysis of the fused double sodium aluminium chloride. Since that date other processes have been devised and the electrolytic processes have entirely replaced the older methods of reduction with sodium. Methods have also been discovered for the electrolytic manu- facture of calcium (q.v.), which have had the effect of converting a laboratory curiosity into a product of commercial importance. Barium and strontium have also been produced by electro- metallurgical methods, but the processes have only a laboratory interest at present. Lead, zinc and other metals have also been reduced in this manner.

For further information the following books, in addition to those mentioned at the end of the article Electrochemistry, may be consulted : Borchers, Handbuch der Elektrockemie; Electric Furnaces (Eng. trans, by H. G. Solomon, 1908) ; Moissan, The Electric Furnace (1904); J. Escard, Fours electrigues (1905); Les Industries electro- chimiques (1907). (W. G. M.)

ELECTROMETER, an instrument for measuring difference of potential, which operates by means of electrostatic force and gives the measurement either in arbitrary or in absolute units (see Units, Physical). In the last case the instrument is called an absolute electrometer. Lord Kelvin has classified electrometers into (1) Repulsion, (2) Attracted disk, and (3) Symmetrical electrometers (see W. Thomson, Brit. Assoc. Report, 1867, or Reprinted Papers on Electrostatics and Magnetization, p. 261).

Repulsion Electrometers.— The simplest form of repulsion electrometer is W. Henley's pith ball electrometer (Phil. Trans., 1772, 63, p. 359) in which the repulsion of a straw ending in a pith ball from a fixed stem is indicated on a graduated arc (see Electroscope). A double pith ball repulsion electrometer was employed by T. Cavallo in 1777.

It may be pointed out that such an arrangement is not merely an arbitrary electrometer, but may become an absolute electrometer within certain rough limits. Let two spherical pith balls of radius r and weight W, covered with gold-leaf so as to be conducting, be suspended by parallel silk threads of length / so as just to touch each other. If then the balls are both charged to a potential V they will repel each other, and the threads will stand out at an angle 20, which can be observed on a protractor. Since the electrical repulsion of the balls is equal to C 2 V 2 4/ 2 sin 2 dynes, where C = r is the capacity of either ball, and this force is balanced by the restoring force due to their weight, Wg dynes, where g is the acceleration of gravity, it is easy to show that we have

v 2l sin $ V Wg tan B r as an expression for their common potential V, provided that the balls are small and their distance sufficiently great not sensibly to disturb the uniformity of electric charge upon them. Observation of 8 with measurement of the value of / and r reckoned in centimetres and W in grammes gives us the potential difference of the balls in absolute C.G.S. or electrostatic units. The gold-leaf electroscope invented by Abraham Bennet (see Electroscope) can in like manner, by the addition of a scale to observe the divergence of the gold-leaves, be made a repulsion electrometer.

Attracted Disk Electrometers. — A form of attracted disk absolute electrometer was devised by A. Volta. It consisted of a plane conducting plate forming one pan of a balance which was suspended over another insulated plate which could be electrified. The attraction between the two plates was balanced by a weight put in the opposite pan. A similar electric balance was subse- quently devised by SirW. Snow-Harris , one of whose instru- ments is shown in fig. 1. C is an in- sulated disk over which is suspended another disk at- tached to the arm of a balance. A weight is put in the opposite scale pan and a measured charge of electricity is given to the disk C just sufficient to tip over the balance. Snow-Harris found that this charge varied as the square root of the weight in the opposite pan, thus showing that the*

1 It is probable that an experiment of this kind had been made as far back as 1746 by Daniel Gralath, of Danzig, who has some claims to have suggested the word " electrometer " in connexion with it. See Park Benjamin, The Intellectual Rise in Electricity (London, 1895), P- 542.

Fig. i. — Snow-Harris's Disk Electrometer.

attraction between the disks at given distance apart varies as the square of their difference of potential.

The most important improvements in connexion with electro- meters are due, however, to Lord Kelvin, who introduced the guard plate and used gravity or the torsion of a wire as a means for evaluating the electrical forces.

His portable electrometer is shown in fig. 2. H H (see fig. 3) is a plane disk of metal called the guard plate, fixed to the inner coating

FlG. 2. — Kelvin's Portable Electrometer.

Fig. 3.

of a small Leyden jar (see fig. 2). At F a square hole is cut out of H H, and into this fits loosely without touching, like a trap door, a square piece of aluminium foil havinga projecting tail, which carries at its end a stirrup L, crossed by a fine hair (see fig. 3). The square piece of aluminium is pivoted round a horizontal stretched wire. If then another horizontal disk G is placed over the disk H H and a difference of potential made between G and H H, the movable aluminium trap door F will be attracted by the fixed plate G. Matters are so arranged by giving a torsion to the wire carrying the aluminium disk F that for a certain potential difference between the plates H and G, the movable part F comes into a definite sighted position, which is observed by means of a small lens. The plate G (see fig. 2) is moved up and down, parallel to itself, by means of a screw. In using the instrument the conductor, whose potential is to be tested, is connected to the plate G. Let this potential be denoted by V, and let v be the potential of the guard plate and the aluminium flap. This last potential is maintained constant by guard plate and flap being part of the interior coating of a charged Leyden jar. Since the distribution of electricity may be considered to be constant over the surface S of the attracted disk, the mechanical force/ on it is given by the expression, 1

f =

S(V-tQ»

where d is the distance between the two plates. If this distance is

varied until the attracted disk comes into a definite sighted position as seen by observing the end of the index through the lens, then since the force / ie constant, being due to the torque applied by the wire for a definite angle of twist, it follows that the dif- ference of potential of the two plates varies as their distance. If then two experiments are made, first with the upper plate connected to earth, and secondly, connected to the object being tested, we get an expression for the potential V of this conductor in the form

V = A(d'-d), where d and d' are the distances of the fixed and movable plates from one another in the two cases, and A is some constant. We thus find V in terms of the constant and the difference of the two screw readings.

Lord Kelvin's absolute electrometer (fig. 4) involves the same principle. There is a certain fixed guard disk B having a hole in it which is loosely occu- pied by an aluminium trap door plate, shielded by D and suspended on springs, so that its surface is parallel with that of the guard plate. Parallel to this is a second movable plate A, the distances between the two being measurable by means of a screw. The movable plate can be drawn down into a definite sighted position when a difference of potential is made between the two

'See Maxwell, Treatise on Electricity and Magnetism (2nd ed.), i. 308.

Fig. 4. — Kelvin's Ab- solute Electrometer.

plates. This sighted position is such that the surface of the trap door plate is leyel with that of the guard plate, and is determined by observations made with the lenses H and L. The movable plate can be thus depressed by placing on it a certain standard weight W grammes.

Suppose it is required to measure the difference of potentials V and V of two conductors. First one and then the other conductor is connected with the electrode of the lower or movable plate, which is moved by the screw until the index attached to the attracted disk shows it to be in the sighted position. Let the screw readings in the two cases be d and a". If W is the weight required to depress the attracted disk into the same sighted position when the plates are unelectrified and g is the acceleration of gravity, then the difference of potentials of the conductors tested is expressed by the formula

V^V' = (d-d')J^fl,

Fig. 5.

where S denotes the area of the attracted disk.

The difference of potentials is thus determined in terms of a weight, an area and a distance, in absolute C.G.S. measure or electro, static units.

Symmetrical Electrometers include the dry pile electrometer and Kelvin's quadrant electrometer. The principle under- lying these instruments is that we can measure differences of potential by means of the motion of an electrified body in a symmetrical field of electric force. In the dry pile electrometer a single gold-leaf is hung up between two plates which are connected to the opposite terminals of a dry pile so that a certain constant dif- ference of potential exists between these plates. The original inventor of this instrument was T. G. B. Behrens (Gilb. Ann., 1806, 23), but it generally bears the name of J. G. F. von Bohnenberger, who slightly modified its form. G. T. Fechner introduced the important improvement of using only one pile, which he removed from the immediate neighbourhood of the suspended leaf. W. G. Hankel still further improved the dry pile electrometer by giving a slow motion movement to the two plates, and substituted a galvanic battery with a large number of cells for the dry pile, and also employed a divided scale to measure the movements of the gold-leaf (Pogg. Ann., 1858, 103). If the gold-leaf is unelectrified, it is not acted upon by the two plates placed at equal distances on either side of it, but if its potential is raised or lowered it is attracted by one disk and repelled by the other, and the displacement becomes a measure of its potential.

A vast improvement in this instrument was made by the invention of the quadrant electrometer by Lord Kelvin, which is the most sensitive form of electrometer yet de- vised. In this instrument (see fig. 5) a flat paddle- shaped needle of alumin- ium foil U is supported by a bifilar suspension consisting of two cocoon fibres. This needle is sus- pended in the interior of a glass vessel partly coated with tin-foil on the outside and inside, forming therefore a Ley- den jar (see fig. 6). In the bottom of the vessel is placed some sulphuric acid, and a platinum wire attached to the suspended needle dips into this acid. By giving a charge to this Leyden jar the needle can thus be maintained at a certain constant high potential. The needle is enclosed by a sort of flat box divided into four insulated quadrants A, B, C, D (fig. 5), whence the name. The opposite quadrants are connected to- gether by thin platinum wires. These quadrants are insulated

Fig.

6. — Kelvin's Quadrant Electro- meter.

from the needle and from the case, and the two pairs are connected to two electrodes. When the instrument is to be used to deter- mine the potential difference between two conductors, they are connected to the two opposite pairs of quadrants. The needle in its normal position is symmetrically placed with regard to the quadrants, and carries a mirror by means of which its dis- placement can be observed in the usual manner by reflecting the ray of light from it. If the two quadrants are at different potentials, the needle moves from one quadrant towards the other, and the image of a spot of light on the scale is therefore displaced. Lord Kelvin provided the instrument with two necessary adjuncts, viz. a replenisher or rotating electrophorus (?.».), by means of which the charge of the Leyden jar which forms the enclosing vessel can be increased or diminished, and also a small aluminium balance plate or gauge, which is in principle the same as the attracted disk portable electrometer by means of which the potential of the inner coating of the Leyden jar is preserved at a known value.

According to the mathematical . theory of the instrument, 1 if V and V are the potentials of the quadrants and v is the potential of the needle, then the torque acting upon the needle to cause rotation is given by the expression,

C(V-V')\{v r i(V+V')\}, where C is some constant. If v is very large compared with the mean value of the potentials of the two quadrants, as it usually is, then the above expression indicates that the couple varies as the difference of the potentials between the quadrants.

Dr J. Hopkinson found, however, before 1885, that the above formula does not agree with observed facts (Proc. Phys. Soc. Lorid., 1885, 7, p. 7). Theformula indicatesthat the sensibility of the instru- ment should increase with the charge of the Leyden jar or needle, whereas Hopkinson found that as the potential of the needle was increased by working the replenisher of the jar, the deflection due to three volts difference between the quadrants first increased and then diminished. He found that when the potential of the needle exceeded

a certain value, of about 200 volts, for the particular instrument he was using (made by White of Glasgow), the above formula did not hold good. W. E. Ayrton, J. Perry arid W. E. Sumpner, who in 1886 had noticed the same fact as Hopkinson, investigated the matter in 189 1 {Proc. Roy. Soc, 1891, 50, p. 52; Phil. Trans., 1891, 182, p. 519). Hopkinson had been inclined to attribute the anomaly to an increase in the tension of the bifilar threads, owing to a downward pull on the needle, but they showed that this theory would not account for the discrepancy. They found from observations that the particular quadrant electrometer they used might be made to follow one or other of three distinct laws. If the quadrants were near together there were certain limits between which the potential of the needle might vary without producing more than a small change in the deflection corresponding with the fixed potential difference of the quadrants. For example, when the quadrants were about 2-5 mm. apart and the suspended fibres near together at the top, the deflection produced by a P.D. of 1-45 volts between the quadrants only varied about 11 % when the potential of the needle varied from 896 to 3586 volts. When the fibres were far apart at the top a similar flatness was obtained in the curve with the quadrants about 1 mm. apart. In this case the deflection of the needle was practically quite constant when its potential varied from 2152 to 3227 volts. When the quadrants were about 3-9 mm. apart, the deflection for a given P.D. between the quadrants was almost directly proportional to the potential of the needle. In other words, the electrometer nearly obeyed the theoretical law. Lastly, when the quadrants were 4 mm. or more apart, the deflection in- creased much more rapidly than the potential, so that a maximum sensibility bordering on instability was obtained. Finally, these ob- servers traced the variation to the fact that the wire supporting the aluminium needle as well as the wire which connects the needle with the sulphuric acid in the Leyden jar in the White pattern of Leyden jar is enclosed in a metallic guard tube to screen the wire from external action. In order that the needle may project outside the guard tube, openings are made in its two sides ; hence the moment the needle is deflected each half of it becomes unsymmetrically

{jlaced relatively to the two metallic pieces which join the upper and ower half of the guard tube. Guided by these experiments, Ayrton, Perry and Sumpner constructed an improved unifilar quadrant electrometer which was not only more sensitive than the White pattern, but fulfilled the theoretical law of working. The bifilar suspension was abandoned, and instead a new form of adjustable magnetic control was adopted. All the working parts of the instru-

ment were supported on the base, so that on removing a glass shade which serves as a Leyden jar they can be got at and adjusted in position. The conclusion to which the above observers came was that any quadrant electrometer made in any manner does not

1 See Maxwell, Electricity and Magnetism (2nd ed., Oxford, 1881), vol. i. p. 311.

necessarily obey a law of deflection making the deflections proportional to the potential difference of the quadrants, but that an electrometer can be constructed which does fulfil the above law.

The importance of this investigation resides in the fact that an electrometer of the above pattern can be used as a wattmeter (q.v.), provided that the deflection of the needle is proportional to the potential difference of the quadrants. This use of the instrument was proposed simultaneously in 188 1 by Professors Ayrton and G. F. Fitzgerald and M . A. Potier. Suppose we have an inductive and a non-inductive circuit in series, which is traversed by a periodic current, and that we desire to know the power being absorbed to the inductive circuit. Let v u v it v s be the instantaneous potentials of the two ends and middle of the circuit ; let a quadrant electrometer be connected first with the quadrants to the two ends of the inductive circuit and the needle to the far end of the non-inductive circuit, and then secondly with the needle connected to one of the quadrants (see fig. 5). Assuming the electrometer to obey the above-mentioned theoretical law, the first reading is proportional to

ˆ-ˆjr.-ELtSJ

and the second to ■ »i-

■v.

\v,- v +

+ V2

The difference of the readings is then proportional to

(»i— »i)(»a— »s). But this last expression is proportional to the instantaneous power taken up in the inductive circuit, and hence the difference of the two readings of the electrometer is proportional to the mean power take?n up in the circuit (Phil. Mag., 1 891, 32, p. 206). Ayrton and Perry and also P. R. Blondlot and P. Curie afterwards suggested that a single electrometer could be constructed

with two pairs of quadrants and a duplicate needle on one stem, so as to make two readings simultaneously and produce a deflection proportional at once to the power being taken up in the inductive circuit.

Quadrant electrometers have also been designed especially for measuring extremely small potential differences. An instru- ment of this kind has been constructed by Dr. F. Dolezalek (fig. 7). The needle and quadrants are of small size, and the

Fig. 7. — Quadrant Electrome

Do

ilek Pattc

electrostatic capacity is correspondingly small. The quadrants are mounted on pillars of amber which afford a very high insulation. The needle, a piece of paddle-shaped paper thinly coated with silver foil, is suspended by a quartz fibre, its extreme lightness making it possible to use a very feeble controlling force without rendering the period of oscillation unduly great. The resistance offered by the air to a needle of such light construction suffices to render the motion nearly dead-beat. Throughout a wide range the deflections are proportional to the potential difference producing them. The needle is charged to a potential

of 50 to 200 volts by means of a dry pile or voltaic battery, or from a lighting circuit. To facilitate the communication of the charge to the needle, the quartz fibre and its attachments are rendered conductive by a thin film of solution of hygroscopic salt such as calcium chloride. The lightness of the needle enables the instrument to be moved without fear of damaging the suspen- sion. The upper end of the quartz fibre is rotated by a torsion head, and a metal cover serves to screen the instrument from stray electrostatic fields. With a quartz fibre 0-009 mm – thick and 60 mm. long, the needle being charged to no volts, the period and swing of the needle was 18 seconds. With the scale at a distance of two metres, a deflection of 130 mm. was produced by an electromotive force of o-i volt. By using a quartz fibre of about half the above diameter the sensitiveness was much increased. An instrument of this form is valuable in measuring small alternating currents by the fall of

potential produced down a known resistance. In the same way it may be employed to measure high potentials by measuring the fall of potential down a fraction of a known non-inductive resistance. In this last case, however, the capacity of the electrometer used must be small, otherwise an error is introduced. 1

See, in addition to references already given, A, Gray, Absolute Measurements in Electricity and Magnetism (London, 1888), vol. i. p. 254; A. Winkelmann, Handbuch der Physik (Breslau, 1905), pp. 58-70, which contains a large number of references to original papers on electrometers. (J. A. F.)

ELECTRON, the name suggested by Dr G. Johnstone Stoney in 1891 for the natural unit of electricity to which he had drawn attention in 1874, and subsequently applied to the ultra- atomic particles carrying negative charges of electricity, of which Professor Sir J. J. Thomson proved in 1897 that the cathode rays consisted. The electrons, which Thomson at first called corpuscles, are point charges of negative electricity, their in- ertia showing them to have a mass equal to about xriWthat °f the hydrogen atom. They are apparently derivable from all kinds of matter, and are believed to be components at any rate of the chemical atom. The electronic theory of the chemical atom supposes, in fact, that atoms are congeries of electrons in rapid orbital motion. The size of the electron is to that of an atom roughly in the ratio of a pin's head to the dome of St Paul's cathedral. The electron is always associated with the unit charge of negative electricity, and it has been suggested that its inertia is wholly electrical. For further details see the articles on Electricity; Magnetism; Matter; Radio- activity; Conduction, Electric; The Electron Theory, E. Fournier d'Albe (London, 1907) ; and the original papers of Dr G. Johnstone Stoney, Proc. Brit. Ass. (Belfast, August 1874), " On the Physical Units of Nature," and Trans. Royal Dublin Society (1891), 4, P- 5 8 3-

ELECTROPHORUS, an instrument invented by Alessandro Volta in 177s, by which mechanical work is transformed into electrostatic charge by the aid of a small initial charge of electri- city. The operation depends on the facts of electrostatic in- duction discovered by John Canton in 1753, and, independently, by J. K. Wilcke in 1762 (see Electricity). Volta, in a letter to J. Priestley on the 10th of June 1775 (see Collezione dell' opere, ed. 1816, vol. i. p. 118), described the invention of a device he called an elcltroforo perpetuo, based on the fact that a con- ductor held near an electrified body and touched by the finger was found, when withdrawn, to possess an electric charge of opposite sign to that of the electrified body. His

electrophorus in one form consisted of a disk of non-conducting material, such as pitch or resin, placed between two metal sheets, one being provided with an insulating handle. For the pitch or resin may be substituted a sheet of glass, ebonite, indiarubber or any other good dielectric placed upon a metallic sheet, called the sole-plate. To use the apparatus the surface of the dielectric is rubbed with a piece of warm flannel, silk or catskin, so as to electrify it, and the upper metal plate is then placed upon it. Owing to the irregularities in the surfaces of the dielectric and upper plate the two are only in contact at a few points, and owing

1 See J. A. Fleming, Handbook for the Electrical Laboratory and Testing Room, vol. i. p. 448 (London, 1901).

to the insulating quality of the dielectric its surface electrical charge cannot move over it. It therefore acts inductively upon the upper plate and induces on the adjacent surface an electric charge of opposite sign. Suppose, for instance, that the dielectric is a plate of resin rubbed with catskin, it will then be negatively electrified and will act by induction on the upper plate across the film of air separating the upper resin surface and lower surface of the upper metal plate. If the upper plate is touched with the finger or connected to earth for a moment, a negative charge will escape from the metal plate to earth at that moment. The arrangement thus constitutes a condenser; the upper plate on its under surface carries a charge of positive electricity and the resin plate a charge of negative electricity on its upper surface, the air film between them being the dielectric of the condenser. If, therefore, the upper plate is elevated, mechanical work has to be done to separate the two electric charges. Accordingly on raising the upper plate, the charge on it, in old-fashioned nomenclature, becomes free and can be communicated to any other insulated conductor at a lower potential, the upper plate thereby becoming more or less discharged. On placing the upper plate again on the resin and touching it for a moment, the process can be repeated, and so at the expense of mechanical work done in lifting the upper plate against the mutual attraction of two electric charges of opposite sign, an indefinitely large electric charge can be accumulated and given to any other suitable conductor. In course of time, however, the surface charge of the resin becomes dissipated and it then has to be again excited. To avoid the necessity for touching the upper plate every time it is put down on the resin, a metal pin may be brought through the insulator from the sole-plate so that each time that the upper plate is put down on the resin it is automatically connected to earth. We are thus able by a process of merely lifting the upper plate repeatedly to convey a large electrical

charge to some conductor starting from the small charge produced by friction on the resin. The above explanation does not take into account the function of the sole-plate, which is important. The sole-plate serves to increase the electrical capacity of the upper plate when placed down upon the resin or excited insulator. Hence when so placed it takes a larger charge. When touched by the finger the upper plate is brought to zero potential. If then the upper plate is lifted by its insulating handle its capacity becomes diminished. Since, however, it carries with it the charge it had when resting on the resin, its potential becomes increased as its capacity becomes less, and it therefore rises to a high potential, and will give a spark if the knuckle is approached to it when it is lifted after having been touched and raised.

The study of Volta's electrophorus at once suggested the performance of these cyclical operations by some form of rota- tion instead of elevation, and led to the invention of various forms of doubler or multiplier. The instrument was thus the first of a long series of machines for converting mechanical work into electrostatic energy, and the predecessor of the modern type of influence machine (see Electrical Machine). Volta himself devised a double and reciprocal electrophorus and also made mention of the subject of multiplying condensers in a paper published in the Phil. Trans, for 1782 (p. 237, and appendix, p. vii.). He states, however, that the use of a condenser in connexion with an electrophorus to make evident and multiply weak charges was due to T. Cavallo {Phil. Trans., 1788).

For further information see S. P. Thompson, " The Influence Machine from 1788 to 1888," Journ. Inst. Tel. Eng., 1888, 17, p. 569. Many references to original papers connected with the electrophorus will be found in A. Winkelmann's Handbuch der Physik (Breslau, 1905), vol. iv. p. 48. (J. A. F.)

ELECTROPLATING, the art of depositing metals by the electric current. In the article Electrolysis it is shown how the passage of an electric current through a solution containing metallic ions involves the deposition of the metal on the cathode. Sometimes the metal is deposited in a pulverulent form, at others as a firm tenacious film, the nature of the deposit being dependent upon the particular metal, the concentration of the solution, the difference of potential between the electrodes, and other experi- mental conditions. As the durability of the electro-deposited

coat on plated wares of all kinds is of the utmost importance, the greatest care must be taken to ensure its complete adhesion. This can only be effected if the surface of the metal on which the deposit is to be made is chemically clean. Grease must be removed by potash, whiting or other means, and tarnish by an acid or potassium cyanide, washing in plenty of water being resorted to after each operation. The vats for depositing may be of enamelled iron, slate, glazed earthenware, glass, lead-lined wood, &c. The current densities and potential differences frequently used for some of the commoner metals are given in the following table, taken from M'Millan's Treatise on Electrometallurgy. It must be remembered, however, that variations in conditions modify the electromotive force required for any given process. For example, a rise in temperature of the bath causes an increase in its conductivity, so that a lower E.M.F. will suffice to give the required current density'; on the other hand, an abnormally great distance between the electrodes, or a diminution in acidity of an acid bath, or in the strength of the solution used, will increase the resistance, and so require the application of a higher E.M.F.

Amp

eres.

Volts between

Metal.

Per sq. decimetre of Cathode

Per sq. in. of Cathode

Anode and Cathode.

Surface.

Surface.

Antimony

0-4-0-5

0-02-0-03

I-0-I-2

Brass

0-5-0-8

0-03-0-05

3-0-4-0

Copper, acid bath

I-0-I-5

0-065-0-10

0-5-I-5

,, alkaline b

ath . 0-3-0-5

0-02-0-03

3-0-5-0

Gold

o-i •

0-006

0-5-4-0

Iron

o-5

0-03

1-0

Nickel, at first

I-4-I-5

0-09-0-10

50

„ after

0-2-0-3

0-015 0-02

1-5-2-0

„ on zinc

o-4

0025

4-0-5-0

Silver

0-2-0-5

0-OI5-0-03

o-75-i-o

Zinc

0-3-0-6

0-02-0-04

2-5-3-Q

Large objects are suspended in the tanks by hooks or wires, care being taken to shift their position and so avoid wire-marks. Small objects are often heaped together in perforated trays or ladles, the cathode connecting-rod being buried in the midst of them. These require constant shifting because the objects are in contact at many points, and because the top ones shield those below from the depositing action of the current. Hence processes have been patented in which the objects to be plated are suspended in revolving drums between the anodes, the rotation of the drum causing the constant renewalof surfaces and affording a burnishing action at the same time. Care must be taken not to expose goods in the plating-bath to too high a current density, else they may be ” burnt “; they must never be exposed one at a time to the full anode surface, with the current flowing in an empty bath, but either one piece at a time should be replaced, or some of the anodes should be transferred

temporarily to the place of the cathodes, in order to distribute the current over a sufficient cathode-area. Burnt deposits are dark-coloured, or even pul- verulent and useless. The strength of the current may also be regulated by introducing lengths of German silver or iron wire, carbon rod, or other inferior conductors in the path of the current, and a series of such resistances should always be provided close to the tanks. Ammeters to measure the volume, and volt- meters to determine the pressure of current supplied to the baths, should also be provided. Very irregular surfaces may require the use of specially shaped anodes in order that the distance between the electrodes may be fairly uniform, otherwise the portion of the cathode lying nearest to the anode may receive an undue share of the current, and therefore a greater thickness of coat. Supplementary anodes are sometimes used in difficult cases of this kind. Large metallic surfaces (especially external surfaces) are sometimes plated by means of a " doctor," which, in its simplest form, is a brush constantly wetted with the electrolyte, with a wire anode buried amid the hairs or bristles; this brush is painted slowly over the surface of the metal to be coated, which must be connected to the negative terminal of the

electrical generator. Under these conditions electrolysis of the solution in the brush takes place. Iron ships' plates have recently been coated with copper in sections (to prevent the adhesion of barnacles), by building up a temporary trough against the side of the ship, making the thoroughly cleansed plate act both as cathode and as one side of the trough. Decorative plating-work in several colours (e.g. "parcel-gilding") is effected by painting a portion of an object with a stopping-out (i.e. a non-conducting) varnish, such as copal varnish, so that this portion is not coated. The varnish is then removed, a different design stopped out, and another metal deposited. By varying this process, designs in metals of different colours may readily be obtained.

Reference must be made to the textbooks (see Electro- chemistry) for a fuller account of the very varied solutions and methods employed for electroplating with silver, gold, copper, iron and nickel. It should be mentioned here, however, that solutions which would deposit their metal on any object by simple immersion should not be generally used for electroplating that object, as the resulting deposit is usually non-adhesive. For this reason the acid copper-bath is not used for iron or zinc objects, a bath containing copper cyanide or oxide dissolved in potassium cyanide being substituted. This solution, being an inferior conductor of electricity, requires a much higher electromotive force to drive the current through it, and is therefore

more costly in use. It is, however, commonly employed hot, whereby its resistance is reduced. Zinc is commonly de- posited by electrolysis on iron or steel goods which would ordinarily be " galvanized," but which for any reason may not conveniently be treated by the method of immersion in fused zinc. The zinc cyanide bath may be used for small objects, but for heavy goods the sulphate bath is employed. Sherard Cowper- Coles patented a process in which, working with a high current density, a lead anode is used, and powdered zinc is kept suspended in the solution to main- tain the proportion of zinc in the electrolyte, and so to guard against the gradual acidification of the bath. Cobalt is deposited by a method analogous to that used for its sister- metal nickel. Platinum, palladium and tin are occasionally deposited for special purposes. In the deposition of gold the colour of the deposit is influenced by the presence of impurities in the solution; when copper is present, some is deposited with the gold, imparting to it a reddish colour, whilst a little silver gives it a greenish shade. Thus so-called coloured-gold deposits may be produced by the judicious introduction of suitable impurities. Even pure gold, it may be noted, is darker or lighter in colour according as a stronger or a weaker current is used. The electro-deposition of brass — mainly on iron ware, such as bedstead tubes — is now very widely practised, the bath employed being a mixture of copper, zinc and potassium cyanides, the proportions of which vary according to the character of the brass required, and to the mode of treatment. The colour depends in part upon the proportion of copper and zinc, and in part upon the current density, weaker currents tending to produce a redder or yellower metal. Other alloys may be produced, such as bronze, or German silver, by selecting solutions (usually cyanides) from which the current is able to deposit the constituent metals simultaneously.

Electrolysis has in a few instances been applied to processes of manufacture. For example, Wilde produced copper printing surfaces for calico printing-rollers and the like by immersing rotating iron cylinders as cathodes in a copper bath. Elmore, Dumoulin, Cowper-Coles and others have prepared copper cylinders and plates by depositing copper on rotating mandrels with special arrangements. Others have arranged a means of obtaining high conductivity wire from cathode-copper without fusion, by depositing the metal in the form of a spiral strip on a cylinder, the strip being subsequently drawn down in the usual way; at present, however, the ordinary methods of wire

production are found to be cheaper. J. W. Swan (Journ. Inst. Elec. Eng., 1898, vol. xxvii. p. 16) also worked out, but did not proceed with, a process in which a copper wire whilst receiving a deposit of copper was continuously passed through the draw- plate, and thus indefinitely extended in length. Cowper-Coles (Journ. Inst. Elec. Eng., 1898, 27, p. 99) very successfully produced true parabolic reflectors for projectors, by depositing copper upon carefully ground and polished glass surfaces rendered conductive by a film of deposited silver.

ELECTROSCOPE, an instrument for detecting differences of electric potential and hence electrification. The earliest form of scientific electroscope was the versorium or electrical needle of William Gilbert (1544- 1603), the celebrated author of the treatise De magnete (see Electricity). It consisted simply of a light metallic needle balanced on a pivot like a compass needle. Gilbert em- ployed it to prove that numerous other bodies besides amber are susceptible of being electrified by friction. 1 In this case the visible indication consisted in the attraction exerted between the electrified body and the light pivoted needle which was acted upon and electrified by induction. The next im- provement was the invention of simple forms of repulsion electroscope. Two similarly electrified bodies repel each other. Benjamin Franklin employed the repulsion of two linen threads, C. F. de C. du Fay, J. Canton, W. Henley and others devised the pith ball, or double straw electroscope (fig. 1). T. Cavallo about 1770 employed two fine silver wires terminating in pith balls suspended in a glass vessel having strips of tin-foil pasted down the sides (fig. 2). The object of the thimble- shaped dome was to keep moisture from the stem from which the pith balls were supported, so that the apparatus could be used in the open air even in the rainy weather. Abraham Bennet (Phil. Trans., 1787, 77, p. 26) invented the modern form of gold-leaf electroscope. Inside a glass shade he fixed to an insulated wire a pair of strips of gold-leaf (fig. 3). The wire terminated in a plate or knob outside the vessel. When an electrified body was held near or in contact with the knob, repulsion of the gold leaves tnsued. Volta added the condenser (Phil. Trans., 1782), t/hich greatly increased the power of the instrument. M.

Fig. 1. — Henley's Electroscope.

Fig. 2. — Cavallo's Electroscope. Fig. 3. — Bennet's Electro-

scope.

Faraday, however, showed long subsequently that to bestow upon the

indications of such an electroscope definite meaning 1 See the English translation by the Gilbert Club of Gilbert's De magnete, p. 49 (London, 1900).

it was necessary to place a cylinder of metallic gauze connected to the earth inside the vessel, or better still, to line the glass shade with tin-foil connected to the earth and observe through a hole the indications of the gold leaves (fig. 4). Leaves of aluminium foil may with advantage be substituted for gold-leaf, and a scale is sometimes added to indicate the angular divergence of the leaves.

The uses of an electroscope are, first, to ascertain if any body is in a state of electrification, and secondly, to indicate the sign of that charge. In connexion with the modern study of radio- activity, the electroscope has become an instrument of great usefulness, far outrivalling the spectroscope in sensibility. Radio-active bodies are chiefly recognized by the power they' possess of rendering the air in their neighbourhood conductive; hence the electroscope detects the presence of a radio-active body by losing an electric charge given to it more quickly than it would otherwise do. A third great use of the electroscope is therefore to detect electric conductivity either in the air or in any other body.

To detect electrification it is best to charge the electroscope by induction. If an electrified body is held near the gold-leaf electroscope the leaves diverge with electricity of the same sign as that of the body being tested. If, without removing the electrified body, the plate or knob of the electroscope is touched, the leaves collapse. If the electroscope is insulated once more and the electrified body removed, the leaves again diverge with electricity of the opposite sign to that of the body being tested. The sign of charge is then deter- mined by holding near the electroscope a glass rod rubbed with silk or a sealing- wax rod rubbed with flannel. If the approach of the glass rod causes the leaves in their final state to collapse, then the charge in the rod was positive, but if it causes them to expand still more the charge was negative, and vice versa for the sealing-wax rod. When employing a Volta condensing electro- scope, the following is the method of procedure: — The top of the electro- scope consists of a flat, smooth plate of lacquered brass on which another plate of brass rests, separated from it by three minute fragments of glass or shellac, or a film of shellac varnish. If the electrified body is touched against the upper plate whilst at the same time the lower plate is put to earth, the condenser formed of the two plates and the film of air or varnish becomes charged with positive electricity on the one plate and negative on the other. On in- sulating the lower plate

and raising the upper plate by the glass handle, the capacity of the condenser formed by the plates is vastly decreased, but since the charge on the lower plate including the gold leaves attached to it remains the same, as the capacity of the system is reduced the potential is raised and therefore the gold leaves diverge widely. Volta made use of such an electro- scope in his celebrated experiments (1790-1800) to prove that metals placed in contact with one another are brought to different potentials, in other words to prove the existence of so-called contact electricity. He was assisted to detect the small potential differences then in question by the use of a multiplying condenser or revolving doubler (see Electrical Machine) . To employ the electroscope as a means of detecting radio-activity, we have first to test the leakage quality of the electroscope itself. Formerly it was usual to insulate the rod of the electroscope by passing it through a hole in a cork or mass of sulphur fixed in the top of the glass vessel within which the gold leaves were suspended. A further improvement consisted in passing the metal wire to which the gold leaves were attached through a glass tube much wider than the rod, the latter being fixed concentrically in the glass tube by means of solid shellac melted and run in. This insulation, however, is not sufficiently good for an electroscope intended for the detection of radio-activity; for this purpose

Fig. 4. — Gold-Leaf Electroscope.

Fig. 5. — Curie's Elec- troscope.

it must be such that the leaves will remain for hours or days in a state of steady divergence when an electrical charge has been given to them.

In their researches on radio-activity M. and Mme P. Curie employed an electroscope made as follows: — A metal case (fig. 5), having two holes in its sides, has a vertical brass strip B attached to the inside of the lid by a block of sulphur SS or any other good insulator. Joined to the strip is a transverse wire terminating at one end in a knob C, and at the other end in a condenser plate P'. The strip B carries also a strip of gold-leaf L, and the metal .case is connected to earth. If a charge is given to the electroscope, and if any radio-active material is placed on a condenser plate P attached to the outer case, then this substance be- stows conductivity on the air between the plates P and

P', and the charge of the electroscope begins to leak away. The collapse of the gold-leaf is observed through an aperture in the case by a miscroscope, and the time taken by the gold- leaf to fall over a certain distance is proportional to the ionizing current, that is, to the intensity of the radio-activity of the substance.

A very similar form of electroscope was employed by J. P. L. J. Elster and H. F. K. Geitel (fig. 6), and also by C. T. R. Wilson (see Proc. Roy. Soc, iqoi, 68, p. 152). A metal box has a metal strip B suspended from a block or insulator by means of a bit of sulphur or amber S, and to it is fastened a strip of gold-leaf L. The electroscope is provided with a charging rod C. In a dry atmosphere sulphur or amber is an early perfect insulator, and hence if the air in the interior of the box is kept dry by calcium chloride, the electroscope will hold its charge for a long time. Any divergence or collapse of the gold-leaf can be viewed by a microscope through an aperture in the side of the case.

Another type of sensitive electroscope is one devised by C. T. R. Wilson (Proc. Cam. Phil. Soc, 1903, 12, part 2). It con- sists of a metal box placed on a tilting stand (fig. 7). At one end is an insulated plate P kept at a potential of 200 volts or so above the earth by a battery. At the other end is an insulated metal wire having attached to it a thin strip of gold-leaf L. If the plate P i's electrified it attracts the strip which stretches out towards it. Before use the strip is for one moment connected to the case, and the arrangement is then tilted until the strip extends at a certain angle. If then the strip of gold-leaf is raised or lowered in potential it moves to or from the plate P, and its movement can be observed by a microscope through a hole in the side of the box. There is a particular angle of tilt of the case which gives a maximum sensitiveness. Wilson found that with the plate electrified to 207 volts and with a tilt of the case of 30°, if the gold-leaf was raised one volt in potential above the case, it moved over 200

Fig. 6. — Elster and Geitel Electroscope.

Fig. 7. — Wilson's Electroscope.

divisions of the micrometer scale in the eye-piece of the micro- scope, 54 divisions being equal to one millimetre. In using the instrument the insulated rod to which the gold-leaf is attached is connected to the conductor, the potential of which is being examined. In the use of all these electroscopic instruments it is essential to bear in mind (as first pointed out by Lord Kelvin) that what a gold-leaf electroscope

really indicates is the difference of potential between the gold-leaf and the solid walls enclosing

the air space in which they move. 1 If these enclosing walls are made of anything else than perfectly conducting material, then the indications of the instrument may be uncertain and meaning- less. As already mentioned, Faraday remedied this defect by coating the inside of the glass vessel in which the gold-leaves were suspended to form an electroscope with tinfoil (see fig. 4). In spite of these admonitions all but a few instrument makers have continued to make the vicious type of instrument consisting of a pair of gold-leaves suspended within a glass shade or bottle, no means being provided for keeping the walls of the vessel continually at zero potential.

See J. Clerk Maxwell, Treatise on Electricity and Magnetism, vol. i. p. 300 (2nd ed., Oxford, 1881); H. M. Noad, A Manual of Electricity , vol. i. p. 25 (London, 1855); £. Rutherford, Radio-activity.

(J.A.F.).

ELECTROSTATICS, the name given to that department of electrical science in which the phenomena of electricity at rest are considered. Besides their ordinary condition all bodies are capable of being thrown into a physical state in which they are said to be electrified or charged with electricity. When in this condition they become sources of electric force, and the space round them in which this force is manifested is called an " electric field " (see Electricity). Electrified bodies exert mechanical forces on each other, creating or tending to create motion, and also induce electric charges on neighbouring surfaces.

The reader possessed of no previous knowledge of electrical phenomena will best appreciate the meaning of the terms em- ployed by the aid of a few simple experiments. For this purpose the following apparatus should be provided: — (1) two small metal tea-trays and some clean dry tumblers, the latter preferably varnished with shellac varnish made with alcohol free from water; (2) two sheets of ebonite rather larger than the tea-trays; (3) a rod of sealing-wax or ebonite and a glass tube, also some pieces of silk and flannel; (4) a few small gilt pith balls suspended by dry silk threads; (5) a gold-leaf electroscope, and, if possible, a simple form of quadrant electrometer (see Electroscope and Electrometer); (6) some brass balls mounted on the ends of ebonite penholders, and a few tin canisters. With the aid of this apparatus, the principal facts of electrostatics can be experimentally verified, as follows: —

Experiment I. — Place one tea-tray bottom side uppermost upon three warm tumblers as legs. Rub the sheet of ebonite vigorously with warm flannel and lay it rubbed side downwards on the top of the tray. Touch the tray with the finger for an instant, and lift up the ebonite without letting the hand touch the tray a second time. The tray is then found to be electrified. If a suspended gilt pith ball is held near it, the ball will first be attracted and then repelled. If small fragments of paper are scattered on the tray and then the other tray held in the hand over them, they will fly up and down rapidly. If the knuckle is approached to the electrified tray, a small spark will be seen, and afterwards the tray will be found to be discharged or

unelectrified. If the electrified tray is touched with the sealing-wax or ebonite rod, it will not be discharged, but if touched with a metal wire, the hand, or a damp thread, it is discharged at once. This shows that some bodies are conductors and others non-conductors or insulators of electricity, and that bodies can be electrified by friction and impart their electric charge to other bodies. A charged conductor supported on a non-conductor retains its charge. It is then said to be insulated.

Experiment II. — Arrange two tea-trays, each on dry tumblers as before. Rub the sheet of ebonite with flannel, lay it face downwards on one tray, touch that tray with the finger for a moment and lift up the ebonite sheet, rub it again, and lay it face downwards on the second tray and leave it there. Then take two suspended gilt pith balls and touch them (a) both against one tray; they will be found to repel each other; (b) touch one against one tray and the other against the other tray, and they will be found to attract each other. This proves the existence of two kinds of electricity, called positive and negative.

1 See Lord Kelvin, " Report on Electrometers and Electrostatic Measurements," Brit. Assoc. Report for 1867, or Lord Kelvin's Reprint of Papers on Electrostatics and Magnetism, p. 260.

The first tea-tray is positively electrified, and the second negatively. If an insulated brass ball is touched against the first tray and then against the knob or plate of the electroscope, the gold leaves will diverge. If the ball is discharged and touched against the other tray, and then afterwards against the previously charged electroscope, the leaves will collapse. This shows that the two electricities neutralize each other's effect when imparted equally to the same conductor.

Experiment III. — Let one tray be insulated as before, and the electrified sheet of ebonite held over it, but not allowed to touch the tray. If the ebonite is withdrawn without touching the tray, the latter will be found to be unelectrified. If whilst holding the ebonite sheet over the tray the latter is also touched with an insulated brass ball, then this ball when removed and tested with the electroscope will be found to be negatively electrified. The sign of the electrification imparted to the electro- scope when so charged — that is, whether positive or negative — ■ can be determined by rubbing the sealing-

wax rod with flannel and the glass rod with silk, and approaching them gently to the electroscope one at a time. The sealing-wax so treated is electrified negatively or resinously, and the glass with positive or vitreous electricity. Hence if the electrified sealing-wax rod makes the leaves collapse, the electroscopic charge is positive, but if the glass rod does the same, the electroscopic charge is negative. Again, if, whilst holding the electrified ebonite over the tray, we touch the latter for a moment and then withdraw the ebonite sheet, the tray will be found to be positively electrified. The electrified ebonite is said to act by " electrostatic induction " on the tray, and creates on it two induced charges, one of positive and the other of negative electricity. The last goes to earth when the tray is touched, and the first remains when the tray is insulated and the ebonite withdrawn.

Experiment I V. — Place a tin canister on a warm tumbler and connect it by a wire with the gold-leaf electroscope. Charge positively a brass ball held on an ebonite stem, and introduce it, without touching, into the canister. The leaves of the electro- scope will diverge with positive electricity. Withdraw the ball and the leaves will collapse. Replace the ball again and touch the outside of the canister; the leaves will collapse. If then the ball be withdrawn, the leaves will diverge a second time with negative electrification. If, before withdrawing the ball, after touching the outside of the canister for a moment the ball is touched against the inside of the canister, then on withdrawing it the ball and canister are found to be discharged. This experi- ment proves that when a charged body acts by induction on an insulated conductor it causes an electrical separation to take place; electricity of opposite sign is drawn to the side nearest the inducing body, and that of like sign is repelled to the remote side, and these quantities are equal in amount.

Seat of the Electric Charge. — So far we have spoken of electric charge as if it resided on the conductors which are electrified. The work of Benjamin Franklin, Henry Cavendish, Michael Faraday and J. Clerk Maxwell demonstrated, however, that all electric charge or electrification of conductors consists simply in the establishment of a physical state in the surrounding insulator or dielectric, which state is variously called electric strain, electric displacement or electric polarization. Under the action of the same or identical electric forces the intensity of this state in various insulators is determined by a quality of them called their dielectric constant, specific inductive capacity or inductivity. In the next place we must notice that electrifica- tion is a measurable magnitude and in electrostatics is estimated in terms of a unit called the electrostatic unit of electric

quantity. In the absolute C.G.S. system this unit quantity is defined as follows: — If we consider a very small electrified spherical conductor, experiment shows that it exerts a repulsive force upon another similar and similarly electrified body. Cavendish and C. A. Coulomb proved that this mechanical force varies inversely as the square of the distance between the centres of the spheres. The unit of mechanical force in the " centimetre, gramme, second " (C.G.S.) system of units is the dyne, which is approxi- mately equal to 1/98 1 part of the weight of one gramme. A

very small sphere is said then to possess a charge of one electrostatic unit of quantity, when it repels another similar and similarly electrified body with a force of one dyne, the centres being at a distance of one centimetre, provided that the spheres are in vacuo or immersed in some insulator, the dielectric constant of which is taken as unity. If the two small conducting spheres are placed with centres at a distance d centimetres, and immersed in an insulator of dielectric constant K, and carry charges of Q and Q' electrostatic units respectively, measured as above described, then the mechanical force between them is equal to QQ'/K<2 2 dynes. For constant charges and distances the mechanical force is inversely as the dielectric constant.

Electric Force. — If a small conducting body is charged with Q electrostatic units of electricity, and placed in any electric field at a point where the electric force has a value E, it will be subject to a mechanical force equal to QE dynes, tending to move it in the direction of the resultant electric force. This provides us with a definition of a unit of electric force, for it is the strength of an electric field at that point where a small conductor carrying a unit charge is acted upon by unit mechanical force, assuming the dielectric constant of the surrounding medium to be unity. To avoid unnecessary complications we shall assume this latter condition in all the following discussion, which is equivalent simply to assuming that all our electrical measurements are made in air or in vacuo.

Owing to the confusion introduced by the employment of the term force, Maxwell and other writers sometimes use the words electromotive intensity instead of electric force. The reader should, however, notice that what is generally called electric force is the analogue in electricity of the so-called acceleration of gravity in mechanics, whilst electrification or quantity of electricity is analogous to mass. If a mass of M grammes be placed in the earth's field at a place where the acceleration of gravity has a value g centimetres per second, then the mechanical force acting on it and

pulling it downwards is Mg dynes. In the same manner, if an electrified body carries a positive charge Q electro- static units and is placed in an electric field at a place where the electric force or electromotive intensity has a value E units, it is urged in the direction of the electric force with a mechanical force equal to QE dynes. We must, however, assume that the charge Q is so small that it does not sensibly disturb the original electric field, and that the -dielectric constant of the insulator is unity.

Faraday introduced the important and useful conception of lines and tubes of electric force. If we consider a very small conductor charged with a unit of positive electricity to be placed in an electric field, it will move or tend to move under the action of the electric force in a certain direction. The path described by it when removed from the action of gravity and all other physical forces is called a line of electric force. We may other- wise define it by saying that a line of electric force is a line so drawn in a field of electric force that its direction coincides at every point with the resultant electric force at that point. Let any line drawn in an electric field be divided up into small elements of length. We can take the sum of all the products of the length of each element by the resolved part of the electric force in its direction. This sum, or integral, is called the "line integral of electric force" or the electromotive force (E.M.F.) along this line. In some cases the value of this electromotive force between two points or conductors is independent of the precise path selected, and it is then called the potential difference (P.D.) of the two points or conductors. We may define the term potential difference otherwise by saying that it is the work done in carrying a small conductor charged with one unit of electricity from one point to the other in a direction opposite to that in which it would move under the electric forces if left to itself.

Electric Potential. — Suppose then that we have a conductor charged with electricity;we may imagine its surface to be divided up into small unequal areas, each of which carries a unit charge of electricity. If we consider lines of electric force to be drawn from the boundaries of these areas, they will cut up the space round the conductor into tubular surfaces called tubes of electric

force, and each tube will spring from an area of the conductor carrying a unit electric charge. Hence the charge on the con- ductor

can be measured by the number of unit electric tubes springing from it. In the next place we may consider the charged body to be surrounded by a number of closed surfaces, such that the potential difference between any point on one surface and the earth is the same. These surfaces are called "equipotential" or " level surfaces," and we may so locate them that the potential difference between two adjacent surfaces is one unit of potential; that is, it requires one absolute unit of work (i erg) to move a small body charged with one unit of electricity from one surface to the next. These enclosing surfaces, therefore, cut up the space into shells of potential, and divide up the tubes of force into electric cells. The surface of a charged conductor is an equi- potential surface, because when the electric charge is in equili- brium there is no tendency for electricity to move from one part to the other.

We arbitrarily call the potential of the earth zero, since all potential difference is relative and there is no absolute potential any more than absolute level. We call the difference of potential between a charged conductor and the earth the potential of the conductor. Hence when a body is charged positively its poten- tial is raised above that of the earth, and when negatively it is lowered beneath that of the earth. Potential in a certain sense is to electricity as difference of level is to liquids or difference of temperature to heat. It must be noted, how- ever, that potential is a mere mathematical concept, and has no objective existence like difference of level, nor is it capable per se of producing physical changes in bodies, such as those which are brought about by rise of temperature, apart from any question of difference of temperature. There is, however, this similarity between them. Electricity tends to flow from places of high to places of low potential, water to flow down hill, and heat to move from places of high to places of low temperature. Returning to the case of the charged body with the space around it cut up into electric cells by the tubes of force and shells of potential, it is obvious that the number of these cells is represented by the product QV, where Q is the charge and V the potential of the body in electrostatic units. An electrified conductor is a store of energy, and from the definition of potential it is clear that the work done in increasing the charge q of a conductor whose potential is v by "a small amount dq, is vdq, and since this added charge increases in turn the potential, it is easy to prove that the work done in charging a conductor with Q units to a potential V units is |QV units of work. Accord- ingly the number of electric cells into which the space round is cut up is equal to twice the energy stored up, or each cell contains half a unit of energy. This harmonizes with the fact that the real seat of the energy of

electrification is the dielectric or in- sulator surrounding the charged conductor. 1

We have next to notice three important facts in electrostatics and some consequences flowing therefrom.

(i) Electrical Equilibrium and Potential. — If there be any number of charged conductors in a field, the electrification on them being in equilibrium or at rest, the surface of each conductor is an equipotential surface. For since electricity tends to move between points or conductors at different potentials, if the electricity is at rest on them the potential must be every- where the same. It follows from this that the electric force at the surface of the conductor has no component along the surface, in other words, the electric force at the bounding surface of the conductor and insulator is everywhere at right angles to it.

By the surface density of electrification on a conductor is meant the charge per unit of area, or the number of tubes of electric force which spring from unit area of its surface. Coulomb proved experimentally that the electric force just outside a conductor at any point is proportional to the electric density at that point. It can be shown that the resultant electric force normal to the surface at a point just outside a conductor is

'See Maxwell, Elementary Treatise on Electricity (Oxford, 1881),

equal to 47ra, where a is the surface density at that point. This is usually called Coulomb's Law. 2

(ii) Seat of Charge. — The charge on an electrified conductor is wholly on the surface, and there is no electric force in the interior of a closed electrified conducting surface which does not contain any other electrified bodies. Faraday proved this experimentally (see Experimental Researches, series xi. § 11 73) by constructing a large chamber or box of "paper covered with tinfoil or thin metal. This was insulated and highly electrified. In the interior no trace of electric charge could be found when tested by electroscopes or other means. Cavendish proved it by enclosing a metal sphere in two hemispheres of thin metal held on insulating supports. If the sphere is charged and then the jacketing hemispheres fitted on it and removed, the sphere is found to be perfectly discharged. 3 Numerous other demonstra- tions of this fact were given by Faraday. The thinnest possible spherical shell of metal, such as a sphere of insulator coated with gold-leaf, behaves as a conductor for static charge just as if it

were a sphere of solid metal. The fact that there is no electric force in the interior of such a closed electrified shell is one of the most certainly ascertained facts in the science of electro- statics, and it enables us to demonstrate at once that particles of electricity attract and repel each other with a force which is inversely as the square of their distance.

We may give in the first place an elementary proof of the con- verse proposition by the aid of a simple lemma: —

Lemma. — If particles of matter attract one another according to the law of the inverse' square the attraction of all sections of a cone for a particle at the vertex is the same. Definition. — The solid angle subtended by any surface at a point is measured by the quotient of its apparent surface by the square of its distance from that point. Hence the total solid angle round any point is 4X. The solid angles subtended by all normal sections of a cone at the vertex are therefore equal, and since the attractions of these sections on a particle at the vertex are proportional to their distances from the vertex, they are numeri- cally equal to one another and to the solid angle of the cone.

Let us then suppose a spherical shell O to be electrified. Select any point P in the interior and let a line drawn through it sweep out a small double cone (see fig. 1). Each cone cuts out an area on the surface equally inclined to the cone axis. The electric density on the sphere being uniform, the quantities of electricity I \ «0 on these areas are proportional to the areas, \ xP and if the electric force varies inversely as the square of the distance, the forces exerted by these two surface charges at the point in question are proportional to the solid angle of the little cone. Hence the forces due to the two areas at opposite ends of the chord are equal and opposed.

Hence we see that if the whole surface of the sphere is divided into pairs of elements by cones described through any interior point, the resultant force at that point must consist of the sum of pairs of equal and opposite forces, and is therefore zero. For the proof of the converse proposition we must refer the reader to the Electrical Researches of the Hon. Henry Cavendish, p. 419, or to Maxwell's Treatise on Electricity and Magnetism, 2nd ed., vol. i. p. 76, where Maxwell gives an elegant proof that if the force in the interior of a closed conductor is zero, the law of the force must be that of the inverse square of the distance. 4 From this fact it follows that we can shield any conductor entirely from external influence by other charged conductors by enclosing it in a metal case. It is not even necessary that

2 See Maxwell, Treatise on Electricity and Magnetism (3rd ed., Oxford, 1892), vol. i. p. 80.

3 Maxwell, Ibid. vol. i. § 74a ; also Electrical Researches of the Hon. Henry Cavendish, edited by J. Clerk Maxwell (Cambridge, 1879), p. 104.

4 Laplace {Mec. Cel. vol. i. ch. ii.) gave the first direct demonstration that no function of the distance except the inverse square can satisfy the condition that a uniform spherical shell exerts no force on a particle within it.

Fig. 1.

this envelope should be of solid metal; a cage made of fine metal wire gauze which permits objects in its interior to be seen will yet be a perfect electrical screen for them. Electroscopes and electrometers, therefore, standing in proximity to electrified bodies can be perfectly shielded from influence by enclosing them in cylinders of metal gauze.

Even if a charged and insulated conductor, such as an open canister or deep cup, is not perfectly closed, it will be found that a proof-plane consisting of a small disk of gilt paper carried at the end of a rod of gum-lac will not bring away any charge if applied to the deep inside portions. In fact it is curious to note how large an opening may be made in a vessel which yet remains for all electrical purposes " a closed conductor." Maxwell {Elementary Treatise, &c, p. 15) ingeniously applied this fact to the insulation of conductors. If we desire to insulate a metal ball to make it hold a charge of electricity, it is usual to do so by attaching it to a handle or stem of glass or ebonite. In this case the electric charge exists at the point where the stem is attached, and there leakage by creeping takes place. If, however, we employ a hollow sphere and let the stem pass through a hole in the side larger than itself, and attach the end to the interior of the sphere, then leakage cannot take place.

Another corollary of the fact that there is no electric force in the interior of a charged conductor is that the potential in the interior is constant and equal to that at the surface. For by the definition of potential it follows that the electric force in any direction at any point is measured by the space rate of change of potential in that

direction or $E = + dV/dx$. Hence if the force is zero the potential V must be constant.

(iii.) Association of Positive and Negative Electricities. — The third leading fact in electrostatics is that positive and negative electricity are always created in equal quantities, and that for every charge, say, of positive electricity on one conductor there must exist on some other bodies an equal total charge of negative electricity. Faraday expressed this fact by saying that no absolute electric charge could be given to matter. If we consider the charge of a conductor to be measured by the number of tubes of electric force which proceed from it, then, since each tube must end on some other conductor, the above statement is equivalent to saying that the charges at each end of a tube of electric force are equal.

The facts may, however, best be understood and demonstrated by considering an experiment due to Faraday, commonly called the ice pail experiment, because he employed for it a pewter ice pail (Exp. Res. vol. ii. p. 279, or Phil. Mag. 1843, 22). On the plate of a gold-leaf electroscope place a metal canister having a loose lid. Let a metal ball be suspended by a silk thread, and the canister lid so fixed to the thread that when the lid is in place the ball hangs in the centre of the canister. Let the ball and lid be removed by the silk, and let a charge, say, of positive electricity (+ Q) be given to the ball. Let the canister be touched with the finger to discharge it perfectly. Then let the ball be lowered into the canister. It will be found that as it does so the gold-leaves of the electroscope diverge, but collapse again if the ball is withdrawn. If the ball is lowered until the lid is in place, the leaves take a steady deflection. Next let the canister be touched with the finger, the leaves collapse, but diverge again when the ball is withdrawn. A test will show that in this last case the canister is left negatively electrified. If before the ball is withdrawn, after touching the outside of the canister with the finger, the ball is tilted over to make it touch the inside of the canister, then on withdrawing it the canister and ball are found to be perfectly discharged. The explanation is as follows: the charge (+ Q) of positive electricity on the ball creates by induction an equal charge (— Q) on the inside of the canister when placed in it, and repels to the exterior surface of the canister an equal charge (+ Q). On touching the canister this last charge goes to earth. Hence when the ball is touched against the inside of the canister before withdrawing it a second time, the fact that the system is found subsequently to be completely discharged proves that the charge -Q induced on the inside of the canister must be exactly equal to the charge

+Q on the ball, and also that the inducing action of the charge +Q on the ball created equal quantities of electricity of opposite sign, one drawn to the inside and the other repelled to the outside of the canister.

Electrical Capacity. — We must next consider the quality of a conductor called, its electrical capacity. The potential of a conductor has already been defined as the mechanical work which must be done to bring up a very small body charged with a unit of positive electricity from the earth's surface or other boundary taken as the place of zero potential to the surface of this conductor in question. The mathematical expression for this potential can in some cases be calculated or predetermined.

Thus, consider a sphere uniformly charged with Q units of positive electricity. It is a fundamental theorem in attractions that a thin spherical shell of matter which attracts according to the „ , ... law of the inverse square acts on all external points as . en if it were concentrated at its centre. Hence a sphere SDBere having a charge Q repels a unit charge placed at a distance x from its centre with a force Q/x 3 dynes, and therefore the work W in ergs expended in bringing the unit up to that point from an ' infinite distance is given by the integral

W= (Qxˆdx = Q/x

•Sen

(1).

Hence the potential at the surface of the sphere, and therefore the potential of the sphere, is Q/R, where R is the radius of the sphere in centimetres. The quantity of electricity which must be given to the sphere to raise it to unit potential is therefore R electrostatic units. The capacity of a conductor is defined to be the charge/ required to raise its potential to unity, all other charged conductors! being at an infinite distance. This capacity is then a function of the geometrical dimensions of the conductor, and can be mathe- matically determined in certain cases. Since the potential of a small charge of electricity dQ at a distance r is equal to dQ/r, and since the potential of all parts of a conductor is the same in those cases in which the distribution of surface density of electrification is uniform or symmetrical with respect to some point or axis in the conductor, we can calculate the potential by simply summing up terms like

We can thus easily calculate the capacity of a long thin wire like a telegraph wire far removed from the earth, as follows: Let 2r be the diameter of the wire, / its length, and a the uniform _ surface electric density. Then consider a thin annulus „/f aC y of the wire of width dx; the charge on it is equal to thin rod 2-Krafdx units, and the potential V at a point on the axis at a distance x from the annulus due to this elementary charge is

Vc2 f' v(rV) &a4irf 'l loge(|/ + V7ˆF)-log/ I •

If, then, r is small compared with /, we have V =4irro- log„ l/r. But the charge is Q = 2«"

C = 1/2 log, l/r (2).

A more difficult case is presented by the ellipsoid. 1 We have

first to determine the mode in which electricity distributes itself on

a conducting ellipsoid in free space. It must be such a „ .

distribution that the potential in the interior will be ° en a . l . ~ of an

Capacity

ota

sphere.

ellipsoid.

constant, since the electric force must be zero. It is a well-known theorem in attractions that if a shell is made of gravitative matter whose inner and outer surfaces are similar ellipsoids, it exercises no attraction on a particle of matter in its interior. 2 Consider then an ellipsoidal shell the axes of whose bounding surfaces are (a, b, c) and (a+da), (b+db), (c+dc), where da/a=db b=dc/c = ix. The potential of such a shell at any internal point is constant, and the equi-potential surfaces for external space are ellipsoids confocal with the ellipsoidal shell. Hence if we distri- bute electricity over an ellipsoid, so that its density is everywhere proportional to the thickness of a shell formed by describing round

1 The solution of the problem of determining the distribution on an ellipsoid of a fluid the particles of which repel each other with a

force inversely as the reth power of the distance was first given by George Green (see Ferrer's edition of Green's Collected Papers, p. 1 19,

1871).

2 See Thomson and Tait, Treatise on Natural Philosophy, § 519.

the ellipsoid a similar and slightly larger one, that distribution will be in equilibrium and will produce a constant potential through- out the interior.- Thus if

Accordingly for a given ellipsoid the surface density of free distribution of electricity on it is everywhere proportional to the c it length of the perpendicular let fall from the centre on Lapac y ˆg tangent plane at that point. From this we can m" M determine the capacity of the ellipsoid as follows: Let ellipsoid, p j Je t j ie ignth f tne perpendicular from the centre of the ellipsoid, whose equation is x 2 /a 2 +y i lb 2 +z 2 lc 2 — i to the tangent plane at x,y,s. Then it can be shown that l/p 2 -x 2 /a 4 +y 2 lb , +z 2 lc i (see Frost's Solid Geometry, p. 172). Hence the density

Q 1

"~ˆabc TˆIˆ+yW+ˆIFy

and the potential at the centre of the ellipsoid, and therefore its potentiat as a whole is given by the expression,

V

J r Af-wabcJ r-

(4).

~4wabcJ rˆ (x 2 la l +yˆ/b i +z 2 /c i) Accordingly the capacity C of the ellipsoid is given by the equation

1 1 f dS / >

C~\wabcJ V (x 2 +y 2 +2 2)V (x 2 /a i +y 2 lb+z 2 lc t) °*

It has been shown by Professor Chrystal that the above integral may also be presented in the form, 1

c :

■»/:

d

V{(o 2 +X)(6 2 +X)(ˆ+X)| (V-

The above expressions for the capacity of an ellipsoid of three unequal axes are in general elliptic integrals, but they can be evaluated for the reduced cases when the ellipsoid is one of revolution, and hence in the limit either takes the form of a long rod or of a circular disk.

Thus if the ellipsoid is one of revolution, and ds is an element of arc which sweeps out the element of surface dS, we have

dS = 2iryds =2irydxl (j-) =2irydxl (vM =■ v

Hence, since

Accordingly the distribution of electricity is such that equal parallel slices of the ellipsoid of revolution taken normal to the axis of revolution carry equal charges on their curved surface.

The capacity C of the ellipsoid of revolution is therefore given by the expression

dx

-dx.

*I=JLf_*

*C 2aJ *

V(2 +;y 2) (7) ‘*

If the ellipsoid is one of revolution round the major axis a (prolate) and of eccentricity e, then the above formula reduces to

I 1 , /l+«

cr™ Xo %AT~e)

(8).

Whereas if it is an ellipsoid of revolution round the minor axis b (oblate), we have

~—- l ae .

rr- (9).

I

c 2

when e = 0, and the ellipsoid thus becomes

In each case we have C = a sphere.

In the extreme case when e = i, the prolate ellipsoid becomes a long thin rod, and then the capacity is given by

Ci = o/log e 2o/6 (10),

which is identical with the formula (2) already obtained. In the other extreme case the oblate spheroid becomes a circular disk when e = I , and then the capacity C 2 = 2ajir. This last result shows that the capacity of a thin disk is 2/17=1/1-571 of that of a sphere of the same radius. Cavendish (Elec. Res. pp. 137 and 347) deter- mined in 1773 experimentally that the capacity of a sphere was 1-541 times that of a disk of the same radius, a truly remarkable result for that date.

Three other cases of practical interest present themselves, viz. the

1 See article " Electricity," Encyclopaedia Britannica (9th edition), vol. viii. p. 30. The reader is also referred to an article by Lord Kelvin {Reprint of Papers on Electrostatics and Magnetism, p. 178), entitled "Determination of the Distribution of Electricity on a Circular Segment of a Plane, or Spherical Conducting Surface under any given Influence," where another equivalent expression is given for the capacity of an ellipsoid.

capacity of two concentric spheres, of two coaxial cylinders and of two parallel planes.

Consider the case of two concentric spheres, a solid one enclosed in a hollow one. Let Ri be the radius of the inner sphere, R 2 the inside radius of the outer sphere, and R 2 the outside c .. radius of the outer

spherical shell. Let a charge +Q be apac y given to the inner sphere. Then this produces a charge oftwo -Q on the inside of the enclosing spherical shell, and a coacentrlc charge +Q on the outside of the shell. Hence the potential s P' ,eˆes • V at the centre of the inner sphere is given by V = Q/Ri-Q/R 2 -f-Q/R3- If the outer shell is connected to the earth, the charge +Q on it disappears, and we have the capacity C of the inner sphere given by

C = i/R 1 -i/R 2 = (R 2 -R 1) R L R 2 (11).

Such a pair of concentric spheres constitute a condenser (see Leyden Jar), and it is obvious that by making R 2 nearly equal to Ri, we may enormously increase the capacity of the inner sphere. Hence the name condenser.

The other case of importance is that of two coaxial cylinders. Let a solid circular sectioned cylinder of radius Ri be enclosed in a coaxial tube of inner radius R 2 . Then when the inner „ cylinder is at potential Vi and the outer one kept at ˆ apac y potential V 2 the lines of electric force between the cylinders ° w ? are radial. Hence the electric force E in the interspace Q °„t varies inversely as the distance from the axis. Accordingly c y'"°" ers – the potential V at any point in the interspace is given by

E=-dV/<2R=A/RorV=-A/R-yR, (12),

where R is the distance of the point in the interspace from the axis, and A is a constant. Hence V 2 -Vi=-A log R 2 /Ri. If we consider a length / of the cylinder, the charge Q on the inner cylinder is Q = 27rRi/

Accordingly Q=2irR I ZA/4?rRi=A//2. If then the outer cylinder be at zero potential the potential V of the inner one is

V = A log (Rs/Ri), and its capacity C=//2 log R 2 /Ri.

This formula is important in connexion with the capacity of electric cables, which consist of a cylindrical conductor (a wire) enclosed in a conducting sheath. If the dielectric or separating insulator has a constant K, then the capacity becomes K times as great.

The capacity of two parallel planes can be calculated at once if we neglect the distribution of the lines of force near the edges of the plates, and assume that the only field is the uniform field _ .. between the plates. Let Vi and V 2 be the potentials of va P acn y the plates, and let a charge Q be given to one of them. oltw ° If S is the surface

of each plate, and d their distance, then P araUel the electric force E in the space between them is E= P' aaes – (V1-V2) Id. But if a is the surface density, E = 471-0-, and

(Vr-V 2)

In this calculation we neglect altogether the fact that electric force distributed on curved lines exists outside the interspace between the plates, and these lines in fact extend from the back of one „ p . plate to that of the other. G. R. Kirchhoff (Gesammelte jt t"

Abhandl. p.i 12) has given a full expression for the capacity effect – C of two circular plates of thickness t and radius r placed at any distance d apart in air from which the edge effect can be calculated. Kirchhoff 's expression is as follows : — ■

In the above formula e is the base of the Napierian logarithms. The first term on the right-hand side of the equation is the expression for the capacity, neglecting the curved edge distribution of electric force, and the other terms take into account, not only the uniform field between the plates, but also the non-uniform field round the edges and beyond the plates.

In practice we can avoid the difficulty due to irregular distribution of electric force at the edges of the plate by the use of a guard plate as first suggested by Lord Kelvin. 2 If a large plate has a _ .

circular hole cut in it, and this is nearly filled up by a " ,

circular plate lying in the same plane, and if we place pMes. another large plate parallel to the first, then the electric field between this second plate and the small circular plate is nearly uniform; and if S is the area of the small plate and d its distance from the opposed plate, its capacity may be calculated by the simple formula C = S/ qird. The outer larger plate in which the hole is cut is called the " guard plate," and must be kept at the same potential as the smaller inner or " trap-door plate." The same arrangement can be supplied to a pair of coaxial cylinders. By placing metal plates on either side of a larger sheet of dielectric or insulator we can construct a condenser of relatively large capacity. The instrument known as a Leyden jar (q.v.) consists of a glass bottle coated within and without for three parts of the way up with tinfoil.

2 See Maxwell, Electricity and Magnetism, vol. i. pp. 284-305 (3rd ed., 1892).

Systems ot con- densers.

If we have a number of such condensers we can combine them in " parallel " or in " series." If all the plates on one side are connected together and also those on the other, the condensers are joined in parallel. If Q, C 2 , C 3 , &c, are the separate capacities, then 2© = Q+C2+C 3 + &c, is the total capacity in parallel. If the condensers are so joined that the inner coating of one is connected to the outer coating of the next, they are said to be in series. Since then they are all charged with the same quantity of electricity, and the total over all potential difference V is the sum of each of the individual potential differences Vi, V 2 , V 3 , &c, we have

Q = C 1 V 1 =C 2 V, = C,V, = &c, and V = Vi+V„+V, + &c. The resultant capacity is C=Q/V, and

C = i/(i/C 1 + i/C 2 + i/Ca + &c)=i/S(i/C) (15).

These rules provide means for calculating the resultant capacity when any number of condensers are joined up in any way.

If one condenser is charged, and then joined in parallel with another uncharged condenser, the charge is divided between them in the ratio of their capacities. For if Ci and C 2 are the capacities and Qi and Q 2 are the charges after contact, then Q1/C1 and Q2JC2 are the potential differences of the coatings and must be equal. Hence Qi/Ci = Q 2 /C 2 or Qi/Q 2 = Ci/C 2 . It is worth noting that if we have a charged sphere we can perfectly discharge it by introducing it into the interior of another hollow insulated conductor and making contact. The small sphere then becomes part of the interior of the other and loses all charge.

Measurement of Capacity. — Numerous methods have been devised for the measurement of the electrical capacity of conductors in those cases in which it cannot be determined by calculation. Such a measurement may be an absolute determination or a relative one. The dimensions of a capacity in electrostatic measure is a length (see Units, Physical). Thus the capacity of a sphere in electrostatic units (E.S.U.) is the same as the number denoting its radius in centimetres. The unit of electrostatic capacity is therefore that of a sphere of 1 cm. radius. 1 This unit is too small for practical purposes, and hence a unit of capacity 900,000 greater, called a microfarad, is generally

employed. Thus for instance the capacity in free space of a sphere 2 metres in diameter would be 100/900,000 = 1/9000 of a microfarad. The electrical capacity of the whole earth considered as a sphere is about 800 microfarads. An absolute measurement of capacity means, therefore, a determination in E.S. units made directly without reference to any other condenser. On the other hand there are numerous methods by which the capacities of condensers may be compared and a relative measurement made in terms of some standard.

One well-known comparison method is that of C. V. de Sauty. The two condensers to be compared are connected in the branches of a Wheatstone's Bridge {q.v.) and the other two arms completed with variable resistance boxes. These arms are then altered until on raising or depressing the battery key there is no sudden deflection either way of the galvano- meter. If Ri and R 2 are the arms' resistances and Ci and C 2 the condenser capacities, then when the bridge is balanced we have R,:R 8 = C,:C 2 .

Another comparison method much used in submarine cable work is the method of mixtures, originally due to Lord Kelvin and usually called Thomson and Gott's method. It depends on the principle that if two condensers of capacity Ci and C2 are respectively charged to potentials Vi and V 2 , and then joined in parallel with terminals of opposite charge together, the resulting potential difference of the two condensers will be V, such that

vJCjVi-cw (I6) .

(C+C) v ; '

and hence if V is zero we have G : C 2 = V2 : Vj.

The method is carried out by charging the two condensers to be compared at the two sections of a high resistance joining the ends of a battery which is divided into two parts by a movable contacts This contact is shifted until such a point is found by trial that the two condensers charged at the different sections and then joined as above described and tested on a galvanometer show no charge. Various special keys have been invented for performing the electrical operations expeditiously.

A simple method for condenser comparison is to charge the two condensers to the same voltage by a battery and then discharge them successively through a ballistic galvanometer^ {q.v.) and observe the

respective "throws" or deflections of the coil or needle. These are proportional to the capacities. For the various precautions necessary in conducting the above tests special treatises on electrical testing must be consulted.

1 It is an interesting fact that Cavendish measured capacity in " globular inches," using as his unit the capacity of a metal ball, 1 in. in diameter. Hence multiplication of his values for capacities by 2-54 reduces them to E.S. units in the C.G.S. system. See Elec. Res. p. 347. _

2 For fuller details of these methods of comparison of capacities see J. A. Fleming, A Handbook for the Electrical Laboratory and Testing Room, vol. ii. ch. ii. (London, 1903).

Relative

deter-

minatlons.

In the absolute determination of capacity we have to measure the ratio of the charge of a condenser to its plate potential difference. One of the best methods for doing this is to charge the .. condenser by the known voltage of a battery, and then . f° " e discharge it through a galvanometer and repeat this e yfC« process rapidly and successively. If a condenser of capacity C is charged to potential V, and discharged n times per second through a galvanometer, this series of intermittent discharges is equivalent to a current reCV. Hence if the galvanometer is calibrated by a potentiometer {q.v.) we can determine the value of this current in amperes, and knowing the value of n and V thus determine C. Various forms of commutator have been devised for effecting this charge and discharge rapidly by J. J. Thomson, R. T. Glazebrook, J. A. Fleming and W. C. Clinton and others. 3 One form consists of a tuning-fork electrically maintained in vibration of known period, which closes an electric contact at every vibration and sets another electromagnet in operation, which reverses a switch and moves over one terminal of the condenser from a battery to a galvanometer contact. In another form, a revolving contact is used driven by an electric motor, which consists of an insulating disk having on its surface slips of metal and three wire brushes a, b, c (see fig. 2) pressing against them. The metal slips are so placed that, as II fc = a

the disk revolves, the middle brush, connected I — 1 1 rab

to one terminal of the condenser C, is alter- nately put in conductive connexion with first one and then the other outside brush, which are joined respectively to the battery B and galvanometer G terminals. From the speed Fig. 2.

of this motor the number of commutations per second can be determined. The above method is especially useful for the determinations of very small capacities of the order of 100 electrostatic units or so and upwards.

Dielectric constant. — Since all electric charge consists in a state of strain or polarization of the dielectric, it is evident that the physical state and chemical composition of the insulator must be of great importance in determfning electrical phenomena. Cavendish and subsequently Faraday discovered this fact, and the latter gave the name " specific inductive capacity," or " dielectric constant," to that quality of an insulator which determines the charge taken by a conductor embedded in it when charged to a given potential. The simplest method of determiningit numerically is, therefore, that adopted by Faraday. 4 Table I. — Dielectric Constants (K) of Solids {Kfor Air = i).

LH|l|l|l|lh-J

Substance.

Glass, double extra dense flint,

density 4-5 ....

Glass, light flint, density 3-2 Glass, hard crown, density 2-485

Sulphur

Ebonite

India-rubber, pure brown . India-rubber, vulcanized, grey Gutta-percha

Paraffin

Shellac

Mica

Quartz — •

along optic axis perp. to optic axis

Ice at -23 . . . .

K.

72 61

24

o

94

05

15

21

86

12

69

462

977

32

29

99 95 74 04 64 00 98 97

4-55 4-49 78-0

Authority.

J. Hopkinson

M. Faraday

Coullner

L. Boltzmann

P. J. Curie

P. R. Blondlot

Rosetti

Boltzmann

Schiller

Elsas

Schiller

I? J. E. H. Gordon Gibson and Barclay Boltzmann J. Hopkinson Gordon Wallner Gordon

A. A. Winkelmann I. Klemencic P. J. Curie E. M. L. Bouty Elsas

P. J. Curie P. J. Curie Bouty

3 See Fleming, Handbook for the Electrical Laboratory, vol. ii. p. 130.

4 Faraday, Experimental Researches on Electricity, vol. i. § 1252. For a very complete set of tables of dielectric constants of solids, liquids and gases see A. Winkelmann, Handbuch der Physik, vol. iv.' pp. 98-148 (Breslau, 1905); also see Landolt and Bernstein's Tables of Physical Constants (Berlin, 1894).

He constructed two equal condensers, each consisting of a metal ball enclosed in a hollow metal sphere, and he provided also certain hemispherical shells of shellac, sulphur, glass, resin, &c, which he could so place in one condenser between the ball and enclosing sphere that it formed a condenser with solid dielectric. He then determined the ratio of the capacities of the two con- densers, one with air and the other with the solid dielectric. This gave the dielectric constant K of the material. Taking the dielectric constant of air as unity he obtained the fol- lowing values, for shellac K = 2-0, glass K = 1-76, and sulphur K. = 2-24.

Since Faraday's time, by improved methods, but depending essentially upon the same principles, an enormous number of

determinations of the dielectric constants of various insulators, solid, liquid and gaseous, have been made (see tables I., II., III. and IV.). There are very considerable differences between the values assigned by different observers, sometimes no doubt due to differences in method, but in most cases unquestionably depending on variations in the quality of the specimens examined. The value of the dielectric constant is greatly affected by the temperature and the frequency of the applied electric force.

Table II. — Dielectric Constant (K)

of Liquids.

Liquid.

K.

Authority.

Water at 17 „ „ 25 ,, „ 25-

Olive oil

Castor oil

Turpentine

Petroleum

Ethyl alcoho Ethyl ether

Acetic acid

C. . C. .

3°C.

at 25 C

8o-88

757 78-87 3-16 478 2-15 2-23 2-072 2-07 257 4-57 4-8

97

F. Heerwagen E. B. Rosa Franke Hopkinson

P. A.'silow

Hopkinson

Silow

Hopkinson

Rosa

Doule

Bouty

Franke

Table III. — Dielectric Constant of some Bodies at a very low Temperature (— 185° C.) {Fleming and Dewar).

Substance.

Water

Formic acid . Glycerine. Methyl alcohol Nitrobenzene . Ethyl alcohol . Acetone . Ethyl nitrate Amyl alcohol Aniline Castor oil Ethyl ether

K

at 15 C.

80

62

56

34

32

25

21-85

177

16

7-5

478

4-25

K

at-i85°C.

2-4 to 2-9

2-41

3‘2

3-13

2-6

3’i

2-62

2-73

2-l 4

2-92 2-19

2-31

The above determinations at low temperature were made with either a steady or a slowly alternating electric force applied a hundred times a second. They show that the dielectric constant of a liquid generally undergoes great reduction in value when the liquid is frozen and reduced to a low temperature. 1

The dielectric constants of gases have been determined by L. Boltzmann and I. Klemencic as follows: —

1 See the following papers by J. A. Fleming and James Dewar on dielectric constants at low temperatures: ” On the Dielectric Constant of Liquid Oxygen and Liquid Air,” Proc. Roy. Soc, 1897, 60, p. 360; ” Note on the Dielectric Constant of Ice and Alcohol at very low Temperatures,” ib., 1897, 61, p. 2; ” On the Dielectric Constants of Pure Ice, Glycerine, Nitrobenzol and Ethylene Di- bromide at and above the Temperature of Liquid Air,” id. ib. p. 316; ” On the Dielectric Constant of Certain Frozen Electrolytes at and above the

Temperature of Liquid Air," id. ib. p. 299 — this paper describes the cone condenser and methods used; " Further Observations on the Dielectric Constantˆ of Frozen Electrolytes at and above the Temperature of Liquid Air," id. ib. p. 381 ; " The Dielectric Constants of Certain Organic Bodies at and below the Temperature of Liquid Air," id. ib. p. 358; "On the Dielectric Constants of Metallic Oxides dissolved or suspended in Ice cooled to the Temperature of Liquid Air," id. ib. p. 368.

Table IV.- — Dielectric Constants (K) of Gases at 15° C. and 760 mm.

Vacuum = 1 .

Gas.

Air . . . . Hydrogen . Carbon dioxide Carbon monoxide Nitrous oxide . Ethylene . Marsh gas (methane) Carbon bisulphide Sulphur dioxide Ether . ._ . Ethyl chloride Ethyl bromide

Dielectric

Constant

K.

1-000590

1-000264

1 -000946

1-000690

1-000994

1-001312

1-000944

1-002900

1-00954

1-00744

1-01552

1-01546

VK.

1-000295 1-000132 1-000475 1 -000345 1 -000497 1 -000656 1 -000478 1-001450

1 •004770 1 •003720

1-007760 1-007730

Optical

Refractive

Index,

1 -000293

1-000139

1-000454

1-000335

1-000516

1-000720

1-000442

1-001478

1-000703

1-00154

1-001174

I-OOI22

In general the dielectric constant is reduced with decrease of temperature towards a certain limiting value it would attain at the absolute zero. This variation, however, is not always linear. In some cases there is a very sudden drop at or below a certain temperature to a much lower value, and above and below the point the temperature variation is small. There is also a large difference in most cases between the value for a steadily applied electric force and

a rapidly reversed or intermittent force — in the last case a decrease with increase of frequency. Maxwell (Elec. and Magn. vol. ii. § 788) showed that the square root of the dielectric constant should be the same number as the refractive index for waves of the same frequency (see Electric Waves). There are very few substances, however, for which the optical refractive index has the same value as K for steady or slowly varying electric force, on account of the great variation of the value of K with frequency.

There is a close analogy between the variation of dielectric constant of an insulator with electric force frequency and that of the rigidity or stiffness of an elastic body with the frequency of applied mechanical stress. Thus pitch is a soft and yielding body under steady stress, but a bar of pitch if struck gives a musical note, which shows that it vibrates and is therefore stiff or elastic for high frequency stress.

Residual Charges in Dielectrics. — In close connexion with this lies the phenomenon of residual charge in dielectrics. 2 If a glass Leyden jar is charged and then discharged and allowed to stand awhile, a second discharge can be obtained from it, and in like manner a third, and so on. The reappearance of the residual charge is promoted by tapping the glass. It has been shown that this behaviour of dielectrics can be imitated by a mechanical model consisting of a series of perforated pistons placed in a tube of oil with spiral springs between each piston. 3 If the pistons are depressed and then released, and then the upper piston fixed awhile, a second discharge can be obtained from it, and the mechanical stress-strain diagram of the model is closely similar to the discharge curve of a dielectric. R. H. A. Kohlrausch called attention to the close analogy between residual charge and the elastic recovery of strained bodies such as twisted wire or glass threads. If a charged condenser is suddenly discharged and then insulated, the reappearance of a potential difference between its coatings is analogous to the reappearance of a torque in the case of a glass fibre which has been twisted, released suddenly, and then gripped again at the ends.

For further information on the qualities of dielectrics the reader is referred to the following sources: — J. Hopkinson, " On the Residual Charge of the Leyden Jar," Phil. Trans., 1876, 166 [ii.], p. 489, where it is shown that tapping the glass of a Leyden jar permits the reappearance of the residual charge; " On the Residual Charge of

- See Faraday, Experimental Researches, vol. i. § 1245; R. H. A. Kohlrausch, Pogg. Ann., 1854, 91; see also MaxVell, Electricity and

Magnetism, vol. i. § 327, who shows that a composite or stratified dielectric composed of layers of materials of different dielectric constants and resistivities would exhibit the property of residual charge.

3 Fleming and Ashton, " On a Model which imitates the behaviour of Dielectrics." Phil. Mag., 1901 [6], 2, p. 228.

the Leyden Jar," ib. 167 [ii.], P- 599. containing many valuable observations on the residual charge of Leyden jars; W. E. Ayrton and J. Perry, " A Preliminary Account of the Reduction of Observa- tions on Strained Material, Leyden Jars and Voltameters," Proc. Roy. Soc, 1880, 30, p. 411, showing experiments on residual charge of condensers and a comparison between the behaviour of dielectrics and glass fibres under torsion. In connexion with this paper the reader may also be referred to one by L. Boltzmann, " Zur Theorie der elastischen Nachwirkung," Wien. Acad. Sitz.-Ber., 1874, 70.

Distribution of Electricity on Conductors. — We now proceed to consider in more detail the laws which govern the distribution of electricity at rest upon conductors. It has been shown above that the potential due to a charge of q units placed on a very small sphere, commonly called a point-charge, at any distance x is g/x. The mathematical importance of this function called the potential is that it is a scalar quantity, and the potential at any. point due to any number of point charges q lt g 2 , 2s, &c, distributed in any manner, is the sum of them separately, or

*2 1 /*i+?2/*2+2 3 /*3+&c.=2(2/*)=V_ _ (17),*

where Xi, x 2 , x 3 , &c, are the distances of the respective point charges from the point in question at which the total potential is required. The resultant electric force E at that point is then obtained by differentiating V, since E = -dV/dx, and E is in the direction in which V diminishes fastest. In any case, therefore, in which we can sum up the elementary potentials at any point we can calculate the resultant electric force at the same point.

We may describe, through all the points in an electric field which have the same potential, surfaces called equipotential surfaces, and these will be everywhere perpendicular or orthogonal to the lines of electric force. Let us assume the field divided up into tubes of electric

force as already explained, and these cut normally by equipotential surfaces. We can then establish some important properties of these tubes and surfaces. At each point in the field the electric force can have but one resultant value. Hence the equipotential surfaces cannot cut each other. Let us suppose any other surface described in the electric field so as to cut the closely compacted tubes. At each point on this surface the resultant force has a certain value, and a certain direction inclined at an angle 9 to the normal to the selected surface at that point. Let dS be an element of the surface. Then the quantity E cos 8dS is the product of the normal component of the force and an element of the surface, and if this is summed up all over the surface we have the total electric flux or induction through the surface, or the surface integral of the normal force mathematically expressed by fE cos 9dS, provided that the dielectric constant of the medium is unity.

We have then a very important theorem as follows: — If any closed surface be described in an electric field which wholly encloses or wholly excludes electrified bodies, then the total flux through this surface is equal to 411- – times the total quantity of electricity within it. 1 This is commonly called Stokes's theorem. The proof is as follows: — Consider any point-charge E of electricity included in any surface S, S, S (see fig. 3), and describe through it as centre a cone of small solid angle dm cutting out of the enclosing surface in two small areas dS and d$' at distances x and x' . Then the electric force due to the point is' charge q at distance x is q/x, and the resolved part normal to the element of surface dS is q cos A/ 2 . The normal sec- tion of the cone at that point is equal to dS cosS, and the solid angle dec is equal to dS cosB/x 2 . Hence the flux through dS is qda. Accordingly, since the total solid angle round a point is 4-71-, it follows that the total flux through the closed surface due to the single point charge q is 47rg, and what is true for one point charge is true for any collection forming a total charge Q of any form. Hence the total electric flux due to a charge Q through an enclosing surface is 4?rQ, and therefore is zero through one enclosing no electricity.*

Stokes's theorem becomes an obvious truism if applied to an incompressible fluid. Let a source of fluid be a point from which an incompressible fluid is emitted in all directions. Close to the source the stream lines will be radial lines. Let a very small sphere be described round the source, and let the strength of the source be defined as the total flow per second through the surface of this small sphere. Then if we have any number of sources enclosed by any surface, the total flow per second through this surface is equal to the total strengths of all the sources. If, however, we defined the strength

of the source by the statement that the strength divided

Fig. 3.

1 The beginner is often puzzled by the constant appearance of the factor 4ir in electrical theorems. It arises from the manner in which the unit quantity of electricity is defined. The electric force due to a point-charge q at a distance r is defined to be q/r 2 , and the total flux or induction through the sphere of radius r is therefore 471-2. If, however, the unit point charge were defined to be that which produces a unit of electric flux through a circumscribing spherical surface or the electric force at distance r defined to be 1/471T 2 , many theorems would be enunciated in simpler forms.

by the square of the distance gives the velocity of the liquid at that point, then the total flux through any enclosing surface would be 4x times the strengths of all the sources enclosed. To every pro- position in electrostatics there is thus a corresponding one in the hydrokinetic theory of incompressible liquids.

Let us apply the above theorem to the case of a small parallel-epipedon or rectangular prism having sides dx, dy, dz respectively, its centre having co-ordinates (x, y, a). Its angular points have then co-ordinates (x%dx, y*My, z*|iz). Let this rectangular prism be supposed to be wholly filled up with electricity of density p; then the total quantity in it is pdxdydz. Consider the two faces perpendicular to the #-axis. Let V be the potential at the centre of the prism, then the normal forces on the two faces of area dy.dx are respectively*

IdV.i d 2 V, \„ nA /dV 1 – . , ” U+J-^^j and \Tx—2dx^ dx

)•

and similar expressions for the normal forces to the other pairs of faces dx.dy, dz.dx. Hence, multiplying these normal forces by the areas of the corresponding faces, we have the total flux parallel to the x-axis given by -(d 2 V/dx 2)dxdydz, and similar expressions for the other sides. Hence the total flux is

-(^ 2+ w 2+ iS) dxdydz ‘

and by the previous theorem this must be equal to ^irpdxdydz.

it „ d 2 V ,d 2 V ,

Hence -+_ + ^ ?+4 , p = (l8).

This celebrated equation was first given by S. D. Poisson, although previously demonstrated by Laplace for the case when p = o. It defines the condition which must be fulfilled by the potential at any and every point in an electric field, through which p is finite and the electric force continuous. It may be looked upon as an equation to determine p when V is given or vice versa. An exactly similar expression holds good in hydrokinetics, provided that for the electric potential we substitute velocity potential, and for the electric force the velocity of the liquid.

The Poisson equation cannot, however, be applied in the above form to a region which is partly within and partly without an electrified conductor, because then the electric force undergoes a sudden change in value from zero to a finite value, in passing out- wards through the bounding surface of the conductor. We can, however, obtain another equation called the " surface characteristic equation " as follows: — Suppose a very small area dS described on a conductor having a surface density of electrification a. Then let a small, very short cylinder be described of which dS is a section, and the generating lines are normal to the surface. Let Vi and V 2 be the potentials at points just outside and inside the surface dS, and let «i and « 2 be the normals to the surface dS drawn outwards and inwards; then -dVi/dni and dVidrw are the normal com ponents of the force over the ends of the imaginary small cylinder. But the force perpendicular to the curved surface of this cylinder is everywhere zero. Hence the total flux through the surface considered is -\(dVi/ dni) + (dVi/dn2)}dS, and this by a previous theorem must be equal to 4irerdS, or the total included electric quantity. Hence we have the surface characteristic equation, 2

(dVi/d»i) + (dV 2 /(f»2)+4T

Let us apply these theorems to a portion of a tube of electric force. Let the part selected not include any charged surface. Then since the generating lines of the tube are lines of force, the component of the electric force perpendicular to the curved surface of the tube is everywhere zero. But the electric force is normal to the ends of the tube. Hence if dS and dS' are the areas of the ends, and +E and -E' the oppositely directed electric forces at the ends of the tube, the surface integral of normal force on the flux over the tube is EdS- E'dS' (20), <

and this by the theorem already given is equal to zero, since the tube

includes no electricity. Hence the characteristic quality of a tube of electric force is that its section is everywhere inversely as the electric force at that point. A tube so chosen that EdS for one section has a value unity, is called a unit tube, since the product of force and section is then everywhere unity for the same tube.

In the next place apply the surface characteristic equation to any point on a charged conductor at which the surface density is a. The electric force outward from that point is -dV/dn, where dn is a distance measured along the outwardly drawn normal, and the force within the surface is zero. Hence we have

-dV/dn = 47r

*The above is a statement of Coulomb's law, that the electric fores at the surface of a conductor is proportional to the surface density of the charge at that point and equal to 4-tt times the density**

2 See Maxwell, Electricity and Magnetism, vol. i. § 78b (2nd ed.).

3 Id. ib. vol. i. § 80. Coulomb proved the proportionality of electric surface force to density, but the above numerical relation E=47rff was first established by Poisson.

If we define the positive direction along a tube o'f electric force as the direction in which a small body charged with positive elec- tricity would tend to move, we can summarize the above facts in a simple form by saying that, if we have any closed surface described in any manner in an electric field, the excess of the number of unit tubes which leave the surface over those which enter it is equal to ˆir-times the algebraic sum of all the electricity included within the surface.

Every tube of electric force must therefore begin and end on electrified surfaces of opposite sign, and the quantities of positive and negative electricity on its two ends are equal, since the force E just outside an electrified surface is normal to it and equal to JCV 2 or by iQ 2 /C.

If a is the surface density and dS an element of surface, then yVdS is the whole charge, and hence i/Vo-dS is the expression for the energy of charge of a conductor.

We can deduce a remarkable expression for the energy stored up in an electric field containing electrified bodies as follows : l Let V denote the potential at any point in the field. Consider the integral

w-fJ//l(I)'+(f)'+®'l"^-<">

where the integration extends throughout the whole space unoccupied by conductors. We have by partial integration

and two similar equations in y and z. Hence

*fc/;/i© i +®) , +(S) , i***-*

where dV/dn means differentiation along the normal, and V stands

Let E be the resultant electric force

d 2 d 2 d 1 for the operator ^+^4-^.

at any point in the field. Then bearing in mind that a=(i/4ir)dV/dn, and p = -(i/4tt)vV, we have finally

The first term on the right hand side expresses the energy of the surface electrification of the conductors in the field, and the second the energy of volume density (if any). Accordingly the term on the left hand side gives us the whole energy in the field.

Suppose that the dielectric has a constant K, then we must'multiply both sides by K and the expression for the energy per unit of volume of the field is equivalent to JDE where D is the displacement or polarization in the dielectric.

Furthermore it can be shown by the application of the calculus of variations that the condition for a minimum value of the function W, is that vV = o. Hence that distribution of potential which is neces-

1 See Maxwell, Electricity and Magnetism, vol. i. § 99a (3rd ed., 1892), where the expression in question is deduced as a corollary of Green's theorem.

sary to satisfy Laplace's equation is also one which makes the potential energy a minimum and therefore the energy stable. Thus the actual distribution of electricity on the conductor in the field is not merely a stable distribution, it is the only possible stable distribution.

Method of Electrical Images. — A very powerful method of attacking

problems in electrical distribution was first made known by Lord Kelvin in 1845 and is described as the method of electrical images. 2 By older mathematical methods it had only been possible to predict in a few simple cases the distribution of electricity at rest on conductors of various forms. The notion of an electrical image may be easily grasped by the following illustration : Let there be at A (see fig. 5) a point-charge of positive electricity f q .q and an infinite conducting plate PO, <2 shown in section, connected to earth and B therefore at zero potential. Then the charge at A together with the induced surface charge on the plate makes a cer tain field of electric force on the left of the plate PQ, which is a zero equipotential surface. If we remove the plate, and Fig. 5.

yet by any means can keep the identical surface occupied by it a plane of zero potential, the boundary conditions will remain the same, and therefore the field of force to the left of PO will remain unaltered. This can be done by placing at B an equal negative point-charge -q in the place which would be occupied by the optical image of A if PO were a mirror, that is, let -g be placed at B, so that the distance BO is equal to the distance AO, whilst AOB is at right angles to PO. Then the potential at any point P in this ideal plane PO is equal to g/AP-g/BP = 0, whilst the resultant force at P due to the two point charges is 2gAO/AP 3 , and is parallel to AB or normal to PO. Hence if we remove the charge -q at B and distribute electricity over the surface PO with a surface density

We (find a precisely analogous effect in optics which justifies the term " electrical image." Suppose a room lit by a single candle. There is everywhere a certain illumination due to it. Place across the room a plane mirror. All the space behind the mirror will become dark, and all the space in front of the mirror will acquire an exalted illumination. Whatever this increased illumination may be, it can be precisely imitated by removing the mirror and placing a second lighted candle at the place occupied by the optical image of the first candle in the mirror, that is, as far behind the plane as the first candle was in front. So the potential distribution in the space due to the electric point-charge +q as A together with -q at B is the same as that due to +q at A and the negative induced charge erected on the infinite plane (earthed) metal sheet placed half-way between A and B.

The same reasoning can be applied to determine the electrical image of a point-charge of positive electricity in a spherical surface, and therefore the distribution of in- duced electricity over a metal sphere connected to earth produced by a point-charge near it. Let +g be any

positive point-charge placed at a point A outside a sphere (fig. 6) of radius r, and centre at C, and let P be any point on it. Let CA = d. Take a point B in CA such that CB-CA = r 2 , or CB = r 2 /

PA

rq

‘ d

1

PB :

(24).

Another equipotential surface is evidently a very small sphere described round A. The resultant force due to these two point-charges must then be in the direction CP,and its value E is the vector sum of the two forces along AP and BP due to the two point-charges. It is not difficult to show that

E=-(d 2 -r 2)g/rAP 3 . . . (25), in other words, the force at P is inversely as the cube of the distance from A. Suppose then we remove the negative point-charge, and let the sphere be supposed to become conductive and be connected to earth. If we make a distribution of negative electricity over it, which has a density o- varying according to the law

f

2 See Lord Kelvin’s Papers on Electrostatics and Magnetism, p. 144.

exactly similar to that which would exist if the sphere were removed and a negative point charge —qrld were placed at B. Hence this charge is the electrical image of the charge +g at A in the spherical surface.

We may generalize these statements in the following theorem, which is an important deduction from a wider theorem due to G. Green. Suppose that we have any distribution of electricity at rest over conductors, and that we know the potential at all points and consequently the level or equipotential surfaces. Take any equi-

potential surface enclosing the whole of the electricity, and suppose this to become an actual sheet of metal connected to the earth. It is then a zero potential surface, and every point outside is at zero potential as far as concerns the electric charge on the conductors inside. Then if U is the potential outside the surface due to this electric charge inside alone, and V that due to the opposite charge it induces on the inside of the metal surface, we must have U+V = or U= — V at all points outside the earthed metal surface. There- fore, whatever may be the distribution of electric force produced by the charges inside taken alone, it can be exactly imitated for all space outside the metal surface if we suppose the inside charge removed and a distribution of electricity of the same sign made over the metal surface such that its density follows the law

where d\J/dn is the electric force at that point on the closed equi-potential surface considered, due to the original charge alone.

Bibliography. — For further developments of the subject we must refer the reader to the numerous excellent treatises on electrostatics now available. The student will find it to be a great advantage to read through Faraday's three volumes entitled Experimental Re-searches on Electricity, as soon as he has mastered some modern elementary book giving in compact form a general account of electrical phenomena. For this purpose he may select from the following books: J. Clerk Maxwell, Elementary Treatise on Elec-tricity (Oxford, 1881); J. J. Thomson, Elements of the Mathematical Theory of Electricity and Magnetism (Cambridge, 1895); J. D. Everett, Electricity, founded on part iii. of Deschanel's Natural Philosophy (London, 1901); G. C. Foster and A. W. Porter, Ele-mentary Treatise on Electricity and Magnetism (London, 1903) ; S. P. Thompson, Elementary Lessons on Electricity and Magnetism (London,

1903)-

When these elementary books have been digested, the advanced student may proceed to study the following: J. Clerk Maxwell, A Treatise on Electricity and Magnetism (1st ed., Oxford, 1873; 2nd ed. by W. D. Niven, 1881; 3rd ed. by J. J. Thomson, 1892); Joubert and Mascart, Electricity and Magnetism, English translation by E. Atkinson (London, 1883); Watson and Burbury, The Mathe- matical Theory of Electricity and Magnetism (Oxford, 1885) ; A. Gray, A Treatise on Magnetism and Electricity (London, 1898). In the collected Scientific Papers of Lord Kelvin (3 vols., Cambridge,

1882), of James Clerk Maxwell (2 vols., Cambridge, 1890), and of Lord Rayleigh (4 vols., Cambridge, 1903), the advanced student will find the means for studying the historical development of electrical knowledge as it has been evolved from the minds of some of the master workers of the 19th century. (J. A. F.)

ELECTROTHERAPEUTICS, a general term for the use of

electricity in therapeutics, i.e. in the alleviation and cure of disease. Before the different forms of medical treatment are dealt with, a few points in connexion with the machines and currents, of special interest to the medical reader, must first be given.

Faradism. — For the battery required either for faradism or galvanism, cells of the Leclanche type are the most satisfactory. Being dry they can be carried in any position, are lighter, and there is no trouble from the erosion of wires and binding screws, such as so often results from wet cells. The best method of producing a smooth current in the secondary coil is for the interruptor hammer to vibrate directly against the iron core of the primary coil. For this it is best that the interruptor be made of a piece of steel spring, as a high rate of interruption can then be maintained, with a fairly smooth current in the secondary coil. This form of interruptor necessitates that the iron core be fixed, and variation in the primary induced current is arranged for by slipping a brass tube more or less over the iron core, thus cutting off the magnetic field from the primary coil. The secondary current (that obtained from the secondary coil) can be varied by keeping the secondary coil permanently fixed over the primary and varying the strength of the primary current. Where, as suggested above, the iron core is fixed, the primary and secondary induced currents will be at their strongest when the brass tube is completely withdrawn. As there is no simple means of measur- ing the strength of the faradic current, it is best to start with a very weak current, testing it on the muscles of one's own hand

until these begin to contract and a definite sensory effect is produced; the current can then be applied to the part, being strengthened only very gradually.

Galvanism. — For treatment by galvanism a large battery is needed, the simplest form being known as a " patient's battery," consisting of a variable number of dry cells arranged in series. The cells used are those of Leclanche, with E.M.F. (or voltage) of 1-5 and an internal resistance of -3 ohm. Thus the exact strength of the current is known; the number of cells usually employed is 24, and when new give an

E.M.F. of about 36 volts.

By using the formula C = g> where E is the voltage of the battery, R the total resistance of battery, electrodes and the patient's skin and tissues, and C the current in amperes, the number of cells required for any particular current can be worked out. The resistance of the patient's skin must be made as low as possible by thoroughly wetting both skin and electrodes with sodium bicarbonate solution, and keeping the electrodes in very close apposition to the skin. A galvanometer is always fitted to the battery, usually of the d'Arsonval type, with a shunt by means of which, on turning a screw, nine-tenths of the inducing current can be short-circuited away, and the solenoid only influenced by one-tenth of the current which is being used on the patient. In districts where electric power is available the continuous current can be used by means of a switchboard. A current of much value for electrotherapeutic purposes is the sinusoidal current, by which is meant an alternating current whose curve of electromotive force, in both positive and negative phase, varies constantly and smoothly in what is known as the sine curve. In those districts supplied by an alternating current, the sinusoidal current can be obtained from the mains by passing it through various transformers, but where the main supply is the direct or constant current, a motor transformer is needed.

Static Electricity. — For treatment by static electricity the Wimshurst type of machine is the one most generally used. A number of electrodes are required; thus for the application of sparks a brass ball and brass roller electrode, for the " breeze" a single point and a multiple point electrode, and another multiple point electrode in the form of a metal cap that can be placed over the patient's head. The polarity of the machine must always be tested, as either knob may become positive or negative, though the polarity rarely changes when once the machine is in action. The oldest method of subjecting a patient to electric influence is that in which static electricity is employed. The patient is insulated on a suitable platform and treated by means of charges and discharges from an electrical machine. The effect is to increase the regularity and frequency of the pulse, raise the blood pressure and increase the action of the skin. The nervous system is quieted, sleep being promoted, the patient often be- coming drowsy during the application. If while the patient is being treated a point electrode is brought towards him he feels the sensation of a wind blowing from that point; this is an electric breeze or brush discharge. The breeze is negative if the patient is positively charged and vice versa. The " breeze discharge " treatment is especially valuable in subduing pain of the superficial cutaneous nerves, and

also in the treatment of chronic indolent ulcers. Quite recently this form of treatment has been applied with much success to various skin lesions — psoriasis, eczema and pruritus. Static electricity is also utilized for medical purposes by means of " sparks," which are adminis- tered with a ball electrode, the result being a sudden muscular contraction at the point of application. The electrode must be rapidly withdrawn before a second spark has time to leap across, as this is a severe form of treatment and must be administered slowly. It is mainly employed for muscular stimulation, and the contractions resulting from spark stimulation can be produced in cases of nerve injury and degeneration, even when the muscles have lost their reaction to faradism. The sensory stimulation of this form of treatment is also strong, and is useful in hysterical anaesthesia and functional paralysis. Where a milder sensory stimulation is required friction can be used, the electrode being in the form of a metal roller which is moved rapidly outside the

patient's clothing over the spine or other part to be treated. The clothing must be dry and of wool, and each additional woollen layer intensifies the effect.

Another method of employing electricity at high potential is by the employment of high frequency currents. There are two methods of application: that in which brush discharges are made use of, with undoubtedly good effects in many of the diseases affecting the surface of the body, and that in which the currents of the solenoid are made to traverse the patient directly. The physiological value of the latter method is not certain, though one point of interest in connexion with it is that whereas statical applications raise the blood pressure, high frequency applications lower it. It has been used in the case of old people with arterio- sclerosis, and the reduction of blood pressure produced is said to have shown considerable permanence.

The Faradic Current.— G. B. Duchenne was the first physician to make use of the induced current for treatment, and the term " faradization " is supposed to be due to him. But in his day the differences between the two currents available, the primary and the secondary, were not worked out, and they were used somewhat indiscriminately. Nowadays it is generally accepted that the primary current should be used for the stimulation of deep-lying organs, as stomach and intestines, &c, while the secondary current is employed

for stimulation of the limb muscles and the cutaneous sensory nerves. The faradic current is also used as a means of diagnosis for neuro-muscular conditions. When the interrupted current is used to stimulate the skin over a motor nerve, all the muscles supplied by that nerve are thrown into rapid tetanic contraction, the contraction both beginning and ceasing sharply and suddenly with the current. This is the mormal reaction of the nerve to faradism. If the muscle be wasted from disuse or some local cause unconnected with its nerve-supply, the contraction is smaller, and both arises and relaxes more slowly. But if the lesion lies in the nerve itself, as in Bell's palsy, the muscles no longer show any response when the nerve is stimulated, and this is known as the reaction of degeneration in the nerve. It is usually preceded by a condition of hyperexcitability. These results are applied to distinguish between functional paralysis and that due to some organic lesion, as in the former case the reaction of faradism will be as brisk as usual. Also at the beginning of most cases of infantile paralysis many more groups of muscles appear to be affected than ultimately prove to be, and faradism enables the physician to distinguish between those groups of muscles that are per- manently paralysed owing to the destruction of their trophic centre, and those muscles which are only temporarily inhibited from shock, and which with proper treatment will later regain their full power. In the testing of muscles electrically that point on the skin which on stimulation gives the maximum contraction for that muscle is known as the " motor point " for that muscle. It usually corresponds to the entry of the motor nerve. Faradic treatment may be employed in the weakness and emaciation depending on any long illness, rickets, anaemia, &c. For these cases it is best to use the electric bath, the patient being placed in warm water, and the two electrodes, one at the patient's back and the other at his feet, being connected with the secondary coil. The patient's general metabolism is stimu- lated, he eats and sleeps better and soon begins to put on weight. This is especially beneficial in severe cases of rickets. In the weakness and emaciation due to neurasthenia, especially in those cases being treated by the Weir Mitchell method (isolation, absolute confinement to bed, massage and overfeeding), a similar faradic bath is a very helpful adjunct. In tabes dorsalis faradic treatment will often diminish the anaesthesia and numbness in the legs, with resulting benefit to the ataxy. Perhaps the most beneficial use of the faradic current is in the treatment of chronic constipation — especially that so frequently met with in young women and due to deficient muscular power of the intestinal walls. In long-standing cases the large intestine becomes permanently dilated, and its muscular fibres so atten- uated as to have no power over the

intestinal contents. But faradism causes contraction at the point of stimulation, and

the peristaltic wave thus started slowly progresses along the bowel. All that is needed is a special electrode for introduction into the bowel and an ordinary roller electrode. The rectal electrode consists of a 6-inch wire bearing at one end a small metal knob and fitted at the other into a metal cup which screws into the handle of the electrode. The only part exposed is the metallic knob; the rest is coated with some insulating material. The patient reclines on a couch on his back, the rectal electrode is connected, and having been vaselined is passed some, three inches into the rectum. A current is started with the secondary coil in such a position as to give only an extremely weak current. The roller electrode is then wetted with hot water and applied to the front of the abdomen. At first the patient should feel nothing, but the current should slowly be increased until a faint response is perceptible from the abdominal muscles. This gives the required strength, and the roller electrode, pressed well into the abdominal wall, should very slowly be moved along the course of the large intestine beginning at the right iliac fossa. Thus a combination of massage and faradic current is obtained, and the results are particularly satisfactory. Treat- ment should be given on alternate days immediately after breakfast, and should be persevered with for six or eight weeks. The patient can be taught to administer it to himself.

The Galvanic, Continuous or Direct Current. — In using the galvanic or direct current the electrode must be covered with padded webbing or some other absorbent material, the metal of the electrode never being allowed to come in contact with the skin. The padding by retaining moisture helps to make good contact, and also helps to guard against burning the skin. But when a continuous current of 3 am. or more is passed for more than 5 min. the electrodes must be raised periodically and the skin inspected. If the current be too strong or applied for too long a time, small blisters are raised which break and are very troublesome to heal. Nor does the patient always feel much pain when this occurs. Also the electrodes must be remoistened every five or six minutes, as they soon become dry, and the skin will then be burnt. It is best to use a solution of sodium bi-carbonate. Again, the danger of burning the skin depends on the density of the current per sq. in. of electrode, so that a strong current through a small electrode will burn the skin, whereas the same current through a larger electrode will produce a beneficial effect. If the patient be immersed up to his neck in an electric bath, much stronger currents can be passed without causing either pain or injury,

as in this case the whole area of the skin in contact with the water acts as an electrode. In passing the current it must be remembered that the negative electrode or kathode is the more painful of the two, and its action more stimulating than the positive electrode or anode, which is sedative. If a muscle be stimulated over its motor point, it will contract with a sharp twitch and then become quiescent. With normal muscle the KCC (kathodal closure contraction) is stronger than that produced by the closure of the current at the anode ACC (anodal closure contraction). And if the muscje be normal the opening contraction KOC and AOC are not seen. When a galvanic current is passed along a nerve its excitability is increased at the kathode and diminished at the anode. The increased excitability at the kathode is katelectrotonus, and the lowered excitability at the anode anelectrotonus. But since in a patient the electrode cannot be applied directly to the nerve, the lines of force from the electrode pass into the nerve both in an upward and downward direction, and hence there are two poles produced by each electrode. If the current be suddenly reversed, so that what was the anode becomes the kathode, a stonger contraction is obtained than by simply making and breaking the current. To avoid the four poles on the nerve to be tested, it is found most satisfactory to have one electrode placed at some distance, on the back or chest, not on the same limb.

As explained above, when the nerve supplying a muscle is diseased it no longer responds to the faradic current. On further testing this with the galvanic or continuous current it responds, but the contraction is not brisk but begins slowly and relaxes

slowly, though the contraction as a whole may be larger than that of a normal muscle. This excessive contraction is known as hyperexcitability to galvanism. This form of contraction is that obtained when the muscle fibre itself is stimulated. Again, whereas in normal muscle KCOACC, when the nerve is degenerated KCC = ACC or ACOKCC. Also in the more severe forms of nerve injury tetanic contractions may be set up in the paralysed muscles, by closure of the current either at the anode or kathode. These charges are known as the reaction of degenera- tion or R D, and are of great value in diagnosis. They occur only after sudden or acute damage to the nerve cells of the anterior horn of the spinal cord, or to the motor nerve fibres proceeding from these cells. Thus RD is present in infantile paralysis, acute neuritis, &c, but absent in progessive

muscular atrophy where the wasting of nerve and muscle takes place extremely slowly. The reaction of degeneration in the nerve is shown by disappearance of reaction to either kind of current, preceded for some days by hyperexcitability to either current. Where the muscle wasting is due to a lesion in the muscle alone, as in ischaemic myositis (usually due to injury from tight bandaging or badly applied splints), no reaction of degeneration is found; the only change is a loss of power in the contraction. If the damage to the anterior horn cells be only very slight, there may only be partial RD, and the prognosis is given according to the extent of RD. From this account it is clear that the greatest value of the continuous current lies in its use in diagnosis. But it is also applied extremely successfully, in combination with massage, to cases of infantile paralysis. Wrist drop from lead poisoning and lead neuritis of all kinds, reflex muscular atrophy and the muscular wasting of hemiplegia, are all benefited by the continuous current; the severe pain of sciatica, and the inflammation of the nerve sheath in these cases, can be arrested more quickly by galvanic treatment than in any other way. Nearly all forms of neuritis, both of the cranial and. other nerves, are best treated by the continuous current. The action in all cases is to stimulate the natural tendency to repair, very largely by improving the circulation through the injured parts.

Another effect of an electric current is electrolysis, and the phenomena of electrolytic conduction involve not merely the ionization of the compounds, but also the setting in motion of the ions towards their respective poles. Solutions, which conduct electric currents are called electrolytes, and in the case of the human body the electrolyte is the whole mass of the saline con- stituents in solution throughout the body. When a current is passed through an electrolyte, dissociation into ions takes place, the ions which are freed round the anode being called anions and those which are freed round the kathode being called kations. The anions carry negative charges and are consequently attracted by the positive electricity of the anode. The kations carry positive charges, hence they are repelled by the anode and attracted by the kathode. But a certain number of molecules do not dissociate, and hence in an electrolytic solution there are neutral molecules, anions and kations. The chemical actions, and thus the antiseptic, remedial or toxic effects of electrolytes, are due to the actions of their ions. The phosphides and phos- phates may be taken as examples. Some are extremely toxic, while others are quite harmless. But it is to the phosphorus ion that the toxic or therapeutic effect is due. In the phosphates the phosphorus is part of a complex ion possessing quite different

properties to those of the phosphorus ion of the phosphides. The strikingly different effects of the sulphates and sulphides are due to similar conditions, as also of many other compounds. There are certain solvents, as alcohol, chloroform, glycerin and vaseline which do not dissociate electrolytes, and consequently the latter become inert when mixed with these solvents. These solutions do not conduct electricity, and hence ionic effects are extremely slow. A vaseline ointment containing S % of phenol makes a good dressing for an ulcer of the leg, and produces no irritant effect, but a 5 % aqueous solution may be both caustic and toxic. Since the toxic or therapeutic action of a solution is due to its ions, the action must be proportional to the number of ions in a given volume, that is, the action of an

electrolyte depends on the degree of dissociation. Thus a strong acid is one that is much dissociated, a weak acid one that has undergone but little dissociation and so on. In 1 896-1 897 it was shown that the bactericidal action of salts varies with their degree of dissociation and therefore depends on the concentration of the active ions. In the medical application of these facts it must be remembered that when an ion is introduced into the body by electrolysis, it is propably forced into the actual cellular constituents of the body, whereas the drug administered by one of the usual methods though circulating in the blood may perhaps never gain access to the cell itself. Hence the different effects that have been recorded between a drug administered by the mouth or subcutaneously and the same administered by electro- lysis. Thus a solution of cocaine injected subcutaneously pro- duces quite different effects to that introduced by electrolysis. By the latter method it produces anaesthesia but does not diffuse, and the anaesthesia remains strictly limited to the surface covered by the electrode. It would appear that the ion is never intro- duced into the general circulation but into the cell plasma.

In the technical working of medical electrolysis the most minute precautions are required. The solution of the drug must be made with as pure water as possible, recently distilled. The spongy substance forming the electrode must be free from any trace of electrolytic substances. Hence all materials used must be washed in distilled water. Absorbent cotton answers all requirements and is easily procured. The area of introduction can be exactly circumscribed by cutting a hole in a sheet of adhe- sive plaster which is applied to the skin and on which the electro- lytic electrodes are pressed. The great advantage of electrolytic methods is that it enables general treatment to be replaced by a strictly local treatment, and the cells can be saturated exactly to the degree and depth required. Strong

antiseptics and materials that coagulate albumen cannot be introduced locally by ordinary methods, as the skin is impermeable to them, but by electrolysis they can be introduced to the exact depth required. The local effects of the ions depend on the dosage; thus a feeble dose of the ions of zinc stimulates the growth of hair, but a stronger dose produces the death of the tissue. Naturally the different ions produce different effects. Thus the ions of the alkalis and magnesium are caustic, those of the alkaline earthy metals produce actual mortification of the tissue and so on. According to the ion chosen the effect may be caustic in various degrees, antiseptic, coagulating, producing vascular or nervous changes, &c, &c. And again electrolysis can also be used for extracting from the body such ions as are injurious, as uric and oxalic acid from a patient suffering from gout.

One of the latest advances is the treatment of ankylosed joints by the electrolytic method, the electrolyte used being chloride of sodium, and the marvellous results being attributed to the introduction of the chlorine ions. This sclerolytic property of the current is applicable to all parts of the body accessible to the current. Old cases of rheumatic scleritis, entirely un- affected by the routine treatment of salicylates and iodide, have often cleared up entirely under electrolytic treatment. Cases of chronic iritis with adhesions and old pleural adhesions are also suited for this method of procedure. Certain menstrual troubles of women and also endometritis yield rapidly to electro- lysis with a zinc anode. Before this method of introduction, the zinc salts, though excellent disinfectants, acted only on the surface in consequence of their coagulating action on the albuminoids, but by the electric current, under the influence of a difference of potential, the zinc iron will penetrate to any desired depth. Cases of rodent ulcer unaffected by all other methods of treatment have been cured by electric kataphoresis with zinc ions, and the method is now being applied to the treatment of inoperable malignant tumours. As very strong currents are required for this latter, the patient has first to be anaesthetized by a general anaesthetic. Another direction in which electric ions are being used is that of the induction of local anaesthesia before minor surgical operations. Cocaine is the drug used, the resulting anaesthesia is absolute, and the operation can be made almost bloodless by the admixture of suprarenal extract.

ELECTROTYPING, an application of the art of electroplating (q.v.) to typography (q.v.). In copying engraved plates for printing purposes, copper may be deposited upon the original plate, the surface of which is first rendered slightly dirty, by means of a weak solution of wax in turpentine or otherwise, to prevent adhesion. The reversed plate thus produced is then stripped from the first and used as cathode in its turn, with the result that even the finest lines of the original are faithfully reproduced. The electrolyte commonly contains about ij lb of copper sulphate and § lb of strong sulphuric acid per gallon, and is worked with a current density of about 10 amperes per sq. ft., which should give a thickness of 0-000563 in. of copper per hour. As time is an object, the conditions alluded to in the article on Copper as being favourable to the use of high current densities should be studied, bearing in mind that a tough copper deposit of high quality is essential. Moulds for reproducing plates or art-work are often taken in plaster, beeswax mixed with Venice turpentine, fusible metal, or gutta- percha, and the surface being rendered conductive by powdered black-lead, copper is deposited upon it evenly throughout. For statuary, and " undercut " work generally, an elastic mould — of glue and treacle (80 : 20 parts) — may be used; the mould, when set, is waterproofed by immersion in a solution of potassium bichromate followed by exposure to sunlight, or in some other way. The best results, however, are obtained by taking a wax cast from the elastic mould, and then from this a plaster mould, which may be waterproofed with wax, black-leaded, and used as cathode. In art-work of this nature the principal points to be looked to in depositing are the electrical connexions to the cathode, the shape of the anode (to secure uniformity of deposi- tion), the circulation of the electrolyte, and, in some cases, the means for escape of anode oxygen. Silver electrotyping is occasionally resorted to for special purposes.

ELECTRUM, ELECTRON (Gr. rJXe/crpoe, amber), an alloy of gold and silver in use among the ancients, described by Pliny as containing one part of silver to four of gold. The term is also applied in mineralogy to native argentiferous gold containing from 20 to 50% of silver. In both cases the name is derived from the pale yellow colour of electrum, resembling that of amber.

ELEGIT (Lat. for " he has chosen "), in English law. a judicial writ of execution, given by the Statute of Westminster II. (1285), and so called from the words of the writ, that the plaintiff has chosen (elegit) this mode of satisfaction. Previously to the Statute of Westminster II., a judgment creditor could only have the profits of lands of a debtor in satisfaction of his judg- ment, but not the

possession of the lands themselves. But this statute provided that henceforth it should be in the election of the party having recovered judgment to have a writ of fieri facias (q.v.) unto the sheriff on lands and goods or else all the chattels of the debtor and the one half of his lands until the judgment be satisfied. Since the Bankruptcy Act 1883 the writ of elegit has extended to lands and hereditaments only. (See further Execution.)

ELEGY, a short poem of lamentation or regret, called forth by the decease of a beloved or revered person, or by a general sense of the pathos of mortality. The Greek word iXeytla is of doubtful signification; it is usually interpreted as meaning a mournful or funeral song. But there seems to be no proof that this idea of regret for death entered into the original meaning of eKeytla. The earliest Greek elegies which have come down to us are not funereal, although it is possible that the primitive t\tyda may have been a set of words liturgically used, with music, at a burial. When the elegy appears in surviving Greek literature, we find it dedicated, not to death, but to war and love. Callinus of Ephesus, who flourished in the 7th century, is the earliest elegist of whom we possess fragments. A little later Tyrtaeus was composing his famous elegies in Sparta. Both of these writers were, so far as we know, exclusively war- like and patriotic. On the other hand, the passion of love inspires Mimnermus, whose elegies are the prototypes not only of the later Greek pieces, and of the Latin poems of the school of Tibullus and Propertius, but of a great deal of the formal erotic

poetry of modern Europe. In the 6th century B.C., the elegies of Solon were admired; they are mainly lost. But we possess more of the work of Theognis of Megara than of any other archaic elegist, and in it we can observe the characteristics of Greek elegy best. Here the Dorian spirit of chivalry reaches its highest expression, and war is combined with manly love.

The elegy, in its calm movement, seems to have begun to lose currency when the ecstasy of emotion was more successfully interpreted by the various rhythmic and dithyrambic inventions of the Aeolic lyrists. The elegy, however, rose again to the highest level of merit in Alexandrian times. It was reintroduced by Philetas in the 3rd cent. B.C., and was carried to extreme per- fection by Callimachus. Other later Greek elegists of high reputation were Asclepiades and Euphorion. But it is curious to notice that all the elegies of these poets were of an amatory nature, and that antiquity styled the funeral dirges of Theocritus, Bion and Moschus — which are to us the types of elegy — not elegies at all, but idylls. When the

poets of Rome began their imitative study of Alexandrian models, it was natural that the elegies of writers such as Callimachus should tempt them to immediate imitation. Gallus, whose works are unhappily lost, is known to have produced a great sensation in Rome by pub- lishing his translation of the poems of Euphorion; and he passed on to the composition of erotic elegies of his own, which were the earliest in the Latin language. If we possessed his once- famous Cytheris, we should be able to decide the question of how much Propertius, who is now the leading figure among Roman elegists, owed to the example of Gallus. His brilliantly emotional Cynthia, with its rich and unexampled employment of that alternation of hexameter and pentameter which had now come to be known as the elegiac measure, seems, however, to have settled the type of Latin elegy. Tibullus is always named in conjunction with Propertius, who was his contemporary, although in their style they were violently contrasted. The sweetness of Tibullus was the object of admiration and constant imitation by the Latin poets of the Renaissance, although Propertius has more austerely pleased a later taste. Finally, Ovid wrote elegies of great variety in subject, but all in the same form, and his dexterous easy metre closed the tradition of elegiac poetry among the ancients. What remains in the decline of Latin literature is all founded on a study of those masters of the Golden Age.

When the Renaissance found its way to England, the word " elegy " was introduced by readers of Ovid and Propertius. But from the beginning of the 16th century, it was used in English, as it has been ever since, to describe a funeral song or lament. One of the earliest poems in English which bears the title of elegy is The Complaint of Philomene, which George Gascoigne began in 1562, and printed in 1576. The Daphnaida of Spenser (1591) is an elegy in the strict modern sense, namely a poem of regret pronounced at the obsequies of a particular person. In 1579 Puttenham had defined an elegy as being a song " of long lamentation." With the opening of the 17th century the composition of elegies became universal on every occasion of public or private grief. Dr Johnson's definition, " Elegy, a short poem without points or turns," is singularly inept and careless. By that time (1755) English literature had produced many great elegies, of which the Lycidas of Milton is by far the most illustrious. But even Cowley's on Crashaw, Tickell's on Addison, Pope's on an Unfortunate Lady, those of Quarks, and Dryden, and Donne, should have warned Johnson of his mistake. Since the 18th century the most illustrious examples of elegy in English literature have been the Adonais of Shelley (on Keats), the Thyrsis of Matthew Arnold (on

Clough), and the Ave atque Vale of Mr Swinburne (on Baudelaire). It remains for us to mention what is the most celebrated elegy in English, that written by Gray in a Country Churchyard. This, however, belongs to a class apart, as it is not addressed to the memory of any particular person. A writer of small merit, James Hammond (1716-1742), enjoyed a certain success with his Love Elegies in which he endeavoured to introduce the erotic elegy as it was written by Ovid and Tibullus. This experiment took no

hold of English literature, but was welcomed in France in the amatory works of Parny (1753-1814), in those of Chenedolld (1769-1833), and of Millevoye (1782-1816). The melancholy and sentimental elegies of the last named are the typical examples of this class of poetry in French literature. Lamartine must be included among the elegists, and his famous ” Le Lac ” is as eminent an elegy in French as Gray’s ” Country Churchyard ” is in English. The elegy has flourished in Portugal, partly because it was cultivated with great success by Camoens, the most illustrious of the Portuguese poets. In Italian, Chiabrera and Filicaia are named among the leading national elegists. In German literature, the notion of elegy as a poem of lamentation does not exist. The famous Roman Elegies of Goethe imitate in form and theme those of Ovid; they, are not even plaintive in character.

Elegiac Verse has commonly been adopted by German poets for their elegies, but by English poets never. Schiller defines this kind of verse, which consists of a distich of which the first line is a hexameter and the second a pentameter, in the following pretty illustration: — ■

” In the hexameter rises the fountain’s silvery column, In the pentameter aye falling in melody back.”

The word ” elegy,” in English, is one which is frequently used very incorrectly; it should be remembered that it must be mournful, meditative and short without being ejacu- latory. Thus Tennyson’s In Memoriam is excluded by its length; it may at best be treated as a collection of elegies. Wordsworth’s Lucy, on the other hand, is a dirge; this is too brief a burst of emotion to be styled an elegy. Lycidas and Adonais remain the two unapproachable types of what a personal elegy ought to be in English. • (E. G.)

ELEMENT (Lat. elementum), an ultimate component of any- thing, hence a fundamental principle. Elementum was used in Latin to translate the Greek arovxtlov (that which stands in a ordixos, or row), and is a word of obscure origin and etymology. The root of Lat. alere, to nourish, has been sug- gested, thus making it a doublet of alimentum, that which sup- ports life; another explanation is that the word represents LMN., the first three letters of the second part of the alphabet, a parallel use to that of ABC. Apart from its application in chemistry, which is treated below, the word is used of the rudiments or principia of any science or subject, as in Euclid's Elements of Geometry, or in the " beggarly elements " (rdtirroixa. aroLxela., of St Paul in Gal. iv. 9); in mathematics, of a funda- mental concept involved in an investigation, as the " elements " of a determinant; and in electricity, of a galvanic (or voltaic) " element " in an electric cell (see Battery: Electric). In astronomy, " element " is used of any one of the numerical or geometrical data by which the course of a varying phenomenon is computed; it is applied especially to orbital motion and eclipses. The " elements of an orbit " are the six data by which the position of a moving body in its orbit at any time may be determined. The " elements of an eclipse " express and determine the motion of the centre of the shadow-axis, and are the data necessary to compute the phenomena of an eclipse during its whole course, as seen at any place. In architecture the term " element " is applied to the outline of the design of a Decorated window, on which the centres for the tracery are found. These centres will all be found to fall on points which, in some way or other, will be equimultiples of parts of the openings.

Chemical Elements. Like all other scientific concepts, that of an element has changed its meaning many times in many ways during the development of science. Owing to their very small amount of real chemical knowledge, the generalizations of the ancients were necessarily rather superficial, and could not stand in the face of the increasing development of practical chemistry. Nevertheless we find the concept of an element as " a substance from which all bodies are made or derived " held at the very beginning of occidental philosophy. Thales regarded " water " as the element of all things; his

Ancient Ideas.

followers accepted his idea of a primordial substance as the basis of all- bodies, but they endeavoured to determine some other general element or elements, like " fire " or " spirit, " or " love " and " hatred," or " fire," " water," " air " and " earth." We find in this

development an exact parallelism to the manner in which scientific ideas generally arise, develop and change. They are created to point out the common part in a variety of observed phenomena, in order to get some leading light in the chaos of events. At first almost any idea will do, if only it promises some comprehensive arrangement of the facts; after- wards, the inconsistencies of the first trial make themselves felt; the first idea is then changed to meet better the new requirements. For a shorter or longer time the facts and ideas may remain in accord, but the uninterrupted increase of empirical knowledge involves sooner or later new fundamental alterations of the general idea, and in this way there is a never-ceasing process of adaptation of the ideas to the facts. As facts are un- changeable by themselves, the adaptation can be only one-sided; the ideas are compelled to change according to the facts. We must therefore educate ourselves to regard the ideas or theories as the changing part of science, and keep ourselves ready to accept even the most fundamental revision of current theories.

The first step in the development of the idea of elements was to recognize that a single principle would not prove sufficient to cover the manifoldness of facts. Empedocles therefore conceived a double or binary elementary principle; and Aristotle developed this idea a stage further, stating two sets of binary antagonistic principles, namely " dry-wet " and " hot-cold." The Aristotelian or peripatetic elements, which played such a great role in the whole medieval philosophy, are the representative's of the several binary combinations of these fundamental properties, " fire " being hot and dry, " air " hot and wet, " water " cold and wet, " earth " cold and dry. According to the amount of these pro- perties found in any body, these elements were regarded as having taken part in forming this body. Concerning the reason why only these properties were regarded as fundamental, we know nothing. They seem to be taken at random rather than carefully selected; they relate only to the sense of touch, and not to vision or any other sense, possibly because deceptions in the sense of touch were regarded as non-existent, while the other senses were apparently not so trustworthy. At any rate, the Aristotelian elements soon proved to be rather inadequate to meet the requirements of the increasing chemical knowledge; other pro- perties had therefore to be selected to represent the general behaviour of chemical substances, and in this case we find them already much more " chemical " in the modern sense.

Among the various substances recognized by the chemists, certain classes or groups readily distinguished themselves. First the metals, by their lustre, their heaviness, and Elements a number of other

common properties. According to at the the general principle of selecting a single substance alchem- as a representative of the group, the metallic properties Ists ‘ were represented by ” mercury. ‘ ‘ The theoreticians of the middle ages were rather careful to point out that common mercury (the liquid metal of to-day) was not at all to be identified with ” philosophical ” mercury, the last being simply the principle of metallic behaviour. In the same way combustibility was represented by ” sulphur,” solubility by ” salt,” and occasionally the chemically indifferent or refractory character by ” earth.” According to the subsistence and preponderance of these pro- perties in different bodies, these were regarded as containing the corresponding elements; conversely, just as experience teaches the chemist every day that by proper treatment the properties of given bodies may be changed in the most various ways, the observed changes of properties were ascribed to the gain or loss of the corresponding elements. According to this theory, which accounted rather well for a large number of facts, there was no fundamental objection against trying to endow base metals with the properties of the precious ones ; to make artificial gold was a task quite similar to the modern problem of, e.g. making artificial quinine. The realization that there is a certain natural law preventing such changes is of much later date. It is therefore

quite unjust to consider the work of the alchemists, who tried to make artificial gold, as consummate nonsense. A priori there was no reason why a change from lead to gold should be less possible than a change from iron to rust; indeed there is no a priori reason against it now. But experience has taught us that lead and gold are chemical elements in the modern sense, and that there is a general experimental law that elements are not transformable one into another. So experience taught the alchemists irresistibly that in spite of the manif oldness of chemical changes it is not always possible to change any given substance into another; the possibilities are much more limited, and there is only a certain range of substances to be obtained from a given one. The impossibility of transforming lead or copper into noble metals proved to be only one case out of many, and it was recog- nized generally that there are certain chemical families whose members are related to one another by their mutual transform- ability, while it is impossible to bridge the boundaries separating these families.

The man who brought all these experiences and considerations into scientific form was Robert Boyle. He stated as a general

principle, that only tangible and ponderable substances Workot should be recognized as elements, an element being Boyle. a substance from which other substances maybemade,

but which cannot be separatedinto different substances. He showed that neither the peripatetic nor the alchemistic elements satisfied this definition. But he was more of a critical than of a synthetical turn of mind; although he established the correct principles, he hesitated to point out what substances, among those known at his time, were to be considered as elements. He only paved the way to the goal by laying the foundations of analytical chemistry, i.e. by teaching how to characterize and to distinguish different chemical individuals. Further, by adopting and developing the corpuscular hypothesis of the constitution of the ponderable substances, he foreshadowed, in a way, the law of the conservation of the elements, viz. that no element can be changed into another element; and he considered the compound substances to be made up from small particles or corpuscles of their elements, the latter retaining their essence in all combinations. This hypothesis accounts for the fact that only a limited number of other substances can be made from a given one — namely, only those which contain the elements present in the given substance. But it is characteristic of Boyle's critical mind that he did not shut his eyes against a serious objection to his hypothesis. If the compound substance is made up of parts of the elements, one would expect that the properties of the compound substance would prove to be the sum of the properties of the elements. But this is not the case, and chemical compounds show properties which generally differ very consider- ably from those of the compounds. On the one hand, the cor- puscular hypothesis of Boyle was developed into the atomic hypothesis of Dalton, which was considered at the beginning of the 19th century as the very best representation of chemical facts, while, on the other hand, the difficulty as to the properties of the compounds remained the same as Boyle found it, and has not yet been removed by an appropriate development of the atomic hypothesis. Thus Boyle considered, e.g. the metals as elements. However, it is interesting to note that he considered the mutual transformation of the metals as not altogether irm possible, and he even tells of a case when gold was transformed into base metal. It is a common psychological fact that a reformer does not generally succeed in being wholly consistent in his reforming ideas; there remains invariably some point where he commits exactly the same fault which he set out to abolish. We shall find the same

inconsistency also among other chemical reformers. Even earlier than Boyle, Joachim Jung (1587-1657) of Hamburg developed similar ideas. But as he did not distinguish himself, as Boyle did, by experimental work in science, his views exerted only a limited influence amongst his pupils.

In the times following Boyle's work we find no remarkable outside development of the theory of elements, but a very important inside one. Analytical chemistry, or the art of dis-

tinguishing different chemical substances, was rapidly develop- ing, and the necessary foundation for such a theory was thus laid. We find the discussions about the true elements disappearing from the text-books, or removed to an tlle gfy °" insignificant corner, while the description of observed chemical changes of different ways of preparing the same sub- stance, as identified by the same properties, and of the methods for recognizing and distinguishing the various substances, take their place. The similarity of certain groups of chemical changes, as, for example, combustion, and the inverse process, reduction, was observed, and thus led to an attempt to shape these most general facts into a common theory. In this way the theory of " phlogiston " was developed by G.E. Stahl, phlogiston being (according to the usual way of regarding general properties as being due to a principle or element) the " principle of combusti- bility," similar to the " sulphur " of the alchemists. This again must be regarded as quite a legitimate step justified by the knowledge of the time. For experience taught that combusti- bility could be transferred by chemical action, e.g. from charcoal to litharge, the latter being changed thereby into combustible metallic lead; and according to Boyle's principle, that only bodies should be recognized as chemical elements, phlogiston was considered as a body. From the fact that all leading chemists in the second half of the 18th century used the phlogiston theory and were not hindered by it in making their great dis- coveries, it is evident that a sufficient amount of truth and usefulness was embodied in this theory. It states indeed quite correctly the mutual relations between oxidation and reduction, as we now call these very general processes, and was erroneous only in regard to one question, which at that time had not aroused much interest, the question of the change of weight during chemical processes.

It was only after Isaac Newton's discovery of universal gravitation that weight was considered as a property of para- mount interest and importance, and that the question – of the changes of weight in chemical reactions became sterns' one worth asking. When in due

time this question was reform. raised, the fact became evident at once, that combus- tion means not loss but gain of weight. To be sure of this, it was necessary to know first the chemical and physical properties of gases, and it was just at the same time that this knowledge was developed by Priestley, Scheele and others. Lavoisier was the originator and expounder of the necessary reform. Oxygen was just discovered at that time, and Lavoisier gathered evidence from all sides that the theory of phlogiston had to be turned inside out to fit the new facts.

He realized that the sum total of the weights of all sub- stances concerned within a chemical change is not altered by the change. This principle of the " conservation of weight " led at once to a simple and unmistakable definition of a chemical element. As the weight of a compound substance is the sum of the weights of its elements, the compound necessarily weighs more than any of its elements. An element is therefore a sub- stance which, by being changed into another substance, in- variably increases its weight, and never gives rise to substances of less weight. By the help of this criterion Lavoisier composed the first table of chemical elements similar to our modern ones. According to the knowledge of his time he regarded the alkalis as elements, although he remarked that they are rather similar to certain oxides, and therefore may possibly contain oxygen; the truth of this was proved at a later date by Humphry Davy. But the inconsistency of the reformer, already referred to, may be observed with Lavoisier. He included " heat and light " in his list of elements, although he knew that neither of them had weight, and that neither fitted his definition of an element; this atavistic survival was subsequently removed from the table of the elements by Berzelius in the beginning of the 19th century. In this way the question of what substances are to be regarded as chemical elements had been settled satisfactorily in a qualitative way, but it is interesting to realize that the last step in this development, the theory of Lavoisier, was based on quantitative considerations. Such considerations became of paramount

interest at once, and led to the concept of the combining weights of the elements.

The first discoveries in this field were made in the last quarter of the 18th century by J. B. Richter. The point at issue was a rather

commonplace one : it was the fact that when two "picht /■> neutral salt solutions were mixed to undergo mutual work. chemical decomposition and recombination, the re-

sulting liquid was neutral again, i.e. it did not contain any excess of acid or base. In other words, if two salts, A'B' and A" B", composed of the acids A' and A" and the bases B' and B", undergo mutual decomposition, the amount of the base B' left by the first salt, when its acid A' united with the base B" to form a new salt A'B", was just enough to make a neutral salt A"B' with the acid A" left by the second salt. At first sight this looks quite simple and self-evident, — that neutral salts should form neutral ones again and not acid or basic ones, — but if this fact is once stated very serious quantitative inferences may be drawn from it, as Richter showed. For if the symbols A', A", B', B" denote at the same time such quantities of the acids and bases as form neutral salts, then if three of these quantities are determined, the fourth may be calculated from the others. This follows from the fact that by decomposing A'B' with just the proper amount of the other salt to form A'B", the remaining quantities B' and A" exist in exactly the ratio to form a neutral salt A" B'. It is possible, therefore, to ascribe to each acid and base a certain relative weight or " combining weight " by which they will combine one with the other to form neutral salts. The same reasoning may be extended to any number of acids and bases. It is true that Richter did not find out by himself this simplest statement of the law of neutrality which he discovered, but he expressed the same consequence in a rather clumsy way by a table of the combining weights of different bases related to the unit amount of a certain acid, and doing the same thing for the unit weight of every other acid. Then he observed that the numbers in these different tables are proportionate one to another. The same holds good if the corresponding series of the combining weights of acids for unit weights of different bases were tabulated. It was only a little later that a Berlin physicist, G. E. Fischer, united the whole system of Richter's numbers simply into a double table of acids and bases, taking as unit an arbitrarily chosen substance, namely sulphuric acid. The following table by Fischer is therefore the first table of combining weights. Bases. ■ Acids.

Alumina 525 Fluoric 427

Carbonic 577

Sebacic 706

Muriatic (hydrochloric) . 712

Oxalic 755

Phosphoric 979

Formic 988

Sulphuric 1000

Succinic 1209

Nitric 1405

Acetic 1480

Citric 1683

Tartaric 1694

It is interesting again to notice how difficult it is for the discoverer of a new truth to find out the most simple and com- plete statement of his discovery. It looks as if the amount of work needed to get to the top of a new idea is so great that not enough energy remains to clear the very last few steps. It is noteworthy also to observe how difficult it was for the chemists of that time to understand the bearing of Richter's work. Although a summary of his results was published in Berthollet's Essai de statique chimique, one of the most renowned chemical books of that time, nobody dared for a long time to take up the scientific treasure laid open for all the world. _

At the beginning of the 19th century the same question was taken up from quite another standpoint. John Dalton, in his investigations of the behaviour of gases, and in order to understand more easily what happened when gases were absorbed by liquids, used the corpuscular hypo- thesis already mentioned in connexion with Boyle. While he depicted to himself how the corpuscles, or, as he pre-

Magnesia 615

Ammoniac .... 672 Lime 793

Soda Strontiane Potash Baryte

859 1329 1605 2222

John Dalton' s atomic theory.

ferred to call them, the "atoms" of the gases, entered the interstices

of the atoms of the liquids in which they dissolved, he asked himself: Are the several atoms of the same substance exactly alike, or are there differences as between the grains ol sand ? Now experience teaches us that it is impossible to separate, for example, a quantity of pure water into two samples of somewhat different properties. When a pure substance is fractionated by partial distillation or partial crystallization or partial change into another substance by chemical means, we find constantly that the residue is not changed in its properties, as it would be if the atoms were slightly different, since in that case e.g. the lighter atoms would distil first and leave behind the heavier ones, &c. Therefore we must conclude that all atoms of the same kind are exactly alike in shape and weight. But, if this be so, then all combinations between different atoms must proceed in certain invariable ratios of the weights of the elements, namely by the ratio of the weights of the atoms. Now it is impossible to weigh the atoms directly; but if we determine the ratio of the weights in which oxygen and hydrogen combine to form water, we determine in this way also the relative weight of their atoms. By a proper number of analyses of simple chemical compounds we may determine the ratios between the weights of all elementary atoms, and, selecting one of them as a standard or unit, we may express the weight of all other atoms in terms of this unit. The following table is Dalton's (Mem. of the Lit. and Phil. Soc. of Manchester (II.), vol. i. p. 287, 1805).

Table of the Relative Weights of other

Hydrogen 1

Azot

Carbone

Ammonia

Oxygen

Water

Phosphorus .... Phosphuretted hydrogen . Nitrous gas ....

Ether

Gaseous oxide of carbone

4-3 5‘2 5-5 6-5 7-2

8-2

9-3 9-6 9-8

the Ultimate Particles of Gaseous and

Bodies.

Nitrous oxide 13-7

Sulphur 14-4

Nitric acid 15-2

Sulphuretted hydrogen . 15-4

Carbonic acid 15-3

Alcohol 15-1

Sulphureous acid . . . 19-9

Sulphuric acid .... 25-4 Carburetted hydrogen from

stagnant water . . . 6-3

Olefiant gas 5-3

Dalton at once drew a peculiar inference from this view. If two elements combine in different ratios, one must conclude that different numbers of atoms unite. There must be, therefore, a simple ratio between the quantities of the one element united to the same quantity of the other. Dalton showed at once that the analysis of carbon monoxide and of carbonic acid satisfied this consequence, the quantity of oxygen in the second compound being double the quantity in the first one. A similar relation holds good between marsh gas and olefiant gas (ethylene). This is the “law of multiple proportions” (see Atom). By these considerations Dalton extended the law of combining weights, which Richter had demonstrated only for neutral salts, to all possible chemical compounds. While the scope of the law was enormously extended, its experimental foundation was even smaller than with Richter. Dalton did not concern himself very much with the experimental verification of his ideas, and the first communication of his theory in a paper on the absorption of gases by liquids (1803) attracted as little notice as Richter’s

discoveries. Even when T. Thomson published Dalton's views in an appendix to his widely read text-book of chemistry, matters did not change very much. It was only by the work of J. J. Berzelius that the enormous importance of Dalton's views was brought to light.

Berzelius was at that time busy in developing a trustworthy system of chemical analysis, and for this purpose he investigated the composition of the most important salts. He then went over the work of Richter, and realized that by his Y° rk ot law he could check the results of his analyses. He tried Berzelius. it and found the law to hold good in most cases; when it did not, according to his analyses, he found that the error was on his own side and that better analyses fitted Richter's law. Thus he was prepared to understand the importance of Dalton's views and he proceeded at once to test its exactness. The result was the best possible. The law of the combining weights of the

atoms, or of the atomic weights, proved to hold good in every case in which it was tested. All chemical combinations between the several elements are therefore regulated by weight according to certain numbers, one for each element, and combinations between the elements occur only in ratios given by these weights or by simple multiples thereof. Consequently Berzelius regarded Dalton's atomic hypothesis as proved by experiment, and became a strong' believer in it.

At the same time W. H. Wollaston had discovered independ- ently the law of multiple proportions in the case of neutral and acid salts. He gave up further work when he learned of Dalton's ideas, but afterwards he pointed out that it was necessary to distinguish the hypothetical part in Dalton's views from their empirical part. The latter is the law of combining weights, or the law that chemical combination occurs only according to certain numbers characteristic for each element. Besides this purely experimental law there is the hypothetical explanation by the assumption of the existence of atoms. As it is not proved that this explanation is the only one possible, the existence of the law is not a proof of the existence of the atoms. He there- fore preferred to call the characteristic combining numbers of the elements not " atomic weights " but " chemical equivalents."

Although there were at all times chemists who shared Wollaston's cautious views, the atomic hypothesis found general acceptance because of its ready adaptability to the most diverse chemical facts. In our time it is even rather difficult to separate, as Wollaston did, the empirical part from the hypothetical one, and the concept of the atom penetrates the whole system of chemistry, especially organic chemistry.

If we compare the work of Dalton with that of Richter we find a fundamental difference. Richter's inference as to the existence of combining weights in salts is based solely on an experimental observation, namely, the persistence of neutrality after double decomposition; Dalton's theory, on the contrary, is based on the hypothetical concept of the atom. Now, however favourably one may think of the probability of the existence of atoms, this existence is really not an observed fact, and it is necessary therefore to ask: Does there exist some general fact which may lead directly to the inference of the existence of combining weights of the elements, just as the persistence of neutrality leads to the same consequence as to acids and bases ? The answer is in the affirmative, although it took a whole cen- tury before this question was put and answered. In a series of rather difficult papers (Zeits. f. Phys. Chem. since 1895, and Annalen der N aturphilosophie since 1902), Franz Wald (of Kladno, Bohemia) developed his investigations as to the genesis of this general law. Later, W. Ostwald (Faraday lecture, Trans. Chem. Soc, 1904) simplified Wald's reasoning and made it more evident.

The general fact upon which the necessary existence of combin- ing weights of the elements may be based is the shifting character of the boundary between elements and compounds. It has already been pointed out that Lavoisier considered the alkalis and the alkaline earths as elements, because in his time they had not been decomposed. As long as the decomposition had not been effected, these compounds could be considered and treated like elements without mistake, their combining weight being the sum of the combining weights of their (subsequently dis- covered) elements. This means that compounds enter in reaction with other substances as a whole, just as elements do. In particular, if a compound AB combines with another substance (elementary or compound) C to form a ternary compound ABC, it enters this latter as a whole, leaving behind no residue of A or B. Inversely, if a ternary compound ABC be changed into a binary one AB by taking away the element C, there will not be found any excess of A or B, but both elements will exhibit just the same ratio in the binary as in the ternary compound.

Experimentally this important fact was proved first by Berzelius, who showed that by oxidizing lead sulphide, PbS, to lead sulphate, PbS0 4 , no excess either of sulphur or lead could be found after oxidation; the same held good with barium sulphite, BaSOs, when converted into barium sulphate, BaS0 4 .

On a much larger scale and with very great accuracy the inverse was proved half a century later by J. S. Stas, who reduced silver chlorate, AgC10 3 , silver bromate, AgBr0 3 , and silver iodate, AgI0 3 , to the corresponding binary compounds, AgCl, AgBr and Agl, and searched in the residue of the reaction for any excess of silver or halogen. As the tests for these substances are among the most sensitive in analytical chemistry, the general law underwent a very severe test indeed. But the result was the same as was found by Berzelius — no excess of one of the elements could be discovered. We may infer, therefore, generally that compounds enter ulterior combinations without change of the ratio of their elements, or that the ratio between different elements in their compounds is the same in binary and ternary (or still more complicated) Combinations.

This law involves the existence of general combining weights just in the same way as the law of neutrality with double de- composition of salts involves the law of the combining weights of acids and bases. For if the ratio between A and B is deter- mined, this same ratio must obtain in all ternary and more complicated compounds, containing the same elements. The same is true for any other elements, C, D, E, F, &c, as related to A. But by applying the general law to the ternary compound ABC the same conclusion may be drawn as to the ratio A: C in all compounds containing A and C, or B : C in the corresponding compounds. By reasoning further in the same way, we come to the conclusion that only such compounds are possible which contain elements according to certain ratio-numbers, i.e. their combining weight. Any other ratio would violate the law of the integral reaction of compounds.

As to the law of multiple proportions, it may be deduced by a similar reasoning by considering the possible combinations between a compound, e.g. AB, and one of its elements, say B. AB and B can combine only according to their combining weights, and therefore the quantity of B combining with AB is equal to the quantity of AB which has combined with A to form AB. The new combination is therefore to be expressed by AB 2 . By extending this reasoning in the same way, we get the general conclusion that any compounds must be com- posed according to the formula A m B„C p . . ., where m, n, p, &c, are integers.

The bearing of these considerations on the atomic hypothesis is not to disprove it, but rather to show that the existence of the law of combining weights, which has been considered for so long as a proof of the truth of this hypothesis, does not necessarily involve such a consequence. Whether atoms may prove to exist or not, the law of combining weights is independent thereof.

Two problems arose from the discoveries of Dalton and Berzelius. The first was to determine as exactly as possible the correct numbers of the combining weights. The other Atomic results from the fact that the same elements may weight combine in different ratios. Which of these ratios determlna' gives the true ratio of the atomic weights? And ons ' which is the multiple one? Both questions have had most ample experimental investigation, and are now answered rather satisfactorily. The first question was a purely technical one; its answer depended upon analytical skill, and Berzelius in his time easily took the lead, his numbers being readily accepted on the continent of Europe. In England there was a certain hesitation at first, owing to Prout's assumption (see below), but when Turner, at the instigation of the British Association for the Advancement of Science, tested Berzelius's numbers and found them entirely in accordance with his own measurements, these numbers were universally accepted. But then a rather large error in one of Berzelius's numbers (for carbon) was discovered in 1841 by Dumas and Stas, and a kind of panic ensued. New determinations of the atomic weights were undertaken from all sides. The result was most satisfactory for Berzelius, for no other important error was discovered, and even Dumas remarked that repeating a determination by Berzelius only meant getting the same result, if one worked properly. In later times more exact measurements, corresponding to the increasing art in analysis, were carried out by various workers, amongst

whom J. S. Stas distinguished himself. But even the classical work of Stas proved not to be entirely without error; for every period has its limit in accuracy, which extends slowly as science extends. In recent times American chemists have been especially prominent in work of this kind, and the determinations of E. W. Morley, T. W. Richards and G. P. Baxter rank among the first in this line of investigation.

During this work the question arose naturally: How far does the

exactness of the law extend ? It is well known that most natural laws are only approximations, owing to disturbing causes. Are there disturbing causes also with atomic weights ? The answer is that as far as we know there are none. The law is still an exact one. But we must keep in mind that an absolute answer is never possible. Our exactness is in every case limited, and as long as the possible variations lie behind this limit, we cannot tell anything about them. In recent times H. Landolt has doubted and experimentally investigated the law of the conservation of weight.

Landolt 's experiments were carried out in vessels of the shape of an inverted U, each branch holding one of the substances to react one on the other. Two vessels were prepared as equal as possible and hung on both sides of a most sensitive balance. Then the difference of weight was determined in the usual way by exchanging both the vessels on the balance. After this set of weighings one of the vessels was inverted and the chemical reaction between the contained substances was performed; then the double weighing was repeated. Finally also the second vessel was inverted and a third set of weighings taken. From blank experiments where the vessels were filled with substances which did not react one on the other, the maximum error was determined to 0-03 milligramme. The reactions experimented with were: silver salts with ferrous sulphate; iron on copper sulphate; gold chloride and ferrous chloride; iodic acid and hydriodic acid; iodine and sodium sulphite; uranyl nitrate and potassium hydrate; chloral hydrate and potassium hydrate; electrolysis of cadmium iodide by an alternating current; solution of ammonium chloride, potassium bromide and uranyl nitrate in water, and precipitation of an aqueous solution of copper sulphate by alcohol. In most of these experiments a slight diminution of weight was observed which exceeded the limit of error distinctly in two cases, viz. silver nitrate with ferrous sulphate and iodic acid with hydriodic acid, the loss of weight amounting from 0-068 to 0-199 mg. with the first and 0-047 to 0-177 mg. with the second reaction on about 50 g. of substance. As each of these reactions had been tried in nine independent experiments, Landolt felt certain that there was no error of observation involved. 1 But when the vessels were covered inside with paraffin wax, no appreciable diminution of weight was observed.

These experiments apparently suggested a small decrease of weight as a consequence of chemical processes. On repeating them, however, and making allowance for the different amounts of water absorbed on the surface of the vessel at the beginning and end of the experiment, Landolt found in 1908 (Zeit. physik. Chem. 64, p. 581)

that the variations in weight are equally positive and negative, and he concluded that there was no change in weight, at least to the extent of 1 part in 10,000,000.

There is still another question regarding the numerical values _. of the atomic weights, namely: Are there relations

periodic between the numbers belonging to the several arrange- elements ? Richter had arranged his combining meat. weights according to their magnitude, and en- deavoured to prove that they form a certain mathematical

series. He also explained the incompleteness of his series by assuming that certain acids or bases requisite to the filling up of the gaps in the series, were not yet known. He even had the satisfaction that in his time a new base was discovered, which fitted rather well into one of his gaps; but when it turned out afterwards that this new base was only calcium phosphate, this way of reasoning fell into discredit and was resumed only at a much later date.

To obtain a correct table of atomic weights the second question already mentioned, viz. how to select the correct value in the case of multiple proportions, had to be answered. Berzelius was constantly on the look-out for means to distinguish the true atomic weights from their multiples or sub-multiples, but he could not find an unmistakable test. The whole question fell into a terrible disorder, until in the middle of the 19th century S. Cannizzaro showed that by taking together all partial evidences one could get a system of atomic weights consistent in itself and fitting the exigencies of chemical systematics. Then a startling discovery was made by the same method which Richter had tried in vain, by arranging all atomic weights in one series aceording to their numerical values.

The Periodic Law. — The history of this discovery is rather long. As early as 1817 J. W. Dobereiner of Jena drew attention to the fact that the combining weight of strontium lies midway between those of calcium and barium, and some years later he showed that such " triads " occurred in other cases too. L. Gmelin tried to apply this idea to all elements, but he realized that in many cases more than three elements had to be grouped together. While Ernst Lenssen applied the idea of triads to the whole table of chemical elements, but without any important result, the other idea of grouping more than three elements into series according to their combining weights proved more success- ful. It was the concept of homologous series just developed in organic chemistry which influenced such

considerations. First Max von Pettenkofer in 1850 and then J. B. A. Dumas in 1851 undertook to show that such a series of similar elements could be formed, having nearly constant differences between their combining weights. It is true that this idea in all its simplicity did not hold good extensively enough; so J. P. Cooke and Dumas tried more complicated types of numerical series, but only with a temporary success.

The idea of arranging all elements in a single series in the order of the magnitude of their combining weights, the germ of which is to be found already in J. B. Richter's work, appears first in i860 in some tables published by Lothar Meyer for his lectures. Independently, A. E. B. de Chancourtois in 1862, J. A. R. Newlands in 1863, and D. I. Mendeleeff in 1869, developed the same idea with the same result, namely, that it is possible to divide this series of all the elements into a certain number of very similar parts. In their papers, which appeared in the same year, 1869, Lothar'Meyer and Mendeleeff gave to all these trials the shape now generally adopted. They succeeded in proving beyond all doubt that this series was of a periodic character, and could be cut into shorter pieces of similar construction. Here again gaps were present to be filled up by elements to be dis- covered, and Mendeleeff , who did this, predicted from the general regularity of his table the properties of such unknown elements. In this case fate was more kind than with Richter, and science had the satisfaction of seeing these predictions turn out to be true.

The following table contains this periodic arrangement of the elements according to their atomic weight. By cutting the whole series into pieces of eight elements (or more in several

He 4-0

U 7-03

Be 9-1

B n-o

C 12-00

N 14-01

16-00

F 19-0

Ne 20

Na 23-00

Mg 24-32

A127-I

Si 28-4

P 3 i-o

S 32-06

CI 35-45

Ar 39-9

K 39-15

Ca 40- 1

Sc 44-1

Ti 4 8-i

V5I-2

Cr 52-0

Mn 5S-o

Fe 55-9,

Ni 58-7,

Co 59-0

Cu 63-6

In 65-4

Ga 70

Ge 72-5

As 75-0

Se 79-2

Br 79-96

Kr 83-0

Rb 85-5

Sr 87-6

Y 89-0

Zr 90-6

Cb(Nb) 94

Mo 96-0

Ru 101-7

Rh 103-0,

Pd 106-5

Ag 107-93

Cd 1 12-4

In 115

Sn 119-0

Sb 120-2

Te 127-6

I 126-97

.. „.

Xe 130-7

Cs 132-9 Au 197-2

Ba 137-4

Hg 2O0-O

La 138-9 Tl 204-1

Ce &c. 140 Pb 206-9

Ta 181 Bi 208-0

W 184

Os 191,

Ir 193-0,

Pt 194-8

Ra 225

Th 232-5

U 238-5

IX. 9

2 5 8

ELEMENT

cases) and arranging these one below another in the alternating way shown in the table, one finds similar elements placed in vertical series whose properties change gradually and with some regularity according to their place in the table. Not only the properties of the uncombined elements obey this rule, but also almost all properties of similar compounds of the elements.

But upon closer investigation it must be confessed that these regularities can be called only rules, and not laws. In the first line one would expect that the steps in the values of the atomic weights should be regular, but it is not so. There are even cases when it is necessary to invert the order of the atomic weights to satisfy the chemical necessities. Thus argon has a larger number than potassium, but must precede it to fit into its proper place. The same is true of tellurium and iodine. It looks as if the real elements were scattered somewhat haphazard on a regular table, or as if some independent factor were active to disturb an existing regularity. It may be that the new facts mentioned above will lead also to an explanation of these irregu- larities; at present we must recognize them and not try to explain them away. Such considerations have to be kept in mind especially in regard to the very numerous attempts-

to express the series of combining weights in a mathematical form. In several cases rather surprising agreements were found, but never without exception. It looks as if some very important factor regulating the whole matter is still unknown, and before this has been elucidated no satisfactory treatment of the matter is possible. It seems therefore premature to enter into the details »f these speculations.

In recent times not only our belief in the absolute exactness of the law of the conservation of weight has been shaken, but also our belief in the law of the conservation of the tatiorrof' elements. The wonderful substance radium, whose itements. existence has made us to revise quite a number of old and established views, seems to be a fulfilment of the jld problem of the alchemists. It is true that by its help lead]j not changed into gold, but radium not only changes itself into another element, helium (Ramsay), but seems also to cause other elements to change. Work in this line is of present day origin only and we do not know what new laws will be found to regulate these most unexpected reactions (see Radioactivity). But we realize once more that no law can be regarded as free from criticism and limitation; in the whole realm of exact sciences there is no such thing as the Absolute.

Another question regarding the values of atomic weights was raised very soon after their first establishment. From the some- what inexact first determinations William Prout ass"m%- concluded that all atomic weights are multiples of the Hon, atomic weight of hydrogen, thus suggesting all other

elements to be probably made up from condensed hydrogen. Berzelius found his determinations not at all in accordance with this assumption, and strongly opposed the arbitrary lounding off of the numbers practised by the partisans of Prout's hypothesis. His hypothesis remained alive, although almost every chemist who did exact atomic weight determinations, especially Stas, contradicted it severely. Even in our time it seems to have followers, who hope that in some way the existing experimental differences may disappear. But one of the most important and best-known relations, that between hydrogen and oxygen, is certainly different from the simple ratio i :i6, for it has been determined by a large number of different investigators and by diff event methods to be undoubtedly lower, namely, 1:15-87. Therefore, if Prout's hypothesis contain an element of truth, by the act of condensation of some simpler substance into the present chemical elements a change of weight also must have occurred, such that the weight of the element did not remain exactly

the weight of the simpler substance which changed into it. We have already remarked that such phenomena are not yet known with certainty, but they cannot be regarded as utterly impossible.

It may here be mentioned that the internationality of science has shown itself active also in the question of atomic weights. These numbers undergo incessantly small variations because

of new work done for their determination. To avoid the un- certainty arising from this inevitable state of affairs, an international committee was formed by the co- operation of the leading chemical societies all over the world, and an international table of the most probable values is issued every year. The following table is that for 1 9 10: —

International Atomic Weights, 1910. Atomic

later- national table of atomic weights.

Weights. Symbol. = 16.

Al . Sb . Ar . As . Ba . Be I . Gl \ . Bi . B . Br . Cd . Cs . Ca . C . Ce . CI . Cr . Co . Cb .(Nb) . Cu

- Dy

. Er . Eu . F . Gd . Ga . Ge . Au . He . H . In . I . Ir . Fe . Kr . La . Pb . Li . Lu . Mg . Mn

27-1

120-2

39 -9 74-96

137-37

9-1

208-0

no

79-92

112-40

132-81

40-09

12-00

140-25 35-46

52-0

58-97

93-5

63-57 162-5 167-4 152-0

19-0

i5~-3

699

72-5 197-2 4-0

i- 008

114-8 126-92 193- 1

55-85

83-0

1390

207-10

7-00

174-0

24-32

54-93

Name. Aluminium Antimony Argon . Arsenic . Barium . Beryllium

(Glucinum) Bismuth Boron . Bromine Cadmium Caesium . Calcium . Carbon . Cerium . Chlorine . Chromium Cobalt _ . Columbium

(Niobium) . Copper . Dysprosium Erbium . Europium Fluorine . Gadolinium Gallium . Germanium Gold . . Helium . Hydrogen Indium . Iodine Iridium . Iron . Krypton . Lanthanum Lead . Lithium . Lutecium . Magnesium Manganese

In the long and manifold development of the concept of the element one idea has remained prominent from the very begin- ning down to our times: it is the idea of a primordial matter. Since the naive statement of Thales that all things came from water, chemists could never reconcile themselves to the fact of the conservation of the elements. By an experimental investigation which over five centuries and more, the impossibility of transmuting one element into another — for example, lead into gold — was demonstrated in the most extended way, and nevertheless this law has so little entered the consciousness of the chemists that it is seldom explicitly stated even in carefully written text-books. On the. other side the attempts to reduce the manifoldness of the actual chemical elements to one single primordial matter have never ceased, and the latest development of science seems to endorse such a view. It is therefore necessary to consider this question from a most general standpoint.

In physical science, the chemical elements may be compared with such concepts as mass, momentum, quantity of electricity, entropy

and such like. While mass and entropy are determined univocally by a unit and a number, quantity of electricity has a unit, a number and a sign, for it can be positive as well as nega- tive. Momentum has a unit, a number and a direction in space. Elements do not have a common -unit as the former magnitudes, but every element has its own unit, and there is no transition from one to another. All these magnitudes underlie a law of conservation, but to a very different degree. While mass was

Name. Mercury . Molybdenum Neodymium . Neon .

Nickel . . Nitrogen . Osmium . Oxygen . Palladium Phosphorus . Platinum. Potassium Praseodymium Radium . Rhodium . Rubidium Ruthenium . Samarium Scandium Selenium Silicon Silver Sodium . Strontium Sulphur . Tantalum Tellurium Terbium . Thallium Thorium . Thulium . Tin . . . Titanium. Tungsten . Uranium . Vanadium Xenon Ytterbium

ytterbium) Yttrium . Zinc . Zirconium

Atomic Weights. Symbol. =-= 16. . Hg 200-0

Mc Nd Ne Ni N Os O Pd P Pt K Pr Ra . Rh . Rb . Ru . Sm . Sc . Se . Si • Ag . Na . Sr . S . Ta . Te . Tb . Tl . Th . Tm . Sn . Ti . W . U . V . Xe (Neo- . Yb . Y . Zn . Zr

96-0

144-3

20-0

58-68 14-01

190-9 1600

106-7

3i-o

195-0

39-10 140-6 226-4 102-9

85-45 101-7 150-4 44-1 79-2 28-3 107-88 23-00 87-62 32-07 181-0

127-5 159-2 204-0 232-42 168-5 119-0 48-1 184-0

238-5

51-2

130-7

172-0 89-0

65-37 90-6

Con- cluding remarks.

extended

considered as absolutely invariable in the classical mechanics, the newer theories of the electrical constitution of matter make mass dependent on the velocity of the moving electron. Momentum also is not entirely conservative because it can be changed by light-pressure. Entropy is known as constantly increasing, remaining constant only in an ideal limiting case. With chemical elements we observe the same thing as with momentum; though till recently considered as conservative, there is now experimental evidence that they do not always show this character.

Generally the laws of the conservation of mass, weight and elements are expressed as the " law of the conservation of matter." But this expression lacks scientific exactness because the term " matter " is generally not denned exactly, and because only the above-named properties of ponderable objects do not change, while all other properties do to a greater or less extent. Con- sidered in the most general way, we may define matter as a complex of gravitational, kinetic and chemical energies, which are found to cling together in the same space. Of these energies the capacity factors, namely, weight, mass and elements, are con- servative as described, while the intensity factors, potential, velocity and affinity, may change in wide limits. To explain why we find these energies constantly combined one with another, we only have to think of a mass without gravity or a ponderable body without mass. The first could not remain on earth because every movement would carry it into infinite space, and the second would acquire infinite velocity by the slightest push and

would also disappear at once. Therefore only such objects which have both mass and weight can be handled and can be objects of our knowledge. In the same way all other energies come to our knowledge only by being (at least tempor- arily) associated with this combination of mass and weight. This is the true meaning of the term " matter."

In this line of ideas matter appears not at all as a primary concept, but as a complex one; there is therefore no reason to consider matter as the last term of scientific analysis of chemical facts, and the idea of a primordial matter appears as a survival from the very first beginning of European natural philosophy. The most general concept science has developed to express the variety of experience is energy, and in terms of energy (combined with number, magnitudes, time and space) all observed and observable experiences are to be described. (W. O.)

ELEMI, an oleo-resin (Manilla elemi) obtained in the Philippine Islands, probably from Canarium commune (nat. ord. Burser- aceae), which when fresh and of good quality is a pale yellow granular substance, of honey-like consistency, but which gradu- ally hardens with age. It is soluble in alcohol and ether, and has a spicy taste with a smell like fennel. In the 17th and 18th centuries the term elemi usually denoted an oleo-resin (American or Brazilian elemi) obtained from trees of the genus Icica in Brazil, and still earlier it meant oriental or African elemi, derived from Boswellia Frereana, which flourishes in the neighbourhood of Cape Gardafui. The word, like the older term animi, appears to have been derived from enhaemon(Gr. evcufiov), the name of a styptic medicine said by Pliny to contain tears exuded by the olive tree of Arabia'.

ELEPHANT, the designation of the two existing representatives of the Proboscidea, a sub-order of ungulate mammals, and also extended to include their more immediate extinct relatives. As the distinctive characteristics of the sub-order, and also of the single existing genus Elephas, are given in the article Probos- cidea, it will suffice to point out how the two existing species are distinguished from one another.

The more specialized of the two species is the Indian or Asiatic elephant, Elephas maximus, specially characterized by the ex- treme complexity of the structure of its molar teeth, which are composed of a great number of tall and thin plates of enamel and dentine, with the intervals filled by cement (see Proboscidea, fig. 1). The average number of plates of the six successive molar teeth may be expressed by the " ridge-formula " 4, 8, 12, 12, 16, 24. The plates are

compressed from before backwards, the anterior and posterior surfaces (as seen in the worn grinding

face of the tooth) being nearly parallel. Ears of moderate size. Upper margin of the end of the proboscis developed into a distinct finger-like process, much longer than the lower margins, and the whole trunk uniformly tapering and smooth. Five nails on the fore-feet, and four (occasionally five) on the hind-feet.

The Asiatic elephant inhabits the forest-lands of India, Burma, the Malay Peninsula, Cochin China, Ceylon and Sumatra. Elephants from the last-named islands present some variations from those of the mainland, and have been separated under the names of E. zeylonicus and E. sumatranus, but they are not more than local races, and the Ceylon animal, which is generally tuskless, may be the typical E. maximus, in which case the Indian race will be E. maximus indicus. The appearance of the Asiatic elephant is familiar to all. In the wild state it is gregarious, associating in herds of ten, twenty or more individuals, and, though it may under certain circumstances become dangerous, it is generally inoffensive and even timid, fond of shade and solitude and the neighbourhood of water. The height of the male at the shoulder when full grown is usually from 8 to 10 ft., occasionally as much as 1 1 , and possibly even more. The female is somewhat smaller.

The following epitome of the habits of the Asiatic elephants is extracted from Great and Small Game of India and Tibet, by R. Lydekker: —

" The structure of the teeth is sufficient to indicate that the food consists chiefly of grass, leaves, succulent shoots and fruits; and this has been found by observation to be actually the case. In this respect the Asiatic species differs very widely from its African relative, whose nutri- ment is largely com- posed of boughs and roots. Another differ- ence between the two animals is to be found in the great intolerance of the direct rays of the sun displayed by the Asiatic species, which never voluntarily exposes itself to their influence. Consequently, during the hot season in Upper India, and at all times except during the rains in the more southern districts, elephants keep much to the denser parts of the forests. In Southern India they delight in hill-forest, where the undergrowth is largely formed of bamboo, the tender shoots of which form a favourite delicacy; but during the rains they venture out to feed on the open grass tracts. Water is everywhere essential to their well-being; and no animals delight more thoroughly in a bath. Nor are they afraid to venture out

of their depth, being excellent swimmers, and able, by means of their trunks, to breathe without difficulty when the entire body is submerged. The herds, which are led by females, appear in general to be family parties; and although commonly restricted to from thirty to fifty, may occasionally include as many as one hundred head. The old bulls are very generally solitary for a considerable portion of the year, but return to the herds during the pairing season. Some ' rogue ' elephants— gunda of the natives— remain, however, permanently separated from the rest of their kind. All such solitary bulls, as their colloquial name indicates, are of a spiteful disposition; and it appears that with the majority the inducement to live apart is due to their partiality for cultivated crops, into which the more timid females are afraid to venture. ' Must ' elephants are males in a condition of — probably sexual — excitement, when an abundant discharge of dark oily matter exudes from two pores in the forehead. In addition to various sounds produced at other times, an elephant when about to charge gives vent to a shrill loud ' trumpet ' ; and on such occasions rushes on its

Fig. 1. Asiatic Elephant {Elephas maximus").

adversary with its trunk safely rolled up out of danger, endeavouring either to pin him to the ground with its tusks (if a male tusker) or to trample him to death beneath its ponderous knees or feet."

Exact information in regard to the period of gestation of the female is still lacking, the length of the period being given from eighteen to twenty-two months by different authorities. The native idea, which may be true, is that the shorter period occurs in the case of female and the longer in that of male calves. In India elephants seldom breed in captivity, though they do so more frequently in Burma and Siam; the domesticated stock is there- fore replenished by fresh captures. Occasionally two calves are produced at a birth, although the normal number is one. Calves suckle with their mouths and not with their trunks. Unlike the African species, the Indian elephant charges with its trunk curled up, and consequently in silence.

As regards their present distribution in India, elephants are found along the foot of the Himalaya as far west as the valley of Dehra-Dun, where the winter temperature falls to a com- paratively low point. A favourite haunt used to be the swamp of Azufghur, lying

among the sal-forests to the northward of Meerut. In the great tract of forest between the Ganges and Kistna rivers they occur locally as far west as Bilaspur and Mandla; they are met with in the Western Ghats as far north as between latitude 17 and 18°, and are likewise found in the hill-

Fig. 2. — Immature African Elephant {Elephas africanus).

forests of Mysore, as well as still farther south. In this part of the peninsula they ascend the hills to a considerable height, as they do in the Newara Eliya district of Ceylon, where they have been encountered at an elevation of over 7000 ft. There is evidence that about three centuries ago elephants wandered in the forests of Malwa and Nimar, while they survived to a later date in the Chanda district of the Central Provinces. At the comparatively remote epoch when the Deccan was a forest tract, they were probably also met with there, but the swamps of the Bengal Sundarbans appear unsuited to their habits.

Of tusks, the three longest specimens on record respectively measure 8 ft. 9 in., 8 ft. 2 in. and 8 ft.; their respective weights being 81, 80 and 90 lb. These are, however, by no means the heaviest — one, whose length is 7 ft. 3! in., weighing 102 lb; while a second, of which the length is 7 ft. 3J in., scaled 97! lb. Of the largest pair in the possession of the British Museum, which belonged to an elephant killed in 1866 by Colonel G. M. Payne in Madras, one tusk measures 6 ft. 8 in. in length, and weighs 77! fb, the other being somewhat smaller. It should be added that some of these large tusks came from Ceylon; such tuskers being believed to be descended from mainland animals imported into the island. "White" elephants are partial or complete albinos, and are far from uncommon in Burma and Siam. Young Indian elephants are hairy, thus showing affinity with the mammoth.

The African elephant is a very different animal from its Asiatic cousin, both as regards structure and habits; and were it

not for the existence of intermediate extinct species, might well be regarded as the representative of a distinct genus. Among its characteristics the following points are noticeable. The molar teeth are of coarse construction, with fewer and larger plates and thicker enamel; the ridge-formula being 3, 6, 7, 7, 8, 10; while the plates are not flattened, but thicker in the middle than at the edges, so that their worn grinding-surfaces are lozenge^ shaped. Ears very large. The upper and lower margins of the end of the trunk form two nearly

equal prehensile lips. Only three toes on the hind-foot. A very important distinction is to be found in the conformation of the trunk, which, as shown in fig. 2, looks as though composed of, a number of segments, gradually decreasing in size from base to tip like the joints of a telescope, instead of tapering gradually and evenly from one extremity to the other. The females have relatively large tusks, which are essential in obtaining their food. Except where exterminated by human agency (and this has been accomplished to a deplorable extent), the African elephant is a native of the wooded districts of the whole of Africa south of the Sahara. It is hunted chiefly for the sake of the ivory of its immense tusks, of which it yields the principal source of supply, to the European market, and the desire to obtain which is rapidly leading to the extermination of the species. In size the male African elephant often surpasses the Asiatic species, reaching nearly 12 ft. in some cases. The circumference of the fore-foot is half the height at the shoulder, a circumstance which enables sportsmen to estimate approximately the size of their quarry. A tusk in the British Museum measures 10 ft. 2 in. in length, with a basal girth of 24 in. and a weight of 2265 lb; but a still longer, although lighter, tusk was brought to London in 1905.

Several local races of African elephant have been described, mainly distinguished from one another by the form and size of the ears, shape of the head, &c. The most interesting of these is the pigmy Congo race, E. africanus pumilio, named on the evidence of an immature specimen in the possession of C. Hagen- beck, the well-known animal-dealer of Hamburg, in 1905. According to Hagenbeck's estimate, this elephant, which came from the French Congo, was about six years old at the time it came under scientific notice. Moreover, in the opinion of the same observer, it is in no wise an abnormally dwarfed or ill- grown representative of the normal type of African elephant, but a well-developed adolescent animal. In height it stood about the same as a young individual of the ordinary African elephant when about a year and a half old, the vertical measure- ment at the shoulder being only 4 ft., or merely a foot higher than a new-born Indian elephant. Hagenbeck's estimate of its age was based on the presence of well-developed tusks, and the relative proportion of the fore and hind limbs, which are stated to show considerable differences in the case of the African elephant according to age. Nothing was stated as to the prob- ability of an increase in the stature of the French Congo animal as it grows older; but even if we allow another foot, its height would be considerably less than half that of a large Central African bull of the ordinary elephant.

By Dr Paul Matschie several races of the African elephant have been described, mainly, as already mantioned, on certain differences in the shape of the ear. From the two West African races (E. a. cyclotis and E. a. oxyotis) the dwarf Congo elephant is stated to be distinguished by the shape of its ear; comparison in at least one instance having been made with an immature animal. The relatively small size of the ear is one of the most distinctive characteristics of the dwarf race. Further, the skin is stated to be much less rough, with fewer cracks, while a more important difference occurs in the trunk, which lacks the trans- verse ridges so distinctive of the ordinary African elephant, and thereby approximates to the Asiatic species.

If the differences in stature and form are constant, there can be no question as to the right of the dwarf Congo elephant to rank as a well-marked local race; the only point for consideration being whether it should not be called a species. The great interest in connexion with a dwarf West African race of elephant is in relation to the fossil pigmy elephants of the limestone

fissures and caves of Malta and Cyprus. Although some of these elephants are believed not to have been larger than donkeys, the height of others may be estimated at from 4 to 5 ft., or prac- tically the same as that of the dwarf Congo race. By their describers, the dwarf European elephants were regarded as distinct species, under the names of E'ephas melitensis, E. mnaidriensis and E. Cypriotes; but since t\eir molar teeth are essentially miniatures of those of the African elephant, it has been suggested by later observers that these animals are nothing more than dwarf races of the latter. This view may receive some sup- port from the occurrence of a dwarf form of the African elephant in the Congo; and if we regard the latter as a subspecies of Elephas africanus, it seems highly probable that a similar position will have to be assigned to the pigmy European fossil elephants. If, on the other hand, the dwarf Congo elephant be regarded as a species, then the Maltese and Cyprian elephants may have to be classed as races of Elephas pumilio; or, rather, E. pumilio will have to rank as a race of the Maltese species. In this connexion it is of interest to note that, both in the Mediterranean islands and in West Africa, dwarf elephants of the African type are accompanied by pigmy species of hippo- potamus, although we have not yet evidence to show that in Africa the two animals occupy actually the same area. Still, the close relationship of the existing Liberian pigmy

hippopotamus to the fossil Mediterranean species is significant, in relation to the foregoing observations on the elephant.

It may be added that fossil remains of the African elephant have been obtained from Spain, Sicily, Algeria and Egypt, in strata of the Pleistocene age. Some of the main differences in the habits of the African as distinct from those of the Asiatic elephant have been mentioned under the heading of the latter species. The most important of these are the greater tolerance by the African animal of sunlight, and the hard nature of its food, which consists chiefly of boughs and roots. The latter are dug up with the tusks; the left one being generally employed in this service, and thus becoming much more worn than its fellow. (R. L.)*

ELEPHANTA ISLE (called by the natives Gharapuri), a small island between Bombay and the mainland of India, situated about 6 m. from Bombay. It is nearly 5 m. in circumference, and the few inhabitants it contains are employed in the cultiva- tion of rice, and in rearing sheep and poultry for the Bombay market. The island, till within recent times, was almost entirely overgrown with wood; it contains several springs of good water. There are also important quarries of building stone. But it owes its chief celebrity to the mythological excavations and sculptures of Hindu superstition which it contains. Opposite to the landing-place was a colossal statue of an elephant, cracked and mutilated, from which the island received from the Portu- guese the name it still bears. The statue was removed in 1864, and may now be seen in the Victoria Gardens, Bombay. At a short distance from this spot is a cave, the entrance to which is nearly 60 ft. wide and 18 high, supported by pillars cut out of the rock; the sides are sculptured into numerous compart- ments, containing representations of the Hindu deities, but many of the figures have been defaced by the zeal of the Mahommedans and Portuguese. In the centre of the excavations is a remarkable Trimurti or bust, formerly thought to represent the Hindu Triad, namely, Brahma the Creator, Vishnu the Preserver, and Siva or Mahadeva the Destroyer-; but now held to be a triform representation of Siva alone. The heads are from 4 to 5 ft. in length, and are well cut, and the faces, with the exception of the under lip, are handsome. The head-dresses are curiously ornamented; and one of the figures holds in it's hand a cobra, while on the cap are, amongst other symbols, a human skull and an infant. On each side of the Trimurti is a pilaster, the front of which is filled up by a human figure leaning on a dwarf, both much defaced. There is a large compartment to the right, hollowed a little, and covered with a great variety of figures, the largest of which is 16 ft. high, representing the double figure of Siva

and Parvati, named Viraj, half male and half female. On the right is Brahma, four-faced, on a lotus — one

of the very few representations of this god which now exist in India; and on the left is Vishnu. On the other side of the Trimurti is another compartment with various figures of Siva and Parvati, the most remarkable of which is Siva in his vindictive character, eight-handed, with a collet of skulls round his neck. On the right of the entrance to the cave is a square apartment, supported by eight colossal figures, containing a gigantic symbol of Mahadeva or Siva cut out of the rock. In a ravine connected with the great cave are two other caves, also containing sculptures, which, however, have been much defaced owing to the action of damp and the falling of the rocks; and in another hill is a fourth cave. This interesting retreat of Hindu religious art is said to have been dedicated to Siva, but it contains numerous representations of other Hindu deities. It has, however, for long been a place not so much of worship as of archaeological and artistic interest alike to the European and Hindu traveller. It forms a wonderful monument of antiquity, and must have been a work of incredible labour. Archaeological authorities are of opinion that the cave must have been excavated about the 10th century of the Christian era, if not earlier. The island is much frequented by the British residents of Bombay; and during his tour in India in 1875 King Edward VII., then prince of Wales, was entertained there at a banquet.

ELEPHANTIASIS (Barbadoes leg; Boucnemia), is a disease dependent on chronic lymphatic obstruction, and characterized by hypertrophy of the skin and subcutaneous tissue. Two distinct forms are known, (1) elephantiasis arabum, due to the development of living parasites, filaria sanguinis hominis (or filaria Bancrofti), and (2) the non-filarial form due to lymphatic obstruction from any other cause whatsoever, as erysipelas, the deposit of tuberculous or cancerous material in the lymphatic glands, phlegmasia dolens (white leg), long-continued eczema, &c. The enlargement is limited to a particular part of the body, generally one, or in rare cases both of the lower limbs, occasion- ally the scrotum, one of the labiae or the mammary gland; far more rarely the face. An attack is usually ushered in by febrile disturbance (elephantoid fever), the part attacked becoming rapidly swollen, and the skin tense and red as in erysipelas. The subcutaneous tissues become firm, infiltrated and hard, pitting only on considerable pressure. The skin becomes roughened with a network of dilated lymphatics, and vesicles and bullae may form, discharging a chyle-like fluid when broken (lymphorrhoea). In a later stage still the skin may be coarse and

wart-like, and there is a great tendency for varicose ulcers to form. At the end of a variable time enlargement ceases to take place, and the disease enters a quiescent state: but recru- descences occur at irregular intervals, always ushered in by elephantoid fever. At the end of some years the attacks of fever cease, and the affected part remains permanently swollen. The only difference in the history of the two forms of the disease lies in the fact that the non-filarial form progresses steadily, until either the underlying condition is cured, or in the case of cancer, &c, brings about a fatal issue. The elephantiasis due to filaria is spread by the agency of mosquitoes, in whose bodies the intermediate stage is passed. The dead mosquito falls upon the water, which thus becomes infected, and hence the ova reach the human stomach. The young worm develops, bores through the gastric mucous membrane and finally becomes lodged in the lymphatics, usually of one or other of the extremities. A large number of embryonic filariae are produced. Some remain in the lymphatic spaces and cause lymphatic obstruction, while others enter the blood stream by night (filaria nocturna), or by day (filaria diurna). It is supposed that a mosquito, biting an infected person, itself becomes infected with the blood it abstracts, and that so a new generation is developed.

Treatment for this condition is unsatisfactory. Occasionally the dilated lymph trunks can be found, and an operation per- formed to implant them in some vein (lymphangeioplasty). And in some few other cases artificial lymphatics have been made by introducing sterilized silk thread in the subcutaneous tissues of the affected part, and prolonging it into the normal tissues. This operation has been most successful when performed on

elephantoid arms dependent on a late stage of cancerous breast. Elevation of the limb and elastic pressure should always be tried, but often amputation has to be resorted to in the end. The disease is totally different from the so-called elephantiasis graecorum or true leprosy, for which see Leprosy.

ELEPHANT'S-FOOT, the popular name for the plant Testudi- naria elephantipes , a native of the Cape of Good Hope. It takes its name from the large tuberous stem, which grows very slowly but often reaches a considerable size, e.g. more than 3 yds. in circumference with a height of nearly 3 ft. above ground. It is rich in starch,

whence the name Hottentot bread, and is covered on the outside with thick, hard, corky plates. It develops slender, leafy, climbing shoots which die down each season. It is a member of the monocotyledonous order Dioscoreaceae,

half of the 17th century, when it became a centre for the trade with south Russia.

ELEUSIS, an ancient Greek city in Attica about 14 m. N.W. of Athens, occupying the eastern part of a rocky ridge close to the shore opposite the island of Salamis. Its fame is due chiefly to its Mysteries, for which see Mystery. Tradition carries back the origin of Eleusis to the highest antiquity. In the earlier period of its history it seems to have been an independent rival of Athens, and it was afterwards reckoned one of the twelve Old Attic cities. A considerable portion of its small territory was occupied by the plains of Thria, noticeable for their fertility, though the hopes of the husbandmen were not unfrequently disappointed by the blight of the south wind. To the west was the Hedlov 'Pdpiov or Rharian Plain, where Demeter is said to

climbing plants with slender herbaceous or shrubby shoots, to which belong the yam and the British black bryony, Tamus communis.

ELETS, a town of Russia, in the government of Orel, 122 m. by rail E.S.E. of Orel, on the railway which connects Riga with Tsaritsyn on the lower Volga. Pop. (1883) 36,680; '(1900) 38,239. Owing to its advantageous position Elets has grown rapidly. Its merchants buy large quantities of grain, and numerous flour-mills, many of them driven by steam, prepare flour, which is forwarded to Moscow and Riga. The trade in cattle is very important. Elets has the first grain elevator erected in Russia (1887), a railway school, and important tanneries, foundries for cast iron and copper, tallow-melting works, limekilns and brickworks. The cathedral and two monasteries contain venerated historic relics.

Elets is first mentioned in 1 147 , when it was a fort of Ryazan. The Turkish Polovtsi or Kumans attacked it in the 1 2th century, and the Mongols destroyed it during their first invasion (1239) and again in 1305. The Tatars plundered it in 1415 and 1450; and it seems to have been completely abandoned in the latter half of the 1 5th century. Its development dates from the second

have sown the first seeds of corn; and on its confines was the field called Orgas, planted with trees consecrated to Demeter and

Persephone. The sacred buildings were destroyed by Alaric in a.d. 396, and it is not certain whether they were restored before the extinction of all pagan rites by Theodosius. The present village on the site is of Albanian origin; it is called Lefsina or Lepsina, officially 'EXeucrts.

The Site. — Systematic excavations, begun in 1882 by D. Philios for the Greek Archaeological Society, have laid bare the whole of the sacred precinct. It is now possible to trace its boundaries as extended at various periods, and also many suc- cessive stages in the history of the Telesterion, or Hall of Initia- tion. These complete excavations have shown the earlier and partial excavations to have been in some respects deceptive.

In front of the main entrance of the precinct is a large paved area, with the foundations of a temple in it, usually identified as that of Artemis Propylaea; in their present form both area and temple date from Roman times; and on each side of the Great Propylaea are the foundations of a Roman triumphal arch. Just below the steps of the Propylaea, on the left as one enters, there has been discovered, at a lower level than the

Roman pavement, the curb surrounding an early well. This is almost certainly the naWlxopov 4>pkap mentioned by Pausanias. The Great Propylaea is a structure of Roman imperial date, in close imitation of the Propylaea on the Athenian Acropolis. It is, however, set in a wall of 6th-century work, though repaired in later times. This wall encloses a sort of outer court, of irregular triangular shape. The Small Propylaea is not set exactly opposite to the Great Propylaea, but at an angle to it; an inscription on the architrave records that it was built by Appius Claudius Pulcher, the contemporary of Cicero. It is also set in a later wall that occupies approximately the same position as two earlier ones, which date from the 6th and 5th centuries respectively, and must have indicated the boundary of the inner precinct. From the Small Propylaea a paved road pf Roman date leads to one of the doors of the Telesterion. Above the Small Propylaea, partly set beneath the overhanging rock, is the precinct of Pluto; it has a curious natural cleft approached by rock-cut steps. Several inscriptions and other antiquities were found here, including the famous head, now in Athens, usually called Eubouleus, though the evidence for its identifica- tion is far from satisfactory. A little

farther on is a rock-cut platform, with a well, approached by a broad flight of steps, which probably served for spectators of the sacred procession. Beyond this, close to the side of the Telesterion, are the founda- tions of a temple on higher ground; it has been conjectured that this was the temple of Demeter, but there is no evidence that such a building existed in historic times, apart from the Telesterion.

The Telesterion, or Hall of Initiation, was a large covered building, about 170 ft. square. It was surrounded on all sides by steps, which must have served as seats for the mystae, while the sacred dramas and processions took place on the floor of the hall: these seats were partly built up, partly cut in the solid rock; in later times they appear to have been cased with marble. There were two doors on each side of the hall, except the north-west, where it is cut out of the solid rock, and a rock terrace at a higher level adjoins it; this terrace may have been the station of those who were not yet admitted to the full initiation. The roof of the hall was carried by rows of columns, which were more than once renewed.

The architectural history of the hall has been traced by Professor W. Dorpfeld with the help of the various foundations that have been brought to light. The earliest building on the site is a small rectangular structure, with walls of polygonal masonry, built of the rock quarried on the spot. This was succeeded by a square hall, almost of the same plan as the later Telesterion, but about a quarter of the size; its eastern corner coincides with that of the later building, and it appears to have had a portico in front like that which, in the later hall, was a later addition. Its roof was carried by columns, of which the bases can still be seen. This building has with great probability been assigned to the time of Peisistratus; it was destroyed by the Persians. Between this event and the erection of the present hall, which must be sub- stantially the one designed by Ictinus in the time of Pericles, there must have been a restoration, of which we may see the remains in a set of round sinkings to carry columns, which occur only in the north-east part of the hall; a set of bases arranged on a different system occur in the south-west part, and it is difficult to see how these two systems could be reconciled unless there were some sort of partition between the two parts of the hall. Both sets were removed to make way for the later columns, of which the bases and some of the drums still remain. These later columns are shown, by inscriptions and other fragments built into their bases, to belong to later Roman times. At the eastern and southern corners of the hall of Ictinus are projecting masses of masonry, which may be the foundation for a portico that was to be added; but perhaps they were only buttresses, intended to resist the

thrust of the roof of this huge structure, which rested at its northern and western corners against the solid rock of the hill. On the south-east side the hall is faced with a portico, extending its whole width; the marble pavement of this portico is a most conspicuous feature of Eleusis at the present day. The portico was added to the hall by the architect Philo, under

Demetrius of Phalerum, about the end of the 4th century B.C. It was never completed, for the fluting of its columns still remains unfinished.

The Telesterion took up the greater part of the sacred precinct, which seems merely to have served to keep the profane away from the temple. The massive walls and towers of the time of Pericles, which resemble those of a fortress, are quite close in on the south and east; later, probably in the 4th century B.C., the precinct was extended farther to the south, and at its end was erected a building of considerable extent, including a curious apsidal chamber, for which a similar but larger curved structure was substituted in Roman times. This was probably the Bouleu- terion. The precinct was full of altars, dedications and in- scriptions; and many fragments of sculptures, pottery and other antiquities, from the earliest to the latest days of Greece, have been discovered. It is to be noted that the subterranean passages which some earlier explorers imagined to be connected with the celebration of the mysteries, have proved to be nothing but cisterns or watercourses.

The excavations of Eleusis, and the antiquities found in them, have been published from time to time in the 'E<£r;,uepis 'Apx a ™Xo7u £tJ and in the UpanTini. of the Greek Archaeological Society, especially for 1887 and 1895. See also D. Philios, Eletisis, ses mysteres, ses mines, et son musee. Inscriptions have also been published in the Bulletin de correspondance hellenique. (E. Gr.)

ELEUTHERIUS, pope from about 175 to 189. Allusions to him are found in the letters of the martyrs of Lyons, cited by Eusebius, and in other documents of the time. The Liber Pontificalis, at the beginning of the 6th century, says that he had relations with a British king, Lucius, who was desirous of being converted to Christianity. This tradition — Roman, not British — is an enigma to critics, and, apparently, has no historical foundation. (L. D.)*

ELEUTHEROPOLIS (Gr. 'EXevdkpa iro\is, "free city"), an ancient city of Palestine, 25 m. from Jerusalem on the road to Gaza, identified by E. Robinson with the modern Beit Jibrln. This

identification is confirmed by Roman milestones in the neighbourhood. It represents the Biblical Mareshah, the ruins of which exist at Tell Sandahannah close by. As Betogabra it is mentioned by Ptolemy; the name Eleutheropolis dates from the Syrian visit of Septimius Severus (a.d. 202). Eusebius in his Onomasticon uses it as a central point from which the distances of other towns are measured. It was destroyed in 796, rebuilt by the crusaders in 1134 (their fortress and chapel remain, much ruined). It was finally captured by Bibars, 1244. Beit Jibrln is in the centre of a district of great archaeological interest. Besides the crusader and other remains in the village itself, the surrounding country possesses many tells (mounds) covering the sites of ancient cities. The famous caves of Beit Jibrln honey- comb the hills all round. These are immense artificial excava- tions of unknown date. Roman milestones and aqueducts also are found, and close by the now famous tomb of Apollophanes, with wall-paintings of animals and other ornamentation, was discovered in 1902; a description of it will be found in Thiersch and Peters, The Marissa Tombs, published by the Palestine Exploration Fund. (R. A. S. M.)

ELEVATORS, Lifts or Hoists, machines for raising or lowering loads, whether of people or material, from one level to another. They are operated by steam, hydraulic or electric power, or, when small and light, by hand. Their construction varies with the magnitude of the work to be performed and the character of the motive power. In private houses, where only small weights, as coal, food, &c, have to be transferred from one floor to another, they usually consist simply of a small counter-balanced platform suspended from the roof or an upper floor by a tackle, the running part of which hangs from top to bottom and can be reached and operated at any level. In buildings where great weights and numbers of people have to be lifted, or a high speed of elevation is demanded, some form of motor is necessary. This is usually, directly or indirectly, a steam-engine or occasionally a gas-engine; sometimes a water- pressure engine is adopted, and it is becoming more and more common to employ an electric motor deriving its energy from

the general distribution of the city. Large establishments, hotels or business houses, commonly have their own source of energy, an electric or other power " plant," on the premises.

The hydraulic elevator is the simplest in construction of elevators proper, sometimes consisting merely of a long pipe set deeply in the ground under the cage and containing Construe- a correS pondingly long plunger, which rises and falls ekvators. as required and carries the elevator-cage on its upper end (fig. 1). The " stroke " is thus necessarily equal to the height traversed by the cage, with some surplus to keep the plunger steady within its guiding-pipe. The pipe or pump

Fig. 1. — The Plunger, or Direct Lift Hydraulic Engine.

chamber has a length exceeding the maximum rise and fall of the plunger, and must be strong enough to sustain safely the heavy hydraulic pressures needed to raise plunger and cage with load. The power is usually supplied by a steam pump (occasion- ally by a hydraulic motor) , which forces water into the chamber of the great pipe as the elevator rises, a waste-cock drawing off the liquid in the process of lowering the cage. A single handle within the cage generally serves to apply the pressure when raising, and to reduce it when lowering the load. The most common form of hydraulic elevator, for important work and under usual conditions of operation, as in cities, consists of a suspended cage, carried by a tackle, the running part of which

Fig. 2.— The Otis Standard Hydraulic Passenger Lift, with Pilot Valve and Lever-operating Device.

is connected with a set of pulleys at each end of a frame (fig. 2). The rope is made fast at one end, and its intermediate part is carried round first one pulley at the farther end of the frame and then round another at the nearer end, and so on as often as is found advisable in the particular case. The two pulley shafts carrying these two sets of pulleys are made to traverse the frame in such a way as, by their separation, to haul in on the running part, or, by their approximation, to permit the weight of the cage to haul out the rope. By this alternate hauling and " rendering " of the rope the cage is raised and lowered. The use of a number of parallel and independent sets of pulleys and tackles assures safety in case of the breakage of any one, each being strong enough alone to hold the load. The movement of the pair of pulley shafts is effected by a water- pressure engine, actuating the plunger of a pump which is similar to that used

in the preceding apparatus, but being relatively of short stroke and large diameter, is more satisfactory in design and construction as well as in operation. Electricity may be applied to elevators of this type by attaching the travelling sheaves to a nut in which works a screwed shaft driven by an electric motor. In other electric lifts the cables which support the cage are wound on a drum which is turned by a motor, the drum being connected to the motor-shaft either by a series of pinions or by a worm-gear. The drum may also be worked by a steam or gas engine. Where the traffic is not very heavy, a form of elevator that requires no attendant is convenient. In this any one wishing to use the lift has merely to press a button placed by the side of the lift-gate on the floor on which he happens to be standing, when the car will come to him; and having entered it he can cause it to travel to any floor he desires by pressing another button inside the car. The motive power in such cases may be either electric or hydraulic, but the control of the switches or valves that govern the action of the apparatus is electric.

The history of the elevator is chronologically extensive, but only since 1850 has rapid or important progress been effected. In that year George H. Fox & Co. built an elevator operated by the motion of a vertical screw, the nut on which carried the cage. This device was used in a number of instances, especially in hotels in the large cities, during the succeeding twenty years, and was then generally supplanted by the hydraulic lift of the kind already described as the plunger-lift. With the increased demand for power, speed, safety, convenience of manipulation, and comfort in operation, the inventive ability of the engineer developed the various systems more and more perfectly, and experience gradually showed to what service each type was best adapted and the best construction of each for its peculiar work. Whatever the class, the following are the essentials of design, construction and operation: the elevator must be

Essentials f comfortable, speedy and convenient, must not

of design, ‘ .’..,,. .

&c be too expensive in either first cost or maintenance,

and must be absolutely trustworthy. It must not be liable to fracture of any element of the hoisting gear that will permit either the fall of the cage or its projection by an over- weighted balance upwards against the top of its shaft. It must be possible to stop it, whether in regular working or in emergency, or when accident occurs, with sufficient promptness, yet without endangering life or property, or

even very seriously inconvenien- cing the passengers. Acceleration and retardation in starting and stopping must be smooth and easy, the stop must be capable of being made precisely where and when intended, and no danger must be incurred by the passengers from contact with running parts of the mechanism or with the walls and doors of the elevator shaft.

These requirements have been fully met in the later forms of elevator commonly employed for passenger service. Usual sizes range from loads of 1000 to 5000 lb with speeds of from 80 to 250 ft. a minute unloaded, and 75 to 200 ft. loaded, and a height of travel of from 50 to 200 ft. In some very tall build- ings, as the Singer and Metropolitan buildings in New York, elevators have been installed having a maximum speed of 600 ft. a minute, with a rise of over 500 ft. Where electric motors

are employed, their speed ranges from 600 and 700 revolutions per minute in the larger to 1000 and 1200 in the smaller sizes, corresponding to from 20 down to 4 or 5 h.p. Two or more counter-weights are employed, and from four to six suspension cables ensure as nearly as possible absolute safety. The electric elevators of the Central London railway are guaranteed to raise 17,000 lb 65 ft. in soma of its shafts, in 30 sees, from start to stop. Over 100,000 ft. of ˆ-in. and 17,000 ft. of f-in. steel rope are re- quired for its 24 shafts, and each rope can carry from 16 to 22 tons without breaking. The steel used in the cables, of which there are four to six for each car and counter-weight, has a tenacity of 85 to 90 tons per sq. in. of section of wire. The maximum pull on each set of rope is assumed to be not over 9500 lb, the remainder of the load being taken by the counter- balance. Oil " dash-pots " or buffers, into which enter plungers attached to the bottom of the cage, prevent too sudden a stop in case of accident, and safety-clutches with friction adjustments of ample power and fully tested before use give ample insurance against a fall even if all the cables should yield at once — an almost inconceivable contingency. The efficiency, i.e. the ratio of work performed to power expended in the same time, was in these elevators found by test to be between 70 and 75 %.

Safety devices constitute perhaps the most important of the later improvements in elevator construction where passengers are carried. The simplest and, where practicable, most certain of them is the " air-cushion," a chamber ,/ev/ces. into which the cage drops if detached or from any cause allowed to fall too rapidly to the bottom, compression of the air bringing it to rest without shock (fig. 3). This chamber must be perfectly air-tight, except in so far as a purposely

arranged clearance around the sides, diminishing downwards and in well- established proportion, is adjusted to per- mit a " dash-pot " action and to prevent rebound. The air-cushion should be about one-tenth the depth of the elevator shaft; in high buildings it may be a well 20 or 30 ft. deep. The Empire building, in New York, is twenty storeys in height, the total travel of the cage is 287 ft., and the air-cushion is 50 ft. deep, extending from the floor of the third storey to the bottom of the shaft. Sliding doors of great strength, and automatic in action, at the first and second floors, are the only openings. The shaft is tapered for some distance below the third floor, and then carried straight to the bottom. An inlet valve admits air freely as the cage rises, and an adjusted safety-valve provides against excess pres- sure. A " car," falling freely from the twentieth storey, was checked by this arrangement without injury to a basket of eggs placed on its floor. Other safety devices consist of catches under the floor of the cage, so arranged that they are held out of engagement by the pull on the cables. But if the strain is suddenly relieved, as by breakage of a cable or accident to the engine or motor, they in- stantly fly into place and, engaging strong side-struts in the shaft, hold the car until it can be once more lifted by its cables. These operate well when the cables part at or near the car, but they are apt to fail if the break occurs on the opposite side of the carrying sheaves at the top of the shaft, since the friction and inertia of the mass of the cables may in that case be sufficient to hold the pawls out of gear either entirely or until the headway is so great as to cause the smashing of all resistances when they do engage.

Another principle employed in safety arrangements is the

IX

**m*

ˆc

Fig. 3. Safety Air-Cushion.

action of inertia of parts properly formed and attached. Any dangerous acceleration of the cage causes the inertia of these parts to produce a retardation relative to the car which throws into action a brake or a catch, and thus controls the motion within safe limits or breaks the fall. The hydraulic brake has been used in this apparatus,

as have mechanical and pneumatic apparatus. This control of the speed of fall is most commonly secured by the employment of a centrifugal or other governor or regulator. The governor may be on the top of the cage and driven by a stationary rope fixed between the top and bottom of the shafts, or it may be placed at the top of the shaft and driven by a rope travelling with the car. Its action is usually to trip into service a set of spring grips or friction clutches, which, as a rule, grasp the guides of the cage and by their immense pressure and great resultant friction bring the cage to rest within a safe limit of speed, time and distance. A coefficient of friction of about 15% is assumed in their design, and this estimate is confirmed by their operation. Pressures of 10 tons or more are sometimes provided in these grips to ensure the friction required. There are many different forms of safety device of these various classes, each maker having his own. The importance of absolute safety against a fall is so great that the best builders are not satisfied with any one form or principle, but combine provisions against every known danger, and often duplicate such precau- tions against the most common accidents.

The " travelling staircase," which may be classed among the passenger elevators, usually consists of a staircase so constructed that while the passenger is ascending it the whole structure is also ascending at a predetermined rate, so that the progress made is the sum of the two rates of motion. The system of " treads and risers " is carried on a long endless band of chain sustained by guides holding it in its desired line, and rendering at either end over cylinders or sprockets. The junctions between the stairway and the upper or lower floors are ingeniously arranged so as to avoid danger of injury to the passengers.

Freight elevators have the same general forms as the passenger elevators, but are often vastly larger and more powerful, and are not as a rule fitted up for such heights of lift, or constructed with such elaborate provision for safety or with any special finish. Elevators raising grain, coal, earth and similar materials, such as can be taken up by scooping into a bucket, or can be run into and out of the bucket by gravity, constitute a class by them- selves, and are described in the article Conveyors.

The term " grain elevator " is often used to include buildings as well as machinery, and it is not unusual in Europe to hear a flour-mill, with its system of motor machinery, mills, elevator and storage departments, spoken of as an " American elevator " (see Granaries).

ELF (O. Eng. aelf; cf. Ger. Alp, nightmare), a diminutive supernatural being of Teutonic mythology, usually of a more or less mischievous and malignant character, causing diseases and evil dreams, stealing children and substituting changelings, and thus somewhat different from the Romanic fairy, which usually has less sinister associations. The prehistoric arrow- heads and other flint implements were in England early known as " elf-bolts " or " elf-arrows," and were looked on as the weapons of the elves, with which they injured cattle. So too a tangle in the hair was called an " elf-lock," as being caused by the mischief of the elves.

ELGAR, SIR EDWARD (1857-), English musical com- poser, son of W. H. Elgar, who was for many years organist in the Roman Catholic church of St George at Worcester, was born there on the 2nd of June 1857. His father's connexion with music at Worcester, with the Glee Club and with the Three Choirs Festivals, supplied him with varied opportunities for a musical education, and he learnt to play several instruments. In 1879 he became bandmaster at the county lunatic asylum, and held that post till 1 884. He was also a member of an orchestra at Birmingham, and in 1883 an intermezzo by him was played there at a concert. In 1882 he became conductor of the Worcester Amateur Instrumental Society; and in 1885 he suc- ceeded his father as organist at St George's, Worcester. There he

wrote a certain amount of church music. In 1889 he moved to London, but finding no encouragement retired to Malvern in 1891; in 1904 he went to live at Hereford, and in 1905 was made professor of music at Birmingham University. To the public generally he was hardly known till his oratorio The Dream of Gerontius was performed at Birmingham in 1900, but this was at once received as a new revelation in English music, both at home and by Richard Strauss in Germany, and the composer was made a Mus. Doc. at Cambridge. His experience in writing church music for a Roman Catholic service cannot be overlooked in regard to this and other works by Elgar, who came to be regarded as the representative of a Catholic or neo-Catholic style of religious music, for which an appreciative public was ready in England at the moment, owing to the recent developments in the more artistic and sensuous side of the religious movement. And the same interest attached to his later oratorios, The Apostles (1903) and The Kingdom (1906). But Elgar's sudden rise into popularity, confirmed by his being knighted in 1904, drew attention to his other productions. In 1896 his Scenes from the Saga of King Olaf was recognized by musicians as a fine work, and in the same year his Scenes from the Bavarian Highlands and Lux Christi were performed; and apart from other important

compositions, his song-cycle Sea-Pictures was sung at Norwich in 1899 by Clara Butt, and his orchestral Variations on an original theme were given at a Richter concert in the same year. In 1901 his popular march " Pomp and Circumstance " was played at a promenade concert, the stirring melody of his song " Land of Hope and Glory " being effectually utilized. It is impossible here to enumerate all Sir Edward Elgar's works, which have excited a good deal of criticism in musical circles without impairing his general recognition as one of the few front-rank English composers of his day; but his most important later production, his first orchestral symphony, produced in 1908 with immediate success, raised his reputation as a composer to an even higher place, as a work of marked power and beauty, developing the symphonic form with the originality of a real master of his art. In 1908 he resigned his professorship at Birmingham University.

ELGIN, a city of Kane county, Illinois, U.S.A., in the N. part of the state, 36 m. N.W. of Chicago. Pop. (1880) 8787; (1890) 17,823; (1900) 22,433, of whom 5419 were foreign-born; (1910 census) 25,976. Elgin is served by the Chicago & North- western and the Chicago, Milwaukee & St Paul railways, and by interurban electric railways to Chicago, Aurora and Belvidere. The city is the seat of the Northern Illinois hospital for the insane, of the Elgin Academy (chartered 1839; opened 1856), and of St Mary's Academy (Roman Catholic) ; and has the Gail Borden public library, with 35,000 volumes in 1908. The city has six public parks, Lord's Park containing 112, and Wing Park 121 acres. The city is in a fine dairying region and is an important market for butter. Among Elgin's manufactures are watches and watch-cases, butter and other dairy products, cooperage (especially butter tubs), canned corn, shirts, foundry and machine-shop products, pipe-organs, and caskets and casket trimmings; in 1905 Elgin's total factory product was valued at $9,349,274. The Elgin National Watch factory, and the Borden milk-condensing works, are famous throughout the United States and beyond. The publishing office of the Dunkers, or German Brethren, is at Elgin; and several popular weeklies with large circulations are published here. A permanent settlement was made as early as 1835, and Elgin was chartered as a city in 1854 and was rechartered in 1880.

ELGIN, a royal, municipal and police burgh, and county town of Elginshire, Scotland, situated on the Lossie, 5 m. S. of Lossiemouth its port, on the Moray Firth, and 71J m. N.W. of Aberdeen, with stations on the Great North of Scotland and Highland railways. Pop. (1901) 8460. It is a place of very con- siderable antiquity, was

created a royal burgh by Alexander I., and received its charter from Alexander II. in 1234. Edward I. stayed at the castle in 1296 and 1303, and it was to blot out the memory of his visit that the building was destroyed im- mediately after national independence had been reasserted.

The hill on which it stood was renamed the Ladyhill, and on the scanty ruins of the castle now stands a monument to the 5th duke of Gordon, consisting of a column surmounted by a statue. The burgh has suffered periodically from fire, notably in 1452, when half of it was burnt by the earl of Huntly. Montrose plundered it twice in 1645. In 1746 Prince Charles Edward spent a few days in Thunderton House. His hostess, Mrs Anderson, an ardent Jacobite, kept the sheets in which he slept, and was buried in them on her death, twenty-five years after- wards. For fifty years after this date the place retained the character and traditions of a sleepy cathedral city, but with the approach of the 19th century it was touched by a more modern spirit. As the result much that was picturesque disappeared, but the prosperity of Elgin was increased, so that now, owing to its pleasant situation in " the Garden of Scotland," its healthy climate, cheap living, and excellent educational facilities, it has become a flourishing community. The centre of interest is the cathedral of Moray, which was founded in 1224, when the church of the Holy Trinity was converted to this use. It was partially burned in 1270 and almost destroyed in 1390 by Alexander Stewart, the Wolf of Badenoch, natural son of Robert II., who had incurred the censure of the Church. In 1402 Alexander, lord of the Isles, set fire to the town, but spared the cathedral for a consideration, in memory of which mercy the Little Cross (so named to distinguish it from the Muckle or Market Cross, restored in 1888) was erected. After these outrages it was practically rebuilt on a scale of grandeur that made it the most magnificent example of church architecture in the north. Its design was that of a Jerusalem cross, with two flanking towers at the east end, two at the west end, and one in the centre, at the intersection of the roofs of the nave and transepts. It measured 282 ft. long from east to west by 120 ft. across the transepts, and consisted of the choir, the gable of which was pierced by two tiers of five lancet windows and the Omega rose window; the north transept, in which the Dunbars were buried, and the south transept, the doorway of which is interesting for its dog's-tooth ornamentation; and the nave of five aisles. The grand entrance was by the richly

carved west door, above which was the Alpha window. The central steeple fell in 1506, but was rebuilt, the new tower with its spire reaching a height of 198 ft. By 1 538 the edifice was complete in every part. Though the Reformation left it unscathed, it suffered wanton violence from time to time. By order of the privy council the lead was stripped off the roofs in 1567 and sold to Holland to pay the troops; but the ship conveying the spoils foundered in the North Sea. In 1637 the roof-tree of the choir perished during a gale, and three years later the rich timber screen was demolished. The central tower again collapsed in 17 11, after which the edifice was allowed to go to ruin. Its stones were carted away, and the churchyard, overgrown with weeds, became the dumping- ground for rubbish. It lay thus scandalously neglected until 1824, when John Shanks, a " drouthy " cobbler, was appointed keeper. By a species of inspiration this man, hitherto a ne'er-do- well, conceived the notion of restoring the place to order. Un- dismayed, he attacked the mass of litter and with his own hands removed 3000 barrow-loads. When he died in 1841 he had cleared away all the rubbish, disclosed the original plan, and collected a quantity of fragments. A tablet, let into the wall, contains an epitaph by Lord Cockburn, recording Shanks's services to the venerable pile, which has since been entrusted to the custody of the commissioners of woods and forests. The chapter-house, to the north-east of the main structure, suffered least of all the buildings, and contains a 'Prentice pillar, of which a similar story is told to that of the ornate column in Roslin chapel. In the lavatory, or vestibule connecting the chapter- house with the choir, Marjory Anderson, a poor half-crazy creature, a soldier's widow, took up her quarters in 1748. She cradled her son in the piscina and lived on charity. In the course of time the lad joined the army and went to India, where he rose to the rank of major-general and amassed a fortune of £70,000 with which he endowed the Elgin Institution (commonly known as the Anderson Institution) at the east end of High

Street, for the education of youth and the support of old age. Within the precincts of the cathedral grounds stood the bishop's palace (now in ruins), the houses of the dean and archdeacon (now North and South Colleges) , and the manses of the canons. Other ecclesiastical buildings were the monasteries of Blackfriars (1230) and Greyfriars (1410) and the preceptory of Maisondieu (1240). They also were permitted to fall into decay, but the 3rd marquess of Bute undertook the restoration of the Grey- friars' chapel. The parish church, in the Greek style, was built in 1828. Gray's hospital, at the west end of High Street, was endowed by Dr Alexander Gray (1751-1808), and

at the east end stands the Institution, already mentioned, founded by General Andrew Anderson (1746-1822). Other public buildings include the assembly rooms, the town-hall, the museum (in which the antiquities and natural history of the shire are abundantly illustrated), the district asylum, the academy, the county buildings and the court house, the market buildings, the Victoria school of science and art, and Lady Gordon-Cumming's children's home. In 1903 Mr G. A. Cooper presented his native town with a public park of 42 acres, containing lakes representing on a miniature scale the British Isles. Grant Lodge, an old mansion of the Grant family, occupying the south-west corner of the park, was converted into the public library. From the top of Ladyhill the view commands the links of the Lossie and the surrounding country, and a recreation ground is laid out on Lossie Green.

The industries include distilling and brewing, nursery garden- ing, tanning, saw and flour mills, iron-foundries and manu- factures of woollens, tweeds and plaiding, and the quarrying of sandstone. Elgin combines with Banff, Cullen, Inverurie, Kintore and Peterhead to return one member to parliament, and the town is controlled by a council with provost and bailies.

Two miles and a half S. by W. of Elgin stands the church of Birnie, with the exception of the church at Mortlach in Banffshire probably the oldest place of public worship in Scotland still in use. It is not later than 1 150 and, with its predecessor, was the cathedral of Moray during the rule of the first four bishops; the fourth bishop, Simon de Toeny, an Englishman, was buried in its precincts in 1184. In the church is preserved an old Celtic altar-bell of hammered iron, known as the " Ronnell bell." Such is the odour of sanctity of this venerable church that there is an old local saying that "to be thrice prayed for in the kirk of Birnie will either mend or end ye." Six miles to the S.W. of Elgin, charmingly situated in a secluded valley encircled by fir- clad heights, lie the picturesque remains of Pluscarden Priory, a Cistercian house founded by Alexander II. in 1230. The ruins, consisting of tower, choir, chapter-house, refectory and other apartments, are nearly hidden from view by their dense coating of ivy and the fine old trees, including many beautiful examples of copper beech, by which they are surrounded. Its last prior, Alexander Dunbar, died in 1560. The Liber Pluscardensis, a valuable authority on early Scots history, was compiled in the priory by Maurice Buchanan in 146 1. The chronicle comes down to the death of James I. The 3rd marquess of Bute acquired the ruins in 1897.

ELGIN AND KINCARDINE, EARLS OF. Thomas Bruce, 7th earl of Elgin (1766-1841), British diplomatist and art collector, was born on the 20th of July 1766, and in 177 1 succeeded his brother in the Scottish peerage as the 7th earl of Elgin (cr. 1633), and nth of Kincardine (cr. 1647). He was educated at Harrow and Westminster, and, after studying for some time at the uni- versity of St Andrews, proceeded to the continent, where he studied international law at Paris, and military science in Germany. When his education was completed he entered the army, in which he rose to the rank of general. His chief attention was, however, devoted to diplomacy. In 1792 he was appointed envoy at Brussels, and in 1795 envoy extraordinary at Berlin; and from 1799 to 1802 he was envoy extraordinary at the Porte. It was during his stay at Constantinople that he formed the purpose of removing from Athens the celebrated sculptures now known as the Elgin Marbles. His doing so was censured by some as vandalism, and doubts were also expressed as to the artistic value of many of the marbles; but he vindicated himscli

in a pamphlet published in 1810, and entitled Memorandum on the Subject of the Earl of Elgin's Pursuits in Greece. In 1816 the collection was purchased by the nation for £36,000, and placed in the British Museum, the outlay incurred by Lord Elgin having been more than £50,000. Lord Elgin was a Scottish representa- tive peer for fifty years. He died at Paris on the 14th of November

1841.

James Bruce, 8th earl of Elgin (181 1-1863), British statesman, eldest son of the 7th earl by his second marriage, was born in 181 1, and succeeded to the peerage as 8th earl of Elgin and 12th of Kincardine in 1841. He was educated at Eton and at Christ Church, Oxford, where he had as companions and rivals his younger predecessors in the office of governor-general of India, Dalhousie and Canning. He began his official career in 1842 at the age of thirty, as governor of Jamaica. During an adminis- tration of four years he succeeded in winning the respect of all classes. He improved the condition of the negroes and con- ciliated the planters by working through them. In 1846 Lord Grey appointed him governor-general of Canada. Son-in-law of the popular earl of Durham, he was well received by the colonists, and he set himself deliberately to carry out the Durham policy. In this his frank and genial manners aided him

power- fully. His assent to the local measure for indemnifying those who had suffered in the troubles of 1837 led the mob of Montreal to pelt his carriage for the rewarding of rebels for rebellion, as Mr Gladstone described it. But long before his eight years' term of service expired he was the most popular man in Canada. His relations with the United States, his hearty support of the self-government and defence of the colony, and his settlement of the free-trade and fishery questions, led to his being raised in 1849 to the British peerage as Baron Elgin.

Soon after his return to England in 1854, Lord Palmerston offered him a seat in the cabinet as chancellor of the duchy of Lancaster, which he declined. But when, in 1856 the seizure of the " Arrow " by Commissioner Yeh plunged England into war with China, he at once accepted the appointment of special envoy with the expedition. On reaching Point de Galle he was met by a force summoned from Bombay to Calcutta by the news of the sepoy mutiny at Meerut on the nth of May. His first idea, that the somewhat meagre intelligence would justify most energetic action in China, was at once changed when urgent letters from Lord Canning reached him at Singapore, the next port, on the 3rd of June. H.M.S. " Shannon " was at once sent on to Calcutta with the troops destined for China, and Lord Elgin himself followed it, when gloomier letters from India reached him. The arrival of the " Shannon " gave new life to the handful of white men fighting for civilization against fearful odds, and before the reinforcements from England arrived the back of the mutiny had been broken. Nor was the position -in China seriously affected by the want of the troops. Lord Elgin sent in his ultimatum to Commissioner Yeh at Canton on the same day, the 1 2th of December, that he learned the relief of Lucknow, and he soon after sent Yeh a prisoner to Calcutta. By July 1858, after months of Chinese deception, he was able to leave the Gulf of Pechili with the emperor's assent to the Treaty of Tientsin. Subsequently he visited Japan, and obtained less considerable concessions from its government in the Treaty of Yeddo. It is true that the negotiations were confined to the really subordinate Tycoon or Shogun, but that visit proved the beginning of British influence in the most progressive country of Asia. Unfortunately, the Chinese difficulty was not yet at an end. After tedious disputes with the tariff commissioners as to the opium duty, and a visit to the upper waters of the Yang-tzse, Lord Elgin had reached England in May 1859. But when his brother and the allied forces attempted to proceed to Peking with the ratified treaty, they were fired on from the Taku forts at the mouth of the Peiho. The Chinese had resolved to try the fortune of war once more, and Lord

Russell again sent out Lord Elgin as ambassador extraordinary to demand an apology for the attack, the execu- tion of the treaty, and an indemnity for the military and naval expenditure. Sir Robert Napier (afterwards Lord Napier of Magdala) and Sir Hope Grant with the French, so effectually

routed the Tatar troops and sacked the Summer Palace that by the 24th of October i860 a convention was concluded which was " entirely satisfactory to Her Majesty's government." Lord Elgin had not been a month at home when Lord Palmerston selected him to be viceroy and governor-general of India. He had now attained the object of his honourable ambition, after the office had been filled in most critical times by his juniors and old college companions, the marquis of Dalhousie and Earl Canning. He succeeded a statesman who had done much to reorganize the whole administration of India, shattered as it had been by the mutiny. But, as the first viceroy directly appointed by the Crown, and as subject to the secretary of state for India, Lord Elgin at once gave up all Lord Canning had fought for, in the co-ordinate independence, or rather the stimulating responsi- bility, of the governor-general, which had prevailed from the days of Clive and Warren Hastings. On the other hand, he loyally carried out the wise and equitable policy of his predecessor towards our feudatories with a firmness and a dignity that in the case of Holkar and Udaipur had a good effect. He did his best to check the aggression of the Dutch in Sumatra, which was contrary to treaty, and he supported Dost Mahommed in Kabul until that aged warrior entered the then neutral and disputed territory of Herat. Determined to maintain inviolate the in- tegrity of our own north-west frontier, Lord Elgin assembled a camp of exercise at Lahore, and marched a force to the Pesha- war border to punish those branches of the Yusufzai tribe who had violated the engagements of 1858.

It was in the midst of this " little war " that he died. Soon after his arrival at Calcutta, he had projected the usual tour to Simla, to be followed by an inspection of the Punjab and its warlike ring-fence of Pathans. He even contemplated the summoning of the central legislative council at Lahore. After passing the summer of 1863 in the cool retreat of Peterhoff , Simla, Lord Elgin began a march across the hills from Simla to Sialkot by the upper valleys of the Beas, the Ravi and the Chenab, chiefly to decide the two allied questions of tea cultivation and trade routes to Kashgar and Tibet. The climbing up to the Rotung Pass (13,000 ft.) which separates the Beas valley from that of the Chenab, and the crossing of the frail twig bridge across the Chundra torrent, prostrated him by the time he had descended into the smiling English-like Kangra valley. Thence he

wrote his last letter to Sir Charles Wood, still full of hope and not free from anxiety as to the Sittana expedition. At the lovely hill station of Dharmsala, " the place of piety," he died of fatty degeneration of heart on the 20th of November 1863.

For his whole career see Letters and Journals of James, Eighth Earl of Elgin, edited by Walrond, but corrected by his brother-in- law, Dean Stanley; for the China missions see Narrative of the Earl of Elgin's Mission to China and Japan, by Laurence Oliphant, his private secretary; for the brief Indian administra'tion see the Friend of India for 1862-1863.

Victor Alexander Bruce, gth earl of Elgin (1849-), British statesman, was born on the 16th of May 1849, the son of the 8th earl, and was educated at Eton and Balliol College, Oxford. In 1863 he succeeded as gth earl of Elgin and 13th of Kincardine. A Liberal in politics, he became first commissioner of works (1886), and subsequently viceroy of India (1894-1899). His administration in India was chiefly notable for the frontier risings of 1897-1898. The Afridis broke out into a fanatical revolt and through hesitation on the part of the government were allowed to seize the Khyber Pass, necessitating the Tirah Expedition. After his return to England be was nominated chairman of the royal commission to investigate the conduct of the South African War; and on the formation of Sir Henry Campbell-Bannerman's ministry in December 1905, he became a member of the cabinet as secretary of state for the colonies. In this capacity, though he showed many statesmanlike qualities, he was somewhat overshadowed by his brilliant under-secretary in the Commons, Mr Winston Churchill, whose speeches on colonial affairs were as aggressive as Lord Elgin's were cautious; and when in April 1908, Mr Asquith became prime minister, Lord Elgin retired from the cabinet.

ELGINSHIRE

269

ELGINSHIRE, or Moray (Gaelic " among the sea-board men "), a northern county of Scotland, bounded N. by the Moray Firth, E. and S.E. by Banffshire, S. and S.W. by Inverness and W. by Nairnshire. It comprises only the eastern portion of the ancient province of Moray, which extended from the Spey to the Beauly and from the Grampians to the sea, embracing an area of about 3900 sq. m. The area of the county is 305,119 acres, or 477 sq. m.

Elginshire is naturally divided into two sections, the level and fertile coast and its hinterland — " the Laigh o' Moray," a tract 30 m. long by from 5 to 1 2 m. broad — and the hilly country in the south. There are, however, no high mountains. Cam Ruigh (1784 ft.), Larig Hill (1783) and Cam Kitty (1711) are the chief eminences in the south-central district until the ridge of the Cromdale Hills is reached on the Banffshire border, where the highest point is 2329 ft. above the sea. The two most im- portant rivers, the Spey (q.v.) and the Findhorn, both have their sources in Inverness-shire. About 50 m. of the course of the Spey are in Elginshire, to which it may be roughly said to serve as the boundary line on the south-east and east. The Findhorn rises in the Monadliadh Mountains which form the watershed for several miles between it and the Spey. Of its total course of nearly 70 m. only the last 12 are in the county, where it separates the woods of Altyre from the Forest of Damaway, before entering the Moray Firth in a bay on the north-eastern shore to which it has given its name. During the first 7 m. of its flow in Elginshire the stream passes through some of the finest scenery in Scotland. It is liable to sudden risings, and in the memorable Moray floods of August 1829 wrought the greatest havoc. Of other rivers the Lossie rises in the small lakes on the flanks of Cam Kitty and pursues a very winding course of 34 m. till it reaches the Moray Firth; Ballintomb Burn, Rothes Burn and Tulchan Burn are left-hand affluents of the Spey; the Dorbock and Divie, uniting their forces near Dunphail House, join the Find- horn at Relugas; and Muckle Water, a left-hand tributary of the Findhorn, comes from Nairnshire. The Spey and Findhorn are famous for salmon, but some of the smaller streams, too, afford good sport. The lochs are few and unimportant, among them being Loch Spynie, 2§ m. N., and Loch-na-Bo, 4 m. S.E. of Elgin; Loch of Blairs, 2J m. S. of Forres; Loch Romach, 3 m. S. of Rafford; Loch Dallas, about 4 m. S.W. of Dallas, and Lochindorb in the S.W., 6 m. N.N.W. of Grantown. Loch Spynie was once a lake extending from the Firth to within 2\ m. of Elgin and covering an area of over 2000 acres. Its shores were the haunt of a great variety of birds, and its waters were full of salmon, sea-trout and pike. But early in the 19th century it was resolved to reclaim the land, and the drainage works then undertaken reduced the beautiful loch to a swamp of some 120 acres.

Lochindorb is now the largest lake, being 2 m. in length and fully \ m. wide. In the upper end, on an island believed to be artificial, stand the ruins of Lochindorb Castle, in the 14th century the stronghold of the Wolf of Badenoch, and afterwards success- ively the property of the earl of Moray, the Campbells of Cawdor and the

earl of Seafield. Sir Thcmas Dick Lauder saw at Cawdor Castle a massive iron gate which, according to tradition, Sir Donald Campbell of Cawdor carried on his back from Lochindorb to Cawdor, a distance of 13 m. In the southern half of the county, amongst the hills, are several glens, among them the Glen of Rothes, Glen Lossie, Glen Gheallaidh, Glen Tulchan and Glen Beag. Strathspey, though more of a valley than a glen, is remarkable for its extent and beauty.

Geology. — This county may be divided geologically into two areas, the hilly region to the south being composed of the crystalline schists of the Central Highlands and the fertile plain of Moray being made up of Old Red Sandstone and Triassic strata. In the Cromdale Hills in the south-east of the county the metamorphic series comprises schistose quartzite, quartz-schists, micaceous flagstones and mica-schists, which are granulitic and holocrystalline, the dark laminae in some cases containing heavy residues such as ilmenite and zircon. The greater portion of the metamorphic area west of the Spey consists of granulitic quartz-biotite-granulites and bands of muscovite-biotite-schist belonging to the Moine series of the Geological Survey (see Scotland : Geology). In certain areas these

are permeated by granitic material in the form of thin strings, knots and veins. Excellent sections of these rocks are exposed in the Findhorn, the Divie and the tributaries of the Spey. Near Gran- town there is a group locally developed, comprising crystalline limestone with tremolite, kyanite gneiss, muscovite-biotite-schist and quartzite, the age and relations of which are still uncertain. The general strike of the crystalline schists, save where there are local deflections, is north-east and south-west, and the general dip is to the south-east. Between Lochindorb and Grantown there is a mass of granite belonging to the later intrusions of the Highlands represented by the Cairngorm granite. Within the county there are representatives of the middle and upper divisions of the Old Red Sandstone resting unconformably on the crystalline schists. The strata of the middle or Orcadian series consist of conglomerates, sandstones, shales and clays, with limestone nodules containing fish remains. This sequence is well displayed in the banks of the Spey north of Boat of Bridge and in the Tynet Burn east of Fochabers, the latter being one of the well-known localities for ichthyolites in the middle or Orcadian division. In the Tynet and Gollachie Burn sections, the fish bed is overlaid by conglomerates and red pebbly sandstones, passing upwards into a thin zone of andesite lavas, indicating contemporaneous volcanic action. West of the Tynet Burn and Spey sections there is no trace of the members of the Orcadian division till we reach the Muckle Burn and Lethen Bar in Nairnshire, save the coarse conglomerate filling

the ancient hollow of the valley of Rothes which may belong to the middle series. In that direction they are overlapped by the Upper Old Red Sandstone, which in the river Lossie, in the Lochty Burn and the Findhorn rest directly on the metamorphic rocks. Even to the south of the main boundary of the upper division there are small outliers of that series resting on the crystalline schists. Hence there must be a dis- cordance between the Middle and Upper Old Red Sandstone in this county. The strata of the upper division consist of red, grey and yellow false-bedded sandstones with conglomeratic bands, which are well seen in the Findhorn between Sluie and Cothall, where they are associated with a bed of cornstone, all dipping to the N.N.W. at gentle angles. South of Elgin they are exposed in the Lossie and at Scaat Craig, while to the north of that town they extend along the ridge from Bishopmill to Alves. By means of the fish remains, which occur at Scaat Craig, in the Bishopmill quarries, at Alves, in the Findhorn cliffs and in the Whitemyre quarry on the Muckle Burn, the Upper Old Red Sandstone in this county is arranged in two groups, the Alves and Rosebrae. In the area lying to the north of the Upper Old Red Sandstone ridge at Bishopmill and Quarry- wood, the strata of Triassic age occur, where they consist of pale grey and yellow sandstones and a peculiar cherty and calcareous band, known as the cherty rock of Stotfield. The sandstones are visible in quarries on the north slope of Quarry Wood, at Findrassie, at Spynie and along the ridge and sea-shore between Burghead and Lossiemouth. Thev are invested with special interest on account of the remarkabfe series of reptilian remains obtained from them, comprising Stagonolepis , a crocodile allied to the modern caiman in form; Telerpeton and Hyperodapedon, species of lizards; Dicynodonts (Gordonia and Geikia) and a horned reptile, Elginia mirabilis (see Scotland: Geology). The palaeontological evidence points to the conclusion that these reptiliferous sandstones must belong in part to the Trias, indeed it is possible that the lower portion may be of Permian age. In the Cutties Hillock quarry west of Elgin these reptiliferous beds rest directly on the sandstones containing Holoptychius of Upper Old Red Sandstone age, so that the apparent conformability must be entirely deceptive. Within the area occupied by the Trias west of Stotfield, flagstones appear, charged with fish scales of Upper Old Red age, where they form a low ridge protruding through the younger strata. Both the Upper Old Red and Triassic sandstones have been largely quarried for building purposes. On the shore at Lossiemouth there is a patch of greenish white sandstones yielding fossils characteristic of the Lower

The glacial deposits distributed over the fertile plain of Moray and in

the upland valleys are of interest. The low grounds were crossed by the ice descending the Moray Firth in an easterly and south-easterly direction, which carried boulders of granite from Strath Nairn and augen gneiss from Easter Ross. In the Elgin district, boulders belonging to the horizons of the Lower and Middle Lias, the Oxford Clay and the Upper Chalk are found both in the glacial deposits and on the surface of the ground. The largest trans- ported mass occurs at Linksfield, where a succession of limestones and shales rests on boulder clay and is covered by it, which from the fossils may be of Rhaetic or Lower Lias age.

Climate and Agriculture. — The climate of the coast is equable and mild, even exotic fruits ripening readily in the open. The uplands are colder and damp.' The average temperature in January is 38 F. and in July 58-5°, while for the year the mean is 47° F. The rainfall for the year averages 26 in. Considering its latitude and the extent of its arable land the standard of farming in Elginshire is high. The rich soil of the lowlands is well adapted for wheat, barley and oats The acreage confined

to the glens and straths under barley approximates that under oats. In the uplands, oats is the principal cereal. The breeding of live-stock is profitable, and some of the finest specimens of shorthorned and polled cattle and of crosses between the two aa; bred. On the larger farms in the Laigh Leicester sheep are kept all the year round, but in the uplands the Blackfaced take their place. Large numbers of horses and pigs are also raised.

Other Industries. — Whisky is the chief product, and the numerous distilleries are usually busy. There are woollen mills at Elgin and elsewhere and chemical works at Forres and Burg- head. Owing to the absence of coal what little mineral wealth there is (iron and lead) cannot be remuneratively worked. The sandstone quarries, yielding a building-stone of superior quality, are practically inexhaustible. The plantations mainly consist of larch and fir and, to a smaller extent, of oak. Much timber was once floated down the Spey and other rivers, but, since the increased facilities of carriage afforded by the railways, trees have been felled on a wider scale. Boat-building is carried on at Burghead, Lossiemouth and Kingston — so-called from the fact that a firm from Kingston-on-Hull laid down a yard there in 1784 — while at Garmouth the fishing fleet lies up during the winter

an'd is also repaired there. The Firth fisheries are of considerable value. The boats go out from Findhorn, Burghead, Hopeman and Lossiemouth, which are all furnished with safe harbours. Findhorn has been twice vsited by calamities. The first village was overwhelmed by the drifting sands of Culbin, and the second was buried beneath the waves in 1 701 . Kingston harbour is tidal, exposed, and liable to interruption from a shifting bar. The deep sea fisheries comprise haddock, cod, ling and herring, and the Spey, Findhorn and Lossie yield large quantities of salmon.

The Great North of Scotland railway enters the shire in the S.E. from Craigellachie, whence a branch runs up the Spey to Boat of Garten in Inverness-shire, and in the N.E. from Port Gordon, running in both cases to Elgin, from which a branch line extends to Lossiemouth. The Highland railway traverses the western limits of the shire running almost due north to Forres, whence it turns westward to Nairn and eastward to Elgin. From the county town it runs to Aberdeen via Orbliston and Keith, with a branch to Fochabers from Orbliston.

Population and Government. — The population was 43,471 in 1891 and 44,800 in 1901, when 1865 persons spoke both Gaelic and English, and 2 spoke Gaelic only. The chief towns are Elgin (pop. in 1901, 8460), Forres (4313) and Lossiemouth (3904), to which may be added Rothes (1621), Grantown (1568) and Burghead (1531). In conjunction with Nairnshire the county returns one member to parliament. Elgin and Forres are royal burghs; the municipal and police burghs include Burghead, Elgin, Forres, Grantown, Lossiemouth, and Rothes. Elginshire is included in one sheriffdom with Inverness and Nairn, and there is a resident sheriff-substitute at Elgin. The county is under school-board jurisdiction, several of the schools earning grants for higher education. There are academies at Elgin and Fochabers and science and art and technical schools at Elgin and Grantown. The bulk of the " residue " grant is spent in subsidizing the agricultural department of Aberdeen University and the science schools and art and technical classes in the county.

History. — Moray, in the wider sense, was first peopled by Picts of the Gaelic branch of Celts, of whom relics are found in the stone circle at Viewfield and at many places in Nairnshire. Christianity, introduced under the auspices of Columba (from whose time the site of Burghead church has probably been so occupied), flourished for a period until the Columban church was expelled in 717 by King Nectan. Thereafter the district was given over to internecine strife between the northern and southern Picts, which was ended by the crushing victory of Kenneth MacAlpine in 831, as one result of

which the kingdom of Pictavia was superseded by the principality of Moravia. Still, settled order had not yet been secured, for the Norsemen raided the country first under Thorstein and then under two Sigurds. It was in the time of the second Sigurd that the Firth

was fixed as the northern boundary of Moray. In spite of such interruptions as the battle of Torfness (Burghead) on the 14th of August 1040, in which Thorfinn, earl of Orkney and Shetland, overthrew a strong force of Scots under King Duncan, the consolidation of the kingdom was being gradually accomplished. After Macbeth ascended the throne the Scandinavians held their hands. Though Macbeth and his faineant successor, " daft " Lulach, were the only kings whom Moray gave to Scot- land, the province never lacked for able, if headstrong, men, and it continued to enjoy home rule under its own marmaer, or great steward (the equivalent of earl, the title that replaced it), until the dawn of the 1 2th century, when as an entity it ceased to exist. With a view to breaking up the power of the marmaers David I. and his successors colonized the seaboard with settlers from other parts of the kingdom. Nevertheless, from time to time the clansmen and their chiefs descended from their fastnesses and plundered the Laigh, keeping the people for genera- tions in a state of panic. Meanwhile, the Church had become a civilizing force. In 1107 Alexander had founded the see of Moray and the churches of Birnie, Kinneddar and Spynie were in turn the cathedral of the early bishops, until in 1224 under the episcopate of Andrew of Moray (de Moravia) , the church of the Holy Trinity in Elgin was chosen for the cathedral. Another factor that drew men together was the struggle for independence. In his effort to stamp out Scottish nationality Edward I. came as far north as Elgin, where he stayed for four days in July 1296, and whence he issued his writ for the parliament at Berwick. Wallace, however, had no doughtier supporter than Sir Andrew Moray of Bothwell, and Bruce recognized the assistance he had received from the men of the north by erecting Mora'y into an earldom on the morrow of Bannockburn and bestowing it upon Thomas Randolph (see Moray, Thomas Randolph, earl of). Henceforward the history of the county resolved itself in the main into matters affecting the power 'of the Church and theambitions of theMoray dynasties. TheChurch accepted the Reformation peacefully if not with gratitude. But there was strife between Covenanters and the adherents of Episcopacy until, prelacy itself being abolished in 1689, the bishopric of Moray came to an end after an existence of 581 years. (For the subsequent history of the earldom, which was successively held by the Randolphs, the Dunbars, the Douglases, the royal Stewarts and an illegitimate branch of the Stewarts, see

Murray or Moray, earls of.) Other cele- brated Moray families who played a more or less, strenuous part in local politics were the Gordons, the Grants and the Duffs. Still, national affairs occasionally evoked interest in Moray. In the civil war Montrose ravaged the villages which stood for the Covenanters, but most of the great lairds shifted in their allegiance, and the mass of the people were quite indifferent to the declining fortunes of the Stewarts. Charles II. landed at Garmouth on the 3rd of July 1650 on his return from his first exile in Holland, but hurried southwards to try the yoke of Presbytery. The fight at Cromdale (May day, 1690) shattered the Jacobite cause, for the efforts in 171 5 and 1745 were too spasmodic and half-hearted to affect the loyalty of the district to Hanoverian rule. A few weeks before Culloden Prince Charles Edward stayed in Elgin for some days, and a month afterwards the duke of Cumberland passed through the town at the top of his speed and administered the coup de gr&ce to the Young Pretender on Drummossie Moor.

Twice Elginshire has been the scene of catastrophes without parallel in Scotland. In 1694 the barony of Culbin — a fine estate, with a rent roll in money and kind of £6000 a year, belong- ing to the Kinnairds, comprising 3600 acres of land, so fertile that it was called the Granary of Moray, a handsome mansion, a church and several houses — was buried under a mass of sand in a storm of extraordinary severity. The sandy waste measures 3 m. in length and 2 in breadth, and the sand, exceedingly fine and light, is constantly shifting and, at rare intervals, exposing traces of the vanished demesne. This wilderness of dome-shaped dunes divided by a loftier ridge lies to the north-west of Forres. The other calamity was the Moray floods of the 2nd and 3rd of

August 1829. The Findhorn rose 50 ft. above the ordinary level, inundating an area of 20 sq. m.; the Divie rose 40 ft., and the Lossie flooded all the low ground around Elgin. The floods tore down bridges and buildings, and obliterated farms and home- steads.

Authorities. — Lachlan Shaw, History of the Province of Moray (Gordon's edition, Glasgow, 1882); A Survey of the Province of Moray (Elgin, 1798); W. Rhind, Sketches of the Past and Present State of Moray (Edinburgh, 1839); E. Dunbar Dunbar, Documents relating to the Province of Moray (Edinburgh, 1895); C. A. Gordon,

History of the House of Gordon (Aberdeen, 1890) ; C. Rampini, History of Moray and Nairn (Edinburgh, 1897); C. Innes, Elgin, Past and Present (Elgin, i860); J. Macdonald, " Burghead " (Proceedings of Glasgow Archaeological Soc), (1891); Sir T. Dick Lauder, The Wolf of Badenoch (Glasgow, 1886) ; An Account of the Great Floods of August 18 2Q in the Province of Moray and Adjoining Districts (Elgin, 1873).

ELGON, also known as Masawa, an extinct volcano in British East Africa, cut by 1° N. and 34!° E., forming a vast isolated mass over 40 m. in diameter. The outer slopes are in great measure precipitous on the north, west and south, but fall more gradually to the east. The southern cliffs are remarkable for extensive caves, which have the appearance of water-worn caves on a coast line and have for ages served as habitations for the natives. The higher parts slope gradually upwards to the rim of an old crater, lying somewhat north of the centre of the mass, and measuring some 8 m. in diameter. The highest point of the rim is about 14,100 ft. above the sea. Steep spurs separated by narrow ravines run out from the mountain, affording the most picturesque scenery. The ravines are traversed by a great number of streams, which flow north-west and west to the Nile (through Lake Choga), south and south-east to Victoria Nyanza, and north-east to Lake Rudolf by the Turkwell, the head-stream of which rises within the crater, breaking through a deep cleft in its rim. To the north-west of the mountain a grassy plain, swampy in the rains, falls towards the chain of lakes ending in Choga; towards the north-east the country becomes more arid, while towards the south it is well wooded. The outer slopes are clothed in their upper regions with dense forest formed in part of bamboos, especially towards the south and west, in which directions the rainfall is greater than elsewhere. The lower slopes are exceptionally fertile on the west, and produce bananas in abundance. On the north-west and north the region between 6000 and 7000 ft. possesses a delightful climate,' and is well watered by streams of ice-cold water. The district of Save on the north is a halting-place for Arab and Swahili caravans going north. On the west the slopes are densely inhabited by small Bantu-Negro tribes, who style their country Masawa (whence the alternative name for the mountain); but on the south and north there are tribes which seem akin to the Gallas. Of these, the best known are the El-gonyi, from whom the name Elgon has been derived. They formerly lived almost entirely in the caves, but many of them have descended to villages at the foot of the mountain. Elgon was first visited in 1883 by Joseph Thomson, who brought to light the cave-dwellings on the southern face. It was crossed from north to south, and its crater

reached, in 1890 by F. J. Jackson and Ernest Gedge, while the first journey round it was made by C. W. Hobley in 1896. (E. He.)

ELI (Hebrew for "high"? 1 Sam. chaps, i.-iv.), a member of the ancient priesthood founded in Egypt (1 Sam. ii. 27), priest of the temple of Shiloh, the sanctuary of the ark, and also " judge " over Israel. This was an unusual combination of offices, when it is considered that in the history preserved to us he appears in the weakness of extreme old age, unable to control the petulance and rapacity of his sons, Hophni and Phinehas, who disgraced the sanctuary and disgusted the people. While the central authority was thus weakened, the Philistines advanced against Israel, and gained a complete victory in the great battle of Ebenezer, where the ark was taken, and Hophni and Phinehas slain. On hearing the news Eli fell from his seat and died. In a passage not unlike the account of the birth of Benjamin (Gen. xxxv. 16 sqq.), it is added that the wife of Phinehas, overwhelmed at the loss of the ark and of her husband, died in child-birth, naming the babe Ichabod (1 Sam.

iv. 19 sqq.). This name, which popular etymology explained by the words " the glory is removed (or, stronger, ' banished ') from Israel " (cf. Hos. x. 5), should perhaps be altered from I-kabod (as though " not glory ") to Jochebed (Yokebed, a slight change in the original), the name which tradition also gave to the mother of Moses (q.v.). After these events the sanctuary of Shiloh appears to have been destroyed (cf. Jer. vii. 12, xxvi. 6, 9), and the descendants of Eli with the whole of their clan or " father's house " subsequently appear as settled at Neb (1 Sam. xxi. 1, xxii. 11 sqq., cp. xiv. 3), perhaps in the immediate neighbourhood of Jerusalem (Is. x. 32). In the massacre of the clan by Saul, and the subsequent substitution of the survivor Abiathar by Zadok (1 Kings ii. 27, 35), later writers saw the fulfilment of the prophecies of judgment which was said to have been uttered in the days of Eli against his corrupt house (1 Sam. ii. 27 sqq., iii. 11 sqq.). 1

See further, Samuel, Books of; and on Eli as a descendant of a Leviteclan (1 Sam. ii 27 sq.), see Levites (§ 3). W.R.S.; S.A.C.)

ELIAS, of Cortona (c. 1180-1253), disciple of St Francis of Assisi, was born near Assisi, about 1180, of the working class, but became schoolmaster at Assisi and then notary at Bologna. In 1 21 7 he was the head of the Franciscan mission to the Holy Land, and in 12 19 St Francis made him first provincial minister of Syria. When St Francis was recalled from the East in 1220 he brought Elias with him. Elias played a leading part in the early history of the Franciscan order

(see Franciscans) ; Francis made him his vicar general in 1221; and he was the practical acting superior of the order till Francis' death in 1226, and the real superior till the general chapter of 1227. This chapter did not elect him minister general, but that of 1232 did; at the chapter of 1239 he was deposed. During these years he erected the basilica and monastery at Assisi which were entirely his creation — he collected the funds and carried the work through, being himself the builder and even the architect. Elias was a man of extraordinary ability, the friend both of Gregory IX. and of his opponent Frederick II. After his deposition Elias joined the party of the emperor and so incurred excommunica- tion. Frederick sent him as ambassador to Constantinople. He dressed and lived as a Franciscan throughout and a small number of friars adhered to him; for these he built a church and monastery at Cortona. Unavailing efforts were made to bring about his reconciliation with the order and the Church; at last on his death-bed he made his submission to the pope and died in 1253, having received the Sacraments.

The best account of Elias is that by Ed. Lempp, Frere Ulie de Cortone (1901), who points out the conflict of view, as to the relations between Elias and Francis, between the Speculum perfectionis and the First Life, by Thomas of Celano; Lempp and Sabatier accept the hostile picture given by the Speculum perfectionis. But see further Francis of Assisi, Saint, " Note on Sources," and especi- ally the articles by Goetz, there referred to, in the Hist. Vierteljahrs- schrift. There is a good article on Elias, but written before the new materials had been produced, in Wetzer und Welte, Kirchenlexicon (ed. 2). (E. C. B.)

ELIAS, JOHN (1774-1841), Welsh Nonconformist preacher and reformer, was born on the 2nd of May 1774, in the parish of Abererch, Carnarvonshire. In his youth he came under the influ- ence of the Calvinistic Methodist revival and became a preacher at nineteen. In 1799 he married and settled at Llanfechell in Anglesey, giving up his trade as a weaver to become a small shopkeeper. His fame as a preacher increased, and under the direction of Thomas Charles of Bala he established numerous Sunday schools, and gave and secured considerable Welsh support to the founding of the London Missionary Society, the British and Foreign Bible Society and the Religious Tract Society. On Charles's death in 18 14 he became the recognized leader of the Calvinistic Methodist Church, and the story of his life is simply a record of marvellously successful preaching tours. He died on the 8th of June 1841; ten thousand people attended his funeral.

1 On the old views relating to the succession of the priests, according to which the high-priesthood was diverted from the line of Eleazar and Phinehas into that of Ithamar, see Robertson Smith, Old Test, in Jewish Churchy 2nd ed., p. 266.

His eloquence was so remarkable that he was known as " the Welsh Demosthenes." His strength lay in his intense conviction of an intimate connexion between sin and punish- ment and in his power of dramatic presentation. As an ecclesi- astic he was not so successful; he helped to compile his church's Confession of Faith in 1823, and laid great stress on a clause which limited the scope of the atonement to the elect. He was a stout Tory in politics and had many friends among the Anglican clergy; he opposed the movement for Roman Catholic emancipation. Several of his sermons were published in Welsh.

ELIAS LEVITA (1460-1549), Jewish grammarian, was born at Neustadt on the Aisch, a place in Bavaria lying between Nuremberg and Wiirzburg. He preferred to call himself " Ashke- nazi," the German, and bore also the nickname of " Bachur," the youth or student, which latter he gave as title to his Hebrew grammar. Before the end of the 15th century he went to Italy, which thenceforth remained his home. He lived first at Padua, went in 1509, after the capture of this town by the army of the League of Cambrai, to Venice, and finally in 15 13 to Rome, where he found a patron in the learned general of the Augustinian Order, the future cardinal Egidio di Viterbo, whom he helped in his study of the Kabbalah, while he himself was inspired by him to literary work. The storming of Rome by the army of the Constable de Bourbon in 1527 compelled Elias to go to Venice, where he was employed as corrector in the printing-house of Daniel Bomberg. In the years 1541 and 1542 he lived at Isny, in Southern Wurttemberg, where he published several of his writings in the printing-house of the learned pastor Paul Fagius. The last years of his life he spent at Venice, continuously active in spite of ill-health and the weakness of old age. His monument in the graveyard of the Jewish community at Venice boasts of him that " he illuminated the darkness of grammar and turned it into light." The importance of Levita rests both in his numerous writings and in his personal activity. In the remark- able period which saw the rise of the Reformation and gave to the study of the Hebrew Bible and to its language an import- ance in the history of the world, it was Levita

who furthered in an extraordinary manner the study of Hebrew in Christian circles by his activity as a teacher and by his writings. To his pupils especially belong Sebastian Minoter, who translated Levita's grammatical works into Latin, also George de Selve, bishop of Lavaur, the French ambassador in Venice (1536), who was instrumental in obtaining for Levita an invitation from Francis I. to come to Paris, which invitation, however, Levita did not accept. Levita's writings on Hebrew grammar (Bachur, a text-book, 15 18; Harkaba, an explanation, alphabetically arranged, of irregular word-forms; a Table of Paradigms; Pirke Elijahu, a description — partly metrical — of phonetics, and other chapters of the grammar, 1520; his earliest work, a Com- mentary on Moses Kimhi's Hebrew Grammar, 1508) were by reason of their methodical exposition, their clear articulation, their avoidance of prolixity, especially suited as an introduction to the study of the Hebrew language. Amongst Levita's other writings is the first dictionary of the Targumim (Meturgeman, 1541) and the first attempt at a lexicon in which much of the treasure of late Hebrew language was explained (Tishbi, explana- tion of 712 new Hebrew vocables, as a supplement to the diction- aries of David Kimhi and Nathan b. Yehiel, 1 542). Scientifically most valuable, and of original importance, are the works of Levita on the Massora; his Concordance to the Massora (Sefer Zikhronot completed in the second revision 1536), of which hitherto only a small part has been published, aiid especially his most celebrated book Massoreth Hamasoreth (1538), published with English translation by Chr. D. Ginsburg, London, 1867. This was the first attempt to give a systematic account of the contents and history of the Massora. By his criticism of the Massora, and especially by proving that the punctuation of the books of the Hebrew Bible is of late origin, Levita exercised an epoch-making influence. Of his other writings may be mentioned his running commentary on David Kimhi's Grammar and Dictionary (in the Bomberg editions 1543, 1546), his German translation of

the Psalms (1545) and the Baba-Buch (more properly Buovobuch, a German recension of the Italian novel Historia di Buovo d' Antona, 1508). '..

Of the literature on Levita may be mentioned : Y. Levi, Elia Levita und seine Leistungen ah Grammatiker (Breslau, 1888); W. Bacher, " E. Levita's wissenschaftliche Leistungen " in Z- d. D. M. G. xliii. (1889), p. 206-272. (W. Ba.)

ELIE, a village and watering-place of Fifeshire, Scotland, on the shore of the Firth of Forth. Pop. 687. It is 10 m. due S. of St

Andrews, but 20 m. distant by the North British railway, which makes a great bend by following the coast. Though it retains some old houses, and the parish church dates from 1639, Elie is, as a whole, quite modern and is one of the most popular resorts in the county on account of its fine golf links and excellent bathing. The royal burgh of Earlsferry (pop. 317) is situated in the parish of Elie, which it adjoins on the west. Its charter, granted by Malcolm Canmore, having been burned, it was re- newed by James VI. The chief structure is the town hall, which is modern but has an ancient steeple. The place derived its name from its use by the earls of Fife as a ferry to the opposite shore of Haddington, 8 m. distant. Macduff's cave near Kincraig Point is believed traditionally to have been that in which the thane took refuge from Macbeth. Two and a half miles north is Balcarres House, belonging to the earl of Crawford, where Lady Anne Barnard (1750-1825) was born.

ELIE DE BEAUMONT, JEAN BAPTISTE ARMAND LOUIS LEONCE (1798-1874), French geologist, was born at Canon, in Calvados, on the 25th of September 1798. He was educated at the Lycee Henri IV. where he took the first prize in mathe- matics and physics; at the Ecole Poly technique, where he stood first at the exit examination in 1819; and at the Ecole des Mines (1819-1822), where he began to show a decided preference for the science with which his name is associated. In 1823 he was selected along with Dufrenoy by Brochant de Villiers, the professor of geology in the Ecole des Mines, to accompany him on a scientific tour to England and Scotland, in order to inspect the mining and metallurgical establishments of the country, and to study the principles on which Greenough's geological map of England (1820) had been prepared, with a view to the construction of a similar map of France. In 1835 he was appointed professor of geology at the Ecole des Mines, in succes- sion to Brochant de Villiers, whose assistant he had been in the duties of the chair since 1827. He held the office of engineer-in- chief of mines in France from 1833 until 1847, when he was appointed inspector-general; and in 1861 he became vice- president of the Conseil-General des Mines and a grand officer of the Legion of Honour. His growing scientific reputation secured his election to the membership of the Academy of Berlin, of the Academy of Sciences of France and of the Royal Society of London. By a decree of the president he was made a senator of France in 1852, and on the death of Arago (1853) he was chosen perpetual secretary of the Academy of Sciences. Elie de Beau- mont's name is widely known to geologists in connexion with his theory of the origin of mountain ranges, first propounded in a paper read to the Academy of Sciences in 1829, and afterwards

elaborated in his Notice sur le systeme des montagnes (3 vols., 1852). According to his view, all mountain ranges parallel to the same great circle of the earth are of strictly contemporaneous origin, and between the great circles a relation of symmetry exists in the form of a pentagonal reseau. An elaborate statement and criticism of the theory was given in his anniversary address to the Geological Society of London in 1853 by William Hopkins (Quart. Journ. Geol. Soc). The theory has not found general acceptance, but it proved of great value to geological science, owing to the extensive additions to the knowledge of the structure of mountain ranges which its author made in endeavouring to find facts to support it. Probably, however, the best service Elie de Beaumont rendered to science was in connexion with the geological map of France, in the preparation of which he had the leading share. During this period Elie de Beaumont published many important memoirs on the geology of the country. After his superannuation at the Ecole des Mines he continued to superintend the issue of the detailed maps almost until his death,

which occurred at Canon on the 21st of September 1874. His academic lectures for 1843-1844 were published in 2 vols., 1845-1849, under the title Lemons de giologie pratique.

A list of his works was published in the Ann. des Mines, vol. vii. 1875. P- 259-

ELIJAH (a Hebrew name meaning ” Yahfweh] is God”), in the Bible, the greatest and sternest of the Hebrew prophets, makes his appearance in the narrative of the Old Testament with an abruptness not out of keeping with his character and work (1 Kings xvii. i). 1 The first and most important part of his career lay in the reign of Ahab, i.e. during the first half of the 9th century B.C. He is introduced as predicting the drought 2 God was to send upon Israel as a punishment for the apostasy into which Ahab had been led by his heathen wife Jezebel. During the first portion of this period Elijah found a refuge by the brook Cherith, ” before the Jordan.” This description leaves it un- certain whether the brook was to the east of Jordan in Elijah’s native Gilead, or — less probably — to the west in Samaria. Here he drank of the brook and was fed by ravens, who night and morn- ing brought him bread and flesh. 3 When this had dried up, the -prophet betook himself to Zarephath, a Phoenician town near Sidon. At the gate of the town he met the widow to whom

he had been sent, gathering sticks for the preparation of what she believed was to be her last meal. She received the prophet with hospitality, sharing with him her all but exhausted store, in faith of his promise in the name of the God of Israel that the supply would not fail so long as the drought lasted. During this period her son died and was miraculously restored to life in answer to the prayers of the prophet (1 Kings xvii. 8-24).

Elijah emerged from his retirement in the third year, when, the famine having reached its worst, Ahab and his minister Obadiah had themselves to search the land for provender for the royal stables. To the latter Elijah suddenly appeared, and announced his intention of showing himself to Ahab. The king met Elijah with the reproach that he was " the troubler of Israel," which the prophet boldly flung back upon him who had forsaken the commandments of the Lord and followed the Baalim. 4 The retort was accompanied by a challenge — or rather a command — to the king to assemble on Mount Carmel " all Israel " and the four hundred and fifty prophets of Baal. (The four hundred prophets of Asherah have been added later.) From the allusion to an " altar of Jehovah that was broken down " (1 Kings xviii. 30) it has been inferred that Carmel was an ancient sacred place. (On Mount Carmel and Elijah's connexion with it in history and tradition see Carmel.)

The scene on Carmel is perhaps the grandest in the lifeof Elijah, or indeed in the whole of the Old Testament. As a typical embodiment for all time of the conflict between superstition and true religion, it is lifted out of the range of mere individual biography into that of spiritual symbolism, and it has accordingly furnished at once a fruitful theme for the religious teacher and

1 The text is uncertain. According to the LXX., he was a native of Tishbeh in Gilead; a more natural reading. Klostermann's conjecture that the original name of his home was Jabesh-Gilead is attractive but unnecessary. His appearance in the narrative, like Melchizedek, " without father, without mother " (Heb. vii. 3), gave rise to various rabbinical traditions, such as that he was Phinehas, the grandson of Aaron, returned to earth, or that he was an angel in human form.

2 Its duration is vaguely stated; from Luke iv. 25, James v. 17, we learn that it lasted three years and a half; but according to Phoenician tradition (Jos. Ant. viii. 13. 2) only one year.

3 The rationalistic view that the word translated " ravens " should be " Arabians " is improbable. Cheyne's suggestion that the unknown

brook Cherith should be placed to the south of Judah agrees with Josephus (Ant. viii. 13. 2, " he departed into the southern parts ") and with 1 Kings xix. 3, 8; " Jordan " may refer to another river, if it be not a gloss; see Cheyne, Ency. Bib., s.v. " Cherith."

4 The sudden introduction of Elijah in xvii. I may be accounted for by the supposition that the commencement of the narrative had been omitted by the editor of xvi. 29 sqq. Hence we are not told the cause of Ahab's hostility towards Elijah, nor is the allusion to Jezebel's massacre of the prophets (xviii. 3, 13) explained. It would appear from Obadiah's words in ver. 9 that he himself was in fear of h>s life. Later tradition supposed he was the captain of 2 Kings i. 13, or that the widow of 2 Kings iv. 1 had been his wife.

a lofty inspiration for the artist. The false prophets were allowed to invoke their god in whatever manner they pleased. The only interruption came in the mocking encouragement of Elijah (1 Kings xviii. 27), a rare instance of grim sarcastic humour occurring in the Bible. Its effect upon the false prophets was to increase their frenzy. The evening came, 5 and the god had made no sign. Elijah now stepped forward with the quiet confidence and dignity that became the prophet and representative of the true God. All Israel is represented symbolically in the twelve stones with which he built the altar; and the \yater which he poured upon the sacrifice and into the surrounding trench Was apparently designed to prevent the suspicion of fraud! In strik ing contrast to the " vain repetitions " of the false prophets are the simple words with which Elijah makes his prayer to Yahweh, Once only, with the calm assurance of one who knew that his prayer would be answered, he invokes the God of his fathers. The answer comes at once: " The fire of the Lord (Gen. xix. 24, Lev. x. 2) fell and consumed the burnt offering, and the wood, and the stones, and the dust, and licked up the water that was in the trench." So convincing a sign was irresistible; all the people fell on their, faces and acknowledged Yahweh as the true God. This was immediately followed by the destruction of the false prophets, slain by Elijah beside the brook Kishon (xviii. 40). The deed, though not without parallel in the Old Testament history, stamps the peculiarly vindictive character of Elijah's prophetic mission. 6

On the evening of the day that had witnessed the decisive contest, Elijah proceeded once more to the top of Carmel, and there, with " his face between his knees " (possibly engaged in the prayer referred to in James v. 17 sq.), waited for the long- looked-for blessing. His servant, sent repeatedly to search the sky for signs, returned the seventh time reporting a little cloud arising out of the sea " like a

man's hand." The sky was speedily full of clouds and a great rain was falling when Ahab, to escape the storm, set out in his chariot for Jezreel. As a proof of Elijah's supernatural power, it is stated that the prophet, for some unknown object, ran before the chariot to the entrance of Jezreel, a distance of at least 16 m. On being told what had taken place, Jezebel sent a messenger to Elijah with a vow that ere another day had passed his life would be even as the lives of the prophets of Baal, and the threat was enough to cause him to take to instant flight (xix. 1-3 ; cp. LXX. in v. 2). The first stage of the journey was to Beersheba, on the southern limits ol Judah. Here he left his servant (according to old Jewish tradition, the widow's son of Zarephath, afterwards the prophet Jonah), and proceeded a day's journey into the wilderness. Resting under a solitary broom bush (a kind of genista) , he gave vent to his disappoint- ment in a prayer for death. By another of those many miracu- lous interpositions which occur in his history he was twice supplied with food and drink, in the strength of which he journeyed forty days and forty nights until he came to Horeb, where he lodged in a cave. 7 A hole " just large enough for a man's body " (Stanley), immediately below the summit of Jebel Musa, is still pointed out by tradition as the cave of Elijah.

If the scene on Carmel is the grandest, that on Horeb is spiritually the most profound in the story of Elijah (xix. 9 sqq.). Not in the strong wind that brake the rocks in .pieces, not in the earthquake, not in the fire, but in the still small voice that followed the Lord made himself known. A threefold commission was laid upon him: he was to return to Damascus and anoint Hazael king of Syria; he was to anoint Jehu, the son of Nimshi,

6 The definition of time by the stated oblation (xviii. 29, 36) is very noteworthy (cp. 2 Kings iii. 20).

6 It is obvious that a purely rationalistic interpretation of the great sign whereby Jahweh manifested himself would be out of place. But there is an interesting parallel in the legend of the kindling of the sacred fire and the igniting of the " thick water " in the time of Nehemiah (2 Mace. i. 1 8 36). Elsewhere, there were sacred fires kindled by the aid of magical invocations (e.g. Hypaepa, Pausanias v. 27. 3).

7 Yahweh is here supposed to have his seat on the ancient mountain. " It was the God of the Exodus to whom he appealed, the ancient King of Israel in the journeyings through the wilderness." For the cave, cp. Ex. xxxiii. 22.

as king of Israel in place of Ahab; and as his own suc- cessor in the prophetic office he was to anoint Elisha (xix.

15-18). 1 –

Leaving Horeb and proceeding northwards along the desert route to Damascus, Elijah met Elisha engaged at the plough probably near his native place, Abel-meholah, in the valley of the Jordan, and by the symbolical act of casting his mantle upon him, consecrated him to the prophetic office. This was the only command of the three which he fulfilled in person; the other two were carried out by his successor. 2 After the call of Elisha the narrative contains no notice of Elijah for several years, although the LXX., by placing 1 Kings xxi. before ch. xx., pro- ceeds at once to the tragic story of Naboth's vineyard (see Jezebel). He is now the champion of freedom and purity of life, like Nathan when he confronted David for the murder of Uriah. Without any indication of whence or how he came, he again appeared, as usual with startling abruptness, in the vine- yard when Ahab entered to take possession of it, and pronounced upon the king and his house that awful doom (1 Kings xxi. 17-24) which, though deferred for a time, was ultimately fulfilled to the letter (see Jehu).

With one more denunciation of the house of Ahab, Elijah's function as a messenger of wrath was fully discharged (2 Kings L). When Ahaziah, the son of Ahab, having injured himself by falling through a lattice, sent to inquire of Baal-zebub, the god of Ekron, whether he should recover, the prophet was commanded to appear to the messengers and tell them that, for this resort to a false god, the king should die. The effect of his appearance was such that they turned back without attempting to fulfil their errand. Ahaziah despatched a captain with a band of fifty to arrest him. They came upon Elijah seated on " the mount,"- — prob- ably Carmel. The imperious terms in which he was summoned to come down were punished by fire from heaven,which descended at the bidding of Elijah and consumed the whole land. A second captain and fifty were despatched, behaved in a similar way, and met the same fate. The leader of a third troop took a humbler tone, sued for mercy, and obtained it. Elijah then went with them to the king, but only to repeat before his face the doom he had already made known to his messengers, which was almost immediately afterwards fulfilled. The spirit, even the style of this narrative, points unmistakably to its being of late origin. It shocks the moral sense with its sanguinary character more than,

perhaps, any other Old Testament story.

The only mention of Elijah's name in the book of Chronicles (2 Chronicles xxi. 12-15) i s where he is represented as sending a letter of rebuke and denunciation to Jehoram, son of Jehosha- phat, king of Judah. The chronological difficulties which are involved suggest that the floating traditions of this great personality were easily attached to well-known names whether strictly contemporary or not. It was before the death of Jehoshaphat that the last grand scene in Elijah's life occurred (2 Kings ii., see iii. 1). He had taken up his residence with Elisha at one of the prophetic guilds at Gilgal. His approaching end seems to have been known to the guilds at Bethel and Jericho, both of which they visited in their last journey. At the Jordan, Elijah, wrapping his prophet's mantle together, smote the water with it, and so by a last miracle passed over on dry ground. When they had crossed the master desired the disciple to ask some parting blessing. The request for a double portion (i.e.

1 The theophany is clearly no rebuke to an impatient prophet, nor a lesson that the kingdom of heaven was to be built up by the slow and gentle operation of spiritual forces. It expresses the spirituality of Yahweh in a way that indicates a marked advance in the conception of his nature. See Skinner, Century Bible, " Kings," adloc.

2 The geographical indications imply that in one account the journey to Damascus and the anointing of Hazael and Jehu must have intervened, and were omitted because another account ascribed these acts to Elisha (2 Kings viii. ix.). In the latter we possess a more historical account of the anointing of Jehu, and Robertson Smith observes: " When the history in I Kings represents Elijah as personally commissioned to inaugurate [the revolution] by anointing Jehu and Hazael as well as Elisha, we see that the author's design is to gather up the whole contest between Yahweh and Baal in an ideal picture of Elijah and his work " (Ency. Brit. (9) art. Kings, vcl. xiv. p. 85).

probably a first-born's portion, Deut. xxi. 17) 3 of the prophet's spirit Elijah characterized as a hard thing; but he promised to grant it if Elisha should see him when he was taken away. The end is told in words of simple sublimity: " And it came to pass, as they still went on and talked, that, behold, there appeared a chariot of fire, and horses of fire, which parted them both asunder; and Elijah went up by a whirlwind into heaven " (2 Kings ii. n). It is scarcely necessary

to point out, however, that through the figure the narrative evidently means to convey as fact that Elijah passed from earth, not by the gates of death, but by miraculous translation. Such a supernatural close is in perfect harmony with a career into every stage of which the supernatural enters as an essential feature. For whatever explanation may be offered of the miraculous element in Elijah's life, it must obviously be one that accounts not for a few miracu- lous incidents only, which might be mere excrescences, but for a series of miraculous events so closely connected and so con- tinuous as to form the main thread of the history.

Elijah occupied an altogether peculiar place in later Jewish history and tradition. For the general belief that he should return for the restoration of Israel cf. Mai. iv. 5-6; Matt. xi. 14, xvi. 14; Luke ix. 8; John i. 21, and on the development of the thought see Bousset, Antichrist, s.v., and the Jewish Encyc. vol. v. p. 126. In Mahom- medan tradition Elijah is the everlasting youthful el-Khidr or el-Khadir.

Elijah is canonized both in the Greek and in the Latin Churches, his festival being kept in both on the 20th July — the date of his ascension in the nineteenth year of Jehoshaphat, according to Cornelius a Lapide. The natural and most reliable estimate of the career of Elijah is that which is based upon a critical examination of the narratives; see, in addition to Robertson Smith, Prophets of Israel (2), pp. 75 sqq., Cheyne, Hallowing of Criticism, the articles by Addis in Encyc. Bib., and J. Strachan, Hastings' Diet. Bib., H. Gunkel, Elias, Yahve u. Baal (Tubingen, 1906), the literature to Kings, Books of, and the histories referred to in Jews. There is difference of opinion as to the historical importance of both Elijah and Elisha ; for a useful summary of views, as also for fuller biblio- graphical information, see W. R. Harper, Amos and Hosea (Internal. Crit. Comm.), pp. xxxiv.-xlix., and article Hebrew Religion.

(W. R. S.; S. A. C.)

ELIJAH WILNA, or Elijah ben Solomon, best known as the Gaon Elijah or Wilna (1720-1797), a noted Talmudist who hovered between the new and the old schools of thought. Orthodox in practice and feeling, his critical treatment of the rabbinic literature prepared the way for the scientific investiga- tions of the 19th century. As a teacher he was one of the first to discriminate between the various strata in rabbinic records; to him was due the revival of interest in the older Midrash (q.v.) and in the Palestinian Talmud (q.v.), interest in which had been weak for some centuries before his time.

He was an ascetic, and was a keen opponent of the emotional mysticism which was known as the new Hassidism.

See S. Schechter's Studies in Judaism (London, 1896). His voluminous writings are classified in the Jewish Encyclopedia, v. 134. (I. A.)

ELIOT, CHARLES WILLIAM (1834-), American educa- tionalist, the son of Samuel Atkins Eliot (1798-1862), mayor of Boston, representative in Congress, and in 1842-1853 treasurer of Harvard, was born in Boston on the 20th of March 1834. He graduated in 1853 at Harvard College, where he was succes- sively tutor (1854-1858) and assistant professor of chemistry (1858-1863). He studied chemistry and foreign educational methods in Europe in 1863-1865, was professor of analytical chemistry in the newly established Massachusetts Institute of Technology (1865-1869), although absent fourteen months in Europe in 1867-1868; and in 1869 was elected president of Harvard University, a choice remarkable at once for his youth and his being a layman and scientist. With Johns Hopkins University, Harvard, in his presidency, led in the work of efficient graduate schools. Its elective system, which has spread far, although not originated by President Eliot, was thoroughly established by him, and is only one of many radical changes which he championed with great success. The raising of entrance requirements, which led to a corresponding raising of the standards of secondary schools, and the introduction of an

- *Understood in Eccles. xlviii. 12 (Heb.) to mean that Elisha was twice as great as Elijah.*

element of choice in these entrance requirements, which allowed a limited election of studies to secondary pupils, became national tendencies primarily through President Eliot's potent influence. As chairman of a national Committee of Ten (1890) on secondary school studies, he urged the abandonment of brief disconnected " information " courses, the correlation of subjects taught, the equal rank in college requirements of subjects in which equal time, consecutiveness and concentration were demanded, and a more thorough study of English composition; and to a large degree he secured national sanction for these reforms and their working out by experts into a practicable and applicable system. He laboured to

unify the entire educational system, minimize prescription, cast out monotony, and introduce freedom and enthusiasm; and he emphasized the need of special training for special work. He was first to suggest (1804) co-operation by colleges in holding common entrance examinations throughout the country, and it was largely through his efforts that standards were so approximated that this became possible. He contended that secondary schools maintained by public funds should shape their courses for the benefit of students whose education goes no further than such high schools, and not be mere training schools for the universities. His success as administrator and man of affairs and as an educational reformer made him one of the great figures of his time, in whose opinions on any topic the deepest interest was felt throughout the country. In November 1908 he resigned the presidency of Harvard, and retired from the position early in 1909, when he was succeeded by Professor Abbott Lawrence Lowell. In December 1908 he was elected president of the National Civil Service Reform League.

His writings include The Happy Life (1896); Five American Contributions to Civilization, and Other Essays and Addresses (1897); Educational Reform, Essays and Addresses i86g-i8gy (1898); More Money for the Public Schools (1903); Four American Leaders (1906), chapters on Franklin, Washington, Channing and Emerson; University Administration (1908); and with F. H. Storer, a Compendious Manual of Qualitative Chemical Analysis (Boston, 1869; many times reissued and revised). His annual reports as President of Harvard were notable contributions to the literature of education in America, and he delivered numerous public addresses, many of which have been reprinted.

See " President Eliot's Administration," by different hands, a summary of his work at Harvard in 1869-1894, in The Harvard Graduates' Magazine, vol. 2, pp. 449-504 (Boston, Mass., 1894); and E. Kuhnemann, Charles W.Eliot, President of Harvard (Boston, 1909).

His son, Charles Eliot (1859-1897), graduated at Harvard in 1882, studied landscape architecture at the Bussey Institution of Harvard and in Europe, successfully urged the incorporation of the Massachusetts Trustees of Public Reservations (1891) and of the Metropolitan Park Commission (1892) of Boston, became landscape architect to the Metropolitan Park Commission in 1892, and in 1893, with F. L. Olmsted and J. C. Olmsted, formed the firm of Olmsted, Olmsted & Eliot, which was employed by the Metropolitan Commission. His life was written by his father, Charles Eliot,

Landscape Architect (Boston, 1902).

ELIOT, GEORGE, the pen-name of the famous English writer, nee Mary Ann (or Marian) Evans (1819-1880), afterwards Mrs J. W. Cross, born at Arbury Farm, in Warwickshire, on the 22nd of November 181 9. Her father, Robert Evans, was the agent of Mr Francis Newdigate, and the first twenty-one years of the great novelist's life were spent on the Arbury estate. She re- ceived an ordinary education at respectable schools till the age of seventeen, when her mother's death, and the marriage of her elder sister, called her home in the character of housekeeper. This, though it must have sharpened her sense, already too acute, of responsibility, was an immense advantage to her mind, and, later, to her career, for, delivered from the tiresome routine of lessons and class-work, she was able to work without pedantic interruptions at German, Italian and music, and to follow her unusually good taste in reading. The life, inasmuch as she was a, girl still in her teens, was no doubt monotonous, even unhappy. Just as Cardinal Newman felt, with such different results, the

sadness and chain of evangelical influences from his boyhood till the end of his days, so Marian Evans was subdued all through her youth by a severe religious training which, while it pinched her mind and crushed her spirit, attracted her idealism by the very hardness of its perfect counsels. It is not surprising to find, therefore, that when Mr Evans moved to Coventry in 1841, and so enlarged the circle of their acquaintance, she became much interested in some new friends, Mr and Mrs Charles Bray and Mr Charles Hennell. Mr Bray had literary taste and wrote works on the Education of the Feelings, the Philosophy of Necessity, and the like. Mr Hennell had published in 1838 An Enquiry concerning the Origin of Christianity. Miss Evans, then twenty-two, absorbed immediately these unexpected, and, at that time, daring habits of thought. So compelling was the atmosphere that it led to a complete change in her opinions. Kind in her affection, she was relentless in argument. She refused to go to church (for some time, at least), wrote painful letters to a former governess — the pious Miss Lewis — and barely avoided an irremediable quarrel with her father, a churchman of the old school. Here was rebellion indeed. But rebels come, for the most part, from the provinces where petty tyranny, exercised by small souls, show the scheme of the universe on the meanest possible scale. George Eliot was never orthodox again; she abandoned, with fierce determination, every creed, and although she passed, later, through various phases, she re- mained incessantly a rationalist in matters of faith and in all other matters. It is nevertheless true that she wrote admirably about

religion and religious persons. She had learnt the evangeli- cal point of view; she knew — none better — the strength of religious motives; vulgar doubts of this fact were as distasteful to her as they were to another eminent writer, to whom she refers in one of her letters (dated 1853) as " a Mr Huxley, who was the centre of interest " at some " agreeable evening." Her books abound in tributes to Christian virtue, and one of her own favourite characters was Dinah Morris in Adam Bede.

She undertook, about the beginning of 1844, the translation of Strauss's Leben Jesu. This work, published in 1846, was considered scholarly, but it met, in the nature of things, with no popular success. On the death of Mr Evans in 1849, she went abroad for some time, and we hear of no more literary ventures till 1851, when she accepted the assistant-editorship of the Westminster Review. For a while she had lodgings at the offices of that publication in the Strand, London. She wrote several notable papers, and became acquainted with many distinguished authors of that period — among them Herbert Spencer, Carlyle, Harriet Martineau, Francis Newman and George Henry Lewes. Her friendship with the last-named led to a closer relationship which she regarded as a marriage. Among the many criticisms passed upon this step (in view of the fact, among other considera- tions, that Lewes had a wife living at the time), no one has denied her courage in defying the law, or questioned the quality of her tact in a singularly false position. That she felt the deepest affection for Lewes is evident; that we owe the development of her genius to his influence and constant sympathy is all but certain. Yet it is also sure that what she gained from his intimate companionship was heavily paid for in the unceasing conscious- ness that most people thought her guilty of a grave mistake, and found her written words, with their endorsement of tradi- tional morality, wholly at variance with the circumstances of her private life. Doubts of her suffering in this respect will be at once dismissed after a study of her journal and letters. Stilted and unnatural as these are to a tragic degree, one can read well enough between the lines, and also in the elaborate dedication of each manuscript to " my husband " (in terms of the strongest love) , that self-repression, coupled with audacity, does not make for peace. Her sensitiveness to criticism was extreme; a flippant paragraph or an illiterate review with regard to her work actually affected her for days. The whole history of her union with Lewes is a complete illustration of the force of sheer will — in that case partly her own and not inconsiderably his — over a nature essentially unfitted for a bold stand against attacks. At first she and the man whom she had described " as a sort of miniature

Mirabeau in appearance," went abroad to Weimar and Berlin, but they returned to England the same year and settled, after several moves, in lodgings at East Sheen.

In 1854 she published The Essence of Christianity, a translation from Feuerbach, a philosopher to whom she had been introduced by Charles Bray. During 1855 she translated Spinoza's Ethics, wrote articles for the Leader, the Westminster Review, and the Saturday Review— then a new thing. It was not until the follow- ing year that she attempted the writing of fiction, and produced The Sad Fortunes of the Reverend A mos Barton — the first of the Scenes of Clerical Life. These, published in Blackwood's Magazine, were issued in two volumes in 1858. The press in general ex- tended a languid welcome to this work, and although the author received much encouragement from private sources, notably from Charles Dickens, the critics were mostly non-committal, and it was not until the publication of Adam Bede in 1859 that enthusiasm was attracted to the quality of the earlier production. Adam Bede, in the judgment of many George Eliot's masterpiece, met with a success (in her own words) " triumphantly beyond anything she had dreamed of." In i860 appeared The Mill on the Floss. After the sensational good fortune of Adam Bede, the criticism applied to the new novel seems to have been disappointing. We find Miss Evans telling her publisher that " she does not wish to see any newspaper articles." But the book made its way, and prepared an ever-growing army of readers for Silas Marner (1861), Romola (1862-1863), and Felix Holt

(1866).

Silas Marner shows a reversion to her early manner — the manner of Scenes of Clerical Life. Romola, which is what is called an historical novel, owes it vitality not to the portraits of Savonarola or of the heroine, or to its vigorous pictures of Florentine life in the 1 5th century, but to its superb presentment of the treacherous, handsome Tito Melema, who belongs not to any one period but to every generation. Felix Holt, a novel dealing with political questions, is strained by a painfulness too severe for any reader's pleasure. Where other eminent authors have produced mechanical books, or books which were mere repetitions of their most popular effort, she erred only on the side of the ponderous and the distressing. Felix Holt is both, and it is the only one of her novels which lacks an un-

forgettable human note. The Spanish Gypsy (1868), a drama in blank verse, received more public response than most com- positions of the kind executed by those connected with the drama or with poetry only; and she published in 1874 another volume of verses, The Legend of Jubal and other Poems.

Any depression which the author may have felt with regard to the faults found with some of the last-named books was completely cured by the praise bestowed on Middlemarch (1872). This profound study of certain types of English character was supreme at the time of its writing, and it remains supreme, of its school, in European literature. Thackeray is brilliant; Tolstoi is vivid to a point where life-likeness overwhelms any considera- tion of art; Balzac created a whole world; George Eliot did not create, but her exposition of the upper and middle class minds of her day is a masterpiece of scientific psychology. Daniel Deronda (1876), a production on the same lines, was less satis- factory. It exhibited the same human insight, the passionate earnestness, the insinuated special pleading for hard cases, the same intellectual strength, but the subject was unwieldy, almost forbidding, and, as a result, the novel, in spite of its distinc- tion, has never been thoroughly liked. The death of Mr Lewes in 1878 was also the death-blow to her artistic vitality. She corrected the proofs of Theophrastus Such (a collection of essays) , but she wrote no more. About two years later, however, she married Mr J. W. Cross, a gentleman whose friendship was especially congenial to a temperament so abnormally dependent on affectionate understanding as George Eliot's. But she never really recovered from her shock at the loss of George Lewes, and died at 4 Cheyne Walk, Chelsea, on the 22nd of December r88o.

No right estimate of her, whether as a woman, an artist or a philosopher, can be formed without a steady recollection of her infinite capacity for mental suffering, and her need of human

support. The statement that there is no sex in genius, is on the face of it, absurd. George Sand, certainly the most independent and dazzling of all women authors, neither felt, nor wrote, nor thought as a man. Saint Teresa, another great writer on a totally different plane, was pre-eminently feminine in every word and idea. George Eliot, less reckless, less romantic than the Frenchwoman, less spiritual than the Spanish saint, was more masculine in style than either; but her outlook was not, for a moment, the man's outlook; her sincerity, with its odd reserves, was not quite the same as a man's sincerity, nor was her humour that genial, broad, unequivocal humour which is peculiarly virile. Hers approximated, curiously enough, to the satire

of Jane Austen, both for its irony and its application to little everyday affairs. Men's humour, in its classic manifestations, is on the heroic rather than on the average scale: it is for the uncommon situations, not for the daily tea-table.

Her method of attacking a subject shows the influence of Jane Austen, especially in parts of Middlemarch; one can detect also the stronger influence of Mrs Gaskell, of Charlotte Bronte, and of Miss Edgeworth. It was, however, but an influence, and no more than a man writer, anxious to acquire a knowledge of the feminine point of view, might have absorbed from a study of these women novelists. One often hears that she is not artistic; that her characterization is less distinct than Jane Austen's; that she tells more than should be known of her heroes and heroines. But it should be remembered that Jane Austen dealt with familiar domestic types, whereas George Eliot excelled in the presentation of extraordinary souls. One woman drew members of polite society with correct notions, while the other woman depicted social rebels with ideas and ideals. In every one of George Eliot's books, the protagonists, tortured by dreams of perfection, are in revolt against the prudent compromises of the worldly. All through her stories, one hears the clash of " the heroic for earth too high," and the desperate philosophy, disguised it is true, of Omar Khayyam. In her day, Epicurean- ism had not reached the life of the people, nor passed into the education of the mob. Few dared to confess that the pursuit of pleasure, whether real or imagined, was the aim of mankind. The charm of Jane Austen is the charm of the untroubled and well-to-do materialist, who sees in a rich marriage, a comfortable house, carriages and an assured income the best to strive for; and in a fickle lover of either sex or the loss of money the severest calamities which can befall the human spirit. Jane Austen despised the greater number of her characters: George Eliot suffered with each of hers. Here, perhaps, we find the reason why she is accused of being inartistic. She could not be im- personal.

Again, George Eliot was a little scornful to those of both sexes who had neither special missions nor the consciousness of this deprivation. Men are seldom in favour of missions in any field. She demanded, too strenuously from the very beginning, an aim, more or less altruistic, from every individual; and as she advanced in life this claim became the more imperative, till at last it overpowered her art, and transformed a great delineator of humanity into an eloquent observer with far too many personal prejudices. But she was altogether free from cynicism, bitter- ness, or the least tendency to pride of intellect. She suffered from bodily weakness the greater part of her life, and, but for an extraordinary mental health — inherited

from the fine yeoman stock from which she sprang— it is impossible that she could have retained, at all times, so sane a view of human conduct, or been the least sentimental among women writers of the first rank — theone wholly without morbidity in any disguise. The accumula- tion of mere book knowledge, as opposed to the friction of a life spent among all sorts and conditions of men, drove George Eliot at last to write as a specialist for specialists: joy was lost in the consuming desire for strict accuracy: her genius became more and more speculative, less and less emotional. The highly trained brain suppressed the impulsive heart, — the heart described with such candour and pathos as Maggie Tulliver's in The Mill on the Floss. For this reason — chiefly because philosophy is popularly associated with inactive depression,

ELIOT, SIR J.— ELIOT, J.

whereas human nature is held to be eternally exhilarating— her later works have not received so much praise as her earlier productions. But one has only to compare Romola or Daniel Deronda with the compositions of any author except herself to realize the greatness of her designs, and the astonishing gifts brought to their final accomplishment.

See also the Life of George Eliot, edited by J. W. Cross (3 vols., 1885-1887); George Eliot, by Sir Leslie Stephen, in the " English Men of Letters " series (1902) ; by Oscar Browning, " Great Writers" series (1890), with a bibliography by J. P. Anderson; by Mathilde Blind, " Eminent Women " series, a new edition of which also contains a bibliography (Boston, Mass., 1904). (P. M. T. C.)

ELIOT, SIR JOHN (1592-1632), English statesman, son of Richard Eliot, a member of an old Devonshire family lately settled in Cornwall, was born at his father's seat at Port Eliot in Cornwall in 1 592. He matriculated at Exeter College, Oxford, on the 4th of December 1607, and leaving the university after a residence of three years he studied law at one of the inns_of court. He also spent some months travelling in France, Spain and Italy, in company, for part of the time, with young George Villiers, afterwards duke of Buckingham. He was only twenty- two when he began his parliamentary career as member for St Germans in the " addled parliament " of 1614. In 1618 he was knighted, and next year through the patronage of Buckingham he obtained the appointment of vice-admiral of Devon, with large powers for the defence and control of the commerce of the county. It was not long before the characteristic energy with which he performed the duties in his office

involved him in diffi- culties. After many attempts, in 1623 he succeeded by a clever but dangerous manoeuvre in entrapping the famous pirate John Nutt, who had for years infested the southern coast, inflicting immense damage upon English commerce. The issue is noteworthy. The pirate, having a powerful protector at court in Sir George Calvert, the secretary of state, was pardoned; while the vice-admiral, upon charges which could not be substantiated, was flung into the Marshalsea, and detained there nearly four months.

A few weeks after his release Eliot was elected member of parliament for Newport (February 1624). On the 27th of February he delivered his first speech, in which he at once revealed his great powers as an orator, demanding boldly that the liberties and privileges of parliament, repudiated by James I. in the former parliament, should be secured. In the first parlia- ment of Charles I., in 1625, he urged the enforcement of the laws against the Roman Catholics. Meanwhile he had continued the friend and supporter of Buckingham and greatly approved of the war with Spain. Buckingham's incompetence, however, and the bad faith with which both he and the king continued to treat the parliament, alienated Eliot completely from the administration. Distrust of his former friend quickly grew in Eliot's excitable mind to a certainty of his criminal ambition and treason to his country. Returned to the parliament of 1626 as member for St Germans, he found himself, in the absence of other chiefs of the opposition whom the king had secured by nominating them sheriffs, the leader of the House. He immediately demanded an inquiry into the recent disaster at Cadiz. On the 27th of March he made an open and daring attack upon Buckingham and his evil administration. He was not intimidated by the king's threatening intervention on the 29th, and persuaded the House to defer the actual grant of the subsidies and to present a remonstrance to the king, declaring its right to examine the conduct of ministers. On the 8th of May he was one of the managers who carried Buckingham's impeach- ment to the Lords, and on the 10th he delivered the charges against him, comparing him in the course of his speech to Sejanus. Next day Eliot was sent to the Tower. On the Commons declin- ing to proceed with business as long as Eliot and Sir Dudley Digges (who had been imprisoned with him) were in confinement, they were released, and parliament was dissolved on the 15th of June. Eliot was immediately dismissed from his office of vice-admiral of Devon, and in 1627 he was again imprisoned for refusing to pay a forced loan, but liberated shortly before the assembling of the parliament of 1628, to which he was returned

as member for Cornwall. He joined in the resistance now organized to arbitrary taxation, was foremost in the promotion of the Petition of Right, continued his outspoken censure of Buckingham, and after the latter's assassination in August, led the attack in the session of 1629 on the ritualists and Arminians.

In February the great question of the right of the king to levy tonnage and poundage came up for discussion; and on the king ordering an adjournment of parliament, the speaker, Sir John Finch, was held down in the chair while Eliot's resolutions against illegal taxation and innovations in religion were read to the House by Holies (q.v.). In consequence, Eliot, with eight other members, was imprisoned on the 4th of March in the Tower. He refused to answer in his examination, relying on his privilege of parliament, and on the 29th of October was removed to the Marshalsea. On the 26th of January he appeared at the bar of the king's bench, with Holies and Valentine, to answer a charge of conspiracy to resist the king's order, and refusing to acknowledge the jurisdiction of the court be was fined £2000 and ordered to be imprisoned during the king's pleasure and till he had made submission. This he steadfastly refused. While some of the prisoners appear to have had certain liberty allowed to them, Eliot's confinement in the Tower was made exceptionally severe. Charles's anger had been from the first directed chiefly against him, not only as his own political antagonist but as the prosecutor and bitter enemy of Buckingham; " an outlawed man," he described him, " desperate in mind and fortune."

Eliot languished in prison for some time, during which he wrote several works, his Negotium posterorum, an account of the parliament in 1625; The Monarchic of Man, a political treatise; De jure majestatis, a Political Treatise of Government; and An Apology for Socrates, his own defence. In the spring of 1632 he fell into a decline. In October he petitioned Charles for per- mission to go into the country, but leave could only be obtained at the price of submission, and was finally refused. He died on the 27th of November 1632. When his son requested permission to move the body to Port Eliot, Charles, whose resentment still survived, returned the curt refusal: " Let Sir John Eliot be buried in the church of that parish where he died." The manner of Eliot's death, not without suspicion of foul play, and as the result of the king's implacability and the severe treatment to which he had been subjected, had more effect, probably, than any other single incident in embittering and precipitating the dispute between king and parliament; and the tragic sacrifice of a man so gifted and patriotic, and actuated originally by no antagonistic feeling against the monarchy or the church, is the

surest con- demnation of the king's policy and administration. Eliot was essentially a great orator, inspired by enthusiasm and high ideals, which he was able to communicate to his hearers by his eloquence, but, like Chatham afterwards, he had not only the gifts but the failings of the orator, was incapable of well-reasoned and balanced judgment, and, though one of the greatest person- alities of the time, was inferior to Pym both as a party leader and as a statesman.

Eliot married Rhadagund, daughter of Richard Gedie of Trebursye in Cornwall, by whom he had five sons, from the youngest of whom Nicholas the present earl of St Germans is descended, and four daughters.

The Life of Sir J. Eliot, by J. Forster (1864), is supplemented and corrected by Gardiner's History of England, vols, v.-vii., and the article intheDict. of Nat. Biog., by the same author. Eliot's writings, together with his Letter-Book, have been edited by Dr Grosart.

ELIOT, JOHN (1604-1690), American colonial clergyman, known as the " Apostle to the Indians," was born probably at Widford, Hertfordshire, England, where he was baptized on the 5th of August 1604. He was the son of Bennett Eliot, a middle- class farmer. Little is known of his boyhood and early manhood except that he took his degree of B.A. at Jesus College, Cam- bridge, in 1622. It seems probable that he entered the ministry of the Established Church, but there is nothing definitely known of him until 1629-1630, when he became an usher or assistant at the school of the Rev. Thomas Hooker, at Little Baddow, near Chelmsford. The influence of Hooker apparently determined

him to become a Puritan, but his connexion with the school ceased in 1630, when Laud's persecutions drove Hooker into exile. The realization of the difficulties in the way of a non- conforming clergyman in England undoubtedly determined Eliot to emigrate to America in the autumn of 1631, where he settled first at Boston, assisting for a time at the First Church. Tn November 1632 he became " teacher " to the church at Roxbury, with which his connexion lasted until his death. There he married Hannah Mulford, who had been betrothed to him in England, and who became his constant helper. In the care of the Roxbury church he was associated

with Thomas Welde from 1632 to 1641, with Samuel Danforth (1626-1674) from 1649 to 1674, and with Nehemiah Walter (1663-1750) from 1688 to 1690.

*Inspired with the idea of converting the Indians, his first step was to perfect himself in their dialects, which he did by the assistance of a young Indian whom he received into his home. With his aid he translated the Ten Commandments and the Lord's Prayer. He first successfully preached to the Indians in their own tongue at Nonantum (Newton) in October 1646. At the third meeting several Indians declared themselves converted, and were soon followed by many others. Eliot induced the Massachusetts General Court to set aside land for their residence, the same body also voting him £10 to prosecute the work, and directing that two clergymen be annually elected by the clergy as preachers to the Indians. As soon as the success of Eliot's endeavours became known, the necessary funds flowed in upon him from private sources in both Old and New England. In July 1649 parliament incorporated the " Society for the Pro- pagation of the Gospel in New England," which henceforth supported and directed the work inaugurated by Eliot. The first appeal for aid brought contributions of £11,000. In 1651 the Christian Indian town founded by Eliot was removed from Nonantum to Natick, where residences, a meeting-house, and a school-house were erected, and where Eliot preached, when able, once in every two weeks as long as he lived. To this community Eliot applied a plan of government by means of tens, fifties and hundreds, which he subsequently advocated as suitable for all England. Eliot's missionary labours encouraged others to follow in his footsteps. A second town under his direction was established at Ponkapog (Stoughton) in 1654, in which he had the assistance of Daniel Gookin (c. 1612-1687). His success was duplicated in Martha's Vineyard and Nantucket by the Mayhews, and by 1674 the unofficial census of the " praying Indians " numbered 4000. King Philip's War (1675-76) was a staggering blow to all missionary enterprise; and although few of the converted Indians proved disloyal, it was some years before adequate support could again be enlisted. *Yet at Eliot's death, which occurred at Roxbury on the 21st of May 1690, the missions were at the height of their prosperity, and that the results of his labours were not permanent was due only to the racial traits of the New England tribes.*

Of wider influence and more lasting value than his personal labours as a missionary was Eliot's work as a translator of the Bible and various religious works into the Massachusetts dialect of the Algonquian language. The first work completed was the Catechism,

published in 1653 at Cambridge, Massachusetts, the first book to be printed in the Indian tongue. Several years elapsed before Eliot completed his task of translating the Bible. The New Testament was at last issued in 1661, and the Old Testament followed two years later. The New Testament was bound with it, and thus the whole Bible was completed. To it were added a Catechism and a metrical version of the Psalms. The title of this Bible, now a great rarity, is Mamussee Wunneetupanatamwe Up-Biblum God naneeswe Nukkone Testament kah wonk Wusku Testament-Ne quoshkinnumuk nashpe Wuttinncumoh Christ noh assoowesit John Eliot; literally translated, " The Whole Holy His-Bible God, both Old Testament and also New Testament. This turned by the-servant-of-Christ, who is called John Eliot."

This book was printed in 1663 at Cambridge, Mass., by Samuel Green and Marmaduke Johnson, and was the first Bible printed in America. In 1685 appeared a second edition, in the preparation

of which Eliot was assisted by the Rev. John Cotton (1640-1699), the younger, of Plymouth, who also had a wide knowledge of the Indian tongue.

Besides his Bible, Eliot published at Cambridge in 1664 a translation of Baxter's Call to the Unconverted, and in 1665 an abridged translation of Bishop Bayly's Practice of Piety. With the assistance of his sons he completed (1664) his well-known Indian Grammar Begun, printed at Cambridge, Massachusetts, in 1666. It was reprinted in vol. ix. of the Collections of the Massachusetts Historical Society. The Indian Primer, comprising an exposition of the Lord's Prayer and a translation of the Larger Catechism, was published at Cambridge in 1669, and was reprinted under the editorial superintendence of Mr John Small of the university of Edinburgh in 1877. In 1671 Eliot printed in English a little volume entitled Indian Dialogues, followed in 1672 by his Logick Primer, both of which were intended for the instruction of the Indians in English. His last translation was Thomas Shepard's Sincere Convert, completed and published by Grindal Rawson in 1689. Eliot's literary activity, however, extended into other fields than that of Indian instruction. He was, with Richard Mather, one of the editors of the Bay Psalm Book (1640). Several tracts written wholly or in part by him in the nature of reports to the society which supported his missions were published at various times in England. In 1660 he pub- lished a curious treatise on government entitled The Christian Commonwealth, in which he found the ideal of government in the ancient Jewish state, and proposed the reorganization of the English

government on the basis of a numerical subdivision of the inhabitants. His Harmony of the Gospels (1678) was a life of Jesus Christ.

Bibliography. — An account of Eliot's life and work is contained in Williston Walker's Ten New England Leaders (New York, 1901). There is a " Life of John Eliot," by Convers Francis, in Sparks' American Biography, vol. v. (New York, 1853); another by N. Adams (Boston, 1847) ; and a sketch in Cotton Mather's Magnalia (London, 1702). For a good account of his publications in the Indian language see the chapter on " The Indian Tongue and its Literature," by J. H. Trumbull, in vol. i. of the Memorial History of Boston (1882). (W. Wr.)

ELIS, or Eleia, an ancient district of southern Greece, bounded on the N. by Achaea, E. by Arcadia, S. by Messenia, and W. by the Ionian Sea. The local form of the name was Valis, or Valeia, and its meaning, in all probability, " the lowland." In its physical constitution Elis is practically one with Achaea and Arcadia; its mountains are mere offshoots of the Arcadian highlands, and its principal rivers are fed by Arcadian springs. From Erymanthus in the north, Skollis (now known as Mavri and Santameri in different parts of its length) stretches toward the west, and Pholoe along the eastern frontier; in the south a prolongation of Mount Lycaeon bore in ancient times the names of Minthe and Lapithus, which have given place respectively to Alvena and to Kaiapha and Smerna. These mountains are well clothed with vegetation, and present a soft and pleasing appearance in contrast to the picturesque wildness of the parent ranges. They gradually sink towards the west and die off into what was one of the richest alluvial tracts in the Peloponnesus. Except where it is broken by the rocky promontories of Chelonatas (now Chlemutzi) and Ichthys (now Katakolo), the coast lies low, with stretches of sand in the north and lagoons and marshes towards the south. During the summer months communication with the sea being established by means of canals, these lagoons yield a rich harvest of fish to the inhabitants, who at the same time, however, are almost driven from the coast by the swarms of gnats. The district for administrative purposes forms part of the nome of Elis and Achaea (see Greece).

Elis was divided into three districts — Hollow or Lowland Elis (■fl / coiXrj'HXis), Pisatis, or the territory of Pisa, and Triphylia, or the country of the three tribes. (1) Hollow Elis, the largest and most northern of the three, was watered by the Peneus and its tributary the Ladon, whose united stream forms the modern Gastouni. It

included not only the champaign country originally designated by its name, but also the mountainous region of Acrorea, occupied by the offshoots of Erymanthus. Besides the capital city of Elis, it contained Cyllene, an Arcadian settlement

on the sea-coast, whose inhabitants worshipped Hermes under the phallic symbol; Pylus, at the junction of the Peneus and the Ladon, which, like so many other places of the same name, claimed to be the city of Nestor, and the fortified frontier town of Lasion, the ruins of which are still visible at Kuti, near the village of Kumani. The district was famous in antiquity for its cattle and horses; and its byssus, supposed to have been intro- duced by the Phoenicians, was inferior only to that of Palestine. (2) Pisatis extended south from Hollow Elis to the right bank of the Alpheus, and was divided into eight departments called after as many towns. Of these Salmone, Heraclea, Cicysion, Dyspontium and Harpina are known — the last being the reputed burial-place of Marmax, the suitor of Hippodamia. From the time of the early investigators it has been disputed whether Pisa, which gave its name to the district, has ever been a city, or was only a fountain or a hill. By far the most important spot in Pisatis was the scene of the great Olympic games, on the northern bank of the Alpheus (see Olympia). (3) Triphylia stretches south from the Alpheus to the Neda, which forms the boundary towards Messenia. Of the nine towns mentioned by Polybius, only two attained to any considerable influence — Lepreum and Macistus, which gave the names of Lepreatis and Macistia to the southern and northern halves of Triphylia. The former was the seat of a strongly independent population, and continued to take every opportunity of resisting the supremacy of the Eleans. In the time of Pausanias it was in a very decadent condition, and possessed only a poor brick-built temple of Demeter; but considerable remains of its outer walls are still in existence near the village of Strovitzi, on a part of the Minthe range.

The original inhabitants of Elis were called Caucones and Paroreatae. They are mentioned for the first time in Greek history under the title of Epeians, as setting out for the Trojan War, and they are described by Homer as living in a state of constant hostility with their neighbours the Pylians. At the close of the nth century B.C. the Dorians invaded the Pelopon- nesus, and Elis fell to the share of Oxylus and the Aetolians. These people, amalgamating with the Epeians, formed a powerful kingdom in the north of Elis. After this

many changes took place in the political distribution of the country, till at length it came to acknowledge only three tribes, each independent of the others. These tribes were the Epeians, Minyae and Eleans. Before the end of the 8th century B.C., however, the Eleans had vanquished both their rivals, and established their supremacy over the whole country. Among the other advantages which they thus gained was the right of celebrating the Olympic games, which had formerly been the prerogative of the Pisatans. The attempts which this people made to recover their lost privilege, during a period of nearly two hundred years, ended at length in the total destruction of their city by the Eleans. From the time of this event (572 B.C.) till the Peloponnesian War, the peace of Elis remained undisturbed. In that great contest Elis sided at first with Sparta; but that power, jealous of the increasing prosperity of its ally, availed itself of the first pretext to pick a quarrel. At the battle of Mantinea (418 B.C.) the Eleans fought against the Spartans, who, as soon as the war came to a close, took vengeance upon them by depriving them of Triphylia and the towns of the Acrorea. The Eleans made no attempt to re-establish their authority over these places, till the star of Thebes rose in the ascendant after the battle of Leuctra (371 B.C.). It is not unlikely that they would have effected their purpose had not the Arcadian confederacy come to the assistance of the Triphylians. In 366 B.C. hostilities broke out between them, and though the Eleans were at first successful, they were soon overpowered, and their capital very nearly fell into the hands of the enemy. Unable to make head against their opponents, they applied for assistance to the Spartans, who invaded Arcadia, and forced the Arcadians to recall their troops from Elis. The general result of this war was the restoration of their territory to the Eleans, who were also again invested with the right of holding the Olympic games. During the Macedonian supremacy in Greece they sided with the victors, but refused to fight against

their countrymen. After the death of Alexander they renounced the Macedonian alliance. At a subsequent period they joined the Aetolian League, but persistently refused to identify them- selves with the Achaeans. When the whole of Greece fell under the Roman yoke, the sanctity of Olympia secured for the Eleans a certain amount of indulgence. The games still continued to attract to the country large numbers of strangers, until they were finally put down by Theodosius in 394, two years previous to the utter destruction of the country by the Gothic invasion under Alaric. In later times Elis fell successively into the hands of the Franks and the Venetians, under whose rule it recovered to some extent its ancient prosperity. By the latter people

the province of Belvedere on the Peneus was called, in consequence of its fertility, "the milch cow of the Morea."

ELIS, the chief city of the ancient Greek district of Elis, was situated on the river Peneus, just where it passes from the mountainous district of Acrorea into the champaign below. According to native tradition, it was originally founded by Oxylus, the leader of the Aetolians, whose statue stood in the market-place. In 471 B.C. it received a great extension by the incorporation (synoecism) of various small hamlets, whose inhabitants took up their abode in the city. Up to this date it only occupied the ridge of the hill now called Kalaskopi, to the south of the Peneus, but afterwards it spread out in several suburbs, and even to the other side of the stream. As all the athletes who intended to take part in the Olympic games were obliged to undergo a month's training in the city, its gymnasiums were among its principal institutions. They were three in number —the " Xystos," with its avenues of plane-trees, its plethrion or wrestling-place, its altars to Heracles, to Eros and Anteros, to Demeter and Kore (Cora), and its cenotaph of Achilles; the " Tetragonon," appropriated to boxing exercises; and the " Maltho," in the interior of which was a hall or council chamber called Lalichmion after its founder. The market-place was of the old-fashioned type, with porticoes at intervals and paths leading between them. It was called the Hippodrome because it was commonly used for exercising horses. Among the other objects of interest were the temple of Artemis Philomirax; the Hellanodicaeon, or office of the Hellanodicae; the Corcyrean Hall, a building in the Dorian style with two facades, built of spoils from Corcyra; a temple of Apollo Acesius; a temple of Silenus; an ancient structure supported on oaken pillars and reputed to be the burial-place of Oxylus; the building where the sixteen women of Elis were wont to weave a robe for the statue of Hera at Olympia; the temple of Aphrodite, with a statue of the goddess by Pheidias as Urania with a tortoise beneath her foot, and by Scopas as Pandemos, riding on a goat; and the shrine of Dionysus, whose festival, the Thyia, was yearly celebrated in the neighbourhood. On the acropolis was a temple of Athena, with a gold and ivory statue by Pheidias. The history of the town is closely identified with that of the country. In 399 B.C. it was occupied by Agis, king of Sparta. The acropolis was fortified in 312 by Telesphorus, the admiral of Antigonus, but it was shortly afterwards dismantled by Philemon, another of his generals. A view of the site is given by Stanhope. It is now called Palaeopolis. No traces of any buildings can be identified, the only remains visible dating from Roman times.

See Pausanias vi. 23-26; J. Spencer Stanhope, Olympia and Elis

(1824), folio; W. M. Leake, Morea (1830); E. Curtius, Peloponnesus (1851-1852); Schiller, Stamme und Staaten Griechenlands ; C. Bursian, Geographie von Griechenland (1868-1872); P. Gardner, " The Coins of Elis," in Num. Chr. (1879). (E. Gr.)

ELIS, PHILOSOPHICAL SCHOOL OF. This school was founded by Phaedo, a pupil of Socrates. It existed for a very short time and was then transferred by Menedemus to Eretria, where it became known as the Eretrian school. Its chief members, beside Phaedo, were Anchipylus, Moschus and Plei- stanus (see Phaedo and Menedemus).

ELISAVETGRAD, a fortress and town of Russia, in the government of Kherson, 296 m. by rail N.E. of Odessa on the Balta-Kremenchug railway, and on the Ingul river, in 48° 31′ N. and 32° 10′ E. The population increased from 23,725 in i860 to

66,182 in 1900. The town is regularly built, with wide streets, some of them lined with trees, and is a wealthy town, which has become an industrial centre for the region especially on account of its steam flour-mills, in which it is second only to Odessa, its distilleries, mechanical workshops, tobacco and tallow factories and brickworks. It is an important centre for trade in cereals and flour for export, and in sheep, cattle, wool, leather and timber. Five fairs are held annually. It has a military school, a first-class meteorological station and a botanical garden. The town was founded in 1 7 54 and named after the empress Elizabeth. The fortifications are now decayed.

ELISAVETPOL, a government of Russia, Transcaucasia, having the governments of Tiflis and Daghestan on the N., Baku on the E., and Erivan and Tiflis on the W. and Persia on the S. Area, 16,721 sq. m. It includes: (a) the southern slope of the main Caucasus range in the north-east, where Bazar- dyuzi (14,770 ft.) and other peaks rise above the snow-line; (b) the arid and unproductive steppes beside the Kura, reaching 1000 ft. of altitude in the west and sinking to 100-200 ft. in the east, where irrigation is necessary; and © the northern slopes of the Transcaucasian escarpment and portions of the Armenian plateau, which is intersected towards its western boundary, near Lake Gok-cha, by chains of mountains consisting of trachytes and various crystalline rocks, and reaching 12,845 ft. i n Mount Kapujikh. Elsewhere the country has the character of a plateau, 7000 to 8000 ft. high, deeply trenched by tributaries of the

Aras. All varieties of climate are found from that of the snowclad peaks, Alpine meadows, and stony deserts of the high levels, to that of the hill slopes, clothed with gardens and vineyards, and of the arid Caspian steppes. Thus, at Shusha, on the plateau, at an altitude of 3680 ft., the average temperatures are: year 48°, January 26°, July 66°; annual rainfall, 26-4; while at Elisavetpol, in the valley of the Kura, they are: year 55°, January 32°-2, July 77° and rainfall only 10-3 in. Nearly one- fifth of the surface is under forests.

The population which was 885,370 in 1807 (only 392,124 women; 84,130 urban), and was estimated at 953.3°° m 1906, consists chiefly of Tatars (56%) and Armenians (33%)- The remainder are Kurds (4-7%), Russians and a few Germans, Jews, Kurins, Udins and Tates. Peasants form the great bulk of the population. Some of the Tatars and the Kurds are nomadic. Wheat, maize, barley, oats and rye are grown, also rice. Cultiva- tion of cotton has begun, but the rearing of silkworms is of old standing, especially at Nukha (1650 tons of cocoons on the average are obtained every year). Nearly 8000 acres are under vines, the yield of wine averaging 825 million gallons annually. Gardening reaches a high standard of perfection. Liquorice root is obtained to the extent of about 35,°°° tons annually. The rearing of live-stock is largely carried on on the steppes. Copper, magnetic iron ore, cobalt and a small quantity of naphtha are extracted, and nearly 10,000 persons are employed in manu- facturing industry — copper works and silk-mills. Carpet-Weaving is widely spread. Owing to the Transcaucasian railway, which crosses the government, trade, both in the interior and with Persia, is very brisk. The government is divided into eight districts, Elisavetpol, Aresh, Jebrail, Jevanshir, Kazakh, Nukha, Shusha and Zangezur. The only towns, besides the capital, are Nukha (24,811 inhabitants in 1897) and Shusha

(2S,6S6).

ELISAVETPOL (formerly Ganja, alternative names being Kenjeh and Kanga), a town of Russia, capital of the govern- ment of the same name, 118 m. by rail S.E. of Tiflis and 35 m. from the railway, at an altitude of 1446 ft. Pop. (1873) 15,439; (1897) 33,090. It is a very old town, which changed hands between Persians, Khazars and Arabs even in the 7th century, and later fell into the possession of Mongols, Georgians, Persians and Turks successively, until the Russians took it in 1804, when the change of name was made. It is a badly built place, with narrow streets and low-roofed, windowless houses, and is situated in a very unhealthy locality, but has been much improved, a new European quarter having been built on the

site of the old fortress (erected by the Turks in 171 2-1 724). The

inhabitants are chiefly Tatars and Armenians, famed for their excellent gardening, and also for silkworm breeding. It has a beautiful mosque, built by Shah Abbas of Persia in 1620; and a renowned " Green Mosque " amidst the ruins of old Ganja, 4 m. distant. The Persian poet, Shah Nizam (Nizam-ed-Din), was born here in 1141, and is said to have been buried (1203) close to the town. The Persians were defeated by the Russians under Paskevich outside this town in 1826.

ELISHA (a Hebrew name meaning " God is deliverance "), in the Bible, the disciple and successor of Elijah, was the son of Shaphat of Abel-meholah in the valley of the Jordan. He was symbolically elected to the prophetic office by Elijah some time during the reign of Ahab (1 Kings xix. 19-21), and he survived until the reign of Joash. His career thus appears to have extended over a period of nearly sixty years. The relation between Elijah and Elisha was of a particularly close kind, but the difference between them is much more striking than the resemblance. Elijah is the prophet of the wilderness, wandering, rugged and austere; Elisha is the prophet of civilized life, of the city and the court, with the dress, manners and appearance of ordinary " grave citizens." Elijah is the messenger of vengeance — sudden, fierce and overwhelming; Elisha is the messenger of mercy and restoration. Elijah's miracles, with few exceptions, are works of wrath and destruction; Elisha's miracles, with but one notable exception, are works of beneficence and healing. Elijah is the "prophet as fire" (Ecclus, xlviii. 1), an abnormal agent working for exceptional ends; Elisha is the " holy man of God which passeth by us continually " (2 Kings iv. 9), mixing in the common life of the people.

It is impossible to draw up a detailed chronology of his life. In most of the events narrated no further indication of time is given than by the words " the king of Israel," the name not being specified. There are some instances in which the order of time is obviously the reverse of the order of narrative, and there are other grounds for concluding that the narrative as we now have it is confused and incomplete. This may serve not only to explain the chronological difficulties, but also to throw some light on the altogether exceptional character of the miraculous element in Elisha's history. On the literary questions, see further Kings.

Not only are Elisha's miracles very numerous, even more so than those of Elijah, but they stand in a peculiar relation to the man and his work. With all the other prophets the primary function is spiritual teaching; miracles, even though numerous and many of them symbolical like Elisha's, are only accessory. With Elisha, on the other hand, miracles seem the principal function, and the teaching is altogether subsidiary. An explanation of the superabundance of miracles in Elisha's life is suggested by the fact that several of them were merely repetitions or doubles of those of his predecessor. Such were : his first miracle, when, returning across the Jordan, he made a dry path for himself in the same manner as Elijah (2 Kings ii. 14); the increase of the widow's pot of oil (iv. 1-7); and the restoration of the son of the woman of Shunem to life (iv. 18-37). The theory that stories from the earlier life have been imported by mistake into the later, even if tenable, applies only to three of the miracles, and leaves unexplained a much larger number which are not only not repetitions of those of Elijah, but have an entirely opposite character. The healing of the water of Jericho by putting salt in it (ii. 19-22), the provision of water for the army of Jehoshaphat in the arid desert (iii. 6-20), the neutralizing by meal of the poison in the pottage of the famine-stricken sons of the prophets at Jericho (iv. 38-41), the healing of Naaman the Syrian (v. 1-19), and the recovery of the iron axehead that had sunk in the water (vi. 1-7), are all instances of the beneficence which was the general characteristic of Elisha's wonder-working activity in con- trast to that of Elijah. Another miracle of the same class, the feeding of a hundred men with twenty loaves so that something was left over (iv. 42-44), deserves mention as the most striking though not the only instance of a resemblance between the work of Elisha and that of Jesus (Matt. xiv. 13-21). The one distinct exception to the general beneficence of Elisha's activity— the

destruction of the forty-two children who mocked him as he was going up to Bethel (2 Kings ii. 23-25) — presents an ethical difficulty which is scarcely removed by the suggestion that the narrative has lost some particulars which would have shown the real enormity of the children's offence. We may prefer to imagine that among the homely stories told of him was one which had for its main object the inculcation of respect for one's elders. 1 The leprosy brought upon Gehazi (v. 20-27), though a miracle of judgment, scarcely belongs to the same class as the other; and it will be observed that Gehazi 's subsequent relations with the court (viii. 1-6) ignore the disease, a fatal hindrance to intercourse. Further, the healing of Naaman (alluded to in Luke iv. 27) presupposes peaceful relations between Israel and the Syrians, with which, however, contrast ch. vi. The wonder- working power of Elisha is represented as continuing even after his death. As the feeding of the hundred men and the cure of leprosy connect his work with that of Jesus, so the story that a dead man who was cast into his sepulchre was brought to life by the mere contact with his bones (2 Kings xiii. 21, cf. Ecclus. xlviii. 12-14) is the most striking instance of an analogy between his miracles and those recorded of medieval saints. Stanley {Jewish Church, 4th ed., ii. 276) in reference to this has remarked that in the life of Elisha alone " in the sacred history the gulf between biblical and ecclesiastical miracles almost disappears." The place which Elisha filled in contemporary history was one of great influence and importance, and several narratives testify to his great reputation in Israel. On one occasion, when he delivered the army that had been brought out against Moab from a threatened dearth of water (2 Kings hi.), 2 he plainly intimates that, but for his regard to Jehoshaphat, the king of Judah, who was in alliance with Israel, he would not have interfered. Whether he was with the army or was supposed to be living in the desert is left obscure. An interesting touch is the influence of music upon the prophetic mind (v. 15). His next signal interference was during the incursions of the Syrians, when he disclosed the plans of the invaders to the " king of Israel " with such effect that they were again and again baffled. When the " king of Syria " was informed that " Elisha, the prophet that is in Israel, telleth the king o£ Israel the words that thou speakest in thy bed-chamber," he at once sent an army to take him captive in Dothan. At Elisha's prayer his terrified servant beheld an army of horses and chariots of fire surrounding the prophet. At a second prayer the invaders were struck blind, and in this state they were led by Elisha to Samaria, where their sight was restored. Their lives were

spared at the command of the prophet, and they returned home so impressed that their incursions thenceforward ceased (vi. 8-23). This is immediately ‘ followed by the siege of Samaria by Benhadad which caused a famine of the severest kind. The calamity was imputed by the ” king of Israel ” to the influence of Elisha, and he ordered the prophet to be immediately put to death. Forewarned of the danger, Elisha ordered the messenger who had been sent to slay him to be detained at the door, and, when, immediately afterwards, the king himself came (” messenger ” in vi. 53 should rather be king), predicted a great plenty within twenty-four hours. This was fulfilled by the flight of the Syrian army under the circumstances stated in ch. vii. After the episode with regard to the woman of Shunem (viii. 1-6), which is out of its chronological order, Elisha is represented as at Damascus (viii. 7-15). The reverence with which the foreign monarch Benhadad addressed Elisha deserves to be noted as showing the extent of the prophet’s influence. In sending to know the issue of his illness, the king caused himself to be styled ” thy son Benhadad.” Equally remarkable is the

1 Similarly Elijah enforces respect for the prophetic office in i. 9 sqq. Prof. Kennett points out to the present writer that the epithet ” bald-head ” may refer to the sign of mourning for Elisha’s lost master (cf. Ez. vii. 18, Deut. xiv. 1); “Go up” is perhaps to be taken literally (in reference to Elijah’s translation).

‘ The method of obtaining water (v. 16 sq.) is that which still gives its name to the Wadi el-Ahsa (” valley of water pits “) at the southern end of the Dead Sea (Old Test, Jew. Church, 2nd ed., 147). On the other hand, see Burney, Heb. Text of Kings, p. 270.

very ambiguous nature of Elisha’s reply (viii. io). 3 The most important interference of Elisha in the history of his country constituted the fulfilment of the third of the commands laid upon Elijah. The work of anointing Jehu to be king over Israel was performed by deputy (ix. 1-3). During the forty-five years which the chronological scheme allows for the reigns of Jehu and Jehoahaz the narratives contain no notice of Elisha, but from the circumstances of his death (xiii. 14-21) it is clear that he had continued to enjoy the esteem of the dynasty which he had helped to found. Joash, the grandson of Jehu, waited on him on his deathbed, and addressed him in the words which he himself had used to Elijah: ” My father, my father, the chariot of Israel and the horsemen thereof ” (cf. ii. 12). By the result of a symbolic discharge of arrows he informed the king of his coming success against Syria, and immediately thereafter he died. The explicit statement that he was buried completes the

contrast between him and his greater predecessor.

On the narratives, see Kings. In general those where " the prophet appears as on friendly terms with the king, and possessed of influence at court (e.g. 2 Kings iv. 13, vi. 9, vi. 21, compared with xiii. 14), plainly belong to the time of Jehu's dynasty, though they are related before the fall of the house of Omri. We can dis- tinguish portions of an historical narrative which speaks of Elisha in connexion with events of public interest, without making him the central figure, and a series of anecdotes of properly biographical character. ... In the latter we may distinguish one circle con- nected with Gilgal, Jericho and the Jordan valley to which Abel- Meholah belongs (iv. 1-7? 38-44, v.? vi. 1-7). Here Elisha appears as the head of the prophetic gilds, having his fixed residence at Gilgal. 4 Another circle, which presupposes the accession of the house of Jehu, places him at Dothan or Carmel, and represents him as a personage of almost superhuman dignity. Here there is an obvious parallelism with the history of Elijah, especially with his ascension (cf. 2 Kings vi. 17 with ii. 11; xiii. 14 with ii. 12); and it is to this group of narratives that the ascension of Elijah forms the introduction " (Robertson Smith, Ency. Brit., 9th ed., art. Kings, vol. xiv. p. 186). This twofold representation finds a parallel in the narratives of Samuel, whose history and the conditions reflected therein are analogous to the life and times of Elisha.

Elisha is canonized in the Orthodox Eastern Church, his festival being on the 14th of June, under which date his life is entered in the Acta sanctorum.

See especially, W. R. Smith, Prophets of Israel (Index, s.v.), and the literature to Elijah; Kings, Books of; Prophet.

(W. R. S. ; S. A. C.)

ELISHA BEN ABUYAH (c. a.d. 100), a unique figure among the Palestinian Jews of the first Christian century. He was born before the destruction of the Temple (which occurred in a.d. 70) and survived into the 2nd century. It is not easy to decide as to his exact attitude towards Judaism. That he refused to accept the current rabbinical views is certain, though the Talmud cites his legal decisions. Most authorities believe that he was a Gnostic; but while it is certain that he was not a Christian, it is possible that he was simply a Sadducee, and thus an opponent not of Judaism but of Pharisaism. His disciple, the famous Pharisee Meir, remained his steadfast friend, and his efforts to reclaim his former master are

among the most pathetic incidents in the Talmud. In later ages Elisha (aher " the other," as he was named) was regarded as the type of a heretic whose pride of intellect betrayed him into infidelity to law and morals. Without much appropriateness Elisha has been sometimes described as the " Faust of the Talmud." (I. A.)

ELIXIR (from the Arabic al-iksir, probably an adaptation of the Gr. Zqpiov, a powder used for drying wounds, from ˆrjpos, dry), in alchemy, the medium which would effect the transmuta- tion of base metals into gold; it probably included all such substances — vapours, liquids, &c. — and had a wider meaning than " philosopher's stone." The same term, more fully elixir

3 R. V. marg. is an alteration to remove from Elisha the suggestion of an untruth.

4 The Gilgal of Elisha is near the Jordan — comp. vi. 1 with iv. 38, v:sˆ D'nii', — and cannot be other than the great sanctuary 2 m. from Jericho, the local holiness of which is still attested in the Onomastica. It is true that in 2 Kings ii. 1 Bethel seems to lie between Gilgal and Jericho; but v. 25 shows that Gilgal was not originally represented as Elisha's residence in this narrative, which belongs to the Carmel-Dothan series. On the other hand, for the identification with the Gilgal (Jiljilia) S.W. of Shiloh, see G. A. Smith, Ency. Bib. (s.v. Gilgal); Burney, op. cit., p. 264; Skinner, Century Bible: Kings, p. 278.

vitae, elixir of life, was given to the substance which would indefinitely prolong life; it was considered to be closely related to, or even identical with, the substance for transmuting metals. In pharmacy the word was formerly given to a strong extract or tincture, but it is only used now for an aromatic sweet prepara- tion, containing one or more drugs, and in such expressions as " elixir of vitriol," a mixture of sulphuric acid, cinnamon, ginger and alcohol.

ELIZABETH (1533-1603), queen of England and Ireland, born on Sunday the 7th of September 1533, and, like all the Tudors except Henry VII., at Greenwich Palace, was the only surviving child of Henry VIII. by his second queen, Anne Boleyn. With such a mother and with Cranmer as her godfather she represented from her birth the principle of revolt from Rome, but the opponents of that

movement attached little importance to her advent into the world. Charles V. 's ambassador, Chapuys, hardly deigned to mention the fact that the king's amie had given birth to a daughter, and both her parents were bitterly dis- appointed with her sex. She was, however, given precedence over Mary, her elder sister by sixteen years, and Mary never forgave the infant's offence. Even this dubious advantage only lasted three years until her mother was beheaded, and by a much more serious freak on Henry's part " divorced." Elizabeth has been censured for having made no effort in later years to clear her mother's memory; but no vindication of Anne's character could have rehabilitated Elizabeth's legitimacy. Her mother was not " divorced " for her alleged adultery, because that crime was no ground for divorce by Roman or English canon law. The marriage was declared invalid ab initio either on the ground of Anne's precontract with Lord Percy or more probably on the ground of the affinity established between Henry and Anne by Henry's previous relations with Mary Boleyn.

Elizabeth thus lost all hereditary title to the throne, and her early years of childhood can hardly have been happier than Mary's. Nor was her legitimacy ever legally established; but after Jane Seymour's death, when Henry seemed likely to have no further issue, she was by act of parliament placed next in order of the succession after Edward and Mary and their issue; and this statutory arrangement was confirmed by the will which Henry VIII. was empowered by statute to make. Queen Catherine Parr introduced some humanity into Henry's house- hold, and Edward and Elizabeth were well and happily educated together, principally at old Hatfield House, which is now the marquess of Salisbury's stables. They were there when Henry's death called Edward VI. away to greater dignities, and Elizabeth was left in the care of Catherine Parr, who married in indecent haste Thomas, Lord Seymour, brother of the protector Somerset. This unprincipled adventurer, even before Catherine's death in September 1548, paid indelicate attentions to Elizabeth. Any attempt to marry her without the council's leave would have been treason on his part and would have deprived Elizabeth of her contingent right to the succession. Accordingly, when Seymour's other misbehaviour led to his arrest, his relations with Elizabeth were made the subject of a very trying investiga- tion, which gave Elizabeth her first lessons in the feminine arts of self-defence. She proved equal to the occasion, partly because she was in all probability innocent of anything worse than a qualified acquiescence in Seymour's improprieties and a girlish admiration for his handsome face. He or his tragic fate may have touched a deeper chord, but it was carefully concealed; and

although in later years Elizabeth seems to have cherished his memory, and certainly showed no love for his brother's children, at the time she only showed resentment at the indignities inflicted on herself.

For the rest of Edward's reign Elizabeth's life was less tempestuous. She hardly rivalled Lady Jane Grey as the ideal Puritan maiden, but she swam with the stream, and was regarded as a foil to her stubborn Catholic sister. She thus avoided the enmity and the still more dangerous favour of Northumberland; and some unknown history lies behind the duke's preference of the Lady Jane to Elizabeth as his son's wife and his own puppet for the throne. She thus escaped shipwreck in his crazy vessel,

and rode by Mary's side in triumph into London on the failure of the plot. For a time she was safe enough; she would not renounce her Protestantism until Catholicism had been made the law of the land, but she followed Gardiner's advice to her father when he said it was better that he should make the law his will than try to make his will the law. As a presumptive ruler of England she was, like Cecil, and for that matter the future arch- bishop Parker also, too shrewd to commit herself to passive or active resistance to the law; and they merely anticipated Hobbes in holding that the individual committed no sin in sub- ordinating his conscience to the will of the state, for the responsi- bility for the law was not his but the state's. Their position was well enough understood in those days; it was known that they were heretics at heart, and that wjicn their turn came they would once more overthrow Catholicism and expect a similar submission from the Catholics.

It was not so much Elizabeth's religion as her nearness to the throne and the circumstances of her birth that endangered her life in Mary's reign. While Mary was popular Elizabeth was safe; but as soon as the Spanish marriage project had turned away English hearts Elizabeth inevitably became the centre of plots and the hope of the plotters. Had not Lady Jane still been alive to take off the edge of Mary's indignation and suspicion Elizabeth might have paid forfeit for Wyat's rebellion with her life instead of imprisonment. She may have had interviews with French agents who helped to foment the insurrection; but she was strong and wary enough to avoid Henry II. 's, as she had avoided Northumberland's, toils; for even in case of success she would have been the French king's puppet, placed on the throne, if at all, merely to keep it warm for Henry's prospective daughter-in-law, Mary Stuart. This did not make Mary Tudor any more friendly, and, although the story that Elizabeth favoured

Courtenay and that Mary was jealous is a ridiculous fiction, the Spaniards cried loud and long for Elizabeth's execution. She was sent to the Tower in March 15 54, but few Englishmen were fanatic enough to want a Tudor beheaded. The great nobles, the Howards, and Gardiner would not hear of such a proposal; and all the efforts of the court throughout Mary's reign failed to induce parliament to listen to the suggestion that Elizabeth should be deprived of her legal right to the succession. After two months in the Tower she was transferred to Sir Henry Bedingfield's charge at Woodstock, and at Christmas, when the realm had been recon- ciled to Rome and Mary was expecting issue, Elizabeth was once more received at court. In the autumn of 1555 she went down to Hatfield, where she spent most of the rest of Mary's reign, enjoying the lessons of Ascham and Baldassare Castiglione, and planting trees which still survive.

She had only to bide her time while Mary made straight her successor's path by uprooting whatever affection the English people had for the Catholic faith, Roman jurisdiction and Spanish control. The Protestant martyrs and Calais between them removed all the alternatives to an insular national English policy in church and in state; and no sovereign was better qualified to lead such a cause than the queen who ascended the throne amid universal, and the Spaniards thought indecent, rejoicings at Mary's death on the 17th of November 1558. " Mere English " she boasted of being, and after Englishmen's recent experience there was no surer title to popular favour. No sovereign since Harold had been so purely English in blood; her nearest foreign ancestor was Catherine of France, the widow of Henry V., and no English king or queen was more superbly insular in character or in policy. She was the unmistakable child of the age so far as Englishmen shared in its characteristics, for with her English aims she combined some Italian methods and ideas. " An Englishman Italianate," ran the current jingle, " is a devil incarnate," and Elizabeth was well versed in Italian scholarship and statecraft. Italians, especially Bernardino Ochino, had given her religious instruction, and the Italians who rejected Catholicism usually adopted far more advanced forms of heresy than Lutheranism, Zwinglianism, or even Calvinism. Elizabeth herself patronized Giacomo Acontio, who thought dogma a " stratagema Satanae," and her last favourite, Essex

was accused of being the ringleader of "a damnable crew of

atheists." A Spanish ambassador early in the reign thought that Elizabeth's own religion was equally negative, though she told him she agreed with nearly everything in the Augsburg Con- fession. She was probably not at liberty to say what she really thought, but she made up by saying a great many things which she did not mean. It is clear enough that, although, like her father, she was fond of ritual, she was absolutely devoid of the religious temperament, and that her ecclesiastical preferences were dictated by political considerations. She was sincere enough in her dislike of Roman jurisdiction and of Calvinism; a daughter of Anne Boleyn could have little affection for a system which made her a bastard, and all monarchs agreed at heart with James I.'s aphorism about " no bishop, no king." It was con- venient, too, to profess Lutheran sympathies, for Lutheranism was now an established, monarchical and comparatively re- spectable religion, very different from the Calvinism against which monarchs directed the Counter-reformation from political motives. Lutheran dogma, however, had few adherents in England, though its political theory coincided with that of Anglicanism in the 16th century. The compromise that resulted from these conflicting forces suited Elizabeth very well; she had little dislike of Catholics who repudiated the papacy, but she was forced to rely mainly on Protestants, and had little respect for any form of ecclesiastical self-government. She valued uni- formity in religion, not as a safeguard against heresy, but as a guarantee of the unity of the state. She respected the bishops only as supporters of her throne; and, although the well-known letter beginning " Proud Prelate " is an 18th-century forgery, it is hardly a travesty of Elizabeth's attitude.

The outlines of her foreign policy are sketched elsewhere (see English History), and her courtships were diplomatic. Contemporary gossip, which was probably justified, said that she was debarred from matrimony by a physical defect; and her cry when she heard that Mary queen of Scots had given birth to a son is the most womanly thing recorded of Elizabeth. Her features were as handsome as Mary's, but she had little fascination, and in spite of her many suitors no man lost his head over Elizabeth as men did over Mary. She was far too masculine in mind and temperament, and her extravagant addiction to the outward trappings of femininity was probably due to the absence or atrophy of deeper feminine instincts. In the same way the impossibility of marriage made her all the freer with her flirtations, and she carried some of them to lengths that scandalized a public unconscious of Elizabeth's security. She had every reason to keep them in the dark, and to convince other courts that she could and would marry if the provocation were sufficient.

She could not marry Philip II., but she held out hopes to more than one of his Austrian cousins whenever France or Mary Stuart seemed to threaten; and later she encouraged two French princes when Philip had lost patience with Elizabeth and made Mary Stuart his protegee. Her other suitors were less important, except Leicester, who appealed to the least intellectual side of Elizabeth and was always a cause of distraction in her policy and her ministers.

Elizabeth was terribly handicapped by having no heirs of her body and no obvious English successor. She could not afford to recognize Mary's claim, for that would have been to alienate the Protestants, double the number of Catholics, and, in her own phrase, to spread a winding-sheet before her eyes; for all would have turned to the rising sun. Mary was dangerous enough as it was, and no one would willingly make his rival his heir. Elizabeth could hardly be expected to go out of her way and ask parlia- ment to repeal its own acts for Mary's sake; probably it would have refused. Nor was it personal enmity on Elizabeth's part that brought Mary to the block. Parliament had long been ferociously demanding Mary's execution, not because she was guilty but because she was dangerous to the public peace. She alone could have given the Spanish Armada any real chance of success; and as the prospect of invasion loomed larger on the horizon, fiercer grew the popular determination to remove the only possible centre of a domestic rising, without which the

external attack was bound to be a failure. Elizabeth resisted the demand, not from compassion or qualms of conscience, but because she dreaded the responsibility for Mary's death. She wished Paulet would manage the business on his own account, and when at last her signature was extorted she made a scapegoat of her secretary Davison who had the warrant executed.

The other great difficulty, apart from the succession, with which Elizabeth had to deal arose from the exuberant aggressive- ness of England, which she could not, and perhaps did not want to, repress. Religion was not really the cause of her external dangers, for the time had passed for crusades, and no foreign power seriously contemplated an armed invasion of England for religion's sake. But no state could long tolerate the affronts which English seamen offered Spain. The common view that the British Empire has been won by purely defensive action is not tenable, and from the beginning of her reign Englishmen had taken the offensive, partly from religious but also from other motives. They were determined to break up the Spanish monopoly in the new world, and in the pursuit of this endeavour they were led to challenge Spain in the old. For

nearly thirty years Philip put up with the capture of his treasure-ships, the raiding of his colonies and the open assistance rendered to his rebels. Only when he had reached the conclusion that his power would never be secure in the Netherlands or the New World until England was conquered, did he despatch the Spanish Armada. Elizabeth delayed the breach as long as she could, probably because she knew that war meant taxation, and that taxation was the most prolific parent of revolt.

With the defeat of the Spanish Armada Elizabeth's work was done, and during the last fifteen years of her reign she got more out of touch with her people. That period was one of gradual transition to the conditions of Stuart times; during it practically every claim was put forward that was made under the first two Stuarts either on behalf of parliament or the pre- rogative, and Elizabeth's attitude towards the Puritans was hardly distinguishable from James I.'s. But her past was in her favour, and so were her sex and her Tudor tact, which checked the growth of discontent and made Essex's rebellion a ridiculous fiasco. He was the last and the most wilful but perhaps the best of her favourites, and his tragic fate deepened the gloom of her closing years. The loneliness of a queen who had no husband or children and no relatives to mention must at all times have been oppressive; it grew desolating in old age after the deaths of Leicester, Walsingham, Burghley and Essex, and Elizabeth died, the last of her race, on the 24th of March 1603.

Bishop Creighton's Queen Elizabeth (1896) is the best biography; there are others by E. S. Beesly {Twelve English Statesmen, 1892) ; Lucy Aikin, Memoirs of the Court of Queen Elizabeth (1818); and T. Wright, Queen Elizabeth and her Times (1838). See also A. Jessopp's article in the Did. Nat. Biog. (A. F. P.)

ELIZABETH [PETROVNA] (1 709-1 762), Empress of Russia, the daughter of Peter the Great and Martha Skovronskaya, born at Kolomenskoye, near Moscow, on the 18th of December 1709. Even as a child her parts were good, if not brilliant, but unfortun- ately her education was both imperfect and desultory. Her father had no leisure to devote to her training, and her mother was too illiterate to superintend her studies. She had a French governess, however, and at a later day picked up some Italian, German and Swedish, and could converse in these languages with more fluency than accuracy. From her earliest years she delighted every one by her extraordinary beauty and vivacity. It was Peter's intention to marry his second daughter to the young French king Louis XV., but the pride of the Bourbons revolted against any such alliance. Other connubial

specula- tions foundered on the personal dislike of the princess for the various suitors proposed to her, so that on the death of her mother (May 1727) and the departure to Holstein of her beloved sister Anne, her only remaining near relation, the princess found herself at the age of eighteen practically her own mistress. So long as Menshikov remained in power, she was treated with liberality and distinction by the government of Peter II., but the Dolgorukis, who supplanted Menshikov and hated the memory of Peter the Great, practically banished Peter's daughter

from court. Elizabeth had inherited her father's sensual temperament and, being free from all control, abandoned herself to her appetites without reserve. While still in her teens, she made a lover of Alexius Shubin, a sergeant in the Semenovsky Guards, and after his banishment to Siberia, minus his tongue, by order of the empress Anne, consoled herself with a handsome young Cossack, Alexius Razumovski, who, there is good reason to believe, subsequently became her husband. During the reign of her cousin Anne (i 730-1 740), Elizabeth effaced herself as much as possible; but under the regency of Anne Leopoldovna the course of events compelled the indolent but by no means incapable beauty to overthrow the existing government. The idea seems to have been first suggested to her by the French ambassador, La Chetardie, who was plotting to destroy the Austrian influence then dominant at the Russian court. It is a mistake to suppose, however, that La Chetardie took a leading part in the revolution which placed the daughter of Peter the Great on the Russian throne. As a matter of fact, beyond lending the tsesarevna 2000 ducats, instead of the 15,000 she demanded of him, he took no part whatever in the actual coup d'etat which was as great a surprise to him as to every one else. The merit and glory of that singular affair belong to Elizabeth alone. The fear of being imprisoned in a convent for the rest of her life was the determining cause of her irresistible outburst of energy. At midnight on the 6th of December 1741, with a few personal friends, including her physician, Armand Lestocq, her chamberlain, Michael Ilarionvich Vorontsov, her future husband, Alexius Razumovski, and Alexander and Peter Shuvalov, two of the gentlemen of her household, she drove to the barracks of the Preobrazhensky Guards, enlisted their sym- pathies by a stirring speech, and led them to the Winter Palace, where the regent was reposing in absolute security. Having on the way thither had all the ministers arrested, she seized the regent and her children in their

beds, and summoned all the notables, civil and ecclesiastical, to her presence. So swiftly and noise- lessly indeed had the whole revolution proceeded that as late as eight o'clock the next morning very few people in the city were aware of it. Thus, at the age of three-and-thirty, this naturally indolent and self-indulgent woman, with little knowledge and no experience of affairs, suddenly found herself at the head of a great empire at one of the most critical periods of its existence. Fortunately for herself, and for Russia, Elizabeth Petrovna, with all her shortcomings, had inherited some of her father's genius for government. Her usually keen judgment and her diplomatic tact again and again recall Peter the Great. What in her sometimes seemed irresolution and procrastination, was, most often, a wise suspense of judgment under exceptionally difficult circumstances; and to this may be added that she was ever ready to sacrifice the prejudices of the woman to the duty of the sovereign.

After abolishing the cabinet council system in favour during the rule of the two Annes, and reconstituting the senate as it had been under Peter the Great, — with the chiefs of the depart- ments of state, all of them now Russians again, as ex-officio members under the presidency of the sovereign, — the first care of the new empress was to compose her quarrel with Sweden. On the 23rd of January 1743, direct negotiations between the two powers were opened at Abo, and on the 7th of August 1743 Sweden ceded to Russia all the southern part of Finland east of the river Kymmene, which thus became the boundary between the two states, including the fortresses of Villmanstrand and Fredrikshamn. This triumphant issue was mainly due to the diplomatic ability of the new vice chancellor, Alexius Bestuzhev- Ryumin (q.v.), whom Elizabeth, much as she disliked him personally, had wisely placed at the head of foreign affairs immediately after her accession. He represented the anti- Franco-Prussian portion of her council, and his object was to bring about an Anglo-Austro-Russian alliance which, at that time, was undoubtedly Russia's proper system, Hence the reiterated attempts of Frederick the Great and Louis XV. to get rid of Bestuzhev, which made the Russian court during the earlier years of Elizabeth's reign the centre of a tangle of intrigue

impossible to unravel by those who do not possess the clue to it (see Bestuzhev-Ryumtn, Alexius). Ultimately, however, the minister, strong in the support of Elizabeth, prevailed, and his faultless diplomacy, backed by the despatch of an auxiliary Russian corps of 30,000 men to the Rhine, greatly accelerated the peace negotiations which led to the treaty of Aix-la-Chapelle (October 18, 1748). By sheer tenacity of purpose, Bestuzhev had extricated his country from

the Swedish imbroglio; recon- ciled his imperial mistress with the courts of Vienna and London, her natural allies; enabled Russia to assert herself effectually in Poland, Turkey and Sweden, and isolated the restless king of Prussia by environing him with hostile alliances. But all this would have been impossible but for the steady support of Elizabeth, who trusted him implicitly, despite the insinuations of the chancellor's innumerable enemies, most of whom were her personal friends.

The great event of Elizabeth's later years was the Seven Years' War. Elizabeth rightly regarded the treaty of West- minster (January 16, 1756, whereby Great Britain and Prussia agreed to unite their forces to oppose the entry into, or the passage through, Germany of the troops of every foreign power) as utterly subversive of the previous conventions between Great Britain and Russia. A by no means unwarrantable fear of the king of Prussia, who was " to be reduced within proper limits," so that " he might be no longer a danger to the empire," induced Elizabeth to accede to the treaty of Versailles, in other words the Franco-Austrian league against Prussia, and on the 17th of May 1757 the Russian army, 85,000 strong, advanced against Konigsberg. Neither the serious illness of the empress, which began with a fainting-fit at Tsarskoe Selo (September 19, 1757), nor the fall of Bestuzhev (February 21, 1758), nor the cabals and intrigues of the various foreign powers at St Petersburg, interfered with the progress of the war, and the crushing defeat of Kunersdorf (August 12, 1759) at last brought Frederick to the verge of ruin. From that day forth he despaired of success, though he was saved for the moment by the jealousies of the Russian and Austrian commanders, which ruined the military plans of the allies. On the other hand, it is not too much to say that, from the end of 1759 to the end of 1761, the unshakable firmness of the Russian empress was the one constraining political force which held together the heterogeneous, incessantly jarring elements of the anti-Prussian combination. From the Russian point of view, Elizabeth's greatness as a statesman consists in her steady appreciation of Russian interests, and her determina- tion to promote them at all hazards. She insisted throughout that the king of Prussia must be rendered harmless to his neigh- bours for the future, and that the only way to bring this about was to reduce him to the rank of an elector. Frederick himself was quite alive to his danger. " I am at the end of my resources," he wrote at the beginning of 1760, " the continuance of this war means for me utter ruin. Things may drag on perhaps till July, but then a catastrophe must come." On the 21st of May 1760 a fresh convention was signed between Russia and Austria, a secret

clause of which, never communicated to the court of Versailles, guaranteed East Prussia to Russia, as an indemnity for war expenses. The failure of the campaign of 1760, so far as Russia and France were concerned, induced the court of Versailles, on the evening of the 22nd of January 1761, to present to the court of St Petersburg a despatch to the effect that the king of France by reason of the condition of his dominions absolutely desired peace. On the following day the Austrian ambassador, Esterhazy, presented a despatch of a similar tenor from his court. The Russian empress's reply was delivered to the two ambassadors on the 12th of February. It was inspired by the most uncompromising hostility towards the king of Prussia. Elizabeth would not consent to any pacific overtures until the original object of the league had been accomplished. Simultane- ously, Elizabeth caused to be conveyed to Louis XV. a confiden- tial letter in which she proposed the signature of a new treaty of alliance of a more comprehensive and explicit nature than the pre- ceding treaties between the two powers, without the knowledge of Austria. Elizabeth's object in this mysterious negotiation

seems to have been to reconcile France and Great Britain, in return for which signal service France was to throw all her forces into the German war. This project, which lacked neither ability nor audacity, foundered upon Louis XV. 's invincible jealousy of the growth of Russian influence in eastern Europe and his fear of offending the Porte. It was finally arranged by the allies that their envoys at Paris should fix the date for the assembling of a peace congress, and that, in the meantime, the war against Prussia should be vigorously prosecuted. The campaign of 1761 was almost as abortive as the campaign of 1760. Frederick acted on the defensive with consummate skill, and the capture of the Prussian fortress of Kolberg on Christmas day O.S. 1761, by Rumyantsev, was the sole Russian success, Frederick, however, was no vv at the last gasp. On the 6th of January 1762, he wrote to Finkenstein, " We ought now to think of preserving for my nephew, by way of negotiation, whatever fragments of my territory we can save from the avidity of my enemies," which means, if words mean anything, that he was resolved to seek a soldier's death on the first opportunity. A fortnight later he wrote to Prince Ferdinand of Brunswick, " The sky begins to clear. Courage, my dear fellow. I have received the news of a great event." The great event which snatched him from destruction was the

death of the Russian empress (January 5, 1762).

See Robert Nisbet Bain, The Daughter of Peter the Great (London, 1899); Sergyei Solovev, History of Russia (Rus.), vols, xx.-xxii. (St Petersburg, 1857-1877); Polilische Correspondenz Friedrichs des Grossen, vols, i.xxi. (Berlin, 1879, &c); Colonel Masslowski, Der siebenjdhrige Krieg nach russischer Darstellung (Berlin, 1888 1893); Kazinsierz Waliszewski, La Derniere des Romanov (Paris, 1902). (R. N. B.)

ELIZABETH [AMELIE EUGENIE] (1837-1808), consort of Francis Joseph, emperor of Austria and king of Hungary, was the daughter of Duke Maximilian Joseph of Bavaria and Louisa Wilhelmina, daughter of Maximilian I. of Bavaria, and was born on the 24th of December 1837 at the castle of Possenhofen on Lake Starnberg. She inherited the quick intelligence and artistic taste displayed in general by members of the Wittelsbach royal house, and her education was the reverse of conventional. She accompanied her eccentric father on his hunting expeditions, becoming an expert rider and climber, visiting the peasants in their huts and sharing in rustic pleasures. The emperor of Austria, Francis Joseph, met the Bavarian ducal family at Ischl in August 1853, and immediately fell in love with Elizabeth, then a girl of sixteen, and reported to be the most beautiful princess in Europe. The marriage took place in Vienna on the 24th of April 1854. In the early days of her married life she frequently came into collision with Viennese prejudice. Her attempts to modify court etiquette, and her extreme fondness for horsemanship and frequent visits to the imperial riding school, scandalized Austrian society, while her predilection for Hungary and for everything Hungarian offended German sentiment. There is no doubt that her influence helped the establishment of the Ausgleich with Hungary, but outside Hungarian affairs the empress took small part in politics. She first visited Hungary in 1857, and ten years later was crowned queen. Her popularity with the Hungarians remained unchanged throughout her life; and the castle of Godbllo, presented as a coronation gift, was one of her favourite residences. Elizabeth was one of the most charitable of royal ladies, and her popularity with her Austrian subjects was more than restored by her assiduous care for the wounded in the campaign of 1866. Besides her public benefac- tions she constantly exercised personal and private charity. Her eldest daughter died in infancy; Gisela (b. 1856) married the Prince Leopold of Bavaria; and her youngest daughter Marie Valerie (b. 1868) married the Archduke Franz Salvator. The tragic death of her only son, the crown prince Rudolph, in 1889, was a shock from which she never really recovered. She was also deeply affected by the

suicide of her cousin Louis II. of Bavaria, and again by the fate of her sister Sophia, duchess of Alencon, who perished in the fire of the Paris charity bazaar in 1897. The empress had shown signs of lung disease in 1861, when she spent some months in Madeira; but she was able to

resume her outdoor sports, and for some years before 1882, when she had to give up riding, was a frequent visitor on English and Irish hunting fields. In her later years her dislike of publicity increased. Much of her time was spent in travel or at the Achilleion, the palace she had built in the Greek style in Corfu. She was walking from her hotel at Geneva to the steamer when she was stabbed by the anarchist Luigi Luccheni, on the 10th of September 1898, and died of the wound within a few hours. This aimless and dastardly crime completed the list of mis- fortunes of the Austrian house, and aroused intense indignation throughout Europe.

See A. de Burgh, Elizabeth, Empress of Austria, a Memoir (London, 1898); E. Friedmann and J. Paves, Kaiserin Elisabeth (Berlin-; 1898); and the anonymous Martyrdom of an Empress (1899), containing a quantity of court gossip.

ELIZABETH (1596-1662), consort of Frederick V., elector palatine and titular king of Bohemia, was the eldest daughter of James I. of Great Britain and of Anne of Denmark, and was born at Falkland Castle in Fifeshire in August 1596. She was entrusted to the care of the earl of Linlithgow, and after the departure of the royal family to England, to the countess of Kildare, subsequently residing with Lord and Lady Harington at Combe Abbey in Warwickshire. In November 1605 the Gunpowder Plot conspirators formed a plan to seize her person and proclaim her queen after the explosion, in consequence of which she was removed by Lord Harington to Coventry. In 1608 she appeared at court, where her beauty soon attracted admiration and became the theme of the poets, her suitors including the dauphin, Maurice, prince of Orange, .Gustavus Adolphus, Philip III. of Spain, and Frederick V., the elector palatine. A union with the last-named was finally arranged, in spite of the queen's opposition, in order to strengthen the alliance with the Protestant powers in Germany, and the marriage took place on the 14th of February 1613 midst great rejoicing and festivities. The prince and princess entered Heidelberg on the 17th of June, and Elizabeth, by means of her English annuity, enjoyed five years of pleasure and of extravagant gaiety to which the small German court was totally unaccustomed. On the 26th of August 1618, Frederick, as a leading Protestant prince, was chosen king by the Bohemians, who deposed the emperor Ferdinand, then

archduke of Styria. There is no evidence to show that his acceptance was instigated by the princess or that she had any influence in her husband's political career. She accompanied Frederick to Prague in October 1619, and was crowned on the 7 th of November. Here her unrestrainable high spirits and levity gave great offence to the citizens. On the approach of misfortune, however, she showed great courage and fortitude. She left Prague on the 8th of November 1620, after the fatal battle of the White Hill, for Kiistrin, travelling thence to Berlin and Wolfenbiittel, finally with Frederick taking refuge at the Hague with Prince Maurice of Orange. The help sought from James came only in the shape of useless embassies and negotiations; the two Palatinates were soon occupied by the Spaniards and the duke of Bavaria; and the romantic attachment and services of Duke Christian of Bruns- wick, of the 1st earl of Craven, and of other chivalrous young champions who were inspired by the beauty and grace of the " Queen of Hearts," as Elizabeth was now called, availed nothing. Her residence was at Rhenen near Arnheim, where she received many English visitors and endeavoured to maintain her spirits and fortitude, with straitened means and in spite of frequent disappointments. The victories of Gustavus Adolphus secured no permanent advantage, and his death at Liitzen was followed by that of the elector at Mainz on the 29th of November 1632. Subsequent attempts of the princess to reinstate her son in his dominions were unsuccessful, and it was not till the peace of Westphalia in 1648 that he regained a portion of them, the Rhenish Palatinate. Meanwhile, Elizabeth's position in Holland grew more and more unsatisfactory. The payment of her English annuity of £12,000 ceased after the outbreak of the troubles with the parliament; the death of Charles I. in 1649 put an end to all hopes from that quarter; and the pension

allowed her by the house of Orange ceased in 1650. Her children, in consequence of disputes, abandoned her, arid her eldest son Charles Louis refused her a home in his restored electorate. Nor did Charles II. at his restoration show any desire to receive her in England. Parliament voted her £20,000 in 1660 for the payment of her debts, but Elizabeth did not receive the money, and on the 19th of May 1661 she left the Hague for England, in spite of the king's attempts to hinder her journey, receiving no official welcome on her arrival in London and being lodged at Lord Craven's house in Drury Lane. Charles, however, subse- quently granted her a pension and treated her with kindness. On the 8th of February 1662 she removed to Leicester House in Leicester Fields, and died shortly afterwards on the 13 th of the same month, being buried in Westminster Abbey. Her

beauty, grace and vivacity exercised a great charm over her contemporaries, the enthusiasm for her, however, being probably not merely personal but one inspired also by her misfortunes and by the fact that these misfortunes were incurred in defence of the Protestant cause; later, as the ancestress of the Protestant Hanoverian dynasty, she obtained a conspicuous place in English history. She had thirteen children — Frederick Henry, drowned at sea in 1629; Charles Louis, elector palatine, whose daughter married Philip, duke of Orleans, and became the ancestress of the elder and Roman Catholic branch of the royal family of England; Elizabeth, abbess and friend of Descartes; Prince Rupert and Prince Maurice, who died unmarried; Louisa, abbess; Edward, who married Anne de Gonzaga, " princesse palatine," and had children; Henrietta Maria, who married Count Sigismund Ragotzki. but died childless; Philip and Charlotte, who died childless; Sophia, who married Ernest Augustus, elector of Hanover, and was mother of George I. of England; and two others who died young.

Bibliography. — See the article in Diet, of Nat. Biography and authorities there collected ; Five Stuart Princesses, ed. by R. S. Rait (1902) ; Brief e der Elizabeth Stuart . . . an . . . den Kurfiirsten Carl Ludwig von der Pfalz, by A. Wendland (Bibliothek des lite- rarischen Vereins, 228, Stuttgart, 1902) ; " Elizabeth Stuart," by J. O. Opel, in Sybel's Historische Zeitschrift, xxiii. 289; Thomason Tracts (Brit. Mus.), E., 138 (14), 122 (12), 118 (40), 119 (18). Im- portant material regarding the princess exists in the MSS. of the earl of Craven, at Combe Abbey.

ELIZABETH [PAULINE ELIZABETH OTTILIE LOUISE]

(1843-), consort of King Charles I. (q.v.) of Rumania, widely known by her literary name of " Carmen Sylva," was born on the 29th of December 1 843 . She was the daughter of Prince Hermann of Neuwied. She first met the future king of Rumania at Berlin in 1861, and was married to him on the 15th of November 1869. Her only child, a daughter, died in 1874. In the Russo-Turkish War of 1877-1878 she devoted herself to the care of the wounded, and founded the Order of Elizabeth (a gold cross on a blue ribbon) to reward distinguished service in such work. She fostered the higher education of women in Rumania, and established societies for various charitable objects. Early distinguished by her excellence as a pianist, organist and singer, she also showed considerable ability in painting and illuminating; but a lively poetic imagination led her to the path of literature, and more especially to poetry, folk-lore and ballads. In addition to numerous original works she put into literary

form many of the legends current among the Rumanian peasantry.

" Carmen Sylva " wrote with facility in German, Rumanian, French and English. A few of her voluminous writings, which include poems, plays, novels, short stories, essays, collections of aphorisms, &c, may be singled out for special mention. Her earliest publications were Sappho and Hammer stein, two poems which appeared at Leipzig in 1880. In 1888 she received the Prix Botta, a prize awarded triennially by the French Academy, for her volume of prose aphorisms Les Pensees d'une reine (Paris, 1882), a German version of which is entitled Vom Amboss (Bonn, 1890). Cuvinte Suflelesci, religious meditations in Rumanian (Bucharest, 1888), was also translated into German (Bonn, 1890), under the name of Seelen-Gesprdche. Several of the works of " Carmen Sylva " were written in collaboration with Mite

Kremnitz, one of her maids of honour, who was born at Greifs- wald in 1857, and married Dr Kremnitz of Bucharest; these were published between 1881 and 1888, in some cases under the pseudonyms Dito et Idem, and includes the novel Aus zwei Welten (Leipzig, 1884), Anna Boleyn (Bonn, 1886), a tragedy, In der Irre (Bonn, 1 888) , a collection of short stories, &c. Edleen Vaughan, or Paths of Peril, a novel (London, 1894), and Sweet Hours, poems (London, 1904), were written in English. Among the translations made by " Carmen Sylva" are German versions of Pierre Loti's romance Pdcheur d Islande, and of Paul de St Victor's dramatic criticisms Les Deux Masques (Paris, 1 881-1884) ; and in particular The Bard of the Dimbovitza, a fine English version by " Carmen Sylva " and Alma Strettell of Helene Vacarescu's collection of Rumanian folk-songs, &c, entitled Lieder aus dem Dimbovitzathal (Bonn, 1889). The Bard of the Dimbovitza was first published in 1891, and was soon reissued and expanded. Translations from the original works of " Carmen Sylva " have appeared in all the principal languages of Europe and in Armenian.

See Rumania: History; also M. Kremnitz, Carmen Sylva — eine Biographie (Leipzig, 1903) ; and, for a full bibliography, G. Bengescu, Carmen Sylva — bibliographie et extraits de ses ceuvres (Paris, 1904).

ELIZABETH (1635-1650), English princess, second daughter of Charles I., was born on the 28th of December 1635 at St James's Palace. On the outbreak of the Civil War and the departure of the king from London, while the two elder princes accompanied their father, the princess and the infant duke of Gloucester were left under

the care of the parliament. In October 1642 Elizabeth sent a letter to the House of Lords begging that her old attendants might not be removed. In July 1644 the royal children were sent to Sir John Danvers at Chelsea, and in 1645 to the earl and countess of Northumberland. After the final defeat of the king they were joined in 1646 by James, and during 1647 paid several visits to the king at Caver- sham, near Reading, and Hampton Court, but were again separ- ated by Charles's imprisonment at Carisbrooke Castle. On the 21st of April 1648 James was persuaded to escape by Elizabeth, who declared that were she a boy she would not long remain in confinement. The last sad meeting between Charles and his two children, at which the princess was overcome with grief, and of which she wrote a short and touching account, took place on the 29th of January 1649, the day before his execution. In June she was entrusted to the care of the earl and countess of Leicester at Penshurst, but in 1650, upon the landing of Charles II. in Scotland, the parliament ordered the royal children to be taken for security to Carisbrooke Castle. The princess fell ill from a wetting almost immediately upon her arrival, and died of fever on the 8th of September. She was buried in St Thomas's church at Newport, Isle of Wight, where the initials " E.S." alone marked her grave till 1856, when a monument was erected to her memory by Queen Victoria. The princess's sorrowful career and early death have attracted general interest and sympathy. She was said to have acquired considerable pro- ficiency in Greek, Hebrew and Latin, as well as in Italian and French, and several books were dedicated to her, including the translation of the Electra of Sophocles by Christopher Wase in 1649. Her mild nature and gentleness towards her father's enemies gained her the name of " Temperance."

See Lives of the Princesses of England, by M. A. E. Green (1855), vol. vi.; Notes and Queries, 7th sen, ix. 444, x. 15.

ELIZABETH [Elisabeth Philippine Marie Helene of France] (1764-1794), commonly called Madame Elizabeth, daughter of Louis the Dauphin and Marie Josephine of Saxony, and sister of Louis XVI., was born at Versailles on the 3rd of May 1764. Left an orphan at the age of three, she was brought up by Madame de Mackau, and had a residence at Montreuil, where she gave many proofs of her benevolent character. She refused all offers of marriage so that she might remain by the side of her brother, whom she loved passionately. At the outset of the Revolution she foresaw the gravity of events, and refused to leave the king, whom she accompanied in his flight on the 20th of June 1792, and with whom she was arrested at Varennes.

She was present at the Legislative Assembly when Louis was suspended, and was imprisoned in the Temple with the royal family. By the execution of the king and the removal of Marie Antoinette to the Conciergerie, Madame Elizabeth was deprived of her companions in the Temple prison, and on the 9th of May 1794 she was herself transferred to the Conciergerie, and haled before the revolutionary tribunal. Accused of assisting the king's flight, of supplying emigres with funds, and of encouraging the resistance of the royal troops on the 10th of August 1792, she was condemned to death, and executed on the 10th of May 1794. Like her brother, she had all the domestic virtues, and, as was to be expected of a sister of Louis XVI., she was in favour of absolutist principles. Hers was one of the most touching tragedies of the Revolution; she perished because she was the sister of the king.

The Memoires de Madame Elisabeth (Paris, 1 858) , by F. de Barghon and Fort-Rion, are of doubtful authenticity ; and the collection of letters and documents published in 1865 by F. Fcuillet de Conches must be used with caution (see the bibliographical note to the article MarieAntoinette). See le Comte A. F. C. Ferrand, Eloge historique de Madame Elisabeth (1814, containing 94 letters; 2nd ed., 1861, containing additional letters, but correspondence mutilated) ; Du Fresne de Beaucourt, Etude sur Madame Elisabeth (Paris, 1864) ; A. de Beauchesne, Vie de Madame Elisabeth (1869); La comtesse d'Armaille,, Madame Elisabeth (Paris, 1886); Madame d'Arvor, Madame Elisabeth (Paris, 1898); and Hon. Mrs Maxwell-Scott, Madame Elizabeth of France (1908).

ELIZABETH, SAINT (1207-1231), daughter of Andrew II., king of Hungary (d. 1235), by his first wife, Gertrude of Andechs- Meran (d. 1213), was born in Pressburg in 1207. At four years of age she was betrothed to Louis IV., landgrave of Thuringia, and conducted to the Wartburg, near Eisenach, to be educated under the direction of his parents. In spite of her decidedly worldly surroundings at the Thuringian court, she evinced from the first an aversion from even the most innocent pleasures, and stimulated by the example of her mother's sister, St Hedwig, wife of Henry VI., duke of Silesia-Breslau, devoted her whole time to religion and to works of charity. She was married at the age of fourteen, and acquired such influence over her husband that he adopted her point of view and zealously assisted her in all her charitable endeavours. According to the

legend, much celebrated in German art, Louis at first desired to curtail her excessive charities, and forbade her unbounded gifts to the poor. One day, returning from hunting, he met his wife descending from the Wartburg with a heavy bundle filled with bread'. He sternly bade her open it; she did so, and he saw nothing but a mass of red roses. The miracle completed his conversion. On the de»th of Louis " the Saint "in 1227, Elizabeth was deprived of the regency by his brother, Henry Raspe IV. (d. 1247), on the pretext that she was wasting the estates by her alms; and with her three infant children she was driven from her home without being allowed to carry with her even the barest necessaries of life. She lived for some time in great hardship, but ultimately her maternal uncle, Egbert, bishop of Bamberg, offered her an asylum in a house adjoining his palace. Through the intercession of some of the principal barons, the regency was again offered her, and her son Hermann was declared heir to the landgraviate; but renouncing all power, and making use of her wealth only for charitable purposes, she preferred to live in seclusion at Marburg under the direction of her confessor, the bigoted per- secutor Conrad of Marburg. There she spent the remainder of her days in penances of unusual severity, and in ministrations to the sick, especially those afflicted with the most loathsome diseases. She died at Marburg on the 19th of November 1231, and four years afterwards was canonized by Gregory IX. on account of the frequent miracles reported to have been performed at her tomb.

The exhibition in the Royal Academy of P. H. Calderon's picture, " St Elizabeth of Hungary's Great Act of Renunciation," now in the Tate Gallery in London, roused considerable protest among Catholics. The saint is represented as kneeling nude before the altar, in the presence of her confessor and a couple of nuns. The passage this is intended to illustrate is in Lib. iv. § 1 of Dietrich of Apolda's Vita, which relates how, on a certain

Good Friday, she went into a chapel and, in the presence of some Franciscan brothers, laid her hands on the bare altar, renounced her own will, her parents, children, relations, and all pomps of this kind (hujus modi) in imitation of Christ; and stripped herself utterly naked (omnino se exuit et nudavit) in order to follow Him naked, in the steps of poverty. A literal inter : pretation of this passage is not impossible; for ecstatic mystics of all ages have -indulged in a like / ceteris, and Conrad, who revelled in inflicting religious tortures, was quite capable of imposing this crowning humiliation upon his gentle victim. It is far more probable, however, that the passage is not to be taken literally.

Lives of St Elizabeth were written by Theodoricus (Dietrich) of Apolda (b. 1228), Caesarius of Heisterbach (d. c 1240), Conrad of Marburg and others (see Potthast, Bibl. Hist. Med. Aev. p. 1284). A metrical life in German exists by Tohann Rothe (d. c. 1440), chaplain to the Landgravine Anne of Thuringia (Potthast, p. 985). L'Histoire de Sainte Elisabeth de Hongrie, by Montalembert, was published at Paris in 1836. Her life has also supplied the materials for a dramatic poem by Charles Kingsley, entitled the " Saint's Tragedy." The edition of this in vol. xvi. of the Life and Works of Charles Kingsley (London, 1902) has valuable notes, with many extracts from the original sources.

ELIZABETH, a city and the county-seat of Union county, New Jersey, U.S.A., on Elizabeth river, Newark Bay, and Arthur Kill, 10 m. S.W. of Jersey City. Pop. (1890) 37,764; (1900) 52,130, of whom 14,770 were foreign-born and 1139 were negroes; (1910 census) 73,409. It is served by the Penn- sylvania, the Lehigh Valley and the Central of New Jersey railways. The site is level and the streets are broad and shaded. There are many residences of New York business men, and several historic buildings, including Liberty Hall, the mansion of William Livingston, first governor of the state; Boxwood Hall (now used as a home for aged women), the former home of Elias Boudinot; the old brick mansion of Jonathan Belcher (1681-1757), governor of the province from 1747 to 1757; the First Presbyterian Church ; and the house occupied at different times by General Winfield Scott. The city has several parks, the Union county court house (1905), a public library and several charitable institutions. Elizabethport, that part of the city on Staten Island Sound, about 2 m. S.E. of the centre of Elizabeth, has a port open to vessels of 300 tons; it is an outlet of the Pennsylvania coal fields and is thus one of the most important coal shipping depots in the United States. Here, too, are a plant (covering more than 800 acres) of the Standard Oil Company and a large establishment for the manufacture of the " Singer " sewing machine — according to the U.S. census the largest manufactory of sewing machines in the world — employing more than 6000 workmen in 1905; among the other manufactures of Elizabeth are foundry and machine shop products (value in 1905, $3,887,139), wire, oil (value in 1905, $2,387,656), refined and smelted copper, the output of railway repair shops, edge tools and lager beer. The value of the manu- factured products was $10,489,364 in 1890; $22,861,375 (factory product) in 1900; and $29,300,801 (factory product) in 1905.

Elizabeth was settled in 1665 by a company from Long Island for whom the land had been purchased from the Indians and a grant had

been obtained from Richard Nicolls as agent for the duke of York. But about the same time the duke conveyed the entire province to John, Lord Berkeley, and Sir George Carteret, and these two conflicting grants gave rise to a long-continued controversy (see New Jersey). The town was named in honour of Elizabeth, wife of Sir George Carteret, and was first known as Elizabethtown. From 1665 to 1686 it was the seat of govern- ment of the province, and the legislature sat here occasionally until 1790. In the home of the Rev. Jonathan Dickinson (1688-1747), its first president, the first sessions of the College of New Jersey (now Princeton University) were held in 1747, but immediately afterwards the college removed to Newark. In December 1776 and twice in June 1780 the British entered Elizabeth and made it a base of operations, but on each occasion they were soon driven out. Elizabeth became a " free town and borough " in 1739; the borough charter was confirmed

by the legislature in 1789 and repealed in 1790, and Elizabeth was chartered as a city in 1855.

See E. F. Hatfield, History of Elizabeth, NewJersey(New York, 1868).

ELIZABETHAN STYLE, in architecture, the term given to the early Renaissance style in England, which nourished chiefly during the reign of Queen Elizabeth; it followed the Tudor style, and was succeeded in the beginning of the 16th century by the purer Italian style introduced by Inigo Jones.. It responds to the Cinque-Cento period in Italy, the Francois I. style in France, and the Plateresque or Silversmith's style in Spain. During the reigns of Henry VIII. and Edward VI. many Italian artists came over, who carried out various decorative features at Hampton Court; Layer Marney, Suffolk (1522-1525); Sutton Place, Surrey (1529); Nonsuch Palace and elsewhere. Later in the century Flemish craftsmen succeeded the Italians, and the Royal Exchange in London (1566-1570) is one of the first important buildings designed by Henri de Paschen, an architect from Antwerp. Longford Castle, Wollaton, Hatfield, Blickling, Audley End, and Charterhouse (London) all show the style introduced by Flemish workmen.

ELIZABETH CITY, a town, port of entry and the county- seat of Pasquotank county, North Carolina, U.S.A., on the Pasquotank

river, at the head of navigation, 46 m. S. by E. of Norfolk, Virginia. Pop. (1890) 3251; (1900) 6348 (3164 negroes); (1910)8412. It is served by the Norfolk & Southern, and the Suffolk & Carolina railways, and is on the Dismal Swamp and Albemarle & Chesapeake canals. Elizabeth City is a winter meeting-place for hunters. It is the seat of a state normal school for negroes and of the Atlantic Collegiate Institute, is a trucking centre, has shipyards, and has a large wholesale trade in clothing, groceries and general merchandise; from it are shipped considerable quantities of fish, cotton and lumber. The town is the port of entry of the Albemarle customs district, but its foreign trade is unimportant. Among its manufactures are cotton goods, iron, lumber, nets and twine, bricks, and carriages and wagons. The oyster fisheries in the vicinity are of considerable importance. Elizabeth City was settled in 1793, and was first incorporated in the same year.

ELK, or Moose, the largest of all the deer tribe, distinguished from other members of the Cervidae by the form of the antlers of the males. These arise as cylindrical beams projecting on each side at right angles to the middle line of the skull, which after a short distance divide in a fork-like manner. The lower prong of this fork may be either simple, or divided into two or three tines, with some flattening. In the East Siberian elk (Alces machlis bedfordiae) the posterior division of the main fork divides into three tines, with no distinct flattening. In the common elk (A. machlis or A. alces), on the other hand, this branch usually expands into a broad palmation, with one large tine at the base, and a number of smaller snags en the free border; there is, however, a phase of the Scandinavian elk in which the antlers are simpler, and recall those of the East Siberian race. The palmation appears to be more marked in the North American race (A. m. americanus) than in the typical Scandinavian elk. The largest of all is the Alaskan race {A.m. gigas), which is said to stand 8 ft. in height, with a span of 6 ft. across the antlers. The great length of the legs gives a decidedly ungainly appearance to the elk. The muzzle is long and fleshy, with only a very small triangular naked patch below the nostrils; and the males have a peculiar sac, known as the bell, hanging from the neck. From the shortness of their necks, elks are unable to graze, and their chief food consists of young shoots and leaves of willow and birch. In North America during the winter one male and several females form a " moose-yard " in the forest, which they keep open by trampling the snow. Although generally timid, the males become very bold during the breeding season, when the females utter a loud call; and at such times they fight both with their antlers and their hoofs. The usual

pace is a shambling trot, but when pressed elks break into a gallop. The female gives birth to one or two young at a time, which are not spotted. In America the elk is known as the moose, and the former name is transferred to the wapiti deer. (R. L.)*

ELKHART, a city of Elkhart county, Indiana, U.S.A., at the confluence of the Elkhart and St Joseph rivers, about 100 m. E. of Chicago. Pop. (1890) 11,360; (1900) 15,184, of whom 1353 were foreign-born; (1910 census) 19,282. Elkhart is at the junction of the western division with the main line of the Lake Shore & Michigan Southern railway, and is served by the Cleveland, Cincinnati, Chicago & St Louis, and the Northern Indiana railways (the latter electric). It is attractively situated and has fine business and public buildings, including a Carnegie library and the Clark hospital, with which a nurses' training school is connected. It has also several parks, including the beautiful Island Park and McNaughton Park, the latter the annual meeting-place of the St Joseph Valley Chautauqua. A valuable water-power is utilized for manufacturing purposes. There are extensive railway-car shops and iron and brass foundries, and the manufactures include band instruments, furniture, telephone supplies, electric transformers, bridges, paper, flour, starch, rubber goods, acetylene gas machines, printing presses, drugs and carriages. The total value of the factory product was $4,345,466 in 1905, an increase of ic-5% since 1900. At Elkhart is the main publishing house of the Mennonite Church in America, two weekly periodicals being issued, one in English, The Herald of Truth, and one in German, the Mennonitische Rundschau. The first settlement was made here about 1834; and Elkhart was chartered as a city in 1875.

ELKINGTON, GEORGE RICHARDS (1801-1865), founder of the electroplating industry in England, was born in Birmingham on the 17th of October 1801, the son of a spectacle manufacturer. Apprenticed to his uncles, silver platers in Birmingham, he became, on their death, sole proprietor of the business, but subsequently took his cousin, Henry Elkington, into partnership. The science of electrometallurgy was then in its infancy, but the Elkingtons were quick to recognize its possibilities. They had already taken out certain patents for the application of electricity to metals when, in 1840, John Wright, a Birmingham surgeon, discovered the valuable properties of a solution of cyanide of silver in cyanide of potassium for electroplating purposes. The Elkingtons purchased and patented Wright's process, subse- quently acquiring the rights of other processes and improve- ments. Large new works for electroplating and electrogilding were opened in Birmingham in 1841, and in the following year Josiah Mason became a partner in the firm. George

Richards Elkington died on the 22nd of September 1865, and Henry Elkington on the 26th of October 1852.

ELLA, or ˆEllа, the name of three Anglo-Saxon kings.

Ella (d. c. 514), king of the South Saxons and founder of the kingdom of Sussex, was a Saxon ealdorman, who landed near Arundel in Sussex with his three sons in 477. Defeating the Britons, who were driven into the forest of Andredsweald, Ella and his followers established themselves along the south coast, although their progress was slow and difficult. However, in 491, strengthened by the arrival of fresh bands of immigrants, they captured the Roman city of Anderida and " slew all that were therein." Ella, who is reckoned as the first Bretwalda, then became king of the South Saxons, and, when he died about 514, he was succeeded by his son Cissa.

Ella (d. 588), king of the Deirans, was the son of an ealdorman named Iffa, and became the first king ˆ of Deira when, in 559, the Deirans separated themselves from the neighbouring kingdom of Bernicia. The English slaves, who aroused the interest of Pope Gregory I. at Rome, were subjects of Ella, and on this occasion the pope, punning the name of their king, suggested that " Alleluia " should be sung in his land. When Ella died in 588 Deira was conquered by Bernicia. One of his sons was Edwin, afterwards king of the Northumbrians,

Ella (d. 867), king of the Northumbrians, became king about 862 on the deposition of Osbert, although he was not of royal birth. Afterwards he became reconciled with Osbert, and to- gether they attacked the Danes, who had invaded Northumbria, and drove them into York. Rallying, however, the Danes defeated the Northumbrians, and in the encounter both Ella and Osbert were slain. In certain legends Ella is represented

as having brought about the Danish invasion of Northumbria by cruel and unjust actions.

See The Anglo-Saxon Chronicle, edited by C. Plummer (Oxford, 1892-1899); Bede, Historiae ecclesiasticae, edited by C. Plummer (Oxford, 1896); Henry of Huntingdon, Historia Anglorum, edited by T. Arnold, Rolls Series (London, 1879); Asser, De rebus gestis

Aelfredi, edited by W. H. Stevenson (Oxford, 1904); J. R. Green, The Making of England (London, 1897), and the Dictionary of National Biography, vol. i. (London, 1895).

ELLAND, an urban district in the Elland parliamentary division of Yorkshire, England, on the Calder, 25 m. S. of Halifax by the Lancashire & Yorkshire railway. Pop. (1901) 10,412. The church of St Mary is Decorated and Perpendicular. Cotton- mills, woollen-factories, ironworks, flagstone quarries at Elland Edge, and fire-clay works employ the industrial population. Elland Hall, though almost rebuilt, retains the recollection of a remarkable family feud between the Ellands and the Beaumonts of Crosland Hall, the site of which may be traced in the vicinity. A nephew of Sir John Elland, in 1342, met death at the hands of a relative of the Beaumonts upon whom Sir John took vengeance, as also upon the heads of the allied houses of Lock- wood and Quarmby. The children of these families were educated in the hope of avenging their parents, and after many years succeeded in doing so, cutting off Sir John Elland and his heir.

ELLENBOROUGH, EDWARD LAW, ist Baron (1750-1818), English judge, was born on the 16th of November 1750, at Great Salkeld, in Cumberland, of which place his father, Edmund Law (1703-1787), afterwards bishop of Carlisle, was at the time rector. Educated at the Charterhouse and at Peterhouse, Cambridge, he passed as third wrangler, and was soon afterwards elected to a fellowship at Trinity. In spite of his father's strong wish that he should take orders, he chose the legal profession, and on quitting the university was entered at Lincoln's Inn. After spending five years as a special pleader under the bar, he was called to the bar in 1780. He chose the northern circuit, and in a very short time obtained a lucrative practice and a high reputation. In 1787 he was appointed principal counsel for Warren Hastings in the celebrated impeachment trial before the House of Lords, and the ability with which he conducted the defence was universally recognized. He had begun his political career as a Whig, but, like many others, he saw in the French Revolution a reason for changing sides, and became a supporter of Pitt. On the formation of the Addington ministry in 1 801, he was appointed attorney-general and shortly after- wards was returned to the House of Commons as member for Newtown in the Isle of Wight. In 1802 he succeeded Lord Kenyon as chief justice of the king's bench. On being raised to the bench he was created a peer, taking his title from the village of Ellenborough in Cumberland, where his maternal ancestors had long held a small patrimony. In 1806, on the formation of Lord Grenville's ministry " of all the talents," Lord Ellenborough declined the offer of the great seal, but accepted a seat in the cabinet. His

doing so while he retained the chief justiceship was much criticized at the time, and, though not without precedent, was open to such obvious objections on constitutional grounds that the experiment has not since been repeated. As a judge he had grave faults, though his decisions displayed profound legal knowledge, and in mercantile law especi- ally were reckoned of high authority. He was harsh and over-bearing to counsel, and in the political trials which were so frequent in his time showed an unmistakable bias against the accused. In the trial of William Hone (q.v.) for blasphemy in

181 7, Ellenborough directed the jury to find a verdict of guilty, and their acquittal of the prisoner is generally said to have hastened his death. He resigned his judicial office in November

1818, and died on the 13th of December following. Ellenborough was succeeded as 2nd baron by his eldest son,

Edward, afterwards earl of Ellenborough; another son was Charles Ewan Law (1792-1850), recorder of London and member of parliament for Cambridge University from 1835 until his death in August 1850.

Three of Ellenborough's brothers attained some degree of IX. 10

fame. These were John Law (1745-1810), bishop of Elphin; Thomas Law (1759-1834), who settled in the United States in 1793, and married, as his second wife, Anne, a granddaughter of Martha Washington; and George Henry Law (1761-1845), bishop of Chester and of Bath and Wells. The connexion of the Law family with the English Church was kept up by George Henry's sons, three of whom took orders. Two of these were Henry Law (1797-1884), dean of Gloucester, and James Thomas Law (1790-1876), chancellor of the diocese of Lichfield.

ELLENBOROUGH, EDWARD LAW, Earl of (1790-1871), the eldest son of the ist Lord Ellenborough, was born on the 8th of September 1790. He was educated at Eton and St John's College, Cambridge. He represented the subsequently dis- franchised borough of St Michael's, Cornwall, in the House of Commons, until the death of his father in 18 18 gave him a seat in the House of Lords. He was twice married; his only child died young; his second wife was divorced by act of parliament in 1830.

In the Wellington administration of 1828 Ellenborough was made lord privy seal; he took a considerable share in the business of the

foreign office, as an unofficial assistant to Welling- ton, who was a great admirer of his talents. He aimed at succeeding Lord Dudley at the foreign office, but was forced to content himself with the presidency of the .board of control, which he retained until the fall of the ministry in 1830. Ellen- borough was an active administrator, and took a lively interest in questions of Indian policy. The revision of the company's charter was approaching, and he held that the government of India should be transferred directly to the crown. He was impressed with the growing importance of a knowledge of central Asia, in the event of a Russian advance towards the Indian frontier, and despatched Burnes on an exploring mission to that district. Ellenborough subsequently returned to the board of control in Peel's first and second administrations. He had only held office for a month on the third occasion when he was appointed by the court of directors to succeed Lord Auckland as governor-general of India. His Indian administration of two and a half years, or half the usual term of service, was from first to last a subject of hostile criticism. His own letters sent monthly to the queen, and his correspondence with the duke of Wellington, published in 1874, afford material for an intelligent and impartial judgment of his meteoric career. The events chiefly in dispute are his policy towards Afghanistan and the army and captives there, his conquest of Sind, and his campaign in Gwalior.

Ellenborough went to India in order " to restore peace to Asia," but the whole term of his office was occupied in war. On his arrival there the news that greeted him was that of the massacre of Kabul, and the sieges of Ghazni and Jalalabad, while the sepoys of Madras were on the verge of open mutiny. In his proclamation of the 15th of March 1842, as in his memor- andum for the queen dated the 18th, he stated with characteristic clearness and eloquence the duty of first inflicting some signal and decisive blow on the Afghans, and then leaving them to govern themselves under the sovereign of their own choice. Unhappily, when he left his council for upper India, and learned the trifling failure of General England, he instructed Pollock and Nott, who were advancing triumphantly with their avenging columns to rescue the British captives, to fall back. The army proved true to the governor-general's earlier proclamation rather than to his later fears; the hostages were rescued, the scene of Sir Alexander Burnes's murder in the heart of Kabul was burned down. Dost Mahommed was quietly dismissed from a prison in Calcutta to the throne in the Bala Hissar, and Ellen- borough presided over the painting of the elephants for an unprecedented military spectacle at Ferozepur, on the south bank of the Sutlej. But this was not the only

piece of theatrical display which capped with ridicule the horrors and the follies of these four years in Afghanistan. When Sultan Mahmud, in 1024, sacked the Hindu temple of Somnath on the north-west coast of India, he carried off, with the treasures, the richly studded sandal-wood gates of the fane, and set them up in his

capital of Ghazni. The Mahommedan puppet of the English, Shah Shuja, had been asked, when ruler of Afghanistan, to restore them to India; and what he had failed to do the Christian ruler of opposing Mahommedans and Hindus resolved to effect in the most solemn and public manner. In vain had Major (afterwards Sir Henry) Rawlinson proved that they were only reproductions of the original gates, to which the Ghazni moulvies clung merely as a source of offerings from the faithful who visited the old conqueror's tomb. In vain did the Hindu sepoys show the most chilling indifference to the belauded restoration. Ellenborough could not resist the temptation to copy Napoleon's magniloquent proclamation under the pyramids. The fraudulent folding doors were conveyed on a triumphal car to the fort of Agra, where they were found to be made not of sandalwood but of deal. That Somnath proclamation (immortalized in a speech by Macaulay) was the first step towards its author's recall.

Hardly had Ellenborough issued his medal with the legend " Pax Asiae Restituta " when he was at war with the amirs of Sind. The tributary amirs had on the whole been faithful, for Major (afterwards Sir James) Outram controlled them. But he had reported the opposition of a few, and Ellenborough ordered an inquiry. His instructions were admirable, in equity as well as energy, and if Outram had been left to carry them out all would have been well. But the duty was entrusted to Sir Charles Napier, with full political as well as military powers. And to add to the evil, Mir Ali Morad intrigued with both sides so effectually that he betrayed the amirs on the one hand, while he deluded Sir Charles Napier to their destruction on the other. Ellenborough was led on till events were beyond his control, and his own just and merciful instructions were forgotten. Sir Charles Napier made more than one confession like this: " We have no right to seize Sind, yet we shall do so, and a very advantageous, useful and humane piece of rascality it will be." The battles of Meeanee and Hyderabad followed; and the Indus became a

British river from Karachi to Multan.

Sind had hardly been disposed of when troubles arose on both sides of the governor-general, who was then at Agra. On the north the disordered kingdom of the Sikhs was threatening the frontier. In Gwalior to the south, the feudatory Mahratta state, there were a large mutinous army, a Ranee only twelve years of age, an adopted chief of eight, and factions in the council of ministers. These conditions brought Gwalior to the verge of civil war. Ellenborough reviewed the danger in the minute of the 1st of November 1845, and told Sir Hugh Gough to advance. Further treachery and military licence rendered the battles of Maharajpur and Punniar, fought on the same day, inevitable though they were, a surprise to the combatants. The treaty that followed was as merciful as it was wise. The pacification of Gwalior also had its effect beyond the Sutlej, where anarchy was restrained for yet another year, and the work of civilization was left to Ellenborough's two successors. But by this time the patience of the directors was exhausted. They had no control over Ellenborough's policy; his despatches to them were haughty and disrespectful; and in June 1844 they exercised their power of recalling him.

On his return to England Ellenborough was created an earl and received the thanks of parliament; but his administration speedily became the theme of hostile debates, though it was successfully vindicated by Peel and Wellington. When Peel's cabinet was reconstituted in 1S46 Ellenborough became first lord of the admiralty. In 1858 he took office under Lord Derby as president of the board of control, for the fourth time. It was then his congenial task to draft the new scheme for the govern- ment of India which the mutiny had rendered necessary. But his old fault of impetuosity again proved his stumbling-block. He wrote a caustic despatch censuring Lord Canning for the Oudh proclamation, and allowed it to be published in The Times without consulting his colleagues, who disavowed his action in this respect. General disapprobation was excited; votes of censure were announced in both Houses; and, to save the cabinet, Ellenborough. resigned.

But for this act of rashness he might have enjoyed the task

of carrying into effect the home constitution for the govern- ment of India which he sketched in his evidence before the select committee of the House of Commons on Indian territories on the 8th of June 1852. Paying off his old score against the East India Company, he then advocated the abolition of the court of directors as a governing

body, the opening of the civil service to the army, the transference of the government to the crown, and the appoint- ment of a council to advise the minister who should take the place of the president of the board of control. These suggestions of 1852 were carried out by his successor Lord Stanley, afterwards earl of Derby, in 1858, so closely even in details, that Lord Ellenborough must be pronounced the author, for good or evil, of the present home constitution of the government of India. Though acknowledged to be one of the foremost orators in the House of Lords, and taking a frequent part in debate, Ellen- borough never held office again. He died at his seat, Southam House, near Cheltenham, on the 22nd of December 187 1, when the barony reverted to his nephew Charles Edmund Law (1820- 1890), the earldom becoming extinct.

See History of the Indian Administration (Bentley, 1874), edited by Loid Colchester; Minutes of Evidence taken before the Select Committee on Indian Territories (June 1852); volume i. of the' Calcutta Review, the Friend of India, during the years 1842-1845; and John Hope, The House of Scindea: A Sketch (Longmans, 1863). The numerous books by and against Sir Charles Napier, on the con- quest of Sind, should be consulted.

ELLERY, WILLIAM (1727 – 1820), American politician, a signer of the Declaration of Independence, was born in Newport, Rhode Island, on the 22nd of December 1727. He graduated from Harvard in 1747, engaged in trade, studied law, and was admitted to the bar in 1770. He was a member of the Rhode Island committee of safety in 1775-1776, and was a delegate in Congress in 1776-1781 and again in 178,3-1785. Just after his first election to Congress, he was placed on the important marine committee, and he was made a member of the board of admiralty when it was established in 1770. In April 1786 he was elected commissioner of the continental loan office for the state of Rhode Island and from 1790 until his death at Newport, on the 15th of February 1820, he was collector of the customs for the district of Newport.

See Edward T. Channing, " Life of William Ellery," in vol. 6 of Jared Sparks's American Biography (Boston and London, 1836).

ELLESMERE, FRANCIS EGERTON, ist Earl of (1800-1857), born in London on the ist of January 1800, was the second son of the ist duke of Sutherland. He was known by his patronymic as Lord Francis Leveson Gower until 1833, when he assumed the surname of Egerton alone, having succeeded on the death of his father to the estates which the latter inherited from the duke of Bridgewater.

Educated at Eton and at Christ Church, Oxford, he entered parliament soon after attaining his majority as member for the pocket borough of Bletchingly in Surrey. He afterwards sat for Sutherlandshire and for South Lancashire, which he represented when he was elevated to the peerage as earl of Ellesmere and Viscount Brackley in 1846. In politics he was a moderate Conservative of independent views, as was shown by his supporting the proposal for establishing the university of London, by his making and carrying a motion for the endowment of the Roman Catholic clergy in Ireland, and by his advocating free trade long before Sir Robert Peel yielded on the question. Appointed a lord of the treasury in 1827, he held the post of chief secretary for Ireland from 1828 till July 1830, when he became secretary-at-war for a short time. His claims to remembrance are founded chiefly on his services to literature and the fine arts. Before he was twenty he printed for private circulation a volume of poems, which he followed up after a short interval by the publication of a translation of Goethe's Faust, one of the earliest that appeared in England, with some transla- tions of German lyrics and a few original poems. In 1839 he visited the Mediterranean and the Holy Land. His impressions of travel were recorded in his very agreeably written Mediter- ranean Sketches (1843), and in the notes to a poem entitled The Pilgrimage. He published several other works in prose and verse, all displaying a fine literary taste. His littrary reputation

secured for him the position of rector of Aberdeen University in 1841. Lord Ellesmere was a munificent and yet discriminating patron of artists. To the splendid collection of pictures which he inherited from his great-uncle, the 3rd duke of Bridgewater, he made numerous additions, and he built a noble gallery to which the public were allowed free access. Lord Ellesmere served as president of the Royal Geographical Society and as president of the Royal Asiatic Society, and he was a trustee of the National Gallery. He died on the 18th of February 1857. He was succeeded by his son (1823-1862) as 2nd earl, and his grandson (b. 1847) as 3rd earl.

ELLESMERE, a market town in the Oswestry parliamentary division of Shropshire, England, on the main line of the Cambrian railway, 182 m. N.W. from London. Pop. of urban district (1901) 1945. It is prettily situated on the west shore of the mere or small lake from which it takes its name, while in the neighbour- hood are other sheets

of water, as Blake Mere, Cole Mere, White Mere, Newton Mere and Crose Mere. The church of St Mary is of various styles from Norman onward, but was partly rebuilt in 1848. The site of the castle is occupied by pleasure gardens, commanding an extensive view from high ground. The town hall contains a library and a natural histoˆ collection. The college is a large boys' school. The town is an important agricultural centre. Ellesmere canal, a famous work of Thomas Telford, connects the Severn with the Mersey, crossing the Vale of Llan- gollen by an immense aqueduct, 336 yds. long and 127 ft. high.

The manor of Ellesmere (Ellesmeles) belonged before the Conquest to Earl Edwin of Mercia, and was granted by William the Conqueror to Roger, earl of Shrewsbury, whose son, Robert de Belesme, forfeited it in n 12 for treason against Henry I. In 1 1 77 Henry II. gave it with his sister in marriage to David, son of Owen, prince of North Wales, after whose death it was retained by King John, who in 1206 granted it to his daughter Joan on her marriage with Llewellyn, prince of North Wales; it was finally surrendered to Henry III. by David, son of Llewellyn, about 1 240. Ellesmere owed its' early importance to its position on the Welsh borders and to its castle, which was in ruins, however, in 1349. While Ellesmere was in the hands of Joan, lady of Wales, she granted to the borough all the free customs of Breteuil. The town was governed by a bailiff appointed by a jury at one of the court leets of the lord of the manor, until a local board was formed in 1859. In 1 221 Henry III. granted Llewellyn, prince of Wales, a market on Thursdays in Ellesmere. The inquisition taken in 1383 after the death of Roger le Straunge (Lord Strange), lord of Ellesmere, shows that he also held two fairs there on the feasts of St Martin and the Nativity of the Virgin Mary. By. 1597 the market had been discontinued on account of the plague by which many of the inhabitants had died, and the queen granted that Sir Edward Kynaston, Kt., and thirteen others might hold a market every Thursday and a fair on the 3rd of November. Since 1792 both have been discontinued. The commerce of Ellesmere has always been chiefly agricultural.

ELLICE (LAGOON) ISLANDS, an archipelago of the Pacific Ocean, lying between 5° and n° S. and about 178 E., nearly midway between Fiji and Gilbert. It is under British protection, being annexed in 1892. It comprises a large number of low coralline islands and atolls, which are disposed in nine clusters extending over a distance of about 400 m. in the direction from N.W. to S.E. Their total area is 14 sq. m. and the population is about 2400. The chief groups, all yielding coco-nuts, pandanus fruit and yams, are Funafuti or Ellice,

Nukulailai or Mitchell, Nurakita or Sophia, Nukufetau or De Peyster, Nui or Egg, Nanomana or Hudson, and Niutao or Lynx. Nearly all the natives are Christians, Protestant missions having been long established in several of the islands. Those of Nui speak the language of the Gilbert islanders, and have a tradition that they came some generations ago from that group. All the others are of Samoan speech, and their tradition that they came thirty generations back from Samoa is supported by recent research. They have an ancient spear which they believe was brought from Samoa, and they actually name the valley from which their ancestors started. A missionary visiting the Samoan valley

found there a tradition of a party who put to sea never to return, and he also found the wood of which the staff was made grow- ing plentifully in the district. Borings and soundings taken at Funafuti in 1897 indicate almost beyond doubt that the whole of this Polynesian region is an area of comparatively recent sub- sidence.

See Geographical Journal, passim; and Atoll of Funafuti: Borings into a Coral Reef (Report of Coral Reef Committee of Royal Society, London, 1904).

ELLICHPUR, or Illichpur, a town of India in the Amraoti district of Berar. Pop. (1901) 26,082. It is first mentioned authentically in the 13th century as " one of the famous cities of the Deccan." Though tributary to the Mahommedans after 1294, it remained under Hindu administration till 1318, when it came directly under the Mahommedans. It was afterwards capital of the province of Berar at intervals until the Mogul occupation, when the seat of the provincial governor was moved to Balapur. The town retains many relics of the nawabs of Berar. It has ginning factories and a considerable trade in cotton and forest produce. It is connected by good roads with Amraoti and Chikalda. It was formerly the headquarters of the district of Ellichpur, which had an area of 2605 sq. m. and a population in 1901 of 297,403. This district, however, was merged in that of Amraoti in 1905. The civil station of Paratwada, 2 m. from the town of Ellichpur, contains the principal public buildings.

ELLIOTSON, JOHN (1 791-1868), English physician, was born at Southwark, London, on the 29th of October 1791. He studied medicine first at Edinburgh and then at Cambridge, in both which places he took the degree of M.D., and subsequently in London at St Thomas's and Guy's hospitals. In 183 1 he was elected professor of

the principles and practice of physic in London University, and in 1834 he became physician to University College hospital. He was a student of phrenology and mesmerism, and his interest in the latter eventually brought him into collision with the medical committee of the hospital, a circumstance which led him, in December 1838, to resign the offices held by him there and at the university. But he continued the practice of mesmerism, holding seances in his home and editing a magazine, The Zoist, devoted to the subject, and in 1849 ne founded a mesmeric hospital. He died in London on the 29th of July 1868. Elliotson was one of the first teachers in London to appreciate the value of clinical lecturing, and one of the earliest among British physicians to advocate the employment of the stethoscope. He wrote a translation of Blumenbach's Institutiones Physiologicae (181 7); Cases of the Hydrocyanic or Prussic Acid (1820); Lectures on Diseases of the Heart (1830); Principles and Practice of Medicine (1839); Human Physiology (1840); and Surgical Operations in the Mesmeric State without Pain (1843). He was the author of numerous papers in the Transactions of the Medico-Chirurgical Society, of which he was at one time president; and he was also a fellow both of the Royal College of Physicians and Royal Society, and founder and president of the Phrenological Society. W. M. Thackeray's Pendennis was dedicated to him.

ELLIOTT, EBENEZER (1781-1849), English poet, the " corn- law rhymer," was born at Masborough, near Rotherham, York- shire, on the 17th of March 1781. His father, who was an extreme Calvinist and a strong radical, was engaged in the iron trade. Young Ebenezer, although one of a large family, had a solitary and rather morbid childhood. ' He was sent to various schools, but was generally regarded as a dunce, and when he was sixteen years of age he entered his father's foundry, working for seven years with no wages beyond a little pocket money. In a fragment of autobiography printed in the Athenaeum (12th of January 1850) he says that he was entirely self-taught, and attributes his poetic development to long country walks undertaken in search of wild flowers, and to a collection of books, including the works of Young, Barrow, Shenstone and Milton, bequeathed to his father by a poor clergyman. At seventeen he wrote his Vernal Walk in imitation of Thomson. His earlier volumes of poems, dealing with romantic themes, received little but unfriendly comment. _ The faults of Night, the earliest of

these, are pointed out in a long and friendly letter (30th of January 1819) from Robert Southey to the author.

Elliott's wife brought him some money, which was invested in his father's share of the iron foundry. But the affairs of the firm were then in a desperate condition, and money difficulties hastened his father's death. Elliott lost all his money, and when he was forty years old began business again in Sheffield on a small borrowed capital. He attributed his father's pecuniary losses and his own to the operation of the corn laws. He took an active part in the Chartist agitation, but withdrew his support when the agitation for the repeal of the corn laws was removed from the Chartist programme. The fervour of his political convictions effected a change in the style and tenor of his verse. The Corn- Law Rhymes (3rd ed., 1831), inspired by a fierce hatred of in- justice, are vigorous, simple and full of vivid description. In 1833-1835 he published The Splendid Village; Corn-Law Rhymes, and other Poems (3 vols.), which included " The Village Patriarch " (1829), " The Ranter," an unsuccessful drama, " Keronah," and other pieces. He contributed verses from time to time to Tait's Magazine and to the Sheffield and Rotherham Independent. In the meantime he had been successful in business, but he remained the sturdy champion of the poor. In 1837 he again lost a great deal of money. This misfortune was also ascribed to the corn laws. He retired in 1 84 1 with a small fortune and settled at Great Houghton, near Barnsley, where he died on the 1st of December 1849. In 1850 appeared two volumes of More Prose and Verse by the Corn-Law Rhymer. Elliott lives by his determined opposition to the " bread-tax," as he called it, and his poems on the subject are saved from the common fate of political poetry by their transparent sincerity and passionate earnestness.

An article by Thomas Carlyle in the Edinburgh Review (July 1832) is the best criticism on Elliott. Carlyle was attracted by Elliott's homely sincerity and genuine power, though he had small opinion of his political philosophy, and lamented his lack of humour and of the sense of proportion. He thought his poetry too imitative, detecting not only the truthful severity of Crabbe, but a " slight bravura dash of the fair tuneful Hemans." His descriptions of his native county reveal close observation and a vivid perception of natural beauty.

See an obituary notice in the Gentleman' s Magazine (Feb. 1 850). Two biographies were published in 1850, one by his son-in-law, John Watkins, and another by " January Searle " (G. S. Phillips). Anew edition of his works by his son, Edwin Elliott, appeared in 1876.

ELLIPSE (adapted from Gr. eXXeiˆw, a deficiency, tWdireiv, to fall behind), in mathematics, a conic section, having the form of a closed oval. It admits of several definitions framed according to the aspect from which the curve is considered. In solido, i.e. as a section of a cone or cylinder, it may be defined, after Menaechmus, as the perpendicular section of an "acute-angled" cone; or, after Apollonius of Perga, as the section of any cone by a plane at a less inclination to the base than a generator; or as an oblique section of a right cylinder. Definitions in piano are generally more useful; of these the most important are: (1) the ellipse is the conic sec- tion which has its eccentricity less than unity: this involves the notion of one directrix and one focus; (2) the ellipse is the locus of a point the sum of whose distances from two fixed points is constant: this involves the notion of two foci. Other geometrical definitions are: it is the oblique projection of a circle; the polar reciprocal of a circle for a point within it; and the conic which intersects the line at infinity in two imaginary points. Analytically it is defined by an equation of the second degree of which the highest terms represent two imaginary lines. The curve has important mechanical relations, in particular it is the orbit of a particle moving under the influence of a central force which varies inversely as the square of the distance of the particle; this is the gravitational law of force, and the curve consequently represents the orbits of the planets if only an individual planet and the sun be considered; the other planets, however, disturb this orbit (see Mechanics).

The relation of the ellipse to the other conic sections is treated in the articles Conic Section and Geometry; in this article a summary of the properties of the curve will be given.

To investigate the form of the curve use may be made of the definition: the ellipse is the locus of a point which moves so that the ratio of its distance from a fixed point (the focus) to its distance from a straight line (the directrix) is constant and is less than unity. This ratio is termed the eccentricity, and will be denoted by e. Let KX (fig. 1) be the directrix, S the focus, and X the foot of the per- pendicular from S to KX. If SX be divided at A so that SA/AX = e, then A is a point on the curve. SX may be also divided externally at A', so that SA'/A'X = e, since e is less than unity ; the points x A and A' are the vertices, and the line AA' the major axis of the curve. It is obvious that the curve is symmetrical about AA'. If AA' be bisected at C, and the line BCB' be drawn perpendicular

to AA', then it is readily seen that the curve is symmetrical about this line also; since if we take S' on AA' so that S'A' = SA, and a line

K'X' parallel to KX such that AX=A'X', then the same curve will be described if we regard K'X' and S' as the given directrix and focus, the eccentricity remaining the same. If B and B' be points on the curve, BB' is the minor axis and C the centre of the curve.

Metrical relations between the axes, eccentricity, distance between the foci, and between these quantities and the co-ordinates of points on the curve (referred to the axes and the centre), and focal distances are readily obtained by the methods of geometrical conies or analytic- ally. The semi-major axis is generally denoted by o, and the semi- minor axis by b, and we have the relation £> 2 = a 2 (i — e 2). Also a 2 = CS.CX, i.e. the square on the semi-major axis equals the rectangle contained by the distances of the focus and directrix from the centre ; and 2a = SP+S'P, where P is any point on the curve, i.e. the sum of the focal distances of any point on the curve equals the major axis. The most important relation between the co-ordinates of a point on an ellipse is : if N be the foot of the perpendicular from a point P, then the square on PN bears a constant ratio to the product of the segments AN, NA' of the major axis, this ratio being the square of the 'ratio of the minor to the major axis; symbolically PN 2 = AN.NA'(CB/CA) 2 . From this or otherwise it is readily deduced that the ordinates of an ellipse and of the circle described on the major axis are in the ratio of the minor to the major axis. This circle is termed the auxiliary circle.

Of the properties of a tangent it may be noticed that the tangent at any point is equally inclined to the focal distances of that point ; that the feet of the perpendiculars from the foci on any tangent always lie on the auxiliary circle, and the product of these per- pendiculars is constant, and equal to the product of the distances of a focus from the two vertices. From any point without the curve two, and only two, tangents can be drawn; if OP, OP' be two tangents from O, and S, S' the foci, then the angles OSP, OSP' are equal and also SOP, S'OP'. If the tangents be at right angles, then the locus of the point is a circle having the same centre as the ellipse ; this is named the director circle.

The middle points of a system of parallel chords is a straight line, and the tangent at the point where this line meets the curve is parallel to the chords. The straight line and the line 'through the centre parallel to the chords are named conjugate diameters; each bisects the chords parallel to the other. An important metrical property of conjugate diameters is the sum of their squares equals the sum of the squares of the major and minor axis.

In analytical geometry, the equation ax 2 +2hxy-\~by 2 +2gx-{-2fy + c = o represents an ellipse when ab>h 2 ; if the centre of the curve be the origin, the equation is a x x 2 --2h l xy J rb l y 2 = C\ and if in addition a pair of conjugate diameters are the axes, the equation is further simplified to A3c 2 + By 2 = C. The simplest form is x 2 /a 2 -}-y 2 lb 2 = 1, in which the centre is the origin and the major and minor axes the axes of co-ordinates. It is obvious that the co-ordinates of any point on an ellipse may be expressed in terms of a single parameter, the abscissa being a cos tj>, and the ordinate b sin , since on eliminating between x = a cos <#> and y = b sin we obtain the equation to the ellipse. The angle is termed the eccentric angle, and is geometrically represented as the angle between the axis of x (the major axis of the ellipse) and the radius of a point on the auxiliary circle which has the same abscissa as the point on the ellipse.

The equation to the tangent at 9 is x cos 6/a+y sin 0/6 = 1, and to the normal ax /cos 6 — by /sin 6 = a 2 — b 2 .

The area of the ellipse is irab, where a, b are the semi-axes; this result may be deduced by regarding the ellipse as the ortho- gonal projection of a circle, or by means of the calculus. The peri- meter can only be expressed as a series, the analytical evaluation leading to an integral termed elliptic (see Function, ii. Complex). There are several approximation formulae: — S = 7r(o+6) makes the perimeter about I /200th too small; s — irˆl (a 2 + b 2) about 1 /200th too great; 2i = ir(o+6)+7rV (a 2 +b 2) is within 1/30,000 of the truth.

An ellipse can generally be described to satisfy any five conditions. If five points be given, Pascal's theorem affords a solution; if five tangents, Brianchon's theorem is employed. The principle of

involution solves such constructions as : given four tangents and one point, three tangents and two points, &c. If a tangent and its point of contact be given, it is only necessary to remember that a double point on the curve is given. A focus or directrix is equal to two conditions; hence such problems as : given a focus and three points ; a focus, two points and one tangent ; and a focus, one point and two tangents are soluble (very conveniently by employing the principle of reciprocation). Of practical importance are the following construc-

tions: — (1) Given the axes; (2) given the major axis and the foci; (3) given the focus, eccentricity and directrix; (4) to construct an ellipse (approximately) by means of circular arcs.

(1) If the axes be given, we may avail ourselves of several constructions, (a) Let AA', BB' be the axes intersecting at right angles in a point C. Take a strip of paper or rule and mark off from a point P, distances Pa and Pb equal respectively to CA and CB. If now the strip be moved so that the point a is always on the minor axis, and the point b on the major axis, the point P describes the ellipse. This is known as the trammel construction.

(b) Let AA', BB' be the axes as before; describe on each as dia- meter a circle. Draw any number of radii of the two circles, and from the points of intersection with the major circle draw lines parallel to the minor axis, and from the points of intersection with the minor circle draw lines parallel to the major axis. The intersections of the lines drawn from corresponding points are points on the ellipse.

(2) If the major axis and foci be given, there is a convenient mechanical construction based on the property that the sum of the focal distances of any point is constant and equal to the major axis. Let AA' be the axis and S, S' the foci. Take a piece of thread of length AA', and fix it at its extremities by means of pins at the foci. The thread is now stretched taut by a pencil, and the pencil moved ; the curve traced out is the desired ellipse.

(3) If the directrix, focus and eccentricity be given, we may employ the general method for constructing a conic. Let S (fig. 2) be the focus, KX the directrix, X being the foot of the perpendicular from S to the directrix. Divide SX internally at A and externally at A', so that the ratios SA/AX and SA'/A'X are each equal to the

eccentricity. Then A, A' are the vertices of the curve. Take any point R on the directrix, and draw the lines RAM, RSN ; draw SL so that the angle LSN = angle NSA'. Let P be the intersection of the line SL with the line RAM, p then it can be readily shown that P is a point on the ellipse. For, draw through P a line parallel to AA', intersecting the directrix in Q and the line RSN in T. Then since XS and QT are parallel and Fig. 2. are intersected by the lines RK,

RM, RN, we have SA/AX = TP/PQ = SP/PQ, since the angle PST = angle PTS. By varying the position of R other points can be found, and, since the curve is symmetrical about both the major and minor axes, it is obvious that any point may be reflected in both the axes,

thus giving 3 additional points.

(4) If the axes be given, the curve can be approximately constructed by circular arcs in the following manner: — Let AA', BB' be the axes ; determine D the intersection of lines through B and A parallel to the major and minor axes respectively. Bisect AD at E and join EB. Then the intersection of EB and DB' determines a point P on the (true) curve. Bisect the chord PB at G, and draw through G a line perpendicular to PB, intersecting BB' in O. An arc with centre O and radius OB forms part of a curve. Let this arc on the reverse side to P intersect a line through parallel to the major axis in a point H. Then HA 1 will cut the circular arc in J. Let JO intersect the major axis in Oi. Then with centre Oi and radius OJ, =OA J , describe an arc. By reflecting the two arcs thus described over the centre the ellipse is approximately described.

ELLIPSOID, a quadric surface whose sections are ellipses. Analytically, it has for its equation r ! /a 2 r:y 2 /fr ! +z 2 /c 2 = i, a, b, c being its axes; the name is also given to the solid contained by this surface (see Geometry: Analytical). The solids and sur- faces of revolution of the ellipse are sometimes termed ellipsoids, but it is advisable to use the name spheroid (q.v.).

The ellipsoid appears in the mathematical investigation of physical properties of media in which the particular property varies in three directions within the media; such properties are the elasticity, giving rise to the strain ellipsoid, thermal expansion, ellipsoid of expansion, thermal conduction, refractive index (see Crystallography), &c. In mechanics, the ellipsoid of gyration or inertia is such that the perpendicular from the centre to a tangent plane is equal to the radius of gyration of the given body about the perpendicular as axis; the " momental ellipsoid," also termed the " inverse ellipsoid of inertia " or Poinsot's ellipsoid, has the perpendicular inversely proportional

to the radius of gyration; the " equimomental ellipsoid " is such that its moments of inertia about all axes are the same as those of a given body. (See Mechanics.)

ELLIPTICITY, in astronomy, deviation from a circular or spherical form; applied to the elliptic orbits of heavenly bodies, or the spheroidal form of such bodies. (See also Compression.)

ELLIS (originally Sharpe), ALEXANDER JOHN (1814-1890), English philologist, mathematician, musician and writer on phonetics, was

born at Hoxton on the 14th of June 1814. He was educated at Shrewsbury, Eton, and Trinity College, Cam- bridge, and took his degree in high mathematical honours. He was connected with many learned societies as member or president, and was governor of University College, London. He was the first in England to reduce the study of phonetics to a science. His most important work, to which the greater part of his life was devoted, is On Early English Pronunciation, with special reference to Shakespeare and Chaucer (1869-1889), in five parts, which he intended to supplement by a sixth, containing an abstract of the whole, an account of the views and criticisms of other inquirers in the same field, and a complete index, but ill-health prevented him from carrying out his intention. He had long been associated with Isaac Pitman in his attempts to reform English spelling, and published A Plea for Phonotypy and Phonography (1845) and A Plea for Phonetic Spelling (1848); and contributed the articles on " Phonetics " and " Speech-sounds " to the 9th edition of the Ency. Brit. He translated (with con- siderable additions) Helmholtz's Sensations of Tone as a physio- logical Basis for the Theory of Music (2nd ed., 1885); and was the author of several smaller works on music, chiefly in connexion with his favourite subject phonetics. He died in London on the 28th of October 1 890.

ELLIS, GEORGE (1753-1815), English author, was born in London in 1 7 53. Educated at Westminster school and at Trinity College, Cambridge, he began his literary career by some satirical verses on Bath society published in 1777, and Poetical Tales, by " Sir Gregory Gander," in 1778. He contributed to the Rolliad and the Probationary Odes political satires directed against Pitt's administration. He was employed in diplomatic business at the Hague in 1784; and in 1797 he accompanied Lord Malmesbury to Lille as secretary to the embassy. On his return he was introduced to Pitt, and the episode of the Rolliad, which had not been forgotten, was explained. He found con- tinued scope for his powers as a political caricaturist in the columns of the Anti- Jacobin, a weekly paper which he founded in connexion with George Canning and William Gifford. For some years before the Anti- Jacobin was started Ellis had been working in the congenial field of Early English literature, in which he was one of the first to arouse interest. The first edition of his Specimens of the Early English Poets appeared in 1790; and this was followed by Specimens of Early English Metrical Romances (1805). He also edited Gregory Lewis Way's translation of select Fabliaux in 1796. Ellis was an intimate friend of Sir Walter Scott, who styled him " the first converser I ever saw," and dedicated

to him the fifth canto of Marmion. Some of the correspondence between them is to be found in Lockhart's Life. He died on the 10th of April 181 5. The monument erected to his memory in the parish church of Gunning Hill, Berks, bears a fine inscription by Canning.

ELLIS, SIR HENRY (1777-1869), English antiquary, was born in London on the 29th of November 1777. He was educated at Merchant Taylors' school, and at St John's College, Oxford, of which he was elected a fellow. After having held for a few months a sub-librarianship in the Bodleian, he was in 1800 appointed to a similar post in the British Museum. In 1827 he became chief librarian, and held that post until 1856, when he resigned on account of advancing age. In 1 83 2 William IV. made him a knight of Hanover, and in the following year he received an English knighthood. He died on the 15th of January 1869. Sir Henry Ellis's life was one of very considerable literary activity. His first work of importance was the preparation of a new edition of Brand's Popular Antiquities, which appeared in 1813. Ini8i6he was selected by the commissioners of public

records to write the introduction to Domesday Book, a task which he discharged with much learning, though several of his views have not stood the test of later criticism. His Original Letters Illustrative of English History (iirst series, 1824; second series, 1827; third series, 1846) are compiled chiefly from manu- scripts in the British Museum and the State Paper Office, and have been of considerable service to historical writers. To the Library of Entertaining Knowledge he contributed four volumes on the Elgin and Townley Marbles. Sir Henry was for many years a director and joint-secretary of the Society of Antiquaries.

ELLIS, ROBINSON (1834-), English classical scholar, was born at Banning, near Maidstone, on the 5th of September 1834. He was educated at Elizabeth College, Guernsey, Rugby, and Balliol College, Oxford. In 1858 he became fellow of Trinity College, Oxford, and in 1870 professor of Latin at University College, London. In 1876 he returned to Oxford, where from 1883 to 1893 he held the university readership in Latin. In 1893 he succeeded Henry Nettleship as professor. His chief work has been on Catullus, whom he began to study in 1859. His first Commentary on Catullus (1876) aroused great interest, and called forth a flood of criticism. In 1889 appeared

a second and enlarged edition, which placed its author in the first rank of authorities on Catullus. Professor Ellis quotes largely from the early Italian commentators, maintaining that the land where the Renaissance originated had done more for scholarship than is commonly recognized. He has supplemented his critical work by a translation (1871, dedicated to Tennyson) of the poems in the metres of the originals. Another author to whom Professor Ellis has devoted many years' study is Manilius, the astrological poet. In 1891 he published Noctes Manilianae, a series of dis- sertations on the Astronomica, with emendations. He has also treated Avianus, Velleius Paterculus and the Christian poet Orientius, whom he edited for the Vienna Corpus Scriptvrum Ecclesiasticorum. He edited the Ibis of Ovid, the Aetna of the younger Lucilius, and contributed to the Anecdota Oxoniensia various unedited Bodleian and other manuscripts. In 1907 he published Appendix Vergiliana (an edition of the minor poems); in 1908 The Annalist Ljcinianus.

ELLIS, WILLIAM (1794- 1872), English Nonconformist missionary, was born in London on the 29th of August 1794. His boyhood and youth were spent at Wisbeach, where he worked as a market-gardener. In 1814 he offered himself to the London Missionary Society, and was accepted. During a year's training he acquired some knowledge of theology and of various practical arts, such as printing and bookbinding. He sailed for the South Sea Islands in January 1816, and remained in Polynesia, occupy- ing various stations in succession, until 1824, when he was com- pelled to return home on account of the state of his wife's health. Though the period of his residence in the islands was thus com- paratively short, his labours were very fruitful, contributing perhaps as much as those of any other missionary to bring about the extraordinary improvement in the religious, moral and social condition of the Pacific Archipelago that took place during the 19th century. Besides promoting the spiritual object of his mission, he introduced many other aids to the improvement of the condition of the people. His gardening experience en- abled him successfully to acclimatize many species of tropical fruits and plants, and he set up and worked the first printing press in the South Seas. Returning home by way of the United States, where he advocated his work, Ellis was for some years employed as a travelling agent of the London Missionary Society, and in 1832 was appointed foreign secretary to the society, an office which he held for seven years. In 1837 he married his second wife, Sarah Stickney, a writer and teacher of some note in her generation. In 1841 he went to live at Hoddesdon, Herts, and ministered to a small Congregational church there. On behalf of the London

Missionary Society he paid three visits to Madagascar (1853-1857), inquiring into the prospects for re- suming the work that had been suspended by Queen Ranavolona's hostility. A further visit was paid in 1863. Ellis wrote accounts of all his travels, and Southey's praise (in the Quarterly Review) of his Polynesian Researches (2 vols., 1829) finds many echoes.

He was a fearless, upright and tactful man, and a keen observer of nature. He died on the 25th of June 1872.

ELLISTON, ROBERT WILLIAM (1774-1831), English actor, was born in London on the 7th of April 1774, the son of a watch- maker. He was educated at St Paul's school, but ran away from home and made his first appearance on the stage as Tressel in Richard III. at Bath in 1791. Here he was later seen as Romeo, and in other leading parts, both comic and tragic, and he repeated his successes in London from 1796. He acted at Drury Lane from 1804 to 1809, and again from 1812; and from 1819 he was the lessee of the house, presenting Kean, Mme Vestris and Macready. Ill-health and misfortune culminated in his bank- ruptcy in 1826, when he made his last appearance at Drury Lane as Falstaff. But as lessee of the Surrey theatre he acted almost up to his death, which was hastened by intemperance. Leigh Hunt compared him favourably with Garrick; Byron thought him inimitable in high comedy; Macready praised his versatility. Elliston was the author of The Venetian Outlaw (1805), and, with Francis Godolphin Waldron, of No Prelude (1803), m both of which plays he appeared.

ELLORA, a village of India in the native state of Hyderabad, near the city of Daulatabad, famous for its rock temples, which are among the finest in India. They are first mentioned by Ma'sudi, the Arabic geographer of the 10th century, but merely as a celebrated place of pilgrimage. The caves differ from those of Ajanta in consequence of their being excavated in the sloping sides of a hill and not in a nearly perpendicular cliff. They extend along the face of the hill for a mile and a quarter, and are divided into three distinct series, the Buddhist, the Brahmanical and the Jain, and are arranged almost chronologically. The most splendid of the whole series is the Kailas, a perfect Dravidian temple, complete in all its parts, characterized by Fergusson as one of the most wonderful and interesting monuments of archi- tectural art in India. It is not a mere interior chamber cut in the rock, but is a model of a complete temple such as might have been erected on the plain. In other words, the rock has been cut away externally as well as internally. First the great sunken court measuring 276 ft. by 154 ft. was hewn out of the solid, trap-rock of

the hillside, leaving the rock mass of the temple wholly detached in a cloistered court like a colossal boulder, save that a rock bridge once connected the upper storey of the temple with the upper row of galleried chambers surrounding three sides of the court. Colossal elephants and obelisks stand on either side of the open mandapam, or pavilion, containing the sacred bull; and beyond rises the monolithic Dravidian temple to Siva, 90 ft. in height, hollowed into vestibule, chamber and image-cells, all lavishly carved. Time and earthquakes have weathered and broken away bits of the great monument, and Moslem zealots strove to destroy the carved figures, but these defects are hardly noticed. The temple was built by Krishna I., Rashtrakuta, king of Malkhed in 760-783.

ELLORE, a town of British India, in the Kistna district of Madras, on the East Coast railway, 303 m. from Madras. Pop. (1901) 33,521. The two canal systems of the Godavari and the Kistna deltas meet here. There are manufactures of cotton and saltpetre, and an important Church of England high school. Ellore was formerly a military station, and the capital of the Northern Circars. At Pedda Vegi to the north of it are extensive ruins, which are believed to be remains of the Buddhist kingdom of Vengi. From these the Mahommedans, after their conquest of the district in T470, obtained material for building a fort at Ellore.

ELLSWORTH, OLIVER (1745-1807), American statesman and jurist, was born at Windsor, Connecticut, on the 29th of April 1745. He studied at Yale and Princeton, graduating from the latter in 1766, studied theology for a year, then law, and began to practise at Hartford in 1771. He was state's attorney for Hartford county from 1777 to 1785, and achieved extraordinary success at the bar, amassing what was for his day a large fortune. From 1773 to 1775 he represented the town of Windsor in the general assembly of Connecticut, and in the latter year became a member of the important commission known as the " Pay Table," which supervised the colony's expenditures

for military purposes during the War of Independence. In 1779 he again sat in the assembly, this time representing Hartford. From 1777 to 1783 he was a member of the Continental Congress, and in this body he served on three important committees, the marine committee, the board of treasury, and the committee of appeals, the

predecessors respectively of the navy and treasury departments and the Supreme Court under the Federal Con- stitution. From 1780 to 1785 he was a member of the governor's council of Connecticut, which, with ˆthe lower house before 1784 and alone from 1784 to 1807, constituted a supreme court of errors; and from 1785 to 1789 he was a judge of the state superior court. In 1787, with Roger Sherman and William Samuel Johnson (1727-1819), he was one of Connecticut's delegates to the constitutional convention at Philadelphia, in which his services were numerous and important. In particular, when disagreement seemed inevitable on the question of representation, he, with Roger Sherman, proposed what is known as the " Connecticut Compromise," by which the Federal legislature was made to consist of two houses, the upper having equal representation from each state, the lower being chosen on the basis of population. Ellsworth also made a determined stand against a national paper currency. Being compelled to leave the convention before its adjournment, he did not sign the instrument, but used his influence to secure its ratification by his native state. From 1789 to 1796 he was one of the first senators from Connecticut under the new Constitution. In the senate he was looked upon as President Washington's personal spokesman and as the leader of the Administration party. His most important service to his country was without a doubt in connexion with the establishment of the Federal judiciary. As chairman of the committee having the matter in charge, he drafted the bill by the enactment of which the system of Federal courts, almost as it is to-day, was established. He also took a leading part in the senate in securing the passage of laws for funding the national debt, assuming the state debts and establishing a United States bank. It was Ellsworth who sug- gested to Washington the sending of John Jay to England to negotiate a new treaty with Great Britain, and he probably did more than any other man to induce the senate, despite widespread and violent opposition, to ratify that treaty when negotiated. By President Washington's appointment he be- came chief justice of the Supreme Court of the United States in March 1796, and in 1799 President John Adams sent him, with William Vans Murray (1762-1803) and William R. Davie (1756—1820), to negotiate a new treaty with France. It was largely through the influence of Ellsworth, who took the principal part in the negotiations, that Napoleon consented to a convention, of the 30th of September 1800, which secured for citizens of the United States their ships captured by France but not yet con- demned as prizes, provided for freedom of commerce between the two nations, stipulated that " free ships shall give a freedom to goods," and contained provisions favourable to neutral commerce. While he was

abroad, failing health compelled him (1800) to resign the chief-justiceship, and after some months in England he returned to America in 1801. In 1803 he was again elected to the governor's council, and in 1807, on the reorganization of the Connecticut judiciary, was appointed chief justice of the new Supreme Court. He never took office, however, but died at his home in Windsor on the 27th of November 1807.

See W. G Brown's Oliver Ellsworth (New York, 1905), an excellent biography. There is also an appreciative account of Ellsworth's life and work in H. C. Lodge's A Fighting Frigate, and Other Essays and Addresses (New York, 1902), which contains in an appendix an interesting letter by Senator George F. Hoar concerning Ellsworth's work in the constitutional convention.

ELLSWORTH, a city, port of entry and the county seat of Hancock count)', Maine, U.S.A., at the head of navigation on the Union river (and about 3f m. from its mouth), about 30 m. S.E. of Bangor. Pop. (1890)4804; (1900)4297 (189 foreign-born); (1910) 3549. It is served by the Maine Central railway. The fall of the river, about 85 ft. in 2 m., furnishes good water- power, and the city has various manufactures, including lumber, shoes, woollens, sails, carriages and foundry and machine shop

products, besides a large lumber trade. Shipbuilding was formerly important. There is a large United States fish hatchery here. The city is the port of entry for the Frenchman's Bay customs district, but its foreign trade is unimportant. Ellsworth was first settled in 1763 and for some time was called New Bowdoin; but when it was incorporated as a town in 1800 the present name was adopted in honour of Oliver Ellsworth. A city charter was secured in 1869.

ELLWANGEN, a town of Germany in the kingdom of Wurttemberg, on the Jagst, 12 m. S.S.E. from Crailsheim on the railway to Goldshofe. Pop. 5000. It is romantically situated between two hills, one crowned by the castle of Hohen-Ellwangen, built in 1354 and now used as an agricultural college, and the other, the Schonenberg, by the pilgrimage church of Our Lady of Loreto, in the Jesuit style of architecture. The town possesses one Evangelical and five Roman Catholic churches, among the latter the Stiftskirche, the old abbey church, a Romanesque building dating from n 24, and the Gothic St Wolfgangskirche. The classical and modern schools (Gymnasium and Realschule) occupy the buildings of a suppressed Jesuit college. The in- dustries include the making of parchment covers, of envelopes, of wooden hafts and handles for tools, &c, and tanneries. There are

also a wool-market and a horse-market, the latter famous in Germany.

The Benedictine abbey of Ellwangen is said to have been founded in 764 by Herulf, bishop of Langres; there is, however, no record of it before 814. In 1460 the abbey was converted, with the consent of Pope Pius II., into a Ritterstift (college or institution for noble pensioners) under a secular provost, who, in 1555, was raised to the dignity of a prince of the Empire. The provostship was secularized in 1803 and its territories were assigned to Wurttemberg. The town of Ellwangen,which grew up round the abbey and received the status of a town about the middle of the 14th century, was until 1803 the capital of the provostship.

See Seckler, Beschreibung der gefursteten Probstei Ellwangen (Stuttgart, 1864); Beschreibung des Oberamts Ellwangen, published by the statistical bureau (Landesamt) at Ellwangen (1888). For a list of the abbots and provosts see Stokvis, Manuel d'histoire (Leiden, 1890-1893), iii. p. 242.

ELLWOOD, THOMAS (1639-1714), English author, was born at Crowell, in Oxfordshire, in 1639. He is chiefly celebrated for his connexion with Milton, and the principal facts of his life are related in a very interesting autobiography, which contains much information as to his intercourse with the poet. While he was still young his father removed to London, where Thomas became acquainted with a Quaker family named Pennington, and was led to join the Society of Friends, a connexion which subjected him to much persecution. It was through the Penning- tons that he was introduced in 1662 to Milton in the capacity of Latin reader. He spent nearly every afternoon in the poet's house in Jewin Street, until the intercourse was interrupted by an illness which compelled him to go to the country. After a period of imprisonment in the old Bridewell prison and in Newgate for Quakerism, Ellwood resumed his visits to Milton, who was now residing at a house his friend had taken for him at Chalfont St Giles. In 1665 Ellwood was again arrested and imprisoned in Aylesbury gaol. When he visited Milton after his release the poet gave him the manuscript of the Paradise Lost to read. On returning the manuscript Ellwood said, " Thou hast said much here of Paradise lost; but what hast thou to say of Paradise found ? " and when Milton long after- wards in London showed him Paradise Regained, it was with the remark, " This is owing to you, for you put it into my head at Chalfont." Ellwood was the friend of Fox and Penn, and was the author of several polemical works in defence of the Quaker position, of which Forgery no Christianity

(1674) and The Foundation of Tithes Shaken (1678) deserve mention. His Sacred Histories of the Old and New Testaments appeared in 1705 and 1709. He also published some volumes of poems, among them a Davideis in five books. He died on the 1st of March 17 14.

The History of the Life of Thomas Ellwood: written by his own hand (1714) has been many times reprinted.

ELM, the popular name for the trees and shrubs constituting the genus Ulmus, of the natural order Ulmaceae. The genus contains fifteen or sixteen species widely distributed throughout the north temperate zone, with the exception of western North America, and extending southwards as far as Mexico in the New and the Sikkim Himalayas in the Old World.

The common elm, U ■ campestris, a doubtful native of England, is found throughout a great part of Europe, in North Africa and in Asia Minor, whence it ranges as far east as north Asia and Japan. It grows in woods and hedge-rows, especially in the southern portion of Britain, and on almost all soils, but thrives best on a rich loam, in open, low-lying, moderately moist situa- tions, attaining a height of 60 to 100, and in some few cases as much as 130 or 150 ft. The branches are numerous and spread- ing, and often pendulous at the extremities; the bark is rugged; the leaves are alternate, ovate, rough, doubly serrate, and, as in other species of Ulmus, unequal at the base. The flowers are small, hermaphrodite, numerous, in purplish-brown tufts, and each with a fringed basal bract; the bell-shaped calyx is often four-toothed and surrounds four free stamens; the pistil bears two spreading hairy styles. They appear before the leaves in March and April. The seed-vessels are green, membranous, one-seeded and deeply cleft. Unlike the wych elm, the common elm rarely perfects its seed in England, where it is propagated by means of root suckers from old trees, or preferably by layers from stools. In the first ten years of its growth it ordinarily reaches a height of 25 to 30 ft. The wood, at first brownish white, becomes, with growth, of a brown colour having a greenish shade. It is close-grained, free from knots, without apparent medullary rays, and is hard and tough, but will not take a polish. All parts of the trunk, including the sapwood, are available in carpentry. By drying, the wood loses over 60% of its weight, and has then a specific gravity of 0-588. It has considerable

transverse strength, does not crack when once seasoned, and is remarkably durable under water, or if kept quite dry; though it decays rapidly on exposure to the weather, which in ten to eighteen months causes the bark to fall off, and gives to the wood a yellowish Colour — a sign of deterioration in quality. To prevent shrinking and warping it may be preserved in water or mud, but it is best worked up soon after felling. Analyses of the ash of the wood have given a percentage of 47 -8% of lime, 21-9% of potash, and 13-7% of soda. In summer, elm trees often exude an alkaline gummy substance, which by the action of the air becomes the brown insoluble body termed ulmin. ' Elm wood is used for keels and bilge-planks, the blocks and dead-eyes of rigging, and ships' pumps, for coffins, wheels, furniture, carved and turned articles, and for general carpenters' work; and previous to the common employment of cast iron was much in request for waterpipes. The inner bark of the elm is made into bast mats and ropes. It contains mucilage, with a little tannic acid, and was formerly much employed for the preparation of an antiscorbutic decoction, now obsolete. The bark of Ulmus fulva, the slippery or red elm of the United States and Canada, serves the North American Indians for the same purpose, and also as a vulnerary. The leaves as well as the young shoots of elms have been found a suitable food for live stock. For ornamental purposes elm trees are frequently planted, and in avenues, as at the park of Stratfieldsaye, in Hampshire, are highly effective. They were first used in France for the adorn- ment of public walks in the reign of Francis I. In Italy, as in ancient times, it is still customary to train the vine upon the elm — a practice to which frequent allusion has been made by the poets. The cork-barked elm, U. campestris, var. suberosa, is distinguished chiefly by the thick deeply fissured bark with which its branches are covered. There are numerous cultivated forms differing in size and shape of leaf, and manner of growth.

The Scotch or wych elm, U. montana, is indigenous to Britain and is the common elm of the northern portion of the island; it usually attains a height of about 50 ft., but among tall-growing trees may reach 1 20 ft. It has drooping branches and a smoother and thinner bark, larger and more tapering leaves, and a far less deeply notched seed-vessel than U. campestris. The wood,

*though more porous than in that species, is a tough and hard material when properly * seasoned, and, being very flexible when steamed, is well adapted for boat-building. Branches of the wych elm were formerly manufactured into bows, and if forked were employed as divining-rods. The weeping elm, the most ornamental member of the genus, is a variety of this species. The Dutch or sand elm is a tree*

very similar to the wych elm, but produces inferior timber. The American or white elm, {7. americana, is a hardy and very handsome species, of which the old tree on Boston (Mass.) Common was a representative. This tree is supposed to have been in existence before the settle- ment of Boston, and at the time of its destruction by the storm of the 15th of February 1876 measured 22 ft. in circumference.

ELMACIN (Elmakin or Elmacinus) , GEORGE (c. 12 23-1 2 74), author of a history of the Saracens, which extends from the time of Mahomet to the year 1 1 18 of our era. He was a Christian of Egypt, where he was born; is known in the east as Ibn-Amid; and after holding an official position under the sultans of Egypt, died at Damascus. His history is principally occupied with the affairs of the Saracen empire, but it contains passages which relate to the Eastern Christians. It was published in Arabic and Latin at Leiden in 1625. The Latin version is a translation by Erpenius, under the title, Historia saracenica, and from this a French translation was made by Wattier as L'Hisloire mahometane (Paris, 1657).

ELMALI (" apple-town "), a small town of Asia Minor in the vilayet of Konia, the present administrative centre of the ancient Lycia, but not itself corresponding to any known ancient city. It lies about 25 m. inland, at the head of a long upland valley (5000 ft.) inhabited by direct descendants of the ancient Lycians, who have preserved a distinctive facial type, noticeable at once in the town population. There are about fifty Greek families, the rest of the population (4000) being Moslem. The district is agricultural and has no manufactures of importance.

ELMES, HARVEY LONSDALE (1813-1847), British architect, son of James Elmes (q.v.), was born at Chichester in 1813. After serving some time in his father's office, and under a surveyor at Bedford and an architect at Bath, he became partner with his father in 1835, and in the following year he was successful among 86 competitors for a design for St George's Hall, Liverpool. The foundation stone of this building was laid en the 28th of June 1838, but, Elmes being successful in a competition for the Assize Courts in the same city, it was finally decided to include the hall and courts in a single building. In accordance with this idea, Elmes prepared a fresh design, and the work of erection commenced in 1841. He superintended its progress till 1847, when from failing health he was compelled to delegate his duties to Charles Robert Cockerel!, and leave for Jamaica, where he died of consumption on the 26th of November 1847.

ELMES, JAMES (1782-1862), British architect, civil engineer, and writer on the arts, was born in London on the 15 th of October 1782. He was educated at Merchant Taylors' school, and, after studying building under his father, and architecture under George Gibson, became a student at the Royal Academy, where he gained the silver medal in 1804. He designed a large number of buildings in the metropolis, and was surveyor and civil engineer to the port of London, but is best known as a writer on the arts. In 1809 he became vice-president of the Royal Architectural Society, but this office, as well as that of surveyor of the port of London, he was compelled through partial loss of sight to resign in 1828. He died at Greenwich on the 2nd of April 1862. His publications were: — Sir Christopher Wren and his Times (1823); Lectures on Architecture (1823); The Arts and Artists (1825); General and Biographical Dictionary of the Fine Arts (1826); Treatise on Architectural Jurisprudence (1827), and Thomas Clarkson: a Monograph (1854).

ELMHAM, THOMAS (d. c. 1420), English chronicler, was probably born at North Elmham in Norfolk. He became a Benedictine monk at Canterbury, and then joining the Cluniacs, was prior of Lenton Abbey, near Nottingham; he was chaplain to Henry V., whom he accompanied to France in 1415, being present at Agincourt. Elmham wrote a history of the monastery

of St Augustine at Canterbury, which has been edited by C. Hardwick for the Rolls Series (1858); and a Liber metrkus de Henrico V., edited by C. A. Cole in the Memorials of Henry V. (1858). It is very probable that Elmham wrote the famous Gesta Henrici Quinti, which is the best authority for the life of Henry V. from his accession to 1416. This work, often referred to as the " chaplain's life," and thought by some to have been written by Jean de Bordin, has been published for the English Historical Society by B. Williams (1850). Elmham, however, did not write the Vita et Gesta Henrici V., which was attributed to him by T. Hearne and others. See C. L. Kingsford, Henry V. (1901).

ELMINA, a town on the Gold Coast, British West Africa, in 5° 4′ N., i° 20′ W. and about 8 m. W. of Cape Coast. Pop. about 4000. Facing the Atlantic on a rocky peninsula is Fort St George, considered the finest fort on the Guinea coast. It is built square with high walls, and has accommodation for 200 soldiers. On the land side were formerly

two moats, cut in the rock on which the castle stands. The castle is the residence of the commissioner of the district and other officials. The houses in the native quarter are mostly built of stone, that material being plentiful in the vicinity.

Elmina is the earliest European settlement on the Gold Coast, and was visited by the Portuguese in 1481. Christopher Columbus is believed to have been one of the officers who took part in this voyage. The Portuguese at once began to build the castle now known as Fort St George, but it was not completed till eighty years afterwards. Another defensive work is Fort St Jago, built in 1666, which is behind the town and at some distance from the coast. (In the latter half of the 19th century it was converted into a prison.) Elmina was captured by the Dutch in 1637, and ceded to them by treaty in 1640. They made it the chief port for the produce of Ashanti. With the other Dutch possessions on the Guinea coast, it was transferred to Great Britain in April 1872. The king of Ashanti, claiming to be ground landlord, objected to its transfer, and the result was the Ashanti war of 1873-1874. For many years the greatest output of gold from this coast came from Elmina. The annual export is said to have been nearly £3,000,000 in the early years of the 1 8th century, but the figure is probably exaggerated. Since 1900 the bulk of the export trade in gold has been trans- ferred to Sekondi (q.v.). Prempeh, the ex-king of Ashanti, was detained in the castle (1896) until his removal to the Seychelles. (See Ashanti: History, and Gold Coast: History.) ELMIRA, a city and the county-seat of Chemung county, New York, U.S.A., 100 m. S.E. of Rochester, on the Chemung river, about 850 ft. above sea-level. Pop. (1890) 30,893; (1900) 35,672, of whom 5511 were foreign-born (1988 Irish and 1208 German); (1910 census) 37,176. It is served by the Erie, the Pennsylvania, the Delaware, Lackawanna & Western, the Lehigh Valley, and the Tioga Division railways, the last of which connects it with the Pennsylvania coalfields 48 m. away. The city is attractively situated on both sides of the river, and has a fine water-supply and park system, among the parks being Eldridge, Rorick's Glen, Riverside, Brand, Diven, Grove, Maple Avenue and Wisner; in the last-named is a statue of Thomas K. Beecher by J. S. Hartley. The city contains a Federal building, a state armoury, the Chemung county court house and other county buildings, the Elmira orphans' home, the Steele memorial library, home for the aged, the Arnot- Ogden memorial hospital, the Elmira free academy, and the Railway Commerical training school. Here, also, is Elmira College (Presbyterian) for women, founded in 1855. This institution, chartered in 1852 as Auburn Female University and then situated in

Auburn, was rechartered in 1855 as the Elmira Female College; it was established largely through the influence and persistent efforts of the Rev. Samuel Robbins Brown (1810- 1880) and his associates, notably Simeon Benjamin of Elmira, who gave generously to the newly founded college, and was the first distinctively collegiate institution for women in the United States, and the first, apparently, to grant degrees to women. The most widely known institution in the city is the Elmira

reformatory, a state prison for first offenders between the ages of sixteen and thirty, on a system of general indeterminate sentences. Authorized by the state legislature in 1866 and opened in 1876 under the direction of Zebulon Reed Brockway (b. 1827), it was the first institution of the sort and has served as a model for many similar institutions both in the United States and in other countries (see Juvenile Offenders). Elmira is an important railway centre, with large repair shops, and has also extensive manufactories (value of production in 1900, $8,558,786, of which $6,596,603 was produced under the " factory system "; in 1905, under the " factory system," $6,984,095), including boot and shoe factories, a large factory for fire-extinguishing apparatus, iron and steel bridge works, steel rolling mills, large valve works, steel plate mills, knitting mills, furniture, glass and boiler factories, breweries and silk mills. Near the site of Elmira occurred on the 29th of August 1779 the battle of Newtown, in which General John Sullivan decisively defeated a force of Indians and Tories under Sir John Johnson and Joseph Brant. There were some settlers here at the close of the War of Independence, but no permanent settle- ment was made until 1788. The village was incorporated as Newtown in 181 5, and was reincorporated as Elmira in 1828. A city charter was secured in 1864. In 1861 a state military camp was established here, and in 1864-1865 there was a prison camp here for Confederate soldiers.

ELMSHORN, a town of Germany, in the Prussian province of Schleswig-Holstein, on the Kriickau, 19 m. by rail N.W. from Altona. Pop. (1905) 13,640. Its industries include weaving, dyeing, brewing, iron-founding and the manufacture of leather goods, boots and shoes and machines. There is a considerable shipping trade.

ELMSLEY, PETER (1773-1825), English classical scholar. He was educated at Westminster and Christ Church, Oxford, and having inherited a fortune from his uncle, a well-known bookseller, devoted himself to the study of classical authors and manuscripts. In 1798 he was appointed to the chapelry of Little Horkesley in Essex, which he held till his death. He travelled extensively in France and Italy, and

spent the winter of 1818 in examining the MSS. in the Laurentian library at Florence. In 1819 he was commissioned, with Sir Humphry Davy, to decipher the papyri found at Herculaneum, but the results proved insignificant. In 1823 he was appointed principal of St Alban's Hall, Oxford, and Camden professor of ancient history. He died in Oxford on the 8th of March 1825. Elmsley was a man of most extensive learning and European reputation, and was considered to be the best ecclesiastical scholar in England. But it is chiefly by his collation of the MSS. of the Greek tragedians and his critical labours on the restoration of their text that he will be remembered. He edited the Acharnians of Aristophanes, and several of the plays and scholia of Sophocles and Euripides. He was the first to recognize the importance of the Laurentian MS. (see Sandys, Hist, of Class. Schol.iii. (1908).

ELNE, a town of south-western France in the department of Pyrenees-Orientales, 10 m. S.S.E. of Perpignan by rail. Pop. (1906) 3026. The hill on which it stands, once washed by the sea, which is now over 3 m. distant, commands a fine view over the plain of Roussillon. From the 6tii century till 1602 the town was the seat of a bishopric, which was transferred to Perpignan. The cathedral of St Eulalie, a Romanesque building completed about the beginning of the 12th century, has a beautiful cloister in the same style, with interesting sculptures and three early Christian sarcophagi. Remains of the ancient ramparts flanked by towers are still to be seen. Silk-worm cultivation is carried on. Elne, the ancient Illiberis, was named Helena by the emperor Constantine in memory of his mother. Hannibal encamped under its walls on his march to Rome in 218 B.C. The emperor Constans was assassinated there in a.d. 350. The town several times sustained siege and capture between its occupation by the Moors in the 8th century and its capitulation in 1641 to the troops of Louis XIII.

EL OBEID, chief town of the mudiria (province) of Kordofan, Anglo-Egyptian Sudan, and 230 m. S.W. by S. of Khartum in

a direct line. Pop. (1905) about 10,000. It is situated about 2000 ft. above the sea, at the northern foot of Jebel Kordofan, in 13 11′ N. and 30 14′ E. It is an important trade centre, the chief articles of commerce being gum, ivory, cattle and ostrich feathers. A considerable part of the trade of Darfur with Egypt passes through El

Obeid.

El Obeid, which appears to be a place of considerable antiquity and the ancient capital of the country, was garrisoned by the Egyptians on their conquest of Kordofan in 182 1. In September 1882 the town was assaulted by the troops of the mahdi, who, being repulsed, laid siege to the place, which capitulated on the 1 7th of January 1883. During the Mahdia the city was destroyed and deserted, and when Kordofan passed, in 1899, into the possession of the Anglo-Egyptian authorities nothing was left of El Obeid but a part of the old government offices. A new town was laid out in squares, the mudiria repaired and barracks built. (See Kordofan, and Sudan: Anglo-Egyptian.)

ELOI [Eligius], SAINT (588-659), apostle of the Belgians and Frisians, was born at Cadillac, near Limoges, in 588. Having at an early age shown artistic talent he was placed by his parents with the master of the mint at Limoges, where he made rapid progress in goldsmith's work. He became coiner to Clotaire II., king of the Franks, and treasurer to his successor Dagobert. Both kings entrusted him with important works, among which were the composition of the bas-reliefs which ornament the tomb of St Germain, bishop of Paris, and the execution (for Clotaire) of two chairs of gold, adorned with jewels, which at that time were reckoned chefs-d'osuvre. Though he was amassing great wealth, Eloi acquired a distaste for a worldly life, and resolved to become a priest. At first he retired to a monastery, but in 640 was raised to the bishopric of Noyon. He made frequent missionary excursions to the pagans of the Low Countries, and also founded a great many monasteries and churches. He died on the 1st of December 659. A mass of legend has gathered round the life of St Eloi, who as the patron saint of goldsmiths is still very popular.

His life was written by his friend and contemporary St Ouen (Audoenus) ; French translations of the Vita S. Eligii auctore Audoeno were published by L. de Montigny (Paris, 1626), by C. Barthelemy in Etudes hist., littt et art. (ib. 1847), and by Parenty, with notes (2nd ed., ib. 1870). For bibliography see Potthast, Bibliotheca hist. med. aevi (Berlin, 1896), s.v. " Vita S. Eligii Noviomensis," and Ulysse Chevalier, Rep. des sources hist., Bio-bibl. (Paris, 1894), s. " Eloi."

ELONGATION, strictly " lengthening "; in astronomy, the apparent angular distance of a heavenly body from its centre of motion, as seen from the earth; designating especially the angular distance of

the planet Mercury or Venus from the sun, or the apparent angle between a satellite and its primary. The greatest elongation of Venus is about 45°; that of Mercury generally ranges between 18° and 27 .

EL PASO, a city, port of entry, and the county-seat of El Paso county, Texas, U.S.A., on the E. bank of the Rio Grande, in the extreme W. part of the state, at an altitude of 3710 ft. Pop. (1880) 736; (1890) 10,338; (1900) 15,906, of whom 6309 were foreign-born and 466 were negroes; (1910 census) 39,279. Many of the inhabitants are of Mexican descent. El Paso is an important railway centre and is served by the following railways: the Atchison, Topeka & Santa Fe, of which it is the S. terminus; the El Paso & South-Western, which connects with the Chicago, Rock Island & El Paso (of the Rock Island system); the Gal- veston, Harrisburg & San Antonio, of which it is the W. terminus; the Mexican Central, of which it is the N. terminus; the Texas & Pacific, of which it is the W. terminus; a branch of the Southern Pacific, of which it is the E. terminus; and the short Rio Grande, Sierra Madre & Pacific, of which it is the N. terminus. The city is regularly laid out on level bottom lands, stretching to the table- lands and slopes to the N.E. and N.W. of the city. Opposite, on the W. bank of the river, is the Mexican town of Ciudad Juarez (until r88j known as Paso del Norte), with which El Paso is con- nected by bridges and by electric railway. The climate is mild, warm and dry, El Paso being well known as a health resort, particularly for sufferers from pulmonary complaints. Among

the city's public buildings are a handsome Federal building, a county court house, a city hall, a Y.M.C.A. building, a public library, a sanatorium for consumptives, and the Hotel Dieu, a hospital maintained by Roman Catholics. El Paso is the seat of St Joseph's Academy and of the El Paso Military Institute. Three miles E. of the city limits is Fort Bliss, a U.S. military post, with a reservation of about 2 sq. m. El Paso's situation on the Mexican frontier gives it a large trade with Mexico; it is the port of entry of the Paso del Norte customs district, one of the larger Mexican border districts, and in 1908 its imports were valued at $2,677,784 and its exports at $5,661,901. Wheat, boots and shoes, mining machinery, cement, lime, lumber, beer, and denatured alcohol are among the varied exports; the principal imports are ore, sugar, cigars, oranges, drawn work and Mexican curios. El Paso has extensive manufactories, especially railway car shops, which in 1905 employed 34-5% of the factory wage-earners. Just outside the city limits are important lead smelting works, to which are brought ores for treatment from western Texas, northern Mexico, New Mexico and Arizona. Among the city's manufactures are cement, denatured alcohol, ether, varnish, clothing

and canned goods. The value of the city's total factory product in 1905 was $2,377,813, 96% greater than that in 1900. El Paso lies in a fertile agricultural valley, and in 1908 the erection of an immense dam was begun near Engle, New Mexico (100 m. above El Paso), by the U.S. govern- ment, to store the flood waters of the Rio Grande for irrigating this area. Before the Mexican War, following which the first United States settlement was made, the site of El Paso was known as Ponce de Leon Ranch, the land being owned by the Ponce de Leon family. El Paso was first chartered as a city in 1873, and in 1907 adopted the commission form of government.

ELPHINSTONE, MOUNTSTUART (1779-1859), Indian states- man and historian, fourth son of the nth Baron Elphinstone in the peerage of Scotland, was born in 1779. Having received an appointment in the civil service of the East India Com- pany, of which one of his uncles was a director, he reached Calcutta in the beginning of 1796. After filling several sub- ordinate posts, he was appointed in 1801 assistant to the British resident at Poona, at the court of the peshwa, the most powerful of the Mahratta princes. Here he obtained his first opportunity of distinction, being attached in the capacity of diplomatist to the mission of Sir Arthur Wellesley to the Mahrattas. When, on the failure of negotiations, war broke out, Elphinstone, though a civilian, acted as virtual aide-de-camp to General Wellesley. He was present at the battle of Assaye, and displayed such courage and knowledge of tactics throughout the whole campaign that Wellesley told him he had mistaken his profession, and that he ought to have been a soldier. In 1804, when the war closed, he was appointed British resident at Nagpur. Here, the times being uneventful and his duties light, he occupied much of his leisure in reading classical and general literature, and acquired those studious habits which clung to him throughout life. In 1808 he was-appointed the first British envoy to the court of Kabul, with the object of securing a friendly alliance with the Afghans; but this proved of little value, because Shah Shuja was driven from the throne by his brother before it could be ratified. The most valuable permanent result of the embassy was the literary fruit it bore several years afterwards in Elphin- stone's great work on Kabul. After spending about a year in Calcutta arranging the report of his mission, Elphinstone was appointed in 181 1 to the important and difficult post of resident at Poona. The difficulty arose from the general complication of Mahratta politics, and especially from the weak and treacherous character of the peshwa, which Elphinstone rightly read from the first. While the mask of friendship was kept up Elphinstone carried out the only suitable policy, that of vigilant quiescence, with

admirable tact and patience; when in 1817 the mask was thrown aside and the peshwa ventured to declare war, the English resident proved for the second time the truth of Wellesley's assertion that he was born a soldier. Though his own account of his share in the campaign is characteristically modest, one can gather from it that the success of the British troops was

chiefly owing to his assuming the command at an important crisis during the battle of Kirkee.

The peshwa being driven from his throne, his territories were annexed to the British dominions, and Elphinstone was nomirated commissioner to administer them. He discharged the responsible task with rare judgment and ability. In 1819 he was appointed lieutenant-governor of Bombay and held this post till 1827, his principal achievement being the compilation of the " Elphinstone code." He may fairly be regarded as the founder of the system of state education in India, and he probably did more than any other Indian administrator to further every likely scheme for the promotion of native education. His con- nexion with the Bombay presidency was appropriately com- memorated in the endowment of the Elphinstone College by the native communities, and in the erection of a marble statue by the European inhabitants.

Returning to England in 1829, after an interval of two years' travel, Elphinstone retained in his retirement and enfeebled health an important influence on public affairs. He twice refused the offer of the governor-generalship of India. Long before his return he had made his reputation as an author by his Account of the Kingdom of Cabul and its Dependencies in Persia and India (1815). Soon after his arrival in England he com- menced the preparation of a work of wider scope, a history of India, which was published in 1841. It embraces the Hindu and Mahommedan periods, and is still a work of high authority. He died on the 20th of November 1859.

See J. S. Cotton, Mountstuart Elphinstone ("Rulers of India" series) , (1892); T. E. Colebrooke, Life of Mountstuart Elphinstone (1884); and G. W. Forrest, Official Writings of Mountstuart F.lphinstone(i88\).

ELPHINSTONE, WILLIAM (1431-1514), Scottish statesman and

prelate, founder of the university of Aberdeen, was born in Glasgow, and educated at the university of his native city, taking the degree of M.A. in 1452. After practising for a short time as a lawyer in the church courts, he was ordained priest, becoming rector of St Michael's church, Trongate, Glasgow, in 1465. Four years later he went to continue his studies at the university of Paris, where he became reader in canon law, and then, proceeding to Orleans, became lecturer in the university there. Before 1474 he had returned to Scotland, and was made rector of the university, and official of the see of Glasgow. Further promotion followed, but soon more important duties were entrusted to Elphinstone, who was made bishop of Ross in 1481. He was a member of the Scots parliament, and was sent by King James III. on diplomatic errands to Louis XL of France, and to Edward IV. of England; in 1483 he was appointed bishop of Aberdeen, although his consecration was delayed for four years; and he was sent on missions to England, both before and after the death of Richard III. in 1485. Although he attended the meetings of parliament with great regularity he did not neglect his episcopal duties, and the fabric of the cathedral of Aberdeen owes much to his care. Early in 1488 the bishop was made lord high chancellor, but on the king's death in the following June he vacated this office, and retired to Aberdeen. As a diplomatist of repute, however, his services were quickly required by the new king, James IV., in whose interests he visited the kings of England and France, and the German king, Maximilian I. Having been made keeper of the privy seal in 1492, and having arranged a dispute between the Scotch and the Dutch, the bishop's concluding years were mainly spent in the foundation of the university of Aberdeen. The papal bull for this purpose was obtained in 1494, and the royal charter which made old Aberdeen the seat of a university is dated 1498. A small endowment was provided by the king, and the university, modelled on that of Paris and intended principally to be a school of law, soon became the most famous and popular of the Scots seats of learning, a result which was largely due to the wide experience and ripe wisdom of Elphinstone and of his friend, Hector Boece, the first rector. The building of the college of the Holy Virgin in Nativity, now King's College, was completed in 1506, and the bishop also rebuilt the choir of his cathedral, and built a bridge over the Dee. Continuing to

participate in public affairs he opposed the policy of hostility towards England which led to the disaster at Flodden in September 1513, and died in Edinburgh on the 25th of October 1 514. Elphinstone was partly responsible for the introduction of printing into Scotland, and for the production of the Breviarium

Aberdonense. He may have written some of the lives in this collection, and gathered together materials concerning the history of Scotland; but he did not, as some have thought, continue the Scotichronicon, nor did he write the Lives of Scottish Saints.

See Hector Boece, Murthlacensium et Aberdonensium episcoporum vitae, edited and translated by J. Moir (Aberdeen, 1894); Fasti Aberdonenses, edited by C. Innes (Aberdeen, 1854) ; and A. Gardyne, Theatre of Scottish Worthies and Lyf of W. Elphinston, edited bv D. Laing (Aberdeen, 1878).

EL RENO, a city and the county-seat of Canadian county, Oklahoma, U.S.A., on the N. fork of the Canadian river, about 26 m. W. of Oklahoma City. Pop. (1890) 285; (1900) 3383; (1907) 5370 (401 were of negro descent and 7 were Indians); (1910) 7872. It is served by the Chicago, Rock Island & Pacific, the Choctaw, Oklahoma & Gulf (owned by the Chicago, Rock Island & Pacific), and the St Louis, El Reno & Western railways, the last extending from El Reno to Guthrie. El Reno lies on the rolling prairie lands, about 1360 ft. above the sea, in an Indian corn, wheat, oats and cotton-producing and dairying region, and has a large grain elevator, a cotton compress, and various manufacturing establishments, among the products being flour, canned goods and crockery. El Reno has a Carnegie library, and within the city's limits is Bellamy's Lake (180 acres), a favourite resort. Near the city is a Government boarding school for the Indians of the Cheyenne and the Arapahoe Reserva- tion. Fort Reno, a U.S. military post, was established near El Reno in 1876, and in 1908 became a supply depot of the quartermaster's department under the name of " Fort Reno Remount Depot." The first settlement here, apart from the fort, was made in the autumn of 1889; in 1892 El Reno received a city charter.

ELSFLETH, a maritime town of Germany, in the grand- duchy of Oldenburg, in a fertile district at the confluence of the Hunte with the Weser, on the railway Hude-Nordenham. Pop. 2000. It has an Evangelical church, a school of navigation, a harbour and docks. It has considerable trade in corn and timber and is one of the centres of the North Sea herring fishery.

ELSINORE (Dan. Helsingor), a seaport of Denmark in the amt (county) of Frederiksborg, on the east coast of the island of Zealand, 28 m. N. of Copenhagen by rail. Pop. (1901) 13.902. It stands at the narrowest part of the Sound, opposite the Swedish town of Helsingborg, 3 m. distant. Communication is maintained by means of a steam ferry. Its harbour admits vessels of 20 ft. draught, and the

roadstead affords excellent anchorage. There are shipbuilding yards, with foundry, engineer- ing shops, &c; the chief export is agricultural produce; imports, iron, coal, cereals and yarn. Helsingor received town-privileges in 1425. In 1522 it was taken and burnt by Ltibeck, but in 1 535 w as retaken by Christian II. It is celebrated as the Elsinore of Shakespeare's tragedy of Hamlet, and was the birthplace of Saxo Grammaticus, from whose history the story of Hamlet is derived. A pile of rocks surrounded by trees is shown as the grave of Hamlet, and Ophelia's brook is also pointed out, but both are, of course, inventions. On a tongue of land east of the town stands the castle of Kronberg or Kronenberg, a magnificent, solid and venerable Gothic structure built by Frederick II. towards the end of the 16th century, and extensively restored by Christian IV. after a fire in 1637. It was taken by the Swedes in 1658, but its possession was again given up to the Danes in 1660. From its turrets, one of which serves as a lighthouse, there are fine views of the straits and of the neighbouring countries. The Flag Battery is the " platform before the castle " where the ghost appears in Hamlet. Within it the principal object of interest is the apartment in which Matilda, queen of Christian VII. and sister of George III. of England, was im- prisoned before she was taken to Hanover. The chapel contains fine wood-carving of the 17th century. North-west of the town

is Marienlyst, originally a royal chateau, but now a seaside resort.

ELSSLER, FANNY (1810-1884), Austrian dancer, was born in Vienna on the 23rd of June 18 10. From her earliest years she was trained ior the ballet, and made her appearance at the Karntner-Thor theatre in Vienna before she was seven. She almost invariably danced with her sister Theresa, who was two years her senior; and, after some years' experience together in Vienna, the two went in 1827 to Naples. Their success there — – to which Fanny contributed more largely than her sister, who used to efface herself in order to heighten the effect of Fanny's more brilliant powers — led to an engagement in Berlin in 1830. This was the beginning of a series of triumphs for Fanny's personal beauty and skill in dancing. After captivating all hearts in Berlin and Vienna, and inspiring the aged statesman Friedrich von Gentz (q.v.) with a remarkable passion, she paid a visit to London, where she received much kindness at the hands of Mr and Mrs Grote, who practically adopted the little girl who was born three months after the mother's arrival in England. In

September 1834 Fanny Elssler appeared at the Opera in Paris, a step to which she looked forward with much misgiving on account of Taglioni's supremacy on that stage. The result, however, was another triumph for her, and the temporary eclipse of Taglioni, who, although the finer artist of the two, could not for the. moment compete with the new- comer's personal fascination. It was conspicuously in her performance of the Spanish cachuca that Fanny Elssler outshone all rivals. In 1840 she sailed with her sister for New York, and after two years' unmixed success they returned to Europe, where during the following five years Fanny appeared in Germany, Austria, France, England and Russia. In 1845, having amassed a fortune, she retired from the stage and settled near Hamburg. A few years later her sister Theresa contracted a morganatic marriage with Prince Adalbert of Prussia, and was ennobled under the title of Baroness von Barnim. Fanny Elssler died at Vienna on the 27th of November 1884. Theresa was left a widow in 1873, and died on the 19th of November 1878.

ELSTER, the name of two rivers of Germany. (1) The Schwarze (Black) Elster rises in the Lausitz range, on the southern border of Saxony, flows N. and N.W., and after a course of 112 m. enters the Elbe a little above Wittenberg. It is a sluggish stream, winding its way through sandy soil and frequently along a divided channel. (2) The Weisse (White) Elster rises in the north-western corner of Bohemia, a little north of Eger, cuts through the Vogtland in a deep and picturesque valley, passing Plauen, Greiz, Gera and Zeitz on its way north to Leipzig, just below which city it receives its most important tributary, the Pleisse. At Leipzig it divides, the main stream turning north-west and entering the Saale from the right a little above Halle; the other arm, the Luppe, flowing parallel to the main stream and south of it enters the Saale below Merseburg. Total length, 12T m.; total descent, 1286 ft.

ELSTER, a spa and inland watering-place of Germany, in the kingdom of Saxony, on the Weisse Elster, close to the Bohemian frontier on the railway Plauen-Eger, and 20 m. S. of the former. It has some industries of lace-making and weaving, and a population of about 2000, in addition to visitors. The mineral springs, saline-chalybeate, specific in cases of nervous disorders and feminine ailments, have been lately supplemented by baths of various kinds, and these, together with the natural attractions of the place as a climatic health resort, have com- bined to make it a fashionable watering-place during the summer season. The number of visitors amounts annually to about

10,000.

See Flechsig, Bad Elster (Leipzig, 1884).

ELSWICK, a ward of the city of Newcastle-upon-Tyne, England, in the western part of the borough, bordering the river Tyne. The name is well known in connexion with the great ordnance and naval works of Sir W. G. Armstrong, Mitchell & Co. Elswick Park, attached to the old mansion of the same name, is now a public recreation ground.

EL TEB, a halting-place in the Anglo-Egyptian Sudan near the coast of the Red Sea, 9 m. S.W. of the port of Trinkitat on the road to Tokar. At El Teb, on the 4th of February 1884, a heterogeneous force under General Valentine Baker, marching to the relief of the Egyptian garrison of Tokar, was completely routed by the Mahdists (see Egypt: Military Operations).

ELTON, CHARLES ISAAC (1830-1900), English lawyer and antiquary, was born at Southampton on the 6th of December 1839. Educated at Cheltenham and Balliol College, Oxford, he was elected a fellow of Queen's College in 1862. He was called to the bar at Lincoln's Inn in 1865. His remarkable knowledge of old real property law and custom helped him to an extensive conveyancing practice and he took silk in 1885. He sat in the House of Commons for West Somerset in 1884-1885 and from 1886 to 1892. In 1869 he succeeded to his uncle's property of Whitestaunton, near Chard, in Somerset. During the later years of his life he retired to a great extent from legal practice, and devoted much of his time to literary work. He died at Whitestaunton on the 23rd of April 1900. Elton's principal works were The Tenures of Kent (1867); Treatise on Commons and Waste Lands (1868); Law of Copyholds (1874); Origins of English History (1882); Custom and Tenant Right (1882).

ELTVILLE (Elfeld), a town of Germany, in the Prussian province of Hesse-Nassau, on the right bank of the Rhine, 5 m. S.W. from Wiesbaden, on the railway Frankfort-on-Main- Cologne, and with a branch to Schlangenbad. Pop. 3700. It has a Roman Catholic and a Protestant church, ruins of a feudal castle, a Latin school, and a monument to Gutenberg. It has a considerable trade in the wines of the district and two manufactories of sparkling wines. Eltville (originally Adeldvile, Lat. Altavilla) is first mentioned in a record of the year 882. It was given by the emperor Otto I. to the archbishops of Mainz, who often resided here. It received town rights in 133 1 and was a place of importance during the middle ages. In 1465 Gutenberg set up his press at Eltville, under the patronage of

Archbishop Adolphus of Nassau, shortly afterwards handing over its use to the brothers Heinrich and Nikolaus Bechtermiinz. Several costly early examples of printed books issued by this press survive^ the earliest being the Vocabularium Latino- Teutonicum, first printed in 1467.

ELTZ, a small river of Germany, a left bank tributary of the Mosel. It rises in the Eifel range, and, after a course of 5 m., joins the latter river at Moselkern. Just above its confluence stands the romantic castle of Eltz, crowning a rocky summit 900 ft. high, and famous as being one of the best preserved medieval strongholds of Germany. It is the ancestral seat of the counts of Eltz and contains numerous antiquities.

See Roth, Geschichte der Herren und Graf en zu Eltz (2 vols., Mainz,

1889-1890).

ELVAS, an episcopal city and frontier fortress of Portugal, in the district of Portalegre and formerly included in the province of Alemtejo; 170 m. E. of Lisbon, and 10 m. W. of the Spanish fortress of Badajoz, by the Madrid-Badajoz-Lisbon railway. Pop. (1900) 13,981. Elvas is finely situated on a hill 5 m. N.W. of the river Guadiana. It is defended by seven bastions and the two forts of Santa Luzia and Nossa Senhora da Graca. Its late Gothic cathedral, which has also many traces of Moorish influence in its architecture, dates from the reign of Emmanuel I. (1495-1521). A fine aqueduct, 4 m. long, supplies the city with pure water; it was begun early in the 15th century and com- pleted in 1622. For some distance it includes four tiers of super- imposed arches, with a total height of 120 ft. The surrounding lowlands are very fertile, and Elvas is celebrated for its excellent olives and plums, the last-named being exported, either fresh or dried, in large quantities. Brandy is distilled and pottery manufactured in the city. The fortress of Campo Maior, 10 m. N.E., is famous for its siege by the French and relief by the British under Marshal Beresford in 181 1 — an exploit com- memorated in a ballad by Sir Walter Scott.

Elvas is the Roman Alpesa or Helvas, the Moorish Balesh, the Spanish Yelves. It was wrested from the Moors by Alphonso VIII. of Castile in 1166; but was temporarily recaptured

before its final occupation by the Portuguese in 1226. In 1570 it became an episcopal see. From 1642 until modern times it was the chief frontier fortress S. of the Tagus; and it twice withstood sieges by the Spanish, in 1658 and 17 11. The French under Marshal Junot took it in March 1808, but evacuated it in August, after the conclusion of the convention of Cintra (see Peninsular War).

ELVEY, SIB GEORGE JOB (1816-1893), English organist and composer, was born at Canterbury on the 27th of March 1816. He was a chorister at Canterbury cathedral under Highmore Skeats, the organist. Subsequently he became a pupil of his elder brother, Stephen, and then studied at the Royal Academy of Music under Cipriani Potter and Dr Crotch. In 1834 he gained the Gresham prize medal for his anthem, " Bow down thine ear," and in 1835 was appointed organist of St George's chapel, Windsor, a post he filled for 47 years, retiring in 1882. He took the degree of Mus. B. at Oxford in 1838, and in 1840 that of Mus.D. Anthems of his were commissioned for the Three Choirs Festivals of 1853 and 1857, and in 1871 he received the honour of knighthood. He died at Windlesham in Surrey on the 9th of December 1893. His works, which are nearly all for the Church, include two oratorios, a great number of anthems and services, and some pieces for the organ. A memoir of him, by his widow, was published in 1894.

ELVIRA, SYNOD OF, an ecclesiastical synod held in Spain, the date of which cannot be determined with exactness. The solution of the question hinges upon the interpretation of the canons, that is, upon whether they are to be taken as reflecting a recent, or as pointing to an imminent, persecution. Thus some argue for a date between 300 and 303, i.e. before the Diocletian persecution; others for a date between 303 and 314, after the persecution, but before the synod of Aries; still others for a date between the synod of Aries and the council of Nicaea, 325. Mansi, Hardouin, Hefele and Dale are in substantial agreement upon 305 or 306, and this is probably the closest approximation possible in the present state of the evidence. The place of meeting, Elvira, was not far from the modern Granada, if not, as Dale thinks, actually identical with it. There the nineteen bishops and twenty-four presbyters, from alLparts of Spain, but chiefly from the south, assembled, probably at the instigation of Hosius of Cordova, but under the presidency of Felix of Accis, with a view to restoring order and discipline in the church. The eighty-one canons which were adopted reflect with considerable fulness the internal life and external relations of the Spanish Church of the 4th century. The social environment of Christians may be inferred from the canons prohibiting marriage and other intercourse with Jews,

pagans and heretics, closing the offices of flamen and duumvir to Christians, forbidding all contact with idolatry and likewise participation in pagan festivals and public games. The state of morals is mirrored in the canons denouncing prevalent vices. The canons respecting the clergy exhibit the clergy as already a special class with peculiar privileges, a more exacting moral standard, heavier penalties for delinquency. The bishop has acquired control of the sacraments, presbyters and deacons acting only under his orders; the episcopate appears as a unit, bishops being bound to respect one another's disciplinary decrees. Worthy of special note are canon ss, enjoining celibacy upon all clerics and all who minister at the altar (the most ancient canon of celibacy); canon 36, forbidding pictures in churches; canon 38, permitting lay baptism under certain conditions; and canon S3, forbidding one bishop to restore a person excommunicated by another.

See Mansi ii. pp. 1-406; Hardouin i. pp. 247-258; Hefele (2nd ed.) i. pp. 148 sqq. (English translation, i. pp. 131 sqq.); Dale, The Synod of Elvira (London, 1882); and Hennecke, in Herzog- Hauck, Realencyklopadie (3rd ed.), s.v. " Elvira," especially biblio- graphy. (T. F. C.)

EL WAD, a town in the Algerian Sahara, 125 m. in a straight line S.S.E. of Biskra, and 190 m. W. by S. of Gabes. Pop. (1906) 7586. El Wad is one of the most interesting places in Algeria. It is surrounded by huge hollows containing noble palm groves; and beyond these on every side stretches the limitless desert

with its great billows of sand, the encroachments of which on the oasis are only held at bay by ceaseless toil. The town itself consists of a mass of one-storeyed stone houses, each surmounted by a little dome, clustering round the market-place with its mosque and minaret. By an exception rare in Saharan settle- ments, there are no defensive works save the fort containing the government offices, which the French have built on the south side of the town. The inhabitants are of two distinct tribes, one, the Aduan, of Berber stock, the other a branch of the Sha'ambah Arabs. El Wad possesses a curious currency known as flous, consisting of obsolete copper coins of Algerian and Tunisian dynasties. Seven flous are regarded as equal to the French five-centime piece.

El Wad oasis is one of a group known collectively as the Suf. Five miles N.W- is Kuinine (pop. 3541) and 6 m. farther N.W. Guemar (pop. 6885), an ancient fortified town noted for its manufacture of carpets. Linen weaving is carried on extensively in the Suf.

Administratively El Wad is the capital of an annexe to the territory of Tuggurt.

ELWOOD, a city of Madison county, Indiana, U.S.A., on Duck Creek, about 38 m. N.E. of Indianapolis. Pop. (1880) 751; (1890) 2284; (1900) 12,950 (1386 foreign-born); (1910) 11,028. Elwood is served by the Lake Erie & Western and the Pittsburg, Cincinnati, Chicago & St Louis railways, and by an interurban electric line. Its rapid growth in population and as a manufacturing centre was due largely to its situation in the natural gas region; the failure of the gas supply in 1903 caused a decrease in manufacturing, but the city gradually adjusted itself to new conditions. It has large tin plate mills, iron and steel foundries, saw and planing mills, wooden-ware and furniture factories, bottling works and lamp-chimney factories, flour mills and packing houses. In 1905 the value of the city's factory product was $6,111,083; in 1900 it was $9,433,513; the glass product was valued at $223,766 in 1905, and at $1,011,803 in 1900. There are extensive brick-yards in the vicinity, and the surrounding agricultural country furnishes large supplies of grain, live-stock, poultry and produce, for which Elwood is the shipping centre. The site was first settled under the name oi Quincy; the present name was adopted in 1869; and in 1891 Elwood received a city charter.

ELY, RICHARD THEODORE (1854-), American econ- omist, was born at Ripley, New York, on the 13th of April 1854. Educated at Columbia and Heidelberg universities, he held the professorship of economics at Johns Hopkins University from 1881 to 1892, and was subsequently professor of economics at Wisconsin University. Professor Ely took an active part in the formation of the American Economic Association, was secretary from 1885 to 1892 and president from 1899 to 1901. He published a useful Introduction to Political Economy (1889); Outlines of Economics (1893); The Labour Movement in America (1883); Problems of To-day (1888); Social Aspects of Christian- ity (1889); Socialism and Social Reform (1894); Monopolies and Trusts (1900), and Studies in the Evolution of Industrial Society (1903).

ELY, a cathedral city and market-town, in the Newmarket parliamentary division of Cambridgeshire, England, 16 m. N.N.E. of Cambridge by the Great Eastern railway. Pop. of urban district (1901) 7713. It stands on a considerable eminence on the west (left) bank of the Ouse, in the Isle of Ely, which rises above the surrounding fens. Thus its situation, before the great drainage operations of the 17 th century, was practically insular. The

magnificent cathedral, towering above the town, is a landmark far over the wide surrounding level. The soil in the vicinity is fertile and market-gardening is carried on, fruit and vegetables (especially asparagus) being sent to the London markets. The town has a considerable manufacture of tobacco pipes and earthenware, and there are in the neighbour- hood mills for the preparation of oil from flax, hemp and cole- seed. Besides the cathedral Ely has in St Mary's church, lying almost under the shadow of the greater building, a fine structure ranging in style from Norman to Perpendicular, but in the main Early English. The sessions house and corn exchange are the

principal public buildings. The grammar school, founded by Henry VIII. in 1541, occupies (together with other buildings) the room over the gateway of the monastery, known as the Porta, and the chapel built by Prior John de Cranden (1321-1341) is restored to use as a school chapel. A theological college was founded in 1876 and opened in 1881.

The foundation of the present cathedral was laid by its first Norman abbot, Simeon, in 1083. But the reputation of Ely had been established long before Etheldreda (ˆEthelthryth), daughter of Anna, king of East Anglia, was married to Ecgfrith, king of Northumbria, against her will, as she had vowed herself wholly to a religious life. Her husband opposed himself to her vow, but with the help of Wilfrid, archbishop of York, she took the veil, and found refuge from her husband in the marsh-girt Isle of Ely. Here she founded a religious house, in all probability a mixed community, in 673, becoming its first abbess, and giving the whole Isle of Ely to the foundation. In 870 the monastery was destroyed by the Danes, as were also the neighbouring foundations at Soham, Thorney, Crowland and Peterborough, and it remained in ruins till 970, when ˆEthelwold, bishop of Winchester, founded a new Benedictine monastery here. King Edgar in 970 endowed the monks with the former possessions of the convent and also granted them the secular causes of two hundreds within and of five hundreds without the marshes, all charges belonging to the king in secular disputes in all their lands and every fourth penny of public revenue in the province of Grantecestre. The wealth and importance of Ely rose, and its abbots held the post of chancellors of the king's court alternately with the abbots of Glastonbury and of St Augustine's, Canter- bury. But Ely again became a scene of contest in the desperate final

struggle against William the Conqueror of which Hereward " the Wake " was the hero. Finally, in 107 1, the monks agreed to surrender the Isle of Ely to the king on condition of the confirmation of all the possessions and privileges, held by them in the time of Edward the Confessor. Abbot Simeon (1081- 1094), who now began the reconstruction of the church, was related to William and brother to Walkelin, first Norman bishop of Winchester. Under Abbot Richard (1100-1107) the transla- tion from the Saxon church of the bodies of St Etheldreda and of the two abbesses who had followed her, and their enshrine- ment in the new edifice, took place; and it was due to the honour in which the memory of the foundresses was held that Ely maintained the position of dignity which it kept henceforth until the dissolution of the monasteries. The feast of St Ethel- dreda, or St Awdrey as she was generally called, was the occasion every year for a large fair here, at which " trifling objects " were sold to pilgrims by way of souvenirs; whence the word " tawdrey," a contraction of St Awdrey. In 1109 the Isle of Ely, most of Cambridgeshire, and the abbeys of Thorney and Cetricht were separated from the diocese of Lincoln, and con- verted into a new diocese, Ely being the seat of the bishopric, and after the dissolution of the monasteries Henry VIII. con- verted the conventual church into a cathedral (1541). The diocese is extensive. It covers nearly the whole of Cambridge- shire, Huntingdonshire and Bedfordshire, part of Suffolk, and small portions of Essex, Norfolk, Northamptonshire, Hertford- shire and Buckinghamshire.

The cathedral is a cruciform structure, 537 ft. long and 190 ft. across the great transepts (exterior measurements). A relic of the Saxon foundation is preserved in the cross of St Osyth (c. 670), and a pre-Norman window is kept in the triforium, having been dug up near the cathedral. Of the work of the first two Norman abbots all that remains is the early Norman lower storey of the main transept. The foundations of Abbot Simeon's apse were discovered below the present choir. The nave, which is Norman throughout, is 208 ft. in length, 72 ft. 9 in. to the top of the walls, and 77 ft. 3 in. broad, including the aisles. The upper parts of the western tower and the transept were begun by Bishop Geoffrey Ridel (d. 1189), and continued by his suc- cessor William Longchamp, chancellor of England. The tower, which is 215 ft. high, is surmounted by a Decorated octagon with partly detached side turrets, and underwent alteration and

strengthening in the Perpendicular period. The north-western transept wing is in ruins; it is not known when it fell. The Galilee, or western porch, by which the cathedral is entered, is the work of

Bishop Eustace (d. 1215), and is a perfect example of Early English style. In 1322 the Norman central tower, erected by Abbot Simeon, fell. Alan of Walsingham, sacrist of the church, designed its restoration in the form of the present octagon, a beautiful and unique conception. Instead of the ordinary four-arched central crossing, an octagon is formed at the crossing, the arches of the nave aisles and choir aisles being set obliquely. Both without and within, the octagon is the principal feature in the unusual general appearance of the cathedral, which gives it a peculiar eminence among English churches. The octagon was completed in 1328, and upon the ribbed vaulting of wood above it rose the lofty lantern, octagonal also, with its angles set opposite those of the octagon below. The total height of the structure is 170 ft. 7 in. Alan of Walsingham was further employed by Bishop John of Hotham (d. 1337) as architect of the Lady chapel, a beautiful example of Decorated work, which served from 1566 onward as a parish church. Of the seven bays of the choir the four easternmost, as well as the two beyond forming the retrochoir, were built by Bishop Hugh of Northwold (d. 1254). The three western bays were destroyed by the fall of the tower in 132 1, and were rebuilt by Alan of Walsingham. The earlier portion is a superb example of Early English work, while the later is perhaps the best example of pure Decorated in England. The wooden canopies of the choir stalls are Decorated (i337) an d very elaborate. The Perpendicular style is repre- sented by windows and certain other details, including supporting arches to the western tower. There are also some splendid chantry chapels and tombs in this style — the chapels of Bishop John Alcock (d. 1500) and Bishop Nicolas West (d. 1534), in the north and south choir aisles respectively, are completely covered with the most delicate ornamentation; while the tomb of Bishop Richard Redman (d. 1 505) has a remarkably beautiful canopy. Among earlier monuments the canopied tomb of Bishop William de Luda (1290-1298) and the finely-carved effigy of Bishop Northwold (1254) are notable. Between 1845 and 1884 the cathedral underwent restoration under the direction of Sir Gilbert Scott. The work included the erection of the modern reredos and choir-screen, both designed by Scott, and the painting of the nave roof by Styleman le Strange (d. 1862), who was suc- ceeded by Gambier Parry. Parry also richly ornamented the octagon and lantern in the style of the 14th century.

Remains of the monastic buildings are fragmentary but numerous. Mention has been made of the Ely " Porta " or gateway (1396), which is occupied by the grammar school, and of Prior John de Cranden's beautiful little Decorated chapel. But many of the

remains, the bulk of which are incorporated in the deanery and canons' and other residences to the south of the cathedral, are of much earlier date. Thus the fine early Norman undercroft of the prior's hall is probably of the time of Abbot Simeon. Another notable fragment is the transitional Norman chancel of the infirmary chapel. The remnants of the cloisters show a reconstruction in the 15th century, but the prior's and monks' doorways from the cloisters into the cathedral are highly decorated late Norman. The bishop's palace to the west of the cathedral has towers erected by Bishop Alcock at the close of the 15th century. In the muniment room of the chapter is preserved, among many ancient documents of great interest, the liber Eliensis, a history of the monastery by the monk known as Thomas of Ely (d. c. n 74), of which the first part, which extends to the year 960, contains a life of St Etheldreda, while the second is continued to the year 1107.

Ely, which according to Bede (Hist. eccl. iv. 19) derives its name from the quantity of eels in the waters about it (A.S. ml, eel,-zg, island), was a borough by prescription at least as early as the reign of William the Conqueror. It owed its importance entirely to the monastery, and for a long time the abbot and afterwards the bishop had almost absolute power in the town. The bailiff who governed the town was chosen by the bishop until 1850, when a local board was appointed. Richard I.

granted the bishop of Ely a fair there, and in 1319-1320 John of Hotham, a later bishop, received licence to hold a fair on the vigil and day of Ascension and for twenty days following. The markets are claimed by -an undated charter by the bishop, who also continues to hold the fairs. In 1295 Ely sent two members to parliament, but has never been represented since.

See C. W. Stubbs, Ely Cathedral (London, 1897); Victoria County History, Cambridgeshire.

ELYOT, SIR THOMAS (c. 1490-1546), English diplomatist and scholar. His father, Sir Richard Elyot (d. 1522), who held considerable estates in Wiltshire, was made (1503) serjeant-at-law and attorney-general to the queen consort, and soon afterwards was commissioned to act as justice of assize on the western circuit, becoming in 1513 judge of common pleas. Thomas was the son of his first marriage with Alice Fynderne, but neither the date nor place of his birth is accurately known. Anthony a. Wood claimed him as an

alumnus of St Mary Hall, Oxford, while C. H. Cooper in the Athenae Cantabrigienses put in a claim for Jesus College, Cambridge. Elyot himself says in the preface to his Dictionary that he was educated under the paternal roof, and was from the age of twelve his own tutor. He supplies, in the introduction to his Castell of Helth, a list of the authors he had read in philosophy and medicine, adding that a " worshipful physician " read to him Galen and some other authors. In 1511 he accompanied his father on the western circuit as clerk to the assize, and he held this position until 1528. In addition to his father's lands in Wiltshire and Oxfordshire he inherited in 1523 the Cambridge estates of his cousin, Thomas Fynderne. His title was disputed, but Wolsey decided in his favour, and also made him clerk of the privy council. Elyot, in a letter addressed to Thomas Cromwell, says that he never received the emoluments of this office, while the barren honour of knighthood conferred on him when he was displaced in 1 530 merely put him to further expense. In that year he sat on the commission appointed to inquire into the Cambridgeshire estates of his former patron, Cardinal Wolsey. He married Margaret Barrow, who is described (Stapleton, Vita Thomae Mori, p. 59, ed. 1558) as a student in the " school " of Sir Thomas More.

In 1 53 1 he produced the Boke named the Governour, dedicated to King Henry VIII. The work advanced him in the king's favour, and in the close of the year he received instructions to proceed to the court of the emperor Charles V. to induce him to take a more favourable view of Henry's projected divorce from Catherine of Aragon. With this was combined another com- mission, on which one of the king's agents, Stephen Vaughan, was already engaged. He was, if possible, to apprehend William Tyndale. It is probable that Elyot was suspected, as Vaughan certainly was, of lukewarmness in carrying out the king's wishes, but this has not prevented his being much abused by Protestant writers. As ambassador Elyot had been involved in ruinous expense, and on his return he wrote to Thomas Cromwell, begging to be excused from serving as sheriff of Cambridgeshire and Huntingdonshire, on the score of his poverty. The request was not granted. He was one of the commissioners in the inquiry instituted by Cromwell prior to the suppression of the monasteries, but he did not obtain any share of the spoils. There is little doubt that his known friendship for Thomas More militated against his chances of success, for in a letter addressed to Crom- well he admitted his friendship for More, but protested that he rated higher his duty to the king. William Roper, in his Life of More, says that Elyot was on a second embassy to Charles V., in the winter of 153 5-1 536, when he received at

Naples the news of More's execution. He had been kept in the dark by his own government, but heard the news from the emperor. The story of an earlier embassy to Rome (1532), mentioned by Burnet, rests on a late endorsement of instructions dated from that year, which cannot be regarded as authoritative. In 1542 he repre- sented the borough of Cambridge in parliament. He had pur- chased from Cromwell the manor of Carleton in Cambridgeshire, where he died on the 26th of March 1546.

Sir Thomas Ehyot received little reward for his services to the state, but his scholarship and his books were held in high esteem

by his contemporaries. The Boke named the Governour was printed by Thomas Berthelet (1531, 1534, 1536, 1544. &c). It is a treatise on moral philosophy, intended to direct the education of those destined to fill high positions, and to inculcate those moral principles which alone could fit them for the perform- ance of their duties. The subject was a favourite one in the 1 6th century, and the book, which contained many citations from classical authors, was very popular. Elyot expressly acknowledges his obligations to Erasmus's Instiluiio Principis Christiani; but he makes no reference to the De regno et regis institutione of Francesco Patrizzi (d. 1494), bishop of Gaeta, on which his work was undoubtedly modelled. As a prose writer, Elyot enriched the English language with many new words. In 1 S34 he published The Castell of Helth, a popular treatise on medicine, intended to place a scientific knowledge of the art within the reach of those unacquainted with Greek. This work, though scoffed at by the faculty, was appreciated by the general public, and speedily went through many editions. His Latin Dictionary, the earliest comprehensive dictionary of the language, was completed in 1538. The copy of the first edition in the British Museum contains an autograph letter from Elyot to Thomas Cromwell, to whom it originally belonged. It was edited and enlarged in 1548 by Thomas Cooper, bishop of Winchester, who called it Bibliotheca Eliotae, and it formed the basis in 1565 of Cooper's Thesaurus linguae Romanae et Britannicac.

Elyot's translations include: — The Doctrinal of Princes (1534), from Isocrates; Cyprianus, A Swete and Devoute Sermon of Holy Saynt Ciprian of the Mortalitie of Man (1534) ; Rules of a Christian Life (1534), from Pico della Mirandola; The Education or Bringing up of Children (c. 1535), from Plutarch; and Howe one may take Profile of his Enymes (1535), from the same author is generally

attributed to him. He also wrote : The Knowledge which maketh a Wise Man and Pasquyll the Playne (1533) ; The Bankelte of Sapience ■ (x 534)i a collection of moral sayings; Preservative agaynste Deth (1545), which contains many quotations from the Fathers; Defence of Good Women (1545). His Image of Governance, compiled of the Actes and Sentences notable of the most noble Emperor Alexander Severus (1540) professed to be a translation from a Greek MS. of the emperor's secretary Encolpius (or Eucolpius, as Elyot calls him), which had been lent him by a gentleman of Naples, called Pudericus, who asked to have it back before the translation was complete. In these circumstances Elyot, as he asserts in his preface, supplied the other maxims from different sources. He was violently assailed by Humphrey Hody and later by William Wotton for putting forward a pseudo-translation; but Mr H. H. S. Croft has discovered that there was a Neapolitan gentleman at tha-time bearing the name cf Poderico, or, Latinized, Pudericus, with whom Elyot may well have been acquainted. Roger Ascham mentions his De rebus memorabilibus Angliae; and Webbe quotes a few lines of a lost translation of the Ars poetica of Horace.*

A learned edition of the Governour (2 vols., 1880), by H. H. S. Croft, contains, besides copious notes, a valuable glossary of 16th century English words.

ELYRIA, a city and the county-seat of Lorain county, Ohio, U.S.A., on the Black river, 8 m. from Lake Erie, and about 25 m. W.S.W. of Cleveland. Pop. (1890) 5611; (1900) 8791, of whom 1397 were foreign-born; (1910 census) 14,825. It is served by the Baltimore & Ohio, and the Lake Shore & Michigan Southern railways. Elyria is about 720 ft. above sea-level, and lies at the junction of the two forks of the Black river, each of which falls about 50 ft. here, furnishing water-power. Among the city's manufactures are oxide of tin and other chemicals, iron and steel, leather goods, automobiles and bicycles, electrical and telephone supplies, butted tubing, gas engines, screws and bolts, silk, lace and hosiery. In 1905 the city's factory products were valued at $2,933,450 — 140-2% more than their value in 1900. Flagging, building-stones and grindstones, taken from quarries in the vicinity (known as the Berea Grit quarries), are shipped from Elyria in large quantities. Elyria was founded about 1819 by Heman Ely, in whose honour it was named; it was selected as the site for the county seat in 1823, and was chartered as a city in 1892.

ELYSIUM, in Greek mythology, the Elysian fields, the abode of the righteous after their removal from earth. In Homer (Od. iv. 563) this

region is a plain at the farthest end of the earth on the banks of the river Oceanus, where the fair-haired

Rhadamanthys rules, and where the people are vexed by neither snow nor storm, heat nor cold, the air being always tempered by the zephyr wafted from the ocean. It is no dwelling of the dead nor part of the lower world, but distinguished heroes are translated thither without dying, to live a life of perfect happiness. In Hesiod (W. and D. 166) the same description is given of the Islands of the Blessed under the rule of Cronus, which yield three harvests yearly. Here, according to Pindar, Rhadamanthys sits by the side of his father Cronus and ad- ministers judgment (01. ii. 61, Frag. 95). All who have suc- cessfully gone through a triple probation on earth are admitted to share these blessings. In later accounts (Aeneid, vi. 541) Elysium was regarded as part of the underworld, the home of the righteous dead adjudged worthy of it by the tribunal of Minos, Rhadamanthys and Aeacus. Those who had lived evil lives were thrust down into Tartarus, where they suffered endless torments.

ELZE, KARL (1821-1889), German scholar and Shakespearian critic, was born at Dessau on the 22nd of May 1821. Having studied (1 839-1 843) classical philology, and modern, but especially English, literature at the university of Leipzig, he was a master for a time in the Gymnasium (classical school) at Dessau, and in 1S75 was appointed extraordinary, and in 1876 ordinary, professor of English philology at the university of Halle, in which city he died on the 2 1st of January 1889. Elze began his literary career with the Englischer Liederschatz (1851), an anthology of English lyrics, edited for a while a critical periodical Atlantis, and in 1857 published an edition of Shakespeare's Hamlet with critical notes. He also edited Chapman's Alphonsus (1867) and wrote biographies of Walter Scott, Byron and Shakespeare; Abhandlungenzu Shakespeare (English translation by D. Schmitz, as Essays on Shakespeare, London, 1874), and the excellent treatise, Notes on Elizabethan Dramatists with conjectural emenda- tions 0} the text (3 vols., Halle, 1880-1886, new ed. 1889).

ELZEVIR, the name of a celebrated family of Dutch printers belonging to the 17th century. The original name of the family was Elsevier, or Elzevier, and their French editions mostly retain this name; but in their Latin editions, which are the more numerous, the

name is spelt Elzeverius, which was gradually corrupted in English into Elzevir as a generic term for their ! books. The family originally came from Lou vain, and there Louis, who first made the name Elzevir famous, was born in 1540. He learned the business of a bookbinder, and having been compelled in 1580, on account of his Protestantism and his adherence to the cause of the insurgent provinces, to leave his native country, he established himself as bookbinder and book- seller in Leiden. His Eutropius, which appeared in 1592, was long regarded as the earliest Elzevir, but the first is now known to be Drusii Ebraicarum quaestionum ac responsionum libri duo, which was produced in 1583. In all he published about 150 works. He died on the 4th of February 161 7. Of his five sons, Matthieu, Louis, Gilles, Joost and Bonaventure, who all adopted their father's profession, Bonaventure, who was born in 1583, is the most celebrated. He began business as a printer in 1608, and in 1626 took into partnership Abraham, a son of Matthieu, born at Leiden in 1592. Abraham died on the 14th of August 1652, and Bonaventure about a month afterwards. The fame of the Elzevir editions rests chiefly on the works issued by this firm. Their Greek and Hebrew impressions are considered inferior to those of the Aldi and the Estiennes, but their small editions in nmo, i6mo and 24mo, for elegance of design, neat- ness, clearness and regularity of type, and beauty of paper, cannot be surpassed. Especially may be mentioned the two editions of the New Testament in Greek ('H nawr) hia.6i)ia), Novum Testamentum, &c), published in 1624 and 1633, of which the latter is the more beautiful and the more sought after; the Psalterium Davidis, 1653; Virgilii opera, 1636; Terentii co mediae, 1635; but the works which gave their press its chief celebrity are their collection of French authors on history and politics in 24mo, known under the name of the Pelites Republiques , and their series of Latin, French and Italian classics in small nmo. Jean, son of Abraham, born in 1622, had since

1647 been in partnership with his father and uncle, and when they died Daniel, son of Bonaventure, born in 1626, joined him.- Their partnership did not last more than two years, and after its dissolution Jean carried on the business alone till his death in 1661. In 1654 Daniel joined his cousin Louis (the third of that name and son of the second Louis), who was born in 1604, and had established a printing press at Amsterdam in 1638. From 1655 to 1666 they published a series of Latin classics in 8vo, cum nolis variorum; Cicero in 4to; the Etymologicon linguae Lalinae; and a magnificent Corpus juris civilis in folio, 2 vols., 1663. Louis died in 1670, and Daniel in 1680. Besides Bonaventure, another son of Matthieu,

Isaac, born in 1593, established a printing press at Leiden, where he carried on business from 1616 to 1625; but none of his editions attained much fame. The last representatives of the Elzevir printers were Peter, grandson of Joost, who from 1667 to 1675 was a bookseller at Utrecht, and printed seven or eight volumes of little consequence; and Abraham, son of the first Abraham, who from 1681 to 17 12 was university printer at Leiden.

Some of the Elzevir editions bear no other typographical mark than simply the words A pud Elzeverios, or Ex officina Elseveriana, under the rubrique of the town. But the majority bear one of their special devices, four of which are recognized as in common use. Louis Elzevir, the founder of the family, usually adopted the arms of the United Provinces, an eagle on a cippus holding in its claws a sheaf of seven arrows, with the motto Concordia res parvae crescunt. About 1620 the Leiden Elzevirs adopted a new device, known as " the solitary," and consisting of an elm tree, a fruitful vine and a man alone, with a motto Non solus. They also used another device, a palm tree with the motto, Assurgo pressa. The Elzevirs of Amsterdam used for their principal device a figure of Minerva with owl, shield and olive tree, and the motto, Ne extra oleas. The earliest productions of the Elzevir press are marked with an angel bearing a book and a scythe, and various other devices occur at different times. When the Elzevirs did not wish to put their name to their works they generally marked them with a sphere, but of course the mere fact that a work printed in the 17th century bears this mark is no proof that it is theirs. The total number of works of all kinds which came from the presses of the Elzevirs is given by Willems as 1608; there were also many forgeries.

See " Notice de la collection d'auteurs latins, francais, et italiens, imprimee de format petit en 12, par les Elsevier," in Brunet's Manuel du libraire (Paris, 1820); A. de Reume, Recherches historiques, genealogiques, et bibliographiques sur les Elsevier (Brussels, 1847); Paul Dupont, Histoire de Vimprimerie, in two vols. (Paris, 1854); Pieters, Annates de Vimprimerie Elsevirienne (2nd ed., Ghent, 18,58) ; Walther, Les Els everiennes de la bibliotheque imperiale de St-Peters- bourg (St Petersburg, 1864); Alphonse Willems, Les Elzevie) (Brussels, 1880), with a history of the Elzevir family and thei? printing establishments, a chronological list and detailed description of all words printed by them, their various typographical marks, and a plate illustrating the types used by them; Kelchner, Catalogus librorum officinae Elsevirianae (Paris, 1880); Frick, Die Elzevir schen Republiken (Halle, 1892); Berghman, Etudes mr la bibliographic Elzevirienne (Stockholm, 1885), and Nouvelles etudes,

&c. (ib.

1897).

EMANATION (Lat. emanatio, from e-, out, manare, to flow), in philosophy and theology, the name of one of the three chief theories of existence, i.e. of the relation between God and men — the One and the Many, the Universal and the Particular. This theory has been propounded in many forms, but the central idea is that the universe of individuals consists of the involuntary " outpourings " of the ultimate divine essence. That essence is not only all-inclusive, but absolutely perfect, while the " emanated " individuals degenerate in proportion to the degree of their distance from the essence. The existence of evil in opposition to the perfect goodness of God, as thus explained, need not be attributed to God's agency, inasmuch as the whole emanation-process is governed by necessary — as it were mechanical — laws, which may be compared to those of the physical universe. The doctrine of emanation is thus to be distinguished from the cosmogonic theory of Judaism and Christianity, which explains human existence as due to a single creative act of a moral agent. The God of Judaism and

Christianity is essentially a person in close personal relation to his creatures; emanation is the denial of personality both for God and for man. The emanation theory is to be contrasted, on the other hand, with the theory of evolution. The two theories are alike in so far as both recognize the existence of individuals as due to a necessary process of differentiation and a scale of existence. They differ, however, fundamentally in this respect, that, whereas evolution regards the process as from the inde- terminate lower towards the determinate higher, emanation regards it as from the highest to the indefinitely lower.

There is considerable superficial similarity between evolution and emanation, especially in their formal statements. The pro- cess of evolution from the indeterminate to the determinate is often expressed as a progress from the universal to the particular. Thus the primordial matter assumed bf the early Greek physicists may be said to be the universal substance out of which particular things arise. The doctrine of emanation also regards the world as a process of particularization. Yet the resemblance is more apparent than real.

The universal is, as Herbert Spencer remarked, a subjective idea, and the general forms, existing ante res, which play so prominent a part in Greek and medieval philosophy, do not in the least correspond to the homogeneous matter of the physical evolutionists. The one process is a logical operation, the other a physical. The theory of emanation, which had its source in certain moral and religious ideas, aims first of all at explaining the origin of mental or spiritual existence as an effluence from the divine and absolute spirit. In the next place, it seeks to account for the general laws of the world, for the 'universal forms of existence, as ideas which emanate from the Deity. By some it was developed into a complete philosophy of the world, in which matter itself is viewed as the lowest emanation from the absolute. In this form it stands in sharp antithesis to the doctrine of evolution, both because the former views the world of particular things and events as essentially unreal and illusory, and because the latter, so far as it goes, looks on matter as eternal, and seeks to explain the general forms of things as we perceive them by help of simpler assumptions. In certain theories known as doctrines of emanation, only mental existence is referred to the absolute source, while matter is viewed as eternal and distinct from the divine nature. In this form the doctrine of emanation approaches certain forms of the evolution theory (see Evolution).

The doctrine of emanation is correctly described as of oriental origin. It appears in various forms in Indian philosophy, and is the characteristically oriental element in syncretic systems like Neoplatonism and Gnosticism. None the less it is easy to find it in embryo in the speculations of the essentially European philosophers of Greece. Plato, whose philosophy was strongly opposed to the evolution theory, distinctly inclines to the emana- tion idea in his doctrine that each particular thing is what it is in virtue of a pre-existent idea, and that the particulars are the lowest in the scale of existence, at the head of, or above, which is the idea of the good. The view of Xenocrates is based on the same ideas. Or again, we may compare the Stoic doctrine of a.Toppoia.1 (literally " emanations ") from the divine essence. It is, however, only in the last eclectic period of Greek philosophy that the emanation doctrine was definitely established in the doctrines, e.g. Plotinus.

See especially articles Evolution, Neoplatonism, Gnosticism.

EMANUEL I. [Portuguese Manoel] (1469-1521), fourteenth king of Portugal, surnamed the Happy, knight of the Garter and of the Golden Fleece, was the son of Duke Ferdinand of Vizeu and of Beatrice of Beja, grandchildren of John I. of Portugal. He was born

at Alcochete on the 3rd of May 1469, or, according to Barbosa Machado, on the 1st of June. His early education was directed by a Sicilian named Cataldo. In 1495 he became king in succession to his cousin John II. In 1497 he married Isabella, daughter of Ferdinand and Isabella of Castile, who had previously been married to Alphonso, the heir of John II. She died in the next year in giving birth to a son named Miguel, who until his death two years later was considered heir to the entire Iberian Peninsula. Emanuel's next wife was Maria,

another daughter of Ferdinand and Isabella, whom he married in 1 500. Two of their children, John and Henry, later became kings of Portugal. Maria died in 1516, and in 1518 her niece Leonora, a sister of the emperor Charles V., became Emanuel's third wife. Emanuel's reign is noteworthy for the continuance of the Portu- guese discoveries and the extension of their chain of trading-posts, Vasco da Gama's opening an all-sea route to India, Cabral's landing in Brazil, Corte-ReaFs voyage to Labrador, the explora- tion of the Indian seas and the opening of commercial relations with Persia and China, bringing Portugal international promin- ence, colonial pre-eminence and a hitherto unparalleled degree of national prosperity. His intense religious zeal variously manifested itself in his persecutions of the Jews, whom at the beginning of his reign he had been disposed to tolerate, his strenuous endeavours to promote an international crusade against the Turks, his eager missionary enterprise throughout his new possessions, and his erection of twenty-six monasteries and two cathedrals, including the stately monastic church of the Jeronymos at Belem (see Lisbon). His jealously despotic character was accentuated by the enormous increase the Indies furnished to his personal wealth, and exemplified in his assump- tion of new titles and in a magnificent embassy to Pope Leo X. He died at Lisbon on the 13th of December 1521.

The best authorities for the history of Emanuel's reign are the contemporary 16th-century Chronica a" el Rei D. Manoel, by Damiao de Goes, and De rebus Emanuelis, by J. Osorio. El Rei D. Manoel, by M. B. Branco (Lisbon, 1888), is a valuable but ill-arranged bio- graphy. See also the OrdenacBes do S. R. D. Manoel (Coimbra University Press, 1797). For further bibliography see Barbosa Machado, Bibliographica Lusitana, vol. iii. pp. 161-166.

EMBALMING (Gr. ˆoK

Herodotus (ii. 86) gives an account of three of the methods of embalming followed by the Egyptians. The most expensive of these,

which cost a talent of silver (£243: 15s.), was as follows. The brains were in part removed through the nostrils by means of a bent iron implement, and in part by the injection of drugs. The intestines having been drawn out through an incision in the left side, the abdomen was cleansed with palm-wine, and filled with myrrh, cassia and other materials, and the opening was sewed up. This done, the body was steeped seventy days

in a solution of litron or natron. 1 Diodorus (i. 91) relates that the cutter (irapacrxicrrris) appointed to make the incision in the flank for the removal of the intestines, as soon as he had performed his office, was pursued with stones and curses by those about him, it being held by the Egyptians a destestable thing to commit any violence or inflict a wound on the body. After the steeping, the body was washed, and handed over to the swathers, a peculiar class of the lowest order of priests, called by Plutarch cholchytae, by whom it was bandaged in gummed cloth; it was then ready for the coffin. Mummies thus prepared were con sidered to represent Osiris. In another method of embalming, costing twenty-two minae (about £90), the abdomen was injected with "cedar-tree pitch" (icedpla), which, as it would seem from Pliny (Nat. Hist. xvi. 21), was the liquid distillate of the pitch- pine. This is stated by Herodotus to have had a corrosive and solvent action on the viscera. After injection the body was steeped a certain number of days in natron; the contents of the abdomen were allowed to escape; and the process was then complete. The preparation of the bodies of the poorest consisted simply in placing them in natron for seventy days, after a previous rinsing of the abdomen with " syrmaea." The material principally used in the costlier modes of embalming appears to have been asphalt; wax was more rarely employed. In some cases embalming seems to have been effected by im- mersing the body in a bath of molten bitumen. Tanning also was resorted to. Occasionally the viscera, after treatment, were in part or wholly replaced in the body, together with wax figures of the four genii of Amenti. More commonly they were embalmed in a mixture of sand and asphalt, and buried in vases, or canopi, placed near the mummy, the abdomen being filled with chips and sawdust of cedar and a small quantity of natron. In one jar were placed the stomach and large intestine; in another, the small intestines; in a third, the lungs and heart; in a fourth, the gall-bladder and liver. Porphyry {De abstinentia, iv. 10) mentions a custom of enclosing the intestines in a

box and consigning them to the Nile, after a prayer uttered by one of the embalmers, but his statement is regarded by Sir J. G. Wilkinson as unworthy of belief. The body of Nero's wife Poppaea, contrary to the usage of the Romans, was not burnt, but as customary among other nations with the bodies of poten- tates, was honoured with embalmment (see Tacitus, Ann. xvi. 6). The body of Alexander the Great is said to have been embalmed with honey (Statius, Silv. iii. 2. 117), and the same material was used to preserve the corpse of Agesipolis I. during its con- veyance to Sparta for burial. Herodotus states (iii. 24) that the Ethiopians, in embalming, dried the body, rubbed it with gypsum (or chalk), and, having painted it, placed it in a block of some transparent substance. The Guanches, the aborigines of the Canaries, employed a mode of embalming similar to that of the Egyptians, filling the hollow caused by the removal of the viscera with salt and an absorbent vegetable powder (see Bory de Saint Vincent, Essais sur les lies Fortunees, 1803, p. 495). Embalming was still in vogue among the Egyptians in the time of St Augustine, who says that they termed mummies gabbarae (Serm. 120, cap. 12).

In modern times numerous methods of embalming have been practised. Dr Frederick Ruysch of Amsterdam (1665-1717) is said to have utilized alcohol for this purpose. By William Hunter essential oils, alcohol, cinnabar, camphor, saltpetre and pitch or rosin were employed, and the final desiccation of the body was effected by means of roasted gypsum placed in its coffin. J. P. Boudet (1778-1849) embalmed with tan, salt, asphalt and Peruvian bark, camphor, cinnamon and other aromatics and corrosive sublimate. The last-mentioned drug, chloride and sulphate of zinc, acetate and sulphate of alumina, and creasote and carbolic acid have all been recommended by various modern embalmers.

See Mummy;' Louis Penicher, Traite des embaumements (Paris, 1669); S. Blancard. Anatomia reformata, et de balsamatione nova methodus (Lugd. Bat., 1695); Thomas Greenhill, The Art of Em-

1 Neutral carbonate of sodium, Na_2CO_3, found at the natron lakes in the Libyan desert, and at El Hegs, in Upper Egypt.

balming (London, 1705); J. N. Marjolin, Manuel d'anatomie (Paris 1810); Pettigrew, History of Mummies (London, 1834); Gannal Traite d' embaumements (Paris, 1838; 2nd ed., 1841); Magnus Das Einbalsamiren der Leichen (Brunsw., 1839); Sucquet, Em baumement (Paris, 1872); Lessley, Embalming (Toledo, Ohio, 1884) Myers, Textbook of Embalming (Springfield, Ohio, 1900) ; Rawlinson, Herodotus, vol. ii. p. 141 ; G. Elliot Smith, A

Contribution to the Study of Mummification in Egypt (Cairo, 1906).

EMBANKMENT, in engineering, a mound of earth or stone, usually narrow in comparison with its length, artificially raised above the prevailing level of the ground. Embankments serve for two main classes of purpose. On the one hand, they are used to preserve the level of railways, canals and roads, in cases where a valley or piece of low-lying ground has to be crossed. On the other, they are employed to stop or limit the flow of water, either constituting the retaining wells of reservoirs constructed in connexion with water-supply schemes, or protecting low-lying tracts of land from river floods or the encroachments of the sea. The word embankment has thus come to be used for the mass of material, faced and supported by a stone wall and protected by a parapet, placed along the banks of a river where it passes through a city, whether to guard against floods or to gain additional space. Such is the Thames Embankment in London, which carries a broad roadway, while under it runs the Under- ground railway. In this sense an embankment is distinguished from a quay, though the mechanical construction may be the same, the latter word being confined to places where ships are loaded and unloaded, thus differing from the French quai, which is used both of embankments and quays, e.g. the Quais along the Seine at Paris.

EMBARGO (a Spanish word meaning " stoppage "), in international law, the detention by a state of vessels within its ports as a measure of public, as distinguished from private, utility. In practice it serves as a mode of coercing a weaker state. In the middle ages war, being regarded as a complete rupture between belligerent states, operated as a suspension of all respect for the person and property of private citizens; an article of Magna Carta (1215) provided that " . . . if there shall be found any such merchants in our land in the beginning of a war, they shall be attached, without damage to their bodies or goods, until it may be known unto us, or our Chief Justiciary, how our merchants are treated who happen to be in the country which is at war with us; and if ours be safe there, theirs shall be safe in our lands" (art. 48).

Embargoes in anticipation of war have long since fallen into disuse, and it is now customary on the outbreak of war for the belligerents even to grant a respite to the enemy's trading vessels to leave their ports at the outbreak of war, so that neither ship nor cargo is any longer exposed to embargo. This has been confirmed in one of the Hague Conventions of 1907 (convention relative to the status of enemy merchant ships at the outbreak of hostilities, Oct. 18, 1907), which provides that " when a merchant ship belonging to one of the

belligerent powers is at the commencement of hostilities in an enemy port, it is desirable that it should be allowed to depart freely, either immediately, or after a reasonable number of days of grace, and to proceed, after being furnished with a pass, direct to its port of destination, or any other port indicated " (art. 1). The next article of the same convention limits the option apparently granted by the use of the word." desirable," providing that " a merchant ship unable, owing to circumstances of force majeure, to leave the enemy port within the period contemplated (in the previous article), or which was not allowed to leave, cannot be confiscated. The belligerent may only detain it, without compensation, but subject to the obligation of restoring it after the war, or requisi- tion it on payment of compensation " (art. 2). (T. Ba.)

EMBASSY, the office of an ambassador, or, more generally, the mission on which an ambassador of one power is sent to another, or the body of official personages attached to such a mission, whether temporary or permanent. Hence " embassy " is often quite loosely used of any mission, diplomatic or other- wise. The word is also used of the official residence of an ambassador. "Embassy" was originally "ambassy," the form

used in the 17th century, but by the time of Johnson considered quite obsolete. " Ambassy " is from the O. Fr. ambassie, derived through such forms as the Port, ambassada, Ital. am- basciata from a lost Med. Lat. ambactiata, ambactiare, to go on a mission. (See further Ambassador, Exterritoriality and Diplomacy.)

EMBER DAYS and EMBER WEEKS, the four seasons set apart by the Western Church for special prayer and fasting, and the ordination of clergy, known in the medieval Church as quatuor tempora, or jejunia quatuor temporum. The Ember weeks are the complete weeks next following Holy Cross day (September 14), St Lucy's day (December 13), the first Sunday in Lent and Whitsun day. The Wednesdays, Fridays and Saturdays of these weeks are the Ember days distinctively, the following Sundays being the days of ordination. These dates are given in the following memorial distich with a frank in- difference to quantity and metre —

" Vult Crux, Lucia, Cinis, Charismata_dia Quod det vota pia quarta sequens feria."

The word has been derived from the A.S. ymb-ren, a circuit or revolution (from ymb, around, and rennen, to run) ; or by process of agglutination and phonetic decay, exemplified by the Ger. quatember, Dutch quatertemper and Dan. kvatember, from the Lat. quatuor tempora. The occurrence of the Anglo-Saxon com- pounds ymbren-tid, ymbren-wucan, ymbren-fastan, ymbren-dagas for Ember tide, weeks, fasts, days, favours the former derivation, which is also confirmed by the use of the word imbren in the acts of the council of ˆEnham, a.d. 1009 (" jejunia quatuor tempora quae imbren vocant "). It corresponds also with Pope Leo the Great's definition, " jejunia ecclesiastica per totius anni circulum distributa."

The observance of the Ember days is confined to the Western Church,

and had its origin as an ecclesiastical ordinance in Rome. They were probably at first merely the fasts preparatory to the three great festivals of Christmas, Easter and Pentecost. A fourth was subsequently added, for the sake of symmetry, to make them correspond with the four seasons, and they became known as the jejunium vernum, aestivum, autumnale and hiemale, so that, to quote Pope Leo's words, " the law of abstinence might apply to every season of the year." An earlier mention of these fasts, as four in number — the first known — is in the writings of Philastrius, bishop of Brescia, in the middle of the 4th century. He also connects them with the great Christian festivals {De haeres. 119). In Leo's time, a.d. 440-461, Wednesday, Friday and Saturday were already the days of special observance. From Rome the Ember days gradually spread through the whole of Western Christendom. Uniformity of practice, however, was of somewhat slow growth. Neither in Gaul nor Spain do they seem to have been generally recognized much before the 8th century. Their introduction into Britain appears to have been earlier, dating from Augustine, a.d. 597, acting under the authority of Gregory the Great. The general period of the four fasts being roughly fixed, the precise date appears to have varied considerably, and in some cases to have lost its connexion with the festivals altogether. The Ordo Romanus fixes the spring fast in the first week of March (then the first month) ; the summer fast in the second week of June ; the autumnal fast in the third week of September; and the winter fast in the complete week next before Christmas eve. Other regulations prevailed in different countries, until the incon- veniences arising from the want of uniformity led to the rule now observed being laid down under Pope Urban II. as the law of the church, in the councils of Piacenza and Clermont, a.d. 1095.

The present rule which fixes the ordination of clergy in the Ember weeks cannot be traced farther back than the time of Pope Gelasius, a.d. 492-496. In the early ages of the church ordinations took place at any season of the year whenever necessity required. Gelasius is stated by ritual writers to have been the first who limited them to these particular times, the special solemnity of the season being in all probability the cause of the sf lection. The rule once introduced commended itself to the mind of the church, and its observance spread. We find

it laid down in the pontificate of Archbishop Ecgbert of York, a.d. 732-766, and referred to as a canonical rule in a capitulary of Charlemagne, and it was finally established as a law of the church in the pontificate of Gregory VII., c. 1085.

Authorities. — Muratori, Dissert, de jejun. quat. temp., c. vii., anecdot. torn. ii. p. 262; Bingham, Antiq. of the Christ. Church, bk. iv. ch. vi. § 6, bk. xxi. ch. ii. §§ 1-7; Binterin, Denkwurdigkeiten, vol. v. part 2, pp. 133 ff.; Augusti, Handbuch der christlich. Archdol. vol. i. p. 465, hi. p. 486. (E. V.)

EMBEZZLEMENT (A.Fr. embesilement, from beseler or besillier, to destroy), in English law, a peculiar form of theft, which is distinguished from the ordinary crime in two points: — (1) It is committed by a person who is in the position of clerk or servant to the owner of the property stolen; and (2) the property when stolen is in the possession of such clerk or servant. The definition of embezzlement as a special form of theft arose out of the difficulties caused by the legal doctrine that to con stitute larceny the property must be taken out of the possession of the owner. Servants and others were thus able to steal with impunity goods entrusted to them by their masters. A statute of Henry VIII. (1529) was passed to meet this case; and it enacted that it should be felony in servants to convert to their own use caskets, jewels, money, goods or chattels delivered to them by their masters. " This act," says Sir J. F. Stephen {General View of the Criminal Law of England), "assisted by certain subtleties according to which the possession of the servant was taken under particular circumstances to be the possession of the master, so that the servant by converting the goods to his ; own use took them out of his own possession qua servant (which was his master's possession) and put them into his own possession qua thief (which was a felony), was considered sufficient for practical purposes for more than 200 years." In 1799 a clerk who had converted to his own use a cheque paid across the counter to him by a customer of his master was held to be not guilty of felony; and in the same year an act was passed, which, meeting the difficulty in such cases, enacted that if any clerk or servant, or any person employed as clerk or servant, should, by virtue of such employment, receive or take into his possession any money, bonds, bills, &c, for .or in the name or on account of his employers, and should fraudulently embezzle the same, every such offender should be deemed to have stolen the same. The same definition is substantially repeated in a Consolidation Act passed in 1827. Numberless difficulties of interpretation arose under these acts, e.g. as to the meaning of " clerk or servant," as to the difference between theft and embezzlement, &c.

The law now in force, or the Larceny Act 1861, defines the offence thus (section 68) :— " Whosoever, being a clerk or servant, or being employed for the purpose or in the capacity of a clerk or servant, shall fraudulently embezzle any chattel, money or valuable security

which shall be delivered to or received or taken into possession by him for or in the name or on the account of his master or employer, or any part thereof, shall be deemed to have feloniously stolen the same from his master or employer, although such chattel, money or security was not received into the possession of such master or employer otherwise than by the actual possession of his clerk, servant or other person so employed, and being convicted thereof shall be liable, at the discretion of the court, to be kept in penal servitude for any time not exceeding fourteen years, and not less than three years," or imprisonment with or without hard labour for not more than two years. To constitute the offence thus described three things must concur: — (1) The offender must be a clerk or servant; (2) he must receive into his possession some chattel on behalf of his master; and (3) he must fraudulently embezzle the same. A clerk or servant has been defined to be a person bound either by an express contract of service or by conduct implying such a contract to obey the orders and submit to the control of his master in the transaction of the business which it is his duty as such clerk or servant to transact. (Stephen's Digest of the Criminal Law, Art. 309.)

The Larceny Act 1901, amending sections 75 and 76 of the Larceny Act 1861, also describes similar offences on the part of

persons, not being clerks or servants, to which the name embezzlement is not uncommonly applied. The act makes the offence of fraudulently misappropriating property entrusted to a person by another, or received by him on behalf of another a mis- demeanour punishable by penal servitude for a term not exceeding seven years, or to imprisonment, with or without hard labour, for a term not exceeding two years. So also trustees fraudulently disposing of trust property, and directors of com- panies fraudulently appropriating the company's property or keeping fraudulent accounts, or wilfully destroying books or publishing fraudulent statements, are misdemeanants punish- able in the same way.

In the United States the law of embezzlement is founded mainly on the English statute passed in 1799, but the statutes of most states are so framed that larceny includes embezzlement. The latter is sometimes denominated statutory larceny. The punishment varies in the different states, otherwise there is little substantive difference in the laws of the two countries.

Statutes have been passed in some states providing that one indicted for larceny may be convicted of embezzlement. But it is doubtful whether such statutes are valid where the constitution of the state provides that the accused must be informed of the nature and cause of the accusation against him. (See also Larceny.)

EMBLEM (Gr. ifiˆXrjua, something put in or inserted, from infiaWew, to throw in), a word originally applied in Greek and Latin (emblema) to a raised or inlaid ornament on vases and other vessels, &c, and also to mosaic or tessellated work. It is in English confined to a symbolical representation of some object, particularly when used as a badge or heraldic device.

EMBLEMENTS (from O. Fr. emblavence de bled, i.e. corn sprung up above ground), a term applied in English law to the corn and other crops of the earth which are produced annually, not spontaneously, but by labour and industry. Emblements belong therefore to the class of fructus industriales, or " industrial growing crops " (Sale of Goods Act 1893, § 62). They include not only corn and grain of all kinds, but everything of an artificial and annual profit that is produced by labour and manuring, e.g. hemp, flax, hops, potatoes, artificial grasses like clover, but not fruit growing on trees, which come under the general rule quicquid plantatur solo, solo cedit. Emblements are included within the definition of goods in s. 62 of the Sale of Goods Act 1893. Where an estate of uncertain duration terminates un-expectedly by the death of the tenant, or some other event due to no fault of his own, the law gives to the personal representative the profits of crops of this nature as compensation for the tilling, manuring and sowing of the land. If the estate, although of uncertain duration, is determined by the tenant's own acts, the right to emblements does not arise. The right to emble- ments has become of no importance in England since 1851, when it was provided by the Landlord and Tenant Act 185 1 (s. 1) that any tenant at rack-rent, whose lease was determined by the death or cesser of the estate, of a landlord entitled only for his life, or for any other uncertain interest, shall, instead of emblements, be entitled to hold the lands until the expiration of the current year of his tenancy. The right to emblements still exists, however, in favour of (a) a tenant not within the Landlord and Tenant Act 1851, whose estate determines by an event which could not be foreseen, (b) the executor, as against the heir of the owner in fee of land in his own occupation, (c) an execution creditor under a writ directing seizure of goods and chattels. A person entitled to emblements may enter upon the lands after the determination of the tenancy for the purpose of cutting and carrying away the crops. Emblements are liable to distress by the

landlord for arrears of rent, or rent during the period of holding on under the act of 1851 (the Distress for Rent Act 1737; see Bullen on Distress, 4th ed., 1893).

The term " emblements " is unknown in Scots law, but the heir or representative of a life-rent tenant, a liferenter of lands, has an analogous right to reap the crop (on paying a proportion of the rent) and a right to recompense for labour in tilling the ground. The Landlord and Tenant Act 1851 (s. 1) was in force

in Ireland till i860, when it was replaced by the Land Act i860, which gave to the tenant an almost identical right to emblements (s. 34)-

In the United States the English common law of emblements has been generally preserved. In North Carolina there has been legislation on the lines of the English Landlord and Tenant Act 185 1. In some states the tenant is entitled to compensation also from the person succeeding to the possession.

Under the French Code Civil, the outgoing tenant is entitled to convenient housing for the consumption of his fodder and for the harvests remaining to be got in (art. 1777). The same rule is in force in Belgium (Code Civil, art. 1777) ; and in Holland (Civil Code, art. 1635) and Spain (art. 1578). Similar rights are secured to the tenant under the German Civil Code (arts. 592 et seq.). French law is in force in Mauritius. The common law of England and the Landlord and Tenant Act 1851 (14 & 15 Vict., c. 25, s. 1) are in force in many of the British colonies acquired by settlement In other colonies they have been recognized by statute (e.g. Victoria, Landlord and Tenant Act 1890, No. 1108, ss. 45-48: Tasmania, Landlord and Tenant Act 1874, 38 Vict. No. 12).

*AuTHORlTiES.-*English Law: Fawcett on the Law of Landlord and Tenant (3rd ed., London, 1905) ; Foa, Landlord and Tenant (4th ed., London, 1907). Scots Law: Bell's Principles (10th ed., Edinburgh, 1899). Irish Law: Noland and Kanes, Statutes relating to the Law of Landlord and Tenant in Ireland (10th ed.), by Kelly (Dublin, 1898). American Law: Stimson, American Statute Law (Boston, 1886) ; Bouvier, Law Dictionary, ed. by Rawle (Boston and London, 1897); Ruling Cases (London and Boston, 1894-1901), tit. " Emblements " (American Notes). (A. W. R.)*

EMBOSSING, the art of producing raised portions or patterns on the surface of metal, leather, textile fabrics, cardboard, paper and

similar substances. Strictly speaking, the term is applicable only to raised impressions produced by means of engraved dies or plates brought forcibly to bear on the material to be embossed, by various means, according to the nature of the substance acted on. Thus raised patterns produced by carving, chiselling, casting and chasing or hammering are excluded from the range of embossed work. Embossing supplies a convenient and ex- peditious medium for producing elegant ornamental effects in many distinct industries; and especially in its relations to paper and cardboard its applications are varied and important. Crests, monograms, addresses, &c, are embossed on paper and envelopes from dies set in small handscrew presses, a force or ceunter-die being prepared in leather faced with a coating of gutta-percha. The dies to be used for plain embossing are generally cut deeper than those intended to be used with colours. Colour embossing is done in two ways — the first and ordinary kind that in which the ink is applied to the raised portion of the design. The colour in this case is spread on the die with a brush and the whole surface is carefully cleaned, leaving only ink in the depressed parts of the engraving. In the second variety — called cameo embossing — the colour is applied to the flat parts of the design by means of a small printing roller, and the letters or design in relief is left uncoloured. In embossing large ornamsntal designs, engraved plates or electrotypes therefrom are employed, the force or counterpart being composed of mill-board faced with gutta-percha. In working these, powerful screw-presses, in principle like coining or medal-striking presses, are employed. Embossing is also most extensively practised for ornamental purposes in the art of bookbinding. The blocked ornaments on cloth covers for books, and the blocking or imitation tooling on the cheaper kinds of leather work, are effected by means of powerful embossing or arming presses. (See Book-binding.) For impressing embossed patterns on wall-papers, textiles of various kinds, and felt, cylinders of copper, engraved with the patterns to be raised, are employed, and these are mounted in calender frames, in which they press against rollers having a yielding surface, or so constructed that depressions in the engraved cylinders fit into corresponding elevations in those against which they press. The operations of embossing and colour printing are also sometimes effected together in a modifica- tion of the ordinary cylinder printing machine used in calico- printing, in which it is only necessary to introduce suitably engraved cylinders. For many purposes the embossing rollers must be maintained at a high temperature while in operation; and they are heated either by steam, by gas jets, or by the

EMBROIDERY

Plate I.

BROIDERY, WITH A REPRESENTATION OF COURTLY FIGURES IN A LANDSCAPE

ivork of the end of the reign of Queen Elizabeth. Scale: 1th.

NORMAN CONQUEST OF ENGLAND. In the museum at

Bayeux, nth century work. Scale: Jth.

K> UF Itib

Plate II.

EMBROIDERY

Fig. 8.— HANGING OF WOOLLEN CLOTH, EMBROIDERED WITH THE FIVE WISE AND THE FIVE FOOLISH VIRGINS,

German work, dated 1598. Scale: -j\jth.

Fig. 9.— PORTION OF THE ORPHREY OF THE "SYON COPE," EMBROIDERED WITH SHIELDS OF ARMS.

The cope, formerly in the monastery- of Syon near Islcworth, is now in the Victoria and Albert Museum. English work of the 13th century. Scale: ˆths.

Fig. 10.— PORTION OF A BAND OF LOOSE LINEN, EMBROIDERED IN WHITE THREAD WITH FIGURES AND ANIMALS

German work of the later part of the 14th century. Scale; =ths.

introduction of red-hot irons within them. The stamped or struck ornaments in sheet metal, used especially in connexion with the brass and Britannia-metal trades, are obtained by a process of embossing — hard steel dies with forces or counterparts of soft metal being used in their production. A kind of embossed ornament is formed on the surface of soft wood by first compress- ing and consequently sinking the parts intended to be embossed, then planing

the whole surface level, after which, when the wood is placed in water, the previously depressed por- tion swells up and rises to its original level. Thus an embossed pattern is produced which may be subse- quently sharpened and finished by the ordinary process of carving (see Chasing and Repousse).

EMBRACERY (from the 0. Fr. embraseour, an embracer, i.e. one who excites or instigates, literally one who sets on fire, from embraser, to kindle a fire; " embrace," i.e. to hold or clasp in the arms, is from O. Fr. em- bracer, Lat. 'in and bracchia, arms), in law, the attempting to influence a juryman corruptly to give his verdict in favour of one side or the other in a trial, by promise, persuasions, en- treaties, money, entertainments and the like. It is an offence both at common law and by statute, and punishable by fine and imprison- ment. As a statutory offence it dates back to 1360. The offence is complete, whether any verdict has been given or not, and whether the verdict is in

accordance with the weight of evidence or otherwise. The person making the attempt, and any juryman who consents, are equally punishable. The false verdict of a jury, whether occasioned by embracery or otherwise, was formerly considered criminal, and jurors were severely punished, being proceeded against by writ of attaint (q.v.). The Juries Act of 1825, in abolishing writs of attaint, made a special exemption as regards jurors guilty of embracery (§ 61). Prosecution for the offence has been so extremely rare that when a case occurred in 1891 (R. v. Baker, 113, Cent, Crim. Ct. Sess. Pap. 374) it was stated that no pre- cedent could be found for the indictment. The defendant was fined £200, afterwards reduced to £100.

EMBRASURE, in architecture, the opening in a battlement between the two raised solid portions or merlons, sometimes called a crenelle (see Battlement, Crenelle); also the splay of a window.

EMBROIDERY (M.E. embrouderie, from O. Fr. embroder, Mod. Fr. broder), the ornamentation of textile fabrics and other materials with needlework. The beginnings of the art of em- broidery probably date back to a very primitive stage in the history of all peoples, since plain stitching must have been one of the earliest attainments of mankind, and from that it is but a short step to decorative needlework of some kind. The discovery of needles among the relics of Swiss lake-dwellings shows that their primitive inhabitants were at least acquainted with the art of stitching.

In concerning ourselves solely with those periods of which ex- amples survive, we must pass over a wide gap and begin with the anciently-civilized land of Egypt. The sandy soil and dry climate of that country have led to the preservation of woven stuffs and embroideries of unique historic interest. The principal, and by far the earliest, known pieces which have a bearing on the present subject, found in 1903 in the tomb of Tethmosis (Thoutm6sis, or Thothmes) IV. at Thebes, are now in the Cairo Museum. There are three fragments, entirely of linen, inwrought with patterns in blue, red, green and black (fig. 1) . A kind of tapestry

method is used, the patterns being wrought upon the warp threads of the ground, instead of upon the finished web or woven material. Such a process, generally supplemented, as in this case, by a few stitches of fine needlework, was still in common use at a far later time. The largest of the three fragments at Cairo bears, in addition to rows of lotus flowers and papyrus

Fig. i.— Fragment of a linen robe, found in the tomb of Tethmosis (Thothmes) IV. at Thebes, and now in the Cairo Museum. The cartouche has the name of Amenophis (Amenhotep) II. (c. 15th century B.C.).

inflorescences, a cartouche containing the name of Amenophis (Amenhotep) II. (c. 15th century B.C.); another is inwrought with the name of Tethmosis III. (c. 16th century B.C.). 1

No other embroidered stuffs which can be assigned to so early a date have hitherto come to light in the Nile valley (nor indeed elsewhere) , and the student who wishes to gain a fuller knowledge of the textile patterns of the ancient Egyptians must be referred to the wall-paintings and sculptured reliefs which haVe been preserved in considerable numbers.

From the ancient civilizations of Babylon and Assyria no frag- ments of embroidery, nor even of woven stuffs, have come down to us. The fine series of wall-reliefs from Nineveh in the British Museum give some idea of the geometrical and floral patterns and diapers which adorned the robes of the ancient Assyrians. The discovery of the ruins of the palace of Darius I. (521- 485 B.C.) at Susa in 1885 has thrown some light upon the textile art of the ancient Persians. They evidently owed much to the nations whom they had supplanted. The famous relief from this palace (now in the Louvre) represents a procession of archers, wearing long robes covered with small diaper patterns, perhaps of embroidery.

The exact significance of the words used in the book of Exodus in describing the robes of Aaron (ch. xxviii.) and the hangings and ornaments of the Tabernacle (ch. xxvi.) cannot be deter- mined, and the " broidered work " of the prophecy of Ezekiel (ch. xxvii.) at a later time is also of uncertain meaning. It seems likely that much of this ancient work was of the tapestry class, such as we have found in the early fragments from Thebes.

The methods of the ancient Greek embroiderer, or "varie- gator " (ieouu\rip) to whom woven garments were submitted

1 See H. Carter and P. E. Newberry, Cat. gen. des ant. egypt. du musee du Caire (1904), pi. i. and xxviii. A remarkable piece of Egyptian needlework, the funeral tent of Queen Isi em Kheb (XXIst Dynasty), was discovered at Deir el Bahri some years ago. It is described as a mosaic of leatherwork — pieces of gazelle hide of several colours, stitched together (see Villiers Stuart, The Funeral Tent of an Egyptian Queen, 1882).

for enrichment, can only be conjectured. The peplos or woven cloth made every fifth year to cover or shade the statue of Athena in the Parthenon at Athens, and carried at the Pan- athenaic festival, 1 was ornamented with the battles of the gods and giants. The late Dr J. H. Middleton thought that very possibly most of the elaborate work upon these peploi was done by the needle. That true embroidery, in the modern sense — the decoration by means of the needle of a finished woven material — was practised among the ancient Greeks, has been demonstrated by the finding of some textile fragments in graves in the Crimea; these are now in the Hermitage at St Petersburg. One of them, of purple woollen material, from a tomb assigned to the 4th century B.C., is embroidered in wools of different colours with a man on horseback, honeysuckle ornament and tendrils. Another woollen piece, attributed to the following century, has a stem and arrow-head leaves worked in gold thread. 2

In turning to ancient Rome, it is well first briefly to notice Pliny's account of the craft {Nat. Hist, viii.), as recording the views current in Rome at his time (ist century a.d.). After relating that Homer mentions embroidered garments (pictas vestes), he states that the Phrygians first used the needle for embroidered robes, which were thence called Phrygionian (Phrygioniae), and that Attalic garments

were named from Attalus II., king of Pergamum (159-138 B.C.), the inventor of the art of embroidering in gold. He further relates that Babylon gave the name to embroideries of divers colours, for the produc- tion of which that city was famous. By the Romans the art was designated as " painting with the needle " (acu pingere), a term used by Virgil in speaking of the decoration of robes, by Ovid (who describes it as an art taught by Minerva), and by Roman writers generally when referring to embroidery. 3 It is to be regretted that no examples have- been discovered in the neighbourhood of the Roman capital. For embroideries made under Roman influence we must again look ,to Egypt. They formed the decoration of garments 4 and mummy-wrappings from the cemeteries in Upper and Middle Egypt, which have been so extensively rifled of late years. Those of Roman type date approximately from the first five centuries of the Christian era. The earliest represent human figures, animals, birds, geometrical and interlacing ornaments, vases, fruit, flowers and foliage (especially the vine). They are generally done in purple wool and undyed linen thread by the tapestry process employed in Egypt at least fifteen centuries earlier, as we have seen; most of the patterns have had the lines more clearly marked out by the ordinary method of needlework. Towards the end of this period a greater choice of colours is seen, and Christian symbols appear. At this time examples worked entirely upon the finished web are found (fig. 2). The transition is easy from such work to the veritable " needle-paintings," representing scenes from the gospels, produced in Egypt shortly after (fig. 3). Such embroideries are evidently akin to those mentioned by Bishop Asterius (330-410), who describes the garments worn by effeminate Christians as painted like the walls of their houses. 5

From the time of Justinian (527-565) onwards for some centuries, the art of Europe, embroidery with the rest, was dominated by that of the Byzantine empire. To trace the pro- gress of the highly conventionalized Byzantine style, becoming more rigid and stereotyped as time passes, belongs to the general history of art, and such a task cannot be attempted here. Perhaps the most remarkable example of all which have survived

1 The procession at this festival is represented upon the frieze of the Parthenon.

2 See Compte rendu de la Comm. Imp. Arch., 1878-1879 (St Petersburg), pi. iii. and v.

8 For an account of the conditions under which Greek and Roman

embroiderers worked, see Alan S. Cole, " Some Aspects of Ancient and Modern Embroidery," Journal of the Society of Arts, vol. Hii., 1905, pp. 958, 959.

4 Chiefly tunics with vertical bands (clavi) and medallions (orbiculae), and an ample outer robe or cloak.

5 The Adoration of the Magi is represented upon the lower border of the long robe worn by the empress Theodora (wife of Justinian) in the mosaic in the church of S. Vitale at Ravenna.

to illustrate the work of the Byzantine embroiderers is the blue silk robe known as the dalmatic of Charlemagne or of Leo III., in the sacristy of St Peter's at Rome (fig. 4). According

Fig. 2. — Embroidered panel from a linen garment, with a jewelled cross and two birds within a wreath. Found in a cemetery at Akhmlm, Upper Egypt. Egypto-Roman work of the 4th or 5th century a.d.

to the present consensus of opinion it belongs to a later time than either of those dignitaries, dating most probably from the 1 2th century. 6 In front is represented Christ enthroned as Judge of the world, a youthful but majestic figure; on the back is the Transfiguration. These, as well as the minor sub- jects, are explained by Greek inscriptions. The wide influence of Byzantine art gradually died out after the Latin sack of

Fig. 3. — Embroidered panel from a linen garment, with a representation of the Annunciation and the Salutation. Found in a cemetery in Egypt. Coptic work of the 6th or 7th century a.d.

Constantinople in the year 1204, although the style lingered, and lingers still, in certain localities, notably at Mount Athos. Palermo in Sicily succeeded Byzantium as the capital of the 6 Writers have assigned different dates to this vestment : Lady Alford, Needlework as Art (earlier than the 13th century); F. Bock, Die Kleinodien (12th century) ; S. Boisseree, Vber die Kaiser-Dalmatica in der St Peter skirche zu Rom (12th or first half of 13th century); A. S. Cole, Cantor Lectures at Society of Arts, iqo$ (possibly of 9th century) ; Lord Lindsay, Christian Art (12th or early 13th century); A. Venturi, Storia dell' arte (10th or nth century); T. Braun, Liturg. Gewandung, p. 305 and note (late 14th or early 15th century).

arts in Europe,- although its ascendancy was of brief duration. Under the Norman kings of Sicily the style was strongly oriental, consequent upon the earlier occupation of the island by the Saracens, and upon the employment of Saracenic craftsmen by the Normans. The magnificent red silk mantle at Vienna, embroidered in gold thread with a date-palm and two lions springing upon camels, and enriched with pearls and enamel plaques, bears round the edge an Arabic inscription, recording that it was made in the royal factory of the capital of Sicily (Palermo) in the year 528 (= a.d. 1134). At that time Roger, the first Norman king, was on the throne. Another of the imperial coronation-robes — a linen alb with gold embroidery — is also at Vienna. 1 An inscription in Latin and Arabic states that it was made in the year 1181, under the reign of William II. (Norman king of Sicily, 1166-1189).

From about that time distinct national styles began to develop in different places. In tracing the progress of the embroiderer's art during the middle ages we must rely mainly upon the many

Fig. 4. — Embroidered robe known as the " Dalmatic of Charlemagne," or of Leo III., preserved in the sacristy of St Peter's at Rome. Byzantine work, probably of the 12th century.

fine examples of ecclesiastical work which have been preserved. The costumes of men and women, as well as curtains and hangings and such articles of domestic use, were often richly adorned with embroidery. These have mostly perished; while the careful preservation and comparatively infrequent use of the vestments and other objects devoted to the service of the church have given us tangible evidence of the attainments of the medieval embroiderer. Much of this work was produced in convents, but old documents show that in monasteries also were to be found men known for their skill in needlework. Other names, both of men and women, are recorded, showing that the craft was by no means exclusively confined to monastic foundation-. Gilds of embroiderers existed far back in medieval times.

In England the craft has been a favourite employment for many centuries, and persons of all ranks have occupied their spare hours at needlework. Some embroidered fragments, found in 1826-1827 in the tomb of St Cuthbert at Durham, and now kept in the cathedral library, were worked, chiefly in gold thread, by order of ˆElfflaeda, queen of Edward the Elder, for Fridestan, bishop of Winchester,

early in the 10th century. 1 Both are illustrated in F. Bock, Die Kleinodien.

In the later part of the following century the " Bayeux tapestry " was produced — a work of unique importance (Plate I. fig. 7). It is a band of linen; more than 230 ft. long, embroidered in coloured wools with the story of the Norman conquest of England. (See Bayeux Tapestry.)

Some fragments of metallic embroidery on silk, of the 12th and 13th centuries, may be seen in the library of Worcester cathedral. They were removed from the coffins of two bishops, William de Blois (1218-1236) and Walter de Cantelupe (1236- 1266). A fragment of gold embroidery from the tomb of the latter bishop is preserved in the Victoria and Albert Museum at South Kensington, and others are in the British Museum. In the 13th century English embroidery was famous throughout western Europe, and many embroidered objects are described in inventories of that time as being de opere anglicano. During that century, and the early part of the next, English work was at its best. The most famous example is the " Syon cope " at South Kensington, belonging to the latter half of the 13th century (see Cqpe, Plate I. fig. 2). It represents the coronation of the Virgin, the Crucifixion, the archangel Michael transfixing the dragon, the death and burial of the Virgin, our Lord meeting Mary Magdalene in the garden, the Apostles and the hierarchies of angels. The broad orphrey is embroidered with a series of heraldic shields (Plate II. fig. 9). Other embroideries of the period are at Steeple Aston, Chesterfield (Col. Butler-Bowden), Victoria and Albert and British museums, Rome (St John Lateran), Bologna, Pienza, Anagni, Ascoli, St Bertrand de Comminges, Lyons museum, Madrid (archaeological museum), Toledo and Vich.

During the course of the 14th and 15th centuries embroideries produced in England were not equal to the earlier work. To- wards the end of the latter century, and until the dissolution of the monasteries in the next, much ecclesiastical embroidery of effective design was done, and many examples are still to be seen in churches throughout the country. In the Tudor period the costumes of the wealthy were often richly adorned with needlework. The portraits of King Henry VIII., Queen Elizabeth and their courtiers show how magnificent was the embroidery used for such purposes. Many examples, especially of the latter reign, worked with very effective and beautiful floral patterns, have come down to these times. A kind of embroidery known as " black work," done in black silk on linen, was popular during the same reign. A tunic embroidered for Queen

Elizabeth, with devices copied from contemporary woodcuts, is an excellent example of this work. It now belongs to the Viscount Falkland. Another class of work, popular at the same time, was closely worked in wools and silks on open-mesh material like canvas, which was entirely covered by the embroidery. Figures in rich costume were often introduced (Plate I. fig. 6). This method was much practised in France, and the term applied to it in that country, " au petit point," has become generally used. Through- out the 17th and 18th centuries embroidery in England, though sometimes lacking in good taste, maintained generally a high standard, and that done to-day, based on the study of old examples, need not fear comparison with any modern work. During these three centuries bold floral patterns for hangings, curtains and coverlets have been usual (Plate III. fig. 13), but smaller works, such as samplers, covers of work-boxes, and pictorial and landscape subjects (fig. 5), have been produced in large numbers. " In the 18th century gentlemen's coats and waistcoats and ladies' dresses were extensively embroidered.

In France, embroidery, like all the arts practised by that nation, has been characterized by much grace and beauty, and many good specimens belonging to different periods are known. The vestments associated with the name of St Thomas of Canter- bury at Sens may be either of French or English work (12th century) . To the later part of the following century belongs a band of embroidery, representing the coronation of the Virgin, the Adoration of the Magi, the presentation in the Temple, and other subjects beneath Gothic arches, preserved in the Hotel- Dieu at Chateau Thierry. The mitre of Jean de Marigny, archbishop of Rouen (1347-1351), in the museum at Evreux,

embroidered with figures of St Peter and St Eloy, may be regarded as representative of 14th-century work. An altar-frontal with the Annunciation embroidered in silks and gold and silver upon a blue silk damask ground, now in the museum at Lille, is a very beautiful example of Franco-Flemish art in the second half of the 15th century. It was originally in the church at Noyelles- lez-Seclin. An embroidery more characteristically French, and belonging to the same century, is in the museum at Chartres. It is a triptych, having in the middle a pieta, on the left wing St John the Evangelist, and on the right St Catherine of Alexandria. Each leaf has a canopy of architecture represented in perspective. In the 1 6th century an

effective style of embroidery was practised in France; the pattern is generally a graceful combination of floral and scroll forms, cut out of velvet, satin or silk, and applied to a thick woollen cloth. Later work, chiefly of a floral character, has served for the decoration of costumes, ecclesiastical vestments, curtains and hangings, and the seats and backs of chairs.

Under the rule of the dukes of Burgundy in the 15th century art in the southern provinces of the Netherlands prospered

FlG. 5. — Oval picture in silk embroidery : Fame scattering Flowers over Shakespeare's Tomb. English work of the 1 8th century.

greatly, and able artists were found to meet the wishes of those munificent rulers. The local schools of painting, which flourished under their patronage, appear to have very considerably in- fluenced the embroiderers' art. Great care and pains were given to reproduce as accurately as possible the painted cartoon or picture which served as the model. The heads are individualized, and the folds of the draperies are laboriously worked out in detail. The masonry of buildings, the veinings of marble, and the architectural enrichments are often represented with careful fidelity, and landscape backgrounds are shown in every detail. As in the case of the tapestries of the Netherlands — the finest which the world has seen— there can be no doubt that patrons of art and donors, when requiring embroideries to be made, secured the services of eminent painters for the designs. There are many examples of such careful work. A set of vestments known as the omement de la Toison a" Or, now in the Hof -museum at Vienna, is embroidered in the most minute manner with sacred subjects and figures of saints and angels. The stiff disposal of many of these figures, within flattened hexagons arranged in zones, is not pleasing, but the needlework is most remarkable for skill and carefulness. They are of 15th-century work. A cope belonging to the second half of that century was given to

the cathedral of Tournay by Guillaume Fillatre, abbot of St Bertin at St Omer, and bishop of Tournay (d. 1473). It is now in the museum there. Upon the orphreys and hood are repre- sented the seven Works of Mercy. The body of the cope, of plain red velvet, is powdered with stags' heads and martlets (the heraldic bearings of the bishop) ; between the antlers of the stags is worked in each case the initial letter of the bishop's name, and the morse is embroidered with his arms. Some panels of embroidery, once decorating an altar in the abbey of Grimbergen, and now at Brussels, illustrate the best class of Flemish needle- work in the 16th century. The scenes are taken from

the Gospel : the marriage at Cana, Christ in the house of the Pharisee, Christ in the house of Zacchaeus, the Last Supper, and the supper at Emmaus. In the museum at Bern there are some embroideries of great historic and artistic interest, found in the tent of Charles the Bold, duke of Burgundy, after his defeat at Granson in 1476. They include some armorial panels and two tabards or heralds' coats. A tabard of the following century, with the royal arms of Spain in applied work, and most probably of Flemish origin, is preserved in the archaeological museum at Ghent.

The later art of Holland was largely influenced by the Dutch conquests in the East Indies at the end of the 16th century, and the subsequent founding of the Dutch East India Company. Embroideries were among the articles produced in the East under Dutch influence for exportation to Holland.

Much embroidery for ecclesiastical purposes has been executed in Belgium of late years. It follows medieval models, but is lacking in the qualities which make those of so much importance in the history of the art.

There is perhaps little worthy of special notice in Italy before the beginning of the 14th century, but the embroideries produced at that time show great skill and are very beautiful. The names of two Florentine embroiderers of the 14th century — both men — have come down to us, inscribed upon their handiwork. A fine frontal for an altar, very delicately worked in gold and silver and silks of many colours, is preserved in the archaeological museum at Florence. The subject in the middle is the coronation of the Virgin; on either side is an arcade with figures of apostles and saints. The embroiderer's name is worked under the central subject: Jacobus Cambi de Floretia me fecit MCCCXXXVIII. The other example is in the basilica at Manresa in Spain. It also is an altar-frontal, worked in silk and gold upon an em- broidered gold ground. There is a large central panel represent- ing the Crucifixion, with nine scenes from the Gospel on each side. The embroidered inscription is as follows: Geri Lapi rachamatore me fecit in Florentia. It is of 14th-century work. An embroidered orphrey in the Victoria and Albert Museum belongs to the early part of the same century. It represents the Annunciation, the coronation of the Virgin and figures of apostles and saints beneath arches. In the spandrels are the orders of angels with their names in Italian. In the best period of Italian art successful painters did not disdain to design for embroidery. Francesco Squarcione (1394-1474), the founder of the Paduah school of painting, and master of Mantegna, is called in a document of the year 1423 a

tailor and embroiderer {sartor et recamator). It is recorded that Antonio del Pollaiuolo painted cartoons which were carried out in embroidery, 1 and Pierino del Vaga, according to Vasari, did likewise. In the 16th and 17th centuries large numbers of towels and linen covers were em- broidered in red, green or brown silk with borders of floral patterns, sometimes (especially in the southern provinces) combined with figure subjects and bird and animal forms (Plate IV. fig. 15). Another type of embroidery popular at the same time, both in Italy and Spain, is known as applique (or applied) work. The pattern is cut out and applied to a bright- coloured ground, frequently of velvet, as in the example illus- trated (Plate III. fig. 14). The later embroidery of Sicily follows that of the mainland. A remarkable coverlet, quilted and padded with wool so as to throw the design into relief, is shown to be of Sicilian origin by the inscriptions which it bears

1 Some embroideries from vestments, designed by Pollaiuolo, are still preserved in the Museo dell' Opera del Duomo, Florence.

EMBROIDERY

Plate III.

i.— SILK PANEL. EMBROIDERED WITH A HANGING LANTERN. Chinese work of the 17th or 1 8th century. Scale: Hh.

Fig. 13. -PORTION OF A BED-HANGING. EMBROIDERED WITH FLOWERING TREES GROWING FROM MOUNDS. English work oC the later part of the 17th century. Scale: /jth.

Fig, 12.— PORTION OF A LARGE HANGING, EM- BROIDERED WITH FIGURES WITHIN MEDALLIONS, AND INSCRIPTIONS.

From a church in Iceland, probably 17th century. Scale: Jth.

Fig. 14.— APPAREL FOR A DALMATIC OF GREEN VEI.VFT,

EMBROIDERED WITH AN APPLIQUE PATTERN.

Italian work ol the 16th century. Scale: ±th.

Tlate IV.

EMBROIDERY

RTION" OF THE BORDER OF A LINEN COVER, EMBROIDERED

WITH A FIGURE OF ST OF ALEXANDRIA AND KNEELING VOTARIES. Italian work of the 16th centurv. Scale: Sths

Fig. 16.— LINEN BORDER, EMBROIDERED WITH DEBASED FIGURES, BIRDS AND ANIMALS AMID FLOWERS.

Cretan work, dated 1762. Scale: §ths.

EMBROIDERY

*3*3*

(Plate VI. fig. 18). It represents scenes from the story of Tristan, agreeing in the main part with the novella entitled " La Tavola Rotonda o l'istoria di Tristano." The quilt dates from the end of the 14th century. Many pattern-books for em- broidery and lace were published in Italy in the 16th and 17th centuries. 1

In the greater part of the Spanish peninsula art was for many centuries dominated by the Arabs, who overran the country in the 8th century, and were not finally subdued until the end of the 15th. Hispano-Moorish embroideries of the medieval period usually have interlacing patterns combined with Arabic in- scriptions. In the 15th and 16th centuries Italian influence becomes evident. Later the effects of the Spanish conquests in Asia are seen. Eastern influence is, however, stronger in the case of the Portuguese, who seized Goa, on the west coast of the Indian peninsula, early in the 16th century, and during the whole of that century held the monopoly of the eastern trade. Many large embroideries were produced in the Indies, showing eastern floral patterns mingled with representations of Europeans, ships and coats of arms. Embroideries done in Portugal in the 1 6th and 17 th centuries strongly reflect the influence of oriental patterns.

German embroidery of the 12th and 13th centuries adheres closely to the traditions of Byzantine art. A peculiarity of much medieval German work is a tendency to treat the draperies of the figures as flat surfaces to be covered with diaper patterns, showing no folds. A cope from Hildesheim cathedral, now in the Victoria and Albert Museum, is a typical illustration of such work, dating from the end of the 13th century. It is embroidered in silk upon linen with the martyrdom of apostles and saints. Other specimens of embroidery in this manner may be seen at Halberstadt. An altar-frontal from Rupertsburg (Bingen), belonging to the earlier years of the 13th century, is now in the Brussels museum. It is of purple silk,

embroidered with Christ in majesty and figures of saints. It was no doubt made in the time of Siegfried, archbishop of Mainz (1 201-1230), who is represented upon it. A type of medieval German embroidery is done in white linen thread on a loose linen ground — a sort of darning- work (Plate II. fig. 10). Earlier specimens of this work are often diversified by using a variety of stitches tending to form diaper patterns. The use of long scrolling bands with inscriptions explaining the subjects represented is more usual in German work than in that of any other country. In the 15th century much fine embroidery was produced in the neighbourhood of Cologne. Later German work shows a preference for bold floral patterns, sometimes mingled with heraldry; the larger examples are often worked in wool on a woollen cloth ground (Plate II. fig. 8). The embroidery of the northern nations (Denmark, Scandinavia, Iceland) was later in development than that of the southern peoples. Figure subjects evidently belonging to as late a period as the 17 th century are still disposed in formal rows of circles, and accompanied by primitive ornamental forms (Plate III. fig. 12). A remarkable early embroidered fabric covers the relics of St Knud (Canute, king of Denmark, 1080-1086) in his shrine in the church dedicated to him at Odense. It is apparently contemporary work. The pattern consists of displayed eagles within oval compartments, in blue on a red ground.

In Greece and the islands of the eastern Mediterranean embroidery has been much employed for the decoration of costumes, portieres and bed-curtains. Large numbers have been acquired in Crete (Plate IV. fig. 16), and patterns of a distinctive character are also found in Rhodes, Cos, Patmos and other islands. Some examples show traces of the influence of the Venetian trading settlements in the archipelago in the 16th and 17th centuries. Among the Turks a great development of the arts followed upon the conquest of Asia Minor and the Byzantine territory in Europe. Their embroideries show a

1 Others, sometimes with the same illustrations, appeared in France and Germany, and no doubt forwarded the general tendency towards Italian models at the time. A few pattern-books were also published in England.

preference for floral forms — chiefly roses, tulips, carnations and hyacinths — which are treated with great decorative skill.

The use of embroidery in Asia — especially in India, China, Turkestan and Persia — dates back to very early times. The conservatism of all these peoples renders the date of surviving examples often difficult to establish, but the greater number of such

embroideries now to be seen in Europe are certainly of no great age.

India has produced vast quantities of embroideries of varying excellence. The fine woollen shawls of Kashmir are widely famed; their first production is supposed to date back to a remote period. The somewhat gaudy effect of many Indian embroideries is at times intensified by the addition of beetles' wings, tinsel or fragments of looking-glass. China is the original home of the silkworm, and the textile arts there reached an advanced stage at a date long before that of any equally skilful work in Europe. Embroideries worked there are generally in silk threads on a ground of the same material. Such work is largely used for various articles of costume, and for coverlets, screens, banners, chair-covers and table-hangings. The orna- ments upon the robes especially are prescribed according to the rank of the wearer. The designs include elaborate landscapes with buildings and figures, dragons, birds, animals, symbolic devices, and especially flowers (Plate III. fig. n). Dr Bushell states that the stuff to be embroidered is first stretched upon a frame, on pivots, and that pattern-books with woodcuts have been published for the workers' guidance. A kind of embroidery exported in large quantities from Canton to Europe rivals painting in the variety and gradation of its colours, and in the smoothness and regularity of its surface.*

Embroidery in Japan resembles in many ways that of China, the country which probably supplied its first models. As a general rule, Japanese work is more pictorial and fanciful than that of China, and the stitching is looser. It frequently happens that the brush has been used to add to the variety of the embroidered work, and in other cases the needle has been an accessory upon a fabric already ornamented with printing or painting. Japanese work is characterized generally by bold and broad treatment, and especial skill is shown in the repre- sentation of landscapes— figures, rocks, waterfalls, animals, birds, trees, flowers and clouds being each rendered by a few lines. More elaborate are the large temple hangings, the pattern being frequently thrown into relief, and completely covering the ground material.

Embroidery in Persia has been used to a great extent for the decoration of carpets, for prayer or for use at the bath (Plate V. fig. 17). Robes, hangings, curtains, tablecovers and portieres are also embroidered. A preference is shown for floral patterns, but the Mahommedans of Persia had no scruples about introducing the forms of men and animals — the former engaged in hawking or hunting, or feasting in gardens. Panels embroidered with close diagonal bands of flowers were made into loose trousers for women, now obsolete. The

embroidered shawls of Kerman are widely celebrated. Hangings and covers of cloth patchwork have been embroidered in many parts of Persia, more particularly at Resht and Ispahan.

In Turkestan, and especially at Bokhara, excellent embroideries have been, and are, produced, some patterns being of a bold floral type, and others conventionalized into hooked and serrated outlines. The work is most usually in bright-coloured silks, red predominating, on a linen material.

In North Africa the embroidery of Morocco and Algeria deserves notice; the former inclines more to geometrical forms and the latter to patterns of a floral character.

Bibliography. — Lady Alford, Needlework as Art (London, 1886) ; Mrs M. Barber, Some Drawings of Ancient Embroidery {ib. t 1880); P. Blanchet, Tissus antiques et du haut moyen-dge (Paris, 1897); F. Bock, Die Kleinodien des Heiligen Rdmischen Reiches Deutscher Nation (Vienna, 1864); M. Charles, Les Broderies et les dentelles (Paris, 1905) ; Mrs Christie, Embroidery and Tapestry Weaving (London, 1906); A. S. Cole, C.B., " Some Aspects of Ancient and Modern Embroidery " (Soc. of Arts Journal, liii., 1905, pp. 956-973) ; R. Cox, L'Arl de dtcorer les tissus (Paris, Lyons, 1900); L. F. Day, Art in Needlework (London, 1900); A. Dolby, Church Embroidery

(ib., 1867), and Church Vestments (ib., 1868); M. Dreger, Kilnst-lerische Eniwicklung der Weberei und Stickerei (Vienna, 1904); Madame I. Errera, Collection de broderies anciennes (Brussels, 1905); L. de Farcy, La Broderie (Paris, 1890) ; R. Forrer, Die Grdber und Textilfunde von Achmim-Panopolis (Strassburg, 1891); F. R. Fowke, The Bayeux Tapestry (London, 1898) ; Rev. C. H. Hartshqrne, On English Medieval Embroidery (ib., 1848); M. B. Huish, Samplers and Tapestry Embroideries (ib., 1900); A. F. Kendrick, English Em- broidery {ib., 1905) ; English Embroidery executed prior to the Middle of the 16th Century (Burlington Fine Arts Club Exhibition, 1905, introduction by A. F. Kendrick); E. Lefebure, Embroideries and Lace, translated by A. S. Cole, C.B. (London, 1888); F. Marshall, Old English Embroidery (ib., 1894); E. M. Rogge, Moderne Kunst- Nadelarbeiten (Amsterdam, 1905) ; South Kensington Museum, Catalogue of Special Loan Exhibition of

Decorative Art Needlework (1874); W. G. P. Townshend, Embroidery (London, 1899). For further examples of ecclesiastical embroidery see the articles Chasuble, Cope, Dalmatic and Mitre. (A. F. K. ; A. S. C.)

EMBRUN, a town in the department of the Hautes Alpes in S.E. France. It is built at a height of 2854 ft. on a plateau that rises above the right bank of the Durance. It is 27J m. by rail from Briancon and 24 m. from Gap. Its ramparts were demolished in 1884. In 1906 the communal pop. (including the garrison) was 3752. Besides the Tour Brune (nth century) and the old archiepiscopal palace, now occupied by government offices, barracks, &c, the chief object of interest in Embrun is its splendid cathedral church, which dates from the second half of the 1 2th century. Above its side door, called the Rial, there existed till 1585 (when it was destroyed by the Huguenots) a fresco, probably painted in the 13th century, representing the Madonna: this was the object of a celebrated pilgrimage for many centuries. Louis XI. habitually wore on his hat a leaden image of this Madonna, for which he had a very great veneration, since between 1440 and 1461, during the lifetime of his father, he had been the dauphin, and as such ruler of this province.

Embrun was the Eburodunum or Ebredunum of the Romans, and the chief town of the province of the Maritime Alps. The episcopal see was founded in the 4th century, and became an archbishopric about 800. In 1147 the archbishops obtained from the emperor Conrad III. very extensive temporal rights, and the rank of princes of the Holy Roman Empire. In 1 232 the county of the Embrunais passed by marriage to the dauphins of Viennois. In 1791 the archiepiscopal see was suppressed, the region being then transferred to the diocese of Gap, so that the once metropolitan cathedral church is now simply a parish church. The town was sacked in 1585 by the Huguenots and in 1692 by the duke of Savoy. Henri Arnaud (1641-1721), the Waldensian pastor and general, was born at Embrun.

See A. Albert, Histoire du diocese d'Embrun (2 vols., Embrun, 1783); M. Fornier, Histoire generate des Alpes Maritimes ou Cottiennes et particuliire de leur metropolitaine Embrun (written 1626-1643), published by the Abbe Paul Guillaume (3 vols., Paris and Gap, 1890-1891); A. Fabre, Recherches historiques sur le pelerinage des rois de France a N. D. d'Embrun (Grenoble, 1859); A. Sauret, Essai historique sur la ville d'Embrun (Gap, i860). (W. A. B. C.)

EMBRYOLOGY. The word embryo is derived from the Gr. ififipvov, which signified the fruit of the womb before birth. In its strict sense,

therefore, embryology is the study of the intrauterine young or embryo, and can only be pursued in those animals in which the offspring are retained in the uterus of the mother until they have acquired, or nearly acquired, the form of the parent. As a matter of fact, however, the word has a much wider application than would be gathered from its deriva- tion. All animals above the Protozoa undergo at the beginning of their existence rapid growth and considerable changes of form and structure. During these changes, which constitute the development of the animal, the young organism may be incapable of leading a free life and obtaining its own food. In such cases it is either contained in the body of the parent or it is protruded and lies quiescent within the egg membranes; or it may be capable of leading an independent life, possessing in a functional condition all the organs necessary for the main- tenance of its existence. In the former case the young organism is called an embryo, 1 in the latter a larva. It might thus be

1 In the mammalia the word foetus is often employed in the same signification as embryo ; it is especially applied to the embryo in the later stages of uterine development.

concluded that embryology would exclude the study of larvae, in which the whole or the greater part of the development takes place outside the parent and outside the egg. But this is not the case; embryology includes not only a study of embryos as just defined, but also a study of larvae. In this way the scope of the subject is still further widened. As long as em- bryology confines its attention to embryos, it is easy to fix its limits, at any rate in the higher animals. The domain of em- bryology ceases in the case of viviparous animals at birth, in the case of oviparous animals at hatching; it ceases as soon as the young form acquires the power of existing when separated from the parent, or when removed from the protection of the egg membranes. But as soon as post-embryonic developmental changes are admitted within the scope of the subject, it becomes on close consideration difficult to limit its range. It must include all the developmental processes which take place as a result of sexual reproduction. A man at birth, when he ceases to be an embryo, has still many changes besides those of simple growth to pass through. The same remark applies to a young frog at the metamorphosis. A chick even, which can run about and feed almost immediately after hatching, possesses a plumage very different from that of the full-grown bird; a starfish at the metamorphosis is in many of its features quite different from the form with which we are familiar. It might be attempted to meet this difficulty by limiting embryology to a study of all those changes which occur in the organism before the attainment

of the adult state. But this merely shifts the difficulty to another quarter, and makes it necessary to define what is meant by the adult state. At first sight this may seem easy, and no doubt it is not difficult when man and the higher animals alone are in question, for in these the adult state may be defined comparatively sharply as the stage of sexual maturity. After that period, though changes in the organism still continue, they are retrogressive changes, and as such might fairly be excluded from any account of development, which clearly implies progres- sion, not retrogression. But, as so often happens in the study of organisms, formulae which apply quite satisfactorily to one group require modifications when others are considered. Does sexual maturity always mark the attainment of the adult state? Is the Axolotl adult when it acquires its reproductive organs? Can a larval Ctenophore, which acquires functional reproductive glands and still possesses the power of passing into the form ordinarily described as adult in that group, be considered to have reached the end of its development? Or — to take the case of those animals, such as Amphioxus, Balanoglossus, and many segmented worms in which important developmental processes occur, e.g. formation of new gill slits, of gonadial sacs, or even of whole segments of the body, long after the power of reproduction has been acquired — how is the attainment of the adult state to be defined, for it is clear that in them the attainment of sexual maturity does not correspond with the end of growth and development? If, then, embryology is to be regarded as includ- ing not only the study of embryos, but also that of larvae, i.e. if it includes the study of the whole developmental history of the individual — and it is impossible to treat the subject rationally unless it is so regarded— it becomes exceeding difficult to fix any definite limit to the period of life with which embryology concerns itself. The beginning of this period can be fixed, but not the end, unless it be the end of life itself, i.e. death. The science of embryology, then, is the science of individual develop- ment, and includes within its purview all those changes of form and structure, whether embryonic, larval or post-larval, which characterize the life of the individual. The beginning of this period is precise and definite — it is the completion of the fertiliza- tion of the ovum, in which the life of the individual has its start. The end, on the other hand, is vague and cannot be precisely defined, unless it be death, in which case the period of life with which embryology concerns itself is coincident with the life of the individual. To use the words of Huxley (" Cell Theory," Collected Works, vol. i. p. 267) : " Development, therefore, and life are, strictly speaking, one thing, though we are accustomed to limit the former to the progressive half of life merelv. and tc

EMBROIDERY

Plate V.

5- C r-.

T3 rtˆ

o ax

i/; c

-ˆ 3 CO

<

eg £3

3 8 rt

o u g

a w

c g .

ox rt

- *“SI*

s Si

&. o i =

■ˆ .2 S.~

f? » » s

_; u “- E

j vS 3 3

£■ 6 ˆ 3

•f B’SS

o 2S„*

Plate VI.

EMBROIDERY

*TEjZrQa** . ■ .^ (^ — -vT-i* 1 Vfc,: *•» £v iw£v»» *> fc »' '/ »»» w- —*

*^*4 -| '■ _. :*

**.rjfc-.'7*» !*

, ■— V- i^. ^ tw jA; ^_ _,_■ j. _ " .■ »- «-i UK »|» «u. »w ■»■■ . .*

a

:,^\ki ■ vt.V vl

K-T i -i*,«J*V« ^ *> ' *»" **» **! W^*

It

Fig. 18.—PART OF A SICILIAN COVERLET, OF THE END OF THE 14TH CENTURY. of white linen, quilted and padded in wool so as to throw the designjnto relief. The scenes represented, taken from the

Story of Tristan, with inscriptions in' the Sicilian dialect, are as follows:— (T j Comu : Lu Amouoi.du Fa Basdiri: Lu Osti: Is CoKNCUAUaA (How the Morold made the host to go to Cornwall); (2) Comu: LuKre: Languis: Cumanda: ChiLaia: LoOsti: CorM'AGLIA (How King Languis ordered that the host should go to Cornwall; (.3) Comu: Lu Rre : LangL'IS: Manda: Per Lu Trabutu in – Cornualia (How King Languis sent to Cornwall for the tribute) ; (4) Comu: dim) Issagieri: so L'innti: Al Rre: Marct: Per Lu Trirutu Di Secti Anni (How the ambassadors are come to King Mark for the tribute of seven years); (5I Comu: Lu Amoroldu Lai: in Cornuuai.gia (How the Morold comes to Cornwall) ; (6) Comu: Lu Amoroi-du: Fa Suldari: La C.exti (How the Morold made the people pay): (7) Comu: T(ristainu): Dai: Lu Guantu Ai.lu Amoroldu Dela Bactagi.ia (How Tristan gives the glove of battle to the Morold); (8) Comu: Lu Amoroldu: E Linutu : in Cornuualgia : Cum XXXX Gai.ei: (How the Morold is come to Cornwall with forty galleys); (9) Comu Tristainu Bucta : La Uarca: Arretu: Intu: Ai.lu Maru (How Tristan struck his boat behind him into the sea) ; (10) Comu : Tristainu: Aspecta : Lu Amoroldu : At. la Isoi.a Di Lu Maru: Sansa Uistura (How Tristan awaits the Morold on the isle Sanza Ventura in the sea) ; (11) Comu: Tristainu Feriu Lu Amoroi.ldu in Testa (How Tristan wounded the

Morold in the head); (12) Comu: Lu Inna (?) Delu Amoroldu : Aspecttaua Lu Patrunu (How the Morold's page (?) awaited his master) ; (13) Comu Lu Amorodu Feriu: Tristainu A Tradimantu (How the Morold wounded Tristan by treachery); (14) . . . Sita: In Airlandia (... in Ireland).

REPRODUCTION]

EMBRYOLOGY

3i5

speak of the retrogressive half as decay, considering an imaginary resting-point between the, two as the adult or perfect state."

There are two kinds of reproduction, the sexual and the asexual. The sexual method has for its results an increase of the number of kinds of individual or organism, whereas ttoa """" the asexual affords an increase in the number of individuals of the same kind. If the asexual method of reproduction alone existed, there would, so far as our know- ledge at present extends, be no increase in the number of kinds of organism: no new individuality could arise. The first establishment of a new kind of individual by the sexual process is effected in a very similar manner in all Metazoa. The parent produces by a process of unequal fission, which takes place at a part of the body called the reproductive gland, a small living organism called the reproductive cell. There are always two kinds of reproductive cells, and these are generally produced by different animals called the male and female respectively (when they are produced by the same animal it is said to be herma- phrodite). The reproductive cell produced by the male is called the spermatozoon, and that produced by the female, the ovum. These two organisms agree in being small uninucleated masses of protoplasm, but differ considerably in form. They are without the organs of nutrition, &c, which characterize their parents, but the ovum nearly always possesses, stored up within its protoplasm, a greater or less quantity of vitelline matter or food-yolk, while the spermatozoon possesses in almost all cases the power of locomotion. The object with which these two minute and simple organisms are produced is to fuse with one another and give rise to one resultant uninucleated (for the nuclei fuse) organism or cell, which is called the zygote. This process of fusion between the two kinds of reproductive cells, which are termed gametes, is called conjugation: it is the process which is sometimes spoken of as the fertilization of the ovum, and its result is the establishment of a new individual. This new individual at first is simply a uninucleated mass of living matter,

which always contains a certain amount of food-yolk, and is generally bounded by a delicate cuticular membrane called the vitelline membrane. In form the newly established zygote resembles the femal-: gamete or ovum — so much so, indeed, that it is frequently called the ovum; but it must be clearly understood that although the bulk of its matter has been derived from the ovum, it consists of ovum and spermatozoon, and, as shown by its subsequent behaviour, the spermatozoon has quite as much to do with determining its vital properties as the ovum.

To the unaided eye the main difference between the newly formed zygotes of different species of animals is that of bulk, and this is due to the amount of food-yolk held in suspension in the proto- plasm. The ovum of the fowl is 30 mm. in diameter, that of the Frog 1-75 mm., while the ova of the rabbit and Ampkioxus have a diameter of - I mm; The food-yolk is deposited in the ovum as a result of the vital activity of its protoplasm, while the ovum is still a part of the ovary of the parent. It is an inert substance which is used as food later on by the developing embryo, and it acts as a dilutant of the living matter of the ovum. It has a profound influence on the subsequent developmental process. The newly formed zygotes of different species of animals have un- doubtedly, as staved above, a certain family resemblance to one another; but however great this superficial resemblance may be, the differences must be most profound, and this fact becomes at once obvious when the properties of these remarkable masses of matter are closely investigated.

As in the case of so many other forms of matter, the more important properties of the zygote do not become apparent

until it is submitted to the action of external forces. Causes of These forces constitute the external conditions of meat. existence, and the properties which are called forth

by their action are called the acquired characters of the organism. The investigation of these properties, particularly of those which are called forth in the early stages of the process, constitutes the science of Embryology. With regard to the manifestation of these properties, certain points must be clearly understood at the outset: — (1) If the zygote is withheld from the appropriate external influences, e.g. if a plant-seed be kept in a box free from moisture or at a low temperature, no properties

are evolved, and the zygote remains apparently unchanged; (2) the acquisition of the properties which constitutes the growth and

development of the organism proceeds in a perfectly definite sequence, which, so far as is known, cannot be altered; (3) just as the features of the growing organism change under the con- tinued action of the external conditions, so the external conditions themselves must change as the organism is progressively evolved. With regard to this last change, it may be said generally that it is usually, if not always, effected by the organism itself, making use of the properties which it has acquired at earlier stages of its growth, and acting in response to the external conditions. There is, to use a phrase of Mr Herbert Spencer, a continuous adjust- ment between the external and internal relations. For every organism a certain succession of conditions is necessary if the complete and normal evolution of properties is to take place.- Within certain limits, these conditions may vary without inter- fering with the normal evolution of the properties, though such variations are generally responded to by slight but unimportant variation of the properties (variation of acquired characters). But if the variation of the conditions is too great, the evolved properties become abnormal, and are of such a nature as to preclude the normal evolution of the organism; in other words, the action of the conditions upon the organism is injurious, causing abortions and, ultimately, death. For many organisms the conditions of existence are well known for all stages of life, and can be easily imitated, so that they can be reared artificially and kept alive and made to breed in confinement — e.g. the common fowl. But in a large number of cases it is not possible, through ignorance of the proper conditions, or on account of the difficulty of imitating them, to make the organism evolve all its properties. For instance, there are many marine larvae which have never been reared beyond a certain point, and there are some organisms which, even when nearly full-grown — a stage of life at which it is generally most easy to ascertain and imitate the natural conditions — will not live, or at any rate will not breed, in captivity. Of late years some naturalists have largely occupied themselves with experimental observation of the effects on certain organisms of marked and definite changes of the conditions, and the name of Developmental Mechanics (or Physiology of Development) has been applied to this branch of study (see below).

In normal fertilization, as a rule, only one spermatozoon fuses with the ovum. It has been observed in some eggs that a membrane, formed round the ovum immediately after the entrance

of the spermatozoon, prevents the entrance of others. If

Gameto-

more than one spermatozoon enters, a corresponding &”?• number of male pronuclei are formed, and the subsequent develop- ment, if it takes place at all, is abnormal and soon ceases. An egg by ill-treatment (influence of chloroform, carbonic acid, &c.) can be made to take more than one spermatozoon. In some animals it appears that several spermatozoa may normally enter the ovum (some Arthropoda, Selachians, Amphibians and Mammals), but of these only one forms a male pronucleus (see below), the rest being absorbed. Gametogeny is the name applied to the formation of the gametes, i.e. of the ova and spermatozoa. The cells of the reproductive glands are the germ cells (oogonia, spermatogonia). They undergo division and give rise to the progametes, which in the case of the female are sometimes called oocytes, in the case of the male spermatocytes. The oocytes are more familiarly called the ovarian ova. The nucleus of the oocyte is called the germinal vesicle. The oocyte (progamete) gives rise by division to the ovum or true gamete, the nucleus of which is called the female pronucleus. As a general rule the oocyte divides unequally twice, giving rise to two small cells called polar bodies, and to the ovum. The first formed polar body frequently divides when the oocyte undergoes its second and final division, so that there are three polar bodies as well as the ovum resulting from the division of the oocyte or progamete. Sometimes the ovum arises from the oocyte by one division only, and there is only one polar body {e.g. mouse, Sobotta, Arch. f. mikr. Anat., 1895, p. 15). The polar bodies are oval, but as a rule they are so small as to be incapable of fertilization. They may therefore be regarded as abortive ova. In one case, however (see Francotte, Bull. Acad. Belg. (3), xxxiii., 1897, p. 278), the first formed polar body is nearly as large as the ovum, and is some- times fertilized and develops. The spermatogonia are the cells of the testis; these produce by division the spermatocytes (pro- gametes), which divide and give rise to the spermatids. In most cases which have been investigated the divisions by which the spermatids arise from the spermatocytes are two in number, so

that each spermatocyte gives origin to four spermatids. Each spermatid becomes a functional spermatozoon or male gamete. The gametogeny of the male therefore closely resembles that of the female, differing from it only in the fact that all the four products of

the progamete become functional gametes, whereas in the female only one, the ovum, becomes functional, the other three (polar bodies) being abortive. In the spermatogenesis of the bee, however, the spermatocyte only divides once, giving rise to a small polar-body-like structure and one spermatid (Meves, Anat. Anzeiger, 24, 1904, pp. 29-32). The nucleus of the male gamete is not called the male pro- nucleus, as would be expected, that term being reserved for the second nucleus which appears in the ovum after fertilization. As this is in all probability derived entirely from the nucleus of the spermatozoon, we should be almost justified in calling the nucleus of the spermatozoon the male pronucleus. In most forms in which the formation of the gametes from the progamete has been accurately followed, and in which the progamete of both sexes divides twice in forming the gametes, the division of the nucleus presents certain peculiarities. In the first place, between the first division and the second it does not enter into the resting state, but immediately proceeds to the second division. In the second place, the number of chromosomes which appear in the final divisions of the progametes and assist in constituting the nuclei of the gametes is half the number which go to constitute the new nuclei in the ordinary nuclear divisions of the animal. The number of chromosomes of the nucleus of the gamete is therefore reduced, and the divisions by which the gametes arise from the progametes are called reducing (maiotic) divisions. It is not certain, however, that this phenomenon is of universal occurrence, or has the significance which is ordinarily attributed to it. In the parthenogenetic ova of certain insects, e.g. Rhodites rosae (Henking), Nematus lacteus (Doncaster, Quart. Journal Mic. Science, 49, 1906, pp. 561-589), reduction does not occur, though two polar bodies are formed.

As soon as the spermatozoon has conjugated with the ovum, a

second nucleus appears in the ovum. This is undoubtedly derived

from the spermatozoon, possibly from its nucleus only,

Ferilllza- am j ; s ca n ec j the male pronucleus. It possesses in the

“ adjacent protoplasm a well-marked centrosome. The*

general rule appears to be that the female pronucleus is without a centrosome, and that ho centrosome appears in the female in the divisions by which the gamete arises from the progamete. If this is true, the centrosome of the zygote nucleus must be entirely derived from that of the male pronucleus. This accounts for the fact, which

has been often observed, that the female pronucleus is not surrounded by protoplasmic radiations, whereas such radiations are present round the male pronucleus in its approach to the female. In the mouse the subsequent events are as follow: — Both pronuclei assume the resting form, the chromatin being distributed over the nuclear network, and. the nuclei come to lie side by side in the centre of the egg. A long loop of chromatin then appears in each nucleus and divides up into twelve pieces, the chromosomes. The centrosome now divides, the membranes of both nuclei disappear, and a spindle is formed. The twenty-four chromosomes arrange themselves at the centre of this spindle and split longitudinally, so that forty-eight chromosomes are formed. Twenty-four of these, twelve male and twelve female, as it is supposed, travel to each pole of the spindle and assist in giving rise to the two nuclei. At the next nuclear division twenty-four chromosomes appear in each nucleus, each of which divides longitudinally; and so in all subsequent divisions. The fusion of the two pronuclei is sometimes effected in a manner slightly different from that described for the mouse. In Echinus, for instance, the two pronuclei fuse, and the spindle and chromosomes are formed from the zygote nucleus, whereas in the mouse the two pronuclei retain their distinctness during the formation of the chromosomes. There appears, however, to be some variation in this respect: cases have been observed in the mouse in which fusion of the pronuclei occurs before the separation of the chromosomes.

Parthenogenesis, or development of the female gamete without fertilization, is known to occur in many groups of the animal king- dom. Attempts have been made to connect this pheno- Partheno' menon w ; tn peculiarities in the gametogeny. For genesis. instance, it has been said that parthenogenetic ova form only one polar body. But, as we have seen, this is sometimes the case in eggs which are fertilized, and parthenogenetic ova are known which form two polar bodies, e.g. ova of the honey-bee which produce drones (Morph. Jahrb. xv., 1889, p. 85) ; ova of Rotifera which produce males (Zool. Anzeiger, xx., 1897, p. 455), ova of some saw-flies and gall flies which produce females (L. Doncaster, Quart. Journ. Mic. Sc, 49, 1906, pp. 561-589). Again it has been asserted that in parthenogenetic eggs the polar bodies are not ex- truded from the ovum; in such cases, though the nucleus divides, those of its products which would in other cases be extruded in polar bodies remain in the protoplasm of the ovum. But this is not a universal rule, for in some cases of parthenogenesis polar bodies are extruded in the usual way (Aphis, some Lepidoptera), and in some fertilized eggs the polar bodies are retained in the ovum.

It is quite probable that parthenogenesis is more common than has been supposed, and it appears that there is some evidence to show that ova, which in normal conditions are incapable of developing without fertilization, may yet develop if subjected to

an altered environment. For instance, it has been asserted that the addition of a certain quantity of chloride of magnesium and other substances to sea-water will cause the unfertilized ova of certain marine animals (Arbacia, Chaetopterus) to develop (J. Loeb, American Journal of Physiology, ix., 1901, p. 423); and according to M. Y. Delage (Comptes rendus, 135, 1902. Nos 15 and 16) such development may occur after the formation of polar bodies, the chromosomes undergoing reduction and the full number being regained in the segmenting stage. These experiments, if authenticated, suggest that ova have the power of development, but are not able to exercise it in their normal surroundings There is reason to believe that the same assertion may be made of spermatozoa. Phenomena of the nature of parthenogenesis have never been ob served in the male gamete, but it has been suggested by A. Giard {Cinquantenaire de la Soc. de Biol., 1900) that the phenomenon of the so-called fertilization of an enucleated ovum which has been described by T. Boveri and Delage in various eggs, and which results in development up to the larval form (merogony), is in reality a case in which the male gamete, unable to undergo development in ordinary circumstances on account of its small size and specialization of structure has obtained a nutritive environment which enables it'to display its latent power of development. Moreover, A. M. Giard suggests that in some cases of apparently normal fertilization one of the pronuclei may degenerate, the resultant embryo being the product of one pronucleus only. In this way he explains certain cases of hybridization in which the paternal (rarely the maternal) type is exclusively reproduced. For instance, in the batrachiate Amphibia, Heron Royer succeeded in 1883 in rearing, out of a vast number of attempts, a few hybrids between a female Pelobates fuscus and a male Rana fusca; the product was a Rana fusca. He also crossed a female Bufo vulgaris with a male Bufo calamita; in the few cases which reached maturity the product was obviously a Bufo calamita. Finally, H. E. Ziegler {Arch. f. Ent.-Mech., 1898, p. 249) divided the just-fertilized ovum of a sea-urchin in such a way that each half had one pronucleus; the half with the male pro- nucleus segmented and formed a blastula, the other degenerated. It is said that in a few species of animals males do not occur, and that parthenogenesis is the sole means of reproduction (a species of Ostracoda among Crustacea; species of Tenthredinidae,

Cynipidae and Coccidae among Insecta) ; this is the thelytoky of K. T. E. von Siebold. The number of species in which males are unknown is constantly decreasing, and it is quite possible that the phenomenon does not exist. Parthenogenesis, however, is undoubtedly of frequent occurrence, and is of four kinds, namely, (1) that in which males alone are produced, e.g. honey-bees (arrhenotoky) ; (2) that in which females only are produced (thelytoky), as in some saw-flies; (3) that in which both sexes are produced (deuteroloky) , as in some saw-flies; (4) that in which there is an alternation of sexual and parthenogenetic generations, as in Aphidae, many Cynipidae, &c. It would appear that " parthenogenesis does not favour the pro- duction of one sex more than another, but it is clear that it decidedly favours the production of a brood that is entirely of one sex, but which sex that is differs according to circumstances " (D. Sharp, Cambridge Natural History, " Insects," pt. i. p. 498). In some Insecta and Crustacea exceptional parthenogenesis occurs : a certain proportion of the eggs laid are capable of undergoing either the whole or a part of development parthenogenetically, e.g. Bombyx mori, &c. (A. Brauer, Arch. f. mikr. Anat., 1893; consult also E. Maupas on parthenogenesis of Rotifera, Comp. rend., 1889-1891, and R. Lauter- born, Biol. Centralblatt, xviii., 1898, p. 173).

The question of the determination of sex may be alluded to here. Is sex determined at the act of conjugation of the two gametes? Is it, in other words, an unalterable property _ of the zygote, a genetic character? Or does it depend /"« upon the conditions to which the zygote is subjected in flf'JLJ"' its development? In other words, is it an acquired character? It is impossible in the present state of knowledge to answer these questions satisfactorily, but the balance of evidence appears to favour the view that sex is an unalterable, inborn character. Thus those twins which are believed to come from a split zygote are always of the same sex, members of the same litter which have been submitted to exactly similar conditions are of different sexes, and all attempts to determine the sex of offspring in the higher animals by treatment have failed. On the other hand, the male bee is a portion of a female zygote — the queen-bee. The same remark applies to the male Rotifer, in which the zygote always gives rise to a female, from which the male arises parthenogenetically, but in these cases it does not appear that the production of males is in any way affected by external conditions (see R. C. Punnett, Proc. Royal Soc, 78 B, 1906, p. 223). It is said that in human societies the number of males born increases after wars and famines, but this, if true, is probably due to an affection of the gametes and not of the*

young zygote. For a review of the whole subject see L. Cuenot, Bull. sci. France et Belgique, xxxii., 1899, pp. 462-

535-

The first change the zygote undergoes in all animals is what is generally called the segmentation or cleavage of the ovum. This consists essentially of the division of the nucleus into a number of nuclei, around which the protoplasm sooner or later

becomes arranged in the manner ordinarily spoken of as cellular. This division of the nucleus is effected by the process called _ binary fission; that is to say, it first divides into

eav ge. ^^ ^ en eacn f tnese divides simultaneously again into two, giving four nuclei; each of these after a pause again simultaneously divides into two. So the process continues for some time until the ovum becomes possessed of a large number of nuclei, all of which have proceeded from the original nucleus by a series of binary fissions. This division of the nucleus, which constitutes the essential part of the cleavage of the ovum, con- tinues through the whole of life, but it is only in the earliest period that it is distinguished by a distinct name and used to characterize a stage of development. The nuclear division of cleavage is usually at first a rhythmical process; all the nuclei divide simultaneously, and periods of nuclear activity alternate with periods of rest. Nuclear divisions may be said to be of three kinds, according to the accompanying changes in the surrounding protoplasm: (1) accompanied by no visible change, e.g. the multinucleated Protozocn Actinosphaerium; (2) accompanied by a rearrangement of the protoplasm around each nucleus, but not by its division into two separate masses, e.g. the division which results in the formation of a colony of Protozoa; (3) accompanied by the division of the protoplasm into two parts, so that two distinct cells result, e.g. the divisions by which the free wandering leucocytes are produced, the reproduction of uninuclear Protozoa, &c. In the cleavage of the ovum the first two of these methods of division are found, but probably not the third. At one time it was thought that the nuclear divisions of cleavage were always of the third kind, and the result of cleavage was supposed to be a mass of isolated cells, which

became reunited in the subsequent development to give rise to the later connexion between the tissues which were known to exist. But in 1885 it was noticed that in the ovum of Peripatus capensis (A. Sedgwick, Quart. Journ. Mic. Science, xxv., 1885, p. 449) the extranuclear protoplasm did not divide in the cleavage of the ovum, but merely became rearranged round the increasing nuclei; the continuity of the protoplasm was not broken, but persisted into the later stages of growth, and gave rise to the tissue-connexions which undoubtedly exist in the adult. This discovery was of some importance, because it rendered intelligible the unity of the embryo so far as its developmental processes are concerned, the maintenance of this unity being somewhat surprising on the previous view. On further inquiry and examination it was found that the ova of many other animals presented a cleavage essentially similar to that of Peripatus. Indeed, it was found that the nuclear divisions of cleavage were of the first two kinds just described. In some eggs, e.g. the Alcyonaria, the first nuclear divisions are effected on the first plan, i.e. they take place without at first producing any visible effect upon the protoplasm of the egg. But in the later stages of cleavage the protoplasm becomes arranged around each nucleus and related to it as to a centre. In the majority of eggs, however, the protoplasm, though not undergoing complete cleavage, becomes rearranged round each nucleus as these are formed. The best and clearest instance of this is afforded by many Arthropodan eggs, in which the nucleus of the just-formed zygote takes up a central position, where it undergoes its first division, subsequent divisions taking place entirely within the egg and not in any way affecting its exterior. The result is to give rise to a nucleated network or foam-work of protoplasm, ramifying through the yolk-particles and containing these in its meshes.*

In other Arthropodan eggs the cleavage is on the so-called centrolecithal type, in which the dividing nuclei pass to the cortex of the ovum, and the surface of the ovum becomes indented with grooves corresponding to each nucleus. In this kind of cleavage all the so-called segments are continuous with the central undivided yolk-mass. It sometimes happens that in Arthropods the egg breaks up into masses, which cannot be said to have the value of cells, as they are frequently without nuclei. In other eggs, characterized by a considerable amount of yolk, e.g. the ova of Cephalopoda, and of the Vertebrata with much yolk, the first nucleus takes up an eccentric position in a small patch of

protoplasm which is comparatively free from yolk-particles. This patch is the germinal disc, and the nuclear divisions are confined to

it and to the transitional region, where it merges into the denser yolk which makes up the bulk of the egg. At the close of segmentation the germinal disc consists of a number of nuclei, each surrounded by its own mass of protoplasm, which is, however, not separated from the protoplasm round the neighbouring nuclei, as was formerly supposed, but is continuous" at the points of contact. In this manner the germinal disc has beecome converted into the blastoderm, which consists of a small watch-glass-shaped mass of so-called cells resting on, but con- tinuous with, the large yolk-mass. It is characteristic of this kind of ovum that there is always a row of nuclei, called the yolk- nuclei, placed in the denser yolk immediately adjacent to the blastoderm. These nuclei are continually undergoing division, one of the products of division, together with a little of the sparse yolk protoplasm, passing into the blastoderm to reinforce it (so-called formative cells). The other product of the dividing yolk-nuclei remains in the yolk, in readiness for the next division. In this manner nucleated masses of protoplasm are continually being added to the periphery of the blastoderm and assisting in its growth. But it must be borne in mind that all the nucleated masses of which the blastoderm consists are in continuity with each other and with the sparse protoplasmic reticulum of the subjacent yolk.

In the great majority of eggs, then, the nuclear division of cleavage is not accompanied by a complete division of the ovum into separate cells, but only by a rearrangement of the proto- plasm, which produces, indeed, the so-called cellular arrangement, and an appearance only of separate cells. But there still remain to be mentioned those small eggs in which the amount of yolk is inconsiderable, and in which division of the nuclei does appear to be accompanied by a complete division of the surrounding protoplasm into separate unconnected cells — ova of many Annelida, Mollusca, Echinoderma, &c, and of Mammalia amongst Vertebrata. In the case of these also (G. F. Andrews, Zool. Bulletin, ii., 1898) it has been shown that the apparently separate spheres are connected by a number of fine anastomosing threads of a hyaline protoplasm, which are not easy to detect and are readily destroyed by the action of reagents. It is there- fore probable that the divisions of the nuclei in cleavage are in no case accompanied by complete division of the surrounding protoplasm, and the organism in the cleavage stage is a continuous whole, as it is in all the other stages of its existence.

Of late years a great number of experiments have been made to discover the effects of dividing the embryo during its cleavage, and of destroying certain portions of it. These experi- ments have been made with the object of testing the e mbtyo.° view, held by some

authorities, that certain segments are already set apart in cleavage to give rise to certain adult organs, so that if they were destroyed the organs in question could not be developed. The results obtained have not borne out this view. Speaking generally, it may be said that they have been different according to the stage at which the separation was effected and the conditions under which the experiment was carried out. If the experiment be made at a sufficiently early stage, each part, if not too small, will develop into a normal, though small, embryo. In some cases the embryo remained imperfect for a certain time after the experiment, but the loss is eventually made good by regeneration. (For a summary of the work done on this subject see R. S. Bergh, Zool. Centralblatt, vii., 1900, p. 1.)

The end of cleavage is marked by the commencement of the differentiation of the organs. The first differentiation is the formation of the layers. These are three in number, TheIa er being called respectively the ectoderm, endoderm and tneory. mesoderm, or, in embryos in which at their first appearance they lie like sheets one above the other, the epiblast, hypoblast and mesoblast. The layers are sometimes spoken of as the primary organs, and their importance lies in the fact that they are supposed to be generally homologous through- out the series of the Metazoa. This view, which is based partly

on their origin and partly on their fate, had great influence on the science of comparative anatomy during the last thirty years of the 19th century, for the homology of the layers being ad- mitted, they afforded a kind of final courtof appealin determining questions of doubtful homologies between adult organs. Great importance was therefore attached to them by embryologists, and both their mode of development and the part which they play in forming the adult organs were examined with the greatest care. It is very unusual for all the layers to be established at the same time. As a general rule the ectoderm and endoderm, which may be called the primary layers, come first, and later the mesoderm is developed from one or other of them. There are two main methods in which the first two are differentiated — invagination and delamination. The former is generally found in small eggs, in which the embryo at the close of cleavage assumes the form of a sphere, having a fluid or gelatinous

material in its centre, and bounded externally by a thin layer of protoplasm, in which all the nuclei are contained. Such a sphere is called a blastosphere, and may be regarded as a spherical mass of protoplasm, of which the central portion is so much vacuolated that it seems to consist entirely of fluid. The central part of the blastosphere is called the segmentation cavity or blastocoel. The blastosphere soon gives rise, by the invagination of one part of its wall upon the other, and a consequent ob- literation of the segmentation cavity, to a double-walled cup with a wide opening, which, however, soon becomes narrowed to a small pore. This cup-stage is called the gastrula stage; the outer wall of the gastrula is the ectoderm, and its inner the endoderm; while its cavity is the enteron, and the opening to the exterior the blastopore. Origin of the primary layers by delamination occurs universally in eggs with large yolks (Cephalopoda and many Vertebra ta), and occasionally in others. In it cleavage gives rise to a solid mass, which divides by de- lamination into two layers, the ectoderm and endoderm. The main difference between the two methods of development lies in the fact that in the first of them the endoderm at its first origin shows the relations which it possesses in the adult, namely, of forming the epithelial wall of the enteric space, whereas in the second method the endoderm is at first a solid mass, in which the enteric space makes its appearance later by excavation. In the delaminate method the enteric space is at first without a blastopore, and sometimes it never acquires this opening, but a blastopore is frequently formed, and the two-layered gastrula stage is reached, though by a very different route from that taken in the formation of the invaginate gastrula. According to the layer-theory, these two layers are homologous throughout the series of Metazoa; their limits can always be accurately defined, they give rise to the same organs in all cases, and the adult organs (excluding the mesodermal organs) can be traced back to one or other of them with absolute precision. Thus the ectoderm gives rise to the epidermis, to the nervous system, and to the lining of the stomodaeum and proctodaeum, if such parts of the alimentary canal are present. The endoderm, on the other hand, gives rise to the lining of the enteron, and of the glands which open into it.

So far as these two layers are concerned, and excluding the mesoderm, it would appear that the layer-theory does apply in a very remarkable manner to the whole of the Metazoa. But even here, when the actual facts are closely scanned, there are found to be difficulties, which appear to indicate that the theory may not perhaps be such an infallible guide as it seems at first sight. Leaving out of consideration the case of the Mammalia, in which the differentiation

of the segmented ovum is not into ectoderm and endoderm, and the case of the sponges, the most important of these difficulties concern the stomodaeum and proctodaeum. The best case to examine is that of Peripatus capensis, in which the blastopore is at first a long slit, and gives rise to both the mouth and the anus of the adult. Here there is always found at the lips of the blastopore, and extending for a short distance inwards as enteric lining, a certain amount of tissue, which by its characters must be regarded as ectoderm. Now, in the closure of the blastopore between the mouth and

. Mesoderm.

anus, this tissue, which at the mouth and anus develops into the lining of the stomodaeum and proctodaeum, is left inside, and actually gives rise to the median ventral epithelium of the alimentary canal. Hence the development of Peripatus capensis suggests the conclusion, if we strictly apply the layer-theory, that a considerable portion of the true mesenteron is lined by ectoderm, and is not homologous with the corresponding portion of the mesenteron of other animals — a conclusion which will on all hands be admitted to be absurd. The difficulties in the application of the layer-theory become vastly greater when the origin and fate of the mesoderm is considered. The mesoderm is, if we may judge from the number of ‘ organs which are derived from it, much the most important of the three layers. It generally arises later than the others, and in its very origin presents difficulties to the theory, which are much increased when we consider its history. It is generally, though not always, developed from the endoderm, either as hollow outgrowths containing prolongations of the enteric cavity, which become the coelom, or as solid proliferations. But in some groups the mesoderm is actually laid down in cleavage, and is present at the end of that process. In others it is entirely derived from the ectoderm (Peripatus capensis). In yet others it is partly derived from endoderm and partly from ectoderm (primitive streak of amniotic Vertebrates). Finally, in whatever manner the first rudiments are developed, it fre- quently receives considerable reinforcements from one of the primary layers. For instance, the structure known as the nerve crest of the vertebrate embryo is not, as was formerly supposed, exclusively concerned with the formation of the spinal nerves and ganglia, but contributes largely to the mesoderm of the axial region of the body. This is particularly clearly seen in the case of the anterior part of the head of Elasmobranch and probably of other vertebrate embryos, where all the meso- derm present is derived from the anterior part of the neural crest (Quart. Journ. Mic. Science, xxxvii. p. 92).

The layer-theory, then, will not bear critical examination. It is clear, both from their origin and history, that the layers or masses of cells called ectoderm, endoderm and mesoderm have not the same value in different animals; indeed, it is misleading to speak of three layers. At the most we can only speak of two, for the mesoderm is formed after the others, has a composite origin, and has no more claim to be considered an embryonic layer than has the rudiment of the central nervous system, which in some animals, indeed, appears as soon as the mesoderm. Arguments as to homology, based on derivation or non-derivation from the same embryonic layer, have therefore in themselves but little value.

It has frequently been asserted that the reproductive cells are marked off at a very early stage of the development (Sagitta, certain Crustacea, Scorpio). Recently it has been asserted that in Ascaris (T. Boveri, Kuppfer's Festschrift, 1899, P- 383).the reproductive cells are set apart after the first cleavage, and that they can be traced by certain peculiarities of their nuclei into the adult reproductive glands.

It has been already stated that the mesoderm is a composite tissue. This fact is frequently conspicuous at its first establishment. In many Coelomata it is present under two forms from ,, the beginning. One of these is epithelial in character, chvme' while the other has the form of a network of protoplasm, with nuclei at the nodes. The former is called simply epithelial mesoderm, the latter mesenchyme. Sometimes the epithelial mesoderm is the first formed, and what little mesenchyme there is is developed from it (Amphioxus, Balanoglossus , &c). Sometimes the mesenchyme is the first to arise, the epithelial mesoderm develop- ing from it (most, if not all, Vertebrates). Finally, it sometimes happens that these two kinds of tissue arise separately from one or other of the primary layers (Echinodermata). As already hinted, in Balanoglossus and Amphioxus the whole of the mesoderm of the body is at first in an epithelial condition, being developed as an outgrowth of the gut-wall. In Peripatus capensis also, and possibly in ether Arthropods, it has at first an intermediate form, being derived from a primitive streak and not from the gut-wall, but it rapidly assumes an epithelial structure, from which all the mesodermal tissues are developed. In Annelids the bulk of the mesoderm has at first a modified epithelial form similar to that of Arthropods, but it is formed, not from a primitive streak, but from some peculiar cells produced in cleavage, called pole-cells. In Annelids with trocho- sphere larvae a certain amount of mesenchyme is formed at an earlier

stage and gives rise to the muscular bands of the young larva. In Echinodermata a certain amount of mesenchyme appears before the epithelial mesoderm, which is formed later as gut-diverticula. In these forms the mesenchyme is said to arise as wandering amoeboid cells, which are budded into the blastocoel by the endoderm just before and during its invagination, but the writer has reason to believe that this account of it does not quite describe what happens. It would seem to be more probable that the mesenchyme arises in these forms, as it certainly does in the case of the later-formed mesenchyme of the Vertebrate embryo, as a protoplasmic outflow from its tissue of origin, passing at first along the line of pre-existent protoplasmic strands which traverse the blastocoel, and sending out at the same time processes which branch and anastomose with neighbouring processes (see E. W. MacBride, Proc. Camb. Phil. Soc, 1896, p. 153). In the Vertebrata the whole of the mesoderm has at first the mesenchyme form. Afterwards, when the body-cavity split appears, the bulk of it assumes a kind of modified epithelial condition, which later on yields, by a process of outflow very, similar in its character to what has been supposed to occur in the Echinoderm blastula, a considerable mesenchyme of the reticulate character. Mesenchyme is the tissue which in Vertebrate embryology has fre- quently been called embryonic connective tissue. This name is no doubt due to the fact that it was supposed to consist of isolated stellate cells. It is, however, in no sense of the word connective tissue, because it gives rise to many organs having nothing whatever to do with connective tissue. For instance, in Vertebrata this tissue gives tise to nervous tissue, blood-vessels, renal tubules, smooth muscular fibres, and other structures, as well as to connective and skeletal tissues. The Vertebrata, indeed, are remarkable for the fact that the epithelial tissues of the so-called mesoderm, e.g. the epithelial lining of the body-cavity, and of the renal tubules and urogenital tracts, all pass through the mesenchymatous condition, whereas in Amphioxus, Balanoglossus and presumably Sagitta and the Brachiopoda, all the mesodermal tissues pass through the epithelial condition, most of the mesodermal tissues of the adult retaining this condition permanently. As has been implied in the above account, mesenchyme is usually formed from epithelial mesoderm or from endoderm, or from tissue destined to form endoderm. It is also sometimes formed from ectoderm, as in the

Vertebrata at the nerve crest and other places. In some Coelenterata also it appears certain that the ectoderm does furnish tissue of a mesenchymatous nature which passes into the jelly, but this phenomenon takes place comparatively late in life, at any rate after the embryonic period. In this connexion it may be interesting to point out that in many Coelenterates all the tissues of the body retain throughout life the epithelial condition, nothing comparable to mesenchyme ever being formed.

Finally, before leaving this branch of the subject, the fact that the three germinal layers are continuous with one another, and not isolated masses of tissue, may be emphasized. Continuity i n(jeed, an embryo may be defined as a multinucleated layers, protoplasmic mass, in which the protoplasm at any surface — whether internal or external — is in the form of a relatively dense layer, while that in the interior is much vacuolated and reduced to a more or less sparse reticulum, the nuclei either being exclusively found in the surface protoplasm, or if the embryo has any bulk and the internal reticulum is at all well developed, at the nodes of the internal reticulum as well.

The origin of some of the more important organs may now be considered. It is a remarkable fact that the mouth and anus develop in the most diverse ways in different groups, mus? and b ut as a rule either one or both of them can be traced into relation with the blastopore, the history of which must therefore be examined. In most, if not all, the great groups of the animal kingdom, e.g. in Coelenterata, Annelida, Mollusca, Vertebrata, and in Arthropoda, the blastopore or its repre- sentative is placed on the neural surface of the body, and, as will be shown later on, within the limits of the central nerve rudiment. Here it undergoes the most diverse fate, even in members of the same group. For instance, in Peripalus capensis it extends as a slit along the ventral surface, which closes up in the middle, but remains open at the two ends as the permanent mouth and anus. In other Arthropods, though full details have not yet in all cases been worked out, the following general statement may be made: — A blastopore (certain Crustacea) or its representative is formed on the neural surface of the embryo and always becomes closed, the mouth and anus arising as independent perforations later. Here no one would doubt the homology of the mouth and anus throughout the group; yet within the limits of a single genus — Peripatus — they show the most diverse modes of development. In Annelids the blastopore

sometimes becomes the mouth (most Chaetopoda); sometimes it

becomes the anus (Serpula); sometimes it closes up, giving rise to neither, though in this case it may assume the form of a long slit along the ventral surface before disappearing. In Mollusca its fate presents the same variations as in Annelida. Now in these groups no zoologist would deny the homology of the mouth and anus in the different forms, and yet how very different is their history even in closely allied animals. How are these apparently diverse facts to be reconciled ? The only satisfactory explanation which has been offered (Sedgwick, Quart. J. Mic. Science, xxiv., 1884, p. 43) is that the blastopore is homologous in all the groups mentioned, and is the repre- sentative of the original single opening into the enteric cavity, such as at present characterizes the Coelenterata. From it the mouth and anus have been derived, as is indicated by its history in Peripatus capensis, and by the variability in its behaviour in closely allied forms; such variability in its subsequent history is due to its specialization as a larval organ, as a result of which it has lost its capacity to give rise to both mouth and anus, and sometimes to either.

That the blastopore does become specialized as a larval organ is obvious in those cases in which it becomes transformed into the single opening with which some larvae are, for a time at least, alone provided, e.g. Pilidium, Echinoderm larvae, &c., and that larval characters have been the principal causes of the form of embryonic characters, strong reason to believe will be adduced later on. In the Vertebrata the behaviour of the blastopore (anus of Rusconi) is also variable in a very remarkable manner. As a rule it is slit-like in form and closes completely, but in most cases one portion of it remains open longer than the rest, as the neurenteric canal. In a few forms (e.g. Newt, Lepidosiren, &c.) the very hindermost portion of the slit-like blastopore remains permanently open as the anus, and from such cases it can be shown that the neurenteric aperture (when present) is derived from a portion of the blastopore just anterior to its hindermost end. The words ” hindermost ” and ” anterior ” are used on the assumption that the whole blastopore has retained its dorsal position; as a matter of fact the hindermost part of it — the part which persists or reopens as the anus — loses this position in the course of development and becomes shifted on to the ventral surface. This is clearly seen in Lepidosiren (Kerr, Phil. Trans. cxcii., 1900), in Elasmobranchii, and in Amniota (primitive streak). Moreover, in Lepidosiren, and possibly in some other forms, the anus, i.e. the hind end of the blastopore, is at first contained within the medullary plate and bounded behind by the medullary folds. Later the portions of the medullary plate in the neighbourhood of the anus completely

atrophy, and this relation is lost. This ex- tension of the hind end of the blastopore on to the ventral surface, and atrophy of the portion of the medullary plate in relation with it is a highly important phenomenon, and one to which attention will be again called when the relation of the mouth to the blastopore is being considered. The remarkable fact about the Vertebrata, a feature which that group shares in common with all other Chordata {Amphioxus, Tunicata, Enteropneusta) and with the Echinodermata, is that the mouth has never been traced into relation with the blasto- pore. For this reason, among others, it has been held by some zoologists that the mouth of the Vertebrata is not homologous with the mouth of such groups as the Annelida, Arthropoda and Mollusca. But, as has been explained above, in face of the extraordinary variability in the history of the mouth and anus in these groups, this view cannot be regarded as in any way established. On the contrary, there are distinct reasons for thinking that the Vertebrate mouth is a derivate of the blastopore. In the first place, in Elasmo- branchii (Sedgwick, Quart. Journ. Mic. Sci. xxxiii., 1892, p. 559), and in a less conspicuous form in other vertebrate groups, the mouth has at first a slit-like form, extending from the anterior end of the central nerve-tube backwards along the ventral surface of the anterior part of the embryo. This slit-like rudiment, recalling as it does the form which the blastopore assumes in so many groups and in many Vertebrata, does suggest the view that possibly the mouth of the Vertebrata may in reality be derived from a portion of an originally long slit-like neural blastopore, which has become extended anteriorly on to the ventral surface and has lost its original relation to the nerve rudiment, as has undoubtedly happened with the posterior part, which persists as the anus.*

Of the other organs which develop from the two primary layers it is only possible to notice here the central nervous system. This in almost all animals develops from the ectoderm. In Cephalopods among Mollusca — the development of which is remarkable from the almost complete absence of features which are supposed to have an ancestral significance — and in one or two other forms, it has been said to develop from the mesoderm ; but apart from

Central

system.

these exceptional and perhaps doubtful cases, the central nervous system of all embryos arises as thickenings of the ectoderm, and in the groups above mentioned, namely, Annelida, Mollusca, Arthropoda and Vertebrata, and probably others, from the ectoderm of the blastoporal surface of the body. This surface generally becomes the ventral surface, but in Vertebrata it becomes the dorsal. These thickened tracts of ectoderm in Peripatus and a few other forms can be clearly seen to surround the blastopore. This relation is retained in the adult in Peripatus, some Mollusca and some Nemertines, in which the main lateral nerve cords are united behind the anus as well as in front of the mouth; in other forms it cannot always be demonstrated, but it can, as in the case of the Vertebrata just referred to, always be inferred; only, in the Invertebrate groups the part of the nerve rudiment which has to be inferred is the posterior part behind the blastopore, whereas in Vertebrata it is the anterior part, namely, that in front of the blastopore, assuming that the mouth is a blastoporal derivate.

In the Echinodermata, Enteropneusta and one or two other groups, it is not possible, in the present state of knowledge, to bring the mouth into relation with the blastopore, nor can the blastopore be shown to be a perforation of the neural surface. For the Echinoderms, at any rate, this fact loses some of the importance which might at first sight be attributed to it when the remarkable or- ganization of the adult and the sharp contrast which exists between it and the larva is remembered. In some Annelids the central nervous system remains throughout life as part of the outer epi- dermis, but as a general rule it becomes separated from the epidermis and embedded in the mesodermal tissues. The mode in which this separation is effected varies according to the form and structure of the central nervous system. In the Vertebrata, in which this organ has the form of a tube extending along the dorsal surface of the body, it arises as a groove of the medullary plate, which becomes constricted into a canal. The wall of this canal consists of ectoderm, which at an earlier stage formed part of the outer surface of the body, but which after invagination thickens, to give rise to the epithelial lining of the canal and to the nervous tissue which forms the bulk of the canal wall. The fact that the blastopore remains open at the hind end of the medullary plate explains to a certain extent the peculiar relation which always exists in the embryo between the hind end of the neural and alimentary canals. This communication between the hind end of the neural tube and the gut is one of the most remarkable and constant features of the Vertebrate embryo. As has been pointed out,

it is not altogether unintelligible when we remember the relation of the blastopore to the medullary plate of the earlier stage, but to give a complete explanation of it is, and probably always will be, impossible. It is no doubt the impress of some remarkable larval condition of the blastopore of a stage of evolution now long past.

In Ceratodus the open part of the blastopore is enclosed by the medullary folds, as in Lepidosiren, and probably persists as the anus, the portion of the folds around the anus undergoing atrophy (Semon, Zool. Forschungsreisen in Australien, 1893, Bd. i. p. 39). In Urodeles the blastopore persists as anus, so far as is known, but the relation to the medullary folds has not been noticed. The same may be said of Petromyzon (A. E. Shipley, Quart. J own. Mic. Sci. xxviii.,

1887).

The nerve tube of the Vertebrata at a certain early stage of the embryo becomes bent ventralwards in its anterior portion, in such a manner that the anterior end, which is represented Cranial j n tne adult by the infundibulum, comes to project flexure. backwards beneath the mid-brain. This bend, which is called the cranial flexure, takes place through the niid-brain, so that the hind-brain is unaffected by it. The cranial flexure is not, however, confined to the brain : the anterior end of the noto- chord, which at first extends almost to the front end of the nerve tube (this extension, which is quite obvious in the young embryo of Elasmobranchs, becomes masked in the later stages by the extra- ordinary modifications which the parts undergo), is also affected by it. Moreover, it affects even other parts, as may be seen by the oblique, almost antero-posterior, direction of the anterior gill slits as compared with the transverse direction of those behind. No satisfactory explanation has ever been offered of the cranial flexure. It is found in all Vertebrates, and is effected at an early stage of the development. In the later stages and in the adult it ceases to be noticeable, on account of an alteration of the relative sizes of parts of the brain. This is due almost entirely to the enormous growth of the cerebral vesicle, which is an outgrowth of the dorsal wall of the fore-brain just short of its anterior end. The anterior end of the fore-brain remains relatively small throughout life as the in- fundibulum, and the junction of this part of the fore-brain with the part which is so largely developed, as the rudiment of the cerebrum, is marked by the attachment of the optic chiasma. The optic nerve, indeed, is morphologically the first cranial nerve, the olfactory being the second ; both are attached to what is morphologically the

dorsal side of the nerve tube. The morphological anterior end of the central nerve tube is the point of the infundibulum which is in contact with the pituitary body. While on the subject of the cranial flexure, it may be pointed out that there is a similar downward curve of the hind end of the nervous axis, which leads into the hind end of the enteron. If it be supposed that originally there was a communication between the infundibulum and pituitary body, then the ventral flexure found at both ends of the nerve axis would originally have had the same result, namely, of placing the neural and alimentary canals in communication. Moreover, the mouth would have had much the same relation to this imaginary anterior neurenteric canal that the anus has to the actual posterior one.

In Amphioxus and the Tunicata the early development of the central nervous system is very much like that of the Vertebrata, but the later stages are simpler, being without the cranial flexure. The Tunicata are remarkable for the fact that the nervous system, though at first hollow, becomes quite solid in the adult. In Balano- glossus the central nervous system is in part tubular, the canal being open at each end. It arises, however, by delamination from the ectoderm, the tube being a secondary acquisition. This is probably due to a shortening of development, for the same feature is found in some Vertebrata (Teleostei, Lepidosteus, &c), where the central canal is secondarily hollowed out in the solid keel-like mass which is separated from the ectoderm. Parts of the central nervous system arise by invagination in other groups; for instance, the cerebral ganglia of Dentalium are formed from the walls of two invaginations of ectoderm, which eventually disappear at the anterior end of the body (A. Kowalevsky, Ann. Mus. Hist. Nat. Marseilles, " Zoology," vol. i.). In Peripatus the cerebral ganglia arise in a similar way, but in this case the cavities of the invagination become separated from the skin and persist as two hollow append- ages on the lower side of the cerebral ganglia. In other Arthropods the cerebral ganglia arise in a similar way, but the invaginations disappear in the adult. In Nemertines the cerebral ganglia contain a cavity which communicates with the exterior by a narrow canal. Finally, in certain Echinodermata the ventral part of the central nervous system arises by the invagination of a linear streak of ectoderm, the cavity of the invagination persisting as the epineural canal.

Although the central nervous system is almost always de- veloped from the ectoderm of the embryo, the same cannot be said of the peripheral nerve trunks. These structures arise from the mesoblastic reticulum already described Peripheral (Sedgwick, Quart. Journ. Mic. Sci. xxxvii. 92). Inas- syste °^, much as this reticulum is

perfectly continuous with the precisely similar though denser tissue in the ectoderm and endoderm, it may well be that a portion of the nerve trunks should be described as being ectodermal and endodermal in origin, though the bulk of them are undoubtedly formed from that portion of the reticulum commonly described as mesoblastic. But, however that may be, the tissue from which the great nerve trunks are developed is continuous on all sides with a similar tissue which pervades all the organs of the body, and in which the nuclei of these organs are contained.

In the early stages of development this tissue is very sparse and not easily seen. It would appear, indeed, that it is of a very delicate texture and readily destroyed by reagents. It is for this reason that the layers of the Vertebrate embryo are commonly represented as being quite isolated from one another, and that the medullary canal is nearly always represented as bejng completely isolated at certain stages from the surrounding tissues. In reality the layers are all connected together by this delicate tissue — in a sparse form, it is true — which not only extends between them, but also in a denser and more distinct form pervades them. In the germinal layers themselves, and in the organs developing from them, this tissue is in the young stages almost entirely obscured by the densely packed nuclei which it contains. For instance, in the wall of the medullary canal in the Vertebrate embryo, in the splanchnic and somatic layers of mesoderm of the same embryo, and in the developing nerve cords of the Peripatus embryo, the nuclei are at first so densely crowded together that it is almost impossible to see the protoplasmic framework in which they rest, but as development proceeds this extranuclear tissue becomes more largely developed, and the nuclei are forced apart, so that it becomes visible and receives various names according to its position. In the wall of the medullary canal of the Vertebrate embryo, on the 'outside of which it becomes especially conspicuous in certain places, and on the dorsal side of the developing nerve cords of the Peripatus embryo, it constitutes the white matter of the developing nerve cord ; in the mesoblastic tissue outside, where it at the same time becomes more conspicuous (Sedgwick, " Mono- graph of the Development of Peripatus capensis," Studies from the Morph. Lab. of the University of Cambridge, iv., 1889, p. 131), it forms the looser network of the mesoblastic reticulum ; and connecting the two, in place of the few and delicate strands of this tissue of the former stage, there are at certain places well-marked cords of a relatively dense texture, with the meshefi of the reticulum elongated

in the direction of the cord. This latter structure is an incipient nerve trunk. It can be traced outwards into the mesoblastic reti- culum, from the strands of which it is indeed developed, and with which it is continuous not only at its free end, but also along its whole course. In this way the nerve trunks are developed — by a gathering up, so to speak, of the fibres of the reticulum into bundles. These bundles are generally marked by the possession of nuclei, especially in their cortical parts, which become no doubt the nuclei of the nerve sheath, and, in the neighbourhood of the ganglia, of nerve cells. From this account of the early development of the nerves, it is apparent that they are in their origin continuous with all the other tissues of the body, with that of the central nervous system and with that which becomes transformed' into muscular tissue and connective and epithelial tissues. All these tissues are developed from the general reticulum, which in the young embryo can be seen to pervade the whole body, not being confined to the mesoderm, but extending between the nuclei of the ectoderm and endoderm, and forming the extra-nuclear, so-called cellular, proto- plasm of those layers. Moreover, it must be remarked that in the stages of the embryo with which we are here concerned the so-called cellular constitution of the tissues, which is such a marked feature of the older embryo and adult, has not been arrived at. It is true, indications of it may be seen in some of the earlier-formed epithelia, but of nerve cells, muscular cells, and many kinds of gland cells no distinct signs are yet visible. This remark particularly applies to nerve cells, which do not make their appearance until a much later stage — not, indeed, until some time after the principal nerve trunks and ganglia are indicated as tracts of pale fibrous substance and aggregations of nuclei respectively. <■

The embryos of Elasmobranchs — particularly of .Scyllium — are the best objects in which to study the development cf nerves. In many embryos it is difficult to make out what happens, because the various parts of the body remain so close together that the process is obscured, and the loosening of the mesoblastic nuclei is deferred until after the nerves have begun to be differentiated. The process may also be traced in the embryos of Peripatus, where the main features are essentially similar to those above described (op. cit. p. 131). The development of the motor nerves has been worked out in Lepidosiren by J. Graham Kerr (Trans. Roy. Soc. of Edinburgh, 41, 1904. p. 119).

To sum up, the development of nerves is not, as has been recently urged, an outgrowth of cell processes from certain cells, but is a differentiation of a substance which was already in position, and from which all other organs of the body have been and are developed. It frequently happens that the young nerve tracts can be seen sooner near the central organ than elsewhere, but it is doubtful if any importance can be attached to this fact, since it is not constantly observed. For instance, in the case of the third nerve of Scyllium the differentiation appears to take place earliest near the ciliary ganglion, and to proceed from that point to the base of the mid-brain.

There are two main methods in which new organs are de- veloped. In the one, which indicates the possibility of physio- c logical continuity, the organ arises by the direct

modification of a portion of a pre-existing organ; the development of the central nervous system of the Vertebrata from a groove in the embryonic ectoderm may be taken as an example of this method. In the other method there is no continuity which can be in any way interpreted as physiological; a centre of growth appears in one of the parts of the embryo, and gives rise to a mass of tissue which gradually shapes itself into the required organ. The development of the central nervous system in Teleosteans and in other similar exceptional cases may be mentioned as an example of the second plan. Such a centre of growth is frequently called a blastema, and consists of a mass of closely packed nuclei which have arisen by the growth- activity of the nuclei in the neighbourhood. The coelom, an organ which is found in the so-called coelomate animals, and which in the adult is usually divided up more or less completely into three parts, namely, body-cavity, renal organs, generative glands, presents in different animals both these methods of development. In certain animals it develops by the direct modification of a part of the primitive enteron, while in others it arises by the gradual shaping of a mass of tissue which consists of a compact mass of nuclei derived by nuclear proliferation from one or more of the pre-existing tissues of the body. Inas- much as the first rudiment of the coelom nearly always makes its appearance at an early stage, when the ectoderm and endoderm are almost the only tissues present, and as it then bulks relatively

very large and frequently contains within itself the potential centres of growth of other organs, e.g. mesenchymal organs (see above), it has come to be regarded by embryologists as being the forerunner of all the so-called mesodermal organs of the body, and has been

dignified with the somewhat mysterious rank which attaches to the conception of a germinal layer. Its prominence and importance at an early stage led embryologists, as has already been explained, to overlook the fact that although some of the centres of growth for the formation of other non- coelomic mesodermal organs and tissues may be contained within it, all are not so contained, and that there are centres of mesodermal growth still left in the ectoderm and endoderm after its establishment. If these considerations, and others like them, are correct, it would seem to follow that the conception implied by the word mesoderm has no objective existence, that the tissue of the embryo called mesoderm, though sometimes mainly the rudiment of the coelom, is often much more than this, and contains within itself the rudiment of many, sometimes of all, of the organs appertaining to the mesenchyme. In thus con- taining within itself the potential centres of growth of other organs and tissues which are commonly ranked as mesodermal, it is not different from the rudiments of the two other organs already formed, namely, the ectoderm and endoderm; for these contain within themselves centres of growth for the production of so-called mesodermal tissues, as witness the nerve-crest of Vertebrata, the growing-point of the pronephric duct, and the formation of blood-vessels from the hypoblast described for some members of the same group.

In Echinodermata, Amphioxus, Enteropneusta, and aˆ few other groups, the coelom develops from a portion or portions of the primitive enteron, which eventually becomes separated from the rest and forms a variable number of closed sacs lying between the gut and the ectoderm. The number of these sacs varies in different animals, but the evidence at present available seems to show that the maximum number is five — an unpaired one in front and two pairs behind — and, further, that if a less number of sacs is actually separated from the enteron, the rule is for these sacs so to divide up that they give rise to five sacs arranged in the manner indicated. The Enteropneusta present us with the clearest case of the separation of five sacs from the primitive enteron (W. Bateson, Quart. Journ. Mic. Sci. xxiv., 1884). In Amphioxus, according to the important researches of E. W. MacBride {Quart. Journ. Mic. Sci. xl. 589), it appears that a similar process occurs, though it is complicated by the fact that the sacs of the posterior pair become divided up at an early stage into many pairs. In Phoronis there are indications of the same phenomenon (A. T. Masterman, Quart. Journ. Mic. Sci. xliii. 375). In the Chaetognatha a single sac only is separated from the enteron, but soon becomes divided up. In the Brachio- poda one pair of sacs is separated from the enteron, but our knowledge of their later history

is not sufficient to enable us to say whether they divide up into the typically arranged five sacs. In Echinodermata the number of sacs separated from the enteron varies from one to three; but though the history of these shows considerable differences, there are reasons to believe that the typical final arrangement is one unpaired and two paired sacs. But however many sacs may arise from the primitive enteron, and however these sacs may ultimately divide up and arrange themselves, the important point of development common to all these animals, about which there can be no dispute, is that the coelom is a direct differentiation of a portion of the enteron.

In the majority of the Coelomata the coelomic rudiment does not arise by the simple differentiation of a pre-existing organ, and there is considerable variation in its method of formation. Speaking generally, it may be said to arise by the differentiation of a blastema (see above), which develops at an early stage as a nuclear proliferation from one or more growth-centres in one or both of the primary layers. It appears in this tissue as a sac or as a series of sacs, which become transformed into the body- cavity (except in the Arthropoda), into the renal organs (with the possible exception, again, of some Arthropoda), and into the reproductive glands. In metamerically segmented animals the

appearance of the cavities of these sacs is synchronous with, and indeed determines, the appearance of metameric segmenta- tion. In all segmented animals in which the mesoderm (coelomic rudiment) appears as a continuous sheet or band of tissue on each side of the body, the coelomic cavity makes its first appear- ance not as a continuous space on each side, which later becomes divided up into the structures called mesoblastic somites, but as a series of paired spaces round which the coelomic tissue arranges itself in an epithelial manner. In the Vertebrata, it is true, the ventral portion of the coelom appears at first as a continuous space, at any rate behind the region of the two anterior pairs of somites, but in the dorsal portion the coelomic cavity is developed in the usual way, the coelomic tissue becoming transformed into the muscle plates and rudimentary renal tubules of the later stages. With regard to this

ventral portion of the coelom in Vertebrata, it is to be noticed that the cavity in it never becomes divided up, but always remains continuous, forming the perivisceral portion of the coelom. The probable explanation of this peculiarity in the development of the Verte- brate coelom, as compared with that of Amphioxus and other segmented animals, is that the segmented stage of the ventral portion of the coelom is omitted. This explanation derives some support from the fact that even in animals in which the coelom is at its first appearance wholly segmented, it frequently happens that in the adult the perivisceral portion of it is un- segmented, i.e. it loses during development the segmentation which it at first possesses. This happens in many Annelida and in Amphioxus. The lesson, then, which the early history of the coelom in segmented animals teaches is, that however the coelomic cavity first makes its appearance, whether by evagina- tions from the primitive enteron, or by the hollowing out of a solid blastema-like tissue which has developed from one or both of the primary layers, it is in its first origin segmented, and forms the basis on which the segments of the adult are moulded. In Arthropoda the origin of the coelom is similar to that of Annelids, but its history is not completely known in any group, with the exception of Peripatus. In this genus it develops no perivisceral portion, as in other groups, but gives rise solely to the nephridia and to the reproductive organs. It is probable, though not certainly proved, that the history of the coelom in other Arthropods is essentially similar to that of Peripatus, allowance being made for the fact that the nephridial portion does not attain full development in those forms which are without nephridia in the adult.

With regard to the development of the vascular system, little can be said here, except that it appears to arise from the spaces of the mesoblastic reticulum. When this reticulum is sparse or so delicate as to give way in manipulation, these spaces appear to be represented by a continuous space which in- the earliest stages of development is frequently spoken of as the blastocoel or segmentation cavity. They acquire special epithelial walls, and form the main trunks and network of smaller vessels found in animals with a canalicular vascular system, or the large sinus-like spaces characteristic of animals with a haemocoelic body-cavity.

The existence of a phase at the beginning of life during which a young animal acquires its equipment by a process of growth of the germ is of course intelligible enough; such a Transient p ij ase ,j s seen j n the formation of buds, and in the organs." " sexua l reproduction of both animals and plants. The remarkable point is that while in most cases this embryonic growth isa direct and simple

process — e.g. animal and plant buds, embryonic development of plant seeds — in many cases of sexual reproduction of animals it is not direct, and the embryonic phase shows stages of structure which seem to possess a meaning other than that of being merely phases of growth. The fact that these stages of structure through which the embryo passes sometimes present for a short time features which are permanent in other members of the same group, adds very largely to the interest of the phenomenon and necessitates its careful examination. This may be divided into two heads: (i) in relation to embryos, (2) in relation to larvae. So iar as embryos

are concerned, we shall limit ourselves mainly to a consideration of the Vertebrata, because in them are found most instances of that remarkable phenomenon, the temporary assumption by certain organs of the embryo of stages of structure which are permanent in other members of the same group. As is well known, the embryos of the higher Vertebrata possess in the structure of the pharynx and of the heart and vascular system certain features — namely, paired pharyngeal apertures, a simple tubular heart, and a single ventral aorta giving off right and left a number of branches which pass between the pharyngeal apertures — which permanently characterize those organs in fishes. The skeleton, largely bony in the adult, passes through a stage in which it is entirely without bone, and consists mainly of cartilage — the form which it permanently possesses in certain fishes. Further, the Vertebrate embryo possesses for a time a notochord, a segmented muscular system, a continuity between the peri- cardium and the posterior part of the perivisceral cavity — all features which characterize certain groups of Pisces in the adult state. Instances of this kind might be multiplied, for the work of anatomists and embryologists has of late years been largely devoted to adding to them. Examples of embryonic characters which are not found in the adults of other Vertebrates are the following: — At a certain stage of development the central nervous system has the form of a groove in the skin, there is a communica- tion at the hind end of the body between the neural and ali- mentary canals, the mouth aperture has at first the form of an elongated slit, the growing end of the Wolffian duct is in some groups continuous with the ectoderm, and the retina is at one stage a portion of the wall of the medullary canal. In the embryos of the lower Vertebrates many other instances of the same interesting character might be mentioned; for instance, the presence of a coelomic sac close to the eye, of another in the jaw, and of a third near the ear (Elasmobranchs), the opening of the Miillerian duct into the front end of the Wolffian duct, and the presence of an aperture of communication between the muscle-plate

coelom and the nephridial coelom.

The interest attaching to these remarkable facts is much increased by the explanation which has been given of them. That explanation, which is a deduction from the theory of evolution, is to the effect that the peculiar embryonic structures and relations just mentioned are due to the retention by the embryo of features which, once possessed by the adult ancestor, have been lost in the course of evolution. This explanation, which at once suggests itself when we are dealing with structures actually present in adult members of other groups, does not so obviously apply to those features which are ˆ apltu " found in no adult animal whatsoever. Nevertheless theory. it has been extended to them, because they are of a nature which it is not impossible to suppose might have existed in a working animal. Now this explanation, which, it will be observed, can only be entertained on the assumption that the evolution theory is true, has been still further extended by embryologists in a remarkable and frequently unjustifiable manner, and has been applied to all embryonic processes, finally leading to the so-called recapitulation theory, which asserts that embryonic history is. a shortened recapitulation of ancestral history, or, to use the language of modern zoology, that the ontogeny or development of the individual contains an abbreviated record of the phytogeny or development of the race. A theory so important and far-reaching as this requires very careful examina- tion. When we come to look for the facts upon which it is based, we find that they are non-existent, for the ancestors of all living animals are dead, and we have no means of knowing what they were like. It is true there are fossil remains of animals which have lived, but these are so imperfect as to be practically useless for the present requirements. Moreover, if they were perfectly pre- served, there would be no evidence to show that they were ancestors of the animals now living. They might have been animals which have become extinct and left no descendants. Thus the explanation ordinarily given of the embryonic structures referred to is purely a deduction from the evolution theory. I Indeed, it is even less than this, for all that can be said is

something of this kind: if the evolution theory is true, then it in conceivable that the reason why the embryo of a bird passes through

a stage in which its pharynx presents some resemblance to that of a fish is that a remote ancestor of the bird possessed a pharynx with lateral apertures such as are at present found in fishes.

But the explanation is sometimes pushed even further, and it is said that these pharyngeal apertures of the ancestral bird had the same respiratory function as the corresponding structures in modern fishes. That this is going too far a little reflection will show. For if it be admitted that all so-called vestigial structures had once the same function as the homologous structures when fully developed in other animals, it becomes necessary to admit that male mammals must once have had fully developed mammary glands and suckled the young, that female mammals formerly were provided with a functional penis, and that in species in which the females have a trace of the secondary sexual characters of the male the latter were once common to both sexes. The second and more extended form of the explanation plainly introduces a considerable amount of contentious matter, and it will be advisable, in the first instance, at any rate, to confine ourselves to a critical examination of the less ambitious con- ception. This explanation obviously implies the view that in the course of evolution the tendency has been for structures to persist in the embryo after they have been lost in the adult. Is there any justification for this view? It is clearly impossible to get any direct evidence, because, as explained above, we have no know- ledge of the ancestors of living animals; but if we assume the evolution theory to be true, there is a certain amount of indirect evidence which is distinctly opposed to the view. As is well known, living birds are without teeth, but it is generally assumed that their edentulous condition has been comparatively recently acquired, and that they are descended from animals which, at a time not very remote from the present, possessed teeth. Considering the resemblance of birds to other terrestrial verte- brates, and the fact that extinct birds, not greatly differing from birds now living, are known to have had teeth, it must be allowed that there is some warrant for the assumption. Yet in no single case has it been certainly shown that any trace of teeth has been developed in the embryo. The same remark applies to a large number of similar cases; for instance, the reduced digits of the bird's hand and foot and the limbs of snakes. Moreover, organs which are supposed to have become recently reduced and functionless in the adult are also reduced in the embryo; for instance, digits 3 and 4 of the horse's foot, the hind limbs of whales (G. A. Guldberg and F. Nansen, " On the Development and Structure of Whales," Bergen Museum, 1894), the spiracle of Elasmobranchii. In fact, considerations of this kind

dis- tinctly point to the view that any tendency to the reduction or enlargement of an organ in the adult is shared approximately to the same extent by the embryo. But there are undoubtedly some, though not many, cases in which organs which were pre- sumably present in an ancestral adult have persisted in the embryo of the modern form. As an instance may be mentioned the presence in whale-bone whales of imperfectly formed teeth, which are absorbed comparatively early in foetal life (Julin, Arch, biologie, i., 1880, p. 75).

It therefore becomes necessary to inquire why in some cases an organ is retained by the embryo after its loss by the adult, whereas in other cases it dwindles and presumably disappears simultaneously in the embryo and the adult. The whole question is examined and discussed by the present writer in the Quarterly Journal of Microscopical Science, xxxvi., 1894, p. 35, and the conclusions there reached are as follows: — A disappearing adult organ is not retained in a relatively greater development by an organism in the earlier stages of its individual growth unless it is of functional importance to the young form. In cases in which the whole development is embryonic this rarely happens, because the conditions of embryonic life are so different from free life that functional embryonic organs are usually organs sui generis, e.g. the placenta, amnion, &c, which cannot be traced to a modification of organs previously present in the adult. It does,

however, appear to have happened sometimes, and as an instance of it may be mentioned the ductus arteriosus of the Sauropsidan and Mammalian embryo. On the other hand, when there is a considerable period of larval life, it does appear that there is a strong case for thinking that organs which have been lost by the adult may be retained and made use of by the larva. The best- known example that can be given of this is the tadpole of the frog. Here we find organs, viz. gills and gill-slits, which are universally regarded as having been attributes of all terrestrial Vertebrata in an earlier and aquatic condition, and we also notice that their retention is due to their being useful on account of the supposed ancient conditions of life having been retained. Many other instances, more or less plausible, of a like retention of ancestral features by larvae might be mentioned, and it must be conceded that thers are strong reasons for supposing that larvae often retain traces, more or less complete, of ancestral stages of structure. But this admission does not carry with it any obligation to accept the widely prevalent view that larval history can in any way be regarded as a recapitulation of ancestral history. Far from it, for larvae in retaining some ancestral features are in no way different from adults; they only differ from adults in the features

which they have retained. Both larvae and adults retain ancestral features, and both have been modified by an adaptation to their respective conditions of life which has ever been becoming more perfect.

The conclusion, then, has been reached, that whereas larvae frequently retain traces of ancestral stages of adult structure, embryos will rarely do so; and we are confronted again with the question, How are we to account for the presence in the embryo of numerous functionless organs which cannot be explained otherwise than as having been inherited from a previous con- dition in which they were functional ? The answer is that the only organs of this kind which have been retained are organs which have been retained by the larvae of the ancestors after they have been lost by the adult, and have become in this way impressed upon the development. As an illustration taken from current natural history of the manner in which larval characters are in actual process of becoming embryonic may be mentioned the case of the viviparous salamander {Salamander atra) , in which the gills, &c, are all developed but never used, the animal being born without them. . In other and closely allied species of salamander there is a considerable period of larval life in which the gills and gill-slits are functional, but in this species the larval stage, for the existence of which there was a distinct reason, viz. the entirely aquatic habits of life in the young state, has become at one stroke embryonic by its simple absorption into the embryonic period. The view, then, that embryonic develop- ment is essentially a recapitulation of ancestral history must be given up; it contains only a few references to ancestral history,, namely, those which have been preserved probably in a much modified form by previous larvae.

We must now pass to the consideration of another supposed law of embryology — the so-called law of v. Baer. This generali- zation is usually stated as follows: — Embryos of different species of the same group are more alike than Y% Baer . adults, and the resemblances are greater the younger the embryo examined. Great importance has been attached to this generalization by embryologists and naturalists, and it is very widely accepted. Nevertheless, it is open to serious criti- cism. If it were true, we should expect to find that embryos of closely similar species would be indistinguishable, but this is notoriously not the case. On the contrary, they often differ more than do the adults, in support of which statement the embryos of the different species of Peripatus may be referred to. The generalization undoubtedly had its origin in the fact that there is what may be called a family resemblance between embryos, but this

resemblance, which is by no means exact, is purely superficial, and does not extend to anatomical detail. On the contrary, it may be fairly argued that in some cases embryos of widely dissimilar members of the same group present anatomical differences of a higher morphological value than do the adults (see Sedgwick, loc. cit.), and, as stated above the

embryos of closely allied animals are distinguishable at all stages of development, though the distinguishing features are not the same as those which distinguish the adults. To say that the development of the organism and of its component parts is a progress from the simple to the complex is to state a truism, but to state that it is also a progress from the general to the special is to go altogether beyond the facts. The bipinnaria larva of an echinoderm, the trochosphere larva of an annelid, the blastodermic vesicle of a mammal are all as highly specialized as their respective adults, but the specialization is for a different purpose, and of a different kind to that which characterizes the adult.

In its scientific and systematic form embryology may be considered as having only taken birth within the last century, although the germ from which it sprung was already History of f ormec i nearly half a century earlier. The ancients, ology. it is true, as we see by the writings of Aristotle and Galen, pursued the subject with interest, and the indefatigable Greek naturalist and philosopher had even made continued series of observations on the progressive stages of development in the incubated egg, and on the reproduction of various animals; but although, after the revival of learning, various anatomists and physiologists from time to time made contributions to the knowledge of the foetal structure in its larger organs, yet from the minuteness of the observations required for embryological research, it was not till the microscope came into use for the investigation of organic structure that any intimate knowledge was attained of the nature of organogenesis. It is not to be wondered at, therefore, that during a long period, in this as in other branches of physical inquiry, vague speculations took the place of direct observation and more solid information. This is apparent in most of the works treating of generation during the 16th and part of the 17th centuries. 1

Harvey was the first to give, in the middle of the latter century, a new life and direction to investigation of this subject, by his discovery of the connexion between the cicatricula of the yolk and the rudiments of the chick, and by hjs faithful description of the successive stages of development as observed in the in- cubated egg, as well as of the progress of gestation in some Mammalia. He had also the merit of fixing the attention of physiologists upon general laws of development as deduced from actual observation of the phenomena, by the enunciation of two important propositions, viz. — (1) that all animals are produced out of ova, and (2) that the organs of the embryo arise by new formation, or epigenesis, and not by mere enlarge- ment out of a pre-existing invisible condition (Exercitationes de generatione animalium, Amstelodami, 1651). Harvey's observa- tions, however, were aided only by the use of magnifying glasses (perspecillae) , probably of no great power, and he saw nothing of the earliest appearances of the embryo in the first thirty-six hours, and believed the blood and the heart to be the parts first formed.

The influence of the work of Harvey, and of the successful application of the microscope to embryological investigation, was soon afterwards apparent in the admirable researches of Malpighi of Bologna, as evinced by his communications to the

1 It may be proper to mention, as authors of this period who made special researches on the development of the embryo — (1) Volcher Coiter of Groningen, who, along with Aldrovandus of Bologna, made a series of observations on the formation of the chick, day by day, in the incubated egg, which were described in a work published in 1573, and (2) Hieronymus Fabricius (ab Aquapendente), who, in his work De formato foetu, first published at Padua in 1600, gave an interesting account, illustrated by many fine engravings, of uterogestation and the foetus of a number of quadrupeds and other animals, and in a post- humous work entitled De formatione ovi et pulli, edited by J. Prevost and published at Padua in 1 62 1, described and illustrated by engrav- ings the daily changes of the egg in incubation. It is enough, how- ever, to say that Fabricius was entirely ignorant of the earlier phenomena of development which occur in the first two or three days, and even of the source of the embryonic rudiments, which he con- ceived to spring, not from the yolk or true ovum, but from the chalazae or twisted, deepest part of the white. The cicatricula he boked upon as merely the vestige of the pedicle by which the yolk had previously been attached to the ovary.

Royal Society of London in 1672, " De ovo incubato," and " De

formatione pulli," and more especially in his delineations of some of the earlier phenomena of development, in which, as in many other parts of minute anatomy, he partially or wholly anticipated discoveries, the full development of which has only been accomplished in the present century. Malpighi traced the origin of the embryo almost to its very commencement in the formation of the cerebro-spinal groove within the cicatricula, which he removed from the opaque mass of the yolk; and he only erred in supposing the embryonal rudiments to have pre- existed as such in the egg, in consequence, apparently, of his having employed for observation, in very warm weather, eggs which, though he believed them to be unincubated, had in reality undergone some of the earlier developmental changes.

The works of Walter Needham (1667), Regnier de Graaf (1673), Swammerdam (168.5), Vallisneri (1689) — following upon those of Harvey — all contain important contributions to the knowledge of our subject, as tending to show the similarity in the mode of production from ova in a variety of animals with that previously best known in birds. The observations more especially of de Graaf, Nicoks Steno and J. van Home gave much greater precision to the knowledge of the connexion between the origin of the ovum of quadrupeds and the vesicles of the ovary now termed Graafian, which de Graaf showed always burst and dis- charged their contents on the occurrence of pregnancy.

These observations bring us to the period of Boerhaave and Albinus in the earlier part of the 18th century, and in the suc- ceeding years to that of Haller, whose vast erudition and varied and accurate original observations threw light upon the entire process of reproduction in animals, and brought its history into a more systematic and intelligible form. A considerable part of the seventh and the whole of the eighth volumes of Haller's great work, the Elementa physiologiae, published at successive times from 1757 to 1766, are occupied with the general view of the function of generation, while his special contributions to embryology are contained in his Deux mfmoires sur la formation du cceur dans le poulet and Deux memoires sur la formation des os, both published at Lausanne in 1758, and republished in an extended and altered form, together with his " Observations on the early condition of the Embryo in Quadrupeds," made along with Kuhlemann, in the Opera minora (1762-1768). Though originally educated as a believer in the doctrine of " preforma- tion " by his teacher Boerhaave, Haller was soon led to abandon that view in favour of " epigenesis " or new formation, as may be seen in various parts of his works published

before the middle of the century; see especially a long note explanatory of the grounds of his change of opinion in his edition of Boerhaave's Praelectiones academicae, vol. v. part 2, p. 497 (1744), and his Primae lineae physiologiae (1747). But some years later, and after having been engaged in observing the phenomena of development in the incubated egg, he again changed his views, and during the remainder of his life was a keen opponent of the system of epigenesis, and a defender and exponent of the theory of " evolution," as it was then named — a theory very different from that now bearing the name, and which implied belief in the pre-existence of the organs of the embryo in the germ, according to the theory of encasement (embottement) or inclusion supported by Leibnitz and Bonnet. (See the interesting work of Bonnet, Considerations sur les corps organises, Amsterdam, 1762, for an account of his own views and those of Haller.)

It was reserved for Caspar Frederick Wolff (1733-1794), a German by birth, but naturalized afterwards in Russia, to bring forward observations which, though almost entirely neglected for a long time after their publication, and in some measure discredited under the influence of Haller's authority, were sixty years later acknowledged to have established the theory of epigenesis upon the secure basis of ascertained facts, and to have laid the first foundation of the morphological science of embryology. Wolff's work, entitled Theoria generationis, first published as an inaugural Dissertation at Berlin in 1759, was republished with additions in German at Berlin in 1764, and again in Latin at Halle in 1774. Wolff also wrote a " Memoir on

the Development of the Intestine " in Nov. comment, acad. Petropol., 1768 and 1769. But it was not till the latter work was translated into German by J. F. Meckel, and appeared in his Archiv for 1812, that Wolff's peculiar merits as the founder of modern embryology came to be known or fully appreciated.

The special novelty of Wolff's discoveries consisted mainly in this, that he showed that the germinal part of the bird's egg forms a layer of united granules or organized particles (cells of the modern histologist), presenting at first no semblance of the form or structure of the future embryo, but gradually converted by various

morphological changes in the formative material, which are all capable of being traced by observation, into the several rudimentary organs and systems of the embryo. The earlier form of the embryo he delineated with accuracy; the actual mode of formation he traced in more than one organ, as for example in the alimentary canal, and he was the discoverer of several new and important embryological facts, as in the in- stance of the primordial kidneys, which have thus been named the Wolffian bodies. Wolff further showed that the growing parts of plants owe their origin to organized particles or cells, so that he was led to the great generalization that the processes of embryonic formation and of adult growth and nutrition are all of a like nature in both plants and animals. No advance, however, was made upon the basis of Wolff's discoveries till the year 181 7, when the researches of C. H. Pander on the develop- ment of the chick gave a fuller and more exact view of the pheno- mena less clearly indicated by Wolff, and laid down with greater precision a plan of the formation of parts in the embryo of birds, which may be regarded as the foundation of the views of all subsequent embryologists.

But although the minuter investigation of the nature and true theory of the process of embryonic development was thus held in abeyance for more than half a century, the interval was not unproductive of observations having an important bearing on the knowledge of the anatomy of the foetus and the function of reproduction. The great work of William Hunter on the human gravid uterus, containing unequalled pictorial illustra- tions of its subject from the pencil of Rymsdyk and other artists, was published in 1775; x and during a large part of the same period numerous communications to the Memoirs of the Royal Society testified to the activity and genius of his brother, John Hunter, in the investigation of various parts of comparative embryology. But it is mainly in his rich museum, and in the manuscripts and drawings which he left, and which have been in part described and published in the catalogue of his wonderful collection, that we obtain any adequate idea of the unexampled industry and wide scope of research of that great anatomist and physiologist.

As belonging to a somewhat later period, but still before the time when the more strict investigation of embryological phenomena was resumed by Pander, there fall to be noticed, as indicative of the rapid progress that was making, the experiments of L. Spallanzani, 1789; the researches of J. H. von Autenrieth, 1797, and of Soemmering, 1799, on the human foetus; the observations of Senff on the formation of the skeleton, 1801; those of L. Oken and D. G. Kieser on the intestine and other organs, 1806; Oken's remarkable work on

the bones of the head, 1807 (with the views promulgated in which Goethe's name is also intimately connected); J. F. Meckel's numerous and valuable contributions to embryology and comparative anatomy, extending over a long series of years; and F. Tiedemann's classical work on the development of the brain, 1816.

The observations of the Russian naturalist, Christian Heinrich Pander (1794-1865), were made at the instance and under the immediate supervision of Prof. Dollinger at Wiirzburg, and we learn from von Baer's autobiography that he, being an early friend of Pander's, and knowing his qualifications for the task, had pointed him out to Dollinger as well fitted to carry out the investigation of development which that professor was desirous

1 Along with the work of W. Hunter must be mentioned a large collection of unpublished observations by Dr James Douglas, which are preserved in the Hunterian Museum of Glasgow University.

of having accomplished. Pander's inaugural dissertation was entitled Historia metamorphoseos quam ovum incubatum prioribus quinque diebus subit (Virceburgi, 1817) ; and it was also published in German under the title of Beitrdge zur Entwickelungsgeschichte des Huhnchens im Eie (Wiirzburg, 1817). The beautiful plates illustrating the latter work were executed by the elder E. J. d'Alton, well known for his skill in scientific observation, delineation and engraving.

Pander observed the germinal membrane or blastoderm, as he for the first time called it, of the fowl's egg to acquire three layers of organized substance in the earlier period of incubation. These he named respectively the serous or outer, the vascular or middle, and the mucous or inner layers; and he traced with great skill and care the origin of the principal rudimentary organs and systems from each of these layers, pointing out shortly, but much more distinctly than Wolff had done, the actual nature of the changes occurring in the process of development.

Karl Ernest von Baer (

1864.)

Von Baer's observations were carried on at various times from 1819 to 1826 and 1827, when he published the first results in a description of the development of the chick in the first edition of Burdach's Physiology.

It was at this time that von Baer made the important dis- covery of the ovarian ovum of mammals and of man, totally unknown before his time, and was thus able to prove- as matter of exact observation what had only been surmised previously, viz. the entire similarity in the mode of origin of these animals with others lower in the scale. (Epislola de ovi mammalium et hominis genesi, Lipsiae, 1827. See also the interesting com- mentary on or supplement to the Epistola in Heusinger's Journal, and the translation in Breschet's Repertoire, Paris, 1829.)

In 1829 von Baer published the first part of his great work, entitled Beobachtungen und Reflexionen iiber die Entwickelungs- geschichte der Thiere, the second part of which, still leaving the work incomplete, did not appear till 1838. In this work, dis- tinguished by the fulness, richness and extreme accuracy of the observations and descriptions, as well as by the breadth and soundness of the general views on embryology and allied branches of biology which it presents, he gave a detailed account not only of the whole progress of development of the chick as observed day by day during the incubation of the egg, but he also described what was known, and what he himself had investigated by numerous and varied observations, of the whole course of formation of the young in other vertebrate animals. His work is in fact a system of comparative embryology, replete with new discoveries in almost every part.

Von Baer's account of the layers of the blastoderm differs somewhat from that of Pander, and appears to be more con- sistent with the further researches which have lately been made than was at one time supposed, in this respect, that he distin- guished from a very early period two primitive or fundamental layers, viz. the animal or upper, and the vegetative or lower, from each of which, in connexion with two intermediate layers derived from them, the fundamental organs and systems of the embryo are derived: — the animal layer, with its derivative, supplying the dermal, neural, osseous and muscular; the vegetative layer, with its derivative, the vascular and mucous (intestinal) systems. He laid down the general morphological

principle that the fundamental organs have essentially the shape of tubular cavities, as appears in the first form of the central organ of the nervous system, in the two muscular and osseous tubes which form the walls of the body, and in the intestinal canal; and he followed out with admirable clearness the steps by which from these fundamental systems the other organs arise secondarily, such as the organs of sense, the glands, lungs, heart, vascular glands, Wolffian bodies, kidneys and generative organs.

To complete von Baer's system there was mainly wanting a more minute knowledge of the intimate structure of the ele- mentary tissues, but this had not yet been acquired by biologists, and it remained for Theodor Schwann of Liege in 1839, along with whom should be mentioned those who, like Robert Brown and M. J. Schleiden, prepared the way for his great discovery, to point out the uniformity in histological structure of the simpler forms of plants and animals, the nature of the organized animal and vegetable cell, the cellular constitution of the primitive ovum of animals, and the derivation of the various tissues, complex as well as simple, from the transformation or, as it is now called, differentiation of simple cellular elements, — dis- coveries which have exercised a powerful and lasting influence on the whole progress of biological knowledge in our time, and have contributed in an eminent degree to promote the advance of embryology itself.

To K. B. Reichert of Berlin more particularly is due the first application of the newer histological views to the explanation of the phenomena of development, 1840. To him and to R, A. von Kolliker and R. Virchow is due the ascertainment of the general principle that there is no free-cell formation in embryonic development and growth, but that all organs are derived from the multiplication, combination and transformation of cells, and that all cells giving rise to organs are the descendants or progeny of previously existing cells, and that these may be traced back to the original cell or cell-substance of the ovum.

It may be that modern research has somewhat modified the views taken by biologists of the statements of Schwann as to the constitution of the organized cell, especially as regards its simplest or most elementary form, and has indicated more exactly the nature of the protoplasmic material which constitutes its living basis; but it has not caused any very wide departure from the general principles

enunciated by that physiologist. Schwann's treatise, entitled Microscopical Researches into the Accordance in the Structure and Growths of Animals and Plants, was published in German at Berlin in 1839, and was translated into English by Henry Smith, and printed for the Sydenham Society in 1847, along with a translation of Schleiden's memoir, " Contributions to Phytogenesis," which originally appeared in 1838 in Miiller's Archiv for that year, and which had also been published in English in Taylor and Francis's Scientific Memoirs, vol. ii. part vi.

Among the newer observations of the same period which contributed to a more exact knowledge 01 the structure of the ovum itself may be mentioned — first the discovery of the germinal vesiqle, or nucleus, in the germ-disk of birds by J. E. von Purkinje (Symbolae ad ovi avium historiam ante incubationem, Vratislaviae, 1825, and republished at Leipzig in 1830); second, von Baer's discovery of the mammiferous ovum in 1827, already referred to; third, the discovery of the germinal vesicle of mammals by J. V. Coste in 1834, and its independent observation by Wharton Jones in 1835; and fourth, the observation in the same year by Rudolph Wagner of the germinal macula or nucleus. Coste's discovery of the germinal vesicle of Mammalia was first communicated to the public in the Comptes rendus of the French Academy for 1833, and was more fully described in the Recherches sur la generation des mammiferes, by Delpech and Coste (Paris, 1834). Thomas Wharton Jones's observations, made in the autumn of 1834, without a knowledge of Coste's communication, were presented to the Royal Society in 1835. This discovery was also confirmed and extended by G. G. Valentin and Bernardt, as recorded by the latter in his work Symb. ad ovi mammal, hist, ante praegnationem. Rudolph Wagner's observa-

tions first appeared in his Textbook of Comparative Anatomy, published at Leipzig in 1834-1835, and in Muller's Archiv for the latter year. His more extended researches are described in his work Prodromus hist, generationis hominis atque animalium (Leipzig, 1836), and in a memoir inserted in the Trans, of the Roy. Bavarian Acad, of Sciences (Munich, 1837).

The two decades of years from 1820 to 1840 were peculiarly fertile in contributions to the anatomy of the foetus and the progress of embryological knowledge. The researches of Prevost and Dumas on the ova and primary stages of development of Batrachia, birds and mammals, made as early as 1824, deserve especial notice as important steps in advance, both in the dis- covery of the process of yolk segmentation in the batrachian ovum, and in their having shown

almost with the force of demon- stration, previous to the discovery of the mammiferous ovarian ovum by von Baer, that that body must exist as a minute spherule in the Graafian follicle of the ovary, although they did not actually succeed in bringing the ova clearly under observation.

The works of Pockels (1825), of Seiler (1831), of G. Breschet (1832), of A. A. L. M. Velpeau (1833), of T. L. W. Bischoff (1834) — all bearing upon human embryology; the researches of Coste in comparative embryology in 1834, already referred to, and those published by the same author in 1837; the publication of Johannes Muller's great work on physiology, and Rudolph Wagner's smaller text-book, in both of which the subject of embryology received a very full treatment, together with the excellent Manual of the Development of the Foetus, by Valentin, in 1835, the first separate and systematic work on the whole subject, now secured to embryology its permanent place among the biological sciences on the Continent; while in this country attention was drawn to the subject by the memoirs of Allen Thomson (1831), Th. Wharton Jones (1835-1838) and Martin Barry (1839-1840).

Among the more remarkable special discoveries which belong to the period now referred to, a few may be mentioned, as, for example, that of the chorda dorsalis by von Baer, a most important one, which may be regarded as the key to the whole of vertebral morphology; the phenomenon of yolk segmentation, now known to be universal among animals, but which was only first carefully observed in Batrachia by Prevost and Dumas (though previously casually noticed by Swammerdam) , and was soon afterwards followed out by Rusconi and von Baer in fishes; the discovery of the branchial clefts, plates and vascular arches in the embryos of the higher abranchiate animals by H. Rathke in 1825-1827; the able investigation of the transformations of these arches by Reichert in 1837; and the researches on the origin and development of the urinary and generative organs by Johannes Miiller in 1829-1830.

On entering the fifth decade of the 19th century, the number of original contributions and systematic treatises becomes so great as to render the attempt to enumerate even a selection of the more important of them quite unsuitable to the limits of the present article. We must be satisfied, therefore, with a reference to one or two which seem to stand out with greater prominence than the rest as landmarks in the progress of embryological discovery. Among these may first be mentioned the researches of Theodor L. W. von Bischoff, formerly of Giessen and later of Munich, on the development of the

ovum in Mammalia, in which a series of the most laborious, minute and accurate observations furnished a greatly novel and very full history of the formative process in several animals of that class. These researches are contained in four memoirs, treating separately of the development of the rabbit, the dog, the guinea-pig and the roe-deer, and appeared in succession in the years 1842, 1845, 1852 and 1S54.

Next may be mentioned the great work of Coste, entitled Histoire gin. et particul. du developpement des animaux, of which, however, only four fasciculi appeared between the years 1847 and 1859, leaving the work incomplete. In this work, in the large folio form, beautiful representations are given of the author's valuable observations on human embryology, and on that of various mammals, birds and fishes, and of the author's

discovery in 1847 of the process of partial yolk segmentation in the germinal disk of the fowl's egg during its descent through the oviduct, and his observations on the same phenomenon in fishes and mammals.

The development of reptiles received important elucidation from the researches of Rathke, in his history of the development of serpents, published at Konigsberg in 1839, and in a similar work on the turtle in 1 848, as well as in a later one on the crocodile in 1866, along with which may be associated the observations of H. J. Clark on the " Embryology of the Turtle," published in Agassiz's Contributions to Natural History, fire, 1857.

The phenomena of yolk segmentation, to which reference has more than once been made, and to which later researches give more and more importance in connexion with the fundamental phenomena of development, received great elucidation during this period, first from the observations of C. T. E. von Siebold and those of Bagge on the complete yolk segmentation of the egg in nematoid worms in 1841, and more fully by the observa- tions of Kolliker in the same animals in 1843. The nature of partial segmentation of the yolk was first made known by Kolliker in his work on the development of the Cephalopoda in 1844, and, as has already been mentioned, the

phenomena were observed by Coste in the eggs of birds. The latter observa- tions have since been confirmed by those of Oellacher, GOtte and Kolliker. Further researches in a vast number of animals give every reason to believe that the phenomenon of segmentation is in some shape or other the invariable precursor of embryonic formation.

The first considerable work on the development of a division of the invertebrates was that of Maurice Herold of Marburg on spiders, De generatione aranearum ex ovo, published at Marburg in 1824, in which the whole phenomena of the formative processes in that animal are described with remarkable clearness and completeness. A few years later an important series of contributions to the history of the development of invertebrate animals appeared in the second volume of Burdach's work on Physiology, of which the first edition was published in 1828, and in this the history of the development of the Entozoa was the production of Ch. Theod. von Siebold, and that of most of the other invertebrates was compiled by H. Rathke from the results of his own observations and those of other?. These memoirs, together with others subsequently published by Rathke, notably that Uber die Bildung und Entwickelungs- geschichte d. Flusskrebses (Leipzig, 1829), in which an attempt is made to extend the doctrine of the derivation of the organs from the germinal layers to the invertebrata, entitle him to be regarded as the founder of invertebrate embryology.

A large body of facts having by this time been ascertained with respect to the more obvious processes of development, a further attempt to refer the phenomena of organogenesis to morphological and histological principles became desirable. More especially was the need felt to point out with greater minuteness and accuracy the relation in which the origin of the fundamental organs of the embryo stands to the layers of the blastoderm; and this we find accomplished with signal success in the researches of R. Remak on the development of the chick and frog, published between the years 1850 and 1855.

Starting from Pander's discovery of the trilaminate blasto- derm, Remak worked out the development of the chick in the light of the cell-theory of Schleiden and Schwann. He observed the division of the middle layer into two by a split which subse- quently gives rise to the body-cavity (pleuro-peritoneal space) of the adult; and traced the principal organs which came from these two layers (Hautfaserblatt and Darmfaserblatt) respectively. In this manner the foundations of the germ-layer theory were established in their modern form.

A great step forward was made in 1859 by T. H. Huxley, who compared the serous and mucous layers of Pander with the ectoderm and endoderm of the Coelenterata. But in spite of this comparison it was generally held that germinal layers similar to those of the vertebrata were not found in invertebrate animals, and it was not until the publication in i87iof Kowalewsky's

researches (see below) that the germinal layer theory was applied to the embryos of all the Metazoa. But the year 1859 will be for ever memorable in the history of science as the year of the publication of the Origin of Species. If the enunciation of the cell-theory may be said to have marked a first from a second period in the history of embryology, the publication of Darwin's great idea ushered in a third. Whereas- hitherto the facts of anatomy and development were loosely held together by the theory of types which owed its origin and maintenance to Cuvier, L. Agassiz, J. Midler and R. Owen, they were now combined into one organic whole by the theory of descent and by the hypothesis of recapitulation which was deduced from that theory. First clearly enunciated by Johann Miiller in his well-known work Fiir Darwin published in 1864 (rendered in England as Facts for Darwin, 1869), the view that a knowledge of embryonic and larval histories would lay bare the secrets of race history and enable the course of evolution to be traced and so lead to the discovery of the natural system of classification, gave a powerful stimulus to embryological research. The first fruits of this impetus were gathered by Alexander Agassiz, A. Kowalewsky and E. Metschnikoff . Agassiz, in his memoir on the Embryology of the Starfish published in 1864, showed that the body-cavity in Echinodermata arises as a differentiation of the enteroh of the larva and so laid the foundations of our present knowledge of the coelom. This discovery was confirmed in 1 869 by Metschnikoff (" Studien iib. d. Entwick. d. Echinodermen u. Nemertinen," Mim. Ac. Petersbourg (7), 41, 1869), and extended by him toTornaria, the larva of Balanoglossus in 1870 (" Untersuchungen iib. d. Metamorphose einiger Seethiere," Zeit. f. wiss. Zoologie, 20, 1870). In 1871 Kowalewsky in his classical memoir, entitled " Embryologische Studien an Wiirmern und Arthropoden " {Mint. Acad. Petersbourg (7), 16, 1871), proved the same fact for Sagitta and added immensely to our knowledge of the early stages of development of the Invertebrata. These memoirs formed the basis on which subsequent workers took their stand. Amongst the most important of these was F. M. Balfour (1851-1882). Led to the study of embryology by his teacher, M. Foster, in association with whom he published in 1874 the Elements of Embryology, Balfour was one of the first to take advantage of the

facilities for research offered by Dr. A. Dohrn's Zoological Station at Naples which has since become so celebrated. Here he did the work which was subse- quently published in 1878 in his Monograph of the Development of Elasmobranch Fishes, and which constituted the most im- portant addition to vertebrate morphology since the days of Johannes Miiller. This was followed in 1879 and 1881 by the publication of his Treatise on Comparative Embryology, the first work in which the facts of the rapidly growing science were clearly and philosophically put together, and the greatest. The influence of Balfour's work on embryology was immense and is still felt. He was an active worker in every department of it, and there are few groups of the animal kingdom on which he has not left the impress of his genius.

In the period under consideration the output of embryological work has been enormous. No group of the animal kingdom has escaped exhaustive examination, and no effort has been spared to obtain the embryos of isolated and out of the way forms, the development of which might have a bearing upon important questions of phylogeny and classification. Of this work it is impossible to speak in detail in this summary. It is only possible to call attention to some of its more important features, to mention the more important advances, and to refer to some of the more striking memoirs.

Marine zoological stations have been established, expeditions have been sent to distant countries, and the methods of investiga- tion have been greatly improved. Since Anton Dohrn founded the Stazione Zoologica at Naples in 1872, observatories for the study of marine organisms have been established in most countries. Of journeys which have been made to distant countries and which have resulted in important contributions to embryology, may be mentioned the expedition (1884-1886) of the cousins Sarasin to Ceylon (development of Gymnophiona),

of E. Selenka to Brazil and the East Indies (development of Marsupials, Primates and other mammals, 1877, 1889, 1892), of A. A. W. Hubrecht to the East Indies (1890, development of Tarsius), of W. H. Caldwell to Australia (1883-1884, discovery of the nature of the ovum and oviposition of Echidna and of Ceratodus), of A.

Sedgwick to the Cape (1883, development of Peripatus), of J. Graham Kerr to Paraguay (1896, development of Lepidosiren), of R. Semon to Australia and the Malay Archi- pelago (1891-1893, development of Monotremata, Marsupialia) , and of J. S. Budgett to Africa (1898, 1900, 1901, 1903, develop- ment of Polypterus).

In methods, while great improvements have been made in the processes of hardening and staining embryos, the principal advance has been the introduction in 1883 by W. H. Caldwell in his work on the development of Phoronis of the method of making tape-worm like strings of sections as a result of which the process of mounting in order all the sections obtained from an embryo was much facilitated, and the use of an automatic microtome rendered possible. The method of Golgi for the investigation of the nervous system, introduced in 1875, must also be mentioned here.

The word " coelom " (q.v.) was introduced into zoology by E. Haeckel in 1872 (Kalkschwdmme, p. 468) as a convenient term for the body-cavity (pleuroperitoneal) . The wo"rd was generally adopted, and was applied alike to the blood-containing body-cavity of Arthropods and to the body-cavity of Vertebra ta and segmented worms, in which there is no blood. In 1875 Huxley (Quarterly Journ. of Mic. Science, 15, p. 53), relying on the researches of Agassiz, Metschnikoff and Kowalewsky above mentioned, put forward the idea that according to their development three kinds of body-cavity ought to be distinguished: (1) the enterocoelic which arises from enteric diverticula, (2) the schizocoelic which develops as a split iri the embryonic mesoblast, and (3) the epicoelic which was enclosed by folds of the skin and lined by ectoderm {e.g. atrial cavity of Tunicates, &c). This suggestion was of great importance, because it led the embryologists of the day (Balfour, the brothers Hertwig, Lankester and others) to discuss the question as to whether there was not more than one kind of body-cavity. The Hertwigs (Coelomtheorie, Jena, 1881) distinguished two kinds, the enterocoel and the pseudocoel. The former, to which they limited the use of the word coelom, and which is developed directly or indirectly from the enteron, is found in Annelida, Arthropoda, Echinodermata, Chordata, &c. The latter they regarded as something quite different from the coelom and as arising by a split in what they called for the first time mesen- chyme; the mesenchyme being the non-epithelial mesoderm, which they described as consisting of amoeboid cells, but which we now know to consist of a continuous reticulum. The next step was made by E. Ray Lankester, who in 1884 (Zoologischer Anzeiger) showed that the pericardium of Mollusca does not con- tain blood, and therein differs from the rest of the body-cavity which

does contain blood, but no suggestion is made that the blood-containing space is not coelomic. In fact it was generally held by the anatomists of the day that the coelom and the vascular system were different parts of the same primitive organ, though separate from it in the adult except in Arthropoda and Mollusca. In the Mollusca, it is true, the pericardial part of the coelom was held to be separate from the vascular, and the Hert- wigs had reached the correct conception that the pericardium of these animals was alone true coelom, the vascular part being pseudocoel. This was the state of morphological opinion until 1886, when it was shown (Proc. Cambridge Phil. Soc, 6, 1886, p. 27) (1) that the coelom of Peripatus gives rise to the nephridia and generative glands only, and to no other part of the body- cavity of the adult, (2) that the nephridia of the adult do not open as had been supposed into the body-cavity, (3) that the body-cavity is entirely formed of the blood-containing space, the coelom having no perivisceral portion. These results were extended by the same author (Quart. Journ. Mic. Sci., 27, 1887, pp. 486-540) to other Arthropods and to the Mollusca, and the modern theory of the coelom was finally established. An in-

creased precision was given to the conception of coelom by the discovery in 1880 (Quart. Journ. Mic. Sci., 20, p. 164) that the nephridia of Elasmobranchs are a direct differentiation of a portion of it. In 1886 this was extended to Peripatus (Proc. Camb. Phil. Soc, 6, p. 27) and doubtless holds universally.

In 1864 it was suggested by V. Hensen (Virchow's Archiv, 31) that the rudiments of nerve-fibres are present from the beginning of development as persistent remains of connexions between the incompletely separated cells of the segmented ovum. This suggestion fell to the ground because it was held by embryo- logists that the cleavage of the ovum resulted in the formation of completely separate cells, and that the connexions between the adult cells were secondary. In 1886 it was shown (Quarterly Journ. Mic. Sci., 26, p. 182) that in Peripatus Capensis the cells of the segmenting ovum do not separate from one another, but remain connected by a loose protoplasmic network. This dis- covery has since been extended to other ova, even to the small so- called holoblastic ova, and a basis of fact was found for Hensen's suggestion as to the embryonic origin of nerves (Quart. Journ. Mic. Sci., 33, r892, pp. 581-584). An extension and further application of the new views as to the cell-theory and the embryonic origin of nerves thus necessitated was made in 1894 (Quart. Journ. Mic. Sci., 37, p. 87), and in 1904 J. Graham Kerr showed that the motor nerves in the dipnoan fish Lepidosiren arise in an essentially similar manner (Trans. Roy.

Society of Edinburgh, 41, p. 119).

In 1883 Elie Metschnikoff published his researches on the intracellular digestion of invertebrates (Arbeiten a. d. zoologischen Inst. Wien, 5; and Biologisches Centralblatt, 3, p. 560); these formed the basis of his theory of inflammation and phagocytosis, which has had such an important influence on pathology. As he himself has told us, he was led to make these investigations by his precedent researches on the development of sponges and other invertebrates. To quote his own words: "Having long studied the problem of the germinal layers in the animal series, I sought to give some idea of their origin and significance. The part played by the ectoderm and endoderm appeared quite clear, and the former might reasonably be regarded as the cutaneous investment of primitive multicellular animals, while the latter might be regarded as their organ of digestion. The discovery of intracellular digestion in many of the lower animals led me to regard this phenomenon as characteristic of those ancestral animals from which might be derived all the known types of the animal kingdom (excepting, of course, the Protozoa) . The origin and part played by the mesoderm appeared the most obscure. Thus certain embryologists supposed that this layer corresponded to the reproductive organs of primitive animals : others regarded it as the prototype of the organs of locomotion. My embryo – logical and physiological studies on sponges led me to the conclusion that the mesoderm must function in the hypothetically primitive animals as a mass of digestive cells, in all points similar to those of the endoderm. This hypothesis necessarily attracted my attention to the power of seizing foreign corpuscles possessed by the mesodermic cells " (Immunity in Infective Diseases, English translation, Cambridge, 1905).

The branch of embryology which concerns itself with the study of the origin, history and conjugation of the individuals (gametes) which are concerned in the reproduction of the species has made great advances. These began in 1875 and following years with a careful examination of the behaviour of the germinal vesicle in the maturation and fertilization of the ovum. The history of the polar bodies, the origin of the female pronucleus, the pre- sence in the ovum of a second nucleus, the male pronucleus, which gave rise to the first segmentation nucleus by fusion with the female pronucleus, were discovered (E. van Beneden, O. Biitschli, O. Hertwig, H. Fol), and in 1876 O. Hertwig (Morpho- logisches Jahrbuch, 3, 1876) for the first time observed the entrance of a spermatozoon into the egg and the formation of the male pronucleus from it. The centrosome was discovered by W. Flemming in 1875 in the egg of the fresh-water

mussel, and independently in 1876 by E. van Beneden in Dicyemids, In 1883 came E. van Beneden's celebrated discovery (Arch.

Biologic, 4) of the reduction of the number of chromosomes in the nucleus of both male and female gametes, and of the fact that the male and female pronuclei contribute the same number of chromosomes to the zygote-nucleus. He also showed that the gametogenesis in the male is a similar process to that in the female, and paved the way for the acceptation of the view (due to Butschli) that polar bodies are aborted female gametes. These discoveries were extended and completed by subsequent workers, among whom may be mentioned E. van Beneden, J. B. Carnoy, G. Platner, T. Boveri, O. Hertwig, A. Brauer. The subject is still being actively pursued, and hopes are enter- tained that some relation may be found between the behaviour of the chromosomes and the facts of heredity.

Since 1874 (W. His, Unsere Kbrperform und das physiologische Problem Hirer Entstehung) a new branch of embryology, which concerns itself with the physiology of development, has arisen (experimental embryology). The principal workers in this field have been W. Roux, who in 1894 founded the Archivfur Enlwicke- lungsmechanik der Organismen, T. Boveri and Y. Delage who discovered and elucidated the phenomenon of merogony, J. Loeb who discovered artificial parthenogenesis, O. and R. Hertwig, H. Driesch, C. Herbst, E. Maupas, A. Weismann, T. H. Morgan, C. B. Davenport {Experimental Morphology, 2 vols., 1899) and many others.

In the elucidation of remarkable life-histories we may point in the first place to the work of A. Kowalewsky on the develop- ment of the Tunicata (" Entwickelungsgeschichte d. einfachen Ascidien," M6m. Acad. PUersbourg (7), 10, 1866, and Arch.f. Mic. Anatomic, 7, 187 1), in which was demonstrated for the first time the vertebrate relationship of the Tunicata (possession of a notochord, method of development of the central nervous system) and which led to the establishment of the group Chordata. We may also mention the work of Y. Delage in the meta- morphosis of Sacculina {Arch. zool. exp. (2) 2, 1884), A. Giard {Comptes rendus, 123, 1896, p. 836) and of A. Malaquin on Monstrilla {Arch. zool. exp. (3), 9, p. 81, 1901), of Delage {Comptes rendus, 103, 1886, p. 698) and Grassi and

Calandruccio {Rend. Ace. Lincei (5), 6, 1897, p. 43), on the development of the eels, and of P. Pergande on the life-history of the Aphidae {Bull. U.S. Dep. Agric. Ent., technical series, 9, 1901). The work of C. Grobben {Arbeilen zool. Inst. Wien, 4, 1882) and of B. Uljanin (" Die Arten der Gattung Doliolum," Fauna u. Flora des Golfes von Neapel, 1884) on the extraordinary life-history and migration of the buds in Doliolum must also be mentioned. In pure embryological morphology we have had Heymons' elucidation of the Arthropod head, the work of Hatschek on Annelid and other larvae, the works of H. Bury and of E. W. MacBride which have marked a distinct advance in our knowledge of the development of Echinodermata, of K. Mitsukuri, who has founded since 1882 an important school of embryology in Japan, on the early development of Chelonia and Aves, of A. Brauer and G. C. Price on the development of vertebrate excretory organs, of Th. W. Bischoff, E. van Beneden, E. Selenka, A. A. W. Hubrecht, R. Bonnet, F. Keibel and R. Assheton on the develop- ment of mammals, of A. A. W. Hubrecht and E. Selenka on the early development and placentation of the Primates, of J. Graham Kerr and of J. S. Budgett on the development of Dipnoan and Ganoid fishes, of A. Kowalewsky, B. Hatschek, A. Willey and E. W. MacBride on the development of Amphioxus, of B. Dean on the development of Bdellostoma, of A. Gotte on the development of Amphibia, of H. Strahl and L. Will on the early development of reptiles, of T. H. Huxley, C. Gegenbaur and W. K. Parker on the development of the vertebrate skeleton, of van Wijhe on the segmentation of the vertebrate head, by which the modern theory of head-segmentation, previously adumbrated by Balfour, was first established, of Leche and Rose on the development of mammalian dentitions. We may also specially notice W. Bateson's work on the development of Balanoglossus and his inclusion of this genus among the Chordata (1884), the discovery by J. P. Hill of a placenta in the marsupial genus Perameles (1895). the work of P. Marchal (1904) on the asexual increase by fission of the early embryos of certain

parasitic Hymenoptera (so called germinogony) , a phenomenon which had been long ago shown to occur in Lumbricus trapezoides by N. Kleinenberg (1879) and by S. F. Harmer in Polyzoa (1893). The work on cell-lineage which has been so actively pursued in America may be mentioned here. It has consisted mainly of an extension of the early work of A. Kowalewsky and B. Hatschek on the formation of the layers, being a more minute and detailed examination of the origin of the embryonic tissues.

The most important text-books and summaries which have appeared

in this period have been Korschelt and Heider's Lehrbuch der vergliichenden Entwickelungsgeschichte der wirbellosen Tiere (1890-1902), C. S. Minot's Human Embryology (1892), and the Handbuch der vergleichenden und experimentellen Entwickelungslehre der Wirbeltiere, edited by O. Hertwig (1901, et seq.). See also K. E. von Baer, Uber Entwicklungsgeschichte der Tiere (Konigsberg, 1828, 1837); F. M. Balfour, A Monograph on the Development of Elasmobranch Fishes (London, 1878); A Treatise on Comparative Embryology, vols. i. and ii. (London, 1885) (still the most important work on Vertebrate Embryology); M. Duval, Atlas d' Embryologie (Paris, 1889); M. Foster and F. M. Balfour, Elements of Embryology (London, 1883); O. Hertwig, Lehrbuch der Entwicklungsgeschichte des Menschen u. der Wirbeltiere (6th ed., Jena, 1898); A. Kolliker, Entwicklungsgeschichte des Menschen u. der hoheren Tiere (Leipzig, 1879); A. M. Marshall, Vertebrate Embryology (London, 1893).

(A. Se.)*

Physiology of Development

Physiology of Development [in German, Entwicklungsmechanik (W. Roux), Entwicklungsphysiologie (H. Driesch), physiologische Morphologie (J. Loeb)] is, in the broadest meaning of the word, the experimental science of morphogenesis, i.e. of the laws that govern morphological differentiation. In this sense it embraces the study of regeneration and variation, and would, as a whole, best be called rational morphology. Here we shall treat of the Physiology of Development in a narrower sense, as the study of the laws that govern the development of the adult organism from the egg, Regeneration and Variation and Selection forming the subjects of special articles.

After the work done by. W. His, A. Goette and E. F. W. Pfliiger, who gave a sort of general outline and orientation of the subject, the first to study developmental problems properly in a systematical way, and with full conviction of their great importance, was Wilhelm Roux. This observer, having found by a full analysis of the facts of " development " that the first special problem to be worked out was the question when and where the first differentiation appeared, got as his main result that, when one of the two first blastomeres (cleavage cells) of the frog's egg was killed, the living one developed into a typical half- embryo, i.e. an embryo that was either the right or the left part of a whole one. From that Roux concluded that the first cleavage plane determined already the median plane of the adult;

and that the basis of all differentiation was given by an unequal division of the nuclear substances during karyokinesis, a result that was also attained on a purely theoretical basis by A. Weis- mann. Hans Driesch repeated Roux's fundamental experiment with a different method on the sea-urchin's egg, with a result that was absolutely contrary to that of Roux: the isolated blastomere cleaved like half the egg, but it resulted in a whole blastula and a whole embryo, which differed from a normal one only in its small size. Driesch's result was obtained in somewhat the same manner by E. B. Wilson with the egg of Amphioxus, by Zoja with the egg of Medusae, &c. It thus became very probable that an inequality of nuclear division could not be the basis of differentiation. The following experiments were still more fatal to the theories of Roux and of Weismann. Driesch found that even when the first eight or sixteen cells of the cleaving egg of the sea-urchin were brought into quite abnormal positions with regard to one another, still a quite normal embryo was developed; Driesch and T. H. Morgan discovered jointly that in the Ctenophore egg one isolated blastomere developed into a half-embryo, but that the same was the case if a portion of protoplasm was cut off from the fertilized egg not yet in cleavage; last, but not of least importance, in the case of the frog's egg which had been Roux's actual subject of experiment, conditions were discovered by O. Schultze and O. Hertwig

under which one of the two first blastomeres of this egg developed into a whole embryo of half size. This result was made still more decisive by Morgan, who showed that it was quite in the power of the experimenter to get either a half -embryo or a whole one of half size, the latter dependent only upon giving to the blastomere the opportunity for a rearrangement of its matter by turning it over.

Thus we may say that the general result of the introductory series of experiments in the physiology of development is the following: — In many forms, e.g. Echinoderms, Amphioxus, Ascidians, Fishes and Medusae, the potentiality (prospective Potenz — Driesch) of all the blastomeres of the segmented egg is the same, i.e. each of them may play any or every part in the future development; the prospective value (prosp. Bedeutung — D.) of each blastomere depends upon, or is a function of, its position in the whole of the segmented egg; we

can term the " whole " of the egg after cleavage an " aequipotential system " (Driesch). But though aequipotential, the whole of the segmented egg is nevertheless not devoid of orientation or direction; the general law of causality compels us to assume a general orientation of the smallest parts of the egg, even in cases where we are not able to see it. It has been experimentally proved that external stimuli (light, heat, pressure, &c.) are not responsible for the first differentiation of organs in the embryo; thus, should the segmented egg be absolutely equal in itself, it would be incomprehensible that the first organs should be formed at one special point of it and not at another. Besides this general argument, we see a sort of orientation in the typical forms of the polar or bilateral cleavage stages.

Differentiation, therefore, depends on a primary, i.e. innate, orientation of the egg's plasma in those forms, the segmented eggs of which represent aequipotential systems; this orientation is capable of a sort of regulation or restoration after disturbances of any sort; in the egg of the Ctenophora such a regulation is not possible, and in the frog's egg it is facultative, i.e. possible under certain conditions, but impossible under others. Should this inter- pretation be right, the difference between the eggs of different animals would not be so great as it seemed at first : differences with regard to the potentialities of the blastomeres would only be differ- ences with regard to the capability of regulation or restoration of the egg's protoplasm.

The foundation of physiological embryology being laid, we now can shortly deal with the whole series of special problems offered to us by a general analysis of that science, but at present worked out only to a very small extent.

We may ask the following questions: — What are the general conditions of development? On what general factors does it de- fend ? How do the different organs of the partly developed embryo stand with regard to their future fate? What are the stimuli {Reize) effecting differentiation ? What is to be said about the specific character of the different formative effects? And as the most important question of all: Are all the problems offered to us in the physiology of development to be solved with the aid of the laws known hitherto in science, or do we want specifically new " vitalistic " factors?

Energy in different forms is required for development, and is provided by the surrounding medium. Light, though of no influence on the cleavage (Driesch), has a great effect Conditions on j ater s t a

g e s of development, and is also necessary Inflation, f or tne formation of polyps in Eudendrium (J. Loeb) . That a certain temperature is necessary for ontogeny has long been known; this was carefully studied by O. Hertwig, as was also the influence of heat on the rate of development. Oxygen is also wanted, either from a certain stage of develop- ment or from the very beginning of it, though very nearly related forms differ in this respect (Loeb) . The great influence of osmotic pressure on growth was studied by J. Loeb, C. Herbst and C. H. Davenport. In all these cases energy may be necessary for development in general, or a specific form of energy may be necessary for the formation of a specific organ; it is clear that, especially in the latter case, energy is shown to be a proper factor for morphogenesis. Besides energy, a certain chemical condition of the medium, whether offered by the water in which the egg lives or (especially in later stages) by the food, is of great importance for normal ontogeny; the only careful study in this respect was carried out by Herbst for the development of the

egg of Echinids. This investigator has shown that all salts of the sea water are of great importance for development, and most of them specifically and typically; for instance, calcium is absolutely necessary for holding together the embryonic cells, and without calcium all cells will fall apart, though they do not die, but live to develop further.

What we have dealt with may be called external factors of development; as to their complement, the internal factors, it is clear that every elementary factor of general physiology may be regarded as one of them. Chemical metamorphosis plays, of course, a great part in differentiation, especially in the form of secretions; but very little has been carefully studied in this respect. Movement of living matter, whether of cells or of intracellular substance, is another important factor (O. Biitschli, F. Dreyer, L. Rhumbler.) Cell-division is another, its differences in direction, rate and quantity being of great importance for differentiation. We know very little about it; a so-called law of O. Hertwig, that a cell would divide at right angles to its longest diameter, though experimentally stated in some cases, does not hold for all, and the only thing we can say is, that the unknown primary organization of fhe egg is here responsible. (Compare the papers on " cell-lineage " of E. B. Wilson, F. R. Lillie, H. S. Jennings, O. Zurstrassen and others.) Of the inner factors of ontogeny there is another category that may be called physical, that already spoken of being physiological. The most important of these is the capillarity of the cell surfaces. Berthold was the first to call attention to its role in the arrangement of cell composites, and

afterwards the matter was more carefully studied by Dreyer, Driesch, and especially W. Roux, with the result that the arrangement of cells follows the principle of sur- faces minimae areae (Plateau) as much as is reconcilable with the conditions of the system.

It has already been shown that in many cases the embryo after cleavage, i.e. the blastula, is an " aequipotential system." It was shown that in the egg of Echinids there existed p a ten- such an absolute lack of determination of the cleavage tiaiittes ■ot cells that (a) the cells may be put in quite abnormal embryonic positions with reference to one another without dis- turbing development; (b) a quarter blastomere gives a quite normal little pluteus, even a sixteenth yields a gastrula; (c) two eggs may fuse in the early blastula stage, giving one single normal embryo of double size. Our next question concerns the distribution of potentiality, when the embryo is developed further than the blastula stage. In this case it has been shown that the potentialities of the different embryonic organs are different: that, for instance, in Echinoderms or Amphibians the ectoderm, when isolated, is not able to form endoderm, and so on (Driesch, D. Barfurth); but it has been shown at the same time that the ectoderm in itself, the intestine in itself of Echinoderms (Driesch), the medullary plate in itself of Triton (H. Spemann), is as aequipotential as was the blastula: that any part whatever of these organs may be taken away without disturbing the development of the rest into a normal and pro- portional embryonic part, except for its smaller size.

If the single phases of differentiation are to be regarded as effects, we must ask for the causes, or stimuli, of these effects. For a full account of the subject we refer to Herbst, by whom also the whole botanical literature , much more s ti mu u, important than the zoological, is critically reviewed. We have already seen that when the blastula represents an aequipotential system, there must be some sort of primary organization of the egg, recoverable after disturbances, that directs and localizes the formation of the first embryonic organs; we do not know much about this organization. Directive stimuli (Richtungsreize) play a great role in ontogeny; Herbst has analysed many cases where their existence is probable. They have been experimentally proved in two cases. The chromatic cells of the yolk sac of Fundulus are attracted by the oxygen of the arteriae (Loeb) ; the mesenchyme cells of Echinus are attracted by some specific parts of the ectoderm, for they move towards them also when removed from their original positions to any point of the blastocoel by shaking (Driesch). Many directive stimuli might

be discovered by a careful study of grafting experiments, such as have been made by Born, Joest, Harrison and others, but at present these experiments have not been carried out far enough to get exact results.

Formative stimuli in a narrower meaning of the word, i.e. stimuli affecting the origin of embryonic organs, have long been known in botany; in zoology we know (especially from Loeb) a good deal about the influence of light, gravitation, contact, &c, on the formation of organs in hydroids, but these forms are very plant-like in many respects; as to free-living animals, Herbst proved that the formation of the arms of the pluteus larva depends on the existence of the calcareous tetrahedra, and made in other cases (lens of vertebrate eye, nerves and muscles, &c.) the existence of formative stimuli very probable. Many of the facts generally known as functional adaptation (junctionelle Anpassung — Roux) in botany and zoology may also belong to this category, i.e. be the effects of some external stimulus, but they are far from having been analysed in a satisfactory manner. That the structure of parts of the vertebrate skeleton is always in relation to their function, even under abnormal conditions, is well known; what is the real " cause " of differentiation in this case is difficult to say.

It is obvious that we cannot answer the question why the different ontogenetic effects are just what they are. Develop- mental physiology takes the specific nature of form for ciTrI&- granted, and it may be left for a really rational theory ters. of the evolution of species in the future to answer

the problem of species, as far as it is answerable at all. What we intend to do here is only to say in a few words wherein consists the specific character of embryonic organs. That embryonic parts are specific or typical in regard to their proto- plasm is obvious, and is well proved by the fact that the different parts of the embryo react differently to the same chemical or other reagents (Herbst, Loeb). That they may be typical also in regard to their nuclei was shown by Boveri for the generative cells of Ascaris; we are not able at present to say anything definite about the importance of this fact. The specific nature of an embryonic organ consists to a high degree in the number of cells composing it; it was shown for many cases that this number, and also the size of cells, is constant under constant

conditions, and that under inconstant conditions the number is variable, the size constant; for instance, embryos which have developed from one of the two first blastomeres show only half the normal number of cells in their organs (Morgan, Driesch) .

We have learnt that the successive steps of embryonic develop- ment are to be regarded as effects, caused by stimuli, which partly exist in the embryo itself. But it must be noted that ferentiit- not ever y P art °^ tne embryo is dependent on every tioa. other one, but that there exists a great independence

of the parts, to a varying degree in every case. This partial independence has been called self-differentiation (Selbstdifferenzierung) by Roux, and is certainly a characteristic feature of ontogeny. At the same time it must not be forgotten that the word is only relative, and that it only expresses our recognition of a negation.

For instance, we know that the ectoderm of Echinus may develop further if the endoderm is taken away; in other words, that it develops by self-differentiation in regard to the endoderm, that its differentiation is not dependent on the endoderm; but it would be obviously more important to know the factors on which this differentiation is actually dependent than to know one factor on which it is not. The same is true for all other experiments on " self differentiation," whether analytical (Loeb, Schaper, Driesch) or not (grafting experiments, Born, Joest, &c). Can we understand differentiation by means of the laws of natural phenomena offered to us by physics and chemistry ? Vitalism Most people would say yes, though not yet. Driesch has tried to show that we are absolutely not able to understand development, at any rate one part of it, i.e. the localization of the various successive steps of differentiation. But it is impossible to give any idea of this argument in a few words, and we can only say here that it is based on the experi

ments upon isolated blastomeres, &c, and on an analysis of the character of aequipotential systems. In this way physiology of development would lead us straight on into vitalism.

_ References. — An account of the subject, with full literature, is given by H. Driesch, Resultate und Probleme der Entwicklungs-physiologie der Tiere in Ergebnissen der Anat. u. Entw.-Gesch. (1899). Other works are: C. H. Davenport, Experimental Morphology (New York, 1897-1899) ; Y. Delage, La Structure du protoplasma, &c. (1895) ; Driesch, Mathem. mech. Betrachtung

morpholog. Probleme (Jena, 1891); Entwicklungsmechan. Stud.ien (1891-1893); Analy- tische Theorie d. organ. Entw. (Leipzig, 1894); Studien iiber d. Regulationsvermogen (1897-1900), &c. ; C. Herbst, " fjber die Bedeu- tung d. Reizphysiologie fur die kausale Auffassung von Vorgangen i. d. tier. Ontogenese," Biolog. Centralblatt, vols. xiv. u. xv. (Leipzig, 1894). Many papers on influence of salts on development in Arch, f. Entw.-Mech. ; O. Hertwig, Papers in Arch.}, mikr. Anat., " Die Zelle und die Gewebe," ii. (Jena, 1897); W. His, Unsere Korperform (Leipzig, 1875); J. Loeb, Vntersuch. 2. physiol. Morph. (Wtirzburg, 1891-1892). Papers in Arch. f. Entw.-Mech. and Pflijger's Archiv; T. H. Morgan, The Development of the Frog's Egg (New York, 1897) : Papers in Arch. f. Entw.-Mech.; Roux, Gesammelte Abhandlungen (Leipzig, 1895); Papers in Arch. f. Entw.-Mech.; A. Weismann, Das Keimplasma (Jena, 1892) ; E. B. Wilson, papers in Journ. Morph., " The Ce'l in Development and Inheritance " (New York, 1896).

(H. A. E. D.) EMDEN, a maritime town of Germany, in the Prussian province of Hanover, near the mouth of the Ems, 49 m. N.W. from Oldenburg by rail. Pop. (1885) 14,019; (1905) 20,754. The Ems once flowed beneath its walls, but is now 2 m. distant, and connected with the town by a broad and deep canal, divided into the inner (or dock) harbour and the outer (or "free port") harbour. The latter is % m. in length, has a breadth of nearly 400 ft., and since the construction of the Ems- Jade and Dort- mund-Ems canals, has been deepened to 38 ft., thus allowing the largest sea-going vessels to approach its wharves. The town is intersected by canals (crossed by numerous bridges), which bring it into communication with most of the towns in East Friesland, of which it is the commercial capital. The waterways which traverse and surround it and the character of its numerous gabled medieval houses give it the appearance of an old Dutch, rather than of a German, town. Of its churches the most note- worthy are the Reformed " Great Church " (Grosse Kirche), a large Gothic building completed in 1455, containing the tomb of Enno II. (d. 1540), count of East Friesland; the Gasthaus- kirche, formerly the church .of a Franciscan friary founded in 1317; and the Neue Kirche (1643-1647). Of its secular build- ings, the Rathaus (town-hall), built in 1574-1576, on the model of that of Antwerp, with a lofty tower, and containing an interest- ing collection of arms and armour, is particularly remarkable. There are numerous educational institutions, including classical and modern schools, and schools of commerce, navigation and telegraphy. The town has two interesting museums. Emden is the seat of an active trade in agricultural produce and live-stock, horses, timber, coal, tea and wine. The deep-

sea fishing industry of the town is important, the fishing fleet in 1902 numbering 67 vessels. Machinery, cement, cordage, wire ropes, tobacco, leather, &c. are manufactured. Emden is also of importance as the station of the submarine cables connecting Germany with England, North America and Spain. It has a regular steamboat service with Borkum and Norderney.

Emden (Emuden, Emetha) is first mentioned in the 12th century, when it was the capital of the Eemsgo (Emsgau, or county of the Ems), one of the three hereditary countsbips into which East Friesland had been divided by the emperor. In 1252 the countship was sold to the bishops of Munster; but their rule soon became little more than nominal, and in Emden itself the family of Abdena, the episcopal provosts and castellans, established their practical independence. Towards the end of the 14th century the town gained a considerable trade owing to the permission given by the provost to the pirates known as " Viktualienbriider " to make it their market, after they had been driven out of Gothland by the Teutonic Order. In 1402, after the defeat of the pirates off Heligoland by the fleet of Ham- burg, Emden was besieged, but it was not reduced by Hamburg, with the aid of Edzard Cirksena of Greetsyl, until 143 1. The town was held jointly by its captors till 1453, when Hamburg sold

its rights to Ulrich Cirksena, created count of East Friesland by the emperor Frederick III. in 1454. In 1 544 the Reformation was introduced, and in the following years numerous Protestant refugees from the Low Countries found their way to the town. In 159 s Emden became a free imperial city under the protection of Holland, and was occupied by a Dutch garrison until 1744 when, with East Friesland, it was transferred to Prussia. In 1810 Emden became the chief town of the French department of Ems Oriental; in 181 5 it was assigned to Hanover, and in 1866 was annexed with that kingdom by Prussia.

See Fiirbringer, Die Stadt Emden in Gegenwart und Vergangenheit (Emden, 1892).

EMERALD, a bright green variety 0/ beryl, much valued as a gem-stone. The word comes indirectly from the Gr. vnapaydos (Arabic zumurrud) , but this seems to have been a name vaguely given to a number of stones having little in common except a green colour. Pliny's " smaragdus " undoubtedly included several distinct species.

Much confusion has arisen with respect to the " emerald " of the Scriptures. The Hebrew word nophek, rendered emerald in the Authorized Version, probably meant the carbuncle: it is indeed translated iivdpai; in the Septuagint, and a marginal reading in the Revised Version gives carbuncle. On the other hand, the word bareqath, rendered afiapaySos in the LXX., appears in the A.V. as carbuncle, with the alternative reading of emerald in the R.V. It may have referred to the true emerald, but Flinders Petrie suggests that it meant rock-crystal.

The properties of emerald are mostly the same as those described under Beryl. The crystals often show simply the hexagonal prism and basal plane. The prisms cleave, though imperfectly, at right angles to the geometrical axis; and hexagonal slices were formerly worn in the East. Compared with most gems, the emerald is rather soft, its hardness (7-5) being but slightly above that of quartz. The specific gravity is low, varying slightly in stones from different localities, but being for the Muzo emerald about 2-67. The refractive and dispersive powers are not high, so that the cut stones display little brilliancy or " fire." The emerald is dichroic, giving in the dichroscope a bluish-green and a yellowish-green image. The magnificent colour which gives extraordinary value to this gem, is probably due to chromium, F. Wohler found 0-186% of Cr 2 3 in the emerald of Muzo,— a proportion which, though small, is sufficient to impart an emerald-green colour to glass. The stone loses colour when strongly heated, and M. Lewy suggested that the colour was due to an organic pigment. Greville Williams showed that emeralds lost about 9 % of their weight on fusion, the specific /gravity being reduced to about 2-4.

The ancients appear to have obtained the emerald from Upper Egypt, where it is said to have been worked as early as 1650 b.c. It is known that Greek miners were at work in the time of Alex- ander the Great, and in later times the mines yielded their gems to Cleopatra. Remains of extensive workings were discovered in the northern Etbai by the French traveller, F. Cailliaud, in 181 7, and the mines were re-opened for a short time under Mehemet Ali. " Cleopatra's Mines " are situated in Jebel Sikait and Jebel Zabara near the Red Sea coast east of Assuan. They were visited in 1891 by E. A. Floyer, and the Sikait workings were explored in 1900 by D. A. MacAlister and others. The Egyptian emeralds occur in mica-schist and talc-schist.

On the Spanish conquest of South America vast quantities of emeralds were taken from the Peruvians, but the exact locality which yielded the stones was never discovered. The only South American

emeralds now known occur near Bogota, the capital of Colombia. The most famous mine is at Muzo, but workings are known also at Coscuez and Somondoco. The emerald occurs in nests of. calcite in a black bituminous limestone containing ammonites of Lower Cretaceous age. The mineral is associated with quartz, dolomite, pyrites, and the rare mineral called " parisite " — a fluo-carbonate of the cerium metals, occurring in brownish-yellow hexagonal crystals, and named after J. J. Paris, who worked the emeralds. It has been suggested that the Colombian emerald is not in its original matrix. The fine stones are called cafiutillos and the inferior ones morallian.

In 1830 emeralds were accidentally discovered in the Ural Mountains. At the present time they are worked on the river Takovaya, about 60 m. N.E. of Ekaterinburg, where they occur in mica-schist, associated with aquamarine, alexandrite, phenacite, &c. Emerald is found also in mica-schist in the Habachthal, in the Salzburg Alps, and in granite at Eidsvold in Norway. Emerald has been worked in a vein of pegmatite, piercing slaty rocks, near Emmaville, in New South Wales. The crystals occurred in association with topaz, fluorspar and cassiterite; but they were mostly of rather pale colour. In the United States, emerald has occasionally been found, and fine crystals have been obtained from the workings for hiddenite at Stony- point, Alexander county, N.C.

Many virtues were formerly ascribed to the emerald. When worn, it was held to be a preservative against epilepsy, it cured dysentery, it assisted women in childbirth, it drove away evil spirits, and preserved the chastity of the wearer. Administered internally it was reputed to have great medicinal value. In consequence of its refreshing green colour it was naturally said to be good for the eyesight.

The stone known as " Oriental emerald " is a green corundum. Lithia emerald is the mineral called hiddenite; Uralian emerald is a name given to demantoid; Brazilian emerald is merely green tourmaline; evening emerald is the peridot; pyro-emerald is fluorspar which phosphoresces with a green glow when heated ; and " mother of emerald " is generally a green quartz or perhaps in some cases a green felspar.

See Aquamarine, Beryl. (F. W. R.)*

EMERIC – DAVID, TOUSSAINT – BERNARD (1755-1839), French archaeologist and writer on art, was born at Aix, in Provence, on the

20th of August 1755. He was destined for the legal profession, and having gone in 1775 to Paris to complete his legal education, he acquired there a taste for art which influenced his whole future career, and he went to Italy, where he continued his art studies. He soon returned, however, to his native village, and followed for some time the profession of an advocate; but in 1787 he succeeded his uncle Antoine David as printer to the parlement. He was elected mayor of Aix in 1 791; and although he speedily resigned his office, he was in 1793 threatened with arrest, and had for some time to adopt a vagrant life. When danger was past he returned to Aix, sold his printing business, and engaged in general commercial .pursuits ; but he was not long in renouncing these also, in order to devote himself exclusively to literature and art. From 1809 to 1814, under the Empire, he represented his department in the Lower House {Corps legislatif) ; in 18 14 he voted for the downfall of Napoleon; in 181 5 he retired into private life, and in 1816 he was elected a member_of the Institute. He died in Paris on the 2nd of April 1839. Emeric-David was placed in 1825 on the commission appointed to continue L'Histoire litteraire de la France. His principal works are Recherchcs sur I'art statuaire, considers chez les anciens el les modemes (Paris, 1805), a work which obtained the prize of the Institute ; Suite d 'etudes calquSes el dessin&es d'apres cinq tableaux de Raphael (Paris, 1818-1821), in 6 vols, fob; Jupiter, ou recherches sur ce dieu, sur son culte, &c. (Paris, i833),2vols. 8vo, illustrated; and Vulcain (Paris, 1837).

EMERITUS (Lat. from emereri, to serve out one's time, to earn thoroughly), a term used of Roman soldiers and public officials who had earned their discharge from the service, a veteran, and hence applied, in modern times, to a university professor {professor emeritus) who has vacated his chair, on account of long service, age or infirmity, and, in the Presbyterian church, to a minister who has for like reason given up his charge.

EMERSON, RALPH WALDO (1803-1882), American poet and essayist, was born in Boston, Massachusetts, on the 25th of May 1 803 . Seven of his ancestors were ministers of New England churches. Among them were some of those men of mark who made the backbone of the American character: the sturdy Puritan, Peter Bulkeley, sometime rector of Odell in Bedfordshire, and afterward pastor of the church in the wilderness at Concord, New Hampshire; the zealous evangelist, Father Samuel Moody of Agamenticus in Maine, who pursued graceless sinners even

into the alehouse; Joseph Emerson of Maiden, " a heroic scholar," who prayed every night that no descendant of his might ever be rich; and William Emerson of Concord, Mass., the patriot preacher, who died while serving in the army of the Revolution. Sprung from such stock, Emerson inherited qualities of self-reliance, love of liberty, strenuous virtue, Sincerity, sobriety and fearless loyalty to ideals. The form of his ideals was modified by the metamorphic glow of Trans- cendentalism which passed through the region of Boston in the second quarter of the 19th century. But the spirit in which Emerson conceived the laws of life, reverenced them and lived them out, was the Puritan spirit, elevated, enlarged and beauti- fied by the poetic temperament.

His father was the Rev. William Emerson, minister of the First Church (Unitarian) in Boston. Ralph Waldo was the fourth child in a family of eight, of whom at least three gave evidence of extraordinary mental powers. He was brought up in an atmosphere of hard work, of moral discipline, and (after his father's death in 181 1) of that wholesome self-sacrifice which is a condition of life for those who are poor in money and rich in spirit. His aunt, Miss Mary Moody Emerson, a brilliant old maid, an eccentric saint, was a potent factor in his education. Loving him, believing in his powers, passionately desiring for him a successful career, but clinging with both hands to the old forms of faith from which he floated away, this solitary, intense woman did as much as any one to form, by action and reaction, the mind and character of the young Emerson. In 181 7 he entered Harvard College, and graduated in 182 1. In scholarship he ranked about the middle of his class. In literature and oratory he was more distinguished, receiving a Boylston prize for declamation, and two Bowdoin prizes for dissertations, the first essay being on " The Character of Socrates " and the second on " The Present State of Ethical Philosophy " — both rather dull, formal, didactic productions. He was fond of reading and of writing verse, and was chosen as the poet for class-day. His cheerful serenity of manner, his tranquil mirthf ul- ness, and the steady charm of his personality made him a favourite with his fellows, in spite of a certain reserve. His literary taste was conventional, including the standard British writers, with a preference for Shakespeare among the poets, Berkeley among the philosophers, and Montaigne (in Cotton's translation) among the essayists. His particular admiration among the college professors was the stately rhetorician, Edward Everett; and this predilection had much to do with his early ambition to be a professor of rhetoric and elocution.

Immediately after graduation he became an assistant in his brother William's school for young ladies in Boston, and continued teaching, with much inward reluctance and discomfort, for three years. The routine was distasteful; he despised the superficial details which claimed so much of his time. The bonds of conventionalism were silently dissolving in the rising glow of his poetic nature. Independence, sincerity, reality, grew more and more necessary to him. His aunt urged him to seek retirement, self-reliance, friendship with nature; to be no longer " the nursling of surrounding circumstances," but to prepare a celestial abode for the muse. The passion for spiritual leadership stirred within him. The ministry seemed to offer the fairest field for its satisfaction. In 1825 he entered the divinity school at Cambridge, to prepare himself for the Unitarian pulpit. His course was much interrupted by ill-health. His studies were irregular, and far more philosophical and literary than theological.

In October 1826 he was " approbated to preach " by the Middlesex Association of Ministers. The same year a threatened consumption compelled him to take a long journey in the south. Returning in 1827, he continued his studies, preached as a candidate in various churches, and improved in health. In 1829 he married a beautiful but delicate young woman, Miss Ellen Tucker of Concord, and was installed as associate minister of the Second Church (Unitarian) in Boston. The retirement of his senior colleague soon left him the sole pastor. Emerson's early sermons were simple, direct, unconventional. He dealt freely with the things of the spirit. There was a homely eleva- I

tion in his discourses, a natural freshness in his piety, a quiet enthusiasm in his manner, that charmed thoughtful hearers. Early in 1832 he lost his wife, a sorrow that deeply depressed him in health and spirits. Following his passion for independ- ence and sincerity, he arrived at the conviction that the Lord's Supper was not intended by Christ to be a permanent sacrament. To him, at least, it had become an outgrown form. He was willing to continue the service only if the use of the elements should be dropped and the rite made simply an act of spiritual remembrance. Setting forth these views, candidly and calmly, in a sermon, he found his congregation, not unnaturally, reluctant to agree with him, and therefore retired, not without some disappointment, from the pastoral office. He never again took charge of a parish; but he continued to preach, as opportunity offered, until 1847. In fact, he was always a preacher, though of a singular order. His supreme task was to befriend and guide the inner life of man.

The strongest influences in his development about this time were the liberating philosophy of Coleridge, the mystical visions of Swedenborg, the intimate poetry of Wordsworth, and the stimulating essays of Carlyle. On Christmas Day 1832 he took passage in a sailing vessel for the Mediterranean. He travelled through Italy, visited Paris, spent two months in Scotland and ' England, and saw the four men whom he most desired to see — Landor, Coleridge, Carlyle and Wordsworth. " The comfort of meeting such men of genius as these," he wrote, " is that they talk sincerely." But he adds that he found all four of them, in different degrees, deficient in insight into religious truth. His visit to Carlyle, in the lonely farm-house at Craigenputtock, was the memorable beginning of a lifelong friendship. Emerson published Carlyle's first books in America. Carlyle introduced Emerson's Essays into England. The two men were bound together by a mutual respect deeper than a sympathy of tastes, and a community of spirit stronger than a similarity of opinions. Emerson was a sweet-tempered Carlyle, living in the sunshine. Carlyle was a militant Emerson, moving amid thunderclouds. The things that each most admired in the other were self- reliance, directness, moral courage. A passage in Emerson's Diary, written on his homeward voyage, strikes the keynote of his remaining life. "A man contains all that is needful to his government within himself. ... All real good or evil that can befall him must be from himself. . . . There is a correspondence between the human soul and everything that exists in the world; more properly, everything that is known to man. Instead of studying things without, the principles of them all may be pene- trated into within him. . . . The purpose of life seems to be to acquaint man with himself. . . . The highest revelation is that God is in every man." Here is the essence of that intuitional philosophy, commonly called Transcendentalism. Emerson disclaimed allegiance to that philosophy. He called it " the saturnalia, or excess of faith." His practical common sense recoiled from the amazing conclusions which were drawn from it by many of its more eccentric advocates. His independence revolted against being bound to any scheme or system of doctrine, however nebulous. He said : " I wish to say what I feel and think to-day, with the proviso that to-morrow perhaps I shall contra- dict it all." But this very wish commits him to the doctrine of the inner light. All through his life he navigated the Trans- cendental sea, piloted by a clear moral sense, warned off the rocks by the saving grace of humour, and kept from capsizing by a good ballast of New England prudence.

After his return from England in 1833 he went to live with his mother at the old manse in Concord, Mass., and began his career as

a lecturer in Boston. His first discourses were delivered before the Society of Natural History and the Mechanics' Institute. They were, chiefly on scientific subjects, approached in a poetic spirit. In the autumn of 1835 he married Miss Lydia Jackson of Plymouth, having previously purchased a spacious old house and garden at Concord. There he spent the remainder of his life, a devoted husband, a wise and tender father, a careful house- holder, a virtuous villager, a friendly neighbour, and, spite of all his disclaimers, the central and luminous figure among the

Transcendentalists. The doctrine which in others seemed to produce all sorts of extravagances — communistic experiments at Brook Farm and Fruitlands, weird schemes of political reform, long hair on men and short hair on women — in his sane, well- balanced nature served only to lend an ideal charm to the familiar outline of a plain, orderly New England life. Some mild departures from established routine he tranquilly tested and as tranquilly abandoned. He tried vegetarianism for a while, but gave it up when he found that it did him no particular good. An attempt to illustrate household equality by having the servants sit at table with the rest of the family was frus- trated by the dislike of his two sensible domestics for such an inconvenient arrangement. His theory that manual labour should form part of the scholar's life was checked by the personal discovery that hard labour in the fields meant poor work in the study. " The writer shall not dig," was his practical conclusion. Intellectual independence was what he chiefly desired; and this, he found, could 'be attained in a manner of living not outwardly different from that of the average college professor or country minister. And yet it was to this property-holding, debt-paying, law-abiding, well-dressed, courteous mannered citizen of Concord that the ardent and enthusiastic turned as the prophet of the new idealism. The influence of other Transcendental teachers, Dr Hedge, Dr Ripley, Bronson Alcott, Orestes Brownson, Theodore Parker, Margaret Fuller, Henry Thoreau, Jones Very, was narrow and parochial compared with that of Emerson. Something in his imperturbable, kindly presence, his angelic look, his musical voice, his commanding style of thought and speech, announced him as the possessor of the great secret which many were seeking — the secret of a freer, deeper, more harmoni ous life. More and more, as his fame spread, those who " would live in the spirit" came to listen to the voice, and to sit at the feet, of the Sage of Concord.

It was on the lecture-platform that he found his power and won his fame. The courses of lectures that he delivered at the Masonic Temple in Boston, during the winters of 1835 and 1836, on " Great Men," " English Literature," and " The Philosophy of History," were well attended and admired. They were followed by two discourses which commanded for him immediate recognition, part friendly and part hostile, as a new and potent personality. His Phi Beta Kappa oration at Harvard College in August 1837, on " The American Scholar," was an eloquent appeal for independence, sincerity, realism, in the intellectual life of America. His address before the graduating class of the divinity school at Cambridge, in 1838, was an impassioned protest against what he called " the defects of historical Chris- tianity " (its undue reliance upon the personal authority of Jesus, and its failure to explore the moral nature of man as the fountain of established teaching), and a daring plea for absolute self- reliance, and a new inspiration of religion. " In the soul," he said, " let redemption be sought. Wherever a man comes, there comes revolution. The old is for slaves. Go alone. Refuse the good models, even those which are sacred in the imagination of men. Cast conformity behind you, and acquaint men at first hand with Deity." In this address Emerson laid his hand on the sensitive point of Unitarianism, which rejected the divinity of Jesus, but held fast to his supreme authority. A blaze of controversy sprang up at once. Conservatives attacked him; Radicals defended him. Emerson made no reply. But amid this somewhat fierce illumination he went forward steadily as a public lecturer. It was not his negations that made him popular; it was the eloquence with which .he presented the positive side of his doctrine. Whatever the titles of his discourses, "Literary Ethics," "Man the Reformer," "The Present Age," " The Method of Nature," " Representative Men," " The Conduct of Life," their theme was always the same, namely, " the infinitude of the private man." Those who thought him astray on the'subject of religion listened to him with delight when he poetized the commonplaces of art, politics, literature or the household. His utterance was Delphic, inspirational. There was magic in his elocution. The simplicity and symmetry of his sentences, the modulations of his thrilling voice, the radiance

of his fine face, even his slight hesitations and pauses over his manuscript, lent a strange charm to his speech. For more than a generation he went about the country lecturing in cities, towns and villages, before learned societies, rustic lyceums and colleges; and there was no man on the platform in America who excelled him in distinction, in authority, or in stimulating eloquence.

In 1847 Emerson visited Great Britain for the second time, was welcomed by Carlyle, lectured to appreciative audiences in Manchester, Liverpool, Edinburgh and London, made many new friends among the best English people, paid a brief visit to Paris, and returned home in July 1848. " I leave England," he wrote, " with increased respect for the Englishman. His stuff or substance seems to be the best in the world. I forgive him all his pride. My respect is the more generous that I have no sympathy with him, only an admiration." The impressions of this journey were embodied in a book called English Traits, published in 1856. It might be called " English Traits and American Confessions," for nowhere does Emerson's American- ism come out more strongly. But the America that he loved and admired was the ideal, the potential America. For the actual conditions of social and political life in his own time he had a fine scorn. He was an intellectual Brahmin. His principles were democratic, his tastes aristocratic. He did not like crowds, streets, hotels — " the people who fill them oppress me with their excessive civility." Humanity was his hero. He loved man, but be was not fond of men. He had grave doubts about universal suffrage. He took a sincere interest in social and political reform, but towards specific "reforms" his attitude was somewhat remote and visionary. On the subject of temperance he held aloof from the intemperate methods of the violent prohibitionists. He was a believer in woman's rights, but he was lukewarm towards conventions in favour of woman suffrage. Even in regard to slavery he had serious hesitations about the ways of the abolitionists, and for a long time refused to be identified with them. But as the irrepressible conflict drew to a head Emerson's hesitation vanished. He said in 1856, " I think we must get rid of slavery, or we must get rid of freedom." With the outbreak of the Civil War he became an ardent and powerful advocate of the cause of the Union. James Russell Lowell said, " To him more than to all other causes did the young martyrs of our Civil War owe the sustaining strength of thoughtful heroism that is so touching in every record of their lives." ,

Emerson the essayist was a condensation of Emerson the lecturer. His prose works, with the exception of the slender volume entitled Nature (1836), were collected and arranged from the manuscripts of his lectures. His method of writing was characteristic. He planted a subject in his mind, and waited for thoughts and illustrations to come to it, as birds or insects to a plant or flower. When an idea appeared, he followed it, " as a boy might hunt a butterfly"; when it was captured he pinned it in his " Thought-book." The writings of other men he used more for stimulus than for guidance. He said that books

were for the scholar's idle times. " I value them," he said, " to make my top spin." His favourite reading was poetry and mystical philosophy: Shakespeare, Dante, George Herbert, Goethe, Berkeley, Coleridge, Swedenborg, Jakob Boehme, Plato, the new Platonists, and the religious books of the East (in translation). Next to these he valued books of biography and anecdote: Plutarch, Grimm, St Simon, Varnhagen von Ense. He had some odd dislikes, and could find nothing in Aristophanes, Cervantes, Shelley, Scott, Miss Austen, Dickens. Novels he seldom read. He was a follower of none, an original borrower from all. His illustrations were drawn from near and far. The zodiac of Denderah; the Savoyards who carved their pine-forests into toys; the naked Derar, horsed on an idea, charging a troop of Roman cavalry; the long, austere Pythagorean lustrum of silence; Napoleon on the deck of the " Bellerophon," observing the drill of the English soldiers; the Egyptian doctrine that every man has two pairs of eyes; Empedocles and his shoe; the horizontal stratification of the

earth; a soft mushroom pushing its way through the hard ground, — all these allusions and a thousand more are found in the same volume. On his pages, close beside the Parthenon, the Sphinx, St Paul's, Etna and Vesuvius, you will find the White Mountains, Monadnock, Agiocochook, Katahdin, the pickerel- weed in bloom, the wild geese honking through the sky, the chick-a-dee braving the snow, Wall Street and State Street, cotton-mills, railroads and Quincy granite. For an abstract thinker he was strangely in love with the concrete facts of life. Idealism in him assumed the form of a vivid illumination of the real. From the pages of his teeming note-books he took the material for his lectures, arranging and rearranging it under such titles as Nature, School,Home, Genius, BeautyandManners, Self-Possession, Duty, The Superlative, Truth, The Anglo-Saxon, The Young American. When the lectures had served their purpose he rearranged the material in essays and published them. Thus appeared in succession the following volumes: Essays (First Series) (1841); Essays (Second Series) (1844); Representative Men (1850); English Traits (1856); The Conduct of Life (i860); Society and Solitude (1870); Letters and Social Aims (1876). Besides these, many other lectures were printed in separate form and in various combinations.

Emerson's style is brilliant, epigrammatic, gem-like; clear in sentences, obscure in paragraphs. He was a sporadic observer. He

saw by flashes. He said, " I do not know what arguments mean in reference to any expression of a thought." The co- herence of his writing lies in his personality. His work is fused by a steady glow of optimism. Yet he states this optimism moderately. " The genius which preserves and guides the human race indicates itself by a small excess of good, a small balance in brute facts always favourable to the side of reason."

His verse, though in form inferior to his prose, was perhaps a truer expression of his genius. He said, " I am born a poet " ; and again, writing to Carlyle, he called himself "half a bard." He had " the vision," but not " the faculty divine " which trans- lates the vision into music. In his two volumes of verse {Poems, 1846; May Day and other Pieces, 1867) there are many passages of beautiful insight and profound feeling, some lines of surprising splendour, and a few poems, like " The Rhodora," " The Snow- storm," " Ode to Beauty," " Terminus," " The Concord Ode," and the marvellous " Threnody " on the death of his first-born boy, of beauty unmarred and penetrating truth. But the total value of his poetical work is discounted by the imperfection of metrical form, the presence of incongruous images, the pre- dominance of the intellectual over the emotional element, and the lack of flow. It is the material of poetry not thoroughly worked out. But. the genius from which it came — the swift faculty of perception, the lofty imagination, the idealizing spirit enamoured of reality — was the secret source of all Emerson's greatness as a speaker and as a writer. Whatever verdict time may pass upon the bulk of his poetry, Emerson himself must be recognized as an original and true poet of a high order.

His latter years were passed in peaceful honour at Concord. In 1866 Harvard College conferred upon him the degree of LL.D., and in 1867 he was elected an overseer. In 1870 he delivered a course of lectures before the university on " The Natural History of the Intellect." In 1872 his house was burned down, and was rebuilt by popular subscription. In the same year he went on his third foreign journey, going as far as Egypt. About this time began a failure in his powers, especially in his memory. But his character remained serene and unshaken in dignity. Steadily, tranquilly, cheerfully, he finished the voyage of life.

" I trim myself to the storm of time,

I man the rudder, reef the sail,

Obey the voice at eve obeyed at prime:

‘ Lowly faithful, banish fear,

Right onward drive unharmed;

The port, well worth the cruise, is near,

And every wave is charmed.’ ”

Emerson died on the 27th of April 1882, and his body was laid to rest in the peaceful cemetery of Sleepy Hollow, in a grove on the edge of the village of Concord.

Authorities. — Emerson’s Complete Works, Riverside edition, edited by J. E. Cabot (11 vols., Boston, 1883-1884) ; another edition (London, 5 vols., 1906), by G. Sampson, in Bohn’s ” Libraries ” ; The Correspondence of Thomas Carlyle and Ralph Waldo Emerson, edited by Charles Eliot Norton (Boston, 1883); George Willis Cooke, Ralph Waldo Emerson: His Life, Writings and Philosophy (Boston, 1881); Alexander Ireland, Ralph Waldo Emerson: His Life, Genius and Writings (London, 1882); A. Bronson Alcott, Ralph Waldo Emerson, Philosopher and Seer (Boston, 1882) ; Moncure Daniel Conway, Emerson at Home and Abroad (Boston, 1882) ; Joel Benton, Emerson as a Poet (New York, 1883); F. B. Sanborn (editor), The Genius and Character of Emerson : Lectures at the Concord School of Philosophy (Boston, 1885); Oliver Wendell Holmes, Ralph Waldo Emerson (” American Men of Letters ” series) (Boston, 1885) ; James Elliott Cabot, A Memoir of Ralph Waldo Emerson, 2 vols, (the authorized biography) (Boston, 1887) ; Edward Waldo Emerson, Emerson in Concord (Boston, 1889); Richard Garnett, Life of Ralph Waldo Emerson (London, 1888) ; G. E. Woodberry, Ralph Waldo Emerson (1907). Critical estimates are also to be found in Matthew Arnold’s Discourses in America, John Morley’s Critical Miscellanies, Henry James’s Partial Portraits, Lowell’s My Study Windows, Birrell’s Obiter Dicta (2nd series), Stedman’s Poets of America, Whipple’s American Literature, &c. There is a Bibliography of Ralph Waldo Emerson, by G. W. Cooke (Boston, 1908). (H. van D.)

EMERSON, WILLIAM (1701-1782), English mathematician, was born on the 14th of May 1701 at Hurworth, near Darlington, where his father, Dudley Emerson, also a mathematician, taught a school. Unsuccessful as a teacher he devoted himself entirely to studious retirement, and published many works which are singularly free from errata. In mechanics he never advanced a proposition which he had not previously tested in practice, nor published an invention without

first proving its effects by a model. He was skilled in the science of music, the theory of sounds, and the ancient and modern scales; but he never attained any excellence as a performer. He died on the 20th of May 1782 at his native village. Emerson was eccentric and indeed clownish, but he possessed remarkable independence of character and intellectual energy. The boldness with which he expressed his opinions on religious subjects led to his being charged with scepticism, but for this there was no foundation.

Emerson's works include The Doctrine of Fluxions (1748); The Projection of the Sphere, Orthographic, Stereographic and Gnomical (1749); The Elements of Trigonometry . (17 49) ; The Principles of Mechanics (1754); A Treatise of Navigation (1755); A Treatise of Algebra, in two books (1765); The Arithmetic of Infinites, and the Differential Method, illustrated by Examples (1767); Mechanics, or the Doctrine of Motion (1769); The Elements of Optics, in four books (1768) ; A System of Astronomy (1769) ; The Laws of Centripetal and Centrifugal Force (1769); The Mathematical Principles of Geography (1770); Tracts (1770); Cyclomathesis, or an Easy Introduction to the several branches of the Mathematics (1770), in ten vols.; A Short Comment on Sir Isaac Newton's Principia; to which is added, A Defence of Sir Isaac against the objections that have been made to several parts of his works (1770) ; A Miscellaneous Treatise containing several Mathematical Subjects (1776).

EMERY (Ger. Smirgel), an impure variety of corundum, much used as an abrasive agent. It was known to the Greeks under the name of anvpis or afxlpis, which is defined by Dioscorides as a stone used in gem-engraving. The Hebrew word shamir (re- lated to the Egyptian asmir), where translated in our versions of the Old Testament " adamant " and " diamond," probably signified the emery-stone or corundum.

Emery occurs as a granular or massive, dark-coloured, dense substance, having much the appearance of an iron-ore. Its specific gravity varies with its composition from 3-7 to 4-3. Under the microscope, it is seen to be a mechanical aggregate of corun- dum, usually in grains or minute crystals of a bluish colour, with magnetite,' which also is granular and crystalline. Other iron oxides, like haematite and limonite, may be present as alteration-products of the magnetite. Some of the alumina and iron oxide may occasionally be chemically combined, so as to form an iron spinel, or hercynite. In addition to these minerals emery sometimes contains quartz, mica, tourmaline, cassiterite, &c. Indeed emery may be regarded as a rock

rather than a definite mineral species.

The hardness of emery is about 8, whereas that of pure corundum is 9. The " abrasive power," or " effective hardness," of emery is by no means proportional to the amount of alumina which it contains, but seems rather to depend on its physical

condition. Thus, taking the effective hardness of sapphire as ioo, Dr J. Lawrence Smith found that the emery of Samos with 70-10% of alumina had a corresponding hardness of 56; that of Naxos, with 68-53 of A1 2 3 , a hardness of 46; and that of Gumach with 77-82 of A1 2 3 , a hardness of 47.

Emery has been worked from a very remote period in the Isle of Naxos, one of the Cyclades, whence the stone was called naxium by Pliny and other Roman writers. The mineral occurs as loose blocks and as lenticular masses or irregular beds in granu- lar limestone, associated with crystalline schists. The Naxos emery has been described by Professor G. Tschermak. From a chemical analysis of a sample it has been calculated that the emery contained 52-4% of corundum, 32-1 of magnetite, 11-5 of tourmaline, 2 of muscovite and 2 of margarite.

Important deposits of corundum were discovered in Asia Minor by J. Lawrence Smith, when investigating Turkish mineral resources about 1847. The chief sources of emery there are Gumach Dagh, a mountain about 12 m. E. of Ephesus; Kula, near Ala-shehr; and the mines in the hills between Thyra and Cosbonnar, south of Smyrna. The occurrence is similar to that in Naxos. The emery is found as detached blocks in a reddish soil, and as rounded masses embedded in a crystalline limestone associated with mica-schist, gneiss and granite. The proportion of corundum in this emery is said to vary from 37 to 57%. Emery is worked at several localities in the United States, especially near Chester, in Hampden county, Mass., where it is associated with peridotites. The corundum and magnetite are regarded by Dr J. H. Pratt as basic segregations from an igneous magma. The deposits were discovered by H. S. Lucas in 1864.

The hardness and toughness of emery render it difficult to work, but it may be extracted from the rock by blasting in holes bored with diamond drills. In the East fire-setting is employed. The emery after

being broken up is carefully picked by hand, and then ground or stamped, and separated into grades by wire sieves. The higher grades are prepared by washing and eleutria- tion, the finest being known as " flour of emery." A very fine emery dust is collected in the stamping room, where it is deposited after floating in the air. The fine powder is used by lapidaries and plate-glass manufacturers. Emery-wheels are made by consolidating the powdered mineral with an agglutinating medium like shellac or silicate of soda or vulcanized india-rubber. Such wheels are not only used by dentists and lapidaries but are employed on a large scale in mechanical workshops for grinding, shaping and polishing steel. Emery-sticks, emery-cloth and emery-paper are made by coating the several materials with powdered emery mixed with glue, or other adhesive media. (See Corundum.) (F.W.R.)*

EMETICS (from Gr. e/xen/cos, causing vomit), the term given to substances which are administered for the purpose of producing vomiting. It is customary to divide emetics into two classes, those which produce their effect by acting on the vomiting centre in the medulla, and those which act directly on the stomach itself. There is considerable confusion in the nomenclature of these two divisions, but all are agreed in calling the former class central emetics, and the latter gastric. The gastric emetics in common use are alum, ammonium carbonate, zinc sulphate, sodium chloride (common salt), mustard and warm water. Copper sulphate has been purposely omitted from this list, since unless it produces vomiting very shortly after administration, being itself a violent gastro-intestinal irritant, some other emetic must promptly be administered. The central emetics are apomorphine, tartar emetic, ipecacuanha, senega and squill. Of these tartar emetic and ipecacuanha come under both heads: when taken by the mouth they act as gastric emetics before absorption into the blood, and later produce a further and more vigorous effect by stimulation of the medullary centre. It must be remembered, however, that, valuable though these drugs are, their action is accompanied by so much depression, they should never be administered except under medical advice.

Emetics have two main uses: that of emptying the stomach, especially in cases of poisoning, and that of expelling the contents

of the air passages, more especially in children before they have learnt or have the strength to expectorate. Where a physician is in attendance, the first of these uses is nearly always replaced by lavage of the stomach, whereby any subsequent depression is avoided. Emetics still have their place, however, in the treat- ment of

bronchitis, laryngitis and diphtheria in children, as they aid in the expulsion of the morbid products. Occasionally also they are administered when a foreign body has got into the larynx. Their use is contra-indicated in the case of anyone suffering from aneurism, hernia or arterio-sclerosis, or where there is any tendency to haemorrhage.

EMEU, evidently from the Port. Etna, 1 a name which has in turn been applied to each of the earlier-known forms of Ratite birds, but has finally settled upon that which inhabits Australia, though, up to the close of the 18th century, it was given by most authors to the bird now commonly called cassowary — this last

Fig. 1. — Ceram Cassowary. 2 '

word being a corrupted form of the Malayan Suuiari (see Craw-furd, Gramm. and Diet. Malay Language, ii. pp. 178 and 25), apparently first printed as Casoaris by Bontius in 1658 {Hist. nat. et med. Ind. Orient, p. 71).

The cassowaries (Casuariidae) and emeus (Dromaeidae) — as the latter name is now used — have much structural resemblance, and form the order Megistanes, 3 which is peculiar to the Australian Region. Huxley showed (Proc. Zool. Soc, 1867, pp. 422, 423, that they agree in differing from the other Ratitae in many important characters; one of the most obvious of them is that

1 By Moraes (1796) and Sousa (1830) the word is said to be from the Arabic Na'ama or Na'ema, an ostrich (Struthio camelus) ; but no additional evidence in support of the assertion is given by Dozy in 1869 (Glossaire des mots espagnols et portugais derives de I'arabe, 2nd ed., p. 260). According to Gesner in 1555 (lib. iii. p. 709), it was the Portuguese name of the crane (Grits communis), and had been trans- ferred with the qualifying addition of " di Gei " (i.e. ground-crane) to the ostrich. This statement is confirmed by Aldrovandus (lib. ix. cap. 2). Subsequently, but in what order can scarcely now be deter- mined, the name was naturally enough used for the ostrich-like birds inhabiting the lands discovered by the Portuguese, both in the Old and in the New World. The last of these are now known as rheas, and the preceding as cassowaries.

2 The figures are taken, by permission, from Messrs Mosentha! and Harting's Ostriches and Ostrich Farming (Triibner & Co., 1877).

3 Ann. and Mag. Nat. Hist. ser. 4, xx. p. 500.

each contour-feather appears to be double, its hyporachis, or aftershaft, being as long as the main shaft — a feature noticed in the case of either form so soon as examples were brought to Europe. The external distinctions of the two families are, however, equally plain. The cassowaries, when adult, bear a horny helmet on their head; they have some part of the neck bare, generally more or less ornamented with caruncles, and the claw of the inner toe is remarkably elongated. The emeus have no helmet, their head is feathered, their neck has no caruncles, and their inner toes bear a claw of no singular character.

The type of the Casuariidae is the species named by Linnaeus Struthio casuarius and by John Latham Casuarius emeu. Vieillot subsequently called it C. galeatus, and his epithet has been very commonly adopted by writers, to the exclusion of the older specific appellation. It seems to be peculiar to the island of Ceram, and was made known to naturalists, as we learn from Clusius, in 1597, by the first Dutch expedition to the East

Fig. 2. — Emeu.

Indies, when an example was brought from Banda, whither it had doubtless been conveyed from its native island. It was said to have been called by the inhabitants " Emeu," or " Ema," but this name they must have had from the earlier Portuguese navigators. 1 Since that time examples have been continually imported into Europe, so that it has become one of the best- known members of the subclass Ratitae. For a long time its glossy, but coarse and hair-like, black plumage, its lofty helmet, the gaudily-coloured caruncles of its neck, and the four or five barbless quills which represent its wing-feathers, made it appear unique among birds. But in 1857 Dr George Bennett certified the existence of a second and perfectly distinct species of casso- wary, an inhabitant of New Britain, where it was known to the natives as the Mooruk, and in his honour it was named by John Gould C. bennetti. Several examples were soon after received in England, and these confirmed the view of it already taken. A considerable number of other species of the genus have since been described from various localities in the same subregion.

1 It is known that the Portuguese preceded the Dutch in their voyages to the East, and it is almost certain that the latter were assisted by

pilots of the former nation, whose names for places and various natural objects would be imparted to their employers (see DodoV

Conspicuous among them from its large size and lofty helmet is the C. australis, from the northern parts of Australia. Its existence indeed had been ascertained, by T. S. Wall, in 1854, but the specimen obtained by that unfortunate explorer was lost, and it was not until 1867 that an example was submitted to competent naturalists.

Not much seems to be known of the habits of any of the cassowaries in a state of nature. Though the old species occurs rather plentifully over the whole of the interior of Ceram, A. R. Wallace was unable to obtain or even to see an example. They all appear to bear captivity well, and the hens in confinement frequently lay their dark-green and rough-shelled eggs, which, according to the custom of the Ratitae, are incubated by the cocks. The nestling plumage is mottled (Proc. Zool. Soc, 1863, pi. xlii.), and when about half-grown they are clothed in dis- hevelled feathers of a deep tawny colour.

Of the emeus (as the word is now restricted) the best known is the Casuarius novae-hollandiae of John Latham, made by Vieillot the type of his genus Dromaeus, 2 whence the name of the family (Dromaeidac) is taken. This bird immediately after the colonization of New South Wales (in 1788) was found to inhabit the south-eastern portion of Australia, where, according to John Hunter (Hist. Journ., &c, pp. 409, '413), the natives call it Maracry, Marryang or Maroang; but it has now been so hunted down that not an example remains at large in the districts that have been fully settled. It is said to have existed also on the islands of Bass Straits and in Tasmania, but it has been exterminated in both, without, so far as is known, any orni- thologist having had the opportunity of determining whether the race inhabiting those localities was specifically identical with that of the mainland or distinct. Next to the ostrich the largest of existing birds, the common emeu is an inhabitant of the more open country, feeding on fruits, roots and herbage, and generally keeping in small companies. The nest is a shallow pit scraped in the ground, and from nine to thirteen eggs, in colour varying from a bluish-green to a dark bottle-green, are laid therein. These are hatched by the cock-bird, the period of incubation lasting from 70 to 80 days. The young at birth are striped longitudinally with dark markings on a light ground. A remark- able structure in Dromaeus is a singular opening in the front of the windpipe, communicating with a tracheal pouch. This has attracted the attention of several anatomists, and has been well described by Dr Murie (Proc. Zool. Soc, 1867, pp.

405-415). Various conjectures have been made as to its function, the most probable of which seems to be that it is an organ of sound in the breeding-season, at which time the hen-bird has long been known to utter a remarkably loud booming note. Due con- venience being afforded to it, the emeu thrives well, and readily propagates its kind in Europe. Like other Ratite birds it will take to the water, and examples have been seen voluntarily swimming a wide river. (A. N.)

EMIGRATION (from Lat. emigrare; e, ex, out of, and migrare, to depart), the movement of population out of one country into another (see Migration).

EMILIA, a territorial division (compartimento) of Italy, bounded by Venetia and Lombardy on the N., Liguria on the W., Tuscany on the S., the Marches on the S.E., and the Adriatic Sea on the E. It has an area of 7967 sq. m., and a population of 2,477,690 (1901), embracing eight provinces, as follows: — (1) Bologna (pop. 529,612; 61 communes); (2) Ferrara (270,558; 16 communes); (3) Forli (283,996; 41 communes); (4) Modena (323,598; 45 communes); (5) Parma (303, 694; 50 communes); (6) Piacenza (250,491; 47 communes); (7) Ravenna (234,656; 18 communes); (8) Reggio nelP Emilia (281,085; 43 communes). In these provinces the chief towns, with communal populations, are as follows: —

(1) Bologna (147,898), Imola (33,144), Budrio (17,077), S. Giovanni in Persiceto (15,978), Castelfranco (13,484), Castel

1 The obvious misprint of Dromeicus in this author's work (Analyse, &c, p. 54) was foolishly followed by many naturalists, forgetful that he corrected it a few pages farther on (p. 70) to Dromaius — the properly latinized form of which is Dromaeus.

S. Pietro (13,426), Medicina (12,575), Molinella (12,081), Crevalcore (11,408).

(2) Ferrara (86,675), Copparo (39,222), Argenta (20,474), Portomaggiore (20,141), Cento (19,078), Bondeno (15,682), Comacchio (10,745).

(3) Forli (43,321), Rimini (43,595), Cesena (42,509)-

(4) Modena (63,012), Carpi (22,876), Mirandola (13,721), Finale

nell' Emilia (12,896), Pavullo nel Frignano (12,034).

(5) Parma (48,523), Borgo S. Donnino (12,019).

(6) Piacenza (35,647).

(7) Ravenna (63,364), Faenza (39,757), Lugo (27,244), Bagna-cavallo (15,176), Brisighella (13,815), Alfonsine (10,369).

(8) Reggio nell' Emilia (58,993), Correggio (14,445), Guastalla

(11,091).

The northern portion of Emilia is entirely formed by a great plain stretching from the Via Aemilia to the Po; its highest point is not more than 200 ft. above sea-level, while along the E. coast are the lagoons at the mouth of the Po and those called the Valli di Comacchio to the S. of them, and to the S. again the plain round Ravenna (10 ft.), which continues as far as Rimini, where the mountains come down to the coast.

Immediately to the S.E. of the Via Aemilia the mountains begin to rise, culminating in the central chain of the Ligurian and Tuscan Apennines. The boundary of Emilia follows the highest summits of the chain in the provinces of Parma, Reggio and Modena, passing over the Monte Bue (5915 ft.) and the Monte Cimone (7103 ft.), while in the provinces of Bologna and Forll it keeps somewhat lower along the N.E. slopes of the chain. With the exception of the Po, the main rivers of Emilia descend from this portion of the Apennines, the majority of them being tributaries of the Po; the Trebbia (which rises in the province of Genoa), Taro, Secchia and Panaro are the most important. Even the Reno, Ronco and Montone, which now flow directly into the Adriatic, were, in Roman times, tributaries of. the Po, and the Savio and Rubicone seem to be the only streams of any importance from these slopes of the Tuscan Apennines which ran directly into the sea in Roman times (see Apennines).

Railway communication in the plain of Emilia is unattended by engineering difficulties (except for the bridging of rivers) and is mainly afforded by the line from Piacenza to Rimini. This, as far as Bologna, forms part of the main route from Milan to Florence and Rome, while beyond Rimini it follows the S.E. coast of Italy past Ancona as far as Brindisi and Lecce. The description follows this main line in a S.E. direction. Pia- cenza, being immediately S. of a bridge over the Po, is an im- portant centre; a line runs to the W. to Voghera, through which it communicates with the lines of W.

Lombardy and Piedmont, and immediately N. of the Po a line goes off to Cremona. A new bridge over the Po carries a direct line from Cremona to Borgo S. Donnino. From Parma starts a main line, followed by expresses from Milan to Rome, which crosses the Apennines to Spezia (and Sarzana, for Pisa and Rome), tunnelling under the pass of La Cisa, while in a N. and N.E. direction lines run to B rescia and Suzzara. From Reggio branch lines run to Guastalla, Carpi and Sassuolo, there being also a line from Sassuolo to Modena. At Modena the main line to Verona through Suzzara and Mantua diverges to the N.; there is also a branch N.N.E. to Mirandola, and another S. to Vignola. Bologna is, however, the most important railway centre; besides the line S. to Pistoia and Florence over the Apennines and the line S.E. to Rimini, Ancona and Brindisi, there is the main line N.N.E. to Ferrara, Padua and Venice, and there are branches to Budrio and Portomaggiore to the N.E., and to S. Felice sul Panaro and Poggio Rusco to the N., which connect the main lines of the district.

At Castel Bolognese, 5 m. N.W. of Faenza, a branch goes off to Lugo, whence there are connexions with Budrio, Lavezzola (on the line between Ravenna and Ferrara) and Ravenna, and at Faenza a line, not traversed by express trains, goes across the Apennines to Florence. Rimini is connected by a direct line with Ravenna and Ferrara; and Ferrara, besides the main line S.S.W. to Bologna and N. by E. to Padua, has a branch to

Poggio Rusco, which goes on to Suzzara, a station on the main line between Modena and Verona. There are also many steam tramways in the flatter part of the province, the fertility and agricultural activity of which are considerable. The main pro- ducts of the plain are cereals, wine, and, in the marshy districts near the Po, rice; the system prevailing is that of the mezzadria — half the produce to the owner and half to the cultivator. The ancient Roman divisions of the fields are still preserved in some places. There are also considerable pastures, and cheese is produced, especially Parmesan. Flax, hemp and silk-worms are also cultivated, and a considerable quantity of poultry kept. The hill districts produce cereals, vines, olives and fruit; while on the mountains are considerable chestnut and other forests, and extensive summer pastures, the flocks going in part to the Maremma in summer, and in part to the pastures of the plain of the Emilia.

The name Emilia comes from the Via Aemilia (?.».), the Roman road from Ariminum to Placentia, which traversed the entire district from S.E. to N.W., its line being closely followed by the modern railway.

The name was transferred to the district (which formed the eighth Augustan region of Italy) as early as the time of Martial, in popular usage (Epigr. vi. 85. 5), and in the 2nd and 3rd centuries it is frequently named as a district under imperial judges (iuridici), generally in combination with Flaminia or Liguria and Tuscia. The district of Ravenna was, as a rule, from the 3rd to the 5th century, not treated as part of Aemilia, the chief town of the latter being Placentia. In the 4th century Aemilia and Liguria were joined to form a consular province; after that Aemilia stood alone, Ravenna being some- times temporarily added to it. The boundaries of the ancient district correspond approximately with those of the modern.

In the Byzantine period Ravenna became the seat of an exarch; and after the Lombards had for two centuries attempted to subdue the Pentapolis (Ravenna, Bologna, Forli, Faenza, Rimini), Pippin took these cities from Aistulf and gave them, with the March of Ancona, to the papacy in 755, to which, under the name of Romagna, they continued to belong. At first, however, the archbishop of Ravenna was in reality supreme. The other chief cities of Emilia — Ferrara, Modena, Reggio, Parma, Piacenza — were, on the other hand, independent, and in the period of the communal independence of the individual towns of Italy each of the chief cities of Emilia, whether belonging to Romagna or not, had a history of its own; and, notwithstand- ing the feuds of Guelphs and Ghibellines, prospered considerably. The study of Roman law, especially at Bologna, acquired great importance. The imperial influence kept the papal power in check. Nicholas III. obtained control of the Romagna in 1278, but the papal dominion almost fell during the Avignon period, and was only maintained by the efforts of Cardinal Albornoz, a Spaniard sent to Italy by Innocent VI. in 1353. Even so, however, the papal supremacy was little more than a name; and this state of things only ceased when Caesar Borgia, the natural son of Alexander VI., crushed most of the petty princes of Romagna, intending to found there a dynasty of his own; but on the death of Alexander VI. it was his successors in the papacy who carried on and profited by what Caesar Borgia had begun. The towns were thenceforth subject to the church and administered by cardinal legates. Ferrara and Comacchio remained under the house of Este until the death of Alphonso II. in 1 597, when they were claimed by Pope Clement VIII. as vacant fiefs. Modena and Reggio, which had formed part of the Ferrara duchy, were thenceforth a separate duchy under a branch of the house of Este, which was descended from a natural son of Alphonso I. Carpi and Mirandola were small principalities, the former of which passed to the house of Este in 1525, in which year

Charles V. expelled the Pio family, while the last of the Pico dynasty of Mirandola, Francesco Maria, having sided with the French in the war of Spanish Succes- sion, was deprived of his duchy in 1709 by the emperor Joseph I., who sold it to the house of Este in 17 10. Parma and Piacenza were at first under the Farnese, Pope Paul III. having placed his natural son PierLuigi therein 1545, and then,

after the extinction of the family in 173 1, under a secondary branch of the Bourbons of Spain. In 1796-1814, Emilia was first incorporated in the Italian republic and then in the Napoleonic Italian kingdom; after 1815 there was a return to the status quo ante, Romagna returning to the papacy and its ecclesiastical government, the duchy of Parma being given to Marie Louise, wife of the deposed Napoleon, and Modena to the archduke Francis of Austria, the heir of the last Este. In Romagna and Modena the government was oppressive, arbitrary, corrupt and unprogressive, while in Parma things were better. In 1821 and 1831 there were unsuccessful attempts at revolt in Emilia, which were sternly and cruelly repressed; chronic discontent continued and the people joined again in the move- ment of 1848-1849, which was crushed by Austrian troops. In 1859 the struggle for independence was finally successful, Emilia passing to the Italian kingdom almost without resistance.

EMINENCE (Lat. eminentia), a title of honour now confined to the cardinals of the Church of Rome. It was originally given as a complimentary title to emperors, kings, and then to less conspicuous persons. The Roman empire of the 4th century adopted from the " vanity of the East the forms and ceremonies of ostentatious greatness." Gibbon includes in the " profusion of epithets " by which " the purity of the Latin language was debased," and which were lavished on " the principal officers of the empire," " your Sincerity, your Gravity, your Excellency, your Eminence, your sublime and wonderful Magnitude, your illustrious and magnificent Highness." From the notitia digni- tatum it passed into the Latin of the middle ages as a flattering epithet, and was applied in the church and by the popes to the dignified clergy at large, and sometimes as a pure form of civility to churchmen of modest rank. On the 10th of June 1630, Urban VIII. confined the use of the titles Eminentiae and Eminentissimi to the cardinals, to imperial electors, and to the master of the Hospital of St John of Jerusalem (order of the Knights

of Malta) . Since the dissolution of the Holy Roman Empire, and the entire change, if not actual destruction, of the order of St John, the title " eminence " has become strictly confined to the cardinals. Before 1630 the members of the Sacred College were " Illus- trissimi " and " Reverendissimi." It is, therefore, not correct to speak of a cardinal who lived before that time as " his Eminence."

See du Cange, Glossarium mediae et infitnae latinitatis (Niort and London, 1884), s.v. " Eminentia."

EMINENT DOMAIN (Lat. eminens, rising high above surround- ing objects: and dominium, domain), a term applied in law to the sovereign right of a state to appropriate private property to public uses, whether the owner consents or not. It is re- peatedly employed by Grotius (e.g. De jure belli, bk. iii. c. 2ˆ s. 7), Bynkershoek (Quaest. jur. pub. bk. 2, c. 15), and Puffendorf (De jure naturae et gentium, bk. i. c. 1, s. 19), — the two latter, however, preferring the word imperium to dominium; and by other Dutch jurists. But in modern times it is chiefly in the United States of America that the doctrine of eminent domain has received its application, and it is chiefly to American law that the following remarks refer (see also the article Compen- sation). Eminent domain is distinguishable alike from the police power, by which restrictions are imposed on private property in the public interest, e.g. in connexion with the liquor traffic or public health (see re Haff (1904), 197 U.S. 488); from the power of taxation, by which the owner of private property is compelled to contribute a portion of it for public purposes; and from the war-power, involving the destruction of private property in the course of military operations. The police power fetters rights of property; eminent domain takes them away. The power of taxation is analogous to eminent domain as regards the purposes to which the contribution of the tax- payer is to be applied. But, unlike eminent domain, it does not necessarily involve a taking of specific property for those purposes. The destruction of property in military operations — or in the discharge by Government of other duties in cases of necessity, e.g. in order to check the progress of a fire in a city — clearly cannot be said to be an exercise of the power of eminent domain.

The question whether the element of compensation is necessarily involved in the idea of eminent domain has in modern times aroused much controversy. According to one school of thought (see Lewis, Eminent Domain, s. 10), this question must be answered in the negative. According to a second, whose view has the support of the civilians (see Randolph, Eminent Domain, s. 227; Mills, Eminent

Domain, s. 1) compensation is an inherent attribute of the power. An intermediate view is advocated by Professor Thayer (Cases on Constitutional Law, vol. 1, 953), according to which eminent domain springs from the necessities of government, while the obligation to reimburse rests upon the natural right of individuals. The right to compensation is thus not a component part of the power to take, but arises at the same time and the latter cannot exist without it. The relation between the two is that of substance and shadow. The matter is not, however, of great practical importance, for the Federal Constitution prohibits the exercise of the power " without just compensation " (5th Amendment), while in most of the states the State constitution or other legislation has imposed upon it a similar limitation: and the tendency of modern judicial decisions is in favour of the view that the absence of such a limitation will make an enactment so far unconstitutional and invalid.

In order to justify the exercise of the power of eminent domain, the purposes to which the property taken is to be applied must be " public," i.e. primarily public, and not primarily of private interest and merely incidentally beneficial to the public (Madison- ville Traction Co. v. Mining Co., 1904, 196 U.S. 239). Subject to this definition, the term " public " receives a wide interpreta- tion. All kinds of property may be taken; and the procedure indicated by the different legislatures must be followed. Any contravention of this rule would involve a breach of the 5th Amendment of the Federal Constitution, which provides that " no person . . . shall be . . . deprived of . . . property, without due process of law." It may be added that if the performance of a covenant is rendered impossible by an act of eminent domain the covenantor is excused.

In English law, the only exact analogue to the doctrine of eminent domain is to be found in the prerogative right of the crown to enter upon the lands of subjects or to interfere with their enjoyment for the defence of the realm (see A. G. v. Tomline; 1879; 12 Ch. D. 214). No attempt is made to exercise this prerogative, and lands are acquired for state purposes by statute usually framed on or incorporating the Lands Clauses Acts (see Compensation). The French Code Civil secures compensation to the owner of property in cases of expropriation pour cause d'utilite publique (art. 545), and there is similar provision in Belgium (Const. Law, art. II.), Holland (Funda- mental Law, art. 147), Spain (Civil Code, art. 349, and Law of 3rd May, 1841), and most other European states. It has been held in France that the right to compensation does not arise under art. 545 of the Code<]ivil where only a servitude d'utilite publique is created on a private individual's land.

In addition to the authorities cited in the text, see Lewis, Eminent Domain (2nd ed., Chicago, 1900) ; Mills, Eminent Domain (2nd ed., St Louis, 1888); Randolph, Eminent Domain in the United States (Boston, 1894). (A. W. R.)

EMINESCU, MICHAIL (1849-1889), the greatest Rumanian poet of the 19th century, was born on the 20th of December in Ipateshti near Botoshani, in the north of Moldavia. He was of Turco-Tatar origin, and his surname was originally Emin; this was changed to Eminovich and finally to the Rumanian form Eminescu. He was educated for a time in Czernowitz, and then entered the civil service. In 1864 he resumed his studies in Transylvania, but soon joined a roving theatrical company where he played in turn the r61es of actor, prompter and stage-manager. After a few years he went to Vienna, Jena and Berlin, where he attended lectures, especially on philosophy. In 1874 he was appointed school inspector and librarian at the university of Jassy, but was soon turned out through the change of government, and took charge, as editor in chief, of the Conservative paper Timpul (Times). In 1883

he had the first attack of the insanit> hereditary in his family, and in 1889 he died in a private institution in Bucharest. In 1870 his great poetical talent was revealed by two contributions to the Convorbiri literare, the organ of the Junimist party in Jassy; these were the poems " Venera §i Madona " and " Epigonii." Other poems followed and soon established his claim to be the first among the modern poets of his country. He was thoroughly acquainted with the chronicles of the past, had a complete mastery of the Rumanian language, and was a lover and admirer of Rumanian popular poetry. Influenced by these studies and by the philosophy of Schopenhauer, he introduced a new spirit into Rumanian poetry. Mystically inclined and himself of a melancholy disposition, he lived in the glory of the medieval Rumanian past; stifled by the artificiality of the world around him, he rebelled against the conventionality of society and his surroundings. In inimitable language he denounced the vileness of the present and painted in glowing pictures the heroism of the past; he also surprised nature in its primitive beauty, and he gave expression to stirring emotions in lyrics couched in the language and metre of popular poetry. He further proved himself an unsurpassed master in satire. Over all his poetry hangs a cloud of sadness, the sense of coming doom. Simplicity of language, masterly handling of

rhyme and verse, deep thought and plastic expression made Eminescu the creator of a school of poetry which dominated the thought of Rumania and the expression of Rumanian writers and poets at the end of the 19th century and the begin- ning of the 20th.

Five editions of his collected poems appeared after 1890. Some of them were translated into German by " Carmen Sylva " and Mite Kremnitz, and others have also been translated into several other languages. Eminescu also wrote two short novels, real poems in prose (Jassy, 1890). (M. G.)

EMIN PASHA [Edtjard Schnitzer] (1840-1892), German traveller, administrator and naturalist, was the son of Ludwig Schnitzer, a merchant of Oppeln in Silesia, and was born in Oppeln on the 28th of March 1840. He was educated at the universities of Breslau, Berlin and Konigsberg, and took the degree of M.D. at Berlin. He displayed an early predilection for zoology and ornithology, and in later life became a skilled and enthusiastic collector, particularly of African plants and birds. When he was four-and-twenty he determined to seek his fortunes abroad, and made his way to Turkey, where, after practising medicine on his own account for a short time, he was appointed (in 1865) quarantine medical officer at Antivari. The duties of the post were not heavy, and allowed him leisure for a diligent study of Turkish, Arabic and Persian. From 1870 to 1874 he was in the service of the governor of northern Albania, had adopted a Turkish name (though not that by which he afterwards became so widely known), and was practically naturalized as a Turk.

After a visit home in 1875 he went to Cairo, and then to Khartum, in the hope of an opportunity for travelling in the interior of Africa. This came to him in the following year, when General Charles George Gordon, who had recently suc- ceeded Sir Samuel Baker as governor of the equatorial provinces of Egypt, invited Schnitzer, who was now known as " Emin Effendi," to join him at Lado on the upper Nile. Although nominally Gordon's medical officer, Emin was soon entrusted with political missions of some importance to Uganda and Unyoro. In these he acquitted himself so well that when, in 1878, Gordon's successor at Lado was deprived of his office on account of malpractices (Gordon himself having been made governor-general of the Sudan), Emin was chosen to fill the post of governor of the Equatorial Province (i.e. the old equatorial provinces minus the Bahr-el-Ghazal) and given the title of " bey." He proved an energetic and enterprising governor; indeed, his enterprise on more than one occasion brought him into conflict with Gordon, who eventually decided to remove Emin to Suakin. Before the change could be

effected, however, Gordon resigned his post in the Sudan, and his successor revoked the order.

The next three or four years were employed by Emin in various journeys through his province, and in the initiation of schemes for its development, until in 1882, on his return from a visit to Khartum, he became aware that the Mahdist rising, which had originated in Kordofan, was spreading southward. The effect of the rising was, of course, more markedly felt in Emin's province after the abandonment of the Sudan by the Egyptian government in 1884. He was obliged to give up several of his stations in face of the Mahdist advance, and ultimately to retire from Lado, which had been his capital, to Wadelai. This last step followed upon his receipt of a letter fom Nubar Pasha, informing him that it was impossible for the Egyptian government to send him help, and that he must stay in his province or retire towards the coast as best he could. Emin (who about this time was raised to the rank of pasha) had some thoughts of a retreat to Zanzibar, but decided to remain where he was and endeavour to hold his own. To this end he carried on protracted negotiations with neighbouring native potentates. When, in 1887, (Sir) H. M. Stanley's expedition was on its way to relieve him, it is clear from Emin's diary that he had no wish to leave his province, even if relieved. He had done good work there, and established a position which he believed himself able to maintain. He hoped, however, that the presence of Stanley's force, when it came, would strengthen his position; but the condition of the relieving party, when it arrived in April 1888, did not seem to Emin to promise this. Stanley's proposal to Emin, as stated in the latter's diary, was that Emin should either remain as governor-general on behalf of the king of the Belgians, or establish himself on Victoria Nyanza on behalf of a group of English merchants who wished to start an enterprise in Africa on the model of the East India Company. After much hesitation, and prompted by a growing disaffection amongst the natives (owing, as he maintained, to his loss of prestige after the arrival of Stanley's force), Emin decided to accompany Stanley to the coast, where the expedition arrived in December 1889. Unfortun- ately, on the evening of a reception dinner given in his honour, Emin met with an accident which resulted in fracture of the skull. Careful nursing gradually restored him to health, and on his convalescence he resolutely maintained his decision to remain in Africa, and, if possible, to work there in future on behalf of the German government. The seal was definitely set upon this decision by his formal engagement on behalf of his native country, early in 1890. Preparations for a new expedition into the interior were set on foot, and meanwhile Emin

was honoured in various ways by learned societies in Germany and elsewhere.

The object of the new expedition was (to quote Emin's in- structions) " to secure on behalf of Germany the territories situated south of and along Victoria Nyanza up to Albert Nyanza," and to " make known to the population there that they were placed under German supremacy and protection, and to break or undermine Arab influence as far as possible." The force, which was well equipped, started at the end of April 1890. But before it had penetrated far inland the political reasons for sending the expedition vanished with the signature, on the 1st of July 1890, of the Anglo-German agreement defining the spheres of influence of the two nations, an agreement which excluded the Albert Nyanza region from the German sphere. For a time things went well enough with the expedition; Emin occupied the important town of Tabora on the route from the coast to Tanganyika and established the post of Bukoba on Victoria Nyanza, but by degrees ill-fortune clouded its prospects. Difficulties on the route; dissensions between Emin and the authorities in German East Africa, and misunderstandings on the part of both; epidemics of disease in Emin's force, followed by a growing spirit of mutiny among his native followers; an illness of a painful nature which attacked him — all these gradually undermined Emin's courage, and his diaries at the close of 1891 reflect a gloomy and almost hopeless spirit. In May that year he had crossed into the Congo State by the south shore of Albert Edward Nyanza, and many months were spent on the borders of the great Congo Forest and in the Undusuma country south-west of Albert Nyanza, breaking ground new to Europeans.

In December 1891 he sent off his companion, Dr Stuhlmann, with the bulk of the caravan, on the way back to the east coast. Emin remained behind with the sick, and with a very reduced following left the lake district in March 1892 for the Congo river. On reaching Ipoto on the Ituri he came within the region of the Arab slave raiders and ivory hunters, in whose company he at times travelled. These gentry were incensed against Emin for the energetic way in which he had dealt with their comrades while in German territory, and against Europeans generally by the campaign for their suppression begun by the Congo State. At the instigation of one of these Arabs Emin was murdered on the 23rd or 24th of October 1892 at Kinena, a place

about 80 m. E.S.E. of Stanley Falls.

See Emin Pasha, his Life and Work, by Georg Schweitzer, with introduction by R. W. Felkin (2 vols., London, 1898); Emin Pasha in Central Africaˆ (London, 1888), a collection of Emin's papers contributed to scientific journals; and Mit Emin Pascha ins Herz von Afrika (Berlin, 1894), by Dr Franz Stuhlmann. Major G. Casati (1838-1902), an Italian officer who spent several years with Emin, and accompanied him and Stanley to the coast, narrated his experiences in Died anni in Eguatoria (English edition, Ten Years in Eguatoria and the Return with Emin Pasha, London, 1891).

EMLYN, THOMAS (1663-1741), English nonconformist divine, was born at Stamford, Lincolnshire. He served as chaplain to the presbyterian Letitia, countess of Donegal, and then to Sir Robert Rich, afterwards (1691) becoming colleague to Joseph Boyse, presbyterian minister in Dublin. From this office he was virtually dismissed on his own confession of unitarianism, and for publishing An Humble Inquiry into the Scripture Account of Jesus Christ (1702) was sentenced to a year's imprisonment and a fine of £1000. Thanks to the intervention of Boyse he was released in 1 705 on payment of £90. He is said to have been the first English preacher definitely to describe himself as "unitarian," and writes in his diary, "I thank God that He did not call me to this lot of suffering till I had arrived at maturity of judgment and firmness of resolution, and that He did not desert me when my friends did. He never let me be so cast down as to renounce the truth or to waver in my faith." Of Christ he writes, " We may regard with fervent gratitude so great a benefactor, but our esteem and rational love must ascend higher and not rest till it centre in his God and ours." Emlyn preached a good deal in Paul's Alley, Barbican, in his later years, and died in London in 1741.

EMMANUEL, or Immanuel, a Hebrew symbolical proper name, meaning " God (is) with us." When in 734-733 B.C. Ahaz, king of Judah, alarmed at the preparations made against him by the Syro-Ephraimitish alliance, was inclined to seek aid from Tiglath-pileser of Assyria, the prophet Isaiah en- deavoured to allay his fear by telling him that the danger would pass away, and as a sign from Yahweh that this should be so, any young woman who should within the year bear a son, might call his name Immanuel in token of the divine protection accorded to Judah. For before the infant should come to even the im- mature intelligence of childhood the lands of the foe would be laid waste (Isaiah vii. 14-16). For other interpretations, especi- ally as regards the mother, see Ency. Bib. col. 2162-3, and the commentaries. In the post-exilic period the

historical meaning of the passage was forgotten, and a new significance was given to it in accordance with the gradually developing eschatological doctrine. This new interpretation finds expression in Matt, i. 23, where the name is applied to Jesus as the Messiah. At the close of Isaiah viii. 8 for " of thy land, O Immanuel," we should probably read " of the land, for God is with us." The three passages quoted are the only instances where this word occurs in Scripture; it is frequent in hymns and devotional literature as a title of Jesus Christ.

EMMANUEL PHILIBERT (1528-1580), duke of Savoy, son of Charles III. and Beatrice of Portugal, one of the most renowned princes of the later Renaissance, was born on the 8th of July 1528. Charles, after trying in vain to remain neutral in the wars between France and the emperor Charles V., had been forced to side with the latter, whereupon his duchy was overrun with foreign soldiery and became the battlefield of the rival armies.

Prince Emmanuel took service with the emperor in 1545 and distinguished himself in Germany. France and the Low Countries. On the death of his father in 1553 he succeeded to the title, little more than an empty one, and continued in the emperor's service. Having been refused the command of the imperial troops in Piedmont, he tried in vain to negotiate a separate peace with France; but in 1556 France and Spain concluded a five years' truce, by which each was to retain what it then occupied. This would have been the end of Savoy, but within a yeai the two powers were again at war. The chief events of the campaign were the successful resistance of Cuneo, held for the duke by Count Luserna, and the victory of St Quentin (jˆy)! w < > n by Emmanuel Philibert himself against the French. At last in 1558 the powers agreed to an armistice, and in 1559 the peace of Cateau-Cambresis was made, by which Emmanuel regained his duchy, but on onerous terms, for France was to occupy several Piedmontese fortresses, including Turin and Pinerolo, for not more than three years, and a marriage was arranged between the duke and Margaret, duchess of Berry, sister of the French king; while Spain was to garrison Asti and Vercelli (afterwards exchanged for Santhia) until France evacuated the above-mentioned fortresses. The duke's marriage took place in Paris a few months later; and after the French evacuation he re-entered his dominions amidst the rejoicings of the people. The condition of Piedmont at that time was deplorable; for wars, the exactions and devastations of the foreign soldiery, and religious antagonism between Catholics and Protestants had wrought terrible havoc. " Uncultivated," wrote the Venetian ambassador, quoted by E. Ricotti, " no citizens in the cities, neither man nor beast

in the fields, all the land forest-clad and wild; one sees no houses, for most of them are burnt, and of nearly all the castles only the walls are visible; of the inhabitants, once so numerous, some have died of the plague or of hunger, some by the sword, and some have fled elsewhere preferring to beg their bread abroad rather than support misery at home which is worse than death." There was no army, the administration was chaotic, and the finances were in a hopeless state. The duke set to work to put his house in order, and inaugurated a series of useful reforms, ably assisted by his minister, Niccolo Balbo. But progress was slow, and was accompanied by measures which abolished the states general, the last survival of feudal liberties. Savoy, following the tendency of the other states of Europe at that time, became thenceforth an absolute monarchy, but without that transforma- tion the achievement of complete independence from foreign powers would have been impossible.

One of the first questions with which he had to deal was the religious difficulty. The inhabitants of the Pellice and Chisone valleys had long professed a primitive form of Christianity which the orthodox regarded as heretical, and had been subject to numerous persecutions in consequence (see Waldenses). At the time of the Reformation they had gone over to Protestant- ism, and during the wars of the 16th century the new religion made great progress in Piedmont. The duke as a devout Catholic desired to purge the state of heresy, and initiated repressive measures against the Waldenses, but after some severe and not very successful fighting he ended by allowing them a measure of religious liberty in those valleys (1561). At the pope's instigation he recommenced persecution some years later, but his duchess and some German princes pleaded successfully in favour of the Protestants. He next turned his attention to getting rid of the French garrisons; the negotiations proved long and troublesome, but in December 1562 the French departed on payment of 100,000 scudi, retaining only Pinerolo and Savigliano, and Turin became the capital once more. There remained the Bernese, who had occupied some of the duke's territories in Savoy and Vaud, and in Geneva, over which he claimed certain rights. With Bern he made a compromise, regaining Gex, the Chablais, and the Genevois, on condition that Protestantism should be tolerated there, but he renounced Vaud and some other districts (1566). Disagreements with the Valais were settled in a similar way in 1569; but the Genevans refused to recognize Savoyard

suzerainty. Emmanuel reformed the currency, reorganized justice, prepared the way for the emancipation of the serfs, raised the standing army to 25,000 men, and fortified the frontiers, ostensibly against Huguenot raids, but in reality from fear of France. On the death of Charles IX. of France in 1574 the new king, Henry III., passed through Piedmont on his way from Poland; Emmanuel gave him a magnificent reception, and obtained from him a promise that Pinerolo and Savigliano should be evacuated, which was carried out at the end of the year. Philip of Spain was likewise induced to evacuate Asti and Santhia in 1575. Thus, after being more or less under foreign occupation for 39 years, the duchy was at last free. The duke rounded off his dominions by the purchase of Tenda and Oneglia, which increased his seaboard, and the last years of his life were spent in fruitless negotiations to obtain Monferrato, held by the Gonzagas under Spanish protection, and Saluzzo, which was a French fief. He died on the 30th of August 1580, and was succeeded by his son Charles Emmanuel I. As a statesman Emmanuel Philibert was able, business-like and energetic; but he has been criticized for his duplicity, although in this respect he was no worse than most other European princes, whose ends were far more questionable. He was autocratic, but just and very patriotic. During his reign the duchy, which had been more than half French, became predominantly Italian. By diplomacy, which, although he was a capable and brave soldier, he preferred to war, he succeeded in freeing his country, and converting it from a ruined and divided land into a respect- able independent power of the second rank, and, after Venice, the best-governed state in Italy.

The most accurate biography of Emmanuel Philibert is contained in E. Ricotti's Storia della monarchia Piemontese, vol. ii. (Florence, 1861), which is well done and based on documents; cf. Claretta's La Successione di Emanuele Filiberto (Turin, 1884).

EMMAUS, the name of two places in Palestine.

1. A village mentioned by Luke (xxiv. 13), without any in- dication of direction, as being 60 stadia (almost 7 m.), or according to some MSS. 1 160 stadia, from Jerusalem. Its identification is a matter of mere guesswork: it has been sought at (a) Emmaus- Nicopolis (see 2 below), distant 176 stadia from Jerusalem; (b) Kuryet el-' Enab, distant 66 stadia, on the carriage road to Jaffa; (c) Kulonieh, distant 36 stadia, on the same road; (d) el-Kubeibeh, distant 63 stadia, on the Roman road to Lydda; (e) 'Urtas, distant 60 stadia; and (f) Khurbet el-Khamasa, distant 86 stadia, on the Roman road to Eleutheropolis. Of these, el-Kubeibeh or 'Urtas seems the most

probable, though many favour Kulonieh because of its nearness to Bet Mizza, in which name there is similarity with Emmaus, and because of a reading (30 stadia) in Josephus.

2. Emmaus-Nicopolis, now 'Amwas, a town on the maritime plain, and a place of importance during the Maccabaean and Jewish wars. Near it Judas Maccabaeus defeated Gorgias in 164 B.C., and Vespasian established a fortified camp in a.d. 69. It was afterwards rebuilt and named Nicopolis, and became an episcopal see. It was also noted for a healing spring.

EMMENDINGEN, a town of Germany, in the grand-duchy of Baden, close to the Black Forest, on the Elz and the main line of railway Mannheim-Constance. Pop. 6200. It has a Protestant church with a fine spire, a Roman Catholic church, a handsome town-hall, an old castle (now a hospital), once the residence of the counts of Hochberg, spinning mills, tanneries and manufactures of photographic instruments, paper, machinery and cigars. There is also a considerable trade in timber and cattle. Here the author Johann Georg Schlosser (1 739-1 799), the husband of Goethe's sister Cornelia (who died in 1777 and is interred in the old graveyard), was Oberamtmann (bailiff) for a few years.

1 Including Codex n. But this distance is too great for the conditions of Luke's narrative and the reading (160) is evidently an attempt to harmonize with the traditional identification of Emmaus-Nicopolis held by Eusebius and Jerome. For a curious reading in three old Latin MSS. which makes Emmaus the name of the second traveller on the journey, see Expos. Times, xiii. 429, 477, 5< >i •

Emmendingen was formerly the seat of the counts of Hochberg, a cadet branch of the margraves of Baden. In 1418 it received market rights from the emperor, and in 1590 was raised to the status of a town, and walled, by Margrave Jacob III.

EMMERICH (the ancient Embrica), a town of Germany, in the Prussian Rhine province, on the right bank of the Rhine and the railway from Cologne to Amsterdam, 5 m. N.E. of Cleves. Pop. (1905) 12,578. Ik has a considerable shipping trade, and manufactories of tobacco and cigars, chocolate, margarine, oil, chemicals, brushes, vinegar, soap, guano and perfumery. There are also iron foundries and machine factories. The old minster church, built in the middle of the nth century, contains some fine choir stalls.

Emmerich, formerly called Embrika and Emrik, originally a Roman

colony, is mentioned in records so early as the 7th century. St Willibrord founded a monastery and church here. In 1233 the place came into the possession of the dukes of Gelderland and received the status of a town in 1247. In 1371 it fell to the duchy of Cleves, and passed with it in 1609 to Brandenburg. The town joined the Hanseatic League in 1407. In 1794 it was bombarded by the French under General Vandamme, and in 1806 it was assigned to the grand-duchy of Berg. It passed into the possession of Prussia in 181 5.

See A. Dederich, Annalen der Stadt Emmerich (Emmerich, 1867).

EMMET, ROBERT (1778-1803), Irish rebel, youngest son of Robert Emmet, physician to the lord-lieutenant of Ireland, was born in Dublin in 1778, and entered Trinity College in October 1793, where he had a distinguished academic career, showing special aptitude for mathematics and chemistry, and acquiring a reputation as an orator. Without taking a degree he removed his name from the college books in April 1798, as a protest against the inquisitorial examination of the political views of the students conducted by Lord Clare as chancellor of the university. Thus cut off from entering a learned profession, he turned towards political intrigue, being already to some extent in the secrets of the United Irishmen, of whom his elder brother Thomas Addis Emmet (see below) was one of the most prominent. In April 1799 a warrant was issued for his arrest, but was not executed; and in 1800 and the following year he travelled on the continent of Europe, where he entered into relations with the leaders of the United Irishmen, exiled since the rebellion of 1798, who were planning a fresh outbreak in Ireland in expectation of support from France. Emmet went to Paris in October 1802, where he had an interview with Bona- parte which convinced him that the peace of Amiens would be of short duration and that a French invasion of England might be looked for in August 1803. The councils of the conspirators were weakened by divided opinions as to the ultimate aim of their policy; and no clearly thought-out scheme of operations appears to have been arrived at when Emmet left Paris for Ireland in October 1802. Those in his confidence afterwards denied that Emmet was himself the originator of the plan on which he acted; and several of the ablest of the United Irishmen held aloof, believing the project to be impracticable. Among the latter was. Lord Cloncurry, at one time on the executive of the United Irishmen, with whom Emmet dined the night before he left Paris, and to whom he spoke of his plans with intense enthusiasm and excitement. Emmet's lack of discretion was shown by his revealing his intentions in detail to an Englishman named Lawrence, resident near Honfleur, with whom he sought shelter when travelling on foot on his way to

Ireland. Arriving in Dublin at the end of October he received information to the effect that seventeen counties were ready to take up arms if a successful effort were made in Dublin. For some time he re- mained concealed in his father's house near Miltown, making his preparations. A large number of pikes were collected and stored in Dublin during the spring of 1803, but fire-arms and ammuni- tion were not plentiful.

The probability of a French invasion in August was increased by the renewal of the war in May, Emmet's brother Thomas being then in Paris in communication with Talleyrand and Bonaparte. But ' a discovery by the government of concealed

arms, and an explosion at one of Emmet's dep6ts in Patrick Street on the 16th of July, necessitated immediate action, and the 23rd of that month was accordingly fixed for the projected rising. An elaborate plan of operations, which he described in detail in a letter to his brother after his arrest, had been prepared by Emmet, the leading feature of which was a simultaneous attack on the castle, the Pigeon House and the artillery barracks at Island bridge; while bodies of insurgents from the neighbouring counties were to march on the capital. But the whole scheme miscarried. Some of Emmet's bolder proposals, such as a plan for capturing the commander-in-chief, were vetoed by the timidity of his associates, none of whom were men of any ability. On the 23rd of July all was confusion at the depots, and the leaders were divided as to the course to be pursued; orders were not obeyed; a trusted messenger despatched for arms absconded with the money committed to him to pay for them; treachery, quite unsuspected by Emmet, honeycombed the conspiracy; the Wicklow contingent failed to appear; the Kildaremen turned back on hearing that the rising had been postponed; a signal expected by a contingent at the Broadstone was never given. In this hopeless state of affairs a false report reached Emmet at one of his depots at nine o'clock in the evening that the military were approaching. Without taking any step to verify it, Emmet put on a green and white uniform and placed himself at the head of some eighty men, who marched towards the castle, being joined in the streets by a second body of about equal strength. None of these insurgents had any discipline, and many of them were drunk. Lord Kilwarden, proceeding to a hastily summoned meeting of the privy council, was dragged from his carriage by this rabble and murdered, together with his nephew Richard Wolfe; his

daughter who accompanied him being conveyed to safety by Emmet himself. Emmet, now seeing that the rising had become a mere street brawl, made his escape; a detachment of soldiers quickly dispersed his followers.

After hiding for some days in the Wicklow mountains Emmet repaired to the house of a Mrs Palmer at Harold's Cross, in order to be near the residence of John Philpot Curran (q.v.), to whose daughter Sarah he had for some time been secretly attached, and with whom he had carried on a voluminous corre- spondence, afterwards seized by the authorities at her father's house. Attempting without success to persuade this lady to fly with him to America, Emmet lingered in the neighbourhood till the 25th of August, when he was apprehended by Major H. C. Sirr, the same officer who had captured Lord Edward Fitzgerald in 1798. At his trial he was defended and betrayed by the infamous Leonard MacNally (q.v.), and was convicted of treason; and after delivering an eloquent speech from the dock, was hanged on the 20th of September 1803.

By the universal testimony of his friends, Robert Emmet was a youth of modest character, pure motives and winning person- ality. But he was entirely lacking in practical statesmanship. Brought up in a revolutionary atmosphere, his enthusiasm was uncontrolled by judgment. Thomas Moofe, who warmly eulogizes Emmet, with whom he was a student at Trinity College, records that one day when he was playing on the piano the melody " Let Erin remember," Emmet started up exclaiming passionately, " Oh, that I were at the head of 20,000 men marching to that air ! " He had no knowledge of the world or of men; he trusted every one with child-like simplicity; except personal courage he had none of the qualities essential to leader- ship in such an enterprise as armed rebellion. The romance of his love affair with Sarah Curran — who afterwards married Robert Henry Sturgeon, an officer distinguished in the Peninsular War — has cast a glamour over the memory of Robert Emmet; and it inspired Thomas Moore's well-known songs, " She is far from the land where her young hero sleeps," and " Oh, breathe not his name"; it is also the subject of Washington Irving's " The Broken Heart." Emmet was short and slight in figure; his face was marked by smallpox, and he was described in 1803 for the purpose of identification as being "of an ugly, sour countenance and dirty brown complexion." A few poems by Emmet of little merit are appended to Madden's biography.

See R. R. Madden, The United Irishmen, their Lives and Times (2nd ed. 4 vols., Dublin, 1858-1860); Charles Phillips, Recollections of

Curran and Some of his Contemporaries (2nd ed., London, 1822); Henry' Grattan, Memoirs of the Life and Times of the Right Hon. H. Grattan (5 vols., London, 1839-1846); W. H. Maxwell, History of the Irish Rebellion in 1798; with Memoirs of the Union and Emmet's Insurrection in 1803 (London, 1845) ; W. H. Curran, Life of J. P. Curran (2 vols., Edinburgh, 1822); Thomas Moore, Life and Death of Lord Edward Fitzgerald (2 vols. 3rd ed., London, 1832); and Memoirs, Journals and Correspondence of Thomas Moore, edited by Lord John Russell (8 vols., London, 1853-1856). (R. J. M.)

EMMET, THOMAS ADDIS (1764-1827), Irish lawyer and politician, second son of Robert Emmet, physician to the lord- lieutenant of Ireland, and elder brother of Robert Emmet (q.v.), the rebel, was born at Cork on the 24th of April 1764, and was educated at Trinity College, Dublin, andat Edinburgh University, where he studied medicine and was a pupil of Dugald Stewart in philosophy. After visiting the chief medical schools on the continent, he returned to Ireland in 1788; but the sudden death of his elder brother, Christopher Temple Emmet (1761- 1788), a barrister of some distinction, induced him to follow the advice of Sir James Mackintosh to forsake medicine for the law as a profession. He was called to the Irish bar in 1790, and quickly obtained a practice, principally as counsel for prisoners charged with political offences, and became the legal adviser of the leading United Irishmen. When the Dublin corporation issued a declaration of Protestant ascendancy in 1792, the counter-manifesto of the United Irishmen was drawn up by Emmet; and in 1795 he took the oath of the society in open court, becoming secretary in the same year and a member of the executive in 1797. Although Grattan had a profound contempt for Emmet's political understanding, describing him as a quack in politics who set up his own crude notions as settled rules, Emmet was among the more prudent of the United Irishmen on the eve of the rebellion. It was only when convinced that parliamentary reform and Catholic emancipation were not to be obtained by constitutional methods, that he reluctantly engaged in treasonable conspiracy; and in opposition to bolder spirits like Lord Edward Fitzgerald, he discountenanced the taking up of arms until help should be obtained from France. Though not among those taken at the house of Oliver Bond on the 1 2th of March 1798 (see Fitzgerald, Lord Edward), he was arrested about the same time, and he was one of the leaders who after the rebellion were imprisoned at Fort George till 1802. Being then released, he went to Brussels, where he was visited by his brother Robert in October of that year; and he was in the secrets of those who were preparing for a fresh rising in Ireland in conjunction with French aid.

After the failure of Robert Emmet's rising in July 1803, the news of which reached him in Paris, where he was in communication with Bonaparte, he emigrated to the United States. Joining the New York bar he obtained a lucrative practice and in 181 2-13 was attorney-general of New York; his abilities and success being such that Judge Story declared him to be " by universal consent in the first rank of American advocates." He died while conducting a case in court on the 14th of November 1827. Thomas Emmet married, in 1 791, Jane, daughter of the Rev. John Patten, of Clonmel.

See authorities under Emmet, Robert ; also Alfred Webb, Compendium of Irish Biography (Dublin, 1878); C. S. Haynes, Memoirs of Thomas Addis Emmet (London, 1829); Theobald Wolfe Tone, Memoirs, edited by W. T. W. Tone (2 vols., London, 1827) ; W. E. H. Lecky, Hist, of Ireland in the Eighteenth Century, vol. iv. (Cabinet edition, 5 vols., London, 1892). (R. J. M.)

EMMETT, DANIEL DECATUR (1815-1904), American song- writer, was born at Mount Vernon, Ohio. He started the " negro minstrel " performances, which from 1842 onwards became so popular in America and England, and he composed a number of songs which had a great temporary vogue. He is remembered particularly as the writer of the famous Southern war-song " Dixie," which he composed in 1859.

EMMITSBURG, a town in Frederick county, Maryland, U.S.A., 61 m. by rail W. by N. of Baltimore, and i| m. S. of the northern boundary of the state. Pop. (1900) 849; (1910) 1054. It is served by the Emmitsburg railway (7 m. long) to Rocky Ridge on the Western Maryland railway. The town is

in a picturesque region on the eastern slope of the Blue Ridge Mountains. Two miles S.W. is Mount St. Mary's College (Roman Catholic), founded in 1808 by the Rev. John du Bois (1764-1842) — its president until 1826, when he became bishop of New York-ˆ and chartered by the state in 1830. The Ecclesiastical Seminary of the college has been a great training school, and has been called the " Nursery of Bishops "; among its graduates have been Bishop Hughes, Cardinal McCloskey and Archbishop Corrigan. In 1908 the college had 25 instructors and 350 students, of whom 57 were in the Ecclesiastical Seminary, and 61 in the Minim Department. Half a

mile S. of the town is St Joseph's College and Academy (incorporated in 18 16), for young women, which is conducted by the Sisters of Charity — this order was in- troduced into the United States at Emmitsburg by Mrs Elizabeth Ann Seton in 1809. The first settlement at Emmitsburg was made about 1773. It was at first called " Silver Fancy," and then for a time was known as " Poplar Fields "; but in 1786 the present name was adopted in honour of William Emmitt, one of the original settlers. The town was incorporated in 1824.

EMMIUS, UBBO (1547-1625), Dutch historian and geographer, was born at Gretha in East Friesland on the 5th of December 1547. After studying at Rostock, he spent two years in Geneva, where he became intimate with Theodore Beza; and returning to the Netherlands was appointed the principal of a college at Norden, a position which he lost in 1587 because, as a Calvinist, he would not subscribe to the confession of Augsburg. Subse- quently he was head of a college at Leer, and in 1594 became rector of the college at Groningen, and when in 1614 this college became a university he was chosen principal and professor of history and Greek, and by his wise guidance and his learning speedily raised the new university to a position of eminence. He was on friendly terms with Louis, count of Nassau; corre- sponded with many of the learned men of his time; and died at Groningen on the 9th of December 1625. He was twice married, and left a son and a daughter. The chief works of Eromius are: Rerum Frisicarum historiae decades, in six parts, a complete edition of which was published at Leiden in 1616; Opus chronologicum (Groningen, 16 19); Vetus Graecia ittustrata (Leiden, 1626); and Historia temporis nostri, which was first published at Groningen in 1732. An account of his life, written by Nicholas Mulerius, was published, with the lives of other professors of Groningen, at Groningen in 1638.

See N. G. van Kampen, Geschiedenis der letteren en wetenschappen in de Nederlanden (The Hague, 1821-1826).

EMMONS, EBENEZER (1800-1863), American geologist, was born at Middlefield, Massachusetts, on the 16th of May 1800. He studied medicine at Albany, and after taking his degree practised for some years in Berkshire county. His interest in geology was kindled in early life, and in 1824 he had assisted Prof.Chester Dewey (1 784-1867) in preparing a geological map of Berkshire county, in which the first attempt was made to classify the rocks of the Taconic area. While thus giving much of his time to natural science, undertaking professional work in natural history and geology in Williams College, he also accepted the professorship of chemistry

and afterwards of obstetrics in the Albany Medical College. The chief work of his life was, however, in geology, and he has been designated by Jules Marcou as " the founder of American palaeozoic stratigraphy, and the first discoverer of the primordial fauna in any country." In 1836 he became attached to the Geological Survey of the State of New York, and after lengthened study he grouped the local strata (1842) into the Taconic and overlying New York systems. The latter system was subdivided into several groups that were by no means well defined. Emmons had previously described the Potsdam sandstone (1838), and this was placed at the base of the New York system. It is now regarded as Upper Cambrian. In 1844 Emmons for the first time obtained fossils in his Taconic system: a notable discovery because the species obtained were found to differ from all then-known Palaeozoic fossils, and they were regarded as representing the primordial group. Marcou was thus led to advocate that the term Taconic be generally adopted in place of Cambrian. Never-

theless the Taconic fauna of Emmons has proved to include only the lower part of Sedgwick's Cambrian. Considerable discussion has taken place on the question of the Taconic system, and whether the term should be adopted; and the general opinion has been adverse. Emmons made contributions on agriculture and geology to a series of volumes on the natural history of New York. He also issued a work entitled American Geology; containing a statement of the principles of the Science, with full illustrations of the characteristic American Fossils (1855-1857). From 1851 to i860 he was state geologist of North Carolina. He died at Brunswick, North Carolina, on the 1st of October 1863. See the Biographical Notice of Ebenezer Emmons, by J. Marcou; Amer. Geologist, vol. vii. (Jan., 1891), p. 1 (with portrait and list of publications).

EMMONS, NATHANAEL (1745-1840), American theologian, was born at East Haddam, Connecticut, on the 20th of April 1745. He graduated at Yale in 1767, studied theology under the Rev. John Smalley (1734-1820) at Berlin, Connecticut, and was licensed to preach in 1769. After preaching four years in New York and New Hampshire, he became, in April 1773, pastor of the Second church at Franklin (until 1778 a part of Wrentham, Massachusetts), of which he remained in charge until May 1827, when failing health compelled his relinquishment of active ministerial cares. He lived, however, for many years thereafter, dying of old age at Franklin on the 23rd of September 1840. It was as a theologian that Dr Emmons was best known, and for half a century probably no clergyman in New England exerted so wide an influence. He developed an original

system of divinity, somewhat on the structural plan of that of Samuel Hopkins, and, in Emmons's own belief, contained in and evolved from Hopkinsianism. While by no means abandoning the tenets of the old Calvinistic faith, he came to be looked upon as the chief representative of what was then known as the " new school " of theologians. His system declared that holiness and sin are free voluntary exercises; that men act freely under the divine agency; that the slightest transgression deserves eternal punishment; that it is through God's mere grace that the penitent believer is pardoned and justified; that, in spite of total depravity, sinners ought to repent; and that regeneration is active, not passive, with the believer. Emmonsism was spread and perpetuated by more than a hundred clergymen, whom he personally trained. Politically, he was an ardent patriot during the War of Independence, and a strong Federalist afterwards, several of his political discourses attracting wide attention. He was a founder and the first president of the Massachusetts Missionary Society, and was influential in the establishment of Andover Theological Seminary. More than two hundred of his sermons and addresses were published during his lifetime. His Works were published in 6 vols. (Boston, 1842; new edition, 1861).

See also the Memoir, by Dr E. A. Park (Andover, 1861).

EMPEDOCLES (c. 490-430 B.C.), Greek philosopher and statesman, was Born at Agrigentum (Acragas, Girgenti) in Sicily of a distinguished family, then at the height of its glory. His grandfather Empedocles was victorious in the Olympian chariot race in 496; in 470 his father Meto was largely instrumental in the overthrow of the tyrant Thrasydaeus. We know almost nothing of his life. The numerous legends which have grown up round his name yield very little that can fairly be regarded as authentic. It seems that- he carried on the democratic tradi- tion of his house by helping to overthrow an oligarchic govern- ment which succeeded the tyranny in Agrigentum, and was invited by the citizens to become their king. That he refused the honour may have been due to a real enthusiasm for free institutions or to the prudential recognition of the peril which in those turbulent times surrounded the royal dignity. Ulti- mately a change in the balance of parties compelled him to leave the city, and he died in the Peloponnese of the results of an accident in 430.

Of his poem on nature (Qvcns) there are left about 400 lines in unequal fragments out of the original 5000; of the hymns of purification {Kadapiwl) less than 100 verses remain; of the

other works, improbably assigned to him, nothing is known. His grand but obscure hexameters, after the example of Par- ” menides, delighted Lucretius. Aristotle, it is said, called him the father of rhetoric. But it was as at once statesman, prophet, physicist, physician and reformer that he most impressed the popular imagination. To his contemporaries, as to himself, he seemed more than a mere man. The Sicilians honoured his august aspect as he moved amongst them with purple robes and golden girdle, with long hair bound by a Delphic garland, and brazen sandals on his feet, and with a retinue of slaves behind him. Stories were told of the ingenuity and generosity by which he had made the marshes round Selinus salubrious, of the grotesque device by which he laid the winds that ruined the harvests of Agrigentum, and of the almost miraculous restoration to life of a woman who had long lain in a death-like trance. Legends stranger still told of his disappearance from among men. Empedocles, according to one story, was one midnight, after a feast held in his honour, called away in a blaze of glory to the gods; according to another, he had only thrown himself into the crater of Etna, in the hope that men, finding no traces of his end, would suppose him translated to heaven. But his hopes were cheated by the volcano, which cast forth his brazen sandals and betrayed his secret (Diog. Laert. viii. 67). The people of Agrigentum have never ceased to honour his name, and even in modern times he has been celebrated by followers of Mazzini as the democrat of antiquity par excellence.

As his history is uncertain, so his doctrines are hard to put together. He does not belong to any one definite school. While, on one hand, he combines much that had been suggested by Parmenides, Pythagoras and the Ionic schools, he has germs of truth that Plato and Aristotle afterwards developed; he is at once a firm believer in Orphic mysteries, and a scientific thinker, precursor of the physical scientists. There are, according to Empedocles, four ultimate elements, four primal divinities, of which are made all structures in the world — fire, air, water, earth. These four elements are eternally brought into union, and eternally parted from each other, by two divine beings or powers, love and hatred — an attractive and a repulsive force which the ordinary eye .can see working amongst men, but which really pervade the whole world. According to the different proportions in which these four indestructible and unchangeable matters are combined with each other is the difference

of the organic structure produced; e.g. flesh and blood are made of equal (in weight but no,t in volume) parts of all four elements, whereas bones are one-half fire, one-fourth earth, and one-fourth water. It is in the aggregation and segregation of elements thus arising that Empedocles, like the atomists, finds the real process which corresponds to what is popularly termed growth, increase or decrease. Nothing new comes or can come into being; the only change that can occur is a change in the juxta- position of element with element.

Empedocles apparently regarded love ((jjlXottjs) and discord Oeixos) as alternately holding the empire over things, — neither, however, being ever quite absent. As the best and original state, he seems to have conceived a period when love was pre- dominant, and all the elements formed one great sphere or globe. Since that period discord had gained more sway; and the actual world was full of contrasts and oppositions, due to the combined action of both principles. His theory attempted to explain the separation of elements, the formation of earth and sea, of sun and moon, of atmosphere. But the most interest- ing and most matured part of his views dealt with the first origin of plants and animals, and with the physiology of man. As the elements (his deities) entered into combinations, there appeared quaint results — heads without necks, arms without shoulders. Then as these fragmentary structures met, there were seen horned heads on human bodies, bodies of oxen with men's heads, and figures of double sex. But most of these products of natural forces disappeared as suddenly as they arose; only in those rare cases where the several parts were found adapted to each other, and casual member fitted into casual member, did the complex structures thus formed last. Thus

from spontaneous aggregations of casual aggregates, which suited each other as if this had been intended, did the organic universe originally spring. Soon various influences reduced the creatures of double sex to a male and a female, and the world was replenished with organic life. It is impossible not to see in this thecry a crude anticipation of the " survival of the fittest " theory of modern evolutionists.

As man, animal and plant are composed of the same elements in different proportions, there is an identity of nature in them all. They all have sense and understanding; in man, however, and especially in the blood at his heart, mind has its peculiar seat. But mind is always dependent upon the body, and varies with its changing constitution. Hence the precepts of morality are with Empedocles largely dietetic.

Knowledge is explained by the principle that the several elements in the things outside us are perceived by the correspond- ing elements in ourselves. We know only in so far as we have within us a nature cognate to the object of knowledge. Like is known by like. The whole body is full of pores, and hence respiration takes place over the whole frame. But in the organs of sense these pores are specially adapted to receive the effluxes which are continually rising from bodies around us; and in this way perception is somewhat obscurely explained. The theory, however unsatisfactory as an explanation, has one great merit, that it recognizes between the eye, for instance, and the object seen an intermediate something. Certain particles go forth from the eye to meet similar particles given forth from the object, and the resultant contact constitutes vision. This idea contains within it the germ of the modern idea of the subjectivity of sense-given data; perception is not merely a passive reflection of external objects.

It is not easy to harmonize these quasi-scientific theories with the theory of transmigration of souls which Empedocles seems to expound. Probably the doctrine that the divinity (Saifj.a>v) passes from element to element, nowhere finding a home, is a mystical way of teaching the continued identity of the principles which are at the bottom of every phase of develop- ment from inorganic nature to man. At the top of the scale are the prophet and the physician, those who have best learned the secret of life; they are next to the divine. One law, an identity of elements, pervades all nature; existence is one from end to end ; the plant and the animal are links in a chain where man is a link too; and even the distinction between male and female is transcended. The beasts are kindred with man ; he who eats their flesh is not much better than a cannibal.

Looking at the opposition between these and the ordinary opinions, we are not surprised that Empedocles notes the limita- tion and narrowness of human perceptions. We see, he says, but a part, and fancy that we have grasped the whole. But the senses cannot lead to truth; thought and reflection must look at the thing on every side. It is the business of a philosopher, while he lays bare the fundamental difference of elements, to display the identity that subsists between what seem unconnected parts of the universe.

See Diog. Laert. viii. 51-77; Sext. Empiric. Adv. math. vii. 123; Simplicius, Phys. f. 24, f. 76. For text Simon Karsten, " Empe- doclis Agrigenti carminum reliquiae," in Reliq. phil. vet. (Amsterdam, 1838); F. W. A. Mullach, Fragmenta philosophorum Graecorum, vol. i. ; H. Stein, Empedoclis Agrigenti fragmenta (Bonn, 1882); H.

Ritterand L. Preller, Hisloria phUosophiae (4th ed., Gotha, 1869), chap. iii. ad fin.; A. Fairbanks, The First Philosophers of Greece (1898). Verse translation, W. E. Leonard (1908). For criticism £. Zeller, Phil, der Griechen (Eng. trans. S. F. Alleyne, 2 vols., London, 188 1); A. W. Benn, Greek Philosophers (1882); J. A. Symonds, Studies of the Greek Poets (3rd ed., 1893), vol. i. chap. 7; C. B. Renouvier, Manuel de philosophic ancienne (Paris, 1844); T. Gomperz, Greek Thinkers, vol. i. (Eng. trans. L. Magnus, 1901); W. Windelband, Hist, of Phil. (Eng. trans. 1895); many articles in periodicals (see Baldwin's Diet, of Philos. vol. iii. p. 190).

(W. W. ; X.)

EMPEROR (Fr. empereur, from the Lat. imperator), a title formerly borne by the sovereigns of the Roman empire (see Empire), and since their time, partly by derivation, partly by imitation, used by a variety of other sovereigns. Under the Republic, the term imperator applied in theory to any magistrate

vested with imperium; but in practice it was only used of a magistrate who was acting abroad (mililiae) and was thus in command of troops. The term imperator was the natural and regular designation employed by his troops in addressing such a magistrate; but it was more particularly and specially employed by them to salute him after a victory; and when he had been thus saluted he could use the title of imperator in public till the day of his triumph at Rome, after which it would lapse along with his imperium. The senate itself might, in the later Republic, invite a victorious general to assume the title; and in these two customs — the salutation of the troops, and the invitation of the senate — we see in the germ the two methods by which under the Empire the princeps was designated; while in the military connotation attaching to the name even under the Republic we can detect in advance the military character by which the emperor and the Empire were afterwards distinguished. Julius Caesar was the first who used the title continuously (from 58 B.C. to his death in 44 B.C.), as well domi as militiae; and his nephew Augustus took a further step when he made the term imperator a praenomen, a practice which after the time of Nero becomes regular. But apart from this amalgamation of the term with his regular name, and the private right to its use which that bestowed, every emperor had an additional and double right to the

title on public grounds, possessed as he was of an imperium infinitum majus, and commanding as he did all the troops of the Empire. From the latter point of view — as generalissimo of the forces of Rome, he had the right to the insignia of the com- mander (the laurel wreath and the fasces), and to the protection of a bodyguard, the praeloriani. This public title of imperator was normally conferred by the senate; and an emperor normally dates his reign from the day of his salutation by the senate. But the troops were also regarded as still retaining the right of saluting an imperator; and there were emperors who regarded themselves as created by such salutation and dated their reigns accordingly. The military associations of the term thus resulted, only too often, in making the emperor the nominee of a turbulent soldiery.

Augustus had been designated (not indeed officially, but none the less regularly) as princeps — the first citizen or foremost man of the state. The designation suited the early years of the Empire, in which a dyarchy of princeps and senate had been maintained. But by the 2nd century the dyarchy is passing into a monarchy: the title of princeps recedes, and the title of imperator comes into prominence to designate not merely the possessor of a certain imperium, or the general of troops, but the simple monarch in the fulness of his power as head of the state. From the days of Diocletian one finds occasionally two emperors, but not, at any rate in theory, two Empires; the two emperors are the dual sovereigns of a single realm. But from the time of Arcadius and Honorius (a.d. 395) there are in reality (though not in theory) two Empires as well as two emperors, one of the East and one of the West. When Greek became the sole language of the East Roman Empire, imperator was rendered sometimes by /3aai\ei>s and sometimes by avroKparoip, the former word being the usual designation of a sovereign, the latter specially denoting that despotic power which the imperator held, and being in fact the official translation of imperator. Justinian uses avroKpanap as his formal title, and /UcuriAeus as the popular term.

On the revival of the Roman empire in the West by Charle- magne in 8oo, the title (at first in the form imperator, or imperator Augustus, afterwards Romanorum imperator Augustus) was taken by him and by his Frankish, Italian and German successors, heads of the Holy Roman Empire, down to the abdication of the emperor Francis II. in 1806. The doctrine had, however, grown up in the earlier middle ages (about the time of the emperor Henry II., 1002-1024) that although the emperor was chosen in Germany (at first by the nation, afterwards by a small body of electors), and entitled from the moment of his election to be crowned in Rome by the pope, he could

not use the title of emperor until that coronation had actually taken place. The German sovereign, therefore, though he exercised, as soon as

chosen, full imperial powers both in Germany and Italy, called himself merely " king of the Romans " {Romanorum rex semper Augustus) until he had received the sacred crown in the sacred city. In 1508 Maximilian I., being refused a passage to Rome by the Venetians, obtained from Pope Julius II. a bull permitting him to style himself emperor elect {imperator electus, erwahlter Kaiser). This title was taken by Ferdinand I. (1558) and all succeeding emperors, immediately upon their coronation in Germany; and it was until 1806 their strict legal designation, and was always employed by them in proclamations and other official documents. The term " elect " was, however, omitted even in formal documents when the sovereign was addressed or was spoken of in the third person.

In medieval times the emperor, conceived as vicegerent of God and co-regent with the pope in government of the Christian people committed to his charge, might almost be regarded as an ecclesiastical officer. Not only was his function regarded as consisting in the defence and extension of true religion; he was himself arrayed in ecclesiastical vestments at his corona- tion; he was ordained a subdeacon; and assisting the pope in the celebration of the Eucharist, he communicated in both kinds as a clerk. The same sort of ecclesiastical character came also to be attached to the tsars 1 of Russia, who — especially in their relations with the Orthodox Eastern Church — may vindicate for themselves (though the sultans of Turkey have disputed the claim) the succession to the East Roman emperors (see Empire). But the title of emperor was also used in the middle ages, and is still used, in a loose and vague sense, without any ecclesiastical connotation or hint of connexion with Rome (the two attributes, which should properly distinguish an emperor), and merely in order to designate a non-European ruler with a large extent of territory. It was thus applied, and is still applied, to the rulers of China and Japan; it was attributed to the Mogul sovereigns of India; and since 1876 it has been used by British monarchs in their capacity of sovereigns of India (Kaiser-i-Hind) . 2*

Since the French Revolution and during the course of the 19th century the term emperor has had an eventful history. In 1804 Napoleon took the title of " Emperor of the French," and posed as the reviver of the Empire of Charlemagne. Afraid that Napoleon would next proceed to deprive him of his title of Holy Roman Emperor, Francis II. first took the step, in 1804, of investing himself with a

new title, that of " Hereditary Emperor of Austria," and then, in 1806, proceeded to the further step of abdicating his old historical title and dissolving the Holy Roman Empire. Thus the old and true sense of the term emperor— the sense in which it was connected with the church in the present and with Rome in the past — finally perished; and the term became partly an apanage of Bonapartism (Louis Napoleon resuscitated it as Napoleon III. in 1853), and partly a personal title of the Habsburgs as rulers of their various family territories. In 1870, however, a new and most important use of the title was begun, when the union of Germany was achieved, and the Prussian king, who became the head of united Germany, received in that capacity the title of German Emperor. Here the title of emperor designates the president of a federal state; and here the Holy Roman emperor of the 17th and 18th centuries, the president of a loose confederation of German states, may be said to have found his successor. But the term has been widely and

1 The word Tsar, like the German Kaiser, is derived from Caesar (see Tsar). Peter the Great introduced the use of the style " Im- perator," and the official designation is now " Emperor of all the Russias, Tsar of Poland, and Grand Duke of Finland," though the term tsar is still popularly used in Russia.

2 For the titles of (iaaiXebs, imperator Augustus, &c, applied in the 10th century to the Anglo-Saxon kings, see Empire (note). The claim to the style of emperor, as a badge of equal rank, played a considerable part in the diplomatic relations between the Sultan and certain European sovereigns. Thus, at a time when this style (Padishah) was refused by the Sultan to the tsars of Russia, and even to the Holy Roman Emperor himself, it was allowed to the French kings, who in diplomatic correspondence and treaties with Turkey called themselves " emperor of France " (empereur de France). — [Ed.].

loosely used in the course of the 19th century. It was the style from 1821 to 1889 of the princes of the house of Braganzawho ruled in Brazil; it has been assumed by usurpers in Haiti, and in Mexico it was borne by Augustin Iturbide in 1822 and 1823, and by the ill-fated Archduke Maximilian of Austria from 1864 to 1867. It can hardly, therefore, be said to have any definite descriptive force at the present time, such as it had in the middle ages. So far as it has any

such force in Europe, it may be said partly to be connected with Bonapartism, and to denote a popular but military dictatorship, partly to be connected with the federal idea, and to denote a precedence over other kings possessed by a ruler standing at the head of a composite state which may embrace kings among its members. It is in this latter sense that it is used of Germany, and of Britain in respect of India; it is in something approaching this latter sense that it may be said to be used of Austria.

See J. Selden, Titles of Honour (1672) ; J. Bryce, Holy Roman Empire (London, 1904); and Sir E. Colebrooke, "On Imperial and Other Titles " in the Journal of the Royal Asiatic Society (1877). See also the articles on " Imperator " and " Princeps " in Smith's Dictionary of Greek and Roman Antiquities (1890). (E. Br.)

EMPHYSEMA (Gr. kfufrvaav to innate) is a word vaguely meaning the abnormal presence of air in certain parts of the body. At the present day, however, there are two conditions to which it refers, " pulmonary emphysema " (and the word pulmonary is often omitted) and " surgical emphysema." Of pulmonary emphysema there are two forms, true vesicular and interstitial (or interlobular). Vesicular emphysema signifies that there is an enlargement of air-vesicles, resulting either from their excessive distension, from destruction of the septa, or from both causes combined (see Respiratory System). In interstitial emphysema the air is infiltrated into the connective tissue beneath the pleura and between the pulmonary air-cells.

The former variety is by far the more common, and appears to be capable of being produced by various causes, the chief of which are the following: —

. 1. Where a portion of the lung has become wasted, or its vesicular structure permanently obliterated by disease, without corresponding falling in of the chest wall, the neighbouring air-vesicles or some of them undergo dilatation to fill the vacuum (vicarious emphysema).

2. In some cases of bronchitis, where numbers of the smaller bronchial tubes become obstructed, the air in the pulmonary vesicles remains imprisoned, the force of expiration being insufficient to expel it; while, on the other hand, the stronger force of inspiration being adequate to overcome the resistance, the air-cells tend to become more and more distended, and permanent alterations in their structure, including emphysema, are the result (inspiratory theory) .

3. Emphysema also arises from exertion involving violent expiratory

efforts, during which the glottis is constricted, as in paroxysms of coughing, in straining, and in lifting heavy weights (expiratory theory). Whooping-cough is well known as the exciting cause of emphysema in many persons.

4. Another view, known as the nutritive theory, maintains that emphysema depends essentially on a primary nutritive change in the walls of the air-vesicles. Thus these are impaired in their resisting power, and are far more likely to become distended by any force acting on them from within.

5. Again in certain cases the cartilages of the chest become hypertrophied and rigid, thus causing a primary chronic enlarge- ment, and the lungs become emphysematous in order to fill up the increased space (Freund's theory).

In whatever manner produced, this disease gives rise to important morbid changes in the affected portions of the lungs, especially the loss of the natural elasticity of the air-cells', and likewise the destruction of many of the pulmonary capillary blood-vessels, and the diminution of aerating surface for the blood. As a consequence an increased strain is thrown on the right ventricle with a consequent dilatation leading on to heart failure and all its attendant troubles. The chief symptom in this complaint is shortness of breath, more or less constant but

greatly aggravated by exertion, and by attacks of bronchitis, to which persons suffering from emphysema appear to be specially liable. The respiration is of similar character to that already described in the case of asthma. In severe forms of the disease; the patient comes to acquire a peculiar puffy or bloated appear- ance, and the configuration of the chest is altered, assuming the character known as the barrel-shaped or emphysematous chest. v

The main element in the treatment cf emphysema consists in attention to the general condition of the health, and in the avoidance of all causes likely to aggravate the disease or induce its complications. Compressed air baths and expiration into rarefied air may be useful. During attacks of urgent dyspnoea and lividity, with engorgement of veins, the patient should be repeatedly bled until relief is obtained. Interstitial emphysema arising from the rupture of air-cells in the immediate neighbour- hood of the pleura may occur as a complication of the vesicular form, or separately as the result of some sudden expulsive effort, such as a fit of coughing, or, as has frequently happened, in parturition. Gangrene or post-mortem

decomposition may lead to the presence of air in the interstitial tissue of the lung. Occasionally the air infiltrates the cellular tissue of the posterior mediastinum, and thence comes to distend the integument of the whole surface of the body (surgical emphysema). Surgical emphysema signifies the effusion of air into the general connective tissues of the body. The commonest causes are a wound, of some air-passage, or a penetrating wound of the chest wall without injury to the lung. It may, however, occur in any situation of the body and in many other ways. Its severity varies from very slight cases where only a little crepitation may be felt under the skin, to extreme cases where the whole body is blown up and death is imminent from impeded respiration and failure of the action of the heart. In the milder cases no treatment is necessary as the air gradually becomes absorbed, but in the more severe cases incisions must be made in the swollen cellular tissues to allow the air to escape.

EMPIRE, a term now used to denote a state of large size and also (as a rule) of composite character, often, but not neces- sarily, ruled by an emperor — a state which may be a federation, like the German empire, or a unitary state, like the Russian, or even, like the British empire, a loose commonwealth of free states united to a number of subordinate dependencies. For many centuries the writers of the Church, basing themselves on the Apocalyptic writings, conceived of a cycle of four empires, generally explained — though there was no absolute unanimity with regard to the members of the cycle— as the Assyrian, the Persian, the Macedonian and the Roman. But in reality the conception of Empire, like the term itself (Lat. imperium), is of Roman origin. The empire of Alexander had indeed in some ways anticipated the empire of Rome. " In his later years," Professor Bury writes, " Alexander formed the notion of an empire, both European and Asiatic, in which the Asiatics' should not be dominated by the European invaders, but Euro- peans and Asiatics alike should be ruled on an equality by a monarch, indifferent to the distinction of Greek and barbarian, and looked upon as their own king by Persians as well as by Macedonians." The contemporary Cynic philosophy of cosmo- politanism harmonized with this notion, as Stoicism did later with the practice of the Roman empire; and Alexander, like Diocletian and Constantine, accustomed a Western people to the forms of an Oriental court, while, like the earlier Caesars, he claimed and received the recognition of his own divinity. But when he died in 323, his empire, which had barely lasted ten years, died with him; and it was divided among Diadochi who, if in some other respects (for instance, the Hellenization of the East) they were heirs

of their master's policy, were destitute of the imperial conception. The work of Alexander was rather that of the forerunner than the founder. He prepared the way for the world-empire of Rome; he made possible the rise of a universal religion. And these are the two factors which, throughout the middle ages, went together to make the thing which men called Empire.

*34**

EMPIRE

*At Rome the term imperium signified generally, in its earlier use, the sovereignty of the state over the individual, a sovereignty which the Romans had disengaged with singular J** clearness from all other kinds of authority. Each of*

empire. tne higher magistrates of the Roman people was vested, by a lex curiata (for power was distinctly conceived as resident in, and delegated by, the community), with an imperium both civil and military, which varied in degree with the magnitude of his office. In the later days of the Republic such imperium was enjoyed, partly in Rome by the resident consuls and praetors, partly in the provinces by the various proconsuls or propraetors. There was thus a certain morcellement of imperium, delegated as it was by the people to a number of magistrates: the coming of the Empire meant the reintegration of this imperium, and its unification, by a gradual process, in the hands of the princeps, or emperor. The means by which this process was achieved had already been anticipated under the Republic. Already in the days of Pompey it had been found convenient to grant to an extraordinary officer an imperium aequum or majus over a large area, and that officer thus received powers, within that area, equal to, or greater than, the powers of the provincial governors. This precedent was followed by Augustus in the year 27 B.C., when he acquired for himself sole imperium in a certain number of provinces (the imperial provinces), and an infinitum imperium majus in the remaining provinces (which were termed senatorial). As a result, Augustus enjoyed an imperium coextensive indeed with the whole of the Roman world, but concurrent, in part of that world, with the imperium of the senatorial proconsuls; and the early Empire may thus be described as a dyarchy. But the distinction between imperial and senatorial provinces finally disappeared; by the time of Constantine the emperor enjoyed sole imperium, and an absolute monarchy had been established. We shall not, however, fully understand the significance of the Roman empire, unless we realize the import- ance of its

military aspect. All the soldiers of Rome had from the first to swear in verba Caesaris Augusti; and thus the whole of the Roman army was his army, regiments of which he might indeed lend, but of which he was sole Imperator (see under Emperor). Thus regarded as a permanent commander-in-chief, the emperor enjoyed the privileges, and suffered from the weaknesses, of his position. He had the power of the sword behind him; but he became more and more liable to be deposed, and to be replaced by a new commander, at the will of those who bore the sword in his service.

The period which is marked by the reigns of Diocletian and Constantine (a.d. 284-337) marks a great transformation in Develop- t ‘ le cnaracter °f the Empire. The old dyarchy, under meat under which the emperor might still be regarded as an official Diocletian of the respublica Romana, passed into a new monarchy, a f

private property of the monarch. There was now no distinction of provinces; and the old public aerarium became merely a municipal treasury, while the fiscus of the emperor became the exchequer of the Empire. The officers of the imperial praetorium, or bodyguard, are now the great officers of state; his private council becomes the public consistory, or supreme court of appeal; and the comites of his court are the adminis- trators of his empire. ” All is in him, and all comes from him,” as our own year-books say of the medieval king; his household, for instance, is not only a household, but also an administration. On the other hand, this unification seems to be accompanied by a new bifurcation. The exigencies of frontier defence had long been drawing the Empire towards the troubled East; and this tendency reached its culmination when a new Rome arose by the Bosporus, and Constantinople became the centre of what

seemed a second Empire in the East (a.d. 324). Par- ofthe” 1 ticularly after the division of the Empire between Empire. Arcadius and Honorius in 395 does this bifurcation

appear to be marked; and one naturally speaks of the two Empires of the West and the East. Yet it cannot be too much emphasized that in reality such language is utterly

inexact. The Roman empire was, and always continued to be, ideally one and indivisible. There were two emperors, but one Empire — two persons, but one power. The point is of great importance for the understanding of the whole of the middle ages: there only is, and can be, one Empire, which may indeed, for convenience, be ruled

conjointly by two emperors, resident, again for convenience, in two separate capitals. And, as a matter of fact, not only did the residence of an emperor in the East not spell bifurcation, it actually fostered the tendency towards unification. It helped forward the transformation of the Empire into an absolute and quasi-Asiatic monarchy, under which all its subjects fell into a single level of loyal submission: it helped to give the emperor a gorgeous court, marked by all the ceremony and the servility of the East. 1 The deification of the emperor himself dates from the days of Augustus; by the time of Constantine it has infected the court and the government. Each emperor, again, had from the first enjoyed the sacrosanct position which was attached to the tribunate; but now his palace, his chamber, his charities, his letters, are all " sacred," and one might almost speak in advance of a " Holy Roman Empire." But there is one factor, the greatest of all, which still remains to be added, before we have counted the sum of the forces that made the world think in terms of empire for centuries – to come; and that is the reception of Christianity into In "" ence the Roman empire by Constantine. That reception laitˆ"" added a new sanction to the existence of the Empire and the position of the emperor. The Empire, already one and indivisible in its aspect of a political society, was welded still more firmly together when it was informed and permeated by a common Christianity, and unified by the force of a spiritual bond. The Empire was now the Church; it was now indeed indestructible, for, if it perished as an empire, it would live as a church. But the Church made it certain that it would not perish, even as an empire, for many centuries to come. On the one hand the Church thought in terms of empire and taught the millions of its disciples (including the barbarians themselves) to think in the same terms. No other political conception — no conception of a x6Xts or of a nation — was any longer possible. When the Church gained its hold of the Roman world, the Empire, as it has been well said, was already " not only a government, but a fashion of conceiving the world " : it had stood for three centuries, and no man could think of any other form of political association. Moreover, the gospel of St Paul — that there is one Church, whereof Christ is the Head, and we are all members- could not but reinforce for the Christian the conception of a necessary political unity of all the world under a single head. Una Chiesa in uno Slato — such, then, was the theory of the Church. But not only did the Church perpetuate the conception of empire by making it a part of its own theory of the world: it perpetuated that conception equally by materializing it in its own organization of itself. Growing up under the shadow of the Empire, the Church too became an empire, as the Empire had become a church. As it took

over something of the old pagan ceremonial, so it took over much of the old secular organi- zation. The pope borrowed his title of pontijex maximus from the emperor: what is far more, he made himself gradually, and in the course of centuries, the Caesar and Imperator of the Church. The offices and the dioceses of the Church are parallel to the offices and dioceses of the Diocletian empire: the whole spirit of orderly hierarchy and regular organization, which breathes in the Roman Church, is the heritage of ancient Rome. The Donation of Constantine is a forgery; but it expresses a great truth when it represents Constantine as giving to the pope the imperial palace and insignia, and to the clergy the ornaments of the imperial army (see Donation of Constantine).

1 Bryce points out, with much subtlety and truth, that the rise of a second Rome in the East not only helped to perpetuate the Empire by providing a new centre which would take the place of Rome when Rome fell, but also tended to make it more universal; "_ for, having lost its local centre, it subsisted no longer by historic right only, but, so to speak, naturally, as a part of an order of things' which a change in external conditions seemed incapable of disturbing " (Holy Roman Empire, p. 8 of the edition of 1904).

Upon this world, informed by these ideas, there finally descended, in the 5th century, the avalanche of barbaric invasion. Its impact seemed to split the Empire into fragmentary invasions, kingdoms; yet it left the universal Church intact, and with it the conception of empire. With that conception, indeed, the barbarians had already been for centuries familiar: service in Roman armies, and settlement in Roman territories, had made the Roman empire for them, as much as for the civilized provincial, part of the order of the world. One of the barbarian invaders, Odoacer (Odovakar), might seem, in 476, to have swept away the Empire from the West, when he com- manded the abdication of Romulus Augustulus; and the date 476 has indeed been generally emphasized as marking " the fall of the Western empire." Other invaders, again, men like the Frank Clovis or the great Ostrogoth Theodoric, might seem, in succeeding years, to have completed the work of Odoacer, and to have shattered the sorry scheme of the later Empire, by remoulding it into national kingdoms. De facto, there is some truth in such a view: de jure, there is none. 1 All that Odoacer did was to abolish one of the two joint rulers of the indivisible Empire, and to make the remaining ruler at Con-

stantinople sole emperor from the Bosporus to the pillars of Hercules. He abolished the dual sovereignty which had been inaugurated by Diocletian, and returned to the unity of the Empire in the days of Marcus Aurelius. He did not abolish the Roman empire in the West : he only abolished its separate ruler, and, leaving the Empire itself subsisting, under the sway (nominal, it is true, but none the less acknowledged) of the emperor resident at Constantinople, he claimed to act as his vicar, under the name of patrician, in the administration, of the Italian provinces. 2 As Odoacer thus fitted himself into the scheme of empire, so did both Clovis and Theodoric. They do not claim to be emperors (that was reserved for Charlemagne) : they claim to be the vicars and lieutenants of the Empire. Theodoric spoke of himself to Zeno as imperio vestro famuians; he left justice and administration in Roman hands, and maintained two annual consuls in Rome. Clovis received the title of consul from Anastasius; the Visigothic kings of Spain (like the kings of the savage Lombards) styled themselves Flavii, and permitted the cities of their eastern coast to send tribute to Constantinople. Yet it must be admitted that, as a matter of fact, this adhesion of the new barbaric kings to the Empire was little more than a form. The Empire maintained its ideal unity by treating them as its vicars; but they themselves were forming separate and independent kingdoms within its borders. The Italy of the Ostrogoths cannot have belonged, in any real sense, to the Empire; otherwise Justinian would never have needed to attempt its reconquest. And in the 7th and 8th centuries the form of adhesion itself decayed: the emperor was retiring upon the Greek world of the East, and the German conquerors, settled within their kingdoms, lost the width of outlook of their old migratory days.

It is here that the action of the Church becomes of supreme importance. The Church had not ceased to believe in the rbe continuous life of the Empire. The Fathers had

Church taught that when the cycle of empires was finally and the ended by the disappearance of the empire of Rome, mpire. ˆg d a y S f Antichrist would dawn; and, since Anti- christ was not yet come, the Church believed that the Empire still lived, and would continue to live till his coming. Mean-

1 The de facto importance of the event of 476 can only be seen in the light of later events, and it was not therefore noticed by contemporaries. Marcellinus is the only contemporary who remarks on its importance, cf. Marcellini Chronicon (Mon. Germ. Hist., Chronica minora, ii. 91), Hesperium Romanae gentis imperium . . . cum hoc

Augustulo periit . . . Gothorum dehinc regibus Romam tenentibus.

2 A passage in Malchus, a Byzantine historian (quoted by Bryce, Holy Roman Empire, p. 25, note u, in the edition of 1904), expresses this truth exactly. The envoys sent to Zeno by Odoacer urge ws idias pXv airols /3aaiX€ias ov deoi kolvos be airoxpT}

while the Eastern emperor, ever since Justinian's reconquest of Italy, had been able to maintain his hold on the centre of Italy; and Rome itself, the seat of the head of the Church; still ranked as one of the cities under his sway. The imperialist theory of the Church found its satisfaction in this connexion of its head with Constantinople; and as long as this connexion continued to satisfy the Church, there was little prospect of any change. For many years after their invasion of 568, the pressure which the Lombards maintained on central Italy, from their kingdom in the valley of the Po, kept the popes steadily faithful to the emperor of the East and his representative in Italy, the exarch of Ravenna. But it was not in the nature of things that such fidelityshouldcontinueunimpaired. The development of the East and the West could not but proceed along 2jˆ«mo<» constantly diverging lines, until the point was reached between when their connexion must snap. On the one hand, the Bast and development of the West set towards the increase of the 5? st powers of the bishop of Rome until he reached a height at which subjection to the emperor at Constantinople became impossible. Residence in Rome, the old seat of empire, had in itself given him a great prestige; and to this prestige St Gregory (pope from 590 to 604) had added in a number of ways. He was one of the Fathers of the Church, and turned its theology into the channels in which it was to flow for centuries; he had acquired for his church the great spiritual colony of England by the mission of St Augustine; he had been the protector of Italy against the Lombards. As the popes thus became more and more spiritual emperors of the West, they found themselves less and less able to remain the subjects of the lay emperor of the East. Meanwhile the emperors of the East were led to interfere in ecclesiastical affairs in a manner which the popes and the Western Church refused to tolerate. Brought into contact with the pure monotheism of Mahommedanism, Leo the Isaurian (718-741) was stimulated into a crusade against image-worship, in order to remove from the Christian Church the charge of idolatry. The West clung to its images: the popes revolted against his decrees; and the breach rapidly became irreparable. As the hold of the Eastern emperor on central Italy began to be shaken, the popes may have begun to cherish the hope of becom- ing their successors and of founding a temporal dominion; and that hope can only have contributed to the final dissolution of their connexion with

the Eastern empire.

Thus, in the course of the 8th century, the Empire, as repre- sented by the emperors at Constantinople, had begun to fade utterly out of the West. It had been forgotten by lay sovereigns; it was being abandoned by the pope, who had been its chosen apostle. But it did not follow that, because the Eastern emperor ceased to be the representative of the Empire for the West, the conception of Empire itself therefore perished. The popes only abandoned the representative; they did not abandon the conception. If they had abandoned the conception, they would have abandoned the idea that there was an order of the world; they would have committed themselves to a belief in the coming of Antichrist. The conception of the world as a single Empire-Church remained: what had to be discovered was a new representative of one of the two sides of that conception. For a brief time, it would seem, the pope himself cherished the idea of becoming, in his own person, the successor of the ancient Caesars in their own old capital. By the aid of the Frankish kings, he had been able to stop the Lombards from acquiring the succession to the derelict territories of the Eastern emperor in Italy (from which their last exarch had fled overseas in 752), and he had become the temporal sovereign of those territories. Successor to the Eastern emperor in central Italy, why should he not also become his successor as representative of the Empire — all the more, since he was the head of the Church, which was coextensive with the Empire? Some such hope seems to inspire the Donation of Constantine, a document forged between 754 and 774, in which Constantine is represented as having conferred on Silvester I. the imperial palace and insignia, and therewith omnes Italiae seu occidentalium regionum pro- vincias loca et civitates. But the hope, if it ever was cherished,

proved to be futile. The popes had not the material force at their command which would have made them adequate to the position. The strong arm of the Frankish kings had alone delivered them from the Lombards: the same strong Hon of arm ‘ tne y found, was needed to deliver them from Charle- the wild nobility of their own city. So they turned magne as to the power which was strong enough to undertake emperor of ˆ task which they could not themselves attempt,

e es ‘ and they invited the Frankish king to become the representative of the imperial conception they cherished. 1 In the year 800 central Italy ceased to date its documents by the regnal years of the Eastern emperors; for Charlemagne was crowned emperor in their stead.

The king of the Franks was well fitted for the position which he was chosen to fill. He was king of a stock which had been from the first Athanasian, and had never been tainted, like most of the Germanic tribes, by the adoption of Arian tenets. His grandfather, Charles Martel, had saved Europe from the danger of a Mahommedan conquest by his victory at Poitiers (732); his father, Pippin the Short, had helped the English missionary Boniface to achieve the conversion of Germany. The popes themselves had turned to the Frankish kings for support again and again in the course of the 8th century. Gregory III., involved in bitter hostilities with the iconoclastic reformers of the East, appealed to Charles Martel for aid, and even offered the king, it is said, the titles of consul and patrician. Zacharias pronounced the deposition of the last of the Merovingians, and gave to Pippin the title of king (751); while his successor, Stephen II., hard pressed by the Lombards, who were eager to replace the Eastern emperors in the possession of central Italy, not only asked and received the aid of the new king, but also acquired, in virtue of Pippin’s donation (754), the disputed exarchate itself. Thus was laid the foundation of the States of the Church; and the grateful pope rewarded the donation by the gift of the title of patricius Romanorum, which conferred on its recipient the duty and the privilege of protecting the Roman Church, along with some undefined measure of authority in Rome itself.’ Finally, in 773, Pope Adrian I. had to appeal to Charles, the successor of Pippin, against the aggressions of the last of the Lombard kings; and in 774 Charles conquered the Lombard kingdom, and himself assumed its iron crown. Thus by the end of the 8th century the Frankish king stood on the very steps of the imperial throne. He ruled a realm which extended from the Pyrenees to the Harz, and from Hamburg to Rome — a realm which might be regarded as in itself a de facto empire. He bore the title of patricius, and he had shown that he did not bear it in vain by his vigorous defence of the papacy in 774. Here there stood, ready to hand, a natural representative of the conception of Empire; and Leo III., finding that he needed the aid of Charlemagne to maintain himself against his own Romans, finally took the decisive step of crowning him emperor, as he knelt in prayer at St Peter’s, on Christmas Day, 800.

The coronation of Charlemagne in 800 marks the coalescence into a single unity of two facts, or rather, more strictly speaking, of a fact

and a theory. The fact is German and secular: it is the wide de facto empire, which the Frankish sword had conquered, and Frankish policy had organized as a single whole. The theory is Latin and ecclesiastical: it is a theory of the

1 According to the view here followed, the Church was the ark in which the conception of Empire was saved during the dark ages between 600 and 800. Some influence should perhaps also be assigned to Roman law, which continued to be administered during these centuries, especially in the towns, and maintained the imperial tradition. But the influence of the Church is the essential fact.

2 In the 5th century the title patricius came to attach particularly to the head of the Roman army {magister utriusque militiae) to men like Aetius and Ricimer, who made and unmade emperors (cf. Mommsen, Gesammelte Schriften, iv. 537, 545 sqq.). Later it had been borne by the Greek exarchs of Ravenna. The concession to Pippin of this great title makes him military head of the Western empire, in the sense in which the title was used in the 5th century; it makes him representative of the Empire for Italy, in the sense in which it had been used of the exarchs.

necessary political unity of the world, and its necessary repre sentation in the person of an emperor — a theory half springing from the unity of the old Roman empire, and half Theory of derived from the unity of the Christian Church as the Cam- conceived in the New Testament. If we seek for Ungian the force which caused this fact and this theory to em P lre – coalesce in the Carolingian empire, we can only answer — the papacy. The idea of Empire was in the Church; and the head of the Church translated this idea into fact. If, however, we seek to conceive the event of 800 from a political or legal point of view, and to determine the residence of the right of constituting an emperor, we at once drift into the fogs of centuries of controversy. Three answers are possible from three points of view; and all have their truth, according to the point of view. From the ecclesiastical point of view, the right resides with the pope. This theory was not promulgated (indeed no theory was promulgated) until the struggles of Papacy and Empire in the course of the middle ages; but by the time of Innocent III. it is becoming an established doctrine that a translatio Imperii took place in 800, whereby the pope transferred the Roman empire from the Greeks to the Germans in the person of the magnificent Charles. 3 One can only say that, as a matter of fact, the popes ceased to recognize the Eastern emperors, and recognized Charles instead, in the year 800; that, again, this recognition alone made Charles emperor, as nothing else could have done; but that no question arose, at the time, of any right of the pope to give the Empire to Charlemagne, for the simple reason that neither of the actors was acting or thinking in a legal spirit. If we now turn to study the point of view of the civil lawyer, animated by .such a spirit, and basing himself on the code of Justinian, we shall find that an emperor must derive his institution and power from a lex regia passed by the populus Romanus; and such a view, strictly interpreted, will lead us to the conclusion that the citizens of Rome had given the crown to Charlemagne in 800, and continued to bestow it on successive emperors afterwards. There is indeed some speech, in the contemporary accounts of Charlemagne's coronation, of the

presence of " ancients among the Romans " and of " the faithful people "; but they are merely present to witness or applaud, and the conception of the Roman people as the source of Empire is one that was only championed, at a far later date, by anti- quarian idealists like Arnold of Brescia and Cola di Rienzi. The faex Romuli, a population of lodging-house keepers, living upon pilgrims to the papal court, could hardly be conceived, except by an ardent imagination, as heir to the Quirites of the past. Finally, from the point of view of the German tribesman, we must admit that the Empire was something which, once received by his king (no matter how), descended in the royal family as an heirloom; or to which (when the kingship became elective) a title was conferred, along with the kingship, by the vote of electors. 4 But apart from these questions of origin, two difficulties have still to be faced with regard to the nature and position of the Carolingian empire. Did Charlemagne and his successors enter into a new relation with their subjects, in virtue of their coronation ? And what was the nature of the relation between the new emperor now established in the West and the old emperor still reigning in the East? It is true that Charlemagne exacted a new oath of allegiance from his subjects after his coronation, and again that he had a revision of all the laws of his dominions made in 802. But the revision did not amount to much in bulk: what there was contained little that was Roman; and, on the whole, it hardly seems probable that Charlemagne entered into any new relation with his subjects. The relation of his empire to the empire in the East is a more difficult and important problem. In 797 the empress Irene had deposed and blinded her son, Constantine VI., and usurped his throne. Now it would seem that Charlemagne, whose thoughts

3 See the famous bull Venerabilem {Corp. Jur. Canon. Deer. Greg. i. 6, c. 34).

4 Even on this view, an imperial coronation at the hands of the pope was necessary to complete the title ; but this was regarded by the Germans (though not by the pope) as a form which necessarily followed.'

*were already set on Empire, hoped to depose and succeed Irene, and thus to become sole representative of the conception of Empire, both for the East and for the West. Sud- f£, e ° * denly there came, in 800,*

his own coronation as em- Caroiin- peror, an act apparently unpremeditated at the gian to the moment, taking him by surprise, as one gathers from emrirv. Einhard's Vita Karoli, and interrupting his plans. It left him representative of the Empire for the West only, confronting another representative in the East. Such a position he did not desire: there had been a single Empire vested in a single person since 476, and he desired that there should still continue to be a single Empire, vested only in his own person. He now sought to achieve this unity by a proposal of marriage to Irene. The proposal failed, and he had to content himself with a recognition of his imperial title by the two suc- cessors of the empress. This did not, however, mean (at any rate in the issue) that henceforth there were to be two conjoint rulers, amicably ruling as colleagues a single Empire, in the manner of Arcadius and Honorius. The dual government of a single Empire established by Diocletian had finally vanished in 476; and the unity of the Empire was now conceived, as it had been conceived before the days of Diocletian, to demand a single representative. Henceforth there were two rulers, one at Aix-la-Chapelle and one at Constantinople, each claiming, whatever temporary concessions he might make, to be the sole ruler and representative of the Roman empire. On the one hand, the Western emperors held that, upon the deposition of Con- stantine VI., Charlemagne had succeeded him, after a slight interval, in the government of the whole Empire, both in the East and in the West; on the other hand, the Eastern emperors, in spite of their grudging recognition of Charlemagne at the moment, regarded themselves as the only lawful successors of Constantine VI., and viewed the Carolings and their later successors as upstarts and usurpers, with no right to their imperial pretensions. Henceforth two halves confronted one another, each claiming to be the whole; two finite bodies touched, and each yet claimed to be infinite.

If, as has been suggested, Charlemagne did not enter into any fundamentally new relations with his subjects after his coronation, it follows that the results of his coronation, of the m t ne sphere of policy and administration, cannot Carol- have been considerable. The Empire added a new ingiaa sanction to a policy and administration already emp ' developed. Charlemagne had already showed himself episcopus episcoporum, anxious not only to suppress heresy and supervise the clergy within his borders, but also to extend true Christianity without them even before the year when his imperial coronation gave him a new title to supreme governorship in all cases ecclesiastical. He had already organized his empire on a new uniform system of counties, and the missi dominici were already

at work to superintend the action of the counts, even before the renovatio imperii Romani came to suggest such uniformity and centralization. Charlemagne had a new title; but his subjects still obeyed the king of the Franks, and lived by Frankish law, in the old fashion. In their eyes, and in the eyes of Charlemagne's own descendants, the Empire was something appendant to the kingship of the Franks, which made that kingship unique among others, but did not radically alter its character. True, the kingship might be divided among brothers by the old Germanic custom of partition, while the Empire must inhere in one person; but that was the one difference, and the one difficulty, which might easily be solved by attaching the name of emperor to the eldest brother. Such was the conception of the Carolings: such was not, however, the conception of the Church. To the popes the Empire was a solemn office, to which the kings of the Franks might most naturally be called, in view of their power and the traditions of their house, but which by no means remained in their hands as a personal property. By thus seeking to dissociate the Empire from any indissoluble connexion with the Carolingian house, the popes were able to save it. Civil wars raged among the descendants of Charlemagne : partitions recurred: the Empire was finally dissolved, in the

*sense that the old realm of Charlemagne fell asunder, in 888. But the Empire, as an office, did not perish. During the 9th century the popes had insisted, as each emperor died, that the new emperor needed coronation at their hands; oTtbe"" P and they had thus kept alive the conception of the Carol- Empire as an office to which they invited, if they did *«*»<• not appoint, each successive emperor. The quarrels empre – of the Carolingian house helped them to make good their claim. John VIII. was able to select Charles the Bald in preference to other claimants in 875; and before the end of his pontificate he could write that " he who is to be A f^ de ordained by us to the Empire must be by us first and papacy. foremost invited and elected." Thus was the unity of the Empire preserved, and the conception of a united Empire continued, in spite of the eventual dissolution of the realm of Charlemagne. When the Carolingian emperors disappeared, Benedict IV. could crown Louis of Provence (901) and John X. could invite to the vacant throne an Italian potentate like Berengar of Friuli (915); and even when Berengar died in 924, and the Empire was vacant of an emperor, they could hold, and hold with truth, that the Empire was not dead, but only sus- pended, until such time as they should invite a new ruler to assume the office.*

Various causes had contributed to the dissolution of the realm of Charlemagne. Partitions had split it; feudalism had begun to

honeycomb it; incessant wars had destroyed its core, the fighting Franks of Austrasia. But, above all, the rise of divisions within the realm, which, whether animated by the spirit of nationality or no, were ultimately destined to develop into nations, had silently undermined the structure of Pippin and Charlemagne. Already in 842 the oath of Strassburg shows us one Caroling king swearing in French and another in German : already in 870 the partition of Mersen shows us the kings of France and Germany dividing the middle kingdom which lay between the two countries by the linguistic frontier of the Meuse and Moselle. The year 888 is the birth-year of modern Europe. France, Germany, Italy, stood distinct as three separate units, with Burgundy and Lorraine as debatable lands, as they were destined to remain for centuries to come. If the conception of Empire was still to survive, the pope must ultimately invite the ruler of the strongest of these three units to assume _. the imperial crown; and this was what happened aerman when in 962 Pope John XII. invited Otto I. of Ger- kingdom many to renew once more the Roman Empire. As the and the imperial strength of the whole Frankish tribe had pre '

given them the Empire in 800, so did the national strength of the East Frankish kingdom, now resting indeed on a Saxon rather than a Frankish basis, bring the Empire to its ruler in 962. The centre of political gravity had already been shifting to the east of the Rhine in the course of the 9th century. While the Northmen had carried their arms along the rivers and into the heart of France, Louis the German had consolidated his kingdom in a long reign of sixty years (817-876); and at the end of the 9th century two kings of Germany had already worn the imperial crown. Early in the 10th century the kingship of Germany had come to the vigorous Saxon dukes (919); and strong in their Saxon basis Henry I. and his son Otto had built a realm which, disunited as it was, was far more compact than that which the Carolings of the West ruled from Laon. Henry I. had thought in his later years of going to Rome for the imperial crown: under Otto I. the imperial idea becomes manifest. On the one hand, he established a semi-imperial position in the West: by 946 Louis IV. d'Outremer is his protege, and it is his arms which maintain the young Conrad of Burgundy on his throne. On the other hand, he showed, by his policy towards the German Church, that he was the true heir of the Carolingian traditions. He made churchmen his ministers; he established missionary bishoprics on the Elbe which should spread Christi- anity among the Wends; and his dearest project was a new archbishopric of Magdeburg. The one thing needful was that he should, like Charlemagne, acquire the throne of

Italy; and the dissolute condition of that country during the first half of the

ioth century made its acquisition not only possible, but almost imperative. Begun in 952, the acquisition was completed

ten years later; and all the conditions were now Rma° y P resent f° r Otto's assumption of the imperial throne. Empire. He was crowned by John XII. on Candlemas Day 962,

and thus was begun the Holy Roman Empire, which lasted henceforth with a continuous life until 1806. 1

The same ideas underlay the new empire which had underlain that of Charlemagne, strengthened and reinforced by the fact that they had already found a visible expression before in that earlier empire. Historically, there was the tradition of the old Roman empire, preserved by the Church as an idea, and preserved in the Church, and its imperial organization, as an actual fact. Ecclesiastically, there was the Pauline conception of a single Christian Church, one in subjection to Christ as its Head, and needing (so men still thought) a secular counterpart of its in- divisible unity. 2 To these two sanctions philosophy later added a third; and the doctrine of Realism, that the one universal is the true abiding substance — the doctrine which pervades the Be monarchia of Dante, — reinforced the feeling which demanded that Europe should be conceived as a single political unity. But ii the Holy Roman empire of the German nation has the old foundations, it is none the less a thing sui generis. Externally, it meant far less than the empire of Charlemagne; it meant simply a union of Germany and northern Italy (to which, after 1032, one must also add Burgundy, though the addition is in reality nominal) under a single rule. Historians of the 19th century, during the years in which the modern German empire was in travail, disputed sorely on the advantages of this union; but whatever its advantages or disadvantages, the fact remains that the union of Teutonic Germany and Latin Italy was, from an external point of view, the essential fact in the structure of the medieval Empire. Internally, again, the Empire of the Ottos and their successors was new and unprecedented. If Latin imperialism had been combined with Frankish tribalism Ttle in the Empire of Charlemagne, it now met and blended

*Empire with feudalism. The Holy Roman emperor of the *"d middle ages, as Frederick I. proudly told the Roman*

feudalism. env0 y Sj found his senate in the diet of the German baronage, his equites in the ranks of the German knights. Feudalism, indeed, came in time to invade the very conception of Empire itself. The emperors began to believe that their position of emperor made them feudal overlords of other kings and princes; and they came to be regarded as the topmost summit of the feudal pyramid, from whom kings held their kingdoms, while they themselves held directly of God. In this way the old conception of the world as a single political society entered upon a new phase: but the translation of that conception into feudal terms, which might have made Diocletian gasp, only gave it the greater hold on the feudal society of the middle ages. Yet in one way the feudal conception was a source of weakness to the Empire; for the popes, from the middle of the 12th century

1 It is a curious fact that imperial titles {imperator and basileus) are used in the Anglo-Saxon diplomata of the ioth century. Edred, for instance (946-955) is " imperator," " cyning and casere totius Britanniae," " basileus Anglorum hujusque insulae barbarorum ": Edgar is " totius Albionis imperator Augustus " (cf. Stubbs, Const. Hist. i. c. vii. § 71). These titles partly show the turgidity of English Latinity in the ioth century, partly indicate the quasi-imperial position held by the Wessex kings after the reconquest of the Danelaw. But there seems to be no real ground for Freeman's view (Norman Conquest, i. 548 sqq.), that England was regarded as a third Empire, side by side with the other Empires of West and East Europe. That the titles were assumed in order to repudiate possible claims of the Western Empire to the overlordship of England is disproved by the fact that they are assumed at a time when there is no Western emperor. The assumption of an imperial style by Henry VIII., which is mentioned below, is explained by the Refor- mation, and does not mean any recurrence to a forgotten Anglo- Saxon style.

2 It is in virtue of this aspect that the Empire is holy. The term sacrum imperium seems to have been first used about the time of Frederick I., when the emperors were anxious to magnify the sanctity of their office in answer to papal opposition. The emperor himself (see under Emperor) was always regarded, and at his coronation treated, as a persona ecclesiastica.

onwards, began to claim for themselves a feudal overlordship of the world, and to regard the emperor as the chief of their vassals. The

theory of the Translatio buttressed their claim to be overlords of the Empire; and the emperors found that their very duty to defend the Papacy turned them into its vassals— for was not the advocqlus who defended the lands of an abbey or church its tenant by feudal service, and might not analogy extend the feudal relation to the imperial advocate himself ?

The relation of the Empire to the Papacy is indeed the cardinal fact in its history for the three centuries which followed the coronation of Otto I. (962-1250). For a century The (962-1076) the- relation was one of amity. The pope Empire and the emperor stood as co-ordinate sovereigns, and the ruling together the commonwealth of Europe. 3 If Papacy. either stood before the other, the emperor stood before the pope. The Romans had sworn to Otto I. that they would never elect or ordain a pope without his consent; and the rights over papal elections conceived to belong to the office of palricius, which they generally held, enabled the emperors, upon occasion, to nominate the pope of their choice. The partnership of Otto III., son of a Byzantine princess, and his nominee Silvester II. (already distinguished as Gerbert, scholasticus of the chapter school of Reims) forms a remarkable page in the annals of Empire and Papacy. Otto, once the pupil of Silvester in classical studies, and taught by his mother the traditions of the Byzantine empire, dreamed of renewing the Empire of Constantine, with Rome itself for its centre; and this antiquarian idealism (which Arnold of Brescia and Cola di Rienzi were afterwards, though with some difference of aim, -to share) was encouraged in his pupil by the pope. Tradition afterwards ascribed to the two the first project of a crusade, and the institution of the seven electors: in truth their faces were turned to the past rather than to the future, and they sought not to create, but to renovate. The dream of restoring the age of Constantine passed with the premature death of Otto; and after the death of Silvester II. the papacy was degraded into an appendage of the Tusculan family. From that degradation the Church was rescued by Henry III. (the second emperor of the new Salian house, which reigned from 1024 to 1125), when in 1046 he caused the deposition of three competing popes, and afterwards filled the papal chair with his own nominees; but it was rescued more effectually by itself, when in 1059 the celebrated bull In nomine Domini of Nicholas II. reserved the right of electing the popes to the college of cardinals (see Conclave). A new era of the Papacy begins with the decree, and that era found its exponent in Hildebrand. If under Henry III. the Empire stands in many respects at its zenith, and the emperor nominates to the Papacy, it sinks, under Henry IV., almost to the nadir of its fortunes, and a pope attempts, with no little

success, to fight and defeat an emperor.

The rise of the Papacy, which the action of Henry III. in 1046 had helped to begin, and the bull of 1059 had greatly promoted, was ultimately due to an ecclesiastical revival, which goes by the name of the Cluniac movement. The aim The t]?~ of that movement was to separate the Church from contest the world, and thus to make it independent of the laity and the lay power; and it sought to realize its aim first by the prohibition of clerical marriage and simony, and ultimately by the prohibition of lay investiture. A decree of Gregory VII. in 1075 forbade emperor, king or prince to " presume to give investiture of bishoprics," under pain of excommunication ; and Henry IV., contravening the decree, fell under the penalty, and the War of Investitures began (1076-1122). Whether or no Henry humiliated himself at Canossa (and the opinion of German historians now inclines to regard the traditional account as exaggerated) the Empire certainly suffered in his reign a 3 The emperor claimed suzerainty over the greater part of Europe at various dates. Hungary and Poland, France and Spain, the Scandinavian peninsula, the British Isles, were all claimed for the Empire at different times (see Bryce, Holy Roman Empire, c. xii.). The " effective " empire, if indeed it may be called effective, em- braced only Germany, Burgundy and the regnum Italiae (the old Lombard kingdom in the valley of the Po).

great loss of prestige. The emperor lost his hold over Germany, where the aid of the pope strengthened the hands of the discon- tented nobility: he lost his hold over Italy, where the Lombard towns gradually acquired municipal independence, and the dona- tion of the Countess Matilda gave the popes the germ of a new and stronger dominium temporale. The First Crusade came, and the emperor, its natural leader, could not lead it; while the centre of learning and civilization, in the course of the fifty years' War of Investitures, gradually shifted to France. The struggle was finally ended by a compromise — the Concordat of Worms — in 1122; but the Papacy, which had fought the long War of Investitures and inspired the First Crusade, was a far greater power than it had been at the beginning of the struggle, and the emperor, shaken in his hold on Germany and Italy, had lost both power and prestige (see Investiture) . It is significant that a theory of the feudal subjection of the emperor to the pope, foreshadowed in the pontificate of Innocent II., and

definitely enounced by the envoys of Adrian IV. at the diet of Besancon in 1 1 57, now begins to arise. The popes, who had called the emperors to be heads of the European commonwealth in 800 and again in 962, begin to vindicate that headship for themselves. Gregory VII. had already claimed that the pope stood to the emperor, as the sun to the moon; and gradually the old co- ordination disappeared in a new subordination of the Empire to the papal plenitudo potestatis. The claim of ecclesiastical independence of the middle of the nth century was rapidly becoming a claim of ecclesiastical supremacy in the middle of the 1 2th: the imperial claim to nominate popes, which had lasted till 1059, was turning into the papal claim to nominate emperors. Yet at this very time a new period of splendour dawned for the Empire; and the rule of the three Hohenstaufen emperors, Frederick I., Henry VI. and Frederick II. (1152-1250), marks the period of its history which attracts most sympathy and admiration.

Frederick I. regained a new strength in Germany, partly because he united in his veins the blood of the two great con- Tne tending families, the Welf s and the Waiblingens ; partly

Hohea- because he had acquired large patrimonial possessions stauten m Swabia, which took the place of the last Saxon emperors. demesne; p ar tly because he had a greater control over the German episcopate than his predecessors had enjoyed for many years past. At the same time the revival of interest in the study of Roman law gave the emperor, as source and centre of that law, a new dignity and prestige, particularly in Italy, the home and hearth of the revival. Confident in this new strength, he attempted to vindicate his claims on Italy, and sought, by uniting the two under his sway, to inspire with new life the old Ottonian Empire. He failed to crush Lombard municipal independence: defeated at Legnano in n 76, he had to recognize his defeat at the treaty of Constance in 1183. He failed to acquire control over the Papacy: a new struggle of Empire and Papacy, begun in the pontificate of Adrian IV. on the question of control over Rome, and continued in the pontifi- cate of Alexander III., because Frederick recognized an anti-pope, ended in the emperor's recognition of his defeat at Venice in 1 1 77. The one success was the acquisition of the Norman kingdom for Henry VI., who was married to its heiress, Constance. But the one success of Frederick's Italian policy proved the ruin of his house in the reign of his grandson Frederick II. On the one hand, the possession of Sicily induced Frederick II. to neglect Germany; and by two documents, one of 1220 and one of 1 23 1 , he practically abdicated his sovereign powers to the German princes in order to conciliate their

support for his Italian policy. On the other hand, the possession of Sicily involved him in the third great struggle of Empire and Papacy. Strong in his Sicilian kingdom in the south, and seeking, like his grandfather, to establish his power in Lombardy, Frederick practically aimed at the unification of Italy, a policy which threatened to engulf the States of the Church and to reduce the Papacy to impotence. The popes excommunicated the emperor: they aided the Lom- bard towns to maintain their independence; finally, after Frederick's death (1250), they summoned Charles of Anjou into

Sicily to exterminate his house. By 1268 he had done his work, and the medieval Empire was practically at an end. When Rudolph of Habsburg succeeded in 1 2 73 , he was only the overthrow head of a federation of princes in Germany, while in of the Italy he abandoned all claims over the centre and south, Empire la and only retained titular rights in the Lombard plain. ay '

Thus ended the first great chapter in the history of the Holy Roman Empire which Otto had founded in 962. In those three centuries the great fact had been its relation to the Papacy: in the last two of those three centuries the relation had been one of enmity. The basis of the enmity had been the papal claim to supreme headship of Latin Christianity, and to an independent temporal demesne in Italy as the condition of that headship. Because they desired supreme headship, the popes had sought to reduce the emperor's headship to something lower than, and dependent upon, their own — to a mere fief held of St Peter: because they desired a temporal demesne, they had sought to expel him from Italy, since any imperial hold on Italy threatened their independence. They had succeeded in defeating the Empire, but they had also destroyed the Papacy; for the French aid which they had invoked against the Hohenstaufen developed, within fifty years of the fall of that house, into French control, and the captivity at Avignon (1308-13 78) was the logical result of the final victory of Charles of Anjou at Tagliacozzo. The struggle seemed to have ended in nothing but the exhaustion of both combatants. Yet in many respects it had in reality made for progress. It had set men thinking of the respective limits of church and state, as the many libelli de lite imperatorum et pontificum show; and from that thought had issued a new con- ception of the state, as existing in its own right and supreme in its own sphere, a conception which is the necessary basis of the modern nation-state. If it had dislocated Germany into a number of territorial principalities, it had produced a college of

electors to represent the cause of unity: if it had helped to pre- vent the unification of Italy, and had left to Italy the fatal legacy of Guelph and Ghibelline feuds, it had equally helped to produce Italian municipal independence.

A new chapter of the history of the Empire fills the three centuries from 1273 to 1556 — from the accession of Rudolph of Habsburg to the abdication of Charles V. Italy was now lost : the Empire had now no peculiar connexion V te with Rome, and far less touch with the Papacy. A /„„„ tae Hew Germany had risen. The extinction of several royal election of stocks and the nomination of anti-kings in the course of Rudolph of civil wars had made the monarchy elective, and raised ˆ3. arg ‘ to the side of the emperor a college of electors (see Electors), which appears as definitely established soon after 1250. With Italy lost, and Germany thus transmuted, why should the Empire have still continued to exist? In the first place, it continued to exist because the Germans still found a king necessary and because, the German king having been called for three centuries emperor, it seemed necessary that he should still continue to bear the name. In this sense the Empire existed as the presidency of a Germanic confederation, and as something analogous to the modern German empire, with the one great difference that the Hohenzollerns now derive from Prussia a strength which enables them to make their imperial position a reality, while no Luxemburg or Habsburg was able to make his imperial position otherwise than honorary and nominal. In the second place, it continued to exist because the conception of the unity of western Europe still lingered, and was still conceived to need an exponent. In this sense the Empire existed as a presidency, still more honorary and still more nominal, of the nations of western Europe. In both capacities the emperor existed to a great extent because he was a legal necessity— because, in Germany, he was necessary for the investiture of princes with their principalities, and because, in Europe, he was necessary, as the source of all rights, to bestow crowns upon would-be kings, or to act as the head of the great orders of chivalry, or to give patents to notaries. With the history of the Empire regarded as a German confederation we are not here concerned. The reigns of the Habsburg, Luxemburg and

n

Wittelsbach emperors belong to the history of Germany. Yet two of these emperors, Henry VII. and Louis IV., should not pass without notice, the one for his own sake, the other for the sake of his adherents, and both because, by interfering in Italy, and coming into conflict with the Papacy, they brought once more into prominence the European aspect of the Empire.

Henry VII., the contemporary and the hero of Dante, descended into Italy in 13 10, partly because he had no power and no occupation in Germany, partly because he was deeply imbued with the sense of his imperial dignity. Coming as a peacemaker and mediator, he was driven by Guelph opposition into a Ghibelline role; and he came into conflict with Clement V., the first of the Avignonese popes, who under the pressure of France attempted to enforce upon Henry a recognition of his feudal subjection. Henry asserted his independence: he claimed Rome for his capital, and the lordship of the world for his right; but, just as a struggle seemed impending, he died, in 1313. During the reign of his successor, Louis IV., the struggle came. Louis had been excommunicated by John XXII. in 1324 for acting as emperor before he had received papal recognition. None the less, in 1328, he came to Rome for his coronation. He had gathered round him strange allies; on the one hand, the more advanced Franciscans, apostles of the cause of clerical disendowment, and inimical to a wealthy papacy; on the other hand, jurists like Marsilius of Padua and John of Jandun, who brought to the cause of Louis the spirit and the doctrines which had already been used in the struggle between Boniface VIII. and Philip IV. of France. Marsilius in particular, in a treatise called the Defensor Pads, insisted on the majesty of the lay state, and even on ils superiority to the Church. Perhaps it was Marsilius, learned as he was in Roman law, and remembering the lex regia by which the Roman people had of old conferred its power on the emperor, who suggested to Louis the policy, which he followed, of receiving the imperial crown by the decree and at the hands of the Roman people. The policy was remarkable: Louis embraced an alliance which Frederick Barbarossa had spurned, and recognized the medieval Romans as the source of imperial power. Not less remarkable was the new attitude of the German electors, who for the first time supported an emperor against the pope, because they now felt menaced in their own electoral rights; and the one permanent result which finally flowed from the struggle was the enunciation and definition of the rights and privileges of the electors in the Golden Bull of 1356 (see Golden Bull).

In this struggle with the Papacy the Empire had shown something of

its old universal aspect. It had come into connexion with Italy, and into close connexion with Rome : it had enlisted in defence of its rights at once an Italian like Marsilius and an Englishman like Ockham. The same universal aspect appeared once more in the age of the conciliar movement, at the beginning of the 15th century. One of the essential duties of the emperor, as defender of the Church, was to help the assembling and the deliberations of general councils of the Church. This was the duty discharged by Sigismund, when he forced John XXIII. to summon a council at Constance in 14 14, and sought, though in vain, to guide its deliberations. The journey which Sigismund undertook in the interests of the council (1415-1417) is particu- larly noteworthy. He sought to make peace throughout western Europe, acting as international arbitrator— in virtue of his presidency of western Europe — between England and France, between Burgundians and Armagnacs; but he failed in his aim, and when he returned to the council, it was only to witness the defeat of the party of reform which he championed. National feeling and national antipathies proved too strong for Empire Sigismund's attempt to revive the medieval empire for and the the purposes of international arbitration : the same feel- rise of the ing, the same antipathies, made inevitable the failure national ° t ˆ le counc il itself, in which western Europe had states. sought to meet once more as a single religious com- monwealth. Early in the 15th century, therefore, the conception of the unity of western Europe, as a single Empire-Church, was already waning in both its aspects. The*

unity of the Church Universal was dissolving, and the conception of the nation-church arising (as the separate concordats granted by Martin V. to the different nations prove) ; while the unity of the Empire was proved a dream, by the powerlessness of the emperor in the face of the struggle of England and France.

Renaissance and Reformation combined to complete the fall which the failure of Sigismund to guide the conciliar movement had already foreshadowed. The Renaissance, revolting influence against the medievalism of the studium and not of the sparing even the sacerdotium of the middle ages, had Reforma- little respect for the medieval imperium; and, going "" back to pure Latin and original Greek, it went back beyond even the classical empire to find its ideals and inspirations. But it is the coming of the Reformation, and with it of the nation-church, which finally marks the epoch at which the last vestige of the old conception of the political unity of the world disappears before the nation-state. Externally indeed it seemed, at the time of the Reformation, as if the old Empire had been revived in the person of Charles V., who owned territories as vast as

those of Charlemagne. But Charles's dominions were a dynastic agglomeration, knit together by no vivifying conception; and, though Charles was a champion of the one Catholic Church against the Reformation, he did not in any way seek to revive the power of the medieval empire. Meanwhile the reforming monarchs, while they cast off the Roman Church, cast off with it the Roman empire. Henry VIII. declared himself free, not only of the pope, but of all other foreign power; not only so, but as he sought to take the place of the pope with regard to his own church, so he sought to take the place of the emperor with regard to his kingdom, and spoke of his " imperial " crown, a style which recurs in later Tudor reigns. 1 The conception of one Empire passed out of Europe, or, if it remained, it remained only in an honorary precedence accorded by other sovereigns to the king of Germany, who still entitled himself emperor. In Germany itself the honorary presidency which the emperor enjoyed over the princes came to mean still less than before, when religious differences divided the country, and the principle of cujus regio ejus religio accentuated the local autonomy of the prince. When Charles abdicated in 1556, the change which the accession of Rudolph of Habsburg had already marked was complete: there was no empire except in Germany, and in Germany the Empire was nothing more than a convenient legal conception. The Reformation, by sweeping away the spiritual unity of western Christendom, had swept away any real conception of its political unity, and with that conception it had swept away the Empire; while it had also, by splitting Germany into two religious camps, and making the emperor at the most the head of a religious faction, dissipated the last vestiges of a real Empire in the country which had, since 062, been its peculiar home.

From 1556 to 1806 the Empire means a loose federation of the different princes of Germany, lay and ecclesiastical, under the presidency, elective in theory but hereditary in Th practice, of the house of Habsburg. It is an empire Empire as much in the same sense as the modern German empire, « German with a diet somewhat analogous to the modern Bundes- c ° ntedera — rat, and a cumbrous imperial chamber for purposes of justice, hardly at all analogous to the highly organized system of federal justice which prevails in Germany to-day. The dis- solution of the Holy Roman Empire into this loose federation had already been anticipated by the concessions made to the princes by Frederick II. in 1220 and 1231; but the final organiza- tion of Germany on federal lines was only attained in the treaty of Westphalia of 1648. The attempt of Ferdinand II., in the course of the Thirty Years' War, to assert a practically monarchical authority over the princes of Germany, only led to the regular

vindication by the princes of their own monarchical authority. The emperor, who had tried in the 15th century to be the inter- national authority of all Europe, now sank to the position of less than inter-state arbitrator in Germany. That the Empire and the emperor were retained at all, when the princes became

1 Cf. the Act 25 Henry VIII. c. 22, § 1: "the lawful kings and emperors of this realm."

so many independent sovereigns, was due partly to a lingering sense of quasi-national sentiment for a magni nominis umbra, partly to the need of some authority which should combine in one whole principalities of very different sizes and strengths, and should protect the weak from the strong, and all from France. But this authority only found its symbol in the emperor. Such real federal authority as there was remained with the diet, a congress of sovereign princes through their accredited repre- sentatives; and the emperor's sole rights, as emperor, were those of granting titles and confirming tolls. The Habsburgs, emperors in each successive generation, never pursued an imperial, but always a dynastic policy; and they were perfectly ready to sacrifice to the aggrandizement of their house the honour of the Empire, as when they ceded Lorraine to France in return for Tuscany (1735).

It needed the cataclysm of the French Revolution finally to overthrow the Empire. Throughout the 18th century it lasted, Bad of a thing of long-winded protocols and never-ending the Holy lawsuits, " neither Holy, nor Roman, nor an Empire." Roman But with Napoleon came its destroyer. As far back Empire. as t jj e en(j f t jj e jˆjjj cen t U ry, French kings had been scheming to annex the title or at any rate' absorb the territories of the Empire: at the beginning of the 19th century the annexa- tion of the title by Napoleon seemed very imminent. Posing as the New Charlemagne (" because, like Charlemagne, I unite the crown of France to that of the Lombards, and my Empire marches with the East "), he resolved in 1806, during the dis- solution and recomposition of Germany which followed the peace of Luneville, to oust Francis II. from his title, and to make the Holy Roman Empire part and parcel of the " Napoleonic idea." He was anticipated, however, by the prompt action of the proud Habsburg, who was equally resolved that no other should wear the crown which he himself was powerless to defend, and accord- ingly,

on the 6th of August 1806, Francis resigned the imperial dignity. So perished the Empire. Out of its ashes sprang the Austrian Empire, for Francis,in i8o4,partly to counter Napoleon's assumption of the title of Emperor of the French, partly to pre- pare for the impending dissolution of the old Empire, had assumed the title of " Hereditary Emperor of Austria." And in yet more recent times the German empire may be regarded, in a still more real sense than Austria, as the descendant and representative of the old Empire of the German nation.

What had been the results of the Holy Roman Empire, in the course of its long history, upon Germany and upon Europe? General It has been a vexata quaestio among German historians, Influence whether or no the Empire ruined Germany. Some of the have argued that it diverted the attention of the Empire. German kings from their own country to Italy, and that, by bringing them into conflict with the popes, and by thus strengthening the hands of their rebellious baronage with a papal alliance, it prevented the development of a national German monarchy, such as other sovereigns of western Europe were able to found. Others again have emphasized the racial division of Saxon and Frank, of High German and Low German, as the great cause of the failure of Germany to grow into a united national whole, and have sought to ascribe to the influence of the Empire such unity as was achieved; while they have attri- buted the learning, the trade, the pre-eminence of medieval Germany to the Italian connexion and the prestige which the Empire brought. It is difficult to pronounce on either side; but one feels that the old localism and individualism which characterized the early German, and had never, on German soil, been combined with and counteracted by a large measure of Roman population and Roman civilization, as they were in Gaul and Spain, would in any case have continued to divide and disturb Germany till late in her history, even if the Empire had never come to reside within her borders. Of the larger question of the influence of the Empire on Europe we can here only say that it worked for good. An Empire which represented, as a Holy Empire, the unity of all the faithful as one body in their secular, no less than in their religious life — an Empire which, again, as a Roman Empire, represented with an unbroken

continuity the order of Roman administration and law — sucb an empire could not but make for the betterment of the world. It was not an empire resting on force, a military empire; it was not, as in modern times empires have sometimes been, an autocracy warranted and stamped by the plebiscite of the mob. It was an empire resting neither on the sword nor on the ballot- box, but on two great ideas,

taught by the clergy and received by the laity, that all believers in Christ form one body politic, and that the one model and type for the organization of that body is to be found in the past of Rome. It was indeed the weakness of the Empire that its roots were only the thoughts of men; for the lack of material force, from which it always suffered, hindered it from doing work it might well have done — the work, for instance, of international arbitration. Yet, on the other hand, it was the strength and glory of the Empire that it lived, all through the middle ages, an unconquerable idea of the mind of man. Because it was a being of their thought, it stirred men to reflection: the Empire, particularly in its clash with the Papacy, produced a political consciousness and a political speculation reflected for us in the many libelli de lite imperalorum et pontificum, and in the pages of Dante and Marsilius of Padua. Roman, it perpetuated the greatest monument of Roman thought — that ordered scheme of law, which either became, as in England, the model for the building of a native system, or, as in Germany from the end of the 15th century onwards, was received in its integrity and administered in the courts. Holy, it fortified and consolidated Christian thought, by giving a visible expression to the kingdom of God upon earth; and not only so, but it maintained, however imperfectly, some idea of international obligation, and some conception of a commonwealth of Europe. 1

The Holy Roman Empire of western Europe had in its own day a contemporary and a rival — that east Roman empire of which we have already spoken. From Arcadius to John Palaeo- logus, from a.d. 395 to 1453, the Roman empire was continued at Constantinople — not as a theory and an idea, but as a simple and daily reality of politics and administration. In one sense the East Roman Empire was more lineally and really Roman than the West : it was absolutely continuous from ancient times. In another sense the Western Empire was the most Roman; for its capital — in theory at least — was Rome itself, and the Roman Church stood by its side, while Constantinople was Hellenic and even Oriental. Between the two Empires there was fixed an impassable gulf; and they were divided by deep differences of thought and temper, which appeared most particu- larly in the sphere of religion, and expressed themselves in the cleavage between the Catholic and the Orthodox Churches. Yet, as when Rome fell, the Catholic Church survived, and ultimately found for itself a new Empire of the West, so, when Constantinople fell, the Orthodox Church continued its life, and found for itself a new Empire of the East — the Empire of Russia. Under Ivan the Great (1462-1505) Moscow became the metropolis of Orthodoxy; Byzantine law influenced his code; and he took for his

cognizance the double-headed eagle. Ivan the Terrible, his grandson, finally assumed in 1547 the title of Tsar; and henceforth the Russian emperor is, in theory and very largely in fact, the successor of the old East Roman emperor, 2 the head of the Orthodox Church, with the mission of vengeance on Islam for the fall of Constantinople.

In the 19th century the word " empire " has had a large and important bearing in politics. In France it has been the apanage of the Bonapartes, and has meant a centralized system M 0(fer _ of government by an efficient Caesar, resting immedi- Empires. ately on the people, and annihilating the powers of the people's representatives. Under Napoleon I. this conception had a Carolingian colour: under Napoleon III. there is less of

1 The Papacy, consistent to the last, formally protested at the Congress of Vienna in 1815 against the failure of the Powers to restore the Holy Roman Empire, the " centre of political unity " (Ed.).

2 The Turks, occupying Constantinople, have also claimed to be the heirs of the old emperors of Constantinople; and their sultans have styled themselves Keisar-i-RHm.

Carolingianism, and more of Caesarism — more of a popular dictatorship. While in modern France Empire has meant autocracy instead of representative government, in Germany it has meant a greater national unity and a federal government in the place of a confederation. The modern German empire is at once like and unlike the old Holy Roman Empire. It is unlike the old medieval Empire; for it has no connexion with the Catholic Church, and no relation to Rome. But it is like the Holy Roman Empire of the 17th and 18th centuries — for it represents a federation, but a more real and more unitary federation, of the several states of Germany. The likeness is perhaps more striking than the dissimilarity; and in virtue of this likeness, and because the memory of the old German Kaiser- zeit was a driving force in 1870, we may speak of the modern German empire as the successor of the old Holy Roman Empire, if we remember that we are speaking of that Empire in its last two centuries of existence. The modern " Empire of Austria," on the other hand, does not connote an empire in the sense of a federation, but is a convenient designation for the sum of the territories ruled by a single sovereign

under various titles (king of Bohemia, archduke of Austria, &c.) and unified in a single political system. 1 The title of Emperor was assumed, as we have seen, through an historical accident; and, though the Habsburgs of to-day are personally the lineal descendants of the old Holy Roman emperors, they do not in any way possess an empire that represents the old Holy Empire. In England, of recent years, the term " Empire " and the conception of imperial- ism have become prominent and crucial. To Englishmen to-day, as to Germans before 1870, the term and the conception stand for the greater unity and definitely federal government of a number of separate states. For the German, indeed, Empire has meant, in great measure, the strengthening of a loose federal institution by the addition of a common personal superior: to us it means the turning of a loose union of separate states already under a common personal superior — the King — into a federal commonwealth living under some common federal institutions. But the aim is much the same; it is the integration of a people under a single scheme which shall be consistent with a large measure of political autonomy. We speak of imperial federation; and indeed our modern imperialism is closely allied to federalism. Yet we do well to cling to the term empire rather than federation; for the one term emphasizes the whole and its unity, the other the part and its independence. This imperialism, which is federalism viewed as making for a single whole, is very different from that Bonapartist imperialism, which means autocracy; for its essence is free co-ordination, and the self-government of each co-ordinated part. The British Empire (q.v.) is, in a sense, an aspiration rather than a reality, a thought rather than a fact; but, just for that reason, it is like the old Empire of which we have spoken; and though it be neither Roman nor Holy, yet it has, like its prototype, one law, if not the law of Rome — one faith, if not in matters of religion, at any rate in the field of political and social ideals.

Authorities. — See, in the first place, J. Bryce, Holy Roman Empire (1904 edition); J. von Dollinger, article on " The Empire of Charles-the Great " (in Essays on Historical and Literary Subjects, translated by Margaret Warre, 1894); H. Fisher, The Medieval Empire (1898); E. Gibbon, The Decline and Fall of the Roman Empire, edited by J. B. Bury. It would be impossible to refer to all the books bearing on the article, but one may select (i.) for the period down to 476,- Stuart Jones, The Roman Empire (1908), an excellent brief sketch; H. Schiller, Geschichle der romischen Kaiser- zeit (1883-1888); O. Seeck, Geschichle des Untergangs der avtiken Welt (Band I., Berlin, 1897-1898, Band II., 1901) (a remarkable and stimulating book); and the two excellent articles on " Imperium " and " Princeps " in

Smith's Dictionary of Greek and Roman Anti- quities (1890) ; (ii.) for the period from 476 down to 888, T. Hodgkin, Italy and her Invaders (1880-1900); F. Gregorovius, Geschichle der Stadt Rom im Mittelalter (1886-1894; Eng. trans., London, 1894- 1900); E. Lavisse, Histoire de France, 11. i. (1901); J. B. Bury, History of the Later Roman Empire (1889) '< ('"•) f° r the Holy Roman

1 This does not, of course, apply to Hungary, which since 1867 has not formed part of the Austrian empire and is ruled by the head of the house of Habsburg not as emperor, but as king of Hungary.

Empire of the German nation, W. von Giesebrecht, Geschichle der deutschen Kaiserzeit (1881-1890); J. Zeller, Histoire d'Allemagne (1872-1891); R. L. Poole, Illustrations of Medieval Thought (1884); S. Riezler, Die literarischen Widersacher der Pdpste sur Zeil Ludwigs des Baiers (1874); J. Jannsen, Geschichte des deutschen Volkes seit dem Ausgang des Mittelalters (1885-1894); L. von Ranke, Deutsche Geschichte im Zeitalter der Reformation (1839-1847), and Zur deutschen Geschichte. Vom Religionsfrieden bis zum dreissigjdhrigen Krieg (1869); and T. Carlyle, Frederick the Great (1872-1873). Ot. the fall of the Roman Empire and the transition to the modern German Empire see Sir J. R. Seeley, Life and Times of Stein (1878) ; H. von Treitschke, Deutsche Geschichte (1879-1894); and H. von Sybel, Die Begrundung des deutschen Reichs (1890-1894, Eng. trans., The Founding of the Germ. Emp., New York, 1890-1891). For institutional history, see R. Schroder, Lehrbuch der deutschen Rechts- geschichte (1894). On the influence of the Holy Roman Empire upon the history of Germany, see J. Ficker, Das deutsche Kaiserreich (1861), and Deutsches Kbnigtum und Kaisertum (1862); and H. von Sybel, Die deutsche Nation und das Kaiserreich (1861). (E. Br.)

EMPIRICISM (from Gr. < = /i7reipos, skilled in, from irelpa., experiment), in philosophy, the theory that all knowledge is derived from sense-given data. It is opposed to all forms of intuitionalism, and holds that the mind is originally an absolute blank (tabula rasa), on which, as it were, sense-given impressions are mechanically recorded, without any action on the part of the mind. The process by which the mind is thus stored consists of an infinity of individual impressions. The frequent or invari- able recurrence of similar series of events gives birth in the mind to what are wrongly called "laws"; in fact, these " laws " are merely statements of experience gathered together by association, and have no other kind of validity. In other words from the empirical standpoint the statement of such a " law " does not contain the word " must ": it merely asserts that such and

such series have been invariably observed. In this theory there can strictly be no " causation "; one thing is observed to succeed another, but observations cannot assert that it is " caused " by that thing; it is post hoc, but not propter hoc. The idea of necessary connexion is a purely mental idea, an a priori conception, in which observation of empirical data takes no part; empiricism in ethics likewise does away with the idea of the absolute authority of the moral law as conceived by the intuitionalists. The moral law is merely a collection of rules of conduct based on an infinite number of special cases in which the convenience of society or its rulers has subordinated the inclination of individuals. The fundamental objection to empiricism is that it fails to give an accurate explanation of experience; individual impressions as such are momentary, and their connexion into a body of coherent knowledge pre- supposes mental action distinct from mere receptivity. Empiri- cism was characteristic of all early speculation in Greece. During the middle ages the empiric spirit was in abeyance, but it revived from the time of Francis Bacon and was systematized especially in the English philosophers, Locke, Hume, the two Mills, Bentham and the associationist school generally.

See Association of Ideas ; Metaphysics ; Psychology ; Logic ; besides the biographies of the empirical philosophers.

In medicine, the term is applied to a school of physicians who, in the time of Celsus and Galen, advocated accurate observation of the phenomena of health and disease in the belief that only by the collection of a vast mass of instances would a true science of medicine be attained. This point of view was carried to extremes by those who discarded all real study, and based their treatment on rules of thumb. Hence the modern sense of empirical as applied to the guess work of an untrained quack or charlatan.

EMPLOYERS' LIABILITY, and WORKMEN'S COMPENSA- TION. 2 The law of England as to the liability of employers in respect of personal injuries to their servants is regulated partly by the common law and partly by statute; but by the Employers' Liability Act 1880, such exceptions have been grafted upon the common law, and by the Workmen's Compensa- tion Act 1906, principles so alien to the common law have been applied to most employments that it is impossible now to present any view of this branch of the law as a logical whole. All that can be done is to state the nature of the liability at common law.

2 " Employ " comes through Fr. from Lat. ' implicate, to enfold, Late Lat. to direct upon something.

Common law.

the extension of it effected by the Employers' Liability Act 1880, and the new liabilities introduced by later acts.

At common law the liability of a master is of a very limited character. There is, of course, nothing to prevent a master and servant from providing by special contract in any way they please for their mutual rights in cases of personal injury to the servant. In such cases the liability will depend upon the terms of the special contract. But apart from any special agreement, it may be broadly stated that a master is liable to his servants only for injuries caused by his own negligence. Injuries to a servant may arise from accident, from the nature of the service, or from negligence; and this negligence may be of the master, of another servant of the master, or of a stranger. If the injury is purely accidental the loss lies where it falls. If it arises from the nature of the service, the servant must bear it himself; he has undertaken a service to which certain risks are necessarily incident; if he is injured thereby, it is the fortune of war, and no one can be made responsible. If the injury is caused by the negligence of a stranger, the servant has his ordinary remedy against the wrong-doer or any one who is responsible as a principal for the conduct of the wrong-doer. If it is caused by the negligence of a fellow-servant, he likewise has his ordinary remedy against the actual wrong-doer; but, by virtue of what is known as the doctrine of common employment, he cannot at common law make the master liable as a principal. The only case (inde- pendently of modern legislation: see below) in which he can recover damages from the master is where the injury has been caused by negligence of the "master himself. A master is negligent if he fails to exercise that skill and care which, in the circumstances of the particular employment, are used by employers of ordinary skill and carefulness. If he himself takes part in the work, he must act with such skill and care as may reasonably be demanded of one who takes upon himself to do work of that kind. If he entrusts the work to other servants, he must be careful in their selection, and must not negligently employ persons who are incompetent. He must take proper care so to arrange the system of work that his servants are not exposed to unnecessary danger. If tools or machinery are used, he must take proper care to provide such as are fit and proper for the work, and must either himself see that they are maintained in a fit condition or employ competent

servants to do so for him. If he is bound by statute to take precautions for the safety of his servants, he must himself see that that obligation is discharged. For breach of any of these duties a master is liable to his servant who is injured thereby, but his liability extends no further.

That his obligations to a servant are so much less than to a stranger is chiefly due to the doctrine of common employment. As a rule a master is responsible for the negligence of Common jjj s servant acting in the course of his employment; meat. DU t> from about the middle of the 19th century, it

became firmly rooted in the law that this principle did not apply where the person injured was himself a servant of the master and engaged in a common employment with the servant guilty of the negligence. In effect this rule protects a master as against his servant from the consequences of negligence on the part of any other of his servants; to this there is no qualifica- tion except that, for the rule to apply, both the injured and the negligent servant must be acting in pursuance of a common employment. They must both be working for a common object though not necessarily upon the same work.

It is not easy to define precisely what constitutes a common employment in this sense, and there is peculiarly little judicial authority as to the limit at which work for the same employer ceases to be work in a common employment. It does not depend on difference in grade; all engaged in one business, from the manager to the apprentice, are within the rule. It does not depend on difference in work, if the work each is doing is part of one larger operation; all the servants of a railway company, whether employed on the trains, or at the stations, or on the line, are in a common employment. It does not necessarily depend on difference of locality; a servant who packs goods at the factory and a servant who unpacks them in the shop may well be in a common employ- ment. On the other hand, it is not enough that the two servants

are working for the same employer, if there is nothing in common between them except that they are making money for the same man; apart from special circumstances, the crews of two ships owned by the same company are probably not in common employ- ment while navigating their respective ships. The test in each case must be derived from the view, invented by the courts, upon which the doctrine was based, namely, that the servant by entering upon the service consented to run all the risks incidental to it, including the risk of negligence on the part of fellow-servants; if the relation

between the two servants is such that the safety of the one may, in the ordinary course of things, be affected by the negligence of the other, that negligence must be taken to be one of the risks of the employment assented to by the servant, and both are engaged in a common employment. In ninety-nine cases out of a hundred it will be found that the doctrine is applicable, and the master pro- tected from liability. It is thus seen that, in general, no action will lie against a master at the suit of his servant, unless the servant can prove personal negligence on the part of the master causing injury to the servant. And in such action the master may avail himself of those defences which he has against a stranger. He may rely upon contributory negligence, and show that the servant was himself negligent, and that, notwithstanding the negligence of the master, the injury was proximately caused by the negligence of the servant. Or (except in cases where the injury results from a breach of a statutory duty) he may prove such facts as establish the defence expressed in the maxim, volenti non fit injuria ; that is, he may prove that the injured servant knew and appreciated the particular risk he was running, and incurred it voluntarily with full understanding of its nature. Mere knowledge on the part of the servant, or even his continuing to work with knowledge, does not necessarily establish this defence; it must be knowledge of such a kind and in such circumstances that it can be inferred that the servant contracted to take the risk upon himself. The action at common law is subject to the general rule that personal actions die with the person ; except so far as the remedy for money loss caused by death by negligence has been preserved in favour of a husband or wife and certain near relatives, under Lord Campbell's Act (Fatal Accidents Act 1846).

Such was the law up to 1880. So long as industry was con- ducted on a small scale, and the master worked with his men, or was himself the manager, its hardship was perhaps little felt; his personal negligence could in many cases J£g ? ctof be established. But with the development of the factory system, and the ever-growing expansion of the scale on which all industries were conducted, it became increasingly difficult to bring home individual responsibility to the employer. As industry passed largely into the control of corporations, difficulty became almost impossibility. The employer was not liable to a servant for the negligence of a fellow-servant, and therefore, in most cases of injury, was not liable at all. It is not surprising that the condition of things thus brought about, partly by the growth of modern industry and partly by the decisions of the courts, caused grave dissatisfaction. The justice of the doctrine of common employment was vigorously called in question. In the result

the Employers' Liability Act 1880 was passed. The effect of this act is to destroy the defence of common employment in certain specified cases. It does not abolish the doctrine altogether, nor, on the other hand, does it impose upon the master any new standard of duty which does not exist as regards strangers. All that it does is to place the servant, in certain cases, in the position of a stranger, making the master liable for the negligence of his servants notwithstand- ing the fact that they are in common employment with the servant injured. It is still necessary under the act, as at common law, to prove negligence, and the master may still rely upon the defences of contributory negligence and volenti non fit injuria. But under the act he cannot, as against the workmen who come within it and in the cases to which it applies, set up the defence that the negligence complained of was the negligence of a servant in a common employment. The act does not apply to all servants. It does not apply to domestic or menial servants, or to seamen, or to any except railway servants and " any person who, being a labourer, servant in husbandry, journeyman, artificer, handicraftsman, miner, or otherwise engaged in manual labour . . . has entered into or works under a contract with an employer, whether the contract be oral or in writing, and be a contract of service or a contract personally to execute any work or labour." Whether a servant, not being one of those specially named, is within the act depends on whether manual labour is the real and substantial employment, or whether it is merely

incidental thereto; thus a carman who handles the goods he carries may be within the act, but a tramcar driver or an omnibus conductor is not. The act does not make the master liable for the negligence of all his servants, but, speaking generally, only for the negligent discharge of their duties by such as are entrusted with the supervision of machinery and plant, or with super- intendence, or the power of giving orders, with the addition, in the case of a railway, of the negligence of those who are given the charge or control of signals, points, locomotive engines or trains. The cases dealt with by the act are five in number; in the first and fourth the words are wide enough to include negligence of the employer himself, for which, as has been seen, he is liable at common law. In such instances the workman has an alternative remedy either at common law or under the act, but in all other respects the rights given by the act are new, being limitations upon the defence of common employment, and can be

enforced only under the act.

The first case is where the injury is caused by reason of any defect in the condition of the ways, works, machinery or plant connected with or used in the business of the employer, provided that such defect arises from, or has not been discovered or remedied owing to the negligence of the employer, or of some person in the service of the employer and entrusted by him with the duty of seeing that the ways, works, machinery or plant are in proper condition. The second case is where the injury is caused by reason of the negligence of any person in the service of the employer who has any superintendence entrusted to him (that is, a person whose sole or principal duty is that of superintendence, and who is not ordinarily engaged in manual labour) whilst in the exercise of such superintendence. The third case is where the injury is caused by reason of the negligence of any person in the service of the employer to whose orders or directions the workman at the time of the injury is bound to conform and does conform, where such injury results from his so conforming. The fourth case is where the injury is caused by reason of the act or omission of any person in the service of the employer done or made in obedience to the rules or by-laws of the employer, or in obedience to particular instructions given by any person delegated with the authority of the employer in that behalf, provided that the injury results from some impropriety or defect in such rules, by-laws or instructions. The fifth case is where the injury is caused by reason of the negligence of any person in the service of the employer who has the charge or control of any signal, points, locomotive engine or train upon a railway.

In all these cases it is provided that the employer shall not be liable if it can be shown that the workman knew of the defect or negligence which caused his injury, and failed within a reason- able time to give, or cause to be given, information thereof to the employer or some person superior to himself in the service of the employer, unless he was aware that the employer or such superior already knew of the said defect or negligence. It was inevitable that these provisions should call for judicial inter- pretation, and a considerable body of authority has grown up about the act. Where general words are used, it must always occur that, between the cases which are obviously within and those which are obviously without the words, there are many on the border line. Thus, under the act, the courts have been called upon to determine the precise meaning of " way," " works," " machinery," " plant," and to say what is precisely meant by a " defect " in the condition of each of them. They have had to say what is included in " railway " and in " train, " what is meant by having "

charge " or "control," and to what extent one whose principal duty is superintendence may partici- pate in manual labour without losing his character of superin- tendent, and what is the precise meaning of negligence in superintendence. These are only illustrations of many points of detail which, having called for judicial interpretation, will be found fully dealt with in the text-books on the subject. A workman who, being within the act, is injured by such negligence of a fellow-servant as is included in one or other of the five cases mentioned above, has against his employer the remedies which the act gives him. These are not necessarily the same as those which a stranger would have in the like circumstances; the amount of compensation is not left at large for a jury to deter- mine, but is limited to an amount not exceeding such sum as may be found to be equivalent to the estimated earnings, during the three years preceding the injury, of a person in the same grade

employed during those years in the like employment and in the district in which the workman is employed at the time of the injury. Moreover, the right to recover is hedged about with technicalities which are unknown at the common law; proceed- ings must be taken in the county court, within a strictly limited time, and are maintainable only if certain elaborate provisions as to notice of injury have been complied with. Where the injury causes death the action is maintainable for the benefit of the like persons as are entitled under Lord Campbell's act in an action at common law.

The law continued in this condition up to 1897. In the majority of cases of injury to a servant, the doctrine of common employment still protected the master; and where, under the Employers' Liability Act, it failed to do so, the liability was of a limited character and often, owing to technicalities of procedure, difficult to enforce. Moreover, there is nothing in the act to prevent master and servant from entering into any special con- tract they please; and in many trades it became a common prac- tice for contracts to be made wholly excluding the operation of the act. In 1893 an attempt was made to alter the law by a total abolition of the defence of common employment, so as to make a master as liable to a servant as to a stranger for the negligence of any of his servants acting in the course of their employment, and at the same time to prohibit any agreements to forego the rights so given to the servant. The bill did not become law, and no further change was made until, in 1897, parliament took the first step in what has been a complete revolution in the law of employers' liability. Up to that year, as has been seen, the foundation of a master's liability was negligence, either of the master himself, or, in certain cases, of his servants. But by the

Workmen's Compensation Act 1897, a new principle was intro- duced, whereby certain servants in certain employments were given a right to compensation for injuries, wholly Acts ot irrespective of any consideration of negligence or 1906." contributory negligence. As regards such servants in such employments the master was in effect made an insurer against accidental injuries. The act was confessedly tentative and partial; it dealt only with selected industries, and even within these industries was not of universal application. But where it did apply, it gave a right to a limited compensation in every case of injury by accident arising out of and in the course of the employment, whether that accident had been brought about by negligence or not, and whether the injured servant had or had not contributed to it by his own negligence.

The act applied only to employment on, or in, or about certain localities where, at the same time, the employer was what the act called an "undertaker," that is, the person whose business was there being carried on. If we wanted to know whether a workman was within the act, we had to ask, first, was he em- ployed on, or in, or about a railway, or a factory, or a mine, or a quarry, or an engineering shop,or a building of the kind mentioned in the act; secondly, was he employed by one who was, in relation to that railway, &c, the undertaker as defined by the act; and thirdly, was he at the time of the accident at work on, or in, or about that railway, &c. Unless these three conditions were fulfilled the employment was not within the act.

The employments to which the act applied comprised rail- ways, factories (which included docks, warehouses and steam laundries), mines, engineering works and most kinds of buildings. " Workman " included every person engaged in an employment to which the act applied, whether by manual labour or otherwise, and whether his agreement was one of service or apprenticeship or otherwise, expressed or implied, oral or in writing.

By the Workmen's Compensation Act 1900, the benefits of the act of 1897 were extended to agricultural labourers.

The Workmen's Compensation Act 1906 (which came into force on the 1st of July 1907) extended the right of compensation for injuries practically to all persons in service, and also intro- duced many provisions not contained in the acts of 1897 and 1900 (repealed). It does not apply to persons in the naval or military service of the crown (s. 9), or persons employed other- wise than by way of manual labour whose remuneration exceeds

two hundred and fifty pounds a year, or persons whose employ- ment is of a casual nature, and who are employed otherwise than for the purposes of the employer's trade or business, or members of a police force, or out-workers, or members of the employer's family dwelling in his house. But it expressely applies to seamen. To entitle a workman engaged in ?n employment to which the act applies to compensation all the following conditions must be fulfilled: (i) There must be personal injury ot claim, by accident. This will exclude injury wilfully in- flicted, unless the injury results in death or serious and permanent disablement, but the act introduces a new provision by making the suspension or disablement from work or death caused by certain industrial diseases " accidents " within the meaning of the act. The industrial diseases specified in the 3rd schedule of the act were anthrax, ankylostomiasis, and lead, mercury, phosphorus and arsenic poisoning or their sequelae. But § 8 of the act authorized the secretary of state to make orders from time to time including other industrial diseases, and such orders have embraced glass workers' cataract, telegraphists' cramp, eczematous ulceration of the skin produced by dust or liquid, ulceration of the mucous membrane of the nose or mouth produced by dust, &c. To render the employer liable the workman must either obtain a certificate of disablement or be suspended or die by reason of the disease. If the disease has been contracted by a gradual process, all the employers who have employed the workman during the previous twelve months in the employment to which the disease was due are liable to contribute a share of the compensation to the employer primarily liable. (2) The accident must arise out of and in the course of the employment. In each case it will have to be determined whether the workman was at the time of the accident in the course of his employment, and whether the accident arose out of the employment. It will have to be considered when and where the particular employment began and ended. Otner difficulties have arisen and will frequently arise when the work- man at the time of the accident is doing something which is no part of the work he is employed to do. So far as the decisions have gone, they indicate that if what the workman is doing is no act of service, but merely for his own pleasure, or if he is im- properly meddling with that which is no part of his work, the accident does not arise out of and in the course of his employment ; but if, while on his master's work, he upon an emergency acts in his master's interest, though what he does is no part of the work he is employed to do, the accident does arise out of and in the course of his

employment. (3) The injury must be such as disables the workman for a period of at least one week from earning full wages at the work at which he was employed. (4) Notice of the accident must be given as soon as practicable after the happening thereof, and before the workman has voluntarily left the employment in which he was injured; and the claim for compensation (by which is meant notice that he claims com- pensation under the act addressed by the workman to the employer) must be made within six months from the occurrence of the accident or, in case of death, from the time of death. Want of notice of the accident or defects in it are not to be a bar to proceedings, if occasioned by mistake or other reasonable cause, and the employer is not prejudiced thereby. But want of notice of a claim for compensation is a bar to proceedings, unless the employer by his conduct has estopped himself from relying upon it. (5) An injured workman must, if so required by the employer, submit himself to medical examination.

When these conditions are fulfilled, an employer who is within the act has no answer unless he can prove that the injury arose from the serious and wilful misconduct of the workman. The precise effect of these terms is not clear; but mere negligence is not within them.

Where the injury causes death, the right to compensation belongs to the workman's " dependents "; that is, such of the members of the workman's family as were at the time of the death wholly or in part dependent upon the earnings of the workman for their maintenance. " Members of a family " means wife or husband, father, mother, grandfather, grandmother, step-father,

step-mother, son, daughter, grandson, granddaughter, step-son, step-daughter, brother, sister, half brother, half-sister. The act of 1906 makes also a very remarkable departure in including illegitimate relations in the direct line among " dependents," for where a workman, being the parent or grandparent of an illegitimate child, leaves such a child dependent upon his earnings, or, being an illegitimate child, leaves a parent or grandparent so dependent upon his earnings, such child or parent is to be included in the " members of a family."

Under the act compensation is for loss of wages only, and is, as has been said, based upon the actual previous earnings of the injured workman in the employment of the employers for whom he is working at the time of the injury. In case of death, if the workman leaves dependents who were wholly dependent on his earnings, the amount recovered is a sum equal to his earnings in the employment

of the same employer during the three years next preceding the injury, or the sum of £150, whichever is the larger, but not exceeding £300; if the period of his employment by the same employer has been less than three years, then the amount of his earnings during the three years is to be deemed to be 156 times his average weekly earnings during the period of his actual employment under the said employer. If the workman leaves only dependents who were not wholly dependent, the amount recovered is such sum as may be reasonable and proportionate to the injury to them, but not exceeding the amount payable in the previous case. If the workman leaves no dependents, the amount recoverable is the reasonable expenses of his medical attendance and burial, not exceeding £10. In case of total or partial incapacity for work resulting from the injury, what is recovered is a weekly payment during the incapacity after the second week not exceeding 50% of the workman's average weekly earnings during the previous twelve months, if he has been so long employed, but if not, then for any less period during which he has been in the continuous employment of the same employer; such weekly payment is not to exceed £1 — and in fixing it regard is to be had to the difference between the amount of his average weekly earnings before the accident and the average amount which he is able to earn after the accident. Any payments, not being wages, made by the employer in respect of the injury must also be taken into account. The weekly payment may from time to time be reviewed at the request of either party, upon evidence of a change in the circumstances since the award was made, and after six months may be redeemed by the employer by payment of a lump sum. A workman is within the act although at the time of the injury he has been in the employment for less than two weeks, and although there are no actual earnings from the same employer upon which a weekly average can be computed. But how are the average weekly earnings which he would have earned from the same employer to be estimated? The question must be determined as one of fact by reference to all the circum- stances of the particular case. Suppose the workman to be engaged at six shillings a day and injured on the first day. If it can be inferred that he would have remained in such employment for a whole week, his average weekly earnings from the same em- ployer may be taken at thirty shillings. If it can be inferred that he would have worked one day and no more, his average weekly earnings from the same employer may be taken at six shillings.

All questions as to liability or otherwise under the act, if not settled by agreement, are referred to arbitration in accordance with a scheme prescribed by the act. Contracting out is not permitted, save

in one event: where a scheme of compensation, benefit or insurance for the workmen of an employer has been certified by the Registrar of Friendly Societies to be not less favourable to the workmen and their dependents than the provisions of the act, and that where the scheme provides for contributions by the workmen, it confers benefits at least equal to those contributions, in addition to the benefits to which the workmen would have been entitled under the act, and that a majority (to be ascertained by ballot) of the workmen to whom the scheme is applicable are in favour of it, the employer may contract with any of his workmen that the provisions of the

scheme shall be substituted for the act; such certificate may not be for more than five years, and may in certain circumstances be revoked. The act does not touch the workman's rights at common law or under the Employers' Liability Act, but the workman, if more than one remedy is open to him, can enforce only one. When the circumstances create a legal liability in some other person, e.g. where the injury is caused by the negli- gence of a sub-contractor or of a stranger, in such cases the employer, if required to pay compensation under the act, is entitled to be indemnified by such other person.

Under the Factory Acts, offences, when they result in death or bodily injury to health, may be punished by fine not exceeding £100, and the whole or any part of such fine may be applied for the benefit of the injured person or his family, or otherwise as the secretary of state determines. Similar provisions occur in the Mines Acts. Any sum so applied must be taken into account in estimating compensation under the Employers' Liability and Work- men's Compensation Acts.

Law in Other Countries. — In Germany (q.v.) there is a system of compulsory state insurance against accidents to workmen. The law. dates from 1884, being amended from time to time (1885, 1886, 1887, 1900, 1903) to embrace different classes of employment. Occupations are grouped into (1) industry; (2) agriculture; (3) building; (4) marine, to all of which one general law, with variations necessary to the particular occupation in question, is applicable. There are also special provisions for prisoners and government officials. Practically every kind of working-man is thus included, with the exception of domestic servants and artisans or labourers working on their own account. All workmen and officials whose

salary does not exceed £150 a year come within the law. No compensation is payable where an accident is caused through a person's own gross carelessness, and where an accident has been contributed to by a criminal act or intentional wrongdoing the compensation may be refused or only partially allowed. With these exceptions, compensation for injury is payable in case of injury so long as the injured is unfit to work; in case of total incapacity an allowance is made equal to two-thirds of the injured person's annual earnings, in case of partial incapacity, in pro- portion to the degree that his wage-earning capacity has been affected. In case of death the compensation is either burial money or an allowance to the family varying in amount from 20 to 60% of the annual earnings according to circumstances. The provision of compensation for accidents falls entirely upon employers, and in order to lighten the burden thus falling upon them, and at the same time to guard against the possible in- solvency of an individual employer, associations or self-adminis- tering bodies of employers have been formed — usually all the employers of each particular branch of industry in a district. These associations fix the amount of compensation after each accident, and at the end of the year assess the amount upon the individual employers. There is an appeal from the association to an arbitration court, and in particularly complicated cases there may be a further appeal to the imperial insurance depart- ment. No allowance is paid until after the lapse of thirteen weeks from the accident, and in the meantime the injured person is supported from a sick fund to' which the employers contribute one-third, the employee contributing two-thirds. In Germany quite twelve millions of workpeople are insured; in 1905 a sum of nearly eight millions sterling was paid for accidents, and a million and a half to the families of those killed in accidents.

In Austria the compulsory insurance of workmen was provided for by a law of 1887, with subsequent amendments. Briefly, nearly every class of industrial worker is included under the Austrian law, which is administered by special territorial insurance institutions, each of them embracing particular classes of industries or workers. The institutions are managed by committees, one-third of the members of each committee being chosen by the minister of the interior, one-third by the employers and one-third by the workers. Compensation is payable, in case of accidents, on a scale proportionate to the injured person's wages during the preceding year. In case of death, a certain sum is paid for funeral expenses, an annuity

Austria.

Norway.

to the widow, if one is left, equal to 20% of the deceased's annual wages — if the widow remarries, she receives a lump sum equal to three annual payments in liquidation of the annuity— an annuity to each legitimate child equal to 15%, or, if the child has no mother, equal to 20% of the father's wages; an annuity to the father or mother, if dependent on the deceased for support, equal to 20% of the annual wages. As in the English act of 1906 illegitimate children are recognized by being granted an annuity in the case of the death of a father equal to 10% of his wages. In no case can the total amount of the annuities exceed 50 % of the deceased's annual wages. Where the accident has resulted in total incapacity, the workman receives an annuity equal to 60% of his wages. No allowance is paid until after the fourth week, during which time the injured is supported by the sick-insurance institutions. The provision for the system is raised by contributions to the extent of nine-tenths by the employers and one-tenth by the workers, deducted from their wages. Instead of the German method by which an annual payment equal to the amount disbursed is required from each employer, he is required to provide the full amount necessary for the complete payment of the pension, this amount being placed to the credit of a special insurance fund.

In France a system of compulsory state insurance against accidents was created by a law of 1898. The principal feature in the French law is the attempt to meet the possible insolvency of the employer by the establishment of a special guarantee fund, created by a small addition to the "business tax" {contribution des patentes), and, in the: case of the mining industry, by a small tax on mines.

Norway, by a law of 1894, amended in 1897 and 1899, adopted a system of compulsory insurance modelled to a great extent on the German system. Instead, however, of a trade association as in Germany, or a district insurance association as in Austria, there is a government insurance office, in which employers have to insure their workmen.

In Denmark a law was passed in 1897 rendering employers

personally liable for the amount of compensation for accidents,

but employers may relieve themselves of this liability „

, , . . Denmark.

by insuring workmen in an assurance association

approved of by the minister of the interior. This course, how- ever, is discretionary with employers.

In Italy, although many attempts were made between 1889 and 1898 to introduce a system of compulsory insurance, it was not until the latter year that the principle was .. y

adopted. There is a National Bank for the Insurance of Working men against Accident (Cassa Nazionale di Assicura- zione per gli infortuni degli operaji sul lavoro), created under a law of 1883. It has special privileges, such as exemption from taxation and the employment of the branch offices of the state post-office savings bank as local offices. Under the law of 1898 there is a primary obligation on the employer to insure his work- men with the National Bank, but he may, if he prefers, insure with other societies approved by government. Employers employing about five hundred workmen may, instead of insuring, establish a fund for the payment of not less than the statutory compensation, subject to giving adequate security for the sufficiency of the fund. Exemption from compulsory insurance is granted to employers who have established a mutual insur- ance association, which must comply with certain prescribed conditions. Railway companies, also, are exempt, if they have relief funds which conform with the provisions of the act.

In Spain an act of the 30th of January 1900, adopted the principle of the personal responsibility of the employer for accidents to workmen other than those due to vis „ . major. The act also lays down regulations for prevent- ing accidents in dangerous trades, and releases the employer from personal liability on effecting adequate insurance of his workmen with an approved insurance company.

Holland has adopted the principle of compulsory insurance by a law of the 2nd of January 1901. An employer has to pay the necessary premium to the State Insurance Office, or by depositing adequate security with the State Office he may

undertake the payment of the prescribed compensation himself. Or he may transfer his liability to an insurance company, pro- h 11 d vided the company deposit adequate security with the

State Office. The State Insurance Office is under the management of directors appointed by the crown, and decides on all questions as to compensation; there is also a " Supervisory Board " of the State Office with joint representation of employers and workmen. There is an appeal from the State Office to Councils of Appeal, and from them to a National Board of Appeal. Greece has a law of the 21st of February 1901, providing for compensation for accidents causing incapacity of more than „ four days' duration to workmen in mines, quarries

and smelting works. The employer is exclusively liable for such compensation and for medical expenses during the first three months; after that time he is liable for one-half, the other half being borne by a miners' provident fund, supported by certain taxes on the properties affected, fines, &c.

By a law of the 5th of July 1001, Sweden adopted the principle of the personal liability of the employer for industrial accidents. Sweden ˆhe em pl° ver can > however, insure himself against

liability in the Royal Insurance Institute. Compensa- tion bcomes payable after the expiration of sixty days from the date of the accident.

Russia has a law which came into force on the 1st of January 1904. Under this law employers in certain specified industries „ ˆ are bound to indemnify workers for incapacity of

more than three days' duration due to injury arising out of their work. Employers are exempt from liability by insuring their workmen in insurance companies whose terms are not less favourable than those laid down by the law.

Belgium passed a law dealing with industrial accidents on the 24th of December 1903. It adopts the principle of the Belxium personal liability of the employer in certain specified

trades or industries. There is a power of extension to such other undertakings as may be declared dangerous by the Commission on Labour Accidents. Employers may exempt themselves from their liability by contracting for the payment of compensation by an insurance company approved by the government or by the National Savings and Pension Fund. Where an employer does not so contract, he must (with certain exemptions) contribute to a special insurance fund. The law of 1903 also established a permanent Commissio.i on

Labour Accidents.

Switzerland in 1899 adopted a law providing for

accident insurance, but it was defeated on referendum

in May 1900.

In the United States the law mainly depends on the doctrine of common employment, and the extent to which this doctrine

is applied varies considerably in the different states,

more particularly as to who are and who are not to

be regarded as fellow-servants. The tendency, how- ever, has been to increase the liability of the employer for the negligence of a fellow-servant, and in the case of employment on railways many states have passed laws either modifying or abrogating the doctrine. Colorado, by a law of 1901 , has entirely abrogated it; and Alabama, Massachusetts and New York have laws generally similar to the English act of 1880. But the greatest departure, due to the initiative of President Roosevelt, has been the passing by the Federal Congress of the laws of April 22 and May 30, 1908, one giving damages to injured employees of interstate carriers by railroad, and common carriers by railroad in Territories, the District of Columbia, the Canal Zone and other territory governed by Congress, and the other giving regular wages for not more than one year to injured employees of the U.S. government in arsenals, navy yards, construction work on rivers, harbours and fortifications, hazardous work in connexion with the Panama Canal or Reclamation Service, and in government manufacturing establishments. These national laws, which were intended to serve as an example to the states, specifically provided for employers' liability and for the non-recognition of the doctrine of common employment.

Most of the British colonial states have adopted the principle

Switzer- land.

United States.

of the English Workmen's Compensation Act of 1897, and the various colonial acts are closely modelled on the English act, with more or less important variations in detail. The New Zealand Act was passed in 1900, and amended colonies. in 1901, 1902, 1903

and 1905. The act of 1905 (No. 50) fixes the minimum compensation for total or partial disablement at £1 a week when the worker's previous remunera- tion was not less than 30s. a week. South Australia passed a Workmen's Compensation Act in 1900 and Western Australia one in 1902. New South Wales passed one in 1905, and British Columbia in 1902.

EMPOLI, a town of Tuscany, Italy, in the province of Florence, from which it is 20 m. W. by S. by rail. Pop. (1901)7005 (town); 20,301 (commune). It is situated 89 ft. above sea-level, to the S. of the Arno. The principal church, the Collegiata, or Pieve di S. Andrea, founded in 1093, still preserves the lower part of the original arcaded facade in black, white and coloured marble. The works of art which it once contained are most of them preserved in a gallery close by. Some of the other churches contain interesting works of art. The principal square is sur- rounded by old houses with arcades. The painter Jacopo Chimenti (Jacopo da Empoli), 1554-1640, was born here. Empoli is on the main railway line from Florence to Pisa, and is the point of divergence of a line to Siena.

EMPORIA, a city and the county-seat of Lyon county, Kansas, U.S.A., on the Neosho river, about 60 m. S.W. of Topeka. Pop. (1890) 7551; (1900) 8223, of whom 686 were foreign-born and 663 were negroes; (1910 U.S. census) 9058. It is served by the Atchison, Topeka & Santa Fe, and the Missouri, Kansas & Texas railways. The city has a Carnegie library, and is the seat of the state normal school and of the College of Emporia (Presbyterian; 1883). Emporia's industrial interests are mainly centred in commerce with the surrounding farming region; but there are small flour mills, machine shops, foundries and other manufacturing establishments, — in 1905 thevalueof the factory product was $571,601. The 1 municipality owns and operates the water-works and the electric-lighting plant. Emporia was settled in 1856 and was chartered as a city in 1870. The Emporia Gazette, established in 1890, was pur. chased in 1894 by William Allen White (b. 1868), a native of Emporia, who took over the editorship and made a great stir in 1896 by his editorial entitled " What's the matter with Kansas?"; he also wrote several volumes of excellent short stories, particularly The Court of Boyville (1889), Stratagems and Spoils (1901) and In Our Town (1906).

EMPORIUM (a Latin adaptation of the Gr. kinrbpuov, from kv, in, and stem of Topevectdai., to travel for purpose of trade) a trade-centre such as a commercial city, to which buyers and dealers resort for transaction of business from all parts of the world. The word is

often applied to a large shop.

EMPSON, SIR RICHARD (d. 1510), minister of Henry VII., king of England, was a son of Peter Empson, an influential inhabitant of Towcester. Educated as a lawyer he soon attained considerable success in his profession, and in 149 1 was one of the members of parliament for Northamptonshire and speaker of the House of Commons. Early in the reign of Henry VII. he became associated with Edmund Dudley (q.v.) in carrying out the king's rigorous and arbitrary system of taxation, and in consequence he became very unpopular. Retaining the royal favour, how- ever, he was made a knight in 1504, and was soon high steward of the university of Cambridge, and chancellor of the duchy of Lancaster; but his official career ended with Henry's death in April 1509. Thrown into prison by order of the new king, Henry VIII. , he was charged, like Dudley, with the crime of constructive treason, and was convicted at Northampton in October 1509. His attainder by the parliament followed, and he was beheaded on the 17 th or 18th of August 1510. Empson left, so far as is known, a family of two sons and four daughters, and about 1 513 his estates were restored to his elder son, Thomas.

See Francis Bacon, History of Henry VII., edited by J. R. Lumby (Cambridge, 1881); and J. S. Brewer, The Reign of Henry VIII.. edited by J. Gairdner (London, 1884).

EMPYEMA (from Gr. kv, within, and irvov, pus), a term in medicine applied to an accumulation of purulent fluid within the cavity of the pleura (see Lung : Surgery) .

EMPYREAN (from the Med. Lat. empyreus, an adaptation of the Gr. ipirvpos, in or on the fire, irvp), the place in the highest heaven, which in ancient cosmologies was supposed to be occupied by the element of fire. It was thus used as a name for the firmament, and in Christian literatureforthedwelling-place of God and the blessed, and as the source of light. The word is used both as a substantive and as an adjective. Having the same Greek origin are the scientific words " empyreuma " and " empyreumatic," applied to the characteristic smell of burning or charring vegetable or animal matter.

EMS, a river of Germany, rising on the south slope of the

Teutoburger Wald, at an altitude of 358 ft., and flowing generally north-west and north through Westphalia and Hanover to the east side of the Doliart, immediately south of Emden. After passing through the Doliart the navigable stream bifurcates, the eastern Ems going to the east, and the western Ems to the west, of the island of Borkum to the North Sea. Length, 200 m.

Between 1892 and 1899 the river was canalized along its right bank for a distance of 43 m. At the same time, and as part of the same general plan, a canal, the Dortmund-Ems Canal, was dug to connect the river (from Miinster) with Heme in the Westphalian coal-field. At Henrichenburg a branch from Heme (5 m. long) connects with another branch from Dortmund (io| m. long). Another branch, from Olfen (north of Dortmund), connects with Duisburg, and so with the Rhine. There is, however, a difference in elevation of 46 ft. between the two branches first named, and vessels are transferred from the one to the other by means of a huge lift. The canal, which was constructed to carry small steamers and boats up to 220 ft. in length and 750 tons burden, measures 169 m. in length, of which 1085 m. were actually dug, and cost altogether £3,728,750. The surface width throughout is 985 ft., the bottom width 59 ft., and the depth 8£ ft.

See Victor Kurs, " Die kiinstlichen Wasserstrassen des deutschen Reichs," in Geog. Zeitschrift (1898), pp. 601-617 and 665-694; and Deutsche Rundschau f. Geog. und Stat. (1898), pp. 130-131.

EMS, a town and watering-place of Germany, in the Prussian province of Hesse-Nassau, romantically situated on both banks of the Lahn, in a valley surrounded by wooded mountains and vine-clad hills, n m. E. from Coblenz on the railway to Cassel and Berlin. Pop. 6500. It has two Evangelical, a Roman Catholic, an English and a Russian church. There is some mining industry (silver and lead). Ems is one of the most delightful and fashionable watering-places of Europe. Its waters — hot alkaline springs about twenty in number — are used both for drinking and bathing, and are efficacious in chronic nervous disorders, feminine complaints and affections of the liver and respiratory organs. On the right bank of the river lies the Kursaal with pretty gardens. A stone let into the promenade close by marks the spot where, on the 13th of July 1870, King William of Prussia had the famous interview with the French ambassador Count Benedetti (q.v.) which resulted in the war of 1870-1871. A funicular railway runs up to the Malberg (1000 ft.), where is a sanatorium and whence extensive views are obtained over the Rhine valley. Ems is largely frequented in the summer months by visitors from all parts

of the world — the numbers amounting to about 11,000 annually — and many handsome villas have been erected for their accommodation. In August 1786 Ems was the scene of the conference of the delegates of the four German archbishops, known as the congress of Ems, which issued (August 25) in the famous joint pronounce- ment, known as the Punctation of Ems, against the interference of the papacy in the affairs of the Catholic Church in Germany (see Febronianism) .

See Vogler, Ems, seine Heilquellen, Kureinrichtungen, &c. (Ems, 1888); and Hess, Zur Geschichte der Stadt Ems (Ems, 1895).

EMSER, JEROME, or Hieronymus (1477-1527), antagonist of Luther, was born of a good family at Ulm on the 20th of March 1477. He studied Greek at Tubingen and jurisprudence at Basel, and after acting for three years as chaplain and secretary

to Raymond Peraudi, cardinal of Gurk, he began lecturing on classics in 1504 at Erfurt, where Luther may have been among his audience. In the same year he became secretary to Duke George of Albertine Saxony, who, unlike his cousin Frederick the Wise, the elector of Ernestine Saxony, remained the stanchest defender of Roman Catholicism among the princes of northern Germany. Duke George at this time was bent on securing the canonization of Bishop Benno of Meissen, and at his instance Emser travelled through Saxony and Bohemia in search of materials for a life of Benno, which he subsequently published in German and Latin. In pursuit of the same object he made an unsuccessful visit to Rome in 15 10. Meanwhile he had also been lecturing on classics at Leipzig, but gradually turned his attention to theology and canon law. A prebend at Dresden (1509) and another at Meissen, which he obtained through Duke George's influence, gave him means and leisure to pursue his studies.

At first Emser was on the side of the reformers, but like his patron he desired a practical reformation of the clergy without any doctrinal breach with the past or the church; and his liberal sympathies were mainly humanistic, like those of Erasmus and others who parted company with Luther after 1519. As late as that year Luther referred to him as " Emser noster," but the disputation at Leipzig in that year completed the breach between them. Emser warned his Bohemian friends against Luther, and Luther retorted with an attack on Emser which outdid in scurrility all his polemical writings. Emser, who was further embittered by an attack of the Leipzig students, imitated Luther's violence, and asserted that Luther's whole crusade

originated in nothing more than enmity to the Dominicans, Luther's reply was to burn Emser's books along with Leo X.'s bull of excommunication.

Emser next, in 1521, published an attack on Luther's " Appeal to the German Nobility," and eight works followed from his pen in the controversy, in which he defended the Roman doctrine of the Mass and the primacy of the pope. At Duke George's instance he prepared, in 1523, a German translation of Henry VIII. 's " Assertio Septem Sacramentorum contra Lutherum," and criticized Luther's " New Testament." He also entered into a controversy with Zwingli. He took an active part in organizing a reformed Roman Catholic Church in Germany, and in 1527 published a German version of the New Testament as a counter- blast to Luther's. He died on the 8th of November in that year and was buried at Dresden.

Emser was a vigorous controversialist, and next to Eck the most eminent of the German divines who stood by the old church. But he was hardly a great scholar; the errors he detected in Luther's New Testament were for the most part legitimate variations from the Vulgate, and his own version is merely Luther's adapted to Vulgate requirements.

Bibliography. — Waldau, Nachricht von Hieronymus Emsers Leben und Schriften (Anspach, 1783); Kawerau, Hieronymus Emser (Halle, 1898); Akten und Briefe zur Kirchenpolitik Herzog Georgs von Sachsen (Leipzig, 1905) ; Allgemeine deutsche Biographic, vi. 96-98 (1877). All histories of the Reformation in Germany contain notices of Emser; see especially Friedensburg, Beitrage zum Brief- wechsel der katholischen Gelehrten Deutschlands im Reformations- zeitalter. (A. F. P.)

ENAMEL (formerly " amel," derived through the Fr. amail, esmal, esmail, from a Latin word smallum, first found in a 9th- century life of Leo IV.), a term, strictly speaking, given to the hard vitreous compound, which is " fused " upon the surface of metallic objects either for the purpose of decoration or utility. This compound is a form of glass made of silica, minium and potash, which is stained by the chemical combination of various metallic oxides whilst in a melted condition in the crucible. This strict application of the term was widened to signify the metal object coated with enamel, so that to-day the term " an enamel " generally implies a work of art in enamel upon metal. The composition of the substance enamel which is used upon metal does not vary to any great extent from the enamels employed upon pottery and faience. But they differ in this

respect, that the pottery enamel is usually applied to the

" biscuit " surface of the ware in a raw state; that is, the com- pound has not been previously " run down " or vitrified in the crucible by heat, as is the case with enamelling upon metal, although, in most of the enamelled iron advertisement tablets, the enamel is in the raw state and is treated in a similar manner to that employed upon pottery.

Examination of the enamels upon brick of the Assyrians shows that they were applied unverified. It was upon pottery and brick that the ancient Egyptians and Assyrians achieved their greatest work in enamelling. For as yet no work of such magnifi- cence as the great enamelled walls of the palace of Rameses III. at Tell el-Yehudia in the Delta of the Nile, or the palace of Nimrod in Babylon, has been discovered upon metal of any kind. But there were gold ornaments and jewelry enamelled of noble design in opaque turquoise, cobalt, emerald green and purple, some of which can be seen at the British Museum and the Louvre. An example is shown in Plate I. fig. 3.

In the subsequent Greek and Roman civilizations enamel was also applied to articles of personal adornment. Many pieces of jewelry, exquisite in workmanship, have been found. But a greater application was made of it by the Greek sculptors in the 4th and 5th centuries B.C. For we find, in many instances, that not only were the eyes made of enamel — which (artistically speaking) is a somewhat doubtful manner of employing it, — as in the fine bronze head found at Anticythera (Cerigotto) in 1902, but in the colossal figure of Zeus for the temple at Olympia made by Pheidias the gold drapery was gorgeously enamelled with figures and flowers. This wonderful work by the greatest sculptor the world has ever seen was destroyed, as so many priceless works of art in enamel have been: doubtless on account of the precious metal upon which they were made. It was in all probability the crowning triumph of a long series of essays in this material. The art of ancient Rome lacked the inspiration of Greece, being mainly confined to copying Greek forms and style, and in the case of enamelling it did not depart from this attitude. But the Roman and Etruscan glass has many beautiful qualities of form and colour that do not seem entirely borrowed, and the enamel work upon them so far as we can discern is of graceful design and rich colour. No doubt, were it not, as has been remarked, for the fact that

enamelling was generally done upon gold and silver, there would still be many works to testify to the art of that period. Such as there are, however, show a rare appreciation of enamel as a beautiful material. With the decline of this civilization the art of enamelling probably died out. For it has ever been one of those exquisite arts which exist only under the sunshine of an opulent luxurious time or sheltered from the rude winds of a poorer age by the affluence of patrons. The next time we hear of it is in an oft-quoted passage (c. a.d. 240) from the writings of the great sophist Philostratus, who says (Icones, i. 28) : — " It is said that the barbarians in the ocean pour these colours into bronze moulds, that the colours become as hard as stone, preserving the designs," — a more or less in- accurate description of the process of champlevi. This has been understood (from an interpretation given to a passage in the commentary on it by Olearius) to refer to the Celts of the British Islands. It also goes to prove that enamelling was not practised at this day in Greece. We have no British enamels to show so early as this, but belonging to a later period, from the 6th to the 9th century, a number of the finest gold and bronze ornaments, horse trappings, shields, fibulae and ciboria have been discovered of Celtic and Saxon make. The Saxon work has nothing to show so exquisitely wrought as that found in Ireland, where one or two pieces are to be seen now in the Dublin Museum, notably the Ardagh chalice and some gold brooches. In the chalice the enamel is of a minute inlaid character, and appears to have been made first in the form of a multi-colour bead, which was fused to the surface of its setting, and then polished down. Many of the pieces seem to have been made after this fashion, which does not speak very highly of the technical knowledge of enamelling, but it is none the less true enamelling of an elementary character. The shield at the British Museum has an inlay of red enamel which is remarkable in its quality.

For centuries such a fine opaque red has not been discovered. An example of Irish work is shown in Plate II. fig. 10.

From Ireland the art was transferred to Byzantium, which is to be seen by the close resemblance of method, style, design and colour. The style and design changed in course of time, but the craft remained. It was at Byzantium that it flourished for several centuries.

The finest work we know of belonging to this period is the Pala d'Oro at St Mark's, Venice, believed to have been brought from Constantinople to Venice about 1105. This magnificent altar-piece is in cloisonne enamel. A typical example is the ciborium and chalice

belonging to the South Kensington loan collection. The design entirely covers the whole of the surface in one rich mass composed of circular or vesica-shaped medallions filled with sacred subjects and foliated scrolls. These are engraved and enamelled, and the metal bands of the scrolls and figures are engraved and gilt. The characteristic quality of the colour scheme is that it is composed almost wholly of primaries. Red, blue and yellow predominate, with a little white and black. Occasionally the secondaries, green and purple, are used, but through the whole period of Byzantine enamelling there is a total absence of what to-day is termed " subtle colour- ing." The arrangement of the enamels is also distinct, in that

Fig. 1. — Byzantine Cloisonne Cross (e. nth century) (South Kensington Museum).

the divisions of the colours are not always made by the cloison, but are frequently laid in side by side without the adjoining colours mingling or running together whilst being melted.; For instance, in a leaf pattern or in the drapery, the dress may be cobalt, heightened with turquoise or green. Thus it is interest- ing to observe that the artist employed the metal dividing lines frequently for the sake of aesthetic result, and was not much hampered by technical difficulties. This was the rule when opaque enamels were used. It is also worthy of remark that these opaque enamels differ from those in common use to-day, in that they are not nearly so opaque. This quality, together with a dull, instead of a highly polished surface, gives a much softer appearance to the enamels. Again, the whole f one of the enamels is darker and richer. Many examples of Byzantine work (see fig. 1.) are to be seen in the public and private art collections throughout Europe. They are principally upon ecclesiastical objects, missal covers, croziers, chalices, ciboria, pyx, candlesticks, crosses and tabernacles. In most instances the enamels are made in separate little plates rudely fastened with nails, screws or rivets to a metal or wooden foundation. Theophilus, a monk of the 13th century, describes the process of enamelling as it was understood by the Byzantines of his time, which probably differed but little from earlier methods. The design and drawing of the figures in Byzantine enamels is similar to the mosaic and carving. The figures are treated entirely as decorations, with scarcely ever the least semblance of expres- sion, although here and there an intention of piety or sorrow is to be descried through the awkward postures in which they

are placed. In spite of this, the sense of decorative design, the simplicity of conception, the strength of the general character, and the richness of the colour, places this period as one of the finest which the art of enamelling has seen, and it leads us to lay stress upon the principle that the simplest methods in design and manipulation attain a higher end than those which are elaborate and intricate. It might be asserted with truth that this style never arrived at the degree of delicacy and refinement of later styles. But the refinement was often at the expense of higher qualities.

The next great application of these kinds of enamelling was at Cologne, for there we find not only the renowned work of Nicolas of Verdun, the altar front at Klosterneuberg, which consists of fifty plates in champlevt enamel, but in that Rhenish province there are many shrines of magnificent conception. From here the secrets of the craft were taken to Limoges, where the greatest activity was displayed, as numerous examples are found throughout England, France and Spain, which no doubt were made there (see Plate I. fig. 6.) But no new method or distinct advance is to be noticed, during these successive revivals at Byzantium, Cologne or Limoges, and it is to early 14th- century Italy that we owe one of the most beautiful develop- ments, that of the process subsequently called basse-taille, which signifies a low-cut relief upon which transparent enamel is fused.

In this process enamelling passed from a decorative to a fine art. For it demanded the highest knowledge of an artist with the consummate skill of both sculptor and enameller. Witness the superb gold cup, called the King's Cup, now in the British Museum, and the silver cup at King's Lynn. The first is in an excellent state of preservation, as it is upon gold, but the latter, like most of the ancient enamelling upon silver, has lost most of its enamel. This' was due — as the present writer believes after much experiment — to the impurity of the silver employed. The King's Cup is one of the finest works in enamelling extant. It consists of a gold cup and cover, hammered out of pure gold; and around the bowl, base and cover there are bands of figures, illustrating the scenes from the life of St Agnes. The hands and faces are of pale jasper, which over the carved gold gives a beautiful flesh tone. The draperies are in most resplendent ruby, sapphire, emerald, ivory, black and orange. The stem was subsequently altered by an additional piece inserted and enamelled with Tudor roses. It is a work of the 13th century, (and belonged to Jean, due de Berry, who gave it to his nephew, Charles VI. of France, in 1391. It afterwards

came into the possession of the kings of England, from Henry VI. to James I., who gave it to Don Juan Velasco, constable of Castile. It was purchased by subscription with the aid of the treasury for the British Museum.

Other well-known pieces are the silver horn in the possession of the marquess of Aylesbury, and the crozier of William of Wykeham at New College, Oxford. The discovery about the same time of the process called plique-a-jour forms another most interesting and beautiful development. Owing to the difficulty of its manufacture and its extreme fragility there are very few examples left. One of the finest specimens is now at the Victoria and Albert Museum, South Kensington. It is in the form of two bands of emerald green enamel which decorate a silver beaker. They are in the form of little stained glass windows, the cloisons forming (as it were) the leads. These fine cloisons and shapes are most correct in form, and the whole piece shows a perfection of craftsmanship rarely equalled.

The end of the 15 th century saw a development in enamelling which was not only remarkable, but revolutionary in its method. For until then the whole theory of enamelling had been that it relied upon the enclosing edges of the metal or the cloison to hold it to the metal ground and in part to preserve it in. the shape of the pattern, much in the same way as a setting holds a stone or a jewel. All the enamel before this date had been sunk into cells or cloisons. Two discoveries were made; first, that enamels could be made which require no enclosing ribbon of metal, but that merely the enamel should be fused on both sides of the metal object ; secondly, that after an enamel had been fused

to a surface of metal, another could be superimposed and fused to .the first layer without any danger of separation from each or from the metal ground. It is true that such processes had been employed upon glass on which enamel had been applied, as well as upon pottery; and it is probably due to the influence of a knowledge of both enamelling upon metal and upon glass or pottery that the discovery was made.

In most of these enamel paintings the subject was laid on with a white enamel upon a dark ground. The white was modulated; so that possessing a slight degree of translucency, it was grey in the thin parts and white in the thick. Thus was obtained a certain amount of light and shade. This gave the process called grisaille. But strange to say, it was not until a later period that this was practised alone, and then the model- ling of the figures and draperies became very

elaborate. At first it was only done in a slight degree, just sufficiently to give expression and to add to the richness of the form. For the enamellers were thinking of a plate upon which to put their wonderful colours, and not only of form. The painting in white was therefore invariably coloured with enamels. Probably the earliest painter in enamel was Nardon Penicaud, many of' whose works Cone of them, dated 1503, is in the Cluny Museum) have been preserved with great care. He had many followers, the most distinguished of whom was Leonard Limosin (i.e. of Limoges). He excelled in portraiture. Examples of his work (between 1532 and 1574) are to be found in most of the larger public and private collections. Leonard Limosin and his Limoges contemporaries were very largely addicted to the employment of foil, which became too largely used, thus spoiling their otherwise fine serious work.

The family of Jean Penicaud, Jean Court de Vigier, Pierre Raymond and Pierre Courteys were all great names of artists who excelled in the grisaille process. Grisaille is similar to pdte-sur-pdte in pottery, and depends for its attractive quality entirely upon form and composition. No comparison should be made with enamels in colour, for they occupy a different category — similar to cameo.

The casket shown in Plate II. fig. 9 is by Jean Penicaud. It is a fine example of the enamelling in this style, very beautiful in colour. The hands and faces are in opaque white enamel; the draperies, garlands and flowers are in transparent green, turquoise blue, purple and cobalt over foil. The background is in transparent violet over white enamel ground, which is seme with gold stars. The draperies are also heightened with gold.

One of the most marvellous pieces of brilliant craft is the missal cover (Plate I. fig. 5) at the South Kensington Museum, said to have belonged to Henrietta Maria, queen of Charles I. The subjects are the " Creation of Adam and Eve " and the " Fountain of Youth." It is about 4 in. by 7 when opened out. The enamel is encrusted upon the figures, ornament and flowers which are beaten up in pure gold into high relief. The extraordinary minuteness and skill of handling, and the extreme brilliancy of the enamels, which are as brilliant to-day as on the day they were made, together form one of the unique specimens of art craftsmanship of the world. To the subdued taste of to-day, however, the effect is tawdry. The conception and design are also alike unworthy of the execution.

Since the Assyrian and Egyptian civilizations, there has been a succession of luxurious developments followed by lapses into the

decline and death of the art of enamelling upon metals. In each revival there has been something added to that which was known and practised before. The last revival took place five hundred years ago, accompanying the rebirth of learning and the arts; but after flourishing for over a century, the art gradually fell into disuse, and remained so until the recent revival and further development. The development consists, first, in the more complete knowledge of the technical processes, following upon the great advances which science has made; and secondly, in a finer and more subtly artistic treatment of them. The advance in technical knowledge comprises greater facility and perfection in the production of the substance enamel,

ENAMELS

Plate I.

Fig. 4.— CHINESE CLOISONNE BOWL.

Flo. ,' v -GRAECO-BACTRIAN GOLD AMULET, SHOWING THE GOLD STRIP FOR SETTING STONES, WHICH

f>— no

Ol'AQT ARMS, ton Mu

IX. 364.

X IN F. EN

O.ˆth >eum.)

COPPER PARTLY ENAMELLE.D IN AMELS CHAMPLEYE WITH COATS OF century, English or German. South Kensing-

Fic. 7— PRAYER-BOOK COYER IN ENAMEL AND SILVER GILT, SF1T WITH RUBIES AND EMERALDS, BY ALEXANDER FISHER. (Size, closed, 4X3 in.)

Plate II.

ENAMELS

Fig. 8.— OVERMANTEL (2 4x i8J in.) IN CHAMPLEYE ENAMEL ON SILVER. SUBJECT: THE GARDEN OF

THE SOUL. BY ALEXANDER FISHER.

>,

1. .

Fig. to.— CELTIC CHAMP- I.EVE ENAMELLED CKOZIER. Fk,. 9.— PAINTED ENAMEL CASKET BY JEAN PE.N1CAUD. (16th century.) (Irish, yth century.)

and its subsequent application to metal surfaces; more intimate knowledge of metals and their alloys to which it is applied, and greater ease in obtaining them from the metalliferous ores and reducing them to suitable dimensions and surfaces. For instance, it is now a simple matter to obtain perfectly pure copper by means of electricity. Again, formerly a fiat sheet of metal was obtained by hammering, which involved an infinite amount of hard labour, whereas it is accomplished to-day with ease by means of flatting and rolling mills: i.e. after the metal has been obtained from the ore in the form of an ingot, it is stretched equally to any degree of thinness by steel rollers. Further, the furnaces have been greatly improved by the introduction of gas and electricity as the heating power, instead of the wood or charcoal employed.

In the manufacture of the substance enamel a much greater advance has been made, for whereas the colours, and conse- quently the schemes of colour, were extremely limited, we now possess an infinite gradation in the colours, as well as the trans- parency and opacity, the hardness and softness of enamels. There are only two colours which cannot yet be obtained; these are opaque vermilion and lemon yellow in a vitrified state. Many of the colours we now employ were not known by enamellers such as Leonard Limosin. Our enamels are also perfect in purity, brilliancy and durability, qualities which are largely due to the perfect knowledge of the proportion of parts composing an«namel and their complete combination. It is this complete combination, together with the absence of any de- structible matter, which gives the enamel its lasting quality.

The base of enamel is a clear, colourless, transparent vitreous compound called flux, which is composed of silica, minium and potash. This flux or base — termed fondant in France — is coloured by the addition of oxides of metals while in a state of fusion, which stain the flux throughout its mass. Enamels are either hard or soft,

according to the proportion of the silica to the other parts in its composition. They are termed hard when the temperature required to fuse them is very high. The harder the enamel the less liable is it to be affected by atmo- spheric agencies, which in soft enamels produce a decomposition of the surface first and ultimately of the whole enamel. It is therefore advisable to use hard enamels in all cases. This involves the employment of pure — or almost pure — metals for the plates; which are in most respects the best to receive and retain the enamel. For if there is an excess of alloy, either the metal will possibly melt before the enamel is fused or afterwards they will part company. To the inferior quality of old silver may be attributed the fact that in all cases the enamel has flown off it; if it has not yet wholly disappeared it will scale off in time. It is therefore essential that metals should be pure and the enamels hard. It is also noteworthy that enamels composed of a great amount of soda or potash, as compared with those wherein red lead is in greater proportion, are more liable to crack and have less cohesion to the metals. It is better not to use silver as a base, although it is capable of reflecting a higher and more brilliant white light than any other metal. Fine gold and pure copper as thin as possible are the best metals upon which to enamel. If silver is to be used, it should be fine silver, treated in the methods called champleve and cloisonne".

The brilliancy of the substance enamel depends upon the perfect combination and proportion of its component parts. The intimacy of the combination depends upon an equal tem- perature being maintained throughout its fusion in the crucible. For this purpose it is better to obtain a flux which has been already fused and most carefully prepared, and afterwards to add the colouring oxides, which stain it dark or light according to the amount of oxide introduced. Many of the enamels are changed in colour by the difference of the proportion of the parts composing the flux, rather than by the change of the oxides. For instance, turquoise blue is obtained from the black oxide of copper by using a comparatively large proportion of carbonate of soda, and a yellow green from the same oxide by increasing the proportionate amount of the red lead. All transparent enamels are made opaque by the addition of calx, which is a

mixture of tin and lead calcined. White enamel is made by the addition of stannic and arsenious acids to the flux. The amount of acid regulates the density or opacity of the enamel.

To elucidate the development which has occurred, it will be necessary to describe some of the processes. After the enamel has

been procured in the lump, the next stage in the process, common to all methods of enamelling, is to pulverize it. To do this properly the enamel must first be placed in an agate mortar and covered with water; next, with a wooden mallet a number of sharp blows must be given to a pestle held vertically over the enamel, to break it; then holding the mortar firmly in the left hand, the pestle must be rotated with the right, with as much pressure as possible on the enamel, grinding it until the particles are reduced to a fine grain. The powder is then subjected to a series of washings in distilled water, until all the floury particles are removed. After this the metal is cleaned by immersion in acid and water. For copper, nitric acid is used; for silver, sulphuric, and for gold hydrochloric acid. All trace of acid is then removed, first by scratching with a brush and water, and finally by drying in warm oak sawdust. After this the pulverized enamel is carefully and evenly spread over those parts of the metal designed to receive it, in sufficient thickness just to cover them and no more. The piece is then dried in front of the furnace, and when dry is placed gently on a fire-clay or iron planche, and introduced carefully into the muffle of the furnace, which is heated to a bright pale red. It is now attentively watched until the enamel shines all over, when it is withdrawn from the furnace. The firing of enamel, unlike that of glass or pottery, takes only a few minutes, and in nearly all processes no annealing is required.

The following are the different modes of enamelling: champleve", cloisonne", basse-taille, plique-a-jour, painted enamel, encrusted, and miniature-painted. These processes were known at successive periods of ancient art in the order in which they are named. To-day they are known in their entirety. Each has been largely developed and improved. No new method has been discovered, although variations have been introduced into all. The most important are those connected with painted enamels, encrusted enamels and plique-d-jour.

Champleve enamelling is done by cutting away troughs or cells in the plate, leaving a metal line raised between them, which forms the outline of the design. In these cells the pulverized enamel is laid and then fused; afterwards it is filed with a corundum file, then smoothed with a pumice stone and polished by means of crocus powder and rouge. An example is shown in Plate II. fig. 8.

In cloisonne enamel, upon a metal plate or shape, thin metal strips are bent to the outline of the pattern, then fixed by silver solder or by the enamel itself. These strips form a raised outline, giving cells as in the case of champlevi. The rest of the process is identical with that of

champleve enamelling. An example is shown in Plate I. fig. 4.

The basse-taille process is also a combination of metal work in the form of engraving, carving and enamelling. The metal, either silver or gold, is engraved with a design, and then carved into a bas-relief (below the general surface of the metal like an Egyptian bas-relief) so that when the enamel is fused it is level with the uncarved parts of the design enamel, and the design shows through the transparent enamel.

Painted enamels are different from any of these processes both in method and in result. The metal in this case is either copper, silver or gold, but usually copper. It is cut with shears into a plate of the size required, and slightly domed with a burnisher or hammer, after which it is cleaned by acid and water. Then the enamel is laid equally over the whole surface both back and front, and afterwards " fired." The first coat of enamel being fixed, the design is carried out, first by laying it in white enamel or any other which is opaque and most advantageous for sub- sequent coloration.

In the case of a grisaille painted enamel the white is mixed with water or turpentine, or spike oil of lavender, or essential oil of petroleum (according to the taste of the artist) and the white is painted thickly in the light parts and thinly in the grey ones,

whereby a slight sense of relief is obtained and a great degree of light and shade.

In coloured painted enamels the white is coloured by transparent enamels spread over the grisaille treatment, parts of which when fired are heightened by touches of gold, usually painted in lines. Other parts can be made more brilliant by the use of foil, over which the transparent enamels are placed and then fired. An example is shown in Plate I. fig. 7.

Enamels by the plique-a-jour method might be best described as translucent cloisonne enamels; for they are similar to cloisonne, except that the ground upon which they are fired is removed, thus making them transparent like stained glass.

Two new processes have been the subject of the present writer's study and experiment for several years, which he has lately brought to

fruition. The first is an inlay of transparent enamels similar to plique-a-jour without cloisons to divide the colours. For if enamels do not run together whilst in a melted state, as is seen in the case of painted and basse-taille enamels, there should be no necessity for it in this process. The result is a clear transparent subject in colour. The other process consists of a coloured enamel relief. It resembles the della Robbia relief, with this important difference, that the colour of the enamel by its nature permeates the whole depth of the relief, whereas in the della Robbia ware it is only on the surface. It also has a fresco surface, instead of one highly glazed. The quality of the enamel is as rare and unlike anything else as it is beautiful. It is in point of fact the only coloured sculpture in which the whole of its parts are one solid homogeneous mass, and through which the colour is one with the substance and is not applied. The process consists of the shapes of the various parts of the relief being selected for the different enamels, and. these enamels melted together, in the mould of the relief, which is finished with lapidary's tools.

Miniature enamel painting is not true enamelling, for after the white enamel is fired upon the gold plate, the colours used are not vitreous compounds — not enamels in fact — as is the case in any other form of metal enamelling; but they are either raw oxides or other forms of metal, with a little flux added, not combined. These colours are painted on the white enamel, and afterwards made to adhere to the surface by partially fusing the enamel, which when in a state of partial fusion becomes viscous.

There are many of these so-called enamels to-day, which are much easier of accomplishment than the true enamel, but they possess none of the beautiful quality of the latter. It is most apparent when parts of a work are true enamels and parts are done in the manner described above. These enamel paintings on enamel are afterwards coated over with a transparent flux, which gives them a surface of enamel. Many are done in this way for the market.

All these methods were used formerly, before the present revival; but they were not so completely understood or carried so far as they are to-day. Nor were the whole methods practised by any artist as they are now. The greatest advance has been in painted enamels. This process requires that both sides of the metal plate shall be covered with enamel; for this reason the plate is made convex on the top, so that the concave side does not touch the planche on which it is supported for firing, but rests on its edges throughout. There are several reasons why these plates are bombe, the principal one being that in the firing they resist the tendency to warp and curl up at the

edges as a flat thin plate would do. Further, the enamel having been fused to both sides is not so liable to crack or to splint in subsequent firings. This is most important, for otherwise the white which is placed on afterwards would be a network of cracks. The manner of firing has also to do with this, but not nearly so much as the preliminary care and mechanical perfection with which a plate is prepared. Nearly all the old enamels are seen to be cracked in the white if minutely examined. To obviate this the following points must be observed: The plate must be of an excellent quality of metal, equal in thickness throughout, and perfectly regular in shape. It must be arched equally from end

to end. The first coat of enamel must be of a perfectly regular equal thickness on both sides, entirely covering the plate. What- ever the medium employed in painting the white on to the enamel, it must be completely evaporated before the plate is placed in the furnace. The furnace must be heated to a bright red heat, and the planche must be red-hot before being taken out for the enamel to be placed upon it, and then quickly returned to the furnace and the muffle door shut tight so as to allow no draught of cool air to enter it. Then as soon as it has begun to fuse, which if a small piece, it would do in a minute or so, the muffle door is slightly opened to afford a view of it. As soon as it shines all over its surface, it is withdrawn from the muffle.

The method of laying a white upon the enamel ground is a matter of individual taste, so far as the medium is concerned. By some, pure distilled water is preferred to any other liquid for mixing the enamel. Otherwise, turpentine and the fat oil of turpentine, as well as spike oil of lavender. The oil mixture takes longer to dry, and thus gives a greater chance for model- ling into fine shades than the water. But it has several draw- backs. Firstly, there is the difficulty of drying the oil out— ˆa process which takes some time and increases the risk of cracking in the drying process; and secondly, the enamel is not so fresh

Fig. 2. — Modern French plique-a-jour bowl, by Fernand Thesmar.

and clear after it is fired as when pure water has been employed. Besides there is a great difference in the result; the water involves a quick, decided, direct touch and method, which carries with it its own charm. The oil medium, besides giving an effect of laborious rounded stippled surfaces, is apt partly to reduce the enamel, thus giving it a dull surface. The colora- tion of the white is comparatively simple and is done by trans- parent enamels finely ground and evenly spread over the white after the latter has been fused. The only danger

to be avoided is that of over-firing, which is produced by too great heat of a prolonged duration of firing, which causes the stannic and arsenious acids in the white to volatilize.

Plique-a-jour enamelling is done in the same way as cloisonni enamelling, except that the wires or strips of metal which enclose the enamel are not soldered to the metal base, but are soldered to each other only. Then these are simply placed upon a sheet of platinum, copper, silver, gold or hard brass, which, after the enamel is fused and sufficiently annealed and cooled, is easily removed. For small pieces of plique-a-jour there is no necessity to apply any metallic base, as the particles of enamel quickly fuse, become viscous, and when drawn out set quite hard. Neither is there any need for annealing, as would be the case in larger work. For an example, see fig. 2.

Commercially there has lately been an activity in enamels such as has never before occurred. This has been the case throughout Europe, Japan and the United States of America. In London there has been a demand for a cheap form of gaudy coloured enamel, fused into sunk spaces of metal obtained by stamping with a steel die; this has been applied to small objects

of cheap jewelry, in the form of brooches, bracelets and the like. There has also been a great demand for enamel watch-cases and small pendants, done mainly by hand, of a better class of work. Many of these have been produced in Birmingham, Berlin, Paris and London. In Paris copies of pictures in black and white enamel, with a little gold paint in the draperies and background, have been manufactured in very large quantities and sometimes of great dimensions. Another curious demand, followed by as astonishing a production, is that of the imitations (a harder name for which is " forgeries ’”) of old enamels, made with much skill, giving all the technical excellence of the originals, even to the cracks and scratches incidental to age. These are duly signed, and will deceive the most expert. They are copies of enamels by Nardon and Jean Penicaud, Leonard Limosin, Pierre Raymond, Courtois and others. The same artificers also produce copies of old Chinese cloisonni and champlevi enamels, as well as old Battersea enamel snuff-boxes, patch- boxes, and indeed every kind of enamelling formerly practised. It is advisable for the collector never to purchase any piece of enamelling

as the work of an old master without having a pedigree extending at least over forty years. From Japan there has been a continuous flow of cloisonne enamelled vases, boxes and plates, either entirely covered with enamel or applied in parts. Compared with this enormous output, only a few small pieces of jewelry have come from Jaipur and other towns in India. There has also been a great quantity of plique-b-jour enamelling manufactured in Russia, Norway and Sweden. And finally, it has been used in an unprecedented manner in large pieces upon iron and copper for purposes of advertisement. Amongst the chief workers in the modern revival of this art are Claudius Popelin, Alfred Meyer, Paul Grandhomme, Fernand Thesmar, Hubert von Herkomer and Alexander Fisher. The work of Claudius Popelin is characterized by good technical skill, correctness, and a careful copying of the work of the old masters. Consequently it suffers from a lack of invention and individuality. His work was devoted to the rendering of mytho- logical subjects and fanciful portraits of historical people. Alfred Meyer and Grandhomme are both accomplished and careful enamellers; the former is a painter enameller and the author of a book dealing technically with enamelling. Grand- homme paints mythological subjects and portraits in a very tender manner, with considerably more artistic feeling than either Meyer or Popelin. There is a specimen of his work in the Luxemburg Museum. Fernand Thesmar is the great reviver of plique-d-jour enamelling in France. Specimens of his work are possessed by the art museums throughout Europe, and one is to be seen in the Victoria and Albert Museum, London. They are principally valued on account of their perfect technical achievement. Lucien Falize was an employer of artists and craftsmen, and to him we are indebted for the production of specimens of basse-laille enamel upon silver and gold, as well as for a book reviewing the revival of the art in France, bearing particularly on the work of Claudius Popelin. Until within recent years there was a clear division between the art and the crafts in the system of producing art objects. The artist was one person and the workman another. It is now acknowledged that the artist must also be the craftsman, especially in the higher branches of enamelling. M. Falize initiated the produc- tion of a gold cup which was enamelled in the basse-taille manner. The band of figures was designed by Olivier Merson, the painter, and carved by a metal carver and enamelled by an enameller, both able craftsmen employed by M. Falize. Other pieces of enamelling in champlevi and cloisonni were also produced under his supervision and on this system; therefore lacking the one quality which would make them complete as an expression of artistic emotion by the artist's own hands. M. Rene

Lalique is among the jewellers who have applied enamelling to their work in a peculiarly technically perfect manner. In England, Professor Hubert von Herkomer has produced painted enamels of considerable dimensions, aiming at the execution of pictures in enamel, such as have been generally regarded as peculiar to the province of oil or water-colour painting. Among numerous

works is a large shield, into which plaques of enamel are inserted, as well as several portraits, one of which, made in several pieces, is 6 ft. high — a portrait of the emperor William II. of Germany. The present writer rediscovered the making of many enamels, the secrets of which had been jealously guarded. He has worked in all these processes, developing them from the art side, and helping to make enamelling not only a decorative adjunct to metal-work, but raising it to a fine art. His work may be seen in the Victoria and Albert Museum, and Brussels Museum. Others who have been enamelling with success in various branches, and who have shown individuality in their work, are Mr John Eyre, Mrs Nelson Dawson, Miss Hart.

Literature. — Among older books on enamelling, apart from the works of Neri and Benvenuto Cellini, are J. -P. Ferrand, V Art du feu, ou de peindre en email (1721); Labarte, Recherches sur la peinture en email (Paris, 1856) ; Marquis de Laborde, Notice des emaux du Louvre (Paris, 1852); Reboulleau, Nouveau manuel complet de la peinture en verre, sur porcelaine et sur email (ed. by Magnier, Pans, 1866); Claudius Popelin, L' Email des peintres (Paris, 1866); Emil Molinier, Dictionnaire des Smailleurs (1885). Among useful recent books are H. Cunynghame's Art of Enamelling on Metals (1906) ; L. Falize, Claudius Popelin et la renaissance des emaux peints; L. Dalpayrat, Limoges Enamels; Alexander Fisher, The Art of Enamelling upon Metal (1906, " The Studio," London). (A. Fl.).*

ENCAENIA, a festival commemorating a dedication, in Greek tA iyKalvia (k

ENCAUSTIC PAINTING. The name encaustic (from the Greek for " burnt in ") is applied to paintings executed with vehicles in which wax is the chief ingredient. The term was appropriately applied to the ancient methods of painting in wax, because these required heat to effect them. Wax may be used as a vehicle for painting without heat being requisite; nevertheless the ancient term encaustic has been retained, and is indiscriminately applied to all methods of painting in wax. The durability of wax, and its power of resisting the effects of the atmosphere, were well known to the Greeks, who used it for the

protection of their sculptures. As a vehicle for painting it was commonly employed by them and by the Romans and Egyptians; but in recent times it has met with only a limited application. Of modern encaustic paintings those by Schnorr in the Residenz at Munich are the most important. Modern paintings in wax, in their chromatic range and in their general effect, occupy a middle place between those executed in oil and in fresco. Wax painting is not so easy as oil, but presents fewer technical difficulties than fresco.

Ancient authors often make mention of encaustic, which, if it had been described by the word inurere, to burn in, one might have supposed to have been a species of enamel painting. But the expressions " incausto pingere," " pictura encaustica," " ceris pingere," " pictura inurere," used by Pliny and other ancient writers, make it clear that some other species of painting is meant. Pliny distinguishes three species of encaustic painting. In the first they used a stylus, and painted either on ivory or on polished wood, previously saturated with some certain colour; the point of the stylus or stigma served for this operation, and its broad or blade end cleared off the small filaments which arose from the outlines made by the stylus in the wax preparation. In the second method it appears that the wax colours, being prepared beforehand, and formed into small cylinders for use, were smoothly spread by the spatula after the outlines were determined, and thus the picture was proceeded with and finished. By the side of the painter stood a brazier which was used to heat the spatula and probably the prepared colours. This is the method which was probably used by the painters who decorated the houses of Herculaneum and of Pompeii, as artists practising this method of painting are depicted in the decorations. The third method was by painting by a brush dipped into wax liquefied by heat; the colours so applied attained considerable hardness, and could not be damaged either by the heat of the sun or by the effects of sea-water. It was thus that ships were

decorated; and this kind of encaustic was therefore styled " ship-painting."

About the year 1749 Count Caylus and J. J. Bachelier, apainter, made some experiments in encaustic painting, and the count undertook to explain an obscure passage' in Pliny, supposed to be the following (xxxv. 39) : — " Ceris pingere ac picturam inurere quis

primus excogitaverit non constat. Quidam Aristidis inventum putant, postea consummatum a Praxitele; sed aliquanto vetustiores encausticae picturae exstitere, ut Polygnoti et Nicanoris et Arcesilai Pariorum. Lysippus quoque Aeginae picturae suae inscripsit ivtuavaev, quod profecto non fecisset nisi encaustica inventa." There are other passages in Pliny bearing upon this subject, in one of which (xxi. 49) he gives an account of the preparation of " Punica cera." The nature of this Punic wax, which was the essential ingredient of the ancient painting in encaustic, has not been definitely ascertained. The chevalier Lorgna, who investigated the subject in a small but valuable tract, asserts that the nitron which Pliny mentions is not the nitre of the moderns, but the natron of the ancients, viz. the native salt which is found crystallized in Egypt and other hot countries in sands surrounding lakes of salt water. This substance the Carthaginians, according to Pliny, used in pre- paring their wax, and hence the name Punic seems to be derived. Lorgna made a number of experiments with this salt, using from three to twenty parts of white melted wax with one of natron. He held the mixture in an iron vessel over a slow fire, stirring it gently with a wooden spatula, till the mass assumed the con- sistency of butter and the colour of milk. He then removed it from the fire, and put it in the shade in the open air to harden. The wax being cooled liquefied in water, and a milky emulsion resulted from it like that which could be made with the best Venetian soap.

Experiments, it is said, were made with this wax in painting in encaustic in the apartments of the Count Giovanni Battista Gasola by the Italian painter Antonio Paccheri, who dissolved the Punic wax when it was not so much hardened as to require to be " igni resoluta," as expressed by Pliny, with pure water slightly infused with gum-arabic, instead of sarcocolla, men- tioned by Pliny. He afterwards mixed the colours with this wax so liquefied as he would have done with oil, and proceeded to paint in the same manner; nor were the colours seen to run or alter in the least; and the mixture was so flexible that the pencil ran smoother than it would have done with oil. The painting being dry, he treated it with caustic, and rubbed it with linen cloths, by which the colours acquired peculiar vivacity and brightness.

About the year 1755 further experiments were made by Count Caylus and several French artists. One method was to melt wax with oil of turpentine as a vehicle for the colours. It is well known that wax may be dissolved in spirit and used as a medium, but it dries too quickly to allow of perfect blending, and would by the evaporation of the spirit be prejudicial to the artist's health. Another method

suggested about this time, and one which seems to tally wry well with Pliny's description, is the following. Melt the wax with strong solution of salt of tartar, and let the colours be ground up in it. Place the picture when finished before the fire till by degrees the wax melts, swells, and is bloated up upon the picture; the picture is then gradually removed from the fire, and the colours, without being injuriously affected by the operation of the fire, become unalterable, spirits of wine having been burnt upon them without doing the least harm. Count Caylus's method was different, and much simpler: (1) the cloth or wood designed for the picture is waxed over, by rubbing it simply with a piece of beeswax; (2) the colours are mixed up with pure water; but as these colours will not adhere to the wax, the whole ground must be rubbed over with chalk or whiting before the colour is applied; and (3) when the picture is dry it is put near the fire, whereby the wax is melted and absorbs the colours. It must be allowed that nothing could well be simpler than this process, and it was thought that this kind of painting would be capable of withstanding the weather and of lasting longer than oil painting. This kind of

painting has not the gloss of oil painting, so that the picture may be seen in any light, a quality of the very first importance in all methods of mural painting. The colours too, when so secured, are firm, and will bear washing, and have a property which is perhaps more important still, viz. that exposure to smoke and foul vapours merely leaves a deposit on the surface without injuring the work. The " encausto pingendi " of the ancients could not have been enamelling, as the word" inurere," taken in its rigorous sense, might at first lead one to suppose, nor could it have been painting produced in the same manner as encaustic tiles or encaustic tesserae; but that it must have been something akin to the count's process would appear from the words of Pliny already quoted, " Ceris pingere ac picturam inurere."

Werner of Neustadt found the following process very effectual in making wax soluble in water. For each pound of white wax he took twenty-four ounces of potash, which he dissolved in two pints of water, warming it gently. In this ley he boiled the wax, cut into litle bits, for half an hour, after which he removed it from the fire and allowed it to cool. The wax floated on the surface of the liquor in the form of a white saponaceous matter; and this being triturated with water produced a sort of emulsion, which he called wax milk, or encaustic wax. This preparation may be mixed with all kinds of colours, and consequently can be applied in a single operation.

Mrs Hooker of Rottingdean, at the end of the 18th century, made many experiments to establish a method of painting in wax, and received a gold palette from the Society of Arts for her investigations in this branch of art. Her account is printed in the tenth volume of the Society's Transactions (1792), under the name of Miss Emma Jane Greenland.

See also Lorgna, Tin Discorso sulla cera punica; Pittore Vicenzo Requeno, Saggi sul ristabilimento dell' antica arte de' Greci e Romani (Parma, 1787); Phil. Trans, vol. xlix. part 2; Muntz on Encaustic Painting; W. Cave Thomas, Methods of Mural Decoration (London, 1869); Cros and Henry, L'Encaustique, &c. (1884); Donner von Richter, t)ber Technisches in der Malerei der Alien (1885).

(W. C. T.)

ENCEINTE (Lat. in, within, cinctus, girdled; to be distin- guished from the word meaning " pregnant," from in, not, and cinctus, i.e. with girdle loosened), a French term used technically in fortification for the inner ring of fortifications surrounding a town. Strictly the term was applied to the continuous line of bastions and curtains forming the " body of the place," this last expression being often used as synonymous with enceinte. The outworks, however, close to the enceinte were not considered as forming part of it. In modern fortification the enceinte is usually simply the innermost continuous line of fortifications. In architecture generally an enceinte is the close or precinct of a cathedral, abbey, castle, &c.

ENCINA, JUAN DEL (1469-C.1533), often called the founder of the Spanish drama, was born in 1469 near Salamanca probably at Encinas. On leaving the university of Salamanca he became a member of the household of the second duke of Alva. In 1492 the poet entertained his patron with a dramatic piece, the Triunfo de la jama, written to commemorate the fall of Granada. In 1496 he published his Cancionero, a collection of dramatic and lyrical poems. Some years afterwards he visited Rome, attracted the attention of Alexander VI. by his skill in music, and was appointed choirmaster. About 1 5 18 Encina took orders, and made a pilgrimage to Jerusalem, where he said his first mass. Since 1509 he had held a lay canonry at Malaga; in 15 19 he was appointed prior of Leon and is said to have died at Sala- manca about 1533. His Cancionero is preceded by a prose treatise {Arte de trobar) on the condition of the poetic art in Spain. His fourteen dramatic pieces mark the transition from the purely ecclesiastical to the secular

stage. The Aucto del Repetin and the Egloga de Fileno dramatize the adventures of shepherds; the latter, like Pldcida y Vitoriano, is strongly influenced by the Celestina. The intrinsic interest of Encina's plays is slight, but they are important from the historical point of view, for the lay pieces form a new departure, and the devout eclogues prepare the way for the autos of the 17th century. Moreover, Encina's

lyrical poems are remarkable for their intense sincerity and

devout grace.

Bibliography. — Teatro complete de Juan del Encina (Madrid, 1893), edited by F. Asenjo Barbieri; Cancionero musical de Ins sighs XV y XVI (Madrid, 1894), edited by F. Asenjo Barbieri ; R. Mitjana, Sobre Juan del Encina, musico y poeta (Malaga, 1895); M. Menendez y Pelayo, Antologia de poetas liricos castellanos (Madrid, 1890-1903), vol. vii.

ENCKE, JOHANN FRANZ (1791-1865), German astronomer, was born at Hamburg on the 23rd of September 1 791 . Matricu- lating at the university of Gottingen in 181 1, he began by devoting himself to astronomy under Carl Friedrich Gauss; but he enlisted in the Hanseatic Legion for the campaign of 1813-14, and became lieutenant of artillery in the Prussian service in 181 5. Having returned to Gottingen in 1816, he was at once appointed by Benhardt von Lindenau his assistant in the observatory of Seeberg near Gotha. There he completed his investigation of the comet of 1680, for which the Cotta prize was awarded to him in 181 7; he correctly assigned a period of 71 years to the comet of 1812 ; and discovered the swift circulation of the remarkable comet which bears his name (see Comet). Eight masterly treatises on its movements were published by him in the Berlin Abhandlungen (1829- 1859). From a fresh discussion of the transits of Venus in 1761 and 1769 he deduced (1822-1824) a solar parallax of 8″ 57, long accepted as authoritative. In 1822 he became director of the Seeberg observatory, and in 1825 was promoted to a corresponding position at Berlin, where a new observatory, built under his superintendence, was inaugu rated in 1835. He directed the preparation of the star-maps of the Berlin academy 1830-1859, edited from 1830 and greatly improved the Astroncmisches Jahrbuch, and issued four

volumes of the Astronomische Beobachtungen of the Berlin observatory (1840-1857). Much labour was bestowed by him upon facilitating the computation of the movements of the asteroids. With this end in view he expounded to the Berlin academy in 1849 a mode of determining an elliptic orbit from three observations, and communicated to that body in 1851 a new method of calcu- lating planetary perturbations by means of rectangular co- ordinates (republished in W. Ostwald's Klassiker der exacten Wissenschaften, No. 141, 1903). Encke visited England in 1840. Incipient brain-disease compelled him to withdraw from official life in November 1863, and he died at Spandau on the 26th of August 1865. He contributed extensively to the periodical literature of astronomy, and was twice, in 1823 and 1830, the recipient of the Royal Astronomical Society's gold

medal. .

See Johann Franz Encke, sein Leben und Wirken, von Dr C. Bruhns (Leipzig, 1869), to which a list of his writings is appended. Also, Month. Notices Roy. Astr. Society, xxvi. 129; V.J.S. Astr. Gesellschaft, iv. 227; Berlin. Abhandlungen (1866), i., G. Hagen; Sitzungsberichte, Munich Acad. (1866), i. p. 395, &c. (A. M. C.)

ENCLAVE (a French word from enclaver, to enclose), a term signifying a country or, more commonly, an outlying portion of a country, entirely surrounded by the territories of a foreign or other power, such as the detached portions of Prussia, Saxony, &c, enclosed in the Thuringian States. (From the point of view of the states possessing such detached portions of territory these become " exclaves.") " Enclave " is, however, generally used in a looser sense to describe a colony or other territory of a state, which, while possessing a seaboard, is entirely surrounded land- ward by the possession of some other power; or, if inland territory, nearly though not entirely so enclosed, e.g. the Lado Enclave in equatorial Africa.

ENCOIGNURE, in furniture, literally the angle, or return, formed by the junction of two walls. The word is now chiefly used to designate a small armoire, commode, cabinet or cup- board made to fit a corner ; a chaise encoignure is called in English a three-cornered chair. In its origin the thing, like the word, is French, and the delightful Louis Quinze or Louis Seize en- coignure in lacquer or in mahogany elaborately mounted in gilded bronze is not the least alluring piece of the great period of French furniture. It was made in a vast variety of forms so far as the front was concerned; in other respects it was strictly limited by its destination. As a rule these

delicate and dainty receptacles

were in pairs and placed in opposite angles; more often than not the top was formed of a slab of coloured marble.

ENCYCLICAL (from Late Lat. encyclicus, for encyclius = Gr. kyKiiKKios, from iv and kvk\os, "a circle"), an ecclesiastical epistle intended for general circulation, now almost exclusively used of such letters issued by the pope. The forms encyclica and encyclic are sometimes, but more rarely, used. The old adjectival use of the word in the sense of " general " (en- circling) is now obsolete, though it survives in the term " encyclopaedia."

ENCYCLOPAEDIA. The Greeks seem to have understood by encyclopaedia (iyKvuXowaidda, or iyniiKkios rraiSua) in- struction in the whole circle (iv /awXy) or complete system of learning — education in arts and sciences. Thus Pliny, in the preface to his Natural History, says that his book treated of all the subjects of the encyclopaedia of the Greeks, " Jam omnia attingenda quae Graeci 'rfjs eyKvuXcrwcuStias vocant." Quin- tilian (Inst. Orat. i. 10) directs that before boys are placed under the rhetorician they should be instructed in the other arts, " ut efficiatur orbis ille doctrinae quam Graeci iynvKkcmaibdav vocant." Galen (De victus ratione in morbis acutis, c. 11) speaks of those who are not educated iv rrj iynvKKoiraib'dq. In these passages of Pliny and Quintilian, however, from one or both of which the modern use of the word seems to have been taken, kynvn\ios irai.8da is now read, and this seems to have been the usual expression. Vitruvius (lib. vi. praef.) calls the encyclios or iyicvKKtas ircuSeia of the Greeks " doctrinarum omnium disciplina," instruction in all branches of learning. Strabo (lib. iv. cap. 10) speaks of philosophy /cat rr)v aWrjv waiddav iyKVKKiov. Tzetzes (Chiliades, xi. 527), quoting from Porphyry's Lives of the Philosophers, says that 'eynvKKio. /xadrjiiara was the circle of grammar, rhetoric, philosophy and the four arts under it, arithmetic, music, geometry and astronomy. Zonaras explains it as grammar, poetry, rhetoric, philosophy, mathe- matics and simply every art and science (curXcos irSura rkxv) Kal ino-Tifuri) , because sophists go through them as through a circle. The idea seems to be a complete course of instruction in all parts of knowledge. An epic poem was called cyclic when it contained the whole mythology; and among physicians k(jkKoi depavebeiv, cyclo curare (Vegetius, De arte veterinaria, ii. 5, 6), meant a cure effected by a regular and prescribed course of diet and medicine (see Wower, De polymathia, c. 24, § 14).

The word encyclopaedia was probably first used in English by Sir Thomas Elyot. " In an oratour is required to be a heape of all maner of lernyng: whiche of some is called the worlde of science, of other the circle of doctrine, whiche is in one worde of greke Encyclopedia " (The Governour, bk. i. chap. xiii.). In his Latin dictionary, 1538, he explains " Encyclios et Encyclia, the cykle or course of all doctrines," and " Encyclopedia, that lernynge whiche comprehendeth all lyberall science and studies." The term does not seem to have been used as the title of a book by the ancients or in the middle ages. The edition of the works of Joachimus Fortius Ringelbergius, printed at Basel in 1541, is called on the title-page Lucubrationes vel potius absolulis- sima KVKt\oirau>tia. Paulus Scalichius de Lika, an Hungarian count, wrote Encyclopaediae seu orbis disciplinarum epistemon (Basileae, 1599, 4to). Alsted published in 1608 Encyclopaedia cursus philosophici, and afterwards expanded this into his great work, noticed below, calling it without any limitation Encyclo- paedia, because it treats of everything that can be learned by man in this life. This is now the most usual sense in which the word encyclopaedia is used — a book treating of all the various kinds of knowledge. The form " cyclopaedia " is not merely without any appearance of classical authority, but is etymologic- ally less definite, complete and correct. For as Cyropaedia means "the instruction of Cyrus," so cyclopaedia may mean " instruction of a circle." Vossius says, " Cyclopaedia is some- times found, but the best writers say encyclopaedia " (De vitiis sermonis, 1645, p. 402). Gesner says, " kvkKos est circulus, quae figura est simplicissima et perfectissima simul: nam incipi potest ubicunque in ilia et ubicunque cohaeret. Cyclopaedia itaque significat omnem doctrinarum scientiam inter

se cohaerere; Encyclopaedia est institutio in illo circulo." (Isagoge, 1774, i. 40).

In a more restricted sense, encyclopaedia means a system or classification of the various branches of knowledge, a subject on which many books have been published, especially in Germany, as Schmid's Allgemeine EncyklopMie und Methodo- logiederWissenschaften (Jena, i8io,4to, 241 pages). Inthissense the Novum Organum of Bacon has often been called an encyclo- paedia. But it is " a grammar only of the sciences: a cyclopaedia is not a grammar, but a dictionary; and to confuse the meanings of grammar

and dictionary is to lose the benefit of a distinction which it is fortunate that terms have been coined to convey " (Quarterly Review, cxiii. 354). Fortunius Licetus, an Italian physician, entitled several of his dissertations on Roman altars and other antiquities encyclopaedias (as, for instance, Encyclo- paedia ad. Aram mysticam Nonarii, Pataviae, 1631,410), because in composing them he borrowed the aid of all the sciences. The Encyclopaedia moralis of Marcellinus de Pise (Paris, 1646, fol., 4 vols.) is a series of sermons. Encyclopaedia is often used to mean a book which is, or professes to be, a complete or very full collection or treatise relating to some particular subject, as Blaine's work, The Encyclopaedia of Rural Sports (London, 1852); The Encyclopaedia of Wit (London, 1803); The Vocal Encyclo- paedia (London, 1807, i6mo), a collection of songs, catches, &c. The word is frequently used for an alphabetical dictionary treating fully of some science or subject, as Murray, Encyclopaedia of Geography (London, 1834); Lefebvre Laboulaye, Encyclopedic iechnologique: Dictionnaire des arts et manufactures (Paris, 1845-1847). Whether under the name of " dictionary " or " encyclopaedia " large numbers of this class of reference-work have been published. These are essentially encyclopaedic, being subject books and not word-books. The important books of this character are referred to in the articles dealing with the respective subjects, but the following may be mentioned here: the Jewish Encyclopedia, in 12 vols. (1901), a descriptive record of the history, religion, literature and customs of the Jewish people from the earliest times; the Encyclopaedia of Sport, 2 vols. (1897-1898); Holtzendorff's Encyklopadie der Rechtswissen- schaft (1870; an edition in 2 vols., 1904); the Dictionary of Political Economy, edited by R. H. Inglis Palgrave, 3 vols. (1894; reprinted 1901); the Encyclopaedia Biblica, edited by T. K. Cheyne and J. Sutherland Black, 4 vols. (1 899-1 903); the Dictionary of the Bible, edited by James Hastings, 4 vols., with a supplementary volume (1904); an interesting series is the Repertoire gineral du commerce, dealing with the foreign trade of France, of which one part, the Encyclopaedia of Trade between the United States of America and France, with a preface by M. Gabriel Hanotaux, appeared, in French and English, in 1904.

The great Chinese encyclopaedias are referred to in the article on Chinese Literature. It will be sufficient to mention here the Wtn hien t'ung k'ao, compiled by Ma Twa-lin in the 14th century, the encyclopaedia ordered to be compiled by the Emperor Yung-Ion in the 1 5th century, and the Ku Kin tu shu thi ch'eng prepared for the Emperor K'ang-hi (d. 1721), in 5020 volumes. A copy of this enormous work, bound in some 700 volumes, is in the British

Museum.

The most ancient encyclopaedia extant is Pliny's Natural History in 37 books (including the preface) and 2493 chapters, which may be thus described generally: — book 1, preface; book 2, cosmography, astronomy and meteorology; books 3 to 6, geography; books 7 to n, zoology, including man, and the invention of the arts; books 12 to 19, botany; books 20 to 32, medicines, vegetable and animal remedies, medical authors and magic; books 33 to 37, metals, fine arts, mineralogy and mineral remedies. Pliny, who died a.d. 79, was not a naturalist, a physician or an artist, and collected his work in his leisure intervals while engaged in public affairs. He says it contains 20,000 facts (too small a number by half, says Lemaire), collected from 2000 books by 100 authors. Hardouin has given a list of 464 authors quoted by him. His work was a very high authority in the middle ages, and 43 editions of it were printed before 1536.

Martianus Minneus Felix Capella, an African, wrote (early in the 5th cent.), in verse and prose, a sort of encyclopaedia, which is important from having been regarded in the middle ages as a model storehouse of learning, and used in the schools, where the scholars had to learn the verses by heart, as a text-book of high- class education in the arts. It is sometimes entitled Salyra, or Satyricon, but is usually known as De nuptiis Philologiae et Mercurii, though this title is sometimes confined to the first two books, a rather confused allegory ending with the apotheosis of Philologia and the celebration of her marriage in the milky way, where Apollo presents to her the seven liberal arts, who, in the succeeding seven books, describe their respective branches of knowledge, namely, grammar, dialectics (divided into meta- physics and logic), rhetoric, geometry (geography, with some single geometrical propositions), arithmetic (chiefly the pro- perties of numbers), astronomy and music (including poetry). The style is that of an African of the 5th century, full of grandilo- quence, metaphors and strange words. He seldom mentions his authorities, and sometimes quotes authors whom he does not even seem to have read. His work was frequently copied in the middle ages by ignorant transcribers, and was eight times printed from 1499 to 1599. The best annotated edition is by Kopp (Frankfort, 1836, 4to), and the most convenient and the best text is that of Eysserhardt (Lipsiae, 1866, 8vo).

Isidore, bishop of Seville from 600 to 630, wrote Etymologiarum libri XX. (often also entitled his Origines) at the request of his friend Braulio, bishop of Saragossa, who after Isidore's death divided the work into books, as it was left unfinished, and divided only into

titles.

The tenth book is an alphabet of 625 Latin words, not belonging to his other subjects, with their explanations as known to him, and often with their etymologies, frequently very .absurd. The other books contain 448 chapters, and are : — 1 , grammar (Latin) ; 2, rhetoric and dialectics; 3, the four mathematical disciplines — arithmetic, geometry, music and astronomy; 4, medicine; 5, laws and times (chronology), with a short chronicle ending in 627; 6, ecclesiastical books and offices; 7, God, angels and the orders of the faithful; 8, the church and sects; 9, languages, society and relationships; II, man and portents; 12, animals, in eight classes, namely, pecora et jumenta, beasts, small animals (including spiders, crickets and ants), serpents, worms, fishes, birds and small winged creatures, chiefly insects; 13, the world and its parts; 14, the earth and its parts, containing chapters on Asia, Europe and Libya, that is, Africa; 15, buildings, fields and their measures; 16, stones (of which one is echo) and metals; 17, de rebus rusticis; 18, war and games; 19, ships, buildings and garments; 20, provisions, domestic and rustic instruments.

Isidore appears to have known Hebrew and Greek, and to have been familiar with the Latin classical poets, but he is a mere collector, and his derivations given all through the work are not unfrequently absurd, and, unless when very obvious, will not bear criticism. He seldom mentions his authorities except when he quotes the poets or historians. Yet his work was a great one for the time, and for many centuries was a much valued authority and a rich source of material for other works, and he had a high reputation for learning both in his own time and in subsequent ages. His Etymologies were often imitated, quoted and copied. MSS. are very numerous:, Antonio (whose editor, Bayer, saw nearly 40) says, " plures passimque reperiuntur in bibliothecarum angulis." This work was printed nine time; before 1529.

Hrabanus Maurus, whose family name was Magnentius, wa educated in the abbey of Fulda, ordained deacon in 802 (" Annales Francorum " in Bouquet, Historiens de la France, v. 66), sent to the school of St Martin of Tours, then directed by Alcuin, where he seems to have learned Greek, and is said by Trithemius to have been taught Hebrew, Syriac and Chaldee by Theophilus an Ephesian. In his Commentaries on Joshua (lib. ii. c. 5) he speaks of having resided at Sidon. He returned to Fulda and taught the school there. He became abbot of Fulda in 822, resigned in April 842, was ordained archbishop of Mainz on the 26th of July 847, and died on the 4th of

February 856. He compiled an encyclopaedia De universo (also called in some MSS. De universale natura, De natura rerum, and De origine rerum) in 22 books and 325 chapters. It is chiefly a rearrangement of

Isidore's Etymologies, omitting the first four books, half of the fifth and the tenth (the seven liberal arts, law, medicine and the alphabet of words), and copying the rest, beginning with the seventh book, verbally, though with great omissions, and adding (according to Ritter, Geschichte der Philosophic, vii. 193, from Alcuin, Augustine or some other accessible source) the meanings given in the Bible to the subject matter of the chapter; while things not mentioned in Scripture, especially such as belong to classical antiquity, are omitted, so that his work seems to be formed of two alternating parts. His arrangement of beginning with God and the angels long prevailed in methodical encyclo- paedias. His last six books follow very closely the order of the last five of Isidore, from which they are taken. His omissions are characteristic of the diminished literary activity and more contracted knowledge of his time. His work was presented to Louis the German, king of Bavaria, at Hersfeld in October 847, and was printed in 1473, fol., probably at Venice, and again at Strassburg by Mentelin about 1472-1475, fol., 334 pages.

Michael Constantine Psellus, the younger, wrote AidaaKaXia TavTodaTTTj, dedicated to the emperor Michael Ducas, who reigned 1071-1078. It was printed by Fabricius in his Bibliotheca Graeca (1712), vol. v., in 186 pages 4to and 193 chapters, each containing a question and answer. Beginning with divinity, it goes on through natural history and astronomy, and ends with chapters on excessive hunger, and why flesh hung from a fig-tree becomes tender. As collation with a Turin MS. showed that 35 chapters were wanting, Harles has omitted the text in his edition of Fabricius, and gives only the titles of the chapters (x. 84-88).

The author of the most famous encyclopaedia of the middle ages was Vincent (q.v.) of Beauvais (c. 1190- c. 1264), whose work Bibliotheca mundi or Speculum majus — divided, as we have it, into four parts, Speculum naturale, Speculum doctrinale, Speculum morale (this part should be ascribed to a later hand), and Speculum historiale — was the great compendium of mid-i3th century knowledge. Vincent of Beauvais preserved several works of the

middle ages and gives extracts from many lost classics and valuable readings of others, and did more than any other medieval writer to awaken a taste for classical literature. Fabricius (Bibl. Graeca, 1728, xiv. pp. 107-125) has given a list of 328 authors, Hebrew, Arabic, Greek and Latin, quoted in the Speculum naturale. To these should be added about 100 more for the doctrinale and historiale. As Vincent did not know Greek or Arabic, he used Latin translations. This work is dealt with separately in the article on Vincent of Beauvais.

Brunetto Latini of Florence (born 1230, died 1294), the master of Dante and Guido Cavalcanti, while an exile in France between 1260 and 1267, wrote in French Li Livres dou Tresor, in 3 books and 413 chapters. Book i. contains the origin of the world, the history of the Bible and of the foundation of governments, astronomy, geography, and lastly natural history, taken from Aristotle, Pliny, and the old French Bestiaries. The first part of Book ii.,' on morality, is from the Ethics of Aristotle, which Brunetto had translated into Italian. The second part is little more than a copy of the well-known collection of extracts from ancient and modern moralists, called the Moralities of the Philosophers, of which there are many MSS. in prose and verse. Book iii., on politics, begins with a treatise on rhetoric, chiefly from Cicero De invenlione, with many extracts from other writers and Brunetto's remarks. The last part, the most original and interesting of all, treats of the government of the Italian republics of the time. Like many of his contemporaries, Brunetto revised his work, so that there are two editions, the second made after his return from exile. MSS. are singularly numerous, and exist in all the dialects then used in France. Others were written in Italy. It was translated into Italian in the latter part of the 13th century by Bono Giamboni, and was printed at Trevigi, 1474, fol., Venice, 1528 and 1533. The Tesoro of Brunetto must not be confounded with his Tesorelto, an Italian poem of 2937 short lines. Napoleon I. had intended to have the French text of the Tesoro printed with commentaries, and appointed a commission for the purpose. It was at last published in the Collection

des documents inedits (Paris, 1863, 410, 772 pages), edited by Chabaille from 42 MSS.

Bartholomew de Glanville, an English Franciscan friar, wrote about 1360 a most popular work, De proprietatibus rerum, in 19 books and 1230 chapters.

Book 1 relates to God; 2, angels; 3, the soul; 4, the substance of the body; 5, anatomy; 6, ages; 7, diseases; 8, the heavens (astro- nomy

and astrology); 9, time; 10, matter and form; 11, air; 12, birds (including insects, 38 names, Aquila to Vespertilio) ; 13, water (with fishes) ; 14, the earth (42 mountains, Ararath to Ziph) ; 15, provinces (171 countries, Asia to Zeugia) ; 16, precious stones (including coral, pearl, salt, 104 names, Arena to Zinguttes) ; 17, trees and herbs (197, Arbor to Zucarum) ; 18, animals (114, Aries to Vipera) ; 19, colours, scents, flavours and liquors, with a list of 36 eggs (Aspis to Vultur). Some editions add book 20, accidents of things, that is, numbers, measures, weights and sounds. The Paris edition of 1574 has a book on bees.

There were 15 editions before 1500. An English translation was completed nth February 1398 by John Trevisa, and printed by Wynkyn de Worde, Westminster, 1495? fol.; London, 1533, fol.; and with considerable additions by Stephen Batman, a physician, London, 1582, fol. It was translated into French by Jehan Corbichon at the command of Charles V. of France, and printed 14 times from 1482 to 1556. A Dutch translation was printed in 1479, and again at Haarlem, 1485, fol.; and a Spanish translation by Padre Vincente de Burgos, Tholosa, 1494, fol.

Pierre Bersuire (Berchorius), a Benedictine, prior of the abbey of St Eloi in Paris, where he died in 1362, wrote a kind of en-cyclopaedia, chiefly relating to divinity, in three parts: — Reductorium morale super totam Bibliam, 428 moralitates in 34 books on the Bible from Genesis to Apocalypse; Reductorium morale de proprietatibus rerum, in 14 books and 958 chapters, a methodical encyclopaedia or system of nature on the plan of Bartholomew de Glanville, and chiefly taken from him(Berchorius places animals next after fishes in books 9 and 10, and adopts as natural classes volatilia, natatilia and gressibilia) ; Dictionarius, an alphabetical dictionary of 3514 words used in the Bible with moral expositions, occupying in the last edition 1558 folio pages. The first part was printed n times from 1474 to 151 5, and the third 4 times. The three parts were printed together as Petri Berchorii opera omnia (an incorrect title, for he wrote much besides), Moguntiae, 1609, fol., 3 vols., 2719 pages; Coloniae Agrippinae, i63i,fol.,3 vols.; ib. 1730-1731ˆ0!., 6 vols., 2 5 7° pages.

A very popular small encyclopaedia, Margarita philosophica, in 12 books, divided into 26 tractates and 573 chapters, was written by Georg Reisch, a German, prior of the Carthusians of Freiburg, and confessor of the emperor Maximilian I. Books 1-7 treat of the seven liberal arts; 8, 9, principles and origin of natural things; 10, n, the soul, vegetative, sensitive and intellectual; 12, moral philosophy. The

first edition, Heidel- berg, 1496, 4to, was followed by 8 others to 1535. An Italian translation by the astronomer Giovanno Paolo Gallucci was published at Venice in 1594, 1138 small quarto pages, of which 343 consist of additional tracts appended by the translator.

Raphael Maff ei, called Volaterranus, being a native of Volterra where he was born in 1451 and died 5th January 1522, wrote Commentarii Urbani (Rome, 1506, fol., in 38 books), so called because written at Rome. This encyclopaedia, printed eight times up to 1603, is remarkable for the great importance given to geography, and also to biography, a subject not included in previous encyclopaedias. Indeed, the book is formed of three nearly equal parts, — geog'raphia, n books; anthropologia (biography), n books; and philologia, 15 books. The books are not divided into short chapters in the ancient manner, like those of its predecessors. The edition of 1603 contains 814 folio pages. The first book consists of the table of contents and a classed index; books 2-12, geography; 13-23, lives of illustrious men, the popes occupying book 22, and the emperors book 23; 24-27, animals and plants; 28, metals, gems, stones, houses and other inanimate things; 34, de scientiis cyclicis (grammar and rhetoric) ; 35, de scientiis mathematicis,

arithmetic, geometry, optica, catoptrica, astronomy and astrology; 36-38, Aristotelica (on the works of Aristotle).

Giorgio Valla, born about 1430 at Placentia, and therefore called Placentinus, died at Venice in 1499 while lecturing on the immortality of the soul. Aldus published his work, edited by his son Giovanni Pietro Valla, De expetendis et fugiendis rebus, Venetiis, 1501, fol. 2 vols.

It contains 49 books and 21 19 chapters. Book 1 is introductory, on knowledge, philosophy and mathematics, considered generally (he divides everything to be sought or avoided into three kinds — those which are in the mind, in the body by nature or habit, and thirdly, external, coming from without); books 2-4, arithmetic; 5-9, music; 10-15, geometry, including Euclid and mechanics — book 15 being in three long chapters — de spiritualibus, that is, pneumatics and hydraulics, de catoptricis, and de optice; 16-19, astrology (with the structure and use of the astrolabe) ; 20-23, physics (including metaphysics); 24-30, medicine; 31-34, grammar; 35-37, dialectics;

38, poetry; 39, 40, rhetoric; 41, moral philo- sophy; 42-44, economics; 45, politics; 46-48, de corporis com- modis et incommodis, on the good and evil of the body (and soul); 49, de rebus externis, as glory, grandeur, &c.

Antonio Zara, born 1574, made bishop of Petina in Istria 1600, finished on the 17th of January 1614 a work published as Anatotnia ingeniorum et scientiarum, Venetiis, 161 5, 4to, 664 pages, in four sections and 54 membra. The first section, on the dignity and excellence of man, in 16 membra, considers him in all his bodily and mental aspects. The first membrum describes his structure and his soul, and in the latter part contains the author's preface, the deeds of his ancestors, an account of himself, and the dedication of his book to Ferdinand, archduke of Austria. Four membra treat of the discovery of character by chiromancy, physiognomy, dreams and astrology. The second section treats of 16 sciences of the imagination — writing, magic, poetry, oratory, courtiership (aulicitas), theoretical and mystic arithmetic, geometry, architecture, optics, cosmography, astrology, practical medicine, war, government. The third section treats of 8 sciences of intellect — logic, physics, meta- physics, theoretical medicine, ethics, practical jurisprudence, judicature, theoretical theology. The fourth section treats of 12 sciences of memory — grammar, practical arithmetic, human history, sacred canons, practical theology, sacred history, and lastly the creation and the final catastrophe. The book, now very rare, is well arranged, with a copious index, and is full of curious learning.

Johann Heinrich Alsted, born 1588, died 1638, published Encyclopaedia septem tomis distincta, Herbornae Nassoviorum, 1630, fol. 7 vols., 2543 pages of very small type. It is in 35 books, divided into 7 classes, preceded by 48 synoptical tables of the whole, and followed by an index of 119 pages.

I. Praecognita disciplinarum, 4 books, hexilogia, technologia, archelogia, didactica, that is, on intellectual habits and on the classi- fication, origin and study of the arts. II. Philology, 6 books, lexica, grammar, rhetoric, logic, oratory and poetry; book 5, lexica, contains dictionaries explained in Latin of 1076 Hebrew, 842 Syriac, 1934 Arabic, 1923 Greek and 2092 Latin words, and also nomen- clator technologiae, &c, a classified vocabulary of terms used in the arts and sciences, in Latin, Greek and Hebrew, filling 34 pages; book 6 contains Hebrew, Aramaic, Greek, Latin and German

frammars; book 10, poetica, contains a list of 61 Rotwelsch words. II. Theoretic philosophy, 10 books: — book n, metaphysics; 12,

pneumatics (on spirits); 13, physics; 14, arithmetic; 15, geometry; 16, cosmography; 17, uranometria (astronomy and astrology); 18,

feography (with maps of the Old World, eastern Mediterranean, and 'alestine under the Old and New Testaments, and a plate of Noah's ark); 19, optics; 20, music. IV. Practical philosophy, 4 books: — – 21, ethics; 22, economics (on relationships); 23, politics, with florilegium politicum, 119 pages of extracts from historians, philosophers and orators; 24, scholastics (on education, with a florilegiumof 25 pages). V. The three superior faculties : — 25, theology; 26, jurisprudence; 27, medicine (ending with the rules of the Salernian school). Vl. Mechanical arts in general: — book 28, mathematical mechanical arts; book 29, agriculture, gardening, care of animals, baking, brewing, preparing medicines, metallurgy (with mining) ; book 30, physical mechanical arts — printing, dialling, &c. Under paedutica (games) is Vida's Latin poem on chess, and one by Leuschner on the ludus Lorzius. VII. Farragines disciplin- arum, 5 books: — 31, mnemonics; 32, history; 33, chronology; 34, architecture; 35, quodlibetica, miscellaneous arts, as magic, cabbala, alchemy, magnetism, &c, with others apparently distinguished and named by himself, as, paradoxologia, the art of explaining paradoxes; dipnosophistica, the art of philosophizing

while feasting; cyclognomica, the art of conversing well de quovis scibili; tabacologia, the nature, use and abuse of tobacco, &c. — in all 35 articles in this book.

Alsted's encyclopaedia was received with very great applause, and was highly valued. Lami (Entretiens, 1684, p. 188) thought it almost the only encyclopaedia which did not deserve to be despised. Alsted's learning was very various, and his reading was very extensive and diversified. He gives few references, and Thomasius charges him with plagiarism, as he often copies literally without any acknowledgment. He wrote not long before the appearance of encyclopaedias in modern languages superseded his own and other Latin books, and but a short time before the alphabetical arrangement began to prevail over the methodical. His book was reprinted, Lugduni, 1649, fol. 4 vols., 2608 pages.

Jean de Magnon, historiographer to the king of France, undertook to write an encyclopaedia in French heroic verse, which was to fill ten volumes of 20,000 lines each, and to render libraries merely a useless ornament. But he did not live to finish it, as he was killed at night by robbers on the Pont Neuf in Paris, in April 1662. The part he left was printed as La Science universelle, Paris, 1663, fol., 348

pages, — 10 books containing about 11,000 lines. They begin with the nature of God, and end with the history of the fall of man. His verses, say Chaudon and Delandine, are perhaps the most nerveless, incorrect, obscure and flat in French poetry; yet the author had been the friend of Moliere, and had acted with him in comedy.

Louis Moreri(born on the 25th of March 1643 at Bargemont, in the diocese of Frejus, died on the 10th of July 1680 at Paris) wrote a dictionary of history, genealogy and biography, Le Grand Dictionnaire historique, ou le melange curieux de I'histoire sacree et profane, Lyons, 1674, fol. He began a second edition on a larger scale, published at Lyons in 1681, in two volumes folio; the sixth edition was edited by Jean le Clerc, Amsterdam, 1691, fol. 4 vols.; the twentieth and last edition, Paris, 1759, fol. 10 vols. Moreri's dictionary, still very useful, was of great value and importance, although not the first of the kind. It superseded the very inferior compilation of Juigne-Broissinere, Dictionnaire theologique, historique, poetique, cosmographique, et chronologique, Paris, 1644,410; Rouen, 1668, &c.,- — a transla- tion, with additions, of the Dictionarium historicum, geographi- cum, et poelicum of Charles Estienne, published in 1553, 4to, and often afterwards. As such a work was much wanted, Juigne's book went through twelve editions in less than thirty years, notwithstanding its want of criticism, errors, anachronisms, defects and inferior style.

Johann Jacob Hofmann (born on the nth of September 1635, died on the 10th of March 1706), son of a schoolmaster at Basel, which he is said never to have left, and where he was professor of Greek and History, wrote Lexicon universale historico- geographico – chronologico – poetico – philologicum, Basileae, 1677, fol. 2 vols., 1823 pages, a dictionary of history, biography, geography, genealogies of princely families, chronology, mytho- logy and philology. At the end is Nomenclator MˆotXcottos, an index of names of places, people, &c, in many languages, care- fully collected, and explained in Latin, filling no pages; with an index of subjects not forming separate articles, Occupying 34 pages. In 1683 he published a continuation in 2 vols, fol., 2293 pages, containing, besides additions to the subjects given in his lexicon, the history of animals, plants, stones, metals, elements, stars, and especially of man and his affairs, arts, honours, laws, magic, music, rites and a vast number of other subjects. In 1698 he published a second edition, Lugduni Batavorum, fol. 4 vols., 3742 pages, incorporating the continua- tion with additions. From the great extent of his plan, many articles, especially in history, are superficial and faulty.

Etienne Chauvin was born at Nismes on the 18th of April 1640. He fled to Rotterdam on the revocation of the edict of Nantes, and in 1688 supplied Bayle's place in his lectures on philosophy. In 1695 he was invited by the elector of Branden- burg to go as professor of philosophy to Berlin, where he became the representative of the Cartesian philosoohy, and died on the

6th of April 1725. He wrote Lexicon rationale, sive thesaurus philosophicus ordine alphabetico digestus, Rotterdami, 1692, fol., 746 pages and 30 plates. An improved and enlarged edition was printed as Lexicon philosophicum secundis curis, Leovardiae, 1 7 13, large folio, 725 pages and 30 plates. This great work may be considered as a dictionary of the Cartesian philosophy, and was very much used by Brucker and other earlier historians of philosophy. It is written in a very dry and scholastic style, and seldom names authorities.

The great dictionary of French, begun by the French Academy on the 7th of February 1639, excluded all words especially belonging to science and the arts. But the success of the rival dictionary of Furetiere, which, as its title-page, as well as that of the Essais published in 1684, conspicuously announced, professed to give " les termes de toutes les Sciences et des Arts," induced Thomas Corneille, a member of the Academy, to compile Le Dictionnaire des arts et des sciences, which the Academy published with the first edition of their dictionary, Paris, 1694, folio, as a supplement in two volumes containing 1236 pages. It was reprinted at Amsterdam, 1696, fol. 2 vols., and at Paris in 1720, and again in 1732, revised by Fontenelle. A long series of dictionaries of arts and sciences have followed Corneille in placing in their titles the arts before the sciences, which he probably did merely in order to differ from Furetiere. Corneille professed to quote no author whom he had not consulted; to take plants from Dioscorides and Matthiolus, medicine from Ettmuller, chemistry from a MS. of Perrault, and architecture, painting and sculpture from Felibien; and to give an abridged history of animals, birds and fishes, and an account of all religious and military orders and their statutes, heresiarchs and heresies, and dignities and charges ancient and modern.

Pierre Bayle (born on the 18th of November 1647, died on the 28th of December 1706) wrote a very important and valuable work, Dictionnaire historique et critique, Rotterdam, 1697, fol. 2 vols. His design was to make a dictionary of the errors and omissions of Moreri and others, but he was much embarrassed by the numerous editions and supplements of Moreri. A second edition with an additional volume appeared at Amsterdam in 1702, fol. 3 vols. The fourth edition, Rotterdam, 1720, fol. 4 vols., was much enlarged

from his manuscripts, and was edited by Prosper Marchand. It contains 3132 pages besides tables, &c. The ninth edition was published at Basel, 1741, fol. 10 vols. It was translated into English from the second edition, London, 1709, fol. 4 vols., with some slight additions and corrections by the author; and again from the fifth edition of 1730 by Birch and Lockman, London, 1 734-1 740, fol. 5 vols. J. G. de Chaufepie published Nouveau Dictionnaire historique, Amsterdam, 1750-1756, fol. 4 vols., as a supplement to Bayle. It chiefly consists of the articles added by the English translators with many corrections and additions, and about 500 new articles added by himself , and contains in all about i4ooarticles. Prosper Marchand, editor of the fourth edition, left at his death on the 14th of January 1756 materials for a supplementary Dictionnaire historique, La Haye, 1758, fol. 2 vols., 891 pages, 136 articles. It had occupied his leisure moments for forty years. Much of his work was written on small scraps of paper, sometimes 20 in half a page and no larger than a nail, in such small characters that not only the editor but the printer had to use powerful magnifiers. Bayle's dictionary was also translated into German, Leipzig, 1741-1744, fol. 4 vols., with a preface by J. C. Gottsched. It is still a work of great importance and value.

Vincenzo Maria Coronelli, a Franciscan friar, who was born in Venice about 1650, made cosmographer to the republic in 1685, became general of his order in 1702, and was found dead at his study table on the 9th of December 1718, began in 1701 to publish a general alphabetical encyclopaedia, written in Italian, at which he had been working for thirty years, Biblioteca uni- versale sacro-profana. It was to explain more than 300,000 words, to include history and biography as well as all other subjects, and to extend to 45 volumes folio. Volumes 1-39 were to contain the dictionary A to Z; 40, 41, the supplement; 42, retractations and corrections; 43, universal index; 44,

index divided into matters; 45, index in various languages. But seven volumes only were published, Venezia, 1 701-1706, fol., 5609 pages, A to Caque. The first six volumes have each an index of from 28 to 48 pages (in all 2 24 pages) of subjects, whether forming articles or incidental. The articles in each are numbered, and amount to 30,269 in the six volumes, which complete the letter B. On an average 3 pages contain 22 articles. Each volume is dedicated to a different patron — the pope, the doge, the king of Spain, &c. This work is remarkable for the extent and completeness of its plan, and for being the first great alpha- betical encyclopaedia, as well as for being written in a modern language, but it was hastily written and very

incorrect. Never, perhaps, says Tiraboschi {Storia della letteratura italiana, viii. 546), was there so quick a writer; he composed a folio volume as easily as others would a page, but he never perfected his works, and what we have of this book will not induce us to regret the want of the remainder.

The first alphabetical encyclopaedia written in English was the work of a London clergyman, John Harris (born about 1667, elected first secretary of the Royal Society on the 30th of November 1709, died on the 7th of September 17 19), Lexicon technicum, or an universal English Dictionary of Arts and Sciences, London, 1704, fol., 1220 pages, 4 plates, with many diagrams and figures printed in the text. Like many subsequent English encyclopaedias the pages are not numbered. It professes not merely to explain the terms used in the arts and sciences, but the arts and sciences themselves. The author complains that he found much less help from previous dictionaries than one would suppose, that Chauvin is full of obsolete school terms, and Corneille gives only bare explanations of terms, which often relate only to simple ideas and common things. He omits theology, antiquity, biography and poetry; gives only technical history, geography and chronology; and in logic, metaphysics, ethics, grammar and rhetoric, merely explains the terms used. In mathematics and anatomy he professes to be very full, but says that the catalogues and places of the stars are very imperfect, as Flamsteed refused to assist him. In botany he gave from Ray, Morrison and Tournefort " a pretty exact botanick lexicon, which was what we really wanted before," with an account of all the " kinds and subalternate species of plants, and their specific differences " on Ray's method. He gave a table of fossils from Dr Woodward, professor of medicine in Gresham College, and took great pains to describe the parts of a ship accurately and particularly, going often on board himself for the purpose. In law he abridged from the best writers what he thought neces- sary. He meant to have given at the end an alphabet for each art and science, and some more plates of anatomy and ships, " but the undertaker could not afford it at the price." A review of his work, extending to the unusual length of four pages, appeared in the Philosophical Transactions, 1704, p. 1699. This volume was reprinted in 1708. A second volume of 1419 pages and 4 plates appeared in 17 10, with a list of about 1300 subscribers. Great part of it consisted of mathematical and astronomical tables, as he intended his work to serve as a small mathematical library. He was allowed by Sir Isaac Newton to print his treatise on acids. He gives a table of logarithms to seven figures of decimals (44 pages), and one of sines, tangents

and secants (120 pages), a list of books filling two pages, and an index of the articles in both volumes under 26 heads, filling 50 pages. The longest lists are law (1700 articles), chyrurgery, anatomy, geometry, fortification, botany and music. The mathematical and physical part is considered very able. Hie often mentions his authorities, and gives lists of books on particular subjects, as botany and chronology. His dictionary was long very popular. The fifth edition was published in 1736, fol. 2 vols. A supplement, including no new subjects, appeared in 1744, London, fol., 996 pages, 6 plates. It was intended to rival Ephraim Chambers's work (see below) , but, being considered a bookseller's speculation, was not well received.

Johann Hiibner, rector of the Johanneum in Hamburg, born on the 17th of March 1668, wrote prefaces to two dictionaries written in German, which bore his name, and were long popular.

The first was Reales Staals Zeitungs- und Conversations-Lexicon, Leipzig, 1704, 8vo; second edition, 1706, 947 pages; at the end a register of arms, and indexes of Latin and French words; fifth edition, 1711; fifteenth edition 173s, 1119 pages. The thirty-first edition was edited and enlarged by F. A. Ruder, and published by Brockhaus, Leipzig, 1824-1828, 8vo, 4 vols., 3088 pages. It was translated into Hungarian by Fejer, Pesten, 1816, 8vo, 5 vols., 2958 pages. The second, published as a supple- ment, was Curieuses und reales Natur- Kunst- Berg- Gewerb- und Handlungs-Lexicon, Leipzig, 171 2, 8vo, 788 pages, frequently reprinted to 1792. The first relates to the political state of the world, as religion, orders, states, rivers, towns, castles, mountains, genealogy, war, ships; the second to nature, science, art and commerce. They were the work of many authors, of whom Paul Jacob Marpurger, a celebrated and voluminous writer on trade and commerce, born at Nuremberg on the 27th of June 1656, was an extensive contributor, and is the only one named by Hiibner.

Johann Theodor Jablonski, who was born at Danzig on the 15th of December 1654, appointed secretary to the newly founded Prussian Academy in 1700, when he went to Berlin, where he died on the 28th of April 1731, published Allgemeines Lexicon der Kiinste und Wissenschaften, Leipzig, 1721, 4to, a short but excellent encyclopaedia still valued in Germany. It does not include theology,

history, geography, biography and genealogy. He not only names his authorities, but gives a list of their works. A new edition in 1748 was increased one-third to 1508 pages. An improved edition, Kbnigsberg and Leipzig, 1767, 4to, 2 vols., 1852 pages, was edited by J. J. Schwabe, public teacher of philosophy at Leipzig.

Ephraim Chambers (q.v.) published his Cyclopaedia; or an Universal Dictionary of Art and Sciences, containing an Explication of the Terms and an Account of the Things Signified thereby in the several Arts, Liberal and Mechanical, and the several Sciences, Human and Divine, London, 1728, fol. 2 vols. The dedication to the king is dated October 15, 1727. Chambers endeavoured to connect the scattered articles relating to each subject by a system of references, and to consider " the several matters, not only in themselves, but relatively, or as they respect each other; both to treat them as so many wholes and as so many parts of some greater whole." Under each article he refers to the subject to which it belongs, and also to its subordinate parts; thus Copyhold has a reference to Tenure, of which it is a particular kind, and other references to Rolls, Custom, Manor,Fine, Charter- land and Freehold. In his preface he gives an " analysis of the divisions of knowledge," 47 in number, with classed lists of the articles belonging to each, intended to serve as table of contents and also as a rubric or directory indicating the order in which the articles should be read. But it does so very imperfectly, as the lists are curtailed by many et cacteras; thus 19 occur in a list of 119 articles under Anatomy, which has nearly 2200 articles in Rees's index. He omits etymologies unless " they appeared of some significance "; he gives only one grammatical form of each word, unless peculiar ideas are arbitrarily attached to different forms, as precipitate, precipitant, precipitation, when each has an article; and he omits complex ideas generally known, and thus " gets free of a vast load of plebeian words." His work, he says, is a collection, not the produce of one man's wit, for that would go but a little way, but of the whole common- wealth of learning. " Nobody that fell in my way has been spared, antient or modern, foreign nor domestic, Christian or Jew nor heathen." To the subjects given by Harris he adds theology, metaphysics, ethics, politics, logic, grammar, rhetoric and poetry, but excludes history, biography, genealogy, geography and chronology, except their technical parts. A second edition appeared in 1738, fol. 2 vols., 2466 pages, " re- touched and amended in a thousand places." A few articles are added and some others enlarged, but he was prevented from doing more because " the booksellers were alarmed with a bill in parliament containing a clause to oblige the publishers of all improved editions of books to

print their improvements separately." The bill after passing the Commons was unex-

pectedly thrown out by the Lords; but fearing that it might be revived, the booksellers thought it best to retreat though more than twenty sheets had been printed. Five other editions were published in London, 1739 to 1751-1752, besides one in Dublin, 1742, all in 2 vols. fol. An Italian translation, Venezia, 1 748-1749, 4to, 9 vols., was the first complete Italian encyclo- paedia. When Chambers was in France in 1739 he rejected very favourable proposals to publish an edition there dedicated to Louis XV. His work was judiciously, honestly and carefully done, and long maintained its popularity. But it had many defects and omissions, as he was well aware; and at his death, on the 1 5th of May 1 740, he had collected and arranged materials for seven new volumes. John Lewis Scott was employed by the booksellers to select such articles as were fit for the press and to supply others. He is said to have done this very efficiently until appointed sub-preceptor to the prince of Wales and Prince Edward. His task was entrusted to Dr (afterwards called Sir John) Hill, who performed it very hastily, and with character- istic carelessness and self-sufficiency, copying freely from his own writings. The Supplement was published in London, 1753, fol. 2 vols., 3307 pages and 12 plates. As Hill was a botanist, the botanical part, which had been very defective in the Cyclopaedia, was the best.

Abraham Rees (1743-1825), a famous Nonconformist minister, published a revised and enlarged edition, " with the supplement and modern improvements incorporated in one alphabet," London, 1778-1788, fol. 2 vols., 5010 pages (but not paginated), 159 plates. It was published in 418 numbers at 6d. each. Rees says that he has added more than 4400 new articles. At the end he gives an index of articles, classed under 100 heads, numbering about 57,000 and filling 80 pages. The heads, with 39 cross references, are arranged alphabetically. Subsequently there were reprints.

One of the largest and most comprehensive encyclopaedias was undertaken and in a great measure completed by Johann Heinrich Zedler, a bookseller of Leipzig, who was born at Breslau 7th January 1706, made a Prussian commerzienrath in 1731, and died at Leipzig in 1760, — Grosses vollstdndiges Universal Lexicon Aller Wissenschaften und Kiinste welche bishero durch menschlichen Verstand und Witz erfunden und verbessert worden, Halle and Leipzig, 1732-1750, fol. 64 vols., 64,309 pages; and Nothige Supplement, ib. 1751-1754, vols. i. to iv., A to Caq, 3016 pages. The columns, two in a page, are numbered, varying from 1356 in vol. li.

to 2588 in vol. xlix. Each volume has a dedication, with a portrait. The first nine are the emperor, the kings of Prussia and Poland, the empress of Russia, and the kings of England, France, Poland, Denmark and Sweden. The dedications, of which two are in verse, and all are signed by Zedler, amount to 4 59 pages. The supplement has no dedications or portraits. The preface to the first volume of the work is by Johann Peter von Ludewig, chancellor of the university of Halle (born 15th August 1690, died 6th September 1743). Nine editors were employed, whom Ludewig compares to the nine muses; and the whole of each subject was entrusted to the same person, that all its parts might be uniformly treated. Carl Giinther Ludovici (born at Leipzig 7th August 1707, public teacher of philosophy there from 1734, died 3rd July 1778) edited the work from vol. xix., beginning the letter M, and published in 1739, to the end, and also the supplement. The work was published by subscription. Johann Heinrich Wolff, an eminent merchant and shopkeeper in Leipzig, born there on the 29th of April 1690, came to Zedler's assistance by advancing the funds for expenses and becoming answerable for the subscriptions, and spared no cost that the work might be com- plete. Zedler very truly says, in his preface to vol. xviii., that his Universal Lexicon was a work such as no time and no nation could show, and both in its plan and execution it is much more comprehensive and complete than any previous encyclopaedia. Colleges, says Ludewig, where all sciences are taught and studied, are on that account called universities, and their teaching is called studium universale; but the Universal Lexicon contains not only what they teach in theology, jurisprudence, medicine,

philosophy, history, mathematics, &c, but also many other things belonging to courts, chanceries, hunting, forests, war and peace, and to artists, artizans, housekeepers and merchants not thought of in colleges. Its plan embraces not only history, geography and biography, but also genealogy, topography, and from vol. xviii., published in 1738, lives of illustrious living persons. Zedler inquires why death alone should make a deserv- ing man capable of having his services and worthy deeds made known to the world in print. The lives of the dead, he says, are to be found in books, but those of the living are not to be met with anywhere, and would often be more useful if known. In consequence of this preface, many lives and genealogies were sent to him for publication. Cross references generally give not only the article referred to, but also the volume

and column, and, when necessary, such brief information as may distinguish the word referred to from others similar but of different meaning. Lists of authorities, often long, exact and valuable are frequently appended to the articles. This work, which is well and carefully compiled, and very trustworthy, is still a most valuable book of reference on many subjects, especially topography, genealogy and biography. The genealogies and family histories are ex- cellent, and many particulars are given of the lives and works of authors not easily found elsewhere.

A work on a new plan was published by Dennis de Coetlogon, a Frenchman naturalized in England, who styled himself " Knight of St Lazare, M.D., and member of the Royal Academy of Angers " — An Universal History of Arts and Sciences, London, 1745, fol. 2 vols., 2529 pages, 33 plates and 161 articles arranged alphabetically. He " endeavours to render each treatise as complete as possible, avoiding above all things needless repeti- tions, and never puzzling the reader with the least reference." Theology is divided into several treatises; Philosophy into Ethicks, Logick and Metaphysick, each under its letter; and Physick is subdivided into Anatomy, Botany, Geography, Geometry, &c. Military Art is divided into Army, Fortification, Gunnery. The royal licence is dated 13th March 1740-1741, the dedication is to the duke of Gisors, the pages are numbered, there is an appendix of 35 pages of astronomical tables, and the two indexes, one to each volume, fill 69 pages, and contain about 9000 subjects. The type is large and the style diffuse, but the subject matter is sometimes curious. The author says that his work is the only one of the kind, and that he wrote out with his own hand every line, even the index. But notwithstanding the novelty of his plan, his work does not seem ever to have been popular.

Gianfrancesco Pivati, born at Padua in 1689, died at Venice in 1764, secretary of the Academy of Sciences at Venice, who had published in 1744 a 4to volume containing a Dizionario universale, wrote Nuovo dizionario scientifico e curioso sacro- profano, Venezia, 1746-1751, fol. 10 vols., 7791 pages, 597 plates. It is a general encyclopaedia, including geography, but not history or biography. He gives frequent references to his authorities and much curious information. His preliminary discourse (80 pages) contains a history of the several sciences from mathematics to geography. The book was published by subscription, and at the end of the last volume is a Catalogo dei Signori Associati, 252 in number, who took 266 copies. It is also remarkable for the number of its plates, which are engraved on copper. In each volume they are placed together at the end, and are preceded by an explanatory index of subjects referring

co the plates and to the articles they illustrate.

One of the greatest and most remarkable literary enterprises of the 18th century, the famous French EncyclopSdie, originated in a French translation of Ephraim Chambers's Cyclopaedia, begun in 1743 and finished in 1745 by John Mills, an Englishman resident in France, assisted by Gottfried Sellius, a very learned native of Danzig, who, after being a professor at Halle and Gottingen, and residing in Holland, had settled in Paris. They applied to Lebreton, the king's printer, to publish the work, to fulfil the formalities required by French law, with which, as foreigners, they were not acquainted, and to solicit a royal privilege. This he obtained, but in his own name alone. Mills

complained so loudly and bitterly of this deception that Lebreton had to acknowledge formally that the privilege belonged en toute propriety to John Mills. But, as he again took care not to acquaint Mills with the necessary legal formalities, this title soon became invalid. Mills then agreed to grant him part of his privilege, and in May 1 745 the work was announced as Encyclo- pedic ou dictionnaire universel des arts et des sciences, folio, four volumes of 250 to 260 sheets each, with a fifth of at least 120 plates, and a vocabulary or list of articles in French, Latin, German, Italian and Spanish, with other lists for each language explained in French, so that foreigners might easily find any article wanted. It was to be published by subscription at 135 livres, but for large paper copies 200 livres, the first volume to be delivered in June 1 746, and the two last at the end of 1748. The subscription list, which was considerable, closed on the 31st of December 1 745. Mills demanded an account, which Lebreton, who had again omitted certain formalities, insultingly refused. Mills brought an action against him, but before it was decided Lebreton procured the revocation of the privilege as informal, and obtained another for himself dated the 21st of January 1 746. Thus, for unwittingly contravening regulations with which his unscrupulous publisher ought to have made him acquainted, Mills was despoiled of the work he had both planned and executed, and had to return to England. Jean Paul de Gua de Malves, professor of philosophy in the college of France (born at Carcas- sonne in 1713, died on the 15th of June 1785), was then engaged as editor merely to correct errors and add new discoveries. But he proposed a thorough revision, and obtained the assistance of many learned men and artists, among whom Desessarts names Louis, Condillac, d'Alembert and Diderot. But the publishers did not think his reputation high enough to ensure success, withheld their confidence, and often opposed his plans as too expensive. Tired

at last of disputes, and too easily offended, de Gua resigned the editorship. The publishers, who had already made heavy advances, offered it to Diderot, who was probably recommended to them by his very well received Dictionnaire universel de medicine, Paris, 1746-1748, fol. 6 vols., published by Briasson, David and Durand, with notes and additions by Julien Busson, doctor regent of the faculty of medicine of Paris. It was a translation, made with the assistance of Eidous and Toussaint, of the celebrated work of Dr Robert James, inventor of the fever powders, A Medicinal Dictionary, London, 1743-1745, fol. 3 vols., 3275 pages and 98 plates, comprising a history of drugs, with chemistry, botany and natural history so far as they relate to medicine, and with an historical preface of 99 pages (in the translation 136). The proposed work was to have been similar in character. De Gua's papers were handed over to Diderot in great confusion. He soon persuaded the publishers to undertake a far more original and comprehensive work. His friend d'Alembert undertook to edit the mathematics. Other subjects were allotted to 21 con- tributors, each of whom received the articles on this subject in Mills' translation to serve as a basis for his work. But they were in most cases so badly composed and translated, so full of errors and omissions, that they were not used. The contribu- tions were to be finished in three months, but none was ready in time, except Music by Rousseau, which he admits was hastily and badly done. Diderot was imprisoned at Vincennes, on the 29th of July 1749, for his Lettre sur les aveugles. He was closely confined for 28 days, and was then for three months and ten days a prisoner on parole in the castle. This did not stop the printing, though it caused delay. The prospectus by Diderot appeared in November 1750. The work, was to form 8 vols, fol., with at least 600 plates. The first volume was published in July 1751, and delivered to the subscribers in August. The second appeared in January 1752. An arrit of the council, 9th of February, suppressed both volumes as injurious to the king's authority and to religion. Malesherbes, director-general of the Librairie, stopped the issue of volume ii., 9th of February, and on the 21st went with a lettre de cachet to Lebreton's to seize the plates and the MSS., but did not find, says Barbier, even those of volume iii., as they had been taken to his own

house by Diderot and one of the publishers. The Jesuits tried to continue the work, but in vain. It was less easy, says Grimm, than to

ruin philosophers. The Dictidnnaire de Tr&ooux pro- nounced the completion of the Encycloptdie impossible, and the project ridiculous (5th edition, 1752, iii, 750). The govern- ment had to request the editors to resume the work as one honourable to the nation. The marquis d'Argenson writes, 7th of May 1752, that Mme de Pompadour had been urging them to proceed, and at the end of June he reports them as again at work. Volume iii., rather improved by the delay, appeared in October 1753; and volume vii., completing G, in November 1757. The clamours against the work soon recom- menced. D ' Alembert retired in January 1758, weary of sermons, satires and intolerant and absurd censors. 'The parlement of Paris, by an arrtt, 23rd of January 17S9, stopped the sale and distribution of the Encycloptdie, Helvetius's De V 'Esprit, and six other books; and by an arril, 6th February, ordered them all to be burnt, but referred the Encyclopedie for examination to a commission of nine. An arret du conseil, 7th of March, revoked the privilege of 1746, and stopped the printing. Volume viii. was then in the press. Malesherbes warned Diderot that he would have his papers seized next day; and when Diderot said he could not make a selection, or find a place of safety at such short notice, Malesherbes said, " Send them to me, they will not look for them there." This, according to Mme de Vandeul, Diderot's daughter, was done with perfect success. In the article Pardonner Diderot refers to these persecutions, and says, " In the space of some months we have seen our honour, fortune, liberty and life imperilled." Malesherbes, Choiseul and Mme de Pompadour protected the work; Diderot obtained private permission to go on printing, but with a strict charge not to publish any part until the whole was finished. The Jesuits were condemned by the parlement of Paris in 1762, and by the king in November 1764. Volume i. of plates appeared in 1762, and volumes viii. to xvii., ten volumes' of text, 9408 pages, com- pleting the work, with the 4th volume of plates in 1765, when there were 4250 subscribers. The .work circulated freely in the provinces and in foreign countries, and was secretly distributed in Paris and Versailles. The general assembly of the clergy, on the 20th of June 1765, approved articles in which it was con- demned, and on the 27th of September adopted a memoire to be presented to the king. They were forbidden to publish their acts which favoured the Jesuits, but Lebreton was required to give a list of his subscribers, and was put into the Bastille for eight days in 1766. A royal order was sent to the subscribers to deliver their copies to the lieutenant of police. Voltaire in 1774 relates that, at a petit souper of the king at Trianon, there was a debate on the composition of gunpowder. Mme de Pompadour said she did not know how her rouge or her silk stockings were made. The due de la

Valliere regretted that the king had confiscated their encyclopaedias, which could decide everything. The king said he had been told that the work was most dangerous, but as he wished to judge for himself, he sent for a copy. Three servants with difficulty brought in the 21 volumes. The company found everything they looked for, and the king allowed the confiscated copies to be returned. Mme de Pompadour died on the 15th of April 1764. Lebreton had half of the property in the work, and Durand, David and Briasson had the rest. Lebreton, who had the largest printing office in Paris, employed 50 workmen in printing the last ten volumes. He had the articles set in type exactly as the authors sent them in, and when Diderot had corrected the last proof of each sheet, he and his foreman, hastily, secretly and by night, unknown to his partners in the work, cut out whatever seemed to them daring, or likely to give offence, mutilated most of the best articles without any regard to the consecutiveness of what was left, and burnt the manuscript as they proceeded. The printing of the work was nearly finished when Diderot, having to consult one of his great philosophical articles in the letter S, found it entirely mutilated. He was confounded, says Grimm, at discovering the atrocity of the printer; all the best articles were in the same confusion. This discovery put him into a

state of frenzy and despair from rage and grief. His daughter never heard him speak coolly on the subject, and after twenty years it still made him angry. He believed that every one knew as well as he did what was wanting in each article, but in fact the mutilation was not perceived even by the authors, and for many years was known to few persons. Diderot at first refused to correct the remaining proofs, or to do more than write the explanations of the plates. He required, according to Mme de Vandeul, that a copy, now at St Petersburg with his library, should be printed with columns in which all was restored. The mutilations began as far back as the article Intendant. But how far, says Rosenkranz, this murderous, incredible and infamous operation was carried cannot now be exactly ascer- tained. Diderot's articles, not including those on arts and trades, were reprinted in Naigeon's edition (Paris, 1821, 8vo, 22 vols.). They fill 4132 pages, and number 1130, of which 601 were written for the last ten volumes. They are on very many subjects, but principally on grammar, history, morality, philosophy, literature and metaphysics. As a contributor, his special department of the work was philosophy, and arts and trades. He passed whole days in workshops, and began by examining a machine carefully, then he had it taken to pieces and put together again, then he watched it at work, and lastly worked it himself. He thus learned to use such complicated machines as the

stocking and cut velvet looms. He at first received 1200 livres a year as editor, but afterwards 2500 livres a volume, besides a final sum of 20,000 livres. Although after his engagement he did not suffer from poverty as he had done before, he was obliged to sell his library in order to provide for his daughter. De Jaucourt spared neither time, trouble nor expense in perfecting the work, for which he received nothing, and he employed several secretaries at it for ten years. To pay them he had to sell his house in Paris, which Lebreton bought with the profits derived from De Jaucourt's work. All the publishers made large fortunes; their expenses amounted to 1,158,000 livres and their profits to 2,162,000. D'Alembert's " Discours Preliminaire," 45 pages, written in 1750, prefixed to the first volume, and delivered before the French Academy on his reception on the 19th of December 1754, consists of a systematic arrangement of the various branches of knowledge, and an account of their progress since their revival. His system, chiefly taken from Bacon, divides them into three classes, under memory, reason and imagination. Arts and trades are placed under natural history, superstition and magic under science de Dieu, and orthography and heraldry under logic. The literary world is divided into three corresponding classes —erudits, philosophes and beaux esprils. As in Ephraim Chambers's Cyclopaedia, history and biography were excluded, except incidentally; thus Aristotle's life is given in the article Aristotelisme. The science to which an article belongs is gener- ally named at the beginning of it, references are given to other articles, and the authors' names are marked by initials, of which lists are given in the earlier volumes, but sometimes their names are subscribed in full. Articles by Diderot have no mark, and those inserted by him as editor have an asterisk prefixed. Among the contributors were Voltaire, Euler, Marmontel, Montesquieu, D'Anville, D'Holbach and Turgot, the leader of the new school of economists which made its first appearance in the pages of the Encyclopedie. Louis wrote the surgery, Daubenton natural history, Eidous heraldry and art, Toussaint jurisprudence, and Condamine articles on South America.

No encyclopaedia perhaps has been of such political importance, or has occupied so conspicuous a place in the civil and literary history of its century. It sought not only to give information, but to guide opinion. It was, as Rosenkranz says {Diderot, i. 157), theistic and heretical. It was opposed to the church, then all-powerful in France, and it treated dogma historically. It was, as Desnoiresterres says {Voltaire, v. 164), a war machine; as it progressed, its attacks both on the church and the still more despotic government, as well as on

Christianity itself, became bolder and more undisguised, and it was met by opposition and persecution unparalleled in the history of encyclopaedias. Its execution is very unequal, and its articles of very different value. It was not constructed on a regular plan, or subjected to sufficient supervision; articles were sent in by the

contributors, and not seen by the editors until they were in type. In each subject there are some excellent articles, but others are very inferior or altogether omitted, and references are often given to articles which do not exist. Thus marine is said to be more than three-fourths deficient; and in geography errors and omissions abound — even capitals and sovereign states are overlooked, while villages are given as towns, and towns are described which never existed. The style is too generally loose, digressive and inexact; dates are seldom given; and discursiveness, verbosity and dog- matism are frequent faults. Voltaire was constantly demanding truth, brevity and method, and said it was built half of marble and half of wood. D'Alembert compared it to a harlequin's coat, in which there is some good stuff but too many rags. Diderot was dis- satisfied with it as a whole; much of it was compiled in haste; and carelessly written articles and incompetent contributors were ad- mitted for want of money to pay good writers. Zedler's Universal Lexicon is on the whole much more useful for reference than its far more brilliant successor. The permanent value of encyclopaedias depends on the proportion of exact and precise facts they contain and on their systematic regularity.

The first edition of the Encyclopedic, in 17 vols, folio, 16,288 pages, was imitated by a counterfeit edition printed at Geneva as the volumes appeared in Paris. Eleven folio volumes of plates were published at Paris (1762 to 1772), containing 2888 plates and 923 pages of explanation, &c. A supplement was printed at Amsterdam and Paris (1776-1777), fol. 5 vols., 3874 pages, with 224 plates. History was introduced at the wish of the public, but only " the general features which mark epochs in the annals of the world." The astronomy was by Delalande, mathematics by Condorcet, tables by Bernouilli, natural history by Adanson, anatomy and physiology by Haller. Daubenton, Condamine, Marmontel and other old contributors wrote many articles, and several were taken from foreign editions. A very full and elaborate index of the articles and subjects of the 33 volumes was printed at Amsterdam in 1 780, fol. 2

*vols. 1852 pages. It was made by Pierre Mouchon, who was born at Geneva on the 30th of July 1 735, consecrated minister on the 18th of August 1758, pastor of the French church at Basel 1766, elected a pastor in Geneva on the 6th of March 1 788, principal of the college there 22nd of April 1791, died on the 20th of August 1797. This Table analytique, which took him five years to make, was undertaken for the publishers Cramer and De Tournes, who gave him 800 louis for it. Though very exact and full, he designedly omits the attacks on Christianity. This index was rendered more useful and indispensable by the very diffuse and digressive style of the work, and by the vast number of its articles. A complete copy of the first edition of the Encyclopedic consists.of 35 vols, fol., printed 1751-1780, containing 23,135 pages and 3132 plates. It was written by about 160 contributdrs. About 1761 Panckoucke and other publishers in Paris proposed a new and revised edition, and bought the plates for 250,000 livres. But, as Diderot indignantly refused to edit what he considered a fraud on the subscribers to the as yet unfinished work, they began simply to reprint the work, promising supplementary volumes. When three volumes were printed the whole was seized in 1770 by the government at the complaint of the clergy, and was lodged in the Bastille. The plan of a second French edition was laid aside then, to be revived twenty years later in a very different form. Foreign editions of the Encyclo- pedic are numerous, and it is difficult to enumerate them correctly. One, with notes by Ottavio Diodati, Dr Sebastiano Paoli and Carlo Giuliani, appeared at Lucca (1758-1771), fol. 17 vols, of text and 10 of plates. Though it was very much expurgated, all engaged in it were excommunicated by the pope in 1759. An attempt made at Siena to publish an Italian translation failed. An addition by the abbe Serafini and Dr Gonnella (Livourne, 1770), &c, fol. 33 vols., returned a profit of 60,000 piastres, and was protected by Leopold II., who secured the pope's silence. Other editions are Geneve, Cramer (1772-1776), a facsimile reprint. Geneve, Pellet (1777-1779), 4to, 36 vols, of text and 3 of plates, with 6 vols, of Mouchon's index (Lyon, 1780), 4to; Geneve et Neufchatel, Pellet (1778-1779), 4to, 36 vols, of text and 3 of plates; Lausanne (1778-1781), 36 vols. 4*0, or 72 octavo, of text and 3 of plates (1779-1780) ; Lausanne et Bern, chez les Societes Typographiques (1780-1782), 36 vols. 8vo of text and 3 vols. 4to of plates (1782). These four editions have the supple- ment incorporated. Fortune Barthelemy de Felice, an Italian monk, born at Rome on the 24th of August 1723, who had been pro- fessor at Rome and Naples, and had become a Protestant, printed a very incorrect though successful edition (Yverdun, 1770-1780) 4to, 42 vols, of text, 5 of supplement and 10 of plates. It professed to be a new work,*

standing in the same relationship to the Encyclopedic as that did to Chambers's, which is far from being the case. Sir Joseph Ayloffe issued proposals, 14th December 1751, for an English translation of the Encyclopedic, to be finished by Christmas. 1756, in 10 vols. 4to, with at least 600 plates. No. 1 appeared in January 1752, but met with little success. Several selections of articles and extracts have been published under the title of L'Esprit de I'Ency- clopedie. The last was by Hennequin (Paris, 1 822-1 823), 8vo, 15 vols. An English selection is Select Essays from the Encyclopedy (London, 1773). 8vo. The articles of most of the principal contributors have been reprinted in the editions of their respective works. Voltaire wrote 8 vols. 8vo of a kind of fragmentary supplement, Questions

sur V Encyclopedic frequently printed, and usually included in editions of his works, together with his contributions to the Encyclo- pedic and his Dictionnaire philosophique. Several special dictionaries have been formed from the Encyclopedic, as the Dictionnaire portatif des arts et metiers (Paris, 1766), 8vo, 2 vols, about I300 pages, by Philippe Macquer, brother of the author of the Diet, de chimie. An enlarged edition by the abbe Jaubert (Paris, 1773), 5 vols. 8vo, 3017 pages, was much valued and often reprinted. The books attacking and defending the Encycloptdie are very many. No original work of the 18th century, says Lanfrey, has been more depreciated, ridiculed and calumniated. It has been called chaos, nothingness, the Tower of Babel, a work of disorder and destruction, the gospel of Satan and even the ruins of Palmyra.

The Encyclopaedia Britannica, " by a society of gentlemen in Scotland, printed in Edinburgh for A. Bell and C. Macfarquhar, and sold by Colin Macfarquhar at his printing office in Nicolson Street," was completed in 1771 in 3 volumes 4to, containing 2670 pages, and 160 copperplates engraved by Andrew Bell. It was published in numbers, of which the two first were issued in December 1768, " price 6d. each, or 8d on a finer paper," and was to be completed in 100 weekly numbers. It was compiled, as the title-page says, on a new plan. The different sciences and arts were " digested into distinct treatises or systems," of which there are 45 with cross headings, that is, titles printed across the page, and about 30 other articles more than three pages long. The longest are " Anatomy," 166 pages, and "Surgery," 238 pages. "The various technical terms, &c, are explained as they occur in the order of the alphabet." " Instead of dismembering the sciences, by attempting to treat them intelligibly under a multitude of technical terms, they have digested the principles of every science in the form of systems or distinct treatises, and explained the terms as they occur iti the order of the alphabet,

with references to the sciences to which they belong." This plan, as the compilers say, differs from that of all the previous dictionaries of arts and sciences. Its merit and novelty consist in the combination of De Coet- logon's plan with that in common use, — on the one hand keeping important subjects together, and on the other facilitating reference by numerous separate articles. It is doubtful to whom the credit of this plan is due. The editor, William Smellie, a printer (born in 1740, died on the 24th of June 1795), afterwards secretary and superintendent of natural history to the Society of Scottish Antiquaries, is said by his biographer to have devised the plan and written or compiled all the chief articles; and he prints, but without date, part of a letter written and signed by Andrew Bell by which he was engaged in the work: — " Sir, As we are engaged in publishing a dictionary of the arts and sciences, and as you have informed us that there are fifteen capital sciences which you will undertake for and write up the subdivisions and detached parts of these conform to your plan, and likewise to prepare the whole work for the press, &c, &c, we hereby agree to allow you £200 for your trouble, &c." Prof. Macvey Napier says that Smellie "was more likely to have suggested that great improvement than any of his known co- adjutors." Archibald Constable, who was interested in the work from 1788, and was afterwards intimately acquainted with Bell, says Colin Macfarquhar was the actual projector of the Encyclo- paedia, and the editor of the two first editions, while Smellie was merely "a contributor for hire" (Memoirs, ii. 311). Dr Gleig, in his preface to the third edition, says: " The idea had been conceived by him (Colin Macfarquhar) and his friend Mr Andrew Bell, engraver. By whom these gentlemen were assisted in digesting the plait which attracted to that work so much public attention, or whether they had any assistance, are ques- tions in which our readers cannot be interested." Macfarquhar, according to Constable, was a person of excellent taste and very general knowledge, though at starting he had little or no capital, and was obliged to associate Bell, then the principal engraver in Edinburgh, as a partner in his undertaking.

The second edition was begun in 1776, and was published in numbers, of which the first was issued on the 21st of June 1777, and the last, No. 181, on the 18th of September 1784, forming 10 vols. 4to, dated 1778 to 1783, and containing 8595 pages and 340 plates. The pagination is continuous, ending

with page 9200, but 295 pages are inserted in various places, and page 7099 is followed by 8000. The number and length of the articles were much increased, 72 have cross headings, and more than 150 others may be classed as long articles. At the end is an appendix (" Abatement " to " Wood ") of 200 pages, containing, under the heading Botanical Table, a list of the 931 genera included in the 58 natural orders of Linnaeus, and followed by a list of 526 books, said to have been the principal authorities used. All the maps are placed together under the article " Geography " (19s pages). Most of the long articles have numbered marginal titles; " Scotland," 84 pages, has 837. " Medicine," 309 pages, and " Pharmacy " have each an index. The plan of the work was enlarged by the addition of history and biography, which encyclopaedias in general had long omitted. " From the time of the second edition of this work, every cyclo- paedia of note, in England and elsewhere, has been a cyclopaedia, not solely of arts and sciences, but of the whole wide circle of general learning and miscellaneous information " (Quarterly Review, cxiii. 362). Smellie was applied to by Bell to edit the second edition, and to take a share of one- third in the work; but he refused, because the other persons concerned in it, at the suggestion of " a very distinguished nobleman of very high rank " (said by Professor Napier to have been the duke of Buccleuch), insisted upon the introduction of a system of general biography which he considered inconsistent with the character of a dictionary of arts and sciences. James Tytler, M.A., seems to have been selected as the next most eligible compiler. His father, a man of extensive knowledge, was 53 years minister of Fearn in Forfarshire, and died in 1785. Tytler (outlawed by the High Court of Justiciary, 7th of January 1793, buried at Salem in Massachusetts on the nth of January 1804, aged fifty-eight) " wrote," says Watt, " many of the scientific treatises and histories, and almost all the minor articles " {BiUiotheca Brit.).

After about a year's preparation, the third edition was announced in 1787; the first number was published early in 1788, and the first volume in October 1788. There were to be 300 weekly numbers, price is. each, forming 30 parts at 10s. 6d. each, and 15 volumes, with 360 plates. It was completed in 1797 in 18 vols. 4to, containing 14,579 pages and 542 plates. Among the multifarious articles represented in the frontispiece, which was required by the traditional fashion of the period, is a balloon. The maps are, as in subsequent editions, distributed among the articles relating to the respective countries. It was edited by Colin Macfarquhar as far as the article " Mysteries " (by Dr Doig, vol. xii.), when he died, on the 2nd of April 1793, in his forty-eighth year, "worn out," says Constable, "by

fatigue and anxiety of mind." His children's trustees and Andrew Bell requested George Gleig of Stirling (consecrated on the 30th of October 1808 assistant and successor to the bishop of Brechin), who had written about twelve articles, to edit the rest of the work; " and for the '■'me, and the limited sum allowed him for the reward of contributors, his part in the work was considered very well done" (Constable, ii. 312). Professor Robison was induced by Gleig to become a contributor. He first revised the article " Optics," and then wrote a series of articles on natural philosophy, which attracted great attention and were long highly esteemed by scientific men. The sub- editors were James Walker (Primus Scotiae Episcopus 27 th of May 1837, died on the 5th of March 1841, aged seventy) until 1795, then James Thomson, succeeded in November 1796 by his brother Thomas, afterwards professor of chemistry at Glasgow, who remained connected with the Encyclopaedia until 1800. According to Kerr {Smellie 's Life, i. 364-365), 10,000 copies were printed, and the profit to the proprietors was £42,000, besides the payments for their respective work in the conduct of the publication as tradesmen, — Bell as engraver of all the plates, and Macfarquhar as sole printer. According to Constable (Memoirs, ii. 312), the impression was begun at 5000 copies, and concluded with a sale of 13,000. James Hunter, " an active bookseller of no character," who had a shop in Middle Row, Holborn, sold the book to the trade, and on his failure Thomson

Bonar, a wine merchant, who had married Bell's daughter, became the seller of the book. He quarrelled with his father-in- law, who would not see him for ten years before his death in 1809. When the edition was completed, the copyright and remaining books were sold in order to wind up the concern, and " the whole was purchased by Bell, who gave £13 a copy, sold all the complete copies to the trade, printed up the odd volumes, and thus kept the work in the market for several years " (Constable,

ii- 3 I2 X

The supplement of the third edition, printed for Thomson Bonar, and edited by Gleig, was published in 1 801 in 2 vols. 4to, containing 1624 pages and 50 copperplates engraved by D. Lizars. In the dedication to the king, dated Stirling, 10th December 1800, Dr Gleig says: " The French Encyclopedic had been accused, and justly accused, of having disseminated far and wide the seeds of anarchy and atheism. If the Encyclo- paedia Britannica shall in any degree counteract the tendency of that pestiferous work, even these two volumes will not be wholly unworthy of your Majesty's attention."

Professor Robison added 19 articles to the series he had begun when the third edition was so far advanced. Professor Playfair assisted in " Mathematics." Dr Thomas Thomson wrote " Chemistry," " Mineralogy " and other articles, in which the use of symbols was for the first time introduced into chemistry; and these articles formed the first outline of his System of Chemistry, published at Edinburgh in 1802, 8vo, 4 vols.; the sixth edition,

1821.

The fourth edition, printed for Andrew Bell, was begun in 1800 or 1801, and finished in 1810 in 20 vols. 4to, containing 16,033 pages, with 581 plates engraved by Bell. The dedication to the king, signed Andrew Bell, is dated Lauristoun, Edinburgh, 1809. The preface is that of the third edition with the necessary alterations and additions in the latter part. No articles were reprinted from the supplement, as Bell had not the copyright. Professor Wallace's articles on mathematics were much valued, and raised the scientific character of the work. Dr Thomas Thomson declined the editorship, and recommended Dr James Millar, afterwards editor of the Encyclopaedia Edinensis (died on the 13th of July 1827). He was fond of natural history and a good chemist, but, according to Constable, slow and dilatory and not well qualified. Andrew Bell died on the 10th of June 1809, aged eighty-three, "leaving," says Constable, "two sets of trustees, one literary to make the money, the other legal to lay it out after it was made." The edition began with 1250 copies and concluded at 4000, of which two-thirds passed through the hands of Constable's firm. Early in 1804 Andrew Bell had offered Constable and his partner Hunter the copyright of the work, printing materials, &c, and all that was then printed of the fourth edition, for £20,000. This offer was in agitation in March 1804, when the two partners were in London. On the 5th of May 1804, after Lord Jeffrey's arrival in Edinburgh, as he relates to Francis Horner, they entrusted him with a design, on which he found that most of his friends had embarked with great eagerness, " for publishing an entire new encyclopaedia upon an improved plan. Stewart, I understand, is to lend his name, and to write the preliminary discourse, besides other articles. Playfair is to superintend the mathematical depart- ment, and Robison the natural philosophy. Thomas Thomson is extremely zealous in the cause. W. Scott has embraced it with great affection. . . . The authors are to be paid at least as well as reviewers, and are to retain the copyright of their articles for separate publication if they think proper " (Cock-burn, Life of Lord Jeffrey, 1852, ii. 90). It was then, perhaps, that Constable gave £100 to Bonar for the copyright of the supplement.

The fifth edition was begun immediately after the fourth as a mere reprint. " The management of the edition, or rather mismanagement, went on under the lawyer trustees for several years, and at last the whole property was again brought to the market by public sale. There were about 1800 copies printed of the five first volumes, which formed one lot, the copyright formed another lot, and so on. The whole was purchased by myself and in my name for between £13,000 and £14,000 , and it was said by the wise

booksellers of Edinburgh and others that I had completely ruined myself and all connected with me by a purchase to such an enormous amount; this was early in 1812 " (Constable, ii. 314). Bonar, who lived next door to the printing office, thought he could con- duct the book, and had resolved on the purchase. Having a good deal of money, he seemed to Constable a formidable rival, whose alliance was to be secured. After " sundry interviews " it was agreed that Constable should buy the copyright in his own name, and that Bonar should have one-third, and also one-third of the copyright of the supplement, for which he gave £200. Dr James Millar cor- rected and revised the last 15 volumes. The preface is dated the 1st of December 18 14. The printing was superintended by Bonar, who died on the 26th of July 1814. His trustees were repaid his advances on the work, about £6000, and the copyright was valued at £11,000, of which they received one-third, Constable adding £500, as the book had been so extremely successful. It was published in 20 vols., 16,017 pages, 582 plates, price £36, and dated 1817.

Soon after the purchase of the copyright, Constable began to prepare for the publication of a supplement, to be of four or, at the very utmost, five volumes. " The first article arranged for was one on ' Chemistry ' by Sir Humphry Davy, but he went abroad [in October 1813] and I released him from his engagement, and employed Mr Brande; the second article was Mr Stewart's Dissertation, for which I agreed to pay him £1000, leaving the extent of it to himself, but with this understanding, that it was not to be under ten sheets, and might extend to twenty " (Constable, ii. 318). Dugald Stewart, in a letter to Constable, the 15th of November 1812, though he declines to engage to execute any of his own suggestions, recommends that four discourses should " stand in front," forming " a general map of the various departments of human knowledge," similar to " the excellent discourse prefixed by D'Alembert to the French Encyclopedic,"

together with historical sketches of the progress since Bacon's time of modern discoveries in metaphysical, moral and political philosophy, in mathematics and physics, in chemistry, and in zoology, botany and mineralogy. He would only promise to undertake the general map and the first historical sketch, if his health and other engagements permitted, after the second volume of his Philosophy of the Human Mind (published in 18 13) had gone to press. For the second he recommended Playfair, for chemistry Sir Humphry Davy. He received £1000 for the first part' of his dissertation (166 pages), and £700 for the second (257 pages), the right of publication being limited to the Supplement and Encyclo- paedia. Constable next contracted with Professor Playfair for a dissertation " to be equal in length or not to Mr Stewart's, for £250; but a short time afterwards I felt that to pay one eminent individual £1000 because he would not take less would be quite unfair, and 1 wrote to the worthy Professor that I had fixed his payment at £500." Constable gave him £500 for the first part (127 pages), and would have given as much for the second (90 pages) if it had been as long. His next object was to find out the greatest defects in the book, and he gave Professor Leslie £200 and Graham Dalyell £100 for looking over it. He then wrote out a prospectus and submitted it in print to Stewart, " but the cautious philosopher referred " him to Play- fair, who " returned it next day very greatly improved." For this Constable sent him six dozen of very fine old sherry, only feeling regret that he had nothing better to offer. He at first intended to have two editors, " one for the strictly literary and the other for the scientific department." He applied to Dr Thomas Brown, who " preferred writing trash of poetry to useful and lucrative employ- ment." At last he fixed on Mr Macvey Napier (born 1777). whom he had known from 1798, and who " had been a hard student, and at college laid a good foundation for his future Career, though more perhaps in general information than in what would be, strictly speaking, called scholarship; this, however, does not fit him the less for his present task." Constable, in a letter dated the nth of June 1813, offered him £300 before the first part went to press, £150 on the completion at press of each of the eight half volumes, £500 if the work was reprinted or extended beyond 7000 copies and £200 for incidental expenses. " In this way the composition of the four volumes, including the introductory dissertations, will amount to considerably more than £9000." In a postscript the certain payment is characteristically increased to £l575. the contingent to £735, and the allowance for incidental expenses to £300 (Constable, ii. 326). Napier went to London, and obtained the co-operation of many literary men. The supplement was published in half-volume parts from December 1816 to April 1824. It

formed six volumes 4to, containing 4933 pages, 125 plates, 9 maps, three dissertations and 669 articles, of which a list is given at the end. The first disser- tation, on the " progress of metaphysical, ethical and political philo- sophy," was by Stewart, who completed his plan only in respect to metaphysics. He had thought it would be easy to adapt the in- tellectual map or general survey of human knowledge, sketched by Bacon and improved by D'Alembert, to the advanced state_ of the sciences, while its unrivalled authority would have softened criticism. But on closer examination he found the logical views on which this systematic arrangement was based essentially erroneous ; _ and, doubting whether the time had come for a successful repetition of this bold experiment, he forebore to substitute a new scheme of his own. Sir James Mackintosh characterized this discourse as " the most splendid of Mr. Stewart's works, a composition which no other

living writer of English prose has equalled" (Edinburgh Review, xxvii. 191, September 1816). The second dissertation, " On the progress of mathematics and physics," was by Playfair, who died 19th July 1819, when he had only finished the period of Newton and Leibnitz. The third, by Professor Brande, " On the progress of Chemistry from the early middle ages to 1800," was the only one completed. These historical dissertations were admirable and delightful compositions, and important and interesting additions to the Encyclopaedia ; but it is difficult to see why they should form a separate department distinct from the general alphabet. The preface, dated March 1824, begins with an account of the more important previous encyclopaedias, relates the history of this to the sixth edition, describes the preparation for the supplement and gives an " outline of the contents," and mentions under each great division of knowledge the principal articles and their authors' names, often with remarks on the characters of both. Among the distinguished contributors were Leslie, Playfair, Ivory, Sir John Barrow, Tredgold, Jeffrey, John Bird Sumner, Blanco White, Hamilton Smith and Hazlitt. Sir Walter Scott, to gratify his generous friend Constable, laid aside Waverley, which he was completing for publication, and in April and May 1814 wrote " Chivalry." He also wrote " Drama " in November 1818, and " Romance " in the summer of 1823. As it seemed to the editor that encyclopaedias had previously attended little to political philosophy, he wrote " Balance of Power," and procured from James Mill " Banks for Savings," " Education," " Law of Nations," " Liberty of the Press," and other articles, which, reprinted cheaply, had a wide circulation. M'Culloch wrote " Corn Laws," " Interest," " Money," " Political Economy," &c. Mr Ricardo

wrote " Commerce " and " Funding System," and Professor Malthus, in his article " Population," gave a compre- hensive summary of the facts and reasonings on which his theory rested. In the article " Egypt " Dr Thomas Young " first gave to the public an extended view of the results of his successful inter- pretation of the hieroglyphic characters on the stone of Rosetta," with a vocabulary of 221 words in English, Coptic, Hieroglyphic and Enchorial, engraved on four plates. There were about 160 biographies, chiefly of persons who had died within the preceding 30 years. Constable " wished short biographical notices of the first founders of this great work, but they were, in the opinion of my editor, too insignificant to entitle them to the rank which such separate notice, it was supposed, would have given them as literary men, although his own consequence in the world had its origin in their exertions " {Memoirs, ii. 326). It is to be regretted that this wish was not carried out, as was done in the latter volumes of Zedler. Arago wrote " Double Refraction " and " Polarization of Light," a note to which mentions his name as author. Playfair wrote " Aepinus," and " Physical Astronomy." Biot wrote " Electricity " and " Pendulum." He " gave his assistance with alacrity," though his articles had to be translated. Signatures, on the plan of the Encyclopedie, were annexed to each article, the list forming a triple alphabet, A to XXX, with the full names of the 72 contributors arranged apparently in the order of their first occurrence. At the end of vol. vi. are Addenda and Corrigenda, including " Inter- polation," by Leslie, and " Polarization of Light," by Arago.

The sixth edition, " revised, corrected and improved," appeared in half-volume parts, price 16s. in boards, vol. xx. part ii. com- pleting the work in May 1823. Constable, thinking it not wise to reprint so large a book year after year without correction, in 1820 selected Mr Charles Maclaren (1782-1866), as editor. " His atten- tion was chiefly directed to the historical and geographical articles. He was to keep the press going, and have the whole completed in three years." He wrote " America," " Greece," " Troy," &c. Many of the large articles as " Agriculture," " Chemistry," " Con- chology," were new or nearly so; and references were given to the supplement. A new edition in 25 vols, was contemplated, not to be announced till a certain time after the supplement was finished ; but Constable's house stopped payment on the 19th of January 1826, and his copyrights were sold by auction. Those of the Encyclo- paedia were bought by contract, on the 16th of July 1828, for £6150, by Thomas Allan, proprietor of the Caledonian Mercury, Adam Black, Abram Thomson, bookbinder, and Alexander Wight, banker, who, with the

trustee of Constable's estate, had previously begun the seventh edition. Not many years later Mr Black purchased all the shares and became sole proprietor.

The seventh edition, 21 vols. 4to (with an index of 187 pages, compiled by Robert Cox), containing 17,101 pages and 506 plates, edited by Macvey Napier, assisted by James Browne, LL.D., was begun in 1827, and published from March 1830 to January 1842. It was reset throughout and stereotyped. Mathematical diagrams were printed in the text from woodcuts. The first half of the preface was nearly that of the supplement. The list of signatures, contain- ing 167 names, consists of four alphabets with additions, and differs altogether from that in the supplement: many names are omitted, the order is changed and 103 are added. A list follows of over 300 articles, without signatures, by 87 writers. The dissertations — 1st, Stewart's, 289 pages; 2nd, "Ethics" (136 pages), by Sir James Mackintosh, whose death prevented the addition of " Political Philosophy "; 3rd, Playfair's, 139 pages; 4th, its continuation by Sir John Leslie, 100 pages — and their index of 30 pages, fill vol. i. As they did not include Greek philosophy, " Aristotle," " Plato "

and " Socrates " were supplied by Dr Hampden, afterwards bishop of Hereford. Among the numerous contributors of eminence, mention may be made of Sir David Brewster, Prof. Phillips, Prof. Spalding, John Hill Burton, Thomas De Quincey, Patrick Fraser Tytler, Capt. Basil Hall, Sir Thomas Dick Lauder, Antonio Panizzi, John Scott Russell and Robert Stephenson. Zoology was divided into II chief articles, " Mammalia," " Ornithology," " Reptilia," " Ich- thyology," " Mollusca," " Crustacea," " Arachnides," "Entomology," " Helminthology," " Zoophytes," and "Animalcule" — all by James Wilson.

*The eighth edition, 1853-1860, 4*0, 21 vols, (and index of 239 pages, 1861), containing 17,957 pages and 403 plates, with many woodcuts, was edited by Dr Thomas Stewart Traill, professor of medical jurisprudence in Edinburgh University. The dissertations were reprinted, with one on the " Rise, Progress and Corruptions of Christianity " (97 pages), by Archbishop Whately, and a con- tinuation of Leslie's to 1850, by Professor James David Forbes, 198 pages, the work of nearly three years, called by himself his " magnum opus " {Life, pp. 361, 366). Lord Macaulay, Charles*

Kingsley, Isaac Taylor, Hepworth Dixon, Robert Chambers, Rev. Charles Merivale, Rev. F. W. Farrar, Sir John Richardson, Dr Scoresby, Dr Hooker, Henry Austin Layard, Edw. B. Eastwick, John Crawfurd, Augustus Petermann, Baron Bunsen, Sir John Herschel, Dr Lankester, Professors Owen, Rankine, William Thomson, Aytoun, Blackie, Daniel Wilson and Jukes, were some of the many eminent new contributors found among the 344 authors, of whom an alphabetical list is given, with a key to the signatures. In the preface a list of 279 articles by 189 writers, classed under 15 heads, is given. This edition was not wholly reset like the seventh, but many long articles were retained almost or entirely intact.

The publication of the ninth edition (A. & C. Black) was commenced in January 1875, under the editorship of Thomas Spencer Baynes until 1880, and subsequently of W. Robertson Smith, and completed in 1889, 24 vols., with index. This great edition retained a certain amount of the valuable material in the eighth, but was substantially ˆ new work; and it was universally acknowledged to stand in the forefront of the scholarship of its time. Its contributors included the most distinguished men of letters and of science. In 1898 a reprint, sold at about half the original price, and on the plan of payment by instalments, was issued by The Times of London; and in 1902, under the joint editorship of Sir Donald Mackenzie Wallace, President Arthur T. Hadley of Yale University, and Hugh Chisholm, eleven supplementary volumes were published, forming, with the 24 vols, of the ninth edition, a tenth edition of 35 volumes. These included a volume of maps, and an elaborate index (vol. 35) to the whole edition, comprising some 600,000 entries. In May 1903 a start was made with the preparation of the nth edition, under the general editorship of Hugh Chisholm, with W. Alison Phillips as chief assistant-editor, and a staff of editorial assistants, the whole work of organization being conducted up to December 1909 from The Times office. Arrangements were then made by which the copyright and control of the Encyclopaedia Britannica passed to Cambridge University, for the publication at the University Press in 1910-1911 of the 29 volumes (one being Index) of the nth edition, a dis- tinctive feature of this issue being the appearance of the whole series of volumes practically at the same time.

A new and enlarged edition of the Encyclopedic arranged as a system of separate dictionaries, and entitled Encyclopidie methodique ou par ordre de matieres, was undertaken by Charles Joseph Panckoucke, a publisher of Paris (born at Lille on the 26th of November 1736, died on the 19th of December 1798). His privilege was dated the 20th of June 1780. The articles belonging to different

subjects would readily form distinct dictionaries, although, having been constructed for an alpha- betical plan, they seemed unsuited for any system wholly methodical. Two copies of the book and its supplement were cut up into articles, which were sorted into subjects. The division adopted was: 1, mathematics; 2 physics; 3, medicine; 4, anatomy and physiology; 5, surgery; 6, chemistry, metal- lurgy and pharmacy; 7, agriculture; 8, natural history of animals, in six parts; 9, botany; 10, minerals; 11, physical geography; 12, ancient and modern geography; 13, antiquities; 14, history; 15, theology; 16, philosophy; 17, metaphysics, logic and morality; 18, grammar and literature; 19, law; 20, finance; 21, political economy; 22, commerce; 23, marine; 24, art militaire; 25, beaux arts; 26, arts et metiers — all forming distinct dictionaries entrusted to different editors. The first object of each editor was to exclude all articles belonging to other subjects, and to take care that those of a doubtful nature should not be omitted by all. In some words (such as air, which belonged equally to chemistry, physics and medicine)

the methodical arrangement has the unexpected effect of break- ing up the single article into several widely separated. Each dictionary was to have an introduction and a classified table of the principal articles. History and its minor parts, as inscrip- tions, fables, medals, were to be included. Theology, which was neither complete, exact nor orthodox, was to be by the abbe Bergier, confessor to Monsieur. The whole work was to be completed and connected together by a Vocabulaire Universel,

1 vol. 4to, with references to all the places where each word occurred, and a very exact history of the Encyclopedic and its editions by Panckoucke. The prospectus, issued early in 1782, proposed three editions—84 vols. 8vo, 43 vols. 4to with 3 columns to a page, and 53 vols. 4to of about 100 sheets with 2 columns to a page, each edition having 7 vols. 4to of 250 to 300 plates each. The subscription was to be 672 livres from the 15th of March to July 1782, then 751, and 888 after April 1783. It was to be issued in livraisons of 2 vols, each, the first (jurisprudence, vol. i., literature, vol. i.) to appear in July 1782, and the whole to be finished in 1787. The number of subscribers, 4072, was so great that the subscription list of 672 livres was closed on the 30th of April. Twenty-five printing offices were employed, and in November 1782 the 1st livraison (jurisprudence, vol. L, and half vol. each of arts et metiers and histoire naturelle) was issued. A Spanish prospectus was sent out, and obtained 330 Spanish subscribers, with the inquisitor-general at their head. The complaints of the subscribers and his own heavy advances, over 150,000 livres, induced Panckoucke, in

November 1788, to appeal to the authors to finish the work. Those en retard made new contracts, giving their word of honour to put their parts to press in 1788, and to continue them without interruption, so that Panckoucke hoped to finish the whole, including the vocabulary (4 or 5 vols.), in 1792. Whole sciences, as architecture, engineering, hunting, police, games, &c, had been over- looked in the prospectus; a new division was made in 44 parts, to contain 51 dictionaries and about 124 vols. Permission was obtained on the 27th of February 1789, to receive subscriptions for the separate dictionaries. Two thousand subscribers were lost by the Revolution. The 50th livraison appeared on the 23rd of July 1792, when all the dictionaries eventually published had been begun except seven — jeux familiers and mathematiques, physics, art oratoire, physical geography, chasses and peches; and 18 were finished, — mathematics, games, surgery, ancient and modern geography, history, theology, logic, grammar, jurisprudence, finance, political economy, commerce, marine, arts militaires, arts academiques, arts et metiers, encyclopediana. Supplements were added to military art in 1797, and to history in 1807, but not to any of the other 16, though required for most long before 1832. The publication was continued by Henri Agasse, Panckoucke's son-in-law, from 1794 to 1813, and then by Mme Agasse, his widow, to 1832, when it was completed in 102 livraisons or 337 parts, forming 1665 vols, of text, and 51 parts containing 6439 plates. The letterpress issued with the plates amounts to 5458 pages, making with the text 124,210 pages. To save expense the plates belonging to architecture were not published. Pharmacy (separated from chemistry), minerals, education, pouts et chaussees had been announced but were not published, neither was the Vocabulaire Universel, the key and index to the whole work, so that it is difficult to carry out any research or to find all the articles on any subject. The original parts have been so often subdivided, and have been so added to by other dictionaries, supplements and appendices, that, without going into great detail, an exact account cannot be given of the work, which contains 88 alphabets, with 83 indexes, and 166 introductions, discourses, prefaces, &c. Many dictionaries have a classed index of articles; that of economie politique is very excellent, giving the contents of each article, so that any passage can be found easily. The largest dictionaries are medicine, 13 vols., 10,330 pages; zoology, 7 dictionaries, 13)ˆ45 pages, 1206 plates; botany, 12,002 pages, 1000 plates (34 only of cryptogamic plants); geography, 3 dictionaries and

2 atlases, 9090 pages, 193 maps and plates; jurisprudence (with

police and municipalities), 10 vols., 7607 pages. Anatomy,

4 vols., 2866 pages, is not a dictionary but a series of systematic treatises. Assemblee Nationale was to be in three parts, — (1) the history of the Revolution, (2) debates, and (3) laws and decrees. Only vol. ii., debates, appeared, 1792, 804 pages, Absens to Aurillac. Ten volumes of a Spanish translation with a vol. of plates were published at Madrid to 1806 — viz. historia natural, i. ii.; grammatica, i.; arte militar, i., ii.; geografia, i.-iii.; fabricas, i., ii., plates, vol. i. A French edition was printed at Padua, with the plates, says Peignot, very carefully engraved. Probably no more unmanageable body of dictionaries has ever been published except Migne's Encyclopedic Mologique, Paris, 1844-1875, 4to, 168 vols., 101 dictionaries, 119,059 pages.

No work of reference has been more useful and successful, or more frequently copied, imitated and translated, than that known as the Conversations Lexikon of Brockhaus. It was begun as Conversations Lexikon mil vorziiglicher Rucksicht auf die gegenwdrtigen Zeiten, Leipzig, 1796 to 1808, 8vo, 6 vols., 2762 pages, by Dr Gotthelf Renatus Lobel (born on the 1st of April 1767 at Thalwitz near Wurzen in Saxony, died on the 14th of February 1799), who intended to supersede Hiibner, and included geography, history, and in part biography, besides mythology, philosophy, natural history, &c. Vols, i.-iv. (A to R) appeared 1796 to 1800, vol. v. in 1806. Friedrich Arnold Brockhaus (q.v.) bought the work with its copyright on the 25th of October 1808, for 1800 thalers from the printer, who seems to have got it in payment of his bill. The editor, Christian Wilhelm Franke, by contract dated the 16th of November, was to finish vol. vi. by the 5th of December, and the already projected supplement, 2 vols., by Michaelmas 1809, for 8 thalers a printed sheet. No penalty was specified, but, says his grandson, Brockhaus was to learn that such contracts, whether under penalty or not, are not kept, for the supplement was finished only in 181 1. Brockhaus issued a new impression as Conversations Lexikon oder kurzgefasstes Handworterbuck, &c, 1809-1811, and on removing to Altenburg in 181 1 began himself to edit the 2nd edition (1812-1819, 10 vols.), and, when vol. iv. was published, the 3rd (1814-1819). He carried on both editions together until 181 7, when he removed to Leipzig, and began the 4th edition as Allgemeine deutsche Real- encyclopadie fur die gebildeten Stande. Conversations Lexikon. This title was, in

the 14th edition, changed to that of Brockhaus' Konversations Lexicon. The 5th edition was at once begun, and was finished in eighteen months. Dr Ludwig Hain assisted in editing the 4th and 5th editions until he left Leipzig in April 1820, when Professor F. C. Hasse took his place. The 12,000 copies of the 5th edition being exhausted while vol. x. was at press, a 2nd unaltered impression of 10,000 was required in 1820 and a 3rd of 10,000 in 1822. The 6th edition, 10 vols., was begun in September 1822. Brockhaus died in 1823, and his two eldest sons, Friedrich and Heinrich, who carried on the business for the heirs and became sole possessors in 1829, finished the edition with Hasse's assistance in September 1823. The 7th edition (1827-1829, 12 vols., 10,489 pages, 13,000 copies, 2nd impression 14,000) was edited by Hasse. The 8th edition (1833-1836, 1 2 vols., 10,689 pages, 3 1 ,000 copies to 1842) , begun in the autumn of 1832, ended May 1837, was edited by Dr Karl August Espe (born February 1804, died in the Irrenanstalt at Stotteritz near Leipzig on the 24th of November 1850) with the aid of many learned and distinguished writers. A general index, Universal Register, 242 pages, was added in 1839. The 9th edition (1843- 1847, 15 vols., 11,470 pages, over 30,000 copies) was edited by Dr Espe. The 10th edition (1851-1855, 12,564 pages) was also in 15 vols., for convenience in reference, and was edited by Dr August Kurtzel aided by Oskar Pilz. Friedrich Brockhaus had retired in 1849; Dr Heinrich Edward, the elder son of Heinrich, made partner in 1854, assisted in this edition, and Heinrich Rudolf, the younger son, partner since 1863, in the nth (1864-1868, 15 vols, of 60 sheets, 13,366 pages).

Kurtzel died on the 24th of April 1 87 1, and Pilz was sole editor until March 1872, when Dr Gustav Stockmann joined, who was alone from April until joined by Dr Karl Wippermann in October. Besides the Universal Register of 136 pages and about 50,000 articles, each volume has an index. The supplement, 2 vols, 1764 pages, was begun in February l87l,and finished in April 1873. The I2th edition, begun in 1875, was completed in 1879 in 15 vols., the 13th

edition (1882-1887), in 16 vols., and the 14th (1901-1903) in 16 vols, with a supplementary volume in 1904. The Conversations Lexicon is intended, not for scientific use, but to promote general mental improvement by giving the results of research and discovery in a simple and popular form without extended details. The articles, often too brief, are very excellent and trustworthy, especially on German subjects, give references to the best books, and include biographies of living men.

One of the best German encyclopaedias is that of Meyer, Neues Konversations-Lexicon. The first edition, in 37 vols., was published in 1839-1852. The later editions, following closely the arrangement of Brockhaus, are the 4th (1885-1890, 17 vols.), the 5th (1894-1898, 18 vols.), and the 6th (begun in 1902).

The most copious German encyclopaedia is Ersch and Gruber's Allgemeine Encyklopddie der Wissenschaften und Kiinste, Leipzig. It was designed and begun in 1813 by Professor Johann Samuel Ersch (born at Gross Glogau on the 23rd of June 1766, chief librarian at Halle, died on the 16th of January 1828) to satisfy the wants of Germans, only in part supplied by foreign works. It was stopped by the war until 1816, when Professor Hufeland (born at Danzig on the 19th of October 1760) joined, but he died on the 25th of November 18 17 while the specimen part was at press. The editors of the different sections at various times have been some of the best-known men of learning in Germany, in- cluding J. G. Gruber, M. H. E. Meier, Hermann Brockhaus, W. Miiller and A. G. Hoffmann of Jena.

The work is divided into three sections (1) A-G, of which 99 vols, had appeared by 1905, (2) H-N, 43 vols., (3) O-Z, 25 vols. All articles bear the authors' names, and those not ready in time were placed at the end of their letter. The longest in the work is Griechenland, vols. 80-87, 3668 pages, with a table of contents. It began to appear after vol. 73 (Gotze to Gondouin), and hence does not come in its proper place, which is in vol. 91. Gross Britannien contains 700 pages, and Indien by Benfey 356.

The Encyclopaedia Metropolitans (London, 1845, 4to, 28 vols., issued in 59 parts in 1817-1845, 22,426 pages, 565 plates) pro- fessed to give sciences and systematic arts entire and in their natural sequence, as shown in the introductory treatise on method by S. T. Coleridge. " The plan was the proposal of the poet Coleridge, and it had at least enough of a poetical character to be eminently unpractical " (Quarterly Review, cxiii., 379). However defective the plan, the excellence of many of the treatises by Archbishop Whately, Sir John Herschel, Professors Barlow, Peacock, de Morgan, &c, is undoubted. It is in four divisions, the last only being alphabetical: — I. Pure Sciences, 2 vols., 1813 pages, 16 plates, 28 treatises, includes grammar, law and theology; II. Mixed and Applied Sciences, 8 vols., 5391 pages, 437 plates, 42 treatises, including fine arts, useful arts, natural history and its " application," the medical sciences; III. History and Biography, 5 vols., 4458 pages, 7 maps, con- taining biography (135 essays) chronologically arranged (to Thomas Aquinas in vol. 3), and interspersed with (210) chapters on

history (to 181 5), as the most philosophical, interesting and natural form (but modern lives were so many that the plan broke down, and a division of biography, to be in 2 vols., was announced but not published); IV. Miscellaneous, 12 vols., 10,338 pages, 105 plates, including geography, a dictionary of English (the first form of Richardson's) and descriptive natural history. The index, 364 pages, contains about 9000 articles. A re-issue in 38 vols. 4to, was announced in 1849. Of a second edition 42 vols. 8vo, 14,744 pages, belonging to divisions i. to iii., were published in 1849-1858.

The very excellent and useful English Cyclopaedia (London, 1854-1862, 4to, 23 vols., 12,117 pages; supplements, 1860-1873, 4 vols., 2858 pages), conducted by Charles Knight, based on the Penny Cyclopaedia (London, 1833-1846, 4to, 29 vols., 15,625 pages), of which he had the copyright, is in four divisions all alphabetical, and evidently very unequal as classes: — 1, geography; 2, natural history; 3, biography (with 703 lives of living persons); 4, arts and sciences. The synoptical index, 168 pages, has four columns on a page, one for each division, so that the order is alphabetical and yet the words are classed.

Chambers's Encyclopaedia (Edinburgh, W. & R. Chambers), 1860-1868, 8vo, 10 vols., 8283 pages, edited in part by the publishers, but under the charge of Dr Andrew Findlater as " acting

editor " throughout, was founded on the ioth edition of Brockhaus. A revised edition appeared in 1874, 8320 pages. In the iist of 1 26 contributors were J.H. Burton, Emmanuel DeUtsch, Professor Goldstiicker, &c. The index of matters not having special articles contained about 1500 headings. The articles were gener- ally excellent, more especially on Jewish literature, folk-lore and practical science; but, as in Brockhaus, the scope of the work did not allow extended treatment. A further revision took place, and in 1888-189 2 an entirely new edition was published, in 10 vols., still further new editions being issued in 1895 and in

1901.

An excellent brief compilation, the Harmsworth Encyclopaedia (1905), was published in 40 fortnightly parts (sevenpence each) in England, and as Nelson's Encyclopaedia (revised) in 12 vols. (1906)

in America. It was originally prepared for Messrs Nelson of Edinburgh and for the Carmelite Press, London.

In the United States various encyclopaedias have been published, but without rivalling there the Encyclopedia Britan- nica, the 9th edition of which was extensively pirated. Several American Supplements were also issued.

The New American Cyclopaedia, New York (Appleton & Co.), 1858-1863, 16 vols., 12,752 pages, was the work of the editors, George Ripley and Charles Anderson Dana, and 364 contributors, chiefly American. A supplementary work, the American Annual Cyclopaedia, a yearly 8vo vol. of about 800 pages and 250 articles, was started in 1861, but ceased in 1902. In a new edition, the American Cyclopaedia, 1873-1876, 8vo, 16 vols., 13,484 pages, by the same editors, 4 associate editors, 31 revisers and a librarian, each article passed through the hands of 6 or 8 revisers.

Other American encyclopaedias are Alvin J. Johnson's New Universal Cyclopaedia, 1875-1877, in 4 vols., a new edition of which (excellently planned) was published in 8 vols., 1893-1895, under the name of Johnson's Universal Cyclopaedia; the Encyclo- paedia Americana, edited by Francis Lieber, which appeared in 1839-1847 in 14 vols.; a new work under the same title, pub- lished in 1903-1904 in 16 vols.; the International Cyclopaedia, first published in 1884 (revised in 189 1, 1894 and 1898), and superseded in 1902 (revised, 1906) by the New International Encyclopaedia in 1 7 vols.

In Europe a great impetus was given to the compilation of encyclo- paedias by the appearance of Brockhaus' Conversations-Lexicon (see above), which, as a begetter of these works, must rank, in the 19th century, with the Cyclopaedia of Ephraim Chambers in the 18th. The following, although in no sense an exhaustive list, may be here mentioned. In France, Le Grand Dictionnaire universel du XIX' siecle, of Pierre Larousse (15 vols., 1866-1876), with supplementary volumes in 1877, 1887 and 1890; the Nouveau Larousse illustre, dictionnaire universel encyclopedique (7 vols., 1901-1904), (this is in no way a re-issue or an abridgment of Le Grand Dictionnaire of Pierre Larousse) ; La Grande Encyclopedic, inventaire raisonni des sciences, des lettres, et des arts, in 31 vols. (1886-1903). In Italy, the Nuova Enciclopedia Italiana (14 vols., 1841-1851, and in 25 vols., 1875-1888). In Spain, the Diccionario enciclopedico Hispano-Americano de litteratura, ciencias y artes, published at Barcelona (25 vols., 1 877- 1 899). The Russian encyclopaedia, Russkiy Enlsi-

klopedicheskiy Slovar (41 vols., 1905, 2 supplementary vols., 1908) was begun in 1890 as a Russian version of Brockhaus' Conversations- Lexicon, but has become a monumental encyclopaedia, to which all the best Russian men of science and letters have contributed. Elaborate encyclopaedias have also appeared in the Polish, Hun- garian, Bohemian and Rumanian languages. Of Scandinavian encyclopaedias there have been re-issues of the Nordesk Conver- sations-Lexicon, first published in 1858-1863, and of the Svenskt Conversations-Lexicon, first published in 1845-1851.

ENDECOTT, JOHN (c. 1 588-1665), English colonial governor in America, was born probably at Dorchester, Dorsetshire, England, about 1588. Little is known of him before 1628, when he was one of the six " joint adventurers " who purchased from the Plymouth Company a strip of land about 60 m. wide along the Massachusetts coast and extending westward to the Pacific Ocean. By his associates Endecott was entrusted with the responsibility of leading the first colonists to the region, and with some sixty persons proceeded to Naumkeag (later Salem) where Roger Conant, a seceder from the colony at Plymouth, had begun a settlement two years earlier. Endecott experienced some trouble

with the previous settlers and with Thomas Morton's settlement at "Merry Mount" (Mount Wollaston, now Quincy), where, in accordance with his strict Puritanical tenets, he cut down the maypole and dispersed the merrymakers. He was the local governor of the Massachusetts Bay Colony from the 30th of April 1629 to the 12th of June 1630, when John Winthrop, who had succeeded Matthew Cradock as governor of the company on the 20th of October 1629, brought the charter to Salem and became governor of the colony as well as of the company. In the years immediately following he continued to take a prominent part in the affairs of the colony, serving as an assistant and as a military commissioner, and commanding, although with little success, an expedition against the Pequots in 1636. At Salem he was a member of the congregation of Roger Williams, whom he resolutely defended in his trouble with the New England clerical hierarchy, and excited by Williams's teachings, cut the cross of St George from the English flag in token of his hatred of all symbols of Romanism. He was deputy-governor in 1641- 1644, and governor in 1644-1645, and served also as sergeant- major-general (commander-in-chief) of the militia and as one of the commissioners of the United Colonies of New England,- of which in 1658 he was president. On the death of John Win- throp in 1649 he became governor, and by annual re-elections served continuously

until his death, with the exception of two years (1650-1651 and 1654-1655), when he was deputy-governor. Under his authority the colony of Massachusetts Bay made rapid progress, and except in the matter of religious intolerance— he showed great bigotry and harshness, particularly towards the Quakers — his rule was just and praiseworthy. Of him Edward Eggleston says: " A strange mixture of rashness, pious zeal, genial manners, hot temper, and harsh bigotry, his extravagances supply the condiment of humour to a very serious history — it is perhaps the principal debt posterity owes him." He died on the 15th of March 1665.

See C. M. Endicott, Memoirs of John Endecott (Salem, 1847), and a " Memoir of John Endecott " in Antiquarian Papers of the American Antiquarian Society (Worcester, Mass., 1879).

A lineal descendant, William Crowninshield Endicott (1826-1900), graduated at Harvard in 1847, was a justice of the Massachusetts supreme court in 1873-1882, and was secretary of war in President Cleveland's cabinet from 1885 to 1889. His daughter, Mary Crowninshield Endicott, was married to the English statesman Mr Joseph Chamberlain in 1888.

ENDIVE, Cichorium Endivia, an annual esculent plant of the natural order Compositae, commonly reputed to have been introduced into Europe from the East Indies, but, according to some authorities, more probably indigenous to Egypt. It has been cultivated in England for more than three hundred years, and is mentioned by John Gerarde in his Herbal (1597). There are numerous varieties of the endive, forming two groups, namely, the curled or narrow-leaved (var. crispa), and the Batavian or broad-leaved (var. latifolia), the leaves of which are not curled. The former varieties are those most used for salads, the latter being grown chiefly for culinary purposes. The plant requires a light, rich and dry soil, in an unshaded situation. In the climate of England sowing for the main crop should begin about the second or third week in June; but for plants required to be used young it may be as early as the latter half of April, and for winter crops up to the middle of August. The seed should be finely spread in drills 4 in. asunder, and then lightly covered. After reaching an inch in height the young plants are thinned; and when about a month old they may be placed out at distances of 12 or 15 in., in drills 3 in. in depth, care being taken in removing them from the seed-bed to disturb their roots as little as possible. The Batavian require more room than the curled-leaved varieties. Transplantation, where early crops are required, has been found inadvisable. Rapidity of growth is promoted by the application of liquid manures. The

bleaching of endive, in order to prevent the development of the natural bitter taste of the leaves, and to improve their appearance, is begun about three months after the sowing, and is best effected either by tying the outer leaves around the inner, or, as in damp seasons, by the use of the

oleaching-pot. The bleaching may be completed in ten days or so in summer, but in winter it takes three or four weeks. For late crops, protection from frost is requisite; and to secure fine winter endive, it has been recommended to take up the full- grown plants in November, and to place them under shelter, in a soil of moderately dry sand or of half-decayed peat earth. Where forcing-houses are employed, endive may be sown in January, so as to procure by the end of the following month plants ready for use.

ENDOEUS, an early sculptor, who worked at Athens in the middle of the 6th century B.C. We are told that he made an image of Athena dedicated by Callias the contemporary of Pisistratus at Athens about 564 B.C. An inscription bearing his name has been found at Athens, written in Ionian dialect. The tradition which made him a pupil of Daedalus is apparently misleading, since Daedalus had no connexion with Ionic art.

ENDOGAMY (Gr. ivhov, within, and 7&/KW, marriage), marriage within the tribe or community, the term adopted to express the custom compelling those of a tribe to marry among themselves. Endogamy was probably characteristic of the very early stages of social organization (see Family), and is to-day found only among races low in the scale of civilization. As a custom it is believed to have been preceded in most lands by the far more general rule of Exogamy (q.v.). Lord Avebury (Origin of Civilisation, p. 154) points out that " there is not the opposition between exogamy and endogamy which Mr McLennan supposed." Some races which are endogamous as regards the tribe are exogamous as regards the gens. Thus the Abors, Kochs, Hos and other peoples of India, are forbidden to marry out of the tribe; but the tribe itself is divided into " keelis " or clans, and no man is allowed to take as wife a girl of his own " keeli." Endogamy must have in most cases arisen from racial pride, and a contempt, either well or ill founded, for the surrounding peoples.

Among the Ahtena of Alaska, though the tribes are extremely militant and constantly at war, the captured women are never made wives, but are used as slaves. Endogamy also prevails among tribes of Central America. With the Yerkalas of southern India a custom prevails by which the first two daughters of a family may be claimed by the maternal uncle as wives for his sons. The value of a wife is fixed at twenty pagodas (a 16th-century Indian coin equivalent to about five shillings), and should the uncle forgo his claim he is entitled to share in the price paid for his nieces. Among some of the Karen tribes marriages between near relatives are usual. The Douignaks, a branch of the Chukmas, seem to have practised endogamy; and they " abandoned the parent stem during the chief ship of Janubrix Khan about 1782. The reason of this split was a disagreement on the subject of marriages. The chief passed an order that the Douignaks should intermarry with the tribe in general. This was contrary to an ancient custom and caused discontent and eventually a break in the tribe " (Lewin's Hill Tracts of Chittagong, p. 65) . This is interesting as being one of the few cases in which evidence of a change in this respect is available. The Kalangs of Java are endogamous, and every man must first prove his common descent before he can enter a family. The Manchu Tatars prohibit those who have the same family names from marrying. Among the Bedouins " a man has an exclusive right to the hand of his cousin." Hottentots seldom marry out of their own kraal, and David Livingstone quotes other examples. Endogamy seems to have existed in the Sandwich Islands and in New Zealand. A community of Javans near Surabaya, on the Teugger Hills, numbering about 1200 persons, distributed in about forty villages, and still following the ancient Hindu religion, is endogamous. Good examples of what biologists call " in-and-in breeding " are to be found in various fishing villages in Great Britain, such as Itchinferry, near Southampton, Portland Island, Bentham in Yorkshire, Mousehole and Newlyn in Mountsbay, Cornwall, Boulmer near Alnwick (where almost all the inhabitants are called Stephenson, Stanton or Stewart), Burnmouth, Ross and (to some extent) Eyemouth in Berwickshire, Boyndie in Banffshire, Rathen in Aberdeenshire, Buckhaven in Fifeshire, Portmahomack and Balnabruach in Eastern Ross.

In France may be mentioned the commune of Batz, near Le Broisic in Loire-Inferieur, many of the central cantons of Bretagne, and the singular society called Foreatines — supposed to be of Irish descent- — living between St Arnaud and Bourges. Many other European examples might be mentioned, such as the Marans of Auvergne, a race of Spanish converted Jews accused of introducing syphilis into

France; the Burins and Sermoyers, chiefly cattle-breeders, scattered over the department of Ain and especially in the arrondissement of Bourg-en-Bresse; the Vaqueros, shepherds in the Asturias Mountains; and the Jewish Chuetas of Majorca.

See Gilbert Malcolm Sproat's Scenes and Studies of Savage Life ; Westermarck's History of Human Marriage (1894) '< Lord Avebury's Origin of Civilisation (1902) ; J. F. McLennan's Primitive Marriage

(1865).

ENDOR, an ancient town of Palestine, chiefly memorable as the abode of the sorceress whom Saul consulted on the eve of the battle of Gilboa, in which he perished (1 Sam. xxviii. 5-25). According to a psalmist (Ps. lxxxiii. 9) it was the scene of the rout of Jabin and Sisera. Although situated in the territory of the tribe of Issachar, it was assigned to Manasseh. In the time of Eusebius and Jerome Endor existed as a large village 5 m. south of Mount Tabor; there is still a poor village of the same name on the slope of Jebel Dahi, near which are numerous caves. For a description of the locality see Stanley, Sinai and Palestine, P- 337-

ENDOSPORA, a natural group or class of the Sporozoa, con- sisting of the orders Myxosporidia, Actinomyxidia, Sarcosporidia and Haplosporidia, together with various insufficiently-known forms (Sero- and Exosporidia), regarded at present as Sporozoa incertae sedis. The distinguishing feature of the group is that the spore-mother-cells (pansporoblasts) arise in the interior of the body of the parent-individual; in other words, sporulation is endogenous. Another very general character— though not so universal — is that the adult trophozoite possesses more than one nucleus, usually many (i.e. it is multinucleate). In the majority of forms, though apparently not in all (e.g. certain Microsporidia), sporulation goes on coincidently with growth and trophic life. With regard to the origin of the group, the probability is greatly in favour of a Rhizopod ancestry. The entire absence, at any known period, of a flagellate or even gregariniform phase; on the other hand, the amoeboid nature of the trophozoites in very many cases together with the formation of pseudopodia; and, lastly, the simple endogenous spore-formation characteristic of the primitive forms,— are all points which support this view, and exclude any hypothesis of a Flagellate origin, such as, on the contrary, is probably the case in the Ectospora (q.v.).

1. Order Myxosporidia. The Myxosporidia, or, more correctly, the

dense masses formed by their spores, were well known to the earlier zoological observers. The parasites in fishes were called by Muller " fish-psorosperms, " a name which has stuck to them ever since, although, as is evident from the meaning of the term ("mange-seed"), Muller had little idea of the true nature of the bodies. Other examples, infesting silkworms, have also long been known as " Pebrine-corpuscles," from the ravaging disease which they produce in those cater- pillars in France, in connexion with which Pasteur did such valuable work. The foundation of our present morphological and biological knowledge of the order was well laid by the admirable researches of Thelohan in 1895. In spite, however, of the contributions of numerous workers since then (e.g. Doflein, Cohn, Stempell and others), there are still one or two very important points, such as the occurrence of sexual conjugation, upon which light is required.

Although pre-eminently parasites of fishes, Myxosporidia also occur, in a few cases, in other Vertebrates (frogs and reptiles); no instance of their presence in a warm-blooded Vertebrate has, however, yet been described. One 0ccar – suborder (the Microsporidia or Cryptocystes) is pretty habitat. equally distributed between fishes on the one hand and Invertebrates — chiefly, but not exclusively, Arthropods— on the other. The parasites are frequently the cause of severe and fatal illness in their hosts, and devastating epidemics of

myxosporidiosis have often been reported (e.g. among carp and barbel in continental rivers, due to a Myxobolus, and among crayfish in France, to Thelohania).

The seat of the invasion and the mode of parasitism are ex- tremely varied. Practically any organ or tissue may be attacked, excepting, apparently, the testis and cartilage and bone. In one instance at least (that of Nosema bombycis of the silkworm) the parasites penetrate into the ova, so that true hereditary infection occurs, the progeny being born with the disease. The parasites may be either free in some lumen, such as that of the gall bladder or urinary bladder (not of the alimentary canal, or the body- cavity itself), when they are known as coelozoic forms; or in intimate relation with some tissue, intracellular while young but becoming intercellular in the adult phase {histozoic forms); or entirely intracellular (cytozoic forms). Among the histozoic and cytozoic types, moreover, two well-defined

conditions, concentra- tion and diffuse infiltration, occur. In the former, the parasitic zone is strictly limited, and well-marked cysts are formed ; in the latter, the infection spreads throughout the neighbouring tissue, and the parasitic development becomes inextricably com- mingled with the host's cells. Sometimes, as shown by Woodcock (45), there may be an attempt on the part of the host's tissue to circumscribe and check the growth of these parasitic areas, which results in the formation of pseudocysts, quite different in character from true cysts.

The most noticeable feature about the Myxosporidian trophozoite is its amoeboid Moroho- andRhizopod-like character. logy. Pseudopodia of various kinds,

from long slender ones (fig. 3, B) to short blunt lobose ones, are of general occurrence, being most easily observed, of course, in the free-living forms. The pseudo- podia serve chiefly for movement and attach- ment, and never, it should be noted, for the injection of solid food-particles, as in the case of Amoebae. The general protoplasm is divisible into ectoplasm and endoplasm. The former is a clear, finely-granular layer, of which the pseudopodia are mainly con- stituted (fig. 3, A). In one or two instances {e.g. Myxidium

tion is found in Myxocystis. The endoplasm is more fluid, and contains numerous inclusions of a granular nature, as well as vacuoles of varying size. In the endoplasm are lodged the nuclei, of which in an adult trophozoite there may be very many; they are all derived by multiplication from the single nucleus with which the young individuals begin life, the number in- creasing as growth pro- ceeds.

Spore-formation goes on entirely in the endoplasm. The number of spores formed is very variable. ■ec

J$£8$&

fillip

hhNi

&&?

*-*4tl*

processes.

From Lankester's Treatise on Zoology, vol. Protozoa, from Wasielewski, after Thelohan.

Fig. 1. — -Transverse section of a stickle-back (Gasterosteus aculeatus), showing two cysts of Glugea anomala, Moniez (kk), in the body muscu- lature on the right side.

lieberkiihnii) the ectoplasm shows a vertical striation, and in the older trophozoites breaks down partially, appearing like a fur of delicate, non-motile filaments. A somewhat similar modifica-

From Wasielewski, Sporozoenkunde.

Fig. 3. — A. Trophozoite of Sphaerospora divergens, Th61. (par. Blennius and Creni- labrus), X 75°- ec < Ectoplasm; en, endoplasm; sp, spores, each with four pole capsules. From Lankester's Treatise on Zoology, vol. Protozoa.

B. Spore-bearing trophozoite of Leptotheca agilis, Thel. (par. Trygon and Scorpaena), X 75°- P s > Pseudopodia localized at the anterior end; jf.gr , fatty granules similarly localized; r.gr, refringent granules; sp, spores, two in number.

It may be as low as two (as in free-living forms, e.g. Leptotheca), in which case a large amount of trophic protoplasm is uncon- verted into spores; or, on the other hand, the number c ,

of spores may be very great (as m tissue-parasites), formation; practically the whole of the parent-body being thus muitipU- used up. The sporont may or may not encyst at the ˆfjf,,, commencement of sporulation. In the free-living forms there is no cyst-membrane secreted; but in certain Glugeidae, on the other hand, the ectoplasm becomes altered into a firm, enclos- ing layer, the ectorind, which forms a thick cyst- wall (fig. 5). The process of sporulation begins by the segregation of small quantities of endoplasm around certain of the nuclei, to form little, rounded bodies, the pansporoblasts. There may be either very many or only few pansporoblasts developed; in some cases, indeed, there is only one, the sporont either itself becoming a pansporo- blast (certain Microsporidia), or giving rise to a solitary one (Ceratomyxidae). The pansporoblast constituted, nuclear multi- plication goes on preparatory to the formation of sporoblasts, which in their turn become spores (see figs. 4 and 5). Not all the nuclei thus formed, however, are made use of. In the Phaeno- cystes there are always two sporoblasts developed in each pan- sporoblast; in the Cryptocystes there may be from one to

several. Around each sporoblast a spore-membrane is secreted, which usually has the form of two valves. It has recently been shown by Leger and Hesse (296) that, in many Phaenocystes at any rate, each of these valves is formed by a definite nucleated portion of the sporoblast.

The spores themselves vary greatly in size and shape (figs. 7 and 8) . They may be as small as 1 • 5 ju by i/i (as in a species of Nosema) , or as large as 100 /x by 12 jj. (as in Ceratomyxa). A conspicuous feature in the structure of a fully-developed spore is the polar-capsules, of which there may be either 1, 2, or 4 to each. In the

*ny**

From Lankester's Treatise on Zoology, vol. Protozoa.

Fig. 2. — Portion of a section through a muscle fibre of Cottus scorpius invaded by Pleistophora typicalis, Gurley. m,f, Muscle fibrils, retaining

their striation. myx, Cysts of the parasite, lying

between the fibrils.

Phaenocystes the polar-capsules are visible in the fresh condition, but not in the Cryptocystes. The polar-capsule is an organella which recalls the nematocyst of a Hydrozoan, containing a spirally-coiled filament, often of great length, which is shot out on the application of a suitable stimulus. Normally, as was

From Lankester's Treatise on Zoology, vol. Protozoa, after Thetohan.

Fig. 4. — Stages in spore-formation. All the figures are from Myxo-bolus ellipsoides, except a and /, which are from M. pfeifferi.

a, Differentiation of the pan- within an envelope, the spore

sporoblast (p.sp). membrane (sp.m).

b, Pansporoblast with two nuclei, g, More advanced stage.

c and d, Pansporoblasts with six h, Spore completely developed,

and ten nuclei respectively; with two polar capsules and

in d, four of the nuclei are sporoplasm containing an

degenerating. iodinophilous vacuole.

e, Pansporoblast segmented into i, Abnormal spore containing

two definitive sporoblasts, six polar capsules.

each with three nuclei. In n, Nuclei.

the next four figures the de- sp.bl, Definitive sporoblast.

finitive sporoblast, or the r.n, Residuary nuclei.

spore produced from it, is vac, Vacuole.

alone figured. r.p.c. Rudiment of p.c, polar /, Definitive sporoblast seg- capsule.

mented into three masses, n.p.c, Nuclei of polar capsules.

the capsulogenous cells (c.g.c) iod.vac, Iodinophilous vacuole.

and the sporoplasm (sp.p), n.sp, Nuclei of sporoplasm.

ingeniously shown by Thelohan (43), the digestive juices of the fresh host serve this purpose, but various artificial means may suffice. The function of the everted filament is probably to secure the attachment of the spore to the epithelium of the new host. In the Phaenocystes, in connexion with each polar-capsule, a small nuclear body can be generally made out ; these two little nuclei are those of the two " capsulogenous " areas of the proto- plasm of the pansporoblast, which formed the capsules. The sporoplasm, representing the sporozoite, is always single. Never-

endoth.

o

From Woodcock, Proc. and Trans, of the Liverpool Biological Society, 1004.

Fig. 5. — Part of the periphery of a cyst of Glugea stephani, in the intestinal wall of the plaice, showing sporoblast and spore-formation. ect, Ectorind. velopment of the pansporo-

end, Endoplasm. blasts.

endoth, Fold of the mucous mem- sp, Ripe spores, filling the

brane, normal in character. greater part of the cyst.

p.sp.U, Various stages in the de- n, Large (vegetative) nuclei.

theless, in the Phaenocystes it is invariably binuclear; and, in the Microsporidia, the nucleus, at first single, gives rise later to four nuclei, two of which are regarded by Stempell (42) as corresponding to those of two polar-capsules (of which only one is developed in the spore), the remaining two representing germ- nuclei. Hence it is possible that the Myxosporidian sporoplasm IX. 13

really consists of two, incompletely-divided (sister) germs. Moreover, it is supposed by some that these two nuclei fuse together later, this act representing a sexual conjugation; since the earliest known phases of young trophozoites (amoebulae) have been described as uninuclear.

In addition to spore-formation, two or three modes of endo- genous reproduction, serving for auto-infection, have been made known. One, termed by Doflein plasmolomy, consists either in the division of the (multinucleate) trophozoite into two, by more or less equal fission (simple plasmotomy), or in the budding-off. from the parent trophozoite, of several portions (example: Myxidium lieberkuhnii, fig. 6) . A variety of this method has been described by Stempell (40) in the case of the young trophozoites (meronts) of Thelohania mulleri, which may divide into two while still uninuclear; and by rapid successive divisions chains of meronts may be formed, the different individuals being incompletely separated. Another method, which is probably chiefly responsible for the rapid spread of tissue-parasites and cell-parasites (such as Myxobolidae and Glugeidae) through their host's tissue in the condition of diffuse infiltration, consists in multiple nuclear division, and the liberation of amoebulae while the parasite is yet quite young and possesses only few nuclei. As Woodcock has pointed out in considering the case of Glugea stephani, it is very probable that this " multiplicative reproduction," in diffuse infiltration, is to be looked upon as a separation of the pansporoblast- rudiments as daughter-individuals; i.e. that the pansporoblasts are, in certain circumstances, capable of independent existence as little sporonts. A further stage in this direction of evolution is seen, according to Stempell, in Thelo- hania, Pleistophora and other types where the whole individual becomes one

reproductive organella; such forms buds by multiple plas- . , -j j i r motomy in Myxidium

are to be considered as examples of a lieher l uhnii< Biitschli

phylogenetic individualization of the (par . Esox and Lota)

pansporoblasts, which now exist as after Cohn.

solitary sporonts. An extreme case of b, Buds.

this " reduction of the individual " is end Endoplasm; the

found apparently in the genus Nosema ^^hˆSˆZ

as lately characterized by Perez (34),

where vast numbers of minute entirely independent sporonts

(pansporoblasts) are produced, each of which gives rise to only

a single spore.

The Myxosporidia are divided into two suborders, the Phaeno- cystes and the Cryptocystes. Some authors have of late years separated these two divisions and raised each to the rank of a distinct order, considering that they are not more closely related to each other than to other Endosporan orders. We think this is a mistake; and it is very interesting to find that Leger and Hesse (1908) have described (29a) a new genus of Phaenocystes, Coccomyxa, which represents a type intermediate between these two suborders, and shows that they are closely connected.

Suborder 1 : Phaenocystes, Gurley. Spores relatively large, with generally two or four polar-capsules, visible in the fresh condition. There are nearly always two spores formed ˆ ,as «" ca " in each pansporoblast. '

Section (a) : Disporea. Only two spores {i.e. one pansporoblast) produced in each individual trophozoite. The greatest length of the spore is at right angles to the plane of the suture.

One family, Ceratomyxidae , including two genera, Ceratomyxa (fig. 3, B) and Leptotheca, typically " free " parasites, mostly from the gall bladders of fishes. The valves of the spore in the former genus are prolonged into hollow cones. The type-species of this genus is C. sphaerulosa, from Mustelus and Galeus; that of Leptotheca is L.

agilis, from Trygon.

Section (b) : Polysporea. More than two spores, generally very many, are produced typically by each individual trophozoite. The greatest length of the spore is usually in the sutural plane.

Family, Myxidiidae. Spores with two polar-capsules, and with- out an iodinophilous vacuole in the sporoplasm. Mostly " free "

From Lankester's Treatise oft Zoology, vol. Protozoa.

Fig. 6. — Formation of

«j8b

ENDOSPORA

parasites. Gen. Sphaerospora. Four or five species are known, from the kidneys or gall bladder of fishes (fig. 3, A). One, 5. elegans, is interesting in that it affords a transition between the two sections, being disporous. Gen. Myxidium; spores elongated and fusiform, with a polar capsule at each extremity. The best-known species is M . lieberkiihnii, from the urinary bladder of the pike. One or two species occur in reptiles. Other genera are Sphaeromyxa, Cystodiscus, Myxo- soma and Myxoproteus.

Family, Chloromyxidae. Spores with four polar capsules and no iodinophilous vacuole. One genus, Chloromyxum, of which several species are known; the type being C. leydigi, from the gall bladder of various Elasmobranchs (fig. 7, B).

Family, Myxobolidae. Spores with two polar-capsules (exceptionally one), and with a characteristic iodinophilous vacuole in the sporoplasm. Typically tissue parasites of Teleosteans, often very dangerous. Genus Myxobolus. Spores oval or rounded, without a tail-like process. Very many species are known, which are grouped into three subsections : (a) forms with only one polar-capsule, such as M. piriformis, of the tench ; (b) forms with two unequal capsules, e.g. M. dispar from Cyprinus and Leuciscus; and © the great majority of species with two equal polar-capsules, including M. mulleri, the type-species, from different fish, M. cyprini and M. pfeifferi, the cause of deadly disease in carp and barbel respectively and others. Other genera are Henneguya and Hoferellus, differing from Myxo-

sf.*

a B t>

Fig. 7. — A. Spore of Ceratomyxa sphaerulosa, Thel. (par. Mustelus and Galeus), X 750, after TMlohan. sp.p, Sporoplasm; p.c, polar capsules; s, suture; x, "irregular, pale masses, of undetermined origin." From Lankester's Treatise on Zoology, vol. Protozoa.

B. Spores of Chloromyxidae, after Thelohan. a, Chloromyxum leydigi, Ming., seen from the sutural aspect, X2250; b, C. caudatum, TheT, X1900. p.c, Polar capsules; s, suture; /, filaments; p.s, tail-like process of the spore envelope.

From Wasielewski's Sporozoenkimde.

C. Spores of Myxobolus ellipsoides, Thel. The spores on the left and right are lying with the sutural plane horizontal, that in the middle with the sutural plane vertical.

bolus in having, respectively, one or two tail-like processes to the spore. Lentospora, according to Plehn (37), lacks an iodinophilous vacuole.

Family Coccomyxidae. The pansporoblasts produce (probably) only one spore. Spore oval, large (14ˆ by 5-5 ji), with a single very large polar-capsule. Sporoplasm with no vacuole. Single genus Coccomyxa, with the characters of the family. One species, C. morovi, Leger and Hesse, from the gall bladder of the sardine. The spore t greatly resembles a Cryptocystid spore.

Suborder 2: Cryptocystes, Gurley { — Microsporidia, Balbiani). Spores minute, usually pear-shaped, with only one polar-capsule, which is visible only after treatment with reagents. The number of spores formed in each pansporoblast varies greatly in different forms.

Section (a) : Polysporogenea. The trophozoite produces numerous pansporoblasts, each of which gives rise to many spores. Genus Glugea, with numerous species, of which the best-known is G. anomala, from the stickleback (fig. 1). The genus Myxocystis, which has been shown by Hesse (24) to be a true Microsporidian, is placed by Perez in this section, but this is a little premature, as Hesse does not describe the exact character of the sporulation, i.e. with regard to the number of pansporoblasts and the spores they produce.

Section (b) : Oligosporogenea. The trophozoite becomes itself the (single) pansporoblast. In Pleistophora, the pansporoblast pro- duces

many spores; P. lypicalis, from the musclrs of various fishes (fig. 2), is the typc-specics. In Thclohania, eight spores are formed;

the different species are parasitic in Crustacea. In Gurleya, parasitic in Daphnia, only four are formed; and, lastly, in Nosema (exs, N. pufvis, from Carcinus, and, most likely, N. bombycis, of the silk-worm), each pansporoblast produces only a single spore.

2. Order — Actinomyxidia. This order comprises a peculiar group of parasites, first described by A. Stole in 1899, which are restricted to Oligochaete worms of the family Tubificidae. Most forms attack the intestinal wall, often destroying its epithelium over consider- able areas; but one genus, Sphaeractino- myxon, inhabits the body-cavity of its host. The researches of Caullery and Mesnil (10-12) and ®f Leger (28 and 29) have shown that the parasites exhibit the typical features of the Endospora, and the spores possess the characteristic polar-capsules of the Myxosporidian spore, but differ therefrom by their more complicated structure.

The growth and development of an Actinomyxidian have been recently worked out by Caullery and Mesnil in the case of Sphaeractinomyxon stolci. A noteworthy point is the differentiation of an external (covering) cellular layer, which affords, perhaps, the nearest ap- proach to distinct tissue-formation known among Protozoa. This envelope is formed soon after nuclear multiplication of the young trophozoite has begun, and is constituted by two nuclei and a thin, peripheral layer of cytoplasm. It remains binuclear throughout the entire period of development, and serves as a delicate cyst-membrane. The multiplication of the internal nuclei is accompanied by a corresponding division of the cytoplasm; so that instead of a multinucleate or

plasmodial condition, distinct uninucleate e < Glugea depressa, cellules are formed, up to sixteen in num- , q , ThfM ber. These cellules, as a matter of fact, '

are sexual elements or gametes; and eight of them can be dis- tinguished from the other eight by slight differences in the nuclei. The gametes unite in couples, each couple being most probably composed of dissimilar members: in other words, conjugation is slightly anisogamous. Each of these eight copulae gives rise to a spore.

As the name of the order implies, there are always eight spores formed. These differ from other Endosporan spores in having invariably a ternary symmetry and constitution (fig. 9). The wall of

the spore is composed of three valves, each formed from an enveloping cell, and three capsular cells, placed at the upper or anterior pole, and containing each a polar-capsule, visible in the fresh condition. The valves are usually prolonged into processes or appendages, whose form and arrangement characterize the genus; but in Sphaeractinomyxon the spore is spherical and lacks processes. The sporoplasm may be either a plasmodial mass, with numerous nuclei, or may form a certain number of uninuclear sporozoites. A remarkable feature in the development of the spore is that the germinal tissue (sporoplasm) arises separate from and outside the cellules which give rise to the spore-wall; later, when the envelopes are nearly developed, the sporoplasm penetrates into the spore.

Four genera have been made known. (1) Hexactinomyxon, Stole. Spores having the form of an anchor with six arms; sporoplasm plasmodial, situate near the anterior pole of the spore. One sp. H. psammoryctis, from Psammoryctes. (2) Triactinomyxon, St. Spores having the form of an anchor with three arms; distinct sporozoites, disposed near the anterior pole. T. ignotum, with eight spores, from Tubifex tubifex, and also frqm an unspecified Tubifkid ; another sp., unnamed, with 32 sporozoites, also from T. t. (3) Synac- tinomyxon, St. Spores united to one another, each having two aliform appendages; sporoplasm plasmodial. One sp., 5. tubificis, from T. rivuhmm. (4) Sphaeractinomyxon, C. and M. Spores spherical, without aliform prolongations ; sporoplasm gives rise to very many

From Lankester's Treatise on Zoology, vol . Protozoa.

Fig. 8. — Spores of various Glugeidae, X 1500 (after Thelohan). a and b, Pleistophora typicalis, Gurley ; o in the fresh con- dition, b after treat- ment with iodine water, causing ex- trusion of the fila- ment.

and d, Thelohania octospora, Henne- guy; c fresh, d treated with ether.

sporozoites, occupying the whole spore. One sp., S. stolci, from Clitellio and HemitubQex.

3. Order — Sarcosporidia. With the exception of one or two forms occurring in reptiles, these parasites are always found

From Lankester's Treatise on Zoology, vol. Protozoa.

Fig. 9.— Spores of Actinomyxidia (after Stole). a Hexactinomyxon psammoryctis (par. Psammoryctes c, Triactinomyxon ignolum (par. Clitellio, sp.). j

barbaius). ˆ t ., . , N i, Upper portion of HexacHnomyxon, showing two t ; and in this hase

b, Synactinomyxon tubificis (par. Tubifex rivulorum) ; of the three polar capsules, one with filament

the mass of united spores. discharged.

up the endoplasm into somewhat angular chambers or alveoli (fig. 12). In each chamber is a pansporoblast, which divides up to produce many spores; hence the spores formed from different pan- sporoblasts are kept more or less separate. The pansporoblasts

originate, in a growing Sarcosporidian, at the two poles of the body, where the peripheral endoplasm with its nuclei is chiefly aggregated. More inter- nally, spore-formation is in progress; and in the centre, pansporoblasts full of ripe spores are found. By this time the para- site has greatly distended the muscle-fibre in which it has hitherto lain, ab- sorbing, with its growth, practically all the con- tractile-substance, until it is surrounded only by the sarcolemma and sarco- plasm. It next passes into the adjacent connective-

in warm-blooded Vertebrates, usually Mammals. They are of com- mon occurrence in domestic animals, such as pigs, sheep, horses and (sometimes) cattle. A Sarcosporidian has also been described from man. The characteristic habitat is the striped muscle, generally of the oesophagus (fig. 10, A) and heart, but in acute ˆ ˆ cases the parasites

overrun the general musculature. When this occurs, as often happens in mice, the result is usually fatal. Unless, however, the organisms thus spread throughout the body, the host does not ap- pear to suffer any serious consequences. In addition to the effects produced by the general disturb- ance to the tissues, the ˆˆ attacked animals have Bˆˆ apparently to contend — at any rate in the case of Sarcocystis lenella in the sheep — with a poison secreted by the parasite. For Laveran and Mesnil (27) have isolated a toxine from this form, which they have termed sarcocystin.

In the early stages of growth, a Sarcosporidian appears as an elongated whitish body lodged in the substance of a muscle- fibre;

this phase has long been known as a " Miescher's tube," or Miescheria. The youngest trophozoites that have been yet observed (by Bertram, 1) were multinucleate (fig. 11, A), but there is no reason to doubt that they begin life in a uninuclear condition. The protoplasm is limited by a delicate cuticle. With growth, organellae corresponding to the Myxosporidian pansporoblasts are formed by the segregation internally of little uninuclear spheres of protoplasm. At the same time, a thick striated envelope is developed around the parasite, which later comes to look like a fur of fine filaments. The probable explana- tion of this feature (given by Vuillemin, 44) is that it is due to the partial breaking down of a stiff, vertically (or radially) striated external layer (fig. 1 2, A) , such as is seen in Myxidium lieberkiihnii. Immediately internal to this is a thin, homogeneous membrane, vhich sends numerous partitions or septa inwards; these divide

From Wasielewski's Sporozoenkunde.

Fig. 10. — A. Sarcosporidia in the ox; a transverse section of the oesophagus, natural size, showing the parasites in the outer (a, b, c, d, e) and inner (/. g, h) muscular coats.

B. Longitudinal section of a muscle-fibre containing a Sarcosporidian parasite, X 60.

has been distinguished from Miescheria as Bal- biania, under the impression that the two forms were quite distinct. In the later stages, the parasite may become more rounded, and a cyst may be secreted around it by the host's tissue. In these older forms, the most centrally placed spores degenerate and die, having become over-ripe and stale.

With regard to the spores themselves and what becomes of them, our knowledge is defective. Two kinds of reproductive germ have been described, termed respectively gymnospores (so-called sporozoites, " Rainey's corpuscles ") and chlamydo- spores, or simply spores. It seems probable that the former serve for endogenous or auto-infection, and the latter for infecting fresh hosts. Unfortunately, however, both kinds of germ are not yet known in the case of any one species. The gymnospores,

After Bertram, from Wasielewski's Sporozoen- kunde.

Fig. 11. — Stages in the growth of Sarcocystis tenella of the sheep. A, Youngest observed stage in which the radially striated outer coat has not appeared; the body of the trophozoite is already divided into a

number of cells or pansporoblasts (k). B and C, Older stages with numerous pansporoblasts and two C

envelopes, an inner membrane and an outer radially striated layer.

which are the more commonly found

miescheriana of the pig, and other forms), are small sickle-shaped

or reniform bodies which are more or less amoeboid, and capable of active movement at certain temperatures. They appear to be naked, and consist of finely granular protoplasm, containing a single nucleus and one or two vacuoles. The chlamydospores, or

c-

B, Sarcocystis of the ox: Substance of muscle-fibre ;

B

From Wasielewski's Sporozoenhunde.

Fig. 1 2. — A, Sarcocystis miescheriana (Kiihn) from the pig: late stage in which the body has become divided up into numerous chambers or alveoli, each containing a number of germs, section of a stage similar to fig. 12. a, b, envelope of parasite ; c, nuclei of the muscle ; d, parasitic germs (gymnospores) ; e, walls of the alveoli. In the peripheral alveoli are seen immature germs.

true spores, occur in 5. tenella of sheep (fig. 13), and have been described by Laveran and Mesnil (26). They also are falciform, but one extremity is rounded, the other pointed. There is a very thin, delicate membrane, most unlike a typical, resistant spore- wall; and the spores themselves are extremely fragile and easily acted upon and deformed by reagents, even by distilled water. The rounded end of the spore contains a large nucleus, while at the other end is an oval, clear space, which, in the fresh condition, shows a distinct spiral striation. The exact significance of this structure has been much debated. In position and appearance it recalls the polar-capsule of a Myxosporidian spore. The proof of this interpretation would be the expulsion of a filament on suitably stimulating the spore; while, how- ever, some investigators have asserted that such a

filament is extruded, this cannot be regarded as at all certain. Hence it is still doubtful whether this striated body really corresponds to a polar-capsule.

Nothing whatever is known as to the natural means by which infection with Sarcosporidia is brought about. Smith (39) showed that mice can be infected with Sarcocystis muris by simply feeding them on the flesh of infected mice. It is not very likely, however, that this represents the natural mode, even in the case of mice; and it certainly cannot do so in the case of Herbivora. The difficulty in the way is the delicacy of the

b

(After Laveran and Mesnil, from Lankester's Treatise on Zoology, vol. Protozoa.)

Fig. 13. — Spores of Sarcocystis tenella, Raill., from the sheep.

a, Spore in the fresh con-

dition.showingaclear nucleus (») and a striated body or cap- sule ©.

b, Stained spore; the

nucleus (») shows a central karyosome ; the striations of the polar capsule © are not visible.

spores, which seem totally unfitted to withstand external conditions. It may be that some alternative (intermediate) host is concerned in dispersal; but this has yet to be ascertained.

All known Sarcosporidia are included in a single genus Sarcocystis, Lank. (= Miescheria + Balbiania, Blanchard.) Some of the prin- cipal species are: 5. miescheriana, from pigs; 5. tenella, from

sheep; 5. bertrami, from horses; S. blanchardi, from Bovines; S. muris, from mice; S. platydactyli, from the gecko; and lastly, S. lindemanni, described from man.

4. Order — Haplosporidia. The Sporozoa included in this order are characterized by the general simplicity of their develop- ment, and by the undifferentiated character of their spores. The order includes a good many forms, whose arrangement and classification have been recently undertaken by Caullery and Mesnil (15), to whom, indeed, most of our knowledge relating to the Haplosporidia is due. The

habitat of the parasites is sufficiently varied; Rotifers, Crustacea, Annelids and fishes furnishing most of the hosts. A recent addition to the list of Protozoa causing injury to man, a Haplosporidian, has been

From Minchin, in Lankester's Treatise on Zoology, vol. Protozoa.

Fig. 14. — Bertramia Asperospora of Brachionus. X 1040. a, Young form with opaque,even-

ly-granulated protoplasm

and few ref ringent granules ;

the nuclei (re) are small, and

appear to be surrounded each

by a clear space. b and c, Full-grown specimens

with large nuclei and clearer

protoplasm, containing nu- merous refringent granules /,

ir.gr.). d and e, Morula stages, derived

from b arid c by division of

the body into segments

centred round the nuclei,

each cell so formed being a

spore. Between the spores

a certain amount of inter- cellular substance or residual

(Fritsch) from the body-cavity

protoplasm is left, in which the refringent granules seem to be embedded. The morula may break up forth- with and scatter the spores, or may first round itself off and form a spherical cyst with a tough, fairly thick wall. Empty, slightly shrunken cyst, from which the spores have escaped.

, Free spore or youngest uni cellular trophozoite.*

, i,j, Commencing growth of the trophozoite, with multi- plication of the nuclei, which results ultimately in forms such as a and b.

described by Minchin and Fantham (29d), who have termed the parasite Rhinos poridium, from its habitat in the nasal septum, where it produces pedunculate tumours.

Bertramia, a well-known parasite of the body-cavity of Rotifers, will serve very well to give a general idea of the life-cycle so far as it has yet been made out (fig. 14). The trophozoite begins life as a small, rounded uninucleate corpuscle, which as it grows, becomes multinucleate. The multinuclear body generally assumes a definite shape, often that of a sausage. Later, the protoplasm becomes segregated around each of the nuclei, giving the parasite a mulberry-like aspect; hence this stage is frequently known as a morula. The uninuclear cellules thus formed are the spores, which are ultimately liberated by the break-up of the parent body. Each is of quite simple, undifferentiated structure, possesses a large, easily-visible nucleus, and gives rise in due course to another young trophozoite. In some instances, as described by

Minchin, the sporulating parasite becomes rounded off and forms a protective cyst, doubtless for the protection of the spores during dissemination.

In some forms (e.g. Haplosporidium and Rhinosporidium) the spore-mother-cells, instead of becoming each a single spore, as in Bertramia, give rise to several, four in the first case, many in the latter. Sometimes, again, the spore, while preserving the essentially simple character of the sporoplasm, may be enclosed in a spore-case; this may have the form of a little box with a lid or operculum, as in some species of Haplosporidium, or may possess a long process or tail, as in Urosporidium (fig. 15).

The Haplosporidia are divided by Caullery and Mesnil into three families, Haplosporidiidae, Bertramiidae and Coelosporidiidae; one or two genera are also included whose exact position is doubtful.

(a) Haplosporidiidae: 3 genera, Haplosporidium, type-species H. heterocirri; Urosporidium, with one sp., U. fuliginosum; all parasitic in various Annelids; and Anurosporidium, with the species A.pelseneeri, from the sporocysts of a Trematode, parasitic on

Donax.

(b) Bertramiidae: 2 genera, Bertramia, with B. capitellae from an

From Caullery and Mesnil, Archives de zoologie expirimenlale. mission of Schleicher Freres et Cie, Paris.

Fig. 15. — Spores of various Haplosporidia. Haplosporidium heterocirri: 3, H. vejdovskii.

1905, by per-

4.

Urosporidium fuliginosum: a, surface-view; 6, side-view. Xiooo.

a, on liberation;

b, after being in sea-water. 2, H. scolopli.

Annelid and B. asperospora, the Rotiferan parasite above described ; and Ichthyosporidium, with 7. gasterophilum and I. phymogenes, parasitic in various fish.

(c) Coelosporidiiae: genera Coelosporidium, type-species C. chydoriclola; and Polycaryum, type-species P. branchiopodianum. These forms are parasitic in small Crustacea. The genus Blastulidium is referred, doubtfully, by Caullery and Mesnil to this family; but certain phases of this organism seem to indicate rather a vegetable nature.

The genus Rhinosporidium should probably be placed in a distinct family. The only species so far described is R. kinealyi from the nasal septum of man, to which reference has above been made. Another form, Neurosporidium cephalodisci, agreeing in some respects with Rhinosporidium, has been described by Ridewood and Fantham (37a) from the nervous system of Cephalodiscus.

A parasite whose affinities are doubtful, but which is regarded by Caullery and Mesnil as allied to the Haplosporidia, is the curious parasite originally described by Schewiakoff as " endoparasitic tubes" of Cyclops ; it has been named by Caullery and Mesnil, Schevia- kovella. This organism is remarkable in one or two ways: it pos- sesses a contractile vacuole; the amoeboid trophozoites tend to form plasmodia; and the spores, of the usual simple type, may apparently divide by binary fission.

5. There remain, lastly, certain forms, which are conveniently grouped together as "Sporozoa incertae sedis," either for thereason that it is impossible to place them in any of the well-defined orders, or because their life-cycle is at present too insufficiently known. Serosporidia is the name given by Pfeiffer to certain minute parasites of the body-cavity of Crustacea; they include Sero- sporidium, Blanchardina and Bolellus. Lymphosporidium, a form with distributed nucleus, causing virulent epidemics among brook-trout,is considered by Calkins(3) to be suitably placed here. Another parasite of lymphatic spaces and channels is the remark- able Lymphocystis, described by Woodcock (46), from plaice and flounders, which in some respects rather recalls a Gregarine. The group Exosporidia was founded by Perrier to include a peculiar organism, ectoparasitic on Arthropods, to which the

name of Amoebidium had been given by Cienkowsky. It has recently been shown, however, that this organism is most probably an Alga. Another genus, Exosporidium, described by Sand (38) , is placed at present in this group. For details of the structure of these forms and others like Siedleckia, Toxosporidium, Chilonicium Joyeuxella and Melschnikovella, a comprehensive treatise on the Sporozoa, such as that of Minchin, should be consulted.

To complete this article, it will be sufficient to mention various enigmatical bodies, associated with different diseases, which are regarded by their describers as Protozoa. Among such is the " Histosporidium carcinomatosum " of Feinberg, which he finds in cancerous growths. Cytoryctes, the name given to " Guarnieri's bodies " in small-pox and vaccinia, has been recently investigated by Calkins (3a), who has described a complex life-cycle for the alleged parasite. Other workers, however, such as Siegel, give a quite different account of these bodies, and, moreover, find similar ones in scarlet-fever, syphilis, &c. ; while yet others (e.g. Prowazek) deny that they are parasitic organisms at all.

Bibliography. — (For general works see under Sporozoa.) (1) Bertram, " Beitrage zur Kenntnis der Sarcosporidien," Zool. Jahrb. Anat. 5,1902; (2) L. Brasil, " Joyeuxella toxoides," (n.g., n.sp.), Arch. zool. exp. N. et R. (3) 10, p. 5, 7 figs., 1902 ; (3) G. N. Calkins,

Lymphosporidium truttae, ' (n.g., n.sp.), Zool. Anz. 23, p. 513 6figs, 1903; (3a) tb. The Life-History of Cytoryctes Variolae; Guarnieri,

Studies path, etiol. variola,"/. Med. Research (Boston, 1904), p.

136,

4 pis. ; (3b) M. Caullery and A. Chappellier, ” Anurosporidium pelse- neen, (n.g., n.sp.), Haplosporidie,” &c, C. R. soc. biol. 60, p. 325 1906 ; (4) M. Caullery and F. Mesnil, ” Sur un type nouveau ” (Melch- ntkovella, n.g.), C. R. ac. set. 125, p. 787, 10 figs., 1897; (S) ib. ” Sur trois Sporozoaires parasites de la Capitella,” C. R. soc. biol. 49, p. 1005, 1877; (6) ib. ” Surun Sporozoaire aberrant ” (Siedleckia, n g) op. ctt. 50, p. 1093, 7 figs., 1898 ; (7) ib. ” Sur le genre Aplosporidium” (nov), op. ctt. 51, p. 789, 1899; (8) ib. ” Sur les Aplosporidies,” t. R ac. set. 129 p. 616, 1899; (9) ib. ” Sur les parasites intimes des Annehdes {Siedleckia, Toxosporidium), C. R. ass. f rang., 1899, P ” 4 ? I J , ,J 9 °. 0; (10) ib – ” Sur un tyP e nouveau (Sphaeractinomyxon,

“‘W- lnomyxidles ’” C – R – soc – bio1 – 5 6 > P- 4° 8 ‘ I 9°4: (ll) ib-

Phenom&nes de sexualite dans le developpement des Actino-myxidies, op. cit. 58, p. 889, 1905; (12) ib. " Recherches sur les Actinomyxidies, Arch. Protistenk. 6, p. 272, pi. 15, 1905- (13) ib "Sur quelques nouvelles Haplosporidies d'Annfilides," C. R. soc. biol. 58, p. 580, 6 figs., 1905; (14) ib. "Sur des Haplosporidies parasites de poissons marins," ib. p. 640, 1905 ; (IS) ib. " Recherches sur les Haplosporidies," _Arch. zool. exp. (4) 4, p. 101, pis. 11-13 1905; (16) L. Cohn, " Uber die Myxosporidien von Esox lucius," Zool Jahr. Anat. 9 p. 227, 2 pis., 1896; (17) ib. " Zur Kenntniss der Myxosporidien," Cenlrbl. Bakt. 1, Orig. 32, p. 628, 3 figs., 1902- (18) ib. Protozoen als Parasiten in Rotatorien," Zool. Anz. 2. p. 497, 1902; (19) F. Doflein, " Uber Myxosporidien," Zool. Jahr. Anat. 11 p. 281, 6 pis., 1898; (20) ib. " Fortschritte auf dem Gebiete der Myxosporidienkunde," Zool. Centrbl. 7, p. 361 1899- (21) R. Gurley, " The Myxosporidia," Bull. U.S. Fish. Comm., 1802 p. 65, 47 pis., 1894; (22) E. Hesse, " Sur une nouvelle Microsporidie tetrasporee du genre Gurleya," C. R. soc. biol. 55, p. 495 , 1903; (ii) tb. inelonama lfegen (n.sp.), op. cit. 57, pp. S7Q-S72, 10 figs., 1904; (24) ib. "Sur Myxocystis Mrazeki Hesse," &c., op. cit. 58, p. \2, 9 figs., 1905; (25) A. Laveran and F. Mesnil, " Sur la multiplication endogene des Myxosporidies," op. cit. 54, p. 469,*

5 figs., 1902; (26) ib. "Sur la morphologie des Sarcosporidies," op. cit. 51, p. 245, 1899; (27) ib. " De la Sarcocystin," op. cit. p. 311,^1899; (28) L. L6ger, "Sur la sporulation du Triactino- myxon, op. cit. 56, p. 844, a figs., 1904; (29) ib. " Considerations SW a V ' Actinomyxidies," op. cit. p. 846, 1904; (29a) L. Leger and E. Hesse, " Sur une nouvelle Myxosporidie, Coccomyxa, n g " C. R. ac. sci., 1st July 1907; (29b) ib. " Sur la structure de la paroisporale des Myxosporidies," op. cit. 142, p. 720, 1906; (29c) A. Lutz and A. Splendore, " Uber 'Pebrine' and verwandte Mikro- sporidien, Centrbl. Bakt. I, 33, Orig. p. 150, 1903, and 36, Orig. p. 645, 2 pis., 1904; (29d) E. A. Minchin and H. B. Fantham,

Khinospondium kinealyi " (n.g., n.sp.), Q. J. Micr. Sci. 49, p. S21 2 pis., 1905; (30) A. Mrazek, " Uber eine neue Sporozoenform " (Myxocystis), S. B. Bohm. Ges. 8, 5 pp., 9 figs., 1897 ; (31) ib. "Glugea Iophn, Doflein, op. ctt. 10, 8pp., 1 pi., 1899; (32) C. Perez, " Sur un organisme nouveau, Blastulidium," C. R. soc. biol. 55, p. 715, 5 figs., 1903; (33) ib. " Sur nouvelles Glugeidees," op. cit. 58, pp. 146-151' 1905; (34) ib. " Microsporidies parasites des crabes," Bull, sta biol. d Arcachon, 8, 22 pp., 14 figs., 1905 ; (35) W. S. Perrin, " Pleisto- phora penplanetae," Q. J. Micr. Sci. 49, p. 615, 2 pis., 1906; (36) L. Plate, Uber einen einzelligen Zellparasiten "

(Chitonicium), Fauna Chilensis, 2, pp. 601, pis., 1901 ; (37) M. Plehn, " Uber die Urehkrankheit der Salmoniden " (Lentospora, n.g.), Arch. Protistenk 5. P- 145, pl. 5, 1904; (37a) W. J. Ridewood and H. B. Fantham,

Neurosporidium cephalodisci, n.g., n.sp.," Q. J. Micr. Sci. 51, p. 8i t p). 7, 1907; (38) R. Sand, " Exosporidium marinum " (n.g.,

n.sp.), Bull. soc. micr. beige, 24, p. 116, 1898; (39) T. Smith, The production of sarcosporidiosis in the mouse," &c, /. Exp. Med. 6, p. 1, 4 pis., 1901; (40) W. Stempell, " fiber Thelphania mulleri,' Zool. Jahr. Anal. 16, p. 235, pi. 25, 1902; (41) ib. " Uber Polycaryum branchiopodianum " (n.g., n.sp.), Zool. Jahrb. Syst. 15, p. 591, pi. 3 J > 1902; (42) ib. " liber Nosema anomalum," Arch. Protistenk, 4, p. I, pis. 1-3, 1904; (43) P. Thelohan, " Recherches sur les Myxosporidies," Bull. set. France belg. 26, p. 100, 3 pis., 1895; (44) P. Vuillemin, " Le Sarcocystis tenella, parasite de l'homme," C. R. ac. sci. 134, p. 1152, 1902; (45) H. M. Woodcock, "On Myxosporidia in flat fish," Proc. Liverp. Biol. Soc. 18, p. 126, pi. 2, 1904; (46) ib. " On a remarkable parasite " (Lymphocystis) , op. cit. p. 143, pi. 3, 1904. (rf.M.Wo.)

ENDYMION, in Greek mythology, son of Aethlius and king of Elis. He was loved by Selene, goddess of the moon, by whom he had fifty daughters, supposed to represent the fifty moons of the Olympian festal cycle. In other versions, Endymion was a beautiful youth, a shepherd or hunter whom Selene visited every night while he lay asleep in a cave on Mount Latmus in Caria (Pausanias v. 1; Ovid, Ars am. iii. 83). Zeus left him free to choose anything he might desire, and he chose an everlasting sleep, in which he might remain youthful for ever (Apollodorus i. 7). According to others, Endymion's eternal sleep was a punishment inflicted by Zeus upon him because he ventured to fall in love with Hera, when he was admitted to the society of the Olympian gods (Schol. Theocritus iii. 49) . The usual form of the legend, however, represents Endymion as having been put to sleep by Selene herself in order that she might enjoy his society undisturbed (Cicero, Tusc. disp. i. 38). Some see in Endymion the sun, setting opposite to the rising moon, the Latmian cave being the cave of forgetfulness, into which the sun plunges beneath the sea; others regard him as the personification of sleep or death (see Mayor on Juvenal x. 318).

ENERGETICS. The most fundamental result attained by the progress of physical science in the 19th century was the definite enunciation and development of the doctrine of energy, which is now paramount both in mechanics and in thermodynamics. For a discussion of the elementary ideas underlying this concep- tion see the separate heading Energy.

Ever since physical speculation began in the atomic theories of the Greeks, its main problem has been that of unravelling the nature of the underlying correlation which binds together the various natural agencies. But it is only in recent times that scientific investigation has definitely established that there is a quantitative relation of simple equivalence between them, whereby each is expressible in terms of heat or mechanical power; that there is a certain measurable quantity associated with each type of physical activity which is always numerically identical with a corresponding quantity belonging to the new type into which it is transformed, so that the energy, as it is called, is conserved in unaltered amount. The main obstacle in the way of an earlier recognition and development of this principle had been the doctrine of caloric, which was suggested by the principles and practice of calorimetry, and taught that heat is a substance that can be transferred from one body to another, but cannot be created or destroyed, though it may become latent. So long as this idea maintained itself, there was no possible compensation for the destruction of mechanical power by friction; it appeared that mechanical effect had there definitely been lost. The idea that heat is itself convertible into power, and is in fact energy of motion of the minute invisible parts of bodies, had been held by Newton and in a vaguer sense by Bacon, and indeed long before their time ; but it dropped out of the ordinary creed of science in the following century. It held a place, like many other anticipa- tions of subsequent discovery, in the system of Natural Philosophy of Thomas Young (1804); and the discrepancies attending current explanations on the caloric theory were insisted on, about the same time, by Count Rumford and Sir H. Davy. But it was not till the actual experiments of Joule verified the same exact equivalence between heat produced and mechanical energy destroyed, by whatever process that was accomplished, that the idea of caloric had to be definitely abandoned. Some time previously R. Mayer, physician, of Heilbronn, had founded a weighty theoretical argument on the production of mechanical

power in the animal system from the food consumed; he had, moreover, even calculated the value of a unit of heat, in terms of its equivalent in power, from the data afforded by Regnault's

determinations of the specific heats of air at constant pressure and at constant volume, the former being the greater on Mayer's hypothesis (of which his calculation in fact constituted the verification) solely on account of the power required for the work of expansion of the gas against the surrounding constant pressure. About the same time Helmholtz, in his early memoir on the Conservation of Energy, constructed a cumulative argument by tracing the ramifications of the principle of conservation of energy throughout the whole range of physical science.

Mechanical and Thermal Energy. — The amount of energy, defined in this sense by convertibility with mechanical work, which is contained in a material system, must be a function of its physical state and chemical constitution and of its temperature. The change in this amount, arising from a given transformation in the system, is usually measured by degrading the energy that leaves the system into heat; for it is always possible to do this, while the conversion of heat back again into other forms of energy is impossible without assistance, taking the form of compensating degradation elsewhere. We may adopt the provisional view which is the basis of abstract physics, that all these other forms of energy are in their essence mechanical, that is, arise from the motion or strain of material or ethereal media; then their distinction from heat will lie in the fact that these motions or strains are simply co-ordinated, so that they can be traced and controlled or manipulated in detail, while the thermal energy subsists in irregular motions of the molecules or smallest portions of matter, which we cannot trace on account of tb» bluntness of our sensual perceptions, but can only measure as regards total amount.

Historical: Abstract Dynamics. — Even in the case of a purely mechanical system, capable only of a finite number of definite types of disturbance, the principle of the conservation of energy is very far from giving a complete account of its motions; it forms only one among the equations that are required to determine their course. In its application to the kinetics of invariable systems, after the time of Newton, the principle was emphasized as fundamental by Leibnitz, was then improved and generalized by the Bernoullis and by Euler, and was ultimately expressed in its widest form by Lagrange. It is recorded by Helmholtz that it was largely his acquaintance in early years with the works of those mathematical physicists of the previous century, who had formulated and generalized the principle as a help towards the theoretical dynamics of complex systems of masses, that started him on the track of extending the principle throughout the whole range of natural phenomena. On the other hand, the

ascertained validity of this extension to new types of phenomena, such as those of electrodynamics, now forms a main foundation of our belief in a mechanical basis for these sciences.

In the hands of Lagrange the mathematical expression for the manner in which the energy is connected with the geometrical constitution of the material system became a sufficient basis for a complete knowledge of its dynamical phenomena. So far as statics was concerned, this doctrine took its rise as far back as Galileo, who recognized in the simpler cases that the work expended in the steady driving of a frictionless mechanical system is equal to its output. The expression of this fact was generalized in a brief statement by Newton in the Principia, and more in detail by the Bernoullis, until, in the analytical guise of the so-called principle of " virtual velocities " or virtual work, it finally became the basis of Lagrange's general formulation of dynamics. In its application to kinetics a purely physical principle, also indicated by Newton, but developed long after with masterly applications by d'Alembert, that the reactions of the infinitesimal parts of the system against the accelerations of theirmotions staticallyequilibrate the forces applied to the system as a whole, was required in order to form a sufficient basis, and one which Lagrange soon afterwards condensed into the single relation of Least Action. As a matter of history, however, the complete formulation of the subject of abstract dynamics actually

arose (in 1758) from Lagrange's precise demonstration of the principle of Least Action for a particle, and its immediate extension, on the basis of his new Calculus of Variations, to a system of connected particles such as might be taken as a representation of any material system; but here too the same physical as distinct from mechanical considerations come into play as in d'Alembert's principle., (See Dynamics: Analytical.)

It is in the cases of systems whose state is changing so slowly that reactions arising from changing motions can be neglected, that the conditions are by far the simplest. In such systems, whether stationary or in a state of steady motion, the energy depends on the configuration alone, and its mathematical expression can be determined from measurement of the work required for a sufficient number of simple transformations; once it is thus found, all the statical relations of the system are implicitly determined along with

it, and the results of all other transformations can be predicted. The general development of such relations is conveniently classed as a separate branch of physics under the name Energetics, first invented by W. J. M. Rankine; but the essential limitations of this method have not always been observed. As regards statical change, the complete specification of a mechanical system is involved in its geometrical configuration and the function expressing its mechanical energy in terms thereof. Systems which have statical energy-functions of the same analytical form behave in corresponding ways, and can serve as models or representations of one another.

Extension to Thermal and Chemical Systems. — This dominant position of the principle of energy, in ordinary statical problems, has in recent times been extended to transformations involving change of physical-state or chemical constitution as well as change of geometrical configuration. In this wider field we cannot assert that mechanical (or available) energy is never lost, for it may be degraded into thermal energy; but we can use the principle that on the other hand it can never spontaneously increase. If this were not so, cyclic processes might theoretically be arranged which would continue to supply mechanical power so long as energy of any kind remained in the system; whereas the irregular and uncontrollable character of the molecular motions and strains which constitute thermal energy, in combina- tion with the vast number of the molecules, must place an effectual bar on their unlimited co-ordination. To establish a doctrine of energetics that shall form a sufficient foundation for a theory of the trend of chemical and physical change, we have, there- fore, to impart precision to this motion of available energy.

Carnot's Principle: Entropy. — The whole subject is involved in the new principle contributed to theoretical physics by Sadi Carnot in 1824, in which the far-reaching modern conception of cyclic processes was first scientifically developed. It was shown by Carnot, on the basis of certain axioms, whose theoretical foundations were subsequently corrected and strengthened by Clausius and Lord Kelvin, that a reversible mechanical process, working in a cycle by means of thermal transfers, which takes heat, say Hi, info the material system at a given temperature Ti, and delivers the part of it not utilized, say H 2 , at a lower given temperature T 2 , is more efficient, considered as a working engine, than any other such process, operating between the same two temperatures but not reversible, could be. This relation of inequality involves a definite law of equality, that the mechanical efficiencies of all reversible cyclic processes are the same, whatever be the nature of their

operation or the material substances involved in them; that in fact the efficiency is a function solely of the two temperatures at which the cyclically working system takes in and gives out heat. These considerations constitute a fundamental general principle to which all possible slow reversible processes, so far as they concern matter in bulk, must conform in all their stages; its application is almost coextensive with the scope of general physics, the special kinetic theories in which inertia is involved, being excepted. (See Thermodynamics.) If the working system is an ideal gas-engine, in which a perfect gas (known from experience to be a possible state of matter) is passed through the cycle, and if temperature is measured from the absolute zero by the expansion of this gas, then simple direct

calculation on the basis of the laws of ideal gases shows that Hi/Ti=H 2 /T 2 ; and as by the conservation of energy the work done is Hi— H 2 , it follows that the efficiency, measured as the ratio of the work done to the supply of heat, is 1— T 2 /'I. If we change the sign of Hi and thus consider heat as positive when it is restored to the system as is H 2 , the fundamental equation becomes Hi/Ti+H 2 /T 2 = o; and as any complex reversible working system may be considered as compounded in various ways of chains of elementary systems of this type, whose ejjects are additive, the general proposition follows, that in any reversible complete cyclic change which involves the taking in of heat by the system of which the amount is 5H, when its temperature ranges between T r and T r +5T, the equation S5H r /T r -o holds good. Moreover, if the changes are not reversible, the proportion of the heat supply that is utilized for mechanical work will be smaller, so that more heat will be restored to the system, and 25H r /T r or, as it may be expressed, fdH/T, must have a larger value, and must thus be positive. The first statement involves further, that for all reversible paths of change of the system from one state C to another state D, the value of fdH/T must be the same, because any one of these paths and any other one reversed would form a cycle; whereas for any irreversible path of change between the same states this integral must have a greater value (and so exceed the difference of entropies at the ends of the path). The definite quantity represented by this integral for a reversible path was introduced by Clausius in 1854 (also adumbrated by Kelvin's investigations about the same time), and was named afterwards by him the increase of the entropy of the system in passing from the state C to the state D . This increase, being thus the same for the unlimited number of possible reversible paths involving independent variation of all its finite co-ordinates, along which the

system can pass, can depend only on the terminal states. The entropy belonging to a given state is therefore a function of that state alone, irrespective of the manner in which it has been reached; and this is the justification of the assignment to it of a special name, connoting a property of the system depending on its actual condition and not on its previous history. Every reversible change in an isolated system thus maintains the entropy of that system unaltered; no possible spontaneous change can involve decrease of the entropy; while any defect of reversibility, arising from diffusion of matter or motion in the system, necessarily leads to increase of entropy. For a physical or chemical system only those changes are spontaneously possible which would lead to increase of the entropy; if the entropy is already a maximum for the given total energy, and so incapable of further continuous increase under the conditions imposed upon the system, there must be stable equilibrium.

This definite quantity belonging to a material system, its entropy cj>, is thus concomitant with its energy E, which is also a definite function of its actual state by the law of conservation of energy; these, along with its temperature T, and the various co-ordinates expressing its geometrical configuration and its physical and chemical constitution, are the quantities with which the thermodynamics of the system deals. That branch of science develops the consequences involved in just two principles: (i.) that the energy of every isolated system is constant, and (ii.) that its entropy can never diminish; any complication that may be involved arises from complexity in the systems to which these two laws have to be applied.

The General Thermodynamic Equation. — When any physical or chemical system undergoes an infinitesimal change of state, we have 5E =5H+5U, where 5H is the energy that has been acquired as heal from sources extraneous to the system during the change, and 8V is the energy that has been imparted by reversible agencies such as mechanical or electric work. It is, however, not usually possible to discriminate permanently between heat acquiredand work imparted, for(unless for isothermal transforma- tions) neither 5H nor 5Uis the exact differential of a function of the constitution of the system and so independent of its previous history, although their sum 5E is such ; but we can utilize the fact thatSH is equal to T5<£ where6$ is such, as has just been seen. Thus E and (f> represent properties of the system which, along with

temperature, pressure and other independent data specifying its constitution, must form the variables of an analytical exposition. We have, therefore, to substitute T5<£ for 6H; also the change of internal energy is determined by the change of constitution, involving a differential relation of type

SU = — p5v+&W+,uidmi+n2&m2 + +»n&m n ,

when the system consists of an intimate mixture (solution) of masses m h m 2 , . . . m n of given constituents, which differ physically or chemically but may be partially transformable into each other by chemical or physical action during the changes under consideration, the whole being of volume v and under extraneous pressure p, while W is potential energy arising from physical forces such as those of gravity, capillarity, &c. The variables

mi, m 2 , m n may not be all independent; for example, if the

system were chloride of ammonium gas existing along with its gaseous products of dissociation, hydrochloric acid and ammonia, only one of the three masses would be independently variable. The sufficient number of these variables (independent components) together with two other variables, which may be v and T, or v and cj>, specifies and determines the state of the system, considered as matter in bulk, at each instant. It is usual to include 5W in Hidnii + . . . ; in all cases where this is possible the single equation

SE =TS(t> — pSv+ni8mi+m&m2+ +f n Sm n (i)

thus expresses the complete variation of the energy-function E arising from change of state; and when the part involving the n constitutive differentials has been expressed in terms of the number of them that are really independent, this equation by itself becomes the unique expression of all the thermodynamic relations of the system. These are in fact the various relations ensuring that the right-hand side is an exact differential, and are of the type of reciprocal relations such as d/i r ld(t>=dTldm r .

The condition that the state of the system be one of stable equilibrium is that 8, the variation of entropy, be negative for all formally imaginable infinitesimal transformations which make 5E vanish; for as 5$ cannot actually be negative for any spontaneous variation, none of these transformations can then occur. From the form of the equation, this condition is the same as that 5E-T5<£ must be positive for all possible variations of state of the system as

above defined in terms of co-ordinates representing its constitution in bulk, without restriction.

We can change one of the independent variables expressing the state of the system from 4> to T by subtracting 5 (

S(E-T) = – <(>ST – pSv+inSnii + ... +Mjm n . It follows that for isothermal changes, i.e. those for which ST is maintained null by an environment at constant temperature, the condition of stable equilibrium is that the function E – T# shall be a minimum. If the system is subject to an external pressure p, which as well as the temperature is imposed constant from without and thus incapable of variation through internal changes, the condition of stable equilibrium is similarly that E-T+pv shall be a minimum.

A chemical system maintained at constant temperature by communication of heat from its environment may thus have several states of stable equilibrium corresponding to different minima of the function here considered, just as there may be several minima of elevation on a landscape, one at the bottom of each depression; in fact, this analogy, when extended to space of n dimensions, exactly fits the case. If the system is sufficiently disturbed, for example, by electric shock, it may pass over (explosively) from a higher to a lower minimum, but never (without compensation from outside) in the opposite direction. The former passage, moreover, is often effected by introducing a new substance into the system; sometimes that substance is recovered unaltered at the end of the process, and then its action is said to be purely catalytic; its presence modifies the form of the function E-T<£ so as to obliterate the ridge between the two equilibrium states in the graphical representation.

There are systems in which the equilibrium states are but very slightly dependent on temperature and pressure within wide limits, outside which reaction takes place. Thus while there are

cases in which a state of mobile dissociation exists in the system which changes continuously as a function of these variables, there are others in which change does not sensibly .occur at all until a certain temperature of reaction is attained, after which it proceeds very rapidly owing to the heat developed, and the system soon becomes sensibly permanent in a transformed phase by completion of the reaction. In some cases of this latter type the cause of the delay in starting lies possibly in passive resistance to change, of the nature of viscosity or friction, which is competent to convert an unstable mechanical equilibrium into a moderately stable one; but in most

such reactions there seems to be no exact equilibrium at any temperature, short of the ultimate state of dissipated energy in which the reaction is completed, although the velocity of reactionis found to diminish exponentially with change of temperature, and thus becomes insignificant at a small interval from the temperature of pronounced activity.

Free Energy. — The quantity E-T < £ thus plays the same fundamental part in the thermal statics of general chemical systems at uniform temperature that the potential energy plays in the statics of mechanical systems of unchanging constitution. It is a function of the geometrical co-ordinates, the physical and chemical constitution, and the temperature of the system, which determines the conditions of stable equilibrium at each tempera- ture; it is, in fact, the potential energy generalized so as to include temperature, and thus be a single function relating to each temperature but at the same time affording a basis of connexion between the properties of the system at different temperatures. It has. been called ihtfree energy of the system by Helmholtz, for it is the part of the energy whose variation is connected with changes in the bodily structure of the system represented by the variables wi, w 2 , . . . m n , and not with the irregular molecular motions represented by heat, so that it can take part freely in physical transformations. Yet this holds good only subject to the condition that the temperature is not varied; it has been seen above that for the more general variation neither 5H nor 5U is an exact differential, and no line of separation can be drawn between thermal and mechanical energies.

The study of the evolution of ideas in this, the most abstract branch of modern mathematical physics, is rendered difficult in the manner of most purely philosophical subjects by the variety of terminology, much of it only partially appropriate, that has been employed to express the fundamental principles by different investigators and at different stages of the development. Attentive examination will show, what is indeed hardly surprising, that the principles of the theory of free energy of Gibbs and Helm- holtz had been already grasped and exemplified by Lord Kelvin in the very early days of the subject (see the paper " On the Thermoelastic and Thermomagnetic Properties of Matter, Part I." Quarterly Journal of Mathematics, No. i, April 1855; reprinted in Phil. Mag., January 1878, and in Math, and Phys. Papers, vol. i. pp. 291, seq.). Thus the striking new advance contained in the more modern work of J. Willard Gibbs (1875-1877) and of Helmholtz (1882) was rather the sustained general application of these ideas to chemical systems, such as the galvanic cell and dissociating gaseous systems, and in general fashion to

heterogeneous concomitant phases. The fundamental paper of Kelvin connecting the electromotive force of the cell with the energy of chemical transformation is of date 1851, some years before the distinction between free energy and total energy had definitely crystallized out; and, possibly satisfied with the approximate exactness of his imperfect formula when applied to a Daniell's cell {infra), and deterred by absence of experimental data, he did not return to the subject. In 1852 he briefly announced (Proc. Roy. Soc. Edin.) the principle of the dissipation of mechanical (or available) energy, including the necessity of compensation elsewhere when restoration occurs, in the form that " any restoration of mechanical energy, without more than an equivalent of dissipation, is impossible " — probably even in vital activity; but a sufficient specification of available energy (cf . infra) was not then developed. In the paper above referred to, where this was done, and illustrated by full application to solid elastic systems, the total energy is represented by c and is named

" the intrinsic energy," the energy taken in during an isothermal transformation is represented by e, of which H is taken in as heat, while the remainder, the change of free (or mechanical or available) energy of the system is the unnamed quantity denoted by the symbol w, which is " the work done by the applied forces " at uniform temperature. It is pointed out that it is w and not e that is the potential energy-function for isothermal change, of which the form can be determined directly by dynamical and physical experiment, and from which alone the criteria of equilibrium and stress are to be derived — simply for the reason that for all reversible paths at constant temperature between the same terminal configurations, there must, by Carnot's principle, be the same gain or loss of heat. And a system of formulae are

given (5) to (11) — Ex. gr. e = w—t-jr+J \ sdt for finding the total

energy e for any temperature / when w and the thermal capacity i of the system, in a standard state, have thus been ascertained, and another for establishing connexion between the form of w for one temperature and its form for adjacent temperatures— which are identical with those developed by Helmholtz long afterwards, in 1882, except that the entropy appears only as an unnamed integral. The progress of physical science is formally identified with the

exploration of this function w for physical systems, with continually increasing exactness and range — except where pure kinetic considerations prevail, in which cases the wider Hamiltonian dynamical formulation is fundamental. Another aspect of the matter will be developed below.

A somewhat different procedure, in terms of entropy as fundamental, has been adopted and developed by Planck. In an isolated system the trend of change must be in the direction which increases the entropy , by Clausius' form of the principle. But in experiment it is a system at constant temperature rather than an adiabatic one that usually is involved; this can be attained formally by including in the isolated system (cf . infra) a source of heat at that temperature and of unlimited capacity, when the energy of the original system increases by5E this source must give up heat of amount 8E, and its entropy therefore diminishes SE/T. Thus for the original system maintained at constant temperature T it is 5-5E/T that must always be positive in spontaneous change, which is the same criterion as was reached above. Reference may also be made to H. A. Lorentz's Collected Scientific Papers, part i.

A striking anticipation, almost contemporaneous, of Gibbs's thermodynamic potential theory (infra) was made by Clerk Maxwell in connexion with the discussion of Andrews's experi- ments on the critical temperature of mixed gases, in a letter published in Sir G. G. Stokes's Scientific Correspondence (vol. ii. p. 34).

Available Energy. — The same quantity , which Clausius named the entropy, arose in various ways in the early develop ment of the subject, in the train of ideas of Rankine and Kelvin relating to the expression of the available energy A of the material system. Suppose there were accessible an auxiliary system containing an unlimited quantity of heat at absolute temperature To, forming a condenser into which heat can be discharged from the working system, or from which it may be recovered at that temperature: we proceed to find how much of the heat of our system is available for transformation into mechanical work, in a process which reduces the whole system to the temperature of this condenser. Provided the process of reduction is performed reversibly, it is immaterial, by Carnot's principle, in what manner it is effected: thus in following it out in detail we can consider each elementary quantity of heat 8H removed from the system as set aside at its actual temperature between T and T+5T for the production of mechanical work 5W and the residue of it 5H as directly discharged into the condenser at T . The principle of Carnot gives 8H/T=5H /T , so that the portion of the heat SH that is

not available for work is 5H , equal to T 5H/T. In the whole process the part not available in connexion with the condenser at To is therefore T /dH/T. This quantity must be the same whatever reversible process is employed : thus, for example, we may first transform the system reversibly

from the state C to the state D, and then from the state D to the final state of uniform temperature T . It follows that the value of To/

It is usual to change the law of sign of 5H so that gain of heat by the system is reckoned positive ; then, relative to a condenser of unlimited capacity at To, the state C contains more mechanic- ally available energy than the state D by the amount Ec-E D +To/rfH/T, that is, by E c -E d -To(ˆ c d) In this way the existence of an entropy function with a definite value for each state of the system is again seen to be the direct analytical equivalent of Carnot's axiom that no process can be more efficient than a reversible process between the same initial and final states. The name motivity of a system was proposed by Lord Kelvin in 1879 for this conception of available energy. It is here specified as relative to a condenser of unlimited capacity at an assigned temperature T : some such specification is necessary to the definition; in fact, if T were the absolute zero, all the energy would be mechanically available.

But we can obtain an intrinsically different and self-contained comparison of the available energies in a system in two different states at different temperatures, by ascertaining how much energy would be dissipated in each in a reduction to the same standard state of the system itself, at a standard temperature T . We have only to reverse the operation, and change back this standard state to each of the others in turn. This will involve abstractions of heat 5H from the various portions of the system in the standard state, and returns of SH to the state at T ; if this return were 5H T/T instead of SH, there would be no loss of availability in the .direct process; hence there is actual dissipa- tion SH-SH0T/T0, that is T (8cb~S(f>o). On passing from state 1 to state 2 through this standard state o the difference of these dissipations will represent the energy of the system that has become unavailable. Thus in this sense E -T(£4-T0 o +const. represents for each state the amount of energy that is available; but instead of implying an unlimited source of heat at the standard temperature T , it implies that there is no extraneous source. The available energy thus defined differs from E-T0, the free energy of Helmholtz, or the work function of the applied forces of Kelvin, which involves no reference to any standard state, by a simple linear function of the temperature alone which is immaterial as regards its

applications.

The determination of the available mechanical energy arising from differences of temperature between the parts of the same system is a more complex problem, because it involves a determination of the common temperature to which reversible processes will ultimately reduce them; for the simple case in which no changes of state occur the solution was given by Lord Kelvin in 1853, in connexion with the above train of ideas (cf. Tait's Thermodynamics, §179). In the present exposition the system is sensibly in equilibrium at each stage, so that its temperature T is always uniform throughout ; isolated portions at different temperatures would be treated as different systems.

Thermodynamic Potentials. — We have now to develop the relations involved in the general equation (1) of thermodynamics. Suppose the material system includes two coexistent states or phases, with opportunity for free interchange of constituents — for example, a salt solution and the aqueous vapour in equilibrium with it. Then in equilibrium a slight transfer 8m of the water- substance of mass m r constituting the vapour, into the water- substance of mass m, existing in the solution, should not produce any alteration of the first order in 5E-T5 < £; therefore ix r must be equal to ix s . The quantity /x r is called by Willard Gibbs the potential of the corresponding substance of mass m r ; it may be defined as its marginal available energy per unit mass at the given temperature. If then a system involves in this way coexistent phases which remain permanently separate, the potentials of any constituent must be the same in all of them in , which that constituent exists, for otherwise it would tend to pass

from the phases in which its potential is higher to those in which it is lower. If the constituent is non-existent in any phase, its potential when in that phase would have to be higher than in the others in which it is actually present; but as the potential increases logarithmically when the density of the constituent is indefinitely diminished, this condition is automatically satisfied — or, more strictly, the constitutent cannot be entirely absent, but the presence of the merest trace will suffice to satisfy the condition of equality of potential. AVhen the action of the force of gravity is taken into account, the potential of each constituent must include the

gravitational potential gh; in the equilibrium state the total potential of each constituent, including this part, must be the same throughout all parts of the system into which it is freely mobile. An example is Dalton's law of the indepen- dent distributions of the gases in the atmosphere, if it were in a state of rest. A similar statement applies to other forms of mechanical potential energy arising from actions at a distance.

When a slight constitutive change occurs in a galvanic element at given temperature, producing available energy of electric current, in a reversible manner and isothermally, at the expense of chemical energy, it is the free energy of the system E— T$, not its total intrinsic energy, whose value must be conserved during the process. Thus the electromotive force is equal to the change of this free energy per electrochemical equivalent of reaction in the cell This proposition, developed by Gibbs and later by Helm- holtz, modifies the earlier one of Kelvin — which tacitly assumed all the energy of reaction to be available- — except in the cases such as that of a Daniell's cell, in which the magnitude of the electromotive force does not depend sensibly on the temperature.

The effects produced on electromotive forces by difference of concentrations in dilute solutions can thus be accounted for and traced out, from the knowledge of the form of the free energy for such cases; as also the effects of pressure in the case of gas batteries. The free energy does not sensibly depend on whether the substance is solid or fused — for the two states are in equilibrium at the temperature of fusion — though the total energy differs in these two cases by the heat of fusion; for this reason, as Gibbs pointed out, voltaic potential-differences are the same for the fused as for the solid state of the substances concerned.

Relations involving Constitution only. — The potential of a component in a given solution can depend only on the tempera- ture and pressure of the solution, and the densities of the various components, including itself; as no distance-actions are usually involved in chemical physics, it will not depend on the aggregate masses present. The example above mentioned, of two coexistent phases liquid and vapour, indicates that there may thus be relations between the constitutions of the phases present in a chemical system which do not involve their total masses. These are developed in a very direct manner in Willard Gibbs's original procedure. In so far as attractions at a distance (a uniform force such as gravity being excepted) and capillary actions at the interfaces between the phases are inoperative, the fundamental equation (i) can be integrated.

Increasing the volume k times, and all the masses to the same extent — m fact, placing alongside each other k identical systems at the same temperature and pressure — will increase

, v, nt\, . . ., m n , and therefore by Euler's theorem relating to such functions

E = T0— pv+mmi+ . . . . +fj n w n .

This integral equation merely expresses the additive character of the energies and entropies of adjacent portions of the system at uniform temperature, and thus depends only on the absence of sensible physical action directly across finite distances. If we form from it the expression for the complete differential <5E, and subtract (i), there remains the relation

o = 5T—v8p+mi5m+ . . . . +m n 8n a . (2)

This implies that in each phase the change of pressure depends on and is determined by the changes in T, fi lt . . . fi n alone; as we know beforehand that a physical property like pressure is an

analytical function of the state of the system, it is therefore a function of these n--i quantities. When they are all inde- pendently variable, the densities of the various constituents and of the entropy in the phase are expressed by the partial fluxions of p with respect to them: thus

$_dpˆ m T dp ,

v~ dT v ~ dn r

But when, as in the case above referred to of chloride of ammonium gas existing partially dissociated along with its constituents, the masses are not independent, necessary linear relations, furnished by the laws of definite combining proportions, subsist between the partial fluxions, and the form of the function which expresses ph thus restricted, in a manner which is easily expressible in each special case.

This proposition that the pressure in any phase is a function of the temperature and of the potentials of the independent con- stituents, thus appears as a consequence of Carnot's axiom combined with the energy principle and the absence of effective actions at a distance. It shows that at a given temperature and pressure the potentials are not all independent, that there is a necessary relation connecting them.

This is the equation of state or constitution of the phase, whose existence forms one mode of expression of Carnot's principle, and in which all the properties of the phase are involved and can thence be derived by simple differentiation.

The Phase Rule. — When the material system contains only a single phase, the number of independent variations, in addition to change of temperature and pressure, that can spontaneously occur in its constitution is thus one less than the number of its independent constituents. But where several phases coexist in contact in the same system, the number of possible independent variations may be much smaller. The present independent variables /ii, . . ., ju,, are specially appropriate in this problem, because each of them has the same value in all the phases. Now each phase has its own characteristic equation, giving a relation between Sp, 5T, and 5fii, . . . 5/x n , or such of the latter as are independent; if r phases coexist, there are r such relations; hence the number of possible independent variations, including those of v and T, is reduced tow-r+2, where m is the number of independently variable chemical constituents which the system contains. This number of degrees of constitutive freedom cannot be negative; therefore the number of possible phases that can coexist alongside each other cannot exceed w+2. If m-f-2 phases actually coexist, there is no variable quantity in the system, thus the temperature and pressure and constitutions of the phases are all determined; such is the triple point at which ice, water and vapour exist in presence of each other. If there are m--i coexistent phases, the system can vary in one respect only; for example, at any temperature of water-substance different from the triple point two phases only, say liquid and vapour, or liquid and solid, coexist, and the pressure is definite, as also are the densities and potentials of the components. Finally, when but one phase, say water, is present, both pressure and tempera- ture can vary independently. The first example illustrates the case of systems, physical or chemical, in which there is only one possible state of equilibrium, forming a point of transition between different constitutions; in the second type each temperature has its own completely determined state of equilibrium; in other cases the constitution in the equilibrium state is indeterminate as regards the corresponding number of degrees of freedom. By aid of this phase rule of Gibbs the number of different chemical substances actually interacting in a given complex system can be determined from observation of the degree of spontaneous variation which it exhibits; the rule thus lies at the foundation of the modern subject of chemical equilibrium and continuous chemical change in mixtures or alloys, and in this connexion it has been

widely applied and developed in the experimental investigations of Roozeboom and van 't.Hoff and other physical chemists, mainly of the Dutch school.

Extent to which the Theory can be practically developed. — It is only in systems in which the number of independent variables is small that the forms of the various potentials, — or the form of the

fundamental characteristic equation expressing the energy of the system in terms of its entropy and constitution, or the pressure in terms of the temperature and the potentials, which includes them all, — can be readily approximated to by experimental determinations. Even in the case of the simple system water- vapour, which is fundamental for the theory of the steam-engine, this has not yet been completely accomplished. The general theory is thus largely confined, as above, to defining the restric- tions on the degree of variability of a complex chemical system which the principle of Carnot imposes. The tracing out of these general relations of continuity of state is much facilitated by geometrical diagrams, such as James Thomson first introduced in order to exhibit and explain Andrews' results as to the range of coexistent phases in carbonic acid. Gibbs's earliest thermo- dynamic surface had for its co-ordinates volume, entropy and energy; it was constructed to scale by Maxwell for water- substance, and is fully explained in later editions of the Theory of Heat (1875); it forms a relief map which, by simple inspection, reveals the course of the transformations of water, with the corresponding mechanical and thermal changes, in its three coexistent states of solid, liquid and gas. In the general case, when the substance has more than one independently variable constituent, there are more than three variables to be repre- sented; but Gibbs has shown the utility of surfaces represent- ing, for instance, the entropy in terms of the constitutive variables when temperature and pressure are maintained constant. Such graphical methods are now of fundamental importance in connexion with the phase rule, for the experimental exploration of the trend of the changes of constitution of complex mixtures with interacting components, which arise as the physical con- ditions are altered, as, for example in modern metallurgy, in the theory of alloys. The study of the phenomena of condensation in a mixture of two gases or vapours, initiated by Andrews and developed in this manner by van der Waals and his pupils, forms a case in point (see Condensation or Gases).

Dilute Components: Perfect Gases and Dilute Solutions. — There are, however, two simple limiting cases, in which the theory can be completed by a determination of the functions involved in it, which throw much light on the phenomena of actual systems not far removed trom these ideal limits. They are the cases of mixtures of perfect gases, and of very dilute solutions.

If, following Gibbs, we apply his equation (2) expressing the pressure in terms of the temperature and the potentials, to a very dilute solution of substances m 2 , m-i, . . • m n in a solvent substance mi, and vary the co-ordinate m, alone, p and T remaining unvaried, we have in the equilibrium state

dii r , „. dfi\ , , __ d/i n

m r + mi d +

+ m,

dm,

= 0,

in which every m except Wi is very small, while d\j.\dm r is presumably finite. As the second term is thus finite, this requires that the total potential of each component m„ which is m r dn r ldm r , shall be finite, say k r , in the limit when m r is null. Thus for very small concentra- tions the potential n r of a dilute component must be of the form kr\ogm,l'i>, being proportional to the logarithm of the density of that component; it thus tends logarithmically to an infinite value at evanescent concentrations, showing that removal of the last traces of any impurity would demand infinite proportionate ex- penditure of available energy, and is therefore practically impossible with finite intensities of force. It should be noted, however, that this argument applies only to fluid phrases, for in the case of deposi- tion of a solid m T is not uniformly distributed throughout the phase; thus it remains possible for the growth of a crystal at its surface in aqueous solution to extrude all the water except such as is in some form of chemical combination.

The precise value of this logarithmic expression for the potential can be readily determined for the case of a perfect gas from its characteristic properties, and can be thence extended to other dilute forms of matter. We have pv = R/m.T for unit mass of the gas, where m is the molecular weight, being 2 for hydrogen, and R is a constant equal to 82X10 6 in C.6.S. dynamical units, or 2 calories

approximately in thermal energy units, which is the same for all gases because they have all the same number of molecules per un-.t volume. The increment of heat received by the unit mass of the gas is 5H = P5v+k8T, k being thus the specific heat at constant volume, which can be a function only of the temperature. Thus

= fdH/T = R/m. log v +/«T- 1 rfT ; and the available energy A per unit mass is E— T0+T0o where E=e+f«fr, the integral bring for a standard state, and e being intrinsic energy of chemical constitution; so that*

A =€+T OcT HT -R/wt.T \ogv.

If there are v molecules in the unit mass, and N per unit volume, we have mv — Nmu, each being 2 v', where v' is the number of molecules per unit mass in hydrogen; thus the free energy per molecule is o'+R'Tlog&N, where b = mJ2v', R' = R/2j/, and a' is a function of T alone. It is customary to avoid introducing the unknown mole- cular constant v' by working with the available energy per " gramme- molecule," that is, for a number of grammes expressed by the molecular weight of the substance; this is a constant multiple of the available energy per molecule, and is a + RT logp, p being the density equal to 6N where b = m/2v'. This formula may now be extended by simple summation to a mixture of gases, on the ground of Dalton's experimental principle that each of the components behaves in presence of the others as it would do in a vacuum. The components are, in fact, actually separable wholly or partially in reversible ways which may be combined into cycles, for example, either (i.) by diffusion through a porous partition, taking account of the work of the pressures, or (ii.) by utilizing the modified constitution towards the top of a long column of the mixture arising from the action of gravity, or (in.) by reversible absorption of a single component.

If we employ in place of available energy the form of characteristic equation which gives the pressure in terms of the temperature and potentials, the" pressure of the mixture is expressed as the sum of those belonging to its components: this equation was made by Gibbs the basis of his analytical theory of gas mixtures, which he tested by its application to the only data then available, those of the equili- brium of dissociation of nitrogen peroxide (2NOj ˆ N2O4) vapour.

Van 't Hojf's Osmotic Principle: Theoretical Explanation. — – We proceed to examine how far the same formulae as hold for gases apply to the available energy of matter in solution which is so dilute

that each molecule of. the dissolved substance, though possibly the centre of a complex of molecules of the solvent, is for nearly all the time beyond the sphere of direct influence of the other molecules of the dissolved substance. The available energy is a function only of the co-ordinates of the matter in bulk and the temperature; its change on further dilution, with which alone we are concerned in the transformations of dilute solutions, can depend only on the further separation of these molecular complexes in space that is thereby produced, as no one of them is in itself altered. The change is therefore a function only of the number N of the dissolved molecules per unit volume, and of the temperature, and is, per molecule, expressible in a form entirely independent of their constitution and of that of the medium in which they are dissolved. This suggests that the expression for the change on dilution is the same as the known one for a gas, in which the same molecules would exist free and in the main outside each other's spheres of influence; which confirms and is verified by the experimental principle of van 't Hoff , that osmotic pressure obeys the laws of gaseous pressure with identically the same physical constants as those of gases. It can be held, in fact, that this suggestion does not fall short of a demonstration, on the basis of Carnot's principle, and independent of special molecular theory, that in all cases where the molecules of a component, whether it be of a gas or of a solution, are outside each other's spheres of influence, the available energy, so far as regards dilution, must have a common form, and the physical constants must therefore be the known gas-constants. The customary exposition derives this principle, by an argument involving cycles, from Henry's law of solution of gases; it is sensibly restricted to such solutes as appear concomitantly in the free gaseous state, but theoretically it becomes general when it is remembered that no solute can be absolutely non-volatile.

Source of the Idea of Temperature. — The single new element that thermodynamics introduces into the ordinary dynamical specification of a material system is temperature. This concep- tion is akin to that of potential, except that it is given to us directly by our sense of heat. But if that were not so, we could still demonstrate, on the basis of Carnot's principle, that there is a definite function of the state of a body which must be the same for all of a series of connected bodies, when thermal equilibrium has become established so that there is no tendency for heat to flow from one to another. For we can by mere geometrical displacement change the order of the bodies so as to bring different ones into direct contact. If this disturbed the thermal equilibrium, we could construct cyclic

processes to take advantage of the resulting flow of heat to do mechanical work, and such processes might be carried on without limit. Thus it is proved

that if a body A is in temperature-equilibrium with B, and B with C, then A must be in equilibrium with C directly. This argument can be applied, by aid of adiabatic partitions, even when the bodies are in a field of force so that mechanical work is required to change their geometrical arrangement; it was in fact employed by Maxwell to extend from the case of a gas to that of any other system the proposition that the temperature is the same all along a vertical column in equilibrium under gravity.

It had been shown from the kinetic theory by Maxwell that in a gas-column the mean kinetic energy of the molecules is the same at all heights. If the only test of equality of temperature con- sisted in bringing the bodies into contact, this would be rather a proof that thermal temperature is of the same physical nature in all parts of the field of force; but temperature can also be equalized across a distance by radiation, so that this law for gases is itself already necessitated by Carnot's general principle, and merely confirmed or verified by the special gas-theory. But without introducing into the argument the existence of radiation, the uniformity of temperature throughout all phases in equilibrium is necessitated by the doctrine of energetics alone, as otherwise, for example, the raising of a quantity of gas to the top of the gravitational column in an adiabatic enclosure together with the lowering of an equal mass to the bottom would be a source of power, capable of unlimited repetition.

Laws of Chemical Equilibrium based on Available Energy. — The complete theory of chemical and physical equilibrium in gaseous mixtures and in very dilute solutions may readily be developed in terms of available energy (cf. Phil. Trans., 1897, A, pp. 266-280), which forms perhaps the most vivid and most direct procedure. The available energy per molecule of any kind, in a mixture of perfect gases in which there are N molecules of that kind per unit volume, has been found to be

n,Vi + R'Tlog6iNi)+«2(a'2 + R'Tlog6 2 N 2) + ... must vanish. Therefore Ni"iN 2 n 2 . . . must be equal to K, a function of the temperature alone. This law, originally based by Guldberg and

Waage on direct statistics of molecular inter- action, expresses for each temperature the relation connecting the densities of the interacting substances, in dilution comparable as regards density with the perfect gaseous state, when the reaction has come to the state of mobile equilibrium.

All properties of any system, including the heat of reaction, are expressible in terms of its available energy A, equal to E — T0+0oT. Thus as the constitution of the system changes with the temperature, we have

dh dE d , .

where

SE =«H+«W, SH = TS

8H being heat and 5W mechanical and chemical energy imparted

to the system at constant temperature; hence

rf(A-W) lA _ _ i , t , + . „ , ˆ(A-W) , T — – = — (— 4>o) , so that A = E +T ;■ — L ,*

dT

which is equivalent to E-

\V = -T

d_lt-W dT

(ˆS)-

This general formma, applied differentially, expresses the heat 5E — 5W absorbed by a reaction in terms of 5 A, the change produced by it in the available energy of the system, and of 5W, the mechanical and electrical work done on the system during its progress.

In the problem of reaction in gaseous systems or in very dilute solution, the change of available energy per molecule of reaction has just been found to be

«A = «Ao + R'TlogK' (where K' = V" 2 K;*

thus, when the reaction is spontaneous without requiring external work, the heat absorbed per molecule of reaction is

d SA dT

-TS^^ U , or -R'T^log K.

■*A.*

'dT 1

This formula has been utilized by van 't Hoff to determine, in terms of the heat of reaction, the displacement of equilibrium in various systems arising from change of temperature; for K, equal to Ni"iN 2 n 2. . ., is the reaction -parameter through which alone the temperature affects the law of chemical equilibrium in dilute systems.

Interfacial Phenomena: Liquid Films. — The characteristic equation hitherto developed refers to the state of an element of mass in the interior of a homogeneous substance: it does not apply to matter in the neighbourhood of the transition between two adjacent phases. A remarkable analysis has been developed by J. W. Gibbs in which the present methods concerning matter in bulk are extended to the phenomena at such an interface, without the introduction of any molecular theory; it forms the thermodynamic completion of Gauss's mechanical theory of capillarity, based on the early form of the principle of total energy. The validity of the fundamental doctrine of available energy, so far as regards all mechanical actions in bulk such as surface tensions, is postulated, even when applied to interfacial layers so thin as to be beyond our means of measurement ; the argument from perpetual motions being available here also, as soon as we have experimentally ascertained that the said tensions are definite physical properties of the state of the interface and not merely accidental phenomena. The procedure will then consist in assuming a definite excess of energy, of entropy, and of the masses of the various components, each per unit surface, at the interface, the potential of each component being of necessity, in equilibrium, the same as it is in the adjacent masses. The interfacial transition layer thus provides in a sense a new surface-phase coexistent with those on each side of it, and having its own characteristic equation. It is only the extent of the interface and not its curvatures that need enter into this relation, because any slight influence of the latter can be eliminated from the equation by slightly displacing the position of the surface which is taken to represent the interface geometrically. By an argument similar to one given above, it is shown that one of the forms of the characteristic equation is a relation expressing the surface tension as a function of the temperature and the potentials of

the various components present on the two sides of the interface; and from the differentiation of this the surface densities of the superficial distributions of these components (as above defined) can be obtained. The conditions that a specified new phase may become developed when two other given ones are brought into contact, i.e. that a chemical reaction may start at the interface, are thence formally expressed in terms of the surface tensions of the three transition layers and the pressures in the three phases. In the case of a thin soap-film, sudden extension of any part reduces the interfacial density of each component at each surface of the film, and so alters the surface tension, which requires time to recover by the very slow diffusion of dissolved material from other parts of the thin film; the system being stable, this change must be an increase of tension, and constitutes a species of elasticity in the film. Thus in a vertical film the surface tension must be greater in the higher parts, as they have to sustain the weight of the lower parts ; the upper parts, in fact, stretch until the superficial densities of the components there situated are reduced to the amounts that

correspond to the tension required for this purpose. Such a film could not therefore consist of pure water. But there is a limit to these processes : if the film becomes so thin that there is no water in bulk between its surfaces, the tensions cannot adjust them- selves in this slow way by migration of components from one part of the film to another; if the film can survive at all after it has become of molecular thickness, it must be as a definite molecular structure all across its thickness. Of such type are the black spots that break out in soap-films (suggested by Gibbs and proved by the measures of Reinold and Riicker) : the spots increase in size because their tension is less than that of the surrounding film, but their indefinite increase is presumably stopped in practice by some clogging or viscous agency at their boundary. Transition to Molecular Theory. — The subject of energetics, based on the doctrine of available energy, deals with matter in bulk and is not concerned with its molecular constitution, which it is expressly designed to eliminate from the problem. This analysis of the phenomena of surface tension shows how far the principle of negation of perpetual motions can carry us, into regions which at first sight might be classed as molecular. But, as in other cases, it is limited to pointing out the general scheme of relations within which the phenomena can have their play. There is now a considerable body of knowledge correlating surface tension with

chemical constitution, especially to a certain extent with the numerical density of the distribution of molecules; thus R. Eotvos has shown that a law of proportion- ality exists for wide classes of substances between the tempera- ture-gradient of the surface tension and the density of the mole- cules over the surface layer, which varies as the two-thirds power of the number per unit volume (see Chemistry: Physical). This takes us into the sphere of molecular science, where at present we have only such indications largely derived from experiment, if we except the mere notion of inter-atomic forces of unknown character on which the older theories of capillarity, those of Laplace and Poisson, were constructed.

In other topics the same restrictions on the scope of the simple statical theory of energy appear. From the ascertained behaviour in certain respects of gaseous media we are able to construct their characteristic equation, and correlate their remaining relations by means of its consequences. Part of the experimental knowledge required for this purpose is the values of the gas-con- stants, which prove to be the same for all nearly perfect gases. The doctrine of energetics by itself can give no clue as to why this should be so; it can only construct a scheme for each simple or complex medium on the basis of its own experimentally determined characteristic equation. The explanation of uni- formities in the intrinsic constitutions of various media belongs to molecular theory, which is a distinct and in the main more complex and more speculative department of knowledge. When we proceed further and find, with van 't Hoff, that these same universal gas-constants reappear in the relations of very dilute solutions, our demand for an explanation such as can only be provided by molecular theory (as supra) is intensely stimulated. But except in respects such as these the doctrine of energetics gives a complete synthesis of the course and relations of the chemical reactions of matter in bulk, from which we can eliminate atomism altogether by restating the merely numerical atomic theory of D alt on as a principle of equivalent combining pro-portions. Of recent years there has been a considerable school of chemists who insist on this procedure as a purification of their science from the hypothetical ideas as to atoms and molecules, in terms of which its experimental facts have come to be expressed. A complete system of doctrine can be developed in this manner, but its scope will be limited. It makes use of one principle of correlation, the doctrine of available energy, and discards another such principle, the atomic theory. Nor can it be said that the one principle is really more certain and definite than the other. This may be illustrated by what has sometimes by German writers been called Gibbs's paradox: the

energy that is available for mechanical effect in the inter-diffusion of given volumes of two gases depends only on these volumes and their pressures, and is independent of what the gases are; if the gases

differed only infinitesimally in constitution it would still be the same, and the question arises where we are to stop, for we cannot suppose the inter-diffusion of two identical gases to be a source of power. This then looks like a real failure, or rather limitation, of the principle; and there are other such, that can only be satis- factorily explained by aid of the complementary doctrine of molecular theory. That theory, in fact, shows that the more nearly identical the gases are, the slower will be the process of inter-diffusion, so that the mechanical energy will indeed be available, but only after a time that becomes indefinitely pro- longed. It is a case in which the simple doctrine of energetics becomes inadequate before the limit is reached. The phenomena of highly rarefied gases provide other cases. And in fact the only reason hitherto thought of for the invariable tendency of available energy to diminish, is that it represents the general principle that in the kinetic play of a vast assemblage of independent mole- cules individually beyond our control, the normal tendency is for the regularities to diminish and the motions to become less correlated: short of some such reason, it is an unexplained empirical principle. In the special departments of dynamical physics on the other hand, the molecular theory, there dynamical and therefore much more difficult and less definite, is an indispens- able part of the framework of science; and even experimental chemistry now leans more and more on new physical methods and instruments. Without molecular theory the clue which has developed into spectrum analysis, bringing with it stellar chemistry and a new physical astronomy, would not have been available; nor would the laws of diffusion and conduction in gases have attained more than an empirical form; nor would it have been possible to weave the phenomena of electrodynamics and radiation into an entirely rational theory.

The doctrine of available energy, as the expression of thermo-dynamic theory, is directly implied in Carnot's Essai of 1824, and constitutes, in fact, its main theme; it took a fresh start, in the light of fuller experimental knowledge regarding the nature of heat, in the early memoirs of Rankine and Lord Kelvin, which may be found in their Collected Scientific Papers; a subsequent exposition occurs in Maxwell's Theory of Heat; its most familiar form of statement is Lord Kelvin's principle of the dissipation of available energy. Its principles were very early applied by James Thomson to a physico-chemical problem, that of the influence of stress on the growth of

crystals in their mother liquor. The " thermodynamic function " introduced by Rankine into its development is the same as the " entropy " of the material system, independently defined by Clausius about the same time. Clausius's form of the principle, that in an adiabatic system the entropy tends continually to increase, has been placed by Pro- fessor Willard Gibbs, of Yale University, at the foundation of his magnificent but complex and difficult development of the theory. His monumental memoir " On the Equilibrium of Heterogene- ous Substances," first published in Trans. Connecticut Academy (1876-1878), made a clean sweep of the subject; and workers in the modern experimental science of physical chemistry have returned to it again and again to find their empirical principles forecasted in the light of pure theory, and to derive fresh inspiration for new departures. As specially preparatory to Gibbs's general discussion may be mentioned Lord Rayleigh's memoir on the thermodynamics of gaseous diffusion (Phil. Mag., 1876), which was expounded by Maxwell in the 9th edition of the Ency. Brit. (art. Diffusion). The fundamental importance of the doctrine of dissipation of energy for the theory of chemical reaction had already been insisted on in general terms by Rayleigh; subsequent to, but independently of, Gibbs's work it had been elaborated by von Helmholtz (Gesamm. Abhandl. ii. and iii.) in connexion with the thermodynamics of voltaic cells, and more particularly in the calculation of the free or available energy of solutions from data of vapour-pressure, with a view to the application to the theory of concentration cells, therein also coming close to the doctrine of osmotic pressure. This form of the general theory has here been traced back substantially to Lord Kelvin under date 1855. Expositions and developments on various lines will be found in papers by Riecke and by Planck in

Annalen tier Physik between 1890 and 1900, in the course of a memoir by Larmor, Phil. Trans., 1897, A, in Voigt's Compendium der Physik and his more recent Thermodynamik, in Planck's Vorlesungen ilber Thermodynamik, in Duhem's elaborate Traite de me'canique chimique and Le Potential ihermodynamique, in Whetham's Theory of Solution and in Bryan's Thermodynamics. Numerous applications to special problems are expounded in van 't HofP s Lectures on Theoretical and Physical Chemistry.

The theory of energetics, which puts a diminishing limit on the

amount of energy available for mechanical purposes, is closely implicated in the discovery of natural radioactive substances by H. Becquerel, and their isolation in the very potent form of radium salts by M. and Mme Curie. The slow degradation of radium has been found by the latter to be concomitant with an evolution of heat, in amount enormous compared with other chemical changes. This heat has been shown by E. Rutherford to be about what must be due to the stoppage of the a and j3 particles, which are emitted from the substance with velocities almost of the same scale as that of light. If they struck an ideal rigid target, their lost kinetic energy must all be sent away as radiation; but when they become entangled among the molecules of actual matter, it will, to a large extent, be shared among them as heat, with availability reduced accordingly. In any case the particles that escape into the surrounding space are so few and their velocity so uniform that we can, to some extent, treat their energy as directly available mechanically, in contradistinction to the energy of individual molecules of a gas (cf. Maxwell's "demons "), e.g. for driving a vane, as in Crookes's experiment with the cathode rays. Indeed, on account of the high velocity of projection of the particles from a radium salt, the actions concerned would find their equilibrium at such enormously high temperatures that any influence of actually available differences of temperature is not sensibly a feature of the phenomena. Such actions, however, like explosive actions in general, are beyond our powers of actual direct measurement as regards the degradation of availability of the energy. It has been pointed out by Rutherford, R. J. Strutt and others, that the energy of degradation of even a very minute admixture of active radium would entirely dominate and mask all other cosmical modes of transformation of energy; for example, it far outweighs that arising from the exhaustion of gravitational energy, which has been shown by Helmholtz and Kelvin to be an ample source for all the activities of our cosmical system, and to be itself far greater than the energy of any ordinary chemical rearrangements con- sequent on a fall of temperature: a circumstance that makes the existence and properties of this substance under settled cosmic conditions still more anomalous (see Radioactivity). Theoretically it is possible to obtain unlimited concentration of availability of energy at the expense of an equivalent amount of degradation spread over a wider field; the potency of electric furnaces, which have recently opened up a new department of chemistry, and are limited only by the refractoriness of the materials of which they are constituted, forms a case in point. In radium we have the very remarkable phenomenon of far higher concentration occurring naturally in very minute permanent

amounts, so that merely chemical sifting is needed to produce its aggregation. Even in pitchblende only one molecule in io 9 seems to be of radium, renewable, however, when lost, by internal transformation.

The energetics of Radiation is treated under that heading. See also Thermodynamics. (J. L.)'*

ENERGICI, or Energumens (Gr. " possessed by a spirit "), the name given in the early Church to those suffering from different forms of insanity, who were popularly supposed to be under the control of some indwelling spirit other than their own. Among primitive races everywhere disease is explained in this way, and its removal supposed to be effected by priestly prayers and incantations. They were sometimes called x^^^ofavoL, as being " tossed by the waves " of uncontrollable impulse. Persons afflicted in this way were restricted from entering the church, but might share the shelter of the porch with lepers and persons of offensive life (Hefele, Conciliengeschichte, vol. i. § 16).

After the prayers, if quiet, they might come in to receive the bishop's blessing (Apost. Const, viii. 6, 7, 32) and listen to the sermon. They were daily fed and prayed over by the exorcists, and, in case of recovery, after a fast of from 20 to 40 days, were admitted to the eucharist, and their names and cures entered in the church records.

A note on the New Testament use of the word hepyelv and its cognates will be found in J. A. Robinson's edition of The Epistle to the Ephesians, pp. 241-247; an excursus on "The Conflict with Demons " in A. Harnack, The Expansion of Christianity, i. 152-180. Cf. Exorcism.

ENERGY (from the Gr. eykpyua; Iv, in, ipyov, work), in physical science, a term which may be defined as accumulated mechanical work, which, however, may be only partially available for use. A bent spring possesses energy, for it is capable of doing work in returning to its natural form ; a charge of gunpowder pos- sesses energy,for it is capable of doingwprk in exploding; aLeyden jar charged with electricity possesses energy, for it is capable of doing work in being discharged. The motions of bodies, or of the ultimate parts of bodies, also involve energy, for stopping them would be a source of work.

All kinds of energy are ultimately measured in terms of work. If we raise 1 lb of matter through a foot we do a certain amount of work

against the earth's attraction; if we raise 2 lb through the same height we do twice this amount of work, and so on. Also, the work done in raising 1 lb through 2 ft. will be double of that done in raising it 1 ft. Thus we recognize that the work done varies as the resistance overcome and the distance through which it is overcome conjointly.

Now, we may select any definite quantity of work we please as our unit, as, for example, the work done in lifting a pound a foot high from the sea-level in the latitude of London, which is the unit of work generally adopted by British engineers, and is called the " foot-pound." The most appropriate unit for scientific purposes is one which depends only on the fundamental units of length, mass and time, and is hence called an absolute unit. Such a unit is independent of gravity or of any other quantity which varies with the locality. Taking the centimetre, gramme and second as our fundamental units, the most convenient unit of force is that which, acting on a gramme for a second, produces in it a velocity of a centimetre per second; this is called a Dyne. The unit of work is that which is required to overcome a resistance of a dyne over a centimetre, and is called an Erg. In the latitude of Paris the dyne is equal to the weight of about ^-|t of a gramme, and the erg is the amount of work required to raise $-|r of a gramme vertically through one centimetre.

Energy is the capacity for doing work. The unit of energy should therefore be the same as that of work, and the centimetre- gramme-second (C.G.S.) unit of energy is the erg.

The forms of energy which are most readily recognized are of course those in which the energy can be most directly employed in doing mechanical work; and it is manifest that masses of matter which are large enough to be seen and handled are more readily dealt with mechanically than are smaller masses. Hence when useful work can . be obtained from a system by simply connecting visible portions of it by a train of mechanism, such energy is more readily recognized than is that which would compel us to control the behaviour of molecules before we could transform it into useful work. This leads up to the fundamental distinction, introduced by Lord Kelvin, between " available energy," which we can turn to mechanical effect, and " diffuse energy," which is useless for that purpose.

The conception of work and of energy was originally derived from observation of purely mechanical phenomena, that is to say, phenomena in which the relative positions and motions of visible portions of matter were all that were taken into consideration. Hence

it is not surprising that, in those more subtle forms in which energy cannot be readily or completely converted into work, the universality of the principle of energy, its conserva- tion, as regards amount, should for a long while have escaped recognition after it had become familiar in pure dynamics.

If a pound weight be suspended by a string passing over

pulley, in descending through 10 ft. it is capable of raising nearly a pound weight attached to the other end of the string, through the same height, and thus can do nearly 10 foot-pounds of work. The smoother we make the pulley the more nearly does the amount of useful work which the weight is capable of doing approach 10 foot-pounds, and if we take into account the work done against the friction of the pulley, we may say that the work done by the descending weight is 10 foot-pounds, and hence when the weight is in its elevated position we have at disposal 10 foot-pounds more energy than when it is in the lower position. It should be noticed, however, that this energy is possessed by the system consisting of the earth and pound together, in virtue of their separation, and that neither could do work without the other to attract it. The system consisting of the earth and the pound therefore possesses an amount of energy which depends on the relative positions of its two parts, on account of the latent physical connexion existing between them. In most mechanical systems the working stresses acting between the parts can be determined when the relative positions of all the parts are known; and the energy which a system possesses in virtue of the relative positions of its parts, or its configuration, is classified as "potential energy," to distinguish it from energy of motion which we shall presently consider. The word potential does not imply that this energy is not real; it exists in potentiality only in the sense that it is stored away in some latent manner; but it can be drawn upon without limit for mechanical work.

It is a fundamental result in dynamics that, if a body be pro- jected vertically upwards in vacuo, with a velocity of v centi- metres per second, it will rise to a height of v i J2g centimetres, where g represents the numerical value of the acceleration pro- duced by gravity in centimetre-second units. Now, if m represent the mass of the body in grammes its weight will be mg dynes, for it will require a force of mg dynes to produce in it the acceleration denoted by g.

Hence the work done in raising the mass will be represented by mg-v l l2g, that is, \tmP- ergs. Now, whatever be the direction in which a body is moving, a frictionless constraint, like a string attached to the body, can cause its velocity to be changed into the vertical direction without any change taking place in the magnitude of the velocity. Thus it is merely in virtue of the velocity that the mass is capable of rising against the resistance of gravity, and hence we recognize that on account of its motion the body possessed %mv 2 units of energy. Energy of motion is usually called " kinetic energy."

A simple example of the transformation of kinetic energy into potential energy, and vice versa, is afforded by the pendulum. When at the limits of its swing, the pendulum is for an instant at rest, and all the energy of the oscillation is static or potential. When passing through its position of equilibrium, since gravity can do no more work upon it without changing its fixed point of support, all the energy of oscillation is kinetic. At intermediate positions the energy is partly kinetic and partly potential.

Available kinetic energy is possessed by a system of two or more bodies in virtue of the relative motion of its parts. Since our conception of velocity is essentially relative, it is plain that any property possessed by a body in virtue of its motion can be effectively possessed by it only in relation to those bodies with respect to which it is moving. If a body whose mass is m grammes be moving with a velocity of v centimetres per second relative to the earth, the available kinetic energy possessed by the system is %mv' 2 ergs if m be small relative to the earth. But if we consider two bodies each of mass m and one of them moving with velocity v relative to the other, only \mi? units of work is available from this system alone. Thus the estimation of kinetic energy is intimately affected by the choice of our base of measurement.

When the stresses acting between the parts of a system depend only on the relative positions of those parts, the sum of the kinetic energy and potential energy of the system is always the same, provided the system be not acted upon by anything outside it. Such a system is called " conservative," and is well illustrated by the swinging pendulum above referred to. But there are stresses which depend on the relative motion of the visible bodies between which they appear to act. When work is done

against these forces no full equivalent of potential energy may be produced; this applies especially to frictional forces, for if the motion of the system be reversed the forces will be also reversed and will still

oppose the motion. It was long believed that work done against such forces was lost, and it was not till the 19th century that the energy thus transformed was traced; the conservation of energy has become the master-key to unlock the connexions in inanimate nature.

It was pointed out by Thomson (Lord Kelvin) and P. G. Tait that Newton had divined the principle of the conservation of energy, so far as it belongs purely to mechanics. But what became of the work done against friction and such non- conservative forces remained obscure, while the chemical doctrine that heat was an indestructible substance afterwards led to the idea that it was lost. There was, however, even before Newton's time, more than a suspicion that heat was a form of energy. Francis Bacon expressed his conviction that heat consists of a kind of motion or " brisk agitation " of the particles of matter. In the Novum Organum, after giving a long list of the sources of heat, he says: " From these examples, taken collectively as well as singly, the nature whose limit is heat appears to be motion. ... It must not be thought that heat generates motion or motion heat (though in some respects this is true), but the very essence of heat, or the substantial self of heat, is motion and nothing else."

After Newton's time the first vigorous effort to restore the universality of the doctrine of energy was made by Benjamin Thompson, Count Rumford, and was published in the Phil. Trans, for 1798. Rumford was engaged in superintending the boring of cannon in the military arsenal at Munich, and was struck by the amount of heat produced by the action of the boring bar upon the brass castings. In order to see whether the heat came out of the chips he compared the capacity for heat of the chips abraded by the boring bar with that of an equal quantity of the metal cut from the block by a fine saw, and obtained the same result in the two cases, from which he concluded that " the heat produced could not possibly have been furnished at the expense of the latent heat of the metallic chips."

Rumford then turned up a hollow cylinder which was cast in one piece with a brass six-pounder, and having reduced the connexion between the cylinder and cannon to a narrow neck of metal, he caused a blunt borer to press against the hollow of the cylinder with a force equal to the weight of about 10,000 lb, while the casting was made to rotate in a lathe. By this means the mean temperature of the brass was raised through about 70 Fahr., while the amount of metal abraded was only 837 grains.

In order to be sure that the heat was not due to the action of the air upon the newly exposed metallic surface, the cylinder and the end of the boring bar were immersed in 1 8 • 7 7 lb. of water contained in an oak box. The temperature of the water at the commence- ment of the experiment was 6o° Fahr., and after two horses had turned the lathe for 25 hours the water boiled. Taking into account the heat absorbed by the box and the metal, Rumford calculated that the heat developed was sufficient to raise 26-58 lb of water from the freezing to the boiling point, and in this calcula- tion the heat lost by radiation and conduction was neglected. Since one horse was capable of doing the work required, Rumford remarked that one horse can generate heat as rapidly as nine wax candles burning in the ordinary manner.

Finally, Rumford reviewed all the sources from which the heat might have been supposed to be derived, and concluded that it was simply produced by the friction, and that the supply was inexhaustible. "It is hardly necessary to add," he remarks, " that anything which any insulated body or system of bodies can continue to furnish without limitation cannot possibly be a material substance; and it appears to me to be extremely difficult, if not quite impossible, to form any distinct idea of anything capable of being excited and communicated in the manner that heat was excited and communicated in these experiments, except it be motion."

About the same time Davy showed that two pieces of ice could be melted by rubbing them together in a vacuum, although

everything surrounding them was at a temperature below the freezing point. He did not, however, infer that since the heat could not have been supplied by the ice, for ice absorbs heat in melting, this experiment afforded conclusive proof against the substantial nature of heat.

Though we may allow that the results obtained by Rumford and Davy demonstrate satisfactorily that heat is in some way due to motion, yet they do not tell us to what particular dynamical quantity heat corresponds. For example, does the heat generated by friction vary as the friction and the time during which it acts, or is it proportional to the friction and the distance through which the rubbing bodies are displaced — that is, to the work done against friction — or does it

involve any other conditions? If it can be shown that, however the duration and all other conditions of the experiment may be varied, the same amount of heat can in the end be always produced when the same amount of energy is expended, then, and only then, can we infer that heat is a form of energy, and that the energy consumed has been really transformed into heat. This was left for J. P. Joule to achieve; his experiments conclusively prove that heat and energy are of the same nature, and that all other forms of energy can be transformed into an equivalent amount of heat.

The quantity of energy which, if entirely converted into heat, is capable of raising the temperature of the unit mass of water from o° C. to i° C. is called the mechanical equivalent of heat. One of the first who took in hand the determination of the mechanical equivalent of heat was Marc. Seguin, a nephew of J. M. Montgolfier. He argued that, if heat be energy, then, when it is employed in doing work, as in a steam-engine, some of the heat must itself be consumed in the operation. Hence he inferred that the amount of heat given up to the condenser of an engine when the engine is doing work must be less than when the same amount of steam is blown through the engine without doing any work. Seguin was unable to verify this experimentally, but in 1857 G. A. Hirn succeeded, not only in showing that such a difference exists, but in measuring it, and hence determining a tolerably approximate value of the mechanical equivalent of heat. In 1839 Seguin endeavoured to determine the mechanical equivalent of heat from the loss of heat suffered by steam in expanding, assuming that the whole of the heat so lost was consumed in doing external work«against the pressure to which the steam was exposed. This assumption, however, cannot be justified, because it neglected to take account of work which might possibly have to be done within the steam itself during the expansion.

In 1842 R. Mayer, a physician at Heilbronn, published an attempt to determine the mechanical equivalent of heat from the heat produced when air is compressed. Mayer made an assump- tion the converse of that of Seguin, asserting that the whole of the work done in compressing the air was converted into heat, and neglecting the possibility of heat being consumed in doing work within the air itself or being produced by the transformation of internal potential energy. Joule afterwards proved (see below) that Mayer's assumption was in accordance with fact, so that his method was a sound one as far as experiment was concerned; and it was only on account of the values of the specific heats of air at constant pressure and at constant volume employed by him being very inexact that the value of the mechanical equivalent of heat obtained by Mayer was very far from

the truth.

Passing over L. A. Colding, who in 1843 presented to the Royal Society of Copenhagen a paper entitled " Theses concern- ing Force," which clearly stated the " principle of the perpetuity of energy," and who also performed a series of experiments for the purpose of determining the heat developed by the compression of various bodies, which entitle him to be mentioned among the founders of the modern theory of energy, we come to Dr James Prescott Joule of Manchester, to whom we are indebted more than to any other for the establishment of the principle of the conserva- tion of energy on the broad basis on which it has since stood. The best-known of Joule's experiments was that in which a brass paddle consisting of eight arms rotated in a cylindrical vessel of water containing four fixed vanes, which allowed the passage of the arms of the paddle but prevented the water from

rotating as a whole. The paddle was driven by weights, and the temperature of the water was observed by thermometers which could indicate -yj-tfth of a degree Fahrenheit. Special experiments were made to determine the work done against resistances outside the vessel of water, which amounted to about ■006 of the whole, and corrections were made for the loss of heat by radiation, the buoyancy of the air affecting the descending weights, and the energy dissipated when the weights struck the floor with a finite velocity. From these experiments Joule obtained 72-692 foot-pounds in the latitude of Manchester as equivalent to the amount of heat required to raise 1 lb of water through 1 Fahr, from the freezing point. Adopting the centi- grade scale, this gives 1390-846 foot-pounds.*

With an apparatus similar to the above, but smaller, made of iron and filled with mercury, Joule obtained results varying from 772-814 foot-pounds when driving weights of about 58 lb were employed to 775-352 foot-pounds when the driving weights were only about 195 lb. By causing two conical surfaces of cast-iron immersed in mercury and contained in an iron vessel to rub against one another when pressed together by a lever, Joule obtained 776-045 foot-pounds for the mechanical equivalent of heat when the heavy weights were used, and 77493 foot-pounds with the small driving weights. In this experiment a great noise was produced, corresponding to a loss of energy, and Joule endeavoured to determine the amount of energy necessary to produce an equal amount of sound from the string of a violoncello and to apply a corresponding correction.

The close agreement between the results at least indicates that " the amount of heat produced by friction is proportional to the work done and independent of the nature of the rubbing surfaces." Joule inferred from them that the mechanical equivalent of heat is probably about 772 foot-pounds, or, employing the centigrade scale, about 1390 foot-pounds.

Previous to determining the mechanical equivalent of heat by the most accurate experimental method at his command, Joule established a series of cases in which the production of one kind of energy was accompanied by a disappearance of some other form. In 1840 he showed that when an electric current was produced by means of a dynamo-magneto-electric machine the heat generated in the conductor, when no external work was done by the current, was the same as if the energy employed in producing the current had been converted into heat by friction, thus showing that electric currents conform to the principle of the conservation of energy, since energy can neither be created nor destroyed by them. He also determined a roughly approximate value for the mechanical equivalent of heat from the results of these experiments. Extending his investigations to the currents produced by batteries, he found that the total voltaic heat generated in any circuit was proportional to the number of electrochemical equivalents electrolysed in each cell multiplied by the electromotive force of the battery. Now, we know that the number of electrochemical equivalents electrolysed is proportional to the whole amount of electricity which passed through the circuit, and the product of this by the electromotive force of the battery is the work done by the latter, so that in this case also Joule showed that the heat generated was pro- portional to the work done.

In 1844 and 1845 Joule published a series of researches on the compression and expansion of air. A metal vessel was placed in a calorimeter and air forced into it, the amount of energy ex- pended in compressing the air being measured. Assuming that the whole of the energy was converted into heat, when the air was subjected to a pressure of 2 1 • 5 atmospheres Joule obtained for the mechanical equivalent of heat about 824-8 foot-pounds, and when a pressure of only 10-5 atmospheres was employed the result was 796-9 foot-pounds.

In the next experiment the air was compressed as before, and then allowed to escape through a long lead tube immersed in the water of a calorimeter, and finally collected in a bell jar. The amount of heat absorbed by the air could thus be measured, while the work done by it in expanding could be readily calculated. In allowing the air to

expand from a pressure of 21 atmospheres

to that of 1 atmosphere the value of the mechanical equivalent of heat obtained was 821-89 foot-pounds. Between 10 atmo- spheres and 1 it was 815-875 foot-pounds, and between 23 and 14 atmospheres 761-74 foot-pounds.

But, unlike Mayer and Seguin, Joule was not content with assuming that when air is compressed or allowed to expand the heat generated or absorbed is the equivalent of the work done and of that only, no change being made in the internal energy of the air itself when the temperature is kept constant. To test this two vessels similar to that used in the last experiment were placed in the same calorimeter and connected by a tube with a stop-cock. One contained air at a pressure of 22 atmospheres, while the other was exhausted. On opening the stop-cock no work was done by the expanding air against external forces, since it expanded into a vacuum, and it was found that no heat was generated or absorbed. This showed that Mayer's assumption was true. On repeating the experiment when the two vessels were placed in different calorimeters, it was found that heat was absorbed by the vessel containing the compressed air, while an equal quantity of heat was produced in the calorimeter containing the exhausted vessel. The heat absorbed was consumed in giving motion to the issuing stream of air, and was reproduced by the impact of the particles on the sides of the exhausted vessel. The subsequent researches of Dr Joule and Lord Kelvin (Phil. Trans., 1853, p. 357, 1854, p. 321, and 1862, p. 579) showed that the statement that no internal work is done when a gas expands or contracts is not quite true, but the amount is very small in the cases of those gases which, like oxygen, hydrogen and nitrogen, can only be liquefied by intense cold and pressure.

For a long time the final result deduced by Joule by these varied and careful investigations was accepted as the standard value of the mechanical equivalent of heat. Recent determina- tions by H. A. Rowland and others, necessitated by modern requirements, have shown that it is in error, but by less than r%. The writings of Joule, which thus occupy the place of honour in the practical establishment of the conservation of energy, have been collected into two volumes published by the Physical Society of London. On the theoretical side the greatest stimulus came from the publication in 1847, without

knowledge of Mayer or Joule, of Helmholtz's •great memoir, Uber die Erhaltung der Kraft, followed immediately (1848-1852) by the establishment of the science of thermodynamics (q.v.), mainly by R. Clausius and Lord Kelvin on the basis of " Carnot's principle " (1824), modified in expression so as to be consistent with the conservation of energy (see Energetics).

Though we can convert the whole of the energy possessed by any mechanical system into heat, it is not in our power to perform the inverse operation, and to utilize the whole of the heat in doing mechanical work. Thus we see that different forms of energy are not equally valuable for conversion into work. The ratio of the portion of the energy of a system which can under given conditions be converted into mechanical work to the whole amount of energy operated upon may be called the " availability " of the energy. If a system be removed from all communication with anything outside of itself, the whole amount of energy possessed by it will remain constant, but will of its own accord tend to undergo such transformations as will diminish its avail- ability. This general law, known as the principle of the " dissipa- tion of energy," was first adequately pointed out by Lord Kelvin in 1852; and was applied by him to some of the principal problems of cosmical physics. Though controlling all phenomena of which we have any experience, the principle of the dissipation of energy rests on a very different foundation from that of the conservation of energy ; for while we may conceive of no means of circumventing the latter principle, it seems that the actions of intelligent beings are subject to the former only in consequence of the rudeness of the machinery which they have at their disposal for controlling the behaviour of those ultimate portions of matter, in virtue of the motions or positions of which the energy with which they have to deal exists. If we have a weight capable of falling through a certain distance, we can employ the mutual forces of the system consisting of the earth and weight to do an amount of

useful work which is less than the full amount of potential energy possessed by the system only in cdhsequence of the friction of the constraints, so that the limit of availability in this case is de- termined only by the friction which is unavoidable. Here we have to deal with a transformation with which we can grapple, and which can be controlled for our purposes. If, on the other hand, we have to deal with a system of molecules of whose motions in the aggregate we become conscious only by indirect means, while we know absolutely nothing either of the motions or positions of any individual molecule, it is obvious that we cannot grasp single molecules and control their

movements so as to derive the full amount of work from the system. All we can do in such cases is to place the system under certain conditions of transformation, and be content with the amount of work which it is, as it were, willing to render up under those conditions. Thus the principle of Carnot involves the conclusion that a greater proportion of the heat possessed by a body at a high temperature can be converted into work than in the case of an equal quantity of heat possessed by a body at a low temperature, so that the availability of heat increases with the temperature.

Clerk Maxwell supposed two compartments, A and B, to be filled with gas at the same temperature, and to be separated by an ideal, infinitely thin partition containing a number of exceed- ingly small trap-doors, each of which could be opened or closed without any expenditure of energy. An intelligent creature, or " demon," possessed of unlimited powers of vision, is placed in charge of each door, with instructions to open the door whenever a particle in A comes towards it with more than a certain velocity V, and to keep it closed against all particles in A moving with less than this velocity, but, on the other hand, to open the door whenever a particle in B approaches it with less than a certain velocity v, which is not greater than V, and to keep it closed against all particles in B moving with a greater velocity than this. By continuing this process every unit of mass which enters B will carry with it more energy than each unit which leaves B, and hence the temperature of the gas in B will be raised and that of the gas in A lowered, while no heat is lost and no energy expended; so that by the application of intelligence alone a portion of gas of uniform pressure and temperature may be sifted into two parts, in which both the temperature and the pressure are different, and from which, therefore, work can be obtained at the expense of heat. This shows that the principle of the dissipation of energy has control over the actions of those agents only whose faculties are too gross to enable them to grapple individually with the minute portions of matter which are the seat of energy.

In 1875 Lord Rayleigh published an investigation on "the work which may be gained during the mixing of gases." In the preface he states the position that " whenever, then, two gases are allowed to mix without the performance of work, there is dissipation of energy, and an opportunity of doing work at the expense of low temperature heat has been for ever lost." He shows that the amount of work obtainable is equal to that which can be done by the first gas in expanding into the space occupied by the second (supposed vacuous) together with that done by the second in expanding into the space occupied by the first. In the experiment imagined by Lord Rayieigh a

porous diaphragm takes the place of the partition and trap-doors imagined by Clerk Maxwell, and the molecules sort themselves automatically on account of the difference in their average velocities for the two gases. When the pressure on one side of the diaphragm thus becomes greater than that on the other, work may be done at the expense of heat in pushing the diaphragm, and the operation carried on with continual gain of work until the gases are uniformly diffused. There is this difference, however, between this experiment and the operation imagined by Maxwei!, that when the gases have diffused the experiment cannot be repeated; and it is no more contrary to the dissipation of energy than is the fact that work may be derived at the expense of heat when a gas expands into a vacuum, for the working substance is not finally restored to its original condition; while Maxwell's " 'lemons " may operate without limit

In such experiments the molecular energy of a gas is converted into work only in virtue of trie molecules being separated into classes in which their velocities are different, and these classes then allowed to act upon one another through the intervention of a suitable heat-engine. This sorting can occur spontaneously to a limited extent; while if we could carry it out as far as we pleased we might transform the whole of the heat of a body into work. The theoretical availability of heat is limited only by our power of bringing those particles whose motions constitute heat in bodies to rest relatively to one another; and we have precisely similar practical limits to the availability of the energy due to the motion of visible and tangible bodies, though theoretically we can then trace all the stages.

If a battery of electromotive force E maintain a current C in a conductor, and no other electromotive force exist in the circuit, the whole of the work done will be converted into heat, and the amount of work done per second will be EC. If R denote the resistance of the whole circuit, E = CR, and the heat generated per second is C 2 R. If the current drive an electromagnetic engine, the reaction of the engine will produce an electromotive force opposing the current. Suppose the current to be thus reduced to C. Then the work done by the battery per second will be EC or CC'R, while the heat generated per second will be C' 2 R, so that we have the difference (C-C')CR for the energy consumed in driving the engine. The ratio of this to the whole work done by the battery is (C-C')/C, so that the efficiency is increased by diminishing C. If we could drive the engine so fast as to

reduce C to zero, the whole of'the energy of the battery would be available, no heat being produced in the wires, but the horse-power of the engine would be indefinitely small. The reason why the whole of the energy of the current is not available is that heat must always be generated in a wire in which a finite current is flowing, so that, in the case of a battery in which the whole of the energy of chemical affinity is employed in producing a current, the availability of the energy is limited only on account of the resistance of the conductors, and may be increased by diminishing this resistance. The availability of the energy of electrical separation in a charged Leyden jar is also limited only by the resistance of conductors, in virtue of which an amount of heat is necessarily produced, which is greater the less the time occupied in discharging the jar. The availability of the energy of magnetization is limited by the coercive force of the magnetized material, in virtue of which any change in the intensity of magnetization is accompanied by the production of heat.

In all cases there is a general tendency for other forms of energy to be transformed into heat on account of the friction of rough surfaces, the resistance of conductors, or similar causes, and thus t o lose availability. In some cases , as when heat is converted into the kinetic energy of moving machinery or the potential energy of raised weights, there is an ascent of energy from the less available form of heat to the more available form of mechanical energy, but in all cases this is accompanied by the transfer of other heat from a body at a high temperature to one at a lower temperature, thus losing availability to an extent that more than compensates for the rise.

It is practically important to consider the rate at which energy may be transformed into useful work, or the horse-power of the agent. It generally happens that to obtain the greatest possible amount of work from a given supply of energy, and to obtain it at the greatest rate, are conflicting interests. We have seen that the efficiency of an electromagnetic engine is greatest when the current is indefinitely small, and then the rate at which it works is also indefinitely small. M. H. von Jacobi showed that for a given electromotive force in the battery the horse-power is greatest when the current is reduced to one-half of what it would be if the engine were at rest. A similar condition obtains in the steam- engine, in which a great rate of working necessitates the dissipa- tion of a large amount of energy. (W. G.; J. L.)*

ENFANTIN, BARTHELEMY PROSPER (1796-1864), French social reformer, one of the founders of Saint-Simonism, was born at Paris on the 8th of February 1796. He was the son of a banker of

Dauphiny, and after receiving his early education at a

lyceum, was sent in 1813 to the Ecole Poiytechnique. In March 1814 he was one of the band of students who, on the heights of Montmartre and Saint-Chaumont, attempted resistance to the armies of the allies then engaged in the investment of Paris. In consequence of this outbreak of patriotic enthusiasm, the school was soon after closed by Louis XVIII., and the young student was compelled to seek some other career instead of that of the soldier. He first engaged himself to a country wine merchant, for whom he travelled in Germany, Russia and the Netherlands. In 1821 he entered a banking-house newly established at St Petersburg, but returned two years later to Paris, where he was appointed cashier to the Caisse Hypothecate. At the same time he became a member of the secret society of the Carbonari. In 1825 a new turn was given to his thoughts and his life by the friendship which he formed with Olinde Rodriguez, who intro- duced him to Saint-Simon. He embraced the new doctrines with ardour, and by 1829 had become one of the acknowledged heads of the sect (see Saint-Simon).

After the Revolution of 1830 Enfantin resigned his office of cashier, and devoted himself wholly to his cause. Besides contri- buting to the Globe newspaper, he made appeals to the people by systematic preaching, and organized centres of action in some of the principal cities of France. The headquarters in Paris were removed from the modest rooms in the Rue Taranne, and estab- lished in large halls near the Boulevard Italien. Enfantin and Bazard (q.v.) were proclaimed " Peres Supremes." This union of the supreme fathers, however, was only nominal. A divergence was already manifest, which rapidly increased to serious difference and dissension. Bazard had devoted himself to political reform, Enfantin to social and moral change; Bazard was organizer and governor, Enfantin was teacher and consoler; the former attracted reverence, the latter love. A hopeless antagonism arose between them, which was widened by Enf antin's announcement of his theory of the relation of man and woman, which would substitute for the " tyranny of marriage" a system of " free love." Bazard now separated from his colleague, and in his withdrawal was followed by all those whose chief aim was philosophical and political. Enfantin thus became sole " father," and the few who were chiefly attracted by his religious pretensions and aims still adhered to him. New converts joined them, and Enfantin assumed that his followers in France numbered 40,000. He wore on his breast a badge with his title of "Pere," was spoken of by his preachers as " the living law," declared, and probably believed, himself to be the chosen of God, and sent out emissaries in a quest of

a woman predestined to be the "female Messiah," and the mother of a new Saviour. The quest was very costly and altogether fruitless. No such woman was discoverable. Meanwhile believers in Enfantin and his new religion were multiplying in all parts of Europe. His extravagances and success at length brought down upon him the hand of the law. Public morality was in peril, and in May 1832 the halls of the new sect were closed by the government, and the father, with some of his followers, appeared before the tribunals. He now retired to his estate at Menilmontant, near Paris, where with forty disciples, all of them men, he continued to carry out his socialistic views. In August of the same year he was again arrested, and on his appearance in court he desired his defence to be undertaken by two women who were with him, alleging that the matter was of special concern to women. This was of course refused. The trial occupied two days and resulted in a verdict of guilty, and a sentence of imprisonment for a year with a small fine.

This prosecution finally discredited the new society. Enfantin was released in a few months, and then, accompanied by some of his followers, he went to Egypt. He stayed there two years, and might have entered the service of the viceroy if he would have professed himself, as a few of his friends did, a Mahommedan. On his return to France, a sadder and practically a wiser man. he settled down to very prosaic work. He became first a postmaster near Lyons, and in 1841 was appointed, through the influence of some of his friends who had risen to posts of power, member of a scientific commission on Algeria, which led him to engage in researches concerning North Africa and colonization in general.

in 1845 he was appointed a director of the Paris&Lyons railway. Three years later he established, in conjunction with Duveyrier, a daily journal, entitled Le Cr6d.it, which was discontinued in 1850. He was afterwards attached to the administration of the railway from Lyons to the Mediterranean. Father Enfantin held fast by his ideal to the end, but he had renounced the hope of giving it a local habitation and a name in the degenerate obstinate world. His personal influence over those who associated with him was immense. " He was a man of a noble presence, with finely formed and expressive features. He was gentle and insinuating in manner, and possessed a calm, graceful and winning delivery " {Gent. Mag., Jan. 1865). His evident sincerity, his genuine enthusiasm, gave him his

marvellous ascendancy. Not a few of his disciples ranked afterwards amongst the most distinguished men of France. He died suddenly at Paris on the 1st of September 1864.

Amongst his works are — Doctrine de Saint-Simon (written in conjunction with several of his followers), published in 1830, and several times republished; Hconomie politique et politique Saint-Simonienne (1831); Correspondence politique (1835-1840); Corresp. philos. et religieuse (1843-1845); and La Vie eternelle passee, presente, future (1861). A large number of articles by his hand appeared in Le Producteur, L Organisateur, Le Globe, and other periodicals. He also wrote in 1832 Le Livre nouveau, intended as a substitute for the Christian Scriptures, but it was not published.

See G. Weill, L'Hcole Saint-Simonienne, son histoire, son influence, jusqu' & nos jours (Paris, 1896).

ENFIDAVILLE [Dar-el-Bey], a town of Tunisia, on the railway between Tunis and Susa, 30 m. N.E. of the last-named place and 5 m. inland from the Gulf of Hammamet. Enfidaville is the chief settlement on the Enfida estate, a property of over 300,000 acres in the Sahel district of Tunisia, forming a rectangle between the towns of Hammamet, Susa, Kairawan and Zaghwan. On this estate, devoted to the cultivation of cereals, olives, vines and to pasturage, are colonies of Europeans and natives. At Enfidaville, where was, as its native name indicates, a palace of the beys of Tunis, there is a large horse-breeding establishment and a much-frequented weekly market. About 5 m. N. of Enfidaville is Henshir Fraga (anc. Uppenna) , where are ruins of a large fortress and of a church in which were found mosaics with epitaphs of various bishops and martyrs.

The Enfida estate was granted by the bey Mahammed-es- Sadok to his chief minister Khaireddin Pasha (q.v.) in return for the confirmation by the sultan of Turkey in 1871, through the instrumentality of the pasha, of the right of succession to the beylik of members of Es-Sadok's family. When, some years later, Khaireddin left Tunisia for Constantinople he sold the estate to a Marseilles company, which resold it to the Societe Franco-africaine.

ENFIELD, a township of Hartford county, Connecticut, U.S.A., in the N. part of the state, on the E. bank of the Connecticut river, 20 m. N. of Hartford. It has an area of 35 sq. m., with three villages — Thompsonville, Hazard ville and Enfield. Pop. (1890) 7199; (1900) 6699 (1812 foreign-born); (1910) 9719. Its principal manufactures

are gunpowder, carpets, brick, cotton press machinery, and coffin hardware. In Enfield and its vicinity much tobacco is grown. First settled in 1679, Enfield was a part of the township of Springfield, Massachusetts, until 1683, when it was made a separate township; in 1749 it became a part of Connecticut. At a town meeting on the nth of July 1774 it was resolved that " a firm and inviolable union of our colonies is absolutely necessary for the defence of our civil rights," and that " the most effectual measures to defeat the machinations of the enemies of His Majesty's government and the liberties of America is to break off all commercial intercourse with Great Britain and the West Indies until these oppressive acts for raising a revenue in America are repealed." A Shaker community was established in the township in 1781, at what is now called Shaker Station.

See Francis Olcutt Allen, History of Enfield (Lancaster, Pa., 1900).

ENFIELD, a market town in the Enfield parliamentary division of Middlesex, England, n m. N. of London Bridge, on the Great Northern and Great Eastern railways. Pop. of urban district, (1891) 31,536, (iqoi) 42,738. It is picturesquely situated on the western slope of the Lea valley, with a consider-

able extension towards the river, mainly consisting of artisans' dwellings (Churchbury, Ponder's End, and Enfield Highway on the Old North Road). Great numbers of villas occupied by those whose work lies in London have grown up; and many of the inhabitants are employed in the Royal Small Arms factory at Enfield Lock. The church of St Andrew is mainly Perpendicular, but has Early English portions; it contains several ancient monuments and brasses, and flanks the market-place, with its modern cross. Enfield Palace fronts the High Street; it retains portions of the building of Edward VI., but has been greatly altered. The grammer school, near the church, was founded in 1557. The New River flows through the parish, and Sir Hugh Myddleton, its projector, was for some time resident here. Middleton House, named after him, is oneof severalfine mansions in the vicinity. Of these, Forty Hall, in splendidly timbered grounds, is from the designs of Inigo Jones; and a former mansion occupying the site of White Webbs House was suspected as the scene of the hatching of Gunpowder Plot. The parish is of great extent (12,653 acres).

An Anglo-Saxon derivation, signifying " forest clearing," is indicated for the name. Enfield Chase was a royal preserve, disafforested in 1777. The principal manor of Enfield, which was held by Asgar, Edward the Confessor's master of horse, was in the hands of the

Norman baron Geoffrey de Mandeville at the time of Domesday, and belonged to the Bohun family in the 12th and 13th centuries. It came, by succession and marriage, into the possession of the crown under Henry IV., and wasincluded in the duchy of Lancaster. There were, however, seven other manors, and of these one, Worcesters, came to the crown in the time of Henry VIII. , whose children resided at the manor-house, Elsynge Hall. Edward VI., settling both manors upon the princess Elizabeth, rebuilt Enfield Palace for her. She was a frequent resident here not only before but after her accession to the throne. About ,1664 the palace was occupied as a school by Robert Uvedale (1642-17 2 2), who was also an eminent horticul- turist, planted the magnificent cedar still standing in the palace grounds, and formed a herbarium now in the Sloane collection at the British Museum. The town received grants of markets from Edward I. and James I.

ENFILADE (a French word, from enfiler, to thread, and so to pass through from end to end), a military term used to express the direction of fire along an enemy's line, or parapet. This species of fire is most demoralizing and destructive, since, from its direction, very few guns or rifles can be brought to bear to meet it. If any considerable body of men changes front, it immediately lays itself open to enfilade from the enemy whom it originally faced. Against entrenchments, or the parapets of fortifications, enfilade is still more effective, as the enemy is deprived of the protection given by his works and is no better covered than if he were in the open. Banks of earth, built perpendicular to the line of defence (called traverses) , are usually employed to protect parapets or trenches against enfilade.

ENGADINE (Ger. Engadin; Ital. Engadina; Ladin, Engia- dina), the name of the upper or Swiss portion of the valley of the Inn, which forms part of the Swiss canton of the Grisons. Its length by carriage road from the Maloja plateau (5935 ft.) at its south-western end to Martinsbruck (3406 ft.) at its north-eastern extremity is about 59 m. It is to be noted that up to and includ- ing St Moritz (6037 ft., the highest) all the villages (save Sils- Baseglia) at its south-western end are higher than the Maloja plateau itself. The uppermost portion of the valley contains several lakes, which, as one descends, gradually diminish in size, those of Sils, Silvaplana and St Moritz. But both the Maloja plateau and the south-western half of the lake of Sils belong to the commune of Stampa in the Val Bregaglia, and are included in the Bregaglia administrative district, so that, from a political point of view, Sils is the first village that is included in the Engadine. The rest of the Engadine forms the districts of the Upper Engadine with eleven

communes, and of the Inn (i.e. the Lower Engadine), subdivided into the Ob Tasna, Remus, and Unter Tasna circles, and containing twelve communes.

In 1900 the total population of the Engadine was 11,712, of

whom 5429 were in the Upper Engadine and 6283 in the Lower Engadine. In point of religion 8594 were Protestants (4923 in the Lower Engadine and 3671 in the Upper Engadine), and 3086 Romanists (1728 in the Upper Engadine and 1358 in the Lower Engadine), while there were 12 Jews in the Upper Engadine and 2 in the Lower Engadine : in the Upper Engadine the majority in each commune was Protestant (the Romanists strongest in St Moritz), as also in the case of the Lower Engadine, save Tarasp and Samnaun, where the Romanists prevail. In point of language 7609 inhabitants (5010 in the Lower Engadine and 2599 in the Upper' Engadine) spoke the curious Ladin dialect (a survival of a primitive Romance tongue), and 2221 German (1265 in the Upper Engadine and 956 in the Lower Engadine). The capital of the Upper Engadine is Samaden (967 inhabitants), and that of the Lower Engadine, Schuls (1 1 1 7 inhabitants) . In 1908 there were no railways in the Engadine, save about 8 m. (from the mouth of the tunnel past Bevers and Samaden to St Moritz village) of the railway pierced (1898-1902) beneath (5987 ft.) the Albula Pass (7595 ft.), which now affords the easiest means of access from Coire to St Moritz (56 m.); but many railways in and to the Engadine have been planned. The valley is reached by many passes (over which excellent carriage roads were constructed 1820-1872). The Maloja (5935 ft.) is the route from Chiavenna and the Lake of Como to the Upper Engadine, which is also reached from Coire by the Julier (7504 ft.) and the Albula Passes (7595 ft-) as weu> as f rom Tirano in the Valtellina by the Bernina Pass (7645 ft.). On the other hand, the Lower Engadine is accessible from Davos over the Fliiela Pass (7838 ft.) and from Mais at the head of the Adige valley (or the Vintschgau) by the Ofen Pass (7071 ft.), while from Martinsbruck, the last Swiss village, a carriage road leads up to Nauders (5 m.), whence it is 27 m. by road down the Inn valley to Landeck on the Arlberg railway, or 17ˆ m. over the Reschen Scheideck Pass (4902 ft.) to Mais in the Vintschgau. v

The Upper Engadine consists of a long, straight, nearly level trough of 26 m., varying from a mile to half a mile in breadth, through

which flows the Inn. On the south-east this trough is limited by the lofty glacier-clad Bernina group (culminating in the Piz Bernina, 13,304 ft.) and the range rising between the Inn valley and that of Livigno to the south-east, while on the north- west the boundary is the extensive Albula group (culminating in Piz Kesch, 1 1,228 ft,). The Lower Engadine is far more pictur- esque and romantic than the Upper Engadine, the Inn valley being here much narrower and the fall greater. On its north- west rises the last bit of the Albula group (culminating in Piz Vadret, 10,584 ft.), and on the north the Silvretta group (culmin- ating in Piz Linard, 11,201 ft.), while to the east and south are the ranges on either side of the Ofen Pass (culminating in Piz Sesvenna, 10,568 ft.). In the Upper Engadine the villages are on the floor of the valley, but in the Lower Engadine many are perched high above the bed of the river on terraces, and are cut off from each other by deep ravines.

The Upper Engadine is far better known to foreign visitors than the Lower Engadine, and is consequently much richer and more prosperous. The mineral waters of St Moritz (q.v.) were known and employed in the 16th century, and long formed the great attraction of the region. But about the middle of the igth century the Upper Engadine came into fashion as a great " air-cure," and now Maloja, Sils, Silvaplana, Campfer and St Moritz are all well known; those who desire to explore the glaciers of the Bernina group mostly resort to Pontresina, on the Flatz- bach, the stream descending from the Bernina Pass. Yet, owing to its great elevation, the scenery of the Upper Engadine has a bleak, northern aspect. Pines and larches alone flourish, garden vegetables are grown only in sunny spots, and there is no tillage. The Alpine flora is very rich and varied. But snow falls even in August, and the climate is well described in the proverb, " nine months winter, and three months cold weather. " The villages are built entirely of stone (as also in the Lower Engadine), chiefly to guard against destructive fires that were formerly frequent in this narrow, wind-swept valley. The wealth of the inhabitants consists in their hay meadows and pasture? The lower pastures

support large herds of cows, while the higher are let out (in both parts of the valley) to Bergamasque shepherds, who come thither every summer with their flocks. In the Lower Engadine the chief attraction is formed by the mineral springs at Schuls below Tarasp, which are much frequented during the summer. The wild gorge of Finstermtinz separates the last Swiss village, Martinsbruck, from the first Tirolese village, Pfunds, the gorge being passable only on foot, while the carriage road makes a great detour by way of Nauders, so that the two villages named are 13 m. by road from each other. The

earliest full description of the country by an English traveller is that by Archdeacon W. Coxe, in Travels in Switzerland (London, 1789).

The Upper Engadine is not mentioned in authentic documents till 1 139, the bishop of Coire being then the great lord, and, from the 13th century, having as his bailiffs the family of Planta, the original seat of which was at Zuz. The valley obtained its freedom from both in i486 (Planta) and in 1526, when the temporal powers of the bishop were abolished. In 1367 it (as well as the bishop's vassals in the Lower Engadine) joined the newly founded League of God's House or Gotteshausbund (see Grisons), one of the 3 Raetian Leagues, which lasted till 1799-1801, when the whole Engadine became part of Canton Raetia of the Helvetic Republic, which, in 1803, altered its name to that of Grisons or Graubunden, and then first entered the Swiss Confederation. In the Upper Engadine the " Referendum " existed as between the different villages composing a bailiwick (Hochgericht). The history of the Lower Engadine is for long quite different. Though always comprised in the diocese of Coire, it formed from the early 9th century onwards (with the Vintschgau) a separate county, which was gradually absorbed in that which, later, took the name of the county of Tirol. The limit between the Upper Engadine and the Tirolese Lower Engadine was definitively fixed in 1282 at the Punt' Ota (the high bridge) just above Brail, and mentioned in 1 139 already. In 1363 Tirol came into the possession of the Habsburgers, who were troublesome neighbours both to the Upper Engadine and to the League of God's House. Their power was stemmed in 1499 at the battle of the Calven gorge (above Mais), though it wasonlyin 1652 that the Lower Engadine bought up the remaining rights of the Habsburgers. But the castle of Tarasp (acquired by them in 1464) was excepted: the lordship was given by them in 1687 to the Dietrichstein family, and held by it till 1801,'when Austria ceded it to France, which, in 1803, handed it over to the Swiss Confederation, by which it was incorporated in 1809 with the Canton of the Grisons. This long connexion with Tirol accounts for the fact that Tarasp is still mainly Romanist, while the lonely Swiss valley of Samnaun (above Martinsbruck) has given up its Protestantism and its Ladin speech owing to communications with Tirol being easier than with Switzerland. The bears in the bear pit at Bern come from the forests in the lower Spol valley, above Zernez, in the Lower Engadine, on the way to the Ofen Pass. The upper Spol valley (Livigno) is Italian (see Valtellina).

Authorities. — M. Caviezel, Das Oberengadin, 7th edition (Coire, 1896); C. Decurtius, Ratoromanische Chrestomathie, vols, v.-ix. (Erlangen, 1899-1908), deals with the two divisions of the Engadine

from the 16th century to modern times; Mrs H. Freshfield, A Summer Tour in tht Grisons and the Italian Valleys of the Bernina (London, 1862); E. Imhof, Itinerarium des S.A.C. fur die Albula- gruppe (Bern, 1893), and Itinerarium des S.A.C. fur die Silvretta- und Ofenpassgruppe (Mountains of the Lower Engadine) (Bern, 1 898) ; E. Lechner, Das Oberengadin in der Vergangenheit und Gegenwart (Leipzig, 1900) ; A. Lorria and E. A. Martel, Le Massif de la Bernina (complete monograph on the Upper Engadine, with full bibliography) (Zurich, 1894) '< P- C. von Planta, Die Curraiischen Herrschaften in der Feudalzeit (Bern, 1881); Z. and E. Pallioppi, Dizionari dels Idioms Romauntschs d'Engiadina ota e bassa, &fc. (Samaden, 1895); F- de B. Strickland, The Engadine, 2nd edition (London and Samaden, 1891); J. Ulrich, Ratoromanische Chrestomathie, vol. ii. (Halle, 1882). (W. A. B. C.)

ENGAGED COLUMN, in architecture, a form of column, sometimes defined as semi or three-quarter detached according to its projection; the term implies that the column is partly attached to a pier or wall. It is rarely found in Greek work, and then only in exceptional cases, but it exists in profusion in Roman architecture. In the temples it is attached to the cella walls.

repeating the columns of the peristyle, and in the theatres and amphitheatres, where they subdivided the arched openings: in all these cases engaged columns are utilized as a decorative feature, and as a rule the same proportions are maintained as if they had been isolated columns. In Romanesque work the classic proportions are no longer adhered to; the engaged column, attached to the piers, has always a special function to perform, either to support subsidiary arches, or, raised to the vault, to carry its transverse or diagonal ribs. The same con- structional object is followed in the earlier Gothic styles, in which they become merged into the mouldings. Being virtually always ready made, so far as their design is concerned, they were much affected by the Italian revivalists.

ENGEL, ERNST (1 821-1896), German political economist and statistician, was born in Dresden on the 21st of March 1821. He studied at the famous mining academy of Freiberg, in Saxony, and on completing his curriculum travelled in Germany and France. Immediately after the revolution of 1848 he was attached to the royal commission in Saxony appointed to deter- mine the relations

between trade and labour. In 1850 he was directed by the government to assist in the organization of the German Industrial Exhibition of Leipzig (the first of its kind). The success which crowned his efforts was so great that in 1854 he was induced to enter the government service, as chief of the newly instituted statistical department. He retired, however, from the office in 1858. He founded at Dresden the first Mortgage Insurance Society (Hypotheken-Versicherungsgesellschaft), and as a result of the success of his work was summoned in i860 to Berlin as director of the statistical department, in succession to Karl Friedrich Wilhelm Dieterici (1790-1859). In his new office he made himself a name of world-wide reputation. Raised to the rank of Geheimer Regierungsrat, he retired in 1882 and lived henceforward in Radebeul near Dresden, where he died on the 8th of December 1896. Engel was a voluminous writer on the subjects with which his name is connected, but his statis- tical papers are mostly published in the periodicals which he himself established, viz. Preuss. Statistik (in 1861); Zeitschrijt des Statistischen Bureaus, and Zeitschrijt des Statistichen Bureaus des Konigreichs Sachsen.

ENGEL, JOHANN JAKOB (1741-1802), German author, was born at Parchim, in Mecklenburg, on the 1 ith of September 1 741 . He studied theology at Rostock and Biitzow, and philosophy at Leipzig, where he took his doctor's degree. In 1776 he was appointed professor of moral philosophy and belles-lettres in the Joachimstal gymnasium at Berlin, and a few years later he became tutor to the crown prince of Prussia, afterwards Frederick William III. The lessons which he gave his royal pupil in ethics and politics were published in 1798 under the title Fiirstenspiegel, and are a favourable specimen of his powers as a popular philosophical writer. In 1787 he was admitted a member of the Academy of Sciences of Berlin, and in the same year he became director of the royal theatre, an office he resigned in 1794. He died on the 28th of June 1802.

Besides numerous dramas, some of which had a considerable success, Engel wrote several valuable books on aesthetic sub- jects. His A nfangsgrunde einer Theorie der Dichiungsarten (1 783) showed fine taste and acute critical faculty if it lacked imagina- tion and poetic insight. The same excellences and the same defects were apparent in his Ideenzu einer Mitnik (1785), written in the form of letters. His most popular work was Der Philosoph fur die Welt (1775), which consists chiefly of dialogues on men and morals, written from the utilitarian standpoint of the philosophy of the day. His last work, a romance entitled Herr Lorenz Stark (1795), achieved a great success, by virtue of the marked individu- ality of its characters and

its appeal to middle-class sentiment.

Engel's Sdmtliche Schriften were published in 12 volumes at Berlin in 1801-1806; a new edition appeared at Frankfort in 1851. See K. Schroder, Johann Jakob Engel (Vortrag) (1897).

ENGELBERG, an Alpine village and valley in central Switzer- – land, much frequented by visitors in summer and to some extent in winter. It is 14 m. by electric railway from Stansstad, on the Lake of Lucerne, past Stans. The village (3343 ft.) is in a

mountain basin, shut in on all sides by lofty mountains (the highest is the Titlis, 10,627 ft. in the south-east), so that it is often hot in summer. It communicates by the Surenen Pass (7563 ft.) with Wassen, on the St Gotthard railway, and by the Joch Pass (7267 ft.) past the favourite summer resort of the Engstlen Alp (6034 ft.), with Meiringen in the Bernese Oberland. The village has clustered round the great Benedictine monastery which gives its name to the valley, from the legend that its site was fixed by angels, so. that the spot was named " Mons Angelorum." The monastery was foundeJˆabout n 20 and still survives, though the buildings date only from the early 18th century. Its library suffered much at the hands of the French in 1798. From 1462 onwards it was under the protectorate of Lucerne, Schwyz, Unterwalden and Uri. In 1 798 the abbot lost all his temporal powers, and his domains were annexed to the Obwalden division of Unterwalden, but in 1803 were transferred to the Nidwalden division. However, in 1816, in consequence of the desperate resistance made by the Nidwalden men to the new Federal Pact of 181 5, they were punished by the fresh transfer of the valley to Obwalden, part of which it still forms. As the ' pastures forming the upper portion of the Engelberg valley have for ages belonged to Uri, the actual valley itself is politically iso- lated between Uri and Nidwalden. The monastery is still directly dependent on the pope. In 1900 the valley had 1973 inhabitants, practically all German-speaking and Romanists. (W. A. B. C.)

ENGELBRECHTSDATTER, DORTHE (1634-1716), Norwegian poet, was born at Bergen on the 16th of January 1634; her father, Engelbrecht Jorgensen, was originally rector of the high school in that city, and afterwards dean of the cathedral. In 1652 she married Ambrosius Hardenbech, a theological writer famous for his flowery funeral sermons, who succeeded her father at the cathedral in 1659. They had five sons and four daughters. In 1678 her first volume appeared, Sjaelens aandelige Sangoffer (" The Soul's Spiritual Offering of Song ") published at Copenhagen. This volume of hymns

and devotional pieces, very modestly brought out, had an unparalleled success. The fortunate poetess was invited to Denmark, and on her arrival at Copenhagen was presented at Court. She was also introduced to Thomas Kingo, the father of Danish poetry, and the two greeted one another with improvised couplets, which have been preserved, and of which the poetess's reply is incomparably the neater. In 1683 her husband died, and before 1698 she had buried allhernine children. In the midst of her troubles appeared her second work, the Taareojfer (" Sacrifice of Tears "), which is a continuous religious' poem in four books. This was combined with the Sangoffer, and no fewer than three editions of the united works were published before her death, and many after it. In 1698 she brought out a third volume of sacred verse, Et kristeligt Valet fra Verden (" A Christian Farewell to the World "), a very tame production. She died on the 19th of February 17 16. The first verses of Dorthe Engelbrechtsdatter are the best; her Sangoffer was dedicated to Jesus, the Taareojfer to Queen Charlotte Amalia; this is signifi- cant of her changed position in the eyes of the world.

ENGELHARDT, JOHANN GEORG VEIT (1791-1855), German theologian, was born at Neustadt-on-the-Aisch on the 12 th of November 1791, and was educated at Erlangen, where he after- wards taught in the gymnasium (181 7), and became professor of theology in the university (1821). His two great works were a Handbuch der Kirchengeschichte in 4 vols. (1 833-1 834), and a Dogmengeschichte in 2 vols.. (1839). He died at Erlangen on the 13th of September 1855.

ENGHIEN, LOUIS ANTOINE HENRI OE BOURBON CONDE\ Due d' (1772-1804), was the only son of Henri Louis Joseph, prince of Conde, and of Louise Marie Therese Mathilde, sister of the duke of Orleans (Philippe Egalite), and was born at Chantilly on the 2nd of August 1772. He was educated privately by the abbe Millot, and received a military training from the commodore de Virieux. He early showed the warlike spirit of the house of Conde, and began his military career in 1 788. On the outbreak of the French Revolution he " emigrated " with very many of the nobles a few days after the fall of the Bastille, and remained in exile, seeking to raise forces for the invasion of France and the

restoration of the old monarchy. In 1 79 2 , on the outbreak of war,

he held a command in the force of emigre's (styled the " French royal army ") which shared in the duke of Brunswick's unsuccess- ful invasion of France. He continued to serve under his father and grandfather in what was known as the Conde army, and on several occasions distinguished himself by his bravery and ardour in the vanguard. On the dissolution of that force after the peace of Luneville (February 1801) he married privately the princess Charlotte, niece of Cardinal de Rohan, and took up his residence at Ettenheim in Baden, near the Rhine. Early in the year 1804 Napoleon, then First Consul of France, heard news which seemed to connect the young duke with the Cadoudal- Pichegru conspiracy then being tracked by the French police. The news ran that the duke was in company with Dumouriez and made secret journeys into France. This was false; the acquaintance was Thumery, a harmless old man, and the duke had no dealings with Cadoudal or Pichegru. Napoleon gave orders for the seizure- of the duke. French mounted gendarmes crossed the Rhine secretly, surrounded his house and brought him to Strassburg (15th of March 1804), and thence to the castle of Vincennes, near Paris. There a commission of French colonels was hastily gathered to try him. Meanwhile Napoleon had found out the true facts of the case, and the ground of the accusation was hastily changed. The duke was now charged chiefly with bearing arms against France in the late war, and with intending to take part in the new coalition then proposed against France. The colonels hastily and most informally drew up the act of condemnation, being incited thereto by orders from Savary (q.v.), who had come charged with instructions. Savary intervened to prevent all chance of an interview between the condemned and the First Consul; and the duke was shot in the moat of the castle, near a grave which had already been prepared. With him ended the house of Conde. In 1816 the bones were exhumed and placed in the chapel of the castle. It is now known that Josephine and Mme de Remusat had begged Napoleon for mercy towards the duke; but nothing would bend his will. The blame which the apologists of the emperor have thrown on Talley- rand or Savary is undeserved. On his way to St Helena and at Longwood he asserted that, in the same circumstances, he would do the same again; he inserted a similar declaration in his will. See H. Welschinger, Le Due d'Enghien 1772-1804 (Paris, 1888); A. Nougaret de Fayet, Recherches historiques sur le prods et la con- damnation du due d'Enghien, 2 vols. (Paris, 1844) ; Comte A. Boulay -de la Meurthe, Les Dernieres Annies du due d'Enghien 1801-1804 (Paris, 1886). For documents see La Catastrophe du due d' Enghien in the edition of Memoires edited by M. F. Barriere, also the edition of the duke's letters, &c., by Count Boulay de la Meurthe (tome i,, Paris, 1904;

tome ii., 1908). (J- Hl. R.)

ENGHIEN, a town in the province of Hainaut, Belgium, lying south of Grammont. Pop. (1904) 4541. It is the centre of considerable lace, linen and cotton industries. There is a fine park outside the town belonging to the duke of Arenberg, whose ancestor, Charles de Ligne, bought it from Henry IV. in 1607, but the chateau in which the duke of Arenberg of the 18th century entertained Voltaire no longer exists. Curiously enough the cottage, a stone building, built by the same duke for Jean Jacques Rousseau, still stands in the park, while the ducal residence was burnt down by the sans-culottes. A fine pavilion or kiosk, named de l'Etoile, has also survived. The great Conde was given, for a victory gained near this place, the right to use the style of Enghien among his subsidiary titles.

ENGINE (Lat. internum) , a term which in the time of Chaucer had the meaning of " natural talent "or" ability," corresponding to the Latin from which it is derived (cf. " A man hath sapiences thre, Memorie, engin, and intellect also," Second Nun's Tale, 339); in this sense it is now obsolete. It also denoted a mechanical tool or contrivance, and especially a weapon of war; this use may be compared with that of ingenium in classical Latin to mean a clever idea or device, and in later Latin, as in Tertullian, for a warlike instrument or machine. In the 19th century it came to have, when employed alone, a specific reference to the steam-engine (q.v.), but it is also used of other prime movers such as the air-engine, gas-engine and oil-engine (qq.v.).

ENGINEERING, a term for the action of the verb " to engineer," which in its early uses referred specially to the operations of those who constructed engines of war and executed works intended to serve military purposes. Such military engineers were long the only ones to whom the title was applied. But about the middle of the 1 8th century there began to arise a new class of engineers who concerned themselves with works which, though they might be in some cases, as in the making of roads, of the same character as those undertaken by military engineers, were neither exclusively military in purpose nor executed by soldiers, and those men by way of distinction came to be known as civil engineers. No better definition of their aims and functions can be given than that which is contained in the charter (dated 1828) of the Insti- tution of Civil Engineers (London), where civil engineering is described as the " art of directing the great sources of power in nature for the use and convenience of man, as the means of production and of traffic in states, both for external and internal trade, as applied in the construction of roads, bridges,

aqueducts, canals, river navigation and docks for internal intercourse and exchange, and in the construction of ports, harbours, moles, breakwaters and lighthouses, and in the art of navigation by artificial power for the purposes of commerce, and in the construction and adaptation of machinery, and in the drainage of cities and towns." Wide as is this enumeration, the practice of a civil engineer in the earlier part of the 19th century might cover many or even most of the subjects it contains. But gradually specializa- tion set in. Perhaps the first branch to be recognized as separate was mechanical engineering, which is concerned with steam- engines, machine tools, mill-work and moving machinery in general, and it was soon followed by mining engineering, which deals with the location and working of coal, ore and other minerals. Subsequently numerous other more or less strictly defined groups and subdivisions came into existence, such as naval architecture dealing with the design of ships, marine engineer- ing with the engines for propelling steamers, sanitary engineering with water-supply and disposal of sewage and other refuse, gas engineering with the manufacture and distribution of illuminating gas, and chemical engineering with the design and erection of the plant required for the manufacture of such chemical products as alkali, acids and dyes, and for the working of a wide range of industrial processes. The last great new branch is electrical engineering, which touches on the older branches at so many points that it has been said that all engineers must be electricians.

ENGINEERS, MILITARY. From the earliest times engineers have been employed both in the field of war and on field defences. In modern times, however, the application of numerous scientific and engineering devices to warfare has resulted in the creation of many minor branches of military engineering, some of them almost rivalling in importance their primary duty of fortification and siegecraft, such as the field telegraph, the balloon service, nearly all demolitions, the building of pontoon and other bridges, and the construction and working of military roads, railways, piers, &c. All these branches requir- ing special knowledge, the modern tendency is to divide a corps of engineers in accordance with such requirements. The " field companies " and " fortress companies " of the R.E. represent the traditional tactical application of their arm to works of offence and defence in field and siege warfare. The balloon, telegraph, and other branches, also organized on a permanent footing, re- present the modern application of scientific aids in warfare. (See Fortification and Siegecraft; Tactics; Infantry, &c.)

History. — It is difficult to distinguish between military and civil engineers in the earlier ages of modern history, for all engineers

acted as builders of castles and defensible strongholds, as well as manufacturers and directors of engines of war with which to attack or defend them. The annals of fortification show professors, artists, &c, as well as soldiers and architects, as designers and builders of innumerable systems of fortification. By the middle of the 13th century there was in England an organized body of skilled workmen employed under a " chief engineer." At the siege of Calais in 1347 this corps consisted of masons, carpenters, smiths, tentmakers, miners, armourers,

gunners and artillerymen. At the siege of Harfleur in 141 5 the chief engineer was designated Master of the King's Works, Guns and Ordnance, and the corps under him numbered 500 men, including 21 foot archers. Headquarters of engineers existed at the Tower of London before 1350, and a century later developed into the Office of Ordnance (afterwards the Board of Ordnance) , whose duty was to administer all matters connected with fortifica tions, artillery and ordnance stores.

Henry VIII. employed many engineers (of whom Sir Richard Lee is the best known) in constructing coast defences from Penzance to the Thames and thence to Berwick-on-Tweed, and in strengthening the fortresses of Calais and Guines in France. He also added to the organization a body of pioneers under trench- masters and a master trenchmaster. Charles II. increased the peace establishment of engineers and formed a separate one for Ireland, with a chief engineer who was also surveyor-general of the King's Works. In both countries only a small permanent establishment was maintained, a special ordnance train being enrolled in war-time for each expedition and disbanded on its termination. The commander of an ordnance train was fre- quently, but not necessarily, an engineer, but there was always a chief engineer of each train. At Blenheim (1 704) Marlborough's ordnance train was commanded by Holcroft Blood, a distin- guished engineer. But after the rebellion of 17 15 it was decided to separate the artillery from the engineers, and the royal warrant of 26th May 17 16 established two companies of artillery as a separate regiment, and an engineer corps composed of 1 chief engineer, 3 directors, 6 engineers-in-ordinary, 6 engineers extraordinary, 6 sub-engineers and 6 practitioner engineers.

Until the 14th of May r7 57 officers of engineers frequently held, in

addition to their military rank in the corps of engineers, commissions in foot regiments; but on and after that date all engineer officers were gazetted to army as well as engineer rank — the chief engineer as colonel of foot, directors as lieutenant- colonel, and so forth down to practitioners as ensigns. On the 18th of November 1782 engineer grades, except that of chief engineer, were abolished, and the establishment was fixed at 1 chief engineer and colonel, 6 colonels commandant,. 6 lieutenant- colonels, 9 captains, 9 captain lieutenants (afterwards second cap- tains), 22 first lieutenants, and 22 second lieutenants. Ten years later a small invalid corps was formed. In 1787 the designation " Royal " was conferred upon the engineers, and its precedence settled to be on the right of the army, with the royal artillery.

In 1802 the title of chief engineer was changed to inspector- general of fortifications. From this time to the conclusion of the Crimean War various augmentations took place, consequent on the increasing and widely extending duties thrown upon the officers. These, in addition to ordinary military duties, comprised the construction and maintenance of fortifications, barrack and ordnance store buildings, and all engineering services connected with them. The cadastral survey of the United Kingdom (called the " Ordnance Survey ") had been entrusted to the engineers as far back as 1784, and absorbed many officers in its execution.

In 1774 the formation at Gibraltar of "The Company of Soldier Artificers," officered by Royal Engineers, was authorized, and a second company was added soon afterwards. In 1787 by royal warrant " The Corps of Royal Military Artificers " was established at home, consisting of six companies, with which the Gibraltar companies were amalgamated. In 1806 this corps was doubled, and in 181 1 increased to 32 companies. In 1813 its title was changed to " The Royal Sappers and Miners." In 1856, at the close of the Crimean War, it was incorporated with " The Corps of Royal Engineers," by whom it had always been officered. At that date the corps numbered about 340 officers and 4000 non- commissioned officers and men, in 1 troop and 32 companies.

In 1 7 70 the East India Company reorganized the engineer corps of the three presidencies, composed of officers only. Native corps of sappers or pioneers were formed later, and officered principally by engineers. The officers of engineers were employed in peace- time on the public works of the country, their services when required being placed at the disposal of the military authorities. The Indian Engineers have not only distinguished themselves in

the operations of war, but have left monuments of engineering skill in the irrigation works, railways, surveys, roads, bridges, public buildings and defences of the country. When Indian administration was transferred to the crown (1862) the Indian Engineers became " Royal," so that there now exists but one corps, the Royal Engineers. This is composed of about 1000 officers and 7700 warrant and non-commissioned officers and men. Of the officers some 220 are attached to units, about 400 employed either at home or in the colonies on engineering duties in military commands, on the staff, or on special duty, and about 370 on the Indian establishment. The supreme technical control of the Royal Engineers is exercised from the War Office. See also United Kingdom; Army.

The history of the French engineers shows a somewhat similar line of development. Originally selected officers of infantry were given brevets as engineers, and these men performed military and also civil duties for the king's service by the aid of companies of workmen enlisted and discharged from time to time. Vauban (q.v.) was the founder of the famous corps de Genie (1690). Its members were selected officers and civilians, employed in all branches of military and naval services, and it soon achieved its European reputation as the first school of fortification and siege- craft. It received a special uniform in 1732. About 1755 it was for a time merged in the artillery. In 1766 the title of Genie was conferred upon the officers, and the same name (troupes de Genie) was given to the previously existing companies of sappers and miners in 1801.

In the United States the separate Corps of Engineers (since 1794 there had been a Corps of Artillerists and Engineers) was organized in 1802, starting with a small body stationed at West Point, which in 1838 and 1846 was gradually increased, and in 1861 given three additional companies. In 1866 they were formed into a battalion and stationed at Willets Point, N.Y. In 1901 they were reorganized in three battalions, with a total strength of 1282. The U.S. Engineer School, formerly at Willets Point; was transferred in 1901 to Washington. Until 1866 the military academy at West Point was under the supervision of the Corps of Engineers, but from that time its direction was thrown open; but the highest branch at West Point is still regarded as that of the engineers. The Corps of Engineers has done a great deal of highly important work in the United States, notably in building forts, and improving rivers and harbours for navigation.

See Maj.Gen. R. W. Porter, Hist, of the Corps of Royal Engineers (Chatham, 1889) ; C. Lecomte, Les Ingenieurs militaires de la France

(Paris, 1903) ; H. Frobenius, Geschichte der K. preuss. Ingenieur und Pioneer-Korps (Berlin, 1906).

ENGIS, a cave on the banks of the Meuse near Liege, Belgium, where in 1832 Dr P. C. Schmerling found human remains in deposits belonging to the Quaternary period. Bones of the cave- bear, mammoth, rhinoceros and hyena were discovered in association with parts of a man's skeleton and a human skull. This, known as " the Engis Skull," gave rise to much discussion among anthropologists, since it has characteristics of both high and low development, the forehead, low and narrow, indicating slight intelligence, while the abnormally large brain cavity contradicts this conclusion. Of it Huxley wrote: " There is no mark of degradation about any part of its structure. It is a fair average human skull, which might have belonged to a philosopher, or might have contained the thoughtless brains of a savage." Dr Schmerling concluded that the human remains were those of man who had been contemporary with the extinct mammals. As, however, fragments of coarse pottery were found in the cave which bore other evidence of having been used by neolithic man, by whom the cave-floor and its contents might have been dis- turbed and mixed, his arguments have not been regarded as conclusive. There is, however, no doubt as to the great age of the Engis Skull. Discoveries of a like nature were made by Dr Schmerling in the neighbourhood in the caves of Engihoul, Chokier and others.

See P. C. Schmerling, Recherches sur les ossements decouverts dans les cavernes de la province Liege (1833); Huxley, Man's Place in Nature, p. 156; Lord Avebury, Prehistoric Times, p. 317 (1900).

408

ENGLAND

[TOPOGRAPHY

ENGLAND. Geographical usage confines to the southern part of the island of Great Britain the name commonly given to the great insular power of western Europe. 1 In this restricted sense the present article deals with England, the predominant partner in the United Kingdom of Great Britain and Ireland, both as containing the seat of government and in respect of extent, population and wealth.

I. Topography.

England extends from the mouth of the Tweed in 55 46′ N. to Lizard Point in 40 57′ 30″ N., in a roughly triangular form. The base of the

triangle runs from the South Foreland to Land's End W. by S., a distance of 316 m. in a straight line, but 545 m. following the larger curves of the coast. The east coast runs N.N.W. from the South Foreland to Berwick, a distance of 348 m., or, following the coast, 640 m. The west coast runs N.N.E. from

—* '

Area

Counties.

Statute

Population.

Acres.

1901.

Bedfordshire ....

298,494

171,240

Berkshire .

462,208

256,509

Buckinghamshire

475,682

195,764

Cambridgeshire

549,723

190,682

Cheshire

657.783

815,099

Cornwall . .

868,220

322,334

Cumberland .

973,086

266,933

Derbyshire .

658,885

620,322

Devonshire .

1,667,154

661,314

Dorsetshire .

632,270

202,936

Durham .

649.352

1,187,361

Essex .

986,975

1.085,771

Gloucestershire

795.709

634.729

Hampshire

1.039,031

797.634

Herefordshire

537.363

J 14.380

Hertfordshire

406,157

250,152

Huntingdonshire

234,218

57.771

Kent . . .

995.014

1,348,841

Lancashire

1,203,365

4,406,409

Leicestershire

527,123

434.019

Lincolnshire .

1,693,550

498,847

Middlesex

181,320

3.585.323

Monmouthshire

341,688

292,317

Norfolk . .

1,308,439

460,120

Northamptonshire

641 ,992

338,088

Northumberland

1,291,530

603,498

Nottinghamshire

539,756

5H.578

Oxfordshire .

483,626

181,120

Rutland . .

97,273

19,709

Shropshire

859,516

239.324

Somersetshire

1,043,409

508,256

Staffordshire

749,602

1,234,506

Suffolk . .

952,710

384,293

Surrey

485,122

2,012,744

Sussex . _ .

933,887

605,202

Warwickshire

577,462

897,835

Westmorland

503,160

64,303

Wiltshire

879,943

273,869

Worcestershire

480,560

488,338

Yorkshire

3,882,328

3.584.762

Total . . .

32,544,685

30,807,232

Land's End to the head of Solway Firth, a distance of 354 m., or following the much-indented coast, 1225 m. The total length of the coast-line may be put down as 2350 m., 2 out of which 515 m. belong to the western principality of Wales. 3 The most easterly point is at Lowestoft, 1° 46′ E., the most westerly is Land's End, in 5 43′ W. The coasts are nowhere washed directly by the ocean, except in the extreme south-west; the south coast faces the English Channel, which is bounded on the southern side by the coast of France, the two shores converging from 100 m.

1 The general questions capable of a single treatment for England, Scotland and Ireland are considered under United Kingdom.

2 Measurements made on a map on the scale of I2j m. to 1 in., the coast being assumed to run up estuaries until the breadth became 1 m., and no bays or headlands of less than 1 m. across being reckoned. The coast-line of Anglesea and the Isle of Wight, but of no other islands, is included.

1 A separate topographical notice is given under the heading Wales, but the consideration of certain points affecting Wales as linked with England is essential in this article.

apart at the Lizard to 21 at Dover. The east coast faces the shallow North Sea, which widens from the point where it joins the Channel to 375 m. off the mouth of the Tweed, the opposite shores being occupied in succession by France, Belgium, Holland, Germany and Denmark. The west coast faces the Irish Sea, with a width varying from 45 to 130 m.

The area of England and Wales is 37,327,479 acres or 58,324 sq. m. (England, 50,851 sq. m.), and the population on this area in 1901 was 32,527,843 (England, 30,807,232). The principal territorial divisions of England, as of W r ales, Scotland and Ireland, are the counties, of which England comprises 40. Their boundaries are not as a rule determined by the physical features of the land; but

localities are habitually defined by the use of their names. A list of the English counties (excluding Wales) is given in the table above. 4

Hills. — As an introduction to the discussion of the natural regions into which England is divided (Section II.), and for the sake of comparison of altitudes, size of rivers and similar details, the salient geographical features may be briefly summarized. The short land-frontier of England with Scotland (its length is only 100 m.) is in great measure a physical boundary, as con- siderable lengths of it are formed on the east side by the river Tweed, and on the west by Kershope Burn, Liddel Water, and the river Sark; while for the rest it follows pretty closely the summit of the Cheviot Hills, whose highest point is the Cheviot (2676 ft.). A narrow but well-marked pass or depression, known as the Tyne Gap, is taken to separate the Cheviot system from the Pennine Chain, which is properly to be described as a wide tract of hill- country, extending through two degrees of latitude, on an axis from N. by W. to S. by E. The highest point is Cross Fell (2930 ft.). On the north-west side of the Pennine system, marked off from it by the upper valleys of the rivers Eden and Lune, lies the circular hill-tract whose narrow valleys, radiating from its centre somewhat like wheel-spokes, contain the beautiful lakes which give it the celebrated name of the Lake District. In this tract is found the highest land in England, Scafell Pike reaching 3 2 10 ft. East of the Pennines, isolated on three sides by lowlands and on the fourthsideby the North Sea, lie the highmoors of the North Riding of Yorkshire, with the Cleveland Hills, and, to the south, the Yorkshire Wolds of the East Riding. Neither of these systems has any great elevation; the moors, towards their north-western edge, reaching an extreme of 1489 ft. in Urra Moor. The tableland called the Peak of Derbyshire, in the south of the Pennine system, is 2088 ft. in extreme height, but south of this system an elevation of 2000 ft. is not found anywhere in England save at a few points on the south Welsh border and in Dartmoor, in the south-west. Wales, on the other hand, projecting into the western sea between Liverpool Bay and the estuary of the Dee on the north, and the Bristol Channel on the south, is practically all mountainous, and has in Snowdon, in the north-west, a higher summit than any in England— 3560 ft. But the midlands, the west, and the south of England, in spite of an absence of great elevation, contain no plains of such extent as might make for monotony. The land, generally undulating, is further diversified with hills arranged in groups or ranges, a common characteristic of which is a bold face on the one hand and a long gentle slope, with narrow valleys deeply penetrating, on the other. South- ward from the Pennines there may be mentioned, in the midlands, the small

elevated tract of Charnwood Forest (Bardon Hill, 912 ft.) in Leicestershire, and Cannock Chase (775 ft.) and the Clent Hills (928 ft.), respectively north and south of the great manu- facturing district of Birmingham and Wolverhampton. Of the western counties, the southern half of Shropshire, Herefordshire and Monmouthshire are generally hilly. Among the Shropshire Hills may be mentioned the isolated Wrekin (1335 ft.), Long Mynd (1674 ft.) and the Clee Hills (Brown Clee, 1805 ft.). The

' The figures given here are for the ancient or geographical counties. Section IX., on Territorial Divisions, indicates the departures from the ancient county boundaries made for certain purposes of administration. Each county is treated in a separate article in the topographical, geological, economical and historical aspects. Further topographical details are given in separate articles on the more important hill-systems, rivers, &c.

ipiBBHframuire – hHp : ;; W i

mm

\ ilqiuxtewi From Ongina! Lolciˆrinis 3j; The SiK Engraving (u, NX

Copyright in -die United States of Emeries., 1910.

■by Thˆs Encyclopaedia Britknnica Co.

long ridge of the Black Mountain reaches an extreme height of 2310 ft. on the Welsh border of Herefordshire. The Malvern Hills on the other side of the county, which, owing to their almost isolated position among lowlands, appear a far more prominent feature, reach only 1395 ft. In western Monmouthshire, again belonging to the south Welsh system, there are such heights as Sugar Loaf (1955 ft.) and Coity (1905 ft.).

In the south midlands of England there are two main ranges of hills, with axes roughly parallel. The western range is the Cotteswold Hills of Gloucestershire and the counties adjacent on the east running S. W. and N.E. Its highest point is Cleeve Cloud (1134 ft.). The uplands of Northamptonshire continue this range north-eastward, decreasing

in elevation. The eastern range, beginning in Wiltshire, runs E.N.E. as the White Horse Hills (856 ft. at the highest point), and after the interruption caused by the gap or narrow valley by which the river Thames penetrates the hills near Goring, continues N.E. as the Chiltern Hills (850 ft.). The East Anglian ridge continues the line E.N.E., gradually decreasing in altitude. In the south-east of England, the North and South Downs are both well-defined ranges, but are character- ized by a number of breaches through which rivers penetrate, on the one hand to the Thames or the North Sea and on the other to the English Channel. Leith Hill in the North Downs reaches 965 ft., and Butser Hill in the South Downs 889 ft.; Blackdown and Hindhead, two almost isolated masses of high ground lying between the two ranges of the Downs towards their western extremity, are respectively 918 and 895 ft. in height. In the north of Hampshire along its boundary with Surrey and Berkshire, in the southern half of Wiltshire (where rises the upland of Salisbury Plain), in Dorsetshire, and the south of Somersetshire, the hills may be said to run in a series of connected groups. They cannot be defined as a single range, nor are they named, as a rule, according to the groups into which they fall, but the general title of the Western Downs is applied to them. One point only in all these groups exceeds 1009 ft. in altitude, namely, Inkpen Beacon (ion ft.) in the extreme south-west of Berkshire, but heights above 900 ft. are not infrequent. In the northern part of Somersetshire, two ranges, short but well defined, lie respectively east and west of a low plain which slopes to the Bristol Channel. These are the Mendips (Black Down, 1068 ft.) and the Quantocks (Will's Neck, 1261 ft.). The Blackdown Hills, in south-western Somersetshire and eastern Devonshire, reach 1035 ft. in Staple Hill in the first-named county. In western Somersetshire and north Devonshire the elevated mass of Exmoor reaches 1707 ft. in Dunkery Beacon; and in south Devonshire the highest land in southern England is found in the similar mass of Dartmoor (High Willhays, 2039 ft.). The westward prolongation of the great south-western promontory of England, occupied by the county of Cornwall, continues as a rugged ridge broken by a succession of depressions, and exceeds a height of 800 ft., nearly as far as the point where it falls to the ocean in the cliffs of Land's End.

Lowlands. — The localities of the more extensive lowlands of England may now be indicated in their relation to the principal hill-systems, and in this connexion the names of some of the more important rivers will occur. In the extreme north-west is the so-called Solway Plain, of no great extent, but clearly defined between the northern foothills of the Lake District and the shore of Solway Firth.

In Lancashire a flat coastal strip occurs between the western front of the Pennine Chain and the Irish Sea, and, widening southward, extends into Cheshire and comprises the lower valleys of the Mersey and the Dee. In the preceding review of the English hill-systems it may have been observed that eastern England hardly enters into consideration. The reason now becomes clear. From Yorkshire to the flat indented sea-coast north of the Thames estuary, east of the Pennines and the slight hills indicated as the Northampton uplands, and in part demarcated southward by the East Anglian ridge in Huntingdonshire, Cambridgeshire and Suffolk, the land, although divided between a succession of river-systems, varies so little in level as to be capable of consideration as a single plain. Its character, however, varies in different parts. The Fens, the flat open levels in the lower basins of the Witham,

Welland, Nene and Great Ouse, only kept from their former marshy conditions by an extensive system of artificial drainage, and the similar levels round the head of the Humber estuary, differ completely in appearance from the higher and firmer parts of the plain. The coast-land north of the mouth of the Thames is a low plain; and on the south coast somewhat similar tracts are found in Romney Marsh, and about the shallow inlets (Portsmouth Harbour and others) which open from Spithead. The vales of Kent and Sussex are rich undulating lowlands within the area of the Weald, separated by the Forest Ridges, and enclosed by the North and South Downs. In the south-west there is a fairly extensive lowland in south Devon-shire watered by the Exe in its lower course. But the most remarkable plain is that in Somersetshire, enclosed by the Mendips, the Western Downs, Blackdown Hills and the Quan- tocks and entered by the Parrett and other streams. The mid- lands, owing to the comparatively slight elevation of the land, are capable of geographical consideration as a plain. But it is not a plain in the sense of that of East Anglia. There is no quite level tract of great extent, excepting perhaps the fertile and beautiful district watered by the lower Severn and its tributary the Upper or Warwickshire Avon, overlooked by the Cotteswolds on the one hand and the Malvern and other hills on the other.

Coast. — The coast-line of England is deeply indented by a succession of large inlets, particularly on the east and west. Thus, from north to south there are, on the east coast, the mouths of the Tyne and the Tees, the Humber estuary, the Wash (which receives the waters of the Witham, Welland, Nene and Great Ouse), the Orwell-Stour, Blackwater and Thames- Medway estuaries. On the west there are Solway Firth, More- cambe Bay, the estuaries of the

Mersey and Dee, Cardigan Bay of the Welsh coast, and the Bristol Channel and Severn estuary. In this way the land is so deeply penetrated by the water that no part is more than 75 m. from the sea. Thus Buckingham appears to be the most inland town in England, being 75 m. from the estuaries of the Severn, Thames and Wash; Coleshill, near Birmingham, is also almost exactly 75 m. from the Mersey, Severn and Wash.

The east and south coasts show considerable stretches of uniform uninflected coast-line, and except for the Fame Islands and Holy Island in the extreme north, the flat islands formed by ramifications of the estuaries on the Essex and north Kent coasts, and the Isle of Wight in the south, they are without islands. The west coast, on the other hand, including both shores of the great south-western promontory, is minutely fretted into capes and bays, headlands and inlets of every size, and an island-group lies off each of the more prominent head- lands from Land's End northward. The formation of the coast varies from low, shifting banks of shingle or sand to majestic cliffs, and its character in different localities has been fore-shadowed in the previous consideration of the hill-systems and lowlands. Thus in the north-east the coast is generally of no great elevation, but the foothills of the Cheviot and Pennine systems approach it closely. On the Yorkshire coast the Cleveland Hills and the high moors are cut off on the seaward side in magnificent cliffs, which reach the greatest elevation of sea-cliffs on the English coast (666 ft.). The Yorkshire Wolds similarly terminate seaward in the noble promontory of Flam- borough Head. From this point as far south as the North Foreland of Kent the coast, like the land, is almost wholly low, though there are slight cliffs at some points, as along the coasts of Norfolk and Suffolk, on which the sea constantly encroaches. On the south coast a succession of cliffs and low shores may be correlated with the main physical features of the land. Thus in succession there are the famous white cliffs about Dover, terminating the North Downs, the low coast of Romney Marsh, projecting seaward in Dungeness, the cliffs above Hastings, terminating an offshoot of the Forest Ridges, the low shore between Hastings and Eastbourne, to which succeeds the lofty Beachy Head, terminating the South Downs. A flat coast follows as far as Selsey Bill and Spithead, but the south coast

of the Isle of Wight shows a succession of splendid cliffs. The shallow inlet of Poole Bay is followed by the eminence of St Alban's Head, and thereafter, right round the south-western promontory of England, the cliff-bound coast, with its bays and inlets closely beset with hills, predominates over the low shore-line, exhibits a remarkable series of different forms, and provides the finest scenery of its kind in England. The shores of the Severn estuary are low, but the Welsh coast, sharing the general character of the land, is more or less elevated throughout, though none of the higher mountain-masses directly approaches the sea. Low shores correspond to the plains of Cheshire, Lancashire and the Solway, while the intervening coast is of no great elevation, as only the foothills of the Lake District approach it with a gradual slope.

A great extent of the English coast is constantly undergoing visible alteration, the sea in some instances receding from the land, and in others gaining upon it. The whole of Romney Marsh, in Kent and Sussex, formerly constituted an arm of the sea, where vessels rode in deep water, carrying produce to ports no longer in existence. Lydd and Romney, though maritime

Length

Drainage

Rivers.

Miles.

Area sq. m.

I. North-east —

Tweed '

97

1870

80

1 130

60

458

85

708

2. East —

Humber system 2

9293

Witham ....

80

1079

Welland ....

70

760

Nene

90

1077

Ouse (Great) .

160

2607

Yare

60

880

Stour (Suffolk-Essex)

60

407

Thames 3 .

209

5924

3. South —

Stour (Kent) .

40

37°

Rother ....

32

312

43

370

Avon (Hampshire) .

60

1 132

55

584

Tamar ....

58

384

4. Bristol Channel (south-

west) —

Torridge ....

45

336

Taw

48

455

Parrett ....

37

562

Severn 4 5 ...

210

6850

Usk 5

70

540

5. North-west —

(a) Cheshire-Lancashire —

Dee 6

70

813

Mersey 6 .

70

1596

Ribble ....

65

585

(b) Solway —

still in name, retaining some of the ancient privileges of the Cinque Ports, have become, through changes in the coast-line, small inland towns; and the same has been the fate of Rye, Winchelsea, and other places in that district. Again, the Isle of Thanet, in the north-eastern corner of Kent, has practically ceased to be an island. The wide estuary of the sea separating it from the mainland, through which ships sailed from the English Channel into the Thames, using it as the shortest route from the south to London, has entirely disappeared, leaving only a flat lowland traversed by branches of the river Stour to

1 Partly belonging to Scotland.

2 The principal members of the Humber-system are the Ouse of Yorkshire (121 m. long from the source of the Swale or Ure) and the Trent (170 m.), qq.v. for their numerous important tributaries.

3 Including the Medway (680 sq. m.) in the drainage area.

4 Including the Wye (1609 sq. m.) and the Lower Avon (891 sq. m.) in the drainage area.

6 These rivers have their earlier courses in Wales, and flow at first to some point of east. Of wholly Welsh rivers only the Towy and the Teifi arc comparable in length and drainage area with the smaller rivprs in the above list (sec WM.F.sV

• From the source of its headstream the Goyt.

mark its former existence. The sea is encroaching over a considerable extent of coast-line on the North Sea as well as on the English Channel. Ravenspur, once an important town of Yorkshire, where Bolingbroke, afterwards Henry IV., landed in 1399, is now submerged; and Dunwich and other ancient ports in East Anglia have met with the same fate. The process of destruction, slow in some places, is so rapid in others that it can be traced even from month to month — the incessant work of the waves washing away the soft strata at the base of the cliffs and leaving the summits unsupported. Many cliffs of the east coast, from the Humber to the mouth of the Thames, are suffering from this destructive action, and instances also occur on the south coast. A royal commission on Coast Erosion was appointed to inquire into this question in 1906 (see Report,

1907 sqq.).

Except along the centre of the Irish Sea, at one point off the Tweed and one between Devon and Normandy, the depth of water between England and the nearest land nowhere exceeds 50 fathoms.

Rivers. — The variations in length of the general slope of the land towards successive natural divisions of the coast may be illustrated by a comparative table of the mileage and drainage areas of the principal English rivers. The mileage does not take account of the lesser sinuosities of rivers.

With the exception of those in the Lake District (q.v.) the lakes of England are few and insignificant. A number of small meres occur in a defined area in Cheshire. (O. J. R. H.)

II. Physical Geography

The object of this section is to give a physical description of England and Wales according to natural regions, which usually follow the geology of the country very closely; although the relationship of configuration and geology is not so simple or so clearly marked as in Scotland.

The land is highest in the west and north, where the rocks also are oldest, most disturbed, and hardest, and the land surface gradually sinks towards the east and south, where therocks become successively less disturbed, more recent, and softer. The study of the scenery of England and Wales as a whole, or the study of orographical and geological maps of the country, allows a broad distinction to be drawn between the types of land-forms in the west and in the east. This distinction is essential, and applies to all the conditions of which geography takes account. The contrasted districts are separated by an intermediate area, which softens the transition between them, and may be described separately.

The Western Division is composed entirely of Archaean and Palaeozoic rocks, embracing the whole range from pre-Cambrian up to Carboniferous. The outcrops of these rocks succeed each other in order of age in roughly concentric belts, with the Archaean mass of the island of Anglesey as a centre, but the arrangement in detail is much disturbed and often very irregular. Contemporary igneous outbursts are extremely common in some of the ancient formations, and add, by their resistance to atmospheric erosion, to the extreme ruggedness of the scenery. The hills and uplands of ancient rocks do

not form regular ranges, but rise like islands in four distinct groups from a plain of New Red Sandstone (Permian and Triassic) , which separates them from each other and from the newer rocks of the Eastern Division. Each of the uplands is a centre for the dispersal of streams; but with only one prominent exception (the Humber) these reach the sea without crossing into the Eastern Division of the country.

The Eastern Division, lying to the east of the zone of New Red Sandstone, may be defined on the west by a slightly curved line drawn from the estuary of the Tees through Leicester and Stratford-on-Avon to the estuary of the Severn, and thence through Glastonbury to Sidmouth. It is built up of nearly uniform sheets of Mesozoic rock, the various beds of the Jurassic lying above the New Red Sandstone (Triassic), and dipping south-eastward under the successive beds of the Cretaceous system. In exactly the same way the whole of the southeast of the island appears to have been covered uniformly with gently

dipping beds of Tertiary sands and clays, beneath which the Cretaceous strata dipped. At some period subsequent to this deposition there was a movement of elevation, which appears to have thrown the whole mass of rocks into a fold along an anti- clinal axis running west and east, which was flanked to north and south by synclinal hollows. In these hollows the Tertiary rocks were protected from erosion, and remain to form the London and the Hampshire Basins respectively, while on the anticlinal axis the whole of the Tertiary and the upper Cretaceous strata have been dissected away, and a complex and beautiful configuration has been impressed on the district of the Weald. The general character of the landscape in the Eastern Division is a succession of steep escarpments formed by the edges of the outcropping beds of harder rock, and long gentle slopes or plains on the dip-slopes, or on the softer layers; clay and hard rock alternating through- out the series.

The contrast between the lower grounds of the Western and the Eastern Divisions is masked in many places by the general covering of the surface with glacial drift, which is usually a stiff clay composed on the whole of the detritus of the rocks upon which it

rests, though containing fragments of rocks which have been transported from a considerable distance. This boulder clay covers almost all the low ground north of the Thames Basin, its southern margin fading away into washed sands and gravels.

The history of the origin of the land-forms of England, as far as they have been deduced from geological studies, is exceedingly complicated. The fact that every known geological formation (except the Miocene) is represented, proves of itself how long the history has been, and how multifarious the changes. It must suffice to say that the separation of Ireland from England was a comparatively recent episode, while the severance of the land- connexion between England and the continent by the formation of the Strait of Dover is still more recent and probably occurred with the human period.

Natural Divisions. — The four prominent groups of high land rising from the plain of the Red Rocks are: (1) the Lake District, bounded by the Solway Firth, Morecambe Bay and the valleys of the Eden and the Lune; (2) the Pennine Region, which stretches from the Scottish border to the centre of England, running south ; (3) Wales, occupying the peninsula between the Mersey and the Bristol Channel, and extending beyond the political boundaries of the principality to include Shropshire and Hereford ; and (4) the peninsula of Cornwall and Devon. They are all similar in the great features of their land-forms, which have been impressed upon them by the prolonged action of atmospheric denudation rather than by the original order and arrangement of the rocks ; but each group has its own geological character, which has imparted something of a distinctive individuality to the scenery. Taken as a whole, the Western Division depends for its prosperity on mineral products and manufactures rather than on farming; and the staple of the farmers is live-stock rather than agriculture. The people of the more rugged and remoter groups of this division are by race survivors of the early Celtic stock, which, being driven by successive invaders from the open and fertile country of the Eastern Division, found refuges in the less inviting but more easily defended lands of the west. Even where, as in the Pennine region and the Lake District, the people have been com- pletely assimilated with the Teutonic stock, they retain a typical character, marked by independence of opinion approaching stubborn- ness, and by great determination and enterprise.

Lake District. — The Lake District occupies the counties of Cumberland, Westmorland and North Lancashire. It forms a roughly circular highland area, the drainage lines of which radiate outward from the centre in a series of narrow valleys, the upper parts of

which cut deeply into the mountains, and the lower widen into the surrounding plain. Sheets of standing water are still numerous, and formerly almost every valley contained a single long narrow lake-basin; but some of these have been subdivided, drained or filled up by natural processes. The existing lakes include Winder- mere and Coniston, draining south ; Wastwater, draining south-west, Ennerdale water, Buttermere and Crummock water (the two latter, originally one lake, are now divided by a lateral delta), draining north-west; Derwent water and Bassenthwaite water (which were probably originally one lake), and Thirlmere, draining north; Ullswater and Haweswater, draining north-east. There are, besides, numerous mountain tarns of small size, most of them in hollows barred by the glacial drift which covers a great part of the district. The central and most picturesque part of the district is formed of great masses of volcanic ashes and tuffs, with intru- sions of basalts and granite, all of Ordovician (Lower Silurian) age. Scafell and Scafell Pike (3162 and 3210 ft.), at the head

The

western

division.

of Wastwater, and Helvellyn (31 18), at the head of Ullswater, are the loftiest amongst many summits the grandeur of whose outlines is not to be estimated by their moderate height. Sedimentary rocks of the same age form a belt to the north, and include Skiddaw (3°54 ft.) ; while to the south a belt of Silurian rocks, thickly covered with boulder clay, forms the finely wooded valleys of Coniston and Windermere. Round these central masses of early Palaeozoic rocks there is a broken ring of Carboniferous Limestone, and several patches of Coal Measures, while the New Red Sand- stone appears as a boundary belt outside the greater part of the district. Where the Coal Measures reach the sea at Whitehaven, there are coal-mines, and the hematite of the Carboniferous Lime- stones has given rise to the active ironworks of Barrow-in-Furness, now the largest town in the district. Except in the towns of the outer border, the Lake District is very thinly peopled; and from the economic point of view, the remarkable beauty of its scenery, attracting numerous residents and tourists, is the most valuable of its resources. The very heavy rainfall of the district, which is the wettest in England, has led to the utilization of Thirlmere as a reservoir for the water supply of Manchester, over 80 m. distant. Pennine Region. — The Pennine Region, the centre of which forms the so-called Pennine Chain,

occupies the country from the Eden valley to the North Sea in the north, and from the lower Tees, Yorkshire Ouse and Trent, nearly to the Irish Sea, in the south. It includes the whole of Northumberland and Durham, the West Riding of Yorkshire, most of Lancashire and Derbyshire, the north of Staffordshire and the west of Nottinghamshire. The region is entirely composed of Carboniferous rocks, the system which transcends all others in the value of its economic minerals. The coal and iron have made parts of the region the busiest manufac- turing districts, and the centres of densest population, in the country, or even in the world. The whole region may be iooked upon as formed by an arch or anticline of Carboniferous strata, the axis of which runs north and south ; the centre has been worn away by erosion, so that the Coal Measures have been removed, and the underlying Millstone Grit and Carboniferous Limestone exposed to the influences which form scenery. On both sides of the arch, east and west, the Coal Measures remain intact, forming outcrops which disappear towards the sea under the more recent strata of Permian or Triassic age. The northern part of the western side of the anticline is broken off by a great fault in the valley of the Eden, and the scarp thus formed is rendered more abrupt by the presence of a sheet of intrusive basalt. Seen from the valley, this straight line of lofty heights, culminating in Crossfell, presents the nearest approach in England to the appearance of a mountain range. In the north the Pennine region is joined to the Southern Uplands of Scotland by the Cheviot Hills, a mass of granite and Old Red Sand- stone; and the northern part is largely traversed by dykes of contemporary volcanic or intrusive rock. The most striking of these dykes is the Great Whin Sill, which crosses the country from a short distance south of Durham almost to the source of the Tees, near Crossfell. The elevated land is divided into three masses by depres- sions, which furnish ready means of communication between east and west. The South Tyne and Irthing valleys cut off the Cheviots on the north from the Crossfell section, which is also marked off on the south by the valleys of the Aire and Ribble from the Kinder Scout or Peak section. The numerous streams of the region carry off the rainfall down long valleys or dales to the east and the south, and by shorter and steeper valleys to the west. The dales are separated from each other by high uplands, which for the most part are heathery moorland or, at best, hill pastures. The agriculture of the region is confined to the bottoms of the dales, and is of small importance. Crossfell and the neighbouring hills are formed from masses of Carboniferous Limestone, which received its popular name of Mountain Limestone from this fact. Farther south, such summits as High Seat, Whernside, Bow Fell, Penyghent and

many others, all over 2000 ft. in height, are capped by portions of the grits and sandstones,' which rest upon the limestone. The belt of Mill- stone Grit south of the Aire, lying between the great coal-fields of the West Riding and Lancashire, has a lower elevation, and forms grassy uplands and dales; but farther south, the finest scenery of the whole region occurs in the limestones of Derbyshire, in which the range terminates. The rugged beauty of the south-running valleys, and especially of Dovedale, is enhanced by the rich woods which still clothe the slopes. There are remarkable features underground as well as on the surface, the caverns and subterranean streams of Yorkshire and Derbyshire being amongst the deepest that have yet been explored. Compared with the rugged and picturesque scenery of the Lower Carboniferous rocks, that of the Coal Measures is, as a rule, featureless and monotonous. The coal-fields on the eastern side, from the Tyne nearly to the Trent, are sharply marked off on the east by the outcrop of Permian dolomite or Magnesian limestone, which forms a low terrace dipping towards the east under more recent rocks, and in many places giving rise to an escarpment facing west- ward towards the gentle slope of the Pennine dales. To the west and south the Coal Measures dip gently under the New Red Sandstone, to reappear at several points through the Triassic plain. The clear water of the upland becks and the plentiful supply of water-power led to the founding of small paper-mills in remote valleys before the days of steam, and some of these primitive establishments still

exist. The prosperity and great population of the Pennine region date from the discovery that pit-coal could smelt iron as well as charcoal ; and this source of power once discovered, the people bred in the dales developed a remarkable genius for mechanical inven- tion and commercial enterprise, which revolutionized the economic life of the world and changed England from an agricultural to an industrial country. The staple industry of the district in ancient times was sheep-rearing, and the villages in nearly all the dales carried on a small manufacture of woollen cloth. The introduction of cotton caused the woollen manufactures on the western side to be superseded by the working up of the imported raw material; but woollen manufactures, themselves carried on now almost entirely with imported raw material, have continued to employ the energies of the inhabitants of the east. Some quiet market-towns, such as

Skipton and Keighley, remain, but most of them have developed by manufactures into great centres of population, lying, as a rule, at the junction of thickly peopled valleys, and separated from one another by the empty uplands. Such are Leeds, Bradford, Sheffield, Huddersfield and Halifax on the great and densely peopled West Riding coal-field, which lies on the eastern slope of the Pennines. The iron ores of the Coal Measures have given rise to great manufactures of steel, from cutlery to machinery and armour-plates. High on the barren crest of the Pennines, where the rocks yield no mineral wealth, except it be medicinal waters, Harrogate, Buxton and Matlock are types of health resorts, prosperous from their pure air and fine scenery. Across the moors, on the western side of the anticline, the vast and dense population of the Lancashire coal-field is crowded in the manufacturing towns surrounding the great commercial centre, Manchester, which itself stands on the edge of the Triassic plain. Ashton, Oldham, Rochdale, Bury, Bolton and Wigan form a nearly confluent semicircle of great towns, their pros- perity founded on the underlying coal and iron, maintained by imported cotton. The Lancashire coal-field, and the portion of the bounding plain between it and the seaport of Liverpool, contain a population greater than that borne by any equal area in the country, the county of London and its surroundings not excepted. In the south-west of the Pennine region the coal-field of North Staffordshire supports the group of small but active towns known collectively from the staple of their trade as " The Potteries." On the north-east the great coal-field of Northumberland and Durham, traversed mid- way by the Tyne, supports the manufactures of Newcastle and its satellite towns, and leaves a great surplus for export from the Tyne ports.

Wales. — The low island of Anglesey, which is built up of the fundamental Archaean rocks, is important as a link in the main line of communication with Ireland, because it is separated from the mainland by a channel narrow enough to be bridged, and lies not far out of the straight line joining London and Dublin. The mainland of Wales rises into three main highlands, the mountain groups of North, Mid and South Wales, connected together by land over iooo ft. in elevation in most places, but separated by valleys affording easy highways. The streams of the southern and western slopes are short and many, flowing directly to the Bristol Channel and the Irish Sea; but the no less numerous streams of the eastern slopes gather themselves into three river systems, and reach the sea as the Dee, the Severn and the Wye. The mountain group of North Wales is the largest and loftiest ; its scenery resembles that of the Scottish Highlands because of the juxtaposition of ancient Palaeozoic rocks

*— Cambrian and Ordovician, often altered into slate— and contemporaneous volcanic outbursts and igneous intrusions. Here rises the peak of Snowdon (3560 ft.), the culminat- ing point of South Britain, and near it half a dozen summits exceed 3000 ft., while Cader Idris, farther south, though slightly lower, presents a singularly imposing outline. The mild winter climate has fringed the coast with seaside resorts, the rugged heights attract tourists in summer, and the vast masses of slate have gi*en rise to the largest slate quarries in the world. The heavy rainfall of the upper valleys unfits them for agriculture, and the farms are poor. There are several lakes: that of Bala being the largest, except the old lake of Vyrnwy, reconstituted artificially to store the rainfall for the water-supply of Liverpool, 68 m. distant. The Vyrnwy is tributary to the Severn ; but north of it the streams gather into the Dee, and flow eventually northward. Mid Wales is built up, for the most part, of Silurian or Ordovician rocks, practically free from igneous intrusions except in the south-west. There the resistance of a series of igneous dykes gives prominence to the Pembroke peninsula, in which the fine fjord-like harbour of Milford Haven lies far out towards the Atlantic. The coast north of Pem- broke and Merioneth has been worked into the grand sweep of Cardigan Bay, its surface carved into gently rounded hills, green with rich grass, which sweep downward into wide rounded valleys. Plinlimmon (2468 ft.) is the highest of the hills, and forms a sort of hydrographic centre for the group, as from its eastern base the Severn and the Wye take their rise — the former describing a wide cwrve to east and south, the latter forming a chord to the arc in its southward course. Mid Wales is mainly a pastoral country, and very thinly peopled. A group of artificial lakes, one of them exceeded in irea only by Windermere, has been formed in the valley of the EUn, a tributary of the Wye, for the supply of water to Birmingham. ” * group of heights of South Wales, running on the whole from*

west to east, marks the outcrops of the Old Red Sandstone and Carboniferous strata which lie within a vast syncline of the Silurian rocks. The Brecon Beacons of Old Red Sandstone are the highest (2907 ft.), but the Black Mountain bears a number of picturesque summits carved out of Millstone Grit and Carboniferous Limestone, which rise frequently over 2000 ft. Throughout Hereford, and in part of Monmouthshire, the Old Red Sandstone sinks to a great un- dulating plain, traversed by the exquisite windings of the Wye, and forming some of the richest pasture and fruit lands of England. This plain formed an easy passage from south to north, and since the time of the Romans was a strategical line of the greatest importance, a fact which has left its traces on the present distribution of towns.

Around the western and northern edge of the Old Red Sandstone plain the underlying Silurian rocks (and even the Cambrian and Archaean in places) have been bent up so that their edges form hills of singular abruptness and beauty. Of these are the Malvern Hills, east of Hereford, and in particular the hills of Shropshire. Wenlock Edge, running from south-west to north-east, is an escarpment of Silurian limestone, while the broad upland of Long Mynd, nearly parallel to it on the north, is a mass of Archaean rock. The Wrekin, the Caradoc and Cardington Hills are isolated outbursts of pre-Cambrian volcanic rocks. The outer rim of the Welsh area contains a broken series of coal-fields, where patches of Carboniferous strata come to the surface on the edge of the New Red Sandstone plain. Such are the coal-fields of Flint in the north, the Forest of Wyre and the Forest of Dean, close to the Severn, on the east. The great coal-field on the south is a perfect example of a synclinal basin, the Millstone Grit and Carboniferous Limestone which underlie the Coal Measures appearing all round the margin. This coal-field occupies practically the whole of Glamorgan and part of Monmouth, and its surface slopes from the Black Mountain and Brecon Beacons to the sea as a gently inclined plateau, scored by deep valleys draining south. Each chief valley has a railway connecting a string of mining villages, and converging seaward to the busy ports of Newport, Cardiff and Barry (a town created on a sandy island by the excavation of a great dock to form an outlet for the mines). In the north of the field, where the limestone crops out and supplies the necessary flux, Merthyr Tydfil has become great through iron-smelting ; and in the west Swansea is the chief centre in the world for copper and tin smelting. The unity and ruggedness of the highlands of Wales have proved sufficient to isolate the people from those of the rest of South Britain, and to preserve a purely Celtic race, still very largely of Celtic speech.

Cornwall and Devon. — The peninsula of Cornwall and Devon may be looked upon as formed from a synclinal trough of Devonian rocks, which appear as plateaus on the north and south, while the centre is occupied by Lower Carboniferous strata at a lower level. The northern coast, bordering the Bristol Channel, is steep, with picturesque cliffs and deep bays or short valleys running into the high land, each occupied by a little seaside town or village. The plateau culminates in the barren heathy upland of Exmoor, which slopes gently southward from a general elevation of 1600 ft., and is almost without inhabitants. The Carboniferous rocks of the centre form a soil which produces rich pasture under the heavy rainfall and remarkably mild and equable temperature, forming a great cattle-

raising district. The Devonian strata on the south do not form such lofty elevations as those on the north, and are in conse- quence, like the plain of Hereford, very fertile and peculiarly adapted for fruit-growing and cider-making. The remarkable features of the scenery of South Devon and Cornwall are due to a narrow band of Archaean rock which appears in the south of the peninsulas terminat- ing in Lizard Head and Start Point, and to huge masses of granite and other eruptive rocks which form a series of great bosses and dykes. The largest granite boss gives relief to the wild upland of Dartmoor, culminating in High Willhays and Yes Tor. The clay resulting from the weathering of the Dartmoor granite has formed marshes and peat bogs, and the desolation of the district has been emphasized by the establishment in its midst of a great convict prison, and in its northern portion of a range for artillery practice. The Tamar flows from north to south on the Devonian plain, which lies between Dartmoor on the east and the similar granitic boss of Bodmin Moor (where Brown Willy rises to 1345 ft.) on the west. There are several smaller granite bosses, of which the mass of Land's End is the most important. Most of the Lizard peninsula, the only part of England stretching south of 50° N., is a mass of serpentine. The great variety of the rocks which meet the sea along the south of Cornwall and Devon has led to the formation of a singularly pic- turesque coast — the headlands being carved from the hardest igneous rocks, the bays cut back in the softer Devonian strata, The fjord-like inlets of Falmouth, Plymouth and Dartmouth are splendid natural harbours, which would have developed great commercial ports but for their remoteness from the centres of commerce and manufactures. China clay from the decomposing granites; tin and copper ore, once abounding at the contacts between the granite and the rocks it pierced, were the former staples of wealth, and the mining largely accounts for the exceptional density of population in Cornwall. Fishing has always been important, the numerous good harbours giving security to fishing-boats; and the fact that this coast is the mildest and almost the sunniest, though by no means the driest, part of Great Britain has led to the establishment of many health

resorts, of which Torquay is the chief. The old Cornish language of the Celtic stock became extinct only in the 18th century, and the Cornish character remains as a heritage of the time when the land

had leisure to mould the life and the habits of the man. Projecting farthest of all England into the Atlantic, it is not surprising that the West country has supplied a large proportion of the great naval commanders in British history, and of the crews of the navy.

Between the separate uplands there extends a plain of Permian and Triassic rocks, which may conveniently be considered as an intermediate zone between the two main divisions. ihi" T° the eye it forms an almost continuous plain with laaapiam. the belt ojf Li as clays, which is the outer border of the Eastern Division; for although a low escarpment marks the line of junction, and seems to influence the direction of the main rivers, there is only one plain so far as regards free movement over its surface and the construction of canals, roads and railways. The plain usually forms a distinct border along the landward margins of the uplands of more ancient rock, though to the east of the Cornwall- Devon peninsula it is not very clear, and its continuity in other places is broken by inliers of the more ancient rocks, which everywhere underlie it. One such outcrop of Carboniferous Lime- stone in the south forms the Mendip Hills; another of the Coal Measures increases the importance of Bristol, where it stands at the head of navigation on the southern Avon. In the north-west a tongue of the Red rocks forms the Eden valley, separating the Lake District from the Pennine Chain, with Carlisle as its central town. Farther south, these rocks form the low coastal belt of Lancashire, edged with the longest stretches of blown sand in England, and dotted here and there with pleasure towns, like Blackpool and South- port. The plain sweeps round south of the Lancashire coal-field, forms the valley of the Mersey from Stockport to the sea, and farther south in Cheshire the salt-bearing beds of the Keuper marls give rise to a characteristic industry. The plain extends through Stafford- shire and Worcester, forming the lower valley of the Severn. The greater part of Manchester, all Liverpool and Birkenhead, and in- numerable busy towns of medium size, which in other parts of England would rank as great centres of population, stand on this soil. Its flat surface and low level facilitate the construction of railways and canals, which form a closer network over it than in other parts of the country. The great junction of Crewe, where railways from south-east, south-west, east, west and north converge, is thus explained. South of the Pennines, the Red rocks extend eastward in a great sweep through the south of Derbyshire, Warwick, the west of Leicestershire, and the east of Nottingham, their margin being approximately marked by the Avon, flowing south-west, and the Soar and Trent, flowing north-east. South and east of these streams the very similar country is on the

Lias clay. Several small coal-fields rise through the Red rocks — the largest, between Stafford and Birmingham, forms the famous " Black Country," with Wolver- hampton and Dudley as centres, where the manufacture of iron has preserved a historic continuity, for the great Forest of Arden supplied charcoal until the new fuel from the pits took its place. This, coal- field, ministering to the multifarious metal manufactures of Birming- ham, constitutes the centre of the Midlands. Smaller patches of the Coal Measures appear near Tamworth and Burton, while deep shafts have been sunk in many places through the overlying Triassic strata to the coal below, thus extending the mining and manufacturing area beyond the actual outcrop of the Coal Measures. A few small outcrops occur where still more ancient strata have been raised to the surface, as, for instance, in Charnwood Forest, where the Archaean rocks, with intrusions of granite, create a patch of highland scenery in the very heart of the English plain ; and in the Lickey Hills, near Birmingham, where the prominent features are due to volcanic rocks of very ancient date. The " Waterstones," or Lower Keuper Sandstones, — forming gentle elevations above the softer marls, and usually charged with an abundant supply of water, which can be reached by wells, — form the site of many towns, such as Birmingham, Warwick and Lichfield, and of very numerous villages. The plain as a whole is fertile and undulating, rich in woods and richer in pasture : the very heart of rural England. Cattle-grazing is the chief farm industry in the west, sheep and horse-rearing in the east; the prevalence of the prefix " Market " in the names of the rural towns is noticeable in this respect. The manufacture of woollen and leather goods is a natural result of the raising of live stock; Leicester, Coventry and Nottingham are manufacturing towns of the region. The historic castles, the sites of ancient battles, and the innumerable mansions of the wealthy, combine to give to central England a certain aesthetic interest which the more purely manufacturing districts of the west and north fail to inspire. The midland plain curves northward between the outcrop of the Dolomite on the west and the Oolitic heights on the east. It sinks lowest where the estuary of the Humber gathers in its main tributaries, and the greater part of the surface is covered with recent alluvial deposits. The Trent runs north in the southern half of this plain, the Ouse runs south through the northern half, which is known as the Vale of York, lying low between the Pennine heights on the west and the Yorkshire moors on the east. Where the plain reaches the sea, the soft rocks are cut back into the estuary of the Tees, and there Middlesbrough stands at the base of the Moors. The quiet beauty of the rural country in the south, where the barren Bunter pebble-beds

The

eastern

division.

have never invited agriculture, and where considerable vestiges of the old woodland still remain in and near Sherwood Forest, has attracted so many seats of the landed aristocracy as to earn for that part the familiar name of " the Dukeries." The central position of York in the north made it the capital of Roman Britain in ancient times, and an important railway junction in our own.

Five natural regions may be distinguished in the Eastern Division of England, by no means so sharply marked off as those of the west, but nevertheless quite clearly characterized. The first is the Jurassic Belt, sweeping along the border of the Triassic plain from the south coast at the mouth of the Exe to the east coast at the mouth of the Tees. This is closely followed on the south-east by the Chalk country, occupying the whole of the rest of England except where the Tertiary Basins of London and Hampshire cover it. where the depression of the Fen- land carries it out of sight, and where the lower rocks of the Weald break through it. Thus the Chalk appears to run in four diverging fingers from the centre or palm on Salisbury Plain, other formations lying wedge-like between them. Various lines of reasoning unite in proving that the Mesozoic rocks of the south rest upon a mass of Palaeozoic rocks, which lies at no very great depth beneath the surface of the anticlinal axis running from the Bristol Channel to the Strait of Dover. The theoretical conclusion has been confirmed by the discovery of Coal Measures, with workable coal seams, at Dover at a depth of 2000 ft. below the surface.

The Eastern Division is built up of parallel strata, the edges of the harder rocks forming escarpments, the sheets of clay forming plains; and on this account similar features are repeated in each of the successive geological formations. The rivers exhibit a remark- ably close relation to the geological structure, and thus contrast with the rivers of the Western Division. There are two main classes of river-course — those flowing down the dip-slopes at right angles to the strike, and cutting through opposed escarpments by deep valleys, and those following the line of strike along a bed of easily eroded rock. A third class of streams, tributary to the second, flows down the steep face of the escarpments. By the study of the adjustment of these rivers to their valleys, and of the relation of the valleys to the general structure, Professor W. M. Davis has elaborated a theory of river

classification, and a scheme of the origin of sufface- features which is attractive in its simplicity. The Thames is the one great river of the division, rising on the Jurassic Belt, crossing the Chalk country, and finishing its course in the Tertiary London Basin, towards which, in its prevailing west-to-east direction, it draws its tributaries from north and south. The other rivers are shorter, and flow either to the North Sea on the east, or to the English Channel on the south. With the exception of the Humber, they all rise and pursue their whole course within the limits of the Eastern Division itself.

The Eastern Division is the richest part of England agriculturally, it is the part most accessible to trade with the Continent, and that least adapted for providing refuges for small bodies of men in con- flict with powerful invaders. Hence the latest of the conquerors, the Saxon and other Germanic tribes, obtained an easy mastery, and spread over the whole country, holding their own against marauding Northmen, except on the northern part of the east coast; and even after the political conquest by the Normans, continuing to form the great mass of the population, though in- fluenced not a little by the fresh blood and new ideas they had assimilated. The present population is so distributed as to show remarkable dependence on the physical features. The chalk and limestone plateaus are usually almost without inhabitants, and the villages of these districts occur grouped together in long strings, either in drift-floored valleys in the calcareous plateaus, or along the exposure of some favoured stratum at their base. In almost every case the plain along the foot of an escarpment bears a line of villages and small towns, and on a good map of density of popula- tion the lines of the geological map may be readily discerned.

The Jurassic Belt. — The Jurassic belt is occupied by the counties of Gloucester, Oxford, Buckingham, Bedford, Northampton, Huntingdon, Rutland, Lincoln and the North Riding of Yorkshire. The rocks of the belt may be divided into two main groups: the Lias beds, which come next to the Triassic plain, and the Oolitic beds. Each group is made up of an alternation of soft marls or clays and hard limestones or sandstones. The low escarpments of the harder beds of the Lias are the real, though often scarcely perceptible, boundary between the Triassic plain and the Jurassic belt. They run along the right bank of the Trent in its northward course to the Humber, and similarly direct the course of the Avon southward to the Severn. The great feature of the region is the long line of the Oolitic escarpment, formed in different piacesby the edges of different beds of rock. The escarpment runs nc-‘ˆh from Portland Island on the English Channel, curves north-eastward as the

Cotteswold Hills, rising abruptly from the Severn plain to heights of over 1000 ft.; it sinks to insignificance in the Midland counties, is again clearly marked in Lincolnshire, and rises in the North Yorkshire moors to its maximum height of over 1500 ft. Steep towards the west, where it overlooks the low Lias plain as the Oolitic escarpment, the land falls very gently in slopes of Oxford Clay towards the Cretaceous escarpments on the south and east. Throughout its whole extent it yields valuable building-stone, and in the Yorkshire

moors the great abundance of iron ore has created the prosperity of Middlesbrough, on the plain below. The Lias plain is rich grazing country, the Oxford Clay forms valuable agricultural land, yielding heavy crops of wheat. The towns of the belt are comparatively small, not one attains a population of 75,000, and the favourite site is on the Lias plain below the great escarpment. They are for the most part typical rural market-towns, the manufactures, where such exist, being usually of agricultural machinery, or woollen and leather goods. Bath, Gloucester, Oxford, Northampton, Bedford, Rugby, Lincoln and Scarborough are amongst the chief. North of the gap in the low escarpment in which the town of Lincoln centres, a close fringe of villages borders the escarpment on the west; and throughout the belt the alternations of clay and hard rock are reflected in the grouping of population.

The Chalk Country. — The dominating surface-feature formed by the Cretaceous rocks is the Chalk escarpment, the northern edge of the great sheet of chalk that once spread continuously over the whole south-east. It appears as a series of rounded hills of no great elevation, running in a curve from the mouth of the Axe to Flamborough Head, roughly parallel with the Oolitic escarpment. Successive portions of this line of heights are known as the Western Downs, the White Horse Hills, the Chiltern Hills, the East Anglian Ridge, the Lincolnshire Wolds and the Yorkshire Wolds. The rivers from the gentle southern slopes of the Oolitic heights pass by deep valleys through the Chalk escarpments, and flow on to the Tertiary plains within. The typical scenery of the Chalk country is unrelieved by small streams of running water; the hills rise into rounded downs, often capped with fine clumps of beech, and usually covered with

thin turf, affording pasture for sheep. The chalk, when exposed on the surface, is an excellent foundation for roads, and the lines of many of the Roman " streets " were probably determined by this fact. The Chalk country extends over part of Dorset, most of Wiltshire, a considerable portion of Hamp- shire and Oxfordshire, most of Hertfordshire and Cambridgeshire, the west of Norfolk and Suffolk, the east of Lincolnshire, and the East Riding of Yorkshire. From the upland of Salisbury Plain, which corresponds to the axis of the anticline marking the centre of the double fold into which the strata of the south of England have been thrown, the great Chalk escarpment runs north-eastward; fingers of Chalk run eastward one each side of the Weald, forming the North and South Downs, while the southern edge of the Chalk sheet appears from beneath the Tertiary strata at several places on the south coast, and especially in the Isle of Wight. Flamborough Head, the South Foreland, Beachy Head and the Needles are examples of the fine scenery into which chalk weathers where it fronts the sea, and these white cliffs gave to the island its early name of Albion. The Chalk is everywhere very thinly peopled, except where it is thickly covered with boulder clay, and so becomes fertile, or where it is scored by drift-filled valleys, in which the small towns and villages are dotted along the high roads. The thickest covering of drift is found in the Holderness district of Yorkshire, where, from the chalk cliffs of Flamborough Head to the sandspit of Spurn Point, the whole coast is formed of boulder- clay resting on chalk. Of the few towns in the Chalk country, the interest of which is largely historical or scholastic, Salisbury, Win- chester, Marlborough and Cambridge are the most distinguished. Reading flourishes from its position on the edge of the London Tertiary Basin, Croydon is a suburb of London, and Hull, though on the Chalk, derives its importance from the Humber estuary, which cuts through the Chalk and the Jurassic belts, to drain the Triassic plain and the Pennine region. The narrow strip of Green- sands appearing from beneath the Chalk escarpment on its northern side is crowded with small towns and villages on account of the plentiful water-supply. The distinction between the low grounds of the Jurassic belt and the Chalk country is not always very apparent on the surface, and from the historic point of view it is important to recognize the individuality of the Eastern plain which extends from the Vale of York across the Humber and the Wash into Essex. The Eastern plain thus includes a portion of the Triassic plain in the north, a portion of the Jurassic and Chalk belts in the middle, and a portion of the Tertiary plain of the London Basin in the south.

The Fenland. — The continuity of the belts of Chalk and of the

Middle and Upper Oolites in the Eastern Plain is broken by the shallow depression of the Wash and the Fenland. The Fenland comprises a strip of Norfolk, a considerable part of Cambridgeshire, and the Holland district of Lincoln. Formerly a great inlet with vague borders of lagoons and marshes, the Fenland has been re- claimed partly by natural processes, partly by engineering works patiently continued for centuries. The whole district is flat and low, for the most part within 13 ft. of sea-level; the seaward edge in many places is below the level of high tide, and is protected by dykes as in Holland, while straight canals and ditches carry the sluggish drainage from the land. The soil is composed for the most part of silt and peat. A few small elevations of gravel, or of underlying formations, rise above the level of 25 ft.; these were in former times islands, and now they form the sites of the infrequent villages. Boston and King's Lynn are memorials of the maritime importance of the Wash in the days of small ships. The numerous ancient churches and the cathedrals of Ely and Peterborough bear witness

to the share taken by religious communities in the reclamation and cultivation of the land.

The Weald. — The dissection of the great east and west anticline in the south-east of England has resulted in a remarkable piece of country, occupying the east of Hampshire and practically the whole of Sussex, Surrey and Kent, in which each geological stratum produces its own type of scenery, and exercises its own specific influence on every natural distribution. The sheet of Chalk shows its cut edges in the escarpments facing the centre of the Weald, and surrounding it in an oval ring, the eastern end of which is broken by the Strait of Dover, so that its completion must be sought in France. From the crest of the escarpment, all round on south, west and north, the dip-slope of the Chalk forms a gentle descent outwards, the escarpment a very steep slope inwards. The cut edges of the escarpment forming the Hog's Back and North Downs on the north, and the South Downs on the south, meet the sea in the fine promontories of the South Foreland and Beachy Head. The Downs are almost without population, waterless and grass-covered, with patches of beech wood. Their only important towns are on the coast, e.g. Brighton, Eastbourne, Dover, Chatham, or in the gaps where rivers from the centre pierce the Chalk ring, as at Guildford , Rochester, Canterbury, Lewes and Arundel. Within the Chalk ring, and at the base of the steep escarpment, there is a low terrace of the Upper Greensand, seldom so much as a mile in width, but in most places crowded with villages scarcely more than a mile apart, and ranged like beads on a necklace. Within the Upper Greensand an

equally narrow ring of Gault is exposed, its stiff clay forming level plains of grazing pasture, without villages, and with few farmhouses even ; and from beneath it the successive beds of the Lower Greensand rise towards the centre, forming a wider belt, and reaching a con- siderable height before breaking off in a fine escarpment, the crest of which is in several points higher than the outer ring of Chalk. Leith Hill and Hindhead are parts of this edge in the west, where the exposure is widest. Several towns have originated in the gaps of the Lower Greensand escarpment which are continuous with those through the Chalk: such are Dorking, Reigate, Maidstone and Ashford. Folkestone and Pevensey stand where the two ends of the broken ring meet the sea. It is largely a region of oak and pine trees, in contrast to the beech of the Chalk Downs. The Lower Greensand escarpment looks inwards in its turn over the wide plain of Weald Clay, along which the Medway flows in the north, and which forms a fertile soil, well cultivated, and particularly rich in hops and wheat. The primitive forests have been largely cleared, the primitive marshes have all been drained, and now the Weald Clay district is fairly well peopled and sprinkled with villages. From the middle of this plain the core of Lower Cretaceous sandstones known as the Hastings Beds emerges steeply, and reaches in the centre an elevation of 796 ft. at Crowborough Beacon. It is on the whole a region with few streams, and a considerable portion of the ancient woodland still remains in Ashdown Forest. The greater part of the Forest Ridges is almost without inhabitants. Towns are found only round the edge bordering the Weald Clay, such as Tonbridge, Tunbridge Wells and Horsham; and along the line where it is cut off by the sea, e.g. Hastings and St Leonards. The broad low tongue of Romney Marsh running out to Dungeness is a product of shore-building by the Channel tides, attached to the Wealden area, but not essentially part of it.

The London Basin. — The London Basin occupies a triangular depression in the Chalk which is filled up with clays and gravels of Tertiary and later age. It extends from the eastern extremity of Wiltshire in a widening triangle to the sea, which it meets along an irregular line from Deal to Cromer. It thus occupies parts of Wiltshire, Hampshire, Surrey, Kent, Berkshire, Hertfordshire, the whole of Middlesex, the county of London and Essex, and the eastern edge of Suffolk and Norfolk. The scenery is quiet in its character, but the gravel hills are often prominent features, as at Harrow and in the northern suburbs of London ; the country is now mainly under grass or occupied with market and nursery gardens, and many parts, of which Epping Forest is a fine example, are still densely wooded, the

oak being the prevailing tree. The coast is everywhere low and deeply indented by ragged and shallow estuaries, that of the Thames being the largest. Shallow lagoons formed along the lower courses of the rivers of Norfolk have given to that part of the country the name of the Broads, a district of low and nearly level land. Apart from the huge area of urban and suburban London, the London Basin has few large towns. Norwich and Ipswich, Yarmouth, Lowestoft, Harwich and Colchester may be mentioned in the north-eastern part, all depending for their pros- perity on agriculture or on the sea; and a fringe of summer resorts on the low coast has arisen on account of the bracing climate. Reading and Windsor lie in the western portion, beyond the sub- urban sphere of London. The Bagshot Beds in the west form infertile tracts of sandy soil, covered with heath and pine, where space is available for the great camps and military training-grounds round Aldershot, and for the extensive cemeteries at Woking. The London Clay in the east is more fertile and crowded with villages, while the East Anglian portion of the basin consists of the more recent Pliocene sands and gravels, which mix with the boulder clay to form the best wheat-growing soil in the country.

The Hampshire Basin. — The Hampshire Basin forms a triangle

with Dorchester, Salisbury and Worthing near the angles, and the rim of Chalk to the south appears in broken fragments in the Isle of Purbeck, the Isle of Wight, and to the east of Bognor. On the infertile Bagshot Beds the large area of the New Forest remains untilled under its ancient oaks. The London Clay of the east is more fertile, but the greatness of this district lies in its coast-line, which is deeply indented, like that of the London Basin. South- ampton and Portsmouth have gained importance through their fine natural harbours, improved by engineering works and fortifications; Bournemouth and Bognor, from their favourable position in the sunniest belt of the country, as health resorts.

Communications. — The configuration of England, while sufficiently pronounced to allow of the division of the country into natural regions, is not strongly enough marked to exercise any very great influence upon lines of communication. The navigable rivers are all connected by barge-canals, even across the Pennine Chain. Although

the waterways are much neglected, compared with those of France or of Germany, they might still be very useful if they were enlarged and improved and if free competition with railways could be secured. The main roads laid out as arteries of inter- communication by the Romans, suffered to fall into neglect, and revived in the coaching days of the beginning of the 19th century, fell into a second period of comparative neglect when the railway system was completed ; but they have recovered a very large share of their old importance in consequence of the development of motor- traffic. Following the Roman roads, the high roads of the Eastern Division very frequently run along the crests of ridges or escarp- ments; but in the Western Division they are, as a rule, forced by the more commanding relief of the country to keep to the river valleys and cross the rougher districts through the dales and passes. The railways themselves, radiating from the great centres of popula- tion, and especially from London, are only in a few instances much affected by configuration. The Pennine Chain has always separated the traffic from south to north into an east coast route through the Vale of York, and a west coast route by the Lancashire plain. The Midland railway, running through the high and rugged country between the two, was the last to be constructed. The most notable bridges over navigable water affording continuous routes are those across Menai Strait, the Tyne at Newcastle, the Severn at Severn Bridge and the Manchester Ship Canal. It is more usual to tunnel under such channels, and the numerous Thames tunnels, the Mersey tunnel between Liverpool and Birkenhead, and the Severn tunnel, the longest in the British Islands (4J m.), on the routes from London to South Wales, and from Bristol to the north of England, are all important. The Humber estuary is neither bridged nor tunnelled below Goole.

Density of Population. — The present distribution of population over England and Wales shows a dense concentration at all large seaports, in the neighbourhood of London, and on the coal-fields where manufactures are carried on. Agricultural areas are very thinly peopled ; purely pastoral districts can hardly be said to have any settled population at all. There are very few dwellings situated at a higher level than 1000 ft., and on the lower ground the Chalk and the Oolitic limestones, where they crop out on the surface, are extremely thinly peopled, and so as a rule are areas of alluvial deposits and the Tertiary sands- But, on the other hand, the broad clay plains of all formations, the Cretaceous sandstones, and the Triassic plain, are peopled more densely than any other district without mineral wealth or sea trade.

Political Divisions. — In the partition of England and Wales into

counties, physical features play but a small part. The forty ancient counties, remnants of various historical groupings and partings, are occasionally bounded by rivers. Thus the Thames divides counties along nearly its whole length, forming the southern boundary of four and the northern boundary of three. Essex and Suffolk, Suffolk and Norfolk, Cornwall and Devon, Durham and Yorkshire, Lancashire and Cheshire, are all separated by rivers, while rivers form some part of the boundaries of almost every county. Still, it is noteworthy that the Severn and Trent nowhere form continuous county boundaries. Watersheds are rarely used as boundaries for any distance; but, although slightly overlapping the watershed on all sides, Yorkshire is very nearly coincident with the basin of the Ouse. The boundaries of the parishes, the fundamental units of English political geography, are very often either rivers or watersheds, and they frequently show a close relation to the strike of the geological strata. The hundreds, or groups of parishes, necessarily share their boundaries, and groups of hundreds are often aggregated to form larger subdivisions of counties. A wider grouping according to natural characteristics may now be recognized only in the cases of Wales, East Anglia, Wessex and such less definite groups as the Home Counties around London or the Midlands around Birmingham. Configuration is only one out of many conditions modifying distributions, and its effects on England ' as a whole appear to be suggestive rather than determinative.

(H. R. M.) III. Geology

For an area so small, England is peculiarly rich in geological interest. This is due in some degree to the energy of the early

British geologists, whose work profoundly influenced all subse- quent thought in the science, as may be seen by the general acceptation of so many of the English stratigraphical terms; but the natural conditions were such as to call forth and to stimulate this energy in an unusual way. Almost every one of the principal geological formations may be studied in England with com- parative ease.

If we lay aside for the moment all the minor irregularities, we find, upon examination of a geological map cf England, two structural features of outstanding importance. (1) The first is the great anti- cline of the Pennine Hills which dominates the northern half of England from the Scottish tiprder to Derby. Its central core of

1 I Recent & Pleistocene

Emery Walfctr sc

t'--- – .-:" : ,"'l Old fled Sandstone 4 Devonian

ES3 Silurian

[2221 Ordouician

Igj&jg Cambrian .

111111111 Metamorphic Group

1 + ■•+! Volcanic Rocks*

wM Basic Intrusive Rocks V-vM'<\ Granite & Acid Intrusive Rocks

_} Tertiary

1 ■' ; 1 Cretaceous

B Jurassic

I Trias

1 Perm >an

iCoot Measures, Carboniferous i Millstone Grit Series & Culm I Lower Carboniferous

Lower Carboniferous rock is broadly displayed towards the north, while southward it contracts; on either side lie the younger rocks, the coal-fields, the Permian strata and the Triassic formations, the last-named, while sweeping round the southern extremity of the Carboniferous axis of the uplift from its eastern and western flanks, spread out in a large sheet over the midland counties. (2) The second striking feature is the regular succession of Jurassic and Cretaceous rocks which crop out in almost unbroken lines from the coast of Dorsetshire, whither they appear to converge, to the Cleveland Hills and the Yorkshire coast. Lying upon the Cretaceous rocks in the S.E. of England are the two Tertiary basins of London and Hampshire, separated by the dissected anticline of the Weald.

The older rocks in England occupy relatively small areas. Pre-Cambrian rocks are represented by the gneisses of Primrose Hili and schists of Rushton in Shropshire; by the gneisses forming the core of the Malvern Hills, and by the ancient volcanic and other rocks of the Wrekin, Charnwood Forest and Nuneaton. The slates of the Long

Mynd, on the Shropshire border, belong to this system. Cam- brian strata appear in Shropshire in the form of sandstones and quartzites; in the Malvern Hills they arc black shales, while in the

Lake District they are represented by the Skiddaw slates. Next in point of age comes the Ordovician system, which is well developed upon the Shropshire border and in the Lake District. In the same two areas we find the Silurian rocks, shales and limestones with grits and flags. In N. and S. Devon are the Devonian limestones, grits and shales; the corresponding Old Red Sandstone type of the system (marls and sandstones) being exposed over a large part of Herefordshire, stretching also into Shropshire and Monmouth. Next in order of succession comes the Carboniferous system, with shales and limestones in the lower members, grits, sandstones and shales — the Millstone Grit series — in the middle of the system, followed by the Coal Measures — a great series of shales with coal, sandstones and ironstone at the top. This important system occupies a large area in England. The limestones and shales are well exposed in Derbyshire, Yorkshire, Northumberland, the Mendip Hills and at Clifton. The Millstone Grit series is prominent in Lancashire, Derbyshire, N. Staffordshire, Yorkshire and in the Forest of Dean. The Coal Measures rest upon the Millstone Giits in most places, generally in synclinal basins. On the eastern side of the Pennine range are the conterminous coal-fields of Yorkshire, Derbyshire and Nottinghamshire, and the coal-field of Durham and Northumberland ; on the western side are the Whitehaven, Burnley, S. Lancashire and N. Staffordshire coal-fields. Farther south are the S. Staffordshire, Warwickshire, Coalbrook Dale, Forest of Wyre, Forest of Dean and Bristol and Somerset coal-fields; while much concealed coal lies under younger formations in the south-east of England, as has been proved at Dover. A large part of N. Devon is occupied by the Culm shales, limestones and grits of Carboniferous age. The principal development of Permian rocks is the narrow strip which extends from Nottingham to Tynemouth; here the Magnesian limestone is the characteristic feature. On the other side of the Pennine Hills we find the Penrith sandstone of the Vale of Eden and the Brockram beds of the Lake District. Red sandstones and conglomerates of this age constitute some of the red rocks which form the picturesque scenery about Dawlish and Teignmouth:

The Triassic rocks, red sandstones, marls and conglomerates cover r. broad area in the Midlands in Worcestershire, Warwickshire and Leicestershire, whence they may be followed south-westward through Somerset to the coast at Sidmouth, and northward, round either flank of the Pennine Hills, through Nottinghamshire and Yorkshire to Middlesbrough on the one hand, and upon the other through Staffordshire, Cheshire and Lancashire to Carlisle.

The outcrop of the Lias, mainly clay with thin limestones and ironstones, runs in an almost continuous band across the country from Lyme Regis, through Bath, Cheltenham, near Leicester, and Lincoln 'to Redcar in Yorkshire. Closely following the same line are the alternating clays and limestones of the Oolitic series. Next in order come the Greensands and Gault, which lie at the base of the Chalk escarpment, between that formation and the Oolites. The Chalk occupies all the remaining portion of the south-east of England, save the Wealden area, and extends northward as far as Flamborough in Yorkshire, forming the Yorkshire Wolds, the Lincolnshire Wolds, the Chiltern Hills, the N. and S. Downs, the Dorsetshire heights and Salisbury Plain. But in the eastern and southern counties the Chalk is covered by younger deposits of Tertiary age; the Pliocene Crags of Norfolk and Suffolk, the Lower London Tertiaries (London Clay, Woolwich and Reading Beds, &c.) of the London Basin comprising parts of Essex, Hertfordshire, Middlesex, Bucks and Berks, and northern Kent. Again, in the Hampshire Basin and Isle of Wight, Eocene and Oligocene formations rest upon the Chalk.

When we attempt to decipher the physical history of the country from the complicated record afforded by the stratigraphical palimpsest, we are checked at the outset by the dearth of information from being able to picture the geographical condition in the older Palaeozoic periods. All we can say is, that in those remote times what is now England had no existence; its site was occupied by seas which were tenanted by marine invertebrates, long since extinct. As for the boundaries of these ancient seas, we can say nothing with certainty, but it is of interest to note the evidence we possess of still older land conditions, such as we have in the old rocks of Shropshire, &c. In the Devonian period it is clear that an elevatory movement had set in towards the north, which gave rise to the formation of inland lakes and narrow estuaries in which the Old Red Sandstone rocks were formed, while in the south of England lay the sea with a vigorous coral fauna. This condition led up to the Carboniferous period, which began with fairly open sea over the south and north of England, but in the centre there rose an elevated land mass from

which much of the Millstone Grit was derived ; other land lay towards the north. Slowly this sea shallowed, giving rise to the alternating estuarine marine and freshwater deposits of the Coal Measures. Continual elevation of the land brought about the close of the coal-forming period and great changes ensued. Desert conditions, with confined inland seas, marked the Permian and Triassic periods. It was about this time that the Pennine Hills, the Lake District mountain mass, and the Mendip Hills were being most vigorously uplifted, while the granite masses of Cornwall and Devon were perhaps being injected into the Carboniferous and Devonian rocks. From this period, more or less of the Pennine ridge has always remained above the sea, along with much of Cornwall ana parts of Devonshire.

In early Jurassic times the sea probably again occupied most of England with the exception of the above-mentioned areas, the Lake District and eastern part of the London Basin; Wales, too, and much of Scotland were land. Elevation gradually caused more land to appear in later Jurassic and early Cretaceous times when a river system, now entirely obliterated, drained into the Purbeck estuary and Wealden lake; but a subsequent depression led to the wide extension of the Chalk sea. By the beginning of the Eocene period we find the sea limited to the S.E. of England, where the London Clay, &c, were being laid down. It was not until quite late in Tertiary time that these islands began to assume anything like their present form. In the earlier part of the Pleistocene period, England and Ireland were still incompletely severed, and the combined activity of certain extinct rivers and the sea had not yet cut through the land connexion with the continent. The last well-marked lowering of the land took place in the Pleistocene period, when it was accompanied by glacial conditions, through which the greater part of northern England and the Midlands was covered by ice; a state of things which led directly and indirectly to the deposition of those extensive boulder clays, sands and gravels which obscure so much of the older surface of the country in all but the southern counties.

Throughout the whole period of its geological history, volcanic activity has found expression with varying degrees of intensity along what is now the western side of the island, with the exception that in the Mesozoic era this activity was in abeyance. We mav note the pre-Cambrian lavas and tuffs of the Wrekin district in Shropshire and the somewhat later volcanic rocks of Charnwood; the porphyrites, andesites, tuffs and rhyolites of the Borrowdale volcanic centre, erupted in the Ordovician period, and the Silurian granites of the same region. The volcanic outbursts which followed became feebler

in the Devonian and Carboniferous periods and ceased with the Permian. When again the volcanic forces became active, it was in the early Tertiary era ; the evidences for this lie outside the English border.

The principal directions of crust movement in England are: (i) north and south, by which the Pennine folds and faults, and the Malvern Hills have been produced; (2) east and west, by which the folds of the Weald and the Mendip Hills, and those of Devonshire have been formed. Another less important direction is N.W. and S.E., as in the Charnwood folding.

Further details of the geology are given under the heads of the counties. (J. A. H.)

IV. Climate

Temperature. — The mean annual temperature of the whole of England and Wales (reduced to sea-level) is about 50 F., varying from something over 52° in the Scilly Isles to something under 48 ” at the mouth of the Tweed. The mean annual CUmate. temperature diminishes very regularly from south-west to north- east, the west coast being warmer than the east, so that the mean temperature at the mouth of the Mersey is as high as that at the mouth of the Thames. During the coldest month of the year (January) the mean temperature of all England is about 40° The influence of the western ocean is very strongly marked, the tempera- ture falling steadily from west to east. Thus while the temperature in the west of Cornwall is 44 , the temperature on the east coast from north of the Humber to the Thames is under 38 , the coldest winters being experienced in the Fenland. In the hottest month (July) the mean temperature of England and Wales is about 61-5°, and the westerly wind then exercises a cooling effect, the greatest heat being foundjn the Thames basin immediately around London, where the mean temperature of the mon-th exceeds 64 : the mean temperature along the south coast is 62 °, and that at the mouth of the Tweed a little under 59 °. In the centre of the country along a line drawn from London to Carlisle the mean temperature in July is found to diminish gradually at an average rate of I ° per 60 m. The coasts are cooler than the centre of the country, but the west coast is much cooler than the east, modified continental conditions pre- vailing over the North Sea. The natural effect of the heating of the air in summer and the cooling of the air in winter by contact with the land is largely masked in England on account of the strength of the prevailing south-westerly wind carrying oceanic influence into the heart of the

country. This effect is well seen in the way in which the wind blowing directly up the Severn estuary is directed along the edges of the Oolitic escarpment north-eastward, thus dis- placing the centre of cold in winter to the east coast, and the centre of heat in summer to the lower Thames, from the position which both centres would occupy, if calms prevailed, in a belt running from Birmingham to Buckingham. As to how far the narrow portion of the North Sea modifies the influence of the European continent, there seems reason to believe that the prevailing winds blowing up the English Channel carry oceanic conditions some distance inland, along those_ parts of the continent nearest to England. The Mersey estuary, being partly sheltered by Ireland and North Wales, does not serve as an inlet for modifying influences to the same extent as the Bristol Channel : and as the wind entering by it blows squarely against the slope of the Pennine Chain, it does not much affect the climate of the midland plain.

Winds. — The average barometric pressure over England is about

^"jDag "3 -uuuoq

4 (101.109$ 'jw i \Y u0 ! Bnu !* u 'O*

PLACE-NAMES]

ENGLAND

4i7

29-94 in -> an d normally diminishes from south-west to north-east at all seasons, the mean pressure on the south coast being 29-97 and that on the northern border 29-88. The pressure at any given latitude is normally highest in the centre of the country and on the east coast, and lowest on the west coast. The direction of the mean annual isobars shows that the normal wind in all parts of England and Wales must be from the south-west on the west coast, curving gradually until in the centre of the country, and on the east coast it is westerly, without a southerly component. The normal seasonal march of pressure-change produces a maximum gradient in December and January, and a minimum gradient in April; but for every month in the year the mean gradient is for winds from southerly and westerly quarters. In April the gradient is so slight that any temporary fall of pressure to the south of England or any temporary rise of pressure to the north, which would suffice in other months merely to reduce the velocity of the south-westerly wind, is

sufficient in that month to reverse the gradient and produce an east wind over the whole country. The liability to east wind in spring is one of the most marked features of the English climate, the effect being naturally most felt on the east coast. The southerly component in the wind is as a rule most marked in the winter months, the westerly component predominating in summer. The west end of a town receives the wind as it blows in fresh from the country at all seasons, and consequently the west end of an English town is with few exceptions the residential quarter, while smoke-producing industries are usually relegated to the east end.

Storms. — On account of the great frequency of cyclonic disturbances passing in from the Atlantic, the average conditions of wind over the British Islands give no idea of the frequency of change in direction and force. The chief paths of depressions are from south-west to north-east across England; one track runs across the south-east and eastern counties, and is that followed by a large proportion of the summer and autumn storms, thereby perhaps helping to explain the peculiar liability of the east of England to damage from hail accompanying thunderstorms. A second track crosses central England, entering by the Severn estuary and leaving by the H umber or the Wash; while a third crosses the north of England from the neighbourhood of Morecambe Bay to the Tyne. While these are tracks frequently followed by the centres of baro- metric depressions, individual cyclones may and do cross the country in all directions, though very rarely indeed from east to west or from north to south.

Rainfall. — The rainfall of England, being largely due to passing cyclones, can hardly be expected to show a very close relation to the physical features of the country, yet looked at in a general way the relation between prevailing winds and orographic structure is not obscure. The western or mountainous division is the wettest at all seasons, each orographic group forming a centre of heavy precipitation. There are few places in the Western Division where the rainfall is less than 35 in., while in Wales, the Cornwall-Devon peninsula, the Lake District and the southern part of the Pennine Region the precipitation exceeds 40 in., and in Wales and the Lake District considerable areas have a rainfall of over 60 in. In the Eastern Division, on the other hand, an annual rainfall exceeding 30 in. is rare, and in the low ground about the mouth of the Thames estuary and around the Wash the mean annual rainfall is less than 25 in. In the Western Division and along the south coast the driest month is usually April or May, while in the Eastern Division it is February or March. The wettest month for most parts of England is October, the most noticeable exception being in East Anglia, where,

on account of the frequency of summer thunderstorms, July is the month in which most rain falls, although October is not far behind. In the Western Division there is a tendency for the annual maximum of rainfall to occur later than October. It may be stated generally that the Western Division is mild and wet in winter, and cool and less wet in summer; while the Eastern Division is cold and dry in winter and spring, and hot and less dry in summer and autumn. 'The south coast occupies an intermediate position between the two as regards climate. Attention has been called to the fact that the bare rocks and steep gradients which are common in the Western Division allow of the heavy rainfall running off the surface rapidly, while the flat and often clayey lands of the Eastern Division retain the scantier rainfallin the soil for a longer time, so that for agricultural purposes the effect of the rainfall is not very dissimilar throughout the country.

Sunshine. — The distribution of sunshine is not yet fully investigated, but it appears that the sunniest part is the extreme south coast, where alone the total number of hours of bright sunshine reaches an average of more than 1600 per annum. The north-east, including the Pennine Region and the whole of Yorkshire, has less than 1300 hours of sunshine, and a portion of North Wales is equally cloudy. Although little more than a guess, 1375 hours may be put down as approximately the average duration of bright sunshine for England as a whole, which may be compared with 2600 hours for Italy, and probably about 1200 hours for Norway.

For the purpose of forecasting the weather, the meteorological office divides England into six districts, which are known as England N.E., Midland Counties, England East, London and Channel, England N.W. and North Wales, and England S.W. and South Wales. (H. R. M.)

IX. 14

V. English Place-Names English place-names are of diverse origin and often extremely corrupt in their modern form, so that the real etymology of the names can often be discovered only by a careful comparison of the modern form with such ancient forms as are to be found in charters, ancient histories, and other early documents. By the aid of these a certain amount of work has been done in the subject, but, it is still largely an unworked field. The most satisfactory method of characterizing English place-nomenclature is to deal with it historically and chronologically, showing the influence of the successive nations who have borne sway in this island. The Celtic influence is to be found scattered evenly up and down the country so far as names of rivers and mountains are concerned; in names of towns it is chiefly confined to the west. Roman influence is slight but evenly distributed. English influence is all-pervading, though in the northern and north-midland counties this influence has been encroached upon by Scandi- navian influence. Norman influence is not confined to any particular district.

Celtic. — Though scattered notices of towns, cities and rivers in Britain are to be found in various early Roman writers, it is not till the time of Ptolemy (2nd century), who constructed a map of the island, and of the itinerary of Antonine (beginning of the 3rd century) that we have much information as to the cities and towns of Britain. We there learn that the following place-names are ultimately of Celtic origin: — Brougham, Catterick, York, Lincoln (Lindum), Manchester (Mancunium), Doncaster (Danum), Wroxeter (Viro- conium), Lichfield (Letocetum) , Gloucester (Glevum), Cirencester (Corinium), Colchester (Camulodunum) , London, Reculver, Rich- borough (Rutupiae), Dover, Lymne, Isle of Wight, Dorchester (Durnovaria), Sarum, Exeter (Isca), Brancaster (Branodunum) , Thanet. We also have the names of the following rivers: — Eden, Dee, Trent, Yare, Colne, Thames, Kennet, Churne, Exe, Severn, Tamar. Gildas, writing in the 6th century, speaks of the twenty- eight cities of the Britons. Nennius' Historia Britonum gives what purports to be a list of these cities. Of these, excluding Welsh ones, we may with some certainty identify Canterbury (Caint), Caerleon- on-Usk,

Leicester (Lerion), Penzelwood, Carlisle, Colchester, Grant- chester (Granth), London, Worcester- (Guveirangon) , Doncaster (Daun), Wroxeter (Guoricon), Chester (Legion — this is Roman), Lichfield (Licitcsith) and Gloucester (Gloui) . Others less certain are Preston-on-H umber and Manchester (Manchguid).

In modern place-names the suffix don often goes back to the Celtic dun, a hill, e.g. Bredon, Everdon, but the suffix was still a living one in Saxon times. Of river-names the vast majority are Celtic (possible exceptions will be named later), and the same is true of mountains and hills. The forests of Wyre, Elmet and Sel (wood), and the districts of the Wrekin and the Peak are probably Celtic.

Roman. — We do not owe entire place-names to Roman influence, with the exception of a few such as Chester, Chester-le-Street (L. strata [via], a road) and Caistor, but Roman influence is to be found in many names compounded of Celtic and Roman elements. The chief of these is the element Chester — (L. castrum, a fort), e.g. Eb-chester, Silchester, Grantchester. Porchester is entirely Latin, but may not have been formed till Saxon times. The form caster is found in the north and east, under Scandinavian influence, e.g. Tadcaster, Lancaster; and in the south-west and in the midlands we have a group of towns with the form cester : — Bicester, Gloucester, Cirencester, Worcester, Alcester, Leicester, Towcester. Exeter, Wroxeter and perhaps Uttoxeter show the suffix in slightly different form. In names like Chesterton, Chesterford, Chesterholm, Wood-chester, the second element shows that the names are of later English or Scandinavian formation. In Lincoln we have a compound of the Celtic Lindum and the Latin colonia.

Saxon. — The chief suffixes of Saxon%rigin to be found in English place-names are as follows (some of them being also used independ-ently) : -burgh, -borough, -bury (O.E. burh, fortified town), e.g. Burgh, Bamborough, Aylesbury, Bury; -bourne, -borne, -burn (O.E. burne, -a, a stream), e.g. Ashbourne, Sherborne, Sockburn; -bridge, e.g. Weybridge, Bridge; -church, e.g. Pucklechurch ; -den, -dean (O.E. denu, a valley), e.g. Gaddesden, Rottingdean; -down, -don, -ton (O.E. diin [Celtic], a hill), e.g. Huntingdon, Seckington, Edington ; -ey, -ea, -y (O.E. tg, an island), e.g. Thorney, Mersea, Ely; -fleet (O.E. fleot, an estuary) e.g. Benfleet; -field, e.g. Lichfield; -ford, e.g. Bradford ; -ham (O.E. ham, a home, and hamm, an enclosure) ; these are not distinguished in modern English, e.g. Bosham, Ham; -hall (O.E. healh, a corner), e.g. Riccall, Tettenhall; -head, e.g. Gateshead; -hill, e.g. Tickhill; -hurst (O.E. hyrst, copse, wood), e.g. Deerhurst; -ing (patronymic suffix, plural form in O.E.), e.g. Basing,

Reading; -leigh, -ley, lea (O.E. leah, meadow), e.g. Leigh, Stone leigh, Whalley; -lade (O.E. lad, path, course), e.g. Cricklade; -land, e.g. Crowland; -lock (O.E. loca, enclosure), e.g. Porlock; -minster (O.E. mynster, L. monasterium) , e.g. Axminster, Minster; -mouth, e.g. Exmouth; -port (O.E. port, market-town, a word of Latin

origin), e.g. Bridport; -sted, -stead (O. E. stede, a place), e.g. Stansted, Wanstead ; -stone, -ston, e.g. Beverstone, Sherston ; -staple (O.E. stapol, foundation),, e.g. Barnstaple; -stow (O.E. stow, place), e.g. Stow, Chepstow, Bristol (earlier Bristow) ; -tree, -try, e.g. Coventry, Elstree, Seasalter; -ton (O.E. tun, enclosure), e.g. Milton; -wark (O.E. geweorc, fortification), e.g. Southwark; -well, e.g. Bakewell; -wich, -wick (O.E. wic. a dwelling), e.g. Norwich, Swanage (O.E. Swanawic), Warwick; -worth, -worthy (O.E. weorth, weorthig, an enclosure), e.g. Polesworth, Holsworthy.

Of river names the Blackwater, Witham, Ashburne, Swift, Washburn, Loxly, Wythburn, Eamont are perhaps English and so also may be the Waveney in Suffolk.

Scandinavian. — The following suffixes are Scandinavian in origin , some of them being also used independently: -beck (O.N. bekkr, stream), e.g. Starbeck, Troutbeck; -by (O.N. byr, town), e.g. Whitby; -dale (O.N. dalr), e.g. Swaledale; -car®, -ker (O.N. kibrr, marshy ground), e.g. Redcar, The Carrs, Muker; -fell (O.N. fjdll, mountain), e.g. Scafell; -force, foss (O.N. fors, waterfall), High Force, Wilber foss; -garth (O.N. garfSr, enclosure), e.g. Hoggarths; -gill (O.N. gil, a deep narrow glen), e.g. Skelgill, Dungeon Ghyll; -holmie) (O.N. holmr, island), e.g. Axholme, Durham (earlier Dunholm) ; keld (O.N. kelda, well, spring), e.g. Threlkeld, Keld; -lund (O.N. lundr, grove), e.g. Snelland, Timberland, Lound; -how (O.N. haugr, hill), e.g. Greenhow; -scale (O.N. shale, hut, shed), e.g. Seascale; -skew (O.N. skogr, forest), e.g. Litherskew; -thorpe (O.N. porp, village), e.g. Thorpe, Osgathorp; -thwaite (O.N. pveit, a piece of land), e.g. Rosthwaite; -toft (O.N. topt, a green knoll), e.g. Toft, Langtoft; -with (O.N. viSr, a wood), e.g. Blawith, Stowiths.

Tarn (a mountain pool), grain and sike (mountain streams) are also

Scandinavian terms.

Norman. — Norman influence has not been very great in English place-nomenclature. The number of places with pure French names is extremely limited; a few such are Beaulieu, Belvoir, Beauchief, Beaudesert, Beaufort, Beaumont, also Theydon Bois, War-boys. Norman influence is marked more strongly in certain compound place-names, where one of the elements often represents the name of the original Norman tenant or holder, e.g. Thorpe Mandeville, Helton Bumstead, Higham Ferrers, Swaffham Bulbeck, Stoke Gifford, Shepton Mallet; similarly names like Lyme Regis, King's Sutton, Monks' Kirby, Zeal Monachorum, Milton Abbas, Bishop's Waltham, Prior's Dean, Huish Episcopi date from feudal times. Gallicized forms are also to be found in a few forms like Kirkby-le-Soken, Chapel-en-le-Frith, Alsop-en-le-Dale, Barnoldby-le-Beck. Ecclesi-astical influence is to be found in such names as Aldwinkle St Peter, Barford St Martin, Belchamp St Paul, the name of the saint being the name either of the saint to whom the church at, that place was dedicated or the patron-saint of the monastery or abbey to whom lands in that district belonged. (A. Mw.)

VI. Population

Until the beginning of the 19th century there existed no other knowledge of the actual area and population of the country but what was given in the vaguest estimates. But there can be little doubt that the population of England and Wales increased very slowly for centuries, owing largely to want of intercommunication, which led to famines, more or less severe — it being a common occurrence that, while one county, with a good harvest, was enjoying abundance, the people of the ad- joining one were starving. The interpretation of certain figures given in the Domesday Survey (which do not cover certain parts of modern England nor take account of the ecclesiastical popula- tion) is a matter of widely divergent opinion; but a total population of one million and a half has been accepted by many for the close of the nth century. In 1377 the levying of a poll-tax provides partial figures from which a total of two to two- and-a-half millions has been deduced, but again divergent views have been expressed as to how far the number was still affected by the Black Death of 1348-1349. It is calculated, on the basis of registers of births and deaths, that the population of England and Wales numbered 5,475,000 in 1700, and 6,467,000 in 1750. From the later part of the 18th century a stronger tendency to increase set ; n, and at the taking of the first census, in 1 801, it was ascertained that the population numbered 8,892,536, being — if the former estimates

were approximately correct— an increase of very nearly 23 millions in little over fifty years. This rate of increase was not only continued, but came to be greatly exceeded.

Since the first census of 1801, regular enumerations of the people of England and Wales have been taken every ten years. The results of these enumerations are published in separate volumes for each county, in a volume of summary tables, and

in a general report. In the summaries England and Wales are treated as one, and this treatment is followed here. The following table gives the total numbers of the population of England and Wales at each census, together with the absolute increase, and growth per cent, during each decennial period:-

Dates of Enumeration.

Population.

Increase at each Census.

Decennial

Rate of Increase

per Cent.

1801, March 10th 1811, May 27th . 1 82 1, May 28th . 1 83 1, May 30th . 1841, June 7th . 1851, March 31st 1861, April 8th . 1 87 1, April 3rd . 1 88 1, April 4th . 1 89 1, April 6th . 1 901, April 1st .

8,892,536 10,164,256 12,000,236

13,896,797 15,914,148 17,927,609 20,066,224 22,712,266

25,974,439 29,002,525 32,527,843

1,271,720 1,835,980 1,896,561

2,017,351 2,013,461 2,138,615 2,646,042 3,262,173 3,028,086

3,525,3i8

14-00 18-06 15-80 14-27 12-65 11-90 13-21 14-36 11-65 12-17

Allowing for a rate of increase equivalent to that which obtained

between 1891 and 1901, the estimated population was 34,i5 2 ,977 in I9°5, and 36,169,150 in 1910.

Distribution. — A detailed map of the distribution of population in England and Wales 1 shows certain well-defined areas of very dense population. First for consideration, though not in geographical extent, stands the area round London, in Middlesex, Surrey, Kent, Essex and Hertfordshire. A great proportion of this population is purely residential, that is to say, its working members do not practise their professions at home or close to home, but in the metropolis, travelling a considerable distance between their residences and their offices. Just as London, in spite of its manifold industrial interests, is hardly to be termed a manufacturing centre, so the populous district surrounding it is not to be termed an industrial district in the sense in which that term is applied to the remaining regions of dense population which fall for consideration here. London gained its paramount importance from its favourable geographical position in respect of the rest of England on the one hand and the Continent on the other, and the populous district of the " home counties " owes its existence to that importance; whereas other populous districts have generally grown up at the point where some source of natural wealth, as coal or iron, lay to hand. The great populous area which covers south Lancashire and the West Riding of York- shire, and extends beyond them into Cheshire, Derbyshire, Stafford- shire and Nottinghamshire, is not in reality a unit. The whole of the lowland in the south of Lancashire has almost the appearance of one vast town, whereas among the hills of the Pennine Chain the popula- tion crowds the valleys on either flank and leaves in the high-lying centre some of the largest tracts of practically uninhabited country in England. Moreover, the industries in different parts of this area (for it is strictly an industrial area) differ completely, as will be observed later, though coal-mining is common to all. The other most extensive centres of dense population are the coal-mining or manufacturing districts of Northumberland and Durham, of the midlands (parts of Warwickshire, Worcestershire and Leicestershire), and of South Wales and Monmouthshire; and it is in these districts, and others smaller, but of similar character, that the greatest increase of population has been recorded, since the extensive development of

Increase

per cent.

Counties.

1871-1891.

1891-1901.

Middlesex

47-42

»45-n

Essex

3J-54

39-6o

Glamorganshire (S. Wales) .

30-72

25-10

Surrey . .

25-03

24-78

Northumberland

14-42

19-19

Worcestershire . .

12-12

18-49

Nottinghamshire

I9-30

18-09

Durham

21-67

16-62

Leicestershire . .

17-43

16-46

Kent . . . . .

13-15

15-95

Hampshire . . .

12-73

15-33

Monmouthshire

12-08

14-97

Yorkshire (E. Riding)

I4-3I

13-49

Northamptonshire . .

11-40

13-27

Warwickshire . .

12-78

12-95

Staffordshire ....

12-15

12-92

Derbyshire ....

15-52

I2-8I

Yorkshire (W. Riding) .

15-36

12-70

Cheshire

14-62

12-56

Lancashire . .

17-92

12-05

Hertfordshire . .

5-08

10-91

•As in Bartholomew's Survey Atlas of England and Wales (1903).

their resources during the 19th century. Thus the preceding counties' showed an increase, under normal conditions, exceeding 10% during the ten years 1891-1901, the percentage oi increase in 1871-1891 being given for comparison.

It will be observed that three of the home counties occur in the first

four in the above list. It is interesting to note, in this connexion, that the increase of population diminished steadily, in the three decades under notice, within the area covered by the administrative county of London, which is only the central part of urban London (compare the population table of the great urban districts, below). This was 17-44% in 1871-1881, 10-39 m 1881-1891, and 7-3 in 1891-1901. This illustrates the constant tendency for the residential districts of a city to radiate away from its centre, which appears, though in a modified degree, in the case of all the great English cities.

During the period 1891-1901 five English and five Welsh counties showed a decrease per cent in the population. The English counties

Decrease or Increase(+).

Decrease.

1891-1901.

1871-1881.

1881-1891.

Huntingdonshire .

Rutland

Westmorland ....

Oxfordshire

Herefordshire .

8-29

i-55

1-25

+ I-27

3-26

5-5i

3-73

+2-96

+3-64 4-02

7-04

5-59

, 2-73

1-70

1-62

rural districts.

The Welsh counties were Montgomeryshire, Cardiganshire, Flint-shire, Merionethshire and Brecknockshire, the first-named showing the highest decrease, 5-08%, in 1891-1901. These Urban and coun t; es are principally agricultural, and it is in agricul- tural districts elsewhere that the increase of population is slightest. But in 1871-1881 a decrease was found in the case of fifteen counties in all, and in 1881-1891 in the case of thirteen, whereas in 1891-1901, although Radnorshire, which returned a decrease previously, now returned an abnormal increase owing to the temporary employment of workmen on the construction of the Birmingham waterworks, the number fell to 10, and the average percentage also fell. This suggested some tendency to return to a state of equilibrium as between urban and rural districts. This is in a measure borne out by the movement of population in the districts classed as purely rural in 1901. In these there was an increase per cent of 14-2 in 1811-1821, which fell off to-2 8 in 1841- 1851. A decrease then set in and grew from 0-2 in 1851-1861 to 0-67 in 1881-1891, but in 1891-1901 an increase, 1-95, was once more recorded. But the drain on the rural population continued heavy, for in the same purely rural area, which had a population in 1901 of 1,330,319, the excess of births over deaths was 150,437, but the actual increase of population was only 25,492, leaving a heavy loss (9-6%) to be accounted for by migration, the term used in this connexion in the general report of the Census to include movement of population to any new locality, home or foreign.

Housing. — The total area of England and Wales covered by urban districts (a term which coincides pretty nearly with that of towns, which bears no technical meaning in England) was 3,848,987 acres, and contained a population of 25,058,355 in 1901, the increase in

the decade 1891-1901 being 15-2 %. The number of inhabited houses in the whole country in 1901, namely 6,260,852, may be compared with the numbers in 1801 (1,575,923) and 1851 (3,278,039); it gives an average of 5-2 persons to each house. This average has decreased with some regularity from a maximum of 5-75 in 1821, but there is no certain evidence on which to affirm or deny that the average cubic capacity of dwelling-houses has been maintained. The urban population averaged 5-4 persons to a house, but varied greatly in different towns. Thus, an average below 4-4 is quoted for Rochdale, Halifax, Huddersfield, Yarmouth, Bradford and Stockport, while the average for London was 7-93, and for Gateshead, Newcastle-upon- Tyne and South Shields, in the northern industrial district of the Tyne, and for Devonport, the average exceeded 8. The average of persons to a house in rural districts was 4-6.

Vital Statistics. — " The increase or decrease of population is governed by two factors: (1) the balance between births and deaths, and (2) the balance between immigration and emigration." 2 The following table is therefore given to show (1) the percentage of

Year.

Percentage of

Excess of Estimated over Enumerated Population.

Increase by Births.

Decrease by Deaths.

1851-1861 1861-1871 1871-1881 1881-1891 1891-1901

36-19 37-56 37-89 34-24 31-57

23-58 23-98

22-80 20-27

I9-I8

122,111

78,968 164,307

601,ˆ89

68,330

1 The figures are for Registration Counties (see classification of Territorial Divisions, below).

2 Census of England and Wales, 1901 ; General Report, p. 15.

increase by births and decrease by deaths in each decade from 1 851, and (2) the difference at the close of each decade (i.e. in the later year mentioned in each line) between the population which would have followed upon the natural increase unaffected by migration and the population as actually enumerated. In the case of (2) the actual population has always been exceeded by the estimate based on natural increase, and this demonstrates an excess of emigration over immigration.

The proportion of males to females is 1000 to 1068, this being a higher proportion of females than any recorded in the 19th century, during which the lowest proportion of females was 1036 in 1821. The proportion rose at each census from 1851. But on the other hand 1000 male children were born against only 965 female, on an average in 1891-1901. This excess of male births, which is usual, has been ascertained to find its equilibrium, through a higher rate of infant mortality among the males, about the tenth year of life, and is finally changed by perilous male occupations and other causes, including the stronger tendency of males to emigration. The pro- portion of females varies much in different localities, being highest in such districts as London and the home counties, which are resi- dential, and in which, therefore, many domestic servants are enumer- ated ; and Somersetshire, Bedfordshire and other seats of industries which especially occupy women (e.g. the straw-plaiting of the county last named). It is lowest, naturally, in the mining districts, as Glamorgan, Monmouth, Durham, Northumberland; but an ex- ception may be noted in the case of Cornwall, where a high proportion of females is attributed to the emigration of miners consequent upon the relative decrease in importance of the tin-mines. In 1901 the proportion of females to males in urban districts was 1086 to 1000, and in rural districts ion to 1000.

The proportion of married adults (aged twenty and upwards) was found to decrease from 1881 to 1901, being 630 per thousand

Urban Districts of England and Wales with Population exceeding 80,000 (1901).

London 3 .

Liverpool

Manchester .

Birmingham .

Leeds

Sheffield . .

Bristol . .

Bradford .

West Ham 1 .

Hull . . .

Nottingham

Salford

Newcastle-upon-Tyne

Leicester .

Portsmouth .

Bolton

Cardiff (Wales)

Sunderland .

Oldham . .

Croydon 4

Blackburn

Brighton .

Willesden 4 .

Rhondda (Wales)

Preston .

Norwich .

Birkenhead .

Gateshead

Plymouth

Derby

Halifax .

Southampton

Tottenham 4 .

Leytcn 4 .

South Shields

Burnley .

East Ham 4 .

Walthamstow ‘

Huddersfield

Swansea (Wales)

Wolverhampton

Middlesborough

Northampton

Walsall . . .

St Helens

Rochdale

Administrative county.

hese districts, ac to Greater London.

Population.

1891.

4,228,317 629,548 505,368 478,113 367,505 324,243 289,280 265,728 204,903 200,472 213,877

198,139 186,300

174,624 159.278 146,487 128,915 131,686

131,463 102,695 120,064

115,873 61,265

88,351 107,573 100,970

99,857 85,692 88,931 94,146

97,7H

82,126

71,343 63,106

78,391 87,016

32,712 46,346 95,420

91,034 82,662

75.532 75-075

7L789

72,413 76,161

1901.

4,536,541 684,958 543,872 522,204 428,968 380,793 328,945 279,767 267,358 240,259

239-743 220,957 215,328

2n,579

188,133 168,215

164.333 146,077 137,246

133.895 127,626

123,478 114,811

113,735 112,989

iii,733

110,915

109,888

107,636

105,912

104,936

104,824

102,541

98,912

97.263

97.043

96,018

95,131 95.047 94.537 94,187 91,302 87,021 86,430 84,410 83,114

Increase per cent.

7-3

8-8

7-6

9-2 16-7 17-4 13-7

5-3 30-5 19-8

I2-I

“•5

15-6

21-2

I8-I

14-8

27-5 10-9

4-4

3o-4

6-3

6-6 87-4 28-7

5-o

10-7

ii-i

28-2 21-0

125

7-4 27-6

43-7

56-7

24-1

u-5

193-5

105-3 ,

0-4 deer.

3-8

13-9 20-9

15-9 20-4

166 91

ministratively distinct, belong topographically

in the former and 604ˆ5 in the latter year. The marriage-rate per thousand has ranged since 1841 from 14-2 in 1886 to 17-6 in 1873, and is evidently closely associated with the general prosperity of the country, for in the latter year the value of the total imports and exports per head of the population of the United Kingdom was at its highest, and in the former year at its lowest. The five years 1895-1899 exhibited a remarkable sequence illustrative of this: —

Years.

Marriage- Rate.

Value,

Exports and

Imports.

1895 1896

1897 1898 1899

15-0 15-8 16-0 16-3 16-5

£ s. d.

17 19 3

18 14 1

18 14 3

19 5

The marriage-rate declined, subsequently to the year last quoted in this table, to 15-6 in 1903. (0. J. R. H.)

Religion. — In attempting to give a concise account of the religious conditions of England we are confronted from the outset with the absence of any trustworthy statistics. A religious census, such as is customary in other countries, has not been taken since 1851; nor is it probable that such a census would be any true indication of the actual religious beliefs of the population. Still less satisfactory, from this standpoint, is the attempt to compile statistics of religious belief from the registrar-general's report on the number of marriages celebrated in the places of worship of the various denominations; for among those who are practically attached to no religious body, and even some Nonconformists, a prejudice survives in favour of having their marriages celebrated and their funerals conducted by the clergy of the Established Church. Nor is the test of " sittings " provided by the various denominations, nor even the number of their communicants, a trustworthy test of the relative number of their adherents. In Wales, for instance, the rivalry of the sects has multiplied chapel accommodation out of all proportion to the population; while everywhere it happens that churches, at one time crowded every Sunday, have been emptied by the shifting of population or other causes. As for the test of communicancy, it is untrustworthy because the insistence on communion as the pledge of membership varies with the different denominations and even with different sections of opinion within those denominations. Any statistics of this nature, then, however useful they may be as a general indication, must not be treated as conclusive.

Whatever disputes there may be as to the relative strength of the various churches and sects, there can be no questioning the fact that the dominant religion in England is Protestant Christianity. Protestantism, indeed, since the Act of Settlement in 1689, has been of the essence of the Constitution, the sovereign forfeiting his or her crown ipso facto by acknowledging the authority of the pope, by accepting " the Romish religion," or by marrying a Roman Catholic; and though of late years efforts have been made to modify or to abrogate this provision, the fact that such efforts have met with widespread opposition shows that it still represents the general attitude of the British nation. Protestantism, however, is a generic term which in England covers a great variety of opinions, and a large number of rival religious organizations. The state church, the Church of England as by law established, represents the tradition of a

time when church and state were regarded as two The h t as P ects °f one divinely ordered organism. In law England. everv subject of the state is also a member of the

Established Church, and can lay claim to its minis- trations so long as he or she obeys the ecclesiastical law, which is also the law of the state. No Englishman, whatever his opinions, can be excommunicated without due process of law. The Church of England is thus theoretically coextensive with the English nation, each unit of which is legally assumed to belong to it unless proof be brought to the contrary. To state the theory is, however, to risk giving an entirely false impression of the facts. In practice the Church of England is no longer regarded as coextensive with the state; nor is nonconformity

any longer, as it once was, an offence against the law. Since the abolition of the Test Acts and the emancipation of the Catholics no Englishman has suffered any civil disability owing to his religion 1 ; and the progress of democracy has given to the great so-called " Free Churches " a political power that rivals that of the Established Church. In the matter of the estimation of their relative strength the main grievance of the Nonconformists is that the law classes as members of the Church of England that enormous floating population which is really conscious of no ecclesiastical allegiance at all.

The. Church of England, both in constitution and doctrine, represents in general the mˆn between Roman Catholicism on the one hand and the more advanced forms of Protestantism on the other (see Episcopacy) . Though its doctrine was reformed in the 16th century and the spiritual supremacy of the pope was repudiated, the continuity of its organic life was not inter- rupted, and historically as well as legally it is the same church as that established before the Reformation. The ecclesiastical system is episcopal, the whole of England (including for this purpose Wales) being divided into two provinces, Canterbury and York, and 37 bishoprics (including the primatial sees of Canterbury and York). These again are subdivided into 14,080 parishes (1001), the smallest ecclesiastical units, which are grouped for certain administrative purposes into 810 rural deaneries. The sovereign is by law the supreme governor of the church, both in things spiritual and temporal, and he has the right to nominate to vacant sees. In the case of sees of old foundation this is done by means of the congt d'Uire {q.v.), in that of others by letters patent. 2 The bishops hold their temporalities as baronies, for which they do homage in the ancient form, and are spiritual peers of parliament. Only 26, however, have the right to seats in the House of Lords, of whom five — viz. the two archbishops and the bishops of

*London, Durham and Winchester — always sit, the others taking their seats in order of seniority of consecration. Under the bishops the affairs of the dioceses are managed by archdeacons (q.v.) and rural deans (see Archpriest and Dean). The cathedral churches are governed by chapters consisting of a dean, canons and prebendaries (see Cathedral). The deaneries are in the gift of the crown, canonries and prebends sometimes in that of the crown, sometimes in that of the bishops. The parish clergy, with a few rare exceptions (when they are elected by the rate- payers), are appointed by patronage. The right of presentation to some 8500 benefices or " livings " is in the hands of private persons; the right is regarded in law as property and is, under certain restrictions for the avoidance of gross simony, saleable (see Advowson). The patronage of the remaining benefices belongs in the main to the crown, the bishops and cathedral chapters, the lord chancellor, and the universities of Oxford and Cambridge. **

In spite of the fact that the Church of England is collectively one of the wealthiest in Christendom, a large proportion of the " livings " are extremely poor. To understand this and other anomalies it is necessary to bear in mind that the church is not, like the established Protestant churches of Germany, an elabor- ately organized state department, nor is it a single corporation with power to regulate its internal polity. It is a conglomeration of corporations. Even the incumbent of a parish is in law a "corporation sole," his benefice a freehold; and until the establishment in 1836, by act of parliament, of the Ecclesiastical Commissioners <(q.v.) nothing could be done to adjust the in- equalities in the emoluments of the clergy resulting from the natural rise and fall of the value of property in various parts of the country. Even more extraordinary is the effect of the singular constitution of the church on its discipline. An incumbent, once inducted, can only be disturbed by complicated and extremely costly processes of law; in effect, except in cases of gross

1 Certain great offices of state are closed to Roman Catholics.

2 The actual selection of the bishops is in practice in the hands of the prime minister for the time being. This formerly led to purely political appointments; but it is usual now to select clergymen approved by public opinion.

Continuation North, Section a.

ENGLAND & WALES

Section III.

Scale, 1:1,000,000

i Castle t*

i5?Kˆfe

- ii 1

... .. -.suuuu s Jitr ...1. i.d»i«» ., – - i) E xlonJ

*Shilion fˆwg*ˆ»?yˆˆ3aK-/ KilUtonoif *££ y*s\v»**

“Mar-ket “joror

on

aldington LKrfUering

i?T W£lUngbor3ug Holdenby jpOverstcnfˆKJ)

iO EMibnMaudi*

fii&O’s-ˆˆas—” ‘- y .Roade*

r ._ J m 2 ssracc»tis!b%«r’ ;■’

“Calvii ˆ lUKhau

ckinfhai

w £& io MS3

Sfislo.w ‘BStJ??’; 5 ? _ [orthMarfton*

.A

*»*gi> ■..._*

. Amershi

*piy.mn*y... . ,*

Ca’rdiff I /Mjr.iwK.

-eyp sHarr ongwbury

*Brail Kno jo .0ˆ Cheddar**** ~*

B^aVr^r'?"" *

_ > Wedmore ■ghttjjdgc Sttw^,

Westotij super Man

Otterfii

bhippenl

U^T Monkta. &.. o¥Sn«igh

n AvU

' y^^T^Wfesttarv Tflshead^: t %Sg' ■< Nerthj

Letcdmbc

Italr ,StHfc£$

» 7n! I Mil I HI HI li.^. ^^-^W,

*Beacon^*

,_'Too6urn -L-n-

-i . . WedburflGn

*4(o **Mejhpeiih*ttt:*

Hb/xO v i _, T . .,,

Henley AM aidenhca9 B ?'£2£H£5 h f ,n onThamesa • ' _

i SJ.pU»aiy«r6r«V|^- Ilr> ^JJ) ; Eton >u sl(, llJ

"esffling

iddesd«n Vwe©Odlham..,,\J

•roiigh BflersKot A

f Frimley

minstet r 1 ""? ^

*Cowingioi r a"ter °/a, ?^*

rfEpjˆopidyˆjMartocfc .„ SoutfijMoniSif”ˆ

*,.- i iPBaMrtoft,.ˆ **

Sflhcantoff CHIlInC ”

‘H

iurboˆ0ie u TSeth« li

*ofau ˆ *3«ˆUopS*

BroKMond ••

“alisbury

M

RLecMord

sfe

r s«rMho …y’

§gfˆhse } ;

••.ˆndlonl.tˆo.

iEbopKokegjˆ

0\Valflialh i noma nm*

X

[Chester

4125 -ˆ“Morden Jf i Kin•oniˆ’ ,

**«*

“SS3S”V-pprchSte”3

**«saBSSf§BE*

ˆ%»ˆj?t

Poote%8ay \, [Siudund

t/ /n e

..^..^JfSivanage Bay -j^fc >

*dge ^YSwanage Ourtston H*ad*

*S/ ™*f2&>&£k[WTOii, /uiMWfc^ji .*

Helen's

lembridge -'Fore! and

-„ „,,,,, C/tfif ' Sandown i Sandouin Bay nklin !

_ 'Dunncse

"Ventnor I

.gh»m

'■Selsey

BUI

*\st^^f N G L I S H st-c*th*rt«*- s p!ru»< *rci;ff c H \A N N E L*

1-5

A 3

D

E Longitude West i° of Greenwich P

JalottrhMia amliuilixl from Hit Orclnan^a*

*r*y. by ptrioinlcn nf tha CoiKrollor of Jl.SL aiMtooerJ- Offlo"*

*Emery *"tw **

RELIGION]

ENGLAND

421

misconduct, he is only checked— so far as ecclesiastical order is

concerned — by his oath of canonical obedience to the " godly " monitions of his bishop; and, since these monitions are difficult and costly to enforce, while their " godliness " may be a matter of opinion, an incumbent is practically himself the interpreter of the law as applied to the doctrine and ritual of his particular church. The result has been the development within the Established Church of a most startling diversity of doctrine and ritual practice, varying from what closely resembles that of the Church of Rome to the broadest Liberalism and the extremest evangelical Protestantism. This broad comprehensiveness, which to outsiders looks like ecclesiastical anarchy, is the characteristic note of the Church of England; it may be, and has been, defended as consonant with Christian charity and suited to the genius of a people, not remarkable for logical consistency; but

it makes it all the more difficult to say what the religion of

Englishmen actually is, even within the English Church.

The following is a list of the archiepiscopal and episcopal sees of England and Wales— the latter arranged in alphabetical order, — with date of their establishment and amount of emoluments: —

Burnley (Manchester), Thetford, Ipswich (Norwich), Reading (Oxford), Leicester (Peterborough), Richmond, Knaresborough (Ripon), Colchester, Barking (St Albans), Swansea (St. David's), Woolwich, Kingston – on – Thames (Southwark), Derby (South- well), St Germans (Truro). See also England, Church of; Anglican Communion; Ecclesiastical Jurisdiction; Vest- ments; Mass.

Sittings.

Com- municants.

Ministers (Pastoral).

Local Preachers.

Sunday Scholars.

Congregationalists (1907) Presbyterian Church of England 2 . Society of Friends ….

Moravians .

Wesleyan Methodists 3 . Primitive Methodists 1 United Methodist Church 4 . Wesleyan Reform Union. Independent Methodists. Welsh Calvinistic Methodist . Countess of Huntingdon's Connexion Reformed Episcopal Church . free Church of England .

1,421,742

1,801,447

173.047

10,000

2,500,000

1,017,690

738,840

47.435

33,000

472,089

12,347 6,000 8,140

424.741

498,953

85.755

17.442

2,999

620,350

205,407.

158,095

8,717

9.732

185.935

2,469

1,090

1.352

2134

3197

323

34 2658

IIOI

833 19

900 26 28 24

5,748 5,603

20,119

15,963

5,577 508

375 361

590,321

729.347

98,258

62,347

4,542

1,039,437

477,“4

315,993

23,008

28,387

187,484

3,040

2,600

4,196

. ,1

Year of

Annual

Foundation.

Emoluments.

Province of Canterbury —

Canterbury (archbishopric) . . 597

£15,000

Bangor ....

c 550

4,200

Bath and Wells

1 139

5,000

Birmingham

1904

3.500

Bristol

1897 1

3,000

Chichester

1075

4,200

Ely .

1109

5,500

Exeter

1050

4,200

Gloucester

i54i

4,300

Hereford .

676

4,200

Lichfield .

669

4,200

Lincoln

1067

4.500

Llandaff .

c- 550

4,200

London

605

10,000

Norwich .

1094

4.500

Oxford

1542

5,000

Peterborough

1 541

4.500

Rochester .

604

3,800

St Albans .

1877

3.200

St Asaph .

£•550

4,200

St David's

c- 550

4,500

Salisbury .

1075

5,000

Southwark

1904

3,000

Southwell .

1884

3,50o

Truro

1876

3,000

Winchester

c. 650

6,500

Worcester

c. 680

4,200

Province of York —

York (archbishopric)

625

10,000

Carlisle

1133

4,50o

Chester

1541

4,200

Durham

995

7,000

Liverpool .

1880

4,200

Manchester

1847

4,200

Newcastle

1882

3.500

Ripon

1836

4,200

Sodor and Man

“54

1,500

Wakefield .

1888

3.000

1 Modern refoundation.

The following are suffragan or assistant bishoprics (the names of the dioceses to which each belongs being given in brackets) : Dover, Croydon (Canterbury), Beverley, Hull, Sheffield (York), Stepney, Islington, Kensington (London), Jarrow (Durham), Guildford, Southampton, Dorking (Winchester), Barrow-in- Furness (Carlisle), Crediton (Exeter), Grantham (Lincoln),

The number of ” denominations ” by whom buildings were certified for worship up to 1895 was 293 (see list in Whitaker’s Almanack, 1896, p. 252), but in many instances such otber ” denominations ” consisted of two or three congrega- protestaat tions only, in some cases of a single congregation. The »«■ more important nonconformist churches are fully dealt a ” ,a,oas – with under their several headings. The above table, however, based on that in the Statesman’s Year-Booh for 1908, and giving the comparative statistics of the chief nonconformist churches, may be useful for purposes of comparison. It may be prefaced by stating that, according to returns made in 1905, the Church of England provided

sitting accommodation in parish and other churches for 7,177,144 people; had an estimated number of 2 ,°53>455 communicants, 206,873 Sunday-school teachers, and 2,538,240 Sunday scholars. There were 14,029 incumbents (rectors, vicars, and perpetual curates), 7500 curates, i.e. assistant clergy, and some 4000 clergy on the non-active list.

Besides the bodies enumerated in the table there are other churches concerning which similar statistics are lacking, but which, in several cases, have large numbers of adherents. The Unitarians are an important body with (1908) 35c ministers and 345 places of worship. Most numerous, probably, are the adherents of the Salvation Army, which with a semi-military organization has in Great Britain alone over 60,000 officers, and " barracks," i.e. preaching stations, in almost every town. The Brethren, generally known, from their place of origin, as the Plymouth Brethren, have " rooms " and adherents throughout England; the Catholic Apostolic Church ("Irvingites ") have some 80 churches; the New Jerusalem Church(Swedenborgians) had (1908) 75 " societies "; the Christian Scientists, the Christa- delphians, the British Israelites and similar societies, such as the New and Latter House of Israel, the Seventh Day Baptists, deserve mention. The Latter Day Saints (Mormons) had (1908) 82 churches in Great Britain.

Roman Catholicism in England has shown a tendency to advance, especially among the upper and upper-middle classes. The published lists of " converts " are, however, no safe index to actual progress; for no equivalent catholics. statistics are available for " leakage " in the opposite direction. The membership of the Roman Catholic Church in England is estimated at about 2,200,000. But though the

1 In 1906.

2 There are in addition some thousands of Presbyterians un-connected with the church, including members of the Church of Scotland.

8 Great Britain and Ireland, 1906.

4 On September 17, 1907, the United Methodist Free Churches, the Methodist New Connexion, and the Bible Christians were united under the name of. the United Methodist Church.

Jews.

growth of the church relatively to the population has not been particularly startling, there can be no doubt that, since the restoration of the Roman Catholic hierarchy in 1851, its general political and religious influence has enormously increased. A notable feature in this has been the great development of monastic institutions, due in large measure to the settlement in England of the congregations expelled from France. The Roman Catholic Church in England is organized in 1 5 dioceses, which are united in a single province under the primacy of the archbishop of Westminster. In December 1907 there were 1736 Roman Catholic churches and stations, and the number of the clergy was returned at 3524 (see Roman Catholic Church).

The Jews in Great Britain, chiefly found in London and other great towns, number (1907) about 196,000 and have some 200 synagogues; at the head of their organiza- tion is a chief Rabbi resident in London.

Finally it may be mentioned that a small number of English- men, chiefly resident in Liverpool and London, have embraced Islam; they have a mosque at Liverpool. Various foreign churches which have numbers of adherents settled in England have also branch churches and organizations in the country, notably the Orthodox Eastern Church, — with a considerable number of adherents in London, Liverpool and Manchester, — the Lutheran, and the Armenian churches. (W. A. P.)

VII. Communications

Roads. — In England and Wales the high-roads, or roads on which wheeled vehicles can travel, are of two classes: (1) the main roads, or great arteries along which the main vehicular traffic of the country passes; and (2) ordinary highways, which are by-roads serving only local areas. The length of the main roads is about 22,000 m., and that of ordinary highways about 96,000. The highways of England, the old coaching roads, are among the best in the world, being generally of a beautiful smoothness and well maintained; they vary, naturally, in different districts, but in many even the local roads are superior to some main roads in other countries. The supersession of the stage coach by the railway took a vast amount of traffic away from the main roads, but their proper

maintenance did not materially suffer; and a larger accession of traffic took place subsequently on the development of the, cycle and the motor- vehicle.

The system of road-building by private enterprise, the under- takers being rewarded by tolls levied from vehicles, persons or animals using the roads, was established in England in 1663, when an act of Charles II. authorized the taking of such tolls at " turnpikes " in Hertfordshire and Cambridgeshire. A century later, in 1767, the authorization was extended over the whole kingdom by an act of George III. In its fulness the system lasted just sixty years, for the first breach in it was made by an act of George IV., in 1827, by which the chief turnpikes in London were abolished. Further acts followed in the same direction, leading to the gradual extinction, by due compensation of the persons interested, of the old system, the maintenance of the roads being vested in " turnpike trusts and highway boards," empowered to levy local rates. The last turnpike trust ceased to exist on the 5th of November 1895, and the final accounts in connexion with its debt were closed in 1898-1899. Toll-gates are now met with only at certain bridges, where the right to levy tolls is statutory or by prescription. By the Local Government Act of 1888 the duty of maintaining main roads was imposed on the county councils, but these bodies were enabled to make arrangements with the respective highway authorities for their repair. Under the Local Government Act of 1894 the duties of all the highway authorities were transferred to the rural district councils on or before the 31st of March 1899.

It was not until the close of the 18th century, when the period of road-building activity already indicated set in, that English roads were redeemed from an extraordinarily bad condition. The roads were until then, as a rule, merely tracks, deeply worn by ages of traffic into the semblance of ditches, and, under adverse weather conditions, impassable. ' Travellers

also had the risk of assault by robbers and highwaymen. As early as 1285 a law provided for the cutting down of trees and bushes on either side of highways, so as to deprive lawless men of cover. Instances of legislation as regards the upkeep of roads are recorded from time to time after this date, but (to take a single illustration) even in the middle of the 18th century the journey from the village, as it was then, of Paddington to London by stage occupied from 2§ to 3 hours. But from 1784 to 1792 upwards of 300 acts were passed dealing with the construction of new roads and bridges.

Railways. — The history and development of railways in England, their birthplace, and in Ireland and Scotland, with illustrative statistics, are considered under the heading United Kingdom. The following list indicates the year of foundation, termini, chief offices and geographical sphere of the chief railways of England and Wales.

1. Railways with Termini in London.

(a) Northern.

Great Northern (1846). — Terminus and offices, King's Cross. Main line — Peterborough, Grantham, Newark, Doncaster; forming, with the North-Eastern and North British lines, the " East Coast route to Scotland. Serving also the West Riding of Yorkshire, Lincoln- shire, Nottingham and other towns of the midlands, and Manchester (by running powers over the Great Central metals). This company has so extensive a system of running powers over other railways, and of lines held jointly with other companies, that few of its more important express trains from London complete their journeys entirely on the company's own lines.

Midland (1844, an amalgamation of the former North Midland, Midland Counties, Birmingham & Derby, and other lines). — Terminus, St Pancras; offices, Derby. Main line — Bedford, Leicester, Sheffield, Leeds and Carlisle, affording the " Midland " route to Scotland. Serving also Nottingham, Derby, and the principal towns of the midlands and West Riding, and Manchester. West and North line from Bristol, Gloucester and Birmingham to Leicester and Derby. Also an Irish section, the Belfast and Northern Counties system being acquired in 1903. Docks at Heysham, Lancashire; and steamship services to Belfast, &c.

London &■ North-Western (1846, an amalgamation of the London & Birmingham, Grand Junction, and Manchester & Birmingham lines). — Terminus and offices, Eus+on. Main line — Rugby, Crewe, Warrington, Preston, Carlisle; forming, with the Caledonian system, the " West Coast " route to Scotland. Serves also Man- chester, Liverpool and all parts of the north-west, North Wales, Birmingham and the neighbouring midland towns, and by joint- lines, the South Welsh coal-fields. Maintains docks at Garston on the Mersey, a steamship traffic with Dublin and Greenore from Holyhead, and, jointly with the Lancashire & Yorkshire Company, a service to Belfast, &c, from Fleetwood.

Great Central (1846; until 1897, when an extension to London was

undertaken, called the Manchester, Sheffield & Lincolnshire). — Terminus, Marylebone; offices, Manchester. Main line — Rugby, Nottingham, Leicester, Sheffield, Manchester. The former main line runs from Manchester and Sheffield east to Retford, thence serving Grimsby and Hull, with branches to Lincoln, &c. The main line reached from London by joining the line of the Metropolitan railway near Aylesbury and following it to Harrow. Subsequently an alternative route out of London was constructed between Neasden and Northolt, where it joins another line, of the Great Western railway, from Acton, and continues as a line held jointly by the two companies through Beaconsfield and High Wycombe. Here it absorbs the old Great Western line as far as Prince's Risborough, and continues thence to Grendon Underwood, effecting a junction with the original main line of the Great Central system. This line was opened for passenger traffic in April 1906. The Great Central company owns docks at Grimsby.

(b) Eastern.

Great Eastern (1862). — Terminus and offices, Liverpool Street. Serving Essex, Suffolk, Cambridgeshire, Norfolk. Joint-line with Great Northern from March to Lincoln and Doncaster. Passenger steamship services from Harwich to the Hook of Holland, Antwerp, Rotterdam, &c.

London, Tilbury fie Southend (1852). — Terminus and offices, Fenchurch Street. Serving places on the Essex shore of the Thames estuary, terminating at Shoeburyness.

(c) Western.

Great Western (1835, London to Bristol). — Terminus and offices, Paddington. Main line — Reading, Didcot, Swindon, Bath, Bristol, Taunton, Exeter, Plymouth, Penzance. Numerous additional main lines— Reading to Newbury, Weymouth and the west, a new line opened in 1906 between Castle Cary and Langport effecting a great reduction in mileage between London and Exeter and places beyond ; Didcot, Oxford, Birmingham, Shrewsbury, Chester with connexions northward, and to North Wales; Oxford to Worcester, and Swindon

to Gloucester and the west of England; South Welsh system (through route from London via Wootton Bassett or via Bristol, and the Severn tunnel), Newport, Cardiff, Swansea, Milford. Steam- ship services to the Channel Islands from Weymouth to Waterford, Ireland from Milford, and to Rosslare, Ireland, from Fishguard, the route last named being opened in 1906. The line constructed jointly with the Great Central company (as detailed in the description above) was extended in 1910 from Ashendon to Aynho, to form a short route to the great centres north of Oxford.

London & South-Western (1839, incorporating the London & Southampton railway of 1835). — Terminus and offices, Waterloo. Main line — Woking, Basingstoke, Salisbury, Yeovil, Exeter, Plymouth; Woking, Guildford and Portsmouth; Basingstoke, Winchester, Southampton, Bournemouth, &c. Extensive connexions in Surrey, Hampshire and the south-west, as far as North Cornwall. This company owns the great docks at Southampton, and maintains passenger services from that port to the Channel Islands, Havre, St Malo and Cherbourg.

(d) Southern.

London, Brighton & South Coast (1846). — Termini, Victoria and London Bridge. Serving all the coast stations from Hastings to Portsmouth, with various lines in eastern Surrey and in Sussex. Maintains a service of passenger steamers between Newhaven and Dieppe.

South Eastern & Chatham (under a managing committee, 1899, of the South-Eastern company, 1836, and the London, Chatham & Dover company, 1853). — Termini — Victoria, Charing Cross.Holborn Viaduct, Cannon Street. Offices, London Bridge Station. Various lines chiefly in Kent. Steamship services between Folkestone and Boulogne, Dover and Calais, &c.

2. Provincial Railways.

The two most important railway companies not possessing lines to London are the North-Eastern and the Lancashire & Yorkshire,

North Eastern (1854, amalgamating a number of systems). — Offices, York. Main line — Leeds, Normanton and York to Darlington, Durham, Newcastle and Berwick-on-Tweed. Connecting with the Great Northern between Doncaster and York, and with the North British at Berwick, it forms part of the " East Coast " route to

Scotland. Serving all ports and coast stations from Hull to Berwick, also Carlisle, &c. Owning extensive docks at Hull, Middles- brough, South Shields, the Hartlepools, Blyth, &c.

Lancashire & Yorkshire (1847, an amalgamation of a number of local systems). — Offices, Manchester. Mainline — Manchester, Roch- dale, Tormorden, Wakefield and Normanton, with branches to Halifax, Bradford, Leeds, Huddersfield and other centres of the West Riding. Extensive system in south Lancashire, connecting Man- chester with Preston and Fleetwood (where the docks and steamship services to Ireland are worked jointly with the London & North- western company), Southport, Liverpool, &c.

Among further provincial systems there should be mentioned : — ■

Cambrian. — Offices, Oswestry. Whitchurch, Oswestry, Welshpool to Barmouth and Pwllheli, Aberystwyth, &c.

Cheshire Lines, worked by a committee representative of the Great Central.GreatNorthernand Midland Companies, andaffording important connexions between the lines of these systems and south Lancashire and Cheshire (Godley, Stockport, Warrington, Liverpool; Manchester and Liverpool ; Manchester and Liverpool to Southport ; Godley and Manchester to Northwich and Chester, &c). .

Furness. — Offices, Barrow-in-Furness. Carnforth, Barrow, White- haven, with branches to Coniston, Windermere (Lakeside), 4 &c. Docks at Barrow.

North Staffordshire. — Offices, Stoke-upon-Trent. Crewe and the Potteries, Macclesfield, &c, to Uttoxeter and Derby.

Cross-Country Connexions. — While London is naturally the principal focal point of the English railway system, the develop- ment of through connexions between the chief lines by way of the metropolis is very small. Some through trains are provided between the North- Western and the London, Brighton & South Coast lines via Willesden Junction, Addison Road and Clapham Junction; and a through connexion by way of Ludgate Hill has been arranged between main line trains of the South-Western and the Great Northern railways, but otherwise passengers travelling through London have generally to make their own way from one terminus to another. Certain cross-country routes, however, are provided to connect the systems of some of the companies, among which the following may be noticed.

(1) Through connexions with the continental services from Harwich, and with Yarmouth and other towns of the East coast, are provided from Yorkshire, Lancashire, &c, by way of the Great Northern and Great Eastern Joint line from Doncaster and Lincoln to March.

(2) Through connexions between the systems of the South-Eastern & Chatham and the Great Western companies are provided via Reading.

(3) Through connexions between the systems of the Great Central and the Great Western companies are provided by the line connecting Woodford and Banbury.

(4) Through connexions between the Midland and the South-Western systems are provided (a) by the Midland and South-Western

Junction line connecting Cheltenham on the north-and-west line of the Midland with Andover Junction on the South-Western line; and (b) by the Somerset & Dorset line, connecting the same lines between Bath, Templecombe and Bournemouth.

(5) The line from Shrewsbury to Craven Arms and Hereford, giving connexion between the north and the south-west, and Wales, is worked by the North-Western and Great Western companies.

Inland Navigation.— The English system of inland navigation is confined principally to the following districts: South Lancashire, the West Riding of Yorkshire, the Midlands, especially „ . . about Birmingham, the Fen district and the Thames ~ aa s *”” basin (especially the lower part). All these districts are vers * interconnected. The condition of inland navigation, as a whole, is not satisfactory. The Fossdyke in Lincolnshire, connecting the river Trent at Torksey with the Witham near Lincoln, and now belonging to the Great Northern and Great Eastern joint rail ways, is usually indicated as the earliest extant canal in England, inasmuch as it was constructed by the Romans for the purpose of drainage or water-supply, and must have been used for navigation at an early period. But the history of canal-building in England is usually dated from about 1760, and from the construction, at the instance of Francis, Duke of Bridgewater, of the Bridgewater canal in South Lancashire, now belonging to the Manchester Ship Canal Company. The activity in canal-building which prevailed during the later years of the 18th century was, in a measure, an earlier counterpart of the first period of railway development, which, proceeding subsequently along systematized lines not applied to canal-construction, and providing*

obvious advantages in respect of speed, caused railways to withdraw much traffic from canals. Some canals and river navigations have consequently become derelict, or are only maintained with difficulty and in imperfect condition. The inland navigation system suffers from a want of uniformity in the size of locks, depth of water, width of channels and other arrangements, so that direct intercommunication between one canal and another is often impossible in consequence ; moreover, although the canals, like railways, are owned by many separate bodies, hardly any provision has been made, as it has in the case of railways, for such facilities as the working of through traffic over various systems at an inclusive charge. Lastly, the railway companies themselves have acquired control of about 30 % of the total mileage of canals in England and Wales, and in many cases this has had a prejudicial effect on the prosperity of canals. Notwithstanding these disabilities, there has been in modern times a new development in the trade of some canals, born of a realization that for certain classes of goods water-transport is cheaper than the swifter rail- transport. Various proposals have been made for the establishment of a single control over all inland waterways.

The lower or estuarine courses of some of the English rivers as the Thames, Tyne, Humber, Mersey and Bristol Avon, are among the most important waterways in the world, as giving access for sea-borne traffic to great ports. From the Mersey the Manchester Ship Canal runs to Manchester. The manufacturing districts of South Lancashire and the West Riding of Yorkshire are traversed and connected by several canals following transverse valleys of the Pennine Chain. The main line of the Aire and Calder navigation runs from Goo'.e by Castleford to Leeds, whence the Leeds and Liverpool canal, running by Burnley and Blackburn, completes the connexion between the Humber and the Mersey. Other canals are numerous, among which may be mentioned the Sheffield and South Yorkshire, connecting Sheffield with the Trent. The Trent itself affords an extensive navigation, from which, at Derwent mouth, the Trent and Mersey Canal runs near Burton and Stafford, and through the Potteries, to the Bridgewater Canal and so to the Mersey. This canal is owned by the North Staffordshire railway company. The river Weaver, a tributary of the Mersey, affords a waterway of importance to the salt-producing towns of Cheshire. The system of the Shropshire Union railways and canal company, which is connected by lease with the London & North-Western railway company, carries considerable traffic, especially in the neighbourhood of Ellesmere Port. In the Black Country and neighbourhood the numerous ramifications of the

Birmingham Canal navigations bear a large mineral traffic. This system is connected with the rivers Severn and Trent and the canal system of the country at large, and is controlled by the London & North- Western company. The principal line of navigation from the Thames northward to the midlands is that of the Grand Junction, which runs from Brentford, is connected through London with the port of London by the Regent's Canal, and follows closely the main line of the North-Western railway. It connects with the Oxford Canal at Braunston in Northamptonshire, and through this with canals to Birmingham and the midlands, and continues to Leicester. Both the Severn up to Stourport and the Thames up to Oxford have a fair traffic, but the Thames and Severn Canal is not much used. There is some traffic on the navigable drainage cuts and rivers of the Fens, but beyond these, in a broad consideration of the waterways of England from the point of view of their commercial importance, it is unnecessary to go.

See H. R. De Salis, Bradshaw's Canals and Navigable Rivers of England and Wales (London, 1904) ; Report of Royal Commission on Canals (London, 1909).

Oversea Communications. — The chief ports for continental passenger traffic are as follows :—

Harwich to Amsterdam, Antwerp, Hamburg, Hook of Holland, Rotterdam (Great Eastern railway) ; to Copenhagen and Esbjerg (Royal Danish mail route).

gueenborough to Flushing; (Zeeland Steamship company). over to Calais (South- Eastern & Chatham railway) ; to Ostend (Belgian Royal mail steamers).

Folkestone to Boulogne (South Eastern & Chatham railway).

Newhaven to Dieppe (London, Brighton & South Coast railway).

Southampton to Cherbourg, Havre, St Malo (South-Western railway).

The chief ports for trans-Atlantic traffic are Liverpool and South-

ampton, and special trains are worked in connexion with the steamers to and from London. The great development of harbour accom- modation at Dover early in the 20th century brought trans-Atlantic traffic to this port also. Southampton and Liverpool are the two greatest English ports for all oceanic passenger traffic ; but London has also a large traffic, both to European and to foreign ports. The passenger traffic to the Norwegian ports, always very heavy in summer, is carried on chiefly from Hull and Newcastle.

VIII. Industries Agriculture. — In the agricultural returns for Great Britain, issued annually by the government, the area of England (apart from Wales) has been divided into two sections, " arable " and " grass," corresponding with a former division into " corn counties " and " grazing counties," except that Leicestershire is included not in the " grass " but in the " arable " section. Most of the eastern part of England is " arable," while the western and northern part is " grass," the boundary between the sections being the western limit of Hampshire, Berkshire, Oxfordshire, Warwickshire, Leicestershire, Nottinghamshire, and of the East Riding of Yorkshire.

The division is thus as follows : —

Grass Counties.	*Arable Counties.*
Northumberland.	*Yorkshire, East Riding.*
Cumberland.	*Lincolnshire.*
Durham.	*Nottingham.*
Yorkshire, North and West Ridings.	*Rutland.*
Westmorland.	*Huntingdonshire.*
Lancashire.	*Warwickshire.*
Cheshire.	*Leicestershire.*
Derbyshire.	*Northamptonshire.*
Staffordshire.	*Cambridgeshire.*
Shropshire.	*Norfolk.*
Worcestershire.	*Suffolk.*
Herefordshire.	*Bedfordshire.*

Monmouthshire. Buckinghamshire.

Gloucestershire. Oxfordshire.

Wiltshire. Berkshire.

Dorsetshire. Hampshire.

Somersetshire. Hertfordshire.

Devonshire. Essex.

Cornwall. Middlesex.

Surrey.

Kent.

Sussex.

The average area under cultivation of all the counties is about •76 of the whole area. The counties having the greatest area under cultivation (ranging up to about nine-tenths of the whole) may be taken to be — Leicestershire, the East Riding of Yorkshire, Lincolnshire, Huntingdonshire, Rutland, Northamptonshire, Bedfordshire and Cambridgeshire. Those with the smallest proportional cultivated area are Westmorland, Middlesex, Northumberland, Surrey, Cumber- land, the North and West Ridings of Yorkshire, Lancashire, Durham and Cornwall. Geographical considerations govern these conditions to a very great extent; thus the counties first indicated lie almost entirely within the area of the low-lying and fertile Eastern Plain, while the smallest areas of cultivation are found in the counties covering the Pennine hill-system, with its high-lying uncultivated moors. In the case of Cornwall and Cumberland the physical conditions are similar to these ; but in that of Middlesex and Surrey the existence of large urban areas belonging or adjacent to London must be taken into account. These also affect the proportion of cultivated areas in the other home counties. The presence of a wide- spread urban population must also be remembered in the case of Lancashire and the West Riding of Yorkshire.

The geographical distribution of the principal crops, &c, may now be followed. The grain crops grown in England consist almost Distrlbu- exclusively of wheat, barley and oats. Lincolnshire, tioaof ” Norfolk, Suffolk, Essex, Cambridgeshire and the East cro s _ Riding of Yorkshire are especially productive in all

these; the North and West Ridings of Yorkshire pro- duce a notable quantity of barley and oats; and the oat-crops in

the following counties deserve mention — Devonshire, Hampshire, Lancashire, Cumberland, Cornwall, Cheshire and Sussex. There is no county, however, in which the single crop of wheat or barley stands pre-eminently above others, and in the case of the upland counties of Cumberland, Westmorland and Derbyshire, the metro- politan iounty of Middlesex, and Monmouthshire, these crops are quite insignificant. In proportion to their area, the counties specially productive of wheat are Cambridgeshire, Huntingdonshire, Hertford- shire, Bedfordshire and Essex; and of barley, Norfolk, Suffolk and the East Riding of Yorkshire. In fruit-growing, Kent takes the first place, but a good quantity is grown in Cambridgeshire, Norfolk and Essex, in Worcestershire and other western counties, where, as in Herefordshire, Somerset and Devon, the apple is especially cultivated and cider is largely produced. Kent is again pre-eminent in the growth of hops; indeed this practice and that of fruit-growing give the scenery of the county a strongly individual character. Hop-growing extends from Kent into the neighbouring parts of Sussex and Surrey, where, however, it is much less important; it is also practised to a considerable degree in a group of counties of the midlands and west — Herefordshire, Worcestershire, Gloucester- shire and Shropshire. Market-gardening is carried on most exten- sively on suitable lands in the neighbourhood of the great areas of urban population; thus the open land remaining in Middlesex is largely devoted to this industry. From the Channel and Scilly Islands, vegetables, especially seasonable vegetables, and also flowers which, owing to the peculiar climatic conditions of these islands, come early to perfection, are imported to the London market. Considering the crops not hitherto specified, it may be indicated that turnips and swedes form the chief green crops in most districts ;

gotatoes, mangels, beans and peas are also commonly grown, eyond the three chief grain crops, only a little rye is grown. The cultivation of flax is almost extinct, but it is practised in a few districts, such as the East and West Ridings of Yorkshire.

The counties in which the greatest proportion of the land is devoted to permanent pasture may be judged roughly from the list of ” grass counties ” already given. Derbyshire, Leicester- #»„«_ <„££ shire, the midland counties generally, and Somersetshire, have the highest proportion, and the counties of the East Anglian seaboard the lowest. But with lands thus classified heath, moor and hill pastures are not included ; and the greatest areas of these are naturally found in the

counties of the Pennines and the Lake District, especially in Northumberland, Cumberland, Westmorland arid the North and West Ridings of Yorkshire. There is also plenty of hill- pasture in the south-western counties (from Hampshire and Berkshire westward), especially in Devonshire, Cornwall and Somersetshire, and also in Monmouthshire and along the Welsh marches, on the Cotteswold Hills, &c. In all these localities sheep are extensively reared, especially in Northumberland, but on the other hand in Lincolnshire the numbers of sheep are roughly equal to those in the northern county. Other counties in which the numbers are especially large are Devonshire, Kent, Cumberland and the North and West Ridings of Yorkshire. Cattle are reared in great numbers in Lincoln- shire, Lancashire and the West Riding of Yorkshire, Devonshire, Somersetshire and Cornwall; but the numbers of both cattle and sheep are in no English county (save Middlesex) to be regarded as insignificant. Pigs are bred most extensively in Suffolk, Norfolk and Lincolnshire and in Somersetshire.

It is often asserted that the scenery of rural England is of its kind unrivalled. Except in open lands like the Fens, the peculiarly -rich appearance of the country is due to the closely-divided Wood-

fields with their high, luxuriant hedges, and especially lands. to the profuse growth of trees. There is not, however, any large continuous forested tract. Certain areas still bear the name of forest where there is now none; the term here possesses an historical significance, in many cases indicating former royal game- preserves. Great areas of England were once under forest. The clearing of land for agricultural purposes, the use of wood for the prosecution of the industries of an increasing population, and other causes, have led to the gradual disforesting of large tracts. There are still, however, some small well-defined woodland areas. The New Forest in Hampshire, the Forest of Dean in Gloucestershire, and Epping Forest, which is preserved as a public recreation-ground by the City of London, are the most notable instances. The counties comprising the greatest proportional amount of woodland fall into two distinct groups — Hampshire, Surrey, Sussex and Kent, with Berkshire and Buckinghamshire; Monmouth, Herefordshire and Gloucestershire. Cambridgeshire, lying almost wholly within the area of the Fens, has the smallest proportional area of woodland of any English county.

The number of persons engaged in agriculture in England and Wales was found by the census of 1901 to be 1,192,167; the total showing a steady decrease (e.g. from 1,352,389 in 1881), which is especially marked in the case of females. But the decrease lies mainly in the

number of agricultural labourers; the number of farmers is not notably affected, and the increasing substitution of machinery for manual labour must be taken into consideration. The average size of holdings in England may be taken approximately as 66 acres, the average in 1903 being 66- 1, whereas in 1895 it was 65-3

(See also the article Agriculture.)

Continuation North, Section 2.

A °°jo' B o° C °° f ?< t v» D 1'

ta.

Wellini borouj

Alder

iGranthai

p " CJipahaihf%r>

*: -&°f Tickeiˆee_ *jrKtSa%rton s / Xs?!ᵉ m 9Ljrˆ£aEfoi*

iWftBB 1 ˆ westgaj r North

~ ^^Jb ' o o bl° u ?? A' PifJdO

i Sedgefbrd Sunhoe WˆSg™i I>a =nS Great

"" ˆvsc ° RuaKxHi RybuiglL— IfStTttonˆdˆpL iVe^^j*ˆ 1 ; Qre« R^^nˆfemˆ # e "^^^^&4ˆ0^^.ˆXT W«T . .. . Ba**

*i**?******

Shc nngharo

Section IV.

Bawd!

PSXjMundrsIey ptonqyON

si or th rVˆPPisburgˆ 'alsharr

jptsey

(7<ˆ SI l&5 lT West c K5S y S,

igtt _^., fig renai .“Ntf

” ■ rai “VlboroughCfcJ-, /w”rax «w_ tr- ji.

Smsby

fesbySt.Margam tflQtlfShil Broad

wriest on J (toads

AttlebridgeV ^- “■*

BOLT” —---■-■-—-

5hiw«u «“T ^Th A.J£..-.a W ^“Wmwitf …i — Aii«i™S8»vflio’»«t°n*

Hodwoldcura ^ EastoOjL „ .^,™ ™·· ,-^ , „» „„„„„_„„.. –*

„ „-.,— ,- -, , .«■> ;«i~i-i.- J ””^» /””””

U^fndoftj

urnoi

*[8n s^rt E ,^*

*igb*m-x ideh?T ekk SJ:*

*S»ii(filiini / *«r ilppcnlut^’ Hengrave*

^&»J

. firfon e

tads

*E««tonh*fn \uimineluun bff – . . . T> Charsffelt*

J Charef^W

tiding toll

Hulesf6rdO%

iiiewell §.« iston

d br H ge^Oleiton ~ J!I^£*«iit – «!t.» n rtr*ivOy-fl *? ^Qrford Ness*

*t5 = 3 > *ciC St. Andre w ‘*

^^^‘a 4..vˆte

*OUlSlrngteri :** 1[R™nX o v ciion*

*_..7 FitwhingfWdo LittjˆM*pt Sfiaxtedfe crefe:*

O-itlftDwln

Salˆteaˆi

art’! CoggesH

sR3y»

Stu«l

ˆjRettSirn\ o K

” Qndni

iu»U$

l Abbots ,

lesdo

Valton-on-the-Naze

Roydon North V(

pifgaryWUfct

/MaR™.

ODut

Jolk:

““‘Pi.

_ OBraawedjUXUMatt

.™ e pieˆna.«ˆgˆ nd

“SolnhmirisWˆ”ˆ (rˆˆ’ˆ J ‘Foulness

_, ., ‘aeons MaideSl’v*

^^ Windsor 9S£!

Suraiingi ,//”*£hot>iwino

Maplin

featVakeritjg «. „ioebuyjfies9 ShtmtTurylttss

^^ — “*r -on

iiii oH

Lap*”

yfh’«n

Hooq

ˆv

pˆf r ^^^^

fcˆA^^f’

_J&Byns(ord “““PKiriawi ” > Sw”nfthll£rW£r : SSˆ?’ frf/i l-zˆfcU® StUjfflsSˆG«liT\g>ˆSPe«« . ˆ .

«K J

otn#° jHaBloi

f e £asT GriDstei

rshipi

rauitPltaa J

_ _ J*”*ˆ” 1 ChilhAc

o Valence ^^ttjCodtnersl

ytartt \

JlMtinek. >rd I Elham,

idwich* r ° **>\„ j . ˆ•1 . ff 5antf*

a She™

‘ Denfcn°»Sr C,m X‘‘lWalmei e ° MSnoAˆuW LyddendVˆSj,™ˆ st-MargaretitCliffe I Swjngfiehfˆy °ˆ t .HafgarlfsBay 5o«t/i Foreland ˆ/ Harbour I*

*ow-mSTo 8 * 1 ˆ*

rpattlee

SwfieW

%,

C H

A N N E L

)> I I ” «|i_J_l_ 1 iˆ.u -1 ■ a q o 3.-sˆˆ»ˆ”””«ˆV«» ‘ ‘“VK-™ V

— 1 — — — L ˆj V %_fleacAy Head fcl U I

t o\?o’ D Longitude liast i° of Greenwich E

Long.W. o°jo’ of Greenwich 3

“iff

Li tlestonc on Se% Romney

‘0 tngenesa

5 t.r

,\ˆ

Boulog

bfwwMk .W4M fraw iIwMhni •>tn’«ˆ, fcj tan-wlMlra • «h* Caur.ll.f ti H.H *i*riot,«7 OffU*.*

« JO

- BranyWatkcr t

ENGLAND

FISHERIES]

Fisheries.— All the seas round Britain are rich in fish, and there are important fishing stations at intervals on all the English coasts, but those on the east coast are by far the most numerous. Sea On an estimate of weight and value of the fish landed,

fisheries. Grimsby at the mouth of the Humber in Lincolnshire, stands pre-eminent as a fishing port. For example, the fish landed there in 1903 were of nearly four times the value of those landed at Hull, which was the second in order of all the English stations. Next in importance stand Lowestoft, Yarmouth and North Shields, Boston and Scarborough, and, among a large number of minor fishing stations, Hartlepool and Ramsgate. Great quantities of nsh are also landed at the riverside market of Billingsgate in London, but the conditions here are exceptional, the landings being effected by carrier steamers, plying from certain of the fishing fleets, and not taking part in the actual process of fishing. On the south coast Newlyn ranks in the same category with Boston; at Plymouth considerable catches are landed; and Brixham ranks alongside the last ports named on the east coast. The chief fishing centres of the English Channel are thus seen to belong to the coast of Devonshire and Cornwall. On the west coast the Welsh port of Milford takes the first place, while Swansea and Cardiff have a considerable fishing industry, surpassed, however, by that of Fleetwood in Lancashire. Liverpool also ranks among the more important centres. As a comparison of the production of the east, south and west coast fisheries, an average may be taken of the annual catches recorded over a term of years. In the ten years 1894-1903 this average was 6,985,588 cwt. for the east coast stations, 669,759 cwt. for those of the south coast, and 884,932 for those of the west (including the Welsh stations). .„ , ‘ .

Distinctions may be drawn, as will be seen, between the nature and methods of the fisheries on the various coasts, and the rela- tive prosperity of the industry from year to year cannot be considered as a whole. Thus in the period considered the re- corded maximum weight of fish landed at the east coast ports was 9 539 114 cwt. in 1903 (the value being returned as £5,721,105); whereas on the south coast it was 736,599 cwt. in 1899, and on the west 1,117,164 cwt. in 1898. Considered as a whole, the individual fish, by far the most important in the English fisheries, is the herring, for which Yarmouth and Lowestoft are the chief ports The next in order are haddock, cod and plaice, and the east coast fisheries return the greatest bulk of these also. But whereas the south coast has the advantage over the west in the herring and plaice fisheries, the reverse is the case in the haddock and cod fisheries haddock, in

particular, being landed in very small quantities at the south coast ports. Mackerel, however, are landed principally at the southern ports, and the pilchard is taken almost solely off the south-western coast. A fish of special importance to the west coast fisheries is the hake. Among shell-fish, crabs and oysters are taken principally off the east coast ; the oyster beds in the shallow water off the north Kent and Essex coasts, as at Whitstable and Colchester, being famous. Lobsters are landed in greatest number on the south coast. .

The number of vessels of every sort employed in fishing was returned in 1903 as 9721, and the number of persons employed as 41 5ˆ9 of whom 34,071 were regular fishermen. The development of the steam trawling-vessel is illustrated by the increase in numbers of these vessels from 480 in 1893 to 1 135 in 1903. They belong chiefly to North Shields, Hull, Grimsby, Yarmouth and Lowestoft. There are a considerable number on the west coast, but very few on the south. These vessels have a wide range of operations, pur- suing their work as far as the Faeroe Islands and Iceland on the one hand, and the Bay of Biscay and the Portuguese coast on the

The English freshwater fisheries are not of great commercial importance, nor, from the point of view of sport, are the salmon and trout fisheries as a whole of equal importance with Fresh- those of Scotland, Ireland or Wales. The English salmon water and trout fisheries may be geographically classified thus:

fisheries. ˆ North-western division. Rivers Eden, Derwent, Lune, Ribble: (2) North-eastern, Coquet, Tyne, Wear, Tees, &c; (3) Western Dee, Usk, Wye, Severn ; (4) South-western, Taw, Torndge, Camel, tamar, Dart, Exe, Teign, &c; (5) Southern, Avon and Stour (Christchurch) and the Itchin and other famous trout streams of Hampshire. The rivers of the midlands and east are of little im- portance to salmon-fishers, though the Trent carries a few, and in modern times attempts have been made to rehabilitate the Thames as a salmon river. The trout-fishing in the upper Thames and many of its tributaries (such as the Kennet, Colne and Lea) is famous. But many of the midland, eastern and south-eastern rivers, the Norfolk Broads, &c, are noted for their coarse fish.

Mining. — Although the conditions of mining have, naturally, undergone' a revolutionary development in comparatively modern times, yet some indications of England's mineral wealth are. found at various periods of early history. The exploitation of tin in the south- west is commonly referred back to the time of the Phoenician sea- traders, and in the first half of the 13th century England supplied

Europe with this metal. At a later period tin and lead were regarded as the English minerals of highest commercial value; whereas to-day both, but especially lead, have fallen far from this position. The Roman working of lead and iron has been clearly traced in many

districts, as has that of salt in Cheshire. The subsequent development of the iron industr" is full of interest, as, while extending vastly, it has entirely lapsed in certain districts. However long before it may have been known to a few, the use of coal for smelting iron did not become general till the later part of the 18th century, and down to that time, iron-working was confined to districts where timber was available for the supply of the smelting medium, charcoal. Thus the industry centred chiefly upon the Weald (Sussex and Kent), the Forest of Dean in Gloucestershire, and the Birming- ham district ; but from the first district named it afterwards wholly departed, following the development of the coal-fields. These have, in some cases, a record from a fairly early date ; thus, an indication of the Northumberland coal-supply occurs in a charter of 1234, and the Yorkshire coal-field is first mentioned early in the following century. But how little this source of wealth was developed appears from an estimate of the total production of coal, which gives in 1700 only 2,612,000 tons, and, in 1800, 10,080,000 tons, against the returned total (for the United Kingdom) of 225,181,300 tons in 1900. . .

The chief minerals raised in England, as stated in the annual home office report on mines and quarries, appear in order of value, thus : coal, iron ore, clay and shale, sandstone, limestone, igneous rocks, salt, tin ore. Coal surpasses all the other minerals to such an extent that, taking the year 1903 as a type, when the total value of the mineral output was very nearly £70,000,000, that of coal is found to approach £61,000,000. ,,.,,, , • j- t j

The position of the various principal coal-fields has been indicated in dealing with the physical geography of England, but the grouping of the fields adopted in the official report may be given Cog/m

here, together with an indication of the counties covered //e/rfs

by each, and the percentage of coal to the total bulk raised in each county. These figures are furnished as a general demonstration of the geographical distribution of the industry, but are based on the returns for 1903.

Coal-fields.

Counties.

Per- centage.

Northern ....

\ *Northumberland*

22-37

7-48

1 Yorkshire (West Riding) l .

■*1 Derbyshire*

[Nottinghamshire

17-76

Yorkshire, &c. .

9-40

5-41

“1 Cheshire

ˆLeicestershire ....

J Staffordshire ....

15-26

Lancashire and Cheshire

0-25

i-3i

0-50

Midland 2 ....

8-io

1 Warwickshire

[Worcestershire ....

2-12

0-44

(-Cumberland ....

Gloucestershire 3 . . .

J Somersetshire ....

1 Westmorland ....

[Yorkshire (North Riding) l

i-37

0-87

Small detached .

0-62

0-07

Monmouthshire 4 .

6-67

The coal-fields on the eastern flank of the Pennines, therefore, namely, the Northern and the Yorkshire, are seen to be by far the most important in England. The carrying trade in coal is naturally very extensive, and may be considered here. The principal ports for the shipping of coal for export, set down in order of the amount shipped, also fall very nearly into topographical groups, thus: — Newcastle, South Shields and Blyth in the Northern District; Newport in Monmouthshire ; Sunderland in the Northern District, Hull, Grimsby and Goole on the Humber, which forms' the eastern outlet of the Yorkshire coal-fields; Hartlepool, in the Northern District, and Liverpool. The tonnage annually shipped ranges from about 45 millions of tons in the case of Newcastle to some half a million in the case of Liverpool ; but the export trade of Cardiff in South Wales far surpasses that of any English port, being more than three times that of Newcastle in 1903. The coastwise carrying trade is also

important, the bulk being shared about equally by Sunderland, Newcastle, South Shields and Cardiff, while Liverpool has also a large share. Of the whole amount of coal received coast- wise at English and Welsh ports (about 13$ million tons), London received considerably over one-half (nearly 8 million tons in 1903). The railways having the heaviest coal traffic are the North-Eastern, which monopolizes the traffic of Northumberland and Durham; the Midland, commanding the Derbyshire, Yorkshire and East Midland traffic, and some of the Welsh; the London & North Western, whose principal sour ces are the Lancashire, S taffordshire

- *The figure 17-76 is the percentage for the whole of Yorkshire.*

2 The West Midlands (Shropshire, &c.) include the coal-fields of Shrewsbury, Leebotwood, Coalbrookdale, the Clee Hills and the Forest of Wyre.

3 The Forest of Dean coal-field is 111 Gloucestershire.

4 The coal-field of Monmouthshire belongs properly to, and in the Report i3 classified with, the great coal-field of South Wales.

and South Welsh districts; the Great Western and the Taff Vale (South Welsh), with the Great Central, Lancashire & Yorkshire and Great Northern systems.

In the face of railway competition, several of the canals maintain a fair traffic in coal, for which they are eminently suitable — the system of the Birmingham navigation, the Aire and Calder navigation of Yorkshire, and the Leeds and Liverpool navigation have the largest shares in this trade.

The richest iron-mining district in England and in the United Kingdom is the Cleveland district of the North Riding of Yorkshire. Iron I- produces over two-fifths of the total amount of ore*

raised in the Kingdom, and not much less than one-half of that raised in England. The richness of the ore (about 30 % of metal) is by no means so great as the red haematite ore found in Cumberland and north Lancashire (Furness district, &c). Here the percentage is over

50, but the ore, though the richest found in the kingdom, is less plentiful, about 15 million tons being raised in 1903 as against more than 5i millions in Cleveland. There isalso a con- siderable working of brown iron ore at various points in Lincolnshire, Northamptonshire and Leicestershire; with further workings of less importance in Staffordshire and several other districts. The total amount of ore raised in England is about I2§ million tons, but it is not so high, in some iron-fields, as formerly. Some of the lesser deposits have been worked out, and even in the rich Furness fields it has been found difficult to pursue the ore. The import of ore (the bulk coming from Spain) has consequently increased, and the ports where the principal import trade is carried on are those which form the principal outlets of the iron-working districts of Cleveland and Furness, namely Middlesbrough and Barrow-in-Furness.

The geographical distribution of the remaining more important English minerals may be passed in quicker review. Of the metals, the production of copper is a lapsing industry, confined to Cornwall. For the production of lead the principal counties are Derbyshire, Durham and Stanhope, but the industry is not extensive, and is confined to a few places in each county. Quarrying for limestone, clay and sandstone is general in most parts. For limestone the principal localities are in Durham, Derbyshire and Yorkshire, while for chalk-quarrying Kent is pre-eminent among a group of south- eastern counties, including Hampshire, Sussex and Surrey, with Essex. Fireclay is largely raised from coal-mines, while, among special clays, there is a considerable production of china and potter's clays in Cornwall, Devonshire and Dorsetshire. As regards igneous rocks, the Charnwood Forest quarries of Leicestershire, and those of Cornwall, are particularly noted for their granite. Slate is worked in Cornwall and Devon, and also in Lancashire and Cumberland, where, in the Lake District, there are several large quarries. Salt, obtained principally from brine but also as rock-salt, is an important object of industry in Cheshire, the output from that county and Staffordshire exceeding a million tons annually. In Worcestershire, Durham and Yorkshire salt is also produced from brine.

The total number of persons in any way occupied in connexion with mines and quarries in England and Wales in 1901 was 805,185; the number being found to increase rapidly, as from 528,474 in 1 881. Coal-mines alone occupied 643,654, and to development in this direction the total increase is chiefly due. The number of ironstone and other mines decreased in the period noticed from 55,907 to

31,606.

Manufacturing Industries. — There are of course a great number of important industries which have a general distribution throughout the country, being more or less fully developed here or there in accordance with the requirements of each locality. But in specifying the principal industries of any county, it is natural to consider those which have an influence more than local on its prosperity. In England, then, two broad classes of industry may be taken up for primary consideration — the textile and the metal. Long after textile and other industries had been flourishing in the leading states of the continent, in the Netherlands, Flanders and France, England remained, as a whole, an agricultural and pastoral country, content to export her riches in wool, and to import them again, greatly enhanced in value, as clothing. It is not to be understood that there were no manufacturing industries whatever. Rough cloth, for example, was manufactured for home consumption. But from Norman times the introduction of foreign artisans, capable of establishing industries which should produce goods fit for distant sale, occupied the attention of successive rulers. Thus the plantation of Flemish weavers in East Anglia, especially at the towns of Worstead (to which is attributed the derivation of the term worsted) and Norwich, dates from the 12th century. The industry, changing locality, like many others, in sympathy with the changes in modern conditions, has long been practically extinct in this district. Then, when religious persecution drove many of the industrial population of the west of Europe away

from the homes of their birth, they liberally repaid English hospitality by establishing their own arts in the country, and teaching them to the inhabitants. Thus religious liberty formed part of the foundation of England's industrial greatness. Then came the material agent, machinery propelled by steam. The invention of the steam engine, following quickly upon that of the carding machine, the spinning jenny, and other ingenious machinery employed in textile manufactures, gave an extra- ordinary impulse to their development, and, with them, that of kindred branches of industry. At the basis of all of them was England's wealth in coal. The vast development of in- dustries in England during the 19th century may be further correlated with certain events in the general history of the time. Insular England was not affected by the disturbing influences of the Napoleonic period in any such degree as was continental Europe. Such conditions carried on the work of British inventors in helping to develop industries so strongly that manufacturers were able to take full advantage of the opportunities offered by the American Civil War (in spite of the temporary disability it entailed upon the cotton

industry) and by the Franco-German War. These wars tended to paralyse industries in the countries affected, which were thus forced to English markets to buy manufactured commodities. That England, not possessing the raw material, became the seat of the cotton manufacture, was owing to the ingenuity of her inventors. It was not till the later part of the 18th century, when a series of inventions, unparalleled in the annals of industry, followed each other in quick succession, that the cotton manufacture took real root in the country, gradually eclipsing that of other European nations, although a linen manufacture in Lancashire had acquired some prominence as early as the 16th century. But though the superior excellence of their machinery enabled Englishmen to start in the race of competition, it was the discovery of the new motive power, drawn from coal, which made them win the race. In 1815 the total quantity of raw cotton imported into the United Kingdom was not more than 99 millions of pounds, which amount had increased to 152 millions of pounds in 1820, and rose further to 229 millions in 1825, so that there was considerably more than a doubling of the imports in ten years.

The geographical analysis of the cotton industry in England is simple. It belongs almost entirely to south Lancashire — to Manchester and the great industrial towns in its neighbourhood. Text n es , The industry has extended into the adjacent parts of Cheshire, the West Riding of Yorkshire and Derbyshire. The immediate neighbourhood of a coal-supply influenced the geo- graphical settlement of this industry, like others ; and the importance to the manufacture of a moist climate, such as is found on the western slope of the Pennines (in contradistinction to the eastern), must also be considered. The excess of the demand of the factories over the supply of raw material has become a remarkable feature of the industry in modern times.

The distribution of the woollen industries peculiarly illustrates the changes which have taken place since the early establishment of manufacturing industries in England. It has been seen how completely the industry has forsaken East Anglia. Similarly, this industry was of early importance along the line of the Cotteswold Hills, from Chipping Camden to Stroud and beyond, as also in some towns of Devonshire and Cornwall, but though it survives in the neighbourhood of Stroud, the importance of this district is far surpassed by that of the West Riding of Yorkshire, where the woollen industry stands pre-eminent among the many which, as already indicated, have concentrated there. As the cotton industry has in some degree extended from Lancashire into the West Riding, so has the woollen from the West Riding into a few Lancastrian towns, such

as Rochdale. Among other textile industries attaching to definite localities may be mentioned the silk manufacture of eastern Staffordshire and Cheshire, as at Congleton and Macclesfield; and the hosiery and lace manufactures of Nottinghamshire, Derbyshire 3.nd Leicestershire.

The metal-working industries also follow a geographical distribution, mainly governed by the incidence of the coal-fields, as well as by that of the chief districts for the production of Metal . iron-ore already indicated, such as the Cleveland and WO rklnz. Durham and the Furness districts. But the district most intimately connected with every branch of this industry, from engineering and the manufacture of tools, &c, to working in the precious metals, is the " Black Country " and Birmingham district of Staffordshire, Warwickshire and Worcestershire. Apart from this district, large quantities of iron and steel are produced in the manu- facturing areas of Lancashire and the West Riding of Yorkshire,

and here, as in the Black Country, are found certain centres especially noted for the production of an individual class of goods, •such as Sheffield for its cutlery. There is, further, a large engineering industry in the London district; and important manufactures of agricultural implements are found art many towns of East Anglia and in other agricultural localities. Birmingham and Coventry may be specially mentioned as centres of the motor and cycle building industry. The establishment of their engineering and other workshops at certain centres by the great railway companies has important bearing on the concentration of urban population. For example, by this means the London & North Western and the Great Western companies have created large towns in Crewe and Swindon respectively.

Certain other important industries may be localized. Thus, the manufacture of china and pottery, although widespread, is primarily identified with Staffordshire, where an area comprising Stoke and a number of contiguous towns actually bears the name of the Potteries (q.v.). Derby has a similar fame, while the manufacture of glass, important in Leeds and elsewhere in the West Riding of Yorkshire, and in the London district, centres peculiarly upon a single town in

South Lancashire — St Helens. Finally, the bootmakers of Northamptonshire (at Wellingborough, Rushden, &c), and the straw-plaiters of Bedfordshire (at Luton and Dunstable), deserve mention among localized industrial communities.

Occupations of the People. — The occupations of the people may be so considered as to afford a conception of the relative extent of the industries already noticed, and their importance in relation to other occupations. The figures to be given are those of the census of 1901, and embrace males and females of 10 years of age and upwards. The textile manufactures occupied a total of 994,668 persons, of which the cotton industry occupied 529,131. A high proportion of female labour is char- acteristic of each branch of this industry, the number of females employed being about half as many again as that of males (the proportion was 1-47 to 1 in 1901). The metal industries of every sort occupied 1,116,202; out of which those employed in engineering (including the building of all sorts of vehicles) numbered 741,346. Of the other broad classes of industry already indicated, the manufacture of boots and shoes occupied 229,257, and the pottery and glass manufactures 90,193. For the rest, the numbers of persons occupied in agriculture has been quoted as 1,192,167; and of those occupied in mining as 805,185. Among occupations not already detailed, those of the male population include transport of every sort (1,094,301), building and other works of construction (1,042,864), manufacture of articles of human consumption, lodging, &c. (774,291), commerce, banking, &c. (530,685), domestic service, &c. (304,195), pro- fessional occupations (311,618). The service of government in every branch occupied 171,687. Female workers were occupied to the number of 1 ,664,381 in domestic service generally. Tailor- ing and the textile clothing industries and trade generally occupied 602,881; teaching 172,873; nursing and other work in institutions 104,036; and the civil service, clerkships and similar occupations 82,635.

IX. Territorial Divisions, &c. For various administrative and other purposes England and Wales have been divided, at different times from the Saxon period onwards, into a series of divisions, whose boundaries have '■"' England and Wales; Areas. County (ancient or geographical). \ Division. i' Borough. Administrative County. County Borough. "1

Municipal Borough. L(City

Urban District (other than borough) J town) Rural District. Civil Parish. Poor Law Union. (County Court Circuit. Judicial Areas j

County Court District. (Petty Sessional Division. Province. Diocese. Parish.

(Division. County. District. Subdistrict.

Parliamentary Areas

Administrative Areas

Ecclesiastical Areas

Registration Areas

been adjusted as each purpose demanded, without much attempt to establish uniformity. Therefore, although the methods of local government are detailed below (Section X.), and other administrative arrangements are described under the various headings dealing with each subject, it is desirable to give here, for ease of reference and distinction, a schedule of the various areas into which England and Wales are divided. The areas here given, excepting the Poor Law Union, are those utilized in the Census Returns (see the General Report, 1901).

The ancient counties were superseded for most practical purposes by the administrative counties created by the Local Government Act of 1888. The ancient division, however, besides being maintained in general speech and usage, forms the basis on which the system of distribution of parliamentary representation now in force was constructed. The Redistribu- tion of Seats Act 1885 made a new division of the country into county and borough constituencies. All the English counties, with the exception of Rutland, are divided into two or more constituencies, each returning one member, the number of English county parliamentary areas being 234. In Wales eight smaller or less populous counties form each one parliamentary constituency, w T hile the four larger are divided, the number of Welsh county parliamentary areas being 19. The number of county areas for parliamentary purposes in England and Wales is thus 253, and the total number of their representatives is the' same. Outside the county constituencies are the parliamentary boroughs. Of these there are 135 in England, one of them, Monmouth district, being made up of three contributory boroughs, while many are divided into several constituencies, the number of borough parliamentary areas in England being 205, of which 61 are in the metropolis. Of the- 205 borough constituencies, 184 return each one member, and 21 return each two members, so that the total number of English borough

members is 226. Besides the county and borough members there are in England five university members, namely, two for Oxford, two for Cambridge and one for London. In Wales there are 10 borough parliamentary areas, all of which, except Merthyr Tydfil and Swansea town division, consist of groups of several contributory boroughs. Each Welsh borough constituency returns one member, except Merthyr Tydfil, which returns two, so that there are eleven Welsh borough members.

The administrative counties, created in 1888, number 62, each having a county council. They sometimes coincide in area with the ancient counties of the same name, but generally differ, in a greater or less degree, for the following reasons — (1) in some cases an ancient county comprises (approximately) two or more administrative counties, in the formation of which names of some ancient divisions were preserved, thus: —

Ancient County. Administrative County.

Cambridgeshire .... j fj™kndge.

Ham > shire liE h f a wI° h ?:

(Parts of Holland. Lincolnshire j Parts of Kesteven.

(Parts of Lindsey. Northamptonshire. . . . (Northampton

(Soke of Peterborough,

Suffolk . . j East Suffolk.

S \ West Suffolk.

c„ c „p Y \ East Sussex.

; West Sussex.

1 East Riding. Yorkshire J North Riding.

(West Riding.

The. Scilly Islands, which form part of the ancient county of Cornwall, without being ranked as an administrative county, are provided with a county council and have separate administra- tion. (2) The administrative county of London has an area taken entirely from the counties of Middlesex, Kent and Surrey. (3) All boroughs which on June 1, 1888, had a population of not less than 50,000,

boroughs which were already counties having a population of not less than 20,000, and a few others, were formed into separate administrative areas, with the name of county

boroughs. Of these there were originally 61, but their number subsequently increased. (4) Provision was made by the act of 1888 for including entirely within one administrative county each of such urban districts as were situated in more than one ancient county.

The various urban and rural districts are described below (Section X.) . The Civil Parish is defined (Poor Law Amendment Act 1866) as " a place for which a separate poor-rate is or can be made," but the parish council has local administrative functions beyond the administration of the poor law. The civil parish has become more or less divorced in relationship from the Ecclesi- astical Parish (a division which probably served in early times for administrative purposes also), owing to successive independent alterations in the boundaries of both (see Parish). Poor-law unions are groups of parishes for the local administration of the Poor Laws. Within the unions the local poor-law authorities are the Board of Guardians. In rural districts the functions of these boards are, under the Local Government Act of 1894, performed by the district councils, and in other places their constitution is similar to that of the urban and district councils (see Poor Law).

Registration districts are generally, but not invariably, co- extensive with unions of the same name'. These districts are divided into sub-districts, within which the births and deaths are registered by registrars appointed for that purpose. Registration counties are groups of registration districts, and their boundaries differ more or less from those both of the ancient and the ad- ministrative counties. In England and Wales there are eleven registration divisions, consisting of groups of registration counties (see Registration). (O. J. R. H.)

X. Local Government

The Reform Act of 1832 was the real starting-point for the overhauling of English local government. For centuries before, from the reign of Edward III., under a number of statutes and

commissions, the administrative work in the counties had been in the hands of the country gentlemen and the clergy, acting as justices of the peace, and sitting in petty sessions and quarter sessions. Each civil or " poor law " parish was governed by the vestry and the overseers of the poor, dating from the Poor Law of 1601; the vestry, which dealt with general affairs, being presided over by the rector, and having the churchwardens as its chief officials. In 1782 Gilbert's Act introduced the grouping of parishes for poor law purposes, and boards of guardians appointed by the justices of the peace. The municipal boroughs (246 in England and Wales in 1832) were governed by mayor, aldermen, councillors and a close body of burgesses or freemen, a narrow oligarchy. Reform began with the Poor Law Amendment Act of 1834, grouping the parishes into Unions, making the boards of guardians mainly elective, and creating a central poor law board in London. The Municipal Corporations Act followed in 1835, giving all ratepayers the local franchise. And as a result of the failure of the Public Health Board established in 1848, the royal commission of 1869-1871 led to the establishment in 1871 of the Local Government Board as a central supervising body. Mean- while, the school boards resulting from the Education Act of 1870 brought local government also into the educational system; and the Public Health Act of 1875 P ut further duties on the local authorities. By 1888 a new state of chaos had grown up as the result of the multiplication of bodies, and the new Redistribution Act of 1885 paved the way for a further reorganization of local matters by the Local Government Act of 1888, followed by that of 1894. In London, which required separate treatment, a similar process had been going on. The Metropolis Management Act of 1855 established (outside the city) two classes of parishes— the first class with vestries of their own, the second class grouped under district boards elected by the component vestries; and the Metropolitan Board of Works (abolished in 1888), elected by the vestries and the district boards, was made the central authority.

In 1867 the Metropolitan Asylums Board took over its work from the metropolitan boards of guardians. See further Charity and Charities, Public Health. Education, Justice or the Peace, Vestry, &c.

The system of local government now existing in England (see also the article Local Government) may be said to have been founded in 1888, when the Local Government Act of that year was passed. Since then the entire system of the government of districts and parishes has been reorganized with due regard to the preceding legislation. The largest area of local govern- ment is the county; next to that the sanitary district, urban or rural, including under this head municipal

boroughs, all of which are urban districts. The parish is, speaking generally, the smallest area, though, as will hereafter be seen, part of a parish may be a separate area for certain purposes; and there may be united districts or parishes for certain purposes. It will be convenient to follow this order in the present article. But before doing so, it should be pointed out that all local bodies in England are to some extent subject to the control of central authorities, such as the privy council, the home office, the Board of Agriculture, the Board of Trade, the Board of Education or the Local Government Board.

The Administrative County. — The administrative county in- cludes all places within its area, with two important exceptions. The first of these consists of the county borough, j-he county The second is the quarter sessions borough, which and the forms part of the county for certain specified purposes count y only. But the county includes all other places, such as liberties and franchises, which before 1888 were exempt from contribution to county rate. For each administrative county a county council is elected. For purposes of election the entire county is divided into divisions corresponding to the wards of a municipal borough, and one councillor is elected for each electoral division.

The electors are the county electors, i.e. in a borough the persons enrolled as burgesses, and in the rest of the county the persons who are registered as county electors, i.e. those persons who possess in a county the same Couat y qualification as burgesses must have in a borough, elections. and are registered.

The qualification of a burgess or county elector is substantially the occupation of rated property within the borough or county, residence during a qualifying period of twelve months within the borough or county, and payment of rates for the qualifying property. A person so qualified is entitled to be enrolled as a burgess, or registered as a county elector (as the case may be), unless he is alien, has during the qualifying period received union or parochial relief or other alms, or is disentitled under some act of parliament such as the Corrupt Practices Act, the Felony Act, &c. The lists of burgesses and county electors are prepared annually by the overseers of each parish in the borough or county, and are revised by the revising barrister at courts holden by him for the purpose in September or October of each year. When revised they are sent to the town clerk of the borough, or to the clerk of the peace of the county, as the case may be, by whom they are printed. The lists are conclusive of the right to vote at an election, although on election petition involving a scrutiny the vote of

a person disqualified by law may be struck off, notwithstanding the inclusion of his name in a list of voters.

The qualification of a county councillor is similar to that required of a councillor in a municipal borough, with some modifications. A person may be qualified in any one of the following ways: viz. by being (1) enrolled as a county elector, and possessed of a property qualification consisting of the possession of real or personal property to the amount of £1000 in a county having four or more divisions, or of £500 in any other county, or the being rated to the poor rate on an annual value of £30 in a county having four or more divisions, or of £15 in any other county; (2) enrolled in the non-resident list, and possessed of the same property qualification (the non-resident list contains the names of persons who are qualified for enrolment in all respects save residence in the county or within 7 m. thereof, and are actually resident beyond the 7 m. and within 15 m.); (3) entitled to elect to the office of county councillor (for this qualification no property qualification is required, but the office of a councillor elected on this qualification only becomes vacant if for six months he ceases to reside within the county); (4) a peer owning property in the county; (5) registered as a parliamentary voter in respect of the ownership of property in the county. Clerks in holy orders and ministers of religion are not disqualified as they are for being borough councillors, but in other respects the persons disqualified to be elected for a county are the same as those disqualified to be elected for a borough. Such disqualifications include the holding of any office or place of profit under the council other than the office of chairman, and the being concerned or interested in any contract or

employment with, by or on behalf of the council. Women, other than married women, are eligible.

County councillors are elected for a term of three years, and at the end of that time they retire together. The ordinary day of election is the 8th March, or some day between the 1st and 8th March fixed by the council. Candidates are nominated in writing by a nomination paper signed by a proposer and seconder, and subscribed by eight

other assenting county electors of the division; and in the event of there being more valid nominations than vacancies a poll has to be taken in the manner prescribed by the Ballot Act 1872. Corrupt and illegal practices at the election are forbidden by a statute passed in the year 1894, which imposes heavy penalties and disqualifications for the offences which it creates. These offences include not only treating, undue influence, bribery and personation, but certain others, of which the following are the chief. Payment on account of the conveyance of electors to or from the poll; payment for any committee room in excess of a prescribed number; the incurring of expenses in and about the election beyond a certain maximum; employing, for the conveyance of electors to or from the poll, hackney carriages or carriages kept for hire; payments for bands, flags, cockades, &c. ; employing for payment persons at the election beyond the prescribed number; printing and publishing bills, placards or posters which do not disclose the name and address of the printer or publisher ; using as committee rooms or for meetings any licensed premises, or any premises where food or drink is ordinarily sold for consumption on the premises, or any club premises where intoxicating liquor is supplied to members. In the event of an illegal practice, payment, employment or hiring, com- mitted or done inadvertently, relief may be given by the High Court, or by an election court, if the validity of the election is questioned on petition ; but unless such relief is given (and it will be observed that it cannot be given for a corrupt as distinguished from an illegal practice) , an infringement of the act may void the election altogether. The validity of the election may be questioned by election petition. Indeed, this is the only method when it is sought to set aside the election on any of the usual grounds, such as corrupt or illegal practices, or the disqualification of the candidate at the date of election. Election petitions against county councillors and members of other local bodies (borough councillors, urban and rural district councillors, members of school boards and boards of guardians) are classed together as municipal election petitions, and are heard in the same way, by a commissioner who must be a barrister of not less than fifteen years' standing. The petition is tried in open court at some place within the county, the expenses of the court being pro- vided in the first instance by the Treasury, and repaid out of the county rates, except in so far as the court may order them to be paid by either of the parties. If a candidate is unseated a casual vacancy is created which has to be filled by a new election. A county councillor is required to accept office by making and subscribing a declaration in the prescribed form that he will duly and faithfully perform the duties of the office, and that he possesses the necessary qualification.

The declaration may be made at any time within three months after notice of election. If the councillor does not make it within that time, he is liable to a fine the amount of which, if not determined by bye-law of the council, is £25 in the case of an alderman or councillor, and £50 in the case of the chairman. Exemp- tion may, however, be claimed on the ground of age, physical or mental incapacity, previous service, or payment of the fine within five years, or on the ground that the claimant was nominated without his consent. If during his term of office a member of the council becomes bankrupt, or compounds with his creditors, or is (except in case of illness) continuously absent from the county, being chairman for more than two months, or being alderman or councillor for more than six months, his office becomes vacant by declaration of the council. In the case of disqualification by absence, the same fines are payable as.upon non-acceptance of office, and the same liability arises on resignation. Acting without making the declaration, or without being qualified at the time of making the declaration, or after ceasing to be qualified, pr after becoming disqualified, involves liability to a fine not exceeding £50, recoverable by action.

The councillors who have been elected come into office on the 8th March in the year of election. The first quarterly meeting of the newly-elected council is held on the 16th or on such Ubairman, otner jay within ten days after the 8th as the county c " council may fix. The first business at that meeting is

the election of the chairman, whose office corresponds to that of the mayor in a borough. He is elected for the ensuing year, and holds office until his successor has accepted office. The chairman must be a fit person, elected by the council from their own body or from persons qualified to be councillors. He may receive such remunera- tion as the council think reasonable. He is by virtue of his office a justice of the peace for the county. Having elected the chair- man, the meeting proceeds to the election of aldermen, whose number is one-third of the number of councillors, except in London, where the number is one-sixth. An alderman must be a councillor or a person qualified to be a councillor. If a councillor is elected he vacates his office of councillor, and thus creates a casual vacancy in the council. In every third year one-half of the whole number of aldermen go out of office, and their places are filled by election, which is conducted by means of voting papers. It will be observed,

therefore, that while a county councillor holds office for three years, a county alderman holds office for six. The council may also appoint a vice-chairman who holds office during the term of office of the

chairman ; _ in London the council have power to appoint a paid deputy chairman.

It may be convenient at this point to refer to the officers of the county council. Of these, the chief are the clerk, the treasurer, and the surveyor. Before 1888 the clerk of the peace was appointed in a county by the custos rotulorum. Officers. He held office for life during good conduct, and had power to act by a sufficient deputy. Under the act of 1888 existing clerks of the peace became clerks of the councils of their counties, holding office by the same tenure as formerly, except in the county of London, where the offices were separated. Thereafter a new appointment to the offices of clerk of the peace and clerk of the county council was to be made by the standing joint-committee, at whose pleasure he is to hold office. The same committee appoint the deputy- clerk, and fix the salaries of both officers. The clerk of the peace was formerly paid by fees which were fixed by quarter sessions, but he is now generally, if not in every case, paid by salary, the fees received by him being paid into the county fund. The county council may also employ such other officers and servants as they may think necessary.

Subject to a few special provisions in the Local Government Act of 1888, the business of the county council is regulated by the provisions laid down in the Municipal Corporations Act 1882, with regard to borough councils. There are four Buslaess – quarterly meetings in every year, the dates of which may be fixed by the council, with the exception of that which must be held on the 16th March or some day within ten days after the 8th of March as already noticed when treating of elections. Meetings are con- vened by notices sent to members stating the time and place of the meeting and the business to be transacted. The chairman, or in his absence the vice-chairman, or in the absence of both an alderman or councillor appointed by the meeting, presides. All questions are determined by the votes of the majority of those present and voting, and in case of equality of votes the chairman has a casting vote. Minutes of the proceedings are taken, and if signed by the chairman at the same or the next meeting of the council are evidence of the proceedings. In all other respects the business of the council is regulated by standing orders which the council are authorized to make. Very full power is given to appoint committees, which may be either general or special, and to them may be delegated, with or without restrictions or conditions, any of their powers or duties except that of raising money by rate or loan. Power is also given to appoint joint-committees with other county councils in matters in which the two councils are jointly interested, but a joint-committee so appointed

must not be con- founded with the standing joint-committee of the county council and the quarter sessions, which is a distinct statutory body and is elsewhere referred to. The finance committee is also a body with distinct duties.

In order to appreciate some of the points relating to the finance of a county council, it is necessary to indicate the relations between an administrative county and the boroughs which are locally situated within it. The act of 1888 Relation of created a new division of boroughs into three classes; ^^Lf," of these the first is the county borough. A certain number of boroughs which either had a population of not less than 50,000, or were counties of themselves, were made counties independent of the county council and free from the payment of county rate. In such boroughs the borough council have, in addition to their powers under the Municipal Corporations Act 1882, all the powers of a county council under the Local Government Act. They are independent of the county council, and their only relation is that in some instances they pay a contribution to the county, e.g. for the cost of assizes where there is no separate assize for the borough. The boroughs thus constituted county boroughs enumerated in the schedule to the Local Government Act 1888 numbered sixty-one, but additional ones are created from time to time.

The larger quarter sessions boroughs, i.e. those which had, according to the census of 1881, a population exceeding 10,000, form part of the county, and are subject to the control of the county council, but only for certain special purposes. The reason for this is that while in counties the powers and duties under various acts were entrusted to the county authority, in boroughs they were exercised by the borough councils. In the class of boroughs now under consideration these powers and duties are retained by the borough council; the county council exercise no jurisdiction within the borough in respect of them, and the borough is not rated in respect of them to the county

rate. The acts referred to include those relating to the diseases of animals, destructive insects, explosives, fish conservancy, gas meters, margarine, police, reformatory and industrial schools, riot (damages), sale of food and drugs, weights and measures. But for

certain purposes these boroughs are part of the county and rateable to county rate, e.g. main roads, cost of assizes and sessions, and in certain cases pauper lunatics. The county councillors elected for one of these boroughs may not vote on any matter involving expenditure on account of which the borough is not assessed to county rate.

The third class of boroughs comprises those which have a separate court of quarter sessions, but had according to the census of 1881 a population of less than 10,000. All such boroughs form part of the county for the purposes of pauper lunatics, analysts, reformatory and industrial schools, fish conservancy, explosives, and, of course, the purposes for which the larger quarter sessions boroughs also form part of the county, such as main roads, and are assessed to county rate accordingly. And in a borough, whether a quarter sessions borough or not, which had in 1881 a population of less than 10,000, all the powers which the borough council formerly possessed as to police, analysts, diseases of animals, gas meters, and weights and measures cease and are transferred to the county council, the boroughs becoming in fact part of the area of the county for these purposes.

It will be seen, therefore, that for some purposes, called in the act general county purposes, the entire county, including all boroughs other than county boroughs, is assessed to the. county rate; while for others, called special county purposes, certain boroughs are now assessed. This explanation is necessary in order to appreciate what has now to be said about county finance. But before leaving the consideration of the area of the county it may be added that all liberties and franchises are now merged in the county and subject to the jurisdiction of the county council.

The county council is a body corporate with power to hold lands. Its revenues are derived from various sources which will presently be mentioned, but all receipts have to be carried to the county fund, either to the general county account if applicable to general county purposes, or to the special county account if applicable to special county purposes. The county council may, with the consent of the Local Government Board, borrow money on the security of the county fund or any of its revenues, for consolidating the debts of the county; purchasing land or buildings; any permanent work or other thing, the cost of which ought to be spread over a term of years; making advances in aid of the emigration or colonization of inhabitants of the county; and any purpose for which quarter sessions or the county council are authorized by any act to borrow. If, however, the total debt of the council will, with the amount

proposed to be borrowed, exceed one- tenth of the annual rateable value of the property in the county, the money cannot be borrowed unless under a provisional order made by the Local Government Board and confirmed by parlia- ment. The period for which a loan is made is fixed by the county council with the consent of the Local Government Board, but may not exceed thirty years, and the mode of repayment may be by equal yearly or half-yearly instalments of principal or of principal and interest combined, or by means of a sinking fund invested and applied in accordance with the Local Government Acts. The loans authorized may be raised by debentures or annuity certificates under these acts, or by the issue of county stock, and in some cases by mortgage.

The county council must appoint a finance committee for regu- lating and controlling the finance of the county, and the council cannot make any order for the payment of money out of the county fund save on the recommendation of that committee. Moreover, the order for payment of any sum must be made in pursuance of an order of the council signed by three members of the finance com- mittee present at the meeting of the council, and countersigned by the clerk. The order is directed to the county treasurer, by whom authorized payments are then made.

The accounts of the receipts and expenditure of the county council are made up for the twelve months ending the 31st March

Finance.

in each year, and are audited by a district auditor. The form in which the accounts must be made up is prescribed by the Local Government Board. The auditor is a district auditor appointed by the Local Government Board under the District Auditors Act 1879, and in respect of the audit the council is charged with a stamp duty, the amount of which depends on the total of the ex- penditure comprised in the financial statement. Before each audit the auditor gives notice of the time and place appointed, and the council publish the appointment by advertisement. A copy of the accounts has to be deposited for public inspection for seven days before the audit. The auditor has the fullest powers of in- vestigation ; he may require the production of any books or papers, and he may require the attendance before him of any person account- able. Any owner of property or ratepayer may attend the audit and object to the accounts, and either on such objection or on his own motion the auditor may disallow any payment and surcharge the amount on the persons who made or authorized it. Against any allowance or

surcharge appeal lies to the High Court if the question involved is one of law, or to the Local Government Board, who have jurisdiction to remit a surcharge if, in the circumstances, it appears to them to be fair and equitable to do so. It will be seen that this is really an effective audit.

The sources of revenue of the council are the exchequer contribution, income from property and fees, and rates. Before 1888 large grants of money had been made annually to local „ authorities in aid of local taxation. Such grants repre- li ˆ v ˆ ueo ‘ sented a contribution out of taxation for the most part C C a U nctl arising out of property other than real property, while local taxation fell on real property alone. By the act of 1888 it was provided that for the future such annual grants should cease, and that other payments should be made instead thereof. The commissioners of Inland Revenue pay into the Bank of England, to an account called ” the local taxation account,” the sums ascertained to be the proceeds of the duties collected by them in each county on what are called local taxation licences, which include licences for the sale of intoxicating liquor, licences on dogs, guns, establish- ment licences, &c. The amount so ascertained to have been collected in each county is paid under direction of the Local Government Board to the council of that county. The commissioners of Inland Revenue also pay into the same account a sum equal to ij% on the net value of personal property in respect of which estate duty is paid. Under the Local Taxation (Customs and Excise) Act 1890, certain duties imposed on spirits and beer (often referred to as ” whisky money “) are also to be paid to “the local taxation account.” The sums so paid in respect of the duties last above mentioned, and in respect of the estate duty and spirits and beer additional duties, are distributed among the several counties in proportion to the share which the Local Government Board certify to have been received by each county during the financial year ending the 31st March 1888, out of the grants theretofore made out of the exchequer in aid of local rates. The payments so made out of ” the local taxation account ” to a county council are paid to the county fund, and carried to a separate account called ” the Exchequer contribution account.” The money standing to the credit of this account is applied : (i.) in paying any costs incurred in respect thereof or other- wise chargeable thereon ; (ii.) in payment of the sums required by the Local Government Act 1888 to be paid in substitution for local grants; (iii.) in payment of the new grant to be made by the county council in respect of the costs of union officers; and (iv.) in re- paying to ” the general county account ” of the county fund the costs on account of general county

purposes for which the whole area of the county (including boroughs other than county boroughs) is liable to be assessed to county contribution. Elaborate provision is made for the distribution of the surplus (if any), with a view to securing a due share being paid to the quarter sessions boroughs.

The payments which the county council have to make in substitution for the local grants formerly made out of Imperial funds include payments for or towards the remuneration of the teachers in poor-law schools and public vaccinators; school fees paid for children sent from a workhouse to a public elementary school; half of the salaries of the medical officer of health and the inspector of nuisances of district councils; the remuneration of registrars for births and deaths ; the maintenance of pauper lunatics ; half of the cost of the pay and clothing of the police of the county, and of each borough maintaining a separate police force. In addition to the grants above mentioned, the county council is required to grant to the guardians of every poor-law union wholly or partly in their county an annual sum for the costs of the officers of the union and of district schools to which the union contributes. Another source is the income of any property belonging to the council, but the amount of this is usually small. The third source of revenue consists of the fees received by the different officers of the county councils or of the joint-committee. For example, fees received by the clerk of the peace, inspectors of weights and measures, and the like. These fees are paid into the county fund, and carried either to " the general county account " or, if they have been received in respect of some matter for which part only of the county is assessed, then to the special account to which the rates levied for that purpose are carried. The remaining source of income of a county council is the county rate, the manner of levying which is hereafter stated.

'£1109335 '18ˆ3 uoutmuiiuo;}

fi

Section VI.

Id

vVg&Vi

1

j= hi

SCILLV ISLANDS

Same Scale

*18 *v.*

*'• ft**

LOCAL GOVERNMENT]

ENGLAND

43 1

Of the powers and duties of county councils, it may be con- venient to treat of these first, in so far as they are transferred to or conferred on them by the Local Government trans- Act 1888, under which they were created, and after- terred wards in so far as they have been conferred by sub- from sequent legislation. Before the passing of the Local

"sessions. Government Act 1888, the only form of county govern- ment in England was that of the justices in quarter sessions (

The subjects of such transfer include (i.) the making, assessing and levying of county, police, hundred and all rates, and the applica- tion and expenditure thereof, and the making of orders for the payment of sums payable out of any such rate, or out of the county stock or county fund, and the preparation and revision of the basis or standard for the county rate. With regard to the county rate, a few words of description may be sufficient here. The council appoint a committee called a county rate committee, who from time to time prepare a basis or standard for county rate, that is to say, they fix the amount at which each parish in the county shall contribute its quota to the county rate. As a general rule the poor- law valuations are followed, but this is not universally the case, some county councils adopting the assessment to income tax, schedule A, and others forming an independent valuation of their own. The overseers of any parish aggrieved by the basis ■ may appeal against it to quarter sessions, and it is to be noticed that this appeal is not interfered with, the transfer of the duties of justices relating only to administrative and not to judicial business. When a contribution is required from county rate, the county council assess the amount payable by each parish according to the basis previously made, and send their precept to the guardians of the unions comprising the several parishes in the county, the guardians in their turn requiring

the overseers of each parish to provide the necessary quota of that parish out of the poor rate, and the sum thus raised goes into the county fund. The police rate is made for the purpose of defraying the expenses of the county police. It is made on the same basis as the county rate, and is levied with it. The hundred rate is seldom made, though in some counties it may be made for purposes of main roads and bridges chargeable to the hundred as distinguished from the county at large ; (ii.) the borrowing of money ; (iii.) the passing of the accounts of, and the discharge of the county treasurer; (iv.) shire halls, county halls, assize courts, the judges' lodgings, lock-up houses, court houses, justices' rooms, police stations and county buildings, works and property; (v.) the licensing under any general act of houses and other places for music or for dancing, and the granting of licences under the Racecourses Licensing Act 1879; (vi.) the pro- vision, enlargement, maintenance and management and visitation of, and other dealing with, asylums for pauper lunatics; (vii.) the establishment and maintenance of, and the contribution to, reforma- tory and industrial schools; (viii.) bridges and roads repairable with bridges, and any powers vested by the Highways and Locomotives Amendment Act 1878 in the county authority. It may be observed that bridges have always been at common law repairable by the county, although, with regard to bridges erected since the year 1805, these are not to be deemed to be county bridges repairable by the county unless they have been erected under the direction or to the satisfaction of the county surveyor. The common-law liability to repair a bridge extends also to the road or approaches for a distance of 300 ft. on each side of the bridge. Of the powers vested in the county authority under the Highway Act 1878, the most important are those relating to main roads, which are specially noticed hereafter ; (ix.) the tables of fees to be taken by and the costs to be allowed to any inspector, analyst or person holding any office in the county other than the clerk of the peace and the clerks of the justices; (x.) the appointment, removal and determination of salaries of the county treasurer, the county surveyor, the public analysts, any officer under the Explosives Act 1875, and any officers whose re- muneration is paid out of the county rate, other than the clerk of the peace and the clerks of the justices; (xi.) the salary of any coroner whose salary is payable out of the county rate, the fees, allowances and disbursements allowed to be paid by any such coroner, and the division of the county into coroners' districts and the assignments of such districts; (xii.) the division of the county into polling districts for the purposes of parliamentary elections, the appointment of the places of election, the places of holding courts for the revision of the lists of voters, and the costs of, and other matters to be done for the

registration of parliamentary voters; (xiii.) the execution as

local authority of the acts relating to contagious diseases of animals, to destructive insects, to fish conservancy, to wild birds, to weights and measures, and to gas meters, and of the Local Stamp Act 1 869 ; (xiv.) any matters arising under the Riot (Damages) Act 1886! Under this act compensation is payable out of the police rate to any person whose property has been injured, stolen or destroyed by rioters; (xv.) the registration of rules of scientific societies, the registration of charitable gifts, the certifying and recording of places of religious worship, the confirmation and record of the rules of loan societies. These duties are imposed under various statutes.

In addition to the business of quarter sessions thus transferred, there was also transferred to the county council certain business of the justices of the county out of session, that is to say, in petty or special sessions. This business consists of the licensing of houses or places for the public performance of stage plays, and the execu- tion, as local authority, of the Explosives Act 1875. Power was given by the act to the Local Government Board to provide, by means of a provisional order, for transferring to county councils any of the powers and duties of the various central authorities which have been already referred to; but although such an order was at one time prepared, it has never been confirmed, and nothing has been done in that direction.

Apart from the business thus transferred to county councils, the act itself has conferred further powers or imposed further duties with reference to a variety of other matters, some of p .. which must be noticed. But before passing to them “ > ” ce –

it is necessary here to call attention to one important subject of county government which has not been wholly transferred to the county council, namely, the police. It was matter of considerable discussion before the passing of the act whether the police should remain under the control of the justices, or be transferred wholly to the control of the county council. Eventually a middle course was taken. The powers, duties and liabilities of the quarter sessions and justices out of session with respect to the county police were vested in the quarter sessions and the county council jointly, and are now exercised through the standing joint-committee of the two bodies. That committee consists of an equal number of members of the county council and of justices appointed by the quarter sessions, the number being arranged between the two bodies or fixed by the secretary of state. The committee are also charged with the duties of

appointing or removing the clerk of the peace, and they have jurisdiction in matters relating to justices' clerks, the provision of accommodation for quarter sessions or justices out of session, and the like, and their expenses are paid by the county council out of the county fund. The standing joint-committee have power to divide their county into police districts, and, when required by order in council, are obliged to do so. In such a case, while the general expenditure in respect of the entire police force is defrayed by the county at large, the local expenditure, i.e. the cost of pay, clothing and such other expenses as the joint-committee may direct, is defrayed at the cost of the particular district for which it is incurred (see also Police).

*Among the powers and duties given to county councils by the Local Government Act 1888, the first to be mentioned, following the order in the act itself, is that of the appointment c of county coroners. The duties of a coroner are limited ™" . to the holding of inquiries into cases of death from causes " e *'*

suspected to be other than natural, and to a few miscellaneous duties of comparatively rare occurrence, such as the holding of inquiries relating to treasure trove, and acting instead of the sheriff on inquiries under the Lands Clauses Act, &c, when that officer is interested and thereby disabled from holding such inquiries. (For the history of the office of coroner, which is a very ancient one, see that title.) The county council may appoint any fit person, not being a County alderman or county councillor, to fill the office, and in the caseof a county divided into coroners' districts, may assign him a district. It has been decided, however, that the power hereby conferred does not extend to the appointment of a coroner for a liberty or other franchise who would not under the old law have been appointed by the freeholders. It may be mentioned that though a coroner may have a district assigned to him, he is never- theless a coroner for the entire county throughout which he has jurisdiction.

It was provided by the Highway Act 1878 that every road which was disturnpiked after the 31st of December 1870 should be deemed to be a main road, the expenses of the repair and main- M

tenance of which were to be contributed as to one-half nd

thereof by the justices in quarter sessions, then the a a "

county authority. By another section of the same act it was provided that where any highway in a county was a medium of communication between great towns, or a thoroughfare to a railway

station, or otherwise such that it ought to be declared a main road, the county authority might declare it to be a main road, and thereupon one-half the expense of its maintenance would fall upon the county at large. Once a road became a main road it could only cease to be such by order of the Local Government Board. As already stated, the powers of the quarter sessions under the act of 1878 were transferred to the county council under the Local Government Act of 1888, and that body alone has now power to declare a road to be a main road. But the act of 1888 made some important

changes in the law relating to the maintenance of main roads. It declared that thereafter not only the half but the whole cost of maintenance should be borne by the county. Provision is made for the control of main roads in urban districts being retained by the urban district council. In urban districts where such control has not been claimed, and in rural districts, the county council may either maintain the main roads themselves or allow or require the district councils to do so. The county council must in any case make a payment towards the costs incurred by the district council, and if any difference arises as to the amount of it, it has to be settled by the Local Government Board. In Lancashire the cost of main roads falls upon the hundred, as distinguished from the county at large, special provision being made to that effect. Special provision has also been made for the highways in the Isle of Wight and in South Wales, where the roads were formerly regulated by special acts, and not by the ordinary Highway Acts.

The county council have the same power as a sanitary authority to

enforce the provisions of the Rivers Pollution Prevention Acts in

relation to so much of any stream as passes through

v .f r f- or by any part of their county. Under these acts a po u ion san ; tar y authority is authorized to take proceedings to v ‘ restrain interference with the due flow of a stream or the

pollution of its waters by throwing into it the solid refuse of any manufactory or quarry, or any rubbish or cinders, or any other waste or any putrid solid matter. They may also take proceedings in

respect of the pollution of a stream by any solid or liquid sewage matter. They have the same powers with respect to manufacturing and mining pollutions, subject to certain restrictions, one of which is that proceedings are not to be taken without the consent of the Local Government Board. The county council may not only themselves institute proceedings under the acts, but they may contribute to the costs of any prosecution under the acts instituted by any other county or district council. The Local Government Board is further empowered by provisional order to constitute a joint-committee representing all the administrative counties through or by which a river passes, and confer on such committee all or any of the powers of a sanitary authority under the acts.

A county council has the same power of opposing bills in parliament and of prosecuting or defending any legal proceedings necessary _ „ for the promotion or protection of the interests of the

*ar *~ inhabitants of a county as are conferred on the council "andteeal °^ a mun ' c ip a ' borough by the Borough Funds Act 1872, costs with this difference, thatin order to enable them to oppose*

a bill in parliament at the cost of the county rate, it is not necessary to obtain the consent of the owners and ratepayers within the county. The power thus conferred is limited to opposing bills. The council are not authorized to promote any bill, and although they frequently do so, they incur the risk that if the bill should not pass the members of the council will be surcharged personally with the costs incurred if they attempt to charge them to the county rate. Of course if the bill passes, it usually contains a clause enabling the costs of promotion to be paid out of the county rate. It must not be supposed, however, that the county council have no power to institute or defend legal proceedings or oppose bills save such as is expressly conferred upon them by the Local Government Act. In this respect they are in the same position as all other local authorities, with respect to whom it has been laid down that they may without any express power in that behalf use the funds at their disposal for protecting themselves against any attack made upon their existence as a corporate body or upon any of their powers or privileges.

*The county council have also the same powers asa borough council of making by-laws for the good government of the county and for B - laws * ne su PP ress i° n °f nuisances not already punishable y " ' under the general law. This power has been largely acted upon throughout England, and the courts of law have on several occasions decided that such by-laws should be benevolently interpreted, and*

that in matters which directly arise and concern the people of the county, who have the right to choose those whom they think best fitted to represent them, such representatives may be trusted to understand their own requirements. Such by-laws will therefore be upheld, unless it is clear that they are uncertain, repugnant to the general law of the land, or manifestly unreasonable. It may be mentioned that, while by-laws relating to the good govern- ment of the county have to be confirmed by the secretary of state, those which relate to the suppression of nuisances have to be con- firmed by the Local Government Board. Such confirmation, how- ever, though necessary to enable the council to enforce them, does not itself confer upon them any validity in point of law.

The county council have power to appoint and pay one or more medical officers of health, who are not to hold any other appoint- ment or engage in private practice without the express written consent of the council. The council may make arrangements whereby any district council or councils may have the services of the county medical officer on payment of a contribution towards his salary, and while such arrangement is in force the duty of the district council to appoint a medical officer is to be deemed to have been satisfied. Every medical officer, whether of a county or district, must now be legally qualified for the practice of medicine, surgery and midwifery. Besides this, in the rase of a county, or of anv district or combination of districts of

Medical officers.

which the population exceeds 50,000, the medical officer must also have a diploma in public health, unless he has during the three consecutive years before 1892 been medical officer of a district or combination having a population of more than 20,000, or has before the passing of the act been for three years a medical officer or inspector of the Local Government Board.

The only other powers and duties of a county council arising under the Local Government Act itself which it is necessary to notice are those relating to alterations of local areas. ... It may be convenient here to state that certain altera- ˆ, era " tions of areas can only be effected through the medium tˆJ/areas of the Local Government Board after local inquiry. These cases include the alteration of the boundary of any county or borough, the union of a county borough with a county, the union of any counties or boroughs or the division of any county, the making of a borough into a county borough. In these cases the order of the Local Government Board is provisional

only, and must be confirmed by parliament. The powers of a county council to make orders for the alteration of local areas are as follows: When a county council is satisfied that a prima facie case is made out as respects any county district not a borough, or as respects any parish, for a proposal for all or any of the things hereafter mentioned, they may hold a local inquiry after giving such notice in the locality and to such public departments as may be prescribed from time to time by the orders of the Local Government Board. The things referred to include the alteration of the boundary of the district or parish ; the division or union thereof with any other district or districts, parish or parishes; the conversion of a rural district or part thereof into an urban district or vice versa. In these cases, after the local inquiry above referred to has been held, the county council, being satisfied that the proposal is desirable, may make an order for the same accordingly. The order has to be submitted to the Local Government Board, and that board must hold a local inquiry in order to determine whether the order should be confirmed or not, if the council of any district affected by it, or one-sixth of the total number of electors in the district or parish to which it relates, petition against it. The Local Government Board have power to modify the terms of the order whether it is petitioned against or not, but if there is no petition, they are bound to confirm, subject only to such modifications. Very large powers are conferred upon county councils for the purpose of giving full effect to orders made by them under these provisions. A considerable extension of the same powers was made by the Local Government Act 1894, which practically required every council to take into consideration the areas of sanitary districts and parishes within the entire administrative county, and to see that a parish did not extend into more than one sanitary district ; to provide for the division of a district which did extend into more than one district into separate parishes, so that for the future the parish should not be in more than one county district ; and to provide for every parish and rural sanitary district being within one county. An enormous number of orders under the act of 1894 was made by county councils, and, speaking generally, it will now be found that no parish extends into more than one county or county district. Other powers and duties of the county council under the act of 1894 will be noticed hereafter.

Of the statutes affecting county councils passed subsequent to 1888 mention need only be made of the chief.

Previous to the Education Act 1902, county councils had certain optional powers under the Technical Instruction Acts to supply or aid the supply of technical or manual instruction. Their g, „ duties in

respect to education were, however, much enlarged by the act of 1902. That act abolished the old school boards and school attendance committees, and substituted a single authority for all kinds of schools and for all kinds of education. The county council or the council of a county borough is now in every case the local education authority, except that non-county boroughs with a population of over 10,000, and urban districts with a population of over 20,000, may be the local education authorities for elementary education only, but they may relinquish their powers in favour of the county council. For higher education county councils and county boroughs are the sole education authorities, except that non-county boroughs and urban councils are given a concurrent power of levying a rate for higher education not exceeding id. in the £. Under the act, an education committee must be established by all authorities. The majority of the members of the committee are appointed by the council, usually out of their own body, and the remainder are appointed by the council on the nomination or recommendation of other bodies. Some of the members of the committee must be women. All matters relating to the exercise of the powers of the education authority (except those of rating and borrowing) must be referred to the committee, and before exercising any of their powers the council must (except in cases of emergency) receive and consider the report of the education committee with respect to the matter in question. As to higher education the local education authority must consider the educational needs of their area and take such steps as seem to them desirable, after consultation with the Board of Educa- tion, to supply or aid the supply of education other than elementary, and to promote the general co-ordination of all forms of education. For this purpose they arc authorized to levy a rate not exceeding 2d.

in the £, except with the consent of the Local Government Board. They must also devote to the same purpose the sums received by them in respect of the residue of the English share of the local taxation (customs and excise) duties already referred to. See further Education and Technical Education.

Under the Midwives Act 1902, every council of a county or county borough is the local supervising authority over midwives within its ., . area. The duty of the local supervising authority is to ,ves ‘ exercise

general supervision over all midwives practising within their area in accordance with rules laid down in the act; to investigate charges of malpractices, negligence or misconduct on the part of a midwife, and if a prima facie case be established, to report it to the Central Midwives Board; to suspend a midwife from practice if necessary to prevent the spread of infection; to report to the central board the name of any midwife convicted of an offence; once a year (in January) to supply the central board with the names and addresses of all midwives practising within their area and to keep a roll of the names, accessible at all reasonable times for public inspection; to report at once the death of any midwife or change in name and address. The local supervising authority may delegate their powers to a committee appointed by them, women being eligible to serve on it. A county council may delegate its powers under the act to a district council.

Part of the business transferred from quarter sessions to the council was that which related to pauper lunatics, but the whole subject of lunacy was consolidated by an act of the year Luna ics. 1890, which again has been amended by a later act. The councils of all administrative counties and county boroughs and the councils of a few specified quarter sessions boroughs, which before 1890 were independent areas for purposes of the Lunacy Acts, are local authorities for the purposes of the Lunacy Acts, and each of them is under an obligation to provide asylum accommodation for pauper lunatics. This accommodation may be provided by one council or by a combination of two or more, and such council or combination may provide one or more asylums. The. county council exercise their powers through a visiting committee, consisting of not less than seven members, or, in the case of a combination, of a number of members appointed by each council in agreed proportions. In the case of a combination the expenses are defrayed by the several councils in such proportion as they may agree upon, and the pro- portion may be fixed with reference to either the accommodation required by each council or the population of the district. A county borough may also, instead of providing an asylum of its own, contract with the visiting committee of any asylum to receive the pauper lunatics from the borough. Private patients may be accommodated in the asylums provided by a county council, and received upon terms fixed by the visiting committee. The expenses of lunatic asylums are defrayed in the following manner: The guardians from whose union a lunatic is sent have to pay a fixed weekly sum, which may not exceed 14s. a week. A larger charge is made for lunatics received from unions outside the county, as these do not, of course, contribute anything

towards the provision or up-keep of the asylum itself. In addition to the payments by guardians, there is a contribution of 4s. a week from " the exchequer contribution account " already mentioned, and the remaining expenses are defrayed out of the county rate.

Under the Allotments Acts 1887 to 1907, it is the duty of a county council to ascertain the extent to which there is a demand for allotments in the urban districts and parishes in the county, or would be a demand if suitable land were available, and the extent to which it is reasonably practicable, having regard to the provisions of the acts, to satisfy any such demand, and to co-operate with authorities, associations or persons best qualified to assist, and to take such steps as may be necessary. The powers of the Local Government Board under the Allotments Acts were transferred by the act of 1907 to the Board of Agriculture and Fisheries, and by the same act the powers and duties of rural district councils were transferred to parish councils. The county council under these acts has compulsory powers of purchase or hire if they are unable to acquire land by agreement and on reasonable terms. If an objection is made to an order for compulsory purchase or hire, the order will not be confirmed by the Board of Agriculture until after a local inquiry has been held. If the Board of Agriculture is satisfied, after holding a local inquiry, that a county council have failed to fulfil their obligations as to allotments, the board may transfer all and any of the powers of the county council to the Small Holdings Commissioners.

By the Small Holdings and Allotments Act 1907, Small Holdings Commissioners are appointed by the Board of Agriculture to ascertain the extent of the demand for small holdings, and confer with county councils as to how best to provide them. Local authorities are required to furnish information and give assistance to the commissioners, who report to the board. If the board, after considering the report, consider it desirable, they require the county council concerned to prepare a scheme for the provision of small holdings; if the county council decline to prepare a scheme, the board may direct the commissioners to do so. A county council may also prepare a scheme on its own initiative. When a scheme has been confirmed, the county council must carry out the obligations imposed on it within a prescribed time; if they

Allot- ments.

Small holdings.

make default the board may direct the commissioners to assume all

the powers of the county council, and the county council must repay to the board the expenses the commissioners may incur. A county council may delegate, by arrangement, to the council of any borough or urban district in the county their powers in respect of the act. A small holding is defined by the act as one which exceeds 1 acre, but must not exceed 50 acres or £50 annual value. Every county council must establish a small holdings and allotments com- mittee, to which must be referred all matters relating to the exercise and performance by the council of their powers and duties as to small holdings and allotments.

Under the Isolation Hospitals Acts 1893 and 1901 , a county council may provide for the establishment of isolation hospitals for the reception of patients suffering from infectious diseases on the application of any local authority within the county, " os f ta s ' or on the report of the medical officer of the county that hospital accommodation is necessary and has not been provided, or it may take over hospitals already provided by a local authority. The council by their order constitute a hospital district and form a com- mittee for its administration. The committee have power to purchase land, erect a hospital, provide all necessary appliances, and generally administer a hospital for the purposes above mentioned.

The powers and duties of a county council under the Local Govern- ment Act 1894 are numerous and varied, and the chief of them are mentioned hereafter in connexion with parish councils. p ar ish The county council may establish a parish council in a councils parish which has a population of less than 300, and may group small parishes under a common parish council ; in every case they fix the number of members of the parish council. They may authorize the borrowing of money by a parish council, and they may lend money to a parish council. They may hear complaints by a parish council that a district council has failed to provide sufficient sewerage or water-supply, or has failed to enforce the provisions of the Public Health Acts in their district, and on such complaint they may transfer to themselves and exercise the powers of the defaulting council, or they may appoint a person to perform those duties. They may make orders for the custody and preservation of public books, writings, papers and documents belonging to a parish. They may divide a parish into wards for purposes of elections or of parish meetings. They may authorize district councils to aid persons in maintaining rights of common. They may, on the petition of a district council, transfer to themselves the powers of a district council who have refused or failed to _ take the necessary proceedings to assert public rights of way or protect roadside wastes. They may dispense

with the disqualification of a parish or district councillor arising only by reason of his being a shareholder in a water company or similar company contracting with the council, and, as has above been stated, they have large powers of altering the boundaries of parishes.

Among the powers and duties of quarter sessions transferred to county councils were those arising under the acts relating „. .

to contagious diseases of animals. These acts were -Jˆffi. ° consolidated and amended by a statute of 1894, and the county council remain the local authority for the execution of that act in counties.

Under the Light Railways Act 1896 a county council may be authorized by order of the light railway commissioners to , . . . construct and work or contract for the construction or r %wavs working of a light railway, lend money to a light railway ‘

company, or join any other council in these matters.

Among other statutes conferring powers or imposing duties upon county councils, mention may be made of such acts as those relating to sea fisheries regulation, open spaces, police superannuation, railway and canal traffic, shop hours, weights and measures, fertilizing and feeding stuffs, wild birds’ protection, land transfer, locomotives on highways and the acquisition of small dwellings. Sufficient has been said to indicate that the legislature from time to time recognizes the important position of the county council as an administrative body, and is continually extending its functions.

The Urban District. — A municipal borough is a place which has been incorporated by royal charter. In the year 1835 the Municipal Corporations Act was passed, which made provision for the constitution and government of mun i c ipai certain boroughs which were enumerated in a schedule, borough That act was from time to time amended, until in 1882 andthe by an act of that year the whole of the earlier acts were co’uncU repealed and consolidated. A few ancient corporations which were not enumerated in the schedule to the act of 1835 continued to exist after that year, but by an act of 1883 all of these, save such as should obtain charters before 1886, were abolished, the result being that all boroughs are now subject to the act of 1882. A place is still created a borough by royal charter on the petition of the inhabitants, and when that is done the provisions of the act of 1882 are applied to it by the charter itself.

The charter also fixes the number of councillors, the

boundaries of the wards (if any), and assigns the number of councillors to each ward, and provides generally for the time and manner in which the act of 1882 is first to come into operation. The charter is supplemented by a scheme which makes provision for the transfer to the new borough council of the powers and duties of existing authorities, and generally for the bringing into operation of the act of 1882. If the scheme is opposed by the prescribed proportion (one-twentieth) of the owners and rate- payers of the proposed new borough, it has to be confirmed by parliament. The governing body in a borough is the council elected by the burgesses.

The qualification of a burgess has been incidentally mentioned in connexion with that of a county elector, and need not be further noticed. A borough councillor must be qualified in the same manner as a county councillor, and he is disqualified in the same way, with this addition, that a peer or ownership voter is not qualified as such, and that a person is disqualified for being a borough coun- cillor if he is in holy orders or is the regular minister of a Dissenting congregation. Women, other than married women, are eligible. Borough councillors are elected for a term of three years, one-third of the whole number going out of office in each year, and if the borough is divided into wards, these are so arranged that the number of councillors for each ward shall be three or a multiple of three. The ordinary day of election is the 1st of November. At an election for the whole borough the returning officer is the mayor; at a ward election he is an alderman assigned for that purpose by the council. The nomination and election of candidates and the procedure at the election are the same as have already been described in the case of the election of county councillors. The law as to corrupt and illegal practices at the election is also similar, and the election may be questioned by petition in exactly the same way. A borough coun- cillor must, within five days after notice of his election, make a declaration of acceptance of office under a penalty, in the case of an alderman or councillor of £50, and in the case of a mayor of £100, or such other sums as the council may by by-law determine. A

councillor may be disqualified in the same way as a county councillor, by bankruptcy or composition with creditors, or continuous absence from the borough (except in case of illness). In short it may be said that as the provisions relating to the election of borough councillors were merely extended to county councillors by the Local Government Act of 1888 with a few modifications, these provisions, as already stated when dealing with county councils, apply generally to the election of borough councillors. After the annual election on the 1st of November the first quarterly meeting of the council is held on the 9th, and at that meeting the mayor and aldermen are elected. The election of the mayor and aldermen is again the same as has already been described in connexion with the election of the chair- Offlcers. man an< ˆ aldermen of a county council. The officers of a borough council are the town clerk and the treasurer, but the council have power to appoint such other officers as they think necessary. All these officers receive such remuneration as the . council from time to time think fit, and hold office during pleasure. The provisions with respect to the transaction of the business of the council are also the same in the case of a borough as in that of a county council.

The entire income of the borough council is paid into the borough fund, and that fund is charged with certain payments, which are Finance specifically set out in the 5th schedule to the act of 1882. audit These include the remuneration of the mayor, recorder

and officers of the borough, overseers' expenses, the expenses of the administration of justice in the borough, the payment of the borough coroner, police expenses and the like. An order of the council for the payment of money out of the borough fund must be signed by three members of the council and countersigned by the town clerk, and any such order may be removed into the king's bench division of the High Court of Justice by writ of certiorari, and may be wholly or partly disallowed or confirmed on the hearing. This is really the only way in which the validity of a payment by a borough council can be questioned, for, as will be seen hereafter, the audit in the borough is not an effective one. The borough fund is derived, in the first instance, from the property of the corporation. If the income from such property is insufficient for the purposes to which it is applicable, as usually is the case, it has to be supplemented by a borough rate, which may be a separate rate made by the council or may be levied through the overseers as part of the poor rate by means of a precept addressed to them. In the event of the borough fund being more than sufficient to meet the demands upon it without recourse to a borough rate, any surplus may be applied in payment

of any expenses of the council as a sanitary authority or in improving the borough or any part thereof by drainage, enlargement of streets or otherwise. The borough treasurer is required to make up his accounts half-yearly, and to submit them, with the necessary vouchers and papers, to the borough auditors. These auditors are three in number — two of them elected annually by the burgesses. An elective auditor must be qualified to be a councillor, but may not be a member of the council. The third auditor is appointed by the mayor and is called the mayor's auditor. The auditors so appointed

are charged with the duty of auditing the accounts of the treasurer, but they have no power of disallowance or surcharge, and their audit is therefore quite ineffective.

*Where a borough has not a separate court of quarter sessions, but has a separate commission of the peace, the justices of the county in which the borough is situate have a concurrent juris- . . .. diction with the borough justices in all matters arising "i?SJ f~ within the borough. Where, however, the borough has i us thes- a court of quarter sessions, the county justices have no Quarter jurisdiction within the borough. In all cases, whether * ess / ons . the borough has quarter sessions or a separate commission or not, the mayor, by virtue of his office, is a justice for the borough, and continues to be such justice during the year next after he ceases to be mayor. He takes precedence over all justices in and for the borough, and is entitled to take the chair at all meetings at which he is present by virtue of his office of mayor. A separate commission of the peace may be granted to a borough on the petition of the council. A borough justice is required to take the oaths of allegiance and the judicial oaths before acting; he must while acting reside in or within 7 m. of the borough, or occupy a house, warehouse or other property in the borough; but he need not be a burgess nor have the qualification by estate required of a county justice. Where the borough has a separate commission, the borough justices have power to appoint a clerk, who is now paid by salary, the fees and costs pertaining to his office being paid into the borough fund, out of which his salary is paid. The council may by petition obtain the appointment of a stipendiary magistrate for the borough. The crown may also on petition of the council grant a separate court of quarter sessions for the borough, and in that event a recorder has to be appointed by the crown. He must be a barrister of not less than five years' standing, and he holds office during good behaviour; he receives a yearly salary. The recorder sits as sole judge of the court of quarter sessions of the borough. He has all the powers of a court of quarter sessions in a county, including the power to hear appeals*

from the borough justices; but to this there are a few exceptions, notably the power to grant licences for the sale of intoxicating liquor. The grant of a separate court of quarter sessions also involves the appointment by the council of a clerk of the peace for the borough. It should be added that the grant of a court of quarter sessions to any borough other than a county borough after the passing of the Local Government Act 1888, does not affect the powers, duties or liabilities of the county council as regards that borough, nor exempt the parishes in the borough from being assessed to county rate for any purposes to which such parishes were previously liable to be assessed.

When a borough is a county of itself the council appoint a sheriff on the 9th of November in every year. And where the borough has a separate court of quarter sessions the council appoint Sheriff a fit and proper person, not an alderman or councillor, to coroner. be the borough coroner, who holds office during good behaviour. If the borough has a civil court the recorder, if there is one, is judge of it. If there is no recorder, the judge of the court is an officer of the borough appointed under the charter.

The provisions of the Municipal Corporations Act 1882 relate chiefly to the constitution of the municipal corporation. It does not itself confer many powers or impose many duties Power to upon the council as a body. It does, however, enable a acquire municipal corporation to acquire corporate land and j aa d. buildings, the buildings including a town hall, council house, justices' room, police stations and cells, sessions house, judges' lodgings, polling stations and the like. The council may borrow money for the erection of such buildings; they may acquire and hold land in mortmain by virtue of their charter, or with the consent of the Local Government Board. Corporate land cannot be alienated without the consent of the same board. The council may convert corporate land, with the approval of the Local Govern- ment Board, into sites for workmen's dwellings.

Another duty imposed upon a borough council by the act of 1882 is the maintenance of bridges within the borough which are not repairable by the county in which the borough is Borough locally situate. It may here be mentioned that a city bridges. or borough which is a county of itself is liable at common law to repair all public bridges within its limits. In a borough which is not a county of itself the inhabitants are only liable to repair bridges within the borough by immemorial usage or custom.

Of the other powers possessed by the council of a borough under the

act of 1882, one of the most important is the power to make by-laws for the good rule and government of the borough, By-laws. and for the prevention and suppression of nuisances not already punishable in summary manner by virtue of an act in force throughout the borough. It will be observed that these by-laws are of two classes. The former do not come into force until the expiration of forty days after a copy of them has been sent to the secretary of state, during which forty days the sovereign in council may disallow any by-law or part thereof. The latter require to be confirmed by the Local Government Board.

Under the act of 1882 every municipal borough might have its own separate police force. As has already been stated when dealing with county councils, boroughs having a population of less than 10,000 according to the census of 1881 can no longer have a

separate police force. But for some time before that year it had become the rule not to grant to any new borough with a population Pnllce °^ ‘ ess tnan 20 > 000 a separate police force. The subject of

police is separately treated in the Encyclopaedia Britan- nica, and it is not necessary to supplement what is there stated. Under an act of 1893 the borough police may, in addition to their ordinary duties, be employed to discharge the duties of a fire brigade.

The powers and duties of a borough council in the Municipal Corporations Act do not arise or exist to any great extent under The dis- tnat act – I n a ˆ ew cases > those namely of county trict and boroughs, the councils have the powers of county the district councils. In the quarter sessions boroughs other than counc . coun ty boroughs they have some only of these powers. But in every case the council of the borough have the powers and duties of an urban district council, and, except where they derive their authority from local acts, it may be said that their principal powers and duties consist of those which they exercise or perform as an urban council. These will now be considered.

Before the year 1848 there was not outside the municipal boroughs any system of district government in England. It is true that in some populous places which were not corporate boroughs local acts of

parliament had been passed appointing im- provement commissioners for the government of these places. In many boroughs similar acts had been obtained conferring various powers relating to sanitary matters, streets and highways and the like. But there was no general system, nor was there, save by special legislation, any means by which sanitary districts could be constituted. In the year 1848 the first Public Health Act was passed. It provided for the formation of local boards in boroughs and populous places, such places outside boroughs being termed local government districts. In boroughs the town council were generally appointed the local board for purposes of the act. It was not, however, until 1872 that a general system of sanitary districts was adopted. By the Public Health Act of that year the whole country was mapped out into urban and rural sanitary districts, and that system has been maintained until the present time, with some important changes introduced by the Public Health Acts 1875 to 1907, and the Local Government Act 1894.

The whole of England and Wales is divided into districts, which are either urban or rural. Urban districts include boroughs and _ … places which were formerly under the jurisdiction of local Cons / u- boards or improvement commissioners. The power to constitute new urban districts is now conferred upon county councils, as already stated. There is a concurrent power in the Local Government Board under the Public Health Act 1875, but that power is now rarely exercised, and new urban districts are in practice created only by orders of county councils made under the Local Government Act 1888, section 57. Rural districts were first created in 1872. Before that time there was practically no sanitary authority outside the urban district, for although the vestry of a parish had in some cases power to make sewers and had also some other sanitary powers, there was no authority for such a district as now corresponds to a rural district. There were, indeed, highway boards and burial boards which had powers for special purposes, but district authority in the sense in which it is now understood there was none. Before the year 1894 the rural district consisted of the area of the poor-law union, ex- clusive of any urban district which might be within it, and the guardians of the poor were the rural sanitary authority. Since 1894 this has been changed. By the Local Government Act of that year the guardians ceased to be the rural sanitary authority. The union was preserved as the rural sanitary district, with this qualification, that if it extended into more than one county it was divided so that no rural district should extend into more than one county. Rural district councillors are elected for each parish in the rural district, and they become by virtue of their office guardians of the poor for the union

comprising the district, so that there is now no election of guardians in a rural district. Guardians are still elected as such for urban districts, but the rural district council have ceased to be the same body as the guardians and are now wholly distinct. A district councillor, whether urban or rural, holds office for a term of three years. One-third of the whole council retire in each year, the annual elections being held in March, but there may be a simultaneous retirement of the whole council in every third year if the county council at the instance of the district council so order. The qualification and disqualification of district councillors, whether urban or rural, now depend upon the Local Government Act 1894. Property qualification is abolished. Any person may be elected who is either a parochial elector of some parish within the district or has during the whole of the twelve months preceding his election resided in the district, and no person

(ton of district councils.

United districts.

is disqualified by sex or marriage. The electors both in urban and rural districts are the body called the parochial electors. These are practically the persons whose names appear in the parliamentary register or in the local government register as being entitled to vote at elections for members of parliament or county or parish councillors as the case may be. The election takes place subject to rules made by the Local Government Board, these rules being largely founded upon adaptations of the Municipal Corporations Act 1882. The election is by ballot on the same lines as those prescribed for a municipal election, and the Corrupt Practices Act, the pro- visions of which have been referred to when dealing with county councils, applies to the elections of district councils. The provisions with reference to election petitions, the grounds upon which they may be presented and the procedure upon them, are the same in every respect as have already been mentioned when dealing with county councils. It may be convenient here to state that the Local Government Board has power to unite any number of districts or parts of districts into what is called a united district for certain special purposes such as water-supply, sewerage or the like. This is done by means of a provisional order made by the board and confirmed by parliament. In such a united district the governing body is a joint board constituted in manner provided by the order, and it has under the order such of the powers of a district council as are necessary for the purposes for which the united district is created. Thus a joint sewerage board would generally be invested by the order with all the powers of a

district council relating to the provision and control of sewers and the disposal of sewage. It may also be convenient here to mention another special kind of district authority, that is, a port sanitary authority. It is also constituted by order u

*of the Local Government Board, and it may include one sa JL *S or more sanitary districts or parts of districts abutting au ° y ‘ upon a port. In this case also the authority consists of such members and is elected in such manner as the order determines, and it has such of the powers of an ordinary district council as the order may confer upon it. These relate for the most part to nuisances and infectious disease, having special reference to ships. It has been thought convenient to deal here with district councils, whether urban or rural, together, but the powers of the former are much more extensive than those of the latter, and ˆJˆtTL”’ as the consideration of the subject proceeds it will be*

urban and rural

necessary to indicate what powers and duties are con- ..

ferred or imposed upon urban district councils only. com g arel i It must be pointed out, however, that when the necessity arises for conferring upon a rural district council any of the powers exercisable only by an urban district council, that can be done by means’ of an order of the Local Government Board. The necessity for this provision arises because it sometimes happens that in a district otherwise rural there are some centres of population, hardly large enough to be constituted urban districts, which nevertheless require the same control as an urban district.

A district council may from time to time make regulations with respect to summoning, notice, place, management and adjournment of their meetings, and generally with respect to the _ transaction and management of their business. Three nˆ” 58 members must be present to constitute a quorum. At the office* annual meeting, which is held as soon as convenient after the 15th April in each year, a chairman for the succeeding year has to be appointed. He presides at all meetings, and in his absence another member appointed by the meeting takes his place. Ques tions are determined by the majority present and voting, the chair- man having the casting vote. Minutes are taken and, if signed at the meeting or the next ensuing meeting, are made evidence. The officers of the council consist of a clerk, a medical officer, a surveyor, one or more inspectors of nuisances and a treasurer. Of these all but the medical officer of health and*

inspectors of nuisances hold office at pleasure and receive such remuneration as the council may determine. If the urban district is a borough, the town clerk and borough treasurer fulfil the same office for purposes of the Public Health Acts. The salaries of the medical officer of health and inspectors of nuisances are, as to one moiety thereof, paid out of " the exchequer contribution account " by the county council, if they are appointed in accordance with the requirements of the Local Govern- ment Board as to qualification, appointment, duties, salary and tenure of office. The orders of the Local Government Board as to these matters are set out in the Statutory Rules and Orders. District councils may also employ such other officers and servants as may be necessary and proper for the fulfilment of their duties. Officers and servants are prohibited from being concerned or interested in any bargain or contract made with their council, and from receiving under cover of their office or employment any fee or reward whatso- ever other than their proper salaries, wages and allowances, under penalty of being rendered incapable of holding office under any district council, and of a pecuniary penalty of £50. There are some exceptions to this provision somewhat similar to those already mentioned with respect to the disqualification of members of the council. It may be mentioned here that by an act, called the Public Bodies' Corrupt Practices Act 1889, severe penalties are imposed alike upon members and officers of public bodies for corruption in office.

Coni- mtttees,

Public Health

Acts.

'A district council may appoint committees consisting wholly or partly of members of their own body for the exercise of any powers which in their opinion can properly be exercised by such committees. Such committees do not, however, hold office beyond the next annual meeting of the council, and their acts must be submitted to the council for their approval. If they are appointed for any purposes of the Public Health or Highway Acts, the council may authorize them to institute any proceedings or do any act which the council

might have instituted or done, other than the raising of any loan or the making of any rate or contract. A rural district council may delegate their entire powers in any parish to a parochial committee. Such committee may consist wholly of members of their own body or of members of the parish council, or partly of members of both. Such a committee may be subject to any regulations and restrictions imposed upon it by the rural district council.

In dealing with the powers and duties of district councils it will be convenient to treat of these first as they arise under the Public Health Acts, and afterwards as they arise under other statutes. In so far as such powers and duties are common to urban and rural district councils alike they will be referred to as appertaining to district councils. When reference is made to any power or duty of an urban council it is to be understood that the rural council have no such power or duty unless conferred or imposed upon them by order of the Local Govern- ment Board. And it must be borne in mind that in a borough the borough council is the urban district council.

The district council are required to cause to be made such sewers as may be necessary for effectually draining their district. This duty may be enforced by the Local Government Board on Sewerage com pl a int made to them that the council have failed in ^° , performing it, and in the case of a rural district by the

ra aage. county counc ;i on complaint of the parish council. All sewers, whether made by the council, by their predecessors, or by private persons, vest in the district council, that is to say, become their property, with some exceptions, of which the principal is sewers made by a person for his own profit. The owner or occupier of any premises is entitled as of right to cause his drain to be con- nected with any sewer, on condition only of his giving notice and complying with the regulations of the council as to the mode in which the communication is to be made, and subject to the control of any person appointed by the council to superintend the work. Moreover, the owner or occupier of premises without the district has the same right, subject only to such terms and conditions as may be agreed or, in case of dispute, settled by justices or by arbitra- tion. If a house does not possess a sufficient drain, the occupier may be required to provide one, and to cause it to discharge into a sewer if there is one within ioo ft. of the house, otherwise into a cesspool, as the council may direct. In the case of new houses, these may not be built or occupied in an urban district without their being first provided with sufficient drains as the council may require; and in an urban district it is forbidden to cause any building to be newly erected over a sewer

without the consent of the council. For the purpose of sewage disposal a district council may construct any works and contract for the use or purchase or lease of any land, buildings, engines, materials or apparatus, and contract to supply for a period not exceeding twenty-five years any person with sewage. It may be pointed out here that these expressions are defined by the act, the effect of the definitions being shortly that a drain is a conduit for the drainage of one building or of several within the same curtilage, while a sewer comprises every kind of drain except that which is covered by the definition of a drain as above stated. The result has been that district councils frequently find themselves in the position of being responsible for the repair and condition of drains which, by reason of having been laid for more than one house, are sewers vested in and repairable by them. An attempt was made to remedy this state of things by the Public Health Amendment Act 1890, section 19, but the remedy so provided was very partial, and may be said to be confined to the case where two or more houses belonging to different owners are drained into a common drain laid under private land, and ultimately discharging into a sewer in a road or street.

The district council are charged with the duty of enforcing the provision of proper sanitary accommodation (water-closets, privies, „ ashpits, &c.) for all dwelling-houses, new or old, and

”” T . f° r factories, and the maintenance of such conveniences dation for m P ro P er condition. The urban council have power to houses provide and maintain and make provision for the regu- lation of urinals, water-closets, earth-closets, privies, ashpits and other similar conveniences for public accommodation. In the event of a complaint being made to a district council that any drain, closet, privy, ashpit or cesspool is a nuisance or injurious to health, the council may empower their surveyor to enter and examine the premises, and, if the complaint is well founded, they may require the owner to do the necessary works. The district council are not Removal bound to undertake the removal of house refuse from of refuse P renl ises, or the cleansing of closets, privies, ashpits and cesspools. They may, however, undertake these duties, and, if the Local Government Board require, they must do so. An urban council and a rural council, if invested with the requisite power

by the Local Government Board, may, and when required by order of that board must, provide for the proper cleansing of streets, and may also provide for the proper watering ofstreets. When they have undertaken, or are required to perform these duties, a penalty is

imposed upon them for neglect. If they do not undertake these duties, they may make by-laws imposing on the occupiers of premises the duty of cleansing footways and pavements, the removal of house refuse, and the cleansing of earth-closets, privies, ashpits and cesspools; and an urban council may also make by-laws for the prevention of nuisances arising from snow, filth, dust, ashes and rubbish, and for the prevention of the keeping of animals on any premises so as to be injurious to health. The keeping of swine in a dwelling-house, or so as to be a nuisance, is made an offence punishable by a penalty in an urban district, as also is the suffering of any waste Or stagnant water to remain in any cellar, or within any dwelling-house after notice, and the allowing of the contents of any closet, privy or cesspool to overflow or soak therefrom. Provision is also made for enforcing the removal of accumulations of manure, dung, soil or filth from any premises in an urban district, and for the periodical removal of manure or other refuse from mews, stables or other premises.

With regard to water-supply, district councils have extensive powers. They may provide their district or any part of it with a supply of water proper and sufficient for public and „„. . private purposes, and for this purpose they may con- “. r ”

struct and maintain waterworks, dig wells, take on SU PPY- lease or hire any waterworks, purchase waterworks or water, or right to take or convey water either within or without their district, and any rights, powers and privileges of any water company, and contract with any person for the supply of water. They may not, however, commence to construct waterworks within the limits of supply of any water company empowered by act of parliament or provisional order to supply water without giving notice to the company, and not even then so long as the company are able and willing to supply the necessary water. Any dispute as to whether the company are able and willing has to be settled by arbitration. Where the council do supply water, they have the same powers of carrying mains under streets or through private lands as they have with respect to the laying of sewers, as already mentioned. They can charge water rents which depend upon agreements with con.- sumers, or they may charge water rates assessed on the net annual value of the premises supplied. It is to be observed that they are not bound to charge for a supply of water at all, unless they are required to do so in an urban district by at least ten persons, rated to the poor rate, or in a parish in a rural district by at least five persons so rated in the parish. Even then the amount of the rate is left to the council, any deficiency in the cost of the water, in so far as it is not defrayed out of water rates

or rents, being borne in an urban district by the general district rate, and in a rural district by the separate sanitary rates made for the parish or contributory place supplied. For the purpose of enabling them to supply water, most of the provisions of the Waterworks Clauses Acts are incdr- porated with the Public Health Act, and are made available for the district council. They are empowered to supply water by measure if they think fit, and may charge a rent for water-meters. The power of the_ district council to supply water is strictly limited to their own district, but they may, with the sanction of the Local Govern- ment Board, supply water to the council of an adjoining district on such terms as may be agreed upon, or as, in case of dispute, may be settled by arbitration. If any house is without a sufficient supply, and it appears that a supply can be furnished at a reasonable cost, as defined in the Public Health Act and the Public Health Water Act 1878, the owner may be required to provide the supply, and, if he fails, the council may themselves provide the supply and charge the owner with the cost. All public sources of water-supply such as streams, pumps, wells, reservoirs, conduits, aqueducts and works used for the gratuitous supply of water to the inhabitants of the district are vested in the council, who may cause all such works to be maintained and plentifully supplied with pure and wholesome water for the gratuitous use of the inhabitants, but not for sale by them. The council may supply water to public baths or wash- houses, or for trade or manufacturing purposes. In the case of the former the supply may be gratuitous. In the latter case it is to be on terms agreed between the parties. The urban council are required to cause fire-plugs, and all necessary works, machinery and assistance for securing a supply of water in case of fire, to be provided and maintained, and for this purpose they may enter into an agreement with any water company or person. Provision is made for preventing the pollution of water by gas refuse and enabling a district council, with the sanction of the attorney-general, to take any proceedings they may think fit for preventing the pollution of any stream in their district by sewage. The district council are also empowered to obtain an order of justices directing the closing of any well, tank or cistern, public or private, or any public pump the water from which is likely to be used for drinking or domestic purposes, or for manufacturing drinks for the use of man, if such water is found to be so polluted as to be injurious to health.

Power is given to prohibit the use as dwellings of any cellars, vaults or underground rooms built or occupied after 1875, and with regard to such cellars as were occupied as dwellings before 1875,

the continued occupation of these is also forbidden unless they comply with certain stringent requirements as to the height of _ _ the rooms, height of the ceilings above the surface of

~. Hi the street, open areas in front, effectual drainage, sanitary

ngs ‘ conveniences appurtenant to the cellars, and the provision of fireplaces.

District councils are required to keep a register of the common lodging-houses in their district. No person is allowed to keep a common lodging-house unless he is registered, and a Lommon jj OUse mav not be registered until it has been inspected “”’” and approved for the purpose by an officer of the council. oases. Further, the council may refuse to register a keeper unless they are satisfied of his character and of his fitness for the position. The council are empowered to make by-laws for fixing the number of lodgers and separating the sexes therein, promoting cleanliness and ventilation, giving of notices and taking precautions in case of any infectious disease, and generally for the well-ordering of such houses. The keepers of common lodging-houses are required to limewash their walls and ceilings in the months of April and October in every year, and if paupers or vagrants are received to lodge, they may be required to report as to the persons who have resorted thereto. They must give notice of any infectious disease to the medical officer of health and to the poor-law relieving officer, and they must give free access for inspection. There is no definition of the expression ” common lodging-house ” in the Public Health Acts, and at one time the courts decided that shelters for the destitute kept by charitable persons were not common lodging-houses. That idea is now exploded, and the acts apply to charitable institutions which receive persons of the class ordinarily received into common lodging-houses.*

By-laws may also be made relating to houses let in lodgings

which are not common lodging-houses. These by-

Mouses j awg are j n pract ; ce limited to those inhabited by

*/ dJlnn-s * e P oorer classes, although the act imposes no such*

o gi gs. res triction.

The Public Health Acts 1875 to 1907 contain elaborate provisions for dealing with nuisances. Those which are dealt with summarily „ are thus enumerated: — (1) any premises in such a state

Nuisances. ag tQ ˆ a nyˆˆg or injurious to health ; (2) any pool, ditch, gutter, watercourse, privy, urinal, cesspool, drain or ashpit so foul or in such a state as to be injurious to health ; (3) any animal so kept as to be a nuisance or injurious to health; (4) any accumulation or deposit which is a nuisance or injurious to health; (5) any house or part of a house so overcrowded as to be dangerous or injurious to the health of the inmates, whether or not members of the same family; (6) any factory, workshop or workplace not already under the operation of any general act for the regulation of factories or bakehouses not kept in a cleanly state or not ventilated in such a manner as to render harmless as far as practicable any gases, vapours, dust or other impurities generated in the course of the work carried on therein that are a nuisance or injurious to health, or so overcrowded while work is carried on as to be dangerous or injurious to the health of those employed therein; (7) any fireplace or furnace which does not as far as practicable consume the smoke arising from the com- bustible used therein, and which is used for working engines by steam or in any mill, factory, dye-house, brewery, bakehouse or gas work, or in any manufacturing or trade process whatsoever; and (8) any chimney not being the chimney of a private dwelling-house sending forth black smoke in such quantity as to be a nuisance. The nuisances above enumerated are said to be nuisances liable to be dealt with summarily. It is the duty of every district council to inspect their district with a view to the discovery of any such nuisances. In the event of such discovery by them or of informa- tion given to them of the existence of any such nuisance, the district council are required to serve a notice requiring the abatement of the nuisance on the person by whose act, default or sufferance it arises or continues, or if such person cannot be found, on the owner or occupier of the premises at which the nuisance arises. The notice must require the abatement of the nuisance within a specified time, and must prescribe the works which in the opinion of the council are necessary to be done. If the nuisance arises from the absence or defective construction of any structural convenience, or if there is no occupier of the premises, the notice must be served upon the owner. If the person who causes the nuisance cannot be found, and it is clear that the nuisance does not arise or continue by the act, default or sufferance of the owner or occupier of the premises, the local authority may themselves abate the nuisance without further order. If the person on whom the notice is served objects to give effect to it,

he may be summoned before justices, and the justices may make an Order upon him to abate the nuisance, or prohibiting the recurrence of the nuisance if this is likely, and directing the execution of the necessary works. If the nuisance is such as to render a dwelling-house unfit for human habitation, the justices may close it until it is rendered fit for that purpose. Disobedience under the order of justices involves a penalty and a daily penalty for every day during which default continues. Private persons may complain to justices in respect of nuisances by which they are personally aggrieved, and if the district council make default in doing their duty, the Local Government Board may authorize any officer of police to institute any necessary proceedings at the cost of the defaulting council. The

Unsound meat

district council may, if in their opinion proceedings before justices afford an inadequate- remedy, take proceedings in the high court, but in that case, if the nuisance is of a public nature, they must proceed by action in the name of the attorney-general. The provisions as to nuisances are extended to ships by an act of 1885.

It is forbidden to establish within an urban district without the consent of the council any offensive trade, business or manufacture. With regard to any offensive trade which has been established or may be consented to in any urban district, if it is verified by the medical officer or any two legally qualified medical practitioners, or by any ten inhabitants of the district, to be a nuisance or injurious to health, the urban district council are required to take proceedings before magistrates with a view to the abatement of the nuisance complained of.

Any medical officer or inspector of nuisances may inspect any meat, &c, exposed for sale or deposited in any place for the purpose of sale or of preparation for sale and intended for the food of man. This power of inspection is, in districts where the Public Health Act 1890 has been adopted, extended to all articles intended for the food of man. If upon such inspection the meat, &c, appears to be diseased, unsound or unwholesome, it may be taken before a justice for the purpose of being condemned, and the person to whom the meat, &c, belongs or in whose possession it was found is liable to a penalty or, in the discretion of the justices, to imprisonment for three months without the option of a fine. .

The Public Health Acts contain important provisions relating to infectious disease. Any person who knows he- is suffering from an

infectious disease must not carry on any trade or business . . ., • unless he can do so without risk of spreading the disease. wjLff-gi' Local authorities may require premises to be cleansed and disinfected ; they may order the destruction of bedding, clothing or other articles which have been exposed to infection; they may provide proper places for the disinfection of infected articles free of charge ; they may provide ambulances, &c In the case of a person found suffering from infectious disease who has not proper lodging or accommodation, or is lodging in a room occupied by more than one family, or is on board any ship or vessel, such person may by means of a justice's order be removed to a hospital; a local authority may pay the expenses of a person in a hospital or, if necessary, provide nursing attendance; any person exposing himself or any other in his charge while suffering from infectious disease, or exposing infected bedding, clothing or the like, is made liable to a penalty. Owners and drivers of public conveyances must not knowingly convey any person suffering from infectious disease, and if any person suffering from such a disease is conveyed in any public vehicle the owner or driver as soon as it comes to his knowledge must give notice to the medical officer. It is also forbidden to let houses or rooms in which infected persons have been lodging, or to make false statements to persons negotiating for the hire of such rooms. An act was passed in the year 1890, called the Infectious Diseases Prevention Act. When adopted it enabled an urban or district council to obtain the inspection of dairies where these were suspected to be the cause of infectious disease, with a view to prohibiting the supply of milk from such dairies if the fact were established. The act of 1907 extended the provisions of the act of 1890. It enables a local authority to require dairymen to furnish a complete list of sources of supply if the medical officer certifies that any person is suffering from infectious disease which he has reason to suspect is attributable to milk supplied within his district. It also compels dairymen to notify infectious diseases existing among their servants. The act of 1890 also forbids the keeping for more than forty-eight hours of the bod}' of a person who has died of infectious disease in a room used at the time as a dwelling-place, sleeping-place or workshop. It provides for the bodies of persons dying of infectious diseases in a hospital being removed only for burial, and gives power to justices in certain cases to order bodies to be buried. The diseases to which the act applies are smallpox, cholera, membranous croup, erysipelas, scarlatina or scarlet fever, typhus, typhoid, enteric, relapsing, continued or puerperal fever, and any other infectious disease to which the act has been applied by the local authority of the district in the prescribed manner. The most important provision, however, relating to

infectious disease is that contained in the Infectious Disease Notification Act 1 889. That was originally an adoptive act, but it is now extended to all districts in England and Wales. It requires the notification to the medical officer of health of the district of every case in which a person is suffering from one of the diseases above mentioned. The duty of notification is imposed upon the head of the family, and also upon the medical practitioner who may be in attendance on the patient. The medical attendant is entitled to receive in respect of each notification a fee of 2s. 6d. if the case occurs in his private practice, and of is. if the case occurs in his practice as medical officer of any public body or institution. These fees are paid by the urban or rural district council as the case may be. The provisions as to notification are applied to every ship, vessel, boat, tent, van, shed or similar structure used for human habitation in like manner as nearly as may be as if it were a building. Exception is made, however, in the case of a ship, vessel or boat belonging to a foreign government. It is not too much to say that this act has been one of the most effectual

means of preventing the spread of infectious disease in modern times.

The district council are empowered to provide hospitals or temporary places for the reception of the sick. They may build them, „ ... contract for the use of them, agree for the reception of Hospitals. tne g j ck m h a bitants of their district into an existing hospital, or combine with any other district council in providing a common hospital. As has already been mentioned when dealing with county councils, if a district council make default in providing hospital accommodation, the county council may put in operation the Isolation Hospitals Act. The power given to provide hospitals must be exercised so as not to create a nuisance, and much litigation has taken place in respect of the providing of hospitals for smallpox. Up to the present time, however, the courts have refused to accept as a principle that a smallpox hospital is necessarily a source of danger to the neighbourhood, and for the most part applications for injunction on that ground have failed.

Where any part of the country appears to be threatened with or is affected by any formidable epidemic, endemic or infectious disease,

the Local Government Board may make regula- Epldemlcs. t ; ons f or tne s p eet jy interment of the dead, house-to- house visitation, the provision of medical aid and accommodation, the promotion of cleansing, ventilation and disinfection, and the guarding against the spread of disease. Such regulations are made and enforced by the district councils. The provisions of the Public Health Acts relating to infectious disease are for the most part extended to ships by an act of the year 1885.

District councils may, and if required by the Local Government Board, must provide mortuaries, and they may make by-laws with respect to the management and charges for the use of Mortuaries. tne same . Where the body of a person who has died of an infectious disease is retained in a room where persons live or sleep, or the retention of any dead body may endanger health, any justice on the certificate of a medical practitioner may order the re- moval of a body to a mortuary and direct the body to be buried within a time limited by the friends of the deceased or in their default by the relieving officer. A district council may also provide and maintain a proper place (otherwise than at a workhouse or at a mortuary) for the reception of dead bodies during the time required to conduct any post mortem examination ordered by a coroner.

Under an act of 1879 the district council have power to provide and maintain a cemetery either within or without their district, c H and they may purchase or accept a donation of land

Cemeteries. £ of tnat p Ur p 0se The provisions of the Cemeteries

Clauses Act 1847 apply to a cemetery thus provided. These cannot all be referred to here, but it may be noted that no part of the cemetery need be consecrated, but that if any part is, such part is to be defined by suitable marks, and a chapel in con- nexion with the Established Church must be erected in it. A chaplain must also be appointed to officiate at burials in the consecrated portion. The power to provide a cemetery under the act under con- sideration must not be confounded with that of providing a burial ground under the Burial Acts. These acts will be mentioned later in connexion with the powers of parish councils, for in general they are adopted for a parish, part of a parish or combination of parishes, and are administered by a burial board, except where that body has been superseded by a parish council or joint committee. It may be mentioned, however, that under the Local Government Act 1894, where a burial board district is wholly in an urban district, the urban council may resolve that the powers, duties and liabilities of the

burial board shall be transferred to the council, and thereupon the burial board may cease to exist. And it is provided by the same act that the Burial Acts shall not hereafter be adopted in any urban parish without the approval of the urban council. The distinction between a burial ground provided under the Burial Acts and a cemetery provided under the act of 1879 is important in many ways, of which one only need be mentioned here — the expenses under the Burial Acts are paid out of the poor rate, while the expenses under the act of 1879 are paid in an urban district out of the general district rate, the incidence of which differs materi- ally from that of the poor rate, as will be seen hereafter.

In an urban district the urban council have always had all the powers and duties of a surveyor of highways under the Highway „. . Acts. But before 1894 a rural district council had no

Hg ways. p 0wer or duty in respect of highways except in a few cases where, by virtue of a provision in the Highway Act 1878, the rural sanitary authority of a district coincident in area with a highway district were empowered to exercise all the powers of a a highway board. Except in these cases the highway authority in a parish was the surveyor of highways, elected annually by the inhabitants in vestry, or in a highway district consisting of a number of parishes united by order of quarter sessions, the highway board composed of waywardens representing the several parishes. By the Local Government Act 1894, there were transferred to the district council of every rural district all the powers, duties and liabilities of every highway authority, surveyor or highway board within their district, and the former highway authorities ceased to exist. The highway authority in every district, rural as well as urban, is there- fore the district council. Of the chief duties of a district council with regard to highways, the first and most obvious is the duty to repair.

This duty was formerly enforceable by indictment of the inhabitants of the parish, but it is not quite clear whether this procedure is applicable, now that the liability to repair is transferred to a council representing a wider area. Under the Highway Acts it is enforceable by summary proceedings before justices and by orders of the county council, but in either case, if the liability to repair is disputed, that question has to be decided on indictment preferred against the high- way authority alleged to be in default. In a rural district any parish council may complain to the county council that the district council have made default in keeping any highway in repair, and the county council may thereupon transfer to themselves and execute the powers of the district council at the cost of the latter body, or they may

make an order requiring the district council to perform their duty, or they may appoint some person to do so at the cost of the district council. It is important to observe, however, that an action does not lie against a district council in respect of the failure to repair a highway even at the suit of a person who has thereby been injured. The reason assigned for this doctrine is that the council as highway surveyor stand in the same position as the inhabitants of the parish, against whom such an action would not lie. The district council are, however, liable for any injury caused through negligence on the part of their officers or servants in carrying out the work of repair.

But while rural as well as urban district councils have the powers and duties of surveyors of highways, the provisions of the Public Health Acts relating to streets apply only in urban streets districts, except in so far as the Local Government Board may by order have conferred urban powers upon a rural district council. These provisions have now to be referred to. It may be convenient to state that the expression "street " is here used in a sense much wider than its ordinary meaning. It is defined by the act to include any highway and any public bridge (not being a county bridge), and any road, lane, footway, square, court, alley or passage, whether a thoroughfare or not. For certain purposes streets as thus defined are divided into two classes, viz. those which are and those which are not highways repairable by the inhabitants at large. But it has to be borne in mind that it is not every highway that is repairable by the inhabitants at large. Before the year 1836 as soon as a way was dedicated to public use and the public had by user signified their acceptance of it, it became without more notice repairable by the parish. Therefore every highway — whether carriage-way, driftway, bridleway or footway — ■ which can be shown to have been in use before 1836, is presumably repairable by the inhabitants at large, the only exceptions being such highways as are repairable by private persons or corporate bodies ratione clausurae, ratione tenurae, or by prescription. But in the year 1836, when the Highway Act 1835 came into operation, the law was altered. It was possible, just as formerly, to dedicate a way to the use of the public, and it thereupon became a highway to all intents and purposes. But mere dedication did not make the way repairable by the public. That result was not to follow unless certain stringent requirements were fulfilled. When it is shown, therefore, that a highway has been dedicated after 1836, it is not repairable by the inhabitants at large unless it can be shown that these provisions have been complied with, or that it has been declared to be repairable under provisions of the Public Health Acts presently to be mentioned. (There was also power given to justices,

by the Highway Act 1862, to declare a private road or occupation road in a highway district to be a public highway repairable by the parish ; but this power does not appear to have been acted upon to any extent.)

All streets being highways repairable by the inhabitants at large within an urban district, are vested in and under the control of the urban council. After much litigation it has now been established that this provision does not give the council an absolute property in the soil of the street, but merely such a qualified property in the surfaces as enables them to exercise control. The urban council are required from time to time to cause all such streets to be made up and repaired as occasion may require, and they are empowered to raise, lower or alter the soil of the street, and to place and keep in repair fences and posts for the safety of foot-passengers. The other class of streets consists of those which are not highways repairable by the inhabitants at large. Under the Public Health Act 1875 such streets may be dealt with in manner following:— If any such street or part thereof is not sewered, levelled, paved, metalled, flagged, channelled, made good or lighted to the satis- faction of the council, the council may cause it to be made up at the expense of the owners of premises fronting the street in pro- portion to their several frontages. When all or any of the works aforesaid have been executed in the street, and the council are of opinion that the street ought to become a highway repairable by the inhabitants at large, they may by notice to be fixed up in the street declare it to be a highway repairable by the inhabitants at large, and the declaration will be effective unless, within one month after the notice has been put up, the majority of the owners in the street object thereto. An alternative procedure has been provided by the Private Street Works Act, which may be adopted by any urban council. One important point of difference is that under the latter act the council may resolve that the expenses shall be apportioned among the owners not merely according to frontage.

but according to the greater or less degree of benefit to be derived by any premises from the works.

Where a house or building in a street is taken down to be rebuilt, the

urban district council may prescribe the line to which it is to be rebuilt, paying compensation to the building owner for any damage which he may sustain consequent upon the requirement. Save to this extent, no power is given by the general law to a district council to prescribe a building line. But under an act of 1888 it is provided that it shall not be lawful in any urban district without the consent of the urban authority to erect or bring forward any house or building in any street or any part of such house or building beyond the front main wall of the house or building on either side thereof in the same street.

The control exercised by an urban district council over streets and buildings is to a very large extent exercised through by-laws which they are empowered to make for various purposes relating to the laying out and formation of new streets, the erection and construction of new buildings, the provision of sufficient air-space about buildings to secure a free circulation of air, and the provision of suitable and sufficient sanitary conveniences. The manner in which such by-laws are made and confirmed will be hereafter noticed. In general, the by-laws require plans of new streets to be submitted to the council, and they are required to approve or disapprove of these plans within a month. They cannot disapprove of a plan unless it contravenes the provisions of some statute or by-law; but if a person builds otherwise than according to an approved plan he does so at the risk of having his work pulled down or destroyed. Among the miscellaneous powers of an urban council with respect to streets may be mentioned the power to widen or improve, and certain powers incorporated from the Towns Improvement Clauses Act 1847, with respect to naming streets, numbering houses, improving the line of streets, removing obstructions, providing protection in respect of ruinous or dangerous buildings, and requiring precautions to be taken during the construction and repair of sewers, streets and houses. An urban council may also provide for the lighting of any street in their district, and may contract with any person or company for that purpose. If there is no company having statutory powers of supply within their district, they may themselves undertake the supply of gas, and they may purchase the undertaking of any gas company within their district.

An urban council may acquire and maintain lands for the purpose of being used as public walks or pleasure-grounds, and may support or contribute to the support of such walks or grounds if Public provided by any other person. They may also contribute

parks. to tne cost f i a yi n g out, planting or improvement of

lands provided for this purpose by any person, in their own district or outside that district, if it appears that the walks or grounds could eventually be used by the inhabitants of that district. An urban council may also provide public clocks or pay for the reasonable cost of repairing and maintaining any public clocks in the district, though not vested in them.

Where an urban council are the council of a borough, and in other cases with the consent of the owners and ratepayers of the district, they may provide market accommodation for Markets their district. They may not, however, establish any and market so as to interfere with any market already estab-

slaughter- i; s h ec i ; n tne district under a franchise or charter. For houses. purposes of markets certain provisions of the Markets and Fairs Clauses Act 1847 are incorporated with the Public Health Act. The only one of these that need be noticed is that which provides that after the market is opened for public use every person, other than a licensed hawker, who shall sell or expose for sale in any place within the district, except in his own dwelling-place or shop, any articles in respect of which tolls are authorized to be taken shall be liable to a penalty. The tolls which may be taken by an urban council must be approved by the Local Government Board; and any by-laws which they make for the regulation of the market must be confirmed by the same body. An urban council may also provide slaughter-houses and make by-laws with respect to the management and charges for the use of them. Where they do not provide slaughter-houses, all previously existing slaughter-houses have to be registered and new ones licensed; and no person may lawfully use a slaughter-house which is not either registered or licensed. Licences may be suspended by justices in the event of their being used contrary to the provisions of the act or of the by-laws, and on a second conviction the licence may be revoked. On a con- viction of selling or exposing for sale, or having in his possession or on his premises unsound meat, the court may also revoke the licence. .

*Certain police regulations contained in the Town Police Clauses Act 1847 are by virtue of the Public Health Act 1875 in force in all urban districts. These relate to obstructions Hackney an(j nu i san ces in streets, fires, places of public resort, carriages, h ac k ne y carriages and public bathing. An urban council * c- may also license proprietors, drivers and conductors of*

horses, ponies, mules or asses standing for hiring in the district in the same way as in the case of hackney carriages, and they may also

license pleasure boats and vessels, and the boatmen or persons in charge thereof, and they may make by-laws for all these purposes.

Every district council may enter into such contracts as are necessary for carrying into execution the various purposes of the Public Health Acts. A district council being a corporation, the general law applies in the case of a rural council Coat ˆ cts > that they must contract under their common seal, the P urcha f e exception to this rule including the doing of acts very ot toads. frequently recurring or too insignificant to be worth the trouble of affixing the common seal. In the case of an urban council certain stringent regulations are laid down. A contract made by an urban council, whereof the value and amount exceed £50, must be under seal, and certain other formalities must be observed, some of which are imperative; for example, the taking of sureties from the con- tractor, and the making provision for penalties to be paid by him in case the terms of the contract are not observed. Every local authority may also, for purposes of the act, purchase or take on lease, sell or exchange, any lands. Such lands as are not required for the purpose for which they were purchased must, unless the Local Government Board otherwise direct, be sold. Powers of compulsory purchase of lands are also given under the Lands Clauses Acts, but before these can be put in operation certain conditions must be observed. The Local Government Board must make inquiry into the propriety of allowing the lands to be taken, and the power to acquire the lands compulsorily can only be conferred by means of a provisional order confirmed by parliament.

With regard to the by-laws which district councils may make for many purposes, the subjects of which have been already from time to time mentioned, it is only necessary to state that these require to be confirmed by the Local Govern- Hy-laws. ment Board. Such confirmation does not, however, give validity to a by-law which cannot be justified by the provisions of the act, and many by-laws which have been so confirmed have been held to be invalid under the general law as being uncertain, unreasonable or repugnant to the law of the realm. For the guidance of local authorities, the Local Government Board have from time to time issued model series of by-laws dealing with the various subjects for which by-laws may be made, and these are for the most part followed throughout England and Wales.

As a general rule, all the expenses of carrying into execution the Public Health Acts in an urban district fall upon a fund which is called the general district fund, and that fund is provided p by means

of a rate called the general district rate. To iaance. this there are some exceptions. First, in the case of boroughs where from the time of the first adoption of the Sanitary Acts these expenses have been paid out of the borough rate, the expenses continue to be so paid; and in an urban district which was formerly subject to an Improvement Act, the expenses may be payable out of the improvement rate authorized by that act. The general rule, however, prevails over by far the greater part of England and Wales. The general district rate is made and levied on the occupiers of all kinds of property for the time being assessable to any rate for the relief of the poor, subject to a few exceptions and conditions. Of these the first is that the owner may be rated instead of the occupier, at the option of the urban authority, where the value of the premises is under £10, where the premises are let to weekly or monthly tenants, or where the premises are let in separate apartments, or the rents become payable or are collected at any shorter period than quarterly. When the owner is rated he must be assessed upon a certain proportion only of the net annual value of the premises. The owners or occupiers of certain specified properties are assessed in respect of the same m the proportion of one-fourth part only of the net annual value thereof. These properties include tithes, tithe commutation rent charge, land used as arable, meadow or pasture ground only, or as woodlands, market gardens or nursery grounds, orchards, allotments, any land covered with water such as the reservoir of a waterworks company, or used only as a canal or towing-path of the same, or as a railway con- structed under the powers of any Act of Parliament for public conveyance. The reason for these partial exemptions apparently is that sanitary arrangements are made chiefly for the benefit of houses and buildings, while the properties just enumerated do not receive the same amount of benefit. The only other point to be noticed in this connexion is that an urban council may divide their district into parts for all or any of the purposes of the act, rating each part separately for those purposes. The expenses of highways in an urban district fall as a rule upon the general district rate, but under certain conditions, which need not be here set out, a separate highway rate may have to be levied. The urban council have extensive powers of amending the rate, and the rate is collected in such manner as the urban authority may appoint.

The expenses of a rural district council are of two kinds. Of these the first is called general expenses, and it includes the expense of the establishment and officers of the council, of disinfection, providing of conveyance for infected persons, and the expenses of highways.'

These expenses are payable out of a common fund which is raised out of the poor rate of the several parishes in the district, according to the rateable value of each. Special expenses include the expenses of the construction and maintenance and cleansing of sewers, providing water-supply, and all other expenses incurred or payable in respect of a parish or contributory place within the district determined by order of the Local Government

4-4-0

ENGLAND

[LOCAL GOVERNMENT

Board to be special expenses. The expression " contributory place " means a place other than a parish chargeable with special expenses. For the most part it has reference only to what is called a special drainage district, that is to say, a district formed out of one or more parishes or parts of parishes for the purpose of the provision of a common water-supply, or scheme of sewerage, or the like, and in the event of such a district including part only of a parish, the remaining portion would, so far as the special expenses for which the district was created are concerned, be a separate contributory place. These special expenses are chargeable to each parish or contributory place, and they are defrayed by means of special sanitary rates, such rates being raised on all property assessed to the relief of the poor, but with the same exemptions of certain properties as have been menˆ tioned under the head of general district rate in urban districts.

District councils are empowered to borrow with the sanction of the Local Government Board, subject to certain restrictions and „ regulations. The money must be borrowed for permanent

Borrowing wor i CS| ˆhe expenses of which ought in the opinion of the powers. Local Government Board to be spread over a term of years which must not exceed sixty. The sums borrowed must not exceed, with the outstanding loans, the amount of the assessable value for two years of the district for which the money is borrowed; and if the sum borrowed would, with the outstanding loans, exceed the assessable value for one year, the sanction of the Local Government Board may not be given except after local inquiry. The money may be repaid by equal instalments of principal, or of principal and interest, or by means of a sinking fund.

Where the urban council are the council of a borough, their accounts

as urban council are made up and audited in the same Audit ineffective manner as has already been mentioned in

the case of the accounts of the council under the Municipal Corporations Act, but each of the borough auditors receives remuneration for auditing the accounts of the council as urban district council. Where the urban council are not the council of a borough, the accounts are made up annually, and audited by the district auditor in the same effective manner as has already been mentioned in the case of the accounts of a county council. The accounts of a rural district council are made up half-yearly and are audited in the same way.

The Public Authorities Protection Act 1893 was passed to repeal the numerous provisions contained in many acts of parliament, _ˆ whereby, before legal proceedings could be taken against a

r roce public body, notice of action had to be given and the

gs . proceedings commenced within a certain limited time.

dfstatt e act a PP. nes t0 a ” P u bhc authorities, including, of

councils course, district councils, and it provides in effect that where any action or legal proceeding is taken against a council for any act done in pursuance or execution, or intended execution, of an act of parliament, or of any public duty or authority, the action must be commenced within six months next after the act, neglect or default complained of, or in the case of a continuance of injury or damage, within six months next after the ceasing thereof. And it provides further that, in the event of the judgment of the court being given in favour of the council, the council shall be entitled to recover their costs taxed as between solicitor and client. Notice of action is abolished in every case.

Among other acts which are either incorporated with the Public Health Acts or have been passed subsequently to them, one of the most important is the Housing of the Working Classes Act fi£ 1890. It contains three distinct parts. Under the first an*

%, urban district council may, by means of a scheme, acquire,

working rearrange and reconstruct an area which has been proved classes. tQ jˆ msan it arv _ T ne scheme has to be confirmed by the Local Government Board, and carried out by means of a provisional order. The second part of the act deals with unhealthy dwelling-

houses, and requires the urban district council to take steps for the closing of any dwelling-houses within their district which are unfit for human habitation. The third part of the act deals with what is called in the act working-class lodging-houses. But the expression is a little misleading, for it includes separate houses or cottages for the working classes, whether containing one or several tenements, and the expression " cottage " may include a garden of not more than half an acre, provided that the estimated annual value of such garden shall not exceed £3. This part of the act may be adopted by a rural district council, but an urban district council can carry it into execu- tion without formal adoption. Land may be acquired for erecting lodging-houses as above defined, and these, when erected, may be managed and let by the council.

The urban district council may adopt the provisions of the Baths

. and Washhouses Acts, and thereunder provide public

Baths ana jj^jjs, wash-houses, open bathing-places, covered swim-

Aou is ming baths, which they may close in the winter months

se ' and use as gymnasia.

Under the Tramways Act 1870 the urban district council may obtain from the Board of Trade a provisional order authorizing the Tramways construct > on of tramways in their district by themselves. ' Any private persons, and any corporation or company fflay, with the consent of the council, obtain the like authority, but the Board of Trade have power in certain cases to dispense ■with the consent of the local authority. Where the order is obtained

by a person or body other than the district council, the council may purchase the undertaking at the end of twenty-one years after the tramways have been constructed or at the expiration of every subsequent period of seven years, and the terms of purchase are that the person or company must sell the undertaking upon payment of the then value, exclusive of any allowance for past or future profits of the undertaking, or any compensation for compulsory sale or other consideration whatsoever of the tramway, and all lands, buildings, works, materials and plant suitable to and used for the purposes of the undertaking. It should be observed, however, that although the local authority may themselves construct, and may acquire from the original promoters a system of tramways, they may not themselves work them without special authority of the

legislature, and must in general let the working of the undertaking to some person or company.

Under the Borough Funds Act 1872 the urban district council may, if in their judgment it is expedient, promote or oppose any local and personal bill or bills in parliament, or may prosecute or defend any legal proceedings necessary for Bills In the promotion or protection of the interests of the district, Par "- and may charge the costs incurred in so doing to the ™ ea * aa " rates under their control. The power to incur parlia- Je & a JP ro " mentary costs, however, is subject to several important ceeaa S s – restrictions. The resolution to promote or oppose the bill must in the first instance have been carried by an absolute majority of the whole number of the council at a meeting convened by special notice, and afterwards confirmed by the like majority. The resolu- tion must have been published in newspapers circulated in the district, and must have received the consent of the Local Government Board or of a secretary of state, if the matter is one within his jurisdiction; and further, the expenses must not be incurred unless the promotion or opposition has been assented to by the owners and ratepayers of the district assembled at a meeting convened for the purpose of considering the matter, and if necessary, signified by a poll. Moreover, the expenses must, before they can be charged to the rates, be examined and allowed by some person authorized by a secretary of state or the Local Government Board, as the case may be.*

Under the Pawnbrokers Act 1872 the licences to pawnbrokers, which were formerly granted by justices, are now granted by district councils.

Under the Sale of Food and Drugs Acts certain important duties devolve upon medical officers and inspectors of nuisances who are officers of district councils. But for the most part the acts do not impose upon district councils themselves '> """"«'■ any special powers or duties, although, as a matter of fact, prosecutions for offences are usually undertaken by the district councils, and the expenses of the execution of the acts are paid out of their funds. In quarter sessions boroughs, however, where the council have the duty of appointing a public analyst, they are under an obligation to put the acts in force from time to time, as occasion may arise. The acts themselves must be consulted for the procedure, beginning with the taking of samples and ending with the conviction of an offender.*

The powers and duties of a district council under the Rivers Pollution Prevention Act 1876 have been incidentally _. noticed when dealing

with county councils, whose powers « e

Under the Electric Lighting Acts the Board of Trade may license any district council to supply electricity, or may grant to them a provisional order for the same purpose. A similar p . . licence or order may be granted to a private person or hmi company to supply electricity within the district of a "gntmg. district council, but in that case the consent of the district council must be given, unless the Board of Trade, for special reasons, dispense with such consent. These licences are now rarely applied for or granted, and the provisions which were formerly contained in the provisional orders have now been consolidated by the Electric Lighting Cfauses Act 1899, the effect of which will be to make provisional orders uniform for the future. It is now almost the exception, at least in urban districts, to find a district council which has not obtained a provisional order under these acts, and for the most part the undertakings of local authorities in the way of supplying electricity have been very prosperous.

Under the Allotment Acts district councils were empowered to provide allotments for the labouring population of their district, if they were satisfied that there was a demand for allot- ... .

ments, that these could not be obtained at a reasonable ° 7

rent by voluntary arrangement, and that the land could mea ' be let at such a price as would not involve a loss to the council. The district council might acquire land, let it and regulate it, and they might provide common pasture. These powers were, by an act of 1907, transferred to parish councils.

The urbart district council execute the Public Libraries Acts for their district, and the rate for the expenses of the acts, which may not exceed id. in the £, is in a borough in the nature pr, n c of a borough rate, and in any other urban district in libraries the nature of a general district rate. Under the acts not only public libraries, but also public museums, schools for science, art galleries and schools for art, with the necessary buildings,

furniture, fittings and conveniences, may be provided for the in-

habitants of the district. Land may be acquired, and money borrowed, for the purposes of the acts.

A great number of other statutes confer powers or impose duties upon district councils, such as the acts relating to town gardens, agricultural gangs, fairs, petroleum, infant life protection, commons, open spaces, canal boats, factories and workshops, margarine, sale of horse-flesh and shop hours.

Before the passing of the Local Government Act 1894 there was really nothing in the form of local government for a parish. The oarish ˆ t ‘ s ˆ rue ˆat the inhabitants in vestry had certain and the powers. They could adopt various acts, which will be parish more particularly referred to hereafter, and they could council. appoint the persons who were to carry these acts into execution. They elected the churchwardens and overseers, the highway surveyor, if the parish was a separate unit for highway purposes, and the waywardens if it was included in a highway district. But there was nothing in the nature of a representative body exercising any powers of government in the parish regarded as a separate area. Under the act of 1804 this was changed. In every rural parish, that is to say, in every parish which is not included within an urban district, there is a parish meeting, which consists of the parochial electors of the parish. As already stated, these are the persons whose names are on the parliamentary and local government registers. If the parish has a population exceeding 300, a parish council must be elected. If it has a population of 100 or upwards, the county council are bound to make an order for the election of a parish council if the parish meeting so resolves. Where there is no parish council, as will be seen hereafter, the various powers conferred upon a council are exercised by the parish meeting itself. Two or more parishes may be grouped together under a common parish council by order of the county council if the parish meetings of each parish consent. An annual parish meeting in every rural parish must be held on the 25th day of March or within seven days before or after that date; and if there is no parish council, there must be at least one other parish meeting in the year. At the annual parish meeting the parish council, if there is one, is elected, and the members of the council, who originally held office for one year only, now, under a subsequent act, hold office for three years. Any person who is a parochial elector, or who has for twelve months preceding the election resided in the parish, or within 3 m. thereof, may be elected parish councillor, and the number of councillors is to be fixed from time to time by the county council, not being less than five nor more than fifteen. Women, whether married or single, are eligible.

The council are elected in manner provided by the rules of the Local Government Board. The rules now in force will be found in the Statutory Rules and Orders. They are very similar to those which are in force with reference to the elections of district councils, which have already been noticed. If a poll is demanded, it must be taken under the Ballot Act, as applied by the rules, and for all practical purposes it may be taken that the election proceeds in the same manner as that of a district council. The parish council elects a chairman annually. He may be one of their own number, or some other person qualified to be a parish councillor. The council is a body corporate, may hold land in mortmain, and can appoint committees for its own parish or jointly with any other parish council. Among the powers conferred upon a parish council are

we , rs . those of appointing overseers and of appointing and re-appoin yoking the appointment of assistant overseers, Church-oversee . warc ; ens are no longer overseers, and the parish council may appoint as overseers a number of persons equal to the number formerly appointed as overseers and churchwardens. It may be useful to mention here that for purposes of the administration of the poor law, overseers no longer act, their duties in that respect having been superseded by the guardians. They remain, however, the rating authority so far as regards the poor rate and nearly all other rates, the exceptions being the general district rate in an urban district and the borough rate in a borough, made by the town council. They still have power to give relief to poor persons in case of sudden and urgent necessity, but their principal duty is that of rating authority, and they are bound to make out the lists for their parishes of jurors and electors. No payment is made to them. The office is compulsory, but certain persons are privileged from being elected to it. The assistant overseer, who was formerly nominated by the inhabitants and vestry and then formally appointed by justices, is now, as has been stated, appointed by the parish council. He holds office at pleasure, and receives such remuneration as the council fix, and he performs all the duties of an overseer,

: or such of them as may be prescribed by the terms of his appointment, i There may be in a parish a collector of rates appointed, by the i guardians. In that event, an assistant overseer cannot be appointed : to perform the duties of collector of rates, but, on the other hand, I the parish council may invest the collector with any of the powers of an overseer. The parish council may appoint a clerk, who may be ‘ either one of their own number without payment, or the assistant ; overseer, rate collector or some other fit person, with remuneration. j Among_ the duties transferred to parish councils

*may be mentioned, the provision of parish books and of a vestry room or parochial ; office, parish chest, fire engine or fire escape, the holding , or management of parish property, "other than property Tˆf 8 ' relating to affairs of the church or held for an ecclesiastical & n & duties charity, the holding or management of village greens or °*P«" S « of allotments, the appointment of trustees of parochial counc > * s > charities other than ecclesiastical charities in certain cases, and certain limited powers with reference to the supply of water to the parish, the removal of nuisances, and the acquisition of rights of way which are beneficial to the inhabitants.*

*Among the most important of the matters which concern a rural: parish is the administration of what are commonly called the adoptive acts. These include the Lighting and Watching Act, the Baths and Washhouses Acts, the Burial Acts, the Public Lighting Improvement Act and the Public Libraries Acts. The ?S t u Lighting and Watching Act was formerly adopted for a Watching parish, or part of a parish, by the inhabitants in vestry, who elected lighting inspectors, of whom one-third went out of office in every year. The inspectors took the necessary steps for having the parish lighted (the provisions as to watching having been obsolete' for many years), and the expenses of lighting were raised by the overseers upon an order issued to them by the inspectors. The owners and occupiers of houses, buildings and property, other than land, pay a rate in the £ three times greater than that at which the owners and occupiers of land are rated and pay for the purposes of the act. Now this act, like the other adoptive acts, can only be adopted by the parish meeting, and where adopted for part only of a, parish, must be adopted by a parish meeting held for that part. After the adoption of the act it is carried into execution by the parish council, if thereˆ is one, and if not, by the parish meeting, and the expenses are raised in the same manner as heretofore. The Baths and Washhouses Acts have already been 5f**f "ˆ referred to in dealing with district councils, and it is J*"*"" sufficient to say that they are now adopted and ad- "°£ ses ministered in a rural parish in the manner pointed out with reference to the Lighting and Watching Act. The same may he said of the Burial Acts, but these are sufficiently important to require special notice. These acts contain provisions whereby burials may be prohibited in urban districts, and Burial*

churchyards or burial grounds already existing may be Acts '

closed when full. Formerly, when the acts had been adopted by the vestry, it was necessary to appoint a burial board to carry the acta into execution and provide and manage burial grounds. Now, in a,

rural parish which is coextensive with an area for which the acts have been adopted, the burial board is abolished and the acts are administered by the parish council ; and the acts cannot be adopted in a rural parish save by the parish meeting. If the area under a burial board in 1894 was partly in a rural parish and partly in an urban district, the burial board was superseded, and the powers of the board are exercised by a j oint committee appointed partly by the urban district council and partly by the parish council, or parish meeting, as the case may be. In a rural parish where there is no parish council, though the acts are adopted by the parish meeting, it is still necessary to elect the burial board, and that board will be elected by the parish meeting. The distinction between a burial ground under the Burial Acts and a cemetery provided under the Public Health Acts has already been noticed. A burial ground, properly so called, has to be divided into consecrated and unconsecrated portions, and the former really takes the place of the parish churchyard; and the incumbent of the parish church, the clerk, and the sexton continue to receive the same fees upon burials in the consecrated portion as they would have done in the parish churchyard. It has been mentioned that a portion of the burial ground must be left un- consecrated. But this is subject to one important exception, that the parish meeting may unanimously resolve that the whole of the burial ground shall be consecrated. In that case, however, the parish council may, within ten years thereafter, determine that a separate unconsecrated burial ground shall also be provided for the parish. The expenses of the execution of the Burial Acts are pro- vided by the overseers out of the poor rate upon the certificate of the body entrusted with the execution of them. In the event of the acts being adopted for a portion only of a rural parish, the burial board, or the parish meeting, may by resolution transfer all the powers of the board to the parish council.

The Public Improvement Act, when adopted, enables a parish council to purchase or lease, or accept gifts of land for the purpose of forming public walks, exercise or play grounds, and p„ Wfc to provide for the expense by means of a parish improve- j morove . meht rate. Before any such rate is imposed, however, m f nt A ˆ a sum in amount not less than at least half of the estimated cost of the proposed improvement must have been raised by private

subscription or donation, and the rate must not exceed sixpence in

the £.

The Public Libraries Acts enable the authority adopting them to provide public libraries, museums, schools for science, art galleries Public anc ˆ scnoo ‘ s Ior art – The expenses in a rural parish are

Libraries defrayed by means of a rate raised with, and as part of, Acts. tne P oor rate ‘ w ‘ tn a qualification to the effect that agri-

cultural land, market gardens and nursery grounds are to be assessed to the rate at one-third only of their rateable value.

The expenses of a parish council may not, without the consent of a parish meeting, exceed the amount of a rate of threepence in the

Finance :

£ for the financial year; but with the consent of the

parish meeting the limit may be increased to sixpence, of parish exclusive of expenses under the adoptive acts. If it council. ls necessar y to borrow, the consent of the parish meeting and of the county council must be obtained. The expenses are payable out of the poor rate by the overseers on the precept of the parish council.

One of the most important powers conferred upon a parish council is that which enables them to prevent stoppage or diversion of any public right of way without their consent and without the approval of the parish meeting. The council may also complain to the ccunty council that the district council have failed to sewer their parish or provide a proper water-supply, or generally to enforce the provisions of the Burial Acts; and upon such complaint, if ascertained to be well founded, the county council rriay transfer to themselves the powers and duties of the district council, or may appoint a competent person to perform such powers and duties. In a parish which is not sufficiently large to have a parish council, most of the powers and duties conferred or imposed on the parish council are exercised by the parish meeting. It may be convenient here to add that where, under the Local Government Act 1894, the powers of a parisn council are not already possessed by an urban district council, the Local Government Board may by order confer such powers on the urban council. This has been done almost universally, as far as regards the power to appoint overseers and assistant overseers, and in many cases urban councils have also obtained powers to appoint trustees of parochial charities.

The foregoing is a sketch of the scheme of local government carried out in England and Wales. No attempt has been made to deal with poor law (q.v.) or education (q.v.). The General local administration of justice devolving upon the tions. ‘ justices in quarter or petty sessions is hardly a matter of local government, although in one important respect, that, namely, of the licensing of premises for the sale of intoxi- cating liquors, it may be thought that the duties of justices fall within the scope of local government. It will be seen that the scheme, as at present existing, has for its object the simplification of local government by the abolition of unnecessary independent authorities, and that this has been carried out almost completely, the principal exception being that in some cases burial boards still exist which have not been superseded either by urban district councils or by parish councils or parish meetings. There are also some matters of local administration arising under what are called commissions of sewers. These exist for the purpose of regulating drainage, and providing defence against water in fen lands or lands subject to floods from rivers or tidal waters. The commissioners derive their authority from the Sewers Commission Acts, which date from the time of Henry VIII., from the Land Drainage Act 1861, and from various local acts. It is unnecessary, however, to consider in any detail the powers exercised by commissioners of sewers in the few areas under their control.

Authorities. — G. L. Gomme, Lectures on the Principles of Local Government; S. and B. Webb, English Local Government; Redlich and Hirst, Local Government in England; Wright and Hobhouse, Local Government and Local Taxation; W. Blake Odgers, Local Government; Alex. Glen and W. E. Gordon, The Law of County Government; Alex. Glen, The Law relating to Public Health; The Law relating to Highways; W. J. Lumley, The Public Health Acts (6th ed., by Macmorran and Dill) ; Macmorran and Dill, The Local Government Act 1888, &c. ; The Local Government Act 1894, &c; Hobhouse and Fairbairn, The County Councillors’ Guide; Pratt, The Law of Highways (15th ed., by W. Mackenzie) ; Archbold, Law of Quarter Sessions (4th ed., by Mead and Croft) ; J. Brooke Little, The Law of Burials; Archbold, On Lunacy (4th ed., by S. G. Lushington. (A. M«M. ; T. A. I.)

General Bibliography Among earlier works devoted to, or dealing largely with topo- graphy, a few may be mentioned out of a considerable mass. W. Camden, Britannia; sive florentissimorum regnorum Angliae, Scotiae,Hibemiae . . . chorographica descriptio{iˆZ(> and subsequent

editions; in Latin, but translated by several successive writers both in Camden's time and later) ; M. Drayton, Poly-Olbion (a descriptive poem, first issued in a complete form in 1622) ; T. Fuller, History of the Worthies of England (1662); J. Leland, Itinerary, and Collectanea., edited by T. Hearne respectively in 17 10 and 1715; T. Cox and A. Hall, Magna Britannia (1720, based on Camden's Britannia, in English) ; D. Defoe, Tour through the whole Island of Great Britain . . . divided into Circuits or Journeys (1724— 1727); various works of Thomas Pennant, published between 1741 and 1820, and, at the same period, of Arthur Young (topographical treatises on agriculture, &c.) ; W. Gilpin, Observations on Picturesque Beauty made in the Year 1776 in several Parts of Great Britain (1778) ; Essays on Prints and Early Engravings; Western Parts of England (1798), and other works on various districts; Gentleman's Magazine (1731-1868); E. W. Brayley, J. Britton and others, Beauties of England and Wales, or. Original Delineation, Topographical, Historical and Descriptive, of each County (1801-1818; both the authors named wrote other descriptive works on special localities; Britton wrote Architectural Antiquities of Great Britain, 1835); Daniel Lysons (with the collaboration of his brother Samuel), Magna Britannia, Topographical Account of the several Counties of Great Britain (1806- 1822; the counties were taken alphabetically but on the death of Samuel Lysons in 1819 the work was stopped at Devonshire); Sir G. Head, Home Tour in the Manufacturing Districts of England (1835); Nathaniel Hawthorne, English Notebooks (1870). Among modern publications, out of a great mass of works of more or less popular character, there may be mentioned the well-known series of Murray's Guides, in which each volume treats of a county or group of counties.

Early in the 20th century the Victoria History of the Counties of England (dedicated to Queen Victoria) began to appear; its volumes deal with each county from every aspect — natural history, prehistoric and historic antiquities, ethnography, history, economic conditions, topography and sport being dealt with by authorities in all branches. The maps of the Ordnance, Geological and Hydrographic Surveys delineate the configuration and geology of England and the adjacent seas with a completeness unsurpassed in any other country. For ordinary detailed work the best series of maps is found in Bartholo- mew's Survey Atlas of England and Wales (Edinburgh Geographical Institute, 1903), which, besides small distributional, physical and other maps and letterpress? contains a magnificent series of coloured- contour maps on the scale of \ in. to 1 m. (also issued in larger separate sheets).

Statistics of every kind — of climate, agriculture, mining, manufactures, trade, population, births, marriages, deaths, disease, migration, education — are liberally furnished by government agencies.

See also A. J. Jukes-Brown, The Building of the British Islands (London, 1888) ; Sir A. C. Ramsay, Physical Geography and Geology of Great Britain, edited by H. B. Woodward (London, 1894); Lord Avebury, The Scenery of England and the Causes to which it is due (London, 1902) ; Sir A. Geikie, Geological Map of England and Wales (scale, 10 m. to 1 in.; Edinburgh, 1897); E. Rectus, Universal Geography, vol. iv., The British Isles, edited by E. G. Ravenstein (London, 1880); H. J. Mackinder, Britain and the British Seas (2nd ed., Oxford, 1907) ; G. G. Chisholm, " On the Distribution of Towns and Villages in England," in Geographical Journal, vol. ix. (1897), PP- 76-87; vol. x. (1897), pp. 511-530; A. Haviland, The Geographical Distribution of Disease in Great Britain (London, 1892) ; A. Buchan, " The Mean Atmospheric Temperature and Pressure of the British Islands " (with maps), Journal of the Scottish Meteoro- logical Society, vol. xi. (1898), pp. 3-41 ; W. M. Davis, " The Develop- ment of Certain English Rivers," Geographical Journal, vol. v. (1895), pp. 127-148; H. R. Mill, " The Mean and Extreme Rainfall of the British Isles," Min. Proc. Inst. C.E. (1904), vol. civ. part i.; "A Fragment of the Geography of England— ˆSouth-west Sussex," Geographical Journal, vol. xv. (1900), p. 205; " England and Wales viewed Geographical!}'," Geographical Journal, vol. xxiv. (1904), pp.*

621-636.

ENGLAND, THE CHURCH OF. The Church of England claims to be a branch of the Catholic and Apostolic Church; it is episcopal in its essence and administration, and is established by law in that the state recognizes it as the national church of the English people, an integral part of the constitution of the realm. It existed, in name and in fact, as the church of the English people centuries before that people became a united nation, and, in spite of changes in doctrine and ritual, it remains the same church that was planted in England at the end of the 6th century. From it the various tribes which had conquered the land received a bond of union, and in it they beheld a pattern of a single organized government administered by local officers, to which they gradually attained in their secular polity. In England, then, the state is in a sense the child of the church. The doctrines of the English Church may be gathered from its Book of Common Prayer (see Prayer, Book or Common) as

FOUNDATION]

ENGLAND, CHURCH OF

finally revised in 1661, with the form of ordaining and consecrating bishops, priests and deacons, with the exception of the services for certain days which were abrogated in 1859; from the XXXIX Articles (see Creeds), published with royal authority in 1571; and from the First and Second Books of Homilies of 1549 and 1562 respectively, which are declared in Article XXXV. to contain sound doctrine.

Precursors. — Christianity reached Britain during the 3rd century, and perhaps earlier, probably from Gaul. An early Christi- tradition records the death of a martyr Alban at anttyia Verulamium, the present St Albans. A fully grown Roman British Church existed in the 4th century: bishops Britain. o ˆ L on d on) York and Lincoln attended the council of Aries in 314; the church assented to the council of Nicaea in 325, and some of its bishops were present at the council of Rimini in 359. The church held the Catholic faith. Britons made pilgrimages, to Rome and to Palestine, and some joined the monks who gathered round St Martin, bishop of Tours. Among these was Ninian, who preached to the southern Picts, and about 400 built a church of stone on Wigton Bay; its whiteness struck the people and their name for it is commemo- rated in the modern name Whithorn. From northern Britain, St Patrick (see Pateick, St) went to accomplish his work as the apostle of Ireland. Early in the 5th century Britain was infected by the heresy of Pelagius, himself a Briton by birth, but in 429 Germanus, bishop of Auxerre, and Lupus, bishop of Troyes, recalled the church to orthodoxy and, according to tradition, led their converts to victory, the " Hallelujah victory," over the Picts and Scots. When the Britons were hard pressed by Saxon invaders large bodies of them found shelter in western Armorica, in a lesser Britain, which gave its name to Brittany. A British Church was founded there, and bishops, scholars and recluses of either Britain seem constantly to have visited the other. The Saxon invasion cut off Britain from communication with Rome; and the British Church having no share in the pro- The gressive life of the Roman Church , differences gradually

cbulvh. arose between them. The organization of the British Church was monastic, its bishops being members, usually abbots, of monasteries, and not strictly diocesan, for the monasteries to which the clergy were attached had a tribal character. The monastic communities were large, Bangor numbered 2000 monks. From Gildas, a British monk, who wrote about 550, we gather that the bishops were rich and powerful and claimed apostolical succession; that though governed by synods the church lacked discipline; that simony was rife, and that bishops and clergy were neglectful. He

evidently draws too dark a picture, for religious activity was not extinct. Gildas himself and others preached in Ireland, and from them the Scots, the dominant people of Ireland, received a ritual. The organization of the Scotic Church in Ireland was similar to that of the British Church. Its monastic settlements or schools were many and large, and were the abodes of learning. Bishops dwelt in them and were reverenced for their office, but each was subject to the direction of the abbot and convent. In 565 (?) St Columba, the founder and head of several Scotic monasteries, left Ireland and founded a monastery in Hii or lona, which afforded gospel teaching to the Scots of Dalriada and the northern Picts, and later did a great work in evangelizing many of the Teutonic conquerors of Britain. By 602 the British Church, in common with the Irish Scots, followed practices which differed from the Roman use as it then was; it kept Easter at a different date; its clergy wore a different tonsure, and there was some defect in its baptismal rite. The conquerors of Britain — Saxons, Angles and Jutes — were heathens; the Britons gradually retreated before them to Wales, and to western and northern districts, or dwelt among them either as slaves or as outlaws hiding in swamps and forests, and they made no attempts to evangelize the conquering race.

About 587 a Roman abbot, Gregory, afterwards Pope Gregory the Great, is said to have seen some English boys exposed for sale in Rome and asked of what people they were, of what kingdom and who was their king. They were " Angli," he was

*told, of Deira, the modern Yorkshire, and their king was iElle. " Not ' Angli,' " said he, struck with the beauty of the fair- haired boys, " but ' angeli ' (angels), fleeing from wrath Founda- (de ird), and file's people must sing Alleluia." He Hon of the wished himself to go as a missionary to the English, English but was prevented. After he became pope he sent c *"" rca – a mission to England headed by Augustine. The way was prepared, for ˆEthelberht, king of Kent, had married a Christian, a Frankish princess Berhta, and allowed her to worship the true God. She brought with her a bishop who ministered to her in St Martin's church outside Canterbury, but evidently made no effort to spread the faith. Augustine and his band landed probably at Ebbsfleet in 597. They were well received by .Ethelberht, who was converted and baptized. On the 16th of November Augustine was consecrated by the archbishop of Aries to be the archbishop of the English, and by Christmas had baptized ic,ooo Kentish men. Thus the fathers of the English Church were Pope Gregory and St Augus- tine.*

Augustine restored a church of the Roman times at Canterbury to be the church of his see. The mission was re- inforced from Rome; and Gregory sent directions for the rule of the infant church. There were to be two archbishops, at London and York; London, however, was not fully Christianized for some years, and the primatial see remained at Canterbury. Augustine held two conferences with British bishops; he bade them give up their peculiar usages, conform to the Roman ritual, and join him in evangelizing the English. His haughtiness is said to have offended them; they refused, and the English Church owes nothing to its British predecessor. The mission prospered, and bishops were consecrated for Rochester, and for London for the East Saxons. After Augustine and ˆEthelberht died a short religious reaction took place in Kent, and the East Saxons apostatized. In 627 Edwin, king of Northumbria, who had married a daughter of iEthelberht, was converted and baptized with his nobles by Paulinus, who became the first bishop of York. As Edwin's kingdom extended from the Humber to the Forth and included the Trent valley, while he exercised superiority over all the other English kingdoms, except Kent, his conversion promised well for the church, but he was slain and his kingdom overrun by Penda, the heathen king of Mercia, the central part of England. Penda's victories en- dangered the cause of Christianity. The Roman mission was dying out. Kent and East Anglia, which was evangelized by Felix, a Burgundian bishop sent from Canterbury, were settled in the faith. Though Bernicia, the northern part of Northumbria, was little affected by the gospel, and after Edwin's death heathenism became dominant in his kingdom, Christianity did not die out in Northumbria. The East Saxons had heard the gospel, and in 634 the conversion of the West Saxons was begun by Birinus, an Italian missionary. Central England and the South Saxons, however, were wholly untouched by Christianity. The work of the Romans was taken up by Scotic missionaries. Oswald, under whom the Northumbrian power revived, had lived as an exile among the Scots, and asked them for a bishop to teach his people. Aidan was sent to him by the monks of lona in 635, and fixed his see in Lindisfarne, or Holy Island, where he founded a monastery. Saintly, zealous and supported by Oswald's influence, he brought Northumbria generally to accept the gospel. The conversion of the Middle Angles and Mercians, and the reconversion of the East Saxons, were also achieved by Scots or by disciples of the Scotic mission. After Aidan's death in 651 the differences between the Roman and Scotic usages, and speci- ally that concerning the date of Easter, led to bitter feelings, were inconvenient in practice, and must have hindered the church in its warfare against heathenism. Oswio, who reigned over

both the Northumbrian kingdoms, was, like his brother Oswald, a disciple of the Scots, his son and his queen, the daughter of Edwin, held to the Roman usages, and these usages were maintained by Wilfrid, who on his return from Rome in 658 was appointed abbot of Ripon. By Oswio's command a conference between the two parties was held at the present Whitby in 664. Oswio decided in favour of the Roman usages. This was the end of the Scotic

mission. The Scots left Lindisfarne, and their disciples generally adopted the Roman usages. The Scots were admirable mission- aries, holy and self-devoted, and building partly on Roman foundations and elsewhere breaking new ground, they and their English disciples, as Ceadda (St Chad), bishop of the Mercians, and Cuthbert, bishop of Lindisfarne, who were by no means inferior to their teachers, almost completed the conversion of the country. But they practised an excessive asceticism and were apt to abandon their work in order to live as hermits. Great as were the benefits which the English derived from their teaching, its cessation was not altogether a loss, for the church was passing beyond the stage of mission teaching and needed organization, and that it could not have received from the Scots.

Its organization like its foundation came from Rome. An archbishop-designate who was sent to Rome for consecration Organlza- having died there, Pope Vitalian in 668 consecrated Hon at the Theodore of Tarsus as archbishop of Canterbury. The English Scots had no diocesan system, and the English

" re ' bishoprics were vast in extent, followed the lines of the kingdoms and varied with their fortunes. The church had no system of government nor means of legislation. Theodore united it in obedience to himself, instituted national synods and subr divided the over-large bishoprics. At his death, in 690, the English dominions were divided into fourteen dioceses. Wilfrid, who had become bishop of Northumbria, resisted the division of his diocese and appealed to the pope. He was imprisoned by the Northumbrian king and was exiled. While in exile he converted the South Saxons, and their conversion led to that of the Isle of Wight, then subject to them, in 686, which completed the evangelization of the English. After long

strife Wilfrid, who was supported by Rome, regained a part of his former diocese. Theodore also gave the church learning by establishing a school at Canterbury, where many gained knowledge of the Scriptures, of Latin and Greek, and other religious and secular subjects. In the north learning was promoted by Benedict Biscop in the sister monasteries which he founded at Wearmouth and Jarrow. There Bede (q.v.) received the learning which he imparted to others. In the year of Bede's death, 735, one of his disciples, Ecgbert, bishop of York, became the first archbishop of York, Gregory III. giving him the pallium, a vestment which conferred archiepiscopal authority. He established a school or university at York, to which scholars came from the continent. His work as a teacher was carried on by Alcuin, who later brought learning to the court and Frankish dominions of Charlemagne. The infant church, following the example of the Irish Scots) showed much missionary zeal, and English missionaries founded an organized church in Frisia and laboured on the lower Rhine; two who attempted to preach in the old Saxon land were martyred. Most famous of all, Winfrid, or St Boniface, the apostle' of Germany, preached to the Frisians, Hessians and Thuringians, founded bishoprics and monasteries, became the first archbishop of Mainz, and in 754 was martyred in Frisia. He had many English helpers, some became bishops, and some were ladies, as Thecla, abbess of Kitzingen, and Lioba, abbess of Bischofsheim. After his death, Willehad laboured in Frisia, and later, at the bidding of Charlemagne, among the Saxons, and became the first bishop of Bremen. Religion, learning, arts, such as transcription and illumination, flourished in English monasteries. Yet heathen customs and beliefs lingered on among the people, and in Bede's time there were many pseudo-monasteries where men and women made monasticism a cloak for idleness and vice. In the latter part of the 8th century Mercia became the predominant kingdom under Offa, and he determined to have an archbishop of his own. By his contrivance two legates from Adrian I. held a council at Chelsea in 787 in which Lichfield was declared an archbishopric, and seven of the twelve suffragan bishoprics of Canterbury were apportioned to it. In 802, however, Leo III. restored Canterbury to its rights and the Lichfield archbishopric was abolished.

The rise of Wessex to power seems to have been aided by a good understanding between Ecgbert and the church, and his successors employed bishops as their ministers. /Ethelred, who was specially under ecclesiastical influence, went on a pilgrimage

to Rome, and before his departure made large grants for pious uses. His donation, though hot the origin of tithes in England, illustrates

the idea of the sacredness of Later the tenth of income on which laws enforcing the Anglo- payment of tithes were founded. His pilgrimage Saxon was probably undertaken in the hope of averting ” les °

*the attacks of the pagan Danes. Their invasions fell heavily on the church; priests were slaughtered and churches sacked and burnt. Learning disappeared in Northumbria, and things were little better in the south. Bishops fought and fell in battle, the clergy lived as laymen, the monasteries were held by married canons, heathen superstitions and immorality prevailed among the laity. Besides bringing the Danish settlers in East Anglia to profess Christianity in 8 7 8, Alfred set himself to improve the religious and intellectual condi- tion of his own people (see Alfred). The gradual recon- quest of middle and northern England by his successors was accompanied by the conversion of the Danish population. A revival of religion was effected by churchmen inspired by the reformed monasticism of France and Flanders, by Odo, arch- bishop of Canterbury, Oswald, archbishop of York, and Dunstan (see Dunstan), who introduced from abroad the strict life of the new Behedictinism. King Edgar promoted the monastic reform, and by his authority Bishop iEthelwold of Winchester turned canons out of the monasteries and *put monks in their place. Dunstan sought to reform the church by ecclesiastical and secular legislation, forbidding immorality among laymen, insisting on the duties of the clergy, and compelling the payment of tithes and other church dues. After Edgar’s death an anti-monastic movement, chiefly in Mercia, nearly ended in civil war. In this strife, which was connected with politics, the victory on the whole lay with the monks’ party, and in many cathedral churches the chapters remained monastic. The renewed energy of the church was manifested by councils, canonical legislation and books of sermons. In the homilies of Abbot ˆElfric, written for Archbishop Sigeric, stress is laid on the purely spiritual presence of Christ in the Eucharist, but his words do not indicate, as some have believed, that the English Church was not in accord with Rome. The ecclesiastical revival was short-lived. Renewed Danish invasions, in the course of which Archbishop Alphege was martyred in 1012, and a decline in national character, injuriously affected the church and, though in the reign of Canute it was outwardly prosperous, spirituality and learning decreased. Bishoprics and abbacies were rewards of service to the king, the bishops were worldly-minded, plurality was frequent, and simony not unknown. Edward the Confessor promoted foreign ecclesi- astics; the connexion with Rome was strengthened, and in 1062 the first legates since the days of Offa were sent to England by Alexander II. A political conflict led to the banishment of Robert, the*

Norman archbishop of Canterbury. An Englishman Stigand received his see, but was excommunicated at Rome, and was regarded even in England as schismatical. When William of Normandy planned his invasion of England, Alexander II., by the advice of Hildebrand, afterwards Gregory VII., moved doubtless by this schism and by the desire to bring the English Church under the influence of the Cluniac revival and into closer relation with Rome, gave the duke a consecrated banner, and the Norman invasion had something of the character of a holy war.

Before the Norman Conquest the church had relapsed into deadness: English bishops were political partisans, the clergy were married, and discipline and asceticism, then the recognized condition of holiness, were extinct. The ttrnTs 1 " Conqueror's relations with Rome ensured a reform; for the papacy was instinct with the Cluniac spirit. In 1070 papal legates were received and held a council by which Stigand was deposed. Lanfranc, abbot of Bee, was appointed arch-bishop of Canterbury and worked harmoniously with the king in bringing the English Church up to the level of the church in Normandy. Many native bishops and abbots were deposed, and the Norman prelates who succeeded them were generally of good character, strict disciplinarians, and men of grander ideas. A council of 1075 decreed the removal of bishops' sees

from villages to towns, as on the continent ; the see of Sherborne, for example, was removed to Old Sarum, and that of Selsey to Chichester, and many churches statelier than of old were built ki the Norman style which the Confessor had already adopted for his church at Westminster. In another council priests and deacons were thenceforward forbidden to marry. William and Lanfranc also worked on Hildebrandine lines in separating ecclesiastical from civil administration. Ecclesiastical affairs were regulated in church councils held at the same time as the king's councils. Bishops and archdeacons were no longer to exercise their spiritual jurisdiction in secular courts, as had been the custom, but in ecclesiastical courts and according to canon law. The king, however, ruled church as well as state; Gregory granted him control over episcopal elections, he invested bishops with the crozier and they held their temporalities of him, and- he allowed no councils to meet and no business to be done

without his licence. Gregory claimed homage from him; but while the king promised the payment of Peter's pence and such obedience as his English predecessors had rendered, he refused homage; he allowed no papal letters to enter the kingdom without his leave, and when an anti-pope was set up, he and Lanfranc treated the question as to which pope should be acknowledged in England as one to be decided by the crown. The Conquest brought the church into closer connexion with Rome and gave it a share in the religious and intellectual life of the continent; it stimulated and purified English monasticism, and it led to the organization of the church as a body with legislative and administrative powers distinct from those of the state. The relations established by the Conqueror between the crown, the church and the pope, its head and supreme judge, worked well as long as the king and the primate were agreed, but were so complex that trouble necessarily arose when they disagreed. William Rufus tried to feudalize the church, to bring its officers and lands under feudal law; he kept bishoprics and abbacies vacant and confiscated their revenues. He quarrelled with Ahselm (q.v.) who succeeded Lanfranc. Anselm while at Rome heard the investiture of prelates by laymen denounced, and he maintained the papal decree against Henry I. Bishops were vassals of the king, holding lands of him, as well as officers of the church. How were they to be appointed ? Who should invest them with the symbols of their office ? To whom was their homage due ? (see Investiture). These questions which agitated western Europe were settled as regards England by a compromise: Henry surrendered investiture and kept the right to homage. The substantial gain lay with the crown, for, while elections were theoretically free, the king retained his power over them. Though Henry in some degree checked' the exercise of papal authority in England, appeals to Rome without his sanction were frequent towards the end of his reign. Stephen obtained the recognition of his title from Innocent II., and was upheld by the church until he violently attacked three bishops who had been Henry's ministers. The clergy then transferred their allegiance to Matilda. His later quarrel with the papacy, then under the influence of St Bernard, added to his embarrass- ments and strengthened the Angevin cause.

During Stephen's reign the church grew more powerful than was for the good either of the state or itself. Its courts en- croached on the sphere of the lay courts, and further Aaeevia c lai me< i exclusive criminal jurisdiction over all clerks kings. whether in holy or minor orders, with the result that criminous clerks, though degraded by a spiritual court, escaped temporal punishment. Henry II., finding ecclesiastical privileges an obstacle to administrative reform,

demanded that the bishops should agree to observe the ancient customs of the realm. These customs were, he asserted, expressed in certain constitutions to which he required their assent at a council at Clarendon in 1 164. In spirit they generally maintained the rights of the crown as they existed under the Conqueror. One provided that clerks convicted of temporal crime in a spiritual court and degraded should be sentenced by a lay court and punished as laymen. Archbishop Becket (see Bxcket) agreed, repented and refused his assent. The king tried to ruin

him by unjust demands; he appealed to Rome and fled to France. A long quarrel ensued, and in n 70 Henry was forced to be reconciled to Becket. The archbishop's murder consequent on the king's hasty words shocked Christendom, and Henry did penance publicly. By agreement with the pope he renounced the Constitutions, but the encroachments of the church courts were slightly checked, and the king's decisive influence on episcopal elections and some other advantages were secured. The church in Wales had become one with the English Church by the voluntary submission of its bishops to the see of Canter- bury in 1 192 and later. The Irish Church remained distinct, though the conquest of Ireland, which was sanctioned by the English pope Adrian IV. (Nicholas Breakspear), brought it into the same relations with the crown as the English Church and into conformity with it. Under the guidance of ecclesiastics employed as royal ministers, the church supported the crown until, in 1206, Innocent TIL refused to confirm the election of a bishop nominated by King John to Canterbury; and representatives of the monks of Christ Church, in whom lay the right of election, being at his court, the pope bade them elect Stephen Langton whom he consecrated as archbishop. John refused to receive Langton and seized the estates of Christ Church. Innocent laid England under an interdict in 1208; the king confiscated the property of the clergy, banished bishops and kept sees vacant. Papal envoys excommunicated him and declared him deposed in 1211. Surrounded by enemies, he made his peace with the pope in 1213, swore fealty to him before his envoy, acknowledged that he held his kingdom of the Roman see, and promised a yearly tribute for England and Ireland. Finally he surrendered his crown to a legate and received it back from him. The banished clergy returned and an agreement was made as to their losses. Langton guided the barons in their demands on the king which were expressed in Magna Carta. The first clause provided, as charters of Henry I. and Stephen had already provided, that the English Church should be " free," adding that it should have freedom of election, which John had promised in 1 214. As John's suzerain,

Innocent annulled the charter, suspended Langton, and excommunicated the barons in arms against the king. On John's death, Gualo, legate of Honoriiis III., with the help of the earl marshal, secured the throne for Henry III., and he and his successor Pandulf, as representatives of the young king's suzerain, largely directed English affairs until 1 221, when Pandulf 's departure restored Langton to his rightful position as head in England of the church. Reforms in discipline and clerical work were inculcated by provincial legislation, and two legates, Otho in 1237 and Ottoboni in 1268, promulgated in councils constitutions which were a fundamental part of the canon law in England. Religious life was quickened by the coming of the friars (see Friars) . Parochial organization was strengthened by the institution of vicars in benefices held by religious bodies, which was regulated and enforced by the bishops. It was a time of intellectual activity, in character rather cosmopolitan than national. English clerks studied philosophy and theology at Paris or law at Bologna; some remained abroad and were famous as scholars, others like Archbishops Langton, and Edmund Rich, and Bishop Grosse- teste returned to be rulers of the church, and others like Roger Bacon to continue their studies in England. The schools of Oxford, however, had already attained repute, and Cambridge began to be known as a place of study. The spirit of the age found expression in art, and English Gothic architecture, though originally, like the learning of the time, imported from France, took a line of its own and reached its climax at this period. Henry's gratitude for the benefits which in his early years he received from Rome was shown later in subservience to papal demands. Gregory IX., and still more Innocent IV., sorely in need of money to prosecute their struggle with the imperial house, laid grievous taxes on the English clergy, supported the king in making heavy demands upon them, and violated the rights of patrons by appointing to benefices by " provisions " often in favour of foreigners. Churchmen, and prominently Grosseteste, the learned and holy bishop of Lincoln, while

recognizing the pope as the divinely appointed source of all ecclesiastical jurisdiction, were driven to resist papal orders which they held to be contrary to apostolic precepts. Their remonstrances were seldom effectual, and the state of the national church was

noted by the Provisions of Oxford in 1258 as part of the general misgovernment which the baronial opposi- tion sought to remedy. The alliance between the crown and the papacy in this reign diminished the liberties of the church.

Edward I., who was a strong king, checked an attempt to magnify the spiritual authority by the writ Circumspecte agatis,

which defined the sphere of the ecclesiastical courts, w/A a " d P ut a res t ra i n t on religious endowments by the Statute centuries. OI Mortmain, and desiring that every estate in the

realm should have a share in public burdens and counsels, caused the beneficed clergy to be summoned to send proctors to parliament. The clergy preferred to make t heir grants in their own convocations, and so lost the position offered to them. For some years clerical taxation by the crown was carried on with the good- will of the papacy; it was not oppressive for unbeneficed clergy and incomes below ten marks were exempt, and in theory the clergy were celibate. Papal demands, however, were additional burdens. In 1296 Boniface VIII., by his bull Clericis laicos, forbade the clergy to grant money to lay princes, and Edward's request for a clerical subsidy was in 1 297 refused by convocation led by Archbishop Winchelsea. The king thereupon outlawed the clergy. The northern province yielded, the southern held out longer; but finally the clergy made their peace severally, each paying his share, and the royal victory was complete. Winchelsea joined the baronial opposition which forced Edward to grant the " Confirmation of the Charters." Edward procured his disgrace from Clement V., and in return allowed Clement to exact so much from the church that the doings of the papal agents provoked an indignant remonstrance from parliament in 1307. With that exception the king's dealings with the church were statesmanlike. He employed clerical ministers and paid them by church preferments, but his nominations to bishoprics did not always receive papal confirma- tion which had become recognized as essential. His weak son Edward II. yielded readily to papal demands. The majority of the bishops of the reign, and specially those engaged in politics, were unworthy men; religion was at a low ebb; plurality and non-residence were common. By the constitution Execrabilis John XXII. ordered that all cures held in plurality save one should be vacated, and, which was not so well, " reserved " all benefices so vacated for his own appointment. As the residence of the popes at Avignon from 1308 to 1377 brought them under French influence, Englishmen during the war with France were specially displeased that large sums should be drawn from the kingdom for them and that they should

exercise patronage there. In the reign of Edward III. the popes, though appointing to bishoprics by provision, did not give them to foreigners, but they appointed foreigners, enemies of England, to lesser preferments, deaneries and prebends. In 1351 the Statute of Provisors declared provisions unlawful. Capitular elections, however, remained mere forms; the king nominated, and the popes provided, and took advantage of their claim to appoint to sees vacant by translation. Papal interference in suits concern- ing temporalities was checked by a law of 1353 (the first statute of Praemunire), which made punishable by outlawry and forfeiture the carrying before a foreign tribunal of causes cognizable by English courts. This measure was extended in 1365, and in 1393 by the great statute of Praemunire. Indignant at the law of 1365, Urban V. demanded payment of the tribute promised by John, which was then thirty-three years in arrear, but parliament repudiated the claim. The Black Death disorganized the church by thinning the ranks of the clergy, who did their duty manfully during the plague. In the diocese of Norwich, for example, 800 parishes lost their incumbents in 1349, 83 of them twice over (Jessopp). Large though insufficient numbers were instituted to benefices and unfit persons received holy orders. The value of livings decreased and many lay vacant. Some incumbents deserted their parishes to take stipendiary work in towns or secular

employments, and unbeneficed clergy demanded higher stipends. Greediness infected the church in common with society at large. Yet Chaucer's ideal parish priest must have represented a familiar type, so that we may believe that much good work was here and there unobtrusively done by the clergy. Prominent among abuses were the sale of pardons, and the extortions of the ecclesi- astical courts; their decrees were enforced by excommunication, and on a writ issued to the sheriff an excommunicated person would be imprisoned until he satisfied the demands of the church. The state needed money and attacks were made in parliament on the wealth of the church. Already, in 1340, Edward III., who quarrelled with Archbishop Stratford on political grounds, had appointed lay ministers, and in 13 71 William of Wykeham, bishop of Winchester, and other clerical ministers were turned out of office and succeeded by laymen. A political crisis in 1376 was followed by a struggle between the bishops and John of Gaunt, duke of Lancaster, the head of the anticlerical party, who allied himself with John Wycliffe (q.v.). He was unpopular, and when the bishops cited Wycliffe before them in St Paul's, the duke's conduct provoked a riot and the proceedings ended abruptly. Wycliffe held that the church was corrupted by

wealth; that only those in giace had a right to God's gifts, and that temporal power belonged only to laymen and not to popes nor priests. Later he attacked the papacy itself, which in 1378 was distracted by the great schism; by 1380 he condemned pilgrimages, secret confession and masses for the dead. While holding the presence of Christ in the Eucharist, he denied a change of substance in the elements, arguing that accidents or qualities, such as form and colour, could not exist without substance. He taught that Holy Scripture was the only source of religious truth, to the exclusion of church authority and tradition, and he and his followers made the first complete English version of the Bible. His opinions were spread by the poor priests whom he sent out to preach and by his English tracts. That his teaching had any direct effect on the insurrection of 1381, though commonly believed, appears to be an unfounded idea; many priests were concerned in the rising, and specially the mendicant orders, Wycliffe's bitter enemies, but the motives of the insurrection were essentially secular (Oman, The Great Revolt of 1381). The reaction which followed extended to religion, and Wycliffe's doctrines were condemned by a church council in 1382. Nevertheless he died in peace. He had many disciples, especially in Oxford and in industrial centres. The Lollards, as his followers were called, had supporters in parliament and among people of high rank in the court of Richard II., and the king's marriage to Anne of Bohemia brought about the importation of Wycliffe's writings into Bohemia, where they had a strong influence on the religious movement led by Hus. At first the bishops were not inclined to persecute, and the earlier Lollards mostly recanted under pressure, but their number increased.

With the accession of the Lancastrian house the crown allied itself with the church, and the bishops adopted a repressive policy towards the Lollards. By the canon law obstinate heretics were to be burnt by the secular century. power, and though England had hitherto been almost free from herefsy, one or two burnings had taken place in accord- ance with that law. In 1401 a statute, De heretico comburendo, ordered that heretics convicted in a spiritual court should be committed to the secular arm and publicly burned, and, while this statute was pending, one Sawtre was burned as a relapsed heretic. Henry V. was zealous for orthodoxy and the persecution of Lollards increased; in 1414 Sir John Oldcastle, Lord Cobham, who had been condemned as a heretic, escaped and made an insurrection; he was taken in 1417 and hanged and burned. Lollardism was connected with an insurrection in 143 1; it then ceased to have any political importance, but it kept its hold in certain towns and

districts on the lower classes; many Lollards were forced to recant and others suffered martyrdom. The church was in an unsatisfactory state. As regards the papacy, the crown generally maintained the position taken up in the previous century, but its policy was fitful, and the custom of allowing bishops who were made cardinals to retain their sees

strengthened papal influence. The bishops were largely engaged in secular business; there was much plurality, and cathedral and collegiate churches were frequently left to inferior officers whose lives were unclerical. The clergy were numerous and drawn from all classes, and humble birth did not debar a man from attaining the highest positions in the church. Candidates for holy orders were still examined, but clerical education seems to have declined. Preaching was rare, partly from neglectfulness and partly because, in 1401, in order to prevent the spread of heresy, priests were forbidden to preach without a licence. While the marriage of the clergy was checked, irregular and temporary connexions were lightly condoned. Discipline generally was lax, and exhortations against field-sports, tavern haunting and other unclerical habits seem to have had little effect. Monasticism had declined. Papal indulgences and relics were hawked about chiefly by friars, though these practices were discountenanced by the bishops. On the other hand, all educa- tion was carried on by the clergy, and religion entered largely into the daily life of the people, into their gild 1 meetings, church-ales, mystery-plays and holidays, as well as into the great events of family life — baptisms, marriages and deaths. Many stately churches were built in the prevailing Perpendicular style, often by efforts in which all classes shared, and many hamlet chapels supplemented the mother church in scattered parishes. The revival of classical learning scarcely affected the church at large. Greek learning was regarded with suspicion by many churchmen, but the English humanists were orthodox. The movement had little to do with the coming religious conflicts, which indeed killed it, save that it awoke in some learned men like Sir Thomas More a desire for ecclesiastical, though not doctrinal, reform, and led many to study the New Testament of which Erasmus pub- lished a Greek text and Latin paraphrases.

During the earlier years of the 16th century Lollardism still existed

*among the lower classes in towns, and was rife here and there in country districts. Persecution went on and P 1 * _ martyrdoms are recorded. The old grievances con- tioa era. cerning ecclesiastical exactions remained unabated and were further strengthened by an ill-founded rumour that Richard Hunne, a Londoner who had refused to pay a niortuary, was imprisoned for heresy in the Lollards' tower, and was found hanged in his cell in 1514, had been murdered. Lutheranism affected England chiefly through the surreptitious importation of Tyndale's New Testament and heretical books. In 1521 Henry VIII. wrote a book against Luther in which he maintained the papal authority, and was rewarded by Leo X. with the title of Defender of the Faith. Henry, however, whose will was to himself as the oracles of God, finding that the pope opposed his intended divorce from Catherine of Aragon, deter- mined to allow no supremacy in his realm save his own. He carried out his ecclesiastical policy by parliamentary help. Parliament was packed, and was skilfully managed; and he had on his side the popular impatience of ecclesiastical abuses, a new feeling of national pride which would brook no foreign inter- ference, the old desire of the laity to lighten their own burdens by the wealth of the church, and a growing inclination to question or reject sacerdotal authority. He used these advantages to forward his policy, and when he met with opposition, enforced his will as a despot. The parliament of 1529 lasted until 1536; it broke the bonds of Rome, established royal supremacy over the English Church, and effected a redistribution of national wealth at the expense of the spirituality. It began by acts abolishing ecclesiastical exactions, such as excessive mortuaries and fees for probate, and by prohibiting pluralities except in stated cases, application to Rome for licence to evade the act being made penal. Henry having crushed his minister Cardinal Wolsey, archbishop of York, declared the whole body of the clergy involved in a praemunire by their submission to Wolsey's legatine authority, and ordered the convocation to purchase pardon by a large payment, and by acknowledging him as " Protector and Supreme Head of the English Church and Clergy." After much debate, the acknowledgment was made in 1531, with the qualifica- tion " so far as the law of Christ allows." A " supplication "*

against clerical jurisdiction and legislation by convocation was obtained from the Commons in 1532, and Henry received from convocation the " submission of the clergy," surrendering its legislative power except on royal licence, and consenting to a revision of the canon law by commissioners to be appointed by the king. A bill for conditionally withholding the payment of annates, or

first-fruits, to Rome was passed, and Henry took advantage of the fear of the Roman court lest it should lose these payments, to obtain without the usual fees bulls promoting Cranmer to the see of Canterbury in 1533, and thus was enabled to gain his divorce. Cranmer pronounced his marriage to Catherine null, and declared him lawfully married to Anne Boleyn. Clement VII. retorted by excommunicating the king, but for that Henry cared not. Appeals to Rome were forbidden by statute, and the council ordained that the pope should thenceforth only be spoken of as bishop of Rome, as not having authority in England. In 1534 the restraint of annates was confirmed by law, all payments to Rome were forbidden, and it was enacted that, on receiving royal licence to elect, cathedral chapters must elect bishops nominated by the king. The papal power was extirpated by statute, parliament at the same time declaring that neither the king nor kingdom would vary from the " Catholic faith of Christendom." The submission of the clergy was made law. Appeals from the archbishops' courts were to be to the king in chancery, and were to be heard by commissioners, whence arose the Court of Delegates as the court of final appeal in ecclesiastical cases. The first-fruits and tenths of benefices were given to the king, and his title as " Supreme Head in earth of the Church of England " was declared by parliament without the qualification added by convocation. Fisher, bishop of Rochester, and Sir Thomas More, lately chancellor, the two most eminent Englishmen, were beheaded in 1535 on an accusation of attempting to deprive the king of this title, and some Carthusian monks suffered a more cruel martyrdom in the same cause. Meanwhile New Testaments were burnt, and heretics, or re-formers, forced to abjure or, remaining steadfast, were sent to the stake, for though the heresy law of Henry IV. was repealed, heresy was still punishable by death, and persecution was not abated. By breaking the bonds of Rome Henry did not give the church freedom; he substituted a single despotism for the dual authority which pope and king had previously exercised over it. In 1535 Cromwell, the king's vicar-general, began a visitation of the monasteries. The reports (comperla) of his commissioners having been delivered to the king and communicated to parlia- ment in 1536, parliament declared the smaller monasteries corrupt, and granted the king all of less value than £200 a year. A rebellion in Lincolnshire and another in the north, the formid- able Pilgrimage of Grace, followed. The suppression of the greater houses was effected gradually, surrenders were obtained by pressure, and three abbots who were reluctant to give up the possessions of their convents for confiscation were hanged. Monastic shrines and treasuries were sacked and the spoil sent to the king, to whom parliament granted all the houses, their

lands and possessions. Of the enormous wealth thus gained Henry spent a part on national defence, a little on the foundation of the bishoprics of Westminster, dissolved in 1550, Bristol, Chester, Gloucester, Oxford and Peterborough, and gave the lands to men either useful to or favoured by himself, or sold them to rich purchasers. In 1536 he dictated the belief and ceremonial of the church by issuing Ten Articles which were subscribed by convocation. This first formulary of the English Church as separate from Rome did not contravene Catholic doctrine, though it showed the influence of Lutheran models. Another exposition of Anglican doctrine was made in the Institution of a Christian Man or " Bishops' book," in some respects more likely to satisfy those attached to the tenets of Rome, in others, as in the distinct repudiation of purgatory and the declaration that salvation depended solely on the merits of Christ, showing an advance. It was published in 1537 with Henry's sanction but not by authority. In that year licence was granted for the sale of a translation of the Bible, and in 1538 another version called Matthew's Bible, was ordered to be kept in all churches (see

Bible). Pilgrimages were suppressed and images used for nrorship destroyed. Denial of the king's supremacy, denial of the corporal presence in the Eucharist, and insults to Catholic rites were alike punished by cruel death. The publication abroad of the king's excommunication rendered an assertion of orthodoxy advisable for political reasons, and in 1 539 came the Act of the Six Articles attaching extreme penalties to deviations from Catholic doctrines. The backward swing of the pendulum continued; Cromwell was beheaded and three reforming preachers were burnt in 1540. Prosecutions for heresy under the act were fitful: four gospellers were burnt in London in 1546, of whom the celebrated Anne Askew was one. Cranmer, how- ever, did not lose the king's favour. A fresh attempt to define doctrine was made in the Necessary Doctrine and Erudition of a Christian Man, the " King's Book," published by authority in 1543, which, while repudiating the pope, was a declaration of Catholic orthodoxy. A Primer, or private prayer-book, of which parts were in English, as the litany composed by Cranmer, and virtually the same as at present, was issued in 1546, and further liturgical change seemed probable when Henry died in 1547.

Henry, while changing many things in the church, would not allow any deviation in essentials from the religion of Catholic Europe, which was not then so dogmatically defined as it was later by the council of Trent. Edward VI. was a child, and the Protector Somerset and the council favoured further changes, which were carried out with Cranmer's help. They issued a book of Homilies and a set of injunctions which were enforced by a royal visitation. Pictures and much painted glass were destroyed in churches, frescoed walls were whitewashed, and in 1548, the removal of all images was decreed. Parliament ordered that bishops should be appointed by letters patent and hold their courts in the king's name. An act of the last reign granting the king all chantries and gilds was enlarged and enforced with cruel injustice to the poor. On the petition of convocation parliament allowed the marriage of priests; and it further ordered that the laity should receive the cup in com- munion. A communion book was issued by the council in English, the Latin mass being retained for a time. Many German reformers came to England, were favoured by the council, and gained influence over Cranmer. The first Book of Common Prayer was authorized by an Act of Uniformity in 1549; it retained much from old service books, but the com- munion office is Lutheran in character. It excited discontent, and a serious insurrection broke out in the West, the insurgents demanding the revival of the Act of the Six Articles and the withdrawal of the new service as " like a Christmas game." After Somerset's fall the government rapidly pushed forward reformation. A new Ordinal issued with parliamentary approval in 1550 was significant of the change in sacramental doctrine, and the four minor orders disappeared. Altars were destroyed and tables substituted. Five bishops, Bonner of London, Gardiner of Winchester, and Heath of Worcester, then already in prison, and two others, were deprived; and the Lady Mary, who would not give up the mass, was harshly treated. The reformers were not tolerant ; for a woman was burnt for Arianism in 1550 and a male Anabaptist in 1551. Under the influence of foreign reformers, who took a lower view of the Eucharist than the Lutheran divines, Cranmer soon advanced beyond the prayer-book of 1549. A second prayer-book, departing further from the old order, appeared in 1552, and without being accepted by convocation was enforced by another Act of Uniformity, and in 15 S3 a catechism and forty-two articles of religion were authorized by Edward for subscription by the clergy, though not laid before Convocation. A revision of the canon law in accordance with the act for " submission of the clergy " was at last undertaken in 1551, but the only result was a document entitled Reformatio legum ecclesiasticarum, which never received authority. Edward died in

1553. Apart from matters of faith, the church had fared ill under a royal supremacy exercised by self-seeking nobles in the name of the boy-king. Convocation; lost all authority and bishops were treated as state officials liable to deprivation for disobedience to the council. Means of

worship were diminished, and the poor were shamefully wronged by the suppression of chantries, gilds and holy days; even the few sheep of the poor brethren of a gild were seized to swell a sum which from 1550 was largely diverted from public purposes to private gain. Churches were despoiled of their plate; the old bishops were forced, the new more easily persuaded, to give up lands belonging to their sees, and rich men grew richer by robbing God.

When Mary succeeded her brother, the deprived bishops were restored, some reforming bishops were imprisoned, and Cranmer, who was implicated in the plot on behalf of Lady Jane Grey, was attainted of treason. As regards doctrine, religious practices and papal supremacy, Mary was set on bringing back her realm to the position existing before her father's quarrel with Rome. Her first parliament repealed the ecclesiastical legislation of Edward's reign, and convocation formally accepted transubstantiation. Seven bishops were deprived in 1554, four of them as married, and about a fifth of the beneficed clergy, though some received other benefices after putting away their wives. Apparently Mary at first believed that her authority would be accepted in religious matters; but she met with opposition, partly provocative, for Wyat's re- bellion consequent on her intended marriage to Philip of Spain was closely connected with religion, and more largely passive in the noble resolution of those who chose martyrdom rather than denial of their faith. To the nation at large, though not averse from the old doctrines and practices of the church, a return to the Roman obedience was distasteful. Nevertheless, Cardinal Pole was received as legate, and the title of Supreme Head of the Church having been dropped, a parliament carefully packed, and the fears of the rich appeased by the assurance that they would not have to surrender the monastic lands, he absolved the nation in parliament and reunited it to the Church of Rome on November 30, 1554, the clergy being absolved in convocation. Parliament repealed all acts against the Roman see since the twentieth year of Henry VIII. The heresy laws were revived, and a horrible persecution of those who refused to disown the doctrines of the prayer-book began in 1555, and lasted during the remainder of the reign. Nearly 300 persons were burned to death as heretics in these four years, among them being five bishops: Hooper of Gloucester, Ferrar of St David's, Ridley of London, and Latimer

(until 1539) of Worcester in 1555, and Archbishop Cranmer in 1556. The chief responsibility for these horrors rests with the queen; the bishops who examined the accused were less zealous than she desired. The most prominent among them in persecution was Bonner of London. The exiles for religion were received at Frankfort, Strassburg and Zurich. At Frankfort a party among them objected to the ceremonies retained in the prayer-book, and, encouraged by Calvin and by Knox, who came to them from Geneva, quarrelled with those who desired to keep the book unchanged. Mary died in 1558. Her reign arrested the rapid spoliation of the church and possibly prevented the adoption of doctrines which would have destroyed its apostolic character; the persecution by which it was disgraced strengthened the hold of the reformed religion on the people and made another acceptance of Roman supremacy for ever impossible.

Elizabeth's accession was hailed with pleasure; she was known to dislike her sister's ecclesiastical policy, and a change was expected. An Act of Supremacy restored to the Etlza- crown the authority over the church held by Henry bethan VIII., and provided for its exercise by commissioners, settle- whence came the court of High Commission nominated ment – by the crown, as a high ecclesiastical court; but Elizabeth rejected the title of Supreme Head, and used that of Supreme Governor, as "over all persons and in all cases within her dominions supreme." An Act of Uniformity prescribed the use of the prayer-book of 1552 in a revised form which raised the level of its doctrine, and injunctions enforced by a royal visitation re-established the reformed order. All the Marian bishops save two refused the oath of supremacy'and were deprived, and eight were imprisoned. Of the clergy generally few refused

it; for only some 200 were deprived for religion during the first six years of the reign. Bishops for the vacant sees were nominated by the crown and elected by their chapters as in Henry's reign; Matthew Parker was canonically consecrated archbishop of Can- terbury. The orthodoxy of the church was vindicated by Bishop Jewel's Apologia ecclesiae Anglicanae. Adherents to Rome vainly tried to obtain papal sanction for attending the church services, and were forced either to disobey the pope or become " recusants "; many were fined, and

those who attended mass were imprisoned. Meanwhile a party, soon known as Puritans, rebelled against church order; the exiles who had come under Genevan influence objecting on their return to vestments and ceremonies enjoined by the prayer-book. There was much non-conformity in the church which the queen ordered the bishops to correct. Parker, though averse to violent measures, in- sisted on obedience to his "Advertisements" of 1566, which, though not formally authorized by the queen, expressed her will, and became held as authoritative, and some of the refractory were punished. A company engaged in irregular worship was discovered in London in 1567 and a few persons were imprisoned by the magistrate. Active opposition to the government was stirred up by Pius V., and in 1569 a rebellion in the north, where the old religion was strong, was aided by papal money and encouraged by hopes of Spanish intervention. In 1570 Pius published a bull excommunicating and deposing the queen. Thenceforward recusants had to choose between loyalty to the queen and loyalty to the pope. They lay under suspicion, and severe penal laws were enacted against Romish practices. About 1579 many seminary priests and Jesuits came over to England as missionaries; some actively engaged in treason, all were legally traitors. The country was threatened with foreign invasion, plots against the government were detected; and the queen's life was held to be endangered. The council hunted down these priests and their abettors, and many were executed, martyrs to the doctrine of the pope's power of deposition. The number put to death in this reign under the penal laws was 187. The papal policy defeated itself; a large number of the old religion while retaining their faith chose to be loyal to the queen rather than lend themselves to the designs of her enemies. From 1 57 1 recusants can no longer be reckoned as nonconforming members of the English Church: the law recognized them as separate from it. The church's doctrine was denned in the catechism of 1570, and in the revised articles of religion which appeared as the XXXIX. Articles in 1571, and its law by a body of canons published with authority in 1576, the attempt at codification made in the Reformatio legum having been laid aside.

From 1574 the Protestant Nonconformists strove to introduce Presbyterianism. Cause for grievance existed in the state of

the church which had suffered from the late violent Ttie changes. Elizabeth plundered it, and laymen who

tormist's. owned the rectories formerly held by monasteries

followed her example; bishoprics were impoverished by the queen

and parish cures by her subjects, and the reform of abuses was checked by self-interest. As bishops, along with some able men, Elizabeth chose others of an inferior stamp who con- sented to the plunder of their sees and whom she could use to report on recusants and harry nonconformists. Separation, or Independency, began about 1578 with the followers of Robert Browne, who repudiated the queen's ecclesiastical authority; two Brownists were executed in 1583. The nonconformists remained in the church and continued their efforts to subvert its episcopal system. Elizabeth, though personally little influenced by religion, understood the political value of the church, and would allow no slackness in enforcing conformity. Archbishop Grindal was sequestrated for defending " prophesyings," or meetings of the Puritan clergy for religious exercises. The House of Commons, in which there was a Puritan element, repeatedly attempted to discuss church questions and was sharply silenced by the queen, who would not allow any interference in ecclesiasti- cal matters. Whitgift, who succeeded Grindal in 1583, though kind-hearted, was strict in his administration of the law. Violent

attacks were made upon the bishops in the Martin Marprelate tracts printed by a secret press; their author is unknown, but some who were probably connected with them were executed for publishing seditious libels. Whitgift's firmness met with success. During the last years of the reign the movement towards Presbyterianism was checked and nonconformity was less prominent. The church regained a measure of orderliness and vigour; its claims on allegiance were advocated by eminent divines and expounded in the stately pages of Hooker. The queen, who had so vigorously ordered ecclesiastical affairs, died in 1603.

*On the accession of James I. the Puritans expressed their desire for ecclesiastical change in the Millenary Petition which purported to come from 1000 clergy; their requests were moderate, a sign of the success of Whitgift's p** ftan policy, but some could not have been granted without rebellion. causing widespread dissatisfaction. At a conference between divines of the two parties at Hampton Court in 1604, James roughly decided against the Puritans. Some small alterations were made in the prayer-book, and a new version of the Bible was undertaken, which appeared in 161 1 as the " authorized version." In 1604 convocation framed a code of canons which received royal authorization. Refusal to obey them was punished with deprivation, and, according to S. R. Gardiner, about 300 clergy were deprived, though a 17th century writer (Peter Heylyn) puts the*

number at 49 only, which W. H. Frere (History of the English Church, 1558-1625,ˆ1. 321) thinks more credible. Conformity could still be enforced, but before long the Puritan party grew in strength partly from religious and partly from political causes. They would not admit any authority in religion that was not based on the scriptures; their opponents maintained that the church had authority to ordain ceremonies not contrary to the scriptures. In doctrine the Puritans re- mained faithful to the Calvinism in which most Englishmen of the day had been brought up; they called the high churchmen Arminians, and asserted that they were inclined to Rome. The Commons became increasingly Puritan; they were strongly Protestant and demanded the enforcement of the laws against recusants, who suffered much, specially after the Gunpowder Plot of 1605, though they were sometimes shielded by the king. The Commons regarded ecclesiastical jurisdiction with dislike, specially the Court of High Commission, which had developed from the ecclesiastical commissions of Elizabeth and was hated as a means of coercion based on prerogative. The bishops derived their support from the king, and the church in return supported the king's claim to absolutism and divine right. It suffered heavily from this alliance. As men saw the church on the side of absolutism, Puritanism grew strong both among the country gentry, who were largely represented in the Commons, and among the nation at large, and the church lost ground through the king's political errors. A restoration of order and decency in worship and the introduction of more ceremonial begun in James's reign were carried on by Laud (q.v.) under Charles I. Laud aimed at silencing disputes about doctrine and enforcing outward uniformity; the Puritans hated ceremonial and wished to make every one accept their doctrines. Many of the reforms introduced by Laud after he became archbishop in 1633 were needful, but they offended the Puritans and were enforced in a harsh and tyrannical manner, for he lacked wisdom and sympathy. Under his rule nonconforming clergy were deprived and sometimes imprisoned. The cruel punishments inflicted by the Court of Star Chamber of which he was a member, the unpopularity of the High Commission Court, his own harsh dealing, and the part which he took in politics as a confidential adviser of the king, combined to bring odium upon him and upon the ecclesiastical system which he represented. The church was weak, for the Laudian system was disliked by the nation. A storm of discontent with the course of affairs both in church and state gathered. In 1640 Charles, after dissolving parlia- ment, prolonged the session of convocation, which issued canons magnifying the royal authority and imposing the so-called " cl cetera oath " against innovations on all clergy, graduates

and others. The Long Parliament voted the canons illegal; Laud was imprisoned, and in 1642 the bishops were excluded from parliament. The civil war began in 1642; in 1643 a bill was passed for the taking away of episcopacy, in 1645 Laud was beheaded, and parliament abolished the prayer-book and accepted the Presbyterian directory, and from 1646 Presbyterian- ism was the legal form of church government. Many, perhaps 2000, clergy were deprived; some were imprisoned and otherwise maltreated, though a fifth of their former revenues was assigned to the dispossessed. The king, who was beheaded in 1649, might have extricated himself from his difficulties if he had consented to the overthrow of episcopacy, and may therefore be held a martyr to the church's cause. The victory of the army over the parliament secured England against the tyranny of Presbyterian- ism, but did not better the condition of the episcopal clergy; the toleration insisted on by the Independents did not extend to " prelacy." Churchmen, however, occasionally enjoyed the ministrations of their own clergy in private houses, and though their worship was sometimes disturbed they were not seri- ously persecuted for. engaging in it. Non-delinquent or non- sequestrated private patronage and the obligation of tithes were retained . Community of suffering and the execution of Charles I . brought the royalist country gentry into sympathy with the clergy, and at the Restoration the church had the hold upon the affection of the laity which it lacked under the Laudian rule. On the king's restoration the survivors of the ejected clergy quietly regained their benefices. The Presbyterians helped to The bring back the king and looked for a reward. Charles

Restora- II. promised them a limited episcopacy and other Hon concessions, but his plan was rejected by the Commons.

period. ˆ conference at the Savoy between leading Presby- terians and churchmen in 1661 was ineffectual, and a revision of the prayer-book by convocation further discontented non- conformists. The parliament of 1661 was violently anti-Puritan, and in 1662 passed an Act of Uniformity providing that all ministers not episcopally ordained or refusing to conform should be deprived on St Bartholomew's day, the 14th of August following. About 2000 ministers are said to have been ejected, and in 1665 ejected ministers

were forbidden to come within five miles of their former cures. Though some bishops and clergy showed kindness to the ejected, churchmen generally approved of this oppressive legislation; they could not forget the wrongs inflicted on their church by the once triumphant Puritans. Nonconformist worship was made punishable by fine and imprisonment, and on the third offence by transportation. In 1672 Charles, who had secretly promised the French king openly to profess Roman Catholicism, issued a Declaration of Indulgence which applied both to Romanists and Protestant Nonconformists, but parliament compelled him to withdraw it, and, in 1673, passed a Test Act making reception of the holy communion and a denial of transubstantiation necessary qualifi- cations for public office. Later, when the dissenters found friends among the party in parliament opposed to the crown, the church supported the king, and the doctrine of passive obedience was generally accepted by the clergy. The church was popular, and among the great preachers and theologians who adorned it in the Caroline period were Jeremy Taylor, Pearson, Bull, Barrow, South and Stillingfleet. The lower clergy were mostly poor, and their social position was conse- quently often humble, but the pictures of clerical humiliation after 1660 are generally overcoloured; the assertion that they commonly married servants or cast-off mistresses of their patrons has been disproved, and it is certain that men of good family entered holy orders. In accordance with an agreement between Archbishop Sheldon and Lord Chancellor Clarendon, the clergy ceased to tax themselves in convocation, and from 1665 have been taxed by parliament. James II., though a Romanist, promised to protect the church, and the clergy were on his side in the rebellion of the duke of Monmouth, who was supported by dissenters. The church and the nation, however, were strongly Protestant and were soon alarmed by his efforts to Romanize the country. James dispensed with the law by prerogative and

appointed Romanists to offices in defiance of the Test Act. In 1688 he ordered that his declaration for liberty of conscience, issued in the interest of Romanism, should be read in all churches. His order was almost universally disobeyed. Arch- bishop Sancroft and six bishops who remonstrated against it were brought to trial, and were acquitted to the extreme delight of the nation. James's attack on the church cost him his crown. Sancroft and eight bishops would not belie their belief in the doctrines of divine right and passive obedience by swearing

allegiance to William and Mary, and the archbishop,

c. u- 1. j 1 j • j Revolution

rive bishops and over 400 clergy were deprived. „ erio< /.

Certain of these nonjuring bishops consecrated others and a schism ensued. The loss to the church was heavy; for among the nonjurors were many men of holy lives and eminent learning, and the fact that some suffered for conscience' sake seemed a reproach on the rest of the clergy. After 1715 the secession became unimportant. Protestantism was secured from further royal attack by the Bill of Rights; and in 1701 the Act of Succession provided that all future sovereigns should be members of the Church of England. That the king's title rested on a parliamentary decision was destructive of the clerical theory of divine right, and encouraged Erastianism, then specially dangerous to the church; for William, a Dutch Presbyterian, gave bishoprics to men personally worthy, but more desirous of union with other Protestant bodies than jealous for the principles of their own church. A bill for union was rejected in the Commons, where the church party had a majority, though one for toleration of Protestant dissenters became law. William, anxious for concessions to dissenters, appointed a committee of convocation for altering the liturgy, canons and ecclesiastical courts, but the Tory party in the lower house of convocation was strong and the scheme was abortive. A long controversy began between the two houses : the bishops were mostly Whigs with latitudinarian tendencies, the lower clergy Tories and high churchmen. During most of the reign convoca- tion was suspended and the church was governed by royal injunctions, a system injurious to its welfare. It had been the bulwark of the nation against Romanism under James II., and the affection of the nation enabled it to preserve its distinctive character amid dangers of an opposite kind under William III. Its religious life was active; associations for worship and the reformation of manners led to more frequent services, the estab- lishment of schools for poor children, and the foundation of the Society for Promoting Christian Knowledge (S.P.C.K.) and for the Propagation of the Gospel in Foreign Parts (S.P.G.). This activity and the discord between the two houses of convocation continued during Anne's reign. Anne was a strong church- woman, and under her the church reached its highest point of popularity and influence. Its supposed interests were used by the Tories for political ends. Hence the Occasional Conformity Act, to prevent evasion of the Test Act, and a tyrannical Schism Act, both repealed in 17 18, belong rather to the history of parties than to that of the church. So, too, does the case of Dr Sacheverell, who was prosecuted for a violently Tory sermon. His trial, in 17 10, caused much excitement; mobs shouted for " High Church and Dr

Sacheverell," and the lightness of his sentence was hailed as a Tory victory. Queen Anne is gratefully remembered by the church for her " Bounty," which gave it the first-fruits and tenths (see Annates and Queen Anne's Bounty).

With the accession of the Hanoverian line the church entered on a period of feeble life and inaction: many church fabrics were neglected; daily services were discontinued; holy days were disregarded; Holy Communion was century. infrequent; the poor were little cared for; and though the church remained popular, the clergy were lazy and held in contempt. In accepting the settlement of the crown the clergy generally sacrificed conviction to expediency, and their character suffered. Promotion largely depended on a profession of Whig principles: the church was regarded as subservient to the state; its historic position and claims were ignored, and it was treated by politicians as though its principal function was to

support the government. This change was accelerated by the silencing of convocation. A sermon by Hoadly, bishop of Bangor, impugned the existence of a visible church, and the " Bangorian controversy" which ensued threatened to end in the condemna- tion of his opinions by convocation, or at least by the lower house. As this would have weakened the government, convoca- tion was prorogued, letters of business were withheld, and from 1717 until 1852 convocation, the church's constitutional organ of reform, existed only in name. Walpole during his long ministry, from 1721 to 1742, discouraged activity in the church lest it should become troublesome to his government. Prefer- ment was shamelessly sought after even by pious men, and was begged and bestowed on the ground of political services. In this the clergy, apart from the sacredness of clerical office, were neither better nor worse than the laity ; in morality and decency they were better even at the lowest point of their decline, about the middle of the century. While the church was inactive in practical work, it showed vigour in the intellectual defence of Christianity. Controversies of earlier origin with assailants of the faith were ably maintained by, among others, Daniel Waterland, William Law, a nonjuror, Bishop Butler, whose Analogy appeared in 1736, and Bishop Berkeley. A revival of spirituality and energy at last set in. Its origin has been traced to Law's Serious Call, published

in 1728. Law's teaching was actively carried out by John Wesley (q.v.), a clergyman who from I 1739 devoted himself to evangelization. Though his preaching awoke much religious feeling, specially among the lower classes, the excitement which attended it led to a horror of religious enthusiasm, and his methods irritated the parochial clergy. Some of them seconded his efforts, but far more regarded them with violent and often unworthily expressed dislike. While he urged his followers to adhere to the church, he could not himself work in subordination to discipline; the Methodist organization which he founded was independent of the church's system and soon drifted into separation. Nevertheless, he did much to bring about a revival of life in the church. Several clergy became his allies, and some preached in Lady Huntingdon's chapels before her secession. These were among the fathers of the Evangelical party: they differed from the Methodists in not forming an organization, remaining in the church, working on the parochial system, and generally holding Calvinistic doctrine, being so far nearer to Whitfield than to Wesley, though Calvinism gradually ceased to be a mark of the party. The Evangelicals soon grew in number, and their influence for good was extensive. They laid stress on the depravity of human nature, and on the importance of conscious conversion, giving prominence to the necessity of personal salvation rather than of incorporation with, and abiding in, the church of the redeemed. Prominent among their early leaders after they became distinct from the Methodists were William Romaine, Henry Venn and John Newton. Bishop Porteus of London sympathized with them, Lord Dart- mouth was a liberal patron, and Cowper's poetry spread their doctrines in quarters where sermons might have failed to attract. Religion was also forwarded in the church by the example of George III. During his reign the progress of toleration, though slowand fitful, greatly advanced both as regards Roman Catholics and Protestant dissenters. The spirit of rationalism, which had been manifested earlier in attacks on revelation, appeared in a movement against subscription to the Articles demanded of the clergy and others which was defeated hi parliament in 1772. The alarm consequent on the French Revolution checked the progress of toleration and was temporarily fatal to free- thinking; it strengthened the position of the church, which was regarded as a bulwark of society against the spread of revolutionary doctrines; and this caused the Evangelicals to draw off more completely from the Methodists. The church was active: the Sunday-school movement, begun in 1780, flourished; the crusade against the slave-trade was vigorously supported by Evangelicals; and the Church Missionary Society (C.M.S.), a distinctly Evangelical organization, was founded. Excellent as were

the results of the revival generally, the Evangelicals had defects which tended to weaken the church.

Some characteristics of their teaching were repellent to the young; they were deficient in theological learning, and often in learning of any kind; they took a low view of the church, regarding it as the offspring of the Protestant reformation; they expounded the Bible without reference to the church's teaching, and paid little heed to the church's directions. Dissent consequently grew stronger. By the Act of Union with Ireland the Churches of England and Ireland were united from the 1st of January 1801, and the continuance of the united church was declared an essential part of the union. No provision, however, was made giving the Irish clergy a place in convocation, which was evidently held unlikely to revive. The union of the churches was dissolved in 187 1 by an act of 1869 for disestab- lishing the Irish Church.

Apart from the Evangelical revival, religion was advanced in the church. In 181 1 the education of the poor was provided for on church principles by the National Society; the Church Building Society was founded in 1818; and the ™o£me!u. colonial episcopate was started by the establishment of bishoprics in Calcutta in 1814, and in Jamaica and Barbados in 1824. Yet reforms were urgently needed. In 1813, out of about 10,800 benefices, 63 n are said to have been without resident in- cumbents (The Black Book, p. 34) ; the value of some great offices was enormous, while many of the parochial clergy were wretchedly poor. The repeal of the Test Act, long practically inoperative, in 1828, and Catholic emancipation in 1829, mark a change in the relations of church and state; and the Reform Bill of 1832 transferred political power from a class which generally supported the church to classes in which dissent was strong. The national zeal for reform was directed towards the church, not always in a friendly spirit. Yet wholesome changes were effected by legislation: dioceses were rearranged and two new bishoprics founded at Manchester and Ripon, the bishopric of Bristol, however, being suppressed; plurality and non-residence were abolished; tithes were commuted, and the Ecclesiastical Com- mission, which has effected reforms in respect of endowments, was permanently established in 1836. Some changes and pro- posals alarmed churchmen, specially as legislation for the church proceeded from parliament, while convocation remained silenced. Latitudinarian opinions revived, and the church was regarded merely as a human institution. Among the clergy generally ritual observance was neglected and rubrical directions disobeyed. A few churchmen, including Keble and Newman, set themselves to revive church feeling,

and Oxford became the centre of a new movement. The publication of Keble's Christian Year prepared its way, and its aims were declared in his assize sermon at Oxford on "National Apostasy" in 1833. Its promoters urged their views in Tracts for the Times, and were strengthened by the adhesion of Pusey. Hence they were nicknamed Tractarians or Puseyites. Their cardinal doctrine was that the Church of England .was a part of the visible Holy Catholic Church and had unbroken connexion with the primitive church; they inculcated high views of the sacraments, and emphasized points of agree- ment with those branches of the Catholic Church which claim apostolic succession. Their party grew in spite of the opposition of low and broad churchmen, who, specially on the publication of Tract XC. by Newman in 1841, declared that its teaching was Romanizing. In 1845 Newman and several others seceded to Rome. Newman's apostasy was a severe blow to the church, though permanent injury was averted by the steadfastness of Pusey. The Oxford movement was wrecked, but its effect survived both in the new high church party and in the church at large. As a body the clergy rated more highly the responsi- bilities and dignity of their profession, and became more zealous in the performance of its duties and more ecclesiastically minded. High churchmen carried out rubrical directions, and after a while began to introduce changes into the performance of divine service which had not been adopted by the early leaders of tfc j party, were deprecated by many bishops, and excited opposition.

In 1833 the supreme jurisdiction of the Court of Delegates was transferred to the judicial committee of the privy council. Before this court came an appeal by a clerk named Gorham,

and the law courts.

whom the bishop of Exeter refused to: institute to a benefice because he denied unconditional regeneration in baptism, and in The 1850 the court decided in the appellant's favour. The

church decision was followed by some secessions to Rome, and high churchmen were dissatisfied that spiritual questions should be decided by a secular court. The "papal aggression" of that year, by which Pius IX. appeared to claim authority in England, roused violent popular indignation which was used against the high church

party. However, it afforded an argument for the revival of convocation, and, chiefly owing to the exertions of Bishop Wilberforce of Oxford, convocation again met in 1852 (see Convocation). Meanwhile broad church opinions were gaining ground to some extent owing to a reaction from the Oxford movement. Among the clergy the broad church party was comparatively small, but it included some men of mark. In i860 appeared Essays and Reviews, a volume of essays by seven authors, of whom six were in orders. The book as a whole had a rationalistic tendency and was condemned by convocation: two of the essayists were suspended by the Court of Arches, but its judgment was reversed by the judicial committee. Crude attacks on the authority of the Scriptures and the position of the English Church with respect to it having been published by Colenso, bishop of Natal, he was deposed by his metropolitan, Bishop Gray of Cape Town, in 1863, but the judicial committee decided that the bishop of Cape Town had no coercive jurisdiction over Natal. Convocation declared Colenso's books erroneous, abstain- ing in face of this judgment from acknowledging as valid the excommunication which Bishop Gray pronounced against him, It followed from the decision of the council that the English Church in a self-governing colony is a voluntary association. Opposition to the dogmatic principle in the church was main- tained. Some practices introduced by clergy desirous of bringing the services of the church to a higher level came before the judicial committee in the case of Westerton y. Liddell in 1857, with a result encouraging to the ritualists, as they then began to be called. An increase in ritual usages, such as eucharistic vest- ments, altar lights and incense, followed. In 1859-1860 dis- graceful riots took place at St George's-in-the-East, London, where an advanced ritual was used. In i860 the English Church Union was formed mainly to uphold high church doctrine and ritual, and assist clergy prosecuted for either cause, and in 1865 the Church Association, mainly to put down such doctrine and ritual by prosecution. A royal commission appointed in 1867 recommended that facilities should be granted for en- abling parishioners aggrieved by ritual to gain redress, and in 1870 that a revised lectionary and a shortened form of service should be provided. A new lectionary was approved by the two convocations and enacted, and convocation having received letters of business in 1872 and 1874 drew up a shortened form of prayer which was also enacted, but the commission had no further direct results. Between 1867 and 1871 two decisions of the judicial committee were adverse to the ritualists, and by exciting dislike to the court among high churchmen indirectly led to an increase in ritual usages. Among those who adopted them were many self-

devoted men; their practices, which they believed to be incumbent on them, were condemned as illegal, yet they saw the rubrics daily disregarded with impunity, by others who trod the easy path of neglect. In 1873 a declaration against sacramental confession received the assent of the bishops, and in 1874 Archbishop Tait of Canterbury introduced a bill for enforcing the law on the ritualist clergy; it was transformed in committee, and was enacted as the Public Worship Regulation Act. It provided for the appointment of a new judge in place of the old ecclesiastical judges, the officials principal, of the two provinces. Litigation increased, the only check on prosecutions being the right of the bishop to veto proceedings, and in 1878-1881 four clergymen were im- prisoned for disobedience to the orders of courts against whose jurisdiction they protested. In consequence of the scandal raised by this mode of dealing with spiritual causes, a royal commission on ecclesiastical courts was appointed in 1881, but

its report in 1883 led to no results, and the bishops strove to mend matters by exercising their veto. Advanced and illegal usages became more frequent. Proceedings in respect of iUegal ritual having been instituted against Bishop King of Lincoln, the archbishop of Canterbury (Benson) personally •heard and decided the case in 1890, and his judgment was upheld by the judicial committee (see Lincoln Judgment). The spiritual character of the tribunal and the authority of the judg- ment which sanctioned certain usages and condemned others, had a quieting effect. Increase in ritualism, however, caused agitation in 1898, and in 1899 and 1900 the two archbishops, Temple of Canterbury and Maclagan of York, delivered " opinions " condemning the use of incense and processional lights, and the reservation of the consecrated elements. Finding himself unable to put down illegal practices, Bishop Creighton of London adopted a policy of compromise which was followed by other bishops, and encouraged illegality. Disregard of law both in excess and defect of ritual being common, a royal commission on ecclesiastical discipline was appointed in 1904. The commissioners presented a unanimous report in 1906, its chief recommendations being, briefly, that practices significant of doctrines repugnant to those of the English Church should be extirpated; that the convocations should prepare a new orna- ments rubric, and frame modifications in the conduct of divine service; that the diocesan and provincial courts and the court of final appeal should be reformed in accordance with the recommendations of 1883, the last to consist of a permanent body of lay judges who on all doubtful questions touching the doctrine or use of the church should be bound by the

decision of an episcopal assembly; that the Public Worship Regulation Act should be repealed, and the bishops' power of veto abolished.

Since the Oxford movement the church has developed wonderful energy. Yet it is beset with difficulties and dangers both from within and without. Within, besides difficulties as regards ritual, it has to contend against rationalism, which has been stimulated by scientific discoveries and speculations, and far more by Biblical criticism. While this criticism has been used by many as a means to a fuller comprehension of divine revelation, much of it is simply destructive, and has led to ill-considered expressions of opinion adverse to the doctrine of the church. From without, the church has been threatened with disestablishment both wholly and as regards the dioceses within the Welsh counties; and the education of the poor, which from early days depended on its care, has largely been taken out of its hands (see Education) . The amount contributed by the church to elementary education, including the maintenance of Sunday schools, in 1907-8 was £576,012. During the last sixty years the church has strengthened its hold on the loyalty of the nation by its increased efficiency. Its bishops are laborious and active. Since 1876 the home episcopate has been increased by the creation of the dioceses of Truro, St Albans, Liverpool, Newcastle, Southwell, Wakefield, Bristol, Southwark and Birmingham, so that there are now (1910) thirty-seven diocesan bishops, aided by twenty-eight suffragan and eight assistant bishops, and a further subdivision of dioceses is contem- plated. At no other time probably have the clergy been so industrious. As a rule they are far better instructed in theology than forty years ago, but they have not advanced in secular learning. Changes in the university system have contributed to draw off able young men to other professions which offer greater worldly advantages. The poverty of many of the clergy stands in strong contrast to the wealth around them. Of 14,242 benefices 4704 are said to be below £200 a year net value. The value of £100 tithe rent charge has sunk (1909) to £69 : 18 : 51, the average value since the Commutation Act of 1836 being £94 : 3 : 2! . Thenumberof assistant clergyis (1910) about 7500, in spite of the hardships often attending clerical life, the supply of men being kept up. The Queen Victoria Clergy Fund and other voluntary associations and various educational institutions have been founded to relieve clerical distress. In the church at home there is much energy in numberless directions: cathedral

Present life.

churches have become centres of religious activity, and iii parish churches the administration of the Holy Communion and week- day services are frequent. Many of the laity co-operate in church work and liberally support it. During the years 1898- 1907 598 churches were built or rebuilt, and during twenty-four years, 1884-1907, the voluntary offerings for church building were £27,612,709, and for endowments and parsonages £6,116,592, yet church extension fails to keep pace with the increase of the population. Evangelistic efforts, the relief of the sick and poor, and the inculcation of temperance are zealously carried on. Good work is done by twenty-six sisterhoods and several institu- tions of deaconesses, and one or two communities of celibate clergy. In the British colonies and India the episcopate consists (1909) of seven archbishops with two coadjutors; there are also seventy diocesan bishops, and in other parts of the world thirty missionary bishops. The S.P. G. has 847 ordained ministers, including thirty chaplains in Europe, besides many female missionaries; the C.M.S. has 793 ordained ministers, and many other missionaries of both sexes; the Zenana Missionary Society has a staff of 1288; other church societies for foreign missions are vigorous, and the S.P.C.K. in addition to its work at home spends large sums in furthering the church abroad. The benefits arising from conference have increasingly been valued since the revival of convocation. Appreciation of the importance of lay support and counsel has led to the institution of two voluntary elective assemblies called Houses of Laymen, one for each province, and in 1905 an association of the four houses of convocation and the two lay assemblies was formed with the name of the Representative Church Council. During the last forty years diocesan confer- ences, in which the laity are represented, have become universal, while ruridecanal and other meetings of a like kind are general. An annual church congress, established in 1861, held its forty- ninth meeting in 1909. Of wider importance are the Lambeth conferences, held since 1878 at intervals of ten years, to which the bishops of the English Church and the churches in communion with it are invited, and meet under the presidency of the arch- bishop of Canterbury. The first of these conferences, which illustrate the dignity of the see founded by St Augustine and now the head of a vast quasi-patriarchate, was held under the presidency of Archbishop Longley in 1867 (see Lambeth Con- Terences and Anglican Communion).

Authorities. — General Histories, Narrative: J. Collier, Ecclesi-

astical History of Great Britain (to 1685), ed. T. Lathbury (9 vols., London, 1852) ; T. Fuller, Church History (to 1648), ed. J. S. Brewer (Oxford, 1845), valuable near the author's own time; C Dodd, Church History of England (to 1625, by a Roman Catholic), ed. M. A. Tierney (5 vols., London, 1839-1843); Dean W. F. Hook, Lives of the Archbishops of Canterbury (to 1663) (12 vols., London, i860- 1879); G. G. Perry, Students' English Church History (to 1884) (London, 1887), a carefully written book; A History of the English Church, ed. Stephens and Hunt, in 8 vols., noticed below under various periods; H. O. Wakeman, An Introduction to the History of the Church of England (London, 1896), a brightly written manual by a pronounced high churchman. Documents: D. Wilkins, Concilia (446-1717) (4 vols, fob, London, 1737), a splendid work; A. W. Haddan and Bishop W. Stubbs, Councils and Ecclesiastical Documents (3 vols., Oxford, 1869-1873), supersedes Wilkins so far as it goes, but deals with English Church only to 870, with Welsh, Scottish and Cumbrian churches to later dates; H. Gee and W. J. Hardy, Documents of English Church History (to 1700) (London, 1896), useful for students. Constitutional: Bishop W. Stubbs, Constitutional History of England (parts of) (3 vols., revised ed., Oxford, 1 895-1 897), a work of great learning; F. Makower, Constitutional History of the Church of England, from the German (London, 1895); F. W. Maitland, Roman Canon Law in the Church of England (London, 1898), authoritative. (See under Convocation.)

From 597: Bede, Historia ecclesiastica, ed. C. Plummer. (2 vols., Oxford, 1896), the primary authority to 731, trans, by J. A. Giles (Bohn's Library) and others; see also Eddi's contemporary " Vita Wilfridi," in Historians of York, ed. James Raine, Rolls series (3 vols., 1879-1894) ; W. Bright, Early English Church History (to 709) (3rd ed., Oxford, 1897), a learned and beautiful book; articles in Dictionary of Christian Biography (to 9th century), ed. W. Smith and H. Wace (4 vols., London, 1877-1887). Later Anglo-Saxon: In Chronicles and biographies, as Anglo-Saxon Chronicle, Two of the Saxon Chronicles, ed. C. Plummer (2 vols., 1892), trans, by B.Thorpe, Rolls series (1861), and others; Asser, Life of Alfred, ed. W. H. Stevenson (Oxford, 1904), trans, by Giles; Memorials of Dunstan,

ed. W. Stubbs, Rolls series (1874). Modern: J. Lingard, History of the Anglo-Saxon Church (2 vols., London, 2nd ed., printed 1858); W. Hunt, History of the English Church, 597ˆ1066, ed. Stephens and Hunt (London, revised ed., 1901).

For later medieval times: (1) Chroniclers, &c, after 1066,. as

Florence of Worcester, ed. B. Thorpe, Eng. Hist. Soc. (2 vols., 1878), trans, by J. Stevenson in Church Historians (London, 1853) ; Symeon of Durham, ed. T. Arnold, Rolls series (2 vols., 1882); Eadmer (for Archbishop Anselm), ed. M. Rule, Rolls series (1884); William of Malmesbury, Gesta regum, &c. (to 1152), ed. W. Stubbs, Rolls series (2 vols., 1887), and Gesta pontificum, ed. N. E. S. A. Hamilton, Rolls series (1870); (John of Salisbury?) Historia pontificalis (for Archbishop Theobald, 1139-1161), ed. Pertz, Rerum Germ, scripts xx.; Materials for the Life of Archbishop Becket, ed. J. C. Robertson, Rolls series (7 vols., 1875-1885); Giraldus Cambrensis (12th cen- tury), Gemma ecclesiastica and Speculum ecclesiae, Works ii. and iv., ed. J. S. Brewer, Rolls series (1862, 1873) ; Matthew Paris, Chronica majora (to 1259), ed. H. R, Luard, Rolls series (7 vols., 1880-1883), and many more. (2) Letters, as Archbishop Lanfranc, Epistolae, ed. Giles (Oxford, 1844); Archbishop Anselm, Epistolae, ed. Migne (Paris, 1863); Robert Grosseteste, Epistolae, ed. H. R. Luard, Rolls series (1861), and others. (3) Bishops' Registers, as Registrum J. Peckham (Archbishop of Canterbury, 1279-1292), ed. C. T. Martin, Rolls series (3 vols., 1882-1886); Exeter Registers, ed. Hingeston- Randolph (5 vols., 1889); Registers of Bishops Drokensford and Ralph of Shrewsbury, ed. W. H. Dickinson and T. S. Holmes, Somerset Record Soc. (3 vols., 1887, 1895-1896), and others. For Wycliffe and early Lollards see Wycliffe. R. Pecock, Repressor of Overmuch Blaming of the Clergy, ed. C. Babington, Rolls series (2 vols., i860); and T. Gascoigne, Loci e libro veritatum, ed. J. T. Rogers (Oxford, 1881), which gives ample notices of abuses, should be consulted for 15th century. Modern books: W. R. W. Stephens, The English Church, 1066-12J2 (revised edition, 1904), and W. W. Capes, The English Church in the 14th and 15th Centuries (1900), both ed. Stephens and Hunt (London); J. Raine, Archbishops of York (ends at 1373) (London, 1863); F. A. Gasquet, Henry III. and the Church (London, 1905). Biographical: Dean R. W. Church, Anselm (London, 1870); M. Rule, Life and Times of St Anselm (written from a Roman Catholic standpoint) (2 vols., London, 1883) ; C. de Remusat, Vie de S. Anselme (Paris, 1868); G. G. Perry, St Hugh, Bishop of Lincoln (London, 1879); F. S. Stevenson, Robert Grosseteste, Bishop of Lincoln (London, 1 899), and others.

For the Reformation Period: Documentary: Notices in Letters and Papers, Henry VIII., ed. J. S. Brewer, J. Gairdner, R. H. Brodie, Record Publ. (19 vols., 1862-1905), and Calendars of Slate Papers for Henry VIII., Edward VI., ed. R. Lemon (1856) and M. A. Green (1870), for Mary, ed. Lemon (1856), Record Publ., and for

Elizabeth, Hatfield MSS., Hist. MSS. Comm. ; Acts of the Privy Council, ed. J. R. Dasent (1890), in progress; Records of the Reforma- tion, ed. N. Pocock (2 vols., Oxford, 1870) ; E. Cardwell, Documentary Annals (Oxford, 1839); Original Letters, ed. H. Ellis (11 vols., 1824-1846); Zurich Letters (2 vols.), Original Letters (2 vols.), edj Robinson (1842-1847); Latimer's Sermons (1844),, and Archbishop Parker's Correspondence, ed. J. Bruce and T. T. Perowne, all Parker Soc. Publ., Cambridge; see also General Index to Parker Soc.'s Publ. (!855); R- Pole (Cardinal), Epistolae, ed. Quirini (5 vols., Brescia, 1 744-1 757); G. W. Prothero, Select Statutes, &c. ; Elizabeth and James I. (3rd ed., Oxford, 1906). Supplementary: Strype, Ecclesi- astical Memorials (6 vols., 1513-1556) ; Annals (Elizabeth) (7 vols.) ; Memorials of Cranmer (2 vols.) ; Lives of Parker (3 vols.), Grindal, Whitgift (3 vols.), all with a large repertory of documents, also of Cheke, T. Smith and Aylmer (all Oxford, 1820-1824); Burnet, History of the Reformation, ed. N. Pocock (7 vols., Oxford, 1865), with many documents. Chronicles and early Histories : W. Camden, Annates (Elizabeth), ed. T. Hearne (3 vols., 1717); Chronicle of Queen Jane and Queen Mary, ed. J. G. Nichols (Camden Soc, 1850) ; E. Hall, Chronicle (Henry VIII.), ed. C. Whibley (2 vols., London, 1904) ; N. Harpsfield, Treatise on the Pretended Divorce of Henry ■ VIII., ed. N. Pocock (Camden Soc, 1878) ; J. Foxe, Acts and Monu- ments (often called "The Book of Martyrs "),ed. S. R. Cattley and G. Townsend (a book with many facts industriously gathered, many documents and some errors) (8 vols., London, 1843-1849); H. Machyn, Diary (1 550-1, 563), and Narratives of the Reformation, both ed. J. G. Nichols (Camden Soc, 1854, 1859) ; W. Roper, The Life of Sir Thomas More, ed. S. Singer (1817), and other editions, a beautiful book by More's son-in-law; N. Sander, De origine ac progressu schismatis Anglicani, continued by E. Rishton (Rome, 1586), translated by D. Lewis (London, 1877) (Sander was a Roman Catholic priest who wrote in 1576; his language is violent but the narrative generally trustworthy) ; The Presbyterian Movement in the Reign of Queen Elizabeth, ed. R. G. Usher (R. Hist. Soc, 1905); Modern histories: J. H. Blunt, History of the English Reformation (London, 1878), a careful work, though of no great historical im- portance; T. E. Bridgett, Life of Blessed John Fisher (London, R. W. Dixon, History of the Church of England from the

Abolition of the Roman Jurisdiction (5 vols., London, 1878-1892), a book showing great knowledge and insight; V. M. Doreau, Henry VIII et les martyres de la Chartreuse (Paris, 1890); H. Fisher. History of England 1485-1547, presents a brilliant and trustworthy narrative

of ecclesiastical affairs during the reign of Henry VIII.,

and forms vol. v. of the Political History of England, ed. W. Hunt and R. L. Poole (London, 1906); P. Friedmann, Anne Boleyn (London, 1884), an important work; W. H. Frere, History of the English Church, 1558-1625, ed. W. R. W. Stephens and W. Hunt (1904), scholarly; J. A. Froude, History of England (1527-1588), a work of literary beauty, research and historical grasp, from an anti-ecclesiastical standpoint, with some blemishes, but of increasing value after the reign of Henry VIII. (12 vols., London, 1856-1870, cheap editions, 1881-1882, 1893) ; J. Gairdner, History of the English Church, Henry VIII. to Mary, ed. Stephens and Hunt (London, 1902), by the highest authority on the period; H. E. Jacobs, The Lutheran Movement in England (Philadelphia, 1890), chiefly on progressive doctrinal change ; A. F. Pollard, Henry VIII. (London, with illustrations 1902, with references 1905), an excellent general history of the reign, England under Protector Somerset (London, 1900), and Life of Cranmer (London, 1904). For Rebellion Period: Contemporary and early: State Papers, Domestic, 1625-1649, ed. J. Bruce, W. D. Hamilton, Mrs S. C. Lomas (23 vols.), from 1649, ed. E. Green (13 vols.), and Calendars of Committees for Plundered Ministers, &c, all Record Publ.; Constitutional Documents of the Puritan Revolution, ed. S. R. Gardiner (Oxford, 1899) ; J. Evelyn, Diary, ed. A. Dobson (3 vols., London, 1906) ; also ed. W. Bray and ed. H. B. Wheatley; J. Hacket, Scrinia reserala, Life of Arch- bishop Williams (London, 1715); P. Heylyn, Cyprianus A nglicanus. Life of Archbishop Laud (Dublin, 1668) ; W. Laud, Works, ed. W. Scott and W. Bliss, Library of Anglo-Catholic Theology (7 vols., Oxford, 1847-1860) ; J. Milton, various Prose Works, ed. C. Symmons (7 vols., London, 1806) ; Puritan Visitations of Oxford, ed. M. Burrows (Camden Soc, 1881). Later: W. H. Hutton, History of the English Church, 1625-1714, ed. Stephen and Hunt (London, 1903), and William Laud (London, 1895) ; S. R. Gardiner, History of England, under various titles, 1603-1657 (London, 1863-1903), and cr. 8vo edition begun 1883, a work of vast research and learning, contains fair and careful accounts of religious matters; D. Masson, Life of Milton (7 vols., London, 1859-1894) ; D. Neal, History of the Puritans, ed. J. Toulmin (3 vols., 1837) ; W. A. Shaw, The English Church, 1640-1660 (2 vols., London, 1900), and on the Westminster Assembly, Cambridge Modern History, iv. c. 12 (Cambridge, 1906) ; J. Stoughton, Ecclesiastical History of England,

Civil Wars, &c. (4 vols., London, 1867-1870), by a dissenting divine, a careful and unprejudiced history; J. Walker, Sufferings of the Clergy (London, 1714). For Restoration and Revolution Period: R. Baxter, Reliquiae Baxterianae, ed. M. Sylvester (London, 1696) ; and E. Calamy, Abridgment of Life of Baxter (2 vols., 1713); R. Bentley, Life of Bishop Stillingfleet, with Works in 6 vols. (London, 1710); Bishop G. Burnet, History of his Own Time (6 vols., Oxford, 1783) ; G. Doyly, Life of Archbishop Sancroft (2 vols., London, 1821); W. Kennett (Bishop), Compleat History, vol. iii. (London, 1710); T. Lathbury, History of the Nonjurors (London, 1843) ; T. B. Macaulay, History of England (5 vols., London, 1858-1861); Magdalen College and James II., ed. J. R. Bloxam, Oxford Historical Society (Oxford, 1886); R. Nelson, Life of Bishop Bull, ed. Burton (Oxford, 1827); J. H. Overton, The Nonjurors (London, 1902), and Life in the English Church, 1660-1714 (2 vols., London, 1885); E. H. Plumptre, Life of Bishop Ken (2 vols., London, 1888); I. Walton, Lives (Bishop G. Morley and others) (London, 1898, and frequently). For 18th century: C. J. Abbey, The English Church and its Bishops, 1700- 1800 (2 vols., London, 1887); C. J. Abbey and J. H. Overton, The English Church in the 18th Century (London, revised ed., 1887), a pleasant and useful book) ; R. Cecil, Life of John Newton (London, 1827) ; A. C. Fraser, Life of Bishop Berkeley, vol. iv. of Works (Oxford, 1871); Lord Hervey, Memoirs of the Reign of George II., ed. J. W. Croker (3 vols., London, 1884); A. H. Hore, The Church of England from William III. to Victoria (2 vols., Oxford, 1886); J. Hunt, Religious Thought in England (3 vols., London, 1873) ; Huntingdon, Selina, Countess of, Life and Times (2 vols., London, 1839-1840); J. Keble, Life of Bishop Wilson (Oxford, 1863); W. E. H. Lecky, History of England in the 18th Century, vols, i.-iii. and v. (8 vols., London, 1879-1890); Bishop T. Newton, Autobiography, with Works (6 vols., London, 1787); J. H. Overton and F. Relton, History of the English Church, 1714-1800, ed. Stephens and Hunt (London, 1906) ; W. Roberts, Memoir of Hannah More (4 vols., London, 1834); W. A. Spooner, Bishop Butler (London, 1891); Sir J. Stephen, Essays in Ecclesiastical Biography (2 vols., London, 1853), for an account of the Evangelicals early in the 19th century ; Sir L. Stephen, English Thought in the 18th Century (2 vols., London, 1881), for theological controversies; H. Thompson, Life of Hannah More (London, 1838) ; R. Watson, Anecdotes of the Life of Bishop R. Watson (2 vols., London, 1818), presents a curious picture of a bishop's life 1782-1816; R. and S. Wilberforce, Memoir of W. Wilberforce (5 vols., London, 1838). See under Methodise; Wesley (family) ; and Whitefield, George.

For the Oxford Movement and onwards: A. W. Benn, English Rationalism in the 10th Century (2 vols., London, 1906); A. C. Benson, Life of Archbishop E. W. Benson (2 vols., London, 1899); J. W. Burgon, Lives of Twelve Good Men (2 vols., London, 1888) ; R. W. Church, History of the Oxford Movement (London, 1891); J. T. Coleridge, Life of Keble (Oxford, 1869); R. T. Davidson and W. Benham, Life of Archbishop A. C. Tail (2 vols., London, 1892); H. P. Liddon and J. O. Johnston, Life of Pusey (4 vols., London,

1 893-1 895); T. Mozley, Reminiscences of Oriel and the Oxford Movement (2 vols., London, 1882); J. H. Newman, Apologia pro Vita sua (London, 1864); R. Prothero, Correspondence of Dean A. P. Stanley (2 vols., London, 1893); R. G. Wilberforce and A. Ashwell, Life of Bishop S. Wilberforce (3 vols., London, 1879) Report of the Royal Commission on Ecclesiastical Courts (1883), and Report of the Royal Commission on Ecclesiastical Discipline (1906), both H.M. Stationery Office; Official Year Book of the Church of England, S.P.C.K. (1906). (W. Hu.)

ENGLEFIELD, SIR FRANCIS (c. 1520-1596), English Roman Catholic politician, born probably about 1520, was the eldest son of Sir Thomas Englefield of Englefield, Berkshire, justice of the common pleas. His mother was Elizabeth, daughter of Sir Robert Throckmorton, one of the well-known Catholic family of Coughton, Warwickshire. Francis, who succeeded his father in z 537; wa s too young to have taken any part in the opposition to the abolition of the Roman jurisdiction and dissolution of the monasteries; and he acquiesced in these measures to the extent of taking the oath of royal supremacy, serving as sheriff of Berkshire and Oxfordshire in 1 546-1 547, and accepting in 1545 a grant of the manor of Tilehurst, which had belonged to Reading Abbey. He was even knighted at the coronation of Edward VI. in February 1547. But the progress of the Reformation during that reign alienated him, and he attached his fortunes to the cause of the princess Mary, whose service he entered before 1 551. In August of that year he was sent to the Tower for permitting Mass to be celebrated in Mary's household. He was released in the following March, and permitted to resume his duties in Mary's service. But in February 1553 he was again summoned before the privy council, and may have been in confinement at the crisis of July; perhaps he was only released on Mary's triumph, for his name does not appear among those who exerted themselves on her behalf before the middle of August. He was then sworn a member of the privy council like many others who owed their promotion to their loyalty rather than to their political abilities. Their numbers swelled the privy council and sadly impaired its efficiency; but Mary

resisted the various attempts to get rid of them because she liked staunch friends, and regarded them as a salutary check upon the abler but less scrupulous members who had served Edward VI. as well as herself. Englefield sat as M.P. for Berkshire in all Mary's parliaments except that of April 1554, but received no higher political office than the lucrative mastership of the court of wards.

He was an ardent believer in persecution, was present at Hooper's trial, sought Ascham's ruin, and naturally lost his office and his seat on the privy council at Elizabeth's succession. He retired to the continent before May 1559, and from that time until his death was an active participant in all schemes for the restoration of Roman Catholicism. At first his ideas took such comparatively mild forms as inducing the pope to send a legate to persuade Elizabeth to return to the fold; but gradually they grew more violent and treasonable, until Englefield became the close confidant of Cardinal Allen, Parsons and the " jesuited " Catholics, who advocated forcible intervention by Spain and the succession of the infanta; in 1585 Englefield thought that Mary's succession, peaceful or other, would not be satisfactory unless it were owing to Spanish support and she were dependent on Philip. Englefield lived first at Rome, then in the Low Countries, and finally at Valladolid. He was blind for the last twenty years of his life, and received a pension of six hundred crowns from Philip. He had been outlawed in 1564 and his estates sequestered, but they were not forfeited until 1585, when an act of attainder was passed against Englefield. Even then some legal difficulties stood in the way of their appropriation by the crown, for Engle- field, obviously with an eye to this contingency, had conditionally settled them on his nephew Francis. The long arguments on the point are given in Coke's Reports, and a further act was passed in 1592 confirming the forfeiture to the crown. The nephew, however, eventually recovered some of the family estates, and was created a baronet in 1612. His uncle was alive in September 1596, but apparently died at Valladolid about the end of that year. His tomb there used to be shown to visitors as that of an eminent man.

See Diet, of Nat. Biog. xvii. 372-374; but additional light has been thrown on Englefield's career since the date of that article by the publication of the Spanish and Venetian Calendars, the Hatfield MSS., the Acts of the Privy Council, and the Letters and Papers of Henry VIII. (A. F. P.)

ENGLEHEART, GEORGE (1752-1829), English miniature painter, the great rival of Richard Cosway, was born at Kew in October 1752, and received his artistic training first under George Barret, R.A., and then under Sir Joshua Reynolds. He started on his own account in 1773, and exhibited in that year at the Royal Academy. He continued the active pursuit of his pro- fession down to 1813, when he retired, and his fee-book, still in existence, records the names of his sitters, and the amount paid for each portrait, proving that he painted 4853 miniatures during that period of thirty-nine years, and that his professional income for many years exceeded £1200 a year. During the greater part of his life he resided in Hertford Street, Mayfair, where he lived till he retired. He died at Blackheath in 1829, and was buried at Kew.

He painted George III. twenty-five times, and had a very extensive circle of patrons, comprising nearly all the important persons connected with the court. He made careful copies in miniature of many of the famous paintings executed by Sir Joshua Reynolds, and in some cases these constitute the only information we possess respecting portraits by Sir Joshua that are now missing. His fee-book, colours, appliances and a large collection of his miniatures still remain in the possession of his descendants.

His nephew, John Cox Diixman Engleheart (1784-1862), also a miniature painter, entered George Engleheart's studio when he was but fourteen years of age. He first exhibited at the Royal Academy in 1801, and sent in altogether 157 works. He was a man of substantial means, and in his time a very popular painter, but his health broke down when he was forty- four years old, and he had to relinquish the pursuit of his pro- fession. He lived at Tunbridge Wells for some years and died there in 1862.

See George Engleheart, by G. C. Williamson and H. L. D. Engle- heart .(1902). (G. C. W.)

ENGLEWOOD, a city of Bergen county, New Jersey, U.S.A., near the Hudson river, 14 m. N. by E. of Jersey City. Pop. (1900) 6253, of whom 1548 were foreign-born and 386 negroes; (1905) 7922; (1910) 9924. It is served by a branch of the Erie railway, and by an electric line connecting with a ferry (at Fort Lee) to New York. Englewood is primarily a residential suburb of New York. The site rises terrace above terrace from the marshes in the valley of the Hackensack to the top of the palisades overlooking the Hudson, from which Englewood is separated by the borough of Englewood Cliffs (pop. in 1905, 266). There are several fine residences, a hospital, a

public library and the Dwight school for girls (1859). The site of Englewood was for a long time a part of " English Neighbourhood," and was known as Liberty Pole; but until 1859, when the place was laid out, there were only a few houses here, one of which was the " Liberty Pole Tavern." In 1S71 Englewood was set off from the township of Hackensack and was incorporated as a separate township, and in 1896 it was chartered as a city; but the act under which it was chartered was declared unconstitutional, and in 1899 Englewood was rechartered as a city by a special act of the state legislature.

ENGLISH CHANNEL (commonly called "The Channel"; Fr. La Manche, "the sleeve"), the narrow sea separating England from France. If its entrance be taken to lie between Ushant and the Scilly Isles, its extreme breadth (between those points) is about 100 m., and its length about 350. At the Strait of Dover, its breadth decreases to 20 m. Along both coasts of the Channel, cliffs and lowland alternate, and the geological affinities between successive opposite stretches are well marked, as between the Devonian and granitic rocks of Cornwall and Brittany, the Jurassic of Portland and Calvados, and the Cretaceous of the Pays de Caux and the Isle of Wight and the Sussex coast, as well as either shore of the Strait of Dover. The English Channel is of comparatively recent geological formation. The land-con-

nexion between England and the continent was not finally severed until the latter part of the Pleistocene period. The Channel covers what was previously a wide valley, and may be described now as a headless gulf. The action of waves and currents, both destructive and constructive, is well seen at many points; thus Shakespeare Cliff at Dover is said to have been cut back more than a mile during the Christian era, and the cliffs of Grisnez have similarly receded. Of the opposite process notable examples are the building of the pebbly beaches of Chesil Bank and near Treguier in C6tes du Nord, and the pro- montory of Dungeness. The total drainage area of the English rivers flowing into the Channel is about 8000 sq. m.; of the French rivers, including as they do the Seine, it is about 41,000 sq. m.

From the Strait of Dover the bottom slopes fairly regularly down to the western entrance of the Channel, the average depths ranging from 20 to 30 fathoms in the Strait to 60 fathoms at the entrance. An exception to this condition, however, is found in Hurd's Deep, a narrow depression about 70 m. long, lying north and north-west of the Channel Islands, and at its nearest point to them only 5 m. distant from their outlying rocks, the Casquets. Towards its eastern

end Hurd's Deep has an extreme depth of 94 fathoms, and in it are found steeper slopes from shoal to deep water than elsewhere within the Channel. Nearing the entrance to the Channel from the Atlantic, the 100 fathoms line may be taken to mark the edge of soundings. Beyond this depth the bottom falls away rapidly. The 100 fathoms line is laid down about 180 m. W. to 120 m. S.W. of the Scilly Isles, and 80 m. W. of Ushant. Within it there are considerable irregularities of the bottom; thus a succession of narrow ridges running N.E. and S.W. occurs west of the Scillies, while only 4 m. N.W. of Ushant there is a small depression in which a depth of 105 fathoms has been found. As a general rule the slope from the English coast to the deepest parts of the Channel is more regular than that from the French coast, and for that reason, and in considera- tion of the greater dangers to navigation towards the French shore, the fairway is taken to lie between 12 and 24 m. from the principal promontories of the English shore, as far up-channel as Beachy Head. These promontories (the Lizard, Start Point, Portland Bill, St Alban's Head, St Catherine's Point of the Isle of Wight, Selsey Bill, Beachy Head, Dungeness, the South Foreland) demarcate a series of bays roughly of sickle-shape, the shores of which run north and south, or nearly so, at their western sides, turn eastward somewhat abruptly at their heads, and then trend more gently towards the south-east. On the French coast the arrangement is similar but reversed; Capes Grisnez, Antifer and La Hague, and the Pointe du Sillon demar- cating a series of bays (larger than those on the English coast) whose shores run north and south on the eastern side, and have a gentler trend westward from the head.

The configuration of the coasts is perhaps the chief cause of the peculiarities of tides in the Channel. From the entrance as far as Portland Bill the time of high water is found to be pro- gressively later in passing from west to east, being influenced by the oceanic tidal stream from the west under conditions which are on the whole normal. But eastward of a line between Portland Bill and the Gulf of St Malo these conditions are changed and great irregularities are observed. On the English coast between Portland Bill and Selsey a double tide is found. At Portland this double tide corresponds approximately with the time of low water in the regular tidal progression, and the result is the occurrence of two periods of low water, separated by a slight rise known locally as " gulder." But farther east the double tide corresponds more nearly with the time of high water, and in consequence either the effect is produced of a prolonged period of high water, or there are actually two periods of high water, as at Southampton. Various causes apparently contribute

to this phenomenon. The configuration of the coast line is such as to present at intervals barriers to the regular movement of the tidal wave (west to east), so that reflex waves (east to west) are set up. In the extreme case at Southampton the tidal effect is carried from the outer Channel first by way of

the Solent, the strait west of the Isle of Wight, and later by way of Spithead, the eastern strait. Finally the effect of the tidal stream entering the Channel through the Strait of Dover from the North Sea must be considered. The set of this stream towards the Strait of Dover from the east corresponds in time with that of the Channel stream (i.e. the stream within an area defined by Start Point, the Casquets, Beachy Head and the mouth of the Somme) towards the strait from the west; the set of the two streams away from the strait also corresponds, and con- sequently they alternately meet and separate. The area in which the meeting and separation take place lies between Beachy Head and the North Foreland, the mouth of the Somme and Dunkirk. Within this area, therefore, a stream is formed, known as the intermediate stream, which, running at first with Ihe Channel stream and then with the North Sea stream, changes its direction throughout its length almost simultaneously, and is never slack. Under these conditions, the time of high water eastward of Selsey Bill as far as Dover is almost the same at all points, though somewhat earlier at the east than at the west of this stretch of coast. The configuration of the French coast causes a very strong tidal flow in the Gulf of St Malo, with an extreme range at spring tides of 42 ft. at St Germain, com- pared with a range of 12 ft. at Exmouth and 7 ft. at Portland. In the neighbourhood of Beer Head and Portland and Weymouth Roads the streams are found to form vortices with only a slight movement. On the eastern (Selsey-Dover) section of the English coast the maximum range of tide is found at Hastings, with a decrease both eastward and westward of this point.

Westerly winds are most prevalent in the Channel. The total number of gales recorded in the period 1871-1885 was 190, of which 104 were south-westerly. Gales are most frequent from October to January (November during the above period had more than any other month, with an average of 2-1), and most rare from May to July. It appears that gales are generally more violent and prolonged when coincident with spring tides than with neaps. The winds have naturally a powerful effect on the tidal streams and currents, the

latter being in these seas simply movements of the water set up by gales, which may themselves be far distant. Thus under the influence of westerly winds prevail- ing west of the Iberian Peninsula a current may be set up from the Bay of Biscay across the entrance of the Channel; this is called Rennell's current. Fogs and thick weather are common in the Channel, and occur at all seasons of the year. Observations during the period 1876-1890 at Dover, Hurst Castle and the Scilly Isles showed that at the two first stations fogs most frequently accompany anticyclonic conditions in winter, but at the Scilly Isles they are much more common in summer than in winter, and accompany winds of moderate strength more frequently than in the case of the up-Channel stations.

(O. J. R. H.)

Salinity and Temperature. — The waters of the English Channel are derived partly from the west and partly from the English and French rivers, and all observations tend to show that there is a slow and almost continuous current through it from west to east. The western supply comes from two sources, one of which, the more important, is the relatively salt and warm water of the Bay of Biscay, which enters from the south-west and has a salinity sometimes reaching 35-6 pro mille (parts of salt per thousand by weight) ; the other consists of a southerly current from the Irish Channel, and is colder and has a salinity of 35-0 to 35-2 pro mille. As the water passes eastwards it mixes with the fresher coastal water, so that the salinities generally rise from the shore to the central line, and from east to west, though south of Scilly Islands there is often a fall due to the influence of the Irish Channel. The mean annual salinity decreases from between 35-4 and 35-5 pro mille in the western entrance to 35- 2 pro mille at the Strait of Dover on the central axis, and to about 34-7 pro mille under the Isle of Wight and off the Bay of the Seine. The English Channel may be divided into two areas by a line drawn from Start Point to Guernsey and the Gulf of St Malo. In the eastern area the water is thoroughly mixed owing to the action of the strong tidal currents and its comparatively small depth, and salinities and

temperatures are therefore generally the same from surface to bottom; while westward of this line there is often a strongly marked division into layers of different salinity and temperature, especially in summer and autumn, when the fresher water of the Irish Channel is found overlying the salt water of the Bay of Biscay. The salinity of the English Channel undergoes an annual change, being highest in winter and spring and lowest in summer, and this change is better marked in the eastern area, where the mean deviation from the

annual mean reaches 0-3 pro mille, than it is farther west with a mean deviation of o-i pro mille. There is also reason to believe that there is a regular change with a two-year period, years of high maximum and low minimum alternating with years of low maximum and high minimum. Variations of long period or unperiodic also occur, which are probably, and in one case (1905) almost certainly, due to changes taking place some months earlier far out in the Atlantic Ocean.

The mean annual surface temperature increases from between n° C. and 11 -5° C. at the Strait of Dover to over 12 C. at the western entrance. 1 The yearly range in the eastern area is considerable, reaching n° C. off the Isle of Wight and io° C. in the Strait of Dover; westward it gradually decreases to 5 C. a short distance north-west of Ushant. The mean maximum temperature, over 16 C, is found under the English coast from Start Point to the Strait of Dover about the 1st of September and off the French coast eastward of Cape la Hague about eleven days later. In the western area the maximum tempera- ture is about 15° C. and occurs between September 1 and 11. The mean minimum surface temperature is between 5° C. and 6° C. at the eastern end, and increases to over 9° C. off the coast of Brittany. Owing to the thorough mixing of the water in the eastern area the temperatures are here generally the same at all depths, and the description of the surface conditions applies equally to the bottom. In the western entrance, on the other hand, the bottom temperature is often much lower than on the surface; the range here is also much less, about 3 C, and the maximum is not reached till about the 1st of October, or from three weeks to a month later than on the surface.

A detailed account of the mean conditions in the English Channel will be found in Rap. et proc&s-verbaux, vol. vi., and Bulletin supplementaire (1908) of the Conseil Permanent International pour {'Exploration de la Mer (Copenhagen). (D. J. M.)

Cross-Channel Communication. — An immense amount of time and thought has been expended in the elaboration of schemes to provide unbroken railway communication between Great Britain and the continent of Europe and enable passengers and goods to be conveyed across the Channel without the delay and expense involved by transhipping them into and out of ordinary steamers. These schemes have taken three main forms: (1) tunnels, either made through the ground under the sea, or consisting of built-up structures resting upon the sea bed; (2) bridges, either elevated high above the sea-level so as to admit of the unimpeded passage of ships under them, or

submerged below the surface; and (3) train ferries, or vessels capable of conveying a train of railway vehicles with their loads. A tunnel was first proposed at the very beginning of the 19th century by a French mining engineer named Mathieu, whose scheme was for a time favourably regarded by Napoleon, but it was first put on a practical basis more than fifty years later by J. A. Thome de Gamond (1807-1876), whose plans were submitted to the French emperor in 1856. This engineer had begun to work at the problem of cross-Channel communication twenty years previously, and had considered the possibility of a submerged tunnel or tube resting on the sea-level, of steam ferries plying between huge piers thrown out from both coasts, and of a bridge, for which he prepared five different plans. He again brought forward his scheme for a tunnel, in a modified form, in 1867, and exhibited his plans in the Universal Exhibition of that year. About the same time an English engineer, William Lowe, of Wrexham, was also working at the idea of a tunnel. Geological investigation convinced him that between Fanhole, a point half a 1 50 F. = io° C. ; 6o-8° F. = 16 C.

utile west of the South Foreland light, and Sangatte on the French coast, 4 m. W. of Calais, the Dover grey chalk was continuous from side to side, and he considered that this stratum, owing to its comparative freedom from water and the general absence of cracks and fissures, offered exceptional advantages for a tunnel. He and Thome' de Gamond joined forces, and their plans were adopted by an international committee whose object was to popularize the idea of a tunnel both in England and France. Its engineers on the English side were Lowe, Sir James Brunlees and Sir John Hawkshaw, the last of whom in 1866 had made trial borings at St Margaret's and near Sangatte; and on the French side Thome de Gamond, Paulin Talabot and Michael Chevalier. In 1868 they reported that there was a reasonable prospect of completing the tunnel in ten or twelve years at a cost not exceeding ten millions sterling. They admitted, however, that there was some risk of an influx of the sea, but pointed out that this risk could be determined by driving preliminary driftways, as suggested by Lowe, and for this purpose asked for financial aid from the imperial treasury. A commission of inquiry then appointed by the French ministry of public works reported favourably on the plans, though it declined to recommend a grant of money; but the further progress of the scheme was interrupted by the outbreak of the Franco-German war.

The tunnel was by no means the only plan in evidence at this period for securing continuous railway communication between England and France. An iron tube, resting on the bottom of the sea, had been proposed by Tessier de Mottray in 1803, and had again been considered by Thome de Gamond in 1833; but after 1850 projects of this kind might almost be counted by the dozen. Some of the structures were to be of iron, others of concrete or masonry, and some were to be floated a moderate distance below the surface. One of the most carefully worked out plans was that of J. F. Bateman and J. Revy, who proposed to con- struct a continuous tube, 13 ft. in internal diameter, of iron rings each 10 ft. long, each ring being built out from the com- pleted portion of the tube by means of a horizontal chamber or bell, which slid telescopically over the last few rings previously put in place, and was moved forward by hydraulic power. About the same time Zerah Colburn produced plans for a tube con- structed of 1000 ft. sections, which were to be built in dry dock and then successively attached by a ball and socket joint to the completed portion, the whole being raised from the bottom and dragged out to sea, by the aid of a large number of ships, as each section was attached and launched. . Thomas Page, again, the builder of Westminster Bridge, proposed to place eight conical steel shafts «t intervals across the Strait of Dover, and to connect them by long sections of tube lowered from the surface, the whole structure being covered with concrete when finished. No attempt was made to put any of these plans into execution, and the same was true of several bridge schemes propounded about the same time; in one of these, spans one- half or three-quarters of a mile in length were contemplated, while another required 190 towers, 500 ft. apart and rising 500 ft. above the water-level, which obviously would have constituted an intolerable nuisance to navigation. The case, however, was different with a train ferry which was vigorously advocated by Sir John Fowler. His proposal was to employ steamers 450 ft. long, with a beam of 57 ft. and a speed of 20 knots, having railway lines laid down on their decks on and off which railway vehicles could be run directly at each side of the strait. Dover was to be the English port, while on the French coast a new harbour was to be formed at Audresselles, between Calais and Boulogne. This plan in 1872 received the sanction of the House of Commons, but was rejected in the House of Lords by the casting vote of the chairman of the committee. According to another similar ferry scheme, which was worked out by Admiral Dupuy de Lome in 1870, a new maritime station was to be constructed at Calais, so far off the shore that it would command deep water at every state of the tide, and connected with the French railways by a bridge.

After the conclusion of the Franco-Prussian War, negotiations

concerning the tunnel were resumed between the French and British governments, and in 1872 the latter intimated that it had " no objection in principle." After some further communica- tions between the two governments in 1874, settling the basis on which the enterprise should be allowed to proceed, a joint conn mission was appointed to arrange details relating to jurisdiction, the right of blocking the tunnel, &c, and this commission's report was accepted as a basis of agreement between the govern- ments. In 1875 the Channel Tunnel Company obtained an act authorizing it to undertake certain preliminary works at St Margaret's Bay. In the same year the French Submarine Rail- way Company obtained a concession, with the obligation to spend a minimum of 2,000,000 francs in making investigations; in fact it took over 3000 samples from the bottom of the sea in the strait, and made over 7000 soundings, and also sunk a shaft at Sangatte and started a heading. The English company did not do so much, for it failed to raise the money it required and its powers expired in 1880. Moreover, it was not the only com- pany in the field, and its programme was not universally accepted as the best possible. Some authorities, such as Sir Joseph Prestwich, doubted whether the tunnel should be attempted in the chalk because of the likelihood of fissures being encountered while others who thought the chalk suitable were dissatisfied With the actual plans and formed a rival " Anglo-French Sub- marine Railway Company." In 1882 another tunnel company made its appearance. In 1874 the South Eastern Railway Company had obtained powers to sink experimental shafts on its property between Dover and Folkestone, and in 1881 to acquire lands, including the beach and foreshore, in that area in connexion with a Channel tunnel. These powers resulted, in 1882, in the formation of the Submarine Continental Railway Company which in that year sought parliamentary sanction for a tunnel, starting from a point west of Dover, at Shakespeare's Cliff; and at the same time the resuscitated Channel Tunnel Company applied for powers to make one from Fanhok, instead of St Margaret's Bay as in its former scheme. The whole question of the tunnel was then widely discussed and considered by various committees, the last of which — a joint select committee of the Lords and Commons— in 1883 expressed the opinion by a majority that it was " inexpedient that parliamentary sanction should be given to a submarine communication between England and France." This decision for the time being disposed of the question of making a tunnel, and though Sir Edward Watkin, one of its most prominent advocates, brought bill after bill before

parliament to authorize experimental works in connexion with it, all were rejected. In 1882 the government interfered with the operations then in progress, and they were ultimately discontinued. They included a driftway 7 ft. in diameter which was driven for a distance of about 2300 yds. eastwards under the sea at an inclination of 1 in 72 from the bottom of a shaft sunk to a depth of 164 ft. in the chalk marl at Shakespeare's Cliff.

About this time the Channel Bridge and Railway Company took in hand the design of a bridge, the preliminary plans for which were exhibited in the Paris Exhibition of 1889. The terminal points were Folkestone and Cap Grisnez, and for the sake of facilitating the laying of the pier foundations it was proposed to take the bridge over the Varne and Colbart shoals. The main girders were to be nearly 59 yds. above the sea-level, the railway itself being more than 20 ft. higher still, and the spans were to vary in length between 540 and 108 yds. As the result of a survey of the sea bottom made in 1890, a modification in the line of the bridge was adopted, and it was taken direct from Cap Blancnez to the South Foreland. It was found that in this way an excellent bottom would be obtained for the foundations, and the length of the bridge would be 3 m. less, the number of piers, by employing spans of 434 and 542 yds. alternately, being reduced to 72. The cost of this structure was estimated at £28,320,000, exclusive of interest on capital during the period of construction, which was put at seven years. The same com- pany also worked out plans for a moving chariot or platform, capable of holding a railway train and supported by long legs on a submerged causeway or track constructed of steel or

armoured concrete 45 or 50 ft. below low- water level. No attempt has been made actually to carry out either this project or that of a bridge.

In 1905 the question of establishing a train ferry from Dover across the Channel was brought forward by the Intercontinental Railway Company, and in the following year the Channel Ferry (Dover) Act was passed authorizing the work. About the same period the Channel Tunnel Company, which had amalgamated with the Submarine Railway Company, awoke to activity and started a campaign in favour of its scheme; but the bill which it promoted was opposed by the government and accordingly was withdrawn in March 1907.

See Blue-book, Correspondence respecting the proposed Channel Tunnel, Commercial No. 6 (1875) ; Blue-book, Correspondence with reference to the proposed Construction of a Channel Tunnel, C. 3358 (1882) ; Blue-book, Report from the Joint Select Committee of theHouse of Lords and House of Commons on the Channel Tunnel (1883); F. J. Bramwell, " The Making and Working of a Channel Tunnel," Proc. Roy. Inst., May 1882; Tylden Wright, "The Channel Tunnel," North of England Inst. Min. and Mech. Eng. vol. 33 (1882); W. Boyd Dawkins, " The Channel Tunnel," Manchester Geol. Soc, May 1882, and Brit. Assoc. Rep. (1882, 1899); E. de Rodakowski, The Channel Ferry (London, 1905). (H. M. R.)

ENGLISH FINANCE. The history of the English fiscal system affords the best example known of continuous financial develop- ment, in respect both of institutions and methods. Though certain great periods of change can be readily noticed, yet from the time of the Norman Conquest to the beginning of the 20th century the line of connexion is substantially unbroken. Perhaps the most revolutionary changes occurred in the 17th century, as the outcome of the Civil War, and, later on, the revolution of 1688. But even in this case there was no real breach of con- tinuity. It is, therefore, possible to trace the normal growth and expansion of British finance as one of the aspects of the nation's history.

The primitive financial institutions of England centre round the king's household, or, in other words, the royal economy precedes the national one. Revenue dues collected by the king's agents, rents, or rather returns of produce, from land, and special levies for emergencies form the elements of the royal income, which gradually acquired greater regularity and consistency. There is, however, little or no evidence of any effective financial organization until we approach the nth century. The influence exercised from Normandy, which so powerfully affected the English rulers at this time, tended towards the creation of records of revenue claims and also of a central treasury.

With the union of England and Normandy under the same head the idea of settled administrative methods was definitely fixed and became of special importance in the field of finance. The systematizing spirit, so characteristic of both the Norman and Angevin kings, produced the great institution of the ex- chequer (q.v.) with its judicial and administrative sides, and its elaborate forms of account and control. Even before this organization was developed the Domesday Survey (see Domesday Book) — now recognized as having a purely fiscal object (in Mait- land's words " a

tax book, a geld book “) — shows the movement towards careful observation of the sources of revenue. It is clear that William I. initiated a policy which was followed by his successors, in spite of the serious difficulties of the period of anarchy during Stephen’s nominal reign. The obscure question as to the real origin of the special contrivances employed by the exchequer is, strictly speaking, irrelevant to the financial inquirer, who may be content to hold that, granting the existence of some Old English analogies, the system, as it appears in the 12th century, was a peculiar product of the conceptions as to fiscal organization formed by Norman subtlety. It is the manner in which this institution held together and focused the revenues and expenditure of the kingdom that has to be considered. The picture presented by the ” Dialogue of the Exchequer ” (c. 1176) is that of a comprehensive system which secured the receipt of the royal income, and provided a thorough audit of the accounts by employing processes adapted to the circumstances of the time. It is, in fact, through the description of financial institutions that it is possible to ascertain the forms of revenue

possessed by the crown. The ingenuity expended on the administrative machinery of the exchequer had as its aim the increase of the king’s resources, an object in which the official class of churchmen and lawyers was deeply interested.

In order to understand the character of English finance in the middle ages it is absolutely essential to bear constantly in mind the identification of the king with the state. Though feudalism (q.v.) was, in one of its aspects, a powerful instrument for division of political authority, it, nevertheless, in the particular form in which the Conqueror introduced it into England, enabled the fiscal rights of the crown to be established in a more definite shape than was possible under the older condition. For, in the first place, the actual property of the crown was more carefully administered as each royal manor came under the system of accounting. Again, the various claims or dues of the king took more decidedly the feudal type and received stricter legal defini- tion. Further, the higher judicial organization assisted the expansion of court fees; while, above all, the increased authority of the state made the casual receipts (for such they were) from trade more profitable.

In a broad view the sources of revenue fall under the following heads: — (1) The royal estates which were distributed over England, derived in part from the possessions of the old English kings, but increased by the confiscations that followed the events of the Conqueror’s reign, as well as by the doctrine that unowned land was

the king's (terra regis) . Over fourteen hundred manors appear in Domesday as royal property. The forests, placed under special laws, yielded little revenue, except in the form of penalties on offenders. The rural tenants, who at first paid their rents in produce, gradually commuted them into money payments. As the royal demesne was favourable for the growth of towns the rents derived from urban tenants became a valuable part of the yield from the demesne; this, later, took the shape of a payment from the town as a unit (the firma burgi) , a method which secured to the burghers freedom from the exactions of the sheriff and which was purchased by special payments. (2) The feudal rights. These included the claim to military service; the three regular aids and the payments of relief at succession to a fief, as also the profits on wardships and marriages. Escheats and forfeitures completed the list. The yield from this source varied with the power of the king and was kept within bounds by the resistance of the tenants as shown in the provisions of Magna Carta. (3) The administration of justice was a lucrative prerogative of the crown. Suitors had to pay for securing the hearing of their cases in addition to the fees for writs, and both amercements and compositions increased the receipts under this head. (4) Two special classes contributed to the royal exchequer. As a great deal of the wealth of the country was in the hands of the church the opportunities afforded by the vacancies of sees, abbacies and priories were utilized for the purpose of securing the profits of these offices during the time in which there was no occupant; and this term was frequently prolonged by the king's action or inaction. The Jews, until their expulsion, were an even more profitable class to the revenue. Being under the absolute control of the crown, they could be taxed at pleasure, either by taking a percentage of their property (e.g. in one case, one-fourth), or by levies for alleged offences. The existence of a separate exchequer for the Jews is an indication of their fiscal value. (5) Direct taxation formed an extraordinary or occasional head of revenue. The Danegeld was succeeded by the carucage, and the commutation of military service introduced the scutage, but these forms were of little immediate importance, though very significant for the future course of development. (6) Lastly come the dues claimed at the ports, which contain in germ the customs system of later times, though they rather resemble the harbour charges of modern ports and were very trivial in amount.

The history of the English financial system consists largely in the exhibition of the different fortunes of these several com- ponent parts of the exchequer receipts; for it must be re- membered that the sheriff was bound to account to that tribunal for all that he should have

received, and by this agency the local

contributions passed into the king's possession for the service of the state, During the century and a half that lay between the Conquest and the granting of the Great Charter the account given above holds good. The character of the ruler affected the vigour of the fiscal, as well as the general, administration. Henry I. and Henry II. secured much better results than Stephen or John; but the collection of the rent and profits of the royal manors and the feudal and other dues continued as the mainstay of revenue. Indications of change are, however, to be found. Thus the substitution of the " carucage " or plough tax for the " Danegeld " marks an advance towards direct taxation of land through its produce, and the introduction of " scutage " is not only further evidence of the same tendency, but also a step in the development of " money economy " in place of the earlier " natural economy " or system of payments in kind. The special levies or " tallages " imposed at times of need on the towns in the king's demesne appear to have been a doubtful exercise of the royal prerogative, but scientifically they belong to the same class as the Danegeld and scutage. Perhaps the most important advance made in this period is the beginning of taxation of movables, first applied in the Saladin tithe of 1189 and, later, expanded into a general system.

In the reign of John (iroc-i2i6) the loss of Normandy and the concession of the barons' demands by the issue of Magna Carta rendered financial readjustments inevitable. During the long reign of Henry III. the struggle to maintain the privileges granted by the Charter acted on the fiscal system by checking the arbitrary use of tallages, and as a consequence, encouraging the regular assessment of the tax on movables, which was becom- ing more prominent. The fruitful idea that it was necessary " to obtain the consent of the payers of taxes before the imposition operated powerfully in favour of the establishment of bodies representing the several estates. It is through the reaction of constitutional on fiscal development that the transition from feudal to parliamentary taxation in its earlier form is made.

Almost at the opening of the age of parliamentary taxation one of the older sources of revenue ceased. The pressure of popular opinon forced Edward I. to decree the expulsion of the Jews (1290), though

he naturally desired to retain such profitable subjects. It is, indeed, probable that, owing to the exactions practised on them, the Jewish usurers had become less serviceable to the exchequer; while it is certain that the general resources of the kingdom had so increased as to make their contribution relatively much smaller. The first effects of the representative influence in the fiscal domain are the abandonment of the tallages on towns and the decline of scutage as a mode of levy. The tax on movables was framed in a more systematic way. Instead of distinct charges on different classes, or variations in proportion of levy from one-fourth to one-fortieth, the policy of imposing a tax of one-tenth on the towns and one-fifteenth on the counties was adopted. Greater strictness in assessment was sought by the appointment of commissioners for each county, supplied with special instructions as to taxable goods and exemptions. This method continued in force for the tax on movables from 1290 till 1334, though in some cases the proportions imposed on the towns and counties were varied (e.g. an eighth and a fifth were granted in 1297, and a tenth and a sixth in 1322). A more general influence was the growing national economy which led to greater activity on the part of the king as administrator, and which also increased the need of the state for revenue. Though the doctrine that " The king should live of his own " was generally accepted as a constitutional maxim, the force of events was making it obsolete. From being an infrequent and uncertain kind of taxation the direct tax on movables, which was practically absorbing the older forms, became usual and regular. Under medieval conditions the collection of a general property tax (for such, in fact, was the nature of " the tenth and fifteenth ") presented serious difficulties. Each locality gained by keeping its assessment down to the lowest point, while the borough authorities were naturally not eager to enforce the charge on their fellow-citizens. England in the 14th century was not ripe for a system that has been found hard

to make effective in more advanced societies. Hence, from 1334 onward, the method of " apportionment " was employed, i.e. the tenth and fifteenth was taken as affording a definite sum measured by the yield on the ancient valuation. As this gave, in the aggregate, between £38,000 and £39,000, " the tenth and fifteenth " became for the future " practically a fiscal expression for a sum of about £39,000 "; the total to be divided or " appor- tioned " between the several counties, cities and boroughs accord- ing to their former payments. This settlement, which remained in force for centuries and affected all the later direct taxes, had the great advantages of certainty and adaptability. The in- habitants of any particular town

knew their total liability and could distribute it amongst themselves in the manner most con- venient to them. From theroyal standpoint also the arrangement was satisfactory, for the " tenth and fifteenth " could be multi- plied (e.g. in 1352 three "tenths and fifteenths " were voted for three years), and supplied a stable revenue for the service of the kingdom. To the parliament the power of regulating the policy of the crown by the bestowal or refusal of grants was naturally agreeable. Thus, all sections of the nation united in support of the system established in 1334, just before the opening of the Hundred Years' War, in connexion with which it was particularly serviceable.

Akin to the tax that has just been described, at least in its nature as a direct impost, is the poll or capitation tax. Financial pressure at the close of Edward III.'s reign (1377) led to the adoption of a tax of fourpence per head on all persons in the kingdom (mendicants and persons under fourteen years being excepted). This " tallage of groats," which seems to be derived by analogy from the hearth money for Peter's pence, was followed by the graduated poll taxes of 1379 and 1380. In the former the scale ranged from ten marks (£6:13:4) imposed on the royal dukes and the viscounts, through six marks on earls, bishops and abbots, and three on barons, down to the groat or fourpence payable by all persons over sixteen years of age. Such a form of taxation approximated — as Adam Smith saw — to an income tax, but it proved to be unproductive, only half of the estimated yield of £50,000 being obtained. The tax of 1380 varied within narrower limits; from twenty shillings to fourpence (or sixty groats to three), with the proviso that " the strong should aid the weak." But this particular tax is chiefly memorable as the occasion — whatever may have been the real causes — of the great " Peasants' Revolt " of 1381. This unlucky association sealed the fate of the poll tax as a fiscal expedient. It was abandoned, with one exception, for nearly three hundred years; and its occasional employment in the 17th century did not result in its permanent revival. Apart from special circumstances it is plain that the " tenth and fifteenth " was better suited than the poll tax for the purpose of English finance. The machinery for collection was ready to hand for the former, while special agents had to gather the latter, even from the poorest classes. In fact, the episode of the poll taxes may be regarded as an attempt — fortunately unsuccessful — to relieve the propertied classes at the expense of the peasants and poorer burghers. Failure in this respect helped in the maintenance of the settlement of direct taxation devised in 1334.

Parallel with the evolution of direct taxation, but decidedly lagging behind, is the progress of indirect taxation. As already mentioned, the right of levying dues on goods entering or leaving English ports belonged from very early times to the king. Whether this power was, in its origin, due to the protection afforded to traders and thus a kind of insurance, or the result of the royal prerogative of pre-emption is immaterial for finance. What is established is that the " prisage " of wine or levy of one cask in ten, and the taking of one-tenth or one-fifteenth of other commodities was in force. Attempts to impose additional dues were forbidden by an important article (41) of the Great Charter which recognized " the ancient and just customs." One of the earliest effects of parliamentary influence is manifested in the

establishment of duties 011 wool, woolfells and leather by Edward I.'s first parliament. After some efforts by the king to gather increased duties, the " Confirmation of the Charters "

(1 297) forbade any increases on the amounts fixed in 1 275, which were henceforth known as the ancient customs. Another attempt was made to obtain a higher scale of duties by arrangement with the merchants. The foreign traders consented to the royal pro- posals, which comprised duties on wine, wool, hides and wax, as well as a general tax of ij% on all imports and exports. Thus, in addition to the old customs of half a mark (6s. 8d.) per sack of wool and on each three hundred woolfells, and one mark (13s. 4d.) per last or load of leather, the foreign merchants paid an extra duty (or surtax) of 50% and also 2s. on the tun of wine — the so-called " butlerage." The privileges granted in the Carta Mercatoria (1303) were probably the consideration for accepting these enhanced dues. The English merchants, how- ever, for the time, successfully resisted the application in their case of the higher charges, and consequently remained under the old prisage of wine. In spite of parliamentary opposition, on the ground that they amounted to an infringement of the Great Charter, the new customs were maintained in force. After being suspended in 13 n they were revived in 1322, con- firmed by royal authority in 1328, and finally sanctioned by parliament in the Statute of the Staple (1353). They became a part of the permanent crown revenue from the ports, and, with the old customs, were the basis for further development.

Just as the old direct taxes were first supplemented by, and then absorbed in, the general taxation of movables, so the customs, in the strict sense, were followed by the subsidies or parliamentary grants. One great source of English wealth in the 14th century was the export of the peculiarly fine wool of the country, and the political circumstances of Edward III.'s time suggested the manipulation of the trade in this commodity for purposes of policy as well as revenue. Sometimes, in order to influence the towns of Flanders, the export of wool was abso- lutely prohibited; at others, export duties of varying amounts were imposed on wool, skins and leather. In the early years of the reign these arrangements were settled by agreement with the merchants. The subsidies of this class began in 1340 and henceforward were frequently granted, though complaints were very often made. Thus, in 1348 the Commons objected to the subsidy of

an export duty of £2 per sack on wool on the ground that it was really a tax on the landowners, who received a lower price for their wool in consequence of the duty. Bargains between the king and the merchants were forbidden, and this species of taxation was brought under parliamentary control by statutes passed in 1362 and 1371. Along with the special duties on wool there was an increase of the imposts on wine and general goods. By agreement with the merchants a charge of 2s. per tun on wine and 25% on goods was levied in 1347. Between 1371 and 1376 these dues were established as parliamentary grants under the names of " Tunnage " and " Poundage," leaving the older dues intact.

One class or " estate " occupied a peculiar position. The clergy still claimed the privilege of self-taxation, and therefore it was convocation, not parliament, that voted the tenths imposed on clerical property. In some instances much heavier charges (e.g. in 1296 one-third) were decreed by the king, but the taxation of the clergy declined in productiveness during the 14th century. By the close of the reign of Richard II. the results of the tran- sition from feudalism to a parliamentary constitution were practically complete. In respect to finance the most important of these were: (1) The disappearance or reduction to unim- portance of the feudal dues. The fact that this change occurred at, relatively speaking, so early a date is of special significance for English development. (2) The royal demesne, though it had not suffered the losses that the grants of later times inflicted on it, had also lost some of its value as a source of revenue. (3) In compensation the direct taxation of property had become a ready means of supplying the growing requirements of the administration, and the mode of levy had been reduced to a well-recognized form, unsatisfactory experiments — such as the poll tax — being withdrawn. (4) The growth of import and ex- port duties through the " old " and " new " customs and the subsidies furnished a large part of the requisite funds. In fact,

in the course of a little over three hundred years the constituent parts of the public income had, without any violent change, been completely altered in relative value and in organization. The period of the Lancastrian kings, extending over two- thirds of the 15th century (1399-1471), is noticeable for various, experiments in the system of direct taxation. The standard tax — " the tenth and fifteenth " — failed to suit the changed con- ditions. In consequence of the decay of some of the towns allowances had to be made to them, amounting to over 15% (£6000), which, with other deductions, lowered the yield from a " tenth and fifteenth " to £31,000. As a supplement a land tax, affecting only the large

owners, was voted at the rate of 5% in 1404, and repeated with wider scope, but at the lower rate of i|%, in 141 1. A house tax made its appearance in 1428. Taxes on knight's fees and other freeholds were also tried, while in 1435 and 1450 the graduated income tax was employed. The minimum rate, 25%, applied to incomes under £100 (or under £20 in the tax of 1450), and rose to 10% on the higher incomes. These devices are evidence of the demand for larger revenue, and also of the increasing unfitness of the existing direct taxation. It may be added that they indicate a disposition to adopt foreign models, particularly the methods of taxation in use in France and Italy. As to indirect taxation the receipts seem at first to have declined, and the subsidies were only granted for fixed terms (the victory of Agincourt gained a life grant to Henry V.). After the establishment of Edward IV. on the throne, the idea of a " tenth," in the literal sense, was taken up and voted (1472) by the two houses as a special military provision; but it failed to bring in the required revenue, and the king had to fall back on grants of the old-established form. Extra taxes on aliens were levied under both Lancastrian and Yorkist rulers with little profit. The most original contribution of Edward IV. to fiscal policy was the " benevolence " (q.v.) or payment by wealthy subjects of sums requested by the king. Voluntary in form, these payments were, in fact, compulsory, and became in later times one of the great grievances against which parliament had to struggle.

Broader issues in finance marked the course of the Tudor period, and these were connected with the general history of the time. The era of national monarchies had arrived, necessitating the maintenance of greater military and naval forces, as well as more costly machinery of administration. External policy was affected by the set of ideas that developed into mercantilism (see Mercantile System); but so also was fiscal policy. Finance reflected the actions of the personal rule that was the characteristic of the 16th century. Within the period, however, some decided contrasts are to be found. Prudence, carried to parsimony with Henry VII., is followed by lavish prodigality in the case of Henry VIII. Elizabeth, again, presents in her reign a very different financial policy from that of either her father or her grandfather. The desire for a vigorous foreign policy, the hope of encouraging native industry, and the sentiment of re- taliation against the trade regulations of other countries are found to interfere with the aim — strictly followed in earlier times— of obtaining the largest possible yield. All the different parts of the public economy were regarded as existing only in order to be utilized for the furtherance of national power. It is this more complex character in

policy, coupled with the new influences, that the discovery of America, the Renaissance and the Reformation brought into operation, which gives special interest to the financial problems of the 16th century.

Taking in order the great heads of public income placed at the disposal of the sovereign, it appears that the first head of the old receipts — the crown lands — had been from time to time diminished by grants to the king's relatives and favourites, but had also gained through resumptions and forfeitures. On the whole, the loss and gain down to the close of the 14th century was probably balanced. The revenue was, however, inelastic, and declined in relative importance. It has been said that " it was in the 15th century that the great impoverishment of the crown estate began." The Lancastrian kings (especially Henry VI.) lost most of the lands attached to the crown through pressure of expenditure and the wholesale plunder of officials.

Though the civil wars of the 15th century brought in many forfeited estates the grants of Edward IV. kept down the increase; But the chief opportunity for aggrandizement was afforded by the dissolution of the monasteries and gilds under Henry VIII. The great mass of property that passed into the royal possession in this way was in part assigned to nobles and officials, while most of the remainder was distributed in the reigns of his children. The dwindling importance of the public revenue from land and rent charges is as noticeable under the Tudors as in earlier times. In like manner the feudal dues had fallen into a very subordinate place notwithstanding the attempts made on particular occasions to enforce them with greater rigour. The force of personal monarchy exercised by the Tudors, depending as it did on popular support, tended to encourage the collection of dues which had a legal ground in preference to taxation of the community. Of similar character was the employment of the old right of purveyance (q.v.), in restraint of which a series of statutes had been passed.

Whatever possibilities of obtaining some additional revenue from the crown lands or prerogative rights may have existed in the 16th century, and these were slight, all the political and social conditions tended more and more to make the need of taxation as the principal financial resource imperative. Amongst the cases of increased calls

for funds to maintain the machinery of state, the rise of prices, due to increased supplies of the precious metals, must be included as one of the chief, and its effect extends into the 17th century. It was under this influence that the old forms of revenue became less profitable and that fresh develop- ments were necessitated.

Direct taxation still retained in one of its branches the pattern set in the reign of Edward III. " Tenths and fifteenths " con- tinued to be voted, and for some time all attempts to introduce new methods failed. In 1488 a military grant framed on the model of the abortive tax of 1472 yielded only a little over oike-> third of the estimate (£27,000 out of £75,000), and the unsatis- factory result prevented further experiments on the part of Henry VII. The foreign policy of Henry VIII.— particularly his French expedition— with its attendant outlay, accounts for the graduated capitation tax of 15 13, which was even less in accordance "with anticipation than the tax of 1488 (it yielded only £50,000 instead of £160,000). But these failures cleared the way for a more effective form of direct impost, which appeared in the ' ' subsidy "or general tax on land and goods. The first case of this tax (1514) was a modest one— 25%; it, however, soon took on a typical form, so that the subsidy came to mean a charge of 4s, in the pound on land and 2s. 8d. in the pound on goods, a scale evidently devised with reference to the older tenth and fifteenth, which was henceforth put in a subordinate position. The subsidy became the established mode of grant under both Tudors and Stuarts, though by degrees it underwent a change similar to that experienced by its predecessor. The taxing statutes made elaborate provisions for the assessment and collection of the tax in order to secure a full return. Old habits proved too strong and the subsidy " slipped into the same kind of groove as that of the fifteenth and tenth, and became, in practice, a grant of a sum of money of about the same amount as the yield of the last preceding subsidy " (Dowell). The consequence was that each subsidy came, in the middle of the 16th century, to be a sum of £100,000, and at its close only £80,000. The parallel vote of the clergy in convocation (which after 1533 had to be confirmed in parliament) amounted to £20,000. The usual parliamentary proceeding was to vote so many " tenths and fifteenths " and so many subsidies, e.g. Elizabeth's first parliament voted her " two fifteenths and tenths and a subsidy," or, taking the usual values, £160,000. At times of crisis such as the arrival of the Armada the votes were enlarged by granting more tenths and fifteenths and subsidies. The history of the subsidy is in- structive as to the tendencies of direct taxation in all countries. The assessment becomes inelastic and approximates to a fixed sum. As

the subsidy follows the course of the later medieval taxation, so it is the undesigned model of the later land and property tax.

Iii the history of the port duties under the Tudors the first point for notice is the life grant to each of the sovereigns of the subsidies on wool, hides and leather, together with tunnage at 3s. and poundage at 5%; thus, with the hereditary customs, supplying a considerable revenue for the crown's use. No better indication of the increased power and popularity of the monarchy could be found. The contrast with the suspicious and grudging attitude of the Plantagenet and Lancastrian parliaments is significant of the change in national sentiment. A duty on malmsey (1400) had a retaliatory rather than a fiscal aim, being directed against the Venetians who had imposed restrictions on English trade. In several later cases wine became liable to extra duties, chiefly applied to French trade in further pursuance of the policy of retaliation. Restrictions on import and export as well as the hostile measures against foreign merchants were matters of economic policy rather than finance, but they had the indirect effect of increasing the control exercised at the ports. The loss of Calais (1558) dislocated the system of the staple and cut off one centre of customs revenue; and it was also probably the cause of an important change in the mode of valuing goods for duty. For the declaration on oath of the merchant a fixed valuation was substituted and set forth in a book of rates, the first of its class (1558). Following this reform came more stringent regulations against smuggling and fraud on the part of officials. All through the Tudor period the cost of collection was unduly high. For the first six years of Elizabeth it has been estimated at one-sixth of the gross receipts.

Just as in the 14th century the subsidy had followed the " old " and " new " customs, so in the 16th the " impositions " levied by royal prerogative formed a supplement to the parlia- mentary subsidy; but the principal employment of this ex- pedient occurs in the next century. Another significant indica- tion of the future course of indirect taxation was furnished by the grants of monopolies to inventors, producers and traders. These privileges, when they affected important commodities, operated in the same way as taxes farmed out to collectors, and, though the profit to the crown was small, they enhanced prices and excited discontent. The wisdom of Elizabeth (or her ministers) was shown in the promise of redress after the hostite debate of 160 1.

From one point of view it may fairly be said that the great struggle of the Stuart kings with the parliament centred round financial issues.

It is, at all events, beyond dispute that ques- tions of taxation were the chosen ground of conflict. Taking the period from the accession of James I. to the opening of the Civil War (1603-42) it appears that the legal basis of indirect taxation was tested for the port duties in the " Great Case of Impositions " (known as Bates' case, see Bates, John), while that of direct taxation was considered in the even more famous " Ship Money " case (for ever associated with the name of Hampden). In parliament the debates deal with impositions, monopolies, the grounds for voting subsidies, and the proper application of the funds granted; in fact, with nearly all the financial questions of the time. Notwithstanding these diffi- culties and disputes the financial system shows evident signs of expansion and adaptation to the needs of the state.

The direct grants of the parliaments of James I. far exceeded those of earlier. periods (in 1606 six "fifteenths and tenths," three lay and four clerical subsidies), but the efforts to extend the other sources of revenue by the exercise of the prerogative naturally reacted on this spirit of liberality. The last " fifteenth and tenth " was voted in 1624, from which date this old-estab- lished form disappears, and the subsidy alone is used. In spite of Charles I.'s high-handed policy five subsidies were voted after the Petition of Right had been accepted, and even the Long Parliament made similar grants. Almost at the outbreak of the Civil War it also gave the king a graduated capitation tax. Other modes of direct taxation were used without parliamentary sanction. The collection of the antiquated feudal dues was enforced through the special courts (particularly the Star Chamber) with a rigour long unknown; James had tried the French device of a " tariff of honors." Both kings employed

the"" benevolence " until the Petition of Right made such a levy illegal. But by far the most serious innovation was the collection of the " ship money," a course forced on Charles by his deter- mination not to meet the representatives of the nation. The writs " embodied the ultimate expression of the ingenuity of the king's advisers in the invention of means to enable him to rule without a parliament." The first writs secured over £100,000, and were followed by five further issues (1634-1639) bringing in an average return of £200,000 or about three lay subsidies. Like the " benevolence," the ship money was declared to be illegal (1641).

The contest respecting monopolies, settled by Elizabeth's withdrawal, was revived under James I., and had to be finally closed by the Statute of Monopolies (1624), declaring such grants to be utterly void. Certain exceptions (as in the case of the soap- boilers) permitted the raising of revenue by what was in fact a rudimentary excise, and plans for a general excise were discussed, especially as a substitute for the feudal dues, though they were not reduced to practice. In the earlier 17th century the customs show a steady increase. From £127,000 in 1604 they rose to nearly £500,000 in 1641. This fourfold increase was due in part to the growth of English trade, but it was also influenced by the adop- tion of new " Books of rates " in 1608 and 1635, fixing higher valuations, and by the inclusion of new commodities with definite duties. Wine, currants (the subject of controversy in Bates' case) and tobacco are particularly noticeable. Sugar also appears as a contributory. An interesting development was the adoption on a larger scale of the " farming " system, an evident imitation from France. A distinction was made between the " great," the " petty " and the " sugar " farms, and oppor- tunities for gain were afforded to the officials. On the consti- tutional side the life grant of subsidies, made in accordance with Tudor usage to James, was temporarily withheld from Charles, a restriction which his own overbearing policy led the parliament to maintain. Practically, the whole customs revenue between 1628 and 1640 was raised by the use of the prerogative without any parliamentary sanction. The Tunnage and Poundage Act of 1 64 1 pronounced definitely against the legality of any extra parliamentary customs and thus closed another of the consti- tutional problems of finance.

In the progress from the Conquest to the crisis of the Great Rebellion there is noticeable a practically complete shifting of the classes of revenue. The king had ceased " to live of his own " ; the royal demesne and the prerogative rights included in feudalism had become very subordinate. The direct taxation of property and income, and the indirect taxation on imported or exported commodities became the principal forms of receipt.

In the long course of English financial history the nearest approach to the new departure and an abandonment of old devices is found at the time of the Civil War and Commonwealth. The actual outlines of the now existing system made their appearances, while the older portions of the revenue — parti- cularly the survivals of feudalism — are eliminated. Thus the Civil War and the Interregnum (1642-60) may be regarded as marking a watershed in the financial history of the country. At the beginning of the struggle both sides had to rely on

volun- tary contributions. Plate and ornaments were melted down and useful commodities were furnished by the adherents of the king and by those of the parliament. As holding possession of London and the central organization the parliament voted sub- sidies and a poll tax. Such imports could hardly be levied with success and new forms became necessary. The direct taxation took the shape of a " monthly assessment " which was fixed from time to time, and which was collected under strict regulations, in marked contrast to the lax management of the former subsidies. As the amount for each district was fixed, the systematic collec- tion secured " the more equitable adjustment of the burden of the tax as regards the various taxpayers " without hardship to the community. In spite of its origin, the " assessment " was the model for later taxation of property. The yield of this tax — exceeding for the whole period £32,000,000 — is a proof of its importance. Minor contrivances, e.g. the "weekly meal" tax, in-

dicate the financial difficulties of the parliament, but are otherwise unimportant. Owing to its control of the sea and the principal ports the parliament was able to command the customs revenue; and in this case also it remodelled the duties, abolishing the wool subsidy and readjusting the general customs by a new book of rates. A more extensive tariff was adopted in 1656, and various restrictions in harmony with the mercantilist ideas of the time were enforced. Thus French wines, silk and wool were excluded from 1649 to 1656. Far more revolutionary in its effects was the introduction of the excise or inland duties on goods — a step which Elizabeth, James I. and Charles I. had hesitated to take. Beginning (1643) with duties on ale, beer and spirits, it was soon extended to meat, salt and various textiles. Meat and domestic salt were relieved in 1647, and the taxation became definitely established under the administration of commissioners appointed for the purpose. Powers to let out the collection to farmers were granted, and a bid for both excise and customs amounted in 1657 to £1,100,000. Confiscations of church lands and those belonging to royalists, feudal charges and special collections helped to make up the total of £83,000,000 raised during the nineteen years of this revolutionary period. Another mark of change was the removal of the exchequer to Oxford, leaving, however, the real fiscal machinery at the disposal of the com- mittees that directed the affairs of the parliament. Under Cromwell the exchequer was re-established (1654) in a form suited for the changes in the finances, the office of treasurer being placed in the hands of commissioners.

A complete reconstruction of the revenue system became necessary at

the Restoration. The feudal tenures and dues, with the prerogative rights of purveyance and pre-emption, which had been abolished by order of the parliament, could not be restored. Their removal was confirmed, and the new revenues that had been developed were resorted to as a substitute. Care- ful inquiry showed that just before the Civil War the king's annual revenue had reached nearly £900,000. The needs of the restored monarchy were estimated at £1,200,000 per annum, and the loyal spirit of the commons provided sources of revenue deemed sufficient for this amount. An hereditary excise on beer and ale was voted as a compensation for the loss of the feudal dues, and temporary excises on spirits, vinegar, coffee, chocolate and tea were added. All differences of " old " and " new " customs and subsidies had disappeared under the Commonwealth. The general or " great statute " (1660) pro- vided a scale of duties — 5 % on imports and exports, with special duties on wines and woollen cloths--accompanied by a new book of rates. A house tax, levied after the French pattern, on each hearth, was introduced in 1662 and became established. Poll taxes were used as an extraordinary resource, as were the last subsidies, voted in 1663, and then for ever abandoned. Licences on retailers and fees on law proceedings were further aids to the revenue, which, in the later years of Charles II. and in the short reign of his successor, was with difficulty kept up to the level of the increasing expenditure. The Common- wealth assessments were revived on several occasions, and indirect taxation was made more rigorous by the imposition of extra duties on brandy, tobacco and sugar, as also on French linens and silks. A very important development was the placing of the customs (1670) and the excise (1683) in the hands of special commissioners, instead of the system of farming them out to private collectors. The approach to modern conditions is further evidenced by the greater care in the administration. Amongst expert officials Dudley North (q.v.), as commissioner of customs, was the most distinguished. In this period, too, the beginning of the public debt as in the appropriation of the bankers' deposits may be found.*

The Revolution of 1688 may be regarded both on its con- stitutional and financial sides as the completion of the work of the Long Parliament. In the latter respect its chief effects were: (1) the transfer of the administration of the finances from the king's nominees to officials under parliamentary control, (2) the consequent application of the revenue to the purposes designated by parliamentary appropriation, (3) the rapid expansion of the

various kinds of revenue, particularly the indirect taxes, (4) the rise and growth of the national debt, combined with the creation of an effective banking system. The greater part of the 18th century was occupied with the working out of these results.

The government of William III. had to face the expenses of a great war and to allay discontent at home. As a preliminary step to the necessary settlement of the revenue a return was prepared, showing the tax receipts at over £1,800,000 and the peace expenditure at about £1,100,000. Parliament accepted the view that £1,200,000 per annum would suffice for the ordinary requirements of the kingdom. It, further, introduced the system of the Civil List (q.v.) and assigned £600,000 for the fixed pay- ments placed under that head, leaving the remainder to be appropriated for the other needs of the state. As the " hearth money " had proved to be a very unpopular charge, it was, in spite of its yield (£170,000), given up. The temporary excise duties were voted for " their majesties' lives " and the customs for a limited term. These branches of revenue were altogether insufficient to meet the pressure of the war outlay, and in conse- quence new heads of taxation — or old ones revived — came into use. A series of poll and capitation taxes were imposed between 1689 and 1698, but were after that date abandoned for the same reason as that for the repeal of the hearth money. The monthly assessment was tried in 1688; then came an income tax followed by " twelve months' " assessments in 1690 and 1691. The way was thus prepared for the property tax of 1692, imposing a rate of 4s. in the pound on real estate, offices and personal property. The old difficulties of securing returns made the tax chiefly one on land. It was under the name of "the land tax" that it was generally known. The 4s. rate brought in £1,922,712, a return which declined in the following years. To meet this a fixed quota of nearly half a million (a is. rate) was adopted in 1697, the amount to be apportioned in specified sums to the several counties and towns. The framework of the tax remained without substantial change till 1 798, the time of Pitt's redemption scheme. In 1696 houses were taxed 2s. each, with higher rates for extra windows. The beginning of the " window tax," licences on pedlars, and a temporary tax on the stocks of companies com- plete the imposts of this kind. Stamp duties — imitated from Holland — were adopted in 1694 and extended in 1698: they mark the beginnings of the modern duties on transactions and the " death duties." Large additions were made to the excise. Breweries and distilleries were placed under charge, and such important commodities as salt, coal, malt, leather and glass were included in

the list of taxable articles, but the two last mentioned were soon relieved for the time. The customs rates were also increased. In 1698 the general 5% duty was raised by the new subsidy to 10%. French goods became liable to surtaxes, first of 25%, afterwards of 50%; those of other countries had to pay similar charges of smaller amount. Spirits, wines, tea and coffee were taxed at special rates. How great was the expansion of the fiscal system may be best realized from the fact that during the comparatively short reign of William III. (1689-1702) the land tax produced £19,200,000, the customs £13,296,000, and the excise £13,650,000, or altogether £46,000,000. In the last year of the reign, the opening one of the 18th century, the returns from these taxes respectively were: land tax (at 2s.), £990,000, customs £1,540,000, excise £986,000, or a total exceeding three and a half millions. The removal of the regular export duties in respect of (a) domestic woollen manufactures, (b) corn, was the only alleviation of taxation, and in both cases it was due to special reasons of policy.

Quite as remarkable as the growth of revenue is the sudden appearance of the use of public loans. In earlier periods a ruler had accumulated treasure (Henry VII. left £1,800,000) or had pledged " his jewels or the customs or occasionally the persons of his friends for the payment " of his borrowings. Edward III.'s dealings with the Florentine bankers are well known; but it was only after the Revolution that the two conditions essential for a permanent public debt were realized, viz.: (1) the responsi- bility of the government to the people, and (2) an effective market for floating capital. At the close of the war in 1697 a

debt of £21,500,000 had been incurred, over £16,000,000 of which remained due at William III.'s death. Connected with the public debt is the foundation of the Bank of England (see Banks and Banking), which more and more became the agent for dealing with the state revenue and expenditure; though the exchequer continued to exist until 1834 as a real, even if anti- quated institution.

Thus it is clear that by the end of the 17th century the new influences which date from the Civil War had brought into being all the elements of the modern financial system. Expenditure, revenue, borrowing to meet deficiencies are all, in a sense, de- veloped into their present-day form. Increase in amount and some refinements in procedure, combined with improved views of public policy, are the only changes that occur later on.

Regarded broadly, the 18th and 19th centuries exhibit several

distinct periods with definite financial aspects. In the ninety years from the death of William III. (1702) to the outbreak of the Revolutionary War with France (1793) there are four serious wars, covering nearly thirty-five years. There is the long peace administration of Walpole, and there are the shorter intervals of rest following each of the contests. From the beginning of the war with the French Republic to the year of Waterloo there is a nearly unbroken war time of over twenty years. The forty years' peace is closed by the Crimean War (1854-56); and another forty years of peace ends with the South African War (1899-1902). During this time the older mercantilism passes into protectionism; and this, again, gives way before the gradual adoption of the free trade policy. At each time of war, taxation (particularly in the indirect form) and debt increase. Financial reform is connected with the maintenance of peace. Among the great financial ministers Walpole, the younger Pitt, Peel and Gladstone are conspicuous; while Huskisson's services in the kindred field of economic policy deserve special notice in their financial bearing.

By taking the several great heads of revenue in order it is comparatively easy to understand the nature of the progress made in subsequent years. (1) The land tax, established on a definite basis in 1692, was the great 18th century form of direct taxation. Varying in rate from is. (as in 1731) to 4s. (as in most war years), it was converted by Pitt in 1798 into a redeemable charge on the lands of each parish, and by this process has sunk from the amount of £1,911,000 in 1798 to £730,000 in 1907-1908. The great increase in other heads had impaired the value of the land tax as a fiscal support. (2) Parallel with the movement of the land tax but showing much more rapid growth was the excise of the 18th century. Most of the articles of common consumption were permanently taxed. Soap, salt, candles and leather are described by Adam Smith as taxed, and that taxation is unreservedly condemned by him. In 1739 the excise duties brought in £3,000,000. By 1792 they had risen to £10,000,000. Their continued expansion was due both to the wider area covered and to the increased consuming power of the country. (3) The customs were equally serviceable, and in their case the increased duties were even more considerable. The general 10% of 1698 became 15% in 1704, a fourth 5% was imposed in 1748, and in 1759 the general duties were raised to 25%. Coincidently with this general extension of the customs duties special articles such as tea were subjected to increased duties. The American War of Independence brought about a further general increase of 10%, together with special extra duties on tobacco and sugar. In 1784 the

customs revenue came to over £3,000,000. Two circumstances account for this slower growth. (1) The extreme rigour of the duties and prohibitions, aimed chiefly against French trade; and (2) the absence of care in estimating the point of maximum productiveness for each duty. Swift's famous saying that " in the arithmetic of the customs two and two sometimes, made only one " is well exemplified in England at this time. The smuggler did a great deal of the foreign trade of the country. Efforts at reform were not, how- ever, altogether wanting. Walpole succeeded in carrying several useful adjustments. He abolished the general duties on exports and also several of those on imported raw materials such as silk,

beaver, indigo and colonial timber. His most ambitious scheme — that for the warehousing of wine and tobacco in order to relieve exporters — -failed, in consequence of the popular belief that it was the forerunner of a general excise. Walpole's treatment of the land tax, which he kept down to the lowest figure (is.), and his earlier funding plan deserve notice. His determination to preserve peace assisted his fiscal reforms. Pitt's administration from 1783 to 1702 marks another great period of improvement. The consolidation of the customs laws (1787), the reduction of the tea duty to nearly one-tenth of its former amount, the con- clusion of a liberal commercial treaty with France, and the attempted trade arrangement with Ireland, tend to show that " Pitt would have anticipated many of the free trade measures of later years if it had been his lot to enjoy ten more years of peaceful administration." One of the financial problems which excited the interest and even the alarm of the students of public affairs was the rapid increase of the public debt. Each war caused a great addition to the burden; the intervals of peace showed very little diminution in it. From sixteen millions in 1702, the debt rose to £53,000,000 at the treaty of Utrecht (1713). In 1748 it reached £78,000,000, at the close of the Seven Years' War it was £137,000,000, and when the American colonies had established their independence it exceeded £238,000,000. Apprehensions of national bankruptcy led to the adoption of the device of a sinking fund, and in this case Pitt's usual sagacity seems to have failed him. The influence of R. Price's theory induced the policy of assigning special sums for debt reduction, without regard to the fundamental condition of maintaining a real surplus.

The revolutionary and Napoleonic wars mark an important stage in

English finance. The national resources were strained to the utmost, and the " whip and spur " of taxation was used on all classes of the community. In the earlier years of the struggle the expedient of borrowing enabled the government to avoid the more oppressive forms of charge; but as time went on every possible expedient was brought into play. One class of taxes had been organized during peace — the " assessed taxes " on houses, carriages, servants; horses, plate, &c. These duties were raised by several steps of 10% each until, in 1798, their total charge was increased threefold (for richer persons four- or fivefold) under the plan of a " triple assessment." The compara- tive failure of this scheme (which did not bring in the estimated yield of £4,500,000) prepared the way for the most important development of the tax system— the introduction of the income- tax in 1798. Though a development of the triple assessment, the income-tax was also connected with the permanent settle- ment of the land tax as a redeemable charge. It is possible to trace the progress of direct taxation from the scutage of Norman days through " the tenth and fifteenth," the Tudor " subsidies," the Commonwealth " monthly assessments," and the 18th cen- tury land tax, to the income-tax as applied by Pitt, and, after an interval of disuse, revived by Peel (1842). The immediate yield of the income-tax was rather less than was expected (£6,000,000 out of £7,500,000); but by alteration of the mode of assessment from that of a general declaration to returns under the several schedules, the tax became, first at 5 , afterwards at 10, the most valuable part of the revenue. In 181 5 it contri- buted 22% of the total receipts (i.e. £14,600,060 out of £67,000,000). If employed at the beginning of the war, it would probably have obviated most of the financial difficulties of the government. The window tax, which continued all through the 1 8th century, had been supplemented in the American War by a tax on inhabited houses (one of Adam Smith's many sugges- tions), a group to which the assessment taxes were naturally joined. During the 18th century the probate duty had been gradually raised, and in 1780 the legacy duty was introduced; but these charges were moderate in character and did not affect land. Though the direct and quasi-direct taxes had been so largely increased, their growth was eclipsed by that of the excise and customs. With each succeeding year of war new articles for duties were detected and the rates of old taxes raised . The maxim, said to have guided the financiers of another country— "Wherever

you see an object, tax it " — would fairly express the guiding policy of the English system of the early 19th century. Eatables, liquors, the materials of industry, manufactures, and the trans- actions of

commerce had in nearly all their forms to pay toll. To take examples: — salt paid 15s. per bushel; sugar 30s. per cwt.; beer 10s. per barrel (with 4s. sd. per bushel on malt and a duty on hops) ; tea 96 % ad valorem. Timber, cotton, raw silk, hemp and: bar iron were taxed, so were leather, soap, glass, candles, paper and starch. In spite of the need of revenue, many of the customs duties were framed on the protective system and thereby gave little returns; e.g. the import duty on salt in 1815 produced £547, as against £1,616,124 from excise; pill-boxes brought in 185. iod., saltpetre 2d., with id. for the war duties. The course of the war taxation was marked by varied experiments. Duties were raised, lowered, raised again, or given some new form in the effort to find additional revenue. Some duties, e.g. that on gloves, were abandoned as unproductive; but the conclusion is irresistible that the financial system suffered from over-complication and absence of principle. In the period of his peace administration Pitt was prepared to follow the teaching of The Wealth of Nations. The strain of a gigantic war forced him and his successors to. employ whatever heads of taxation were likely to bring in funds without violating popular prejudices. Along with taxation, debt increased. For the first ten years the addition to it averaged £27,000,000 per annum, bringing the total to over £500,000,000. By the close of the war period in 1815 the total reached over £875,000,000, or a somewhat smaller annual increase — a result due to the adoption of more effective tax forms, and particularly the income tax. The progress of English trade was another contributing agency towards securing higher revenue. The import of articles such as tea advanced with the growing population; so that the tea duty of 96% yielded in 1815 no less than £3,591,000. It is, however, true that by the year just mentioned the tax system had reached its limit. Further extension (except by direct confiscation of property) was hardly possible. The war closed victoriously at the moment when its prolongation seemed unendurable.

A particular aspect of the English financial system is its relation to the organization of the finance of territories connected with the English crown. The exchequer may be plausibly held to have been derived from Normandy, and wherever territory came under English rule the methods familiar at home seem to have been adopted. With the loss of the French possessions the older cases of the kind disappeared. Ireland, however, had its own exchequer, and Scotland remained a distinct kingdom. The 18th century introduced a remarkable change. One of the aims of the union with Scotland was to secure freedom of com- merce throughout Great Britain, and the two revenue systems were amalgamated. Scotland was assigned a

very moderate share of the land tax (under one-fortieth), and was exempted from certain stamp duties. The attempt to apply selected forms of taxation — custom duties (1764), stamp duties (1765), and finally the effort to collect the tea duty (1773) — to the American colonies are indications of a movement towards what would now be called " imperialist " finance. The complete plan of federation for the British empire, outlined by Adam Smith, is avowedly actuated by financial considerations. Notwith- standing the failure of this movement in the case of the colonies, the close of the century saw it successful in respect to Ireland, though separate financial departments were retained till after the close of the Napoleonic War and some fiscal differences still remain. By the consolidation of the English and Irish ex- chequers and the passage from war to peace, the years between 181 5 and 1820 may be said to mark a distinct step in the financial development of the country. The connected change in the Bank of England by the resumption of specie payments supports this view. Moreover, the political conditions in their influence on finance were undergoing a revolution. The landed interest, though powerful at the moment, had henceforth to face the rivalry of the wealthy manufacturing communities of the north of England, and it may be added that the influence of theoretic

discussion was likely to be felt in the treatment of the financial policy of the nation. Canons as to the proper system of adminis- tration, taxation and borrowing come to be noticed by states- men and officials.

These influences may be followed out in their working by observing the chief lines of adjustment and modification that followed the conclusion of peace. Relieved from the extra- ordinary outlay of the preceding years, the government felt bound to propose reductions. With commendable prudence it was resolved to retain the income-tax at 5% (one-half of the former rate) , and to join with this reduction the removal of some war duties on malt and spirits. Popular feeling against direct taxation was so strong that the income-tax had to be surrendered in toto, a course which seriously embarrassed the finances of the following years. For over twenty-five years the income-tax remained in abeyance, to the great detriment of the revenue system. Its revival by Peel (1842), intended as a temporary expedient, proved its services as a permanent tax: it has con- tinued and expanded considerably since. Both the excise and customs at the

close of the war were marked by some of the worst defects of a vicious kind of taxation. The former had the evil effect of restricting the progress of industry and hampering invention. The raw materials and the auxiliary substances of industry were in many cases raised in price. The duties on salt and glass specially illustrated the bad results of the excise. New processes were hindered and routine made compulsory. The customs duties were still more restrictive of trade; as they practically excluded foreign manufactures, and were both costly and in many instances unproductive of revenue. As G. R. Porter has shown, the really profitable customs taxes were few in number. Less than a score of articles contributed more than nineteen-twentieths of the revenue from import duties. The duties on transactions, levied chiefly by stamps, were ill-graded and lacking in comprehensiveness. From the standpoint of equity the ground for criticism was equally plain. The great weight of taxation fell on the poorer classes. The owners of land escaped giving any return for the property that they held undet the state, and other persons were not taxed in proportion to theif abilities, which had been long recognized as the proper criterion. The grievance as to distribution has been modified, if not removed, by the great development of (1) the income-tax, (2) the " death " or inheritance duties. Beginning at the rate of 7d. per pound (1842-1854), the income-tax was raised to is. 4d. for the Crimean War, and then continued at varying rates; reduced to 2d. in 1874, it rose to sd., then in 1894 to 8d., and by 1909 appeared to be fixed as a minimum at is., or 5% on income from property. The yield per penny on the £ has risen almost uninterruptedly. From £710,000 in 1842, it now exceeds £2,800,000, though the exemptions and abatements are much more extensive. In fact, all incomes of £3 per week are abso- lutely free (£160 per annum is the precise exemption limit), and an income of £400 derived from personal exertion pays less than 5§d. per pound, or 2j%. The great productiveness of the tax is equally remarkable. From £5,600,000 in 1843 (with a rate of 7d.) the return rose to £32,380,000 in 1907-1908, having been at the maximum of £38,800,000 in 1902-1903, with a tax rate of 6|%. The income-tax thus supplies about one-fifth of the total revenue, or one-fourth of that obtained by taxation. Several fundamental questions of finance are connected with the taxation of income and have been dealt with by English practice. Small incomes claim lenient treatment; and, as mentioned above, this leniency means in England complete freedom. Again, earned incomes appear to represent lower ability to pay than unearned ones. Long refused on practical grounds (as by Gladstone and Lowe), the concession of an abatement of 25% on earned incomes of £2000 and under was granted in 1907. The question

whether savings should be exempt from taxation as income has (with the exception of life insurance premiums) been decided in the negative. Allowances for depreciation and cost of repairs are partially recognized. Far more important than these special problems is the general one of increased tax rates on large incomes. Up to 1908-1909 the tax above the abatement limit of £700 remained

strictly proportional; but opinion showed a decided tendency in favour of extra rates or a " super tax " on incomes above an assigned amount (e.g. £5000), and this was included in the budget of 1909-1910 (see IncomB-Tax).

: In close relation with the income-tax is the estate duty, with its adjuncts of Legacy and Succession Duties. After Pitt's failure to carry the succession duty in 1 796, no change was made till Gladstone's introduction in 1853 of a duty on land and settled property parallel to the legacy duty on free personality. Apart from certain minor alterations, the really vital change was the extension in 1894 of the old Probate Duty into a comprehensive impost (entitled the Estate Duty) applicable to all the possessions of a deceased person. This " Inheritance Tax "—to give it its scientific title — operates as a complementary property tax, and is thus an addition to the contribution from incomes derived from large properties. By graduation the charges on large estates in 1908-1009 (before the proposal for further increase in 1909- 1910) came to 10% on £1,000,000, and reached the maximum of 15% at £3,500,000. From the several forms of the "In- heritance Taxes " the national revenue gained £14,500,000, with 4ˆ millions as a supplementary yield for local finance. The immense expansion of direct taxation is evident on comparing 1840 with 1908. In the former year the Probate and legacy duties brought in about one million; the other direct taxes, even including the "House duty," did not raise the total to £3,000,000. In 1908 the direct taxation of property and income supplied £51,500,000, or one-third of the total receipts as against less than one-twentieth in 1840.

But though this wider employment of direct taxation— a characteristic of European finance generally — reduced the relative position of the taxation of commodities, there was a growth in the absolute amount obtained from this category of duties. There were also considerable alterations, the result of changes in the views respecting fiscal policy. At the close of the Great War the excise duties were at first retained, and even in some cases increased. After some years reforms began. The following articles amongst others were freed from charge: salt (1825); leather and candles (1830);

glass (1845); soap (1853); and paper (i860). The guiding principles were: (1) the removal of raw materials from the list of goods liable to excise,

(2) the limitation of the excise to a small number of productive articles, with (3) the placing of the greater part (practically nearly the whole) of this form of taxation on alcoholic drinks. Apart from breweries and distilleries, the excise had little field for its work. The large revenue of £35,700,000 in 1907-1908 was derived one-half from spirits (£17,700,000), over one-third from beer, while most of the remainder was obtained from business taxation in the form of licences, the raising of which was one of the features' of the budget in 1909. As a feeder of the revenue the excise might be regarded as equal to the income-tax, but less to be relied on in times of depression. Valuable as were the reforms of the excise after 1820, they were insignificant as compared with the changes in the customs. The particular circumstances of English political life have led to perhaps undue emphasis being placed on this particular branch of financial development. Between 1820 and i860 the customs system was transformed from a highly complicated arrangement of duties, pressing with severity on nearly all foreign imports, into a simple and easily understood set of charges on certain specially selected commodities. All favours or preferences to home or colonial producers disappeared. Expressed in financial terms, all duties were imposed " for revenue only," and estimated in reference to their productiveness. An assimilation between the excise and customs rates necessarily followed. The stages of the development under the guidance of (1) Huskisson, (2) Peel, and

(3) Gladstone are commonly regarded as part of the movement for Free Trade; but the financial working of the alteration is understood only by remembering that the duties removed by " tens " or by " hundreds " were quite trivial in yield, and did not involve any serious loss to the revenue. Perhaps the most remarkable feature of the English customs of the 19th century was the steadiness of the receipts. In spite of trade depressions,

commercial crises and sweeping changes in rates, the annual revenue in the period 1815-1900 only varied between £19,000,000 and £24,000,000; though, on balance, duties amounting to £30,000,000 were remitted. The potential resources of this branch of revenue were

made evident in the rapid rise of the yield by the new taxation imposed for the South African War (1 899- 1902). In consequence of this increase the customs became equal to the excise in return, and, combined, they collected over £60,000,000 annually from the consumption of commodities. They accordingly afforded a counterpoise to the burden put on income and property, or, more accurately speaking, they ob- tained due, or somewhat more than due, contribution from the smaller incomes, particularly those of the working class.

The exemption of raw materials and food; the absence of duties on imported, as on home manufactures; the selection of a small number of articles for duty; the rather rigorous treat- ment of spirits and tobacco, were the salient marks of the English fiscal system which grew up in the 19th century. The part of the system most criticised was the very narrow list of dutiable articles. Why, it was asked, should a choice be made of certain objects for the purpose of imposing heavy taxation on them? The answer has been that they were taken as typical of con- sumption in general and were easily supervised for taxation. Moreover, the sumptuary element is introduced by the policy of putting exceptionally heavy duties on spirits and tobacco, with lighter charges on the less expensive wines and beers. Facility of collection and distribution of taxation over a larger class appear to be the grounds for the inclusion of the tea and coffee duties, which are further supported by the need for obtaining a contribution of, roughly speaking, over half the tax revenue by duties on commodities. The last consideration led, at the beginning of the 20th century, to the sugar tax and the temporary duties on imported corn and exported coal.

As a support to the great divisions of income-tax, Death Duties, Excise and Customs, the stamps, fees and miscellaneous taxes are of decided service. A return of £9,000,000 was secured by stamp duties.

In recent years the so-called " non-tax " revenue largely in- creased, owing to the extension of the postal and telegraphic services. The real gain is hot so great, as out of gross receipts of £22,000,000 over £17,500,000 is absorbed in expenses, while the carriage of ordinary letters seems to be the only profitable part of these services. Crown lands and rights (such as vintage charges) are of even less financial value.

One cardinal principle of the greatest English finance ministers has been the avoidance of deficits or undue surpluses. Glad- stone's

inheritance of doctrine from Peel " was to estimate expenditure liberally, to estimate revenue carefully, to make each year pay its own expenses, and to take care that your charge is not greater than your income." This method of treatment requires that taxation shall be productive in yield, and that it shall be so elastic as to admit of expansion, a function specially assigned to the income-tax. It may also be said to involve due care in the treatment of the national resources. The reaction of ill-chosen taxes on industry is a hindrance to their productiveness and their growth.

Authorities. — The constitutional historians — Stubbs, Gneist, Hallam — deal with the legal and constitutional aspects of finance. Special financial histories are: Sir J. Sinclair, History of the Public Revenue of the British Empire (3 vols., 3rd ed., London, 1803); S. Dowell, History of Taxation and Taxes in England (4 vols., 2nd ed., London, 1888); Schanz, Englische Handelspolitik (2 vols., Leipzig, 1881), and H. Hall, History of the Customs Revenue of England. (2 vols., London, 1885), are valuable for the earlier periods. W. Cunningham, Growth of English Industry and Commerce (2 vols., Cambridge, 1903-1907) ; H. O. Meredith, Economic History of England (London, 1908), devote sections to finance. A. Smith, Wealth of Nations (1776), Tooke and Newmarch, History of Prices (6 vols., London, 1837-1856), give financial details. G. R. Porter, Progress of the Nation (3rd ed., London, 1851); Sir S. Northcote, Twenty Years of Financial Policy (London, 1862); S. Buxton, Finance and Politics (2 vofs., London, 1888); J. R. McCulloch, Taxation and Funding (3rd ed., London, 1863); W. M. J. Williams, The King's Revenue (London, 1908), for 19th-century finance.

(C. F. B.)

ENGLISH HISTORY.— The general account of English history which follows should be supplemented for the earlier period by the article Britain. See also Scotland, Ireland, Wales.

I. From the- Landing of Augustine to the Norman Conquest (600-1066)

With the coming of Augustine to Kent the darkness which for nearly two centuries had enwrapped the history of Britain begins to clear away. From the days of Honorius to those of Gregory the Great the line of vision of the annalists of the con- tinent was bounded by the Channel. As to what was going on beyond it, we have but a few casual gleams of light, just enough to make the darkness visible, from writers such as the author of the life of St Germanus, Prosper Tiro,

Procopius, and Gregory of Tours. These notices do not, for the most part, square particularly well with the fragmentary British narrative that can be patched together from Gildas's " lamentable book," or the confused story of Nennius. Nor again do these British sources

ANGLO-SAXON BRITAIN

597-825

English Miles

English Territory in 597 gjgggja

rritoryoonquered S97'82S tsv\l

Celtic Territory in 825- \ ^}l

Territory partly occupied [wyv^l but lost again he/ore 825- .tLiSd

M . denotes annexed to Hernia

fi.B.- The email names Wessex & Mercia refer to 597, tile large names

825

fit in happily with the English annals constructed long centuries after by King Alfred's scribes in the first edition of the Anglo- Saxon Chronicle. But from the date when the long-lost com- munication between Britain and Rome was once more resumed, the history of the island becomes clear and fairly continuous. The gaps are neither broader nor more obscure than those which may be found in the contemporary annals of the other kingdoms of Europe. The stream of history in this period is narrow and turbid throughout the West. Quite as much is known of the doings of the English as of those of the Visigoths of Spain, the Lombards, or the later Merovingians. The 7th century was the darkest of all the " dark ages," and England is particularly fortunate in possessing the Ecclesiastica historia of Bede, which, though its author was primarily interested in things religious, yet contains a copious chronicle of things secular. No Western author, since the death of Gregory of Tours, wrote on such a scale, or with such vigour and insight.

S97-8oo]

ENGLISH HISTORY

The conversion of England to Christianity took, from first to last, some ninety years (a.d. 597 to 686), though during the last

thirty the ancestral heathenism was only lingering on Conver- j n rem0 ˆ e corne rs of the land. The original missionary England, impulse came from Rome, and Augustine is rightly

regarded as the evangelist of the English; yet only a comparatively small part of the nation owed its Christianity directly to the mission sent out by Pope Gregory. Wessex was won over by an independent adventurer, the Frank Birinus, who had no connexion with the earlier arrivals in Kent. The great kingdom of Northumbria, though its first Christian monarch Edwin was converted by Paulinus, a disciple of Augustine, re- lapsed into heathenism after his death. It was finally evangelized from quite another quarter, by Irish missionaries brought by King Oswald from Columba's monastery of Iona. The church that they founded struck root, as that of Paulinus and Edwin had failed to do, and was not wrecked even by Oswald's deata in battle at the hands of Penda the Mercian, the one strong champion of heathenism that England produced. Moreover, Penda was no sooner dead, smitten down by Oswald's brother Oswio at the battle of the Winwaed (a.d. 655), than his whole kingdom eagerly accepted Christianity, and received missionaries, Irish and Northumbrian, from the victorious Oswio. It is clear that, unlike their king, the Mercians had no profound enthusiasm for the old gods. Essex, which had received its first bishop from Augustine's hands but had relapsed into heathenism after a few years, also owed its ultimate conversion to a Northumbrian preacher, Cedd, whom Oswio lent to King Sigeberht after the latter had visited his court and been baptized, hard by the Roman wall, in 653.

Yet even in those English regions where the missionaries from Iona were the founders of the Church, the representatives of Rome were to be its organizers. In 664 the Northumbrian king Oswio, at the synod of Whitby, declared his adhesion to the Roman connexion, whether it was that he saw political advantage therein, or whether he realized the failings and weaknesses of the Celtic church, and preferred the more orderly methods of her rival. Five years later there arrived from Rome the great organizer, Archbishop Theodore of Tarsus, who bound the hitherto isolated churches of the English kingdoms into a well-compacted whole, wherein the tribal bishops paid obedience to the metropolitan at Canterbury, and met him frequently in national councils and synods. England gained a spiritual unity long ere she

attained a political unity, for in these meetings, which were often attended by kings as well as by prelates, Northumbrian, West Saxon and Mercian first learnt to work together as brothers.

In a few years the English church became the pride of Western Christendom. Not merely did it produce the great band of

*missionaries who converted heathen Germany — Willi- ** e brord, Suidbert, Boniface and the rest — but it excelled*

church. the other national churches in learning and culture.

It is but necessary to mention Bede and Alcuin. The first, as has been already said, was the one true historian who wrote during the dark time of the 7th-8th centuries; the second became the pride of the court of Charles the Great for his un- rivalled scholarship. At the coming of Augustine England had been a barbarous country; a century and a half later she was more than abreast of the civilization of the rest of Europe.

But the progress toward national unity was still a slow one. The period when the English kingdoms began to enter into the

commonwealth of Christendom, by receiving the p °™ ” missionaries sent out from Rome or from Iona, practi- klngdoms. cally coincides with the period in which the occupation

of central Britain was completed, and the kingdoms of the conquerors assumed their final size and shape. .ˆEthel- frith, the last heathen among the Northumbrian kings, cut off the Britons of the North from those of the West, by winning the battle of Chester (a.d. 613), and occupying the land about the mouths of the Mersey and the Dee. Cenwalh, the last monarch who ascended the throne of Wessex unbaptized, carried the boundaries of that kingdom into Mid-Somersetshire, where they halted for a long space. Penda, the last heathen king of Mercia,

determined the size and strength of that state, by absorbing into it the territories of the other Anglian kingdoms of the Midlands, and probably also by carrying forward its western border beyond the Severn. By the time when the smallest and most barbarous of the Saxon states — Sussex— accepted Christianity in the year 686, the political geography of England had reached a stage from which it was not to vary in any marked degree for some 200 years. Indeed, there was nothing accomplished in the way of further encroachment on the Celt after 686, save Ine’s and Cuthred’s extension of Wessex

into the valleys of the Tone and the Exe, and Offa's slight expansion of the Mercian frontier beyond the Severn, marked by his famous dyke. The conquests of the Northumbrian kings in Cumbria were ephemeral; what Oswio won was lost after the death of Ecgfrith.

That the conversion of the English to Christianity had any- thing to do with their slackening from the work of conquest it would be wrong to assert. Though their wars with the Welsh were not conducted with such ferocious cruelty as of old, and though (as the laws of Ine show) the Celtic inhabitants of newly- won districts were no longer exterminated, but received as the king's subjects, yet the hatred between Welsh and English did not cease because both were now Christians. The westward advance of the invaders would have continued, if only there had remained to attract them lands as desirable as those they had already won. But the mountains of Wales and the moors of Cornwall and Cumbria did not greatly tempt the settler. More- over, the English states, which had seldom turned their swords against each other in the 5th or the 6th centuries, were engaged during the 7th' and the 8th in those endless struggles for supre- macy which seem so purposeless, because the hegemony which a king of energy and genius won for his kingdom always dis- appeared with his death. The " Bretwaldaship," as the English seem to have called it, was the most Midas'"' ephemeral of dignities. This was but natural: con- quest can only be enforced by the extermination of the conquered, or by their consent to amalgamate with the conquerors, or by the garrisoning of the land that has been subdued by settlers or by military posts. None of these courses were possible to a king of the 7th or 8th centuries: even in their heathen days the English were not wont to massacre their beaten kinsmen as they massacred the unfortunate Celt. After their conversion to Christianity the idea of exterminating other English tribes grew even more impossible. On the other hand, local particularism was so strong that the conquered would not, at first, consent to give up their natural independence and merge themselves in the victors. Such amalgamations became possible after a time, when many of the local royal lines died out, and unifying in- fluences, of which a common Christianity was the most powerful, sapped the strength of tribal pride. But it is not till the 9th century that we find this phenomenon growing general. A kingdom like Kent or East Anglia, even after long subjection to a powerful overlord, rose and reasserted its independence immediately on hearing of his death. His successor had to attempt a new conquest, if he felt himself strong enough. To garrison a district that had been overrun was impossible: the military force of an English king consisted of his military house- hold of

gesiths, backed by the general levy of the tribe. The strength of Mercia or Northumbria might be mustered for a single battle, but could not supply a standing army to hold down the vanquished. The victorious king had to be content with tribute and obedience, which would cease when he died, or was beaten by a competitor for the position of Bretwalda.

In the ceaseless strife between the old English kingdoms, therefore, it was the personality of the king which was the main factor in determining the hegemony of one state over another. If in the 7 th century the successive great s "?? e ™ acy Northumbrians — Edwin, Oswald, Oswio and Ecgfrith thumbria. — were reckoned the chief monarchs of England, and exercised a widespread influence over the southern realms, yet each had to win his supremacy by his own sword; and when Edwin and Oswald fell before the savage heathen Penda, and Ecgfrith was cut off by the Picts, there was a gap of anarchj

before another king asserted his superior power. The same phenomenon was seen with regard to the Mercian kings of the 8th century; the long reigns of the two conquerors Sunreni- ˆthelbald and Offa covered eighty years (716-796), Mereia. and it might have been supposed that after such a term of supremacy Mereia would have remained permanently at the head of the English kingdoms. It was not so, ˆEthelbald in his old age lost his hegemony at the battle of Burford (752), and was murdered a few years after by his own people. Offa had to win back by long wars what his kins- man had lost; he became so powerful that we find the pope calling him Rex Anglorum, as if he were the only king in the island. He annexed Kent and East Anglia, overawed North- umbria and Wessex, both hopelessly faction-ridden at the time, was treated almost as an equal by the emperor Charles the Great, and died still at the height of his power. Yet the moment that he was dead all his vassals revolted; his successors could never recover all that was lost. Kent once more became a kingdom, and two successive Mercian sovereigns, Beornwulf and Ludica, fell in battle while vainly trying to recover Offa's supremacy over East Anglia and Wessex.

The ablest king in England in the generation that followed Offa was

Ecgbert of Wessex, who had long been an exile abroad, and served for thirteen years as one of the captains of f"'!'" Charles the Great. He beat Beornwulf of Mereia at Wessex. Ellandune (a.d. 823), permanently annexed Kent, to whose crown he had a claim by descent, in 829 received the homage of all the other English kings, and was for the re- mainder of his life reckoned as " Bretwalda." But it is wrong to call him, as some have done, " the first monarch of all Eng- land." His power was no greater than that of Oswio or Offa had been, and the supremacy might perhaps have tarried with Wessex no longer than it had tarried with Northumbria or Mereia if it had not chanced that the Danish raids were now beginning. For these invasions, paradoxical as it may seem, were the greatest efficient cause in the welding together of England. They seemed about to rend the land in twain, but they really cured the English of their desperate particularism, and drove all the tribes to take as their common rulers the one great line of native kings which survived the Danish storm, and maintained itself for four generations cf desperate fighting against the in- vaders. On the continent the main effect of the viking invasions was to dash the empire of Charles the Great into fragments, and to aid in producing the numberless petty states of feudal Europe. In this island they did much to help the transformation of the mere Bretwaldaship of Ecgbert into the monarchy of all England.*

Already ere Ecgbert ascended the throne of Kent the new enemy had made his first tentative appearance on the British shore. It was in the reign of Beorhtric, Ecgbert's 'invasions, predecessor, that the pirates of the famous " three ships from Heretheland " had appeared on the coast of Dorset, and slain the sheriff " who would fain have known what manner of men they might be." A few years later another band appeared, rising unexpectedly from the sea to sack the famous Northumbrian monastery of Lindisfarne (793). After that their visits came fast and furious on the shore-line of every English kingdom, and by the end of Ecgbert's reign it was they, and not his former Welsh and Mercian enemies, who were the old monarch's main source of trouble. But he brought his Bretwaldaship to a good end by inflicting a crushing defeat on them at Hingston Down, hard by the Tarriar, probably in 836, and died ere the year was out, leaving the ever-growing problem to his son iEthelwulf

The cause of the sudden outpouring of the Scandinavian deluge upon the lands of Christendom at this particular date is one of the puzzles of history. So far as memory ran, 'otvUda" t ˆ xe P eo P' es beyond the North Sea had been seafaring sea-power. races addicted to piracy. Even Tacitus mentions their fleets. Yet since the 5th century

they had been restricting their operations to their own shores, and are barely heard of in the chronicles of their southern neighbours. It seems most probable that the actual cause of their sudden activity

was the conquest of the Saxons by Charles the Great, and his subsequent advance into the peninsula of Denmark. The em- peror seemed to be threatening the independence of the North, and in terror and resentment the Scandinavian peoples turned first to strike at the encroaching Frank, and soon after to assail the other Christian kingdoms which lay behind, or on the flank of, the Empire. But their offensive action proved so successful and so profitable that, after a short time, the whole manhood of Denmark and Norway took to the pirate life. Never since history first began to be recorded was there such a supreme example of the potentialities of sea-power. Civilized Europe had been caught at a moment when it was completely destitute of a war-navy; the Franks had never been maritime in their tastes, the English seemed to have forgotten their ancient sea- faring habits. Though their ancestors had been pirates as fierce as the vikings of the 9th century, and though some of their later kings had led naval armaments — Edwin had annexed for a moment Man and Anglesea, and Ecgfrith had cruelly ravaged part of Ireland — yet by the year 800 they appear to have ceased to be a seafaring race. Perhaps the long predominance of Mereia, an essentially inland state, had something to do with the fact. At any rate England was as helpless as the Empire when first the Danish and Norwegian galleys began to cross the North Sea, and to beat down both sides of Britain seeking for prey. The number of the invaders was not at first very great; their fleets were not national armaments gathered by great kings, but squadrons of a few vessels collected by some active and enterprising adventurer. Their original tactics were merely 10 land suddenly near some thriving seaport, or rich monastery, to sack it, and to take to the water again before the local militia could turn out in force against them. But such raids proved so profitable that the vikings soon began to take greater things in hand; they began to ally themselves in confederacies: two, six or a dozen "sea-kings" would join their forces for something more than a desultory raid. With fifty or a hundred ships they would fall upon some un- happy region, harry it for many miles inland, and offer battle to the landsfolk unless the latter came out in overpowering force. And as their crews were trained warriors chosen for their high spirit, contending with a raw militia fresh from the plough, they were generally successful. If the odds were too great they could always retire to their ships, put to sea, and resume their predatory operations on some other coast three hundred miles away. As long as their enemies were unprovided with

a navy they were safe from pursuit and annihilation. The only chance against them was that, if caught too far from the base-fort where they had run their galleys ashore, they might find their communication with the sea cut off, and be forced to fight for their lives surrounded by an infuriated countryside. But in the earlier years of their struggles with Christendom the vikings seldom suffered a complete disaster; they were often beaten but seldom annihilated. Ere long they grew so bold that they would stay ashore for months, braving the forces of a whole kingdom, and sheltering themselves in great palisaded camps on peninsulas or islands when the enemy pressed them too hard. On well-guarded strongholds like Thanet or Sheppey in England, Noirmoutier at the Loire mouth, or the Isle of Walcheren, they defied the local magnates to evict them. Finally they took to wintering on the coast of England or the Empire, a preliminary to actual settlement and conquest. (See Viking.)

King Ecgbert died long ere the invaders had reached this stage of insolence. ˆEthelwulf, his weak and kindly son, would un- doubtedly have lost the titular supremacy of Wessex over the other English kingdoms if there had been in p ˆf re f s u

.- , , t . 1 ■ • . . • of Danish

Mereia or Northumbria a strong king with leisure to conquest. concentrate his thoughts on domestic wars. But the vikings were now showering such blows on the northern states that their unhappy monarchs could think of nothing but self- defence. They slew Redulf — king of Northumbria — in 844, took London in 851, despite all the efforts of Burgred of Mereia, and forced that sovereign to make repeated appeals for help to ˆEthelwulf as his overlord. For though Wessex had its full share of Daaish attacks it met them with a vigour that was not seen in

the other realms. The defence was often, if not always, success- ful; and once at least (at Aclea in 851) ˆEthelwulf exterminated a whole Danish army with " the greatest slaughter among the heathen host that had been heard of down to that day," as the Anglo-Saxon chronicler is careful to record. But though he might ward off blows from his own realm, he was helpless to aid Mercia or East Anglia,

and still more the distant Northumbria.

It was not, however, till after ˆEthelwulf's death that the attack of the vikings developed its full strength. The fifteen years (856-871) that were covered by the reigns of his three shortlived sons, vEthelbald, ˆthelbert and iEthelred, were the most miserable that England was to see. Assembling in greater and ever greater confederacies, the Danes fell upon the northern kingdoms, no longer merely to harry but to conOj'uer and occupy them. A league of many sea-kings which called itself the " great army " slew the last two sovereigns of Northumbria and stormed York in 867. Some of the victors settled down there to lord it over the half-exterminated English population. The rest con- tinued their advance southward. East Anglia was conquered in 870; its last king, Edmund, having been defeated and taken prisoner, the vikings shot him to death with arrows because he would not worship their gods. His realm was annexed and partly settled by the conquerors. The fate of Mercia was hardly better: its king, Burgred, by constant payment of tribute, bought off the invaders for a space, but the eastern half of his realm was reduced to a wilderness.

Practically masters of all that lay north of Thames, the " great army " next moved against Wessex, the only quarter where a vigorous resistance was still maintained against them, though its capital, Winchester, had been sacked in 864. Under two kings named Halfdan and Bacsceg, and six earls, they seized Reading and began to harry Berkshire, Surrey and Hampshire. King ˆEthelred, the third son of ˆEthelwulf, came out against them, with his young brother Alfred and all the levies of Wessex. In the year 871 these two gallant kinsmen fought no less than six pitched battles against the invaders. Some were victories — • notably the fight of Ashdown, where Alfred first won his name as a soldier— but the English failed to capture the fortified camps of the vikings at Reading, and were finally beaten at Marten (" Maeretun ") near Bedwyn, where ˆEthelred was mortally wounded.

He left young sons, but the men of Wessex crowned Alfred king, because they needed a grown man to lead them in their desperate campaigning. Yet Iris reign opened in- Qreat auspiciously: defeated near Wilton, he offered in

despair to pay the vikings to depart. He must have known, from the experience of Mercian, Northumbrian and Frankish kings, that such blackmail only bought a short respite, but the condition of his realm was such that even a moderate time for reorganization might prove

valuable. The enemy had suffered so much in the " year of the six battles " that they held off for some space from Wessex, seeking easier prey on the continent and in northern England. In 874 they harried Mercia so cruelly that King Burgred fled in despair to Rome; the victors divided up his realm, taking the eastern half for themselves, and establishing in it a confederacy, whose jarls occupied the " five boroughs " of Stamford, Lincoln, Derby, Nottingham and Leicester. But the western half they handed over to " an unwise thegn named Ceolwulf," who bought for a short space the precarious title of king by paying great tribute.

Alfred employed the four years of peace, which he had bought in 871, in the endeavour to strengthen his realm against the inevitable return of the raiders. His wisdom was shown by the fact that he concentrated his attention on the one device which must evidently prove effective for defence, if only he were given time to perfect it — the building of a national navy. He began to lay down galleys and " long ships," and hired " pirates " — ■ renegade vikings no doubt- — to train crews for him and to teach his men seamanship . The scheme , however, was only partly com- pleted when in 876 three Danish kings entered Wessex and re- sumed the war. But Alfred blockaded them first in Wareham and then in Exeter. The fleet which was coming to carry them

off, or to bring them reinforcements, fought an indecisive engagement with the English ships, and was wrecked immedi- ately after on the cliffs of the Isle of Purbeck, where more than 100 galleys and all their crews perished. On hearing of this disaster the vikings in Exeter surrendered the place on being granted a free departure.

Yet within a few months of this successful campaign Alfred was attacked at midwinter by the main Danish army under King Guthrum. He was apparently taken by surprise by an assault at such an unusual time of the year, and was forced to escape with, his military household to the isle Of – Athelney among the marshes of ' the Parrett. The invaders harried Wiltshire and Hampshire at their leisure, and vainly thought that Wessex was at last subdued. But with the spring the English rallied: a Danish force was cut to pieces before Easter by the men of

ENGLAND, 886, after Alfred & Guthrum's Peace

Boundary between Alfred & Guthrum after 886,..,

'■ Jg S' J^>- ! '4 Under English rule.~..,,... ■ J '«Jii*i£iiL Under*

Danish & Morse ru/e„J iSm Under Celtic rule.™.ˆ.

The Fine Boroughsˆ

HmovWalta j&

Devonshire. A few weeks later Alfred had issued from Athelney, had collected a large army in Selwood, and went out to meet the enemy in the open field. He beat them at Edington in.Wiltshire, blockaded them in their great camp at Chippenham, and in fourteen days starved them into surrender. The terms were that they should give hostages, that they should depart for ever from Wessex, and that their king Guthrum should do homage to Alfred as overlord, and submit to be baptized, with thirty of his chiefs, Not only were all these conditions punctually fulfilled, but (what is more astonishing) the Danes had been so thoroughly cured of any desire to try their luck against the great king that they left him practically unmolested for fourteen years (878-892). King Guthrum settled down as a Christian sovereign in East Anglia, with the bulk of the host that had capitulated at Chippenham. Of the rest of the invaders one section established a petty kingdom in Yorkshire, but those in the Midlands were subject to no common sovereign but lived in a loose confederacy under the jarls of the " Five Boroughs " already named above. The boundary between English and Danes established by the peace of 878 is not perfectly ascertainable, but a document of

a few years later, called " Alfred and Guthrum's frith," gives the border as lying from Thames northward up the Lea to its source, then across to Bedford, and then along the Ouse to Watling Street, the old Roman road from London to Chester. This gave King Alfred London and Middlesex, most of Hertford- shire and Bedfordshire, and the larger half of Mercia — lands that had never before been an integral part of Wessex, though they had some time been tributary to her kings. They were now taken inside the realm and governed by the ealdorman iEthelred, the king's son-in-law. The Mercians gladly mingled with the West Saxons, and abandoned all memories of ancient inde- pendence. Twenty years of schooling under the hand of the Dane had taught them to forget old particularism.

Alfred's enlarged kingdom was far more powerful than any one of

the three new Danish states which lay beyond the Lea and Watling Street: it was to be seen, ere another generation was out, that it was stronger than all three together. But Alfred was not to see the happy day when York and Lincoln, Colchester and Leicester, were to become mere shire-capitals in the realm of United England.

The fourteen years of comparative peace which he now enjoyed were devoted to perfecting the military organization of his enlarged kingdom. His fleet was reconstructed : Reforms in ˆ 2 ˆ e went out w i tn it m person and destroyed a small piratical squadron: in 885 we hear of it coasting all along Danish East Anglia. But his navy was not yet strong enough to hold off all raids: it was not till the very end of his reign that he perfected it by building " long ships that were nigh twice as large as those of the heathen; some had 60 oars, some more; and they were both steadier and swifter and lighter than the others, and were shaped neither after the Frisian nor after the Danish fashion, but as it seemed to himself that they would be most handy." This great war fleet he left as a legacy to his son, but he himself in his later campaigns had only its first beginnings at his disposal.

His military reforms were no less important. Warned by the failures of the English against Danish entrenched camps, he introduced the long-neglected art of fortification, and built many " burhs " — stockaded fortresses on mounds by the waterside — wherein dwelt permanent garrisons of military settlers. It would seem that the system by which he maintained them was that he assigned to each a region of which the inhabitants were responsible for its manning and its sustentation. The land- owners had either to build a house within it for their own inhabit- ing, or to provide that a competent substitute dwelt there to represent them. These " burh-ware," or garrison-men, are re- peatedly mentioned in Alfred's later years. The old national levy of the " fyrd " was made somewhat more serviceable by an ordinance which divided it into two halves, one of which must take the field when the other was dismissed. But it would seem that the king paid even more attention to another military reform — the increase of the number of the professional fighting class, the thegnhood as it was now called. All the wealthier men, both in the countryside and in the towns, were required to take up the duties as well as the privileges of membership of the military household of the king. They became " of thegn- right worthy " by receiving, really or nominally, a place in the royal hall, with the obligation to take the field whenever their master raised his banner. The document which defines their duties and privileges sets forth that " every ceorl who throve so that he had fully five hides of land, and a helm, and a mail-shirt, and a sword ornamented with gold, was to be reckoned

gesith- cund." A second draft allowed the man who had the military equipment complete, but not fully the five hides of land, to slip into the list, and also " the merchant who has fared thrice over the high seas at his own expense." How far the details of the scheme are Alfred's own, how far they were developed by his son Edward the Elder, it is unfortunately impossible to say. But there is small doubt that the system was working to some extent in the later wars of the great king, and that his successes were largely due to the fact that his army contained a larger nucleus of fully armed warriors than those of his predecessors.

Military reforms were only one section of the work of King Alfred during the central years of his reign. It was then that he set afoot his numerous schemes for the restoration of the learning and culture of England which had sunk so low during the long years of disaster which had preceded his accession. How he gathered scholars from the continent, Wales and Ireland; how he collected the old heroic poems of the nation, how he himself translated books from the Latin tongue, started schools, and set his scribes to write up the Anglo-Saxon Chronicle, is told else- where, as are his mechanical inventions, his buildings, and his dealings with missionaries and explorers (see Alfred).

The test of the efficiency of his work was that it held firm when, in his later years, the Danish storm once more began to beat against the shores of Wessex. In the years 892-896 Alfred was assailed from many sides at once by viking fleets, of which the most important was that led by the great freebooter Hasting. Moreover, the settled Danes of eastern England broke their oaths and gave the invaders assistance. Yet the king held his own, with perfect success if not with ease. The enemy was checked, beaten off, followed up rapidly whenever he changed his base of operation, and hunted repeatedly all across England. The campaigning ranged from Appledore in Kent to Exeter, from Chester to Shoeburyness; but wherever the invaders transferred themselves, either the king, or his son Edward, or his son-in-law Ethelred, the ealdorman of Mercia, was promptly at hand with a competent army. The camps of the Danes were stormed, their fleet was destroyed in the river Lea in 895, and at last the remnant broke up and dispersed, some to seek easier plunder in France, others to settle down among their kinsmen in North- umbria or East Anglia.

Alfred survived for four years after his final triumph in 896, to complete the organization of his fleet and to repair the damages done by the last four years of constant fighting. He died on the 26th of October 900, leaving Wessex well armed for the con- tinuance of the

struggle, and the inhabitants of the " Danelagh " much broken in spirit. They saw that it would never be in their power to subdue all England. Within a few years they were to realize that it was more probable that the English kings would subdue them.

The house of Wessex continued to supply a race of hard- fighting and capable monarchs, who went on with Alfred's work. His son, Edward the Elder, and his three grandsons, iEthelstan, Edmund and Edred, devoted themselves ^^ A for fifty-five years (a.d. 900-955) to the task of con- quering the Danelagh, and ended by making England into a single unified kingdom, not by admitting the conquered to homage and tribute, in the old style of the 7th century, but by their complete absorption. The process was not so hard as might be thought; when once the Danes had settled down, had brought over wives from their native land or taken them from among their English vassals, had built themselves farm- steads and accumulated flocks and herds, they lost their old advantage in contending with the English. Their strength had been their mobility and their undisputed command of the sea. But now they had possessions of their own to defend, and could not raid at large in Wessex or Mercia without exposing their homes to similar molestation. Moreover, the fleet which Alfred had built, and which his successors kept up, disputed their mastery of the sea, and ended by achieving a clear superi- ority over them. Unity of plan and unity of command was also on the side of the English. The inhabitants of the three sections of the Danelagh were at best leagued in a many-headed con- federacy. Their opponents were led by kings whose orders were punctually obeyed from Shrewsbury to Dover and from London to Exeter. It must also be remembered that in the greater part of the land which they possessed the Danes were but a small minority of the population. After their first fury was spent they no longer exterminated the conquered, but had been content to make the Mercians and Deirans their subjects, to take the best of the land, and exact tribute for the rest. Only in Lincolnshire, East Yorkshire and parts of Notting- hamshire and Leicestershire do they seem to have settled thickly

and formed a preponderating element in the countryside. In the rest of the Midlands and in East Anglia they were only a governing oligarchy of scanty numbers. Everywhere there was an English lower

class which welcomed the advent of the con- quering kings of Wessex and the fall of the Danish jarls.

Edward the Elder spent twenty-five laborious years first in repelling and repaying Danish raids, then in setting to work to subdue the raiders. He worked forward into the Danelagh, building burhs as he advanced, to hold down each district that he won. He was helped by his brother-in-law, the Mercian ealdorman ˆEthelred, and, after the death of that magnate, by his warlike sister ˆEthelflaed, the ealdorman's widow, who was continued in her husband's place. While Edward, with London as his base, pushed forward into the eastern counties, his sister, starting from Warwick and Stafford, encroached on the Danelagh along the line of the Trent. The last Danish king of East Anglia was slain in battle in 918, and his realm annexed. ˆEthel- flaed won Derby and Leicester, while her brother reduced Stamford and Nottingham. Finally, in 921, not only was the whole land south of the Humber subdued, but the Yorkshire Danes, the Welsh, and even — it is said — the remote Scots of the North, did homage to Edward and became his men.

In 925 Edward was succeeded by his eldest, son ˆEthelstan, who completed the reduction of the Danelagh by driving out Guthfrith, the Danish king of York, and annexing ˆ, n f his realm. But this first conquest of the region beyond Humber had to be repeated over and over again; time after time the Danes rebelled and proclaimed a new king, aided sometimes by bands of their kinsmen from Ireland or Norway, sometimes by the Scots and Strathclyde Welsh. ˆEthelstan's greatest and best-remembered achievement was his decisive victory in 937 at Brunanburh — an unknown spot, probably by the Solway Firth or the Ribble — over a great confederacy of rebel Danes of Yorkshire, Irish Danes from Dublin, the Scottish king, Constantine, and Eugenius, king of Strathclyde. Yet even after such a triumph ˆEthelstan had to set up a Danish under-king in Yorkshire, apparently despairing of holding it down as a shire governed by a mere ealdorman. But its over- lordship he never lost, and since he also maintained the supre- macy which his father had won over the Welsh and Scots, it was not without reason that he called himself on his coins and in his charters Rex totius Britanniae. Occasionally he even used the' title Batileus, as if he claimed a quasi-imperial position.*

The trampling out of the last embers of Danish particularism in the North was reserved for /Ethelstan's brothers and suc- cessors, Edmund and Edred (940-955), who put down Edred° d: severa l risings of the Yorkshiremen, one of which was aided by a rebellion of

the Midland Danes of the Five Boroughs. But the untiring perseverance of the house of Alfred was at last rewarded by success. After the expulsion of the last rebel king of York, Eric Haraldson, by Edred in 948, we cease to hear of trouble in the North. When next there was rebellion in that quarter it was in favour of a Wessex prince, not of a Danish adventurer, and had no sinister national significance. The descendants of the vikings were easily incorporated in the English race, all the more so because of the wise policy of the conquering kings, who readily employed and often promoted to high station men of Danish descent who showed themselves loyal — and this not only in the secular but in spiritual offices. In 942 Oda, a full-blooded Dane, was made archbishop of Canter- bury. The Danelagh became a group of earldoms, ruled by officials who were as often of Danish as of English descent.

It is notable that when, after Edred's death, there was civil strife, owing to the quarrel of his nephew Edwy with some of his kinsmen, ministers and bishops, the rebels, who included the majority of the Mercians and Northumbrians, set up as their pretender to the throne not a Dane but Edwy's younger brother Edgar, who ruled for a short time north of Thames, and became sole monarch on the death of his unfortunate kinsman.

The reign of Edgar (959-975) saw the culmination of the power of the house of Alfred. It was untroubled by rebellion

Edgar.

or by foreign invasions, so that the king won the honourable title of Rex Pacificus. The minor sovereigns of Britain owned him as overlord, as they had owned his grandfather Edward and his uncle ˆEthelstan. It was long remembered " how all the kings of this island, both the Welsh and the Scots, eight kings, came to him once upon a time on one day and all bowed to his governance." The eight were Kenneth of Scotland, Malcolm of Strathclyde, Maccus of Man, and five Welsh kings. There is fair authority for the well-known legend that, after this meeting at Chester, he was rowed in his barge down the Dee by these potentates, such a crew as never was seen before or after, and afterwards exclaimed that those who followed him might now truly boast that they were kings of all Britain.

Edgar's chief counsellor was the famous archbishop Dunstan, to whom no small part of the glory of his reign has been ascribed. This great prelate was an ecclesiastical reformer — a leader in a movement for the general purification of morals, and especially for

the repressing of simony and evil-living among the clergy — a great builder of churches, and a stringent enforcer of the rules of the monastic life. But he was also a busy statesman; he probably had a share in the considerable body of legislation which was enacted in Edgar's reign, and is said to have encour- aged him in his policy of treating Dane and Englishman with exact equality, and of investing the one no less than the other with the highest offices in church and state.

Edgar's life was too short for the welfare of his people — he was only in his thirty-third year when he died in 975, and his sons were young boys. The hand of a strong man was still needed to keep the peace in the newly-constituted realm of all England, and the evils of a minority were not long in showing themselves. One section of the magnates had possession of the thirteen-year- old king Edward, and used his name to cover their ambitions. The other was led by his step-mother ˆElfthryth, who was set on pushing the claims of her pon, the child ˆEthelred. After much factious strife, and many stormy meetings of the Witan, Edward was murdered at Corfe in 978 by some thegns of the party of the queen-dowager. The crime provoked universal indignation, but since there wa° no other prince of the house of Alfred avail- able, the magnates were forced to place ˆEthelred on the throne: he was only in his eleventh year, and was at least personally innocent of complicity in his brother's death.

With the accession of ˆEthelred, the "Redeless," as he was afterwards called from his inability to discern good counsel from evil, and the consistent incapacity of his policy, an evil time began. The retirement from public life of the Edgar's old minister Dunstan was the first event of Unready. the new reign, and no man of capacity came forward to take his place. The factions which had prevailed during the reign of Edward " the Martyr " seem to have continued to rage during his brother's minority, yet ˆEthelred's earliest years were his least disastrous. It was hoped that when he came to man's estate things would improve, but the reverse was the case. The first personal action recorded of him is an unjust harryirg of the goods of his own subjects, when he besieged Rochester because he had quarrelled with its bishop over certain lauds, and was bribed to depart with 100 pounds of silver. Yet l r om 978 to 991 no irreparable harm came to England; the machinery for government and defence which his ancestors had established seemed fairly competent to defend the realm even undˆr a wayward and incapable king. Two or three small descents of vikings are recorded, but the ravaging was purely local, and the invader soon departed. No trouble occurred in the Dane-lagh, where the old tendency of the inhabitants to take sides with

their pagan kinsmen from over the sea appears to have completely vanished. But the vikings had apparently learnt by small experiments that England was no longer guarded as she had been in the days of Alfred or i avas i oas , .lEthelstan, and in 991 the first serious invasion of ˆEthelred's reign took place. A large fleet came ashore in Essex, and, after a hard fight with the ealdorman Brihtnoth at Maldon, slew him and began to ravage the district north of the Thames.

Instead of making a desperate attempt to drive them off, the king bribed them to depart with 10,000 pounds of silver, accept- ing it is said this cowardly advice from archbishop Sigeric. The fatal precedent soon bore fruit: the invaders came back in larger numbers, headed by Olaf Tryggveson, the celebrated adventurer who afterwards made himself king of Norway, and who was already a pretender to its throne. He was helped by Sweyn, king of Denmark, and the two together laid siege to London in 994, but were beaten off by the citizens. Nevertheless iEthelred for a second time stooped to pay tribute, and bought the departure of Dane and Norwegian with 16,000 pounds of silver. There was a precarious interval of peace for three years after, but in 997 began a series of invasions led by Sweyn which lasted for seventeen years, and at last ended in the complete subjection of England and the flight of ˆthelred to Normandy. It should be noted that the invader during this period was no mere adventurer, but king of all Denmark, and, after Olaf Tryggveson's death in 1000, king of Norway also. His power was something far greater than that, of the Guthrums and Anlafs of an earlier generation, and — in the end of his life at least — he was aiming at political conquest, and not either at mere plunder or at finding new settlements for his followers. But if the strength of the invader was greater than that of his predecessors, ˆEthelred also was far better equipped for war than his ancestors of the 9th Century. He owned, and he some- times used — but always to little profit — a large fleet, while all England instead of the mere realm of Wessex was at his back. Any one of the great princes of the house of Egbert who had reigned from 871 to 975, would have fought a winning fight with such resources, and it took nearly twenty years of ˆEthelred's tried incapacity to lose the game. He did, however, succeed in undoing all the work of his ancestors, partly by his own slackness and sloth,

partly by his choice of corrupt and treacher- ous ministers. For the two ealdormen whom he delighted to honour and placed at the head of his armies, JLlfric and Eadric Streona, are accused, the one of persistent cowardice, the other of underhand intrigue with the Danes. Some of the local mag- nates made a desperate defence of their own regions, especially Ulfkytel of East Anglia, a Dane by descent; but the central government was at fault. /Ethelred's army was always at the wrong place — " if the enemy were east then was the fyrd held west, and if they were north then was our force held south." When yEthelred did appear it was more often to pay a bribe to the invaders than to fight. Indeed the Danegeld, the tax which he raised to furnish tribute to the invaders, became a regular institution: on six occasions at least ˆEthelred bought a few months of peace by sums ranging from 10,000 to 48,000 pounds of silver.

At last in the winter of 1013-1014, more as it would seem from

sheer disgust at their king's cowardice and incompetence than

because further resistance was impossible, the English

"" "' gave up the struggle and acknowledged Sw«yn as king. First Northumbria, then Wessex, then London yielded, and /Ethelred was forced to fly over seas to Richard, duke of Nor- mandy, whose sister he had married as his second wife. But Sweyn survived his triumph little over a month; he died suddenly at Gainsborough on the 3rd of February 1014. The Danes hailed his son Canute, a lad of eighteen, as king, but many of the English, though they had submitted to a hard-handed conqueror like Sweyn, were not prepared to be handed over like slaves to his untried successor. There was a general rising, the Old king was brought over from Normandy, and Canute was driven out for a moment by force of arms. He returned next year with a greater army to hear soon after of iEthelred's death (1016). The witan chose Edmund " Ironside," the late king's eldest son, to succeed him, and as he was a hard-fighting prince of that normal type of his house to which his father had been such a disgraceful exception, it seemed probable that the Danes might be beaten off. But .Ethelred's favourite Eadric Streona adhered to Canute, fearing to lose the office and power that he had' enjoyed for so long under ˆEthelred, and prevailed on the magnates of part of Wessex and Mercia to follow his example. For a moment the

curious phenomenon was seen of Canute reigning in Wessex, while Edmund was making head against him with the aid of the Anglo-Danes of the " Five Boroughs " and Northumbria. There followed a year of desperate struggle: the two young kings fought five pitched battles, fortune seemed to favour Edmund, and the traitor Eadric submitted to him with all Wessex. But the last engagement, at Assandun (Ashingdon) in Essex went against the English, mainly because Eadric again betrayed the national cause and deserted to the enemy.

Edmund was so hard hit by this last disaster that he offered to divide the realm with Canute; they met on the isle of Alney near Gloucester, and agreed that the son of jEthelred should keep Wessex and all the South, London and East Anglia, while the Dane should have Northumbria, the " five boroughs " and Eadric's Mercian earldom. But ere the year was out Edmund died: secretly murdered, according to some authorities, by the infamous Eadric. The witan of Wessex made no attempt to set on the throne either one of the younger sons of ˆEthelred by his Norman wife, or the infant heir of Edmund, but

chose Canute as king, preferring to reunite England by submission to the stranger rather than to continue the disastrous war.

They were wise in so doing, though their motive may have been despair rather than long-sighted policy. Canute became more of an Englishman than a Dane: he spent more of his time in his island realm than in his native Denmark. He paid off and sent home the great army with whose aid he had won the English crown, retaining only a small bodyguard of " house-carls "and trusting to the loyalty of his new subjects. There was no con- fiscation of lands for the benefit of intrusive Danish settlers. On the contrary Canute had more English than Danish courtiers and ministers about his person, and sent many Englishmen as bishops and some even as royal officers to Denmark. It is strange to find that — whether from policy or from affection- — he married King /Ethelred's young widow Emma of Normandy, though she was somewhat older than himself— so that his son King Harthacnut and that son's successor Edward the Confessor, the heir of the line of Wessex, were half-brothers. It might have been thought likely that the son of the pagan Sweyn would have turned out a mere hard-fighting viking. But Canute developed into a great administrator and a friend of learning and culture. Occasionally he committed a harsh and tyrannical act. Though he need not be blamed for making a prompt end of the traitor Eadric Streona and of Uhtred, the turbulent earl of Northumbria, at the commencement of his reign, there are other and less justifiable deeds of blood to be laid to his account. But they were but few; for the most part his administration was just and wise as well as strong and intelligent.

As long as he lived England was the centre of a great Northern empire, for Canute reconquered Norway, which had lapsed into independence after his father's death, and extended his power into the Baltic. Moreover, all the so-called Scandinavian colonists in the Northern Isles and Ireland owned him as over- lord. So did the Scottish king Malcolm, and the princes of Wales and Strathclyde. The one weak point in his policy that can be detected is that he left in the hands of Malcolm the Bernician district of Lothian, which the Scot had conquered during the anarchy that followed the death of ˆEthelred. The battle of Carham (1018) had given this land to the Scots, and Canute consented to draw the border line of England at the Tweed instead of at the Firth of Forth, when Malcolm did him homage. Strangely enough it was this cession of a Northumbrian earldom to the Northern king that ultimately made Scotland an English- speaking country. For the Scottish kings, deserting their native Highlands, took to dwelling at Edinburgh among their new

sub- jects, and first the court and afterwards the whole of their Low-land subjects were gradually assimilated to the Northumbrian nucleus which formed both the most fertile and the most civilized portion of their enlarged realm.

The fact, that England recovered with marvellous rapidity from the evil effects of ˆEthelred's disastrous reign, and achieved great wealth and prosperity under Canute, would seem to show that the ravages of Sweyn, widespread and ruthless though they

tO$S-io66

had been, had yet fallen short of the devastating completeness of those of the earlier vikings. He had been more set on exacting tribute than on perpetrating wanton massacres. A few years of peace and wise administration seem to have restored the realm to a satisfactory condition. A considerable mass of his legis- lation has survived to show Canute's care for law and order.

Canute died in 1035, aged not more than forty or forty-one. The crown was disputed between his two sons, the half-brothers Harold and Harthacnut; it was doubtful whether the birth of the elder prince was legitimate, and Queen Emma strove to get her own son Harthacnut preferred to him. In Denmark the younger claimant was acknowledged by the whole people, but in England the Mercian and Northumbrian earls chose Harold as king, and Wessex only fell to Harthacnut. Both the young kings were cruel, dissolute and wayward, most unworthy sons of a wise father. It was to the great profit of England that they died within two years of each other, the elder in 1040, the younger in 1042.

On Harthacnut's death he was succeeded not by any Danish prince but by his half-brother Edward, the elder son of ˆEthelred

and Emma, whom he had entertained at his court, and Edward j,ad apparently designated as his heir, for he had no Confessor, offspring. There was an end of the empire of Canute,

for Denmark fell to the great king's nephew, Sweyn Estrithson, and Norway had thrown off the Danish yoke. En- gaged in wars with each other, Dane and Norseman had no leisure to think of reconquering England. Hence Edward's accession took place without

any friction. He reigned, but did not rule, for twenty-four years, though he was well on in middle age before he was crowned. Of all the descendants of Alfred he was the only one who lived to see his sixtieth birthday — the house of Wessex were a short-lived race. In character he differed from all his ancestors— he had Alfred's piety without his capacity, and iEthelred's weakness without his vices. The mildest of men, a crowned monk, who let slip the reins of government from his hands while he busied himself in prayer and church building, he lowered the kingly power to a depth to which it had nevei sunk before in England. His sole positive quality, over and above his piety, was a love for his mother's kin, the Normans. He had spent his whole life from 1013 to 1040 as an exile at the court of Rouen, and was far more of a Norman than an Englishman. It was but natural, therefore, that he should invite his continental relatives and the friends of his youth to share in his late-coming prosperity. But when he filled his court with them, made them earls and bishops, and appointed one of them, Robert of Jumieges, to the archbishopric of Canterbury, his undisguised preference for strangers gave no small offence to his English subjects. In the main, however, the king's personal likes and dislikes mattered little to the realm, since he had a comparatively small share in its governance. He was habitually Overruled and dominated by his earls, of whom three, Leofric, Godwine and Siward — all old servants of Canute — had far more power than their master. Holding respectively the great earldoms of West Mercia, Wessex and Northumbria, they reigned almost like petty sovereigns in their domains, and there seemed some chance that England might fall apart into semi-independent feudal states, just as France had done in the preceding century. The rivalries and intrigues of these three magnates constitute the main part of the domestic politics of Edward's reign. Godwine, whose

daughter had wedded the king, was the most forcible

and ambitious of the three, but his pre-eminence pro- voked a general league against him and in 105 1 he was cast out of the kingdom with his sons. In the next year he returned in arms, raised Wessex in revolt, and compelled the king to in-law him again, to restore his earldom, and to dismiss with ignominy the Norman favourites who were hunted over seas. The old earl died in 1053, but was succeeded in power by his son Harold, who for thirteen years maintained an unbroken mastery over the king, and ruled England almost with the power of a regent. There seems little doubt that he aspired to be Edward's successor: there was no direct heir to the crown, and the nearest of kin was ah infant, Edgar, the great-nephew of the reigning sovereign

Harold.

and grandson of Edmund Ironside. England's experience of minors on the throne had been unhappy — Edwy and ˆEthelred the Redeless were warnings rather than examples. Moreover , Harold bad before his eye as a precedent the displacement of the effete Carolingian line in France, by the new house of Robert the Strong and Hugh Capet, seventy years before. He prepared for the crisis that must come at the death of Edward the Con fessor by bestowing the governance of several earldoms upon his brothers. Unfortunately for him, however, the eldest of them, Tostig, proved the greatest hindrance to his plans, pro- voking wrath and opposition wherever he went by his high-handedness and cruelty.

Harold's governance of the realm seems to have been on the whole successful. He put down the Scottish usurper Macbeth with the swords of a Northumbrian army, and restored Malcolm III. to the throne of that kingdom (1055-1058). He led an army into the heart of Wales to punish the raids of King Griffith ap Llewelyn, and harried the Welsh so bitterly that they put their leader to death, and renewed their homage to the English crown (1063). He won enthusiastic devotion from the men of Wessex and the South, but in Northumbria and Mercia he was less liked. His experiment in taking the rule of these earldoms out of the hands of the descendants of Siward and Leofric proved so unsuccessful that he had to resign himself to undoing it. Ultimately one of Leofric's grandsons, Edwin, was left as earl of Mercia, and the other, Morcar, became earl of Northumbria instead of Harold's unpopular brother Tostig. It was on this fact that the fortune of England was to turn, for in the hour of crisis Harold was to be betrayed by the lords of the Midlands and the North.

Somewhere about the end of his period of ascendancy, perhaps in 1064, Harold was sailing in the Channel when his ship was driven ashore by a tempest near the mouth of the QM tt Somme. He fell into the hands of William the Bastard, of the duke of Normandy, King Edward's cousin and best- Norman loved relative. The duke brought him to Rouen, and Cot "iuest. kept him in a kind of honourable captivity till he had extorted a strange pledge from him. William alleged that his cousin had promised to make him his heir, and to recommend him to the witan as king of England. He demanded that Harold should swear to aid him in the project. Fearing for his personal safety, the earl gave the required oath, and sailed home a per- jured man, for he had assuredly no intention of keeping the promise that had been extorted from him. Within two years King

Edward expired (Jan. 5, 1066) after having recommended Harold as his successor to the thegns and bishops who stood about his deathbed. The witan chose the earl as king without any show of doubt, though the assent of the Mercian and North- umbrian earls must have been half-hearted. Not a word was said in favour of the claim of the child Edgar, the heir of the house of Alfred, nothing (of course) for the preposterous claim of William of Normandy. Harold accepted the crown without a moment's hesitation, and at once prepared to defend it, for he was aware that the Norman would fight to gain his purpose. He endeavoured to conciliate Edwin and Morcar by marrying their sister Ealdgyth, and trusted that he had bought their loyal support. When the spring came round it was known that William had begun to collect a great fleet and army. Aware that the resources of his own duchy were inadequate to the conquest of England, he sent all over Europe to hire mercenaries, promising every knight who would join him broad lands beyond the Channel in the event of victory. He gathered beneath his banner thousands of adventurers not only from France, Brittany and Flanders, but even from distant regions such as Aragon, Apulia and Germany. The native Normans were but a third part of his host, and he himself commanded rather as director of a great joint-stock venture than as the feudal chief of his own duchy. He also obtained the blessing of Pope Alexander II. for his enterprise, partly on the plea that Harold was a perjurer, partly because Stigand, the archbishop of Canterbury, had acknowledged the late anti-pope Benedict.

All through the summer Harold held a fleet concentrated

under the lee of the Isle of Wight, waiting to intercept William's armament, while the fyrd of Wessex was ready to support him if the enemy should succeed in making a landing. By September the provisions were spent, and the ships were growing ˆunsea- worthy. Very reluctantly the king bade them go round to London to refit and revictual themselves. William meanwhile had been unable to sail, because for many weeks the wind had been unfavourable. If it had set from the south the fortune of England would have been settled by a sea-fight. At this moment came a sudden and incalculable diversion; Harold's turbulent brother Tostig, banished for his crimes in 1065, was seeking revenge. He had persuaded Harold Hardrada,

king of Norway, almost the last of the great viking adventurers, to take him as guide for a raid on England. They ran into the Humber with a great fleet, beat the earls Edwin and Morcar in battle, and captured York. Abandoning his watch on the south coast Harold of England flew northward to meet the invaders; he surprised them at Stamford Bridge, slew both the Norse king and the rebel earl, and almost exterminated their army (Sept. 25 ? 1066). But while he was absent from the Channel the wind turned, and William of Normandy put to sea. The English fleet and the English army were both absent, and the Normans came safely to shore on the 28th of September. Harold had to turn hastily southward to meet them. On the 13th of October his host was arrayed on the hill of Senlac, 7 miles from the duke's camp at Hastings. The ranks of his thegnhood and house-carles had .been thinned by the slaughter of Stamford Bridge, and their place was but indifferently supplied by the hasty levies of London, Wessex and the Home Counties. Edwin and Morcar, who should have been at his side with their Mercians and Northumbrians, were still far away — probably from treachery, slackness and jealousy. .Next morning (October 14) William marched out from Hastings and attacked the English host, which stood at bay in a solid mass of spear and axemen behind a slight breastwork on the hillside. After six hours of desperate fighting the victory fell to the duke, who skilfully alternated the use of archers and cavalry against the unwieldy English phalanx. (See Hastings : Battle of.) The disaster was complete, Harold himself was slain, his two brothers had fallen with him, not even the wreck of an army escaped. There was no one to rally the English in the name of the house of Godwine. The witan met and hastily saluted the child Edgar ˆEtheling as king. But the earls Edwin and Morcar refused to fight for him, and when William appeared in front of the gates of London they were opened almost without resistance. He was elected king in the old English fashion by the surviving magnates, and crowned on Christmas Day 1066.

II. The Norman and Angevin Monarchy (1066-1199)

When William of Normandy was crowned at Westminster by Archbishop Aldred of York and acknowledged as king by the

witan, it is certain that few Englishmen understood jy /;/ {? m _ the full importance of the occasion. It is probable queror. that most men recalled the election of Canute, and

supposed that the accession of the one alien sovereign would have no more permanent effect on the realm than that of the other. The rule of the Danish king and his two short-lived sons had caused no break

in the social or constitutional history of England. Canute had become an Englishman, had accepted all the old institutions of the nation, had dismissed his host of vikings, and had ruled like a native king and for the most part with native ministers. Within twenty years of his accession the disasters and calamities which had preceded his triumph had been forgotten, and the national life was running quietly in its old channels. But the accession of William the Bastard meant something very different. Canute had been an impressionable lad of eighteen or nineteen when he was crowned; he was ready and eager to learn and to forget. He had found himself con- fronted in England with a higher civilization and a more ad- vanced social organization than those which he had known in his boyhood, and he accepted them with alacrity, feeling that he was thereby getting advantage. With William the Norman

all was different: he was a man well on in middle age, too old to adapt himself easily to new surroundings, even if he had been willing to do so. He never even learnt the language of his English subjects, the first step to comprehending their needs and their views. Moreover, unlike his Danish predecessor, he looked down upon the English from the plane of a higher civiliza- tion ; the Normans regarded the conquered nation as barbarous and boorish. The difference in customs and culture between the dwellers on the two sides of the Channel was sufficient to make this possible; though it is hard to discern any adequate justi- fication for the Norman attitude. Probably the bar of language was the most prominent cause of estrangement. In five genera- tions the viking settlers of Normandy had not only completely forgotten their old Scandinavian tongue, but had come to look upon those who spoke the kindred English idiom not only as aliens but as inferiors. For three centuries French remained the court speech, and the mark of civilization and gentility.

Despite all this the Conquest would not have had its actual results if William, like Canute, had been able to dismiss his conquering army, and to refrain from a general policy pr 0gress Of confiscation. But he had won his crown not as of Norman duke of Normandy, but as the head of a band of cosmo- settle- politari adventurers, who had to be rewarded with land meat – in England. Some few received their pay in hard cash, and went off to other wars; but the large majority, Breton and Angevin, French and Fleming, no less than Norman, wanted land. William could only provide it by a wholesale confiscation of the estates of all the thegnhood who had followed the house of Godwine. Almost his first act was to seize on these lands, and to distribute them among his followers. In the regions of the South, which had supplied the army that fell at Hastings, at least

four-fifths of the soil passed to new masters. The dis- possessed heirs of the old owners had either to sink to the con- dition of peasants, or to throw themselves upon the world and seek new homes. The friction and hatred thus caused were bitter and long enduring. And this same system of confiscation was gradually extended to the rest of England. At first the English landowners who had not actually served in Harold's host were permitted to " buy back their lands," by paying a heavy fine to the new king and doing him homage. What would have happened supposing that England had made no further stir, and had not vexed William by rebellion, it is impossible to say. But, as a matter of fact, during the first few years of his reign one district after another took up arms and endeavoured to cast out the stranger. As it became gradually evident that William's whole system of government was to be on new and distasteful lines, the English of the Midlands, the North and the West all went into rebellion. The risings were sporadic, ill- organized, badly led, for each section of the realm fought for its own hand. In some parts the insurrections were in favour of the sons of Harold, in others Edgar ˆEtheling was acclaimed as king: and while the unwise earls Edwin and Morcar fought for their own hand, the Anglo-Danes of the East sent for Sweyn, king of Denmark, who proved of small help, for he abode but a short space in England, and went off after sacking the great abbey of Peterborough and committing other outrages. The rebels cut up several Norman garrisons, and gave King William much trouble for some years, but they could never face him in battle. Their last stronghold, the marsh-fortress of Ely, sur- rendered in 1071, and not long after their most stubborn chief, Hereward " the Wake," the leader of the fenmen, laid down his arms and became King William's man (see Hereward).

The only result of the long series of insurrections was tp provoke the king to a cruelty which he had not at first shown, and to give him an excuse for confiscating and dividing among his foreign knights and barons the immense majority of the estates of the English thegnhood. William could be pitiless when pro- voked; to punish the men of the North for persistent rebellion and the destruction of his garrison at York, he harried the whole countryside from the Aire to the Tees with such remorseless ferocity that it did not recover its ancient prosperity for cen- turies. The population was absolutely exterminated, and the

great Domesday survey, made nearly twenty years later, shows the greater part of Yorkshire as "waste." This act was excep- tional only in its extent : the king was as cruel on a smaller scale elsewhere, and not contented with the liberal use of the axe and the rope was wont to inflict his favourite punishments of blinding and mutilation on a most reckless scale.

The net result of the king's revenge on the rebellious English was that by 1075 the old governing class had almost entirely disappeared, and that their lands, from the Channel to the Tweed, had everywhere been distributed to new holders. To a great extent the same horde of continental adventurers who had obtained the first batch of grants in Wessex and Kent were also the recipients of the later confiscations, so that their newly acquired estates were scattered all over England. Many of them came to own land in ten or a dozen counties remote from each other, a fact which was of the greatest importance in determining the character of English feudalism. While abroad the great vassals of the crown generally held their property in compact blocks, in England their power was weakened by the dispersion of their lands. This tendency was assisted by the fact that even when the king, as was his custom, transferred to a Norman the estates of an English landowner just as they stood, those estates were already for the most part not conterminous. Even before the Conquest the lands of the magnates were to a large extent held in scattered units, not in solid patches. Only in two cases did William establish lordships of compact strength, and these were created for the special purpose of guarding the turbulent Welsh March. The " palatine " earls of Chester and Shrewsbury were not only endowed with special powers and rights of jurisdiction, but were almost the only tenants-in-chief within their respective shires. These rare exceptions prove the general rule: William probably foresaw the dangers of such accumulation of territory in private hands. He made a com- plete end of the old English system by which great earls ruled many shires: there were to be no Godwines or Leofrics under the Norman rule. This particular feudal danger was avoided: where earls were created, and they were but few, their authority was usually restricted to a single shire.

It remains to speak of the most important change which William's rearrangements made in the polity of England. It f d 11 m ' s °^ course untrue to say — as was so often done by ' early historians — that he " introduced the feudal system into England." In some aspects feudalism was already in the land before he arrived: in others it may be said that it was never introduced at all. He did not introduce the practice by which the small man commended himself to the great man, and in return for his protection divested himself of the

full ownership of his own land, and became a customary tenant in what later ages called a " manor." That system was already in full operation in England before the Conquest. In some districts the wholly free small landowner had already disappeared, though in the regions which had formed the Dane- lagh he was still to be found in large numbers. Nor did William introduce the system of great earldoms, passing from father to son, which gave over-great subjects a hereditary grip on the countryside. On the contrary, as has been already said, he did much to check that tendency, which had already developed in England.

What he really did do was to reconstruct society on the essentially feudal theory that the land was a gift from the king, held on conditions of homage and military service. The duties which under the old system were national obligations resting on the individual as a citizen, he made into duties depending on the relation between the king as supreme landowner and the subject as tenant of the land. Military service and the paying of the feudal taxes— aids, reliefs, &c. — are incidents of the bargain between the crown and the grantee to whom land has been given. That grantee, the tenant-in-chief, has the right to demand from his sub-tenants, to whom he has given out fractions of his estate, the same dues that the king exacts from himself. As at least four-fifths of the land of England had fallen into the king's hands between 1066 and 1074, and had been actually

regranted to new owners — foreigners to whom the feudal system was the only conceivable organization of political existence — the change was not only easy but natural. The few surviving English landholders had to fall into line with the newcomers. England, in short, was reorganized into a state of the continental type, but one differing from France or Germany in that the crown had not lost so many of its regalities as abroad, and that even the greater earls had less power than the ordinary continental tenant-in-chief.

The English people became aware of this transformation in the " theory of the state" mainly through the fact that the new tenants-in-chief, bringing with them the ideas in which they had been reared, failed to comprehend the rather complicated status of the rural population on this side of the Channel. To the French or Norman knight all peasants on his manor seemed to be villeins, and he failed to understand the distinction between freemen who had personally commended themselves to his English predecessor but still owned their land, and the mass of ordinary servile tenants. There can be no doubt that the first effect of the Conquest was that the upper strata of the agri- cultural classes lost the comparative independence which

they had hitherto enjoyed, and were in many cases depressed to the level of their inferiors. The number of freemen began to decrease, from the encroachments of the landowner, and continued to dwindle for many years: even in districts where Domesday Book shows them surviving in considerable numbers, it is clear that a generation or two latˆr they had largely disappeared, and became merged in the villein class.

In this sense, therefore, England was turned into a feudal state by the results of the work of William the Conqueror. But it would be wrong to assert that all traces of the ancient social organization of the realm were swept omes ay ‘ away. The old Saxon customs were not forgotten, though they might in many cases be twisted to fit new surroundings. Indeed William and his successors not infrequently caused them to be collected and put on record. The famous Domesday Book (q.v.) of 1086 is in its essential nature an inquiry into the state of England at the moment of the Conquest, compiled in order that the king may have a full knowledge of the rights that he possesses as the heir of King Edward. Being primarily intended to facilitate the levy of taxation, it dwells more on the details of the actual wealth and resources of the country in 1066 and 1086, and less on the laws and customs that governed the distribution of that wealth, than could have been wished. But it is never- theless a monument of the permanence of the old English insti- tutions, even after the ownership of four-fifths of the soil has been changed. The king inquires into the state of things in 1066 because it is on that state of things that his rights of taxation depend. He does not claim to have rearranged the whole realm on a new basis, or to be levying his revenue on a new assessment made at his own pleasure. Nor is it in the sphere of taxation alone that William’s organization of the realm stands on the old English customs. In the military sphere, though his normal army is the feudal force composed of the tenants-in-chief and the knights whom they have enfeoffed, he retains the power to call out the fyrd, the old national levSe en masse, without regard to whether its members are freemen or villeins of some lord. And in judicial matters the higher rights of royal justice remain intact, except in the few cases where special privileges have been granted to one or two palatine earls. The villein must sue in his lord’s manorial courts, but he is also subject to the royal courts of hundred and shire. The machinery of the local courts survives for the most part intact.

William’s dealings with the Church of England were no less important than his dealings with social organization. In the earlier years of his reign he set himself to get rid of the whole of the upper

hierarchy, in order to replace a fthe them by Normans. In 1070 Archbishop Stigand was church. deposed as having been uncanonically chosen, and six or seven other bishops after him. All the vacancies, as well as those which kept occurring during the next few years, were immediately filled up with foreigners. By the time that William

had been ten years on the throne there were only three English bishops left. At his death there was only one — the saintly Wulfstan of Worcester. The same process was carried out with regard to abbacies, and indeed with all important places of ecclesiastical preferment. By 1080 the English Church was officered entirely by aliens. Just as with the lay landholders, the change of personnel made a vast difference, not so much in the legal position of the new-comers as in the way in which they regarded their office. The outlook of a Norman bishop was as unlike that of his English predecessor as that of a Norman baron. The English Church had got out of touch with the ideals and the spiritual movements of the other Western churches. In especial the great monastic revival which had started from the abbey of Cluny and spread all over France, Italy and Germany had hardly touched this island. The continental churchmen of the nth century were brimming over with ascetic zeal and militant energy, while the majority of the English hierarchy were slack and easy-going. The typical faults of the dark ages, pluralism, simony, lax observation of the clerical rules, contented ignorance, worldliness in every aspect, were all too prevalent in England. There can be no doubt that the greater part of William's nominees were better men than those who preceded them; his great arch- bishop, Lanfranc, though a busy statesman, was also an energetic reformer and a man of holy life. Osmund, Remigius and others of the first post-Conquest bishops have left a good name behind them. The condition of the church alike in the matter of spiritual zeal, of hard work and of learning was much improved. But there was a danger behind this revival; for the reformers of the nth century, in their zeal for establishing the Kingdom of God on earth, were not content with raising the moral and intellectual standards prevailing in Christendom, but sought to bring the whole scheme of life under the church, by asserting the absolute supremacy of the spiritual over the temporal power, wherever the two came in contact or overlapped.

The result, since the feudal and ecclesiastical systems had become closely interwoven, arid the frontier between the religious and secular spheres must ever be vague and undefined, was the conflict between the spiritual and temporal powers which, for two centuries to come, was to tear Europe into warring factions (see the articles Church History; Papacy; Investiture). The Norman Conquest of England was contemporaneous with the supreme influence of the greatest exponent of the theory of ecclesiastical supremacy, the archdeacon Hildebrand, who in 1073 mounted the papal throne as Gregory VII. (

At the same time, however, he was not blind to the possibilities of papal interference in domestic matters, and of the danger of conflict between the crown and the recently-strengthened clerical order. To guard against them he laid down three general rules: (1) that no one should be recognized as pope in England till he had himself taken cognizance of the papal election, and that no papal letters should be brought into the realm without his leave; (2) that no decisions of the English ecclesiastical synods should be held valid till he had examined and sanctioned them; (3) that none of his barons or ministers should be ex- communicated unless he approved of such punishment being

inflicted on them. These rules seem to argue a deeply rooted distrust of the possible encroachments of the papacy on the power of the state. The question of ecclesiastic patronage, which was to 'be the source of the first great quarrel between the crown and the church in the next generation, is not touched upon. William retained in his own hands the choice of bishops and abbots, and Alexander II. and Gregory VII. seem to have made no objection to his doing so, in spite of the claim that free election was the only canonical way of filling vacancies. The Conqueror was allowed for his lifetime to do as he pleased, since he was recognized as a true friend of the church. But the question was only deferred and not settled.

The political history of William's later years is unimportant; his main energy was absorbed in the task of holding down and organizing his new kingdom. His rather precarious conquest of the county of Maine, his long quarrels Y' lttam " with Philip I. of France, who suborned against him his Xign. undutiful and rebellious eldest son Robert, his negotia- tion with Flanders and Germany, deserve no more than a mention. It is more necessary to point out that he reasserted on at least one occasion (when King Malcolm Canmore did him homage) the old suzerainty of the English kings over Scotland. He also began that encroachment on the borders of Wales

which was to continue with small interruptions for the next two centuries. The advance was begun by his great vassals, the earls of Chester, Shrewsbury and Hereford, all of whom occupied new districts on the edge of the mountains of Powys and Gwynedd. William himself led an expedition as far as St. Davids in 1081, and founded Cardiff Castle to mark the boundary of his realm north of the Bristol Channel.

Perhaps the most noteworthy event of the second portion of the Conqueror's reign was a rebellion which, though it made no head and was easily suppressed, marks the commencement of that feudal danger which was to be the constant trouble of the English kings for the next three generations. Two of the greatest of his foreign magnates, Roger, earl of Hereford, and Ralph, earl of Norfolk, rose against him in 1075, with no better cause than personal grievances and ambitions. He put them down with ease; the one was imprisoned for life, the other driven into exile, while Waltheof, the last of the English earls, who had dabbled in a hesitating way in this plot, was executed. There was never any serious danger, but the fact that under the new regime baronial rebellion was possible, despite of all William's advan- tages over other feudal kings, and despite of the fact that the rebels were hardly yet settled firmly into their new estates, had a sinister import for the future of England. With the new monarchy there had come into England the anarchic spirit of continental feudalism. If such a man as the Conqueror did not overawe it, what was to be expected in the reigns of his suc- cessors? William had introduced into his new realm alike the barons, with their personal ambition, and the clerics of the school of Hildebrand, with their intense jealousy for the rights of the church. The tale of the dealings of his descendants with these two classes of opponents constitutes the greater part of English history for a full century.

William died at Rouen on the 7th of September 1087; on his death-bed he expressed his wish that Normandy should pass to his elder son, Robert, in spite of all his rebellions, but gave his second son William (known by the nick- ./f u fl,s!" name of Rufus) the crown of England, and sent him thither with commendatory letters to archbishop Lanfranc and his other ministers. There was at first no sign of opposition to the will of the late king, and William Rufus was crowned within three weeks of his father's decease. But the results of the Conquest had made it hard to tear England and Normandy apart. Almost every baron in the duchy was now the possessor of a smaller or a greater grant of lands in the kingdom, and the possibility of serving two masters was as small in 1087 as at any other period of the world's history. By dividing his two states between his "sons the

Conqueror undid his own work, and left to his subjects the certainty of civil war. For the brothers Robert and William were, and always had been, enemies, and

every intriguing baron had before him the tempting prospect of aggrandizing himself, by making his allegiance to one of the brothers serve as an excuse for betraying the other. Robert was thriftless, volatile and easy-going, a good knight but a most in- competent sovereign. These very facts commended him to the more turbulent section of the baronage; if he succeeded to the whole of the Conqueror's heritage they would have every oppor- tunity of enjoying freedom from all governance. William's private character was detestable: he was cruel, lascivious, greedy of gain, a habitual breaker of oaths and promises, ungrate- ful and irreligious. But he was cunning, strong-handed and energetic; clearly the "Red King" would be an undesirable master to those who loved feudal anarchy. Hence every tur- bulent baron in England soon came to the conclusion that Robert was the sovereign whom his heart desired.

The greater part of the reign of William II. was taken up with his fight against the feudal danger. Before he had been six months on the throne he was attacked by a league comprising more than half the baronage, and headed by his uncles, bishop Odo of Bayeux and Robert of Mortain. They used the name of the duke of Normandy and had secured his promise to cross the Channel for their assistance. A less capable and unscrupu- lous king than Rufus might have been swept away, for the rising burst out simultaneously in nearly every corner of the realm. But he made head against it with the aid of mercenary bands, the loyal minority of the barons, and the shire-levies of his English subjects. When he summoned out the fyrd they came in great force to his aid, not so much because they trusted in the promises of good governance and reduced taxation which he made, but because they saw that a horde of greedy barons would be worse to serve than a single king, however hard and selfish he might be. With their assistance William fought down the rebels, expelled his uncle Odo and several other leaders from the realm, confiscated a certain amount of estates, and then pardoned the remainder of the rebels. Such mercy, as he was to discover, was misplaced. In 1095 the same body of barons made a second and a more formidable

rising, headed by the earls of Shrewsbury, Eu and Northumberland. It was put down with the same decisive energy that William had shown in 1088, and this time he was merciless; he blinded and mutilated William of Eu, shut up Mowbray of Northumberland for life in a monastery, and hanged many men of lesser rank. Of the other rebels some were deprived of their English estates altogether, others restored to part of them after paying crushing fines. This second feudal rebellion was only a distraction to William from his war with his brother Robert, which continued intermittently all through the earlier years of his reign. It was raging from 1088 to iogt, and again from 1093 to 1096, when Robert tired of the losing game, pawned his duchy to his brother and went off on the First Crusade. Down to this moment William's position had been somewhat precarious; with the Norman war generally on hand, feudal rebellion always imminent, and Scottish invasions occa- sionally to be repelled, he had no easy life. But he fought through his troubles, conquered Cumberland from the Scots (1092), in dealing with his domestic enemies used cunning where force failed, and generally got his will in the end. His rule was expensive, and he made himself hated by every class of his sub- jects, baronage, clergy and people alike, by his ingenious and oppressive taxation. His chosen instrument, a clerical lawyer named Ranulf Flambard (q.v.), whom he presently made bishop of Durham, was shameless in his methods of twisting feudal or national law to the detriment of the taxpayer. William sup- ported him in every device, however unjust, with a cynical frank- ness which was the distinguishing trait of his character; for he loved to display openly all the vices and meannesses which most men take care to disguise. In dealing with the baronage Ranulf and his master extorted excessive and arbitrary "reliefs" when- ever land passed in succession to heirs. When the church was a landholder their conduct was even more unwarrantable; every clerk installed in a new preferment was forced to pay a large sum down — which in that age was considered a clear case of simony by all conscientious men. But' in addition the king kept

Anselm.

all wealthy posts, such as bishoprics and abbacies, vacant for years at a time and appropriated the revenue meanwhile.

This policy, when pursued with regard to the archbishopric of Canterbury, brought on Rufus the most troublesome of his quarrels. When the wise primate Lanfranc, his father's friend, died in 1089, he made no appointment till 1093, extracting meanwhile great plunder

from the see. In a . moment of sickness, when his conscience was for a space troub-‘ ling him or his will was weak, he nominated the saintly Anselm (q.v.) to the archbishopric. When enthroned the new primate refused to make the enormous gift which the king expected from every recipient of preferment. Soon after he began to press for leave to hold a national synod, and when it was denied him, spoke out boldly on the personal vices as well as the immoral policy of the king. From this time William and Anselm became open enemies. They fought first upon the question of acknowledging Urban II. as pope 1 — for the king, taking advantage of the fact that there was an antipope in existence, refused to allow that there was any certain and legitimate head of the Western church at the moment. Then, after William had reluctantly yielded on this point, the far more important question of lay investitures cropped up. The council of Clermont (Nov. 1095) had just issued its famous decree to the effect that bishops must be chosen by free election, and not invested with their spiritual insignia or enfeoffed with their estates by the hands of a secular prince, Anselm felt himself obliged to accept this decision, and refused to accept his own pallium from William when Urban sent it across the sea by the hands of a legate. The king replied by harrying him on charges of having failed in his feudal obligation to provide well-equipped knights for a Welsh expedition, and imposed ruinous fines on him. It was even said that his life was threatened, and he fled to Rome in 1097, not to return till his adversary was dead. There was much to be said for the theory of the king as to the relations between church and state; he was indeed only carrying on in a harsh form his father’s old policy. But the fact that he was a tyrant and an evil-liver, while Anselm was a saint, so much influenced public opinion that William was universally regarded as in the wrong, and the sympathy of the laity no less than the clergy was with the archbishop. For the remaining three years of his life the Red King was considered to be in a state of reprobation and at open strife with righteousness.

Yet so far as secular affairs went William seemed prosperous enough. Since his brother had pawned the duchy of Normandy to him, so that he reigned at Rouen no less than at London, the danger of rebellion was almost removed. His foreign policy was successful: he installed a nominee of his own, Edgar, the son of Malcolm Canmore, on the throne of Scotland (1097); he reconquered Maine, which his brother Robert had lost; he made successful war upon King Philip of France. His barons subdued much of South Wales, though his own expeditions into North Wales, which he had designed to conquer and annex, had a less fortunate ending. He dreamed, we are told, of

attacking Ireland, even of crowning himself king at Paris. But on the 2nd of August 1 100 he was suddenly cut off in the midst of his sins. While hunting with some of his godless companions in the New Forest, he was struck by an arrow, unskilfully shot by one of the party. The knight Walter Tyrrell, who was persistently accused of being the author of his master's death, as persistently denied his responsibility for it; and whether the arrow was his or no, it was not alleged that malice guided it. William's favourites had all to lose by his death.

The king's death was unexpected : he was only in his fortieth year, and men's minds had not even begun to ponder over, the question of who would succeed him. The crown of England was left vacant for the boldest kinsman to ffj^jfjy ", snatch at, if he dared. William had two surviving brothers, beside several nephews. Robert's claim seemed the more likely to succeed, for not only was he the elder, but England was full of barons who desired his accession, and had already taken up arms for him in 1087 or 1095. But he was far away — being at the moment on his return journey from Jerusalem — while on the spot was his brother Henry, an ambitious

prince, whose previous efforts to secure himself a territorial endowment had failed more from ill-luck than from want of enterprise or ability. Seeing his opportunity, Henry left his brother's body unburied, rode straight off to Winchester with a handful of companions, and seized the royal treasure. This and his ready tongue were the main arguments by which he convinced the few magnates present, and persuaded them to back him, despite the protests of some supporters of Robert. There was hardly the semblance of an election, and the earl of Warwick and the chancellor William Giffard were almost the only persons of importance on the spot. But Henry, once hailed as king, rode hard for London and persuaded bishop Maurice to crown him without delay at Westminster, since the primate Anselm was absent beyond seas. He certainly lost no time: Rufus was shot on Thursday, the 2nd of August — his successor was crowned on Sunday the 5th of August ! The realm heard almost by the same messengers that it had lost one king and that it had gained another.

Henry at once issued a proclamation and charter promising the redress of all the grievances with which his brother had afflicted his feudal tenants, the clergy and the whole nation. He would keep the ancient laws of King Edward, as amended by his father the Conqueror, and give all men good justice. These promises he observed more faithfully than Norman kings were wont to do ; if the pledge was not redeemed in every detail, he yet kept England free from anarchy, abandoned the arbitrary and unjust taxation of his brother, and set up a government that worked by rule and order, not by the fits and starts of tyrannical caprice. He was a man of a cold and hard disposition, but full of practical wisdom, and conscious that his precarious claim to the crown must be secured by winning the confidence of his subjects. Almost the first and quite the wisest of his inspirations was to wed a princess of the old English line — Edith, 1 the niece of Edgar ˆEtheling, the child of his sister Margaret of Scotland and Malcolm Canmore. The match, though his Norman barons sneered at it, gave him the hearts of all his English subjects, who supported him with enthusiasm, and not merely (as had been the case with Rufus) because they saw that a strong king would oppress them less than a factious and turbulent baronage. Henry won much applause at the same time by filling up all the bishoprics and abbacies which his brother had kept so long vacant, by inviting the exiled Anselm to return to England, and by imprisoning William's odious minister Ranulf Flambard. He had just time to create a favourable impression by his first proceedings, when his brother Robert, who had returned from Palestine and resumed possession of Normandy, landed at Ports- mouth to claim the crown and to rouse his partisans among the English baronage. Henry bought him off, before the would-be rebels had time to join him, by promising him an annual tribute of 3000 marks and surrendering to him all his estates in Nor- mandy (1101). His policy seemed tame and cautious, but was entirely justifiable, for within a few months of Robert's departure the inevitable feudal rebellion broke out. If the duke and his army had been on the spot to support it, things might have gone hardly with the king. The rising was led by Robert of Belesme, earl of Shrewsbury, a petty tyrant of the most ruffianly type, the terror of the Welsh marches. He was backed by his kinsmen and many other barons, but proved unable to stand before the king, who was loyally supported by the English shire levies. After taking the strong castles of Arundel, Tickhill, Bridgnorth and Shrewsbury, Henry forced the rebels to submit. He con- fiscated their estates and drove them out of the realm; they fled for the most part to Normandy, to spur on duke Robert to make another bid for the English crown. From the broad lands which they forfeited Henry made haste to reward his own

servants, new men who owed all to him and served him faithfully. From them he chose the sheriffs, castellans and councillors through whom he administered the realm during the rest of his long reign.

1 As the name Edith (Eadgyth) sounded uncouth to Norman ears, she assumed the continental name Maheut or Mahelt (Eng. Mahald, later Mold and Maud), in Latin Matildis or Matilda. Sir J. H. Ramsay, Foundations of England, ii. 235. (Ed.)

This minor official nobility was the strength of the crown, and was sharply divided in spirit and ambition from the older feudal aristocracy which descended from the original adventurers who had followed William the Conqueror. Yet the latter still re- mained strong enough to constitute a danger to the crown when- ever it should fall to a king less wary and resolute than Henry himself. >

Henry was by nature more of an administrator and organizer than of a fighting man. He was a competent soldier, but his wish was rather to be a strong king at home than a great con- queror abroad. Nevertheless he was driven by the logic of events to attack Normandy, for as long as his brother reigned there, and as long as many English barons retained great holdings on both sides of the Channel and were subjects of the duke as well as of the king, intrigues and plots never ceased. The Norman war ended in the battle of Tenchebrai (Sept. 28, 1106), where Duke Robert was taken prisoner. His brother shut him up in honourable confinement for the rest of his life, though other- wise he was not ill-treated. For the rest of his reign Henry was ruler of all the old dominions of the Conqueror, and none of his subjects could cloak disloyalty by the pretence of owing a divided allegiance to two masters. With this he was content, and made no great effort to extend his dominions farther; his desire wastoreignas a true king in EnglandandNormandy, rather than to build up a loosely compacted empire around them.

Throughout the time of Henry's Norman war, he was engaged in a tiresome controversy with the primate on the question of lay investitures, the continuation of the struggle which Henry's had begun in his brother's reign. Every English king difficulties for five generations had to face the danger from the wHh tbe church, no less than the danger from the barons. cburcb ' Anselm had come back from Rome confirmed in the theories for which he had contended with Rufus — nay, taught to extend them to a further extreme. He now maintained not only that it was a sin that kings should invest prelates with their spiritual insignia, the pallium, the staff, the ring, but claimed that no clerk ought to do homage to the king for the

lands of his benefice, though he himself seven years before had not scrupled to make his oath to his earlier master. He now refused to swear allegiance to the new monarch, though he had recalled him and had restored him to the possession of his see. He also refused to consecrate Henry's nominees to certain bishoprics and abbacies on the grouiivl that they had not been chosen by free election by their chapters or their monks. The king was loath to take up the quarrel, for he highly respected the archbishop; yet he was still more loath to surrender the ancient claims and privileges of the crown. Anselm was equally reluctant to force matters to an open breach, yet would not shift from his position. There followed an interminable series of arguments, interrupted by truces, till at last Anselm, at the king's suggestion, went to Rome to see if the pope could arrange some modus vivendi. Paschal II. for some time refused to withdraw from his fixed theory of the relation of church and state, and Anselm, in despair, preferred to remain abroad rather than to press matters to the rupture that seemed the only logical issue of the controversy. But in 1 107 the pope consented to a compromise, which satisfied the king, and yet was acceptable to the church. Bishops and abbots were for the future to be canonically elected by the clergy, and were no longer to receive the ring and staff from lay hands. But they were to do homage to the king for their lands, and since they thus acknowledged him as their temporal lord Henry was content. Moreover, he retained in practice, if not in theory, his power to nominate to the vacant offices ; chapters and monasteries seldom dared to resist the pressure which the sovereign could bring to bear upon them in favour of the candidate whom he had selected. The arrangement was satisfactory, and served as the model for the similar compromise arrived at between Pope Calixtus II. and the emperor Henry V. fifteen years later.

From 1 107 onward Henry was freed from both the dangers which had threatened him in his earlier years, and was free to develop his policy as he pleased. He had yet twenty-eight years to reign, for he survived to the age of sixty-seven, an age

unparalleled by any of his predecessors, and by all his successors till Edward I.

It is to Henry, aided by his great justiciar, Roger, bishop of Salisbury, that England owed the institution of the machinery of government by which it was to be ruled during the Coastita- ear ii er m iddle ages. This may be described as a primi- machinery, tive kind of bureaucracy, which gradually developed into a much more complicated system of courts and offices. Around the sovereign was his Curia Regis or body of councillors, of whom the most important were the justiciar, the chancellor and the treasurer, though the feudal officers, the constable and marshal, were also to be found there. The bulk of the council, however, was composed of knights and clerks selected by the king for their administrative or financial ability. The Curia, besides advising the king on ordinary matters of state, had two special functions. It sat, or certain members of it sat, under the presidency of the king or the justiciar, as the supreme court of justice of the realm. In this capacity it tried the suits of tenants-in-chief, and all appeals from the local courts. But Henry, not contented with this, adopted the custom of sending forth certain members of the Curia throughout the realm at intervals, to sit in the shire court, along with or in place of the sheriff, and to hear and judge all the cases of which the court had cognizance. From these itinerant commissioners (justices in eyre) descend the modern justices of assize. The sheriff, the original president of the shire court, was gradually extruded by them from all important business.

But there were other developments of the Curia. The justiciar, chancellor and treasurer sat with certain other members of the council as the court of exchequer, not only to receive and audit the accounts of the royal revenue, but to give legal decisions on all questions connected with finance. Twice in every year the sheriffs and other royal officials came up to the exchequer court, which originally sat at Winchester, with their bags of money and their sheaves of accounts. Their figures were sub- jected to a severe scrutiny, and the law was laid down on all points in which the interests of the sheriff and the king, or the sheriff and the taxpayer, came into conflict. In this way the exchequer grew into a law court of primary importance, instead of remaining merely a court of receipt. Though its members were originally the same men who sat in the Curia Regis, the character of the question to be tried settled the capacity in which they should sit, and two separate courts were evolved. (See Exchequer.)

Under the superintendence of the Curia Regis and the ex- chequer, the sheriff still remained the king's factotum in local affairs. He led the shire-levies, collected the royal revenues both feudal and non-feudal, and presided in the shire-court as judge, till in the course of

years his functions in that sphere were gradually taken over by the itinerant justices. On his fidelity the king had to rely both for military aid in times of baronial revolt and for the collection of the money which formed the sinews of war. Hence the position was one of the highest im- portance, and Henry's new nobility, the men of ability whom he selected and promoted, found their special occupation in holding the office of sheriff. It was they who had to see that the shire court, and in minor affairs the hundred court, did not allow cases to slip away into the jurisdiction of the feudal courts of the baronage.

Henry I. must count not merely as the father of the English bureaucracy, but as a fosterer of the municipal independence of the towns. He gave charters of a very liberal character to many places, and in especial to London, where the citizens were allowed to choose their own sheriff, and to deal directly with the ex- chequer in matters of revenue. He even farmed out to them the charge of the taxes of the whole shire of Middlesex, outside the city walls. Such a grant was exceptional — though Lincoln also seems to have been granted the privilege of dealing directly with the exchequer. But in many other smaller towns the first grants —the smaller beginnings of autonomy — may be traced back to this period (see Borough).

Though Henry was an autocrat, and governed through

bureaucratic officials who were entirely under his hand, yet a reign of law and order such as his was indirectly favourable to the growth of constitutional liberty. It was equally favourable to the growth of national unity, it was in his time that Norman and English began to melt together: intermarriage in all classes became common, and only thirty years after his death a con- temporary writer could remark that it was hard for any man to call himself either Norman or English, so much had blood been intermingled.

It is unnecessary to go into the very uninteresting and un- important history of Henry's later years. A long war with France, prosecuted without much energy, led to no results, for the French king's attempts to stir up rebellions in the name of William the Clito (q.v.), the son of Duke Robert, came to an end with that prince's death in 1129. But the extension of the English borders in South Wales by the conquests of the lords marcher as far as Pembroke and Cardigan deserves a word of notice.

The question of the succession was the main thing which occupied the mind of the king and the whole nation in Henry's later years. It

*had a real interest for every man in an age when any doubt as to the heir meant the out- heir? * break of civil war such as had occurred at the death of the Conqueror and of Rufus. There was now a problem of some difficulty to be solved. Henry's only son William had been drowned at sea in 1 1 20. He had no other child born in wedlock save a daughter, Matilda, who married the emperor Henry V. , but had no issue by him. On the emperor's decease she wedded as her second husband Geoffrey of Anjou (n 2 7), to whom during her father's last years she bore two sons. But the succession of a woman to the crown was as unfamiliar to English as to Norman ideas, nor did it seem natural to either to place a young child on the throne. Moreover, Matilda's husband Geoffrey was un- popular among the Normans; the Angevins had been the chief enemies of the duchy for several generations, and the idea that one of them might become its practical ruler was deeply resented. The old king, as was but natural, had determined that his daughter should be his successor; he made the great council do homage to her in n 26, and always kept her before the eyes of his people as his destined heir. But though he had forced or cajoled every leading man in England and Normandy to take his oath to serve her, he must have been conscious that there "was a large chance that such pledges would be forgotten at his death. – The prejudice against a female heir was strong, and there were too many turbulent magnates to whom the anarchy that would follow a disputed succession presented temptations which could not be resisted.*

*Henry died suddenly on the 25th of November 1135, while he was on a visit to his duchy of Normandy. The moment that his death was reported the futility of oaths became apparent. A majority of the Norman barons ap- ■ Ma ' /W *> pealed to Theobald, count of Blois, son of the Con- Stephen. queror's daughter Adela, to be their duke, and to save them from the yoke of the hated Angevin. His supporters and those of Matilda were soon at blows all along the frontier of Normandy. Meanwhile in England another pretender had appeared. Stephen, count of Boulogne, the younger brother of Theobald, had landed at Dover within a few days of Henry's death, determined to make a snatch at the crown, though he had been one of the first who had taken the oath to his cousin a few years before. The citizens of London welcomed him, but he was not secure of his success till by a swift swoop on Winchester he obtained possession of the royal treasure — an all-important factor in a crisis, as Henry I. had shown in 1100. At Winchester he was acknowledged as king by the bishop, his own brother Henry of Blois, and by the great justiciar, Roger, bishop of Salisbury, and the archbishop, William of Corbeil.*

The allegiance of these prelates was bought by an unwise promise to grant all the demands of the church party, which his pre- decessor had denied, or conceded only in part. He would permit free election to all benefices, and free legislation by ecclesiastical synods, and would surrender any claims of the royal courts to

have jurisdiction over clerks or the property of clerks. . It then remained necessary to buy the baronage, of which only a few members had as yet committed themselves to his side. It was done by grants of lands and privileges, the first instalment of a never-ending crop of ruinous concessions which Stephen continued to make from the day of his accession down to the day of his death.

The pretender was crowned at Westminster on the 22nd of December 113 5 — less than a month after his uncle's death. No one yet openly withstood him, but he was well aware that his position was precarious, and that the claims of Matilda would be brought forward ere long by the section of the baronage which had not yet got from him all they desired. Meanwhile, however, he was encouraged to persevere by the fact that his brother Theobald had withdrawn his claim to the duchy of Normandy, and retired in his favour. For a space he was to be duke as well as king; but this meant merely that he would have two wars, not one, in hand ere long. Matilda's adherents were already in the field in Normandy; in England their rising was only delayed for a few months.

Stephen, though he had shown some enterprise and capacity in his successful snatch at the crown, was a man far below his three predecessors on the throne in the matter of perseverance and foresight. He was a good fighter, a liberal giver, and a faithful friend, but he lacked wisdom, caution and the power to organize. Starting his career as a perjurer, it is curious that he was singularly slow to suspect perjury in others; he was the most systematically betrayed of all English kings, because he was the least suspicious, and the most ready to buy off and to forgive rebels. His troubles began in 1136, when sporadic re- bellions, raised in the name of Matilda, began to appear; they grew steadily worse, though Stephen showed no lack of energy, posting about his realm with a band of mercenary knights whenever trouble broke out. But in 1138 the crisis

came; the baronage had tried the capacity of their new master and found him wanting. The outbreak was now widespread and systematic Civil war — caused not by the turbulence of a few wild spirits, but by the deliberate conspiracy of all who saw their advantage in anarchy. Matilda had a few genuine partisans, such as her half-brother Robert, earl of Gloucester, the illegitimate son of Henry I., but the large majority of those who took arms in her name were ready to sell their allegiance to either candidate in return for lands, or grants of rank or privilege. A long list of doubly and triply forsworn nobles, led by Geoffrey de Mandeville, Aubrey de Vere and Ralph of Chester, made the balance of war sway alternately from side to side, as they transferred themselves to the camp of the highest bidder. It is hard to trace any meaning in the civil war — it was not a contest between the principle of hereditary succession and the principle of elective kingship, as might be supposed. It was rather, if some explanation must be found for it, a strife between the kingly power and feudal anarchy. Unfortunately for England the kingly power was in the hands of an incapable holder, and feudal anarchy found a plausible mask by adopting the disguise of loyalty to the rightful heiress.

The civil war was not Stephen's only trouble; foreign invasion was added. David I., king of Scotland, was the uncle of Matilda, and used her wrongs as the plea for thrice invading northern England, which he ravaged with great cruelty. His most for- midable raid was checked by the Yorkshire shire levies, at the battle of the Standard (Aug. 22, 1138). Yet in the following year he had to be bought off by the grant of all Northumberland (save Newcastle and Bamborough) to his son Earl Henry. Car- lisle and Cumberland were already in his hands. Some years later the Scottish prince also got possession of the great " Honour of Lancaster." It was not Stephen's fault that the boundary of England did not permanently recede from the Tweed and the Solway to the Tyne and the Ribble.

But the affairs of the North attracted little attention while the civil war was at its height in the South. In 1139 Stephen had wrought himself fatal damage by quarrelling with the ecclesi- astical. bureaucrats, the kinsmen and allies of Roger of Salisbury,

who had been among his earliest adherents. Jealous of their, power and their arrogance, and doubting their loyalty, he im- prisoned them; and confiscated their lands. This threw the whole church party on to the side of Matilda; even Henry,: bishop of Winchester, the king's own brother, disowned him and passed over to the other side. Moreover, the whole machinery of local government in the realm fell

out of gear, when the experienced ministers who were wont to control it were removed from power.

Matilda had landed in England in the winter of 1139-1140; for a year her partisans made steady progress against the king, and on the 2nd of February 1 141 Stephen was defeated and taken prisoner at the battle of Lincoln. AH England, save the county of Kent and a few isolated castles elsewhere, submitted to Matilda. She was hailed as a sovereign by a great assembly at Winchester, over which Stephen's own brother Bishop Henry presided (April 7, 1141) and entered London in triumph in June. It is doubtful whether she would have obtained complete possession of- the realm if she had played her cards well, for there were too many powerful personages who were interested in the perpetuation of the civil war. But she certainly did her best to ruin her own chances by showing an unwise arrogance, and a determination to resume at once all the powers that her father had possessed. When she annulled all the royal acts of the last six years, declared charters forfeited and lands confiscated, and began to raise heavy and arbitrary taxes, she made the partisans of Stephen desperate, and estranged many of her own supporters. A sudden rising of the citizens drove her out of London, while she was making preparations for her coronation. The party of the imprisoned king rallied under the wise guidance of his wife Matilda of Boulogne and his brother Henry, and many other of the late deserters adhered to it. Their army drove the lately triumphant party out of Winchester, and captured its military chief, Robert, earl of Gloucester. So much was his loss felt that his sister exchanged him a few months later for King Stephen.

After this the war went on interminably, without complete advantage to either side, Stephen for the most part dominating the eastern and Matilda the western shires. It was the zenith of the power of the baronial anarchists, who moved from camo to camp with shameless rapidity, wresting from one or other of the two rival sovereigns some royal castle, or some dangerous grant of financial or judicial rights, at each change of allegiance. The kingdom was in the desperate state described in the last melan- choly pages of the Anglo-Saxon Chronicle, when life and property were nowhere safe from the objectless ferocity of feudal tyrants ■ — when " every shire was full of castles and every castle filled with devils and evil men," and the people murmured that " Christ and his saints slept."

Such was England's fate till 1153, when Matilda had retired from the strife in favour of her son, Henry of Anjou, and Stephen was grown an old man, and had just lost his heir, Eustace, to whom he had

desired to pass on the crown. Both parties were exhausted, both were sick of the incessant treachery of their more unscrupulous barons, and at last they came to the compro- mise of Wallingford (October 1153), by which it was agreed that Stephen should reign for the remainder of his life, but that on his death the crown should pass to Henry. Both sides promised to lay down their arms, to dismiss their mercenaries, and to acquiesce in the destruction of unlicensed castles, of which it is said, with no very great exaggeration, that there were at the moment over 1000 in the realm. Henry then returned to Nor- mandy, of which his mother had been in possession since 114S) while Stephen turned his small remaining strength to the weary task of endeavouring to restore the foundations of law and order. But he had accomplished little when he died in October 1154. The task of reconstruction was to be left to Henry of Anjou : his predecessor was only remembered as an example of the evil that may be done by a weak man who has been reckless enough to seize a throne which he is incapable of defending. England has had many worse kings, but never one who wrought her more harm. If his successor had been like him, feudal anarchy might have become as permanent in England as in Poland.

iJ54-n62j

Fortunately the young king to whom Stephen's battered crown now fell was energetic and capable, if somewhat self- willed and hasty. He was inferior in caution and self-control to his grandfather Henry I., though he resembled him in his love of strong and systematic govern- ance. From the point of view of his English subjects his main achievement was that he restored in almost every detail the well-organized bureaucracy which his ancestor had created, and with it the law and order that had disappeared during Stephen's unhappy reign. But there was this essential difference between the position of the two Henries, that the elder aspired to be no more than king of England arid duke of Normandy, while the younger strove all his life for an imperial position in western Europe. Such an ambition was almost forced upon him by the consequences of his descent and his marriage. Besides his grandfather's Anglo-Norman inheritance, he had received from his father Geoffrey the counties of Anjou and Touraine, and the predominance in the valley of the Lower Loire. But it was his marriage to Eleanor of Aquitaine, two years before his ac- cession to the English throne, which gave him the right to dream of

greatness such as his Norman forbears had never enjoyed. This lady, the divorced wife of Louis VII. of France, brought to her second husband the whole of the lands from Poitou to the Pyrenees, the accumulated gains of many warlike ancestors. In wealth and fighting strength the duchy of Aquitaine was a full third of France. Added to Anjou and Normandy it made a realm far more important than England. Hence it came that Henry's ambitions and interests were continental more than English. Unlike his grandfather he dwelt for the greater part of his time beyond seas. It must be remembered, too, that his youth had been spent abroad, and that England only came to him when he was already a grown man. The concerns of his island realm were a matter of high importance to him, but only formed a part of his cares. Essentially he was an Angevin, neither a Norman nor an Englishman, and his primary ambition was to make the house of Anjou supreme in France. Nor did this seem impossible; he owned a far broader and wealthier domain beyond the Channel than did his nominal suzerain King Louis VII., and— what was of more importance— he far excelled that prince both in vigour and in capacity..

On succeeding to the English crown, however, he came over at once to take possession of the realm, and abode there for over a year, displaying the most restless energy in setting to rights the governance of the realm. He expelled all Stephenˆ mercenaries, took back into his hands the royal lands and castles which his predecessor had granted away, and destroyed hundreds of the " adulterine " castles which the barons and knights had built without leave during the years of the anarchy. Hardly a single magnate dared to oppose him — Bridgnorth, now a castle of the Mortimers, was the only place which he had to take by force. His next care was to restore the bureaucracy by which Henry I. had been wont to govern. He handed over the exchequer to Nigel, bishop of Ely, the nephew of the old justiciar Roger of Salisbury, and the heir of his traditions. His chancellor was a young clerk, Thomas Becket, who was recommended to him by archbishop Theobald as the most capable official in the realm. A short experience of his work convinced the king that his merits had not been exaggerated. He proved a zealous and capable minister, and such a strong exponent of the claims of the crown that no one could have foreseen the later developments by which he was to become their greatest enemy.

The machine of government was beginning to work in a satis- factory fashion, and the realm was already settling down into order, when Henry was called abroad by a rebellion raised in Anjou by his brother Geoffrey — the first of the innumerable dynastic troubles

abroad which continued throughout his reign to distract his attention from his duties as an English king. He did not return for fifteen months; but when he did reappear it was to complete the work which he had begun in 1155, to extort from the greater barons the last of the royal fortresses which still remained in their hands, and to restore the northern boun- daries of the realm. Malcolm TV., the young king of Scotland, ix. 16

was compelled to give up the earldoms of Northumberland and Cumberland, which his father Henry had received from Stephen. He received instead only the earldom of Huntingdon, too far from the border to be a dangerous possession, to which he had a hereditary right as descending from Earl Waltheof. He did homage to the king of England, and actually followed him with a great retinue on his next continental expedition. In the same year (1157) Henry made an expedition into North Wales, and forced its prince Owen to become his vassal, not without some fighting, in which the English army received several sharp checks at the commencement of the campaign.

Yet once more Henry's stay on the English side of the Channel was but for a year. In n 58 he again departed to plunge into schemes of continental conquest. This time it was an attempt to annex the great : county of Toulouse, and so to carry the borders of Aquitaine, to the Mediterranean, which distracted him. Naturally Louis of France was unwilling to see his great vassal striding all across his realm, and did what he could to hinder him. Into the endless skirmishes and negotiations which followed the raising of the question of Toulouse it would be fruit- less to enter. Henry did not achieve his purpose, indeed he seems to have failed to use his strength to its best advantage, and allowed himself to be bought off by a futile marriage treaty by which his eldest son was to marry the French king's daughter (1160), This was to be but the first of many disappointments in this direction; there was apparently some fatal scruple, both in Henry's own mind and in that of his continental subjects, as to pressing their suzerain too hard. But it must also be remem- bered that a feudal army was an inefficient weapon for long wars, and that the mercenaries, by whom alone it could be replaced, were both expensive and untrustworthy. Henry developed as. far as he was able the system of " scutage " (q.v.) which his grandfather had apparently invented; by this the vassal compounded for his forty days' personal service by paying money, with which the king could hire professional soldiers. But even with this help he could never keep a large enough army together.

Meanwhile England, though somewhat heavily taxed, was at least

enjoying quiet and strong governance. There is every sign that Henry's early years were a time of returning prosperity. But there was also much friction between Q uarre ' the crown and its subjects. The more turbulent part church of the baronage, looking back to the boisterous times of Stephen with regret, was reserving itself for a favourable opportunity. The danger of feudal rebellion was not yet past, as was to be shown ten years later. The towns did not find Henry an easy master. He took away from London some of the exceptional privileges which his grandfather had granted, such as the free election of sheriffs of Middlesex, and the right of farming the shire at a fixed rent. He asserted his power to raise " tallages " — arbitrary taxation — from the citizens on occasion. Yet he left the foundations of municipal liberty untouched, and he was fairly liberal in granting charters which contained moderate privileges to smaller towns. His most difficult task, however, was to come to a settlement with the Church. The lavish grants of Stephen had made an end of the old authority which the Conqueror and Henry I. had exercised over the clergy. Their successor was well aware of the fact, and was resolved to put back the clock, so far as it was in his power. It was not, however, on the old problems of free election, of lay investiture, that his quarrel with the clerical body broke out, but on the comparatively new question of the conflicting claims of ecclesiastical and secular courts. The separate tribunals of the church, whose erection William I. had favoured, had been developing in power ever since, and had begun to encroach on the sphere of the courts of the state. This was more than ever the case since Stephen had formally granted them jurisdiction over all suits concerning clerics and clerical property. During the first few years of his reign Henry had already been in collision with the ecclesiastical authorities over several such cases; he had chafed at seeing two clerks accused of murder and black- mailing claimed by and acquitted in the church courts; and

most of all at the frequency of unlicensed appeals to Rome — a flagrant breach of one of the three rules laid down by William the Conqueror. Being comparatively at leisure after the paci- fication with France, he resolved to turn his whole attention to the

arrangement of a new modus vivendi with the church. As a preliminary move he appointed his able chancellor Thomas Becket to the archbishopric of Canterbury, which fell vacant in „ . , 1 1 62. This was the greatest mistake of his reign. Becket was one of those men who, without being either hypocrites or consciously ambitious, live only to magnify their office. While chancellor he was the most zealous servant of the crown, and had seemed rather secular than clerical in his habits and his outlook on life. But no sooner had he been promoted to the archbishopric than he put away his former manners, became the most formal and austere of men, and set himself to be the champion of the church party in all its claims, reasonable or unreasonable, against the state. The king's astonishment was even greater than his indignation when he saw the late chancellor setting himself to oppose him in all things. Their first quarrel was about a proposed change in some details of taxation, which seems to have had no specially ecclesi- astical bearing at all. But Becket vehemently opposed it, and got so much support when the great council met at Woodstock that Henry withdrew his schemes. This was only a preliminary skirmish; the main battle opened in the following year, when the king, quite aware that he must for the future look on Thomas as his enemy, brought forward the famous Constitutions of Clarendon, of which the main purport was to assert the juris- diction of the state over clerical offenders by a rather complicated procedure, while other clauses provided that appeals to Rome must not be made without the king's leave, that suits about land or the presentation to benefices, in which clerics were concerned, should be tried before the royal courts, and that bishops should not quit the realm unless they had obtained permission to do so from the king (see Clarendon, Constitutions of). Some- what to the king's surprise, Becket yielded for a moment to his pressure, and declared his assent to the constitutions. But he had no sooner left the court than he proclaimed that he had grievously sinned in giving way, suspended himself from his archiepiscopal functions, and wrote to the pope to beg for pardon and absolution. He then made a clandestine attempt to escape from the realm, but was detected on the seashore and forced to return.

Incensed with Becket for his repudiation of his original sub- mission, Henry proceeded to open a campaign of lawsuits against him, in order to force him to plead in secular courts. He also took the very mean step of declaring that he should call him to account for all the moneys that had passed through his hands when he was chancellor, though Becket had been given a quit- tance for them when he resigned the office more than two years before. The business came up

at the council of Northampton (October n 64), when the archbishop was tried for refusing to recognize the jurisdiction of the king's courts, and declared to have forfeited his movable goods. The sentence was passed by the lay members of the Curia Regis alone, the bishops having been forbidden to sit, and threatened with excommunication if they did so, by the accused primate. When Becket was visited by the justiciar who came to rehearse the judgment, he started to his feet, refused to listen to a word, declared his repudiation of all lay courts and left the hall. That same night he made a second attempt to escape from England and this time succeeded in getting off to Flanders. From thence he fled to the court of the pope, where he received less support than he had expected. Alexander III. privately approved of all that he had done, and regarded him as the champion of the Church, but he did not wishto quarrel with King Henry. He had lately been driven from Rome by the emperor Frederick I., who had installed an antipope in his place, and had been forced to retire to France. If he sided with Becket and thundered againsthis persecutor, there wassmalldoubt that the king of England would adhere to the schism. Accord- ingly he endeavoured to temporize and to avoid a rupture, to the archbishop's great disgust. But since he "also declared theConsti-

tutions of Clarendon uncanonical and invalid, Henry was equally offended, and opened negotiations with the emperor and the anti-pope. This conduct forced Alexander's hand, and he gave Becket leave to excommunicate his enemies. The exile, who had taken refuge in a French abbey, placed the justiciar and six other of the king's chief councillors under the ban of the Church, and intimated that he should add Henry himself to the list unless he showed speedy signs of repentance (April n 66).

Thus the quarrel had come to a head. Church and State were at open war. Henry soon found that Becket's threats had more effect than he liked. Many of the English clergy were naturally on the side of the primate in a dispute which touched their loyalty to the Church and their class feeling. Several bishops declared to the king that, since his ministers had been duly ex- communicated, they did not see how they could avoid regarding them as men placed outside the pale of Christendom. Fortun- ately the pope interfered for a moment to lighten the friction; being threatened with a new invasion by the emperor Frederick, he suspended the sentences and sent legates to patch up a peace. They failed, for neither the king nor the archbishop would give way. Atˆthis juncture Henry was desirous of getting his eldest son and namesake crowned as his colleague, the best mode that he could devise for avoiding the dangers of a disputed succession

at his death. He induced the archbishop of York, assisted by the bishops of London and Salisbury, to perform the ceremony. This was a clear invasion of the ancient rights of the primate, and Becket took it more to heart than any other of his grievances.

Yet the next move in the struggle was a hollow reconciliation between the combatants — a most inexplicable act on both sides. The king offered to allow Becket to return from exile, and to restore him to his possessions, without exacting from him any promise of submission, or even a pledge that he would not reopen the dispute on his return. Apparently he had made a wrong interpretation of the primate's mental attitude, and thought him desirous of a truce, if not ready for a compromise. He had wholly misjudged the situation; Becket made neither promises nor threats, but three weeks after he reached Canterbury publicly excommunicated the bishops of London and Salisbury for the part that they had taken in the coronation of the young king, and suspended from their functions the other prelates who had been present at the ceremony. He then proceeded to excommunicate a number of his minor lay enemies.

The news was carried overseas to Henry, who was then in Normandy. It roused one of the fits of wild rage to which he was not unfrequently liable; he burst out into ejacu- lations of wrath, and cursed " the cowardly idle ser- mrd/ vants who suffered their master to be made the laughing-stock of a low-born priest." Among those who stood about him were four knights, some of whom had personal grudges against Becket, and all of whom were reckless ruffians, who were eager to win their master's favour by fair means or foul. They crossed the Channel with astonishing speed; two days after the king's outburst they stood before Becket at Canterbury and threatened him with death unless he should remove the excommunications and submit to his master. The archbishop answered with words as scornful as their own, and took his way to the minster to attend vespers. The knights went out to seek their weapons, and when armed followed him into the north transept, where they fell upon him and brutally slew him with many sword-strokes (December 29, 11 70). Thomas had been given time to fly, and his followers had endeavoured to persuade him to do so. It seems that he deliberately courted martyrdom, anxious apparently that his death should deal the king the bitterest blow that it was in his power to inflict (see Becket).*

Nothing could have put Henry in such an evil plight; the whole world held him responsible for the murder, and he was forced to buy pardon for it byVsurrendering many ft ., of the advantages over the

Church which he had hoped to gain by enforcing the Constitutions of Clarendon. Especially the immunity of clerical offenders from the juris- diction of lay courts had to be conceded; for the rest of the

middle ages the clerk guilty of theft or assault, riot or murder, could plead his orders, and escape from the harsh justice of the king's officers to the milder penalties of the bishop's tribunal. " Benefit of clergy " became an intolerable anomaly, all the more so because the privilege was extended in practice not only to all persons actually in minor orders, but to all who claimed them; any criminal who could read had a fair chance of being reckoned a clerk. Another concession which Henry was forced to make was that the appeals to Rome of litigants in ecclesiastical suits should be freely permitted, provided that they made an oath that they were not contemplating any wrong to the English crown or the English church, a sufficiently easy condition. Such appeals became, and remained, innumerable and vexatious. Pope Alexander also extorted from the king a pledge that he would relinquish any customs prejudicial to the rights of the Church which had been introduced since his accession. To the pope this meant that the Constitutions of Clarendon were disavowed; to the king, who maintained that they were in the main a mere restatement of the customs of William I., it bore no such general interpretation. The points were fought out in detail, and not settled for many years. Practically it became the rule to regard suits regarding land, or presentations to bene- fices, as pertaining to the king's court, while those regarding probate, marriage and divorce fell to the ecclesiastical tribunal. The question of election to bishoprics and abbacies went back to the stage which it had reached in the time of Henry I.; the choice was made in canonical form, by the chapters or the monasteries, but the king's recommendation was a primary factor in that choice. When the electors disregarded it, as was sometimes the case, there was friction; a weak king was some- times overruled; a strong one generally got his way in the end.

Becket's death, then, gave a qualified triumph to the church party, and he was rightly regarded as the successful champion of his caste. Hence they held his death in grateful remembrance; the pope canonized him in 11 73, and more churches were dedi- cated to him during the next two centuries than to any other English saint. In the

eyes of most men his martyrdom had put the king so much in the wrong that the obstinacy and provo- cative conduct which had brought it about passed out of memory. His life of ostentatious austerity, and the courage with which he met his death, had caused all his faults to be forgotten. Henry himself felt so much the invidious position in which he was placed that even after making his submission to the pope's legates at Avranches in 1172, he thought it necessary to do penance before Becket's tomb in 1 174, on which occasion he allowed himself to be publicly scourged by the monks of Canter- bury, who inflicted on him three cuts apiece.

Between the outbreak of the king's quarrel with Becket at the council of Woodstock and the compromise of Avranches no less than ten years had elapsed — the best years of Henry's manhood. During this period his struggle with the Church had been but one of his distractions. His policy of imperial aggran- disement had been in progress. In 1163 he had completed the conquest of South Wales; the marcher lords were now in possession of the greater part of the land; the surviving Welsh princes did homage for the rest. In 1166 Henry got practical possession of the duchy of Brittany, the only remaining large district of western France which was not already in his hands. Conan, the last prince of the old Breton house, recognized him as his lord, and gave the hand of his heiress Constance to Geoffrey, the king's third son. When the count died in n 71 Henry did not transfer the administration of the land to the young pair, who were still but children, but retained it for himself, and clung to it jealously long after his son came of age. Intermittent wars with France during these years were of small importance; Henry never pushed his suzerain to extremity. But the Angevin dominions were extended in a new direction, where no English king had yet made his power felt.

The distressful island of Ireland was at this moment enjoying the anarchy which had reigned therein since the dawn of history. Its state had grown even more unhappy than before since the Danish invasions of the 10th century, which had not

welded the native kingdoms into unity by pressure from without — as had been the case in England — but had simply complicated affairs, by setting up two or three alien principalities on the coastline. As in England, the vikings had fj re i sa a. destroyed much of the old civilization; but they had neither succeeded in occupying the whole country nor had they been absorbed by the natives. The state of the island was much like that of England in the days of the Heptarchy: occasionally a " High King " succeeded in forcing his rivals into a precarious submission; more usually there was not even a pretence of

a central authority in the island, and the annals of objectless tribal wars formed its sole history. King Henry's eyes had been fixed on the faction-ridden land since the first years of his reign. As early as 11 55 he had asked and obtained the approval of Pope Adrian IV., the only Englishman who ever sat upon the papal throne, for a scheme for the conquest of Ireland. The Holy See had always regarded with distaste the existence in the West of a nation who repudiated the Roman obedience, and lived in schismatical independence, under local ecclesiastical customs which dated back to the 5th century, and had never been brought into line with those of the rest of Christendom. Hence it was natural to sanction an invasion which might bring the Irish within the fold. But Henry made no endeavour for many years to utilize the papal grant of Ireland, which seems to have been made under the preposterous " Donation of Constantine," the forged document which gave the bishop of Rome authority over all islands. It was conveniently forgotten that Ireland had never been in the Roman empire, and so had not even been Constantine's to give away.

Not till 1 168, thirteen years after the agreement with Pope Adrian, did the interference of the English king in Ireland actually begin. Even then he did not take the conquest in hand himself, but merely sanctioned a private adventure of some of his subjects. Dermot MacMorrough, king of Leinster, an unquiet Irish prince who for good reasons had been expelled by his neighbours, came to Henry's court in Normandy, proffering his allegiance in return for restoration to his lost dominions. The quarrel with Becket, and the French war, were both distracting the English king at the moment. He could not spare attention for the matter, but gave Dermot leave to enlist auxiliaries among the turbulent barons of the South Welsh Marches. The Irish exile enlisted first the services of Maurice Fitzgerald and Robert Fitzstephen, two half-brothers, both noted fighting men, and afterwards those of Richard de Clare, earl of Pembroke, an ambitious and impecunious magnate of broken fortunes. The two barons were promised lands, the earl a greater bribe — the hand of Dermot's only daughter Eva and the inheritance of the kingdom of Leinster. Fitzgerald and Fitzstephen crossed to Ireland in n 69 with a mere handful of followers. But they achieved victories of an almost incredible" completeness over Dermot's enemies. The undisciplined hordes of the king of Ossory and the Danes of Wexford could not stand before the Anglo-Norman tactics — the charge of the knights and the arrow- flight of the archers, skilfully combined by the adventurous in- vaders. Dermot was triumphant, and sent for more auxiliaries, aspiring to evict Roderic O'Connor of Connaught from

the precarious throne of High King of Ireland. In n 70 the earl of Pembroke came over with a larger force, celebrated his marriage with Dermot's daughter, and commenced a series of conquests. He took Waterford and Dublin from the Danes, and scattered the hosts of the native princes. Early in the next spring Dermot died, and Earl Richard, in virtue of his marriage, claimed the kingship of Leinster. He held his own, despite the assaults of a great army gathered by Roderic the High King, and of a viking fleet which came to help the conquered jarls of Waterford and Dublin. At this moment King Henry thought it necessary to interfere; if he let more time slip away, Earl Richard would become a powerful king and forget his English allegiance. Accordingly, with a large army at his back, he landed at Water- ford in 1171 and marched on Dublin. Richard did him homage for Leinster, engaging to hold it as a palatine earldom, and not to claim the name or rights of a king. The other adventurers

followed his example, as did, after an interval, most of the native Irish princes. Only Roderic of Connaught held aloof in- his western solitudes, asserting his independence. The : clergy, almost without a murmur, submitted themselves to the Roman Church.

Such was the first conquest of Ireland, a conquest too facile to be secure. Four years later it appeared to be completed by the submission of the king of Connaught, who did Homage like the rest of the island chiefs. But their oaths were as easily broken as made, and the real subjection of the island :was not to be completed for 400 years. What happened was that the Anglo-Norman invaders pushed gradually west, occupying the best of the land and holding it down by castles, but leaving the profitless bogs and mountains to the local princes. The king's writ only ran in and about Dublin and a few other harbour fortresses. Inland, the intruding barons and the Irish chiefs fought perpetually, with varying fortunes. The conquest hardly touched central and western Ulster, and left half Connaught unsubdued: even in the immediate vicinity of Dublin the tribes of the Wicklow Hills were never properly tamed. The English conquest was incomplete; it failed to introduce either unity or strong governance. After a century and a half it began to recede rather than to advance. Many of the districts which had been overrun in the time of the Angevin kings were lost; many of the Anglo-Norman families

intermarried with and became absorbed by the Irish; they grew as careless of their-‘ allegiance to the crown as any of the native chiefs. The ” Lordship of Ireland ” was never a reality till the times of the Tudors. But as long as Henry II. lived this could not have been foreseen. The first generation of the conquerors pushed their advance with such Vigour that it seemed likely that they would complete the adventure. (See Ireland: History.)

It was in n 73, the year after his return from Ireland and his submission to the papal legates at Avranches, that King Henry became- involved in the first of a series of troubles Rebellion w hi c h were to pursue him for the rest of his life — the of Henry’s rebellions of jˆs graceless sons. His wife Eleanor of Aquitaine had borne him many children. Henry, the eldest surviving son, had already been crowned in n 70 as his father’s colleague and successor; not only he, but Richard -the second, and Geoffrey the third son, were now old enough to chafe against the restraints imposed upon them by an imperious and strong-willed father. The old king very naturally preferred to keep his dominions united under his own immediate govern- ment, but he had designated his eldest son- as his successor in England and Normandy, while Richard was to have his mother’s heritage of Aquitaine, and Geoffrey’s wife’s dowry, the duchy of Brittany, was due to him, now that he had reached the verge of manhood. The princes were shamelessly eager to enter on their inheritance, the king was loath to understand that by con- ferring a titular sovereignty on his sons he had given them a sort of right to expect some share of real power. Their grudge against their father was sedulously fostered by their mother Eleanor, a clever and revengeful woman, who could never forgive her husband for keeping her in the background in political matters and insulting her by his frequent amours. Her old subjects in Aquitaine were secretly encouraged by her to follow her son Richard against his father, whom the barons of the south always regarded as an alien and an intruder. The Bretons were equally willing to rise in the name of Geoffrey and Constance against the guardian who was keeping their prince too long waiting for his inheritance. In England the younger Henry had built himself up a party among the more turbulent section of the baronage, who remembered with regret and longing the carnival of licence which their fathers had enjoyed under King Stephen. Secret agreements had also been made with the kings of France and Scotland, who were eager to take advantage of tha troubles which were about to break out.

In 1 1 73 the plot was complete, and Henry’s three elder sons all took arms against him, collecting Norman, Breton and Gascon rebels

in great numbers, and being backed by a French army. At the same moment the king of Scots invaded Northumberland,

and the earls of Norfolk, Chester and Leicester rose in the name of the younger Henry. This was in all essentials a feudal rebellion of the old type. The English barons were simply desirous of getting rid of the strong and effective governance of the king, and the alleged wrongs of his sons were an empty excuse. For precisely the same reason all classes in England, save the more turbulent section of the baronage, remained faithful to the eldei king. The bureaucracy, the minor landholders, the towns; and the clergy refused to join in the rising, and lent their aid for its suppression, because they were unwilling to see anarchy re- commence. Hence, though the rebellious princes made head for a time against their father abroad, the insurrection of their partisans in England was suppressed without much difficulty. The justiciar, Richard de Lucy, routed the army of the earl of Leicester at Fornham in Suffolk, the castles of the rebel earls were subdued one after another, and William of Scotland was surprised and captured by a force of northern loyalists while he was besieging Alnwick (1173-1174). The war lingered on for a space on the continent; but Henry raised the siege of Rouen, which was being attacked by his eldest son and the king of France^ captured most of Richard's castles in Poitou, and then received the, submission of his undutiful children. Showing considerable magnanimity, he promised to grant to each of them half the revenues of the lands in which they were his destined heirs, and a certain number of castles to hold as their own. Their allies fared less well; the rebel earls were subjected to heavy fines, and their strongholds were demolished. The king of Scots was forced to buy his liberty by doing homage to Henry for the whole of his kingdom. Queen Eleanor, whom her husband regarded as responsible for the whole rebellion, was placed in a sort of honourable captivity, or retirement, and denied her royal state.

Henry appeared completely triumphant; but the fourteen years which he had yet to live were for the most part to be times of trouble and frustrated hopes. He was growing old; the in- domitable energy- of his early career was beginning to slacken; his dreams of extended empire were vanishing. In the last period of his life he was more set on defending what he already enjoyed, and perfecting the details of administration in his realms, than on taking new adventures in hand. Probably the consciousness that his dominions would be broken up among his sons after his death had a disheartening effect upon him. At any rate his later years bear a considerable resemblance to the corresponding period of his grandfather's reign. The machinery of government which the one had sketched out the other com- pleted.

Under Henry II. the circuits of the itinerant justices became regular instead of intermittent; the judicial functions of the Curia Regis were delegated to a permanent committee of that body which took form as the court of king's bench {Curia Regis in Banco). The sheriffs were kept very tightly in hand, and under incessant supervision; once in n 70 nearly the whole body of them were dismissed for misuse of their office. The shire levies which had served the king so well against the feudal rebels of 11 73 were reorganized, with uniformity of weapons and armour, by the Assize of Arms of 11 81. There was also a considerable amount of new legislation with the object of pro- tecting the minor subjects of the crown, and the system of trial by jurors was advanced to the detriment of the absurd old practices of trial by ordeal and trial by wager of battle. The 13th-century jury was a rough and primitive institution, which acted at once as accuser, witness and judge — but it was at any rate preferable to the chances of the red-hot iron, or the club of the duellist.

The best proof that King Henry's orderly if autocratic regime was appreciated at its true value by his English subjects, is that when the second series of rebellions raised by his undutiful sons began in 1182, there was no stir whatever in England, though in Normandy, Brittany and Aquitaine the barons rose in full force to support the young princes, whose success would mean the triumph of particularism and the destruction of the Angevin empire. Among the many troubles which broke down King Henry's strdng will and great bodily vigour in those unhappy

years, rebellion in England was not one. For this reason he was almost constantly abroad, leaving the administration of the one loyal section of his realm to his great justiciar. Hence the story of the unnatural war between father and sons has no part in English history. It is but necessary to note that the younger Henry died in n 83, that Geoffrey perished by accident at a tournament in 1186, and that in 1180, when the old king's strength finally gave out, it was Richard who was leading the rebellion, to which John, the youngest and least worthy of the four undutiful sons, was giving secret countenance. , It was the discovery of the treachery of this one child whom he had deemed faithful, and loved over well, that broke Henry's heart. " Let things go as they will; I have nothing to care for

in the world now," he murmured on his death-bed, and turned his face to the wall to breathe his last.

The death of the younger Henry had made Richard heir to all his father's lands from the Tweed to the Bidassoa save Brittany, Richard 1. wmcn had fallen to Arthur, the infant son of the un- lucky Geoffrey. John, the new king's only surviv- ing brother, had been declared " Lord of Ireland " by his father in 1185, but Henry had been forced to remove him for persistent misconduct, and had left him nothing, more than a titular sovereignty in the newly conquered island. In this Richard confirmed him at his accession, and gave him a more tangible endowment by allowing him to marry Isabella, the heiress of the earldom of Gloucester, and by bestowing on him the honour of Lancaster and the shires of Derby, Devon, Corn- wall and Somerset. The gift was over-liberal and the recipient was thankless; but John was distinctly treated as a vassal, not granted the position of an independent sovereign.

Of all the medieval kings of England, Richard I. (known as Coeurde Lion) cared least for his realm on the English side of the Channel, and spent least time within it. Though he chanced to have been born in Oxford, he was far more of a foreigner than his father; his soul was that of a south French baron, not that of an English king. Indeed he looked upon England more as a rich area for taxation than as the centre of a possible empire. His ambitions were continental: so far as he had a policy at all it was Angevin — he would gladly have increased his. dominions on the side of the upper Loire and Garonne, and was set on keep- ing in check the young king of France, Philip Augustus,, though the latter had been his ally during his long struggle with his father. Naturally the policy of Richard as a newly crowned king was bound to differ from that which he had pursued as a rebellious prince. As regards his personal character he has been described, not without truth, as a typical man of his time and nothing more. He was at heart a chivalrous adventurer delighting in war for war's sake; he was not destitute of a con- science — his undutiful conduct to his father sat heavily on his soul when that father was once dead; he had a strong sense of knightly honour and a certain magnanimity of soul in times of crisis; but he was harsh, thriftless, often cruel, generally lacking in firmness and continuity of purpose, always careless of his subjects' welfare when it interfered with his pleasure or his ambitions of the moment. If he had, stayed long in England he would have made himself hated ; but he was nearly always absent ; it was only as a reckless and spasmodic extorter of taxation, not as a personal tyrant, that he was known on the English side of the Channel.

, At the opening of his reign Richard had one all-engrossing desire ; he was set on going forth to the Crusade for the recovery of Jerusalem which had been proclaimed in 1187, Crusade. P ar tly from chivalrous instincts, partly as a penance for his misconduct to his father. He visited England in 1 189 only in order to be crowned, and to raise as much money for the expedition as he could procure. He obtained enormous sums, by the most unwise and iniquitous expedients, mainly by selling to any buyer that he could find valuable pieces of crown property, high offices and dangerous rights and privileges. The king of Scotland bought for 15,000 marks a release from the homage to the English crown which had been imposed upon him by Henry II. The chancellorship, one of the two chief

offices in the realm, was sold to William Longchamp, bishop of Ely, for £3000, though he was well known as a tactless arrogant and incapable person. The earldom of Northumberland, with palatine rights, was: bought by Hugh Puiset, bishop of Durham. Countless other instances of unwise bargains could be quoted. Having raised every penny that he could procure by legal or illegal means, Richard crossed the Channel, and embarked at Marseilles with a great army on the 7th of August 1 190. The only security which he had for the safety of his dominions in his absence was that. his most dangerous neighbour, the king of France, was also setting out on the Crusade, and that his brother John, whose shifty and treacherous character gave sure promise of trouble, enjoyed a welli-merited unpopularity both in England and in the continental dominions of the crown.*

Richard's crusading exploits have no connexion with the history of England. He showed himself a good knight and a capable general — the capture of Acre and the victory of, Arsuf were highly to his credit as a soldier. But he quarrelled with all the other princes of the Crusade, and showed himself as lacking in tact and diplomatic ability as he was full of military capacity. The king of France departed in wrath, to raise trouble at home; the army gradually melted away, the prospect of recovering Jerusalem disappeared, and finally Richard must be reckoned fortunate in that he obtained from Sultan Saladin a peace, by which the coastland of Palestine was preserved for the Christians, while the Holy City and the inland was sacrificed (Sept. 2, 1192). While returning to his dominions by the way of the Adriatic, the king was shipwrecked, and found himself obliged to enter the dominions of Leopold, duke of Austria, a prince whom he had offended at Acre during the Crusade. Though he disguised himelf, he was detected by his old enemy and imprisoned. The duke then, sold him to the emperor Henry VI., who found pre-

texts for forcing him to buy his freedom by the promise of a ransom of 150,000 marks. It was not till February n 94 that he got loose, after paying a considerable instalment of this vast sum. The main bulk of it, as was to be expected, .was never made over; indeed it could not have been raised, as Richard was well aware. But, once free, he had no scruple in cheating the imperial brigand of his blackmail. '

. For .five years Richard was away from his dominions as a crusader or a captive. There was plenty of trouble during his absence, but less than might have been expected. The strong governance set up by Henry II. proved J^icAeiy-' competent to maintain itself, even when Richard's ministers were tactless and his brother treacherous. A genera- tion before it is certain that England would have been convulsed by a great feudal rising when such an opportunity was granted to the barons. Nothing of the kind happened between 1 190 and 1 1 94. The chancellor William Longchamp made himself odious by his vanity and autocratic behaviour, and was overthrown in 1 191 by a general rising, which was headed by Prince John, and approved by Walter, archbishop of Rouen, whom Richard had sent to England with a commission to assume the justiciar- ship if William should prove impossible as an administrator. Longchamp fled to the continent, and John then hoped to seize on supreme power, even perhaps to grasp the crown. But he was bitterly, disappointed- to find that he could gather few sup- porters; the justiciar and the bureaucrats of the Curia Regis would give him no assistance; they worked on honestly in the name of the absent king. Among the baronage hardly a man would commit himself to treason. In vain John hired foreign mercenaries, garrisoned his castles, and leagued himself with the king of France when the latter returned from the Crusade. It was only the news of his brother's captivity in Austria which gave the intriguing prince a transient hope of success. Boldly asserting that Richard would never be seen alive again he went to France, and did homage to King Philip for Normandy and Aquitaine, as if they were already his own. Then he crossed to England with a band of mercenaries, and seized Windsor and Wallingf ord castles. But no one rose to aid him, and his garrisons were soon being besieged by loyal levies, headed by the justiciar and,byHubertWalter,the newly elected archbishop of Canterbury.

At the same time King Philip's invasion of Normandy was repulsed by the barons of the duchy. Richard's faithful minis- ters, despite of all their distractions, succeeded in raising the first instalment of his ransom by grinding taxation — a fourth part of the revenue of all lay persons, a tithe from ecclesiastical land, was raised, and in addition much church plate was seized, though the officials who exacted it were themselves prelates. John and Philip wrote to the emperor to beg him to detain his captive at all costs, but Henry VI. pocketed the ransom money and set Richard free. He reached England in March n 94, just in time to receive the surrender of the last two castles which were holding out in his treacherous brother's name. With astonish- ing, and indeed misplaced, magnanimity, Richard pardoned his brother, when he made a grovelling submission, and restored him to his lordship of Ireland and to a great part of his English lands.

The king abode for no more than three months in England; he got himself recrowned at Winchester, apparently to wipe out the stain of his German captivity and of an enforced homage which the emperor had extorted from him. Then he raised a heavy tax from his already impoverished subjects, sold a number of official posts and departed to France — never to return, though he had still five years to live. He left behind Archbishop Hubert Walter as justiciar, a faithful if a somewhat high-handed minister.

Richard's one ruling passion was now to punish Philip of France for his unfriendly conduct during his absence. He plunged into a war with this clever and shifty prince, which lasted — with certain short breaks of truces and treaties — till his death. He wasted his considerable military talents in a series of skirmishes and sieges which had no great results, and after spending countless treasures and harrying many regions, perished obscurely by a wound from a cross-bow-bolt, received while beleaguering Chalus, a castle of a rebellious lord of Aqui- taine, the viscount of Limoges (April 6, 1199).

During these years of petty strife England was only reminded at intervals of her king's existence by his intermittent demands e 11 ft ˆ 0r mone y> which his ministers did their best to satisfy. constitu- The machine of government continued to work without tioaaide- his supervision. It has been observed that, from one veiopment. p omt f v j eWj England's worst kings have been her best; that is to say, a sovereign like Richard, who per- sistently neglected his duties, was unconsciously the foster father of constitutional liberty. For his ministers, bureaucrats of an orderly frame of mind, devised for their own convenience rules and customs which became permanent, and

could be cited against those later kings who interfered more actively in the details of domestic governance. We may trace back some small beginnings of a constitution to the time of Henry II. — himself an absentee though not on the scale of his son. But the ten years of Richard's reign were much more fruitful in the growth of institutions which were destined to curb the power of the crown. His justiciars, and especially Hubert Walter, were responsible for several innovations which were to have far-spreading results. The most important was an extension of the use of juries into the province of taxation. When the government employs com- mittees chosen by the taxpayers to estimate and assess the details of taxation, it will find it hard to go back to arbitrary exactions. Such a practice had been first seen when Henry II., in his last year, allowed the celebrated " Saladin Tithe " for the service of the crusade to be assessed by local jurors. In Richard's reign the practice became regular. In especial when England was measured out anew for the great carucage of 1197 — a tax on every ploughland which replaced the rough calculation of Domesday Book — knights elected by the shires shared in all the calculations then made for the new impost. Another constitutional advance was that which substituted "coroners," knights chosen by the county court, for the king's old factotum the sheriff in the duty of holding the " pleas of the crown," i.e. in making the preliminary investigations into such offences as riot, murder or injury to the king's rights or property. The sheriff's natural impulse was to indict every man from whom money could be got; the new coroners were influenced by other motives than financial rapacity, and so were much more likely

to deal equitably with accusations. The towns also profited in no small degree from Richard's absence and impecuniosity. One of the most important charters to London, that which granted the city the right of constituting itself a " commune " and choosing itself a mayor, goes back to October 1191, the troubled month of Longchamp's expulsion from England. It was given by Prince John and the ministers, who were then supporting him against the arrogant chancellor, to secure the adherence of London. Richard on his return seems to have allowed it to stand. Lincoln was also given the right of electing its own magistrates in 11 94, and many smaller places owe grants of more or less of municipal privilege to Hubert Walter acting in the name of the absent king. The English nation began to have some conception of a regime of fixed custom, in which its rights depended on some other source than the sovereign's personal caprice. The times, it may be remembered, were not unprosperous. There had been no serious civil war since the baronial

rising of 11 73. Prince John's turbulence had only affected the neighbourhood of a few royal castles. Despite of the frequent and heavy demands for money for the king's service, wealth seems to have been increasing, and prosperity to have been widespread. Strong and regular governance had on the whole prevailed ever since Henry II. triumphed over baronial anarchy.

III. The Struggle tor Constitutional Liberty (i 199-133 7)

Richard's queen, Berengaria of Navarre, had borne him no children. At the moment of his premature death his nearest kinsmen were his worthless brother John, and the boy Arthur of Brittany, the heir of Geoffrey, the third son Accessl °" of Henry II. On his death-bed the king had designated John as his successor, holding apparently that a bad ruler who was at least a grown man was preferable to a child. John's claim prevailed both in Normandy and in England, though in each, as we are told, there were those who considered it a doubtful point whether an elder brother's son had not a better right than a younger brother. But the ministers recognized John, and the baronage and nation acquiesced, though with little enthusiasm. In the lands farther south, however, matters went otherwise. The dowager duchess Constance of Brittany raised her son's claim, and sent an army into Anjou, and all down the Loire many of the nobles adhered to his cause. The king of France announced that he should support them, and allowed Arthur to do him homage for Anjou, Maine and Touraine. There would have been trouble in Aquitaine also, if the aged Queen Eleanor had not asserted her own primary and indefeasible right to her ancestral duchy, and then declared that she transferred it to her best loved son John. Most of her subjects accepted her decision, and Arthur's faction made no head in this quarter.

It seemed for a space as if the new king would succeed in re- taining the whole of his brother's inheritance, for King Philip very meanly allowed himself to be bought off by the cession of the county of Evreux, and, when his troops were withdrawn, the Angevin rebels were beaten down, and the duchess of Brittany had to ask for peace for her son. But it had not long been granted, when John proceeded to throw away his advantage by acts of reckless impolicy. Though cunning, he was destitute alike of foresight and of self-control ; he could never discern the way in which his conduct would be judged by other men, because he lacked even the rudiments of a conscience. Ere he had been many months on the throne he divorced his wife, Isabella of Gloucester, alleging that their marriage had been illegal because they were within the prohibited degrees. This act offended

the English barons, but in choosing a new queen John gave much greater offence abroad; he carried off Isabella of Angouleme from her affianced husband, Hugh of Lusignan, the son of the count of la Marche, his greatest vassal in northern Aquitaine, and married her despite the precontract. This seems to have been an amorous freak, not the result of any deep-laid policy. Roused by the insult the Lusignans took arms, and a great part of the barons of Poitou joined them. They appealed for aid to Philip of France, who judged it opportune to intervene once

more. He summoned John to appear before him as suzerain, to answer the complaints of his Poitevin subjects, and when he failed to plead declared war on him and declared his dominions

escheated to the French crown for non-fulfilment of his WsrwWA f eu(j a i allegiance. He enlisted Arthur of Brittany in Augustus, his cause by recognizing him once more as the rightful

owner of all John's continental fiefs save Normandy, which he intended to take for himself. Philip then entered Normandy, while Arthur led a Breton force into Anjou and Poitou to aid the Lusignans. The fortune of war at first turned in favour of the English king. He surprised his nephew while he was besieging the castle of Mirebeau in Poitou, where the old Queen Eleanor was residing. The young duke and most of his chief supporters were taken prisoners (August 1, 1202). Instead of using his advantage aright, John put Arthur in secret confine- ment, and after some months caused him to be murdered. He is said also to have starved to death twenty-two knights of Poitou who had been among his captives. The assassination of his nearest kinsman, a mere boy of sixteen, was as unwise as it was cruel. It estranged from the king the hearts of all his French subjects, who were already sufficiently disgusted by many minor acts of brutality, as well as by incessant arbitrary taxation and by the reckless ravages in which John's mercenary troops had been indulging. The French armies met with little or no

resistance when they invaded Normandy, Anjou and Normaady. P °itou. John sat inert at Rouen, pretending to take ' his misfortunes lightly, and boasting that " what was easily lost could be as easily

won back." Meanwhile Philip Augustus conquered all western Normandy, without having to fight a battle. The great castle of Chateau Gaillard, which guards the Lower Seine, was the only place which made a strenu- ous resistance. It was finally taken by assault, despite of the efforts of the gallant castellan, Roger de Lacy, constable of Chester, who had made head against the besiegers for six months (September 1 203-March 1 204) without receiving any assistance from his master. John finally absconded to England in December 1203; he failed to return with an army of relief, as he had promised, and before the summer of 1204 was over, Caen, Bayeux and Rouen, the last places that held out for him, had been forced to open their gates. The Norman barons had refused to strike a blow for John, and the cities had shqwn but a very passive and precarious loyalty to him. He had made himself so well hated by his cruelty and vices that the Normans, for- getting their old hatred of France, had acquiesced in the conquest. Two ties alone had for the last century held the duchy to the English connexion: the one was that many Norman baronial families held lands on this side of the Channel; the second was the national pride which looked upon England as a conquered appendage of Normandy. But the first had grown weaker as the custom arose of dividing family estates between brothers, on the principle that one should take the Norman, the other the English parts of a paternal heritage. By John's time there were com- paratively few landholders whose interests were fairly divided between the duchy and the kingdom. Such as survived had now to choose between losing the one or the other section of their lands; those whose holding was mainly Norman adhered to Philip; those who had more land in England sacrificed their transmarine estates. For each of the two kings declared the property of the barons who did not support him confiscated to the crown. As to the old Norman theory that England was a' conquered land, it had gradually ceased to exist as an operative force, under kings who, like Henry II. or Richard I., were neither Norman nor English in feeling, but Angevin. John did not, and could not, appeal as a Norman prince to Norman patriotism.

The successes of Philip Augustus did not cease with the conquest of Normandy. His armies pushed forward in the south toss of also > An i ou > Touraine and nearly all Poitou submitted aVjou, to him. Only Guienne and southern Aquitaine held Touraine out for King John, partly because they preferred a JJJJJ weak and distant master to such a strenuous and

grasping prince as King Philip, partly because they were far more alien in blood and language to their French

neighbours than were Normans or Angevins. The Gascons were practically a separate nationality, and the house of Capet had no ancient connexion with them. The kings of England were yet to reign at Bordeaux and Bayonne for two hundred and fifty years. But the connexion with Gascony meant little compared with the now vanished connexion with Normandy. Henry I. or Henry II. could run over to his continental dominions in a day or two days; Dieppe and Harfleur were close to Ports- mouth and Hastings. It was a different thing for John and his successors to undertake the long voyage to Bordeaux, around the stormy headlands of Brittany and across the Bay of Biscay. Visits to their continental dominions had to be few and far between; they were long, costly and dangerous when a French fleet — a thing never seen before Philip Augustus conquered Normandy — might be roaming in the Channel. The kings of England became perforce much more home-keeping sovereigns after 1204.

It was certainly not a boon for England that her present sovereign was destined to remain within her borders for the greater part of his remaining years. To know John well was to loathe him, as every contemporary chronicle bears witness. The two years that followed the loss of Normandy were a time of grow- ing discontent and incessant disputes about taxation. The king kept collecting scutages and tallages, yet barons and towns com- plained that nothing seemed to be done with the money he col- lected. At last, however, in 1206, the king did make an ex- pedition to Poitou, and recovered some of its southern borders. Yet, with his usual inconsequence, he did not follow up his success, but made a two years' truce with Philip of France on the basis of uti possidetis — which left Normandy and all the territories on and about the Loire in the hands of the conqueror.

*It is probable that this pacification was the result of a new quarrel which John had just taken up with a new enemy — the Papacy. The dispute on the question of free election, which was to range over all the central years of his «»f3*i reign, had just begun. In the end of 1205 Hubert papacy. Walter, archbishop of Canterbury, had died. The king announced his intention of procuring the election of John de Gray, bishop of Norwich, as his successor; but, though his purpose was well known, the chapter (i.e. the monks of Christ Church, Canterbury) met secretly and elected their sub-prior Reginald as archbishop. They sent him to Rome at once, to receive confirmation from Pope Innocent III., whom they knew to be a zealous champion of the rights of the Church. But John descended upon them in great wrath, and by threats compelled them to hold a second meeting, and to elect his nominee Gray, in whose name application for confirmation was also made to the pope. Innocent, however, seeing a*

splendid chance of asserting his authority, declared both the elections that had taken place invalid, the first because it had been clandestine, the second because it had been held under force majeure, and proceeded to nominate a friend of his own — Cardinal Stephen Langton, an Englishman of proved capacity and blameless life, then resident in Rome. He was far the worthiest of the three candidates, but it was an intolerable invasion of the rights of the English crown and the English Church that an archbishop should be foisted on them in this fashion. The representatives of the chapter who had been sent to Rome were persuaded or compelled to elect him in the pope's presence (Dec. 1206).

King John was furious, and not without good reason; he refused to accept Langton, whom he declared (quite unjustly) to be a secret friend of Philip of France, and sequestrated the lands of the monks of Canterbury. On this the pope threatened to lay an interdict on himself and his realm. The king replied by issuing a proclamation to the effect that he would outlaw any clerk who should accept the validity of such an interdict and would confiscate his lands. Despising such threats Innocent carried out his threat, and put England under the ban of the Church on the 23rd of March 1208.

In obedience to the pope's orders the large majority of the English clergy closed their churches, and suspended the ordinary course of the services and celebration of the sacraments. Baptism

and extreme unction only were continued, lest souls should be lost; and marriages were permitted but not inside the walls of churches. Foreseeing the wrath of the king against all who obeyed the mandate from Rome, the larger number of the bishops and many others of the higher clergy fled overseas to escape the storm. Those who were bold enough to remain behind had much to endure. John, openly rejoicing at the plunder that lay before him, declared the temporalities of all who had accepted the inter- dict, whether they had exiled themselves or no, to be confiscated. His treasury was soon so well filled that he could dispense with ordinary taxation. He also outlawed the whole body of the clergy, save the timid remnant who promised to disregard the papal commands.

Nothing proves more conclusively the strength of the Angevin monarchy, and the decreasing power of feudalism, than that an

unpopular king like John could maintain his strife Gfcaracfer with the pope, and suppress the discontents of his refcg subjects, for nearly five years before the inevitable

explosion came. Probably his long immunity was due in the main to the capacity of his strong-handed justiciar Geoffrey Fitz-Peter; the king hated him bitterly, but generally took his advice. The crash only came when Geoffrey died in 1 2 1 3 ; his ungrateful master only expressed joy. ‘ ‘ Now by God’s feet am I for the first time king of England,” he exclaimed, when the news reached him. He proceeded to fill the vacancy with a mere, Poitevin adventurer, Peter ; des Roches, whom he had made bishop of Winchester some time before. Indeed John’s few trusted confidants were nearly all foreigners, such men as the mercenary captains Gerard of Athies and Engelhart of Cigogne, whom he made sheriffs and castellans to the discontent of all Englishmen. He spent all his money in : maintaining bands of hired Br.abanQons and routiers, by whose aid he for some time succeeded in terrorizing the countryside. There were a few preliminary outbreaks of rebellion, which were suppressed with vigour and punished with horrible cruelty. John starved to death the wife and son of William de Braose, the first baron, who took arms against him, and hanged in a row twenty-eight young boys, hostages for the fidelity of their fathers, Welsh princes who had dabbled in treason. Such acts provoked rage as well as fear, yet the measure of John’s iniquities was not full till 1212. Indeed for some time his persistent prosperity pro- voked the indignant, surprise of those who believed him to be under a curse. If his renewed war with Philip of France was generally unsuccessful, yet at home he held his own. The most astounding instance of his success is that in 12 10 he found leisure for a hasty expedition to Ireland, where he compelled rebellious barons to do homage, and received the submission of more than twenty of the local kinglets. It is strange that he came back to find England undisturbed behind him.

His long-deserved humiliation only began in the winter of 1212-1213, when Innocent III., finding him so utterly callous

as to the interdict, took the further step of declaring John does ˆ m deposed from the throne for contumacy, and the pope, handing over the execution of the penalty to the king

of France. This act provoked a certain amount of indignation in

England, and in the spring of 12 13 the king "was able to collect a large army on Barham Down to resist the threatened French invasion. Yet so many of his subjects were discontented that he dared not trust himself to the chances of war, and, when the fleet of King Philip was ready to sail, he sur- prised the world by making a sudden and grovelling submission to the pope. Not only did he agree to receive Stephen Langton as archbishop, to restore all the exiled clergy to their benefices, and to pay them handsome compensation for all their losses during the last five years, but he took the strange and ignomini- ous step of declaring that he ceded his whole kingdom to the pope, to hold as his vassal. He formally resigned his crown into the hands, of the legate Cardinal Pandulf, and took it back as the pope's vassal, engaging at the same time to pay a tribute of 1000 marks a year for England and Ireland. This was felt to, be a. humiliating transaction by many of John's subjects, though to others the joy at reconciliation with the Church

caused all else to be forgotten. The political effect of the device was all that John had desired. His new suzerain took him under his protection, and forbade Philip of France to proceed with his projected invasion, though ships and men were all ready (May 1213). John's safety, however, was secured in a more practical way when his bastard brother, William Longsword, earl of Salisbury, made a descent on the port of Damme and burnt or sunk a whole squadron of the French transports. After this John's spirits rose, and he talked of crossing the seas himself to recover Normandy and Anjou. But he soon found that his subjects were hot inclined to follow him; they were resigned to the loss of the Angevin heritage, whose union with England brought no profit to them, however much it might interest their king. The barons expressed their wish for a peace with France, and when summoned to produce their feudal con- tingents pleaded poverty, and raised a rather shallow theory to the effect that their services could not be asked for wars beyond seas — against which there were conclusive precedents in the reigns of Henry I. and Henry II. But any plea can be raised against an unpopular king. John found himself obliged to turn back, since hardly a man save his mercenaries had rallied to his standard at Portsmouth. In great anger and indignation he marched off towards the nOrth, with his hired soldiery, swear- ' ing to punish the barons who had taken the lead in the " strike " which had defeated his purpose. But the outbreak of war was to be deferred for a space. Archbishop Langton; who on assum- ing possession of his see had shown at once that he was a patriotic English statesman, and not the mere delegate of the pope, besought his master to hold back, and, when he refused,*

threatened to renew the excommunication which had so lately been removed. The old justiciar Geoffrey Fitz-Peter, now on his death-bed, had also refused to pronounce sentence on the defaulters. John hesitated, and meanwhile his enemies began to organize their resistance.

A great landmark in the constitutional history of England was reached when ‘ Langton assembled the leading barons, rehearsed to them the charter issued by Henry I. on his accession, and pointed out to them’ the rights °PP° sitloa and liberties therein promised by the crown to the bkroas. nation. For the future ;they agreed to take this docu- ment as their programme of demands. It was the first of the many occasions in English history when the demand for reform took the shape of a reference back to old precedents, and now (as on all subsequent occasions) the party which opposed the crown read back into the ancient grants which they quoted a good deal more than had been actually conceded in them. To Langton and the barons the charter of Henry I. seemed to cover all the customs and practices which had grown up under the rule of the bureaucracy which had served Henry II. and Richard I. A correct historical perspective could hardly be expected from men whose constitutional knowledge only ran back as far as the memory of themselves and their fathers. The Great Charter of 1 2 1 5 was a commentary on, rather than a reproduction of, the old accession pledges of Henry I.

Meanwhile John, leaving his barons to discuss and formulate their grievances, pushed on with a great scheme of foreign alliances, by which he hoped to crush Philip of France, even though the aid of the feudal levies of England AUi ^\ was denied him. He leagued himself with his nephew prance. the emperor Otto IV. (his sister’s son), and the counts of Flanders and Boulogne, with many other princes of the Netherlands. Their plan was that John should land in Poitou and distract the attention of the French by a raid up the Loire, while the emperor and his vassals should secretly mobilize a great army in Brabant and make a sudden dash at Paris. The scheme was not destitute of practical ability, and if it had been duly carried out would have placed France in such a crisis of danger as she has seldomknown. It was not John’s fault that the campaign failed. He sent the earl of Salisbury with some of his mercenaries to join the confederates in Flanders, while he sailed with the main body of them to La Rochelle, whence he marched northward, devastating the land before him. Philip’tame out

to meet him with the whole levy of France (April 12 14), and Paris would have been left exposed if Otto and his Netherland vassals had struck promptly in. But the emperor was late, and by the time that he was approaching the French frontier Philip Augustus had discovered that John's invasion was but a feint, executed by an army too weak to do much harm. Leaving a small containing force on the Loire in face of the English king, Philip hurried to the north with his main army, and on the 27th of July 1 2 14 inflicted a crushing defeat on the emperor and his allies at Bouvines near Lille. This was the greatest victory of the French medieval monarchy. It broke up the Anglo-German alliance, and gave the conqueror undisturbed possession of all that he had won from the Angevin house and his other enemies.

• Indirectly Bouvines was almost as important in the history of England as in that of France. John returned to England foiled, and in great anger; he resolved to give up the French war, secured a truce with King Philip by abandoning his attempt to reconquer his lost lands on the Loire, and turned to attack the recalcitrant subjects who had refused to join him in his late campaign beyond the Channel. Matters soon came to a head: on hearing that the king was mobilizing his mercenary bands, the barons met at Bury St Edmunds, and leagued themselves by an oath to obtain from the king a confirmation of the charter of Henry I. (Novem- ber 1214). At the New Yearthey sent him a formal ultimatum, to which he would not assent, though he opened up futile negotia- tion with them through the channel of the archbishop, who did not take an open part in the rising. At Easter, nothing having been yet obtained from the king, an army headed by five earls, forty barons, and Giles Braose, bishop of Hereford, mustered at Stamford and marched on London. Their captain was Robert FitzWalter, whom they had named " marshal of the army of God and Holy Church." When they reached the capital its gates were thrown open to them, and the mayor and citizens adhered to their cause (May 17). The king, who had tried to turn them back by taking the cross and declaring himself a crusader, and by making loud appeals for the arbitration of the pope, was forced to retire to Windsor. He found that he had no supporters save a handful

of courtiers and officials and the leaders of his mercenary bands; wherefore in despair he accepted the terms forced upon him by the insurgents. On the 15th of June 1215 he sealed at Runny mede, close to Windsor, the famous Magna Carta, in face of a vast assembly among which he had hardly a single friend. It is a long document of 63 clauses, in which Archbishop Langton and a committee of the barons had endeavoured to recapitulate all their grievances, and to obtain redress for them. Some of the clauses are un- important concessions to individuals, or deal with matters of trifling importance — such as the celebrated weirs or " kiddles " on Thames and Medway, or the expulsion of the condottieri chiefs Gerard d'Athies and Engelhart de Cigogne. But many of them are matters of primary importance' in the constitutional history of England. The Great Charter must not, however, be overrated as an expression of general constitutional rights; to a large extent it is a mere recapitulation of the claims of the baronage, and gives redress for their feudal grievances in the matters of aids, reliefs, wardships, &c, its object being the re- pression of arbitrary exactions by the king on his tenants-in-chief. One section, that which provides against the further encroach- ments of the king's courts on the private manorial courts of the landowners, might even be regarded as retrograde in character from the point of view of administrative efficacy. But it is most noteworthy that the barons, while providing for the abolition of abuses which affect themselves, show an unselfish and patriotic spirit in laying down the rule that all the concessions which the king makes to them shall also be extended by themselves to their own sub-tenants. The clauses dealing with the general govern- ance of the realm are also as enlightened as could be expected from the character of the committee which drafted the charter. There is to be no taxation without the consent of the Great Council of the Realm — which is to consist of all barons, who are

to be summonedby individual units; and of all smaller tenants- in-chief, who are to be called not by separate letters, but by a general notice published by the sheriff: It has been pointed out that' this provides no representation for sub-tenants or the rest of the nation, so that we are still far from the ideal of a repre- sentative parliament. John himself had gone a step farther on the road towards that ideal when in 12 13 he had summoned four " discreet men " from every shire to a council at Oxford, which (as it appears) was never held. But this would seem to have been a vain bid for popularity with the middle classes, which had no result at the time, and the barons preferred to keep things in their own hands, and to abide by ancient precedents. It was to be some forty years later that

the first appearance of elected shire representatives at the Great Council took place. In ,1215 the control of the subjects over the 'Crown in the matter, of taxation is reserved entirely for the tenants-in-chief, great and small.

There is less qualified praise to be bestowed on the clauses of Magna Carta which deal with justice. The royal courts are no longer to attend the king's person — a vexatious practice when sovereigns Were always on the move, and litigants and witnesses had to follow them from manor to manor — but are to be fixed at Westminster. General rules of indisputable equity are fixed for the conduct of the courts — no man is to be tried or punished more than once for the same offence; no one is to be arrested and kept in prison without trial; all arrested persons are to be sent before the courts within a reasonable time, and to be tried by a jury of their peers. Fines imposed on unsuccessful liti- gants are to be calculated according to the measure of their offence, and are not to be arbitrary penalties raised or lowered at the king's good pleasure according to the sum that he imagined that the offender could be induced to pay. No foreigners or other persons ignorant of the laws of England are to be entrusted with judicial or administrative offices.

There is only a single clause dealing with the grievances of the English Church, although Archbishop Langton had been the principal adviser in the drafting of the whole document. Ibis clause, " that the English church shall be free," was, however, sufficiently broad to cover all demands. The reason that Langton did not descend to details was that the king had already conceded the right of free canonical election and the other claims of the clerical order in a separate charter, so that there was no need to discuss them at length.

The special clauses for the benefit of the city of London were undoubtedly, inserted as a tribute of gratitude on the part of the barons for .the readiness which the citizens had shown in ad- hering to their cause. There are other sections for the benefit of the commons in general, such as that which gives merchants full right of leaving or entering the realm with their goods on payment of the fixed ancient custom dues. But these clauses are less numerous than might have been expected — the framers of the document were, after all, barons and not burghers.

The most surprising part of the Great Charter to modern eyes is its sixty-first paragraph, that which openly statesdoubts as to the king's intention to abide by his promise, and appoints a committee of twenty-five guardians of the charter (twenty-four barons and the

mayor of London) , who are to coerce their master, by force of arms if necessary, to observe every one of its clauses. The twenty-five were to hear and decide upon any claims and complaints preferred against the king, and to keep up their numbers by co-optation, so that it would seem that the barons intended to keep a permanent watch upon the crown. The clause seems unnecessarily harsh and violent in its wording; but it must be remembered that John's character was well known, and that it was useless to stand on forms of politeness when dealing with him. It seems certain that the drafters of the charter were honest in their intentions, and did not purpose to set up a feudal oligarchy in the place of a royal autocracy. They were only insisting on the maintenance of what they believed to be the ancient and laudable customs of the realm.

That the barons were right to suspect John is sufficiently shown by his subsequent conduct. His pretence of keeping his

promise lasted less than two months; by August 1215 he was already secretly collecting money and hiring more mercenaries. He wrote to Rome to beg the pope to annul the charter, stating that all his troubles had come upon him in consequence of his dutiful conduct to the Holy See. He also stated that he had taken the cross as a crusader, but could not sail to Palestine as long as his subjects were putting him in restraint. Innocent III. at once took the hint; in September Archbishop Langton was suspended for disobedience to papal commands, and the charter was declared uncanonical, null and void. The " troublers of the king and kingdom" were declared excommunicate.

*Langton departed at once to Rome, to endeavour to turn the heart of his former patron, a task in which he utterly failed. Civil War M ar *y of the clergy who had hitherto supported the baronial cause drew back in dismay at the pope's attitude. But the laymen were resolute, and 'prepared for open war, which broke out in October 1215. The king, who had already gathered in many mercenaries, gained the first advantage by capturing Rochester Castle before the army of the barons was assembled. So formidable did he appear to them for the moment that they took the deplorable step of in- viting the foreign foe to join in the struggle. Declaring John deposed because he had*

broken his oath to observe the charter, they offered the crown to Louis of France, the son of King Philip, because he had married John's niece Blanche of Castile and could assert in her right a claim to the throne. This was a most unhappy inspiration, and drove into neutrality or even into the king's camp many who had previously inclined to the party of reform. "But John did his best to disgust his followers by adopting the policy of carrying out fierce and purposeless raids of devastation all through the countryside, while refusing to face his enemies in a pitched battle. He bore himself like a captain of banditti rather than a king in his own country. Presently, when the French prince came over with a considerable army to join the insurgent barons, he retired northward, leaving London and the home counties to his rival. In all the south country only Dover and Windsor castles held out for him. His sole success was that he raised the siege of Lincoln by driving off a detachment of the baronial army which was besieging it. Soon after, while marching from Lynn towards Wis- beach, he was surprised by the tide in the fords of the Wash and lost part of his army and all his baggage and treasure. Next day he fell ill of rage and vexation of spirit, contracted a dysenteric ailment, and died a week later at Newark (Oct. 19, 1216). It was the best service that he could do his kingdom. Owing to the unwise and unpatriotic conduct of the barons in summoning over Louis of France to their aid, John had become in some sort the representative of national inde- pendence. Yet he was so frankly impossible as a ruler that, save the earls of Pembroke and Chester, all his English followers had left him, and he had no one to back him but the papal legate Gualo and a band of foreign mercenaries. When once he was dead, and his heritage fell to his nine-year-old son Henry III., whom none could make responsible for his father's doings, the whole aspect of affairs was changed.

The aged William Marshal, earl of Pembroke, by far the most important and respectable personage who had adhered to John's Henry in cause > assumed the position of regent. He at once offered in the name of the young king pardon and oblivion of offences to all the insurgent barons. At the same time he reissued the Great Charter, containing all the important concessions which John had made at Runnymede, save that which gave the control of taxation to the tenants-in- chief. Despite this and certain other smaller omissions, it was a document which would satisfy most subjects of the crown, if only it were faithfully observed. The youth of the king and the good reputation of the earl marshal were a sufficient guaran- tee that, for some years at any rate, an honest attempt would be made to redeem the pledge. Very soon the barons began to return to their allegiance,

or at least to slacken in their support of Louis, who had given much offence by his openly displayed

Death of John.

Battle of Lincoln.

distrust of his partisans and his undisguised preference for his French followers. The papal influence was at the same time employed in the cause of King Henry, and Philip of France was forced to abandon open support of his son, though he naturally continued to give him secret help and to send him succours of men and money.

The fortune of war, however, did not turn without a battle. At Lincoln, on the 20th of May 121 7, the marshal completely defeated an Anglo-French army commanded by the count of Perche and the earls of Winchester and Here- ford. The former was slain, the other two taken prisoners, with more than 300 knights and barons. This was the death-blow to the cause of Louis of France; when it was followed up by the defeat in the Dover Straits of a fleet which was bringing him reinforcements (Aug. 17), he despaired of success and asked for terms. By the treaty of Lambeth (Sept. n, 1217) he secured an amnesty for all his followers and an indemnity of 10,000 mark? for himself. Less than a month later he quitted England; the victorious royalists celebrated his departure by a second reissue of the Great Charter, which contained some new clauses favour- able to the baronial interest.

After the departure of Prince Louis and his foreigners the earl marshal had to take up much the same task that had fallen to Henry II. in 1154. Now, as at the death of Stephen, the realm was full of " adulterine castles," of bands of robbers who had cloaked their plundering under the pretence of loyal service to the king or the French prince, and of local magnates who had usurped the prerogatives of royalty, each in his own district. It was some years before peace and order were restored in the realm, and the aged Pembroke died in 12 19 before his work was completed. After his decease the conduct of the government passed into the hands of the justiciar Hubert de Burgh, and the papal legate Pandulf, to whom the marshal had specially recom- mended the young king. Their worst enemies were those who during the civil war had been their best friends, the mercenary captains and upstart knights whom John had made sheriffs and castellans. From 1 2 1 9 to 1 2 24 de Burgh was constantly occupied in evicting the old loyalists from castles which they had seized or offices which they had disgraced. In several cases

it was necessary to mobilize an army against a recalcitrant magnate. The most troublesome of them was Falkes de Breaute, the most famous of King John's foreign condottieri, whose minions held Bedford castle against the justiciar and the whole shire levy of eastern England for nearly two months in 1224. The castle was taken and eighty men-at-arms hanged on its surrender, but Falkes escaped with his life and fled to France. It was not till this severe lesson had been inflicted on the faction of disorder that the pacification of England could be considered complete.

The fifty-six years' reign of Henry III. forms one of the periods during which the mere chronicle of events may seem tedious and trivial, yet the movement of national life and constitutional progress was very important. Except during the stirring epoch 1258-1265 there was little that was dramatic or striking in the events of the reign. Yet the England of 1272 was widely different from the England of 12 16. The futile and thriftless yet busy and self-important king was one of those sovereigns who irritate their subjects into opposition by injudicious activity. He was not a ruffian or a tyrant like his father, and had indeed not a few of the domestic virtues. But he was constitutionally incapable of keeping a promise or paying a debt. Not being strong- handed or capable, he could never face criticism nor suppress discontent by force, as a king of the type of Henry I. or Henry II. would have done. He generally gave way when pressed, without attempting an appeal to arms; he would then swear an oath to observe the Great Charter, and be detected in violating it again within a few months. His greatest fault in the eyes of his subjects was his love of foreigners; since John had lost Normandy the English baronage had become as national in spirit as the commons. The old Anglo-Norman houses had forgotten the tradition of their origin, and now formed but a small section of the aristocracy; the newer families, sprung from the officials of the first two Henries, had always been English in spirit.

Unfortunately for himself the third Henry inherited the con- tinental cosmopolitanism of his Angevin ancestors, and found himself confronted with a nation which was growing ever more and more insular in its ideals. He had all the ambitions of his grandfather Henry II.; his dreams were of shattering the newly-formed kingdom

of France, the creation of Philip Augustus, and of recovering all the lost lands of his forefathers on the Seine and Loire. Occasionally his views grew yet wider — he would knit up alliances all over Christendom and dominate the West. Nothing could have been wilder and more unpractical than the scheme on which he set his heart in 1255-1257, a plan for con- quering Naples and Sicily for his second son. Moreover it was a great hindrance to him that he was a consistent friend and supporter of the papacy. He had never forgotten the services of the legates Pandulf and Gualo to himself and his father, and was always ready to lend his aid to the political schemes of the popes, even when it was difficult to see that any English interests were involved in them. His designs, which were always shifting from point to point of the continent, did not appeal in the least to his subjects, who took little interest in Poitou or Touraine, and none whatever in Italy. After the troubled times which had lasted from 12 14 to 1224 they desired nothing more than peace, quietness and good governance. They had no wish to furnish their master with taxation for French wars, or to follow his banner to distant Aquitaine. But most of all did they dislike his practice of flooding England with strangers from beyond seas, for whom offices and endowments had to be found. The moment that he had got rid of the honest and capable old justiciar Hubert de Burgh, who had pacified the country during his minority, and set the machinery of government once more in regular order, Henry gave himself over to fostering horde after horde of foreign favourites. There was first his Poitevin chancellor, Peter des Roches, bishop of Winchester, with a numer- ous band of his relations and dependents. As a sample of the king's methods it may be mentioned that he once made over nineteen of the thirty-five sheriffdoms, within a fortnight, to Peter of Rivaux, a nephew of the chancellor. Des Roches was driven from office after two years (1234), and his friends and relatives fell with him. But they were only the earliest of the king's alien favourites; quite as greedy were the second family of his mother, Isabella of Angouleme, who after King John's death had married her old betrothed, Hugh of Lusignan. Henry secured great English marriages for three of them, and made the fourth, Aymer, bishop of Winchester. Their kinsmen and dependents were equally welcomed. Even more numerous and no less ex- pensive to the realm were the Provencal and Savoyard relatives of Henry's queen, Eleanor of Provence. The king made one of her uncles, Boniface of Savoy, archbishop of Canterbury — it was three years before he deigned to come over to take up the post, and then he was discovered to be illiterate and unclerical in his habits, an unworthy successor for Langton and Edmund of Abingdon, the great primates who went before him. Peter of Savoy, another uncle, was

perhaps the most shameless of all the beggars for the king's bounty; not only was he made earl of Richmond, but his debts were repeatedly paid and great sums were given him to help his continental adventures.

King Henry's personal rule lasted from 1232, the year in which he deprived Hubert de Burgh of his justiciarship and confiscated most of his lands, down to 1258. It was thriftless, arbitrary, and lacking in continuity of policy, yet not tyrannical or cruel. If he had been a worse man he would have been put under control long before by his irritated subjects. All through these twenty-six years he was being opposed and criticised by a party which embraced the wisest and most patriotic section of the baronage and the hierarchy. It numbered among its leaders the good archbishop, Edmund of Abingdon, and Robert Grosseteste, the active and learned bishop of Lincoln; it was not infrequently aided by the king's brother Richard, earl of Cornwall, who did not share Henry's blind admiration for his foreign relatives. But it only found its permanent guiding spirit somewhat late in the reign, when Simon de Montfort, earl of Leicester, became the habitual mouthpiece of the

grievances of the nation. The great earl had, oddly enough, commenced his career as one of the king's foreign favourites. He was the grandson of Amicia, countess of Leicester, but his father, Simon the Elder, a magnate whose %™atfort. French interests were greater than his English, had adhered to the cause of Philip Augustus in the days of King John and the Leicester estates had been confiscated. Simon, reared as a Frenchman, came over in 1230 to petition for their re- storation. He not only obtained it, but to the great indignation of the English baronage married the king's sister Eleanor in 1238. For some time he was in high favour with his brother-in-law, and was looked upon by the English as no better than Aymer de Valence or Peter of Savoy. But he quarrelled with the fickle king, and adhered ere long to the party of opposition. A long experience of his character and actions convinced barons and commons alike that he was a just and sincere man, a friend of good governance, and an honest opponent of arbitrary and un- constitutional rule. He had become such a thorough English- man in his views and prejudices, that by 1250 he was esteemed the natural exponent of all the wrongs of the realm. He was austere and religious; many of his closest friends were among the more saintly of the national clergy. By the end of his life the man who had started as the king's unpopular minion was known as " Earl Simon the Righteous," and had become the respected leader of the national opposition to his royal brother-in-law.

Though Henry's taxes were vexatious and never-ending, though his subservience to the pope and his flighty interference in foreign politics were ever irritating the magnates c ona m on and the people, and though outbreaks of turbulence of England were not unknown during his long period of personal under rule, it would yet be a mistake to regard the central Henry " , – years of the 13th century as an unprosperous period for England. Indeed it would be more correct to regard the period as one cf steady national development in wealth, culture and unity. The towns were growing fast, and extending their municipal liberties; the necessities of John and the facile carelessness of Henry led to the grant of innumerable charters and privileges. As was to be seen again during the first period of the reign of Charles I., political irritation is not incompatible either with increasing material prosperity or with great intellectual development. The king's futile activity led to ever more frequent gatherings of the Great Council, in which the theory of the constitution was gradually hammered out by countless debates between the sovereign and his subjects. Every time that Henry confirmed the Great Charter, the fact that England was already a limited monarchy became more evident. It is curious to find that — like his father John — he himself contributed unconsciously to advances towards representative government. Begin- John'swritof 12 13, bidding" discreet men "from each ningsof shire to present themselves at Oxford, found its pariia-parallel in another writ of 1 2 53 which bids four knightly ment – delegates from each county to appear along with the tenants- in-chief, for the purpose of discussing the king's needs. When county members begin to present themselves along with the barons at the national assembly, the conception of parliament is already reached. And indeed we may note that the precise word "parliament" first appears in the chroniclers and in official documents about the middle of Henry's reign. By its end the term is universally acknowledged and employed.

We may discern during these same years a great intellectual activity. This was the time of rapid development in the univer- sities, where not only were the scholastic philosophy and systematic theology eagerly studied, but figures i ec t ua i iit e „ appear like that of the great Roger Bacon, a scientific researcher of the first rank, whose discoveries in optics and chemistry caused his contemporaries to suspect him of magical arts. His teaching at Oxford in 12 50-1 2 57 fell precisely into the years of the worst misgovernance of Henry III. It was the same with law, an essentially 13th-century study; it was just in this age that the conception of law as something not depending on the pleasure of the king, nor compiled from mere collected

ancestral customs, but existing as a logical entity, became

generally prevalent. The feeling is thoroughly well expressed by the partisan of Montfort who wrote in his jingling Latin verse: —

" Dicitur vulgariter ' ut rex vult lex vadit ': Veritas vult aliter: nam lex stat, rex cadit." –

Law has become something greater than, and independent of, royal caprice. The great lawyers of the day, of whom Bracton is the most celebrated name, were spinning theories of its origin and development, studying Roman precedents, and turning the medley of half -understood Saxon and Norman customs into a system.

Intellectual growth was accompanied by great religious activity; it is no longer merely on the old questions of dispute between church and state that men were straining Religious t ne i r minds. The reign of Henry III. saw the invasion Mars. °f England by the friars, originally the moral re- formers of their day, who preached the superiority of the missionary life over the merely contemplative life of the old religious orders, and came, preaching holy poverty, to minister to souls neglected by worldly incumbents and political prelates (see Mendicant Movement). The mendi- cants, Dominican and Franciscan, took rapid root in England; the number of friaries erected in the reign of Henry III. is astounding. For two generations they seem to have absorbed into their ranks all the most active and energetic of those who felt a clerical vocation. It is most noteworthy that they were joined by thinkers such as Grosseteste, Adam Marsh, Roger Bacon, Duns Scotus and William of Ockham. Still more strik- ing is the fact that the friars threw themselves energetically into the cause of political reform, and that several of their leading brothers were the close friends and counsellors of Simon de Montfort.

Architecture and art generally were making rapid strides during this stirring time. The lofty Early English style had now completely superseded the more heavy and and art™ sombre Norman, and it was precisely during the years of the maladministration of Henry III. that some of the most splendid of the English cathedrals, Salisbury (1220-1258) and Wells (1 230-1 239), were built. The king himself, when rearing the new Westminster Abbey over the grave of Edward the

Confessor, spent for once some of his money on a worthy object. It may be noted that he showed a special rever- ence for the old English royal saint, and christened his eldest son after him; while his second bore the name of Edmund, the East Anglian martyr. These were the first occasions on which princes of the Angevin house received names that were not drawn from the common continental stock, but recalled the days before the Conquest. The reappearance of these old English names bears witness to the fact that the vernacular was reasserting itself. Though French was still the language of the court and of law, a new literature was already growing up in the native tongue, with such works as Layamon's Brut and the Ormulum as its first fruits. Henry III. himself on rare occasions used English for a state document.

All these facts make it sufficiently clear that England was irritated rather than crushed by Henry's irregular taxation and thriftless expenditure. The nation was growing and prospering, despite of its master's maladministration of its resources. On several occasions when he endeavoured to commit parliaments to back his bills and endorse his policy, they refused to help him, and left him to face his debts as best he might. This was especi- ally the case with the insane contract which he made with Pope Innocent IV. in 1254, when he bound the realm of England to find 140,000 marks to equip an army for the conquest of Naples and Sicily. Henry lacked the energy to attempt to take by force what he could not obtain by persuasion, and preferred to break his bargain with the pope rather than to risk the chance of civil war at home.

It was over this Sicilian scheme, the crowning folly of the king, that public opinion at last grew so hot that the intermittent criticism and grumbling of the baronage and the nation passed into: vigorous and masterful action. At the " Mad Parliament/'

which met at Oxford, 1258, the barons informed their master that his misgovernment had grown so hopeless that they were resolved to put him under constitutional restraints, p,,/,/^. They appointed a committee of twenty-four, in which content. Simon de Montfort was the leading spirit, and en- The Pre trusted it with the duty, not only of formulating f"" lists of grievances, but of seeing that they were re- dressed. Henry found that he had practically no supporters save his unpopular foreign relatives and favourites, and yielded perforce. To keep him in bounds the celebrated " Provisions of Oxford "were framed. They provided that he was to do nothing Without the consent of a permanent council of fifteen barons and bishops, and that all his finances were to be controlled by another committee of twenty-four

persons. All aliens were to be expelled from' the realm, and even the king's household was to be "reformed " by his self-constituted guardians. The inevitable oath to observe honestly all the conditions of the Great Charter of 121 5 was, as usual, extorted from him with special formalities. Though Montfort and the barons voiced the public discontent, the constitution which they thus imposed on the king had nothing popular about it. The royal functions of which Henry was stripped were to be exercised by a series of baronial committees. The arrangement was too cumbersome, for there was nothing which would be called a central execu- tive; the three bodies (two of twenty-four members each, the third of fifteen) were interdependent, and none of them pos- sessed efficient control over the others. It was small wonder that the constitution established by the Provisions of Oxford was found unworkable. They were not even popular— the small landholders and subtenants discovered that their interests had not been sufficiently regarded, and lent themselves to an agitation against the provisional government, which was got up by Edward, the king's eldest son, who now appeared promi- nently in history for the first time. To conciliate them the barons allowed the " Provisions of Westminster " to be enacted in 1259, in which the power of feudal courts was considerably restricted, and many classes of suit were transferred to the royal tribunals, a sufficient proof that the king's judges did not share in the odium which appertained to their master, and were re- garded as honest and impartial.

The limited monarchy established by the Provisions of Oxford lasted only three years. Seeing the barons quarrelling among themselves, and Montfort accused of ambition and overweening masterfulness by many of his colleagues, the king took heart. Copying the example of his father in 12 15, he obtained from the pope &, bull, which declared the new constitution irregular and illegal, and absolved him from his oath to abide by it. He then began to recall his foreign friends and relatives, and to assemble mercenaries. De Montfort answered by raising an army, arrest- ing prorhinent aliens, and seizing the lands which the king had given them. Henry thereupon, finding his forces too weak to face the earl, took refuge in the Tower of London and proposed an arbitration. He offered to submit his case to Louis IX., the saintly king of France, whose virtues were known and respected all over Europe, if the baronial party would do the same. An appeal to the pope they would have laughed to scorn; but the confidence felt in the probity of the French king was so great that Montfort advised his friends to accede to the proposal. This was an unwise step. Louis was a saint, but he was also an autocratic king, and had no knowledge of the constitutional customs of England.

Having heard the claims of the king and the barons, he issued the mise of Amiens (Jan. 23, 1264), so called from the city at which he dated it, a document which stated that King Henry ought to abide by the terms of Magna Carta, to which he had so often given his assent, but that the Provisions of Oxford were wholly invalid and derogatory to the royal dignity. " We ordain," he wrote, " that the king shall have full power and free jurisdiction over his realm, as in the days before the said Provisions." The pope shortly afterwards confirmed the French king's award.

Simon de Montfort and his friends were put in an awk- ward position by this decision, to which they had so unwisely

.'is&HICTzJ

committed themselves. But they did not hesitate to declare that they must repudiate the mise. Simon declared that it would be a worse perjury to abandon his oath to keep the Provisions of Oxford than his oath to abide by the French king's award. He took arms again at the head of the Londoners and his personal adherents and allies. But many of the barons stood neutral, not seeing how they could refuse to accept the arbitration they had courted, while a number not inconsiderable joined the king, deciding that Leicester had passed the limits of reasonable loyalty, and that their first duty was to the crown.

Hence it came to pass that in the campaign of 1264 Simon was supported by a minority only of the baronial class, and the The king's army was the larger. The fortune of war in-

barons' clined at first in favour of the royalists, who captured wan Northampton and Nottingham. But when it came

battle of t0 p en battle, the military skill of the earl sufficed

to compensate for the inferiority of his numbers. At Lewes, on the 14th of May, he inflicted a crushing defeat on the king's army. Henry himself, his brother Richard of Cornwall, and many hundreds of his chief supporters were taken prisoners. His son Prince Edward, who had been victorious on his own flank of the battle, and had not been caught in the rout, gave himself up next morning, wishing to share his father's fate, and not to prolong a civil war which seemed to have

become hopeless.

On the day that followed his victory Leicester extorted from the captive king the document called the " mise of Lewes,"

in which Henry promised to abide by all the terms "a°riia t ? rtS of the Provisions of Oxford, as well as to uphold the meat. Great Charter and the old customs of the realm.

Montfort was determined to put his master under political tutelage for the rest of his life. He summoned a parlia- ment, in which four knights elected by each shire were present, to establish the new constitution. It appointed Simon, with his closest allies, the young earl of Gloucester and the bishop of Chichester, as electors who were to choose a privy council for the king and to fill up all offices of state. The king was to exer- cise no act of sovereignty save by the consent of the councillors, of whom three were to follow his person wherever he went. This was a far simpler constitution than that framed at Oxford in 1258, but it was even more liable to criticism. For if the " Provisions " had established a government by baronial com- mittees, the parliament of 1264 created one which was a mere party administration. For the victorious faction, naturally but unwisely, took all power for themselves, and filled every sheriff- dom, castellany and judicial, office with their own firm friends. Simon's care to commit the commons to his cause by summon- ing them to his parliament did not suffice to disguise the fact that the government which he had set up was not representative of the whole nation. He himself was too much like a dictator; even his own followers complained that he was over-masterful, and the most important of them, the young earl of Gloucester, was gradually estranged from him by finding his requests often refused and his aims crossed by the old earl's action. The new government lasted less than two years, and was slowly losing prestige all the time. Its first failure was in the repression of the surviving royalists. Isolated castles in several districts held out in the king's name, and the whole March of Wales was never properly subdued. When Simon turned the native Welsh prince Llewelyn against the marcher barons, he gave great offence; he was accused of sacrificing Englishmen to a foreign enemy. The new regime did not give England the peace which it had promised; its enemies maintained that it did not even give the good governance of which Simon had made so many promises. It certainly appears that some of his followers, and notably his three reckless sons, had given good cause for offence by high- handed and selfish acts. Much indignation was provoked by the sight of the king kept continually in ward by his privy councillors and treated with

systematic neglect ; but the treat- ment of his son was even more resented. Edward, though he had given little cause of offence, and had behaved admirably in refusing to continue the civil war, was deprived of his earldom of Chester; and put under the same restraint as his father.

There was no good reason for treating him so harshly, and his state was much pitied.

. i Montfort attempted to strengthen his position, and to show his confidence in the commons, by summoning to his second and last parliament, that Of 1265, a new element — two citizens from each city and two burgesses from each borough in the realm. It must be confessed that his object was probably not to introduce a great constitutional improvement, and to make parliament more representative, but rather to compensate for the great gaps upon the baronial benches by showing a multitude of lesser adherents, for the towns were his firm supporters. The actual proceedings of this particular assembly had no great importance.

Two months later Prince Edward escaped from his confine- ment, and fled to the earl of Gloucester, who now declared him- self a royalist. They raised an army, which seized the fords of the Severn, in order to prevent de Montfort— who was then at Hereford with the captive king— from getting back to London or the Midlands. The earl, who could only raise a trifling force in the Marches, where the barons were all his enemies, failed in several attempts to force a passage eastward. But his friends raised a considerable host, which marched under his son Simon the Younger and the earl of Oxford, to fall on the rear of the royalists. Prince Edward now displayed skilful generalship — hastily turning backward he surprised and scattered the army of relief at Kenilworth (Aug. 1); he was then free to deal with the earl, who had at last succeeded in passing the Severn during his absence. On the 4th of August he beset Montfort 's little force with five-fold numbers, and absolutely jj^^J^ exterminated it at Evesham. Simon . fought most gallantly, and was left dead on the field along with his eldest son Henry, his justiciar Hugh Despenser, and the flower of his party. The king fell into the hands of his son's followers, and was once more free.

It might have been expected that the victorious party would now introduce a policy of reaction and autocratic government. But the king was old and broken by his late misfortunes: his son the prince was wise beyond his years, and Gloucester and many other of the present supporters of the crown had originally been friends of

reform, and had not abandoned their old views. They had deserted Montfort because he was autocratic and masterful, not because they had altogether disapproved of his policy. Hence we find Gloucester insisting that the remnant of the vanquished party should not be subjected to over heavy punishment, and even making an armed demonstration, in the spring of 1267, to demand the re-enactment of the Provisions of Oxford. Ultimately the troubles of the realm were ended by the Dictum of Kenilworth (Oct. 31, 1266) and the Statute of Marlborough (Nov. 1267). The former allowed nearly all of Montfort's faction to obtain amnesty and regain their estates on the payment of heavy fines; only Simon's own Leicester estates and those of Ferrers, earl of Derby, were confiscated. The latter established a form of constitution in which many, if not all, of the innovations of the Provisions of Oxford were embodied. The only unsatisfactory part of the pacification was that Llewelyn of Wales, who had ravaged the whole March while he was Montfort's ally, was allowed to keep a broad region (the greater part of the modern shire of Denbigh) which he had, won back from its English holders. His power in a more indirect fashion extended itself over much of Mid-Wales. The line of the March was distinctly moved backward by the treaty of 1267.

King Henry survived his restoration to nominal, if not to actual, authority for seven years. He was now too feeble to indulge in any of his former freaks of foreign policy, and allowed the realm to be governed under his son's ^^,% eye by veteran bureaucrats, who kept to the old cus- toms of the land. Everything settled down so peacefully that when the prince took the cross, and went off to the Crusades in 1270, no trouble followed. Edward was still absent in Palestine when his father died, on the 16th of November 1272. : For the first time in English history there was no form of election of the new king, whose accession was quietly acknowledged by the

officials and the nation. It was nearly two years after his father's death that he reached England, yet absolutely no trouble had occurred during his absence. He had taken advantage of his leisurely journey home to pacify the turbulent Gascony, and to visit Paris and make a treaty with King Philip III. by which the frontiers of his duchy of Aquitaine were rectified, to some slight extent, in his

favour. He, of course, did homage for the holding, as his father had done before him.

The reign which began with this unwonted quietness was perhaps the most important epoch of all English medieval Ed rdi mstor y m tne way of the definition and settlement of the constitution. Edward I. was a remarkable figure, by far the ablest of all the kings of the house of Plantagenet. He understood the problem that was before him, the construction of a working constitution from the old ancestral customs of the English monarchy plus the newer ideas that had been embodied in the Great Charter, the Provisions of Oxford, and the' scanty legislation of Simon de Montfort. Edward loved royal power, but he was wise in his generation, and saw that he could best secure the loyalty of his subjects by assenting to so many of the new constitutional restraints as were compatible with his own practical control of the policy of the realm. He was pre- pared to refer all important matters to his parliament, and (as we shall see) he improved the shape of that body by reintroduc- ing into it the borough members who had appeared for the first time in Montfort 's assembly of 1265. He would have liked to make parliament, no doubt, a mere meeting for the voting of taxation with the smallest possible friction. But he fully realized that this dream was impossible, and was wise enough to give way, whenever opposition grew too strong and bitter. He had not fought through the civil wars of 1263-66 without learning his lesson. There was a point beyond which it was unwise to provoke the baronage or the commons, and, unlike his flighty and thriftless father, he knew where that point came. The constitutional quarrels of his reign were conducted with decency and order, because the king knew his own limitations, and because his subjects trusted to his wisdom and moderation in times of crisis. Edward indeed was a man worthy of respect, if not of affection. His private life was grave and seemly, his court did not sin by luxury or extravagance. His chosen ministers were wise and experienced officials, whom no man could Call favourites or accuse of maladministration. He was sincerely religious, self-restrained and courteous, though occasionally, under provocation, he could burst out into a royal rage. He was a good master and a firm friend. Moreover, he had a genuine regard for the sanctity of a promise, the one thing in which his father had been most wanting. It is true that some- times he kept his oaths or carried out his pledges with the literal punctuality of a lawyer, rather than with the chivalrous gener- osity of a knight. But at any rate he always endeavoured to discharge an obligation, even if he sometimes interpreted it by the strict letter of the law and not with liberality. A conscien- tious man according

to his lights, he took as his device the motto Pactum serva, " keep troth," which was afterwards inscribed on his tomb, and did his best to live up to it. Naturally he ex- pected the same accuracy from other men, and when he did not meet it he could be harsh and unrelenting in the punishment that he inflicted. To sum up his character it must be added that he was a very great soldier. The headlong courage which he showed at Lewes, his first battle, was soon tempered by caution, and already in 1265 he had shown that he could plan a campaign with skill. In his later military career he was the first general who showed on a large scale how the national English weapon, the bow, could win fights when properly combined with the charge of the mailed cavalry. He inaugurated the tactics by which his grandson and great-grandson were to win epoch- making victories abroad –

Edward's reign lasted for thirty-five years, and was equally important in constitutional development and in imperial policy. The first period of it, 127 2-1 290, may be defined as mainly notable for his great series of legislative enactments and his conquest of Wales. The second, 1290-1307, contains his long and ulti-

mately unsuccessful attempt to incorporate Scotland into his realm, and his quarrels with his parliament.

The changes made by Edward in constitutional law by his great series of statutes commenced very soon after his return to his kingdom in 1274. We may trace in all of them the coastltu- same purpose of strengthening the power of the crown tionai by judicious and orderly definition of its privileges, changes. The great enactments start with the First Statute f'f". of Westminster (1275), a measure directed to the minster improvement of administrative details, which was andoiou- accompanied by a grant to the king of a permanent cester – customs-revenue on imports and exports, which soon became more valuable to the royal exchequer than the old feudal taxes on land. In 1278 followed the Statute of Gloucester, an act empowering the king to make inquiry as to the right by which old royal estates, or exceptional franchises which infringed on the royal prerogative of justice or taxation, had passed into the hands of their present owners. This inquest was made by the writ Quo Warranto:, by which each landholder was invited to show the charter or warrant in which his claims rested. The baronage were angry and suspicious, for many of their customary rights rested on immemorial and unchartered antiquity, while others were usurpations from the weakness of John or Henry III. They showed signs of an intention to make open resistance; but to their surprise the king contented himself with

making complete lists of all franchises then existing, and did no more; this being his method of preventing the growth of any further trespasses on his prerogative.

Edward's next move was against clerical encroachments. In 1279 he compelled' Archbishop Peckham to withdraw some legislation made in a synod called without the royal permission — a breach of one of the three great canons Mortmain of William the Conqueror. Then he took the offensive himself, by persuading his parliament to pass the Statute of Mortmain (de religiosis) . This was an act to prevent the further accumulation of landed property in the " dead hand " of religious persons and communities. The more land the church acquired, the less feudal taxation came into the royal exchequer. For undying corporations paid the king neither " reliefs " (death duties) nor fees on wardship and marriage, and their property would never escheat to the crown for want of an heir. The Statute of Mortmain forbade any man to alienate land to the church without royal licence. It was very acceptable to the baronage, who had suffered, on a smaller scale, the same griev- ance as the king, for when their subtenants transferred estates to the church, they (like their masters) suffered a permanent loss of feudal revenue. A distinct check in the hitherto steady growth of clerical endowments began from this time, though licences in mortmain were by no means impossible to obtain.

The great group of statutes that date from Edward's earlier years ends with the legislative enactments of 1285, the Second Statute of Westminster and the Statute of Winchester. Second The former contains the clause De Donis Condi- statute of tionalibus, a notable landmark in the history of English West- law, since it favoured the system of entailing estates. m,nster – Hitherto life-owners of land, holding as subtenants, had pos- sessed large powers of alienating it, to the detriment of their superior lords, who would otherwise have recovered it, when their vassals died heirless, as an " escheat." This custom was primarily harmful to the king — the greatest territorial magnate and the one most prone to distribute rewards in land to his servants. But it was also prejudicial to all tenants-in-chief. By De Donis the tenant for life was prevented from selling his estate, which could only pass to his lawful heir; if he had none, it fell back to his feudal superior. Five years later this legis- lation was supplemented by the statute Quia Emptores, equally beneficial to king and barons, which provided that subtenants should not be allowed to make over land to other persons, retain- ing the nominal possession and feudal rights over it, but should be compelled to sell it out and out, so that their successor in title stood to the overlord exactly as the seller had done. Hitherto

Win Chester.

Welsh wars.

they had been wont to dispose of the whole or parts of their estates while maintaining their feudal rights over it, so that the ultimate landlord could not deal directly with the new occupant, whose reliefs, wardship, &c, fell to the intermediate holder who had sold away the land. The main result of this was that, when a baron parted with any one of his estates, the acquirer became a tenant -in-chief directly dependent on the king, instead of being left a vassal of the person who had passed over the land to him. Subinfeudation came to a complete stop, and whenever great family estates broke up the king obtained new tenants-in-chief. The number of persons holding immediately of the crown began at once to multiply by leaps and bounds. As the process of the partition of lands continued, the fractions grew smaller and smaller, and many of the tenants-in-chief were ere long very small and unimportant persons. These, of course, would not form part of the baronial interest, and could not be distinguished from any other subjects of the crown.

The Statute of Winchester, the other great legislative act of 1285, was mainly concerned with the keeping of the peace of the

realm. It revised the arming and organization of the Statute of national militia, the lineal descendent of the oldfyrd,

and provided a useful police force for the repression of

disorder and robbery by the reorganization of watch and ward. This was, of course, one more device for strengthen- ing the power of the crown.

In the intervals of the legislation which formed the main feature of the first half of his reign, Edward was often distracted

by external matters. He was, on the whole, on very

good terms with his first cousin, Philip III. of France;

the trouble did not come from this direction, though there was the usual crop of feudal rebellions in Gascony. Nor did Edward's relations with the more remote states of the con- tinent lead to any important results, though he had many treaties and alliances in hand. It was with Wales that his most troublesome relations occurred. Llewelyn-ap-Gruffydd, the old ally of de Montfort, had come with profit out of the civil wars of 1263-66, and having won much land and more influence during the evil days of Henry III., was reluctant to see that his time of prosperity had come to an end, now that a king of a very different character sat on the English throne.

Friction had begun the moment that Edward returned to his kingdom from the crusade. Llewelyn would not deign to appear before him to render the customary homage due from Wales to the English crown, but sent a series of futile excuses lasting over three years. In 1277, however, the king grew tired of waiting, invaded the principality and drove his recalcitrant vassal up into the fastnesses of Snowdon, where famine compelled him to surrender as winter was beginning. Llewelyn was pardoned, but deprived of all the lands he had gained during the days of the civil war, and restricted to his old North Welsh dominions. He remained quiescent for five years, but busied himself in knitting up secret alliances with the Welsh of the South, who were resenting the introduction of English laws and customs by the strong-handed king. In 1282 there was a sudden and well-planned rising, which extended from the gates of Chester to those of Carmarthen; several castles were captured by the insurgents, and Edward had to come to the rescue of the lords- marchers at the head of a very large army. After much checkered fighting Llewelyn was slain at the skirmish of Orewyn Bridge near Builth on the 1 ith of December 1 282. On his death the southern rebels submitted, but David his brother continued the struggle for three months longer in the Snowdon district, till his last bands were scattered and he himself taken prisoner. Edward

beheaded him at Shrewsbury as a traitor, having the otwaks. excus e that David had submitted once before, had*

been endowed with lands in the Marches, and had nevertheless joined his brother in rebellion. After this the king abode for more than a year in Wales, organizing the newly conquered principality into a group of counties, and founding many castles, with dependent towns, within its limits. The " statute of Wales," issued at Rhuddlan in 1284, provided for the introduction of English law into the country, though a

certain amount of Celtic customs was allowed to survive. For the next two centuries and a half the lands west of Dee and Wye were divided between the new counties, forming the " princi- pality " of Wales, and the " marches " where the old feudal franchises continued, till the marcher-lordships gradually fell by forfeiture or marriage to the crown. Edward's grip on the land was strong, and it had need to be so, for in 1287 and 1204- 1295 there were desperate and widespread revolts, which were only checked by the existence of the new castles, and subdued by the concentration of large royal armies. In 1301 the king's eldest surviving son Edward, who had been born at Carnarvon in 1284, was created " prince of Wales," and invested with the principality, which henceforth became the regular appanage of the heirs of the English crown. This device was apparently intended to soothe Welsh national pride, by reviving in form, if not in reality, the separate existence of the old Cymric state. For four generations the land was comparatively quiet, but the great rebellion of Owen Glendower in the reign of Henry IV. was to show how far the spirit of particularism was from extinction.

*Some two years after his long sojourn in Wales Edward made an even longer stay in a more remote corner of his dominions. Gascony being, as usual, out of hand, he crossed to Bordeaux in 1 286, and abode in Guienne for no less than three years, reducing the duchy to such order as it had never known before, settling all disputed border questions with the new king of France, Philip IV., founding many new towns, and issuing many useful statutes and ordinances. He returned suddenly in 1289, called home by complaints that reached him as to the administration of justice by his officials, who were slighting the authority of his cousin Edmund of Cornwall, whom he had left behind as regent. He dismissed almost the whole bench of judges, and made other changes among his ministers. At the same time he fell fiercely upon the great lords of the Welsh Marches, who had been indulging in private wars; when they returned to their evil practice he imprisoned the chief offenders, the earls of Hereford and Gloucester, forfeited their estates, and only gave them back when they had paid vast fines (1291). Another act of this period was Edward's celebrated expulsion of the Jews from England (1290). This was the con- f/*5f' °" tinuation of a policy which he had already carried j eW s. out in Guienne. It would seem that his reasons were partly religious, but partly economic. No earlier king could have afforded to drive forth a race who had been so useful to the crown as bankers and money-lenders; but by the end of the 13th century the financial monopoly of the Jews had been broken by the great Italian banking firms, whom Edward had been already*

employing during his Welsh wars. Finding them no less accommodating than their rivals, he gratified the prejudices of his subjects and himself by forcing the Hebrews to quit England. The Italians in a few years became as unpopular as their predecessors in the trade of usury, their practices being the same, if their creed was not.

Meanwhile in the same year that saw the expulsion of the Jews, King Edward's good fortune began to wane, with the rise of the Scottish question, which was to overshadow the latter half of his reign. Alexander III., the last ˆ male in direct descent of the old Scottish royal house, Scotland. had died in 1286. His heiress was his only living descendant, a little girl, the child of his deceased daughter Margaret and Eric, king of Norway. After much discussion, for both the Scottish nobles and the Norse king were somewhat suspicious, Edward had succeeded in obtaining from them a promise that the young queen should marry his heir, Edward of Carnarvon. This wedlock would have led to a permanent union of the English and Scottish crowns, but not to an absorption of the lesser in the greater state, for the rights of Scotland were carefully guarded in the marriage-treaty. But the scheme was wrecked by the premature death of the bride, who expired by the way, while being brought over from Norway to her own kingdom, owing to privations and fatigue suffered on a tem- pestuous voyage.

She had no near relatives, and more than a dozen Scottish or Anglo-Scottish nobles, distantly related, to the royal line; put in a claim to the crown, or at least to a part of the royal heritage. The board of six regents, who had been ruling Scotland for the young queen, seeing their own power at an end and civil war likely to break out, begged Edward of England to arbitrate between the claimants. The history of the next twenty years turned on the legal point whether the arbitrator acted— as he himself contended — in the capacity of suzerain, or — as. the Scots maintained — in that of a neighbour of acknowledged wisdom and repute, invited to settle a domestic problem. ■ This ' question of the relations between the English and the Scottish crowns had been raised a dozen times between the days of Edward the Elder and those of Henry III. There was no deny- ing the fact that the northern kings had repeatedly done homage to their

greater neighbours. But, save during the years when William the Lion, after his captivity, had owned himself the vassal of Henry II. for all his dominions, there was considerable uncertainty as to the exact scope of the allegiance which had been demanded and given. And William's complete submission had apparently been cancelled, when Richard I. sold him in 1 190 a release from the terms of the treaty of Falaise. Since that date Alexander II. and Alexander III. had repeatedly owned themselves vassals to the English crown, and had even sat in English parliaments. But it was possible for patriotic Scots to contend that they had done so only in their capacity as English barons — for they held much land south of Tweed— and to point to the similarity of their position to that of the Eaghsh king when he did homage for his duchy of Guienne at Paris, without thereby admitting any suzerainty of the French crown over England or Ireland. On the last occasion when Alexander III. had owned 1 himself the vassal of Edward I., there had been con- siderable fencing on both sides as to the form of the oath, and, as neither sovereign at the moment had wished to push matters to a rupture, the words used had been intentionally vague, and both parties had kept their private interpretations to themselves. But now, when Edward met the Scottish magnates, who had asked for his services as arbitrator, he demanded that they should acknowledge that he was acting as suzerain and overlord of the whole kingdom of Scotland. After some delay, and with manifest reluctance, the Scots complied; their hand was forced by the fact that most of the claimants to the crown had hastened to make the acknowledgment, each hoping thereby to prejudice the English king in his own favour.

This submission having been made, Edward acted with honesty and fairness, handing over the adjudication to a body of eighty Scottish and twenty-four English barons, knights :and bishops. These commissioners., after ample discussion and taking Of evidence, adjudged the crown to John Baliol, the grandson of the eldest daughter of Earl David, younger brother of William the Lion. They ruled Out the claimof Robert Bruce, the son of David's second daughter, who had raised the plea that his descent was superior because he was a generation nearer than Baliol to their common ancestor. This theory of affinity had been well known in the 12th century, and had been urged in favour of King John when he was contending with his nephew Arthur. But by 1291 it had gone out of favour, and the Scottish barons, had no hesi- tation in declaring Baliol their rightful king. Edward at once gave him seizin of Scotland, and handed over to him the royal castles, which had been placed in his hands as a pledge during the arbitration. In return

Baliol did him homage as overlord of the whole kingdom of Scotland.

This, unfortunately, turned out to be the beginning,: not the end, of troubles. Edward was determined to exact all the ordinary feudal rights of an overlord — whatever might have been the former relations of the English and Scottish, crowns. The Scots, on the other hand, were resolved not to allow of the intro- duction of usages which had not prevailed in earlier times, and to keep the tie as vague and loose as possible. Before Baliol had been many months on the throne there was grave friction on the question of legal appeals. Scottish litigants defeated in the local courts began to appeal to the courts of Westminster, just

as Gascon litigants were wont to appeal from Bordeaux to' Paris. King John and his baronage, relying on the fact that such evocation of cases to a superior, court had never before been known, refused to allow that it was valid. King Edward insisted that by common feudal usage it was perfectly regular, and announced his intention of permitting it. Grave friction had already begun when external events precipitated an open rupture between the king of England and his new vassal. ;■ Philip III. of France, who had always pursued a friendly policy with his cousin of England, had died in 1285, and had been succeeded by his son Philip IV., a prince of a very different type, the most able and unscrupulous of aJt ˆ a all the dynasty of Capet. In 1294 he played a most Philipiv. dishonourable trick upon King Edward. There had been some irregular and piratical fighting at sea between English and Norman sailors, in which the latter had been worsted. When called to account for the doings of his subjects, as well as for certain disputes in Gascony, the English king promised redress, and, on the suggestion of Philip, surrendered, as a formal act of apology, the six chief fortresses of Guienne, which were to be restored when reparation had been made. Having garrisoned the places, Philip suddenly changed his line, refused to continue the negotiations, and declared the whole duchy forfeited. Edward was forced into war, after having been tricked out of his strongholds. Just after his first succours had sailed for the Gironde, the great Welsh rebellion of 1294 broke out, and the king was compelled to turn aside to repress it. This he accomplished in the next spring, but meanwhile hardly a foot- hold remained to him in Gascony. He was then preparing to cross the Channel in person, when Scottish affairs began to become threatening. King John declared himself unable to restrain the indignation of his subjects at the attempt to enforce English suzerainty over Scotland, and in July 1295 leagued himself with Philip of France, and expelled from his realm the chief supporters of the English alliance. Finding himself in- volved in two

wars at once, Edward made an earnest appeal to his subjects to rise to the occasion and " because that which touches all should be approved of all " summoned the celebrated " model parliament " of November 1295, •• m0 4 e i which exactly copied in its constitution Montfort's pariia- parliament of 1265, members from all cities and ment " of boroughs being summoned along with the knights of ' the shires, and the inferior clergy being also represented by their proctors. This system henceforth became the normal one, and the English parliament assumed its regular form, though the differentiation of the two houses was not fully completed till the next century. Edward was voted liberal grants by the laity, though the clergy gave less than he had hoped; but enough money was obtained to fit out two armies, one destined for the invasion of Scotland, the other for that of Gascony.

The French expedition, which was led by the king's brother Edmund, earl of Lancaster, failed to recover Gascony, and came to an ignominious end. But Edward's own army achieved complete success in Scotland. Berwick was invasion stormed, the Scottish army was routed at Dunbar sc ti an d. (April 27), Edinburgh and Stirling were easily captured, and at last John Baliol, deserted by most of his adherents, surrendered at Brechin. Edward pursued his triumphant march as far as Aberdeen and Elgin, without meeting further resistance. He then summoned a parliament at Berwick, and announced to the assembled Scots that he had determined to depose King John, and to assume the crown himself. The ease with whicK he had subdued the realm misled him; he fancied that the slack resistance, which was mainly due to the incapacity and un-popularity of Baliol, implied the indifference of the Scots to the idea ol annexation. The alacrity with which the greater part of the baronage flocked in to do him homage confirmed him in the mistaken notion. He appointed John, earl Warenne, lieutenant of the realm, with Hugh Cressingham, an English clerk, as treasurer, but left nearly all the minor offices in Scottish hands, and announced that Scottish law should be administered

**296-i303]*

He then returned to England, and began to make preparations for a great expedition to France in 1207.

His plan was something more ambitious than a mere attempt to recover Bordeaux; succours were to go to Gascony, but he Disputes himself and the main army were to invade France from with the the north with the aid of the count of Flanders. Much clergy and money was, of course, needed for the double exˆ baronage, potion, and in raising it Edward became involved in two desperate constitutional disputes. Though the barons and the commons voted a liberal grant at the parliament of Bury (Nov. 1296) the clergy would give nothing. This was owing to a bull — the celebrated Clericis Laicos, recently issued by the arrogant and contentious pope Boniface VIII., which forbade the clergy to submit to any taxation by secular princes. Robert Winchelsea, the archbishop of Canterbury, an enthusi- astic exponent of clerical rights and grievances, declared himself in conscience bound to obey the pontiff, and persuaded the representatives of the Church in the parliament to refuse supplies. The king, indignant that an attempt should be made to exempt the vast ecclesiastical lands from taxation at a time of national crisis, sequestrated the estates of the see of Canter- bury, and copied John's conduct in 1208 by outlawing the whole body of the clergy. Winchelsea in return excommuni- cated all those who refused to recognize the authority of the pope's bull.

Scarcely was this quarrel developed when Edward found himself involved in an equally hot dispute with the commons and the baronage. In his eagerness to collect the sinews of war he had issued orders for the levy of a heavy customs duty on wool, the main export of the land, and in some cases laid hands on the wool itself, which lay ready for shipping, though this had not been granted him by the late parliament. The " mal- tolt " — or illegal tax — as his subjects called it, provoked the anger of the whole body of merchants in England. At the same time the barons, headed by the earls of Norfolk and Hereford, raised the old grievance about feudal service beyond seas, which had been so prominent in the time of King John. Norfolk, who had been designated to lead the expedition to Guienne, declared that though he was ready to follow his master to Flanders in his capacity of marshal, he would not be drafted off to Gascony against his own will. Hereford and a number of other barons gave him hearty support.

Harassed by these domestic troubles, the king could not carry out his intention of sailing for Flanders in the spring, and spent the greater part of the campaigning season in wrangles with his subjects. He was obliged to come to a compromise. If the clergy would give him a voluntary gift, which was in no way to be considered a tax, he agreed to inlaw them. They did soj and even Winchelsea, after a

time, was reconciled to his master; As to the barons, the king took the important constitutional step of conceding that he would not ask them to serve abroad as a feudal obligation, but would pay them for their services, if they would oblige him by joining his banner. Even then Norfolk and Hereford refused to sail; but the greater part of the minor magnates consented to serve as stipendiaries. The commons were conciliated by a promise that the wool which the royal officers had seized should be paid for, when a balance was forthcoming in the exchequer.

By these means Edward succeeded at last in collecting a considerable army, and sailed for Flanders at the end of August. insurrec- But ne was nar(Hy gone when dreadful news reached tionin him from Scotland. An insurrection, to which no Scotland, great importance was attached at first, had broken Wallace. Qut j n tne summer j ts fi rs t leader was none of the

great barons, but a Renfrewshire knight, Sir William Wallace; but ere long more important persons, including Robert Bruce, earl of Carrick (grandson of Robert Bruce of Annandale, one of the competitors for the crown of Scotland), and the bishop of Glasgow, were found to be in communication with the rebels. Earl Warenne, the king's lieutenant in Scotland, mustered his forces to put down the rising. On the nth of September 1207 he attempted to force the passage of the Forth at Stirling Bridge,

and was completely beaten by Wallace, who allowed half the English army to pass the river and then descended upon it and- annihilated it, while Warenne .looked on helplessly from the other bank. Almost the whole of Scotland rose in arms on hearing of this victory', but the barons showed less zeal than the commons, owing to their jealousy of Wallace. Warenne retired to Berwick and besought his master for aid.

Edward, who was just commencing an autumn campaign in Flanders which was to lead to no results, sent home orders to summon a parliament, which should raise men and money for the Scottish war. It was called, and made a liberal grant for that purpose; but Archbishop Winchelsea and the earls of Norfolk and Hereford took advantage of their master's needs, and of his absence, to assert themselves. Taking up the position of defenders of the constitution, they induced the parliament to couple its grants of money with the condition that the king should not only confirm Magna Carta— as had been so often done before— but 'give a specific promise that no " maltolts," or other taxes not legally granted him, should be raised for

the future. Edward received the petition at Ghent, and made the required oath. The document to which he gave his assent, the Confirmatio Carlarum (less accurately called the statute The De Tallagio non concedendo) marked a distinct advance "Confir beyond the theories of Magna Carta; for the latter matio Cf- had been drawn up before England possessed a parlia- arum – ment, and had placed the control of taxation in the hands of the old feudal council Of tenants-in-chief, while the Confirmatio gave it to the assembly, far more national and representative, which had now superseded the Great Council as the mouthpiece of the whole people of the realm.*

The Scottish revolt had become so formidable that Edward was compelled to abandon his unfruitful Flemish campaign; he patched up an unsatisfactory truce with the king of France, which left four-fifths of his lost Gascon lands in the power of the enemy, and returned to England in the spring of 1298. In July he invaded Scotland at the head of a formidable army of 15,000 men, and on the 22nd of that month brought Wallace to action on the moors above Falkirk. The steady Scottish infantry held their Own for some time against the charge of the English men-at-arms. But when Edward brought forward his archers to aid his cavalry, as William I. had done at Hastings, Wallace's columns broke up, and a dreadful slaughter followed. The impression made on the Scots was so great that for some years they refused to engage in another pitched battle. But the immediate' consequences were not all that might have been expected. Edward was able to occupy many towns and castles, but the broken bands of the insurgents lurked in the hills and forests, and the countryside as a whole remained unsubdued. Wallace went to France to seek aid from King Philip, and his place was taken by John Comyn, lord of Badenoch, a nephew of Baliol, who was a more acceptable leader to the Scottish nobles than the vanquished knight Of Falkirk. Edward was detained in the south for a year, partly by negotiations with France, partly by a renewed quarrel with his parliament, and during his absence Comyn recovered Stirling and most of the other places which had received English garrisons. It was not till 1300 that the king was able to resume the invasion of Scotland, with an army raised by grants of money that he had only bought by humiliating concessions to the will of his parliament, formulated in the Articuli super cartas which were drawn up in the March of that year. Even then he only succeeded in recovering some border holds, and the succeeding campaign of 1301 only took' him as far as Linlithgow. But in the following year his position was suddenly changed by unexpected events abroad; the king of France became involved in a desperate quarrel with the pope, and at the

same moment his army received a crushing defeat before Courtrai at the hands of the Flemings. To free himself for these new struggles Philip made up his mind to conclude peace with England, even at the cost of sacrificing his conquests in Gascony. Bordeaux had already revolted from him, and he gave up the rest of his ill-gotten gains of 1294 by the treaty of Paris (May 20, 1303).

Now that he had only a single war upon his hands Edward's position was entirely changed. There was no more need to Ed rd conciliate the magnates nor the parliament. His dis- agaia in- pleasure fell mainly on the archbishop and the earl vades of Norfolk, who had so long led the opposition. Scotland, wi nc h e i se a was put in disgrace, and ultimately exiled. Norfolk, who was childless, was forced to sign a grant by which his lands went to the king after his death— a harsh and illegal proceeding, for he had collateral heirs. But the Scots, as was natural, bore the brunt of the king's wrath. In June 1303, a month after the peace of Paris, he advanced from Rox- burgh, determined to make a systematic conquest of the realm, and not to return till it was ended. He kept up his campaign throughout the winter, reduced every fortress that held out, and carried his arms as far as Aberdeen and Elgin. In February 1304 the regent Comyn and most of the Scottish baronage sub- mitted, on the promise that they should retain their lands on doing homage. Wallace, who had returned from France, kept up a guerilla warfare in the hills for a year more, but was cap- tured in July 1305, and sent to London to be executed as a traitor. Even before his capture it seemed that Scotland was thoroughly tamed, and was destined to share the fate of Wales.

Edward's arrangements for the administration of the conquered kingdom were wise and liberal, if only the national spirit of the Scots could have tolerated them. The Scottish parliament was to continue, though representatives from beyond Tweed were also to be sent to the English parliament. The sheriffdoms and most of the ministerial posts were left in the hands of Scots, though the supreme executive authority was put in. the hands of John of Brittany, earl of Richmond, the king's nephew. The land seemed for a time to be settling down, and indeed the baronage were to such a large extent English in both blood and feeling, that there was no insuperable difficulty in conciliating them. A considerable fraction of them adhered consistently to the English cause from this time forth, and ultimately lost their lands for refusing to follow the rest of the nation in the next insurrection.

But the delusion that Scotland had been finally subdued was to last only for a year, although in 1305 Edward seemed to have accomplished his task, and stood triumphant, with the northern realm at his feet, his domestic foes humbled, and France and the papacy defeated. His last short interval of peaceful rule was

distinguished by the passing of the Statute of Trailbaston in the parliament of 1305. This was a measure for the repression of local riots, empowering justices in every shire to suppress club- men (trailbastons) , gangs of marauders who had been rendering the roads unsafe.

In the first month of 1306, however, the weary Scottish war

broke out again, with the appearance of a new insurgent chief.

Robert Bruce, earl of Carrick, grandson of the claimant

Robert ˆ j nrone f 1202, had hitherto pursued a shifty

Bruce. . ˆ ‘ … . ..

policy, wavering between submission and opposition

to the English invader. He had been in arms more than once, but had finally adhered to the pacification of 1304, and was now entirely trusted by the king. But he was secretly plotting re- bellion, disgusted (as it would seem) that Edward had not trans- ferred the crown of Scotland to the line of Bruce when the house of Baliol was found wanting. Though he found himself certain of a considerable amount of support, he yet could see that there would be no general rising in his favour, for many of the mag- nates refused to help in making king a baron whom they re- garded as no more important than one of themselves. But the insurrection was precipitated by an unpremeditated outrage. Bruce was conferring at Dumfries with John Comyn, the late regent, whom he was endeavouring to tempt into his plots, on the 10th of January 1306. An angry altercation followed, for Comyn would have nothing to do with the scheme, and Bruce and his followers finally slew him before the altar of a church into which he had fled. After this crime, which combined the disgrace of sacrilege with that of murder under tryst, Bruce was forced to take arms at once, though his preparations were incomplete. He raised his banner, and was hastily crowned at Scone on the 25th of March; by that time the rising had burst

out in many shires of Scotland, but it was neither unanimous nor complete. Edward by no means despaired of crushing it, and had raised a large army, when he was smitten with an illness which prevented him from crossing the border. But his troops ; under Aymer de Valence, earl of Pembroke, pressed north, and surprised and routed Bruce at Methven near Perth. The pretender’s brother Nigel and many of his chief supporters were taken prisoners, and he

himself escaped with a handful of followers and took refuge in the Western islands. Edward ordered young Nigel Bruce and many other captives to be executed; for he was provoked to great wrath by the rebellion of a magnate who had given him every assurance of loyalty. He intended to follow de Valence to Scotland, and to complete the suppression of the rising in person. But this proved beyond his strength; he struggled as far as the border in July, but could not shake off his disease, and was forced to linger, a broken invalid, in the neighbourhood of Carlisle for many months. Meanwhile his lieutenants failed to follow up with energy the victory gained at Methven, and in the next spring Bruce re- appeared in the Lowlands, gathered new levies, and inflicted a defeat on de Valence at Loudoun Hill. Roused to anger King Edward rose from his bed, mounted his horse, and started for Scotland. But after struggling on for a few miles he fell by the way, and died at Burgh-on-Sands, just inside the English border, on the 7th of July 1307.

Despite the chequered fortunes of his later years the reign of Edward had been a time of progress and prosperity for England. He had given his realm good and strong governance; according to his lights he had striven to keep faith of^-ward and to observe his coronation oath. He had on more i.'smle. than one occasion quarrelled with his subjects, but matters had never been pushed to an open rupture. The king knew how to yield, and even opponents like Winchelsea and the earls of Norfolk and Hereford respected him too much to drive him to an extremity. The nation, however much it might murmur, would never have been willing to rebel against a sove- reign whose only fault was that he occasionally pressed his pre- rogative too far, Edward's rule was seldom or never oppressive, the seizure of the merchants' wool in 1297 was the only one of his acts which caused really fierce and widespread indignation. For his other arbitrary proceedings he had some show of legal justification in every case. It would have been absurd to declare that his rule was tyrannical or his policy disastrous." The realm was on the whole contented and even flourishing. Population was steadily increasing, and with it commerce; the intellectual activity which had marked the reign of Henry III. was still alive; architecture, religious and military, was in its prime. He was himself a great builder, and many of the per- fected castles of that concentric style, which later ages have called the " Edwardian type," were of his own planning. In ecclesiastical architecture his reign represents the early flower of the " Decorated " order, perhaps the most beautiful of all the developments of English art. In many respects the reign may be regarded as the culmination and crowning point of the middle ages. It certainly gave a promise of

greatness and steady progress which the 14th century was far from justifying.

With the great king's death a sudden change for the worse was at once visible. The individual character of the reigning king was still the main factor in political history, Edward II. and Edward II. was in every respect a contrast to his father. He was incorrigibly frivolous, idle and apathetic; his father had given him much stern schooling, but this seems only to have inspired him with a deeply rooted dis-like for official work of any kind. He has been well described as " the first king since the Conquest who was not a man of business." Even Stephen and Henry III. had been active and bustling princes, though their actions were misguided and in- consequent. But Edward II. hated all kingly duties; he detested war, but he detested even more the routine work of administration. He was most at bis ease in low company, his favourite diversion was gambling, his best trait a love for farming and the mechanical arts of the smith and the gardener.

His first acts on coming to the throne caused patriotic English- men to despair. His father, on his deathbed, had made him swear to conduct the Scottish expedition to its end, aavestoa. But ˆ e marc hed no further than Dumfries, and then turned back, on the vain pretext that he must conduct his parent's funeral in person. Leaving Bruce to gather fresh strength and to commence the tedious process of reducing the numerous English garrisons in Scotland, he betook himself to London, and was not seen on the border again for more than three years. He then dismissed all his father's old ministers, and replaced them by creatures of his own, for the most part persons of complete incompetence. But his most offensive act was to promote to the position of chief councillor of the crown, and disperser of the royal favours, a clever but vain and osten- tatious Gascon knight, one Piers Gaveston, who had been the companion of his boyhood, and had been banished by Edward I. for encouraging him in his follies and frivolity. Piers was given the royal title of earl of Cornwall, and married to the king's niece; when Edward went over to France to do homage for Gascony, he even made his friend regent during his absence, in preference to any of his kinsmen. It was his regular habit to refer those who came to him on matters of state to " his good brother Piers," and to refuse to discuss them in person.

It was of course impossible that the nation or the baronage should accept such a preposterous regime, and Edward was soon involved in a lively struggle with his subjects. Of Baronial t k e j eac [ers f opposition in his father's reign both •«ton? S " Hereford and Norfolk were now dead. But Arch- bishop Winchelsea had returned from exile in a belli- gerent mood, and the place of Norfolk and Hereford was taken by an ambitious prince of the royal house, Thomas, earl of • Lancaster, the son of the younger brother of Edward I. Thomas was selfish and incompetent, but violent and self-assertive, and for some years was able to pose successfully as a patriot simply because he set himself to oppose every act of the un- popular king. He had several powerful baronial allies — the earls of Warwick, Pembroke and Warenne, with Humphrey Bohun of Hereford, who had succeeded to his father's politics, though he had married the king's own sister.

The annals of the early years of Edward II. are mainly filled by contemporary chroniclers with details of the miserable strife between the king and his barons on the question of ' 3 ˆ re – ss Gaveston's unconstitutional position. But the really Scotland, important feature of the time was the gradual recon- quest of Scotland by Robert Bruce, during the con- tinuance of the domestic strife in England. Edward I. had laid such a firm grip on the northern realm that it required many years to undo his work. A very large proportion of the Scottish nobility regarded Bruce as a usurper who had opened his career with murder and sacrilege, and either openly opposed him or denied him help. His resources were small, and it was only by constant effort, often chequered by failures, that he gradually fought down his local adversaries, and reduced the English garrisons one by one. Dumbarton and Linlithgow were only mastered in 13 12. Perth did not finally fall into his hands till 13 13; Edinburgh, Roxburgh and Stirling were still holding out in 13 14. During all this time the English king only once went north of the Border — in 1311 — and then with a very small army, for Lancaster and his friends had refused to join his banner. Yet even under such conditions Bruce had to retire to the mountains, and to allow the invaders to range unopposed through Lothian and Fife, and even beyond the Tay. With ordinary capacity and perseverance Edward II. might have mastered his enemy, indeed the Comyns and Umfravilles and other loyalist barons of Scotland would have carried out the business for him, if only he had given them adequate support. But he spent what small energy he possessed in a wretched strife of chicanery and broken promises with Thomas of Lan- caster and his party, dismissing and recalling Gaveston according to the exigencies of the moment, while he let the Scottish war shift for itself. It must be confessed that the

conduct of his adversaries was almost as contemptible and unpatriotic. They

refused to aid in the war, as if it was the king's private affair and not that of the nation. And repeatedly, when they had Edward at their mercy and might have dictated what terms they pleased to him, they failed to rise to the situation. This was especially the case in 1311, when the king had completely submitted in face of their armed demonstrations. Instead of introducing any general scheme of reform they contented themselves with putting him under the tutelage of twenty-one " lords T . ordainers," a baronial committee like that which had "Lords been appointed by the Provisions of Oxford, fifty Or- years back. Edward was not to levy an army, appoint dalaers – " an official, raise a tax, or quit the realm without their leave. He had also to swear an obedience to a long string of consti- tutional limitations of his power, and to promise to remove many practical grievances of administration. But there were two great faults in the proceedings of Thomas of Lancaster and his friends. The first was that they ignored the rights of the commons — save indeed that they got their ordinances confirmed by parliament — and put all power into the hands of a council which represented nothing but the baronial interest. The second, and more fatal, was that this council of " ordainers," when installed in office, showed energy in nothing save in persecuting the friends of Edward and Gaveston; it neglected the general welfare of the realm, and in particular made no effort whatever to end the Scottish war. It was clearly their duty either to make peace with Robert Bruce, or to exert themselves to crush him; but they would do neither.

Gaveston's unhappy career came to an end in 1312. After he had been twice exiled, and had been twice recalled by the king, he was besieged in Scarborough and captured by the earl of Pembroke. He was being conducted to London to be tried in parliament, when his two greatest enemies, Thomas of Lan- caster and Guy, earl of Warwick, took him out of the hands of his escort, and beheaded him by the wayside without any legal authority or justification. The unhappy king was compelled to promise to forget and forgive this offence, and was then restored to a certain amount of freedom and power; the barons believed that when freed from the influence of Gaveston he would prove a less unsatisfactory sovereign. The experiment did not turn out happily. Bruce having at last made an almost complete end of the English garrisons within his realm, laid siege to Stirling, the last and strongest of them all, in the spring of 13 13. Compelled by the pressure of public opinion to attempt its relief, Edward crossed the border in June i3i4,with an army of 20,000 foot

and 4000 men-at-arms. He found Bruce prepared to dispute his advance on the hillside of Bannockburn, 2 m. in front of Stirling, in a strong position with a ˆ att,e of stream in front and his flanks covered by rows of pit- bum. falls, dug to discomfit the English cavalry. The Scots, as at Falkirk, were ranged in solid clumps of pikemen above the burn, with only a small reserve of horse. The English king, forgetting his father's experiences, endeavoured to ride down the enemy by headlong frontal charges of his men-at-arms, and made practically no attempt to use his archery to advantage. After several attacks had been beaten off with heavy loss, the English host recoiled in disorder and broke up — the king, who had kept in the rear all day, was one of the first to move off. The flower of his knights had fallen, including his nephew, the earl of Gloucester, who was the only one of the great magnates of the realm who had shown loyalty to him during the last six years. The Scots also made many prisoners; the disaster was complete, and the wrecks of the beaten army dispersed before reaching the border. Bruce followed them up, and spent the autumn in ravaging Northumberland and Cumberland.

*Thomas of Lancaster, who had refused to join in the late campaign, took advantage of its results to place the king once more in complete tutelage. His household was dis- missed, he was bidden to live as best he could on an Tnom * s ' allowance of £10 a day, and all his ministers and Lancaster. officials were changed. For more than thr£e years Lancaster practically reigned in his cousin's name; it was soon found that the realm got no profit thereby, for Earl Thomas,*

though neither so apathetic nor so frivolous as Edward, was not a whit more competent to conduct either war or domestic administration. The Scots swept everything before them, ravaging the north at their will, and capturing Berwick. They even made a great expedition to Ireland, where Bruce's brother Edward was proclaimed king by the rebellious Celtic septs, and rode across the whole island, exterminating the Anglo-Irish population in many districts (1315-1317). But the colonists rallied, and cut to pieces a great Irish army at Athenry (1316), while in the next year Roger Mortimer, a hard-handed baron of the Welsh march, crossed with reinforcements and drove back Edward Bruce into the north. Resuming his advance after a space, the rebel king was routed and slain at Dundalk (Oct.

14, 13 18) and the insurrection died out. But it had had the permanent result of weakening the king's grip on the north and west of Ireland, where the Englishry had been almost exterminated. From this time forth until the reign of Henry VIII. the limit of the country in full subjection to the crown was always shrinking, and the Irish chiefs of the inland continued to pay less and less attention to orders issued from Dublin or London.

Though the Scottish expedition to Ireland had been beaten off, this was not in the least to be ascribed to the credit of Lancaster, who was showing the grossest incompetence as an administrator. He could neither protect the Border, nor even prevent private civil wars from breaking out, not only on the Welsh marches (where they had always been common), but even in the heart of England. The most extraordinary symptom of the time was a civic revolt at Bristol (1316), where the towns- folk expelled the royal judges, and actually stood a siege before they would submit. Such revolts of great towns were normal in Germany or Italy, but almost unknown on this side of the Channel. All this unrest might well be ascribed to Lancaster's want of ability, but he had also to bear — with less justice — the discontent caused by two years of famine and pestilence. In August 13 18 he was removed from power by a league formed by Pembroke, Warenne, Arundel and others of the lords or- dainers, who put a new council in power, and showed themselves somewhat less hostile to the king than Earl Thomas had been. Edward was allowed to raise an army for the siege of Berwick, and was lying before its walls, when the Scots, turning his flank, made a fierce foray into Yorkshire, and routed the shire-levy under Archbishop Melton at the battle of Myton. This so disheartened the king and the council that controlled him that they concluded a two years truce with Robert of Scotland, thus for the first time acknowledging him as a regular enemy and no mere rebel (1319). The time of comparative quiet that followed was utilized by the king in an attempt to win back some of his lost authority.

For a short space Edward showed more capacity spensei-s. an< ˆ ener gy than he had ever been supposed to possess.

Probably this was due entirely to the fact that he had come under the influence of two able men who had won his confidence and had promised him revenge for the murdered Gaveston. These were the two Hugh Despensers, father and son; the elder was an ambitious baron who hated Lancaster, the younger had been made Edward's chamberlain in 1318 and had become his secret councillor and constant companion. Finding that the king was ready to back them in

all their enterprises, the Despensers resolved to take the fearful risk of snatching at supreme power by using their master's name to oust the barons who were now directing affairs from their position. The task was the more easy because Lancaster was at open discord with the men who had supplanted him, so that the baronial party was divided; while the mishaps of the last six years had convinced the nation that other rulers could be as incompetent and as unlucky as the king. Indeed, there was a decided reaction in Edward's favour, since Lancaster and his friends had been tried and found wanting. Moreover, the Despensers felt that they had a great advantage over Gaveston in that they were native-born barons of ancient ancestry and good estate: the younger Hugh, indeed, through his marriage with the sister of the earl of Gloucester who fell at Bannockburn, was one of the greatest landowners on the Welsh border: they

could not be styled upstarts or adventurers. Edward's growing confidence in the Despensers at last provoked the notice and jealousy of the dominant party. The barons brought up many armed retainers to the parliament of 1321, and forced the king to dismiss and to condemn them to exile. But their discom- fiture was only to last a few months; in the following October a wanton outrage and- assault on the person and retinue of Edward's queen, Isabella of France, by the retainers of Lord Badlesmere, one of Pembroke's associates, provoked universal reprobation. The king made it an excuse for gathering an army to besiege Badlesmere's castle at Leeds; he took it and hanged the garrison. He then declared the Despensers pardoned, and invited them to return to England. On this Thomas of Lan- caster and the more resolute of his associates took arms, but the majority both of the baronage and of the commons remained quiescent, public opinion being rather with than against the king. The rebels displayed great indecision, and Lancaster proved such a bad general that he was finally driven into the north and beaten at the battle of Boroughbridge (March 16, 1322), where his chief associate, the earl of Hereford, was slain. Next day he surrendered, with the wreck Bxecutloa of his host. But the king, who showed himself un- L, aoC aster. expectedly vindictive, beheaded him at once; three other peers, Badlesmere, Clifford and Mowbray, were subsequently executed, with a score of knights.

Such severity was most impolitic, and Lancaster was ere long hailed as a saint and a martyr. But for the moment the king seemed triumphant; he called a parliament which revoked the " ordinances " of 13 n, and replaced the Despensers in power. For the remaining four years of his reign they were omnipotent ; but able and unscrupulous as they were, they could not solve the problem of

successful governance. To their misfortune the Scottish war once more recommenced, King Robert having refused to continue the truce. The fortune of Edward II. now hung on the chance that he might be able to maintain the struggle with success; he raised a large army and invaded Lothian, but Bruce refused a pitched battle, and drove him off with loss by devastating the countryside around him. Thereupon Edward, to the deep humiliation of the people, sued for another cessation of hostilities, and obtained it by conceding all that Robert asked, save the formal acknowledgment of his kingly title. But peace did not suffice to end Edward's troubles; he dropped back into his usual apathy, and the Despensers showed themselves so harsh and greedy that the general indignation only required a new leader in order to take once more the form of open insurrection. The end came in an unexpected fashion. Edward had quarrelled with his wife Isabella, who complained that he made her the " handmaid of the Despensers," and excluded her from her proper place and honour. Yet in 1325 he was unwise enough to send her over to France on an embassy to her brother Charles IV., and to allow his eldest son Edward, prince of Wales, to follow her to Paris. Having the boy in her power, and being surrounded by the exiles of Lancaster's faction, she set herself to plot against her husband, and opened up com- _ . munications with the discontented in England. It was f Queen in vain that Edward besought her to return and to re- Isabella store him his son; she came back at last,butatthehead f,"^, of an army commanded by Roger, Lord Mortimer, the most prominent survivor of the party of Earl Thomas, with whom she had formed an adulterous connexion which they for some time succeeded in keeping secret.

When she landed with her son in Essex in September 1326, she was at once joined by Henry of Lancaster, the heir of Earl Thomas, and most of the baronage of the eastern n e oosition counties. Even the king's half-brother, the earl of and Norfolk, rallied to her banner. Edward and the De- murder of spensers, after trying in vain to raise an army, fled Edwar,i into the west. They were all caught by their pursuers ; the two Despensers were executed — the one at Bristol, the other at Hereford. Several more of Edward's scanty band of friends — ■ the earl of Arundel and the bishop of Exeter and others — were also slain. Their unhappy master was forced to ahdicate on

Mortimer.

1326-134°]

ENGLISH HISTORY

the 20th of January 1327, his fourteen-year old son being pro- claimed king in his stead. He was allowed to survive in close prison some eight months longer, but when his robust con- stitution defied all attempts to kill him by privations, he was murdered by the orders of the queen and Mortimer at Berkeley Castle on the 21st of September.

The three years regency of Isabella, during the minority of Edward III., formed a disgraceful episode in the history of Regency of England. She was as much the tool of Mortimer as Isabella her husband had been the tool of the Despensers, and *Jf "V their relations became gradually evident to the whole

nation. All posts of dignity and emolument were kept for their personal adherents, and a new and formidable dignity was conferred on Mortimer himself, when he was made both justiciar of the principality of Wales, and also earl of March, in which lay both his own broad lands and the estates of De- spenser and Arundel, which he had shamelessly appropriated. It is surprising that the adulterous pair succeeded in maintain- ing themselves in power for so long, since the ignominy of the situation was evident. They were even able to quell the first attempt at a reaction, by seizing and beheading Edmund, earl of Kent, the late king's half-brother, who was betrayed while organizing a plot for their destruction. The one politic act of Mortimer's administration, the conclusion of a permanent peace with Scotland by acknowledging Bruce as king (1328), was not one which made him more popular. The people called it " the shameful peace of Northampton," and firmly believed that he had been bribed by the Scots.

Yet Isabella and her paramour held on to power for two years after the peace, and were only overthrown by a blow from an unexpected quarter. When the young king had reached the age of eighteen he began to understand the disgraceful nature of his own situation. Having secured promise of aid from Henry of Lancaster, his cousin t and other barons, he executed a coup de main, and seized Mortimer in his chamber at midnight. The queen was also put under guard till a parliament could be called. It met, and at the king's demand passed sentence on the earl for the murder of Edward II. and other crimes. He was hanged at Tyburn (Nov. 1330); the queen suffered nothing worse than complete ex- clusion from power, and lived for more than

twenty years in retirement on the manors of her dowry.

Edward III., who thus commenced his reign ere he was out of his boyhood, was, as might have been foretold from his prompt action against Mortimer, a prince of great vigour and enterprise. He showed none of his father's weakness and much of his grand- father's capacity. He fell short of Edward I. in steadiness of character and organizing power, but possessed all his military capacity and his love of work. Unfortunately for England his ambition was to be the mirror of chivalry rather than a model administrator. He took up and abandoned great enterprises with equal levity; he was reckless in the spending of money; and in times of trouble he was careless of constitutional pre- cedent, and apt to push his prerogative to extremes. Yet like Edward I. he was popular with his subjects, who pardoned him much in consideration of his knightly virtues, his courage, his ready courtesy and his love of adventure. In most respects he was a perfect exponent of the ideals and foibles of his age, and when he broke a promise or repudiated a debt he was but displaying the less satisfactory side of the habitual morality of the 14th century the chivalry of which was often deficient in the less showy virtues. With all his faults Edward during his prime was a capable and vigorous ruler ; and it was not without reason that not England only but all western Europe looked up to him as the greatest king of his generation.

His early years were specially fortunate, as his rule contrasted in the most favourable way with that of his infamous mother Edward and his contemptible father. The ministers whom ///. he substituted for the creatures of Mortimer were

lo-edes capable, if not talented administrators. He did much to

''"*■ restore the internal peace of the realm, and put down the local disorders which had been endemic for the last twenty*

years. Moreover, when the war with Scotland recommenced he gave the English a taste of victory such as they had not enjoyed since Falkirk. Robert Bruce was now dead and his throne was occupied by the young David II., whose factious nobles were occupied in civil strife when, in 1332, a pretender made a snatch at the Scottish throne. This was Edward, the son of John Baliol, an adventurous baron who collected all the " disinherited " Scots lords, the members of the old English faction who had been expelled by Bruce, and invaded the realm at their head. He beat the regent Mar at the battle of Dupplin, seized Perth and Edinburgh, and crowned himself at

Scone. But knowing that his seat was precarious he did homage to the English king, and made him all the promises that his father had given to Edward I. The temptation was too great for the young king to refuse; he accepted the homage, and offered the aid of his arms. It was soon required, for Baliol was ere long expelled from Scotland. Edward won the battle of Halidon Hill (July 19, J 333) — where he displayed considerable tactical skill — captured Berwick, and reconquered a considerable portion of Scotland for his vassal. Unfortunately for himself he made the mistake of requiring too much from Baliol — forcing him to cede Lothian, Tweeddale and the larger part of Galloway, and to promise a tribute. These terms so irritated the Scots, who had shown signs of submission up to this moment, that they refused to accept the pretender, and kept up a long guerilla warfare which ended in his final expulsion. But the fighting was all on Scottish ground, and Edward repeatedly made incursions, showy if not effective, into the very heart of the northern realm; on one occasion he reached Inverness unopposed. He held Perth till 1339, Edinburgh till 1341, and was actually in possession of much Scottish territory when his attention was called off from this minor war to the greater question of the struggle with France. Meanwhile he had acquired no small military reputation, had collected a large body of professional soldiers whose experience was to be invaluable to him in the continental war, and had taught his army the new tactics which were to win Crecy and Poitiers. For the devices employed against the Scottish " schiltrons " of pikemen at Dupplin and Halidon, were the same as those which won all the great battles of the Hundred Years' War— the combination of archery, not with cavalry (the old system of Hastings and Falkirk) , but with dismounted men- at-arms. The nation, meanwhile prosperous, not vexed by over- much taxation, and proud of its young king, was ready and willing to follow him into any adventure that he might indicate.

IV. The Hundred Years' War (1337-1453)

Wars between England and France had been many, since William the Conqueror first linked their fortunes together by adding his English kingdom to his Norman duchy. _ .

They were bound to recur as long as the kings who the ruled on this side of the Channel were possessed of Hundred continental dominions, which lay as near, or nearer, to ?ˆ srs ' their hearts than their insular realm. While the king- dom of France was weak, monarchs like Henry II. and Richard I. might dream of extending their transmarine possessions to the detriment of their suzerain at Paris. When France had grown strong, under Philip Augustus, the

house of Plantagenet still retained a broad territory in Gascony and Guienne, and the house of Capet could not but covet the possession of the largest sur- viving feudal appanage which marred the solidarity of their kingdom. There had been a long interval of peace in the 13th century, because Henry III. of England was weak, and Louis IX. of France an idealist, much more set on forwarding the welfare of Christendom than the expansion of France. But the inevitable struggle had recommenced with the accession of the unscrupulous Philip IV. Its cause was simple; France was incomplete as long as the English king ruled at Bordeaux and Bayonne, and far up the valleys of the Garonne and the Adour. From 1 293 onward Philip and his sons had been striving to make an end of the power of the Plantagenets in Aquitaine, sometimes by the simple argument of war, more frequently by the insidious process of encroaching on ducal rights, summoning

litigants to Paris, and encouraging local magnates and cities alike to play off their allegiance to their suzerain against that to their immediate lord. Both in the time of Edward II. and in that of his son active violence had several times been called in to aid legal chicanery. Fortunately for the duke of Guienne the majority of his subjects had no desire to become French- men; the Gascons felt no national sympathy with their neigh- bours of the north, and the towns in especial were linked to England by close ties of commerce, and had no wish whatever to break off their allegiance to the house of Plantagenet. The English rule, if often weak, had never proved tyrannical, and they had a great dread of French taxes and French officialism. But there were always individuals, more numerous among the noblesse than among the citizens, whose private interests im- pelled them to seek the aid of France.

The root of the Hundred Years' War, now just about to commence, must be sought in the affairs of Guienne, and not in any of the other causes which complicated and obscured the outbreak of hostilities. These, however, were sufficiently im- portant in themselves. The most obvious was the aid which Philip VI. had given to the exiled David Bruce, when he was driven out of Scotland by Edward and his ally Baliol. The English king replied by welcoming and harbouring Robert of Artois, a cousin whom Philip VI. had expelled from France.

He also made alliances with several of the dukes and counts of the Netherlands, and with the emperor Louis the Bavarian, obviously with the intention of raising trouble for France on her northern and eastern frontiers.

It was Philip, however, who actually began the war, by declar- ing Guienne and the other continental dominions of Edward III. forfeited to the French crown, and sending out a fleet ofthe'war. wmcn ravaged the south coast of England in 1337. In return Edward raised a claim to the throne of France, not that he had any serious intention of pressing it — for throughout his reign he always showed himself ready to barter it away in return for sufficient territorial gains — but because such a claim was in several ways a useful asset to him both in war and in diplomacy. It was first turned to account when the Flemings, who had scruples about opposing their liege lord the king of France, found it convenient to discover that, since Edward was the real king and not Philip, their allegiance was due in the same direction whither their commercial interests drew them. Led by the great demagogue dictator, Jacob van Artevelde, they became the mainstay of the English party in the Netherlands.

Edward's claim — such as it was — rested on the assertion that his mother, Isabella, was nearer of kin to her brother Charles Edward IV. , the last king of the main line of the house of Capet, ///. and than was Charles's cousin Philip of Valois. The French the French l aW y ers ruled that heiresses could not succeed to the crown. crown themselves, but Edward pleaded that they could nevertheless transmit their right to their sons. He found it convenient to forget that the elder brother of Charles IV., King Louis X., had left a daughter, whose son, the king of Navarre, had on this theory a title preferable to his own. This prince, he said, had not been born at the time of his grand- father's death, and so lost any rights that might have passed to him had he been alive at that time. A far more fatal bar to Edward's claim than the existence of Charles of Navarre was the fact that the peers of France, when summoned to decide the succession question nine years before, had decided that Philip of Valois had the sole valid claim to the crown, and that Edward had then done homage to him for Guienne. If he pleaded that in 1328 he had been the mere tool of his mother and Mortimer, he could be reminded of the unfortunate fact that in 1331, after he had crushed Mortimer, and taken the power into his own hands, he had deliberately renewed his oath to King Philip.

Edward's claim to the French crown embittered the strife in a most unnecessary fashion. It was an appeal to every dis- contented French

vassal to become a traitor under a plausible show of loyalty, and from first to last many such persons utilized it. It also gave Edward an excuse for treating every loyal

Battle of Sluys.

Frenchman as guilty of treason, and, to his shame, he did nol always refrain from employing such a discreditable device. Yet, as has been already said, he showed his consciousness of the fallacy of his claim by offering to barter it again and again during the course of the war for land or money. But he finally passed on the wretched fiction as a heritage of his descendants, to cause untold woes in the 1 5th century. It is seldom in the world's history that a hollow legal device such as this has had such long enduring and deplorable results.

In the commencement of his continental war Edward took little profit either from his assumption of the French royal title, or from the lengthy list of princes of the Low Countries whom he enrolled beneath his banner. His two land- campaigns of 1339 and 1340 led to no victories or conquests, but cost enormous sums of money. The Netherland allies brought large contingents and took high pay from the king, but they showed neither energy nor enthusiasm in his cause. When Philip of Valois refused battle in the open, and confined his operations to defending fortified towns, or stockading himself in entranched camps, the allies drifted off, leaving the king with his English troops in force too small to accomplish anything. The sole achievement of the early years of the war which was of any profit to Edward or his realm was the great naval triumph of Sluys (June 24, 1340), which gave the English the command of the sea for the next twenty years. The French king had built or hired an enormous fleet, and with it threatened to invade England. Seeing that he could do nothing on land while his com- munications with the Low Countries were endangered by the existence of this armada, Edward levied every ship that was to be found, and brought the enemy to action in the Flemish harbour of Sluys. After a day of desperate hand to hand fighting — for the vessels grappled and the whole matter was settled by boarding — the French fleet was annihilated. Hence- forth England was safe from coast raids, could conduct her commerce with Flanders without danger, and could strike with- out difficulty at any point of the French littoral. But it was not for some years that Edward utilized the advantage that Sluys had given him. As long as he persevered in the attempt to conduct the invasion of the northern frontier of France he achieved nothing.

Such schemes were finally abandoned simply because the king

discovered that his allies were worthless and that his money was all spent. On his return from Flanders in 1340 he became involved in an angry controversy with his cr j sjs _ ministers, whom he accused, quite unjustly, of wasting Trial of his revenue and wrecking his campaign thereby. He Arch- imprisoned some of them, and wished to try his late stnutord chancellor, Archbishop Stratford, for embezzlement, in the court of the exchequer. But the primate contended very vigorously for the right to be tried before his peers, and since the king could get no subsidies from his parliament till he acknowledged the justice of this claim, he was forced to concede it. Stratford was acquitted — the king's thriftlessness and not the chancellor's maladministration had emptied the treasury. Edward drifted on along the path to financial ruin till he actually went bankrupt in 1345, when he repudiated his debts, and ruined several great Italian banking houses, who had been unwise enough to continue lending him money to the last. The Flemings were also hard hit by this collapse of the king's credit, and very naturally lost their enthusiasm for the English alliance. Van Artevelde, its chief advocate, was murdered by his own towns- men in this same year.

The second act of the Hundred Years' War, after King Edward haff abandoned in despair his idea of invading France from the side of the Netherlands, was fought out in another quarter — the duchy of Brittany. Here a war of Brittany. succession had broken out in which (oddly enough) . Edward took up the cause of the pretender who had male descent, while Philip supported the one who represented a female line — each thus backing the theory of heritage by which his rival claimed the throne of France. By espousing the cause of John of Montfort Edward obtained a good foothold on the

flank of France, for many of the Breton fortresses were put into his hands. But he failed to win any decisive advantage thereby over King Philip. It was not till 1346, when he adopted the new policy of trusting nothing to allies, and striking at the heart of France with a purely English army, that Edward found the fortune of war turning in his favour.

In this year he landed in Normandy, where the English banner had not been seen since the days of King John, and executed a

destructive raid through the duchy, and up the Seine, invades ^ ^ e a l most reached the gates of Paris. This brought France. out the king of France against him, with a mighty

host, before which Edward retreated northward, apparently intending to retire to Flanders. But after crossing the Somme he halted at Crecy, near Abbeville, and offered

battle to the pursuing enemy. He fought relying on Crecy. tne tactics which had been tried against the Scots at

Dupplin and Halidon Hill, drawing up his army with masses of dismounted men-at-arms flanked on either side by archery. This array proved as effective against the disorderly charges of the French noblesse as it had been against the heavy columns of the Scottish pikemen. Fourteen times the squadrons of King Philip came back to the charge; but mowed down by the arrow-shower, they seldom could get to handstrokes with the English knights, and at last rode off the field in disorder. This astonishing victory over fourfold numbers was no mere chival- rous feat of arms, it had the solid result of giving the victors a

foothold in northern France. For Edward took his Calais ° arm Y to beleaguer Calais, and after blockading it for*

nearly a year forced it to surrender. King Philip, after his experience at Crecy, refused to fight again in order to raise the siege. From henceforth the English possessed a secure landing-place in northern France, at the most convenient point possible, immediately opposite Dover. They held it for over two hundred years, to their own inestimable advantage in every recurring war.

The years 1345-1347 saw the zenith of King Edward's pros- perity; in them fell not only his own triumphs at Crecy and

Calais, but a victory at Auberoche in Perigord won Nevnie°'s by his cousin Henry of Lancaster, which restored Cross. many long-lost regions of Guienne to the English

suzerainty (Oct. 21, 1345), and another and more famous battle in the far north. At Neville's Cross, near Durham, the lords of the Border defeated and captured David Bruce, king of Scotland (Oct. 17, 1346). The loss of their king and the destruction of a fine army took the heart out of the resistance of the Scots, who for many years to come could give their French allies little assistance.

In 1347 Edward made a short truce with King Philip: even after his late victories he felt his strength much strained, his Trace with treasury being empty, and his army exhausted by the France. year-long siege of Calais. But he would have returned V" > t ? lack to the struggle without delay had it not been for

the dreadful calamity of the " Black Death," which fell upon France and England, as upon all Europe, in the years 1348-1340. The disease, on which the 14th century bestowed this name, was the bubonic plague, still familiar in the East. After devastating western Asia, it reached the Medi- terranean ports of Europe in 1347, and spread across the con- tinent in a few months. It was said that in France, Italy and England a third of the population perished, and though this estimate may be somewhat exaggerated, local records of un- impeachable accuracy show that it cannot be very far from the truth. The bishop's registers of the diocese of Norwich show that many parishes had three and some four successive vicars admitted in eighteen months. In the manor rolls it is not un- common to find whole families swept away, so that no heir can be detected to their holdings. Among the monastic orders, whose crowded common life seems to have been particularly favourable to the spread of the plague, there were cases where a whole com- munity, from the abbot down to the novices, perished. The upper classes are said to have suffered less than the poor; but the king's daughter Joan and two archbishops of Canterbury

were among the victims. The long continuance of the visitation, which as a rule took six or nine months to work out its virulence in any particular spot, seems to have cowed and demoralized society. Though it first spread from the ports of Bristol and Weymouth in the summer of 1348, it had not finished its de- struction in northern England till 1350, and only spread into Scotland in the summer of that year.

When the worst of the plague was over, and panic had died down, it was found that the social conditions of England had been considerably affected by the visitation. Thecondi- Economic tion of the realm had been stable and prosperous during and social the earlier years of Edward III., the drain on its re- effects of sources caused by heavy war-taxationhavingbeenmore (?" f h Iack than compensated by the increased wealth that arose from growing commerce and developing industries. The victory of Sluys, which gave England the command of the seas, had been a great landmark in the economic no less than in the naval history of this island. But the basis of society was shaken by the Black Death; the kingdom was still

essentially an agri- cultural community, worked on the manorial system; and the sudden disappearance of a third of the labouring hands by which that system had been maintained threw everything into disorder. The landowners found thousands of the crofts on which their villeins had been wont to dwell vacant, and could not fill them with new tenants. Even if they exacted the full rigour of service from the survivors, they could not get their broad demesne lands properly tilled. The landless labourers, who might have been hired to supply the deficiency, were so reduced in numbers that they could command, if free competition prevailed, double and triple rates of payment, compared with their earnings in the days before the plague. Hence there arose, almost at once, a bitter strife between the lords of manors and the labouring class, both landholding and landless. The lords wished to exact all possible services from the former, and to pay only the old two or three pence a day to the latter. The villeins, as hard hit as their masters, resented the tightening of old duties, which in some cases had already been commuted for small money rents during the prosperous years preceding the plague. The landless men formed combinations, disputed with the landlords, and asked and often got twice as much as the old rates, despite of the murmurings of the employer.

After a short experience of these difficulties the king and council, whose sympathies were naturally with the landholders, issued an ordinance forbidding workmen of any kind to demand more than they had been wont to receive st ˆ tute of before 1348. This was followed up by the famous Labourers. Statute of Labourers of 1351, which fixed rates for all wages practically identical with those of the times before the Black Death. Those workmen who refused to accept them were to be imprisoned, while employers who went behind the backs of their fellows and secretly paid higher sums were to be punished by heavy fines. Later additions to the statute were devised to terrorize the labourer, by adding stripes and branding to his punishment, if he still remained recalcitrant or absconded. And landowners were empowered to seize all vagrant able-bodied men, and to compel them to work at the statutory wages. As some compensation for the low pay of the workmen, parliament tried to bring down the price of commodities to their former level, for (like labour) all manufactured articles had gone up immensely in value.

Thirty years of friction followed, while the parliament, and the ruling classes tried in a spasmodic way to enforce the statute, and the peasantry strove to evade it. It proved impossible to carry out the scheme; the labourers were too many and too cunning to be crushed. If driven over hard they absconded to the towns, where hands were

needed as much as in the country- side, or migrated to districts where the statute was laxly ad- ministered. Gradually the landowners discovered that the only practical way out of their difficulties was to give up the old custom of working the manorial demesne by the forced labour of their villeins, and to cut it up into farms which were rented out to free tenants, and cultivated by them. In the course of two

generations the " farmers " who paid rent for these holdings became more and more numerous, and demesne land tilled by villein-service grew more and more rare. But enough old- fashioned landlords remained to keep up the struggle with the peasants to the end of the 14th century and beyond, and the number of times that the Statute of Labourers was re-enacted and recast was enormous. Nevertheless the struggle turned gradually to the advantage of the labourer, and ended in the creation of the sturdy and prosperous farming yeomanry who were the strength of the realm for several centuries to come.

One immediate consequence of the " Black Death " was the renewal of the truce between England and France by repeated agreements which lasted from 1347 to 1355. During this interval Philip of France died, in 1350, and was succeeded by his son John. The war did not entirely cease, but became local and spasmodic. In Brittany the factions which supported the two claimants to the ducal title were so embittered that they never laid down their arms. In 1351 the French noblesse of Picardy, apparently without their master's knowledge or consent, made an attempt to surprise Calais, which was beaten off with some difficulty by King Edward in person. There was also con- stant bickering on the borders of Guienne. But the main forces Renewaiot on both sides were not brought into action till the the war series of truces ran out in 1353. From that time with onward the English took the offensive with great

France. vigour. Edward, prince of Wales, ravaged Languedoc as far as the Mediterranean, while his younger brother John of Gaunt, duke of Lancaster, executed a less ambitious raid in Picardy and Artois. In the south this campaign marked real progress, not mere objectless plunder, for it was followed by the reconquest of great districts in

Perigord and the Agenais, which had been lost to England since the 13th century. A similar double invasion of France led to even greater results in the following year, 1356. While Lancaster landed in Normandy, and with the aid of local rebels occupied the greater part of the peninsula of the Cotentin, the prince of Wales accomplished greater things on the borders of Aquitaine. After executing a great circular sweep through Perigord, Limousin and Berry, he was returning to Bordeaux laden with plunder, when he was

intercepted by the king of France near Poitiers. The Poitiers. battle that followed was the most astonishing of all

the English victories during the Hundred Years' War. The odds against the prince were far heavier than those of Crecy, but by taking up a strong position and using the national tactics which combined the use of archery and dismounted men-at- arms, the younger Edward not merely beat off his assailants in a long defensive fight, but finally charged out upon them, scattered them, and took King John prisoner (Sept. 19, 1356).

This fortunate capture put an enormous advantage in the hands of the English; for John, a facile and selfish prince, was The ready to buy his freedom by almost any concessions.

English He signed two successive treaties which gave such ravage advantageous terms to Edward III. that the dauphin France. Charles, who was acting as regent, and the French states-general refused to confirm them. This drove the English king to put still further pressure on the enemy; in 1359 he led out from Calais the largest English army that had been seen during the war, devastated all northern France as far as Reims and the borders of Burgundy, and then — 'Continuing the cam- paign through the heart of the winter — presented himself before the gates of Paris and ravaged the lie de France. This brought the regent Charles and his counsellors to the verge of despair;

they yielded, and on the 8th of May 1360, signed an Bretleny agreement at Bretigny near Chartres, by which nearly

all King Edward's demands were granted. These preliminaries were ratified by the definitive peace of Calais (Oct. 24, 1360), which brought the first stage of the Hundred Years' War to an end.

By this treaty King Edward formally gave up his claim to the French throne, which he had always intended to use merely as an asset for

barter, and was to receive in return not only a sum of 3,000,000 gold crowns for King John's personal ransom, but

Submis- sion of David of Scotland.

an immense cession of territory which — in southern France at least — almost restored the old boundaries of the time of Henry II. The duchy of Aquitaine was reconstructed, so as to include not only the lands that Edward had inherited, and his recent conquests, but all Poitou, Limousin, Angoumois, Quercy, Rouergue and Saintonge — a full half of France south of the Loire. This vast duchy the English king bestowed not long after on his son Edward, the victor of Poitiers, who reigned there as a vassal-sovereign, owing homage to England but ad- ministering his possessions in his own right. In northern France, Calais and the county of Guines, and also the isolated county of Ponthieu, the inheritance of the wife of Edward I., were ceded to the English crown. All these regions, it must be noted, were to be held for the future free of any homage or acknowledgment of allegiance to an overlord, " in perpetuity, and in the manner in which the kings of France had held them." There was to be an end to the power of the courts of Paris to harass the duke of Aquitaine, by using the rights of the suzerain to interfere with the vassal's subjects. It was hoped that for the future the insidious legal warfare which had been used with such effect by the French kings would be effectually prevented.

To complete the picture of the triumph of Edward III. at this, the culminating point of his reign, it must be mentioned that some time before the peace of Calais he had made terms with Scotland. David Bruce was to cede Roxburgh and Berwick, but to keep the rest of his dominions on condition of paying a ransom of 100,000 marks. This sum could never be raised, and Edward always had it in his power to bring pressure to bear on the king of Scots by demand- ing the instalments, which were always in arrear. David gave no further trouble; indeed he became so friendly to England that he offered to proclaim Lionel of Clarence, Edward's second son, as his heir, and would have done so but for the vigorous opposition of his parliament.

The English people had expected that a sort of Golden Agt would follow the conclusion of the peace with Scotland and France. Freed from the war-taxes which had vexed them for the last twenty years, they would be able Bconomi ° to repair the ravages of the Black Death, and to de- 'England.'" velop the commercial advantages which had been won at Sluys, and secured by the dominion of the seas which they had held ever since. In some respects this

expectation was not deceived; the years that followed 1360 seem to have been pros- perous at home, despite the continued friction arising from the Statute of Labourers. The towns would seem to have fared better than the countryside, partly indeed at its expense, for the discontented peasantry migrated in large numbers to the centres of population where newly-developed manufactures were calling for more hands. The weaving industry, introduced into the eastern counties by the king's invitation to Flemish settlers, was making England something more than a mere producer of raw material for export. The seaports soon recovered from their losses in the Black Death, and English shipping was beginning to appear in the distant seas of Portugal and the Baltic. Nothing illustrates the growth of English wealth better than the fact that the kingdom had, till the time of Edward III., contrived to conduct all its commerce with a currency of small silver, but that within thirty years of his introduction of a gold coinage in 1343, the English " noble " was being struck in enormous quantities. It invaded all the markets of western Europe, and became the prototype of the gold issues of the Netherlands, Scotland, and even parts of Germany. It is in the latter years of Edward III. that we find the first forerunners of that class of English merchant princes who were to be such a marked feature in the succeeding reigns. The Poles of Hull, whose descendants rose in three generations to ducal rank, were the earliest specimens of their class. The poet Chaucer may serve as a humbler example of the rise of the burgher class — the son of a vintner, he became the father of a knight, and the ancestor, through female descents, of many baronial families. The second half of the 14th century is the first period in English history in which we can detect a distinct rise in the importance

of the commercial as opposed to the landed interest. The latter, hard hit by the manorial difficulties that followed the plague of 1348-1349, found their rents stationary or even diminishing, while the price of the commodities from which the former made their wealth had permanently risen. As to intellectual vigour, the age that produced two minds of such marked origin- ality in different spheres as Wycliffe and Chaucer must not be despised, even if it failed to carry out all the promise of the 13th century.

For a few years after the peace of 1360 the political influence of Edward III. in western Europe seemed to be supreme. France, prostrated by the results of the English raids, by English peasant revolts, and municipal and baronial turbulence, Prance, did not begin to recover strength till the thriftless king John had died (1364) and had been succeeded by his capable if unchivalrous son Charles V. Yet the state of the English dominions on the continent was not satisfactory; in building up the vast duchy of Aquitaine Edward had made a radical mistake. Instead of contenting himself with creating a homogeneous Gascon state, which might have grown together into a solid unit, he had annexed broad regions which had been for a century and a half united to France, and had been entirely assimilated to her. From the first Poitou, Quercy, Rouergue and the Limousin chafed beneath the English yoke; the noblesse in especial found the comparatively orderly and constitutional governance to which they were subjected most intolerable. They waited for the first opportunity to revolt, and meanwhile murmured against every act of their duke, the prince of Wales, though he did his best to behave as a gracious sovereign.

The younger Edward ended by losing his health and his wealth in an unnecessary war beyond the Pyrenees. He was persuaded by the exiled Peter the Cruel, king of Castile, to restore The Black ⟍ m to the throne which he had forfeited by his mis- Spain. government. In 1367 he gathered a great army, entered Castile, defeated the usurper Henry of Trasta- mara at the battle of Najera, and restored his ally. But Peter, when once re-established as king, forgot his obligations and left the prince burdened with the whole expense of the campaign. Edward left Spain with a discontented and unpaid army, and had himself contracted the seeds of a disease which was to leave him an invalid for the rest of his life. To pay his debts he Was obliged to resort to heavy taxation in Aquitaine, which gave his discontented subjects in Poitou and the other outlying districts an excuse for the rebellion that they had been for some time meditating. In 1368 his greatest vassals, the counts of Armagnac, Perigord and Comminges, displayed their disloyalty by appeal- ing to the king of France as their-suzerain against the legality of Edward's imposts. The French overlordship had been formally abolished by the treaty of 1360, so this appeal amounted to open rebellion. And when Charles V. accepted it, and cited Edward to appear before his parlement to answer the complaints of the counts, he was challenging England to renewed war. He found a preposterous excuse for repudiating the treaty by which he was bound, by declaring that some details had been omitted in its formal ratification.

The Hundred Years' War, therefore, broke out again in 1369, after an interval of nine years. Edward III. assumed once more Renewal tne title °f king of Franee, while Charles V., in the of the war usual style, declared that the whole duchy of Aqui- wlth taine had been forfeited for treason and rebellion on

France. the part of its present holder. The secord period of war, which was to last till the death of the English king, and for some years after, was destined to prove wholly disastrous to England. All the conditions had changed since 1360. Edward, though only in his fifty-seventh year, was entering into a pre- mature and decrepit old age, in which he became the prey of unworthy favourites, male and female. The men of the 14th century, who commanded armies and executed coups d'Uat at eighteen, were often worn out by sixty. The guidance of the war should have fallen into the hands of his eldest son, the victor of Poitiers and Najera, but the younger Edward had never re- covered from the fatigues of his Spanish campaign; his disease

having developed into a form of dropsy, he had become a con- firmed invalid and could no longer take the field. The charge of the military operations of the English armies had passed to John of Gaunt, duke of Lancaster, the king's younger son, a prince far inferior in capacity to his father and brother. Though not destitute of good impulses Lancaster was hasty, improvident and obstinate; he was unfortunate in his choice of friends, for he allied himself to all his father's unscrupulous dependents. He was destitute of military skill, and wrecked army after army by attempting hard tasks at inappropriate times and by mistaken methods. Despite of all checks and disasters he remained active, self-confident and ambitious, and, since he had acquired a com- plete control over his father, he had ample opportunity to mismanage the political and military affairs of England.

Lancaster's strategy, in the early years of the renewed war, consisted mainly of attempts to wear down the force of France by devastating raids; he hoped to provoke the enemy to battle by striking at the heart of his realm, but f the war. never achieved his purpose. Warned by the disasters of Crecy and Poitiers, Charles V. and his great captain Bertrand du Guesclin would never commit themselves to an engagement in the open field. They let the English invaders pass by, garrisoning the towns but abandoning the countryside. Since Lancaster, in his great circular raids, had never the leisure to sit down to a siege — generally a matter of long months in the 14th century — he repeatedly crossed France leaving a train of ruined

villages behind him, but having accomplished nothing else save the exhaustion of his own army. For the French always followed him at a cautious distance, cutting off his stragglers, and restricting the area of his ravages by keeping flying columns all around his path. But while the duke was executing useless marches across France, the outlying lands of Aquitaine were falling away, one after the other, to the enemy. The limit of the territory which still remained loyal was ever shrinking, and what was once lost was hardly ever regained. Almost the only reconquest made was that of the city of Limoges, which was stormed in September 1370 by the troops of the Black Prince, who rose from his sick-bed to strike his last blow at the rebels. His success did almost as much harm as good to his cause, for the deliberate sack of the city was carried out with such ruthless severity that it roused wild wrath rather than terror in the neighbouring regions. Next spring the prince returned to England, feeling himself physically unable to ad- minister or defend his duchy any longer.

The greater part of Poitou, Quercy and Rouergue had been lost, and the English cause was everywhere losing ground, when a new danger was developed. Since Sluys the enemy had never disputed the command of the seas; but in f "verses 1372 a Spanish fleet- joined the French, and destroyed off La Rochelle a squadron which was bringing reinforcements for Guienne. The disaster was the direct result of the campaign of Najera— for Henry of Trastamara. who had long since de- throned and slain his brother Peter the Cruel, remained a Con- sistent foe of England. From this date onward Franco-Spanish fleets were perpetually to be met not only in the Bay of Biscay but in the Channel; they made the voyage to Bordeaux unsafe, and often executed descents on the shores of Kent, Sussex, Devon and Cornwall. It was to no effect that, in the year after the battle of La Rochelle,Lancaster carried out the last, the most expensive, and the most fruitless of his great raids across France. He marched from Calais to Bordeaux, inflicted great misery on Picardy, Champagne and Berry, and left half his army dead by the way.

This did not prevent Bertrand du Guesclin from expelling from his dominions John of Brittany, the one ally whom King Edward possessed in France, or from pursuing a consistent career of petty conquest in the heart of Aquitaine. By 1374 little was left of the great possessions which the English had held beyond the Channel save Calais, and the coast slip from Bordeaux to Bayonne, which formed the only loyal part of the duchy of Guienne. Next year King Edward sued for peace — he failed to obtain it, finding the French terms too hard for acceptance—

but a truce at least was signed at Bruges (Jan. 1375) which endured till a few weeks before his death.

These two last years of Edward's reign were filled with an episode of domestic strife, which had considerable constitutional

importance. The nation ascribed the series of disasters strife" " wn i cn na d filled the space from 1369 to 1375 entirely

to the maladministration of Lancaster and the king's favourites, failing to see that it was largely due to the mere fact that England was not strong enough to hold down Aquitaine, when France was administered by a capable king and served by a great general. Hence there arose, both in and out of parliament, a violent agitation for the removal of Lancaster from power, and the punishment of the favourites, who were believed, with complete justification, to be misusing the royal name for their own private profit. Among the leaders of this agitation were the clerical ministers whom John of Gaunt had expelled from office in 1371, and chiefly William of Wykeham, bishop of Win- chester, the late chancellor; they were helped by Edmund Mortimer, earl of March, a personal enemy of Lancaster, and could count on the assistance of the prince of Wales when he was well enough to take a part in politics. The greater part of the House of Commons was on their side, and on the whole they may be regarded as the party of constitutional protest against maladministration. But there was another movement on foot at the same time, which cut across this political agitation in the most bewildering fashion. Protests against the corruption of the Agitation Church and the interference of the papacy in national against affairs had always been rife in, England. At this the moment they were more prevalent than ever, largely

Church. . J t it. ■ v.- u 4-v. 4-

m consequence of the way in which the popes at Avignon had made themselves the allies and tools of the kings of France. The Statutes of Praemunire and Provisors had been passed a few years before (1351-1365) to check papal pretensions. There was a strong anti-clerical party, whose practical aim was to fill the coffers of the state by large measures of disendowment and confiscations of Church

property. The intellectual head of this party at the time was John Wycliffe, a famous Oxford

teacher, and for some time master of Balliol College.

In his lectures and sermons he was always laying stress on the unsa tisf actory state of the national church and the infamous corruption of the papacy. The doctrine which first made him famous, and commended him to all members of the anti-clerical faction, was that unworthy holders of spiritual endowments ought to be dispossessed of them, because " dominion " should depend on " grace." Churchmen, small and great, as he held, had been corrupted, because they had fallen away from the early Christian idea of apostolic poverty. Instead of discharging their proper functions, bishops and abbots had become statesmen or wealthy barons, and took no interest in anything save politics. The monasteries, with their vast possessions, had become cor- porations of landlords, instead of associations for prayer and good works. The papacy, with its secular ambitions, and its insatiable greed for money, was the worst abuse of all. A bad pope, and most popes were bad, was the true Antichrist, since he was always overruling the divine law of the scriptures by his human ordinances. Every man, as Wycliffe taught — using the feudal analogies of contemporary society — is God's tenant-in- chief, directly responsible for his acts to his overlord; the pope is always thrusting himself in between, like a mesne-tenant, and destroying the touch between God and man by his interference. Sometimes his commands are merely presumptuous; sometimes — as when, for example, he preaches crusades against Christians for purely secular reasons — they are the most horrible form of blasphemy. Wycliffe at a later period of his life developed views on doctrinal matters, not connected with his original thesis about the relations between Church and State, and foreshadowed most of the leading tenets of the reformers of the 16th century. But in 1376-1377 he was known merely as the outspoken critic of the " Caesarean clergy " and the papacy. He had a following of enthusiastic disciples at Oxford, and scattered adherents both among the burghers and the knighthood, the nucleus of the party that afterwards became famous as the Lollards. But they had

Wycliffe.

not yet differentiated themselves from the body of those who were merely anti-clerical, without being committed to any theories of religious reform.

Since Wycliffe was, above all things, the enemy of the political clergy of high estate, and since those clergy were precisely the leaders of the attack upon John of Gaunt, it came to pass that hatred of a common foe drew the duke and J ~ hn ° f . the doctor together for a space. There was a strange wycliffe. alliance between the advocate of clerical reform, and the practical exponent of secular misgovernment. The only point on which they were agreed was that it would be highly desirable to strip the Church of most of her endowments, in order to fill the exchequer of the state. Lancaster hoped to use Wycliffe as his mouthpiece against his enemies ; Wycliffe hoped to see Lancaster disendowing bishops and monasteries and defy- ing the pope. Hence the attempt of the political bishops to get Wycliffe condemned as a heretic became inextricably mixed with the attempt of the constitutional party, to which the bishops belonged, to evict the duke from his position of first councillor to the king and director of the policy of the realm.

*The struggle began in the parliament of 1376, called by the anti-Lancastrian party the " Good Parliament." Headed by the earl of March, William Courtenay, bishop of London, Tne and Sir Peter de la Mare, the daring speaker of the "Good House of Commons, the duke's enemies began their ˆent" campaign by accusing the king's ministers and favourites of corruption. Here they were on safe ground, for the misdeeds of Lord Latimer — the king's chamberlain, Lord Neville — his steward, Richard Lyons — his financial agent, and Alice Perrers — his greedy and shameless mistress, had been so flagrant that it was hard for Lancaster to overthrow defend them. In face of the evidence brought forward of the the old king and his son had to abandon their friends 1 ? n * s ri to the angry parliament. Latimer and Lyons were condemned to imprisonment and forfeiture of their goods, Alice Perrers was banished from court. Encouraged by this victory, the parliament passed on to constitutional reforms, forced on the king a council of twelve peers nominated by themselves, who were to exercise over him much the same control that the lords ordainers had held over his father, and ˆ""aJ""" compelled him to assent to a long list of petitions reforms. which, if properly carried out, would have removed most of the practical grievances of the nation. Having so done they dispersed, not guessing that Lancester had yielded so easily because he was set on undoing their work the moment that they were gone.*

This, however, was the case; after the shortest of intervals the duke executed something like a coup d'itat. In his father's name he released Latimer and Lyons, dismissed the , h , council of twelve, imprisoned Peter de la Mare, daunt re- sequestrated the temporalities

of Bishop Wykeham, establishes and sent the earl of March out of the realm. Alice tbe r °y al Perrers took possession again of the king, and all his power ‘ corrupt courtiers came back to him. A royal edict declared the statutes of the ” Good Parliament ” null and void. Lancaster would never have dared to defy public opinion and challenge the constitutional party to a life-and-death struggle in this fashion, had it not teen that his brother the prince of Wales had died while the ” Good Parliament ” was sitting; thus the opposition had been deprived of ^ / “°’ their strongest support. The prince’s heir was a mere prince. child, Richard of Bordeaux, aged only nine. It was feared by some that Duke John might carry his ambitions so far as to aim at the throne — he could do what he pleased with his doting father, and flaws might have been picked in the marriage of the Black Prince and his wife Joan of Kent, who were cousins, and therefore within the “prohibited degrees.” As a matter of fact Lancaster was a more honest man than his enemies sus- pected; he hastened to acknowledge his little nephew’s rights, acknowledged him as prince of Wales, and introduced him as his grandfather’s heir before the parliament of January 1377.*

The character of this body was a proof of the great strength

of the royal name and power even in days when parliamentary institutions had been long in existence, and were supposed to act as a check on the crown. To legalize his arbitrary acts Duke John dared to summon the estates together, after he had issued stringent orders to the sheriffs to exclude his enemies and return his friends when the members for the Commons were chosen. He obtained a house of the complexion that he desired, and having a strong following among the peers actually succeeded in undoing all the work of 1376. No sign of trouble or rebellion followed, the opposition being destitute of a fighting leader. March had left the realm; Bishop Wykeham showed an unworthy sub- servience by suing for pardon through the mediation of Alice Perrers. Only Bishop Courtenay refused to be terrorized; he chose this moment to open a campaign against the duke’s ally, John Wycliffe, who was arraigned for heresy before the ecclesi- astical courts. His trial, however, ended in a scandalous fiasco. Lancaster and his friend Lord Percy came to St Paul’s, and so insulted and browbeat the bishop, that the proceedings de- generated

into a riot, and reached no conclusion (Feb. 19). Courtenay dared not recommence them, and Lancaster ruled as he pleased till his father, five months later, died. Deserted by his worthless courtiers and plundered on his death-

?t s ‘ 4 °’ bed by his greedy mistress, the victor of Sluys and Edward _ J , . ° , , , .• r

III. Crecy sank into an unhonoured grave. It was a relief

to the nation that he was gone. Yet there was a general feeling that chaos might follow. If Lancaster should justify the malevolent rumours that were afloat by making a snatch at the crown, the last state of the realm might be worse than the first.

Duke John, however, was a better man than his enemies supposed. He was loyal to the crown according to his lights, and

showed a chivalrous self-denial that had hardly been

expected from him. He saluted his little nephew as king without a moment’s hesitation, though he was aware that with the commencement of a new reign his own dictator- ship had come to an end. The princess of Wales, in whose hands the young Richard II. was placed, had never been his friend, and was surrounded by adherents of her deceased husband, who belonged to the constitutional party. Disarmed, however, by the duke’s frank submission they wisely resolved not to push him to extremes, and the first council which was appointed to act for the new monarch was a sort of ” coalition ministry ” in which Lancaster’s followers as well as his foes were represented. For that very reason it was lacking in strength and unity of purpose, and proved lamentably incapable of dealing with the problems of the moment.

Of these the most pressing was the renewal of the French war; the truce had expired a few weeks before the death of

Edward III., and the new reign began with a series French °f military disasters. The French fleet landed in great war. force in Sussex, burnt Rye and Hastings and routed

the shire levies. Simultaneously the seneschal of Aquitaine was defeated in battle, and Bergerac, the last great town in the inland which remained in English hands, was captured by the duke of Anjou.

The first parliament of Richard II. met in October under the most gloomy auspices. It showed its temper by taking up the First work of the " Good Parliament." Lancaster's ad-

partia- herents were turned out of the council; the persons meat 0/ condemned in 1376 were declared incapable of serving

in it; Alice Perrers was sentenced to banishment

and forfeiture, and the little king was made to re- pudiate the declaration whereby his uncle had quashed the statutes of 1376 by declaring that " no act of parliament can be repealed save with parliament's consent." John of Gaunt bowed before the storm, retired to his estates, and for some time took little part in affairs of state.

Unfortunately the new government proved wholly unable either to conduct the struggle with France successfully or to pluck up courage to make a humiliating peace — the only wise course before them. The nation was too proud to accept defeat, and persevered in the unhappy attempt to reverse the

Richard. Reforms,

fortunes of war. An almost unbroken series of petty disasters marked the first three years of King Richard. The worst was the failure of the last great devastating raid which the English launched against France. Thomas of Woodstock, the youngest son of Edward III., took a powerful army to Calais, and marched through Picardy and Champagne, past Orleans, and finally to Rennes in Brittany, but accomplished nothing save the ruin of his own troops and the wasting of a vast sum of money. Meanwhile taxation was heavy, the whole nation was seething with discontent, and — what was worst — no way was visible out of the miserable situation; ministers and councillors were repeatedly displaced, but their successors always proved equally incompetent to find a remedy.

This period of murmuring and misery culminated in the Great Revolt of 1381, a phenomenon whose origins must be sought in the most complicated causes, but whose outbreak was due in the main to a general feeling that the realm oeXohot was being misgoverned, and that some one must be usi. made responsible for its maladministration. It was actually provoked by the unwise and unjust poll-tax of one shilling a head on all adult persons, voted by the parliament of Northampton in November 1380. The last poll-tax had been carefully graduated on a sliding scale so as to press

lightly'on the poorest classes; in this one a shilling for each person had to be exacted from every township, though it was provided that "the strong should help the weak " to a certain extent. But in hundreds of villages there were no " strong " residents, and the poorest cottager had to pay his three groats. The peasantry defended themselves by the simple device of understating the numbers of their families; the returns made it appear that the adult population of England had gone down from 1,355,000 to 896,000 since the poll-tax of 1379. Thereupon the government sent out commissioners to revise the returns and exact the missing shillings. Their appearance led to a series of widespread and preconcerted riots, which soon spread over all England from the Wash to the Channel, and in a few days developed into a for- midable rebellion. The poll-tax was no more than the spark which fired the mine; it merely provided a good general griev- ance on which all malcontents could unite. In the districts which took arms two main causes of insurrection may be differ- entiated; the first and the most widespread was the discontent of the rural population with the landowners and the Statute of Labourers. Their aim was to abolish all villein-service, and to wring from their lords the commutation of all manorial customs' and obligations for a small rent — fourpence an acre was gener- ally the sum suggested. But there was a simultaneous outbreak in many urban districts. In Winchester, London, St Albans, Canterbury, Bury, Beverley, Scarborough and many other places the rioting was as violent as in the countryside. Here the object of the insurgents was in most cases to break down the local oligarchy, who engrossed all municipal office and oppressed the meaner citizens; but in less numerous instances their end was to win charters from lords (almost always ecclesiastical lords) who had hitherto refused to grant them. But it must not be forgotten that there was also a tinge of purely political discontent about the rising; the insurgents everywhere proclaimed their intention to destroy " traitors," of whom the most generally condemned were the chancellor, Archbishop Sudbury, and the treasurer, Sir Robert Hailes, the two persons most responsible for the levy of the poll-tax. Often the rebels added the name of John of Gaunt to the list, looking upon him as the person ultimately responsible for the mismanagement of the war and the misgovernment of the realm. It must be added that though the leaders of the revolt were for the most part local dema- gogues, the creatures of the moment, there were among them a few fanatics like the " mad priest of Kent," John Ball, who had long preached socialist doctrines from the old text: " When Adam delved and Eve span Who was then the gentleman ? "

and clamoured for the abolition of all differences of rank, status and property. Though many clerics were found among the rebels, it does not seem that any of them were Wycliffites, or that

the reformer's teaching had played any part in exciting the peasantry at this time. No contemporary authority ascribes the rising to the Lollards.

The riots had begun, almost simultaneously in Kent and Essex: from thence they spread through East Anglia and the home counties. In the west and north there were only isolated and sporadic outbreaks, confined to a few turbulent towns. In the countryside the insurrection was accompanied by wholesale burnings of manor-rolls, the hunting down of unpopular bailiffs and landlords, and a special crusade against the commissioners of the poll-tax and the justices who had been enforcing the Statute of Labourers. There was more arson and blackmailing than murder, though some prominent persons perished, such as the judge, Sir John Cavendish, and the prior of Bury. In many regions the rising was purely disorderly and destitute of organi- zation. This was not, however, the case in Kent and London. The mob which had gathered at Maidstone and Canter- bury marched on the capital many thousands strong, headed by a local demagogue named Wat Tyler, whom they had chosen as their captain; his most prominent lieutenant was the preacher John Ball. They announced their intention of executing all " traitors," seizing the person of the king, and setting 'up a new government for the realm. The royal council and ministers showed grievous incapacity and cowardice— they made no attempt to raise an army, and opened negotiations with the rebels. While these were in progress the malcontent party in London, headed by three aldermen, opened the gates of the city to Tyler and his horde. They poured in, and, joined by the London mob, sacked John of Gaunt's palace of the Savoy, the Temple, and many other buildings, while the ministers took refuge with the young king in the Tower. It was well known that not only the capital and the neighbouring counties but all eastern England was ablaze, and the council in despair sent out the young king to parley with Tyler at Mile End. The rebels at first demanded no more

than that Richard should declare villeinage abolished, and that all feudal dues and services should be commuted for a rent of fourpence an acre. This was readily conceded, and charters were drawn up to that effect and sealed by the king. But, while the meeting was still going on, Tyler went off to the Tower with a part of his horde, entered the for- tress unopposed, and murdered the unhappy chancellor, Arch- bishop Sudbury, the treasurer, and several victims more. This was only the beginning of massacre. Instead of dispersing with their charters, as did many of the peasants, Tyler and his con- federates ran riot through London, burning houses and slaying lawyers, officials, foreign merchants and other unpopular persons. This had the effect of frightening the propertied classes in the city, who had hitherto observed a timid neutrality, and turned public opinion against the insurgents. Next day the rebel leaders again invited the king to a conference, in the open space of Smithfield, and laid before him a programme very different from that propounded at Mile End. Tyler demanded that all differences of rank and status should cease, that all church lands should be confiscated and divided up among the laity, that the game laws should be abolished, and that " no lord should any longer hold lordship except civilly." Apparently he was set on provoking a refusal, and thus getting an excuse for seizing the person of the king. But matters went otherwise than he had expected; when he waxed unmannerly, and unsheathed his dagger to strike one of the royal retinue who had dared to answer him back, the mayor of London, William Walworth, drew his cutlass and cut him down. The mob strung their bows, and were about to shoot down the king and his suite. But Richard — who showed astounding nerve and presence of mind for a lad of fourteen — cantered up to them shouting that he would be their chief and captain and would give them their rights. The conference was continued, but, while it was in progress, the mayor brought up the whole civic militia of London, who had taken arms when they saw that the triumph of the rebels meant anarchy, and rescued the king out of the hands of the mob. Seeing such a formidable body of armed men opposed to them, the insurgents dispersed— without their

reckless and ready-witted captain they were helpless (June 1 5,

1381).

This was the turning-point of the rebellion; within a few days the council had collected a considerable army, which marched through Essex scattering Such rebel bands as still held together. Kent was pacified at the same s fW™ s ' time; and Henry Despenser, the warlike bishop of the rising. Norwich, made a separate campaign

against the East Anglian insurgents, defeating them at the skirmish of North Walsham, and hanging the local leader Geoffrey Lister, who had declared himself " king of the commons " (June 25, 1381). After this there was nothing remaining save to punish the leaders of the revolt; a good many scores of them were hanged, though the vengeance exacted does not seem to have been greater than was justified by the numerous murders and burnings of which they had been guilty; the fanatic Ball was, of course, among the first to suffer. On the 30th of August the rough methods of martial law were suspended, and on the 14th of December the king issued an amnesty to all save certain leaders who had hitherto escaped capture. A parliament had been called in November; it Voted that all the charters given by the king at Mile End were null and void, no manumissions or grants of privileges could have been valid without the consent of the estates of the realm, " and for their own parts they would never consent to such, of their own free will nor otherwise, even to save themselves from sudden death."

The rebellion, therefore, had failed either to abolish villeinage in the countryside or to end municipal oligarchy in the towns, and many lords took the opportunity of the time of Decline of reaction in order to revindicate old claims over their the bondsmen. Nevertheless serfdom continued to decline manorial all through the latter years of the 14th century, and system – was growing obsolete in the 15th. This, however, was the result not of the great revolt of 1381, but of economic causes working out their inevi table' progress. The manorial system was already doomed, and the rent-paying tenant farmers, who had begun to appear after the Black Death, gradually superseded the villeins as the normal type of peasantry during the two gener- ations that followed the outbreak that is generally known as " Wat Tyler's rebellion."

King Richard, though he had shown such courage and ready resources at Smithfield, was still only a lad of fourteen. For three years more he was under the control of tutors and governors appointed by his council. Their rule M ˆf'f fe was incompetent, but the chief danger to the realm Lollards. had passed away when both Charles V. of France and his great captain Du Guesclin died in 1380. The new king at Paris was a young boy, whose councils were swayed by a knot of quarrelsome and selfish uncles; the vigour of the attack on England began to slacken. Nevertheless there was no change in the fortune of war, which continued to be disastrous, if on a smaller scale than before. The chief domestic event of the time was the attack of the clerical party on Wycliffe and his followers. The reformer had begun to develop dogmatic views, in addition to his old theories

about the relations of Church and State. When he proceeded to deny the doctrine of transubstantiation, to assert the all-sufficiency of the Scriptures as a rule of life, to denounce saint-worship, pilgrimages, and indulgences, and to declare, the pope to be Antichrist, he frightened his old supporter John of Gaunt and the politicians of the anti-clerical clique. They ceased to support him, and his followers became a sect rather than a political party. He and his disciples were expelled from Oxford, and ere long the bishops began to arrest and try them for heresy. Wycliffe himself, strange to say, was not molested. He survived to publish his translation of the.Bible and to die in peace in December 1383. But his followers were being hunted, and imprisoned or forced to recant, all through the later years of Richard II. Yet they continued to multiply, and exercised at times considerable influence; though they had few supporters among the baronage, yet among the lesser gentry and still more among the burgher class and in the universities they were strong. It was not till the next reign, when the

bishops succeeded in calling in the crown to their aid, and passed the statute De heretico comburendo, that Lollardy ceased to flourish.

King Richard meanwhile had grown to man's estate, and had resolved to take the reins of power into his own hands. He

was wayward, high-spirited and self-confident. He ˆersania w i sne d to restore the royal powers which had slipped rule, into the hands of the council and parliament during

his minority, and had small doubts of his capacity to restore it. His chosen instruments were two men whom his enemies called his " favourites," though it was absurd to apply the name either to an elderly statesman like Michael de la Pole, who was made chancellor in 1384, or to Robert de Vere, earl of Oxford, a young noble of the oldest lineage, who was the king's other confidant. Neither of them was an upstart, and both, the one from his experience and the other from his high station, were persons who might legitimately aspire to a place among the advisers of the king. But Richard wis tactless; he openly flouted his two uncles, John of Gaunt and Thomas of Woodstock, and took no pains to conciliate either the baronage Or

the commons. His autocratic airs and his ostentatious prefer- ence for his confidants — of whom he made the one earl of Suffolk . and the other marquess of Dublin— provoked both meat of lords and commons. Pole was impeached on a ground- the king's less charge of corruption and condemned, but Richard " fav ° urm at once pardoned him and restored him to favour. De

Vere was banished to Ireland, but at his master's desire omitted to leave the realm. The contemptuous disregard for the will of parliament which the king displayed brought on him a worse fate than he deserved. His youngest uncle, Thomas of Woodstock, duke of Gloucester, was a designing and ambitious prince who saw his own advantage in embittering the strife between Richard and his parliament. John of Gaunt having departed to Spain, where he was stirring up Civil strife in the name of his wife, the heiress of Peter the Cruel, Gloucester put him- self at the head of the opposition. Playing the part of the dema- gogue, and exaggerating all his nephew's petulant acts and sayings, he declared the constitution in danger, and took arms at the head of a party of peers, the earls of Warwick, Arundel and Nottingham, and Henry, earl of Derby, the son of John of Ttte Gaunt, who called themselves the lords appellant,

"lords because they were ready to " appeal " Richard's appei- councillors of treason. Public opinion was against laitt. j. ne k m g ; an(j t ne small army which his confidant

De Vere raised under the royal banner was easily scattered by Gloucester's forces at the rout of Radcot Bridge (Dec. 20, 1387). Oxford and Suffolk succeeded in escaping to France, but the king and the rest of his adherents fell into the hands of the lords appellant. They threatened for a moment to depose him, but finally placed him under the control of a council and ministers Execution chosen by themselves, and to put him in a proper of the state of terror, executed Lord Beauchamp, the judge, king's gj r Robert Tressilian, and six or seven more of his Mends. c hi e f friends. This was a piece of gratuitous cruelty, for the king, though wayward and unwise, had done nothing to justify such treatment.

To the surprise of the nation Richard took his humiliation quietly. But he was merely biding his time; he had sworn Richard revenge in his heart, but he was ready to wait long for rules con- it. For the next nine years he appeared an unexcep- stitution- tionable sovereign, anxious only to conciliate the

nation and parliament. He got rid of the ministers

ally.

imposed upon him by the lords appellant, but replaced them by Bishop Wykeham and other old statesmen against whom no objection could be raised. He disarmed Gloucester by making a close alliance with his elder uncle John of Gaunt, who had been absent in Spain during the troubles of 1387-1388, and was dis- pleased at the violent doings of his brother. His rule was mild and moderate, and he succeeded at last in freeing himself from the incubus of the French war — the

Peace with France.

source of most of the evils of the time, for it was the heavy taxation required to feed this struggle which embittered

all the domestic politics of the realm. After two long truces, which filled the years 1300-1305, a definitive peace was at last concluded, by which the English king kept Calais and the coast- strip of Guienne, from Bordeaux to Bayonne, which had never been lost to the enemy. To confirm the peace, he married Isabella, the young daughter of Charles VI. (Nov. 1396); he had lost his first wife, the excellent Anne of Bohemia, two years before.

The king seemed firmly seated on his throne — so much so that in 1395 he had found leisure for a long expedition to Ireland, which none of his ancestors had visited since King „. t ..

i ii i 11 i • • Richard

John. He compelled all the native princes to do him reduces homage, and exercised the royal authority in such a Ireland to firm manner as had never before been known in the obea,ence – island. But those who looked forward to quiet and prosperous times both for Ireland and for England were destined to be un- deceived. In 1397 Richard carried out an extradrdinary and unexpected coup d'etat, which he had evidently premeditated for many years. Having lived down his unpopularity, and made himself many powerful friends, he resolved to take his long- deferred revenge on Gloucester and the other lords appellant. He trumped ■ up a vain story that his uncle was once more conspiring against him, arrested him, and sent him over to Calais, where he was secretly murdered in

His revenge on

prison. At the same time Gloucester's two chief Gloucester

*confederates of 1387, the earls of Arundel and Warwick, **>dthe were tried and sentenced to death: the former was*

lords appellant

*actually executed, the latter imprisoned for life. The other two lords appellant, Mowbray, duke of Norfolk, 1 and Henry of Bolingbroke, the son of John of Gaunt, were dealt with a year later. Richard pretended to hold them among his best friends, but in 1398 induced Bolingbroke to accuse „ Norfolk of treasonable language. Mowbray denied it, men t f and challenged his accuser to a judicial duel. When Boiing- they were actually facing each other in the lists at * roiea ‘”’ Coventry, the king forbade them to fight, and an- oro,k – nounced that he banished them both — Henry for six years, Norfolk for life.*

Having thus completed his vengeance on those who had slain his friends ten years before — their respective punishments were judiciously adapted to their several responsibilities in that matter — Richard began to behave in an arbitrary _T. ˆ ry and unconstitutional fashion. He evidently thought Richard. that no one would dare to lift a hand against him after the examples that he had just made. This might have been so, if he had continued to rule as cautiously as during the time when he was nursing his scheme of revenge. But now his brain seemed to be turned by success- — indeed his wild language at times seemed to argue that he was not wholly sane. He declared that all pardons issued since 1387 were invalid, and imposed heavy fines oh persons, and even on whole shires, that had given the lords appellant aid. He made huge forced loans, and employed recklessly the abuse of purveyance. He browbeat the judges on the bench, and kept many persons under arrest for indefinite periods without a trial. But the act which provoked the nation most was that he terrified the parliament which met at Shrews- bury in 1398 into voting away its powers to a small committee of ten persons, all creatures of his own. This body he used as his instrument of government, treating its assent as equivalent to that of a whole parliament in session. There seemed to be an end to the constitutional liberties of England.

Such violence, however, speedily brought its own punishment. In 1399 Richard sailed over to Ireland to put down a revolt of the native princes, who had defeated and slain the earl of March, his cousin and their lord-lieutenant. Sea “‘f H . While he was absent Henry of Bolingbroke landed ˆIreland. at Ravenspur with a small body of exiles and mer- cenaries. He pretended that he had merely come to claim the estates and title of his father John of Gaunt, who had died a few months before. The adventurer was at once joined by

the

1 The Nottingham of 1387, who had been promoted to the higher title.

broke lands in England.

earl of Northumberland and all the lords of the north; the army which was called out against him refused to fight, and joined Henry of ˆis banner, and in a few days he was master of all Boiing- England (July 1399). King Richard, hurrying back from Ireland, landed at Milford Haven just in time to learn that the levies raised in his name had dis- persed or joined the enemy. He still had with him a considerable force, and might have tried the fortune of war with some prospect of success. But his conduct seemed dictated by absolute infatuation; he might have fought, or he might have fled to his father-in-law in France, if he judged his troops untrustworthy. Instead of taking either course, he Richard. deserted his army by night, and fled into the Welsh mountains, apparently with the intention of collecting fresh adherents from North Wales and Cheshire, the only regions where he was popular. But Bolingbroke had already seized Chester, and was marching against him at the head of such a large army that the countryside refused to stir. After skulking for three weeks in the hills, Richard surrendered to his cousin at Flint, on the 19th of August 1399, having previously stipu- lated that if he consented to abdicate his life should be spared,

_ . his adherents pardoned, and an honourable livelihood

surrender r ‘

andabdi- assured to him. Ims surrender put the crown to his

cation of career of folly. He should have known that Henry Richard. would never feel safe while he survived, and that no oaths could be trusted in such circumstances. At all costs he should have endeavoured to escape abroad, a course that was still in his power.

Richard carried out his part of the bargain ; he executed a deed of abdication in which he owned himself ” insufficient and use- less.” It

was read to a parliament summoned in his Acces- name on the 30th of September, and the throne was Henry iv. declared vacant. There was small doubt as to the personality of his successor; possession is nine points of the law, and Henry of Bolingbroke for the moment had the whole nation at his back. His hereditary title indeed was im- perfect; though he was the eldest descendant of Edward III. in the male line after Richard, yet there was a whole family which stood between him and the crown. From Lionel of Clarence, the second son of Edward III. (John of Gaunt was only the third) descended the house of March, and the late king had proclaimed that Edmund of March would be his heir if he should die childless. Fortunately for Bolingbroke the young earl was only six years of age; not a voice was raised in his favour in parliament. When Henry stood forward and claimed the vacant throne by right of conquest and also by right of descent, no one gainsaid him. Lords and commons voted that they would have him for their king, and he was duly crowned on the 13th of October 1399. No faith was kept with the un- happy Richard; he was placed in close and secret confinement, and denied the ordinary comforts of life. Moreover the ad- herents for whose safety he had stipulated were at once im- peached of treason.

Henry of Lancaster came to the throne, for all intents and purposes as an elective king; he had to depend for the future on his ability to conciliate and satisfy the baronage f? slt J°" of and the commons by his governance. For by his kinv. usurpation he had sanctioned the theory that kings

can be deposed for incapacity and maladministration. If he himself should become unpopular, all the arguments that he had employed against Richard might be turned against him- self. The prospect was not reassuring; his revenue was small, and parliament would certainly murmur if he tried to increase it. The late king was not without partisans and admirers. There was a considerable chance that the French king might declare war — nominally to avenge his son-in-law, really to win Calais and Bordeaux. Of the partisans who had placed Henry on the throne many were greedy, and some were wholly un- reasonable. But he trusted to his tact and his energy, and cheerfully undertook the task of ruling as a constitutional king — the friend of the parliament that had placed him on the throne.

The problem proved more weary and exhausting than he had suspected. From the very first his reign was a time of war, foreign and domestic, of murmuring, and of humiliating shifts and devices. Henry commenced his career by „ ft e he °" granting the adherents of Richard II. their lives, after earls. they had been first declared guilty

of treason and had been deprived of the titles, lands and endowments given them by the late king. Their reply to this very modified show of mercy was to engage in a desperate conspiracy against him. If they had waited till his popularity had waned, they might have had some chance of success, but in anger and resentment they struck too soon. The earls of Kent and Huntingdon, close kinsmen of Richard on his mother's side, the earl of Salisbury — a noted Lollard — and the lords Despenser and Lumley took arms at midwinter (Jan. 4, 1400) and attempted to seize the king at Windsor. They captured the castle, but Henry escaped, raised the levies of London against them, and beat them into the west. Kent and Salisbury were slain at Cirencester, the others captured and executed with many of their followers. Their rebellion sealed the fate of the master in whose cause they had risen. Henry and his counsellors were determined that there should be no further use made of the name of the "lawful king," and Richard was deliberately murdered by /yˆan/. privation — insufficient clothing, food and warmth — in his dungeon at Pontefract Castle (Feb. 17, 1400). It is im- possible not to pity his fate. He had been wayward, unwise and occasionally revengeful; but his provocation had been great, and if few tyrants have used more violent and offensive language, few have committed such a small list of actual crimes. It was a curious commentary on Henry's policy, that Richard, even when dead, did not cease to give him trouble. Rumour got abroad, owing to the secrecy of his end, that he was not really dead, and an impostor long lived at the Scottish court who claimed to be the missing king, and was recognized as Richard by many malcontents who wished to be deceived.

The rising of the earls was only the first and the least danger- ous of the trials of Henry IV. Only a few months after their death a rebellion of a far more formidable sort broke Welsh rlSm out in Wales — where Richard II. had been popular, ing under and the house of March, his natural heirs, held large Owen estates. The leader was a gentleman named Owen G } en ~

{lower

Glendower, who had the blood of the ancient kings of Gwynedd in his veins. Originally he had taken to the hills as a mere outlaw, in consequence of a quarrel with one of the marcher barons; but after many small successes he began to be recognized as a national leader by his countrymen, and pro- claimed himself prince of Wales. The king marched against him in person in 1400 and 1401, but Glendower showed himself a master of guerrilla warfare; he refused battle, and defied pursuit in his mountains, till the stores of the

English army were exhausted and Henry was forced to retire. His prestige as a general was shaken, and his treasury exhausted by these fruitless irregular campaigns.

Meanwhile worse troubles were to come. The commons were beginning to murmur at the king's administration; they had obtained neither the peace nor the diminished taxation which they had been promised. Moreover, among of s f h °" eat some classes at least, he had won desperate hatred commons. by his policy in matters of religion. One of his chief supporters in 1399 had been Archbishop Arundel, an old enemy of Richard II. and brother to the earl who had been beheaded in 1397. Arundel was determined to extirpate the Lollards, and used his influence on the king to induce him to frame and pass through parliament the detestable statute De statute De heretico comburendo, which recognized death by burn- heretico ing at the stake as the penalty of heresy, and bound «>m- the civil authorities to arrest, hand over to the church buren " ' courts, and receive back for execution, all contumacious Lollards. Henry himself does not seem to have been particularly enthusi- astic for persecution, but in order to keep the church party on his side he was forced to sanction it. The burnings began with that of William Sawtre, a London vicar, on the 2nd of

War with Scotland.

with Qten- dower.

March 1401 ; they continued intermittently throughout the reign.

The victims were nearly all clergy or citizens; the king shrank

from touching the Lollards of higher rank, and even employed

in his service some who were notoriously tainted with heresy.

External troubles continued to multiply during Henry's

earlier years. The Scots had declared war, and there was every

sign that the French would soon follow suit, for the

king's failure to crush Glendower had destroyed his

reputation for capacity. The rebel achieved his

greatest success in June 1402, when he surprised and routed the

whole levy of the marcher lords at Bryn G'las, between Pilleth

and Knighton, capturing (among many other prisoners) Sir

Edmund Mortimer, the uncle and guardian of the young earl of

March, whom all malcontents regarded as the rightful monarch

of England. A few months after the king's fortune seemed to

take a turn for the better, when the Scots were defeated at

Homildon Hill by the earl of Northumberland and

battle of h; Henry Percy, the celebrated " Hotspur." But

Homildon ... J , , 1 , t 1

mu. this victory was to be the prelude to new dangers:

half the nobility of Scotland had been captured in the battle, and Northumberland intended to fill his coffers with their ransoms; but the king looked upon them as state prisoners and announced his intention of taking them out of the earl's hands. Northumberland was a greedy and unscrupulous Border chief, who regarded himself as entitled to exact whatever he chose from his master, because he had been the first to join him at his landing in 1399, and had lent him a consistent support ever since. He had been amply rewarded by grants of land and money, but was not yet satisfied. In indignation at the first refusal that he had met, the earl conspired with Glendower to raise rebellion in the name of the rightful heirs of spiracyof King Richard, the house of March. The third party Northum- in the plot was Sir Edmund Mortimer, Glendower's beriand captive, who was easily persuaded to join a movement for the aggrandizement of his own family. He married Owen's daughter, and became his trusted lieutenant. Northumberland also enlisted the services of his chief Scottish prisoner, the earl of Douglas, who promised him aid from beyond Tweed.

In July 1403 came the crisis of King Henry's reign; while Glendower burst into South Wales, and overran the whole insurrec countryside

as far as Cardiff and Carmarthen, the tion in the Percies raised their banner in the North. The old earl north and se [himself to subdue Yorkshire; his son Hotspur west ‘ and the earl of Douglas marched south and opened

communication with the Welsh. All Cheshire, a district always faithful to the name of Richard II., rose in their favour, and they were joined by Hotspur’s uncle, the earl of Worcester. They then advanced towards Shrewsbury, where they hoped that Glendower might meet them. But long ere the Welsh could appear, King Henry was on the spot; he brought the rebels Defeat of to ac ti° n at Hately Field, just outside the gates of the rebels Shrewsbury, and inflicted on them a complete defeat, at Shrews- ; n w hich his young son Henry of Monmouth first bury ‘ won his reputation as a fighting man. Hotspur was

slain, Worcester taken and beheaded, Douglas desperately wounded (July 23, 1403). On receiving this disastrous news the earl of Northumberland sued for pardon; the king was unwise enough to grant it, merely punishing him by fining him and taking all his castles out of his hands.

By winning the battle of Shrewsbury Henry IV. had saved his crown, but his troubles were yet far from an end. The long- expected breach with France had at last come to War with p ass . t h e duke f Orleans, without any declaration of renewed. war > na d entered Guienne, while a French fleet attacked the south-west of England, and burnt Plymouth. Even more menacing to the king’s prosperity was the news that another squadron had appeared off the coast of Wales, and landed stores and succours for Glendower, who had now conquered the whole principality save a few isolated fortresses. The drain of money to meet this combination of foreign war and domestic rebellion was more than the king’s exchequer

could meet. He was driven into unconstitutional ways of raising money, which recalled all the misdoings of his prede- cessor. Hence came a series of rancorous quarrels with his parliaments, which grew more disloyal and clamorous at every new session. The cry was raised that the ment ‘ taxes were heavy not because of the French or Welsh assumes wars, but because Henry lavished his money on control of favourites and unworthy dependents. He was forced tiaances to bow before the storm, though the charge had small foundation: the greater part of his household was dismissed, and the war-taxes were paid not to his treasurer but to a financial committee appointed by parliament.

It was not till 1405 that the worst of Henry's troubles came to an end. This year saw the last of the convulsions that threatened to overturn him, — a rising in the North headed by the old earl of Northumberland, by Richard fjgff a of Scrope, archbishop of York, and by Thomas Mowbray the North. the earl marshal. It might have proved even more dangerous than the rebellion of 1403, if Henry's unscrupulous general Ralph, earl of Westmorland, had not lured Scrope and Mowbray to a conference, and then arrested them under circum- stances of the vilest treachery. He handed them over to the king, who beheaded them both outside the gate of York, without any proper trial before their peers. Northumberland thereupon fled to Scotland without further fighting. He remained in exile till January 1408, when he made a final attempt to raise rebellion in the North, and was defeated and slain at the battle of Bramham Moor.

Long before this last-named fight Henry's fortunes had begun to mend. Glendower was at last checked by the untiring energy of the king's eldest son, Henry of Monmouth, who guppres- had been given charge of the Welsh war. Even when sion of the French aid was sent him, the rebel chief proved unable VVe/sA to maintain his grip on South Wales. He was beaten ng ' out of it in 1406, and Aberystwyth Castle, where his garrison made a desperate defence for two years, became the southern limit of his dominions. In the end of 1408 Prince Henry captured this place, and six weeks later Harlech, the greatest stronghold of the rebels, where Sir Edmund Mortimer, Owen's son-in-law and most trusted captain, held out till he died of starvation. From this time onwards the Welsh rebellion gradually died down, till Owen relapsed into the position from which he had started, that of a guerrilla chief maintaining a predatory warfare in the mountains. From 1409 onward he ceased to be a public danger to the realm, yet so great was his cunning and activity that he was never caught, and died still maintaining a hopeless rebellion so late as 1416.

The French war died down about the same time that the Welsh rebellion became insignificant. Louis of Orleans, the head of the French war party, was murdered by his cousin End of the John, duke of Burgundy, in November 1407, and after French his death the French turned from the struggle with and Scot- England to indulge in furious civil wars. Calais, s wars – Bordeaux and Bayonne still remained safe under the English banner. The Scottish war had ended even earlier. Prince James, the heir of Robert III., had been captured at sea in 1406. The duke of Albany, who became regent when Robert died, had no wish to see his nephew return, and concluded a corrupt agree- ment with the king of England, by which he undertook to keep

Scotland out of the strife, if Henry would prevent the rightful heir from returning to claim his own. 1 Hence Albany and his son ruled at Edinburgh for seventeen years, while James was detained in an honourable captivity at Windsor.

From 1408 till his death in 1413 Henry was freed from all the dangers which had beset his earlier years. But he got small enjoyment from the crown which no longer tottered //faess ot on his brow. Soon after his execution of Archbishop the king. Scrope he had been smitten with a painful disorder, Paction in which his enemies declared to be the punishment e cou

1 Mr Andrew Lang takes a different view of the character of Albany and his attitude in this matter. See Hist, of Scotland, i. 289, and the article Scotland: History. — Ed.

inflicted on him by heaven for the prelate's death. It grew gradually worse, and developed into what his contemporaries called leprosy — a loathsome skin disease accompanied by bouts of fever, which sometimes kept him bedridden for months at a time. From 1409 onwards he became a mere invalid, only able to assert himself in rare intervals of convalescence. The domestic politics of the realm during his last five years were nothing more than a struggle between two court factions who desired to use his name. The one was headed by his son Henry, prince of Wales, and his half-brothers John, Henry and Thomas Beau- fort, the base-born but legitimized children of John of Gaunt. The other was under the direction of Archbishop Arundel, the king's earliest ally, who had already twice served him as chan- cellor, and had the whole church party at his back. Arundel was backed by Thomas duke of Clarence, the king's second son, who was an enemy of the Beauforts, and not on the best terms with his own elder brother, the prince of Wales. The fluctuating influence of each party with the king was marked by the passing of the chancellorship from Arundel to Henry Beaufort and back again during the five years of Henry's illness. The rivalry between them was purely personal; both were prepared to go on with the "Lancastrian experiment," the attempt to govern the realm in a

constitutional fashion by an alliance between the king and the parliament; both were eager persecutors of the Lollards; both were eager to make profit for England by inter- fering in the civil wars of the Orleanists and Burgundians which were now devastating France.

The prince of Wales, it is clear, gave much umbrage to his father by his eagerness to direct the policy of the crown ere.yet it had fallen to him by inheritance. The king sus- pected, and with good reason, that his son wished him to abdicate, and resented the idea. It seems that a plot with such an object was actually on foot, and that the younger Henry gave it up in a moment of better feeling, when he realized the evil impression that the unfilial act would make upon the nation. At this time the prince gave small promise of developing into the model monarch that he afterwards became. There was no doubt of his militaty ability, which had been fully demonstrated in the long Welsh wars, but he is reputed to have shown himself arrogant, contentious and over-given to loose- living. There were many, Archbishop Arundel among them, who looked forward with apprehension to his accession to the throne.

The two parties in the council of Henry IV. were agreed that it would be profitable to intervene in the wars of France, but they differed as to the side which offered the most English advantages. Hence came action which seemed in- "toPrance. consistent, if not immoral; in 1411, under the prince's influence, an English contingent joined the Bur- gundians and helped them to raise the siege of Paris. In 141 2, by Arundel's advice, a second army under the duke of Clarence crossed the Channel to co-operate with the Orleanists. But the French factions, wise for once, made peace at the time of Clarence's expedition, and paid him 210,000 gold crowns to leave the country! The only result of the two expeditions was to give the English soldiery a poor opinion of French military capacity, and a notion that money was easily to be got from the distracted realm beyond the narrow seas.

On the 20th of March 1413, King Henry's long illness at last reached a fatal issue, and his eldest son ascended the throne. The new king had everything in his favour; his father Accession jj a(j DO rne the odium of usurpation and fought down Henry v. tne forces of anarchy. The memory of Richard II. had been forgotten; the young earl of March had grown up into the most harmless and unenterprising of men, and the nation seemed satisfied with the new dynasty, whose first sovereign had shown himself, under much provocation, the most moderate and accommodating of constitutional monarchs.

Henry V. on his accession bade farewell to the faults of his youth. He seems to have felt a genuine regret for the unfilial conduct which had vexed his father's last years, and showed a careful determination to turn over a new leaf and give his

and France.

enemies no scope for criticism. From the first he showed a sober and grave bearing; he reconciled himself to all his enemies, gave up his youthful follies, and became a model king according to the ideas of his day. There is no doubt character. that he had a strong sense of moral responsibility, and that he was sincerely pious. But his piety inspired him to redouble the persecution of the unfortunate Lollards, whom his father had harried only in an intermittent fashion; and his sense of moral responsibility did not prevent him from taking the utmost advantage of the civil wars of his unhappy neighbours of France.

*The first notable event of Henry's reign was his assault upon the Lollards. His father had spared their lay chiefs, and con- tented himself with burning preachers or tradesmen. Henry arrested John Oldcastle, Lord Cobham, their ˆ er * e 5 u J' A leading politician, and had him tried and condemned Lollards. to the stake. But Oldcastle escaped from the Tower before the day fixed for his execution, and framed a wild plot for slaying or deposing his persecutor. He planned to gather the Lollards of London and the Home Counties under arms, and to seize the person of the king — a scheme as wild as the design of Guy Fawkes or the Fifth Monarchy t lsl "g Men in later generations, for the sectaries were not oldcastle strong enough to coerce the whole nation. Henry received early notice of the plot, and nipped it in the bud, scattering Oldcastle's levies in St Giles' Fields (Jan. 10, 1414I and hanging most of his lieutenants. But their reckless leader escaped, and for three years led the life of an outlaw, till in 141 7 he was finally captured, still in arms, and sent to the stake.*

This danger having passed, Henry set himself to take advan- tage of the troubles of France. He threatened to invade that realm unless the Orleans faction, who had for the moment possession of the person of the mad king Henry v. Charles VI., should restore to him all that Edward III. had owned in 1360, with Anjou and Normandy in addition. The demand was absurd and exorbitant and was refused, though the French government offered him the hand of their king's daughter Catherine with a dowry of 800,000 crowns and the districts of Quercy and Perigord — sufficiently handsome terms. When he

began to collect a fleet and an army, they added to the offer the Limousin and other regions; but Henry was determined to pick his quarrel, and declared war in an impudent and hypocritical manifesto, in which he declared that he was driven into strife against his will. The fact was that he had secured the promise of the neutrality or the co-operation of the Burgundian faction, and thought that he could crush the Orleanists with ease.

He sailed for France in August 1415, with an army compact and well-equipped, but not very numerous. On the eve of his departure he detected and quelled a plot as wild and futile as that of Oldcastle. The conspirators were his Henry cousin, Richard, earl of Cambridge, Lord Scrope, and France. Sir Thomas Grey, a kinsman of the Percies. They had planned to raise a rebellion in the name of the earl of March, in whose cause Wales and the North were to have been called to arms. But March himself refused to stir, and betrayed them to the king, who promptly beheaded them, and set sail five days later. He landed near the mouth of the Seine, and commenced his campaign by besieging and capturing Harfleur, which the Orleanists made no attempt to succour. But such a large number of his troops perished in the trenches by a pestilential disorder, that he found himself too weak to march on Paris, and took his way to Calais across Picardy, hoping, as it seems, to lure the French to battle by exposing his small army to attack. The plan was hazardous, for the Orleanists turned out in great numbers and almost cut him off in the marshes of the Somme. When he had struggled across them, and was half-way to Calais, the enemy beset him in the fields of Agincourt (Oct. 25, 141 5). Here Henry vindicated his military reputation Agincourt by winning a victory even more surprising than those of Crecy, and Poitiers, for he was outnumbered in an even greater proportion than the two Edwards had been in 1346 and 1356,

and had to take the offensive instead of being attacked in a strong position. The heavily armoured French noblesse, embogged in miry meadows, proved helpless before the lightly equipped English archery. The slaughter in their ranks was terrible, and the young duke of Orleans, the head of the predominant faction of the moment, was taken prisoner with many great nobles. How- ever, so exhausted was the victorious army that Henry merely led it back to Calais,

without attempting anything more in this year. The sole tangible asset of the campaign was the oattie. t ˆ le possession of Harfleur, the gate of Normandy, a second Calais in its advantages when future invasions were taken in hand. The moral effects were more important. The Orleanist party was shaken in its power; the rival Burgundian faction became more inclined to commit itself to the English cause, and the terror of the English arms weighed heavily upon both.

It was not till the next year but one that Henry renewed his invasion of France — the intervening space was spent in ne- Bnrlaad gotiations with Burgundy, and with the emperor and the Sigismund, whose aid the king secured in return for council of help in putting an end to the scandalous ” great Constance. scn j sm » w hi c h had been rending the Western Church for so many years. The English deputation lent their aid to Sigismund at the council of Constance, when Christendom was at last reunited under a single head, though all the reforms which were to have accompanied the reunion were postponed, and ultimately avoided altogether, by the restored papacy.

In July 141 7 Henry began his second invasion of France, and landed at the mouth of the Seine with a powerful army of 17,000 Henry’s men. He had resolved to adopt a plan of campaign second very different from those which Edward III. or the invasion Black Prince had been wont to pursue, having in view of France. notn i n g more than the steady and gradual conquest of the province of Normandy. This he was able to accomplish without any interference from the government at Paris, for the constable Armagnac, who had succeeded the captive Orleans at the head of the anti-Burgundian party, had no troops to spare. He was engaged in a separate campaign with Henry’s Conquest a jj y j onn the F ear i esSj an(i i e f t Normandy to shift

Normandy. Ior itself. One after another all the towns of the duchy were reduced, save Rouen, the siege of which, as the hardest task, King Henry postponed till the rest of the country- side was in his hands. He sat down to besiege it in 1418, and was detained before its walls for many months, for the citizens made an admirable defence. Meanwhile a change had taken place in the domestic politics of France; the Burgundians seized Paris in May 1418; the constable Armagnac and many of his Triumph partisans were massacred, and John the Fearless got ofthe possession of the person of the mad Charles VI., Bur- a nd became the responsible ruler of France. He had

*gundlans. ˆhen t0 c hoose between buying off his English allies by great concessions, or taking up the position of champion of French interests. He selected the latter role, broke with Henry, and tried to relieve Rouen. But all his efforts were foiled, and the Norman capital surrendered, completely starved out,on J*l nly the 10th of January 1419. On this Burgundy resolved Rouen. to open negotiations with Henry; he wished to free his hands for an attack on his domestic enemies, who had rallied beyond the Loire under the leadership of the dauphin Charles — from whom the party, previously known first as Or- leanists and then as Armagnacs, gets for the future the name of the " Dauphinois." The English king, however, seeing the manifest advantage of his position, tried to drive too hard a bargain; he demanded the old boundaries of 1360, with his new conquest of Normandy, the hand of the princess Catherine, and a great sum of ready money. Burgundy dared not concede so much, under pain of alienating all his more patriotic supporters. He broke off the conference of Meulan, Burgundy. an d tried to patch up a peace with the dauphin, in order to unite all Frenchmen against the foreign in- vader. This laudable intention was wrecked by the treachery of the young heir to the French throne; on the bridge of*

IX. 17

Murder of John of

Montereau Charles deliberately murdered the suppliant duke, as he knelt to do homage, thinking thereby that he would make an end of the Burgundian party (Sept. 9, 1419).

This abominable deed gave northern France for twenty years to an English master. The young duke of Burgundy, Philip the Good, and his supporters in Paris and the north, were so incensed with the dauphin's cruel treachery gundlans that they resolved that he should never inherit his acknow- father's crown. They proffered peace to King Henry, /e< &e and offered to recognize his preposterous 1 claim to ˆ e /"ˆ as the French throne, on condition that he should marry France. the princess Catherine and guarantee the constitutional liberties of the realm. The insane Charles VI. should keep nominal possession of the royal title till his death, but meanwhile the Burgundians would do homage to Henry as " heir of France. " These terms were welcomed by the English king, and ratified at the treaty of Troyes (May 21, 1420). Troyes" Henry married the princess Catherine, received the oaths of Duke Philip and his partisans, and started forth to conquer the Dauphinois at the head of an army of which half was composed of Burgundian levies.

Paris, Picardy, Cham- pagne, and indeed the greater part of France north of the Loire, acknowledged him as their sovereign.

Henry had only two years longer to live; they were spent in incessant and successful campaigning against the partisans of his brother-in-law, the dauphin Charles; by a long series of sieges the partisans of that worthless prince tunryv were evicted from all their northern strongholds. They fought long and bitterly, nor was this to be marvelled at, for Henry had a custom of executing as traitors all who with- stood him, and those who had once defied him did well to fight to the last gasp, in order to avoid the block or the halter. In the longest and most desperate of these sieges, that of Meaux (Oct. 1421-March 1422), the king contracted a dysenteric ailment which he could never shake off. He survived for a few months, but died, worn out by his incessant campaigning, on the 31st of August 1422, leaving the crown of England and the heirship of France to his only child Henry of Windsor, an infant less than two years old..

Few sovereigns in history have accomplished such a disastrous life's work as this much-admired prince. If he had not been a soldier of the first ability and a diplomatist of the most unscrupulous sort, he could never have advanced Effects of so far towards his ill-chosen goal, the conquest of quests' France. His genius and the dauphin's murderous act of folly at Montereau conspired to make the incredible almost possible. Indeed, if Henry had lived five years longer, he would probably have carried his arms to the Mediterranean, and have united France and England in uneasy union for some short space of time. It is clear that they could not have been held together after his death, for none but a king of exceptional powers could have resisted their natural impulse to break apart. As it was, Henry had accomplished just enough to tempt his countrymen to persevere for nearly thirty years in the endeavour to complete the task he had begun. France was ruined for a generation, England was exhausted by her effort, and (what was worse) her governing classes learnt in the long and pitiless war lessons of demoralization which were to bear fruit in the ensuing struggle of the two Roses. It is a strange fact that Henry, though he was in many respects a conscientious man, with a strong sense of responsibility, and a sincere piety, was so blind to the un- righteousness of his own actions that he died asserting that " neither ambition nor vainglory had led him into France, but a genuine desire to assert a righteous claim, which he desired his heirs to prosecute to the bitter end."

The guardianship of the infant Henry VI. fell to his two uncles, John of Bedford and Humphrey of Gloucester, the two

1 The peculiar absurdity of Henry's claim to be king of France was that if, on the original English claim as set forth by Edward III., heirship through females counted, then the earl of March was entitled to the French throne. A vote of the English parliament superseding March's claim in favour of that of Henry IV. could obviously have no legal effect in Franc?.

surviving brothers of the late king. Bedford became regent in France, and took over the heritage of the war, in which he H arv vi was vl g° rous ly aided by the young Philip of Bur- gundy, whose sister he soon after married. Almost his first duty was to bury the insane Charles VI., who only survived his son-in-law for a few months, and to proclaim his little nephew king of France under the name of Henry II. Gloucester, however, had personal charge of the child, who was to be reared in England; he had also hoped to become pro- tector of the realm, and to use the position for his own private interests, for he was a selfish and ambitious prince. But the council refused to let him assume the full powers of a regent, and bound him with many checks and restrictions, because they were well aware of his character. The tiresome and monotonous domestic history of England during the next twenty years consisted of little else than quarrels between Gloucester and the lords of the council, of whom the chief was the duke's half- uncle Henry Beaufort, bishop of Winchester, the last to survive of all the sons of John of Gaunt. The duke and the bishop were both unscrupulous; but the churchman, with all his faults, was a patriotic statesman, while Gloucester cared far more for his own private ends than for the welfare of the realm.

While these two well-matched antagonists were wrangling in England, Bedford, a capable general and a wise administrator, was doing his best to carry out the task which the e . °. r s dying Henry V. had laid upon him, by crushing the France. dauphin, or Charles VII. as he now called himself since his father's death. As long as the Burgundian party lent the regent their aid, the limits of the land still unsubdued continued to shrink, though the process was slow. Two con- siderable victories, Cravant (1423) and Verneuil (1424), marked the early years of Bedford's campaigning; at each, it may be

noted, a very large proportion of his army was composed of Burgundian auxiliaries. But after a time their assistance began to be given less freely; this was due to the selfish intrigues of Humphrey of Gloucester, who, regardless of the general ""aio™ y P 01 ' ˆ of Engiand, had quarrelled with Philip the cester. Good. He had married Jacoba (Jacquelaine), countess of Hainaut and Holland, a cousin of the Burgundian duke, who coveted and hoped to secure her lands. Pressing her claims, Gloucester came to open blows with Philip in Flanders and Hainaut (1424). In his anger the Burgundian ceased to support Bedford, and would have joined Charles VII. if revenge on the murderers of his father had not still remained his dominant passion. But Gloucester's attempt to seize Hainaut failed, and Philip, when he had got possession of his cousin's person and estates, allowed himself to be pacified by Bedford, who could prove that he had no part in his brother's late intrigues.

This quarrel having been appeased, the advance against the territories of Charles VII. was resumed. It went slowly on, till in 1428 the tide of war reached the walls of Orleans, Orleans. now t ' le on ˆy pl ace north of the Loire which remained unsubdued. The siege was long; but after the last army which the Dauphinois could raise had been beaten at the battle of Rouvray (Feb. 1429) it seemed that the end was near. Charles VII. was in such a state of despair after this last check, that he was actually taking into consideration a flight to Italy or Spain, and the abandonment of the struggle. He had shown himself so incapable and apathetic that his followers were sick of fighting for such a despicable master.

From this depth of despair the party which, with all its faults, represented the national sentiment of France was rescued by the astonishing exploits of Joan of Arc. Charles and his counsellors had no great confidence in the mission of this prophetess and champion, when she presented herself to them, promising to relieve Orleans and turn back the English. But all expedients are worth trying in the hour of ruin, and seeing that Joan was disinterested and sincere, and that her preaching exercised a marked influence over the people and the soldiery, Charles allowed her to march with the last levies that he put into the field for the relief of Orleans. From Viat moment the fortune of war turned; the presence of the

Joan of Arc

prophetess with the French troops had an immediate and in-calculable effect. Under the belief that they were now led by a messenger from heaven, the Dauphinois fought with a fiery courage

that they had never before displayed. Their movements were skilfully directed — whether by Joan's generalship or that of her captains it boots not to inquire — and after the first successes which she achieved, in entering Orleans and capturing some of the besiegers' forts around it, the English became panic-stricken. They were cowed, as they said, " by that disciple and limb of the fiend called La Pucelle, that used false enchantments and sorcery." Suffolk, their commander, raised the siege, and sent to Bedford for reinforcements; but as he retreated he was set upon by the victorious army, and captured with most of his men at J^rgeau and Beaugency (June 1429). The succours which were coming to his aid from Paris were defeated by the Maid at Patay a few days later, and for the most part destroyed.

The regent Bedford was now in a desperate position. His field army had been destroyed, and on all sides the provinces which had long lain inert beneath the English yoke .were corona- beginning to stir. When Joan led forth the French tlonof king to crown him at Reims, all the towns of Cham- Charles pagne opened their gates to her one after another. VUm at A large reinforcement received from England only just """

enabled Bedford to save Paris and some of the fortresses of the lie de France. The rest revolted at the sight of the Maid's white banner. If Joan had been well supported by her master and his counsellors, it is probable that she might have completed her mission by expelling the English from France. But, despite all that she had done, Charles VII. and his favourites had a profound disbelief in her inspiration, and generally thwarted her plans. After an ill-concerted attack on Paris, in which Joan was wounded, the French army broke up for the winter. They had shaken the grip of the English on the north, and reconquered a vast stretch of territory, but they had failed by their own fault to achieve complete success. Nevertheless the crucial point of the war had passed; after 1429 the Burgundian party began to slacken in its support of the English cause, and to pass over piecemeal to the national side. This was but natural: the partisans who could remember nothing but the foul deed of Montereau were yearly growing fewer, and it was clear that Charles VII., personally despicable though he might be, repre- sented the cause of French nationality.

The natural drift of circumstances was not stayed even by the disastrous end of the career of Joan of Arc in 1430. The king's ministers had refused to take her counsels or to entrust caoture her with another army, but she went forth with a small and force of

volunteers to relieve the important fortress of exe ” ttl °” Compiegne. The place was saved, but in a sortie she was captured by the Burgundians, who sold her for 10,000 francs to Bedford. The regent handed her over for punishment as a sorceress to the French clergy of his own party. After a long trial, carried out with elaborate formality and great unfairness, the unhappy Joan was found guilty of proclaiming as divine visions what were delusions of the evil one, or of her own vain imagination, and when she persisted in maintaining their reality she was declared a relapsed heretic, and burnt at Rouen on the 30th of May 143 1. Charles VII. took little interest in her fate, which he might easily have prevented by threatening to retaliate on the numerous English prisoners who were in his power. Seldom had a good cause such an unworthy figurehead as that callous and apathetic prince.

The movement which Joan had set on foot was in no way crushed by her execution. For the next four years the limits of the English occupation continued to recede. It was to no profit that Bedford brought over the young Burgundy Henry VI. and had him Crowned at Paris, in order to joins appeal to the loyalty of his French partisans by means Charles. of the king’s forlorn youth and simplicity. Yet by ˆw& °’ endless feats of skilful generalship the regent continued to maintain a hold on Paris and on Normandy. The fatal blow was administered by Philip of Burgundy, who. tired of maintain- ing a failing cause, consented at last to forget his father’s murder.

Truce with France.

and to be reconciled to Charles VII. Their alliance was cele- brated by the treaty of Arras (Sept. 6, 1435), at which the English were offered peace and the retention of Normandy and Guienne if they would evacuate Paris and the rest of France. They would have been wise to accept the agreement; but with obstinate and misplaced courage they refused to acknowledge Charles as king of France, or to give up to him the capital.

Bedford, worn out by long campaigning, died at Rouen on the 14th of September 1435, just before the results of the treaty Death ot 0I Arras began to make themselves felt. With him Bedford, died the best

hope of the English party in France, English f or ne nac i b een we n loved by the Burgundians, and defeats. many na d adhered to the cause of Henry VI. solely because of their personal attachment to him. No worthy successor could be found — England had many hard-handed soldiers but no more statesmen of Bedford's calibre. It was no wonder that Paris was lost within six months of the regent's death, Normandy invaded, and Calais beleaguered by an army headed by England's new enemy, Philip of Burgundy. But the council, still backed by the nation, refused to give up the game; Burgundy was beaten off from Calais, and the young'duke of York, the heir of the Mortimers, took the command at Rouen, and recovered much of what had been lost on the Norman side. The next eight years of the war were in some respects the most astonishing period of its interminable length. The English

fought out the losing game with a wonderful obstinacy.

Though every town that they held was eager to revolt,

and though they were hopelessly outnumbered in every quarter, they kept a tight grip on the greater part of Normandy, and on their old domain in the Bordelais and about Bayonne. They lost nearly all their outlying possessions, but still made head against the generals of Charles VII. in these two regions. The leaders of this period of the war were the duke of York, and the aged Lord Talbot, afterwards earl of Shrews- bury. The struggle only ceased in 1444, when the English council, in which a peace party had at last been formed, con-cluded a two-year truce with King Charles, which they hoped to turn into a permanent treaty, on the condition that their king should retain what he held in Normandy and Guienne, but sign away his claim to the French crown, and relinquish the few places outside the two duchies which were still in his power — terms very similar to those rejected at Arras nine years before — but there was now much less to give up. To mark the reconcilia- tion of the two powers Henry VI. was betrothed to the French king's niece, Margaret of Anjou. The two years' truce was re- peatedly prorogued, and lasted till 1449, but no definitive treaty was ever concluded, owing to the bad faith with which both parties kept their promises.

The government in England was now in the hands of the faction which Bishop Beaufort had originally led, for after long

struggles the churchman had at last crushed his nephew acyofthe Humphrey. In 1441 the duchess of Gloucester had Beaufort been arrested and charged with practising sorcery '" against the health of*

the young king — apparently not

B "B aa • without justification. She was tried and condemned to imprisonment for life; her guilt was visited on her husband, on whose behalf she was acting, for if Henry had died his uncle would have come to the throne. For some years he was con strained to take a minor part in politics, only emerging occasion- ally to make violent and unwise protests against peace with France. The bishop now ruled, with his nephew Edmund Beaufort, duke of Somerset, and William de la Pole, earl of Suffolk, as his chief instruments. As he grew older he let the power slip into their hands, as it was they who were mainly responsible for the truce of 1444. King Henry, though he had reached the age of 23 at the time of his marriage, counted for

nothing. He was a pious young man, simple to the Character verge f imbecility; a little later he developed actual Henry VI. insanity, the heritage of his grandfather Charles VI.

He showed a blind confidence in Suffolk and Somerset, who were wholly unworthy of it, for both were tricky and un- scrupulous politicians. His wife Margaret of Anjou, though she

possessed all the fire and energy which her husband lacked, was equally devoted to these two ministers, and soon came to share their unpopularity.

The truce with France had offended the natural pride of the nation, which still refused to own itself beaten. The evacuation of the French fortresses in Maine and elsewhere, which was the price paid for the suspension of arms, was Humphrey bitterly resented. Indeed the garrisons had to be ofaiou- threatened with the use of force before they would cester and quit their strongholds. A violent clamour was raised Beaufort against Suffolk and Somerset, and Humphrey of Gloucester emerged from his retirement to head the agitation. This led to his death; he was arrested by the order of the queen and the ministers at the parliament of Bury. Five days later he died suddenly in prison, probably by foul play, though it was given out that he had been carried off by a paralytic stroke. His estates were confiscated, and distributed among the friends of Suffolk and the queen. Six weeks later the aged Bishop Beaufort followed him to the grave — he had no share in Glou- cester's fate, having long before made over his power and the leadership of his party to his nephew Edmund of Somerset

(i447)-

The truce- with France lasted for two years after the death of Duke Humphrey, and came to an end partly owing to the eagerness of the French to push their advantages, but R eoewa] much more from the treachery and bad faith of Suffolk of the war and Somerset, who gave the enemy an admirable w,th casus belli. By their weakness, or perhaps with their rance • secret connivance, the English garrisons of Normandy carried out plundering raids of the most impudent sort on French territory. When summoned to punish the offenders, and to make monetary compensation, Suffolk and Somerset shuffled and prevaricated, but gave no satisfaction. Thereupon the French king once more declared war (July 1449) and invaded Normandy. Somerset was in command; he showed hopeless incapacity and timidity, and in a few months the duchy which had been so long held by the swords of Bedford, York and Shrewsbury was hopelessly lost. The final blow came when a small Loss of army of relief sent over from England was absolutely exterminated by the French at the battle of For- migny (April 15, 1450). Somerset, who had retired into Caen, surrendered two months later after a feeble defence, and the English power in northern France came to an end.

Even before this final disaster the indignation felt against Suffolk and Somerset had raised violent disturbances at home. Suffolk was impeached on many charges, true and false; it was unfair to accuse him of treason, but i? c ˆ quite just to lay double-dealing and bad

faith to his Rebellion. charge. The king tried to save him from the block by banishing him before he could be tried. But while he wa9 sailing to Flanders his ship was intercepted by some London vessels, which were on the look-out for him, and he was deliber- ately murdered. The instigators of the act were never dis- covered. But, though Suffolk was gone, Somerset yet survived, and their partisans still engrossed the confidence of the king. To clear out the government, and punish those responsible for the late disasters, the commons of Kent rose in insurrection under a captain who called himself John Mortimer, though his real name seems to have been John Cade. He was a soldier of fortune who had served in the French wars, and claimed to be in the confidence of the duke of York, the person to whom the eyes of all who hated Somerset and the present regime were now directed.

Cade was not a social reformer, like his predecessor Wat Tyler, with whom he has often been compared, but a politician. Though he called himself " John Amend-all," and promised to put down abuses of every kind, the main part of the pro- gramme which he issued was intended to appeal to national sentiment, not to class feeling. Whether he was the tool of other and more highly placed malcontents, or whether he was simply a ready-witted adventurer playing his own game, it is hard to determine. His first success was marvellous; he defeated the

Nor- mandy.

king's troops, made a triumphant entry into London and held the city for two days. He seized and beheaded Lord Saye, the treasurer, and several other unpopular persons, and might have continued his dictatorship for some time if the Kentish mob that followed him had not fallen to general pillage and arson. This led to the same results that had been seen in Tyler's day. The propertied classes in London took arms to suppress anarchy, and beat the insurgents out of the city. Cade, striving to keep up the rising outside the walls, was killed in a skirmish a month later, and his bands dispersed.

But the troubles of England were only just beginning; the protest against the misgovernment of Somerset and the rest Richard °^ tne

confidants of the king and queen was now duke of taken up by a more important personage than the York, adventurer Cade. Richard, duke of York, the heir

heads the t t]:ie c j a j ms f t jj e h ouse f Mortimer— his mother

OPPOSltiOtt. , . rll , r t, r , , ■

was the sister of the last earl of March — now placed himself at the head of the opposition. He had plausible grounds for doing so; though he had distinguished himself in the French wars, and was, since the death of Humphrey of Gloucester, the first prince of the blood royal, he had been ignored and flouted by the king's ministers, who had sent him into a kind of honour- able banishment as lord-lieutenant of Ireland, and had forbidden him to re-enter the realm. When, in defiance of this mandate, he came home and announced his intention of impeaching Somerset, he took the first step which was to lead to the Waxs of the Roses.

Yet he was a cautious and in the main a well-intentioned prince, and the extreme moderation of his original demands seems tc prove that he did not at first aim at the crown. He merely required that Somerset and his friends should be dis- missed from office and made to answer for their misgovernment. Though he backed his demands by armed demonstration — twice calling out his friends and retainers to support his policy — he carefully refrained for five long years from actual violence. Indeed in 1452 he consented to abandon his protests, and to lend his aid to the other party for a great national object, the recovery of Guienne. For in the previous year Charles VII. had dealt with Bordeaux and Bayonne as he had already dealt with Normandy, and had met with no better resistance while completing the conquest. Six months' experience of French rule, however, had revealed to the Bordelais how much they had lost when they surrendered. Their old loyalty to the house of Plantagenet burst once more into flame; they rose in arms and called for aid to England. For a moment the quarrel of York and Somerset was suspended, and the last English army that crossed the seas during theHundredYears'War landed in Guienne, joined the insurgents, and for a time swept all before it. But there seemed to be a curse on whatever Henry VI. and Somerset took in hand. On the 17th of July 1453 the veteran earl of Shrewsbury and the greater part of his Anglo-Gascon host were Battle of cut t0 pieces at the hard-fought battle of Castillon. Castnioo. Bordeaux, though left to defend itself, held out for Loss of eighty days after Talbot's defeat and death, and then made its final submission to the French. The long struggle was over, and England

now retained nothing of her old transmarine possessions save Calais and the Channel Islands. The ambition of Henry V. had finally cost her the long-loyal Guienne, as well as all the ephemeral conquests of his own sword.

The last crowning disaster of the administration of the favourites of Henry VI. put an end to the chance that a way out of domestic strife might be found in the vigorous prosecution of the French war. For the next twenty years the battles of Eng- land were to be fought on her own soil, and between her own sons. It was a righteous punishment for her interference in the unnatural strife of Orleanists and Burgundians that the struggle between York and Lancaster was to be as bitter and as bloody as that between the two French factions.

V. The Wars or the Roses (1453-1497)

The Wars of the Roses have been ascribed to many different causes by different historians. To some their origin is mainly

constitutional. Henry VI., it is argued, had broken the tacit com- pact which the house of Lancaster had made with the nation; instead of committing the administration of the realm origin of to ministers chosen for him by, or at least approved the Wars by, his parliament, he persisted in retaining in office of the persons like Suffolk and Somerset, who had for- " oses- feited the confidence of the people by their many failures in war and diplomacy, and were suspected of something worse than incapacity. They might not be so personally odious as the favourites of Edward II. or of Henry III., but they were even more dangerous to the state, because they were not foreign adventurers but great English peers. In spite of the warnings given by the assault on Suffolk in 1450, by Jack Cade's insur- rection, and by the first armed demonstrations of Richard of York in 1450 and 1452, the king persisted in keeping his friends in office, and they had to be removed by the familiar and forcible methods that had been applied in earlier ages by the lords ordainers or the lords appellant. Undoubtedly there is much truth in this view of the situation; if Henry VI., or perhaps we should rather say, if his queen Margaret of Anjou, had been content "to accept ministries in which the friends of Richard of York were fairly represented, it is probable that he might have died a king, and have transmitted his crown to his natural heir. But this explanation of the Wars of the Roses is not complete; it accounts for their outbreak, but not for their long continuance. According to another school the real key to the problem is simply the question of the succession to the crown. If the wedlock of Henry VI. and Margaret of Anjou had claims of been fruitful during the first

*few years after their the duke marriage, no one would have raised the question of a "f Vork *» change of dynasty. But when they remained childless ' e crowa for seven years,, and strong suspicion arose that there was a project on foot to declare the Beauforts heirs to the throne, the claim of Richard of York, as the representative of the houses of Clarence and March, was raised by those who viewed the possible accession of the incapable and unpopular Somerset with terror and dislike. When once the claims of York had been displayed and stated by his imprudent partisan, Thomas Yonge, in the parliament of 1451, there was no possibility of' hiding the fact that in the strict legitimate line of succession he had a better claim than the reigning king. He disavowed any pretensions to the crown for nine years; it was only in 1460 that he set forth his title with his own mouth. But his friends and followers were not so discreet; hence when a son was at last born to Henry and Margaret, in 1453, the succession question was already in the air and could no longer be ignored. If the claim of York was superior to that of Lancaster in the eyes of a consider- able part of the nation, it was no longer possible to Birth of consider the problem solved by the birth of a direct Ed- ward, heir to the actual occupant of the throne. Though prince of Duke Richard behaved in the most correct fashion, Wales – acknowledged the infant Edward as prince of Wales, and made no attempt to assert dynastic claims during his two regencies in 1454 and 1455-1456, yet the queen and her partisans already looked upon him as a pretender to the throne. It is this fact which accounts for the growing bitterness of the Yorkist and Lancastrian parties during the last years of Henry VI. Margaret believed herself to be defending the rights Margaret. of her son against a would-be usurper. Duke Richard, on the other hand, considered himself as wrongfully oppressed, and excluded from his legitimate position as a prince of the blood and a chief councillor of the crown. Nor can there be any doubt that the queen took every opportunity of showing her suspicion of him, and deliberately kept him and his friends from sharing in the administration of the realm. This might have been more tolerable if the Lancastrian party had shown any governing power; but both while Somerset was their leader, down to his death in the first battle of St Albans, and while in 1456-1459 Exeter, Wiltshire, Shrewsbury and Beaumont were the queen's trusted agents, the condition of England was de. plorable. As a contemporary chronicler wrote, " the realm was out of all good governance — as it has been many days before:*

the king was simple, ?.nd led by covetous councillors, and owed more than he was worth. His debts increased daily, but pay- ment was there none, for all the manors and posses- Co”” 00 s ; ons that pertained to the crown he had given away, sountry. s0 that ne had almost nought to live on. For these misgovernances the hearts of the people were turned from them that had the land in rule, and their blessing was turned to cursing. The officers of the realm, and especially the earl of Wiltshire the treasurer, for to enrich himself plundered poor people and disinherited rightful heirs, and did many wrongs. The queen was defamed, that he that was called the prince was not the king's son, but a bastard gotten in adultery.” When it is added that the Lancastrian party avoided holding a parlia- ment for three years, because they dared not face it, and that the French were allowed to sack Fowey, Sandwich and other places because there was no English fleet in existence, it is not wonderful that many men thought that the cup of the iniquities of the house of Lancaster was full. In the military classes it was felt that the honour of the realm was lost; in mercantile circles it was thought that the continuance for a few years more of such government would make an end of English trade. Some excuse must be found for getting rid of the queen and her friends, and the doubtful legitimacy of the Lancastrian claim to the crown afforded such an excuse. Hence came the curious paradox, that the party which started as the advocates of the rights of parliament against the incapable ministers appointed by the crown, ended by challenging the right of parliament, exercised in 1390, to depose a legitimate king and substitute for him another member of the royal house. For Richard of York in 1460 and Edward IV. in 1461 put in their claim to the throne, not as the elect of the nation, but as the possessors of a divine hereditary right to the succession, there having been no true king of England since the death of Richard II. Hence Edward assumed the royal title in March 146 1, was crowned in June, but called no parliament till November. When it met, it acknow- ledged him as king, but made no pretence of creating or electing him to be sovereign.*

But putting aside the constitutional aspects of the Wars of the Roses, it is necessary to point out that they had another Motives of as P ect – From one point of view they were little more the con- than a great faction fight between two alliances of tending over-powerful barons. Though the Lancastrians parUes ” made much play with the watchword of loyalty to the crown, and though the Yorkists never forgot to speak of the need for strong and wise governance, and the welfare of the realm, yet personal and family enmities had in many

cases more effect in determining their action than a zeal for King Henry's rights or for the prosperity of England. It is true that some classes were undoubtedly influenced in their choice of sides mainly by the general causes spoken of above; the citizens of London and the other great towns (for example) inclined to the Yorkist faction simply because they saw that under the Lancastrian rule the foreign trade of England was being ruined, and insufficient security was given for life and property. But the leading men among the baronage were undoubtedly swayed by ambition and resentment, by family ties and family feuds, far more than by enlightened statesmanship or zeal for the king or the common- weal. It would be going too far to seek the origin of the Yorkist party — as some have done — in the old enmity of the houses of March, Norfolk and Salisbury against Henry IV. But it is not so fantastic to ascribe its birth to the personal hatred that existed between Richard of York and Edmund of Somerset, to the old family grudge (going back to 1405) between the Percies and the Nevilles, to the marriage alliance that bound the houses of York and Neville together, and to other less well- remembered quarrels or blood-ties among the lesser baronage. As an example of how such motives worked, it may suffice to quote the case of those old enemies, the Bonvilles and Courtenays, in the west country. While Lord Bonville supported the queen, the house of Courtenay were staunch Yorkists, and the earl of Devon joined in the armed demonstration of Duke Richard in 1452. But when the earl changed his politics and fought on the

Lancastrian side at St Albans in 1455, the baron at once became a strenuous adherent of the duke, adhered firmly to the white rose and died by the axe for its cause.

*Richard of York, in short, was not merely the head of a constitutional opposition to misgovernment by the queen's friends, nor was he merely a legitimist claimant to the crown, he was also the head of a powerful baronial baronial league, of which the most prominent members party. were his kinsmen, the Nevilles, Mowbrays and The Bourchiers. The Nevilles alone, enriched with the ev e *' ancient estates of the Beauchamps and Montagus, and with five of their name in the House of Lords, were a sufficient nucleus for a faction. They were headed by the two most capable politicians and soldiers then alive in England, the two Richards, father and son, who held the earldoms of Salisbury and Warwick, and were respectively brother-in-law and nephew to York. It must be remembered that a baron of 1450 was not strong merely by reason of the spears and bows of his household and his tenantry, like a baron of the 13th century. The pernicious practice of " livery and maintenance " was*

now at its zenith; all over England in times of stress the knighthood and gentry were wont to pledge themselves, by sealed bonds of indenture, to follow the magnate whom they thought best able to protect them. They mounted his badge, and joined his banner when strife broke out, in return for his championship of their private interests and his promise to " maintain " them against all their enemies. A soldier and statesman of the ability and ambition of Richard of Warwick counted hundreds of such adherents, scattered over twenty shires. The system had spread so far that the majority of the smaller tenants-in-chief, and even many of the lesser barons, were the sworn followers of an insignificant number of the greater lords. An alliance of half-a-dozen of these over-powerful subjects was a serious danger to the crown. For the king could no longer count on raising a national army against them; he could only call out the adherents of the lords of his own party. The factions were fairly balanced, for if the majority of the baronage were, on the whole, Lancastrian, the greatest houses stood by the cause of York.

Despite all this, there was still, when the wars began, a very strong feeling in favour of compromise and moderation. For this there can be no doubt that Richard of York was mainly responsible. When he was twice placed in Attlt "deot power, during the two protectorates which followed y or % ° Henry's two long fits of insanity in 1454 and 1455-1456, he carefully avoided any oppression of his enemies, though he naturally took care to put his own friends in office. Most of all did he show his sincere wish for peace by twice laying down the protectorate when the king was restored to sanity. He was undoubtedly goaded into his last rebellion of 1459 by the queen's undisguised preparations for attacking him. Yet because he struck first, without waiting for a definite casus belli, public opinion declared so much against him that half his followers refused to rally to his banner. The revulsion only came when the queen, victorious after the rout of Ludford, suppres- applied to the vanquished Yorkists those penalties of sion of confiscation and attainder which Duke Richard .had York's always refused to employ in his day of power. After r f^ elu ° a – the harsh doings at the parliament of Coventry (1459), tionsand and the commencement of political executions by the confisca- sending of Roger Neville and his fellows to the scaffold, tloas – the trend of public opinion veered round, and Margaret and her friends were rightly held responsible for the embittered nature of the strife. Hence came the marvellous success of the Yorkist counterstroke in June 1460, when the exiled Warwick, landing in Kent with a mere handful of men, was suddenly joined by the whole of the south of England and the V} eea f k ot citizens of London, and*

inflicted a crushing defeat on defeats the the Lancastrians at Northampton before he had been Lancas- fifteen days on shore (July 10, 1460). The growing trlansat rancour of the struggle was marked by the fact that aˆ-ton. the Yorkists, after Northampton, showed themselves by no means so merciful and scrupulous as in their earlier

to the throne.

days. Retaliatory executions began, though on a small scale, and when York reached London he at last began to talk of his rights to the crown, and to propose the deposition of Henry VI. Yet moderation was still so far prevalent in the ranks of his adherents that they refused to follow him to such lengths. Warwick and the other leading men of the party dictated a compromise, by which Henry was to reign for the term of his Richard of nat ural life, but Duke Richard was to be recognized York de- as his heir and to succeed him on the throne. They dared heir na d obviously borrowed the expedient from the terms

of the treaty of Troyes. But the act of parliament

which embodied it did not formally disinherit the reigning king's son, as the treaty of Troyes had done, but merely ignored his existence.

It would have been well for England if this agreement had held, and the crown had passed peaceably to the house of York, after the comparatively short and bloodless struggle which had just ended. But Duke Richard had forgotten to reckon with the fierce and unscrupulous energy of Queen Margaret, when she was at bay in defence of her son's rights. Marching with a trifling Battle of f° rce t0 expel her from the north, he was surprised and Wakefield, slain at Wakefield (Dec. 30, 1460). But it was not his Richard death that was the main misfortune, but the fact slam. tna) . j n tne battle the Lancastrians gave no quarter

to small or great, and that after it they put to death York's brother-in-law Salisbury and other prisoners. The heads of the duke and the earl were set up over the gates of York. This

ferocity was repeated when Margaret and her northern st Allans,

host beat Warwick at the second battle of St Albans

(Feb. 17, 1461), where they had the good fortune to recover possession of the person of King Henry. Lord Bonville and the other captives of rank were beheaded next morning.

After this it was but natural that the struggle became a mere record of massacres and executions. The Yorkists proclaimed

Edward, Duke Richard's heir, king of England; they earl of ' took, no further heed of the claims of King Henry, March, declared their leader the true successor of Richard II., p™- and stigmatized the whole period of the Lancastrian

*Bdwardlv. ru * e as a mere usurpation. They adopted a strict*

legitimist theory of the descent of the crown, and denied the right of parliament to deal with the succession. This was the first step in the direction of absolute monarchy which England had seen since the short months of King Richard's tyranny in 1397-1399. It was but the first of many encroachments of the new dynasty upon the liberties that had been enjoyed by the nation under the house of Lancaster.

The revenge taken by the new king and his cousin Richard of Warwick for the slaughter at Wakefield and St Albans was prompt

and dreadful. They were now well supported by the charter wnole of southern England; for not only had the of the war. queen's ferocity shocked the nation, but the reckless

plundering of her northern moss-troopers in the home counties had roused the peasantry and townsfolk to an interest in the struggle which they had never before displayed. Up to this moment the civil war had been conducted like a great faction fight; the barons and their liveried retainers had been wont to seek some convenient heath or hill and there to fight out their quarrel with the minimum of damage to the countryside. The deliberate harrying of the Midlands by Margaret's northern levies was a new departure, and one bitterly resented. The house of Lancaster could never for the future count on an adherent south of Trent or east of Chiltern. The Yorkist army

that marched in pursuit of the raiders, and won the Towton. bloody field of Towton under Warwick's guidance,

gave no quarter. Not only was the slaughter in that battle and the pursuit more cruel than anything that had been seen since the day of

Evesham, but the executions that followed Ruthless were ruthless. Ere Edward turned south he had be- reprisals headed two earls — Devon and Wiltshire — and forty- ofthe two knights, and had hanged many prisoners of lesser Yorkists. eS (- a t e fjjg y rkist parliament of November 1461 carried on the work by attainting 133 persons, ranging from

Henry VI. and Queen Margaret down through the peerage and the knighthood to the clerks and household retainers of the late king. All the estates of the Lancastrian lords, living or dead, were confiscated, and their blood was declared corrupted. This brought into the king's hands such a mass of plunder as no one had handled since William the Conqueror. Edward IV. could not only reward his adherents with it, so as to p ers0 nal create a whole new court noblesse, but had enough rule of over to fill his exchequer for many years, and to Edward enable him to dispense with parliamentary grants of lv ' money for an unexampled period. Between 1461 and 1465 he only asked for £37,000 from the nation — and won no small popularity thereby. For, in their joy at being quit of taxa- tion, men forgot that they were losing the lever by which their fathers had been wont to move the crown to constitutional concessions.

After Towton peace prevailed south of the Tyne and east of the Severn, for it was only in Northumberland and in Wales that the survivors of the Lancastrian faction succeeded cir.'iwar in keeping the war alive. King Edward, as indolent in the and pleasure-loving in times of ease as he was active "rth and and ruthless in times of stress and battle, set himself wes ' to enjoy life, handing over the suppression of the rebels to his ambitious and untiring cousin Richard of Warwick. The annals of the few contemporary chroniclers are so entirely devoted to the bickerings in the extreme north and west, that it is necessary to insist on the fact that from 1461 onwards the civil war was purely local, and nine-tenths of the realm enjoyed what passed for peace in the 15th century. The campaigns of 1462-63-64, though full of incident and bloodshed, were not of first-rate political importance. The cause of Lancaster had been lost at Towton, and ail that Queen Margaret succeeded in accomplish- ing was to keep Northumberland in revolt, mainly by means of French and Scottish succours. Her last English partisans, attainted men who had lost their lands and lived with the shadow of the axe ever before them, fought bitterly enough. But the obstinate and hard-handed Warwick beat them down again and again, and the old Lancastrian party was Battte of almost exterminated when the last of its chiefs went Hexham. to the block in the series of wholesale executions that Imprison- followed the battle of Hexham (May 15, 1464). A %? °V1.

year later Henry VI. himself fell into the hands of his enemies, as he lurked in Lancashire, and with his consignment to the Tower the dynastic question seemed finally solved in favour of the house of York.

The first ten years of the reign of Edward IV. fall into two parts, the dividing point being the avowal of the king's marriage to Elizabeth Woodville in November 1464. During the Richard first of these periods Edward reigned but Warwick Neville, governed; he was not only the fighting man, but the eariof statesman and diplomatist of the Yorkist party, and Warwlck – enjoyed a complete ascendancy over his young master, who long preferred thriftless ease to the toils of personal monarchy. Warwick represented the better side of the victorious cause; he was no mere factious king-maker, and his later nickname of " the last of the barons " by no means expresses his character or his position. He was strong, not so much by reason of his vast estates and his numerous retainers, as by reason of the confidence which the greater part of the nation placed in him. He never forgot that the Yorkist party had started as the advocates of sound and strong administration, and the man- datories of the popular will against the queen's incapable and corrupt ministers. " He ever had the goodwill of the people because he knew how to give them fair words, and always spoke not of himself but of the augmentation and good governance of the kingdom, for which he would spend his life; and thus he had the goodwill of England, so that in all the land he was the lord who was held in most esteem and faith and credence." As long as he remained supreme, parliaments were regularly held, and the house of York appeared to be keeping its bargain with the nation. His policy was sound; peace with France, the re- habilitation of the dwindling foreign trade of England, and the

maintenance of law and justice by strong-handed governance were his main aims.

But Warwick was one of those ministers who love to do every- thing for themselves, and chafe at masters and colleagues who presume to check or to criticise their actions. He was sur- rounded and supported, moreover, by a group of brothers and cousins, to whom he

gave most of his confidence, and most of the preferment that came to his hands. England has always chafed against a family oligarchy, however well it may do its work. The Yorkist magnates who did not belong to the clan of the Nevilles were not unnaturally jealous of that house, and Edward IV. himself gradually came to realize the ignominious position of a king who is managed and overruled by a strong- willed and arbitrary minister.

His first sign of revolt was his secret marriage to Elizabeth Woodville, a lady of decidedly Lancastrian connexions, for her _ . . father and her first husband were both members of IV. the defeated faction. Warwick was at the moment

marries suing for the hand of Louis XL's sister-in-law in Bl.zabeih n j s mas t er 's name, and had to back out of his negotia- tions in a sudden and somewhat ridiculous fashion. His pride was hurt, but for two years more there was no open breach between him and his master, though their estrangement grew more and more marked when Edward continued to heap titles and estates on his wife's numerous relatives, and to conclude for them marriage alliances with all the great Yorkist families who were not of the Neville connexion. In this way between he built up for himself a personal following within the Warwick Yorkist party; but the relative strength of this faction and of that which still looked upon Warwick as the true representative of the cause had yet to be tried. The king had in his favour the prestige of the royal name, and a popularity won by his easy-going affability and his liberal gifts. The earl had his established reputation for disinterested devotion to the welfare of the realm, and his brilliant record as a soldier and statesman. In districts as far apart as Kent and Yorkshire, his word counted for a good deal more than that of his sovereign.

Unhappily for England and for himself, Warwick's loyalty was not sufficient to restrain his ambition and his resentment. He felt the ingratitude, of the king, whom he had Warwick ma(j e) s0 bitterly that he stooped ere long to intrigue a rebellion, and treason. Edward in 1467 openly broke with him by dismissing his brother George Neville from the chancellorship, by repudiating a treaty with France which the earl had just negotiated, and by concluding an alliance with Burgundy against which he had always protested. Warwick en- listed in his cause the king's younger brother George of Clarence, who desired to marry his daughter and heiress Isabella Neville, and with the aid of this unscrupulous but unstable young man began to organize rebellion. His first experiment in treason was

and the king.

Rising of

the so-called " rising of Robin of Redesdale," which

•Robin of was ostensibly an armed protest by the gentry and Redes- commons of Yorkshire against the maladministration dale." Q £ t jj e rea i m by the king's favourites — his wife's relatives, and the courtiers whom he had lately promoted to high rank and office. The rebellion was headed by well-known ad- herents of the earl, and the nickname of " Robin of Redesdale " seems to have covered the personality of his kinsman Sir John Conyers. When the rising was well started Warwick declared his sympathy with the aims of the insurgents, wedded his daughter to Clarence despite the king's prohibition of the match, and raised a force at Calais with which he landed in Kent.

But his plot was already successful before he reached the scene of operations. The Yorkshire rebels beat the royalist army at Battle of l ˆ e battle of Edgecott (July 6, 1469). A few days later Edgecott. Edward himself was captured at Olney and put into Edward a the earl's hands. Many of his chief supporters, includ- prlsoner. j n g ˆ e q Ueen ' s father, Lord Rivers, and her brother, John Woodville, as well as the newly-created earls of Pembroke and Devon, were put to death with Warwick's connivance, if not by his direct orders. The king was confined for some

weeks in the great Neville stronghold of Middleham Castle, but presently released on conditions, being compelled to accept new ministers nominated by Warwick. The earl supposed that his cousin's spirit was broken and that he would give Execution no further trouble. In this he erred grievously. / t ne Edward vowed revenge for his slaughtered favourites, queen's and waited his opportunity. Warwick had lost relatltes – credit by using such underhand methods in his attack on his master, and had not taken sufficient care to conciliate public opinion when he reconstructed the government. His conduct had destroyed his old reputation for disinterestedness and honesty.

In March 1470 the king seized the first chance of avenging him- self. Some unimportant riots had broken out in Lincolnshire, originating probably in mere local quarrels, but possibly Ki in Lancastrian intrigues. To suppress this rising the Edward king gathered a great force, carefully calling in to his drives banner all the peers who were

offended with Warwick ^' arw,c f t ^ or, at any rate, did not belong to his family alliance. Having scattered the Lincolnshire bands, he suddenly turned upon Warwick with his army, and caught him wholly unprepared. The earl and his son-in-law Clarence were hunted out of the realm before they could collect their partisans, and fled to France; Edward seemed for the first time to be master in his own realm.

But the Wars of the Roses had one more phase to come. Warwick's name was still a power in the land, and his expulsion had been so sudden that he had not been given an w .. opportunity of trying his strength. His old enmity takes up for the house of Lancaster was completely swallowed the cause up in his new grudge against the king that he had of Henry made. He opened negotiations with the exiled Queen Margaret, and offered to place his sword at her disposition for the purpose of overthrowing King Edward and restoring King Henry. The queen had much difficulty in forcing herself to come to terms with the man who had been the bane of her cause, but finally, was induced by Louis XL to conclude a bargain. Warwick married his younger daughter to her son Edward, prince of Wales, as a pledge of his good faith, and swore allegiance to King Henry in the cathedral of Angers. He then set himself to stir up the Yorkshire adherents of the house of Neville to distract the attention of Edward IV. When the king had gone northward to attack them, the earl landed He laads at Dartmouth (Sept. 1470) with a small force partly Figiand. composed of Lancastrian exiles, partly of his own men. His appearance had the effect on which he had calcu- lated. Devon rose in the Lancastrian interest; Kent, where the earl's name had always been popular, took arms a few days later; and London opened its gates. King p'f e dl Edward, hurrying south to oppose the invader, found eA/te> his army melting away from his banner, and hastily took ship at Lynn and fled to Holland. He found a refuge with his brother-in-law and ally Charles the Bold, the great duke of Burgundy.

King Henry was released and replaced on the throne, and for six months W r arwick ruled England as his lieutenant. But there was bitterness and mistrust between the old Lan- castrian faction and the Nevilles, and Queen Margaret R< > stor j> m refused to cross to England or to trust her son in the Henry vi. king-maker's hands. Her partisans doubted his sin- cerity, while many of the Yorkists who had hitherto followed Warwick in blind admiration found it impossible to reconcile themselves to the new regime. The duke of Clarence in par- ticular, discontented at the triumph of Lancaster, betrayed his father-in-law, and opened secret negotiations with his exiled brother. Encouraged by the news of the dissensions among his enemies,

Edward IV. resolved to try his fortune once more, and landed near Hull on the isth of March Edward

■ 1 , , <■ . , , . , , returns to

1471 with a body of mercenaries lent him by the England. duke of Burgundy. The campaign that followed was most creditable to Edward's generalship, but must have been fatal to him if Warwick had been honestly supported by his

lieutenants. But the duke of Clarence betrayed to his brother the army which he had gathered in King Henry's name, and Battle of man y °f the Lancastrians were slow to join the earl, Burnet. from their distrust of his loyalty. Edward, dashing Death of through the midst of the slowly gathering levies of Warwick, j^g opponents, seized London, and two days later defeated and slew Warwick at the battle of Barnet (April 13,

1471).

On that same day Queen Margaret and her son landed at

Weymouth, only to hear that the earl was dead and Battle of^ jjj s armv scattered. But she refused to consider the bury. struggle ended, and gathered the Lancastrians of the

Death of west for a final rally. On the fatal day of Tewkes- Bdward, Dur y (May 3, 147 1) her army was beaten, her son Wales? was sl a i n m the flight, and the greater part of her

chief captains were taken prisoner. She herself was captured next day. The victorious Edward sent to the block

the last Beaufort duke of Somerset, and nearly all Queen the other captains of rank, whether Lancastrians or Margaret followers of. Warwick. He then moved to London, and which was being threatened by Kentish levies raised

™ " ffyj in Warwick's name, delivered the city, and next day

caused the unhappy Henry VI. to be murdered in the Tower (May 21, 1471).

The descendants of Henry IV. were now extinct, and the succession question seemed settled for ever. No one dreamed

of raising against King Edward the claims of the

remoter heirs of John of Gaunt — the young earl of

Richmond, who represented the Beauforts by a female descent, or the king of Portugal, the grandson of Gaunt's eldest daughter. Edward was now king indeed, with no over-powerful cousin at his elbow to curb his will. He had, moreover, at his disposal plunder almost as valuable as that which he had divided up in 146 1 — the estates of the great Neville clan and their ad- herents. A great career seemed open before him; he had proved himself a fine soldier and an unscrupulous diplomatist; he was in the very prime of life, having not yet attained his thirty-first year. He might have devoted himself to foreign politics and have rivalled the exploits of Edward III. or Henry V. — for the state of the continent was all in his favour — or might have set himself to organize an absolute monarchy on the ruins of the parliament and the baronage. For the successive attainders of the Lancastrians and the Nevilles had swept away many of the older noble families, and Edward's house of peers consisted for the main part of new men, his own partisans promoted for good service, who had not the grip on the land that their predecessors had possessed.

But Edward either failed to see his opportunity or refused to take it. He did not plunge headlong into the wars of Louis XI.

and Charles of Burgundy, nor did he attempt to recast character the institutions of the realm. He settled down into reign. inglorious ease, varied at long intervals by outbursts

of spasmodic tyranny. It would seem that the key to his conduct was that he hated the hard work without which a despotic king cannot hope to assert his personality, and preferred leisure and vicious self-indulgence. In many ways the later years of his reign were marked with all the signs of absolutism. Between 1475 and 1483 he called only one single parliament, and that was summoned not to give him advice, or raise him money, but purely and solely to attaint his brother

of Clarence, whom he had resolved to destroy. The tfc"du°o/ duke's fate (Feb. 17, 1478) need provoke no sympathy, Clarence, he was a*

detestable intriguer, and had given his brother

just offence by a series of deeds of high-handed violence and by perpetual cavilling. But he had committed no act of real treason since his long-pardoned alliance with Warwick, and was not in any way dangerous; so that when the king caused him to be attainted, and then privately murdered in the Tower, there was little justification for the fratricide.

Edward was a thrifty king; he was indeed the only medieval monarch of England who succeeded in keeping free of debt and made his revenue suffice for his expenses. But his methods

of filling his purse were often unconstitutional and sometimes ignominious. When the resources drawn from confiscations were exhausted, he raised " benevolences " — forced ;

gifts extracted from men of wealth by the unspoken policy. threat of the royal displeasure — instead of applying to parliament for new taxes. But his most profitable source of revenue was drawn from abroad. Having allied himself with his brother-in-law Charles of Burgundy against the king of France, he led an army into Picardy in 1475, and then by the treaty of Picquigny sold peace to Louis XL for 75,000 gold crowns down, and an annual pension (or tribute as he preferred to call it) of 50,000 crowns more. It was regularly paid up to the last year of his reign. Charles the Bold, whom he had thus deliberately deserted in the middle of their joint campaign, used the strongest language about this mean act of treachery, and with good cause. But the king cared not when his pockets were full. Another device of Edward for filling his exchequer was a very stringent enforcement of justice; small infractions of the laws being made the excuse for exorbitant fines. This was a trick which Henry VII. was to turn to still greater effect. In defence of both it may be pleaded that after the anarchy of the Wars of the Roses a strong hand was needed to restore security for life and property, and that it was better that penalties should be over- heavy rather than that there should be no penalties at all. Another appreciable source of revenue to Edward was his private commercial ventures. He owned many ships, and traded with great profit to himself abroad, because he could promise, as a king, advantages to foreign buyers and sellers with which no mere merchant could compete.

During the last period of Edward's rule England might have been described as a despotism, if only the king had cared to be a despot. But except on rare occasions he allowed his power to be disguised

under the old machinery of the medieval monarchy, and made no parade of his autocracy. Much was pardoned by the nation to one who gave them comparatively efficient and rather cheap government, and who was personally easy of access, affable and humorous. It is with little justification that he has been called the " founder of the new monarchy," and the spiritual ancestor of the Tudor despotism. Another king in his place might have merited such titles, but Edward was too careless, too unsystematic, too lazy, and too fond of self-indulgence to make a real tyrant. He preferred to be a man of pleasure and leisure, only awaking now and then to perpetrate some act of arbitrary cruelty.

England was not unprosperous under him. The lowest point of her fortunes had been reached under the administration of Margaret of Anjou, during the weary years that pre- ceded the outbreak of the civil wars in 1459. At that Condition time the government had been bankrupt, foreign country. trade had almost disappeared, the P'rench and pirates of all nations had possession of the Channel, and the nation had lost heart, because there seemed no way out of the trouble save domestic strife, to which all looked forward with dismay. The actual war proved less disastrous than had been expected. It fell heavily upon the baronage and their retainers, but passed lightly, for the most part, over the heads of the middle classes. The Yorkists courted the approval of public opinion by their careful avoidance of pillage and requisitions; and the Lan- castrians, though less scrupulous, only once launched out into general raiding and devastation, during the advance of the queen's army to St Albans in the early months of 1461. As a rule the towns suffered little or nothing — they submitted to the king of the moment, and were always spared by the victors. It is one of the most curious features of these wars that no town ever stood a siege, though there were several long and arduous sieges of baronial castles, such as Harlech, Alnwick and Barn- borough. Warwick, with his policy of conciliation for the masses and hard blows for the magnates, was mainly responsible for this moderation. In battle he was wont to bid his followers spare the commons in the pursuit, and to smite only the knights and nobles. Towton, where the Yorkist army was infuriated by the harrying of the Midlands by their enemies in the preceding

Com- mercial develop- meat.

campaign, was the only fight that ended in a general massacre. There were, of course, many local feuds and riots which led to the destruction of property; well-known instances are the private war about Caister Castle between the duke of Norfolk and the Pastons, and the " battle of Nibley Green," near Bristol, between the Berkeleys and the Talbots. But on the whole there was no ruinous devastation <5f the land. Pro- sperity seems to have revived early during the rule of York; Warwick had cleared the seas of pirates, and both he and King Edward were great patrons of commerce, though the earl's policy was to encourage trade with France, while his master wished to knit up the old alliance with Flanders by adhering to the cause of Charles of Burgundy. Edward did much in his later years to develop interchange of commodities with the Baltic, making treaties with the Hanseatic League which displeased the merchants of London, because of the advantageous terms granted to the foreigner. The east coast ports seem to have thriven under his rule, but Bristol was not less prosperous. On the one side, developing the great- salt-fish trade, her vessels were encom- passing Iceland, and feeling their way towards the Banks of the West; on the other they were beginning to feel their way into the Mediterranean. The famous William Canynges, the patriarch of Bristol merchants, possessed 2500 tons of shipping, including some ships of 900 tons, and traded in every sea. Yet we still find complaints that too much merchandize reached and left England in foreign bottoms, and King Edward's treaty with the Hansa was censured mainly for this reason. Internal commerce was evidently developing in a satisfactory style, despite of the wars; in especial raw wool was going out of England in less bulk than of old, because cloth woven at home was becoming the staple export. The woollen manufactures which had begun in the eastern counties in the 14th century were now spreading all over the land, taking root especially in Somersetshire, Yorkshire and some districts of the Maaafac- Midlands. Coventry, the centre of a local woollen wooUrade. and dyeing industry, was probably the inland town which grew most rapidly during the 15th century. Yet there was still a large export of wool to Flanders, and the long pack-trains of the Cotswold flockmasters still wound eastward to the sea for the benefit of the merchants of the staple and the continental manufacturer.

As regards domestic agriculture, it has been often stated that the 15th century was the golden age of the English peasant, and State of tnat his prosperity was little affected either by the the rural unhappy French wars of Henry VI. or by the Wars popuia- f the Roses. There is certainly very little evidence of tloa ' any general discontent

among the rural population,

such as had prevailed in the times of Edward III. or Richard II. Insurrections that passed as popular, like the risings of Jack Cade and Robin of Redesdale, produced manifestos that spoke of political grievances but hardly mentioned economic ones. There is a bare mention of the Statute of Labourers in Jack Cade's ably drafted chapter of complaints. It would seem that the manorial grudges between landowner and peasant, which had been so fierce in the 14th century, had died down as the lords abandoned the old system of working their demesne by villein labour. They were now for the most part letting out the soil to tenant-farmers at a moderate rent, and the large class of yeomanry created by this movement seem to have been pros- perous. The less popular device of turning old manorial arable land into sheep-runs was also known, but does not yet seem to have grown so common as to provoke the popular discontents which were to prevail under the Tudors. Probably such labour as was thrown out of work by this tendency was easily absorbed by the growing needs of the towns. Some murmurs are heard about " enclosures," but they are incidental and not widely spread.

One of the best tests of the prosperity of England under the Yorkist rule seems to be the immense amount of building that was on hand. Despite the needs of civil war, it was not on castles that the builders' energy was spent; the government

of the counttj'.

discouraged fortresses in private hands, and the dwellings of the new nobility of Edward IV. were rather splendid manor-houses, with some slight external protection of moat and gate- house, than old-fashioned castles. But the church- tectJre. building of the time is enormous and magnificent. A very large proportion of the great Perpendicular churches of England date back to this age, and in the cathedrals also much work was going on.

Material prosperity does not imply spiritual development, and it must be confessed that from the intellectual and moral point of view 15th-century England presents an un- Religious pleasing picture. The Wycliffite movement, the one condition phenomenon which at the beginning of the century seemed to give some promise of better things, had died down under persecution. It lingered on in a subterranean fashion among a small class in the universities and the minor clergy, and had some adherents among the townsfolk and even

among the peasantry. But the Lollards were a feeble and help- less minority; they no longer produced writers, organizers or missionaries. They continued to be burnt, or more frequently to make forced recantations, under the Yorkist rule, though the list of trials is not a long one. Little can be gathered concerning them from chronicles or official records. We only know that they continued to exist, and occasionally produced a martyr. But the governing powers were not fanatics, bent on seeking out victims; the spirit of Henry V. and Archbishop Arundel was dead. The life of the church seems, indeed, to have been in a more stagnant and torpid condition in this age than at any other period of English history. The great prelates from Cardinal Beaufort down to Archbishops Bourchier and Rotherham, and Bishop John Russell — trusted supporters of the Yorkist dynasty — were mere politicians with nothing spiritual about them. Occasionally they appear in odious positions. Rotherham was the ready tool of Edward IV. in the judicial murder of Clarence. Russell became the obsequious chancellor of Richard III. Bourchier made himself responsible in 1483 for the taking of the little duke of York from his mother's arms in order to place him in the power of his murderous uncle. It is difficult to find a single bishop in the whole period who was respected for his piety or virtue. The best of them were capable statesmen, the worst were mean time-servers. Few of the higher clergy were such patrons of learning as many prelates of earlier ages. William Grey of Ely and James Goldwell of Norwich did something for scholars, and there was one bishop in the period who came to sad grief through an intellectual activity which was rare among his contemporaries. This was the eccentric Reginald Pecock of Chichester, who, while setting himself to confute Lollard con- troversialists, lapsed into heresy by setting " reason " above " authority." He taught that the organization and many of the dogmas of the medieval church should be justified by an appeal to private judgment and the moral law, rather than to the scriptures, the councils, or the fathers. For taking up this dangerous line of defence, and admitting his doubts about several received articles of faith, he w r as attacked by the Yorkist archbishop Bourchier in 1457, compelled to do penance, and shut up in a monastery for the rest of his life. He seems to have had no school of followers, and his doctrines died with him.

In nothing is the general stagnation of the church in the later 15th century shown better than by the gradual cessation of the monastic chronicles. The stream of narrative was still flowing strongly in 1400; by 1485 it has run dry, ™„ a . even St Albans, the mother of historians, produced teries. no annalist after Whethamstede, whose

story ceases early in the Wars of the Roses. The only monastic chronicler who went on writing for a few years after the extinction of the house of York was the " Croyland continuator." For the last two-thirds of the century the various " London chronicles," the work of laymen, are much more important than anything which was produced in the religious houses. The regular clergy indeed seem to have been sunk in intellectual torpor. Their numbers were falling off, their zeal was gone; there is little good to be said of them save that they were still in some cases endowing

England with splendid architectural decorations. But even in the wealthier abbeys we find traces of thriftless administration, idleness, self-indulgence and occasionally grave moral scandals. The parochial clergy were probably in a healthier condition; but the old abuses of pluralism and non-residence were as rampant as ever, and though their work may have been in many cases honourably carried out, it is certain that energy and intelligence were at a low ebb.

The moral faults of the church only reflected those of the nation. It was a hard and selfish generation which witnessed

the Wars of the Roses and the dictatorship of Moral Edward IV. The iniquitous French war, thirty years

the nation. °f plunder and demoralization, had corrupted the

minds of the governing classes before the civil strife began. Afterwards the constant and easy changes of allegiance, as one faction or the other was in the ascendant, the wholesale confiscations and attainders, the never-ending executions, the sudden prosperity of adventurers, the premium on time-serving and intrigue, sufficed to make the whole nation cynical and sordid. The claim of the Yorkists to represent constitutional opposition to misgovernment became a mere hypocrisy. The claim of the Lancastrians to represent loyalty soon grew almost as hollow. Edward IV. with his combination of vicious self- indulgence and spasmodic cruelty was no unfit representative

of his age. The Paston Letters, that unique collection J^ e of the private correspondence of a typical family of

Letters." nouveaux riches, thriftless, pushing, unscrupulous, give

us the true picture of the time. All that can be said in favour of the Yorkists is that they restored a certain measure of national prosperity, and that their leaders- had one redeeming virtue in their addiction to literature. The learning which had died out in monasteries began to flourish again in the corrupt soil of the court. Most of Edward's favourites had literary tastes. His constable Tiptoft, the " butcher earl " of Worcester, was a figure who might have stepped out of the Italian Renaissance. influence ˆ graduate of Pavia, a learned lawyer, who translated at the Caesar and Cicero, composed works both in Latin

Italian Re- and English, and habitually impaled his victims, he naissance. was a man f a ty p e hitherto unknown in England. Antony, Lord Rivers, the queen's brother, was a mere adven- turer, but a poet of some merit, and a great patron of Caxton. Hastings, the Bourchiers, and other of the king's friends were minor patrons of literature. It is curious to find that Caxton, an honest man, and an enthusiast as to the future of the art of printing, which he had introduced into England, waxes enthusiastic as to the merits of the intelligent but un- scrupulous peers who took an interest in his endeavours. Of the detestable Tiptoft he writes that " there flowered in virtue and cunning none like him among the lords of the temporalty in science and moral virtue " ! And this is no time-serving praise of a patron, but disinterested tribute to a man who had perished long before on the scaffold.

The uneventful latter half of the reign of Edward IV. ended with his death at the age of forty-one on the oth of April 1483.

He had ruined a splendid constitution by the com- Death of bination of sloth and evil living, and during his last iy, years had been sinking slowly into his grave, unable

to take the field or to discharge the more laborious duties of royalty. Since Clarence's death he had been gradually falling into the habit of transferring the conduct of great matters of state to his active and hard-working youngest brother, Richard Richard, duke of Gloucester, who had served him well duke of' and faithfully ever since he first took the field at Barnet. Qiou- Gloucester passed as a staid and religious prince, and

tester. jj tn ere was blood on his hands, the same could be said of every statesman of his time. His sudden plunge into crime and

usurpation after his brother's death was wholly unexpected by the nation. Indeed it was his previous reputation for loyalty and moderation which made his scandalous coup d'etat of 1483 possible. No prince with a sinister reputation would have had the chance of executing the series of crimes which placed him on the throne. But when Richard declared that he was the

victim of plots and intrigues, and was striking down his enemies only to defend his own life and honour, he was for some time believed.

At the moment of King Edward's death his elder son by Elizabeth Woodville, Edward, prince of Wales, was twelve; his younger son Richard, duke of York, was nine. It gioucest r was clear that there would be a long minority, and proclaims that the only possible claimants for the regency were himself the queen and Richard of Gloucester. Elizabeth was P rotector – personally unpopular, and the rapacity and insolence of her family was well known. Hence when Richard of Gloucester seized on the person of the young king, and imprisoned Lord Rivers and Sir Richard Grey, the queen's brother and son, on the pretence that they were conspiring against him, his action was regarded with equanimity by the people. Nor did the fact that the duke took the title of "protector and defender of the realm" cause any surprise. Suspicions only became rife after Richard had seized and beheaded without any trial, Lord Hastings, the late king's most familiar friend, and had arrested at the same moment the archbishop of York, Morton, bishop of Ely, and Lord Stanley, all persons of unimpeachable loyalty to the house of Edward IV. It was not plausible to accuse such persons of plotting with the queen to overthrow the protector, and public opinion began to turn against Gloucester. Never- theless he went on recklessly with his design, having already enlisted the support of a party of the greater peers, who were ready to follow him to any length of treason. These confidants, the duke of Buckingham, the lords Howard and Lovel, and a few more, must have known from an early date that he was aiming at the crown, though it is improbable that they suspected that his plan involved the murder of the rightful heirs as well as mere usurpation.

On the 16th of June, Richard, using the aged archbishop Bourchier as his tool, got the little duke of York out of his mother's hands, and sent him to join his brother in the Tower. A few days later, having packed London with his own armed retainers and those of Buckingham and his other confidants, he openly put forward his pretensions to the throne. Edward IV., as he asserted, had been privately contracted to Lady Eleanor Talbot before he ever met

*Queen Elizabeth. His children therefore were bastards, the offspring of a bigamous union. As to the son and daughter of the duke of Clarence, their blood had been corrupted by their father's attainder, and they could not be reckoned as heirs to the crown. He himself, therefore, was the legitimate successor of Edward IV. This preposterous theory was set forth by Buckingham, first to the mayor and corporation of London, and next day to an assembly of the estates of the realm held in St Paul's. Cowed by the show of armed force, and remembering the fate of Hastings, the two assemblies received the claim with silence which gave consent. Richard, after a hypocritical show of reluctance, allowed himself to be saluted as king, and was crowned on the 6th of July R lcn *rd 1483. Before the coronation ceremony he had issued crowned orders for the execution of the queen's relatives, who had been in prison since the beginning of May. He paid his adherents lavishly for their support, making Lord Howard duke of Norfolk, and giving Buckingham enormous grants of estates and offices.*

Having accomplished his coup d'Hat Richard started for a royal progress through the Midlands, and a few days after his departure sent back secret orders to London for the murder of his two nephews in the Tower. There is Murder no reason to doubt that they were secretly smothered princes. on or about the 15th of July by his agent Sir James Tyrrell, or that the bones found buried under a staircase in the fortress two hundred years after belonged to the two unhappy lads. But the business was kept dark at the time, and it was long before any one could assert with certainty that they were dead or alive. Richard never published any statement as to their end, though some easy tale of a fever, a conflagration, or an accident might have served him better than the mere silence that he employed. For while many persons believed

that the princes still existed there was room for all manner of impostures and false rumours.

The usurper's reign was from the first a troubled one. Less

than three months after his coronation the first insurrection

broke out; it was headed — strangely enough — by the

Bucking- Juke of Buckingham, who seems to have been shocked ham's ii-i

rebellion. Dv the murder of the princes; he must have been one of the few who had certain information of the crime. He did not take arms in his own cause, though after the house of York the house of Buckingham had the best claim to the throne, as representing Thomas of Woodstock, the youngest son of Edward III. His plan was to unite the causes of York and Lancaster by wedding the Lady Elizabeth, the eldest sister of the murdered princes, to Henry Tudor, earl of Richmond, a young exile who represented the very doubtful claim of the Beauforts to the Lancastrian heritage. Henry was the son of Margaret Beaufort, the daughter of John, first duke of Somerset, and the niece of Edmund, second duke, who fell at St Albans. All her male kinsmen had been exterminated in the Wars of the Roses. This promising scheme was to be supported by a rising of those Yorkists who rejected the usurpation of Richard III., and by the landing on the south coast of Henry of Execution Ri c h monc i with a body of Lancastrian exiles and of Buck- . v, 1 . .

Ingham, foreign mercenaries. But good organization was

wanting, and chance fought for the king. A number of scattered risings in the south were put down by Richard's troops, while Buckingham, who had raised his banner in Wales, was prevented from bringing aid by a week of extraordinary rains which made the Severn impassable. Finding that the rest of the plan had miscarried, Buckingham's retainers melted away from him, and he was forced to fly. A few days later he was betrayed, handed over to the king, and beheaded (Nov. 2, 1483). Meanwhile Richmond's little fleet was dispersed by the same storms that scattered Buckingham's army, and he was forced to return to Brittany without having landed in England.

Here King Richard's luck ended. Though he called a parlia- ment early in 1484, and made all manner of gracious promises of good governance, he felt that his position was insecure. The nation was profoundly disgusted with his unscrupulous policy, and the greater part of the leaders of the late insurrection had escaped abroad and were weaving new plots. Early in the spring he lost his only son and heir, Edward, prince of Wales, and the question of the succession to the crown was opened from a new point of view. After some hesitation Richard named his nephew John de la Pole, earl of Lincoln, a son of his sister, as his heir. But he also bethought him of another and a most repulsive plan for strengthening his position. His

queen, Anne Neville, the daughter of the kingmaker, was on her death-bed. With indecent haste he began to devise a scheme for marrying his niece Eliza- beth, whose brothers he had murdered but a year before. Know- ledge of this scheme is said to have shortened the life of the unfortunate Anne, and many did not scruple to say that her husband had made away with her.

When the queen was dead, and some rumours of the king's intentions got abroad, the public indignation was so great that Henry of Richard's councillors had to warn him to disavow the Richmond projected marriage, if he wished to retain a single Af»? S rf' adherent. He yielded, and made public complaint

that he had been slandered — which few believed. Meanwhile the conspirators of 1483 were busy in organizing another plan of invasion. This time it was successfully carried out, and the earl of Richmond landed at Milford Haven with many exiles, both Yorkists and Lancastrians, and 1000 mer- cenaries lent him by the princess regent of France. The Welsh joined him in great numbers, not forgetting that by his Tudor descent he was their own kinsman, and when he reached Shrews- bury English adherents also began to flock in to his banner, for

the whole country was seething with discontent, and Bosworth. Richard III. had but few loyal adherents. When the

rivals met at Bosworth Field (Aug. 22, 1485) the king's army was far the larger, but the greater part of it was deter- mined not to fight. When battle was joined some left the field I

Henry VII.

and many joined the pretender. Richard, however, refused to fly, and was slain, fighting to the last, along with the duke of Norfolk and a few other of his more desperate partisans. The slaughter was small, for treason, not the sword, had settled the day. The battered crown which had fallen from Richard's helmet was set on the victor's head by Lord Stanley, the chief of the Yorkist peers who had joined his standard, and his army hailed him by the new title of Henry VII.

No monarch of England since William the Conqueror, not excluding Stephen and Henry IV., could show such a poor title to the throne as the first of the Tudor kings. His claim to represent the house of Lancaster was of the weakest — when Henry IV. had assented to the legiti- mating of his brothers the Beauforts, he had attached a clause

to the act, to provide that they were given every right save that of counting in the line of succession to the throne. The true heir to the house of John of Gaunt should have been sought among the descendants of his eldest legitimate daughter, not among those of his base-born sons. The earl of Richmond had been selected by the conspirators as their figure-head mainly because he was known as a young man of ability, and because he was unmarried and could therefore take to wife the princess Eliza- beth, and so absorb the Yorkist claim in his own. This had been the essential part of the bargain, and Henry was ready to carry it out, but he insisted that he should first be recognized as king in his own right, lest it might be held that he ruled merely as his destined wife's consort. He was careful to hold his first parlia- ment and get his title acknowledged before he married the princess. When he had done so, he had the triple claim by conquest, by election and by inheritance, safely united. Yet his position was even then insecure; the vicissitudes of the last thirty years had shaken the old prestige of the name of king, and a weaker and less capable man than Henry Tudor might have failed to retain the crown that he had won. There were plenty of possible pretenders in existence; the earl of Lincoln, whom Richard III. had recognized as his heir, was still alive; the two children of the duke of Clarence might be made the tools of conspirators ; and there was a widespread doubt as to whether the sons of Edward IV. had actually died in the Tower. The secrecy with which their uncle had carried out their murder was destined to be a sore hindrance to his successor.

Bosworth Field is often treated as the last act of the Wars of the Roses. This is an error; they were protracted for twelve years after the accession of Henry VII., and did not really end till the time of Blackheath Field and the Ear,y siege of Exeter (1497). The position of the first Tudor ufZign. king is misconceived if his early years are regarded as a time of strong governance and well-established order. On the contrary he was in continual danger, and was striving with all the resources of a ready and untiring mind to rebuild foundations that were absolutely rotten. Phenomena like the Cornish revolt (which recalls Cade's insurrection) and the Yorkshire rising of 1489, which began with the Insurrec- death of the earl of Northumberland, show that at pfofc. 3 " any moment whole counties might take arms in sheer lawlessness, or for some local grievance. Loyalty was such an uncertain thing that the king might call out great levies yet be forced to doubt whether they would fight for him — at Stoke Field it seems that a large part of Henry's army misbehaved, much as that of Richard III. had done at Bosworth. The demoralization brought about by the evil years between 1453 and 1483 could not be lived

down in a day — any sort of treason was possible to the generation that had seen the career of Warwick and the usurpation of Gloucester. The survivors of that time were capable of taking arms for any cause that offered a chance of unreasonable profit, and no one's loyalty could be trusted. Did not Sir William Stanley, the best paid of those who betrayed Richard III., afterwards lose his head for a deliberate plot to betray Henry VII.? The various attempts that were made to overturn the new dynasty seem contemptible to the historian of the 20th century. They wore not so con- temptible at the time, because England and Ireland were full

of adventurers who were ready to back any cause, and who looked on the king of the moment as no more than a successful member of their own class — a base-born Welshman who had been lucky enough to become the figurehead of the movement that had overturned an unpopular usurper. The organizing spirits of the early troubles of the reign of Henry VII. were irreconcil- able Yorkists who had suffered by the change of dynasty; but their hopes of success rested less on their own strength than on the not ill-founded notion that England would tire of any ruler who had to raise taxes and reward his partisans. The position bore a curious resemblance to that of the early years of Henry IV., a king who, like Henry VII., had to vindicate a doubtful elective title to the throne by miracles of cunning and activity. The later representative of the house of Lancaster was fortunate, however, in having less formidable enemies than the earlier; the power of the baronage had been shaken by the Wars of the Roses no less than the power of the crown; so many old estates had passed rapidly from hand to hand, so many old titles were represented by upstarts destitute of local influence, that the feudal danger had become far less. Risings like that of the Percies in 1403 were not the things which the seventh Henry had to fear. He was lucky too in having no adversary of genius of the type of Owen Glendower. Welsh national spirit indeed was enlisted on his own side. Yet leaderless seditions and the plots of obvious impostors sufficed to make his throne tremble, and a ruler less resolute, less wary, and less unscrupulous might have been overthrown.

The first of the king's troubles was an abortive rising in the north riding of Yorkshire, the only district where Richard III. seems to have

enjoyed personal popularity. It was led by Lord Lovel, Richard's chamberlain and admiral; but the insurgents dispersed when Henry marched against them with a large force (i486), and Lovel took refuge in Flanders with Margaret of York, the widow of Charles the Bold of Burgundy, whose dower towns were the refuge of all English exiles, and whose coffers were always open to subsidize plots against her niece's husband. Under the auspices of this rancorous princess the second con- spiracy was hatched in the following year (1487)- Its leaders were Lovel and John, earl of Lincoln, whom Richard III. had designated as his heir. But the Yorkist banner was to be raised, not in the name of Lincoln, but in that of the boy Edward of Clarence, then a prisoner in the Tower. His absence and cap- tivity might seem a fatal hindrance, but the conspirators had prepared a " double " who was to take his name till he sjmoel could be released. This was a lad named Lambert Simnel, the son of an Oxford organ-maker, who bore a personal resemblance to the young captive. The conspirators seem to have argued that Henry VII. would not proceed to murder the real Edward, but would rather exhibit him to prove the imposition; if he took the more drastic alternative Lincoln could fall back on his own claim to the crown.*

In May 1487 Lincoln and Lovel landed in Ireland accom- panied by other exiles and 2000 German mercenaries. The cause of York was popular in the Pale, and the Anglo-Irish barons seem to have conceived the notion that Henry VII. was likely to prove too strong and capable a king to suit their convenience. The invading army was welcomed by almost all the lords, and the spurious Clarence was crowned at Dublin by the name of Edward VI. A few weeks later Lincoln had recruited his army with 4000 or 5000 Irish adventurers under Thomas Fitzgerald, son of the earl of Kildare, and had taken ship for England. He landed in Lancashire, and pushed forward, hoping to gather the English Yorkists to his aid. But few had joined him when King Henry brought him to action at Stoke, near Newark, on the 17th of July. Despite the doubtful conduct of part of the royal army, and the fierce resistance of the Germans and Irish, the rebel army was routed. Lincoln and Fitzgerald were slain; Lovel disappeared in the rout; the young impostor Simnel was taken prisoner. Henry treated him with politic contempt, and made him a cook boy in his kitchen. He lived for many years after in the royal house- hold. The Irish lords were pardoned on renewing their, oaths

Battle of Stoke.

of fealty; the king did not wish to entangle himself in costly

campaigns beyond St George's Channel till he had made his position in England more stable.

The Yorkist cause was crushed for four years, till it was raised again by Margaret of Burgundy, with an imposture even more preposterous than that of Lambert Simnel. In the

• • 1 1 m it t .,, Foreign

intervening space, however, while Henry VII. was a uiaoces.

comparatively undisturbed by domestic rebellion, he found opportunity for a first tentative experiment at interfering in European politics. He allied himself with Ferdinand and Isabella of Spain and with Maximilian' of Austria, who was ruling the Netherlands in behalf of his young son, Philip, the heir of the Burgundian inheritance, for the purpose of preventing France from annexing Brittany, the last great fief of the crown which had not yet been absorbed into the Valois royal domain. This struggle, the only continental war in which the first of the Tudors risked his fortunes, was not prosecuted with any great energy, and came to a necessary end when Anne, duchess of Brittany, in whose behalf it was being waged, disappointed her allies by marrying Charles VIII. of her own freewill (Dec. 1491). Henry very wisely proceeded to get out of the war on the best terms possible, and, to the disgust of Maximilian, sold peace to the French king for 600,000 crowns, as well as an additional sum representing arrears of the pension which Louis XL had been bound to pay to Edward IV. This treaty of Etaples was, in short, a repetition of Edward's treaty §jjfL£ a °- of Picquigny, equally profitable and less disgraceful, for Maximilian of Austria, whom Henry thus abandoned, had given more cause of offence than had Charles of Burgundy in 1475. Domestic malcontents did not scruple to hint that the king, like his father-in-law before him, had made war on France, not with any hope of renewing the glories of Crecy or Agincourt, still less with any design of helping his allies, but purely to get first grants from his parliament, and then a war indemnity from his enemies. In any case he was wise to make peace. France was now too strong for England, and both Maximilian and Ferdinand of Spain were selfish and shifty allies. Moreover, it was known that the one dominating desire of Charles VIII. was to conquer Italy, and it was clear that his ambitions in that direction were not likely to prove dangerous to England.

In the year of the treaty of Etaples the Yorkist conspiracies began once more to thicken, and Henry was fortunate to escape with profit from the French war before his domestic Yorkist troubles recommenced. Ever since 1483 it had been plots. rumoured that one or both of the sons of Edward IV. {S ri {“° k had escaped, not having been murdered in the Tower. Of this widespread belief the plotters now took advantage; they held that much more could be accomplished with such a claim than by using that of the unfortunate Edward of Clarence, whose chances were so severely handicapped by his being still the prisoner of Henry VII. The scheme for producing a false Plantagenet was first renewed in Ireland, where Simnel's imposture had been so easily taken up a few years before. The tool selected was one Perkin Warbeck, a handsome youth of seven- teen or eighteen, the son of a citizen of Tournai, who had lived for some time in London, where Perkin had actually been born. There is a bare possibility that the young adventurer may have been an illegitimate son of Edward IV.; his likeness to the late king was much noticed. When he declared himself to be Richard of York, he obtained some support in Ireland from the earl of Desmond and other lords; but he did not risk open rebellion till he had visited Flanders, and had been acknowledged as •her undoubted nephew by Duchess Margaret. Maximilian of Austria also took up his cause, as a happy means of revenging himself on Henry VII. for the treaty of Etaples. There can be small doubt that both the duchess and the German King (Maximilian had succeeded, to his father's crown in 1493) were perfectly well aware that they were aiding a manifest fraud. But they made much of Perkin, who followed the imperial court for two years, while his patron was intriguing with English mal- contents. The emissaries from Flanders got many promises of assistance,' and a formidable rising might have taken place had

not Henry VII. been well served by his spies. But in the winter of 1494-1495 the traitors were themselves betrayed, and a large number of arrests were made, including not only Lord Fitz- walter and a number of well-known knights of Yorkist families, but Sir William Stanley, the king's chamberlain, who had been rewarded with enormous gifts for his good service at Bosworth, and was reckoned one of the chief supports of the throne. Stanley and several others were beheaded, the rest hanged or imprisoned. This vigorous

action on the part of the king seems to have cowed all Warbeck's supporters on English soil. But the pretender nevertheless sailed from Flanders in July 1495 with a following of 2000 exiles and German mercenaries. He at- tempted to land »at Deal, but his vanguard was destroyed by Kentish levies, and he drew off and made for Ireland. Suspect- ing that this would be his goal, King Henry had been doing his best to strengthen his hold on the Pale, whither he had sent his capable servant Sir Edward Poynings as lord deputy. Already before Warbeck's arrival Poynings had arrested the earl of Kildare, Simnel's old supporter, cowed some of the Irish by military force, and bought over others by promises of subsidies and pensions. But his best-remembered achievement was that he had induced the Irish parliament to pass the ordinances known as " Poynings' Law," by which it acknowledged that it could pass no legislation which had not been approved by the king and his council, and agreed that all statutes passed by the English parliament should be in force in Ireland. That such terms could be imposed shows the strength of Poynings' arm, and his vigour was equally evident when Warbeck came ashore in Munster in July 1495. Few joined the impostor save the earl of Desmond, and he was repulsed from Waterford, and dared not face the army which the lord deputy put into the field against him. Thereupon, abandoning his Irish schemes, Warbeck sailed to Scotland, whose young king James IV. had just been seduced by the emperor Maximilian into declaring war on England. He promised the Scottish king Berwick and 50,000 crowns in return for the aid of an army. James took the offer, gave him the hand of his kinswoman Catherine Gordon, daughter of the earl of Huntly, and took him forth for a raid into Northumber- land (1496), But a pretender backed by Scottish spears did not appeal to the sympathies of the English borderers. The expedition fell flat; not a man joined the banner of the white rose, and James became aware that he had set forth on a fool's errand. But Warbeck soon found other allies of a most un- expected sort. The heavy taxation granted by the English parliament for the Scottish war had provoked discontent and rioting in the south-western counties. In Cornwall especially the disorders grew to such a pitch that local dema- C ˚tei/ioa 8˚g ues called out several thousand men to resist the tax-collectors, and finally raised open rebellion, pro- posing to march on London and compel the king to dismiss his ministers. These spiritual heirs of Jack Cade were Flammock, a lawyer of Bodmin, and a farrier named Michael Joseph. Whether they had any communication with Warbeck it is im- possible to say; there is no proof of such a connexion, but their acts served him well. A Cornisˆ army marched straight on London, picking up some supporters in Devon and Somerset on their way,

including a discontented baron, Lord Audley, whom they made their captain.

So precarious was the hold of Henry VII. on the throne that he was in great danger from this outbreak of mere local turbu- lence. The rebels swept over five counties unopposed, Battle of an(j were on iy stopped and beaten in a hard fight on heath. Blackheath, when they had reached the gates of London. Audley, the farrier and the lawyer were all captured and executed (June 18, 1497)- But the crisis was not yet at an end. Warbeck, hearing of the rising, but not of its suppression, had left Scotland, and appeared in Devonshire in August. He rallied the wrecks of the west country rebels, and presently appeared before the gates of Exeter with nearly 8000 men. But the citizens held out against him, and presently the approach of the royal army was reported. The pretender led off his horde to meet the relieving force, but when he reached

Taunton he found that his followers were so dispirited that dis- aster was certain. Thereupon he absconded by night, and took sanctuary in the abbey of Beaulieu. He offered to confess his imposture if he were promised his life, and the king accepted the terms. First at Taunton and again at Westminster, Perkin publicly recited a long narrative of his real parentage, his frauds and his adventures. He was then consigned to not over strict confinement in the Tower, and might have fared no worse than Lambert Simnel if he had possessed his soul in patience. But in the next year he corrupted his warders, broke out from his prison, and tried to escape beyond seas. He was captured, but the king again spared his life, though he was placed for the future in a dungeon " where he could see neither moon nor sun." Even this did not tame the impostor's mercurial tem- perament. In 1499 he again planned an escape, which was to be shared by another prisoner, the unfortunate Edward of Clarence, earl of Warwick, whose cell was in the storey above his own. But there were traitors among the Tower officials whom they suborned to help them, and the king was warned of the plot. He allowed it to proceed to the verge of execution, and then arrested both the false and the true Plantagenet. Evidence of a suspicious character was produced to „ show that they had planned rebellion as well as mere of War . escape, and both were put to death with some of their beck and accomplices. Warbeck deserved all that he reaped, Edward of but the unlucky Clarence's fate estranged many hearts from the king. The simple and weakly young man, who had spent fifteen of his twenty-five years in confinement, had, in all probability, done no more than scheme for an escape from his dungeon. But as the true male heir of the house of Plantagenet he was too dangerous to be allowed to survive.

*The turbulent portion of the reign of Henry VII. came to an end with Blackheath Field and the siege of Exeter. From that time forward the Tudor dynasty was no longer in Establish- serious danger; there were still some abortive plots, went of but none that had any prospect of winning popular the Tudor support. The chances of Warbeck and Clarence had dy"****' vanished long before they went to the scaffold. The Yorkist claim, after Clarence's death, might be supposed to have passed to his cousin Edmund, earl of Suffolk, the younger brother of that John, earl of Lincoln, who had been declared heir to the crown by Richard III., and had fallen at Stoke field. Fully conscious of the danger of his position, Suffolk fled to the continent, and lived for many years as a pensioner of the emperor Maximilian. Apparently he dabbled in treason; it is at any rate certain that in 1 501 King Henry executed some, and imprisoned others, of his relatives and retainers. But his plots, such as they were, seem to have been futile. There was no substratum of popular dis- content left in England on which a dangerous insurrection might be built up. It was to be forty years before another outbreak of turbulence against the crown was to break forth.*

VI. The Tudor Despotism and the Beginnings of the Reformation (1497-1528) The last twelve years of the reign of Henry VII. present in most respects a complete contrast to the earlier period, 148 5- 149 7. There were no more rebellions, and — as we have already seen — no more plots that caused any serious danger. Nor did the king indulge his unruly subjects in foreign wars, though he was constantly engaged in negotiations with France, Scotland, Spain and the emperor, which from time to time took awkward turns. But Henry was determined to win all that he could by diplomacy, and not by force of arms. His cautious, but often unscrupulous, dealings with the rival continental powers had two main ends; the first was to keep his own position safe by playing off France against the Empire and Spain; the second was to get commercial advantages by dangling his alliance before each power in turn. Flanders was still the greatest customer of England, and it was therefore necessary above all things to keep on good terms with the archduke Philip, the son of Maximilian, who on coming of age had taken over the rule of the Netherlands from his father.

The king's great triumphs were the conclusion of the Intercursus Magnus of 1496 and the Intercursus Malus (so called by the Flemings, not by the English) of 1506. The former _°^."i.f provided for a renewal of the old commercial alliance mercial .

treaties. with the house of Burgundy, on the same terms under which it had existed in the time of Edward IV.; the rupture which had taken place during the years when Maximilian was backing Perkin Warbeck had been equally injurious to both parties. The Malus Intercursus on the other hand gave England some privileges which she had not before enjoyed — exemption from local tolls in Antwerp and Holland, and a licence for English merchants to sell cloth retail as well as wholesale — a concession which hit the Netherland small traders and middle- men very hard. Another great commercial advantage secured by Henry VII. for his subjects was an increased share of the trade to the Scandinavian countries. The old treaties of Edward IV. with the Hanseatic League had left the Germans still in control of the northern seas. Nearly all the Baltic goods, and most of those from Denmark and Norway, had been reaching London or Hull in foreign bottoms. Henry allied himself with John of Denmark, who was chafing under the monopoly of the Hansa, and obtained the most ample grants of free trade in his realms. The Germans murmured, but the English shipping in eastern and northern waters continued to multiply. Much the same policy was pursued in the Mediterranean. Southern goods hitherto had come to Southampton or Sandwich invariably in Venetian carracks, which took back in return English wool and metals. Henry concluded a treaty with Florence, by which that republic undertook to receive his ships in its harbours and to allow them to purchase all eastern goods that they might require. From this time forward the Venetian monopoly ceased, and the visits of English merchant vessels to the Mediterranean became frequent and regular.

Nor was it in dealing with old lines of trade alone that Henry Tudor showed himself the watchful guardian of the interests of his subjects. He must take his share of credit for the English encouragement of the exploration of the seas of the gators. Far West. The British traders had already pushed far into the Atlantic before Columbus discovered America; fired by the success of the great navigator they continued their adventures, hoping like him to discover a short " north-west

passage ” to Cathay and Japan. With a charter from the king giving him leave to set up the English banner on all the lands he might discover, the Bristol Genoese trader John Cabot successfully passed the great sea in 1497, and discovered New- foundland and its rich fishing stations. Henry rewarded him with a pension of £20 a year, and encouraged him to further exploration, in which he discovered all the American coast-line from Labrador to the mouth of the Delaware — a great heritage for England, but one not destined to be taken up for coloniza- tion till more than a century had passed.

Henry’s services to English commerce were undoubtedly of far more importance to the nation than all the tortuous details of his foreign policy. His chicanery need not, how- Forelgn ever, be censured over much, for the princes with whom Henry VII. he had to deal, and notably Ferdinand and Maxi- milian, were as insincere and selfish as himself. Few diplomatic hagglings have been so long and so sordid as that between England and Spain over the marriage treaty which gave the hand of Catherine of Aragon first to Henry’s eldest son Arthur, and then, on his premature death in 1502, to his second son Henry. The English king no doubt imagined that he had secured a good bargain, as he had kept the princess’s dowry, and yet never gave Ferdinand any practical assistance in war or peace. It is interesting to find that he had for some time at the end of his reign a second Spanish marriage in view; his wife Elizabeth of York having died in 1503, he seriously proposed himself as a suitor for Joanna of Castile, the elder sister of Catherine, and the widow of the archduke Philip, though she was known to be insane. Apparently he hoped there- by to gain vantage ground for an interference in Spanish politics, which would have been most offensive to Ferdinand. Nothing

came of the project, which contrasts strangely with the greater part of Henry’s sober and cautious schemes.

On the other hand a third project of marriage alliance which Henry carried out in 1503 was destined to be consummated, and to have momentous, though long-deferred, results. This was the giving of the hand of his daughter Marriage Margaret to James IV. of Scotland. Thereby he %ˆ” bought quiet on the Border and alliance with Scotland Scotland for no more than some ten years. B ut — as it chanced — an4 the issue of this alliance was destined to unite the Tudor™ English and the Scottish crowns, when the male line of the Tudors died out, and Henry, quite unintentionally, had his share in bringing about the consummation, by peaceful means, of that end which Edward I. had sought for so long to win by the strong hand.*

All the foreign politics of the reign of Henry VII. have small importance compared with his work within the realm. The true monument of his ability was that he left England Ch rf tamed and orderly, with an obedient people and a full ot Henry's exchequer, though he had taken it over wellnigh Internal in a state of anarchy. The mere suppression of insur- Tule ' rections like those of Simnel and Warbeck was a small part of his task. The harder part was to recreate a spirit of order and subordination among a nation accustomed to long civil strife. His instruments were ministers of ability chosen from the clergy and the gentry— he seems to have been equally averse to trusting the baronage at the one end of the social scale, or mere upstarts at the other, and it is notable that no one during his reign can be called a court favourite. The best-known names among his servants were his great chancellor, Archbishop Morton, Foxe, bishop of Winchester, Sir Reginald Bray, and the lawyers Empson and Dudley. These two last bore the brunt of the unpopularity of the financial policy of the king during the latter half of his reign, when the vice of avarice seems to have grown upon him beyond all reason. But Henry was such a hard-working monarch, and so familiar with all the details of administration, that his ministers cannot be said to have had any independent authority, or to have directed their master's course of action.

The machinery employed by the first of the Tudors for the suppression of domestic disorder is well known. The most important item added by him to the administrative machinery of the realm was the famous Star Chamber, £J e s f" r r which was licensed by the parliament of 1487. It consisted of a small committee of ministers, privy councillors and judges, which sat to deal with offences that seemed to lie outside the scope of the common law, or more frequently with the misdoings of men who were so powerful that the local courts could not be trusted to execute justice upon them, such as great landowners, sheriffs and other royal officials, or turbulent individuals who were the terror of their native districts. The need for a strong central court directly inspired by the king, which could administer justice without respect of persons, was so great, that the constitutional danger of establishing an autocratic judicial committee, untrammelled by the ordinary rules of law, escaped notice at the time. It was not till much later that the nation came to look upon the Star Chamber as the special engine of royal tyranny and to loathe its name. In 1 500 it was for the common profit of the realm that there should exist such a court, which could reduce even the most powerful offender to order.

One of the most notable parts of the king's policy was his long-

continued and successful assault on the abuse of ” livery and maintenance,” which had been at its height during the Wars of the Roses. We have seen the part which s “on7f’ it had taken in strengthening the influence of those livery and who were already too powerful, and weakening the mainten- ordinary operation of the law. Henry put it down aace ‘ with a strong hand, forbidding all liveries entirely, save for the mere domestic retainers of each magnate. His determination to end the system was well shown by the fact that he heavily fined even the earl of Oxford, the companion of his exile, the

victor of Bosworth, and the most notoriously loyal peer in the realm, for an ostentatious violation of the statute. Where Oxford was punished, no less favoured person could hope to escape. By the end of the reign the little hosts of badged ad- herents which had formed the nucleus for the armies of the Wars of the Roses had ceased to exist.

Edward IV., as has been already remarked, had many of the opportunities of the autocrat, if only he had cared to use them; Personal ˆut his sloth and self-indulgence stood in the way. rule. Henry VII., the most laborious and systematic of men,

turned them to account. He formed his personal opinion on every problem of administration and intervened himself in every detail. In many respects he was his own prime minister, and nothing was done without his knowledge and consent. A consistent policy may be detected in all his acts — ■ that of gathering all the machinery of government into his own hands. Under the later Plantagenets and the Lancastrian kings the great check on the power of the crown had been that financial difficulties were continually compelling the sovereign to summon parliaments. The estates had interfered perpetually in all the details of governance, by means of the power of the purse. Edward IV., first among English sovereigns, had been able to dispense with parliaments for periods of many years, because he did not need their grants save at long intervals. Henry was in the same position; by strict economy, by the use of foreign subsidies, by the automatic growth of his revenues during a time of peace and returning prosperity, by confiscation and forfeitures, he built himself up a financial position which rendered it unnecessary for him to

make frequent appeals to parliament. Not the least fertile of his expedients was that regular exploitation of the law as a source of revenue, which had already been seen in the time of his father-in-law. This part of Henry's policy is connected with the name of his two extortionate " fiscal judges " Empson and Dudley, who " turned law and justice into rapine " by their minute inquisition into all technical breaches of legality, and the nice fashion in which they adapted the fine to the wealth of the misdemeanant, without any reference to his moral guilt or any regard for ex- tenuating circumstances. The king must take the responsi- bility for their unjust doings; it was his coffers which mainly profited by their chicane. In his later years he fell into the vice of hoarding money for its own sake; so necessary was it to his policy that he should be free, as far as possible, from the need for applying to parliament for money, that he became morbidly anxious to have great hoards in readiness for any possible day of financial stress. At his death he is said to have had £1,800,000 in hard cash laid by. Hence it is not strange to find that he was able to dispense with parliaments in a fashion that would have seemed incredible to a 14th-century king. In his whole reign he only asked them five times for grants of taxation, and three of the five requests were made during the first seven years of his reign. In the eyes of many men parliament lost the main reason for its existence when it ceased to be the habitual provider of funds for the ordinary expenses of the realm. Those who had a better conception of its proper functions could see that it had at any rate been stripped of its chief power when the king no longer required its subsidies. There are traces of a want of public interest in its proceedings, very different from the anxiety with which they used to be followed in Plantagenet and Lan- castrian times. Legislation, which only incidentally affects him, is very much less exciting to the ordinary citizen than taxation, which aims directly at his pocket. It is at any rate clear that during the latter years of his reign, when the time of impostures and rebellions had ended, Henry was able to dis- pense with parliaments to a great extent, and incurred no un- popularity by doing so. Indeed he was accepted by the English people as the benefactor who had delivered them from anarchy; and if they murmured at his love of hoarding, and cursed his inquisitors Empson and Dudley, they had no wish to change the Tudor rule, and were far from regarding the times of the " Lan- castrian experiment " as a lost golden age. The present king might be unscrupulous and avaricious, but he was cautious,

intelligent and economical; no one would have wished to recall the

regime of that " crowned saint " Henry VI.

Nevertheless when the first of the Tudors died, on the 21st of April 1509, there were few who regretted him. He was not a monarch to rouse enthusiasm, while much was ex- pected from his brilliant, clever and handsome son Henry VIII. , whose magnificent presence and manly vigour recalled the early prime of Edward IV. Some years later England realized that its new king had inherited not only the physical beauty and strength of his grandfather, but also every one of his faults, with the sole exception of his tendency to sloth. Henry VIII. indeed may be said, to sum up his character in brief, to have combined his father's brains with his grandfather's passions. Edward IV. was selfish and cruel, but failed to become a tyrant because he lacked the energy for continuous work. Henry VII. was unscrupulous and untiring, but so cautious and wary that he avoided violent action and dangerous risks. Their descendant had neither Edward's sloth nor Henry's moderation; he was capable of going to almost any lengths in pursuit of the gratification of his ambition, his passions, his resentment or his simple love of self-assertion. Yet, however far he might go on the road to tyranny, Henry had sufficient cunning, versatility and power of cool reflection, to know precisely when he had reached the edge of the impossible. He had his father's faculty for gauging public opinion, and estimating dangers, and though his more venturous temperament led him to press on far beyond the point at which the seventh Henry would have halted, he always stopped short on the hither side of the gulf. It was the most marvellous proof of his ability that he died on his throne after nearly forty years of autocratic rule, during which he had roused more enmities and done more to change the face of the realm than any of the kings that were before him.

But it was long before the nation could estimate all the features of the magnificent but sinister figure which was to dominate England from 1509 to 1547. At his accession Henry VIII. was only eighteen years of age, and, if his character was already formed, it was only the attractive side of it that was yet visible. His personal beauty, his keen intelligence, his scholarship, his love of music and the arts, his kingly ambition, were all obvious enough. His selfishness, his cruelty, his ingratitude, his fierce hatred of criticism and opposition, his sensuality, had yet to be discovered by his subjects. A suspicious observer might have detected something ominous in the first act of his reign — the arrest and attainder of his father's unpopular ministers, Empson and Dudley, whose heads he flung to the people in order to win a moment's applause. Whatever their faults, they had served the house of Tudor well, and it was a grotesque perversion of

justice to send them to the scaffold on a charge of high treason. A similar piece of cruelty was the execution, some time later, of the earl of Suffolk, who had been languishing long years in the Tower; he was destroyed not for any new plots, but simply for his Yorkist descent. But in Henry's earlier years such acts were still unusual; it was not till he had grown older, and had learnt how much the nation would endure, that judicial murder became part of his established policy.

Henry's first outburst of self-assertion took the form of reversing his father's thrifty and peaceful policy, by plunging into the midst of the continental wars from which England had been held back by his cautious parent. a °eatai The adventure was wholly unnecessary, and also projects of unprofitable. But while France was engaged in the Hel "y " Holy War " against the pope, Venice, the emperor, VIIf ' and Ferdinand of Spain, Henry renewed the old claims of the Plantagenets, and hoped, if not to win back the position of Edward III., at least to recover the duchy of Aquitaine, or some parts of it. He lent an army to Ferdinand for the invasion of Gascony, and landed himself at Calais with 25,000 men, to beat up the northern border of France. Little good came of his efforts. The Spanish king gave no assistance, and the northern campaign, though it included the brilliant battle of the Spurs (August 16th, 1513), accomplished nothing more than the capture of Tournai and Therouanne. It was soon borne in upon

King Henry that France, even when engaged with other enemies, was too strong to be overrun in the old style. Moreover, his allies were giving him no aid, though they had eagerly accepted his great subsidies. With a sudden revulsion of feeling Henry offered peace to France, which King Louis XII. gladly bought,

agreeing to renew the old pension or tribute that Btapies° Henry VII. had received by the treaty of Etaples.

Their reconciliation and alliance were sealed by the marriage of the French king to Henry's favourite sister Mary, who was the bridegroom's junior by more than thirty years. Their wedlock and the Anglo-French alliance lasted only till the next year, when Louis died,

and Mary secretly espoused an old admirer, Charles Branddn, afterwards duke of Suffolk, King Henry's greatest friend and confidant.

While the French war was still in progress there had been heavy fighting on the Scottish border. James IV., reverting to War with ˆhe traditionary policy of his ancestors, had taken the Scotland, opportunity of attacking England while her king Battle of an(i his army were over-seas. He suffered a disaster Flodden. whkh recaUs tha(. of Dayid n at Neville > s Cross

— a fight which had taken place under precisely similar political conditions. After taking a few Northumbrian castles, James was brought to action at Flodden Field by the earl of Surrey (September gth, 1513). After a desperate fight lasting the greater part of a day, the Scots were outmanoeuvred and surrounded. James IV. — who had refused to quit the field — was slain in the forefront of the battle, with the greater part of his nobles; with him fell also some 10,000 or 12,000 of his men. Scotland, with her military power brought low, and an infant king on the throne, was a negligible quantity in international politics for some years. The queen dowager, Margaret Tudor, aided by a party that favoured peace and alliance with England, was strong enough to balance the faction under the duke of Albany which wished for perpetual war and asked for aid from France.

With the peace of 1514 ended the first period of King Henry's reign. He was now no longer a boy, but a man of twenty-three, with his character fully developed; he had gradually Wolsey. S ot r ˆ of his father's old councillors, and had chosen for himself a minister as ambitious and energetic as himself, the celebrated Thomas Wolsey, whom he had just made archbishop of York, and who obtained the rank of cardinal from the pope in the succeeding year. Wolsey was the last of the great clerical ministers of the middle ages, and by no means the worst. Like so many of his predecessors he had risen from the lower middle classes, through the royal road of the church; he had served Henry VII. 's old councillor Fbxe, bishop of Win- chester, as secretary, and from his household had passed into that of his master. He had been an admirable servant to both, full of zeal, intelligence and energy, and not too much burdened with scruples. The young king found in him an instrument well fitted to his hand, a man fearless, ingenious, and devoted to the further- ance of the power of the crown, by which alone he had reached his present position of authority. For fourteen years he was his master's chief minister — the person responsible in the nation's eyes for all the

more unpopular assertions of the royal pre- rogative, and for all the heavy taxation and despotic acts which Henry's policy required. It mattered little to Henry that the cardinal was arrogant, tactless and ostentatious; indeed it suited his purpose that Wolsey should be saddled by public opinion with all the blame that ought to have been laid on his own shoulders. It was convenient that the old nobility should detest the upstart, and that the commons should imagine him to be the person responsible for the demands for money required for the royal wars. As long as his minister served his purposes and could execute his behests Henry gave him a free hand, and supported him against all his enemies. It was believed at the time, and is still sometimes maintained by historians, that Wolsey laid down schemes of policy and persuaded his master to adopt them; but the truth would appear to be that Henry was in no wise dominated by the cardinal, but imposed on him his own wishes, merely leaving matters of detail to be settled

by his minister. Things indifferent might be trusted to him, but the main lines of English diplomacy and foreign policy show rather the influence of the king's personal desires of the moment than that of a statesman seeking national ends.

It has often been alleged that Henry, under the guidance of Wolsey, followed a consistent scheme for aggrandizing England, by making her the state which kept the balance of power of Europe in her hands. And it is pointed out that during the years of the cardinal's ascendancy the alliance of England was sought in turn by the great princes of the continent, and proved the make-weight in the scales. This is but a superficial view of the situation. Henry, if much courted, was much deceived by his contemporaries. They borrowed his money and his armies, but fed him with vain promises and illusory treaties. He and his minister were alternately gulled by France and by the emperor, and the net result of all their activity was bankruptcy and discontent at home and ever-frustrated hopes abroad. It is hard to build up a reputation for statecraft for either Henry or Wolsey on the sum total of English political achievement during their collaboration.

During the first few years of the cardinal's ascendancy the elder race of European sovereigns, the kings with whom Henry VII. had been wont to haggle, disappeared one after the other. Louis of France died in 1515, Ferdi- vinXnd nand of Aragon in 15 16, the emperor Maximilian — the rivalry the last survivor of his generation — in 1510. Louis of Francis was succeeded by the active, warlike and shifty carles v Francis I.; the heritage of both Ferdinand and

Maximilian — his maternal and paternal grandfathers — fell to Charles of Habsburg, who already possessed the Netherlands in his father's right and Castile in that of his mother. The enmity of the house of Valois and the house of Habsburg, which had first appeared in the wars of Charles VIII. and Maximilian, took a far more bitter shape under Francis I. and Charles V., two young princes who were rivals from their youth. Their wars were almost perpetual, their peaces never honestly carried out. Their powers were very equally balanced; if Charles owned broader lands than Francis, they were more scattered and in some cases less loyal. The solid and wealthy realm of France proved able to make head against Spain and the Netherlands, even when they were backed by the emperor's German vassals. Charles was also distracted by many stabs in the back from the Ottoman Turks, who were just beginning their attack on Christendom along the line of the Danube. To each of the combatants it seemed that the English alliance would turn the scale in his own favour. Henry was much courted, and wooed with promises of lands to be won from the other side by his ally of the moment. But neither Charles nor Francis wished him to be a real gainer, and he himself was a most untrust- worthy friend, for he was quite ready to turn against his ally if he seemed to be growing too powerful, and threatened to dominate all Europe; the complete success of either party would mean that England would sink once more into a second-rate power. How faithless and insincere was Henry's policy may be gauged from the fact that in 1520, after all the pageantry of the " Field of the Cloth of Gold " and his vows of undying friendship for Francis, he met Charles a few weeks later at Gravelines, and concluded with him a treaty which pledged England to a defensive alliance against the king's " good brother " of France. Such things happened not once nor twice during the years of Wolsey's ministry. It was hardly to be wondered at, therefore, if Henry's allies regularly endeavoured to cheat him out of his share of their joint profits. p a// Kre . What use was there in rewarding a friend who might Henry's become an enemy to-morrow? The greatest decep- dipio- tion of all was in 1522, when Charles V., who had mac y- made the extraordinary promise that he would get Wolsey made pope, and lend Henry an army to conquer northern France, failed to redeem his word in both respects. He caused his own old tutor, Adrian of Utrecht, to be crowned with the papal tiara, and left the English to invade Picardy entirely unassisted. But this was only one of many such disappointments.

The result of some twelve years of abortive alliances and ill-kept treaties was that Henry had obtained no single one Beein- °^ tne advantages which he had coveted, and that he alngsot na d lavished untold wealth and many English lives par/As- upon phantom schemes which crumbled between his mentary fingers. His subjects had already begun to murmur; ress ce. tng early parliaments of his reign had been passive and complaisant; but by 1523 the Commons had been goaded into resistance. They granted only half the subsidies asked from them, pleading that three summers more of such taxation as the cardinal demanded for his master would leave the realm drained of its last penny, and reduced to fall back on primitive forms of barter, " clothes for victuals and bread for cheese," out of mere want of coin. Fortunately for the king his subjects laid all the blame upon his mouthpiece the cardinal, instead of placing it where it was due. On Wolsey's back also was saddled the most iniquitous of Henry's acts of tyranny against indi- viduals — the judicial murder of the duke of Buckingham, the highest head among the English nobility. For some hasty words, amplified by the doubtful evidence of treacherous retainers, e oil a together w i tn a foolish charge of dabbling with astro- ofthe logers, the heir of the royal line o*F Thomas of Woodstock duke of had been tried and executed with scandalous haste. Bucking- jjj s on jy rea j cr j me was that, commenting on the lack of male heirs to the crown — for after many years of wedlock with Catherine of Aragon Henry's sole issue was one sickly daughter — he had been foolish enough to remark that if anything should happen to the king he himself was close in succession to the crown. The cardinal bore the blame, because he and Buckingham had notoriously disliked each other; but the deed had really been of the king's own contriving. He was roused to implacable wrath by anyone who dared to speak on the for- bidden topic of the succession question.

In the later years of Wolsey's ascendancy, nevertheless, that same question was the subject of many anxious thoughts. Question From Henry's own mind it was never long absent ; he otthe yearned for a male heir, and he was growing tired of

king's his wife Catherine, who was some years older than vorce. himself, had few personal attractions, and was growing somewhat of an invalid. Somewhere about the end of 1526 those who were in the king's intimate confidence began to be aware that he was meditating a divorce — a thing not lightly to be taken in hand, for the queen was the aunt of the emperor Charles V., who would be vastly

offended at such a proposal. But Henry's doubts had been marvellously stimulated by the fact that he had become enamoured of another lady — the beautiful, ambitious and cunning Anne Boleyn, a niece of the duke of Norfolk, who had no intention of becoming merely the king's mistress, but aspired to be his consort.

The question of the king's divorce soon became inextricably confused with another problem, whose first beginnings go back England to a slightly earlier date. What was to be the attitude and the of England towards the Reformation? It was now Reforma- nearly ten years since Martin Luther had posted up his famous theses on the church door at Wittenberg, and since he had testified to his faith before the diet of Worms. All Germany was now convulsed with the first throes of the revolt against the papacy, and the echoes of the new theological disputes were being heard in England. King Henry himself in 1 52 1 had deigned to write an abusive pamphlet against Luther, for which he had been awarded the magnificent title of Fidei Defensor by that cultured sceptic Pope Leo X. About the same time we begin to read of orders issued by the bishops for the discovery and burning of all Lutheran books— a clear sign that they were reaching England in appreciable quantities. Hitherto it had been only the works of Wycliffe that had merited this attention on the part of inquisitors. In the Wyclifnte remnant, often persecuted but never exterminated, there already existed in England the nucleus of a Protestant party. All through the reign of Henry VII. and the early years of Henry VIII. the intermittent burning of " heretics," and their far more frequent recantations, had borne witness to the

fact that the sect still lingered on. The Wycliffites were a feeble folk, compelled to subterraneous ways, and destitute of learned leaders or powerful supporters. But they survived to see Luther's day, and to merge themselves in one body with the first English travelling scholars and merchants who brought back from the continent the doctrines of the German Refor- mation. The origins of a Protestant party, who were not mere Wycliffites, but had been first interested in dogmatic controversy by coming upon the works of Luther, can be traced back to the year 15 21 and to the university of Cambridge. There a knot of scholars, some of whom were to perish early at the stake, whi'e others were destined to become the leaders of the English Reformation, came together and encouraged each other to test the received doctrines of contemporary orthodoxy by searching the Scriptures and the works of the Fathers. The sect spread in a few years to London, Oxford and other centres of intellectual life, but for many years its followers were not numerous; like the old Lollardy, Protestantism took root only in certain places and among certain

classes — notably the lesser clergy and the merchants of the great towns.

King Henry and those who wished to please him professed as great a hatred and contempt for the new purveyors of German doctrines as for the belated disciples of Wycliffe. But there was another movement, whose origins went back for many centuries, which they were far from discouraging, and were prepared to utilize when it suited their convenience. This was the purely political feeling against the tyranny of the papacy, and the abuses of the national church, which in early ages had given supporters to William the Conqueror and Henry II., which had dictated the statutes of Mortmain and of Praemunire. Little had been heard of the old anti-clerical party in England since the time of Henry IV. ; it had apparently been identified in the eyes of the orthodox with that Lollardy with which it had for a time allied itself, and had shared in its discredit. But it had always continued to exist, and in the early years of Henry VIII. had been showing unmistakable signs of vitality. The papacy of the Renaissance was a fair mark for criticism. It was not hard to attack the system under which Rodrigo Borgia wore the tiara, while Girolamo Savonarola went to the stake; or in which Julius II. exploited the name of Christianity to serve his territorial policy in Italy, and Leo X. hawked his indulgences round Europe to raise funds which would enable him to gratify his artistic tastes. At no period had the official hierarchy of the Western Church been more out of touch with common righteousness and piety. Moreover, they were sinning under the eyes of a laity which was far more intelligent and educated, more able to think and judge for itself, less the slave of im-memorial tradition, than the old public of the middle ages. In Italy the Renaissance might be purely concerned with things intellectual or artistic, and seem to have little or no touch with things moral. Beyond the Alps it was otherwise; among the Teutonic nations at least the revolt against the scholastic philosophy, the rout of the obscurantists, the eager pursuit of Hellenic culture, had a religious aspect. The same generation which refused to take thrice-translated and thrice-garbled screeds from Aristotle as the sum of human knowledge, and went back to the original Greek, was also studying the Old and New Testaments in their original tongues, and drawing from them conclusions as unfavourable to the intelligence as to the scholar- ship of the orthodox medieval divines. Such a discovery as that which showed that the " False Decretals," on which so much of the power of the papacy rested, were mere oth-century forgeries struck deep at the roots of the whole traditional relation between church and state.

The first English scholars of the Renaissance, like Erasmus on the continent, did not see the logical outcome of their own discoveries, nor realize that the campaign against obscurantism would develop into a campaign against Roman orthodoxy. Sir Thomas More, the greatest of them, was actually driven into reaction by the violence of Protestant controversialists, and the fear that the new doctrines would rend the church in twain. He became himself a persecutor, and a writer of abusive

pamphlets unworthy of the author of the Utopia. But to the younger generation the irreconcilability of modern scholar- ship and medieval formulae of faith became more and more evident. One after another all the cardinal doctrines were challenged by writers who were generally acute, and almost invariably vituperative. For the controversies of the Reforma- tion were conducted by both sides, from kings and prelates down to gutter pamphleteers, in language of the most unseemly violence.

But, as has been already said, the scholars and theologians had less influence in the beginning of the English Reformation than the mere lay politicians, whose anti-clerical tendencies chanced to fit in with King Henry's convenience when he quarrelled with the papacy. It is well to note that the first attacks of parliament on the church date back to two years before Luther published his famous theses. The contention began in 1 5 1 5 with the fierce assault by the Commons on the old abuse of benefit of clergy, and the immunity of clerical criminals from due punishment for secular crimes — a question as old as the times of Henry II. and Becket. But the discussion spread in later years from this particular point into a general criticism of the church and its relations to the state, embracing local grievances as well as the questions which turned on the dealings of the papacy with the crown. The old complaints which had been raised against the Church of England in the days of Edward I. or Richard II. had lost none of their force in 1526. The higher clergy were more than ever immersed in affairs of state, " Caesarean " as Wycliffe would have called them. It was only necessary to point to the great cardinal himself, and to ask how far his spiritual duties at York were properly dis- charged while he was acting as the king's prime minister. The cases of Foxe and Morton were much the same; the former passed for

a well-meaning man, yet had been practically absent from his diocese for twenty years. Pluralism, nepotism, simony and all the other ancient abuses were more rampant than ever. The monasteries had ceased to be even the nurseries of literature ; their chronicles had run dry, and secular priests or laymen had taken up the pens that the monks had dropped. They were wealthier than ever, yet did little to justify their existence; indeed the spirit of the age was so much set against them that they found it hard to keep up the numbers of their inmates. Truculent pamphleteers like Simon Fish, who wrote Beggars' Supplication, were already demanding " that these sturdy boobies should be set abroad into the world, to get wives of their own, and earn their living by the sweat of their brows, according to the commandment of God; so might the king be better obeyed, matrimony be better kept, the gospel better preached, and none should rob the poor of his alms." It must be added that monastic scandals were not rare; though the majority of the houses were decently ordered, yet the unexceptionable testimony of archiepiscopal and episcopal visitations shows that in the years just before the Reformation there was a certain number of them where chastity of life and honesty of adminis- tration were equally unknown. But above all things the church was being criticized as an imperium in imperio, a privileged body not amenable to ordinary jurisdiction, and subservient to a foreign lord — the pope. And it - was true that, much as English churchmen might grumble at papal exactions, they were generally ready as a body to support the pope against the crown ; the traditions of the medieval church made it impossible for them to do otherwise. That there would in any case have been a new outbreak of anti-clerical and anti-papal agitation in England, under the influence of the Protestant impulse started by Luther in Germany, is certain. But two special causes gave its particular colour to the opening of the English Reformation; the one was that the king fell out with the papacy on the question of his divorce. The other was that the nation at this moment was chafing bitterly against a clerical minister, whom it (very unjustly) made responsible for the exorbitant taxation which it was enduring, in consequence of the king's useless and un- successful foreign wars. The irony of the situation lay in the facts that Henry was, so far as dogmatic views were concerned,

a perfectly orthodox prince; he had a considerable knowledge of the old theological literature, as he had shown in his pam- phlet against Luther, and though he was ready to repress clerical immunities and privileges that were inconvenient to the crown, he had no sympathy whatever with the doctrinal side of the new revolt against the system

of the medieval church. Moreover, Wolsey, whose fall was to synchronize with the commencement of the reforming movement, was if anything more in sympathy with change than was his master. He was an enlightened patron of the new learning, and was inclined to take vigorous measures in hand for the pruning away of the abuses of the church. It is significant that his great college at Oxford — " Cardinal's College " as he designed to call it, " Christ Church " as it is named to-day — was endowed with the revenues of some score of small monasteries which he had suppressed on the ground that they were useless or ill-conducted. His master turned the lesson to account a few years later; but Henry's wholesale destruction of religious houses was carried out not in the interests of learning, but mainly in those of the royal exchequer. (C. W. C. O.)

VII. The Reformation and the Age of Elizabeth

(1528-1603)

Wolsey did not fall through any opposition to reform; nor was he opposed to the idea of a divorce. Indeed, both in France and Spain he was credited with the authorship of the project. But he differed from Henry on the question ^". "' of Catherine's successor. Wolsey desired a French marriage to consummate the breach upon which he was now bent with the emperor; and war, in fact, was precipitated with Spain in 1528. This is said to have been done without Henry's consent; he certainly wished to avoid war with Charles V., and peace was made after six months of passive hostility. Nor did Henry want a French princess; his affections were fixed for the time on Anne Boleyn, and she was the hope of the anti- clerical party. The crisis was brought to a head by the failure of Wolsey's plan to obtain a divorce. Originally it had been sug- gested that the ecclesiastical courts in England were competent without recourse to Rome. Wolsey deprecated this procedure, and application was made to Clement VII. Wolsey relied upon his French and Italian allies to exert the necessary powers of persuasion; and in 1528 a French army crossed the Alps, marched through Italy and threatened to drive Charles V. out of Naples. Clement was in a position to listen to Henry's prayer; and Campeggio was commissioned with Wolsey to hear the suit and grant the divorce.

No sooner had Campeggio started than the fortunes of war changed. The French were driven out of Naples, and the Imperialists again dominated Rome; the Church, wrote Clement to Campeggio, was completely in the Q^stfon power of Charles V. The cardinal, therefore, must on divorce. no account pronounce against Charles's

aunt; if he could not persuade Henry and Catherine to agree on a mutual separation, he must simply pass the time and come to no conclusion. Hence it was June 1529 before the court got to work at all, and then its proceedings were only preparatory to an adjourn- ment and revocation of the suit to Rome in August. Clement VII. had, in his own words, made up his mind to live and die an imperialist; the last remnants of the French army in Italy had been routed, and the pope had perforce concluded the treaty of Barcelona, a sort of family compact between himself and Charles, whereby he undertook to protect Charles's aunt, and the emperor to support the Medici dynasty in Florence. This peace was amplified at the treaty of Cambrai (August 1529) into a general European pacification in which England had no voice. So far had it fallen since 1521.

In every direction Wolsey had failed, and his failure involved the triumph of the forces which he had opposed. The fate of the papal system in England was bound up with his personal fortunes. It was he and he alone who had kept parliament at arm's length and the enemies of the church at bay. He had interested the king, and to some extent the nation, in a spirited

foreign policy, had diverted their attention from domestic questions, and had staved off that parliamentary attack on the church which had been threatened fifteen years before. Now he was doomed, and both Campeggio and Cardinal du Bellay were able to send their governments accurate outlines of the future policy of Henry VIII. The church was to be robbed of its wealth, its power and its privileges, and the papal jurisdiction was to be abolished. In October Wolsey was deprived of the great seal, and surrendered many of his ecclesiastical prefer- ments, though he was allowed to retain his archbishopric of York which he now visited for the first time. The first lay ministry since Edward the Confessor's time came into office; Sir Thomas More became lord chancellor, and Anne Boleyn's father lord privy seal; the only prominent cleric who remained in office was Stephen Gardiner, who succeeded Wolsey as bishop of Winchester.

Parliament met in November 1529 and passed many acts against clerical exactions, mortuaries, probate dues and Attack on pluralities, which evoked a passionate protest from the church Bishop

Fisher: " Now, with the Commons," he cried laparlia- j n the House of Lords, " is nothing but ' Down with """""" the Church.'" During 1530 Henry's agents were busy

abroad making that appeal on the divorce to the univer- sities which Cranmer had suggested. In 1531 the clergy in convocation, terrified by the charge of praemunire brought against them for recognizing Wolsey's legatine authority, paid Henry a hundred and eighteen thousand pounds and recognized him as supreme head of the church so far as the law of Christ would allow. The details of this surrender were worked out by king and Commons in 1532; but Gardiner and More secured the rejection by the Lords of the bill in which they were embodied, and it was not till 1533, when More had ceased to be chancellor and Gardiner to be secretary, that a parliamentary statute annihilated the independent legislative authority of the church. An act was, however, passed in 1532 empowering the king, if he thought fit, to stop the payment of annates to Rome. Henry suspended his consent in order to induce the pope to grant Cranmer his bulls as archbishop of Canterbury where he suc- ceeded Warham late in 1532. The stratagem was successful, and Henry cast off all disguise. The act of annates was confirmed; another prohibiting appeals to Rome and providing for the appointment of bishops without recourse to the papacy was passed ; and Cranmer declared Henry's marriage with Catherine

null and void and that with Anne Boleyn, which had v;;/, taken place about January 25, 1533, valid. Anne

marries was crowned in June, and on the 7th of September the Anne future Queen Elizabeth was born. At length in 1534

o eyn. Clement VIL concluded the case at Rome, pronouncing in favour of Catherine's marriage, and drawing up a bull of ex- communication against Henry and his abettors. But he did not venture to publish it; public opinion in England, while hostile to the divorce, was not in favour of the clergy or the pope, and the rivalry between Charles V. and Francis I. was too bitter to permit of joint, or even isolated, action against Henry. Charles was only too anxious to avoid the duty of carrying out the pope's commands, and a year later he was once more involved in war with France. Henry was able to deal roughly with such manifestations as Elizabeth Barton's visions, and in the autumn

of 1 534 to obtain from parliament the Act of Supremacy The Act of which transferred to him the juridical, though not the

spiritual, powers of the pope. No penalties were

attached to this act, but another passed in the same session made it treason to attempt to deprive the king of any of his titles, of which supreme head of the church was one, being incorporated in the royal style by letters patent of January 1535. Fisher and More were executed on this charge; they had been imprisoned in the previous year for objecting to take the form of oath to the succession as vested in Anne Boleyn's children which the commissioners prescribed. But their lives could only be forfeit on the supposition that they sought to deprive the king of his royal supremacy. Many of the friars observant of Greenwich and monks of the Charterhouse were involved in a

Suprem- acy.

similar fate, but there was no general resistance, and Henry, now inspired or helped by Thomas Cromwell, was able to proceed with the next step in the Reformation, the dissolution of the monasteries.

*It was Cecil's opinion twenty-five years later that, but for the dissolution, the cause of the Reformation could not have succeeded. Such a reason could hardly be avowed, d; sso i u . and justification had to be sought in the condition of tlonolthe the monasteries themselves. The action of Wolsey and •"onas- other bishops before 1529, the report of a commission cres * of cardinals appointed by Paul III. in 1535, the subsequent experience of other, even Catholic, countries give collateral support to the conclusions of the visitors appointed by Cromwell, although they were dictated by a desire not to deal out impartial justice, but to find reasons for a policy already adopted in principle. That they exaggerated the evils of monastic life hardly admits of doubt; but even a Henry VIII. and a Thomas Cromwell would not have dared to attack, or succeeded in destroy- ing, the monasteries had they retained their original purity and influence. As it was their doubtful reputation and financial embarrassments enabled Henry to offer them as a gigantic bribe to the upper classes of the laity, and the Reformation parliament met for its last session early in 1536 to give effect to the reports of the visitors and to the king's and their own desires.*

But it had barely been dissolved in April when it became necessary to call another. In January the death of Catherine had rejoiced the hearts of Henry and Anne Boleyn, but Anne's happiness was short- lived. Two miscarriages and the failure to produce the requisite male heir linked her in Henry's mind and in misfortune to Catherine; unlike Catherine she was un- popular and not above suspicion. The

story of her tragedy is still one of the most horrible and mysterious pages in English history. It is certain that Henry was tired and wanted to get rid of her; but if she were innocent, why were charges brought against her which were not brought against Catherine of Aragon and Anne of Cleves? and why were four other victims sacrificed when one would have been enough? The peers a year before could acquit Lord Dacre; would they have condemned the queen without some show of evidence? and unless there was suspicious evidence, her daughter was inhuman in making no effort subse- quently to clear her mother's character. However that may be, Anne was not only condemned and executed, but her Execution marriage was declared invalid and her daughter a of Queen bastard. Parliament was required to establish the Anne succession on the new basis of Henry's new queen, ° eyn ' Jane Seymour. It also empowered the king to leave the crown by will if he had no legitimate issue; but the illegitimate son, the duke of Richmond, in whose favour this provision is said to have been conceived, died shortly afterwards.

Fortunately for Henry, Queen Jane roused no domestic or foreign animosities; Charles V. and Francis I. were at war; and the pope's and Pole's attempt to profit by the Pilgrimage of Grace came too late to produce any effect

The Pilgrimage

except the ruin of Pole's family. The two risings of otorace! 1536 in Lincolnshire and Yorkshire were provoked partly by the dissolution of the monasteries, partly by the collec- tion of a subsidy and fears of fresh taxation on births, marriages and burials, and partly by the protestantizing Ten Articles of 1536 and Cromwell's Injunctions. They were conservative demonstrations in favour of a restoration of the old order by means of a change of ministry, but not a change of dynasty. The Lincolnshire rising was over before the middle of October, the more serious revolt in Yorkshire under Aske lasted through the winter. Henry's lieutenants were compelled to temporize and make concessions. Aske was invited to come to London and hoodwinked by Henry into believing that the king was really bent on restoration and reform. But an impatient outburst of the insurgents and a foolish attempt to seize Hull and Scar borough gave Henry an excuse for repudiating the concessions made in his name. He could afford to do so because England south of the Trent remained stauncher to him than England north of it did to the Pilgrimage. Aske and other leaders were

tried and executed, and summary vengeance was wreaked on the northern counties, especially on the monasteries. The one satisfactory outcome was the establishment of the Council of the North, which gave the shires between the Border and the Trent a stronger and more efficient government than they had ever had before.

Probably the Pilgrimage had some effect in moderating Henry's progress. The monasteries did not benefit and in 1 538-1539 the greater were involved in the fate which Articles " nac ˆ a h" ea dy overtaken the less. But no further ad- vances were made towards Protestantism after the publication and authorization of the " Great " Bible in English. The Lutheran divines who came to England in 1538 with a project for a theological union were rebuffed; the parliament elected in 1539 was Catholic, and only the reforming bishops in the House of Lords offered any resistance to the Six Articles which reaffirmed the chief points in Catholic doctrine and practice. The alliance between pope, emperor and French king induced Henry to acquiesce in Cromwell's scheme for a political understanding with Cleves and the Schmalkaldic League, which might threaten Charles V.'s position in Germany and the Netherlands, but could not be of much direct advantage to England. Cromwell rashly sought to wed Henry to this policy, proposed Anne of Cleves as a bride for Henry, now once more a widower, and represented the marriage as England's sole protection against a Catholic league. Henry put his neck under the yoke, but soon discovered that there was no necessity; for Charles and Francis were already beginning to quarrel and had no thought of a joint attack on England. The dis- Th Wo/ covery was fatal to Cromwell; after a severe struggle Cromwell. i n tne council he was abandoned to his enemies, attainted of treason and executed. Anne's marriage was declared null, and Henry found a fifth queen in Catherine Howard, a niece of Norfolk, a protegee of Gardiner, and a friend of the Catholic church.

Nevertheless there was no reversal of what had been done, only a check to the rate of progress. Cranmer remained arch- bishop and compiled an English Litany, while Catherine Howard soon ceased to be queen; charges of loose conduct, which in her case at any rate were not instigated by the king, were made against her and she was brought to the block; she was succeeded by Catherine Parr, a mild

patron of the new learning. The Six Articles were only fitfully put in execution, especially in 1543 and 1546; all the plots against Cranmer failed; and before he died Henrv was even considering the advisability of further steps in the religious reformation, apart from mere spoliation like the confiscation of the chantry lands.

But Scotland, Ireland and foreign affairs concerned him most. Something substantial was achieved in Ireland; the papal Policy in sovereignty was abolished and Henry received from Ireland the Irish parliament the title of king instead of lord of and Ireland. The process was begun of converting Irish

Scotland. c hief tains into English peers which eventually divorced the Irish people from their natural leaders; and principles of English law and government were spread beyond the Pale. In Scotland Henry was less fortunate. He failed to win over James V. to his anti-papal policy, revived the feudal claim to suzerainty, won the battle of Solway Moss (1542), and then after James's death bribed and threatened the Scots estates into concluding a treaty of marriage between their infant queen and Henry's son. The church in Scotland led by Beaton, and the French party led by James V.'s widow, Mary of Guise, soon reversed this decision, and Hertford's heavy hand was (1544) laid on Edinburgh in revenge. France was at the root of the evil, and Henry was thus induced once more to join Charles V. in war (1543). The joint invasion of 1544 led to the capture of Boulogne, but the emperor made peace in order to deal with the Lutherans and left Henry at war with France. The French attempted to retaliate in 1545, and burnt some villages in the Isle of Wight and on the coast of Sussex. But their expedition was a failure, and peace was made in 1546, by which Henry undertook to restore Boulogne in eight years' time on payment

Edward VI.

of eight hundred thousand crowns. Scotland was not included in the pacification, and when Henry died (January 28, 1547) he was busy preparing to renew his attempt on Scotland's independence.

He left a council of sixteen to rule during his son's minority. The balance of parties which had existed since Cromwell's fall had been destroyed in the last months of the reign by the attainder of Norfolk and his son Surrey, and the exclusion of Gardiner and Thirlby from the council of regency. Men of the new learning prevailed, and Hertford (later duke of Somerset), as uncle to Edward VI., was made pro- tector of the realm and governor of the king's person. He soon

succeeded in removing the trammels imposed upon his authority, and made himself king in everything but name. He used his arbitrary power to modify the despotic system of the Tudors; all treason laws since Edward III., all heresy laws, all restrictions upon the publication of the Scriptures were removed in the first parliament of the reign, and various securities for liberty were enacted. The administration of the sacrament of Prornss the altar in both elements was permitted, the Catholic of the interpretation of the mass was rendered optional, Refor- images were removed, and English was introduced mat ‘ oa – into nearly the whole of the church service. In the following session (1 548-1 549) the first Act of Uniformity authorized the first Book of Common Prayer. It met with strenuous resistance in Devon and in Cornwall, where rebellions added to the thicken- ing troubles of the protector.

His administration was singularly unsuccessful. In 1547 he won the great but barren victory of Pinkie Cleugh over the Scots, and attempted to push on the marriage and Aatt- union by a mixture of conciliation and coercion. He tration made genuine and considerable concessions to Scottish of the feeling, guaranteeing autonomy and freedom of trade, P otect < > r and suggesting that the two realms should adopt the indifferent style of the empire of Great Britain. But he also seized Haddington in 1548, held by force the greater part of the Lowlands, and, when Mary was transported to France, revived the old feudal claims which he had dropped in 1547. France was, as ever, the backbone of the Scots resistance; men and money poured into Edinburgh to assist Mary of Guise and the French faction. The protector’s offer to restore Boulogne could not purchase French acquiescence in the union of England and Scotland; and the bickerings on the borders in France and open fighting in Scotland led the French to declare war, on England in August 1549. They were encouraged by dissensions in England. Somerset’s own brother, Thomas Seymour, jealous of the protector, intrigued against the government; he sought to secure the hand of Elizabeth, the favour of Edward VI. and the support of the Suffolk line, secretly married Catherine Parr, and abused his office as lord high admiral to make friends with pirates and othe- enemies of order. Foes of the family, such as Warwick and Southampton, saw in his factious conduct the means of ruining both the brothers. Seymour was brought to the block, and the weak consent of the protector seriously damaged him in the public eye. His notorious sympathy with the peasantry further alienated the official classes and landed gentry, and his campaign against enclosures brought him into conflict with the strongest forces of the time. The remedial measures which he favoured failed; and the*

rising of Ket in Norfolk and others less important in nearly all the counties of England, made Somerset's position impossible. Bedford and Herbert suppressed the rebellion in the west, Warwick that in Norfolk (July- August 1549). They then combined with the majority of the council and the discontented Catholics to remove the protector from office and imprison him in the Tower (October) .

The Catholics hoped for reaction, the restoration of the mass, and the release of Gardiner and Bonner, who had been im- prisoned for resistance to the protector's ecclesiastical . . _ policy. But Warwick meant to rely on the Protestant tration 0/ extremists; by January r55o the Catholics had been the duke ot expelled from the council, and the pace of the Ref orma- Northum- tion increased instead of diminishing. Peace was made with France by the surrender of Boulogne and abandonment

of the policy of union with Scotland (March 1550); and the approach of war between France and the emperor, coupled with the rising of the princes in Germany, relieved Warwick from foreign apprehensions and gave him a free hand at home. Gardiner, Bonner, Heath, Day and Tunstall were one by one deprived of their sees; a new ordinal simplified the ritual of ordination, and a second Act of Uniformity and Book of Common Prayer (1552) repudiated the Catholic interpretation which had been placed on the first and imposed a stricter conformity to the Protestant faith. All impediments to clerical marriage were . removed, altars and organs were taken down, old meat of ' service books destroyed and painted windows broken; Protest- it was even proposed to explain away the kneeling at aatlsm – the sacrament. The liberal measures of the protector were repealed, and new treasons were enacted; Somerset him- self, who had been released and restored to the council in 1550, became an obstacle in Warwick's path, and was removed by means of a bogus plot, being executed in January 1552; while Warwick had himself made duke of Northumberland, his friend Dorset duke of Suffolk, and Herbert earl of Pembroke.

But his ambition and violence made him deeply unpopular, and the failing health of Edward VI. opened up a serious prospect for Northumberland. He was only safe so long as he controlled the

government, and prevented the administration of justice, and the knowledge that not only power but life was at stake drove him into a desperate plot for the retention of both. He could trade upon Edward's precocious hatred of Mary's religion, he could rely upon French fears of her Spanish inclinations, and the success which bad attended his schemes in England deluded him into a belief that he could supplant the Tudor with a Dudley dynasty. His son Guilford Dudley was hastily married to Lady Jane Grey, the eldest granddaughter of Henry VIII. 's younger sister Mary. Henry's two daughters, Mary and Elizabeth, the descendants of his elder sister Margaret, and Lady Jane's mother, the duchess of Suffolk, were all to be passed over, and the suc- cession was to be vested in Lady Jane and her heirs male. Edward was persuaded that he could devise the crown by will, the council and the judges were browbeaten into acquiescence, and three days after Edward's death (July 6, 1553), Lady Jane Grey was proclaimed queen in London. Northumberland had miscalculated the temper of the nation, and failed to kidnap Mary. She gathered her forces in Norfolk and Suffolk, North- umberland rode out from London to oppose her, but defection dogged his steps, and even in London Mary was proclaimed queen behind his back by his fellow-conspirators. Mary entered London amid unparalleled popular rejoicings, and Northumber- land was sent to a well-deserved death on the scaffold.

Mary was determined from the first to restore papalism as well as Catholicism, but she had to go slowly. The papacy had few friends in England, and even Charles V., on Mary. whom Mary chiefly relied for guidance, was not eager Restom- to see the papal jurisdiction restored. He wanted Hon of England to be first firmly tied to the Habsburg interests by Mary's marriage with Philip. Nor was it generally anticipated that Mary would do more than restore religion as it had been left by her father. She did not attempt anything further in 1553 than the repeal of Edward VI.'s legis- lation and the accomplishment of the Spanish marriage. The latter project provoked fierce resistance; various risings were planned for the opening months of 1554, and Wyat's nearly proved successful. Only his arrogance and procrastination and Mary's own courage saved her throne. But the failure of this protest enabled Mary to carry through the Spanish marriage, which was consummated in July; and in the ensuing parliament (Oct.-Jan. 1554-1555) all anti-papal legislation was repealed; Pole was received as legate; the realm was reconciled to Rome; and, although the holders of abbey lands were carefully protected against attempts at restitution, the church was empowered to work its will with regard to heresy. The Lollard statutes were

revived, and between February 1555 and November 1558 some three hundred Protestants were burnt at the stake. They began with John Rogers and Rowland Taylor, and Bishops Ferrar of

the old religion.

St Davids and Hooper of Gloucester. Ridley and Latimer were not burnt until October 1555, and Cranmer not till March 1556. London, Essex, Hertfordshire, East Anglia, Kent and Sussex provided nearly all the victims; only one was burnt north of the Trent, and only one south-west of Wiltshire. But in the Pro- testant districts neither age nor sex was spared; even the dead were dug up and burnt. The result was to turn the hearts of Mary's people from herself, her church and her creed. Other causes helped to convert their enthusiastic loyalty into bitter hatred. The Spanish marriage was a failure from every point of view. In spite of Mary's repeated de- hrity lusions, she bore no child, and both parliament and of the people resisted every attempt to deprive Elizabeth of Spanish her right to the succession. Philip did all he could to p^/s/ft' conciliate English affections, but they would not have Spanish control at any price. They knew that his blandishments were dictated by ulterior designs, and that the absorption of England in the Habsburg empire was his ultimate aim. As it was, the Spanish connexion checked England's aspirations; her adventurers were warned off the Spanish Main, and even trade with the colonies of Philip's ally Portugal was prohibited. They had to content themselves with the Arctic Ocean and Muscovy; and they soon found themselves at war in Philip's interests. Philip himself refused to declare war on Scotland on England's behalf, but he induced Mary to declare war on France on his own (1557). The glory of the war fell to the Spaniards at St Quentin (1557) and Gravelines (1558), but the shame to England by the loss of Calais (Jan. 1558). Ten months later Mary died (Nov. 17), deserted by her husband and broken- hearted at the loss of Calais and her failure to win English hearts back to Rome.

The Spanish and Venetian ambassadors in London were shocked at what they regarded as. the indecent rejoicings over Elizabeth's accession. The nation, indeed, breathed Accession a new life. Papal control of its ecclesiastical, and of Spanish control of its foreign policy ceased, and it had Elizabeth. a queen who gloried in being " mere English." There ^fionai was really no possible rival sovereign, and no possible straggle alternative policy. The English were tugging at the with chain and Elizabeth had to follow; her efforts through- Soaln – out were aimed at checking the pace at which her people wanted to go. She could not have married Philip had she wished to,

and she could not have kept her sea-dogs off the Spanish Main. They were willing to take all the risks and relieve her of all responsibility; they filled her coffers with Spanish gold which they plundered as pirates, knowing that they might be hanged if caught; and they fought Elizabeth's enemies in France and in the Netherlands as irregulars, taking their chance of being shot if taken prisoners. While Elizabeth nursed prosperity in peace, her subjects sapped the strength of England's rivals by attacks which were none the less damaging because they escaped the name of war.

It required all Elizabeth's finesse to run with the hare and hunt with the hounds; but she was, as Henry III. of France said, la plus fine femme du monde, and she was ably seconded by Cecil who had already proved himself an adept in the art of taking cover. Nevertheless, English policy in their hands was essen- tially aggressive. It could not be otherwise if England was to emerge from the slough in which Mary had left it. The first step was to assert the principle of England for the English; the queen would have no foreign husband, though she found suitors useful as well as attractive. Spanish counsels were applauded and neglected, and the Spaniards soon departed. Elizabeth was glad of Philip's support at the negotiations for peace at Cateau Cambr6sis (1559), but she took care to assert the independence of her diplomacy and of England's interests. At .

*home the church was made once more English. All Q fthenew foreign jurisdiction was repudiated, and under the religion. style " supreme governor " Elizabeth reclaimed nearly J??/*** ' all the power which Henry VIII. had exercised as mtty _ "supreme head." The Act of Uniformity (1559) restored with a few modifications the second prayer-book of*

Edward VI. The bishops almost unanimously refused to conform, and a clean sweep was made of the episcopal bench. An eminently safe and scholarly archbishop was found in Matthew Parker, who had not made himself notorious by resistance to authority even under Mary. The lower clergy were more amenable; the two hundred who alone are said to have been ejected should perhaps be multiplied by five; but even so they were not one in seven, and these seven were clergy

who had been pro- moted in Mary's reign, or who had stood the celibate and other tests of 1 553-1 554. Into the balance must be thrown the hundreds, if not thousands, of zealots who had fled abroad and returned in 1558-1559. The net result was that a few years later the lower house of convocation only rejected by one vote a very puritanical petition against vestments and other " popish dregs."

The next step was to expand the principle of England for the English into that of Britain for the British, and Knox's reformation in 1 559-1 560 provided an opportunity Elizabeth f or j ts application. By timely and daring intervention Scotland. m Scotland Elizabeth procured the expulsion of the French bag and baggage from North Britain, and that French avenue to England was closed for ever. The logic of this plan was not applied to Ireland; there it was to be Ireland for the English for many a generation yet to come; and so Ireland remained Achilles' heel, the vulnerable part of the United King- dom. The Protestant religion was forced upon the Irish in a foreign tongue and garb and at the point of foreign pikes; and national sentiment supported the ancient faith and the ancient habits in resistance to the Saxon innovations. In other directions the expansion of England, the third stage in the development of Elizabeth's policy, was more successful. The attractions of the Spanish Main converted the seafaring folk of south-west Eng- land into hardy Protestants, who could on conscientious a 'ainst as we '^ as otner grounds contest a papal allocation the of new worlds to Spain and Portugal. Their monopoly

Spanish was broken up by Hawkins, Drake, Frobisher, Raleigh, dominion an(j scores f others who recognized no peace beyond the line; and although, as far as actual colonies went, the results of Elizabeth's reign were singularly meagre, the idea had taken root and the ground had been prepared. In every direction English influence penetrated, and Englishmen before 1603 might be found in every quarter of the globe, following Drake's lead into the Pacific, painfully breaking the ice in search of a north-east or a north-west passage, hunting for slaves in the wilds of Africa, journeying in caravans across the steppes of Russia into central Asia, bargaining with the Turks on the shores of the Golden Horn, or with the Greeks in the Levant, laying the foundations of the East India Company, or of the colonies of Virginia and Newfoundland.

This expansion was mainly at the expense of Spain; but at first Spain was regarded as Elizabeth's friend, not France. France had a rival candidate for Elizabeth's throne Mar y > in Mary Stuart, the wife of

the dauphin who soon Scots. 0559) became king as Francis II.; and Spanish favour

was sought to neutralize this threat. Fortunately for Elizabeth, Francis died in 1560, and the French government passed into the hands of Catherine de' Medici, who had no cause to love her daughter-in-law and the Guises. France, too, was soon paralysed by the wars of religion which Elizabeth judiciously fomented with anything but religious motives. Mary Stuart returned to Scotland with nothing but her brains and her charms on which to rely in her struggle with her people and her rival. She was well equipped in both respects, but human passions spoilt her chance; her heart turned her head. Elizabeth's head was stronger and she had no heart at all. When Mary married Darnley she had the ball at her feet; the pair had the best claims to the English succession and enjoyed the united affections of the Catholics. But they soon ceased to love one another, and could not control their jealousies. There followed rapidly the murders of Rizzio and Darnley, the Bothwell marriage, Mary's defeat, captivity, and flight into England (1568). It was a difficult problem for Elizabeth to solve; to let Mary go to

France was presenting a good deal more than a pawn to her

enemies; to restore her by force to her Scottish throne might

have been heroic, but it certainly was not politics; to hand her

over to her Scottish foes was too mean even for Elizabeth ; and to

keep her in England was to nurse a spark in a powder-magazine.

Mary was detained in the hope that the spark might be carefully

isolated.

But there was too much inflammable material about. The

duke of Norfolk was a Protestant, but his convictions were

weaker than his ambition, and he fell a victim to

Mary's unseen charms. The Catholic north of England o%l 6 g"

was to rise under the earls of Westmorland and and ex-

Northumberland, who objected to Elizabeth's seizure communi-

of their mines and jurisdictions as well as to her pro- Sf" 1 °L e . . r . , , , ^ . Elizabeth.

scrip tion of their faith; and the pope was to assist

with a bull of deposition. Norfolk, however, played the coward; the bull came nearly a year too late, and the rebellion of the earls (1569) was easily crushed. But the conspiracies did not end, and Spain began to take a hand. Elizabeth, partly in revenge for the treatment of Hawkins and Drake at San Juan de Ulloa, seized some Spanish treasure on its way to the Netherlands (Dec. 1569). Alva's operations were fatally handicapped by this disaster, but Philip was too much involved in the Nether- lands to declare war on England. But his friendship for Eliza- beth had received a shock, and henceforth his finger may be traced in most of the plots against her, of which p,ot f the Ridolfi conspiracy was the first. It cost Norfolk "Elizabeth. his head and Mary more of her scanty liberty. Eliza- Relations beth also began to look to France, and in 1572, by the wlth treaty of Blois, France instead of Spain became Eng- snauT "" land's ally, while Philip constituted himself as Mary's patron. The massacre of St Bartholomew placed a severe strain upon the new alliance, but was not fatal to it. A series of prolonged but hollow marriage negotiations between Elizabeth and first Anjou (afterwards Henry III.) and then Alencon (afterwards duke of Anjou) served to keep up appearances. But the friendship was never warm; Elizabeth's relations with the Huguenots on the one hand and her fear of French designs on the Netherlands on the other prevented much cordiality. But the alliance stood in the way of a Franco-Spanish agreement, limited Elizabeth's sympathy with the French Protestants, and enabled her to give more countenance than she otherwise might have done to the Dutch.

Gradually Philip grew more hostile under provocation; slowly he came to the conclusion that he could never subdue the Dutch or check English attacks on the Spanish Main without a conquest of England. Simultaneously J e the counter- Reformation began its attacks; the missions. " Jesuit invasion " took place in 1580, and Campion went to the block. A papal and Spanish attempt upon Ireland in the same year was foiled at Smerwick. But more important was Philip 's acquisition of the throne of Portugal with its harbours, its colonies and its marine. This for the first time gave him a real command of the sea, and at least doubled the chances of a successful attack upon England. But Philip's mind moved slowly and only on provocation. It took a year or two to satisfy him that Portugal was really his; not until 1583 was the fleet of the pretender Don Antonio destroyed in the Azores. The victor, Santa Cruz, then suggested an armada against England, but the English Catholics could not be brought into line with a Spanish invasion. The various attempts to square James VI. of Scotland had not been successful, and events in the Nether- lands and in France disturbed Philip's calculations. But his purpose was now probably fixed. After the murder of William the Silent (1584) Elizabeth sided more openly with the Dutch; the Spanish ambassador Mendoza was expelled from England for his intrigues with Elizabeth's enemies (1586); and _ ,. on the discovery of Babington's plot Elizabeth yielded „f Mary, to the demand of her parliament and her ministers queen of for Mary's execution (1587); her death removed the ff?£ s ' only possible centre for a Catholic rebellion in case of a Spanish attack. It also removed Philip's last doubts;*

Mary had left him her claims to the English throne, and he might, now that she was out of his path, hope to treat England like Portugal. Drake's "singeing of Philip's beard" in Cadiz harbour in 1587 delayed the expedition for a year, and a storm again postponed it in the early summer of 1588. At length the armada sailed in July under the incompetent duke of Medina Sidonia; its object was to secure command of the narrow seas and facilitate the transport of Parma's army from the Nether- lands to England. But Philip after his twenty years' experience in the Netherlands can hardly have hoped to conquer a bigger and richer country with scantier means and forces.

He relied

in fact upon a domestic explosion, and the armada The a f? at was on ˆ v t0 k e the torch. This miscalculation made ISS8. ‘ it a hopeless enterprise from the first. Scarcely an

English Catholic would have raised a finger in Philip’s favour; and when he could not subdue the two provinces of Holland and Zeeland, it is absurd to suppose that he could have simultaneously subdued them and England as well. English armies were not perhaps very efficient, but they were as good as the material with which William of Orange began his task. Philip, however, was never given the opportunity. His armada was severely handled in a week’s fighting on its way up the Channel, and was driven off the English ports into the German Ocean ; there a south-west gale drove it far from its rendezvous, and completed the havoc which the English ships had begun. A miserable remnant alone escaped destruction in its perilous flight round the north and west of Scotland.

The defeat of the armada was the beginning and not the end of the war; and there were moments between 1588 and 1603 when England was more seriously alarmed than in 1588. The Spaniards seized Calais in 1596; at another time they threatened England from Brest, and the ” invisible ” armada of 1599 created a greater panic than the ” invincible ” armada of 1588. It was not till the very end of the reign that what was in some ways the most dangerous of Spanish aggressions was foiled at Kinsale. Nor were the English counter-attacks very happy; the attempt on Portugal in 1589 under Drake and Norris proved a complete failure. The raid on Cadiz under Essex and Raleigh in 1596 was attended with better results, but the ” Islands ” voyage to the Azores in 1597 was a very partial success. Still it was now a war upon more or less equal terms, and there was little more likelihood that it would end with England’s than with Spain’s loss of national independence. The subjection of the Netherlands was now almost out of the question, and although Elizabeth’s help had not enabled the Protestant cause to win in France, Henry IV. built up a national monarchy which would be quite as effectual a bar to the ambitions of Spain.

Elizabeth had in fact safely piloted England through the struggle to assert its national independence in religion and

politics and its claim to a share in the new inheritance Lfls ‘ . which had been opened up for the nations of Europe; Elizabeth, and the passionate loyalty which had supported her as

the embodiment of England's aspirations somewhat cooled in her declining years. She herself grew more cautious and conservative than ever, and was regarded as an obstacle by the hotheads in war and religion. She sided with the " scribes," Burghley and Sir Robert Cecil, against the men of war, Essex and Raleigh; and she abetted Whitgift's rigorous persecution of the Puritans whose discontent with her via media was rancorously expressed in the Martin Marprelate tracts. Essex's folly and failure to crush Hugh O'Neill's rebellion (1599), the most serious effort made in the reign to throw off the English /oke in Ireland, involved him in treason and brought him to he block. Parliament was beginning to quarrel with the royal prerogative, particularly when expressed in the grant of mono- polies, and even Mountjoy's success in Ireland (1602-1603) failed to revive popular enthusiasm for the dying queen. Strange as it may seem, the accession of James I. was hailed as heralding a new and gladder age by Shakespeare, and minor writers (March 24, 1603). (A. F. P.)

VIII. The Stuart Monarchy, the Great Rebellion and the Restoration (1603-1689)

The defeat of the Spanish armada in 1588 had been the final victory gained on behalf of the independence of the English church and state. The fifteen years which followed had been years of successful war; but they had been "f%j?ff '" also years during which the nation had been preparing iˆs. itself to conform its institutions to the new circum- stances in which it found itself in consequence of the great victory. When James arrived from Scotland to occupy the throne of Elizabeth he found a general desire for change. Especially there was a feeling that there might be some relaxa- tion in the ecclesiastical arrangements. Roman Catholics and Puritans alike wished for a modification of the laws which bore hardly on them. James at first relaxed the penalties under which the Roman Catholics suffered, then he grew frightened by the increase of their numbers and reimposed the penalties. The gunpowder plot (1605) was the result, followed by a sharper persecution than ever (see Gunpowder Plot).

The Puritans were invited to a conference with the king at Hampton Court (1604). They no longer asked, as many of them had asked in the beginning of Elizabeth's reign, to substitute the presbyterian discipline for the episcopal govern- ment. All they demanded was to be allowed permission, whilst remaining as ministers in the church, to omit the usage of certain ceremonies to which they objected. It was the opinion of Bacon that it would be wise to grant their request. James thought otherwise, and attempted to carry out the Elizabethan

conformity more strictly than it had been carried out in his predecessor's reign.

In 1604 the Commons agreed with Bacon. They declared that they were no Puritans themselves, but that, with such a dearth of able ministers, it was not well to lose the services of any one who was capable of preaching the gospel. Jal ˆ e f h 1 ' By his refusal to entertain their views James placed commons. himself in opposition to the Commons in a matter which touched their deeper feelings. As a necessary consequence every dispute on questions of smaller weight assumed an ex- aggerated importance. The king had received a scanty revenue with his crown, and he spent freely what little he had. As the Commons offered grudging supplies, the necessity under which he was of filling up the annual deficit led him to an action by which a grave constitutional question was raised.

From the time of Richard II. to the reign of Mary no attempt had been made to raise duties on exports and imports without consent of parliament. But Mary had, under a specious pretext, recommenced to a slight extent the evil practice, and Elizabeth had gone a little further in the same direction. In 1606 a merchant named John Bates (g.v.) resisted the payment of an imposition — as duties levied by the sole authority of the crown were then called. The case was argued in the court of exchequer, and was there decided in favour of the crown. Shortly after- wards new impositions were set to the amount of £70,000 a year. When parliament met in 1610 the whole subject was discussed, and it was conclusively shown that, if the barons of the exchequer had been right in any sense, it was only in that narrow technical sense which is of no value at all. A compromise attempted broke down, and the difficulty was left to plague the next generation. The king was always able to assert that the judges were on his side, and it was as yet an acknowledged principle of the consti- tution that parliament could not change the law without the express consent of the crown, even if, which was not the case in this matter, the Lords had sided with the Commons. James's attempt to obtain further supplies from the Commons by opening a bargain for the surrender of some of his old feudal prerogatives, such as wardship and marriage, which had no longer any real meaning except as a means of obtaining money in an oppressive way, broke down, and early in 1611 he dissolved his first parliament in anger. A second parliament, summoned in 1614, met with the same fate after a session of a few weeks.

The dissolution of this second parliament was followed by a

short imprisonment of some of the more active members, and by a demand made through England for a benevolence to make up the deficiency which parliament had neglected to meet. The court represented that, as no compulsion was used, there was nothing illegal in this proceeding. But as the names of those who refused to pay were taken down, it cannot be said that there was no indirect pressure.

The most important result of the breach with the parliament of 1614, however, was the resolution taken by James to seek refuge from his financial and other troubles in a close alliance Attempted w ; tn ˆ ˆma of Spain. His own accession had done ualon with , . ° , r . . . _, ... , ,

Scotland, much to improve the position of England m its relation

with the continental powers. Scotland was no longer available as a possible enemy to England, and though an attempt to bind the union between the two nations by freedom of com- mercial intercourse had been wrecked upon the jealousy of the English Commons (1607), a legal decision had granted the status of national subjects to all persons born in Scotland after the king's accession in England. Ireland, too, had been thoroughly over- powered at the end of Elizabeth's reign, and the flight of the

earls of Tyrone and Tyrconnel in 1607 had been Jzamnot foilowed b y the settlement of English and Scottish Ulster. colonists in Ulster, a measure which, in the way in

which it was undertaken, sowed the seeds of future evils, but undoubtedly conduced to increase the immediate strength of the English government in Ireland.

Without fear of danger at home, therefore, James, who as king of Scotland had taken no part in Elizabeth's quarrel with

Philip II., not only suspended hostilities immediately Spanish on n * s accession, and signed a peace in the following alliance. year, but looked favourably on the project of a Spanish

marriage alliance, so that the chief Protestant and the chief Catholic powers might join together to impose peace en Europe, in the place of those hideous religious wars by which the last century had been disfigured. In 161 1 circumstances had disgusted him with his new ally, but in 1614 he courted him again, not only on grounds of general policy, but because he hoped that the large portion which would accompany the hand of an infanta would go far to fill the empty treasury.

In this way the Spanish alliance, unpopular in itself, was formed to liberate the king from the shackles imposed on him by the English constitution. Its unpopularity, great from the beginning, became greater when Raleigh's execution (1618) caused the government to appear before the world as truckling to Spain. The obloquy under which James laboured increased when the Thirty Years' War broke out (1618), and when his daughter Elizabeth, whose husband, the elector palatine, was the unhappy claimant to the Bohemian crown (1619), stood forth as the lovely symbol of the deserted Protestantism of Europe. Yet it was not entirely in pity for German Pro- testants that the heart of Englishmen, beat. Men felt that their own security was at stake. The prospect of a Spanish infanta as the bride of the future king of England filled them with suspicious terrors. In Elizabeth's time the danger, if not entirely external, did not come from the government itself. Now the favour shown to the Roman Catholics by the king opened up a source of mischief which was to some extent real, if it was to a still greater extent imaginary. Whether the danger were real or imaginary, the consequence of the distrust resulting from the suspicion was the reawakening of the slumbering demand for fresh persecution of the Roman Catholics, a demand which made a complete reconciliation between the crown and the Lower House a matter of the greatest difficulty.

In 1621 the third parliament of James was summoned to provide money for the war in defence of his son-in-law's in- Parlia- heritance, the Palatinate, which he now proposed to meat and undertake. But it soon appeared that he was not the mono- prepared immediately to come to blows, and the po es. Commons, voting a small sum as a token of their loyalty, passed to other matters. Indolent in his temper, James had been in the habit of leaving his patronage in the hands of a confidential favourite, and that position was now filled by

George Villiers, marquess and afterwards duke of Buckingham. The natural consequence was that men who paid court to him were promoted, and those who kept at a distance from him had no notice

taken of their merits. Further, a system of granting monopolies and other privileges had again sprung up. Many of these grants embodied some scheme which was intended to serve the interests of the public, and many actions which appear startling to us were covered by the extreme protectionist theories then in vogue. But abuses of every kind had clustered round them, and in many cases the profits had gone into the pockets of hangers-on of the court, whilst officials had given their assist- ance to the grantors even beyond their legal powers. James was driven by the outcry raised to abandon these monopolies, and an att of Parliament in 1624 placed the future grant of pro- tections to new inventions under the safeguard of the judges.

The attack on the monopolies was followed by charges brought by the Commons before the Lords against persons implicated in carrying them into execution, and subsequently against Lord Chancellor Bacon as guilty of corruption. Bacon. The sentence passed by the Lords vindicated the right of parliament to punish officials who had enjoyed the favour of the crown, which had fallen into disuse since the accession of the house of York. There was no open contest between parliament and king in this matter. But the initiative of demand- ing justice had passed from the crown to the Commons. It is impossible to overestimate the effect of these proceedings on the position of parliament. The crown could never again be regarded as the sum of the governmental system.

When the Commons met after the summer adjournment a new constitutional question was raised. The king was at last determined to find troops for the defence of the Palatinate, and asked the Commons for money to pay them. They in turn petitioned the crown to abandon the Spanish alliance, which they regarded as the source of all the mischief. James told them that they had no right to discuss business on which he had not asked their opinion. They declared that they were privileged to discuss any matter relating to the commonwealth which they chose to take in hand, and embodied their opinion in a protest, which they entered on their journals. The king tore the protest out of the book and dissolved parliament.

Then followed a fresh call for a benevolence, this time more sparingly answered than before. A year of fruitless diplomacy failed to save the Palatinate from total loss. The ill-considered journey to Madrid, in which Prince Charles, accompanied by Buckingham, hoped to wring from the Spanish statesmen a promise to restore the Palatinate in compliment for his marriage with the infanta, ended also in total failure. In the autumn of 1623 Charles returned to England without a wife, and without hope of regaining the Palatinate

with Spanish aid.

He came back resolved to take vengeance upon Spain. The parliament elected in 1624 was ready to second him. It voted some supplies on the understanding that, when the king had matured his plans for carrying on the war, p£f acA it should come together in the autumn to vote the alliance. necessary subsidies. It never met again. Charles had promised that, if he married a Roman Catholic, he would grant no toleration to the English Catholics in consideration of the marriage. In the autumn he had engaged himself to marry Henrietta Maria, the sister of the king of France, and had bound himself to grant the very conditions which he had declared to the Commons that he never would concede. Hence it was that he did not venture to recommend his father to summon parlia- ment till the marriage was over. But though there was but little money to dispose of, he and Buckingham, who, now that James was sick and infirm, were the real leaders of the government, could not endure to abstain from the prosecution of the war. Early in 1625 an expedition, under Count Mansfeld, was sent to Holland that it might ultimately cut its way to the Palatinate. Left without pay and without supplies, the men perished by thousands, and when James died in March the new king had to meet his first parliament burthened by a broken promise and a disastrous failure.

When parliament met (1625) the Commons at first contented themselves with voting a sum of money far too small to carry on

the extensive military and naval operations in which 1625-1649. Charles had embarked. When the king explained his

necessities, they intimated that they had no con- fidence in Buckingham, and asked that, before they granted further supply, the king would name counsellors whom they could trust to advise him on its employment. Charles at once dissolved parliament. He knew that the demand for ministerial responsibility would in the end involve his own responsibility, and, believing as he did that Buckingham's arrangements had been merely unlucky, he declined to sacrifice the minister whom he trusted.

Charles and Buckingham did their best to win back popularity by

strenuous exertion. They attempted to found a great Pro- testant alliance on the continent, and they sent a great ex- pedition to Cadiz. The Protestant alliance and the expedition to Cadiz ended in equal failure. The second parliament of the reign (1626) impeached Buckingham for crimes against the state. As Charles would not dismiss him simply because the Commons were dissatisfied with him as a minister, they fell back on charg- ing him with criminal designs. Once more Charles dissolved parliament to save Buckingham. Then came fresh enterprises and fresh failures. A fleet under Lord Willoughby (afterwards earl of Lindsey) was almost ruined by a storm. The king of Denmark, trusting to supplies from England which never came, was defeated at Lutter. A new war in addition to the Spanish war, broke out with France. A great expedition to Re, under Buckingham's command (1627), intended to succour the Huguenots of La Rochelle against their sovereign, ended in disaster. In order to enable himself to meet expenditure on so vast a scale, Charles had levied a forced loan from his subjects. Men of high rank in society who refused to pay were imprisoned. Soldiers were billeted by force in private houses, and military officers executed martial law on civilians. When the imprisoned gentlemen appealed to the king's bench for a writ of habeas corpus, it appeared that no cause of committal had been assigned, and the judges therefore refused to liberate them. Still Charles believed it possible to carry on the war, and especially to send relief to La Rochelle, now strictly blockaded by the forces of the French crown. In order to find the means for this object he summoned his third parliament (1628). The Commons at once

proceeded to draw a line which should cut off the p titi f P oss ib mt y °f a repetition of the injuries of which they Right. complained. Charles was willing to surrender his claims

to billet soldiers by force, to order the execution of martial law in time of peace, and to exact forced loans, bene- volences, or any kind of taxation, without consent of parliament; but he protested against the demand that he should surrender the right to imprison without showing cause. It was argued on his behalf that in case of a great conspiracy it would be necessary to trust the crown with unusual powers to enable it to preserve the peace. The Commons, who knew that the crown had used the powers which it claimed, not against conspirators, but against the commonwealth itself, refused to listen to the argu- ment, and insisted on the acceptance of the whole Petition of Right, in which they demanded redress for all their grievances. The king at last gave his consent to it, as he could obtain money in no other way. In after times, when any real danger

occurred which needed a suspension of the ordinary safeguards of liberty, a remedy was found in the suspension of the law by act of parlia- ment; such a remedy, however, only became possible when king and parliament were on good terms of agreement with one another.

That time was as yet far distant. The House of Commons brought fresh charges against Buckingham, whose murder soon

after the prorogation removed one subject of dispute.

arila- an ˆ Ut wnen tne y met: a S a i n (1629) they had two quarrels

meat. left over from the preceding session. About a third

part of the king's revenue was derived from customs duties which had for many generations been granted by parlia- ment to each sovereign for life. Charles held that this grant

was little more than a matter of form, whilst the Commons held that it was a matter of right. But for the other dispute the difficulty would probably have been got over. The strong Protestantism of Elizabeth's reign had assumed a distinctly Calvinistic form, and the country gentlemen who formed the majority of the House of Commons were resolutely determined that no other theology than that of Calvin should be taught in England. In the last few years a reaction against it had arisen especially in the universities, and those who adopted an un- popular creed, and who at the same time showed tendencies to a more ceremonial form of worship, naturally fell back on the support of the crown. Charles, who might reasonably have exerted himself to secure a fair liberty for all opinions, promoted these unpopular divines to bishoprics and livings, and the divines in turn exalted the royal prerogative above parliamentary rights. He now proposed that both sides should keep silence on the points in dispute. The Commons rejected his scheme, and prepared to call in question the most obnoxious of the clergy. In this irritated temper they took up the question of tonnage and poundage, and instead of confining themselves to the great public question, they called to the bar some custom-house officers who happened to have seized the goods of one of their members. Charles declared that the seizure had taken place by his orders. When they refused to accept the excuse, he dis- solved parliament, but not before a tumult took place in the House, and the speaker was forcibly held down in his chair whilst resolutions hostile to the government were put to the vote.

For eleven years no parliament met again. The extreme action of the Lower House was not supported by the people, and the king had the opportunity, if he chose to use it, of putting himself right with the nation after no long delay. But he never understood that power only attends sympathetic leadership. He contented himself with putting himself technically in the right, and with resting his case on the favourable decisions of the judges. Under any circumstances, neither the training nor the position of judges is such as to make them fit to be the final arbiters of political disputes. They are accustomed to declare what the law is, not what it ought to be. These judges, moreover, were not in the position to be impartial. They had been selected by the king, and were liable to be deprived of their office when he saw fit. In the course of Charles's reign two chief justices and one chief baron were dismissed or suspended. Besides the ordinary judges there were the extraordinary tribunals, the court of high commission nominated by the crown to punish ecclesiastical offenders, and the court of star chamber, composed of the privy councillors and the chief justices, and therefore also nominated by the crown, to inflict fine, im- prisonment, and even corporal mutilation on lay offenders. Those who rose up in any way against the established order were sharply punished.

The harsh treatment of individuals only calls forth resistance when constitutional morality has sunk deeply into the popular mind. The ignoring of the feelings and prejudices of large classes has a deeper effect. Charles's foreign ˆfjney. policy, and his pretentious claim to the sovereignty of the British seas, demanded the support of a fleet, which might indeed be turned to good purpose in offering a counterpoise to the growing navies of France and Holland. The increasing estrangement between him and the nation made him averse from the natural remedy of a parliament, and he reverted to the absolute practices of the middle ages, in order that he might strain them far beyond the warrant of precedent to levy a tax under the name of ship-money, first on the port towns and then on the whole of England. Payment was resisted by John Hampden, a Buckinghamshire squire; but the judges declared that the king was in the right (1638). Yet the arguments used by Hampden's lawyers sunk deeply into the popular mind, and almost every man in England who was called on to pay the tax looked upon the king as a wrong-doer under the forms of law.

In his ecclesiastical policy Charles was equally out of touch with the feelings of his people. He shared to the full his father's dislike and distrust of the Puritans, and he supported with the

whole weight of the crown the attempt of William Laud (q.v.), since 1633 archbishop of Canterbury, to enforce conformity to

the ritual prescribed by the Prayer Book. At the same Church. time offence was given to the Puritans by an order

that every clergyman should read the Declaration of Sports, in which the king directed that no one should be prevented from dancing or shooting at the butts on Sunday afternoon. Many of the clergy were suspended or deprived, many emigrated to Holland or New England, and of those who remained a large part bore the yoke with feelings of ill-concealed dissatisfaction. Suspicion was easily aroused that a deep plot existed, of which Laud was believed to be the centre, for carry- ing the nation over to the Church of Rome, a suspicion which seemed to be converted into a certainty when it was known that Panzani and Conn, two agents of the pope, had access to Charles, and that in 1637 there was a sudden accession to the number of converts to the Roman Catholic Church amongst the lords and ladies of the court.

In the summer of 1638 Charles had long ceased to reign in the affections of his subjects. But their traditionary loyalty

had not yet failed, and if he had not called on them cha J' es for fresh exertions, it is possible that the coming re- Scotland. volution would have been long delayed. Men were

ready to shout applause in honour of Puritan martyrs like Prynne, Burton and Bastwick, whose ears were cut off in 1 63 7, or in honour of the lawyers who argued such a case as that of Hampden. But no signs of active resistance had yet appeared. Unluckily for Charles, he was likely to stand in need of the active co-operation of Englishmen. He had attempted to force a new Prayer Book upon the Scottish nation. A riot at Edinburgh in

1637 quickly led to national resistance, and when in November

1638 the general assembly at Glasgow set Charles's orders at defiance, he was compelled to choose between tame submission and immediate war. In 1639 he gathered an English force, and marched

towards the border. But English laymen, though asked to supply the money which he needed for the support of his army, deliberately kept it in their pockets, and the contri- butions of the clergy and of official persons were not sufficient to enable him to keep his troops long in the field. The king, therefore, thought it best to agree to terms of pacification. Misunderstandings broke out as to the interpretation of the treaty, and Charles having discovered that the Scots were intriguing with France, fancied that England, in hatred of its ancient foe, would now be ready to rally to his standard. After an interval of eleven years, in April 1640 he once more called a parliament.

The Short Parliament, as it was called, demanded redress of grievances, the abandonment of the claim to levy ship-money,

and a complete change in the ecclesiastical system. T parifa- 0rt Cnarles thought that it would not be worth while even meat. to conquer Scotland on such terms, and dissolved

parliament. A fresh war with Scotland followed. Wentworth, now earl of Strafford, became the leading adviser of the king . With all the energy of his disposition he threw himself into Charles's plans, and left no stone unturned to furnish the new expedition with supplies and money. But no skilfulness of a commander can avail when soldiers are determined not to fight.

The Scots crossed the Tweed, and Charles's army was Scottish we ˆ pl ease d to fly before them. In a short time the invasion, whole of Northumberland and Durham were in the

hands of the invaders. Charles was obliged to leave these two counties in their hands as a pledge for the payment of their expenses; and he was also obliged to summon parliament to grant him the supplies which he needed for that object.

When the Long Parliament met in November 1640 it was in a position in which no parliament had been before. Though

nominally the Houses did not command a single Partial soldier, they had in reality the whole Scottish army at ment. their back. By refusing supplies they would put it

out of the king's power to fulfil his engagements to that army, and it would immediately pursue its onward march to claim its rights. Hence there was scarcely anything which

the king could venture to deny the Commons. Under Pym's

leadership, they began by asking the head of Strafford. Nomin- ally he was accused of a number of acts of oppression in the north of England and in Ireland. His real ˆ alader offence lay in his attempt to make the king absolute, Strafford. and in the design with which he was credited of intend- ing to bring over an Irish army to crush the liberties of England. If he had been a man of moderate abilities he might have escaped. But the Commons feared his commanding genius too much to let him go free. They began with an impeachment. Difficulties arose, and the impeachment was turned into a bill of attainder. The king abandoned his minister, and the execution of Strafford left Charles without a single man of supreme ability on his side. Then came rapidly a succession of blows at the supports by which the Tudor monarchy had been upheld. The courts of star chamber and high commission and the council of the north were abolished. The raising of tonnage and poundage without a parliamentary grant was declared illegal. The judges who had given obnoxious decisions were called to answer for their fault and were taught that they were responsible to the House of Commons as well as the king. Finally a bill was passed provid- ing that the existing House should not be dissolved without its awn consent.

It was clearly a revolutionary position which the House had assumed. But it was assumed because it was impossible to ex- pect that a king who had ruled as Charles had ruled could take up a new position as the exponent of the feelings which were represented in the Commons. As long as Charles lived he could not be otherwise than an object of suspicion; and yet if he were dethroned there was no one available to fill his place. There arose therefore two parties in the House, one ready to trust the king, the other disinclined to put any confidence in him at all. The division was the sharper because it coincided with a difference in matters of religion. Scarcely any one wished to see the Laudian ceremonies upheld. But the members who favoured the king, and who formed a considerable minority, wished to see a certain liberty of religious thought, together with a return under a modified Episcopacy to the forms of worship which prevailed before Laud had taken the church in hand. The other side, which had the majority by a few votes, wished to see the Puritan creed prevail in all its strictness, and were favourable to the establishment of the Presbyterian discipline. The king by his unwise action threw power into the hands of his opponents. He listened with tolerable calmness to their Grand Remonstrance, but his attempt to seize the five members whom he accused of high treason made a good understanding impossible. The Scottish army had been paid off some months before, and civil war was the only means of deciding the

quarrel.

At first the fortune of war wavered. Edgehill was a drawn battle (1642), and the campaign of 1643, though it was on the whole favourable to the king, gave no decisive results. Before the year was at an end parliament invited a wa e r ° V new Scottish army to intervene in England. As an inducement, the Solemn League and Covenant was signed by all Parliamentarian Englishmen, the terms of which were interpreted by the Scots to bind England to submit to Presbyterianism, though the most important clauses had been purposely left vague, so as to afford a loophole of escape. The battle of Marston Moor, with the defeat of the Royalist forces in the north, was the result. But the battle did not improve the^^ position of the Scots. They had been repulsed, and terians and the victory was justly ascribed to the English con- indepen- tingent. The composition of that contingent was such deats – as to have a special political significance. Its leader was Oliver Cromwell. It was formed by men who were fierce Puritan enthusiasts, and who for the very reason that the intensity of their religion separated them from the mass of their countrymen, had learnt to uphold with all the energy of zeal the doctrine that neither church nor state had a right to interfere with the forms of worship which each congregation might select for itself (see Congregationalism and Cromwell, Oliver). The principle advocated by the army, and opposed by the Scots and the

majority of the House of Commons, was liberty of sectarian association. Some years earlier, under the dominion of Laud, another principle had been proclaimed by Chillingworth and Hales, that of liberty of thought within the unity of the church. Both these movements conduced to the ultimate establishment of toleration, but for the present the Independents were to have their way.

The Presbyterian leaders, Essex and Manchester, were not successful leaders. The army was remodelled after Cromwell's

pattern, and the king was finally crushed at Naseby Tne (1645). The next year (1646) he surrendered to the

S lvilwar Scots. Then followed two years of fruitless negotiation,

in which after the Scots abandoned the king to the English parliament, the army took him out of the hands of the parliament, whilst each in turn tried to find some basis of arrange- ment on which he might reign without ruling. Such a basis could not be found, and when Charles stirred up a fresh civil war and a Scottish invasion (1648) the leaders of the army vowed that, if victory was theirs, they would bring him to justice. To do this it was necessary to drive out a large number of the members of the House of Commons by what was known as

Pride's Purge, and to obtain from the mutilated Execution Commons the dismissal of the House of Lords, and kine ^ e establishment of a high court of justice, before*

which the king was brought to trial and sentenced to death. He was beheaded on a scaffold outside the windows of Whitehall (1649).'

The government set up was a government by the committees of a council of state nominally supporting themselves on the

House of Commons, though the members who still The retained their places were so few that the council of

wealth. ' stat; e was sufficiently numerous to form a majority

in the House. During eleven years the nation passed through many vicissitudes in its forms of government. These forms take no place in the gradual development of English institutions, and have never been referred to as affording pre- cedents to be followed. To the student of political science, however, they have a special interest of their own, as they show that when men had shaken themselves loose from the chain of habit and prejudice, and had set themselves to build up a political shelter under which to dwell, they were irresistibly attracted by that which was permanent in the old constitutional forms of which the special development had of late years been so disastrous. After Cromwell had suppressed resistance in Ireland (1649), had conquered Scotland (1650), and had over- thrown the son of the late king, the future Charles II., at Wor- cester (1651), the value of government by an assembly was tested and found wanting. After Cromwell had expelled the remains of the Long Parliament (1653), and had set up another assembly of nominated members, that second experiment was found equally wanting. It was necessary to have recourse to one head of the executive government, controlling and directing its

actions. Cromwell occupied this position as lord Cr< ""~ protector. He did all that was in his power to do to 7ectorate. ' prevent his authority from degenerating into tyranny.

He summoned two parliaments, of only one House, and with the consent of the second parliament he erected a second House, so that he might have some means of checking the Lower House without constantly coming into personal collision with its authority. As far as form went, the constitution in 1658, so far as it differed from the Stuart constitution, differed for the better. But it suffered from one fatal defect. It was based on the rule of the sword. The only substitute for traditional authority is the clearly expressed expression of the national will, and it is impossible to doubt that if the national will had been expressed it would have swept away Cromwell and all his system. The majority of the upper and middle classes, which had united together against Laud, was now reunited against Cromwell. The Puritans themselves were but a minority, and of that

1 The events of the reign of Charles I. are treated in greater detail in the articles Charles I., King of Great Britain and Ireland ; Strafford; Hampden; Pym; Great Rebellion; Cromwell, &c.

minority considerable numbers disliked the iree liberty accorded to the sects. Whilst the worship of the Church of England was proscribed, every illiterate or frenEied enthusiast was allowed to harangue at his pleasure. Those who cared little for religion felt insulted when they saw a government with which they had no sympathy ruling by means of an army which they dreaded and detested. Cromwell did his best to avert a social revolution, and to direct the energies of his supporters into the channels of merely political change. But he could not prevent, and it cannot be said that he wished to prevent, the rise of men of ability from positions of social inferiority. The nation had striven against the arbitrary government of the king; but it was not prepared to shake off the predominance of that widely spreading aristo- cracy which, under the name of country gentlemen, had rooted itself too deeply to be easily passed by. Cromwell's rule was covered with military glory, and there can be no doubt that he honestly applied himself to solve domestic difficulties as well. But he reaped the reward of those who strive for something better than the generation in which they live is able to appreciate. His own faults and errors were remembered against him. He tried in vain to establish constitutional government and religious toleration (see Cromwell, Oliver). When he died (1658) there remained branded on the national mind two strong impressions

which it took more than a century to obliterate — the dread of the domination of a standing army, and abhorrence of the very name of religious zeal.

The eighteen months which followed deepened the impression thus formed. The army had appeared a hard master when it lent its strength to a wise and sagacious rule. It was worse when it undertook to rule in its own name, to

The anarchy.

set up and pull down parliaments and governments.

The only choice left to the nation seemed to be one between

military tyranny and military anarchy. Therefore it was that

when Monk advanced from Scotland and declared for a free

parliament, there was little doubt that the new parliament would

recall the exiled king, and seek to build again on the old

foundations.

*The Restoration was effected by a coalition between the Cavaliers, or followers of Charles I., and the Presbyterians who had originally opposed him. It was only after the nature of a great reaction that the latter should for f£**J£ n a time be swamped by the former. The Long Parlia- ment of the Restoration met in 166 1, and the Act of Uniformity entirely excluded all idea of reform in the Puritan direction, and ordered the expulsion from their benefices of all clergymen who refused to express approval of the whole of the Book of Common Prayer (1662). A previous statute, the Corporation Act (1661), ordered that all members of corporations should renounce the Covenant and the doctrine that subjects might in any case rightfully use force against their king, and should receive the sacrament after the forms of the Church of England. The object for which Laud had striven, the compulsory im- position of uniformity, thus became part of the law of the land.*

Herein lay the novelty of the system of the Restoration. The system of Laud and the system of Cromwell had both been imposed by a minority which had possessed itself of the powers of government. The new uniformity was imposed by parliament, and parliament had the nation behind it. For the first time, therefore, all those who objected

to the established religion sought, not to alter its forms to suit thffiiselves, but to gain permission to worship in separate congregations. Ulti- mately, the dissenters, as they began to be called, would obtain their object. As soon as it became clear to the mass of the nation that the dissenters were in a decided minority, there would be no reason to fear the utmost they could do even if the present liberty of worship and teaching were conceded to them. For the present, however, they were feared out of all proportion to their numbers. They counted amongst them the old soldiers of the Protectorate, and though that army had been dissolved, it always seemed possible that it might spring to arms once more. A bitter experience had taught men that a hundred of Oliver's Ironsides might easily chase a thousand Cavaliers; and as long

as this danger was believed to exist, every effort would be made to keep dissent from spreading. Hence the Conventicle Act (1664) imposed penalties on those taking part in religious meetings in private houses, and the Five Mile Act (1665) forbade an expelled clergyman to come within five miles of a corporate borough, the very place where he was most likely to secure adherence, unless he would swear his adhesion to the doctrine of non-resistance.

The doctrine of non-resistance was evidently that by which, at this time, the loyal subject was distinguished from those

whom he stigmatized as disloyal. Yet even the most Doctrine loyal found that, if it was wrong to take up arms "resistance, against the king, it might be right to oppose him in

other ways. Even the Cavaliers did not wish to see Charles II. an absolute sovereign. They wished to reconstruct the system which had been violently interrupted by the events of the autumn of 1641, and to found government on the co- operation between king and parliament, without defining to themselves what was to be done if the king's conduct became insufferable. Openly, indeed, Charles II. did not force therh to reconsider their position. He did not thrust members of the Commons into prison, or issue writs for ship-money. He laid no claim to taxation which had not been granted by parliament. But he was extravagant and self-indulgent, and he

wanted more money than they were willing to supply. A war with the

*Dutch broke out, and there were strong suspicions that VOt *”’ Charles applied money voted for the fleet to the maiii- war ˆ tenance of a vicious and luxurious court. Against the*

vice and luxury, indeed, little objection was likely to be brought. The over-haste of the Puritans to drill England into ways of morality and virtue had thrown at least the upper classes into a slough of revelry and baseness. But if the vice did not appear objectionable the expense did, and a new chapter in the financial history of the government was opened when the Commons, having previously gained control over taxation, pro- ceeded to vindicate their right to control expenditure.

As far, indeed, as taxation was concerned, the Long Parlia- ment had not left its successor much to do. The abolition of

feudal tenures and purveyance had long been de- Commons manded, and the conclusion of an arrangement which aim at had been mooted in the reign of James I. is only notable control as affording one instance out of many of the tendency

of a single class to shift burdens off its own shoulders.

The predominant landowners preferred the grant of an excise, which would be taken out of all pockets, to a land-tax which would exclusively be felt by those who were relieved by the abolition of the tenures. The question of expenditure was constantly telling on the relations between the king and the House of Commons. After the Puritan army had been disbanded, the king resolved to keep on foot a petty force of 5000 men, and he had much difficulty in providing for it out of a revenue which had not been intended by those who voted it to be used for such a purpose. Then came the Dutch war, bringing with it a sus- picion that some at least of the money given for paying sailors and fitting out ships was employed by Charles on very different objects. The Commons accordingly, in 1665, succeeded in enforcing, on precedents derived from the reigns of Richard II. and Henry IV., the right of appropriating the supplies granted to special objects; and withˆriore difficulty they obtained, in 1666, the appointment of a commission empowered to investigate irregularities in the issue of moneys. Such measures were the complement of the control over taxation which they had previously gained, and as far as their power of supervision went, it constituted them and not the king the directors of the course of government. If this result was not

immediately felt, it was because the king had a large certain revenue voted to him for life, so that, for the present at least, it was only his extraordinary expenses which could be brought under parliamentary control. Nor did even the renewal of parliamentary impeachment, which ended in the banishment of Lord Chancellor Clarendon (1667), bring on any direct collision with the king. If the Commons wished to be rid of him because he upheld the prerogative, the

over ex= penditure.

king was equally desirous to be rid of him because he looked coldly on the looseness of the royal morals.

*The great motive power of the later politics of the reign was to be found beyond the Channel. To the men of the days of Charles II., Louis XIV. of France was what Philip II. of Spain had been to the men of the days of Elizabeth. c ** r/es lL Gradually, in foreign policy, the commercial emulation Louis XIV. with the Dutch, which found vent in one war in the time of the Commonwealth, and in two wars in the time of Charles II., gave way to a dread, rising into hatred, of the arrogant potentate who, at the head of the mightiest army in Europe, treated with contempt all rights which came into collision with his own wishes. Louis XIV., moreover, though prepared to quarrel with the pope in the matter of his own authority over the Gallican Church, was a bigoted upholder of Catholic ortho- doxy, and Protestants saw in his political ambitions a menace to their religion. In the case of England there seemed a special danger to Protestantism; for whatever religious sympathies Charles II. possessed were with the Roman Catholic faith, and in his annoyance at the interference of the Commons with his expenditure he was not ashamed to stoop to become the pen- sioner of the French king. In 1670 the secret treaty of Dover was signed. Charles was to receive from Louis £200,000 a year and the aid of 6000 French troops to enable him to declare him- self a convert, and to obtain special advantages for his religion, whilst he was also to place the forces of England at Louis's dis- posal for his purposes of aggression on the continent of Europe.*

Charles had no difficulty in stirring up the commercial jealousy of England so as to bring about a second Dutch war (1672). The next year, unwilling to face the dangers of his larger plan, he issued a declaration of indulgence, ouich which, by a single act of the prerogative, suspended war, and all penal laws against Roman Catholics and dissenters deciara- alike. To the country gentlemen who constituted the autˆnce". cavalier parliament, and who had long

been drifting into opposition to the crown, this was intolerable. The pre- dominance of the Church of England was the prime article of their political creed; they dreaded the Roman Catholics; they hated and despised the dissenters. Under any circumstances an indulgence would have been most distasteful to them. But the growing belief that the whole scheme was merely intended to serve the purposes of the Roman Catholics converted their dislike into deadly opposition. Yet the parliament resolved to base its opposition upon constitutional grounds. The right claimed by the king to suspend the laws was questioned, and his claim to special authority in ecclesiastical matters was treated with contempt. The king gave way and withdrew his declaration. But no solemn act of parliament declared it to be illegal, and in due course of time it would be heard of again.

The Commons followed up their blow by passing the Test Act, making the reception of the sacrament according to the forms of the Church of England, and the renunciation of the doctrine of transubstantiation, a necessary qualifica- AcL tion for office. At once it appeared what a hold the members of the obnoxious church had had upon the adminis- tration of the state. The lord high admiral, the lord treasurer, and a secretary of state refused to take the test. The lord high admiral was the heir to the throne, the king's brother, the duke of York.

Charles, as usual, bent before the storm. In Danby (see Leeds, ist Duke of) he found a minister whose views answered precisely to the views of the existing House of Commons. t

Like the Commons, Danby wished to silence both ministry. Roman Catholics and dissenters. Like the Commons, too, he wished to embark on a foreign policy hostile to France. But he served a master who regarded Louis less as a possible adversary than as a possible paymaster. Sometimes Danby was allowed to do as he liked, and the marriage of the duke of York's eldest daughter Mary to her cousin the prince of Orange was the most lasting result of his administration. More often he was obliged to follow where Charles led, and Charles was constantly ready to sell the neutrality of England for large sums

of French gold. At last one of these negotiations was detected, and Danby, who was supposed to be the author instead of the unwilling instrument of the intrigue, was impeached. In order to save his minister, Charles dissolved parliament (1678). He could not have chosen a more unlucky time for his own quiet.

The strong feeling against the Roman Catholics had ™ e been quickened into a flame by a great imposture.

pl £ t s The inventors of the so-called popish plot charged the

leading English Roman Catholics with a design to murder the king. Judges and juries alike were maddened with excitement, and listened greedily to the lies which poured forth from the lips of profligate informers. Innocent blood was shed in abundance.

The excitement had its root in the uneasy feeling caused by the knowledge that the heir to the throne was a Roman Catholic.

Three parliaments were summoned and dissolved. In Tbe each parliament the main question at issue between

B« as on t j ie c ommons an(j t ne crown was the Exclusion Bill,

by which the Commons sought to deprive the duke of York of his inheritance; and it was notorious that the leaders of the movement wished the crown to descend to the king's illegitimate son, the duke of Monmouth.

The principles by which the Commons were guided in these parliaments were very different from those which had prevailed

in the first parliament of the Restoration. Those r^s 1 ”’ principles, to which that party adhered which about*

this time became known as the Tory party, had been formed under the influence of the terror caused by militant Puritanism. In the state the Tory inherited the ideas of Clarendon, and, without being at all ready to abandon the claims of parliaments, nevertheless somewhat inconsistently spoke of the king as ruling by a divine and indefeasible title, and wielding a power which it was both impious and unconstitutional to resist by force. In the church he inherited the ideas of Laud, and saw in the maintenance of the Act of Uniformity the safe- guard of religion. But the hold of these opinions on the nation had been weakened with the cessation of the causes which had produced them. In 1680 twenty years had passed since the

Puritan army had been disbanded. Many of Cromwell's soldiers had died, and most of them were growing old. The dissenters had shown no signs of engaging in plots or conspiracies. They were known to be only a comparatively small minority of the population, and though they had been cruelly persecuted, they had suffered without a thought of resistance. Dread of the dissenters, therefore, had become a mere chimaera, which only those could entertain whose minds were influenced by prejudice. On the other hand, dread of the Roman Catholics was a living force. Unless the law were altered a Roman Catholic would be on the throne, wielding all the resources of the prerogative, and probably supported by all the resources of the king of France. Hence the leading principle of the Whigs, as the predominant party was now called, was in the state to seek for the highest national authority in parliament rather than in the king, and in the church to adopt the rational theology of Chillingworth and Hales, whilst looking to the dissenters as allies against the Roman Catholics, who were the enemies of both.

Events were to show that it was a wise provision which led the Whigs to seek to exclude the duke of York from the throne.

But their plan suffered under two faults, the con- reactlon. junction of which was ruinous to them for the time.

In the first place, their choice of Monmouth as the heir was infelicitous. Not only was he under the stain of illegitimacy, but his succession excluded the future succession of Mary, whose husband, the prince of Orange, was the hope of Protestant Europe. In the second place, drastic remedies are never gener- ally acceptable when the evil to be remedied is still in the future. When, in the third of the short parliaments held at Oxford the Whigs rode armed into the city, the nation decided that the future danger of a Roman Catholic succession was incomparably less than the immediate danger of another civil war. Loyal addresses poured in to the king. For the four remaining years of his reign he ruled without summoning any parliament. Whigs

were brought before prejudiced juries and partial judges. Their blood flowed on the scaffold. The charter of the city of London was confiscated. The reign of the Tories was unquestioned! Yet it was not quite what the reign of the Cavaliers had been in 1660. The violence of the Restoration had been directed primarily against Puritanism, and only against certain forms of government so far as they allowed Puritans to gain the upper hand. The violence of the Tories was directed against rebellion and disorder, and only against dissenters

so far as they were believed to be the fomenters of disorder. Religious hatred had less part in the action of the ruling party, and even from its worst actions a wise man might have predicted that the day of toleration was not so fa.r off as it seemed.

*The accession of James II. (1685) put the views of the op- ponents of the Exclusion Bill to the test. A new parliament was elected, almost entirely composed of decided Tories. A rebellion in Scotland, headed by the earl "j™** "" of Argyll, and a rebellion in England, headed by the /&sa. duke of Monmouth, were easily suppressed. But the inherent difficulties of the king's position were not thereby overˆ come. It would have been hard, in days in which religious questions occupied so large a space in the field of politics, for a Roman Catholic sovereign to rule successfully over a Protestant nation. James set himself to make it, in his case, impossible. It may be that he did not consciously present to himself any object other than fair treatment for his co-religionists. On the cne hand, however, he alienated even reasonable opponents by offering no guarantees that equality so gained would not be con- verted into superiority by the aid of his own military force and of the assistance of the French king; whilst on the other hand he relied, even more strongly than his father had done, on the technical legality which exalted the prerogative in defiance of the spirit of the law. He began by making use of the necessity of resisting Monmouth to increase his army, under the pretext of the danger of a repetition of the late rebellion; and in the regiments thus levied he appointed many Roman Catholic officers who had refused to comply with the Test Act. Rather than submit to the gentlest remonstrance, he prorogued parliament, and proceeded to obtain from the court of king's bench a judg- ment in favour of his right to dispense with all penalties due by law, in the same way that his grandfather had appealed to the judges in the matter of the post-nati. But not only was the question put by James II. of far wider import than the question put by James I., but he deprived the court to which he applied of all moral authority by previously turning out of office the judges who were likely to disagree with him, and by appointing new ones who were likely to agree with him. A court of high commission of doubtful legality was subsequently erected (1686) to deprive or suspend clergymen who made themselves obnoxious to the court, whilst James appointed Roman Catholics to the headship of certain colleges at Oxford. The legal support given him by judges of his own selection was fortified by the military support of an army collected at Houns- low Heath; and a Roman Catholic, the earl of Tyrconnel, was sent as lord-deputy to Ireland (1687) to organize a Roman Catholic army on*

which the king might fall back if his English forces proved insufficient for his purpose.

Thus fortified, James issued a declaration of indulgence (1687) granting full religious liberty to all his subjects. The belief, that the grant of liberty to all religions was only intended j ames > s to serve as a cloak for the ascendancy of one, was so declata- strong that the measure roused the opposition of all t'oa otia- those who objected to see the king's will substituted for du, Z«oce. the law, even if they wished to see the Protestant dissenters tolerated. In spite of this opposition, the king thought it possible to obtain a parliamentary sanction for his declaration. The parliament to which he intended to appeal was, however, to be as different a body from the parliament which met in the first year of his reign as the bench of judges which had ap- proved of the dispensing power had been different from the bench which existed at his accession. A large number of the borough members were in those days returned by the corporations, and

the corporations were accordingly changed. But so thoroughly was the spirit of the country roused, that many even of the new corporations were set against James's declaration, and he had therefore to abandon for a time the hope of seeing it accepted even by a packed House of Commons. All, however, that he could do to give it force he did. He ordered the clergy to read

it in all pulpits (1688). Seven bishops, who presented 7rto/o/ a petition asking him to relieve the clergy from the bishops, burthen of proclaiming what they believed to be

illegal, were brought to trial for publishing a seditious libel. Their acquittal by a jury was the first serious blow to the system adopted by the king.

Another event which seemed likely to consolidate his power was in reality the signal of his ruin. The queen bore him a son.

*There was thus no longer a strong probability that 0ˆ1688.°" *-he king would be succeeded at no great distance of*

time by a Protestant heir. Popular incredulity ex- pressed itself in the

assertion that, as James had attempted to gain his ends by means of a packed bench of judges and a packed House of Commons, he had now capped the series of falsifications by the production of a supposititious heir. The leaders of both parties combined to invite the prince of Orange to come to the rescue of the religion and laws of England. He landed on the 5th of November at Brixham. Before he could reach London every class of English society had declared in his favour. James was deserted even by his army. He fled to France, and a con- vention parliament, summoned without the royal writ, declared that his flight was equivalent to abdication, and offered the crown in joint sovereignty to William and Mary (1689).

IX. The Revolution and the Age of Anne

(1680-1714)

The Revolution, as it was called, was more than a mere change of sovereigns. It finally transferred the ultimate decision in William t ˆ le state from the king to parliament. What parlia- ///. and ment had been in the 1 5th century with the House of Mary //., Lords predominating, that parliament was to be again in the end of the 17th century with the House of Commons predominating. That House of Commons was far from resting on a wide basis of popular suffrage. The county voters were the freeholders; but in the towns, with some important exceptions, the electors were the richer inhabitants who formed the corporations of the boroughs, or a body of select householders more or less under the control of some neighbour- ing landowner. A House so chosen was an aristocratic body, but it was aristocratic in a far wider sense than the House of Lords was aristocratic. The trading and legal classes found their representation there by the side of the great owners of land. The House drew its strength from its position as a true represent- ative of the effective strength of the nation in its social and economical organization.

Such was the body which firmly grasped the control over every branch of the administration. Limiting in the Bill of Rights the powers assumed by the crown, the Commons declared that the king could not keep a standing army in time of peace without consent of parliament; and they made that consent effectual, as far as legislation could go, by passing a Mutiny Act year by year for twelve months only, so as to prevent the crown from exercising military discipline without their authority. Behind these legal contrivances stood the fact that the army was or- ganized in the same way as the nation was organized, being officered by gentlemen who had no

desire to overthrow a con- stitution through which the class from which they sprung con- trolled the government. Strengthened by the cessation of any fear of military violence, the Commons placed the crown in financial dependence on themselves by granting a large part of the revenue only for a limited term of years, and by putting strictly in force their right of appropriating that revenue to special branches of expenditure.

Such a revolution might have ended in the substitution of the despotism of a class for the despotism of a man. Many causes combined to prevent this result. The landowners, who formed

the majority of the House, were not elected directly, as was the case with the nobility of the French states-general, by their own class, but by electors who, though generally loyal to them, would have broken off from them if they had attempted to make themselves masters of their fellow citizens. Causesin No less important was the almost absolute inde- liberty. pendence of the judges, begun at the beginning of the reign, by the grant of office to them during good behaviour instead of during the king's pleasure, and finally secured by the clause in the Act of Settlement in 1701, which protected them against dismissal except on the joint address of both Houses of Parliament. Such an improvement, however, finds its full counterpart in another great step already taken. The more representative a government becomes, the more necessary it is for the well-being of the nation that the expression of individual thought should be free in every direction. If it is not so, the government is inclined to proscribe unpopular opinion, and to forget that new opinions by which the greatest benefits arc likely to be conferred are certain at first to be entertained by a very few, and are quite certain to be unpopular as soon as they come into collision with the opinions of the majority. In the middle ages the benefits of the liberation of thought from state control had been secured by the antagonism between church and state. The Tudor sovereigns had rightfully asserted the principle that in a well-ordered nation only one supreme power can be allowed to exist; but in so doing they had enslaved religion. It was fortunate that, just at the moment when parliamentary control was established over the state, circumstances should have arisen which made the majority ready to restore to the individual conscience that supremacy over religion which the medieval ecclesiastics had claimed for the corporation of the universal ■church. Dissenters had, in the main, stood shoulder to shoulder with churchmen in rejecting the suspicious benefits of James, and both gratitude and policy forbade the thought of replacing them under the heavy yoke which had been imposed on them at the Restoration. The exact mode in which relief

should be afforded was still an open question. The idea prevalent with the more liberal minds amongst the clergy was that of comprehension — that is to say, of so modifying the prayers and ceremonies of the church as to enable the dissenters cheerfully to enter in. The scheme was one which had approved itself to minds of the highest order — to Sir Thomas More, to Bacon, to Hales and to Jeremy Taylor. It is one which, as long as beliefs are not very divergent, keeps up a sense of brotherhood overruling the diversity of opinion. It broke down, as it always will break down in practice, whenever the difference of belief is so strongly felt as to seek earnestly to embody itself in diversity of outward practice. The greater part of the clergy of the church felt that to surrender their accustomed formularies was to surrender somewhat of the belief which those formularies signified, while the dissenting clergy were equally reluctant to adopt the common prayer book even in a modified form. Hence the Toleration Act, which guaranteed the right of separate ™® assemblies for worship outside the pale of the church, Act.™ °" though it embodied the principles of Cromwell and Milton, and not those of Chillingworth and Hales, was carried without difficulty, whilst the proposed scheme of comprehension never had a chance of success (1689). The choice was one which posterity can heartily approve. However wide the limits of toleration be drawn, there will always be those who will be left outside. By religious liberty those inside gain as much as those who are without. From the moment of the passing of the Toleration Act, no Protestant in England performed any act of worship except by his own free and deliberate choice. The literary spokesman of the new system was Locke. His Letters concerning Toleration laid down the principle which had been maintained by Cromwell, with a wider application than was possible in days when the state was in the hands of a mere minority only able to maintain itself in power by constant and suspicious vigilance.

One measure remained to place the dissenters in the position of full membership of the state. The Test Act excluded them from

Liberty of the press.

office. But the memory of the high-handed proceedings of Puritan

rulers was still too recent to allow Englishmen to run the risk of a reimposition of their yoke, and this feeling, fanciful as it was, was sufficient to keep the Test Act in force for years to come.

The complement of the Toleration Act was the abolition of the censorship of the press (1695). The ideas of the author of the Areopagitica had at last prevailed. The attempt to fix certain opinions on the nation which were pleasing to those in power was abandoned by king and parlia- ment alike. The nation, or at least so much of it as cared to read books or pamphlets on political subjects, was acknowledged to be the supreme judge, which must therefore be allowed to listen to what counsellors it pleased.

This new position of the nation made itself felt in various ways. It was William's merit that, fond as he was of power, he recog- nized the fact that he could not rule except so far as he carried the goodwill of the nation with him. No doubt he was helped to an intelligent perception of the new situation by the fact that, as a foreigner, he cared far more for carrying on war successfully against France than for influencing the domestic legislation of a country which was not his own, and by the knowledge that the conduct of the struggle which lasted till he was able to treat with France on equal terms at Ryswick (1697) was fairly trusted to his hands. Nevertheless these years of war called for the united action of a national government, and in seeking to gain this support for himself, he hit upon an expedient which opened a new era in constitutional politics.

The supremacy of the House of Commons would have been an evil of no common magnitude, if it had made government Beginning impossible. Yet this was precisely what it threatened of cabinet to do. Sometimes the dominant party in the House govern- pressed with unscrupulous rancour upon its opponents. Sometimes the majority shifted from side to side as the House was influenced by passing gusts of passion or sym- pathy, so that, as it was said at the time, no man could foretell one day what the House would be pleased to do on the next. Against the first of these dangers William was to a great extent able to guard by the exercise of his right of dissolution, so as to appeal to the constituencies, which did not always share in the the passions of their representatives. But the second danger could not be met in this way. The only cure for waywardness is responsibility, and not only was this precisely what the Commons had not learned to feel, but it was that which it was impossible to make them feel directly. A body composed of several hundred members cannot carry on government with the requisite steadiness of action and clearness

of insight. Such work can only fitly be entrusted to a few. and whenever difficult circumstances arise it is necessary that the action of those few be kept in harmony by the predominance of one. The scheme on which William hit, by the advice of the earl of Sunderland, was that which has since been known as cabinet government. He selected as his ministers the leading members of the two Houses who had the confidence of the majority of the House of Commons. In this way, the majority felt an interest in support- ing the men who embodied their own opinions, and fell in turn under the influence of those who held them with greater prudence or ability than fell to the lot of the average members of the House. All that William doubtless intended was to acquire a ready instrument to enable him to carry on the war with success. In reality he had refounded, on a new basis, the government of England. His own personal qualities were such that he was able to dominate over any set of ministers; but the time would come when there would be a sovereign of inferior powers. Then the body of ministers would step into his place. The old rude • arrangements of the middle ages had provided by frequent de- positions that an inefficient sovereign should cease to rule, and those arrangements had been imitated in the cases of Charles I. and James II. Still the claim to rule had, at least from the time of Henry III., been derived from hereditary descent, and the interruption, however frequently it might occur, had been re- garded as something abnormal, only to be applied where there

was an absolute necessity to prevent the wielder of executive authority from setting at defiance the determined purpose of the nation. After the Revolution not only had the king's title been so changed as to make him more directly than ever dependent on the nation, but he now called into existence a body which derived its own strength from its conformity with the wishes of the representatives of the nation.

For the moment it seemed to be but a temporary expedient. When the war came to an end, the Whig party which had sus- tained William in his struggle with France split up. The domi- nant feeling of the House of Commons was no longer the desire to support the crown against a foreign enemy, but to make government as cheap as possible, leaving future dangers to the chances of the future. William had not so understood the new invention of a united ministry as binding him to take into his service a united ministry of men whom he regarded as fools and knaves. He allowed the Commons to reduce the army to a skeleton, to question his actions, and to treat him as if he were a cipher. But it was only by slow degrees that he was brought

to acknowledge the necessity of choosing his ministers from amongst the men who had done these things.

The time came when he needed again the support of the nation. The death of Charles II., the heirless king of the huge Spanish monarchy, had long been expected. Since Tne the peace of Ryswick, William and Louis XIV. had Spanish come to terms by two successive partition treaties for succes- a division of those vast territories in such a way that s "°"' the whole of them should not fall into the hands of a near relation either of the king of France or of the emperor, the head of the house of Austria. When the king of Spain actually died in 1700, William seemed to have no authority in England whatever; and Louis was therefore encouraged to break his engagements, and to accept the whole of the Spanish inheritance for his grandson, who became Philip V. of Spain. William saw clearly that such predominance of France in Europe would lead to the development of pretensions unbearable to other states. But the House of Commons did not see it, even when the Dutch garrisons were driven by French troops out of the posts in the Spanish Netherlands which they had occupied for many years (1 701) .

William had prudently done all that he could to conciliate the Tory majority. In the preceding year (1700) he had given office to a Tory ministry, and he now (1701) gave Lis assent to the Act of Settlement, which secured the T t A ,

. , . . , „ , . . of Settle-

succession of the crown to the electress Sophia of ment. Hanover, daughter of Tames I.'s daughter Elizabeth, to the exclusion of all Roman Catholic claimants, though it imposed several fresh restrictions on the prerogative. William was indeed wise in keeping his feelings under control. The country sympathized with him more than the Commons did, and when the House imprisoned the gentlemen deputed by the freeholders of Kent to present a petition asking that its loyal addresses might be turned into bills of supply, it simply adver- tised its weakness to the whole country.

The reception of this Kentish petition was but a foretaste of the discrepancy between the Commons and the nation, which was to prove the marked feature of the middle of the century now opening. For the present the House Ant aace , was ready to give way. It requested the king to enter into alliance with the Dutch. William went yet further in the direction in which he was urged. He formed an alliance with the emperor, as well as with the Netherlands, to

prevent the union of the crowns of France and Spain, and to compel France to evacuate the Netherlands. An unexpected event came to give him all the strength he needed. James II. died, and Louis acknowledged his son as the rightful king of England. English- men of both parties were stung to indignation by the insult. William dissolved parliament, and the new House of Commons, Tory as it was by a small majority, was eager to support the king. It voted men and money according to his wishes. Eng- land was to be the soul of the Grand Alliance against France. But before a blow was struck William was thrown from his horse. He died on the 8th of March 1702. " The man," as Burke said

of him, " was dead, but the Grand Alliance survived in which King William lived and reigned."

Upon the accession of Anne, war was at once begun. The Grand Alliance became, as William would have wished, a league to wrest the whole of the Spanish dominions from Queen Philip, in favour of the Austrian archduke Charles. 1702-1714. It f° un(l a chief of supreme military and diplomatic genius in the duke of Marlborough. His victory at Blenheim (1704) drove the French out of Germany. His victory of Ramillies (1706) drove them out of the Netherlands. In Spain, Gibraltar was captured by Rooke (1704) and Barcelona by Peterborough (1705). Prince Eugene relieved Turin from a French siege, and followed up the blow by driving the besiegers out of Italy.

The influence of Marlborough at home was the result partly of the prestige of his victories, partly of the dominating influence of his strong-minded duchess (" Mrs Freeman ") over the queen (see Anne, queen of England). The duke cared little for home politics in themselves; but he had his own ends, both public and private, to serve, and at first gave his support to the Tories, whose church policy was regarded with favour by the queen. Their efforts were directed towards the restriction of theToleration Act within narrow limits. Many dissenters had evaded the Test Act by partaking of the communion in a church, though they subsequently attended their own chapels. An Occasional .Con- formity Bill, imposing penalties on those who adopted this practice, twice passed the Commons (1702, 1703), but was re- jected by the House of Lords, in which the Whig

element pre- dominated. The church was served in a nobler manner in 1704 by the abandonment of first-fruits and tenths by the queen for the purpose of raising the pittances of the poorer Ua . l ? a clergy (see Queen Anne's Bounty). In 1707 apiece Scotland. ˚f legislation of the highest value was carried to a successful end. The Act of Union, passed in the parliaments of England and Scotland, joined the legislatures of the two kingdoms and the nations themselves in an indissoluble bond.

The ministry in office at the time of the passing of the Act of Union had suffered important changes since the commence- ment of the reign. The Tories had never been as u""' earnest in the prosecution of the war as the Whigs; ministry. an ˆ Marlborough, who cared above all things for the furtherance of the war, gradually replaced Tories by Whigs in the ministry. His intention was doubtless to conciliate both parties by admitting them both to a share of power; but the Whigs were determined to have all or none, and in 1708 a purely Whig ministry was formed to support the war as the first purely Whig ministry had supported it in the reign of William. The years of its power were the years of the victories of Oude- narde (1708) and of Malplaquet (1709), bringing with them the entire ruin of the military power of Louis XIV.*

Such successes, if they were not embraced in the spirit of moderation, boded no good to the Whigs. It was known that even before the last battle Louis had been ready to abandon the cause of his grandson, and that his offers had been rejected because he would not consent to join the allies in turning him out of Spain. A belief spread in England that Marlborough wished the endless prolongation of the war for his own selfish ends. Spain was far away, and, if the Netherlands were safe, enough had been done for the interests of England. The Whigs were charged with refusing to make peace when an honourable and satisfactory peace was not beyond their reach.

As soon as the demand for a vigorous prosecution of the war relaxed, the Whigs could but rely on their domestic policy, in which they were strongest in the eyes of posterity but weakest in the eyes of contemporaries. It was known that they looked for the principle on which the queen's throne rested to the national act of the Revolution, rather than to the birth of the sovereign as the daughter of James II., whilst popular feeling preferred, however inconsistently, to attach itself to some frag- ment of hereditary right. What was of greater consequence was, that it was known that they were the friends of the dissenters,

and that their leaders, if they could have had their way, would not only have maintained the Toleration Act, but would also have repealed the Test Act. In 1709 a sermon preached by Dr Sacheverell (q.v.) denounced toleration and the right of resistance in tones worthy of the first days of the Restoration. Foolish as the sermon was, it was but the reflection of folly which was widely spread amongst the rude and less educated classes. The Whig leaders unwisely took up the challenge and impeached Sacheverell. The Lords condemned the man, but they condemned him to an easy sentence. His trial was the signal for riot. Dissenting chapels were sacked to the cry of High Church and Sacheverell. The queen, who ministry. had personal reasons for disliking the Whigs, dis- missed them from office (1710), and a Tory House of Commons was elected amidst the excitement to support the Tory ministry of Harley and St John.

After some hesitation the new ministry made peace with France, and the treaty of Utrecht (1713), stipulating for the permanent separation of the crowns of France and Spain, and assigning Milan, Naples and the Spanish utrecbt. Netherlands to the Austrian claimant, accomplished all that could reasonably be desired, though the abandonment to the vengeance of the Spanish government of her Catalan allies, and the base desertion of her continental confederates on the very field of action, brought dishonour on the good name of England. The Commons gladly welcomed the cessa- tion of the war. The approval of the Lords had been secured by the creation of twelve Tory peers. In home politics the new ministry was in danger of being carried away by its more violent supporters. St John, now Viscount Bolingbroke, with un- scrupulous audacity placed himself at their head. The Occasional Conformity Bill was at last carried (1711). £ %, S ‘”” U To it was added the Schism Act (17 14), forbidding formlty dissenters to keep schools or engage in tuition. Boling- Act an * broke went still farther. He engaged in an intrigue t ˆ Schlsm for bringing over the Pretender to succeed the queen upon her death. This wild conduct alienated the moderate Tories, who, much as they wished to see the throne occupied by the heir of the ancient line, could not bring themselves to consent to its occupation by a Roman Catholic prince. Such men, therefore, when Anne died (1714) joined the Whigs in proclaiming the elector of Hanover king as George I.*

X. The Hanoverian Kings (1714-1793) The accession of George I. brought with it the predominance of the Whigs. They had on their side the royal power, the greater part of the aristocracy, the dissenters and the Accession higher trading and commercial classes. The Tories otthe appealed to the dislike of dissenters prevalent

amongst House of the country gentlemen and the country clergy, and ” nover – to the jealousy felt by the agricultural classes towards those who enriched themselves by trade. Such a feeling, if it was aroused by irritating legislation, might very probably turn to the advantage of the exiled house, especially as the majority of Englishmen were to be found on the Tory side. It was there- fore advisable that government should content itself with as little action as possible, in order to give time for old habits to wear themselves out. The landing of the Pretender in Scotland (17 1 5), and the defeat of a portion of his army which had ad- vanced to Preston — a defeat which was the consequence of the apathy of his English supporters, and which was followed by the complete suppression of the rebellion — gave increased strength to the Whig government. But they were reluctant to face an immediate dissolution, and the Septennial Act was passed (17 16) to extend to seven years the duration of parliaments, which had been fixed at three years by ˆccas/onal the Triennial Act of William and Mary. Under General Conform- Stanhope an effort was made to draw legislation in a Hy Act and more liberal direction. The Occasional Conformity ˆ lsm Act and the Schism Act were repealed (1719); but the majorities on the side of the government were unusually small, and Stanhope, who would willingly have repealed the

Test Act so far as it related to dissenters, was compelled to abandon the project as entirely impracticable. The Peerage Bill, introduced at the same time to limit the royal power of creating peers, was happily thrown out in the Commons. It was proposed, partly from a desire to guard the Lords against such a sudden increase of their numbers as had been forced on them when the treaty of Utrecht was under discussion, and partly to secure the Whigs in office against any change in the royal councils in a succeeding reign. It was in fact conceived by men who valued the immediate victory of their principles more than they trusted to the general good sense of the nation. The Lords were at this time, as a matter of fact, not merely wealthier but wiser than the Commons; and it is no wonder that, in days when the Commons, by passing the Septennial Act, had shown their distrust of their own constituents, the peers should show, by the Peerage Bill, their distrust of that House which was elected by those constituencies. Nevertheless, the remedy was worse than the disease,

for it would have estab- lished a close oligarchy, bound sooner or later to come into conflict with the will of the nation, and only to be overthrown by a violent alteration of the constitution.

The excitement following on the bursting of the South Sea Bubble (q.v.), and the death or ruin of the leading ministers, brought Sir Robert Walpole to the front (1721). As ministry? a man °^ busmess when men of business were few in the House of Commons, he was eminently fit to manage the affairs of the country. But he owed his long con- tinuance in office especially to his sagacity. He clearly saw, what Stanhope had failed to see, that the mass of the nation was not fitted as yet to interest itself wisely in affairs of government, and that therefore the rule must be kept in the hands of the upper classes. But he was too sensible to adopt the coarse expedient which had commended itself to Stanhope, and he preferred humouring the masses \o contradicting them.

The struggle of the preceding century had left its mark in every direction on the national development. Out of the reaction against Puritanism had come . a widely-spread relaxation of morals, and also, as far as the educated class was concerned, an eagerness for the discussion of all social and religious problems. The fierce excitement of political life had quickened thought, and the most anciently received doctrines were held of little ■vorth until they were brought to the test of reason. It was a time when the pen was more powerful than the sword, when a secretary of state would treat with condescension a Witty pamphleteer, and when such a pamphleteer might hope, not in vain, to become a secretary of state.

It was in this world of reason and literature that the Whigs of the Peerage Bill moved. Walpole perceived that there was another world which understood none of these things. With cynical insight he discovered that a great government cannot rest on a clique, however distinguished. If the mass of the nation was not conscious of political wants, it was conscious of material wants. The merchant needed protection for his trade; the voters gladly welcomed election days as bringing guineas to their pockets. Members of parliament were ready to sell their votes for places, for pensions, for actual money. The system was not new, as Danby is credited with the discovery that a vote in the House of Commons might be purchased. But with Walpole it reached its height.

Such a system was possible because the House of Commons was not really accountable to its constituents. The votes of its members were not published, and still less were their speeches made known. Such a

silence could only be maintained around the House when there was little interest in its proceedings. The great questions of religion and taxation which had agitated the country under the Stuarts were now fairly settled. To re- awaken those questions in any shape would be dangerous. Walpole took good care never to repeat the mistake of the Sacheverell trial. When on one occasion he was led into the proposal of an unpopular excise he at once drew back. England in his days was growing rich. Englishmen were bluff and inde- pendent, in their ways often coarse and unmannerly. Their life

was the life depicted on the canvas of Hogarth and the pages of Fielding. All high imagination, all devotion to the public weal, seemed laid asleep. But the political instinct was not dead, and it would one day express itself for better ends than an agitation against an excise bill or an outcry for a popular war. A government could no longer employ its powers for direct oppression. In his own house and in his own conscience, every Englishman, as far as the government was concerned, was the master of his destiny. By and by the idea would dawn on the nation that anarchy is as productive of evil as tyranny, and that a government which omits to regulate or control allows the strong to oppress the weak, and the rich to oppress the poor.

Walpole's administration lasted long enough to give room for some feeble expression of this feeling. When George I. was succeeded by George II. (1727), Walpole remained in power. His eagerness for the possession of that power fr?S? e U ' which he desired to use for his country's good, together 1760. with the incapacity of two kings born and bred in a foreign country to take a leading part in English affairs, completed the change which had been effected when William first entrusted the conduct of government to a united cabinet'. There was now for the first time a prime minister in England, a person who was himself a subject imposing harmonious action on the cabinet. The change was so gradually and silently effected that it is difficult to realize its full importance. So far, indeed, as it only came about through the incapacity of the first two kings of the house of Hanover, it might be undone, and was in fact to a great extent undone by a more active successor. But so far as it was the result of general tendencies, it could never be obliterated. In the ministries in which Somers and Montagu on the one hand and Harley and St John on the other had taken part, there was no prime minister except so far as one member of the adminis- tration dominated over his colleagues by the force of character and intelligence. In the reign of George III.,

even North and Addington were universally acknowledged by that title, though they had little claim to the independence of action of a Walpole or a Pitt.

The change was, in fact, one of the most important of those by which the English constitution has been altered from an hereditary monarchy with a parliamentary regulative agency to a parliamentary government with an hereditary regulative agency. In Walpole's time the forms of the constitution had become, in all essential particulars, what they are now. What was wanting was a national force behind them to set them to their proper work.

The growing opposition which finally drove Walpole from power was not entirely without a nobler element than could be furnished by personal rivalry, or ignorant distrust of commercial and financial success. It was well that S M oa ? complaints that a great country ought not to be governed by patronage and bribery should be raised, although, as subsequent experience showed, the causes which rendered corruption inevitable were not to be removed by the expulsion of Walpole from office. But for one error, indeed, it is probable that Walpole's rule would have been still further prolonged. In 1739 a popular excitement arose for a declaration of war against Spain. Walpole believed that war spaing to be certainly unjust, and likely to be disastrous. He had, however, been so accustomed to give way to popular pressure that he did not perceive the difference between a wise and timely determination to leave a right action undone in the face of insuperable difficulties, and an unwise and cowardly determination to do that which he believed to be wrong and imprudent . If he had now resigned rather than demean himself by acting against his conscience, it is by no means unlikely that he would have been recalled to power before many years were over. As it was, the failures of the war recoiled on his own head, and in 1742 his long ministry came to an end.

After a short interval a successor was found in Henry Pelham. All the ordinary arts of corruption which Walpole had practised were continued, and to them were added arts of corruption

which Walpole had disdained to practise. He at least under- stood that there were certain principles in accordance with which

he wished to conduct public affairs, and he had driven Ministry co lleague after colleague out of office rather than allow "pelham. them to distract his method of government. Pelham

and his brother, the Thomas Pelham, duke of Newcastle, had no principles of government whatever. They offered place to every man of parliamentary skill or influence. There was no opposition, because the ministers never attempted to do anything which would arouse opposition, and because they were ready to do anything called for by any one who had power enough to make himself dangerous; and in 1743 they embarked on a useless war with France in order to please the king, who saw in every commotion on the continent of Europe some danger to his beloved Hanover.

At most times in the history of England such a ministry would have been driven from office by the outcry of an offended

people. In the days of the Pelhams, government was Z h f „, regarded as lying too far outside the all-important

Rebellion ? . \ °, . .. , .; ..

otiT4S. private interests of the community to make it worth v/hile to make any effort to rescue it from the degrada- tion into which it had fallen; yet the Pelhams had not been long in power before this serene belief that the country could get on very well without a government in any real sense of the word was put to the test. In 1745 Charles Edward, the son of the Pretender, landed in Scotland. He was followed by many of the Highland clans, always ready to draw the sword against the constituted authorities of the Lowlands; and even in the Lowlands, and especially in Edinburgh, he found ad- herents, who still felt the sting inflicted by the suppression of the national independence of Scotland. The British army was in as chaotic a condition as the British government, and Charles Edward inflicted a complete defeat on a force which met him at Prestonpans. Before the end of the year the victor, at the head of 5000 men, had advanced to Derby. But he found no support in England, and the mere numbers brought against him compelled him to retreat, to find defeat at Culloden in the following year (1 746) . The war on the continent had been waged with indifferent success. The victory of Dettingen (1743) and the glorious defeat of Fontenoy (1745) had achieved no objects worthy of English intervention, and the peace of Aix-la-

Chapelle put an end in 1748 to hostilities which should never have been begun. The government pursued its inglorious career as long as Henry Pelham lived. He had at least some share in the finan- cial ability of Walpole, and it was not till lie died in 1754 that the real difficulties of a system which was based on the avoidance of difficulties had fairly to be faced.

The change which was needed was not any mere re-adjustment of the political machine. Those who cared for religion or morality Moral and na ˆ forgotten that man is an imaginative and emotional religious being. Defenders of Christianity and of deism alike atmo- appealed to the reason alone. Enthusiasm was treated sphere. as a ˆ \y r a crime, and earnestness of every kind was branded with the name of enthusiasm. The higher order of minds dwelt with preference upon the beneficent wisdom of the Creator. The lower order of minds treated religion as a kind of life assurance against the inconvenience of eternal death. Upon such a system as this human nature was certain to revenge Wesfey itself. The preaching of Wesley and Whitefield and appealed direct to the emotions, with its doctrine of

White- " conversion," and called upon each individual not neld ' to understand, or to admire, or to act, but vividly

to realize the love and mercy of God. In all this there was nothing new. What was new was that Wesley added an organi- zation, Methodism (q.v.), in which each of his followers unfolded to one another the secrets of their heart, and became accountable to his fellows. Large as the numbers of the Methodists ultimately became, their influence is not to be measured by their numbers. The double want of the age, the want of spiritual earnestness and the want of organized coherence, would find satisfaction in many ways which would have seemed strange to Wesley, but which were, nevertheless, a continuance of the work which he began.

As far as government was concerned, when Henry Pelham died (1754) the lowest depth of baseness seemed to have been reached. The duke of Newcastle, who succeeded his brother, looked on the work of corruption with absolute fN r ? pleasure, and regarded genius and ability as an castle. awkward interruption of that happy arrangement which made men subservient to flattery and money. Whilst he was in the very act of trying to drive from office all men who were possessed of any sort of ideas, he was surprised by a great war. In America, the French settlers in Canada and the English settlers on the Atlantic coast were falling to blows for the possession of the vast territories drained by the Ohio and its tributaries. In

India, Frenchmen and Englishmen had striven during the last war for authority over the native states round Pondicherry and Madras, and the conflict threatened to break out anew. When war began in earnest, and the reality of danger came home to Englishmen by the capture of Minorca (1756), there arose a demand for a more capable government than any which New- castle could offer. Terrified by the storm of obloquy which he aroused, he fled from office. A government was formed, of which the soul was William Pitt. Pitt was, in some sort, to the political life of Englishmen what Wesley was to their religious life. He brought no new political ideas into their minds, but he ruled them by the force of his character and the example of his purity. His weapons were trust and confidence. He appealed to the patriotism of his fellow-countrymen, to their imaginative love for the national greatness, and he did not appeal in vain. He perceived instinctively that a large number, even of those who took greedily the bribes of Walpole and the Pelhams, took them, not because they loved money better than their country, but because they had no conception that their country had any need of them at all. It was a truth, but it was not the whole truth. The great Whig families rallied under Ministry Newcastle and drove Pitt from office (1757). But if of Pitt Pitt could not govern without Newcastle's corruption, and New- neither could Newcastle govern without Pitt's energy. cas . "' At last a compromise was effected, and Newcastle undertook the work of bribing, whilst Pitt undertook the work of governing (see Chatham, William Pitt, ist earl of).

*The war which had already broken out, the Seven Years' War (1756-1763), was not confined to England alone. By the side of the duel between France and England, a war was going on upon the continent of Europe, in which y** rs f ven Austria — with its allies, France, Russia and the \y ar . German princes — had fallen upon the new king- dom of Prussia and its sovereign Frederick II. England and Prussia therefore necessarily formed an alliance. Different as the two governments were, they were both alike in recogniz- ing, in part at least, the conditions of progress. Even in Pitt's day England, however imperfectly, rested its strength on the popular will. Even in Frederick's day Prussia was ruled by administrators selected for their special knowledge. Neither France nor Austria had any conception of the necessity of ful- filling these requirements. Hence the strength of England and of Prussia. The war seemed to be a mere struggle for terri- tory. There was no feeling in either Pitt or Frederick, such as there was in the men who contended half a century later against Napoleon, that they were fighting the battles of the civilized world. There was something repulsive as well in the enthusiastic nationalism*

of Pitt as in the cynical nationalism of Frederick. Pitt's sole object was to exalt England to a position in which she would fear no rival. But in so doing he exalted that which, in spite of all that had happened, best deserved to be exalted. The habits of individual energy fused together by the inspiration of patriotism conquered Canada. The unintelligent over-regula- tion of the French government could not maintain the colonies which had been founded in happier times. In 1758 Louisburg was taken, and the mouth of the St Lawrence guarded against France. In 1759 Quebec fell before Wolfe, who died at the moment of victory. In the same year the naval victories of Lagos and Quiberon Bay established the supremacy of the British at sea. The battle of Plassey (1757) had laid Bengal at the feet

of Clive; and Coote's victory at Wandiwash (1760) led to the final ruin of the relics of French authority in southern India. When George II. died (1760) England was the first maritime and colonial power in the world (see Seven Years' War; Canada: History; India: History).

In George III. the king once more became an important factor in English politics. From his childhood he had been trained

by his mother and his instructors to regard the break- /"""/?>»> ln & d° wn °f the power of the great families as the task 1820. " °f hi s hf e – I n this he was walking in the same direction

as Pitt. If the two men could have worked together, England might have been spared many misfortunes. Unhappily, the king could not understand Pitt's higher qualities, his bold con- fidence in the popular feeling, and his contempt for corruption and intrigue. And yet the king's authority was indispensable to Pitt, if he was to carry on his conflict against the great families with success. When the war came to an end, as it must come to an end sooner or later, Pitt's special predominance, derived as it was from his power of breathing a martial spirit into the fleets and armies of England, would come to an end too. Only the king, with his hold upon the traditional instincts of loyalty and the force of his still unimpaired prerogative, could, in ordinary times, hold head against the wealthy and influential aristocracy. Unfortunately, George III. was not wise enough to deal

with the difficulty in a high-minded fashion. With a well-intentioned but narrow mind, he had nothing in him to strike the imagination of his subjects. He met influence with influence, corruption with corruption, intrigue with intrigue. Unhappily, too, his earliest relations with Pitt involved a dispute on a point on which he

was right and Pitt was wrong. In 1761 Pitt resigned sizaatlo'a omce > because neither the king nor the cabinet were

willing to declare war against Spain in the midst of the war with France. As the war with Spain was inevitable, and as, when it broke out in the following year (1762), it was followed by triumphs for which Pitt had prepared the way, the prescience of the great war-minister appeared to be fully established. But it was his love of war, not his skill in carrying it on, which was really in question. He would be satisfied with nothing short of the absolute ruin of France. He would have given England that dangerous position of supremacy which was gained for France by Louis XIV. in the 17th century, and by Napoleon in the 19th century. He would have made his country still more haughty and arrogant than it was, till other nations rose against it, as they have three times risen against France, rather than submit to the intolerable yoke. It was a happy thing for England that peace was signed (1763).

Even as it was, a spirit of contemptuous disregard of the rights of others had been roused, which would not be easily allayed.

The king's premature attempt to secure a prime OrenW/fe. mm i s t er of his own choosing in Lord Bute (1761)

came to an end through the minister's incapacity (1763). George Grenville, who followed him, kept the king in leading strings in reliance upon his parliamentary majority. Something, no doubt, had been accomplished by the incorrupti- bility of Pitt. The practice of bribing members of parliament by actual presents in money came to an end, though the practice of bribing them by place and pension long continued. The arrogance which Pitt displayed towards foreign nations was displayed by Grenville towards classes of the population of the British dominions. It was enough for him to establish a right. He never put himself in the position of those who were to suffer by its being put in force.

The first to suffer from Grenville's conception of his duty were the American colonies. The mercantile system, which had

sprung up in Spain in the 16th century, held that Ttte colonies were to be entirely prohibited from trading,

co/oates." exce Pt w i tn tri e mother country. Every European

country had adopted this view, and the acquisition of fresh colonial dominions by England, at the peace of 1763, had been made not so much through lust of empire as through love of trade. Of all English colonies, the American were the most populous and important. Their proximity to the Spanish

colonies in the West Indies had naturally led to a contraband trade. To this trade Grenville put a stop, as far as lay in his power. Obnoxious as this measure was in America, the colonists had acknowledged the principle on which it was founded too long to make it easy to resist it. Another step of Grenville's met with more open opposition. Even with all the experience of the century which followed, the relations between a mother country and her colonies are not easy to arrange. If the burthen of defence is to be borne in common, it can hardly be left to the mother country to declare war, and to exact the necessary taxation, without the consent of the colonies. If, on the other hand, it is to be borne by the mother country alone, she may well complain that she is left to bear more than her due share of the weight. The latter alternative forced itself upon the attention of Grenville. The British parliament, he held, was the supreme legislature, and, as such, was entitled to raise taxes in America to support the military forces needed for the defence of America. The act (1765) imposing a stamp tax on the American colonies was the result.

As might have been expected, the Americans resisted. For them, the question was precisely that which Hampden had fought out in the case of ship-money. As far as they were concerned, the British parliament had stepped The Rock- into the position of Charles I. If Grenville had re- /nis/. mained in office he would probably have persisted in his resolution. He was driven from his post by the king's resolve no longer to submit to his insolence, and a new ministry was formed under the marquess of Rockingham, composed of some of those leaders of the Whig aristocracy who had not followed the Grenville ministry. They were well-intentioned, but weak, and without political ability; and the king regarded them with distrust, only qualified by his abhorrence of the ministry which they superseded.

As soon as the bad news came from America, the ministry was placed

between two recommendations. Grenville, on the one hand, advised that the tax should be enforced. _, „

The D& m

Pitt, on the other, declared that the British parliament claratory had absolutely no right to tax America, though he Act ana held that it had the right to regulate, or in other words ™ pea/ ot to tax, the commerce of America for the benefit of the A ˆ t British merchant and manufacturer. Between the two the government took a middle course. It obtained from parliament a total repeal of the Stamp Act, but it also passed a Declaratory Act, claiming for the British parliament the supreme power over the colonies in matters of taxation, as well as in matters of legislation.

It is possible that the course thus adopted was chosen simply because it was a middle course. But it was probably suggested by Edmund Burke, who was then Lord Rockingham's private secretary, but who for some time to come was Bu ˆfl s , to furnish thought to the party to which he attached theory. himself. Burke carried into the world of theory those politics of expediency of which Walpole had been the practical originator. He held that questions of abstract right had no place in politics. It was therefore as absurd to argue with Pitt that England had a right to regulate commerce, as it was toargue with Grenville that England had a right to levy taxes. All that could be said was, that it was expedient in a widespread empire that the power of final decision should be lodged somewhere, and that it was also expedient not to use that power in such a way as to irritate those whom it was the truest wisdom to conciliate.

The weak side of this view was the weak side of all Burke's political philosophy. Like all great innovators, he was intensely conservative where he was not an advocate of change. Argu , With new views on every subject relating to the pS? u 9 exercise of power, he shrank even from entertaining the Burke. slightest question relating to the distribution of power. He recommended to the British parliament the most self-deny- ing wisdom, but he could not see that in its relation to the colonies the British parliament was so constituted as to make it entirely unprepared to be either wise or self-denying. It is true that if*

he had thought out the matter in this direction, he would have been led further than he or any other man in England or America was at that time prepared to go. If the British parliament was unfit to legislate for America, and if, as was undoubtedly the case, it was impossible to create a representative body which was fit to legislate, it would follow that the American colonies could only be fairly governed as practically independent states, though they might possibly remain, like the great colonies of our own day, in a position of alliance rather than of dependence. It was because the issues opened led to changes so far greater than the wisest statesman then perceived, that Pitt's solution, logically untenable as it was, was preferable to Burke's. Pitt would have given bad reasons for going a step in the right direction. Burke gave excellent reasons why those who were certain to go wrong should have the power to go right.

Scarcely were the measures relating to America passed when the king turned out the ministry. The new ministry was formed by Pitt, who was created earl of Chatham (1766), Ministry on tne p rmc ipi e f bringing, together men who had Chatham, shaken themselves loose from any of the different Whig cliques. Whatever chance the plan had of succeeding was at an end when Chatham's mind temporarily gave way under stress of disease (1767). Charles Townshend, a brilliant, headstrong man, led parliament in the way which had been prepared by the Declaratory Act, and laid duties on tea and other articles of commerce entering the ports of America.

It was impossible that the position thus claimed by the British parliament towards America should affect America alone. The habit of obtaining money otherwise than by the consent of those who are required to pay it would be certain to make parliament careless of the feelings and interests of that great majority of the population at home, which was un- represented in parliament. The resistance of America to the taxation imposed was therefore not without benefit to the people of the mother country. Already there were signs of a readiness in parliament to treat even the constituencies with contempt. Wilkes I n I 7ˆ>3> m tne days of the Grenville ministry, John and "The Wilkes, a profligate and scurrilous writer, had been North ˆ arrested on a general warrant — that is to say, a warrant Briton. – n wn j cn tne name of no individual was mentioned — as the author of an alleged libel on the king, contained in No. 45 of The North Briton. He was a member of parliament, and as such was declared by Chief Justice Pratt to be privileged against arrest. In 1768 he was elected member for Middlesex. The House of Commons

expelled him. He was again elected, and again expelled. The third time, the Commons gave the seat to which Wilkes was a third time chosen to Colonel Luttrell, who was far down in the poll. Wilkes thus became the representative of a great constitutional principle, the principle that the electors have a right to choose their representatives without restriction, save by the regulations of the law.

For the present the contention of the American colonists and of the defenders of Wilkes at home was confined within the compass of the law. Yet in both cases it might easily pass beyond that compass, and might rest itself upon an appeal to the duty of governments to modify the law, and to enlarge the basis of their authority, when law and authority have become too narrow.

As regards America, though Townshend died, the government persisted in his policy. As resistance grew stronger in America, the king urged the use of compulsion. If he had not I f9 rd , the wisdom of the country on his side, he had its ministry, prejudices. The arrogant spirit of Englishmen made them comtemptuous towards the colonists, and the desire to thrust taxation upon others than themselves made the new colonial legislation popular. In 1770 the king made Lord North prime minister. He had won the object on which he had set his heart. A new Tory party had sprung up, not distinguished, like the Tories of Queen Anne's reign, by a special ecclesiastical policy, but by their acceptance of the king's claim to nominate ministers, and so to predominate in the ministry himself.

Unhappily the opposition, united in (he desire to conciliate America, was divided on questions of home policy. Chatham

would have met the new danger by parliamentary reform, giving increased voting power to the freeholders of the counties. Burke from principle, and his noble patrons mainly from lower motives, were opposed to any such change. As Burke had wished the British parliament to be supreme over the colonies, in con- fidence that this supremacy would not be abused, so he wished the great landowning connexion resting on the rotten boroughs to ruie over the unrepresented people, in confidence that this power would not be abused. Amid these distractions the king had an easy game to play. He had all the patronage of the government in his hands, and beyond the circle which was influenced by gifts of patronage, he could appeal to the ignorance and self-seeking of the nation, with which, though he knew it not, he was himself in the closest sympathy.

No wonder resistance grew more vigorous in America. In 1773 the

inhabitants of Boston threw ship-loads of tea into the harbour rather than pay the obnoxious duty. In 1 7 74 Tne the Boston Port Bill deprived Boston of its commercial American rights, whilst the Massachusetts Government Bill took War ot away from that colony the ordinary political liberties °^ e p ‘ of Englishmen. The first skirmish of the inevitable war was fought at Lexington in 1775. In 1776 the thirteen colonies united in the continental congress issued their Declara- tion of Independence. England put forth all its strength to beat down resistance; but the task, which seemed easy at a distance, ‘ proved impossible. It might have been so even had the war been conducted on the British side with greater military skill and with more insight into the conditions of the struggle, which was essentially a civil contest between men of the same race. But the initial difficulties of the vast field of operations were greatly increased by the want of skill of the British leaders in adapting themselves to new conditions, while even loyalist sentiment was shocked by the employment of German mer- cenaries and Red Indian savages against men of English blood. Even so, the issue of the struggle was for long doubtful, and there were moments when it might have ended by a policy of wise concession; but the Americans, though reduced at times to desperate straits, had the advantage of fighting in their own country, and above all they found in George Washington a leader after the model of the English country gentleman who had up- held the standard of liberty against the Stuarts, and worthy of the great cause for which they fought. In 1777 a British army under Burgoyne capitulated at Saratoga; and early in 1778 France, eager to revenge the disasters of the Seven Years’ War, formed an alliance with the revolted colonies as free and inde- pendent states, and was soon joined by Spain.

Chatham, who was ready to make any concession to America short of independence, and especially of independence at the dictation of France, died in 1778. The war was continued for some years with varying results; but in 1781 the capitulation of a second British army under Cornwallis at Yorktown was a decisive blow, which brought home to the minds of the dullest the assurance that the conquest of America was an impossibility.

Before this event happened there had been a great change in public feeling in England. The increasing weight of taxation gave rise in 1780 to a great meeting of the freeholders of York- shire, which in turn gave the signal for a general agitation for the reduction of unnecessary expense in the government. To this desire Burke gave expression in his bill for economical reform, though he was unable to carry it in the teeth of interested opposition. The movement in favour

of economy was necessarily also a movement in favour of peace; and when the surrender of Yorktown was known (1782), Lord North at once resigned office.

The new ministry formed under Lord Rockingham comprised not only his own immediate followers, of whom the most pro- minent was Charles Fox, but the followers of Chatham, Tne secoag of whom Lord Shelburne was the acknowledged leader. Rocking- A treaty of peace acknowledging the independence " am of the United States of America was at once set on foot; and the negotiation with France was rendered easy by the defeat of a French fleet by Rodney, and by the failure of the combined forces of France and Spain to take Gibraltar,

1782-1784]

ENGLISH HISTORY

$49

The India Bill.

Already the ministry on which such great hopes, had been placed had broken up. Rockingham died in July 1782. The two sections of which the government was composed had different aims. The Rockingham section, which now looked up to Fox, rested on aristocratic connexion and influence; the Shelburne section was anxious to gain popular support by active reforms, and to gain over the king to their side. Judging by past ex- perience, the combination might well seem hopeless, and honour- able men like Fox might easily regard it with suspicion. But Fox's allies took good care that their name should not be associ- ated with the idea of improvement. They pruned Burke's Economical Reform Bill till it left as many abuses as it sup- pressed; and though the bill prohibited the grant of pensions above £300, they hastily gave away pensions of much larger value to their own friends before the bill had received the royal assent. They also opposed a bill for parliamentary reform brought in by young William Pitt. When the king chose Shelburne as prime minister, they refused to follow him, and put forward the incompetent duke of Portland as their candidate for the office. The struggle was thus renewed on the old ground of the king's right to select his ministers. But while the king now put forward a minister notoriously able and competent to the task, his opponents put forward a man whose only claim to office was the possession of large estates. They forced their way back to power by means as unscrupulous as their claim to it was un-

justifiable. They formed a coalition with Lord North, whose politics and character they had denounced for years. coalition. The coalition, as soon as the peace with America and France had been signed (1783), drove Shelburne from office. The duke of Portland became the nominal head of the government, Fox and North its real leaders.

Such a ministry could not afford to make a single blunder. The king detested it, and the assumption by the Whig houses of a right to nominate the head of the government without reference to the national interests, could never be popular. The blunder was soon committed. Burke, hating wrong and injustice with a bitter hatred, had descried in the government of British India by the East India Company a disgrace to the English name. For many of the actions of that government no honourable man can think of uttering a word of defence. The helpless natives were oppressed and robbed by the company and its servants in every possible way. Burke drew up a bill, which was adopted by the coalition government, for taking all authority in India out of the hands of the company, and even placing the company's management of its own commercial affairs under control. The governing and controlling body was naturally to be a council appointed at home. The question of the nomination of this council at once drew the whole question within the domain of party politics. The whole patronage of India would be in its hands, and, as parliament was then constituted, the balance of parties might be more seriously affected by the distribution of that patronage than it would be now. When, therefore, it was understood that the government bill meant the council to be named in the bill for four years, or, in other words, to be named by the coalition ministry, it was generally regarded as an unblushing attempt to turn a measure for the good government of India into a measure for securing the ministry in office. The bill of course passed the Commons. When it came before the Lords, it was thrown out in consequence of a message from the king, that he would regard any one who voted for it as his enemy.

The contest had thus become one between the influence of the crown and the influence of the great houses. Constitutional Ministry historians, who treat the question as one of merely ofthe theoretical politics, leave out of consideration this

younger essential element of the situation, and forget that, if Pitt

it was wrong for the king to influence the Lords by

his message, it was equally wrong for the ministry to acquire

for themselves fresh patronage with which to influence the

Commons. But there was now, what there had not been in the

time of Walpole and the Pelhams, a public opinion ready to throw

its weight on one side or the other. The county members still

formed the most independent portion of the representation, and there were many possessors of rotten boroughs, who were ready to agree with the county members rather than with the great landowners. In choosing Pitt, the young son of Chatham, for his prime minister, as soon as he had dismissed the coalition, George III. gave assurance that he wished his counsels to be directed by integrity and ability. After a struggle of many weeks, parliament was dissolved (1784), and the new House of Commons was prepared to support the king's minister by a large majority.

As far as names go, the change effected placed the new Tory party in office for an almost uninterrupted period of forty-six years. It so happened, however, that after the first eight years of that period had passed by, circumstances occurred which effected so great a change in the composition and character of that party as to render any statement to this effect entirely illusive. During eight years, however, Pitt's ministry was not merely a Tory ministry resting on the choice of the king, but a Liberal ministry resting on national support and upon advanced political knowledge.

The nation which Pitt had behind him was very different from the populace which had assailed Walpole's Excise Bill, or had shouted for Wilkes and liberty. At the beginning of the century the intellect of thoughtful Englishmen

Material progress.

had applied itself to speculative problems of religion and philosophy. In the middle of the century it applied itself to practical problems affecting the employment of industry. In 1776 Adam Smith published the Wealth of Nations. Already in 1762 the work of Brindley, the Bridgewater canal, the first joint of a network of inland water communication, was opened. In 1767 Hargreaves produced the spinning- jenny; Arkwright's spinning machine was exhibited in 1768; Crompton's mule was finished in 1779; Cartwright hit upon the idea of the power- loom in 1784, though it was not brought into

profitable use till 1801. The Staffordshire potteries had been flourishing under Wedgwood since 1763, and the improved steam-engine was brought into shape by Watt in 1768. During these years the duke of Bedford, Coke of Norfolk, and Robert Bakewell were busy in the improvement of stock and agriculture.

The increase of wealth and prosperity caused by these changes went far to produce a large class of the population entirely out- side the associations of the landowning class, but with sufficient intelligence to appreciate the advantages of a government carried on without regard to the personal, interests and rivalries of the aristocracy. The mode in which that increase of wealth was effected was even more decisive on the ultimate destinies of the country. The substitution of the organization of hereditary monarchy for the organization of wealth and station would ultimately have led to evils as great as those which it superseded. It was only tolerable as a stepping-stone to the organization of intelligence. The larger the numbers admitted to influence the affairs of state, the more necessary is it that they respect the powers of intellect. It would be foolish to institute a com-parison between an Arkwright or a Crompton and a Locke or a Newton. But it is certain that for one man who could appreciate the importance of the treatise On the Human Understanding or the theory of gravitation, there were thousands who could under- stand the value of the water-frame, or the power-loom. The habit of looking with reverence upon mental power was fostered in no slight measure by the industrial development of the second half of the 18th century.

The supremacy of intelligence in the political world was, for the time, represented in Pitt. In 1784 he passed an India Bill, which left the commerce and all except the highest patronage of India in the hands of the East India to(W / B ;//. Company, but which erected a department of the home government, named the board of control, to compel the com- pany to carry out such political measures as the government saw fit. A bill for parliamentary reform was, however, thrown out by the opposition of his own supporters in parliament, whilst outside parliament there was no general desire for a change in a system which for the present produced such excellent fruits.

Still more excellent was his plan of legislation for Ireland. Irish- men had taken advantage of the weakness of England during the American War to enforce upon the ministry of the day, in 1780 and 1782, an abandonment of all claim on the part of the English government and the English judges to interfere in any way with Irish affairs. From 1782, therefore, there were two independent legislatures within the British Isles — the one sitting at Westminster and the other sitting in Dublin. With these political changes Fox professed himself to be content. Pitt, whose mind was open to wider considerations, proposed to throw open commerce to both nations by removing all the restrictions placed on the trade of Ireland with England and with the rest of the world. The opposition of the English parliament was only removed by concessions continuing some important restrictions upon Irish exports, and by giving the English parliament the right of initiation in all measures relating to the regulation of the trade which was to be common to both nations. The Irish parliament took umbrage at the superiority claimed by England, and threw out the measure as an insult, though, even as it stood, it was undeniably in favour of Ireland. The lesson of the in-compatibility of two coordinate legislatures was not thrown away upon Pitt.

In 1786 the commercial treaty with France opened that country to English trade, and was the first result of the theories laid down by Adam Smith ten years previously. The first attack upon the horrors of the slave-trade was made in 1788; and in the same year, in the debates on the Regency Bill caused by the king's insanity, Pitt defended against Fox the right of parliament to make provision for the exercise of the powers of the crown when the wearer was permanently or temporarily disabled from exercising his authority.

When the king recovered, he went to St Paul's to return thanks on the 23rd of April 1789. The enthusiasm with which he was greeted showed how completely he had the nation on his side. All the hopes of liberal reformers were now with him. All the hopes of moral and religious men were on his side as well. The seed sown by Wesley had grown to be a great tree. A spirit of thoughtfulness in religious matters and of moral energy was growing in the nation, and the king was endeared to his subjects, as much by his domestic virtues as by his support of the great minister who acted in his name. The happy prospect was soon to be overclouded. On the 4th of May, eleven days after the appearance of George III. at St Paul's, the French states-general met at Versailles.

By the great mass of intelligent Englishmen the change was greeted

with enthusiasm. It is seldom that one nation under- stands the tendencies and difficulties of another; and French th e mere fact that power was being transferred from Revolu- an absolute monarch to a representative assembly tion; j ec j superficial observers to imagine that they were

witnessing a mere repetition of the victory of the English parliament over the Stuart kings. In fact, that which was passing in France was of a totally different nature from the English struggle of the 17th century. In England, the conflict had been carried on for the purpose of limiting the power of the king. In France, it was begun in order to sweep away an aristocracy in church and state which had become barbarously oppressive. The French Revolution was not, therefore, a conflict for the reform of the political organization of the state, but one for the reorganization of the whole structure of society; and in proportion as it turned away from the path which English ignorance had marked out for it, Englishmen turned away from it in disgust. As they did not understand the aims of the French Revolutionists, they were unable to make that excuse for even so much of their conduct as admits of excuse. Three men, Fox, Burke and Pitt, however, represented three varieties of opinion into which the nation was very unequally divided.*

Fox, generous and trustful towards the movements of large masses of men, had very little intellectual grasp of the questions at issue in France. He treated the struggle as one simply for the establishment of free institutions; and when at last the crimes of the leaders became patent to the world, he contented

English feeling.

himself wjth lamenting the unfortunate fact, and fell back on the argument that though England could not sympathize with the French tyrants, there was no reason why she should go to war with them.

Burke, on the other hand, while he failed to understand the full tendency of the Revolution for good as well as for evil, understood it far better than any Englishman of that day under- stood it. He saw that its main aim was equality, not liberty, and that not only would the French nation be ready, in pursuit of equality, to welcome any tyranny which would serve its purpose, but would be the more prone to acts of tyranny over individuals. This would arise from the remodelling of institutions, with the object of giving immediate effect to the will of the masses, which was especially liable to be counterfeited by design- ing and unscrupulous agitators. There is no

doubt that in all this Burke was in the right, as he was in his denunciation of the mischief certain to follow when a nation tries to start afresh, and to blot out all past progress in the light of simple reason, which is often most fallible when it believes itself to be most infallible. Where he went wrong was in his ignorance of the special circum- stances of the French nation, and his consequent blindness to the fact that the historical method of gradual progress was im- possible where institutions had become so utterly bad as they were in France, and that consequently the system of starting afresh, to which he reasonably objected, was to the French a matter not of choice but of necessity. Nor did he see that the passion for equality, like every great passion, justified itself, and that the problem was, not how to obtain liberty in defiance of it, but how so to guide it as to obtain liberty by it and through it.

Burke did not content himself with pointing out speculatively the evils which he foreboded for the French. He perceived clearly that the effect of the new French principles could no more be confined to French territory than the principles of Protestant- ism in the 16th century could be confined to Saxony. He knew well that the appeal to abstract reason and the hatred of aristo- cracy would spread over Europe like a flood, and, as he was in the habit of considering whatever was most opposed to the object of his dislike to be wholly excellent, he called for a crusade of all established governments against the anarchical principles of dissolution which had broken loose in France.

Pitt occupied ground apart from either Fox or Burke. He had neither Fox's sympathy for popular movements, nor Burke's intellectual appreciation of the immediate tendencies of the Revolution. Hence, whilst he pronounced against any active interference with France, he was an advocate of peace, not because he saw more than Fox or Burke, but because he saw less. He fancied that France would be so totally occupied with its own troubles that it would cease for a long time to be dangerous to other nations.

This view was soon to be stultified by the effect of the coalition against France in 1 792 of Prussia and Austria. The proclamation of the allies calling on the French to restore the royal Beginning authority was answered by a passionate outburst of of the re- defiance. The king himself was suspected of com- vo,atloam plicity with the invaders of his country, and the rising w

of the 10th of August was followed by the proclamation of the republic and by the awful " September massacres " of helpless

prisoners, guilty of no crime but noble birth, and therefore presumably of attachment to the old regime, and treason towards the new. This passionate attachment to the Revolution, which in France displayed itself in a carnival of insane suspicion and cruelty, inspired on the frontiers an astonishing patriotic resist- ance. Before the end of the year the invasion was repulsed, and the ragged armies of the Revolution had overrun Savoy and the Austrian Netherlands, and were threatening the aristo- cratic Dutch republic.

Very few governments in Europe were so rooted in the affections of their people as to be able to look without terror on the challenge thus thrown out to them. The English govern- ment was one of those very few. No mere despotism was here exercised by the king. No broad impassable line here divided

the aristocracy from the people. The work of former genera- tions of Englishmen had been too well done to call for that breach of historical continuity which was a dire Change of necess ;(y ; n France. There was much need of reform. England. There was no need of a revolution. The whole of the upper and middle classes, with few exceptions, clung together in a fierce spirit of resistance; and the mass of the lower classes, especially in the country, were too well off to wish for change. The spirit of resistance to revolution quickly developed into a spirit of resistance to reform, and those who continued to advocate changes, more or less after the French model, were treated as the enemies of mankind. A fierce hatred of France and of all that attached itself to France became the predominating spirit of the nation.

Such a change in the national mind could not but affect the constitution of the Whig party. The reasoning of Burke would, in itself, have done little to effect its disruption. But 't'h'whi"' tne 8 r eat landowners, who contributed so strong an party. element in it, composed the very class which had most to fear from the principles of the Revolution. The old questions which had divided them from the king and Pitt in 1783 had dwindled into nothing before the appalling question of the immediate present. They made themselves the leaders of the war party, and they knew that that party comprised almost the whole of the parliamentary classes.

What could Pitt do but surrender? The whole of the intel- lectual basis of his foreign policy was swept away when it became evident that the continental war would bring with it an accession of French territory. He did not abandon his opinions. His opinions rather abandoned him. A wider intelligence might have held that, let France gain what territorial aggrandizement it might upon the continent of Europe, it was impossible to resist such changes until the opponents of France had so purified themselves as to obtain a hold upon the moral feelings of man- kind. Pitt could not take this view; perhaps no man in his day could be fairly expected to take it. He did not indeed declare war against France; but he sought to set a limit to her conquests in the winter, though he had not sought to set a limit to the conquests of the allied sovereigns in the preceding summer. He treated with supercilious contempt the National Convention, which had dethroned the king and proclaimed a republic. Above all, he took up a declaration by the Convention, that they would give help to all peoples struggling for liberty against their re- spective governments, as a challenge to England. The horror caused in England by the trial and execution of Louis XVI. completed the estrangement between the two countries, and though the declaration of war came from France (1793), it had been in great part brought about by the bearing of England and its government. (S. R. G.)

XI. The Revolutionary Epoch, the Reaction, and the Triumph of Reform (1793-1837)

In appearance the great Whig landowners gave their support to Pitt, and in 1794 some of their leaders, the duke of Portland, Lord Fitzwilliam, and Windham, entered the cabinet to serve under him. In reality it was Pitt who had meat and surrendered. The ministry and the party by which the "re- it was supported might call themselves Tory still; rotation- j)u(. trle grea t reforming policy of 1784 was at an "agitation. en d, and the government, unconscious of its own strength, conceived its main function to be at all costs to preserve the constitution, which it believed to be in danger of being overwhelmed by the rising tide of revolu- tionary feeling. That this belief was idle it is now easy enough to see; at the time this was not so obvious. Thomas Paine's Rights of Man, published in 1791, a brilliant and bitter attack on the British constitution from the Jacobin point of view, sold by tens of thousands. Revolutionary societies with high-sounding names were established, of which the most con- spicuous were the Revolution Society, the Society for Consti- tutional Information, the London Corresponding Society, and the Friends of the People. Of these, indeed, only the two last

The p > vem

were directly due to the example of France. The Revolution Society, founded to commemorate the revolution of 1688, had long carried on a respectable existence under the patronage of cabinet ministers; the Society for Constitutional Infor- mation, of which Pitt himself had been a member, was founded in 1780 to advocate parliamentary reform; both had, however, developed under the influence of the events in France in a revolutionary direction. The London Corresponding Society, composed mainly of working-men, was the direct outcome of the excitement caused by the developments of the French Re- volution. Its leaders were obscure and usually illiterate men, who delighted to propound their theories for the universal reformation of society and the state in rhetoric of which the characteristic phrases were borrowed from the tribune of the Jacobin Club. Later generations have learned by repeated experience that the eloquence of Hyde Park orators is not the voice of England; there were some even then — among those not immediately responsible for keeping order — who urged the government " to trust the people ";' but with the object-lesson of France before them it is not altogether surprising that ministers refused to believe in the harmlessness of societies, which not only kept up a fraternal correspondence with the National Convention and the Jacobin Club, but, by attempting to estab- lish throughout the country a network of affiliated clubs, were apparently aiming at setting up in Great Britain the Jacobin idea of

popular control.

The danger, of course, was absurdly exaggerated; as indeed was proved by the very popularity of the repressive measures to which the government thought it necessary to resort, and which gave to the vapourings of a few knots of agitators the dignity of a widespread conspiracy for the overthrow of the constitution. On,the 1st of December 1792 a proclamation was issued calling out the militia on the ground that a dangerous spirit of tumult and disorder had been excited by evil-disposed persons, acting in concert with persons in foreign parts, and this statement was repeated in the king's speech at the opening of parliament on the 13th. In spite of the protests of Sheridan and other members of the opposition, a campaign of press and other prosecutions now began which threatened to extinguish the most cherished right of Englishmen — liberty of speech. The country was flooded with government spies and informers, whose efforts were seconded by such voluntary societies as the Association for preserving Liberty and Property against Republicans and Levellers, founded by John Reeves, the historian of English law. No one was safe from these zealous and too often credulous defenders of the established order; and a few indiscreet words spoken in a coffee house were enough to bring imprisonment and ruin, as in the case of John Frost, a respectable attorney, condemned for sedition in March 1793. In Scotland the panic, and the consequent cruelty, were worse than in England. The meeting at Edinburgh of a "convention of delegates of the associated friends of the people," at which some foolish and exaggerated language was used, was followed by the trial of Thomas Muir, a talented young advocate whose brilliant defence did not save him from a sentence of fourteen years' transportation (August 30, 1793), while seven years' trans- portation was the punishment of the Rev. T. Fyshe Palmer for circulating an address from " a society of the friends of liberty to their fellow-citizens " in favour of a reform of the House of Commons. These sentences and the proceedings which led up to them, though attacked with bitter eloquence by Sheridan and Fox, were confirmed by a large majority in parliament.

It was not, however, till late in the session of 1794 that ministers laid before parliament any evidence of seditious practices. In May certain leaders of democratic societies were arrested and their papers seized, and on the 13th a king's message directed the books of certain corresponding societies to be laid before both Houses. The committee of the House of Commons at once reported that there was evidence of a conspiracy

1 The position of the Corresponding Society was greatly strengthened by the establishment of the Friends of the People by Erskine and Grey.

to supersede the House of Commons by a national con- vention, and Pitt proposed and carried a bill suspending the Habeas Corpus Act. This was followed by further reports of the committees of both Houses, presenting evidence of the secret manufacture of arms and of other proceedings calculated to endanger the public peace. A series of state prosecutions followed. The trials of Robert Watt and David Dbwnie for high treason (August and September 1794) actually revealed a treasonable plot on the part of a few obscure individuals at Edinburgh, who were found in the possession of no less than fifty-seven pikes of home manufacture, wherewith to overthrow the British government. The execution of Watt gave to this trial a note of tragedy which was absent from that of certain members of the Corresponding Society, accused of conspiring to murder the king by means of a poisoned arrow shot from an air-gun. The ridicule that greeted the revelation of the " Pop-gun Plot " marked the beginning of a reaction that found a more serious expression in the trials of Thomas Hardy, John Home Tooke and John Thelwall (October and November 1794). The prisoners were accused of high treason, their chief offence consisting in their attempt to assemble a general convention of the people, ostensibly for the purpose of obtaining parlia- mentary reform, but really— as the prosecution urged — for sub- verting the constitution. This latter charge, though proved to the satisfaction of the committees of both Houses of Parliament, broke down under the cross-examination of the government witnesses by the counsel for the defence, and could indeed only have been substantiated by a dangerous stretching of the doctrine of constructive treason. Happily the jury refused to convict, and its verdict saved the nation from the disgrace of meting out the extreme penalty of high treason to an attempt to hold a public meeting for the redress of grievances.

The common sense of a British jury had preserved, in spite of parliament and ministry, that free right of meeting which was to be one of the strongest instruments of future reform. The government, however, saw little reason in the events of the following months for

reversing their coercive policy. The year 1795 was one of great suffering and great popular unrest; for the effect of the war upon industry was now beginning to be felt, and the distress had been aggravated by two bad harvests. The sudden determination of those in power, who had hitherto advocated reform, to stereotype the existing system, closed the avenues of hope to those who had expected an improvement of their lot from constitutional changes, and the disaffected temper of the populace that resulted was taken advantage of by the London Corresponding Society, emboldened by its triumph in the courts, to organize open and really dangerous demonstrations, such as the vast mass meeting at Copenhagen House on the 26th of October. On the 29th of October the king, on his way to open parliament, was attacked by an angry mob shouting, " Give us bread," " No Pitt," " No war," " No famine,"; and the glass panels of his state coach were smashed to pieces.

The result of these demonstrations was the introduction in the House of Lords, on the 4th of November, of the Treasonable Practices Bill, the main principle of which was that it modified the law of treason by dispensing with the necessity for the proof of an overt act in order to secure conviction; and in the House of Commons, on the 10th, of the Seditious Meetings Bill, which seriously limited the right of public meeting, making all meetings of over fifty persons, as well as all political debates and lectures, subject to the previous consent and active supervision of the magistrates. In spite of the strenuous resistance of the oppo- sition, led by Fox, and of numerous meetings of protest held outside the walls of parliament, both bills passed into law by enormous majorities. The inevitable result followed. The London Corresponding Society and other political clubs, deprived of the right of public meeting, became secret societies pledged to the overthrow of the existing system by any means. United Englishmen and United Scotsmen plotted with United Irish- men for a French invasion, and sedition was fomented in the army and the navy. Their baneful activities were exposed in the inquiries that followed the Irish rebellion of 1798, and the

result was the Corresponding Societies Bill, introduced by Pitt on the 19th of April 1799, which completed the series of repressive measures and practically suspended the popular constitution of England. The right of public meeting, of free speech, of the free press had alike ceased for the time to exist.

The justification of the government in all this was the life and death struggle in which Great Britain Was engaged with the power of republican France in Europe. Yet Pitt's Tha conduct of the war, so

far as the continent was con- Mcvolu- cerned, had hitherto led to nothing but failure after tioaary failure. In 1 794, in spite of the presence of an English War ‘ army under the duke of York, the Austrian Netherlands had been finally conquered and annexed to the French republic; in 1795 the Dutch republic was affiliated to that of France, and the peace of Basel between Prussia and the French republic left Austria to continue the war alone with the aid of British sub- sidies. On the sea Great Britain had been more successful, Howe’s victory of the 1st of June 1794 being the first of the long series of defeats inflicted on the French navy, while in 1795 a beginning was made of the vast expansion of the British Empire by the capture of Ceylon and the Cape of Good Hope from the Dutch (see French Revolutionary Wars) , The war, however, had become so expensive, and its results were evidently so small, that there was a growing feeling in England m favour of peace, especially as the Reign of Terror had come to an end in 1794, and a regular government, the Directory, had been appointed in 1795. At last Pitt was forced to yield to the popular clamour, and in 1796 Lord Malmesbury was sent to France to treat for peace. The negotiation, however, was at once broken off by his demand that France should abandon the Netherlands.

The French government, assured now of the assistance of Spain and Holland, and freed of the danger from La Vendee, now determined to attempt the invasion of Ireland. On the 16th of December a fleet of 17 battle-ships, Hocoe ‘ s 13 frigates and 15 smaller vessels set sail from Brest, ^“ireiaˆd. carrying an expeditionary force of some 13,000 men Under General Hoche: The British fleet, under Lord Bridport, was wintering at Spithead; and before it could put to sea the French had slipped past. Before it reached the coast of Ireland, however, the French fleet had already suffered serious losses, owing partly to the attacks, of British frigate detachments, partly to the bad seamanship of the French crews and the rottenness of the ships. Only a part of the fleet succeeded in reaching Bantry Bay on the 20th of December, and of these a large number were scattered by a storm on the 23rd. Hoche himself, with the French admiral, had been driven far to the westward in an effort to avoid capture; the attempt of Grouchy, in his absence, to land a force was defeated by the weather, and by the end of the month the whole expedition was in full retreat for Brest. A French diversion on the coast of Pembroke was even less successful; a force of 1500 men, under Colonel Tate, an American adventurer, landed in Cardigan Bay on the 22nd of February 1797, but was at once surrounded by the local militia and surrendered without a blow.

A more serious attempt was now made to renew the enterprise by means of a junction of the French, Spanish and Dutch fleets. The victory of Jervis over the Spanish fleet at Mutinies St Vincent on the 14th of February postponed the atSpit- imminence of the danger; but this again became acute head and owing to the general disaffection in the fleet, which in tbeNore – April and May found vent in the serious mutinies at Spithead and the Nore. The mutiny at Spithead, which was due solely to the intolerable conditions under which the seamen served at the time, was ended on the 17th of May by concessions: an increase of pay, the removal of officers who had abused their power of discipline, and the promise of a general free pardon. More serious was the outbreak at the Nore. The disaffection had spread practically to the whole of Admiral Duncan's fleet, and by the beginning of June the mutineers were blockading the Thames with no less than 26 vessels. The demands of the seamen were more extensive than at Spithead; their resistance was better organized; and they were suspected, though without

reason, of harbouring revolutionary designs. The return of the Channel fleet to its duty emboldened the admiralty to refuse any concessions, and the vigorous measures of repression taken proved effective. One by one the mutinous crews surrendered; and the arrest of the ringleader, Richard Parker, on board the " Sandwich," on the 14th of June, brought the affair to an end. 1 – The seamen regained their reputation, and those who Camper- nac ˆ been imprisoned their liberty, by Duncan's victory down. over the Dutch fleet at Camperdown (October 11), by which the immediate danger was averted. Though the French attempt at a concerted invasion had failed, however, the Directory did not abandon the enterprise, and commissioned Bonaparte to draw up fresh plans.

At the close of the year 1797 the position of Great Britain was indeed sufficiently alarming. On the 18th of April, during the very crisis of the mutiny at Spithead, Austria had signed with Bonaparte the humiliating terms of the preliminary peace of Leoben, which six months later were embodied in the treaty of Campo Formio (October 17). On the 10th of August Portugal had concluded a treaty with the French Republic; and Great Britain was left without an ally in Europe. The mutiny at the Nore, the threat of rebellion in Ireland,

the alarming fall in consols, argued strongly against continuing the war single- handed, and in July Lord Malmesbury had been sent to Lille to open fresh negotiations with the plenipotentiaries of France. The negotiations broke down on the refusal of England to restore the Cape of Good Hope to the Dutch. But though forced, in spite of misgivings, to continue the struggle, the British govern- ment in one very important respect was now in a far better position to do so. For though Great Britain was now isolated and her policy in Europe advertised as a failure, the temper of the British people was less inclined to peace in 1798 than it had been three years before. The early enthusiasm of the dis- franchised classes for French principles had cooled with the later developments of the Revolution; the attempted invasions had roused the national spirit; and in the public imagination the sinister figure of Bonaparte, the rapacious conqueror, was begin- ning to loom large to the exclusion of lesser issues. Henceforth, in spite of press prosecutions and trials for political libel, the government was supported by public opinion in its vigorous prosecution of the war.

If the danger of French invasion was a reality, it was so mainly owing to the deplorable condition of Ireland, where the The Act natural disaffection of the Roman Catholic majority of Union of the population — deprived of political and many w,tn social rights, and exposed to the insults and oppression

of a Protestant minority corrupted by centuries of ascendancy — invited the intervention of a foreign enemy. The full measure of the intolerable conditions prevailing in the country was revealed by the horrors of the rebellion of 1798, and after this had been suppressed Pitt decided that the only way to deal with the situation was to establish a union between Great Britain and Ireland, similar to that which had proved so successful in the case of England and Scotland. He saw that to establish peace in Ireland the Roman Catholics would have to be enfranchised; he realized that to enfranchise them in a separated Ireland would be to subject the proud Protestant minority to an impossible domination, and to establish not peace but war. The Union, then, was in his view the necessary pre- liminary to Catholic emancipation, which was at the same time the reward held out to the majority of the Irish people for the surrender of their national quasi-independence. It was a bribe little likely to appeal to the Protestant minority which consti- tuted the Irish parliament, and to them other inducements had to be offered if the scheme was to be carried through. These inducements were not all corrupt. Those members who stood out were, indeed, bought by a lavish distribution of money and coronets; but the advantages to Ireland which might reason- ably

be expected from the Union were many and obvious; and if all the promises held out by the promoters of the measure

1 A vivid account of the mutiny arid its causes is given in Captain Marryat's Kin£s Chun.

have even now not been realized, the fault is not theirs. The Act of Union was placed on the statute-book in 1800; Catholic emancipation was to have been accomplished in the following session, the first of the united parliament. But Pitt's policy broke on the stubborn obstinacy of George III., who believed himself bound by his coronation oath to resist any concession to the enemies of the Established Church. The disadvantage of the possession of too strait a conscience in politics was never more dismally illustrated. To the Irish people it was the first breach of faith in connexion with the Union, Resigna- and threw them into opposition to a settlement into plttt which they believed themselves to have been drawn under false pretences. Pitt, realizing this, had no option but to resign.

The resignation of the great minister who had so long held the reins of power coincided with a critical situation in Europe. The isolation of Bonaparte in Egypt, as the result Boaaparte of Nelson's victory of the Nile (1798), had enabled breaks up the allies to recover some of the ground lost to France. tne coatt- But this had merely increased Bonaparte's prestige, tlon ' and on his return in 1799 he found no difficulty in making him- self master of France by the coup d'etat of the 18th Brumaire. The campaign of Marengo followed (1800) and the peace of Lun6ville, which not only once more isolated Great Britain, but raised up against her new enemies, to the list of whom she added by using her command of the sea to enforce the right of search in order to seize enemies' goods in neutral vessels. Russia joined with Sweden and Denmark, all hitherto friendly powers, in resistance to this claim.

Such was the position when Addington became prime minister. He was a man of weak character and narrow intellect, whose main claim to succeed Pitt was that he shared to the full the Protestant prejudices of king and people. „,/„/"£?" His tenure of power was, indeed, marked by British successes abroad; by Nelson's victory at Copenhagen, which broke up the northern alliance, and by Abercromby's victory at Alexandria, which forced the French to evacuate Egypt; but these had been prepared by the previous administration. Addington's real work was the peace of Amiens (1802), an experimental peace, as the king called it, to see T /^/ ace if the First Consul could be contented to restrain himself within the

very wide limits by which his authority in Europe was still circumscribed.

In a few months Great Britain was made aware that the experiment would not succeed. Interference and annexation became the standing policy of the new French govern- ment; and Britain, discovering how little intention f b e "^r' " Bonaparte had of carrying out the spirit of the treaty, refused to abandon Malta, as she had engaged to do by the terms of peace. The war began again, no longer a war against re- volutionary principles and their propaganda, but against the boundless ambitions of a military conqueror. This time the British nation was all but unanimous in resistance. This time its resistance would be sooner or later supported by all that was healthy in Europe. The news that Bonaparte was making preparations on a vast scale for the invasion of England roused a stubborn spirit of resistance in the country. Volunteers were enrolled, and the coast was dotted with Martello towers, many of which yet remain as monuments of the time when the " army of England " was encamped on the heights near Boulogne within sight of the English cliffs. To meet so great a crisis Addington was not the man. He had been ceaselessly assailed, in and out of parliament, by the trenchant criticism, and often unmannerly wit, of " Pitt's friends," among whom George Canning was now conspicuous. Pitt himself had remained silent; but in view of the seriousness of the crisis and of a threatened illness of the king, which would have necessitated a regency and — in view of the prince of Wales's dislike for him — -his own permanent exclusion from office, he now put himself forward once more. The government majorities in the House now rapidly dwindled ; on the 26th of April 1804, Addington resigned; and Pitt, after his attempt to form a national coalition ministry had broken*

down on the king's refusal to admit Fox, became head of a government constructed on a narrow Tory basis. Of the

members of the late government Lord Eldon, the duke r t rns to °^ Portland, Lord Westmorland, Lord Castlereagh and office. Lord Hawkesbury retained office, the latter surrender- ing the foreign office to Lord Harrowby and going to the home office. Dundrs, now Lord Melville, became first lord of the admiralty, and the cabinet

further included Lord Camden, Lord Mulgrave and the duke of Montrose. Canning, Huskisson and Perceval were given subordinate offices.

Save for the commanding personality of Pitt, the new govern- ment was scarcely stronger than that which it had replaced. It had to face the same Whig opposition, led by Fox, who scoffed at the French peril, and reinforced by Addington and his friends; and the whole burden of meeting this opposition fell upon Pitt; for Castlereagh, the only other member of the cabinet in the House of Commons, was of little use in debate. Nevertheless, fresh vigour was infused into the conduct of the war. The Additional Forces Act, passed in the teeth of a strenuous op- position, introduced the principle of a modified system of com- pulsion to supplement the deficiencies of the army and reserve, while the navy was largely increased. Abroad, Pitt's whole energies were directed to forming a fresh coalition against Bonaparte, who, on the 14th of May 1804, had proclaimed him- self emperor of the French; but it was a year before Russia signed with Great Britain the treaty of St Petersburg (April n, 1805), and the accession to the coalition of Austria, Sweden and Naples was not obtained till the following September. In the

following month(October 2i)Nelson's crowning victory Trafalgar. at Trafalgar over the allied fleets of France and Spain

relieved England of the dread of invasion. It served, however, to precipitate the crisis on the continent of Europe; the great army assembled at Boulogne was turned eastwards; by the capitulation of Ulm (October 19) Austria lost a large part of her forces; and the last news that reached Pitt on his . . ... death-bed was that of the ruin of all his hopes by the

crushing victory of Napoleon over the Russians and Austrians at Austerlitz (December 2).

Pitt died on the 23rd of January, and the refusal of Lord Hawkesbury to assume the premiership forced the king to Death of summon Lord Grenville, and to agree to the inclusion Pitt. of Fox in the cabinet as secretary for foreign affairs.

"Ministry Several members of Pitt's administration were ad- °Taˆents" mitted to tms " Ministry of all the Talents," including

Addington (now Lord Sidmouth), who had rejoined the ministry in December 1804 and again resigned, owing to a disagreement with

Pitt as to the charges against Lord Melville (q.v.) in July 1805. The new ministry remained in office for a year, a disastrous year which saw the culmination of Napoleon's power: the crushing of Prussia in the campaign of Jena, the formation of the Confederation of the Rhine and the end of the Holy Roman Empire. In the conduct of the war the British government had displayed little skill, frittering away its forces Abolition on distant expeditions, instead of concentrating them of the in support of Prussia or Russia, and the chief title

slave- to fame of the Ministry of all the Talents is that it

ra e ' secured the passing of the bill for the abolition of the

slave-trade (March 25, 1807).

The death of Fox (September 13, 1806) deprived the ministry of its strongest member, and in the following March it fell on

the old question of concessions to the Roman Catholics. question. True to his principles, Fox had done his best to negotiate

terms of peace with Napoleon; but the breakdown of the attempt had persuaded even the Whigs that an arrange- ment was impossible, and in view of this fact Grenville thought it his duty to advise the king that the disabilities of Roman Catholics and dissenters in the matter of serving in the army and navy should be removed, in order that all sections of the nation might be united in face of the enemy. The situation, moreover, was in the highest degree anomalous; for by an act passed in 1793 Roman Catholics might hold commissions in the army in Ireland up to the rank of colonel, and this right had

not been extended to England, though by the Act of Union the armies had become one. The king, however, was not to be moved from his position; and he was supported in this attitude not only by public opinion, but by a section of the ministry itself, of which Sidmouth made himself the mouthpiece. The demand of George III. that ministers should undertake never again to approach him on the subject of concessions to the Catholics was rejected by Grenville, rightly, as unconstitutional, and on the 1 8th of March 1807 he resigned.

The new ministry, under the nominal headship of the vale- tudinarian duke of Portland, included Perceval as chancellor of the exchequer, Canning as foreign secretary and Castlereagh as secretary for war and the colonies. Port ' a '"l

Tii. 1 1 ,. 1 1,1 ministry.

*It had given the undertaking demanded' by the king; those of its members who, like Canning, were in favour of Catholic emancipation, arguing that, in view of greater and more pressing questions, it was useless to insist in a matter which could never be settled so long as the old king lived. Of more importance to Great Britain, for the time being, than any constitutional issues, was the life – and – death struggle with Napoleon, which had now entered on a new phase. Defeated at sea, but master now of the greater part of the continent of Europe, the French emperor planned to bring Great Britain to terms by ruining her commerce with the vast territories under his influence.' In November 1806 The con- he issued from Berlin the famous decree prohibiting system. the importation of British goods and excluding from the harbours under his control even neutral ships that had touched at British ports. The British government replied by the famous Orders in Council of 1807, which declared all vessels trading with France liable to seizure, and V 1 * that all such vessels clearing from France must touch Council. at a British port to pay customs duties. To this Napoleon responded with the Milan decree (December 17), for- bidding neutrals to trade in any articles imported from the British dominions. The effects of these measures were destined to be far-reaching. The Revolution had made war on princes and privilege, and the common people had in general gained wherever the Napoleonic regime had been substituted for their effete despotisms; but the " Continental System " was felt as an oppression in every humble household, suddenly deprived of the little imported luxuries, such as sugar and coffee, which custom had made necessaries; and from this time date the beginnings of that popular revolt against Napoleon that was to culminate in the War of Liberation. Great Britain, too, was to suffer from her own retaliatory policy. The Americans had taken advantage of the war to draw into their own hands a large part of the British carrying trade, a Amertca' process greatly encouraged by the establishment of the Continental System. This brought them into conflict with the British acting under the Orders in Council, and the consequent ill-feeling culminated in the war of 181 2.*

It was not only the completion of the Continental System, however, that made the year 1807 a fateful one for Great Britain. On the 7th of July the young emperor Alexander I. of Russia, fascinated by Napoleon's genius and bribed TUsit " by the offer of a partition of the world, concluded the treaty of Tilsit, which not only brought Russia into the Con- tinental System, but substituted for a coalition against France a formidable coalition against England. A scheme for

wresting from the British the command of the sea was only defeated by Canning's action in ordering the English fleet to capture the Danish navy, though Denmark was still nominally a friendly power (see Canning, George). Meanwhile, in order to com- plete the ring fence round Europe against British commerce, Napoleon had ordered Junot to invade Portugal; p rencn i a . Lisbon was occupied by the French, and the Portu- vasionof guese royal family migrated to Brazil. In the follow- Spain and ing year Napoleon seized the royal family of Spain, Portu ˆ aL and gave the crown, which Charles VI. resigned on behalf of himself and his heir, to his brother Joseph, king of Naples. The revolt of the Spanish people that followed was the first of

the national uprisings against his rule by which Napoleon was destined to be overthrown. In England it was greeted with immense popular enthusiasm, and the government, without realizing the full import of the step it was taking, sent an ex- pedition to the Peninsula. It disembarked, under the command of Sir Arthur Wellesley, at Figueras on the 1st of Wa'" SUlar Au g ust – II was the beginning of the Peninsular War, which was destined not to end until, in 18 14, the British troops crossed the Pyrenees into France, while the Allies were pressing over the Rhine. The political and military events on the continent of Europe do not, however, belong strictly to English history, though they profoundly affected its develop- ment, and they are dealt with elsewhere (see Europe: History; Napoleon; Napoleonic Campaigns; Peninsular War; Waterloo Campaign).

The war, while it lasted, was of course the main preoccupa- tion of British ministers and of the British people. It entailed Walcheren enormous sacrifices, which led to corresponding dis- expedttion. contents; and differences as to its conduct produced Cabinet frequent friction within the government itself. A cabinet crisis was the result of the outcome of the unfortunate Walcheren expedition of 1809. It had heen Castle- reagh's conception and, had it been as well executed as it was conceived, it might have dealt a fatal blow at Napoleon's hopes of recovering his power at sea, by destroying his great naval establishments at Antwerp. It failed, and it became the subject of angry dispute between Canning and Castlereagh, a dispute

embittered by personal rivalry and the friction due to the ill- defined relations of the foreign secretary to the secretary for war; the quarrel culminated in a duel, and in the resignation of both ministers (see Londonderry, 2nd Marquess of, and Canning, George). The duke of Portland resigned at the same time, and in the reconstruction of the ministry, under Perceval as premier, Lord Wellesley became foreign secretary, ministry. wm le Lord Liverpool, with Palmerston as his under- secretary, succeeded Castlereagh at the war office. The most conspicuous member of this government was Wellesley, whose main object in taking office was to second his brother's efforts in the Peninsula. In this he was, however, only partially successful, owing to the incapacity of his colleagues to realize the unique importance of the operations in Spain. In November 1810 the old king's mind gave way, and on the nth of February 181 1, an act of parliament bestowed the regency, under certain restrictions, upon the prince of Wales. The prince had been on intimate terms with the Whig leaders, and it was assumed that his accession to power would mean a change of government. He had, however, been offended by their attitude on the question of the restriction of his authority as regent, and he continued Perceval in office. A year later, the king's insanity being proved incurable, the regency was definitively established (February 1812). Lord Wellesley took advantage of the reconstruction of the cabinet to resign a position in which he had not been given a free hand, and his post of foreign secretary was offered to Canning. Canning, however, refused to serve with Castlereagh as minister of war, and the latter received the foreign office, which he was to hold till his death in 1822. A month later, on the nth of May, Perceval was assassinated in the lobby of the House of Commons, and Lord Liverpool became the head of a government that was to last till 1827.

The period covered by the Liverpool administration was a fateful one in the history of Europe. The year 1812 saw Napoleon's invasion of Russia, and the disastrous ministry. retreat f rom Moscow. In the following year Welling- ton's victory at Vitoria signalled the ruin of the French cause in Spain; while Prussia threw off the yoke of France, and Austria, realizing after cautious delay her chance of retrieving the humiliations of 1809, joined the alliance, and in concert with Russia and the other German powers overthrew Napoleon at Leipzig. The invasion of France followed in 1814, the abdication of Napoleon, the restoration of the Bourbons and the assembling of the congress of Vienna. The following year saw the return

The regency.

of Napoleon from Elba, the close of the congress of Vienna, and the campaign that ended with the battle of Waterloo. The succeeding period, after so much storm and stress, might seem dull and unprofitable; but it witnessed the instructive experi- ment of the government of Europe by a concert of the great powers, and the first victory of the new principle of nationality in the insurrection of the Greeks. The share taken by Great Britain in all this, for which Castlereagh pre-eminently must take the praise or blame, is outlined in the article on the history of Europe (q.v.). Here it must suffice to point out Foreign how closely the development of foreign affairs was policy m interwoven with that of home politics. The great Castie- war, so long as it lasted, was the supreme affair of reas ' moment; the supreme interest when it was over was to prevent its recurrence. For above all the world needed peace, in order to recover from the exhaustion of the revolutionary epoch ; and this peace, bought at so great a cost, could be preserved only by the honest co-operation of Great Britain in the great inter- national alliance based on " the treaties." This explains Castlereagh's policy at home and abroad. He was grossly attacked by the Opposition in parliament and by irresponsible critics, of the type of Byron, outside; historians, bred in the atmosphere of ' mid- Victorian Liberalism, have re-echoed the cry against him and the government of which he was the most distinguished member; but history has largely justified his attitude. He was no friend of arbitrary government; but he judged it better that " oppressed nationalities " and " persecuted Liberals " should suffer than that Europe should be again plunged into war. He was hated in his day as the arch-opponent of reform, yet the triumph of the reform movement would have been impossible but for the peace his policy secured.

To say this is not to say that the attitude of the Tory govern- ment towards the great issues of home politics was wholly, or even mainly, inspired by a far-sighted wisdom. It character had departed widely from the Toryism of Pitt's ofthe younger years, which had sought to base itself on Tor y popular support, as opposed to the aristocratic ex- pa y ' clusiveness of the Whigs. It conceived itself as the trustee of a system of government which, however theoretically imperfect, alone of the governments of Europe had survived the storms of the Revolution intact. To tamper with a constitution that had so proved its quality seemed not so much a sacrilege as a folly. The rigid conservatism that resulted from this attitude served, indeed, a useful purpose in giving weight to Castlereagh's counsels in the European concert; for Metternich at least, wholly occupied with " propping up mouldering institutions," could not have worked harmoniously with

a minister suspected of an itch for reform. At home, however, it undoubtedly tended to provoke that very revolution which it was intended to prevent. This was due not so much to the notorious corrup- tion of the representative system as to the fact that it represented social and economic conditions that were rapidly passing away.

Both Houses of Parliament were in the main assemblies of aristocrats and landowners; but agriculture was ceasing to be the characteristic industry of the country and the p ar i la . old semi-feudal relations of life were in process of mentand rapid dissolution. The invention of machinery and the Indus- the concentration of the working population in manu- M ˆ 1 ˆf' facturing centres had all but destroyed the old village industries, and great populations were growing up outside the traditional restraints of the old system of class dependence. The distress inevitable in connexion with such an industrial revolution was increased by the immense burden of the war and by the high protective policy of the parliament, which restricted trade and deliberately increased the price of food in the interests of the agricultural classes. Between 181 1 and 1814 bands of so-called " Luddites," starving operatives out of work, scoured the country, smashing machinery — the immediate cause of their misfortunes — and committing every sort of out- rage. The fault of the government lay, not in taking vigorous measures for the suppression of these disorders, but in remain- ing obstinately blind to the true causes that had produced them.

Ministers saw in the Luddite organization only another con- spiracy against the state; and, so far from seeking means for removing the grievances that underlay popular disaffection, the activity of parliament, inspired by the narrowest class interests, only tended to increase them. The price of food, already raised by the war, was still further increased by suc- Corn Laws cess i ve Corn Laws, and the artificial value thus given and to arable land led to the passing of Enclosure Bills,

Enclosure under which the country people were deprived of their Acts ' common rights with very inadequate compensation,

and life in the village communities was made more and more difficult. In the circumstances it is not surprising that the spirit of unrest grew apace. In 1815 the passing of a new Corn Law, forbidding the importation of corn so long as the price for home-grown wheat was under 80s. the quarter, led to riots in London. An attack made on the prince regent at the opening of parliament on the 28th of January 181 7 led to an inquiry, which revealed the existence of an elaborate organization for the overthrow of the existing order. The repressive measures of 1795 and 1799 were now revived and extended, and Repressive a ˆill SUS p en ding the Habeas Corpus Act for a year Hon. was passed through both Houses by a large majorityi

On the 27th of March Lord Sidmouth opened the government campaign against the press by issuing a circular to the lords-lieutenants, directing them to instruct the justices of the peace to issue warrants for the arrest of any person charged on oath with publishing blasphemous or seditious libels. The legality of this suggestion was more than doubtful, but it was none the less acted on, and a series of press prosecutions followed, some — as in the case of the bookseller William Hone — on grounds so trivial that juries refused to convict. William Cobbett, the most influential of the reform leaders, in order to avoid arbitrary imprisonment, " deprived of pen, ink and paper," suspended the Political Register and sailed for America. A disturbance that was almost an armed insurrection, which broke out in Derbyshire in June of this year, seemed to justify the severity of the government; it was suppressed without great difficulty, and three of the ringleaders were executed.

It was, however, in 1819 that the conflict between the govern- ment and the new popular forces culminated. Distress was acute; and in the manufacturing towns mass meetings for reform. were ne ld. to discuss a remedy, which, under the guid- ance of political agitators, was discovered in universal suffrage and annual parliaments. The right to return members to parliament was claimed for all communities; and since this right was unconstitutionally withheld, unrepresented towns were invited to exercise it in anticipation of its formal concession. At Birmingham, accordingly, Sir Charles Wolseley was duly elected " legislatorial attorney and representative " of the town. Manchester followed suit; but the meeting arranged for the 9th of August was declared illegal by the magistrates, on the strength of a royal proclamation against seditious meetings issued on the 30th of July. Another meeting was accordingly summoned for the undoubtedly legal purpose of petitioning parliament in favour of reform. On the appointed day (August 16) thousands poured in from

the surrounding districts. These men had been previously drilled, for the pur- pose, as their own leaders asserted, of enabling the vast assem- blage to be conducted in an orderly manner; for the purpose, as the magistrates suspected, of preparing them for an armed insurrection. An attempt was made by a party of yeomanry The t0 arrest a popular agitator, Henry Hunt; the angry

" Mao- mob surged round the horsemen, who found themselves Chester powerless; the Riot Act was read, and the 15th Massacre. jj ussars charged the crowd with drawn swords. The meeting rapidly broke up, but not before six had been killed and many injured. The " Manchester Massacre " gave an immense impetus to the movement in favour of reform. The employment of soldiers to suppress liberty of speech stirred up the resentment of Englishmen as nothing else could have done, and this resentment was increased by the conviction that the government was engaged with the " Holy Alliance " in an

unholy conspiracy against liberty everywhere. The true tend- ency of Castlereagh's foreign policy was not understood, nor had he any of the popular arts which would have enabled Canning to carry public opinion with him in cases where a frank ex- planation was impossible. The Liberals could see no more than that he appeared to be committed to international engagements, the logical outcome of which might be— as an orator of the Opposition put it — that Cossacks would be encamped in Hyde Park for the purpose of overawing the House of Commons.

The dangerous agitation that gave expression to this state of feeling was met by the government in the session of November 1819 by the passing of the famous Six Acts. The first of these deprived the defendant of the right of travers- Acts." ing, but directed that he should be brought to trial within a year; the second increased the penalties for seditious libel; the third imposed the newspaper stamp duty on all pamphlets and the like containing news; the fourth (Seditious Meetings Act) once more greatly curtailed the liberty of public meetings; the fifth forbade the training of persons in the use of arms; the sixth empowered magistrates to search for and seize arms.

The apparent necessity for the passing of these exceptional measures was increased by the imminent death of the old king, the tragic close of whose long reign had won for him a measure of popular sympathy which was wholly A III. died, and the regent became king as George IV. This was the signal for an outburst of popular discontent with the existing order of a far more ominous character than any that had preceded it. The king was generally loathed, not so much for his vices

— which would have been, in this case as in others, condoned in a more popular monarch — but for the notorious meanness and selfishness of his character. Of these qualities he took the occasion of his accession to make a fresh display. He had long been separated from his wifeˆ Caroline of Brunswick; he now refused her the title of queen consort, forbade the mention of her name in the liturgy, and persuaded the government to promote an inquiry in parliament into her conduct, with a view to a divorce. What- ever grounds there may have been for this action, popular sym- pathy was wholly with Queen Caroline, who became the centre round which all the forces of discontent rallied. The failure of the Bill of Pains and Penalties against the queen, which was dropped after it had passed its third reading in the Lords by a majority of only seven, was greeted as a great popular triumph.. The part played by the government in this unsavoury affair had discredited them even in the eyes of the classes whose fear of revolution had hitherto made them supporters of the established system; and the movement for reform received a new stimulus.

The Tory government itself realized the necessity for some concessions to the growing public sentiment. In 1821 a small advance was made. The reform bill (equal electoral districts) introduced by Lambton (afterwards Lord Begin- Durham) was thrown out; but the corrupt borough reform. of Grampound in Cornwall was disfranchised and the seats transferred to the county of York. Even more significant was the change in the cabinet, which was strengthened by the admission of some of the more conservative section of the Opposition, Lord Sidmouth retiring and Robert Peel becoming home secretary. A bill for the removal of Catholic disabilities, too, was carried in the Commons, though rejected in the Lords; and the appointment of Lord Wellesley, an advocate of the Catholic claims, to the lord-lieutenancy of Ireland marked yet another stage in the settlement of a question which, more than anything else at that time, kept Ireland and Irishmen in a state of chronic discontent and agitation.

It is not without significance that this modification of the policy of the Tory government at home coincided with a modi- fication of its relations with the European powers. The tendency of Metternich's 'system had long been growing distasteful to Castlereagh, who had consistently protested against the attempt to constitute the Grand Alliance general police of Europe and

1821-1832}

had specially protested against the Carlsbad Decrees (q.v.). The first steps towards the inevitable breach with the reactionary- powers had already been taken before Castlereagh's tragic death on the eve of the congress of Verona brought George

Canning into office as the executor of his policy. With Canning. Canning, foe of the Revolution and all its works though

he was, the old liberal Toryism of Pitt's younger days seemed once more to emerge. It might have emerged in any case ; but Canning, with his brilliant popular gifts and his frank appeal to popular support, gave it a revivifying stimulus which it would never have received from an aristocrat of the type of Castlereagh.

The new spirit was most conspicuous in foreign affairs; in the protest of Great Britain against the action of the continental

powers at Verona (see Verona, Consress of), in tendency the recognition of the South American republics, and of British later in the sympathetic attitude of the government polky. towards the insurrection in Greece. This policy had been foreshadowed in the instructions drawn up by Castlereagh for his own guidance at Verona; but Canning succeeded in giving it a popular and national colour and thus removing from the government all suspicion of sympathy with the reactionary spirit of the " Holy Alliance." In home affairs, too, the government made tentative advances in a Liberal direction. In January 1823 Vansittart was succeeded as chancellor of the exchequer by Robinson (afterwards Lord Goderich), and Huskisson became president of the Board of Trade. The term of office of the latter was marked by the first tentative efforts to modify the high protective system by which British trade was hampered, especi- ally by the Reciprocity of Duties Act (1823), a modification of the Navigation Acts, by which British and foreign shipping were placed on an equal footing, while the right to impose re- strictive duties on ships of powers refusing to reciprocate was retained. In spite, however, of the improvement in trade that ultimately resulted from these measures, there was great de- pression; in 1825 there was a financial crisis that caused wide- spread ruin, and in 1826 the misery of the labouring poor led to renewed riots and machinery smashing. It became in- creasingly clear that a drastic alteration in the existing system was absolutely inevitable. As to this necessity,

however, the ministry was in fact hopelessly divided. The government was one of compromise, in which even so burning a question as Catholic emancipation had been left open. Among its members were some — like the lord chancellor Eldon, the duke of Welling- ton, and the premier, Lord Liverpool, himself — whose Toryism was of the type crystallized under the influence of the Revolution, adamant against change. Such progressive measures as it had passed had been passed in the teeth of its own nominal sup- porters, even of its own members. In 1826 Lord Palmerston, himself a member of the government, wrote: " On the Catholic question, on the principles of commerce, on the corn laws, on the settlement of the currency, on the laws relating to trade in money, on colonial slavery, on the game laws . . . ; on all these questions, and everything like them, the government will find support from the Whigs and resistance from their self-denom- inated friends." It was, in fact, only the personal influence of Liverpool that held the ministry together, and when, on the 17th of February 1827, he was seized with an apoplectic fit, a crisis was inevitable.

The crisis, indeed, arose before the nominal expiration of the Liverpool administration. Two questions were, in the view of Catholic Canning and his supporters, of supreme importance — Emanctpa Catholic emancipation and the reform of the Corn Laws. Hon and The first of these had assumed a new urgency since the Com formation in 1823 of the Catholic Association, which*

Laws. under the brilliant leadership of Daniel O'Connell established in Ireland a national organization that threatened the very basis of the government. In March 1826 Sir Francis Burdett had brought in a Catholic Relief Bill, which, passed in the Commons, was thrown out by the Lords. A year later Burdett's motion that the affairs of Ireland required immediate attention, though supported by Canning, was rejected in the

Commons. A bill modifying the Corn Laws, introduced by Canning and Huskisson, passed the House of Commons on the 1 2th of April 1827, but was rejected by the Lords.

Meanwhile (April 10) Canning had become prime minister, his appointment being followed by the resignation of all the most conspicuous members of the Liverpool administration: Wellington, Eldon, Melville, Bathurst, Westmorland ^"niltrl. and Peel, the latter of whom resigned on account of his opposition to Catholic emancipation. The new govern- ment had perforce to rely on the Whigs, who took their seats on the government side of the House,

Lord Lansdowne being included in the cabinet. Before this coalition could be com- pleted, however, Canning died (August 8). The short-lived Goderich administration followed; and in January 1828 the king, weary of the effort to arrange a coalition, summoned the duke of Wellington to office as head of a purely WeHing- Tory cabinet. Yet the logic of facts was too strong ministry. even for the stubborn spirit of the Iron Duke. In May 1828, on the initiative of Lord John Russell, the Test and Corporation Acts were repealed; in the same session a Corn Bill, differing but little from those that Wellington had hitherto opposed, was passed; and finally, after a strenuous agitation which culminated in the election of O'Connell for Clare, and in spite of the obstinate resistance of King George IV., the Catholic Emancipation Bill was passed (April 10, Catho "' ! 1829) by a large majority. On the 26th of June 1830 tion the king died, exactly a month before the outbreak passed. of the revolution in Paris that hurled Charles X. from ˆgjJ' " the throne and led to the establishment of the Liberal ' Monarchy under Louis Philippe; a revolution that was to exert a strong influence on the movement for reform in England.

King William IV. ascended the throne at a critical moment in the history of the English constitution. Everywhere misery and discontent were apparent, manifesting themselves in riots against machinery, in rick-burning on a large lv lam scale, and in the formation of trades unions which tended to develop into organized armies of sedition. All the elements of violent revolution were present. Nor was there anything in the character of the new king greatly calculated to restore the damaged prestige of the crown; for, if he lacked the evil qualities that had caused George IV. to be loathed as well as despised, he lacked also the sense of personal dignity that had been the saving grace of George, while he shared the conservative and Protestant prejudices of his predecessors. Reform was now inevitable. The Wellington ministry, hated by the Liberals, denounced even by the Tories as traitorous for the few concessions made, resigned on the 16th of November; and the Whigs at last came into office under Lord WnI „ Grey, the ministry also including a few of the more ministry Liberal Tories. Lord Durham, perhaps the most under influential leader of the reform movement, became Lord are - privy seal, Althorp chancellor of the exchequer, Palmerston foreign secretary, Melbourne home secretary, Goderich colonial secretary. Lord John Russell, as paymaster-general, and Stanley (afterwards Lord Derby), as secretary for Ireland, held office outside the cabinet. With the actual House of Commons, however, the government was powerless to effect its purpose. Though it succeeded in carrying the second reading of the Reform Bill (March 21, 183 1), it was defeated ££f a ' in committee, and appealed to the country. The biii. result was a great governmental majority, and the bill passed the Commons in September. Its rejection by the Lords on the 8th of October was the signal for dangerous rioting; and in spite of*

the opposition of the king, the bill was once more passed by the Commons (December 12). A violent agitation marked the recess. On the 14th of April 1832 the bill was read a second time in the Lords, but on the 7th of May was again rejected, whereupon the government resigned. The attempt of Wellington, at the king's instance, to form a ministry failed; of all the Tory obstructionists he alone had the courage to face the popular rage. On the 15th Lord Grey was in office again; the demand was made for a sufficient creation of peers to swamp

the House of Lords; tho king, now thoroughly alarmed, used his influence to persuade the peers to yield, and on the 4th of June the great Reform Bill became law. Thus was England spared the crisis of a bloody revolution, and proof given to the world that her ancient constitution was sufficiently elastic to expand with the needs of the times.

The effect of the Reform Bill, which abolished fifty-six " rotten " boroughs, and by reducing the representation of others set free 143 seats, which were in part conferred on the new in- dustrial centres, was to transfer a large share of political power from the landed aristocracy to the middle classes. Yet the opposition of the Tories had not been wholly inspired by the desire to maintain the political predominance of a class. Canning, who had the best reason for knowing, defended the unreformed system on the ground that its very anomalies opened a variety of paths by which talent could make its way into parliament, and thus produced an assembly far more widely representative than could be expected from a more uniform and logical system. This argument, which the effect of progressive extensions of the franchise on the intellectual level of parliament has certainly not tended to weaken, was however far outweighed — as Canning himself would have come to see — by the advantage of reconciling with the old constitution the new forces which were destined during the century to transform the social organization of the country. Nor, in spite of the drastic character of the Reform Bill, did it in effect constitute a revolution. The 143 seats set free were divided equally between the towns and the counties; and in the counties the landowning aristocracy was still supreme. In the towns the new £10 household franchise secured a demo- cratic

constituency; in the counties the inclusion of tenants at will (of £50 annual rent), as well as of copyholders and lease- holders, only tended to increase the influence of the landlords. There was as yet no secret ballot to set the voter free.

The result was apparent in the course of the next few years. The first reformed parliament, which met on the 29th of January 1833, consisted in the main of Whigs, with a sprinkling of Radicals and a compact body of Liberal Tories under Sir Robert Peel. Its great work was the act emancipating the slaves in the British colonies (August 30). Other burning questions were the con- dition of Ireland, the scandal of the established church there, the misery of the poor in England. In all these matters the House showed little enough of the revolutionary temper; so little, indeed, that in March Lord Durham resigned. To the Whig leaders the church was all but as sacrosanct as to the Tories, the very foundation of the constitution, not to be touched save at imminent risk to the state; the most they would ad- venture was to remedy a few of the more glaring abuses of an establishment imposed on an unwilling population. As for O'Connell's agitation for the repeal of the Union, that met with but scant sympathy in parliament; on the 27th of May 1834 his repeal motion was rejected by a large majority.

In July the Grey ministry resigned, and on the 16th Lord Melbourne became prime minister. His short tenure of office is memorable for the passing of the bill for the reform mMst™ of the Poor Law (August). The reckless system of outdoor relief, which had pauperized whole neighbour- hoods, was abolished, and the system of unions and workhouses established (see Poor Law). An attempt to divert some of the revenues of the Irish Church led in the autumn to serious differ- ences of opinion in the cabinet; the king, as tenacious as his father of the exact obligations of his coronation oath, dismissed the ministry, and called the Tories to office under Sir Robert Peel and the duke of Wellington. Thus, within three years of the passing of the Reform Bill, the party which had most strenuously opposed it was again in office. Scarcely less striking testimony to the constitutional temper of the English was given by the new attitude of the party under the new conditions. In the " Tam- The worth manifesto " of January 1835 Peel proclaimed

"Coaser- the principles which were henceforth to guide the vatlve" party, no longer Tory, but " Conservative." The par y. Reform Bill and its consequences were frankly accepted ;

further reforms were promised, especially in the matter of the

municipal corporations and of the disabilities of the dissenters. The new parliament, however, which met on the 19th of February, was not favourable to the ministry, which fell on the 8th of April. Lord Melbourne once more came into office, and the Municipal Corporations Act of the 7 th of September was the work of a Liberal government. This was the last measure of first-rate importance passed before the death of King William, which occurred on the 20th of June 1837.

It is impossible to exaggerate the importance, not only for England but for the world at large, of the epoch which cul- minated in the passing of the Reform Bill of 1832. All Europe, whether Liberal or reactionary, was watching the constitutional struggle with strained attention; the principles of monarchy and of constitutional liberty were alike at stake. To foreign observers it seemed impossible that the British monarchy could survive. Baron Brunnow, the Russian ambassador in London, sent home to the emperor Nicholas I. the most pessimistic reports. According to Brunnow, King William, by using his influence to secure the passage of the Reform Bill, had " cast his crown into the gutter"; the throne might endure for his lifetime, but the next heir was a young and inexperienced girl, and, even were the princess Victoria ever to mount the throne — which was unlikely — she would be speedily swept off it again by the rising tide of republicanism. The course of the next reign was destined speedily to convince even Nicholas I. of the baselessness of these fears, and to present to all Europe the exemplar of a progressive state, in which the principles of traditional authority and democratic liberty combined for the common good. (W. A. P.)

XII. The Reign of Victoria (1837-1901)

The death of William IV., on the 20th of June 1837, placed on the throne of England a young princess, who was destined to reign for a longer period than any of her pre- decessors. The new queen, the only daughter of the y^,^j a t s duke of Kent, the fourth son of George III., had just accession. attained her majority. Educated in comparative seclusion, her character and her person were unfamiliar to her future subjects, who were a little weary of the extravagances and eccentricities of her immediate predecessors. Her accession gave them a new interest in the house of Hanover. And their loyalty, which would in any case have been excited by the accession of a young and inexperienced girl to the throne of the greatest empire in the world, was stimulated by her conduct and appearance. She displayed from the first a dignity and good sense which won the affection of the multitude who merely saw her in public, and the

confidence of the advisers who were admitted into her presence.

The ministry experienced immediate benefit from the change. The Whigs, who had governed England since 1830, under Lord Grey and Lord Melbourne, were suffering from the reaction which is the inevitable consequence of revolution. The country which, in half-a-dozen years, had seen a radical reform of parlia- ment, a no less radical reform of municipal corporations, the abolition of slavery, and the reconstruction of the poor laws, was longing for a period of political repose. The alliance, or understanding, between the Whigs and the Irish was increasing the distrust of the English people in the ministry, and Lord Melbourne's government, in the first half of 1837, seemed doomed to perish. The accession of the queen gave it a new lease of power. The election, indeed, which followed her ac- cession did not materially alter the composition of the House of Commons. But the popularity of the queen was extended to her government. Taper's suggestion in Coningsby that the Conservatives should go to the country with the cry, " Our young queen and our old institutions," expressed, in an epigram, a prevalent idea. But the institution which derived most immediate benefit from the new sovereign was the old Whig ministry.

The difficulties of the ministry, nevertheless, were great. In the preceding years it had carried most of the reforms which were demanded in Great Britain; but it had failed to

diffi- culties.

obtain the assent of the House of Lords to its Irish measures. It had desired ® to follow up the reform of English cor- Lord Mel- porations by a corresponding reform of Irish muni- bourae's cipalities; (2) to convert the tithes, payable to the Irish Church, into a rent charge, and to appropriate its surplus revenues to other purposes; (3) to deal with the chronic distress of the Irish people by extending to Ireland the principles of the English poor law. In the year which succeeded the accession of the queen it accomplished two of these objects. It passed an Irish poor law and a measure commuting tithes in Ireland into a rent charge. The first of these measures was carried in opposition to the views of the Irish, who thought that it imposed an

intolerable burden on Irish property. The second was only carried on the government con- senting to drop the appropriation clause, on which Lord Mel- bourne's administration had virtually been founded.

It was not, however, in domestic politics alone that the ministry was hampered. In the months which immediately followed the queen's accession news reached England of dis- turbances, or even insurrection in Canada. The rising was easily put down; but the condition of the colony was so grave that the ministry decided to suspend the constitution of lower Canada for three years, and to send out Lord Durham with almost dicta- torial powers. Lord Durham's conduct was, unfortunately, marked by indiscretions which led to his resignation; but before leaving the colony he drew up a report on its condition and on its future, which practically became a text-book for his successors, and has influenced the govtinment of British colonies ever since. Nor was Canada the only great colony which was seething with discontent. In Jamaica the planters, who had sullenly accepted the abolition of slavery, were irritated by the passage of an act of parliament intended to remedy some grave abuses in the management of the prisons of the island. The colonial House of Assembly denounced this act as a violation of its rights, and determined to desist from its legislative functions. The governor dissolved the assembly, but the new house, elected in its place, reaffirmed the decision of its predecessor; and the British ministry, in face of the crisis, asked parliament in 1839 for authority to suspend the constitution of the island for five years. The bill introduced for this purpose placed the Whig ministry in a position of some embarrassment. The advocates of popular government, they were inviting parliament, for a second time, to suspend representative institutions in an important colony. Supported by only small and dwindling majorities, they saw that it was hopeless to carry the measure, and they decided on placing their resignations in the queen's hands. The queen naturally sent for Sir Robert Peel, who undertook to form a government. In the course of the negotiations, however, he stated that it would be necessary to make certain changes in the household, which contained some great ladies closely connected with the leaders of the Whig party. The queen shrank from separating herself from ladies who had surrounded her since she came to the throne, and Sir Robert thereupon declined the task of forming a ministry. Technically he was justified in adopting this course, but people generally felt that there was some hardship in com- pelling a young queen to separate herself from her companions and friends, and they consequently approved the decision of Lord Melbourne to support the queen in her refusal, and to resume office.

The Whigs returned to place, but they could not be said to return to power. They did not even venture to renew the original Jamaica Bill. They substituted for it a modified proposal which they were unable to carry. They were obviously indebted for office to the favour of the queen, and not to the support of parliament.

Yet the session of 1839 was not without important results. After a long struggle, in which ministers narrowly escaped defeat Peanv m tne Commons, and in the course of which they postage. suffered severe rebuffs in the Lords, they succeeded in laying the foundation of the English system of national education. In the same session they were forced against their will to adopt a reform, which had been recommended by

The bed- chamber question.

Rowland Hill, and to confer on the nation the benefit of a uniform penny postage. No member of the cabinet foresaw the consequences of this reform. The postmaster-general, Lord Lichfield, in opposing it, declared that, if the revenue of his office was to be maintained, the correspondence of the country, on which postage was paid, must be increased from 42,000,000 to 480,000,000 letters a year, and he contended that there were neither people to write, nor machinery to deal with, so pro- digious a mass of letters. He would have been astonished to hear that, before the end of the century, his office had to deal with more than 3,000,000,000 postal packets a year, and that the net profit which it paid into the exchequer was to be more than double what it received in 1839.

In 1840 the ministry was not much more successful than it had proved in 1839. After years of conflict it succeeded indeed in placing on the statute book a measure dealing with _. . Irish municipalities. But its success was purchased policy. by concessions to the Lords, which deprived the measure of much of its original merit. The closing years of the Whig administration were largely occupied with the financial difficulties of the country. The first three years of the queen's reign were memorable for a constantly deficient revenue. The deficit amounted to £1,400,000 in 1837, to £400,000 in 1838, and to £1,457,000 in 1839. Baring, the chancellor of the ex- chequer, endeavoured to terminate this deficiency by a general increase of taxation, but this device proved a disastrous failure. The deficit rose to £1,842,000 in 1840. It was obvious that the old expedient of increasing taxation had failed, and that some new method had to be substituted for it. This new method Baring tried to discover in altering the differential duties on timber and sugar, and substituting

a fixed duty of 8s. per quarter for the sliding duties hitherto payable on wheat. By these alterations he expected to secure a large increase of revenue, and at the same time to maintain a sufficient degree of protection for colonial produce. The Conservatives, who believed in pro- tection, at once attacked the proposed alteration of the sugar duties. They were reinforced by many Liberals, who cared very little for protection, but a great deal about the abolition of slavery, and consequently objected to reducing the duties on foreign or slave-grown sugar. This combination of interests proved too strong for Baring and his proposal was rejected. As ministers, however, did not resign on their defeat, Sir Robert Peel followed up his victory by moving a vote of want of confidence, and this motion was carried in an exceptionally full house by 312 votes to 311.

Before abandoning the struggle, the Whigs decided on appeal- ing from the House of Commons to the country. The general election which ensued largely increased the strength of the Conservative party. On the meeting of the ff Peel new parliament in August 1841, votes of want of m i B i s try. confidence in the government were proposed and carried in both houses; the Whigs were compelled to resign office, and the queen again charged Sir Robert Peel with the task of forming a government. If the queen had remained unmarried, it is possible that the friction which had arisen in 1839 might have recurred in 1841. In February 1840, however, Her Majesty had married her cousin, Prince Albert of Saxe-Coburg-Gotha. She was, therefore, no longer dependent on the Whig ladies, to whose presence in her court she had attached so much importance in 1 839. By the management of the prince — who later in the reign was known as the prince consort — the great ladies of the house- hold voluntarily tendered their resignations; and every obstacle to the formation of the new government was in this way removed.

Thus the Whigs retired from the offices which, except for a brief interval in 1834-1835, they had held for eleven years. During the earlier years of their administration they had suc- ceeded in carrying many memorable reforms: during the later years their weakness in the House of Commons had prevented their passing any considerable measures. But, if they had failed in this respect, Lord Melbourne had rendered conspicuous service to the queen. Enjoying her full confidence, consulted by her on every occasion, he had always used his influence for the public

good ; and perhaps those who look back now with so much satis-faction at the queen's conduct during a reign of unexampled length, imperfectly appreciate the debt which in this respect is owed to her first prime minister. The closing years of the Whig government were marked by external complications. A contro- versy on the boundary of Canada and the United States was provoking increasing bitterness on both sides of the Atlantic. The intervention of Lord Palmerston in Syria, which resulted in a great military success at Acre, was embittering the relations between France and England, while the unfortunate expedition to Afghanistan, which the Whigs had approved, was already producing embarrassment, and was about to result in disaster. Serious, however, as were the complications which surrounded British policy in Europe, in the East, and in America, the country, in August 1841, paid more attention to what a great writer called the " condition of England " question. There had never been a period in British history when distress and crime had been so general. There had hardly ever been a period when food had been so dear, when wages had been so low, when poverty had been so widespread, and the condition of the lower orders so depraved and so hopeless, as in the early years of the queen's reign. The condition of the people had prompted the formation of two great associations. The Chartists derived their name from the charter which set out their demands. The rejection of a monster petition, which they presented to parliament in 1839 led to a formidable riot in Birmingham, and to a projected march from South Wales on London, in which twenty persons were shot dead at Newport. Another organization, in one sense even more formidable than the Chartist, was agitating at the same time for the repeal of the corn laws, and was known as the Anti-Corn Law League. It had already secured the services of two men, Cobden and Bright, who, one by clear reasoning, the other by fervid eloquence, were destined to make a profound impression on all classes of the people.

The new government had, therefore, to deal with a position of almost unexampled difficulty. The people were apparently „ sinking into deeper poverty and misery year after year.

reforms. As an outward and visible sign of the inward distress, the state was no longer able to pay its way. It was estimated that the deficit, which had amounted to £1,842,000 in 1840, would reach £2,334,000 in 1841. It is the signal merit of Sir Robert Peel that he terminated this era of private distress and public deficits. He accomplished this task partly by economical administration — for no

minister ever valued economy more — and partly by a reform of the financial system, effected in three great budgets. In the budget of 1842 Sir Robert Peel terminated the deficit by reviving the income tax. The proceeds of the tax, which was fixed at 7d. in the £, and was granted in the first instance for three years, were more than sufficient to secure this object. Sir Robert used the surplus to reform the whole customs tariff. The duties on raw materials, he proposed, should never exceed 5%, the duties on partly manufactured articles 12%, and the duties on manufactured articles 20 % of their value. At the same time he reduced the duties on stage coaches, on foreign and colonial coffee, on foreign and colonial timber, and repealed the export duties on British manufactures. The success of this budget in stimulating consumption and in promoting trade induced Sir Robert Peel to follow it up in 1845 with an even more remarkable proposal. Instead of allowing the income tax to expire, he induced parliament to continue it for a further period, and with the resources which were thus placed at his disposal he purged the tariff of various small duties which produced little revenue, and had been imposed for purposes of protection. He swept away all the duties on British exports; he repealed the duties on glass, on cotton wool, and still further reduced the duties on foreign and colonial sugar. This budget was a much greater step towards free trade than the budget of 1842. The chief object in his third budget in 1846 — the reduc- tion of the duty on corn to is. a quarter — was necessitated by causes which will be immediately referred to. But it will be convenient at once to refer to its other features. Sir Robert Peel told the house that, in his previous budgets, he had given

the manufacturers of the country free access to the raw materials which they used. He was entitled in return to call upon them to relinquish the protection which they enjoyed. He decided, therefore, to reduce the protective duties on cotton, woollen, silk, metal and other goods, as well as on raw materials still liable to heavy taxation, such as timber and tallow. As the policy of 1842 and 1845 had proved unquestionably successful in stimu- lating trade, he proposed to extend it to agriculture. He reduced the duties on the raw materials which the farmers used, such as seed and maize, and in return he called on them to give up the duties on cattle and meat, to reduce largely the duties on butter, cheese and hops, and to diminish the duty on corn- by gradual stages to is. a quarter. In making these changes Sir Robert Peel avowed that it was his object to make the country a cheap one to live in. There is no doubt that they were followed by a remarkable development of British trade. In the twenty- seven years from 1815 to 1842 the export trade of Great

Britain diminished from £49,600,000 to £47,280,000; while in the twenty-seven years which succeeded 1842 it increased from £47,280,000 to nearly £190,000,000. These figures are a simple and enduring monument to the minister's memory. It is fair to add that the whole increase was not due to free trade. It was partly attributable to the remarkable development of com- munications which marked this period.

Two other financial measures of great importance were accomplished in Sir Robert Peel's ministry. In 1844 some £250,000,000 of the national debt still bore an interest of 3!. The improvement in the credit of the country enabled the government to reduce the interest on the stock to 3! for the succeeding ten years, and to 3 % afterwards. This conversion, which effected an immediate saving of £625,000, and an ultimate saving of £1,250,000 a year, was by far the most important measure which had hitherto been applied to the debt; and no operation on the same scale was attempted for more than forty years. In the same year the necessity of renewing the charter of the Bank of England afforded Sir Robert Peel an opportunity of reforming the currency. He separated the issue department from the banking department of the bank, and decided that in future it should only be at liberty to issue notes against (1) the debt of £14,000,000 due to it from the government, and (2) any bullion actually in its coffers. Few measures of the past century have been the subject of more controversy than this famous act,, and at one time its repeated suspension in periods of financial crises seemed to suggest the necessity of its amendment. But opinion on the whole has vindicated its wisdom, and it has survived all the attacks which have been made upon it.

The administration of Sir Robert Peel is also remarkable for its Irish policy. The Irish, under O'Connell, had constantly supported the Whig ministry of Lord Melbourne. But their alliance, or understanding, with the Whigs had not procured them all the results which they had expected from it. The two great Whig measures, dealing with the church and the municipalities, had only been passed after years of controversy, and in a shape which deprived them of many expected advantages. Hence arose a notion in Ireland that nothing was to be expected from a British parliament, and hence began a movement for the repeal of the union which had been accomplished in 1801. This agitation, which smouldered during the reign of the Whig ministry, was rapidly revived when Sir Robert Peel entered upon office. The Irish contributed large sums, which were known as repeal rent, to the cause, and they held monster meetings in various parts of Ireland to stimulate the demand for repeal. The

ministry met this campaign by coercive legislation regulating the use of arms, by quartering large bodies of troops in Ireland, and by prohibiting a great meeting at Clontarf, the scene of Brian Boru's victory, in the immediate neighbourhood of Dublin. They further decided in 1843 to place O'Connell and some of the leading agitators on their trial for conspiracy and sedition. O'Connell was tried before 9 jury chosen from a defective panel, was convicted on an indictment which contained many counts, and the court passed sentence without distinguishing between these counts.

These irregularities induced the House of Lords to reverse the judgment, and its reversal did much to prevent mischief. O'ConnelPs illness, which resulted in his death in 1847, tended also to establish peace. Sir Robert Peel wisely endeavoured to stifle agitation by making considerable concessions to Irish sentiment. He increased the grant which was made to the Roman Catholic College at Maynooth; he established three colleges in the north, south and west of Ireland for the unde- nominational education of the middle classes; he appointed a commission — the Devon commission, as it was called, from the name of the nobleman who presided over it — to investigate the conditions on which Irish land was held; and, after the report of the commission, he introduced, though he failed to carry, a measure for remedying some of the grievances of the Irish tenants. These wise concessions might possibly have had some effect in pacifying Ireland, if, in the autumn of 1845, they had not been forgotten in the presence of a disaster which suddenly fell on that unhappy country. The potato, which was the sole food of at least half the people of an overcrowded island, failed, and a famine of unprecedented proportions was obviously imminent. Sir Robert Peel, whose original views on protection had been rapidly yielding to the arguments afforded by the success of his own budgets, concluded that it was impossible to provide for the necessities of Ireland without suspending the corn laws; and that, if they were once suspended, it would be equally impossible to restore them. He failed, however, to convince two prominent members of his cabinet — Lord Stanley and the duke of Buccleuch — that pro- tection must be finally abandoned, and considering it hopeless to persevere with a disunited cabinet he resigned office. On Sir Robert's resignation the queen sent for Lord John Russell, who had led the Liberal party in the House of

Commons with conspicuous ability for more than ten years, and charged him with the task of forming a new ministry. Differences, which it proved impossible to remove, between two prominent Whigs — Lord Palmerston and Lord Grey — made the task impracticable, and after an interval Sir Robert Peel consented to resume power. Sir Robert Peel was probably aware that his fall had been only postponed. In the four years and a half during which his ministry had lasted he had done much to estrange his party. They said, with some truth, that, whether his measures were right or wrong, they were opposed to the principles which he had been placed in power to support. The general election of 1841 had been mainly fought on the rival policies of protection and free trade. The country had decided for protection, and Sir R. Peel had done more than all his predecessors to give it free trade. The Conservative party, more- over, was closely allied with the church, and Sir Robert had offended the church by giving an increased endowment to Maynooth, and by establishing undenominational colleges — " godless colleges " as they were called — in Ireland. The Conservatives were, therefore, sullenly discontented with the conduct of their leader. They were lashed into positive fury by the proposal which he was now making to abolish the corn laws. Lord George Bentinck, who, in his youth, had been private secretary to Canning, but who in his maturer years had devoted more time to the turf than to politics, placed himself at their head. He was assisted by a remarkable man — Benjamin Disraeli — who joined great abilities to great ambition, and who, embittered by Sir Robert Peel's neglect to appoint him to office, had already displayed his animosity to the minister. The policy on which Sir Robert Peel resolved facilitated attack. For the minister thought it necessary, while providing against famine by repealing the corn laws, to ensure the preservation of order by a new coercion bill. The financial bill and the coercion bill were both pressed forward, and each gave opportunities for discussion and, what was then new in parliament, for obstruction. At last, on the very night on which the fiscal proposals of the ministers were accepted by the Lords, the coercion bill was defeated in the Commons by a combination of Whigs, radicals and protectionists; and Sir R. Peel, worn out with a protracted struggle, placed his resignation in the Queen's hands.

Thus fell the great minister, who perhaps had conferred more

benefits on his country than any of his predecessors. The

external policy of his ministry had been almost as

remarkable as its domestic programme. When he Peel's

, rr 1 1 r foreign

accepted office the country was on the eve of a great policy.

disaster in India; it was engaged in a serious dispute with the United States; and its relations with France were so strained that the two great countries of western Europe seemed unlikely to be able to settle their differences without war. In the earlier years of his administration the disaster in Afghanistan was repaired in a successful campaign; and Lord Ellenborough, who was sent over to replace Lord Auckland as governor-general, increased the dominion and responsibilities of the East India Company by the unscrupulous but brilliant policy which led to the conquest of Sind. The disputes with the United States were satisfactorily composed; and not only were the differences with France terminated, but a perfect understanding was formed between the two countries, under which Guizot, the prime minister of France, and Lord Aberdeen, the foreign minister of England, agreed to compromise all minor questions for the sake of securing the paramount object of peace. The good understanding was so complete that a disagreeable incident in the Sandwich Islands, in which the injudicious conduct of a French agent very nearly precipitated hostilities, was amicably settled; and the ministry had the satisfaction of knowing that, if their policy had produced prosperity at home, it had also maintained peace abroad.

On Sir R. Peel's resignation the queen again sent for Lord John Russell. The difficulties which had prevented his forming a ministry in the previous year were satisfactorily arranged, and Lord Palmerston accepted the seals of the foreign office, while Lord Grey was sent to the colonial office., The history of the succeeding years was destined, however, to prove that Lord Grey had had solid reasons for objecting to Lord Palmerston's return to his old post; for, whatever judgment may ultimately be formed on Lord Palmerston's foreign policy, there can be little doubt that it did not tend to the maintenance of peace. The first occasion on which danger was threatened arose im- mediately after the installation of the new ministry on the question of the Spanish marriages. The queen of Spain, Isabella, was a young girl still in her teens; the heir to the throne was her younger sister, the infanta Fernanda. Diplomacy had long been occupied with the marriages of these children; and Lord Aberdeen had virtually accepted the principle, which the French government had laid down, that a husband for the queen should be found among the descendants of Philip V., and that her sister's marriage to the due de Montpensier — a son of Louis Philippe — should not be celebrated till the queen was married and had issue.

While agreeing to this compromise, Lord Aberdeen declared that he regarded the Spanish marriages as a Spanish, and not as a European question, and that, if it proved impossible to find a suitable consort for the queen among the descendants of Philip V., Spain must be free to choose a prince for her throne elsewhere. The available descendants of Philip V. were the two sons of Don Francis, the younger brother of Don Carlos, and of these the French government was in favour of the elder, while the British government preferred the younger brother. Lord Palmerston strongly objected to the prince whom the French government supported; and, almost immediately after acceding to office, he wrote a despatch in which he enumerated the various candi- dates for the queen of Spain's hand, including Prince Leopold of Saxe-Coburg, a near relation of the prince consort, among the number. Louis Philippe regarded this despatch as a departure from the principle on which he had agreed with Lord Aberdeen, and at once hurried on the simultaneous marriages of the queen with the French candidate, and of her sister with the due de Montpensier. His action broke up the entente cordialc which had been established between Guizot and Lord Aberdeen.

The second occasion on which Lord Palmerston's vigorous diplomacy excited alarm arose out of the revolution which broke out almost universally in Europe in 1848. A rising in Hungary

The

Spanish mar- riages.

was suppressed by Austria with Russian assistance, and after its suppression many leading Hungarians took refuge in Turkish territory. Austria and Russia addressed demands to the Porte for their surrender. Lord Palmerston determined to sup- port the Porte in its refusal to give up these exiles, and actually sent the British fleet to the Dardanelles with this object. His success raised the credit of Great Britain and his own reputation. The presence of the British fleet, however, at the Dardanelles suggested to him the possibility of settling another long-standing controversy. For years British subjects settled in Greece had raised complaints against the Greek government. In particular

Don Pacifico, a Jew, but a native of Gibraltar, com- Padfko. plained that, at a riot, in which his house had been

attacked, he had lost jewels, furniture and papers which he alleged to be worth more than £30,000. As Lord Palmerston was unable by correspondence to induce the Greek government to settle claims of this character, he determined to enforce them; and by his orders a large number of Greek vessels were seized and detained by the British fleet. The French government tendered its good offices to compose the dispute, and an arrangement was actually arrived at between Lord Palmerston and the French minister in London. Unfortunately, before its terms reached Greece, the British minister at Athens had ordered the resumption of hostilities, and had compelled the Greek government to submit to more humiliating conditions. News of this settlement excited the strongest feelings both in Paris and London. In Paris, Prince Louis Napoleon, who had acceded to the presidency of the French republic, decided on recalling his representative from the British court. In London the Lords passed a vote of censure on Lord Palmerston's pro- ceedings; and the Commons only sustained the minister by adopting a resolution approving in general terms the principles on which the foreign policy of the country had been conducted. In pursuing the vigorous policy which characterized his tenure of the foreign office, Lord Palmerston frequently omitted

to consult his colleagues in the cabinet, the prime sto'ad'is- minister, or the queen. In the course of 1849 Her missed. Majesty formally complained to Lord John Russell

that important despatches were sent off without her knowledge; and an arrangement was made under which Lord Palmerston undertook to submit every despatch to the queen through the prime minister. In 1850, after the Don Pacifico debate, the queen repeated these commands in a. much stronger memorandum. But Lord Palmerston, though all confidence between himself and the court was destroyed, continued in office. In the autumn of 185 1 the queen was much annoyed at hearing that he had received a deputation at the foreign office, which had waited on him to express sympathy with the Hungarian refugees, and to denounce the conduct of " the despots and tyrants " of Russia and Austria, and that he had, in his reply, expressed his gratification at the demonstration. If the queen had had her way, Lord Palmerston would have been removed from the foreign office after this incident. A few days later the coup d'etat in Paris led to another dispute. The cabinet decided to do nothing that could wear the appearance of interference in the internal affairs of France; but Lord Palmerston, in con- versation with the French

minister in London, took upon himself to approve the bold and decisive step taken by the president. The ministry naturally refused to tolerate this conduct, and Lord Palmerston was summarily removed from his office.

The removal of Lord Palmerston led almost directly to the fall of the Whig government. Before relating, however, the exact occurrences which produced its defeat, it is necessary to retrace our steps and describe the policy which it had pursued in internal matters during the six years in which it had been in power. Throughout that period the Irish famine had been its chief anxiety and difficulty. Sir Robert Peel had attempted to deal with it (1) by purchasing large quantities of Indian corn, which he had retailed at low prices in Ireland, and (2) by enabling the grand juries to employ the people on public works, which were to be paid out of moneys advanced by the state, one-half being ultimately repayable by the locality. These measures were not I

entirely successful. It was found, in practice, that the sale of Indian corn at low prices by the government checked the efforts of private individuals to supply food; and that the offer of comparatively easy work to the poor at the 'famine, cost of the public, prevented their seeking harder private work either in Ireland or in Great Britain. The new government, with this experience before it, decided on trusting to private enterprise to supply the necessary food, and on throw- ing the whole cost of the works which the locality might under- take on local funds. If the famine had been less severe, this policy might possibly have succeeded. Universal want, how- ever, paralysed every one. The people, destitute of other means of livelihood, crowded to the relief works. In the beginning of 1847 nearly 750,000 persons — or nearly one person out of every ten in Ireland — were so employed. With such vast multitudes to relieve, it proved impracticable to exact the labour which was required as a test of destitution. The roads, which it was decided to make, were blocked by the labourers employed upon them, and by the stones, which the labourers were supposed to crush for their repair. In the presence of this difficulty the government decided, early in 1847, gradually to discontinue the relief works, and to substitute for them relief committees charged with the task of feeding the people. At one time no less than 3,000,000 persons — more than one-third of the entire population of Ireland — were supported by these committees. At the same time it decided on adopting two measures of a more permanent character. The poor law of 1838 had made no provision for the relief of the poor outside the workhouse, and outdoor relief was sanctioned by an act of 1847. Irish landlords complained that their properties, ruined

by the famine, and encumbered by the extravagances of their predecessors, could not bear the cost of this new poor law; and the ministry introduced and carried a measure enabling the embarrassed owners of life estates to sell their property and discharge their liabilities. It is the constant misfortune of Ireland that the measures intended for her relief aggravate her distress. The encumbered estates act, though it substituted a solvent for an insolvent proprietary, placed the Irish tenants at the mercy of landlords of whom they had no previous knowledge, who were frequently absentees, who bought the land as a matter of business, and who dealt with it on business principles by raising the rent. The new poor law, by throwing the maintenance of the poor on the soil, encouraged landlords to extricate themselves from their responsi- bilities by evicting their tenants. Evictions were made on a scale which elicited from Sir Robert Peel an expression of the deepest abhorrence. The unfortunate persons driven from their holdings and forced to seek a refuge in the towns, in England, or — when they could afford it — in the United States, carried with them everywhere the seeds of disease, the constant hand- maid of famine.

Famine, mortality and emigration left their mark on Ireland. In four years, from 1845 to 1849, its population decreased from 8,295,000 to 7,256,000, or by more than a million persons; and the decline which took place at that time went on to the end of the century. The population of Ireland in 1901 had decreased to 4,457,000 souls. This fact is the more remarkable, because Ireland is almost the only portion of the British empire, or indeed of the civilized world, where such a circumstance has occurred. We must go to countries like the Asiatic provinces of Turkey, devastated by Ottoman rule, to find such a diminution in the numbers of the people as was seen in Ireland during the last half of the 19th century. It was probably inevitable that the distress of Ireland should have been followed by a renewal of Irish outrages. A terrible series of agrarian crimes was com- mitted in the autumn of 1847; and the ministry felt compelled, in consequence, to strengthen its hands by a new measure of coercion, and by suspending the Habeas of 1848." Corpus Act in Ireland. The latter measure at once brought to a crisis the so-called rebellion of 1848, for his share in which Smith O'Brien, an Irish member of parliament, was convicted of high treason. The government, however, did not venture to carry out the grim sentence which the law still applied

to traitors, and introduced an act enabling it to commute the death penalty to transportation. The " insurrection " had from the first proved abortive. With Smith O'Brien's transportation it practically terminated.

In the meanwhile the difficulties which the government was experiencing from the Irish famine had been aggravated by a grave commercial crisis in England. In the autumn of 1847 a series of failures in the great commercial centres created a panic in the city of London, which forced consols down to 78, and induced the government to take upon itself the responsibility of suspending the Bank Charter Act. That step, enabling the directors of the Bank of England to issue notes unsecured by bullion, had the effect of gradually restoring confidence. But a grave commercial crisis of this character is often attended with other than financial consequences. The stringency of the money market increases the distress of the industrial classes by diminish- ing the demand for work; and, when labour suffers, political agitation flourishes. Early in 1848, moreover, revolutions on the continent produced a natural craving for changes at home. Louis Philippe was- driven out of Paris, the emperor of Austria was driven out of Vienna, the Austrian soldiery had to withdraw from Milan, and even in Berlin the crown had to make terms with the people. While thrones were falling or tottering in every country in Europe, it was inevitable that excitement and agitation should prevail in Great Britain. The Chartists, reviving the machinery which they had endeavoured to employ in 1839, decided on preparing a monster petition to parliament, which was to be escorted to Westminster by a monster procession. Their preparations excited general alarm, and on the invitation Charts °^ t ' ie g° vernmen t no less than 170,000 special con- stables were sworn in to protect life and property against a rabble. By the judicious arrangements, however, which were made by the duke of Wellington, the peace of the metropolis was secured. The Chartists were induced to abandon the procession which had caused so much alarm, and the monster petition was carried in a cab to the House of Commons. There it was mercilessly picked to pieces by a select committee. It was found that, instead of containing nearly 6,000,000 signatures, as its originators had boasted, less than 2,000,000 names were attached to it. Some of the names, moreover, were obviously fictitious, or even absurd. The exposure of these facts turned the whole thing into ridicule, and gave parliament an excuse for postponing measures of organic reform which might otherwise have been brought forward.

If the ministry thus abstained from pressing forward a large scheme of political reform, it succeeded in carrying two measures of the highest commercial and social importance. In 1849 it supplemented the free trade policy, which Sir Robert Peel had developed, by the repeal of the Navigation Acts. Briefly stated, these acts, which had been originated during the Protectorate of Cromwell, and continued after the Restoration, reserved the whole coasting trade of the country for British vessels and British seamen, and much of the foreign trade for British vessels, commanded and chiefly manned by British subjects. The acts, therefore, were in the strictest sense protective, but they were also designed to increase the strength of Great Britain at sea, by maintaining large numbers of British seamen. They had been defended by Adam Smith on the ground that defence was " of much more importance than opulence," and by the same reasoning they had been described by John Stuart Mill as, " though economically disadvantageous, politically expedient." The acts, however, threw a grave burden on British trade and British shipowners. Their provisions by restricting competition naturally tended to raise freights, and by restricting employment made it difficult for shipowners to man their vessels. Accordingly the government wisely determined on their repeal; and one of the last and greatest battles between Free Trade and Protection was fought over the question. The second reading of the government bill was carried in the House of Lords by a majority of only ten: it would not have been carried at all if the government had not secured a much larger number of proxies than their opponents could obtain.

Naviga- tion Acts.

If the repeal of the Navigation Acts constituted a measure of the highest commercial importance, the passage of the Ten Hours Bill in 1847 marked the first great advance in factory legislation. Something, indeed, had already B ˆ ours been done to remedy the evils arising from the em- ployment of women and very young children in factories and mines. In 1833 Lord Ashley, better known as Lord Shaftesbury, had carried the first important Factory Act. In 1842 he had succeeded, with the help of the striking report of a royal com- mission, in inducing parliament to prohibit the employment of women and of boys under ten years of age in mines. And in 1843 Sir James Graham, who was home secretary in Sir Robert Peel's administration, had been compelled by the pressure of public opinion to introduce a measure providing for the education of children employed in factories, and for limiting the hours of work of children and young persons. The educational clauses of this bill were obviously framed in the interests of the Church of England, and

raised a heated controversy which led to the abandonment of the measure; and in the following year Sir James Graham introduced a new bill dealing with the labour question alone. Briefly stated, his proposal was that no child under nine years of age should be employed in a factory, and that no young person under eighteen should be employed for more than twelve hours a day. This measure gave rise to the famous controversy on the ten hours clause, which commenced in 1844 and was protracted till 1847. Lord Ashley and the factory reformers contended, on the one hand, that ten hours were long enough for any person to work; their opponents maintained, on the contrary, that the adoption of the clause would injure the working-classes by lowering the rate of wages, and ruin the manufacturers by exposing them to foreign competition. In 1847 the reform was at last adopted. It is a remarkable fact that it was carried against the views of the leading statesmen on both sides of the House. It was the triumph of common sense over official arguments.

During the first four years of Lord John Russell's government, his administration had never enjoyed any very large measure of popular support, but it had been partly sustained by the advocacy of Sir Robert Peel. The differences which estranged Sir Robert from his old supporters were far greater than those which separated him from the Whigs, and the latter were therefore constantly able to rely on his assistance. In the summer of 1850, however, a lamentable accident — a fall from his horse — deprived the country of the services of its great statesman. His death naturally affected the position of parties. The small remnant of able men, indeed, who had been associated with him in his famous administration, still maintained an attitude of neutrality. But the bulk of the Conservative party rallied under the lead of Lord Stanley (afterwards Derby) in the House of Lords, and gradually sub- mitted to, rather than accepted, the lead of Disraeli in the House of Commons.

In the autumn which succeeded Sir Robert Peel's death, an event which had not been foreseen agitated the country and produced a crisis. During the years which had suc- ceeded the Reform Bill a great religious movement movement. had influenced politics both in England and Scotland. In England, a body of eminent men at Oxford — of whom J. H., afterwards Cardinal, Newman was the chief, but who numbered among their leaders Hurrell Froude, the brother of the historian, and Keble, the author of the Christian Year — endeavoured to prove that the doctrines of the Church of England were identical with those of the primitive Catholic Church, and that every Catholic doctrine might be held by those who were within its pale. This view was explained in a remarkable series of tracts, which

gave their authors the name of Tractarians. The most famous of these, and the last of the series, Tract XC, was pub- lished three years after the queen's accession to the throne. In Scotland, the Presbyterian Church — mainly under the guidance of Dr Chalmers, one of the most eloquent preachers of the century —was simultaneously engaged in a contest with the state on the subject of ecclesiastical patronage. Both movements had this

Death ot Peel.

in common, that they indicated a revival of religious energy, and aimed at vindicating the authority of the church, and resist- ing the interference of the state in church matters. The Scottish movement led to the disruption of the Church of Scotland and the formation of the Free Church in 1 843 . The Tractarian movement was ultimately terminated by the secession of Newman and many of his associates from the Church of England, and their admission to the Church of Rome. These secessions raised a feeling of ■ alarm throughout England. The people, thoroughly Protestant, were excited by the proofs — which they thought were afforded —that the real object of the Tractarians was to reconcile England with Rome; and practices which are now regarded as venial or even praiseworthy — such as the wearing of the surplice in the pulpit, and the institution of the weekly offertory'— were denounced because they were instituted by the Tractarians, and were regarded as insidious devices to lead the country Romewards. The sympathies of the Whigs, and especially of the Whig prime minister, Lord John Russell, were with the people; and Lord John displayed his dislike to the Romanizing tendencies of the Tractarians by appointing Renn Dickson Hampden — whose views had been formally condemned by the Hebdomadal Board at Oxford — to the bishopric of Hereford, The High Church party endeavoured to oppose the appointment at every stage; but their attempts exposed them to a serious defeat. The courts held that, though the appointment of a bishop by- the crown required confirmation in the archbishop's court, the confirmation was a purely ministerial act which could not be refused. The effort which the High Church party had made to resist Dr Hampden's appointment had thus resulted in showing conclu- sively that authority resided in the crown, and not in the arch- bishop. It so happened that about the

same time this'view was confirmed by another judicial decision. The lord chancellor presented the Rev. G. C. Gorham to a living in Devonshire; and Dr Phillpotts, the bishop of Exeter, declined to institute himj on the ground that he held heretical views on the subject of baptism. The court of arches upheld the bishop's decision. The finding of the court, however, was reversed by the privy council, and its judgment dealt a new blow at the Tractarian party. For it again showed that authority — even in doctrine — ■ resided in the crown and not in the church. Within a few months of this famous decision the pope — perhaps encouraged by the activity and despondency of the High Church party- issued a brief " for re-establishing and extending the Catholic faith in England," and proceeded to divide England and Wales into twelve sees. One of them — Westminster — was made an archbishopric, and the new dignity was conferred on Nicholas Patrick Stephen Wiseman, who was almost immediately after- wards created cardinal. The publication of this brief caused much excitement throughout the country, which was fanned by a letter from the prime minister to the bishop of Durham, con- demning the brief as " insolent and insidious " and " inconsistent with the queen's supremacy, with the rights of our bishops and clergy, and with the spiritual independence of the nation." Somewhat unnecessarily the prime minister went on to condemn the clergymen of the Church of England who had subscribed the Thirty-nine Articles, " who have been the most forward in leading their own flocks, step by step, to the very edge' of the precipice."

In accordance with the promise of Lord John Russell's letter, the ministry, at the opening of the session of 1851, introduced

a measure forbidding the assumption of territorial ttaiTnues titles by the priests and bishops of the Roman Catholic BUI. Church, declaring all gifts made to them. and all acts

done by them under these titles null and void, and forfeiting to the crown all property bequeathed to them. The bill naturally encountered opposition from many Liberals, while it failed to excite any enthusiasm among Conservatives, who thought its remedies inadequate. In the middle of the debates upon it the government was defeated on another question —a proposal to reduce the county franchise — and, feeling that it could no longer rely on the support of the House of Commons, tendered its resignation. But Lord Stanley, whom the, queen

entrusted with the duty of forming a new administration, was compelled to decline the task, and Lord John resumed office. Mild as

the original Ecclesiastical Titles Bill had been thought, the new edition of it, which was introduced after the restoration of the Whigs to power, was still milder. Though, after pro- tracted debates, it at last became law, it satisfied nobody. Its provisions, as was soon found, could be easily evaded, and the bill, which had caused so much excitement, and had nearly precipitated the fall of a ministry, remained a dead letter. The government, in fact, was experiencing the truth that, if a defeated ministry may be occasionally restored to place, it cannot be restored to power. The dismissal of Lord Palmerston from the foreign office in 185 1 further increased the embarrassments of the government. In February 1852 it was defeated on a proposal to revive the militia, and resigned.

The circumstances which directly led to the defeat of the Whigs were, in one sense, a consequence of the revolutionary wave which had swept over Europe in; 1848. The : fall of Louis Philippe in that year created a panic in scare. Great Britain.- Men thought that the unsettled state of France made war probable, and they were alarmed at the defenceless condition of England. Lord Palmerston, speaking in 1845, had declared that " steam had bridged the Channel "; and the duke of Wellington had addressed a letter to Sir John Burgoyne, in which he had demonstrated that the country was not in a position to resist an invading force. The panic was so great that the ministry felt it necessary to make exceptional provisions for allaying it. Lord John Russell decided on asking parliament to sanction increased armaments, and to raise the income tax to is. in the pound in order to pay for them. The occasion deserves to be recollected as one on which a prime minister, who was not also chancellor of the exchequer, has himself proposed the budget of the year. But it was still more memorable because the.remedy which Lord John proposed at once destroyed the panic which had suggested it. A certain increase of the income tax to a shilling seemed a much more serious calamity than the uncertain prospect of a possible invasion. The estimates were recast, the budget was withdrawn, and the nation was content to dispense with any addition to its military and naval strength. Events in France, in the meanwhile, moved with railway speed. Louis Napoleon became president of the French Republic: in 1852 he became emperor of the French. The new emperor, indeed, took pains to reassure a troubled continent that " the empire was peace." The people insisted on believing— and, as the event proved, rightly — that the empire was war. Notwithstanding the success of the Great Exhibition of 1851, which was supposed to inaugurate a new reign of peace, the panic, which had been temporarily allayed in 1848, revived at the close of 1851, and the government endeavoured

to allay it by reconstituting the militia. There were two possible expedients. An act of 1757 had placed under the direct authority of the crown a militia composed of men selected in each parish by ballot, liable to be called out for active service, and to be placed under military law. But the act had been supplemented by a series of statutes passed between 1808 and 1812, which had provided a local militia, raised, like the regular militia, by ballot, but, unlike the latter, only liable for service for the suppression of riots, or in the event of imminent invasion. Lord John Russell's government, forced to do something by the state of public opinion, but anxious — from the experience of 1848— to make that something moderate, decided on reviving the local militia. Lord Palmerston at once suggested that the regular and not the local militia should be revived; and, in a small house of only 265 members, he succeeded in carrying a resolution to that effect. He had, in this way, what he called his " tit for tat " with Lord John; and the queen, accepting her minister's resignation, sent for Lord Derby — for Lord Stanley had now succeeded to this title— and charged him with the task of forming a ministry. ....

The government • which Lord Derby succeeded in forming was composed almost exclusively of the men who had rebelled against Sir Robert Peel in 1845. It was led in the House of

1852-18531

ENGLISH HISTORY

565

Commons by the brilliant, but somewhat unscrupulous states man Who had headed the revolt. With the exception of

Lord Derby and one other man, its members had Derby. no experience of high office; and it had no chance

of commanding a majority of 'the House of Commons in the existing parliament. It owed its position to the divisions of its opponents. Profiting by their experience, it succeeded in framing and passing a measure reconstituting the regular militia, which obtained general approval. It is perhaps worth observing that it maintained the machinery of a ballot, but reserved it only in case experience should prove that it was necessary. Voluntary enlistment under the new Militia Bill was to be the rule: compulsory service was only to be resorted to if voluntary enlistment should fail. This success, to a

certain extent, strengthened the position of the new ministry. It was obvious, however, that its stability would ultimately be deter- mined by its financial policy. Composed of the men who had resisted the free trade measures of the previous decade, its fate depended on its attitude towards. free trade. In forming his administration Lord Derby had found it necessary to declare that, though he was still in favour of a tax on corn, he should take no steps in this direction till the country had received an opportunity of expressing its opinion. His leader in the House of Commons went much further, and declared that the time had gone by for reverting to protection. The view which Disraeli thus propounded in defiance of his previous opinions was con- firmed by the electors on the dissolution of parliament. Though the new government obtained some increased strength from the result of the polls, the country, it was evident, had no intention of abandoning the policy of free trade, which by this time, it was clear, had conferred substantial benefits on all classes. When the new parliament met in the autumn of 1852, it was at once plain that the issue would be determined on the rival merits of the old and the new financial systems. Disraeli courted the decision by at once bringing forward the budget, which custom, and perhaps convenience, would have justified him in postponing till the following spring. His proposal — in which he avowedly threw over his friends on the ground that " he had greater subjects to consider than the triumph of obsolete opinions " — was, in effect, an attempt to conciliate his old supporters by. a policy of doles, and to find the means for doing so by the increased taxation of the middle classes. He offered to relieve the shipping interest by transferring some of the cost of lighting the coasts to the Consolidated Fund; the West India interest by sanctioning the refining of sugar in bond; and the landed classes by reducing the malt tax by one-half, and by repealing the old war duty on hops. He suggested that the cost of these measures should be defrayed by extending the income tax to Ireland to industrial incomes of £100 and to permanent incomes of £50 a year, as well as by doubling the house tax, and extend- ing it to all £10 householders. The weight, therefore, of these measures was either purposely or unintentionally thrown mainly on persons living in houses worth from £10 to £20 a year, or on persons in receipt of incomes from £50 to £150 a year. This defect in the budget was exposed in a great speech by Gladstone, which did much to ensure the defeat of the scheme and the fall of the ministry.

On the resignation of Lord Derby, the queen, anxious to terminate a period of weak, governments, decided on endeavour-

ing to combine in one cabinet the chiefs of the Whig 1853. “”” P art y

and the followers of Sir Robert Peel. With this

view she sent both for Lord Aberdeen, who had held the foreign office under Sir Robert, and for Lord Lansdowne, who was the Nestor of the Whigs; and with Lord Lansdowne's concurrence charged Lord Aberdeen with the task of forming a government. In the new ministry Lord Aberdeen became first lord of the treasury, Gladstone chancellor of the exchequer, Lord John Russell foreign minister — though he was almost immediately replaced in the foreign office by Lord Clarendon, and himself assumed the presidency of the council. Lord Palmerston went to the home office. One other appointment must also be mentioned. The secretary of state for the colonies

was also at that time secretary of state for war. No one in 1852. however, regarded that office as of material importance, and it was entrusted by Lord Aberdeen to an amiable and conscientious nobleman, the duke of Newcastle.

The first session of the Aberdeen administration will be chiefly recollected for the remarkable budget which Gladstone brought forward. It constituted a worthy supplement

Budget of

1853.

to the measures of 1842, 1845 and 1846. Gladstone swept away the duty on one great necessary of life — soap; he repealed the duties pn 123 other articles; he reduced the duties on 133 others, among them that on tea; and he found means for paying for these reforms and for the gradual reduction and ultimate abolition of the income tax, which had become very unpopular, by (1) extending the tax to incomes of £100 a year; (2) an increase; of the spirit duties; and (3) applying the death duties to real property, and to property passing by settle-, ment. There can be little doubt that this great proposal was one of the most striking which had ever been brought forward in the House of Commons; there can also, unhappily, be no doubt that its. promises and intentions were frustrated by events which proved too strong for its author. For Gladstone, in framing his budget, had contemplated a continuance of peace, and the country was, unhappily, already drifting into war.

For some years an obscure quarrel had been conducted at Constantinople about the custody of the holy places at Jerusalem. France, relying on a treaty concluded in the first half of the 1 8th

century, claimed the guardianship of these places. ■ places for the Latin Church. But the rights which the Latin Church had thus obtained had practically fallen into disuse, while the Greek branch of the Christian Church had occupied and repaired the shrines which the Latins had neglected. In the years which preceded 1853, however, France had shown more activity in asserting her claims; and the new emperor of the French, anxious to conciliate the church which had supported his elevation to the throne, had a keen interest in upholding them. If, for reasons of policy, the emperor had grounds for his action, he had personal motives for thwarting the tsar of Russia; for the latter potentate had been foolish enough, in recognizing the second empire, to address its sovereign as " Mon Cher Ami," instead of, in the customary language of sovereigns, as "Monsieur Mon Frere." Thus, at the close of 1852, and in the beginning of 1853, Russia and France were both addressing opposite and irreconcilable demands to the Porte, and France was already talking of sending her fleet to the Dardanelles, while Russia was placing an army corps on active service and despatching Prince Menshikov on a special mission to Constantinople. So far the quarrel which had occurred at the Porte was obviously one in which Great Britain had no concern. The Aberdeen ministry, however, thought it desirable that it should be represented in the crisis by a strong man at Constantinople; and it selected Lord Stratford de Redcliffe for the post, which he had filled in former years with marked ability. Whatever merits Lord Stratford possessed— and he stands out in current diplomacy as the one strong man whom England had abroad — there was no doubt that he had this disqualification: the emperor Nicholas had refused some years before to receive him as ambassador at St Petersburg, and Lord Stratford had resented, and never forgiven, the discourtesy of this refusal. Lord Stratford soon discovered that Prince Menshikov was the bearer of larger demands, and that he was requiring the Porte to agree to a treaty acknowledging the right of Russia to protect the Greek Church throughout the Turkish dominions. By Lord Stratford's advice the Porte — while making the requisite concession respect- ing the holy places — refused to grant the new demand ; and Prince Menshikov thereupon withdrew from Constantinople.

The rejection of Prince Menshikov's ultimatum was followed by momentous consequences. Russia — or rather her. tsar- resolved on the occupation of the Danubian principalities; the British ministry — though the quarrel did not directly concern Great Britain — sent a fleet to the Dardanelles and placed it under Lord Stratford's orders. Diplomacy, however, made a fresh attempt to terminate the dispute,

and in July 1853 a note

was agreed upon by the four neutral powers, France, Great Britain, Austria and Prussia, which it was decided to present to Constantinople and St Petersburg. This note, the adoption of which would have ensured peace, was accepted at St Petersburg; at Constantinople it was, unfortunately, rejected, mainly on Lord Stratford's advice, and in opposition to his instructions from home. Instead, however, of insisting on the adoption of the note to which it had agreed, Lord Aberdeen's ministry recommended the tsar to accept some amendments to it suggested by Lord Stratford, which it was disposed to regard as unimportant. It then discovered, however, that the tsar attached a meaning to the original note differing from that which it had itself applied to it, and in conjunction with France it thereupon ceased to recommend the Vienna note — as it was called — for acceptance. This decision separated the two western powers from Austria and Prussia, who were disposed to think that Russia had done all that could have been required of her in accepting the note which the four powers had agreed upon.

It was obvious that the control of the situation was passing from the hands of the cabinet at home into those of Lord Stratford at Constantinople. The ambassador, in fact, had the great advantage that he knew his own mind; the cabinet laboured under the fatal disadvantage that it had, collectively, no mind. Its chief, Lord Aberdeen, was dominated by a desire to preserve peace; but he had not the requisite force to control the stronger men who were nominally serving under him. Lord John Russell was a little sore at his own treatment by his party. He thought that he had a claim to the first place in the ministry, and he did not, in consequence, give the full support to Lord Aberdeen which the latter had a right to expect from him. Lord Palmerston, on the other hand, had no personal grudge to nurture, but he was convinced that the first duty of England was to support Turkey and to resist Russia. He represented in the cabinet the views which Lord Stratford was enforcing at Constantinople, and step by step Lord Stratford, thus supported, drove the country nearer and nearer to war.

In October the Porte, encouraged by the presence of the British fleet

in the Bosporus, took the bold step of summoning the Russians to evacuate the principalities. Following up this demand the Turkish troops attacked the Russian army, and inflicted on it one or two sharp defeats. The Russians retaliated by loosing their squadron from Sevastopol, and on the 30th of November it attacked and destroyed the Turkish fleet at Sinope. The massacre of Sinope — as it was rather inaccurately called in Great Britain, for it is difficult to deny that it was a legitimate act of a belligerent power — created an almost irresistible demand for war among the British people. Yielding to popular opinion, the British ministry assented to a suggestion of the French emperor that the fleets of the allied powers should enter the Black Sea and " invite " every Russian vessel to return to Sevastopol. The decision was taken at an unfortunate hour. Diplomatists, pursuing their labours at Vienna, had succeeded in drawing up a fresh notewhichthey thought might prove acceptable both at St Petersburg and at Constantinople. This note was presented almost at the moment the tsar learned that the French and British fleets had entered the Black Sea, and the Russian government, instead of considering it, withdrew its ministers from London and Paris; the French and British ambassadors were thereupon withdrawn from St Petersburg. An ultimatum was soon afterwards addressed to Russia requiring her to evacuate the principalities, and war began. In deciding on war the British government relied on the capacity of its fleet, which was entrusted to the command of Sir Charles Napier, to strike a great blow in the Baltic. The fleet was despatched with extraordinary rejoicings, and amidst loud and confident expressions of its certain triumph. As a matter of fact it did very little. In the south of Europe, however, the Turkish armies on the Danube, strengthened by the advice of British officers, were more successful. The Russians were forced to retire, and the principalities were evacuated. A prudent administration might possibly have succeeded in stopping the war at this point. But the temper of the country was by this

Crimean War.

time excited, and it was loudly demanding something more than a preliminary success. It was resolved to invade the Crimea and attack the great arsenal, Sevastopol, whence the Russian fleet had sailed to Sinope, and in September 1854 the allied armies landed in the Crimea. On the 20th the Russian army, strongly posted on the banks of the Alma, was completely defeated, and it is almost certain that, if the victory had been at once followed up, Sevastopol would have fallen. The commanders of the allied armies, however, hesitated to throw themselves against the forts greeted to the north of the town,

and decided on the hazardous task of marching round Sevastopol and attacking it from the south. The movement was successfully carried out, but the Allies again hesitated to attempt an immediate assault. The Russians, who were advised by ; Colonel Todleben, the only military man who attained a great reputation in the war, thus gained time to strengthen their position by earthworks; and the Allies found themselves forced, with scanty preparations, to undertake a regular, siege against an enemy whose force was numerically superior to their own. In the early days of the siege, indeed, the allied armies were twice in great peril. A formidable attack on the 25th October on the British position at Balaklava led to a series of encounters which displayed the bravery of British troops, but did not enhance the reputation of British commanders. A still more formidable sortie on the 5th of November was with difficulty repulsed at Inkerman. And the Russians soon afterwards found, in the climate of the country, a powerful ally. The allied armies, imperfectly organized, and badly equipped for such a. campaign, suffered severely from the hardships of a Crimean winter. The whole expedition seemed likely to melt away from want and disease.

The terrible condition of the army, vividly described in the letters which the war correspondents of the newspapers sent home, aroused strong feelings of indignation in Great Britain. When parliament met Roebuck gave notice that he would move for a committee of inquiry. Lord John Russell — who had already vainly urged in the cabinet that the duke of Newcastle should be superseded, and the conduct of the war entrusted to a stronger minister — resigned office. His resignation was followed by the defeat of the government, and Lord Aberdeen, thus driven from power, was succeeded by Lord Palmerston. In selecting him for the post, the queen undoubtedly placed her seal on the wish of the country to carry out the wai? to the bitter end. But it so happened that the formation of a new p ” ,m r erm ministry was accompanied by a fresh effort to make ministry. terms of peace. Before the change of administration a conference had been decided on, and Lord Palmerston entrusted its management to Lord John Russell. While the latter was on his way to Vienna an event occurred which seemed at first to facilitate his task. The tsar, worn out with disappoint- ment, suddenly died, and was succeeded by his son Alexander. – Unfortunately the conference failed, and the war went on for another year. In September 1855 the allied troops succeeded in obtaining possession of the southern side of Sevastopol, and the emperor of the French, satisfied with this partial success, or alarmed at the expense of the war, decided on withdrawing from the struggle. The attitude of Napoleon made the conclusion of peace only

a question of time. In the beginning of 1856 a congress to discuss the terms was assembled at Paris; in February hostilities were suspended; and in April a treaty was concluded. The peace set back the boundaries of Russia from the Danube to the Pfuth; it secured the free navigation of the first of these rivers; it opened the Black Sea to the commercial navies of the world, closing it to vessels of war, and forbidding the establish- ment of arsenals upon its shor.es. The last condition, to which Great Britain attached most importance, endured for about fourteen years. Peace without this provision could undoubtedly have been secured at Vienna, and the prolongation of the war from 1855 to 1856 only resulted in securing this arrangement for a little more than one decade.

The Crimean War left other legacies behind it. The British government had for some time regarded with anxiety the gradual encroachments of Russia in central Asia. Russian

diplomacy was exerting an increasing influence in Persia, and the latter had always coveted the city of Herat, which was popularly regarded as the gate of India. In 1856 the Persian government, believing that England had her hands fully occupied in the Crimea, seized Herat, and, in consequence, a fresh war — in which a British army under Sir James Outram rapidly secured a victory — broke out. The campaign, entered upon when parliament was not in session, was unpopular in the country. A grave constitutional question, which was ultimately settled by legislation, was raised as to the right of the government to undertake military operations beyond the boundaries of India without the consent of parliament. But the incidents Wsra wtth a of the Persian war were soon forgotten in the presence China. °f a st 'M graver crisis; for in the following year, 1857, the country suddenly found itself involved in war with China, and face to face with one of the greatest dangers which it has ever encountered — the mutiny of the sepoy army in India. The Chinese war arose from the seizure by the Chinese authorities of a small vessel, the " Arrow " commanded by a British subject, and at one time holding a licence (which, however, had expired at the time of the seizure) from the British super intendent at Hongkong, and the detention of her crew on the charge of piracy. Sir John Bowring, who represented Great Britain in China, failing to secure the reparation

and apology which he demanded, directed the British admiral to bombard Canton. Lord Palmerston's cabinet decided to approve and support Sir John Bowring's vigorous action. Cobden, however, brought forward a motion in the House of Commons condemning these high-handed proceedings. He succeeded in securing the co-operation of his own friends, of Lord John Russell, and of other independent Liberals, as well as of the Conservative party, and in inflicting a signal defeat on the government. Lord Palme'rston at once appealed from the House to the country. The constituencies, imperfectly acquainted with the technical issues involved in the dispute, rallied to the minister, who was upholding British interests. Lord Palmerston obtained a decisive victory, and returned to power apparently in irresistible strength. Lord Elgin had already been sent to China with a considerable force to support the demand for redress. On his way thither he learned that the British in India were reduced to the last extremities by the mutiny of the native army in Bengal, and, on the application of Lord Canning, the governor- general, he decided on diverting the troops, intended to bring the Chinese to reason, to the more pressing duty of saving India for the British crown.

During the years which had followed the accession of the queen, the territories and responsibilities of the East India Company had been considerably enlarged by the mutiny annexation of Sind by Lord Ellenborough, the conquest of the Punjab after two desperate military campaigns under Lord Dalhousie, the conquest of Pegu, and the annexation of Oudh. These great additions to the empire had naturally imposed an increased strain on the Indian troops, while the British garrison, instead of being augmented, had been depleted to meet the necessities of the Russian war. Several circum- stances, moreover, tended to propagate disaffection in the Indian army. Indian troops operating outside the Company's dominions were granted increased allowances, but these were automatically reduced when conquest brought the provinces in which they were serving within the British pale. The Sepoys again had an ineradicable dislike to serve beyond the sea, and the invasion of Pegu necessitated their transport by water to the seat of war. Finally, the invention of a new rifle led to the introduction of a cartridge which, though it was officially denied at the moment, was in fact lubricated with a mixture of cow's fat and lard. The Sepoys thought that their caste would be destroyed if they touched the fat of the sacred cow or unclean pig; they were even persuaded that the British government wished to destroy their caste in order to facilitate their conversion to Christianity. Isolated mutinies in Bengal were succeeded by much

more serious events at Cawnpore in Oudh, and at Meerut in the North-West Provinces. From Meerut the mutineers, after some acts of

outrage and murder moved on Delhi, the capital of the old Mogul empire, which became the headquarters of the mutiny. In Oudh the native regiments placed themselves under a Mahratta chief, Nana Sahib, by whose orders the British in Cawnpore, including the women and children, were foully murdered. In the summer of 1857 these events seemed to imperil British rule in India. In the autumn the courage of the troops and the arrival of reinforcements gradually restored the British cause. Delhi, after a memorable siege, was at last taken by a brilliant assault. Lucknow, where a small British garrison was besieged in the residency, was twice relieved, once temporarily by Sir James Outram and General Havelock, and afterwards permanently by Sir Colin Campbell, who had been sent out from England to take the chief command. Subsequent military operations broke up the remnants of the revolt, and in the beginning of 1858 the authority of the queen was restored throughout India. The mutiny, however, had impressed its lesson on the British people, and, as the first consequence, it was decided to transfer the government from the old East India Company to the crown. Lord Palmerston's administration was defeated on another issue before it succeeded in carrying the measure which it introduced for the purpose, though Lord Derby's second ministry, which succeeded it, was compelled to frame its proposals on somewhat similar lines. The home government ot India was entrusted to a secretary of state, with a council to assist him; and though the numbers of the council have been reduced, the form of govern- ment which was then established has endured.*

The cause which led to the second fall of Lord Palmerston was in one sense unexpected. Some Italian refugees living in London, of whom Orsini was the chief, formed a design to assassinate the emperor of the French. On the evening of 14th January 1858, while the emperor, accom- panied by the empress, was driving to the opera, these men threw some bombs under his carriage. The brutal attempt happily failed. Neither the emperor nor the empress was injured by the explosion, but the carriage in which they were driving was wrecked, and a large number of persons who happened to be in the street at the time were either killed or wounded. This horrible outrage naturally created indignation in France, and it unfortunately became plain that the conspiracy had been hatched in England, and that the bombs had been manufactured in Birmingham. On these facts becoming known, Count Walewski, the chief of the French foreign office, who was united by ties of blood to the emperor, called on the British government to provide against the danger to which

France was exposed. " Ought the right of asylum to protect such a state of things? " he asked. " Is hospitality due to assassins ?• Ought the British legislature to continue to favour their designs and their plans ? And can it continue to shelter persons who by these flagrant acts place themselves beyond the pale of common rights? " Lord Clarendon, the head of the British foreign office, told the French ambassador, who read him this despatch, that " no consideration on earth would induce the British parliament to pass a measure for the extradition of political refugees," but he added that it was a question whether the law was as complete and as stringent as it should be, and he stated that the government had already referred the whole subject to the law officers of the crown for their consideration. Having made these remarks, however, he judged it wise to refrain from giving any formal reply to Count Walewski 's despatch, and contented himself with privately communicating to the British ambassador in Paris the difficulties of the British government. After receiving the opinion of the law officers the cabinet decided to introduce a bill into parlia- ment increasing in England the punishment for a conspiracy to commit a felony either within or without the United Kingdom. The first reading of this bill was passed by a considerable majority. But, before the bill came on for a second reading, the language which was being used in France created strong resent ment in England. The regiments of the French army sent addresses to the emperor congratulating him on his escape and violently denouncing the British people. Some of these addresses, which were published in the Moniteur, spoke of London as "an

assassins' den," and invited the emperor to give his troops the order to destroy it. Such language did not make it easier to alter the law in the manner desired by the government. The House of Commons, reflecting the spirit of the : country, blamed Lord Clarendon for neglecting to answer Count Walewski's despatch, and blamed Lord Palmerston for introducing a bill at French dictation. The feeling was so strong that, when the Conspiracy Bill came on for a second reading, an amendment hostile to the government was carried, and Lord Palmerston at once resigned.

For a second time Lord Derby undertook the difficult task of carrying on the work of government without the support of Lord a majority of

the House of Commons. If the Liberal

Derby's party had been united his attempt would have failed second immediately. In 1858, however, the Liberal party ministry. j ia(j nQ cˆgˆon The wave f popularity which had

carried Lord Palmerston to victory in 1857 had lost its strength. The Radicals, who were slowly recovering the influence they had lost during the Crimean War, regarded even a Conservative government as preferable to his return to power, while many Liberals desired to entrust the fortunes of their party to the guidance of their former chief, Lord John Russell. It was obvious to most men that the dissensions thus visible in the Liberal ranks could be more easily healed in the cold shade of. the opposition benches than in the warmer sunlight of office. And therefore, though no one had much confidence, in Lord Derby, or in the stability of his second administration, every one was disposed to acquiesce in its temporary occupation of office.

Ministries which exist by sufferance are necessarily compelled to adapt their measures to the wishes of those who permit them to continue in power. The second ministry of Lord Derby experienced the truth of this rule. For some years a controversy had been conducted in the legislature in reference to the admission of the Jews to parliament. This dispute had been raised in 1847 into a question of practical moment by the election of Baron Lionel Nathan Rothschild as representative of the City of London, and its importance had been emphasized in 1851 by the return of another Jew, Alderman Salomons, for another constituency. The Liberal party generally in the House of Commons was in favour of such a modification of the oaths as would enable the

Jews so elected to take their seats. The bulk of the Jews in Conservative party, on the contrary, and the House p men ˆ of Lords, were strenuously opposed to the change.

Early in 1858 the House of Commons, by an increased majority, passed a bill amending the oaths imposed by law on members of both Houses, and directing the omission of the words "on the true faith of a Christian " from the oath of abjuration when it was taken by a Jew. If the Conservatives had remained in opposition there can be little doubt that this bill would have shared the fate of its predecessors and have been rejected by the Lords. The lord chancellor, indeed, in speaking upon the clause relieving the Jews, expressed a hope that the peers would not hesitate to pronounce that

our " Lord is king, be the people never so impatient." But some Conservative peers realized the in- convenience of maintaining a conflict between the two Houses when the Conservatives were in power; and Lord Lucan, who had commanded the cavalry in the Crimea, suggested as a comr promise that either House should be authorized by resolution to determine the form of oath to be administered to its members. This solution was reluctantly accepted by Lord Derby, and Baron Rothschild was thus enabled to take the seat from which he had been so long excluded. Eight years afterwards parliament was induced to take a fresh step in advance. It imposed a new oath from which the words which disqualified the Jews were omitted. The door of the House of Lords was thus thrown open, and in 1885 Baron Nathan Mayes Rothschild, raised to the peerage, was enabled to take his seat in the upper chamber.

This question was not the only one on which a Conservative government, without a majority at its back, was compelled to make concessions. For some years past a growing disposition had been displayed among the more earnest Liberals to extend the provisions of the Reform Act of 1832. Lord John Russell's

ministry had been defeated in 18 51 on a proposal of Locke King to place £10 householders in counties on the same footing as regards the franchise as £10 householders in towns, andi Lord John himself in 1854 had actually intro- bui"i8S9. duced a new Reform Bill. After the general election of 1857 the demand for reform increased, and, in accepting office in 1858, Lord Derby thought it necessary to declare that, though he had maintained in opposition that the settlement of 1832, with all its anomalies, afforded adequate representation to all classes, the promises of previous governments and the expectations of the people imposed on him the duty of bringing forward legislation on the subject. The scheme which Lord Derby's government adopted was peculiar. Its chief proposal was the extension of the county franchise to £10 householders. But it also proposed that persons possessing a 40s. freehold in a borough should in future have a vote in the borough in which their property was situated, and not in the county. The bill also conferred the franchise on holders of a certain amount of stock, on depositors in savings banks, on graduates of universities, and on other persons qualified by position or education. The defect of the bill was that it did nothing to meet the only real need of reform— the enfranchisement of a certain proportion of the working classes. On the contrary, in this respect it perpetuated the settlement of 1832. The £10 householder was still to furnish the bulk of the electorate, and the ordinary working man could not afford to pay £10 a year for his house. While

the larger proposals of the bill were thus open to grave objection, its subsidiary features provoked ridicule. The suggestions that votes should be con- ferred on graduates and stockholders were laughed at as " fancy franchises." The bill, moreover, was not brought forward with the authority of a united cabinet. Two members of the govern- ment — Spencer Walpole and Henley— declined to be responsible for its provisions, and placed their resignations in Lord Derby's hands. In Walpole's judgment the bill was objectionable because it afforded no reasonable basis for a stable settlement. There was nothing in a £10 franchise which was capable of permanent defence, and if it was at once applied to counties as well as boroughs it would sooner or later be certain to be extended. He himself advocated with some force that it would be wiser and more popular to fix the county franchise at £20 and the borough franchise at £6 rateable value; and he contended that such a settlement could be defended on the old principle that taxation and representation should go together, for £20 was the minimum rent at which the house tax commenced, and a rateable value of £6 was the point at which the householder could not compound to pay his rates through ' his landlord. Weakened by the defection of two of its more important members, the govern- ment had little chance of obtaining the acceptance of its scheme. An amendment by Lord John Russell, condemning its main provisions, was adopted in an unusually full house by a sub- stantial majority, and the cabinet had no alternative but to resign or dissolve. It chose the latter course. The general election, which almost immediately took place, increased to Some extent the strength of the Conservative party. For the first time since their secession from Sir Robert Peel the Con- servatives commanded more than three hundred votes in the House of Commons, but this increased strength was not sufficient to ensure them a majority. When the new parliament assembled, Lord Hartington, the eldest son of the duke of Devonshire, was put forward to propose a direct vote of want of confidence in the administration. It was carried by 323 votes to 310, and the second Derby administration came to an end.

It was plain that the House of Commons had withdrawn its support from Lord Derby, but it was not clear that any other leading politician would be able to form a government. p a i mer . The jealousies between Lord John Russell and Lord ston's • Palmerston still existed; the more extreme men, who second were identified with the policy of Cobden and Bright, mlalstr y- had little confidence in either of these statesmen; and it was still uncertain whether the able group who had been the friends of Sir Robert Peel would finally gravitate to the Conservative or to the Liberal camp. The queen, on

the advice of Lord Derby,

endeavoured to solve the first of these difficulties by sending for Lord Granville, who led the Liberal party in the Lords, and authorizing him to form a government which should combine, as far as possible, all the more prominent Liberals. The attempt; however, failed, and the queen thereupon fell back upon Lord Palmerston. Lord John Russell agreed to accept office as foreign minister; Gladstone consented to take the chancellorship of the exchequer. Cobden was offered, but declined, the presidency of the Board of Trade; and the post which he refused was conferred on a prominent free trader, who had associated himself with Cobden's fortunes, Milner Gibson. Thus Lord Palmerston had succeeded in combining in one ministry the various representatives of political progress. He had secured the support of the Peelites, who had left him after the fall of Lord Aberdeen in 1855, and of the free traders, who had done so much to defeat him in 1857 and 1858. His new administration was accordingly based on a broader bottom, and contained greater elements of strength than his former cabinet. And the country was requiring more stable government. The first three ministries of the queen had endured from the spring of 1835 to the spring of 1852, or for very nearly seventeen years; but the next seven years had seen the formation and dissolution : of no less than four, cabinets. It was felt that these frequent changes were unfortunate for the country, and every one was glad to welcome the advent of a government which seemed to promise greater permanence. That promise was fulfilled. The adminis- tration which Lord Palmerston succeeded in forming in 1859 endured till his death in 1865, and with slight modifications, under its second chief Lord John (afterwards Earl) Russell, till the summer of 1866. It had thus a longer life than any cabinet which had governed England since the first Reform Act. But it owed its lasting character to the benevolence of its opponents rather than to the enthusiasm of its supporters. The Con- servatives learned to regard the veteran statesman, who had combined all sections of Liberals under his banner, as the most powerful champion of Conservative principles; a virtual truce of parties was established during his continuance in office; and s for the most part of his ministry, a tacit understanding existed that the minister, on his side, should pursue a Conservative policy, and that the Conservatives, on

theirs, should abstain from any real attempt to- oust him from power. Lord John Russell, indeed, was too earnest in his desire for reform to abstain from one serious effort to accomplish it. Early in i860 he pro- posed, with the sanction of the cabinet, a measure providing for the extension of the county franchise to £10 householders, of the borough franchise to £6 householders, and for a moderate redistribution of seats. But the country, being in enjoyment of considerable prosperity, paid only a languid attention to the scheme; its indifference was reflected in the House; the Con- servatives were encouraged in their opposition by the lack of interest which the new bill excited, and the almost unconcealed dislike of the prime minister to its provisions. The bill, thus steadily opposed and half-heartedly supported, made only slow progress; and at last it was withdrawn by its author. He did not again attempt during Lord Palmerston's life to reintroduce the subject. Absorbed in the work of the foreign office, which at this time was abnormally active, he refrained from pressing home the arguments for internal reform.

In one important department, however, the ministry departed from the Conservative policy it pursued in other matters.

Gladstone signalized his return to the exchequer by ??", introducing a series of budgets which excited keen budgets. opposition at the time, but in the result largely added

to the prosperity of the country. The first of these great budgets, in i860, was partly inspired by the necessity of adapting the fiscal system to meet the requirements of a com- mercial treaty which, mainly through Cobden's exertions, had been concluded with the emperor of the French. The treaty bound France to reduce her duties on English coal and iron, and on many manufactured articles; while, in return, Great Britain undertook to sweep away the duties on all manufactured goods, and largely to reduce those on French wines. But Gladstone

was not content with these great alterations, which involved a loss of nearly £1,200,000 a year to the exchequer; he voluntarily undertook to sacrifice another million on what he called a supple- mental measure of customs reform. He proposed to repeal the duties on paper, by which means he hoped to increase the opportunities of providing cheap literature for the people. The budget .of i860 produced a protracted controversy. The French treaty excited more criticism than enthusiasm on both sides of the Channel. In France the manufacturers complained that they would be unable to stand against the competition of English goods. In England many people

thought that Great Britain was wasting her resources and risking her supremacy by giving the French increased facilities for taking her iron, coal and machinery, and that no adequate advantage could result from the greater consumption of cheap claret. But the criticism which the French treaty aroused was drowned in the clamour which was created by the proposed repeal of the paper duties. The manufacture of paper was declared to be a struggling industry, which would be destroyed by the withdrawal of protection. The dissemination of cheap literature and the multiplication of cheap newspapers could not compensate the nation for the ruin of an important trade. If money could be spared, moreover, for the remission of taxation, the paper duties were much less oppressive than those on some other articles. The tax on tea, for example, which had been raised during the late war to no less than is. 5d. a lb, was much more injurious; and it would be far wiser — so it was contended— to reduce the duty on tea than to abandon the duties on paper. Notwith- standing the opposition which the Paper Duties Bill undoubtedly excited, the proposal was carried in the j a f, er Commons; it was, however, thrown out in the Lords, repeated. and its rejection led to a crisis which seemed at one time to threaten the good relations between the two houses of parliament. It was argued that if the Lords had the right to reject a measure remitting existing duties, they had in effect the right of imposing taxation, since there was no material difference between the adoption of a new tax and the continuance of an old one which the Commons had determined to repeal. Lord Palmerston, however, with some tact postponed the controversy for the time by obtaining the appointment of a committee to search for precedents; and, after the report of the committee, he moved a series of resolutions affirming the right of the Commons to grant aids and supplies as their exclusive privilege, stating that the occasional rejection of financial measures by the Lords had always been regarded with peculiar jealousy, but declaring that the Comnions had the remedy in their own hands by so framing bills of supply as to secure their acceptance. In accordance with this suggestion the Commons in the following year again resolved to repeal the paper duties; but, instead of embodying their decision in a separate bill, they included it in the same measure which dealt with all the financial arrange ments of the year, and thus threw on the Lords the responsibility of either accepting the proposal, or of paralysing the whole machinery of administration by depriving the crown of the supplies which were required for the public services. The Lords Were not prepared to risk this result, and they accordingly accepted a reform which they could no longer resist, and the bill became law. In order to enable him to accomplish these great

changes, Gladstone temporarily raised the income tax, which he found at od. in the £, to lod. But the result of his reforms was so marked that he Was speedily able to reduce it. The revenue increased by leaps and bounds, and the income tax was gradually reduced till it stood at 4d. in the closing years of the administration. During the same period the duty on tea was reduced from is. $&. to 6d. a lb; and the national debt was diminished from rather more than £800,000,000 to rather less than £780,000,000, the charge for the debt declining, mainly through the falling in of the long annuities, by some £2,600,000 a year. With the possible exception of Sir Robert Peel's term of office, no previous period of British history had been memor- able for a series of more remarkable financial reforms. Their success redeemed the character of the administration. The

Liberals, who complained that their leaders were pursuing a Conservative policy, could at least console themselves by the reflection that. the chancellor of the exchequer was introducing satisfactory budgets. The language, moreover, which Gladstone was holding on other subjects encouraged the more advanced Liberals to expect that he would ultimately place himself at the head of the party of progress. This expectation was the more remarkable because Gladstone was the representative in the cabinet of the old Conservative party which Sir Robert Peel had led to victory. As lately as 1858 he had reluctantly refused to serve under Lord Derby; he was still a member of the Carlton Club; he sat for the university of Oxford ; and on many ques- tions he displayed a constant sympathy with Conservative traditions. Yet, on all the chief domestic questions which came before parliament in Lord Palmerston's second administration, Gladstone almost invariably took a more Liberal view than his chief. It was understood, indeed, that the relations between the two men were not always harmonious; that Lord Palmerston disapproved the resolute conduct of Gladstone, and that Glad- stone deplored the Conservative tendencies of Lord Palmerston. It was believed that Gladstone on more than one occasion desired to escape from a position which he disliked by resigning office, and that the resignation was only averted through a consciousness that the ministry could not afford to lose its most eloquent member.

While on domestic matters, other than those affecting finance, the Liberal ministry was pursuing a Conservative policy, its members were actively engaged on, and the attention of the public was keenly directed to, affairs abroad. For the period was one of foreign unrest, and the wars which were then waged have left an enduring mark on the map of the world, and have affected the position of the Anglo-Saxon race for all time. In the far East, the operations which it had been decided to under- take in China were necessarily postponed on account of the diversion of the forces, intended to exact redress at Peking, to the suppression of mutiny in India. It was only late in 1858 that Lord Elgin and Baron Gros, the French plenipotentiary (for France joined England in securing simultaneous redress of grievances of her own) , were enabled to obtain suitable reparation. It was arranged that the treaty, which was then provisionally concluded at Tientsin, should be ratified at Peking in the follow- ing year; and in June 1859 Mr (afterwards Sir us"™' Frederick) Bruce, Lord Elgin's brother, who had been appointed plenipotentiary, attempted to proceed up the Peiho with the object of securing its ratification. The allied squadron, however, was stopped by the forts at the mouth of the Peiho, which fired on the vessels; a landing party, which was disembarked to storm the forts, met with a disastrous check, and the squadron had to retire with an acknowledged loss of three gunboats and 400 men. This reverse necessitated fresh operations, and in i860 Lord Elgin and Baron Gros were directed to return to China, and, at the head of an adequate force, were instructed to exact an apology for the attack on the allied fleets, the ratification and execution of the treaty of Tientsin, and the payment of an indemnity for the expenses of the war. The weak- ness of the Chinese empire was not appreciated at that time; the unfortunate incident on the Peiho in the previous summer had created an exaggerated impression of the strength of the Chinese arms, and some natural anxiety was felt for the success of the expedition. But the allied armies met with no serious resistance. The Chinese, indeed, endeavoured to delay their progress by negotiation rather than by force; and they succeeded in treacher- ously arresting some distinguished persons who had been sent into the Chinese lines to negotiate. But by the middle of October the Chinese army was decisively defeated; Peking was occupied; those British and French prisoners who had not succumbed to the hardships of their confinement were liberated. Lord Elgin determined on teaching the rulers of China a lesson by the destruction of the summer palace; and the Chinese government was compelled to submit to the terms of the Allies, and to ratify the treaty of Tientsin. There is no doubt that these operations helped to open the Chinese markets to British trade;

but

incidentally, by regulating the emigration of Chinese coolies, they had the unforeseen effect of exposing the industrial markets of the world to the serious competition of "cheap yellow" labour. A distinguished foreign statesman observed that Lord Palmerston had made a mistake. He thought that he had opened China to Europe; instead, he had let out the Chinese. It was perhaps a happier result of the war that it tended to the continuance of the Anglo-French alliance. French and British troops had again co-operated in a joint enterprise, and had shared the dangers and successes of a campaign.

War was not confined to China. In the beginning of i85g diplomatists were alarmed at the language addressed by the emperor of the French to the Austrian ambassador at Paris, which seemed to breathe the menace of a rupture. Notwith- standing the exertions which Great Britain made to avert hostilities, the provocation of Count Cavour induced Austria to declare war against Piedmont, and Napoleon thereupon moved to the support of his ally, promising to free Italy from the Alps. to the Adriatic. As a matter of fact, the attitude of northern; Germany, which was massing troops on the Rhine, and the defenceless condition of France, which was drained of soldiers for the Italian campaign, induced the emperor to halt before he had carried out his purpose, and terms of peace were hastily concerted at Villafranca, and were afterwards

confirmed at Zurich, by which Lombardy was given .,. .„ „. ˆ tv j .. i_'i \ \ • 1 cl ■ ■ 1 Unification

to Piedmont, while Austria was left m possession 01 ofItaly-

Venice and the Quadrilateral, and central Italy was restored to its former rulers. The refusal of the Italians to take back the Austrian grand dukes made the execution of these arrangements impracticable. Napoleon, indeed, used his influence to carry them into effect; but Lord John Russell, who was now in charge of the British foreign office, and who had Lord Palmerston and Gladstone on his side in the cabinet, gave a vigorous support to the claim of the Italians that their country should be allowed to regulate her own affairs. The French emperor had ultimately to yield to the determination of the inhabitants of central Italy, when it was backed by thearguments of the British foreign office, and Tuscany, Modena, Parma, as well as a portion of the states of the Church, were united to Piedmont. There was no doubt that through the whole of the negotiations the Italians were largely indebted to the labtfurs of Lord

John Russell. They recognized that they owed more to the moral support of England than to the armed assistance of France. The French emperor, moreover, took a step which lost him the sympathy of many Italians. Before the war he had arranged with Count Cavour that France should receive, as the price of her aid, the duchy of Savoy and the county of Nice. After Villafranca, the emperor, frankly recognizing that he had only half kept his promise, consented to waive his claim to these provinces. But, when he found himself unable to resist the annexation of central Italy to Piedmont, he reverted to the old arrangement. The formation of a strong Piedmontese kingdom, with the spoliation of the papal dominion, was un- popular in France; and he thought — perhaps naturally — that he must have something to show his people in return for sacrifices which had cost him the lives of 50,000 French soldiers, and concessions which the whole Catholic party in France resented. Count Cavour consented to pay the price which Napoleon thus exacted, and the frontier of France v as accordingly extended to the Alps. But it is very doubtful whether Napoleon did not lose more than he gained by this addition to his territory. It certainly cost him the active friendship of Great Britain. The Anglo-French alliance had been already strained by the language of the French colonels in 1858 and the Franco-Austrian War of 1859; it never fully recovered from the shock which it received by the evidence, which the annexation of Savoy and Nice gave, of the ambition of the French emperor. The British people gave way to what Cobden called the last of the three panics. Lord Palmerston proposed and carried the provision of a large sum of money for the fortification of the coasts; and the volunteer movement, which had its origin in 1859, received a remarkable stimulus in i860. In this year the course of events in Italy

emphasized the differences between the policy of Great Britain and that of France. Garibaldi, with a thousand followers, made his famous descent on the coast of Sicily. After making himself master of that island, he crossed over to the mainland, drove the king of Naples out of his capital, and forced him to take refuge in Gaeta. In France these events were regarded with dismay. The emperor wished to stop Garibaldi's passage across the strait, and stationed his fleet at Gaeta to protect the king of Naples. Lord John Russell, on the contrary, welcomed Garibaldi's success with enthusiasm. He declined

to intervene in the affairs of Italy by confining the great liberator to Sicily; he protested against the presence of the French fleet at Gaeta; and when other foreign nations denounced the conduct of Piedmont, he defended it by quoting Vattel and citing the example of William III. When, finally, Italian troops entered the dominions of the pope, France withdrew her ambassador from the court of Turin, and England under Lord John Russell's advice at once recognized the new kingdom of Italy.

In these great events — for the union of Italy was the greatest fact which had been accomplished in Europe since the fall of the first Napoleon — the British ministry had undoubtedly acquired credit. It was everywhere felt that the new kingdom owed much to the moral support which had been steadily and consistently given to it by Great Britain. Soon afterwards, however, in the autumn of 1863, the death of the king of Denmark led to a new revolution in the north of Europe, in which Lord Palmerston's government displayed less resolution, and lost much of the prestige which it had acquired by its Italian policy. The duchies of Schleswig and Holstein had been for centuries united to the kingdom of Denmark by the golden link of the Schies- crown; in other respects they had been organically wig- kept distinct, while one of them — Holstein — wa» a

Holstein member of the German confederation. The succession ques a. tQ tne crown of Denmark, however, was different from that in the duchies. In Denmark the crown could descend, as it descends in Great Britain, through females, In the duchies the descent was confined to the male line; and, as Frederick VII., who ascended the Danish throne in 1848, had no direct issue, the next heir to the crown of Denmark under this rule was Prince Christian of Gliicksburg, afterwards king; the next heir to the duchies being the duke of Augustenburg. In 1850 an arrangement had been made to prevent the separation of the duchies from the kingdom. As a result of a conference held in London, the duke of Augustenburg was induced to renounce his claim on the receipt of a large sum of money. Most of. the great powers of Europe were parties to this plan. But the German confederation was not represented at the conference, and was not therefore committed to its conclusions. During the reign of Frederick VII. the Danish government endeavoured to cement the alliance between the duchies and the kingdom, and specially to separate the interests of Schleswig, which was largely Danish in its sympathies, from those of Holstein, which was almost exclusively German. With this object, in the last year of his life, Frederick VII. granted Holstein autonomous institu- tions, and bound Schleswig more closely to the Danish monarchy. The new king Christian IX.

confirmed this arrangement. The German diet at Frankfort at once protested against it. Following up words with acts, it decided on occupying Holstein, and it delegated the duty of carrying out its order to H a nover and Saxony. While this federal execution was taking place, the duke of Augustenburg— regardless of the arrangements to which he had consented — delegated his rights in the duchies to his son, who formally claimed the succession. So far the situation, which was serious enough, had been largely dependent on the action of Germany. In the closing days of 1863 it passed mainly into the control of the two chief German powers. In Prussia Bismarck had lately become prime minister, and was animated by ambitious projects for his country's aggrandizement. Austria, afraid of losing her influence in Germany, followed the lead of Prussia, and the two powers required Denmark to cancel the arrangements which Frederick VII. had made, and which Christian IX. had confirmed, threatening in case of refusal to follow up the occupa-

tion of Holstein by that of Schleswig. As the Danes gave only a provisional assent to the demand, Prussian and Austrian troops entered Schleswigˆ . These events created much excitement in England. The great majority of the British people, who imperfectly understood the merits of the case, were unanimous in their desire to support Denmark by arms. Their wish had been accentuated by the circumstance that the marriage in the previous spring of the prince of Wales to the daughter of the new king of Denmark had given them an almost personal interest in the struggle. Lord Paimerston had publicly expressed the views of the people by declaring that, if Denmark were attacked, her assailants would not have to deal with Denmark alone. The language of the public press and of Englishmen visiting Denmark confirmed the impression which the words of the prime minister had produced; and there is unfortunately no doubt that Denmark was encouraged to resist her powerful opponents by the belief, which she was thus almost authorized in entertain- ing, that she could reckon in the hour of her danger on the active assistance of the United Kingdom. If Lord Paimerston had been supported by his cabinet, or if he had been a younger man, he might possibly, in 1864, have made good the words which he had rashly uttered in 1863. But the queen, who, it is fair to add, understood the movement which was tending to German unity much better than most of her advisers, was averse from war. A large section of the cabinet shared the queen's hesitation, and Lord Paimerston — with the weight of nearly eighty summers upon him — was not strong enough to enforce his will against both his sovereign and his colleagues. He made some attempt to ascertain whether the emperor of the French

would support him if he went to war. But he found that the emperor had not much fancy for a struggle which would have restored Holstein to Denmark; and that, if he went to war at all, his chief object would be the liberation of Venice and the rectification of his own frontiers. Even Lord Paimerston shrank from entering on a campaign which would have involved all Europe in conflagration and would have unsettled the boundaries of most continental nations; and the British government endeavoured thence- forward to stop hostilities by referring the question immediately in dispute to a conference in London. The labours of the con- ference proved, abortive. Its members were unable to agree upon any methods of settlements, and the war went on. Denmark, naturally unable to grapple with her powerful antagonists, was forced to yield, and the two duchies which were the subject of dispute were taken from her.

The full consequences of this struggle were not visible at the time. It was impossible to foresee that it was the first step which was to carry Prussia forward, under her ambitious minister, to a position of acknowledged supremacy on the continent. But the results to Great Britain were plain enough. She had been mighty in words and weak in deeds. It was no doubt open to her to contend, as perhaps most wise people consider, that the cause of Denmark was not of sufficient importance to justify her in going to war. But it was not open to her to encourage a weak power to resist and then desert her in the hour of her necessity. Lord Paimerston should not have used the language which he employed in 1863 if he had not decided that his brave words would be followed by brave action. His conduct lowered the prestige of Great Britain at least as much as his Italian policy had raised it., Continental statesmen thenceforward assumed that Great Britain, however much she might protest, would not resort to arms, and the influence of England suffered, as it was bound to suffer, in consequence.

Meanwhile, in this period of warfare, another struggle was being fought out on a still greater scale in North America. The election of Abraham Lincoln to the presidency of the United States emphasized the fact that the majority of the inhabitants of the Northern States were opposed to the further spread ol slavery; and, in the beginning of 186 1, several of the Southern States formally seceded from the union. A c "ii war . steamer sent by the Federal government with reinforce- ments to Fort Sumter was fired upon, and both parties made pre- parations for the civil war which was apparently inevitable. On

the one side the Confederate States^-as the seceding states were called — were animated by a resolution to protect their property. On the other side the " conscience " of the North was excited by a passionate desire to wipe out the blot of slavery. Thus both parties were affected by some of the most powerful con- siderations which can influence mankind, while the North were further actuated by the natural incentive to' preserve the union, which was threatened with disruption. The progress of the great struggle was watched with painful attention in England. The most important manufacturing interest in England was paralysed by the loss of the raw cotton, which was obtained almost exclusively from the United States, and tens of thousands of workpeople were thrown out of employment. The distress which resulted naturally created a strong feeling in favour of intervention, which might terminate the war and open the Southern ports to British commerce; and the initial successes which the Confederates secured seemed to afford some justification for such a proceeding. In the course of 1862 indeed, when the Confederate armies had secured many victories, Gladstone, speaking at Newcastle, used the famous expression that President Jefferson Davis had " made a nation ";and Lord Palmerston's language in the House of Commons — while opposing a; motion for the recognition of the South— induced the impression that his thoughts were tending in the same direction as Mr Gladstone's. The emperor Napoleon, in July of the same year, confidentially asked the British minister whether the moment had not come for recognizing the South; and in the following September Lord Palmerston was himself disposed in concert With France to offer to mediate on the basis of separation. Soon afterwards, however, the growing exhaustion of the South improved the prospects of the Northern States: an increasing number of persons in Great Britain objected to interfere in the interests of slavery; and the combatants were allowed to fight out their quarrel without the interference of Europe.

At the beginning of the war, Lord John Russell (who was made a peer as Earl Russell in 1861) acknowledged the Southern States as : belligerents. His decision caused some ill-feeling at Washington; but it was inevitable. For the North had pro- claimed a blockade of the Southern ports; and it would have been both inconvenient and unfaif if Lord Russell had decided to recognize the blockade and had refused to acknowledge the belligerent rights of the Southern States. Lord Russell's decision, however, seemed to indicate some latent

sympathy for the Southern cause; and the irritation which Was felt in the North was increased by the news that the Southern States were accrediting two gentlemen to represent them at Paris "'r /" an(i a t London. These emissaries; Messrs Mason and incident. Slidell, succeeded in running the blockade and in reaching Cuba, where they embarked on the " Trent," a British mail steamer sailing for England. On her passage home the " Trent " was stopped by the Federal steamer "'■ San Jacinto"; she was boarded, and Messrs Mason and Slidell were arrested: There was no doubt that the captain of the " San Jacinto " had acted irregularly. While he had the right to stop the " Trent,"- examine the mails, and, if he found despatches for the enemy among them, carry the vessel into an American port for adjudication, he had no authority to board the vessel and arrest two of her passengers. " The British government," to use its own language, " could not allow such an affrbnt to the national honour to pass without due reparation." They decided on sending what practically amounted to an ultimatum to the Federal government, calling upon it to liberate the prisoners and to make a suitable ap61ogy. The presentation of this ultimatum, which was accompanied by the despatch of troops to Canada, was very nearly provoking war with the United States. If, indeed, the ultimatum had been presented in the form in which it was originally framed, war might have ensued. But at the prince consort's suggestion its language was consider- ably modified, and the responsibility for the outrage was thrown on the officer who committed it, and not on the government of the Republic. It ought not to-be forgotten that this important modification was the last service rendered to his adopted country 1

by the prince consort before his fatal illness. He died before the answer to the despatch was received; and his death deprived the queen of an adviser who had stood by her side since the earlier days Of her reign, and who, by his prudence and conduct, had done much to raise the tone of the court and the influence of the crown. Happily for the future of the world, the govern- ment of the United States felt itself able to accept the despatch which had been thus addressed to it, and to give the reparation which was demanded; and the danger of war between the two great branches of the Anglo-Saxon race was averted. But, in the following summer, a new event excited fresh animosities, and aroused a controversy which endured for the best part of ten years.

The Confederates, naturally anxious to harass the commerce of their enemies, endeavoured from the commencement of hostilities to purchase armed cruisers from builders of neutral nations. In June

1862 the American minister in London drew Lord Russell's attention to the fact that a vessel, lately launched at Messrs Laird's yard at Birkenhead, was obviously intended to be employed as a Confederate cruiser. The solicitor to the commissioners of customs, however, considered that no facts had been revealed to authorize the detention of the vessel, and this opinion was reported in July to the American minister, Charles Francis Adams. He thereupon supplied the government with additional facts, and at the 1 same time furnished them With the opinion of an eminent English lawyer, R. P. Collier (afterwards Lord-Monkswell), to the effect that "it would be difficult to make out a stronger case of infringement J? _ of the Foreign Enlistment Act, which if not enforced bama." on this occasion is little better than a dead letter." These facts and this opinion were at oiice sent to the law officers-.' They reached the queen's advocate ori Saturday the 26th of July; but, by an unfortunate mischance, the queen's advocate had just been wholly incapacitated by a distressing illness; and the papers, in consequence, did not reach the attorney- and solicitor- general till the evening of the following Monday, when they at onCe advised the government to detain the vessel. Lord Russell thereupon sent Orders to Liverpool for her detention. In the meanwhile the : vessel — probably aware of the necessity for haste —had put to sea, and had commenced the career which made her famous as the" Alabama." Ministers might even then have ta'ken steps to stop the vessel by directing her detention in any British port to which she resorted for supplies. The cabinet, however, shrank from this course. The " Alabama " was allowed to prey on Federal commerce, and undoubtedly inflicted a vast amount -of injury on the trade of the United States. In the autumn of 1862 Adams demanded redress for the injuries which had thus been sustained, and this demand was repeated for many years in stronger and stronger language. At last, in 1871, long after Lord Palmerston's death and Lord' Russell's retirement, a joint commission was appointed to examine into the many cases of dispute which had arisen between the United States and Great Britain. 'The Commissioners agreed upon three rules by which they thought neutrals should in future be bound, and recommended that they should be given a retrospective effect. They decided also that the claims which had arisen out of the depredations bf the " Alabama " should be referred to arbitra tion. In the course of 1872 the arbitrators met at Geneva. Their finding 1 was adverse to Great Britain, which was con- demned to pay a large sum of money— more than £3,000,000 — as Compensation. A period of exceptional prosperity, which largely increased the revenue, enabled a chancellor of the exchequer to boast that the country had drunk itself out of the "- Alabama " difficulty. ■ ■ ■'■*

*In October 1865 Lord Palmerston's rule, which had been characterized by six years of political inaction at home and by constant disturbance abroad, was terminated by his Lord death. The ministry, which had suffered many losses RusseWs from de ! ath during its duration;- • was temporarily re- sec » ad constructed under Lord Russell ; and the new minister *" " s ty ' at once decided' to put an end to the ' period of internal stagnation, which had lasted so long, by the introduction of a*

new Reform Bill. Accordingly, in March 1866 Gladstone, who now led the House of Commons, introduced a measure which proposed to extend the county franchise to £14 and the borough franchise to £7 householders. The bill did not create much enthusiasm among Liberals, and it was naturally opposed by the Conservatives, who were reinforced by a large section of moderate Liberals, nicknamed, in consequence of a phrase in one of Bright's speeches, Adullamites. After many debates, in which the' Commons showed little disposition to give the ministry any effective support, an amendment was carried by Lord Dunkellin, the eldest son of Lord Clanricarde, basing the borough franchise on rating instead of rental. The cabinet, recognizing from the division that the control of the House had passed out of its hands, resigned office, and the queen was compelled to entrust Lord Derby with the task of forming a new administration.

For the third time in his career Lord Derby undertook the formidable task of conducting the government of the country Lord vrith only a minority of the House of Commons to

Derby's support him. The moment at which he made this tBk ' d third attempt was one of unusual anxiety. Abroad,

ministry. ˆ a i most simultaneous outbreak of war between Prussia and Austria was destined to affect the whole aspect of continental politics. At home, a terrible murrain had fallen on the cattle, inflicting ruin on the agricultural interest; a grave commercial crisis was creating alarm in the city of London, and, in its consequences, injuring the interests of labour; while the working classes, at last roused from their long indifference, and angry at the rejection of

Lord Russell's bill, were assembling in their tens of thousands to demand reform. The cabinet deter- mined to prohibit a meeting which the Reform League decided to hold in Hyde Park on the 23rd of July, and closed the gates of the park on the people. But the mob, converging on the park in thousands, surged round the railings, which a little inquiry might have shown were too weak to resist any real pressure. Either accidentally or intentionally, the railings were overturned in one place, and the people, perceiving their opportunity, at once threw them down round the whole circuit of the park. Few acts in Queen Victoria's reign were attended with greater consequences. For the riot in Hyde Park led almost directly to a new Reform Act, and to the transfer of power from the middle classes to the masses of the people.

Yet, though the new government found it necessary to intro- duce a Reform Bill, a wide difference of opinion existed in the cabinet as to the form which the measure should take. Iser™' Several of its members were in favour of assimilating the borough franchise to that in force in municipal elections, and practically conferring a vote on every householder who had three years' residence in the constituency. General Peel, however — Sir Robert Peel's brother — who held the seals of the war office, objected to this extension; and the cabinet ultimately decided on evading the difficulty by bringing forward a series of resolutions on which a scheme of reform might ulti- mately be based. Their success in 1858, in dealing with the government of India in this way, commended the decision to the acceptance of the cabinet. But it was soon apparent that the House of Commons required a definite scheme, and that it would not seriously consider a set of abstract resolutions which committed no one to any distinct plan. Hence on the 23rd of February 1867 the cabinet decided on withdrawing its resolutions and reverting to its original bill. On the following day Lord Cranborne — better known afterwards as Lord Salisbury — dis- covered that the bill had more democratic tendencies than he had originally supposed, and refused to be a party to it. On Monday, the 25th, the cabinet again met to consider the new difficulty which had thus arisen; and it decided (as was said afterwards by Sir John Pakington) in ten minutes to substitute for the scheme a mild measure extending the borough franchise to houses rated at £6 a year, and conferring the county franchise on £20 householders. The bill, it was soon obvious, would be acceptable to no one; and the government again fell back on its original proposal. Three members of the cabinet, however,

Lord Cranborne, Lord Carnarvon and General Peel, refused to be parties to the measure, and resigned office, the government being

necessarily weakened by these defections. In the large scheme which the cabinet had now adopted, the borough franchise was conferred on all householders rated to the relief of the poor, who had for two years occupied the houses which gave them the qualification; the county franchise was given to the occupiers of all houses rated at £1 5 a year or upwards. But it was proposed that these extensions should be accompanied by an educational franchise, and a franchise conferred on persons who had paid twenty shillings in assessed taxes or income tax; the tax-payers who had gained a vote in this way being given a second vote in respect of the property which they occupied. In the course of the discussion on the bill in the House of Commons, the securities on which its authors had relied to enable them to stem the tide of democracy were, chiefly through Gladstone's exertions, swept away. The dual vote was abandoned, direct payment of rates was surrendered, the county franchise was extended to £12 householders, and the redistribution of seats was largely increased. The bill, in the shape in which it had been introduced, had been surrounded with safeguards to property. With their loss it involved a great radical change, which placed the working classes of the country in the position of predominance which the middle classes had occupied since 1832.

The passage of the bill necessitated a dissolution of parliament; but it had to be postponed to enable parliament to supplement the English Reform Act of 1867 with measures applic- able to Scotland and Ireland, and to give time for D ˆ el1 settling the boundaries of the new constituencies minister. which had been created. This delay gave the Con- servatives another year of office. But the first place in the cabinet passed in 1868 from Lord Derby to his lieutenant, Disraeli. The change added interest to political life. Thence- forward, for the next thirteen years, the chief places in the two great parties in the state were filled by the two men, Gladstone and Disraeli, who were unquestionably the ablest representatives of their respective followers. But the situation was also remark- able because power thus definitely passed from men who, without exception, had been born in the 18th century, and had all held cabinet offices before 1832, to men who had been born in the ioth century, and had only risen to cabinet rank in the 'forties and the 'fifties. It was also interesting to reflect that Gladstone had begun life as a Conservative, and had only gradually moved to the ranks of the Liberal party; while Disraeli had fought his first election under the auspices of O'Connell and Hume, had won his spurs by his attacks on Sir Robert Peel, and had been only reluctantly adopted by the Conservatives as their leader in the House of Commons.

The struggle commenced in 1 868 on an Irish question. During the previous years considerable attention had been paid to a secret conspiracy in Ireland and among the Irish in America. The Fenians, as they were called, actually attempted insurrection in Ireland, and an invasion of Canada from the United States. At the beginning of 1866 Lord Russell's government thought itself compelled to suspend the Habeas Corpus Act in Ireland; and in 1867 Lord Derby's government Was confronted in the spring by a plot to seize Chester Castle, and in the autumn by an attack on a prison van at Manchester containing Fenian prisoners, and by an atrocious attempt to blow up Clerkenwell prison. Conservative politicians deduced from these circum- stances the necessity of applying firm government to Ireland. Liberal statesmen, on the contrary, desired to extirpate rebellion by remedying the grievances of which Ireland still complained. Chief among these was the fact that the Established' Church in Ireland was the church Of only a minority of the people. In March 1868 John Francis Maguire, an Irish Catholic, asked the House of Commons to resolve itself into a committee to take into immediate considera- tion the affairs of Ireland. Gladstone, in the course of the debate, declared that in his opinion the time had come when the Irish Church, as a political institution, should cease; and he followed up his declaration by a series of resolutions, which

Irlsb Church.

Abys- sinian war.

were accepted by considerable majorities, pledging the House to its disestablishment. Disraeli, recognizing the full significance of this decision, announced that, as soon as the necessary pre- parations could be made, the government would appeal from the House to the country. Parliament was dissolved at the end of July, but the general election did not take place till the end of the following November. The future of the Irish Church naturally formed one of the chief subjects which occupied the attention of the electors, but the issue was largely determined by wider considerations. The country, after the long political truce which had been maintained by Lord Palmerston, was again ranged in two hostile camps, animated by opposing views. It was virtually asked to decide in 1868 whether it

would put its trust in Liberal or Conservative, in Gladstone or Disraeli. By an overwhelming majority it threw its lot in favour of Gladstone; and Disraeli, without even venturing to meet parliament, took the unusual course of at once placing his resignation in the queen's hands.

The Conservative government, which thus fell, will be chiefly recollected for its remarkable concession to democratic principles by the passage of the Reform Act of 1867; but it deserves perhaps a word of praise for its conduct of a distant and unusual war. The emperor of Abyssinia had, for some time, detained some Englishmen prisoners in his country; and the government, unable to obtain redress in other ways, decided on sending an army to release them. The expedition, entrusted to Sir Robert Napier, after- wards Lord Napier of Magdala, was fitted out at great expense, and was rewarded with complete success. The prisoners were released, and the Abyssinian monarch committed suicide. Disraeli — whose oriental imagination was excited by the triumph — incurred some ridicule by his bombastic declaration that " the standard of St George was hoisted upon the mountains of Rasselas." But the ministry could at least claim that the war had been waged to rescue Englishmen from captivity, that it had been conducted with skill, and that it had accomplished its object. The events of the Abyssinian war, however, were forgotten in the great political revolution which had swept the Conservatives from office and placed Gladstone in power. His government was destined to endure for more than five years. During that period it experienced the alternate prosperity and decline which nearly forty years before had been the lot of the Whigs after the passage of the first Reform Act. During its first two sessions it accomplished greater changes in legislation than had been attempted by any ministry since that of Lord Grey. In its three last sessions it was destined to sink into gradual disrepute; and it was ultimately swept away by a wave of popular reaction, as remarkable as that which had borne it into power.

It was generally understood that Gladstone intended to deal with three great Irish grievances — " the three branches of the Glad- u P as tree " — t ˆ le reu gi° us ! agricultural and educa-

*stone's tional grievances. The session of 1869 was devoted *** to the first of these subjects. Gladstone introduced*

ministry. a jjjjj disconnecting the Irish Church from the state, establishing a synod for its government, and; — after leaving it in possession of its churches and its parsonages, and making ample

provision for the life-interest of its existing clergy — devoting the bulk of its property to the relief of distress in Ireland. The bill was carried by large majorities through the House of Com- mons; and the feeling of the country was so strong that the Lords did not venture on its rejection. They satisfied themselves with engrafting on it a series of amendments which, on the whole, secured rather more liberal terms of compensation for existing interests. Some of these amendments were adopted by Gladstone; a compromise was effected in respect of the others; and the bill, which had practically occupied the whole session, and had perhaps involved higher constructive skill than any measure passed in the previous half-century, became law. Having dealt with the Irish Church in 1869, Gladstone turned to the more complicated question #f Irish land. So far back as the 'forties Sir R. Peel had appointed a commission, known

Irish land.

from its chairman as the Devon commission, which had recom- mended that the Irish tenant, in the event of disturbance, should receive some compensation for certain specified improvements which he had made in his holding. Parliament neglected to give effect to these recom- mendations; in a country where agriculture was the chief of almost only occupation, the tenant remained at his landlord's mercy. In 1870 Gladstone proposed to give the tenant a pecuniary interest in improvements, suitable to' the holding, which he had made either before or after the passing of the act. He proposed also that, in cases of eviction, the smaller tenantry should receive compensation for disturbance. The large tenantry, who were supposed to be able to look after their own interests, were entirely debarred, and tenants enjoying leases were excluded from claiming compensation, except for tillages, buildings and reclamation of lands. A special court, it was further provided, should be instituted to carry out the provisions of the bill. Large and radical as the measure was, reversing many of the accepted principles of legislation by giving the tenant a ˆMaw-partnership with the landlord in his holding, no serious opposition was made to it in either House of Parliament. Its details, indeed, were abundantly criticized, but its principles were hardly disputed, and it became law without any substantial alteration of its original provisions. In two sessions two branches of the upas tree had been summarily cut off. But parliament in 1870 was not solely occupied with the wrongs of Irish tenantry. In the same year Forster, as vice-president of the council, succeeded in carrying the great measure which for the first time made education compulsory. In devising his scheme, Forster endeavoured to utilize, as far as possible, the educational machinery which had been*

voluntarily provided by various religious organizations. He gave the institutions, which had been thus established, the full benefit of the assistance which the government was prepared to afford to board schools, on their adopting a conscience clause under which the religious suscepti- bilities of the parents of children were protected. This provision led to many debates, and produced the first symptoms of dis- ruption in the Liberal party. The Nonconformists contended that no such aid should be given to any school which was not conducted on undenominational principles. Sup- ported by the bulk of the Conservative party, Forster Biement- was enabled to defeat the dissenters. But the victory education which he secured was, in one sense, dearly purchased. The first breach in the Liberal ranks had been made; and the government, after 1870, never again commanded the same united support which had enabled it to pursue its victorious career in the first two sessions of its existence.

Towards the close of the session of 1870 other events, for which the government had no direct responsibility, introduced new difficulties. War unexpectedly broke out between

France and Prussia. The French empire fell; the f /a< f ˆ a „ . . , _ , , -ˆ . neutrality.

German armies marched on Paris; and the Russian

government, at Count Bismarck's instigation, took advantage of the collapse of France to repudiate the clause in the treaty of 1856 which neutralized the Black Sea. Lord Granville, who had succeeded Lord Clarendon at the foreign office, protested against this proceeding. But it was everywhere felt that his mere protest was not likely to affect the result; and the government at last consented to accept a suggestion made by Count Bismarck, and to take part in a conference to discuss the Russian proposal. Though this device enabled them to say that they had not yielded to the Russian demand, it was obvious that they entered the conference with the foregone conclusion of conceding the Russian claim. The attitude which the government thus chose to adopt was perhaps inevitable in the circumstances, but it confirmed the impression, which the abandonment of the cause of Denmark had produced in 1864, that Great Britain was not prepared to maintain its principles by going to war. The weak- ness of the British foreign office was emphasized by its consenting, almost at the same moment, to allow the claims of the United States, for the depredations of the " Alabama," to be settled under a rule only agreed upon in 187 1. Most Englishmen now

appreciate the wisdom of a concession which has gained for them the friendship of the United States. But in 1871 the country- resented the manner in which Lord Granville had acted. What- ever credit the government might have derived from its domestic measures, it was discredited, or it was thought to be, by its foreign policy. In these circumstances legislation in 187 1 was not marked with the success which had attended the government in previous sessions. The government succeeded in terminating a long controversy by abolishing ecclesiastical tests at universities. But the Lords ventured to reject a measure for the introduction of the ballot at elections, and refused to proceed with a bill for the abolition of purchase in the army. The result of these decisions was indeed remarkable. In the one case, the Lords in 1872 found it necessary to give way, and to pass the Ballot Bill, which they had rejected in 1871. In the other, Gladstone decided on abolishing, by the direct authority of the crown, the system which the Lords refused to do away with by legislation. But his high-handed proceeding, though it forced the Lords to reconsider their decision, strained the allegiance of many of his supporters, and still further impaired the popularity of his administration. Most men felt that it would have been permissible for him, at the commencement of the session, to have used the queen's authority to terminate the purchase system; but they considered that, as he had not taken this

ˆ?m!L..- course, it was not open to him to reverse the decision purchase. ,.,,., T 1

of the legislature by resorting to the prerogative.

Two appointments, one to a judicial office, the other to an ecclesiastical preferment, in which Gladstone, about the same time, showed more disposition to obey the letter than the spirit of the law, confirmed the impression which the abolition of purchase had made. Great reforming ministers would do well to recollect that the success of even liberal measures may be dearly purchased by the resort to what are regarded as un- constitutional expedients.

In the following years the embarrassments of the government were further increased. In 1872 Bruce, the home secretary,

succeeded in passing a measure of licensing reform.

But the abstainers condemned the bill as inadequate;

the publicans denounced it as oppressive; and the whole strength of the licensed victuallers was thenceforward arrayed against the ministry. In 1873 Gladstone attempted to complete his great Irish measures by conferring on Ireland the advantage of a university which would be equally acceptable to Protestants and Roman Catholics. But his proposal again failed to satisfy those in whose interests it was proposed. The second reading of the bill was rejected by a small majority, and Gladstone resigned; but, as Disraeli could not form a govern- ment, he resumed office. The power of the great minister was, however, spent; his ministry was hopelessly discredited. History, in fact, was repeating itself. The ministry was suffering, as Lord Grey's government had suffered nearly forty years before, from the effect of its own successes. It had accomplished more than any of its supporters had expected, but in doing so it had harassed many interests and excited much opposition. Gladstone endeavoured to meet the storm by a rearrangement of his crew. Bruce, who had offended the licensed victuallers, was removed from the home office, and made a peer and president of the council. Lowe, who had incurred unpopularity by his fiscal measures, and especially by an abortive suggestion for the taxation of matches, was transferred from the exchequer to the home office, and Gladstone himself assumed the duties of chancellor of the exchequer. He thereby created a difficulty for himself which he had not foreseen. Up to 1867 a minister leaving one office and accepting another vacated his seat; after 1867 a transfer from one post to another did not necessitate a fresh election. But Gladstone in 1873 had taken a course which had not been contemplated in 1 867 . He had not been transferred from one office to another. He had accepted a new in addition to his old office. It was, to say the least, uncertain whether his action in this respect had, or had not, vacated his seat. It would be unfair to suggest that the inconvenient difficulty with which he was thus confronted determined his policy, though he

1872 1874.

was probably insensibly influenced by it. However this may be, on the eve of the session of 1874 he suddenly decided to dissolve parliament and to appeal to the country. He announced his decision in an address to his constituents, in which, among other financial reforms, he promised to repeal the income tax. The course which Gladstone took, and the bait which he held out to the electors, were

generally condemned. The country, wearied of the ministry and of its measures, almost everywhere supported the Conservative candidates. Disraeli found himself restored to power at the head of an overwhelming majority, and the great minister who, five years before, had achieved so marked a triumph temporarily withdrew from the leadership of the party with whose aid he had accomplished such important results. His ministry had been essentially one of peace, yet its closing days were memorable for one little war in which a great soldier increased a reputation already high. Sir Garnet Wolseley triumphed over the difficulties which the climate of the west coast of Africa imposes on Europeans, and brought a troublesome contest with the Ashantis to a successful conclusion.

The history of Disraeli's second administration affords an exact reverse to that of Gladstone's first cabinet. In legislation the ministry attempted little and accomplished less. They did something to meet the wishes of the publicans, DisraeWs whose discontent had contributed largely to Gladstone's mMistry. defeat, by amending some of the provisions of Bruce's licensing bill; they supported and succeeded in passing a measure, brought in by the primate, to restrain some of the irregularities which the Ritualists were introducing into public worship ; and they were compelled by the violent insistence of Plimsoll to pass an act to protect the lives of merchant seamen. Disraeli's government, however, will be chiefly remembered for its foreign policy. Years before he had propounded in Tancred the theory that England should aim at eastern empire. Circumstances in his second term of office enabled him to translate his theory into practice. In 1875 the country was suddenly startled at hearing that it had acquired a new position and assumed new responsi- bilities in Egypt by the purchase of the shares which the khedive of Egypt held in the Suez Canal. In the following spring a new surprise was afforded by the introduction of a measure authoriz- ing the queen to assume the title of empress of India. But these significant actions were almost forgotten in the presence of a new crisis; for in 1876 misgovernment in Turkey had pro- duced its natural results, and the European provinces of the Porte were in a state of armed insurrection. In the presence of a grave danger, Count Andrassy, the Austrian minister, drew up a note which was afterwards known by his name, declaring that the Porte had failed to carry into effect the promises of reform which she had made, and that some combined action on the part of Europe was necessary to compel her to do so. The note was accepted by the three continental empires, but Great Britain refused in the first instance to assent to it, and only ultimately consented at the desire of the Porte, whose

statesmen seem to have imagined that the nominal co-operation of England would have the effect of restraining the action Bulgarian of other powers. Turkey accepted the note and ties!"' renewed the promises of reform, which she had so often made, and which meant so little. The three northern powers thereupon agreed upon what was known as the Berlin Memor- andum, in which they demanded an armistice, and proposed to watch over the completion of the reforms which the Porte had promised. The British government refused to be a party to this memorandum, which in consequence became abortive. The insurrection increased in intensity. The sultan Abdul Aziz, thought unequal to the crisis, was hastily deposed; he was either murdered or led to commit suicide; and insurrection in Bulgaria was stamped out by massacre. The story of the " Bulgarian atrocities " was published in Great Britain in the summer of 1876. Disraeli characteristically dismissed it as " coffee-house babble," but official investigation proved the substantial accuracy of the reports which had reached England. The people regarded these events with horror. Gladstone, emerging from his retirement, denounced the conduct of the

Turks, In a phrase which became famous he declared that the only remedy for the European provinces of the Porte was to turn out the Ottoman government "bag and baggage." All England was at once arrayed into two camps. One party was led by Disraeli, who was supposed to represent the traditional policy of England of maintaining the rule of the Turk at all hazards; the other, inspired by the example of Gladstone, was resolved at all costs to terminate oppression, but was at the same time distrusted as indirectly assisting the ambitious views by which the Eastern policy of Russia had always been animated. The crisis soon became intense. In June 1876 Servia and Montenegro declared war against Turkey. In a few months Servia was hopelessly beaten. Through the insistence of Russia an armistice was agreed upon; and Lord Beaconsfield- — for Disraeli had now been raised to the peerage — endeavoured to utilize the breathing space by organizing a conference of the great powers at Constantinople, which was attended on behalf of Great Britain by Lord Salisbury. The Constantinople con- ference proved abortive, and in the beginning of 1877 Russia declared war. For some time, however, her success was hardly equal to her expectations. The

Turks, entrenched at Plevna, delayed the Russian advance; and it was only towards the close of 1877 that Plevna at last fell and Turkish resistance collapsed. With its downfall the war party in England, which was led by the prime minister, increased in violence. From the refrain of a song, sung night after night at a London music hall, its members became known as Jingoes. The government ordered the British fleet to pass the Dardanelles and go up to Constantinople; and though the order was subsequently withdrawn, it asked for and obtained a grant of £6,000,000 for naval and mili- tary purposes. When news came that the Russian armies had reached Adrianople, that they had concluded some arrangement with the Turks, and that they were pressing forward towards Constantinople, the fleet was again directed to pass the Dardanelles; Soon afterwards the government decided to call out the reserves and to bring a contingent of Indian troops to the Mediterranean. Lord Derby, 1 who was at the foreign office, thereupon retired from the ministry, and was succeeded by Lord Salisbury. Lord Derby's resignation was everywhere regarded as a proof that Great Britain was on the verge of war. Happily this did not occur. At Prince Bismarck's suggestion Russia consented to refer the treaty which she had concluded at San Stefano to a congress of the great powers; and the congress, at which Great Britain was represented by Lord Beaconsfield and Lord Salisbury, ■ succeeded in substituting for the treaty of San Stefano

treaty. the treaty of Berlin. The one great advantage derived from it was the tacit acknowledgment by Russia that Europe could alone alter arrangements which Europe had made. In every other sense it is doubtful whether the provisions of the treaty of Berlin were more favourable than those of the treaty of San Stefano. On Lord Beaconsfield's return, however, he claimed for Lord Salisbury and himself that they had brought back " peace with honour," and the country accepted with wild delight the phrase, without taking much trouble to analyse its justice.

If Lord Beaconsfield had dissolved parliament immediately after his return from Berlin, it is possible that the wave of popularity which had been raised by his success would have borne him forward to a fresh victory in the constituencies. His omission to do so gave the country time to meditate on the con- sequences of his policy. One result soon became perceptible. Differences with Russia produced their inevitable consequences in fresh complications on the Indian frontier. The Russian government, confronted with a quarrel with Great Britain in A eastern Europe, endeavoured to create difficulties in

wars. Afghanistan. A Russian envoy was sent to Kabul,

where Shere AH, who had succeeded his father Dost Mahommed in 1863, was amir; and the British • government, alarmed at this new embarrassment, decided on sending a mission to the Afghan capital. The mission was stopped on the frontier

1 Edward Henry Stanley, 15th earl of Derby, son of the 14th earl and former prime minister. ;

by an agent of Shere AH, who declined to allow it to proceed. The British government refused to put up with an affront of this kind, and their envoy, supported by an army, continued his advance. Afghanistan was again invaded. Kabul and Kandahar were occupied; and Shere Ali was forced to fly, and soon afterwards died. His successor, Yakub Khan, came to the British camp and signed, in May 1879, the treaty of Gandamak. Under the terms of this treaty the Indian government undertook to pay the new amir a subsidy of £60,000 a year; and Yakub Khan consented to receive a British mission at Kabul, and to cede some territory in the Himalayas which the military advisers of Lord Beaconsfield considered necessary to make the frontier more "scientific." This apparent success was soon followed by disastrous news. The deplorable events of 1841 were re-enacted in 1870. The new envoy reached Kabul, but was soon afterwards murdered. A British army was again sent into Afghanistan, and Kabul was again occupied. Yakub Khan, who had been made amir in 1879, was deposed, and Abdur Rahman Khan was selected as his successor. The British did not assert their superiority without much fighting and some serious reverses. Their victory was at last assured by the ex- cellent strategy of Sir Donald Stewart and Sir Frederick (after- wards Lord) Roberts. But before the final victory was gained Lord Beaconsfield had fallen. His policy had brought Great Britain to the verge of disaster in Afghanistan: the credit of reasserting the superiority of British arms was deferred till his successors had taken office.

It was not only in Afghanistan that the new imperial policy which Lord Beaconsfield had done so much to encourage was straining the resources of the empire. In South Africa a still more serious difficulty was already commencing. At the time at which Lord Beaconsfield's administration began, British territory in South Africa was practically confined to Cape Colony and Natal. Years before, in 1852 and 1854 respectively, the British government, at that time a little weary of the responsi- bilities of colonial rule, had recognized the independence of the two Dutch republics, the Transvaal and the Orange Free State. Powerful native tribes occupied the territory to

the north of Natal and the east of the Transvaal. War broke out between the Transvaal Republic and one of the most powerful of these native chieftains, Sikukuni; and the Transvaal was worsted in the struggle. Weary of the condition of anarchy which existed in the repubhc, rriany inhabitants of the Transvaal were ready to welcome its annexation to Great Britain-ˆa proposal favoured by the colonial secretary, Lord Carnarvon, who wished to federate the South African states, after the manner in which the North American colonies had become by confederation the Dominion of Canada. Sir Theophilus Shepstone, who was sent to inquire into the proposal, mistook the opinion of a party for the verdict of the republic, and declared (April i877)the Transvaal a part of the British Empire. His policy entailed far more serious consequences than the mission to Afghanistan. The first was a war with the Zulus, the most powerful and , , w warlike of the South African natives, who under their ruler, Cetewayo, had organized a formidable army. A dispute had been going on for some: time about the possession of a strip of territory which some British arbitrators had awarded to the Zulu king. Sir Bartle Frere, who had won distinction in India, and was sent out by Lord Beaconsfield's government to the Cape, kept back the award; and, though he ultimately communicated it to Cetewayo, thought it desirable to demand the disbandment of the Zulu army. • In the war which ensued, the British troops who invaded Zulu territory met with a severe reverse; and, though the disasterˆwas ultimately retrieved by Lord Chelmsford, the war involved heavy expenditure and brought little credit to the British army, while one unfortunate incident, the death of Prince Napoleon, who had obtained leave to serve with the British troops, and was surprised by the Zulus while reconnoitring, created a deep and unfortunate impression. Imperialism, which had been excited by Lord Beaconsfield's policy in 1878, and by the prospect of a war with a great European power, fell into discredit when it degenerated into a fresh expedition into

Afghanistan, and an inglorious war with a savage African tribe. A period of distress at home increased the discontent which Lord Beaconsfield's external policy was exciting; and, when parlia- ment was at last dissolved in 1880, it seemed no longer certain that the country would endorse the policy of the minister, who only a short time before had acquired such popularity. Gladstone, emerging from

*his retirement, practically placed himself again at the head of the Liberal party. In a series of speeches in Mid- lothian, where he offered himself for election, he denounced the whole policy which Lord Beaconsfield had pursued. His im- passioned eloquence did much more than influence his own election. His speeches decided the contest throughout the kingdom. The Liberals secured an even more surprising success than that which had rewarded the Conservatives six years before. For the first time in the queen's reign, a solid Liberal majority, independent of all extraneous Irish support, was returned, and Gladstone resumed in triumph his old position as prime minister. The new minister had been swept into power on a wave of popular favour, but he inherited from his predecessors difficulties Wad- * n almost every quarter of the world; and his own*

stone's language had perhaps tended to increase them. He second was committed to a reversal of Lord Beaconsfield's mnsry. p jj cv . anc ˆ m politics, it is never easy, and perhaps rarely wise, suddenly and violently to change a system. In one quarter of the world the new minister achieved much success. The war in Afghanistan, which had begun with disaster, was creditably concluded. A better understanding was gradually established with Russia; and, before the ministry went out, steps had been taken which led to the delimitation of the Russian and Afghan frontier. In South Africa, however, a. very different result ensued. Gladstone, before he accepted office, had de- nounced the policy of annexing the Transvaal; his language was so strong that he was charged with encouraging the Boers to maintain their independence by force ; his example had naturally been imitated by some of his followers at the general election; and, when lie resumed power, he found himself in the difficult dilemma of either maintaining an arrangement which he had declared to be unwise, or of yielding to a demand which the Boers were already threatening to support in arms. The events of the first year of his administration added to his difficulty. Before its close the Boers seized Heidelberg and established a republic; they destroyed a detachment of British troops at Bronkhorst Spruit; and they surrounded and attacked the British garrisons in the Transvaal. Troops were of course sent from England to maintain the British cause; and Sir George Colley, who enjoyed a high reputation and had experience in South African warfare, was made governor of Natal, and en- trusted with the military command. The events which im-< mediately followed will not be easily forgotten. Wholly mis- talculating the strength of the Boers, Sir George Colley, at the end of January 1881, attacked them at Laing's Nek, in the north of Natal, and was repulsed with heavy loss. Some ten days afterwards he

fought another action on the Ingogo, and was again forced to retire. On the 26th February, with some 600 men, he occupied a high hill, known as Majuba, which, he thought, dominated the Boer position. The following day the Boers attacked the hill, overwhelmed its defenders, and Sir George Colley was himself killed in the disastrous contest on the summit. News of these occurrences was received with dismay in England. It was, no doubt, possible to say a good deal for Gladstone's indignant denunciation of his predecessor's policy in annexing the Transvaal; it would have been equally possible to advance many reasons for reversing the measures of Lord Beaconsfield's

cabinet, and for conceding independence to the 1881. ‘ Transvaal in 1880. But the great majority of persons

considered that, whatever arguments might have been urged for concession in 1880, when British troops had suffered no reverses, nothing could be said for concession in 1881, when their arms had been tarnished by a humiliating disaster. Great countries can afford to be generous in the hour of victory; but they cannot yield, without loss-of credit, in the hour of defeat. Unfortunately this reasoning was not suited to Gladstone’s a 19

Bradlaugh

temperament. The justice or injustice of the British cause seemed to him a much more important matter than the vindica- tion of military honour; and he could not bring himself to acknowledge that Majuba had altered the situation, and that the terms which he had made up his mind to concede before the battle could not be safely granted till military reputation was restored. The retrocession of the Transvaal was decided upon, though it was provided that the country should remain under the suzerainty of the queen. Even this grea.t concession did not satisfy the ambition of the Boers, who were naturally elated by their victories. Three years later some Transvaal deputies, with their president, Kruger, came to London and saw Lprd Derby, the secretary of state for the colonies. Lord Derby consented to a new convention, from which any verbal reference to suzerainty was excluded; and the South African ‘ republic was made independent, subject only to the condition that it should conclude no treaties with foreign powers without the approval of the crown. (For the details and disputes con- cerning the terms of this convention the reader is referred to the articles Transvaal and Suzerainty.) .‘Gladstone’s government declined in popularity from the date of the earliest of these concessions. Gladstone, in fact, had ‘■■ succeeded in doing

what Lord Beaconsfield had failed to accom- plish. Annoyance at his foreign policy had rekindled the imperialism which the embarrassments created by Lord Beacons- field had done so much to damp down. And, if things were i going badly with the new government abroad, matters were not progressing smoothly at home. At the general election of 1880, the borough of Northampton, which of late years has shown an unwavering preference for Liberals of an advanced type, returned as its members Henry Labouchere and Charles Bradlaugh. Bradlaugh, who had attained some notoriety for an aggressive atheism, claimed the right to make an affirmation of allegiance instead of taking the customary oath, which he declared was, in his eyes, a meaningless form. The speaker, instead of deciding the question, submitted it to the judgment of the House, and it was ultimately referred to a select committee, which reported against Bradlaugh's claim. Bradlaugh, on hearing the decision of the committee, presented himself at the bar and offered to take the oath. It was objected that, as he had publicly declared that the words of the oath had no clear meaning for him, he could not be permitted to take it; and after some wrangling the matter was referred to a fresh committee, which supported the view that Bradlaugh could not be allowed to be sworn, but recommended that he should be permitted to make the affirmation at his own risk. The House refused to accept the recommendation of this committee when a bill was introduced to give effect to it. This decision naturally enlarged the question before it. For, while hitherto the debate had turned on the technical points whether an affirmation could be substituted for an oath, or whether a person who had declared that an oath had no meaning for him could properly be sworn, the end at which Bradlaugh's opponents were thenceforward aiming was the imposition of a new religious test — the belief in a God — on members of the House of Commons. The con- troversy, which thus began, continued through the parliament of 1880, and led tq many violent scenes, which lowered the dignity of the House. It was quietly terminated, in the parlia- ment of 1886, by the firm action of a new speaker. Mr Peel, who had been elected to the chair in 1884, decided that neither the speaker nor any other member had the right to intervene to prevent a member from taking the oath if he was willing to take it. Parliament subsequently, by a new act, permitted affirmations to be used, and thenceforward religion, or the absence of religion, was no disqualification for a seat in the House of Commons. The atheist, like the Roman Catholic and the Jew, could sit and vote.

The Bradlaugh question was not the only difficulty with which the new government was confronted. Ireland was again attracting the

attention of politicians. The Fenian move- ment had practically expired; some annual motions for the introduction of Home Rule, made with all the decorum Cjf

Paraell.

parliamentary usage, had been regularly defeated. But the Irish were placing themselves under new leaders and adopting new methods. During the Conservative government of 1874, the Irish members had endeavoured to arrest attention by organized obstruction. Their efforts had increased the difficulties of

government and taxed the endurance of parliament.

These tactics were destined to be raised to a fine art by Parnell, who succeeded to the head of the Irish party about the time of the formation of Gladstone's government. It was Parnell's determination to make legislation impracticable, and parliament unendurable, till Irish grievances were redressed. It was his evident belief that by pursuing such tactics he could force the House of Commons to concede the legislation which he desired. The Irish members were not satisfied with the legislation which parliament had passed in 1869-1870. The land act of 1870 had given the tenant no security in the case of eviction for non-payment of rent; and the tenant whose rent was too high or had been raised was at the mercy of his landlord. It so happened that some bad harvests had temporarily increased the difficulties of the tenantry, and there was no doubt that large numbers of evictions were taking place in Ireland. In these circumstances, the Irish contended that the relief which the act of 1870 had afforded should be extended, and that, till such legislation could be devised, a temporary measure should be passed giving the tenant compensation for disturbance. Gladstone admitted the force of this reasoning, and a bill was introduced to give effect to it. Passed by the Commons, it was thrown out towards the end of the session by the Lords; and the government acquiesced — perhaps could do nothing but acquiesce — in this decision. In Ireland, however, the rejection of the measure was attended with disastrous results. Outrages increased, obnoxious landlords and agents were " boycotted " — the name of the first gentleman exposed to this

treatment adding a new word to the language ; and Forster, who had accepted the office of chief secretary, thought it necessary, in the presence of outrage and intimidation, to adopt stringent measures for enforcing order. A measure was passed on his initiation, in 1881, authorizing him to arrest and detain suspected persons; and many well-known Irishmen, including Parnell himself and other members of parliament, were thrown into prison. It was an odd commentary on parliamentary government that a Liberal ministry should be in power, and that Irish members should be in prison; and early in 1882 Gladstone determined to liberate the prisoners on terms. The new policy — represented by what was known as the Kilmainham Treaty — led to the resignation of the viceroy, Lord Cowper, and of Forster, and the appoint- ment of Lord Spencer and Lord Frederick Cavendish as their successors. On the 6th of May 1882 Lord Spencer made his entry into Dublin, and on the evening of the same day Lord Frederick, unwisely allowed to walk home alone with Burke, the under- secretary to the Irish government, was murdered with his companion in Phoenix Park. This gross outrage led to fresh measures of coercion. The disclosure, soon afterwards, of a conspiracy to resort to dynamite still further alienated the sympathies of the Liberal party from the Irish nation. Gladstone might fairly plead that he had done much, that he had risked much, for Ireland, and that Ireland was making him a poor return for his services.

In the meanwhile another difficulty was further embarrassing a harassed government. The necessities of the khedive of Egypt

*had been only temporarily relieved by the sale to gyp ‘ Lord Beaconsfield’s government of the Suez Canal shares. Egyptian finance, in the interests of the bondholders, had been placed under the dual control of England and France. Thenewarrangement naturally produced some native resentment, and Arabi Pasha placed himself at the head of a movement which was intended to rid Egypt of foreign interference. His preparations eventually led to the bombardment of Alexandria by the British fleet, and still later to the invasion of Egypt by a British army under Sir Garnet, afterwards Lord Wolseley, and *>o tbe battle of Tell-el-Kebir, after which Arabi was defeated «nd taken pri; oner. The bombardment of Alexandria led to the*

immediate resignation of Bright, whose presence in the cabinet had been of importance to the government; the occupation of Egypt broke up the dual control, and made Great Britain responsible for Egyptian administration. The effects of British rule were, in one sense, remarkable. The introduction of good government increased the

prosperity of the people, and restored confidence in Egyptian finance. At the same time it provoked the animosity of the French, who were naturally jealous of the increase of British influence on the Nile, and it also threw new responsibilities on the British nation. For south of Egypt lay the great territory of the Sudan, which to some extent commands the Nile, and which had been added to the Egyptian dominions at various periods between 1820 and 1875. In 1881 a fanatic sheikh— known as the mahdi — had headed an insur- rection against the khedive's authority; and towards the close of 1883 an Egyptian army under an Englishman, Colonel Hicks, was annihilated by the mahdi's followers. The insurrection increased the responsibilities which intervention had imposed on England, and an expedition was sent to Suakin to guard the littoral of the Red Sea; while, at the beginning. of 1884, General Gordon — whose services in China had gained him a high reputation, and who had had previous experience in the Sudan — was sent to Khartum to report on the condition of affairs. These decisions led to momentous results. The British expedition to Suakin was engaged in a series of battles with Osman Digna, the mahdi's lieutenant; while General Gordon, after alternate reverses and successes, was isolated at Khartum. Anxious as Gladstone's ministry was to restrict the sphere of its responsibilities, it was compelled to send an expedi- tion to relieve General Gordon; and Lord Wolseley, who was appointed to the command, decided on moving up the Nile to his relief. The expedition proved much more difficult than Lord Wolseley had anticipated. And before it reached its goal, Khartum was forced to surrender, and General Gordon and his few faithful followers were murdered (January 1885). General Gordon's death inflicted a fatal blow on the Liberal government. It was thought that the general, whose singular devotion to duty made him a popular hero, had been allowed to assume an impossible task; had been feebly supported; and that the measures for his relief had been unduly postponed and at last only reluctantly undertaken. The ministry ultimatelyexperienced defeat on a side issue. The budget, which Childers brought forward as chancellor of the exchequer, was attacked by the Conservative party ; and an amendment proposed by Sir Michael Hicks-Beach, condemning an increase in the duties on spirits and beer, was adopted by a small majority. Gladstone resigned office, and Lord Salisbury, who, after Lord Beaconsfield's death, had succeeded to the lead of the Conservative party, was in- structed to form a new administration.

It was obvious that the new government, as its first duty, would be compelled to dissolve the parliament that had been elected when

Gladstone was enjoying the popularity which he hadlost so rapidly in office. But it so happened Act"i884. that it was no longer possible to appeal to the old con- stituencies. For, in 1884, Gladstone had introduced a new Reform Bill; and, though its passage had been arrested by the Lords, unofficial communications between the leaders of both parties had resulted in a compromise which had led to the adoption of a large and comprehensive Reform Act. By this measure, household franchise was extended to the counties. But counties and boroughs were broken up into a number of small constituencies, for the most part returning only one member each; while the necessity of increasing the relative weight of Great Britain, and the reluctance to inflict disfranchise- ment on Ireland, led to an increase in the numbers of the House of Commons from 658 to 670 members. This radical reconstruc- tion of the electorate necessarily made the result of the elections doubtful. As a matter of fact, the new parliament comprised 334 Liberals, 250 Conservatives and 86 Irish Nationalists. It was plain beyond the possibility of doubt that the future de- pended on the course which the Irish Nationalists might adopt. It they threw in their lot with Gladstone, Lord Salisbury's

Home Rule.

government was evidently doomed. If, on the contrary, they joined the Conservatives, they could make a Liberal administra- tion impracticable.

In the autumn of 1885 it was doubtful what course the Irish Nationalists would take. It was generally understood that Lord Carnarvon, who had been made viceroy of Ireland, had been in communication with Parnell; that Lord Salisbury was aware of the interviews which had taken place; and it was whispered that Lord Carnarvon was in favour of granting some sort of administrative autonomy to Ireland. Whatever opinion Lord Carnarvon may have formed — and his precise view is uncertain — a greater man than he had suddenly arrived at a similar conclusion. In his election speeches Gladstone had insisted on the necessity of the country returning a Liberal majority which could act indepen- dently of the Irish vote; and the result of the general election had left the Irish the virtual arbiters of the political situation. In these circumstances Gladstone

arrived at a momentous decision. He recognized that the system under which Ireland had been governed in the past had failed to win the allegiance of her people; and he decided that it was wise and safe to entrust her with a large measure of self-government. It was perhaps characteristic of Gladstone, though it was unquestion- ibly unfortunate, that, in determining on this radical change of policy, he consulted few, if any, of his previous colleagues. On the meeting of the new parliament Lord Salisbury's govern- ment was defeated on an amendment to the address, demanding facilities for agricultural labourers to obtain small holdings for gardens and pasture — the policy, in short, which was described as " three acres and a cow." Lord Salisbury resigned, and Gladstone resumed power. The attitude, however, which Gladstone was understood to be taking on the subject of Home Rule threw many difficulties in his way. Lord Hartington, and others of his former colleagues, declined to join his administra- tion; Mr Chamberlain, who, in the first instance, accepted office, retired almost at once from the ministry; and Bright, whose eloquence and past services gave him a unique position in the House, threw in his lot in opposition to Home Rule. A split in the Liberal party thus began, which was destined to endure; and Gladstone found his difficulties increased by the defection of the men on whom he had hitherto largely relied. He persevered, however, in the task which he had set hiniself, and introduced a measure endowing Ireland with a parliament, and excluding the Irish members from Westminster. He was defeated, and appealed from the House which had refused to support him to the country. For the first time in the queen's reign two general elections occurred within twelve months. The country showed no more disposition than the House of Commons to approve the course which the minister was taking. A large majority of the members of the new parliament were pledged to resist Home Rule. Gladstone, bowing at once to the verdict of the people, resigned office, and Lord Salisbury returned to power.

The new cabinet, which was formed to resist Home Rule, did not succeed in combining all the opponents to this measure. The secessionists from the Liberal party — the Liberal Unionists, as they were called — held aloof from it; and Lord Salisbury was forced to form his cabinet out of his immediate followers. The most picturesque appointment was that of Lord Randolph Churchill, who was made chancellor of the exchequer and leader of the House of Commons. But before many months were over, Lord Randolph — unable to secure acceptance of a policy of financial retrenchment — resigned office, and Lord Salisbury was forced to reconstruct his ministry. Though he again failed to obtain the co-operation of the

Liberal Unionists, one of the more prominent of them — Goschen — accepted the seals of the Exchequer. W. H. Smith moved from the war office to the treasury, and became leader of the House of Commons; while Lord Salisbury himself returned to the foreign office, which the dramatically sudden death of Lord Iddesleigh, better known as Sir Stafford Northcote, vacated. These arrangements lasted till 1891, when, on Smith's death,

Unionism.

the treasury and the lead of the Commons were entrusted to Lord Salisbury's nephew, Mr Arthur Balfour, who had made a great reputation as chief secretary for Ireland.

The ministry of 1886, which endured till 1892, gave to London a county council; introduced representative government into every English county; and made elementary education free throughout England. The alliance with the Liberal Unionists was, in fact, compelling the Conservative government to promote measures which were not wholly consistent with the stricter Conservative traditions, or wishes. In other respects, the legis- lative achievements of the government were not great; and the time of parliament was largely occupied in devising rules for the conduct of its business, which the obstructive attitude of the Irish members made necessary, and in discussing the charges brought against the Nationalist party by The Times, of complicity in the Phoenix Park murders. Under the new rules, the sittings of the House on ordinary days were made to commence at 3 p.m., and opposed business was automatically interrupted at midnight, while for the first time a power was given to the majority in a House of a certain size to conclude debate by what was known as the closure. Notwithstanding these new rules obstructive tactics continued to prevail; and, in the course of the parliament, many members were suspended for disorderly conduct. The hostility of the Irish members was perhaps increased by some natural indignation at the charges brought against Parnell. The Times, in April 1887, printed the facsimile of a letter purporting to be signed by Parnell, in which he declared that he had no other course open to him but to denounce the Phoenix Park murders, but that, while he regretted " the accident " of Lord Frederick Cavendish's death, he could not " refuse to admit that Burke got no more than his deserts." The publication of this letter, and later of other similar documents, naturally created a great sensation; and the government ultimately appointed a special commission of three judges to inquire into the charges and allegations that were made. In the course of the inquiry it was proved that the letters had emanated

from a man named Pigott, who had at one time been associated with the Irish Nationalist movement, but who for some time past had earned a precarious living by writing begging and threatening letters. Pigott, subjected to severe cross-examination by Sir Charles Russell (afterwards Lord Russell of Killo wen) , broke down, fled from justice and committed suicide. His flight practically settled the question; and an inquiry, which many people had thought at its inception would brand Parnell as a criminal, raised him to an influence which he had never enjoyed before. But in the same year which witnessed his triumph, he was doomed to fall. He was made co-respondent in a divorce suit brought by Captain O'Shea — another Irishman — for the dissolution of his marriage; and the disclosures made at the trial induced Gladstone, who was supported by the Nonconformists generally throughout the United Kingdom, to request Parnell to withdraw from the leadership of the Irish party. Parnell refused to comply with this request, and the Irish party was shattered into fragments by his decision. Parnell himself did not long survive the disruption of the party which he had done so alist s " pUtt much to create. The exertions which he made to retrieve his waning influence proved too much for his strength, and in the autumn of 1891 he died suddenly at Brighton. Parnell's death radically altered the political situation. At the general elections of 1885 and 1886 the existence of a strong, united Irish party had exercised a dominating influence. As the parliament of 1886 was drawing to a close, the dissensions among the Irish members, and the loss of their great leader, were visibly sapping the strength of the Nationalists. At the general election of 1892 Home Rule was still the prominent subject before the electors. But the English Liberals were already a little weary of allies who were quarrelling among themselves, and whose disputes were introducing a new factor into politics. The political struggle virtually turned not on measures, but on men. Gladstone's great age, and the marvellous powers which he displayed at a time when most men seek the repose of

retirement, were the chief causes which affected the results. His influence enabled him to secure a small Liberal majority. But it was noticed that the majority depended on Scottish, Irish and Welsh votes, and that England — the " predominant partner," as it was subsequently called by Lord Rosebery — returned a majority of

members pledged to resist any attempt to dissolve the union between the three kingdoms.

On the meeting of the new parliament Lord Salisbury's government was defeated on a vote of want of confidence, and

*for a fourth time Gladstone became prime minister. b°h"i893 * n tne sess i° n °f I ˆ93 he again introduced a Home*

Rule Bill. But the measure of 1893 differed in many respects from that of 1886. In particular, the Irish were no longer to be excluded from the imperial parliament at Westminster. The bill which was thus brought forward was actually passed by the Commons. It was, however, rejected by the Lords. The dissensions among the Irish themselves, and the hostility which English constituents were displaying to the proposal, emboldened the Peers to arrive at this decision. Some doubt was felt as to the course which Gladstone would take in this crisis. Many persons thought that he should at once have appealed to the country, and have endeavoured to obtain a distinct mandate from the constituencies to introduce a new Home Rule Bill. Other persons imagined that he should have followed the precedent which had been set by Lord Grey in 183 1, and, after a short prorogation, have reintroduced his measure in a new session. As a matter of fact, Gladstone adopted neither of these courses. The government decided not to take up the gauntlet thrown down by the Peers, but to proceed with the rest of their political programme. With this object an autumn session was held, and the Parish Councils Act, introduced by Mr Fowler (afterwards Lord Wolverhampton), was passed, after important amendments, which had been introduced into it in the House of Lords, had been reluctantly accepted by Gladstone. On the other hand, an Employers' Liability Bill, introduced by Mr Asquith, the home secretary, was ultimately dropped by Gladstone after passing all stages in the House of Commons, rather than that an amendment of the Peers, allowing "contracting out," should be accepted.

Before, however, the session had quite run out (3rd March 1894), Gladstone, who had now completed his eighty-fourth year, laid down a load which his increasing years made it im- possible for him to sustain (see the article Gladstone). He was succeeded by Lord Rosebery, whose abilities and attainments had raised him to a high place in the Liberal counsels. Lord Rosebery did not succeed in popularizing the Home Rule

proposal which Gladstone had failed to carry. He Rosebery.

declared, indeed, that success was not attainable till

England was converted to its expediency. He hinted that success would not even then be assured until something was done to reform the constitution of the House of Lords. But if, on the one hand, he refused to introduce a new Home Rule Bill, he hesitated, on the other, to court defeat by any attempt to reform the Lords. His government, in these circumstances, while it failed to conciliate its opponents, excited no enthusiasm among its supporters. It was generally understod, moreover, that a large section of the Liberal party resented Lord Rosebery's appointment to the first place in the ministry, ai.d thought that the lead should have been conferred on Sir W. Harcourt. It was an open secret that these differences in the party were reflected in the cabinet, and that the relations between Lord Rosebery and Sir W. Harcourt were too strained to ensure either the harmonious working or the stability of the administration. In these circuit stances the fall of the ministry was only a question of time. It occurred — as often happens in parliament — on a minor issue which no one had foreseen. Attention was drawn in the House of Commons to the insufficient supply of cordite provided by the war office, and the House — notwithstanding the assurance of the war minister (Sir Henry Campbell-Bannerman) that the supply was adequate — placed the government in a minority. Lord Rosebery resigned office, and Lord Salisbury for the third time became prime minister, the duke of Devonshire. Mr Chamberlain

and other Liberal Unionists joining the government. Parliament was dissolved, and a new parliament, in which the Unionists obtained an overwhelming majority, was returned.

The government of 1892-1895, which was successively led by Gladstone and Lord Rosebery, will, on the whole, be remembered for its failures. Yet it passed two measures which have exercised a wide influence. The Parish Councils Act introduced electoral institutions into the government of every parish, and in 1894 Sir W. Harcourt, as chancellor of the exchequer, availed himself of the opportunity, which a large addition to the navy invited, to reconstruct the death duties. He swept away in doing so many of the advantages which the owner of real estate and the life tenant of settled property had previously enjoyed, and drove home a principle which Goschen had tentatively introduced a few years before by increasing the rate of the duty with the amount of the estate. Rich men, out of their superfluities, were thence- forward to pay more than poor men out of their necessities.

The Unionist government which came into power in 1893 lasted, with certain changes of personnel, till 1905, with a break caused by the dissolution of 1900. History may hereafter conclude that the most significant circumstance of the earlier period is to be found in the demonstration of loyalty and affection to which the sixtieth anniversary of Queen Victoria's accession led in 1897. Ten years before, her jubilee had been the occasion of enthusiastic rejoicings, and the queen's progress through London to a service of thanksgiving at Westminster had impressed the imagination of her subjects and proved the affection of her people. But the rejoicings of 1887 were forgotten amid the more striking demonstrations ten LwteM° years later. It was seen then that the queen, by her conduct and character, had gained a popularity which has had no parallel in history, and had won a place in the hearts of her subjects which perhaps no other monarch had ever previously enjoyed. There was no doubt that, if the opinion of the English- speaking races throughout the world could have been tested by a plebiscite, an overwhelming majority would have declared that the fittest person for the rule of the British empire was the gracious and kindly lady who for sixty years, in sorrow and in joy, had so worthily discharged the duties of her high position. This remarkable demonstration was not confined to the British empire alone. In every portion of the globe the sixtieth anni- versary of the queen's reign excited interest; in every country the queen's name was mentioned with affection and respect; while the people of the United States vied with the subjects of the British empire in praise of the queen's character and in expressions of regard for her person. Only a year or two before, an obscure dispute on the boundary of British Venezuela had brought the United States and Great Britain within sight of a quarrel. The jubilee showed conclusively that, whatever politicians might say, the ties of blood and kinship, which united the two peoples, were too close to be severed by either for some trifling cause; that the wisest heads in both nations were aware of the advantages which must arise from the closer union of the Anglo-Saxon races; and that the true interests of both countries lay in their mutual friendship. A war in which the United States was subsequently engaged with Spain cemented this feeling. The government and the people of the United States recognized the advantage which they derived from the goodwill of Great Britain in the hour of their necessity, and the two nations drew together as no other two nations had perhaps ever been drawn together before.

If the jubilee was a proof of the closer union of the many sections of the British empire, and of their warm attachment to their sovereign, it also gave expression to the " imperialism " which was becoming a

dominant factor in British politics. Few people realized the mighty change which in this respect had been effected in thought and feeling. Forty years before, the most prominent English statesmen had regarded with anxiety the huge responsibilities of a world-wide empire. In 1897 the whole tendency of thought and opinion was to enlarge the burden of which the preceding generation had been weary. The extension of British influence, the protection of British interests, were almost universally advocated; and the few statesmen who

repeated in the 'nineties the sentiments which would have been generally accepted in the 'sixties, were regarded as " Little Englanders." It is important to note the consequences which these new ideas produced in Africa. Both in the north and in the south of this great and imperfectly explored Continent, memories still clung which were ungrateful to imperialism. In the north, the murder of Gordon was still unavenged; and the vast territory known as the Sudan had escaped from the control of Egypt. In the south, war with the Transvaal had been concluded by a British defeat; and the Dutch were elated, the English irritated, at the recollection of Majuba. In 1896 Lord Salisbury's government decided on extending the Anglo-Egyptian rule over the Sudan, and an expedition was sent from Egypt under the command of Sir Herbert (afterwards Lord) Kitchener to Khartum. Few military expeditions have been more elaborately organized, or have achieved a more brilliant success. The conquest of the country was achieved in three separate campaigns in successive years. In September 1898 the Sudanese forces were decisively beaten, with great slaughter, in the immediate neighbourhood of

Omdurman; and Khartum became thenceforward the maa" > capital of the new province, which was placed under Fathoda. Lord Kitchener's rule. Soon after this decisive

success, it was found that a French expedition under Major Marchand had reached the upper Nile and had hoisted the French flag at Fashoda. It was obvious that the French could not be allowed to remain at a spot which the khedive of Egypt claimed as Egyptian territory; and after some negotiation, and some irritation, the French were withdrawn. In South Africa still more important events were in

the meanwhile progressing. Ever since the independence of the South African Republic had been virtually conceded by the convention of 1884, unhappy differences had prevailed between the Dutch and British residents in the Transvaal. The discovery of gold at Johannesburg and elsewhere in 1885-1886 had led to a large immigration of British and other colonists. Johannesburg had grown into a great and prosperous city. The foreign population of the Transvaal, which was chiefly English, became in a few years more numerous than the Boers themselves, and they complained that they were deprived of all political rights, that they were subjected to unfair taxation, and that they were hampered in their industry and unjustly treated by the Dutch courts and Dutch officials. Failing to obtain redress, at the end of 1895 certain persons among them made preparations for a revolution. Dr Jameson, the administrator of Rhodesia, accompanied by some British officers, actually invaded the Transvaal. His force, utterly

*inadequate for the purpose, was stopped by the Boers, PaW? S01 * ant * ne an ˆ n ‘ s fellow-officers were taken prisoners.*

There was no doubt that this raid on the territory of a friendly state was totally unjustifiable. Unfortunately, Dr Jameson's original plans had been framed at the instance of Cecil Rhodes, the prime minister at the Cape, and many persons thought that they ought to have been suspected by the colonial office in London. England at any rate would have had no valid ground of complaint if the leaders of a buccaneering force had been summarily dealt with by the Transvaal authorities. The president of the republic, Kruger, however, handed over his prisoners to the British authorities, and parliament instituted an inquiry by a select committee into the circumstances of the raid. The inquiry was terminated somewhat abruptly. The committee acquitted the colonial office of any knowledge of the plot; but a good many suspicions remained unanswered. The chief actors in the raid were tried under the Foreign Enlistment Act, found guilty, and subsequently released after short terms of imprison- ment. Rhodes himself was not removed from the privy council, as his more extreme accusers demanded; but he had to abandon his career in Cape politics for a time, and confine his energies to the development of Rhodesia, which had been added to the empire through his instrumentality in 1888-1889.

In consequence of these proceedings, the Transvaal authorities at once set to work to accumulate armaments, and they succeeded in procuring vast quantities of artillery and military stores. The British government would undoubtedly have been entitled to

insist that these armaments should cease. It was obvious that they could only be directed against Great Britain; and no nation is bound to allow another people to prepare great armaments to be; employed against itself. The criminal folly of the raid prevented the British government from making this demand. It could not say that the Transvaal government had no cause for alarm when British officers had attempted an invasion of its territory, and had been treated rather as heroes than as criminals at home. Ignorant of the strength of Great Britain, and elated by the recollection of their previous successes, the Boers themselves believed that a new struggle might give them predominance in South Africa. The knowledge that a large portion of the population of Cape Colony was of Dutch extraction, and that public men at the Cape sympathized with them in their aspirations, increased their confidence. In the meantime, while the Boers were silently and steadily continuing their military preparations, the British settlers at Johannesburg — the Uitlanders, as they were called — continued to demand considera- tion for their grievances. In the spring of 1899, Sir Alfred Milner, governor of the Cape, met President Kruger at Bloemfontein, the capital of the Orange Free State, and fggg ”' endeavoured to accomplish that result by negotiation. He thought, at the time, that if the Uitlanders were given the franchise and a fair proportion of influence inthe legislature, other difficulties might be left to settle themselves. The negotiations thus commenced unfortunately failed. The discussion, which had originally turned on the franchise, was enlarged by the introduction of the question of suzerainty or supremacy; and at last, in the beginning of ‘October, when the rains of an African spring were causing the grass to grow on which the Boer armies were largely dependent for forage, the Boers declared war and invaded Natal. The British government had not been altogether happy in its conduct of theprecedingnegotiations. It wascertainly unhappy in its preparations for the struggle. It made the great mistake of underrating the strength of its enemy; it suffered its agents to commit the strategical blunder of locking up the few troops it had in an untenable position in the north of Natal. It was not surprising, in such circumstances, that the earlier months of the war should have been memorable for a series of exasperating reverses. These reverses, however, were redeemed by the valour of the British troops, the spirit of the British nation, and the enthusiasm which induced the great autonomous colonies of the empire to send men to support the cause of the mother country. The gradual arrival of reinforcements, and the appointment of a soldier of genius — Lord Roberts — to the supreme command, changed the military situation; and, before the summer of 1900 was concluded, the places which had been besieged by the Boers — Kimberley,

Ladysmith and Maf eking — had been successively relieved; the capitals of the Orange Free State and of the Transvaal had been occupied; and the two republics, which had rashly declared war against the British empire, had been formally annexed.

*The defeat and dispersal of the Boer armies, and the apparent collapse of Boer resistance, induced a hope that the war was over; and the government seized the opportunity in 1900 to terminate the parliament, which had already ˆ *pˆ se endured for more than five years. The election was conducted with unusual bitterness; but the constituencies practically affirmed the policy of the government by maintaining, almost unimpaired, the large majority which the Unionists had secured in 1895. Unfortunately, the expectations which had been formed at the time of the dissolution were disappointed. The same circumstances which had emboldened the Boers to declare war in the autumn of 1899, induced them to renew a guerilla warfare in the autumn of 1900 — the approach of an African summer supplying the Boers with the grass on which they were dependent for feeding their hardy horses. Guerilla bands suddenly appeared in different parts of the Orange River Colony and of the Transvaal. They interrupted the com- munications of the British armies; they won isolated victories over British detachments; they even invaded Cape Colony. Thus the last year of the century closed in disappointment*

and gloom. The serious losses which the war entailed, the heavy expenses which it involved, and the large force which it absorbed, filled thoughtful men with anxiety.

*No one felt more sincerely for the sufferings of her soldiers, and no one regretted more truly the useless prolongation of the struggle, than the venerable lady who occupied the ** throne. She had herself lost a grandson (Prince*

queen. Christian Victor) in South Africa; and sorrow and anxiety perhaps told even on a constitution so un- usually strong as hers. About the middle of January 190 1 it was known that she was seriously ill; on the 22nd she died. The death of the queen thus occurred immediately after the close of the century over so long a

period of which her reign had extended.

The queen's own life is dealt with elsewhere (see Victoria, Queen), but the Victorian era is deeply marked in English history. During her reign the people of Great Britain doubled their number; but the accumulated wealth of the country increased at least threefold, and its trade sixfold. All classes shared the prevalent prosperity. Notwithstanding the increase of population, the roll of paupers at the end of the reign, compared with the same roll at the beginning, stood as 2 stands to 3; the criminals as 1 to 2. The expansion abroad was still more remarkable. There were not 200,000 white persons in Australasia when the queen came to the throne; there were nearly 5,000,000 when she died. The great Australian colonies were almost created in her reign; two of them — Victoria and Queensland — owe their name to her; they all received those autonomous institutions, under which their prosperity has been built up, during its continuance. Expansion and progress were not confined to Australasia. The opening months of the queen's reign were marked by rebellion in Canada. The close of it saw Canad,a one of the most loyal portions of the Empire. In Africa, the advance of the red line which marks the bounds of British dominion was even more rapid; while in India the Punjab, Sind, Oudh and Burma were some of the acquisitions added to the British empire while the queen was on the throne. When she died one square mile in four of the land in the world was under the British flag, and at least one person out of every five persons alive was a subject of the queen.

Material progress was largely facilitated by industry and invention. The first railways had been made, the first steamship had been built, before the queen came to the throne. But, so far as railways are concerned, none of the great trunk lines had been constructed in 1837; the whole capital authorized to be spent on railway construction did not exceed £55,000,000; and, five years after the reign had begun, there were only 18,000,000 passengers. The paid-up capital of British railways in 1901 exceeded £1,100,000,000; the passengers, not including season ticket-holders, also numbered i,ido,ooo,ooo; and the sum annually spent in working the lines considerably exceeded the whole capital authorized to be spent on their construction in 1837. The progress of the commercial marine was still more noteworthy. In 1837 the entire commercial navy comprised 2,800,000 tons, of which less than 100,000 tons were moved by steam. At the end of the reign the tonnage of British merchant vessels had reached 13,700,000 tons, of which more than 11,000,000 tons were moved by steam. At the beginning of the reign it was supposed to be impossible to build a steamer which could

either cross the Atlantic, or face the monsoon in the Red Sea. The development of steam navigation since then had made Australia much more accessible than America was in 1837, and had brought New York, for all practical purposes, nearer to London than Aberdeen was at the commencement of the reign. Electricity had even a greater effect on communication than steam on locomotion; and electricity, as a practical invention, had its origin in the reign. The first experimental telegraph line was only erected in the year in which Queen Victoria came to the throne. Submarine telegraphy, which had done so much to knit the empire together, was not perfected for many years afterwards; and long ocean cables were almost entirely con- structed in the last half of the reign. (S. W.)

*On the death of Queen Victoria, the prince of Wales succeeded to the throne, with the title of Edward VII. (q.v.). The corona- tion fixed for June in the following year was at the last moment stopped by the king's illness with appendi- p!f'' ?l *J)' citis, but he recovered marvellously from the operation V n. and the ceremony took place in August. His excellent health and activity in succeeding years struck every one with astonishment. The Boer War had at last been brought to an end in May 1902 (see Transvaal), and the king had the satisfaction of seeing South Africa settle down and eventually receive self-govern- ment. The political history of his reign, which ended with his death in May 1910, is dealt with in detail in separate biographical and other articles in this work (see especially those on Lord Salisbury, Mr A. J. Balfour, Mr J. Chamberlain, Lord Rosebery, Sir H. Campbell-Bannerman, Mr H. H. Asquith, Mr D. Lloyd George, and on the history of the various portions of the British Empire); and in this place only a summary need be given. The king himself (see Edward VII.), who nobly earned the title of Edward the Peacemaker, played no small part in the domestic and international politics of these years; and contemporary publi- cists,whohadbecomeaccustomed to Victorian traditions, gradually realized that, within the limits of the constitutional monarchy, there was much more scope for the initiative of a masculine sovereign in public life than had been supposed by the generation which grew up after the death of his father in 1862. Edward VII. made the Crown throughout all classes of society a popular power which it had not been in England for long ages. And while the growing rivalry between England and Germany, in international relations, was continually threatening danger, his influence in cementing British friendship on all other sides was of the- most marked description. His sudden death was felt, not only throughout the empire but throughout the world, with even more poignant emotion than that of Queen Victoria*

herself, for his personality had been much more in the forefront.

The end of his reign coincided with a domestic constitutional crisis, to which party politics had been working up more and more acutely for several years. The Tariff Reform propaganda of Mr Chamberlain (q. v.) in 1903 convulsed ™' ' . the Conservative party, and the long period of Unionist igio. domination came to an end in November 1905. Mr Balfour (q.v.), who became prime minister in 1902 on Lord Salisbury's retirement, resigned, and was succeeded by Sir H. Campbell-Bannerman (q.v.), as head of the Liberal party; and the general election of January 1906 resulted in an overwhelming victory for the Liberals and their allies, the Labour party (now a powerful force in politics) and the Irish Nationalists. Just before Sir H. Campbell-Bannerman's death in April 1908 he was succeeded as prime minister by Mr Asquith, a leader of far higher personal ability though with less hold on the affections of his party. The Liberals had long arrears to make up in their political programme, and their supremacy in the House of Commons was an encouragement to assert their views in legisla- tion. In several directions, and notably in administration, they carried their policy into effect; but the House of Lords (see Parliament) was an obvious stumbling-block to some of their more important Bills, and the Unionist control of that House speedily made itself felt, first in wrecking the Education Bill of 1906, then in throwing out the Licensing Bill of 1908, and finally (see Lloyd George, D.) in forcing a dissolution by the rejection of the budget of 1909, with its novel proposals for the increased taxation of land and licensed houses. The Unionist party in the country had, meanwhile, been recovering from the Tariff Reform divisions of 1903, and was once more solid under Mr Balfour in favour of its new and imperial policy; but the cam- paign against the House of Lords started by Mr Lloyd George and the Liberal leaders, who put in the forefront the necessity of obtaining statutory guarantees for the passing into law of measures deliberately adopted by the elected Chamber, resulted in the return of Mr Asquith's government to office at the election of January 1910. The Unionists came back equal in numbers to the Liberals, but the latter could also count on the Labour party and the Irish Nationalists; and the battle was fully arrayed for

a frontal attack on the powers of the Second Chamber when the

king's death in May upset all calculations. This unthought- of complication seemed to act like the letting of blood in an apoplectic patient.

The prince of Wales became king as George V. (

attempt between the leaders of the two great parties, Acces- by p r i V ate conference, to see whether compromise was George v. not possible (see Parliament). Apart from the

parliamentary crisis, really hingeing on the difficulty of discovering a means by which the real will of the people should be carried out without actually making the House of Commons autocratically omnipotent, but also without allowing the House of Lords to obstruct a Liberal government merely as the organ of the Tory party, the new king succeeded to a noble heritage. The monarchy itself was popular, the country was prosperous and in good relations with' the world, except for the increasing naval rivalry with Germany, and the consciousness of imperial solidarity had made extraordinary progress among all the dominions. However the domestic problems in the United Kingdom might be solved, the future of the greatness of the English throne lay with its headship of an empire, loyal to the core, over which the sun never sets. (H. Ch.)

XIII. — Sources and Writers of English History

The attempt here made to combine a bibliography of English history with some account of the progress of English historical writing is beset with some difficulty. The evidential value of what a writer says is quite distinct from the literary art with which he says it; the real sources of history are not the works of historians, but records and documents written with no desire to further any literary purpose. Domesday Book is unique as a source of medieval history, but it does not count in the develop- ment of English historical writing. That is quite a secondary consideration; for there was much English history before any Englishman could write; and even after he could write, his compositions constitute a minor part of the evidence.

Our earliest information about the land and its people is derived from geological, ethnological and archaeological studies, from the remains in British barrows and caves, Roman roads, walls and villas, coins, place-names and inscriptions. The writings of Caesar and Tacitus, and a few scattered notices in other Roman authors, supplement this evidence. But the scientific accuracy of Tacitus' Germania is not beyond dispute, and that light fails centuries before

the Anglo-Saxon conquest of Great Britain. The history of that conquest itself is mainly inferential; there is the flebilis narratio of Gildas, vague and rhetorical, moral rather than historical in motive, and written more than a century after the conquest had begun, and the narrative of the Welsh Nennius, who wrote two and a half centuries after Gildas, and makes no critical distinction between the deeds of dragons and those of Anglo-Saxons. The Anglo-Saxons themselves could not write until Christian missionaries had reintroduced the art at the end of the 6th century, and history was not by any means the first purpose to which they applied it. It was first used to compile written statements of customs and dooms which were their nearest approach to law, and these codes and charters are the earliest written materials for Anglo-Saxon history. The remarkable outburst of literary culture in Northumbria during the 7th and 8th centuries produced a real historian in Bede; Bede, however, knows little or nothing of English history between 450 and 596, and he is valuable only for the 7th and early part of the 8th centuries. Almost contemporary is the Vita Wilfridi by Eddius, but more valuable are the letters we possess of Boniface and Alcuin. The famous Anglo-Saxon Chronicle was probably started under the influence of Alfred the Great towards the end of the 9th century. Its chronology is often one, two or three years wrong even when it seems to be a contemporary authority, and the value of its evidence on the con- quest and the first two centuries after it is very uncertain. But from Ecgbert's reign onwards it supplies a good deal of apparently

trustworthy information. For Alfred himself we have also Asser's biography and the Annals of St Neots, a very imaginative compilation, while most of the stories which have made Alfred's name a household word are fabulous. Even the Chronicle becomes meagre a few years after Alfred's death, and its value depends largely upon the ballads which it incorporates; nor is it materially supplemented by the lives of St Dunstan, for hagiologists have never treated historical accuracy as a matter of moment; and our knowledge of the last century of Anglo- Saxon history is derived mainly from Anglo-Norman writers who wrote after the Norman Conquest. Some collateral light on the Danish conquest of England is thrown by the Heims- kringla and other materials collected in Vigfusson and Powell's Corpus Poeticum Boreale, and for the reign of Canute and his sons there is the contemporary Encomium Emmae, which is a dishonest panegyric on the widow of ˆEthelred and Canute. For Edward the Confessor there is an almost equally biased biography.

For the Norman Conquest itself strictly contemporary evidence is

extremely scanty, and historians have exhausted their own and their readers' patience in disputing the precise significance of some phrases about the battle of Hastings used by Wace, a Norman poet who wrote nearly a century after the battle. One version of the Anglo-Saxon Chronicle goes down to 1079 and another to 1154, but their notices of current events are brief' and meagre. The Bayeux tapestry affords, however, valuable contemporary evidence, and there are some facts related by eye-witnesses in the works of William of Poitiers and William of Jumieges. A generation of copious chroniclers was, moreover, springing up, and among them were Florence of Worcester, Henry of Huntingdon, Simeon of Durham and William of Malmesbury. Their ambition was almost invariably to write the history of the world, and they generally begin with the Creation. They only become original and contemporary authorities towards the end of their appointed tasks, and the bulk of their work is borrowed from their predecessors. Frequently they embody materials which would otherwise have perished, but their transcription is. marred by an amount of conscious or unconscious falsification which seriously impairs their value. All the above-mentioned writers lived in the half- century immediately following the Norman Conquest, but their critical acumen and their literary art vary considerably. William of Malmesbury, Eadmer and Ordericus Vitalis attain a higher historical standard than had yet been reached in England by any one, with the possible exception of Bede. They are not mere annalists; they practise an art and cultivate a style; history has become to them a form of literature. They have also their philosophy and interpretation of history. It is mainly a theological conception, blind to economic influences, and attaching excessive importance to the effects of the individual action of emperors and popes, kings and cardinals. Even their characters are painted in different colours according to their action on quite irrelevant questions, as, for instance, their benefactions to the monastery, to which the historian happens to belong, or to rival houses; and the character once determined by such considerations, history is made to point the moral of their fortunes, or their fate. It is regarded as the record of moral judgments and the proof of orthodox doctrine, and it is long before ecclesiastical historians expel the sermon from their text.

The line of monastic historians stretches out to the close of the middle ages. Most of the great monasteries had their official annalists, who produced such works as the Annals of Tewkesbury, Gloucester, Burton, Waverley, Dunstable, Bermondsey, Oseney, Winchester (see Annates Monastics, 5 vols., ed. Luard, and other

volumes in the Rolls series). Some of them are mainly local chronicles; others are almost national histories. In particular, St Albans developed a remarkable school of historians extending over nearly three centuries to the death of Whethamstede in 1465 (see Chronica Monasterii S. Albani, Rolls series, 7 vols., ed. Riley). Only a few of the 235 volumes published under the direction of the master of the Rolls, and called the Rolls series, can Here be mentioned. Other medieval writers have been

edited for the earlier English Historical Society; some of them have been re-edited without being superseded in the Rolls series. For the reign of Stephen we have the anonymous Gesla Stephani in addition to the writers already mentioned, several of whom continue into Stephen's reign. For Henry II. we have William of Newburgh, who reaches the highest point attained by historical composition in the 12th century; the so-called Benedict of Peterborough's Gesta Henrici, which Stubbs tentatively and without sufficient authority ascribed to Richard Fitznigel; Robert' of Torigni; and seven volumes of " Materials for the History of Thomas Becket," which contain some of the best and worst samples of hagiological history. For Richard and John the chronicles of Roger of Hoveden, Ralph de Diceto (Diss) , Gervase of Canterbury, Ralph of Coggeshall, and a later continuation of Hoveden, known under the name of Walter of Coventry, are the best narrative authorities.

With the accession of Henry III., Roger of Wendover, the first of the St Albans school whose writings are extant, becomes our chief authority. He was re-edited and continued after 1236 by Matthew Paris, the greatest of medieval historians. His work, which goes down to 1259, is picturesque, vivid, and marked by considerable breadth of view and independence of judgment. The story is carried on by a series of jejune compilations known as the Flores historiarum (ed. Luard). Better authorities for Edward I. are Rishanger, Trokelowe and Blaneforde, Wykes, Walter of Hemingburgh, Nicholas Trevet, Oxnead and Bartholo- mew Cotton, and others contained in Stubbs's Chronicles of Edward I. and Edward II. In the 14th century there is a significant deterioration in the monastic chroniclers, and their place is taken by the works of secular clergy like Adam Murimuth, Geoffrey the Baker, Robert of Avesbury, Henry Knighton and the

anonymous author of the Eulogium historiarum. Monastic history is represented by Higden's voluminous Polychronicon, which succeeds the Flores historiarum. A brief revival of the St Albans school towards the end of the century is seen in the Chronicon Angliae and the works of T. Walsingham, which continue into the reign of Henry V. For Richard II. we have also Malverne and the Monk of Evesham; for the early Lan- castrians, Capgrave, Elmham, Otterbourne, Adam of Usk; and for Henry VI., Amundesham, Whethamstede, William of Worcester and John Hardyng, as well as a number of anonymous briefer chronicles, edited, though not in the Rolls series, by J. Gairdner, C. L. Kingsford, N. H. Nicolas and J. S. Davies.

These are the principal English historical writers for the middle ages; but as the connexion between England and the continent grew closer, and international relations developed, an increasing amount of light is thrown on English history by foreign writers. Of these authorities one of the earliest is the Histoire des dues de Normandie et des rois d' Angleterre (ed. Michel); briefer are the Chronique de V ' Anonyme de BUhune and the Histoire de Guillaume le Marechal. A large number of French and Flemish chronicles illustrate the history of the Hundred Years' War, by far the most important being Froissart (best edition by Luce, though Lettenhove's is bigger). Next come Jehan le Bel, Waurin's Recueil, Monstrelet, Chastellain, Juvenal des Ursins, and more limited works such as Creton's Chronique de la traison et mort de Richard II.

Chronicles, however, grow less important as sources of history as time goes on. Their value is always dependent upon the absence of the more satisfactory materials known as records, and these records gradually become more copious and complete. They develop with the government, of whose activity and policy they are the real test and evidence. Perhaps the most important thing in history is the evolution of government, the development of consciousness and a will on the part of the state. This will is expressed in records; and, as the state progresses from infancy through the stage of tutelage under the church to its modern " omnicompetence," so its will is expressed in an ever widening and differentiating series of records. The first need of a govern- ment is finance; the earliest organized machinery for exerting its will is the exchequer; and the earliest great record in English history is Domesday Book. It is followed by a series of exchequer

records, called the Pipe Rolls; which begin in the reign of Henry I., and dating from that of Henry II. is the Diulogus de scaccario, which explains in none too lucid language the intricate working of the

exchequer system. It was Henry II. who gave the greatest impetus to the development of the machinery for expressing the will of the state. He began with finance and went on to justice, recognizing that justitia magnum emolumentum, the administration of justice was a great source of revenue. So national courts of law are added to the national exchequer, and by the end of the 12th century legal records become an even more important source of history than financial documents. The judicial system is described by Glanvill at the end of the 1 2th, and by Bracton and Fleta in the 13th century (for the exchequer see the Testa de Nevill and the Red Book of the Exchequer). During that period the Curia Regis threw off three offshoots — the courts of exchequer, king's bench and common pleas; and records of their judicial proceedings survive in the Plea Rolls and Year Books, some of which have been edited for the Rolls series, the Selden and other societies. Numerous other classes of legal and administrative records gradually develop, the Patent and Close Rolls (first calendared by the Record Commission, and subsequently treated more adequately under the direction of the deputy keeper of the Records), Charters (which were first grants to individuals, then to collective groups, monasteries or boroughs, then to classes, and finally expanded — as in Magna Carta — into grants to the whole nation), Escheats, Feet of Fines, Inquisitiones post mortem, Inquisitiones ad quod damnum, Placita de Quo Warranto, and others for which the reader is referred to S. R. Scargill-Bird's Guide to the Principal Classes of Documents preserved in the Record Office (3rd ed., 1908). Every branch of administration comes to be represented in records almost as soon as it is developed. The evolution of the army which won Crecy and Poitiers is accompanied by the accumulation of a mass of indentures and other military documents, the value of which has been illustrated in Dr Morris's Welsh Wars of Edward I. and George Wrottesiey's Crecy and Calais from the Public Records. The growth of naval organization is reflected in the Black Book of the Admiralty; the growth of taxation in the Liber custumarum and Subsidy Rolls; the rise of parliament in the Parliamentary Writs (ed. Palgrave), in the Rotuli parliamentorum, in the Official Return of Members of Parliament, and in the Statutes of the Realm; that of Con- vocation in David Wilkins's Concilia. The register of the privy council does not begin until later in the 14th century, and then is broken off between the middle of the 15th and 1539.

Local as well as central government begets records as it grows. From the Extenta manerii of the 12th century we get to the Manorial Rolls of the 13th, when also we have Hundred Rolls, records of forest

courts, of courts leet and of coroners' courts, and a variety of municipal documents, for which the reader is referred to Dr C. Gross's Bibliography of British Municipal History and to Mrs J. R. Green's more popular Town Life in the Fifteenth Century. The municipal records of London, its hustings court and city companies, are too multifarious to describe; some classes of these documents have been exemplified in the works of Dr R. R. Sharpe. Ecclesiastical records are represented by the episcopal registers (for the most part still unpublished), monastic cartularies, and other documents rendered com paratively scarce by the spoliation of the monasteries, and scattered proceedings of ecclesiastical courts. (See also the article Record.)

Documents, other than records strictly so called, begin to grow with the habit of correspondence and the necessity of communication. A few letters survive from the time of the Norman kings, but the earliest collection of English royal letters is the Letters of Henry III. (Rolls series) . Contemporary are the Letters of Grosseteste, and a little later come the Letters of Arch- bishop Peckham and Raine's Letters from Northern Registers (all in the Rolls series). Private correspondence appeared earlier in the voluminous epistles of Peter of Blois, archdeacon of Bath (ed. Giles). This is a somewhat intermittent source of history until we come to the 1 5th century, when the well-known Paslon

Letters (ed. Gairdner) begin a stream which never fails thereafter and soon becomes a torrent. The most important series of official correspondence is the Papal Letters, calendared from 1 198 to 1404 in 4 vols. (ed. Bliss, Johnson and Twemlow). Subsidiary sources are the Political Songs (ed. Wright), treatises like those of John of Salisbury, Gerald of Wales, and, later, Wycliffe's works, Netter's Fasciculi Zizaniorunij Gascoigne's Loci e libro veritatum, Pecock's Repressor, and the literary writings of Chaucer, Langland, Gower, Richard Rolle and others.

During the 15th century the transition, which marks the change from medieval to modern history, affects also the character of historical sources and historical writing. In the first place, history ceases to be the exclusive province of thg church; monastic chronicles shrink to a

trickle and then dry up; the last of their kind in England is the Greyfriars Chronicle (Camden Society), which ends in 1554. Their place is taken by the city chronicle compiled by middle-class laymen, just as the Re- naissance was not a revival of clerical learning, but the expression of new intellectual demands on the part of the laity. Secondly, the definite disappearance of the medieval ideas of a cosmopolitan world and the emergence of national states begat diplomacy, and with it an ever-swelling mass of diplomatic material. Diplomacy had hitherto been occasional and intermittent, and embassies rare; now we get resident ambassadors carrying on a regular correspondence (see Diplomacy). The mercantile interests of Venice made it the pioneer in this direction, though its representa- tives abroad were at first commercial rather than diplomatic agents. The Calendar of Venetian State Papers goes back to the 14th century, but does not become copious till the reign of Henry VII., when also the Spanish Calendar begins. Resident French ambassadors in England only begin in the 16th century, and later still those from the emperor, the German and Italian states other than Venice. In the third place, the development of the new monarchy involved an enormous extension of the activity of the central government, and therefore a corresponding expansion in the records of its energy.

The political records of this energy are the State Papers, a class of document which soon dwarfs all others, and renders chroniclers, historians and the like almost negligible quantities as sources of history; but in another way their value is enhanced, for these hundreds of thousands of documents provide a test of the accuracy of modern historians which is imperfect in the case of medieval chroniclers and almost non-existent in that of ancient writers. These state papers are either " foreign " or " domestic," that is to say, the correspondence of the English government with its agents abroad, or at home. There is also the correspondence of foreign ambassadors resident in England with their governments. This last class of documents exists in England mainly in the form of transcripts from the originals in foreign archives, which have been made for the purpose of the Venetian and Spanish Calendars of state papers. The Venetian Calendar had by 1909 been carried well into the 17th century; the Spanish (which includes transcripts from the Habsburg archives at Vienna, Brussels and Simancas) covered only the reigns of Henry VII. and VIII. and Queen Elizabeth. No attempt had yet been made to calendar the French correspondence in a similar way, though the French Foreign Office published some frag- mentary collections, such as the Correspondance de MM. de Castillon et de

Marillac and that of Odet de Selve. There are other collections too numerous to enumerate, such as Lettenhove's edition of Philip II. 's correspondence relating to the Nether- lands, Diegerick and Miiller's, Teulet's and Albert's collections, the French Documents inidits and the Spanish Documentos ineditos, all containing state papers relating to England's foreign policy in the 16th century. The Scottish and Irish state papers are calendared in separate series and without much system. Thus for Scottish affairs there are four series, the Border Papers, the Hamilton Papers, Thorp's Calendar, and, more recent and complete, Bain's Calendar. For Ireland, besides the regular Irish state papers, there are the Carew Papers, almost as important. Anarchy, indeed, pervades the whole method of publication. For the reign of Henry VII. we have,

besides the Venetian and Spanish Calendars, only three volumes—Gairdner's Letters and Papers of Richard III. and Henry VII. and Campbell's Materials (2 vols., Rolls series). Then with the reign of Henry VIII. begins the magnificent and monumental Letters and Papers of Henry VIII., the one modern series for which the Record Office deserves unstinted praise. This is not limited to state papers, domestic and foreign, nor to documents in the Record Office; it calendars private letters, grants, &c, extant in the British Museum and elsewhere. It extends to 21 volumes, each volume consisting of two or more parts, and some parts (as in vol. iv.) containing over a thousand pages; it comprises at least fifty thousand documents. Its value, how- ever, varies; the earlier volumes are not so full as the later, the documents are not so well calendared, and some classes are excluded from earlier, which appear in the later, volumes.

After 1547 a different plan is adopted, though not consistently followed. Only state papers are calendared, and as a rule only those in the Record Office; and the domestic are separated from the foreign. The great fault is the neglect of the vast quantities of state papers in the British Museum. The Domestic Calendar (the first volume of which is very inadequate) extended in 1909 in a series of more than seventy volumes nearly to the end of the 17th century; the mass of MSS. calendared therein may be gathered from the fact that for the reign of Elizabeth the Domestic state papers fill over three hundred MS. volumes. The Foreign Calendar had only got to 1582, but it occupied sixteen printed volumes against one of the Domestic Calendar. For the masses of MSS. uncalendared in the British Museum there is no guide except the imperfect indexes to the Cotton, Harleian, Lansdowne, Additional and other collections. Hardly less important than the calendars are the reports of the Historical Manuscripts Com- mission and the appendices thereto, which extend

to over a hundred volumes; twelve are occupied by Lord Salisbury's 16th-century MSS. at Hatfield House. The dispersion of these state papers is due to the fact that they were in those days treated not as the property of the state, but as the private property of individual secretaries.

State papers represent only one side of the activity of the central government. The register of the privy council, extending with some lacunae from 1539 to 1604, has been printed in thirty-two volumes. The Rotuli parliamentorum end with Henry VII., but in 1509 begin the journals of the House of Lords, and in 1547 the journals of the House of Commons. These are supplemented by private diaries of members of parliament, several of which were used in D'Ewes's Journals. Legal history can now be followed in a continuous series of law reports, beginning with Keilway, Staunford and Dyer, and going on with Coke and many others; documentary records of various courts are exemplified in the Select Cases from the star chamber, the court of requests and admiralty courts, published by the Selden Society; and there are voluminous records of the courts of augmentations, first-fruits, wards and liveries in the Record Office. For Ireland, besides the state papers, there are the Calendars of Patents and of Fiants, and for Scotland the Exchequer Rolls and Registers of the Privy Council and of the Great Seal, both extending to many volumes.

Unofficial sources multiply with equal rapidity, but it isi impossible to enumerate the collections of private letters, &c, only a few of which have been published. The chronicles, which in the 15th century are usually meagre productions like Warkworth's (Camden Society), get fuller, especially those emanating from London. Fabyan is succeeded by Hall, an indispensable authority for Henry VIII., and Hall by Grafton. Other useful books are Wriothesley's Chronicle and Machyn's Diary, and they have numerous successors; some of their works have been edited for the Camden Society, which now takes the place of the Rolls series. The most important are Holinshed, Stow and Camden; and gradually, with Speed and Bacon, the chronicle develops into the history, and early in the 17th cen- tury we get such works as Lord Herbert's Reign of Henry VIII., Hayward's Edward VI., and, on the ecclesiastical side, Heylyn, Fuller, Burnet and Collier's histories of the church and

Reformation. Foxe, who died in 1587, included a vast and generally accurate collection of documents in his Acts and Monuments, popularized as the Book of Martyrs, though his own contributions have to be discounted as much as those of Sanders, Parsons and other Roman Catholic controversialists. Two other great collections are the Parker Society's publications (56 vols.), which contain besides the works of the reformers a considerable number of their letters, and Strype's works (26 vols.). The naval epic of the period is Hakluyt's Navigations, re-edited in 12 vols, in 1902, and continued in Purchas's Pilgrims.

In the 17th century the domestic and foreign state papers eclipse other sources almost more completely than in the 16th. The colonial state papers now become important and extensive, those relating to America and the West Indies being most numerous (18 vols, to 1700). Parliamentary records naturally expand, and the journals of both Houses become more detailed. Parliamentary diarists like D'Ewes, Burton and Walter Yonge, only a fragment of whose shorthand notes in the British Museum has been published (Camden Society), elucidate the bare official statements; and from 1660 the series of parliamentary debates is fairly complete, though not so full or authoritative as it becomes with Hansard in the 19th century. Social diarists of great value appear after the Restoration in Pepys, Evelyn, Reresby, Narcissus Luttrell and Swift (Journal to Stella), and political writing grows more important as a source of history, whether it takes the form of Bacon's (ed. Spedding) or Milton's treatises, or of satires like Dryden's and political pamphlets like Halifax's and then Swift's, Defoe's and Steele's. Clarendon's Great Rebellion and Burnet's History of My Own Time are the first modern attempts at contemporary history, as distinct from chronicles and annals, in England, although it is difficult to • exclude the work of Matthew Paris from the category. The innumerable tracts and newsletters are a valuable source for the Civil Wars and Commonwealth period (see J. B. Williams, A History of English Journalism, 1909), while Thurloe's, Clarendon's and Nalson's collections of state papers deserve a mention apart from the Domestic Calendar. There is a still more monumental collection — the Carte Papers — on Irish affairs in the Bodleian Library, where also the Tanner MSS. and other collections have only been very partially worked. The volumes of the Historical MSS. Commission are of great value for the later Stuart period, notably the House of Lords MSS.

For the 18th century the only calendars are the Home Office Papers and the Treasury Books and Papers, the further specializa- tion of government having made it necessary to differentiate domestic state papers into several classes. But it need hardly be said that the bulk of correspondence in the Record Office does not diminish. Outside its walls the most important single collection is perhaps the duke of Newcastle's papers among the Additional MSS. in the British Museum; the Stuart papers at Windsor, Mr Fortescue's at Dropmore, Lord Charlemont's (Irish affairs), Lord Dartmouth's (American affairs) and Lord Carlisle's, all calendared by the Historical MSS. Commission, are also valuable. Chatham's correspondence with colonial governors has been published (2 vols., 1906), as have the Grenville Papers, Bedford Correspondence, Malmesbury's Diaries, Auck- land's Journals and Correspondence, Grafton's Correspondence, Lord North's Correspondence with George III., and other corre- spondence in The Memoirs of Rockingham, and the duke of Buckingham's Court and Cabinets of George III. Mention should also be made of Gower's Despatches, the Cornwallis Correspond- ence, Rose's Correspondence and Lord Colchester's Correspondence. Of special interest is the series of naval records, despatches to and from naval commanders, proceedings of courts-martial, and logs in the Record Office which have never been properly utilized. Among unofficial sources the most characteristic of the 18th century are letters, memoirs and periodical literature. Horace Walpole's Letters (Clarendon Press, 16 vols.) are the best comment on the history of the period; his Memoirs are not so good, though they are superior to Wraxall, who succeeds him. Periodical literature becomes regular in the reign of Queen Anne, chiefly in the form of journals like the Spectator; but several

daily newspapers, including The Times, were founded during the century. The Craftsman provided a vehicle for Bolingbroke's attacks on Walpole, while the Gentleman's Magazine and Annual Register begin a more serious and prolonged career. Both contain occasional state papers, and not very trustworthy reports of parliamentary proceedings. . The publication of debates was not authorized till the last quarter of the century; parliamentary papers begin earlier, but only slowly attain their present por- tentous dimensions. Political writing is at its best from Halifax to Cobbett, and its three greatest names are perhaps Swift, " Junius " and Burke, though Steele, Defoe, Bolingbroke and Dr Johnson are not far behind, while Canning's contributions to the Anti-Jacobin and Gillray's caricatures require mention.

The sources for 19th-century history are somewhat similar to those

for the 18th. Diaries continue in the Creevey Papers, Greville's Diary, and lesser but not less voluminous writers like Sir M. E. Grant-Duff. The most important series of letters is Queen Victoria's (ed. Lord Esher and A. C. Benson, 1908), and the correspondence of most of her prime ministers and many of her other advisers has been partially published. Of political biographies there is no end. The great bulk of material, however, consists of blue-books, Hansard's Parliamentary Debates, and newspapers-ˆwhich are better as indirect than direct evidence. The real truth is not of course revealed at once, and many episodes in 19th-century history are still shrouded by official secrecy. In this respect English governments are more cautious or reactionary than many of those on the continent of Europe, and access to official documents is denied when it is granted elsewhere; even the lapse of a century is not considered, a sufficient salve for susceptibilities which might be wounded by the whole truth.

Meanwhile the 19th century witnessed a great development in historical writing. In the middle ages the stimulus to write was mainly of a moral or ecclesiastical nature, though the patriotic impulse which had suggested the Anglo-Saxon Chronicle was perhaps never entirely absent, and the ecclesiastical motive often degenerated into a desire to glorify, sometimes even by forgery, not merely the church as a whole, but the particular monastery to which the writer belonged. As nationalism developed, the patriotic motive supplanted the ecclesiastical, and stress is laid on the " famous " history of England. Insular self-glorification was, however, modified to some extent by the Renaissance, which developed an interest in other lands, and the Reformation, which gave to much historical writing a partisan theological bias. This still colours most of the " histories " of the Reformation period, because the issues of that time are living issues, and the writers of these histories are committed beforehand by their profession and their position to a particular interpretation. In the 17th century political partisanship coloured historical writing, and that, too, remained a potent motive so long as historians were either Whigs or Tories. Histories were often elaborate party pamphlets, and this race of historians is hardly yet extinct. Macaulay is not greatly superior in impartiality to Hume; Gibbon and Robertson were less open to temptation because they avoided English subjects. Hallam deliberately aimed at impartiality, but he could not escape his Whig atmosphere. Nevertheless, the effort to be impartial marks a new conception of history, which is well expressed in Lord Acton's admonition to his contributors in the Cambridge Modern History. Historians are to serve no cause but that of truth; in so far even as they desire a line of investiga- tion to lead to a

particular result, they are not, maintains Professor Bury, real historians. S. R. Gardiner perhaps attained most nearly this severe ideal among English historians, and Ranke among Germans. But, even when all conscious bias is eliminated, the unconscious bias remains, and Ranke's history of the Reformation is essentially a middle-class, even bourgeois, presentment. Stubbs's medievalist sympathies colour his history throughout, and still more strongly does Froude's anti- clericalism. Freeman's bias was peculiar; he is really a West Saxon of Godwine's time reincarnated, and his Somerset hatred of French, Scots and Mercian foreigners sets off his robust loyalty to the house of Wessex. Lecky and Creighton are almost

as dispassionate as Gardiner, but are more definitely committed to particular points of views, while democratic fervour pervades the fascinating pages of J.R.Green, and an intellectual secularism, which is almost religious in its intensity and idealism, inspired the genius of Maitland.

The latest controversy about history is whether it is a science or an art. It is, of course, both, simply because there must be science in every art and art in every science. The antithesis is largely false; science lays stress on analysis, art on synthesis. The historian must apply scientific methods to his materials and artistic methods to his results; he must test his documents and then turn them into literature. The relative importance of the two methods is a matter of dispute. There are some who still maintain that history is merely an art, that the best history is the story that is best told, and that what is said is less important than the way in which it is said. This school generally ignores records. Others attach little importance to the form in which truth is presented; they are concerned mainly with the principles and methods of scientific criticism, and specialize in palaeography, diplomatic and sources. The works of this school are little read, but in time its results penetrate the teaching in schools and universities, and then the pages of literary historians; it is represented in England by a fairly good organization, the Royal Historical Society (with which the Camden Society has been amalgamated), and by an excellent periodical, The English Historical Review (founded in 1884), while some sort of propa- ganda is attempted by the Historical Association (started in 1 906) . Its standards have also been upheld with varying success in great co-

operative undertakings, such as the Dictionary of National Biography, the Cambridge Modem History, and Messrs Longmans' Political History of England.

These 19th-century products require some sort of classification for purposes of reference, and the chronological is the most con- venient. Lingard's, J. R. Green's and Messrs Longmans' histories are the only notable attempts to tell the history of England as a whole, though Stubbs's Constitutional History (3 vols.) covers the middle ages and embodies a political survey as well (for corrections and modifications see Petit-Dutaillis, Supplementary Studies, 1908), while Hallam's Constitutional History (3 vols.) extends from 1485 to 1760 and Erskine May's (3 vols.) from 1760 to i860. Sir James Ramsay's six volumes also cover the greater part of medieval English history. There is no work on a larger scale than Lappenberg and Kemble, dealing with England before the Norman Conquest, though J. R. Green's Making of England and Conquest of England deal with certain portions in some detail, and Freeman gives a preliminary survey in his Norman Conquest (6 vols.). For the succeeding period see Freeman's William Rufus, J. H. Round's Feudal England and Geoffrey de Mandeville, and Miss Norgate's England under the A ngevins and John Lackland. From 1 2 1 6 we have nothing but Ramsay, Stubbs, Longmans' Political History and monographs (some of them good), until we come to Wylie's Henry IV. (4 vols.); and again from 1413 the same is true (Gairdner's Lollardy and the Reformation being the most elaborate monograph) until we come to Brewer's Reign of Henry VIII. (2 vols.; to 1530 only), Froude's History (12 vols., 1529-1588) and R. W. Dixon's Church History (6 vols., 1529-1570). From 1603 to 1656 we have Gardiner's History (England, 10 vols. ; Civil War, 4 vols. ; Commonwealth and Protectorate, 3 vols.), and to 1714 Ranke's History of England (6 vols.; see also Firth's Cromwell and Cromwell's Army, and various editions of texts and monographs). For Charles II. there is no good history; then come Macaulay, and Stanhope and Wyon's Queen Anne, and for the 18th century Stanhope and Lecky (England, 7 vols.; Ireland, 5 vols.). From 1793 to 1815 is another gap only partially filled. Spencer Walpole deals with the period from 1815 to 1880, and Herbert Paul with the years 1846-1895.

A few books on special subjects deserve mention. For legal history see Pollock and Maitland's History of English Law (2 vols, to Edward I.), Maitland's Domesday Book and Beyond, and Anson's Law and Custom of the Constitution ; for economic history, Cunning- ham's Growth of Industry and Commerce, and Ashley's Economic History; for ecclesiastical history, Stephens and Hunt's series (7 vols.); for

foreign and colonial, Seeley's British Foreign Policy and Expansion of England, and J. A. Doyle's books on the American colonies; for military history, Fortescue's History of the British Army, Napier's and Oman's works on the Peninsular War, and Kinglake's Invasion of the Crimea ; and for naval history, Corbett's Drake and the Tudor Navy, Successors of Drake, English in the Medi- terranean and Seven Years' War, and Mahan's Influence of Sea- Power on History and Influence of Sea-Power upon the French Revolu- tion and Empire.

Bibliography of Bibliographies. — The sources for the middle ages have been enumerated in C. Gross's Sources and Literature of

English History . . . to about 148s (London, 1900), but there is nothing similar for modern history. G. C. Lee's Source Book of English History is not very satisfactory. More information can be obtained from the bibliographies appended to the volumes in Longmans' Political History, or the chapters in the Cambridge Modern History, or to the biographical articles in the D.N.B. and Ency. Brit. A series of bibliographical leaflets for the use of teachers is issued by the Historical Association. For MSS. sources see Scargill-Bird's Guide to the Record Office, and the class catalogues in the MSS. Department of the British Museum. Lists of the state papers and other documents printed and calendared under the direc- tion of the master of the Rolls and deputy keeper of the Records are supplied at the end of many of their volumes. (A. F. P.)

ENGLISH LANGUAGE. In its historical sense, the name English is now conveniently used to comprehend the language of the English people from their settlement in Britain to the present day, the various stages through which it has passed being distinguished as Old, Middle, and New or Modern English. In works yet recent, and even in some still current, the term is confined to the third, or at most extended" to the second and third of these stages, since the language assumed in the main the vocabulary and grammatical forms which it now presents, the oldest or inflected stage being treated as a separate language, under the title of A nglo-Saxon, while the transition period which connects the two has been called Semi-Saxon. This view had the justification that, looked upon by themselves, either as vehicles of thought or as objects of study and analysis, Old English or Anglo-Saxon and Modern English are, for all practical ends, distinct languages, — as much so, for example, as Latin and Spanish. No amount of familiarity with Modern English, including its local dialects, would enable the student to read Anglo-Saxon, three-fourths of the vocabulary of which have perished and been reconstructed within 900 years; ' nor would a knowledge even of

these lost words give him the power, since the grammatical system, alike in accidence and syntax, would be entirely strange to him. Indeed, it is probable that a modern Englishman would acquire the power of reading and writing French in less time than it would cost him to attain to the same proficiency in Old English; so that if the test of distinct lan- guages be their degree of practical difference from each other, it cannot be denied that " Anglo-Saxon " is a distinct language from Modern English. But when we view the subject historically, recognizing the fact that living speech is subject to continuous change in certain definite directions, determined by the con- stitution and circumstances of mankind, as an evolution or development of which we can trace the steps, and that, owing to the abundance of written materials, this evolution appears so gradual in English that we can nowhere draw distinct lines separating its successive stages, we recognize these stages as merely temporary phases of an individual whole, and speak of the English language as used alike by Cynewulf, by Chaucer; by Shakespeare and by Tennyson. 2 It must not be forgotten, however, that in this wide sense the English language includes, not only the literary or courtly forms of speech used at successive periods, but also the popular and, it may be, altogether unwritten dialects that exist by their side. Only on this basis, indeed, can we speak of Old, Middle and Modern English as the same language, since in actual fact the precise dialect which is now the cultivated language, or " Standard English," is not the descendant of that dialect which was the cultivated language or " Englisc " of Alfred, but of a sister dialect then sunk in com- parative obscurity, — even as the direct descendant of Alfred's Englisc is now to be found in the non-literary rustic speech of Wiltshire and Somersetshire. Causes which, linguistically

1 A careful examination of several letters of Bosworth's Anglo-Saxon dictionary gives in 2000 words (including derivatives and compounds, but excluding orthographic variants) 535 which still exist as modern English words.

2 The practical convenience of having one name for what was the same thing in various stages of development is not affected by the probability that (E. A. Freeman notwithstanding) Engle and Englisc were, at an early period, not applied to the whole of the inhabitants of Teutonic Britain, but only to a part of them. The dialects of Engle and Seaxan were alike old forms of what was afterwards English speech, and so, viewed in relation to it, Old English t whatever their contemporary names might be.

considered, are external and accidental, have shifted the political and intellectual centre of England, and along with it transferred literary and official patronage from one form of English to another ; if the centre of influence had happened to be fixed at York or on the banks of the Forth, both would probably have been neglected for a third.

The English language, thus defined, is not " native " to Britain, that is, it was not found there at the dawn of history, but was introduced by foreign immigrants at a date many centuries later. At the Roman Conquest of the island the languages spoken by the natives belonged all (so far as is known) to the Celtic branch of the Indo-European or Indd-Germanic family, modern forms of which still survive in Wales, Ireland, the Scottish Highlands, Isle of Man and Brittany, while one has at no distant date become extinct in Cornwall (see Celt: Language). Brythonic dialects, allied to Welsh and Cornish, were apparently spoken, over the greater part of Britain, as far north as the firths of Forth and Clyde; beyond these estuaries and in the isles to the west, including Ireland and Man, Goidelic dialects, akin to Irish and Scottish Gaelic, prevailed. The long occupation of south Britain by the Romans (a.d. 43-409) — a period, it must not be forgotten, equal to that from the Reforma- tion to the present day, or nearly as long as the whole duration of modern English — familiarized the provincial inhabitants with Latin, which was probably the ordinary speech of the towns. Gildas, writing nearly a century and a half after the renunciation of Honorius in 410, addressed the British princes in that language; 1 and the linguistic history of Britain might have been not different from that of Gaul, Spain and the other provinces of the Western Empire, in which a local type of Latin, giving birth to a neo-Latinic language, finally superseded the native tongue except in remote and mountainous districts, 2 had not the course of events been entirely changed by the Teutonic conquests of the 5th and 6th centuries.

The Angles, Saxons, and their allies came of the Teutonic stock, and spoke a tongue belonging to the Teutonic or Germanic branch of the Indo-Germanic (Indo-European) family, the same race and form of speech being represented in modern times by the people and languages of Holland, Germany, Denmark, the Scandinavian peninsula and Iceland, as well as by those of England and her colonies. Of the original home of the so-called primitive Aryan race (q.v.), whose language was the parent Indo-European, nothing is certainly known, though the subject has called forth many

conjectures; the present tendency is to seek it in Europe itself. The tribe can hardly have occupied an extensive area at first, but its language came by degrees to be diffused over the greater part of Europe and some portion of Asia. Among those whose Aryan descent is generally recognized as beyond dispute are the Teutons, to whom the Angles and Saxons belonged.

The Teutonic or Germanic people, after dwelling together in a body, appear to have scattered in various directions, their language gradually breaking up into three main groups, which can be already clearly distinguished in the 4th century a.d., North Germanic or Scandinavian, West Germanic or Low and High German, and East Germanic, of which the only important representative is Gothic. Gothic, often called Mbeso-Gothic, was the language of a people of the Teutonic stock, who, passing down the Danube, invaded the borders of the Empire, and obtained settlements in the province of Moesia, where their language was committed to writing in the 4th century; its literary remains are of peculiar value as the oldest specimens, by several centuries, of Germanic speech. The dialects of the invaders of Britain belonged to the West Germanic branch, and within this to the Low German group, represented at the present

1 The works of Gildas in the original Latin were edited by Mr Stevenson for the English Historical Society. There is an EnglisTi translation in Six Old English Chronicles in Bohn's Antiquarian library. '

2 As to the continued existence of Latin in Britain, see further in Rhys's Lectures on Welsh Philology, pp. 226-227 ; also Dogatschar, Lautiehre d, gr., lat. u. roman. Lehnworte im Altengl. (Strassburg,

1888).

day by Dutch, Frisian, and the various " Platt-Deutsch " dialects of North Germany. At the dawn of history the fore- fathers of the English appear to have been dwelling between and about the estuaries and lower courses of the Rhine and the Weser, and the adjacent coasts and isles; at the present day the most English or Angli-form dialects of the European continent are held to be those of the North Frisian islands of Amrum and Sylt, on the west coast of Schleswig. It is well known that the greater part of the ancient Friesland has been swept away by the encroachments of the North Sea, and the disjecta membra of the Frisian race, pressed by the sea in front and more powerful nationalities behind, are found only in isolated fragments from the Zuider Zee to the coasts of Denmark.

Many Frisians accom- panied the Angles and Saxons to Britain, and Old English was in many respects more closely connected with Old Frisian than with any other Low German dialect. Of the Geatas, Eotas or " Jtltes," who, according to Bede, occupied Kent and the Isle of Wight, and formed a third tribe along with the Angles and Saxons, it is difficult to speak linguistically. The speech of Kent certainly formed a distinct dialect in both the Old English and the Middle English periods, but it has tended to be assimilated more and more to neighbouring southern dialects, and is at the present day identical with that of Sussex, one of the old Saxon kingdoms. Whether the speech of the Isle of Wight ever showed the same characteristic differences as that of Kent cannot now be ascertained, but its modern dialect differs in no respect from that of Hampshire, and shows no special connexion with that of Kent. It is at least entirely doubtful whether Bede's Geatas came from Jutland; on linguistic grounds we should expect that they occupied a district lying not to the north of the Angles, but between these and the old Saxons.

The earliest specimens of the language of the Germanic invaders of Britain that exist point to three well-marked dialect groups: the Anglian (in which a further distinction may be made between the Northumbrian and the Mercian, or South- Humbrian); the Saxon, generally called West-Saxon from the almost total lack of sources outside the West-Saxon domain; and the Kentish. The Kentish and West-Saxon are sometimes, especially in later times, grouped together as southern dialects as opposed to midland and northern. These three groups were distinguished from each other by characteristic points of phono- logy and inflection. Speaking generally, the Anglian dialects may be distinguished by the absence of certain normal West-Saxon vowel-changes, and the presence of others not found in West- Saxon, and also by a strong tendency to confuse and simplify inflections, in all which points, moreover, Northumbrian tended to deviate more widely than Mercian. Kentish, on the other hand, occupied a position intermediate between Anglian and West- Saxon, early Kentish approaching more nearly to Mercian, owing perhaps to early historical connexion between the two, and late Kentish tending to conform to West-Saxon characteristics, while retaining several points in common with Anglian. Though we cannot be certain that these dialectal divergences date from a period previous to the occupation of Britain, such evidence as can be deduced points to the existence of differences already on the continent, the three dialects corresponding in all likelihood to Bede's three tribes, the Angles, Saxons and

Geatas.

As it was amongst the Engle or Angles of Northumbria that literary culture first appeared, and as an Angle or Englisc dialect was the first to be used for vernacular literature, Englisc came eventually to be a general name for all forms of the vernacular as opposed to Latin, &c; and even when the West-Saxon of Alfred became in its turn the literary or classical form of speech, it was still called Englisc or English. The origin of the name ˆ4«gM/-5eoa;a»(Anglo-Saxons)hasbeen disputed, some maintaining that it means a union of Angles and Saxons, others (with better foundation) that it meant English Saxons, or Saxons of England or of the Angel-cynn as distinguished from Saxons of the Continent (see New English Dictionary, s.v.). Its modern use is mainly due to the little band of scholars who in the 16th and 17th centuries turned their attention to the long-forgotten language of Alfred and ˆElfric, which, as it differed so greatly from

the English of their own day, they found it convenient to dis- tinguish by a name which was applied to themselves by those who spoke it. 1 To these scholars " Anglo-Saxon " and " English " were separated by a gulf which it was reserved for later scholar- ship to bridge across, and show the historical continuity of the English of all ages.

As already hinted, the English language, ia the wide sense, presents three main stages of development— Old, Middle and Modern — distinguished by their inflectional characteristics. The latter can be best summarized in the words of Dr Henry Sweet in his History of English Sounds: 2 "Old English is the period of full inflections (nama, gifan, cam), Middle English of levelled inflections (naame, given, caare), and Modern English of lost inflections (name, give, care = nam, giv, car) . We have besides two periods of transition, one in which nama and name exist side by side, and another in which final e [with other endings] is beginning to drop." By lost inflections it is meant that only very few remain, and those mostly non-syllabic, as the -s in stones and love.?/the -ed in loved, the r in their, as contrasted with the Old English stan

As to the chronology of the successive stages, it is of course impossible to lay down any exclusive series of dates, since the linguistic changes were inevitably gradual, and also made them-

selves felt in some parts of the country much earlier than in others, the north being always in advance of the midland, and the south much later in its changes. It is easy to point to periods at which Old, Middle and Modern English were fully developed, but much less easy to draw lines separating these stages; and even if we recognize between each part a " transition " period or stage, the determination of the beginning and end of this will to a certain extent be a matter of opinion. But bearing these considerations in mind, and having special reference to the midland dialect from which literary English is mainly descended, the following may be given as approximate dates, which if they do not demarcate the successive stages, at least include them: —

Old English or Anglo-Saxon ... to 1 100

Transition Old English (" Semi-Saxon ") . 1 100 to 1 150 Early Middle English . . . . .1 150 to 1250

(Normal) Middle English . . . 1250 to 1400

Late and Transition Middle English . 1400 to 1485

Early Modern or Tudor English . . . 1485 to 1611

Seventeenth century transition . . 161 1 to 1688

Modern or current English .... 1689 onward

Dr Sweet has reckoned Transition Old English (Old Transition) from 1050 to 1 1 50, Middle English thence to 1450, and Late or Transition Middle English (Middle Transition) 1450 to 1500; As to the Old Transition see further below.

The Old English or Anglo-Saxon tongue, as introduced into Britain, was highly inflectional, though its inflections at the date when it becomes known to us were not so full as those of the earlier Gothic, and considerably less so than those of Greek and Latin during their classical periods. They corresponded more closely to those of modern literary German, though both in nouns and verbs the forms were more numerous and distinct; for example, the German guten answers to three Old ˆEnglish forms, — gddne, gddum, gddan; guter to two — gddre, gddra; liebten to two, — lujodon and lufeden. Nouns had four cases, Nominative, Accusative (only sometimes distinct), Genitive,

1 /Ethelstan in 934 calls himself in a charter " Ongol-Saxna cyning and Brytaenwalda eallaes thyses iglandes"; Eadred in 955 is "

Angul-seaxna cyning and casere totius Britanniae," and the name is of frequent occurrence in documents written in Latin. These facts ought to be remembered in the interest of the scholars of the 17th century, who have been blamed for the use of the term Anglo-Saxon, as if they had invented it. By " Anglo-Saxon " language they meant the language of the people who sometimes at least called themselves " Anglo-Saxons." Even now the name is practically useful, when we are dealing with the subject per se, as is Old English, on the other hand, when we are treating it historically or in con- nexion with English as a whole.

2 Transactions of the Philological Society (1873-1874), p. 620;; new and much enlarged edition, 1888.

Dative, the latter used also with prepositions to express locative, instrumental, and most ablative relations; of a distinct instru- mental case only vestiges occur. There were several declensions of nouns, the main division being that known in Germanic languages generally as strong and weak, — a distinction also extending to adjectives in such wise that every adjective assumed either the strong or the weak inflection as determined by associated gram- matical forms. The first and second personal pronoun s possessed a 'dual number = we two, ye two; the third person had a complete declension of the stem he, instead of being made up as now of the three stems seen in he, she, they. The verb distinguished the subjunctive from the indicative mood, but had only two inflected tenses, present and past (more accurately, that of incomplete and that of completed or " perfect " action) — the former also used for the future, the latter for all the shades of past time. The order of the sentence corresponded generally to that of German. Thus from King Alfred's additions to his translation of Orosius: " Donne hy ylcan dage hi hine to haem ade beran wyllaS]?onne todadaShi his feoh baet haer to lafe bio" after hasm gedrynce and J>aem plegan, on fif oSSe syx, hwilum on ma, swa swa baes feqs andefn biS " ("Then on the same day [that] they him to the pile bear will, then divide they his property that there to remainder shall be after the drinking and the sports, into five or six, at times into more, according as the property's value is"). The poetry was distinguished by alliteration, and the abundant use of figurative and metaphorical expressions, of bold compounds and archaic words never found in prose. Thus in the following lines from Beowulf (ed. Thorpe, 1. 645, Zupitza 320): —

5/raet waes stan-fkh, stig wisode

Gumum aetgaedere. guS-byrne scan

.Heard Aond-locen. «ring-iren scir

Song in rearwum, |)a hie to sele furˆum

In hyra gry're geatwum gangan cwomon. Trans. :—

The street was stone-variegated, the path guided

(The) men together; the war-mailcoat shone,

Hard hand-locked. Ring-iron sheer (bright ring-mail)

Sang in (their) cunning-trappings, as they to hall forth

In their horror-accoutrements going came. The Old English was a homogeneous language, having very few foreign elements in it, and forming its compounds and derivatives entirely from its own resources. A few Latin appellatives learned from the Romans in the German wars had been adopted into the common West Germanic tongue, and are found in English as in the allied dialects. Such were strcete (street, via strata), camp (battle), casere (Caesar), mil (mile), pin (punishment) , mynet (money) , pund (pound) , win (wine) ; probably also cyrite (church), biscop (bishop), Iceden (Latin language), cise (cheese), butor (butter) , pipor (pepper), olfend (camel, elephantus) , ynce (inch, uncia), and a few others. The relations of the first invaders to the Britons were to a great extent those of destroyers; and with the exception of the proper names of places and promi- nent natural features, which as is usual were retained by the new population, few British words found their way into the Old English. Among these are named broc (a badger) , brec (breeches) , clut (clout), pill (pool), and a few words relating to the employ- ment of field or household menials. Still fewer words seem to have been adopted from the provincial Latin, almost the only certain ones being caslra, applied to the Roman towns, which appeared in English as ccestre, chaster, now found in composition as -caster, -Chester, cester, and culina(kitchen) , which gave cylen(kila) . The introduction and gradual adoption of Christianity, brought a new series of Latin words connected with the offices of the church, the accompaniments of higher civilization, the foreign productions either actually made known, or mentioned in the Scriptures and devotional books. Such were mynster (monas terium), munuc (monk), nunne (nun), maesse (mass), schql (school), admesse (eleemosyna) , candel (candela), turtle (turtur), fie (ficus), cedar (cedrus). These words, whose number increased from the 7th to the 10th century, are commonly called Latin of the second period, the

Latin of the first period including the Latin words brought by the English from the continent, as well as those picked up in Britain either from the Roman provincials or the Welsh. • The Danish invasions of the 8th and 10th centuries

resulted in the establishment of extensive Danish and Norwegian populations, about the basin of the Humber and its tributaries, and above Morecambe Bay.! Although these Scandinavian settlers must have greatly affected the language of their own localities, but few traces of their influence are to be found in the literature of the Old English period. As with the greater part of the words adopted from the Celtic, it was not until after the dominion of the Norman had overlaid all preceding conquests, and the new English began to emerge] from the ruins of the old, that Danish words in any number made their appearance in books, as equally " native " with the Anglo-Saxon.

The earliest specimens we have of English date to the end of the 7th century, and belong to the Anglian dialect, and particu- larly to Northumbrian, which, under the political eminence of the early Northumbrian kings from Edwin to EcgfriS, aided perhaps by the learning of the scholars of Ireland and Iona, first attained to literary distinction. Of this literature in its original form mere fragments exist, one of the most interesting of which consists of the verses uttered by Bede on his deathbed, and preserved in a nearly contemporary MS. : —

Fore there neid faerae . naenig uuiurthit thonc snotturra . than him tharf sie, to ymb-hycggannse . aer his hin-iongae, huaet his gastae . godaes aeththa yflaes, aefter deoth-daege . doemid uueorthae. Trans. : —

Before the inevitable journey becomes not any Thought more wise than (that) it is needful for him, To consider, ere his hence-going, What, to his ghost, of good or ill, After death-day, doomed may be.

But our chief acquaintance with Old English is in its West- Saxon form, the earliest literary remains of which date to the 9th century, when under the political supremacy of Wessex and the scholarship of King Alfred it became the literary language of the English nation, the classical "Anglo-Saxon." If our materials were more extensive, it

would probably be necessary to divide the Old English into several periods; as it is, consider- able differences have been shown to exist between the " early West-Saxon " of King Alfred and the later language of the nth century, the earlier language having numerous phonetic and inflectional distinctions which are "levelled" in the later, the inflectional changes showing that the tendency to pass from the synthetical to the analytical stage existed quite independently of the Norman Conquest. The northern dialect, whose literary career had been cut short in the 8th century by the Danish invasions, reappears in the roth in the form of glosses to the Latin gospels and a service-book, often called the Ritual of Durham, where we find that, owing to the confusion which had so long reigned in the north, and to special Northumbrian tendencies, e.g. the dropping of the inflectional n in both verbs and nouns, this dialect had advanced in the process of inflection- levelling far beyond the sister dialects of Mercian and the south, so as already to anticipate the forms of Early Middle English.

Among the literary remains of the Old English may be men- tioned the epic poem of Beowulf, the original nucleus of which has been supposed to date to heathen and even continental times, though we now possess it only in a later form; the poetical works of Cynewulf ; those formerly ascribed to Csedmon; several works of Alfred, two of which, his translation of Orosius and of The Pastoral Care of St Gregory, are contemporary specimens of his language; the Old English or Anglo-Saxon Chronicle; the theological works of iElfric (including translations of the Pentateuch and the gospels) and of Wulfstan; and many works both in prose and verse, of which the authors are unknown.

The earliest specimens, the inscriptions on the Ruthwell and Bewcastle crosses, are in a Runic character; but the letters used in the manuscripts generally are a British variety of the Roman alphabet which the Anglo-Saxons found in the island, and which was also used by the Welsh and Irish. 1 Several of the Roman letters had in Britain developed forms, and retained or acquired values, unlike those used on the continent , in particular S p 3 n r Z 1 See on this Rhys, Lectures on Welsh Philology, v.^'

(d f g r s t). The letters q and s were not used, ; q being repre- sented by cw, and k was a rare alternative to c; u or v was only a vowel, the consonantal power of v being represented as in Welsh by /. The Runes called thorn and wen, having the con- sonantal values now expressed by th and w, for which the Roman alphabet had no character, were at first expressed by th, $ (a contraction for 88 or

8h), and v or u; but at a later period the characters p and P were revived from the old Runic alphabet. Contrary to Continental usage, the letters c and 3 (g) had originally only their hard or guttural powers, as in the neighbour- ing Celtic languages; so that words which, when the Continental Roman alphabet came to be used for Germanic languages, had to be written with k, were in Old English written with c, as c6ne = keen, cywd = kind. 2 The key to the values of the letters, and thus to the pronunciation of Old English, is also to be found in the Celtic tongues whence the letters were taken.

The Old English period is usually considered as terminating 1 1 20, with the death of the generation who saw the Norman Conquest. The Conquest established in England a foreign court, a foreign aristocracy and a foreign hierarchy. 3 The French language, in its Norman dialect, became the only polite medium of intercourse. The native tongue, despised not only as unknown but as the language of a subject race, was left to the use of boors and serfs, and except in a few stray cases ceased to be written at all. The natural results followed. 4 When the educated generation that saw the arrival of the Norman died out, the language, ceasing to be read and written, lost all its literary words. The words of ordinary life whose preservation is independent of books lived on as vigorously as ever, but the literary terms, those that related to science, art and higher culture, the bold artistic compounds, the figurative terms of poetry, were speedily forgotten. The practical vocabulary shrank to a fraction of its former extent. And when, generations later, English began to be used for general literature, the only terms at hand to express ideas above those of every-day life were to be found in the French of the privileged classes, of wnprn alone art, science, law and theology had been for generations the inheritance. Hence each successive literary effort of the reviving English tongue showed a larger adoption of French words to supply the place of the forgotten native ones, till by the days of Chaucer they constituted a notable part of the vocabulary. Nor was it for the time being only that the French words affected the English vocabulary. The Norman French words introduced by the Conquest, as well as the Central or Parisian French words which followed under the early Planta- genets, were mainly Latin words which had lived on among the people of Gaul, and, modified in the mouths of succeeding generations, had reached forms more or less remote from their originals. In being now adopted as English, they supplied precedents in accordance with which other Latin words might be converted into English ones, whenever required; and long before the Renascence of classical learning, though in much greater numbers after that epoch, these precedents were freely

followed.

While the eventual though distant result of the Norman Con- quest was thus a large reconstruction of the English vocabulary,

8 During the Old English period both c and g appear to have acquired a palatal value in conjunction with front or palatal vowel- sounds, except in the north where c, and in some cases 3, tended to remain guttural in such positions. This value was never distin- guished in Old English writing, but may be deduced from certain phonetic changes depending upon it, and from the use of c, cc, as an alternative for tj (as in ort Qeard, orceard = orchard, fetian, feccean = fetch), as well as from the normal occurrence of ch and y in these positions in later stages of the language, e.g. cHd= child, ,taecean = teach, Qiellan=ye\l, daeQ =day, &c.

3 For a discriminating view of the effects of the Norman Conquest on the English Language, see Freeman, Norman Conquest, ch. xxv.

4 There is no reason to suppose that any attempt was made to proscribe or suppress the native tongue, which was indeed used in some official documents addressed to Englishmen by the Conqueror himself. Its social degradation seemed even on the point of coming to an end, when it was confirmed and prolonged for two centuries more by the accession of the Angevin dynasty, under whom every- thing French received a fresh impetus.

the grammar of the language was not directly affected by it. There was no reason why it should — we might almost add, no way by which it could. While the English used their own words, they could not forget their own way of using them, the inflections and constructions by which alone the words expressed ideas — in other words, their grammar; when one by one French words were introduced into the sentence they became English by the very act of admission, and were at once subjected to all the duties and liabilities of English words in the same position. This is of course precisely what happens at the present day: telegraph and telegram make participle telegraphing and plural telegrams, and naive the adverb naively, precisely as if they had been in the language for ages.

But indirectly the grammar was affected very quickly. In languages in the inflected or synthetic stage the terminations must be

pronounced with marked distinctness, as these contain the correlation of ideas; it is all-important to hear whether a word is bonus or bonis or bonas or bonos. This implies a measured and distinct pronunciation, against which the effort for ease and rapidity of utterance is continually struggling, while indolence and carelessness continually compromise it. In the Germanic languages, as a whole, the main stress-accent falls on the radical syllable, or on the prefix of a nominal compound, and thus at or near the beginning of the word; and the result of this in English has been a growing tendency to suffer the concluding syllables to fall into obscurity. We are familiar with the cockney winder, sofer, holler, Sorer, Sunder, would yer, for window, sofa, holla, SaraA, Sunday, would you, the various final vowels sinking into an obscure neutral one now conventionally spelt er, but formerly represented by final e. Already before the Conquest, forms originally hatu, sello, tunga, appeared as hate, selle, tunge, with the terminations levelled to obscure i; but during the illiterate period of the language after the Conquest this careless obscuring of terminal vowels became universal, all unaccented vowels in the final syllable (except i) sinking into e. During the 1 2th century, while this change was going on, we see a great confusion of grammatical forms, the full inflections of Old English standing side by side in the same sentence with the levelled ones of Middle English. It is to this state of the language that the names Transition and Period of Confusion (Dr Abbott's appellation) point; its appearance, as that of Anglo-Saxon broken down in its endings, had previously given to it the suggestive if not logical appellation of Semi-Saxon.

Although the written remains of the transition stage are few, sufficient exist to enable us to trace the course of linguistic change in some of the dialects. Within three generations after the Conquest, faithful pens were at work transliterating the old homilies of vElfric, and other lights of the Anglo-Saxon Church, into the current idiom of their posterity. 1 Twice during the period, in the reigns of Stephen and Henry II., ˆElfric's gospels were similarly modernized so as to be " understanded of the people." 2 Homilies and other religious works of the end of the 1 2th century 3 show us the change still further advanced, and the language passing into Early Middle English in its southern form. While these southern remains carry on in unbroken sequence the history of the Old English of Alfred and iElfric, the history of the northern English is an entire blank from the nth to the 13th century. The stubborn resistance of the north, and the terrible retaliation inflicted by William, apparently effaced northern English culture for centuries. If anything was written in the vernacular in the

kingdom of Scotland during the same period, it probably perished during the calamities to which that country was sub- jected during the half-century of struggle for independence. In reality, however, the northern English had entered upon its transition stage two centuries earlier; the glosses of the 10th century show that the Danish inroads had there anticipated the results hastened by the Norman Conquest in the south.

1 MS. Cotton Vesp. A. 22.

2 Gospels in Anglo-Saxon, &c, ed. for Cambridge Press, by W. W. Skeat (1871-1887), second text.

3 Old English Homilies of Twelfth Century, first and second series, ed. R. Morris (E.E.T.S.), (1868-1873).

Meanwhile a dialect was making its appearance in another quarter of England, destined to overshadow the old literary dialects of north and south alike, and become the English of the future. The Mercian kingdom, which, as its name imports, lay along the marches of the earlier states, and was really a congeries of the outlying members of many tribes, must have presented from the beginning a linguistic mixture and transition; and it is evident that more than one intermediate form of speech arose within its confines, between Lancashire and the Thames. The specimens of early Mercian now in existence consist mainly of glosses, in a mixed Mercian and southern dialect, dating from the 8th century; but, in a oth-century gloss, the so-called Vespasian Psalter, representing what is generally held to be pure Mercian. Towards the close of the Old English period we find some portions of a gloss to the Rushworth Gospels, namely St Matthew and a few verses of St John xviii., to be in Mercian. These glosses, with a few charters and one or two small fragments, represent a form of Anglian which in many respects stands midway between Northumbrian and Kentish, approaching the one or the other more nearly as we have to do with North Mercian or South Mercian. And soon after the Conquest we find an undoubted midland dialect in the transition stage from Old to Middle English, in the eastern part of ancient Mercia, in a district bounded on the south and south-east by the Saxon Middlesex and Essex, and on the east and north by the East Anglian Norfolk and Suffolk and the Danish settlements on the Trent and Humber. In this district, and in the monastery of Peterborough, one of the copies of the Anglo-Saxon Chronicle, transcribed about 1 1 20, was continued by two succeeding hands to the death of Stephen in n 54. The section from 1122 to 1131, probably written in the latter year, shows a notable

confusion between Old English forms and those of a Middle English, im- patient to rid itself of the inflectional trammels which were still, though in weakened forms, so faithfully retained south of the Thames. And in the concluding section, containing the annals from 1132 to 1154, and written somewhere about the latter year, we find Middle English fairly started on its career. A specimen of this new tongue will best show the change that had taken place:

1 140 a.d. — And i te eorl of Angaeu waerd ded, and his sune Henri toe to Pe rice. And te cuen of France to-dselde fra Pe king, and scae cow to Pe iunge eorl Henri, and he toe hire to wiue, and al Peitou mid hire. Fa ferde he mid micel faerd into Engleland andwan castles — and te king ferde agenes him mid micel mare ferd. PoPwaethere fuhtten hi noht. oc ferden Pe eercebiscop and te wise men betwux heoTO, and makede that sahte that te king sculde ben lauerd and king wile he liuede. and aefter his daei ware Henri king, and he helde him for fader, and he him for sune, and sib and saehte sculde ben betwyx heom, and on al Engleland. 6

With this may be contrasted a specimen of southern English, from 10 to 20 years later (Hatton Gospels, Luke i. 46 s) :

Da cwaeS Maria: Min saule mersed drihten, and min gast ge-blissode on gode minen haelende. For Para Pe he geseah his Pinene eadmodnysse. So'Slice henen-forS me eadige seggeS alle cneornesse; for Pam Pe me mychele Ping dyde se Pe mihtyg ys; and his name is halig. And his mildheortnysse of cneornisse on cneornesse hine on-draedende. He worhte maegne on hys earme; he to-daelde Pa ofermode, on moda heora heortan. He warp Pa rice of setlle, and Pa eadmode he up-an-hof. Hyngriende he mid gode ge-felde, and Pa ofermode ydele for-let. He afeng israel his cniht, and gemynde his mildheortnysse; Swa he spraec to ure faederen, Abrahame and his saede on a weorlde.*

To a still later date, apparently close upon 1200, belongs the versified chronicle of Layamon or Laweman, a priest of Ernely on the Severn, who, using as his basis the French Brut of Wace, ; expanded it by additions from other sources to more than twice the extent: his work of 32,250 lines is a mine of illustration for the language of his time and locality. The latter was intermediate between midland and southern, and the language, though forty years later than the specimen from the Chronicle, is much more archaic in structure, and can scarcely be considered even as Early Middle English. The following is a specimen (lines

9064-9079) :

4 The article pe becomes te after a preceding / or d by assimilation. 6 Earle, Two of the Saxon Chronicles parallel (1865), p. 265. 6 Skeat, Anglo-Saxon and Northumbrian Gospels (1874).

On Kinbelines daeie . . . P e king wes inne Bruttene, com a Pissen middel aerde . . . anes maidenes sune, iboren wes in BePleem ... of bezste aire burden. He is ihaten Jesu Crist . . . Purh Pene halie gost, aire worulde wunne . . . walden englenne; faeder he is on heuenen . . . froure moncunnes; sune he is on eorSen ... of sele Pon maeidene, & Pene halie gost . . . haldeS mid him seoluen.

The Middle English was pre-eminently the Dialectal period of the language. It was not till after the middle of the 14th century that English obtained official recognition. For three centuries, therefore, there was no standard form of speech which claimed any pre-eminence over the others. The writers of each district wrote in the dialect familar to them; and between extreme forms the difference was so great as to amount to unintelligibility; works written for southern Englishmen had to be translated for the benefit of the men of the north: — " In sotherin Inglis was it drawin,

And turnid ic haue it till ur awin

Langage of Pe northin lede

That can na nothir Inglis rede."

Cursor Mundi, 20,064.

Three main dialects were distinguished by contemporary writers, as in the often-quoted passage from Trevisa's translation of Higden's Polychronicon completed in 1387:—

" Also Englysche men . . . hadde fram pe bygynnynge pre maner speche, Souperon, Norperon and Myddel speche (in Pe myddel of Pe lond) as hy come of Pre maner people of Germania. . . . Also of Pe forseyde Saxon tonge, Pat ys deled a Pre, and ys abyde scars- lyche wip feaw uplondysche men and ys gret wondur, for men of Pe est wip men of Jie west, as hyt were under Pe same part of heyvene, acordeP more in sounynge of speche Pan men of Pe norp wip men of i>e

soup; Perfore hyt ys Pat Mercii, PatbuP men of myddel Engelond, as hyt were parteners of Pe endes, undurstondeP betre Pe syde longages NorPeron and SouPeron, Pan NorPern and SouPern undur- stondeP oyper oPer."

The modern study of these Middle English dialects, initiated by the elder Richard Garnett, scientifically pursued by Dr Richard Morris, and elaborated by many later scholars, both English and German, has shown that they were readily distinguished by the conjugation of the present tense of the verb, which in typical specimens was as follows: — •■

Southern.

Ich singe. We singeP.

Pou singest. 3e singeP.

He singeP. Hy singeP.

Midland.

Ich, I, singe. We singen.

Pou singest. 3e singen.

He singeP. Hy, thei, singen.

Northern. Ic. I, sing(e) (I Pat singes). We sing(e), We Pat synges.

Pu singes. 3e sing(e), 3e foules synges.

He singes. Thay sing(e), Men synges.

Of these the southern is simply the old West-Saxon, with the vowels levelled to e. The northern second person in -es preserves an older form than the southern and West-Saxon -est; but the -es of the third person and plural is derived from an older -eth, the change of -tk into -s being found in progress in the Durham glosses of the 1 oth century. In the plural, when accompanied by the pronoun subject, the verb had already dropped the inflections entirely as in Modern English. The origin of the -en plural in the midland dialect, unknown to Old English, is probably an instance of form-levelling, the inflection of the present indicative being assimilated to that of the past, and the present and past sub- junctive, in all of which en was the plural termination. In the declension of nouns, adjectives and pronouns, the

northern dialect had attained before the end of the 13th century to the simplicity of Modern English, while the southern dialect still retained a large number of inflections, and the midland a consider able number. The dialects differed also in phonology, for while the northern generally retained the hard or guttural values of k, g, sc, these were in the two other dialects palatalized before front vowels into ch, j and sh. Kirk, chirche or church, hryg, bridge; scryke, shriek, are examples. Old English hw was written in the north qu(h), but elsewhere wh, often sinking into w. The original long d in stdn, mdr, preserved in the northern stane,

*mare, became elsewhere, as in stone, mo*e. So that the north presented a general aspect of conservation of old sounds with the most thorough going dissolution of old inflections; the south, a tenacious retention of the inflections, with an extensive evolution in the sounds. In one important respect, however,phonetic decay was far ahead in the north i the final e to which all the old vowels had been levelled during the transition stage, and which is a dis tinguishing feature of Middle English in the midland and southern dialects, became mute, i.e., disappeared, in the northern dialect before that dialect emerged from its three centuries of obscuration, shortly before 1300. So thoroughly modern had its form conse-quently become that we might almost call it Modern English, and say that the Middle English stage of the northern dialect is lost. For comparison with the other dialects, however, the same nomenclature may be used, and we may class as Middle English the extensive literature which northern England produced during the 14th century. The earliest specimen is probably the Metrical Psalter in the Cotton Library, 1 copied during the reign of Edward II. from an original of the previous century. The gigantic versified paraphrase of Scripture history called the Cursor Mundi, 11 is held also to have been composed before 1300. The dates of the numerous alliterative romances in this dialect have not been determined with exactness, as all survive in later copies, but it is probable that some of them were written before 1300. In the 14th century appeared the theological and devotional works of Richard Rolle the anchorite of Hampole, Dan Jon Gaytrigg, William of Nassington, and other writers whose names are unknown; and towards the close of the century, specimens of the language also appear from Scotland both in official documents and in the poetical works of John Barbour, whose language, barring minute points of orthography, is identical with that of the contemporary northern English writers. From 1400 onward, the distinction between northern English and Lowland Scottish becomes clearly marked.*

In the southern dialect one version of the work called the Ancren Riwle or " Rule of Nuns," adapted about 1225 for a small sisterhood at Tarrant-Kaines, in Dorsetshire, exhibits a dialectal characteristic which had probably long prevailed in the south, though concealed by the spelling, in the use of v for /, as voile fall, vordonne fordo, vorto for to, veder father, worn from. Not till later do we find a recognition of the parallel use of z for s. Among the writings which succeed, The Owl and the Nightingale of Nicholas de Guildford, of Portesham in Dorsetshire, before 1250, the Chronicle of Robert of Gloucester, 1298, and Trevisa's translation of Higden, 1387, are of special importance in illus- trating the history of southern English. The earliest form of Langland's Piers Ploughman, 1362, as preserved in the Vernon MS., appears to be in an intermediate dialect between southern and midland. 3 The Kentish form of southern English seems to have retained specially archaic features; five short sermons in it of the middle of the 13th century were edited by Dr Morris (1866) ; but the great work illustrating it is the Ayenbite of Inwyt (Remorse of Conscience), 1340, 4 a translation from the French by Dan Michel of Northgate, Kent, who tells us —

" Pet Pis boc is y- write mid engliss of Kent; Pis boc is y-mad uor lewede men, Vor uader, and uor moder, and uor oPer ken, Ham uor to ber3e uram alle manyere zen, Pet ine hare inwytte ne bleue no uoul wen."

In its use of v («) and z for / and s, and its grammatical in- flections, it presents an extreme type of southern speech, with peculiarities specially Kentish; and in comparison with con- temporary Midland English works, it looks like a fossil of two centuries earlier.

Turning from the dialectal extremes of the Middle English to the midland speech, which we left at the closing leaves of the

1 Edited for the Surtees Society, by Rev. J. Stevenson.

2 Edited for the Early English Text Society, by Rev. Dr Morris.

3 The Vision of William concerning Piers the Pl'oughman exists irt three different recensions, all of which have been edited for the Early English Text Society by Rev. W. W. Skeat.

4 Edited by Rev. Dr Morris for Early English Text Society, in

1866.

Peterborough Chronicle of 1154, we find a rapid development of this dialect, which was before long to become the national literary language. In this, the first great work is the Ormulum, or metrical Scripture paraphrase of Orm or Ormin, written about 1200, somewhere near the northern frontier of the midland area. The dialect has a decided smack of the north, and shows for the first time in English literature a large percentage of Scandinavian words, derived from the Danish settlers, who, in adopting English, had preserved a vast number of their ancestral forms of speech, which were in time to pass into the common language, of which they now constitute some of the most familiar words. Blunt, bull, die, dwell, ill, kid, raise, same, thrive, wand, wing, are words from this source, which appear first in the work of Orm, of which the following lines may be quoted: — " Pe Judewisshe folkess boc

hemm se33de, Patt hemm birrde Twa bukkes samenn to Pe preost '

att kirrke-dure brinngenn ; And te33 fa didenn blipeli3,

swa summ Pe boc hemm tahhte, And brohhtenn twejjenn bukkess Paer

Drihhtin PserwiPP to lakenn. And att 1 te kirrke-dure toe

pe preost ta twe33enn bukkess, And o Patt an he le33de paer all pe33re sake and sinne, And let itt eornenn forPwiPP all

lit inntill wilde wesste; And toe and snap Patt operr bucc

Drihhtin PaerwiPP to lakenn. All Piss wass don forr here ned,

and ec forr ure nede ; For hemm itt hallp biforenn Godd

to clennssenn hemm of sinne; And all swa ma33 itt hellpenn Pe 3iff Patt tu willt [itt] foll3henn. 3iff Patt tu willt full innwarrdli3

wiPP fulle trowwpe lefenn All Patt tatt wass bitacnedd teer, to lefenn and to trowwenn."

Ormulum, ed. White, 1. 1324.

The author of the Ormulum was a phonetist, and employed a special spelling of his own to represent not only the quality but the quantities of vowels and consonants — a circumstance which gives

his work a peculiar value to the investigator. He is generally assumed to have been a native of Lincolnshire or Notts, but the point is a disputed one, and there is somewhat to be said for the neighbourhood of Ormskirk in Lancashire.

It is customary to differentiate between east and west midland, and to subdivide these again into north and south. As was natural in a tract of country which stretched from Lancaster to Essex, a very considerable variety is found in the documents which agree in presenting the leading midland features, those of Lancashire and Lincolnshire approaching the northern dialect both in vocabulary, phonetic character and greater neglect of inflections. But this diversity diminishes as we advance.

Thirty years after the Ormulum, the east midland rhymed Story of Genesis and Exodus 11 shows us the dialect in a more southern form, with the vowels of modern English, and from about the same date, with rather more northern characteristics, we have an east midland Bestiary.

Different tests and different dates have been proposed for subdividing the Middle English period, but the most important is that of Henry Nicol, based on the observation that in the early 13th century, as in Ormin, the Old English short vowels in an open syllable still retained their short quantity, as n&ma, dver, mUt; but by 1250 or 1260 they had been lengthened to ndrme, o-ver, me-te, a change which has also taken place at a particular period in all the Germanic, and even the Romanic languages, as in bud-no for bd-num, pa-dre for pd-trem, &c. The lengthening of the penult left the final syllable by contrast shortened or weakened, and paved the way for the disappearance of final e in the century following, through the stages nd-me,

•Here, and in tatt, tu, taer, for patt, pu, poet, after /, d, there is the same phonetic assimilation as in the last section of the Anglo- Saxon Chronicle above.

2 Edited for the Early English Text Society by Dr Morris (1865).

na-mi, na-m' , nam, the one long syllable in nam(e) being the quantitative equivalent of the two short syllables in nd-m&\ hence the notion that mute e makes a preceding vowel long, the truth being that the lengthening of the vowel led to the e becoming mute.

After 1250 we have the Lay of Havelok, and about 1300 the writings of Robert of Brunne in South Lincolnshire. In the 14th century we

find a number of texts belonging to the western part of the district. South-west midland is hardly to be distin- guished from southern in its south-western form, and hence texts like Piers Plowman elude any satisfactory classification, but several metrical romances exhibit what are generally considered to be west midland characteristics, and a little group of poems, Sir Gawayne and the Grene Knighte, the Pearl, Cleanness and Patience, thought to be the work of a north-west midland writer of the 14th century, bear a striking resemblance to the modern Lancashire dialect. The end of the century witnessed the prose of Wycliff and Mandeville, and the poetry of Chaucer, with whom Middle English may be said to have culminated, and in whose writings its main characteristics as distinct from Old and Modern English may be studied. Thus, we find final e in full use representing numerous original vowels and terminations as

Him thougbte that his herti wolde breke, in Old English —

Him Puhte Past his heorte wolde brecan, which may be compared with the modern German—

Ihm dauchte dass sein Herze wollte brechen. In nouns the -es of the plural and genitive case is still syllabic —

Reede as the berstl-es of a sow-es eer-es. Several old genitives and plural forms continued to exist, and the dative or prepositional case has usually a final e. Adjectives retain so much of the old declension as to Lave -e in the definite form and in the plural—

The tend-re cropp-es and the yong-e sonne.

And smalˆe fowl-es maken melodic

Numerous old forms of comparison were in use, which have not come down to Modern English, as herre, ferre, lenger, hext = higher, farther, longer, highest. In the pronouns, ich lingered alongside of 7; ye was only nominative, and you objective; the northern thei had dispossessed the southern hy, but her and hem (the modern 'em) stood their ground against their and them. The verb is I lov-e, thou lov-est, he lov-eth; but, in the plural, lov-en is interchanged with lov-e, as rhyme or euphony requires. So in the plural of the past we love-den or love-de. The infinitive also ends in en, often e, always syllabic. The present participle, in Old English -ende, passing through -inde, has been confounded with the verbal noun in -ynge, yng, as in Modern English. The past participle largely retains the prefix y or i-, representing the Old English ge-, as in i-ronne, y-don, Old English

zerunnen, zeddn, run, done. Many old verb forms still continued in existence. The adoption of French words, not only those of Norman introduction, but those subsequently introduced under the Angevin kings, to supply obsolete and obsolescent English ones, which had kept pace with the growth of literature since the beginning of the Middle English period, had now reached its climax; later times added many more, but they also dropped some that were in regular use with Chaucer and his con- temporaries.

Chaucer's great contemporary, William Langland, in his Vision of William concerning Piers the Ploughman, and his imitator the author of Pierce the Ploughman's Crede (about 1400) used the Old English alliterative versification for the last time in the south. Rhyme had made its appearance in the language shortly after the Conquest — if not already known before; and in the south and midlands it became decidedly more popular than alliteration; the latter retained its hold much longer in the. north, where it was written even, after fjbo: many of the northern romances are either simply alliterative, or have both alliteration and rhyme. To tfieSe characteristics of northern and southern verse respectively Chaucer alludes in the prologue of the "Persone," who, when called upon for his tale said: —

" But trusteth wel; I am a sotherne man, I cannot geste rom, ram, ruf, by my letter, And, God wote, rime hold I but litel better: And therefore, if you list, I wol not glose, I wol you tell a litel tale in prose."

The changes from Old to Middle English may be summed up thus: Loss of a large part of the native vocabulary, and adoption of French words to fill their place; not infrequent adoption of French words as synonyms of existing native ones; modernization of the English words preserved, by vowel change in a definite direction from back to front, and from open 'to close, a becoming y, original e, 6, tending to ee, oo, monophthongi- zation of the old diphthongs eo, ea, and development of new diphthongs in connexion with g, h, and w; adoption of French orthographic symbols, e.g. ou for u, qu, v, ch, and gradual loss of the symbols], J>, S, P; obscuration of vowels after the accent, and especially of final a, o, u to e; consequent confusion and loss of old inflections, and their replacement by prepositions, auxiliary verbs and rules of position; abandonment of alliteration for rhyme; and great development of dialects, in

consequence of there being no standard or recognized type of English.

But the recognition came at length. Already in 1258 was issued the celebrated English proclamation of Henry III., or rather of Simon de Montfort in his name, which, as the only public recognition of the native tongue between William the Conqueror and Edward III., has sometimes been spoken of as the first specimen of English. It runs: —

" Henri Pur3 godes fultume king on Engleneloande Lhoauerd on Yrloande. Duk on Normondie on Aquitaine and eorl on Aniow. Send igretinge to alle hise holde ileerde and ileawede on Huntendone-schire. paet witen 3e wel alle J^aet we willen and vnnen)3aet paet vre raedesmen alle oper pe moare dael of heom paet beop ichosen pur3 us and Pur3 Paet loandes folk on vre kuneriche. habbep idon and schullen don in be worp nesse of gode and on vre treowpe. for pe freme of te loande. pur3 pe besi3te of ten to-foren-iseide redesmen. beo stedefsest and ilestinde in alle pinge a buten sende. And we hoaten alle vre treowe in pe treowpe paet heo vs o3en. paet heo stedef aestliche healden and swerien to healden and to werien po isetnesses peet ben imakede and beon to makien pur3 Fan to-foren iseide raedesmen. oper pur3 pe moare dael of heom alswo alse hit is biforen iseid. And paet aehc oper helpe tret for to done bi pan ilohe ope a3enes alle men. Ri3t for to done and to foangen. And noan ne nime of loande ne of e3te. wherpur3 Pis besi3te mu3e beon ilet oper iwersed on onie wise.' And 3if oni oper onie cumen her on3enes; we willen and hoaten paet alle vre treowe heom healden deadliche ifoan. And for paet we willen paet pis beo stedefsest and lestinde ; we senden 3ew pis writ open iseined wip vre seel, to halden amanges 3ew ine hord. Witnesse vs seluen set Lundene. pane E3tetenpe day. on pe Monpe of Octobre In pe Two-and-fowerti3pe 3eare of vre cruninge. And pis wes idon aetforen vre isworene redesmen. …

" And al on po ilche worden is isend in to aeurihce opre shcire ouer al paere kuneriche on Engleneloande. and ek in tel Irelonde."

The dialect of this document is more southern than anything else, with a slight midland admixture. It is much more archaic inflectionally than the Genesis and Exodus or Ormulum; but it closely resembles the old Kentish sermons and Proverbs of Alfred, in the southern dialect of 1230. It represents no doubt the London speech of the day. London being in a Saxon county, and contiguous to Kent and Surrey, had certainly at first a southern dialect; but its position as the capital, as well as its proximity to the midland district, made its dialect more and more midland. Contemporary

London documents show that Chaucer's language, which is distinctly more southern than standard English eventually became, is behind the London dialect of the day in this respect, and is at once more archaic and consequently more southern.

During the next hundred years English gained ground steadily, and by the reign of Edward III. French was so little known in England, even in the families of the great, that about 1350 " John Cornwal, a maystere of gramere, chaungede >e lore (= leaching) in gramere scole and construccion of [i.e. from] Freynsch into Englysch " ; l and in 1362-1363 English by statute took the place of French in the pleadings in courts of law. Every reason conspired that this " English " should be the midland dialect. It was the intermediate dialect, intelligible, as Trevisa has told us, to both extremes, even when these failed 1 Trevisa, Translation of Higden's Polychronicon.

to be intelligible to each other; in its south-eastern form, it was the language of London, where the supreme law courts were, the centre of political and commercial life; it was the language in which the Wyclifnte versions had given the Holy Scriptures to the people; the language in which Chaucer had raised English poetry to a height of excellence admired and imitated by con- temporaries and followers. And accordingly after the end of the 14th century, all Englishmen who thought they had anything to say to their countrymen generally said it in the midland speech. Trevisa's own work was almost the last literary effort of the southern dialect; henceforth it was but a rustic patois, which the dramatist might use to give local colouring to his creations, as Shakespeare uses it to complete Edgar's peasant disguise in Lear, or which 19th century research might disinter to illustrate obscure chapters in the history of language. And though the northern English proved a little more stubborn, it disappeared also from literature in England; but in Scotland, which had now become politically and socially estranged from England, it continued its course as the national language of the country, attaining in the 15th and 16th centuries a distinct development and high literary culture, for the details of which readers are referred to the article on Scottish Language.

The 15th century of English history, with its bloody French war abroad and Wars of the Roses at home, was a barren period in literature, and a transition one in language, witnessing the decay and disappearance of the final e, and most of the syllabic inflections of Middle English. Already by 1420, in Chaucer's disciple Hoccleve, final e was quite uncertain; in Lydgate it was practically gone. In 1450 the writings of Pecock against the Wycliffites show the verbal

inflections in -en in a state of obsolescence; he has still the southern pronouns her and hem for the northern their, them : —

" And here-a3ens holi scripture wole pat men schulden lacke pe coueryng which wommen schulden haue, & thei schulden so lacke bi pat pe heeris of her heedis schulden be schorne, &schulde not growe in lengpe doun as wommanys heer schulde growe. . . .

" Also here-wipal into pe open si3t of ymagis in open chirchis, alle peple, men & wommen & children mowe come whanne euere pei wolen in ech tyme of pe day, but so mowe pei not come in-to pe vce of bokis to be delyuered to hem neiper to be red bifore hem; & perfore, as for to soone & ofte come into remembraunce of a long mater bi ech oon persoon, and also as forto make pat Pe mo persoones come into remembraunce of a mater, ymagis & picturis serven in a specialer maner pan bokis doon, pou3 in an oper maner ful sub- stanciali bokis seruen better into remembrauncing of po same materis pan ymagis & picturis doon; & Perfore, pou3 writingis seruen weel into remembrauncing upon pe bifore seid pingis, 3it not at pe ful : Forwhi pe bokis han not pe avail of remembrauncing now seid whiche ymagis han." 2

The change of the language during the second period of Transition, as well as the extent of dialectal differences, is quaintly expressed a generation later by Caxton, who in the prologue to one of the last of his works, his translation of Virgil's Eneydos (1490), speaks of the difficulty he had in pleasing all readers : —

" I doubted that it sholde not please some gentylmen, whiche late blamed me, sayeng, y l in my translacyons I had ouer curyous termes, whiche coud not be vnderstande of comyn peple, and desired me to vse olde and homely termes in my translacyons. And fayn wolde I satysfy euery man; and so to doo, toke an olde boke and redde therein; and certaynly the englysshe was so rude and brood that I coude not wele vnderstande it. And also my lorde abbot of West- mynster ded do shewe to me late certayn euydences wryton in olde englysshe for to reduce it in to our englysshe now vsid. And cer- taynly it was wreton in suche wyse that it was more lyke to dutche than englysshe ; I coude not reduce ne brynge it to be vnderstonden. And certaynly, our langage now vsed varyeth ferre from that whiche was vsed and spoken whan I was borne. For we englysshemen ben borne vnder the domynacyon of the mone, whiche is neuer stedfaste, but euer wauerynge, wexynge one season, and waneth and dycreaseth another season. And that comyn englysshe that is spoken in one shyre varyeth from a nother. In so much that in my days

happened that certayn marchauntes were in a shipe in tamyse, for to haue sayled ouer the sea into zelande, and for lacke of wynde thei taryed atte forlond, and wente to lande for to refreshe them. And one of theym named sheffelde, a mercer, cam in to an hows and axed for mete, and specyally he axyd after eggys, And the goode wyf answerde, that she coude speke no frenshe. And the marchaunt was angry,

2 Skeat , Specimens of English Literature, pp. 49, 54.

for he also coulde speke no frenshe, but wolde haue hadde egges; and she vnderstode hym not. And thenne at laste a nother sayd that he wolde haue eyren ; then the good wyf sayd that she vnderstod hym wel. Loo! what sholde a man in thyse dayes now wryte, egges or eyren? certaynly, it is harde to playse euery man, by cause of dyuersite & chaunge of langage. For in these dayes, euery man that is in ony reputacyon in his countre wyll vtter his comyny- cacyon and maters in suche maners & termes that fewe men shall vnderstonde theym. And som honest and grete clerkes haue ben wyth me, and desired me to wryte the moste curyous termes that I coude fynde. And thus bytwene playn, rude and curyous, I stande abasshed; but in my Iudgemente, the comyn termes that be dayli vsed ben lyghter to be vnderstonde than the olde and auncyent englysshe."

In the productions of Caxton's press we see the passage from Middle to Early Modern English completed. The earlier of these have still an occasional verbal plural in -n, especially in the word they ben; the southern her and hem of Middle English vary with the northern and Modern English their, them. In the late works, the older forms have been practically ousted, and the year 1485, which witnessed the establishment of the Tudor dynasty, may be conveniently put as that which closed the Middle English transition, and introduced Modern English. Both in the completion of this result, and in its comparative permanence, the printing press had an important share. By its exclusive patronage of the midland speech, it raised it still higher above the sister dialects, and secured its abiding victory. As books were multiplied and found their way into every corner of the land, and the art of reading became a more common acquirement, the man of Northumberland or of Somersetshire had forced upon his attention the book-English in which alone these were printed. This became in turn the model for his own writings, and by-and-by , if he made any

pretensions to education, of his own speech. The written form of the language also tended to uniformity. In previous periods the scribe made his own spelling with a primary aim at expressing his own speech, accord- ing to the particular values attached by himself or his con- temporaries to the letters and combinations of the alphabet, though liable to disturbance in the most common words and combinations by his ocular recollections of the spelling of others. But after the introduction of printing, this ocular recognition of words became ever more and more an aim; the book addressed the mind directly through the eye, instead of circuitously through eye and ear; and thus there was a continuous tendency for written words and parts of words to be reduced to a single form, and that the most usual, or through some accident the best known, but not necessarily that which would have been chosen had the ear been called in as umpire. Modern English spelling, with its rigid uniformity as to individual results and whimsical caprice as to principles, is the creation of the printing-office, the victory which, after a century and a half of struggle, mechanical convenience won over natural habits. Besides eventually creating a uniformity in writing, the introduction of printing made or at least ratified some important changes. The British and Old English form of the Roman alphabet has already been referred to. This at the Norman Conquest was superseded by an alphabet with the French forms and values of the letters. Thus k took the place of the older c before e and i; qu replaced cw; the Norman w took the place of the wen (p), &c; and hence it has often been said that Middle English stands nearer to Old English in pronunciation, but to Modern English in spelling. But there were certain sounds in English for which Norman writing had no provision; and for these, in writing English, the native characters were retained. Thus the Old English g (g), beside the sound in go, had a guttural sound as in German tag, Irish mag/z, and in certain positions a palatalized form of this approaching y as in you (if pronounced with aspiration //you or ghyon). These sounds continued to be written with the native form of the letter as burˆ,ˆour, while the French form was used for the sounds in go, age, — one original letter being thus repre- sented by two. So for the sounds of th, especially the sound in thut, the Old English thorn (]') continued to be used. But as these characters were not used for French and Latin, their use even in English became disturbed towards the 15th century,

and when printing was introduced, the founts, cast for continental languages, had no characters for them, so that they were dropped entirely, being replaced, 3 by gh, yh, y, and h by th. This was a real loss to the English alphabet. In the north it is curious that the

printers tried to express the forms rather than the powers of these letters, and consequently 3 was represented by z, the 'black letter form of which was confounded with it, while the]> was expressed by y, which its MS. form had come to approach or in some cases simulate. So in early Scotch books we find zellow, ze, yat, yem — yellow, ye, that, them; and in Modern Scottish, such names as Menzies, Dalziel, Cockenzie, and the word gaberlunzie, in which the z stands for y.

Modern English thus dates from Caxton. The language had at length reached the all but fiectionless state which it now presents. A single older verbal form, the southern -eth of the third person singular, continued to be the literary prose form throughout the 16th century, but the northern form in -s was intermixed with it in poetry (where it saved a syllable), and must ere long, as we see from Shakespeare, have taken its place in familiar speech. The fuller an, none, mine, thine, in the early part of the 16th century at least, were used in positions where their shortened forms a, no, my, thy are now found {none other, mine own = no other, my own) . But with such minute exceptions, the accidence of the 16th century was the accidence of the 19th. While, however, the older inflections had disappeared, there was as yet no general agreement as to the mode of their replace ment. Hence the 16th century shows a syntactic licence and freedom which distinguishes it strikingly from that of later times. The language seems to be in a plastic, unformed state, and its writers, as it were, experiment with it, bending it to constructions which now seem indefensible. Old distinctions of case and mood have disappeared from noun and verb, without custom having yet decided what prepositions or auxiliary verbs shall most fittingly convey their meaning. The laxity of word-order which was permitted in older states of the language by the formal expression of relations was often continued though the inflections which expressed the relations had disappeared. Partial analogy was followed in allowing forms to be identified in one case, because, in another, such identification was accidentally produced, as for instance the past participles of write and take were often made wrote and took, because the contracted participles of bind and break were bound and broke. Finally, because, in dropping inflections, the former distinctions even between parts of speech had disappeared, so that irc.i, e.g., was at once noun, adjective and verb, clean, adjective, verb and adverb, it appeared as if any word whatever might be used in any grammatical relation, where it conveyed the idea of the speaker. Thus, as has been pointed out by Dr Abbott, " you can happy your friend, malice or foot your enemy, or fall an axe on his neck. You can speak and act

easy, free, excellent, you can talk oifair instead of beauty (fairness), and a pale instead of a paleness. A he is used for a man, and a lady is described by a gentleman as 'the fairest she he has yet beheld.' An adverb can be used as a verb, as ' they askance their eyes ' ; as a noun, ' the backward and abyss of time'; or as an adjective, a 'seldom pleasure.'" 1 For, as he also says, "clearness was preferred to grammatical correctness, and brevity both to correctness and clearness. Hence it was common to place words in the order in which they came upper- most in the mind without much regard to syntax, and the result was a forcible and perfectly unambiguous but ungrammatical sentence, such as

The prince that feeds great natures they will slay him.

Ben Jonson. or, as instances of brevity,

Be guilty of my death since of my crime.

Shakespeare. It cost more to get than to lose in a day.

Ben Jonson."

These characteristics, together with the presence of words now obsolete or archaic, and the use of existing words in senses

1 A Shakspearian Grammar, by Dr E. A. Abbott. To this book we are largely indebted for its admirable summary of the characters of Tudor English.

different from our own, as genera! for specific, literal for meta- phorical, and vice versa, which are so apparent to every reader of the 16th-century literature, make it. useful to separate Early Modem ox Tudor English from the subsequent and still existing stage, since the consensus of usage has declared in favour of in- dividual senses and constructions which are alone admissible in ordinary language.

The beginning of the Tudor period was 1 contemporaneous with the Renaissance in art and literature, and the dawn of modern discoveries in geography and science. The revival of the study of the classical writers of Greece and Rome, and the translation of their works into the vernacular, led to the introduc- tion of an immense number of new words derived from these languages, either to express

new ideas and objects or to indicate new distinctions in or grouping of old ideas. Often also it seemed as if scholars were so pervaded with the form as well as the spirit of the old, that it came more natural to them to express them- selves in words borrowed from the old than in their native tongue, and thus words of Latin origin were introduced even when English already possessed perfectly good equivalents. As has already been stated, the French words of Norman and Angevin introduction, being principally Latin words in an altered form, when used as English supplied models whereby other Latin words could be converted into English ones, and it is after these models that the Latin words introduced during and Since the 1 6th century have been fashioned. There is nothing in the form of the words procession and progression to show that the one was used in England in the nth, the other not till the 16th century. Moreover, as the formation of new words from Latin had gone on in French as well as in English since the Renaissance we often cannot tell whether such words, e.g. as persuade and persuasion, were borrowed from their French equivalents or formed from Latin in England independently. With some words indeed it is impossible to say whether they were formed in England directly from Latin, borrowed from contemporary late French, or had been in England since the Norman period, even photograph, geology and telephone have the form that they would have had if they had been living words in the mouths of Greeks, Latins, French and English from the beginning, instead of formations of the 19th century. 1 While every writer was thus introducing new words according to his notion of their being needed, it naturally happened that a large number were not accepted by contemporaries or posterity; a long list might be formed of these mintages of the 16th and 17th centuries, which either never became current coin, or circulated only as it were for a moment. The revived study of Latin and Greek also led to modifications in the spelling of some words which had entered Middle English in the French form. So Middle English doute, dette, were changed to doubt, debt, to show a more immediate connexion with Latin dubitum, debitum; the actual derivation from the French being ignored. Similarly, words containing a Latin and French /, which might be traced back to an original Greek 0, were remodelled upon the Greek, e.g. theme, throne, for Middle English leme, trone, and, by false association with Greek, anthem, Old English antefne, Latin antiphona; Anthony, Latin Antonius; Thames, Latin Tamesis, apparently after Thomas.*

The voyages of English navigators in the latter part of the 1 6th century introduced a considerable number of Spanish words, and American words in Spanish forms, of which negro, potato, tobacco,

cargo, armadillo, alligator, galleon may serve as examples.

The date of 161 1, which nearly coincides with the end of Shakespeare's literary work, and marks the appearance of the Authorized Version of the Bible (a compilation from the various 16th-century versions), may be taken as marking the close of Tudor English. The language was thenceforth Modern in structure, style and expression, although the spelling did not settle down to present usage till about th'e revolution of 1688. The latter date also marks the disappearance from literature of

1 Evangelist, astronomy, dialogue, are words that have so lived, of which their form is the resurt. Photograph, geology, &c, take this form as 1/ they had the same history.

a large number of words, chiefly of such as were derived from Latin during the 16th and 17th centuries. Of these nearly all that survived 1688 are still in use; but -a long list might be made out of those that appear for the last time before that date. This sifting of the literary vocabulary and gradual fixing of the literary spelling, which went on between 161 1, when the language became modern in structure, and 1680, when it became modern also in form, suggests for this period the name of Seventeenth-Century Transition. The distinctive features of Modern English have already been anticipated by way of contrast with preceding stages of the language. It is only necessary to refer to the fact that the vocabulary is now much more composite than at any previous period. The immense development of the physical Sciences has called for a corresponding extension of terminology which has been supplied from Latin and especially Greek; and although these terms are in the first instance technical, yet, with the spread of education and general diffusion of the rudiments and appliances of science, the boundary line between technical and general, indefinite at the best, tends more and more to melt away— this in : addition to the fact that words still technical become general in figurative or metonymic senses. Ache, diamond, stomach, comet, organ, tone, ball, carte, are none the less familiar because once technical words. Commercial, social, artistic or literary contact has also led to the adoption of numerous words from modern European languages, especially French, Italian, Portuguese, Dutch (these two at a less recent period): thus from French soirie, seance, depdt, debris, programme, prestige ; from Italian bust, canto, folio, cartoon, concert, regatta, ruffian; from Portuguese caste, palaver; from Dutch yacht, skipper, schooner, sloop. Commercial intercourse and colonization have extended far beyond Europe, and given us words more or fewer from Hindostani, Persian, Arabic, Turkish, Malay, Chinese, and

from American, Australian, Polynesian and African languages. 2 More important even than these, perhaps, are the dialect words that from time to time obtain literary recognition, restoring to us obsolete Old English forms, and not seldom words of Celtic or Danish origin, which have been pre- served in local dialects, and thus at length find their way into the standard language.

As to the actual proportion of the various elements of the language, it is probable that original English words do not now form more than a fourth or perhaps a fifth of the total entries in a full English dictionary; and it may seem strange, therefore, that we still identify the language with that of the oth century, and class it as a member of the Low German division. But this explains itself, when we consider that of the total words in a dictionary only a small portion are used by any one individual in speaking or even in writing; that this portion includes the great majority of the Anglo-Saxon words, and but a minority of the others. The latter are in fact almost all names — the vast majority names of things (nouns), a smaller number names of attributes and actions (adjectives and verbs), and, from their very nature, names of the things, attributes and actions which come less usually or, it may be, very rarely under our notice. Thus in an ordinary book, a novel or story, the foreign elements will amount to from 10 to 15% of the whole; as the subject becomes more recondite or technical their number will increase; till in a work on chemistry or abstruse mathematics the proportion may be 40%. But after all, it is not the question whence words may have been taken, but how they are used in a language that settles its character. If new words when adopted conform them- selves to the manner and usage of the adopting language, it makes absolutely no difference whether they are taken over from some other language,, or invented off at the ground. In either case they are new words to begin with; in either case also, if they are needed, they will become as thoroughly native, i.e. familiar from childhood to those who use them, as those that possess the longest native pedigree. In this respect English is still the same language it was in the days of Alfred; and, comparing its history with that of other Low German tongues, there is no reason to believe that

- *See extended lists of the foreign words in English in Dr Morris's*

Historical Outlines of English Accidence, p. 33.

its grammar or structure would have been very different, however different its vocabulary might have been, if the Norman Conquest had never taken place.

A general broad view of the sources of the English vocabulary and of the dates at which the various foreign elements flowed into the language, as well as of the great change produced in it by the Norman Conquest, and consequent influx of French and Latin elements, is given in the accompanying chart. The transverse lines represent centuries, and it will be seen how limited a period after all is occupied by modern English, how long the language had been in the country before the Norman Conquest, and how much of this is prehistoric and without any literary remains. Judging by what has happened during the historic period, great changes may and indeed must have taken place between the first arrival of the Saxons and the days of

King Alfred, when literature practically begins. The chart also illustrates the continuity of the main stock of the vocabulary, the body of primary " words of common life," which, notwith- standing numerous losses and more numerous . additions, has preserved its corporate identity through all the periods. But the " poetic and rhetorical," as well as the " scientific " terms of Old English have died out, and a new vocabulary of " abstract and general terms " has arisen from French, Latin and Greek, while a still newer " technical, commercial and scientific " vocabulary is composed of words not only from these, but from every civilized and many uncivilized languages.

The preceding sketch has had reference mainly to the gram- matical changes which the language has undergone; distinct from, though intimately connected with these (as where the confusion or loss of inflections was a consequence of the weakening of final sounds) are the great phonetic changes which have taken place between the 8th and 19th centuries, and which result in making modern English words very different from their Anglo-Saxon originals, even where no element has been lost, as in wdfds lik«

stone, mine, doom, day, hail, child, bridge, shoot, Anglo-Saxon sldn, min, dom, dag, nrngel, did, brycg, sceot. The history of English sounds (see Phonetics) has been treated at length by Dr A. J. Ellis and Dr Henry Sweet; and it is only necessary here to indicate the broad facts, which are the following. (1) In an accented closed syllable, original short vowels have remained nearly unchanged; thus the words at, men, bill, God, dust are pronounced now nearly as in

Old English, though the last two were more like the Scotch o and North English u respectively, and in most words the short a had a broader sound like the provincial a in man. (2) Long accented vowels and diphthongs have undergone a regular sound shift towards closer and more advanced positions, so that the words ban, hcer, soece or sece, st6l (bahn or bawn, htr, sok or saik, stole) are now bone, hair, seek, stool; while the twobigh vowels u (= 00) and i (ee) have become diphthongs, as Ms, scir, now house, shire, though the old sound of « remains in the north (hoose); and the original i in the pronunciation sheer, approved by Walker, "as in machine, and shire, and magazine." (3) Short vowels in an open syllable have usually been lengthened, as in nil-ma, cd-fa, now name, cove; but to this there are exceptions, especially in the case of I and u. (4) Vowels in terminal unaccented syllables have all sunk into short obscure e, and then, if final, disappeared; so oxa, sio, wudu became ox-e, se-e, wud-e, and then ox, see, wood; oxan, lufod, now oxen, loved, lov'd; settan, setton, later setten, sette, sett, now set: (5) The back consonants, c, g, sc, in connexion with front vowels, have often become palatalized to ch, j, sh, as circe, rycg, fisc, now church, ridge, fish. A medial or final g has passed through a guttural or palatal continuant to w or y, forming a diphthong or new vowel, as in boga, laga, dag, heg, drig, now bow, law, day, hay, dry. W and h have disappeared before r and I, as in write, (w)lisp, (h)ring; h final (— gh) has become /, k, w or nothing, but has developed the glides w or i before itself, these combining with the pre- ceding vowel to form a diphthong, or merging with it into a simple vowel-sound, as ruh, hoh, boh, deah, heah, hleah, now rough, hough, bough, dough, high, laugh — ruˆ, hok, bdw, do, hi, Idf. R after a vowel has practically disappeared in standard English, or at most become vocalized, or combined with the vowel, as in hear, bar, more, her. These and other changes have taken place gradually, and in accordance with well-known phonetic laws; the details as to time and mode may be studied in special works. It may be mentioned that the total loss of grammatical gender in English, and the almost complete disappear- ance of cases, are purely phonetic phenomena. Gender (whatever its remote origin) was practically the use of adjectives and pronouns with certain distinctive terminations, in accordance with the genus, genre, gender or kind of nouns to which they were attached; when these distinctive terminations were uniformly levelled to final i, or other weak sounds, and thus ceased to distinguish nouns into kinds, the distinctions into genders or kinds having no other existence disappeared. Thus when \cet gode hors,] > one godan hund,] > a godan b&c, became, by phonetic weakening, \e gode hors, \e gode hownd, \e gode boke, and later still the good horse, the good

hound, the good book, the words horse, hound, book were no longer grammatically different kinds of nouns; grammatical gender had ceased to exist. The concord of adjectives has entirely disappeared; the concord of the pronouns is now regulated by rationality and sex, instead of grammatical gender, which has no existence in English. The man who lost his life; the bird which built its nest.

Our remarks from the end of the 14th century have been confined to. the Standard or literary form of English, for of the other dialects from that date (with the exception of the northern

English in Scotland, where it became in a social and literary sense a distinct language), we have little history. We know, however, that they continued to exist as local and popular forms of speech, as well from occasional specimens and from the fact that they exist still as from the statements of writers during the interval. Thus Puttenham in his Arte of English Poesie (1589) says:—

" Our maker [i.e. poet] therfore at these dayes shall not follow Piers Plowman, nor Gower, nor Lydgate, not yet Chaucer, for their language is now not of use with us : neither shall he take the termes of Northern-men, such as they use in dayly talke, whether they be noble men or gentle men or of their best clarkes, all is a [=one] matter ; nor in effect any speach used beyond the river of Trent, though no man can deny but that theirs is the purer English Saxon at this day, yet it is not so Courtly nor so currant as our Southerne English is, no more is the far Westerne mans speach; ye shall therefore take the usual speach of the Court, and that of London and the shires lying about London within lx myles, and not much above. I say not this but that in every shyre of England there be gentlemen and others that speake but specially write as good Southerne as we of Middlesex or Surrey do, but not the common people of every shire, to whom the gentlemen, and also their learned clarkes do for the most part condescend, but herein we are already ruled by th' English Dictionaries and other bookes written by learned men." — Aroer's Reprint, p. 157.

In comparatively modern times there has been a revival of interest in these forms of English, several of which following in the wake of the revival of Lowland Scots in the 18th and 19th centuries, have produced a considerable literature in the form of local poems, tales and " folk-lore." In these respects Cumber- land, Lancashire, Yorkshire, Devon, Somerset and Dorset, the " far north " and " far west " of Puttenham, where the dialect was felt to be so independent of literary English as not to be branded as a mere vulgar corruption of it, stand prominent. More recently the dialects have been investigated philologically, a department in which, as in other

departments of English philology, the elder Richard Garnett must be named as a pioneer. The work was carried out zealously by Prince Louis Lucien Bonaparte and Dr A. J. Ellis, and more recently by the English Dialect Society, founded by the Rev. Professor Skeat, for the investigation of this branch of philology. The efforts Of this society resulted in the compilation and publication of glossaries or word-books, more or less complete and trustworthy, of most of the local dialects, and in the production of grammars dealing with the phonology and grammatical features of a few of these, among which that of the Windhill dialect in Yorkshire, by Professor Joseph Wright, and that of West Somerset, by the late F. T. Elworthy, deserve special mention. From the whole of the glossaries of the Dialect Society, and from all the earlier dialect works of the 18th and 19th centuries, amplified and illustrated by the contributions of local collaborators in nearly every part of the British Isles, Professor Joseph Wright has constructed his English Dialed Dictionary, recording the local words and senses, with indication of their geographical range, their pronunciation, and in most cases with illustrative quotations or phrases. To this he has added an English Dialect Grammar, dealing very fully with the phonology of the dialects, showing the various sounds which now represent each Old English sound, and endeavouring to define the area over which each modern form extends; the accidence is treated more summarily, without going minutely into that of each dialect-group, for which special dialect grammars must be consulted. The work has also a very full and valuable index of every word and form treated.

The researches of Prince L. L. Bonaparte and'Dr Ellis were directed specially to the classification and mapping of the existing dialects, 1 and the relation of these to the dialects of Old and Middle English. They recognized a Northern dialect lying north of a line drawn from Morecambe Bay to the Humber, which, with the kindred Scottish dialects (already investigated and classed), 2 is the direct descendant of early northern English,

1 See description and map in Trans. ofPhilol. Soc, 1875-1876, p. 570.

2 The Dialect of the Southern Counties of Scotland, its Pronunciation, Grammar and Historical Relations, with an Appendix on the present limits of the Gaelic and Lowland Scotch, and the Dialectal Divisions of the Lowland Tongue; and a Linguistical Map of Scotland, by James A. H. Murray (London, 1873).

and a South-western dialect occupying Somerset, Wilts, Dorset,

Gloucester and western Hampshire, which, with the Devonian dialect beyond it, are the descendants of early southern English and the still older West-Saxon of Alfred. This dialect must in the 14th Century have been spoken everywhere south of Thames; but the influence of London caused its extinction in Surrey, Sussex and Kent, so that already in Puttenham it had become " far western." An East Midland dialect, extending from south Lincolnshire to London, occupies the cradle-land of the standard English speech, and still shows least variation from it. Between and around these typical dialects are ten others, representing the old Midland proper, or dialects between it and the others already mentioned. Thus "north of Trent" the North-western dialect of south Lancashire, Cheshire, Derby and Stafford, with that of Shropshire, represents the early West Midland English, of which several specimens remain; while the North-eastern of Nottingham and north Lincolnshire represents the dialect of the Lay of Havelok. With the North Midland dialect of south-west York-shire, these represent forms of speech which to the modern Londoner, as to Puttenham, are still decidedly northern, though actually intermediate between northern proper and midland, and preserving interesting traces of the midland pronouns and verbal inflections. There is an Eastern dialect in the East Anglian counties; a Midland in Leicester and Warwick shires; a Western in Hereford, Worcester and north Gloucestershire, intermediate between south-western and north-western, and representing the dialect of Piers Plowman. Finally, between the east midland and south-western, in the counties of Buckingham, Oxford, Berks, Hants, Surrey and Sussex, there is a dialect which must have once been south-western, but of which the most salient characters have been rubbed off by proximity to London and the East Midland speech. In east Sussex and Kent this South-eastern dialect attains to a more distinctive character. The Kentish form of early Southern English evidently maintained its existence more toughly than that of the counties immediately south of London. It was very distinct in the days of Sir Thomas More; and even, as we see from the dialect attributed to Edgar in Lear, was still strongly marked in the days of Shakespeare. In the south-eastern corner of Ireland, in the baronies of Forth and Bargy, in county Wexford, a very archaic form of English, of which specimens have been preserved, 8 was, still spoken in the 1 8th century. In all probability it dated from the first English invasion. In many parts of Ulster forms of Lowland Scotch dating to the settlement under James I. are still spoken; but the English of Ireland generally seems to represent 16th and 17th century English, as in the pronunciation of tea, wheat (lay, whait), largely affected, of course, by the native Celtic. The subsequent work of the English Dialect Society, and the facts set

forth in the English Dialect Dictionary, confirm in a general way the classification of Bonaparte and Ellis; but they bring out strongly the fact that only in a few cases can the boundary between dialects now be determined by precise lines. For every dialect there is a central region, larger or smaller, in which its characteristics are at a maximum; but towards the edges of the area these become mixed and blended with the features of the contiguous dialects, so that it is often impossible to define the point at which the one dialect ends and the other begins. The fact is that the various features of a dialect, whether its distinc- tive words, characteristic pronunciations or special grammatical features, though they may have the same centre, have not all the same circumference. Some of them extend to a certain distance round the centre; others to a much greater distance. The Only approximately accurate way to map the area of any dialect, whether in England, France, Germany or elsewhere, is to take a well-chosen set of its characteristic features— words, senses, sounds or grammatical peculiarities, and draw a line round the area over which each of these extends; between the innermost and outermost of these there will often be a large border district. If the same process be followed with the contiguous dialects,

3 A Glossary {with some pieces of Verse) of the Old Dialect of the English Colony of Forth and Bargy, collected by Jacob Poole, edited by W. Barnes, B.D. (London, 1867).

CHRONOLOGICAL TABLE OF THE PERIODS AND DIALECTS OF THE ENGLISH LANGUAGE

Chronological Nomenclature,

Literary Development of the Leading Dialects.

Divisions.

Subdivisions.

Dates.

Northern English.

Midland English.

Southern English.

£3

Zjc

W c

Q-33 Q >

Z c

500

6OO

700

Early Old English.

i

Ceedmon, 660.

Beda, 734. Leiden Riddle. Cynewulf, c. 750.

8do

Typical Old English,

or

Anglo-Saxon.

900

Durham Glosses, 950-975. Lindisfarne' Gospel Gloss.

Late Old English

and Old English

Transition.

1150

Early Middle English. 1200

Middle English (typical).

Late Middle English

and Middle English

Transition.

1250 1300

1400

.1485-

{Charter Glosses), 736-800. Beowulf (7)

(Charter Glosses), 805- Vespasian Ps., c. 825. Charters, 836-840.

Lorica Glosses.

Rush-worth Gloss, St. Matthew, ? 975-1000.

Early Modern English

(Tudor English).

-1611

Transitional Modern,

or 17TH Century English.

•1689-

Current English. 1800

1900

Cursor Mundi (?).

Hampole, 1350. ‘■

Barbour, 1375.

Mandeville (Northern ver- Wyntoun, 1420. [sion).

Toivnley Mysteries. Henryson, 1470.

Peterborough Chronicle,

1123-31.

Dunbar, 1500 — .

Lyndesay.

Archbp. Hamilton, 1552.

James VI., 1590. Montgomery, c. 1600.

Sir IV. Mure, 1617-57. Yorkshire Dialogue, 1673.

Allan Ramsay, 1717.

Burns, 1790. Scott, 1815.

Ian Maclaren, Barrie, . Crockett, etc.

Chronicle, 1154. p

n. vf

Ormulum , 1 200. g>

Genesis &>Exodus, c. 1250. »

B

Harrowing of Hell, 1280. ˆ

Robt. of Brunne, 1303-30. <•

W

Pearl, Sir Gawayne. 7ˆ

*Wycliffe. p**

Chaucer, Gower.

(Charter Glosses), 692-780 . (Laws of Ine, 700).

Charter, 847.

Alfred, 885. Judith, 900-910.

Poems in O. E. Chron.,

937-979-

Battle of Maldon, 993. vElfric, 1000.—

(Charter Glosses), 679-770.

I Charters, 805-840. Lorica Prayer. Psalm 50, c. 860.

Wulfstan, 1016.

O. E. Chron., Parker MS. ends, 1070.

Cotton Homilies, 11 60.

Layamon, 1203. Ancren Riwle, 1220.

Prod, of Henry III ., 1258. §; Robt. Gloucester, 1300.

Trevisa, 1387.

Lydgate. Caxton, 1477-90.

Tyndal, 1525.

Homilies, 1547-63.

Shakspere, 1590-1613. King James's Bible, 1611 .

Milton, 1626-71. Dryden, 1663-1700.- Addison, 1717. Johnson, 1750.

Hatton Gospels, 1170.

Kentish Sermons, 1250.

Shoreham, 1320. Ayenbite, 1340.

Coleridge, 1805. Macaulay, 1825. Tennyson, 1830.

Comishman in A. Boorde, 3 | (« Sir. T. More.)*

1547-

Gammer Gurton, 1575.

_ ■ (Edgar in Lear, 1605.) £L I (in Ben Jonson.) ˆ o I Kentish Wooing Song,

1611.

Somersetsh. Man's Com- playnt, c, 1645.

Eocmoor Scolding, 1746.

Barnes, 1844. Elworthy, 1875-88.

INairne, Kentish Tales,

1700.

I Dick and Sal, 1821.

The vertical lines represent the four leading forms of English — Northern, Midland, Southern, and Kentish — and the names occurring down the course of each are those of writers and works in that form of English at the given date. The thickness of the line shows the comparative literary position of this form of speech at the time : thick indicating a literary language ; medium, a literary dialect ; thin, a popular dialect or patois ; a dotted line shows that this period is unrepresented by specimens. The horizontal lines divide the periods; these (after the first two) refer mainly to the Midland English ; in inflectional decay the Northern English was at least a century in advance of the Midland, and the Southern nearly as much behind it.

it will be found that some of the lines of each intersect some of the lines of the other, and that the passing of one dialect into another is not effected by the formation of intermediate or blended forms of any one characteristic, but by the overlapping or intersecting of more or fewer of the features of each. Thus a definite border village or district may use 10 of the 20 features of dialect A and 10 of those of B, while a village on the one side has 12 of those of A with 8 of those of B, and one on the other side has 7 of those of A with 13 of those of B. Hence a dialect boundary line can at best indicate the line within which the dialect has, on the whole, more of the features of A than of B or C; and usually no single line can be drawn as a dialect boundary, but that without it there are some features of the same dialect, and within it some features of the contiguous dialects.

Beyond the limits of the British Isles, English is the language of

extensive regions, now or formerly colonies. In all these countries the presence of numerous new objects and new con- ditions of life has led to the supplementing of the vocabulary by the adoption of words from native languages, and special adapta- tion and extension of-the sense of English words. The use of a common literature, however, prevents the overgrowth of these local peculiarities, and also makes them more or less familiar to Englishmen at home. It is only in the older states of the American Union that anything like a local dialect has been produced; and even there many of the so-called Americanisms are quite as much archaic English forms which have been lost or have become dialectal in England as developments of the American soil.

The steps by which English, from being the language of a few thousand invaders along the eastern and southern seaboard of Britain, has been diffused by conquest and colonization over its present area form a subject too large for the limits of this article. It need only be remarked that within the confines of Britain itself the process is not yet complete. Representatives of earlier languages survive in Wales and the Scottish Highlands, though in neither case can the substitution of English be very remote. In Ireland, where English was introduced by conquest much later, Irish is still spoken in patches all over the country; though English is understood, and probably spoken after a fashion, almost everywhere. At opposite extremities of Britain, the Cornish of Cornwall and the Norse dialects of Orkney and Shetland died out very gradually in the course of the 18th century. The Manx, or Celtic of Man, is even now in the last stage of dissolu- tion ; and in the Channel Isles the Norman patois of Jersey and Guernsey have largely yielded to English.

The table on p. 599 (a revision of that brought before the Philological Society in Jan. 1876) graphically presents the chrono- logical and dialectal development of English. Various names have been proposed for the different stages; it seems only necessary to add to those in the table the descriptive names of Dr Abbott, who has proposed {How to Parse, p. 298) to call the Old English, or Anglo-Saxon, the " Synthetical or Inflexional Period "; the Old English Transition (Late .Anglo-Saxon of Dr Skeat), the " Period of Confusion "; the Early Middle English, " Analytical Period " (1250-1350); the normal Middle English, "National Period" (1350-1500); the Tudor English, " Period of Licence "; and the Modern English, " Period of Settlement."

Bibliography. — As the study of English has made immense advances

within the last generation, it is only in works recently published that the student will find the subject satisfactorily handled. Among the earlier works treating of the whole subject or parts of it may be mentioned — A History of English Rhythms, by Edwin Guest (London, 1838); the Philological Essays of Richard Garnett (1835-1848), edited by his son (London, 1859); The English Language, by R. G. Latham (5th ed., London, 1862); Origin and History of the English Language, by G. P. Marsh (revised 1885) ; Lectures on the English Language, by the same (New York and London, 1863); Historische Grammatik der englischen Sprache, by C. F. Koch (Weimar, 1863, &c.) ; Englische Grammatik, by Eduard Matzner (Berlin, 1860- 1865), (an English translation by C. J. Grece, LL.B., London, 1874) ; The Philology of the English Tongue, by John Earle, M.A. (Oxford, 1866, 5th ed. 1892); Comparative Grammar of the Anglo-Saxon Language, by F. A. March (New York, 1870) ; Historical Outlines of English Accidence, by the Rev. R. Morris, LL.D. (London, 1873), (new ed. by Kellner) ; Elementary Lessons in Historical English

Grammar, by the same (London, 1874) ; The Sources of Standard English, by T. L. Kington Oliphant, M.A. (London, 1873); Modern English, by F. Hall (London, 1873) ; A Shakespearian Grammar, by E. A. Abbott, D.D. (London, 1872); How to Parse, by the same (London, 1875); Early English Pronunciation, &c, by A. J. Ellis (London, 1869) ; The History of English Sounds, by Henry Sweet (London, 1874, 2nd ed. 1888); as well as many separate papers by various authors in the Transactions of the Philological Society, and the publications of the Early English Text Society.

Among more recent works are: M. Kaluza, Historische Grammatik der englischen Sprache (Berlin, 1890); Professor W. W. Skeat, Principles of English Etymology (Oxford, 1887-1891) ; Johan Storm, Englische Philologie (Leipzig, 1 892-1 896) ; L. Kellner, Historical Outlines of English Syntax (London, 1892); O. F. Emerson, History of the English Language (London and New York, 1894) ; Otto Jespersen, Progress in Language, with special reference to English (London, 1894) ; Lorenz Morsbach, Mittelenglische Grammatik, part i. (Halle, 1896) ; Paul, " Geschichte der englischen Sprache," in Grundriss der german. Philologie (Strassburg, 1898) ; Eduard Sievers, Angelsachsische Grammatik (3rd ed., Halle, 1898); Eng. transl. of same (2nd ed.), by A. S. Cook (Boston, 1887) ; K. D. Biilbring, Alt- englisches Elementarbuch (Heidelberg, 1902) ; Greenough and Kitt- redge, Words and their Ways in English Speech (London and New York, 1902) ; Henry Bradley, The Making of English (London, 1904). Numerous contributions to the subject have

also been made in Englische Studien (ed. Kolbing, later Hoops; Leipzig, 1877 onward) ; Anglia (ed. Wulker, Fliigel, &c; Halle, 1878 onward); publications of Mod. Lang. Assoc, of America (J. W. Bright ; Baltimore, 1884 on ward), and A. M. Elliott, Modern Language Notes (Baltimore, 1886 onward). (J. A. H. M. ; H. M. R. M.)

ENGLISH LAW {History). In English jurisprudence "legal memory " is said to extend as far as, but no further than the coronation of Richard I. (Sept. 3, 1189). This is a technical doctrine concerning prescriptive rights, but is capable of express- ing an important truth. For the last seven centuries, little more or less, the English law, which is now overshadowing a large share of the earth, has had not only an extremely continuous, but a matchlessly well-attested history, and, moreover, has been the subject matter of rational exposition. Already in 1 1 94 the daily doings of a tribunal which was controlling and moulding the whole system were being punctually recorded in letters yet legible, and from that time onwards it is rather the enormous bulk than any dearth of available materials that prevents us from tracing the transformation of every old doctrine and the emergence and expansion of every new idea. If we are content to look no further than the text-books — the books written by lawyers for lawyers — we may read our way backwards to Blackstone (d. 1780), Hale (d. 1676), Coke (d. 1634), Fitzherbert (d. 1538), Littleton (d. 1481), Bracton (d. 1268), Glanvill (d. 1 1 90), until we are in the reign of Henry of Anjou, and yet shall perceive that we are always reading of one and the same body of law, though the little body has become great, and the ideas that were few and indefinite have become many and explicit.

Beyond these seven lucid centuries lies a darker period. Nearly six centuries will still divide us from the dooms of ˆEthelberht (c. 600), and nearly seven from theZesSa/jca {c. 500). We may regard the Norman conquest of England as marking the confluence of two streams of law. The one we may call French or Frankish. If we follow it upwards we pass through the capitularies of Carlovingian emperors and Merovingian kings until we see Chlodwig and his triumphant Franks invading Gaul, submitting their Sicambrian necks to the yoke of the imperial religion, and putting their traditional usages into written Latin. The other rivulet we may call Anglo-Saxon. Pursuing it through the code of Canute (d. 1035) and the ordi- nances of Alfred {c. 900) and his successors, we see Ine publishing laws in the newly converted Wessex {c. 690), and, almost a century earlier, ˆEthelberht doing the same in the newly converted Kent (c. 600). This he did, says Beda, in accordance with Roman precedents. Perhaps from the Roman missionaries he had heard tidings of what

the Roman emperor had lately been doing far off in New Rome. We may at any rate notice with interest that in order of time Justinian's law-books fall between the Lex Salica and the earliest Kentish dooms; also that the great pope who sent Augustine to England is one of the very few men who between Justinian's day and the nth century lived in the Occident and yet can be proved to have known the

Digest. In the Occident the time for the Germanic " folk- laws " {Leges Barbarorum) had come, and a Canon law, ambitious of independence, was being constructed, when in the Orient the lord of church and state was " enucleating " all that was to live of the classical jurisprudence of pagan Rome. It was but a brief interval between Gothic and Lombardic domination that enabled him to give law to Italy: Gaul and Britain were beyond his reach.

The Anglo-Saxon laws that have come down to us (and we have no reason to fear the loss of much beyond some dooms of the Mercian Off a) are best studied as members of a large Teutonic family. Those that proceed from the Kent and Wessex of the 7th century are closely related to the continental folk-laws. Their next of kin seem to be the Lex Saxonum and the laws of the Lombards. Then, though the 8th and 9th centuries are unproductive, we have from Alfred (c. 900) and his successors a series of edicts which strongly resemble the Frankish capitularies — so strongly that we should see a clear case of imitation, were it not that in Frankland the age of legislation had come to its disastrous end long before Alfred was king. This, it may be noted, gives to English legal history a singular continuity from Alfred's day to our own. The king of the English was expected to publish laws at a time when hardly any one else was attempting any such feat, and the English dooms of Canute the Dane are probably the most comprehensive statutes that were issued in the Europe of the nth century. No genuine laws of the sainted Edward have descended to us, and during his reign England seems but too likely to follow the bad example of Frankland, and become a loose congeries of lordships. From this fate it was saved by the Norman duke, who, like Canute before him, subdued a land in which kings were still expected to publish laws.

In the study of early Germanic law — a study which now for some considerable time has been scientifically prosecuted in Germany — the Anglo-Saxon dooms have received their due share of attention. A

high degree of racial purity may be claimed on their behalf. Celtic elements have been sought for in them, but have never been detected. At certain points, notably in the regulation of the blood-feud and the construction of a tariff of atonements, the law of one rude folk will always be somewhat like the law of another; but the existing remains of old Welsh and 'old Irish law stand far remoter from the dooms of jEthelberht and Ine than stand the edicts of Rothari and Liutprand, kings of the Lombards. Indeed, it is very dubious whether distinctively Celtic customs play any considerable part in the evolution of that system of rules of Anglian, Scandi- navian and Frankish origin which becomes the law of Scotland. Within England itself, though for a while there was fighting enough between the various Germanic folks, the tribal differences were not so deep as to prevent the formation of a common lan- guage and a common law. Even the strong Scandinavian strain seems to have rapidly blended with the Anglian. It amplified the language and the law, but did not permanently divide the country. If, for example, we can to-day distinguish between law and right, we are debtors to the Danes; but very soon law is not distinctive of eastern or right of western England. In the first half of the 12th century a would-be expounder of the law of England had still to say that the country was divided between the Wessex law, the Mercian law, and the Danes' law, but he had also to point out that the law of the king's own court stood apart from and above all partial systems. The local customs were those of shires and hundreds, and shaded off into each other. We may speak of more Danish and less Danish counties; it was a matter of degree; for rivers were narrow and hills were low. England was meant by nature to be the land of one law.

Then as to Roman law. In England and elsewhere Germanic law developed in an atmosphere that was charged with traditions of the old world, and many of these traditions had become implicit in the Christian religion. It might be argued that all that we call progress is due to the influence exercised by Roman civilization; that, were it not for this, Germanic law would never have been set in writing; and that theoretically unchange- able custom would never have been supplemented or superseded

by express legislation. All this ard much more of the same sort might be said; but the survival in Britain, or the reintroduction into England, of anything that we should dare to call Roman jurisprudence would be a different matter. Eyes, carefully trained, have minutely scrutinized the Anglo-Saxon legal texts without finding the least trace of a Roman rule outside the ecclesiastical sphere. Even within that sphere modern research is showing that the

church-property-law of the middle ages, the law of the ecclesiastical " benefice," is permeated by Ger- manic ideas. This is true of Gaul and Italy, and yet truer of an England in which Christianity was for a while extinguished. Moreover, the laws that were written in England were, from the first, written in the English tongue; and this gives them a unique value in the eyes of students of Germanic folk-law, for even the very ancient and barbarous Lex Salica is a Latin document, though many old Frankish words are enshrined in it. Also we notice — and this is of grave importance — that in England there are no vestiges of any " Romani " who are being suffered to live under their own law by their Teutonic rulers. On the Continent we may see Gundobad, the Burgundian, publishing one law-book for the Burgundians and another for the Romani who own his sway. A book of laws, excerpted chiefly from the Theodosian code, was issued by Alaric the Visigoth for his Roman subjects before the days of Justinian, and this book (the so-called Breviarium Alarici or Lex Romana Visigothorum) became for a long while the chief representative of Roman law in GauL The Frankish king in his expansive realm ruled over many men whose law was to be found not in the Lex Salica or Lex Ribuaria, but in what was called the Lex Romana. "A system of personal law" prevailed: the homo Romanus handed on his Roman law to his children, while Frankish or Lombardic, Swabian or Saxon law would run in the blood of the homo barbarus. Of all this we hear nothing in England. Then on the mainland of Europe Roman and barbarian law could not remain in juxtaposition without affecting each other. On the one hand we see dis- tinctively Roman rules making their way into the law of the victorious tribes, and on the other hand we see a decay and debasement of jurisprudence which ends in the formation of what modern historians have called a Roman "vulgar-law" (V ulgarrechi) . For a short age which centres round the year 800 it seemed possible that Frankish kings, who were becoming Roman emperors, would be able to rule by their capitularies nearly the whole of the Christian Occident. The dream vanished before fratricidal wars, heathen invaders, centrifugal feudalism, and a centripetal church which found its law in the newly concocted forgeries of the Pseudo- Isidore (c. 850). The " personal laws" began to transmute themselves into local customs, and the Roman vulgar-law began to look like the local custom of those districts where the Romani were the preponderating element in the population. Meanwhile, the Norse pirates subdued a large tract of what was to be northern France — a land where Romani were few. Their restless and boundless vigour these Normans retained; but they showed a wonderful power of appropriating whatever of alien civilization came in their way. In their language,

religion and law, they had become French many years before they subdued England. It is a plausible opinion that among them there lived some sound traditions of the Frankish monarchy's best days, and that Norman dukes, rather than German emperors or kings, of the French, are the truest spiritual heirs of Charles the Great.

In our own day German historians are wont to speak of English law as a " daughter " of French or Frankish law. This tendency derived its main impulse from H. Brunner's proof that the germ of trial by jury, which cannot be found in the Anglo-Saxon laws, can be found in the prerogative procedure of the Frankish kings. We must here remember that during a long age English lawyers wrote in French and even thought in French, and that to this day most of the technical terms of the law, more especially of the private law, are of French origin. Also it must be allowed that when 'English law has taken shape in the 13th century it is very like one of the routumes of northern France. Even when linguistic difficulties have been surmounted, the Saxon Mirror

of Eike von Repgow will seem far less familiar to an Englishman than the so-called Establishments of St Louis. This was the outcome of a slow process which fills more than a century (1066- 11 89), and was in a great measure due to the reforming energy of Henry II., the French prince who, in addition to England, ruled a good half of France. William the Conqueror seems to have intended to govern Englishmen by English law. After the tyranny of Rufus, Henry I. promised a restoration of King Edward's law: that is, the law of the Confessor's time (Lagam Eadwardi regis vobis reddo). Various attempts were then made,

mostly, so it would seem, by men of French birth, man age. to state in a modern and practicable form the laga

Eadwardi which was thus restored. The result of their labours is an intricate group of legal tracts which has been explored of late years by Dr Liebermann. The best of these has long been known as the Leges Henrici Pritni, and aspires to be a comprehensive law-book. Its author, though he had some foreign sources at his command, such as the Lex Ribuaria and an epitome of the Breviary of Alaric, took the main part of his matter from the code of Canute and the older English dooms. Neither the Conqueror nor either of his sons had

issued many ordinances: the' invading Normans had little, if any, written law to bring with them, and had invaded a country where kings had been lawgivers. Moreover, there was much in the English system that the Conqueror was keenly interested in retaining — especially an elaborate method of taxing the land and its holders. The greatest product of Norman government, the grandest feat of government that the world had seen for a long time past, the compilation of Domesday Book, was a conservative effort, an attempt to fix upon every landholder, French or English, the amount of geld that was due from his predecessor in title. Himself the rebellious vassal of the French king, the duke of the Normans, who had become king of the English, knew much of disruptive feudalism, and had no mind to see England that other France which it had threatened to become in the days of his pious but incompetent cousin. The sheriffs, though called vice-comiles, were to be the king's officers; the shire-moots might be called county courts, but were not to be the courts of counts. Much that was sound and royal in English public law was to be preserved if William could preserve it.

The gulf that divides the so-called Leges Henrici (c. n 15) from the text-book ascribed to Ranulf Glanvill (c. 1188) seems

at first sight very wide. The one represents a not lusttce. easily imaginable chaos and clash of old rules and

new; it represents also a stage in the development of feudalism which in other countries is represented chiefly by a significant silence. The other is an orderly, rational book, which through all the subsequent centuries will be readily under- stood by English lawyers. Making no attempt to tell us what goes on in the local courts, its author, who may be Henry II. 's chief justiciar, Ranulf Glanvill, or may be Glanvill's nephew, Hubert Walter, fixes our attention on a novel element which is beginning to subdue all else to its powerful operation. He speaks to us of the justice that is done by the king's own court. Henry II. had opened the doors of his French-speaking court to the mass of his subjects. Judges chosen for their ability were to sit there, term after term; judges were to travel in circuits through the land, and in many cases the procedure by way of " an inquest of the country," which the Norman kings had used for the ascertainment of their fiscal rights, was to be at the disposal of ordinary litigants. All this had been done in a piecemeal, experimental fashion by ordinances that were known as " assizes." There had not been, and was not to be, any enunciation of a general principle inviting all who were wronged to bring in their own words their complaints to the king's audience. The general prevalence of

feudal justice, and of the world-old methods of supernatural probation (ordeals, battle, oaths sworn with oath-helpers), was to be theoretically respected; but in exceptional cases, which would soon begin to devour the rule, a royal remedy was to be open to any one who could frame his case within the compass of some carefully-worded and prescript formula. With allusion to a remote stage in the history

of Roman law, a stage of which Henry's advisers can have known little or nothing, we may say that a " formulary system " is established which will preside over English law until modern times. Certain actions, each with a name of its own, are open to litigants. Each has its own formula set forth in its original (or, as we might say, originating) writ; each has its own pro- cedure and its appropriate mode of trial. The litigant chooses his writ, his action, and must stand or fall by his choice. Thus a book about royal justice tends to become, and Glanvill's book already is, a commentary on original writs.

The precipitation of English law in so coherent a form as that which it has assumed in Glanvill's book is not to be explained without reference to the revival of Roman jurisprudence in Italy. Out of a school of Lombard lawyers at Pavia had come Lanfranc the Conqueror's adviser, and the Lombardists had already been studying Justinian's Institutes. Then at length the Digest came by its rights. About the year 1100 Irnerius was teaching at Bologna, and from all parts of the West men were eagerly flocking to hear the new gospel of civilization. About the year 1149 Vacarius was teaching Roman law in England. The rest of a long life he spent here, and faculties of Roman and Canon law took shape in the nascent university of Oxford. Whatever might be the fate of Roman law in England, there could be no doubt that the Canon law, which was crystal- lizing in the Dccretum Gratiani (c. 1139) and in the decretals of Alexander III., would be the law of the English ecclesiastical tribunals. The great quarrel between Henry II. and Thomas of Canterbury brought this system into collision with the temporal law of England, and the king's ministers must have seen that they had much to learn from the methodic enemy. Some of them were able men who became the justices of Henry's court, and bishops to boot. The luminous Dialogue of the Exchequer (c. 1 1 79), which expounds the English fiscal system, came from the treasurer, Richard Fitz Nigel, who became bishop of London; and the treatise on the laws of England came perhaps from Glanvill, perhaps from Hubert Walter, who was to be both primate and chief justiciar. There was healthy emulation of the work that was being done by Italian jurists, but no meek acceptance

of foreign results.

A great constructive era had opened, and its outcome was a large and noble book. The author was Henry of Bratton (his name has been corrupted into Bract on), who died in 1268 after having been for many years one of Henry III.'s justices. The model for its form was the treatise of Azo of Bologna (" master of all the masters of the laws," an English- man called him), and thence were taken many of the generalities of jurisprudence: maxims that might be regarded as of universal and natural validity. But the true core of the work was the practice of an English court which had yearly been extending its operations in many directions. For half a century past diligent record had been kept on parchment of all that this court had done, and from its rolls Bracton cited numerous decisions. He cited them as precedents, paying special heed to the judgments of two judges who were already dead, Martin Pateshull and William Raleigh. For this purpose he compiled a large Note Book, which was discovered by Prof. Vinogradoff in the British Museum in 1884. Thus at a very early time English " common law " shows a tendency to become what it afterwards definitely became, namely, " case law." The term " common law " was being taken over from the canonists by English lawyers, who used it to distinguish the general law of the land from local customs, royal prerogatives, and in short from all that was exceptional or special. Since statutes and ordinances were still rarities, all expressly enacted laws were also excluded from the English lawyers' notion of " the common law." The Great Charter (12 15) had taken the form of a grant of " liberties and privileges," comparable to the grants that the king made to individual men and favoured towns. None the less, it was in that age no small body of enacted law, and, owing to its import- ance and solemnity, it was in after ages regarded as the first article of a statute book. There it was followed by the " pro- visions " issued at Mcrton in t2j6 and by. those issued at

Bracton.

Marlborough after the end of the Barons' War. But during Henry III.'s long reign the swift development of English law was due chiefly to new " original writs " and new " forms of action " devised by the chancery and sanctioned by the court. Bracton knew many writs that were unknown to Glanvill, and men were already perceiving that

limits must be set to the inventive power of the chancery unless the king was to be an uncontrollable law-maker. Thus the common law was losing the power of rapid growth when Bracton summed the attained results in a book, the success of which is attested by a crowd of manuscript copies. Bracton had introduced just enough of Roman law and Bolognese method to save the law of England from the fate that awaited German law in Germany. His book was printed in 1569, and Coke owed much to Bracton.

The comparison that is suggested when Edward I. is called the English Justinian cannot be- pressed very far. Nevertheless, as is well known, it is in his reign (1272-1307) that English institutions finally take the forms that they are to keep through coming centuries. We already see the parliament of the three estates, the convocations of the clergy, the king's council, the chancery or secretarial department, the exchequer or financial department, the king's bench, the common bench, the com- missioners of assize and gaol delivery, the small group of pro- fessionally learned judges, and a small group of professionally learned lawyers, whose skill is at the service of those who will employ them. Moreover, the statutes that were passed in the first eighteen years of the reign, though their bulk seems slight to us nowadays, bore so fundamental a character that in sub- sequent ages they appeared as the substructure of huge masses of superincumbent law. Coke commented upon them sentence by sentence, and even now the merest smatterer in English law must profess some knowledge of Quia emptores and De donis conditionalibus . If some American states have, while others have not, accepted these statutes, that is a difference which is not unimportant to citizens of the United States in the 20th century. Then from the early years of Edward's reign come the first "law reports " that have descended to us: the oldest of them have not yet been printed; the oldest that has been printed belongs to 1292. These are the precursors of the long series of Year Books (Edw. II. Hen. VIII.) which runs through the residue of the middle ages. Lawyers, we perceive, are already making and preserving notes of the discussions that take place in court; French notes that will be more useful to them than the formal Latin records inscribed upon the plea rolls. From these reports we learn that there are already, as we should say, a few " leading counsel," some of whom will be retained in almost every important cause. Papal decretals had been endeavouring to withdraw the clergy from secular employment. The clerical element had been strong among the judges of Henry III.'s reign: Bracton was an archdeacon, Pateshull a dean, Raleigh died a bishop. Their places begin to be filled by men who are not in orders, but who have pleaded the king's causes for him — his

serjeants or servants at law — and beside them there are young men who are " apprentices at law," and are learning to plead. Also we begin to see men who, as " attorneys at law," are making it their business to appear on behalf of litigants. The history of the legal profession and its monopoly of legal aid is intricate, and at some points still obscure; but tne influence of the canonical system is evident: the English attorney corre sponds to the canonical proctor, and the English barrister to the canonical advocate. The main outlines were being drawn in Edward I.'s day; the legal profession became organic, and professional opinion became one of the main forces that moulded the law.

The study of English law fell apart from all other studies, and the impulse that had flowed from Italian jurisprudence was ebbing. We have two comprehensive text-books from Edward's reign: the one known to us as Fleta, the other as Britton; both of them, however, quarry their materials from Bracton's treatise. Also we have two little books on procedure which are attributed to Chief-Justice Hengham, and a few other small tracts of an intensely practical kind. Under the cover of fables about King

Alfred, the author of the Mirror of Justices made a bitter attack upon King Edward's judges, some of whom had fallen into deep disgrace. English legal history has hardly yet been purged of the leaven of falsehood that was introduced by this fantastic and unscrupulous pamphleteer. His enigmatical book ends that literate age which begins with Glanvill's treatise and the trea- surer's dialogue. Between Edward I.'s day and Edward IV. 's hardly anything that deserves the name of book was written by an English lawyer.

During that time the body of statute law was growing, but not very rapidly. Acts of parliament intervened at a sufficient number of important points to generate and maintain a persuasion that no limit, or no ascertainable limit, '' and can be set to the legislative power of king and parlia- centuries. ment. Very few are the signs that the judges ever permitted the validity of a statute to be drawn into debate. Thus the way was being prepared for the definite assertion of parliamentary " omnicompetence " which we obtain from the Elizabethan statesman Sir Thomas Smith, and for those theories of sovereignty which we couple with the names of Hobbes and Austin. Nevertheless, English law was being developed rather by debates in court than by open legislation. The most dis- tinctively English of English institutions in the later middle ages are the Year-Books and the Inns of Court. Year by year, term by term, lawyers were reporting cases in order, that they and their fellows might know how

cases had been decided. The allegation of specific precedents- was indeed much rarer than it afterwards became, and no calculus of authority so definite as that which now obtains had been established in Coke's day, far less in Littleton's. Still it was by a perusal of reported cases that a man would learn the law of England. A skeleton for the law was provided, not by the Roman rubrics (such as public and private, real and personal, possessory and proprietary, contract and delict), but by the cycle of original writs that were inscribed in the chancery's Registrum Brevium. A new form of action could not be introduced without the authority of Parlia- ment, and the growth of the law took the shape of an explication of the true intent of ancient formulas. Times of inventive liberality alternated with times of cautious and captious con- servatism. Coke could look back to Edward III.'s day as to a golden age of good pleading. The otherwise miserable time which saw the Wars of the Roses produced some famous lawyers, and some bold doctrines which broke new ground. It produced also Sir Thomas Littleton's (d. 1481) treatise on Tenures, which (though it be not, as Coke thought it, the most perfect work that ever was written in any human science) is an excellent statement of law in exquisitely simple language.

Meanwhile English law was being scholastically taught. This, if we look at the fate of native and national law in Germany, or France, or Scotland, appears as a fact of primary importance. From beginnings, so small and formless e e Jucation that they still elude research, the Inns of Court had grown. The lawyers, like other men, had grouped themselves in gilds, or gild-like " fellowships." The fellowship acquired property; it was not technically incorporate, but made use of the thoroughly English machinery of a trust. Behind a hedge of trustees it lived an autonomous life, unhampered by charters or statutes. There was a hall in which its members dined in common; there was the nucleus of a library; there were also dormitories or chambers in which during term-time lawyers lived celibately, leaving their wives in the country. Something of the college thus enters the constitution of these fellowships; and then something academical. The craft gild regulated apprenticeship; it would protect the public against incompetent artificers, and its own members against unfair competition. So the fellowship of lawyers. In course of time a lengthy and laborious course of education of the medieval sort had been devised. He who had pursued it to its end received a call to the bar of his inn. This call was in effect a degree. Like the doctor or master of a university, the full-blown barrister was competent to teach others, and was expected to read lectures to students. But further, in a manner that is still very dark, these societies

had succeeded in making their degrees the only steps that led to practice in the king's courts. At the end of the middle ages (c. 1470) Sir John Fortescue rehearsed the praises of the laws of England in a book which is one of the earliest efforts of com' parative politics. Contrasting England with France, he rightly connects limited monarchy, public and oral debate in the law courts, trial by jury, and the teaching of national law in schools that are thronged by wealthy and well-born youths. But nearly a century earlier, the assertion that English law affords as subtle and civilizing a discipline as any that is to be had from Roman law was made by a man no less famous than John Wycliffe. The heresiarch naturally loathed the Canon law; but he also spoke with reprobation of the " paynims' law," the " heathen men's law," the study of which in the two universities was being fostered by some of the bishops. That study, after inspiring Bracton, had come to little in England, though the canonist was compelled to learn something of Justinian, and there was a small demand for learned civilians in the court of admiralty, and in what we might call the king's diplomatic service. No medieval Englishman did anything considerable for Roman law. Even the canonists were content to read the books of French and Italian masters, though John Acton (c. 1340) and William Lyndwood (1430) wrote meritorious glosses. The Angevin kings, by appropriating to the temporal forum the whole province of ecclesiastical patronage, had robbed the decretists of an inexhaustible source of learning and of lucre. The work that was done by the legal faculties at Oxford and Cambridge is slight when compared with the inestimable services rendered to the cause of national continuity by the schools of English law which grew within the Inns of Court.

A danger threatened: the danger that a prematurely osseous system of common law would be overwhelmed by summary justice and royal equity. Even when courts for all Chancery. on jj nar y causes had been established, a reserve of residuary justice remained with the king. Whatever lawyers and even parliaments might say, it was seen to be desirable that the king in council should with little regard for form punifl offenders who could break through the meshes of a tardy pro- cedure and should redress wrongs which corrupt and timid juries would leave unrighted. Papal edicts against heretics had made familiar to all men the notion that a judge should at times proceed summarie et de piano et sine strepitu et figura justitiae. And so

extraordinary justice of a penal kind was done by the king's council upon misdemeanants, and extraordinary justice of a civil kind was ministered by the king's chancellor (who was the specially learned member of the council) to those who " for the love of God and in the way of charity," craved his powerful assistance. It is now well established that the chancellors started upon this course, not with any desire to introduce rules of " equity " which should supplement, or perhaps supplant, the rules of law, but for the purpose of driving the law through those accidental impediments which sometimes unfortunately beset its due course. The wrongs that the chancellor redressed were often wrongs of the simplest and most brutal kind: assaults, batteries and forcible dispossessions. However, he was warned off this field of activity by parliament; the danger to law, to lawyers, to trial by jury, was evident. But just when this was happening, a new field was being opened for him by the growing practice of conveying land to trustees. The English trust of land had ancient Germanic roots, and of late we have been learning how in far-off centuries our Lombard cousins were in effect giving themselves a power of testation by putting their lands in trust. In England, when the forms of action were crystallizing, this practice had not been common enough to obtain the protection of a writ; but many causes conspired to make it common in the 14th century; and so, with the general approval of lawyers and laity, the chancellors began to enforce by summary process against the trustee the duty that lay upon his conscience. In the next century it was clear that England had come by a new civil tribunal. Negatively, its competence was defined by the rule that when the common law offered a remedy, the chancellor was not to intervene. Positively, his power was conceived as

that of doing what " good conscience " required, more especially in cases of " fraud, accident or breach of confidence." His procedure was the summary, the heresy-suppressing (not the ordinary and solemn) procedure of an ecclesiastical court; but there are few signs that he borrowed any substantive rules from legist or decretist, and many proofs that within the new field of trust he pursued the ideas of the common law. It was long, however, before lawyers made a habit of reporting his decisions. He was not supposed to be tightly bound by precedent. Adapta- bility was of the essence of the justice that he did.

A time of strain and trial came with the Tudor kings. It was questionable whether the strong " governance " for which the weary nation yearned could work within the limits of a parliamentary system, or would be compatible A ° " or with the preservation of the

common law. We see new courts appropriating large fields of justice and proceeding summarie et de piano ; the star chamber, the chancery, the courts of requests, of wards, of augmentations, the councils of the North and Wales; a little later we see the high commission. We see also that judicial torture which Fortescue had called the road to hell. The stream of law reports became intermittent under Henry VIII.; few judges of his or his son's reign left names that are to be remembered. In an age of humanism, alphabetically arranged " abridgments " of medieval cases were the best work of English lawyers: one comes to us from Anthony Fitzherbert (d. 1538), and another from Robert Broke (d. 1558). This was the time when Roman law swept like a flood over Germany. The modern historian of Germany will speak of " the Reception " (that is, the reception of Roman law), as no less important than the Renaissance and Reformation with which it is intimately connected. Very probably he will bestow hard words on a movement which disintegrated the nation and consolidated the tyranny of the princelings. Now a project that Roman law should be "received" in England occurred to Reginald Pole (d. 1558), a humanist, and at one time a reformer, who with good fortune might have been either king of England or pope of Rome. English law, said the future cardinal and archbishop, was barbarous; Roman law was the very voice of nature pleading for " civility " and good princely governance. Pole's words were brought to the ears of his majestic cousin, and, had the course of events been somewhat other than it was, King Henry might well have decreed a reception. The r61e of English Justinian would have perfectly suited him, and there are distinct traces of the civilian's Byzantinism in the doings of the Church of England's supreme head. The academic study of the Canon law was prohibited; regius professorships of the civil law were founded; civilians were to sit as judges in the ecclesiastical courts. A little later, the Protector Somerset was deeply in- terested in the establishment of a great school for civilians at Cambridge. Scottish law was the own sister of English law, and yet in Scotland we may see a reception of Roman jurisprudence which might have been more whole-hearted than it was, but for the drift of two British and Protestant kingdoms towards union. As it fell out, however, Henry could get what he wanted in church and state without any decisive supersession of English by foreign law. ' The omnicompetence of an act of parliament stands out the more clearly if it settles the succession to the throne, annuls royal marriages, forgives royal debts, defines religious creeds, attaints guilty or innocent nobles, or prospectively lends the force of statute to the king's proclamations. The courts of common law were suffered to work in obscurity, for jurors feared fines, and matter of

state was reserved for council or star chamber. The Inns of Court were spared; their moots and readings did no perceptible harm, if little perceptible good.

Yet it is no reception of alien jurisprudence that must be chronicled, but a marvellous resuscitation of English medieval law. We may see it already in the Commentaries of Edward Plowden (d. 1585) who reported cases at length and lovingly. Bracton's great book was put in print, and was a key to much that had been forgotten or misunderstood. Under Parker's patronage, even the Anglo-Saxon dooms were brought to light; they seemed to tell of a Church of England that had not yet been

Coke.

enslaved by Rome. The new national pride that animated Elizabethan England issued in boasts touching the antiquity, humanity, enlightenment of English law. Resuming the strain of Fortescue, Sir Thomas Smith, himself a civilian, wrote concern- ing the Commonwealth of England a book that claimed the attention of foreigners for her law and her polity. There was dignified rebuke for the French jurist who had dared to speak lightly of Littleton. And then the common law took flesh in the person of Edward Coke (1552-1634). With an enthusiastic love of English tradition, for the sake of which many offences may be forgiven him, he ranged over nearly the whole field of law, commenting, reporting, arguing, deciding, — disorderly, pedantic, masterful, an incarnate national dogmatism tenacious of continuous life. Imbued with this new spirit, the lawyers fought the battle of the constitution against James and Charles, and historical research appeared as the guardian of national liberties. That the Stuarts united against themselves three such men as Edward Coke, John Selden and William Prynne, is the measure of their folly and their failure. Words that, rightly or wrongly, were ascribed to Bracton rang in Charles's ears when he was sent to the scaffold. For the modern student of medieval law many of the reported cases of the Stuart time are storehouses of valuable material, since the lawyers of the 17th century were mighty hunters after records. Prynne (d. 1669), the fanatical Puritan, published ancient documents with fervid zeal, and made possible a history of parliament. Selden (d. 1654) was in all Europe among the very first to write legal history as it should be written. His book

about tithes is to this day a model and a masterpiece. When this accomplished scholar had declared that he had laboured to make himself worthy to be called a common lawyer, it could no longer be said that the common lawyers were indoctissimum genus doctissimorum hominum. Even pliant judges, whose tenure of office depended on the king's will, were compelled to cite and discuss old precedents before they could give judgment for their master; and even at their worst moments they would not openly break with medieval tradition, or declare in favour of that " modern police-state " which has too often become the ideal of foreign publicists trained in Byzantine law.

The current of legal doctrine was by this time so strong and voluminous that such events as the Civil War, the Restoration and the Revolution hardly deflected the course of the stream. In retrospect, Charles II. reigns so soon as life has left his father's body, and James II. ends a lawless career by a considerate and convenient abdication. The statute book of the restored king was enriched by leaves excerpted from the acts of a lord protector; and Matthew Hale (d. 1676), who was, perhaps, the last of the great record-searching judges, sketched a map of English law which Blackstone was to colour. Then a time of self-complacency came for the law, which knew itself to be the perfection of wisdom, and any proposal for drastic legislation would have worn the garb discredited by the tyranny of the Puritan Caesar. The need for the yearly renewal of the Mutiny Act secured an annual session of parliament. The mass of the statute law made in the 18th century is enor- mous; but, even when we have excluded from view such acts as are technically called " private," the residuary matter bears a wonderfully empirical, partial and minutely particularizing character. In this " age of reason," as we are wont to think it, the British parliament seems rarely to rise to the dignity of a general proposition, and in our own day the legal practitioner is likely to know less about the statutes of the 18th century than he knows about the statutes of Edward I., Henry VIII. and Elizabeth. Parliament, it should be remembered, was endeavouring directly to govern the nation. There was little that resembled the permanent civil service of to-day. The choice lay between direct parliamentary government and royal "prerogative"; and lengthy statutes did much of that work of detail which would now be done by virtue of the powers that are delegated to ministers and governmental boards. Moreover, extreme and verbose particularity was required in statutes, for judges were loath to admit that the common law was capable

Hale.

of amendment. A vague doctrine, inherited from Coke, taught that statutes might be so unreasonable as to be null, and any political theory that seemed to derive from Hobbes would have been regarded with not unjust suspicion. But the doctrine in question never took tangible shape, and enough could be done to protect the common law by a niggardly exposition of every legislating word. It is to be remembered that some main features of English public law were attracting the admiration of en- lightened Europe. When Voltaire and Montesquieu applauded, the English lawyer had cause for complacency.

The common law was by no means stagnant. Many rules which come to the front in the 18th century are hardly to be traced farther. Especially is this the case in the province of mercantile law, where the earl of Mansfield's (d. 1793) long presidency over the king's bench marked an epoch. It is too often forgotten that, until Elizabeth's reign, England was a thoroughly rustic kingdom, and that trade with England was mainly in the hands of foreigners. Also in medieval fairs, the assembled merchants declared their own " law merchant," which was considered to have a supernational validity. In the reports of the common law. courts it is late in the day before we read of some mercantile usages which can be traced far back in the statutes of Italian cities. Even on the basis of the exces- sively elaborated land law — a basis which Coke's Commentary on Littleton seemed to have settled for ever- — a lofty and ingenious superstructure could be reared. One after another delicate devices were invented for the accommodation of new wants within the law; but only by the assurance that the old law could not be frankly abolished can we be induced to admire the subtlety that was thus displayed. As to procedure, it had become a maze of evasive fictions, to which only a few learned men held the historical clue. By fiction the courts had stolen business from each other, and by fiction a few comparatively speedy forms of action were set to tasks for which they were not originally framed. Two fictitious persons, John Doe and Richard Roe, reigned supreme. On the other hand, that healthy and vigorous institution, the Commission of the Peace, with a long history behind it, was giving an important share in the adminis- tration of justice to numerous country gentlemen who were thus compelled to learn some law. A like beneficial work was being done among jurors, who, having ceased to be regarded as wit- nesses, had become " judges of fact." No one doubted that trial by jury was the " palladium " of English liberties, and popularity awaited those who would exalt the office of the jurors and narrowly limit the powers of the judge.

But during this age the chief addition to English jurisprudence was made by the crystallization of the chancellor's equity. In the 17th century the chancery had a narrow escape of sharing the fate that befell its twin sister the star "

chamber. Its younger sister the court of requests perished under the persistent attacks of the common lawyers. Having outlived troubles, the chancery took to orderly habits, and administered under the name of " equity " a growing group of rules, which in fact were supplemental law. Stages in this process are marked by the chancellorships of Nottingham (1673-1675) and Hard- wicke (173 7-1756). Slowly a continuous series of Equity Reports began to flow, and still more slowly an " equity bar " began to form itself. The principal outlines of equity were drawn by men who were steeped in the common law. By way of ornament a Roman maxim might be borrowed from a French or Dutch expositor, or a phrase which smacked of that " nature-rightly " school which was dominating continental Europe; but the influence exercised by Roman law upon English equity has been the subject of gross exaggeration. Parliament and the old courts being what they were, perhaps it was only in a new court that the requisite new law could be evolved. The result was not altogether satisfactory. Freed from contact with the plain man in the jury-box, the chancellors were tempted to forget how plain and rough good law should be, and to screw up the legal standard of reasonable conduct to a height hardly attainable except by those whose purses could command the constant advice of a family solicitor. A court which started with the

Black- stone.

idea of doing summary justice for the poor became a court which did a highly refined, but tardy justice, suitable only to the rich.

About the middle of the century William Blackstone, then a disappointed barrister, began to give lectures on English law at Oxford (i 758), and soon afterwards he began to publish (1765) his Commentaries. Accurate enough in its history and doctrine to be an invaluable guide to professional students and a useful aid to practitioners, his book set before the unprofessional public an artistic picture of the laws of England such as had never been drawn of any similar system. No nation but the English had so eminently readable

a law-book, and it must be doubtful whether any other lawyer ever did more important work than was done by the first pro- fessor of English law. Over and over again the Commentaries were edited, sometimes by distinguished men, and it is hardly too much to say that for nearly a century the English lawyer's main ideas of the organization and articulation of the body of English law were controlled by Blackstone. This was far from all. The Tory lawyer little thought that he was giving law to colonies that were on the eve of a great and successful rebellion. Yet so it was. Out in America, where books were few and lawyers had a mighty task to perform, Blackstone's facile presentment of the law of the mother country was of inestimable value. It has been said that among American lawyers the Commentaries " stood for the law of England," and this at a time when the American daughter of English law was rapidly growing in stature, and was preparing herself for her destined march from the Atlantic to the Pacific Ocean. Excising only what seemed to savour of oligarchy, those who had defied King George retained with marvellous tenacity the law of their forefathers. Profound discussions of English medieval law have been heard in American courts; admirable researches into the recesses of the Year-Books have been made in American law schools; the names of the great American judges are familiar in an England which knows little indeed of foreign jurists; and the debt due for the loan of Blackstone's Commentaries is being fast repaid. Lectures on the common law delivered by Mr Justice Holmes of the Supreme Court of the United States may even have begun to turn the scale against the old country. No chapter in Blackstone's book nowadays seems more antiquated than that which describes the modest territorial limits of that English law which was soon to spread throughout Australia and New Zealand and to follow the dominant race in India.

Long wars, vast economic changes and the conservatism generated by the French Revolution piled up a monstrous arrear of work for the English legislature. Meanwhile, Jeremy Bentham (d. 1832) had laboured for the over- throw of much that Blackstone had lauded. Bentham's largest projects of destruction and reconstruction took but little effect. Profoundly convinced of the fungibility and pliability of mankind, he was but too ready to draw a code for England or Spain or Russia at the shortest notice; and, scornful as he was of the past and its historic deposit, a code drawn by Bentham would have been a sorry failure. On the other hand, as a critic and derider of the system which Blackstone had complacently expounded he did excellent service. Reform, and radical reform, was indeed sadly needed throughout a system which was encumbered by noxious rubbish, the

useless leavings of the middle ages: trial by battle and compurgation, deodands and benefit of clergy, John Doe and Richard Roe. It is perhaps the main fault of " judge-made law " (to use Bentham's phrase) that its destructive work can never be cleanly done. Of all vitality, and therefore of all patent harmfulness, the old rule can be deprived, but the moribund husk must remain in the system doing latent mischief. English law was full of decaying husks when Bentham attacked- it, and his persistent demand for reasons could not be answered. At length a general interest in "law reform" was excited; Romilly and Brougham were inspired by Bentham, and the great changes in constitutional law which cluster round the Reform Act of 1832 were accompanied by many measures which purged the private, procedural and criminal law of much, though hardly enough, of the medieval dross. Some credit for rousing

Bentham.

Recent changes.

an interest in law, in definitions of legal terms, and in schemes of codification, is due to John Austin (d. 1859) who was regarded as the jurist of the reforming and utilitarian group. But, though he was at times an acute dissector of confused thought, he was too ignorant of the English, the Roman and every other system of law to make any considerable addition to the sum of knowledge ; and when Savigny, the herald of evolution, was already in the field, the day for a " Nature- Right " — and Austin's projected " general jurisprudence " would have been a Nature-Right — was past beyond recall. The obsolescence of the map of law which Blackstone had inherited from Hale, and in which many outlines were drawn by medieval formulas, left intelligent English lawyers without a guide, and they were willing to listen for a while to what in their insularity they thought to be the voice of cosmopolitan science. Little came of it all. The revived study of Germanic law in Germany, which was just beginning in Austin's day, seems to be showing that the scheme of Roman jurisprudence is not the scheme into which English law will run without distortion.

In the latter half of the 19th century some great and wise changes were made by the legislature. Notably in 1875 the old courts were merged in a new Supreme Court of Judi- cature, and a concurrent administration of law and equity was introduced. Successful endeavours have been made also to reduce the bulk of old statute law, and to improve the form of acts of parliament; but the emergence of new forces whose nature may be suggested by some such names as " socialism " and " imperialism " has distracted the

attention of the British parliament from the commonplace law of the land, and the development of obstructive tactics has caused the issue of too many statutes whose brevity was purchased by: disgraceful obscurity. By way of " partial codification " some branches of the common law (bills of exchange, sale of goods, partnership) have been skilfully stated in statutes, but a draft criminal code, upon which much expert labour was expended, lies pigeon-holed and almost forgotten. British India has been the scene of some large legislative exploits, and in America a few big experiments have been made in the way of code-making, but have given little satisfaction to the bulk of those who are competent to appreciate their results. In England there are large portions of the law which, in their present condition, no one would think of codifying: notably the law of real property, in which may still be found numerous hurtful relics of bygone centuries. So omnipresent are statutes throughout the whole field of jurisprudence that the opportunity of doing any great feat in the development of law can come but seldom to a modern court. More and more, therefore, the fate of English law depends on the will of parliament, or rather of the ministry. The quality of legal text-books has steadily improved; some of them a"re models of clear statement and good arrangement; but no one has with any success aspired to be the Blackstone of a new age.

The Council of Law Reporting was formed in the year 1863. The council now consists of three ex-officio members — the attorney-general, the solicitor-general and the presi- dent of the Incorporated Law Society, and ten members reporting. appointed by the three Inns of Court, the Incorporated Law Society and the council itself on the nomination of the general council of the bar. The practitioner and the student now get for a subscription of four guineas a year the reports in all the superior courts and the Hoiˆp; of Lords, and the judicial committee of the privy council issued in monthly parts a king's printer's copy of the statutes, and weekly notes, containing short notes of current decisions and announcements of all new rules made under the Judicature Acts and other acts of parlia- ment, and other legal information. In addition the subscriber receives the chronological index of the statutes published from time to time by the Stationery Office, and last, but not least, the Digests of decided cases published by the council from time to time. In 1892 a Digest was published containing the cases and statutes for twenty-five years, from 1865 to 1890, and this was supplemented by one for the succeeding ten years, from 1891 to 1900. The digesting is now carried on continuously by means

of " Current Indexes," which are published monthly and annually, and consolidated into a digest at stated intervals (say) of five years. The Indian appeals series, which is not required by the general practitioner, is supplied separately at one guinea a year.

In the 16th and 17th centuries the corporate life of the Inns of Court in London became less and less active. The general decay of the organization of crafts and gilds showed education, itself among lawyers as among other craftsmen. Successful barristers, sharing in the general prosperity of the country, became less and less able and willing to devote their time to the welfare of their profession as a whole. The Inns of Chancery, though some of their buildings still remain — picturesque survivals in their " suburbs " — ceased to be used as places for the education of students. The benchers of the Inns of Court, until the revival towards the middle of the 19th century, had wholly ceased to concern themselves with the systematic teaching of law. The modern system of legal educa- tion may be said to date from the establishment, in 1852, of the council of legal education, a body of twenty judges and barristers appointed by the four Inns of Court to control the legal education of students preparing to be called to the bar. The most im- portant feature is the examination which a student must pass before he can be called. The examination (which by degrees has been made " stiffer ") serves the double purpose of fixing the compulsory standard which all must reach, and of guiding the reading of students who may desire, sooner or later, to carry their studies beyond this standard. The subjects in which the examination is held are divided into Roman law; Constitutional law and legal history; Evidence, Procedure and Criminal law; Real and Personal Property; Equity; and Common law. The council of legal education also appoint a body of readers and assistant readers, practising barristers, who deliver lectures and hold classes.

Meanwhile the custom remains by which a student reads for a year or more as a pupil in the chambers of some practising barrister. In the 18th century it first became usual for students to read with a solicitor or attorney, and after a short time the modern practice grew up of reading in the chambers of a con- veyancer, equity draftsman or special pleader, or, in more recent times, in the chambers of a junior barrister. Before the modern examination system, a student required to have a certificate from the barrister in whose chambers he had been a pupil before he could be " called," but the only relic of the old system now is the necessity of " eating dinners," six (three for

university men) in each of the four terms for three years, at one of the Inns of Court.

The education of solicitors suffered from the absence of any professional organization until the Incorporated Law Society was established in 1825 and the following years. So far as any professional education is provided for solicitors or required from them, this is due to the efforts of the Law Society. As early as 1729 it was required by statute that any person applying for admission as attorney or solicitor should submit to examination by one of the judges, who was to test his fitness and capacity in consideration of a fee of one shilling. At the same time regular preliminary service under articles was required, that is to say, under a contract by which the clerk was bound to serve for five years. The examination soon became, perhaps always was, an empty form. The Law Society, however, soon showed zeal for the education of future solicitors. In 1833 lectures were instituted. In 1836 the first regular examinations were estab- lished, and in i860 the present system of examinations — pre- liminary, intermediate and final — came into effect. Of these only the last two are devoted to law, and both are of a strictly professional character. The final examination is a fairly severe test of practical acquaintance with all branches of modern English law. The Law Society makes some provision for the teaching of students, but this teaching is designed solely to assist in preparation for the examinations.

At the universities of Oxford and Cambridge there has, since 1850, been an attempt to promote the study of law. The curriculum of legal subjects in which lectures are given and

examinations held is calculated to give a student a sound funda- mental knowledge of general principles, as well as an elementary acquaintance with the rules of modern English law. Juris- prudence, Roman law, Constitutional law and International law are taught, as well as the law of Real and Personal Property, the Law of Contract and Tort, Criminal law, Procedure and Evidence. But the law tripos and the law schools suffer from remoteness from the law courts, and from the exclusively academical character of the teaching. Law is also taught, though not on a very large scale, at Manchester and at Liverpool. London University has encouraged the study of law by its examinations for law degrees, at which a comparatively high standard of knowledge is required; and at University College, London, and King's College, London, teaching is given in law and jurisprudence.

Authorities. — F. Liebermann, Die Gesetze der Angelsachsen (1898) ; K. E. Digby, History of the Law of Real Property, Sir W. Dugdale, Origines juridicales (1671); O. W. Holmes, The Common Law (Boston, 1881); H. Hallam, Constitutional History; W. S. Holdsworth, History of English Law, 3 vols. (1903-9); J. Reeves, History of English Law, ed. W. F. Finlason (1869) ; T. Madox, History and Antiquities of the Exchequer (1769) ; C. de Franqueville, Le Systeme judiciaire de la Grande-Bretagne (Paris, 1893); Sir F. Pollock and F. W. Maitland, History of English Law (2 vols., 1898) ; H. Brunner, The Sources of the Law of England, trans, by W. Hastie (1888); Sir R. K. Wilson, History of Modern English Law (1875); A. V. Dicey, Law and Public Opinion in England (1905); Sir J. F. Stephen, History of the Criminal Law of England (3 vols., 1883); W. Stubbs, Select Charters, Constitutional History; the Publications of the Selden Society and the Year Books in the Rolls Series. (F. W. M.)

ENGLISH LITERATURE. The following discussion of the evolution of English literature, i.e. of the contribution to literature made in the course of ages by the writers of England, is planned so as to give a comprehensive view, the details as to particular authors and their work, and special consideration of the greater writers, being given in the separate articles devoted to them. It is divided into the following sections : (1) Earliest times to Chaucer; (2) Chaucer to the end of the middle ages; (3) Elizabethan times; (4) the Restoration period; (5) the Eighteenth century; (6) the Nineteenth century. The object of these sections is to form connecting links among the successive literary ages, leaving the separate articles on individual great writers to deal with their special interest; attention being paid in the main to the graduallydeveloping characteristics of theproduct, qud literary. The precise delimitation of what may narrowly be called " English " literature, i.e. in the English language, is perhaps impossible, and separate articles are devoted to American literature (q.v.), and to the vernacular literatures of Scotland (see Scotland; and Celt: Literature), Ireland (see Celt: Literature), and Wales (see Celt: Literature); see also Canada: Literature. Reference may also be made to such general articles on particular forms as Novel; Romance; Verse, &c.

I. Earliest Times to Chaucer

English literature, in the etymological sense of the word, had, so far as we know, no existence until Christian times. There is no evidence either that the heathen English had adopted the Roman alphabet, or that they had learned to employ their native monumental script (the

runes) on materials suitable for the writing of continuous compositions of considerable length.

It is, however, certain that in the pre-literary period at least one species of poetic art had attained a high degree of develop- ment, and that an extensive body of "poetry was handed down — not, indeed, with absolute fixity of form or substance — from generation to generation. This unwritten poetry was the work of minstrels who found their audiences in the halls of kings and nobles. Its themes were the exploits of heroes belonging to the royal houses of Germanic Europe, with which its listeners claimed kinship. Its metre was the alliterative long line, the lax rhythm of which shows that it was intended, not to be sung to regular melodies, but to be recited — probably with some kind of instru- mental accompaniment. Of its beauty and power we may judge from the best passages in Beowulf (q.v.); for there can be little

doubt that this poem gained nothing and lost much in the process of literary redaction.

The conversion of the people to Christianity necessarily involved the decline of the minstrelsy that celebrated the glories of heathen times. Yet the descendants of Woden, even when they were devout Christians, would not easily lose all interest in the achievements of their kindred of former days. Chaucer's knowledge of " the song of Wade " is one proof among others that even so late as the 14th century the deeds of Germanic heroes had not ceased to be recited in minstrel verse. The paucity of the extant remains of Old English heroic poetry is no argument to the contrary. The wonder is that any of it has survived at all. We may well believe that the professional reciter would, as a rule, be jealous of any attempt to commit to writing the poems which he had received by tradition or had himself composed. The clergy, to whom we owe the writing and the preservation of the Old English MSS., would only in rare instances be keenly interested in secular poetry. We possess, in fact, portions of four narrative poems, treating of heroic legend — Beowulf, Widsith, Finnesburh and Waldere. The second of these has no poetical merit, but great archaeological interest 1 . It is an enumeration of the famous kings known to German tradition, put into the mouth of a

minstrel (named Widsith, "far-travelled"), who claims to have been at many of their courts and to have been rewarded by them for his song. The list includes historical persons such as Ermanaric and Alboin, who really lived centuries apart, but (with the usual chronological vagueness of tradition) are treated as contemporaries. The extant fragment of Finnesburh (50 lines) is a brilliant battle piece, belonging to a story of which another part is introduced episodically in Beowulf. Waldere, of which we have two frag- ments (together 68 lines) is concerned with Frankish and Bur- gundian traditions based on events of the 5th century; the hero is the " Waltharius " of Ekkehart's famous Latin epic. The English poem may possibly be rather a literary composition than a genuine example of minstrel poetry, but the portions that have survived are hardly inferior to the best passages of Beowulf.

It may reasonably be assumed that the same minstrels who entertained the English kings and nobles with the recital of ancient heroic traditions would also celebrate in verse the martial deeds of their own patrons and their immediate, ancestors. Probably there may have existed an abundance of poetry commemorative of events in the conquest of Britain and the struggle with the Danes. Two examples only have survived, both belonging to the 10th century: The Battle of Brunanburh, which has been greatly over-praised by critics who were unaware that its striking phrases and compounds are mere traditional echoes ; and the Battle of Maldon, the work of a truly great poet, of which unhappily only a fragment has been preserved.

One of the marvels of history is the rapidity and thoroughness with which Christian civilization was adopted by the English. Augustine landed in 597; forty years later was born an English- man, Aldhelm, who in the judgment of his contemporaries throughout the Christian world was the most accomplished scholar and the finest Latin writer of his time. In the next generation England produced in Bede (Baeda) a man who in solidity and variety of knowledge, and in literary power, had for centuries no rival in Europe. Aldhelm and'Bede are known to us only from their Latin writings, though the former is recorded to have written vernacular poetry of great merit. The extant Old English literature is almost entirely Christian, for the poems that belong to an earlier' period have been expurgated and interpolated in a Christian sense. From the writings that have survived, it would seem as if men strove to forget that England had ever been heathen. The four deities whose names are attached to the days of the week are hardly mentioned at all. The names Thunor and Tiw are sometimes used to translate the Latin Jupiter and Mars; Woden has his place (but not as a god) in the genealogies of the kings, and his

name occurs once in a magical poem, but that is all. Bede, as a historian, is obliged to tell the story of the conversion ; but the only native divinities he mentions are the goddesses Hreth and Eostre, and all we

learn about them is that they gave their names to Krethemonath (March) and Easter. That superstitious practices of heathen origin long survived among the people is shown by the acts of church councils and by a few poems of a magical nature that have been preserved; but, so far as can be discovered, the definite worship of the ancient gods quickly died out. English heathenism perished' without leaving a record.

The Old English religious poetry was written, probably without exception, in the cloister, and by men who were familiar with the Bible and with Latin devotional literature. Setting aside the wonderful Dream of the Rood, it gives little evidence of high poetic genius, though much of it is marked by a degree of culture and refinement that we should hardly have expected. Its material and thought are mainly derived from Latin sources; its expression is imitated from the native heroic poetry. Con- sidering that a great deal of Latin verse was written by English- men in the 7th and succeeding centuries, and that in one or two poems the line is actually composed of an English and a Latin hemistich rhyming together, it seems strange that the Latin influence on Old English versification should have been so small. The alliterative long 1 line is throughout the only metre employed, and although the laws of alliteration and rhythm were less rigorously obeyed in the later than in the earlier poetry, there is no trace of approximation to the structure of Latin verse. It is true that, owing to imitation' of the Latin hymns of the church, rhyme came gradually to be more and more frequently used as an ornament of Old English verse; but it remained an ornament only, and never became an essential feature. The only poem in which rhyme is employed throughout is one in which sense is so completely sacrificed to sound that a translation would hardly be possible. It was not only in metrical respects that the Old English religious poetry remained faithful to its native models. The imagery and the diction are mainly those of the old heroic poetry, and in some of the poems Christ and the saints are presented, often very incongruously, under the aspect of Germanic warriors. Nearly all the religious poetry that has any considerable religious value seems to have been written in Northumbria during the 8th century. The remarkably vigorous poem of Judith, however, is certainly much later; and the Exodus, though early, seems to be of southern origin. For a detailed account of the Old English sacred

poetry, the reader is referred to the articles on Cˆedmon and Cynewulf, to one or other of whom nearly every One of the poems, except those of obviously late date, has at some time been attributed.

The Riddles (q.v.) of the Exeter Book resemble the religious poetry in being the work of scholars, but they bear much more decidedly the impress of the native English character. Some of them tank among the most artistic and pleasing productions of Old English poetry. The Exeter Book contains also several pieces of a gnomic character, conveying proverbial instruction in morality and worldly wisdom. Their morality is Christian, but it is not unlikely that some of the wise sayings they contain may have come down by tradition from heathen times. The very curious Dialogue of Solomon and Saturn may be regarded as belonging to the same class.

The most original and interesting portion of the Old English literary poetry is the group of dramatic monologues — The Banished Wife's Complaint, The Husband's Message, The Wanderer, The Seafarer, Deor and Wulf and Eadwacer. The date of these compositions is uncertain, though their occurrence in the Exeter Book shows that they cannot be later than the 10th century. That they are all of one period is at least unlikely, but they are all marked by the same peculiar tone of pathos. The monodramatic form renders it difficult to obtain a clear idea of the situation of the supposed speakers. It is not improb- able that most of these poems may relate to incidents of heroic legend, with which the original readers were presumed to be acquainted. This, however, can be definitely affirmed only in the case of the two short pieces— Deor and Wulf and Eadwacer — which have something of a lyric character, being the only examples in Old English of strophic structure and the use of the refrain. Wulf and Eadwacer, indeed, exhibits A still further

development in the same direction, the monotony of the long line metre being varied by the admission of short lines formed by the suppression of the second hemistich. The highly developed art displayed in this remarkable poem gives reason for believing that the existing remains of Old English poetry very inadequately represent its extent and variety. , .

While the origins of English poetry go back to heathen times, English prose may be said to have had its effective beginning in the reign of Alfred. It is of course true that vernacular prose of some kind was written much earlier. The English laws of iEthelberht of Kent, though it is perhaps unlikely that they were written down, as is commonly supposed, in the lifetime of Augustine (died a.d. 604), or even in that of the king (d. 616), were well known to Bede; and even in the 12th-century transcript that has come down to us, their crude and elliptical Style gives evidence of their high antiquity. Later kings of Kent and of Wessex followed the example of publishing their laws in the native tongue. Bede is known to have translated the beginning of the gospel of John (down to vi. 9). The early part of the Anglo-Sa.xon Chronicle (q.v.) is probably founded partly on prose annals of pre-Alfredian date. But although the amount of English prose written between the beginning of the 7 th and the middle of the 9th century may have been consider- able, Latin continued to be regarded as the appropriate vehicle for works of any literary pretension. If the English clergy had retained the scholarship which they possessed in the days of Aldhelm and Bede, the creation of a vernacular prose literature would probably have been longer delayed; for while Alfred certainly was not indifferent to the need of the laity for instruc- tion, the evil that he was chiefly concerned to combat was the ignorance of their spiritual guides.

Of the works translated by him and the scholars whom he employed, St Gregory's Pastoral Care and his Dialogues (the latter rendered by Bishop Werferth) are expressly addressed to the priesthood; if the other translations were intended for a wider circle of readers, they are all (not excepting the secular History of Orosius) essentially religious in purpose and spirit. In the interesting preface to the Pastoral Care, in the important accounts of Northern lands and peoples inserted in the Orosius, and in the free rendering and amplification of the Consolation of Boethius and of the Soliloquies of Augustine, Alfred appears as an original writer. Other fruits of his activity are his Laws (preceded by a collection of those of his 7th-century predecessor, Ine of Wessex) , and the beginnings of the Anglo-Saxon Chronicle; The Old English prose after Alfred is entirely of clerical author- ship; even the Laws, so far as their literary form is concerned, are hardly to be regarded as an exception. Apart from the Chronicle (see Anglo-Saxon Chronicle), the bulk of this literature consists of translations from Latin and of homilies and saints' lives, the substance of which is derived from sources mostly accessible to us in their original form; it has therefore for us little importance except from the philological point of view. This remark may be

applied, in the main, even to the writings of jElfric, notwithstanding the great interest which attaches to his brilliant achievement in the development of the capacities of the native language for literary expression. The translation of the gospels, though executed in ˆElfric's time (about 1000), is by other hands. The sermons of his younger contemporary, Archbishop Wulfstan, are marked by earnestness and eloquence, and contain some passages of historical value.

From the early years of the nth century we possess an encyclopaedic manual of the science of the time— chronology, astronomy, arithmetic, metre, rhetoric and ethics— by the monk Byrhtferth, a pupil of Abbo of Fleury. It is a compilation, but executed with intelligence. The numerous works on medicine, the properties of herbs, and the like, are in the main composed of selections from Latin treatises; so far as they are original, they illustrate the history of superstition rather than that of science. It is interesting to observe that they contain one or two formulas of incantations in Irish.

Two famous works of fiction, the romance of A pollonius of Tvre and the Letter of Alexander, which in their Latin form had

much influence on the later literature of Europe, were Englished in the ; 1 ith century with considerable skill. To the same period belongs the. curious tract on . The Wonders of the East. In these works, and. some minoi; productions of the time, we see that the minds of Englishmen were beginning to find interest in other than religious subjects.

The crowding of the English monasteries by foreigners, which was one of the results of the Norman Conquest, brought about a rapid arrest of the development of the vernacular literature. It was not long before the boys trained in the monastic schools ceased to learn to read and write their native tongue, and learned instead to read and write French. The effects of this change are visible in the rapid alteration of the literary language. The artificial tradition of grammatical correctness lost its hold; the archaic literary vocabulary fell into disuse; and those who wrote English at all wrote as they spoke, using more and more an extemporized phonetic spelling based largely on French analogies. The 12th century is a brilliant period in the history of Anglo-Latin literature, and many works of merit were written in French (see. Anglo-Norman). But vernacular literature is scanty and of little originality. The Peterborough Chronicle, it is

true, was continued till 11 54, and its later portions, while markedly exemplifying the changes in the language, contain some really admirable writing. But it is substantially correct to say that from this point until the age of Chaucer vernacular prose served no other purpose than that of popular religious edification. For light on the intellectual life of the nation during this period we must look mainly to the works written in Latin. The homilies of the 12th century are partly modernized trans- cripts from ˆElfric and other older writers, partly translations from French and Latin; the remainder is. mostly commonplace in substance and clumsy in expression. At the beginning of the 13th century the Ancren Riwle (q.v.), a book of counsel for nuns, shows true literary genius, and is singularly interesting in its substance and spirit; but notwithstanding the author's remark- able mastery of English expression, his culture was evidently French rather than English. Some minor religious prose works of the same period are not without merit. But these examples had no literary following. In the early 14th century the writings of Richard Rolle and his school attained great popularity. The profound influence which they exercised on later religious thought, and On the development of prose style, has seldom been adequately recognized. The A yenbite of Inwyt (see Michel, Dan), a wretchedly unintelligent translation (finished in 1340) from Frere Lorens's Somme des vices et des vertus, is valuable to the student of language, but otherwise worthless.

The break in the continuity of literary tradition, induced by the Conquest, was no less complete with regard to poetry than with regard to prose. The poetry of the 13th and the latter part of the 12th century was uninfluenced by the written works of Old English poets, whose archaic diction had to a great extent become unintelligible. But there is no ground to suppose that the succession of popular singers and reciters was ever inter- rupted. In the north-west, indeed, the old recitative metre seems to have survived in oral tradition, with little more altera- tion than was rendered necessary by the changes in the language, until the middle of the 14th century, when it was again adopted by literary versifiers. In the south this metre had greatly degenerated in strictness before the Conquest, but, with gradually increasing laxity in the laws of alliteration and rhythm, it continued long in use. It is commonly believed, with great intrinsic probability but with scanty actual evidence, that in the Old English period there existed, beside the alliterative long line, other forms of verse adapted not for recitation but for sing ing, used in popular lyrics and ballads that were deemed too trivial for written record. The influence of native popular poetic tradition, whether in

the form of recited or of sung verse, is clearly discernible in the earliest Middle English poems that have been preserved. But the authors of these poems were familiar with Latin, and probably spoke French as easily as their mother tongue; and there was no longer any literary convention to restrain them from adopting foreign metrical forms. The

artless verses of the hermit Godric, who died in 1170, exhibit in their metre the combined influence of native rhythm and of that of Latin hymnology. The Proverbs of Alfred, written about 1200, is (like the later Proverbs of Hendyng) in style and substance a gnomic poem of the ancient Germanic type, containing maxims some of which may be of immemorial antiquity; and its rhythm is mainly of native origin. On the other hand, the solemn and touching meditation known as the Moral Ode, which is somewhat earlier in date, is in a metre derived from contemporary Latin verse — a line of seven accents, broken by a caesura, and with feminine end-rhymes. In the Ormulum (see Orm) this metre (known as the septenarius) appears without rhyme, and with a syllabic regularity previously without example in English verse, the line (or distich, as it may be called with almost equal propriety) having invariably fifteen syllables. In various modified forms, the septenarius was a favourite measure throughout the Middle English period. In the poetry of the 13th century the influence of French models is conspicuous. The many devotional lyrics, some of which, as the Luve Ron of Thomas of Hales, have great beauty, show this influence not only in their varied metrical form, but also in their peculiar mystical tender- ness and fervour. The Story of Genesis and Exodus, the substance of which is taken from the Bible and Latin commentators, derives its metre chiefly from French. Its poetical merit is very small. The secular poetry also received a new impulse from France. The brilliant and sprightly dialogue of the Owl and Nightingale, which can hardly be dated later than about 1230, is a " contention " of the type familiar in French and Provencal literature. The " Gallic " type of humour may be seen in various other writings of this period, notably in the Land of Cockaigne, a vivacious satire on monastic self-indulgence^ and in the fabliau of Dame Siviz, a story of Eastern origin, told with almost Chaucerian skill. Predominantly, though not exclusively French in metrical structure, are the charming love poems collected in a MS. (Harl. 2253) written

about 1320 in Herefordshire, some of which (edited in T. Wright's Specimens of Lyric Poetry) find a place in modern popular anthologies. It is noteworthy that they are accompanied by some French lyrics very similar in style. The same MS. contains, besides some religious poetry, a number of political songs of the time of Edward II. They are not quite the earliest examples of their kind; in the time of the Barons' War the popular cause had had its singers in English as well as in French. Later, the victories of Edward III. down to the taking of Guisnes in 1352, were celebrated by the Yorkshireman Laurence Minot in alliterative verse with strophic arrangement and rhyme.

At the very beginning of the 13 th century a new species of composition, the metrical chronicle, was introduced into English literature. The huge work of Layamon, a history (mainly legendary) of Britain from the time of the mythical Brutus till after the mission of Augustine, is a free rendering of the Norman- French Brut of Wace, with extensive additions from traditional sources. Its metre seems to be a degenerate survival of the Old English alliterative line, gradually modified in the course of the work by assimilation to the regular syllabic measure of the French original. Unquestionable evidence of the knowledge of the poem on the part of later writers is scarce, but distinct echoes of its diction appear in the chronicle ascribed to Robert of Gloucester, written in rhymed septenary measures about 1300. This work, founded in its earlier part on the Latin historians of the 12th century, is an independent historical source of some value for the events of the writer's own times. The succession of versified histories of England was continued by Thomas Bek of Castleford in Yorkshire (whose work still awaits an editor), and by Robert Mannyng of Brunne (Bourne, Lincolnshire). Mannyng's chronicle, finished in 1338; is a translation, in its earlier part from Wace's Brut, and in its later part from an Anglo-French chronicle (still extant) written by Peter Langtoft, canon of Bridlington.

Not far from the year 1300 (for the most part probably earlier rather than later) a vast mass of hagiological and homiletic verse was produced in divers parts of England. To Gloucester belongs

an extensive series of Lives of Saints, metrically and linguistically closely resembling Robert of Gloucester's Chronicle, and perhaps wholly or in part of the same authorship. A similar collection was written in the north of England, as well as a large body of homilies showing considerable poetic skill, and abounding in exempla or illustrative stories. Of exempla several prose collec- tions had

already been made in Anglo-French, and William of Wadington's poem Manuel des pSchSs,' which contains a great number of them, was translated in 1303 by Robert Mannyng already mentioned, with some enlargement of the anecdotic element, and frequent omissions of didactic passages. The great rhyming chronicle of Scripture history entitled Cursor Mundi (q.v.) was written in the north about this time. It was extensively read and transcribed, and exercised a powerful influence on later writers down to the end of the 14th century. The remaining homiletic verse of this period is too abundant to be referred to in detail; it will be enough to mention the sermons of William of Shoreham, written in strophic form, but showing little either of metrical skill or poetic feeling. To the next generation belongs the Pricke of Conscience by Richard Rolle, the influence of which was not less powerful than that of the author's prose writings.

Romantic poetry, which in French had been extensively cultivated, both on the continent and in England from the early years of the 12th century, did not assume a vernacular form till about 1250. In the next hundred years its development was marvellously rapid. Of the vast mass of metrical romances pro- duced during this period no detailed account need here be at- tempted (see Romance, and articles, &c. referred to; Arthurian Romance). Native English traditions form the basis of King Horn, Guy of Warwick, Bevis of Hamtoun and Havelok, though the stories were first put into literary form by Anglo-Norman poets. The popularity of these home-grown tales (with which may be classed the wildly fictitious Coerde Lion) was soon rivalled by that of importations from France. The English rendering of Floris and Blancheflur (a love-romance of Greek origin) is found in the same MS. that contains the earliest copy of King Horn. Before the end of the century, the French " matter of Britain " was represented in English by the Southern Arthur and Merlin and the Northern Tristram and Yvaine and Gawin, the "matter of France" by Roland and Vernagu and Otuel; the Alexander was also translated, but in this instance the immediate original was an Anglo-French and not a continental poem. The tale of Troy did not come into English till long afterwards. The Auchinleck MS., written about 1330, contains no fewer than 14 poetical romances; there were many others in circulation, and the number continued to grow. About the middle of the 14th century, the Old English alliterative long line; which for centuries had been used only in unwritten minstrel poetry, emerges again in literature. One of the earliest poems in this revived measure, Wynnere and Wastour, written in 1352, is by a professional reciter-poet, who complains bitterly that original minstrel poetry no longer finds a welcome in the halls of

great nobles, who prefer to listen to those who recite verses not of their own making. About the same date the metre began to be employed by men of letters for the translation of romance — William of Palerne and Joseph of Arimathea from the French, Alexander from Latin prose. The later development of alliter- ative poetry belongs mainly to the age of Chaucer.

The extent and character of the literature produced during the first half of the r4th century indicate that the literary use of the native tongue was no longer, as in the preceding age, a mere condescension to the needs of the common people. The rapid disuse of French as the ordinary medium of intercourse among the middle and higher ranks of society, and the conse- quent substitution of English for French as the vehicle of school instruction, created a widespread demand for vernacular reading. The literature which arose in answer to this demand, though it consisted mainly of translations or adaptations of foreign works, yet served to develop the appreciation of poetic beauty, and to prepare an audience in the near future for a poetry in which the genuine thought and feeling of the nation were to find expression.

Bibliography.— Only general works need be mentioned here. Those cited contain lists of books for more detailed information, (i) For the literature from the beginnings to Chaucer:— B. ten Brink, Geschichte der englischen Litteratur, vol. i. 2nd ed., by A. Brandl (Strassburg, 1899) (English translation from the 1st ed. of 1877, by H. M. Kennedy, London, 1883) ; The Cambridge History of English Literature, vol. i. (1907). (2) For the Old English period : — R. Wiilker, Grundriss zur Geschichte der angelsachsischen Litteratur (Leipzig, 1885) ; Stopford A. Brooke, English Literature from the Beginning to the Norman Conquest (London, 1898); A. Brandl, " Altenglische Litteratur," in H. Paul's Grundriss der germanischen Philologie, vol. ii. (2nd ed., Strassburg, 1908). (3) For the early Middle English Period: — H. Morley, English Writers, vol. iii. (London, 1888; vols. i. and ii., dealing with the Old English period, cannot be recommended) ; A. Brandl, " Mittelenglische Litteratur," in H. Paul's Grundriss der germanischen Philologie, vol. ii. (1st ed., Strassburg, 1893) ; W. H. Schofield, English Literature from the Norman Conquest to Chaucer (London, 1906). (H. Br.)

II. Chaucer to the Renaissance

The age of Chaucer is of peculiar interest to the student of literature, not only because of its brilliance and productiveness but also because of its apparent promise for the future. In this, as in other aspects, Chaucer (c. 1340-1400) is its most notable literary figure. Beginning as a student and imitator of the best French poetry of his day, he was for a time, like most of his French contemporaries, little more than a skilful maker of elegant verses, dealing with conventional material in a con- ventional way, arranging in new figures the same flowers and bowers, sunsets and song-birds, and companies of fair women and their lovers, that had been arranged and rearranged by every poet of the court circle for a hundred years, and celebrated in sweet phrases of almost unvarying sameness. Even at this time, to be sure, he was not without close and loving observation of the living creatures of the real world, and his verses often bring us flowers dewy and fragrant and fresh of colour as they grew in the fields and gardens about London, and birds that had learned their music in the woods; but his poetry was still not easily distinguishable from that of Machault, Froissart, Deschamps, Transoun and the other " courtly makers " of France. But while he was still striving to master perfectly the technique of this pretty art of trifling, he became acquainted with the new literature of Italy, both poetry and prose. Much of the new poetry moved, like that of France, among the conventionalities and artificialities of an unreal world of romance, but it was of wider range, of fuller tone, of far greater emotional intensity, and, at its best, was the fabric, not of elegant ingenuity, but of creative human passion, — in Dante, indeed, a wonderful visionary structure in which love and hate, and pity and terror, and the forms and countenances of men were more vivid and real than in the world of real men and real passions. The new prose — which Chaucer knew in several of the writings of Boccaccio — was vastly different from any that he had ever read in a modern tongue. Here were no mere brief anecdotes like those exempla which in the middle ages illustrated vernacular as well as Latin sermons, no cumbrous, slow-moving treatises on the Seven Deadly Sins, no half-articulate, pious meditations, but rapid, vivid, well-constructed narratives ranging from the sentimental beauty of stories like Griselda and the Franklin's Tale to coarse mirth and malodorous vulgarity equal to those of the tales told later by Chaucer's Miller and Reeve and Summoner. All these things he studied and some he imitated. There is scarcely a feature of the verse that has not left some trace in his own; the prose he did not imitate as prose, but there can be little doubt that the subject matter of Boccaccio's tales and novels, as well

as his poems, affected the direction of Chaucer's literary development, and quickened his habit of observing and utilizing human life, and that the narrative art of the prose was in- fluential in the transformation of his methods of narration.

This transformation was effected not so much through the mere superiority of the Italian models to the French as through the stimulus which the differences between the two gave to his reflections upon the processes and technique of composition, for Chaucer was not a careless, happy-go-lucky poet of divine endowment, but a conscious, reflective artist, seeking not merely

for fine words and fine sentiments, but for the proper arrangement of events, the significant exponent of character, the right tone, and even the appropriate background and atmosphere, — as may be seen, for example, in the transformations he wrought in the Pardoner's Tale. It is therefore in the latest and most original of the Canterbury Tales that his art is most admirable, most distinguished by technical excellences. In these we fina so many admirable qualities that we almost forget that he had any defects. His diction is a model of picturesqueness, of simplicity, of dignity, and of perfect adaptation to his theme: his versification is not only correct but musical and varied, and shows a progressive tendency towards freer and more complex melodies; his best tales are not mere repetitions of the ancient stories they retell, but new creations, transformed by his own imaginative realization of them, full of figures having the dimen- sions and the vivacity of real life, acting on adequate motives, and moving in an atmosphere and against a background appro- priate to their characters and their actions. In the tales of the Pardoner, the Franklin, the Summoner, the Squire, he is no less notable as a consummate artist than as a poet.

Chaucer, however, was not the only writer of his day remark- able for mastery of technique. Gower, indeed, though a man of much learning and intelligence, was neither a poet of the first rank nor an artist. Despite the admirable qualities of clearness, order and occasional picturesqueness which distinguish his work, he lacked the ability which great poets have of making their words mean more than they say, and of stirring the emotions even beyond the bounds of this enhanced meaning; and there is not, perhaps, in all'his voluminous work in English, French and Latin, any indication that he regarded composition as an art requiring consideration or any care beyond that of conforming to the chosen rhythm and finding suitable rhymes.

There were others more richly endowed as poets and more finely

developed as artists. There was the beginner of the P.iers Plowman cycle, 1 the author of the Prologue and first eight passus of the A-text, a man of clear and profound observation, a poet whose imagination brought before him with distinctness and reality visual images of the motley individuals and masses of men of whom he wrote, an artist who knew how to organize and direct the figures of his dream-world, the movement of his ever-unfolding vision. There was the remarkable successor of this man, the author of the B-text, an almost prophetic figure, a great poetic idealist, and, helpless though he often was in the direction of his thought, an absolute master of images and words that seize upon the heart and haunt the memory. Besides these, an unknown writer far in the north-west had, in Gawayne and the Grene Knight, transformed the medieval romance into a thing of speed and colour, of vitality and mystery, no less remarkable for its fluent definiteness of form than for the delights of hall-feast and hunt, the graceful comedy of temptation, and the lonely ride of the doomed Gawayne through the silence of the forest and the deep snow. In the same region, by its author's power of visual imagination, the Biblical paraphrase, so often a mere humdrum narrative, had been transformed, in Patience, into a narrative so detailed and vivid that the reader is almost ready to believe that the author himself, rather than Jonah, went down into the sea in the belly of the great fish, and sat humbled and rebuked beside the withered gourd-vine. And there also, by some strange chance, blossomed, with perhaps only a local and temporary fragrance until its rediscovery in the 19th century, that delicate flower of loneliness and aspiration, Pearl, a wonder of elaborate art as well as of touching sentiment.

All these writings are great, not only relatively, but absolutely. There is not one of them which would not, if written in our own time, immediately mark its author as a man of very unusual ability. But the point of special concern to us at the present moment is not so much that they show remarkable poetic power, as that they possess technical merits of a very high order. And we are accustomed to believe that, although genius is a purely

1 Piers Plowman has been so long attributed as a whole to Langland {q.v.), that in spite of modern analytical criticism it is most conveniently discussed under that name.

personal and incommunicable element, technical gains are a common possession; that after Marlowe had developed the technique of blank verse, this technique was available for all ; that after Pope had mastered the heroic couplet and Gray the ode, and Poe the short story, all men could write couplets and odes and short stories of technical correctness; that, as Tennyson puts it,

" All can grow the flower now, For all have got the seed."

But this was singularly untrue of the technical gains made by Chaucer and his great contemporaries. Pearl and Patience were apparently unknown to the 15th century, but Gawayne and Piers Plowman and Chaucer's works were known and were influential in one way or another throughout the century. Gawayne called into existence a large number of romances dealing with the same hero or with somewhat similar situations, some of them written in verse suggested by the remarkable verse of their model, but the resemblance, even in versification, is only superficial. Piers Plowman gave rise to satirical allegories written in the alliterative long line and furnished the figures and the machinery for many satires in other metres, but the technical excellence of the first Piers Plowman poem was soon buried for centuries under the tremendous social significance of itself and its successors. And Chaucer, in spite of the fact that he was praised and imitated by many writers and definitely claimed as master by more than one, not only transmitted to them scarcely any of the technical conquests he had made, but seems also to have been almost without success in creating any change in the taste of the public that read his poems so eagerly, any demand for better literature than had been written by his predecessors.

Wide and lasting Chaucer's influence undoubtedly was. Not only was all the court-poetry, all the poetry of writers who pretended to cultivation and refinement, throughout the century, in England and Scotland, either directly or indirectly imitative of his work, but even the humblest productions of unpretentious writers show at times traces of his influence. Scotland was fortunate in having writers of greater ability than England had (see Scotland : Literature) . In England the three chief followers of Chaucer known to us by name are Lydgate, Hoccleve (see Occleve) and Hawes. Because of their praise of Chaucer and their supposed personal relations to him, Lydgate and Hoccleve are almost inseparable in modern discussions, but 13th century readers and writers appear not to have associated them very closely. Indeed, Hoccleve is rarely mentioned, while

Lydgate is not only mentioned continually, but continually praised as Chaucer's equal or even superior. Hoccleve was not, to be sure, as prolific as Lydgate, but it is difficult to understand why his work, which compares favourably in quality with Lydgate's, attracted so much less attention. The title of his greatest poem, De regimine principum, may have repelled readers who were not princely born, though they would have found the work full of the moral and prudential maxims and illustrative anecdotes so dear to them; but his attack upon Sir John Oldcastle as a heretic ought to have been decidedly to the taste of the orthodox upper classes, while his lamentations over his misspent youth, his tales and some of his minor poems might have interested any one. Of a less vigorous spirit than Lydgate, he was, in his mild way, more humorous and more original. Also despite his sense of personal loss in Chaucer's death and his care to transmit to posterity the likeness of his beloved master, he seems to have been less slavish than Lydgate in imitating him. His memory is full of Chaucer's phrases, he writes in verse-forms hallowed by the master's use, and he tries to give to his lines the movement of Chaucer's decasyllables, but he is comparatively free from the influence of those early allegorical works of the Master which produced in the 1 5th century so dreary a flock of imitations.

Lydgate's productivity was enormous, — how great no man can say, for, as was the case with Chaucer also, his fame caused many masterless poems to be ascribed to him, but, after making all necessary deductions, the amount of verse that has come down to us from him is astonishing. Here it may suffice to say

that his translations are predominantly epic (140,000 lines), and his original compositions predominantly allegorical love poems or didactic poems. If there is anything duller than a dull epic it is a dull allegory, and Lydgate has achieved both. This is not to deny the existence of good passages in his epics and ingenuity in his allegories, but there is no pervading, persistent life in either. His epics, like almost all the narrative verse of the time, whether epic, legend, versified chronicle or metrical romance, seem designed merely to satisfy the desire of 15th century readers for information, the craving for facts — true or fictitious — the same craving that made possible the poems on alchemy, on hunting, on manners and morals, on the duties of parish priests, on the seven liberal arts. His allegories, like most allegories of the age, are ingenious rearrangements of old figures and old machinery, they are full of what had once been imagination but had become merely memory assisted by clever- ness. The great fault of all his work, as of nearly all the literature of the age, is that it is merely a more or less skilful

manipulation of what the author had somewhere read or heard, and not a faithful transcript of the author's own peculiar sense or concep- tion of what he had seen or heard or read. The fault is not that the old is repeated, that a twice-told tale is retold, but that it is retold without being re-imagined by the teller of the tale, without taking on from his personality something that was not in it before. Style, to be sure, was a thing that Lydgate and his fellows tried to supply, and some of them supplied it abundantly according to their lights. But style meant to them external decoration, classical allusions, personifications, an inverted or even dislocated order of words, and that famous " ornate diction," those " aureate terms," with which they strove to surpass the melody, picturesqueness and dignity which, for all its simplicity, they somehow dimly discerned in the diction of Chaucer.

Stephen Hawes, with his allegorical treatise on the seven liberal sciences, came later than these men, only to write worse. He was a disciple of Lydgate rather than of Chaucer, and is not only lacking in the vigour and sensitiveness which Lydgate sometimes displays, but exaggerates the defects of his master. If it be a merit to have conceived the pursuit of knowledge under the form of the efforts of a knight to win the hand of his lady, it is almost the sole merit to which Hawes can lay claim. Two or three good situations, an episode of low comedy, and the epitaph of the Knight with its famous final couplet, exhaust the list of his credits. The efforts that have been made to trace through Hawes the line of Spenser's spiritual ancestry seem not well advised. The resemblances that have been pointed out are such as arise inevitably from the allegories and from the traditional material with which both worked. There is no reason to believe that Spenser owed his general conception to Hawes, or that the Faery Queene would have differed in even the slightest detail from its present form if the Pastime of Pleasure had never been written. The machinery of chivalric romance had already been applied to spiritual and moral themes in Spain without the aid of Hawes.

It is obvious that the fundamental lack of all these men was imaginative power, poetic ability. This is a sufficient reason for failure to write good poetry. But why did not men of better ability devote themselves to literature in this age? Was it because of the perturbed conditions arising from the prevalence of foreign and civil wars? Perhaps not, though it is clear that if Sir Thomas Malory had perished in one of the many fights through which he lived, the chivalric and literary impulses which he perhaps received from the " Fadre of Curteisy," Richard Beauchamp, earl of Warwick, would have gone for nothing and we should lack the Morte Ddrtkur. But it

may very well be that the wars and the tremendous industrial growth of England fixed the attention of the strongest and most original spirits among the younger men and so withdrew them- from the possible attractions of literature. But, after all, whatever general truth may lie in such speculations, the way of a young man with his own life is as incalculable as any of the four things which Agur son of Jakeh declared to be past finding out; local

and special accidents rather than general communal influences are apt to shape the choice of boys of exceptional character, and we have many instances of great talents turning to literature or art when war or commerce or science was the dominant attraction of social life.

But even recognizing that the followers of Chaucer were not men of genius, it seems strange that their imitation of Chaucer was what it was. They not only entirely failed to see what his merits as an artist were and how greatly superior his mature work is to his earlier in point of technique; they even preferred the earlier and imitated it almost exclusively. Furthermore, his mastery of verse seemed to them to consist solely in writing verses of approximately four or five stresses and arranging them in couplets or in stanzas of seven or eight lines. Their preference for the early allegorical work can be explained by their lack of taste and critical discernment and by the great vogue of allegorical writing in England and Prance. Men who are just beginning to think about the distinction between literature and ordinary writing usually feel that it consists in making literary expression differ as widely as possible from simple direct speech. For this reason some sort of artificial diction is developed and some artificial word order devised. Allegory is used as an elegant method of avoiding unpoetical plainness, and is an easy means of substituting logic for imagination. The failure to reproduce in some degree at least the melody and smoothness of Chaucer's decasyllabic verse, and the particular form which that failure took in Lydgate, are to be explained by the fact that Lydgate and his fellows never knew how Chaucer's verse sounded when properly read. It is a mistake to suppose that the disappearance of final unaccented e from many words or its instability in many others made it difficult for Lydgate and his fellows to write melodious verse. Melodious verse has been

written since the disappearance of all these sounds, and the possibility of a choice between a form with finale and one without it is not a hindrance but an advantage to a poet, as Goethe, Schiller, Heine and innumerable German poets have shown by their practice. The real difficulty with these men was that they pronounced Chaucer's verse as if it were written in the English of their own day. As a matter of fact all the types of verse discovered by scholars in Lydgate's poems can be discovered in Chaucer's also if they be read with Lydgate's pronunciation; Chaucer did not write archaic English, as some have supposed,— that is, English of an earlier age than his own, — it would have been impossible for him to do so with the unfailing accuracy he shows; he did, however, write a conservative, perhaps an old-fashioned, English, such as was spoken by the conservative members of the class of society to which he was attached and for which he wrote. An English with fewer final e's was already in existence among the less conservative classes, and this rapidly became standard English in consequence of the social changes which occurred during his own life. We know that a misunder- standing of Chaucer's verse existed from the 16th century to the time of Thomas Tyrwhitt; it seems clear that it began even earlier, in Chaucer's own lifetime.

There are several poems of the 1 5th century which were long ascribed to Chaucer. Among them are: — the Complaint of the Black Knight, or Complaint of a Loner's Life, now known to be Lydgate's; the Mother of God, now ascribed to Hoccleve; the Cuckoo and the Nightingale, by Clanvowe; La Belle Dame sans merci, a translation from the French of Alain Chartier by Richard Ros; Chaucer's Dream, or the Isle of Ladies; the Assembly of Ladies; the Flower and (he Leaf; and the Court of Love, The two poems of Lydgate and Hoccleve are as good as Chaucer's poorest work. The Assembly of Ladies and the Flower and the Leaf are perhaps better than the Book of the Duchess, but not so good as the Parliament of Fowls. The Flower and the Leaf, it will be remembered, was very dear to John Keats, who, like all his contemporaries, regarded it as Chaucer's. An addi- tional Interest attaches to both it and the Assembly of Ladies, from the fact that the author may have been a woman; Professor Skeat is, indeed, confident that he knows who the woman was •and when she wrote. These poems, like the Court of Love, are

thoroughly conventional in material, all the figures and poetical machinery may be found in dozens of other poems in England and France, as Professor Neilson has shown for the Court of Love and Mr Marsh for the Flower and the Leaf; but there are a fresh- ness of spirit and a love of beauty in them that are not common; the

conventional birds and flowers are there, but they seem, like those of Chaucer's Legend, to have some touch of life, and the conventional companies of ladies and gentlemen ride and talk and walk with natural grace and ease. The Court of Love is usually ascribed to a very late date, as late even as the middle of the 1 6th century. If this is correct, it is a notable instance of the persistence of a Chaucerian influence. An effort has been made, to be sure, to show that it was written by Scogan and that the writing of it constituted the offence mentioned by Chaucer in his Envoy to Scogan, but it has been clearly shown that this is impossible, both because the language is later than Scogan's time and because nothing in the poem resembles the offence clearly described by Chaucer.

Whatever may be trvte of the authorship of the Assembly of Ladies and the Flower and the Leaf, there were women writers in England in the middle ages. Juliana of Norwich wrote her Revelations of Divine Love before 1400. The much discussed Dame Juliana Berners, the supposed compiler of the treatise on hunting in the Book of St Albans, may be mythical, though there is no reason why a woman should not have written such a book; and a shadowy figure that disappears entirely in the sunlight is the supposed authoress of the Nut Brown Maid, for if language is capable of definite meaning, the last stanza declares unequivocally that the poem is the work of a man. But there is a poem warning young women against entering a nunnery which may be by a woman, and there is an interesting entry among the records of New Romney for 1463-1464, " Paid to Agnes Forde for the play of the Interlude of our Lord's Passion, 6s. 8d.," which is apparently the earliest mention of a woman dramatist in England. Finally, Margaret, countess of Richmond, the mother of Henry VII., not only aided scholars and encouraged writers, but herself translated the (spurious) fourth boqk of St Thomas a Kempis's Imitatio Christi. Another Margaret, the duchess of Burgundy, it will be remembered, encouraged Caxton in his translation and printing. Women seem, indeed, to have been especially lovers of books and patrons of writers, and Skelton, if we may believe his Garland of Laurel, was surrounded by a bevy of ladies comparable to a modern literary club; Erasmus's Suffragette Convention may correspond to no reality, but the Learned Lady arguing against the Monk for the usefulness and pleasure derived from books was not an unknown type. Women were capable of many things in the middle ages. English records show them to have been physi- cians, churchwardens, justices of the peace and sheriffs, and, according to a satirist, they were also priests.

The most original and powerful poetry of the 15th century was

composed in popular forms for the ear of the common people and was apparently written without conscious artistic purpose. Three classes of productions deserve special attention, — songs and carols, popular ballads and certain dramatic com- positions. The songs and carols belong to a species which may have existed in England before the Norman Conquest, but which certainly was greatly modified by the musical and lyric forms of France. The best of them are the direct and simple if not entirely artless expressions of personal emotion, and even when they contain, as they sometimes do, the description of a person, a situation, or an evetit, they deal with these things so subjec- tively) confine themselves so closely to the rendering of the emotional effect upon the singer, that they lose none of their directness or simplicity. Some of them deal with secular sub- jects, some with religious, and some are curious and delightful blendings of religious worship and aspiration with earthly tender- ness for the embodiments of helpless infancy and protecting motherhood which gave Christianity so much of its power over the- affections and imagination of the middle ages. Even those which begin as mere expressions of joy in the Yule-tide eating and drinking and merriment catch at moments hints of higher

joys, of finer emotions, and lift singer and hearer above the noise and stir of earth. Hundreds of songs written and sung in the 15th century must have perished; many, no doubt, lived only a single season and were never even written down; but chance has preserved enough of them to make us wonder at the age which could produce such masterpieces of tantalizing simplicity.

The lyrics which describe a situation form a logical, if not a real transition to those which narrate an episode or an event. The most famous of the latter, the Nut Brown Maid, has often been called a ballad, and " lyrical ballad " it is in the sense established by Coleridge and Wordsworth, but its affinities are rather with the song or carol than with the folk-ballad, and, like Henryson's charming Robin and Malkin, it is certainly the work of a man of culture and of conscious artistic purpose and methods. Unaccompanied, as it is, by any other work of the same author, this poem, with its remarkable technical merits, is an even more astonishing literary phenomenon than the famous single sonnet of Blanco White. It can hardly be

doubted that the author learned his technique from the songs and carols.

The folk-ballad, like the song or carol, belongs in some form to immemorial antiquity. It is doubtless a mistake to suppose that any ballad has been preserved to us that is a purely com- munal product, a confection of the common knowledge, tradi- tions and emotions of the community wrought by subconscious processes into a song that finds chance but inevitable utterance through one or more individuals as the whole commune moves in its molecular dance. But it is equally a mistake to argue that ballads are essentially metrical romances in a state of decay. Both the matter and the manner of most of the best ballads forbid such a supposition, and it can hardly be doubted that in some of the folk-ballads of the 15th century are preserved not only traditions of dateless antiquity, but formal elements and technical processes that actually are derived from communal song and dance. By the 15th century, however, communal habits and processes of composition had ceased, arid the traditional ele- ments, formulae and technique had become merely conventional aids and guides for the individual singer. Ancient as they were, conventional as, in a sense, they also were, they exercised none of the deadening, benumbing influence of ordinary conventions. They furnished, one may say, a vibrant framework of emotional expression, each tone of which moved the hearers all the more powerfully because it had sung to them so many old, unhappy, far-off things, so many battles and treacheries and sudden griefs; a framework which the individual singer needed only to fill out with the simplest statement of the event which had stirred his own imagination and passions to produce, not a work of art, but a song of universal appeal. Not a work of art, because there are scarcely half a dozen ballads that are really works of art, and the greatest ballads are not among these. There is scarcely one that is free from excrescences, from dulness, from trivialities, from additions that would spoil their greatest situations and their greatest lines, were it not that we resolutely shut our ears and our eyes, as we should, to all but their greatest moments. But at their best moments the best ballads have an almost incomparable power, and to a people sick, as we are, of the ordinary, the usual, the very trivialities and impertinences of the ballads only help to define and emphasize these best moments. In histories of English literature the ballads have been so commonly discussed in connexion with their rediscovery in the 18th century, that we are apt to forget that some of the very best were demonstrably composed in the 15th and that many others of uncertain date probably belong to the same time.

Along with the genuine ballads dealing with a recent event or a traditional theme there were ballads in which earlier romances are retold in ballad style. This was doubtless inevitable in view of the increasing epic tendency of the ballad and the interest still felt in metrical romances, but it should not mislead us into regarding the genuine folk-ballad as an out-growth of the metrical romance.

Besides the ordinary epic or narrative ballad, the 15th century produced ballads in dramatic form, or, perhaps it were better to say, dramatized some of its epic ballads. How commonly

this was done we do not know, but the scanty records of the period indicate that it was a widespread custom, though only three plays of this character (all concerning Robin Hood) have come down to us. These plays had, however, no further inde- pendent development, but merely furnished elements of incident and atmosphere to later plays of a more highly organized type. With these ballad plays may also be mentioned the Christmas plays (usually of St George) and the sword-dance plays, which also flourished in the 15th century, but survive for us only as obscure elements in the masques and plays of Ben Jonson and in such modern rustic performances as Thomas Hardy has so charmingly described in The Return of the Native.

The additions which the 15th century made to the ancient cycles of Scripture plays, the so-called Mysteries, are another instance of a literary effort which spent itself in vain (see Drama). The most notable of these are, of course, the world renowned comic scenes in the Towneley (or Wakefield) Plays, in the pageants of Cain, of Noah and of the Shepherds. In none of these is the 15th century writer responsible for the original comic intention; in the pageants of Cain and of the Shepherds fragments of the work of a 14th century writer still remain to prove the earlier existence of the comic conception, and that it was traditional in the Noah pageant we know from the testimony of Chaucer's Miller; but none the less the 15th century writer was a comic dramatist of original power and of a skill in the development of both character and situation previously un- exampled in England. The inability of Lydgate to develop a comic conception is strikingly displayed if one compares his Pageant for Presentation before the King at Hereford with the work of this unknown artist. But in our admiration for this man and his famous episode of Mak and the fictitious infant, we are apt to forget the equally fine, though very different qualities shown in some of the later pageants of the York Plays. Such, for example, is the final pageant, that of the Last Judgment, a drama of slow and majestic movement, to be sure, but with a large and fine conception of the great situation, and a noble

and dignified elocution not inadequate to the theme.

The Abraham and Isaac play of the Brome MS., extant as a separate play and perhaps so performed, which has been so greatly admired for its cumulative pathos, also belongs de- monstrably to this century. It is not, as has been supposed, an intermediate stage between French plays and the Chester Abraham and Isaac, but is derived directly from the latter by processes which comparison of the two easily reveals. Scripture plays of a type entirely different from the well-known cyclic mysteries, apparently confined to the Passion and Resurrection and the related events, become known to us for the first time in the records of this century. Such plays seem to have been confined to the towns of the south, and, as both their location and their structure suggest, may have been borrowed from France. In any event, the records show that they flourished greatly and that new versions were made from time to time.

Another form of the medieval drama, the Morality Play, had its origin in the 15th century, — or else very late in the 14th. The earliest known examples of it in England date from about 1420. These are the Castle of Perseverance and the Pride of Life. Others belonging to the century are Mind, Will and Understand- ing, Mankind and Medwall's Nature. There are also parts of two pageants in the Ludus Coventriae (c. 1460) that are commonly classed as Moralities, and these, together with the existence of a few personified abstractions in other plays, have led some critics to suppose that the Morality was derived from the Mystery by the gradual introduction of personified abstractions in the place of real persons. But the two kinds of plays are fundamentally different, different in subject and in technique; and no replace- ment of real persons by personifications can change a Mystery into a Morality, Moreover, the Morality features in Mysteries are later than the origin of the Morality itself and are due to the influence of the latter. The Morality Play is merely a dramatized allegory, and derives its characters and its peculiar technique from the application of the dramatic method to the allegory, the favourite literary form of the middle ages. None of the 15th

century Moralities is literature of the first rank, though both the

Castle of Perseverance and Pride of Life contain passages ringing with a passionate sincerity that communicates itself to the hearer or reader. But it was not until the beginning of the 1 6th century that a Morality of permanent human interest appeared in Everyman, which, after all, is a translation from the Dutch, as is clearly proved by the fact that in the two prayers near the end of the play the Dutch has complicated but regular stanzas, whereas the English has only irregularly rhymed passages.

Besides the Mysteries and Moralities, the 15th century had also Miracle Plays, properly so called, dealing with the lives, martyr-doms and miracles of saints. As we know these only from records of their performance or their mere existence— no texts have been preserved to us, except the very curious Play of the Sacrament — it is impossible to speak of their literary or dramatic qualities. The Miracle Play as a form was, of course, not confined to the 1 5th century. Notwithstanding the assertions of historians of literature that it died out in England soon after its introduction at the beginning of the 12th century, its existence can be demon- strated from c. 1 1 10 to the time of Shakespeare. But records seem to indicate that it flourished especially during this period of supposed barrenness.

What was the nature of the " Komedy of Troylous and Pandor " performed before Henry VIII. on the 6th of January 1516 we have no means of knowing. It is very early indeed to assume the influence of either classical or Italian drama, and although we have no records of similar plays from the 15th century, it must be remembered that our records are scanty, that the middle ages applied the dramatic method to all sorts of material, and that it is therefore not impossible that secular plays like this were performed at court at a much earlier date. The record at any rate does not indicate that it was a new type of play, and the Griselda story had been dramatized in France, Italy and the Netherlands before 1 500.

That not much good prose was written in the 15th century is less surprising than that so little good verse was written. The technique of verse composition had been studied and mastered in the preceding age, as we have seen, but the technique of prose had apparently received no serious consideration. Indeed, it is doubtful if any one thought of prose as a possible medium of artistic expression. Chaucer apparently did not, in spite of the comparative excellence of his Preface to the Astrolabe and his occasional noteworthy successes with the difficulties of the philosophy of Boethius; Wycliffe is usually clumsy; and the translators of Mandeville, though they often give us

passages of great charm, obviously were plain men who merely translated as best they could. There was, however, a comparatively large amount of prose written in the 15th century, mainly for religious or educational purposes, dealing with the same sorts of subjects that were dealt with in verse, and in some cases not distinguish- able from the verse by any feature but the absence of rhyme. The vast body of this we must neglect; only five writers need be named : John Capgrave, Reginald Pecock, Sir John Fortescue, Caxton and Malory. Capgrave, the compiler of the first chronicle in English prose since the Conquest, wrote by preference in Latin; his English is a condescension to those who could not read Latin and has the qualities which belong to the talk of an earnest and sincere man of commonplace ability. Pecock and Fortescue are more important. Pecock (c. 1305-c. 1460) was a man of singularly acute and logical mind. He prided himself upon his dialectic skill and his faculty for discovering arguments that had been overlooked by others. His writings, therefore — or at least the Repressor — are excellent in general structure and arrangement, his ideas are presented clearly and simply, with few digressions or excrescences, and his sentences, though sometimes too long, are more like modern prose than any others before the age of Elizabeth. His style is lightened by frequent figures of speech, mostly illustrative, and really illustrative, of his ideas, while his intellectual ingenuity cannot fail to interest even those whom his prejudices and preconceptions repel. Fortescue, like Capgrave, wrote by preference in Latin, and, like

Pecock, was philosophical and controversial. But his principal English work, the Difference between an Absolute and a Limited Monarchy, differs from Pecock's in being rather a pleading than a logical argument, and the geniality and glowing patriotism of its author give it a far greater human interest.

No new era in literary composition was marked by the activity of William Caxton as translator and publisher, though the print- ing-press has, of course, changed fundamentally the problem of the dissemination and preservation of culture, and thereby ultimately affected literary production profoundly. But neither Caxton nor the writers whose works he printed produced anything new in form or spirit. His publications range over the whole field of 15th century literature, and no doubt he tried, as his quaint prefaces indicate, to direct the public taste to what was best among the works of the past, as when he printed and re- printed the Canterbury Tales, but among all his numerous publications not one is the herald of a new era. The only book of permanent interest as literature which he introduced to the world was the Morte Darthur of Sir Thomas Malory, and this is a

compilation from older romances (see Arthurian Legend). It is, to be sure, the one book of permanent literary significance produced in England in the 15th century; it glows with the warmth and beauty of the old knight's conception of chivalry and his love for the great deeds and great men of the visionary past, and it continually allures the reader by its fresh and vivid diction and by a syntax which, though sometimes faulty, has almost always a certain naive charm; " thystorye {i.e. the history) of the sayd Arthur," as Caxton long ago declared, " is so gloryous and shynyng, that he is stalled in the first place of the moost noble, beste and worthyest of the Crysten men "; it is not, however, as the first of a new species, but as the final flower of an old that this glorious and shining book retains its place in English literature.

Whatever may have been the effect of the wars and the growth of industrial life in England in withdrawing men of the best abilities from the pursuit of literature, neither these causes nor any other interfered with the activity of writers of lesser powers. The amount of writing is really astonishing, as is also its range. More than three hundred separate works (exclusive of the large number still ascribed to Lydgate and of the seventy printed by Caxton) have been made accessible by the Early English Text Society and other public or private presses, and it seems probable that an equal number remains as yet un- published. No list of these writings can be given here, but it may not be unprofitable to indicate the range of interests by noting the classes of writing represented. The classification is necessarily rough, as some writings belong to more than one type. We may note, first, love poems, allegorical and un- allegorical, narrative, didactic, lyrical and quasi-lyrical; poems autobiographical and exculpatory; poems of eulogy and appeal for aid; tales of entertainment or instruction, in prose and in verse; histories ancient and modern, and brief accounts of recent historical events, in prose and in verse; prose romances and metrical romances; legends and lives of saints, in prose and in verse; poems and prose works of religious meditation, devotion and controversy; treatises of religious instruction, in prose and in verse; ethical and philosophical treatises, and ethical and prudential treatises; treatises of government, of political economy, of foreign travel, of hygiene, of surgery, of alchemy, of heraldry, of hunting and hawking and fishing, of farming, of good manners, and of cooking and carving. Prosaic and intended merely to serve practical uses as many of these were, verse is the medium of expression as often as prose. Besides this large amount and variety of English compositions, it must be remembered that much was also written in Latin, and that Latin and French works of this and other

centuries were read by the educated classes.

Although the intellectual and spiritual movement which we call the Italian Renaissance was not unknown in England in the 14th and 15th centuries, it is not strange that it exercised no perceptible influence upon English literature, except in the case of Chaucer. Chaucer was the only English man of letters before

the 1 6th century who knew Italian literature. The Italians who visited England and the Englishmen who visited Italy were interested, not in literature, but in scholarship. Such studies as were pursued by Free, Grey, Flemming, Tilly, .Gunthorpe and others who went to Italy, made them better grammarians and rhetoricians, and no doubt gave them a freer, wider outlook, but upon their return to England they were immediately absorbed in administrative cares, which left them little leisure for literary wmposition, even if they had had any inclination to write. They prepared the way, however, for the leaders of the great intellectual awakening which began in England with Linacre, Colet, More and their fellows, and which finally culminated in the age of Spenser, Bacon, Shakespeare, Jonson, Gilbert, Harvey and Harriott.

When the middle ages ceased in England it is impossible to say definitely. Long after the new learning and culture of the Renaissance had been introduced there, long after classical and Italian models were eagerly chosen and followed, the epic and lyric models of the middle ages were admired and imitated, and tbe ancient forms of the drama lived side by side with the new until the time of Shakespeare himself. John Skeltbn, although according to Erasmus " unum Britannicarum literarum lumen ac decus," and although possessing great originality and vigour both in diction and in versification when attacking his enemies or indulging in playful rhyming, was not only a great admirer of Lydgate, but equalled even the worst of his prede- cessors in aureate pedantries of diction, in complicated im- possibilities of syntax, and in meaningless inversions of word- order whenever he wished to write elegant and dignified litera- ture. And not a little of the absurd diction of the middle of the 16th century is merely a continuation of the bad ideals and practices of the refined writers of the 15th.

In fine, the 15th century has, aside from its vigorous, though sometimes coarse, popular productions, little that can interest the lover of literature. It offers, however, in richest profusion problems for the literary antiquarian and the student of the relations between social conditions and literary productivity, — problems which have usually been attacked only with the light weapons of irresponsible speculation, but which may perhaps be solved by a careful comparative study of many literatures and many periods. Moreover, although in the quality of its literary output it is decidedly inferior to the 14th century, the amount and the wide range of its productions indicate the gradual extension of the habit of reading to classes of society that were previously unlettered; and this was of great importance for the future of English literature, just as the innumerable dramatic performances throughout England were important in developing audiences for Marlowe and Shakespeare and Beaumont and Fletcher.

For bibliography see vol. ii. of the Cambridge History of Literature (1909) ; and Brandl's Geschichte der mittelenglischen Literatur (re-printed from Paul's Crundriss der germanischen Philologie). Inter-esting general discussions may be found in the larger histories of English Literature, such as Ten Brink's, Jusserand's, and (a little more antiquated) Courthope's and Morley's. (J. M. Ma.)

III. Elizabethan Times General Influences, and Prologue to 1579. — The history of letters in England from More's Utopia (1516), the first Platonic vision, to Milton's Samson Agonistes (1671), the latest classic tragedy, is one and continuous. That is the period of the English Renaissance, in the wider sense, and it covers all and more of the literature loosely called " Elizabethan." With all its com- plexity and subdivisions, it has as real a unity as the age of Pericles, or that of Petrarch and Boccaccio, or the period in Germany that includes both Lessing and Heine. It is peculiar in length of span, in variety of power, and in wealth of production, though its master-works on the greater scale are relatively few. It is distinct, while never quite cut off, from the middle age preceding, and also from the classical or " Augustan " age that followed. The coming of Dryden denoted a new phase; but it was still a phase of the Renaissance ; and the break that declared itself about 1660. counts as nothing beside the break with the

middle ages; for this implied the whole change in art, thought and temper, which re-created the European mind. It is true that many filaments unite Renaissance and middle ages, not only in the religious and purely intellectual region, but in that of art. The matter

of Geoffrey of Monmouth, the tales of Arthur and of Troilus, the old fairy folklore of the South, the topic of the Falls of Princes, lived on; and so did the characteristic medieval form, allegory and many of the old metres of the 14th century. But then these things were transformed, often out of knowledge. Shakespeare's use of the histories of Macbeth, Lear and Troilus, and Spenser's of the allegoric romance, are examples. And when the gifts of the middle ages are not trans- formed, as in the Mirror for Magistrates, they strike us as sur- vivals from a lost world.

So vital a change took long in the working. The English Renaissance of letters only came into full flower during the last twenty years of the 16th century, later than in any Southern land; but it was all the richer for delay, and would have missed many a life-giving element could it have been driven forward sooner. If the actual process of genius is beyond analysis, we can still notice the subjects which genius receives, or chooses, to work upon, and also the vesture which it chooses for them; and we can watch some of the forces that long retard but in the end fertilize these workings of genius.

What, then, in England, were these forces ? Two of them lie outside letters, namely, the political settlement, culminating in the later reign of Elizabeth, and the religious settlement, whereby the Anglican Church grew out of ^^f the English Reformation. A third force lay within the sphere of the Renaissance itself, in the narrower meaning of the term. It was culture — the prefatory work of culture and education, which at once prepared and put off the flowering of pure genius. " Elizabethan " literature took its complexion from the circumstance that all these three forces were in operation at once. The Church began to be fully articulate, just when the national feeling was at its highest, and the tides of classical and immigrant culture were strongest. Spenser's Faerie Queene, Hooker's Ecclesiastical Polity and Shakespeare's Henry V. came in the same decade (1590-1600). But these three forces, political, religious and educational, were of very different duration and value. The enthusiasm of 1 590-1600 was already dying down in the years 1600-1610, when the great tragedies were written; and soon a wholly new set of political forces began to tell on art. The religious inspiration was mainly confined to certain important channels; and literature as a whole, from first to last, was far more secular than religious. But Renaissance culture, in its ramifications and consequences, tells all the time and over the whole field, from 1500 to 1660. It is this culture which really binds together the long and varied chronicle. Before passing to narrative, a short review of each of these elements is required.

Down to 1579 the Tudor rule was hardly a direct inspiration to authors. The reign of Henry VII. was first duly told by Bacon, and that of Henry VIII. Staged by Shakespeare and Fletcher, in the time of James I. Sir Thomas More found in Roper, and Wolsey in Cavendish, sound biographers, who are nearly the earliest in the language. The later years of Henry VIII. were full of episodes too tragically picturesque for safe handling in the lifetime of his children. The next two reigns were engrossed with the religious war;

and the first twenty years of Elizabeth, if they laid the bases oi an age of peace, well-being, and national self-confidence that was to prove a teeming soil for letters, were themselves poor in themes for patriotic art. The abortive treason of the northern earls was echoed only in a ringing ballad. But the voyagers, freebooters, and explorers reported their experiences, as a duty, not for fame; and these, though not till the golden age, were edited by Hakluyt, and fledged the poetic fancies that took wing from the " Indian Peru" to the " still- vext Bermoothes." Yet, in default of any true historian, the queen's wise delays and diplomacies that upheld the English power, and her refusal to launch on a Pro- testant or a national war until occasion compelled and the country

Politics.

was ready, were subjects as uninspiring to poets as the burning questions of the royal marriage or the royal title. But by 1580 the nation was filled with the sense of Elizabeth's success and greatness and of its own prosperity. No shorter struggle and no less achievement could have nursed the insolent, jubilant patriotism of the years that followed; a feeling that for good reasons was peculiar to England among the nations, and created the peculiar forms of the chronicle play and poem. These were borrowed neither from antiquity nor from abroad, and were never afterwards revived. The same exultation found its way into the current forms of ode and pastoral, of masque and allegory, and into many a dedication and interlude of prose. It was so strong as to outlive the age that gave it warrant. The passion for England, the passion of England for herself, animates the bulk of Drayton's Poly-Olbion, which was finished so late as 1622. But the public issues were then changing, the temper was darker; and the civil struggle was to speak less in poetry than in the prose of political theory and ecclesiastical argument, until its after-explosion came in the verse of Milton.

The English Reformation, so long political rather than doctrinal or imaginative, cost much writing on all sides; but no book like Calvin's Institution is its trophy, at once rtafflre S defining the religious change for millions of later men and marking a term of departure in the national prose. Still, the debating weapons, the axes and

billhooks, of vernacular English were sharpened— somewhat jaggedly — in the pamphlet battles that dwarfed the original energies of Sir Thomas More and evoked those of Tyndale and his friends. The powers of the same style were proved for descriptive economy by Starkey's Dialogue between Pole and Lupset, and for religious appeal by the blunt sound rhetoric and forthright jests in the sermons of Latimer (died 155s)- Foxe's reports of the martyrs are the type of early Protestant English (1563); but the reforming divines seldom became real men of letters even when their Puritanism, or discontent with the final Anglican settlement and its temper, began to announce itself. Their spirit, however, comes out in many a corner of poetry, in Gascoigne's Steel Glaus as in Spenser's Shepherd's Calendar; and the English Reforma- tion lived partly on its pre-natal memories of Langland as well as of Wycliffe. The fruit of the struggle, though retarded, was ample. Carrying on the work of Fisher and Cranmer, the new church became the nursing mother of English prose, and trained it more than any single influence, — trained it so well, for the purposes of sacred learning, translation and oratory, and also as a medium of poetic feeling, that in these activities England came to rival France. How late any religious writer of true rank arose may be seen by the lapse of over half a century between Henry VIII. 's Act of Supremacy and Hooker's treatise. But after Hooker the chain of eloquent divines was unbroken for a hundred years.

Renaissance culture had many stages and was fed from many streams. At the outset of the century, in the wake of Erasmus, under the teaching of Colet and his friends, there az/taireT spread a sounder knowledge of the Greek and Latin tongues, of the classic texts, and so of the ancient life and mind. This period of humanism in the stricter sense was far less brilliant than in Italy and France. No very great scholar or savant arose in Britain for a long time; but neo-Latin literature, the satellite of scholarship, shone brightly in George Buchanan. But scholarship was created and secured; and in at least one, rather solitary, work of power, the Utopia (which remained in Latin till 1551); the fundamental process was begun which appropriates the Greek mind, not only for purposes of schooling, but as a source of new and independent thinking. In and after the middle of the century the classics were again put forward by Cheke, by Wilson in his A rt of Rhetoric (1553), and by Ascham in his letters and in his Schoolmaster (1570), as the true staple of humane education, and the pattern for a simple yet lettered English. The literature of translations from the classics, in prose and verse, increased; and these works, at first plain, business-like, and uninspired, slowly rose in style and power, and at last, like the

translations from modern tongues, were

written by a series of masters of English, who thus introduced Plutarch and Tacitus to poets and historians. This labour of mediation was encouraged by the rapid expansion and reform of the two universities, of which almost every great master except Shakespeare was a member; and even Shakespeare had ample Latin for his purpose.

The direct impact of the classics on " Elizabethan " literature, whether through such translations or the originals, would take long to describe. But their indirect impact is far stronger, though in result the two are hard to discern. fraa

As in Greece, and as in the day of Coleridge and Shelley, the fabric of poetry and prose is shot through with philosophical ideas; a further distinction from other literatures like the Spanish of the golden age or the French sophy. of 1830. But these were not so much the ideas of the new physical science and of Bacon as of the ethical and metaphysical ferment. The wave of free talk in the circles of Marlowe, Greville and Raleigh ripples through their writings. Though the direct influence of Giordano Bruno on English writers is probably limited to a reminiscence in the Faerie Queene (Book vii.), he was well acquainted with Sidney and Greville, argued for the Copernican theory at Greville's house, lectured on the soul at Oxford, and published his epoch- marking Italian dialogues during his two years' stay (1583- 1585) in London. The debates in the earlier schools of Italy on the nature and tenure of the soul are heard in the

Nosce Teipsum (1599) of Sir John Davies; a stoicism, " of the schools " as well as " of the blood," animates Cassius and also the French heroes of Chapman; and if the earlier drama is sown with Seneca's old maxims on sin and destiny, the later drama, at least in Shakespeare, is penetrated with the freer reading of life and conduct suggested by Montaigne. Platonism — with its vox angelica sometimes a little hoarse — is present from the youthful Hymns of

Spenser to the last followers of Donne; sometimes drawn from Plato, it is oftener the Christianized doctrine codified by Ficino or Pico. It must be noted that this play of philosophic thought only becomes marked after 1580, when the preparatory tunings of English literature are over.

We may now .quickly review the period down to 1580, in the departments of prose, verse and drama. It was a time which left few memorials of form.

Early modern English prose, as a medium of art, was of slow growth. For long there was alternate strife and union (ending in marriage) between the Latin, or more rhetorical, and the ancestral elements of the language, and this was true both of diction and of construction. We need to begin with the talk of actual life, as we find it in the hands of the more naif writers, in its idiom and gusto and unshapen power, to see how style gradually declared itself. In state letters and reports, in the recorded words of Elizabeth and Mary of Scotland and public men, in travels and memoirs, in Latimer, in the rude early versions of Cicero and Boethius, in the more unstudied speech of Ascham or Leland, the material lies. At the other extreme there are the English liturgy (1549, I 5S 2 > I SS9, with the final fusion of Anglican and Puritan elo- quence), and the sermons of Fisher and Cranmer, — nearly the first examples of a sinuous, musical and Ciceronian cadence. A noble pattern for saga-narrative and lyrical prose was achieved in the successive versions (1526-1540-1568) of the Hebrew and Greek Scriptures, where a native simple diction of short and melodious clauses are prescribed by the matter itself. Prose, in fact, down to Shakespeare's time, was largely the work of the churchmen and translators, aided by the chroniclers. About the mid-century the stories, as well as the books of conduct and maxim, drawn from Italy and France, begin to thicken. Per- verted symmetry of style is found in euphuistic hacks like Pettie. Painter's Palace of Pleasure (1566) provided the plots of Bandello and others for the dramatists. Hoby's version (1561) of Castiĝ- Hone's Courtier, with its command of elate and subtle English, is the most notable imported book between Berners's Froissart (1523-1525) and North's Plutarch (1579). Ascharc's School- master is the most typical English book of Renaissance culture, in its narrower sense, since Utopia. Holinshed's Chronicle (157 7-1 587) and the work of Halle, if pre-critical, were all the fitter to minister to Shakespeare.

The lyric impulse was fledged anew at the court of Henry VIII. The short lines and harping burdens of Sir Thomas Wyatt's songs show the revival, not only of a love- poetry more plangent than anything in

English since Chaucer, but also of the long-deadened sense of metre. In Wyatt's sonnets, octaves, terzines and other Italian measures, we can watch the painful triumphant struggles of this noble old master out of the slough of formlessness in which verse had been left by Skelton. Wyatt's primary deed was his gradual re- discovery of the iambic decasyllabic line duly accented — the line that had been first discovered by Chaucer for England; and next came its building into sonnet and stanza. Wyatt (d. 1542) ended with perfect formal accuracy; he has the honours of victory; and Henry Howard, earl of Surrey (d. 1547), a younger-hearted and more gracious but a lighter poet, carried on his labour, and caught some of Chaucer's as well as the Italian tunes. The blank verse of his two translated Aeneids, like all that written previous to Peele, gave little inkling of the latencies of the measure which was to become the cardinal one of English poetry. It was already the vogue in Italy for translations from the classics; and we may think of Surrey importing it like an uncut jewel and barely conscious of its value. His original poems, like those of Wyatt, waited for print till the eve of

Verse to

1580.

Elizabeth's reign, when they appeared, with those of followers like Grimoald, in Tottel's Miscellany (1557), the first of many such garlands, and the outward proof of the poetical revival dating twenty years earlier. But this was a false dawn. Only one poem of authentic power, Sackville's Induction (1563) to that dreary patriotic venture, A Mirror for Magistrates, was published for twenty years. In spirit medieval, this picture of the gates of hell and of the kings in bale achieves a new melody and a new intensity, and makes the coming of Spenser far less incredible. But poetry was long starved by the very ideal that nursed it— that of the all-sided, all-accomplished "courtier" or cavalier, to whom verse-making was but one of all the ac- complishments that he must perfect, like fencing, or courting, or equestrian skill. Wyatt and Surrey, Sackville and Sidney (and we may add Hamlet, a true Elizabethan) are of this type. One of the first competent professional writers was George Gascoigne, whose remarks on metric, and whose blank verse satire, The Steel Glass (1576), save the years between Sackville and Spenser. Otherwise the gap is filled by painful rhymesters with rare flashes, such as Googe, Churchyard and Turberville.

The English Renaissance drama, both comic and tragic, illustrates on the largest scale the characteristic power of the antique at this period

— at first to reproduce itself in imitation, and then to generate something utterly jgso!" ° different from itself, something that throws the antique to the winds. Out of the Morality, a sermon upon the certainty of death or the temptations of the soul, acted by personified qualities and supernatural creatures, had grown up, in the reign of Henry VII., the Interlude, a dialogue spoken by representative types or trades, who faintly recalled those in Chaucer's Prologue. These forms, which may be termed medieval, continued long and blended; sometimes heated, as in Respublica, with doctrine, and usually lightened by the comic play of a " Vice " or in- carnation of sinister roguery. John Hey wood was the chief maker of the pure interludes, and Bishop Bale of the Protestant medleys; his King Johan, a reformer's partisan tract in verse, contains the germs of the chronicle play. In the drama down to 1580 the native talent is sparse enough, but the historical interest is high. Out of a seeming welter of forms, the structure, the metres and the species that Kyd and Marlowe found slowly emerged. Comedy was first delivered from the interlude, and fashioned in essence as we know it, by the schoolmasters. Draw- ing on Plautus, they constructed duly-knitted plots, divided into acts and scenes and full of homely native fun, for their pupils to present. In Thersites (written 1537), the oldest of these pieces, and in UdalPs Ralph Roister Doisler (1552 at latest), the best known of them, the characters are lively, and indeed are almost individuals. In others, like Misogonus (written 1560), the abstract element and improving purpose remain, and the source is partly neo-Latin comedy, native or foreign. Romance crept in: serious comedy, with its brilliant future, the comedy of high sentiment and averted dangers mingled still with farce, was shadowed forth in Damon and Pithias and in the curious play Common Conditions; while the domestic comedy of in- trigue dawned in Gascoigne's Supposes, adapted from Ariosto. Thus were displaced the ranker rustic fun of Gammer Gurlon's Needle (written c. 1559) and other labours of " rhyming mother- wits." But there was no style, no talk, no satisfactory metre. The verse of comedy waited for Greene, and its prose for Lyly. Structure, without style, was also the main achievement of the early tragedies. The Latin plays of Buchanan, sometimes biblical in topic, rest, as to their form, upon pAiripides. But early English tragedy was shapen after the Senecan plays of Italy and after Seneca himself, all of whose dramas were translated by 1 581. Gorboduc, or Ferrex and Porrex, acted about 1561, and written by Sackville and Norton, and Hughes' Misfortunes of Arthur (acted 1588), are not so much plays as wraiths of plays, with their chain of slaughters and revenges, their two-dimensional personages, and their lifeless maxims which fail to sweeten the

bloodshot atmosphere. The Senecan form was not barren' in itself, as its sequel in France was to show: it was only barren for England. After Marlowe it was driven to the study, and was

still written (possibly under the impulse of Mary countess of Pembroke), by Daniel and Greville, with much reminiscence of the French Senecans. But it left its trail on the real drama. It set the pattern of a high tragical action, often motived by revenge, swayed by large ideas of fate and retribution, and told in blank metre; and it bequeathed, besides many moral sen- tences, such minor points of mechanism as the Ghost, the Chorus and the inserted play. There were many hybrid forms like Gismond of Salem, based On foreign story, alloyed with the mere personifications of the Morality, and yet contriving, as in the case of Promos and Cassandra (the foundation of Measure for Measure), to interest Shakespeare. Thus the drama by 1580 had some of its carpentry, though not yet a true style or versifica- tion. These were only to be won by escape from the classic tutelage. The ruder chronicle play also began, and the reigns of John and Henry V. amongst others were put upon the stage.

Verse from Spenser to Donne. — Sir Philip Sidney almost shares with Edmund Spenser the honours of announcing the new verse, for part of his Astrophel and Stella was P enser – written, if not known in unpublished form, about 1 580-1 581, and contains ten times the passion and poetry of The Shepherd's Calendar (1579). This work, of which only a few passages have the seal of Spenser's coming power, was justly acclaimed for its novelty of experiment in many styles, pastoral, satiric and triumphal, and in many measures: though it was criticized for its " rustic " and archaic diction— a " no language " that was to have more influence upon poetry than any of the real dialects of England. Spenser's desire to write high tragedy, avowed in his October, was not to be granted; his nine comedies are lost; and he became the chief non-dramatic poet of his time and country. Both the plaintive pessimism of Petrarch and du Bellay, with their favourite method of emblem, and the Platonic theory of the spiritual love and its heavenly begetting sank into him; and the Hymns To Love and To Beauty are possibly his earliest verses of sustained perfection and exaltation. These two strains of feeling Spenser never lost and never harmonized; the first of them recurs in

his Complaints of 1591, above all in The Ruins of Time, the second in his Amoretti (1595) and Colin Clout and Epithalamion, which are autobiographical. These and a hundred other threads are woven into The Faerie Queene, an unfinished allegorical epic in honour of moral goodness, of which three books came out in 1590 and three more in 1596, while the fragment Of Constancy (so-called) is first found in the posthumous folio of 1609. This poem is the fullest reflex, outside the drama, of the soul and aspirations of the time. For its scenery and mechanism the Orlando Furioso of Ariosto furnishes the framework. In both poems tales of knightly adventu-e intertwine unconfused; in both the slaying of monsters, the capture of strong places, and the release of the innocent, hindered by wizard and sorcerer, or aided by magic sword and horn and mirror, constitute the quest; and in both warriors, ladies, dwarfs, dragons and figures from old mythology jostle dreamily together. To all this pomp Spenser strove to give a moral and often also a political meaning. Ariosto was not a vates sacer; and so Spenser took Tasso's theme of the holy war waged for the Sepulchre, and expanded it into a war between good and evil, as he saw them in the world; between chastity and lust, loyalty and detraction, England and Spain, England and Rome, Eliza- beth and usurpers, Irish governor and • Irish rebel, right and wrong. The title-virtues of his six extant books he affects to take from Aristotle; but Holiness, Temperance, Chastity, Justice, Friendship and Courtesy form a medley of medieval, puritanical and Greek ideals.

Spenser's moral sentiments, often ethereally noble, might well be contrasted, and that not always to their credit, with those more secular and naturalistic ones that rule in Shakespeare or in Bernardino Telesio and Giordano Bruno. But The Faerie Queene lives by its poetry; and its poetry lives independently of its creed. The idealized figures of Elizabeth, who is the Faerie Queene, and of the " magnificent " Prince Arthur, fail to bind the adventures together, and after two books the poem breaks down in structure. And indeed all through it relies on episode

and pageant, on its prevailing and insuppressible loveliness of scene and tint, of phrasing and of melody, beside which the inner meaning is often an interruption. Spenser is not to be tired; in and out of his tapestry, with its " glooming light much like a shade," pace his figures on horseback, or in durance, with their clear and pictorial allegoric trappings; and they go either singly, or in his favourite masques or pageants, suggested by emblem- atical painting or civic procession. He is often duly praised for his lingering and liquid melodies and his gracious images, or blamed for their langour; but

his ground-tone is a sombre melancholy— unlike that of Jaques — and his deepest quality as a writer is perhaps his angry power. Few of his forty and more thousand lines are unpoetical; in certainty of style- amongst English poets who have written profusely, he has no equals but Chaucer, Milton and Shelley. His " artificial " diction, drawn from middle English, from dialect or from false analogy, has always the intention and nearly always the effect of beauty; we soon feel that its absence would be unnatural, and it has taken its rank among the habitual and exquisite implements of English poetry. This equality of noble form is Spenser's strength, as dilution and diffusion of phrase, and a certain monotonous slow- ness of tempo, are beyond doubt his weaknesses. His chief tech- nical invention, the nine-line stanza (ababbcbcC) was developed not from the Italian octave (abababcc)., but by adding an alexan- drine to the eight-line stave (ababbcbc) of Chaucer's Monk's Tale. It is naturally articulated twice — at the fifth line, where the turn of repeated rhyme inevitably charms, and at the ninth, which runs now to a crashing climax, now to a pensive and sighing close. In rhyming, Spenser, if not always accurate, is one of the most natural and resourceful of poets. His power over the heroic couplet or quatrain is shown in his fable, Mother Hubbard's Tale, and in his curious verse memoir, Colin Clout ; both of which are medleys of satire and flattery. With formal tasks so various and so hard, it is wonderful how effortless the style of Spenser remains. His Muiopotmos is the lightest-handed of mock-heroics. No writer of his day except Marlowe was so faithful to the law of beauty.

The mantle of Spenser fell, somewhat in shreds, upon poets of many schools until the Restoration. As though in thanks to his master Tasso, he lent to Edward Fairfax, the best translator of the Jerusalem Delivered {Godfrey of serians. Bulloigne, 1600), some of his own ease and intricate melody. Harington, the witty translator of Ariosto (iS9i)and spoilt child of the court, owed less to Spenser. The allegorical colouring was nobly caught, if sometimes barbarized, in the Christ's Victory and Triumph of the younger Giles Fletcher (16 10), and Spenser's emblematic style was strained, even cracked, by Phineas Fletcher in The Purple Island (1633), an aspiring fable, gorgeous in places, of the human body and faculties. Both of these brethren clipped and marred the stanza, but they form a link between Spenser and their studentMilton. The allegoric form, long-winded and broken-backed, survived late in Henry More's and Joseph Beaumont's verse disquisitions on the soul. Spenser's pastoral and allusive manner was allowed by Drayton in his Shepherd's Garland (1593), and differently by William Browne in Britannia's Pastorals (

1613-1616), and by William Basse; while his more honeyed descriptions took on a mawkish taste in the anonymous Britain's Ida and similar poems. His golden Platonic style was buoyantly echoed in Orchestra (1596), Sir John Davies' poem on the dancing spheres. He is continually traceable in 17th-century verse, blending with the alien currents of Ben Jonson and of Donne. He was edited and imitated in the age of Thomson, in the age of William Morris, and constantly between.

The. typical Elizabethan poet is Michael Drayton; who followed Spenser in pastoral, Daniel, Sidney, Spenser and Shakespeare in sonnet, Daniel again in chronicle and legend, and Marlowe in mythological story, and who /% °" yet remained himself. His Endimion and Phoebe Daniel. in passages stands near Hero and Leander ; his England's Heroical Epistles (1597) are in ringing rhetorical couplets; his Odes (1606), like the Ballad of Agincourt and the*

Sonnets.

Virginian Voyage, forestall and equal Cowper's or Campbell's; his Nymphidia (1627) was the most popular of burlesque fairy poems; and his pastorals are full of graces and felicities. The work of Drayton that is least read and most often mentioned is his Poly-Olbion (1612-1622), a vast and pious effort, now and then nobly repaid, to versify the scenery, legend, customs and particularities of every English county. The more recluse and pensive habit of Samuel Daniel chills his long chronicle poems; but with Chapman he is the clearest voice of Stoicism in Eliza- bethan letters ; and his harmonious nature is perfectly expressed in a style of happy, even excellence, free alike from " fine mad ness " and from strain. Sonnet and epistle are his favoured forms, and in his Musophilus (1599) as well as in his admirable prose Defence of Rhyme (1602), he truly prophesies the hopes and glories of that illustre vulgare, the literary speech of England. All this patriotic and historic verse, like the earlier and ruder Albion's England (1586) of William Warner, or Fitzgeoffrey's poem upon Drake, or the outbursts of Spenser, was written during or inspired by the last twenty years of the queen's reign; and the same is true of Shakespeare's and most of the other*

history plays, which duly eclipsed the formal, rusty-gray chronicle poem of the type of the Mirror for Magistrates, though editions (1559- 1610) of the latter were long repeated. Patriotic verse outside the theatre, however, full of zeal, started at a disadvantage compared with love-sonnet, song, or mythic narrative, because it had no models before it in other lands, and remained therefore the more shapeless.

The English love-sonnet, brought in by Wyatt and rif est between 1 590 and 1600, was revived as a purely studious imitation

by Watson in his Hekatompathia (1582), a string of

translations in one of the exceptional measures that were freely entitled " sonnets." But from the first, in the hands of Sidney, whose Astrophel and Stella (1591) was written, as remarked above, about 1581, the sonnet was ever ready to pulse into feeling, and to flash into unborrowed beauty, embodying sometimes dramatic fancy and often living experience. These three fibres of imitation, imagination and confession are inter- twisted beyond severance in many of the cycles, and now one, now another is uppermost. Incaution might read a personal diary into Thomas Lodge's Phillis (1593), which is often a translation from Ronsard. Literal judges have announced that Shakespeare's Sonnets are but his mode of taking exercise. But there is poetry in " God's plenty " almost everywhere; and few of the series fail of lovely lines or phrasing or even of perfect sonnets. This holds of Henry Constable's Diana (1592), of the Parthenophil and Parthenophe of Barnabe Barnes (1593), inebriate with poetry, and of the stray minor groups, Alcilia, Licia, Caelia; while the Caelica of Fulke Greville, Lord Brooke, in irregular form, is full of metaphysical passion struggling to be delivered. Astrophel and Stella, Drayton's Idea (1 594-1619), Spenser's Amoretti and Shakespeare's Sonnets (printed 1609) are addressed to definite and probably to known persons, and are charged with true poetic rage, ecstatic or plaintive, desperate or solemn, if they are also intermingled with the mere word-play that mocks or beguiles the ebb of feeling, or with the purely plastic work that is done for solace. In most of these series, as in Daniel's paler but exquisitely-wrought Delia (1591-1592), the form is that of the three separate quatrains with the closing couplet for emotional and melodic climax; a scheme slowly but defiantly evolved, through traceable gradations, from that stricter one of Italy, which Drummond and Milton revived, and where the crisis properly coincides with the change from octave to sestet.

The amorous mythologic tale in Verse derives immediately from

contemporary Italy, but in the beginning from Ovid,

whose Metamorphoses, familiar in Golding's old version poems. (I SS5 _I SS7)) furnished descriptions, decorations and

many tales, while his Heroides gave Chaucer and Boccaccio a model for the self -anatomy of tragic or plaintive sentiment. Within ten years, between 1588 and 1598, during the early sonnet-vogue, appeared Lodge's Scillaes Metamorphosis, Shakespeare's Venus and Adonis and Rape of Lucrece, Marlowe's Hero and Leander and Drayton's Endimion and Phoebe. Shake-

speare owed something to Lodge, and Drayton to Marlowe. All these points describe a love-situation at length, and save in one instance they describe it from without. The exception is Marlowe, who achieves a more than Sicilian perfection; he says everything, and is equal to everything that he has to say. In Venus and Adonis the poet is enamoured less of love than of the tones and poses of lovers and of the beauty and gallant motion of animals, while in The Rape- of Lucrece he is intent on the gradations of lust, shame and indignation, in which he has a spectator's interest. Virtuosity, or the delight of the executant in his own brilliant cunning, is the mark of most of these pieces. If we go to the lyrics, the versified mythic tales and the sonnets of Elizabethan times for the kind of feeling that Moliere's Alceste loved and that Burns and Shelley poured into song, we shall often come away disappointed, and think the old poetry heartless. But it is not heartless, any more than it is always impassioned or personal; it is decorative. The feeling is often that of the craftsman; it is not of the singer who spends his vital essence in song and commands an answering thrill so long as his native language is alive or understood. The arts that deal with ivories or enamelling or silver suggest themselves while we watch the delighted tinting and chasing, the sense for gesture and grouping (in Venus and Adonis), or the delicate beating out of rhyme in a madrigal, or the designing of a single motive, or two contrasted motives, within the panel of the sonnet. And soon it is evident how passion and emotion readily become plastic matter too, whether they be drawn from books or observation or self-scrutiny. This is above all the case in the sonnet; but it is found in the lyric as well. The result is a wonderful fertility of lyrical pattern, a wonderfully diffused power of lyrical execution, never to recur at any later time of English literature. Wyatt had to recover the very form of such verse from oblivion, and this he did in the school of trans- lation and adaptation. Not only the decasyllabic,

but the lyric, in short lines had almost died out of memory, and Wyatt brought it back. From his day to Spenser's there is not much lyric that is noteworthy, though in Gascoigne and others the impulse is seen. The introduction of Italian music, with its favourite metrical schemes, such as the madrigal, powerfully schooled and coloured lyric: in especial, the caressing double ending, regular in Italian but heavier in English, became common. The Italian poems were often translated in their own measure, line by line, and the musical setting retained. Their tunes, or other tunes, were then coupled with new and original poems; and both appeared together in the song-books of Dowland the lutanist, of Jones and Byrd (1588), and in chief (1601-1619) of Thomas Campion. The words of Campion's songs are not only supremely musical in the wider sense, but are chosen for their singing quality. Misled awhile by the heresy that rhyme was wrong, he was yet a master of lovely rhyming, as well as of a lyrical style of great range, gaily or gravely happy. But, as with most of his fellows, singing is rather his calling than his consolation. The lyrics that are sprinkled in plays and romances are the finest of this period, and perhaps, in their kind, of any period. Shake- speare is the greatest in this province also; but the power of infallible and unforgettable song is often granted to slighter, gentler playwrights like Greene and Dekker, while it is denied to men of weightier build and sterner purpose like Chapman and Jonson. The songs of Jonson are indeed at their best of absolute and antique finish; but the irrevocable dew of night or dawn seldom lies upon them as it lies on the songs of Webster or of Fletcher. The best lyrics in the plays are dramatic; they must be read in their own setting. While the action stops, they seize and dally with the dominant emotion of the scene, and yet relieve it. The songs of Lodge and Breton, of Drayton and Daniel, of Oxford and Raleigh, and the fervid brief flights of the Jesuit Southwell, show the omnipresence of the vital gift, whether among professional writers of the journalistic type, or among poets whose gift was not primarily song, or among men of action and quality or men of religion, who only wrote when they Were stirred. Lullaby and valentine and compliment, and love- plaint ranging from gallantry to desperation, are all there;

and the Fortunate Hour, which visits commonly only a few men in a generation, and those but now and then in their lives, is never far

off. But the master of melody, Spenser, left no songs, apart from his two insuperable wedding odes. And religious lyric is rarer before the reign of James. : Much of the best lyric is saved for us by the various Miscellanies, A Handful of Pleasant Delights (1584), the Phoenix Nest (1593) and Davison's Poetical Rhapsody (1602); while other such collections, like England's Helicon(i6oo), were chiefly garlands of verse that was already in print.

There is plenty of satiric anger and raillery in the spirit of the time, but the most genuine part of it is drawn off into drama. Except for stray passages in Spenser, Drayton and others, formal satire, though profuse, was a literary unreal thing, a pose in the manner of Persius or Juvenal, and tiresome in expression. In this kind only Donne triumphed. The attempts of Lodge and Hall and Marston and John Da vies of Hereford and Guilpin and Wither are for the most part simply weariful in different ways, and satire waited for Dryden and his age. The attempt, however, persisted throughout. Wyatt was the first and last who suc- ceeded in the genial, natural Horatian style.

Verse from Donne to Milton.— As the age of Elizabeth receded, some changes came slowly over non-dramatic verse. In Jonson, Meta . as in John Donne (1573-1631), one of the greater poets physical or of the nation, and in many writers after Donne, may fantastic be traced a kind of Counter-Renaissance, or revulsion schools. against the natural man and his claims to pleasure — a revulsion from which regret for pleasure lost is seldom far. Poetry becomes more ascetic and mystical, and this feeling takes shelter alike in the Anglican and in the Roman faith. George Herbert (The Temple, 1633), the most popular, quaint and pious of the school, but the least poetical; Crashaw, with his one ecstatic vision (The Flaming Heart) and occasional golden stanzas ; Henry Vaughan, who wrote from 1646 to 1678, with his mystical landscape and magical cadences; and Thomas Traherne, his fellow-dreamer, are the best known of the religious Fantastics. But, earlier than most of these are Lord Herbert of Cherbury, and Habington with his Castara (1634), who show the same temper, if a fitful power and felicity. Such writers form the devouter section of the famous "metaphysical" or "fantastic" school, which includes, besides Donne its founder, pure amorists like Carew (whose touch on certain rhythms has no fellow), young academic followers like Cartwright and Cleveland (in whom survives the vein of satire that also marks the school), and Abraham Cowley, who wrote from 1633 to 1678, and was perhaps the most acceptable living poet about the middle of the century. In his Life of Cowley Johnson tramples on the "meta- physical " poets and their vices, and he is generally right in detail. The shock of cold quaintness, which

every one of them continually administers, is fatal. Johnson only erred in ignoring all their virtues and all their historical importance.

In Donne poetry became deeply intellectualized, and in temper disquisitive and introspective. The poet's emotion is played with in a cat-and-mouse fashion, and he torments it subtly. Donne's passion is so real, if so unheard-of, and his brain so finely-dividing, that he can make almost any image, even the remotest, even the commonest, poetical. His satires, his Val- entine, his Litany, and his lyric or odic pieces in general, have an insolent and sudden daring which is warranted by deep- seated power and is only equalled by a few of those tragedians who are his nearest of kin. The recurring contrast of " wit " or intelligence, and " will " or desire, their struggle, their mutual illumination, their fusion as into some third and undiscovered element of human nature, are but one idiosyncrasy of Donne's intricate soul, whose general progress, so far as his dateless poems permit of its discovery, seems to have been from a pagan- ism that is unashamed but crossed with gusts of compunction, to a mystical and otherwordly temper alloyed with covetous regrets. The Anatomy of the World and other ambitious pieces have the same quality amid their outrageous strangeness. In Donne and his successors the merely ingenious and ransacking intellect often came to overbalance truth and passion; and hence

arose conceits and abstract verbiage, and the difficulty of finding a perfect poem, however brief, despite the omnipresence of the poetic gift. The "fantastic " school, if it contains some of the rarest sallies and passages in English, is one of the least satis- factory. Its faults only exaggerate those of Sidney, Greville and Shakespeare, who often misuse homely or technical meta- phor; and English verse shared, by coincidence not by borrow- ing, and with variations of its own, in the general strain and torture of style that was besetting so many poets of the Latin countries. Yet these poets well earn the name of metaphysical, not for their philosophic phrasing, but for the shuttle-flight of their fancy to and fro between the things of earth and the realities of spirit that lie beyond the screen of the flesh.

Between Spenser and Milton many measures of lyrical and other poetry were modified. Donne's frequent use of roughly- accentual, almost tuneless lines is unexplained and _. was not often followed. Rhythm in general came to be studied more for its own sake, and the study was rewarded. The lovely cordial music of Carew's amorous iambics, or of Wither's trochees, or of Crashaw's odes, or of Mar veil's octo- syllables, has never been regained. The formal ode set in, sometimes regularly " Pindaric " in strophe-grouping, sometimes

irregularly " Pindaric " as in Cowley's experiments. Above all, the heroic couplet, of the isolated, balanced, rhetorical order, such as Spenser, Drayton, Fairfax and Sylvester, the translator (1590-1606) of Du Bartas, had often used, began to be a regular instrument of verse, and that for special purposes which soon became lastingly associated with it. The flatteries of Edmund Waller and theOvidian translations of Sandys dispute the priority for smoothness and finish, though the fame was Waller's for two generations; but Denham's overestimated Cooper's Hill (1642), Cowley's Davideis (1656), and even Ogilby's Aeneid made the path plainer for Dryden, the first sovereign of the rhetorical couplet which throve as blank verse declined. Sonnet and madrigal were the favoured measures of William Drummond of Hawthornden, a real and exquisite poet of the studio, who shows the general drift of verse towards sequestered and religious feeling. Drummond's Poems of 1616 and Flowers of Zion (1623) are full of Petrarch and Plato as well as of Christian resignation, and he kept alive the artistry of phrasing and versification in a time of indiscipline and conflicting forms. William Browne has been named as a Spenserian, but his Britannia's Pastorals (1613-1616), with their slowly-rippling and overflowing couplets which influenced Keats, were a medley of a novel kind. George Wither may equally rank among the lighter followers of Spenser, the easy masters of lyrical narrative, and the devotional poets. But his Shepherd's Hunting and other pieces in his volume of 1622 contain lovely landscapes, partly English and partly artificial, and stand far above his pious works, and still further above the dreary satires which he lived to continue after the Restoration.

Of poets yet unmentioned, Robert Herrick is the chief, with his two thousand lyrics and epigrams, gathered in Hesperides and Noble Numbers (1648). His power of song and „ . . sureness of cadence are not excelled within his range of topic, which includes flowers and maidens — whom he treats as creatures of the same race — and the swift decay of both their beauties, and secular regret over this decay and his own mortality and the transience of amorous pleasure, and the virtues of his friends, and country sports and lore, and religious com- punction for his own paganism. The Hesperides are pure Re- naissance work, in natural sympathy with the Roman elegiac writings and with the Pseudo- Anacreon. Cowley is best where he is nearest Herrick, and his posy of short lyrics outlives his " epic and Pindaric art." There are many writers who last by virtue of one or two poems; Suckling by his adept playfulness, Love- lace and Montrose by a few gallant stanzas, and many a name- less poet by many a consummate cadence. It is the age of sudden flights and brief

perfections. All the farther notm" out of reach, yet never wholly despaired of or un- attempted in England, was the " long poem," heroical and noble, the " phantom epic," that shadow of the ancient masterpieces,*

which had striven to life in Italy and France. Davenant's Gondibert (1651), Cowley's Davideis and Chamberlayne's Pharon- nida (1659) attest the effort which Milton in 1658 resumed with triumph. These works have between them all the vices possible to epic verse, dulness and flatness, faintness and quaintness and incoherence. But there is some poetry in each of them, and in Pharonnida there is far more than enough poetry to save it .

Few writers have found a flawless style of their own so early in life as John Milton (1608-1674). His youthful pieces show „... some signs of Spenser and the Caroline fantastics;

but soon his vast poetical reading ran clear and lay at the service of his talent. His vision and phrasing of natural things were already original in the Nativity Ode, written when he was twenty; and, there also, his versification was already that of a master, of a renovator. The pensive and figured beauty of U Allegro and // Penseroso, two contrasted emblematic panels, the high innocent Platonism and golden blank verse of the Comus (1634); the birth of long-sleeping power in the Lycidas {1637), with its unapproached contrivance both in evolution and detail, where the precious essences of earlier myth and pastoral seem to be distilled for an offering in honour of the tombless friend; — the newness, the promise, the sureness of it all amid the current schools! The historian finds in these poems, with their echoes of Plato and Sannazzaro, of Geoffrey of Monmouth and St John, the richest and most perfect instance of the studious, decorative Renaissance style, and is not surprised to find Milton's scholars a century later in the age of Gray. The critic, while feeling that the strictly lyrical, spontaneous element is absent, is all the more baffled by the skill and enduring charm. The sonnets were written before or during Milton's long immersion (1637-1658) in prose and warfare, and show the same gifts. They are not cast in the traditional form of love- cycle, but are occasional poems; in metre they revert, not always strictly but once or twice in full perfection, to

the Italian scheme; and they recall not Petrarch but the spiritual elegies or patriot exaltations of Dante or Guidiccioni.

Milton also had a medieval side to his brain, as the History of Britain shows. The heroic theme, which he had resolved from his youth up to celebrate, at last, after many hesitations, proved to be the fall of man. This, for one of his creed and for the audience he desired, was the greatest theme of all. Its scene was the Ptolemaic universe with the Christian heaven and hell inserted. The time, indicated by retrospect and prophecy, was the whole of that portion of eternity, from the creation of Christ to the doomsday, of which the history was sacredly revealed. The subject and the general span of the action went back to the popular mystery play; and Milton at first planned out Paradise Lost as such a play, with certain elements of classic tragedy embodied. But according to the current theory the epic, not the drama, was the noblest form of verse; and, feeling where his power lay, he adopted the epic. The subject, therefore, was partly medieval, partly Protestant, — for Milton was a true Protestant in having a variant of doctrine shared by no other mortal. But the ordering and presentment, with their overture, their interpolated episodes or narratives, their journeys between Olympus, Earth and hell, invocations, set similes, battles and divine thunderbolts, are those of the classical epic. Had Milton shared the free thought as well as the scholarship of the Renais- sance, the poem could never have existed. With all his range of soul and skill, he had a narrower speculative brain than any poet of equal gift; and this was well for his great and peculiar task. But whatever Milton may fail to be, his heroic writing is the permanent and absolute expression of something that in the English stock is inveterate — the Promethean self-possession of the mind in defeat, its right to solitude there, its claim to judge and deny the victor. This is the spirit of his devils, beside whom his divinities, his unf alien angels (Abdiel excepted), and even his human couple with their radiance and beauty of line, all seem shadowy. The discord between Milton's doctrine and his sympathies in Paradise Lost (1667) has never escaped notice. The discord between his doctrine and his culture comes out in Paradise Regained (1671), when he has at once to reprobate

and glorify Athens, the " mother of arts." In this afterthought to the earlier epic the action is slight, the Enemy has lost spirit; and the Christ is something of a pedagogue. But there is a new charm in its even, grey desert tint, sprinkled with illuminations of gold and luxury. In Samson Agonistes (1671) the ethical treatment as well as the machinery is Sophoclean, and the theo- logy not wholly

Christian. But the fault of Samson is forgotten in his suffering, which is Milton's own; and thus a cross-current of sympathy is set up, which may not be much in keeping with the story, but revives the somewhat exhausted interest and heightens a few passages into a bare and inaccessible grandeur.

The essential solitude of Milton's energies is best seen in his later style and versification. When he resumed poetry about 1658, he had nothing around him to help him as an artist in heroic language. The most recent memories of the drama were also the worst; the forms of Cowley and Davenant, the would-be epic poets, were impossible. Spenser's manner was too even and fluid as a rule for such a purpose, and his power was of an alien kind. Thus Milton went back, doubtless full of Greek and Latin memories, to Marlowe, Shakespeare and others among the greater dramatists (including John Ford) ; and their tragic diction and measure are the half-hidden bases of his own. The product, however, is unlike anything except the imitations of itself. The incongruous elements of the Paradise Lost and its divided sympathies are cemented, at least superficially, by its style, perhaps the surest for dignity, character and beauty that any Germanic language has yet developed. If dull and pedantic over certain stretches, it is usually infallible. It is many styles in one, and Time has laid no hand on it. In these three later poems its variety can be seen. It is perfect in personal invocation and appeal; in the complex but unfigured rhetoric of the speeches; in narrative of all kinds; for the inlaying work of simile or scenery or pageant, where the quick, pure impressions of Milton's youth and prime — possibly kept fresher by his blindness — are felt through the sometimes conventional setting; and for soliloquy and choric speech of a might unapproachable since Dante. To these calls his blank verse responds at every point. It is the seal of Milton's artistry, as of his self-confidence, for it greatly extends, for the epical purpose, all the known powers and liberties of the metre; and yet, as has often been shown, it does so not spasmodically but within fixed technical laws or rather habits. Latterly, the underlying metrical ictus is at times hard to detect. But Milton remains by far the surest and greatest instrumentalist, outside the drama, on the English unrhymed line. He would, however, have scorned to be judged on his form alone. His soul and temper are not merely unique in force. Their historic and representative character ensure attention, so long as the oppositions of soul and temper in the England of Milton's time remain, as they still are, the deepest in the national life. He is sometimes said to harmonize the Renaissance and the Puritan spirit; but he does not do this, for nothing can do it. The Puritan spirit is the deep thing in

Milton; all his culture only gives immortal form to its expression. The critics have instinctively felt that this is true; and that is why their political and religious prepossessions have nearly always coloured, and perhaps must colour, every judgment passed upon him. Not otherwise can he be taken seriously, until historians are without public passions and convictions, or the strife between the hierarch and the Protestant is quenched in English civilization.

Drama, 1580-1642. — We must now go back to the drama, which lies behind Milton, and is the most individual product of

all English Literature. The nascent drama of genius

i r 1 • 1 n tt • • 11 1 n Drama.

can be found in the University wits, who flour- ished between 1580 and 1595, and the chief of whom are Lyly, Kyd, Peele, Greene and Marlowe. John Lyly is the first practi- tioner in prose — of shapely comic plot and pointed talk — the artificial but actual talk of courtly masquers who rally one another with a bright and barren finish that is second nature. Campaspe, Sapho and Phao, Midas, and Lyly's other comedies; mostly written from 1580 to 1591, are frail vessels, often filled with compliment, mythological allegory, or topical satire, and

enamelled with pastoral interlude and flower-like song. The work of Thomas Kyd, especially The Spanish Tragedy (written c. 1585), was the most violent effort to put new wine into the old Senecan bottles, and he probably wrote the lost pre-Shake- spearian Hamlet. He transmitted to the later drama that subject of pious but ruinous revenge, which is used by Chapman, Marston, Webster and many others; and his chief play was translated and long acted in Germany. Kyd's want of modula- tion is complete, but he commands a substantial skill of dramatic mechanism, and he has more than the feeling for power, just as Peele and Greene have more than the feeling for luxury or grace. To the expression of luxury Peele's often stately blank verse is well fitted, and it is by far the most correct and musical before Marlowe's, as his Arraignment of Paris (1584) and his David and Bethsabe attest. Greene did something to create the blank verse of gentle comedy, and to introduce the tone of idyll and

chivalry, in his Friar Bacon and Friar Bungay (1594). Otherwise these writers, with Nashe and Lodge, fall into the wake of Marlowe.

Tamburlaine, in two parts (part i. c. 1587), The Life and Death of Doctor Faustus, The Jew of Malta, Edward II. (the first

chronicle play of genius), and the incomplete poem

Hero and Leander are Christopher Marlowe's title- deeds (1564-1593). He established tragedy, and inspired its master, and created for it an adequate diction and versification. His command of vibrant and heroic recitative should not obscure his power, in his greater passages, describing the descent of Helen, the passing of Mortimer, and the union of Hero and Leander, to attain a kind of Greek transparency and perfection. The thirst for ideal beauty, for endless empire, and for prohibited knowledge, no poet has better expressed, and in this respect Giordano Bruno is nearest him in his own time. This thirst is his own; his great cartoon-figures, gigantic rather than heroic, proclaim it for him: their type recurs through the drama, from Richard III. to Dryden's orotund heroes; but in Faustus and in Edward II. they become real, almost human beings. His con-structive gift is less developed in proportion, though Goethe praised the planning-out of Faustus. The glory and influence of Marlowe on the side of form rest largely on his meteoric blank lines, which are varied not a little, and nobly harmonized into periods, and resonant with names to the point of splendid ex- travagance; and their sound is heard in Milton, whom he taught how to express the grief and despair of demons dissatisfied with their kingdom. Shakespeare did not excel Marlowe in Marlowe's own excellences, though he humanized Marlowe's Jew, launched his own blank verse on the tide of Marlowe's oratory, and modulated, in Richard II., his master's type of chronicle tragedy.

As the middle ages receded, the known life of man upon this earth became of sovereign interest, and of this interest the

*drama is the freest artistic expression. If Marlowe speare * s tne v °i ce °f the impulse to explore, the plays of*

Shakespeare are the amplest freight brought home by any voyager. Shakespeare is not only the greatest but the earliest English dramatist who took humanity for his province. But this he did not do from the beginning. He was at first subdued to what he worked in; and though the dry pedantic tragedy was shattered and could not touch him, the gore and rant, the impure though genuine force of Kyd do not seem

at first to have repelled him; if, as is likely, he had a hand in Titus A ndronicus. He probably served with Marlowe and others of the school at various stages in the composition of the three chronicle dramas finally entitled Henry VI. But besides the high-superlative style that is common to them all, there runs through them the rhymed rhetoric with which Shakespeare dallied for some time, as well as the softer flute-notes and deeper undersong that foretell his later blank verse. In Richard III., though it is built on the scheme and charged with the style of Marlowe, Shakespeare first showed the intensity of his original power. But after a few years he swept out of Marlowe's orbit into his own vaster and unreturning curve. In King John the lyrical, epical, satirical and pathetic chords are all present, if \hey are scarcely harmonized. Meantime, Lyly and Greene

1590-

1S9S.

1596- 1600.

having displaced the uncouther comedy, Shakespeare learned all they had to teach, and shaped the comedy of poetic, chivalrous fancy and good-tempered high spirits, which showed him the way of escape from his own rhetoric, and enabled him to perfect his youthful, noble and gentle blank verse. This attained its utmost fineness in Richard II., and its full cordiality and beauty in the other plays that consummate this period — A Midsummer Night's Dream, The Merchant of Venice, and one romantic tragedy, Romeo and Juliet. Behind them lay the earlier and fainter romances, with their chivalry and gaiety, The Comedy of Errors, Love's Labour's Lost and The Two Gentlemen of Verona. Throughout these years blank verse contended with rhyme, which Shakespeare after a while abandoned save for special purposes, as though he had exhausted its honey. The Italian Renaissance is felt in the scenery and setting of these plays. The novella furnishes the story, which passes in a city of the Southern type, with its absolute ruler, its fantastic by-laws on which the plot nominally turns, and its mixture of real life and marvel. The personages, at first fainter of feature and symmetrically paired, soon assume sharper outline: Richard II. and Shylock, Portia and Juliet, and Juliet's Nurse and Bottom are created. The novella has left the earth and taken wings: the spirit is now that of youth and Fancy (or love brooding among the shallows) with interludes of " fierce vexa-tion," or of tragedy, or of kindly farce. And there is a visionary element, felt in the musings of Theseus upon the nature of poetry of the dream-faculty itself; an element which is new, like the use made

of fairy folklore, in the poetry of England.

Tragedy is absent in the succeeding histories (1597-1599), and the comedies of wit and romance (1599-1600), in which Shakespeare perfected his style for stately, pensive or boisterous themes. Falstaff, the most popular as he is the wittiest of all imaginable comic persons, dominates, as to their prose or lower world, the two parts of Henry IV., and its interlude or offshoot, The Merry Wives of Windsor. The play that celebrates Henry V. is less a drama than a pageant, diversified with mighty orations and cheerful humours, and filled with the love of Shakespeare for England. Here the most indigenous form of art invented by the English Renaissance reaches its climax. The Histories are peopled chiefly by men and warriors, of whom Hotspur, " dying in his excellence and flower," is perhaps more attractive than Henry of Agincourt. But in the " middle comedies," As You Like It, Much Ado, and Twelfth Night; the warriors are home at court, where women rule the scene and deserve to rule it ; for their wit now gives the note; and Shakespeare's prose, the medium of their talk, has a finer grace and humour than ever before, euphuism lying well in subjection behind it.

Mankind and this world have never been so sharply sifted or so sternly consoled, since Lucretius, as in Shakespeare's tragedies. The energy which created them evades, like that of the sun, our estimate. But they were not out of relation to their time, the first few years of the reign of James, with its conspiracies, its Somerset and Overbury horrors, its enigmatic and sombre figures like Raleigh, and its revulsion from Elizabethan buoyancy. In the same decade were written the chief tragedies of Jonson, Chapman, Dekker, Marston, Tourneur; and The White Devil, and A Yorkshire Tragedy, and The Maid's Tragedy, and A Woman Killed with Kindness. But, in spite of Shakespeare's affinities with these authors at many points, Hamlet, Macbeth, Lear, Othello, with the three Roman plays (written at intervals and not together), and the two quasi-antique plays Troilus and Cressida, and Timon of Athens, form a body of drama apart from anything else in the world. They reveal a new tragic philosophy, a new poetic style, a new dramatic technique and a new world of characters. In one way above all Shakespeare stands apart; he not only appropriates the ancient pattern of heroism, of right living and right dying, revealed by North's Plutarch; others did this also; but the intellectual movement of the time, though by no means fully reflected, is reflected in his tragedies far more than else- where. The new and troublous thoughts on man and conduct

1601- 1608.

that were penetrating the general mind, the freedom and play of vision that Montaigne above all had stimulated, here find their fullest scope; and Florio's translation (1603) of Montaigne's Essays, coming out between the first and the second versions of Shakespeare's Hamlet, counted probably for more than any other book. The Sonnets (published 1609) are also full of far- wandering thoughts on truth and beauty and on good and evil. The story they reveal may be ranked with the situations of the stranger dramas like Troilus and Measure for Measure. But whether or no it is a true story, and the Sonnets in the main a confession, they would be at the very worst a perfect dramatic record of a great poet's suffering and friendship.

Shakespeare's last period, that of his tragi-comedies, begins about 1608 with his contributions to Pericles, Prince of Tyre. For unknown reasons he was moved, about the time of his retirement home, to record, as though in justice to the world, the happy turns by which tragic disaster is at times averted. Pericles, The Winter's Tale, Cymbeline, and The Tempest all move, after a series of crimes, calumnies, or estrangements, to some final scene of enthralling beauty* where the lost reappear and love is recovered; as though after all the faint and desperate last partings — of Lear and Cordelia, of Hamlet and Horatio — which Shakespeare had imagined, he must make retrieval with the picture of young and happy creatures whose life renews hope even in the experienced. To this end he chose the loose action and free atmosphere of the roman d'aventure, which had already been adapted by Beaumont and Fletcher, who may herein have furnished Shakespeare with novel and successful theatrical effects, and who certainly in turn studied his handiwork. In The Tempest this tragi-comic scheme is fitted to the tales brought by explorers of far isles, wild men, strange gods and airy music. Even if it be true that in Prospero's words the poet bids farewell to his magic, he took part later nevertheless in the composition of Henry VIII.; and not improbably also in The Two Noble Kinsmen. His share in two early pieces, Arden of Fever sham (1592) and Edward III., has been urged, never established, and of many other dramas he was once idly accused.

Shakespeare's throne rests on the foundation of three equal and master faculties. One is that of expression and versification; the next is the invention and presentation of human character in action; the third is the theatrical faculty. The writing of Dante may seem to us more steadily great and perfect, when we remember Shakespeare's conceits, his experiments, his haste and impatience in his long wrestle with tragic language, his not infrequent sheer infelicities. But Dante is always himself, he had not to find words for hundreds of imaginary persons. Balzac, again, may have created and exhibited as many types of man- kind, but except in soul he is not a poet. Shakespeare is a supreme if not infallible poet; his verse, often of an antique simplicity or of a rich, harmonious, romantic perfection, is at other times strained and shattered with what it tries to express, and attains beauty only through discord. He is also many persons in one; in his Sonnets he is even, it may be thought, himself. But he had furthermore to study a personality not of his own fancying- — with something in it of Caliban, of Dogberry and of Cleopatra — that of the audience in a playhouse. He belongs distinctly to the poets like Jonson and Massinger who are true to their art as practical dramatists, not to the poets like Chapman whose works chance to be in the form of plays. Shake speare's mastery of this art is approved now by every nation. But apart from the skill that makes him eternally actable — the skill of raising, straining and relieving the suspense, and bringing it to such an ending as the theatre will tolerate— he played upon every chord in his own hearers. He frankly enlisted Jew-hatred, Pope-hatred and France-hatred; he flattered the queen, and celebrated the Union, and stormed the house with his fanfare over the national soldier, Henry of Agincourt, and glorified England, as in Cymbeline, to the last. But in deeper ways he is the chief of playwrights. Unlike another master, Ibsen, he nearly always tells us, without emphasis, by the words and behaviour of his characters, which of them we are to love and

hate, and when we are to love ; andwhen to hate those whom we can neither love nor hate wholly. Yet he is. not to be bribed, and deals to his characters something of the same injustice or rough justice that is found in real life. His loyalty to life, as well as to the stage, puts the crown on his felicity and his fertility, and raises him to his solitude of dramatic greatness.

Shakespeare's method could not be imparted, and despite reverberations in Beaumont, Fletcher, Webster and others he left no school. But his friend Ben Jonson, his nearest equal in vigour of

brain, though not in poetical in- tuition, was the greatest of dramatic influences down to the shutting of the theatres in 1642, and his comedies found fresh disciples even after 1660. He had " the devouring eye and the portraying hand"; he could toaster and order the contents of a mighty if somewhat burdensome memory into an organic drama, whether the matter lay in Roman historians or before his eyes in the London streets. He had an armoury of doctrine, drawn from the Poetics and Horace, which moulded his creative practice. This was also partly founded on a revulsion against the plays around him, with their loose build and moral improb- abilities. But in spite of his photographic and constructive power, his vision is too seldom free and genial; it is that of the satirist who thinks that his office is to improve mankind by derisively representing it. And he does this by beginning with the " humour," or abstract idiosyncrasy or quality, and clothing it with accurately minute costume and gesture, so that it may pass for a man; and indeed the result is as real as many a man', and in his best-tempered and youthful comedy, Every Man in his Humour (acted 1598), it is very like life. In Jonson 's monu- mental pieces, Volpone or the Fox (acted 1605) and The Alchemist (acted 1610), our laughter is arrested by the lowering and portentous atmosphere, or is loud and hard, startled by the enormous skill and energy displayed. Nor are the joy and relief of poetical comedy given for an instant by The Silent Woman, Bartholomew Fair (acted 1614), or The Staple of News, still less by topical plays like Cynthia's Revels, though their unfailing farce and rampant fun are less charged with contempt. The erudite tragedies, Sejanus (acted 1603) and Catiline, chiefly live by passages of high forensic power. Jonson's finer elegies, eulogies and lyrics, which are many, and his fragmentary Sad Shepherd, show that ˆhe also had a free and lovely talent, often smothered by doctrine and temper; and his verse, usually strong but full of knots and snags t becomes flowing and graciously finished. His prose is of the best, especially in his Discoveries, a series of ethical essays and critical maxims; its prevalently brief and emphatic rhythms suggesting those of Hobbes, and even, though less easy and civil and various, those of Dryden. The " sons " of Jonson, Randolph and Browne, Shadwell and Wilson, were heirs rather to his riot of " humours," his learned method and satiric aim, than to his larger style, his architectural power, or his relieving graces.

As a whole, the romantic drama (so to entitle the remaining bulk of plays down to 1642) is a vast stifled jungle, full of wild life and song, with strange growths and heady perfumes, with glades of sunshine and recesses of poisoned ˆrama. darkness; it is not a cleared

forest, where single and splendid trees grow to shapely perfection. It has "poetry enough for anything"; passionate situations, and their elo- quence; and a number, doubtless small considering its mass, of living and memorable personages. Moral keeping and construc- tive mastery are rarer still; and too seldom through a whole drama do we see human life and hear its voices, arranged and orchestrated by the artist. But it can be truly said in defence that while structure without poetry is void (as it tended at times to be in Ben Jonson), poetry without structure is still poetry, and that the romantic drama is like nothing else in this world for variety of accent and unexpectedness of beauty. We must read it through, as Charles Lamb did, to do it justice. The diffusion of its characteristic excellences is surprising. Of its extant plays it is hardly safe to leave one unopened, if we are searchers for whatsoever is lovely or admirable. The reasons for the lack of steadfast power and artistic conscience lay partly

Chapman.

in the conditions of the stage. Playwrights usually wrote rapidly for bread, and sold their rights. The performances of each play were few. There was no authors' copyright, and dramas were made to be seen and heard, not to be read. There was no articulate dramatic criticism, except such as we find casually in Shakespeare, and in the practice and theory of Jonson, who was deaf or hostile to some of the chief virtues of the romantic playwrights.

The wealth of dramatic production is so great that only a broad classification is here offered. George Chapman stands apart, nearest to the greatest in high austerity of sentiment and in the gracious gravity of his romantic love-comedies. But the crude melodrama of his tragedies is void of true theatrical skill. His quasi-historical French tragedies on Bussy d'Ambois and Biron and Chabot best show his gift and also his insufferable interrupting quaintness. His versions of Homer (1598-1624), honoured alike by Jonson and by Keats, are the greatest verse translations of the time, and the real work of Chapman's life. Their virtues are only partially Homer's, but the general epic nobility and the majesty of single lines, which in length are the near equivalent of the hexameter, redeem the want of Homer's limpidity and continuity and the translator's imperfect

knowledge of Greek. A vein of satiric ruggedness unites Jonson and Chapman with Marston and Hall, the professors of an artificial and disgusting invective; and the same strain spoils Marston's plays, and obscures his genuine command of the language of feverish and bitter sentiment. With these writers satire and contempt of the world lie at the root both of their comedy and tragedy.

*It is otherwise with most of the romantic dramatists, who may be provisionally grouped as follows, (a) Thomas Dekker and Thomas Heywood are writers-of-all-work, the former Dekker profuse of tracts and pamphlets, the latter of treatises Heywood. an d compilations. They are both unrhetorical and void of pose, and divide themselves between the artless comedy of bustling, lively, English humours and pathetic, unheroic tragedy. But Dekker has splendid and poetical dreams, in Old Forlunalus (1600) and The Honest Whore, both of luxury and of tenderness; while Heywood, as in his English Traveller and Woman killed with Kindness (acted 1603), excels in pictures of actual, chivalrous English gentlemen and their generosities. The fertility and volubility of these writers, and their modest carelessness of fame, account for many of their imperfections. With them may be named the large crowd of professional journeymen, who did not want for power, but wrote usually in partnership together, like Munday, Chettle and Drayton, or supplied, like William Rowley, underplots of rough, lively comedy or tragedy, (b) Amongst dramatists of primarily tragic and sombre temper, who in their best scenes recall the creator of Angelo, Iago and Timon, must be named Thomas */rf*

when all is said, are great men in their dark province, (e) The playwrights who may be broadly called romantic, of whom Beaumont, Fletcher and Massinger are the chief, while they share in the same sombre vein, have a wider range and move more in the daylight. The three just named left a very large body of drama, tragic, comic and tragi-comic, in which their several shares can partly be discerned by metrical or other tests. Beau- mont (d. 1616) is nearest the prime, with his vein of Cervantesque mockeryandhis pure, beautifully-broken and cadenced verse, which is seen in his contributions to Philasler Bea " m <'" t and The Maid's Tragedy. Fletcher (d. 1625) brings us Fletcher. closest to the actual gaieties and humours of Jacobean life ; he has a profuse comic gift and the rare instinct for natural dialogue. His verse, with its flood of vehement and expansive rhetoric, heard at its best in plays like Bonduca, cannot cheat us into the illusion that it is truly dramatic; but it overflows with beauty, like his silvery but monotonous versification with its endecasyllabics arrested at the end. In Fletcher

the decadence of form and feeling palpably begins. His personages often face about at critical instants and bely their natures by sudden revulsions. Wanton and cheap characters invite not only dramatic but personal sympathy, as though the author knew no better. There is too much fine writing about a chastity which is complacent rather than instinctive, and satisfied with its formal resistances and technical escapes; so that we are far from Shakespeare's heroines. These faults are present also in Philip Massinger (d. 1640), who offers in substantial recom- pense, not like Beaumont and Fletcher treasures of Massln X er – incessant vivacious episode and poetry and lyric interlude, but an often splendid and usually solid constructive skill, and a steady eloquence which is like a high table-land without summits. A New Way to Pay Old Debts (1632) is the most enduring popular comedy of the time outside Shakespeare's, and one of the best. Massinger's interweaving of impersonal or political conceptions, as in The Bondman and The Roman Actor, is often a triumph of arrangement; and though he wrote in the reign of Charles, he is saved by many noble qualities from being merely an artist of the decline, (d) A mass of plays, of which the authorship is unknown, uncertain or attached to a mere name, baffle classification. There are domestic tragedies, such as Arden of Fever sham; scions of the vindictive e Maay ' drama, like The Second Maiden's Tragedy; historic or half- historic tragedies like Nero. There are chronicle histories, of which the last and one of the best is Ford's Perkin Warbeck, and melodramas of adventure such as Thomas Heywood poured forth. There are realistic citizen comedies akin to The Merry Wives, like Porter's refreshing Two Angry Women of Abingdon; there are Jonsonian comedies, vernacular farces, light intrigue- pieces like Field's and many more. Few of these, regarded as wholes, come near to perfection; few fail of some sally or scene that proves once more the unmatched diffusion of the dramatic or poetic instinct, (e) Outside the regular drama there are many varieties: academic plays, like The Return from Parnassus and Lingua, which are still mirthful; many pastoral plays or enter- tainments in the Italian style, like The Faithful Shepherdess; versified character-sketches, of which Day's Parliament of Bees, with its Theocritean grace and point, is the happiest; many masques and shows, often lyrically and scenically lovely, of which kind Jonson is the master, and Milton, in his Comus, the transfigurer; Senecan dramas made only to be read, like Daniel's and Fulke Greville's; and Latin comedies, like Ignoramus. All these species are only now being fully grouped, sifted and edited by scholars, but a number of the six or seven hundred dramas of the time remain unreprinted.

There remain two writers, John Ford and James Shirley, who kept the higher tradition alive till the Puritan ordinance crushed the theatre in 1642. Ford is another specialist, of grave, sinister and concentrated power (reflected shh-ky° in his verse and diction), to whom no topic, the incest of Annabella in 'Tis Pity She's a Whore, or the high crazed heroism of Calantha in The Broken Heart, is beyond the pale, if only he can dominate it; as indeed he does, without

complicity, standing above his subject. Shirley, a fertile writer, has the general characteristic gifts, in a somewhat dilute but noble form, of the more romantic playwrights, and claims honour as the last of them.

Prose from 7579 to 1660. — With all the unevenness of poetry, the sense of style, of a standard, is everywhere; felicity is never far off. Prose also is full of genius, but it is more disfigured than verse by aberration and wasted power. A central, classic, durable, adaptive prose had been attained by Machiavelli, and by Amyot and Calvin, before 1550. In England it was only to become distinct after 1660. Vocabulary, sentence-structure, paragraph, idiom and rhythm were in a state of unchartered freedom, and the history of their crystallization is not yet written. But in more than compensation there is a company of prose masters, from Florio and Hooker to Milton and Clarendon, not one of whom clearly or fully anticipates the modern style, and who claim all the closer study that their special virtues have been for ever lost. They seem farther away from us than the poets around them. The verse of Shakespeare is near to us, for its tradition has persisted; his prose, the most natural and noble of his age, is far away, for its tradition has not persisted. One reason of this difference is that English prose tried to do more work than that of France and Italy; it tried the work of poetry; and it often did that better than it did the normal work of prose. This overflow of the imaginative spirit gave power and elasticity to prose, but made its task of finding equilibrium the harder. Moreover, prose in England was for long a natural growth, never much affected by critical or academic canons as in France; and when it did submit to canons, the result was often merely manner. The tendons and sinews of the language, still in its adolescent power and bewilderment, were long unset; that is, the parts of speech — noun and verb, epithet and

adverb — were in freer interchange than at any period afterwards. The build, length and cadence of a complex sentence were habitually elaborate; and yet they were disorganized, so that only the ear of a master could regulate them. The law of taste and measure, perhaps through some national disability, was long unperceived. Prose, in fact, could never be sure of doing the day's work in the right fashion. The cross-currents of pedantry in the midst of simplicity, the distrust of clear plain brevity, which was apt to be affected when it came, the mimicries of foreign fashions, and the quaintness and cumbrousness of so much average writing, make it easier to classify Renaissance prose by its interests than by its styles.

The Elizabethan novel was always unhappily mannered, and is therefore dead. It fed the drama, which devoured it. The

tales of Boccaccio, Bandello, Cinthio, Margaret of

Navarre, .and others were purveyed, as remarked above, in the forgotten treasuries of Painter, Pettie, Fenton and Whetstone, and many of these works or their originals filled a shelf in the playwrights' libraries. The first of famous

English novels, Lyly's Euphues (1578), and its sequel euphuism. Euphues and his England, are documents of form.

They are commended by a certain dapper shrewdness of observation and an almost witty priggery, not by any real beauty or deep feeling. Euphuism, of which Lyly was only the patentee, not the inventor, strikes partly back to the Spaniard Guevara, and was a model for some years to many followers like Lodge and Greene. It did not merely provide Falstaff with a pattern for mock-moral diction and vegetable similes. It genuinely helped to organize the English sentence, complex or co-ordinate, and the talk of Portia and Rosalind shows what could be made of it. By the arch-euphuists, clauses and clusters of clauses were paired for parallel or contrast, with the beat of emphatic alliteration on the corresponding parts of speech in each constituent clause. This was a useful discipline for prose in its period of groping. Sidney's incomposite and unfinished Arcadia, written 1580-1581, despite its painful forced antitheses, is sprinkled with lovely rhythms, with pleasing formal landscapes, and even with impassioned sentiment and situation, through which the writer's eager and fretted spirit shines. Both these stories, like those of Greene and Lodge,

The novel.

show by their somewhat affected, edited delineation of life and their courtly tone that they were meant in chief for the eyes of ladies, who were excluded alike from the stage and from its audience. Nashe's drastic and photographic tale of masculine life. Jack Wilton, or The Unfortunate Traveller, stands almost alone, but some of the gap is filled by the contemporary pamphlets, sometimes vivid, often full of fierce or maudlin declamation, of Nashe himself — by far the most powerful of the group — and of Greene, Dekker and Nicholas Breton. Thus the English novel was a minor passing form; the leisurely and amorous romance went on in the next century, owing largely to French influence and example.

In criticism, England may almost be counted with the minor Latin countries. Sidney, in his Defence of Poesy (1595, written about 1580), and Jonson, in his Discoveries, offer a cml well-inspired and lofty restatement of the current answers to the current questions, but could give no account of the actual creative writing of the time. To defend the " truth " of poetry — which was identified with all inventive writing and not only with verse — poetry was saddled with the work of science and instruction. To defend its character it was treated as a delightful but deliberate bait to good behaviour, a theory at best only true of allegory and didactic verse. The real relation of tragedy to spiritual things, which is admittedly shown, however hard its definition, in Shakespeare's plays, no critic for centuries tried to fathom. One of the chief quarrels turned on metric. A few lines that Sidney and Campion wrote on what they thought the system of Latin quantity are really musical. This theory, already raised by Ascham, made a stir, at first in the group of Harvey, Sidney, Dyer and Spenser, called the " Areopagus," an informal attempt to copy the Italian academies; and it was revived on the brink of the reign of James. But Daniel's firm and eloquent Defence of Rhyming (1602) was not needed to persuade the poets to continue rhyming in syllabic verse. The stricter view of the nature and classification of poetry, and of the dramatic unity of action, is concisely given, partly by Jonson, partly by Bacon in his Advancement of Learning and De Augmentis; and Jonson, besides passing his famed judgments on Shakespeare and Bacon, enriched our critical vocabulary from the Roman rhetoricians. Scholastic and sensible manuals, like Webbe's Discourse of Poetry and the Art of English Poesy (1589) ascribed to Puttenham, come in the rear.

The translators count for more than the critics; the line of their great achievements from Berners' Froissart (1523-1525) to Urquhart's Rabelais (1653) is never broken long; and though their lives are often obscure, their number y a < ra" witnesses to that far-spread

diffusion of the talent for English prose, which the wealth of English poetry is apt to hide. The typical craftsman in this field, Philemon Holland, translated Livy, Pliny, Suetonius, Plutarch's Morals and Camden's Britannia, and his fount of English is of the amplest and purest. North, in his translation, made from Amyot's classic French, of Plutarch's Lives (1579), disclosed one of the master-works of old example; Florio, in Montaigne's Essays (1603), the charter of the new freedom of mental exploration; and Shelton, in Don Quixote (1612), the chief tragi-comic creation of continental prose. These versions, if by no means accurate in the letter, were adequate in point of soul and style to their great originals; and the English dress of Tacitus (1591), Apuleius, Heliodorus, Commines, Celestina and many others, is so good and often so sumptuous a fabric, that no single class of prose authors, from the time of More to that of Dryden, excels the prose translators, unless it be the Anglican preachers. Their matter is given to them, and with it a certain standard of form, so that their natural strength and richness of phrase are controlled without being deadened. But the want of such control is seen in the many pamphleteers, who are the journalists of the time, and are often also playwrights or tale-tellers, divines or politicians. The writings, for instance, of the hectic, satiric and graphic Thomas Nashe, run at one extreme into fiction, and at the other into the virulent rag-sheets of the Marprelate controversy, which is of historical and social but not of artistic

note, being only a fragment of that vast mass of disputatious literature, which now seems grotesque, excitable or dull.

Richard Hooker’s Laws of Ecclesiastical Polity (1594-1597), an accepted defence of the Anglican position against Geneva „ . and Rome, is the first theological work of note in the

English tongue, and the first of note since Wycliffe written by an Englishman. It is a plea for reason as one of the safe and lawful guides to the faith ; but it also speaks with admir- able temper and large feeling to the ceremonial and aesthetic sense. The First Book, the scaffolding of the treatise, discusses the nature of law at large; but Hooker hardly has pure specu- lative power, and the language had not yet learnt to move easily in abstract trains of thought. In its

elaboration of clause and period, in its delicate resonant eloquence, Hooker's style is Ciceronian; but his inversions and mazes of subordinate sentence somewhat rack the genius of English. Later divines like Jeremy Taylor had to disintegrate, since they could not wield, this admirable but over-complex eloquence. The sermons (1621-1631) of Donne have the mingled strangeness and in- timacy of his verse, and their subtle flame, imaginative tenacity, and hold upon the springs of awe make them unique. Though without artificial symmetry, their sentences are intricately harmonized, in strong contrast to such pellet-like clauses as those of the learned Lancelot Andrewes, who was Donne's younger contemporary and the subject of Milton's Latin epitaph.

With Francis Bacon (1561-1626) English philosophy began its unbroken course and took its long-delayed rank in Europe. His prose, of which he is the first high and various master in English, was shaped and coloured by his bent as orator and pleader, by his immixture in affairs, by his speculative brain, and by his use and estimate of Latin. In his conscious craftsmanship, his intellectual confidence and curiosity, his divining faith in the future of science, and his resolve to follow the leadings of nature and experience unswervingly; in his habit of storing and using up his experience, and in his wide wordly insight, crystallized in maxim, he suggests a kind of Goethe, without the poetic hand or the capacity for love and lofty suffering. He saw all nature in a map, and wished to understand and control her by outwitting the " idols," or inherent paralysing frailties of the human judgment. He planned but could not finish a great cycle of books in order to realize this conception. The De Augmentis Scientiarum (1623) expanded from the English Advancement 0} Knowledge (1605) draws the map; the Novum Organum (1620) sets out the errors of scholasticism and the methods of inductive logic; the New Atlantis sketches an ideally equipped and moralized scientific community. Bacon shared with the great minds of his century the notion that Latin would outlast any vernacular tongue, and committed his chief scientific writings to a Latin which is alive and splendid and his own, and which also disciplined and ennobled his English. The Essays (1597, 1612, 1625) are his lifelong, gradually accumulated diary of his opinions on human life and business. These famous compositions are often sadly mechanical. They are chippings and basketings of maxims and quotations, and of anecdotes, often classical, put together inductively, or rather by " simple enumeration " of the pros and cons. Still" they are the honest notes of a practical observer and statesman, disenchanted — why not? — with mankind, concerned with cause and effect rather than

with right and wrong, wanting the finer faith and insight into men and women, but full of reality, touched with melancholy, and redeeming some arid, small and pretentious counsels by many that are large and wise. Though sometimes betraying the workshop, Bacon's style, at its best, is infallibly expressive; like Milton's angels, it is " dilated or condensed " according to its purposes. In youth and age alike, Bacon commanded the most opposite patterns and extremes of prose — the curt maxim, balanced in antithesis or triplet, or standing solitary; the sumptuous, satisfying and brocaded period; the movements of exposition, oratory, pleading and narrative. The History of Henry VII. (1622), written after his fall from office, is in form as well as insight and mastery of material the one historical classic in English before Clarendon. Bacon's

Hobbes.

musical sense for the value and placing of splendid words and proper names resembles Marlowe's. But the master of mid- Renaissance prose is Shakespeare; with him it becomes the voice of finer and more impassioned spirits than Bacon's — the voice of Rosalind and Hamlet. And the eulogist of both men, Ben Jonson, must be named in their company for his senatorial weight and dignity of ethical counsel and critical maxim.

As the Stuart rule declined and fell, prose became enriched from five chief sources: from philosophy, whether formal or un- methodical; from theology and preaching and political dispute; from the poetical contemplation of death; from the observation of men and manners; and from antiquarian scholarship and history. As in France, where the first three of these kinds of writings flourished, it was a time rather of individual great writers than of any admitted pattern or common ideal of prose form, although in France this pattern was always clearlier defined. The mental energy, meditative depth, and throbbing brilliant colour of the English drama passed with its decay over into prose. But Latin was still often the supplanter: the treatise of Lord Herbert of Cherbury, De Veritate, of note in the early history of Deism, and much of the writing of the ambidextrous Thomas Hobbes, are in Latin. In this way Latin disciplined English once more, though it often tempted men of genius away from English. The Leviathan (1651) with its companion books on Human Nature and Liberty, and Hobbes' explosive dialogue on the civil wars, Behemoth (1679), have the bitter concision of Tacitus and the clearness of a half-relief in bronze. Hobbes' speculations on the human animal, the social contract, the absolute power of the sovereign, and the sub-servience owed to the sovereign by the Church or " Kingdom of

Darkness," enraged all parties, and left their track on the thought and controversial literature of the century. With Ben Jonson and the jurist Selden (whose English can be judged from his Table Talk), Hobbes anticipates the brief and clear sentence- structure of the next age, though not its social ease and amenity of form. But his grandeur is not that of a poet, and the poetical prose is the most distinctive kind of this period. It is eloquent above all on death and the vanity of human Funereal affairs; its solemn tenor prolongs the reflections of prose – Claudio, of Fletcher's Philaster, or of Spenser's Despair. It is exemplified in Bacon's Essay Of Death, in the anonymous descant on the same subject wrongly once ascribed to him, in Donne's plea for suicide, in Raleigh's History of the World, in Drummond's Cypress Grove (1623), in Jeremy Taylor's sermons and Holy Dying (1651), and in Sir Thomas Browne's Urn-Burial (1658) and Letter to a Friend. Its usual vesture is a long purple period, freely Latinized, though Browne equally commands the form of solemn and monumental epigram. He is also free from the dejection that wraps round the other writers on the subject, and a holy quaintness and gusto relieve his ruminations. The Religio Medici (1642), quintessentially learned, wise and splendid, is the fullest memorial of his power. Amongst modern prose writers, De Quincey is his only true rival in musical sensibility to words.

Jeremy Taylor, the last great English casuist and schoolman, and one of the first pleaders for religious tolerance (in his Liberty of Prophesying, 1647), is above all a preacher; tender, intricate, copious, inexhaustible in image and Taylor. picturesque quotation. From the classics, from the East, from the animal world, from the life of men and children, his illustrations flow, without end or measure. He is a master of the lingering cadence, which soars upward and onward on its coupled clauses, as on balanced iridescent wings, and is found long after in his scholar Ruskin. Imaginative force of another kind pervades Robert Burton's Anatomy of Melancholy (1621), where the humorous medium refracts and colours every ray of the recluse's far-travelled spirit. The mass of Latin citation, woven, not quilted, into Burton's style, is another proof of the vitality of the cosmopolitan language. Burton and Browne owe much to the pre-critical learning of their time, which yields up such precious savours to their fancy, that we may be thankful for the delay of more precise science and

Burton.

scholarship. Fancy, too, of a suddener and wittier sort, pre- serves some of the ample labours of Thomas Fuller, which are scattered over the years 1631-1662; and the Lives and Compleat Angler (1653) of Izaak Walton are unspoilt, happy or pious pieces of idyllic prose. No adequate note on the secular or sacred learning of the time can here be given; on Camden, with his vast erudition, historical, antiquarian and comparatively critical (Britannia, in Latin, 1586); or on Ussher, with his patristic and chronological learning, one of the many savants of the Anglican church. Other divines of the same camp pleaded, in a plainer style than Taylor, for freedom of personal judgment and against the multiplying of " vitals in religion "; the chief were Chilling- worth, one of the closest of English apologists, in his Religion of Protestants (1638), and John Hales of Eton. The Platonists, or rather Plotinists, of Cambridge, who form a curious digression in the history of modern philosophy, produced two writers, John Smith and Henry More, of an exalted and esoteric prose, more directly inspired by Greece than any other of thetime; and their champion of erudition, Cudworth, in his True Intellectual System, gave some form to their doctrine.

Above the vast body of pamphlets and disputatious writing that form the historian's material stands Edward Hyde, Earl of Clarendon's History of the Rebellion, printed in 1 702- 1704, thirty years after his death. Historical writing hitherto, but for Bacon's Henry VII., had been tentative though profuse. Raleigh's vast disquisition upon all things, The History of the World (1614), survives by passages and poetic splendours; gallantly written second-hand works like Knolles's History of the Turks, and the rhetorical History of the Long Parliament by May, had failed to give England rank with France and Italy. Clarendon's book, one of the greatest of memoirs and most vivid of portrait-galleries, spiritually unappreciative of the other side, but full of a subtle discrimination of character and political motive, brings its author into line with Retz and Saint-Simon, the watchers and recorders and sometimes the makers of con- temporary history. Clarendon's Life, above all the picture of Falkland and his friends, is a personal record of the delightful sort in which England was thus far infertile. He is the last old master of prose, using and sustaining the long, sinuous sentence, unworkable in weaker hands. He is the last, for Milton's polemic prose, hurled from the opposite

camp, was written between 1643 and 1660. Whether reviling bishops or royal privilege or indissoluble monogamy, or recalling his own youth and aims; or claiming liberty for print in Areopagitica (1644); in his demonic defiances, or angelic calls to arms, or his animal eruptions of spite and hatred, Milton leaves us with a sense of the motive energies that were to be transformed into Paradise Lost and Samson. His sentences .are ungainly and often inharmonious, but often irresistible; he rigidly withstood the tendencies of form, in prose as in verse, that Dryden was to represent, and thus was true to his own literary dynasty.

A special outlying position belongs to the Authorized Version (161 1) of the Bible, the late fruit of the long toil that had begun The with Tyndale's, and, on the side of style, with the

Author- Wyclifnte translations. More scholarly than all the ized preceding versions which it utilized, it won its in-

era on. comparable form, not so much ' because of the " grand style that was in the air," which would have been the worst of models, as because the style had been already tested and ennobled by generations of translators. Its effect on poetry and letters was for some time far smaller than its effect on the national life at large, but it was the greatest translation — being of a whole literature, or rather of two literatures — in an age of great translations.

Some other kinds of writing soften the transition to Restoration prose. The vast catalogue of Characters numbers hundreds of titles. Deriving from Theophrastus, who was edited by Casaubon in 1592, they are yet another Renaissance form that England shared with France. But in English hands, failing a La Bruyere —in Hall's, in Overbury's, even in those of the gay and skilful Earle (Microcosmographic, 1628) — the Character is a mere list

MlHoa's prose.

of the attributes and oddities of a type or calling. It is to the Jonsonian drama of humours what the Pensee, or detached remark, practised by Bishop Hall and later by Butler and Halifax, is to the Essay. These works tended long to be common- place or didactic, as the popular Resolves of Owen Feltham shows. Cowley was the first essayist to come down from the desk and talk as to his equals in easy phrases of middle length. A time of dissension was not the best for this kind of peaceful, detached writing. The letters of James Howell, the autobiography of Lord Herbert of Cherbury, and the memoirs of

Kenelm Digby belong rather to the older and more mannered than to the more modern form, though Howell's English is in the plainer and quicker movement.

IV. Restoration Period

Literature from 1660 to 1700. — The Renaissance of letters in England entered on a fresh and peculiar phase in the third quarter of the century. The balance of intellectual and artistic power in Europe had completely shifted since 1580. Inspiration had died down in Italy, and its older classics were no longer a stimulus. The Spanish drama had flourished, but its influence though real was scattered and indirect . The Germanic countries were slowly emerging into literature; England they scarcely touched. But the literary empire of France began to declare itself both in Northern and Southern lands, and within half a century was assured. Under this empire the English genius partly fell, though it soon asserted its own equality, and by 1720 had so reacted upon France as more than to repay the debt. Thus between 1 660 and 1 700 is prepared a temporary dual control of European letters. But in the age of Dryden France gave England more than it received; it gave more influence. than it had ever given since the age of Chaucer. During Charles II. 's days Racine, Moliere, La Fontaine and Bossuet ran the best of their course. Cavalier exiles like Waller, Cowley and Hobbes had come back from the winter of their discontent in Paris, and Saint-Evremond, the typical bel esprit and critic, settled long in England. A vast body of translations from the French is recounted, including latterly the works of the Protestant refugees printed in the free Low Countries or in England. Natur- ally this influence told most strongly on the social forms of verse and prose — upon comedy and satire, upon criticism and maxim and epigram, while it also affected theology and thought. And this meant the Renaissance once more, still unexhausted, only working less immediately and in fresh if narrower channels. Greek literature, Plato and Homer and the dramatists, became dimmer; the secondary forms of Latin poetry came to the fore, especially those of Juvenal and the satirists, and the pedestris sermo, epistolary and critical, of Horace. These had some direct influence, as Dryden's translation of them, accompanying his Virgil and Lucretius, may show. But they came commended by Boileau, their chief modernizer, and in their train was the fashion of gallant, epigrammatic and social verse. The tragedy of Corneille and Racine, developed originally from the Senecan drama, contended with the traditions of Shakespeare and Fletcher, and was reinforced by that of the correcter Jonson, in shaping the new theatre of England. The French codifiers, who were often also the distorters, of Aristotle's Poetics

and Horace's Ars poetica, furnished a canonical body of criticism on the epic and the drama, to which Dryden is half a disciple and half a rebel. All this implied at once a loss of the larger and fuller inspirations of poetry, a decadence in its great and primary forms, epic, lyric and tragic, and a disposition, in default of such creative power, to turn and take stock of past production. In England, therefore, it is the age of secondary verse and of nascent, often searching criticism.

The same critical spirit was also whetted in the fields of science and speculation, which the war and the Puritan rule had not encouraged. The activities of the newly-founded Royal Society told directly upon literature, and Science counted powerfully in the Organization of a clear, Letters. uniform prose — the " close, naked, natural way of speaking," which the historian of the Society, Sprat, cites as

part of its programme. And the style of Sprat, as of scientific masters like Newton and Ray the botanist, itself attests the change. A time of profound and peaceful and fruitful scientific labour began; the whole of Newton's Principia appeared in 1687; the dream of Bacon came nearer, and England was less isolated from the international work of knowledge. The spirit of method and observation and induction spread over the whole field of thought and was typified in John Locke, whose Essay concerning Human Understanding came out in English in 1690, and who applied the same deeply sagacious and cautious calculus to education and religion and the " conduct of the understand- ing." But his works, though their often mellow and dignified style has been ignorantly underrated, also show the change in philosophic writing since Hobbes. The old grandeur and pugnacity are gone; the imaginative play of science, or quasi- science, on the literature of reflection is gone; the eccentrics, the fantasts, the dreamers are gone, or only survive in curious transitional writers like Joseph Glanvil (Scepsis scientifica, 1665) or Thomas Burnet (Sacred Theory of the Earth, 1684). This change was in part a conscious and an angry change, as is clear from the attacks made in Samuel Butler's Hudibras (1663-1668) upon scholastic verbiage, astrology, fanatical sects and their disputes, poetic and " heroic " enthusiasm and intellectual whim.

Before the Restoration men of letters, with signal exceptions like Milton and Marvell, had been Cavalier, courtly and Anglican

in their sympathies. The Civil War had scattered them Coi ˆ t,y 1 . away from the capital, which, despite Milton's dream influence. m Areopagitica of its humming and surging energies,

had ceased to be, what it now again became, the natural haunt and Rialto of authors. The taste of the new king and court served to rally them. Charles II. relished Hudibras, used and pensioned Dryden, sat under Barrow and South and heard them with appreciation, countenanced science, visited comedies, and held his own in talk by mother-wit. Letters became the pastime, and therefore one of the more serious pursuits, of men of quality, who soon excelled in song and light scarifying verse and comedy, and took their own tragedies and criticisms gravely. Poetry under such auspices became gallant and social, and also personal and partisan; and satire was soon its most vital form, with the accessories of compliment, rhymed popular argumenta- tion and elegy. The social and conversational instinct was the master-influence in prose. It produced a subtle but fundamental change in the attitude of author to reader. Prose came nearer to living speech, it became more civil and natural and persuasive, and this not least in the pulpit. The sense of ennui, or boredom, which seemed as unknown in the earlier part of the century as it is to the modern German, became strongly developed, and prose was much improved by the fear of provoking it. In all these ways the Restoration accompanied and quickened a speedier and greater change in letters than any political event in English history since the reign of Alfred, when prose itself was created.

The formal change in prose can thus be assigned to no one writer, for the good reason that it presupposes a change of

spoken style lying deeper than any personal influence. criticism. H we De 8 m w i tn the writing that is nearest living

talk — the letters of Otway or Lady Rachel Russell, or the diary of Pepys (1650-1669) — that supreme disclosure of our mother-earth — or the evidence in a state trial, or the dialogue in the more natural comedies; if we then work upwards through some of the plainer kinds of authorship, like the less slangy of L'Estrange's pamphlets, or Burnet's History of My Own Time, a solid Whig memoir of historical value, until we reach really admirable or lasting prose like Dryden's Preface to his Fables (1700), or the maxims of Halifax; — if we do this, we are aware, amid all varieties, survivals and reversions, of a

strong and rapid drift towards the style that we call modern. And one sign of this movement is the revulsion against any over-saturating of the working, daily language, and even of the language of appeal and eloquence, with the Latin element. In Barrow and Glanvil, descendants of Taylor and Browne, many Latinized words remain,

which were soon expelled from style like foreign bodies from an organism. As in the mid-sixteenth and the mid-eighteenth century, the process is visible by which the Latin vocabulary and Latin complication of sentence first gathers strength, and then, though not without leaving its traces, is forced to ebb. The instinct of the best writers secured this result, and secured it for good and all. In Dryden's diction there is a nearly perfect balance and harmony of learned and native constituents, and a sensitive tact in Gallicizing; in his build of sentence there is the same balance between curtness or bareness and complexity or ungainly lengthiness. For ceremony and compliment he keeps a rolling period, for invective a short sharp stroke without the gloves. And he not only uses in general a sentence of moderate scale, inclining to brevity, but he finds out its harmonies; he is a seeming-careless but an absolute master of rhythm. In delusive ease he is unexcelled; and we only regret that he could not have written prose oftener instead of plays. We should thus, how- ever, have lost their prefaces, in which the bulk and the best of Dryden's criticisms appear. From the Essay of Dramatic Poesy (1668) down to the Preface to Fables (1700) runs a series of essays: On the Grounds of Criticism in Tragedy, On Heroic Plays, On Translated Verse, On Satire and many more; which form the first connected body of criticisms in the language, and are nobly written always. Dryden's prose is literature as it stands, and yet is talk, and yet again is mysteriously better than talk. The critical writings of John Dennis are but a sincere application of the rules and canons that were now becoming conventional ; Rymer, though not so despicable as Macaulay said, is still more depressing than Dennis; and for any critic at once so free, so generous and so sure as Dryden we wait in vain for a century.

Three or four names are usually associated with Dryden's in the work of reforming or modifying prose: Sprat, Tillotson, Sir William Temple, and George Savile, marquis of coatri- Halifax; but the honours rest with Halifax. Sprat, tutors to though clear and easy, has little range ; Tillotson,though tne aew lucid, orderly, and a very popular preacher, has little ' >rose – distinction ; Temple, the elegant essayist, has a kind of barren gloss and fine literary manners, but very little to say. The political tracts, essays and maxims of Halifax (died 1695) are the most typically modern prose

between Dryden and Swift, and are nearer than anything else to the best French writing of the same order, in their finality of epigram, their neatness and mannerliness and sharpness. The Character of a Trimmer and Advice to a Daughter are the best examples.

Religious literature, Anglican and Puritan, is the chief remain- ing department to be named. The strong, eloquent and coloured preaching of Isaac Barrow the mathematician, who _ˆ. died in 1677, is a survival of the larger and older manner of the Church. In its balance of logic, learning and emotion, in its command alike of Latin splendour and native force, it deserves a recognition it has lost. Another athlete of the pulpit, Robert South, who is so often praised for his wit that his force is forgotten, continues the lineage, while Tillotson and the elder Sherlock show the tendency to the smoother and more level prose. But the revulsion against strangeness and fancy and magnificence went too far, it made for a temporary bareness and meanness and disharmony, which had to be checked by Addison, Bolingbroke and Berkeley. From what Addison saved our daily written English, may be seen in the vigorous slangy hackwork of Roger L'Estrange, the translator and pamphleteer, in the news-sheets of Dunton, and in the satires of Tom Brown. These writers were debasing the coinage with their street journalism.

Another and far nobler variety of vernacular prose is found in the Puritans. Baxter and Howe, Fox and Bunyan, had the English Bible behind them, which gave them the best of their inspiration, though the first two of them were prose. also erudite men. Richard Baxter, an immensely fertile writer, is best remembered by those of his own fold for his Saint's Everlasting Rest (1650) and his autobiography, John Howe for his evangelical apologia The Living Temple of God

(1675), Fox for his Journal and its mixture of quaintness and rapturous mysticism. John Bunyan, the least instructed of „ them all, is their only born artist. His creed and point

of view were those of half the nation — the half that was usually inarticulate in literature, or spoke without style or genius. His reading, consisting not only of the Bible, but of the popular allegories of giants, pilgrims and adventure, was also that of his class. The

Pilgrim's Progress, of which the first part appeared in 1678, the second in 1684, is the happy flowering sport amidst a growth of barren plants of the same tribe. The Progress is a dream, more vivid to its author than most men's waking memories to themselves; the emblem and the thing signified are merged at every point, so that Christian's journey is not so much an allegory with a key as a spiritua' vision of this earth and our neighbours. Grace Abounding, Bunyan's diary of his own voyage to salvation, The Holy War, an overloaded fable of the fall and recovery of mankind, and The Life and Death of Mr Badman, a novel telling of the triumphal earthly progress of a scoundrelly tradesman, are among Bunyan's other contributions to literature. His union of spiritual intensity, sharp humorous vision, and power of simple speech consum- mately chosen, mark his work off alike from his own inarticulate public and from all other literary performance of his time.

The transition from the older to the newer poetry was not abrupt. Old themes and tunes were slowly disused, others

previously of lesser mark rose into favour, and a few Traasi- q U ;t e f re sh ones were introduced. The poems of John verse. Oldham and Andrew. Marvell belong to both periods.

Both of them begin with fantasy and elegy, and end with satires, which indeed are rather documents than works of art. The monody of Oldham on his friend Morwent is poorly exchanged for the Satires on the Jesuits (1681), and the lovely metaphysical verses of Marvell on gardens and orchards and the spiritual love sadly give place to his Last Instructions to a Painter (1669). In his Horatian Ode Marvell had nobly and impartially applied his earlier style to national affairs; but the time proved too strong for this delightful poet. Another and a H nib stranger satire had soon greeted the Restoration, the

Hudibras (1663-1678) of Samuel Butler, with its companion pieces. The returned wanderers delighted in this horribly agile, boisterous and fierce attack on the popular party and its religions, and its wrangles and its manners. Profoundly eccentric and tiresomely allusive in his form, and working in the short rhyming couplets thenceforth called " Hudibrastics," Butler founded a small and peculiar but long-lived school of satire. The other verse of the time is largely satire of a different tone and metre; but the earlier kind of finished and gallant lyric persisted through the reign of Charles II. The songs of John Wilmot, Earl of Rochester, are usually malicious, some

Songsters.

Dryden.

times passionate; they have a music and a splendid self-abandonment such as we rever meet again till Burns. Sedley and Dorset and Aphra Behn and Dryden are the rightful heirs of Carew and Lovelace, those infallible masters of short rhythms; and this secret also was lost for a century afterwards.

In poetry, in prose, and to some extent in drama, John Dryden, the creature of his time, is the master of its expression. He began with panegyric verse, first on Cromwell and then on Charles, which is full of fine things and false writing. The Annus Mirabilis (1667) is the chief example, celebrating the Plague, the Eire and the naval victory, in the quatrains for which Davenant's pompous Gondibert had shown the way. The Essay on Dramatic Poesy (1668), a dialogue on the rivalries of blank verse with rhyme, and of the Elizabethan drama with the French, is perfect modem prose; and to this perfection Dryden attained at a bound, while he attained his poetical style more gradually. He practised his couplet in panegyric, in heroic tragedy, and in dramatic prologue and epilogue for twenty years before it was consummate. Till 1680 he supported himself chiefly by his plays, which have not lived so long as their critical prefaces, already mentioned. His diction and versification came to their full power in his satires, rhymed arguments, dedications

Tragedy.

and translations. Absalom and Achitophel (part i., 1681; part ii., with Nahum Tate, 1682), as well as The Medal and Mac Flecknoe, marked a new birth of English satire, placing it at once on a level with that of any ancient or modern country. The mixture of deadly good temper, Olympian unfairness, and rhetorical and metrical skill in each of these poems has never been repeated. The presentment of Achitophel, earl of Shaftes- bury, in his relations with Absalom Walters and Charles the minstrel-king of Judah, as well as the portraits of Shimei and Barzillai and Jotham, the eminent Whigs and Tories, and of the poets Og and Doeg, are things whose vividness age has never discoloured. Dryden's Protestant arguings in Religio Laid (1682) and his equally sincere Papistical arguings in The Hind and the Panther (1687) are just as skilful. His translations of Virgil and parts of Lucretius, of Chaucer and Boccaccio (Fables, 1 700) , set the seal on his command of his favourite couplet for the higher kinds of appeal and oratory. His Ode on Anne Killigrew, and his popular

but coarser Alexander's Feast, have a more lyric harmony; and his songs, inserted in his plays, reflect the change of fashion by their metrical adeptness and often thoroughgoing wantonness. The epithet of " glorious," in its older sense of a certain conscious and warranted pride of place, not in that of boastful or pretentious, suits Dryden well. Not only did he leave a model and a point of departure for Pope, but his influence recurs in Churchill, in Gray, in Johnson and in Crabbe, where he is seen counteracting, with his large, wholesome and sincere bluntness, the acidity of Pope. Dryden was counted near Shakespeare and Milton until the romantic revival renewed the sense of proportion; but the same sense now demands his acknowledgment as the English poet who is nearest to their frontiers of all those who are exiled from their kingdom.

Restoration and Revolution tragedy is nearly all abortive; it is now hard to read it for pleasure. But it has noble flights, and its historic interest is high. Two of its species, the rhymed heroic play and the rehandling of Shake- speare in blank verse, were also brought to their utmost by Dryden, though in both he had many companions. The heroic tragedies were a hybrid offspring of the heroic romance and French tragedy; and though The Conquest of Granada (1669-1676) and Tyrannic Love would be very open to satire in Dryden's own vein, they are at least generously absurd. Their intention is never ignoble, if often impossible. After a time Dryden went back to Shakespeare, after a fashion already set by Sir William Davenant, the connecting link with the older tragedy and the inaugurator of the new. They "revived" Shakespeare; they vamped him in a style that did not wholly perish till after the time of Garrick. The Tempest, Troilus and Cressida, and Antony and Cleopatra were thus handled by Dryden; and the last of these, as converted by him into All for Love (1678), is loftier and stronger than any of his original plays, its blank verse renewing the ties of Restoration poetry with the great age. The heroic plays, written in one or other metre, lived long, and expired in the burlesques of Fielding and Sheridan. The Re- hearsal (1671), a gracious piece of fooling partially aimed at Dryden by Buckingham and his friends, did not suffice to kill its victims. Thomas Otway and Nathaniel Lee, both of whom generally used blank verse, are the other tragic writers of note, children indeed of the extreme old age of the drama. Otway's long-acted Venice Preserved (1682) has an almost Shakespearian skill in melodrama, a wonderful tide of passionate language, and a blunt and bold delineation of char- acter; but Otway's inferior style and verse could only be admired in an age like his own. Lee is far more of a poet, though less of a dramatist, and he wasted a certain talent in noise

and fury.

Restoration comedy at first followed Jonson, whom it was easy to try and imitate; Shadwell and Wilson, whose works are a museum for the social antiquary, photographed the humours of the town. Dryden's many comedies often show his more boisterous and blatant, rarely his finer qualities. Like all playwrights of the time he pillages from the French, and vulgarizes Moliere without stint or shame. A truer light comedy began with Sir George Etherege, who mirrored in

Otway.

Comedy.

i8th CENTURY}

ENGLISH LITERATURE

631

his fops the gaiety and insolence of the world he knew. The society depicted by William Wycherley, the one comic dramatist

of power between Massinger and Congreve, at first Wycher- seems hardly human; but his energy is skilful and

faithful as well as brutal; he excels in the graphic reckless exhibition of outward humours and bustle; he scavenges in the most callous good spirits and with careful cynicism. The Plain Dealer (1677), a skilful transplantation, as well as a de- pravation of Moliere's Le Misanthrope, is his best piece: he writes in prose, and his prose is excellent, modern and lifelike.

Bibliography. — General Histories: Hallam, Introduction to the Lit. of Europe (1838-1839); G. Saintsbury, Elizabethan Literature (1890), and History of Literary Criticism, vol. ii. (1902) ; W. J. Courthorpe, History of English Poetry, vols. i.-v. (1895-1905); J. J. Jusserand, Histoire litteraire du peuple anglais, vol. ii. (1904) ; T. Seccombe and J. W. Allen, The Age of Shakespeare (2 vols., 1903) ; D. Hannay, The Later Renaissance (1898); H. J. C. Grierson, First Half of 17th Century; O. Elton, The Augustan Ages (1899) ; Masson, Life of Milton (6 vols., London, 1881-1894); R. Garnett, The Age of Dryden (1901); W. Raleigh, The English Novel (1894); J. J. Jusserand, Le Roman anglais au temps de Shakespeare (1887, Eng. tr., 1901); G. Gregory Smith, Elizabethan Critical Essays (2 vols., 1904, reprints and introd.). *Classical and Foreign Influences. — ■ '*

Mary A. Scott, Elizabethan Translations from the Italian (bibliography), (Baltimore, 1895); E. Koeppel, Studien zur Gesch. der ital. Novelle i. d. eng. Litteratur des i6ten Jahrh. (Strasb., 1892); L. Einstein The Italian Renaissance in England (New York, 1902) ; J. Erskine, The Elizabethan Lyric (New York, 1903); J. S. Harrison, Platonism in Eliz. Poetry of the 16th and 17th Centuries (New York, 1903) ; S. Lee, Elizabethan Sonnets (2 vols., 1904) ; C. H. Herford, Literary Relations of England and Germany in 16th Century; J. G. Underhill, Spanish Lit. in the England of the Tudor s (New York, 1899) ; J. E. Spingarn, Hist, of Literary Criticism in the Renaissance (New York, 1899). Many articles in Englische Studien, Anglia, &c, on influences, texts and sources. See too arts. Drama; Sonnet ; Renaissance.

(O. E.)*

V. The i 8th Century

In the reign of Anne (1702-1714) the social changes which had commenced with the Restoration of 1660 began to make themselves definitely felt. Books began to penetrate

Social changes.

among all classes of society. The period is consequently one of differentiation and expansion. As the practice of reading becomes more and more universal, English writers lose much of their old idiosyncrasy, intensity and obscurity. As in politics and religion, so in letters, there is a great development of nationality. Commercial considerations too for the first time become important. We hear relatively far less of religious controversy, of the bickering between episcopalians and non- conformists and of university squabbles. Specialization and cumbrous pedantry fall into profound disfavour. Provincial feeling exercises a diminishing sway, and literature becomes increasingly metropolitan or suburban. With the multiplication of moulds, the refinement of prose polish, and the development of breadth, variety and ease, it was natural enough, having regard to the place that the country played in the world's affairs, that English literature should make its debut in western Europe. The strong national savour seemed to stimulate the foreign appetite, and as represented by Swift, Pope, Defoe, Young, Goldsmith, Richardson, Sterne and Ossian, if we exclude Byron and Scott, the 18th century may be deemed the cosmopolitan age, par excellence, of English Letters. The charms of 18th- century English literature, as it happens, are essentially of the rational, social and

translatable kind : in intensity, exquisiteness and eccentricity of the choicer kinds it is proportionately deficient. It is pre-eminently an ageof prose, and although verbal expression is seldom represented at its highest power, we shall find nearly every variety of English prose brilliantly illustrated during this period: the aristocratic style of Bolingbroke, Addison and Berkeley; the gentlemanly style of Fielding; the keen and logical controversy of Butler, Middleton, Smith and Bentham; the rhythmic and balanced if occasionally involved style of Johnson and his admirers; the limpid and flowing manner of Hume and Mackintosh ; the light, easy and witty flow of Walpole ; the divine chit-chat of Cowper; the colour of Gray and Berkeley; the organ roll of Burke; the detective journalism of Swift and Defoe; the sly familiarity of Sterne; the dance music and wax

candles of Sheridan; the pomposity of Gibbon; the air and ripple of Goldsmith; the peeping preciosity of Boswell, — these and other characteristics can be illustrated in 18th-century prose as probably nowhere else.

But more important to the historian of literature even than the development of qualities is the evolution of types. And in this respect the 18th century is a veritable index-museum of English prose. Essentially, no doubt, it is true that in form the prose and verse of the 18th century is mainly an extension of Dryden, just as in content it is a reflection of the increased variety of the city life which came into existence as English trade rapidly increased in all directions. But the taste of the day was rapidly changing. People began to read in vastly increasing numbers. The folio was making place on the shelves for the octavo. The bookseller began to transcend the mere tradesman. Along with newspapers the advertizing of books came into fashion, and the market was regulated no longer by what learned men wanted to write, but what an increasing multitude wanted to read. The arrival of the octavo is said to have marked the enrolment of man as a reader, t]jat of the novel the attachment of woman. Hence, among other causes, the rapid decay of lyrical verse and printed drama, of theology and epic, in ponderous tomes. The fashionable types of which the new century was to witness the fixation are accordingly the essay and the satire as represented respectively by Addison and Steele, Swift and Goldsmith, and by Pope and Churchill. Pope, soon to be followed by Lady Mary Wortley Montagu, was the first English- man who treated letter- writing as an. art upon a considerable scale. Personalities and memoirs prepare the way for history, in which as a department of literature English letters hitherto had been almost scandalously deficient. Similarly the new growth of fancy essay (Addison) and plain biography (Defoe)

prepared the way for the English novel, the most important by far of all new literary combinations. Finally, without going into unnecessary detail, we have a significant development of topography, journalism and criticism. In the course of time, too, we shall perceive how the pressure of town life and the logic of a capital city engender, first a fondness for landscape garden- ing and a somewhat artificial Arcadianism, and then, by degrees, an intensifying love of the country, of the open air, and of the rare, exotic and remote in literature.

At the outset of the new century the two chief architects of public opinion were undoubtedly John Locke and Joseph Addison. When he died at High Laver in October 1704 at the mature age of seventy-two, Locke had, Addison. perhaps, done more than any man of the previous century to prepare the way for the new era. Social duty and social responsibility were his two watchwords. The key to both he discerned in the Human Understanding — " no province of knowledge can be regarded as independent of reason." But the great modernist of the time was undoubtedly Joseph Addison (1672-1719). He first left the 17th century, with its stiff euphuisms, its foimal obsequiousness, its ponderous scholasticism and its metaphorical antitheses, definitely behind. He did for English culture what Rambouillet did for that of France, and it is hardly an exaggeration to call the half -century before the great fame of the English novel, the half century of the Spectator.

Addison's mind was fertilized by intercourse with the greater and more original genius of Swift and with the more inventive and more genial mind of Steele. It was Richard Steele (1672-1729) in the Taller of 1709-1710 who first realized that the specific which that urbane age both needed and desired was no longer copious preaching and rigorous declamation, but homoeopathic doses of good sense, good taste and good-humoured morality, disguised beneath an easy and fashionable style. Nothing could have suited Addison better than the opportunity afforded him of contributing an occasional essay or roundabout paper in praise of virtue or dispraise of stupidity and bad form to his friend's periodical. When the Spectator succeeded the Tatler in March 171 1, Addison took a more active share in shaping the chief characters (with the immortal baronet, Sir Roger, at their head) who were to make

SteeJe.

up the " Spectator Club "; and, better even than before, he saw his way, perhaps, to reinforcing his copious friend with his own more frugal but more refined endowment. Such a privileged talent came into play at precisely the right moment to circulate through the coffee houses and to convey a large measure of French courtly ease and elegance into the more humdrum texture of English prose. Steele became rather disreputable in his later years, Swift was banished and went mad, but Addison became a personage of the utmost consideration, and the essay as he left it became an almost indispensable accomplishment to the complete gentlemen of that age. As an architect of opinion from 1717 to 1775 Addison may well rank with Locke.

The other side, both in life and politics, was taken by Jonathan Swift (1667-1745), who preferred to represent man on his unsocial side. He sneered at most things, but not at his own order, and he came to defend the church and the country squirearchy against the conventicle and CapeJ court. To under- mine the complacent entrenchments of the Whig capitalists at war with France no sap proved so effectual as his pen. Literary influence was then exercised ia politics mainly by pamphlets, and Swift was the greatest of pamphleteers. In the Journal to Stella he has left us a most wonderful portrait of himself in turn currying favour, spoiled, petted and humiliated by the party leaders of the Tories from 1710-1713. He had always been savage, and when the Hanoverians came in and he was treated as a suspect, his hate widened to embrace all mankind {Gulliver's Travels, 1726) and he bit like a mad dog. Would that he could have bitten more, for the infection of English stylists ! In wit, logic, energy, pith, resourcefulness and Saxon simplicity, his prose has never been equalled. The choicest English then, it is the choicest English still. Dr John Arbuthnot (1667- 1735) may be described as an understudy of Swift on the whimsical side only, whose malignity, in a nature otherwise most kindly, was circumscribed strictly by the limits of political persiflage. Bernard Mandeville (1670-1733), un-orthodox as he was in every respect, discovered a little of Swift's choice pessimism in his assault (in The Fable of the Bees of 1723) against the genteel optimism of the Characteristics of Lord

Shaftesbury. Neither the matter nor the manner of the brilliant Tory chieftain Henry St John, Viscount Bolingbroke (1678-1751), appears to us now as being of the highest significance; but, although Bolingbroke's ideas were second-hand, his work has an historical importance; his dignified, balanced and decorated style was the cynosure of 18th-century statesmen. His essays on " History " and on " a Patriot King " both disturb a soil well prepared, and set up a reaction against such evil tendencies as a narrowing conception of history and a primarily factious and partisan conception of politics. It may be noted here how the fall of Bolingbroke and the Tories in 17 14 precipitated the decay of the Renaissance ideal of literary patronage. The dependence of the press upon the House of Lords was already an anomaly, and the practical toleration achieved in 1695 removed another obstacle from the path of liberation. The government no longer sought to strangle the press. It could generally be tuned satisfactorily and at the worst could always be temporarily muzzled. The pensions hitherto devoted to men of genius were diverted under Walpole to spies and journalists. Yet one of the most unscrupulous of all the fabricators of intelligence, looked down upon as a huckster of the meanest and most inconsiderable literary wares, established his fame by a masterpiece of which literary genius had scarcely even cognizance.

*The new trade of writing was represented most perfectly by Daniel Defoe (1660-1731), who represents, too, what few writers possess, a competent knowledge of work and wages, * ° e " buying and selling, the squalor and roguery of the very hungry and the very mean. From reporting sensations and chronicling faits divers, Defoe worked his way almost insensibly to the Spanish tale of the old Mendoza or picaresque pattern. Robinson Crusoe was a true story expanded on these lines, and written down under stress of circumstance when its author was just upon sixty. Resembling that of Bunyan and, later,*

Boling- broke.

Pope.

Smollett in the skilful use made of places, facts and figures, Defoe's style is the mirror of man in his shirt sleeves. What he excelled in was plain, straightforward story-telling, in under- standing and appraising the curiosity of the man in the street, and in possessing just the knowledge and just the patience, and just the literary stroke that would enable him most effectually to satisfy it. He was the first and cleverest of all descriptive reporters, for he knew better than any successor how and where to throw in those irrelevant details, tricks

of speech and circum- locution, which tend to give an air of verisimilitude to a bald and unconvincing narrative — the funny little splutterings and naivetes as of a plain man who is not telling a tale for effect, but striving after his own manner to give the plain unvarnished truth. Defoe contributes story, Addison character, Fielding the life-atmosphere, Richardson and Sterne the sentiment, and we have the 18th-century novel complete — the greatest literary birth of modern time. Addison, Steele, Swift and Defoe, as master-builders of prose fiction, are consequently of more importance than the " Augustan poets," as Pope and his school are sometimes called, for the most that they can be said to have done is to have perfected a more or less transient mode of poetry. To the passion, imagination or musical quality essential to the most inspired kinds of poetry Alexander Pope (1688-1744) can lay small claim. His best work is contained in the Satires and Epistles, which are largely of the proverb-in-rhyme order. Yet in lucid, terse and pungent phrases he has rarely if ever been surpassed. His classical fancy, his elegant turn for periphrasis and his venomous sting alike made him the idol of that urbane age. Voltaire in 1726 had called him the best poet living, and at his death his style was paramount throughout the civilized world. It was the apotheosis of wit, point, lucidity and technical correctness. Pope was the first Englishman to make poetry pay (apart from patronage). He was flattered by imitation to an extent which threatened to throw the school of poetry which he represented into permanent discredit. Prior, Gay, Parnell, Akenside, Pomfret, Garth, Young, Johnson, Goldsmith, Falconer, Glover, Grainger, Darwin, Rogers, Hayley and indeed a host of others — the once famous mob of gentlemen who wrote with ease — wor- shipped Pope as their poetic founder. The second-rate wore his badge. But although the cult of Pope was the established religion of poetic taste from 1714 to 1798, there were always nonconformists. The poetic revolt, indeed, was far more versatile than the religious revival of the century. The Winter (1726) of Tames Thomson may be regarded as in- _.

K ' '. ••c-i-i.i tj Thomson.

augurating a new era in English poetry. Lady Winchilsea, John Philips, author of Cyder, and John Dyer, whose Grongar Hill was published a few months before Winter, had pleaded by their work for a truthful and unaffected, and at the same time a romantic treatment of nature in poetry; but the ideal of artificiality and of a frigid poetic diction by which English poetry was dominated since the days of Waller and Cowley was first effectively challenged by Thomson. At the time when the Popean couplet was at the height of its vogue he

deliberately put it aside in favour of the higher poetic power of blank verse. And he it was who transmitted the sentiment of natural beauty not merely to imitators such as Savage, Armstrong, Somerville, Langhorne, Mickle and Shenstone, but also to his elegist, William Collins, to Gray and to Cowper, and aray. so indirectly to the lyrical bards of 1798. By the same hands and those of Shenstone experiments were being made in the stanza of The Faerie Queene; a little later, owing to the virtuosity of Bishop Percy, the cultivation of the old English and Scottish ballad literature was beginning to take a serious turn. Dissatisfaction with the limitations of "Augustan" poetry was similarly responsible for the revived interest in Shakespeare and Chaucer. Gray stood not only for a far more intimate worship of wild external nature, but also for an awakened curiosity in Scandinavian, Celtic and Icelandic poetry.

To pretend then that the poetic heart of the 18th century was Popean to the core is nothing short of extravagance. There were a number of true poets in the second and third quarters of

the century to whom all credit is due as pioneers and precentors of the romantic movement under the depressing conditions to which innovators in poetry are commonly subject. They may strike us as rather an anaemic band after the great Elizabethan poets. Four of them were mentally deranged (Collins, Smart, Cowper, Blake), while Gray was a hermit, and Shenstone and Thomson the most indolent of recluses. The most adventurous, one might say the most virile of the group, was a boy who died at the age of seventeen. Single men all (save for Blake), a more despondent group of artists as a whole it would not perhaps be easy to discover. Catacombs and cypresses were the forms of imagery that came to them most naturally. Elegies and funeral odes were the types of expression in which they were happiest. Yet they strove in the main to follow the gleam in poetry, to reinstate imagination upon its throne, and to substitute the singing voice for the rhetorical recitative of the heroic couplet. Within two years of the death of Pope, in 1746, William Collins was content to sing (not say) what he had in him without a glimpse of wit or a flash of eloquence — and in him many have discerned the germ of that romantic eclosion which blossomed in Chrisiabel. A more important if less original factor in that movement was Collins's severe critic

Thomas Gray, a man of the widest curiosities of his time, in whom every attribute of the poet to which scholar- ship, taste and refinement are contributory may be found to the full, but in whom the strong creative energy is fatally lacking — despite the fact that he wrote a string of " divine truisms " in his Elegy, which has given to multitudes more of the exquisite pleasure of poetry than any other single piece in the English language. Shenstone and Percy, Capell, the Wartons and eventually Chatterton, continued to mine in the shafts which Gray had been the first to sink. Their laborious work of dis- covery resembled that which was commencing in regard to the Gothic architecture which the age of Pope had come to regard as rude and barbaric. The Augustans had come seriously to regard all pre-Drydenic poetry as grossly barbarian. One of the greatest achievements of the mid-eighteenth century was concerned with the disintegration of this obstinate delusion. The process was manifold; and it led, among other things, to a realization of the importance of the study of comparative literature.

The literary grouping of the 18th century is, perhaps, the biggest thing on the whole that English art has to show; but among all its groups the most famous, and probably the most original, is that of its proto-novelists Richardson, Fielding, Smollett and Sterne. All nations have had their novels, which are as old at least as Greek vases. The various types have generally had collective appellations such as Milesian Tales, Alexandrian Romances, Romances of Chivalry, Acta Sanctorum, Gesta Romanorum, Cent Nouvelles Nouvelles, Romances of Roguery, Arabian Nights; but owing to the rivalry of other more popular or more respectable or at least more eclectic literary forms, they seldom managed to attain a permanent lodgment in the library. The taste in prose fiction changes, perhaps, more rapidly than that in any other kind of literature. In Britain alone several forms had passed their prime since the days of Caxton and his Arthurian prose romance of Morte d' Arthur. Such were the wearisome Arcadian romance or pastoral heroic; the new centos of tales of chivalry like the Seven Champions of Christendom; the Utopian, political and philosophical romances (Oceana, The Man in the Moone) ; the grotesque and facetious stories of rogues retailed from the Spanish or French in dwarf volumes; the prolix romance of modernized classic heroism (The Grand Cyrus) ; the religious allegory (Bunyan's Life and Death of Mr Badman) ; the novels of outspoken French or Italian gallantry, represented by Aphra Behn; the imaginary voyages so notably adapted to satire by Dr Swift; and last, but not least, the minutely prosaic chronicle- novels of Daniel Defoe. The prospect of the novel was changing rapidly. The development of the individual

and of a large well-to-do urban middle class, which was rapidly multiplying its area of leisure, involved a curious and self-conscious society, hungry for pleasure and new sensations, anxious to be told about

The novel.

Richard- son.

Fielding.

themselves, willing in some cases even to learn civilization from their betters. The disrepute into which the drama had fallen since Jeremy Collier's attack on it directed this society by an almost inevitable course into the flowery paths of fiction. The novel, it is true, had a reputation which was for the time being almost as unsavoury as that of the drama, but the novel was not a confirmed ill-doer, and it only needed a touch of genius to create for it a vast congregation of enthusiastic votaries. In the Toiler and Spectator were already found the methods and subjects of the modern novel. The De Coverley papers in the Spectator, in fact, want nothing but a love-thread to convert them into a serial novel of a high order. The supreme importance of the sentimental interest had already been discovered and exemplified to good purpose in France by Madame de la Fayette, the Marquise de Tencin, Marivaux and the Abbe Prevost. Samuel Richardson (1689-1762), therefore, when he produced the first two modern novels of European fame in Pamela (1740) and Clarissa (1748), inherited far more than he invented. There had been Richardsonians before Richardson. Clarissa is nevertheless a pioneer work, and we have it on the high authority of M. Jusserand that the English have contributed more than any other people to the formation of the contemporary novel. Of the long-winded, typical and rather chaotic English novel of love analysis and moral sentiment (as opposed to the romance of adventure) Richardson is the first successful charioteer.

The novel in England gained prodigiously by the shock of opposition between the ideals of Richardson and Henry Fielding (1707-17 54), his rival and parodist. Fielding's brutal toleration is a fine corrective to the slightly rancid morality of Richardson, with its frank insistence upon the cash-value of chastity and virtue. Fielding is, to be brief, the succinct antithesis of Richardson, and represents the opposite pole of English character. He is the Cavalier, Richardson the Roundhead; he is the gentleman, Richardson the tradesman; he represents church and county, Richardson chapel and borough.

Richardson had much of the patient insight and intensity of genius, but he lacked the humour and literary accomplishment which Fielding had in rich abundance. Fielding combined breadth and keenness, classical culture and a delicate Gallic irony to an extent rare among English writers. He lacked the delicate intuition of Richardson in the analysis of women, nor could he compass the broad farcical humour of Smollett or the sombre colouring by which Smollett produces at times such poignant effects of contrast. There was no poetry in Fielding; but there was practically every other ingredient of a great prose writer — taste, culture, order, vivacity, humour, penetrating irony and vivid, pervading common sense, and it is Fielding's chef-d'oeuvre Tom Jones (1749) that we must regard if not as the fundament at least as the head of the corner in English prose fiction. Before Tom Jones appeared, the success of the novel had drawn a new competitor into the field in Tobias Smollett, the descendant of a good western lowland family who had knocked about the world and seen more of its hurlyburly than Fielding himself. In Roderick Random (1748) Smollett represents a rougher and more uncivilized world even than that depicted in Joseph Andrews. The savagery and horse-play peculiar to these two novelists derives in part from the rogue romance of Spain (as then recently revived by Lesage) , and has a counterpart to some extent in the graphic art of Hogarth and Rowlandson; yet one cannot altogether ignore an element of exaggeration which has greatly injured both these writers in the estimation (and still more in the affection) of posterity. The genius which struggles through novels such as Roderick Random and Ferdinand Count Fathom was nearly submerged under the hard conditions of a general writer during the third quarter of the 1 8th century, and it speaks volumes for Smollett's powers of recuperation that he survived to write two such masterpieces of sardonic and humorous observation as his Travels and Humphry Clinker.

The fourth proto-master of the English novel was the anti- quarian humorist Lawrence Sterne. Though they owed a

Smollett.

Johnson.

good deal to Don Quixote and the French novelists, Fielding and Smollett were essentially observers of life in the quick.

Sterne brought a far-fetched style, a bookish apparatus

and a deliberate eccentricity into fiction. Tristram Shandy, produced successively in nine small volumes between 1760 and 1764, is the pretended history of a personage who is not born (before the fourth volume) and hardly ever appears, carried on in an eccentric rigmarole of old and new, original and borrowed humour, arranged in a style well known to students of the later Valois humorists as fatrasie. Far more than Moliere, Sterne took his literary bien wherever he found it. But he invented a kind of tremolo style of his own, with the aid of which, in conjunction with the most unblushingly indecent innuendoes, and with a conspicuous genius for humorous por- traiture, trembling upon the verge of the pathetic, he succeeded in winning a new domain for the art of fiction.

These four great writers then, Richardson, Fielding, Smollett and Sterne — all of them great pessimists in comparison with the benignant philosophers of a later fiction — first thoroughly fer- tilized this important field. Richardson obtained a European fame during his lifetime. Sterne, as a pioneer impressionist, gave all subsequent stylists a new handle. Fielding and Smollett grasped the new instrument more vigorously, and fashioned with it models which, after serving as patterns to Scott, Marryat, Cooper, Ainsworth, Dickens, Lever, Stevenson, Merriman, Weyman and other romancists of the 19th century, have still retained a fair measure of their original popularity un- impaired.

Apart from the novelists, the middle period of the 18th century is strong in prose writers: these include Dr Johnson, Oliver

Goldsmith, Lord Chesterfield and Horace Walpole.

The last three were all influenced by the sovereign lucidity of the best French style of the day. Chesterfield and Walpole were both writers of aristocratic experience and of European knowledge and sentiment. Johnson alone was a distinctively English thinker and stylist. His knowledge of the world, outside England, was derived from books, he was a good deal of a scholar, an earnest moralist, and something of a divine; his style, at any rate, reaches back to Taylor,. Barrow and South, and has a good deal of the complex structure, the cadence, and the balance of English and Latinistic words proper to the 17th century, though the later influence of Addison and Bolingbroke is

also apparent; Johnson himself was fond of the essay, the satire in verse, and the moral tale (Rasselas) ; but he lacked the creative imagination indispensable for such work and excelled chiefly as biographer and critic. For a critic even, it must be admitted that he was singly deficient in original ideas. He upholds authority. He judges by what he regards as the accepted rules, derived by Dryden, Rapin, Boileau, Le Bossu, Rymer, Dennis, Pope and such " estimable critics " from the ancients, whose decisions on such matters he regards as para- mount. He tries to carry out a systematic, motived criticism; but he asserts rather than persuades or convinces. We go to his critical works (Lives of the Poets and Essay on Shakespeare) not for their conclusions, but for their shrewd comments on life, and for an application to literary problems of a caustic common sense. Johnson's character and conversation, his knowledge and 'memory were far more remarkable than his ideas or his writings, admirable though the best of these were; the exceptional traits which met in his person and made that age regard him as a nonpareil have found in James Boswell a delineator un- rivalled in patience, dexterity and dramatic insight. The result has been a portrait of a man of letters more alive at the present time than that which any other age or nation has be- queathed to us. In most of his ideas Johnson was a generation behind the typical academic critics of his date, Joseph and Thomas Warton, who championed against his authority what the doctor regarded as the finicking notions of Gray. Both of the Wartons were enthusiastic for Spenser and the older poetry; they were saturated with Milton whom they placed far above the correct Mr Pope, they wrote sonnets (thereby provoking Johnson's ire) and attempted to revive medieval and Celtic lore

Gold- smith.

in every direction. Johnson's one attempt at a novel or tale was Rasselas, a long " Rambler " essay upon the vanity of human hope and ambition, something after the manner of the Oriental tales of which Voltaire had caught the idea from Swift and Montesquieu; but Rasselas is quite unenlivened by humour, personality or any other charm.

This one quality that Johnson so completely lacked was possessed in its fullest perfection by Oliver Goldsmith, whose style is the supreme expression of 18th-century clear- ness, simplicity and easy graceful fluency. Much of Goldsmith's material, whether as playwright, story writer or essayist, is trite and commonplace — his material worked up by any other hand would be worthless. But, when- ever Goldsmith writes about human life, he seems to pay it a compliment, a relief of

fun and good fellowship accompanies his slightest description, his playful and delicate touch could trans- form every thought that he handled into something radiant with sunlight and fragrant with the perfume of youth. Goldsmith's plots are Irish, his critical theories are French with a light top dressing of Johnson and Reynolds or Burke, while his prose style is an idealization of Addison. His versatility was great, and, in this and in other respects, he and Johnson are con- stantly reminding us that they were hardened professionals, writing against time for money.

Much of the best prose work of this period, from 1740 to 1780, was done under very different conditions. The increase of travel, of intercourse between the nobility of Europe, and of a sense of solidarity, self-consciousness, leisure and connoisseurship among that section of English society known as the governing class, or, since Disraeli, as " the Venetian oligarchy," could hardly fail to produce an increasing crop of those elaborate collections of letters and memoirs which had already attained their apogee in France with Mme de Sevigne and the due de Saint-Simon. England was not to remain far behind, for in 1718 commence the Letters of Lady Mary Wortley Montagu; ten years more saw the commencement of Lord Hervey's Memoirs of the Reign of George II. ; and Lord Chesterfield and Lord Orford (better known as Horace Walpole) both began their J.!. 5 '*"^ inimitable series of Letters about 1740. These writings, walpole. none of them written ostensibly for the press, serve to show the enormous strides that English prose was making as a medium of vivacious description. x The letters are all the re- creation of extensive knowledge and cosmopolitan acquirements; they are not strong on the poetic or imaginative side of things, but they have an intense appreciation of the actual and mundane side of fallible humanity. Lord Chesterfield's Letters to his son and to his godson are far more, for they introduce a Ciceronian polish and a Gallic irony and wit into the hitherto uncultivated garden of the literary graces in English prose. Chesterfield, whose theme is manners and social amenity, deliberately seeks a form of expression appropriate to his text — the perfection of tact, neatness, good order and savoirfaire. After his grandfather, the marquess of Halifax, Lord Chesterfield, the synonym in the vulgar world for a heartless exquisite, is in reality the first fine gentleman and epicurean in the best sense in English polite literature. Both Chesterfield and Walpole were conspicuous as raconteurs in an age of witty talkers, of whose talk R. B. Sheridan, in The School for Scandal (1777), served up a supreme. Some of it may be tinsel, but it looks wonderfully well under the lights. The star comedy of the century represents the sparkle of this*

brilliant crowd: it reveals no hearts, but it shows us every trick of phrase, every eccentricity of manner and every foible of thought. But the most mundane of the letter writers, the most frivolous, and also the most pungent, is Horace Walpole, whose writings are an epitome of the history and biography of the Georgian era. " Fiddles sing all through them, wax lights, fine dresses, fine jokes, fine plate, fine equipages glitter and sparkle; never was such a brilliant, smirking Vanity Fair as that through which he leads us." Yet, in some ways, he was a corrective to the self-complacency of his generation, a vast dilettante, lover of " Gothic," of curios and antiques, of costly printing, of old' illuminations and stained glass. In his short miracle-novel,

author- ship.

called The Castle of Otranto, he set a fashion for mystery and terror in fiction, for medieval legend, diablerie, mystery, horror, antique furniture and Gothic jargon, which led directly by the route of Anne Radcliffe, Maturin, Vathek, St Leon and Frankenstein, to Queenhoo Hall, to Waverley and even to Hugo and Poe.

Meanwhile the area of the Memoir was widening rapidly in the hands of Fanny, the sly daughter of the wordly-wise and

fashionable musician, Dr Burney, author of a novel Brne {Evelina) most satirical and facete, written ere she was

Boswell. well out of her teens; not too kind a satirist of her

former patroness, Mrs Thrale (afterwards Piozzi), the least tiresome of the new group of scribbling sibyls, blue stockings, lady dilettanti and Delia Cruscans. Both, as portraitists and purveyors of Johnsoniana, were surpassed by the inimitable James Boswell, first and most fatuous of all interviewers, in brief a biographical genius, with a new recipe, distinct from Sterne's, for disclosing personality, and a deliberate, artificial method of revealing himself to us, as it were, unawares.

From all these and many other experiments, a far more flexible prose was developing in England, adapted for those critical reviews,

magazines and journals which were multiplying rapidly to exploit the new masculine interest, apart from the schools, in history, topography, natural philosophy and the picturesque, just as circulating libraries were springing up to exploit the new feminine passion for fiction, which together with memoirs and fashionable poetry contributed to give the booksellers bigger and bigger ideas.

It is surprising how many types of literary productions with which we are now familiar were first moulded into definite and The pro-classical form during the Johnsonian period. In tress of addition to the novel one need only mention the

economic treatise, as exemplified for the first time in

the admirable symmetry "of The Wealth of Nations, the diary of a faithful observer of nature such as Gilbert White, the Fifteen Discourses (1769-1791) in which Sir Joshua Reynolds endeavours for the first time to expound for England a philosophy of Art, the historico-philosophical tableau as exemplified by Robertson and Gibbon, the light political parody of which the poetry of The Rolliad and Anti- Jacobin afford so many excellent models; and, going to the other extreme, the ponderous archaeological or topographical monograph, as exemplified in Stuart and Revett's Antiquities of Athens, in Robert Wood's colossal Ruins of Palmyra (1753), or the monu- mental History of Leicestershire by John Nichols. Such works as this last might well seem the outcome of Horace Walpole's maxim: In this scribbling age " let those who can't write, glean." In short, the literary landscape in Johnson's day was slowly but surely assuming the general outlines to which we are all accustomed. The literary conditions of the period dated from the time of Pope in their main ieatures, and it is quite possible that they were more considerably modified in Johnson's own lifetime than they have been since. The booksellers, or, as they would now be called, publishers, were steadily superseding the old ties of patronage, and basing their relations with authors upon a commercial footing. A stage in their progress is marked by the success of Johnson's friend and Hume's correspondent, William Strahan, who kept a coach, " a credit to literature." The evolution of a normal status for the author was aided by the definition of copyright and gradual extinction of piracy.

Histories of their own time by Clarendon and Burnet have been in much request from their own day to this, and the first, at least, Historians ' s a ˆ ne mon ument of English prose; Bolingbroke

again, in 1735, dwelt memorably upon the ethical, political and

philosophical value of history. But it was not until the third quarter of the 18th century that English literature freed itself from the imputation of lagging hopelessly behind France, Italy and Germany in the serious work of historical reconstruc- tion. Hume published the first volume of his History of England in 1754. Robertson's History of Scotland saw the light in i759and Us Charles V. in 1769; Gibbon's Decline and Fall of the Roman Empire came in 1776. Hume was, perhaps, the first modernist

in history; he attempted to give his work a modern interest and, Scot though he was, a modern style — it could not fail, as he knew, to derive piquancy from its derision of the Whiggish assumption which regarded 1688 as a political millennium. Wm. Robertson was, perhaps, the first man to adapt the polished periphrases of the pulpit to historical generalization. The gifts of compromise which he had learned as Moderator of the General Assembly he brought to bear upon his historical studies, and a language so unfamiliar to his lips as academic English he wrote with so much the more care that the greatest connoisseurs of the day were enthusiastic about " Robertson's wonderful style." Even more portentous in its superhuman dignity was the style of Edward Gibbon, who conbined with the unspiritual optimism of Hume and Robertson a far more concentrated devotion to his subject, an industry more monumental, a greater co-ordinative vigour, and a malice which, even in the 18th century, rendered him the least credulous man of his age. Of all histories, therefore, based upon the transmitted evidence of other ages rather than on the personal observation of the writer's own, Gibbon's Decline and Fall has hitherto maintained its reputation best. Hume, even before he was superseded, fell a prey to continuations and abridge- ments, while Robertson was supplanted systematically by the ornate pages of W. H. Prescott.

The increasing transparency of texture in the working English prose during this period is shown in the writings of theologians such as Butler and Paley, and of thinkers such as Berkeley and Hume, who, by prolonging and extending Berkeley's contention that matter was an abstraction, had shown that mind would have to be considered an abstraction too, thereby signalling a school of reaction to common sense or " external reality " represented by Thomas Reid, and with modifications by David Hartley, Abraham Tucker and others. Butler and Paley are merely two of the biggest amd most characteristic apologists of that day, both great stylists, though it must be allowed that their very lucidity and good sense excites almost more doubt than it stills, and both very successful in repelling the enemy in controversy, though their very success accentuates the faults of that

unspiritual age in which churchmen were so far more concerned about the title deeds than about the living portion of the church's estate. Free thought was already beginning to sap their defences in various directions, and in Tom Paine, Priestley, Price, Godwin and Mackintosh they found more formidable adversaries than in the earlier deists. The greatest champion, however, of continuity and conservation both in church and state, against the new schools of latitudinarians and radicals, the great eulogist of the unwritten constitution, and the most perfect master of emotional prose in this period, prose in which the harmony of sense and sound is attained to an extent hardly ever seen outside supreme poetry, was Edmund Burke, one of the most commanding intellects in the whole range of political letters — a striking con- trast in this respect to Junius, whose mechanical and journalistic talent for invective has a quite ephemeral value.

From 1660 to 1760 the English mind was still much occupied in shaking off the last traces of feudality. The crown, the parlia- ment, the manor and the old penal code were left, it is true: but the old tenures and gild-brotherhoods, nature. ° the old social habits, miracles, arts, faith, religion and letters were irrevocably gone. The attempt of the young Chevalier in 1745 was a complete anachronism, and no sooner was this generally felt to be so than men began to regret that it should so be. Men began to describe as " grand " and " pictur- esque " scenery hitherto summarized as " barren mountains covered in mist "; while Voltaire and Pope were at their height, the world began to realize that the Augustan age, in its zeal for rationality, civism and trim parterres, had neglected the wild freshness of an age when literature was a wild flower that grew on the common. Rousseau laid the axe to the root of this over- sophistication of life; Goldsmith, half understanding, echoed some of his ideas in " The Deserted Village." Back from books to men was now the prescription- — from the crowded town to the spacious country. From plains and valleys to peaks and pinewoods. From cities, where men were rich and corrupt,

to the earlier and more primitive moods of earth. The breath had scarcely left the body of the Grand Monarque before an intrigue was set on foot to dispute the provisions of his will. So with the critical

testament of Pope. Within a few years of his death we find Gray, Warton, Hurd and other disciples of the new age denying to Pope the highest kind of poetic excellence, and exalting imagination and fancy into a sphere far above the Augustan qualities of correct taste and good judgment. De- centralization and revolt were the new watchwords in literature. We must eschew France and Italy and go rather to Iceland or the Hebrides for fresh poetic emotions: we must shun academies and classic "coffee-houses and go into the street-corners or the hedge-lanes in search of Volkspoesie. An old muniment chest

and a roll of yellow parchment were the finest incen- Chaage la t j ves t0 tne new S pj r it of the picturesque. How else spirit. are we t0 explain the enthusiasm that welcomed the

sham Ossianic poems of James Macpherson in 1760; Percy's patched-up ballads of 1765 (Reliques of Ancient Poetry); the new enthusiasm for Chaucer; the " black letter " school of Ritson, Tyrrwhitt; George Ellis, Steevens, Ireland and Malone; above all, the spurious 15th-century poems poured forth in 1768- 1769 with such a wild gusto of archaic imagination by a prodigy not quite seventeen years of age ? Chatterton's precocious fantasy cast a wonderful spell upon the romantic imagination of other times. It does not prepare us for the change that was coming over the poetic spirit of the last two decades of the century, but it does at least help us to explain it. The great masters of verse in Britain during this period were the three very disparate figures of William Cowper, William Blake and Robert Burns. Cowper was not a poet of vivid and rapturous visions. There is always something of the rusticating city- scholar about his humour. The ungovernable impulse and imaginative passion of the great masters of poesy were not his to claim. His motives to express himself in verse came very largely from the outside. The greater part, nearly all his best poetry is of the occasional order. To touch and retouch, he says, in one of his letters — among the most delightful in English- is the secret of almost all good writing, especially verse. What- ever is short should be nervous, masculine and compact. In all

the arts that raise the best occasional poetry to the Cowper. i eve i f greatness Cowper is supreme. In phrase- Burn's. moulding, verbal gymnastic and prosodical marquetry

he has scarcely a rival, and the fruits of his poetic industry are enshrined in the filigree of a most delicate fancy and a highly cultivated intelligence, purified and thrice refined in the fire of mental affliction. His work expresses the rapid civilization of his

time, its humanitarian feeling and growing sensitiveness to natural beauty, home comfort, the claims of animals and the charms of light literature. In many of his short poems, such as " The Royal George," artistic simplicity is indistinguishable from the stern reticence of genius. William Blake had no immediate literary descendants, for he worked alone, and Lamb was practically alone in recognizing what he wrote as poetry. But he was by far the most original of the reactionaries who preceded the Romantic Revival, and he caught far more of the Elizabethan air in his lyric verse than any one else before Coleridge. The Songs of Innocence and Songs of Experience, in 1789 and 1794, sing themselves, and have a bird- like spontaneity that has been the despair of all song-writers from that day to this. After 1800 he winged his flight farther and farther into strange and unknown regions. In trie finest of these earlier lyrics, which owe so little to his contemporaries, the ripple of the stream of romance that began to gush forth in 1798 is distinctly heard. But the first poetic genius of the century was unmistakably Robert Burns. In song and satire alike Burns is racy, in the highest degree, of the poets of North Britain, who since Robert Sempill, Willy Hamilton of Gilbertfield, douce Allan Ramsay, the Edinburgh periwig-maker and miscellanist, and Robert Fergusson, " the writer-chiel, a deathless name," had kept alive the old native poetic tradition, had provided the strolling fiddlers with merry and wanton staves, and had perpetu- ated the daintiest shreds of national music, the broadest col-

loquialisms, and the warmest hues of patriotic or local sentiment. Burns immortalizes these old staves by means of his keener vision, his more fiery spirit, his stronger passion and his richer volume of sound. Burns's fate was a pathetic one. Brief, broken glimpses of a genius that could never show itself complete, his poems wanted all things for completeness: culture, leisure, sustained effort, length of life. Yet occasional, fragmentary, extemporary as most of them are, they bear the guinea stamp of true genius. His eye is unerring, his humour of the ripest, his wit both fine and abundant. His ear is less subtle, except when dialect is concerned. There he is infallible. Landscape he understands in subordination to life. For abstract ideas about Liberty and 1789 he cares little. But he is a patriot and an insurgent, a hater of social distinction and of the rich. Of the divine right or eternal merit of the system under which the poor man sweats to put money into the rich man's pocket and fights to keep it there, and is despised in proportion to the amount of his perspiration, he had a low opinion. His work has inspired the meek, has made the poor feel themselves less of ciphers in the world and given courage to the down-trodden. His love of women has inspired some of the most

ardently beautiful lyrics in the world. Among modern folk-poets such as Jokai and Mistral, the position of Burns in the hearts of his own people is the best assured.

Bibliographical Note. — The dearth of KteraryhistoryinEngland makes it rather difficult to obtain a good general view of letters in Britain during the 18th century. Much may be gleaned, however, from chapters of Lecky's History of England during the 18th Century, from Stephen's Lectures on English Literature and Society in the 18th Century (1904), from Taine's History of English Literature (van Laun's translation), from vols. v. and vi. of Prof. Courthope's History oj English Poetry, and from the second volume of Chambers's Cyclo- paedia of English Literature (1902). The two vols, dealing respect- ively with the Age of Pope and the Age of Johnson in Bell's Hand- books of English Literature will be found useful, and suggestive chapters will be found in Saintsbury's Short History and in A. H. Thompson's Student's History of English Literature (1901). The same may, perhaps, be said of books v. and vi. in the Bookman Illustrated History of English Literature (1906), by the present writer. Sidelights of value are to be found in Walter Raleigh's little book on the English Novel, in Beljame's Le Publique et les hommes de lettres en Angleterre au XVIII" siecle, in H. A. Beers' History of English Romanticism in the 18th Century (1899), and above all in Sir Leslie Stephen's History of English Thought during the 18th Century; Stephen's Hours in a Library, the monographs dealing with the period in the English Men of Letters series, the Vignettes and Portraits of Austin Dobson and George Paston, Elwin's Eighteenth Century Men of Letters, and Thomas Wright's Caricature History of the Georges, must also be kept in mind. (T. Se.)

VI. The 19TH Century

We have seen how great was the reverence which the 18th century paid to poetry, and how many different kinds of poetic experiment were going on, mostly by the imitative efforts of revivalists (Spenserians, Miltonians, Shakespeareans, Ballad- mongers, Scandinavian, Celtic, Gothic scholars and the like), but also in the direction of nature study and landscape descrip- tion, while the more formal type of Augustan poetry, satire and description, in the direct succession of Pope, was by no means neglected.

The most original vein in the 19th century was supplied by the Wordsworth group, the first manifesto of which appeared in the Lyrical Ballads of 1798. William Wordsworth himself represents, in the first place, a revolutionary movement W orth' against the poetic

diction of study-poets since the first acceptance of the Miltonic model by Addison. His ideal, im- perfectly carried out, was a reversion to popular language of the utmost simplicity and directness. He added to this the idea of the enlargement of man by Nature, after Rousseau, and went further than this in the utterance of an essentially pantheistic desire to become part of its loveliness, to partake in a mystical sense of the loneliness of the mountain, the sound of falling water, the upper horizon of the clouds and the wind. To the growing multitude of educated people who were being pent in huge cities these ideas were far sweeter than the formalities of the old pastoral. Wordsworth's great discovery, perhaps, was that popular poetry need not. be imitative, artificial or condescending,

Lamb.

but that a simple story truthfully told of the passion, affliction or devotion of simple folk, and appealing to the primal emotion, is worthy of the highest effort of the poetic artist, and may achieve a poetic value far in advance of conventional descriptions of strikingly grouped incidents picturesquely magnified or rhetoric- ally exaggerated. But Wordsworth's theories might have ended very much where they began, had it not been for their impregna- tion by the complementary genius of Coleridge.

Coleridge at his best was inspired by the supreme poetic gifts of passion, imagination, simplicity and mystery, combining form Coleridze an ˆ colour, sound and sense, novelty and antiquity,

realism and romanticism, scholarly ode and popular ballad. His three fragmentary poems The Rime of the Ancient Mariner, Christabel and Kubla Khan are the three spells and touchstones, constituting what is often regarded by the best judges as the high-standard of modern English poetry. Their subtleties and beauties irradiated the homelier artistic conceptions of Wordsworth, and the effect on him was permanent. Cole- ridge's inspiration, on the other hand, was irrecoverable; a physical element was due, no doubt, to the first exaltation indirectly due to the opium habit, but the moral influence was contributed by the Wordsworths. The steady will of the Dalesman seems to have constrained Coleridge's imagination from

aimless wandering; his lofty and unwavering self-confidence inspired his friend with a similar energy. Away from Words- worth after 1 798, Coleridge lost himself in visions of work that always remained to be " transcribed," by one who had every poetic gift — save the rudimentary will for sustained and con- centrated effort.

Coleridge's more delicate sensibility to the older notes of that more musical era in English poetry which preceded the age of

Dryden and Pope was due in no small measure to the

luminous yet subtle intuitions of his friend Charles Lamb. Lamb's appreciation of the imaginative beauty inhumed in old English literature amounted to positive genius, and the persistence with which he brought his perception of the supreme importance of imagination and music in poetry to bear upon some of the finest creative minds of 1800, in talk, letters, selections and essays, brought about a gradual revolution in the aesthetic morality of the day. He paid little heed to the old rhetoric and the ars poetica of classical comparison. His aim was rather to discover the mystery, the folk-seed and the old-world element, latent in so much of the finer ancient poetry and implicit in so much of the new. The Essays of Elia (1820-1825) are the binnacle of Lamb's vessel of exploration. Lamb and his great

rival, William Hazlitt, both maintained that criticism

was not so much an affair of learning, or an exercise of comparative and expository judgment, as an act of imagination in itself. Hazlitt became one of the master essayists, a fine critical analyst and declaimer, denouncing all insipidity and affectation, stirring the soul with metaphor, soaring easily and acquiring a momentum in his prose which often approximates to the impassioned utterance of Burke. Like Lamb, he wanted to measure his contemporaries by the Elizabethans, or still older masters, and he was deeply impressed by Lyrical Ballads. The new critics gradually found responsible auxiliaries, notably

Leigh Hunt, De Quincey and Wilson of Blackwood's. h' 1 ^ n Leigh Hunt, not very important in himself, was a Quiacey, cause of great authorship in others. He increased*

both the depth and area of modern literary sensibility. The world of books was to him an enchanted forest, in which every leaf had its own secret. He was the most catholic of critics, but he knew what

was poor — at least in other people. As an essayist he is a feminine diminutive of Lamb, excellent in fancy and literary illustration, but far inferior in decisive insight or penetrative masculine wit. The Miltonic quality of im- passioned pyramidal prose is best seen in Thomas De Quincey, of all the essayists of this age, or any age, the most diffuse, unequal and irreducible to rule, and which yet at times trembles upon the brink of a rhythmical sonority which seems almost to rival that of the greatest poetry. Leigh Hunt supplies a valuable link between Lamb, the sole external moderator of the Lake

Hazlitt.

school, Byron, Shelley, and the junior branch of imaginative Aesthetic, represented by Keats.

John Keats (1795-1821), three years younger than Shelley, was the greatest poetic artist of his time, and would probably have surpassed all, but for his collapse of health at K . twenty-five. His vocation was as unmistakable as that of Chatterton, with whose youthful ardour his own had points of likeness. The two contemporary conceptions of him as a fatuous Cockney Bunthorne or as " a tadpole of the lakes " were equally erroneous. But Keats was in a sense the first of the virtuoso or aesthetic school (caricatured later by the formula of " Art for Art's sake "); artistic beauty was to hirri a kind of religion, his expression was more technical, less personal than that of his contemporaries, he was a conscious " romantic," and he travelled in the realms of gold with less impedimenta than any of his fellows. Byron had always himself to talk about, Wordsworth saw the universe too much through the medium of his own self-importance, Coleridge was a metaphysician, Shelley hymned Intellectual Beauty; Keats treats of his subject, " A Greek Urn," " A Nightingale," the season of " Autumn," in such a way that our thought centres not upon the poet but upon the enchantment of that which he sings. In his three great medievalising poems, " The Pot of Basil," " The Eve of St Agnes " and " La Belle Dame Sans Merci," even more than in his Odes, Keats is the forerunner of Tennyson, the greatest of the word-painters. But apart from his perfection of loveliness, he has a natural magic and a glow of humanity surpassing that of any other known poet. His poetry, immature as it was, gave a new beauty to the language. His loss was the greatest English Literature has sustained.

Before Tennyson, Rossetti and Morris, Keats's best disciples in the aesthetic school were Thomas Lovell Beddoes, George Dailey and Thomas Hood, the failure of whose , " Midsummer Fairies " and " Fair Inez " drove him into that almost mortific vein of verbal humour

which threw up here and there a masterpiece such as " The Song of a Shirt." The master virtuoso of English poetry in another department (the classical) during this and the following age was Walter Savage Landor, who threw off a few fragments of verse worthy of the Greek Anthology, but in his Dialogues or " Imaginary Conversa- tions " evolved a kind of violent monologizing upon the common- place which descends into the most dismal caverns of egotism. Carlyle furiously questioned his competence. Mr Shaw allows his classical amateurship and respectable strenuosity of char- acter, but denounces his work, with a substratum of truth, as that of a " blathering, unreadable pedant."

Among those, however, who found early nutriment in Landor's Miltonic Gebir (1798) must be reckoned the most poetical of our poets. P. B. Shelley was a spirit apart, who fits into ghette no group, the associate of Byron, but spiritually as ey '

remote from him as possible, hated by the rationalists of his age, and regarded by the poets with more pity than jealousy. He wrote only for poets, and had no public during his lifetime among general readers, by whom, however, he is now regarded as the poet par excellence. In his conduct it must be admitted that he was in a sense, like Coleridge, irresponsible, but on the other hand his poetic energy was irresistible and all his work is technic- ally of the highest order of excellence. In ideal beauties it is supreme; its great lack is its want of humanity; in this he is the opposite of Wordsworth who reads human nature into everything. Shelley, on the other hand, dehumanises things and makes them unearthly. He hangs a poem, like a cobweb or a silver cloud, on a horn of the crescent moon, and leaves it to dangle there in a current of ether. His quest was continuous for figures of beauty, figures, however, more ethereal and less sensuous than those in Keats; having obtained such an idea he passed it again and again through the prism of his mind, in talk, letters, prefaces, poems. The deep sense of the mystery of words and their lightest variations in the skein of poetry, half forgotten since Milton's time, had been recovered in a great measure by Coleridge and Wordsworth since 1798; Lamb, too, and Hazlitt, and, perhaps, Hogg were in the secret, while Keats

Byron.

had its open sesame on his lips ere he died. The union of poetic emotion with verbal music of the greatest perfection was the aim of all, but none of these masters made words breathe and sing with quite the same spontaneous ease and fervour that Shelley attained in some of the lyrics written between twenty-four and thirty, such as " The Cloud," " The Skylark," the " Ode of the West Wind," "The Sensitive Plant," the "Indian Serenade."

The path of the new romantic school had been thoroughly prepared during the age of Gray, Cowper and Burns, and it won its triumphs with little resistance and no serious convulsions. The opposition was noisy, but its representative character has been exaggerated. In the meantime, however, the old-fashioned school and the Popean couplet, the Johnsonian dignity of re- flection and the Goldsmithian ideal of generalized description, were well maintained by George Crabbe (1754-1832), " though Nature's sternest painter yet the best," a worsted-stockinged Pope and austere delineator of village misdoing and penurious age, and Samuel Rogers (1763-1855), the banker poet, liberal in sentiment, extreme Tory in form, and dilettante delineator of Italy to the music of the heroic couplet. Robert Southey, Thomas Campbell and Thomas Moore were a dozen years younger and divided their allegiance between two schools. In the main, however, they were still poeticisers of the orthodox old pattern, though all wrote a few songs of exceptional merit, and Campbell especially by defying the old anathemas.

The great champion of the Augustan masters was himself ■the architect of revolution. First the idol and then the outcast of respectable society, Lord Byron sought relief in new cadences and new themes for his poetic talent. He was, however, essentially a history painter or a satirist in verse. He had none of the sensitive aesthetic taste of a Keats, none of the spiritual ardour of a Shelley, or of the elemental beauty or artistry of Wordsworth or Coleridge. He manages the pen (said Scott) with the careless and. negligent ease of a man of quality. The " Lake Poets " sought to create an impression deep, calm and profound, Byron to start a theme which should enable him to pose, travel, astonish, bewilder and confound as lover of daring, freedom, passion and revolt. For the subtler symphonic music — that music of the spheres to which the ears of poets alone are attuned— Byron had an imperfect sympathy. The delicate ear is often revolted in his poetry by the vices of impromptu work. He steadily refused to polish, to file or to furbish — the damning, inevitable sign of a man born to wear a golden tassel. " I am like the

tiger. If I miss the first spring I go growling back to the jungle." Subtlety is sacrificed to freshness and vigour. The exultation, the breadth, the sweeping magnificence of his effects are consequently most appreciated abroad, where the ineradicable flaws of his style have no power to annoy.

The European fame of Byron was from the first something quite unique. At Missolonghi people ran through the streets crying " The great man is dead — he is gone." His corpse was refused entrance at Westminster; but the poet was taken to the inmost heart of Russia, Poland, Spain, Italy, France, Ger- many, Scandinavia, and among the Slavonic nations generally. In Italy his influence is plainly seen in Berchet, Leopardi, Giusti, and even Carducci. In Spain the Myrtle Society was founded in Byron's honour. Hugo in his Orientates traversed Greece. Chateaubriand joined the Greek Committee. Delavigne dedicated his verse to Byron; Lamartine wrote another canto to Childe Harold; Merirhee is interpenetrated by Byronesque feeling which also animates the best work of Heine, Pushkin, Lermontov, and Mickievicz, and even De Musset.

Like Scott, Byron was a man of two eras, and not too much ahead of his time to hold the Press-Dragon in fee. His supremacy and that of his satellites Moore and Campbell were championed by the old papers and by the two new blatant Quarterlies, whose sails. were filled not with the light airs of the future but by the Augustan " gales " of the classical past. The distinction of this new phalanx of old-fashioned critics who wanted to confer literature by university degree was that they wrote as gentlemen for gentlemen: they first

Criticism.

gave criticism in England a respectable shakedown. Francis Jeffrey, a man of extraordinary ability and editor of The Edin- burgh Review from 1803 to 1829 (with the mercurial Sydney Smith, the first of English conversationists, as his aide-de-camp), exercised a powerful influence as a standardizer of the second rate. He was one of the first of the critics to grasp firmly the main idea of literary evolution — the importance of time, environ- ment, race and historical development upon the literary land- scape; but he was vigorously aristocratic in his preferences, a hater of mystery, symbolism or allegory, an instinctive indi- vidualist of intolerant pattern. His chief weapons against the new ideas were social superiority and omniscience, and he used both unsparingly. The strident political partisanship of the Edinburgh raised up within six years a serious rival in the Quarterly, which was edited in turn by the good-natured peda- gogue William Gifford and by Scott's extremely able son-in-law John Gibson Lockhart, the " scorpion " of the infant Blackwood. With the aid of the remnant of the old anti- Jacobins, Canning, Ellis, Barrow, Southey, Croker, Hayward, Apperley and others, the theory of Quarterly infallibility was carried to its highest point of development about 1845.

The historical and critical work of the Quarterly era, as might be expected, was appropriate to this gentlemanly censorship. The thinkers of the day were economic or juristic — Bentham, the great codifier; Mai thus, whose theory of population gave Darwin his main impulse to theorise; and Mackintosh, whose liberal opposition to Burke deserved a better fate than it has ever perhaps received. The historians were mainly of the second class — the judicial Hallam, the ornate Roscoe, the plodding Lingard, the accomplished Milman, the curious Isaac DTsraeli, the academic Bishop Thirlwall. Mitford and Grote may be considered in the light of Tory and Radical historical pamphlet- eers, but Grote's work has the much larger measure of per- manent value. As the historian of British India, James Mill's industry led him beyond his thesis of Benthamism in practice. Sir William Napier's heroic picture of the Peninsular War is strongly tinged by bias against the Tory administration of 1808-1813; but it conserves some imperishable scenes of war. Some of the most magnetic prose of the Regency Period was contained in the copious and insincere but profoundly emotional- ising pamphlets of the self-taught Surrey labourer William Cobbett, in whom Diderot's paradox of a comedian is astonish- ingly illustrated. Lockhart's Lives of Burns and of Sir Walter Scott — the last perhaps the most memorable prose monument of its epoch — appeared in 1828 and 1838, and both formed the subjects of Thomas Carlyle in the Edinburgh Review,

where, under the unwelcome discipline of Jeffrey, the new prophet worked nobly though in harness.

Great as the triumph of the Romantic masters and the new ideas was, it is in the ranks of the Old School after all that we have to look for the greatest single figure in the literature of this age. Except in the imitative vein of ballad or folk-song, the poetry of Sir Walter Scott is never quite first-rate. It is poetry for repetition rather than for close meditation or contemplation, and resembles a military band more than a full orchestra. Nor will his prose bear careful analysis. It is a good servant, no more. When we consider, however, not the intensity but the vast extent, rang, and versatility of Scott's powers, we are constrained to assign him the first place in his own age, if not that in the next seat to Shakespeare in the whole of the English literary Pantheon. . Like Shakespeare, he made humour and a knowledge of human nature his first instruments in depicting the past. Unlike Shakespeare, he was a born antiquary, and he had a great (perhaps excessive) belief in mise en seine, costume, patois and scenic properties generally. His portraiture, however, is Shakespearean in its wisdom and maturity, and, although he wrote very rapidly, it must be remembered that his mind had been prepared by strenuous work for twenty years as a store- house of material in which nothing was handled until it had been carefully mounted by the imagination, classified in the memory, and tested by experimental use. Once he has got the imagination of the reader well grounded to earth, there is nothing he loves

better than telling a good story. Of detail he is often careless. But he trusted to a full wallet, and rightly, for mainly by his abundance he raised the literature of the novel to its highest point of influence, breathing into it a new spirit, giving it a fulness and universality of life, a romantic charm, a dignity and elevation, and thereby a coherence, a power and predominance which it never had before. '

In Scott the various lines of 18th-century conservatism and 19th-century romantic revival most wonderfully converge. His intense feeling for Long Ago made him a romantic almost from his cradle.

The master faculties of history and humour made a strong conservative of him; but his Toryism was of a very different spring from that of Coleridge or Wordsworth. It was not a reaction from disappointment in the sequel of 1780, nor was it the result of reasoned conviction. It was indwelling, rooted deeply in the fibres of the soil, to which Scott's attachment was passionate, and nourished as from a source by ancestral sentiment and " heather " tradition. This sentiment made Scott a victorious pioneer of the Romantic movement all over Europe. At the same time we must remember that, with all his fondness for medievalism, he was fundamentally a thorough 18th-century Scotsman and successor of Bailie Nicol Jarvie : a worshipper of good sense, toleration, modern and expert governmental ideas, who valued the past chiefly by way of picturesque relief, and was thoroughly alive to the benefit of peaceful and orderly rule, and deeply convinced that we are much better off as we are than we could have been in the days of King Richard or good Queen Bess. Scott had the mind of an enlightened 18th-century administrator and statesmen who had made a fierce hobby of armour and old ballads. To expect him to treat of intense passion or romantic medievalism as Charlotte Bronte or Dante Gabriel Rossetti would have treated them is as absurd as to expect to find the sentiments of a Mrs Browning blossoming amidst the horse-play of Tom Jones or Harry Lorrequer. Scott has few niceties or secrets: he was never subtle, morbid or fantastic. His handling is ever broad, vigorous, easy, careless, healthy and free. Yet nobly simple and straightforward as man and writer were, there is something very complex about his literary legacy, which has gone into all lands and created bigoted enemies (Carlyle, Borrow) as well as unexpected friends (Hazlitt, Newman, Jowett) ; and we can seldom be sure whether his influence is reactionary or the reverse. There has always been something semi-feudal about it. The " shirra " has a demesne in letters as broad as a countryside, a band of mesne vassals and a host of Eildon hillsmen, Tweedside cottiers, minor feudatories and forest retainers attached to the " Abbotsford Hunt." Scott's humour, humanity and insistence upon the continuity of history transformed English literature profoundly.

Scott set himself to coin a quarter of a million sterling out of the new continent of which he felt himself the Columbus. He failed (quite narrowly), but he made the Novel the paymaster of literature for at least a hundred years. His immediate contemporaries and successors were not particularly great. John Gait (1770-1830), SusanFerrier (1782- 1854) and D. M. Moir (1798-1851) all attempted the delineation of Scottish scenes with a good deal of shrewdness of

insight and humour. The main bridge from Scott to the great novelists of the 'forties and 'fifties was supplied by sporting, military, naval and political novels, represented in turn by Surtees, Smith, Hook, Maxwell, Lever, Marryat, Cooper, Morier, Ainsworth, Bulwer Lytton and Disraeli. Surtees gave all-important hints to Pick- wick, Marryat developed grotesque character-drawing, Ainsworth and Bulwer attempted new effects in criminology and con- temporary glitter. Disraeli in the 'thirties was one of the fore- most romantic wits who had yet attempted the novel. Early in the 'forties he received the laying-on of hands from the Young England party, and attempted to propagandize the good tidings of his mission in Coningsby and Sybil, novels full of entrainement and promise, if not of actual genius. Unhappily the author was enmeshed in the fatal drolleries of the English party system, and Lothair is virtually a confession of abandoned ideals. He completes the forward party in fiction; Jane Austen (1775—

Transition fiction.

Victorian era.

1815) stands to this as Crabbe and Rogers to Coleridge and Shelley. She represents the fine flower of the expiring 18th century. Scott could do the trumpet notes on the organ. She fingers the fine ivory flutes. She combines self-knowledge and artistic reticence with a complete tact and an absolute lucidity of vision within the area prescribed. Within the limits of a park wall in a country parish, absolutely oblivious of Europe and the universe, her art is among the finest and most finished that our literature has to offer. In irony she had no rival at that period. But the trimness of her plots and the delicacy of her miniature work have affinities in Maria Edgeworth, Harriet Martineau and Mary Russell Mitford, three excellent writers of pure English prose. There is a finer aroma of style in the contemporary " novels " of Thomas Love Peacock (1785-1866). These, how- ever, are rather tournaments of talk than novels proper, releasing a flood of satiric portraiture upon the idealism of the day — difficult to be apprehended in perfection save by professed students. Peacock's style had an appreciable influence upon his son-in-law George Meredith (1828-1909). His philosophy is for the most part Tory irritability exploding in ridicule ; but Peacock was one of the most lettered men of his age, and his flouts and jeers smack of good reading, old wine and respectable prejudices. In these his greatest successor was George Borrow (1 803-1881), who used three volumes of half imaginary auto biography and road-faring in strange lands as a sounding-board for a kind of romantic revolt against the

century of comfort, toleration, manufactures, mechanical inventions, cheap travel and commercial expansion, unaccompanied (as he maintains) by any commensurate growth of human wisdom, happiness, security or dignity.

In the year of Queen Victoria's accession most of the great writers of the early part of the century, whom we may denominate as" late Georgian," were silent. Scott, Byron, Shelley, Keats, Coleridge, Lamb, Sheridan, Hazlitt, Mackintosh, ™^ Crabbe and Cobbett were gone. Wordsworth, Southey, Campbell, Moore, Jeffrey, Sydney Smith, De Quincey, Miss Edgeworth, Miss Mitford, Leigh Hunt, Brougham, Samuel Rogers. were still living, but the vital portion of their work was already done. The principal authors who belong equally to the Georgian and Victorian eras are Landor, Bulwer, Marryat, Hallam, Milman and Disraeli ; none of whom, with the exception of the last, approaches the first rank in either. The significant work of Tennyson, the Brownings, Carlyle, Dickens, Thackeray, the Brontes, George Eliot, Mrs Gaskell, Trollope, the Kingsleys, Spencer, Mill, Darwin, Ruskin, Grote, Macaulay, Freeman, Froude, Lecky, Buckle, Green, Maine, Borrow, FitzGerald, Arnold, Rossetti, Swinburne, Meredith, Hardy, Stevenson, Morris, Newman, Pater, Jefferies — the work of these writers may be termed conclusively Victorian; it gives the era a stamp of its own and distinguishes it as the most varied in intellectual riches in the whole course of our literature. Circumstances have seldom in the world been more favourable to a great outburst of literary energy. The nation was secure and prosperous to an unexampled degree, conscious of the will and the power to expand still further. The canons of taste were still aristocratic. Books were made and unmade according to a regular standard. Literature was the one form of art which the English understood, in which they had always excelled since 1579, and in which their originality was supreme. To the native genius for poetry was now added the advantage of materials for a prose which in lucidity and versatility should surpass even that of Goldsmith and Hazlitt. The diversity of form and content of this great literature was commensurate with the development of human knowledge and power which marked its age. In this and some other respects it resembles the extraordinary contemporary development in French literature which began under the reign of Louis Philippe. The one signally disconcerting thing about the great Victorian writers is their amazing prolixity. Not content with two or three long books, they write whole literatures. A score of volumes, each as long as the Bible or Shakespeare, barely represents the output of such authors as Carlyle, Ruskin, Froude, Dickens, Thackeray, Newman, Spencer or

Trollope.

They obtained vast quantities of new readers, for the middle class was beginning to read with avidity; but the quality of brevity, the knowledge when to stop, and with it the older classic conciseness and the nobler Hellenic idea of a perfect measure — these things were as though they had not been. Meanwhile, the old schools were broken up and the foolscap addressed to the old masters. Singers, entertainers, critics and historians abound. Every man may say what is in him in the phrases that he likes best, and the sole motto that compels is " every style is per- missible except the style that is tiresome." The old models are strangely discredited, and the only conventions which hold are those concerning the subjects which English delicacy held to be tabooed. These conventions were inordinately strict, and were held to include all the unrestrained, illicit impulses of love and all the more violent aberrations from the Christian code of faith and ethics. Infidel speculation and the liaisons of lawless love (which had begun to form the staple of the new French fiction — hence regarded by respectable English critics of the time as profoundly vitiated and scandalous) had no recognized existence and wei2 totally ignored in literature designed for general reading. The second or Goody-two-Shoes convention remained strictly in force until the penultimate decade of the 10th century, and was acquiesced in or at least submitted to by practically all the greatest writers of the Vic- torian age. The great poets and novelists of that day easily out-topped their fellows. Society had no difficulty in responding to the summons of its literary leaders. Nor was their fame partial, social or sectional. The great novelists of early Victorian days were aristocratic and democratic at once. Their popularity was universal within the limits of the language and beyond it. The greatest of men were men of imagination rather than men of ideas, but such sociological and moral ideas as they derived from their environment were poured helter-skelter into their novels, which took the form of huge pantechnicon magazines. Another distinctive feature of the Victorian novel is the position it enabled women to attain in literature, a position attained by them in creative work neither before nor since.

The novelists to a certain extent created their own method like the

great dramatists, but such rigid prejudices or conventions _. . as they found already in possession they respected

without demur. Both Dickens and Thackeray write as if they were almost entirety innocent or tne existence or sexual vice. As artists and thinkers they were both formless. But the enormous self-complacency of the England of their time, assisted alike by the part played by the nation from 1793 to 181 5, evangelicalism, free trade (which was originally a system of super-nationalism) and later, evolution, generated in them a great benignity and a strong determination towards a liberal and humanitarian philosophy. Despite, however, the diffuseness of the envelope and the limitations of horizon referred to, the unbookish and almost unlettered genius of Charles Dickens (1812-1870), the son of a poor lower middle-class clerk, almost entirely self-educated, has asserted for itself the foremost place in the literary history of the period. Dickens broke every rule, rioted in absurdity and bathed in extravagance. But everything he wrote was received with an almost frantic joy by those who recognized his creations as deifications of themselves, his scenery as drawn by one of the quickest and intensest observers that ever lived, and his drollery as an accumulated dividend from the treasury of human laughter. Dickens's mannerisms were severe, but his geniality as a writer broke down every obstruction, reduced Jeffrey to tears and Sydney Smith to helpless laughter.

The novel in France was soon to diverge and adopt the form of an anecdote illustrating the traits of a very small group of persons, but the English novel, owing mainly to the predilection of Dickens for those Gargantuan enter- tainers of his youth, Fielding and Smollett, was to remain anchored to the history. William Makepeace Thackeray (1811- 1863) was even more historical than Dickens, and most of his leading characters are provided with a detailed genealogy. Dickens's great works, excepting David Copperfield and Great Expectations, had all appeared when Thackeray made his

Thackeray.

mark in 1848 with Vanity Fair, and Thackeray follows most of his predecessor's conventions, including his conventional religion, ethics and politics, but he avoids his worse faults of theatricality. He never forces the note or lashes himself into fury or senti- mentality; he limits himself in satire to the polite sphere which he understands, he is a great master of style and possesses every one of its fairy gifts except brevity. He creates characters and scenes worthy of Dickens, but within a smaller range and without the same abundance. He is a

traveller and a cosmo- politan, while Dickens is irredeemably Cockney. He is often content to criticize or annotate or to preach upon some congenial theme, while Dickens would be in the flush of humorous creation. His range, it must be remembered, is wide, in most respects a good deal wider than his great contemporary's, for he is at once novelist, pamphleteer, essayist, historian, critic, and the writer of some of the most delicate and sentimental vers d 'occasion in the language.

The absorption of England in itself is shown with excep- tional force in the case of Thackeray, who was by nature a cosmopolitan, yet whose work is so absorbed with the structure of English society as to be almost unintelligible Bronte. ' to foreigners. The exploration of the human heart and conscience in relation to the new problems of the time had been almost abandoned by the novel since Richardson's time. It was for woman to attempt to resolve these questions, and with the aid of powerful imagination to propound very different conclusions. The conviction of Charlotte Bronte (1816-1855) was that the mutual passionate love of one man and one woman is sacred and creates a centre of highest life, energy and joy in the world. George Eliot (1819-1880), on the other hand, detected a blind and cruel egoism in all such bum ecstasy of individual passion. It was in the autumn of 1847 that Jane Eyre shocked the primness of the coteries by the unconcealed ardour of its love passages. Twelve years later Adam Bede astonished the world by the intensity of its ethical light and shade. The introspective novel was now very gradually to establish a supremacy over the historical. The romance of the Brontes' forlorn life colours Jane Eyre, colours Wuthering Heights and colours Villette; their work is inseparable from their story to an extent that we perhaps hardly realize. George Eliot did not receive this adventitious aid from romance, and her worK was, pernaps, unduly burdened By etfiicar diatribe, scientific disquisition and moral and philosophical asides. It is more than redeemed, however, by her sovereign humour, by the actual truth in the portrayal of that absolutely self-centred Midland society of the 'thirties and 'forties, and by the moral significance which she extracts from the smaller actions and more ordinary characters of life by means of sympathy, imagina- tion and a deep human compassion. Her novels are generally admitted to have obtained twin summits in Adam Bede (1859) and Middlemarch (1872). An even nicer delineator of the most delicate shades of the curiously remote provincial society of that day was Mrs Gaskell (1810-1865), whose Cranford and Wives and Daughters attain to the perfection of easy, natural and unaffected English narrative. Enthusiasm and a picturesque boyish*

*ardour and partisanship are the chief features of Westward Ho 1 and the other vivid and stirring novels of Charles Kingsley (1819-1875), to which a subtler gift in the discrimination of character must be added in the case of his brother Henry Kingsley (1830-1876). Charles, however, was probably more /ctngsley accomplished as a poet than in the to him too exciting Troliope. operation of taking sides in a romance. The novels Reade. of Troliope, Reade and Wilkie Collins are, generally '£j*f' th ' speaking, a secondary product of the literary forces which produced the great fiction of the 'fifties. The two last were great at structure and sensation: Troliope dogs the prose of every-day life with a certainty and a clearness that border upon inspiration. The great novels of George Meredith range between 1859 and 1880, stories of characters deeply interesting who reveal themselves to us by flashes and trust to our inspiration to do the rest. The wit, the sparkle, the entrain and the horizon of these books, from Richard Feverel to the master analysis of*

Tennyson.

Browning.

The Egoist, have converted the study of Meredith into an exact science. Thomas Hardy occupies a place scarcely inferior to Meredith's as a stylist, a discoverer of new elements of the plaintive and the wistful in the vanishing of past ideals, as a depicter of the old southern rustic life of England and its tragi-comedy, in a series of novels which take rank with the greatest.

If Victorian literature had something more than a paragon in Dickens, it had its paragon too in the poet Tennyson. The son of a Lincolnshire parson of squirearchal descent, Alfred Tennyson consecrated himself to the vocation of poesy with the same unalterable conviction that had character- ized Milton, Pope, Thomson, Wordsworth and Keats, and that was yet to signalize Rossetti and Swinburne, and he became easily the greatest virtuoso of his time in his art. To lyrics and idylls of a luxurious and exotic picturesqueness he gave a per- fection of technique which criticism has chastened only to perfect in such miracles of description as" The Lotus Eaters," " The Dream of Fair Women," and " Morte d'Arthur."

He received as vapour the sense of uneasiness as to the problems of the future which pervaded his generation, and in the elegies and lyrics of In Memoriam, in The Princess and in Maud he gave them back to his contemporaries in a running stream, which still sparkles and radiates amid the gloom. After the lyrical monodrama of Maud in 1855 he devoted his flawless technique of design, harmony and rhythm to works primarily of decoration and design (The Idylls of the King) , and to experiments in metrical drama for which the time was not ripe; but his main occupation was varied almost to the last by lyrical blossoms such as " Frater Ave," " Roman Virgil," or " Crossing the Bar," which, like " Tears, Idle Tears " and " O that 'twere possible," embody the aspirations of Flaubert towards a perfected art of language shaping as no other verse probably can.

*Few, perhaps, would go now to In Memoriam as to an oracle for illumination and guidance as many of Queen Victoria's contemporaries did, from the Queen herself downwards. *' And yet it will take very long ere its fascination fades. In language most musical it rearticulates the gospel of Sorrow and Love, and it remains still a pathetic expression of emotions, sentiments and truths which, as long as human nature remains the same, and as long as calamity, sorrow and death are busy in the world, must be always repeating themselves. Its power, perhaps, we may feel of this poem and indeed of most of Tennyson's poetry, is not quite equal to its charm. And if we feel this strongly, we shall regard Robert Browning as the typical poet of the Victorian era. His thought has been compared to a galvanic battery for the use of spiritual paralytics. The grave defect of Browning is that his ideas, however excellent, are so seldom completely won; they are left in a twilight, or even a darkness more Cimmerian than that to which the worst of the virtuosi dedicate their ideas. Similarly, even in his " Dramatic Romances and Lyrics " (1845) or his " Men and Women " (1855) he rarely depicts action, seldom goes further than interpreting the mind of man as he approaches action. If Dickens may be described as the eye of Victorian literature, Tennyson the ear attuned to the subtlest melodies, Swinburne the reed to which everything blew to music, Thackeray the velvet pulpit-cushion, Eliot the impending brow, and Meredith the cerebral dome, then Browning might well be described as the active brain itself eternally expounding some point of view remote in time and place from its own. Tennyson was ostensibly and always a poet in his life and his art, in his blue cloak and sombrero, his mind and study alike stored with intaglios of the thought of all ages, always sounding and remodelling his verses so that they shall attain the maximum of sweetness and sym- metry. He was a recluse.*

Browning on the other hand dis-. sembled his poethood, successfully disguised his muse under the semblance of a stock merchant, was civil to his fellowmen, and though nervous with bores, encountered every one he met as if he were going to receive more than he could impart. In Tennyson's poetry we are always discovering new beauties. In Browning's we are finding new blemishes. Why he chose rhythm and metre for seven-eighths of his purpose is somewhat of a mystery.

ex. 21

Arnold.

His protest against the materialistic view of life is, perhaps, a more valid one than Tennyson's; he is at pains to show us the noble elements valuable in spite of failure to achieve tangible success. He realizes that the greater the man, the greater is the failure, yet protests unfailingly against the despondent or materialist view of life. His nimble appreciation of character and motive attracts the attentive curiosity of highly intellectual people; but the question recurs with some persistence as to whether poetry, after all, was the right medium for the expression of these views.

Many of Browning's ideas and fertilizations will, perhaps, owing to the difficulty and uncertainty which attaches to their form, penetrate the future indirectly as the stimulant R us kin. of other men's work. This is especially the case with Morris. those remarkable writers who have for the first time Symonds. given the fine arts a considerable place in English Pater – literature, notably John Ruskin (Modern Painters, 1842, Seven Lamps, 1849, Stones of Venice, 1853), William Morris, John Addington Symonds and Walter Pater. Browning, it is true, shared the discipleship of the first two with Kingsley and Carlyle. But Ruskin outlived all discipleships and transcended almost all the prose writers of his period in a style the elements of emotional power in which still preserve their secret.

More a poet of doubt than either Tennyson or the college friend, A. H. Clough, whose loss he lamented in one of the finest pastoral elegies of all ages, Matthew Arnold takes rank with Tennyson, Browning and Swinburne alone among the Dii Majores of Victorian poetry. He is perhaps a disciple of Wordsworth even more than of Goethe, and he finds in Nature, described in rarefied though at times intensely beautiful phrase, the balm for the unrest of man's unsatisfied yearnings, the divorce between soul and intellect, and the sense of contrast between the barren toil of man and the magic

operancy of nature. His most delicate and intimate strains are tinged with melancholy. The infinite desire of what might have been, the lacrimae rerum, inspires " Resignation," one of the finest pieces in his volume of 1849 (The Strayed Reveller). In the deeply-sighed lines of " Dover Beach " in 1867 it is associated with his sense of the decay of faith. The dreaming garden trees, the full moon and the white evening star of the beautiful English-coloured Thyrsis evoke the same mood, and render Arnold one of the supreme among elegiac poets. But his poetry is the most individual in the circle and admits the popular heart never for an instant. As a popularizer of Renan and of the view of the Bible, not as a talisman but as a literature, and, again, as a chastener of his contemporaries by means of the iteration of a few telling phrases about philistines, barbarians, sweetness and light, sweet reasonableness, high seriousness, Hebraism and Hellenism, " young lions of the Daily Telegraph," and " the note of provinciality," Arnold far eclipsed his fame as a poet during his lifetime. His crusade of banter against the bad civilization of his own class was one of the most audaciously successful things of the kind ever accomplished. But all his prose theorizing was excessively superficial. In poetry he sounded a note which the prose Arnold seemed hopelessly unable ever to fathom.

It is easier to speak of the virtuoso group who derived their first incitement to poetry from Chatterton, Keats and the early exotic ballads of Tennyson, far though these yet were „ from attaining the perfection in which they now appear after half a century of assiduous correction. The chief of them were Dante Gabriel Rossetti, his sister Christina, William Morris and Algernon Charles Swinburne. The founders of this school, which took and acquired the name Pre-Raphaelite, were profoundly impressed by the Dante revival and by the study of the early Florentine masters. Rossetti himself was an accom- plished translator from Dante and from Villon. He preferred Keats to Shelley because (like himself) he had no philosophy. The 18th century was to him as if it had never been, he dislikes Greek lucidity and the open air, and prefers lean medieval saints, spectral images and mystic loves. The passion of these students was retrospective; they wanted to revive the literature of a

forgotten past, Italian, Scandinavian, French, above all,medieval. To do this is a question of enthusiastic experiment and adventure. Rossetti leads the way with his sonnets and ballads. Christina follows with Goblin Market, though she subsequently, with a perfected technique, writes poetry more and more confined to the religious emotions. William Morris publishes in 1858 his Defence of Guenevere, followed in ten years by The Earthly Paradise, a collection of metrical tales, which hang in the sunshine like tapestries woven of golden thread, where we should naturally expect the ordinary paperhanging of prose romance.

From the verdurous gloom of the studio with its mysterious and occult properties in which Rossetti compounded his colours,

Morris went forth shortly to chant and then to narrate barne. Socialist songs and parables. Algernon Charles

Swinburne set forth to scandalize the critics of 1866 with the roses and lilies of vice and white death in Poems and Ballads, which was greeted with howls and hisses, and reproach against a " fleshly school of modern poetry." Scandalous verses these were, rioting on the crests of some of these billows of song. More discerning persons perceived the harmless im- personal unreality and mischievous youthful extravagance of all these Cyprian outbursts, that the poems were the out- pourings of a young singer up to the chin in the Pierian flood, and possessed by a poetic energy so urgent that it could not wait to apply the touchstones of reality or the chastening planes of experience. Swinburne far surpassed the promoters of this exotic school in technical excellence, and in Atalanta in Calydon and its successors may be said to have widened the bounds of English song, to have created a new music and liberated a new harmonic scale in his verse. Of the two elements which, superadded to a consummate technique, compose the great poet, intensity of imagination and intensity of passion, the latter in Swinburne much predominated. The result was a great abundance of heat and glow and not perhaps quite enough defining light. Hence the tendency to be incomprehensible, so fatal in its fascination for the poets of the last century, which would almost justify the title of the triumvirs of twilight to three of the greatest. It is this incomprehensibility which alienates the poet from the popular understanding and confines his audience to poets, students and scholars. Poetry is often comparable to a mountain range with its points and aiguilles, its peaks and crags, its domes and its summits. But Swinburne's poetry, filled with the sound and movement of great waters, is as incommunicable as the sea. Trackless and almost boundless, it has no points, no definite

summits. The poet never seems to know precisely when he is going to stop. His metrical flow is wave-like, beautiful and rather monotonous, inseparable from the general effect. His endings seem due to an exhaustion of rhythm rather than to an exhaustion of sense. A cessation of meaning is less perceptible than a cessation of magnificent sound. . Akin in some sense to the attempt made to get behind the veil and to recapture the old charms and spells of the middle ages,

*to discover the open sesame of the Morte D' Arthur N< "d7h'" anc * l ˆ e Mabinogion and to reveal the old Celtic and Church. monastic life which once filled and dominated our*

islands, was the attempt to overthrow the twin gods of the 'forties and 'fifties, state-Protestantism and the sanctity of trade. The curiously assorted Saint Georges who fought these monsters were John Henry Newman and Thomas Carlyle. The first cause of the movement was, of course, the anomalous position of the Anglican Church, which had become a province of the oligarchy officered by younger sons. It stood apart from foreign Protestantism; its ignorance of Rome, and consequently of what it protested against, was colossal; it was conscious of itself only as an establishment — it had produced some very great men since the days of the non-jurors, when it had mislaid its historical conscience, but these had either been great scholars in their studies, such as Berkeley, Butler, Warburton, Thomas Scott, or revivalists, evangelicals and missionaries, such as Wilson, Wesley, Newton, Romaine, Cecil, Venn, Martyn, who were essentially Congregationalists rather than historical Churchmen. A. new spiritual beacon was to be raised; an

attempt was to be made to realize the historical and cosmic aspects of the English Church, to examine its connexions, its descent and its title-deeds. In this attempt Newman was to spend the best years of his life.

The growth of liberal opinions and the denudation of the English Church of spiritual and historical ideas, leaving " only pulpit orators at Clapham and Islington and two-bottle orthodox" to defend it, seemed to involve the continued existence of Anglicanism in any form in considerable doubt. Swift had said at the commencement of the 18th century that if an act was passed for the extirpation of the gospel, bank stock might decline 1%; but a century later it is doubtful whether the passing of such a bill would have left any trace, however evanescent, upon the stability of the money market. The Anglican via media had enemies not only in the philosophical

radicals, but also in the new caste of men of science. Perhaps, as J. A. Froude suggests, these combined enemies, The Edinburgh Review, Brougham, Mackintosh, the Reform Ministry, Low Church philosophy and the London University were not so very terrible after all. The Church was a vested interest which had a greater stake in the country and was harder to eradicate than they imagined. But it had nothing to give to the historian and the idealist. They were right to fight for what their souls craved after and found in the Church of Andrewes, Herbert, Ken and Waterland. Belief in the divine mission of the Church lingered on in the minds of such men as Alexander Knox or his disciple Bishop Jebb; but few were prepared to answer the question — " What is the Church as spoken of in England? Is it the Church of Christ ? " — and the answers were various. Hooker had said it was " the nation "; and in entirely altered circumstances, with some qualifications, Dr Arnold said the same. It was " the Establishment " according to the lawyers and politicians, both Whig and Tory. It was an invisible and mystical body, said the Evangelicals. It was the aggregate of separate congregations, said the Nonconformists. It was the parliamentary creation of the Reformation, said the Erastians. The true Church was the communion of the Pope; the pretended Church was a legalized schism, said the Roman Catholics. All these ideas were floating about, loose and vague, among people who talked much about the Church.

One thing was persistently obvious, namely, that the national- ist church had become opportunist in every fibre, and that it had thrown off almost every semblance of ecclesiastical discipline. The view was circulated that the Church owed its continued existence to the good sense of the individuals who officered it, and to the esteem which possession and good sense combined invariably engendered in the reigning oligarchy. But since Christianity was true — and Newman was the one man of modern times who seems never to have doubted this, never to have overlooked the unmistakable threat of eternal punishment to the wicked and unbelieving — modern England, with its march of intellect and its chatter about progress, was advancing with a light heart to the verge of a bottomless abyss. By a diametrically opposite chain of reasoning Newman reached much the same conclusion as Carlyle. Newman sought a haven of security in a rapprochement with the Catholic Church. The medieval influences already at work in Oxford began to fan the flame which kindled to a blaze in the ninetieth of the celebrated Tracts for the Times. It proved the turning of the ways leading Keble and Pusey to Anglican ritual and Newman to Rome. This anti-liberal campaign was poison to the

state-churchmen and Protestants, and became perhaps the chief intellectual storm centre of the century. Charles Kingsley in 1864 sought to illustrate by recent events that veracity could not be considered . a Roman virtue.

After some preliminary ironic sparring Newman was stung into writing what he deliberately called Apologia pro vita sua. In this, apart from the masterly dialectic and exposition in which he had already shown himself an adept, a Sc,ea ˆ ae volume of autobiography is made a chapter of general currents. history, unsurpassed in its kind since the Confessions of St Augustine, combined with a perfection of form, a precision

of phrasing and a charm of style peculiar to the genius of the author, rendering it one of the masterpieces of English prose. But while Newman was thus sounding a retreat, louder and more urgent voices were signalling the advance in a totally opposite direction. The Apologia fell in point of time between The Origin of Species and Descent of Man, in which Charles Darwin was laying the corner stones of the new science of which Thomas Huxley and Alfred Russel Wallace were to be among the first apostles, and almost coincided with the First Principles of a synthetic philosophy, in which Herbert Spencer was formulating a set of probabilities wholly destructive to the acceptance of positive truth in any one religion. The typical historian of the . . 'fifties, Thomas Babington Macaulay, and the seminal thinker of the 'sixties, John Stuart Mill, had as determinedly averted their faces from the old conception of revealed religion. Nourished in the school of the great Whig pamphleteer historians, George Grote and Henry Hallam, Macaulay combined gifts of memory, enthusiastic conviction, portraiture and literary expression, which gave to his historical writing a resonance unequalled (even by Michelet) in modern literature. In spite of faults of taste and fairness, Macaulay's resplendent gifts enabled him to achieve for the period from Charles II. to the peace of Ryswick what Thucydides had done for the Peloponnesian War. The pictures that he drew with such exultant force are stamped irieffaceably upon the popular mind. His chief faults are not of detail, but rather a lack of

subtlety as regards characterization and motive, a disposition to envisage history too exclusively as a politician, and the sequence of historical events as a kind of ordered progress towards the material ideals of universal trade and Whig optimism as revealed in the Great Exhibition of 1851. Macaulay's tendency to disparage the past brought his whole vision of the Cosmos into sharp collision with that of his rival appellant to the historical conscience, Thomas Carlyle, a man whose despair of the present easily exceeded Newman's. But Carlyle's despondency was totally irrespective of the attitude preserved by England towards the Holy Father, whom he seldom referred to save as " the three-hatted Papa " and " servant of the devil." It may be in fact almost regarded as the reverse or complement to the excess of self-complacency in Macaulay. We may correct the excess of one by the opposite excess of the other. Macaulay was an optimist in ecstasy with the material advance of his time in knowledge and power; the growth of national wealth, machinery and means of lighting and locomotion caused him to glow with satisfaction. Carlyle, the pessimist, regards all such symptoms of mechanical development as contemptible. Far from panegyrizing his own time, he criticizes it without mercy. Macaulay had great faith in rules and regula- tions, reform bills and parliamentary machinery. Carlyle regards them as wiles of the devil. Frederick William of Prussia, according to Macaulay, was the most execrable of fiends, a cross between Moloch and Puck, his palace was hell, and Oliver Twist and Smike were petted children compared with his son the crown prince. In the same bluff and honest father Carlyle recognized the realized ideal of his fancy and hugged the just man made perfect to his heart of hearts. Such men as Bentham and Cobden, Mill and Macaulay, had in Carlyle's opinion spared themselves no mistaken exertion to exalt the prosperity and happiness of their own day. The time had come to react at all hazards against the prevalent surfeit of civilization. Henceforth his literary activity was to take two main directions. First, tracts for the times against modern tendencies, especially against the demoralizing modern talk about progress by means of money and machinery which emanated like a miasma from the writings of such men as Mill, Macaulay, Brougham, Buckle and from the Quarterlies. Secondly, a cyclopean exhibition of Caesarism, discipline, the regimentation of workers, and the convertibility of the Big Stick and the Bible, with a preference to the Big Stick as a panacea. The snowball was to grow rapidly among such writers as Kingsley, Ruskin, George Borrow, unencumbered by reasoning or deductive processes which they despised. Carlyle himself felt that the condition of England was one for anger rather than discussion. He detested the rationalism and

sym-

New schools.

metry of such methodists of thought as Mill, Buckle, Darwin, Spencer, Lecky, Ricardo and other demonstrations of the dismal science — mere chatter he called it. The palliative philanthropy of the day had become his aversion even more than the inroads of Rome under cover of the Oxford movement which Froude, Borrow and Kingsley set themselves to correct. As an historian of a formal order Carlyle's historical portraits cannot bear a strict comparison with the published work of Gibbon and Macaulay, or even of Maine and Froude in this period, but as a biographer and autobicgrapher Carlyle's caustic insight has enabled him to produce much which is of the very stuff of human nature. Surrounded by philomaths and savants who wrote smoothly about the perfectibility of man and his institutions, Carlyle almost alone refused to distil his angry eloquence and went on railing against the passive growth of civilization at the heart of which he declared that he had discovered a cancer. This uncouth Titan worship and prostration before brute force, this constant ranting about jarls and vikings trembles often on the verge of cant and comedy, and his fiddling on the one string of human pretension and bankruptcy became discordant almost to the point of chaos. Instinctively destructive, he resents the apostleship of teachers like Mill, or the pioneer discoveries of men like Herbert Spencer and Darwin. He remains, nevertheless, a great incalculable figure, the cross grandfather of a school of thought which is largely unconscious of its debt and which so far as it recognizes it takes Carlyle in a manner wholly different from that of his contemporaries.

*The deaths of Carlyle and George Eliot (and also of George Borrow) in 1881 make a starting-point for the new schools of historians, novelists, critics and biographers, and those new nature students who claim to cure those evil effects of civilization which Carlyle and his disciples had discovered. History in the hands of Macaulay, Buckle and Carlyle had been occupied mainly with the bias and tendency of change, the results obtained by those who consulted the oracle being more often than not diametrically opposite. With Froude still on the one hand as the champion of Protestantism, and with E. A. Freeman and J. R. * ory '*

Green on the other as nationalist historians, the school of applied history was fully represented in the next generation, but as the records grew and multiplied in print in accordance with the wise

provisions made in 1857 by the commencement of the Rolls Series of medieval historians, and the Calendars of State Papers, to be followed shortly by the rapidly growing volumes of Calendars of Historical Manuscripts, historians began to concentrate their attention more upon the process of change as their right subject matter and to rely more and more upon documents, statistics and other impersonal and disinterested forms of material. Such historical writers as Lecky, Lord Acton, Creighton, Morley and Bryce contributed to the process of transition mainly as essayists, but the new doctrines were tested and to a certain extent put into action by such writers as Thorold Rogers, Stubbs, Gardiner and Maitland. The theory that History is a science, no less and no more, was propounded in so many words by Professor Bury in his inaugural lecture at Cambridge in 1903, and this view and the corresponding divergence of history from the traditional pathway of Belles Lettres has become steadily more dominant in the world of historical research and historical writing since 1 88 1. The bulk of quite modern historical writing can certainly be justified fiom no other point of view.

The novel since 1881 has pursued a course curiously analogous to that of historical writing. Supported as it was by masters of the old regime such as Meredith and Hardy, and by those who then ranked even higher in popular esteem such as Wilkie Collins, Anthony Trollope, Besant and Rice, Blackmore, William Black and a monstrous rising regiment of lady novelists — Mrs Lynn Linton, Rhoda Broughton, Mrs Henry Wood, Miss Braddon, Mrs Humphry Ward, the type seemed securely anchored to the old formulas and the old ways. In reality, however, many of these popular workers were already moribund and the novel was being honeycombed by French influence.

) < 0.4-

ENGLISH LITERATURE

[19TH CENTURA

This is perceptible in Hardy, but may be traced with greater distinctness in the best work of George Gissing, George Moore, Mark Rutherford, and later on of H. G. Wells, Arnold Bennett and John Galsworthy. The old novelists had left behind them a giant's robe. Intellectually giants, Dickens and Thackeray were equally gigantic spendthrifts. They worked in a state of fervent heat above a glowing furnace, into which they flung lavish masses of unshaped metal,

caring little for immediate effect or minute dexterity of stroke, but knowing full well that the emotional energy of their temperaments was capable of fusing the most intractable material, and that in the end they would produce their great downright effect. Their spirits rose and fell, but the case was desperate; copy had to be despatched at once or the current serial would collapse. Good and bad had to make up the tale against time, and revelling in the very exuberance fend excess of their humour, the novelists invariably triumphed. It was incumbent on the new school of novelists to economize their work with more skill, to relieve their composition of irrelevancies, to keep the writing in one key, and to direct it consistently to one end — in brief, to unify the novel as a work of art and to simplify its ordonnance.

The novel, thus lightened and sharpened, was conquering new fields. The novel of the 'sixties remained not, perhaps, to win many new triumphs, but a very popular instrument in the hands of those who performed variations on the old masters, and much later in the hands of Mr William de Morgan, showing a new force and quiet power of its own. The novel, however, was ramifying in other directions in a way full of promise for the future. A young Edinburgh student, Robert Louis Stevenson, had inherited much of the spirit of the Pre-Raphaelitic virtuosos, and combined with their passion for the romance of the historic past a curiosity fully as strong about the secrets of romantic technique. A coterie which he formed with W. E. Henley and his cousin R. A. M. Stevenson studied words as a young art student studies paints, and made studies for portraits of buccaneers with the same minute drudgery that Rossetti had studied a wall or Morris a piece of figured tapestry. While thus forming a new romantic school whose work when wrought by his methods should be fit to be grafted upon the picturesque historic fiction of Scott and Dumas, Stevenson was also naturalizing the short story of the modern French type upon English ground. In this particular field he was eclipsed by Rudyard Kipling, who, though less original as a man of letters, had a technical vocabulary and descriptive power far in advance of Stevenson's, and was able in addition to give his writing an exotic quality derived from Oriental colouring. This regional type of writing has since been widely imitated, and the novel has simultaneously developed in many other ways, of which perhaps the most significant is the psychological study as manipulated severally by Shorthouse, Mallock and Henry James.

The expansion of criticism in the same thirty years was not a whit less marked than the vast divagation of the novel. In Crltl 1 t ' ie ear ˆ y ' ei g nt i es it was still tongue-bound by the

hypnotic influence of one or two copy-book formulae — Arnold's "criticism of life" as a definition of poetry, and Walter Pater's implied doctrine of art for art's sake. That two dicta so manifestly absurd should have cast such an augur-like spell upon the free expression of opinion, though it may of course, like all such instances, be easily exaggerated, is nevertheless a curious example of the enslavement of ideas by a confident clap- trap. A few representatives of the old schools of motived or scientific criticism, deduced from the literatures of past time, survived the new century in Leslie Stephen, Saintsbury, Stopford Brooke, Austin Dobson, Courthope, Sidney Colvin, Watts- Dunton; but their agreement is certainly not greater than among the large class of emancipated who endeavour to concentrate the attention of others without further ado upon those branches of literature which they find most nutritive. Among the finest appreciators of this period have been Pattison and Jebb, Myers, Hutton, Dowden, A. C. Bradley, William Archer, Richard Garnett, E. Gosse and Andrew Lang. Birrell, Walkley and Max Beerbohm have followed rather in the wake of the Stephens and

Poetry.

Bagehot, who have criticized the sufficiency of the titles made out by the more enthusiastic and lyrical eulogists. In Arthur Symons, Walter Raleigh and G. K. Chesterton the new age possessed critics of great originality and power, the work of the last two of whom is concentrated upon the application of ideas about life at large to the conceptions of literature. In exposing palpable nonsense as such, no one perhaps did better service in criticism than the veteran Frederic Harrison.

In the cognate work of memoir and essay, the way for which has been greatly smoothed by co-operative lexicographical efforts such as the Dictionary of National Biography, the New English Dictionary, the Victoria County History and the like, some of the most dexterous and permeating work of the transition from the old century to the new was done by H. D. Traill, Gosse, Lang, Mackail, E. V. Lucas, Lowes Dickinson, Richard le Gallienne, A. C. Benson, Hilaire Belloc, while the open-air relief work for dwellers pent in great cities, pioneered by Gilbert White, has been expanded with all the zest and charm that a novel pursuit can endow by such writers as Richard Jefferies, an open-air and nature mystic of extraordinary power at his best, Selous, Seton Thompson, W. H. Hudson.

The age has not been particularly well attuned to the efforts of the newer poets since "Coventry Patmore in the Angel in the House

achieved embroidery, often extremely beautiful, upon the Tennysonian pattern, and since Edward FitzGerald, the first of all letter-writing commentators on life and letters since Lamb, gave a new cult to the decadent century in his version of the Persian centoist Omar Khayyam. The prizes which in Moore's day were all for verse have now been transferred to the prose novel and the play, and the poets them- selves have played into the hands of the Philistines by disdaining popularity in a fond preference for virtuosity and obscurity. Most kinds of the older verse, however, have been well repre- sented, descriptive and elegiac poetry in particular by Robert Bridges and William Watson; the music of the waters of the western sea and its isles by W. B. Yeats, Synge, Moira O'Neill, " Fiona Macleod " and an increasing group of Celtic bards; the highly wrought verse of the 17th-century lyrists by Francis Thompson, Lionel Johnson, Ernest Dowson; the simplicity of a more popular strain by W. H. Davies, of a brilliant rhetoric by John Davidson, and of a more intimate romance by Sturge Moore and Walter de la Mare. Light verse has never, perhaps, been represented more effectively since Praed and Calverley and Lewis Carroll than by Austin Dobson, Locker Lampson, W. S. Gilbert and Owen Seaman. The names of C. M. Doughty, Alfred Noyes, Herbert Trench and Laurence Binyon were also becoming prominent at the opening of the 20th century. For originality in form and substance the palm rests in all probability with A. E. Housman, whose Shropshire Lad opens new avenues and issues, and with W. E. Henley, whose town and hospital poems had a poignant as well as an ennobling strain. The worK of Henry Newbolt, Mrs. Meynell and Stephen Phillips showed a real poetic gift. Above all these, however, in the esteem of many reign the verses of George Meredith and of Thomas Hardy, whose Dynasts was widely regarded by the best judges as the most remarkable literary production of the new century.

The new printed and acted drama dates almost entirely from the late 'eighties. Tom Robertson in the 'seventies printed nothing, and his plays were at most a timid recognition of the claims of the drama to represent reality and truth. The enormous superiority of the French drama as represented by Augier, Dumas fits and Sardou began to dawn slowly upon the English consciousness. Then in the 'eighties came Ibsen, whose daring in handling actuality was only equalled by his intrepid stage-craft. Oscar Wilde and A. W. Pinero were the first to discover how the spirit of these new discoveries might be adapted to the English stage. Gilbert Murray, with his fascinating' and tantalizing versions from Euripides, gave a new flexibility to the expansion that was going on in English dramatic ideas. Bernard

Shaw and his disciples, conspicuous among them Granville Barker, gave a new seasoning of wit to the absolute novelties of subject, treatment and application with which they

transfixed the public which had so long abandoned thought upon entering the theatre. This new adventure enjoyed a succis de stupeur, the precise range of which can hardly be estimated, and the force of which is clearly by no means spent.

English literature in the 20th century still preserves some of the old arrangements and some of the consecrated phrases of patronage and aristocracy; but the circumstances 20tb ‘ of its production were profoundly changed during the

changes. 19th century. By 1895 English literature had become a subject of regular instruction for a special degree at most of the universities, both in England and America. This has begun to lead to research embodied in investigations which show that what were regarded as facts in connexion with the earlier literature can be regarded so no longer. It has also brought comparative and historical treatment of a closer kind and on a larger scale to bear upon the evolution of literary types. On the other hand it has concentrated an excessive attention perhaps upon the grammar and prosody and etymology of literature, it has stereotyped the admiration of lifeless and obsolete forms, and has substituted antiquarian notes and ready-made commentary for that live enjoyment, which is essentially individual and which tends insensibly to evaporate from all literature as soon as the circumstance of it changes. It is prone, moreover, to force upon the immature mind a rapt admiration for the mirror before ever it has scanned the face of the original. A result due rather to the general educational agencies of the time is that, while in the middle of the 19th century one man could be found to write competently on a given subject, in 19 10 there were fifty. Books and apparatus for reading have multiplied in proportion. The fact of a book having been done quite well in a certain way is no longer any bar whatever to its being done again without hesitation in the same way. This continual pouring of ink from one bottle into another is calculated gradually to raise the standard of all subaltern writing and compiling, and to leave fewer and fewer books securely rooted in a universal recognition of their intrinsic excellence, power and idiosyncrasy or personal charm. Even then, of what we consider

first-rate in the 19th century, for instance, but a very small residuum can possibly survive. The one characteristic that seems likely to c ,; ng and to differentiate this voluble century is its curious reticence, of which the 20th century has already made uncommonly short work. The new playwrights have untaught England a shyness which came in about the time of Southey, Wordsworth and Sir Walter Scott. That the best literature has survived hitherto is at best a pious opinion. As the area of experience grows it is more and more difficult to circumscribe or even to describe the supreme best, and such attempts have always been responsible for base superstition. It is clear that some limitation of the literary stock-in-trade will become increasingly urgent as time goes on, and the question may well occur as to whether we are insuring the right baggage. The enormous apparatus of literature at the present time is suitable only to a peculiar phasis and manner of existence. Some hold to the innate and essential aristocracy of literature; others that it is bound to develop on the popular and communistic side, for that at present, like machinery and other deceptive benefits, it is a luxury almost exclusively advantageous to the rich. But to predict the direction of change in literature is even more futile than to predict the direction of change in human history, for of all factors of history, literature, if one of the most permanent, is also one of the least calculable.

Bibliographical Note. — The Age of Wordsworth and The Age of Tennyson in Bell's " Handbooks of English Literature " are of special value for this period. Prof. Dowden's and Prof. Saintsbury's 19th-century studies fill in interstices; and of the " Periods of European Literature," the Romantic Revolt and Romantic Triumph are pertinent, as are the literary chapters in vols. x. and xi. of the Cambridge Modern History. Of more specific books George Brandes's Literary Currents of the Nineteenth Century, Stedman's Victorian Poets, Holman Hunt's Pre-Raphaelite Brotherhood, R. H. Hutton's Contemporary Thought (and companion volumes), Sir Leslie Stephen's The Utilitarians, Buxton Forman's Our Living Poets, Dawson's Victorian Novelists, Thureau-Dangin's Renaissance des idees catho- liques en Angleterre, A. Chevrillon's Sydney Smith et la renaissance des idees liberates' jen Angleterre, A. W. Benn's History of English Thought in the Nineteenth Century, the publishing histories of Murray,

Blackwood, Macvey Napier, Lockhart, &c, J. M. Robertson's Modern Humanists, and the critical miscellanies of Lord Morley, Frederic Harrison, W. Bagehot, A. Birrell, Andrew Lang and E. Gosse, will be found, in their several degrees, illuminating. The chief literary lives are those of Scott by Lockhart, Carlyle by Froude, Macaulay by

Trevelyan, Dickens by Forster and Charlotte Bronte by Mrs Gaskell. (T. Se.)

ENGLISHRY (Englesckerie) , a legal name given, in the reign of William the Conqueror, to the presentment of the fact that a person slain was an Englishman. If an unknown man was found slain, he was presumed to be a Norman, and the hundred was fined accordingly, unless it could be proved that he was English. Englishry, if established, excused the hundred. Dr W. Stubbs (Constitutional History, i. 196) says that possibly similar measures were taken by King Canute. Englishry was abolished in 1340.

See Select Cases from the Coroners' Rolls, 1265-1413, ed. C. Gross, Selden Society (London, 1896).

ENGRAVING, the process or result of the action implied by the verb " to engrave " or mark by incision, the marks (whether for inscriptive, pictorial or decorative purposes) being produced, not by simply staining or discolouring the material (as with paint, pen or pencil), but by cutting into or otherwise removing a portion of the substance. In the case of pictures, the engraved surface is reproduced by printing; but this is only one restricted sense of " engraving," since the term includes seal-engraving (where a cast is taken), and also the chased ornamentation of plate or. gems, &c.

The word itself is derived from an O. Fr. engraver (not to be confused with the same modern French word used for the running of a boat's keel into the beach, or for the sticking of a cart's wheels in the mud, — from greve, Provencal grava, sands of the sea or river shore; cf. Eng. "gravel"); it was at one time supposed that the Gr. ypaqbtn, to write, was etymologically connected, but this view is not now accepted, and (together with " grave," meaning either to engrave, or the place where the dead are buried) the derivation is referred to a common Teutonic form signifying " to dig " (O. Eng. grafan, Ger. graben). The modem French graver, to engrave, is a later adoption. The idea of a furrow, by digging or cutting, is thus historically associated with an engraving, which may properly include the rudest marks cut into any substance. In old English literature it included carving and sculpture, from which it has become convenient to differentiate the terminology; and the ancients who chiselled their writing on slabs of stone were really " engraving." The word is not applicable, therefore, either strictly to lithography (q.v.), nor to any of the photographic processes (see Process), except those in which the surface of the plate is actually eaten into or lowered. In the latter case, too, it is convenient to mark

a distinction and to ignore the strict analogy. In modern times the term is, therefore, practically restricted — outside the spheres of gem-engraving and seal-engraving (see Gem), or the inscribing or ornamenting of stone, plate, glass, &c. — to the art of making original pictures (i.e. by the draughtsman himself, whether copies of an original painting or not), either by incised lines on metal plates (see Line- Engraving), or by the corrosion of the lines with acid (see Etching), or by the roughening of a metal surface without actual lines (see Mezzotint), or by cutting a wood surface away so as to leave lines in relief (see Wood-Engraving) ; the result in each case may be called generically an engraving, and in common parlance the term is applied, though incorrectly, to the printed reproduction or " print."

Of these four varieties of engraving — line-engraving, etching, mezzotint or wood-engraving — the woodcut is historically the earliest. Line-engraving is now practically obsolete, while etching and mezzotint have recently come more and more to the front. To the draughtsman the difference in technical handling in each case has in most cases some relation to his own artistic impulse, and to his own feeling for beauty. A line engraver, as P. G. Hamerton said, will not see or think like an etcher, nor an etcher like an engraver in mezzotint. Each kind, with its own sub-varieties, has its; peculiar effect and attraction.

A real knowledge of engraving can only be attained by a careful study and comparison of the prints themselves, or of accurate facsimiles, so that books are of little use except as guides to prints when the reader happens to be unaware of their existence, or else for their explanation of technical processes. The value of the prints varies not only according to the artist, but also according to the fineness of the impression, and the " state " (or stage) in the making of the plate, which may be altered from time to time. " Proofs " may also be taken from the plate, and even touched up by the artist, in various stages and various degrees of fineness of impression.

The department of art-literature which classifies prints is called Iconography, and the classifications adopted by icono- graphers are of the most various kinds. For example, if a com- plete book were written on Shakespearian iconography it would contain full information about all prints illustrating the life and works of

Shakespeare, and in the same way there may be the iconography of a locality or of a single event.

The history of engraving is a part of iconography, and various histories of the art exist in different languages. In England W. Y. Ottley wrote an Early History of Engraving, published in two volumes 4to (1816), and began what was intended to be a series of notices on engravers and their works. The facilities for the reproduction of engravings by the photographic processes have of late years given an impetus to iconography. One of the best modern writers on the subject was Georges Duplessis, the keeper of prints in the national library of France. He wrote a History of Engraving in France (1888), and published many notices of engravers to accompany the reproductions by M. Amand Durand. He is also the author of a useful little manual entitled Les Merveilles de la gravure (1871). Jansen's work on the origin of wood and plate engraving, and on the know- ledge of prints of the 15th and 16th centuries, was puhlished at Paris in two volumes 8vo in 1808. Among general works see Adam Bartsch, Le Peintre-graveur (1803-1843); J. D. Passavant, Le Peintre-graveur (1860-1864); P. G. Hamerton, Graphic Arts (1882); William Gilpin, Essay on Prints (1781); J. Maberly, The Print Collector (1844); W. H. Wiltshire, Introduction to the Study and Collection of Ancient Prints (1874); F. Wedmore, Fine Prints (1 897). See also the lists of works given under the separate headings for Line-Engraving, Etching, Mezzotint and Wood-Engraving.

ENGROSSING, a term used in two legal senses: (1) the writing or copying of a legal or other document in a fair large hand (en gros), and (2) the buying up of goods wholesale in order to sell at a higher price so as to establish a monopoly. The word " engross " has come into English ultimately from the Late Lat. grossus, thick, stout, large, through the A. Fr. engrosser, Med. Lat. ingrossare, to write in a large hand, and the French phrase en gros, in gross, wholesale. Engrossing and the kindred practices of forestalling and regrating were early regarded as serious offences in restraint of trade, and were punishable both at common law and by statute. They were of more particular importance in relation to the distribution of corn supplies. The statute of 1552 defines engrossing as "buying corn growing, or any other corn, grain, butter, cheese, fish or other dead victual, with intent to sell the same again." The law forbade all dealing in corn as an article of ordinary mer- chandise, apart from questions of foreign import or export. The theory was that when corn was plentiful in any district it should be consumed at what it would bring, without much respect to whether the next harvest might be equally abundant, or to what the immediate wants of an adjoining province of the same

country might be. The first statute on the subject appears to have been passed in the reign of Henry III., though the general policy had prevailed before that time both in popular prejudice and in the feudal custom. The statute of Edward VI. (1552) was the most important, and in it the offences were elaborately defined; by this statute any one who bought corn to sell it again was made liable to two months' imprisonment with forfeit of the corn. A second offence was punished by six months' imprisonment and forfeit of double the value of the corn, and a third by the pillory and utter ruin. Severe as this statute was, liberty was given by it to transport corn from one part of the country under licence to men of approved probity, which implied that there was to be some buying of corn to sell it again and elsewhere. Practically " engrossing " came to be considered buying wholesale to sell again wholesale. " Forestalling "

was different, and the statutes were directed against a class of dealers who went forward and bought or contracted for corn and other provisions, and spread false rumours in derogation of the public and open markets appointed by law, to which our ancestors appear to have attached much importance, and probably in these times not without reason. The statute of Edward VI. was modified by many subsequent enactments, particularly by the statute of 1663, by which it was declared that there could be no " engrossing " of corn when the price did not exceed 48s. per quarter, and which Adam Smith recognized, though it adhered to the variable and unsatisfactory element of price, as having contributed more to the progress of agriculture than any previous law in the statute book. In 1773 these injurious statutes were abolished, but the penal character of " engrossing " and " fore- stalling " had a root in the common law of England, as well as in the popular prejudice, which kept the evil alive to a later period. As the public enlightenment increased the judges were at no loss to give interpretations of the common law consistent with public policy. Subsequent to the act of 1773, for example, there was a case of conviction and punishment for engrossing hops, R. v. Waddington, 1800, 1 East, 143, but though this was deemed a sound and proper judgment at the time, yet it was soon afterwards overthrown in other cases, on the ground that buying wholesale to sell wholesale was not in " restraint of trade " as the former judges had assumed.

In 1800, one John Rusby was indicted for having bought ninety quarters of oats at 41s. per quarter and selling thirty of them at 43s. the same day. Lord Kenyon, the presiding judge, animadverted strongly against the repealing act of 1773, and addressed the jury strongly against the accused. Rusby was heavily fined, but, on

appeal, the court was equally divided as to whether engrossing, forestalling and regrating were still offences at common law. In 1844, all the statutes, English, Irish and Scottish, defining the offences, were repealed and with them the supposed common law foundation. In the United States there have been strong endeavours by the government to suppress trusts and combinations for engrossing. (See also Trusts; Monopoly.)

Authorities. — D. Macpherson, Annals of Commerce (1805); J. S. Girdler, Observations on Forestalling, Regrating and Ingrossing (1800); W. Cunningham, Growth of English Industry and Commerce; W. J. Ashley, Economic History; Sir J. Stephen, History of Criminal Law; Murray, New English Dictionary.

ENGYON, an ancient town of the interior of Sicily, a Cretan colony, according to legend, and famous for an ancient temple of the Matres which aroused the greed of Verres. Its site is uncertain; some topographers have identified it with Gangi, a town 20 m. S.S.E. of Cefalu, but only on the ground of the similarity of the two names.

See C. Hiilsen in Pauly-Wissowa, Realencyclopddie, v. 2568.

ENID, a city and the county-seat of Garfield county, Oklahoma, U.S.A., about 55 m. N.W. of Guthrie. Pop. (1900) 3444; (1907) 10,087 (355 of negro descent); (1910) 13,799. Enid is served by the St Louis & San Francisco, the Atchison, Topeka & Santa Fe, and the Chicago, Rock Island & Pacific railways, and by several branch lines, and is an important railway centre. It is the seat of the Oklahoma Christian University (1907; co-educational). Enid is situated in a flourishing agricultural and stock-raising region, of which it is the commercial centre, and has various manufactures, including lumber, brick, tile and flour. Natural gas was discovered near the city in 1907. Enid was founded in 1893 and was chartered as a city in the same year.

ENIGMA (Gr. olvvyna), a riddle or puzzle, especially a form of verse or prose composition in which the answer is concealed by means of metaphors. Such were the famous riddle of the Sphinx and the riddling answers of the ancient oracles. The composition of enigmas was a favourite amusement in Greece and prizes were often given at banquets for the best solution of them (Athen. x. 457). In France during the 17th century enigma-making became fashionable. Boileau, Charles Riviere Dufresny and J. J. Rousseau did not consider it beneath their literary dignity. In 1646 the abbe Charles Cotier (1604-1682)

published a Recueil des enigmes de ce temps. The word is applied figuratively to anything inexplicable or difficult of understanding.

ENKHUIZEN, a seaport of Holland in the province of North Holland, on the Zuider Zee, and a railway terminus, n-§ m. N.E. by E. of Hoorn, with which it is also connected by steam tramway. In conjunction with the railway service there is a steamboat ferry to Stavoren in Friesland. Pop. (1900) 6865. Enkhuizen, like its neighbour Hoorn, exhibits many interesting examples of domestic architecture dating from the 1 6th and 17th centuries, when It was an important and flourishing city. The facades of the houses are usually built in courses of brick and stone, and adorned with carvings, sculptures and inscriptions. Some ruined gateways belonging to the old city walls are still standing; among them being the tower-gateway called the Dromedary (1 540) , which overlooks the harbour. The tower contains several rooms, one of which was formerly used as a prison. Among the churches mention must be made of the Zuiderkerk, or South j church, with a conspicuous tower (1450-1525); and the Wester- j kerk, or West church, which possesses a beautifully carved Renaissance screen and pulpit of the middle of the 16th century,] and a quaint wooden bell-house (1519) built for use before the completion of the bell-tower. There are also a Roman Catholic church and a synagogue. The picturesque town hall (1688) contains some finely decorated rooms with paintings by Johan van Neck, a collection of local antiquities and the archives. Other interesting buildings are the orphanage (1616), containing some 17th and 18th century portraits and ancient leather hangings; the weigh-house (1559), the upper story of which was once used by the Surgeons' Gild, several of the window- panes (dating chiefly from about 1640), being decorated with the arms of various members; the former mint (1611); and the ancient assembly-house of the dike-reeves of Holland and West Friesland. Enkhuizen possesses a considerable fishing fleet and has some shipbuilding and rope-making, as well as market traffic.

ENNEKING, JOHN JOSEPH (1841-), American landscape painter, was born, of German ancestry, in Minster, Ohio, on the 4th of October 1841. He was educated at Mount St Mary's College, Cincinnati, served in the American Civil War in 1861- 1862, studied art in New York and Boston, and gave it up because his eyes were weak, only to return to it after failing in the manufacture of tinware.

In 1873-1876 he studied in Munich under Schleich and Leier, and in Paris under Daubigny and Bonnat; and in 1878-1879 he studied in Paris again and sketched in Holland. Enneking is a " plein-airist," and his favourite subject is the " November twilight " of New England, and more generally the half lights of early spring, late autumn, and winter dawn and evening.

ENNIS (Gaelic, Innis, an island; Irish, Ennis and Inish), the county town of Co. Clare, Ireland, in the east parliamentary division, on the river Fergus, 25 m. W.N.W. from Limerick -by the Great Southern & Western railway. Pop. of urban district (1901) 5093. It is the junction for the West Clare line. Ennis has breweries, distilleries and extensive flour-mills; and in the neighbourhood limestone is quarried. The principal buildings are the Roman Catholic church, which is the pro-cathedral of the diocese of Killaloe; the parish church formed out of the ruins of the Franciscan Abbey, founded in 1240 by Donough Carbrac O'Brien; a school on the foundation of Erasmus Smith, and various county buildings. The abbey, though greatly mutilated, is full of interesting details, and includes a lofty tower, a marble screen, a chapter-house, a notable east window, several fine tombs and an altar of St Francis. On the site of the old court-house a colossal statue in white limestone of Daniel O'Connell was erected in 1865. The interesting ruins of Clare Abbey, founded in 1 194 by Donnell O'Brien, king of Munster, are half-way between Ennis and the village of Clare Castle. O'Brien also founded Killone Abbey, beautifully situated on the lough of the same name, 3 m. S. of the town, possessing the unusual feature of a crypt and a holy well. Five miles N.W. of Ennis is Dysert O'Dea, with interesting ecclesiastical remains, a cross, a round tower and a castle. Ennis was incorporated in

161 2, and returned two members to the Irish parliament until the Union, and thereafter one to the Imperial parliament until

1885.

ENNISCORTHY, a market town of Co. Wexford, Ireland, in the north parliamentary division, on the side of a steep hill above the Slaney, which here becomes navigable for barges of large size. Pop. of urban district (1901) 5458. It is 77! m. S. by W. from Dublin by the Dublin & South-Eastern railway. There are breweries and flour-mills; tanning, distilling and woollen manufactures are also prosecuted to some extent, and the town is the centre of the agricultural trade for the district, which is aided by the water communication with Wexford. There are important fowl markets and

horse-fairs. Enniscorthy was taken by Cromwell in 1649, and in 1798 was stormed and burned by the rebels, whose main forces encamped on an emi- nence called Vinegar Hill, which overlooks the town from the east. The old castle of Enniscorthy, a massive square pile with a round tower at each corner, is one of the earliest military structures of the Anglo-Norman invaders, founded by Raymond le Gros (n 76). Ferns, the next station to Enniscorthy on the railway towards Dublin, was the seat of a former bishopric, and the modernized cathedral, and ruins of a church, an Augus- tinian monastery founded by Dermod Mac-Morrough about 1 1 60, and a castle of the Norman period, are still to be seen. Enniscorthy was incorporated by James I., and sent two members to the Irish parliament until the Union.

ENNISKILLEN, WILLIAM WILLOUGHBY COLE, 3 rd Earl of (1807-1886), British palaeontologist, was born on the 25th of January 1807, and educated at Harrow and Christ Church, Oxford. As Lord Cole he early began to devote his leisure to the study and collection of fossil fishes, with his friend Sir Philip de M. G. Egerton, and he amassed a fine collection at Florence Court, Enniskillen — including many specimens that were described and figured by Agassiz and Egerton. This collection was subsequently acquired by the British Museum. He died on the 21st of November 1886, being succeeded by his son (b. 1845) as 4th earl.

The first of the Coles (an old Devonshire and Cornwall family) to settle in Ireland was Sir William Cole (d. 1653), who was " undertaker " of the northern plantation and received a grant of a large property in Fermanagh in 161 1, and became provost and later governor of Enniskillen. In 1760 his descendant John Cole (d. 1767) was created Baron Mountflorence, and the latter's son, William Willoughby Cole (1736-1803), was in 1776 created Viscount Enniskillen and in 1789 earl. The 1st earl's second son, Sir Galbraith Lowry Cole (1772-1842), was a prominent general in the Peninsular War, and colonel of the 27th Inniskillings, the Irish regiment with whose name the family was associated.

ENNISKILLEN [Inniskilling], a market town and the county town of county Fermanagh, Ireland, in the north parliamentary division, picturesquely situated on an island in the river connect- ing the upper and lower loughs Erne, 116 m. N.W. from Dublin by :he Great Northern railway. Pop. of urban district (1901) 5412. The town occupies the whole island, and is connected with two suburbs on the mainland on each side by two bridges. It has a brewery, tanneries and a small manufactory of cutlery, and a considerable trade in

corn, pork and flax. In 1689 Ennis- killen defeated a superior force sent against it by James II. at the battle of Crom; and part of the defenders of the town were subsequently formed into a regiment of cavalry, which still retains the name of the Inniskilling Dragoons. The town was incorporated by James I., and returned two members to the Irish parliament until the Union; thereafter it returned one to the Imperial parliament until 1885. There are wide communications by water by the river and the upper and lower loughs Erne, and by the Ulster canal to Belfast. The loughs contain trout, large pike and other coarse fish. Two miles from Enniskillen in the lower lough is Devenish Island, with its celebrated monastic remains. The abbey of St Mary here was founded by St Molaise (Laserian) in the 6th century; here too are a fine round tower 85 ft. high, remains of domestic buildings, a holed stone and a tall well-preserved cross. The whole is carefully preserved by

the commissioners of public works under the Irish Church Act of 1869. Steamers ply between Enniskillen and Belleek on the lower lake, and between Enniskillen and Knockninny on the upper lake.

ENNIUS, QUINTUS (239-170 B.C.), ancient Latin poet, was born at Rudiae in Calabria. Familiar with Greek as the language in common use among the cultivated classes of his district, and with Oscan, the prevailing dialect of lower Italy, he further acquired a knowledge of Latin; to use his own expression (Gellius xvii. 17), he had three "hearts" (corda), the Latin word being used to signify the seat of intelligence. He is said (Servius on Aen. vii. 691) to have claimed descent from one of the legendary kings of his native district, Messapus the eponymous hero of Messapia, and this consciousness of ancient lineage is in accordance with the high self-confident tone of his mind, with his sympathy with the dominant genius of the Roman republic, and with his personal relations to the members of her great families. Of his early years nothing is directly known, and we first hear of him in middle life as serving during the Second Punic War, with the rank of centurion, in Sardinia, in the year 204, where he attracted the attention of Cato the elder, and was taken by him to Rome in the same year. Here he taught Greek and adapted Greek plays for a livelihood, and by his poetical compositions gained the friendship of the greatest men in Rome. Amongst these were the elder Scipio and Fulvius Nobilior, whom he accompanied on his Aetolian campaign (189). Through the influence of Nobilior's son, Ennius

subsequently obtained the privilege of Roman citizenship (Cicero, Brutus, 20. 79) . He lived plainly and simply on the Aventine with the poet Caecilius Statius. He died at the age of 70, immediately after producing his tragedy Thyestes. In the last book of his epic poem, in which he seems to have given various details of his personal history, he mentions that he was in his 67th year at the date of its composition. He compared himself, in contemplation of the close of the great work of his life, to a gallant horse which, after having often won the prize at the Olympic games, obtained his rest when weary with age. A similar feeling of pride at the completion of a great career is expressed in the memorial lines which he composed to be placed under his bust after death, — " Let no one weep for me, or celebrate my funeral with mourn- ing; for I still live, as I pass to and fro through the mouths of men." From the impression stamped on his remains, and from the testimony of his countrymen, we think of him as a man of a robust, sagacious and cheerful nature (Hor. Epp. ii. 1. 50; Cic. De sen. 5); of great industry and versatility; combining imaginative enthusiasm and a vein of religious mysticism with a sceptical indifference to popular beliefs and a scorn of religious imposture; and tempering the grave seriousness of a Roman with a genial capacity for enjoyment (Hor. Epp. i. 19. 7).

Till tJie appearance of Ennius, Roman literature, although it had produced the epic poem of Naevius and some adaptations of Greek tragedy, had been most successful in comedy. Naevius and Plautus were men of thoroughly popular fibre. Naevius suffered for his attacks on members of the aristocracy, and, although Plautus carefully avoids any direct notice of public matters, yet the bias of his sympathies is indicated in several passages of his extant plays. Ennius, on the other hand, was by temperament in thorough sympathy with the dominant aristocratic element in Roman life and institutions. Under his influence literature became less suited to the popular taste, more especially addressed to a limited and cultivated class, but at the same time more truly expressive of what was greatest and most worthy to endure in the national sentiment and traditions. He was a man of many-sided activity. He devoted attention to questions of Latin orthography, and is said to have been the first to introduce shorthand writing in Latin. He attempted comedy, but with so little success that in the canon of Volcacius Sedigitus he is mentioned, solely as a mark of respect " for his antiquity," tenth and last in the list of comic poets. He may be regarded also as the inventor of Roman satire, in its original sense of a " medley " or " miscellany," although it was by Lucilius that the character of aggressive and censorious

criticism of men and manners was first imparted to that form of literature. The word satura was originally applied to a rude scenic and musical performance, exhibited at Rome before the introduction of the regular drama. The saturae of Ennius were collections of writings on various subjects, written in various metres and contained in four (or six) books. Among these were included metrical versions of the physical speculations of Epi- charmus, of the gastronomic researches of Archestratus of Gela (Hedyphagetica) , and, probably, of the rationalistic doctrines of Euhemerus. It may be noticed that all these writers whose works were thus introduced to the Romans were Sicilian Greeks. Original compositions were also contained in these saturae, and among them the panegyric on Scipio, unless this was a drama. The satire of Enniifs seems to have resembled the more artistic satire of Horace in its record of personal experiences, in the occasional introduction of dialogue, in the use made of fables with a moral application, and in the didactic office which it assumed.

But the chief distinction of Ennius was gained in tragic and narrative poetry. He was the first to impart to the Roman adaptations of Greek tragedy the masculine dignity, pathos and oratorical fervour which continued to animate them in the hands of Pacuvius and Accius, and, when set off by the acting of Aesopus, called forth vehement applause in the age of Cicero. The titles of about twenty-five of his tragedies are known to us, and a considerable number of fragments, varying in length from a few words to about fifteen lines, have been preserved. These tragedies were for the most part adaptations and, in some cases, translations from Euripides. One or two were original dramas, of the class called praetextae, i.e. dramas founded on Roman history or legend; thus, the Ambracia treated of the capture of that city by his patron Nobilior, the Sabinae of the rape of the Sabine women. The heroes and heroines of the Trojan cycle, such as Achilles, Ajax, Telamon, Cassandra, Andromache, were prominent figures in some of the dramas adapted from the Greek. Several of the more important fragments are found in Cicero, who expresses a great admiration for their manly fortitude and dignified pathos. In these remains of the tragedies of Ennius we can trace indications of strong sympathy with the nobler and bolder elements of character, of vivid realization of impassioned situations, and of sagacious observation of life. The frank bearing, fortitude and self-sacrificing heroism of the best type of the soldierly character find expression in the persons of Achilles, Telamon and Eurypylus; and a dignified and passionate tender- ness of feeling makes itself heard in the lyrical utterances of Cassandra and Andromache. The language is generally nervous and vigorous, occasionally vivified with imaginative energy. But it flows

less smoothly and easily than that of the dialogue of Latin comedy. It shows the same tendency to aim at effect by alliterations, assonances and plays on words. The rudeness of- early art is most apparent in the inequality of the metres in which both the dialogue and the " recitative " are composed.

But the work which gained him his reputation as the Homer of Rome, and which called forth the admiration of Cicero and Lucretius and frequent imitation from Virgil, was the Annates, a long narrative poem in eighteen books, containing the record of the national story from mythical times to his own. Although the whole conception of the work implies that confusion of the provinces of poetry and history which was perpetuated by later writers, and especially by Lucan and Silius Italicus, yet it was a true instinct of genius to discern in the idea of the national destiny the only possible motive of a Roman epic. The execution of the poem (to judge from the fragments, amount- ing to about six hundred lines), although rough, unequal and often prosaic, seems to have combined the realistic fidelity and freshness of feeling of a contemporary chronicle with the vivifying and idealizing power of genius. Ennius prided himself especially on being the first to form the strong speech of Latium into the mould of the Homeric hexameter in place of the old Saturnian metre. And although it took several generations of poets to beat their music out to the perfection of the Virgilian cadences, yet in the rude adaptation of Ennius the secret of what ultimately

became one of the grandest organs of literary expression was first discovered and revealed. The inspiring idea of the poem was accepted, purified of all alien material, and realized in artistic shape by Virgil in his national epic. He deliberately imparted to that poem the charm of antique associations by incorporating with it much of the phraseology and sentiment of Ennius. The occasional references to Roman history in Lucretius are evidently reminiscences of the Annates. He as well as Cicero speaks of him with pride and affection as " Ennius noster." Of the great Roman writers Horace had least sympathy with him; yet he testifies to the high esteem in which he was held during the Augustan age. Ovid expresses the grounds of that esteem when he characterizes him as

" Ingenio maximus, arte rudis." A sentence of Quintilian expresses the feeling of reverence for his genius and character, mixed with

distaste for his rude workmanship, with which the Romans of the early empire re- garded him: " Let us revere Ennius as we revere the sacred groves, hallowed by antiquity, whose massive and venerable oak trees are not so remarkable for beauty as for the religious awe which they inspire " {Inst. or. x. 1. 88).

Editions of the fragments by L. Miiller (1884), L. Valmaggi (1900, with notes), J. Vahlen (1903); monographs by L. Miiller (1884 and 1893), C. Pascal, Studi sugli scrittori Latini (1900); see also Mommsen, History of Rome, bk. iii. ch. 14. On Virgil's in- debtedness to Ennius see V. Crivellari, Quae praecipue hausit Ver- gilius ex Naevio et Ennio (1889).

ENNODIUS, MAGNUS FELIX (a.d. 474-521), bishop of Pavia, Latin rhetorician and poet. He was born at Arelate (Aries) and belonged to a distinguished but impecunious family. Having lost his parents at an early age, he was brought up by an aunt at Ticinum (Pavia); according to some, at Mediolanum (Milan). After her death he was received into the family of a pious and wealthy young lady, to whom he was betrothed. It is not certain whether he actually married this lady; she seems to have lost her money and retired to a convent, whereupon Ennodius entered the Church, and was ordained deacon (about 493) by Epiphanius, bishop of Pavia. From Pavia he went to Milan, where he continued to reside until his elevation to the see of Pavia about 515. During his stay at Milan he visited Rome and other places, where he gained a reputation as a teacher of rhetoric. As bishop of Pavia he played a considerable part in ecclesiastical affairs. On two occasions (in 515 and 517) he was sent to Constantinople by Theodoric on an embassy to the emperor Anastasius, to endeavour to bring about a reconciliation between the Eastern and Western churches. He died on the 17th of July 521; his epitaph still exists in the basilica of St Michael at Pavia {Corpus Inscriptionum Latinarum, v. pt. ii. No. 6464).

Ennodius is one of the best representatives of the twofold (pagan and Christian) tendency of sth-century literature, and of the Gallo-Roman clergy who upheld the cause of civilization and classical literature against the inroads of barbarism. But his anxiety not to fall behind his classical models — the chief of whom was Virgil — his striving after elegance and grammatical correctness, and a desire to avoid the commonplace have pro- duced a turgid and affected style, which, aggravated by rhetorical exaggerations and popular barbarisms, makes his works difficult to understand. It has been remarked that his poetry is less unintelligible than his prose.

The numerous writings of this versatile ecclesiastic may be divided into (1) letters, (2) miscellanies, (3) discourses, (4) poems. The letters on a variety of subjects, addressed to high church and state officials, are valuable for the religious and political history of the period. Of the miscellanies, the most important are : The Panegyric 0/ Theodoric, written to thank the Arian prince for his tolerance of Catholicism and support of Pope Symmachus (probably delivered before the king on the occasion of his entry into Ravenna or Milan) ; like all similar works, it is full of flattery and exaggeration, but if used with caution is a valuable authority ; The Life of St Epiphanius, bishop of Pavia, the best written and perhaps the most important of all his writings, an interesting picture of the political activity and influence of the church; Eucharisticon de Vila Sua, a sort of " confessions," after the manner of St Augustine; the description of the enfranchise- ment of a slave with religious formalities in the presence of a bishop ; Paraenesis didascalica, an educational guide, in which the claims of

grammar as a preparation for the study of rhetoric, the mother of all the sciences, are strongly insisted on. The discourses (Dictiones) are sacred, scholastic, controversial and ethical. The discourse on the anniversary of Laurentius, bishop of Milan, is the chief authority for the life of that prelate; the scholastic discourses, rhetorical exercises for the schools, contain eulogies of classical learning, dis- tinguished professors and pupils; the controversial deal with imaginary charges, the subjects being chiefly borrowed from the Controversiae of the elder Seneca; the ethical harangues are put into the mouth of mythological personages (e.g. the speech of Thetis over the body of Achilles). Amongst the poems mention may be made of two Itineraria, descriptions of a journey from Milan to Brigantium (Briangon) and of a trip on the Po ; an apology for the study of profane literature; an epithalamium, in which Love is introduced as execrating Christianity; a dozen hymns, after the manner of St Ambrose, probably intended for church use ; epigrams on various subjects, some being epigrams proper — inscriptions for tombs, basilicas, baptisteries — others imitations of Martial, satiric pieces and descriptions of scenery.

There are two excellent editions of Ennodius by G. Hartel (vol. vi. of Corpus scriptorum ecclesiasticorum Latinorum, Vienna, 1882) and F. Vogel (vol. vii. of Monumenta Germaniae hislorica, 1885, with exhaustive prolegomena). On Ennodius generally consult M. Fertig, Ennodius und seine Zeit (1855-1860); A. Dubois, La Latinite d'Ennodius (1903); F. Magani, Ennodio (Pavia, 1886); A. Ebert, Allgemeine Geschichte der Litt. des Mittelalters im Abend- lande, i.

(1889); M. Manitius, Geschichte der christlich-lateinischen Poesie (1891); Teuffel, Hist, of Roman Literature, § 479 (Eng. tr., 1892). French translation by the abbe S. Leglise (Paris, 1906 foil.).

ENNS, a town of Austria, in upper Austria, 11 m. by rail S.E. of Linz. Pop. (1900) 4371. It is situated on the Enns near its confluence with the Danube and possesses a 15th-century castle, an old Gothic church, and a town hall erected in 1565. Three miles to the S.W. lies the Augustinian monastery of St Florian, one of the oldest and largest religious houses of Austria. Founded in the 7th century, it was occupied by the Benedictines till the middle of the 11th century. It was established on a firm basis in 1071, when it passed into the hands of the Augustinians. The actual buildings, which are among the most magnificent in Austria, were constructed between 1686 and 1745. Its library, with over 70,000 volumes, contains valuable manuscripts and also a fine collection of coins. Enns is one of the oldest towns in Austria, and stands near the site of the Roman Laureacum. The nucleus of the actual town was formed by a castle, called Anasiburg or Anesburg, erected in 900 by the Bavarians as a post against the incursions of the Hungarians. It soon attained commercial prosperity, and by a charter of 1212 was made a free town. In 1275 it passed into the hands of Rudolph of Habsburg. An encounter between the French and the Austrian troops took place here on the 5th of November 1805.

ENOCH (ˆq, IJq, Hanokh, Teaching or Dedication). (1) In Gen. iv. 17, 18 (J), the eldest son of Cain, born while Cain was building a city, which he named after Enoch ; nothing is known of the city. (2) In Gen. v. 24, &c. (P), seventh in descent from Adam in the line of Seth; he " walked with God," and after 365 years " was not for God took him." [(1) and (2) are often regarded as both corruptions of the seventh primitive king Evedorachos (Enmeduranki in cuneiform inscriptions), the two genealogies, Gen. iv. 16-24, v. 12-17, being variant forms of the Babylonian list of primitive kings. Enmeduranki is the favourite of the sun-god, cf. Enoch's 365 years. 1] Heb. xi. 5 says Enoch "was not found, because God translated him." Later Jewish legends represented him as receiving revelations on astronomy, &c, and as the first author; apparently following the Babylonian account which makes Enmeduranki receive instruction in all wisdom from the sun-god. 1 Two apocryphal works written in the name of Enoch are extant, the Book of Enoch, compiled from documents written 200-50 B.C., quoted as the work of Enoch, Jude 14 and 15; and the Book of the Secrets of Enoch, a.d. 1-50. Cf. 1 Chron. i. 3; Luke iii. 37; Wisdom iv. 7-14; Ecclus. xliv. 16, xlix. 14. (3) Son, i.e. clan, of Midian, in Gen. xxv. 4; 1 Chron. i- 33′ (4) Son,

i.e. clan, of Reuben, E. V. Hanoch, Henoch, in Gen. xlvi. 9; Exod. vi. 14; Num. xxvi. 5; 1 Chron. v. 3. There may have been some historical connexion between these two clans with identical names.

1 Eberhard Schrader, Die Keilinschriften und das A.T., 3rd ed., pp. 540 f.

ENOCH, BOOK OF.. The Book of Enoch, or, as it is sometimes called, the Ethiopic Book of Enoch, in contradistinction to the Slavonic Book of Enoch (see later), is perhaps the most important of all the apocryphal or pseudapocryphal Biblical writings for the history of religious thought. It is not the work of a single author, but rather a conglomerate of literary fragments which once circulated under the names of Enoch, Noah and possibly Methuselah. In the Book of the Secrets of Enoch we have addi- tional portions of this literature. As the former work is derived from a variety of Pharisaic writers in Palestine, so the latter in its present form was written for the most part by Hellenistic Jews in Egypt.

The Book of Enoch was written in the second and first centuries B.C. It was well known to many of the writers of the New Testa- ment, and in many instances influenced their thought and diction. Thus it is quoted by name as a genuine production of Enoch in the Epistle of Jude, 14 sq., and it lies at the base of Matt. xix. 28 and John v. 22, 27, and many other passages. It had also a vast indirect influence on the Palestinian literature of the 1st century of our era. Like the Pentateuch, the Psalms, the Megilloth, the Pirke Aboth, this work was divided into five parts, with the critical discussion of which we shall deal below. With the earlier Fathers and Apologists it had all the weight of a canonical book, but towards the close of the 3rd and the beginning of the 4th century it began to be discredited, and finally fell under the ban of the Church. Almost the latest reference to it in the early church is made by George Syncellus in his Chrono- graphy about a.d. 800. The book was then lost sight of till 1773, when Bruce discovered the Ethiopic version in Abyssinia.

Original Language. — That the Book of Enoch was written in Semitic is now accepted on all hands, but scholars are divided as to whether the Semitic language in question was Hebrew or Aramaic. Only one valuable contribution on this question has been made, and that by Halevy in the Journal Asiatique, Avril- Mai 1867, pp. 352-395. This

scholar is of opinion that the entire work was written in Hebrew. Since this publication, however, fresh evidence bearing on the question has been discovered in the Greek fragment (i.-xxxii.) found in Egypt. Since this fragment contains three Aramaic words transliterated in the Greek, some scholars, and among them Schiirer, Levi and N. Schmidt, have concluded that not only are chapters i.-xxxvi. derived from an Aramaic original, but also the remainder of the book. In support of the latter statement no evidence has yet been offered by these or any other scholars, nor yet has there been any attempt to meet the positive arguments of Halevy for a Hebrew original of xxxvii.-civ., whose Hebrew reconstructions of the text have been and must be adopted in many cases by every editor and translator of the book. A prolonged study of the text, which has brought to light a multitude of fresh passages the majority of which can be explained by retranslation into Hebrew, has convinced the present writer 1 that, whilst the evidence on the whole is in favour of an Aramaic original of vi.-xxxvi., it is just as conclusive on behalf of the Hebrew original of the greater part of the rest of the book.

Versions — Greek, Latin and Ethiopic. — The Semitic original was translated into Greek. It is not improbable that there were two distinct Greek versions. Of the one, several fragments have been preserved in Syncellus (a.d. 800), vi.-x. 14, viii. 4-ix. 4,. xv. 8-xvi. 1 ; of the other, i.xxxii. in the Giza Greek fragment discovered in Egypt and published by Bouriant {Fragments grecs du livre d' Enoch)', in 1892, and subsequently by Lods, Dillmann, Charles {Book of Enoch, 318 sqq.), Swete, and finally by Rader macher and Charles {Ethiopic Text, 3-75). In addition to these fragments there is that of lxxxix. 42-49 (see Gildemeister in the ZDMG, 1855, pp. 621-624, and Charles, Ethiopic Text, pp. 175- 177). Of the Latin version only i. 9 survives, being preserved in the Pseudo-Cyprian's Ad Novatianum, and cvi. 1-18 discovered by James in an 8th-century MS. of the British Museum (see James, Apoc. anecdota, 146-150; Charles, op. cit. 219-222). This version is made from the Greek.

1 The evidence is given at length In R. H. Charles' Ethiopic Text of Enoch, pp. xxvii-xxxiii.

The Ethiopic version, which alone preserves the entire text, is a very faithful translation of the Greek. Twenty-eight MSS. of this version are in the different libraries of Europe, of which fifteen are to be found in England. This version was made from an ancestor of the Greek fragment discovered at Giza. Some of the utterly unintelligible passages in this fragment are literally reproduced in the Ethiopic. The same wrong order of the text in vii.-viii. is common to both. In

order to recover the original text, it is from time to time necessary to retranslate the Ethiopic into Greek, and the latter in turn into Aramaic or Hebrew. By this means we are able to detect dittographies in the Greek and variants in the original Semitic. The original was written to a large extent in verse. The discovery of this fact is most helpful in the criticism of the text. This version was first edited by Laurence in 1838 from one MS., in 1851 by Dillmann from five, in 1902 by Flemming from fifteen MSS., and in 1906 by the present writer from twenty-three.

Translations and Commentaries. — Laurence, The Book of Enoch (Oxford, 1821); Dillmann, Das Buck Henoch (1853); Schodde, The Book of Enoch (1882); Charles, The Book of Enoch (1893); Beer, " Das Buch Henoch," in Kautzsch's.4£o&. u. Pseud, des A.T. (1900), ii. 217-310; Flemming and Radermacher, Das Buch Henoch (1901) ; Martin, Le Livre d' Henoch (1906). Critical Inquiries. — The bibliography will be found in Schiirer, Gesch. d. judischen Volkes 3 , iii. 207-209, and a short critical account of the most important of these in Charlef, op. cit. pp. 9-21.

The different Elements in the Book, with their respective Characteristics and Dates. — We have remarked above that the Book of Enoch is divided into five parts — i.-xxxvi., xxxvii.lxxi., lxxii. lxxxii., lxxxiii.-xc, xci-cviii. Some of these parts constituted' originally separate treatises. In the course of their reduction and incorporation into a single work they suffered much mutila- tion and loss. From an early date the com posit eness of this work was recognized. Scholars have varied greatly in their critical analyses of the work (see Charles, op. cit. 6-21, 309-311). The analysis which gained most acceptation was that of Dillmann (Herzog's Realencyk? xii. 350-352), according to whom the present books consist of — (1) the groundwork, i.e. i.-xxxvi., lxxii.-cv., written in the time of John Hyrcanus; (2) xxxvii.-lxxi., xvii. -xix., .before 64 B.C.; (3) the Noachic fragments, vi. 3-8, viii. 1-3, ix. 7, x. 1, 11, xx., xxxix. 1, 20, liv. 7-lv. 2, lx., lxv.-lxix. 25, cvi.-cvii.; and (4) cviii., from a later hand. With much of this analysis there is no reason to disagree. The similitudes are undoubtedly of different authorship from the rest of the book, and certain portions of the book are derived from the Book of Noah. On the other hand, the so-called groundwork has no existence unless in the minds of earlier critics and some of their belated followers in the present. It springs from at least four hands, and may be roughly divided into four parts, corresponding to the present actual divisions of the book.

A new critical analysis of the book based on this view was given by

Charles {op. cit. pp. 24-33), an d further developed by Clemen and Beer. The analysis of the latter (see Herzog, Realencyk? xiv. 240) is very complex. The book, according to this scholar, is composed of the following separate elements from the Enoch tradition: — (1) Ch. i.-v.; (2) xii-xvi.; (3) xvii. -xix. ; (4) xx.-xxxvi.; (5) xxxvii.-lxix. (from diverse sources); (6) lxx.-lxxi.; (7) lxxii.-lxxxii. ; (8) lxxxiii.-lxxxiv.; (9) lxxxv.-xc; (10) xciii., cxi. 12-17; (IX) XC1 – i-n, 18, 19, xcii., xciv.-cv.; (12) cviii., and from the Noah tradition; (13) vi.-xi.; (14) xxxix. i-2a, liv. 7-lv. 2, lx., lxv.-lxix. 25; (15) cvi.-cvii. Thus while Clemen finds eleven separate sources, Beer finds fifteen. A fresh, study from the hand of Appel {Die Composition des athiopischen Henochbuchs, 1906) seeks to reach a final analysis of our book. But though it evinces considerable insight, it cannot escape the charge of extravagance. The original book or ground-work of Enoch consisted of i.-xvi., xx.-xxxvi. This work called forth a host of imitators, and a number of their writings, together with the groundwork, were edited as a Book of Methuselah, i.e. lxxii.-cv. Then came the final redactor, who interpolated the groundwork and the Methuselah sections, adding two others from his own pen. The Similitudes he worked up from a series of later sources, and gave them the second place

in the final work authenticating them with the name of Noah. The date of the publication of the entire work Appel assigns to the years immediately following the death of Herod.

We shall now give an analysis of the book, with the dates of the various sections where possible. Of these we shall deal with the easiest first. Chap. Ixxii.-lxxxii. constitutes a work in itself, the writer of which had very different objects before him from the writers of the rest of the book. His sole aim is to give the law of the heavenly bodies. His work has suffered disarrangements and interpolations at the hands of the editor of the whole work. Thus lxxvi.-lxxvii., which are concerned with the winds, the quarters of the heaven, and certain geographical matters, and lxxxi., which is concerned wholly with ethical matters, are foreign to a work which professes in its title (lxxii. 1) to deal only with the luminaries of the heaven and their laws. Finally, lxxxii. should stand before lxxix. ; for the opening words of the latter suppose it to be already read. The date of this section can be partially established, for it was known to the author of Jubilees, and was therefore written before the last third of the 2nd

century B.C.

Chaps. Ixxxiii.-xc. — This section was written before 161 B.C., for " the great horn," who is Judas the Maccabee, was still warring when the author was writing. (Dillmann, Schiirer and others take the great horn to be John Hyrcanus, but this interpretation does violence to the text.) These chapters recount three visions : the first two deal with the first-world judgment ; the third with the entire history of the world till the final judgment. An eternal Messianic kingdom at the close of the judgment is to be established under the Messiah, with its centre in the New Jerusalem set up by God Himself. Chaps, xci.-civ. — In the preceding section the Maccabees were the religious champions of the nation and the friends of the H as idim. Here they are leagued with the Sadducees, and are the declared foes of the Pharisaic party. This section was written therefore after 134 B.C., when the breach between John Hyrcanus and the Pharisees took place and before the savage massacres of the latter by Jannaeus (95 B.C.) ; for it is not likely that in a book dealing with the sufferings of the Pharisees such a reference would be omitted. These chapters indicate a revolution in the religious hopes of the nation. An eternal Messianic kingdom is no longer anticipated, but only a temporary one, at the close of which the final judgment will ensue. The righteous dead rise not to this kingdom but to spiritual blessedness in heaven itself — to an immortality of the soul. This section also has suffered at the hands of the final editor. Thus xci. 12-17, which describe the last three weeks of the Ten-Weeks Apocalypse, should be read immediately after xciii. 1-10, which recount the first seven weeks of the same apocalypse. But, furthermore, the section obviously begins with xcii. " Written by Enoch the scribe," &c. Then comes xci. 1-10 as a natural sequel. The Ten-Weeks Apoca- lypse, xciii. 1-10, xci. 12-17, if >t came from the same hand, followed, and then xciv. The attempt (by Clemen and Beer) to place the Ten-Weeks Apocalypse before 167, because it makes no reference to the Maccabees, is not successful ; for where the history of mankind from Adam to the final judgment is despatched in sixteen verses, such an omission need cause little embarrassment, and still less if the author is the determined foe of the Maccabees, whom he would probably have stigmatized as apostates, if he had mentioned them at all, just as he similarly brands all the Sadducean priesthood that preceded them to the time of the captivity. This Ten-Weeks Apocalypse, therefore, we take to be the work of the writer of the rest of xci.-civ. Chaps, i.-xxxvi. — This is the most difficult section of the book. It is very composite. Chaps, vi.xi. is apparently an independent fragment of the Enoch Saga. It is itself compounded of the Semjaza and Azazel

myths, and in its present composite form is already pre supposed by lxxxviii.-lxxxix. I ; hence its present form is earlier than 166 B.C. It represents a primitive and very sensuous view of the eternal Messianic kingdom on earth, seeing that the righteous beget 1000 children before they die. These chapters appear to be from the Book of Noah ; for they never refer to Enoch but to Noah only (x. 1). Moreover, when the author of Jubilees is clearly drawing on the Book of Noah, his subject-matter (vii. 21-25) agrees most closely with that of these chapters in Enoch (see Charles' edition of Jubilees, pp. lxxi. sq. 264). xii.-xvi., on the other hand, belong to the Book of Enoch. These represent for the most part what Enoch saw in a vision. Now whereas vi.-xvi. deal with the fall of the angels, their destruction of mankind, and the condemnation of the fallen angels, the subject-matter now suddenly changes and xvii.- xxxvi. treat of Enoch's journeyings through earth and heaven escorted by angels. Here undoubtedly we have a series of doublets ; for xvii.-xix. stand in this relation to xx.-xxxvi., since both sections deal with the same subjects. Thus xvii. 4 = xxiii. ; xvii. 6 = xxii. ; xviii. 1 =xxxiv.-xxxvi. ; xviii. 6-9 = xxiv.-xxv., xxxii. 1-2; xviii. 11, xix.=xxi. 7-10; xviii. I2-I6 = xxi. 1-6. They belong to the same cycle of tradition and cannot be independent of each other. Chap. xx. appears to show that xx.-xxxvi. is fragmentary, since only four of the seven angels mentioned in xx. have anything to do in xxi.-xxxvi. Finally, i.v. seems to be of a different date and author ship from the rest.

Chaps, xxxvii.-lxxi. — These constitute the well-known Similitudes. They were written before 64 B.C., for Rome was not yet known to the

writer, and after 95 B.C., for the slaying of the righteous, of which the writer complains, was not perpetrated by the Maccabean princes before that date. This section consists of three similitudes — xxxviii.-xliv., xlv.-lvii., lviii.lxix. These are introduced and con cluded by xxxvii. and lxx. There are many interpolations — lx., lxv.-lxix. 25 confessedly from the Book of Noah; most probably also liv. 7-lv. 2. Whence others, such as xxxix. 1, 2a, xli. 3-8, xliii. sq., spring is doubtful. Chaps. 1, lvi. 5— lvii. 3a are likewise insertions. In R. H. Charles's edition of Enoch, lxxi. was bracketed as an interpolation. The writer now sees that it belongs to the text of the Similitudes though it is dislocated from its original context. It presents two visits of Enoch to heaven in lxxi. 1-4 and lxxi. 5-17. The extraordinary statement in lxxi. 14, according to which Enoch is addressed as " the Son of Man," is seen, as Appel points out, on examination of the context to have arisen from the loss of a portion of the text after verse 13, in which Enoch saw a heavenly being with the Head of

Days and asked the angel who accompanied him who this being was. Then comes ver. 14, which, owing to the loss of this passage, has assumed the form of an address to Enoch : " Thou art the Son of Man," but which stood originally as the angel's reply to Enoch: " This is the Son of Man," &c. Ver. 15, then, gives the message sent to Enoch by the Son of Man. In the next verse the second person should be changed into the third. Thus we recover the original text of this difficult chapter. The Messianic doctrine and eschatology of this section is unique. The Messiah is here for the first time described as the pre-existent Son of Man (xlviii. 2), who sits on the throne of God (xlv. 3; xlvii. 3), possesses universal dominion (lxii. 6), and is the Judge of all mankind (lxix. 27). After the judg- ment there will be a new heaven and a new earth, which will be the abode of the blessed.

' The Book of the Secrets or Enoch, or Slavonic Enoch. This new fragment of the Enochic literature has only recently come to light through five MSS. discovered in Russia and Servia. Since about a.d. 500 it has been lost sight of. It is cited without acknowledgment in the Book of Adam and Eve, the Apocalypses of Moses and Paul, the Sibylline Oracles, the Ascension of Isaiah, the Epistle of Barnabas, and referred to by Origen and Irenaeus (see Charles, The Book of the Secrets of Enoch, 1895, pp. xvii-xxiv). For Charles's editio prince'ps of this work, in 1895, Professor Morfill translated two of the best MSS., as well as Sokolov's text, which is founded on these and other MSS. In 1896 Bonwetsch issued his Das slavische Henochbuch, in which a German transla- tion of the above two MSS. is given side by side, preceded by a short introduction.

Analysis.- — Chaps, i.ii. Introduction: life of Enoch: his dream, in which he is told that he will be taken up to heaven: his admoni tions to his sons, iii.-xxxvi. What Enoch saw in heaven, iii.-vi. The first heaven: the rulers of the stars: the great sea and the treasures of snow, &c. vii. The second heaven: the fallen angels. viii.-x_. The third heaven: Paradise and place of punishment, xi.xvh. The fourth heaven: courses of the sun and moon: phoe nixes, xviii. The fifth heaven: the watchers mourning for their fallen brethren, xix. The sixth heaven: seven bands of angels arrange and study the courses of the stars, &c. : others set over the years, the fruits of the earth, the souls of men. xx.xxxvi. The seventh heaven. The Lord sitting on His throne with the ten chief orders of angels. Enoch is clothed by Michael in the raiment of God's glory and instructed in the secrets of nature and of man, which he wrote down in 366 books. God reveals to Enoch the history of the creation of the earth and the seven planets and circles of the heaven and of man, the story of the fallen angels, the duration of the World through 7000 years, and its

millennium of rest, xxxviii. lxvi. Enoch returns to earth, admonishes his sons: instructs them on what he had seen in the heavens, gives them his books. Bids them not to swear at all nor to expect any intercession of the de- parted saints for sinners. lvi.-lxiii. Methuselah asks Enoch's blessing before he departs, and to all his sons and their families Enoch gives fresh instruction. lxiv.-lxvi. Enoch addressed the assembled people at Achuszan. lxvii.-lxviii. Enoch's translation. Rejoicings of the people on behalf of the revelation given them through Enoch.

Language and Place of Writing. — A large part of this book was written for the first time in Greek. This may be inferred from such statements as (1) xxx. 13, " And I gave him a name {i.e. Adam) from the four substances: the East, the West, the North and the South." Thus Adam's name is here derived from the initial letters of the four quarters: avarokri, 56

sections may wholly or in part go back to Hebrew originals. There is a Hebrew Book of Enoch attributed to R. Ishmael ben Elisha who lived at the close of the 1st century and the beginning of the 2nd century B.C. This book is very closely related to the Book of the Secrets of Enoch, or rather, to a large extent de- pendent upon it. Did Ishmael ben Elisha use the Book of the Secrets of Enoch in its Greek form, or did he find portions of it in Hebrew? At all events, extensive quotations from a Book of Enoch are found in the rabbinical literature of the middle ages, and the provenance of these has not yet been determined. See Jewish Encyc. i. 676 seq.

But there is a stronger argument for a Hebrew original of certain sections to be found in the fact that the Testaments of the XII. Patriarchs appears to quote xxxiv. 2, 3 of our author in T. Napth. iv. 1, T. Benj. ix.

The book in its present form was written in Egypt. This may be inferred (1) from the variety of speculations which it holds in common with Philo and writings of a Hellenistic character that circulated mainly in Egypt. (2) The Phoenixes are Chalkydries (ch. xii.) — monstrous serpents with the heads of crocodiles — are natural products of the Egyptian imagination. (3) The syn- cretistic character of the creation account (xxv.-xxvi.) betrays Egyptian elements.

Relation to Jewish and Christian Literature. — The existence of a kindred literature in Neo-Hebrew has been already pointed out. We might note besides that it is quoted in the Book of Adam and Eve, the Apocalypse of Moses, the Apocalypse of Paul, the anonymous work De montibus Sina et Sion, the Sibylline Oracles ii. 75, Origen, De princip. i. 3, 2. The authors of the Ascension of Isaiah, the Apoc. of Baruch and the Epistle of Barnabas were probably acquainted with it. In the New Testament the simi- larity of matter and diction is sufficiently strong to establish a close connexion, if not a literary dependence. Thus with Matt. v. 9, " Blessed are the peacemakers," cf. lii. n, " Blessed is he who establishes peace ": with Matt. v. 34, 35, 37, " Swear not at all," cf. xlix. 1, " I will not swear by a single oath, neither by heaven, nor by earth, nor by any other creature which God made — if there is no truth in man, let them swear by a word yea, yea, or nay, nay."

Date and Authorship. — The book was probably written between 30 B.C. and a.d. 70. It was written after 30 B.C., for it makes use of Sirach, the (Ethiopic) Book of Enoch and the Book of Wisdom. It was written before a.d. 70; for the temple is still standing: see lix. 2.

The author was an orthodox Hellenistic Jew who lived in Egypt. He believed in the value of sacrifices (xlii. 6; lix. 1, 2, &c), but is careful to enforce enlightened views regarding them (xlv. 3, 4; lxi. 4, 5.) in the law, lii. 8, 9; in a blessed im- mortality, 1. 2; Ixv. 6, 8-10, in which the righteous should be clothed in " the raiment of God's glory," xxii. 8. In questions relating to cosmology, sin, death, &c, he is an eclectic, and allows himself the most unrestricted freedom, and readily incorporates Platonic (xxx. 16), Egyptian (xxv. 2) and Zend (lviii. 4-6) elements into his system of thought.

Anthropological Views. — All the souls of men were created before the foundation of the world (xxiii. 5) and likewise their future abodes in heaven or hell (xlix. 2, lviii. 5). Man's name was derived, as we have already seen, from the four quarters of the world, and his body was compounded from seven sub- stances (xxx. 8). He was created originally good: freewill was bestowed upon him with instruction in the two ways of light and darkness, and then he was left to mould his own destiny (xxx. 15). But his preferences through the bias of the flesh took an evil direction, and death followed as the wages of sin (xxx. 16).

Literature. — Morfill and Charles, The Book of the Secrets of Enoch (Oxford, 1896); Bonwetsch, " Das slavische Henochbuch," in the Abhandlungen der koniglichen gelehrten Gesellschaft zu Gbt- tineen

(1896). See also Schiirer in loc. and the Bible Dictionaries.

(R. H. C.)

ENOMOTO, BUYO, Viscount (1839-1909), Japanese vice- admiral, was born in Tokyo. He was the first officer sent by the Tokugawa government to study naval science in Europe, and

after going through a course of instruction in Holland he returned in command of the frigate " Kaiyo Maru," built at Amsterdam to order of the Yedo administration. The salient episode of his career was an attempt to establish a republic at Hakodate. Finding himself in command of a squadron which represented practically the whole of Japan's naval forces, he refused to acquiesce in the deposition of the Shogun, his liege lord, and, steaming off to Yezo (1867), proclaimed a republic and fortified Hakodate. But he was soon compelled to surrender. The newly organized government of the empire, however, instead of inflict- ing the death penalty on him and his principal followers, as would have been the inevitable sequel of such a drama in previous times, punished them with imprisonment only, and four years after the Hakodate episode, Enomoto received an important post in Hokkaido, the very scene of his wild attempt. Subse- quently (1874), as his country's representative in St Petersburg, he concluded the treaty by which Japan exchanged the southern half of Saghalien for the Kuriles. He received the title of viscount in 1885, and afterwards held the portfolios of com- munications, education and foreign affairs. He died at Tokyo in 1909.

ENOS (anc. Aenos), a town of European Turkey, in the vilayet of Adrianople; on the southern shore of the river Maritza, where its estuary broadens to meet the Aegean Sea in the Gulf ofEnos. Pop. (1905) about 8000. Enos occupies a ridge of rock surrounded by broad marshes. It is the seat of a Greek bishop, and the population is mainly Greek. It long possessed a valuable export trade, owing to its position at the mouth of the Maritza, the great natural waterway from Adrianople to the sea. But its commerce has declined, owing to the unhealthiness of its climate, to the accumulation of sandbanks in its harbour, which now only admits small coasters and fishing-vessels, and to the rivalry of D6deagatch, a neighbouring seaport connected with Adrianople by rail.

ENRIQUEZ GOMEZ, ANTONIO (c. 1601-c. 1661), Spanish dramatist, poet and novelist of Portuguese- Jewish origin, was known in the early part of his career as Enrique Enriquez de Paz. Born at Segovia, he entered the army, obtained a cap- taincy, was suspected

of heresy, fled to France about 1636, assumed the name of Antonio Enriquez Gomez, and became majordomo to Louis XIII., to whom he dedicated Luis dado de Dios a Anna (Paris, 1645). Some twelve years later he removed to Amsterdam, avowed his conversion to Judaism, and was burned in effigy at Seville on the 14th of April 1660. He is supposed to have returned to France, and to have died there in the following year. Three of his plays, El Gran Cardenal de Espana, don Gil de Albornoz, and the two parts of Fernan Mendez Pinto were received with great applause at Madrid about 1629; in 1635 he contributed a sonnet to Montalban's collection of posthumous panegyrics on Lope de Vega, to whose dramatic school Enriquez Gomez belonged. The Academias morales de las Musas, consisting of four plays (including A lo que obliga el honor, which recalls Calderon's Medico de su honrd), was published at Bordeaux in 1642; La Torre de Babilonia, containing the two parts of Fernan Mendez Pinto, appeared at Rouen in 1647; and in the preface to his poem, El Samson Nazareno (Rouen, 1656), Enriquez Gomez gives the titles of sixteen other plays issued, as he alleges, at Seville. There is no foundation for the theory that he wrote the plays ascribed to Fernando de Zarate. His dramatic works, though effective on the stage, are disfigured by extravagant incidents and preciosity of diction. The latter defect is likewise observable in the mingled prose and verse of La Culpa del primer peregrino (Rouen, 1644) and the dialogues entitled Politica Angelica (Rouen, 1647). Enriquez Gomez is best represented by El Siglo Pitagdrico y Vida de don Gregorio Guadana (Rouen, 1644), a striking picaresque novel in prose and verse which is still reprinted.

ENSCHEDE, a town in the province of Overysel, Holland, near the Prussian frontier, and a junction station 5 m. by rail S.E. of Hengelo. Pop. (1900) 23,141. It is important as the centre of the flourishing cotton-spinning and weaving industries of the Twente district; while by the railway via Gronau and

Koesfeld to Dortmund it is in direct communication with the Westphalian coalfields. Enschede possesses several churches, an industrial trade school, and a large park intended for the benefit of the working classes. About two-thirds of the town was burnt down in 1862.

ENSENADA, CENON DE SOMODEVILLA, Marques de la

(1702-1781), Spanish statesman, was born at Alesanco near Logrofio on the 2nd of June 1702. When he had risen to high office it was said that his pedigree was distinguished, but nothing is known of his parents — Francisco de Somodevilla and his wife Francisca de Bengoechea, — nor is anything known of his own life before he entered the civil administration of the Spanish navy as a clerk in 1720. He served in administrative capacities at the relief of Ceuta in that year and in the reoccupation of Oran in 1731. His ability was recognized by Don Jose Patinos, the chief minister of King Philip V. Somodevilla was much employed during the various expeditions undertaken by the Spanish government to put the king's sons by his second marriage with Elizabeth Farnese, Charles and Philip, on the thrones of Naples and Parma. In 1736 Charles, afterwards King Charles III. of Spain, conferred on him the Neapolitan title of Marques de la Ensenada. The name can be resolved into the three Spanish words " en se nada," meaning " in himself nothing." The courtly flattery of the time, and the envy of. the nobles who disliked the rise of men of Ensenada's class, seized upon this poor play on words; an Ensenada is, however, a roadstead or small bay. In 1742 he became secretary of state and war to Philip, duke of Parma. In the following year (nth of April 1743), on the death of Patifios's successor Campillo, he was chosen by Philip V. as minister of finance, war, the navy and the Indies (i.e. the Colonies) . Ensenada met the nomination with a becom- ing nolo episcopari, professing that he was incapable of filling the four posts at once. His reluctance was overborne by the king, and he became in fact prime minister at the age of forty-one. During the remainder of the king's reign, which lasted till the nth of July 1746, and under his successor Ferdinand VI. until 1754, Ensenada was the effective prime minister. His ad- ministration is notable in Spanish history for the vigour of his policy of internal reform. The reports on the finances and general condition of the country, which he drew up for the new king on his accession, and again after peace was made with England at Aix-la-Chapelle on the 18th of October 1748, are very able and clear-sighted. Under his direction the despotism of the Bourbon kings became paternal. Public works were undertaken, shipping was encouraged, trade was fostered, numbers of young Spaniards were sent abroad for education. Many of them abused their opportunity, but on the whole the prosperity of the country revived, and the way was cleared for the more sweeping innova- tions of the following reign. Ensenada was a strong partizan of a French alliance and of a policy hostile to England. Sir B. Keene, the English minister, supported the Spanish court party opposed to him, and succeeded in preventing him from adding the foreign office to others which he held. Ensenada would

probably have fallen sooner but for the support he received from the Portuguese queen, Barbara. In 1754 he offended her by opposing an exchange of Spanish and Portuguese colonial possessions in America which she favoured. On the 20th of July of that year he was arrested by the king's order, and sent into mild confinement at Granada, which he was afterwards allowed to exchange for Puerto de Santa Maria. On the accession of Charles III. in 1759, he was released from arrest and allowed to return to Madrid. The new king named him as member of a commission appointed to reform the system of taxation. En- senada could not renounce the hope of again becoming minister, and entered into intrigues which offended the king. On the 18th of April 1766 he was again exiled from court, and ordered to go to Medina del Campo. He had no further share in public life, and died on the 2nd of December 1781. Ensenada acquired wealth in office, but he was never accused of corruption. Though, like most of his countrymen, he suffered from the mania for grandeur, and was too fond of imposing schemes out of all pro- portion with the resources of the state, he was undoubtedly

an able and patriotic man, whose administration was beneficial to Spain.

For his administration see W. Coxe, Memoirs of the Kings of Spain of the House of Bourbon (London, 1815), but the only complete account of Ensenada is by Don Antonio Rodriguez Villa, Don Cenon de Somodevilla, Marques de la Ensenada (Madrid, 1878). (D. H.)

ENSIGN (through the Fr. enseigne from the Latin plural insignia), a distinguishing token, emblem or badge such as symbols of office, or in' heraldry, the ornament or sign, such as the crown, coronet or mitre borne above the charge or arms. The word is more particularly used of a military or naval standard or banner. In the British navy, ensign has a specific meaning, and is the name of a flag having a red, white or blue ground, with the Union Jack in the upper corner next the staff. The white ensign (which is sometimes further distinguished by having the St George's Cross quartered upon it) is only used in the royal navy and the royal yacht squadron, while the blue and red ensigns are the badges of the naval reserve, some privileged companies, and the merchant service respectively (see Flag). Until 187 1 the lowest grade of commissioned officers in infantry regiments of the British army had the title of ensign (now replaced by that of second lieutenant). It is the duty of the officers of this rank to carry the colours of the regiment (see Colours, Military) . In the 16th century ensign was corrupted into " ancient," and was used in the two senses of a banner and the bearer of the banner. In the United

States navy, the title ensign superseded in 1862 that of passed midshipman. It designates an officer ranking with second lieutenant in the army.

ENSILAGE, the process of preserving green food for cattle in an undried condition in a silo (from Gr. crtpos, Lat. sirus, a pit for holding grain), i.e. a pit, an erection above ground, or stack, from which air has been as far as possible excluded. The fodder which is the result of the process is called silage. In various parts of Germany a method of preserving green fodder precisely similar to that used in the case of Sauerkraut has pre- vailed for upwards of a century. Special attention was first directed to the practice of ensilage by a French agriculturist, Auguste Goffart of the district of Sologne, near Orleans, who in 1877 published a work (Manuel de la culture et de Vensilage des mats et autres fourrages verts) detailing the experiences of many years in preserving green crops in silos. An English translation of Goff art's book by J. B. Brown was published in New York in 1879, and, as various experiments had been previously made in the United States in the way of preserving green crops in pits, Goflart's experience attracted considerable attention. The conditions of American dairy farming proved eminently suitable for the ensiling of green maize fodder; and the success of the method was soon indisputably demonstrated among the New England farmers. The favourable results obtained in America led to much discussion and to the introduction of the system in the United Kingdom, where, with different conditions, success has been more qualified.

It has been abundantly proved that ensilage forms a wholesome and nutritious food for cattle. It can be substituted for root crops with advantage, because it is succulent and digestible; milk resulting from it is good in quality and taste; it can be secured largely irrespective of weather; it carries over grass from the period of great abundance and waste to times when none would otherwise be available; and a larger number of cattle can be supported on a given area by the use of ensilage than is possible by the use of green crops.

Early silos were made of stone or concrete either above or below ground, but it is recognized that air may be sufficiently excluded in a tightly pressed stack, though in ttiis case a few inches of the fodder round the sides is generally useless owing to mildew. In America round erections made of wood and 35 or 40 ft. in depth are most commonly used. The crops suitable for ensilage are the ordinary grasses, clovers, lucerne, vetches, oats, rye and maize, the latter being the most important silage crop in America; various weeds may

also be stored in silos with good results, notably spurrey (Spergula arvensis). a most troublesome plant in poor light soils. As a rule the crop should be mown

when in full flower, and deposited in the silo on the day of its cutting. Maize is cut a few days before it is ripe and is shredded before being elevated into the silo. Fair, dry weather is not essential; but it is found that when moisture, natural and extraneous, exceeds 75% of the whole, good results are not obtained. The material is spread in uniform layers over the floor of the silo, and closely packed and trodden down. If possible, not more than a foot or two should be added daily, so as to allow the mass to settle down closely, and to heat uni- formly throughout. When the silo is filled or the stack built, a layer of straw or some other dry porous substance may be spread over the surface. In the silo the pressure of the material, when chaffed, excludes air from all but the top layer; in the case of the stack extra pressure is applied by means of planks or other weighty objects in order to prevent excessive heating.

The closeness with which the fodder is packed determines the nature of the resulting silage by regulating the chemical changes which occur in the stack. When closely packed, the supply of oxygen is limited; and the attendant acid fermentation brings about the decomposition of the carbohydrates present into acetic, butyric and lactic acids. This product is named "sour silage." If, on the other hand, the fodder be unchaffed and loosely packed, or the silo be built gradually, oxidation proceeds more rapidly and the temperature rises; if the mass be com- pressed when the temperature is i4o°-i6o° F., the action ceases and" sweet silage " results. The nitrogenous ingredients of the fodder also suffer change: in making sour silage as much as one-third of the albuminoids may be converted into amino and ammonium compounds; while in making "sweet silage " a less proportion is changed, but they become less digestible. In extreme cases, sour silage acquires a most disagreeable odour. On the other hand it keeps better than sweet silage when removed from the silo.

ENSTATITE, a rock-forming mineral belonging to the group of orthorhombic pyroxenes. It is a magnesium metasilicate, $MgSiO_3$, often with a little iron replacing the magnesium: as the iron increases in amount there is a transition to bronzite (q.v.), and with still more iron to hypersthene (q.v.). Bronzite and hypersthene were known

long before enstatite, which was first described by G. A. Kenngott in 1855, and named from har arris, " an opponent," because the mineral is almost in- fusible before the blowpipe: the material he described consisted of imperfect prismatic crystals, previously thought to be scapolite, from the serpentine of Mount Zdjar near Schonberg in Moravia. Crystals suitable for goniometric measurement were later found in the meteorite which fell at Breitenbach in the Erzgebirge, Bohemia. Large crystals, a foot in length and mostly altered to steatite, were found in 1874 in the apatite veins traversing mica-schist and hornblende-schist at the apatite mine of Kjorre- stad, near Brevig in southern Norway. Isolated crystals are of rare occurrence, the mineral being usually found as an essential constituent of igneous rocks; either as irregular masses in plutonic rocks (norite, peridotite, pyroxenite, &c.) and the serpentines which have resulted by their alteration, or as small idiomorphic crystals in volcanic rocks (trachyte, andesite). It is also a common constituent of meteoric stones, forming with olivine the bulk of the material: here it often forms small spherical masses, or chondrules, with an internal radiated structure.

Enstatite and the other orthorhombic pyroxenes are distin- guished from those of the monoclinic series by their optical characters, viz. straight extinction, much weaker double refrac- tion and stronger pleochroism: they have prismatic cleavages (with an angle of 88° 16') as well as planes of parting parallel to the planes of symmetry in the .prism-zone. Enstatite is white, greenish or brown in colour; its hardness is $$, and sp. gr. 3-2-3-3. (L. J. S.)

ENTABLATURE (Lat. in, and tabula, a tablet), the archi- tectural term for the superstructure carried by the columns in the classic orders (q.v.). It usually consists of three members, the architrave (the supporting member carried from column to column, pier or wall) ; the frieze (the decorative member) ; and

the cornice (the projecting and protective member). Sometimes the frieze is omitted, as in the entablature of the portico of the caryatides of the Erechtheum. There is every reason to believe that the frieze did not exist in the archaic temple of Diana at Ephesus; and it is not found in the Lycian tombs, which are reproductions in the rock of timber structures based on early Ionian work.

ENTADA, in botany, a woody climber belonging to the family Leguminosae and common throughout the tropics. The best- known species is Entada scandens, the sword-bean, so called from its large woody pod, 2 to 4 ft. in length and 3 to 4 in. broad, which contains

large flat hard polished chestnut-coloured seeds or " beans." The seeds are often made into snuff-boxes or match-boxes, and a preparation from the kernel is used as a drug by the natives in India. The seeds will float for a long time in water, and are often thrown up on the north-western coasts of Europe, having been carried by the Gulf-stream from the West Indies; they retain their vitality, and under favourable con- ditions will germinate. Linnaeus records the germination of a seed on the coast of Norway.

ENTAIL (from Fr. tattler, to cut; the old derivation from tales haeredes is now abandoned), in law, a limited form of succession (q.v.). In architecture, the term " entail " denotes an ornamental device sunk in the ground of stone or brass, and subsequently filled in with marble, mosaic or enamel.

ENTASIS (from Gr. tvrdvuv, to stretch a line or bend a bow), in architecture, the increment given to the column (q.v.), to correct the optical illusion which produces an apparent hollow- ness in an extended straight line. It was referred to by Vitruvius (iii. 3), arid was first noticed in the columns of the Doric orders in Greek temples by Allason in 1814, and afterwards measured and verified by Penrose. It varies in different temples, and is not found in some: it is most pronounced in the temple of Jupiter Olympius, most delicate in the Erechtheum. The entasis is almost invariably introduced in the spires of English churches.

ENTERITIS (Gr. tvrepov, intestine), a general medical term for inflammation of the bowels. According to the anatomical part specially attacked, it is subdivided into duodenitis, jejunitis, ileitis, typhlitis, appendicitis, colitis, proctitis. The chief sympton is diarrhoea. The term " enteric fever " has recently come into use instead of " typhoid " for the latter disease; but see Typhoid Fever.

ENTHUSIASM, a word originally meaning inspiration by a divine afflatus or by the presence of a god. The Gr. 'evdovciacfios, from which the word is adapted, is formed from the verb hdownafcw, to be evdeos, possessed by a god (Okos). Applied by the Greeks to manifestations of divine " possession," by Apollo, as in the case of the Pythia, or by Dionysus, as in the case of the Bacchantes and Maenads, it was also used in a trans- ferred or figurative sense; thus Socrates speaks of the inspiration of poets as a form of enthusiasm (Plato, Apol. Soc. 22 c). Its uses, in a religious sense, are confined to an exaggerated or wrongful belief in religious inspiration, or to intense religious fervour or emotion. Thus a Syrian sect of the 4th century was known as " the Enthusiasts "; they believed that by

perpetual prayer, ascetic practices and contemplation, man could become inspired by the Holy Spirit, in spite of the ruling evil spirit, which the fall had given to him. From their belief in the efficacy of prayer (evxv) , they were also known as Euchites. In ordinary usage, " enthusiasm " has lost its peculiar religious significance, and means a whole-hearted devotion to an ideal, cause, study or pursuit; sometimes, in a depreciatory sense, it implies a devotion which is partisan and is , blind to difficulties and objections. (See further Inspiration, for a comparison of the religious meanings of " enthusiasm," " ecstasy " and " fanaticism.")

ENTHYMEME (Gr. kv, %tos), in formal logic, the technical name of a syllogistic argument which is incompletely stated. Any one of the premises may be omitted, but in general it is that one which is most obvious or most naturally present to the mind. In point of fact the full formal statement of a syllogism is rare, especially in rhetorical language, when the deliberate omission of one of the premises has a dramatic effect. Thus ˆhe

suppression of the conclusion may have the effect of emphasizing the idea which necessarily follows from the premises. Far commoner is the omission of one of the premises which is either too clear to need statement or of a character which makes its omission desirable. A famous instance quoted in the Port Royal Logic, pt. iii. ch. xiv., is Medea's remark to Jason in Ovid's Medea, " Servare potui, perdere an possim rogas? " where the major premise " Qui servare, perdere possunt " is understood. This use of the word enthymeme differs from Aristotle's original application of it to a syllogism based on probabilities or signs (■;£ eiKorcov r} arjfitluv), i.e. on propositions which are generally valid (eUora) or on particular facts which may be held to justify a general principle or another particular fact (Anal, prior. j3 xxvii. 70 a 10).

See beside text-books on logic, Sir W. Hamilton's Discussions (1547); Mansel's ed. of Aldrich, Appendix F; H W. B. Joseph, Introd. to Logic, chap. xvi.

ENTOMOLOGY (Gr. evro/xa, insects, and X670S, a discourse), the science that treats of insects, i.e. of the animals included in the class Hexapoda of the great phylum (or sub-phylum) Arthro- poda. The term, however, is somewhat elastic in its current use, and students of

centipedes and spiders are often reckoned among the entomologists. As the number of species of insects is believed to exceed that of all other animals taken together, it is no wonder that their study should form a special division of zoology with a distinctive name.

Beetles (Scarabaei) are the subjects of some of the oldest sculptured works of the Egyptians, and references to locusts, bees and ants are familiar to all readers of the Hebrew scriptures. The interest of insects to the eastern races was, however,economic, religious or moral. The science of insects began with Aristotle, who included in a class " Entoma " the true insects, the arach- nids and the myriapods, the Crustacea forming another class (" Malacostraca ") of the "Anaema" or "bloodless animals." For nearly 2000 years the few writers who dealt with zoological subjects followed Aristotle's leading.

In the history of the science, various lines of progress have to be traced. While some observers have studied in detail the structure and life-history of a few selected types (insect anatomy and development), others have made a more superficial examina- tion of large series of insects to classify them and determine their relationships (systematic entomology), while others again have investigated the habits and life-relations of insects (insect bionomics). During recent years the study of fossil insects (palaeoentomology) has attracted much attention.

The foundations of modern entomology were laid by a series of wonderful memoirs on anatomy and development published in the 17th and 18th centuries. Of these the most famous are M. Malpighi's treatise on the silkworm (1669) and J. Swammer- dam's Biblia naturae, issued in 1737, fifty years after its author's death, and containing observations on the structure and life- history of a series of insect types. Aristotle and Harvey (De generatione animalium, 1651) had considered the insect larva as a prematurely hatched embryo and the pupa as a second egg. Swammerdam, however, showed the presence under the larval cuticle of the pupal structures. His only unfortunate contribu- tion to entomology — indeed to zoology generally — was his theory of pre-formation, which taught the presence within the egg of a perfectly formed but miniature adult. A year before Malpighi's great work appeared, another Italian naturalist, F. Redi, had disproved by experiment the spontaneous generation of maggots from putrid flesh, and had shown that they can only develop from the eggs of flies.

Meanwhile the English naturalist, John Ray, was studying the

classification of animals ; he published, in 1705, his Methodus insectorum, in which the nature of the metamorphosis received due weight. Ray's " Insects " comprised the Arachnids, Crus- tacea, Myriapoda and Annelida, in addition to the. Hexapods. Ray was the first to formulate that definite conception of the species which was adopted by Linnaeus and emphasized by his binominal nomenclature. In 1735 appeared the first edition of the Systema naturae of Linnaeus, in which the " Insecta " form

a group equivalent to the Arthropoda of modern zoologists, and are divided into seven orders, whose names — Coleoptera, Diptera, Lepidoptera, &c, founded on the nature of the wings — have become firmly established. The fascinating subjects of insect bionomics and life-history were dealt with in the classical memoirs (1 734-1 742) of the Frenchman R. A. F. de Reaumur, and (1752-1778) of the Swede C. de Geer. The freshness, the air of leisure, the enthusiasm of discovery that mark the work of these old writers have lessons for the modern professional zoologist, who at times feels burdened with the accumulated knowledge of a century and a half. From the end of the 18th century until the present day, it is only possible to enumerate the outstanding features in the progress of entomology. In the realm of classification, the work of Linnaeus was continued in Denmark by J. C. Fabricius (Systema entomologica, 1775), and extended in France by G. P. B. Lamarck (Animaux sans verlebres, 1801) and G. Cuvier (Leqons d'anatomie comparZe, 1800-1805), and in England by W. E. Leach (Trans. Linn. Soc. xi., 1815). These three authors definitely separated the Arachnida, Crus- tacea and Myriapoda as classes distinct from the Insecta (see Hexapoda). The work of J. O. Westwood (Modern Classification of Insects, 1839-1840) connects these older writers with their successors of to-day.

In the anatomical field the work of Malpighi and Swammerdam was at first continued most energetically by French students. P. Lyonnet had published in 1760 his elaborate monograph on the goat-moth caterpillar, and H. E. Strauss-Durckheim in 1828 issued his great treatise on the cockchafer. But the name of J. C. L. de Savigny, who (Mem. sur les animaux sans verlebres, 1816) established the homology of the jaws of all insects whether biting or sucking, deserves especial honour. Many anatomical and developmental details were carefully worked out by L. Dufour (in a long series of memoirs from 181 1 to i860) in France, by G. Newport (" Insecta " in Encyc. Anat. and Physiol., 1839) in England, and by H. Burmeister (Handbuch der Entomologie, 1832) in Germany. Through the 19th century, as knowledge increased, the work of investigation became necessarily more and more specialized. Anatomists like F.

Leydig, F. Miiller, B. T. Lowne and V. Graber turned their attention to the detailed investigation of some one species or to special points in the structure of some particular organs, using for the elucidation of their subject the ever-improving microscopical methods of research.

Societies for the discussion and publication of papers on entomology were naturally established as the number of students increased. The Societe Entomologique de France was founded in 1832, the Entomological Society of London in 1834. Few branches of zoology have been more valuable as a meeting- ground for professional and amateur naturalists than entomology, and not seldom has the amateur — as in the case of Westwood — developed into a professor. During the pre-Linnaean period, the beauty of insects — especially the Lepidoptera — had attracted a number of collectors; and these " Aurelians " — regarded as harmless lunatics by most of their friends — were the forerunners of the systematic students of later times. While the insect fauna of European countries was investigated by local naturalists, the spread of geographical exploration brought ever-increasing stores of exotic material to the great museums, and specialization — either in the fauna of a small district or in the world-wide study of an order or a group of families — became constantly more marked in systematic work. As examples may be instanced the studies of A. H. Haliday and H. Loew on the European Diptera, of John Curtis on British insects, of H. T. Stainton and 0. Staudinger on the European Lepidoptera, of R. M'Lachlan on the European and of H. A. Hagen on the North American Neuroptera, of D. Sharp on the Dyticidae and other families of Coleoptera of the whole world.

The embryology of insects is entirely a study of the last century. C. Bonnet indeed observed in 1745 the virgin-repro- duction of Aphids, but it was not until 1842 that R. A. von Kolliker described the formation of the blastoderm in the egg of the midge Chironomus. Later A. Weismann (1863-1864)

traced details of the growth of embryo and of pupa among the Diptera, and A. Kovalevsky in 1871 first described the formation of the germinal layers in insects. Most of the recent work on the embryology of insects has been done in Germany or the United States, and among numerous students V. Graber, K. Heider, W. M.

Wheeler and R. Heymons may be especially mentioned.

The work of de Reaumur and de Geer on the bionomics and life-history of insects has been continued by numerous observers, among whom may be especially mentioned in France J. H. Fabre and C. Janet, in England W. Kirby and W. Spence, J. Lubbock (Lord Avebury) and L. C. Miall, and in the United States C. V. Riley. The last-named may be considered the founder of the strong company of entomological workers now labouring in America. Though Riley was especially interested in the bearings of insect life on agriculture and industry — economic entomology (q. v.) — he and his followers have laid the science generally under a deep obligation by their researches.

After the publication of C. Darwin's Origin of Species (1859) a fresh impetus was given to entomology as to all branches of zoology, and it became generally recognized that insects form a group convenient and hopeful for the elucidation of certain problems of animal evolution. The writings of Darwin himself and of A. R. Wallace (both at one time active entomological collectors) contain much evidence drawn from insects in favour of descent with modification. The phylogeny of insects has since been discussed by F. Brauer, A. S. Packard and many others; mimicry and allied problems by H. W. Bates, F. Miiller, E. B. Poulton and M. C. Piepers; the bearing of insect habits on theories of selection and use-inheritance by A. Weismann, G. W. and E. Peckham, G. H. T. Eimer and Herbert Spencer; variation by W. Bateson and M. Standfuss.

Bibliography. — References to the works of the above authors, and to many others, will be found under Hexapoda and the special articles on various insect orders. Valuable summaries of the labours of Malpighi, Swammerdam and other early entomologists are given in L. C. Miall and A. Denny's Cockroach (London, 1886), and L. Henneguy's Les Insectes (Paris, 1904). (G. H. C.)

ENTOMOSTRACA. This zoological term, as now restricted, includes the Branchiopoda, Ostracoda and Copepoda. The Ostracoda have the body enclosed in a bivalve shell-covering, and normally unsegmented. The Branchiopoda have a very variable number of body-segments, with or without a shield, simple or bivalved, and some of the postoral appendages normally branchial. The Copepoda have normally a segmented body, not enclosed in a bivalved shell-covering, the segments not exceeding eleven, the limbs not branchial.

Under the heading Crustacea the Entomostraca have already been

distinguished not only from the Thyrostraca or Cirripedes, but also from the Malacostraca, and an intermediate group of which the true position is still disputed. The choice is open to maintain the last as an independent subclass, and to follow Claus in calling it the Leptostraca, or to introduce it among the Malacostraca as the Nebaliacea, or with Packard and Sars to make it an entomostracan subdivision under the title Phyllo- carida. At present it comprises the single family Nebaliidae. The bivalved carapace has a jointed rostrum, and covers only the front part of the body, to which it is only attached quite in front, the valve-like sides being under control of an adductor muscle. The eyes are stalked and movable. The first antennae have a lamellar appendage at the end of the peduncle, a decidedly non-entomostracan feature. The second antennae, mandibles and two pairs of maxillae may also be claimed as of malacostracan type. To these succeed eight pairs of foliaceous branchial appendages on the front division of the body, followed on the hind division by four pairs of powerful bifurcate swimming feet and two rudimentary pairs, the number, though not the nature, of these appendages being malacostracan. On the other hand, the two limbless segments that precede the caudal furca are decidedly non-malacostracan. The family was long limited to the single genus Ncbalia (Leach), and the single species N. bipes (O. Fabricius). Recently Sars has added a Norwegian species, N. lyphlops, not blind but weak-eyed. There are also now two more genera, Paranebalia (Claus, 1880), in which the branchial

feet are much longer than in Nebalia, and Nebaliopsis (Sars, 1887), in which they are much shorter. All the species are marine.

Branchiopoda. — In this order, exclusion of the Phyllocarida will leave three suborders of very unequal extent, the Phyllopoda, Cladocera, Branchiura. The constituents of the last have often been classed as Copepoda, and among the Branchiopods must be regarded as aberrant, since the "branchial tail" implied in the name has no feet, and the actual feet are by no means obviously branchial.

Phyllopoda. — This " leaf -footed " suborder has the appendages which follow the second maxillae variable in number, but all foliaceous and branchial. The development begins with a free nauplius stage. In the outward appearance of the adults there is great want of uniformity, one set having their limbs sheltered by no carapace, another having a broad shield over most of them, and a third having a bivalved shell-cover within which the whole body can be enclosed. In accord with these differences the sections may be named Gymnophylla, Notophylla, Concho- phylla. The equivalent

terms applied by Sars are Anostraca, Notostraca, Conchostraca, involving a termination already appropriated to higher divisions of the Crustacean class, for which it ought to be reserved.

1. Gymnophylla. — These singular crustaceans have long soft flexible bodies, the eyes stalked and movable, the first antennae small and filiform, the second lamellar in the female, in the male prehensile; this last character gives rise to some very fanciful developments. There are three families, two of which form companies rather severely limited. Thus the Polyartemiidae, which compensate themselves for their stumpy little tails by having nineteen instead of the normal eleven pairs of branchial feet, consist exclusively of Polyartemia forcipata (Fischer, 1851). This species from the high north of Europe and Asia carries green eggs, and above them a bright pattern in ultramarine (Sars, 1896, 1897). The Thamnocephalidae have likewise but a single species, Thamnocephalus platyurus (Packard, 1877), which justifies its title " bushy-head of the broad tail " by a singularity at each end. Forward from the head extends a long ramified appendage described as the " frontal shrub," backward from the fourth abdominal segment of the male spreads a fin-like expansion which is unique. In the ravines of Kansas, pools supplied by torrential rains give birth to these and many other phyllopods, and in turn " millions of them perish by the drying up of the pools in July " (Packard). The remaining family, the Branchipodidae, includes eight genera. In the long familiar Branchipus, Chirocephalus and Streptocephalus the males have frontal appendages, but these are wanting in the " brine-shrimp " Artemia, and the same want helps to distinguish Branchinecta (Verrill, 1869) from the old genus Branchipus. Of Branchiopsyllus (Sars, 1897) the male is not yet known, but in his genera of the same date, the Siberian Artemiopsis and the South African Branchipodopsis (1898), there is no such appendage. Of the last genus the type species B. hodgsoni belongs to Cape Colony, but the specimens described were born and bred and observed in Norway. For the study of freshwater Ento- mostraca large possibilities are now opened to the naturalist. A parcel of dried mud, coming for example from Palestine or Queens- land, and after an indefinite interval of time put into water in England or elsewhere, may yield him living forms, both new and old, in the most agreeable variety. Some caution should be used against confounding accidentally introduced indigenous species with those reared from the imported eggs. Those, too, who send or bring the foreign soil should exercise a little thought in the choice of it, since dry earth that has never had any Entomostraca near it at home will not

become fertile in them by the mere fact of exportation.

2. Notophylla. — In this division the body is partly covered by a broad shield, united in front with the head; the eyes are sessile, the first antennae are small, the second rudimentary or wanting; of the numerous feet, sometimes sixty-three pairs, exceeding the number of segments to which they are attached, the first pair are more or less unlike the rest, and in the female the eleventh have the epipod and exopod (flabellum and sub-apical lobe of Lankester) modified to form an ovisac. Development begins with a, nauplius stage. Males are very rare. The single family Apodidae contains only two genera, Apus and its very near neighbour Lepidurus. Apus australiensis (Spencer and Hall, 1896) may rank as the largest of the Entomostraca, reaching in the male, from front of shield to end of telson, a length of 70 mm., in the female of 64 mm. In a few days, or at most a fortnight, after a rainfall numberless specimens of these sizes were found swimming about, " and as not a single one was to be found in the water-pools prior to the rain, these must have been developed from the egg." Similarly, in Northern India Apus hima-layanus was " collected from a stagnant pool in a jungle four days after a shower of rain had fallen," following a drought of lour months (Packard).

3. Conchophylla. — Though concealed within the bivalved shell-cover, the mouth-parts are nearly as in the Gymnophylla, but the flexing of the caudal part is in contrast, and the biramous second antennae correspond with what is only a larval character in the other phyllopods. In the male the first one or two pairs of feet are modified into grasping organs. The small ova are crowded beneath the dorsal part of the va'ves. The development usually begins with a nauplius stage (Sars, 1896, 1900). There are four families: (a) The Limnadiidae, with feet from 18 to 32 pairs, com- prise four (or five) genera. Of these Limnadella (Girard, 1855) has a single eye. It remains rather obscure, though the type species originally " was discovered in great abundance in a roadside puddle .subject to desiccation." Limnadia (Brongniart, 1820) is supposed to consist of species exclusively parthenogenetic. But when asked to believe that males never occur among these amazons, one cannot but remember how hard it is to prove a negative, (b) The Lynceidae, with not more than twelve pairs of feet. This family is limited to the species, widely distributed, of the single genus Lynceus, established by O. F. Miiller

in 1776 and 1781, and first restricted by Leach in 1816 in the Encyclopaedia Britannica (art. " Annulosa," of that edition). Leach there assigns to it the single species L. brachyurus' (Miiller), and as this is included in the genus Limnetis (Loven, 1846), that genus must be a synonym of Lynceus as restricted, (c) Lept- estheriidae. Estheria (Ruppell, 1837) was instituted for the species dahalacensis, which Sars includes in his genus Leplestheria (1898); but Estheria was already appropriated, and of its synonyms Cyzicus (Audouin, 1837) is lost for vagueness, while Isaura (Joly, 1842) is also appropriated, so that Leptestkeria becomes the name of the typical genus, and determines the name of the family, (d) Cycles- theriidae. This family consists of the single species Cyclestheria hislopi (Baird), reported from India, Ceylon, Celebes, Australia, East Africa and Brazil. Sars (1887) having had the opportunity of raising it from dried Australian mud, found that, unlike other phyllopods, but like the Cladocera, the parent keeps its brood within the shell until their full development.

Cladocera. — In this suborder the head is more or less distinct, the rest of the body being in general laterally compressed and covered by a bivalved test. The title " branching horns " alludes to the second antennae, which are two-branched except in the females of Holopedium, with each branch setiferous, composed of only two to four joints. The mandibles are without palp. The pairs of feet are four to six. The eye is single, and in addition to the eye there is often an " eye-spot, " Monospilus being unique in having the eye-spot alone and no eye, while Leydigiopsis (Sars, 1901) has an eye with an eye-spot equal to it or larger. The heart has a pair of venous ostia, often blending into one, and an anterior arterial aorta. Respiration is conducted by the general surface, by the branchial lamina (external branch) of the feet, and the vesicular appendage (when present) at the base of this branch. The " abdomen," behind the limbs, is usually very short, occasionally very long. The ' ' postabdomen, ' ' marked off by the two postabdominal setae, usually has teeth or spines, and ends in two denticulate or ciliate claws, or it may be rudimentary, as in Polyphemus. Many species have a special glandular organ at the back of the head, which Sida crˆstallina uses for attaching itself to various objects. The Leydigian or nuchal organ is supposed to be auditory and to contain an otolith. The female lays two kinds of eggs — " summer-eggs," which develop without fertilization, and " winter-eggs" or resting eggs, which require to be fertilized. The latter in the Daphniidae are enclosed in a modified part of the mother's shell, called the ephippium from its resemblance to a saddle in shape and position. In other families a less elaborate case has been observed,

for which Scourfield has proposed the term protoephippitim. In Leydigia he has recently found a structure almost as complex as that of the Daphniidae. In some families the resting eggs escape into the water without special covering. Only the embryos of Leptodora are known to hatch out in the nauplius stage. Penilia (Dana, 1849) is perhaps the only exclusively marine genus. The great majority of the Cladocera belong to fresh water, but their adaptability is large, since Moina rectirostris (0. F. Miiller) can equally enjoy a pond at Blackheath, and near Odessa live in water twice as salt as that of the ocean. In point of size a Cladoceran of 5 mm. is spoken of as colossal.

Dr Jules Richard in his revision (1895) retains the sections proposed by Sars in 1865, Calyptomera and Gymnomera. The former, with the feet for the most part concealed by the carapace, is subdivided into two tribes, the Ctenopoda, or " comb-feet," in which the six pairs of similar feet, all branchial and nonprehensile, are furnished

with setae arranged like the teeth of a comb, and the Anomopoda, or " variety-feet," in which the front feet differ from the rest by being more or less prehensile, without branchial laminae.

The Ctenopoda comprise two families: (a) the Holopediiiae, with a solitary species, Holopedium gibberum (Zaddach), queerly clothed in a large gelatinous involucre, and found in mountain tarns all over Europe, in large lakes of N. America, and also in shallow ponds and waters at sea-level ; (b) the Sididae, with no such involucre, but with seven genera, and rather more than twice as many species. Of Diaphanosoma modiglianii Richard says that at different points of Lake Toba in Sumatra millions of specimens were obtained, among which he had not met with a single male.

The Anomopoda are arranged in four families, all but one very extensive, (a) Daphniidae. Of the seven genera, the cosmopolitan Daphnia contains about 100 species and varieties, of which Thomas Scott (1899) observes that " scarcely any of the several characters that have at one time or another been selected as affording a means for discriminating between the different forms can be relied on as satisfactory." Though this may dishearten the systematist, Scourfield (1900) reminds us that " It was in a water-flea that Metschnikoff first saw the leucocytes (or phagocytes) trying to get rid of disease germs by swallowing them, and was so led to his epoch-making discovery of the part played by these minute amoeboid corpuscles in the animal body." For Scapholeberis mucronata (O. F.

Miiller), Scourfield has shown how it is adapted for movement back downwards in the water along the underside of the surface film, which to many small crustaceans is a dangerously disabling trap, (b) Bosminidae. To Bosmina (Baird, 1845) Richard added Bosminopsis in 1895. (c) Macrotrichidae. In this family Macrothrix (Baird, 1843) is the earliest genus, among the latest being Grimaldina (Richard, 1892) and Jheringula (Sars, 1900). Dried mud and vegetable debris from S. Paulo in Brazil supplied Sars with representatives of all the three in his Norwegian aquaria, in some of which the little Macrothrix elegans " multiplied to such an extraordinary extent as at last to fill up the water with immense shoals of individuals." " The appearance of male specimens was always contemporary with the first ephippial formation in the females." For Streblocerus pygmaeus, grown under the same conditions, Sars observes: " This is perhaps the smallest of the Cladocera known, and is hardly more than visible to the naked eye," the adult female scarcely exceeding 0-25 mm. Yet in the next family Alonella nana (Baird) disputes the palm and claims to be the smallest of all known Arthropoda. (d) Chydoridae. This family, so commonly called Lynceidae, contains a large number of genera, among which one may usually search in vain, and rightly so, for the genus Lynceus. The key to the riddle is to be found in the Encyclopaedia Britannica for 1816. There, as above explained, Leach began the subdivision of Miiller's too compre- hensive genus, the result being that Lynceus belongs to the Phyllo- poda, and Chydorus (Leach, 1816) properly gives its name to the present family, in which the doubly convoluted intestine is so re- markable. Of its many genera, Leydigia, Leydigiopsis, Monospilus have been already mentioned. Dadaya macrops (Sars, 1901), from South America and Ceylon, has a very large eye and an eye-spot fully as large, but it is a very small creature, odd in its behaviour, moving by jumps at the very surface of the water. " To the naked eye it looked like a little black atom darting about in a most wonderful manner."

The Gymnomera, with a carapace too small to cover the feet, which are all prehensile, are divided also into two tribes, the Onycho- poda, in which the four pairs of feet have a toothed maxillary process at the base, and the Haplopoda, in which there are six pairs of feet, without such a process. To the Polyphemidae, the well- known family of the former tribe, Sars in 1897 added two remarkable genera, Cercopagis, meaning " tail with a sling," and Apagis, " without a sling," for seven species from the Sea of Azov. The Haplopoda likewise have but a single family, the Leptodoridae, and this has but the single genus Leptodora (Lilljeborg, 1861). Dr Richard (1895, 1896)

gives a Cladoceran bibliography of 601 references.

Branchiura. — This term was in- troduced by Thorell in 1864 for the Argulidae, a family which had been transferred to the Branchiopoda by Zenker in 1854, though some- times before and since united with the parasitic Copepoda. Though the animals have an oral siphon, they do not carry ovisacs like the siphonostomous copepods, but glue their eggs in rows to extraneous objects. Their lateral, compound, feebly movable eyes agree with those of the Phyllopoda. The family are described by Claus as

Fig. 1 . — Dolops ranarum (Stuhlmann).

" intermittent parasites," because when gorged they leave their hosts, fishes or frogs, and swim about in freedom for a con- siderable period. The long-known Argulus (0. F. Miiller) has the second maxillae transformed into suckers, but in Dolops (Audouin, 1837) (fig. 1), the name of which supersedes the more familiar Gyropeltis (Heller, 1857), these effect attachment by ending in strong hooks (Bouvier, 1897). A third genus, Chono- peltis (Thiele, 1900), has suckers, but has lost its first antennae, at least in the female.

Ostracoda. — The body, seldom in any way segmented, is wholly encased in a bivalved shell, the caudal part strongly inflexed, and almost always ending in a furca. The limbs, including antennae and mouth organs, never exceed seven definite pairs. The first antennae never have more than eight joints. The young usually pass through several stages of development after leaving the egg, and this commonly after, even long after, the egg has left the maternal shell. Partheno- genesis is frequent.

The four tribes instituted by Sars in 1865 were reduced to two by G. W. Miiller in 1894, the Myodocopa, which almost always have a heart, and the Podocopa, which have none.

Myodocopa. — These have the furcal branches broad, lamellar, with at least three pairs of strong spines or ungues. Almost always the shell has a rostral sinus. Miiller divides the tribe into three families, Cypridinidae , Halocypridae, and the heartless Polycopidae, which constituted the tribe Cladocopa of Sars. From the first of 'these Brady and Norman distinguish the Asteropidae (fig. 3), re- markable for seven pairs of long branchial leaves which fold over the hinder

extremity of the animal, and the Sarsiellidae, still somewhat obscure, besides adding the Rutidermatidae, knowledge of which is based on skilful maceration of minute and long-dried specimens. The Halocypridae are destitute of compound lateral eyes, and have the sexual orifice unsymmetrically placed.

Podocopa. — In these the furcal branches are linear or rudimentary, the shell is without rostral sinus, and, besides distinguishing characters of the second pntennae, they have always a branchial plate well developed on the first maxillae, which is inconstant in the other tribe. There are five families : (a) Cyprididae (? including Cypridopsidae of Brady and Norman). In some of the genera partheno- genetic propagation is carried to such an extent that of the familiar Cypris it is said, " until quite lately males in this genus were un- known; and up to the present time no male has been found in the British Islands " (Brady and Norman, 1896). On the other hand, the ejaculatory duct with its verticillate sac in the male of Cypris and other genera is a feature scarcely less remarkable, (b) Bairdiidae, which have the valves smooth, with the hinge untoothed. (c) Cytheridae (? including Paradoxostomatidae of Brady and Norman), in which the valves are usually sculptured, with toothed hinge. Of this family the members are almost exclusively marine, but Limnicythere is found in fresh water, and Xesioleberis bromeliarum (Fritz Miiller) lives in the water that collects among the leaves. of Bromelias, plants allied to the pine-apples, (d) Darwinulidae, in- cluding the single species Darwinula stevensoni, Brady and Robertson, described as " perhaps the most characteristic Entomostracan of the East Anglian Fen District." (e) Cytherellidae, which, unlike the Ostracoda in general, have the hinder part of the body segmented, at least ten segments being distinguishable in the female. They have the valves broad at both ends, and were placed by Sars in a separate tribe, called Platycopa.

The range in time of the Ostracoda is so extended that, in G. W. Miiller's opinion, their separation into the families now living may have already taken place in the Cambrian period. Their range in space, including carriage by birds, may be co- extensive with the distribution of water, but it is not known what height of temperature or how much chemical adulteration of the water they can sustain, how far they can penetrate underground, nor what are the limits of their activity between the floor and the surface of aquatic expanses, fresh or saline. In individual size they have never been important, and of living forms the largest is one of recent discovery, Crossophorus afri- canus, a Cypridinid about three-fifths of an inch (1 5 • 5 mm.) long ; but a length of one or two millimetres is more

common, and it may descend to the seventy-fifth of an inch. By multitude they have been, and still are, extremely important.

Though the exterior is more uniform than in most groups of Crustacea, the bivalved shell or carapace may be strongly calcified and diversely sculptured (fig. 2), or membranaceous and polished, hairy or smooth, oval or round or bean-shaped, or of some less simple pattern ; the valves may fit neatly, or one overlap the other, their hinge may have teeth or be edentulous, and their front part

may be excavated for the protrusion of the antennae or have no such " rostral sinus." By various modifications of their valves and appendages the creatures have become adapted for swimming, creeping, burrowing, or climbing, some of them combining two or more of these activities, for which their structure seems at the first glance little adapted. Considering the imprisonment of the ostracod body within the valves, it is more surprising that the A steropidae and Cypridinidae should have a pair of com- pound and sometimes large eyes, in addition to the median organ at the base of the " frontal tentacle," than, that other members of the (group should be limited to that median organ of sight, or have no eyes at all. The median eye when present „ _ ,, , .„ „,

may have or not have a . /r ?, I , G \ 2 – — Cytherets ornata_ (G W. lens, and its three pigment- Muller). One eye-space is shown cups may be close together or above on the leIt – wide apart and the middle one rudimentary. As might be expected, in thickened and highly embossed valves thin spaces occur over the visual organ. The frontal organ varies in form and apparently in function, and is sometimes absent. The first antennae, according to the family, may assist in walking, swimming, burrowing, climb- ing, grasping, and besides they carry sensory setae, and sometimes they have suckers on their setae (see Brady and Norman on Cypri- dina norvegica). The second antennae are usually the chief motor- organs for swimming, walking and climbing. The mandibles are normally five-jointed, with remnants of an outer branch on the second joint, the biting edge varying from strong development to evanescence, the terminal joints or " palp " giving the organ a leg-like appearance and function, which disappears in suctorial genera such as Paracytherois. The variable first maxillae are seldom pediform, their function being concerned chiefly with nutrition, sensation and respiration. The variability in form and function of the second maxillae is sufficiently shown by the fact that G. W. Muller, our leading authority, adopts the confusing plan of calling them second maxillae in the Cypridinidae (including Asteropidae), maxillipeds in the

*Halocypridae and Cyprididae, and first legs in the Bairdiidae, Cytheridae, Polycopidae and Cytherel- lidae, so that in his fine monograph he uses the term first leg in two quite different senses. The first legs, meaning thereby the sixth pair of appendages, are generally pediform and locomotive, but sometimes unjointed, acting as a kind of brushes to cleanse the furca, while in the Polycopidae they are entirely wanting. The second legs are sometimes wanting, sometimes pediform and locomotive, some- times strangely metamorphosed into the " vermiform organ," generally long, many-jointed, and distally armed with retroverted spines, its function being that of an extremely mobile cleansing foot, which can in- sert itself among the eggs in the brood-space, between the branchial leaves of Asterope (fig. 3), and even range over the external surface of the valves. The " brush-formed " organs of the Podocopa are medially placed, and, in spite of their some- times forward situation, Muller be- lieves among other possibilities that they and the penis in the Cypri- dinidae may be alike remnants of a third pair of legs, not homologous with the penis of other Ostracoda (Podocopa included). The furca is, as a rule, a powerful motor-organ, and has its laminae edged with strong OC teeth (ungues) or setae or both. The yy young, though born with valves, MX. have at first a nauplian body, and MX! pass through various stages to p, j maturity. v'.O**

Brady and Norman, in their Mono- br ' graph of the Ostracoda of the North p Atlantic and North-Western Europe (1889), give a bibliography of 125 titles, and in the second part (1896) they give 55 more. The lists are not meant to be exhaustive, any more than G. W. Miiller's literature list of 125 titles in 1894. They do not refer to Latreille, 1802, with whom the term Ostracoda originates.

Copepoda. — The body is not encased in a bivalved shell; its articulated segments are at most eleven, those behind the genital segment being without trace of limbs, but the last almost always carrying a furca. Sexes separate, fertilization by spermatophores. Ova in single or double or rarely several

M

Fig. 3. — Asterope arthuri. Left valve removed. End of adductor muscle. Eye.

Second antenna. First maxilla. 2, Second maxilla. First foot. Vermiform organ. Seven branchial leaves. Projecting ungues of the furca.

packets, attached as ovisacs or egg-strings to the genital openings, or enclosed in a dorsal marsupium, or deposited singly or occasion- ally in bundles. The youngest larvae are typical nauplii. The next, the copepodid or cyclopid, stage is characterized by a cylindrical segmented body, with fore- and hind-body distinct, and by having at most six cephalic limbs and two pairs of swimming feet.

The order thus defined (see Giesbrecht and Schmeil, Das Tierreich, 1898), with far over a thousand species (Hansen, 1900), embraces forms of extreme diversity, although, when species are known in all their phases and both sexes, they constantly tend to prove that there are no sharply dividing lines between the free-living, the semi-parasitic, and those which in adult life are wholly parasitic and then sometimes grotesquely unlike the normal standard. Giesbrecht and Hansen have shown that the mouth-organs consist of mandibles, first and second maxillae and maxillipeds; and Claus himself relinquished his long-maintained hypothesis that the last two pairs were the separated exopods and endopods of a single pair of append- ages. Thorell's classification (1859) of Gnathostoma, Poecilo- stoma, Siphonostoma, based on the mouth-organs, was long followed, though almost at the outset shown by Claus to depend on the erroneous supposition that the Poecilostoma were devoid of mandibles. Brady added a new section, Chonio- stomata, in 1894, and another, Leptostomata, in 1900, each for a single species. Canu in 1892 proposed two groups, Monoporo- delphya and Diporodelphya, the copulatory openings of the female being paired in the latter, unpaired in the former. It may be questioned whether this distinction, however important in itself, would lead to a satisfactory grouping of families. In the same year Giesbrecht proposed his division of the order into Gymnoplea and Podoplea.

In appearance an ordinary Copepod is divided into fore- and hind-body, of its eleven segments the composite first being the head, the next five constituting the thorax, and the last five the abdomen. The coalescence of segments, though frequent, does not after a little experience materially confuse the counting. But there is this peculiarity, that the middle segment is some- times continuous with the broader fore-body, sometimes with the narrower hind-body. In the former case the hind-body, con- sisting only of the abdomen, forms a pleon or tail-part devoid of feet, and the species so constructed are Gymnoplea, those of the naked or footless pleon. In

the latter case the middle segment almost always carries with it to the hind-body a pair of rudi- mentary limbs, whence the term Podoplea, meaning species that have a pleon with feet. It may be objected that hereby the term pleon is used in two different senses, first applying to the abdomen alone and then to the abdomen plus the last thoracic segment. Even this verbal flaw would be obviated if Giesbrecht could prove his tentative hypothesis, that the Gymnoplea may have lost a pre-genital segment of the abdomen, and the Podoplea may have lost the last segment of the thorax. The classification is worked out as follows: —

I. Gymnoplea. — First segment of hind-body footless, bearing the orifices of the genital organs (in the male unsymmetrically placed) ; last foot of the fore-body in the male a copulatory organ; neither, or only one, of the first pair of antennae in the male geniculating; cephalic limbs abundantly articulated and provided with many plumose setae; heart generally present. Animals usually free- living, pelagic (Giesbrecht and Schmeil).

This group, with 65 genera and four or five hundred species, is divided by Giesbrecht into tribes: (a) Amphaskandria. In this tribe the males have both antennae of the first pair as sensory organs. There is but one family, the Calanidae, but this is a very large one, with 26 genera and more than 100 species. Among them is the cosmopolitan Calanus ftnmarchicus, the earliest described (by Bishop Gunner in 1770) of all the marine free-swimming Cope- poda. Among them also is the peacock Calanid, Calocalanus pavo (Dana), with its highly ornamented antennae and gorgeous tail, the most beautiful species of the whole order (fig. 4). (6) Heterar- thrandria. Here the males have one or the other of the first pair of antennae modified into a grasping organ for holding the female. There are four families, the Diaptomidae with 27 genera, the Pontel- lidae with 10, the P seudocyclopidae and CandaCiidae each with one genus. The first of these families is often called Centropagidae, but, as Sars has pointed out, Diaptomus (Westwood, 1836) is the

oldest genus in it. Of 177 species valid in the family Giesbrecht and Schmeil assign 67 to Diaptomus. In regard to one of its species Dr Brady says : " In one instance, at least (Talkin Tarn, Cumberland) I have seen the net come up from a depth of 6 or 8 ft. below the

Fig. 4. — Calocalanus pavo (Dana).

surface with a dense mass consisting almost entirely of D. gracilis." The length of this net-filling species is about a twentieth of an inch.

2. Podoplea. — The first segment of the hind-body almost always with rudimentary pair of feet ; orifices of the genital organs (symmetrically placed in both sexes) in the following segment; neither the last foot of the fore-body nor the rudimentary feet just men- tioned acting as a copulatory organ in the male ; both or neither of the first pair of antennae in the male geniculating; cephalic limbs less abundantly articulated and with fewer plumose setae or none, but with hooks and clasping setae. Heart almost always wanting. Free-living (rarely pelagic) or parasitic (Giesbrecht and Schmeil).

This group is also divided by Giesbrecht into two tribes, Amphar-thrandna and Isokerandria. In 1892 he distinguished the former as those in which the first antennae of the male have both members modified for holding the female, and the genital openings of the female have a ventral position, sometimes in close proximity, sometimes strongly lateral ; the latter as those in which the first antennae of the male are similar to those of the female, the function of holding her being transferred to the male maxillipeds, while the genital openings of the female are dorsal, though at times strongly lateral. In 1899, with a view to the many modifications exhibited by parasitic and semi-parasitic species, the definitions, stripped of a too hampering precision, took a different form : (a) Ampharthrandria. "Swimming Podoplea with geniculating first antennae in the male sex, and descendants of such; first antennae in female and male almost always differently articulated." The families occupy fresh water as well as the sea. Naturally " descendants " which have lost the characteristic feature of the definition cannot be recognized without some further assistance than the definition supplies. Of the families comprised, the Mormonillidae consist only of Mormonilla (Giesbrecht), and are not mentioned by Giesbrecht in 1899 in the grouping of this section. The Thaumatoessidae include Thaumatoessa (Kroyer), established earlier than its synonym Thaumaleus (Kroyer), or than Monstrilla (Dana, 1849). The species are imperfectly known. The defect of mouth-organs probably does not apply to the period of youth, which some of them spend parasitically in the body-cavity of worms (Giard, 1896). To the Cyclopidae six genera are allotted by Giesbrecht in 1900. Cyclops (O. F. Miiller, 1776), though greatly restricted since Muller's time, still has several scores of species abundantly peopling inland waters of every kind and situation, without one that can be relied on as exclusively marine like the species of Oithona (Baird). The Misophriidae are now limited to Misophria (Boeck). The presence of a heart in this genus helps to make it a link between the Podoplea and Gymnoplea, though in various other respects it approaches the next family. The

Har- pacticidae owe their name to the genus Arpacticus (Milne-Edwards, 1840). Brady in 1880 assigns to this family 33 genera and 81 species. Canu (1892) distinguishes eight sub-families, Longipediinae, Pelti- diinae, Tachidiinae, Amymoninae, Harpacticinae, Idyinae, Cantho- camptinae (for which Canlhocampinae should be read), and Nanno- pinae, adding Stenheliinae (Brady) without distinctive characters for it. The Ascidicolidae have variable characters, showing a gradual adaptation to parasitic life in Tunicates. Giesbrecht (1900) con- siders Canu quite right in grouping together in this single family those parasites of ascidians, simple and compound, which had been previously distributed among families with the more or less significant names Notodelphyidae, Doropygidae, Buproridae, Schizoproctidae, Kossmechtridae, Enter ocolidae, Enteropsidae. Further, he includes in it his own Enterognathus comatulae, not from an ascidian, but from the intestine of the beautiful starfish Antedon rosaceus. The Astero- cheridae, which have a good swimming capacity, except in the case of Cancerilla tubulata (Dalyell), lead a semi-parasitic life on echino- derms, sponges, &c, imbibing their food. Giesbrecht, displacing the older name Ascomyzontidae, assigns to this family 21 genera in five subfamilies, and suggests that the long-known but still puzz- ling Nicothoe from the gills of the lobster might be placed in an

additional subfamily, or be made the representative of a closely related family. The Dichelestiidae, on account of their sometimes many-jointed first antennae, are referred also to this tribe by Gies- brecht. (b) Isokerandria. " Swimming Podoplea without genicul- lating first antennae in the male sex, and descendants of such: First antennae of male and female almost always articulated alike." To this tribe Giesbrecht assigns the families Clausidiidae, Corycaeidae, Oncaeidae, Lichomolgidae, Ergasilidae, Bomolochidae, Clausiidae, Nereicolidae. Here also must for the time be placed the Caligidae, Philichthyidae (Philichthydae of Vogt, Carus, Claus), Lernaeidae, Chondracanthidae, Sphaeronellidae (better known as Choniostomatidae, from H. J. Hansen's remarkable study of the group), Lernaeopodidae, Herpyllobiidae, Entomolepidae. For the distinguishing marks of all these, the number of their genera and species, their habits and trans- formations and dwellings, the reader must be referred to the writings of specialists. Sars (1901) proposed seven suborders — Calanoida, Harpacticoida, Cyclopoida,

Notodelphoida, Monstrilloida, Caligoida, Lernaeoida.

Authorities. — (The earlier memoirs of importance are cited in Giesbrecht's Monograph of Naples, 1892); Canu, " Hersiliidae,' Bull. Sci. France belgique, ser. 3, vol. i. p. 402 (1888) ; and Les Copepodes du Boulonnais (1892); Cuenot, Rev. biol. Nord France, vol. v. (1892); Giesbrecht, " Pelag. Copepoden." F. u. fl. des Golfes von Neapel (Mon. 19, 1892); Hansen, Entomol. Med. vol. iii. pt. 5 (1892); I. C. Thompson, " Copepoda of Liverpool Bay," Trans. Liv. Biol. Soc. vol. vii. (1893) > Schmeil, " Deutschlands Copepoden," Bibliotheca zoologica (1892-1897); Brady, Journ. R. Micr. Soc. p. 168 (1894); T. Scott, " Entomostraca from the Gulf of Guinea," Trans. Linn. Soc. London, vol. vi. pt. I (1894) ! Giesbrecht, Mitteil. Zool. Stat. Neapel, vol. xi. p. 631; vol. xii. p. 217 (1895); T. and A. Scott, Trans. Linn. Soc. London, ser. 2, vol. vi. p. 419 (1896) ; Hansen " Choniostomatidae " (1897); Sars, Proc. Mus. Zool. St Petersburg, " Caspian Entomostraca " (1897); Giesbrecht and Schmeil, " Cope- poda gymnoplea," Das Tierreich (1898); Giesbrecht, " Astero- cheriden," F. u. fl. Neapel (Mon. 25, 1899); Bassett-Smith, "Copepoda on Fishes," Proc. Zool. Soc. London, p. 438 (1899); Brady, Trans. Zool. Soc. London, vol. xv. pt. 2, p. 31 (1899); Sars, Arch. Nature, vol. xxi. No. 2 (1899); Giesbrecht, Mitteil. Zool. Stat. Neapel, vol. xiv. p. 39 (1900) ; Scott, " Fish Parasites," Scottish Fishery Board, 18th Ann. Rep. p. 144 (1900) ; Stebbing, Willey's Zool. Results, pt. 5, p. 664 (1900) ; Embleton, Journ. Linn. Soc. London, vol. xxviii. p. 211 (1901); Sars, Crustacea of Norway, vol. iv. (1901). (T. R. R. S.)

ENTRAGUES, CATHERINE HENRIETTE DE BALZAC D'

(1579-1633), marquise de Verneuil, mistress of Henry IV., king of France, was the daughter of Charles Balzac d'Entragues and of Marie Touchet, mistress of Charles IX. Ambitious and intriguing, she succeeded in inducing Henry IV. to promise to marry her after the death of Gabrielle d'Estrees, a promise which led to bitter scenes at court when shortly afterwards Henry married Marie de' Medici. She carried her spite so far as to be deeply compromised in the conspiracy of Marshal Biron against the king in 1606, but escaped with a slight punishment, and in 1608 Henry actually took her back into favour again. She seems then to have been involved in the Spanish intrigues which preceded the death of the king in 1610.

See H. de la Ferriere, Henri /V. le roi, Vamoureux (Paris, 1890).

ENTRECASTEAUX, JOSEPH-ANTOINE BRUNI D (1739- 1793),*

French navigator, was born at Aix in 1739. At the age of fifteen he entered the navy. In the war of 1778 he commanded a frigate of thirty-two guns, and by his clever seamanship was successful in convoying a fleet of merchant vessels from Mar- seilles to the Levant, although they were attacked by two pirate vessels, each of which was larger than his own ship. In 1785 he was appointed to the command of the French fleet in the East Indies, and two years later he was named governor of the Mauritius and the Isle of Bourbon. While in command of the East India fleet he made a voyage to China, an achievement which, in 1791, led the French government to select him to command an expedition which it was sending out to seek some tidings of the unfortunate La Perouse, of whom nothing had been heard since February 1788. Rear-admiral d'Entrecasteaux's expedition comprised the " Recherche " and "L'Esperance," with Captain Huon de Kermadec as second in command. No tidings were obtained of the missing navigator, but in the course of his search Entrecasteaux made important geographical discoveries. He traced the outlines of the eastern coast of New Caledonia, made extensive surveys round the Tasmanian coast, and touched at several places on the south coast of New Holland. The two ships entered Storm Bay, Tasmania, on the 21st of

April 1792, and remained there until the 16th of May, surveying and naming the d'Entrecasteaux Channel, the entrances to the Huon and Derwent rivers, Bruni Island, Recherche Bay, Port Esperance and various other localities. Excepting the name of the river Derwent (originally called Riviere du Nord by its French discoverers), these foregoing appellations have been retained. Leaving Tasmania the expedition sailed northward for the East Indies, and while coasting near the island of Java, Entrecasteaux was attacked by scurvy and died on the 20th of July 1793.

ENTRE MINHO E DOURO (popularly called Minho), a former province of Northern Poitugal; bounded on the N. by Galicia in 3pain, E. by Traz-os-Montes, S. by Beira and W. by the Atlantic Ocean. Pop. (1900) 1,170,361; area 2790 sq. m. Though no longer officially recognized, the old provincial name remains in common use. The coast-line of Entre Minho e Douro is level and unbroken except by the estuaries of the main rivers; inland, the elevation gradually increases towards the north and east, where several mountain ranges mark the frontier. C these, the most important are the Serra da Peneda (4728 ft.' between the rivers Minho and Limia; the Serra do Gerez (4357 ft.), on the Galician border; the Serra da Cabreira (4021 ft!), immediately to the south; and the Serra de Marao (4642 ft.), in the extreme south-east. As its name implies, the

province is bounded by two great rivers, the Douro (q.v.) on the south, and the Minho (Spanish Mino) on the north; but a small tract of land south of the Douro estuary is included also within the provincial boundary. There are three other large rivers which, like the Minho, flow west-south-west into the Atlantic. The Limia or Antela (Spanisli Linia) rises in Galicia, and reaches the sea at Vianna do Castello; the Cavado springs from the southern foot hills of La Raya Seca, on the northern frontier of Traz-os- Montes, and forms, at its mouth, the small harbour of Espozende; and the Ave descends from its sources in the Serra da Cabreira to Villa do Conde, where it enters the Atlantic. A large right- hand tributary of the Douro, the Tamega, rises in Galicia, and skirts the western slopes of the Serra de Marao.

The climate is mild, except among the mountains, and such plants as heliotrope, fuchsias, palms, and aloes thrive in the open throughout the year. Wheat and maize are grown on the plains, and other important products are wine, fruit, olives and chestnuts. Fish abound along the coast and in the main rivers; timber is obtained from the mountain forests, and dairy-farming and the breeding of pigs and cattle are carried on in all parts. As the province is occupied by a hardy and industrious peasantry, and the density of population (419-5 per sq. m.) is more than twice that of any other province on the Portuguese mainland, the soil is very closely cultivated. The methods and implements of the farmers are, however, most primitive, and at the beginning of the 20th century is was not unusual to see a mule, or even a woman, harnessed with the team of oxen to an old-fashioned wooden plough. Small quantities of coal, iron, antimony, lead and gold are mined; granite and slate are quarried; and there are mineral springs at Moncao (pop. 2283) on the Minho. The Oporto-Corunna railway traverses the western districts and crosses the Spanish frontier at Tuy; its branch lines give access to Braga, Guimaraes and Povoa de Varzim; and the Oporto- Salamanca railway passes up the Douro valley. The greater part of the north and west can only be reached by road, and even the chief highways are ill-kept. In these regions the principal means of transport is the springless wooden cart, drawn by one or more of the tawny and under-sized but powerful oxen, with immense horns and elaborately carved yoke, which are characteristic of northern Portugal. For administrative purposes the province is divided into three districts: Vianna do Castello in the north, Braga in the centre, Oporto in the south. The chief towns are separately described; they include Oporto (167,955), one of the greatest wine-producing cities in the world; Braga (24,202), the seat of an archb ; shop who is primate of

Portugal; the sea- ports of Povoa de Varzim (12,623) and Vianna do Casteiio (9990); and Guimaraes (9104), a place of considerable historical interest.

ENTREPfiT (a French word, from the Lat. interpositum, that which is placed between), a storehouse or magazine for the temporary storage of goods, provisions, &c. ; also a place where goods, which are not allowed to pass into a country duty free, are stored under the superintendence of the custom house authorities till they are re-exported. In a looser sense, any town which has a considerable distributive trade is called an entrepot. The word is also used attributively to indicate the kind of trade carried on in such towns.

ENTRE RIOS (Span. " between rivers "), a province of the eastern Argentine Republic, forming the sourthern part of a region sometimes described as the Argentine Mesopotamia, bounded N. by Corrientes, E. by Uruguay with the Uruguay river as the boundary line, S. by Buenos Aires and W. by Santa Fe, the Parana river forming the boundary line with these two provinces. Pop. (1895) 292,019; (1905, est.) 376,600. The province has an area of 28,784 sq. m., consisting for the most part of an undulating, well-watered and partly-wooded plain, termin- ating in a low, swampy district of limited extent in the angle between the two great rivers. The great forest of Monteil occupies an extensive region in the N., estimated at nearly one- fifth the area of the province. Its soil is exceptionally fertile and its climate is mild and healthy. The province is sometimes called the " garden of Argentina," which would probably be sufficiently correct had its population devoted as much energy to agriculture as they have to political conflict and civil war. Its principal industry is that of stock-raising, exporting live cattle, horses, hides, jerked beef, tinned and salted meats, beef extract, mutton and wool. Its agricultural products are also, important, including wheat, Indian corn, barley and fruits. Lime, gypsum and firewood are also profitable items in its export trade. The Parana and Uruguay rivers provide exceptional facilities for the shipment of produce and the Entre Rios railways, consisting of a trunk line running E. and W. across the province from Parana to Conception del Uruguay and several tributary branches, afford ample transportation facilities to the ports. Another railway line follows the Uruguay from Concordia north- ward into Corrientes. Entre Rios has been one of the most turbulent of the Argentine provinces, and has

suffered severely from political disorder and civil war. Comparative quiet reigned from 1842 to 1870 under the autocratic rule of Gen. J. J. Urquiza. After his assassination in 1870 these partizan conflicts were renewed for two or three years, and then the province settled down to a life of comparative peace, followed by an extraordinary development in her pastoral and agricultural industries. Among these is the slaughtering and packing of beef, the exportation of which has reached large proportions. The capital is Parana, though the seat of government was originally located at Conception del Uruguay, and was again transferred to that town during Urquiza's domination. Con- ception del Uruguay, or Conception (founded 1778), is a flourish- ing town and port on the Uruguay, connected by railway with an extensive producing region which gives it an important export trade, and is the seat of a national college and normal school. Its population was estimated at 9000 in 1905. Other large towns are Gualeguay and Gualeguaychu.

ENVOY (Fr. envoye, " sent "), a diplomatic agent of the second rank. The word envoyi comes first into general use in this connexion in the 17th century, as a translation of the Lat. ablegatus or missus (see Diplomacy). Hence the word envoy is commonly used of any one sent on a mission of any sort.

ENZIO (c. 1220-1272), king of Sardinia, was a natural son of the emperor Frederick II. His mother was probably a German, and his name, Enzio, is a diminutive form of the German Hein- rick. His father had a great affection for him, and he was probably present at the battle of Cortenuova in 1237. In 1238 he was married, in defiance of the wishes of Pope Gregory IX., to Adelasia, widow of Ubaldo Visconti and heiress of Torres and Gallura in Sardinia. Enzio took at once the title of king of Torres and Gallura, and in 1 243 that of king of Sardinia, but he only spent a few months in the island, and his sovereignty existed in name alone. In July 1239 he was appelated imperial

vicegerent in Italy, and sharing in his father's excommunication in the same year, took a prominent part in the war which broke out between the emperor and the pope. He commenced his campaign by subduing the march of Ancona, and in May 1241 was in command of the forces which defeated the Genoese fleet at Meloria, where he seized a large amount of booty and captured a number of ecclesiastics who were proceeding to a council summoned by Gregory to Rome. Later he fought in Lombardy. In 1248 he assisted Frederick in his vain attempt to take Parma, but was wounded and taken prisoner by the Bolognese at Fossalta on the 26th of May 1249. His

captivity was a severe blow to the Hohenstaufen cause in Italy, and was soon followed by the death of the emperor. He seems to have been well treated by the people of Bologna, where he remained a captive until his death on the 14th of March 1272. He was apparently granted a magnificent funeral, and was buried in the church of St Dominic at Bologna. During his imprisonment Enzio is said to have been loved by Lucia da Viadagola, a well-born lady of Bologna, who shared his captivity and attempted to procure his release. Some doubt has, however, been cast upon this story, and the same remark applies to another which tells how two friends had almost succeeded in freeing him from prison concealed in a wine-cask, when he was recognized by a lock of his golden hair. His marriage with Adelasia had been declared void by the pope in 1243, and he left one legitimate, and probably two illegitimate daughters. Enzio forms the subject of a drama by E. B. S. Raupach and of an opera by A. F. B. Dulk.

See F. W. Grossman, K'dnig Enzio (Gottingen, 1883); and H. Blasius, K'dnig Enzio (Breslau, 1884).

ENZYME (Gr. eefu/ws, leavened, from iv, in, and fu/ti?, leaven), a term, first suggested by Kuhne, for an unorganized ferment (see Fermentation), a group of substances, in the constitution of plants and animals, which decompose certain carbon compounds occurring in association with them. See also Plants: Physiology; Nutrition, &c.

EOCENE (Gr. 1701s, dawn, Kat.v6s, recent), in geology, the name suggested by Sir C. Lyell in 1833 for the lower subdivision of the rocks of the Tertiary Era. The term was intended to convey the idea that this was the period which saw the dawn of the recent or existing forms of life, because it was estimated that among the fossils of this period only 35 % of the species are still living. Since Lyell's time much has been learned about the fauna and flora of the period; and many palaeontologists doubt if any of the Eocene species are still extant, unless it be some of the lowest forms of life. Nevertheless the name is a convenient one and is in general use. The Eocene as originally defined was not long left intact, for E. Beyrich in 1854 proposed the term " Oligocene " for the upper portion, and later, in 1874, K. Schimper suggested " Paleoceno " as a separate appellation for the lower portion. The Oligocene division has been generally accepted as a distinct period, but " Paleocene " is not so widely used.

In north-western Europe the close of the Cretaceous period was marked by an extensive emergence of the land, accompanied, in many places, by considerable erosion of the Mesozoic rocks; a

prolonged interval elapsed before a relative depression of the land set in and the first Eocene deposits were formed. The early Eocene formations of the London-Paris-Belgian basin were of fresh- water and brackish origin; towards the middle of the period they had become marine, while later they reverted to the original type. In southern and eastern Europe changes of sea- level were less pronounced in character; here the late Cretaceous seas were followed without much modification by those of the Eocene period, so rich in foraminiferal life. In many other regions, the great gap which separates the Tertiary from the Mesozoic rocks in the neighbourhood of London and Paris does not exist, and the boundary line is difficult to draw. Eocene strata succeed Cretaceous rocks without serious unconformity in the Libyan area, parts of Denmark, S.E. Alps, India, New Zealand and central N. America. The unconformity is marked in England, parts of Egypt, on the Atlantic coastal plain and in the eastern gulf region of N. America, as well as in the marine Eocene of western Oregon. The clastic Flysch formation of the

Carpathians and northern Alps appears to be of Eocene age in the upper and Cretaceous in the lower part. The Eocene sea covered at various times a strip of the Atlantic coast from New Jersey southward and sent a great tongue or bay up the Missis- sippi valley; similar epicontinental seas spread over parts of the Pacific border, but the plains of the interior with the mountains on the west were meanwhile being filled with terrestrial and lacustrine deposits which attained an enormous development. This great extension of non-marine formations in the Eocene of different countries has introduced difficulties in the way of exact correlation; it is safer, therefore, in the present state of knoWr ledge, to make no attempt to find in the Eocene strata of America and India, &c, the precise equivalent of subdivisions that have been determined with more or less exactitude in the London- Paris-Belgian area.

It is possible that in Eocene times there existed a greater continuity of the northern land masses than obtains to-day. Europe at that time was probably united with N. America through Iceland and Greenland; while on the other side, America may have joined Asia by the way of Alaska. On the other hand, the great central, mediterranean sea which stretched across the Eurasian continents sent an arm northward somewhere just east of the Ural mountains, and thus divided the northern land mass in

Distribution of Eocene Rocks

(Mid. Eocene, Lutetian)

after de Lspparenl

/f

S Areas in which Middle tocene Rocks an found Non-marine Eocene deposits of N.America Eocene Aocks absent or unknown Suggested limits of land A Sea about Mid. Eooent time

that region. S. America, Australia and perhaps Africa may have been connected more or less directly with the Antarctic continent.

Associated, no doubt, with the crustal movements which closed the Cretaceous and inaugurated the Eocene period, there were local and intermittent manifestations of volcanic activity throughout the period. Diabases, gabbros, serpentines, soda-potash granites, &c, are found in the Eocene of the central and northern Apennines. Tuffs occur in the Veronese and Vicentin Alps — Ronca and Spelecco schists. Tuffs, basalts and other igneous rocks appear also in Montana, Wyoming, California, Oregon, Washington, Idaho, Colorado; als6 in Central America, the Antillean region and S. America.

It has been very generally assumed by geologists, mainly upon the evidence of plant remains, that the Eocene period opened with a temperate climate in northern latitudes; later, as in- dicated by the London Clay, Alum Bay and Bournemouth beds, &c, the temperature appears to have been at least subtropical. But it should be observed that the frequent admixture of temperate forms with what are now tropical species makes it difficult to speak with certainty as to the degree of warmth ex- perienced. The occurrence of lignites in the Eocene of the Paris basin, Tirol and N. America is worthy of consideration in this connexion. On the other hand, the coarse boulder beds in the lower Flysch have been regarded as evidence of local glaciation; this would not be inconsistent with a period of widespread geniality of climate, as is indicated by the large size of the nummulites and the dispersion of the marine Mollusca, but the evidence for glaciation is not yet conclusive.

Eocene Stratigraphy. — In Britain, with the exception of the Bovey beds (q.v.) and the leaf-bearing beds of Antrim and Mull, Eocene rocks are confined to the south-eastern portion of England. They lie in the two well-marked synclinal basins of London and Hamp- shire

which are conterminous in the western area (Hampshire, Berkshire), but are separated towards the east by the denuded anticline of the Weald. The strata in these two basins have been grouped in the following manner: —

Upper

Lower .

Hampshire Basin. Headon Hill and Barton Sands. Bracklesham Beds and leaf

beds of Bournemouth and

Alum Bay.

London Clay and the equiva- lent Bognor Beds, Woolwich and Reading Beds.

. London Basin. Upper Bagshot Sands. (“Middle Bagshot Beds and Middle •! part of Lower Bagshot [Beds.

fPart of Lower Bagshot Beds, London Clay, Blackheath and Old- haven Beds, Woolwich and ReadingBeds.Thanet Sands.

The Thanet sands have not been recognized in the Hampshire basin ; they are usually pale yellow and greenish, sands with streaks of clay and at the base; resting on an evenly denuded surface of chalk is a very constant layer of green-coated, well-rounded chalk flint pebbles. It is a marine formation, but fossils are scarce except in E. Kent, where it attains its most complete development. The Woolwich and Reading beds (see Reading Beds) contain both marine and estuarine fossils. In western Kent, between the Woolwich beds and the London Clay are the Oldhaven beds or Blackheath pebbles, 20 to 40 ft., made up almost entirely of well- rounded flint pebbles set in sand ; the fossils are marine and estuar- ine. The London Clay, 500 ft. thick, is a marine deposit consisting of blue or brown clay with sandy layers and septarian nodules; its equivalent in the Hampshire area is sometimes called the Bognor Clay, well exposed on the coast of Sussex. The Bagshot, Brackles- ham and Barton beds will be found briefly described under those heads.

Crossing the English Channel, we find in northern France and Belgium a series of deposits identified in their general characters with those of England. The anticlinal ridge of the English Weald is prolonged south-eastwards on to the continent, and separates the Belgian from the French Eocene areas much as it separates the areas of London and Hampshire; and it is clear that at the time of deposition all four regions were intimately related and subject to similar variations of marine and estuarine conditions. With a series of strata so variable from point to point it is natural that many purely local phases should have received distinctive names; in the Upper Eocene of the Paris basin the more important formations are the highly fossiliferous marine sands known as the " Sands of Beauchamp " and the local fresh-water limestone, the " Calcaire de St Ouen." The Middle Eocene is represented by the well-known "Calcaire grossier," about 90 ft. thick. The beds in this series vary a good deal lithologically, some being sandy, others marly or glau- conitic; fossils are abundant. The Upper Calcaire grossier or " Caillasses " is a fresh- water formation; the middle division is marine; while the lower one is partly marine, partly of fresh-water origin. The numerous quarries and mines for building stone in the neighbourhood of Paris have made it possible to acquire a very precise knowledge of this division, and many of the beds have re- ceived trade names, such as " Rochette," " Roche," " Banc franc," " Banc vert," " Cliquart," " Saint Nom;' 1 the two last named are dolomitic. Below these limestones are the nummulitic sands of Cuise and Soissons. The Lower Eocene contains the lignitic plastic clay (argile plastique) of Soissons and elsewhere ; the limestones of Rilly

and Sezanne and the greenish glauconitic sands of Bracheux. The relative position of the above formations With respect to those of Belgium and England will be seen from the table of Eocene strata. The Eocene deposits of southern Europe differ in a marked manner from those of the Anglo-Parisian basin. The most important feature is the great development of nummulitic limestone with thin marls and nummulitic sandstones. The sea in which the nummulitic limestones were formed occupied the site of an enlarged Mediter- ranean communicating with similar waters right round the world, for these rocks are found not only in southern Europe, including all the Alpine tracts, Greece and Turkey and southern Russia, but they are well developed in northern Africa, Asia Minor, Palestine, and they may be followed through Persia, Baluchistan, India, into China, Tibet, Japan, Sumatra, Borneo and the Philippines. The nummulitic limestones are frequently hard and crystalline, especially where they have been subjected to elevation and compression as in the Alpine region, 10,000 ft. above the sea, or from 16,000, to 20,000 ft., in the central Asian plateau. Besides being a wide-spread formation the nummulitic limestone is locally several thousand feet thick.

While the f oraminiferal limestones were being formed over most of southern Europe, a series of clastic beds were in course of formation in the Carpathians and the northern Alpine region, viz. the Flysch and the Vienna sandstone. Some portions of this Alpine Eocene are coarsely conglomeratic, and in places there are boulders of

non-local rocks of enormous dimensions included in the argillaceous or sandy matrix. The occurrence of these large boulders together with the scarceness of fossils has suggested a glacial origin for the formation; but the evidence hitherto collected is not conclusive. C. W. von Giimbel has classified the Eocene of the northern Alps (Bavaria, &c.) as follows : —

tt„ˆ«, cˆˆonˆ S Flysch and Vienna sandstone, with younger num-
Upper eocene | mulitic beds and H aring group.

Middle „ Kressenberg Beds, with older nummulitic beds.

Lower „ % Burberg Beds, Greensands with small nummulites.

The Haring group of northern Tirol contains lignite beds of some

importance.- In the southern and S.E. Alps the following divisions

are recognized.

tt^^ 17 D S Macigno or Tassello — Vienna Sandstone, conglo- upper tocene -y merateSi marls and shales .

Middle ,, Nummulitic limestones, three subdivisions.

(Liburnian stage (or Proteocene), foraminiferal 1 J limestones with fresh-water intercalations at the

ower ,, \ tQ p an(j bottom, the Cosina beds, fresh-water in I the middle of the series. In the central and northern Apennines the Eocene strata have been subdivided by Prof. F. Sacco into an upper Bartonian, a middle Parisian and a lower Suessonian series. In the middle member are the representatives of the Flysch and the Macigno. These Eocene strata are upwards of 5500 ft. thick. In northern Africa the num- mulitic limestones and sandstones are widely spread; the lower portions comprise the Libyan group and the shales of Esneh on the Nile (Flandrien), the Alveolina beds of Sokotra and others; the Mokattam stage of Egypt is a representative of the later Eocene. Much of the N. African Eocene contains phosphatic beds. In India strata of Eocene age are extensively developed ; in Sind the marine Ranikot beds, 1500 to 2000 ft., consisting of clays with gypsum and lignite, shales and sandstones; these beds have, side by side with Eocene nummulites, a few fossils of Cretaceous affinities. Above the Ranikot beds are the massive nummulitic limestones and sand- stones of the Kirthar group ; these are succeeded by the nummulitic limestones and shales at the base of the Nari group. In the southern Himalayan region the nummulitic phase of Eocene deposit is well developed, but there are difficulties in fixing the line of demarcation between this and the younger formations. The lower part of the Sirmur series of the Simla district may belong to this period ; it is subdivided into the Kasauli group and the Dagshai group with the Subathu group at the base. Beneath the thick nummulitic Eocene limestone of the Salt Range are shales and marls with a few coal seams. The marine Eocene rocks of N. America are most exten- sively developed round the coast of the Gulf of Mexico, whence they spread into the valley of the Mississippi and, as a comparatively narrow strip, along the Atlantic coastal plain to New Jersey.

The series in Alabama, which may be taken as typical of the Gulf coast Eocene, is as follows: —

Upper Jacksonian, White limestone of Alabama (and Vicksburg?). ,,.,,, r~< ., . \ Claiborne series. Middle Ckubornian j Buhrstone series . _

T J Chickasawan Sands and lignites.

Lower j Midwayan or Clayton formation, limestones.

The above succession is not fully represented in the Atlantic coast

states.

On the Pacific coast marine formations are found in California and Oregon; such are the Tejon series with lignite and oil; the Escondido series of S. California (7000 ft.), part of the Pascadero series of the Santa Cruz Mountains; the Pulaski, Tyee, Arago and Coaledo beds — with coals — in Oregon. In the Puget formation of Washington we have a great series of sediments, largely of brackish water origin, and in parts coal-bearing. The total thickness of this formation has been estimated at 20,000 ft. (it may prove to be less than this), but it is probable that only the lower portion is of Eocene age. The most interesting of the N. American Eocene deposits are those of the Rocky Mountains and the adjacent western plains, in Wyoming, Nevada, Nebraska, Colorado, &c. ; they are of terrestrial, lacustrine or aeolian origin, and on this account and because they were not strictly synchronous, there is considerable difficulty in placing them in their true position in the time-scale. The main divisions or groups are generally recognized as follows : —

Mammalian Zonal Forms.

Upper 'Uinta Group, 800 ft. (? = Jacksonian). ˆdmatotZ'rium. Middle 2 Bridger Group, 2000 ft. (? = Clai-

bornian) .... Uinlatherium.

I 3 Wind River Group, 800 ft. Bathyopsis. Lower] 4 Wasatch Group, 2000 ft. (? = Chicka-

(sawan) Coryphodon.

{ 5 Torrejon Group, 300 ft. Pantolambda.

\ 6 Puerco Group, 500 to iooo ft. . . Polymastodon.

Basal

1 South of the Uinta Mts. in Utah. 3 Wind river in Wyoming. 5 Torrejon in New Mexico.

2 Fort Bridger Basin. 4 Wasatch Mts. in Utah. 6 Puerco river New Mexico.

The Fort Union beds of Canada and parts of Montana and N. Dakota are probably the oldest Eocene strata of the Western Interior; they are some 2000 ft. thick and possibly are equivalent to the Midwayan group. But in these beds, as in those known as Arapahoe, Livingston, Denver, Ohio and Ruby, which are now often classed as belonging to the upper Laramie formation, it is safer to regard them as a transitional series between the Mesozoic and Tertiary systems. There is, however, a marked unconformity between the Eocene Telluride or San Miguel and Poison Canyon formations of Colorado and the underlying Laramie rocks.

Many local aspects of Eocene rocks have received special names, but too little is known about them to enable them to be correctly placed in the Eocene series. Such are the Clarno formation (late Eocene) of the John Day basin, Oregon, the Pinyon conglomerate of Yellowstone Park, the Sphinx conglomerate of Montana, the Whitetail conglomerate of Arizona, the Manti shales of Utah, the Mojave formation of S. California and the Amyzon formation of Nevada.

Of the Eocene of other countries little is known in detail. Strata of this age occur in Central and S. America (Patagonia-Megellanian series — Brazil, Chile, Argentina), in S. Australia (and in the Great Australian Bight), New Zealand, in Seymour Island near Graham Land in the Antarctic Regions, Japan, Java, Borneo, New Guinea, Moluccas, _ Philippines, New Caledonia, also in Greenland, Bear Island, Spitzbergen and Siberia.

Organic Life of the Eocene Period. — As it has been observed above, the name Eocene was given to this period on the ground that in its fauna only a small percentage of living species were present; this estimation was founded upon the assemblage of. invertebrate remains in which, from the commencement of this period until the present day, there has been comparatively little change. The real biological interest of the period centres around the higher vertebrate types. In the marine mollusca the most noteworthy change is the entire absence of ammonoids, the group which throughout the Mesozoic era had taken so prominent a place, but disappeared completely with the close of the Cretaceous. Nautiloids were more abundant than they are at present, but as a whole the Cephalopods

took a more subordinate part than they had done in previous periods. On the other hand, Gasteropods and Pelecypods found in the numerous shallow seas a very suitable environment and flourished exceedingly, and their shells are often preserved in a state of great perfection and in enormous numbers. Of the Gasteropod genera Cerithiitm with its estuarine and lagoonal forms Potamides, Potamidopsis, &c, is very characteristic; Rostettaria, Voluta, Fusus, Pleuro- toma, Conus, Typhis, may also be cited. Cardium, Venericardia, Crassatella, Corbulomya, Cytherea, Lucina, Anomia, Ostrea are a few of the many Pelecypod genera. Echinoderms were repre- sented by abundant sea-urchins, Echinclampas, Linthia, Cono-clypeus, &c. Corals flourished on the numerous reefs and ap-proximated to modern forms (Trochosmilia, Dendrophyllia) . But by far the most abundant marine organisms were the foramini- fera which flourished in the warm seas in countless myriads. Foremost among these are the Nummulites, which by their extraordinary numerical development and great size, as well as by their wide distribution, demand special recognition. Many other genera of almost equal importance as rock builders, lived at the same time: Ortkopkragma, Opcrculina, Assilina, Orbilolites, Miliola, Alveolina. Cms' acea were fairly abundant {Xanthopsis, Porlunus), and most of the Orders and many families of modern insects were represented.

When we turn to the higher forms of life, the reptiles and mammals, we find a remarkable contrast between the fauna of the Eocene and those periods which preceded and succeeded it. The great group of Saurian reptiles, whose members had held dominion on land and sea during most of the Mesozoic time, had completely disappeared by the beginning of the Eocene; in their place placental mammals made their appearance and rapidly became the dominant group. Among the early Eocene mammals no trace can be found of the numerous and clearly-marked orders with which we are familiar to-day; instead we find obscurely differentiated forms, which cannot be fitted without violence into any of the modern orders. The early placental mammals were generalized types (with certain nori-placental characters) with potentialities for rapid divergence and development in the direction of the more specialized modern orders. Thus, the Creodonta foreshadowed the Carnivora. the

Stages.

Paris Basin.

England.

Belgian Basin.

Mediterranean

regions and

Great Central

sea.

Flysch Phase.

North America.

Bartonien. 1

Limestone of Saint-Ouen. Sands of Mortefontaine. Sands of Beauchamp. Sands of Auvers.

Barton beds.

Upper Bagshot sands.

Sands of Lede.

Nummulitic limestones, sandstones and shales.

Upper part of the Alpine Flysch and Vienna

and Carpathian sandstones. Macigno of the Apennines and Maritime Alps.

Uinta Group and Jacksonian.

Bridger Group and Claibornian.

Wind River Group. Wasatch Group and

Chickasawan.

Torrejon Group

and Midwayan.

Puerco Group.

Lutetien.

Calcaire grossier.

Bracklesham and Bourne- mouth beds. Lower Bagshot sands.

Laekenien. Bruxellien. Paniselien.

Ypresien.

Nummulitic sands of Soissons and Sands of Cuise and Aizy.

Plastic Clay and lignite beds.

Alum Bay leaf beds.

London Clay. Oldhaven beds.

Woolwich and Reading beds.

Sands of Mons en

Pevele. Flanders Clay.

c

ID

‘3

T3

a ta J

a Si ‘o

c

u

a, in

Upper Landenien sands.

Sands of Ostri- court.

Landenien tuff-

eau. Marls of Gelinden.

a

c

n!

J3

H

Limestones of Rilly and

Sezanne. Sands of Rilly and Bra-

cheux.

Thanet sands.

Condylarthra presaged the herbivorous groups; but before the close of this period, so favourable were the conditions of life to a rapid evolution of types, that most of the great orders had been clearly defined, though none of the Eocene genera are still extant. Among the early carnivores were Arctocyon,Palaeonictis, Amblyctonus, Hyaenodon, Cynodon, Provivera, Patriofelis. The primitive dog-like forms did not appear until late in the period, in Europe; and true cats did not arrive until later, though they were represented by Eusmilus in the Upper Eocene of France. The primitive ungulates (Condylarths) were generalized forms with five effective toes, exemplified in Phenacodus. The gross Amblypoda, with five-toed stumpy feet (Coryphodon), were prominent in the early Eocene; particularly striking forms were the Dinoceratidae, Dinoceras, with three pairs of horns or protuberances on its massive skull and a pair of huge canine teeth projecting downwards; Tinoceras, Uintatherium, Loxo- phodon, &c. ; these elephantine creatures, whose remains are so abundant in the Eocene deposits of western America, died out before the close of the period. The divergence of the hcofed mammals into the two prominent divisions, the odd-toed and even-toed, began in this period, but the former did not get beyond the three-toed stage. The least differentiated of the odd-toed group were the Lophiodonts: tapirs were foreshadowed by Systemodon and similar forms (Palaeotherium, Paloplotherium); the peccary-like Hyracotherium was a forerunner of the horse, Hyrochinus was a primitive

rhinoceros. The evolution of the horse through such forms as Hyracotherium, P achy nolo phus, Eohippus, &c, appears to have proceeded along parallel lines in Eurasia and America, but the true horse did not arrive until later. Ancestral deer were represented by Dichobune, Amphi- tragulus and others, while many small hog-like forms existed (Diplopus, Eohyus, Hyopolamus, Homacodon). The primitive stock of the camel group developed in N. America in late Eocene time and sent branches into S. America and Eurasia. The edentates were very generalized forms at this period (Gan-

1 Bartonien from Barton, England.

Lutetien „ Lutetia = Paris.

Ypresien ,, Ypres, Flanders.

Landenien „ Landen, Belgium.

Thanetien ,, The Isle of Thanet.

Sparnacien „ Sparnacum = Epernay.

Laekenien ,, Laeken, Belgium.

Bruxellien ,, Brussels.

Paniselien „ Mont Paniiri, near Mons. Other names that have been applied to subdivisions of the Eocene not included in the table are Parisien and Suessonien (Soissons) ; Ludien (Ludes in the Paris basin) and Priabonien (Priabona in the Vicentine Alps) ; Heersien (Heer near Maastricht) and Wemmelien iWemmel, Belgium) ; very many more might be mentioned.

odonta); the rodents (Tillodontia) attained a large size for members of this group, e.g. Tillotherium. The Insectivores had Eocene forerunners, and the Lemuroids — probable ancestors' of the apes — were forms of great interest, Anaptomorphus., Microsyops, Heterohyus, Microchaerus, Coenopithecus; even the Cetaceans were well represented by Zeuglodon and others.

The non-placental mammals although abundant were taking a secondary place; Didelphys, the primitive opossum, is note- worthy on account of its wide geographical range.

Among the birds, the large flightless forms, Eupteromis, Gastornis, were prominent, and many others were present, such as the ancestral

forms of our modern gulls, albatrosses, herons, buzzards, eagles, owls, quails, plovers. Reptiles were poorly represented, with the exception of crocodilians, tortoises, turtles and some large snakes.

The flora of the Eocene period, although full of interest, does not convey the impression of newness that is afforded by the fauna of the period. The reason for this difference is this: the newer flora had been introduced and had developed to a considerable extent in the Cretaceous period, and there is no sharp break between the flora of the earlier and that of the later period; in both we find a mixed assemblage — what we should now regard as tropical palms, growing side by side with mild- temperate trees. Early Eocene plants in N. Europe, oaks, willows, chestnuts (Castanea), laurels, indicate a more temperate climate than existed in Middle Eocene when in the Isle of Wight, Hampshire and the adjacent portions of the continent, palms, figs, cinnamon flourished along with the cactus, magnolia, sequoia, cypress and ferns. The late Eocene flora of Europe was very similar to its descendant in modern Australasia.

See A. de Lapparent, Traite de gSologie, vol. iii. (5th ed., 1906), which contains a good general account of the period, with numerous references to original papers. Also R. B. Newton, Systematic, List of the Frederick E. Edwards Collection of British Oligocene and Eocene Mollusca in the British Museum (Natural History) (1891), pp. 299-325 ; G. D. Harris, " A Revision of our Lower Eocenes," Proc. Geologists' Assoc, x., 1887-1888; W. B. Clark, " Correlation Papers: Eocene " (1891), U.S. Geol. Survey Bull. No. 83. For more recent literature consult Geological Literature added to the Geological Society's Library, published annually by the society. (J. A. H.)

EON DE BEAUMONT, Charles Genevieve Louise Auguste Andre Timothee d' (1728-1810), commonly known as the Chevalier d'Eon, French political adventurer, famous for the supposed mystery of his sex, was born near Tonnerre in Bur- gundy, on the 7th of October 1728. He was the son of an advocate of good position, and after a distinguished course of study at the College Mazarin he became a doctor of law by special dispensation before the usual age, and adopted his father's profession. He

began literary work as a contributor to Freron's Annee litteraire, and attracted notice as a political writer by two works on financial and

administrative questions, which he published in his twenty-fifth year. His reputation increased so rapidly that in 1755 he was, on the recommendation of Louis Francois, prince of Conti, entrusted by Louis XV. (who had originally started his " secret " foreign policy — i.e. by undisclosed agents behind the backs of his ministers — in favour of the prince of Conti's ambition to be king of Poland) with a secret mission to the court of Russia. It was on this occasion that he is said for the first time to have assumed the dress of a woman, with the connivance, it is sup- posed, of the French court. 1 In this disguise he obtained the appointment of reader to the empress Elizabeth, and won her over entirely to the views of his royal master, with whom he main- tained a secret correspondence during the whole of his diplomatic career. After a year's absence he returned to Paris to be immediately charged with a second mission to St Petersburg, in which he figured in his true sex, and as brother of the reader who had been at the Russian court the year before. He played an important part in the negotiations between the courts of Russia, Austria and France during the Seven Years' War. For these diplomatic services he was rewarded with the decora- tion of the grand cross of St Louis. In 1759 he served with the French army on the Rhine as aide-de-camp to the marshal de Broglie, and was wounded during the campaign. He had held for some years previously a commission in a regiment of dragoons, and was distinguished for his skill in military exercises, particu- larly in fencing. In 1762, on the return of the due de Nivernais, d'Eon, who had been secretary to his embassy, was appointed his successor, first as resident agent and then as minister pleni- potentiary at the court of Great Britain. He had not been long in this position when he lost the favour of his sovereign, chiefly, according to his own account, through the adverse influence of Madame de Pompadour, who was jealous of him as a secret correspondent of the king. Superseded by count de Guerchy, d'Eon showed his irritation by denying the genuineness of the letter of appointment, and by raising an action against Guerchy for an attempt to poison him. Guerchy, on the other hand, had previously commenced an action against d'Eon for libel, founded on the publication by the latter of certain state docu- ments of which he had possession in his official capacity. Both parties succeeded in so far as a true bill was found against Guerchy for the attempt to murder, though by pleading his privilege as ambassador he escaped a trial, and d'Eon was found guilty of the libel. Failing to come up for judgment when called on, he was outlawed. For some years afterwards he lived in obscurity, appearing in public chiefly at fencing matches. During this period rumours as to the sex of d'Eon, originating probably in the story of his first residence at St

Petersburg as a female, began to excite public interest. In 1774 he published at Amsterdam a book called Les Loisirs du Chevalier d'Eon, which stimulated gossip. Bets were frequently laid on the subject, and an action raised before Lord Mansfield in 1777 for the re- covery of one of these bets brought the question to a judicial decision, by which d'Eon was declared a female. A month after the trial he returned to France, having received permission to do so as the result of negotiations in which Beaumarchais was em- ployed as agent. The conditions were that he was to deliver up certain state documents in his possession, and to wear the dress of a female. The reason for the latter of these stipulations has never been clearly explained, but he complied with it to the close of his life. In 1784 he received permission to visit London for the purpose of bringing back his library and other property. He did not, however, return to France, though after the Revolu- tion he sent a letter, using the name of Madame d'Eon, in which he offered to serve in the republican army. He continued to dress as a lady, and took part in fencing matches with success, though at last in 1796 he was badly hurt in one. He died in London on the 22nd of May 18 10. During the closing years of his life he is said to have enjoyed a small pension from George III.

1 But see Lang's Historical Mysteries, pp. 241-242, where this tradi- tional account is discussed and rejected.

A post-mortem examination of the body conclusively established the fact that d'Eon was a man.

The best modern accounts are in the due de Broglie's Le Secret du roi (1888); Captain J. Buchan Telfer's Strange Career of the Chevalier d'Eon (1888) ; Octave Homberg and Fernand Jousselin, Le Chevalier d'Eon (1904) ; and A. Lang's Historical Mysteries (1904;.

EOTVOS, JOZSEF, Baron (1813-1871), Hungarian writer and statesman, the son of Baron Ignacz E6tv6s and the baroness Lilian, was born at Buda on the 13th of September 1813. After an excellent education he entered the civil service as a vice- notary, and was early introduced to political life by his father. He also spent many years in western Europe, assimilating the new ideas both literary and political, and making the acquaint- ance of the leaders of the Romantic school. On his return to Hungary he wrote his first political work, Prison Reform; and at the diet of 1839-1840 he made a great impression by his eloquence and learning. One of his first speeches (published, with additional matter, in 1841) warmly advocated Jewish emancipation. Subsequently, in the columns of the

Pesti Hirlap, Eotvos disseminated his progressive ideas farther afield, his standpoint being that the necessary reforms could only be carried out administratively by a responsible and purely national government. The same sentiments pervade his novel The Village Notary (1844-1846), one of the classics of the Magyar literature, as well as in the less notable romance Hungary in 1514, and the comedy Long live Equality! In 1842 he married Anna Rosty, but his happy domestic life did ndt interfere with his public career. He was now generally regarded as one of the leading writers and politicians of Hungary, while the charm of his oratory was such that, whenever the archduke palatine Joseph desired to have a full attendance in the House of Mag- nates, he called upon Eotvos to address it. The February revolution of 1848 was the complete triumph of Eotvos' ideas, and he held the portfolio of public worship and instruction in the first responsible Hungarian ministry. But his influence extended far beyond his own department. Eotvos, Deak and Szech£nyi represented the pacific, moderating influence in the council of ministers, but when the premier, Batthyany, resigned, Eotvos, in despair, retired for a time to Munich. Yet, though withdrawn from the tempests of the War of Independence, he continued to serve his country with his pen. His Influence of the Ruling Ideas of the igth Century on the State (Pest, 1851-1854, German editions at Vienna and Leipzig the same year) profoundly influenced literature and public opinion in Hungary. On his return home, in 185 1, he kept resolutely aloof from all political movements. In 1859 he published The Guarantees of the Power and Unity of Austria (Ger. ed. Leipzig, same year), in which he tried to arrive at a compromise between personal union and ministerial responsi- bility on the one hand and centralization on the other. After the Italian war, however, such a halting-place was regarded as in- adequate by the majority of the nation. In the diet of 1861 Eotvos was one of the most loyal followers of Deak, and his speech in favour of the " Address " (see Deak, Francis) made a great impression at Vienna. The enforced calm which prevailed during the next few years enabled him to devote himself once more to literature, and, in 1866, he was elected president of the Hungarian academy. In the diets of 1865 and 1867 he fought zealously by the side of Deak, with whose policy he now com- pletely associated himself. On the formation of the Andrassy cabinet (Feb. 1867) he once more accepted the portfolio of public worship and education, being the only one of the ministers of 1848 who thus returned to office. He had now, at last, the opportunity of realizing the ideals of a lifetime. That very year the diet passed his bill for the emancipation of the Jews; though his further efforts in the direction of religious liberty were less successful, owing to the

opposition of the Catholics. But his greatest achievement was the National Schools Act, the most complete system of education provided for Hungary since the days of Maria Theresa. Good Catholic though he was (in matters of religion Tie had been the friend and was the disciple of Mont- alembert) , EotvSs looked with disfavour on the dogma of papal infallibility, promulgated in 1870, and when the bishop of

Fehervar proclaimed it, Eotvos cited him to appear at the capital ad audiendum verbum regium. He was a constant defender of the composition with Austria (Ausgleich), and during the absence of Andrassy used to preside over the council of ministers; but the labours of the last few years were too much for his failing health, and he died at Pest on the 2nd of February 1871. On the 3rd of May 1879 a statue was erected to him at Pest in the square which bears his name.

Eotvos occupied as prominent a place in Hungarian literature as in Hungarian politics. His peculiarity, both as a politician and as a statesman, lies in the fact that he was a true philosopher, a philosopher at heart as well as in theory; and in his poems and novels he clothed in artistic forms all the great ideas for which he contended in social and political life. The best of his verses are to be found in his ballads, but his poems are insignificant compared with his romances. It was The Carthusians, written on the occasion of the floods at Pest in 1838, that first took the public by storm. The Magyar novel was then in its infancy, being chiefly represented by the historico-epics of Josika. Eotvos first modernized it, giving prominence in his pages to current social problems and political aspirations. The famous Village Notary came still nearer to actual life, while Hungary in 1514, in which the terrible Dozsa Jacquerie (see Dozsa) is so vividly described, is especially interesting because it rightly attributes the great national catastrophe of Mohacs to the blind selfishness of the Magyar nobility and the intense sufferings of the people. Yet, as already stated, all these books are written with a moral purpose, and their somewhat involved and difficult style is, nowadays at any rate, a trial to those who are acquainted with the easy, brilliant and lively novels of Jokai.

The best edition of Eotvos' collected works is that of 1 891, in 17 vols. Comparatively few of his writings have been translated, but

there are a good English version (London, 1850) and numerous German versions of The Village Notary, while The Emancipation of the Jews has been translated into Italian and German (Pest, 1841-1842), and a German translation of Hungary in 1514, under the title of Der Banernkrieg in Ungarn was published at Pest in 1850.

See A. Ban, Life and Art of Baron Joseph Eotvos (Hung.) (Budapest, 1902) ; Zoltan Ferenczi Baron Joseph Eotvos (Hung.) (Budapest, 1903) [this is the best biography]; and M. Berkovics, Baron Joseph Eotvos anu the French Literature (Hung.) (Budapest, 1904). (R. N. B.)

EPAMINONDAS (c. 418-362), Theban general and statesman, born about 418 B.C. of a noble but impoverished family. For his education he was chiefly indebted to Lysis of Tarentum, a Pythagorean exile who had found refuge with his father Polymnis. He first comes into notice in the attack upon Mantineia in 385, when he fought on the Spartan side and saved the life of his future colleague Pelopidas. In his youth Epaminondas took little part in public affairs; he held aloof from the political assassina- tions which preceded the Theban insurrection of 379. But in the following campaigns against Sparta he rendered good service in organizing the Theban defence. In 371 he represented Thebes at the congress in Sparta, and by his refusal to surrender the Boeotian cities under Theban control prevented the conclusion of a general peace. In the ensuing campaign he commanded the Boeotian army which met the Peloponnesian levy at Leuctra, and by a brilliant victory on this site, due mainly to his daring innovations in the tactics of the heavy infantry, established at once the predominance of Thebes among the land-powers of Greece and his own fame as the greatest and most original of Greek generals. At the instigation of the Peloponnesian states which armed . against Sparta in consequence of this battle, Epaminondas in 370 led a large host into Laconia; though unable to capture Sparta he ravaged its territory and dealt a lasting blow at Sparta's predominance in Peloponnesus by liber- ating the Messenians and rebuilding their capital at Messene. Accused on his return to Thebes of having exceeded the term of his command, he made good his defence and was re-elected boeotarch. In 369 he forced the Isthmus lines and secured Sicyon for Thebes, but gained no considerable successes. In the following year he served as a common soldier in Thessaly, and upon being reinstated in command contrived the safe retreat of the Theban army from a difficult position. Returning to

Thessaly next year at the head of an army he procured the liberation of Pelopidas from the tyrant Alexander of Pherae without striking a

blow. In his third expedition (366) to Pelo- ponnesus, Epaminondas again eluded the Isthmus garrison and won over the Achaeans to the Theban alliance. Turning his attention to the growing maritime power of Athens, Epaminondas next equipped a fleet of 100 triremes, and during a cruise to the Propontis detached several states from the Athenian con- federacy. When subsequent complications threatened the position of Thebes in Peloponnesus he again mustered a large army in order to crush the newly formed Spartan league (362). After some masterly operations between Sparta and Mantineia, by which he nearly captured both these towns, he engaged in a decisive battle on the latter site, and by his vigorous shock tactics gained a complete victory over his opponents (see Mantineia). Epaminondas himself received a severe wound during the combat, and died soon after the issue was decided.

His title to fame rests mainly on his brilliant qualities both as a strategist and as a tactician; his influence on military art in Greece was of the greatest. For the purity and uprightness of his character he likewise stood in high repute; his culture and eloquence equalled the highest Attic standard. In politics his chief achievement was the final overthrow of Sparta's predomin- ance in the Peloponnese; as a constructive statesman he displayed no special talent, and the lofty pan-Hellenic ambitions which are imputed to him at any rate never found a practical expression.

Cornelius Nepos, Vita Epaminondae ; Diodorus xv. 52-88; Xenophon, Hellenica, vii, ; L. Pomtow, Das Leben des Epaminondas (Berlin, 1870) ; von Stein, Geschichte der spartanischen und thebani- schen Hegemonie (Dorpat, 1884), pp. 123 sqq. ; H. Swoboda in Pauly- Wissowa, Realencyclopadie, v. pt. 2 (Stuttgart, 1905), pp. 2674-2707; also Army: History, § 6. (M. O. B. C.)

EPARCH, an official, a governor of a province of Roman Greece, tirapxos, whose title was equivalent to, or represented that of the Roman praefectus. The area of his administration was called an eparchy («rapx£a). The term survives as one of the administrative units of modern Greece, the country being divided into nomarchies, subdivided into eparchies, again sub- divided into demarchies (see Greece: Local Administration). " Eparch " and " eparchy " are also used in the Russian Orthodox Church for a bishop and his diocese respectively,

EPAULETTE (a French word, from epaule, a shoulder), properly a shoulder-piece, and so applied to the shoulder-knot of ribbon to which a scapulary was attached, worn by members of a religious

order. The military usage was probably derived from the metal plate (epauliere) which protected the shoulder in the defensive armour of the 16th century. It was first used merely as a shoulder knot to fasten the baldric, and the application of it to mark distinctive grades of rank was begun in France at the suggestion, it is said, of Charles Louis Auguste Fouquet, due de Belle-Isle, in 1759. In modern times it always appears as a shoulder ornament for military and naval uniforms. At first it consisted merely of a fringe hanging from the end of the shoulder- strap or cord over the sleeve, but towards the end of the 18th century it became a solid ornament, consisting of a flat shoulder- piece, extended beyond the point of the shoulder into an oval plate, from the edge of which hangs a thick fringe, in the case of officers of gold or silver. The epaulette is worn in the British navy by officers above the rank of sub-lieutenant; in the army it ceased to be worn about 1855. It is worn by officers in the United States navy above the rank of ensign; since 1872 it is only worn by general officers in the army. In most other countries epaulettes are worn by officers, and in the French army by the men also, with a fringe of worsted, various dis- tinctions of shape and colour being observed between ranks, corps and arms of the service. The " scale " is similar to the epaulette, but has no fringe.

EPEE, CHARLES-MICHEL, Abbe del' (1712-1789), celebrated for his labours in behalf of the deaf and dumb, was born at Paris on the 25th of November 1712, being the son of the king's archi- tect. He studied for the church, but having declined to sign a religious formula opposed to the doctrines of the Jansenists, he was denied ordination by the bishop of his diocese. He then

devoted himself to the study of law; but about the time of his admission to the bar of Paris, the bishop of Troyes granted him ordination, and offered him a canonry in his cathedral. This bishop died soon after, and the abbe, coming to Paris, was, on account of his relations with Soanen, the famous Jansenist, deprived of his ecclesiastical functions by the archbishop of Beaumont. About the same time it happened that he heard of two deaf mutes whom a priest lately dead had been endeavour- ing to instruct, and he offered to take his place. The Spaniard Pereira was then in Paris, exhibiting the results he had obtained in the education of deaf mutes; and it has been affirmed that it was from him that Epee obtained his manual alphabet. The abbe, however, affirmed that he knew nothing of

Pereira ‘s method; and whether he did or not, there can be no doubt that he attained far greater success than Pereira or any of his predecessors, and that the whole system now followed in the instruction of deaf mutes virtually owes its origin to his intelligence and devotion. In 1755 he founded, for this beneficent purpose, a school which he supported at his own expense until his death, and which afterwards was succeeded by the ” Institution Nationale des Sourds Muets a Paris,” founded by the National Assembly in 1791. He died on the 23rd of December 1789. In 1838 a bronze monument was erected over his grave in the church of Saint Roch. He published various books on his method of instruction, but that published in 1784 virtually supersedes all others. It is entitled La Veritable Manure d’in- struire les sourds et muets, confirmee par une tongue experience. He also began a Dictionnaire g&niral des signes, which was com- pleted by his successor, the abbe Sicard.

6p£E-DE-COMBAT, a weapon still used in France for duel- ling, and there and elsewhere (blunted, of course) for exercise and amusement in fencing (q.v.). It has a sharp-pointed blade, about 35 in. long, without any cutting edge, and the guard, or shell, is bowl-shaped, having its convexity towards the point. The epte is the modern representative of the small-sword, and both are distinguished from the older rapier, mainly by being several inches shorter and much lighter in weight. The small- sword (called thus in opposition to the heavy cavalry broadsword), was worn by gentlemen in full dress throughout the 18th century, and it still survives in the modern English court costume.

Fencing practice was originally carried on without the pro- tection of any mask for the face. Wire masks were not in- vented till near 1780 by a famous fencing-master, La Boessiere the elder, and did not come into general use until much later. Consequently, in order ‘to avoid dangerous accidents to the face, and especially the eyes, it was long the rigorous etiquette of the fencing-room that the point should always be kept low. \f In the 17th century a Scottish nobleman, who had procured the assassination of a fencing-master in revenge for having had one of his eyes destroyed by the latter at sword-play, pleaded on his trial for murder that it was the custom to ” spare the face.”

Rowlandson’s well-known drawing of a fencing bout, dated 1787, shows two accomplished amateurs making a foil assault without masks, while in the background a less practised one is having a wire mask tied on.

For greater safety the convention was very early arrived at that no hits should count in a fencing-bout except those landing on the breast. Thus sword-play soon became so unpractical as to lose much of its value as a training for war or the duel. For, hits with " sharps " take effect wherever they are made, and many an expert fencer. of the old school has been seriously wounded, or lost his life in a duel, through forgetting that very simple fact.

Strangely enough, when masks began to be generally worn, and the fieuret (anglice, " foil," a cheap and light substitute for the real epee) was invented, fencing practice became gradually even more conventional than before. No one seems to have understood that with masks all the conventions could be safely done away with, root and branch, and sword-practice might assume all the semblance of reality. Nevertheless it should be clearly recognized that the basis of modern foil-fencing was laid with the epee or small-sword alone, in and before the days of Angelo, of Danet, and the famous chevalier de St George, who

were among the first to adopt the fieuret also. All the illustrious . French professors who came after them, such as La Boessiere the younger, Lafaugere, Jean Louis, Cordelois, Grisier, Bertrand and Robert, with amateurs like the baron dEzpeleta, were foil-players pure and simple, whose reputations were gained before the modern epee play had any recognized status. It was reserved for Jacob, a Parisian fencing-master, to establish in the last quarter of the 19th century a definite method of the epee, which differed essentially from all its forerunners. He was soon followed by Baudry, Spinnewyn, Laurent and Ayat. The methods of the four" first-named, not differing much inter se, are based on the perception that in the real sword fight, where hits are effective on all parts of the person, the "classical" bent-arm guard, with the foil inclining upwards, is hopelessly bad. It offers a tempting mark in the exposed sword-arm itself, while the point requires a movement to bring it in line for the attack, which involves a fatal loss of time. The epee is really in the nature of a short lance held in one hand, and for both rapidity and precision of attack, as well as for the defence' of the sword-arm and the body behind it, a position of guard with the arm almost jully extended, and epee in line with the forearm, is far the safest. Against this guard the direct lunge at the body is impossible, except at the risk of a mutual or double hit (le coup des deux veuves). No safe attack at the face or body can be made without first binding or beating, opposing or evading the adverse blade, and such an attack usually involves an initial forward movement. Beats and binds of the blade, with retreats of the body, or counter attacks with opposition,

replace the old foil-parries in most instances, except at close quarters. And much of the offensive is reduced to thrusts at the wrist or forearm, intended to disable without .seriously wounding the adversary. The direct lunge (coup-droit) at the body often succeeds in tournaments, but usually at the cost of a counter hit, which, though later in time, would be fatal with sharp weapons.

Ayat's method, as might be expected from a first-class foil- player, is less simple. Indeed for years, too great simplicity marked the most successful epee-play, because it usually gained its most conspicuous victories over those who attempted a foil defence, and whose practice gave them no safe strokes for an attack upon the extended blade. But by degrees the epeists themselves discovered new ways of attacking with comparative safety, and at the present day a complete epee-player is master of a large variety of attractive as well as 'scientific movements, both of attack and defence.

It was mainly by amateurs that this development was achieved. Perhaps the most conspicuous representative of the new school is J. Joseph-Renaud, a consummate swordsman, who has also been a champion foil-player. Lucien Gaudin, Alibert and Edmond Wallace may be also mentioned as among the most skilful amateurs, Albert Ayat and L. Bouche as professors — all of Paris. Belgium, Italy and England have also produced epeists quite of the first rank

The epee lends itself to competition far better than the foil, and the revival of the small-sword soon gave rise in France to " pools " and " tournaments " in which there was the keenest rivalry between all comers.

In considering the epee from a British point of view, it may be mentioned that it was first introduced publicly in London by C. Newton-Robinson at an important assault-at-arms held in the Steinway Hall on the 4th May 1900. Professor Spinnewyn was the principal demonstrator, ' with his pupil, the late Willy Sulzbacher. The next day was held at the Inns of Court R. V. School of Arms, Lincoln's Inn, the first English open ep6e tourna- ment for amateurs. It was won by W. Sulzbacher, C. Newton- Robinson being second, and Paul Ettlinger, a French resident in London, third. This was immediately followed by the institu- tion of the Epee Club of London, which, under the successive residencies of a veteran swordsman, Sir Edward Jenkinson, and of Lord Desborough, subsequently held annual open international tournaments. The winners were: in 1901, Willy Sulzbacher; 1902, Robert Montgomerie; 1903, the marquis de Chasseloup- Laubat; IQ04, J. J.-Renaud; 1905, R. Montgomerie. In

the Amateur Fencing Association for the first time recognized the best-placed Englishman, Edgar Seligman (who was the actual winner), as the English epee champion. In 1907 R. Montgomerie was again the winner, in 1908 C. L. Daniell, in 1909 R. Montgomerie.

Among the most active of the English amateurs who were the earliest to perceive the wonderful possibilities of epee-play, it is right to mention Captain Hutton, Lord Desborough, Sir Cosmo Duff-Gordon, Bart., Sir Charles Dilke, Bart., Lord Howard de Walden, Egerton Castle, A. S. Cope, R.A., W. H. C. Staveley, C. F. Clay, Lord Morpeth, Evan James, Paul King, J. B. Cunliffe, John Norbury, Jr., Theodore A. Cook, John Jenkinson, R. Montgomerie, S. Martineau, E. B. Milnes, H. J. Law, R. Merivale, the Marquis of Dufferin, Hugh Pollock, R. W. Doyne, A. G. Ross, the Hon. Ivor Guest and Henry Balfour.

Among foreign amateurs who did most to promote the use of the epee in England were Messrs P. Ettlinger, Anatole Paroissien, J. Joseph-Renaud, W. Sulzbacher, Rene Lacroix, H. G. Berger and the Marquis He Chasseloup-Laubat.

Epee practice became popular among Belgian and Dutch fencers about the same time as in England, and this made it possible to set on foot international team-contests for amateurs, which have done much to promote good feeling and acquaintance- ship among swordsmen of several countries. In 1903 a series of international matches between teams of six was inaugurated in Paris. Up to 1 909 the French team uniformly won the first place, with Belgium or England second.

English fencers who were members of these international teams were Lord Desborough, Theodore A. Cook, Bowden, Cecil Haig, J. Norbury, Jr., R. Montgomerie, John Jenkin- son, F. Townsend, W. H. C. Staveley, S. Martineau, C. L. Daniell, W. Godden, Captain Haig, M. D. V. Holt, Edgar Seligman, C. Newton-Robinson, A. V. Buckland, P. M. Davson, E. M. Amphlett and L. V. Fildes. In 1906 a British epee team of four, consisting of Lord Desborough, Sir Cosmo Duff-Gordon, Bart., Edgar Seligman and C. Newton- Robinson, with Lord Howard de Walden and Theodore Cook as reserves (the latter

acting as captain of the team), went to Athens to compete in the international match at the Olympic games. After defeat- ing the Germans rather easily, the team opposed and worsted the Belgians. It thus found itself matched against the French in the final, the Greek team having been beaten by the French and the Dutch eliminated by the Belgians. After a very close fight the result was officially declared a tie. This was the first occasion upon which an English fencing team had encountered a French one of the first rank upon even terms. In fighting off the tie, however, the French were awarded the first prize and the Englishmen the second.

In the Olympic games of London, 1908, the Epee International Individual Tournament was won by Alibert (France), but Montgomerie, Haig and Holt (England) took the 4th, 5th, and 8th places in the final pool. The result of the International Team competition was also very creditable to the English repre- sentatives, Daniell, Haig, Holt, Montgomerie and Amphlett, who by defeating the Dutch, Germans, Danes and Belgians took second place to the French. Egerton Castle was captain of the English team.

In open International Tournaments on the Continent, English epeists have also been coming to the front. None had won such a competition up to 1909 outright, but the following had reached the final pool: C. Newton-Robinson, Brussels, 1901 (10th), Etretat, 1904 (6th); E. Seligman, Copenhagen, 1907 (2nd), and Paris, 1909 (12th); R. Montgomerie, Paris, 1909 (5th); and E. M. Amphlett, Paris, 1909 (10th).

The method of ascertaining the victor in epee " tournaments " is by dividing the competitors into "pools," usually of six or eight fencers. Each of these fights an assault for first hit only, with every other member of the same pool, and he who is least often hit, or not at all, is returned the winner. If the competitors are numerous, fresh pools are formed out of the first two, three or four in each pool of the preliminary round, and so on, until a

small number are left in for a final pool, the winner of which is the victor of the tournament.

Epee fencing can be, and often is, conducted indoors, but one of its attractions consists in its fitness for open-air practice in pleasant gardens.

In the use of the epee the most essential points are (1) the position of the sword-arm, which, whether fully extended or not, should always

be so placed as to ensure the protection of the wrist, forearm and elbow from direct thrusts, by the intervention of the guard or shell; (2) readiness of the legs for instant advance or retreat; and (3) the way in which the weapon is held, the best position (though hard to acquire and maintain) being that adopted by J. J. Renaud with the fingers over the grip, so that a downward beat does not easily disarm.

The play of individuals is determined by their respective temperaments and physical powers. But every fencer should be always ready to deliver a well-aimed, swift, direct thrust at any exposed part of the antagonist's arm, his mask or thigh. Very tall men, who are usually not particularly quick on their legs, should not as a rule attack, otherwise than by direct thrusts, when matched against shorter men. For if they merely extend their sword-arm in response to a simple attack, their longer reach will ward it off with a stop or counter-thrust. Short men can only attack them safely by beating, binding, grazing, pressing or evading the blade, and the taller fencers must be prepared with all the well-known parries and counters to such offensive movements, as well as with the stop-thrust to be made either with advancing opposition or with a retreat. Fencers of small stature must be exceedingly quick on their feet, unless they possess the art of parrying to perfection, and even then, if slow to shift ground, they will continually be in danger. With plenty of room, the quick mover can always choose the moment when he will be within distance, for an attack which his slower opponent will be always fearing and unable to prevent or anticipate.

It is desirable to put on record the modern form of the weapon. An average epee weighs, complete, about a pound and a half, while a foil weighs approximately one-third less. The ep6e blade is exactly like that of the old small-sword after the abandon- ment of the " eolichemarde " form, in which the "forte " of the blade was greatly thickened. In length from guard or shell to point it measures about 35 in., and in width at the shell about ˆfths of an inch. From this it gradually and regularly tapers to the point. There is no cutting edge. The side of the epee which is usually held uppermost is slightly concave, the other is strengthened with a midrib, nearly equal in thickness and similar in shape to either half of the true blade. The material is tempered steel. There is a haft or tang about 8 in. long, which is pushed through a circular guard or shell (" coquille ") of convex form, the diameter of which is normally 5 in. and the convexity 1 f in. The shell is of steel or aluminium, and if of the latter metal, sometimes fortified at the centre with a disk of steel the size of a crown piece. The insertion of the haft or tang through the

shell may be either central or excentric to the extent of about 1 in., for the better protection of the outside of the forearm.

After passing through the shell, the haft of the blade is in- serted in a grip or handle (" poignet "), averaging 7 in. in length and of quadrangular section, which is made of tough wood covered with leather, india-rubber, wound cord or other strong material with a rough surface. The grip is somewhat wider than its vertical thickness when held in the usual way, and it diminishes gradually from shell to pommel for convenience of holding. It should have a slight lateral curvature, so that in executing circular movements the pommel is kept clear of the wrist. The pommel, usually of steel, is roughly spherical or eight-sided, and serves as a counterbalance. The end of the haft is riveted through it, except in the case of " eptes demontables," which are the most convenient, as a blade may be changed by simply un- screwing or unlocking the pommel.

An epee is well balanced and light in hand when, on poising the blade across the forefinger, about 1 in. in advance of the shell, it is in equilibrium.

For practice, the point is blunted to resemble the flat head of a nail, and is made still more incapable of penetration by winding around it a small ball of waxed thread, such as cobblers use. This is called the " button." In competitions various forms of " boutons marqueurs," all of which are unsatisfactory, are occasionally used. The " pointe d'arril," like a small tin-tack placed head downwards on the flattened point of the epee, and fastened on by means of the waxed thread, is, on the contrary, most useful, by fixing in the clothes, to show where and when a good hit has been made. The point need only protrude about iVth of an inch from the button. There are several kinds of pointes d'arret. The best is called, after its inventor, the " Leon Sazie," and has three blunt points of hardened steel each slightly excentric. The single point is sometimes prevented by the thickness of the button from scoring a good hit.

A mask of wire netting is used to protect the face, and a stout glove on the sword hand. It is necessary to wear strong clothes and to pad the jacket and trousers at the most exposed parts, in case the blade should break unnoticed. A vulnerable spot, which ought to be specially padded, is just under the sword-arm.

Bibliography. — Among the older works on the history and practice of the small-sword, or epee, are the following: — The Scots Fencing-Master, or Compleat Small-swordsman, by W. H. Gent (Sir William Hope, afterwards baronet) (Edinburgh, 1687), and several other works by the same author, of later date, for which see Schools and Masters of Fence, by Egerton Castle; Nouveau traite de la perfection sur le fait des armes, by P. G. F. Girard (Paris, 1736) ; L'Ecole des armes, by M. Angelo (London, 1763) ; L'Art des armes, by M. Danet (2 vols., Paris, 1766-1767); Nouveau traite de I'arl des armes, by Nicolas Demeuse (Liege, 1778).

More modern are: Traite de Vart des armes, by la Boessiere, Jr. (Paris, 1818); Les Armes et le duel, by A. Grisier (2nd ed., Paris, 1847) ; Les Secrets de Vepee, by the baron de Bazancourt (Paris, 1862); Schools and Masters of Fence, by Egerton Castle (London, 1885); Le Jeu de Vepee, by J. Jacob and Emil Andre (Paris, 1887); L'Escrime pratique au XIX' siecle, by Ambroise Baudry (Paris) ; L'Escrime a Vepee, by A. Spinnewyn and Paul Manonry (Paris, 1898) ; The Sword and the Centuries, by Captain Hutton (London, 1901) ; "The Revival of the Small-sword," by C. Newton-Robinson, in the Nine- teenth Century and After (London, January 1905) ; Nouveau Traite de Vepee, by Dr Edom, privately published (Paris, 1908) ; and, most important of all, Methode d'escrime a Vepee, by J. Joseph-Renaud, privately published (Paris, 1909). . (C. E. N. R.)

EPERJES, a town of Hungary, capital of the county of Saros, 190 m. N.E. of Budapest by rail. Pop. (1900) 13,098. It is situated on the left bank of the river Tarcza, an affluent of the Theiss, and has been almost completely rebuilt since a great fire in 1887. Eperjes is one of the oldest towns of Hungary, and is still partly surrounded by its old walls. It is the seat of a Greek- Catholic bishop, and possesses a beautiful cathedral built in the 1 8th century in late Gothic style. It possesses manufactures of cloth, table-linen and earthenware, and has an active trade in wine, linen, cattle and grain. About 2 m. to the south is Sovar with important salt-works.

In the same county, 28 m. by rail N. of Eperjes, is situated the old town of Bdrtfa (pop. 6098), which possesses a Gothic church from the 14th century, and an interesting town-hall, dating from the 15th century, and containing very valuable archives. In its neighbourhood, surrounded by pine forests, are the baths of Bartfa, with twelve mineral springs — iodate, ferruginous and alkaline — used for bathing and drinking.

About 6 m. N.W. of Eperjes is situated the village of Voros- vagas,

which contains the only opal mine in Europe. The opal was mined here 800 years ago, and the largest piece hitherto found, weighing 2940 carats and estimated to have a value of £175,000, is preserved in the Court Museum at Vienna.

Eperjes was founded about the middle of the 1 2th century by a German colony, and was elevated to the rank of a royal free town in 1347 by Louis I. (the Great). It was afterwards fortified and received special privileges. The Reformation found many early adherents here, and the town played an important part during the religious wars of the 17 th century. It became famous by the so-called " butchery of Eperjes," a tribunal instituted by the Austrian general Caraffa in 1687, which condemned to

death and confiscated the property of a great number of citizens accused of Protestantism. During the 16th and the 17th centuries its German educational establishments enjoyed a wide reputation.

ˆPERNAY, a town of northern France, capital of an arron- dissement in the department of Marne, 88 m. E.N.E. of Paris on the main line of the Eastern railway to Chalons-sur-Marne. Pop. (1906) 20,291. The town is situated on the left bank of the Marne at the extremity of the pretty valley of the Cubry, by which it is traversed. In the central and oldest quarter the streets are narrow and irregular; the surrounding suburbs are modern and more spacious, and that of La Folie, on the east, contains many handsome villas belonging to rich wine merchants. The town has also extended to the right bank of the Marne. One of its churches preserves a portal and stained-glass windows of the 1 6th century, but the other public buildings are modern. Epernay is best known as the principal entrepot of the Champagne wines, which are bottled and kept in extensive vaults in the chalk rock on which the town is built. The manufacture of the apparatus and material used in the champagne industry occupies many hands, and the Eastern Railway Company has important workshops here. Brewing, and the manufacture of sugar and of hats and caps, are also carried on. Epernay is the seat of a sub-prefect and has tribunals of first instance and of commerce, and communal colleges for girls and boys.

Epernay (Sparnacum) belonged to the archbishops of Reims from the 5th to the 10th century, at which period it came into the possession of the counts of Champagne. It suffered severely during the Hundred Years' War, and was burned by Francis I. in 1544. It resisted Henry of Navarre in 1592, and Marshal Biron fell in the attack which preceded its capture. In 1642 it was, along with Chateau-Thierry,

erected into a duchy and assigned to the duke of Bouillon.

EPERNON, a town of northern France in the department of Eure-et-Loir, at the confluence of the Drouette and the Guesle, 17 m. N.E. of Chartres by rail. Pop. (1906) 2370. It belonged originally to the counts of Montfort, who, in the nth century, built a castle here of which the ruins are still left, and granted a charter to the town. In the 13th century it became an inde- pendent lordship, which remained attached to the crown of Navarre till, in the 16th century, it was sold by King Henry (afterwards King Henry IV. of France) to Jean Louis de Nogaret, for whom it was raised to the rank of a duchy in 1581. The new duke of Epernon was one of the favourites of Henry III., who were called les Mignons; the king showered favours upon him, giving him the posts of colonel-general in the infantry and of admiral of France. Under the reign of Henry IV. he made himself practically independent in his government of Provence. He was instrumental in giving the regency to Marie de' Medici in 1 610, and as a result exercised a considerable influence upon the government. During his governorship of Guienne in 1622 he had some scandalous scenes with the parlement and the arch- bishop of Bordeaux. He died in 1642. His eldest son, Henri de Nogaret de la Valette, duke of Candale, served under Richelieu, in the armies of Guienne, of Picardy and of Italy. The second son of Jean Louis de Nogaret, Bernard, who was born in 1592, and died in 1661, was, like his father, duke of Epernon, colonel- general in the infantry and governor of Guienne. After his death, the title of duke of Epernon was borne by the families of Goth and of Pardaillan.

EPHEBEUM (from Gr. tffafios, a young man), in architecture, a large hall in the ancient Palaestra furnished with seats (Vitruvius v. n), the length of which should be a third larger than the width. It served for the exercises of youths of from sixteen to eighteen years of age.

EPHEBI (Gr. bri, and i?/3ij, i.e. " those who have reached puberty "), a name specially given, in Athens and other Greek towns, to a class of young men from eighteen to twenty years of age, who formed a sort of college under state control. On the completion of his seventeenth year the Athenian youth attained his civil majority, and, provided he belonged to the first three property classes and passed the scrutiny (SoKijicwria) as to age,

civic descent and physical capability, was enrolled on the register of his deme (X7)£(.apX"«w' ypaˆixareiop). He thereby at once became liable to the military training and duties, which, at least in the earliest times, were the main object of the Ephebia. In the time of Aristotle the names of the enrolled ephebi were engraved on a bronze pillar (formerly on wooden tablets) in front of the council-chamber. After admission to the college, the ephebus took the oath of allegiance, recorded in Pollux and Stobaeus (but not in Aristotle), in the temple of Aglaurus, and was sent to Munychia or Acte to form one of the garrison. At the end of the first year of training, the ephebi were reviewed, and, if their performance was satisfactory, were provided by the state with a spear and a shield, which, together with the thlamys (cloak) and petasus (broad-brimmed hat), made up their equip- ment. In their second year they were transferred to other garrisons in Attica, patrolled the frontiers, and on occasion took an active part in war. During these two years they were free from taxation, and were not allowed (except in certain cases) to appear in the law courts as plaintiffs or defendants. The ephebi took part in some of the most important Athenian festivals. Thus during the Eleusinia they were told off to fetch the sacred objects from Eleusis and to escort the image of Iacchus on the sacred way. They also performed police duty at the meetings of the ecclesia.

After the end of the 4th century B.C. the institution underwent a radical change. Enrolment ceased to be obligatory, lasted only for a year, and the limit of age was dispensed with. In- scriptions attest a continually decreasing number of ephebi, and with the admission of foreigners the college lost its representative national character. This was mainly due to the weakening of the military spirit and the progress of intellectual culture. The military element was no longer all-important, and the ephebia became a sort of university for well-to-do young men of good family, whose social position has been compared with that of the Athenian "knights" of earlier times. The institution lasted till the end of the 3rd century a.d.

It is probable that the ephebia was in existence in the 5th century B.C., and controlled by the Areopagus and strategus as its moral and military supervisors. In the 4th century their place was taken by ten sophronistae (one for each tribe), who, as the name implies, took special interest in the morals of those under them, their military training being in the hands of experts, of whom the chief were the hoplomachus, the acontistcs, the toxotes and the aphetes (instructors respectively in the use of arms, javelin-throwing, archery and the use of artillery engines). Later, the sophronistae were superseded by a single official called cosmetes, elected for a year by the people, who

appointed the instructors. When the ephebia instead of a military college became a university, the military instructors were replaced by philosophers, rhetoricians, grammarians and artists. In Roman imperial times several new officials were introduced, one of special importance being the director of the Diogeneion, where youths under age were trained for the ephebia. At this period the college of ephebi was a miniature city; its members called themselves " citizens," and it possessed an archon, strategus, herald and other officials, after the model of ancient Athens.

There is an extensive class of inscriptions, ranging from the 3rd century B.C. to the 3rd century a.d., containing decrees relating to the ephebi, their officers and instructors, and lists of the same, and a whole chapter (42) of the Aristotelian Constitution of Athens is devoted to the subject. The most important treatises on the subject are: W. Dittenberger, De ephebis Alticis (Gottingen, 1863) ; A. Dumont, Essai- sur V ephebie attique (1875-1876) ;.L. Grasberger, Erziehung und Vnterricht im klassichen Altertum, iii. (Wiirzburg, 1881); J. P. Mahaffy, Old Greek Education (1881); P. Girard, L 'Education athenienne au V e et IV" Steele avant J.C. (2nd ed., 1891), and article in Daremberg and Saglio's Dictionnaire des antiquites which contains further bibliographical references; G. Gilbert, The Constitutional Antiquities of Athens (Eng. tr., 1895); G. Busolt, Die griechischen Staats und, Bechtsaltertumer (1892); T. Thalheim and J. Ohler in Pauly-Wissowa, Realencyclopddie der classischen Altertumswissenschaft, v. pt. 2 (1905) ; W. W. Capes, University Life in Ancient Athens (1877).

EPHEMERIS (Greek for a " diary "), a table giving for stated times the apparent position and other numerical particulars

relating to a heavenly body. The Astronomical Ephemeris, familiarly known as the " Nautical Almanac," is a national annual publication containing ephemerides of the principal or more conspicuous heavenly bodies, elements and other data of eclipses, and other matter useful to the astronomer and navigator. The governments of the United Kingdom, United States, France, Germany and Spain publish such annals.

EPHESIANS, EPISTLE TO THE. This book of the New Testament, the most general and least occasional and polemic of all the Pauline epistles, a large section of which seems almost like the literary elaboration of a theological topic, may best be described as a solemn oration, addressed to absent hearers, and intended not primarily to clarify their minds but to stir theii emotions. It is thus a true letter,

but in the grand style, verging on the nature not of an essay but a poem. Ephesians has been called " the crown of St Paul's writings," and whether it be measured by its theological or its literary interest and import- ance, it can fairly dispute with Romans the claim to be his greatest epistle. In the public and private use of Christians some parts of Ephesians have been among the most favourite of all New Testament passages. Like its sister Epistle to the Colossians, it represents, whoever wrote it, deep experience and bold use of reflection on the meaning of that experience; if it be from the pen of the Apostle Paul, it reveals to us a distinct and important phase of his thought.

To the nature of the epistle correspond well the facts of its title and address. The title " To the Ephesians " is found in the Muratorian canon, in Irenaeus, Tertullian and Clement of Alexandria, as well as in all the earliest MSS. and versions. Marcion, however (c. a.d. 150), used and recommended copies with the title " To the Laodiceans." This would be inexplicable if Eph. i. 1 had read in Marcion 's copies, as it does in most ancient authorities, " To the saints which are at Ephesus "; but in fact the words ev 'JLfecry of verse 1 were probably absent. They were not contained in the text used by Origen (d. 253); Basil (d. 379) says that " ancient copies " omitted the words; and they are actually omitted by Codices B (Vaticanus, 4th century) and n (Sinaiticus, 4th century), together with Codex 67 (nth century). The words " in Ephesus" were thus probably originally lacking in the address, and were inserted from the suggestion of the title. Either the address was general (" to the saints who are also faithful ") or else a blank was left. In the latter case the name may have been intended to be supplied orally, in communicating the letter, or a different name may have been written in each of the individual copies. Under any of these hypotheses the address would indicate that we have a circular letter, written to a group of churches, doubtless in Asia Minor. This would account for the general character of the epistle, as well as for the entire and striking absence of personal greetings and of concrete allusions to existing circumstances among the readers. It appears to have drawn its title, " To the Ephesians," from one of the churches for which it was intended, perhaps the one from which a copy was secured when Paul's epistles were collected, shortly before or after the year 100. That our epistle is the one referred to in Col. iv. 16, which was to be had by the Colossians from Laodicea, is not unlikely. Such an identification doubtless led Marcion to alter the title in his copies.

The structure of Ephesians is epistolary; it opens with the usual salutation (i.1-2) and closes with a brief personal note and formal

farewell (vi. 21-24). In the intervening body-of the epistle the writer also follows the regular form of a letter. In an ordinary Greek letter (as the papyri show) we should find the salutation followed by an expression of gratification over the corre- spondent's good health and of prayer for its continuance. Paul habitually expanded and deepened this, and, in this case, that paragraph is enormously enlarged, so that it may be regarded as including chapters i.-iii., and as carrying the main thought of the epistle. Chapters iv.-vi. merely make application of the main ideas worked out in chapters i.-iii. Throughout the epistle we have a singular combination of the seemingly desultory method of a letter, turning aside at a word and straying wherever

the mood of the moment leads, with the firm, forward march of earnest and mature thought. In this combination resides the doubtless unconscious but nevertheless real literary art of the composition.

The fundamental theme of the epistle is The Unity of Mankind in Christ, and hence the Unity and Divinity of the Church of Christ. God's purpose from eternity was to unite mankind in Christ, and so to bring human history to its goal, the New Man, the measure of the stature of the fulness of Christ. Those who have believed in Christ are the present representatives and result of this purpose; and a clear knowledge of the purpose itself, the secret of the ages, has now been revealed to men. This theme is not formally discussed, as in a theological treatise, but is rather, as it were, celebrated in lofty eulogy and application. First, in chapters i.-iii., under the mask of a conventional congratulatory paragraph, the writer declares at length the privileges which this great fact confers upon those who by faith receive the gift of God, and he is thus able to touch on the various aspects of his subject. Then, in chapters iv.-vi., he turns, with a characteristic and. impressive " therefore," to set forth the obligations which correspond to the privileges he has just expounded. This author is indeed interested to prosecute vigorous and substantial thinking, but the mainspring of his interest is the conviction that such thought is significant for inner and outer life.

The relationship, both literary and theological, between the epistle to the Ephesians and that to the Colossians (q.v.) is very close. It is to be seen in many of the prominent ideas of the two writings,

especially in the developed view of the central position of Christ in the whole universe; in the conception of the Church as Christ's body, of which He is the head; in the thought of the great Mystery, once secret, now revealed. There is further resemblance in the formal moral code, arranged by classes of persons, and having much the same contents in the two epistles (Eph. v. 22-vi. 9; Col. iii. 18-iv. 1). In both, also, Tychicus carries the letter, and in almost identical language the readers are told that he will by word of mouth give fuller information about the apostle's affairs (Eph. vi. 21-22; Col. iv. 7-8). More- over, in a great number of characteristic phrases and even whole verses the two are alike. Compare, for instance, Eph. i. 7, Col. i. 14; Eph. i. 10, Col. i. 20; Eph. i. 21, Col. i. 16; Eph. i. 22, 23, Col. i. 18, 19; Eph. ii. 5, Col. ii. 13; Eph. ii. 11, Col. ii. n; Eph. ii. 16, Col. i. 20; Eph. iii. 2, 3, Col. i. 25, 26, and many other parallels. Only a comparison in detail will give a true impression of the extraordinary degree of resemblance. Yet the two epistles do not follow the same course of thought, and their contents cannot be successfully exhibited in a common synoptical abstract. Each has its independent occasion, purpose, character and method; but they draw largely on a common store of thought and use common means of expression.

The question of the authorship of Ephesians is less important to the student of the history of Christian thought than in the case of most of the Pauline epistles, because of the generalness of tone and the lack of specific allusion in the work. It purports to be by Paul, and was held to be his by Marcion and intheMura- torian canon, and by Irenaeus, Tertullian and Clement of Alexandria, all writing at the end of the 2nd century. No doubt of the Pauline authorship was expressed in ancient times; nor is there any lack of early use by writers who make no direct quotation, to raise doubts as to the genuineness of the epistle. The influence of its language is probably to be seen in Ignatius, Polycarp and Hermas, less certainly in the epistle of Barnabas. Some resemblances of expression in Clement of Rome and in Second Clemejnt may have significance. There is here abundant proof that the epistle was in existence, and was highly valued and influential with leaders of Christian thought, about the year 100, when persons who had known Paul well were still living.

To the evidence given above may be added the use of Ephesians in the First Epistle of Peter. If the latter epistle could be finally established as genuine, or its date fixed, it would give important evidence with regard to Ephesians; but in the present state

of discussion we must confine ourselves to pointing out the fact.

Some of the more striking points of contact are the following: Eph. i. 3, 1 Peter i. 3; Eph. i. 20, 21, 1 Peter iii. 22; Eph. ii. 2, 3, iv. 17, 1 Peter iv. 3; Eph. ii. 21, 22, 1 Peter ii. 5; Eph. v. 22, 1 Peter iii. 1, 2; Eph. v. 25, 1 Peter iii. 7, 8; Eph. vi. 5, 1 Peter ii. 18, 19. A similar relation exists between Romans and 1 Peter. In both cases the dependence is clearly on the part of 1 Peter; for ideas and phrases that in Ephesians and Romans have their firm place in closely wrought sequences, are found in 1 Peter with less profound significance and transformed into smooth and pointed maxims and apophthegmatic sentences.

Objections to the genuineness of Ephesians have been urged since the early part of the 19th century. The influence of Schleiermacher, whose pupil Leonhard Usteri in his Entwickelung der paulinischen Lehrbegriffs (1824) expressed strong doubts as to Ephesians, carried weight. He held that Tychicus was the author. De Wette first (1826) doubted, then (1843) denied that the epistle was by Paul. The chief attack came, however, from Baur (1845) and his colleagues of the Tubingen school. Against the genuineness have appeared Ewald, Renan, Hausrath, Hilgenfeld, Ritschl, Pfleiderer, Weizsacker, Holtzmann, von Soden, Schmiedel, von Dobschiitz and many others. On the other hand, the epistle has been defended by Bleek, Neander, Reuss, B. Weiss, Meyer, Sabatier, Lightfoot, Hort, Sanday, Bacon, Jiilicher, Harnack, Zahn and many others. In recent years a tendency has been apparent among critics to accept Ephesians as a genuine work of Paul. This has followed the somewhat stronger reaction in favour of Colossians.

Before speaking of the more fundamental grounds urged for the rejection of Ephesians, we may look at various points of detail which are of less significance.

(1) The style has unquestionably a slow and lumbering movement, in marked contrast with the quick effectiveness of Romans and Galatians. The sentences are much longer and less vivacious, as any one can see by a superficial examination. But nevertheless there are parts of the earlier epistles where the same tendency appears (e.g. Rom. iii. 23-26), and on the whole the style shows Paul's familiar traits. (2) The vocabulary is said to be peculiar. But it can be shown to be no more so than that of Galatians (Zahn, Einleitung, i. pp. 365 ff.). On the other hand, some words characteristic of Paul's use appear (notably 5io, five times), and the most recent and careful investigation of Paul's vocabulary (Nageli, Wortschatz der paulinischen Briefe, 1905) concludes that the evidence speaks for Pauline authorship. (3) Certain phrases have aroused suspicion, for

instance, " the devil" (vi. n, instead of Paul's usual term "Satan"); "his holy apostles and prophets" (iii. 5, as smacking of later fulsomeness) ; "I Paul" (iii. 1); "unto me, who am less than the least of all the saints " (iii. 8, as ex- aggerated). But these cases, when properly understood and calmly viewed, do not carry conviction against the epistle. (4) The relation of Ephesians to Colossians would be a serious diffi- culty only if Colossians were held to be not by Paul. Those who hold to the genuineness of Colossians find it easier to explain the resemblances as the product of the free working of the same mind, than as due to a deliberate imitator. Holtzmann's elaborate and very ingenious theory (1872) that Colossians has been expanded, on the basis of a shorter letter of Paul, by the same later hand which had previously written the whole of Ephesians, has not met with favour from recent scholars.

But the more serious difficulties which to many minds still stand in the way of the acceptance of the epistle have come from the developed phase of Pauline theology which it shows, and from the general background and atmosphere of the under- lying system of thought, in which the absence of the well-known earlier controversies is remarkable, while some things suggest the thought of John and a later age. Among the most important points in which the ideas and implications of Ephesians suggest an authorship and a period other than that of Paul are the following:

(a) The union of Gentiles and Jews in one body is already accomplished, (b) The Christology is more advanced, uses

Alexandrian terms, and suggests the ideas of the Gospel of John.

(c) The conception of the Church as the body of Christ is new.

(d) There is said to be a general softening of Pauline thought in the direction of the Christianity of the 2nd century, while very many characteristic ideas of the earlier epistles are absent.

With regard to the changed state of affairs in the Church, it must be said that this can be a conclusive argument only to one who holds the view of the Tubingen scholars, that the Apostolic Age was all of a piece and was dominated solely by one contro- versy. The change in the situation is surely not greater than can be imagined within the lifetime of Paul. That the epistle implies as already existent a

developed system of Gnostic thought such as only came into being in the 2nd century is not true, and such a date is excluded by the external evidence. As to the other points, the question is, whether the admittedly new phase of Paul's theological thought is so different from his earlier system as to be incompatible with it. In answering this question different minds will differ. But it must remain possible that contact with new scenes and persons, and especially such controversial necessities as are exemplified in Colossians, stimulated Paul to work out more fully, under the influence of Alexandrian categories, lines of thought of which the germs and origins must be admitted to have been present in earlier epistles. It cannot be maintained that the ideas of Ephesians directly contradict either in formulation or in tendency the thought of the earlier epistles. Moreover, if Colossians be accepted as Pauline (and among other strong reasons the unquestionable genuineness of the epistle to Philemon renders it extremely difficult not to accept it), the chief matters of this more advanced Christian thought are fully legitimated for Paul.

On the other hand, the characteristics of the thought in Ephesians give some strong evidence confirmatory of the epistle's own claim to be by Paul. (a) The writer of Eph. ii. 11-22 was a Jew, not less proud of his race than was the writer of Rom. ix.-xi. or of Phil. iii. 4 ff. (b) The centre in all the theology of the epistle is the idea of redemption. The use of Alexandrian categories is wholly governed by this interest, (c) The epistle shows the same panoramic, pictorial, dramatic conception of Christian truth which is everywhere characteristic of Paul. (d) The most fundamental elements in the system of thought do not differ from those of the earlier epistles.

The view which denies the Pauline authorship of Ephesians has to suppose the existence of a great literary artist and pro- found theologian, able to write an epistle worthy of Paul at his best, who, without betraying any recognizable motive, presented to the world in the name of Paul an imitation of Colossians, incredibly laborious and yet superior to the original in literary workmanship and power of thought, and bearing every appear- ance of earnest sincerity. It must further be supposed that the name and the very existence of this genius were totally forgotten in Christian circles fifty years after he wrote. The balance of evidence seems to lie on the side of the genuineness of the Epistle.

If Ephesians was written by Paul, it was during the period of his imprisonment, either at Caesarea or at Rome (iii. 1, iv. 1, vi.. 20). At very nearly the same time he must have written Colossians and

Philemon; all three were sent by Tychicus. There is no strong reason for holding that the three were written from Caesarea. For Rome speaks the greater probability of the metropolis as the place in which a fugitive slave would try to hide himself, the impression given in Colossians of possible opportunity for active mission work (Col. iv. 3, 4; cf. Actsxxviii. 30, 31), the fact that Philippians, which in a measure belongs to the same group, was pretty certainly written from Rome. As to the Christians addressed, they are evidently converts from heathenism (ii. 1, 11-13, 17 f., iii. 1, iv. 17); but they are not merely Gentile Christians at large, for Tychicus carries the letter to them, Paul has some knowledge of their special circumstances (i. 15), and they are explicitly distinguished from "all the saints " (iii. 18, vi. 18). We may most naturally think of them as the members of the churches of Asia. The letter is very likely referred to in Col. iv. 16, although this theory is not wholly free from difficulties.

Bibliography. — -The best commentaries on Ephesians are by C. J. Ellicott (1855, 4th ed. 1868), H. A. W. Meyer (4th ed., 1867), (Eng. trans. 1880), T. K. Abbott (1897), J. A. Robinson (1903, 2nd ed. 1904); in. German by H. von Soden (in Hand-Commentar) (1891, 2nd ed. 1893), E. Haupt (in Meyer's Kommentar) (8th ed., 1902). _ J. B. Lightfoot's commentary on Colossians (1875, 3rd ed. 1879) is important for Ephesians also. On the English text see H. C. G. Moule (in Cambridge Bible for Schools) (1887). R. W. Dale, Epistle to the Ephesians; its Doctrine and Ethics (1882), is a valuable series of expository discourses.

Questions of genuineness, purpose, &c, are discussed in the New Testament Introductions of H. Holtzmann (1885, 3rd ed. 1892); B. Weiss (1886, 3rd ed. 1897, Eng. trans. 1887); G. Salmon (1887, 8th ed. 1897); A. Julicher (1894, 5th and 6th ed. 1906, Eng. trans. 1904); T. Zahn (1897-1899, 2nd ed. 1900); and in the thorough investigations of H. Holtzmann, Kritik der Epheser- und Kolosser-briefe (1872), and F. J. A. Hort, Prolegomena to St Paul's Epistles to the Romans and the Ephesians (1895). See also the works on the Apostolic Age of C. Weizsacker (1886, 2nd ed. 1892, Eng. trans. 1894-1895); O. Pfleiderer (Das Urchristenthum) (1887, 2nd ed.

1902, Eng. trans. 1906) ; and A. C. McGiffert (1897).

On early attestation see A. H. Charteris, Canonicity (1880) and the New Testament in the Apostolic Fathers (Oxford, 1905).

The theological ideas of Ephesians are also discussed in some of the works on Paul's theology; see especially F. C. Baur, Paulus (1845,

2nd ed. 1866-1867, Eng. trans. 1873-1874); O. Pfleiderer, Der Paulinismus (1873, 2nd ed. 1890, Eng. trans. 1877); an d in the works on New Testament theology by B. Weiss (1868, 7th ed.

1903, Eng. trans. 1882-1883); H. Holtzmann (1897), and G. B. Stevens (1899). See also Somerville, St Paul's Conception of Christ

(1897).

For a guide to other literature see W. Lock, art. " Ephesians, Epistle to," in Hastings's Dictionary of the Bible, the various works of Holtzmann above referred to, and T. K. Abbott's Commentary , pp. 35-40. (J. H. Rs.)

EPHESUS, an ancient Ionian city on the west coast of Asia Minor. In historic times it was situate on the lower slopes of the hills, Coressus and Prion, which rise out of a fertile plain near the mouth of the river Cayster, while the temple and precinct of Artemis or Diana, to the fame of which the town owed much of its celebrity, were in the plain itself, E.N.E. at a distance of about a mile. But there is reason to think both town and shrine had different sites in pre-Ionian times, and that both lay farther south among the foot-hills of Mt. Solmissus. The situation of the city was such as at all times to command a great commerce. Of the three great river basins of Ionia and Lydia, those of the Hermus, Cayster and Maeander, it commanded the second, and had already access by easy passes to the other two.

The earliest inhabitants assigned to Ephesus by Greek writers are the " Amazons," with whom we hear of Leleges, Carians and Pelasgi. In the nth century B.C., according to tradition (the date is probably too early), Androclus, son of the Athenian king Codrus, landed on the spot with his Ionians and a mixed body of colonists; and from his conquest dates the history of the Greek Ephesus. The deity of the city was Artemis; but we must guard against misconception when we use that name, remembering that she bore close relation to the primitive Asiatic goddess of nature, whose cult existed before the Ionian migration at the neighbouring Ortygia, and that she always remained the virgin-mother of all lh"e and especially wild life, and an embodiment of the fertility and productive power of the earth. The well-known monstrous representation of her, as a figure with many breasts, swathed below the waist in grave-clothes, was probably of late and alien origin. In early Ionian times she seems to have been represented as a natural matronly figure, sometimes accompanied by a child, and to have been a more typically Hellenic goddess than she became in the Hellenistic and Roman periods.

Twice in the period 700-500 B.C. the city owed its preservation to the interference of the goddess; once when the swarms of the Cimmerians overran Asia Minor in the 7th century and burnt the Artemision itself; and once when Croesus besieged the town in the century succeeding, and only retired after it had solemnly dedicated itself to Artemis, the sign of such dedication being the stretching of a rope from city to sanctuary. Croesus was eager in every way to propitiate the goddess, and since about this time her temple was being restored on an enlarged scale, he presented most of the columns required for the building as well as some

cows of gold. That is to say, these gifts were probably paid for out of the proceeds of the sequestration of the property of a rich Lydian merchant, Sadyattes, which Croesus presented to Ephesus (Nic. Damasc. fr. 65). To counteract, perhaps, the growing Lydian influence, Athens, the mother-city of Ephesus, despatched one of her noblest citizens, Aristarchus, to restore law on the basis of the Solonian constitution. The labours of Aristarchus seem to have borne fruit. It was an Ephesian follower of his, Hermodorus, who aided the Decemviri at Rome in their compilation of a system of law. And in the same genera- tion Heraclitus, probably a descendant of Codrus, quitted his hereditary magistracy in order to devote himself to philosophy, in which his name became almost as great as that of any Greek. Poetry had long flourished at Ephesus. From very early times the Homeric poems found a home and admirers there; and to Ephesus belong the earliest elegiac poems of Greece, the war songs of Callinus, who flourished in the 7th century B.C. and was the model of Tyrtaeus. The city seems to have been more than once under tyrannical rule in the early Ionian period; and it fell thereafter first to Croesus of Lydia, and then to Cyrus, the Persian, and when the Ionian revolt against Persia broke out in the year 500 B.C. under the lead of Miletus, the city remained submissive to Persian rule. When Xerxes returned from the march against Greece, he honoured the temple of Artemis, although he sacked other Ionian shrines, and even left his children behind at Ephesus for safety's sake. We hear again of Persian respect for the temple in the time of Tissaphernes (411 B.C.). After the final Persian defeat at theEurymedon(466B.c), Ephesus for a time paid tribute to Athens, with the other cities of the coast, and Lysander first and Agesilaus afterwards made it their headquarters. To the latter fact we owe a contemporary description of it by Xenophon. In the early part of the 4th century it fell again

under Persian influence, and was administered by an oligarchy.

Alexander was received by the Ephesians in 334, and estab- lished democratic government. Soon after his death the city fell into the hands of Lysimachus, who introduced fresh Greek colonists from Lebedus and Colophon and, it is said, by means of an artificial inundation compelled those who still dwelt in the plain by the temple to migrate to the city on the hills, which he surrounded by a solid wall. He renamed the city after his wife Arsinoe, but the old name was soon resumed. Ephesus was very prosperous during the Hellenistic period, and is conspicuous both then and later for the abundance of its coinage, which gives us a more complete list of magistrates' names than we have for any other Ionian city. The Roman coinage is remarkable for the great variety and importance of its types. After the defeat of Antiochus the Great, king of Syria, by the Romans, Ephesus was handed over by the conquerors to Eumenes, king of Per- gamum, whose successor, Attalus Philadelphus, unintentionally worked the city irremediable harm. Thinking that the shallow- ness of the harbour was due to the width of its mouth, he built a mole part-way across the latter; the result, however, was that the silting up of the harbour proceeded more rapidly than before. The third Attalus of Pergamum bequeathed Ephesus with the rest of his possessions to the Roman people, and it became for a while the chief city, and for longer the first port, of the province of Asia, the richest in the empire. Henceforth Ephesus remained subject to the Romans, save for a short period, when, at the'instigation of Mithradates Eupator of Pontus, the cities of Asia Minor revolted and massacred their Roman residents. The Ephesians even dragged out and slew those Romans who had fled to the precinct of Artemis for protection, notwithstanding which sacrilege they soon returned from their new to their former masters, and even had the effrontery to state, in an inscription preserved to this day, that their defection to Mithradates was a mere yielding to superior force. Sulla, after his victory over Mithradates, brushed away their pretexts, and inflicting a very heavy fine told them that the punishment fell far short of their deserts. In the civil wars of the 1st century B.C. the Ephesians twice supported the unsuccessful party, giving shelter to, or being made use of by, first, Brutus and

ix. 22

Cassius, and afterwards Antony, for which partisanship or weak- ness they paid very heavily in fines.

All this time the city was gradually growing in wealth and in

devotion to the service of Artemis. The story of St Pauls doings there illustrates this fact, and the sequel is very suggestive, — the burning, namely, of books of sorcery of great value. Addiction to the practice of occult arts had evidently become general in the now semi-orientalized city. The Christian Church which Paul planted there was governed by Timothy and John, and is famous in Christian tradition as a nurse of saints and martyrs. According to local belief, Ephesus was also the last home of the Virgin, who was lodged near the city by St John and there died. But to judge from the Apocalyptic Letter to this Church (as shown by Sir W. M. Ramsay), the latter showed a dangerous tendency to lightness and reaction, and later events show that the pagan tradition of Artemis continued very strong and perhaps never became quite extinct in the Ephesian district. It was, indeed, long before the spread of Christianity threatened the old local cult. The city was proud to be termed neocorus or servant of the goddess. Roman emperors vied with wealthy natives in lavish gifts, one Vibius Salutaris among the latter presenting a quantity of gold and silver images to be carried annually in procession. Ephesus contested stoutly with Smyrna and Pergamum the honour of being called the first city of Asia; each city appealed to Rome, and we still possess rescripts in which the emperors endeavoured to mitigate the bitterness of the rivalry. One privilege Ephesus secured; the Roman governor of Asia always landed and first assumed office there: and it was long the provincial centre of the official cult of the emperor, and seat of the Asiarch. The Goths destroyed both city and temple in the year a.d. 262, and although the city revived and the cult of Artemis continued, neither ever recovered its former splendour. A general council of the Christian Church was held there in 431 in the great double church of St Mary, which is still to be seen. On this occasion Nestorius was con- demned, and the honour of the Virgin established as Theotokus, amid great popular rejoicing, due, doubtless, in some measure to the hold which the cult of the virgin Artemis still had on the city. (On this council see below.) Thereafter Ephesus seems to have been gradually deserted owing to its malaria; and life transferred itself to another and higher site near the Artemision, the name of which, Ayassoluk (written by early Arab geographers Ayathulukh), is now known to be a corruption of the title of St John Theoldgos, given to a great cathedral built on a rocky hill near the present railway station, in the time of Justinian I. This church was visited by Ibn Batuta in a.d. 1333; but few traces are now visible. The ruins of the Artemision, after serving as a quarry to local builders, were finally covered deep with mud by the river Cayster, or one of its left bank tributaries, the Selinus, and the true site remained unsuspected until 1869.

Excavations. — The first light thrown on the topography of Ephesus was due to the excavations conducted by the architect, J. T. Wood, on behalf of the trustees of the British Museum, during the years 1863-1874. He first explored the Odeum and the Great Theatre situate in the city itself, and in the latter place had the good fortune to find an inscription which indicated to him in what direction to search for the Artemision; for it stated that processions came to the city from the temple by the Magnesian gate and returned by the Coressian. These two gates were next identified, and following up that road which issued from the Magnesian gate, Wood lighted first on a ruin which he believed to be the tomb of Androclus, and afterwards on an angle of the peribolus wall of the time of Augustus. After further tentative explorations, he struck the actual pavement of the Artemision on the last day of 1869.

The Artemision. — Wood removed the whole stratum of superficial deposit, nearly 20 ft. deep, which overlay the huge area of the temple, and exposed to view not only the scanty remains of the latest edifice, built after 350 B.C., but the platform of an earlier temple, now known to be that of the 6th century to which Croesus contributed. Below this he did not find any remains. He discovered and sent to England parts of several

sculptured drums {coliimnae caelatae) of the latest temple, and archaic sculptures from the drums and parapet of the earlier building. He also made accurate measurements and a plan of the Hellenistic temple, fiund many inscriptions and a few miscellaneous antiquities, and had begun to explore the Precinct, when the great expense and other considerations induced the trustees of the British Museum to suspend his operations in 1874. Wood made two subsequent attempts to resume work, but failed; and the site lay desolate till 1904, when the trustees, wishing to have further information about the earlier strata and the Precinct, sent D. G. Hogarth to re-examine the remains. As a result of six months' work, Wood's " earliest temple " was re- cleared and planned, remains of three earlier shrines were found beneath it, a rich deposit of offerings, &c, belonging to the earliest shrine was discovered, and tentative explorations were made in the Precinct. This deep digging, however, which reached the sand of the original marsh, released much ground water and resulted in the permanent flooding of the site.

The history of the Artemision, as far as it can be inferred from the remains, is as follows. (1) There was no temple on the plain previous to the Ionian occupation, the primeval seat of the nature-goddess having been in the southern hills, at Ortygia (near mod. Arvalia). Towards the end of the 8th century B.C. a small shrine came into existence on the plain. This was little more than a small platform of green schist with a sacred tree and an altar, and perhaps later a wooden icon (image), the whole enclosed in a temenos: but, as is proved by a great treasure of objects in precious and other metals, ivory, bone, crystal, paste, glass, terra-cotta and other materials, found in 1904-1905, partly within the platform on which the cult-statue stood and partly outside, in the lowest stratum of deposit, this early shrine was presently enriched by Greeks with many and splendid offerings of Hellenic workmanship. A large number of electron coins, found among these offerings, and in style the earliest of their class known, combine with other evidence to date the whole treasure to a period considerably anterior to the reign of Croesus. This treasure is now divided between the museums of Constantinople and London. (2) Within a short time, perhaps after the Cimmerian sack (? 650 B.C.), this shrine was restored, slightly enlarged, and raised in level, but not altered in character. (3) About the close of the century, for some reason not known, but possibly owing to collapse brought about by the marshy nature of the site, this was replaced by a temple of regular Hellenic form. The latter was built in relation to the earlier central statue-base but at a higher level than either of its pre- decessors, doubtless for dryness' sake. Very little but its founda- tions was spared by later builders, and there is now no certain evidence of its architectural character; but it is very probable that it was the early temple in which the Ionic order is said to have been first used, after the colonists had made use of Doric in their earlier constructions (e.g. in the Panionion); and that it was the work of the Cnossian Chersiphron and his son, Meta- genes, always regarded afterwards as the first builders of a regular Artemision. Their temple is said by Strabo to have been made bigger by another architect. (4) The latter's work must have been the much larger temple, exposed by Wood, and usually known as the Archaic or Croesus temple. This overlies the remains of No. 3, at a level higher by about a metre, and the area of its cella alone contains the whole of the earlier shrines. Its central point, however, was still the primitive statue-base, now enlarged and heightened. About half its pavement, parts of the cella walls and of three columns of the peristyle, and the foundations of nearly all the platform, are still in position. The visible work was all of very fine white marble, quarried about 7 m. N.E., near the modern Kos Bunar. Fragments of relief-

sculptures belonging to the parapet and columns, and o.f fluted drums and capitals, cornices and other architectural members have been recovered, showing that the workmanship and Ionic style were of the highest excellence, and that the building presented a variety of ornament, rare among Hellenic temples. The whole ground-plan covered about 80,000 sq. ft. The height of the temple is doubtful, the measurements of columns given

us by later authority having reference probably to its successor, the height of which was considered abnormal and marvellous. Judged by the diameter of the drums, the columns of the Croesus temple were not two-thirds of the height of those of the Hellen- istic temple. This fourth temple is, beyond question, that to which Croesus contributed, and it was, therefore, in process of building about 540 B.C. Our authorities seem to be referring to it when they tell us that the Artemision was raised by common contribution of the great cities of Asia, and took 120 years to complete. It was dedicated with great ceremony, probably between 430 and 420 B.C., and the famous Timotheus, son of Thersander, carried off the magnificent prize for a lyric ode against all comers. Its original architects were, probably, Paeonius of Ephe- sus, and Demetrius, a iepos of the shrine itself: but it has been suggested that the latter may have been rather the actual contracting builder than the architect. Of this temple Herodotus speaks as existing in his day; and un- less weight be given to an isolated state- ment of Eusebius, that it was burned about 395 B.C., we must assume that it survived until the night when one Herostratus, de- sirous of acquiring eternal fame if only by a great crime, set it alight. This is said to have hap- pened in 356 B.C. on the October night on which Alexander the Great came into the world, and, as Hegesias said, the goddess herself was absent, assisting at the birth; but the exactness of this

portentous syn- „

, . , ., Ground plan of the 6th Century ("Croesus)

enromsm makes the Teraple at Ephesus, conjecturally restored by date suspect. (5) It A. E. Henderson, was succeeded by

what is called the Hellenistic temple, begun almost immedi- ately after the catastrophe, according to plans drawn by the famous Dinocrates the architect of Alexandria. The platform was once more raised to a higher level, some 7 ft. above that of the Archaic, by means of huge foundation blocks bedded upon the earlier structures; and this increase of elevation necessitated a slight expansion of the

area all round, and ten steps in place of three. The new columns were of greater diameter than the old and over 60 ft. high; and from its great height the whole structure was regarded as a marvel, and accounted one of the wonders of the world. Since, however, other Greek temples had colonnades hardly less high, and were of equal or greater area, it has been suggested that the Ephesian temple had some distinct element of grandiosity, no longer known to us—perhaps a lofty sculptured parapet or some imposing form of podium. Bede, in his treatise De sept, mir. mundi, describes a stupendous erection of several storeys; but his other descriptions are so fantastic that no credence can

©

State of Feet 3f> 40 go Gp ro 1

be attached to this. The fifth temple was once more of Ionic order, but the finish and style of its details as attested by existing remains were inferior to those of its predecessor. The great sculptured drums and pedestals, now in the British Museum, belong to the lower part of certain of its columns: but nothing of its frieze or pediments (if it had any) has been recovered. Begun probably before 350 B.C., it was in building when Alexander came to Ephesus in 334 and offered to bear the cost of its comple- tion. It was probably finished by the end of the century; for Pliny the Elder states that its cypress-wood doors had been in existence for 400 years up to his time. It stood intact, except for very partial restorations, till'A.D. 262 when it was sacked and burned by the Goths: but it appears to have been to some extent restored afterwards, and its cult no doubt survived till the Edict of Theodosius closed the pagan temples. Its material was then quarried extensively for the construction of the great cathedral of St John Theologos on the neighbouring hill (Ayas- soluk), and a large Byzantine building (a church?) came into existence on the central part of its denuded site, but did not last long. Before the Ottoman conquest its remains were already buried under several feet of silt.

The organization of the temple hierarchy, and its customs and privileges, retained throughout an Asiatic character. The priestesses of the goddess were TapdevoL (i.e. un wedded), and her priests were

compelled to celibacy. The chief among the latter, who bore the Persian name of Megabyzus and the Greek title Neocorus, was doubtless a power in the state as well as a dignitary of religion. His official dress and spadonic appearance are probably revealed to us by a small ivory statuette found by D. G. Hogarth in 1905. Besides these there was a vast throng of dependents who lived by the temple and its services— theologi, who may have expounded sacred legends, hymnodi, who composed hymns in honour of the deity, and others, together with a great crowd of hieroi who performed more menial offices. The making of shrines and images of the goddess occupied many hands. To support this greedy mob offerings flowed in in a constant stream from votaries and from visitors, who contributed sometimes money, sometimes statues and works of art. These latter so accumulated that the temple became a rich museum, among the chief treasures of which were the figures of Amazons sculptured in competition by Pheidias, Polyclitus, Cresilas and Phradmon, and the painting by Apelles of Alexander holding a thunderbolt. The temple was also richly endowed with lands, and possessed the fishery of the Selinusian lakes, with other large revenues. But perhaps the most important of all the privileges possessed by the goddess and her priests was that of asylum. Fugitives from justice or vengeance who reached her precincts were per fectly safe from all pursuit and arrest. The boundaries of the space possessing such virtue were from time to time enlarged. Mithradates extended them to a bowshot from the temple in all directions, and Mark Antony imprudently allowed them to take in part of the city, which part thus became free of all law, and a haunt of thieves and villains. Augustus, while leaving the right of asylum untouched, diminished the space to which the privilege belonged, and built round it a wall, which still surrounds the ruins of the temple at the distance of about a quarter of a mile, bearing an inscription in Greek and Latin, which states that it was erected in the proconsulship of Asinius Gallus, out of the revenues of the temple. The right of asylum, however, had once more to be defended by a deputation sent to the emperor Tiberius. Besides being a place of worship, a museum and a sanctuary, the Ephesian temple was a great bank. Nowhere in Asia could money be more safely bestowed, and both kings and private persons placed their treasures under the guardianship of the goddess.

The City. — After Wood's superficial explorations, the city remained desolate till 1894, when the Austrian Archaeological Institute obtained a concession for excavation and began systematic work. This has continued regularly ever since, but has been carried down no farther than the imperial stratum. The main areas of operation

*have been: (1) The Great Theatre. The stage buildings, orchestra *>nd lower parts of the cavea have*

been cleared. In the process considerable additions were made to Wood's find of sculptures in marble and bronze, and of inscriptions, including missing parts of the Vibius Salutaris texts. This theatre has a peculiar interest as the scene of the tumult aroused by the mission of St Paul; but the existing remains represent a reconstruction carried out after his time. (2) The Hellenistic Agora, a huge square, surrounded by porticoes, lying S.W. of the theatre and having fine public halls on the S. It has yielded to the Austrians fine sculpture in marble and bronze and many inscriptions. (3) The Roman Agora, with its large halls, lying N.W. of the theatre. Here were found many inscriptions of Roman date and some statuary. (4) A street running from the S.E. angle of the Hellenic Agora towards the Magnesian gate. This was found to be lined with pedestals of honorific statues and to have on the west side a remarkable building, stated in an inscription to have been a library. The tomb of the founder, T. Julius Celsus, is hard by, and some fine Roman reliefs, which once decorated it, have been sent to Vienna. (5) A street running direct to the port from the theatre. This is of great breadth, and had a Horologion half-way down and fine porticoes and shops. It was known as the Arcadiane after having been restored at a higher level than formerly by the emperor Arcadius (a.d. 395). It leaves on the right the great Thermae of Constantine, of which the Austrians have cleared out the south-east part. This huge pile used to be taken for the Artemision by early visitors to Ephesus. Part of the quays and buildings round the port were exposed, after measures had been taken to drain the upper part of the marsh. (6) The Double Church of the Virgin " Deipara " in the N.W. of the city, wherein the council of 43 1 was held. Here interesting inscriptions and Byzantine architectural remains were found. Besides these excavated monuments, the Stadion; the enceinte of fortifications erected by Lysimachus, which runs from the tower called the " Prison of St Paul " and right along the crests of the Bulbul (Prion) and Panajir hills; the round monument miscalled the " Tomb of St Luke "; and the Opistholeprian gymnasium near the Magnesian gate, are worthy of attention.

The work done by the Austrians enables a good idea to be obtained of the appearance presented by a great Graeco-Roman city of Asia in the last days of its prosperity. It may be realized better there than anywhere how much architectural splendour was concentrated in the public quarters. But the restriction of the clearance to the upper stratum of deposit has prevented the acquisition of much further

knowledge. Both the Hellenistic and, still more, the original Ionian cities remain for the most part unexplored. It should, however, be added that very valuable topographical exploration has been carried out in the environs of Ephesus by members of the Austrian expedition, and that the Ephesian district is now mapped more satisfactorily than any other district of ancient interest in Asia Minor.

The Turkish village of Ayassoluk (the modern representative of Ephesus), more than a mile N.E. of the ancient city, has revived somewhat of recent years owing to the development of its fig gardens by the Aidin railway, which passes through vhe upper part of the plain. It is noteworthy for a splendid ruined mosque built by the Seljuk, Isa Bey II., of Aidin, in 1375, which contains magnificent columns: for a castle, near which lie remains of the pendentives from the cupola of the great cathedral of St John, now deeply buried in its own ruins: and for an aqueduct, Turkish baths and mosque-tombs. There is a fair inn managed by the Aidin Railway Gompany.

Bibliography. — E. Guhl, Ephesiaca (1843); E. Curtius, Ephesos (1874); C. Zimmermann, Ephesos im ersten christlichen Jahrhundert (1874); J. T. Wood, Discoveries at Ephesus (1877); E. L. Hicks, Anc. Greek Inscr. in the Brit. Museum, iii. 2 (1890); B. V. Head, " Coinage of Ephesus " (Numism. Chron., 1880); J. Menadier, Que, condicione Ephesii usi sint, &c. (1880); Sir W. M. Ramsay, "Letter to the- Seven Churches (1904); O. Benndorf, R. Heberdey, &c , Forschungen in Ephesos, vol. i. (1906) (Austrian Arch. Institute); D. G. Hogarth, Excavations at Ephesus: the Archaic Artemisia (2 vols., 1908), with chapters by C. H. Smith, A. Hamilton Smith, B. V. Head, and A. E. Henderson. (D. G. H.)*

EPHESUS, COUNCIL OF. This Church council was convened in 43 1 for the purpose of taking authoritative action concerning

the doctrine of the person of Christ. The councils of Nicaea and Constantinople had asserted the full divinity and real humanity of Christ, without, however, defining the manner of their union. The attempt to solve the apparent incongruity of a perfect union of two complete and distinct natures in one person produced first Apollinarianism, which substituted the divine Logos for the human poDs or weOˆa of Jesus, thereby detracting from the completeness of

his humanity; and then Nestorianism, which destroyed the unity of Christ's person by affirming that the divine Logos dwelt in the man Jesus as in a temple, and that the union of the two was in respect of dignity, and furthermore that, inasmuch as the Logos could not have been born, to call Mary OtoTOKos, " Godbearer," was absurd and blasphemous. The Alexandrians, led by Cyril, stood for the doctrine of the perfect union of two complete natures in one person, and made 0eor

The disturbances that followed the arrival of John, the patriarch of Antioch, are sufficiently described in the article Nestorius.

The emperor finally interposed to terminate that scandalous strife, banished Nestorius and dissolved the council. Ultimately he gave decision in favour of the orthodox. The council was generally received as ecumenical, even by the Antiochenes, and the differences between Cyril and John were adjusted (433) by a "Union Creed," which, however, did not prevent a recrudescence

of theological controversy.

See Mansi iv. pp. 567-1482, v. pp. 1-1023; Hardouin 1. pp. 1271-1722; Hefele (2nd ed.) ii. pp. 141-247 (Eng. trans. 111. pp. 1-114); Peltanus, 55. Magni et Ecumen. Cone. Ephesim primi Acta omnia (Ingolstadt, 1576); Wilhelm Kraetz, Koptische Akten zum Ephe's. Konzil . . . (Leipzig, 1904); also the articles Nestorius; Cyril; Theodore of Mopsuestia.

The so-called " Robber Synod " of Ephesus (Latrocinium Ephesinwm) of 449, although wholly irregular and promptly repudiated by the church, may, nevertheless, not improperly be treated here. The archimandrite Eutyches (q.v.) having been deposed by his bishop, Flavianus of Constantinople, on account of his heterodox doctrine of the person of Christ, had appealed to Dioscurus, the successor of Cyril in the see of Alexandria, who restored him and moved the emperor Theodosius II. to summon a council, which should " utterly destroy Nestorianism." Rome recognizing that she had more to fear from Alexandria, departed from her traditional policy and sided with Constantinople. The council of 130 bishops, which convened on the 8th of August 449, was completely dominated by Dioscurus.. Eutyches was acquitted of heresy and reinstated, Flavianus and other bishops deposed, the Roman legates insulted, and all opposition was overborne by intimidation or actual violence. The death of Flavianus, which soon followed, was attributed to injuries received in this synod; but the proof of the charge leaves some- thing to be

desired.

The emperor confirmed the synod, but the Eastern Church was divided upon the question of accepting it, and Leo I. of Rome excommunicated Dioscurus, refused to recognize the

successor of Flavianus and demanded a new and greater council. The death of Theodosius II. removed the main support of Dios- curus, and cleared the way for the council of Chalcedon (q.v.), which deposed the Alexandrian and condemned Eutychianism.

See Mansi vi. pp. 503 sqq., 606 sqq. ; Hardouin ii. 71 sqq. ; Hefele (2nd ed.) ii. pp. 349 sqq. (Eng. trans, iii. pp. 221 sqq.); S. G. F. Perry, The Second Synod of Ephesus (Dartford, 188 1); l'Abbe Martin, Actes du brigandage d'Ephese (Amiens, 1874) and Le Pseudo-synode connu dans Vhistoire sous le nom de brigandage d'Ephese (Paris, 1875). (T. F. C.)

EPHOD, a Hebrew word (ephod) of uncertain meaning, retained by the translators of the OM Testament. In the post-exilic priestly writings (5th century B.C. and later) the ephod forms part of the gorgeous ceremonial dress of the high-priest (see Ex. xxix. s sq. and especially Ecclus. xlv. 7-13). It was a very richly decorated object of coloured threads interwoven with gold, worn outside the luxurious mantle or robe; it was kept in place by a girdle, and by shoulder-pieces (?), to which were attached brooches of onyx (fastened to the robe) and golden rings from which hung the " breastplate " (or rather pouch) containing the sacred lots, Urim and Thummim. The somewhat involved description in Ex. xxviii. 6 sqq., xxxix. 2: sqq. (see V. Ryssel's ed. of Dillmann's commentary on Ex. -Lev.) leaves it uncertain whether it covered the back, encircling the body like a kind of waistcoat, or only the front; at all events it was not a garment in the ordinary sense, and its association with the sacred lots indicates that the ephod was used for divination (cf. Num. xxvii. 21), and had become the distinguishing feature of the leading priestly line (cf . 1 Sam. ii. 28) . l But from other passages it seems that the ephod had been a familiar object whose use was by no means so restricted. Like the teraphim (q.v.) it was part of the common stock of Hebrew cult; it is borne (rather than worn) by persons acting in a priestly character (Samuel at Shiloh, priests of Nob, David) , it is part of the worship of individuals (Gideon at Ophrah), and is found in a private shrine with a lay attendant (Micah ; Judg. xvii. 5 ; see, however, vv. 10-13) ? Nevertheless, while the prophetical teaching came to regard the ephod as contrary to the true worship of Yahweh, the priestly doctrine of the post-exilic age (when worship was withdrawn from

the community at large to the recognized priest- hood of Jerusalem) has retained it along with other remains of earlier usage, legalizing it, as it were, by confining it exclusively to the Aaronites.

An intricate historical problem is involved at the outset in the famous ephod, which the priest Abiathar brought in his hand when he fled to David after the massacre of the priests of Nob. It is evidently regarded as the one which had been in Nob (1 Sam. xxi. 9), and the presence of the priests at Nob is no less clearly regarded as the sequel of the fall of Shiloh. The ostensible intention is to narrate the transference of the sacred objects to David (cf. 2 Sam. i. 10), and henceforth he regularly inquires of Yahweh in his movements (1 Sam. xxiii. 9-12, xxx. 7 sq.; cf. xxiii. 2, 4; /Sam. ii. 1, v. 19-23). It is possible that the writer (or writers) desired to trace the earlier history of the ephod through the line of Eli and Abiathar to the time when the Zadokite priests gained the supremacy (see Levites) ; but else- where Abiathar is said to have borne the ark (1 Kings ii. 26; cf. 2 Sam. vii. 6), and this fluctuation is noteworthy by reason of the present confusion in the text of 1 Sam. xiv. 3, 18 (see commentaries).

On one view, the ark in Kirjath-jearim was in non-Israelite hands (1 Sam. vii. 1 sq.) ; on the other, Saul's position as king necessitates the presumption that his sway extended over Judah and Israel, including those cities which otherwise appear to have been in the hands of aliens (1 Sam. xiv. 47 sq.; cf. xvii. 54, &c). There are some fundamental divergencies in the representations of the tradi- tions of both David and Saul (qq.v.), and there is indirect and

1 Cf. the phrase " ephod of prophecy " (Testament of Levi, viii. 2). The priestly apparatus of the post-exilic age retains several traces of old mythological symbolism and earlier cult, the meaning of which had not altogether been forgotten. With the dress one may perhaps compare the apparel of the gods Marduk and Adad, for which see A. Jeremias, Das Alte Test, im Lichte des Alten Orients, 2nd ed., figs. 33, 46, and pp. 162, 449.

2 The ordinary interpretation " linen ephod " (i Sam. u. 18, xxii. 18; 2 Sam. vi. 14) is questioned by T. C. Foote in his useful monograph, Journ. Bibl. Lit. xxi., 1902, pp. 3, 47. This writer also aptly compares the infant Samuel with the child who drew the lots at the temple of Fortuna at Praeneste (Cicero, De divin. ii. 41, 86), and with the modern practice of employing innocent instruments of chance in lotteries (op. cit. pp. 22, 27).

independent evidence which makes 1 Kings ii. 26 not entirely isolated. Here it must suffice to remark that the ark, too, was also an object for ascertaining the divine will (especially Judg. xx. 26-28 ; cf. 18, 23), and it is far from certain that the later records of the ark (which was too heavy to be borne by one), like those of the ephod, are valid for earlier times.

For the form of the earlier ephod the classic passage is 2 Sam. vi. 14, where David girt in (or with) a linen ephod dances before the ark at its entry into Jerusalem and incurs the unqualified contempt of his wife Michal, the daughter of Saul. Relying upon the known custom of performing certain observances in a practically, or even entirely, nude condition, it seems plausible to infer that the ephod was a scanty wrapping, perhaps a loin- cloth, and this view has found weighty support. On the other hand', the idea of contempt at the exposure of the person, to whatever extent, may not have been so prominent, especially if the custom were not unfamiliar, and it is possible that the sequel refers more particularly to grosser practices attending outbursts of religious enthusiasm. 1

The favourite view that the ephod was also an image rests partly upon 1 Sam. xxi. 9, where Goliath's sword is wrapped in a cloth in the sanctuary of Nob behind the ephod. But it is equally natural to suppose that it hung on a nail in the wall, and apart from the omission of the significant words in the original Septuagint, the possibility that the text read " ark " cannot be wholly ignored (see above; also G. F. Moore, Ency. Bib. col. 1307, n. 2). Again, in the story of Micah's shrine and the removal of the sacred objects and the Levite priest by the Danites, parallel narratives have been used: the graven and molten images of Judg. xvii. 2-4 corresponding to the ephod and teraphim of ver. 5. Throughout there is confusion in the use of these terms, and the finale refers only to the graven image of Dan (xviii. 30 sq., see 1 Kings xii. 28 sq.). But the combination of ephod and teraphim (as in Hos. iii. 4) is noteworthy, since the fact that the latter were images (1 Sam. xix. 13; Gen. xxxi. 34) could be urged against the view that the former were of a similar character. Finally, according to Judg. viii. 27, Gideon made an ephod of gold, about 70 lb in weight, and " put " it in Ophrah. It is regarded as a departure from the worship of Yahweh, although the writer of ver. 33 (cf. also ver. 23) hardly shared this feeling; it was probably something once harmlessly associated with the cult of Yahweh (cf.

Calf, Golden), and the term " ephod " may be due to a later hand under the influence of the prophetical teaching referred to above. The present passage is the only one which appears to prove that the ephod was an image, and several writers, including Lotz {Realencyk. f. prot. Theol. vol. v., s.v.), T. C. Foote (pp. 13-18) and A.Maecklenburg (Zeit. f. wissens. Theol., 1906, pp. 433 sqq.) find this interpretation unnecessary.

Archaeological evidence for objects of divination (see, e.g., the interesting details in Ohnefalsch-Richter, Kypros, the Bible and Homer, i. 447 sq.), and parallels from, the Oriental area, can be readily cited in support of any of the explanations of the ephod which have been offered, but naturally cannot prove the form which it actually took in Palestine. Since images were clothed, it could be supposed that the diviner put on the god's apparel (cf. Ency. Bib. col. 1141); but they were also plated, and in either case the transference from a covering to the object covered is intelligible. If the ephod was a loin-cloth, its use as a receptacle and the known evolution of the article find useful analogies (Foote, p. 43 sq., and Ency. Bib. col. 1734 [1]). Finally, if there is no decisive evidence for the view that it was an image (Judg. viii. 27), or that as a wrapping it formed the sole covering of the officiating agent (2 Sam. vi.), all that can safely be said is that

1 It is not stated that the linen ephod was David's sole covering, and it is difficult to account for the text in the parallel passage I Chron. xv. 27 (where he is clothed with a robe); " girt," too, is ambiguous, since the verb is even used of a sword. On the question of nudity (cf. I Sam. xix. 24) see Robertson Smith, Rel. Sent. 2 pp. 161, 450 sq.; Ency. Bib. s.vv. "girdle," "sackcloth."; and M. Jastrow, Journ. Am. Or. Soc. xx. 144, xxi. 23. The significant terms " uncover," " play " (2 Sam. vi. 20 sq.), have other meanings intel- ligible to those acquainted with the excesses practised in Oriental cults.

it was certainly used in divination and presumably did not differ radically from the ephod of the post-exilic age.

See further, in addition to the monographs already cited, the articles in Hastings's Diet. Bible (by S. R. Driver), Ency. Bib. (by G. F. Moore), and Jew. Encyc. (L. Ginsburg), and E. Sellin, in Oriental. Studten: Theodor Noldeke (ed. Bezold, 1906), pp. 699 sqq. (S. A. C.)

EPHOR (Gr. tyopos), the title of the highest magistrates of the ancient Spartan state. It is uncertain when the office was created

and what was its original character. That it owed its institution to Lycurgus (Herod, i. 65; cf. Xen. Respub. Lacedaem. viii. 3) is very improbable, and we may either regard it as an immemorial Dorian institution (with C. 0. Muller, H. Gabriel, H. K. Stein, Ed. Meyer and others), or accept the tradition that it was founded during the first Messenian War, which necessitated a prolonged absence from Sparta on the part of both kings (Plato, Laws, iii. 692 a; Aristotle, Politics, v. 9. i=p. 1313 a 26; Plut. Cleomenes, 10; so G. Dum, G. Gilbert, A. H. J. Greenidge). There is no evidence for the theory that originally the ephors were market inspectors; they seem rather to have had from the outset judicial or police functions. Gradually they extended their powers, aided by the jealousy between the royal houses, which made it almost impossible for the two kings to co-operate heartily, and from the 5th to the 3rd century they exercised a growing despotism which Plato justly calls a tyrannis {Laws, 692). Cleomenes III. restored the royal power by murdering four of the ephors and abolishing the office, and though it was revived by Antigonus Doson after the battle of Sellasia, and existed at least down to Hadrian's reign {Sparta Museum Catalogue, Introd. p. 10), it never regained its former power.

In historical times the ephors were five in number, the first of them giving his name to the year, like the eponymous archon at Athens. Where opinions were divided the majority prevailed. The ephors were elected annually, originally no doubt by the kings, later by the people; their term of office began with the new moon after the autumnal equinox, and they had an official residence {icbopelov) in the Agora. Every full citizen was eligible and no property qualification was required.

The ephors summoned and presided over meetings of the Gerousia and Apella, and formed the executive committee responsible for carrying out decrees. In their dealings with the kings they represented the supremacy of the people. There was a monthly exchange of oaths, the kings swearing to rule according to the laws, the ephors undertaking on this condition to maintain the royal authority (Xen. Resp. Laced. 15. 7). They alone might remain seated in a king's presence, and had power to try and even to imprison a king, who must appear before them at the third summons. Two of them accompanied the army in the field, not interfering with the king's conduct of the campaign, but prepared, if need be, to bring him to trial on his return. The ephors, again, exercised a general guardianship of law and custom and superintended the training of the young. They shared the criminal jurisdiction of the Gerousia and decided civil suits. The administration of taxation, the distribution of

booty, and the regulation of the calendar also devolved upon them. They could actually put penoeci to death without trial, if we may believe Isocrates (xii. 181), and were responsible for protecting the state against the helots, against whom they formally declared war on entering office, so as to be able to kill any whom they regarded as dangerous without violating religious scruples. Finally, the ephors were supreme in questions of foreign policy. They enforced, when necessary, the alien acts (few/Xaoxa) , negotiated with foreign ambassadors, instructed generals, sent out expeditions and were the guiding spirits of the Spartan confederacy.

See the constitutional histories of G. Gilbert (Eng. trans.), pp. 16, 52-59; G. Busolt, p. 84 ff., V. Thumser, p. 241 ff., G. F. Schomann (Eng. trans.), p. 236 ff., A. H. J. Greenidge, p. 102 ff. ; Szanto's article " Ephoroi " in Pauly-Wissowa, Realencyclopddie, v. 2860 ff . ; Ed. Meyer, Forschungen zur alten Geschichte, i. 244 ff. ; C. O. Muller, Dorians, bk. iii. ch. vii. ; G. Grote, History of Greece, pt. ii. ch. vi. ; G. Busolt, Griechische Geschichte, i. 2 555 ff. ; B. Niese, Historische Zeitschrift, lxii. 58 ff. Of the many monographs dealing with thie subject the following are specially useful : G. Dum, Entstehung und

Entwicklung des spartan. Ephorats (Innsbruck, 1878) ; H. K. Stein, Das spartan. Ephorat bis auf Cheilon (Paderborn, 1870) ; K. Kuchtner, Entstehung und urspriingliche Bedeutung des spartan. Ephorats (Munich, 1897) ; C. Frick, De ephoris Spartanis (Gottingen, 1872) ; A. Schaefer, De ephoris Lacedaemoniis (Greifswald, 1863) ; E. von Stern, Zur Entstehung und ursprilnglichen Bedeutung des Ephorats in Sparta (Berlin, 1894). (M. N. T.)

EPHORUS (c. 400-330 B.C.), of Cyme in Aeolis, in Asia Minor, Greek historian. Together with the historian Theopompus he was a pupil of Isocrates, in whose school he attended two courses of rhetoric. But he does not seem to have made much progress in the art, and it is said to have been at the suggestion of Isocrates himself that he took up literary composition and the study of history. ' The fruit of his labours was his "Ioropicu in 29 books, the first universal history, beginning with the return of the Heraclidae to Peloponnesus, as the first well-attested historical event. The whole work was edited by his son Demophilus, who added a 30th book, containing a

summary description of the Social War and ending with the taking of Perinthus (340) by Philip of Macedon (cf. Diod. Sic. xvi. 14 with xvi. 76). Each book was complete in itself, and had a separate title and preface. It is clear that Ephorus made critical use of the best authorities, and his work, highly praised and much read, was freely drawn upon by Diodorus Siculus 1 and other compilers. Strabo (viii. p. 332) attaches much importance to his geographical investigations, and praises him for being the first to separate the historical from the merely geographical element. Polybius (xii. 25 g) while crediting him with a knowledge of the conditions of naval warfare, ridicules his description of the battles of Leuctra and Mantineia as showing ignorance of the nature of land opera- tions. He was further to be commended for drawing (though not always) a sharp line of demarcation between the mythical and historical (Strabo i'x. p. 423); he even recognized that a profusion of detail, though lending corroborative force to accounts of recent events, is ground for suspicion in reports of far-distant history. His style was high-flown and artificial, as was natural considering his early training, and he frequently sacrificed truth to rhetoric effect; but, according to Dionysius of Halicarnassus, he and Theopompus were the only historical writers whose language was accurate and finished. Other works attributed to him were: — A Treatise on Discoveries; Respecting Good and Evil Things; On Remarkable Things in Various Countries (it is doubtful whether these were separate works, or merely extracts from the Histories) ; A Treatise on my Country, on the history and antiquities of Cyme, and an essay On Style, his only rhetorical work, which is occasionally mentioned by the rhetorician Theon. Nothing is known of his life, except the statement in Plutarch that he declined to visit the court of Alexander the Great.

Fragments in C. W. Miiller, Fragmenta historicorum Graecorum, i., with critical introduction on the life and writings of Ephorus; see J. A. Kliigmann, De Ephoro historico (i860) ; C. A. Volquardsen, Untersuchungen uber die Quellen der griechischen und sicilischen Geschichten bei Diodor. xi.-xvi. (1868) ; and specially J. B. Bury, Ancient Greek Historians (1909); E. Schwartz, in Pauly-Wissowa, Realencyc. s.v. ; and article Greece: History: Ancient Authorities.

EPHRAEM SYRUS (Ephraim the Syrian), a saint who lived in Mesopotamia during the first three quarters of the 4th century a.d. He is perhaps the most influential of all Syriac authors; and his fame as a poet, commentator, preacher and defender of orthodoxy has spread throughout all branches of the Christian Church. This reputation he owes partly to the vast fertility of his pen — according to the historian Sozomen he was credited with having written

altogether 3,000,000 lines — partly to the elegance of his style and a certain measure of poetic inspiration, more perhaps to the strength and consistency of his personal character, and his ardour in defence of the creed formulated at Nicaea.

An anonymous life of Ephraim was written not long after his death in 373. The biography has come down to us in two recensions. But in neither form is it free from later interpolation; and its untrustworthiness is shown by its conflicting with data

1 It is now generally recognized, thanks to Volquardsen and others, that Ephorus is the principal authority followed by Diodorus, except in the chapters relating to Sicilian history.

supplied by his own works, as well as by the manner in which it is overloaded with miraculous events. The following is a probable outline of the main facts of Ephraim's life. He was born in the reign of Constantine (perhaps in 306) at or near Nisibis. His father was a pagan, the priest of an idol called Abnil or Abizal. 2 During his boyhood Ephraim showed a repugnance towards heathen worship, and was eventually driven by his father from the home. He became a ward and disciple of the famous Jacob — the same who attendedthe Council of Nicaea as bishop of Nisibis, and died in 338. At his hands Ephraim seems to have received baptism at the age of 18 or of 28 (the two recensions differ on this point), and remained at Nisibis till its surrender to the Persians by Jovian in 363. Probably in the course of these years he was ordained a deacon, but from his humble estimate of his own worth refused advancement to any higher degree in the church. He seems to have played an im- portant part in guiding the fortunes of the city during the war begun by Shapur II. in 337, in the course of which Nisibis was thrice unsuccessfully besieged by the Persians (in 338, 346 and 350). The statements of his biographer to this effect accord with the impression we derive from his own poems (Carmina Nisibena, 1-21). His intimate relations with Bishop Jacob were continued with the three succeeding bishops — Babu (338-? 349), Vologaeses (?349-36i), and Abraham — on all of whom he wrote encomia. The surrender of the city in 363 to the Persians resulted in a general exodus of the Christians, and Ephraim left with the rest. After visiting Amid (Diarbekr) he proceeded to Edessa, and there settled and spent the last ten years of his life. He seems to have lived mainly as a hermit outside the city: his time was devoted to study, writing, teaching and the refutation of heresies. It is possible that during these years he paid a visit to Basil at Caesarea. Near the end of his life he rendered great public service by distributing provisions in the city during a famine. The best attested date for his

death is the 9th of June 373. It is clear that this chronology leaves no room for the visit to Egypt, and the eight years spent there in refuting Arianism, which are alleged by his biographer. Perhaps, as has been surmised, there may be confusion with another Ephraim. Nor can he have written the funeral panegyric on Basil who survived him by three months. But with all necessary deductions the biography is valuable as witnessing to the immense reputation for sanctity and for theological acumen which Ephraim had gained in his lifetime, or at least soon after he died. His bio- grapher's statement as to his habits and appearance is worth quoting, and is probably true: — " From the time he became a monk to the end of his fife his only food was barley bread and sometimes pulse and vegetables: his drink was water. And his flesh was dried upon his bones, like a potter's sherd. His clothes were of many pieces patched together, the colour of dirt. In stature he was little; his countenance was always sad, and he never condescended to laughter. And he was bald and beardless."

The statement in his Life that Ephraim miraculously learned Coptic falls to the ground with the narrative of his Egyptian visit: and the story of his suddenly learning to speak Greek through the prayer of St Basil is equally unworthy of credence. He probably wrote only in Syriac, though he may have possessed some knowledge of Greek and possibly of Hebrew. But many of his works must have been early translated into other languages; and we possess in MSS. versions into Greek, Armenian, Coptic, Arabic and Ethiopic. The Greek versions occupy three entire volumes of the Roman folio edition, and the extant Armenian versions (mainly of N.T. commentaries) were published at Venice in four volumes in 1836.

It was primarily as a sacred poet that Ephraim impressed himself on his fellow-countrymen. With the exception of his commentaries on scripture, nearly all his extant Syriac works are composed in metre. In many cases the metrical structure

2 It is true that in the Confession attributed to him and printed among his Greek works in the first volume of the Roman edition he speaks (p. 129) of his parents as having become martyrs for the Christian faith. But this document is of very doubtful authenticity.

is of the simplest, consisting only in the arrangement of the discourse

in lines of uniform length — usually heptasyllabic (Ephraim's favourite metre) or pentasyllabic. A more compli- cated arrangement is found in other poems, such as the Carmina Nisibena:' these are made up of strophes, each consisting of lines of different lengths according to a settled scheme, with a recurring refrain. T.J. Lamy has estimated that, in this class of poems, there are as many as 66 different varieties of metres to be found in the works of Ephraim. These strophic poems were set to music, and sung by alternating choirs of girls. Accord- ing to Ephraim's biographer, his main motive for providing these hymns set to music was his desire to counteract the baneful effects produced by the heretical hymns of Bardaisan and his son Harmonius, which had enjoyed popularity and been sung among the Edessenes for a century and a half.

The subject-matter of Ephraim's poems covers all departments of theology. Thus the Roman edition contains (of metrical works) exegetical discourses, hymns on the Nativity of Christ, 65 hymns against heretics, 85 on the Faith against sceptics, a discourse against the Jews, 85 funeral hymns, 4 on free-will, 76 exhortations to repentance, 12 hymns on paradise, and 12 on miscellaneous subjects. The edition of Lamy has added many other poems, largely connected with church festivals. It must be confessed that, judged by Western standards, the poems of Ephraim are prolix and wearisome in the extreme, and are distinguished by few striking poetic beauties. And so far as they are made the vehicle of reasoning, their efficiency is seriously hampered by their poetic form. On the other hand, it is fair to remember that the taste of Ephraim's countrymen in poetry was very different from ours. As Duval remarks: " quant a. la prolixite de saint fiphrem que nous trouvons parfois fastidieuse, on ne peut la condamner sans tenir compte du gout des Syriens qui aimaient les repetitions et les developpements de la meme pensee, et voyaient des qualites la ou nous trouvons des defauts " (Litter, syriaque, p. 19). He is no worse in these respects than the best of the Syriac writers who succeeded him. And he surpasses almost all of them in the richness of his diction, and his skill in the use of metaphors and illustrations.

Of Ephraim as a commentator on Scripture we have only imperfect means of judging. His commentaries on the O.T. are at present accessible to us only in the form they had assumed in the Catena Patrum of Severus (compiled in 861), and to some extent in quotations by later Syriac commentators. His com- mentary on the Gospels is of great importance in connexion with the textual history of the N.T., for the text on which he composed it was that of the Diatessaron. The Syriac original is lost: but the ancient Armenian version survives, and was published at Venice in 1836 along with Ephraim's commentary on the Pauline epistles (also only extant in Armenian) and some other works. A Latin version of the Armenian Diatessaron commentary has been made by Aucher and Mosinger (Venice, 1876). Using this version as a clue, J. R. Harris 1 has been able to identify a number of Syriac quotations from or references to this commentary in the works of Isho'dadh, Bar-Kepha (Severus), Bar-salibi and Barhebraeus. Although, as Harris points out, it is unlikely that the original text of the Diatessaron had come down unchanged through the two centuries to Ephraim's day, the text on which he comments was in the main unaffected by the revision which produced the Peshitta. Side by side with this conclusion may be placed the result of F. C. Burkitt's 2 careful examination of the quotations from the Gospels in the other works of Ephraim; he shows conclusively that in all the undoubtedly genuine works the quotations are from a pre-Peshitta text.

As a theologian, Ephraim shows himself a stout defender of Nicaean orthodoxy, with no leanings in the direction of either the Nestorian or the Monophysite heresies which arose after his time. He regarded it as his special task to combat the views of Marcion, of Bardaisan and of Mani.

1 Fragments of the Commentary of Ephrem Syrus upon the Dia- tessaron (London, 1895).

2 " Ephraim's Quotations from the Gospel," in Texts and Studies, vol. vii. (Cambridge, 1901).

To the modern historian Ephraim's main contribution is in the material supplied by the 72 hymns 3 known as Carmina Nisibena and published by G. Bickell in 1866. The first 20 poems were written at Nisibis between 350 and 363 during the Persian invasions; the remaining 52 at Edessa between 363 and 3 73. The former tell us much of the incidents of the frontier war, and particularly enable us to reconstruct in detail the history of the third siege of Nisibis in 350.

Of the many editions of Ephraim's works a full list is given by Nestle in Realenk. f. protest. Theol. und Kirche (3rd ed.). For modern students the most important are: (1) the great folio edition in 6 volumes (3 of works in Greek and 3 in Syriac), in which the text is throughout accompanied by a Latin version (Rome, 1 732-1 746); on the unsatisfactory character of this edition (which includes many works that are not Ephraim's) and especially of the Latin version, see Burkitt, Ephraim's Quotations, pp. 4 sqq.; (2) Carmina Nisibena, edited with a Latin translation by G. Bickell (Leipzig, 1866) ; (3) Hymni et sermones, edited with a Latin translation by T. J. Lamy (4 vols., Malines, 1882-1902). Many selected homilies have been edited or translated by Overbeck, Zingerle and others (cf. Wright, Short History, pp. 35 sqq.) ; a selection of the Hymns was translated by H. Burgess,_ Select Metrical Hymns of Ephrem Syrus (1853). Of the two recensions of Ephraim's biography, one was edited in part by J. S. Assemani (B.O. i. 26 sqq.) and in full by S. E. Assemani in the Roman edition (iii. pp. xxiii.-lxiii.) ; the other by Lamy (ii. 5-90) and Bedjan {Acta mart, et sand. iii. 621-665). The long poem on the history of Joseph, twice edited by Bedjan (Paris, 1887 and 1891) and by him attributed to Ephraim, is more probably the work of Balai. (N. M.)

EPHRAIM, a tribe of Israel, called after the younger son of Joseph, who in his benediction exalted Ephraim over the elder brother Manasseh (Gen. xlviii.). These two divisions were often known as the "house of Joseph" (Josh. xvii. 14 sqq.; Judg.i. 22; 2 Sam. xix. 20; 1 Kings xi. 28). The relations between them are obscure; conflicts are referred to in Is. ix. 21, 4 and Ephraim's proud and ambitious character is indicated in its demands as narrated in Josh. xvii. 14; Judg. viii. 1-3, xii. 1-6. Thoughout, Ephraim played a distinctive and prominent part; it probably excelled Manasseh in numerical strength, and the name became a synonym for the northern kingdom of Israel. Originally the name may have been a geographical term for the central portion of Palestine. Regarded as a tribe, it lay to the north of Benjamin, which traditionally belongs to it; but whether the young " brother " (see Benjamin) sprang from it, or grew up separately, is uncertain. Northwards, Ephraim lost itself in Manasseh, even if it did not actually include it (Judg. i. 27; 1 Chron. vii. 29); the boundaries between them can hardly be recovered. Ephraim's strength lay in the possession of famous sites: Shechem, with the tomb of the tribal ancestor, also one of the capitals; Shiloh, at one period the home of the ark; Timnath- Serah (or Heres), the burial-place of Joshua; and Samaria, whose name was afterwards extended to the whole district (see Samaria).

Shechem itself was visited by Abraham and Jacob, and the latter bought from the sons of Hamor a burial-place (Gen. xxxiii. 19) . The story of Dinah may imply some early settlement of tribes in its vicinity (but see Simeon), and the reference in Gen. xlviii. 22 (see R. V. marg.) alludes to its having been forcibly captured. But how this part of Palestine came into the hands of the Israelites is not definitely related in the story of the invasion (see Joshua).

A careful discussion of the Biblical data referring to Ephraim is given by H. W. Hogg, Ency. Bib., s.v. On the characteristic narratives which appear to have originated in Ephraim (viz. the Ephraimite or Elohist source, E), see Genesis and Bible: Old Testament Criticism. See further Abimelech ; Gideon ; Manasseh ; and Jews: History.

EPHTHALITES, or White Huns. This many-named and enigmatical tribe was of considerable importance in the history of India and Persia in the 5th and 6th centuries, and was known to the Byzantine writers, who call them 'E0aXtroi, JZWayiroi, Ntcbdaklroi or 'AfiStKoi. The last of these is an independent attempt to render the original name, which was probably

3 There were originally 77, but 5 have perished.

4 Inter-tribal feuds during the period of the monarchy may underlie the events mentioned in 1 Kings xvi. 9 sq., 21 sq. ; 2 Kings

XV. 10, 14.

something like Aptal or Haptal, but the initial N of the third is believed to be a clerical error. They were also called Aewcoi Ovvvot. or Xovvol, White (that is fair-skinned) Huns. In Arabic and Persian they are known as Haital and in Armenian as Haithal, Idal or Hepthal. The Chinese name Yetha seems an attempt to represent the same sound. In India they were called Hunas. Ephthalite is the usual orthography, but Hephthalite is per- haps more correct.

Our earliest information about the Ephthalites comes from the Chinese chronicles, in which it is stated that they were originally a tribe of the great Yue-Chi (q.v.), living to the north of the Great Wall, and in subjection to the Jwen-Jwen, as were also the Turks at one time. Their original name was Hoa or Hoa-tun; subsequently they styled themselves Ye-tha-i-li-to after the name of their royal

family, or more briefly Ye-tha. Before the 5th century a.d. they began to move westwards, for about 420 we find them in Transoxiana, and for the next 130 years they were a menace to Persia, which they continually and successfully invaded, though they never held it as a conquest. The Sassanid king, Bahrain V., fought several campaigns with them and succeeded in keeping them at bay, but they defeated and killed Peroz (Firuz), a.d. 484. His son Kavadh I. (Kobad), being driven out of Persia, took refuge with the Ephthalites, and recovered his throne with the assistance of their khan, whose daughter he had married, but subsequently he engaged in prolonged hostilities with them. The Persians were not quit of the Ephthalites until 557 when Chosroes Anushirwan destroyed their power with the assistance of the Turks, who now make their first appearance in western Asia.

The Huns who invaded India appear to have belonged to the same stock as those who molested Persia. The headquarters of the horde were at Bamian and at Balkh, and from these points they raided south-east and south-west. Skandagupta repelled an invasion in 455, but the defeat of the Persians in 484 probably stimulated their activity, and at the end of the 5th century their chief Toromana penetrated to Malwa in central India and succeeded in holding it for some time. His son Mihiragula (c. 510-540) made Sakala in the Punjab his' Indian capital, but the cruelty of his rule provoked the Indian princes to form a confederation and revolt against him about 528. He was not, however, killed, but took refuge in Kashmir, where after a few years he seized the throne and then attacked the neighbouring kingdom of Gandhara, perpetrating terrible massacres. About a year after this he died (c. 540), and shortly afterwards the Ephthalites collapsed under the attacks of the Turks. They do not appear to have moved on to another sphere, as these nomadic tribes often did when defeated, and were probably gradually absorbed in the surrounding populations. Their political power perhaps continued in the Gurjara empire, which at one time extended to Bengal in the east and the Nerbudda in the south, and continued in a diminished form until a.d. 1040. These Gurjaras appear to have entered India in connexion with the Hunnish invasions.

Our knowledge of the Indian Hunas is chiefly derived from coins, from a few inscriptions distributed from the Punjab to central India, and from the account of the Chinese pilgrim Hsuan Tsang, who visited the country just a century after the death of Mihiragula. The Greek monk Cosmas Indicopleustes, who visited India about 530, describes the ruler of the country, whom he calls Gollas, as a White Hun king, who exacted an oppressive tribute with the help of a large

army of cavalry and war elephants. Gollas no doubt represents the last part of the name Mihiragula or Mihirakula.

The accounts of the Ephthalites, especially those of the Indian Hunas, dwell on their ferocity and cruelty. They are represented as delighting in massacres and torture, and it is said that popular tradition in India still retains the story that Mihiragula used to amuse himself by rolling elephants down a precipice and watching their agonies. Their invasions shook Indian society and institu- tions to the foundations, but, unlike the earlier Kushans, they do not seem to have introduced new ideas into India or have acted as other than a destructive force, although they may perhaps

have kept up some communication between India and Persia. The first part of Mihiragula seems to be the name of the Persian deity Mithra, but his patron deity was Siva, and he left behind him the reputation of a ferocious persecutor of Buddhism. Many of his coins bear the Nandi bull (Siva's emblem), and the king's name is preceded by the title sahi (shah), which had previously been used by the Kushan dynasty. Toramana's coins are found plentifully in Kashmir, which, therefore, probably formed part of the Huna dominions before Mihiragula's time, so that when he fled there after his defeat he was taking refuge, if not with his own subjects, at least with a kindred clan.

Greek writers give a more flattering account of the Ephthalites, which may perhaps be due to the fact that they were useful to the East Roman empire as enemies of Persia and also not dangerously near. Procopius says that they were far more civilized than the Huns of Attila, and the Turkish ambassador who was received by Justin is said to have described them as ao-TLKoi, which may merely mean that they lived in the cities which they conquered. The Chinese writers say that their customs were like those of the Turks; that they had no cities, lived in felt tents, were ignorant of writing and practised polyandry. Nothing whatever is known of their language, but some scholars explain the names Toramana and Jauvla as Turkish.

For the possible connexion between the Ephthalites and the European Huns see Huns. The Chinese statement that the Hoa or Ye-tha were a section of the great Yue-Chi, and that their customs resembled those of the Turks (Tu-Kiue), is probably correct, but does not amount to much, for the relationship did not prevent them from fighting with the Yue-Chi and Turks, and means little more than that they belonged to the warlike and energetic section of central Asian

nomads, which is in any case certain. They appear to have been more ferocious and less assimilative than the other conquering tribes. This may, how- ever, be due to the fact that their contact with civilization was so short; the Yue-Chi -and Turks had had some commerce with more advanced races before they played any part in political history, but the Ephthalites appear as raw barbarians, and were annihilated as a nation in little more than a hundred years. Like the Yue-Chi they have probably contributed to form some of the physical types of the Indian population, and it is noticeable that polyandry is a recognized institution among many Himalayan tribes, and is also said to be practised secretly by the Jats and other races of the plains.

Among original authorities may be consulted Procopius, Menander Protector, Cosmas Indicopleustes (trans. McCrindle, Hakluyt Society, 1897), the Kashmir chronicle Rajatarangint (trans. Stein, 1900, and Yuan Chwang). See also A. Stein, White Huns and Kindred Tribes (1905); O. Franke, Beitrdge aus chinesischen Quellen zur Kenntnis der Tiirkvolker und Skythen (1904) ; Ujfalvy, Memoire sur les Huns Blancs (1898) ; Drouin, Memoire sur les Huns Ephtha- lites (1895) ; and various articles by Vincent Smith, Specht, Drouin, and E. H. Parker in the Journal of the Royal Asiatic Society, Journal asiatique, Revue numismatique, Asiatic Quarterly, &c. (C. El.)

fiPI, the French architectural term for a light finial, generally of metal, but sometimes of terra-cotta, forming the termination of a spire or the angle of a roof.

EPICENE (from the Gr. hxinoivos, common), a term in Greek and Latin grammar denoting nouns which, possessing but one gender, are used to describe animals of either sex. In English grammar there are no true epicene nouns, but the term is some- times used instead of common gender. In figurative and literary language, epicene is an adjective applied to persons having the characteristics of both sexes, and hence is occasionally used as a synonym of " effeminate."

EPICHARMUS (c. 540-450 B.C.), Greek comic poet, was born in the island of Cos. Early in life he went to Megara in Sicily, and after its destruction by Gelo (484) removed to Syracuse, where he spent the rest of his life at the court of Hiero, and died at the age of ninety or (according to a statement in Lucian, Macrobii, 25) ninety-seven. A brazen statue was set up in his honour by the inhabitants, for which Theocritus composed an inscription (Epigr. 1 7) . Epicharmus was the chief representative of the Sicilian or Dorian comedy. Of his works 35 titles and a

few fragments have survived. In the city of tyrants it would have been dangerous to present comedies like those of the Athenian stage, in which attacks were made upon the authorities. Accordingly, the comedies of Epicharmus are of two kinds, neither of them calculated to give offence to the ruler. They are either mythological travesties (resembling the satyric drama of Athens) or character comedies. To the first class belong the Busiris, in which Heracles is represented as a voracious glutton; the Marriage of Hebe, remarkable for a lengthy list of dainties. The second class dealt with different classes of the population (the sailor, the prophet, the boor, the parasite). Some of the plays seem to have bordered on the political, as The Plunderings, describing the devastation of Sicily in the time of the poet. A short fragment has been discovered (in the Rainer papyri) from the 'OSvaaevs auro/xoXos, which told how Odysseus got inside Troy in the disguise of a beggar and obtained valuable information. Another feature of his works was the large number of excellent sentiments expressed in a brief proverbial form; the Pythagoreans claimed him as a member of their school, who had forsaken the study of philosophy for the writing of comedy. Plato (Theaetetus, 1 5 2 e) puts him at the head of the masters of comedy, coupling his name with Homer and, according to a remark in Diogenes Laertius, Plato was indebted to Epicharmus for much of his philosophy. Ennius called his didactic poem on natural philosophy Epicharmus after the comic poet. The metres employed by Epicharmus were iambic trimeter, and especially trochaic and anapaestic tetrameter. The plot of the plays was simple, the action lively and rapid; hence they were classed among the fabulae motoriae (stirring, bustling), as indicated in the well-known line of Horace (Epistles, ii. 1. 58):

" Plautus ad exemplar Siculi properare Epicharmi."

Epicharmus is the subject of articles in Suidas and Diogenes Laertius (viii. 3). See A. O. Lorenz, Leben und Schriften des Koers E. (with account of the Doric drama and fragments, 1864) ; J. Girard, Ittudes sur la poesie grecque (1884); Kaibel in Pauly- Wissowa's Realencyclopadie, according to whom Epicharmus was a Siceliot ; for the papyrus fragment, Blass in Jahrbiicher fur Philologie, cxxxix., 1889.

EPIC POETRY, or Epos (from the Gr. tiros, a story, and ewucos, pertaining to a story), the names given to the most dignified and

elaborate forms of narrative poetry. The word epopee is also, but more rarely, employed to designate the same thing, exoiroios in Greek being a maker of epic poetry, and ewoiroda what he makes.

It is to Greece, where the earliest literary monuments which we possess are of an epical character, that we turn for a definition of these vast heroic compositions, and we gather that their subject-matter was not confined, as Voltaire and the critics of the 18th century supposed, to " narratives in verse of warlike adventures." When we first discover the epos, hexameter verse has already been selected for its vehicle. In this form epic poems were composed not merely dealing with war and personal romance, but carrying out a didactic purpose, or celebrating the mysteries of religion. These three divisions, to which are severally attached the more or less mythical names of Homer, Hesiod and Orpheus seem to have marked the earliest literary movement of the Greeks. But, even here, we must be warned that what we possess is not primitive; there had been unwritten epics, probably in hexameters, long before the composition of any now-surviving fragment. The saga of the Greek nation, the catalogue of its arts and possessions, the rites and beliefs of its priesthood, must have been circulated, by word of mouth, long before any historical poet was born. We look upon Homer and Hesiod as records of primitive thought, but Professor Gilbert Murray reminds us that " our Iliad, Odyssey, Erga and Theogony are not the first, nor the second, nor the twelfth of such embodiments." The early epic poets, Lesches, Linus, Orpheus, Arctinus, Eugammon are the veriest shadows, whose names often betray their symbolic and fabulous character. It is now believed that there was a class of minstrels, the Rhapso- dists or Homeridae, whose business it was to recite poetry at feasts and other solemn occasions. " The real bards of early

Greece were all nameless and impersonal." When our tradition begins to be preserved, we find everything of a saga-character attributed to Homer, a blind man and an inhabitant of Chios. This gradually crystallized until we find Aristotle definitely treating Homer as a person, and attributing to him the composi- tion of three great poems, the Iliad, the Odyssey and the Margites, now lost (see Homer) . The first two of these have been preserved and form for us the type of the ancient epic; when we speak of epic poetry, we unconsciously measure it by the example of the Iliad and the Odyssey. It is quite certain, however, that these poems had not merely been preceded by a vast number of revisions of the mythical history of the country, but were accom- panied by innumerable poems of a similar character, now entirely lost. That antiquity did not regard these other epics as equal in beauty to the Iliad seems to

be certain; but such poems as Cypria, Iliou Per sis (Sack of Uion) and Aethiopis can hardly but have exhibited other sides of the epic tradition. Did we possess them, it is almost certain that we could speak with more assurance as to the scope of epic poetry in the days of oral tradition, and could understand more clearly what sort of ballads in hexameter it "was which rhapsodes took round from court to court. In the 4th century B.C. it seems that people began to write down what was not yet forgotten of all this oral poetry. Unfortunately, the earliest critic who describes this process is Proclus, a Byzantine neo-Platonist, who did not write until some 800 years later, when the whole tradition had become hopelessly corrupted. When we pass from Homer and Hesiod, about whose actual existence critics will be eternally divided, we reach in the 7th century a poet, Peisander of Rhodes, who wrote an epic poem, the Heracleia, of which fragments remain. Other epic writers, who appear to be undoubtedly historic, are Antimachus of Colophon, who wrote a Thebais; Panyasis, who, like Peisander, celebrated the feats of Heracles; Choerilus of Samos; and Anyte, of whom we only know that she was an epic poetess, and was called " The female Homer." In the 6th and 5th centuries B.C. there was a distinct school of philosophical epic, and we distinguish the names of Xenophanes, Parmenides and Empedocles as the leaders of it.

From the dawn of Latin literature epic poetry seems to have been cultivated in Italy. A Greek exile, named Livius Andronicus, translated the Odyssey into Latin during the first Punic War, but the earliest original epic of Rome was the lost Bellum Punicum of Naevius, a work to which Virgil was indebted. A little later, Ennius composed, about 172 B.C., in 18 books, an historical epic of the Annates, dealing with the whole chronicle of Rome. This was the foremost Latin poem, until the appearance of the Aeneid; it was not imitated, remaining, for a hundred years, as Mr Mackail has said, " not only the unique, but the satisfying achievement in this kind of poetry." Virgil began the most famous of Roman epics in the year 30 B.C., and when he died, nine years later, he desired that the MS. of the Aeneid should be burned, as it required three years' work to complete it. Nevertheless, it seems to us, and seemed to the ancient world, almost perfect, and a priceless monument of art; it is written, like the great Greek poems on which it is patently modelled, in hexameters. In the next generation, the Pharsalia of Lucan, of which Cato, as the type of the republican spirit, is the hero, was the principal example of Latin epic. Statius, under the Flavian emperors, wrote several epic poems, of which the Thebaid survives. In the 1st century a.d. Valerius Flaccus wrote the Argonautica in 8 books, and

Silius Italicus the Punic War, in 17 books; these authors show a great decline in taste and merit, even in comparison with Statius, and Silius Italicus, in particular, is as purely imitative as the worst of the epic writers of modern Europe. At the close of the 4th century the style revived with Claudian, who produced five or six elaborate historical and mythological epics of which the Rape of Proserpine was probably the most remarkable; in his interesting poetry we have a valuable link between the Silver Age in Rome and the Italian Renaissance. With Claudian the history of epic poetry among the ancients closes.

In medieval times there existed a large body of narrative

poetry to which the general title of Epic has usually been given. Three principal schools are recognized, the French, the Teutonic and the Icelandic. Teutonic epic poetry deals, as a rule, with legends founded on the history of Germany in the 4th, 5th and 6th centuries, and in particular with such heroes as Ermanaric, Attila and Theodoric. But there is also an important group in it which deals with English themes, and among these Beowulf, Waldere, The Lay of Maldon and Finnesburh are pre-eminent. To this group is allied the purely German poem of Hildebrand, attributed to c. 800. Among these Beowulf is the only one which exists in anything like complete form, and it is of all examples of Teutonic epic the most important. With all its trivialities and incongruities, which belong to a barbarous age, Beowulf is yet a solid and comprehensive example of native epic poetry. It is written, like all old Teutonic work of the kind, in alliterative unrhymed rhythm. In Iceland, a new heroic literature was invented in the middle ages, and to this we owe the Sagas, which are, in fact, a reduction to prose of the epics of the warlike history of the North. These Sagas took the place of a group of archaic Icelandic epics, the series of which seems to have closed with the noble poem of Atlam&l, the principal surviving specimen of epic poetry as it was cultivated in the primitive literature of Iceland. The surviving epical fragments of Icelandic composition are found thrown together in the Codex Regius, under the title of The Elder Edda, a most precious MS. discovered in the 17th century. The Icelandic epics seem to have been shorter and more episodical in character than the lost Teutonic specimens; both kinds were written in alliterative verse. It is not probable that either possessed the organic unity and vitality of spirit which make the Sagas so

delightful. The French medieval epics (see Chansons de Geste) are late in comparison with those of England, Germany and Iceland. They form a curious transitional link between primitive and modern poetry; the literature of civilized Europe may be said to begin with them. There is a great increase of simplicity, a great broadening of the scene of action. The Teutonic epics were obscure and intense, th« French chansons de geste are lucid and easy. The existing masterpiece of this kind, the magnificent Roland, is doubtless the most interesting and pleasing of all the (epics of medieval Europe. Professor Ker's analysis of its merits' may be taken as typical of all that is best in the vast body of epic which comes between the antique models, which were un- known to the medieval poets, and the artificial epics of a later time which were founded on vast ideal themes, in imitation of the ancients. " There is something lyrical in Roland, but the poem is not governed by lyrical principles; it requires the deliberation and the freedom of epic; it must have room to move in before it can come up to the height of its argument. The abruptness of its periods is npt really an interruption of its even flight; it is an abruptness of detail, like a broken sea with a larger wave moving under it; it does not impair or disguise the grandeur of the movement as a whole." Of the progress and decline of the chansons de geste (q.v.) from the ideals of Roland a fuller account is given elsewhere. To the Nibelungenlied (q.v.) also, detailed attention is given in a separate article.

What may be called the artificial or secondary epics of modern Europe, founded upon an imitation of the Iliad and the Aeneid, are more numerous than the ordinary reader supposes, although but few of them have preserved much vitality. In Italy the Chanson de Roland inspired romantic epics by Luigi Pulci (i43 2_ 1487), whose Morgqnle Maggiore appeared in 1481, and is a masterpiece of burlesque; by M. M. Boiardo (1434-1494), whose Orlando Innamorato was finished in i486; by Francesco Bello (i440?i49s), whose Mambriano was published in 1497; by Lodovico Ariosto (q.v.), whose Orlando Furioso, by far the greatest of its class, was published in 1516, and by Luigi Dolce (1508 1568), as well as by a great number of less illustrious poets. G.G. Trissino (1478-1549) wrote a Deliverance of Italy from the Goths in 1547, and Bernardo Tasso (1493-1569) an Amadigi in 1559; Berni remodelled the epic of Boiardo in 1541, and Teofilo Fo1ango(i49i-i544), ridiculed the whole school in an Orlandino of 1526. An extraordinary feat of mock-heroic epic was The

Bucket (1622) of Alessandro Tassoni (1565-1638). The most splendid of all the epics of Italy, however, was, and remains, the

Jerusalem Delivered of Torquato Tasso (q.v.), published originally in 1580, and afterwards rewritten as The Conquest of Jerusalem, 1593. The fantastic Adone (1623) of G. B. Marini (1569-1625) and the long poems of Chiabrera, close the list of Italian epics. Early Portuguese literature is rich in epic poetry. Luis Pereira Brandao wrote an Elegiada in 18 books, published in 1588; Jeronymo Corte-Real (d. 1588) a Shipwreck of Sepul- veda and two other epics; V. M. Quevedo, in 160 1, an Alphonso of Africa, in 12 books; Sa de Menezes (d. 1664) a Conquest of Malacca, 1634; but all these, and many more, are obscured by the glory of Camoens (q.v.), whose magnificent Lusiads had been printed in 1572, and forms the summit of Portuguese literature. In Spanish poetry, the Poem of the Cid takes the first place, as the great national epic of the middle ages; it is supposed to have been written between 1135 and 1175. It was followed by the Rodrigo, and the medieval school closes with the Alphonso XI. of Rodrigo Yanez, probably written at the close of the 1 2th century. The success of the Italian imitative epics of the 15th century led to some imitation of their form in Spain. Juan de la Cueva (i55o?-i6o6) published a Conquest of Betica in 1603; Cristobal de Virues (1550-1610) a Monserrate, in 1588; Luis Barahona de Soto continued Ariosto in a Tears of Angelica; Gutierrez wrote an Ausiriada in 1584; but perhaps the finest modern epic in Spanish verse is the Araucana (1569-1590) of Alonso de Ercilla y Zuniga (1533-1595), " the first literary work of merit," as Mr Fitzmaurice-Kelly remarks, " composed in either American continent." In France, the epic never flourished in modern times, and no real success attended the Franciade of Ronsard, the Alaric of Scudery, the Pucelle of Chapelain, the Divine Epopee of Soumet, or even the Henriade of Voltaire. In English literature The Faery Queen of Spenser has the same claim as the Italian poems mentioned above to bear the name of epic, and Milton, who stands entirely apart, may be said, by his isolated Paradise Lost, to take rank with Homer and Virgil, as one of the three types of the mastery of epical composition.

See Bossu, Traite du poeme epique (1675); Voltaire, Sur la poksie epique; Fquviel, L'Origine de I' epopee chevaleresque (1832); W. P. Ker, Epic and Romance (1897), an d Essays in Medieval Literature (1905); Gilbert Murray, History of Ancient Greek Literature (1897); W. von Christ, Ceschichte der griechischen Litteratur (1879); Gaston Paris, La Litterature francaise au moye'n dge (1890); Leon Gautier, Les Epopees francaises (1 865-1 868). For works on the Greek epics see also Greek Literature and Cycle. (E. G.)

EPICTETUS (born c. a.d. 60), Greek philosopher, was probably a native of Hierapolis in south-west Phrygia. The name Epictetus is

merely the Greek for "acquired" (from brucraoOai); his original name is not known. As a boy he was a slave in the house of Epaphroditus, a freedman and courtier of the emperor Nero. He managed, however, to attend the lectures of the Stoic Musonius Rufus, and subsequently became a freedman. He was lame and of weakly health. In 90 he was expelled with the other philosophers by Domitian, who was irritated by the support and encouragement which the opposition to his tyranny found amongst the adherents of Stoicism. For the rest of his life he settled at Nicopolis, in southern Epirus, not far from the scene of the battle of Actium. There for several years he lived, and taught by close earnest personal address and conversation. According to some authorities he lived into the time of Hadrian; he himself mentions the coinage of the emperor Trajan. His contemporaries and the next generation held his character and teaching in high honour. According to Lucian, the earthenware lamp which had belonged to the sage was bought by an anti- quarian for 3000 drachmas. He was never married. He wrote nothing; but much of his teaching was taken down with affectionate care by his pupil Flavius Arrianus, the historian of Alexander the Great, and is preserved in two treatises, of the larger of which, called the Discourses of Epictetus C&izuiTijTOV AtaTpijScu), four books are still extant. The other treatise is a shorter and more popular work, the Encheiridion (" Hand- book "). It contains in an aphoristic form the main doctrines of the longer work.

EPICURUS

68'3'

The philosophy of Epictetus is intensely practical, and exhibits a high idealistic type of morality. He is an earnest, sometimes stern and sometimes pathetic, preacher of righteousness, who despises the mere graces of style and the subtleties of an abstruse logic. He has no patience with mere antiquarian study of the Stoical writers. The problem of how life is to be carried out well is the one question which throws all other inquiries into the shade. True education lies in learning to wish things to be as they actually are; it lies in learning to distinguish what is our own from what does not belong to us. But there is only one thing which is fully our own, — that is, our will or purpose. God, acting as a good king and a true father, has given us a will which cannot be restrained, compelled or thwarted. Nothing external, neither death nor exile nor pain nor any such thing, can ever force us to act against our will; if we are conquered, it is because we have willed to be conquered. And thus, although we are not responsible for the ideas that present themselves to our

conscious- ness, we are absolutely and without any modification responsible for the way in which we use them. Nothing is ours besides our will. The divine law which bids us keep fast what is our own forbids us to make any claim to what is not ours; and while enjoining us to make use of whatever is given to us, it bids us not long after what has not been given. " Two maxims," he says, " we must ever bear in mind — that apart from the will there is nothing either good or bad, and that we must not try to anticipate or direct events, but merely accept them with intelligence." We must, in short, resign ourselves to whatever fate and fortune bring to us, believing, as the first article of our creed, that there is a god, whose thought directs the universe, and that not merely in our acts, but even in our thoughts and plans, we cannot escape his eye. In the world the true position of man is that of member of a great system, which comprehends God and men. Each human being is in the first instance a citizen of his own nation or commonwealth; but he is also a member of the great city of gods and men, whereof the city political is only a copy in miniature. All men are the sons of God, and kindred in nature with the divinity. For man, though a member in the system of the world, has also within him a principle which can guide and understand the movement of all the members; he can enter into the method of divine administration, and thus can learn — and it is the acme of his learning — the will of God, which is the will of nature. Man, said the Stoic, is a rational animal; and in virtue of that rationality he is neither less nor worse than the gods, for the magnitude of reason is estimated not by length nor by height but by its judgments. Each man has within him a guardian spirit, a god within him, who never sleeps; so that even in darkness and solitude we are never alone, because God is within, our guardian spirit. The body which accompanies us is not strictly speaking ours; it is a poor dead thing, which belongs to the things outside us. But by reason we are the masters of those ideas and appearances which present themselves from without; we can combine them, and systematize, and can set up in ourselves an order of ideas corresponding with the order of nature.

The natural instinct of animated life, to which man also is originally subject, is self-preservation and self-interest. But men are so ordered and constituted that the individual cannot secure his own interests unless he contribute to the common welfare. We are bound up by the law of nature with the whole fabric of the ,world. The aim of the philosopher therefore is to reach the position of a mind which embraces the whole world in its view, — to grow into the mind of God and to make the will of nature our own. Such a sage agrees in

his thought with God; he no longer blames either God or man; he fails of nothing which he purposes and falls in with no misfortune unprepared; he indulges in neither anger nor envy nor jealousy; he is leaving manhood for godhead, and in his dead body his thoughts are concerned about his fellowship with God.

The historical models to which Epictetus reverts are Diogenes and Socrates. But he frequently describes an ideal character of a missionary sage, the perfect Stoic — or, as he calls him, the

nor slave; his bed is the ground; he is without wife or child; his only mansion is the earth and sky and a shabby cloak. He must suffer stripes, and must love those who beat him as if he were a father or a brother. He must be perfectly unembarrassed in the service of God, not bound by the common ties of life, nor entangled by relationships, which if he transgresses he will lose the character of a man of honour, while if he upholds them he will cease to be the messenger, watchman and herald of the gods. The perfect man thus described will not be angry with the wrong- doer; he will only pity his erring brother; for anger in such a case would only betray that he too thought the wrong-doer gained a substantial blessing by his wrongful act, instead of being, as he is, utterly ruined.

The best editions of the works of Epictetus are by J. Schweig- hauser (6 vols., Leipzig, 1799-1800) and H. Schenkl (Leipzig, 1894, 1898). English translations by Elizabeth Carter (London, 1758); G. Long (London, 1848, ed. 1877, 1892, 1897); T. W. Higginson (Boston, 1865, newed. 1890) ; of the Encheiridion alone bv'H. Talbot (London, 1881); T. W. H. Rolleston (London, 1881). See A. Bonhoffer, Epiktet und die Stoa (Stuttgart, 1890) and Die Ethik des Strikers Epiktet (1894); E. M. Schranka, Der Striker Epiktet und, seine Philosophie (Frankfort, 1885); T. Zahn, Der Striker Epiktet und sein Verhdltnis zum Christentum (2nd ed. Erlangen, 1895). See also Stoics and works quoted. (W. W. ; X.)

EPICURUS (342-270 B.C.), Greek philosopher, was born in Samos in the end of 342 or the beginning of 341 B.C., seven years after the death of Plato. His father Neocles, a native of Gar- gettos, a small village of Attica, had settled in Samos, not later than 352, as one of the cleruchs sent out after the victory of Timotheusin 366-365. At the age of eighteen he went to Athens,. where the Platonic school was flourishing under the lead of Xenocrates. A year later, however, Antipater banished some 12,000 of the poorer citizens, and Epicurus joined his father, who was now living at Colophon. It seems possible that he had listened to the lectures of Nausiphanes,a Democritean

philosopher, and Pamphilus the Platonist, but he was probably, like his father, merely an ordinary teacher. Stimulated, however, by the perusal of some writings of Democritus, he began to formulate a doctrine of his own; and at Mitylene, Colophon and Lampsacus, he gradually gathered round him several enthusiastic disciples. In 307 he returned to Athens, which had just been restored to a nominal independence by Demetrius Poliorcetes, and there he lived for the rest of his life. The scene of his teaching was a garden which he bought for about £300 (80 minae). There he passed his days as the loved and venerated head of a remarkable, and up to that time unique, society of men and women. Amongst the number were Metrodorus (d. 277), his brother Timocrates, and his wife Leontion (formerly a hetaera), Polyaenus, Her- marchus, who succeeded Epicurus as chief of the school, Leonteus and his wife Themista, and Idomeneus, whose wife was a sister of Metrodorus. It is possible that the relations between the sexes — in this prototype of Rabelais's Abbey of Theleme — were not entirely what is termed Platonic. But there is on the other hand scarcely a doubt that the tales of licentiousness circulated by opponents are groundless. The stories of the Stoics, who sought to refute the views of Epicurus by an appeal to his alleged antecedents and habits, were no doubt in the main,, as Diogenes Laertius says, the stories of maniacs. The general charges, which they endeavoured to substantiate by forged letters, need not count for much, and in many cases they only exaggerated what, if true, was not so heinous as they suggested. Against them trustworthy authorities testified to his general and remark able considerateness, pointing to the statues which the city had raised in his honour, and to the numbers of his friends, who were many enough to fill whole cities.

The mode of life in his community was plain. The general drink was water and the food barley bread; half a pint of wine was held an ample allowance. " Send me," says Epicurus to a correspondent, " send me some Cythnian cheese, so that, should I choose, I may fare sumptuously." There was no community of property, which, as Epicurus said, would imply distrust of their own and others' good resolutions. The company was held in unity by the charms of his personality, and by the free inter- course which he inculcated and exemplified. Though he seems

to have had a warm affection for his countrymen, it was as human

beings brought into contact with him, and not as members of a political body, that he preferred to regard them. He never entered public life. His kindliness extended even to his slaves, one of whom, named Mouse, was a brother in philosophy.

Epicurus died of stone in 270 B.C. He left his property, consisting of the garden (Kijiroi 'Eirt/coupou), a house in Melite (the south-west quarter of Athens), and apparently some funds besides, to two trustees on behalf of his society, and for the special interest of some youthful members. The garden was set apart for the use of the school; the house became the house of Hermarchus and his fellow-philosophers during his lifetime. The surplus proceeds of the property were further to be applied to maintain a yearly offering in commemoration of his departed father, mother and brothers, to pay the expenses incurred in celebrating his own birthday every year on the 7th of the month Gamelion, and for a social gathering of the sect on the 20th of every month in honour of himself and Metrodorus. Besides similar tributes in honour of his brothers and Polyaenus, he directed the trustees to be guardians of the son of Polyaenus and the son of Metrodorus; whilst the daughter of the last mentioned was to be married by the guardians to some member of the society who should be approved of by Hermarchus. His four slaves, three men and one woman, were left their freedom. His books passed to Hermarchus.

Philosophy. — The Epicurean philosophy is traditionally divided into the three branches of logic, physics and ethics. It is, however, only as a basis of facts and principles for his theory of life that logical and physical inquiries find a place at all. Epicurus himself had not apparently shared in any large or liberal culture, and his influence was certainly thrown on the side of those who depreciated purely scientific pursuits as one- sided and misleading. "Steer clear of all culture" was his advice to a young disciple. In this aversion to a purely or mainly intellectual training may be traced a recoil from the systematic metaphysics of Plato and Aristotle, whose tendency was to sub- ordinate the practical man to the philosopher. Ethics had been based upon logic and metaphysics. But experience showed that systematic knowledge of truth is not synonymous with right action. Hence, in the second place, Plato and Aristotle had assumed a perfect state with laws to guide the individual aright. It was thus comparatively easy to show how the individual Could learn to apprehend and embody the moral law in his own conduct. But experience had in the time of Epicurus shown the temporary and artificial character of the civic form of social life. It was necessary, therefore, for Epicurus to go back to nature to find a more enduring

and a wider foundation for ethical doctrine, to go back from words to realities, to give up reasonings and get at feelings, to test conceptions and arguments by a final reference to the only touchstone of truth — to sensation. There, and there only, one seems to find a common and a satisfactory ground, supposing always that all men's feelings give the same answer. Logic must go, but so also must the state, as a specially-privileged and eternal order of things, as anything more than a contrivance serving certain purposes of general utility.

To the Epicureans the elaborate logic of the Stoics was a superfluity. In place of logic we find canonic, the theory of the three tests of truth and reality. (1) The only ultimate canon of reality is sensation; whatever we feel, whatever we perceive by any sense, that we know on the most certain evidence we can have to be real, and in proportion as our feeling is clear, distinct and vivid, in that proportion are we sure of the reality of its object. But in what that vividness (hvapyeia.) consists is a question which Epicurus does not raise, and which he would no doubt have deemed superfluous quibbling over a matter sufficiently settled by common sense. (2) Besides our sensations, we learn truth and reality by our preconceptions or ideas (irpoXˆttr). These are the fainter images produced by repeated sensations, the " ideas " resulting from previous " impressions " — sensations at second-hand as it were, which are stored up in memory, and which a general name serves to recall. These bear witness to reality, not because we feel anything now, but because

we felt it once; they are sensations registered in language, and again, if need be, translatable into immediate sensations or groups of sensation. (3) Lastly, reality is vouched for by the imaginative apprehensions of the mind (cjxivTacjTiKal trnfioXai), immediate feelings of which the mind is conscious as produced by some action of its own. This last canon, however, was of dubious validity. Epicureanism generally was content to affirm that whatever we effectively feel in consciousness is real; in which sense they allow reality to the fancies of the insane, the dreams of a sleeper, and those feelings by which we imagine the existence of beings of perfect blessedness and endless life. Similarly, just because fear, hope and remembrance add to the intensity of consciousness, the Epicurean can hold that bodily pain and pleasure is a less durable and important thing than pain and pleasure of mind. Whatever we feel to affect us does affect us, and is therefore real. Error can arise only because we mix up our opinions and sup- positions with what we actually feel. The Epicurean canon is a rejection of logic; it sticks

fast to the one point that " sensation is sensation," and there is no more to be made of it. Sensation, it says, is unreasoning (akoyos); it must be accepted, and not criticized. Reasoning can come in only to put sensations to- gether, and to point out how they severally contribute to human welfare; it does not make them, and cannot alter them.

Physics. — In the Epicurean physics there are two parts — a general metaphysic and psychology, and a special explanation of particular phenomena of nature. The method of Epicurus is the argument of analogy. It is an attempt to make the phenomena of nature intelligible to us by regarding them as instances on a grand scale of that with which we are already familiar on a small scale. This is what Epicurus calls explaining what we do not see by what we do see.

In physics Epicurus founded upon Democritus, and his chief object was to abolish the dualism between mind and matter which is so essential a point in the systems of Plato and Aristotle. All that exists, says Epicurus, is corporeal (to irav eon o&fxa); the intangible is non-existent, or empty space. If a thing exists it must be felt, and to be felt it must exert resistance. But not all things are intangible which our senses are not subtle enough to detect. We must indeed accept our feelings; but we must also believe much which is not directly testified by sensation, if only it serves to explain phenomena and does not contravene our sensations. The fundamental postulates of Epicureanism are atoms and the void (arofia /cai Ktvbv). Space is infinite, and there is an illimitable multitude of indestructible, indivisible and absolutely compact atoms in perpetual motion in this illimitable space. These atoms, differing only in size, figure and weight, are perpetually moving with equal velocities, but at a rate far surpassing our conceptions; as they move, they are for ever giving rise to new worlds; and these worlds are per- petually tending towards dissolution, and towards a fresh series of creations. This universe of ours is only one section out of the innumerable worlds in infinite space; other worlds may present systems very different from that of our own. The soul of man is only a finer species of body, spread throughout the whole aggregation which we term his bodily frame. Like a warm breath, it pervades the human structure and works with it; nor could it act as it does in perception unless it were corporeal. The various processes of sense, notably vision, are explained on the principles of materialism. From the surfaces of all objects there are continually flowing thin filmy images exactly copying the solid body whence they originate; and these images by direct impact on the organism produce (we need not care to ask how)

the phenomena of vision. Epicurus in this way explains vision by substituting for the apparent action of a body at a distance a direct contact of image and organ. But without following the explanation into the details in which it revels, it may be enough to say that the whole hypothesis is but an attempt to exclude the occult conception of action at a distance, and substitute a familiar phenomenon.

The Gods. — This aspect of the Epicurean physics becomes clearer when we look at his mode of rendering particular pheno- mena intelligible. His purpose is to eliminate the common idea of

divine interference. That there are gods Epicurus never dreams of denying. But these gods have not on their shoulders the burden of upholding and governing the world. They are them- selves the products of the order of nature — a higher species than humanity, but not the rulers of man, neither the makers nor the upholders of the world. Man should worship them, but his worship is the reverence due to the ideals of perfect blessedness; it ought not to be inspired either by hope or by fear. To prevent all reference of the more potent phenomena of nature to divine action Epicurus rationalizes the processes of the cosmos. He imagines all possible plans or hypotheses, not actually contra dicted by our experience of familiar events, which will represent in an intelligible way the processes of astronomy and meteorology. When two or more modes of accounting for a phenomena are equally admissible as not directly contradicted by known phenomena, it seems to Epicurus almost a return to the old mythological habit of mind when a savant asserts that the real cause is one and only one. " Thunder," he says, " may be ex- plained in many other ways; only let us have no myths of divine action. To assign only a single cause for these phenomena, when the facts familiar to us suggest several, is insane, and is just the absurd conduct to be expected from people who dabble in the vanities of astronomy." We need not be too curious to inquire how these celestial phenomena actually do come about; we can learn how they might have been produced, and to go further is to trench on ground beyond the limits of human knowledge.

Thus, if Epicurus objects to the doctrine of mythology, he objects no less to the doctrine of an inevitable fate, a necessary order of things unchangeable and supreme over the human will. The Stoic doctrine of Fatalism seemed to Epicurus no less deadly a foe of man's true

welfare than popular superstition. Even in the movement of the atoms he introduces a sudden change of direction, which is supposed to render their aggregation easier, and to break the even law of destiny. So, in the sphere of human action, Epicurus would allow of no absolutely controlling necessity. In fact, it is only when we assume for man this in- dependence of the gods and of fatality that the Epicurean theory of life becomes possible. It assumes that man can, like the gods, withdraw himself out of reach of all external influences, and thus, as a sage, " live like a god among men, seeing that the man is in no wise like a mortal creature who lives in undying blessedness." And this present life is the only one. With one consent Epicureanism preaches that the death of the body is the end of everything for man, and hence the other world has lost all its terrors as well as all its hopes.

The attitude of Epicurus in this whole matter is antagonistic to science. The idea of a systematic enchainment of phenomena, in which each is conditioned by every other, and none can be taken in isolation and explained apart from the rest, was foreign to his mind. So little was the scientific conception of the solar system familiar to Epicurus that he could reproach the astronomers, because their account of an eclipse represented things otherwise than as they appear to the senses, and could declare that the sun and stars were just as large as they seemed to us.

Ethics. — The moral philosophy of Epicurus is a qualified hedonism, the heir of the Cyrenaic doctrine that pleasure is the good thing in life. Neither sect, it may be added, advocated sensuality pure and unfeigned — the Epicurean least of all. By pleasure Epicurus meant both more and less than the Cyrenaics. To the Cyrenaics pleasure was of moments; to Epicurus it extended as a habit of mind through life. To the Cyrenaics pleasure was something active and positive; to Epicurus it was rather negative — tranquillity more than vigorous enjoyment. The test of true pleasure, according to Epicurus, is the removal and absorption of all that gives pain; it implies freedom from pain of body and from trouble of mind. The happiness of the Epicurean was, it might almost seem, a grave and solemn pleasure — a quiet unobtrusive ease of heart, but not exuberance and excitement. The sage of Epicureanism is a rational and reflective seeker for happiness, who balances the claims of each pleasure against the evils that may possibly ensue, and treads

' the path of enjoyment cautiously. Prudence is, therefore, the only real guide to happiness; it is thus the chief excellence, and the foundation of all the virtues. It is, in fact, says Epicurus— in

language which contrasts strongly with that of Aristotle on the same topic — " a more precious power than philosophy." The reason or intellect is introduced to balance possible pleasures and pains, and to construct a scheme in which pleasures are the materials of a happy life. Feeling, which Epicurus declared to be the means of determining what is good, is subordinated to a reason which adjudicates between competing pleasures with the view of securing tranquillity of mind and body. " We cannot live pleasantly without living wisely and nobly and righteously." Virtue is at least a means of happiness, though apart from that it is no good in itself, any more than mere sensual enjoyments, which are good only because they may sometimes serve to secure health of body and tranquillity of mind. (See further Ethics.)

The Epicurean School. — Even in the lifetime of Epicurus we hear of the vast numbers of his friends, not merely in Greece, but in Asia and Egypt. The crowds of Epicureans were a standing enigma to the adherents of less popular sects. Cicero pondered over the fact; Arcesilaus explained the secession to the Epicurean camp, compared with the fact that no Epicurean was ever known to have abandoned his school, by saying that, though it was possible for a man to be turned into a eunuch, no eunuch could ever become a man. But the phenomenon was not obscure. The doctrine has many truths, and is attractive to many in virtue of its simplicity and its immediate relation to life. The dogmas of Epicurus became to his followers a creed embodying the truths on which salvation depended; and they passed on from one generation to another with scarcely a change or addition. The immediate disciples of Epicurus have been already mentioned, with the exception of Colotes of Lampsacus, a great favourite of Epicurus, who wrote a work arguing " that it was impossible even to live according to the doctrines of the other philosophers." In the 2nd and 1st centuries B.C. Apollodorus, nicknamed KiyiroTvpavvos (" Lord of the Garden "), and Zeno of Sidon (who describes Socrates as "the Attic buffoon": Cic. De nat. deor. i- 21, 33; 34) taught at Athens. About 150'B.c. Epicureanism established itself at Rome. Beginning with C. Amafmius or Amafanius (Cic. Acad. i. 2, Tusc. iv. 3), we find the names of Phaedrus (who became scholarch at Athens c. 70 B.C.) and Philodemus (originally of Gadara in Palestine) as distinguished Epicureans in the time of Cicero. But the greatest of its Roman names was Lucretius, whose De rerum natura embodies the main teaching of Epicurus with great exactness, and with a beauty which the subject seemed scarcely to allow. Lucretius is a proof, if any were needed, that Epicureanism is compatible with nobility of soul. In the 1st

century of the Christian era, the nature of the time, with its active political struggles, naturally called Stoicism more into the foreground, yet Seneca, though nominally a Stoic, draws nearly all his suavity and much of his paternal wisdom from the writings of Epicurus. The position of Epicureanism as a recognized school in the 2nd century is best seen in the fact that it was one of the four schools (the others were the Stoic, Platonist, and Peripatetic) which were placed on a footing of equal endowment when Marcus Aurelius founded chairs of philosophy at Athens. The evidence of Diogenes proves that it still subsisted as a school a century later, but its spirit lasted longer than its formal organization as a school. A great deal of the best of the Renaissance was founded on Epi- cureanism, and in more recent times a great number of prominent thinkers have been Epicureans in a greater or less degree. Among these may be mentioned Pierre Gassendi, who revived and codified the doctrine in the 17th century; Moliere, the comte de Gramont, Rousseau, Fontenelle and Voltaire. All those whose ethical theory is in any degree hedonistic are to some extent the intellectual descendants of Epicurus (see Hedonism).

Works. — Epicurus was a voluminous writer (iroKvypaˆcoraros, Diog. Laert. x. 26) — the author, it is said, of about 300 works. He had a style and vocabulary of his own. His chief aim in writing was plainness and intelligibility, but his want of order and logical precision thwarted his purpose. He pretended to

have read little, and to be the original architect of his own system, and the claim was no doubt on the whole true. But he had read Democritus, and, it is said, Anaxagoras and Archelaus. His works, we learn, were full of repetition, and critics speak of vulgarities of language and faults of style. None the less his writings were committed to memory and remained the text- books of Epicureanism to the last. His chief work was a treatise on naturf Mtlept (pvaecos), in thirty-seven books, of which frag- ments from about nine books have been found in the rolls discovered at Herculaneum, along with considerable treatises by sever.U of his followers, and most notably Philodemus. An epitome of his doctrine is contained in three letters preserved by Diogenes.

Authorities. — The chief ancient accounts of Epicurus are in the tenth book of Diogenes Laertius, in Lucretius, and in several treatises

of Cicero and Plutarch. Gassendi, in his De vita, moribus, et doctrina Epicuri (Lyons, 1647), and his Syntagma philosophiae Epicuri, systematized the doctrine. The Volumina Herculanensia (1st and 2nd series) contain fragments of treatises by Epicurus and members of his school. See also H. Usener, Epicurea (Leipzig, 1887) and Epicuri recogniti specimen (Bonn, 1880) ; Epicuri physica et meteorologica (ed. J. G. Schneider, Leipzig, 1813); Th. Gomperz in his Herkulanische Studien, and in contributions to the Vienna Academy {Monatsberichte), has tried to evolve from the fragments more approximation to modern empiricism than they seem to contain. For criticism see W. Wallace, Epicureanism (London, 1880), and Epicurus; A Lecture (London, 1896); G. Trezza, Epicuro el' Epicureismo (Florence, 1877; ed. Milan, 1885); E. Zeller, Philosophy of the Stoics, Epicureans and Sceptics (Eng. trans. O. J. Reichel, 1870; ed. 1880); Sir James Mackintosh, On the Progress of Ethical Philosophy (4th ed.) ; J. Watson, Hedonistic Theories (Glasgow, 1895); J. Kreibig, Epicurus (Vienna, 1886); A. Goedeckemeyer, Epikurs Verhdltnis zu Demokrit in der Naturphil. (Strassburg, 1897) ; Paul von Gizycki, Uber das Leben und die Moralphilos. des Epikur (Halle, 1879), and Einleitende Bemerkungen zu einer Untersuchung fiber den Werth der Naturphilos. des Epikur (Berlin, 1884); P. Cassel, Epikur der Philosoph (Berlin, 1892) ; M. Guyau, La Morale d'Hpicure et ses rapports avec les doctrines contemporaines (Paris, 1878 ; revised and enlarged, 1881) ; F. Picavet, De Epicuro novae religionis sectatore (Paris, 1889); H. Sidgwick, History of Ethics (5th ed., 1902). (W. W. ; X.)

EPICYCLE (Gr. eiri, upon, and kvkKos, circle), in ancient astronomy, a small circle the centre of which describes a larger one. It was especially used to represent geometrically the periodic apparent retrograde motion of the outer planets, Mars, Jupiter and Saturn, which we now know to be due to the annual revolution of the earth around the sun, but which in the Ptole- maic astronomy were taken to be real.

EPICYCLOID, the curve traced out by a point on the cir- cumference of a circle rolling externally on another circle. If the moving circle rolls internally on the fixed circle, a point on the circumference describes a " hypocycloid " (from wo, under). The locus of any other carried point is an " epitrochoid " when the circle rolls externally, and a " hypotrochoid " when the circle rolls internally. The epicycloid was so named by Ole Romer in 1674, who also demonstrated that cog-wheels having epicycloidal teeth revolved with minimum friction (see Mechanics: Applied); this was also proved by Girard Desargues, Philippe de la Hire and Charles Stephen Louis

Camus. Epicycloids also received attention at the hands of Edmund Halley, Sir Isaac Newton and others; spherical epicycloids, in which the moving circle is inclined at a constant angle to the plane of the fixed circle, were studied by the Bernoullis, Pierre Louis M. de Maupertuis, Francois Nicole, Alexis Claude Clairault and others.

In the annexed figure, there are shown various examples of the curves named above, when the radii of the rolling and fixed circles are in the ratio of 1 to 3. Since the circumference of a circle is proportional to its radius, it follows that if the ratio of the radii be commensurable, the curve will consist of a finite number of cusps, and ultimately return into itself. In the particular case when the radii are in the ratio of 1 to 3 the epicycloid (curve a) will consist of three cusps external to the circle and placed at equal distances along its circumference. Similarly, the corresponding epitrochoids will exhibit three loops or nodes (curve b), or assume the form shown in the curve' c. It is interesting to compare the forms of these curves with the three forms of the cycloid (q.v.). The hypocycloid derived from the same circles is shown as curve d, and is seen to consist of three cusps arranged internally to the fixed circle ; the corresponding hypotrochoid consists of a three-foil and is shown in curve e. The

epicycloid shown is termed the " three-cusped epicycloid " or the

" epicycloid of Cremona."

The cartesian equatio n to t he epicycloid assumes the f orm

x = (a+b) cosO-bcos (a+b/b)9, y = (a+b) sin 0-6 sin (a+b/b)$,

when the centre of the fixed circle is the origin, and the axis of x

passes through the initial- point of the curve (i.e. the original position

of the moving point on the fixed circle), a and b being the radii of the fixed and rolling circles, and 6 the angle through which the line joining the centres of the two circles has passed. It may be shown that if the distance of the carried point from the centre of the rolling circle be mb, the equation to the epitrochoid is

x = (a + b) cos 6 – mb cos (a + b/b)e, y = (a + b) sin S – mb sin (a+b/b)6. The equations to the hypocycloid and its corresponding trochoidal curves are derived from the two preceding equations by changing the sign of b. Leonhard Euler (Acta Petrop. 1784) showed that the same hypocycloid can be generated by circles having radii of

i(a+b) rolling on a circle of radius a ; and also that the hypocycloid formed when the radius of the rolling circle is greater than that of rhe fixed circle is the same as the epicycloid formed by the rolling of a circle whose radius is the difference of the original radii. These pro- positions may be derived from the formulae given above, or proved directly by purely geometrical methods.

The tangential polar e quati on to the epicycloid, as given above, is p = (a--2b) s in (al a+2b)tl/, while the intrinsic equation is s = (a--b) cos (o/a+26) and the pedal equation is r 2 = a 2 + (b.a--b)p 2 l(a J r2by. Therefore any epicycloid or hypocycloid may be represented by the equations p = A sin B \(/ or p — A cos B, i= =A sin Bi/' or s =AcosBi/-, or r 2 = A+B£ 2 , the constants A and B being readily determined by the above considerations.

If the radius of the rolling circle be one-half of the fixed circle, the hypocycloid becomes a diameter of this circle; this may be con- firmed from the equation to the hypocycloid. If the ratio of the radii be as I to 4, we obtain the four-cusped hypocycloid, which has the simple cartesian equation x 2 " +y 2 ' 3 = a 2 ' 3 . This curve is the envelope of a line of constant length, which moves so that its ex- tremities are always on two fixed lines at right angles to each other, i.e. of the line x/a-j-y/f} = 1 , with the condition a 2 + /3 2 = 1 / a, a constant. The epicycloid when the radii of the circles are equal is the cardioid (q.v), and the corresponding trochoidal curves are limacons (q.v.). Epicycloids are also examples of certain caustics (q.v.).

For the methods of determining the formulae and results stated above see J. Edwards, Differential Calculus, and for geometrical constructions see T. H. Eagles, Plane Curves.

EPIDAURUS, the name of two ancient cities of southern Greece.

1. A maritime city situated on the eastern coast of Argolis, sometimes distinguished as 17 lepa '~Enri8avpos, or Epidaurus the Holy. It stood on a small rocky peninsula with a natural harbour on the northern side and an open but serviceable bay on the southern; and from this position acquired the epithet of 8l(JTOfxos, or the two-mouthed. Its narrow but fertile territory consisted of a plain shut in on all sides except towards the sea by considerable elevations, among which the most remarkable were Mount Arachnaeon and Titthion. The conterminous states were Corinth, Argos, Troezen and Hermione. Its proximity to Athens and the islands of the Saronic gulf, the commercial advantages of its position, and the fame of its

of Asclepius combined to make Epidaurus a place of no small importance. Its origin was ascribed to a Carian colony, whose memory was possibly preserved in Epicarus, the earlier name of the city; it was afterwards occupied by Ionians, and appears to have incorporated a body of Phlegyans from Thessaly. The Ionians in turn succumbed to the Dorians of Argos, who, according to the legend, were led by Deiphontes; and from that time the city continued to preserve its Dorian character. It not only colonized the neighbouring islands, and founded the city of Aegina, by which it was ultimately outstripped in wealth and power, but also took part with the people of Argos and Troezen in their settlements in the south of Asia Minor. The monarchical government introduced by Deiphontes gave way to an oligarchy, and the oligarchy degenerated into a despotism. When Procles the tyrant was carried captive by Periander of Corinth, the oligarchy was restored, and the people of Epidaurus continued ever afterwards close allies of the Spartan power. The governing body consisted of 180 members, chosen from certain influential families, and the executive was entrusted to a select committee of arlynae (from aprvvav, to manage). The rural population, who had no share in the affairs of the city, were called Koviirodes (" dusty-feet ")• Among the objects of interest described by Pausanias as extant in Epidaurus are the image of Athena Cissaea in the Acropolis, the temple of Dionysus and Artemis, a shrine of Aphrodite, statues of Asclepius and his wife Epione,

and a temple of Hera. The site of the last is identified with the chapel of St Nicolas; a few portions of the outer walls of the city can be traced; and the name Epidaurus is still preserved by the little village of Nea-Epidavros, or Pidhavro.

The Hieron (sacred precinct) of Asclepius, which lies inland about 8 m. from the town of Epidaurus, has been thoroughly excavated by the Greek Archaeological Society since the year 1881, under the direction of M. Kavvadias. In addition to the sacred precinct, with its temples and other buildings, the theatre and stadium have been cleared; and several other extensive buildings, including baths, gymnasia, and a hospital for invalids, have also been found. The sacred road from Epidaurus, which is flanked by tombs, approaches the precinct through a gateway or propylaea. The chief buildings are

grouped together, and include temples of Asclepius and Artemis, the Tholos, and the Abaton, or portico where the patients slept. In addition to remains of architecture and sculpture, some of them of high merit, there have been found many inscriptions, throwing light on the cures attributed to the god. The chief buildings outside the sacred precinct are the theatre and the stadium.

The temple of Asclepius, which contained the gold and ivory statue by Thrasymedes of Paros, had six columns at the ends and eleven at the sides; it was raised on stages and approached by a ramp at the eastern front. An inscription has been found recording the contracts for building this temple; it dates from

Scale of Metres Scale of Yards

Emery Wa lker, »c.

about 460 B.C. The sculptor Timotheus — one of those who collaborated in the Mausoleum — is mentioned as undertaking to make the acroteria that stood on the ends of the pediments, and also models for the sculpture that filled one of them. Some of this sculpture has been found; the acroteria are Nereids mounted on sea-horses, and one pediment contained a battle of Greeks and Amazons. The great altar lay to the south of the temple, and a little to the east of it are what appear to be the remains of an earlier altar, built into the corner of a large square edifice of Roman date, perhaps a house of the priests. Just to the south of this are the foundations of a small temple of Artemis. The Tholos lay to the south-west of the temple of Asclepius; it must, when perfect, have been one of the most beautiful buildings in Greece; the exquisite carving of its mouldings is only equalled by that of the Erechtheum at Athens. It consisted of a circular chamber, surrounded on the outside by a Doric colonnade, and on the inside by a Corinthian one. The architect was Polyclitus, probably to be identified with the younger sculptor of that name. In the inscription recording the contracts for its building it is called the Thymele; and this name may give the clue to its purpose; it was probably the idealized architectural representative of a primitive pit of sacrifice, such as may still be seen in the Asclepianum at Athens. The foundations now visible present a very curious appearance,

consisting of a series of concentric walls. Those in the middle are thin, having only the pavement of the cella to support, and are provided with doors and partitions that make a sort of subterranean labyrinth. There is no evidence for the statement sometimes made that there was a well or spring below the Tholos. North of the Tholos is the long portico described in inscriptions as the Abaton; it is on two different levels, and the lower or western portion of it had two storeys, of which the upper one was on a level with the ground in the eastern portion. Here the invalids used to sleep when consulting the god, and the inscrip- tions found here record not only the method of consulting the god, but the manner of his cures. Some of the inscriptions are contemporary dedications; but those which give us most information are long lists of cases, evidently compiled by the priests from the dedications in the sanctuary, or from tradition. There is no reason to doubt that most of the records have at least a basis of fact, for the cases are in accord with well-attested phenomena of a similar nature at the present day; but there are others, such as the miraculous mending of a broken vase, which suggest either invention or trickery-

In early times, though there is considerable variety in the cases treated and the methods of cure, there are certain character- istics common to the majority of the cases. The patient consult- ing the god sleeps in the Abaton, sees certain visions, and, as a result, comes forth cured the next morning. Sometimes there seem to be surgical cases, like that of a man who had a spear-head extracted from his jaw, and found it laid in his hands when ne awoke in the morning, and there are many examples resembling those known at the present day at Lourdes or Tenos, where hysterical or other similar affections are cured by the influence of imagination or sudden emotion. It is, however, difficult to make any scientific use of the records, owing to the indiscriminate manner in which genuine and apocryphal cases are mingled, and circumstantial details are added. We learn the practice of later times from some dedicated inscriptions. Apparently the. old faith-healing had lost its efficacy, and the priests sub- stituted for it elaborate prescriptions as to diet, baths and regimen which must have made Epidaurus and its visitors resemble their counterparts in a modern spa. At this time there were extensive buildings provided for the accommodation of invalids, some of which have been discovered and partially cleared; one was built by Antoninus Pius. They were in the form of great courtyards surrounded by colonnades and chambers.

Between the precinct and the theatre was a large gymnasium, which was in later times converted to other purposes, a small odeum being

built in the middle of it. In a valley just to the south-west of the precinct is the stadium, of which the seats and goal are well preserved. There is a gutter round the level space of the stadium, with basins at intervals for the use of spectators or competitors,

and a post at every hundred feet of the course, thus dividing it into six portions. The goal, which is well preserved at the upper end, is similar to that at Olympia ; it consists of a sill of stone sunk level with the ground, with parallel grooves for the feet of the runners at starting, and sockets to hold the posts that separated the spacesassigned to the various competitors, and served as guides to them in running. For these were substituted later a set of stone columns resembling those in the proscenium of a theatre. There was doubtless a similar sill at the lower end for the start of the stadium, this upper one being intended for the start of the diaulos and longer races.

The theatre still deserves the praise given it by Pausanias as the most beautiful in Greece. The auditorium is in remarkable preserva- tion, almost every seat being still in situ, except a few where the supporting walls have given way on the wings. The whole plan is drawn from three centres, the outer portion of the curves being arcs of a larger circle than the one used for the central portion; the complete circle of the orchestra is marked by a sill of white lime- stone, and greatly enhances the effect of the whole. There are benches with backs not only in the bottom row, but also above and below the diazoma. The acoustic properties of the theatre are extraordinarily good, a speaker in the orchestra being heard through- out the auditorium without raising his voice. The stage buildings are not preserved much above their foundations, and show signs of later repairs; but their general character can be clearly seen. They consist of a long rectangular building, with a proscenium or column front which almost forms a tangent to the circle of the orchestra; at the middle and at either end of this proscenium are doors leading into the orchestra, those at the end set in projecting wings; the top of the proscenium is approached by a ramp, of which the lower part is still preserved, running parallel to the parodi, but sloping up as they slope down. The proscenium was originally about 14 ft. high and 12 ft. broad; so corresponding approximately to the Greek stage as described by Vitruvius. M. Kavvadias, who excavated the theatre, believes that the proscenium is contem- porary with the rest of the theatre, which, like the Tholos, was built by Polyclitus (the younger) ; but Professor W. Dorpfeld maintains that it is a later addition. In any case, the theatre at Epidaurus ranks as the most typical of Greek theatres, both from the simplicity of its plan and the

beauty of its proportions.

See Pausanias i. 20, ; Expedition de la Moree, ii. ; Curtius, Peloponnesus, ii. ; Transactions of Roy. Soc. of Lit., 2nd series, vol. ii.; Weclawski, De rebus Epidauriorum (Posen, 1854).

The excavations at the Hieron have been recorded as they went on in'the HpaKTiKa of the Greek Archaeological Society, especially for l88l-l884and 1889, and also in the 'EjyquepU 'A-p%a1.0X0y1.K-q, especially for 1883 and 1885; see also Kavvadias, Les Fouilles d' Epidaure and TA '\tpbv rov "Ao-kXtjxioD iv 'ETiSavpco Kal 77 Bepamia rS>v aodtvGiv ; Def rasse and Lechat, j&pidaure. A museum was completed in 1910.

2. A city of Peloponnesus on the east coast of Laconia, distinguished by the epithet of Limera (either " The Well-havened " or " The Hungry "). It was founded by the people of Epidaurus the Holy, and its principal temples were those of Asclepius and Aphrodite. It was abandoned during the middle ages; its inhabitants took posession of the promontory of Minoa, turned it into an island, and built and fortified thereon the city of Monembasia, which became the most flourishing of all the towns in the Morea, and gave its name to the well-known Malmsey or Malvasia wine. The ruins of Epidaurus are to be seen at the place now called Palaea Monemvasia.

A third Epidaurus was situated in Illyricum, on the site of the present Ragusa Vecchia; but it is not mentioned till the time of the civil wars of Pompey and Caesar, and has no special interest. (E. Gr.)

EPIDIORITE, in petrology, a typical member of a family of rocks consisting essentially of hornblende and felspar, often with epidote, garnet, sphene, biotite, or quartz, and having usually a foliated structure. The term is to some extent synonymous with " amphibolite " and " hornblende-schist." These rocks are metamorphic, and though having a mineral constitution somewhat similar to that of diorite, they have been produced really from rocks of more basic character, such as diabase, dolerite and gabbro. They occur principally among the schists, slates and gneisses of such districts as the Scottish Highlands, the north-west of Ireland, Brittany, the Harz, the Alps, and the crystalline ranges of eastern N. America. Their hornblende in microscopic section is usually dark green, rarely brownish; their felspar may be clear and recrystallized, but more frequently is converted into a turbid aggregate of epidote, zoisite, quartz, sericite and albite. In the less complete stages of alteration, ophitic structure may persist, and the original augite of the rock may

not have been entirely replaced by

hornblende. Pink or brownisn garnets are common and may be an inch or two in diameter. The iron oxides, originally ilmenite, are usually altered to sphene. Biotite, if present, is brown; epidote is yellow or colourless; rutile, apatite and quartz all occur with some frequency. The essential minerals, hornblende and felspar, rarely show crystalline outlines, and this is generally true also of the others. The rocks may be fine grained, so that their constituents are hardly visible to the unaided eye; or may show crystals of hornblende an inch in length. Their prevalent colour is dark green and they weather with brown surfaces. In many parts of the world epidiorites and the quartz veins which sometimes occur in them have proved to be auriferous. As they are tough, hard rocks, when fresh, they are well suited for use as road-mending stones. (J. S. F.)

EPIDOSITE, in petrology, a typical member of a family of metamorphic rocks composed mainly of epidote and quartz. In colour they are pale yellow or greenish yellow, and they are hard and somewhat brittle. They may occur in more than one way and are derived from several kinds of rock. Some have been epidotic grits and sandstones; others are limestones which have undergone contact-alteration; probably the majority, however, are allied to epidiorite and amphibolite, and are local modifications of rocks which were primarily basic intrusions or lavas. The sedimentary epidosites occur with mica-schists, sheared grits and granulitic gneisses; they often show, on minute examination, the remains of clastic structures. The epidosites derived from limestones may contain a great variety of minerals such as calcite, augite, garnet, scapolite, &c, but their source may usually be inferred from their close association with calc-silicate rocks in the field. The third group of epidosites may form bands, veins, or irregular streaks and nodules in masses of epidiorite and hornblende-schist. In microscopic section they are often merely a granular mosaic of quartz and epidote with some iron oxides and chlorite, but in other cases they retain much of the structure of the originaf rock though there has been a complete replacement of the former minerals by new ones. Epidosites when streaked and variegated have been cut and polished as ornamental stones. They are translucent and hard, and hence serve for brooch stones, and the simpler kinds of jewelry. These rocks occasionally carry gold in visible yellow specks. (J. S. F.)

EPIDOTE, a mineral species consisting of basic calcium, aluminium and iron orthosilicate, Ca 2 (A10H)(Al,Fe) 2 (Si0 4)3, crystallizing in the monoclinic system. Well-developed crystals are of frequent occurrence: they are commonly prismatic in habit, the direction of elongation being perpendicular to the single plane of symmetry. The faces lettered M, T and r in the figure are often deeply striated in the same direc- tion: M is a direction of perfect cleavage, and T of imperfect cleavage: crystals are often twinned on the face T. Many of the characters of the mineral vary with the amount of iron present (Fe 2 3 ,5-i7%), for instance, the colour, the optical constants, and the specific gravity (3-3-3-5). The hardness is 65. The colour is green, grey, brown or nearly black, but usually a characteristic shade of yellowish-green or pistachio-green. The pleochroism is strong, the pleochroic colours being usually green, yellow and brown. The names thallite (from 0aXX6s, " a young shoot ") and pistacite (from Tri.arb.Kia, " pistachio nut ") have reference to the colour. The name epidote is one of R. J. Hauy's crystallographic names, and is derived from eirLSoats, "increase," because the base of the primitive prism has one side longer than the other. Several other names (achmatite, bucklandite, escherite, puschkinite, &c.) have been applied to this species. Withamite is a carmine-red to straw-yellow, strongly pleochroic variety from Glencoe in Scotland. Fouqueite and clinozoisite are white or pale rose-red varieties containing very little iron, thus having the same chemical composition as the orthorhombic mineral zoisite (q.v.). Epidote is an abundant rock-forming mineral, but one of

secondary origin. It occurs in crystalline limestones and schistose rocks of metamorphic origin; and is also a product of weathering of various minerals (felspars, micas, pyroxenes, amphiboles, garnets, &c.) composing igneous rocks. A rock composed of quartz and epidote is known as epidosite. Well-developed crystals are found at many localities, of which the following may be specially mentioned: Knappenwand, near the Gross- Venediger in the Untersulzbachthal in Salzburg, as magnificent, dark green crystals of long prismatic habit in cavities in epidote- schist, with asbestos, adularia, calcite, and apatite; the Ala valley and Traversella in Piedmont; Arendal in Norway (arendalite) ; Le Bourg d'Oisans in Dauphine (oisanite and delphinite); Haddam in Connecticut; Prince of Wales Island in Alaska, here as large, dark green, tabular crystals with copper ores in metamorphosed limestone.

The perfectly transparent, dark green crystals from the Knappenwand and from Brazil have occasionally been cut as gem-stones.

Belonging to the same isomorphous group with epidote are the species piedmontite and allanite, which may be described as manganese and cerium epidotes respectively.

Piedmontite has the composition Ca 2 (A10H)(Fe,Mn) 2 (Si0 4) 3 ; it occurs as small, reddish-black, monoclinic crystals in the manganese mines at San Marcel, near Ivrea in Piedmont, and in crystalline schists at several places in Japan. The purple colour of the Egyptian porfido rosso antico is due to the presence of this mineral.

Allanite has the same general formula R 2 ”(R‘“OH)R 2 ”’(Si0 4)3, where R” represents calcium and ferrous iron, and R’” aluminium, ferric iron and metals of the cerium group. In external appear- ance it differs widely from epidote, being black or dark brown in colour, pitchy in lustre, and opaque in the mass; further, there is little or no cleavage, and well-developed crystals are rarely met with. The crystallographic and optical characters are similar to those of epidote; the pleochroism is strong with reddish-, yellowish-, and greenish-brown colours. Although not a common mineral, allanite is of fairly wide distribution as a primary accessory constituent of many crystalline rocks, e.g. gneiss, granite, syenite, rhyolite, andesite, &c. It was first found in the granite of east Greenland and described by Thomas Allan in 1808, after whom the species was named. Allanite is a mineral readily altered by hydration, becoming optically isotropic and amorphous: for this reason several varieties have been distinguished, and many different names applied. Orthite, from bpdbs, ” straight,” was the name given by J. J. Berzelius in 1818 to a hydrated form found as slender prismatic crystals, sometimes a foot in length, at Finbo, near Falun in Sweden. (L. J. S.)

EPIGONI (” descendants “), in Greek legend, the sons of the seven heroes who fought against Thebes (see Adrastus). Ten years later, to avenge their fathers, the Epigoni undertook a second expedition, which was completely successful. Thebes was forced to surrender and razed to the ground. In early times the war of the Epigoni was a favourite subject of epic poetry. The term is also applied to the descendants of the Diadochi, the successors of Alexander the Great.

EPIGONION (Gr. bnyoveiov), an ancient stringed instrument mentioned in Athenaeus 183 C, probably a psaltery. The epigonion was invented, or at least introduced into Greece, by Epigonus, a Greek musician of Ambracia in Epirus, who was admitted to citizenship at Sicyon as a recognition of his great musical ability and of his having been the first to pluck the strings with his fingers,

instead of using the plectrum. 1 The instrument, which Epigonus named after himself, had forty strings. 2 It was undoubtedly a kind of harp or psaltery, since in an instrument of so many strings some must have been of different lengths, for tension and thickness only could hardly have produced forty different sounds, or even twenty, supposing that they were arranged in pairs of unisons. Strings of varying lengths require

a Michael Praetorius, Syntagma musicum, torn. I, c. 13, p. 380: Salomon van Til, Sing-Dicht und Spiel-Kunst, p. 95. 2 Pollux, Onomasticon, lib. iv. cap. 9, 59.

a frame like that of the harp, or of the Egyptian cithara which had one of the arms supporting the cross bar or zugon shorter than the other, 1 or else strings stretched over harp-shaped bridges on a sound-board in the case of a psaltery. Juba II., king of Mauretania, who reigned from 30 B.C., said (ap. Athen. I.e.) that Epigonus brought the instrument from Alexandria and played upon it with the fingers of both hands, not only using it as an accompaniment to the voice, but introducing chromatic passages, and a chorus of other stringed instruments, probably citharas, to accompany the voice. Epigonus was also a skilled citharist and played with his bare hands without plectrum. 2 Unfortunately we have no record of when Epigonus lived. Vincenzo Galilei 3 has given us a description of the epigonion accompanied by an illus- tration, representing his conception of the ancient instrument, an upright psaltery with the outline of the clavicytherium (but no keyboard). (K. S.)

EPIGRAM, properly speaking, anything that is inscribed. Nothing could be more hopeless, however, than an attempt to discover or devise a definition wide enough to include the vast multitude of little poems which at one time or other have been honoured with the title of epigram, and precise enough to exclude all others. Without taking account of its evident misapplications, we find that the name has been given — first, in strict accordance with its Greek etymology, to any actual inscription on monument, statue or building; secondly, to verses never intended for such a purpose, but assuming for artistic reasons the epigraphical form; thirdly, to verses expressing with something of the terse- ness of an inscription a striking or beautiful thought; and fourthly, by unwarrantable restriction, to a little poem end- ing in a "point," especially of the satirical kind. The last of

these has obtained considerable popularity from the well-known lines —

" The qualities rare in a bee that we meet In an epigram never should fail; The body should always be little and sweet, And a sting should be left in its tail " —

which represent the older Latin of some unknown writer — " Omne epigramma sit instar apis: sit aculeus illi; Sint sua mella; sit et corporis exigui."

Attempts not a few of a more elaborate kind have been made to state the essential element of the epigram, and to classify existing specimens; but, as every lover of epigrams must feel, most of them have been attended with very partial success. Scaliger, in the third book of his Poetics, gives a fivefold division, which displays a certain ingenuity in the nomenclature but is very superficial : the first class takes its name from mel, or honey, and consists of adulatory specimens; the second from fel, or gall; the third from acetum, or vinegar; and the fourth from sal, or salt ; while the fifth is styled the condensed, or multiplex. This classification is adopted by Nicolaus Mercerius in his De conseribendo epigrammate (Paris, 1653); but he supplemented it by another of much more scientific value, based on the figures of the ancient rhetoricians. Lessing, in the preface to his own epigrams, gives an interesting treatment of the theory, his principal doctrine being practically the same as that of several of his less eminent predecessors, that there ought to be two parts more or less clearly distinguished, — the first awakening the reader's attention in the same way as an actual monument might do, and the other satisfying his curiosity in some unex- pected manner. An attempt was made by Herder to increase the comprehensiveness and precision of the theory; but as he him- self confesses, his classification is rather vague — the expository, the paradigmatic, the pictorial, the impassioned, the artfully turned, the illusory, and the swift. After all, if the arrangement according to authorship be rejected, the simplest and most satisfactory is according to subjects. The epigram is one of the most catholic of literary forms, and lends itself to the expression of almost any feeling or thought. It may be an elegy, a satire, or a love-poem in miniature, an embodiment

1 For an illustration, see Kathleen Schlesinger, Orchestral Instru- ments, part ii. " Precursors of the Violin Family," fig. 165, p. 219.

2 Athenaeus, iv. p. 183 d. and xiv. p. 638 a.

11 Dialogo delta musica antica e moderna, ed. 1602, p. 40.

of the wisdom of the ages, a bon-mot set off with a couple of rhymes.

" I cannot tell thee who lies buried here; No man that knew him followed by his bier; The winds and waves conveyed him to this shore, Then ask the winds and waves to tell thee more."

Anonymous- " Wherefore should I vainly try

To teach thee what my love will be In after years, when thou and I

Have both grown old in company, If words are vain to tell thee how, Mary, I do love thee now? "

Anonymous. " O Bruscus, cease our aching ears to vex, With thy loud railing at the softer sex; No accusation worse than this could be, That once a woman did give birth to thee."

Acinus. " Treason doth never prosper. What's the reason? For if it prospers none dare call it treason."

Harrington. " Ward has no heart they say, but I deny it; He has a heart, and gets his speeches by it."

Rogers. From its very brevity there is no small danger of the epigram passing into childish triviality: the paltriest pun, a senseless anagram, is considered stuff enough and to spare. For proof of this there is unfortunately no need to look far; but perhaps the reader could not find a better collection ready to his hand than the second twenty-five of the Epigrammatum centuriae of Samuel Erichius; by the time he reaches No. n of the 47th century, he will be quite ready to grant the appropriateness of the identity maintained between the German Seele, or soul, and the German Esel, or ass.

Of the epigram as cultivated by the Greeks an account is given in the article Anthology, discussing those wonderful collections which bid fair to remain the richest of their kind. The delicacy and simplicity of so much ofVhat has been preserved is perhaps their most striking feature; and one cannot but be surprised at the number of poets proved capable of such work. In Latin literature, on the other hand, the epigrammatists whose work has been preserved are comparatively few, and though several of them, as Catullus and Martial, are men of high literary genius, too much of what they have left behind is vitiated by brutality and obscenity. On the subsequent history of the epigram, indeed, Martial has exercised an influence as

baneful as it is extensive, and he may fairly be counted the far-off progenitor of a host of scurrilous verses. Nearly all the learned Latinists of the 16th and 17th centuries may claim admittance into the list of epigrammatists, — Bembo and Scaliger, Buchanan and More, Stroza and Sannazaro. Melanchthon, who succeeded in combining so much of Pagan culture with his Reformation Christianity, has left us some graceful specimens, but his editor, Joannes Major Joachimus, has so little idea of what an epigram is, that he includes in his collection some translations from the Psalms. The Latin epigrams of Etienne Pasquier were among the most admirable which the Renaissance produced in France. John Owen, or, as he Latinized his name, Johannes Audoenus, a Cambro-Briton, attained quite an unusual celebrity in this department, and is regularly distinguished as Owen the Epi- grammatist. The tradition of the Latin epigram has been kept alive in England by such men as Porson, Vincent Bourne and Walter Savage Landor. Happily there is now little danger of any too personal epigrammatist suffering the fate of Niccolo Franco, who paid the forfeit of his life for having launched his venomous Latin against Pius V., though he may still incur the milder penalty of having his name inserted in the Index Ex- purgatorius, and find, like John Owen, that he consequently has lost an inheritance.

In English literature proper there is no writer like Martial in Latin or Logau in German, whose fame is entirely due to his epigrams; but several even of those whose names can perish never have not disdained this diminutive form. The designa- tion epigram, however, is used by earlier English writers with excessive laxity, and given or withheld without apparent reason.

The epigrams of Robert Crowley (1550) and of Henry Parrot (1613) are worthless so far as form goes. John Weever's collection (1 599) is of interest mainly because of its allusion to Shakespeare. Ben Jonson furnishes a number of noble examples in his Under- woods; and one or two of Spenser's little poems and a great many of Herrick's are properly classed as epigrams. Cowley, Waller, Dryden, Prior, Parnell, Swift, Addison, Johnson, Gold- smith and Young have all been at times successful in their epigrammatical attempts; but perhaps none of them has proved himself so much " to the manner born " as Pope, whose name indeed is almost identified with the epigrammatical spirit in English literature. Few English modern poets

have followed in .his footsteps, and though nearly all might plead guilty to an epigram or two, there is no one who has a distinct reputation as an epigrammatist. Such a reputation might certainly have been Landor's, had he not chosen to write the best of his minor poems in Latin, and thus made his readers nearly as select as his language.

The French are undoubtedly the most successful cultivators of the " salt " and the. " vinegar " epigram; and from the 16th century downwards many of their principal authors have earned no small celebrity in this department. The epigram was intro- duced into French literature by Mellin de St Gelais and Clement Marot. It is enough to mention the names of Boileau, J. B. Rousseau, Lebrun, Voltaire, Marmontel, Piron, Rulhiere, and M. J. Chenier. In spite of Rapin's dictum that a man ought to be content if he succeeded in writing one really good epigram, those of Lebrun alone number upwards of 600, and a very fair proportion of them would doubtless pass muster even with Rapin himself. If Piron was never anything better, " pas meme academicien," he appears at any rate in Grimm's phrase to have been "une machine a, saillies, a epigrammes, et a bons mots." Perhaps more than anywhere else the epigram has been recognized in France as a regular weapon in literary and political contests, and it might not be altogether a hopeless task to compile an epigrammatical history from the Revolution to the present time.

While any fair collection of German epigrams will furnish examples that for keenness of wit would be quite in place in a French anthology, the Teutonic tendency to the moral and didactic has given rise to a class but sparingly represented in French. The very name of Sinngedichte bears witness to this peculiarity, which is exemplified equally by the rude priameln or proeameln, of the 13th and 14th centuries and the polished lines of Goethe and Schiller. Logau published his Deutsche Sinngetichte Drey Tausend in 1654, and Wernicke no fewer than six volumes of Ueberschriften oder Epigrammata in 1697; Kastner's Sinngedichte appeared in 1 782, and Haug and Weissen's Epigrammatische Anthologie in 1804. Kleist, Opitz, Gleim, Hagedorn, Klopstock and A. W. Schlegel all possess some reputation as epigrammatists; Lessing is facile princeps in the satirical style ; and Herder has the honour of having enriched his language with much of what is best from Oriental and classical sources.

It is often by no means easy to trace the history of even a single epigram, and the investigator soon learns to be cautious of congratulating himself on the attainment of a genuine original. The

same point, refurbished and fitted anew to its tiny shaft, has been shot again and again by laughing cupids or fierce-eyed furies in many a frolic and many a fray. During the period when the epigram was the favourite form in Germany, Gervinus tells us how the works, not only of the Greek and Roman writers, but of Neo-Latinists, Spaniards, Dutchmen, Frenchmen, Englishmen and Poles were ransacked and plundered; and the same process of pillage has gone on in a more or less modified degree in other times and countries. Very noticeable often are the modifications of tone and expression occasioned by national and individual characteristics; the simplicity of the prototype may become common-place in the imitation, the sublime be distorted into the grotesque, the pathetic degenerate into the absurdly senti- mental; or on the other hand, an unpromising motif may be happily developed into unexpected beauty. A good illustration of the variety with which the same epigram may be translated

and travestied is afforded by a little volume published in Edin- burgh in 1808, under the title of Lucubrations on the Epigram —

*Et nlv r\v ixaBelv & Set iradtlv, Kal fir/ ttaBtiv, KaKbv fjv to iiadtif ti 5k Set iradeiv a 8′ fiv nadtiv, rl Set nadeliff' XPV 7< *p iratieii/.*

The two collections of epigrams most accessible to the English reader are Booth 's Epigrams, Ancient and Modern (1863) and Dodd's The Epigrammatists (1870). In the appendix to the latter is a pretty full bibliography, to which the following list may serve as a supple- ment : — Thomas Corraeus, De toto eo poematis genere quod epigramma dicitur (Venice, 1569; Bologna, 1590); Cottunius, De conficiendo epigrammate (Bologna, 1632) ; Vincentius Callus, Opusculum de epigrammate (Milan, 1641); Vavassor, De epigrammate liber (Paris, 1669); Gedanke von deutschen Epigrammatibus (Leipzig, 1698); Doctissimorum nostra aetate Italorum epigrammata; Flaminii Moleae Naugerii, Cottae, Lampridii, Sadoleti, el aliorum, cura Jo. Gagnaei (Paris, c. 1550); Brugiere de Barante, Recueil des plus belles ipi- grammes des po'etes frangais (2 vols., Paris, 1698) ; Chr. Aug. Heumann, Anthologia Latina: hoc est, epigrammata partim a priscis partim junioribus a poetis (Hanover, 1721); Fayolle, Acontologie ou diction- naire d'epigrammes (Paris, 1817); Geijsbeck, Epigrammatische Anthologie, Sauvage, Les Guepes gauloises: petit encyclopedie des meilleurs epigrammes, fr'c, depuis Clement Marot jusqu'aux poetes de nos jours (1859) ; La Recreation et passe-temps des tristes: recueil d' epigrammes et de petits contes en vers reimprime sur I'edition de Rouen 1595, &c. (Paris, 1863). A large number of epigrams and much miscellaneous information in regard

to their origin, applica- tion and translation is scattered through Notes and Queries.

See also an article in The Quarterly Review, No. 233.

EPIGRAPHY (Gr. hrl, on, and jpcˆjxiv, to write), a term used to denote (1) the study of inscriptions collectively, and (2) the science connected with the classification and explanation of inscriptions. It is sometimes employed, too, in a more con- tracted sense, to denote the palaeography, in inscriptions. Generally, it is that part of archaeology which has to do with inscriptions engraved on stone, metal or other permanent material (not, however, coins, which come under the heading Numismatics).

See Inscriptions; Palaeography.

EPILEPSY (Gr. bri, upon, and Xafifiavuv, to seize), or Falling Sickness', a term applied generally to a nervous disorder, characterized by a fit of sudden loss of consciousness, attended with convulsions. There may, however, exist manifestations of epilepsy much less marked than this, yet equally characteristic of the disease; while, on the other hand, it is to be borne in mind that many other attacks of a convulsive nature have the term " epileptic " or " epileptiform " applied to them.

Epilepsy was well known in ancient times, and was regarded as a special infliction of the gods, hence the names morbus sacer, morbus divus. It was also termed morbus Herculeus, from Hercules having been supposed to have been epileptic, and morbus comitialis, from the circumstance that when any member of the forum was seized with an epileptic fit the assembly was broken up. Morbus caducus, morbus lunaticus astralis, morbus demoniacus] morbus major, were all terms employed to designate epilepsy.

There are three well-marked varieties of the epileptic seizure; to these the terms le grand mat, le petit mat and Jacksonian epilepsy are usually applied. Any of these may exist alone, but the two former may be found to exist in the same individual. The first of these, if not the more common, is at least that which attracts the most attention, being what is generally known as an epileptic fit.

Although in most instances such an attack comes on suddenly, it is in many cases preceded by certain premonitory indications or warnings, which may be present for a greater or less time previously. These are of very varied character, and may be in the form of some

temporary change in the disposition, such as unusual depression or elevation of spirits, or of some alteration in the look. Besides these general symptoms, there are frequently peculiar sensations which immediately precede the onset of the fit, and to such the name of aura epileptica is applied. In its strict sense this term refers to a feeling of a breath of air blowing upon some part of the body, and passing upwards towards the head. This sensation, however, is not a common one, and the term has now come to be applied to any peculiar feeling which the

patient experiences as a precursor of the attack. The so-called aura may be of mental character, in the form of an agonizing feeling of momentary duration; of sensorial character, in the form of pain in a limb or in some internal organ, such as the stomach, or morbid feeling connected with the special senses; or, further, of motorial character, in the form of contractions or trembling in some of the muscles. When such sensations affect a limb, the employment of firm compression by the hand or by a ligature occasionally succeeds in warding off an attack. The aura may be so distinct and of such duration as to enable the patient to lie down, or seek a place of safety before the fit comes on.

The seizure is usually preceded by a loud scream or cry, which is not to be ascribed, as was at one time supposed, to terror or pain, but is due to the convulsive action of the muscles of the larynx, and the expulsion of a column of air through the narrowed glottis. If the patient is standing he immediately falls, and often sustains serious injury. Unconsciousness is complete, and the muscles generally are in a state of stiffness or tonic contraction, which will usually be found to affect those of one side of the body in particular. The head is turned by a series of jerks towards one or other shoulder, the breathing is for the moment arrested, the countenance first pale then livid, the pupils dilated and the pulse rapid. This, the first stage of the fit, generally lasts for about half a minute, and is followed by the state of clonic (i.e. tumultuous) spasm of the muscles, in which the whole body is thrown into violent agitation, occasionally so great that bones may be fractured or dislocated. The eyes roll wildly, the teeth are gnashed together, and the tongue and cheeks are often severely bitten. The breathing is noisy and laborious, and foam (often tinged with blood) issues from the mouth, while the contents of the bowels and bladder are ejected. The aspect of the patient in

this condition is shocking to witness, and the sight has been known to induce a similar attack in an onlooker. This stage lasts for a period varying from a few seconds to several minutes, when the convulsive movements gradually subside, and relaxation of the muscles takes place, together with partial return of consciousness, the patient looking confusedly about him and attempting to speak. This, however, is soon followed by drowsiness and stupor, which may continue for several hours, when he awakes either apparently quite recovered or fatigued and depressed, and occasionally in a state of excitement which sometimes assumes the form of mania.

Epileptic fits of this sort succeed each other with varying degrees of frequency, and occasionally, though not frequently, with regular periodicity. In some persons they only occur once in a lifetime, or once in the course of many years, while in others they return every week or two, or even are of daily occurrence, and occasionally there are numerous attacks each day. Accord- ing to Sir J. R. Reynolds, there are four times as many epileptics who have their attacks more frequently than once a month as there are of those whose attacks recur at longer intervals. When the fit returns it is not uncommon for one seizure to be followed by another within a few hours or days; Occasionally there occurs a constant succession of attacks extending over many hours, and with such rapidity that the patient appears as if he had never come out of the one fit. The term status epilepticus is applied to this condition, which is sometimes "followed with fatal results. In many epileptics the fits occur during the night as well as during the day, but in some instances they are entirely nocturnal, and it is well known that in such cases the disease may long exist and yet remain unrecognized either by the patient or the physician.

The second manifestation of epilepsy, to which the names epilepsia mitior or le petit mat are given, differs from that above described in the absence of the convulsive spasms. It is also termed by some authors epileptic vertigo (giddiness), and consists essentially in the sudden arrest of volition and consciousness, which is of but short duration, and may be accompanied with staggering or some alteration in position or motion, or may simply exhibit itself in a look of absence or confusion, and should the patient happen to be engaged in conversation, by an abrupt

termination of the act. In general it lasts but a few seconds, and the individual resumes his occupation without perhaps being aware of anything having been the matter. In some instances there is a degree of spasmodic action in certain muscles which may cause the patient to make some unexpected movement, such as turning half round, or

walking abruptly aside, or may show itself by some unusual expression of countenance, such as squinting or grinning. There may be some amount of aura preceding such attacks, and also of faintness following them. The petit mal most commonly co-exists with the grand mal, but has no necessary connexion with it, as each may exist alone. According to Armand Trousseau, the petit mal in general precedes the mani- festation of the grand mal, but sometimes the reverse is the case.

The third manifestation — Jacksonian epilepsy or partial ' epilepsy — is distinguished by the fact that consciousness is retained or lost late. The patient is conscious throughout, and is able to watch the march of the spasm. The attacks are usually the result of lesions in the motor area of the brain, such being caused, in many instances, by depression of the vault of the skull, due to trauma.

Epilepsy appears to exert no necessarily injurious effect upon the general health, and even where it exists in an aggravated form is quite consistent with a high degree of bodily vigour. It is very different, however, with regard to its influence upon the mind; and the question of the relation of epilepsy to insanity is one of great and increasing importance. Allusion has already been made to the occasional occurrence of maniacal excitement . as one of the results of the epileptic seizure. Such attacks, to which the name of furor epilepticus is applied, are generally accompanied with violent acts on the part of the patient, render- ing him dangerous, and demanding prompt measures of restraint. These attacks are by no means limited to the more severe form of epilepsy, but appear to be even more frequently associated with the milder form — the epileptic vertigo — where they either replace altogether or immediately follow the short period of ab- sence characteristic of this form of the disease. Numerous cases are on record of persons known to be epileptic being suddenly seized, either after or without apparent spasmodic attack, with some sudden impulse, in which they have used dangerous violence to those beside them, irrespective altogether of malevolent intention, as appears from their retaining no recollection what- ever, after the short period of excitement, of anything that had occurred; and there is reason to believe that crimes of heinous character, for which the perpetrators have suffered punishment, have been committed in a state of mind such as that now described. The subject is obviously one of the greatest medico-legal interest and importance in regard to the question of criminal responsibility.

Apart, however, from such marked and comparatively rare instances' of what is termed epileptic insanity, the general mental condition of

the epileptic is in a large proportion of cases un- favourably affected by the disease. There are doubtless examples (and their number according to statistics is estimated at less than one-third) where, even among those suffering from frequent and severe attacks, no departure from the normal condition of mental integrity can be recognized. But in general there exists some peculiarity, exhibiting itself either in the form of defective memory, or diminishing intelligence, or what is perhaps as frequent, in irregularities of temper, the patient being irritable or perverse and eccentric. In not a few cases there is a steady mental decline, which ends in dementia or idiocy. It is stated by some high authorities that epileptic women suffer in regard to their mental condition more than men. It also appears to be the case that the later in life the disease shows itself the more likely is the mind to suffer. Neither the frequency nor the severity of the seizures seem to have any necessary influence in the matter; and the general opinion appears to be that the milder form of the disease is that with which mental failure is more apt to be associated. (For a consideration of the conditions of the nervous system which result in epilepsy, see the article Neuropathology.)

The influence of hereditary predisposition in epilepsy is very

marked. It is necessary, however, to bear in mind the point so forcibly insisted on by Trousseau in relation to epilepsy, that hereditary transmission may be either direct or indirect, that is to say, that what is epilepsy in one generation may be some other form of neurosis in the next, and conversely, nervous diseases being remarkable for their tendency to transformation in their descent in families. Where epilepsy is hereditary, it generally manifests itself at an unusually early period of life. A singular fact, which also bears to some extent upon the pathology of this disease, was brought to light by Dr Brown Sequard in his experiments, namely, that the young of animals which had been artifically rendered epileptic were liable to similar seizures. In connexion with the hereditary transmission of epilepsy it must be observed that all authorities concur in the opinion that this disease is one among the baneful effects that often follow marriages of consanguinity. Further, there is reason to believe that intemperance, apart altogether from its direct effect in favouring the occurrence of epilepsy, has an evil influence in the hereditary transmission of this as of other nervous diseases. A want of symmetry in the formation of the skull and defective cerebral

development are not infrequently observed where epilepsy is hereditarily transmitted.

Age is of importance in reference to the production of epilepsy. The disease may come on at any period of life, but it appears from the statistics of Reynolds and others, that it most frequently first manifests itself between the ages of ten and twenty years, the period of second dentition and puberty, and again at or about the age of forty.

Among other causes which are influential in the development of epilepsy may be mentioned sudden fright, prolonged mental anxiety, over-work and debauchery. Epileptic fits also occur in connexion with a depraved stage of the general health, and with irritations in distant organs, as seen in the fits occurring in dentition, in kidney disease, and as a result of worms in the intestines. The symptoms traceable to these causes are some- times termed sympathetic or eccentric epilepsy; these are but rarely epileptic in the strictest sense of the word, but rather epileptiform.

Epilepsy is occasionally feigned for the purpose of extortion, but an experienced medical practitioner will rarely be deceived; and when it is stated that although many of the phenomena of an attack, particularly the convulsive movements, can be readily simulated, yet that the condition of the pupils, which are dilated during the fit, cannot be feigned, and that the impostor seldom bites his tongue or injures himself, deception is not likely to succeed even with non-medical persons of intelligence.

The medical treatment of epilepsy can only be briefly alluded to here. During the fit little can be done beyond preventing as far as possible the patient from injuring himself while unconscious- ness continues. Tight clothing should be loosened, and a cork or pad inserted between the teeth. When the fit is of long continuance, the dashing of cold water on the face and chest, or the inhalation of chloroform, or of nitrite of amyl, may be useful; in general, however, the fit terminates independently of any such measures. When the fit is over the patient should be allowed to sleep, and have the head and shoulders well raised.

In the intervals of the attack, the general health of the patient is one of the most important points to be attended to. The strictest hygienic and dietetic rules should be observed, and all such causes as have been referred to as favouring the develop- ment of the disease should, as far as possible, be avoided. In the case of children, parents must

be made to realize that epilepsy is a chronic disease, and that therefore the seizures must not be allowed to interfere unnecessarily with the child's training. The patient must be treated as such only during the attack; between times, though being carefully watched, must be made to follow a child's normal pursuits, and no distinction must be made from other children. The same applies to adults: it is far better for them to have some definite occupation, preferably one that keeps them in the open air. If such patients become irritable, then they should be placed under supervision. As regards

those who cannot be looked after at home, colonies on a self-supporting basis have been tried, and where the supervision has been intelligent the success has been proved, a fairly high level of health and happiness being attained.

The various bromides are the only medical drugs that have produced any beneficial results. They require to be given in large doses which are carefully regulated for every individual patient, as the quantities required vary enormously. Children take fair larger doses in proportion than adults. They are best given in a very diluted form, and after meals, to diminish the chances of gastric disturbance. Belladonna seems also to have some influence on the disease, and forms a useful addition; arsenic should also be prescribed at times, both as a tonic, and for the sake of the improvement it effects in those patients who develop a tendency to acne, which is one of the troublesome results of bromism. The administration of the bromides should be maintained until three years after the cessation of the fits. The occurrence of gastric pain, palpitations and loss of the palate reflex are indications to stop, or to decrease the quantity of the drug. In very severe cases opium may be required.

Surgical treatment for epilepsy is yet in its infancy, and it is too early to judge of its results. This does not apply, however, to cases of Jacksonian epilepsy, where a very large number have been operated on with marked benefit. Here the lesion of the brain is, in a very large percentage of the patients, caused by pressure from outside, from the presence of a tumour or a depressed fracture ; the removal of the one, or the elevation of the other is the obvious procedure, and it is usually followed by the complete disappearance of the seizures.

EPILOGUE. The appendix or supplement to a literary work, and in particular to a drama in verse, is called an epilogue from bri\oyos, the name given by the Greeks to the peroration of a speech. As we read in Shakespeare's Midsummer Night's Dream, the epilogue was generally treated as the apology for a play; it was a final appeal*

made to encourage the good-nature of the audiences, and to deprecate attack. The epilogue should form no part of the work to which it is attached, but should be independent of it; it should be treated as a sort of commentary. Sometimes it adds further information with regard to what has been left imperfectly concluded in the work itself. For instance, in the case of a play, the epilogue will occasionally tell us what became of the characters after the action closed; but this is irregular and unusual, and the epilogue is usually no more than a graceful way of dismissing the audience. Among the ancients the form was not cultivated, further than that the leader of the chorus or the last speaker advanced and said " Vos valete, et plaudite, cives " — " Good-bye, citizens, and we hope you are pleased." Sometimes this formula was reduced to the one word, " Plaudite ! " The epilogue as a literary species is almost entirely confined to England, and it does not occur in the earliest English plays. It is rare in Shakespeare, but Ben Jonson made it a particular feature of his drama, and may almost be said to have invented the tradition of its regular use. He employed the epilogue for two purposes, either to assert the merit of the play or to deprecate censure of its defects. In the former case, as in Cynthia's Revels (1600), the actor went off, and immediately came on again saying: —

" Gentles, be't known to you, since I went in I am turned rhymer, and do thus begin : — The author (jealous how your sense doth take His travails) hath enjoined me to make Some short and ceremonious epilogue," —

and then explained to the audience what an exremely interest- ing play it had been. In the second case, when the author was less confident, his epilogue took a humbler form, as in the comedy of Volpone (1605), where the actor said: — " The seasoning of a play is the applause. Now, as the Fox be punished by the laws, He yet doth hope, there is no suffering due For any fact which he hath done 'gainst you. If there be, censure him ; here he doubtful stands : If not, fare jovially and clap your hands."

Beaumont and Fletcher used the epilogue sparingly, but after

their day it came more and more into vogue, and the form was almost invariably that which Ben Jonson had brought into fashion,

namely, the short complete piece in heroic couplets. The hey-day of the epilogue, however, was the Restoration, and from 1660 to the decline of the drama in the reign of Queen Anne scarcely a play, serious or comic, was produced on the London stage without a prologue and an epilogue. These were almost always in verse, even if the play itself was in the roughest prose, and they were intended to impart a certain literary finish to the piece. These Restoration epilogues were often very elaborate essays or satires, and were by no means confined to the subject of the preceding play. They dealt with fashions, or politics, or criticism. The prologues and epilogues of Dryden are often brilliantly finished exercises in literary polemic. It became the custom for playwrights to ask their friends to write these poems for them, and the publishers would even come to a prominent poet and ask him to supply one for a fee. It gives us an idea of the seriousness with which the epilogue was treated that Dryden originally published his valuable " Defence of the Epilogue; or An Essay on the Dramatic Poetry of the Last Age " (1672) as a defence of the epilogue which he had written for The Conquest of Granada. In France the custom of reciting dramatic epilogues has never prevailed. French criticism gives the name to such adieux to the public, at the close of a non- dramatic work, as are reserved by La Fontaine for certain critical points in the " Fables." (E. G.)

EPIMENIDES, poet and prophet of Crete, lived in the 6th century B.C. Many fabulous stories are told of him, and even his existence is doubted. While tending his father's sheep, he is said to have fallen into a deep sleep in the Dictaean cave near Cnossus where he lived, from which he did not awake for fifty-seven years (Diogenes Laertius i. 100-115). When the Athenians were visited by a pestilence in consequence of the murder of Cylon, he was invited by Solon (596) to purify the city. The only reward he would accept was a branch of the sacred olive, and a promise of perpetual friendship between Athens and Cnossus (Plutarch, Solon, 12; Aristotle, Aih. Pol. 1). He died in Crete at an advanced age; according to his country- men, who afterwards honoured him as a god, he lived nearly three hundred years. According to another story, he was taken prisoner in a war between the Spartans and Cnossians, and put to death by his captors, because he refused to prophesy favourably for them. A collection of oracles, a theogony, an epic poem on the Argonautic expedition, prose works on purifica- tions and sacrifices, and a cosmogony, were attributed to him. Epimenides must be reckoned with Melampus and Onomacritus as one of the founders of Orphism. He is supposed to be the Cretan prophet alluded to in the epistle to Titus (i. 12).

See C. Schultess, De Epimenide Cretensi (1877); O. Kern, De Orphei, Epimenidis . . . Theogoniis (1888) ; G. Barone di Vincenzo, E. di Creta eleCredenze religiose de'suoi Tempi (1880); H. Demoulin, Apimenide de Crete . (1901); H. Diels, Die Fragmente der Vor~ sokrdtiker (1903) ; O. Kern in Pauly-Wissowa's Realencyclopadie.

EPINAL, a town on the north-eastern frontier of France, capital of the department of Vosges, 46 m. S.S.E. of Nancy on the Eastern railway between that town and Belfort. Pop. (1906), town 21,296, commune (including garrison) 29,058. The town proper — the Grande Ville — is situated on the right bank of the Moselle, which at this point divides into two arms forming an island whereon another quarter — the Petite Ville — is built. The lesser of these two arms, which is canalized, separates the island from the suburb of Hospice on its left bank. The right bank of the Moselle is bordered for some distance by pleasant promenades, and an extensive park surrounds the ruins of an old stronghold which dominated the Grande Ville from an eminence on the east. Apart from the church of St Goery (or St Maurice) rebuilt in the 13th century but preserving a tower of the 12th century, the public buildings of Epinal offer little of architectural interest. The old hospital on the island-quarter contains a museum with interesting collections of paintings, Gallo-Roman antiquities, sculpture, &c. Close by stands the library, which possesses many valuable MSS.

The fortifications of Epinal are connected to the southward

with Belfort, Dijon and Besancon, by the fortified line of the Moselle, and north of it lies the unfortified zone called the Trouie d' Epinal, a gap designedly left open to the invaders between Epinal and Toul, another great fortress which is itself connected by the Meuse forts d'arrit with Verdun and the places of the north-east. Epinal therefore is a fortress of the greatest possible importance to the defence of France, and its works, all built since 1870, are formidable permanent fortifications. " The Moselle runs from S. to N. through the middle of the girdle of forts; the fortifications of the right bank, beginning with Fort de la Mouche, near the river 3 m. above Spinal, form a chain of de- tached forts and batteries over 6 m. long from S. to N., and the northernmost part of this line is immensely strengthened by numerous advanced works between the villages of Dogneville and Longchamp. On the left bank, a larger area of ground is included in the perimeter of defence for the purposes of encamp- ment, the most westerly of the forts, Girancourt, being 7 m. distant from Epinal; from the lower Moselle to Girancourt the works are grouped principally about Uxegney and Sarchey; from Girancourt to

the upper river and Fort de la Mouche a long ridge extends in an arc, and on this south-western section the principal defence is Fort Ticha and its annexes. The circle of forts, which has a perimeter of nearly 30 m., was in 1895 re- inforced by the construction of sixteen new works, and the area of ground enclosed and otherwise protected by the defences of Epinal is sufficiently extensive to accommodate a large army.

Epinal is the seat of a prefect and of a court of assizes and has tribunals of first instance and of commerce, a board of trade-arbitrators, a chamber of commerce, training-colleges, a com- munal college and industrial school, and exchange and a branch of the Bank of France. The town, which is important as the centre of a cotton-spinning region, carries on cotton-spinning, -weaving and printing, brewing and distilling, and the manufacture of machinery and iron goods, glucose, embroidery, hats, wall paper and tapioca. An industry peculiar to Epinal is the pro- duction of cheap images, lithographs and engravings. There is also trade in wine, grain, live-stock and starch products made in the vicinity. Epinal is an important junction on the Eastern railway.

Epinal originated towards the end of the 10th century with the founding of a monastery by Theodoric (Dietrich) I., bishop of Metz, whose successors ruled the town till 1444, when its inhabitants placed themselves under the protection of King Charles VII. In 1466 it was transferred to the duchy of Lorraine, and in 1766 it was, along with that duchy, incorporated with France. It was occupied by the Germans on the 1 2th of October 1870 after a short fight, and until the 15th was the headquarters of General von Werder.

EPINAOS (Gr. evl, after, and vaos, a temple), in architecture, the open vestibule behind the nave. The term is not found in any classic author, but is a modern coinage, originating in Germany, to differentiate the feature from " opisthodomus," which in the Parthenon was an enclosed chamber.

EPINAY, LOUISE FLORENCE PETRONILLE TARDIEU D'ESCLAVELLES D' (1726-1783), French writer, was born at Valenciennes on the nth of March 1726. She is well known on account of her liaisons with Rousseau and Baron von Grimm, and her acquaintanceship with Diderot, D'Alembert, D'Holbach and other French men of letters. Her father, Tardieu d'Esclavelles, a brigadier of infantry, was killed in battle when she was nineteen; and she married her cousin Denis Joseph de La Live d'Epinay, who was made a collector-general of taxes. The marriage was an unhappy one; and

Louise d'Epinay believed that the prodigality, dissipation and infidelities of her husband justified her in obtaining a formal separation in 1749. She settled in the chateau of La Chevrette in the valley of Montmorency, and there received a number of distinguished visitors. Conceiving a strong attachment for J. J. Rousseau, she furnished for him in 1756 in the valley of Montmorency a cottage which she named the "Hermitage," and in this retreat he found for a time the quiet and natural rural pleasures he praised so highly. Rousseau, in his Confessions, affirmed that

the inclination was all on her side; but as, after her visit to Geneva, Rousseau became her bitter enemy, little weight can be given to his statements on this point. Her intimacy with Grimm, which began in 1755, marks a turning-point in her life, for under his influence she escaped from the somewhat compromising conditions of her life at La Chevrette. In 1757-1759 she paid a long visit to Geneva, where she was a constant guest of Voltaire. In Grimm's absence from France (1775-17 76), Madame d'Epinay continued, under the superintendence of Diderot, the corre- spondence he had begun with various European sovereigns. She spent most of her later life at La Briche, a small house near La Chevrette, in the society of Grimm - and of a small circle of men of letters. She died on the 17th of April 1783. Her Conversations d'Emilie (1774), composed for the education of her grand-daughter, Emilie de Belsunce, was crowned by the French Academy in 1783. The Memoires et Correspondance de Mme d'Epinay, renfermant un grand nombre de leltres inedites de Grimm, de Diderot, et de J.-J . Rousseau, ainsi que des dStails, &c, was published at Paris (1818) from a MS. which she had bequeathed to Grimm. The Memoires are written by herself in the form of a sort of autobiographic romance. Madame d'Epinay figures in it as Madame de Montbrillant, and Rene is generally recognized as Rousseau, Volx as Grimm, Gamier as Diderot. All the letters and documents published along with the Memoires are genuine. Many of Madame d'Epinay's letters are contained in the Correspondance de I' abbe Galiani (1818). Two anonymous works, Lettres a mon fits (Geneva, 1758) and Mes moments heureux (Geneva, 1759), are also by Madame d'Epinay.

See Rousseau's Confessions ; Lucien Perey [Mile Herpin] and Gaston Maugras, La Jeunesse de Mme d'Epinay, les dernieres annees de Mme d'Epinay (1882-1883); Sainte-Beuve, Causeries du lundi, vol.

ii. ; Edmond Scherer, Eludes sur la litlerature contemporaine, vols. iii. and vii. There are editions of the Memoires by L. Enault (1855) and by P. Boiteau (1865); and an English translation, with introduction and notes (1897), by J. H. Freese.

EPIPHANIUS, SAINT (c. 3 1 5-402) , a celebrated Church Father, born in the beginning of the 4th century at Bezanduca, a village of Palestine, near Eleutheropolis. He is said to have been of Jewish extraction. In his youth he resided in Egypt, where he began an ascetic course of life, and, freeing himself from Gnostic influences, invoked episcopal assistance against heretical thinkers, eighty of whom were driven from the cities. On his return to Palestine he was ordained presbyter by the bishop of Eleuther- opolis, and became the president of a monastery which he founded near his native place. The account of his intimacy with the patriarch Hilarion is' not trustworthy. In 367 he was nominated bishop of Constantia, previously known as Salamis, the metropolis of Cyprus — an office which he held till his death in 402. Zealous for the truth, but passionate and bigoted, he devoted himself to two great labours, namely, the spread of the recently estab- lished monasticism, and the confutation of heresy, of which he regarded Origen and his followers as the chief representatives. The first of the Origenists that he attacked was John, bishop of Jerusalem, whom he denounced from his own pulpit at Jerusalem (394) in terms so violent that the bishop sent his archdeacon to request him to desist ; and afterwards, instigated by Theophilus, bishop of Alexandria, he proceeded so far as to summon a council of Cyprian bishops to condemn the errors of Origen. In his closing years he came into conflict with Chrysostom, the patriarch of Constantinople, who had given temporary shelter to four Nitrian monks whom Theophilus had expelled on the charge of Origenism. The monks gained the support of the empress Eudoxia, and when she summoned Theophilus to Constantinople that prelate forced the aged Epiphanius to go with him. He had some controversy with Chrysostom but did not stay to see the result of Theophilus's machinations, and died on his way home. The principal work of Epiphanius is the Panarion, or treatise on heresies, of which he also wrote an abridgment. It is a " medicine chest " of remedies for all kinds of heretical belief, of which he names eighty varieties. His accounts of the earlier errors (where he has preserved for us large excerpts from the original Greek of Irenaeus) are more reliable than those of contemporary heresies. In his desire to see the Church safely moored he also wrote the

Ancoratus, or discourse on the true faith. His encyclopaedic learning shows itself in a treatise on Jewish weights and measures, and

another (incomplete) on ancient gems. These, with two epistles to John of Jerusalem and Jerome, are his only genuine remains. He wrote a large number of works which are lost. In allusion to his knowledge of Hebrew, Syriac, Egyptian, Greek and Latin, Jerome styles Epiphanius JlevTa'y'Kuaaos (Five-tongued) ; but if his knowledge of languages was really so extensive, it is certain that he was utterly destitute of critical and logical power. His early asceticism seems to have imbued him with a love of the marvellous; and his religious zeal served only to increase his credulity. His erudition is outweighed by his prejudice, and his inability to recognize the responsibilities of authorship makes it necessary to assign most value to those portions of his works which he simply cites from earlier writers.

The primary sources for the life are the church histories of Socrates and Sozomen, Palladius's De vita Chrysostomi and Jerome's De vir. illust. 114. Petau (Petavius) published an edition of the works in 2 vols. fol. at Paris in 1622; cf. Migne, Patr. Graec. 41-43. The Panarion and other works were edited by F. Oehler (Berlin, 1859-1861). For more recent work especially on the fragments see K. Bonwetsch's art. in Herzog-Hauck's Realencyk. v. 417.

Other theologians of the same name were: (1) Epiphanius Scholasticus, friend and helper of Cassiodorus; (2) Epiphanius, bishop of Ticinum (Pavia), c. 438-496; (3) Epiphanius, bishop of Constantia and Metropolitan of Cyprus (the Younger), c. a.d. 680, to whom some critics have ascribed certain of the works supposed to have been written by the greater Epiphanius ; (4) Epiphanius, bishop of Constantia in the 9th century, to whom a similar attribution has been made.

EPIPHANY, FEAST OF. The word epiphany, in Greek, signifies an apparition of a divine being. It was used as a singular or a plural, both in its Greek and Latin forms, according as one epiphany was contemplated or several united in a single commemoration. For in the East from an early time were associated with the feast of the Baptism of Christ commemora- tions of the physical birth, of the Star of the Magi, of the miracles of Cana, and of the feeding of the five thousand. The commemoration of the Baptism was also called by the Greek fathers of the 4th century the Theophany or Theophanies, and the Day of Lights, i.e. of the Illumination of Jesus or of the Light which shone in the Jordan. In the Teutonic west it has become the Festival of the three kings (i.e. the Magi), or simply Twelfth day. Leo the Great called it the Feast of the Declaration; Ful- gentius, of the Manifestation; others, of the Apparition of Christ.

In the following article it is attempted to ascertain the date of institution of the Epiphany feast, its origin, and its signifi- cance and development.

Clement of Alexandria first mentions it. Writing c. 194 he states that the Basilidians feasted the day of the Baptism, devoting the whole night which preceded it to lections of the scriptures. They fixed it in the 15th year of Tiberius, on the ■15th or nth of the month Tobi, dates of the Egyptian fixed calendar equivalent to January 10th and 6th. When Clement wrote the great church had not adopted the feast, but toward a.d. 300 it was widely in vogue. Thus the Acts of Philip the Martyr, bishop of Heraclea in Thrace, a.d. 304, mention the " holy day of the Epiphany." Note the singular. Origen seems not to have heard of it as a feast of the Catholic church, but Hippolytus (died c. 235) recognized it in a homily which may be genuine.

In the age of the Nicene Council, a.d. 325, the primate of Alexandria was charged at every Epiphany Feast to announce to the churches in a " Festal Letter " the date of the forthcoming Easter. Several such letters written by Athanasius and others remain. In the churches so addressed the feast of Jan. 6 must have been already current.

In Jerusalem, according to the Epistle of Macarius 1 to the Armenians, c. 330, the feast was kept with zeal and splendour, and was with Easter and Pentecost a favourite season for Baptism.

We have evidence of the 4th century from Spain that a long fast marked the season of Advent, and prepared for the feast of Epiphany on the 6th of January. The council of

1 For its text see The Key of Truth, translated by F. C. Conybeare, Oxford, and the article Armenian Church.

Saragossa c. 380 enacted that for 21 days, from the 17th of December to the 6th of January, the Epiphany, the faithful should not dance or make merry, but steadily frequent the churches. The synod of Lerida in 524 went further and forbade marriages during Advent. Our earliest Spanish lectionary, the Liber comicus of Toledo, edited by Don Morin (Anecd. Maredsol. vol. i.) , provides lections for five Sundays in Advent, and the gospel lections 1 chosen regard the Baptism of Christ, not His Birth, of which the feast, like that of the Annunciation, is mentioned, but not yet dated, December 25 being

assigned to St Stephen. It is odd that for " the Apparition of the Lord " the lection Matt. ii. 1-15 is assigned, although the lections for Advent belong to a scheme which identified Epiphany with the Baptism. This anomaly we account for below. The old editor of the Mozarabic Liturgy, Fr. Antonio Lorenzano, notes in his preface § 28 that the Spaniards anciently terminated the Advent season with the Epiphany Feast. In Rome also the earliest fixed system of the ecclesiastical year, which may go back to 300, makes Epiphany the caput festorutn or chief of feasts. The Sundays of Advent lead up to it, and the first Sundays of the year are " The Sunday within the octave of Epiphany," " the first Sunday after," and so forth. December 25 is no critical date at all. In Armenia as early as 450 a month of fasting prepared for the Advent of the Lord at Epiphany, and the fast was interpreted as a reiteration of John the Baptist's season of Repentance.

In Antioch as late as about 386 Epiphany and Easter were the two great feasts, and the physical Birth of Christ was not yet feasted. On the eve of Epiphany after nightfall the springs and rivers were blessed, and water was drawn from them and stored for the whole year to be used in lustrations and baptisms. Such water, says Chrysostom, to whose orations we owe the information, kept pure and fresh for one, two and three years, and like good wine actually improved the longer it was kept. Note that Chrysostom speaks of the Feast of the Epiphanies, implying two, one of the Baptism, the other of the Second Advent, when Christ will be manifested afresh, and we with him in glory. This Second Epiphany inspired, as we saw, the choice of Pauline lections in the Liber comicus. But the salient event commemorated was the Baptism, and Chrysostom almost insists on this as the exclusive significance of the feast : — " It was not when he was born that he became manifest to all, but when he was baptized." In his commentary on Ezekiel Jerome employs the same language abscondilus est et non apparuit, by way of protest against an interpretation of the Feast as that of the Birth of Jesus in Bethlehem, which was essayed as early as 375 by Epiphanius in Cyprus, and was being enforced in Jerome's day by John, bishop of Jerusalem. Epiphanius boldly removed the date of the Baptism to the 8th of November. " January 6 " (= Tobi n), he writes, " is the day of Christ's Birth, that is, of the Epiphanies." He uses the plural, because he adds on January 6 the commemoration of the water miracle of Cana. Although in 375 he thus protested that January 6 was the day " of the Birth after the Flesh," he became before the end of the century a convert, according to John of Nice, to the new opinion that December 25 was the real day of this Birth. That as

early as about 385, January 6 was kept as the physical birthday in Jerusalem, or rather in Bethlehem, we know from a contemporary witness of it, the lady pilgrim of Gaul, whose peregrinatio, recently discovered by Gamurrini, is confirmed by the old Jerusalem Lectionary preserved in Armenian. 2 Ephraem the Syrian father is attested already by Epiphanius (c. 375) to have celebrated the physical birth on January 6. His genuine Syriac hymns confirm this, but prove that the Baptism, the Star of the Magi, and the Marriage at Cana were also commemorated on the same day. That the same union prevailed in Rome up to the year 354 may be inferred from Ambrose. Philastrius (De haer. ch. 140) notes that some

1 These are Matt. iii. 1-11, xi. 2-15, xxi. 1-9; Mark i. 1-8; Luke Hi. 1-18. The Pauline lections regard the Epiphany of the Second Advent, of the prophetic or Messianic kingdom.

2 Translated in Rituale Armenorum (Oxford, 1905).

abolished the Epiphany feast and substituted a Birth feast. This was between 370 and 390.

In 385 Pope Siricius 3 calls January 6 Natalicia, "the Birthday of Christ or of Apparition," and protests against the Spanish custom (at Tarragona) of baptizing on that day — another proof that in Spain in the 4th century it commemorated the Baptism. In Gaul at Vienna in 360 Julian the Apostate, out of deference to Christian feeling, went to church " on the festival which they keep in January and call Epiphania." So Ammianus; but Zonaras in his Greek account of the event calls it the day of the Saviour's Birth.

Why the feast of the Baptism was called the feast or day of the Saviour's Birth, and why fathers of that age when they call Christmas the birthday constantly qualify and add the words " in the flesh," we are able to divine from Pope Leo's (c. 447) 18th Epistle to the bishops of Sicily. For here we learn that in Sicily they held that in His Baptism the Saviour was reborn through the Holy Spirit. " The Lord," protests Leo, " needed no remission of sins, no remedy of rebirth." The Sicilians also baptized neophytes on January 6, " because baptism conveyed to Jesus and to them one and the same grace." Not so, argues Leo, the Lord sanctioned and hallowed the power of regeneration, not when He was baptized, but " when the blood of redemption and the water of baptism flowed forth from his side." Neophytes should therefore be baptized at Easter and Pentecost alone, never at Epiphany.

Fortune has preserved to us among the Spuria of several Latin fathers, Ambrose, Augustine, Jerome and Maximus of Turin, various homilies for Sundays of the Advent fast and for Epiphany. The Advent lections of these homilists were much the same as those of the Spanish Liber comicus; and they insist on Advent being kept as a strict fast, without marriage celebra- tions. Their Epiphany lection is however Matt. iii. 1-17, which must therefore have once on a time been assigned in the Liber comicus also in harmony with its general scheme. The psalms used on the day are, cxiii. (cxiv.) " When Israel went forth," xxviii. (xxix.) " Give unto the Lord," and xxii. (xxiii.) " the Lord is my Shepherd." The same lection of Matthew and also Ps. xxix. are noted for Epiphany in the Greek oration for the day ascribed to Hippolytus, which is at least earlier than 300, and also in special old Epiphany rites for the Benediction of the waters found in Latin, Greek, Armenian, Coptic, Syriac, &c. Now by these homilists as by Chrysostom, 4 the Baptism is regarded as the occasion on which " the Saviour first appeared after the flesh in the world or on earth."' These words were classical to the homilists, who explain them as best they can. The baptism is also declared to have been " the consecration of Christ," and " regeneration of Christ and a strengthening of our faith," to have been " Christ's second nativity." " This second birth hath more renown than his first ... for now the God of majesty is inscribed (as his father), but then (at his first birth) Joseph the Carpenter was assumed to be his father ... he hath more honour who cries aloud from Heaven (viz. God the Father), than he who labours upon earth " (viz. Joseph). 5

Similarly the old ordo Romanus of the age of Pepin (given by Montfaulcon in his preface to the Mozarabic missal in Migne, Pair. Latina, 85, col. 46), under the rubric of the Vigil of the Theophany, insists that " the second birth of Christ (in Baptism) being distinguished by so many mysteries {e.g. the miracle of Cana) is more honoured than the first" (birth from Mary).

These homilies mostly belong to an age (? 300-400) when the commemoration of the physical Birth had not yet found its own day (Dec. 25), and was therefore added alongside of the Baptism on January 6. Thus the two Births, the physical and the

3 Epist. ad Himerium, c. 2.

4 Horn. I. in Pentec. op. torn. ii. 458; " With us the Epiphanies is the first festival. What is this festival's significance? This, that God was seen upon earth and consorted with men." For this idea there had soon to be substituted that of the manifestation of Christ to the

Gentiles.

5 See the Paris edition of Augustine (1838), torn, v., Appendix, Sermons cxvi., cxxv., cxxxv., cxxxvi., cxxxvii.; cf. torn. vi. dial, quaestionum, xlvi. ; Maximus of Turin, Homily xxx.

spiritual, of Jesus were celebrated on one and the same day, and one homily contains the words: " Not yet is the feast of his origin fully completed, and already we have to celebrate the solemn commemoration of his Baptism. He has hardly been born humanwise, and already he is being reborn in sacramental wise. For to-day, though after a lapse of many annual cycles, he was hallowed (or consecrated) in Jordan. So the Lord arranged as to link rite with rite; I mean, in such wise as to be brought forth through the Virgin and to be begotten through the mystery (i.e. sacrament) in one and the same season." Another homily preserved in a MS. of the 7th or 8th century and assigned to Maximus of Turin declares that the Epiphany was known as the Birthday of Jesus, either because He was then born of the Virgin or reborn in baptism. This also was the classical defence made by Armenian fathers of their custom of keeping the feast of the Birth and Baptism together on January 6. They argued from Luke's gospel that the Annunciation took place on April 6, and therefore the Birth on January 6. The Baptism was on Christ's thirtieth birthday, and should therefore be also kept on January 6. Cosmas Indico-pleustes (c. 550) relates that on the same grounds believers of Jerusalem joined the feasts. All such reasoning was of course apres coup. As late as the 9th century the Armenians had at least three discrepant dates for the Annunciation — January 5, January 9, April 6; and of these January 5 and 9 were older than April 6, which they perhaps borrowed from Epiphanius's commentary on the Gospels. The old Latin homilist, above quoted, hits the mark when he declares that the innate logic of things required the Baptism (which must, he says, be any how called a natal or birth festival) to fall on the same day as Christmas —Ratio enim exigit. Of the argument from the 6th of April as the date of the Annunciation he knows nothing. The 12 th century Armenian Patriarch Nerses, like this homilist, merely rests his case against the Greeks, who incessantly reproached the Armenians for ignoring their Christmas on December 25, on the inherent logic of things, as follows:

" Just as he was born after the flesh from the holy virgin, so he was

born through baptism and from the Jordan, by way of example unto us. And since there are here two births, albeit differing one from the other in mystic import and in point of time, therefore it was appointed that we should feast them together, as the first, so also the second birth."

The Epiphany feast had therefore in its own right acquired the name of natalis dies or birthday, as commemorating the spiritual rebirth of Jesus in Jordan, before the natalis in came, the Birthday in the flesh, as Jerome and others call it, was associ- ated with it. This idea was condemned as Ebionite in the 3rd century, yet it influences Christian writers long before and long afterwards. So Tertullian says: " We little fishes (pisciculi), after the example of our great fish (ixOi>v) Jesus Christ the Lord, are born (gignimur) in the water, nor except by abiding in the water are we in a state of salvation." And Hilary, like the Latin homilists cited above, writes of Jesus that " he was born again through baptism, and then became Son of God," adding that the Father cried, when he had gone up out of the water, " My Son art thou, I have this day begotten thee " (Luke iii. 22). " But this," he adds, " was with the begetting of a man who is being reborn; on that occasion too he himself was being reborn unto God to be perfect son; as he was son of man, so in baptism, he was constituted son of God as well." The idea frequently meets us in Hilary; it occurs in the Epiphany hymn of the orthodox Greek church, and in the Epiphany hymns and homilies of the Armenians.

A letter is preserved by John of Nice of a bishop of Jerusalem to the bishop of Rome which attests a temporary union of both feasts on January 6 in the holy places. The faithful, it says, met before dawn at Bethlehem to celebrate the Birth from the Virgin in the cave; but before their hymns and lections were finished they had to hurry off to Jordan, 13 m. the other side of Jerusalem, to celebrate the Baptism, and by consequence neither commemoration could be kept fully and reverently. The writer therefore begs the pope to look in the archives of the Jews brought to Rome after the destruction of Jerusalem,

and to ascertain from them the real date of Christ's birth. The pope looked in the works of Josephus and found it to be December 25. The letter's genuineness has been called in. question; but revealing as it does the Church's ignorance of the date of the Birth, the inconvenience and precariousness of its association with the Baptism, the recency of its separate institution, it could not have been invented. It is too tell-tale a document. Not the least significant fact about it is that it views the Baptism as an established feast which

cannot be altered and set on another date. Not it but the physical birth must be removed from January 6 to another date. It has been shown above that perhaps as early as 380 the difficulty was got over in Jerusalem by making the Epiphany wholly and solely a commemoration of the miraculous birth, and suppressing the commemoration of the Baptism. Therefore this letter must have been written — or, if invented, then invented before that date. Chrysostom seems to have known of it, for in his Epiphany homily preached at Antioch, c. 392 (op. vol. ii. 354, ed. Montf.), he refers to the archives at Rome as the source from which the date December 25 could be confirmed, and declares that he had obtained it from those who dwell there, and who observing it from the beginning and by old tradition, had communicated it to the East. The question arises why the feast of the Baptism was set on January 6 by the sect of Basilides ? And why the great church adopted the date ? Now we know what sort of considerations influenced this sect in fixing other feasts, ?o we have a clue. They fixed the Birth of Jesus on Pachon 2 5 (= May 20) , the day of the Niloa, or feast of the descent of. the Nile from heaven. We should thus expect January 6 to be equally a Nile festival. And this from various sources we know it was. On Tobi n, says Epiphanius 1 (c. 370), 'every one draws up water from the river and stores it up, not only in Egypt itself, but in many other countries. In many places, he adds, springs and rivers turn into wine on this day, e.g. at Cibyra in Caria and Gerasa in Arabia. Aristides Rhetor (c. 160) also relates how in the winter, which began with Tobi, the Nile water was at its purest. Its water, he says, if drawn at the right time conquers time, for it does not go bad, whether you keep it on the spot or export it. Galleys were waiting on a certain night to take it on board and transport it to Italy and elsewhere for libations and lustrations in the Temples of Isis. " Such water," he adds, " remained fresh, long after other water supplies had gone bad. The Egyptians filled their pitchers with this water, as others did with wine; they stored it in their houses for three or four years or more, and recommended it the more, the older it grew, just as the Greeks did their wines."

Two centuries later Chrysostom, as we have seen, commends in identical terms the water blessed and drawn from the rivers at the Baptismal feast. It is therefore probable that the Basilidian feast was a Christianized form of the blessing of the Nile, called by Chabas in his Coptic calendar Hydreusis. Mas'udl the Arab historian of the 10th century, in his Prairies d'or (French trans. Paris, 1863, ii. 364), enlarges on the splendours of this feast as he saw it still celebrated in Egypt.

Epiphanius also (Haer. 51) relates a curious celebration held at Alexandria of the Birth of the Aeon. On January 5 or 6 the votaries met in the holy compound or Temple of the Maiden (Kore), and sang hymns to the music of the flute till dawn, when they went down with' torches into a shrine under ground, and fetched up a wooden idol on a bier representing Kore, seated and naked, with crosses marked on her brow, her hands and her knees. Then with flute-playing, hymns and dances they carried the image seven times round the central shrine, before restoring it again to its dwelling-place below. He adds: "And the votaries say that to-day at this hour Kore, that is, the Virgin, gave birth to the Aeon."

Epiphanius says this was a heathen rite, but it rather resembles some Basilidian or Gnostic commemoration of the spiritual birth of the Divine life in Jesus of the Christhood, from the older creation the Ecclesia.

The earliest extant Greek text of the Epiphany rite is in a

1 Perhaps Epiphanius is here, after his wont, transcribing an earlier source.

Euchologion of about the year 795, now in the Vatican. The prayers recite that at His baptism Christ hallowed the waters by His presence in Jordan, 1 and ask that they may now be blessed by the Holy Spirit visiting them, by its power and inworking, as the streams of Jordan were blessed. So they will be able to purify soul and body of all who draw up and partake of them. The hymn sung contains such clauses as these:

" To-day the grace of the Holy Spirit hallowing the waters appears (iirKfraiverai , cf. Epiphany) . . . To-day the systems of waters spread out their backs under the Lord's footsteps. To-day the unseen is seen, that he may reveal himself to us. To-day the Increate is of his own will ordained (lit. hath hands laid on him) by his own creature. To-day the Unbending bends his neck to his own servant, in order to free us from servitude. To-day we were liberated from darkness and are illumined by light of divine knowledge. To-day for us the Lord by means of rebirth (lit. palingenesy) of the Image reshapes the Archetype."

This last clause is obscure. In the Armenian hymns the ideas of the

rebirth not only of believers, but of Jesus, and of the latter's ordination by John, are very prominent. The history of the Epiphany feast may be summed up thus: — From the Jews the Church took over the feasts of Pascha and Pentecost; and Sunday was a weekly commemoration of the Resurrection. It was inevitable, however, that believers should before long desire to commemorate the Baptism, with which the oldest form of evangelical tradition began, and which was widely regarded as the occasion when the divine life began in Jesus; when the Logos or Holy Spirit appeared and rested on Him, conferring upon Him spiritual unction as the promised Messiah; when, according to an old reading of Luke iii. 22, He was begotten of God. Perhaps the Ebionite Christians of Palestine first instituted the feast, and this, if a fact, must underlie the statement of John of Nice, a late but well-informed writer (c. 950), that it was fixed by the disciples of John the Baptist who were present at Jesus' Baptism. The Egyptian gnostics anyhow had the feast and set it on January 6, a day of the blessing of the Nile. It was a feast of Adoptionist complexion, as one of its names, viz. the Birthday (Greek yeved\ia, Latin Natalicia or Natalis dies), implies. This explains why in east and west the feast of the physical Birth was for a time associated with it; and to justify this association it was suggested that Jesus was baptized just on His thirtieth birthday. In Jerusalem and Syria it was perhaps the Ebionite or Adoptionist, we may add also the Gnostic, associations of the Baptism that caused this aspect of Epiphany to be relegated to the background, so that it became wholly a feast of the miraculous birth. At the same time other epiphanies of Christ were superadded, e.g. of Cana where Christ began His miracles by turning water into wine and manifested forth His glory, and of the Star of the Magi. Hence it is often called the Feast of Epiphanies (in the plural) . In the West the day is commonly called the Feast of the three kings, and its early significance as a commemoration of the Baptism and season of blessing the waters has been obscured; the Eastern churches, however, of Greece, Russia, Georgia, Armenia, Egypt, Syria have been more conservative. In the far East it is still the season of seasons for baptisms, and in Armenia children born long before are baptized at it. Long ago it was a baptismal feast in Sicily, Spain, Italy (see Pope Gelasius to the Lucanian Bishops), Africa and Ireland. In the Manx prayer-book of Bishop Phillips of the year 1610 Epiphany is called the " little Nativity " (La nolicky bigge), and the Sunday which comes between December 25 and January 6 is " the Sunday between the two Nativities," or Jihduni oedyr 'a Nolick; Epiphany itself is the " feast of the water vessel," lail ymmyrt uyskey, or " of the well of water," Chibbyrt uysky.

Authorities. — Gregory Nazianz., Orat. xli.; Suicer, Thesaurus, s.v. Siriˆdceia; Cotelerius In constit. Apost. (Antwerp, 1698), lib. v. cap. 13; R. Bingham, Antiquities (London, 1834), bk. xx. ; Ad. Jacoby, Bericht uber die Taufe Jesu (Strassburg, 1902); H. Blumenbach, Antiquitates Epiphaniorum (Leipzig, 1737); J. L. Schulze, De festo Sanctorum Luminum, ed. J. E. Volbeding (Leipzig, 1841) ; and K. A. H. Kellner, Heortologie (Freiburg im Breisgau, 1906). (See also the works enumerated under Christmas.) (F. C.C.)

1 X V same idea is frequent in Epiphanv homilies of Chrysostom ana otner 4th-century fathers.

EPIRUS, or Epeirus, an ancient district of Northern Greece extending along the Ionian Sea from the Acroceraunian promontory on the N. to the Ambracian gulf on the S. It was conterminous on the landward side with Illyria, Macedonia and Thessaly, and thus corresponds to the southern portion of Albania (q.v.). The name Epirus ("H7reipos) signified " mainland," and was originally applied to the whole coast southward to the Corinthian Gulf, in contradistinction to the neighbouring islands, Corcyra, Leucas, &c. The country is all mountainous, especially towards the east, where the great rivers of north-western Greece — Achelous, Arachthus and Aous — rise in Mt Lacmon, the back- bone of the Pindus chain. In ancient times Epirus did not produce corn sufficient for the wants of its inhabitants; but it was celebrated, as it has been almost to the present day, for its cattle and its horses. According to Theopompus (4th cent. B.C.), the Epirots were divided into fourteen independent tribes, of which the principal were the Chaones, the Thesproti and the Molossi. The Chaones (perhaps akin to the Chones who dwelt in the heel of Italy) inhabited the Acroceraunian shore, the Molossians the inland districts round the lake of Pambotis (mod. Jannina), and the Thesprotians the region to the north of the Ambracian gulf. In spite of its distance from the chief centres of Greek thought and action, and the barbarian repute of its inhabitants, Epirus was believed to have exerted at an early period no small influence on Greece, by means more especi- ally of the oracle of Dodona. Aristotle even placed in Epirus the original home of the Hellenes. But in histdric times its part in Greek history is mainly passive. The states of Greece proper founded a number of colonies on its coast, which formed stepping-stones towards the Adriatic and the West. Of these one of the earliest and most flourishing was the Corinthian colony of Ambracia, which gives its name to the neighbouring gulf. Elatria, Bucheta and Pandosia, in Thesprotia, originated from Elis. Among the other towns in the country the following were of some importance. In Chaonia: Palaeste and Chimaera, fortified posts to which the dwellers in the

open country could retire in time of war; Onchesmus or Anchiasmus, opposite Corcyra (Corfu), now represented by Santi Quarante; Phoenice, still so called, the wealthiest of all the native cities of Epirus, and after the fall of the Molossian kingdom the centre of an Epirotic League; Buthrotum, the modern Butrinto; Phanote, important in the Roman campaigns in Epirus; and Adrianopolis, founded by the emperor whose name it bore. In Thesprotia: Cassope, the chief town of the most powerful of the Thesprotian clans; and Ephyra, afterwards Cichyrus, identified by W. M. Leake with the monastery of St John 3 or 4 m. from Phanari, and by C. Bursian with Kastri at the northern end of the Acherusian Lake. In Molossia: Passaron, where the kings were wont to take the oath of the constitution and receive their people's allegiance; and Tecmon, Phylace and Horreum, all of doubtful identification. The Byzantine town of Rogus is probably the same as the modern Luro, the Greek Oropus.

History. — The kings, or rather chieftains, of the Molossians, who ultimately extended their power over all Epirus, claimed to be descended from Pyrrhus, son of Achilles, who, according to legend, settled in the country after the sack of Troy, and transmitted his kingdom to Molossus, his son by Andromache. The early history of the dynasty is very obscure ; but Admetus, who lived in the 5th century B.C., is remembered for his hospitable reception of the banished Themistocles, in spite of the fact that the great Athenian had persuaded his countrymen to refuse the alliance tardily offered by the Molossians when victory against the Persians was already secured. Admetus was suc- ceeded, about 429 B.C., by his son or grandson, Tharymbas or Arymbas I., who being placed by a decree of the people under the guardianship of Sabylinthus, chief of the Atintanes, was educated at Athens, and at a later date introduced a higher civilization among his subjects. Alcetas, the next king mentioned in history, was restored to his throne by Dionysius of Syracuse about 385 B.C. His son Arymbas II. (who succeeded by the death of his brother Neoptolemus) ruled with prudence and equity, and gave encouragement to literature and the arts.

To him Xenocrates of Chalcedon dedicated his four books on the art of governing; and it is specially mentioned that he bestowed great care on the education of his brother's children. One of them, Troas, he married; Olympias, the other niece, was married to Philip II. of

Macedon and became the mother of Alexander the Great. On the death of Arymbas, Alexander the brother of Olympias, was put on the throne by Philip and married his daughter Cleopatra. Alexander assumed the new title of king of Epirus, and raised the reputation of his country abroad. Asked by the Tarentines for aid against the Samnites and Lucanians, he made a descent at Paestum in 332 B.C., and reduced several cities of the Lucani and Bruttii; but in a second attack he was surrounded, defeated and slain near Pandosia in Bruttium.

Aeacides, the son of Arymbas II., succeeded Alexander. He espoused the cause of Olympias against Cassander, but was dethroned by his own soldiers, and had hardly regained his position when he fell in battle (313 B.C.) against Philip, brother of Cassander. He had, by his wife Phthia, a son, the celebrated Pyrrhus, and two daughters, Deidamia and Troas, of whom the former married Demetrius Poliorcetes. His brother Alcetas, who succeeded him, continued unsuccessfully the war with Cassander; he was put to death by his rebellious subjects in 295 B.C., and was succeeded by Pyrrhus (q.v.), who for six years fought against the Romans in south Italy and Sicily, and gave to Epirus a momentary importance which it never again possessed.

Alexander, his son, who succeeded in 272 B.C., attempted to seize Macedonia, and defeated Antigonus Gonatas, but was himself shortly afterwards driven from his kingdom by Deme- trius. He recovered it, however, and spent the rest of his days in peace. Two other insignificant reigns brought the family of Pyrrhus to its close, and Epirus was thenceforward governed by a magistrate, elected annually in a general assembly of the nation held at Passaron. Having imprudently espoused the cause of Perseus (q.v.) in his ill-fated war against the Romans, 168 B.C., it was exposed to the fury of the conquerors, who destroyed, it is said, seventy towns, and carried into slavery 150,000 of the inhabitants. From this blow it never recovered. At the dis- solution of the Achaean League (q.v.), 146 B.C., it became part of the province of Macedonia, receiving the name Epirus Vetus, to distinguish it from Epirus Nova, which lay to the east.

On the division of the empire it fell to the East, and so re- mained until the taking of Constantinople by the Latins in 1204, when Michel Angelus Comnenus seized Aetolia and Epirus. On the death of Michel in 12 16, these countries fell into the hands of his brother Theodore. Thomas, the last of the direct line, was murdered in 1318 by his nephew Thomas, lord of Zante and Cephalonia, and his

dominions were dismembered. Not long after, Epirus was overrun by the Samians and Albanians, and the confusion which had been growing since the division of the empire was worse confounded still. Charles II. Tocco, lord of Cephalonia and Zante, obtained the recognition of his title of Despot of Epirus from the emperor Manuel Comnenus in the beginning of the 15th century; but his family was deprived of their possession in 143 1 by Murad (Amurath) II. In 1443, Scan- derbeg, king of Albania, made himself master of a considerable part of Epirus; but on his death it fell into the power of the Venetians. From these it passed again to the Turks, under whose dominion it still remains. For modern history see Albania.

Authorities. — Nauze, " Rech. hist, sur les peuples qui s'etab- lirent en Epire," in Mem. de I'Acad. des Inscr. (1729) ; Pouqueville, Voyage en Moree, &c, en Albanie (Paris, 1805) ; Hobhouse, A Journey through Albania, &c. (2 vols., London, 1813) ; Wolfe, " Observations on the Gulf of Arta " in Journ. Royal Geog. Soc, 1834; W. M. Leake, Travels in Northern Greece (London, 1835) : Merleker, Darstellung des Landes und der Bewohner von Epeiros (KSnigsberg, 1841); J. H. Skene, " Remarkable Localities on the Coast of Epirus," in Journ. Roy. Geog. Soc, 1848; Bowen, Mount Alhos, Thessaly and Epirus (London, 1852); von Hahn, Albanesische Studien (Jena, i854)_; Bursian, Geog. von Griechenland (vol. i., Leipzig, 1862); Schafli, " Versuch einer Klimatologie des Thales von Jannina," Neue Denkschr. d. allgem. schweizer. Ges. f. Naturw. xix. (Zurich, 1862); Major R. Stuart, " On Phys. Geogr. and Natural Resources of Epirus," in Journ R.G.S., 1869; Guido Cora, in Cosmos ;-Dumont,

" Souvenirs de l'Adriatique, de l'Epire, &c." in Rev. des deux mondes (Paris, 1872); de Gubernatis, " L'Epiro," Bull. Soc. Geogr. Ital. viii. (Rome, 1872); Dozon, "Excursion en Albanie," Bull. Soc. Geogr., 6th series; Karapanos, Dodone et ses ruines (Paris, 1878) ; von Heldreich, " Ein Beitrag zur Flora von Epirus," Verh. Bot. Vereins Brandenburg (Berlin, 1880); Kiepert, "Zur Ethnographie von Epirus," Ges. Erdk. xvii. (Berlin, 1879); Zompolides, "Das Land und die Bewohner von Epirus," Ausland (Berlin, 1880); A. Philippson, Thessalien und Epirus (Berlin, 1897). (J. L. M.)

EPISCOPACY (from Late Lat. episcopatus, the office of a bishop, episcopus) , the general term technically applied to that system of church organization in which the chief ecclesiastical authority within a defined district, or diocese, is vested in a bishop. As such it is distinguished on the one hand from Presbyterian- ism, government by elders, and Congregationalism, in which the individual church or community of worshippers is autonomous, and on the other from

Papalism. The origin and development of episcopacy in the Christian Church, and the functions and attributes of bishops in the various churches, are dealt with elsewhere (see Church History and Bishop). Under the present heading it is proposed only to discuss briefly the various types of episcopacy actually existing, and the different principles that they represent.

The deepest line of cleavage is naturally between the view that episcopacy is a divinely ordained institution essential to the effective existence of a church as a channel of grace, and the view that it is merely a convenient form of church order, evolved as the result of a variety of historical causes, and not necessary to the proper constitution of a church. The first of these views is closely connected with the doctrine of the Apostolical Succession. According to this, Christ committed to his apostles certain powers of order and jurisdiction in the Church, among others that of transmitting these powers to others through " the laying on of hands "; and this power, whatever obscurity may surround the practice of the primitive Church (see Apostle, ad fin.) was very early confined to the order of bishops, who by virtue of a special consecration became the successors of the apostles in the function of handing on the powers and graces of the ministry. 1 A valid episcopate, then, is one derived in an unbroken series of " layings on of hands " by bishops from the time of the apostles (see Order, Holy). This is the Catholic view, common to all the ancient Churches whether of the West or East, and it is one that necessarily excludes from the union of Christendom all those Christian communities which possess no such apostolically derived ministry. <

Apart altogether, however, from the question of orders, episcopacy represents a very special conception of the Christian Church. In the fully developed episcopal system the bishop sums up in his own person the collective powers of the Church in his diocese, not by delegation of these powers from below, but by divinely bestowed authority from above. " Ecclesia est in episcopo," wrote St Cyprian (Cyp. iv. Ep. 9); the bishop, as the successor of the apostles, is the centre of unity in his diocese, the unity of the Church as a whole is maintained by the inter- communion of the bishops, who for this purpose represent their dioceses. The bishops, individually and collectively, are thus the essential ties of Catholic unity; they alone, as the deposi- tories of the apostolic traditions, establish the norm of Catholic orthodoxy in the general councils of the Church. This high theory of episcopacy which, if certain of the Ignatian letters be genuine, has a very early origin, has, of course, fallen upon evil days. The power of the collective episcopate to maintain Catholic

unity was disproved long before it was overshadowed by the centralized authority of Rome; before the Reformation, its last efforts to assert its supremacy in the Western Church, at the councils of Basel and Constance, had broken down; and the religious revolution of the 16th century left it largely discredited and exposed to a double attack, by the papal monarchy on the one hand and the democratic Presbyterian model on the other. Within the Roman Catholic Church the high doctrine of episco- pacy continued to be maintained by the Gallicans and Febron- ians (see Gallicanism and Febronianisaj) as against the claims

1 See Bishop C. Gore, The Church and the Ministry (1887).

of the Papacy, and for a while with success; but a system which had failed to preserve the unity of the Church even when the world was united under the Roman empire could not be expected to do so in a world split up into a series of rival states, of which many had already reorganized their churches on a national basis. " Febronius," indeed, was in favour of a frank recognition of this national basis of ecclesiastical organization, and saw in Episcopacy the best means of reuniting the dissidents to the Catholic Church, which was to consist, as it were, of a free federation of episcopal churches under the presidency of the bishop of Rome. The idea had considerable success; for it happened to march with the views of the secular princes. But religious people could hardly be expected to see in the worldly prince-bishops of the Empire, or the wealthy courtier-prelates of France, the trustees of the apostolical tradition. The Revolution intervened; and when, during the religious reaction that followed, men sought for an ultimate authority, they found it in the papal monarch, exalted now by ultramontane zeal into the sole depositary of the apostolical tradition (see Ultramontan- ism). At the Vatican Council of 1870 episcopacy made its last stand against papalism, and was vanquished (see Vatican Council). The pope still addresses his fellow-bishops as "venerable brothers"; but from the Roman Catholic Church the fraternal union of coequal authorities, which is of the essence of episcopacy, has vanished; and in its place is set the autocracy of one. The modern Roman Catholic Church is episcopal, for it preserves the bishops, whose polestas ordinis not even the pope can exercise until he has been duly consecrated; but the bishops as such are now but subordinate elements in a system for which "Episcopacy" is certainly no longer an appropriate term.

The word Episcopacy has, in fact, since the Reformation, been more especially associated with those churches which, while ceasing to be in communion with Rome, have preserved the episcopal model. Of these by far the most important is the Church of England, which has preserved its ecclesiastical organ- ization essentially unchanged since its foundation by StAugustine, and its daughter churches (see England, Church or, and Anglican Communion). The Church of England since the Reformation has been the chief champion of the principle of Episcopacy against the papal pretensions on the one hand and Presbyterianism and Congregationalism on the other. As to the divine origin of Episcopacy and, consequently, of its universal obligation in the Christian Church, Anglican opinion has been, and still is, considerably divided. 1 The " High Church " view, now predominant, is practically identical with that of the Gallicans and Febronians, and is based on Catholic practice in those ages of the Church to which, as well as to the Bible, the formularies of the Church of England make appeal. So far as this view, however, is the outcome of the general Catholic movement of the 19th century, it can hardly be taken as typical of Anglican tradition in this matter. Certainly, in the 16th and 17th centuries, the Church of England, while rigorously enforcing the episcopal model at home, and even endeavouring to extend it to Presbyterian Scotland, did not regard foreign non-episcopal Churches otherwise than as sister communions. The whole issue had, in fact, become confused with the confusion of functions of the Church and State. In the view of the Church of England the ultimate governance of the Christian community, in things spiritual atid temporal, was vested not in the clergy but in the " Christian prince " as the vicegerent of God. 2 It was the

1 Neither the Articles nor the authoritative Homilies of the Church of England speak of episcopacy as essential to the constitution of a church. The latter make " the three notes or marks " by which a true church is known " pure and sound doctrine, the sacraments administered according to Christ's holy institution, and the right use of ecclesiastical discipline." These marks are perhaps ambiguous, but they certainly do not depend on the possession of the Apostolic Succession; for it is further stated that " the bishops of Rome and their adherents are not the true Church of Christ " (Homily " con- cerning the Holy Ghost," ed. Oxford, 1683, p. 292).

2 " He and his holy apostles likewise, namely Peter and Paul, did forbid unto all Ecclesiastical Ministers, dominion over the Church of Christ " (Homilies appointed to be read in Churches, " The V. part

transference to the territorial sovereigns of modern Europe of the

theocratic character of the Christian heads of the Roman world-empire; with the result that for the reformed Churches the unit of church organization was no longer the diocese, or the group of dioceses, but the Christian state. Thus in England the bishops, while retaining their polestas ordinis in virtue of their consecration as successors of the apostles, came to be regarded" not as representing their dioceses in the state, but the state in their dioceses. Forced on their dioceses by the royal CongS d'ilire (q.v.), and enthusiastic apostles of the High Church doctrine of non-resistance, the bishops were looked upon as no more than lieutenants of the crown; 3 and Episcopacy was ultimately resisted by Presbyterians and Independents as an expression and instrument of arbitrary government, " Prelacy " being confounded with " Popery " in a common condemnation. With the constitutional changes of the 18th and 19th centuries, however, a corresponding modification took place in the character of the English episcopate; and a still further change resulted from the multiplication of colonial and missionary sees having no connexion with the state (see Anglican Communion). The consciousness of being in the line of apostolic succession helped the English clergy to revert to the principle Ecclesia est in episcopo, and the great periodical conferences of Anglican bishops from all parts of the world have something of the character, though they do not claim the ecumenical authority, of the general councils of the early Church (see Lambeth Conferences).

Of the reformed Churches of the continent of Europe only the Lutheran Churches of Denmark, Iceland, Norway, Sweden and Finland preserve the episcopal system in anything of its historical sense; and of these only the two last can lay claim to the possession of bishops in the unbroken line of episcopal suc- cession. 4 The superintendents (variously entitled also arch- priests, deans, provosts, ephors) of the Evangelical (Lutheran) Church, as established in the several states of Germany and in Austria, are not bishops in any canonical sense, though their jurisdictions are known as dioceses and they exercise many episcopal functions. They have no special powers of order, being presbyters, and their legal status is admittedly merely that of officials of the territorial sovereign in his capacity as head of the territorial church (see Superintendent). The "bishops" of the Lutheran Church in Transylvania are equivalent to the superintendents.

Episcopacy in a stricter sense is the system of the Moravian Brethren (q.v.) and the Methodist Episcopal Church of America (see Methodism). In the case of the former, claim is laid to the unbroken episcopal succession through the Waldenses, and the question of

their eventual intercommunion with the Anglican

of the Sermon against Wilful Rebellion," ed. Oxford, 1683, p. 378). Princes are " God's lieutenants, God's presidents, God's officers, God's commissioners, God's judges . . . God's vicegerents "(" The II. part of the Sermon of Obedience," ib. p. 64).

3 Juridically they were, of course, never this in the strict sense in which the term could be used of the Lutheran superintendents (see below). They were never mere royal officials, but peers of parliament, holding their temporalities as baronies under the crown.

4 During the crisis of the Reformation all the Swedish sees be- came vacant but two, and the bishops of these two soon left the kingdom. The episcopate, however, was preserved by Peter Mag- nusson, who, when residing as warden of the Swedish hospital of St Bridget in Rome, had been duly elected bishop of the see of Westeraes, and consecrated, c. 1524. No official record of his con- secration can be discovered, but there is no sufficient reason to doubt the fact ; and it is certain that during his lifetime he was acknowledged as a canonical bishop both by Roman Catholics and by Protestants. In 1528 Magnusson consecrated bishops to fill the vacant sees, and, assisted by one of these, Magnus Sommar, bishop of Strengness, he afterwards consecrated the Reformer, Lawrence Peterson, as archbishop of Upsala, Sept. 22, 1531. Some doubt has been raised as to the validity of the consecration of Peterson's successor, also named Lawrence Peterson, in 1575, from the insufficiency of the documentary evidence of the consecration of his consecrator, Paul Justin, bishop of Abo. The integrity of the succession has, however, been accepted after searching investigation by men of such learning as Grabe and Routh, and has been formally recognized by the con- vention of the American Episcopal Church. The succession to the daughter church of Finland, now independent, stands or falls with

, that of Sweden.

Church was accordingly mooted at the Lambeth Conference of 1908. The bishops of the Methodist Episcopal Church, on the other hand, derive their orders from Thomas Coke, a presbyter of the Church of England, who in 1784 was ordained by John Wesley, assisted by two other presbyters, " superintendent " of the Methodist Society in

America. Methodist episcopacy is therefore based on the denial of any special potestas ordinis in the degree of bishop, and is fundamentally dis- tinct from that of the Catholic Church — using this term in its narrow sense as applied to the ancient churches of the East and West.

In all of these ancient churches episcopacy is regarded as of divine origin; and in those of them which reject the papal supremacy the bishops are still regarded as the guardians of the tradition of apostolic orthodoxy and the stewards of the gifts of the Holy Ghost to men (see Orthodox Eastern Church; Armenian Church; Copts: Coptic Church, &c). In the West, Gallican and Febronian Episcopacy are represented by two ecclesiastical bodies: the Jansenist Church under the archbishop of Utrecht (see Jansenism and Utrecht), and the Old Catholics (q.v.). Of these the latter, who separated from the Roman communion after the promulgation of the dogma of papal infallibility, represent a pure revolt of the system of Epis- copacy against that of Papalism. (W. A. P.)

EPISCOPIUS, SIMON (1583-1643), the Latin form of the name of Simon Bischop, Dutch theologian, was born at Amster- dam on the 1st of January 1583. In 1600 he entered the uni- versity of Leiden, where he studied theology under Jacobus Arminius, whose teaching he followed. In 1610, the year in which the Arminians presented the famous Remonstrance to the states of Holland, he became pastor at Bleyswick, a small village near Rotterdam; in the following year he advocated the cause of the Remonstrants (q.v.) at the Hague conference. In 161 2 he succeeded Francis Gomarus as professor of theology at Leiden, an appointment which awakened the bitter enmity of the Calvinists, and, on account of the influence lent by it to the spread of Arminian opinions, was doubtless an ultimate cause of the meeting of the synod of Dort in 1618. Episcopius was chosen as the spokesman of the thirteen representatives of the Remon- strants before the synod; but he was refused a hearing, and the Remonstrant doctrines were condemned without any explanation or defence of them being permitted. At the end of the synod's sittings in 1619, Episcopius and the other twelve Arminian representatives were deprived of their offices and expelled from the country (see Dort, Synod or). Episcopius retired to Antwerp and ultimately to France, where he lived partly at Paris, partly at Rouen. He devoted most of his time to writings in support of the Arminian cause; but the attempt of Luke Wad- ding (1588-1657) to win him over to the Romish faith involved him also in a controversy with that famous Jesuit. After the death (1625) of Maurice, prince of Orange, the violence of the Arminian controversy began to abate, and Episcopius was permitted

in 1626 to return to his own country. He was ap- pointed preacher at the Remonstrant church in Rotterdam and afterwards rector of the Remonstrant college in Amsterdam. Here he died in 1 643 . Episcopius may be regarded as in great part the theological founder of Arminianism, since he developed and systematized the principles tentatively enunciated by Arminius. Besides opposing at all points the peculiar doctrines of Calvinism, Episcopius protested against the tendency of Calvinists to lay so much stress on abstract dogma, and argued that Christianity was practical rather than theoretical — not so much a system of intellectual belief as a moral power — and that an orthodox faith did not necessarily imply the knowledge of and assent to a system of doctrine which included the whole range of Christian truth, but only the knowledge and acceptance of so much of Christianity as was necessary to effect a real change on the heart and life.

*The principal works of Episcopius are his Confessio s. declaratio senlentiae pastorum qui in foederato Belgio Remonstr antes vocantur super praecipuis arhcuUs religionis Christianae (162 1), his Apologia *>m confessione (1629), his Verus theologus remonstrans, and his incompleted work Institutiones theologicae. A life of Episcopius*

was written by Philip Limborch, and one was also prefixed by his successor, Etienne de Courcelles (Curcellaeus) (1586-1659), to an edition of his collected works published in 2 vols. (1650-1665). See also article in Herzog-Hauck, Realencyklopadie.

EPISODE, an incident occurring in the history of a nation, an institution or an individual, especially with the significance of being an interruption of an ordered course of events, an irrele- vance. The word is derived from a word (eweiaodos) with a technical meaning in the ancient Greek tragedy. It is defined by Aristotle (Poetics, 12) as pepos Sh>p TpayqSias t6 /xera£ii oXcop xoput&v jueXcov, all the scenes, that is, which fall between the choric songs. daodos, or entrance, is generally applied to the entrance of the chorus, but the reference may be to that of the actors at the close of the choric songs. In the early Greek tragedy the parts which were spoken by the actors were con- sidered of subsidiary importance to those sung by the chorus, and it is from this aspect that the meaning of the word, as some- thing which breaks off the course of events, is derived (see A. E. Haigh, The Tragic Drama of the Greeks, 1896, at p. 353).

EPISTAXIS (Gr. «r£, upon, and arafav, to drop), the medical term for bleeding from the nose, whether resulting from local injury or

some constitutional condition. In persistent cases of nose-bleeding, various measures are adopted, such as holding the arms over the head, the application of ice, or of such astringents as zinc or alum, or plugging the nostrils.

EPISTEMOLOGY (Gr. incTrtiiV, knowledge, and X670S, theory, account; Germ. Erkenntnistheorie) , in philosophy, a term applied, probably first by J. F. Ferrier, to that department of thought whose subject matter is the nature and origin of knowledge. It is thus contrasted with metaphysics, which considers the nature of reality, and with psychology, which deals with the objective part of cognition, and, as Prof. James Ward said, " is essentially genetic in its method " (Mind, April 1883, pp. 166-167). Epistemology is concerned rather with the possibility of knowledge in the abstract (sub specie aeternitatis, Ward, ibid.). In the evolution of thought epistemological inquiry succeeded the speculations of the early thinkers, who concerned themselves primarily with attempts to explain existence. The differences of opinion which arose on this problem naturally led to the inquiry as to whether any univers- ally valid statement was possible. The Sophists and the Sceptics, Plato and Aristotle, the Stoics and the Epicureans took up the question, and from the time of Locke and Kant it has been prominent in modern philosophy. It is extremely difficult, if not impossible, to draw a hard and fast line between epistemology and other branches of philosophy. If, for example, philosophy is divided into the theory of knowing and the theory of being, it is impossible entirely to separate the latter (Ontology) from the analysis of knowledge (Epistemology), so close is the connexion between the two. Again, the relation between logic in its widest sense and the theory of knowledge is extremely close. Some thinkers have identified the two, while others regard Epistemology as a subdivision of logic; others demarcate their relative spheres by confining logic to the science of the laws of thought, i.e. to formal logic. An attempt has been made by some philosophers to substitute " Gnosiology " (Gr. yvuxns) for " Epistemology " as a special term for that part of Epistemology which is con- fined to " systematic analysis of the conceptions employed by ordinary and scientific thought in interpreting the world, and including an investigation of the art of knowledge, or the nature of knowledge as such." " Epistemology " would thus be reserved for the broad questions of " the origin, nature and limits of knowledge " (Baldwin's Diet, of Philos. i. pp. 333 and 414). The term Gnosiology has not, however, come into general use. (See Philosophy.)

EPISTLE, in its primary sense any letter addressed to an absent person; from the Greek word exiaroXri, a thing sent on a particular

occasion. Strictly speaking, any such communication is an epistle, but at the present day the term has become archaic, and is used only for letters of an ancient time, or for elaborate literary productions which take an epistolary form, that is to say, are, or affect to be, written to a person at a distance.

i. Epistles and Letters. — The student of literary history soon discovers that a broad distinction exists between the letter and the epistle. The letter is essentially a spontaneous, non- literary production, ephemeral, intimate, personal and private, a substitute for a spoken conversation. The epistle, on the other hand, rather takes the place of a public speech, it is written with an audience in view, it is a literary form, a distinctly artistic effort aiming at permanence; and it bears much the same rela- tion to a letter as a Platonic dialogue does to a private talk between two friends. The posthumous value placed on a great man's letters would naturally lead to the production of epistles, which might be written to set forth the views of a person or a school, either genuinely or as forgeries under some eminent name. Pseudonymous epistles were especially numerous under the early Roman empire, and mainly attached themselves to the names of Plato, Demosthenes, Aristotle and Cicero.

Both letters and epistles have come down to us in considerable variety and extent from the ancient world. Babylonia and Assyria, Egypt, Greece and Rome alike contribute to our inherit- ance of letters. Those of Aristotle are of questionable genuine- ness, but we can rely, at any rate in part, on those of Isocrates and Epicurus. Some of the letters of Cicero are rather epistles, since they were meant ultimately for the general eye. The papyrus discoveries in Egypt have a peculiar interest, for they are mainly the letters of people unknown to fame, and having no thought of publicity. It is less to be wondered at that we have a large collection of ancient epistles, especially in the realm of magic and religion, for epistles were meant to live, were published in several copies, and were not a difficult form of literary effort. The Tell el-Amarna tablets found in Upper Egypt in 1887 are a series of despatches in cuneiform script from Babylonian kings and Phoenician and Palestinian governors to the Pharaohs (c. 1400 B.C.). The epistles of Dionysius of Halicarnassus, Plutarch, Seneca and the Younger Pliny claim mention at this point. In the later Roman period and into the middle ages, formal epistles were almost a distinct branch of literature. The

ten books of Symmachus' Epistolae, so highly esteemed in the cultured circles of the 4th century, may be contrasted with the less elegant but more forceful epistles of Jerome.

The distinction between letters and epistles has particular interest for the student of early Christian literature. G. A. Deissmann {Bible Studies) assigns to the category of letters all the Pauline writings as well as 2 and 3 John. The books bearing the names of James, Peter and Jude, together with the Pastorals (though these may contain fragments of genuine Pauline letters) and the Apocalypse, he regards as epistles. The first epistle of John he calls less a letter or an epistle than a religious tract. It is doubtful, however, whether we can thus reduce all the letters of the New Testament to one or other of these categories; and W. M. Ramsay (Hastings' Diet. Bib. Extra vol. p. 401) has pointed out with some force that " in the new conditions a new category had been developed — the general letter addressed to a whole class of persons or to the entire Church of Christ." Such writings have affinities with both the letter and the epistle, and they may further be compared with the " edicts and rescripts by which Roman law grew, documents arising out of special circumstances but treating them on general principles." Most of the literature of the sub-apostolic age is epistolary, and we have a particularly interesting form of epistle in the communications between churches (as distinct from individuals) known as the First Epistle of Clement (Rome to Corinth) , the Martyrdom of Polycarp (Smyrna to Philomelium) , and the Letters of the Churches of Vienne and Lyons (to the congregations of Asia Minor and Phrygia) describing the Gallican martyrdoms of a.d. 177. In the following centuries we have the valuable epistles of Cyprian, of Gregory Nazianzen (to Cledonius on the Apollinarian controversy), of Basil (to be classed rather as letters), of Ambrose, Chrysostom, Augustine and Jerome. The encyclical letters of the Roman Catholic Church are epistles, even more so than bulls, which are usually more special in their destination. In the Renaissance one of the most common forms of literary production was that modelled upon Cicero's letters. From Petrarch to the Epistolae

obscurorum virorum there is a whole epistolary literature. The Epistolae obscurorum virorum have to some extent a counter- part in the Epistles of Martin Marprelate. Later satires in an epistolary form are Pascal's Provincial Letters, Swift's Drapier Letters, and the Letters of Junius. The " open letter " of modern journalism is really an epistle. (A. J. G.)

2. Epistles in Poetry. — A branch of poetry bears the name of the

Epistle, and is modelled on those pieces of Horace which are almost essays (sermones) on moral or philosophical subjects, and are chiefly distinguished from other poems by being addressed to particular patrons or friends. The epistle of Horace to his agent (or villicus) is of a more familiar order, and is at once a masterpiece and a model of what an epistle should be. Examples of the work in this direction of Ovid, Claudian, Ausonius and other late Latin poets have been preserved, but it is particularly those of Horace which have given this character to the epistles in verse which form so very characteristic a section of French poetry. The graceful precision and dignified familiarity of the epistle are particularly attractive to the temperament of France. Clement Marot, in the 16th century, first made the epistle popular in France, with his brief and spirited specimens. We pass the witty epistles of Scarron and Voiture, to reach those of Boileau, whose epistles, twelve in number, are the classic examples of this form of verse in French literature; they were composed at different dates between 1668 and 1695. In the 18th century Voltaire enjoyed a supremacy in this graceful and sparkling species of writing; the Jtpitre a Uranie is perhaps the most famous of his verse-letters. Gresset, Bernis, Sedaine, Dorat, Gentil – Bernard, all excelled in the epistle. The curious " Epitres " of J. P. G. Viennet (1 777-1868) were not easy and mundane like their predecessors, but violently polemical. Viennet, a hot defender of lost causes, may be considered the latest of the epistolary poets of France.

In England the verse-epistle was first prominently employed by Samuel Daniel in his " Letter from Octavia to Marcus Antonius " (1599), and later on, more legitimately, in his " Certain Epistles " (1601-1603). His letter, in terza rima, to Lucy, Countess of Bristol, is one of the finest examples of this form in English literature. It was Daniel's deliberate intention to introduce the Epistle into English poetry, " after the manner of Horace." He was supported by Ben Jonson, who has some fine Horatian epistles in his Forests (1616) and his Underwoods. Letters to Several Persons of Honour form an important section in the poetry of John Donne. Habington's Epistle to a Friend is one of his most finished pieces. Henry Vaughan (1622-1695) addressed a fine epistle in verse to the French romance-writer Gombauld (1570-1666). Such "letters" were not unfrequent down to the Restoration, but they did not create a department of literature such as Daniel had proposed. At the close of the 17th century Dryden greatly excelled in this class of poetry, and his epistles to Congreve (1694) and to the duchess of Ormond (1700) are among the most graceful and eloquent that we possess. During the age of Anne various Augustan poets in whom the lyrical faculty

was slight, from Congreve and Richard Duke down to Ambrose Philips and William Somerville, essayed the epistle with more or less success, and it was employed by Gay for several exercises in his elegant persiflage. Among the epistles of Gay, one rises to an eminence of merit, that called " Mr Pope's welcome from Greece," written in 1720. But the great writer of epistles in English is Pope himself, to whom the glory of this kind of verse belongs. His " Eloisa to Abelard " (1717) is carefully modelled on the form of Ovid's " Heroides," while in his Moral Essays he adopts the Horatian formula for the epistle. In either case his success was brilliant and complete. The " Epistle to Dr Arbuthnot " has not been surpassed, if it has been equalled, in Latin or French poetry of the same class. But Pope excelled, not only in the voluptuous and in the didactic epistle, but in that of compliment as well, and there is no more graceful example of this in literature than is afforded by the letter about the poems of Parnell addressed, in 1721, to Robert, earl of Oxford. After the day of Pope the epistle again fell into desuetude, or occasional use, in England. It revived in

the charming naivete of Cowper's lyrical letters in octosyllabics to his friends, such as William Bull and Lady Austin (1782). At the close of the century Samuel Rogers endeavoured to resuscitate the neglected form in his " Epistle to a Friend " (1798). The formality and conventional grace of the epistle were elements with which the leaders of romantic revival were out of sympathy, and it was not cultivated to any important degree in the 19th century. It is, however, to be noted that Shelley's "Letter to Maria Gisborne" (1820), Keats's "Epistle to Charles Clarke " (181 6), and Landor's " To Julius Hare " (1836), in spite of their romantic colouring, are genuine Horatian epistles and of the pure Augustan type. This type, in English literature, is commonly, though not at all universally, cast in heroic verse. But Daniel employs rime royal and terza rima, while some modern epistles have been cast in short iambic rhymed measures or in blank verse. It is sometimes not easy to distinguish the epistle from the elegy and from the dedication. (E. G.)

For St Paul's Epistles see Paul, for St Peter's see Peter, for Apocryphal Epistles see Apocryphal Literature, for Plato's see Plato, &c.

EPISTYLE (Gr. eiri, upon, and otOXos, column), the Greek architectural term for architrave, the lower member of the entablature of the classic orders (q.v.).

EPISTYLIS (C. G. Ehrenberg), in zoology, a genus of peri- trichous Infusoria with a short oral disc and collar, and a rigid stalk, often branching to form a colony.

EPITAPH (Gr. bnrcMpios, sc. X670S, from ewi, upon, and ra

The desire to perpetuate the memory of the dead being natural to man, the practice of placing epitaphs upon their graves has been common among all nations and in all ages. And the similarity, amounting sometimes almost to identity, of thought and expression that often exists between epitaphs written more than two thousand years ago and epitaphs written only yesterday is as striking an evidence as literature affords of the close kinship of human nature under the most varying conditions where the same primary elemental feelings are stirred. The grief and hope of the Roman mother as expressed in the touching lines —

" Lagge fili bene quiescas; Mater tua rogat te, Ut me ad te recipias : Vale!"

find their echo in similar inscriptions in many a modern cemetery. Probably the earliest epitaphial inscriptions that have come down to us are those of the ancient Egyptians, written, as their mode of sepulture necessitated, upon the sarcophagi and coffins. Those that have been deciphered are all very much in the same form, commencing with a prayer to a deity, generally Osiris or Anubis, on behalf of the deceased, whose name, descent and office are usually specified. There is, however, no attempt to delineate individual character, and the feelings of the survivors are not expressed otherwise than in the fact of a prayer being offered. Ancient Greek epitaphs, unlike the Egyptian, are of great literary interest, deep and often tender in feeling, rich and varied in expression, and generally epigrammatic in form. They are written usually in elegiac verse, though many of the later

epitaphs are in prose. Among the gems of the Greek anthology familiar to English readers through translations are the epitaphs upon those who had fallen in battle. There are several ascribed to Simonides on the heroes of Thermopylae, of which the most celebrated is the epigram —

" Go tell the Spartans, thou that passest by, That here, obedient to their laws, we lie.

A hymn of Simonides on the same subject contains some lines of great beauty in praise of those who were buried at Thermopylae, and these may be regarded as forming a literary epitaph. In Sparta epitaphs were inscribed only upon the graves of those who had been especially distinguished in war; in Athens they were applied more indiscriminately. They generally contained the name, the descent, the demise, and some account of the life of the person commemorated. It must be remembered, however, that many of the so-called Greek epitaphs are merely literary memorials not intended for monumental inscription, and that in these freer scope is naturally given to general reflections, while less attention is paid to biographical details. Many of them, even some of the monumental, do not contain any personal name, as in the one ascribed to Plato — " I am a shipwrecked sailor's tomb ; a peasant's there doth stand : Thus the same world of Hades lies beneath both sea and land." Others again are so entirely of the nature of general reflections upon death that they contain no indication of the particular case that called them forth. It may be questioned, indeed, whether several of this character quoted in ordinary collections are epitaphs at all, in the sense of being intended for a particular occasion.

Roman epitaphs, in contrast to those of the Greeks, contained, as a rule, nothing beyond a record of facts. The inscriptions on the urns, of which numerous specimens are to be found in the British Museum, present but little variation. TheletterssD.M.orD.M.S. {Diis Manibus or Diis Manibus Sacrum) are followed by the name of the person whose ashes are enclosed, his age at death, and sometimes one or two other particulars. The inscription closes with the name of the person who caused the urn to be made, and his relationship to the deceased. It is a curious illustration of the survival of traces of an old faith after it has been formally discarded to find that the letters D.M. are not uncommon on the Christian inscriptions in the catacombs. It has been suggested that in this case they mean Deo Maximo and not Diis Manibus, but the explanation would be quite untenable, even if there were not many other undeniable instances of the survival of pagan superstitions in the thought and life of the early Christians. In these very catacomb inscriptions there are many illustrations to be found, apart from the use of the letters D.M., of the union of heathen with Christian sentiment, (see Maitland's Church in the Catacombs) . The private burial-places for the ashes oJ the dead were usually by the side of the various roads leading into Rome, the Via Appia, the Via Flaminia, &c. The traveller to or from the city thus passed for miles

an almost uninterrupted succession of tombstones, whose inscriptions usually began with the appropriate words Siste Viator or A spice Viator, the origin doubt- less of the " Stop Passenger," which still meets the eye in many parish churchyards of Britain. Another phrase of very common occurrence on ancient Roman tombstones, Sit tibi terra levis (" Light he the earth upon thee "), has continued in frequent use, as conveying an appropriate sentiment, down to modern times. A remarkable feature of many of the Roman epitaphs was the terrible denunciation they often pronounced upon those who violated the sepulchre. Such denunciations were not uncommon in later times. A well-known instance is furnished in the lines on Shakespeare's tomb at Stratford-on-Avon, said to have been written by the poet himself —

" Good frend, for Jesus' sake forbeare To digg the dust enclosed heare ; Bleste be y e man y spares thes stones, And curst be he y* moves my bones."*

The earliest existing British epitaphs belonged to the Roman period, and are written in Latin after the Roman form. Speci- mens are to be seen in various antiquarian museums throughout

the country; some of the inscriptions are given in Bruce's Roman Wall, and the seventh volume of the Corpus Inscriptionum Latinarum edited by Hiibner, containing the British inscriptions, is a valuable repertory for the earlier Roman epitaphs in Britain. The earliest, of course, are commemorative of soldiers, belonging to the legions of occupation, but the Roman form was afterwards adopted for native Britons. Long after the Roman form was discarded, the Latin language continued to be used, especially for inscriptions of a more public character, as being from its supposed permanence the most suitable medium of communication to distant ages. It is only, in fact, within recent years that Latin has become unusual, and the more natural practice has been adopted of writing the epitaphs of distinguished men in the language of the country in which they lived. While Latin was the chief if not the sole literary language, it was, as a matter of course, almost exclusively used for epitaphial inscriptions. The com- paratively few English epitaphs that remain of the nth and 12th centuries are all in Latin. They are generally confined to a mere statement of the name and rank of the deceased following the words " Hie jacet." Two noteworthy exceptions to this

general brevity are, however, to be found in most of the collections. One is the epitaph to Gundrada, daughter of the Conqueror (d. 1085), which still exists at Lewes, though in an imperfect state, two of the lines having been lost; another is that to William de Warren, earl of Surrey (d. 1089), believed to have been inscribed in the abbey of St Pancras, near Lewes, founded by him. Both are encomiastic, and describe the character and work of the deceased with considerable fulness and beauty of expression. They are written in leonine verse. In the 13th century French began to be used in writing epitaphs, and most of the inscriptions to celebrated historical personages between 1 200 and 1400 are in that language. Mention may be made of those to Robert, the 3rd earl of Oxford (d. 1221), as given in Weever, to Henry III. (d. 1272) at Westminster Abbey, and to Edward the Black Prince (d. 1376) at Canterbury. In most of the inscriptions of this period the deceased addresses the reader in the first person, describes his rank and position while alive, and, as in the case of the Black Prince, contrasts it with his wasted and loathsome state in the grave, and warns the reader to prepare for the same inevitable change. The epitaph almost invariably closes with a request, sometimes very urgently worded, for the prayers of the reader that the soul of the deceased may pass to glory, and an invocation of blessing, general or specific, upon all who comply. Epitaphs preserved much of the same character after English began to be used towards the close of the 14th century. The following, to a member of the Savile family at Thornhill, is probably even earlier, though its precise date cannot be fixed: —

" Bonys emongg stonys lys ful

steyl gwylste the sawle wan-

deris were that God wylethe " —

that is, Bones among stones lie full still, whilst the soul wanders whither God willeth. It may be noted here that the majority of the inscriptions, Latin and English, from 1300 to the period of the Reformation, that have been preserved, are upon brasses (see Brasses, Monumental). The very curious epitaph on St Bernard, probably written by a monk of Clairvaux, has the peculiarity of being a dialogue in Latin verse.

It was in the reign of Elizabeth that epitaphs in English began to assume a distinct literary character and value, entitling them to rank with those that had hitherto been composed in Latin. We learn from Nash that at the close of the 16th century it had become a trade to

supply epitaphs in English verse. There is one on the dowager countess of Pembroke (d. 162 1), remarkable for its successful use of a somewhat daring hyperbole. It was written by William Browne, author of Britannia's Pastorals: —

" Underneath this sable hearse Lies the subject of all verse; Sydney's sister, Pembroke's mother; Death, ere thou hast slain another Fair and learn'd and good as she, Time will throw his dart at thee. Marble piles let no man raise To her name for after days ;

Some kind woman, born as she, Reading this, like Niobe, Shall turn marble, and become Both her mourner and her tomb,"

If there be something of the exaggeration of a conceit in the second stanza, it needs scarcely to be pointed out that epitaphs, like every other form of composition, necessarily reflect the literary characteristics of the age in which they were written. The deprecation of marble as unnecessary suggests one of the finest literary epitaphs in the English language, that by Milton upon Shakespeare.

The epitaphs of Pope are still considered to possess very great literary merit, though they were rated higher by Johnson and critics of his period than they are now.

Dr Johnson, who thought so highly of Pope's epitaphs, was himself a great authority on both the theory and practice of this species of composition. His essay on epitaphs is one of the few existing monographs on the subject, and his opinion as to the use of Latin had great influence. The manner in which he met the delicately insinuated request of a number of eminent men that English should be employed in the case of Oliver Goldsmith was characteristic, and snowed the strength of his conviction on the subject. His arguments in favour of Latin were chiefly drawn from its inherent fitness for epitaphial inscriptions and its classical stability. The first of these has a very considerable force, it being admitted on all hands that few languages are in themselves so suitable for the purpose; the second is out- weighed by considerations that had considerable force in Dr Johnson's time, and have acquired more since. Even to the learned Latin is no longer the language of daily thought and life as it was at the period of the Reformation, and the great body of those who may fairly claim to be called the well-educated classes can only read it with difficulty, if at all. It seems, there- fore, little less than absurd, for the sake of a stability which is itself in great part delusive, to write epitaphs in a language unintelligible to the vast majority of

those for whose information presumably they are intended. Though a stickler for Latin, Dr Johnson wrote some very beautiful English epitaphs, as, for example, the following on Philips, a musician: —

" Philips, whose touch harmonious could remove The pangs of guilty power or hapless love ; Rest here, distressed by poverty no more, Here find that calm thou gav'st so oft before ; Sleep undisturbed within this peaceful shrine Till angels wake thee with a note like thine ! "

In classifying epitaphs various principles of division may be adopted. Arranged according to nationality they indicate dis- tinctions of race less clearly perhaps than any other form of literature does, — and this obviously because when under the influence of the deepest feeling men think and speak very much in the same way whatever be their country. At the same time the influence of nationality may to some extent be traced in epitaphs. The characteristics of the French style, its grace, clearness, wit and epigrammatic point, are all recognizable in French epitaphs. In the 16th century those of Etienne Pasquier were universally admired. Instances such as " La premiere au rendez-vous," inscribed on the grave of a mother, Piron's epitaph, written for himself after his rejection by the French Academy —

" Ci-git Piron, qui ne fut rien, Pas mfme academicien " —

and one by a relieved husband, to be seen at Pere la Chaise —

" Ci-git ma femme. Ah ! qu'elle est bien Pour son repos et pour le mien " —

might be multiplied indefinitely. One can hardly look through a collection of English epitaphs without being struck with the fact that these represent a greater variety of intellectual and emotional states than those of any other nation, ranging through every style of thought from the sublime to the commonplace, every mood of feeling from the most delicate and touching to the coarse and even brutal. Few subordinate illustrations of the complex nature of the English nationality are more striking. Epitaphs are sometimes classified according to their authorship and sometimes according to their subject, but neither division

is So interesting as that which arranges them according to their

characteristic features. What has just been said of English epitaphs is, of course, more true of epitaphs generally. They exemplify every variety of sentiment and taste, from lofty pathos and dignified eulogy to coarse buffoonery and the vilest scurrility. The extent to which the humorous and even the low comic element prevails among them is a noteworthy circumstance. It is curious that the most solemn of all subjects should have been frequently treated, intentionally or unintentionally, in a style so ludicrous that a collection of epitaphs is generally one of the most amusing books that can be picked up. In this as in other cases, too, it is to be observed that the unintended humour is generally of a much more entertaining kind than that which has been deliberately perpetrated.

See Weever, Ancient Funerall Monuments (1631, 1661, Tooke's edit., 1767); Philippe Labbe, Thesaurus epifaphiorum (Paris, 1666); Theatrum funebre extructum a Dodone Richea seu Ottone Aicher (1675); Hackett, Select and Remarkable Epitaphs (1757); de Laplace, Eˆpitaphes serieuses, badines, satiriques et burlesques (3 vols., Paris, 1782); Pulleyn, Churchyard Gleanings (c. 1830); L. Lewy- sohn, Sechzig Epitaphien von Grabsteinen d. israelit. Friedhofes zu. Worms (1855); Pettigrew, Chronicles of the Tombs (1857); S. Tissington, Epitaphs (1857); Robinson, Epitaphs from Cemeteries, in London, Edinburgh, &c. (1859); le Blant, Inscriptions chretiennes de la Gaule anterieures au VIII' siecle (1856, 1865); Blommaert, Galliard, &c, Inscriptions funeraires et monumentales de la prov. de Flandre Orient (Ghent, 1857, i860); Inscriptions fun. et mon. de la prov. d'Anvers (Antwerp, 1857-1860); Chwolson, Achtzehn hebrdische Grabschriften aus der Krim (1859); J. Brown, Epitaphs, &c, in Greyfriars Churchyard, Edinburgh (1867); H. J. Loaring, Quaint, Curious, and Elegant Epitaphs (1872); -J. R. Kippax, Churchyard Literature, a Choice Collection of American Epitaphs (Chicago, 1876); also the poet William Wordsworth's Essay on Epitaphs.

EPITHALAMIUM (Gr. brl, at or upon, and daKafws, a nuptial chamber), originally among the Greeks a song in praise of bride and bridegroom, which was sung by a number of boys and girls at the door of the nuptial chamber. According to the scholiast on Theocritus, one form, the KaraKoi/xriTiKov, was employed at night, and' another, the bieytpriKov, to arouse the bride and bridegroom on the following morning. In either case, as was natural, the main burden of the song consisted of invocations of blessing and predictions of happiness, interrupted from time to time by the ancient chorus of Hymen hymenaee. Among the Romans a similar custom was in vogue, but the song was sung by girls only, after the marriage

guests had gone, and it contained much more of what modern morality would condemn as obscene. In the hands of the poets the epithalamium was developed into a special literary form, and received considerable cultivation. Sappho, Anacreon, Stesichorus and Pindar are all regarded as masters of the species, but the finest example preserved in Greek literature is the 18th Idyll of Theocritus, which celebrates the marriage of Menelaus and Helen. In Latin, the epithalamium, imitated from Fescennine Greek models, was a base form of literature, when Catullus redeemed it and gave it dignity by modelling his Marriage of Thetis and Peleus on a lost ode of Sappho. In later times Statius, Ausonius, Sidonius Apollinaris and Claudian are the authors of the best-known epithalamia in classical Latin; and they have been imitated by Buchanan, Scaliger, Sannazaro, and a whole host of modern Latin poets, with whom, indeed, the form was at one time in great favour. The names of Ronsard, Malherbe and Scarron are especially associated with the species in French literature, and Marini and Metastasio in Italian. Perhaps no poem of this class has been more universally admired than the Epithalamium of Spenser (JSOS)) though he has found no unworthy rivals in Ben Jonson, Donne and Quarles. At the close of In Memoriam Tennyson has appended a poem, on the nuptials of his sister, which is strictly an epithalamium.

EPITHELIAL, ENDOTHELIAL and GLANDULAR TISSUES, in anatomy. Every surface of the body which may come into contact with foreign substances is covered with a lum. ” ‘ protecting layer of cells closely bound to one another to form continuous sheets. These are epithelial cells (from BrfKri, a nipple). By the formation of outgrowths or in- growths from these surfaces further structures, consisting largely

or entirely of cells directly derived from the surface epithelium, may be formed. In this way originate the central nervous system, the sensitive surfaces of the special sense organs, the glands, and the hairs, nails, &c. The epithelial cells possess typical microscopical characters which enable them to be readily distinguished from all others. Thus the cell outline is clearly marked, the nucleus large and spherical or ellipsoidal. The protoplasm of the cell is usually large in amount and often contains large numbers of granules.

The individual cells forming an epithelial membrane are classified according to their shape. Thus we find flattened, or squamous, cubical, columnar, irregular, ciliated or flagellated cells. Many of the membranes formed by these cells are only one cell thick, as for instance is the case for the major part of the alimentary canal. In

other instances the epithelial membrane may consist of a number of layers of cells, as in the case of the epidermis of the skin. Considering in the first place those membranes of which the cells are in a single layer we may distinguish the following: —

1. Columnar Epithelium (figs. 1 and 2). — This variety covers the main part of the intestinal tract, i.e. from the end of the oesophagus to the commencement of the rectum. It is also found lining the ducts of many glands. In a highly typical form it is found covering the villi of the small in- testine (fig. 1). The external layer of the cell is commonly modified to form a thin membrane showing a number of very fine

Fig. 1. — Isolated Epithelial Cellsf rom the Small Intestine of the Frog.

Fig. 2. — Columnar Epithelial Cells rest- ing upon a Basement Membrane.

Fig. 3.— Mosaic appearance of a Columnar Epi- thelial Surface as seen from above.

radially arranged lines, which are probably the expression of very minute tubular perforations through the membrane.

The close apposition of these cells to form a closed membrane is well seen when a surface covered by them is examined from above (fig. 3). The surfaces of the cells are then seen to form a mosaic, each cell area having a polyhedral shape.

2. Cubical Epithelium.— -This differs from the former in that the cells are less in height. It is found in many glands and ducts {e.g. the kidney), in the middle ear, choroid plexuses of the brain, &c.

3. Squamous or Flattened Epithelium (fig. 4). — In this variety the cell is flattened, very thin and irregular in outline. It occurs

as the covering epithelium of the alveoli of the lung, of the kidney glomerules and capsule, &c. The sur- face epithelial cells of a stratified epi- thelium are also of this type (fig. 4). Closely resembling these cells are those known as endothelial (see later).

4. Ciliated Epithelium (fig. 5).— The surface cells of many epithelial membranes are often provided with a number of very fine proto- plasmic processes or cilia. Most com-

Fig. 4. — Squamous Epithelial Cells from the Mucous Membrane of the Mouth.

Fig. 5.— Isolated ciliated Epithelial , ., ,. Cells from the

monly the cells Trachea, are columnar, but other shapes are also found. During life the cilia are always in movement, and set up a current tending to drive fluid or other material on the surface in one direction along the membrane or tube lined by such epithelium. It is found lining the trachea, bronchi, parts of the nasal cavities and the

Fig. 6.— A Stratified Epi- thelium from a Mucous Membrane.

uterus, oviduct, vas deferens, epididymis, a portion of the renal tubule, &c.

In the instance of some cells there may be but a single process from the exposed surface of the cell, and then the process is usually of large size and length. It is then known as a flagellum. Such cells are common among the surface cells of many of the simple animal organisms.

When the cells of an epithelial surface are arranged' several layers deep, we can again distinguish various types: —

i. Stratified Epithelium (figs. 6 and 7). — This is found in the epithelium of the skin and of many mucous membranes (mouth,

oesophagus, rectum, conjunctiva, vagina, &c). Here the surface cells are very much flattened (squamous epithelium), those of the middle layer are polyhedral and those of the lowest layer are cubical or columnar. This type of epithelium is found covering surfaces commonly exposed to friction. The surface may be dry as in the skin, or moist, e.g. the mouth. The surface cells are con- stantly being rubbed off, and are then replaced by new cells growing up from below. Hence the deepest layer, that nearest the blood supply, is a formative layer, and'in succes- sive stages from this we can trace the gradual transformation of these protoplasmic cells into scaly cells, which no longer show any sign of being alive. In the moist mucous surfaces the number of cells form- ing the epithelial layer is usually much smaller than in a dry stratified epithelium.

2. Stratified Ciliated Epithelium. — , In this variety the superficial cells are ciliated and columnar, between the bases of these are found fusi- form cells and the lowest cells are cubical or pyramidal. This epi- thelium is found lining parts of the respiratory passages, the vas deferens and the epididymis.

3. Transitional Epithelium (fig. 8). — This variety of epithelium is found lining the bladder, and the appearance observed depends upon the contracted or distended state of the bladder from*

which the preparation was made. If the bladder was con- tracted tne form seen in fig. 8 is obtained. The epithelium is in three or more layers, the super- ficial one being very character- istic. The cells are cubical and Fig. 8.— Transitional Epithel- fit over the rounded ends of the ium from the Urinary Bladder, cells of the next layer. These showing the outlines of the cells are pear-shaped, the points of y ' the pear resting on the base-

ment membrane. Between the bases of these cells lie those of the lowermost layer. These are irregularly columnar. If the bladder is distended before the preparation is made, the cells are then found stretched out transversely. This is especially the case with the surface cells, which may then become very flattened.

Considering epithelium from the point of view of function, it may be classified as protective, absorptive or secretory. It may produce special outgrowths for protective or ornamental purposes, such are hairs, nails, horns, &c, and for such purposes it may manufacture within itself chemical material best suited for that purpose, e.g. keratin; here the whole cell becomes modified. In other instances may be seen in the interior of the

Fig. 7. — Stratified Epithel- ium from the Skin. c, Columnar cells resting on

the fibrous true skin. p, The so-called prickle cells g, Stratum granulosum. h, Horny cells. s\ Squamous horny cells.

cells many chemical substances which indicate the nature of their work, e.g, fat droplets, granules of various kinds, protein, mucin, watery granules, glycogen, &c. In a typical absorbing cell granules of material being absorbed may be seen. A secreting cell of normal type forming specific substances stores these in its interior until wanted, e.g. fat as in sebaceous and mammary glands, ferment precursors (salivary, gastric glands, &c), and various excretory substances, as

in the renal epithelium.

Initially the epithelium cell might have all these functions, but later came specialization and therefore to most cells a specific work. Some of that work does not require the cell to be at the surface, while for other work this is indispensable, and hence when the surface becomes limited those of the former category are removed from the surface to the deeper parts. This is seen typically in secretory and excretory cells, which usually lie below the surface on to which they pour their secretions. If the secretion required at any one point is considerable, then the secreting cells are numerous in proportion and a typical gland is formed. The secretion is then conducted to the surface by a duct, and this duct is also lined with epithelium.

Glandular Tissues. — Every gland is formed by an ingrowth from an epithelial surface. This ingrowth may from the begin- ning possess a tubular structure, but in other instances aiands may start as a solid column of cells which subsequently becomes tubulated. As growth proceeds, the column of cells may divide or give off offshoots, in which case a compound gland is formed. In many glands the number of branches is limited, in others (salivary, pancreas) a very large structure is finally formed by repeated growth and sub- division. As a rule the branches do not unite with one another, but in one instance, the liver, this does occur when a reticulated compound gland is pro- duced. In compound glands the more typical or secretory epithelium is found forming the terminal portion of each branch, and the uniting portions form ducts and are lined with a less modified type of epithelial cell.

Glands are classified according to their shape. If the gland retains its shape as

Fig. 9. — A Com-

, , ‘ , , , .. . , , . K , pound Tubular Gland

a tube throughout it is termed a tubular One of the pyloric gland, simple tubular if there is no division glands of the stomach (large intestine) , compound tubular (fig. 9) of the dog. if branching occurs (pyloric glands of stomach). In the simple tubular glands the gland may be coiled without losing its tubular form, e.g. in sweat glands. In the second main variety of gland the secretory portion is enlarged and the lumen variously increased in size. These are termed alveolar or saccular glands. They are again subdivided into simple or compound alveolar glands, as in the case of the tubular glands (fig.

10). A further

‘ -4

Fig. 10. — A Tubulo-alveolar Gland. One of the mucous salivary glands of the dog. On the left the alveoli are un- folded to show their general arrange- ment, d, Small duct of gland sub- dividing into branches; e, / and g, terminal tubular alveoli of gland.

Fig. 11. — A Com- pound Alveolar Gland. One of the terminal lobules of the pancreas, showing the spherical form of the alveoli.

complication in the case of the alveolar glands may occur in the form of still smaller saccular diverticuli growing out from the main sacculi (fig. 11). These are termed alveoli.

The typical secretory cells of the glands are found lining the

terminal portions of the ramifications and extend upwards to varying degrees. Thus in a typical acinous gland the cells are restricted to the final alveoli. The remaining tubes are to be considered mainly as ducts. In tubulo-alveolar glands the secreting epithelium lines the alveus as well as the terminal tubule.

The gland cells are all placed upon a basement membrane. In many instances this membrane is formed of very thin flattened cells, in other instances it is apparently a homogeneous mem- brane, and according to some observers is simply a modified part of the basal surface of the cell, while according to others it is a definite structure distinct from the epithelium.

In the secretory portion of the gland and in the smaller ducts the epithelial layer is one cell thick only. In the larger ducts there are two layers of cells, but even here the surface cell usually extends by a thinned-out stalk down to the basement membrane. The detailed characters of the epithelium of the different glands of the body are given in separate articles (see Alimentary Canal, &c). It will be sufficent here to give the more general characters possessed by these cells. They are cubical or conical cells with distinct oval nuclei and granular protoplasm. Within the protoplasm is accumulated a large number of spherical granules arranged in diverse manners in different cells. The granules vary much in size in different glands,

and in chemical composition, but in all cases represent a store of material ready to be discharged from the cell as its secretion. Hence the general appearance of the cell is found to vary according to the previous degree of activity of the cell. If it has been at rest for some time the cell contains very many granules which swell it out and increase its size. The nucleus is then largely hidden by the granules. In the opposite condition, i.e. when the cell has been actively secreting, the protoplasm is much clearer, the nucleus obvious and the cell shrunken in size, all these changes being due to the extrusion of the granules.

Endothelium and Mesothelium. — Lining the blood vessels, lymph vessels and lymph spaces are found flattened cells apposed Endothel- to one another by their edges to form an extremely lum and thin membrane. These cells are developed from the middle embryonic layer and are termed endothelium. A very similar type of cells is also found, formed into a very thin continuous sheet, lining the body-cavity, i.e. pleural pericardial, and peritoneal cavities. These cells develop from that portion of the mesoderm known as the mesothelium, and are therefore frequently termed mesothelial, though by many they are also included as endothelial cells.

A mesothelial cell is very flattened, thus resembling a squamous epithelial cell. It possesses a protoplasm with faint granules and an oval or round nucleus (fig. 12). j The outline of the cell is irregularly polyhedral, and the borders may be finely serrated. The cells are united to one another by an intercellular cement substance which, however, is very scanty in amount, but can be made apparent by staining with silver nitrate when the appearance repro- duced in the figure is seen. By being thus united together, the cells form a continuous layer. This layer is pierced by a number of small open-ings, known as stomata, which bring the cavity into direct communication with lymph spaces or vessels lying beneath the membrane. The stomata are surrounded by a special layer of cubical and granular cells. Through these stomata fluids and other materials present in the body-cavity can be removed into the lymph spaces.

Endothelial membranes (fig. 13) are quite similar in structure to mesothelial. They are usually elongated cells of irregular outline and serrated borders.

By means of endothelial or mesothelial membranes the surfaces of the parts covered by them are rendered very smooth,

mesothel- ium.

Fig. 12. — Mesothelial Cells forming the Peri- toneal SerousMembrane. Three stomata are seen surrounded by cubical cells. One of these is closed. The light band marks the position of a lymphatic. (After Klein.)

Fig. 13. — Endothelial Cells from the Interior of an Artery.

so that movement over the surface is greatly facilitated. Thus the abdominal organs can glide easily over one another within the peritoneal cavity; the blood or lymph experiences the least amount of friction; or again the friction is reduced to a minimum between a tendon and its sheath or in the joint cavities. The cells form- ing these membranes also possess ‘ further physiological properties. Thus it is most probable that they play an active part in the blood capillaries in transmitting substances from the blood into the tissue spaces, or conversely in preventing the passage of materials from blood to tissue space or from tissue space to blood. Hence the fluid of the blood and that of the tissue space need not be of the same chemical composition. (T.G.Br.)

EPITOME (Gr. inroixi}, from brirtuvuv, to cut short), an abridgment, abstract or summary giving the salient points of a book, law case, &c, a short and concise account of any particular subject or event. By transference epitome is also used to express the representation of a larger thing, concrete or abstract, repro- duced in miniature. Thus St Mark’s was called by Ruskin the ” epitome of Venice,” as it embraces examples of all the periods of architecture from the 10th to the 19th centuries.

EPOCH (Gr. ‘eiroxk, holding in suspense, a pause, from hcexti-v, to hold up, to stop), a term for a stated period of time, and so used of a date accepted as the starting-point of an era or of a new period in chronology, such as the birth of Christ. It is hence transferred to a period which marks a great change, whether in the history of a country or a science, such as a great discovery or invention. Thus an event may be spoken of as “epoch-making.” The word is also used, synonymously with ” period,” for any space of time marked by a distinctive con- dition or by a particular series of events.

In astronomy the word is used for a moment from which time is measured, or at which a definite position of a body or a definite relation of two bodies occurs. For example, the position of a body moving in an orbit cannot be determined unless its position at some given time is known. The given time is then the epoch; but the term is often applied to the mean longitude of the body at the given time.

EPODE, in verse, the third part in an ode, which followed the strophe and the antistrophe, and completed the movement; it was called kncabbs ■wtpiob'os by the Greeks. At a certain moment the choirs, which had chanted to right of the altar or stage and then to left of it, combined and sang in unison, or permitted the coryphaeus to sing for. them all, standing in the centre. When, with the appearance of Stesichorus and the evolution of choral lyric, a learned and artificial kind of poetry began to be cultivated in Greece, a new form, the tlSos eirydiicov, or epode-song, came into existence. It consisted of a verse of trimeter iambic, followed by a dimeter iambic, and it is reported that, although the epode was carried to its highest perfection by Stesichorus, an earlier poet, Archilochus, was really the inventor of this form. The epode soon took a firm place in choral poetry, which it lost when that branch of literature declined. But it extended beyond the ode, and in the early dramatists we find numerous examples of monologues and dialogues framed on the epodical system. In Latin poetry the epode was cultivated, in conscious archaism, both as a part of the ode and as an inde- pendent branch of poetry. Of the former class, the epithalamia of Catullus, founded on an imitation of Pindar, present us with examples of strophe, antistrophe and epode; and it has been observed that the celebrated ode of Horace, beginning Quern virum aut heroa lyra vel acri, possesses this triple character. But the word is now mainly familiar from an experiment of Horace in the second class, for he entitled his fifth book of odes Epodon liber or the Book of Epodes. He says in the course of these poems, that in composing them he was introducing a new form, at least in Latin literature, and that he was imitating the effect of the iambic distichs invented by Archilochus. Accordingly we find the first ten of these epodes

composed in alternate verses of iambic trimeter and iambic dimeter, thus: —

" At o Deorum quicquid in coelo regit Terras et humanura genus."

In the seven remaining epodes Horace has diversified the measures, while retaining the general character of the distich. This group of poems belongs in the main to the early youth of the poet, and displays a truculence and a controversial heat which are absent from his more mature writings. As he was imitating Archilochus in form, he believed himself justified, no doubt, in repeating the sarcastic

violence of his fierce model. The curious thing is that these particular poems of Horace, which are really short lyrical satires, have appropriated almost exclusively the name of epodes, although they bear little enough resemblance to the genuine epode of early Greek literature.

EPONA, a goddess of horses, asses and mules, worshipped by the Romans, though of foreign, probably Gallic, origin. The majority of inscriptions and images bearing her name have been found in Gaul, Germany and the Danube countries; of the few that occur in Rome itself most were exhumed on the site of the barracks of the equites singulares, a foreign imperial body- guard mainly recruited from the Batavians. Her name does not appear in Tertullian's list of the indigetes di, and Juvenal con- trasts her worship unfavourably with the old Roman Numa ritual. Her cult does not appear to have been introduced before imperial times, when she is often called Augusta and invoked on behalf of the emperor and the imperial house. Her chief function, however, was to see that the beasts of burden were duly fed, and to protect them against accidents and malicious influence. In the countries in which the worship of Epona was said to have had its origin it was a common belief that certain beings were in the habit of casting a spell over stables during the night. The Romans used to place the image of the goddess, crowned with flowers on festive occasions, in a sort of shrine in the centre of the architrave of the stable. In art she is generally represented seated, with her hand on the head of the accompany- ing horse or animal.

See Tertullian, Apol. 16; Juvenal viii. 157; Prudentius, Apoth. 197; Apuleius, Metam. iii. 27; articles in Daremberg and Saglio's Diet, des antiquites and Pauly-Wissowa's Realencyclopddie.

EPONYMOUS, that which gives a name to anything (Gr. hciavvfios, from ovojxo., a name), a term especially applied to the mythical or semi-mythical personages, heroes, deities, &c. from whom a country or city took its name. Thus Pelops is the giver of the name to the Peloponnese. At Athens the chief archon of the year was known as the apxoiv htiovvjxos, as the year was known by his name. There was a similar official in ancient Assyria. In ancient times, as in historical and modern cases, a country or a city has been named after a real personage, but in many cases the person has been invented to account for the name.

EPPING, a market town in the Epping parliamentary division of Essex, England, 17 m. N.N.E. from London by a branch of the Great Eastern railway. Pop. of urban district (1001), 3789. The town lies

high and picturesquely, at the northern outskirts of Epping Forest. The modern church of St John the Baptist replaces the old parish church of All Saints in the village of Epping Upland 2 m. N.W. This is in part Norman. There is considerable trade in butter, cheese and sausages.

Epping Forest forms part of the ancient Waltham Forest, which covered the greater part of the county. All the " London Basin," within which the Forest lies, was densely wooded. The Forest became one of the commonable lands of Royal Chases or hunting-grounds. It was threatened with total disafforestation, when under the Epping Forest Act of 1871 a board of commissioners was appointed for the better manage- ment of the lands. The corporation of the city of London then acquired the freehold interest of waste land belonging to the lords of the manor, and finally secured 55595 acres, magnificently timbered, to the use of the public for ever, the tract being declared open by Queen Victoria in 1882. The Ancient Court of Verderers was also revived, consisting of an hereditary lord

warden together with four verderers elected by freeholders of the' county. The present forest lies between the valleys of the Roding and the Lea, and extends southward from Epping to the vicinity of Woodford and Walthamstow, a distance of about 7 m. It is readily accessible from the villages on its outskirts, such as Woodford, Chingford and Lough ton, which are served by branches of the Great Eastern railway. These are centres of residential districts, and, especially on public holidays in the summer, receive large numbers of visitors.

EPPS, the name of an English family, well known in commerce and medicine. In the second half of the 18th century they had been settled near Ashford, Kent, for some generations, claiming descent from an equerry of Charles II., but were reduced in circumstances, when John Epps rose to prosperity as a provision merchant in London, and restored the family fortunes. He had four sons, of whom John Epps (1805-1869), George Napoleon Epps (1815-1874), and James Epps (1821-1907) were notable men of their day, the two former as prominent doctors who were ardent converts to homoeopathy, and James as a homoeopathic chemist and the founder of the great cocoa business associated with his name. Among Dr G. N. Epps's children were Dr Washington Epps, a well-known homoeopathist, Lady Alma-Tadema, and Mrs Edmund Gosse.

EPREMESNIL (Espremesnil or Epremenil), JEAN JACQUES DUVAL D' (1745-1794), French magistrate and politician, was born in India

on the 5th of December 1745 at Pondicherry, his father being a colleague of Dupleix. Returning to France in 1750 he was educated in Paris for the law, and became in 1775 conseiller in the parlement of Paris, where he soon distinguished himself by his zealous defence of its rights against the royal prerogative. He showed bitter enmity to Marie Antoinette in the matter of the diamond necklace, and on the 19th of November 1787 he was the spokesman of the parlement in demanding the convocation of the states-general. When the court retaliated by an edict depriving the parlement of its functions, Epremesnil bribed the printers to supply him with a copy before its pro- mulgation, and this he read to the assembled parlement. A royal officer was sent to the palais de justice to arrest Epremesnil and his chief supporter Goislard de Montsabert, but the parlement (5th of May 1788) declared that they were all Epremesnils, and the arrest was only effected on the next day on the voluntary surrender of the two members. After four months' imprisonment on the island of Ste Marguerite, Epremesnil found himself a popular hero, and was returned to the states-general as deputy of the nobility of the outlying districts of Paris. But with the rapid advance towards revolution his views changed; in his Reflexions impartiales . . . (January 1789) he defended the monarchy, and he led the party among the nobility that refused to meet with the third estate until summoned to do so by royal command. In the Constituent Assembly he opposed every step towards the destruction of the monarchy. After a narrow escape from the fury of the Parisian populace in July 1792 he was imprisoned in the Abbaye, but was set at liberty before the September massacres. In September 1793, however, he was arrested at Le Havre, taken to Paris, and denounced to the Convention as an agent of Pitt. He was brought to trial before the revolutionary tribunal on the 21st of April 1794, and was guillotined the next day.

D'Epremesnil's speeches were collected in a small volume in 1823. See also H. Carre, Un Precurseur inconscient de la Revolution (Paris,

1897).

EPSOM, a market town in the Epsom parliamentary division of Surrey, England, 14 m. S.W. by S. of London Bridge. Pop. of urban district (1901), 10,915. It is served by the London & South- Western and the London, Brighton & South Coast railways, and on the racecourse on the neighbouring Downs there is a station (Tattenham Corner) of the South-Eastern & Chatham railway. The principal building is the parish church of St Martin, a good example of modern Gothic, the interior of which contains some fine sculptures by Flaxman and Chantrey. Epsom (a contraction of Ebbisham, still the

name of the manor) first came into notice when mineral springs were discovered there

about 1618. For some time after their discovery the town enjoyed a wonderful degree of prosperity. After the Restoration it was often visited by Charles II., and when Queen Anne came to the throne, her husband, Prince George of Denmark, made it his frequent resort. Epsom gradually lost its celebrity as a spa, but the annual races held on its downs arrested the decay of the town. Races appear to have been established here as early as James I's residence at Nonsuch, but they did not assume a permanent character until 1730. The principal races — the Derby and Oaks — are named after one of the earls of Derby and his seat, the Oaks, which is in the neighbourhood. The latter race was established in 1 7 79, and the former in the following year. The spring races are held on a Thursday and Friday towards the close of April; and the great Epsom meeting takes place on the Tuesday and three following days immediately before Whitsuntide, — the Derby on the Wednesday, and the Oaks on the Friday (see Horse-Racing). The grand stand was erected in 1829, and subsequently enlarged; and there are numerous training stables in the vicinity. Close to the town are the extensive buildings of the Royal Medical Benevolent College, commonly called Epsom College, founded in 1855. Scholars on the foundation must be the sons of medical men, but in other respects the school is open. In the neighbourhood is the Durdans, a seat of the earl of Rosebery.

EPSOM SALTS, heptohydrated magnesium sulphate, MgS0 4 7H 2 0, the magnesii sulphas of pharmacy (Ger. Bitter sah). It occurs dissolved in sea water and in most mineral waters, especially in those at Epsom (from which place it takes its name), Seidlitz, Saidschutz and Pullna. It also occurs in nature in fibrous excrescences, constituting the mineral epsomite or hair-salt ; and as compact masses (reichardite) , as in the Stassfurt mines. It is also found associated with limestone, as in the Mammoth Caves, Kentucky, and with gypsum, as atMontmartre. Epsom salts crystallizes in the orthorhombic system, being isomorphous with the corresponding zinc and nickel sulphates, and also with magnesium chromate. Occasionally monoclinic crystals are obtained by crystallizing from a strong solution. It is used in the arts for weighting cotton fabrics, as a top- dressing for clover hay in agriculture, and in dyeing. In medicine it is frequently employed as a

hydragogue purgative, specially valuable in febrile diseases, in congestion of the portal system, and in the obstinate constipation of painters' colic. In the last case it is combined with potassium iodide, the two salts being exceedingly effective in causing the elimination of lead from the system. It is also very useful as a supplement to mercury, which needs a saline aperient to complete its action. The salt should be given a few hours after the mercury, e.g. in the early morning, the mercury having been given at night. It possesses the advantage of exercising but little irritant effect upon the bowels. Its nauseous bitter taste may to some extent be con- cealed by acidifying the solution with dilute sulphuric acid, and in some cases where full doses have failed the repeated administration of small ones has proved effectual.

For the manufacture of Epsom salts and for other hydrated magnesium sulphates see Magnesium.

EQUATION (from Lat. aequatio, aequare, to equalize), an expression or statement of the equality of two quantities. Mathematical equivalence is denoted by the sign = , a symbol invented by Robert Recorde (1510-1558), who considered that nothing could be more equal than two equal and parallel straight lines. An equation states an equality existing between two classes of quantities, distinguished as known and unknown; these correspond to the data of a problem and the thing sought. It is the purpose of the mathematician to state the unknowns separately in terms of the knowns; this is called solving the equation, and the values of the unknowns so obtained are called the roots or solutions. The unknowns are usually denoted by the terminal letters, ... x, y, z, of the alphabet, and the knowns are either actual numbers or are represented by the literals

a, b, c, &c , i.e. the introductory letters of the alphabet.

Any number or literal which expresses what multiple of term occurs in an equation is called the coefficient of that term;

and the term which does not contain an unknown is called the absolute term. The degree of an equation is equal to the greatest index of an unknown in the equation, or to the greatest sum of the indices of products of unknowns. If each term has the sum of its indices the same, the equation is said to be homogeneous. These definitions are exemplified in the equations: —

(1) ax 2 -j-2bx+c = o,

(2) xy 2 +4a 2 x = 8a 3 ,

(3) ax 2 --2hxy+by 2 =o.

In (1) the unknown is x, and the knowns a, b, c; the coefficients of x and * are a and 26; the absolute term is c, and the degree is 2. In (2) the unknowns are x and y, and the known a; the degree is 3, i.e. the sum of the indices in the term xy 2 . (3) is a homo- geneous equation of the second degree in x and y. Equations of the first degree are called simple or linear; of the second, quadratic; of the third, cubic; of the fourth, biquadratic; of the fifth, quintic, and so on. Of equations containing only one unknown the number of roots equals the degree of the equation; thus a simple equation has one root, a quadratic two, a cubic three, and so on. If one equation be given containing two un- knowns, as for example ax+by = c or ax 2 +by 2 = c, it is seen that there are an infinite number of roots, for we can give x, say, any value and then determine the corresponding value of y; such an equation is called indeterminate; of the examples chosen the first is a linear and the second a quadratic indeterminate equation. In general, an indeterminate equation results when the number of unknowns exceeds by unity the number of equations. If, on the other hand, we have two equations connecting two unknowns, it is possible to solve the equations separately for one unknown, and then if we equate these values we obtain an equation in one unknown, which is soluble if its degree does not exceed the fourth. By substituting these values the corresponding values of the other unknown are determined. Such equations are called simultaneous; and a simultaneous system is a series of equations equal in number to the number of unknowns. Such a system is not always soluble, for it may happen that one equation is implied by the others; when this occurs the system is called porismatic or poristic. An identity differs from an equation inas- much as it cannot be solved, the terms mutually cancelling; for example, the expression x 2 — a 2 ={x— a) (x+a) is an identity, for on reduction it gives = 0. It is usual to employ the sign s= to express this relation.*

An equation admits of description in two ways: — (1) It may be regarded purely as an algebraic expression, or (2) as a geometrical locus. In the first case there is obviously no limit to the number of unknowns and to the degree of the equation; and, consequently, this aspect is the most general. In the second case the number of unknowns is limited to three, corresponding to the three dimensions of space; the degree is unlimited as before. It must be noticed, however, that by the introduction of appropriate hyperspaces, i.e. of degree equal to the number of unknowns, any equation theoretically

admits of geometrical visualization, in other words, every equation may be represented by a geometrical figure and every geometrical figure by an equation. Corresponding to these two aspects, there are two typical methods by which equations can be solved, viz. the algebraic and geometric. The former leads to exact results, or, by methods of approximation, to results correct to any required degree of accuracy. The latter can only yield approximate values : when theoretically exact constructions are available there is a source of error in the draughtsmanship, and when the constructions are only approximate, the accuracy of the results is more problematical. . The geometric aspect, however, is of considerable value in discussing the theory of equations.

History. — There is little doubt that the earliest solutions of equations are given, in the Rhind papyrus, a hieratic document written some 2000 years before our era. The problems solved were of an arithmetical nature, assuming such forms as " a mass and its fth makes 19." Calling the unknown mass x, we have given x+\x~ig, which is a simple equation. Arith metical problems also gave origin to equations involving two unknowns; the early Greeks were familiar with and solved simultaneous linear equations, but indeterminate equations, such, for instance, as the system given in the " cattle problem " of Archimedes, were not seriously studied until Diophantus solved many particular problems. Quadratic equations arose in the Greek investigations in the doctrine of proportion, and

although they were presented and solved in a geometrical form, the methods employed have no relation to the generalized conception of algebraic geometry which represents a curve by an equation and vice versa. The simplest quadratic arose in the construction of a mean proportional (x) between two lines (a, b), or in the construction of a square equal to a given rectangle; for we have the proportion a:x = x:b; i.e. x 2 = ab. A more general equation, viz. x i -ax+a? = o, is the algebraic equivalent of the problem to divide a line in medial section; this is solved in Euclid, ii. n. It is possible that Diophantus was in possession of an algebraic solution of quadratics; he recognized, however, only one root, the interpretation of both being first effected by the Hindu Bhaskara. A simple cubic equation was presented in the problem of finding two mean proportionals, x, y, between two lines, one double the other. We have a:x = x:y = y.2a, which gives x 2 ay and xy=2d i ; eliminating y we obtain x 3 = 2a

3 , a simple cubic. The Greeks could not solve this equation, which also arose in the problems of duplicating a cube and trisecting an angle, by the ruler and compasses, but only by mechanical curves such as the cissoid, conchoid and quadratrix. Such solutions were much improved by the Arabs, who also solved both cubics and biquadratics by means of intersecting conies; at the same time, they developed methods, originated by Dio phantus and improved by the Hindus, for finding approximate roots of numerical equations by algebraic processes. The algebraic solution of the general cubic and biquadratic was effected in the 16th century by S. Ferro, N. Tartaglia, H. Cardan and L. Ferrari (see Algebra : History) . Many fruitless attempts were made ,to solve algebraically the quintic equation until P. Ruffini and N. H. Abel proved the problem to be impossible; a solution involving elliptic functions has been given by C. Hermite and L. Kronecker, while F. Klein has given another solution.

*In the geometric treatment of equations the Greeks and Arabs based their constructions upon certain empirically deduced properties of the curves and figures employed. Knowing various metrical relations, generally expressed as proportions, it was found possible to solve particular equations, but a general method was wanting. This lacuna was not filled until the 17th century, when Descartes discovered the general theory which explained the nature of such solutions, in particular those wherein conies were employed, and, in addition, established the most important facts that every equation represents a geometrical locus', and conversely. To represent equations containing two unknowns, x, y, ne chose two axes of reference mutually perpendicular, and measured * along the horizontal axis and y along the vertical. Then by the methods described in the article Geometry: Analytical, he showed that— (1) a linear equation represents a straight line, and (2) a quadratic represents a conic. If the equation be homogeneous or break up into factors, it represents a number of straight lines in the first case, and the loci corre- sponding to the factorsinthesecond. The solution of simultaneous equations is easily seen to be the values of x, y corresponding to the intersections of the loci. It follows that there is only one value of x, y which satisfies two linear equations, since two lines intersect in one point only; two values which satisfy a linear and quadratic, since a line intersects a conic in two points; and four values which satisfy two quadratics, since two conies intersect in four points. It may happen that the curves do not actually intersect in the theoretical maximum number of points; the principle of continuity (see Geometrical Continuity) shows us that in such cases some of the roots are*

*imaginary. To repre- sent equations involving three unknowns x, y, z, a third axis is introduced, the z-axis, perpendicular to the plane xy and passing through the intersection of the lines *, y. In this notation a linear equation represents a plane, and two linear simultaneous equa- tions represent a line, i.e. the intersection of two planes; a quadratic equation represents a surface of the second degree. In order to graphically consider equations containing only one unknown, it is convenient to equate the terms to y; i.e. if the equation be/(«) = 0, we take y=f(x) and construct this curve on rectangular Cartesian co-ordinates by determining the values of*

y which correspond to chosen values of x, and describing a curve through the points so obtained. The intersections of the curve with the axis of x gives the real roots of the equation; imaginary roots are obviously not represented.

In this article we shall treat of: (1) Simultaneous equations, (2) indeterminate equations, (3) cubic equations, (4) biquadratic equations, (5) theory of equations. Simple, linear simultaneous and quadratic equations are treated in the article Algebra; for differential equations see Differential Equations.

I. Simultaneous Equations.

Simultaneous equations which involve the second and higher powers of the unknown may be impossible of solution. No general rules can be given, and the solution of any particular problem will largely depend upon the student's ingenuity. Here we .shall only give a few typical examples.

1. Equations which may be reduced to linear equations. — Ex. To so \vex(x-a) = yz, y{y-b) = zx, z{z-c) = xy. Multiply the equations by y, z and x respectively, and divide the sum by xyz; then

a , b , c z ' x y

Multiply by z, x and y, and divide the sum by xyz; then

a , b , c

j \- =0

y z x

(1).

(2).

From (1) and (2) by cross multiplication we obtain

= r (suppose) (3).

y(b 2 -ac) ~z{c 2 -ab) ~x(a 2 -bc) ~A Substituting for x, y and z in x(x-a) =yz we obtain I T,abc-(a 3 +b 3 +c 3)

X ~ (a 2 – be) (b 2 – ac) (c 2 – ab) ‘ and therefore x, y and z are known from (3). The same artifice solves the equations x 2 — yz = a, y 2 —xz = b, z*—xy = c.

2. Equations which are homogeneous and of the same degree. — These equations can be solved by substituting y = mx. We proceed to explain the method by an example.

Ex. Tosolve3× 2 X3’>’ 2 = i5. 3ˆ3’-3ˆ 2 53 ,2 = 45 Substituting y = mx in both these equations, and then dividing, we obtain 31m — 3— 5«i 2 = 3(3-)-»t+m 2)or8JM 2 — 28m + 12=0. The roots of this quadratic are m = J or 3, and therefore 2y = x, or y = 3x.

Taking 2y = x and substituting in i,x’ i +xy+y 2 =o, we obtain y 2 {i2--2 + i) = i$; .”.y 2 = i, which gives y= ±i, x= = ± *2. Taking the second value, y = ix, and substituting for y, we obtain x 2 (3+3+9) = i5; .\ x 2 = i, which gives x= ±1, y= ±3- Therefore the solutions are *= ±2, y= ±i and *= = ± =i, y= ±3- Other artifices have to be adopted to solve other forms of simultaneous equations, for which the reader is referred to J. J. Milne, Companion to Weekly Problem Papers.

II. Indeterminate Equations.

1. When the number of unknown quantities exceeds the number of equations, the equations will admit of innumerable solutions, and are therefore said to be indeterminate. Thus if it be required to find two numbers such that their sum be 10, we have two unknown quantities * and y, and only one equation, viz. x+y — 10, which may evidently be satisfied by innumerable different values of x and y, if fractional solutions be admitted. It is, however, usual, in such questions as this, to restrict values of the numbers sought to positive integers, and therefore, in this case, we can have only these nine solutions,

- = i, 2, 3, 4, 5, 6, 7, 8, 9; y = 9, 8, 7,6, 5,4, 3, 2, 1;

*which indeed may be reduced to five ; for the first four become the same as the last four, by simply changing * into y, and the contrary. This branch of analysis was extensively studied by Diophantus, and is sometimes termed the Diophantine Analysis.*

2. Indeterminate problems are of different orders, according to the dimensions of the equation which is obtained after all the unknown quantities but two have been eliminated by means of the given equations. Those of the first order lead always to equations of the form

ax ± by — == c, where o, b, c denote given whole numbers, and x, y two numbers to be found, so that both may be integers. That this condition may be fulfilled, it is necessary that the coefficients a, b have no common divisor which is not also a divisor of c; for if a = md and 6 = me, then ax+by = mdx+mey = c, and dx+ey = c/m; but d, e, x, y are supposed to be whole numbers, therefore c/m is a whole number; hence m must be a divisor of c. .*

Of the four forms expressed by the equation ax±by = ==e, it is obvious that ax+by=— c can have no positive integral solutions. Also ax — by= —c is equivalent to by—ax = c, and so we have only to consider the forms ax=*=by = c. Before proceeding to the general solution of these equations we will give a numerical example.*

To solve 2+3;y = 25 in positive integers. From the given equation*

EQUATION

711

*we have *= (25-330/2 = 12-y- (y- i)/2. Now, since x must be a whole number, it follows that (y-i)/2 must be a whole number. Let us assume (y-i)/2=z, then y = l+2z; and ^=11-3$, where z might be any whole number whatever, if there were no limitation as to the signs of * and y. But since these quantities are required to be positive, it is evident, from the value of y, that z must be either o or positive, and from the value of x, that it must be less than 4; hence z may have these four values, o, 1,2, 3. If z= o, 8 = 1, z = 2, z = 3;*

t, (x = n, x = 8, # = 5, X = 2,

l nen \ y = i, y = 3 , y = S , y = j.

3. We shall now give the solution of the equation ax~by = c in positive integers.

Convert a/b into a continued fraction, and let p/q be the convergent immediately preceding a/b, then aq-bp=\ (see Continued Fraction).

(a) If aq — bp = i, the given equation may be written ax — by — c(aq — bp) ; .-. a(x-cq)=b(y-cp). Since a and 6 are prime to one another, then x — cq must be divisible by b and y— cp by a; hence

(x-cq)/b = (y-cq)/a = t.

That is, x = bt+cq and y = at+cp. _

Positive integral solutions, unlimited in number, are obtained by giving t any positive integral value, and any negative integral value, so long as it is numerically less than the smaller of the quantities cq/b, cp/a; t may also be zero.

(0) If aq — bp=—i, we obtain x = bt — cq, y = at — cp, from which positive integral solutions, again unlimited in number, are obtained by giving / any positive integral value which exceeds the greater of the two quantities cqlb, cp/a.

If a or b is unity, a/b cannot be converted into a continued fraction with unit numerators, and the above method fails. In this case the solutions can be derived directly, for if b is unity, the equation may be written y = ax-c, and solutions are obtained by giving x positive integral values greater than c/a.

4. To solve ax+by — c in positive integers. Converting a/b into a continued fraction and proceeding as before, we obtain, in the case of aq — bp = i,

x = cq — bl, y = at — cp.

Positive integral solutions are obtained by giving I positive integral values not less than cp/a and not greater than cq/b.

In this case the number of solutions is limited. If aq — bp= —I we obtain the general solution x = bt — cq, y = cp — at, which is of the same form as in the preceding case. For the determination of the number of solutions the reader is referred to H. S. Hall and S. R. Knight's Higher Algebra, G. Chrystal's Algebra, and other text-books.

5. If an equation were proposed involving three unknown quantities, as ax+by+cz =

x = mr+nc', y = mr+n'c', or x = mr+n(d — cz), y = m'r+n (d — cz);

where z and r may be taken at pleasure, except in so far as the values of x, y, z may be required to be all positive ; for from such restriction the values of z and r may be confined within certain limits to be determined from the given equation. For more advanced treatment of linear indeterminate equations see Combinatorial Analysis.

6. We proceed to indeterminate problems of the second degree: limiting ourselves to the consideration of the formula y 2 = a+bx +cx 2 , where x is to be found, so that y may be a rational quantity. The possibility of rendering the proposed formula a square depends altogether upon the coefficients a, b, c; and there are four cases of the problem, the solution of each of which is connected with some peculiarity in its nature.

Case 1. Let a be a square number; then, putting g 2 for a, we have y = g'+bx+cx i . Suppose ˆ (g 2 +bx+cx 2)=g+mx; then g 2 +bx +cx 2 = g 2 +2gmx+m 2 × 2 , or bx+cx 2 = 2gmx+m 2 × 2 , that is, b+cx = 2gm + m 2 x ; hence*

2gm — b 1/5 it 1 21 cg — bm+gm 2

x=-f=rir,y = Tl(s 2 +bx+cx 2)= c _ w , ■*

Case 2. Let c be a square number = g 2 ; then, putting V (a+bx+ g 2 × 2)=m+gx, we find a+bx+g 2 × 2 = m 2 +2tngx+g 2 × 2 , or a+bx = m 2 +2mgx\ hence we find

x ~b-2mg' y -Via-t-MC-t-g; b-zmg*

Case 3. Whon neither a nor c is a square number, yet if the expression a+bx+cx 2 can be resolved into two simple factors, as f +gx and h+kx, the irrationality may be taken away as follows: — Assume V (a+bx+cx 2)ˆ ˆ1 {(f+gx) (h+kx)} =m(f+gx), then (f +gx) (h+kx)=m 2 (f+gx) 2 , or h+kx = m 2 (f+gx) ; hence we find fm 2 -h ..... .,, , , >, (fk-gh)m ,

x =tˆgW 2 ' y ^^^ f+&x){h+kx)]= kˆglˆ-' and in all these formulae m may be taken at pleasure.

Case 4. The expression a+bx+cx 2 may be transformed into a

square as often as it can be resolved into two parts, one of which is a

complete square, and the other a product of two simple factors; for then it has this form, p 2 +qr, where p, q and r are quantities which contain no power of x higher than the first. Let us assume ■ˆ (p 2 +qr)=p+m.q; thus we have p 2 +qr = p 2 +2mpq+m 2 q 2 and r = 2mp+m 2 q, and as this equation involves only the first power of x, we may by proper reduction obtain from it rational values of x and y, as in the three foregoing cases.

The application of the preceding general methods of resolution to any particular case is very easy; we shall therefore conclude with a single example.

Ex. It is required to find two square numbers whose sum is a given square number.

Let a 2 be the given square number, and x 2 , y 2 the numbers required ; then, by the question, x 2 +y 2 = a 2 , and y = V (a 2 – x 2) . This equation is evidently of such a form as to be resolvable by the method em- ployed in case I. Accordingly, by comparing j(a 2 -x 2) with the general expression V (g 2 +bx+cx 2), we have g = a, 6 = 0, c=-l, and substituting these values in the formulae, and also -n for +m, we find

2an ajn 1 — 1)

X ~n 2 + V y ~ n 2 + i If a = n 2 + i, there results x = 2n, y = n 2 -i, a — n 2 +i. Hence if r be an even number, the three sides of a rational right-angled triangle are r, (ir) 2 -i, (ir) 2 + l. If r be an odd number, they become (dividing by 2) r, f(r>-l), \(r 2 + \).

For example, if r = 4, 4, 4-1, 4 + 1, or 4, 3, 5, are the sides of a right-angled triangle ; if r = 7, 7, 24, 25 are the sides of a right-angled triangle.

III. Cubic Equations.

1. Cubic equations, like all equations above the first degree, are divided into two classes: they are said to be pure when they contain only one power of the unknown quantity; and adjected when they contain two or more powers of that quantity.

Pure cubic equations are therefore of the form x 3 = r; and hence it appears that a value of the simple power of the unknown quantity may always be found without difficulty, by extracting the cube root of each side of the equation. Let us consider the equation x 3 c 3 — o more fully. This is decomposable into the factors x-c — o and x 2

+cx+c 2 = o. The roots of thisquadratic equation are %(- I ± V ~3)c, and we see that the equation x 3 — c 3 has three roots, namely, one real root c, and two imaginary roots i(— i ±V — 3)c. By making c equal to unity, we observe that J(— 1 = ± = V —3) are the imaginary cube roots of unity, which are generally denoted by a and co 2 , for it is easy to show that (i(-i-V-3)) 2 = K-i+V-3)-

2. Let us now consider such cubic equations as have all their terms, and which are therefore of this form,

x*+Ax 2 +Bx+C=o, where A, B and C denote known quantities, either positive or negative.

This equation may be transformed into another in which the second term is wanting by the substitution x = y — A/3. This transformation is a particular case of a general theorem. Let x" + Ax"" 1 +Bx"~ 2 ... =0. Substitute x — y+h; then (y+h) n + A(y + h)"' 1 . . . =0. Expand each term by the binomial theorem, and let us fix our attention on the coefficient of y n ~ l . By this process we obtain o = y"+y n ~ l (A+nh) + terms involving lower powers of y.

Now h can have any value, and if we choose it so that A+nk=o, then the second term of our derived equation vanishes.

Resuming, therefore, the equation y 3 +qy+r = o, let us suppose y = v+z; we then have y a =v a +z s +zvz(v+z) =v 3 +z 3 +^vzy, and the original equation becomes v 3 +z 3 + (3 vz+q)y+r = o. Now v and z are any two quantities subject to the relation y = v+z, and if we suppose i>vz+q = o, they are completely determined. This leads to v 3 +z 3 +r — o and $vz+q = o. Therefore v 3 and z 3 are the roots of the quadratic f+rt-q 2 /2'j = 0. Therefore

„. = -ir + V (-hf + \r 2) ; z 3 = -ir-V G>VW + ir 2)} ;

and y =t»+z = ^{-ir+V (-£7? + ^)} +1 {-ir-V (-zW + \r 2)}. Thus we have obtained a value of the unknown quantity y, in terms of the known quantities q and r; therefore the equation is resolved.

3. But this is only one of three values which y may have. Let us, for the sake of brevity, put

A=-hr+y/(M 3 +ir 2)< B = -Jr-V GrVe' + ir 2),

andput| /3==i(_ I _ v _ ?)

Then, from what has been shown (§ 1), it is evident that v and z have each these three values,

» = ˆA, = 0-? A, o-/S-?A; 2 = ˆB, z = a\B, z = /3-?B. To determine the corresponding values of v and z, we must con- sider that vz = — $g = -J (AB) Now if we observe that a/3 = 1 , it will immediately appear that v+z has these three values, »+z= -JA+ -JB, p+z-a-JA-hS-CB, »+z = i 8-j'A+a-fB)

which are therefore the three values of y.

7 I2

EQUATION

The first of these formulae is commonly known by the name of Cardan's rule (see Algebra: History).

The formulae given above for the roots of a cubic equation may be put under a different form, better adapted to the purposes of arithmetical calculation, as follows :— Because vz= -,q, therefore z=-iqXl/v=-iqM A ' hence v+zˆ-ilA-iql-SIA: thus it appears that the three values of y may also be expressed thus :

y= 1A-iql ˆA ,

y = a ˆIA-ˆqPMA

See below, Theory of Equations, §§ 16 et seq. IV. Biquadratic Equations.

1. When a biquadratic equation contains all its terms, it has this form,

x 4 +Ax 3 + Bx 2 +C + D =o, where A, B, C, D denote known quantities. ,*

*We shall first consider pure biquadratics, or such as contain only the first and last terms, and therefore are of this form, x i = b. In this case it is evident that x may be readily had by two extractions ot the square root ; by the first we find x 2 = b 2 , and by the second x = b. This however, is only one of the values which x may have; for since x i = b i therefore x i -b i = o\ but x A -b s may be resolved into two factors x 2 b 2 and x 2 +b 2 ', each of which admits of a similar resolu tion; for x 2 -b 2 = (x-b)(x+b) and * 2 +i 2 = (-&V -i)(+W -i). Hence it appears that the equation x i -b i = o may also*

be expressed thus,

(x-b)(x+b)(x-bˆ -i)(+6V -i)=o; so that x may have these four values,*

+b, -6, +6V-I, ” -&V-I, two of which are real, and the others imaginary. _

2. Next to pure biquadratic equations, in respect of easiness ot resolution, are such as want the second and fourth terms, and therefore have this form,

x i +qx 2 +s — o. These may be resolved in the manner of quadratic equations ; for if we put y = x 2 , we have

y 2 +qy+s = o, from which we find y = ||-g ± V (g 2 -4ˆ)l. and therefore x=±vii-5 ± V(g 2 4i)l

3 When a biquadratic equation has all its terms, its resolution may be always reduced to that of a cubic equation There are various methods by which such a reduction may be effected. 1 he following was first given by Leonhard Euler in the Petersburg Commentaries, and afterwards explained more fully in his Elements of Algebra. . . , . , .

We have already explained how an equation which is complete in its terms may be transformed into another of the same degree, but which wants the second term; therefore any biquadratic equation may be reduced to this form,

y 4 +py 2 +qy+r = o, where the second term is wanting, and where p, q, r denote any known quantities whatever.

That we may form an equation similar to the above, let us assume y=Vo+V&+Vc, and also suppose that the letters a, b, c denote the roots of the cubic equation

z 3 +Pz 2 +Qz-R = o; then, from the theory of equations we have

a +b+c=-P, ab+ac+bc = Q, _ abc = R. We square the assumed formula

y= Va+ ijb+ˆjc, and obtain y 2 = a+b+c+2 (V ab+ V ac+V be);

or, substituting -P for a+b+c, and transposing,

y2-fP = 2 (VoJ-r-Vac+V6c)- Let this equation be also squared, and we have

yi+2~Py 2 +V 2 =4{ab+ac+bc) +8(V a 2 bc + V ab 2 c+ V abc 2) ; and since ab+acfbc = Q, ,,,,,. ,_

and yla 2 bc+ˆab 2 c+ylabc 2 = Va6e(V&+ V&+ V e) = VK.ji, the same equation may be expressed thus:

y«+2P3> 2 +P 2 = 4Q+8v'R-y. Thus we have the biquadratic equation

y+2Py 2 -8VR.y+P 2 4Q=°

one of the roots of which isy=Va+Vi+\£, while a, b, c are the roots of the cubic equation z 3 + Pz 2 +Qz — R = o.

4. In order to apply this resolution to the proposed equation yt+pys +qy+r = 0, we must express the assumed coefficients P, Q, R by means of p, q, r, the coefficients of that equation. For this pur- pose let us compare the equations

y t +pf+qy+r = o, yi+2 Py2-8 v Ry+P 2 -4Q = o, and it immediately appears that |

2? = p, -8VR = g, P 2 4Q='; and from these equations we find

P = iP, Q = MP-v), R = «W-

Hence it follows that the roots of the proposed equation are generally expressed by the formula

y=Va+V& + Vc; where a, b, c denote the roots of this cubic equation,

z 3 +ˆ2 +

16 2

£

But to find each particular root, we must consider, that as the square root of a number may be either positive or negative, so each of the quantities V a, V b, V c may have either the sign + or — prefixed to it ; and hence our formula will give eight different expressions for the

root. It is, however, to be observed, that as the product of the three quantities V a, V b, V c must be equal to V R or to — \q\ when q is positive, their product must be a negative quantity, and this can only be effected by making either one or three of them negative ; again, when q is negative, their product must be a positive quantity ; so that in this case they must either be all positive, or two of them must be negative. These considerations enable us to determine that four of the eight expressions for the root belong to the case in which q is positive, and the other four to that in which it is negative.

5. We shall now give the result of the preceding investigation in the f orrrt bf a practical rule ; and as the coefficients of the cubic equation which has been found involve fractions, we shall transform it into another, in which the coefficients are integers, by supposing z = jv. Thus the equation

z'+§z 2 + £

-4r

*16 * 64""*

becomes, after reduction,

v 3 +2pv 2 + (p 2 -4r)v-q 2 = o; it also follows, that if the roots of the latter equation are a, b, c, the roots of the former are \a, \b, \c, so that our rule may now be expressed thus :

L et yi+py2+qy-- r = o be any biquadratic equation wanting its second term. Form this cubic equation

v 3 +2pv + (p 2 — \r)v — q 2 = o, and find its roots, which let us denote by a, b, c.*

Then the roots of the proposed biquadratic equation are, when q is negative, when q is positive,

y = , i(Vo+V6+Vc), y = K-Va-V6-yc),

3, = i(Vo-V6-Vc), y = i(-Va+V6+Vc),

y = J(- Va+V6-Vc), y = i(Va-V6+Vc),

y = j(-Vo-V6+Vt). y = i(Va+V6-Vc).

See also below, Theory of Equations, § 17 et seq. (X.)

V. Theory of Equations.

1. In the subject " Theory of Equations " the term equation is used to denote an equation of the form x n —p 1 x n " 1 ... ±p n ~o, where pi, pi . . . p n are regarded as known, and x as a quantity to be determined; for shortness the equation is written /(*) = o.

The equation may be numerical; that is, the coefficients Ph P2, ■ ■ ■ Pn are then numbers — understanding by number a quantity of the form a+fii (a and j3 having any positive or negative real values whatever, or say each of these is regarded as susceptible of continuous variation from an indefinitely large negative to an indefinitely large positive value), and i denoting

V-i.

Or the equation may be algebraical; that is, the coefficients are not then restricted to denote, or are not explicitly considered as denoting, numbers.

1. We consider first numerical equations. (Real theory, 2-6; Imaginary theory, 7-10.)

Real Theory.

2. Postponing all consideration of imaginaries, we take in the first instance the coefficients to be real, and attend only to the real roots (if any) ; that is, p h p 2 , . . . pn are real positive or negative quantities, and a root a, if it exists, is a positive or negative quantity such that a n -pia n " 1 ... ==#„ = o, or say, /(a) =0.*

*It is very useful to consider the curve y =/(), —or, what would come to the same, the curve Ay =/(), — but it is better to retain the first-mentioned form of equation, drawing, if need be, the ordinate y on a reduced scale. For instance, if the given equation be * 3 -6× 2 +iix-6-o6 = o, 1 then the curve*

1 The coefficients were selected so that the roots might be nearly

1, 2, 3-

EQUATION

*7*3*

y=« s — 6 2 +n*— 6-o6 is as shown in fig. i, without any*

reduction of scale for the ordinate.

*It is clear that, in general, y is a continuous one-valued function of *, finite for every finite value of *, but becoming infinite when x is infinite; i.e., assuming throughout that the coefficient of x n is +i, then when *= oo , y= + oo ; but when x= — oo, then y=+oo or — oo, according as n is even or odd ; the curve cuts any line whatever, and in particular it cuts the axis (of x) in at most n points; and the value of x, at any point of intersection with the axis, is a root of the equation f(x)=o.*

If |3, a are any two values of x(a>/3, that is, a nearer +00), then if /(/3),/(a) have opposite signs, the curve cuts the axis an odd number of times, and therefore at least once, between the points x=j3, x = a; but if /(/?), /(a) have the same sign, then between these points the curve cuts the axis an even number of times, or it may be not at all. That is, /(j8) , /(a) having opposite signs, there are between the limits /3, a an odd number of real roots, and therefore at least one real root; but /(/3), /(a) having the same sign, there are between these limits an even number of real roots, or it may be there is no real root. In particular, by giving to jS, a the values — 00 , + 00 (or, what is the same thing, any two values sufficiently near to these values respectively) it appears that an equation of an odd order has always an odd number of real roots, and therefore at least one real root; but that an equation of an even order has an even number of real roots, or it may be no real root.

*If a be such that f or x = or > a (that is, * nearer to + 00) /(*) is always +, and /3 be such that for *=or*

3. Suppose that the positive value 5 is an inferior limit to the difference between two real roots of the equation; or rather (since the foregoing expression would imply the existence of real roots) suppose that there are not two real roots such that their difference taken positively is = or <5; then, 7 being any value whatever, there is clearly at most one real root between the limits 7 and 7+5; and by what precedes there is such real root or there is not such real root, according as f(y), f(y+8) have opposite signs or have the same sign. And by dividing in this manner the interval |3 to a into intervals each of which is = or <5, we should not only ascertain the number of the real roots (if any), but we should also separate the real roots, that is, find for each of them limits 7, 7+5 between which there lies this one, and only this one, real root.

In particular cases it is frequently possible to ascertain the number of

the real roots, and to effect their separation by trial or otherwise, without much difficulty ; but the foregoing was the general process as employed by Joseph Louis Lagrange even in the second edition (1808) of the Traite de la resolution des equations numeriques; 1 the determination of the limit 8 had to be effected by means of the "equation of differences" or equation of the order ire(re-l), the roots of which are the squares of the differences of the roots of the given equation, and the process is a cumbrous and unsatisfactory one.

4. The great step was effected by the theorem of J. C. F. Sturm (1835) — viz. here starting from the function f(x), and its first derived f unction f'(x'), we have (by a process which is a slight modification of that for obtaining the greatest common measure of these two functions) to form a series of functions

/()■/()./.() ■ • ■ /.() of the degrees n, n— 1, n — 2 . . . o respectively, — the last term /„(*) being thus an absolute constant. These lead to the im- mediate determination of the number of real roots (if any) between any two given limits P, a; viz. supposing a>|3 (that is, a nearer to + 00) , then substituting successively these two values in the series of functions, and attending only to the signs of the resulting values, the number of the changes of sign lost in passing from j3 to a is the required number of real roots between the two

'The third edition (1826) is a reproduction of that of 1808; the first edition has the date 1798, but a large part of the contents is taken from memoirs of 1767-1768 and 1770-1771.

limits. In particular, taking /3, a = — 00 , +00 respectively, the signs of the several functions depend merely on the signs of the terms which contain the highest powers of x, and are seen by inspection, and the theorem thus gives at once the whole number of real roots.

And although theoretically, in order to complete by a finite number of operations the separation of the real roots, we still 1 need to know the value of the before-mentioned limit 5; yet in any given case the separation may be effected by a limited number of repetitions of the process. The practical difficulty is when two or more roots are very near to each other. Suppose, for instance, that the theorem shows that there are two roots between o and 10; by giving to x the values 1, 2, 3, . . . succes- sively, it might appear that the two roots were between 5 and 6; then again that they were between 5-3 and 5-4, then between 5-34 and 5-35, and so on until we arrive at a separation; say it appears that between 5-346 and 5-347 there is one root, and between 5-348 and 5-349 the other root. But in the case in

question 5 would have a very small value, such as 002, and even supposing this value known, the direct application of the first mentioned process would be still more laborious.

5. Supposing the separation once effected, the determination of the single real root which lies between the two given limits may be effected to any required degree of approximation either by the processes of W. G. Horner and Lagrange (which are in principle a carrying out of the method of Sturm's theorem), or by the process of Sir Isaac Newton, as perfected by Joseph Fourier (which requires to be separately considered).

First as to Horner and Lagrange. We know that between the limits /3, a there lies one, and only one, real root of the equation; /(/9) and /(a) have therefore opposite signs. Suppose any inter- mediate value is 6; in order to determine by Sturm's theorem whether the root lies between 0, 6, or between 0, a, it would be quite unnecessary to calculate the signs of f(6), f'{6), fi{&) . . .; only the sign of f(B) is required; for, if this has the same sign as /(/3), then the root is between 0,0; if the same sign as /(a), then the root is between 0, a. We want to make $ increase from the inferior limit /S, at which f(B) has the sign of/(/3), so long as/(0) retains this sign, and then to a value for which it assumes the opposite sign ; we have thus two nearer limits of the required root, and the process may be repeated indefinitely.

Horner's method (1819) gives the root as a decimal, figure by figure ; thus if the equation be known to have one real root between o and 10, it is in effect shown say that 5 is too small (that is, the root is between 5 and 6) ; next that 5-4 is too small (that is, the root is between 5-4 and 5-5) ; and so on to any number of decimals. Each figure is obtained, not by the successive trial of all the figures which precede it, but (as in the ordinary process of the extraction of a square root, which is in fact Horner's process applied to this particular case) it is given presumptively as the first figure of a quotient; such value may be too large, and then the next inferior integer must be tried instead of it, or it may require to be further diminished. And it is to be remarked that the process not only gives the approximate value a of the root, but (as in the extraction of a square root) it includes the calculation of the function /(a), which should be, and approximately is, =0. The arrangement of the calculations is very elegant, and forms an integral part of the actual method. It is to be observed that after a certain number of decimal places have been obtained, a good many more can be found by a mere division. It is in the progress tacitly assumed that the roots have

been first separated.

Lagrange's method (1767) gives the root as a continued fraction

a+r 1 – 1 . . . , where a is a positive or negative integer (which

o~rc-r may be = o),buti, c, . . '. are positive integers. Suppose the roots have been separated ; then (by trial if need be of consecutive integer values) the limits may be made to be consecutive integer numbers : say they are o, 0+1 ; the value of x is therefore =a + i/ y, where y is positive and greater than I ; from the given equation for x, writing therein x = a + 1 ly, we form an equation of the same order for y, and this equation will have one, and only one, positive root greater than 1; hence finding for it the limits b, b + l (where b is = or>i), we have y = b + 1 /z, where z is positive and greater than 1 ; and so on — that is, we thus obtain the successive denominators b, c, d . . . of the continued fraction. The method is theoretically very elegant, but the disadvantage is that it gives the result in the form of a continued fraction, which for the most part must ultimately be con- verted into a decimal. There is one advantage in the method, that a commensurable root (that is, a root equal to a rational fraction) is found accurately, since, when such root exists, the continued fraction terminates.

6. Newton's method (171 1), as perfected by Fourier(i83i), may be

7H

EQUATION

roughly stated as follows. If a; = 7 be an approximate value of any root, and y+h the correct value, thenf(y-\~h) =0, that is,

/(7)+ff(7)+ 1 ˆr(7)+...=o;

and then, if h be so small that the terms after the second may be neglected, f(y) + hf (7) =0, that is, h = f(y)lf'(.y), or the new approxi mate value is x=y-f(y)/f'(y); and so on, as often as we please. It will be observed that so far nothing has been assumed as to the separation of the roots, or even as to the existence of a real root; 7 has been taken as the approximate value of a root, but no precise meaning has been attached to this expression. The question arises, What are the conditions to be satisfied by 7 in order that the process may by successive repetitions actually lead to a certain real root of the equation; or that, 7 being an approximate value of a certain real root, the new value 7-/(7) if' (7) may be a more approximate value.

Referring to fig. I, it is easy to see that if OC represent the assumed value 7, then, drawing the ordinate CP to meet the curve in P, and the tangent PC to meet the axis in C, we shall have OC as the new approximate value of the root. But observe that there is here a real root OX, and that the curve beyond X is convex to the axis; under these conditions the point C is nearer to X than was C ; and, starting with C instead of C, and proceeding in like manner to draw a new ordinate and tangent, and so on as often as we please, we approximate continually, and that with great rapidity, to the true value OX. But if C had been taken on the other side of X, where the curve is concave to the axis, the new point C might or might not be nearer to X than was the point C ; and in this case the method, if it succeeds at all, does so by accident only, i.e. it may haopen that C or some subsequent point comes to be a point C, such that CO is a proper approximate value of the root, and then the subsequent approximations proceed in the same manner as if this value had been assumed in the first instance, all the preceding work being wasted.

*N**

Fig. 1.

It thus appears that for the proper application of the method we require more than the mere separation of the roots. In order to be able to approximate to a certain root o, =0X, we require to know that, between OX and some value ON, the curve is always convex to the axis (analytically, between the two values, Ux) and /"(*) must have always the same sign). When this is so, the point C may be taken anywhere on the proper side of X, and within the portion XN of the axis; and the process is then the one already explained. The approximation is in general a very rapid one. If we know for the required root OX the two limits OM, ON such that from M to X the curve is always concave to the axis, while from X to N it is always convex to the axis, — then, taking D anywhere in the portion MX and (as before) C in the portion XN, drawing the ordinates DQ, CP, and joining the points P, Q by a line which meets the axis in D', also constructing the point C by means of the tangent at P as before, we have for the required root the new limits OD', OC; and pro- ceeding in like manner with the points D', C, and so on as often as we please, we obtain at each step two limits approximating more and more nearly to the required root OX. The process as to the point D', translated into analysis, is the ordinate process of interpolation. Suppose OD = /3, OC=a, we have approximately f(0+h) =/(/3)
+

h\f(*)-f(0)) whe nce if the root is 0+h then h = ^=M|) a/3 _ /(»)-/ (W

Returning for a moment to Horner's method, it may be remarked that the correction h, to an approximate value a, is therein found as a quotient the same or such as the quotient /(a) =/'(a) which presents itself in Newton's method. The difference is that with Horner the integer part of this quotient is taken as the presumptive value of h, and the figure is verified at each step. With Newton the quotient itself, developed to the proper number of decimal places, is taken as the value of h; if too many decimals are taken, there would be a waste of work ; but the error would correct itself at the next step. Of course the calculation should be conducted without any such waste of work.

Imaginary Theory. 7. It will be recollected that the expression number and the correlative epithet numerical were at the outset used in a wide

sense, as extending to imaginaries. This extension arises out of the theory of equations by a process analogous to that by which number, in its original most restricted sense of positive integer number, was extended to have the meaning of a feal positive or negative magnitude susceptible of continuous variation.

*If for a moment number is understood in its most restricted sense as meaning positive integer number, the solution of a simple equation leads to an extension; ax — b~o gives x = b/a, a positive fraction, and we can in this manner represent, not accurately, but as nearly as we please, any positive magnitude whatever; so an equation ax+b = o gives x— —b/a, which (approximately as before) represents any negative magnitude. We thus arrive at the extended signification of number as a continuously varying positive or negative magnitude. Such numbers may be added or subtracted, multiplied or divided one by another, and the result is always a number. Now from a quadric equation we derive, in like manner, the notion of a complex or imaginary number such as is spoken of above. The equation * 2 +i = o is not (in the foregoing sense, number = real number) satisfied by any numerical value whatever of x; but we assume that there is a number which we call i, satisfying the equation i 2 +i=o, and then taking a and b any real numbers, we form an expression such as a--bi, and use the expression number in this extended sense: any two such numbers may be added or subtracted, multiplied or divided one by the other, and the result is always a number. And if we consider first a quadric equation x 2 --px--q = o where p and q are real*

*numbers, and next the like equation, where p and q are any numbers whatever, it can be shown that there exists for * a numerical value which satisfies the equation; or, in other words, it can be shown that the equation has a numerical root. The like theorem, in fact, holds good for an equation of any order whatever; but suppose for a moment that this was not the case; say that there was a cubic equation xfl+px'+qx+r^o, with numerical coefficients, not satisfied by any numerical value of *, we should have to establish a new imaginary.; satisfying some such equation, and should then have to consider numbers of the form a--bj, or perhaps a+bj+cp (a, b, c numbers a-{-fii of the kind heretofore considered), — first we should be thrown back on the quadric equation x i --px+q = o, p arid q being now numbers of the last- mentioned extended form — non constat that every such equation has a numerical root — and if not, we might be led to other imaginaries k, I, &c, and so on ad infinitum in inextricable confusion.*

But in fact a numerical equation of any order whatever has always a numerical root, and thus numbers (in the foregoing sense, number = quantity of the form a--fii) form (what real numbers do not) a universe complete in itself, such that starting in it we are never led out of it. There may very well be, and perhaps are, numbers in a more general sense of the term (quaternions are not a case in point, as the ordinary laws of combination are not adhered to), but in order to have to do with such numbers (if any) we must start with them.

S. The capital theorem as regards numerical equations thus is, every numerical equation has a numerical root; or for shortness (the meaning being as before), every equation has a root. Of course the theorem is the reverse of self-evident, and it requires proof; but provisionally assuming it as true, we derive from it the general theory of numerical equations. As the term root was introduced in the course of an explanation, it will be convenient to give here the formal definition.

A number a such that substituted for x it makes the function xf-pix"' 1 . . . ±f» to be =0, or say such that it satisfies the equation f(x)= o, is said to be a root of the equation; that is, a being a root, we have

a"-^io n_1 . . . ±£„ = o, or say /(a)=o;

and it is then easily shown that x-a is a factor of the function /(jc), viz. that we have f(x) = {x-a)f\ (x) , where fi(x) is a function x n ~ l — qiX n ~ i . . . ±g„_i of the order »-l, with numerical co- efficients 51, q% . . . g„-i.

In general a is not a root of the equation fi(x) =0, but it may be so — i.e. fi{x) may contain the factor x-a; when this is so, f{x) will contain the factor {x- a) 2 ; writing then/(x) = (-a) 2 / 2 (3c),and assum- ing that a is not a root of the equation fz(x) =0, x — a is then said to*

EQUATION

7 J 5

be a double root of the equation f(x)=o; and similarly f(x) may contain the factor (x—a) 3 and no higher power, and x = a is then a triple root; and so on.

Supposing in general that f(x) — (x—a) a F(x) (a being a positive integer which may be = I, (x—a) a the highest power oi x—a which divides f(x), and F(x) being of course of the order n — a), then the equation F(x) =0 will have a root b which will be different from a; x —b will be a factor, in general a simple one, but it may be a multiple one, of F(x), and /(*) will in this case be = (x — a) a (x — b)P&(x) {fi a positive integer which may be =i, (x — b)& the highest power of x — b in F(x) or f(x), and $(x) being of course of the order n — a — /S). The original equation f(x) =o is in this case said to have o roots each =a, roots each =b ; and so on for any other factors (x— cfY, &c.

We have thus the theorem — A numerical equation of the order n has in every case n roots, viz. there exist n numbers, a, b, . . . (in general all distinct, but which may arrange themselves in any sets of equal values), such that/() = (x— a)(— b) (x—c) . . . identically.

If the equation has equal roots, these can in general be determined, and the case is at any rate a special one which may be in the first instance excluded from consideration. It is, therefore, in general assumed that the equation f(x) =0 has all its roots unequal.

If the coefficients pi, p it . . . are all or any one or more of them imaginary, then the equation /(*) = o, separating the real and imagin- ary parts thereof, may be written F(x)+i&(x) = o, where F(x), () are each of them a function with real coefficients; and it thus appears that the equation f(x) =o, with imaginary coefficients, has not in general any real root ; supposing it to have a real root a, this must be at once a root of each of the equations F(x) =o and $(x) =o.

But an equation with real coefficients may have as well imaginary as

real roots, and we have further the theorem that for any such equation the imaginary roots enter in pairs, viz. a+j8i being a root, then a — pi will be also a root. It follows that if the order be odd, there is always an odd number of real roots, and therefore at least one real root.

o. In the case of an equation with real coefficients, the question of the existence of real roots, and of their separation, has been already considered. In the general case of an equation with imaginary (it may be real) coefficients, the like question arises as to the situation of the (real or imaginary) roots; thus, if for facility of conception we regard the constituents a, /3 of a root a+(3i as the co-ordinates of a point in piano, and accordingly represent the root by such point, then drawing in the plane any closed curve or " contour," the question is how many roots lie within such contour.

This is solved theoretically by means of a theorem of A. L. Cauchy (1837), viz. writing in the original equation x+iy in place of x, the function }{x--iy) becomes =P+iQ, where P and Q are each of them a rational and integral function (with real coefficients) of (x, y). Imagining the point (x, y) to travel along the contour, and considering the number of changes of sign from — to f and from + to — of the fraction corresponding to passages of the fraction through zero (that is, to values for which P becomes =0, disregarding those for which Q becomes =0), the difference of these numbers gives the number of roots within the contour.

It is important to remark that the demonstration does not pre-suppose the existence of any root; the contour may be the infinity of the plane (such infinity regarded as a contour, or closed curve), and in this case it can be shown (and that very easily) that the difference of the numbers of changes of sign is = n ; that is, there are within the infinite contour, or (what is the same thing) there are in all n roots ; thus Cauchy's theorem contains really the proof of the fundamental theorem that a numerical equation of the nth order (not only has a numerical root, but) has precisely n roots. It would appear that this proof of the fundamental theorem in its most complete form is in principle identical with the last proof of K. F. Gauss (1849) of the theorem, in the form — A numerical equation of the nth order has always a root. 1

But in the case of a finite contour, the actual determination of the difference which gives the number of real roots can be effected only in the case of a rectangular contour, by applying to each of its sides separately a method such as that of Sturm's theorem ; and thus the

actual determination ultimately depends on a method such as that of Sturm's theorem.

Very little has been done in regard to the calculation of the imaginary roots of an equation by approximation; and the question is not here considered.

10. A class of numerical equations which needs to be con- sidered is that of the binomial equations x n — a = o(a=a+fii, a complex number).

1 The earlier demonstrations by Euler, Lagrange, &c, relate to the case of a numerical equation with real coefficients ; and they consist in showing that such equation has always a real quadratic divisor, fur- nishing two roots, which are either real or else conjugate imaginaries a--fti (see Lagrange's liquations numeriques).

The foregoing conclusions apply, viz. there are always n roots, which, it may be shown, are all unequal. And these can be found numerically by the extraction of the square root, and of an nth root, of real numbers, and by the aid of a table of natural sines and cosines. 2 For writing

a+ˆ = V(aHˆ)j 7 (ˆ+ 7T ˆ!,

there is always a real angle X (positive and less than 2v), such that

its cosine and sine are = ˆ(g a+ffn and ˆ (a'+fl 2) respectively; that

is, writing for shortness V(o 2 |8 2) = p, we haveo/3i = p(cosX +isinX), or the equation is x" = p(cosX-H sin X) ; hence observing that

/ X . . X

cos— +1 sin—

V n n

= cos --i sin X, a value of x i

■Vp(cos~Hsin£).

The formula really gives all the roots, for instead of X we may write X-f-2jjT, j a positive or negative integer, and then we have

= Vp(«

X + 2SJT ... X-f-2i7T'

cos — -t sin

:).

n ' ' '" n which has the n values obtained by giving to s the values o, 1 , 2 ... » — 1 in succession; the roots are, it is clear, represented by points lying at equal intervals on a circle. But it is more convenient to pro- ceed somewhat differently ; taking one of the roots to be 6, so that 6"= a, then assuming x = dy, the equation becomes y" — l~o, which equation, like the original equation, has precisely n roots (one of them being of course =1). And the original equation x n — a = o is thus reduced to the more simple equation x n —i =0; and although the theory of this equation is included in the preceding one, yet it is proper to state it separately.

The equation x n — I =0 has its several roots expressed in the form

1, w, co 2 , . . . o>" l , where u may be taken

2r . . . 2x

=cos -t sin — ;

n n '

in fact,

a having this value, any integer power u k is = cos— — Hsin-^-, and

we thence have (w 1)" = cos 2irk+i sin 27r&, = 1, that is, a> is a root of the equation. The theory will be resumed further on.*

By what precedes, we are led to the notion (a numerical) of the radical a 1 /" regarded as an n-valued function ; any one of these being denoted by y/ a, then the series of values is ^ a, aij a, . . . u n_ir Va; or we may, if we please, use V a instead of a 1 /" as a symbol to denote the n-valued function.

As the coefficients of an algebraical equation may be numerical, all which follows in regard to algebraical equations is (with, it may be, some few modifications) applicable to numerical equations; and hence, concluding for the present this subject, it will be convenient to pass on to algebraical equations.

Algebraical Equations. 11. The equation is

x n px" 1J r... ±p n =o, and we here assume the existence of roots, viz. we assume that there are n quantities a, b, c ... (in general all of them different, but which in particular cases may become equal in sets in any manner), such that*

x n -pi n – i +.:. ±p n =o; or looking at the question in a different point of view, and starting with the roots a, b, c ... as given, we express the product of the n factors x—a, x—b, ... in the foregoing form, and thus arrive at an equation of the order n having the n roots a, b, c ... In either case we have*

pi = 2a, p2 = SoJ, ...p n = abc . . . ; i.e. regarding the coefficients p h p 2 . . . p n as given, then we assume the existence of roots a, b, c, . . . such that pi = ~Za, &c; or, regarding the roots as given, then we write p u p 2 , &c, to denote the functions 2a, 'Sab, &c.

As already explained, the epithet algebraical is not used in opposition to numerical; an algebraical equation is merely an equation wherein the coefficients are not restricted to denote, or are not explicitly considered as denoting, numbers. That the abstraction is legitimate, appears by the simplest example; in saying that the equation x 2 -px+q = o has a root x = § \p + V (p 2 — 4c)) , we mean that writing this value for x the equation becomes an identity, H\P+ ^(p 2 -^q)\f-pli{p+y(p 2 -4q)]]+q = o; and the verification of this identity in nowise depends upon p and q meaning numbers. But if it be asked what there is beyond numerical equations included in the term algebraical equation, or, again, what is the full extent of the meaning attributed to the term — the latter question at any

2 The square root of 0+/S1 can be determined by the extraction of square roots of positive real numbers, without the trigonometrical tables.

rate it would be very difficult to answer; as to the former one, it may be said that the coefficients may, for instance, be symbols of operation. As regards such equations, there is certainly no proof that every equation has a root, or that an equation of the «th order has n roots ; nor is it in any wise clear what the precise signification of the statement is. But it is found that the assumption of the existence of the n roots can be made without contradictory results; conclusions

derived from it, if they involve the roots, rest on the same ground as the original assumption; but the conclusion may be independent of the roots altogether, and in this case it is undoubtedly valid ; the reasoning, although actually conducted by aid of the assumption (and, it may be, most easily and elegantly in this manner) , is really independent of the assumption. In illustra- tion, we observe that it is allowable to express a function of p and q as follows, — 'that is, by means of a rational symmetrical function of a and b, this can, as a fact, be expressed as a rational function of a+b and ab; and if we prescribe that a+b and ab shall then be changed into p and q respectively, we have the required function of p, q. That is, we have F(a, 0) as a representation of/ (p, g), obtained as if we had p = a +b, q = ab, but without in any wise assuming the existence of the a, b of these equations.

12. Starting from the equation

x n —pix n r 1 + ■ ■ .

or the equivalent equations pi-

=x—a.x — b. &c.

= So, &c, we find a n — pia"-~ y + ... =o, b n -pib n ~ 1 + . . . =o;

(it is as satisfying these equations that a, b . . . are said to be the roots of x n — p i x"~ 1 + . . . = o); and conversely from the last-mentioned equations, assuming that a,b . . . are all different,

we deduce

pi – So, pi = Lab, &c. and

x"-pix" 1 + . . ■ = x — a.x — b.&c.

Observe that if, for instance, a = b, then the equations

»o n_I — (n — i)^ l a n_2 + . . . =o, which, with the first, expresses that a is a double root; and then the whole system of equations leads as before to the equations £i = So, &c. But the existence of a double root implies a certain relation between the coefficients; the general case is when the roots are all unequal.

We have then the theorem that every rational symmetrical function of the roots is a rational function of the coefficients. This is an easy

consequence from the less general theorem, every rational and integral symmetrical function of the roots is a rational and integral function of the coefficients.

In particular, the sums of the powers So 2 , So 3 , &c. ; are rational and integral functions of the coefficients.

The process originally employed for the expression of other functions Za a bP, &c, in terms of the coefficients is to make them depend upon the sums of powers: for instance, 2a a iˆ = Sa a 2a/ s — 2a a+ £; but this is very objectionable ; the true theory consists in showing that we have systems of equations pi = 2a,

\ p 2 = 2a6

/ pf = 2a 2 +22aZ>,

(p 3 = Labc,

] pip2 = La 2 b + 32aZ>c,

{pi 3 = 2a 3 +32a 2 6+62a6c,

where in each system there are precisely as many equations as there are root-functions on the right-hand side — e.g. 3 equations and 3 functions Lobe, 2a 2 i, 2a 3 . Hence in each system the root-functions can be determined linearly in terms of the powers and products of the coefficients :

2a& = p2,

2a 2 =pi 2 -2p 2 ,

Labc = pi,

La 2 b = piptSpi,

2a 3 =pi % -$pip2+ipi,

and so on. The other process, if applied consistently, would derive the originally assumed value Lab, = p%, from the two equa- tions Xa=p, Xa 1 = pi 2 — 2p i ; i.e. we have 22o& = 2a.2a,— 2a 2 , =

p?-{pl i -2p2), =2p i .

13. It is convenient to mention here the theorem that, x

being determined as above by an equation of the order n, any rational and integral function whatever of x, or more generally any rational function which does not become infinite in virtue of the equation itself, can be expressed as a rational and integral function of x, of the order n—i, the coefficients being rational functions of the coefficients of the equation. Thus the equation gives x n a function of the form in question; multiplying each side by x, and on the right-hand side writing for x n its foregoing value, we have'x n+1 , a function of the form in question; and the like for any higher power of x, and therefore also for any rational and integral function of x. The proof in the case of a rational non-integral function is somewhat more complicated. The final result is of the form {x) — ip{x)l ix) — o, where (x) — I(x) = M(x)/(x). And it is, moreover, clear that the equation 4>(x)l{x) = I(x), being satisfied if only/(x) =o, must be satisfied by each root of the equation.

From the theorem that a rational symmetrical function of the roots is expressible in terms of the coefficients, it at once follows that it is possible to determine an equation (of an assignable order) having for its roots the several values of any given (unsymmetrical) function of the roots of the given equation. For example, in the case of a quartic equation, roots (a, b, c, d), it is possible to find an equation having the roots ab, ac, ad, be, bd, cd (being therefore a sextic equa- tion) : viz. in the product

(y — ab) (y — ac) (y — ad) (y — be) (y — bd) (y — cd) the coefficients of the several powers of y will be symmetrical functions of a, b, c, d and therefore rational and integral functions of the co-efficients of the quartic equation; hence, supposing the product so expressed, and equating it to zero, we have the required sextic equation. In the same manner can be found the sextic equation haying the roots (a- b)\ (0-c) 2 , (a-d) 2 , b-c)\ (b-d)\ (c-d)\ which is the equation of differences previously referred to; and similarly we obtain the equation of differences for a given equation of any order. Again, the equation sought for may be that having for its n roots the given rational functions (a) ,(b) , ... of the several roots of the given equation. Any such rational function can (as was shown) be expressed as a rational and integral function of the order n — I ; and, retaining x in place of any one of the roots, the problem is to find y from the equations x"—pix n ~ 1 . . . =0, and y = Mox"~ 1 +MiX n ~ 2 {... , or, what is the same thing, from these two equations to eliminate x. This is in fact E. W. Tschirnhausen's transformation (1683).

14. In connexion with what precedes, the question arises as to the

number of values (obtained by permutations of the roots) of given unsymmetrical functions of the roots, or say of a given set of letters: for instance, with roots or letters (0, b, c, d) as before, how many values are there of the function ab + cd, or better, how many functions are there of this form? The answer is 3, viz. ab + cd, ac + bd, ad--bc; or again we may ask whether, in the case of a given number of letters, there exist functions with a given number of values, 3-valued, 4-vaIued functions, &c.

It is at once seen that for any given number of letters there exist 2-valued functions; the product of the differences of the letters is such a function ; however the letters are interchanged, it alters only its sign; or say the two values are A and —A. And if P, Q are symmetrical functions of the letters, then the general form of such a function is P + QA; this has only the two values P + QA, P — QA.

In the case of 4 letters there exist (as appears above) 3-valued functions: but in the case of 5 letters there does not exist any 3-valued or 4-valued function; and the only 5-valued functions are those which are symmetrical in regard to four of the letters, and can thus be expressed in terms of one letter and of symmetrical functions of all the letters. These last theorems present themselves in the demonstration of the non-existence of a solution of a quintic equation by radicals.

The theory is an extensive and important one, depending on the notions of substitutions and of groups (q.v.).

15. Returning to equations, we have the very important theorem that, given the value of any unsymmetrical function of the roots, e.g. in the case of a quartic equation, the function ab + cd, it is in general possible to determine rationally the value of any similar function, such as (a + by + (c + d) 3 .

The a priori ground of this theorem may be illustrated by means of a numerical equation. Suppose that the roots of a quartic equation are 1,2,3,4, then if it is given that ai + cd = i4, this in effect deter- mines a, b to be 1, 2 and c, d to be 3, 4 (viz. a = 1,6 — 2 or a = 2, 6 = 1,

andc = 3, d = 4arc — 3, a 1 = 4) or else a, b to be 3, 4 and c, d to be 1, 2; and it therefore in effect determines (a + b) 3 + (c + d) 3 to be = 370, and not any other value; that is, (a--b) 3 + (c + d) 3 , as

having a single value, must be determinable rationally. And we can in the same way account for cases of failure as regards particular equations ; thus, the roots being I, 2, 3, 4 as before, o 2 6=2 determines a to be = 1 and b to be =2, but if the roots had been 1, 2. 4, 16 then a 2 b = 16 does not uniquely determine a, b but only makes them to be 1,16 or 2,4 respectively. As to the a posteriori proof, assume, for instance,

h = ab+cd, yi = (a+b) 3 + (c+d) 3 , h = ac+bd, y 2 = (a+c) s + (b+d)\ h = ad+bc, y s = (a+d) 3 + {b+c) 3 :

then yi+yz+y3, hyi+kyz+hys, h 2 yi+t2 2 y2+t 3 2 ys will be respectively symmetrical functions of the roots of the quartic, and therefore rational and integral functions of the coefficients; that is, they will be known.

Suppose for a moment that h, ti, h are all known; then the equations being linear in yi, yi, y$ these can be expressed rationally in terms of the coefficients and of ti, t 2 , h\ that is, yi, y 2 , ya will be known. But observe further that yi is obtained as a function of '1, hy h symmetrical as regards h, h; it can therefore be expressed as a rational function of h and of h+tz, hh, and thence as a rational function of h and of /1-N2-M3, W2+W3+W3, hhtz\ but these last are symmetrical functions of the roots, and as such they are expressible rationally in terms of the coefficients; that is, yi will be expressed as a rational function of h and of the coefficients; or ti (alone, not h or £3) being known, yi will be rationally determined.

16. We now consider the question of the algebraical solution of equations, or, more accurately, that of the solution of equations ■ by radicals.

*In the case of a quadric equation x 2 — px+q = o, we can by the assistance of the sign V ( ) or ( ) * find an expression for x as a 2-valued function of the coefficients p, q such that substituting this value in the equation, the equation is thereby identically satisfied ; it has been found that this expression is*

- *= {£ V(i> 2 r 4?)l, and the equation is on this account said to be algebraically solvable, or more accurately solvable by radicals. Or we may by writing x = — %p+z reduce the equation to z 2 = Up 2 — \q), viz. to an equation of the form x 2 = o; and in virtue of its being thus reducible we say that the original equation is solvable by radicals. And the question for an equation of any higher order, say of the order n, is, can*

we by means of radicals (that is, by aid of the sign^ ( ) or ( ) 1 / m , using as many as we please of such signs and with any values of m) find an re-valued function (or any function) of the coefficients which substituted for x in the equation shall satisfy it identically?

It will be observed that the coefficients p, q ... are not explicitly considered as numbers, but even if they do denote numbers, the question whether a numerical equation admits of solution by radicals is wholly unconnected with the before-mentioned theorem of the existence of the n roots of such an equation. It does not even follow that in the case of a numerical equation solvable by radicals the algebraical solution gives the numerical solution, but this requires exolanation. Consider first a numerical quadric equation with imaginary coefficients. In the formula ct = i|£ = V (p 2 — 43)), sub- stituting for p, q their given numerical values, we obtain for x an expression of the form 3c = a+/3i±V (y+Si), where a, /S, y, S are real numbers. This expression substituted for x in the quadric equation would satisfy it identically, and it is thus an algebraical solution; but there is no obvious a priori reason why Vf7+Si) should have a value = c--di, where c and d axe real numbers cal- culable by the extraction of a root or roots of real numbers ; however the case is (what there was no a priori right to expect) that V (y+Si) has such a value calculable by means of the radical expressions V IV (y 2 +^2) = fc 'y} : and hence the algebraical solution of a numerical quadric equation does in every case give the numerical solution. The case of a numerical cubic equation will be considered presently.

17. A cubic equation can be solved by radicals.

*Taking for greater simplicity the cubic in the reduced form x 3 +qx — r = o, and assuming x = a--b, this will be a solution if only 306=3 and a 3 +b 3 = r, equations which give (a 3 —b 3) 2 = r 2 — ^r q 3 , a quadric equation solvable by radicals, and giving a 3 — b 3 = V (r 2 — 2 *. q 3) , a 2-valued function of the coefficients: combining this with a 3 +b 3 = r, we have a 3 = i{r + V if 2 — ^q 3)\, a 2-valued function: we then have a by means of a cube root, viz.*

a = f[i{r+_V(/del> 9 3)j], a 6- valued function of the coefficients; but then, writing 5 = 6/30, we have, as may be shown, a+6 a 3- valued function of the coefficients; and x = a+b is the required solution by radicals. It would have been wrong to complete the solution by writing

b = H[h[r-nr 2 -lW)\l for then 0+6 would have been given as a 9-valued function having only 3 of its values roots, and the other 6 values being irrelevant. Observe that in this last process we make no use of the equation

306 = 3, in its original form, but use only the derived equation 2ya 3 b 3 = q 3 , implied in, but not implying, the original form.

An interesting variation of the solution is to write x = ab(a+b),

giving o 3 6 3 (o 3 +6 3) =r and 3o 3 6 3 =o, or say a 3 +6 3 = ˆ, a 3 b 3 = \q;

and consequently

a 3 = |{r+V(- 2 Vs 3)!, b 3 = \[r – {r 2 -M 3)\, i.e. here a 3 , b 3 are each of them a 2-valued function, but as the only effect of altering the sign of the quadric radical is to interchange a 3 , b 3 , they may be regarded as each of them I-valued; a and b are each of them 3-valued (for observe that here only a 3 b 3 , not ab, is given); and 06(0+6) thus is in appearance a 9-valued function; but it can easily be shown that it is (as it ought to be) only 3-valued. In the case of a numerical cubic, even when the coefficients are real, substituting their values in the expression

- *= -nMr+V(ˆ-Ag 3)!]+k-Y[J|r+V(r*- ? W)}],*

this may depend on an expression of the form J (y+Si) where y and & are real numbers (it will do so if r 2 — ˆf q 3 is a negative num ber), and then we cannot by the extraction of any root or roots of real positive numbers reduce -si (y+Si) to the form c+di, c and d real numbers; hence here the algebraical solution does not give the numerical solution, and we have here the so-called ” irreducible case of a cubic equation. By what precedes there is nothing in this that might not have been expected; the algebraical solution makes the solution depend on the extraction of the cube root of a number, and there was no reason for expecting this to be a real number. It is well known that the case in question is that wherein the three roots of the numerical cubic equation are all real; if the roots are two imaginary, one real, then contrariwise the quantity under the cube root is real ; and the algebra’cal solution gives the numerical one.

Theirreducible case is solvable by a trigonometrical formula, but this is not a solution by radicals : it consists in effect in reducing the given numerical cubic (not to a cubic of the form z 3 = a, solvable by the extraction of a cube root, but) to a cubic of the form 4X 3 —

3 = o, corresponding to the equation 4 cos 3 #— 3 cos = cos 30 which serves to determine cos when cos 30 is known. The theory is applicable to an algebraical cubic equation; say that such an equation, if it. can be reduced to the form 4X 3 — 3x = o, is solvable by " trisection " — then the general cubic equation is solvable by trisection.*

18. A quartic equation is solvable by radicals, and it is to be remarked that the existence of such a solution depends on the existence of 3-valued functions such as ab + cd of the four roots (a, b, c, d) : by what precedes ab + cd is the root of a cubic equation, which equation is solvable by radicals: hence ab + cd can be found by radicals; and since abed is a given function, ab and cd can then be found by radicals. But by what precedes, if ab be known then any similar function, say a + b, is obtainable rationally; and then from the values of a--b and ab we may by radicals obtain the value of a or b, that is, an expression for the root of the given quartic equation: the expression ultimately obtained is 4-valued, corresponding to the different values of the several radicals which enter therein, and we have thus the ex- pression by radicals of each of the four roots of the quartic equation. But when the quartic is numerical the same thing happens as in the cuhic, and the algebraical solution does not in every case give the numerical one.

It will be understood from the foregoing explanation as to the quartic how in the next following case, that of the quintic, the question of the solvability by radicals depends on the existence or non- existence of ˆ-valued functions of the five roots (a, b, c, d, e) ; the fundamental theorem is the one already stated, a rational function of five letters, if it has less than 5, cannot have more than 2 values, that is, there are no 3-valued or 4-valued functions of 5 letters : and by reasoning depending in part upon this theorem, N. H. Abel (1824) showed that a general quintic equation is not solvable by radicals; and o fortiori the general equation of any order higher than 5 is not solvable by radicals.

19. The general theory of the solvability of an equation by radicals depends fundamentally on A. T. Vandermonde's remark (1770) that, supposing an equation is solvable by radicals, and that we have r therefore an algebraical expression of x in terms of the coefficients, then substituting for the coefficients their values in terms of the roots, the resulting expression must reduce itself to any one at pleasure of the roots a, b, c . . . ; thus in the case of the quadric equation, in the expression x = jy > + V (p 2 —4q)}, substituting for p and q their values, and observing that (0 + 6) 2 — 406 = (a — 6)

2 ; this becomes x = i{a+b + V (o — 6) 2 j, the value being a or b according as the radical is taken to be +(0 — 6) or —(0 — 6).

So in the cubic equation x 3 —px 2 +qx—r = o, if the roots are o, b, c, and if w is used to denote an imaginary cube root of unity, oi 2 +a + 1=0, then writing for shortness p = a+b+c, h = a+ub+a 2 c, M = a+oi 2 b+ac, it is at once seen that LM, L 3 +M 3 , and therefore also

(L— M')» are symmetrical functions of the roots, and consequently rational functions of the coefficients : hence*

ilL 8 +M»+V(L»-M») 8 } is a rational function of the coefficients, which when these are replaced by their values as functions of the roots becomes, according to the sign given to the quadric radical, = L 3 or M 3 ; taking it =L 3 , the cube root of the expression has the three values L, «L, oˆL; and LM divided by the same cube root has therefore the values M, tˆM, oiM; whence finally the expression

l[ˆ+-fiKL 3 +M 3 +V(L 3 M 3) 2)!+LMHˆliL 3 +M 3 +V(L 3 -M 3) 2)!] has the three values

ifo+L+M), l(p+wL+M), Hp+tfL+ulA) ; that is, these are =o, b, c respectively. If the value M 3 had been taken instead of L 3 , then the expression would have had the same three values a, b, c. Comparing the solution given for the cubic x 3 +qx — r=o, it will readily be seen that the two solutions are identical, and that the function r 2 — ˆ? 3 under the radical sign must (by aid of the relation p = o which subsists in this case) reduce itself to (L 3 — M 3) 2 ; it is only by each radical being equal to a rational function of the roots that the final expression can become equal to the roots a, b, c respectively.

20. The formulae for the cubic were obtained by J. L. Lagrange (1770-1771) from a different point of view. Upon examining and comparing the principal known methods for the solution of algebraical equations, he found that they all ultimately depended upon finding a " resolvent " equation of which the root is a+a>b +uPc+w 3 d+ . . . , o> being an imaginary root of unity, of the same order as the equation; e.g. for the cubic the root is a+wb+oPc, u an imaginary cube root of unity. Evidently the method gives for L 3 a quadric equation, which is the " resolvent " equation in this particular case.

For a quartic the formulae present themselves in a somewhat different form, by reason that 4 is not a prime number. Attempt- ing to apply it to a quintic, we seek for the equation of which the root is (a+cab+ui i c+(>i 3 d+(a , e), w an imaginary fifth root of unity, or rather the fifth power thereof (a+wft+wV+aAf+coV) 6 ; this is a 24-valued function, but if we consider the four values corresponding to the roots of unity 01, co 2 , w 3 , w 4 , viz. the values

(a+a b+o> 2 c+u 3 d+o> 4 ey,

(a+o?b+w 4 c+oi d+u 3 e)

(a+u 3 b+o> c+a> 4 d+w 2 e) 6 ,

(a+a) 4 6 + e) 5 ,

any symmetrical function of these, for instance their sum, is a 6-valued function of the roots, and may therefore be determined by means of a sextic equation, the coefficients whereof are rational functions of the coefficients of the original quintic equation; the conclusion being that the solution of an equation of the fifth order is made to depend upon that of an equation of the sixth order. This is, of course, useless for the solution of the quintic equation, which, as already mentioned, does not admit of solution by radicals; but the equation of the sixth order, Lagrange's re- solvent sextic, is very important, and is intimately connected with all the later investigations in the theory.

21. It is to be remarked, in regard to the question of solv- ability by radicals, that not only the coefficients are taken to be arbitrary, but it is assumed that they are represented each by a single letter, or say rather that they are not so expressed in terms of other arbitrary quantities as to make a solution possible. If the coefficients are not all arbitrary, for instance, if some of them are zero, a sextic equation might be of the form x+bx 4 +cx 2 +d = o, and so be solvable as a cubic; or if the coefficients of the sextic are given functions of the six arbitrary quantities a, b, c, d, e, f, such that the sextic is really of the form (x 2 +ax+b){x 4 +cx 3 +dx 2 +ex+f) =o, then it breaks up into the equations x 2 +ax+b = o, x*+cx 3 +dx 2 +ex--f=o, and is consequently solvable by radicals; so also if the form is (x-a)(x-b)(x— c)(x— d) (x—e)(x-f)= o, then the equation is solvable by radicals, — in this extreme case rationally. Such cases of solvability are self-evident; but they are enough to show that the general theorem of the non-solvability by radicals of*

an equation of the fifth or any higher order does not in any wise exclude for such orders the existence of particular equations solvable by radicals, and there are, in fact, extensive classes of equations which are thus solvable; the binomial equations x n — 1 = present an instance.

22. It has already been shown how the several roots of the equation

x n — 1 — can be expressed in the form cos 1- i sin — , but the

question is now that of the algebraical solution (or solution by radicals) of this equation. There is always a root = 1 ; if a be any other root, then obviously o>, w 2 , . . . oi n ~ l are all of them roots; x" — l contains the factor x — 1 , and it thus appears that o>, w 2 , . . . w n_1 are the » — 1 roots of the equation

x n – 1 +x n – 2 + . . . +x+i =0; we have, of course, M"~ 1 - f-«"~ 2 + . . . +»-)-i =0.

It is proper to distinguish the cases re prime and n composite; and in the latter case there is a distinction according as the prime factors of re are simple or multiple. By way of illustration, suppose successively re = 15 and n = 9 ; in the former case, if a be an imaginary root of x 3 — I =0 (or root of x 2 --x--l =0), and /S an imaginary root of x 5 — I =0 (or root of x 4 +x 3 +x 2 +x+l =0), then u may be taken = a/S; the successive powers thereof, af}, a 2 /? 2 , /3 3 , a/3 4 , a 2 , /3, a/3 2 , a 2 /? 3 , /3 4 , a, a 2 /?, /S 2 , a/3 3 , a 2 /3 4 , are the roots of x u x". . . +£-1-1 =0; the solution thus depends on the solution of the equations x 3 — I =0 and 3C 6 — 1=0. In the latter case, if a be an imaginary root of x 3 — 1 =0 (or root of x 2 +x + i =0), then the equation a; 9 — 1 =0 gives x 3 = l, a, or a 2 ; x 3 = l gives x = i, a, or a 2 ; and the solution thus depends on the solution of the equations x 3 — I = o,x 3 — a = o,x 3 — o?=o. The first equation has the roots 1 , a, a 2 ; if p be a root of either of the others, say if /8 3 = a, then assuming a = /3, the successive powers are /3, /J 2 , a, a/3, a(P, a 2 , a 2 /3, a 2 /^, which are the roots of the equation x+x 7 + ...* 1 =0.*

It thus appears that the only case which need be considered is that of re a prime number, and writing (as is more usual) r in place of w, we have r, r 2 , r 3 , . . . r n ~ l as the (re — I) roots of the reduced equation

x"- 1 x n - . . . +x+i =0; then not only r n — I =0, but also r n ~ 1 --r n ~"'+ . . . +r+i =0.*

23. The process of solution due to Karl Friedrich Gauss (1801) depends essentially on the arrangement of the roots in a certain order, viz. not as above, with the indices of r in arithmetical progression, but with their indices in geometrical progression; the prime number n has a certain number of prime roots g, which are such that g”- 1 is the lowest power of g, which is = 1 to the modulus n; or, what is the same thing, that the series of powers 1, g, g 2 , . . . g”~ 2 , each divided by n, leave (in a different order) the remainders 1, 2, 3, . . . n— 1; hence giving to r in succession the indices 1, g, g 2 , . . . g”~ 2 , we have, in a different order, the whole series of roots r, r 2 , r 3 , . . . r n ” 1 . ,

*In the most simple case, re = 5, the equation to be solved*is* 4 -|-x 3 -f x 2 --x--l =0; here 2 is a prime root of 5, and the order of the roots is r, r 2 , r 4 , r 3 . The Gaussian process consists in forming an equation for determining the periods Pi, P2, =r+r i and r 2 --r 3 respectively, — these being such that the symmetrical functions P1+P2, P1P2 are rationally determinable: in fact Pi+P 2 =— I, PiP 2 = (r+r 4)(r 2 +r 3), = r 3 +r*+r*+r 7 , =r’ i +r i +r+r 2 , =— 1. Pi, P 2 are thus th» roots of « 2 +w — I =0; and taking them to be known, they are themselves broken up into subperiods, in the present case single terms, r and r* for Pi, r 2 and r 3 for P 2 ; the symmetrical functions of these are then rationally determined in terms of Pi and P 2 ; thus r--r i = V\, r.r 4 = l, or r, r 4 are the roots of u 2 — Pi«+i =0. The mode of division is more clearly seen for a larger value of re; thus, for re = 7 a prime root is = 3, and the arrangement of the roots is r, r 3 , r 2 , r 6 , r 4 , r 6 . We may form either 3 periods each of 2 terms, Pi, P 2 , P 3 = r+r 6 , r 3 +r*, r 2 +r* respectively; or else 2 periods each of 3 terms, Pi, Pt = r+r 2 +r 4 , r 3 4 rr 6ˆ« r 5 respectively; in each case the symmetrical functions of the periods are rationally determinable : thus in the case of the two periods Pi+P 2 =-i, PiP 2 = 3+r+r 2 -t-r 3 +r 4 +r s +r li , =2; and the periods being known the symmetrical functions of the several terms of each period are rationally determined in terms of the periods, thus r-t-r 2 +r 4 = Pi, r.r 2 +r.r 4 +r 2 .r* = P 2 , r.r 2 .r 4 = i.*

The theory was further developed by Lagrange (1808), who, applying his general process to the equation in question, x n ~ l + x”- 2 + . . . +x+i =o(the roots a,b, c. . . being the several powers of r, the indices in geometrical progression as above), showed that the function (a+cob+ui 2 c+ . . .) n_I was in this case a given function of w with integer coefficients.

Reverting to the before-mentioned particular equation x 4 +x 3 + x

2 +x + i =0, it is very interesting to compare the process of solution with that for the solution of the general quartic the roots whereof are a, b, c, d.

*Take «, a root of the equation w 4 — 1 =0 (whence o> is =1, — I, *', or — *, at pleasure), and consider the expression*

(a+ab+ofc+wH) 4 , the developed value of this is

= a 4 +b 4 +c t +d l +6(a 2 c 2 +b 2 d 2)+i2(a 2 bd+b 2 ca +c>db+d 2 ac) +o> \4(a 3 b+b 3 c+c 3 +d 3 a) +I2(a 2 cd+b 2 da+c 2 ab+d 2 bc)} +

EQUATION

719

that is, this is a 6-valued function of a, b, c, d, the root of a sextic (which is, in fact, solvable by radicals; but this is not here material). If, however, a, b, c, d denote the roots r, r 2 , r l , r 1 of the special equation, then the expression becomes

r«+r'+r+r ! +6(l+l) + I2(r 2 +r+r 3 +r) + u H(l + i +1 +1) +I2(r*+r3+r +r 2)} 4-« 2 J6(r+r ! +r 4 +r 3) + 4(r 2 +r 4 +r 3 +r)| +u 3 {4(r+r 2 +r*+r 3) + i2(r 3 +r +r 2 +r 4)j*
viz. this is

= — i+4«j+i4<»> 2 — 160 3 , a completely determined value. That is, we have

(r+wr 2 +a) 2 r 4 +w 3 r i _) 4 =-i+4cu + i4w 2 -l6a> 3 , which result contains the solution of the equation. If a = 1 , we have (r+r 2 +r 4 +r 3) 4 = l,whichisright;ifco= -i,then(r+r 4 -r 2 r 3) 4 = 2S; ifo> = i, then we have {r — r > +i(r 2 — r s)} i = — 15+201; and ifo>=— i, then \r — r — Of — r 3) | 4 = — 1 5 — 202 ' ; the solution may be completed . without difficulty.*

The result is perfectly general, thus: — n being a prime number, r a root of the equation x n ~ 1 +x n ~ 2 + . . . +x+i = 0, u> a root of co n_1 — 1 =o, and g a prime root of g n-1 s 1 (mod. «), then

(/+urs+ . . . -f-u»-ifo"- 2)n-l

is a given function M +Miw . . . +M„_2C0 n_2 with integer co-efficients, and by the extraction of (»— i)th roots of this and similar expressions we ultimately obtain r in terms of ca, which is taken to

*be known; the equation * n — 1 = 0, n a prime number, is thus solvable by radicals. In particular, if n— 1 be a power of 2, the solution (by either process) requires the extraction of square roots only; and it was thus that Gauss discovered that it was possible to construct geometrically the regular polygons of 17 sides and 257 sides respectively. Some interesting developments in regard to the theory were obtained by C. G. J. Jacobi (1837); see the memoir " Ueber die Kreistheilung, u.s.w.," Crelle, t. xxx.*

(1846).

*The equation x"~ 1 + . . . +£+1 = 0 has been considered for its own sake, but it also serves as a specimen of a class of equations solvable by radicals, considered by N. H. Abel (1828), and since called Abelian equations, viz. for the Abelian equation of the order n, if * be any root, the roots are x, dx, (Px, . . . d n " i x (dx being a rational function of x, and 6"x = x) ; the theory is, in fact, very analogous to that of the above particular case.*

A more general theorem obtained by Abel is as follows: — If the roots of an equation of any order are connected together in such wise that all the roots can be expressed ratiqnally in terms of any one of them, say x; if, moreover, ex, 61X being any two of the roots, we have 86ix = 6i6x, the equation will be solvable algebraically. It is proper to refer also to Abel's definition of an irreducible equation : ■ — an equation x = o, the coefficients of which are rational functions of a certain number of known quantities a, b, c . . . , is called irreducible when it is impossible to express its roots by an equation of an inferior degree, the coefficients of which are also rational functions of a, b, c . . . (or, what is the same thing, when x does not break up into factors which are rational functions of a, b, c . . .). Abel applied his theory to the equations which present themselves in the division of the elliptic functions, but not to the modular equations.

24. But the theory of the algebraical solution of equations in its most complete form was established by Evariste Galois (born October 1811, killed in a duel May 1832; see his collected works, Liouville, t. xl., 1846). The definition of an irreducible, equation resembles Abel's, — an equation is reducible when it admits of a rational divisor, irreducible in the contrary case; only the word rational is used in this extended sense that, in connexion with the coefficients of the given equation, or with the irrational quantities (if any) whereof these are composed, he considers any number of other irrational quantities called " adjoint radicals," and he terms rational any

rational function of the coefficients (or the irrationals whereof they are composed) and of these adjoint radicals; the epithet irreducible is thus taken either absolutely or in a relative sense, according to the system of adjoint radicals which are taken into account. For instance, the equation x A +x+x*+x+i =0; the left hand side has here no rational divisor, and the equation is irreducible; but this function is= (a^+jx+i) 2 — f-x 2 , and it nas thus the irrational divisors x 2 +i(i + yl s)x+i, x 2 +i(i- V5)*+i; and these, if we adjoin the radical V 5, are rational, and the equation is no longer irreducible. In the case of a given equation, assumed to be irreducible, the problem to solve the equation is, in fact, that of*

finding radicals by the adjunction of which the equation becomes reducible; for instance, the general quadric equation ■x z --px+ q = o is irreducible, but it becomes reducible, breaking up into rational linear factors, when we adjoin the radical V Q/> 2 — q).

The fundamental theorem is the Proposition I. of the " Memoire sur les conditions de resolubilite des equations par radicaux " ; viz. given an equation of which a, b, c . . . are the m roots, there is always a group of permutations of the letters a, b, c . . . possessed of the following properties: —

1. Every function of the roots invariable by the substitutions of the group is rationally known.

2. Reciprocally every rationally determinable function of the roots is invariable by the substitutions of the group.

Here by an invariable function is meant not only a function of which the form is invariable by the substitutions of the group, but further, one of which the value is invariable by these substitutions : for instance, if the equation be (x) =0, then(x) is a function of the roots invariable by any substitution whatever. And in saying that a function is rationally known, it is meant that its value is expressible rationally in terms of the coefficients and of the adjoint quantities.

For instance in the case of a general equation, the group is simply the system of the 1.2.3 ■ ■ ■ n permutations of all the roots, since, in this case, the only rationally determinable functions are the symmetric functions of the roots.

In the case of the equation x n ~ l . . . + + i =0, n a prime number, a, b, c . . .k — r, ro, ra* . . . re" -2 , where g is a prime root of n, then the group is the cyclical group abc.k, be. .ka, ... kab . . ,j,*

that is, in this particular case the number of the permutations of the group is equal to the order of the equation.

This notion of the group of the original equation, or of the group of the equation as varied by the adjunction of a series of radicals, seems to be the fundamental one in Galois's theory. But the problem of solution by radicals, instead of being the sole object of the theory, appears as the first link of a long chain of questions relating to the transformation and classification of irrationals.

Returning to the question of solution by radicals, it will be readily understood that by the adjunction of a radical the group may be diminished ; for instance, in the case of the general cubic, where the group is that of the six permutations, by the adjunction of the square root which enters into the solution, the group is reduced to abc, bca, cab; that is, it becomes possible to express rationally, in terms of the coefficients and of the adjoint square root, any function such as a 2 6+6 2 c+c 2 a which is not altered by the cyclical substitution o into b, b into c, c into a. And hence, to determine whether an equation of a given form is solvable by radicals, the course of investigation is to inquire whether, by the successive adjunction of radicals, it is possible to reduce the original group of the equation so as to make it ultimately consist of a single permutation.

The condition in order that an equation of a given prime order n may be solvable by radicals was in this way obtained — in the first instance in the form (scarcely intelligible without further explanation) that every function of the roots x u x?.. .x n , invariable by the substitutions x„k+b for xt, must be rationally known; and then in the equivalent form that the resolvent equation of the order 1.2 .. . (n — 2) must have a rational root. In particular, the condition in order that a quintic equation may be solvable is that Lagrange's resolvent of the order 6 may have a rational factor, a result obtained from a direct investigation in a valuable memoir by E. Luther, Crelle, t. xxxiv. (1847).

Among other results demonstrated or announced by Galois may be mentioned those relating to the modular equations in the theory of elliptic functions; for the transformations of the orders 5, 7, II, the modular equations of the orders 6, 8, 12 are depressible to the orders 5, 7, II respectively; but for the transformation, » a prime number greater than II, the depression is impossible.

The general theory of Galois in regard to the solution of equations was completed, and some of the demonstrations supplied by E. Betti

(1852). See also J. A. Serret's Cours d'algebre superieure, 2nd ed. (1854); 4th ed. (1877-1878).

25. Returning to quintic equations, George Birch Jerrard (1835) established the theorem that the general quintic equation is by the extraction of only square and cubic roots reducible to the form x b +ax-- b = o, or what is the same thing, to x 6 +x+b = o. The actual reduction by means of Tschirnhausen's theorem was effected by Charles Hermite in connexion with his elliptic- function solution of the quintic equation (1858) in a very elegant manner. It was shown by Sir James Cockle and Robert Harley (1858-1859) in connexion with the Jerrardian form, and by Arthur Cayley (1861), that Lagrange's resolvent equation of the sixth order can be replaced by a more simple sextic equation occupying a like place in the theory.

The theory of the modular equations, more particularly for the case n—5, has been studied by C. Hermite, L. Kronecker and F. Brioschi. In the case n = 5, the modular equation of the order 6

depends, as already mentioned, on an equation of the order 5; and conversely the general quintic equation may be made to depend upon this modular equation of the order 6; that is, assuming the solution of this modular equation, we can solve (not by radicals) the general quintic equation; this is Hermite's solution of the general quintic equation by elliptic functions (1858); it is analogous to the before-mentioned trigonometrical solution of the cubic equation. The theory is reproduced and developed in Brioschi's memoir, " t)ber die Auflosung der Gleichungen vom fiinften Grade," Math. Annalen, t. xiii.

(1877-1878).

26. The modern work, reproducing the theories of Galois, and exhibiting the theory of algebraic equations as a whole, is C. Jordan's Tratle des substitutions et des equations algebriques (Paris, 1870). The work is divided into four books — book L, preliminary, relating to the theory of congruences; book ii. is in two chapters, the first relating to substitutions in general, the second to substitu- tions defined analytically, and chiefly to linear substitutions; book iii. has four chapters, the first discussing the principles of the general theory,

the other three containing applications to algebra, geometry, and the theory of transcendents; lastly, book iv., divided into seven chapters, contains a determination of the general types of equations solvable by radicals, and a complete system of classification of these types. A glance through the index will show the vast extent which the theory has assumed, and the form of general conclusions arrived at; thus, in book iii., the algebraical applications comprise Abelian equations, equations of Galois; the geometrical ones comprise Q. Hesse's equation, R. F. A. Clebsch's equations, lines on a quartic surface having a nodal line, singular points of E. E. Rummer's surface, lines on a cubic surface, problems of contact; the applica- tions to the theory of transcendents comprise circular functions, elliptic functions (including division and the modular equation), hyperelliptic functions, solution of equations by transcendents. And on this last subject, solution of equations by transcendents, we may quote the result — " the solution of the general equation of an order superior to five cannot be made to depend upon that of the equations for the division of the circular or elliptic functions"; and again (but with a reference to a possible case of exception), " the general equation cannot be solved by aid of the equations which give the division of the hyperelliptic functions into an odd number of parts." (See also Groups, Theory of.) (A. Ca.)

Bibliography. — For the general theory see W. S. Burnside and A. W. Panton, The Theory of Equations (4th ed., 1899-1901); the Galoisian theory is treated in G. B. Matthews, Algebraic Equations (1907). See also the Ency. d. math. Wiss. vol. ii.

EQUATION OF THE CENTRE, in astronomy, the angular distance, measured around the centre of motion, by which a planet moving in an ellipse deviates from the mean position which it would occupy if it moved uniformly. Its amount is the correc- tion which must be applied positively or negatively to the mean anomaly in order to obtain the true anomaly. It arises from the ellipticity of the orbit, is zero at pericentre and apocentre, and reaches its greatest amount nearly midway between these points. (See Anomaly and Orbit.)

EQUATION OF TIME, the difference between apparent time, determined by the meridian passage of the real sun, and mean time, determined by the passage of the mean sun. It goes through a double period in the course of a year. Its amount varies a fraction of a minute for the same date, from year to year and from one longitude to another, on the same day. The follow- ing table shows an average value for any date and for the Green- wich meridian for a number of years, from which the actual value will seldom deviate more than 20

seconds until after 1050. The + sign indicates that the real sun reaches the meridian after mean noon; the – sign before mean noon.

Table of the Equation of Time.

m.

s.

m.

s.

m.

s.

I

+ 3

26

Mar

1

+ 12

39

May

1

— 2

55

6

5

45

6

11

35

6

-3

27

11

7

5i

11

10

20

11

-3

46

16

9

43

16

8

58

16

-3

5i

21

11

19

21

7

30

21

-3

40

26

12

36

26

5

59

26

-3

16

Jan.

Feb. 1 +13 42 Apr. 1+4 9 June 1 —2 32

6 14 14 6 2 40 6 —1 44

11 14 25 11 -f 1 15 11 — o 48

16 14 17 36 — o 3 16 +0 14

21 n 52 21 — 1 12 21 1 19

26 13 11 26 — 2 10 26 2 24

m. s. m. s. m s.

July 1 +3 26 Sept. 1 + o 9 Nov. 1 -16 18

6 4 21 6 — 1 28 6 ˆ16 19

11 5 8 11 – 3 10 11 -15 58

16 5 44 16-4 55 16 -15 15

21 6 8 21 — 6 41 21 —14 12

26 6 18 26 — 8 25 26 —12 49

Aug. 1 +6 10 Oct. 1 —10 5 Dec. 1 — 11 7

65 47 6 -11 38 6-99

*11 5 9 * 11 -13 2 11 – 6 57*

16 4 17 16 -14 14 16-4 35

21 3 12 21 —15 11 21 — 2 7

26 1 55 26 —15 52 26 + 23

EQUATOR (Late Lat. aequator, from aequare, to make equal), in geography, that great circle of the earth, equidistant from the two poles, which divides the northern from the southern hemi- sphere and lies in a plane perpendicular to the axis of the earth ; this is termed the " geographical " or " terrestrial equator." In astronomy, the " celestial equator " is the name given to the great circle in which the plane of the terrestrial equator intersects the celestial sphere; it is consequently equidistant from the celestial poles. The " magnetic equator " is an imaginary line encircling the earth, along which the vertical component of the earth's magnetic force is zero; it nearly coincides with the terrestrial equator.

EQUERRY (from the Fr. Scurie, a stable, through its older form escurie, from the Med. Lat. scuria, a word of Teutonic origin for a stable or shed, cf. Ger. Scheuer; the modern spelling has con- fused the word with the Lat. equus, a horse), a contracted form of " gentleman of the equerry," an officer in charge of the stables of a royal household. At the British court, equerries are officers attached to the department of the master of the horse, the first of whom is called chief equerry (see Household, Royal) .

EQUIDAE, the family of perissodactyle ungulate mammals typified by the horse {Equus caballus); see Horse. According to the older

classification this family was taken to include only the forms with tall-crowned teeth, more or less closely allied to the typical genus Equus. There is, however, such an almost complete graduation from the former to earlier and more primi- tive mammals with short-crowned cheek-teeth, at one time included in the family Lophiodontidae (see Perissodactyla), that it has now become a very general practice to include the whole " phylum " in the family Equidae. The Equidae, in this extended sense, together with the extinct Palaeotheriidae, are indeed now regarded as forming one of four main groups into which the Perissodactyla are divided, the other groups being the Tapiroidea, Rhinocerotoidea and Titanotheriide. For the horse-group the name Hippoidea is employed. All four groups were closely connected in the Lower Eocene, so that exact definition is almost impossible.

In the Hippoidea there is generally the full series of 44 teeth, but the first premolar is often deciduous or wanting in the lower or in both jaws. The incisors are chisel-shaped, and the canines tend to become isolated so as in the now specialized forms to occupy nearly the middle of a longer or shorter gap between the incisors and premolars. In the upper molars the two outer columns of the primitive tubercular molar coalesce to form an outer wall, from which proceed two crescentic transverse crests; the connexion between the crests and the wall being imperfect or slight, and the crests themselves sometimes tubercular. Each of the lower molars carries two crescentic ridges. The number of toes ranges from four to one in the fore-foot, and from three to one in the hind-foot. The paroccipital, postglenoid and post- tympanic processes of the skull are large, and the latter always distinct. Normally there are no traces of horn-cores. The calcaneum lacks the facet for the fibula found in the Titano- theroidea.

In the earlier Equidae the teeth were short-crowned, with the premolars simpler than the molars; but there is a gradual tendency to an increase in the height of the crowns of the teeth, accompanied by increasing complexity of structure and the filling up of the hollows with cement. Similarly the gap on each side of the canine tooth in each jaw continues to increase in

Fig. 1. — a, Side view of second upper moiar tooth of A nchitherium (brachyodont form) ; b, corre- sponding tooth of horse (hypsidont form).

length; while in all the later forms the orbit is surrounded by a ring of bone. A third modification is the increasing length of limb (as well as in general bodily size), accompanied by a gradual reduction in the number of toes from three or four to one.

All the existing members of the family, such as the domesticated horse (Equus caballus) and its wild or half-wild relatives, the 7, asses and the zebras, are in-

cluded in the typical genus. In all these the crowns of the cheek-teeth are very tall (fig. 1, b) and only develop roots late in life; while their grinding-surfaces (fig. 2, b and c) are very complicated and have all the hollows filled with cement. The summits'of the incisors are infolded, pro- ducing, when partially worn, the " mark . " In th e skull the orbit is surrounded by bone, and there is no distinct de-pression in front of the same. Each limb terminates in one large toe; the lateral digits being represented by the splint-bones, corresponding to the lateral metacarpals and metatarsals of Hipparion. Not unfrequently, however, the lower ends of the splint-bones carry a small expansion, representing the phalanges.

Remains of horses indistinguishable from E. caballus occur in the Pleistocene deposits of Europe and Asia; and it is from them that the dun-coloured small horses of northern Europe and Asia are probably derived. The ancestor of these Pleistocene horses is probably E. stenonis, of the Upper Pliocene of Europe, which has a small depression in front of the orbit, while the skull is relatively larger, the feet are rather shorter, and the splint- bones somewhat more developed. In India a nearly allied species (E. sivalensis), occurs in the Lower Pliocene, and may have, been the ancestor of the Arab stock, which shows traces of the depression in front of the orbit characteristic of the earlier forms. In North America species of Equus occur in the Pleistocene and from that continent others reached South America during the same epoch. In the latter country occurs Hippidium, in which the cheek-teeth are shorter and simpler, and the nasal bones very long and slender, with elongated slits at the side. The limbs, especially the cannon-bones, are relatively short, and the splint-bones large. The allied Argentine Onohippidium, which is also Pleistocene, has still longer nasal bones and slits, and a deep double cavity in front of the orbit, part of which probably contained a gland. Onohippidium is certainly off the

b c

Fig. 2. — a, Grinding surface of unworn right upper molar tooth of

AncHitherium ; b, corresponding surface of unworn molar of young horse; c, the same tooth after it has been some time in use. The uncoloured portions are the dentine or ivory, the shaded parts the cement filling the cavities and surrounding the exterior. The black line separating these two structures is the enamel or hardest constituent of the tooth.

direct line of descent of the modern horses, and, on account of the length of the nasals and their slits, the same probably holds good for Hippidium.

Species from the Pliocene of Texas and the Upper Miocene (Loup Fork) of Oregon were at one time assigned to Hippidium, but this is incorrect, that genus being exclusively South American.

The name Pliohippus has been applied to species from the same two formations on the supposition that the foot-structure was similar to that of Hippidium, but Mr J. W. Gidley is of opinion that the lateral digits may have been fully developed.

Apparently there is here some gap in the line of descent of the horse, and it may be suggested that the evolution took place, not as commonly supposed, in North America, but in eastern central Asia, of which the palaeontology is practically unknown ; some support is given to this theory by the fact that the earliest species with which we are acquainted occur in northern India.

Be this as it may, the next North American representatives of the family constitute the genera Protohippus and Merychippus of the Miocene, in both of which the lateral digits are fully developed and terminate in small though perfect hoofs. In both the cheek-teeth have moderately tall crowns, and in the first named of the two those of the milk-series are nearly similar to their permanent successors. In Merychippus, on the other hand, the milk-molars have short crowns, without any cement in the hollows, thus resembling the permanent molars of the under-mentioned genus Anchitherium. From the well-known Hipparion, or Hippotherium, typically from the Lower Pliocene of Europe, but also occurring in the corresponding formation in North Africa, Persia, India and China, and represented in the Upper Miocene Loup Fork beds of the United States by species which it has been proposed to separate generically as Neo-

Fig. 3. — Successive stages of modification of the left fore-feet of extinct forms of horse-like animals, showing gradual reduction of the outer and enlargement of the middle toe (ill).

a, Hyracotherium (Eocene). d, Hipparion (Pliocene).

b, Mesohippus (Oligocene). e, Equus (Pleistocene).

c, Anchitherium (Miocene).

hipparion, we reach small horses which are now generally regarded as a lateral offshoot from the Merychippus type. The cheek-teeth, which have crowns of moderate height, differ from those of all the foregoing in that the postero-internal pillar (the projection on the right-hand top corner of c in fig. 2) is isolated in place of being attached by a narrow neck to the adjacent crescent. The skull, which is relatively short, has a large depression in front of the orbit, commonly supposed to have contained a gland, but this may be doubtful. In the typical, and also in the North American forms these were complete, although small, lateral toes in both feet (fig. 3, d), but it is possible that in H. antilopinum of India the lateral toes had disappeared. If this be so, we have the development of a monodactyle foot in this genus independently of Equus.

The foregoing genera constitute the subfamily Equinae, or the Equidae as restricted by the older writers. In all the dentition is of the hypsodont type, with the hollows of the cheek-teeth filled by cement, the premolars molariform, and the first small and generally deciduous. The orbit is surrounded by a bony ring; the ulna and radius in the fore, and the tibia and fibula in the hind-limb are united, and the feet are of the types described above. Between this subfamily and the second subfamily, Hyracotheriinae, a partial connexion is formed by the North American Upper Miocene genera Desmatippus and Anchippus or Parahippus. The characteristics of the group will be gathered from the remarks on the leading genera; but it may be mentioned that the orbit is open behind, the cheek-teeth are short-crowned and without cement (fig. 1, a), the gap between the canine and

the outermost incisor is short, the bones of the middle part of the leg are separate, and there are at least three toes to each foot.

The longest-known genus and the one containing the largest species is Anchitherium, typically from the Middle Miocene of Europe, but also represented by one species from the Upper Miocene of North America. The European A. aurelianense was of the size of an

ordinary donkey. The cheek-teeth are of the type shown in a of figs, i and 2 ; the premolars, with the exception of the small first one, being molar-like; and the lateral toes (fig. 3, c) were to some extent functional; The summits of the incisors were infolded to a small extent. Nearly allied is the American Mesohippus, ranging from the Lower Miocene to the Lower Oligocene of the United States, of which the earliest species stood only about 18 in. at the shoulder. The incisors were scarcely, if at all, infolded, and there is a rudiment of the fifth metacarpal (fig. 3, b). By some writers all the species of Mesohippus are included in the genus Miohippus, but others consider that the two genera are distinct.

Mesohippus and Miohippus are connected with the earliest and most primitive mammal which it is possible to include in the family Equidae by means of Epihippus of the Uinta or Upper Eocene of North America, and Pachynolophus, or Orohippus, of the Middle and Lower Eocene of both halves of the northern hemisphere. The final stage, or rather the initial stage, in the series is presented by Hyracotherium (Protorohippus) , a mammal no larger than a fox, common to the Lower Eocene of Europe and North America. The general characteristics of this pro- genitor of the horses are those given above as distinctive of the group. The cheek-teeth are, however, much simpler than those of Anchitherium; the transverse crests of the upper molars not being fully connected with the outer wall, while the premolars in the upper jaw are triangular, and thus unlike the molars. The incisors are small and the canines scarcely enlarged; the latter having a gap on each side in the lower, but only one on their hinder aspect in the upper jaw. The fore-feet have four complete toes (fig. 3, a), but there are only three hind-toes, with a rudiment of the fifth metatarsal. The vertebrae are simpler in structure than in Equus. From Hyracotherium, which is closely related to the Eocene representatives of the ancestral stocks of the other three branches of the Perissodactyla, the transition is easy to Phenacodus, the representative of the common ancestor of all the Ungulata.

See also H. F. Osborn, " New Oligocene Horses," Bull. Amer. Mus. vol. xx. p. 167 (1904) ; J. W. Gidley, Proper Generic Names of Miocene Horses, p. 191; and the article Palaeontology. (R. L.)*

EQUILIBRIUM (from the Lat. aequus, equal, and libra, a balance), a condition of equal balance between opposite or counteracting forces. By the " sense of equilibrium " is meant the sense, or sensations, by which we have a feeling of security in standing, walking, and indeed in all the movements by which the body is carried through space. Such a feeling of security is necessary both for maintaining any posture, such as standing, or for performing any movement. If this feeling is absent or uncertain, or if there are contradictory sensations, then definite muscular movements are inefficiently or irregularly performed, and the body may stagger or fall. When we stand erect on a firm surface, like a floor, there is a feeling of resistance, due to nervous impulses reaching the brain from the soles of the feet and from the muscles of the limbs and trunk. In walking or running, these feelings of resistance seem to precede and guide the muscular movements necessary for the next step. If these are absent or perverted or deficient, as is the case in the disease known as locomotor ataxia, then, although there is no loss of the power of voluntary movement, the patient staggers in walking, especially if he is not allowed to look at his feet, or if he is blind- folded. He misses the guiding sensations that come from the limbs; and with a feeling that he is walking on a soft substance, offering little or no resistance, he staggers, and his muscular movements become irregular. Such a condition maybe artificially brought about by washing the soles of the feet with chloroform or ether. And it has been observed to exist partially after extensive destruction of the skin of the soles of the feet by burns

or scalds. This shows that tactile impulses from the skin take a share in generating the guiding sensation. In the disease above mentioned, however, tactile impressions may be nearly normal, but the guiding sensation is weak and inefficient, owing to the absence of impulses from the muscles. The disease is known to depend on morbid changes in the posterior columns of the spinal cord, by which impulses are not freely transmitted upwards to the brain. These facts point to the existence of impulses coming from the muscles and tendons. It is now known that there exist peculiar spindles, in muscle, and rosettes or coils or loops of nerve fibres in close proximity to tendons. These are the end organs of the sense. The transmission of impulses gives rise to the muscular sense, and the guiding sensa- tion which precedes co-ordinated muscular movements depends on these impulses. Thus

from the limbs streams of nervous impulses pass to the sensorium from the skin and from muscles and tendons; these may or may not arouse consciousness, but they guide or evoke muscular movements of a co-ordinated character, more especially of the limbs.

In animals whose limbs are not adapted for delicate touch nor for the performance of complicated movements, such as some mammals and birds and fishes, the guiding sensations depend largely on the sense of vision. This sense in man, instead of assisting, sometimes disturbs the guiding sensation. It is true that in locomotor ataxia visual sensations may take the place of the tactile and muscular sensations that are inefficient, and the man can walk without staggering if he is allowed to look at the floor, and especially if he is guided by transverse straight lines. On the other hand, the acrobat on the wire-rope dare not trust his visual sensations in the maintenance of his equilibrium. He keeps his eyes fixed on one point instead of allowing them to wander to objects below him, and his muscular movements are regulated by the impulses that come from the skin and muscles of his limbs. The feeling of insecurity probably arises from a conception of height, and also from the knowledge that by no muscular movements can a"man avoid a catastrophe if he should fall. A bird, on the other hand, depends largely on visual impressions, and it knows by experience that if launched into the air from a height it can lly. Here, probably, is an explanation of the large size of the eyes of birds. Cover the head, as in hood- ing a falcon, and the bird seems to be deprived of the power of voluntary movement. Little effect will be produced if we attempt to restrain the movements of a cat by covering its eyes. A fish also is deprived of the power of motion if its eyes are covered. But both in the bird and in the fish tactile and muscular impressions, especially the latter, come into play in the mechanism of equilibrium. In flight the large-winged birds, especially in soaring, can feel the most delicate wind-pressures, both as regards direction and force, and they adapt the position of their body so as to catch the pressure at the most efficient angle. The same is true of the fish, especially of the flat-fishes. In mammals the sense of equilibrium depends, then, on streams of tactile, muscular and visual impressions pouring in on the sensorium, and calling forth appropriate muscular movements. It has also been suggested that impulses coming from the ab- dominal viscera may take part in the mechanism. The presence in the mesentery of felines (cats, &c.) of large numbers of Pacinian corpuscles, which are believed to be modified tactile bodies, favours this supposition. Such animals are remarkable for the delicacy of such muscular movements, as balancing and leaping.

There is another channel by which nervous impulses feach the sensorium and play their part in the sense of equilibrium, namely, from the semicircular canals, a portion of the internal ear. It is pointed out in the article Hearing that the appreciation of sound is in reality an appreciation of variations of pressure. The labyrinth consists of the vestibule, the cochlea and the semi- circular canals. The cochlea receives the sound-waves (varia- tions of pressure) that constitute musical tones. This it accom- plishes by the structures in the ductus cochlearis. In the vesti- bule we find two sacs, the saccule next to and communicating with the ductus cochlearis, and the utricle communicating with the semicircular canals. The base of the stapes communicates

pressures to the utricle. The membranous portion of the semi-circular canals consists of a tube, dilated at one end into a swelling or pouch, termed the ampulla, and each end com- municates freely with the utricle. On the posterior wall of both the saccule and of the utricle there is a ridge, termed in each case the macula acustica, bearing a highly specialized epithelium. A similar structure exists in each ampulla. This would suggest that all three structures have to do with hearing; but, on the other hand, there is experimental evidence that the utricle and the canals may transmit impressions that have to do with equilibrium. Pressure of the base of the stapes is exerted on the utricle. This will compress the fluid in that cavity, and tend to drive the fluid into the semicircular canals that communicate with that cavity by five openings. Each canal is surrounded by a thin layer of perilymph, so that it may yield a little to this pressure, and exert a pull or pressure on the nerve-endings in each ampulla. Thus impulses may be generated in the nerves of the ampullae.

The three semicircular canals lie in the three directions in space, and it has been suggested that they have to do with our appreciation of the direction of sound. But our appreciation of sound is very inaccurate: we look with the eyes for the source of a sound, and instinctively direct the ears or the head, or both, in the direction from which the sound appears to proceed. But the relationship of the canals on the two sides must have a physiological significance. Thus (1) the six canals are parallel, two and two; or (2) the two horizontal canals are in the same plane, while the superior canal on one side is nearly parallel with the posterior canal of the other. These facts point to the two sets of canals and ampullae acting as

one organ, in a manner analogous to the action of two retinae for single vision.

We have next to consider how the canals may possibly act in connexion with the sense of equilibrium. In 1820 J. Purkinje studied the vertigo that follows rapid rotation of the body in the erect position on a vertical axis. On stopping the rotation there is a sense of rotation in the opposite direction, and this may occur even when the eyes are closed. Purkinje noticed that the position of the imaginary axis of rotation depends on the axis around which the head revolves. In 1828 M. J. P. Flourens discovered that injury to the canals causes disturbance to the equilibrium and loss of co-ordination, and that sections of the canals produce a rotatory movement of a kind corresponding to the canal that had been divided. Thus division of a mem- branous canal causes rotatory movements round an axis at right angles to the plane of the divided canal. The body of the animal always moves in the direction of the cut canal. Many other observers have corroborated these experiments. F. Goltz was the first who formulated the conditions necessary for equilibra- tion. He put the matter thus: — (1) A central co-ordinating organ — in the brain; (2) centripetal fibres, with their peripheral terminations — in the ampullae; and (3) centrifugal fibres, with their terminal organs — in the muscular mechanisms. A lesion of any one of these portions of the mechanism causes loss or im- pairment of balancing. Cyon also investigated the subject, and concluded: — (1) To maintain equilibrium, we must have an accurate notion of the position of the head in space; (2) the function of the semicircular canals is to communicate impressions that give a representation of this position — each canal having a relation to one of the dimensions of space; (3) disturbance of equilibrium follows section; (4) involuntary movements follow- ing section are due to abnormal excitations; (5) abnormal movements occurring a few days after the operation are caused by irritation of the cerebellum.

On theoretical considerations of a physical character, E. Mach, Crum-Brown and Breuer have advanced theories based on the idea of the canals being organs for sensations of acceleration of movement, or for the sense of rotation. Mach first pointed out that Purkinje's phenomena, already alluded to, were in all probability related to the semicircular canals. " He showed that when the body is moved in space, in a straight line, we are not conscious of the velocity of motion, but of variations in this velocity. Similarly, if a body is rotated round a vertical axis,

we perceive only angular acceleration and not angular velocity. The

sensations produced by angular acceleration last longer than the acceleration itself, and the position of the head during the movements enables us to determine direction." Both Mach and Goltz state that varying pressures of the fluid in the canals produced by angular rotation produce sensations of movement (always in a direction opposite to the rotation of the body), and that these, in turn, cause the vertigo of Purkinje and the phenomena of Flourens. Mach, Crum-Brown and Breuer ad- vance hydrodynamical theories in which they assume that the fluids move in the canals. Goltz, on the other hand, supports a hydrostatical theory in which he assumes that the phenomena can be accounted for by varying pressures. Crum-Brown differs from Mach and Breuer as follows: — (1) In attributing movement or variation of pressure not merely to the endolymph, but also to the walls of the membranous canals and to the surrounding perilymph; and (2) in regarding the two labyrinths as one organ, all the six canals being required to form a true conception of the rotating motion of the head. He sums up the matter thus: " We have two ways in which a relative motion can occur between the endolymph and the walls of the cavity containing it — (1) When the head begins to move, here the walls leave the fluid behind; (2) when the head stops, here the fluid flows on. In both cases the sensation of rotation is felt. In the first this sensation corresponds to a real rotation, in the second it does not, but in both it corresponds to a real acceleration (positive or negative) of rotation, using the word acceleration in its technical kinematical sense."

Cyon states that the semicircular canals only indirectly assist in giving a notion of spatial relations. " He holds that knowledge of the position of bodies in space depends on nervous impulses coming from the contracting ocular muscles; that the oculo- motor centres are in intimate physiological relationship with the centres receiving impulses from the nerves of the semicircular canals; and that the oculomotor centres, thus excited, produce the movements of the eyeballs, which then determine our notions of spatial relations." These views are supported by experiments of Lee on dog-fish. When the fish is rotated round different axes there are compensating movements of the eyes and fins. " It was observed that if the fish were rotated in the plane of one of the canals, exactly the same movements of the eyes and fins occurred as were produced by experimental operation and stimulation of the ampulla of that canal." Sewall, in 1883, carried out experiments on young sharks and skates with negative results. Lee returned to the subject in 1894, and, after numerous experiments on dog-fish, in which the canals or

the auditory nerves were divided, obtained evidence that the ampullae con- tain sense-organs connected with the sense of equilibrium.

It has been found by physicians and aurists that disease or injury of the canals, occurring rapidly, produces giddiness, staggering, nystagmus (a peculiar twitching movement of the muscles of the eyeballs), vomiting, noises in the ear and more or less deafness. It is said, however, that if pathological changes come on slowly, so that the canals and vestibule are converted into a solid mass, none of these symptoms may occur. On the whole, the evidence is in favour of the view that from the semi- circular canals nervous impulses are transmitted, which, co- ordinated with impulses coming from the visual organs, from the muscles and from the skin, form the bases of these guiding sensations on which the sense of equilibrium depends. These impulses may not reach the level of consciousness, but they call into action co-ordinated mechanisms by which complicated muscular movements are effected.

Full bibliographical references are given in the article on " The Ear " by J. G. McKendrick, in Schafer's Textbook of Physiology, vol. ii. p. 1 194. (J. G. M.)

EQUINOX (from the Lat. aequus, equal, and nox, night), a term used to express either the moment at which, or the point at which, the sun apparently crosses the celestial equator. Since the sun moves in the ecliptic, it is in the last-named sense the point of intersection of the ecliptic and the celestial equator. This is the usual meaning of the term in astronomy. There arc

two such points, opposite each other, at one of which the sun crosses the equator toward the north and at the other toward the south. They are called vernal and autumnal respectively, from the relation of the corresponding times to the seasons of the northern hemisphere. The line of the equinoxes is the imaginary diameter of the celestial sphere which joins them.

The vernal equinox is the initial point from which the right ascensions and the longitudes of the heavenly bodies are measured (see Astronomy: Spherical). It is affected by the motions of Precession and Nutation, of which the former has been known since

the time of Hipparchus. The actual equinox is defined by first taking the conception of a fictitious point called the Mean Equinox, which moves at a nearly uniform rate, slow varying, however, from century to century. The true equinox then moves around the mean equinox in a period equal to that of the moon's nodes. These two motions are defined with greater detail in the articles Precession of the Equinoxes and Nutation.

Equinoctial Gales. — At the time of the equinox it is commonly believed that strong gales may be expected. This popular idea has no foundation in fact, for continued observations have failed to show any unusual prevalence of gales at this season. In one case observations taken for fifty years show that during the five days from the 21st to the 25th of March and September, there were fewer gales and storms than during the preceding and succeeding five days.

EQUITES (" horsemen " or " knights," from equus, " horse "), in Roman history, originally a division of the army, but subse- quently a distinct political order, which under the empire resumed its military character. According to the traditional account, Romulus instituted a cavalry corps, consisting of three centuriae (" hundreds "), called after the three tribes from which they were taken (Ramnes, Tities, Luceres), divided into ten turmae (" squadrons ") of thirty men each. The collective name for the corps was celeres (" the swift," or possibly from Ktkqs, " a riding horse "); Livy, however, restricts the term to a special body-guard of Romulus. The statements in ancient authorities as to the changes in the number of the equites during the regal period are very confusing; but it is regarded as certain that Servius Tullius found six centuries in existence, to which he added twelve, making eighteen in all, a number which remained unchanged throughout the republican period. A proposal by M. Porcius Cato the elder to supplement the de- ficiency in the cavalry by the creation of four additional centuries was not adopted. The earlier centuries were called sex suffragia (" the six votes "), and at first consisted exclusively of patricians, while those of Servius Tullius were entirely or for the most part plebeian. Until the reform of the comitia centuriata (probably during' the censorship of Gaius Flaminius in 220 B.C.; see Comitia), the equites had voted first, but after that time this privilege was transferred to one century selected by lot from the centuries of the equites and the first class. The equites then voted with the first class, the distinction between the sex suffragia and the other centuries being abolished.

Although the equites were selected from the wealthiest citizens, service in the cavalry was so expensive that the state gave financial

assistance. A sum of money (aes equestre) was given to each eques for the purchase of two horses (one for him- self and one for his groom), and a further sum for their keep (aes hordearium); hence the name equites equo publico. In later times, pay was substituted for the aes hordearium, three times as much as that of the infantry. If competent, an eques could retain his horse and vote after the expiration of his ten years' service, and (till 129 B.C.) even after entry into the senate.

As the demands upon the services of the cavalry increased, it was decided to supplement the regulars by the enrolment of wealthy citizens who kept horses of their own. The origin of these equites equo privato dates back, according to Livy (v. 7), to the siege of Veii, when a number Of young men came forward and offered their services. According to Mommsen, although the institution was not intended to be permanent, in later times vacancies in the ranks were filled in this manner, with the result that service in the cavalry, with either a public or a private

horse, became obligatory upon all Roman citizens possessed of a certain income. These equites equo privato had no vote in the centuries, received pay in place of the aes equestre, and did not form a distinct corps.

Thus, at a comparatively early period, three classes of equites may be distinguished: (a) The patrician equites equo publico of the sex suffragia; (b) the plebeian equites in the twelve remaining centuries; (c) the equites equo privato, both patrician and plebeian.

The equites were originally chosen by the curiae, then in suc- cession by the kings, the consuls, and (after 443 B.C.) by the censors, by whom they were reviewed every five years in the Forum. Each eques, as his name was called out, passed before the censors, leading his horse. Those whose physique and character were satisfactory, and who had taken care of their horses and equipments, were bidden to lead their horse on (traducere equum), those who failed to pass the scrutiny were ordered to sell it, in token of their expulsion from the corps. This inspection {recognitio) must not be confounded with the full-dress procession (transvectio) on the 15th of July from the temple of Mars or Honos to the Capitol, instituted in 304 B.C. by the censor Q. Fabius Maximus Rullianus to commemorate the miraculous intervention of Castor and Pollux at the battle of Lake Regillus. Both inspection and procession were discontinued before the end of the republic, but revived and in a manner combined by Augustus.

In theory, the twelve plebeian centuries were open to all free- born youths of the age of seventeen, although in practice prefer- ence was given to the members of the older families. Other requirements were sound health, high moral character and an honourable calling. At the beginning of the republican period, senators were included in the equestrian centuries. The only definite information as to the amount of fortune necessary refers to later republican and early imperial times, when it is known to have been 400,000 sesterces (about £3500 to £4000). The insignia of the equites were, at first, distinctly military — such as the purple-edged, short military cloak (trabea) and decorations for service in the field.

With the extension of the Roman dominions, the equites lost their military character. Prolonged service abroad possessed little attraction for the pick of the Roman youth, and recruiting for the cavalry from the equestrian centuries was discontinued. The equites remained at home, or only went out as members of the general's staff, their places being taken by the equites equo privato, the cavalry of the allies and the most skilled horse- men of the subject populations. The first gradually disappeared, and Roman citizens were rarely found in the ranks of the effective cavalry. In these circumstances there grew up in Rome a class of wealthy men, whose sole occupation it was to amass large fortunes by speculation, and who found a most lucrative field of enterprise in state contracts and the farming of the public revenues. These tax-farmers (see Publicani) were already in existence at the time of the Second Punic War; and their numbers and influence increased as the various provinces were added to the Roman dominions. The change of the equites into a body of financiers was further materially promoted (a) by the lex Claudia (218 B.C.), which prohibited senators from engaging in commercial pursuits, especially if (as seems probable) it included public contracts (cf. Flaminius, Gaius); (b) by the enactment in the time of Gaius Gracchus excluding members of the senate from the equestrian centuries. These two measures definitely marked off the aristocracy of birth from the aristocracy of wealth — the landed proprietor from the capitalist. The term equites, originally confined to the purely military equestrian centuries of Servius Tullius, now came to be applied to all who possessed the property qualification of 400,000 sesterces.

As the equites practically monopolized the farming of the taxes, they came to be regarded as identical with the publicani, not, as Pliny remarks, because any particular rank was necessary to obtain the farming of the taxes, but because such occupation was beyond the reach of all except those who were possessed of considerable means.

Thus, at the time of the Gracchi, these

EQUITES

72 5

equites-publicani formed a close financial corporation of about 30,000 members, holding an intermediate position between the nobility and the lower classes, keenly alive to their own interests, and ready to stand by one another when attacked. Although to some extent looked down upon by the senate as following a dishonourable occupation, they had as a rule sided with the latter, as being at least less hostile to them than the democratic party. To obtain the support of the capitalists, Gaius Gracchus conceived the plan of creating friction between them and the senate, which he carried out by handing over to them the control (a) of the jury-courts, and (b) of the revenues of Asia.

(a) Hitherto, the list of jurymen for service in the majority of processes, both civil and criminal, had been composed ex- clusively of senators. The result was that charges of corruption and extortion failed, when brought against members of that order, even in cases where there was little doubt of their guilt. The popular indignation at such scandalous miscarriages of justice rendered a change in the composition of the courts imperative. Apparently Gracchus at first proposed to create new senators from the equites and to select the jurymen from this mixed body, but this moderate proposal was rejected in favour of one more radical (see W. W. Fowler in Classical Review, July 1896). By the lex Sempronia (123 B.C.) the list was to be drawn from persons of free birth over thirty years of age, who must possess the equestrian census, and must not be senators. Although this measure was bound to set senators and equites at variance, it in no way improved the lot of those chiefly concerned. In fact, it increased the burden of the luckless provincials, whose only appeal lay to a body of men whose interests were identical with those of the publicani. Provided he left the tax-gatherer alone, the governor might squeeze what he could out of the people, while on the other hand, if he were humanely disposed, it was dangerous for him to remonstrate.

(b) The taxes of Asia had formerly been paid by the inhabitants themselves in the shape of a fixed sum. Gracchus ordered that the taxes, direct and indirect, should be increased, and that the farming of them should be put up to auction at Rome. By this arrangement the provincials were ignored, and everything was left in the hands of

the capitalists.'

From this time dates the existence of the equestrian order as an officially recognized political instrument. When the control of the courts passed into the hands of the property equites, all who were summoned to undertake the duties of judices were called equites; the ordo judicum (the official title) and the ordo equester were regarded as identical. It is probable that certain privileges of the equites were due to Gracchus; that of wearing the gold ring, hitherto reserved for senators; that of special seats in the theatre, subsequently withdrawn (probably by Sulla) and restored by the lex Othonis (67 B.C.); the narrow band of purple on the tunic as distinguished from the broad band worn by the senators.

Various attempts were made by the senate to regain control of the courts, but without success. The lex Livia of M. Livius Drusus (q.v.), passed with that object, but irregularly and by the aid of violence, was annulled by the senate itself. In 82 Sulla restored the right of serving as judices to the senate, to which he elevated 300 of the most influential equites, whose support he thus hoped to secure; at the same time he indirectly dealt a blow at the order generally, by abolishing the office of the censor (immediately revived), in whom was vested the right of bestowing the public horse. To this period Mommsen assigns the regulation, generally attributed to Augustus, that the sons of senators should be knights by right of birth. By the lex Aurelia (70 B.C.) the judices were to be chosen in equal numbers from senators, equites and tribuni aerarii (see Aerarium), the last-named being closely connected with the equites), who thus practically commanded a majority. About this time the influence of the equestrian order reached its height, and Cicero's great object was to reconcile it with the senate. In this he was successful at the time of the Catilinarian conspiracy, .in the suppression of which he was materially aided by the equites. But the union did not last long; shortly afterwards the majority

ranged themselves on the side of Julius Caesar, who did away with the tribuni aerarii as judices, and replaced them by equites.

Augustus undertook the thorough reorganization of the equestrian order on a military basis. The equites equo privato . were abolished (according to Herzog, not till the reign of Tiberius) and the term equites was officially limited to the equites equo publico, although all who possessed the property qualification were still considered to belong to the " equestrian order." For the equites equo publico high moral character, good health and the equestrian fortune were

necessary. Although free birth was considered indispensable, the right of wearing the gold ring (jus anuli aurei) was frequently bestowed by the emperor upon freedmen, who thereby became ingenui and eligible as equites. Tiberius, however, insisted upon free birth on the father's side to the third generation. Extreme youth was no bar; the emperor Marcus Aurelius had been an eques at the age of six. The sons of senators were eligible by right of birth, and appear to have been known as equites illustres. The right of bestowing the equus publicus was vested in the emperor; once given, it was for life, and was only forfeitable through degrada- tion for some offence or the loss of the equestrian fortune.

Augustus divided the equites into six turmae (regarded by Hirschfeld as a continuation of the sex suffragia). Each was under the command of a sevir (iXapxos), who was appointed by the emperor and changed every year. During their term of command the seviri had to exhibit games (ludi sevir ales) . Under these officers the equites formed a kind of corporation, which, although not officially recognized, had the right of passing resolutions, chiefly such as embodied acts of homage to the imperial house. It is not known whether the turmae contained a fixed number of equites; there is no doubt that, in assigning the public horse, Augustus went far beyond the earlier figure of 1 800. Thus, Dionysius of Halicarnassus mentions 5000 equites as taking part in a review at which he himself was present.

As before, the equites wore the narrow, purple-striped tunic, and the gold ring, the latter now being considered the distinctive badge of knighthood. The fourteen rows in the theatre were extended by Augustus to seats in the circus.

The old recognitio was replaced by the probalio, conducted by the emperor in his censorial capacity, assisted by an advisory board of specially selected senators. The ceremony was combined with a procession, which, like the earlier transvectio, took place on the 15 th of July, and at such other times as the emperor pleased. As in earlier times, offenders were punished by expulsion.

In order to provide a supply of competent officers, each eques was required to fill certain subordinate posts, called militiae equestres. These were (1) the command of an auxiliary cohort; (2) the tribunate of a legion; (3) the command of an auxiliary cavalry squadron, this order being as a rule strictly adhered to. To these Septimius Severus added the centurionship. Nomina- tion to the militiae equestres was in the hands of the emperor. After the

completion of their preliminary military service, the equites were eligible for a number of civil posts, chiefly those with which the emperor himself was closely concerned. Such were various procuratorships; the prefectures of the corn supply, of the fleet, of the watch, of the praetorian guards; the governor- ships of recently acquired provinces (Egypt, Noricum), the others being reserved -for senators. At the same time, the abolition of the indirect method of collecting the taxes in the provinces greatly reduced the political influence of the equites. Certain religious functions of minor importance were also reserved for them. In the jury courts, the equites, thanks to Julius Caesar, already formed two-thirds of the judices; Augustus, by excluding the senators altogether, virtually gave them the sole control of the tribunals. One of the chief objects of the emperors being to weaken the influence of the senate by the opposition of the equestrian order, the practice was adopted of elevating those equites who had reached a certain stage in their career to the rank of senator by adlectio. Certain official posts, of which it would have been inadvisable to deprive senators, could thus be bestowed upon the promoted equites.

The control of the imperial correspondence and purse was

at first in the hands of freedmen and slaves. The emperor Claudius tentatively entrusted certain posts connected with these to the equites; in the time of Hadrian this became the regular custom. Thus a civil career was open to the equites without the obligation of preliminary military service, and the emperor was freed from the pernicious influence of freedmen. After the reign of Marcus Aurelius (according to Mommsen) the equites were divided into: (a) viri eminentissimi, the prefects of the praetorian guard; (b) viri perfectissimi, the other prefects and the heads of the financial and secretarial departments; (c) viri egregii, first mentioned in the reign of Antoninus Pius, a title by right of the procurators generally.

Under the empire the power of the equites was at its highest in the time of Diocletian; in consequence of the transference- of the capital to Constantinople, they sank to the position of a mere city guard, under the control of the prefect of the watch. Their history may be said to end with the reign of Constantine the Great.

Mention may also be made of the equites singulares Augusti. The

body-guard of Augustus, consisting of foreign soldiers (chiefly Germans and Batavians), abolished by Galba, was revived from the time of Trajan or Hadrian under the above title. It was chiefly recruited from the pick of the provincial cavalry, but contained some Roman citizens. It formed the imperial " Swiss guard," and never left the city except to accompany the emperor. In the time of Severus, these equites were divided into two corps, each of which had its separate quarters, and was commanded by a tribune under the orders of the prefect of the praetorian guard. They were subsequently replaced by the protect ores Augusti.

See further article Rome: History; also T. Mommsen, Romisches Staatsrechl, iii. ; J. N. Madvig, Die Verfassung des romischen Staates, i. ; R. Cagnat in Daremberg and Saglio's Dictionnaire des antiquites, where full references to ancient authorities are given in the footnotes; A. S. Wilkins in Smith's Dictionary of Greek and Roman Antiquities (3rd ed., 1891) ; E. Belot, Histoire des chevaliers romains (1866-1873) ; H. O. Hirschfeld, Untersuchungen auf dem Gebiete der romischen Verwaltungsgeschichte (Berlin, 1877) ; E. Herzog, Geschichte und System der romischen Slaatsverfassung (Leipzig, 1884-1891); A. H. Friedlander, Siltengeschichte Roms, i. (1901); A. H. J. Greenidge, History of Rome, i. (1904); J. B. Bury, The Student's Roman Empire (1893): T. M. Taylor, Political and Constitutional History of Rome (1899). Fora concise summary of different views of the sex suffragia see A. Bouche-Leclercq's Manuel des antiquites romaines, quoted in Daremberg and Saglio; and on the equites singulares, T. Mommsen in Hermes, xvi. (1881), p. 458. (J. H. F.)

EQUITY (Lat. aequitas), a term which in its most general sense means equality or justice; in its most technical sense it means a system of law or a body of connected legal principles, which have superseded or supplemented the common law on the ground of their intrinsic superiority. Aristotle (Ethics, bk. v. c. 10) defines equity as a better sort of justice, which corrects legal justice where the latter errs through being expressed in a universal form and not taking account of particular cases. When the law speaks universally, and something happens which is not according to the common course of events, it is right that the law should be modified in its application to that particular case, as the lawgiver himself would have done, if the case had been present to his mind. Accordingly the equitable man (hneucfis) is he who does not push the law to its extreme, but, having legal justice on his side, is disposed to make allowances. Equity as thus described would correspond rather to the judicial discretion which modifies the administration of the law than to the antagonistic

system which claims to supersede the law.

The part played by equity in the development of law is admir- ably illustrated in the well-known work of Sir Henry Maine on Ancient Law. Positive law, at least in progressive societies, is constantly tending to fall behind public opinion, and the ex- pedients adopted for bringing it into harmony therewith are three, viz. legal fictions, equity and statutory legislation. Equity here is defined to mean " any body of rules existing by the side of the original civil law, founded on distinct principles, and claiming incidentally to supersede the civil law in virtue of a superior sanctity inherent in those principles." It is thus different from legal fiction, by which a new rule is introduced surreptitiously,

and under the pretence that no change has been made in the law, and from statutory legislation, in which the obligatory force of the rule is not supposed to depend upon its intrinsic fitness. The source of Roman equity was the fertile theory of natural law, or the law common to all nations. Even in the Institutes of Justinian the distinction is carefully drawn in the laws of a country between those which are peculiar to itself and those which natural reason appoints for all mankind. The connexion in Roman law between the ideas of equity, nature, natural law and the law common to all nations, and the influence of the Stoical philosophy on their development, are fully discussed in the third chapter of the work we have referred to. The agency by which these principles were introduced was the edicts of the praetor, an annual proclamation setting forth the manner in which the magistrate intended to administer the law during his year of office. Each successive praetor adopted the edict of his predecessor, and added new equitable rules of his own, until the further growth of the irregular code was stopped by the praetor Salvius Julianus in the reign of Hadrian.

The place of the praetor was occupied in English jurisprudence by the lord high chancellor. The real beginning of English equity is to be found in the custom of handing over to that officer, for adjudication, the complaints which were addressed to the king, praying for remedies beyond the reach of the common law. Over and above the authority delegated to the ordinary councils or courts, a reserve of judicial power was believed to reside in the king, which was invoked as of grace by the suitors who could not obtain relief from any inferior tribunal. To the chancellor, as already the head of the judicial system, these petitions were referred, although he was not at first the only officer through whom the prerogative of grace was administered. In the reign of Edward III. the equitable jurisdiction of

the court appears to have been established. Its constitutional origin was analogous to that of the star chamber and the court of requests. The latter, in fact, was a minor court of equity attached to the lord privy seal as the court of chancery was to the chancellor. The successful assumption of extraordinary or equitable jurisdiction by the chancellor caused similar pretensions to be made by other officers and courts. " Not only the court of exchequer, whose functions were in a peculiar manner connected with royal authority, but the counties palatine of Chester, Lancaster and Durham, the court of great session in Wales, the universities, the city of London, the Cinque Ports and other places silently assumed extraordinary jurisdiction similar to that exercised in the court of chancery." Even private persons, lords and ladies, affected to establish in their honours courts of equity.

English equity has one marked historical peculiarity, viz. that it established itself in a set of independent tribunals which remained in standing contrast to the ordinary courts for many hundred years. In Roman law the judge gave the preference to the equitable rule; in English law the equitable rule was enforced by a distinct set of judges. One cause of this separation was the rigid adherence to precedent on the part of the common law courts. Another was the jealousy prevailing in England against the principles of the Roman law on which English equity to a large extent was founded.

When a case of prerogative was referred to the chancellor in the reign of Edward III., he was required to grant such remedy as should be consonant to honesty (honestas). And honesty, conscience and equity were said to be the fundamental principles of the court. The early chancellors were ecclesiastics, and under their influence not only moral principles, where these were not regarded by the common law, but also the equitable principles of the Roman law were introduced into English jurisprudence. Between this point and the time when equity became settled as a portion of the legal system, having fixed principles of its own, various views of its nature seem to have prevailed. For a long time it was thought that precedents could have no place in equity, inasmuch as it professed in each case to do that which was jus.t; and we find this view maintained by common lawyers after it had been abandoned by the professors of equity them- selves. G. Spence, in his book on the Equitable Jurisdiction af

the Court of Chancery, quotes a case in the reign of Charles II., in which chief justice Vaughan said:

" I wonder to hear of citing of precedents in matter of equity, for if there be equity in a case, that equity is an universal truth, and there can be no precedent in it ; so that in any precedent that can be produced, if it be the same with this case, the reason and equity is the same in itself; and if the precedent be not the same case with this it is not to be cited."

But the lord keeper Bridgeman answered:

" Certainly precedents are very necessary and useful to us, for in them we may find the reasons of the equity to guide us, and besides the authority of those who made them is much to be regarded. We shall suppose they did it upon great consideration and weighing of the matter, and it would be very strange and very ill if we should disturb and set aside what has been the course for a long series of times and ages."

Selden's description is well known: " Equity is a roguish thing. Tis all one as if they should make the standard for measure the chancellor's foot." Lord Nottingham in 1676 reconciled the ancient theory and the established practice by saying that the conscience which guided the court was not the natural conscience of the man, but the civil and political con- science of the judge. The same tendency of equity to settle into a system of law is seen in the recognition of its limits — in the fact that it did not attempt in all cases to give a remedy when the rule of the common law was contrary to justice. Cases of hardship, which the early chancellors would certainly have relieved, were passed over by later judges, simply because no precedent could be found for their interference. The point at which the introduction of new principles of equity finally stopped is fixed by Sir Henry Maine in the chancellorship of Lord Eldon, who held that the doctrines of the court ought to be as well settled and made as uniform almost as those of the common law. From that time certainly equity, like common law, has professed to take its principles wholly from recorded decisions and statute law. The view (traceable no doubt to the Aristotelian definition) that equity mitigates the hardships of the law where the law errs through being framed in universals, is to be found in some of the earlier writings. Thus in the Doctor and Student it is said:

" Law makers take heed to such things as may often come, and not to every particular case, for they could not though they would ;

therefore, in some cases it is necessary to leave the words of the law and follow that reason and justice requireth, and to that intent equity is ordained, that is to say, to temper and mitigate the rigour of the law."

And Lord Ellesmere said:

" The cause why there is a chancery is for that men's actions are so divers and infinite that it is impossible to make any general law which shall aptly meet with every particular act and not fail in some circumstances."

Modern equity, it need hardly be said, does not profess to soften the rigour of the law, or to correct the errors into which it falls by reason of its generality.

To give any account, even in outline, of the subject matter of equity within the necessary limits of this article would be impossible. It will be sufficient to say here that the classification generally adopted by text-writers is based upon the relations of equity to the common law, of which some explanation is given above. Thus equitable jurisdiction is said to be exclusive, concurrent or auxiliary. Equity has exclusive jurisdiction where it recognizes rights which are unknown to the common law. The most important example is trusts. Equity has con- current jurisdiction in cases where the law recognized the right but did not give adequate relief, or did not give relief without circuity of action or some similar inconvenience. And equity has auxiliary jurisdiction when the machinery of the courts of law was unable to procure the necessary evidence.

" The evils of this double system of judicature," says the report of the judicature commission, (1863-1867), "and the confusion and conflict of jurisdiction to which it has led, have been long known and acknowledged." A partial attempt to meet the difficulty was made by several acts of parliament (passed after the reports of commissions appointed in 1850 and 1851), which enabled courts of law and equity both to exercise

certain powers formerly peculiar to one or other of them. A more complete remedy was introduced by the Judicature Act 1873, which consolidated the courts of law and equity, and ordered that law and equity should be administered concurrently accord- ing to the rules contained in the 26th section of the act. At the same time many matters of equitable jurisdiction are still left to the chancery division of the High Court in the first instance. (See Chancery.)

Authorities. — The principles of equity as set out by the following writers may be consulted: J. Story, J. W. Smith, H. A. Smith and W. Ashburner; and for the history see G. Spence, The Equitable Jurisdiction of the Court of Chancery (2 vols., 1846-1849); D. M. Kerly, Historical Sketch of the Equitable Jurisdiction of the Court of Chancery (1890).

EQUIVALENT, in chemistry, the proportion of an element which will combine with or replace unit weight of hydrogen. When multiplied by the valency it gives the atomic weight. The determination of equivalent weights is treated in the article Stoichiometry. (See also Chemistry.) In a more general sense the term " equivalent " is used to denote quantities of sub- stances which neutralize one another, as for example NaOH, HC1, |H 2 S0 4 , iBa(OH) 2 .

12RARD, SfiBASTIEN (1752-1831), French manufacturer of musical instruments, distinguished especially for the improve- ments he made upon the harp and the pianoforte, was born at Strassburg on the 5th of April 1752. While a boy he showed great aptitude for practical geometry and architectural drawing, and in the workshop of his father, who was an upholsterer, he found opportunity for the early exercise of his mechanical ingenuity. When he was sixteen his father died, and he removed to Paris where he obtained employment with a harpsichord maker. Here his remarkable constructive skill, though it speedily excited the jealousy of his master and procured his dismissal', almost equally soon attracted the notice of musicians and musical instrument makers of eminence. Before he was twenty-five he set up in business for himself, his first workshop being a room in the hotel of the duchesse de Villeroi, who gave him warm encouragement. Here he constructed in 1780 his first pianoforte, which was also one of the first manufactured in France. It quickly secured for its maker such a reputation that he was soon overwhelmed with commissions, and finding assistance necessary, he sent for his brother, Jean Baptiste, in conjunction with whom he established in the rue de Bourbon, in the Faubourg St Germain, a piano manufactory, which in a few years became one of the most celebrated in Europe. On the outbreak of the Revolution he went to London where he established a factory. Returning to Paris in 1796, - he soon afterwards introduced grand pianofortes, made in the English . fashion, with improvements of his own. In 1808 he again visited London, where, two years later, he produced his first double-movement harp. He had previously made various improvements in the manufacture of harps, but the new instru- ment was an immense advance upon anything he had before produced, and obtained such a reputation that for some time he devoted himself exclusively to its

manufacture. It has been said that in the year following his invention he made harps to the value of £25,000. In 181 2 he returned to Paris, and con- tinued to devote himself to the further perfecting of the two instruments with which his name is associated. In 1823 he crowned his work by producing his model grand pianoforte with the double escapement. Erard died at Passy, on the 5th of August 1831. (See also Harp and Pianoforte.)

ERASMUS, DESIDERIUS (1466-1536), Dutch scholar and theologian, was born on the night of the 27/28th of October, probably in 1466 ; but his statements about his age are conflicting, and in view of his own uncertainty (Ep. x. 29: 466) and the weakness of his memory for dates, the year of his birth cannot be definitely fixed. His father's name seems to have been Rogerius Gerardus. He himself was christened Herasmus; but in 1503, when becoming familiar with Greek, he assimilated the name to a fancied Greek original, which he had a few years before Latinized into Desyderius. A contemporary authority states that he was born at Gouda, his father's native town;

but he adopted the style Rotterdammensis or Roterodamus, in accordance with a story to which he himself gave credence. His first schooling was at Gouda under Peter Winckel, who was afterwards vice-pastor of the church. In the dull round of in- struction in " grammar " he did not distinguish himself, and was surpassed by his early friend and companion, William Herman, who was Winckel's favourite pupil. From Gouda the two boys went to the school attached to St Lebuin's church at Deventer, which was one of the first in northern Europe to feel the influence of the Renaissance. Erasmus was at Deventer from 1475 to 1484, and when he left, had learnt from Johannes Sinthius (Syntheim) and Alexander Hegius, who had come as headmaster in 1483, the love of letters which was the ruling passion of his life. At some period, perhaps in an interval of his time at Deventer, he was a chorister at Utrecht under the famous organist of the cathedral, Jacob Obrecht.

About 1484 Erasmus' father died, leaving him and an elder brother Peter, both born out of wedlock, to the care of guardians, their mother having died shortly before. Erasmus was eager to go to a university, but the guardians, acting under a perhaps genuine enthusiasm for the religious life, sent the boys to another school at

Hertogenbosch; and when they returned after two or three years, prevailed on them to enter monasteries. Peter went to Sion, near Delft; Erasmus after prolonged reluctance became an Augustinian canon in St Gregory's at Steyn, a house of the same Chapter near Gouda. There he found little religion and less refinement; but no serious difficulty seems to have been made about his reading the classics and the Fathers with his friends to his heart's content. The monastery once entered, there was no drawing back; and Erasmus passed through the various stages which culminated in his ordination as priest on the 25th of April 1492.

But his ardent spirit could not long be content with monastic life. He brought his attainments somehow to the notice of Henry of Bergen, bishop of Cambrai, the leading prelate at the court of Brussels; and about 1494 permission was obtained for him to leave Steyn and become Latin secretary to the bishop, who was then preparing for a visit to Rome. But the journey was abandoned, and after some months Erasmus found that even with occasional chances to read at Groenendael, the life of a court was hardly more favourable to study than that of Steyn. At the suggestion of a friend, James Batt, he applied to his patron for leave to go to Paris University. The bishop consented and promised a small pension; and in August 1495 Erasmus entered the " domus pauperum " of the college of Montaigu, which was then under the somewhat rigid rule of the reformer Jan Standonck. He at once introduced himself to the distin- guished French historian and diplomatist Robert Gaguin (1425- 1502) and published a small volume of poems; and he became intimate with Johann Mauburnus (Mombaer), the leader of a mission summoned from Windesheim in 1496 to reform the abbey of Chateau-Landon. But the life at Montaigu was too hard for him. Every Lent he fell ill and had to return to Holland to recover. He continued to read nevertheless for a degree in theology, and at some time completed the requirements for the B.D. After a year or two he left Montaigu and eked out his money from the bishop by taking pupils. One of these, a young Englishman, William Blount, 4th Baron Mount joy (d. 1534), persuaded him to visit England in the spring of 1499.

Being without a benefice, he had no settled income to look to, and apart from the precarious profits of teaching and writing books, could only wait on the generosity of patrons to supply him with the leisure he craved. The faithful Batt had sought a pension for him from his own patroness, Anne of Borsselen, the Lady of Veere, who resided at the castle of Tournehem near Calais, and whose son Batt was now teaching. But as nothing promised at once, Erasmus accepted Mountjoy's offer, and thus a tie was formed which led

Mountjoy then or a few years later to grant him a pension of £20 for life. Otherwise the visit to England gave no hope of preferment; and in the summer Erasmus prepared to leave. He was delayed, and used the interval to spend two or three months at Oxford, where he found

John Colet lecturing on the Epistle to the Romans. Discussions between them on theological questions soon convinced Colet of Erasmus' worth, and he sought to persuade him to stay and teach at Oxford. But Erasmus could not be content with the Bible in Latin. Oxford could teach him no Greek, so away he must go.

In January 1500 he returned to Paris, which though it could- offer no Greek teacher better than George Hermonymus, was at least a better centre for buying and for printing books. The next few years were spent still in preparation, supported by pupils' fees and the dedications of books; the Collectanea adagiorum in June 1500 to Mountjoy, and some devotional and moral compositions to Batt's patroness and her son. When the plague drove him from Paris, he went to Orleans or Tournehem or St Omer, as the way opened. From 1502 to 1504 he was at Louvain, still declining to teach publicly; among his friends being the future Pope Adrian VI. In January 1 504 the archduke Philip gave him fifty livres for the Panegyric which " ung religieuxdel'ordredeSt Augustin" had composed on his Spanish journey; and in October, ten more, for the maintenance of his studies.

He had been working hard at Greek, of which he now felt himself master, at the Fathers (above all at Jerome), and at the Epistles of St Paul, fulfilling the promise made to Colet in Oxford, to give himself to sacred learning. But the bent of his reading is shown by the manuscript with which he returned to Paris at the close of 1504 — Valla's Annotations on the New Testament, which Badius printed for him in 1505.

Shortly afterwards Lord Mountjoy invited him again to England, and this visit was more successful. He found in London a circle of learned friends through whom he was introduced to William Warham, archbishop of Canterbury, Richard Foxe, bishop of Winchester and other dignitaries. John Fisher (bishop of Rochester), who was then superintending the founda- tion of Christ's College for the Lady Margaret, took him down to Cambridge for the king's visit; and at length the opportunity came to fulfil his dream of seeing Italy. Baptista Boerio, the king's physician, engaged him to accompany his two sons thither as supervisor of their studies. In September 1506 he set foot on that sacred soil, and took his D.D. at Turin. For a year he

remained with his pupils at Bologna, and then, his engagement completed, negotiated with Aldus Manutius for a new edition of his Adagia upon a very different scale. The volume of 1500 had been jejune, written when he knew nothing of Greek; 800 adages put together with scanty elucidations. In 1508 he had conceived a work on lines more to the taste of the learned world, full of apt and recondite learning, and now and again relieved by telling comments or lively anecdotes. Three thousand and more collected justified a new title — Chiliades adagiorum; and the author's reputation was now established. So secure in public favour did the book in time become, that the council of Trent, unable to suppress it and not daring to overlook it, ordered the preparation of a castrated edition.

To print the Adagia he had gone to Venice, where he lived with Andrea Torresano of Asola (Asulanus) and did the work of two men, writing and correcting proof at the same time. When it was finished, with an ample re-dedication to Mountjoy, a new pupil presented himself, Alexander Stewart, natural son of James IV. of Scotland — perhaps through a connexion formed in early days at Paris. They went together to Siena and Rome and then on to Campania, thirsty under the summer sun. When they returned to Rome, his pupil departed to Scotland, to fall a few years later by his father's side at Flodden; Erasmus also found a summons to call him northwards.

On the death of Henry VII. Lord Mountjoy, who had been companion to Prince Henry in his studies, had become a person of influence. He wrote tq Erasmus of a land flowing with milk and honey under the " divine " young king, and with Warham sent him £10 for journey money. At first Erasmus hesitated. He had been disappointed in Italy, to find that he had not much to learn from its famed scholarship; but he had made many friends in Aldus's circle — Marcus Musurus, John Lascaris,

Baptista Egnatius, Paul Bombasius, Scipio Carteromachus; and his reception had been flattering, especially in Rome, where cardinals had delighted to honour him. But to remain in Rome was to sell himself. He might have the leisure which was so indispensable, but at price of the freedom to read, think, write what he liked. He decided, therefore, to go, though with regrets ; which returned upon him sometimes in after years, when the English hopes had not borne fruit.

In the autumn he reached London, and in Thomas More's house in Bucklersbury wrote the witty satire which Milton found "in every one's hands" at Cambridge in 1628, and which is read to this day. The Moriae encomium was a sign of his decision. In it kings and princes, bishops and popes alike are shown to be in bondage to Folly; and no class of men is spared. Its author was willing to be beholden to any one for leisure; but he would be no man's slave. For the next eighteen months he is entirely lost to view; when he reappears in April 1511, he is leaving More's house and taking the Moria to be printed privily m Paris. Wherever they were spent, these must have been months of hard work, as were the years that followed. His time was now come. The long preparation and training, bought by privation and uncongenial toil, was over, and he was ready to apply himself to the scientific study of sacred letters. His English patrons were liberal. Fisher sent him in August 1 51 1 to teach in Cambridge; Warham gave him a benefice, Aldington in Kent, worth £33,6s.&d. a year, and in violation of his own rule commuted it for a pension of £20 charged on the living; and the dedications of his books were fruitful. In Cambridge he completed his work on the New Testament, the Letters of Jerome, and Seneca; and then in 1514, when there seemed no prospect of ampler prefer- ment, he determined to transfer himself to Basel and give the results of his labours to the world.

The origin of Erasmus's connexion with Johann Froben is not clear. In 1511 he was preparing to reprint his Adagia with Jodocus Badius, who in the following year was to have also Seneca and Jerome. But in 1 513 Froben, who had just reprinted the Aldine Adagia, acquired through a bookseller-agent Erasmus' amended copy which had been destined for Badius. That the agent was acting entirely on his own responsibility may be doubted; for within a few months Erasmus had decided to betake himself to Basel, bearing with him Seneca and Jerome, the latter to be incorporated in the great edition which Johannes Amerbach and Froben had had in hand since 1510. In Germany he was widely welcomed. The Strassburg Literary Society feted him, and Johannes Sapidus, headmaster of the Latin school at Schlettstadt, rode with him into Basel. Froben received him with open arms, and the presses were soon busy with his books. Through the winter of 1514-1515 Erasmus worked with the strength of ten; and after a brief visit to England in the spring, the New Testament was set up. Around him was a circle of students, some young, some already distinguished — the three sons of Froben's partner, Johannes Amerbach, who was now dead, Beatus Rhenanus, Wilhelm Nesen, Ludwig Ber, Heinrich Glareanus, Nikolaus Gerbell, Johannes Oecolampadius — who looked to him as their head and were proud

to do him service.

Though from this time forward Basel became the centre of occupation and interest for Erasmus, yet for the next few years he was mainly in the Netherlands. On the completion of the New Testament in 1516 he returned to his friends in England; but his appointment, then recent, as councillor to the young king Charles, brought him back to Brussels in the autumn. In the spring of 151 7 he went for the last time to England, about a dispensation from wearing his canonical dress, obtained originally from Julius II. and recently confirmed by Leo X., and in May 1518 he journeyed to Basel for three months to set the second edition of the New Testament in progress. But with these exceptions he remained in proximity to the court, living much at Louvain, where he took great interest in the foundation of Hieronymus Busleiden's Collegium Trilingue. His circumstances had improved so much, by pensions, the presents which were showered upon him, and the sale of his books, that he was now in a position to refuse all proposals which would

have interfered with his cherished independence. The general ardour for the restoration of the arts and of learning created an aristocratic public, of which Erasmus was supreme pontiff. Luther spoke to the people and the ignorant ; Erasmus had the ear of the educated class. His friends and admirers were dis- tributed over all the countries of Europe, and presents were continually arriving from small as well as great, from a donation of 200 florins, made by Pope Clement VII., down to sweetmeats and comfits contributed by the nuns of Cologne (Ep. 666). From England, in particular, he continued to receive supplies of money. In the last year of his life Thomas Cromwell sent him 20 angels, and Archbishop Cranmer 18. Though Erasmus led a very hard-working and far from luxurious life, and had no extravagant habits, yet he could not live upon little. The excessive delicacy of his constitution, not pampered appetite, exacted some unusual indulgences. He could not bear the stoves of Germany, and required an open fireplace in the room in which he worked. He was afflicted with the stone, and obliged to be particular as to what he drank. Beer he could not touch. The white wines of Baden or the Rhine did not suit him; he could only drink those of Burgundy or Franche-Comte. He could neither eat, nor bear the smell of, fish. " His heart," he said, " was Catholic, but his stomach was Lutheran." For his constant journeys he required two horses, one for himself and one for his attendant." And though he was almost always found in horse-flesh by his friends, the keep had to be paid for. For his literary labours and his extensive correspondence he required one or more amanuenses. He often had occasion, on his own business, or on that

of Froben's press, to send special couriers to a distance, employing them by the way in collecting the free gifts of his tributaries.

Precarious as these means of subsistence seem, he preferred the independence thus obtained to an assured position which would have involved obligations to a patron or professional duties which his weak health would have made onerous. The duke of Bavaria offered to dispense with teaching, if he would only reside, and would have named him on these terms to a chair in his new university of Ingolstadt, with a salary of 200 ducats, and the reversion of one or more prebendal stalls. The archduke Ferdinand offered a pension of 400 florins, if he would only come to reside at Vienna. Adrian VI. offered him a deanery, but the offer seems to have been of a possible and not an actual deanery. Offers, flattering but equally vague, were made from France, on the part of the bishop of Bayeux, and even of Francis I. " Invitor amplissimis conditionibus; offeruntur dignitates et episcopatus; plane rex essem, si juvenis essem " (Ep. xix. 106; 735). Erasmus declined all, and in November 1521 settled permanently at Basel, in the capacity of general editor and literary adviser of Froben's press. As a subject of the emperor, and attached to his court by a pension, it would have been convenient to him to have fixed his residence in Louvain. But the bigotry of the Flemish clergy, and the monkish atmosphere of the university of Louvain, overrun with Dominicans and Franciscans, united for once in their enmity to the new classical learning, inclined Erasmus to seek a more congenial home in Basel. To Froben his arrival was the advent of the very man whom he had long wanted. Froben's enterprise, united with Erasmus's editorial skill, raised the press of Basel, for a time, to be the most important in Europe. The death of Froben in 1527, the final separation of Basel from the Empire, the wreck of learning in the religious disputes, and the cheap paper and scamped work of the Frankfort presses, gradually withdrew the trade from Basel. But during the years of Erasmus's co-operation the Froben press took the lead of all the presses in Europe, both in the standard value of the works published and in style of typographical execution. Like some other publishers who preferred reputation to returns in money, Froben died poor, and his impressions never reached the splendour afterwards attained by those of the Estiennes, or of Plantin. The series of the Fathers alone contains Jerome (1516), Cyprian (1520), Pseudo-Arnobius (1522), Hilarius (1523), Irenaeus (Latin, 1526), Ambrose (1527), Augustine (1528), Chrysostom

(Latin, 1530), Basil (Greek, 1532, the first Greek author printed in Germany), and Origen (Latin, 1536). In these editions, partly texts, partly translations, it is impossible to determine the respective shares of Erasmus and his many helpers. The prefaces and dedications are all written by him, and some of them, as that to the Hilarius, are of importance for the history as well of the times as of Erasmus himself. Of his most important edition, that of the Greek text of the New Testament, something will be said farther on.

In this " mill," as, he calls it, Erasmus continued to grind incessantly for eight years. Besides his work as editor, he was always writing himself some book or pamphlet called for by the event of the day, some general fray in which he was compelled to mingle, or some personal assault which it was necessary to repel. But though painfully conscious how much his reputation as a writer was damaged by this extempore production, he was unable to resist the fatal facility of print. He was the object of those solicitations which always beset the author whose name upon the title page assures the sale of a book. He was besieged for dedications, and as every dedication meant a present proportioned to the circumstances of the dedicatee, there was a natural temptation to be lavish of them. Add to this a corre- spondence so extensive as to require him at times to write forty letters in one day. " I receive daily," he writes, " letters from remote parts, from kings, princes, prelates and men of learning, and even from persons of whose existence I was ignorant." His day was thus one of incessant mental activity; but hard work "was so far from breeding a distaste for his occupation, that reading and writing grew ever more delightful to him (literarum assiduitas non modo mihi jastidium noti parit, sed voluplatem; crescit scribendo scribendi stadium) .

Shortly after Froben's death the disturbances at Basel, occasioned by the zealots for the religious revolution which was in progress throughout Switzerland, began to make Erasmus desirous of changing his residence. He selected Freiburg in the Breisgau, as a city which was still in the dominion of the emperor, and was free from religious dissension. Thither he removed in April 1529. He was received with public marks of respect by the authorities, who granted him the use of an un- finished residence which had been begun to be built for the late emperor Maximilian. Erasmus proposed only to remain at Freiburg for a few months, but found the place so suited to his habits that he bought a house of his own, and remained there six years. A desire for change of air — he fancied Freiburg was damp — rumours of a new war with France, and the necessity of seeing his Ecclesiastes through the press, took him back to Basel in 1535. He

lived now a very retired life, and saw only a small circle of intimate friends. A last attempt was made by the papal court to enlist him in some public way against the Reforma- tion. On the election of Paul III. in 1534, he had, as usual, sent the new pope a congratulatory letter. After his arrival in Basel, he received a complimentary answer, together with the nomination to the deanery of Deventer, the income of which was reckoned at 600 ducats. This nomination was accompanied with an intimation that more was in store for him, and that steps would be taken to provide for him the income, viz., 3000 ducats, which was necessary to qualify for the cardinal's hat. But Erasmus was even less disposed now than he had been before to barter his reputation for honours. His health had been for some years gradually declining, and disease in the shape of gout gaining upon him. In the winter of 1535-1536 he was confined entirely to his chamber, many days to his bed. Though thus afflicted he never ceased his literary activity, dictating his tract On the Purity of the Church, and revising the sheets of a translation of Origen which was passing through the Froben press. His last letter is dated the 28th of June 1536, and subscribed " Eras. Rot. aegra manu." " I have never been so ill in my life before as I am now, — for many days unable even to read." Dysentery setting in carried him off on the 12th of July 1536, in his 70th year.

By his will, made on the 12th of February 1536, he left what he had to leave, with the exception of some legacies, to Bonifazius

Amerbach, partly for himself, partly in trust for the benefit of the aged and the infirm, or to be spent in portioning young girls, and in educating young men of promise. He left none of the usual legacies for masses or other clerical purposes, and was not attended by any priest or confessor in his last moments.

Erasmus's features are familiar to all, from Holbein's many portraits or their copies. Beatus Rhenanus, " summus Erasmi observator," as he is called by de Thou, describes his person thus: " In stature not tall, but not noticeably short; in figure well built and graceful; of an extremely delicate constitution, sensitive to the slightest changes of climate, food or drink. After middle life he suffered from the stone, not to mention the common plague of studious men, an irritable mucous membrane. His complexion was fair; light blue eyes, and yellowish hair. Though his voice was weak, his enunciation was distinct; the expression of his face cheerful; his manner and conversation polished, affable, even charming." His highly nervous organiza- tion made his feelings acute, and his brain incessantly active. Through his ready sympathy with all forms of life and

character, his attention was always alive. The active movement of his spirit spent itself, not in following .out its own trains of thought, but in outward observation. No man was ever less introspective, and though he talks much of himself, his egotism is the genial egotism which takes the world into its confidence, not the selfish egotism which feels no interest but in its own woes. He says of himself, and justly, " that he was incapable of dissimulation " (Ep. xxvi. 19 ; 1 1 5 2) . There is nothing behind, no pose, no scenic effect. It may be said of his letters that in them " tota patet vita senis." His nature was flexible without being faultily weak. He has many moods and each mood imprints itself in turn on his words. Hence, on a superficial view, Erasmus is Set down as the most inconsistent of men. Further acquaintance makes us feel a unity of character underlying this susceptibility to the impressions of the moment. His seeming inconsistencies are reconciled to apprehension, not by a formula of the intellect, but by the many-sidedness of a highly impressible nature. In the words of J. Nisard, Erasmus was one of those " dont la gloire a ete de beaucoup comprendre et d'affirmer peu."

This equal openness to every vibration of his environment is the key to all Erasmus's acts and words, and among them to the middle attitude which he took up towards the great religious conflict of his time. The reproaches of party assailed him in his lifetime, and have continued to be heaped upon his memory. He was loudly accused by the Catholics of collusion with the enemies of the faith. His powerful friends, the pope, Wolsey, Henry VIII., the emperor, called upon him to declare against Luther. Theological historians from that time forward have perpetuated the indictment that Erasmus sided with neither party in the struggle for religious truth. The most moderate form of the censure presents him in the odious light of a trimmer; the vulgar and venomous assailant is sure that Erasmus was a Protestant at heart, but withheld the avowal that he might 'not forfeit the worldly advantages he enjoyed as a Catholic. When by study of his writings we come to know Erasmus intimately, there is revealed to us one of those natures to which partisanship is an impossibility. It was not timidity or weakness which kept Erasmus neutral, but, the reasonableness of his nature. It was not only that his intellect revolted against the narrowness of party, his whole being repudiated its clamorous and vulgar excesses. As he loathed fish, so he loathed clerical fanaticism. Himself a Catholic priest — " the glory of the priesthood and the shame " — the tone of the orthodox clergy was distasteful to him; the ignorant hostility to classical learning which reigned in their colleges and convents disgusted him. In common with all the learned men of his age, he wished to see the power of the

clergy broken, as that of an obscurantist army arrayed against light. He had employed all his resources of wit and satire against the priests and monks, and the superstitions in which they traded, long before Luther's name was heard of. The motto which was already current in his lifetime, " that Erasmus laid the egg and Luther hatched it," is so far true, and no more. Erasmus would have suppressed the monasteries, put an end to the domination

of the clergy, and swept away scandalous and profitable abuses, but' to attack the church or re-mould received theology was far from his thoughts. And when out of Luther's revolt there arose a new fanaticism — that of evangelism, Erasmus recoiled from the violence of the new preachers. " Is it for this," he writes to Melanchthon (Ep. xix. 113; 703), " that we have shaken off bishops and popes, that we may come under the yoke of such madmen as Otto and Farel ? " Passages have been collected, and it is an easy task, from the writings of Erasmus to prove that he shared the doctrines of the Reformers. Passages equally strong might be culled to show that he repudiated them. The truth is that theological questions in themselves had no attraction for him. And when a theological position was emphasized by party passion it became odious to him. In the words of Drum- mond: " Erasmus was in his own age the apostle of common sense and of rational religion. He did not care for dogma, and accordingly the dogmas of Rome, which had the consent of the Christian world, were in his eyes preferable to the dogmas of Protestantism. . . . From the beginning to the end of his career he remained true to the purpose of his life, which was to fight the battle of sound learning and plain common sense against the powers of ignorance and superstition, and amid all the con- vulsions of that period he never once lost his mental balance."

Erasmus is accused of indifference. But he was far from indifferent to the progress of the revolution. He was keenly alive to its pernicious influence on the cherished interest of his life, the cause of learning. " I abhor the evangelics, because it is through them that literature is everywhere declin ig, and upon the point of perishing." He had been born with tl hopes of the Renaissance, with its anticipation of a new Augi .tan age, and had seen this fair promise blighted by the irruption of a new horde of theological polemics, worse than the old scholastics, inasmuch as they were revolutionary instead of conservative. Erasmus never flouted at religion nor even at

theology as such, but only at blind and intemperate theologians.

*In the mind of Erasmus there was no metaphysical inclination ; he was a man of letters, with a general tendency to rational views on every subject which came under his pen. His was not the mind to originate, like Calvin, a new scheme of Christian thought. He is at his weakest in defending free will against Luther, and indeed he can hardly be said to enter on the metaphysical question. He treats the dispute entirely from the outside. It is impossible in reading Erasmus not to be reminded of the ration- alist of the 18th century. Erasmus has been called the " Voltaire of the Renaissance." But there is a vast difference in the relations in which they respectively stood to the church and to Christianity. Voltaire, though he did not originate, yet adopted a moral and religious scheme which he sought to substitute for the church tradition. He waged war, not only against the clergy, but against the church and its sovereigns. Erasmus drew the. line at the first of these. He was not an anticipation of the 18th century; he was the man of his age, as Voltaire of his; though Erasmus id not intend it, he undoubtedly shook the ecclesiastical edifice in all its parts; and, as Melchior Adam says of him, " pontifici Romano plus nocuit jocando quam Lutherus stomachando." **

But if Erasmus was unlike the 18th century rationalist in that he did not declare war against the church, but remained a Catholic and mourned the disruption, he was yet a true rationalist in principle. The principle that reason is the one only guide of life, the supreme arbiter of all questions, politics and religion included, has its earliest and most complete exemplar in Erasmus. He does not dogmatically denounce the rights of reason, but he practically exercises them. Along with the charm of style, the great attraction of the writings of Erasmus is this unconscious freedom by which they are pervaded.

It must excite our surprise that one who used his pen so freely should have escaped the pains and penalties which invariably overtook minor offenders in the same kind. For it was not only against the clergy and the monks that he kept up a ceaseless stream of satiric raillery; he treated nobles, princes and kings with equal freedom. No 18th century republican has used stronger language than has this pensioner of Charles V. " The

people build cities, princes pull them down; the industry of the citizens creates wealth for rapacious lords to plunder; plebeian magistrates pass good laws for kings to violate; the people love peace, and their rulers stir up war." Such outbursts are frequent in the Adagia. These freedoms are part cause of Erasmus's popularity.

He was here in sympathy with the secret sore of his age, and gave utterance to what all felt but none dared to whisper but he. It marks the difference between 1513 and 1669 that, in a reprint of the Julius Exclusus published in 1669 at Oxford, it was thought necessary to leave out a sentence in which the writer of that dialogue, supposed by the editor to be Erasmus, asserts the right of states to deprive and punish bad kings. It is difficult to say to what we are to ascribe his immunity from painful consequences. We have to remember that he was removed from the scene early in the reaction, before force was fully organized for the suppression of the revolution. And his popular works, the Adagia, and the Colloquia (1524), had established themselves as standard books in the more easy going age, when power, secure in its unchallenged strength, could afford to laugh with the laughers at itself. At the date of his death the Catholic revival, with its fell antipathy to art and letters, was only in its infancy; and when times became dangerous, Erasmus cautiously declined to venture out of the protection of the Empire, refusing repeated invitations to Italy and to France. " I had thought of going to Besancon," he said, " ne non essem in ditione Caesaris " (Ep. xxx. 74; 1299). In Italy a Bembo and a Sadoleto wrote a purer Latin than Erasmus, but contented themselves with pretty phrases, and were careful to touch no living chord of feeling. In France it was necessary for a Rabelais to hide his free-thinking under a disguise of revolting and unintelligible jargon. It was only in the Empire that such liberty of speech as Erasmus used was practicable, and in the Empire Erasmus passed for a moderate man. Upon the strength of an established character for modera- tion he enjoyed an exceptional licence for the utterance of unwelcome truths; and in spite of his flings at the rich and powerful, he remained through life a privileged person with them.

But though the men of the keys and the sword let him go his way unmolested, it was otherwise with his brethren of the pen. A man who is always launching opinions must expect to be retorted on. And when these judgments were winged by epigram, and weighted by the name of Erasmus, who stood at the head of letters, a widespread exasperation was the consequence. Disraeli has not noticed Erasmus in his Quarrels of Authors, perhaps because Erasmus's quarrels would require a volume to themselves. " So thin-skinned that a fly would draw blood," as the prince of Carpi expressed it, he could not himself restrain his pen from sarcasm. He forgot that though it is safe to lash the dunces, he could not with equal impunity sneer at those who, though they might not have the ear of the public as he had, could yet contradict and call names. And when literary jealousy was

complicated with theological differences, as in the case of the free-thinkers, or with French vanity, as in that of Budaeus, the cause of the enemy was espoused by a party and a nation. The quarrel with Budaeus was strictly a national one. Cos- mopolitan as Erasmus was, to the French literati he was still the Teuton. Etienne Dolet calls him " enemy of Cicero, and jealous detractor of the French name." The only contemporary name which could approach to a rivalry with his was that of Budaeus (Bude), who was exactly contemporary, having been born in the same year as Erasmus. Rivals in fame, they were unlike in accomplishment, each having the quality which the other wanted. Budaeus, though a Frenchman, knew Greek well; Erasmus, though a Dutchman, very imperfectly. But the Frenchman Budaeus wrote an execrable Latin style, unreadable then as now, while the Teuton Erasmus charmed the reading world with a style which, though far from good Latin, is the most delightful which the Renaissance has left us.

The style of Erasmus is, considered as Latin, incorrect, some- times even barbarous, and far removed from any classical model. But it has qualities far above purity. The best Italian Latin is but an echo and an imitation; like the painted glass which

we put in our churches, it is an anachronism. Bembo, Sadoleto and the rest write purely in a dead language. Erasmus's Latin was a living and spoken tongue. Though Erasmus had passed nearly all his life in England, France and Germany, his conversa- tion was Latin; and the language in which he talked about common things he wrote. Hence the spontaneity and naturalness of his page, its flavour of life and not of books. He writes from himself, and not out of Cicero. Hence, too, he spoiled nothing by anxious revision in terror lest some phrase not of the golden age should escape from his pen. He confesses apologetically to Christopher Longolius (Ep. iii. 63; 402) that it was his habit to extemporize all he wrote, and that this habit was incorrigible; " effundo verius quam scribo omnia." He complains that much reading of the works of St Jerome had spoiled his Latin; but, as Scaliger says {Scalig 2"), "Erasmus's language is better than St Jerome's." The same critic, however, thought Erasmus would have done better "if he had kept more closely to the classical models."*

In the annals of classical learning Erasmus may be regarded as constituting an intermediate stage between the humanists of the Latin

Renaissance and the learned men of the age of Greek scholarship, between Angelo Poliziano and Joseph Scaliger. Erasmus, though justly styled by Muretus (Varr. Lectt. 7, 15) " eruditus sane vir, ac multae lectionis," was not a " learned " man in the special sense of the word — not an " erudit." He was more than this; he was the " man of letters " — the first who had appeared in Europe since the fall of the Roman empire. His acquirements were vast, and they were all brought to bear upon the life of his day. He did not make a study apart of antiquity for its own sake, but used it as an instrument of culture. He did not worship, imitate and reproduce the classics, like the Latin humanists who preceded him; he did not master them and reduce them to a special science, as did the French Hellenists who succeeded him. He edited many authors, it is true, but he had neither the means of forming a text, nor did he attempt to do so. In editing a father, or a classic, he had in view the practical utility of the general reader, not the accuracy required by the gild of scholars. " His Jerome," says J. Scaliger, " is full of sad blunders " (Scalig" 2"). Even Julien Gamier could discover that Erasmus " falls in his haste into grievous error in his Latin version of St Basil, though his Latinity is superior to that of the other translators " (Pref. in Opp. St. Bas., 1721). It must be remembered that the commercial interests of Froben's press led to the introduction of Erasmus's name on many a title page when he had little to do with the book, e.g. the Latin Josephus of 1524 to which Erasmus only contributed one translation of 14 pages; or the Aristotle of 1531, of which Simon Grynaeus was the real editor. Where Erasmus excelled was in prefaces — not philological introductions to each author, but spirited appeals to the interest of the general reader, showing how an ancient book might be made to minister to modern spiritual demands.

Of Erasmus's works the Greek Testament is the most memor- able. It has no title to be considered as a work of learning or scholarship, yet its influence upon opinion was profound and durable. It contributed more to the liberation of the human mind from the thraldom of the clergy than all the uproar and rage of Luther's many pamphlets. As an edition of the Greek Testament it has no critical value. But it was the first, and it revealed the fact that the Vulgate, the Bible of the church, was not only a second-hand document, but in places an erroneous document. A shock was thus given to the credit of the clergy in the province of literature, equal to that which was given in the province of science by the astronomical discoveries of the 17th century. Even if Erasmus had had at his disposal the MSS. subsidia for forming a text, he had not the critical skill required to use them. He had at hand a few late Basel MSS., one of which he sent straight

to press, correcting them in places by collations of others which had been sent to him by Colet in England. In four reprints, 1519, 1522, 1527, 1535, Erasmus gradually weeded out many of the typographical errors of his first edition, but the text remained essentially such as he had first printed it. The Greek text indeed was only a part of his scheme. An important

feature of the volume was the new Latin version, the original being placed alongside as a guarantee of the translator's good faith. This translation, with the justificatory notes which accompanied it, though not itself a work of critical scholarship, became the starting-point of modern exegetical science. Erasmus did nothing to solve the problem, but to him belongs the honour of having first propounded it.

Besides translating and editing the New Testament, Erasmus paraphrased the whole, except the Apocalypse, between 1517 and 1524. The paraphrases Were received with great applause, even by those who had little appreciation for Erasmus. In England a translation of them made in 1548 was ordered to be placed in all parish churches beside the Bible. His correspond- ence is perhaps the part of his works which has the most per- manent value; it comprises about 3000 letters, which form an important source for the history of that period. For the same purpose his Colloquia may be consulted. They are a series of dialogues, written first for pupils in the early Paris days as formulae of polite address, but afterwards expanded into lively conversations, in which many of the topics of the day are dis- cussed. Later in the century they were read in schools, and some of Shakespeare's lines are direct reminiscences of Erasmus.

His complete works have been printed twice ; by the Froben firm under the direction of his literary executors (9 vols., Basel, 1540) ; and by Leclerc at Leiden (11 vols., 1703-1706). For his life the chief contemporary sources, are a Compendium vitae written by himself in 1524, and a sketch prefixed by Beatus Rhenanus to the Basel edition of 1540 Of his writings he gives an account in his Catalogus lucubrationum, composed first in January 1523 and enlarged in September 152ˆ ; and also in a letter to Hector Boece of Aberdeen, written in 153c. An elaborate bibliography, entitled Bibliotheca Erasmiana, was undertaken by the officials of the Ghent University Library; it is divided into three sections, for Erasmus's writings, the books he edited, and the literature about him. Listes sommaires were issued in 1893 ; and since 1897 the completed volumes have been appearing at intervals. There is an excellent sketch of Erasmus's life down to 1519 in F. Seebohm's Oxford Reformers (3rd ed., 1887) ; and of the many biographies those by S. Knight (1726), J. Jortin (2

vols., 1758-1760) and R. B. Drummond (2 vols., 1873) ma 3f be mentioned. There are also two volumes (1901-1904) of translations by F. M. Nichols from Erasmus's letters down to 1517, with an ample commentary which amounts almost to a biography ; and an edition of the letters, in Latin, was begun by the Oxford University Press in 1906 (vol. ii., 1910). (M. P.; P. S. A.)

ERASTUS, THOMAS (1524-1583), German-Swiss theologian, whose surname was Liiber, Lieber, or Liebler, was born of poor parents on the 7th of September 1524, probably at Baden, canton of Aargau, Switzerland. In 1540 he was studying theology at Basel. The plague of 1544 drove him to Bologna and thence to Padua as student of philosophy and medicine. In 1553 he became physiqan to the count of Henneberg, Saxe-Meiningen, and in 1558 held the same post with the elector-palatine, Otto Heinrich, being at the same time professor of medicine at Heidel- berg. His patron's successor, Frederick III., made him (1559) a privy councillor and member of the church consistory. In theology he followed Zwingli, and at the sacramentarian con- ferences of Heidelberg (1 560) and Maulbronn (1 564) he advocated by voice and pen the Zwinglian doctrine of the Lord's Supper, replying (1565) to the counter arguments of the Lutheran Johann Marbach, of Strassburg. He ineffectually resisted the efforts of the Calvinists, led by Caspar Olevianus, to introduce the Presbyterian polity and discipline, which were established at Heidelberg in 1570, on the Genevan model. One of the first acts of the new church system was to excommunicate Erastus on a charge of Socinianism, founded on his correspondence with Transylvania. The ban was not removed till 1575, Erastus declaring his firm adhesion to the doctrine of the Trinity. His position, however, was uncomfortable, and in 1580 he returned to Basel, where in 1 583 he was made professor of ethics. He died on the 31st of December 1583. He published several pieces bearing on medicine, astrology and alchemy, and attacking the system of Paracelsus. His name is permanently associated with a post- humous publication, written in 1 568. Its immediate occasion was the disputation at Heidelberg (1568) for the doctorate of theology by George Wither or Withers, an English Puritan (subsequently archdeacon of Colchester), silenced (1565) at Bury St Edmunds

by Archbishop Parker. Withers had proposed a disputation against vestments, which the university would not allow; his thesis affirming

the excommunicating power of the presbytery was sustained. Hence the treatise of Erastus. It was published (1589) by Giacomo Castelvetri, who had married his widow, with the title Explicatio gravissimae quaestionis utrum excom- municatio, quatenus religionem intelligentes et amplexantes, a sacramentorum usu, propter admissum facinus arcet, mandato nitatur divino, an excogitata sit ab hominibus. The work bears the imprint Pesclavii {i.e. Poschiavo in the Grisons) but was printed by John Wolfe in London, where Castelvetri was staying; the name of the alleged printer is an anagram of Jacobum Castelvetrum. In the Stationers' Register (June 20, 1589) the printing is said to have been " alowed " by Archbishop Whitgift. It consists of seventy- five Theses, followed by a Confirmatio in six books, and an appendix of letters to Erastus by Bullinger and Gualther, showing that his Theses, written in 1 568, had been circulated in manuscript. An English translation of the Theses, with brief life of Erastus (based on Melchior Adam's account), was issued in 1659, entitled The Nullity of Church Censures; it was reprinted as A Treatise of Excommunica- tion (1682), and, as revised by Robert Lee, D.D., in 1844. The aim of the work is to show, on Scriptural grounds, that sins of professing Christians are to be punished by civil authority, and not by withholding of sacraments on the part of the clergy. In the Westminster Assembly a party holding this view included Selden, Lightfoot, Coleman and Whitelocke, whose speech (1645) is appended to Lee's version of the Theses; but the opposite view, after much controversy, was carried, Lightfoot alone dissenting. The consequent chapter of the Westminster Confession (" Of Church Censures ") was, however, not ratified by the English parliament. " Erastianism," as a by-word, is used to denote the doctrine of the supremacy of the state in ecclesiastical causes ; but the problem of the relations between church and state is one on which Erastus nowhere enters. What is known as " Erastian- ism " would be better connected with the name of Grotius. The only direct reply made to the Explicatio was the Tractatus de vera excommunicatione (1590) by Theodore Beza, who found himself rather savagely attacked in the Confirmatio thesium; e.g. " ApostolumetMosenadeoqueDeumipsumaudescorrigere."

See A. Bonnard, Thomas Eraste et la discipline ecclesiastique (1894); Gass, in Allgemeine deutsche Biog. (1877); G. V. Lechler and R. Stahelin, in A. Hauck's Realencyklop. fiir prot. Theol. u. Kirche (1898). (A. Go.)*

ERATOSTHENES OF ALEXANDRIA (c. 276-c. 194 B.C.), Greek scientific writer, was born at Cyrene. He studied grammar under

Callimachus at Alexandria, and philosophy under the Stoic Ariston and the Academic Arcesilaus at Athens. He re- turned to Alexandria at the summons of Ptolemy III. Euergetes, by whom he was appointed chief librarian in place of Callimachus. He is said to have died of voluntary starvation, being threatened with total blindness. Eratosthenes was one of the most learned men of antiquity, and wrote on a great number of subjects. He was the first to call himself Philologos (in the sense of the " friend of learning "), and the name Pentathlos was bestowed upon him in honour of his varied accomplishments. He was also called Beta as being second in all branches of learning, though not actually first in any. In mathematics he wrote two books On means (Hepl inaorˆTUiv) which are lost, but appear, from a remark of Pappus, to have dealt with " loci with reference to means." He devised a mechanical construction for two mean proportionals, reproduced by Pappus and Eutocius (Comm. on Archimedes). His kooklvov or sieve (cribrum Eratosthenis) was a device for discovering all prime numbers. He laid the foundation of mathematical geography in his Geographica, in three books. His greatest achievement was his measurement of the earth. Being informed that at Syene (Assuan), on the day of the summer solstice at noon, a well was lit up through all its depth, so that Syene lay on the tropic, he measured, at the same hour,the zenith distance of the sun at Alexandria. He thus found the distance between Syene and Alexandria (known to be 5000 stadia) to correspond to A tn 0I a great circle, and so arrived

at 250,000 stadia (which he seems subsequently to have corrected to 252,000) as the circumference of the earth. He is credited by Ptolemy and his commentator Theon with having found the distance between the tropics to be \ˆ rds. of the meridian circle, which gives 23 51′ 20″ for the obliquity of the ecliptic. His astronomical poem Hermes began apparently with the birth and exploits of Hermes, then passed to the legend of his having ordered the heavens, the zones and the stars, and gave a history of the latter. His Erigone, of which a few fragments are also preserved, is sometimes spoken of as a separate poem, but it may have belonged to the Hermes, which appears also to have been known by other names such as Catalogi. The still extant Catasterismi, containing the story of certain stars in prose, is probably not by Eratosthenes.

Eratosthenes was the founder of scientific chronology in his Xpovoypacfrla in which he endeavoured to fix the dates of the chief literary and political events from the conquest of Troy. An important work was his treatise on the old comedy, dealing with theatres and theatrical apparatus generally, and discussing the works of the

principal comic poets themselves. Works on moral philosophy, history, and a number of letters were also attributed to him.

There is a complete edition of the fragments of Eratosthenes by Bernhardy (1822); poetical fragments, Hillier (1872) ; geographical, Seidel (1799) and Berger (1880) ; KaTatrTtpuryoi, Schaubach (1795) and Robert (1878). See Sandys, Hist. Class. Schol. i. (1906). (T. L. H,)

ERBACH, a town of Germany, in the grand-duchy of Hesse-Darmstadt, on the Miimling, 22 m. S.E. of Darmstadt. It has cloth mills and ivory-turning, for which last branch it possesses a technical school. Wool and cattle fairs are held twice a year. Pop. 2800. The castle contains an interesting collection of weapons and pictures, and in the chapel are the coffins of Einhard, the friend and biographer of Charlemagne, and his wife, Emma.

Erbach has long been the residence of the counts of Erbach, who trace their descent back to the 12th century, and who held the office of cupbearer to the electors palatine of the Rhine Until 1806. In 1532 the emperor Charles V. made the county a direct fief of the Empire, on account of the services rendered by Count Eberhard during the Peasants' War. Since 1 717 the family has been divided into the three lines of Erbach- Fiirstenau, Erbach- Erbach and Erbach-Schonberg, who rank for precedence, not according to the age of their descent, but according to the age of the chief of their line. In 181 8 the counts of Erbach-Erbach inherited the county of Wartenberg-Roth, and in 1903 the count of Erbach-Schonberg was granted the title of prince. The county was mediatized in 1806, and is now incorporated with the duchy of Hesse-Darmstadt.

See Simon, Die Geschichte der Dynasten und Grafen zu Erbach (Frankfort, 1858).

ERBIUM (symbol, Er; atomic weight, 165-166), one of the metals of the rare earths. The first of the rare earth minerals was discovered in 1794 by J. Gadolin and was named gadolinite from its discoverer. In 1797 Ekeberg showed that gadolinite contained another rare earth, which was given the name yttria. Yttria is an exceedingly complex mixture, which has been decomposed, yielding as an intermediate product terbia. This latter substance in its turn has been split by J. L. Soret, P. T. Cleve, Lecoq de Boisbaudran and others into erbia, holmia, thulia and dysprosia, but it is still doubtful whether any one qt these four splitting products is a single substance. The rare earth metals are found in the minerals gadolinite, samarskite, fergusonite,

euxenite and cerite. They are separated from the minerals by converting them into oxalates, which by ignition give the corresponding oxides. The oxides are then converted into double sulphates which are separated from each other by repeated fractional crystallization or by fractional precipitation with ammonia or some other base. Erbium forms rose-coloured salts and a rose-coloured oxide. The oxide dissolves slowly in acids; it is not reduced by hydrogen and is infusible. The salts show a characteristic absorption spectrum.

See J. F. Bahr and R. Bunsen (Ann., 1866, 137, p. 1) ; A. v. Welsbach (Monats., 1883, 4, p. 641; 1884, 5, p. 508; 1885, 6, p. 477); P. T. Cleve (Comptes rendus, 1879, 89, p. 478; 1880, 91, pp. 328,

381; 1882, 95, p. 1225; Bull, de la soc. chim., 1874, 21, p. 196; 1883, 39, p. 287) ; C. Marignac (Ann.Chim. phys., 1849 [3] 27, p. 226) ; B. Brauner (Monats., 1882, 3, p. 13); W. Crookes (Proc. Roy. Soc, 1886, 40, p. 502); Lecoq de Boisbaudran (Comptes renins, 1886, 102, p. 1005) ; A. Bettendorf (Ann., 1892, 270, p. 376) ; M. Muthmann (Ber., 1898, 31, p. 1718; 1900, 33, p. 42); G. Kriiss (Zeit.f. anorg. Chem., 1893, 3, p. 108).

ERCILLA Y ZUNIGA, ALONSO DE (1533-1 595), Spanish soldier and poet, was born in Madrid on the 7th of August 1533. In 1548 he was appointed page to the heir-apparent, afterwards Philip II. In this capacity Ercilla visited Italy, Germany and the Netherlands, and was present in 1554 at the marriage of his master to Mary of England. Hearing that an expedition was preparing to subdue the Araucanians of Chile, he joined the adventurers. He distinguished himself in the ensuing campaign ; but, having quarrelled with a comrade, he was condemned to death in 1 5 58 by his general, Garcia Hurtado de Mendoza. The sentence was commuted to imprisonment, but Ercilla was speedily released and fought at the battle of Quipeo (14th of December 1558). He returned to Spain in 1562, visited Italy, France, Germany, Bohemia, and in 1570 married Maria de Bazan, a lady distantly connected with the Santa Cruz family; in 1571 he was made knight of the order of Santiago, and in 1578 he was employed by Philip II. on a mission to Saragossa. He complained of living in poverty but left a modest fortune, and was obviously disappointed at not being offered the post of secretary of state. His principal work is La Araucana, a poem based on the events of the wars in which he

had been engaged. It consists of three parts, of which the first, composed in Chile and published in 1569, is a versified narrative adhering strictly to historic fact; the second, published in 1578, is en- cumbered with visions and other romantic machinery; and the third, which appeared in 1 589-1 590, contains, in addition to the subject proper, a variety of episodes mostly irrelevant. This so-called epic lacks symmetry, and has been over-praised by Cervantes and Voltaire; but it is written in excellent Spanish, and is full of vivid rhetorical passages. An analysis of the poem was given by Hayley in his Essay on Epic Poetry (1782).

A good biography precedes the Morceaux choisis (Paris, 1900) by Jean Ducamin.

ERCKMANN-CHATRIAN, the joint names of two French writers whose collaboration made their work that of, so to speak, one personality. Emile Erckmann (182 2-1 899) was born on the 20th of May 182 2 at Phalsbourg, and Louis Gratien Charles Alexandre Chatrian (1826-1890) on the 18th of December 1826 at Soldatenthal, Lorraine. In 1847 they began to write together, and continued doing so till 1889. Chatrian died in 1890 at Villemomble near Paris, and Erckmann at Luneville in 1899. The list of their publications is a long one, ranging from the Histoires et contes fantastiques (1849; reprinted from the t>tmocratedu Rhin), L'lllustre Docteur Matheus (1859), Madame Thirese (1863), L Ami Fritz (1864), Histoire d'un consent de 181 j (1864), Waterloo (1865), Le Blocus (1867), Histoire d'un paysan. (4 vols., 1868-1870), L'Histoire du plebiscite (1872), to Le Grand-pereLebigue (1880); besides dramas like Le Juij polonais (1869) and Les Rantzau (1882). Without any special literary claim, their stories are distinguished by simplicity and genuine de- scriptive power, particularly in the battle scenes and in connexion with Alsatian peasant life. They are marked by a genuine democratic spirit, and by real patriotism, which developed after 1870 into hatred of the Germans. The authors attacked militarism by depicting the horrors of war in the plainest terms.

See also J. Claretie, Erckmann- Chatrian (1883), in the series of " Celebrites contemporaines."

ERD&LYI, jANOS (1814-1868), Hungarian poet and author, was born in 1 8 1 4 at Kapos , in the county of Ungvar, and educated at the Protestant college of Sarospatak. In 1833 he removed to Pest, where he was, in 1839, elected member of the Hungarian Academy of Sciences. His literary fame was made by his collec- tion of

Hungarian national poems and folk-tales, Magyar NepkbltSsi Gyujteme'ny, Nipdalok Is Monddk (Pest, 1846-1847). This work, published by the Kisfaludy Society, was supplemented by a dissertation upon Hungarian national poetry, afterwards

partially translated into German by Stier (Berlin, 1851). Erdelyi also compiled for the Kisfaludy Society an extensive collection of Hungarian proverbs — Magyar Kbzmonddsok kbnyve (Pest, 1851), — and was for some time editor of the Szfpirodalmi Szemle (Review of Polite Literature). In 1848 he was appointed director of the national theatre at Pest; but after 1849 he resided at his native town. He died on the 23rd of January 1868. A collection of folklore was published the year after his death, entitled A Nep Koltiszete nepdalok, nSpmesek es kozmonddsok (Pest, 1869). This work contains 300 national songs, 19 folk-tales and 7362 Hungarian proverbs.

ERDMANN, JOHANN EDUARD (1805-1892), German philosophical writer, was born at Wolmar in Livonia on the 13 th of June 1805. He studied theology at Dorpat and afterwards at Berlin, where he fell under the influence of Hegel. From 1829 to 1832 he was a minister of religion in his native town. After- wards he devoted himself to philosophy, and qualified in that subject at Berlin in 1834. In 1836 he was professor-extraordinary at Halle, became full professor in 1839, and died there on the 1 2 th of June 1892. He published many philosophical text-books and treatises, and a number of sermons; but his chief claim to remembrance rests on his elaborate Grundriss der Geschichte der Philosophic (2 vols., 1866), the 3rd edition of which has been translated into English. Erdmann's special merit is that he does not rest content with being a mere summarizer of opinions, but tries to exhibit the history of human thought as a continuous and ever-developing effort to solve the great speculative problems with which man has been confronted in all ages. His chief other works were: Leib und Seele (1837), Grundriss der Psychologie (1840), Grundriss der Logik und Metaphysik (1841), and Psychologische Brief e (1 8 5 1) .

ERDMANN, OTTO- LINNfi (1804-1869), German chemist, son of Karl Gottfried Erdmann (1774-1835), the physician who introduced vaccination into Saxony, was born at Dresden on the nth of ApriLi8o4. In 1820 he began to attend the medico- chirurgical academy of his native place, and in 1822 he entered the university of Leipzig where in 1827 he became extraordinary professor, and in 1830 ordinary professor of chemistry. This office he held until his death, which happened at Leipzig on the 9th of October 1869. He

was particularly successful as a teacher, and the laboratory established at Leipzig under his direction in 1843 was long regarded as a model institution. As an investi- gator he is best known for his work on nickel and indigo and other dye-stuffs. With R. F. Marchand (1813-1850) he also carried out a number of determinations of atomic weights. In 1828, in conjunction with A. F. G. Werther (1815-1869), he founded the Journal fur technische und bkonomische Chemie, which became in 1834 the Journal fur praktische Chemie. He was also the author of Uber das Nickel (1827), Lehrbuch der Chemie (1828), Grundriss der Waarenkunde (1833), and liber das Studium der Chemie (1861).

EREBUS, in Greek mythology, son (according to Hesiod, Theog. 123) of Chaos, and father of Aether (upper air) and Hemera (day) by his sister Nyx (night). The word, which signifies darkness, is in Homer the gloomy subterranean region through which the departed shades pass into Hades. The entrance to it was in the extreme west, on the borders of Ocean, in the mythical land of the Cimmerians. It is to be distinguished from Tartarus, the place of punishment for the wicked.

ERECH (Uruk in the Babylonian inscriptions; Gr. Orchoe), the Biblical name of an ancient city of Babylonia, situated E. of the present bed of the Euphrates, on the line of the ancient Nil canal, in a region of marshes, about 140 m. S.S.E. from Bagdad. It was one of the oldest and most important cities of Babylonia, and the site of a famous temple, called E-Anna, dedicated to the worship of Nana, or Ishtar. Erech played a very important part in the political history of the country from an early time, exercising hegemony in Babylonia at a period before the time of Sargon. Later it was prominent in the national struggles of the Babylonians against Elam (2000 B.C. and earlier), in which it suffered severely; recollections of these conflicts are embodied in the Gilgamesh epic, as it has come down to us

through the library of Assur-bani-pal. Erech enjoyed much distinction in the later times, as a seat of learning and of the worship of Ishtar, and Assur-bani-pal drew largely on its literary stores for his library at Nineveh, from which we "derive our principal information concerning ancient Babylonian literature. The inscriptions found here show that it continued in existence through the Persian and Seleucid periods. The ruins of the ancient site, known as Warka, which are among the largest in all Babylonia,

forming an irregular circle nearly 6 m. in circum- ference, bounded by a wall, still standing in some places to the height of 40 ft., were explored and partially excavated by W. K. Loftus in 1850 and 1854. The most conspicuous ruin, now called Abu-Berdi, " Father of Marsh Grass," or Buwariye, " reed matting," because of the layers of reeds between each twelve courses of unbaked brick, is the ziggurat (tower) of the ancient temple of E-Anna. It is about 100 ft. in height, and strikingly resembles in general appearance the ruins of the ziggurat of the temple of Enlil at Nippur. Second to this in size was the ruin called Wuswas, a walled quadrangle, including an area of more than seven and a half acres, within which was an edifice 246 ft. long and 174 ft. wide, elevated on an artificial platform 50 ft. in height. The south-west facade, still standing in some places to the height of 23 ft., exhibited an interesting use of half columns, and stepped recesses for purposes of decoration. In another ruin Loftus found a wall, 30 ft. long, composed en- tirely of small yellow terra-cotta nail-headed cones, such as have been discovered in great numbers, inscribed and uninscribed, used for votive purposes in connexion with walls at Tello and elsewhere in Babylonia. His excavations being superficial, the Babylonian inscriptions found by him, about one hundred in all, exclusive of the ancient Ur-Gur bricks from the temple, belong in general to the neo-Babylonian, Persian and Seleucid periods. The older remains are buried deep beneath the huge mass of later debris. Loftus also discovered at Erech, almost everywhere within and without the walls, great numbers of clay coffins, piled one above another, to the height of over 30 ft., forming a vast and, on the whole, well-ordered cemetery belonging to the Persian, Parthian and later occupations of Babylonia, during which period Erech, like other cities of the south, evidently became a necropolis for a large extent of country. After Loftus's time the mounds were visited by various travellers, but no further excavations have been conducted. Work on this important part of the site is attended with very great difficulties, owing to the inaccessible position of the ruins, the unsettled character of the country, the frequent sand-storms, and above all, the immense mass of material of later periods which must be removed before a systematic excavation of the more ancient and interesting ruins could be undertaken. A curious feature of the Warka neighbour- hood is the existence of conical sand-hills, rising to a considerable height, so compact as to be almost like stone. These hills extend from Warka northward as far as Tel Ede.

See W. K. Loftus, Chaldaea and Susiana (1857); J. P. Peters, Nippur (1897) ; E. Sachau, Am Euphrat und Tigris (1900). Cf. also Nippur and authorities there quoted. (J. P. Pe.)

ERECHTHEUM, a temple (commonly called after Erechtheus, to whom a portion of it was" dedicated) on the acropolis at Athens, unique in plan, and in its execution the most refined example of the Ionic order. There is no clear evident as to when the building was begun, some placing it among the temples projected by Pericles, others assigning it to

The peculiar plan of the Erechtheum has given rise to much speculation. It m».y be due partly to the natural conformation of the rock and the differences of level, partly to the necessity of enclosing within a single building several objects of ancient sanctity, such as the mark of Poseidon's trident and the spring that arose from it, the sacred olive tree of Athena, and the tomb of Cecrops. But there are some features which cannot be so

explained, and which have led Professor W. Dorpfeld and others to believe that the plan, as we now have it, is a modification or abridgment of the original design, due to the same conservative influences as led to the curtailment of the plan of the Propylaea (q.v.).

The building as completed consisted of a temple of the ordinary type, opening by a door and two windows to the east front, before which stood a portico of six Ionic columns. This part was the temple of Athena Polias. Adjoining it on the west was the central chamber, on a lower level; this chamber- was separated by a partition, originally of wood and later of marble, from the western compartment of the temple, which was of peculiar construction. The west end was formed by a wall, on which stood four columns between antae; but the main entrance to this western compartment was through a large and very ornate door- way on the north; and a large Ionic portico, consisting of four columns in the front, and one in the return on each side, was placed in front of this door. At the south end of the western compartment was a smaller door, with steps leading up to the higher level, within a projecting space enclosed by a low wall and covered with a projecting porch carried by six " maidens " or caryatides. The construction of the building at this south- western corner shows that there was some sacred object that

Aflt J W MMd1«"> « J«»r»*l.fUIU«U »»< amypl.HI PI t*

had to be bridged over by a huge block of marble; this we know from inscriptions to have been the Cecropeum or tomb of Cecrops. In the north portico a square hole in the floor, with a corre- sponding hole in the roof above it, must have given access to another sacred object,

the mark of Poseidon's trident in the rock. The sacred olive tree probably stood just outside the temple to the west in the Pandroseion- The Ionic order, as used in this temple, is of the most ornate Attic type. The bases of the columns are "ither reeded or decorated with a plait-pattern; the capital has the broad channel between the volutes sub- divided by a carefully-profiled incision; and the top of the shafts is ornamented by a broad band of palmette or honeysuckle pattern. A similar band of ornament runs round the top of the walls outside, and at their base is a reeded torus. The frieze consisted of white marble figures in relief, affixed to a background of black Eleusinian stone.

The contents of the Erechtheum are described by Pausanias. It contained the ancient image of Athena Polias, and three altars, one to Poseidon and Erechtheus, one to Butes and one to Hephaestus; there were portraits of the family of the Butadae on the walls. Within it was also the gold lamp of Callimachus, which burnt for a year without refilling, and had a chimney in the form of a palm-tree.

The Erechtheum was damaged by a fire, soon after its com- pletion, in 406 B.C., but was repaired early in the following century. The west end appears to have been damaged in Roman times and to have been replaced by the attached columns with

windows between them which appear in old drawings and are still partially extant. It was used as a church in Christian times, and under Turkish rule as the harem of the governor of Athens. Lord Elgin carried off to London, about 1801-1803, one of the columns of the east portico and one of the caryatides; these were replaced later by terra-cotta casts. During the siege of the Acropolis in 1827, the roof of the north portico was thrown down and the building was otherwise much damaged. It was partially rebuilt between 1838 and 1846; the west front was blown down in a storm in 1852. Since 1900 the project of rebuilding the Erechtheum as far as possible with the original blocks has again been undertaken.

See Stuart, Antiquities of Athens; Inwood, The Erechtheum; H. Forster in Papers of American School at Athens, i. (1882-1883); J. H. Middleton, Plans and Drawings of Athenian Buildings (1900), pis. xiv.xxii.; E. A. Gardner, Ancient Athens, chap. viii. ; W. Dorp feld, " Der ursprungliche Plan des Erechtheion " in Mitteil. Athen.,

1904, p. 101, taf. 6; G. P. Stevens, " The East Wall of the Erechtheum," in American Journ. Arch., 1906, pis. vi.-ix. (E. Gr.)

ERECHTHEUS, in Greek legend, a mythical king of Athens, originally identified with Erichthonius, but in later times distinguished from him. According to Homer, who knows nothing of Erichthonius, he was the son of Aroura (Earth), brought up by Athena, with whom his story is closely connected. In the later story, Erichthonius (son of Hephaestus and Atthis or Athena herself) was handed over by Athena to the three daughters of Cecrops — Aglauros (or Agraulos), Herse and Pandrosos — in a chest, which they were forbidden to open. Aglauros and Herse disobeyed the injunction, and when they saw the child (which had the form of a snake, or round which a snake was coiled) they went mad with fright, and threw themselves from the rock of the Acropolis (or were killed by the snake). Athena herself then undertook the care of Erichthonius, who, when he grew up, drove out Amphictyon and took possession of the kingdom of Athens. Here he established the worship of Athena, instituted the Panathenaea, and built an Erechtheum. The Erechtheus of later times was supposed to be the grandson of Erechtheus-Erichthonius, and was also king of Athens. When Athens was attacked by the Thracian Eumolpus (or by the Eleusinians assisted by Eumolpus) victory was promised Erechtheus if he sacrificed one of his daughters. Eumolpus was slain and Erech- theus was victorious, but was himself killed by Poseidon, the father of Eumolpus, or by a thunderbolt from Zeus. The contest between Erechtheus and Eumolpus formed the subject of a lost tragedy by Euripides; Swinburne has utilized the legend in his Erechtheus. The scene of the opening of the chest is represented on a Greek vase in the British Museum. The name Erichthonius is connected with xˆ&v (" earth ") and the representation of him as half-snake, like Cecrops, indicates that he was regarded as one of the autochthones, the ancestors of the Athenians who sprung from the soil.

See Apollodorus iii. 14. 15; Euripides, Ion; Ovid, Metam. ii. 553; Hyginus, Poet, astron. ii. 13; Pausanias i. 2. 5. 8; E. Ermatinger, Die attische Autochthonensage (1897); article by J. A. Hild in Daremberg and Saglio's Dictionnaire des antiquites; B. Powell in Cornell Studies, xvii. (1906), who identifies Erechtheus, Erichthonius, Poseidon and Cecrops, all denoting the sacred serpent of Athena, whose cult she first contested, but then amalgamated with her own. The birth of Erichthonius (as a corn-spirit) is interpreted by Mann- hardt as a mythical way of describing the growth of the corn, and by J. E. Harrison (Myths and Monuments of Ancient Athens, xxvii.- xxxvi.) as a fiction to explain the ceremony performed by the

two maidens called Arrephori. See also Farnell, Cults of the Greek States, i. 270; and Frazer's Pausanias, ii. 169.

ERESHKIGAL, also known as Allatu, the name of the chief Babylonian goddess of the nether-world where the dead are gathered. Her name signifies " lady of the nether-world." She is known to us chiefly through two myths, both symbolizing the change of seasons, but intended also to illustrate certain doctrines developed in the temple-schools of Babylonia. One of these myths is the famous story of Ishtar's descent to Irkalla or Aralu, as the lower world was called, and her reception by her sister who presides over it; the other is the story of Nergal's offence against Ereshkigal, his banishment to the kingdom controlled by the goddess and the reconciliation between Nergal

and Ereshkigal through the latter's offer to have Nergal share the honours of the rule over Irkalla. The story of Ishtar's descent is told to illustrate the possibility of an escape from Irkalla, while the 'other myth is intended to reconcile the existence of two rulers of Irkalla — a goddess and a god.

It is evident that it was originally a goddess who was supposed to be in control of Irkalla, corresponding to Ishtar in control of fertility and vegetation on earth. Ereshkigal is therefore the sister of Ishtar and from one point of view her counterpart, the symbol of nature during the non-productive season of the year. As the doctrine of two kingdoms, one of this world and one of the world of the dead, becomes crystallized, the dominions of the two sisters are sharply differentiated from one another. The addition of Nergal represents the harmonizing tendency to unite with Ereshkigal as the queen of the nether-world the god who, in his character as god of war and of pestilence, conveys the living to Irkalla and thus becomes the one who presides over the dead. (M. J a.)

ERETRIA (mod. Aletria), an ancient coast town of Euboea about 15 m. S.E. of Chalcis, opposite to Oropus. Eretria, like its neighbour Chalcis (q.v.), early entered upon a commercial and colonizing career. Besides founding townships in the west and north of Greece, it acquired dependencies among the Cyclades and joined the great mercantile alliance of Miletus and Aegina. Since the so-called Lelantine War (7th century B.C.) against the coming league of Chalcis, it began to be overshadowed by its rivals. The interference of Eretria in the Ionian revolt (498) brought upon it the vengeance of the Persians, who captured and destroyed it shortly before the battle of Marathon (490). The city was soon rebuilt, and as a member of

both the Delian Leagues attached itself by numerous treaties to the Athenians. The latter, through their general Phocion, rescued it from the tyrants suborned by Philip of Macedon (354 and 341). Under Macedonian and Roman rule Eretria fell into insignificance; for a short period under Mark Antony, the triumvir, it became a possession of Athens. Eretria was the birthplace of the tragedian Achaeus and of the " Megarian " philosopher Menedemus.

The modern village, which is sometimes called Nea Psara because the inhabitants of Psara were transferred there in 1821, is on unhealthy low-lying ground near the sea. The excavation of the site was carried out by the American School of Athens (1890-1895). At the foot of the Acropolis Hill, where the ground begins to rise, the theatre lies; and though the material of which this was built is rough, and only seven imperfect rows of seats remain, a good part of the scena and of the chambers behind it is preserved, and beneath these there runs a tunnel, which, together with other peculiar features, has raised interesting questions in connexion with the arrangement of the Greek theatre, the orchestra being at present on a level about 12 ft. below that of the rooms in the scena. Near by are the sub- structions of a temple of Dionysus and a large altar, and also a gymnasium with arrangements for bathing. Besides these, in 1900 the substructions of a temple of Apollo Daphnephoros were unearthed. Both the northern and the southern side of the hill are flanked by walls, which seem to have reached the sea, where there was a mole and a harbour; and the wall of the acropolis itself remains in one part to the height of eight courses.

Authorities. — Strabo x. 447 f. ; Herodotus v. 99, vi. 101 ; Corpus Inscr. Atticarum, i. 339, iv. (2), pp. 5, 10, 22; H. Heinze, De rebus Eretriensium (Gottingen, 1869); W. M. Leake, Travels in Northern Greece (London, 1835), ii. 266, 443; B. V. Head, Historia numorum (Oxford, 1887), pp. 305-308; Papers of the American School at Athens, vol. vi. (E. Gr.)

ERETRIAN SCHOOL OF PHILOSOPHY. This Greek school was the continuation of the Elian school, which was transferred to Eretria by Menedemus. It was of small importance, and in the absence of certain knowledge must be supposed to have adhered to the doctrines of Socrates. (See Menedemus.)

ERFURT, a city of Germany, in Prussian Saxony, on the Gera, and the railway Halle-Bebra, about midway between Gotha and Weimar, which are 14 m. distant. Pop. (1875) 48,025; (1905) 100,065. The city, which is dominated on the

west by the two citadels of Petersbergand Cyriaxburg,is irregularly built, the only feature in its plan, or want of plan, being the Friedrich Wilhelmsplatz, a broad open space of irregular shape abutting on the Petersberg. On the south-western side of this square, which contains a monument to the elector Frederick Charles Joseph of Mainz (1719-1802), is the Domberg, an eminence on which stand, side Jay side, the cathedral and the great church of St Severus with its three spires (14th century). The churches are approached by a flight of forty-eight stone steps, the grouping of the whole mass of buildings being exceed- ingly impressive. The cathedral (Beatae Mariae Virginis) is one of the finest churches in Germany. It was begun in the 1 2th century, but the nave was rebuilt in the 13th in the Gothic style. The magnificent chancel (1349-1372), with the 14th- century crypt below, rests on massive substructures, known as the Cavate. The twin towers are set between the chancel and nave. The cathedral contains, besides fine 15th-century glass, some very rich portal sculptures and bronze castings, among others the coronation of the Virgin by Peter Vischer. In one of its towers is the famous bell, called Maria Gloriosa, which bears the date 1497, and weighs 270 cwt. Besides the cathedral and St Severus, which are Roman Catholic, Erfurt possesses several very interesting medieval churches, now Evangelical. Among these may be mentioned the Predigerkirche, dating from the latter half of the 12th century; the Reglerkirche, a Romanesque building (restored in 1859) with a 12th-century tower; and the Barfiisserkirche, a Gothic building containing fine 14th-century monuments. All these were originally monastic churches. Of the former religious houses there survive a Franciscan convent, with a girls' school attached, and an Ursuline convent. The Augustinian monastery, in which Luther lived as a friar, is now used as an orphanage, under the name of the Martinsstift. The cell of Luther was destroyed by fire in 1872. A bronze statue of the reformer was erected in the Anger, the chief street of the town, in 1890. At one time Erfurt had a university, of which the charter dated from 1392; but it was suppressed in 1816, and its funds devoted to other purposes, among these being the endowment of an institution founded in 1758 and now called the royal academy of sciences, and the support of the royal library, which now contains 60,000 volumes and over 1000 manuscripts. On the W. and S.W. extensive new quarters have grown up within recent years, e.g. Hirschbriihl. The interior of the town hall (1869-187 5) is adorned with legendary and historical frescoes by Kampfer and Peter Janssen. Erfurt

possesses also a picture gallery and an antiquarian collection.

The educational establishments of the town include a gymnasium, a realgymnasium, a realschule, technical schools for building and handicrafts, a high-class commercial school, a school of agriculture, and an academy of music. The most notable industry of Erfurt is the culture of flowers and of vege- tables, which is very extensively carried on. This industry had its origin in the large gardens attached to the monasteries. It has also important and growing manufactures of ladies' mantles, boots and shoes, machines, furniture, woollen goods, musical instruments, agricultural machinery and implements, leather, tobacco, chemicals, &c. Brewing, bleaching and dyeing are also carried on on a large scale, and there are extensive railway works and a government rifle factory.

Erfurt (Med. Erpesfurt, Erphorde, Lat. Erfordia) is a town of great antiquity. Its origin is obscure, but in 741 it was sufficiently important for St Boniface to found a bishopric here, which was, however, after the martyrdom of the first bishop, Adolar, in 755, reabsorbed in that of Mainz. In 805 the place received certain market rights from the emperor Charlemagne. Later the overlordship was claimed by the archbishops of Mainz, on the strength of charters granted by the emperor Otto I., and their authority in Erfurt was maintained by a burgrave and an advocatus, the office of the latter becoming in the 12th century hereditary in the family of the counts of Gleichen. In spite of many vicissitudes (from 1109 to 1137, for instance, the town was subject to the landgraves of Thuringia), and of a charter granted in 1242 by the emperor Frederick II., the archbishops succeeded

in upholding their claims. In 1255, however, Archbishop Gerhard I. had to grant the city municipal rights, the burgraviate disappeared, and Erfurt became practically a free town. Its power was at its height early in the 15th century, when it joined the Hanseatic League. It had acquired by force or purchase various countships and other fiefs in the neighbourhood, and ruled a considerable territory; and its wealth was so great that in 1378 it established a university, the first in Europe that em-< braced the four faculties. By the end of the century, however, its prosperity had sunk owing to the perpetual feud with Mainz, the internecine war in Saxony, and the consequent dwindling of trade. By the convention of Amorbach in 1483 the over-lordship of Erfurt was ultimately transferred by the electors of Mainz to Saxony. The political and religious quarrels of the 16th century still further depressed the city, in which the reformed religion was established in 1521. Then came the Thirty Years' War, during which

Erfurt was for a while occupied by the Swedes. After the peace of Westphalia (1648) the city was assigned by the emperor to the elector of Mainz, and, on its refusal to submit, it was placed under the ban of the Empire (1660). In 1664 it was captured by the troops of the archbishop of Mainz, and remained in the possession of the electorate till 1802, when it came into the possession of Prussia. In 1808 it was the scene of the memorable ' interview between Napoleon and the emperor Alexander I. of Russia, at which the kings of Bavaria, Saxony, Westphalia and Wiirttemberg also assisted, which is known as the congress of Erfurt. Here in 1850 the parliament of the short-lived Prussian Northern Union (known as the Erfurt parliament) held its sittings. In 1902 the 100th anniversary of the city's incorporation with Prussia was celebrated.

See W. J. A. von Tettau, Erfurt in seiner Vergangenheit und Gegenwart (Erfurt, 1880); C. Beyer, Geschichle der Stadt Erfurt (Erfurt, 1900) ; and F. W. Kampschulte, Die Universitat Erfurt in ihrem Verhdltnisse zu dem Humanismus und der Reformation (1856-1858). For a detailed bibliography see U. Chevalier, Repertoire des sources. Topa-bibliographie (Montebeliard, 1 894-1 899), s. v.

ERGOT, or Spurred Rye, the drug ergota or Secale cornutum (Ger. Mullerkorn; Fr. seigle ergote), consisting of the sclerotium (or hard resting condition) of a fungus, Claviceps purpurea, parasitic on the pistils of many members of the Grass family, but obtained almost exclusively from rye, Secale cereale. In the ear of rye that is infected with ergot a species of fermentation takes place, and there exudes from it a sweet yellowish mucus, which after a time disappears. The ear loses its starch, and ceases to grow, and its ovaries become penetrated with the white spongy tissue of the mycelium of the fungus which towards the end of the season forms the sclerotium, in which state the fungus lies dormant through the winter.

The drug consists of grains, usually curved (hence the name, from the O. Fr. argot, a cock's spur), which are violet-black or dark-purple externally, and whitish with a tinge of pink within, are between | and i| in. long, and from 1 to 4 lines broad, and have two lateral furrows, a close fracture, a disagreeable rancid taste, and a faint, fishy odour, which last becomes more per- ceptible when the powder of; the drug is mixed with potash solution. Ergot should be kept in stoppered bottles in order to preserve it from the attacks of a species of mite, and to prevent the oxidation of its fatty oil.

The extremely complex composition of this drug has been studied in

great detail, and with such important results that instead of giving ergot itself by the mouth in doses of 20 to 60 grains, it is now possible to obtain much more rapid and certain results by giving one three-hundredth of a grain of one of its constituents hypodermically. This constituent is the alkaloid cornutine, which is the valuable ingredient of the drug. Other ingredients are a fixed oil, present to the extent of 30%, ergotinic acid, a glucoside, trimethylamine, which gives the drug its unpleasant odour, and sphacelinic acid, a non-nitrogenous resinoid body. Of the numerous preparations only two need be mentioned — the liquid extract (dose 10 minims to 2 drachms or more), and the hypodermic injection. The latter does not keep well, and the best way of using ergot is to dissolve tablets obtained from a reputable maker, and containing some of the

active principles, in pure water, the solution being injected subcutaneously.

Ergot has no external action. Given internally it stimulates the intestinal muscles and may cause diarrhoea. After absorption it slows the pulse by stimulation of the vagus nerves. It has indeed been asserted that the slow pulse characteristic of the puerperal period is really due to the common administration of ergot at that time. This is probably an exaggeration. The important actions of ergot are on the blood-vessels and the uterus. The drug greatly raises the blood-pressure by causing extreme contraction of the arteries. This is mainly due to a direct action on the muscular coats of the vessels, but is also partly of central origin, since the drug also stimulates the vaso- motor centre in the medulla oblongata. This action on the vessels is so marked as to constitute the drug a haemostatic, not only locally but also remotely. It may arrest bleeding from the nose, for instance, when injected hypodermically. Nearly all the constituents share in causing this action, but the sphacelinic acid is probably the most potent. Ergot is the most powerful known stimulant of the pregnant uterus. The action is a double one. At least four of its constituents act directly on the muscular fibre of the uterus, whilst the cornutine acts through the nerves. Of great practical importance is the fact that the cornutine causes rhythmic contractions such as naturally occur, whilst the sphacelinic acid produces a tonic contraction of the uterus, which is unnatural and highly inimical to the life of the foetus. Ergot is used in therapeutics as a haemostatic, and is very valu- able in haemoptysis and sometimes in

haematemesis. But its great use is in obstetrics. The drug should regularly be given hypodermically, and it is important to note that if the injection be made immediately under the skin, an abscess, or considerable discomfort, may ensue. The injection should be intra-muscular, the needle being boldly plunged into a muscular mass, such as that of the deltoid or the gluteal region. The indications for the use of ergot in obstetrics are highly complex and demand detailed treatment. It can only be said here that the drug should only in the rarest possible cases be given whilst the child is still in utero. This rule is necessitated by the sphacelinic acid, which causes an unnatural state of the organ. When it is possible to obtain pure cornutine, which is unfortunately very expensive, the precautions necessary in other cases may be abrogated.

Chronic poisoning, or ergotism, used frequently to occur amongst the poor fed on rye infected with the Claviceps. As it is practically impossible to reproduce the symptoms of ergotism nowadays, whether experimentally in the lower animals, or when the drug is being administered to a human being for some thera- peutic purpose, it is believed that the symptoms of ergotism were rendered possible only by the semi-starvation which must have ensued from the use of such rye-bread; for the grain disappears as the fungus develops. There were two types of ergotism. In the gangrenous form various parts of the body underwent gangrene as a consequence of the arrest of blood- supply produced by the action of sphacelinic acid on the arteries. In the spasmodic form the symptoms were of a nervous character. The initial indications of the disease were cutaneous itching, tingling and formication, which gave place to actual loss of cutaneous sensation, first observed in the extremities. Amblyopia and some loss of hearing also occurred, as well as mental failure. With weakness of the voluntary muscles went intermittent – spasms which weakened the patient and ultimately led to death by implication of the respiratory muscles. The last-known " epidemic " of ergotism occurred in Lorraine and Burgundy in the year 1816.

ERIC XIV. (1533-1577), king of Sweden, was the only son of Gustavus Vasa and Catherine of Saxe-Lauenburg. The news of his father's death reached Eric as he was on the point of embark- ing for England to press in person his suit for the hand of Queen Elizabeth. He hastened back to Stockholm, after burying his father, summoned a Riksdag, which met at Arboga on the 15th of April 1561, and adopted the royal propositions known as the Arboga articles, considerably curtailing the authority of the royal dukes, John and Charles, in their respective provinces. Two

months later Eric was crowned at Upsala, on which occasion he first introduced the titles of baron and count into Sweden, by way of attaching to the crown the higher nobility, these new counts and barons receiving lucrative fiefs adequate to the maintenance of their new dignities.

From the very beginning of his reign Eric's morbid fear of the upper classes drove him to give his absolute confidence to a man of base origin and bad character, though, it must be admitted, of superior ability. This was Goran Persson, born about 1530, who had been educated abroad in Lutheran principles, and after narrowly escaping hanging at the hands of Gustavus I Vasa for some vile action entered the service of his son. This powerful upstart was the natural enemy of the nobility, who suffered much at his hands, though it is very difficult to determine whether the initiative in these prosecutions proceeded from him or his master. Goran was also a determined opponent of Duke John, with whom Eric in 1563 openly quarrelled, because John, contrary a to the royal orders, had married (Oct. 4, 1 562) Catherine, daughter of Sigismund I. of Poland, engaging at the same time to assist the Polish king to conquer Livonia. This act was a flagrant breach of that paragraph of the Arboga articles which forbade the royal dukes to contract any political treaty without the royal assent. An army of 10,000 men was immediately sent by Eric to John's duchy of Finland, and John and his consort were seized, brought over to Sweden and detained as prisoners of state in Gripsholm Castle. But Eric did not stop here. His suspicion suggested to him that, if his own brother failed him, the loyalty of the great nobles, especially the members of the ancient Sture family, who had been notable in Sweden when the Vasas were unknown, could not be depended upon. The head of the Sture family at this time was Count Svante, who had married a sister of Gustavus Vasa's second wife, and had by her a numerous family, of whom two sons, Nils and Eric, still survived. The dark tragedy, known as the Sture murders, began with Eric XIV. 's strange treatment of young Count Nils, In 1566 he was summoned before a newly erected tribunal and condemned to death for gross neglect of duty, though not one of the frivolous charges brought against him could be sub stantiated. The death penalty was commuted into a punishment worse because more shameful than death. On the 15th of June 1566 the unfortunate youth, bruised and bleeding from shocking ill-treatment, was placed upon a wretched hack, with a crown of straw on his head, and led in derision through the streets of Stockholm. The following night he was sent a prisoner to the fortress of Orbyhus. A few days later he was appointed ambassador extraordinary, and despatched to Lorraine to

resume the negotiations for Eric's marriage with the princess Renata. Before he returned, however, Eric had resolved to marry Karin, or Kitty Mansdatter, the daughter of a common soldier, who had been his mistress since 1565. In January 1567 Eric extorted a declaration from two of his senators that they would assist him to punish all who should try to prevent his projected marriage; and, in the middle of May, a Riksdag was summoned to Upsala to judge between the king and those of the aristocracy whom he regarded as his personal enemies. Eric himself arrived at Upsala on the 16th in a condition of incipient insanity. On the 19th he opened parliament in a speech which, as he explained, he had to deliver extempore owing to " the treachery " of his secretary. Two days later Nils Sture arrived at Upsala fresh from his embassy to Lorraine, and was at once thrown into prison, where other members of the nobility were already detained. On the following day Eric murdered Nils in his cell with his own hand, and by his order the other prisoners were despatched by the royal provost marshal forthwith. These murders were com- mitted so promptly and secretly that it is doubtful whether the estates, actually in session at the same place, knew what had been done when, on the 26th of May, under violent pressure from Goran Persson, they signed a document declaring that all the accused gentlemen under detention had acted like traitors, and confirming all sentences already passed or that might be passed upon them.

During the greater part of 1567 Eric was so deranged that a

committee of senators was appointed to govern the kingdom. One of his illusions was that not he was king but his brother John, whom he now set at liberty. When, at the beginning of 1568, Eric recovered his reason, a reconciliation was effected between the king and the duke, on condition that John recognized the legality of his brother's marriage with Karin M&nsdatter, and her children as the successors to the throne. A month later, on the 4th of July, he was solemnly married to Karin at Stock- holm by the primate. The next day Karin was crowned queen of Sweden and her infant son Gustavus proclaimed prince-royal. Shortly after his marriage Eric issued a circular ordering a general thanksgiving for his delivery from the assaults of the devil. This document, in every line of which madness is legible, con- vinced most thinking people that Eric was unfit to reign. The royal dukes, John and Charles, had already taken measures to depose him; and in July the rebellion broke out in

Ostergot- land. Eric at first offered a stout resistance and won two victories; but on the 17th of September the dukes stood before Stockholm, and Eric, after surrendering Goran Persson to the horrible vengeance of his enemies, himself submitted, and re- signed the crown. On the 30th of September 1568 John III. was proclaimed king by the army and the nobility; and a Riksdag, summoned to Stockholm, confirmed the choice and formally deposed Eric on the 25th of January 1569. For the next seven years the ex-king was a source of the utmost anxiety to the new government. No fewer than three rebellions, with the object of releasing and reinstating him, had to be suppressed, and his prison was changed half a dozen times. On the 10th of March 1575, an assembly of notables, lay and clerical, at John's request, pronounced a formal sentence of death upon him. Two years later, on the 24th of February 1577, he died suddenly in his new prison at Orbyhus, poisoned, it is said, by his governor, Johan Henriksen.

See Sveriges Historia, vol. iii. (Stockholm, 1880); Robert Nisbet Bain, Scandinavia, cap. 4-6 (Cambridge, 1905); Eric Tegel, Konung Eriks den XIV. historia (Stockholm, 1751). (R. N. B.)

ERICACEAE, in botany, a natural order of plants belonging to the higher or gamopetalous division of Dicotyledons. They are woody plants, sometimes with a slender creeping stem as in bilberry, Vaccinium (fig. 1), or Andromeda (fig. 2), or form- ing low bushes as in the heaths, or larger, sometimes becoming tree-like, as in species of Rhododendron. The leaves are alter- nate, opposite or whorled in arrange- ment, and in their form and structure show well – marked adaptation for life in dry or exposed situations. Thus in the true heaths they are needle-like, with the margins often rolled back to form a groove or an almost closed chamber on the under side. In others such as Rhodo- dendron or Arbutus they are often leathery and ever- green, the strongly cuticularized upper surface protecting a water-storing tissue situated above the green layers of the leaf. The flowers are sometimes solitary and axillary or terminal as in Andromeda, but are generally arranged in racemose inflorescences at the end of the branches as in Arbutus and Rhododendron, or on small lateral shoots as in Erica. They are hermaphrodite and generally

Fig. 1. — Vaccinium vitis-idaea, with leaf and flower, nat. size. 1, Flower of V. myrtillus, cut lengthwise. 2, Fruit of same.

regular with parts in 4 or 5, thus: sepals 4 or 5, petals 4 or 5, stamens 8 or 10 in two series, the outer of which is opposite the

petals, and carpels 4 or 5. The corolla is usually more or less bell-shaped, and in the heaths persists in a dry state in the fruit. The petals with the stamens are situated on the outer edge of a

Fig. 2. — Andromeda Hypnoides, nat. size. I, Flower; 2, Unripe fruit cut across; 3, Stamen — all enlarged.

honey-secreting disk. The anthers show a very great variety in shape, the halves are often more or less free and often appendaged; they open to allow the escape of the pollen by a terminal pore or slit. The carpels are united to form a 4- to 5- chambered ovary, which bears a simple elongated style ending in a capitate stigma; each ovary-chamber contains one to many ovules attached to a central placenta. The brightly coloured

Fig. 3.

1 , Flowering shoot of Erica cinerea,

about I \ nat. size.

2, Flower cut lengthwise. 5,

3, Stamen showing appendages

and porous dehiscence of anther.

4, Capsule showing the loculicidal

dehiscence ; a few seeds re-

main attached to the central axis. Diagram of the flower having four sepals, four divisions of the corolla, eight stamens in two rows, and four divisions of the pistil.

corolla, the presence of nectar and the scent render the flowers attractive to insects, and the projection of the stigma beyond the anthers favours crossing. The fruit is generally a capsule con- taining many seeds, as in Erica (fig. 3) or Rhododendron; some- times a berry as in Arbutus.

The order falls into four distinct tribes, which are characterized by the relative position of the ovary and by the fruit and seed. They are as follows: —

1. Rhododendron tribe, characterized by capsular fruit, seed with a loose coat, deciduous petals and anthers without append- ages. It

consists mainly of the great genus Rhododendron (in which Azalea is included by recent botanists), which is chiefly

developed in the mountains of eastern Asia, many species occur- ring on the Himalayas. Dabeocia, St Dabeoc's heath, occurs in Ireland.

2. Arbutus Tribe, — -Fruit a berry or capsule, petals deciduous and anthers with bristle-like appendages, chiefly north temperate to arctic in distribution. Arbutus Unedo, the strawberry-tree, so called from its large scarlet berry, is a southern European species which extends into south Ireland. Arctostaphylos (bearberry) and A ndromeda are arctic and alpine genera occurring in Britain. Epigaea repens is the trailing arbutus or mayflower of Atlantic America.

3. V actinium Tribe. — Ovary inferior, fruit a berry. Extends from the north temperate zone to the mountains of the tropics. V actinium, the largest genus, has four British species: V. Myrtillus is the bilberry (q.v.), blaeberry or whortleberry, V. Vitis-Idaea the cowberry, and V. Oxycoccos the cranberry {q.v.). This tribe is sometimes regarded as a separate order Vacciniaceae, distinguished by its inferior ovary.

4. Erica Tribe. — Fruit usually a capsule, seeds round, not winged; corolla persisting round the ripe fruit; anthers often appendaged. The largest genus is Erica, the true heath (q.v.), with over 400 species, the great majority of which are confined to the Cape; others occur on the mountains of tropical Africa and in Europe and North Africa, especially the Mediterranean region. E. cinerea (purple heather) and E. Tetralix (cross-leaved heath) are common British heaths. Calluna is the ling or Scotch heather.

ERICHSEN, SIR JOHN ERIC, Bart. (1818-1896), British surgeon, born on the 19th of July 1818 at Copenhagen, was the son of Eric Erichsen, a member of a well-known Danish family. He studied medicine at University College, London, and at Paris, devoting himself in the early years of his career to physiology, and lecturing on general anatomy and physiology at University College hospital. In 1844 he was secretary to the physiological section of the British Association, and in 1845 he was awarded the Fothergillian gold medal of the Royal Humane Society for his essay on asphyxia. In 1848 he was appointed assistant surgeon at University College hospital, and in 1850 became full surgeon and professor of surgery,

his lectures and clinical teaching being much admired; and in 1875 he joined the consulting staff. His Science and Art of Surgery (1853) went through many editions. He rose to be president of the College of Surgeons in 1880. From 1879 to 1881 he was president of the Royal Medical and Chirurgical Society. He was created a baronet in 1895, having been for some years surgeon-extra- ordinary to Queen Victoria. As a surgeon his reputation was world-wide, and he counts (says Sir W. MacCormac in his volume on the Centenary of the Royal College of Surgeons) " among the makers of modern surgery," He was a recognized authority on concussion of the spine, and was often called to give evidence in court on obscure cases caused by railway accidents, &c. He died at Folkestone on the 23rd of September 1896.

ERICHT, LOCH, a lake partly in Inverness-shire and partly in Perthshire, Scotland, lying between the districts of Badenoch on the N. and Rannoch on the S. The boundary line is drawn from a point opposite to the mouth of the Alder, and follows the centre of the longitudinal axis north-eastwards to 56 50′ N., where it strikes eastwards to the shore. All of the lake to the S. and E. of this line belongs to Perthshire, the rest, forming the major portion, to Inverness-shire. It is a lonely lake, situated in extremely wild surroundings at a height of n 53 ft. above the sea, being thus the loftiest lake of large size in the United Kingdom. It is over 14I m. long, with a mean breadth of half a mile and over 1 m. at its maximum. Its area amounts to some 7j sq. m., and it receives the drainage of an area of nearly 50! sq. m. The mean depth is 189 ft., and the maximum 512 ft. It has a general trend from N.E. to S.W., the head lying 1 m. from Dalwhinnie station on the Highland railway. It receives many streams, and discharges at the south-western extremity by the Ericht. Salmon and trout afford good fishing. The surrounding mountains are lofty and rugged. Ben Alder (3757 ft.) on the west shore is the chief feature of the great Corrour

deer forest. The only point of interest on the banks is the cavern, near the mouth of the Alder, in which Prince Charles Edward concealed himself for a time after the battle of Culloden.

ERICSSON, JOHN (1 803-1 889), Swedish-American naval engineer, was born at Langbanshyttan, Wermland, Sweden, on the 31st of July 1803. He was the second son of Olaf Ericsson, an inspector of mines, who died in 1818. Showing from his earliest years a strong mechanical bent, young Ericsson, at the age of twelve, was employed as a draughtsman by the Swedish Canal Company. From 1820 to 1827 he served in the army, where his drawing and

military maps attracted the attention of the king, and he soon attained the rank of captain. In 1826 he went to London, at first on leave of absence from his regiment, and in partnership with John Braithwaite constructed the " Novelty," a locomotive engine for the Liverpool & Manchester railway competition at Rainhill in 1829, when the prize, however, was won by Stephenson's " Rocket." The number of Ericsson's inventions at this period was very great. Among other things he worked out a plan for marine engines placed entirely below the water-line. Such engines were made for the " Victory," for Captain (afterwards Sir) John Ross's voyage to the Arctic regions in 1829, but they did not prove satisfactory. In 1833 his caloric engine was made public. In 1836 he took out a patent for a screw-propeller, and though the priority of his invention could not be maintained, he was afterwards awarded a one-fifth share of the £20,000 given by the Admiralty for it. At this time Captain Stockton, of the United States navy, gave an order for a small iron vessel to be built by Laird of Birkenhead, and to be fitted by Ericsson with engines and screw. This vessel reached New York in May 1839. A few months later Ericsson followed his steamer to New York, and there he resided for the rest of his life, establishing himself as an engineer and a builder of iron ships. In 1848 he was naturalized as a citizen of the United States. He had many difficulties to contend with, and it was only by slow degrees that he established his fame and won his way to competence. At his death he seems to have been worth about £50,000. The provision of defensive armour for ships of war had long occupied his attention, and he had con- structed plans and a model of a vessel lying low in the water, carrying one heavy gun in a circular turret mounted on a turn- table. In 1854 he sent his plans to the emperor of the French. Louis Napoleon, however, acting probably on the advice of Dupuy de L6me, declined to use them. The American Civil War, and the report that the Confederates were converting the " Merrimac " into an ironclad, caused the navy department to invite proposals for the construction of armoured ships. Among others, Ericsson replied, and as it was thought that his design might be serviceable in inland waters, the first armoured turret ship, the " Monitor," was ordered; she was launched on the 30th of January 1862, and on the 9th of March she fought the celebrated action with the Confederate ram " Merrimac." The peculiar circumstances in which she was built, the great import- ance of the battle, and the decisive nature of the result gave the " Monitor " an exaggerated reputation, which further experience did not confirm. In later years Ericsson devoted himself to the study of torpedoes and sun motors. He published Solar In- vestigations (New York, 1875) and Contributions to the Centennial Exhibition (New York, 1877). He

died in New York on the 8th of March 1889, and in the following year, on the request of the Swedish government, his body was sent to Stockholm and thence into Wermland, where, at Filipstad, it was' buried on the 1 5th of September.

A Life of Ericsson by William Conant Church was published in New York in 1890 and in London in 1893.

ERIDANUS, or Fluvius (" the river "), in astronomy, a constellation of the southern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.) ; Ptolemy catalogued 34 stars in it. 6 Eridani, a fine double star of magni- tudes 3-5 and 5- 5, is now of the third magnitude. It is supposed to be identical with the Achernar of Al-Sufi, who described it as of the first magnitude; this star has therefore decreased in brilliancy in historic times. The star 02 Eridani (numbered 40

by Flamsteed) was discovered to be a ternary star group by Herschel in 1783; it consists of a close pair, of magnitudes 9-2 and 10-9, revolving in a period of 180 years, associated with a star of magnitude 4-5, which is distant from the pair by 82"; these stars have an exceptionally swift proper motion, about 4" per annum. Eridanus was the ancient name of the river Po. ERIDU, one of the oldest religious centres of the Sumerians, described in the ancient Babylonian records as the " city of the deep." The special god of this city was Ea (?.».), god of the sea and of wisdom, and the prominence given to this god in the incantation literature of Babylonia and Assyria suggests not only that many of our magical texts are to be traced ultimately to the temple of Ea at Eridu, but that this side of the Babylonian religion had its origin in that place. Certain of the most ancient Babylonian myths, especially that of Adapa, may also be traced back to the shrine of Ea at Eridu. But while of the first im- portance in matters of religion, there is no evidence in Babylonian literature of any special political importance attaching to Eridu, and certainly at no time within our knowledge did it exercise hegemony in Babylonia. The site of Eridu was discovered by J. E. Taylor in 1854, in a ruin then called by the natives Abu- Shahrein, a few miles south-south-west of Moghair, ancient Ur, nearly in the centre of the dry bed of an inland sea, a deep valley, 15 m. at its broadest, covered for the most part with a nitrous incrustation, separated from the alluvial plain about Moghair by a low, pebbly, sandstone range,*

called the Hazem, but open toward the north to the Euphrates and stretching southward to the Khanega wadi below Suk-esh-Sheiukh. In the rainy season this valley becomes a sea, flooded by the discharge of the Khanega; in summer the Arabs dig holes here which supply them with brackish water. The ruins, in which Taylor conducted brief excavations, consist of a platform of fine sand enclosed by a sandstone wall, 20 ft. high, the corners toward the cardinal points, on the N.W. part of which was a pyramidal tower of two stages, constructed of sun-dried brick, cased with a wall of kiln-burned brick, the whole still standing to a height of about 70 ft. above the platform. The summit of the first stage was reached by a staircase on the S.E. side, 15 ft. wide and 70 ft. long, constructed of polished marble slabs, fastened with copper bolts, flanked at the foot by two curious columns. An inclined road led up to the second stage on the N.W. side. Pieces of polished alabaster and marble, with small pieces of pure gold and gold-headed copper nails, found on and about the top of the second stage, indicated that a small but richly adorned sacred chamber, apparently plated within or without in gold, formerly crowned the top of this structure. Around the whole tower was a pavement of inscribed baked bricks, resting on a layer of clay 2 ft. thick. On the S.E. part of the terrace were the remains of several edifices, containing suites of rooms. Inscriptions on the bricks identified the site as that of Eridu.' Since Taylor's time the place has not been visited by any explorer, owing to the unsafe condition of the neighbourhood; but T. K. Loftus (1854) and J. P. Peters (1890) both report having seen it from the summit of Moghair. The latter states that the Arabs at that time called the ruin Nowawis, and apparently no longer knew the name Abu-Shahrein. Through an error, in many recent maps and Assyriological publications Eridu is described as located in the alluvial plain, between the Tigris and the Euphrates. It was, in fact, an island city in an estuary of the Persian Gulf, stretching up into the Arabian plateau. Originally " on the shore of the sea," as the old records aver, it is now about 120 m. from the head of the Persian Gulf. Calculating from the present rate of deposit of alluvium at the head of that gulf, Eridu should have been founded as early as the seventh millennium B.C. It is mentioned in historical inscriptions from the earliest times onward, as late as the 6th century b.c. From the evidence of Taylor's excavations, it would seem that the site was abandoned about the close of the Babylonian period.

See J. E. Taylor, Journal of the Royal A siatic Society, vol. xv. (1855) ; F. Delitzsch, Wo lag das Parodies? (1881); J. P. Peters, Nippur (1897); M. Jastrow, The Religion of Babylonia and Assyria

(1898); H. V. Hilprecht, Excavations in Assyria and Babylonia (1904); L. W. King, A History of Sumer and Akkad (1910). (J. P. Pe.)

ERIE, the most southerly of the Great Lakes of North America, between 41 23′ and 42° S3′ N., and 78 51′ and 83 28′ W., bounded W. by the state of Michigan, S. and S.E. by Ohio, Pennsylvania and New York, and N. by the province of Ontario. It is nearly elliptical, the major axis, 250 m. long, lying east and west; its greatest breadth is 60 m.; its area about 10,000 sq. m.; and the total area of its basin 34,412 sq. m. Its elevation above mean sea-level is 573 ft.; and its surface is nearly 9 ft. below that of Lake Huron, which discharges into it through St Clair river, Lake St Clair and Detroit river, and is 327 ft. above that of Lake Ontario, this great difference being absorbed by the rapids and falls in the Niagara river, which joins the two lakes. Lake Erie is very shallow, and may be divided into three basins, the western extending to Point Pelee and including all the islands, containing about 1200 sq. m., with a comparatively flat bottom at 5 to 6 fathoms; the main basin, between Point Pelee and the narrows at Long Point, containing about 6700 sq. m., and having a marked shelving bottom deepening gradually to 14 fathoms; and the portion east of the narrows, containing about 2100 sq. m., having a depression 30 fathoms deep just east from Long Point, with an extensive flat of 11 fathoms depth between it and the main basin. The Canadian shore is low and flat throughout, the United' States shore is low but bordered by an elevated plateau through which the rivers have cut deep channels. The lake basin is relatively so small that the rivers are without importance; Grand river, on the north shore, is the largest tributary. The flat alluvial soil bordering on the lake is very fertile, and the climate is well adapted for fruit cultivation. Large quantities of peaches, grapes and small fruits are grown; the islands in the west end have a climate much warmer and more equable than the adjoining mainland, and are practically covered with vineyards. The low clayey or sandy shores are subject to erosion by waves. In severe storms the water near shore is filled with sand, which is deposited where the currents are checked around the ends of jetties in such a way as to form bars out into the lake across improved channels. This shoaling has rendered continuous dredging necessary at every harbour on the lake west of Erie, Pa. In consequence of the shallowness of the lake its waters are easily disturbed, making navigation very rough and dangerous, and causing large fluctuations of surface. Strong winds are frequent, as nearly every cyclonic depression traversing North America, either from the westward or the Gulf of Mexico, passes near enough to Lake Erie to

be felt. Westerly gales are more frequent, and have more effect on the water surface than easterly ones, lowering the water as much as 7 to 8 ft. at the west end and raising it 5 to 8 ft. at the east end. The worst storms occur in autumn, when the immense quantity of shipping on the lake makes them specially destructive. There are no tides, and usually only a slight current towards the outlet, though powerful currents are temporarily produced by the rapid return of waters after a storm, and during the height of a westerly gale there is invariably a reflex current into the west end of the lake. There is an annual fluctuation in the level of the lake, varying from a minimum of 9 in. to a maximum of 2 ft., the normal low level occurring in February and the high level in midsummer. Standard high water (of 1838) is 575-11 ft. above mean sea-level, and the lowest record was 570-8 in November 1895. The harbours and exits of the lake freeze over, but the body of the lake never freezes completely.

Ice-breaking car ferries run across the lake all winter. General navigation opens as a rule in the middle of April and closes in the middle of December. The volume of traffic is immense, because practically all freight from the more westerly lakes finds terminal harbours in Lake Erie. Official statistics of com- merce passing through the Detroit river into the lake during the season of 1906 show that 35,128 vessels, having a net register of 50,673,897 tons, carried 63,805,571 (short) tons of freight, valued at $662,971,053. The 1175 vessels engaged in this business were valued at $106,223,000. Over 90% of the whole traffic is in United States ships to United States ports. Fine passenger steamers run nightly between Buffalo and Cleveland and Detroit, and there are many shorter passenger routes.

The large traffic on Lake Erie has brought into existence a number of important harbours on the south shore, nearly all artificially made and deepened, with entrances between two breakwaters running into the lake at right angles to the coast line. The principal of these are Toledo, Sandusky, Huron, Vermilion, Lorain, Cleveland, Fairport, Ashtabula, Conneaut, Erie (a natural harbour), Dunkirk and Buffalo, Rondeau, Port Stanley, Port Burwell, Port Dover, Port Maitland and Port Colborne. The Miami and Erie canal, leading from Maumee river to Cincinnati, 244J m., with a branch to Port Jefferson, 14 m., with locks 90 by 15 by 4 ft., connects with Lake Erie through Toledo. The Erie canal leading from Buffalo to the

Hudson river at Troy, and connecting with Lake Ontario at Oswego, had a capacity for boats 98 ft. long, 17 ft. 10 in. beam, with 6 ft. draught, until in 1907 the State of New York undertook its deepening to accommodate boats of 1000 tons capacity. Buffalo from its position at the eastern limit of deep draught lake naviga- tion is a city of first rate commercial importance. Its harbour is formed by an artificial breakwater, built parallel with the shore about half a mile distant from it. It receives practically all the Lake Erie grain shipments besides large quantities of iron ore, lumber and copper, and is a large shipping port for coal, principally anthracite. It has over 600 m. of railway tracks to accommodate lake freights. The Welland canal, 26! m. long, connecting Lake Ontario and Lake Erie, with locks 270 by 45 by 14 ft., leaves Lake Erie at Port Colborne, where the Canadian government have constructed an artificial harbour and elevators for transhipment of grain from upper lake freighters to lighters of canal capacity.

Fishing operations are carried on extensively in Lake Erie, the fish being taken with gill nets, seines and pound nets. Each state touching the lake has its own fishery regulations, which differ amongst themselves as well as from those of the Dominion. Both nations maintain a Fishery Protection Service, and the fisheries are replenished from artificial hatcheries. The most numerous and valuable fish are the lesser white fish (Coregonus artedi, Le Sueur), pickerel {Stizostedion vitreum, Walb.), pike (Lucius lucius, L.), and white fish (Coregonus dupeiformis, Mitchill), in the order named. The fish caught are estimated to be worth annually $1,000,000. They are collected in fishing tugs and distributed by rail throughout the United States and Canada.

Bibliography. — Bulletin No. 17, Survey of Northern and North-western Lakes, U.S. Lake Survey Office, War Dept. (Detroit, 1907) ; U.S. Hydrographic Office, Publication No. 108D, Sailing Directions for Lake Erie, &c. (Washington, 1902) ; Sailing Directions for the Canadian Shore of Lake Erie, Department of Marine and Fisheries (Ottawa, 1897) ; J. O. Curwood, The Great Lakes (New York, 1909) ; E. Channing and M. F. Lansing, The Great Lakes (New York, 1909). (W. P.A.)

ERIE, a city, a port of entry, and the county-seat of Erie county, Pennsylvania, U.S.A., on Lake Erie, 148 m. by rail N. of Pittsburg and near the N.W. corner of the state. Pop. (1890) 40,634; (1900) 52,733, of whom 11,957 were foreign-born, including 5226 from Germany and 1468 from Ireland, and 26,797 were of foreign parentage (both parents foreign-born), including 13,316 of German

parentage and 4203 of Irish parentage; (1910 census) 66,525. Erie is served by the New York, Chicago & St Louis, the Lake Shore & Michigan Southern, the Erie & Pittsburg (Pennsylvania Company), the Philadelphia & Erie (Pennsylvania railway), and the Bessemer & Lake Erie railways, and by steamboat lines to many important lake ports. The city extends over an area of about 7 sq. m., which for the most part is quite level and is from 50 to 175 ft. above the lake. Erie has a fine harbour about 4 m. in length, more than 1 m. in width, and with an average depth of about 20 ft.; it is nearly enclosed by Presque Isle, a long narrow strip of land of about 3000 acres from 300 ft. to 1 m. in width, and the national govern- ment has protected its entrance and deepened its channel by constructing two long breakwaters. Most of the streets of the city are 60 ft. wide — a few are 100 ft. — and nearly all intersect at right angles; they are paved with brick and asphalt, and many in the residential quarters are shaded with fine elms and

maples. The city has four parks, in one of which is a soldiers' and sailors' monument of granite and bronze, and not far away, along the shore of lake and bay, are several attractive summer resorts. Among Erie's more prominent buildings are the United States government building, the city hall, the public library, and the county court house. The city's charitable institutions consist of two general hospitals, each of which has a training school for nurses; a municipal hospital, an orphan asylum, a home for the friendless, two old folks' homes, and a bureau of charities; here, also, on a bluff, within a large enclosure arid overlooking both lake and city, is the state soldiers' and sailors' home, and near by is a monument erected to the memory of General Anthony Wayne, who died here on the 15th of December 1796.

Erie is the commercial centre of a large and rich grape-growing and agricultural district, has an extensive trade with the lake ports and by rail (chiefly in coal, iron ore, lumber and grain), and is an important manufacturing centre, among its products being iron, engines, boilers, brass castings, stoves, car heaters, flour, malt liquors, lumber, planing mill products, cooperage products, paper and wood pulp, cigars and other tobacco goods, gas meters, rubber goods, pipe organs, pianos and chemicals. In 1905 the city's factory products were valued at $19,911,567, the value of foundry and machine-shop products being $6,723,819, of flour and grist-mill products $1,444,450, and of malt liquors $882,493. The municipality owns and operates its water-works.

On the site of Erie the French erected Fort Presque Isle in 1753, and

about it founded a village of a few hundred inhabitants. George Washington, on behalf of the governor of Virginia, came in the same year to Fort Le Bceuf (on the site of the present Waterford), 20 m. distant, to protest against the French fortify- ing this section of country. The protest, however, was unheeded. The village was abandoned in or before 1758, owing probably to an epidemic of smallpox, and the fort was abandoned in 1759. It was occupied by the British in 1760, but on the 22nd of June 1763 this was one of the several forts captured by the Indians during the Conspiracy of Pontiac. In 1764 the British regained nominal control and retained it until 1785, when it passed into the possession of the United States. The place was laid out as a town in 1795; in 1800 it became the county-seat of the newly- erected county of Erie; it was incorporated as a borough in 1805, the charter of that year being revised in 1833; and in 1851 it was incorporated as a city. At Erie were built within less than six months most of the vessels with which Commodore Oliver H. Perry won his naval victory over the British off Put-in-Bay on the 10th of September 1813.

ERIGEKA, JOHANNES SCOTUS (c. 800 c. 877), medieval philosopher and theologian. His real name was Johannes Scotus (Scottus) or John the Scot. The combination Johannes Scotus Erigena has not been traced earlier than Ussher and Gale; even Gale uses it only in the heading of the version of St Maximus. The date of Erigena's birth is very uncertain, and there is no evidence to show definitely where he was born. The name Scotus, which has often been taken to imply Scottish origin, really favours the theory that he was an Irishman accord ing to the then usage of Scotus or Scotigena. Prudentius, bishop of Troyes, definitely states that he was of Irish extraction. The pseudonym commonly read Erigena, used by himself in the titles of his versions of Dionysius the Areopagite, is lerugena (in later MSS. Erugena and Eriugena), formed apparently on the analogy of Graiugena ("Greek-born"), which he applies to St Maximus. There seems no reason to doubt that Eriugena is connected with Erin, the name for Ireland, and lerugena suggests the Greek Upos, tepos vfjaos being a common name for Ireland. On the other hand, William of Malmesbury prefers to read Heruligena, which would make Scotus a Pannonian, while Bale says he was born at St David's, Dempster connects him with Ayr, and Gale with Eriuven in Hereford. Some early writers thought there were two persons, John Scotus and John Erigena.

Of Erigena's early life nothing is known. Bale quotes the story that he travelled in Greece, Italy and Gaul, and studied

not only Greek, but also Arabic and Chaldaean. Since, however, Bale describes him as " ex patricio genitore natus," it is a reason- able inference (so R. L. Poole) that Bale confused him with one John, the son of Patricius, a Spaniard, who tells much the same story of his own travels. The knowledge of Greek displayed in Erigena's works is not such as to compel us to conclude that he had actually visited Greece. That he had a competent acquaintance with Greek is manifest from his translations of Dionysius the Areopagite and of Maximus, from the manner in which he refers to Aristotle, and from his evident familiarity with Neoplatonist writers and the fathers of the early church. Roger Bacon, in his severe criticism on the ignorance of Greek displayed by the most eminent scholastic writers, expressly exempts Erigena, and ascribes to him a knowledge of Aristotle in the original.

Among other legends which have at various times been attached to Erigena are that he was invited to France by Charlemagne, and that he was one of the founders of the university of Paris. The only portion of Erigena's life as to which we possess accurate information was that spent at the court of Charles the Bald. Charles invited him to France soon after his accession to the throne, probably in the year 843, and placed him at the head of the court school {schola palatina) . The reputation of this school seems to have increased greatly under Erigena's leadership, and the philosopher himself was treated with indulgence by the king. William of Malmesbury's amusing story illustrates both the character of Scotus and the position he occupied at the French court. The king having asked, " Quid distat inter sottum et Scottum ? " Erigena replied, " Mensa tantum."

The first of the works known to have been written by Erigena during this period was a treatise on the eucharist, which has not come down to us (by some it has been identified with a treatise by Ratramnus, De cor pore et sanguine Domini). In it he seems to have advanced the doctrine that the eucharist was merely symbolical or commemorative, an opinion for which Berengarius was at a later date censured and condemned. As a part of his penance Berengarius is said to have been compelled to burn publicly Erigena's treatise. So far as we can learn, however, Erigena's orthodoxy was not at the time suspected, and a few years later he was selected by Hincmar, archbishop of Reims, to defend the doctrine of liberty of will against

the extreme predestinarianism of the monk Gottschalk (Gotteschalchus). The treatise De divina praedeslinatione, composed on this occasion, has been preserved, and from its general tenor one cannot be surprised that the author's orthodoxy was at once and vehemently suspected. Erigena argues the question entirely on speculative grounds, and starts with the bold affirmation that philosophy and religion are fundamentally one and the same — " Conficitur inde veram esse philosophiam veram religionem, conversimque \reram religionem esse veram philosophiam." Even more significant is his handling of authority and reason, to which we shall presently refer. The work was warmly assailed by Drepanius Florus, canon of Lyons, and Prudentius, and was condemned by two councils — that of Valence in 855, and that of Langres in 859. By the former council his arguments were described as Pultes Scotorum (" Scots porridge ") and commentum diaboli (" an invention of the devil ").

Erigena's next work was a Latin translation of Dionysius the Areopagite (see Dionysius Areopagiticus) undertaken at the request of Charles the Bald. This also has been preserved, and fragments of a commentary by Erigena on Dionysius have been discovered in MS. A translation of the Areopagite's pantheistical writings was not likely to alter the opinion already formed as to Erigena's orthodoxy. Pope Nicholas I. was offended that the work had not been submitted for approval before being given to the world, and ordered Charles to send Erigena to Rome, or at least to dismiss him from his court. There is no evidence, however, that this order was attended to.

The latter part of his life is involved in total obscurity. The story that in 882 he was invited to Oxford by Alfred the Great, that he laboured there for many years, became abbot at Malmes- bury, and was stabbed tp dg

is apparently without any satisfactory foundation, and doubtless refers to some other Johannes. Erigena in all probability never left France, and Haureau has advanced some reasons for fixing the date of his death about 877.

Erigena is the most interesting figure among the middle-age writers. The freedom of his speculation, and the boldness with which he works out his logical or dialectical system of the universe, altogether prevent us from classing him along with the scholastics properly so called. He marks, indeed, a stage of transition from the older Platonizing philosophy to the later and more rigid scholasticism. In no sense whatever can it be affirmed that with Erigena philosophy is

*in the service of theology. The above- quoted assertion as to the substantial identity between philo- sophy and religion is indeed repeated almost tolidem verbis by many of the later scholastic writers, but its significance altogether depends upon the selection of one or other term of the identity as fundamental or primary. Now there is no possibility of mis- taking Erigena's position: to him philosophy or reason is first, is primitive; authority or religion is secondary, derived. " Auctoritas siquidem ex vera ratione processit, ratio vero nequaquam ex auctoritate. Omnis enim auctoritas, quae vera ratione non approbatur, infirma videtur esse. Vera autem ratio, quum virtutibus suis rata atque immutabilis munitur, nullius auctoritatis adstipulatione roborari indiget " {De divisione naturae, i. 71). F. D. Maurice, the only historian of note who declines to ascribe a rationalizing tendency to Erigena, obscures the question by the manner in which he states it. He asks his readers, after weighing the evidence advanced, to determine " whether he (Erigena) used his philosophy to explain away his theology, or to bring out what he conceived to be the fullest meaning of it." These alternatives seem to be wrongly put. " Explaining away theology " is something wholly foreign to the philosophy of that age; and even if we accept the alterna- tive that Erigena endeavours speculatively to bring out the full meaning of theology, we are by no means driven to the conclusion that he was primarily or principally a theologian. He does not start with the datum of theology as the completed body of truth, requiring only elucidation and interpretation; his fundamental thought is that of the universe, nature, to wav, or God, as the ultimate unity which works itself out into the rational system of the world. Man and all that concerns man are but parts of this system, and are to be explained by reference to it; for ex- planation or understanding of a thing is determination of its place in the universal or all. Religion or revelation is one element or factor in the divine process, a stage or phase of the ultimate rational life. The highest faculty of man, reason, intellectus, intellectualis visio, is that which is not content with the individual or partial, but grasps the whole and thereby comprehends the parts. In this highest effort of reason, which is indeed God thinking in man, thought and being are at one, the opposition of being and thought is overcome. When Erigena starts with such propositions, it is clearly impossible to understand his position and work if we insist on regarding him as a scholastic, accepting the dogmas of the church as ultimate data, and endeavouring only to present them in due order and defend them by argument. **

Erigena's great work, De divisione naturae, which was condemned by

a council at Sens, by Honorius III. (1225), who described it as " swarming with worms of heretical perversity," and by Gregory XIII. in 1585, is arranged in five books. The form of exposition is that of dialogue ; the method of reasoning is the syllogistic. The leading thoughts are the following. Natura is the name for the universal, the totality of all things, containing in itself being and non-being. It is the unity of which all special phenomena are manifestations. But of this nature.there are four distinct classes : — (1) that which creates and is not created ; (2) that which is created and creates; (3) that which is created and does not create; (4) that which neither is created nor creates. The first is God as the ground or origin of all things, the last is God as the final end or goal of all things, that into which the world of created things ultimately returns. The second and third together compose the created uni- verse, which is the manifestation of God, God in processu, Theo- phania. Thus we distinguish in the divine system beginning, middle and end ; but these three are in essence one — the difference is only the consequence of our finite comprehension. We are compelled to envisage this eternal process under the form of time, to apply temporal distinctions to that which is extra- or supra-temporal.

The universe of created things, as we have seen, is twofold : — first, that which is created and creates — the primordial ideas, archetypes, immutable relations, divine acts of will, according to which individual things are formed ; second, that which is created and does not create, the world of individuals, the effects of the primordial causes, without which the causes have no true being. Created things have no individual or self-independent existence; they are only in God; and each thing is a manifestation of the divine, theophania, divina apparitio.

God alone, the uncreated creator of all, has true being. He is the true universal, all-containing and incomprehensible. The lower cannot comprehend the higher, and therefore we must say that the existence of God is above being, above essence; God is above goodness, above wisdom, above truth. No finite predicates can be applied to him; his mode of being cannot be determined by any category. True theology is negative. Nevertheless the world, as the theophania, the revelation of God, enables us so far to under- stand the divine essence. We recognize his being in the being of all things, his wisdom in their orderly arrangement, his life in their constant motion. Thus God is

for us a Trinity — the Father as substance or being (ova-ia), the Son as wisdom (Si/pa/jus), the Spirit as life (hipytta). These three are realized in the universe — the Father as the system of things, the Son as the word, i.e. the 1-ealm of ideas, the Spirit as the life or moving force which introduces individuality and which ultimately draws back all things into the divine unity. In man, as the noblest of created things, the Trinity is seen most perfectly reflected; intellectus (vovs), ratio (X6yos) and sensus (Siaj-oia) make up the threefold thread of his being. Not in man alone, however, but in all things, God is to be regarded as realizing himself, as becoming incarnate.

The infinite essence of God, which may indeed be described as nihilum (nothing) is that from which all is created, from which all proceeds or emanates. The first procession or emanation, as above indicated, is the realm of ideas in the Platonic sense, the word or wisdom of God. These ideas compose a whole or inseparable unity, but we are able in a dim way to think of them as a system logically arranged. Thus the highest idea is that of goodness; things are, only if they are good ; being without well-being is naught. Essence participates in goodness — that which is good has being, and is therefore to be regarded as a species of good. Life, again, is a species of essence, wisdom a species of life, and so on, always descending from genus to species in a rigorous logical fashion.

The ideas are the eternal causes, which, under the moving influence of the spirit, manifest themselves in their effects, the individual created things. Manifestation, however, is part of the being or essence of the causes, that is to say, if we interpret the expres- sion, God of necessity manifests himself in the world and is not without the world. Further, as the causes are eternal, timeless, so creation is eternal, timeless. The Mosaic account, then, is to be looked upon merely as a mode in which is faintly shadowed forth what is above finite comprehension. It is altogether allegorical, and requires to be interpreted. Paradise and the Fall have no local or temporal being. Man was originally sinless and without distinction of sex. Only after the introduction of sin did man lose his spiritual body, and acquire the animal nature with its distinction of sex. Woman is the impersonation of man's sensuous and fallen nature; on the final return to the divine unity, distinction of sex will vanish, and the spiritual body will be regained.

The most remarkable and at the same time the most obscure por- tion of the work is that in which the final return to God is handled. Naturally sin is a necessary preliminary to this redemption, and Erigena has the greatest difficulty in accounting for the fact of sin. If

God is true being, then sin can have no substantive existence; it cannot be said that God knows of sin, for to God knowing and being are one. In the universe of things, as a universe, there can be no sin; there must be perfect harmony. Sin, in fact, results from the will of the individual who falsely represents something as good which is not so. This misdirected will is punished by finding that the objects after which it thirsts are in truth vanity and empti- ness. Hell is not to be regarded as having local existence; it is the inner state of the sinful will. As the object of punishment is not the will or the individual himself, but the misdirection of the will, so the result of punishment is the final purification and redemp- tion of all. Even the devils shall be saved. All, however, are not saved at once ; the stages of the return to the final unity, correspond- ing to the stages in the creative process, are numerous, and are passed through slowly. The ultimate goal is deificatio, theosis or resumption into the divine being, when the individual soul is raised to a full knowledge of God, and where knowing and being are one. After all have been restored to the divine unity, there is no further creation. The ultimate unity is that which neither is created nor creates.

Editions.— There is a complete edition of Erigena's works in J. P. Migne's Patrologiae cursus completus (vol. cxxii.), edited by H. J. Floss (Paris, 1853). The De divina praedestinatione was pub- lished in Gilbert Mauguin's Veterum auctorum qui nono saeculo de praedestinatione et gratia scripserunt opera et fragmenta (Paris, 1650). The commentary (" Expositiones ") on Dionysius' Hier- archiae caelestes appeared in the Appendix ad opera edita ab A. Maio (ed. J. Cozza, Rome, 1871). Of the De divisione naturae, editions

have been published by Thomas Gale (Oxford, 1681) ; C. B. Schliiter (Miinster, 1838); and in Floss's Opera omnia; there is a German translation by Ludwig Noack, Johannes Scotus Erigena ilber die Eintheilung der Natur (3 vols., 1 874-1 876). Erigena was also the author of some poems edited by L. Traube in Monumenta Germaniae historica. Po'etae Latini aevi Carolini, iii. (1896). A commentary on the Opuscula sacra of Boetius is attributed to him and edited by

E. K. Rand (1906). Monographs on Erigena's life and works are numerous; see St Rene Taillandier, Scot Erigene et la phihsophie scholastique (1843) ; T. Christlieb, Leben u. Lehre des Johannes Scotus Erigena{Gotb.&,l86o) ; J. N. Huber, Johannes Scotus ErigenaiMunich, 1861); W. Kaulich, Das speculative System des Johannes Scotus Erigena (Prague, i860); A. Stockl, De Joh. Scoto Erigena (1867); L. Noack, TJber Leben und Schriften des Joh. Scotus

Erigena: die Wissenschaft und Bildung seiner Zeit (Leipzig, 1876); R. L. Poole, Medieval Thought (1884), and article in Dictionary of National Biography; T. Wotschke, Fichte und Erigena (Halle, 1896) ; M. Baum- gartner in Wetzer and Welte's Kirchenlexikon, x. (1897); Alice Gardner's Studies in John the Scot (1900) ; J. Draseke, Joh. Scotus Erigena und seine Gewdhrsmdnner (Leipzig, 1902) ; S. M. Deutsch in Herzog-Hauck's Realencyklopddie fur protestantische Theologie, xviii. (1906); J. E. Sandys, Hist, of Classical Scholarship (1906), pp. 491- 495. ˆSee also the general works on scholastic philosophy, especially Haureau, Stockl and Kaulich. An admirable resume is given by

F. D. Maurice, Medieval Phil. pp. 45-79. (R. Ad.; J. M. M.)

ERIGONE, in Greek mythology, daughter of Icarius, the hero of the Attic deme Icaria. Her father, who had been taught by Dionysus to make wine, gave some to some shepherds, who became intoxicated. Their companions, thinking they had been poisoned, killed Icarius and buried him under a tree on Mount Hymettus (or threw his body into a well). Erigone, guided by her faithful dog Maera, found his grave, and hanged herself on the tree. Dionysus sent a plague on the land, and all the maidens of Athens, in a fit of madness, hanged themselves like Erigone. Icarius, Erigone and Maera were set among the stars as Bootes (or Arcturus), Virgo and Procyon. The festival called Aeora (the " swing ") was subsequently instituted to propitiate Icarius and Erigone. Various small images (in Lat. oscilla) were suspended on trees and swung backwards and forwards, and offerings of fruit were made (Hyginus, Fab. 130, Poet, astron. ii. 4; Apollodorus iii. 14) . The story was probably intended to explain the origin of these oscilla, by which Dionysus, as god of trees (Dendrites), was propitiated, and the baneful influence of the dog-star averted (see also Oscilla) .

ERIN, an ancient name for Ireland. The oldest form of the word is Eriu, of which Erinn is the dative case. Eriu was itself almost certainly a contraction from a still more primitive- form Iberiu or Iveriu; for when the name of the island was written in ancient Greek it appeared as 'lovepvia (Ivernia), and in Latin as Iberio, Hiberio or Hibernia, the first syllable of the word firiu being thus represented in the classical languages by two distinct vowel sounds separated by b or v. Of the Latin variants, Iberio is the form found in the most ancient Irish MSS., such as the Confession of St Patrick, and the same saint's Epistle to Coroticus. Further evidence to the same effect is found in the fact that the ancient Breton and Welsh names for Ireland were Ywerddon or Iverdon. In later Gaelic literature the

primitive form Eriu became the dissyllable Eire; hence the Norsemen called the island the land of Eire, i.e. Ireland, the latter word being origin- ally pronounced in three syllables. (See Ireland: Notices of Ireland in Greek and Roman writers.) Nothing is known as to the meaning of the word in any of its forms, and Whitley Stokes's suggestion that it may have been connected with the Sanskrit avara, meaning "western," is admittedly no more than con- jecture. There was, indeed, a native Irish legend, worthless from the standpoint of etymology, to account for the origin of the name. According to this myth there were three kings of the Dedannans reigning in Ireland at the coming of the Milesians, named MacColl, MacKecht and MacGrena. The wife of the first was Eire, and from her the name of the country was derived. Curiously, Ireland in ancient Erse poetry was often called " Fodla " or " Bauba," and these were the wives of the other two kings in the legend.

ERINNA, Greek poet, contemporary and friend of Sappho, a native of Rhodes or the adjacent island of Telos, flourished about 600 (according to Eusebius, 350 B.C.). Although she died at the early age of nineteen, her poems were ampng the most

famous of her time and considered to rank with those of Homer. Of her best-known poem, 'HXcucari; (the Distaff), written in a mixture of Aeolic and Doric, which contained 300 hexameter lines, only 4 lines are now extant. Three epigrams in the Palatine anthology, also ascribed to her, probably belong to a later date.

The fragments have been edited (with those of Alcaeus) by J. Pellegrino (1894).

ERINYES (Lat. Furiae), in Greek mythology, the avenging deities, properly the angry goddesses or goddesses of the curse pronounced upon evil-doers. According to Hesiod (Theog. 185) they were the daughters of Earth, and sprang from the blood of the mutilated Uranus; in Aeschylus (Eum. 321) they are the daughters of Night, in Sophocles (O.C. 40) of Darkness and Earth. Sometimes one Erinys is mentioned, sometimes several; Euripides first spoke of them as three in number, to whom later Alexandrian writers gave the names Alecto (unceasing in anger), Tisiphone (avenger of murder), Megaera (jealous). Their home is the world below, whence they ascend to earth to pursue the wicked. They punish all offences against the laws

of human society, such as perjury, violation of the rites of hospitality, and, above all, the murder of relations. But they are not without bene- volent and beneficent attributes. When the sinner has expiated his crime they are ready to forgive. Thus, their persecution of Orestes ceases after his acquittal by the Areopagus. It is said that on this occasion they were first called Eumenides (" the kindly "), a euphemistic variant of their real name. At Athens, however, where they had a sanctuary at the foot of the Areo- pagus hill and a sacred grove at Colonus, their regular name was Semnae (venerable). Black sheep were sacrificed to them during the night by the light of torches. A festival was held in their honour every year, superintended by a special priesthood, at which the offerings consisted of milk and honey mixed with water, but no wine. In Aeschylus, the Erinyes are represented as awful, Gorgon-like women, wearing long black robes, with snaky locks, bloodshot eyes and claw-like nails. Later, they are winged maidens of serious aspect, in the garb of huntresses, with snakes or torches in their hair, carrying scourges, torches or sickles. The identification of Erinyes with Sanskrit Saranyu, the swift-speeding storm cloud, is rejected by modern etymologists; according to M. Breal, the Erinyes are the personification of the formula of imprecation (dpd), while E. Rohde sees in them the spirits of the dead, the angry souls of murdered men.

See C. O. Miiller, Dissertations on the Eumenides of Aeschylus, (Eng. tr., 1835); A. Rosenberg, Die Erinyen (1874); J- E. Harrison, Prolegomena to the Study of Greek Religion (1903); and Journal of Hellenic Studies, xix. p. 205, according to whom the Erinyes were primarily local ancestral ghosts, potent for good or evil after death, earth genii, originally conceived as embodied in the form of snakes, whose primitive haunt and sanctuary was the omphalos at Delphi ; E. Rohde, Psyche (1903); A. Rapp in Roscher's Lexikon der Mytho- logie, and J. A. Hild in Daremberg and Sagliq's Dictionnaire des antiquites, s. v. Furiae.

ERIPHYLE, in Greek mythology, sister of Adrastus and wife of Amphiaraus. Having been bribed by Polyneices with the necklace of Harmonia, she persuaded her husband to take part in the expedition of the Seven against Thebes, although he knew it would prove fatal to him. Before setting out, the seer charged his sons to slay their mother as soon as they heard of his death. The attack on Thebes was repulsed, and during the flight the earth opened and swallowed up Amphiaraus together with his chariot. His son Alcmaeon, as he had been bidden, slew his mother, and was driven from place to place by the Erinyes, seeking purification and a new home (Apollodorus iii. 6. 7).

ERIS, in Greek mythology, a sister of the war-god Ares (Homer, Iliad, iv. 440), and in the Hesiodic theogony (225) a daughter of Night. In the later legends of the Trojan War, Eris, not having been invited to the marriage festival of Peleus and Thetis, flings a golden apple (the " apple of discord ") among the guests, to be given to the most beautiful. The claims of the three deities Hera, Aphrodite and Athena are decided by Paris in favour of Aphrodite, who as a reward assists him to gain possession of Helen (Hyginus, Fab. 92; Lucian, Charidemus, 17). Hesiod also mentions (W. and D. 24) a beneficent Eris, the personification

of honourable rivalry. In Virgil (Aeneid, viii. 702) and other Roman poets Eris is represented by Discordia.

ERITH, an urban district in the north-western parliamentary division of Kent, England, 14 m. E. by S. of London, on the South Eastern & Chatham railway. Pop. (1891) 13,414; (1901) 25,296. It lies on the south bank of the Thames and extends up the hills above the shore, many villas having been erected on the higher ground. The park of a former seat, Belvedere, was thus built over (c. i860), and the mansion became a home for disabled seamen. The church of St John the Baptist, though largely altered by modern restoration, retains Early English to Perpendicular portions, and some early monuments and brasses. Erith has large engineering and gun factories, and in the neigh- bourhood are gunpowder, oil, glue and manure works. The southern outfall works of the London main drainage system are at Crossness in the neighbouring lowland called Plumstead Marshes. Erith is the headquarters of several yacht clubs. Erith, the name of which is commonly derived from A.S. Mrra-hythe (old haven), was anciently a borough, and was granted a market and fairs in 13 13. Down to the close of the 17th century it was of some importance as a naval station.

ERITREA, an Italian colony on the African coast of the Red Sea. It extends from Ras Kasar, a cape 1 10 m. S. of Suakin, in 18° 2′ N, as far as Ras Dumeira (12 42′ N.), in the Strait of Bab-el-Mandeb, a coast-line of about 650 m. The colony is bounded inland by the Anglo-Egyptian Sudan, Abyssinia and French Somaliland. It consists of the coast lands lying between the capes named and of part of the northern portion of the Abyssinian plateau. The total area is about 60,000 sq. m. The population is approximately 450,000, of which, exclusive of soldiers, not more than 3000 are whites.

The land frontier starting from Ras Kasar runs in a south- westerly direction until in about 14 15′ N., 36 35′ E. it reaches the river Setit,

some distance above the junction of that stream with the Atbara. This, the farthest point inland, is 198 m. S.W. of Massawa. The frontier now turns east, following for a short distance the course of the river Setit; thence it strikes north- easterly to the Mareb, and from 38 E. follows that river and its tributaries the Belesa and Muna, until within 42 m. of the sea directly south of Annesley Bay. At this point the frontier turns south and east, crossing the Afar or Danakil country at a distance of 60 kilometres (37-28 m.) from the coast-line. About i2°2o' N. the French possessions in Somaliland are reached. Here the frontier turns N.E. and so continues until the coast of the Red Sea is again reached at a point south of the town of Raheita. In the southern part of the colony are small sultanates, such as those of Aussa and Raheita, which are under Italian protection. The Dahlak archipelago and other groups of islands along the coast belong to Eritrea.

Physical Features. — The coast-line is of coral formation and is, in the neighbourhood of Massawa, thickly studded with small islands. The chief indentations are Annesley Bay, immediately south of Massawa, and Assab Bay in the south. The colony consists of two widely differing regions. The northern division is part of the Abyssinian highlands. The southern division, part of the Afar or Danakil country, includes all the territory of the colony south of Annesley Bay. These two regions are connected by a narrow strip of land behind Annesley Bay, where the Abyssinian hills approach close to the sea. From this bay the coast-line trends S.E. so that at Tajura Bay the distance between the Abyssinian hills and the sea is over 200 m. The Afar country is part of the East African rift-valley, and in the southern parts of the valley its surface is diversified by ranges of hills, frequently volcanic, and by lakes. The plains, however, extend over large areas, they are generally arid and are often covered with mimosa trees which form a kind of jungle called by the natives khala. The torrents which descend from the Abyssinian plateau usually fail to reach the sea. They are mostly bordered by dense vegetation; in the dry season water is found in pools in the river beds or can be obtained by digging. The principal rivers enter and are lost in one or other of two salt plains or basins, that of Asali in the north and that of Aussa in the south. The Hawash flows through the Aussa country in a N.E. direction, but is lost in lakes Abbebad and Aussa (see Abyssinia). The Raguali and other rivers drain into the Asali basin. This basin, like that of Aussa, is in places 200 ft. below sea-level. On the west the Asali basin reaches to the Abyssinian foot-hills; in its southern part is the small lake Alelbad The eastern edge of the basin is formed by a*

ridge of gypsum and on its margin grow palms. In parts the salt lies thick on the plain, which then has the appearance of a lake frozen over. South of Lake Alelbad is a volcano called Artali or Erta-ale (" the smoky "), and farther to the S.E., in about 13 15′ N., is the peak of Afdera, which was in eruption in June 1907. The hills, 1000 to 4000 ft. in height, which run more or less parallel to and a few miles from the coast, include the volcano of Dubbi (reported active in 1 861), some 30 m. S. of the port of Edd (Eddi). In 14 52′ N., 39° 53′ E. and near the northern end of the zone of depression the volcano of Alid (2985 ft.) rises from the trough. Its chief crest forms an elongated ring and encloses a crater over half a mile in diameter and with walls 350 ft. high. North and south of Alid extends a vast lava field. Dubbi and Alid are in Italian terri- tory; the greater part of Afar belongs to Abyssinia.

At Annesley Bay the narrow coast plain is succeeded by foothills separated by small valleys through which flow innumerable streams. From these hills the ascent to the plateau which constitutes northern Eritrea is very steep. This tableland, which has a general elevation of about 6500 ft., is fairly fertile despite a desert region — Sheb — to the S.E. of Keren. It is characterized by rich, well-watered valleys, verdant plains and flat-topped hills with steep sides, running in ranges or isolated. The highest hills in Eritrean territory rise to about 10,000 ft. The plateau is known by various names, the region directly west of Massawa being called Hamasen. To the west and north the plateau sinks in terraces to the plains of the Sudan, and eastward falls more abruptly to the Red Sea, the coast plain, known as the Samhar, consisting of sandy country covered with mimosa and, along the khors, with a somewhat richer vegetation.

The colony contains no navigable streams. For a short distance the Setit (known in its upper course as the Takazze), a tributary of the Atbara, forms the frontier, as does also in its upper course the Gash or Mareb (see Abyssinia). The Mareb, often dry in summer, in the floods is a large and impassable river. Both the Setit and Mareb have a general westerly course across the Abyssinian plateau. The Baraka (otherwise Barka) and Anseba rise in the Hamasen plateau near Asmara within a short distance of each other. The Baraka flows west and then north; the Anseba, which has a more easterly course, also flows northward and joins the Baraka a little N. of 17 N. A few miles below the confluence the Baraka leaves Italian territory. It is (as is

the Anseba) an intermittent stream. After heavy rain it discharges some of its water into the Red Sea north of Tokar. The whole of the hill country north of Asmara belongs to the drainage area of the Baraka or Anseba. Of the numerous streams which, north of the Danakil country, run direct from the hills to the Red Sea, the Hadas may be mentioned, as along the valley of that stream is one of the most frequented routes to the tableland. The Hadas, in time of flood, reaches the ocean near Adulis in Annesley Bay.

Climate.— The climate in different parts of the colony varies greatly. Three distinct climatic zones are found: — (1) that of the coastlands, including altitudes up to 1650 ft., (2) that of the escarp- ments and valleys, and (3) that of the high plateau and alpine summits. In the coast zone the heat and humidity are excessive during most of the year, June, September and October being the hottest months. Rains occur between November and April, during which time the temperature is lower. In this zone malarial fevers prevail in winter. The heat is greatest at Massawa, where the mean temperature averages 88″ F., but where, in summer, the thermometer often rises to 120 F. in the shade. In the second zone the climate is more temperate and there is considerable varia- tion in temperature owing to nocturnal radiation. This zone falls within the regime of the summer monsoon rains, while those districts adjoining the coast zone enjoy also winter rains. August is the most rainy and May the hottest month. On the high plateau, i.e. the third zone, the climate is generally moderately cool. Slight rain falls in the spring and abundant monsoon rains from June to September. The heat is greatest in the dry season, November to April. Above 8500 ft. the climate becomes sub-alpine in character.

Flora and Fauna. — In the low country the flora differs little from that of tropical Africa generally, whilst on the plateau the vege- tation is characteristic of the temperate zone. The olive tree grows on the high plateau and covers the flanks of the hills to within 3000 ft. of sea-level. The sycamore-fig tree grows to enormous proportions in parts of the plateau. Lower down durra, maize and bultuc grow in profusion. In the northern part of the colony, especially along the Khor Baraka, the dom palm flourishes. The fauna includes, in the low country, the lion, panther, elephant, camel, and antelope of numerous species. On the plateau the fauna is that of Abyssinia {a. v.).

Inhabitants. — The inhabitants of the plains and foothills are for the most part semi-nomad shepherds, living on durra and milk. In the north these people are largely of Arab or Hamitic stock, such as the

Beni-Amer, but include various negro tribes. Afar and Somali form the population of the southern regions. The inhabi- tants of the plateau are Abyssinians. The nomads are Mussulmans and are, as a rule, docile and pacific, though the Danakils are given to occasional raiding. The Abyssinians are more warlike, but they have settled down under Italian rule. Among the native industries are mat-weaving, cotton-weaving, silver-working and rudimentary iron and leather working. (See Af ars ; Somaliland and Abyssinia.)

Towns. — The principal places on the coast are Massawa (q.v.), pop. about 10,000, the chief seaport of the colony, Assab, chief town of the Danakil region, to which converges the trade from Abyssinia across the Aussa country, and Zula (q.v.), identified with the ancient Adulis. The chief town in the interior is Asmara (q.v.), the capital of the colony and under the Abyssinians capital of the province of Hamasen, and favourite headquarters of Ras Alula (see below and also Abyssinia). It is situated 7800 ft. above the sea, and has something of the aspect of a European town. Keren, 50 m N.W. of Asmara, is the centre for a district (Bogos) fertilized by tne upper course of the Anseba; Agordat, on the river Baraka, on the road from Keren to Kassala, is the centre of the Beni-Amer, Algheden and Sabderat tribes; Mogolo, on the lower Mareb, is the rendezvous of the Baria and Baza tribes. Towards Abyssinia the chief towns are Saganeiti (capital of the Okule-Kusai province), Godofelassi and Adi-Ugri, the two latter situated in the fertile plain of the Serae; Adiquala, on the edge of the Mareb gorge; and Arrasa, the Centre of the districts constituting the province of Deki-Tesfa.

Agriculture and Trade. — The nomads of the plains possess large herds of cattle and camels. The low country is almost entirely

Eastoral and unsuited for the cultivation of crops. On the other and almost all European cereals flourish in the intermediate zone and on the high plateau, and the Abyssinian is a good agriculturist and understands irrigation. Numbers of emigrants from Italy possess farms on the plateau. Experiments in the cultivation of coffee, tobacco and cotton have given good results in the inter- mediate zone. Besides camels and oxen, sheep and goats are numerous, and meat, hides and butter are articles of local trade. Hides are the principal export (about £50,000 a year). Wax, gum, coffee and ivory are also exported. Pearl fishing is carried on at Massawa and the Dahlak islands. The annual value of the fisheries is about £40,000 (pearls £10,000, mother of pearl £30,000). Gold mines 1 are worked near Asmara. Salt, obtained from the salt lakes in the Aussa and Danakil countries, is a valuable article of commerce.

Cotton goods are the chief imports. There is a little trade with northern Abyssinia, but it is undeveloped. For the five years 1901-1905 the average value of the external trade was £456,000 per annum. The imports more than doubled the exports.

Communications. — A railway, 65 m. long, connects Massawa with Asmara. An extension of the line is planned from Asmara to Sabderat and Kassala. The whole territory is crossed by camel and mule paths between the sea and the high plateau, and between the various centres of population. Every valley that brings water to the Red Sea has a route leading to the high plateau. The great arteries, however, number three, which, starting from Massawa by way of Asmara, run, two to Abyssinia, and one to Kassala and Khartum. They are all more or less practicable for carts, and are flanked by a good telegraph line as long as they lie in Italian terri- tory. There are also two caravan routes from Assab Bay, across the Danakil country to southern Abyssinia. The northern leads by a comparatively easy ascent to Yejju, the more southern follows the valley of the Hawash. A telegraph line 500 m. long connects Massawa with Adis Ababa via Asmara. Massawa is also tele- graphically connected with the outside world by a cable to Perim via Assab. There is regular steamship communication with Italy.

Administration. — Eritrea is administered by a civil governor responsible to the ministry of foreign affairs at Rome. It is divided into six provinces, each governed by a regional commissioner. Some tracts of frontier territory are detached from the various regions and entrusted to political residents, as, for instance, on the Sudan frontier and also on the Abyssinian boundary, where strict surveillance is necessary to repress raiding incursions from Tigre, and where the chief intelligence department is established. The six regions or principal provinces ate: — Asmara, which includes Hamasen and other small districts; Keren, which comprises the high territories to the north of Asmara, i.e. the Bogos country; Massawa, extending over all the tribes between the high plateau and the sea from the Hababs to the Danakil ; Assab, which extends from- Edd to Raheita; Okule-Kusai, the plateau country S.E. of Asmara; Serae, including Deki-Tesfa, the country S.W. of Asmara. The regional commissioners and the political residents act either by means of the village headmen (Shum or Chicca) , by the chiefs of districts in the few localities where villages are still organized in districts, or by the headmen of tribes, and by the councils of the elders wherever these remain.

Revenue is derived from customs duties, direct taxation and tribute

paid by the nomad tribes. The local revenue, which for the period 1897-1907 was about £100,000 a year, is supplemented by grants from Italy, the total cost of the administration being about £400,000 yearly. Nearly half the expenditure is on the military force maintained.

Justice. — Civil justice for natives is administered, in the first instance, by the headmen of villages, provinces, tribes, or by councils of notables (Shumagalle) ; in appeal, by the residents and regional tribunals, and, in the last instance, by the colonial court of appeal. Europeans are entirely under Italian jurisdiction. Penal justice is administered by Italian judges only. An administrative tribunal settles, without appeal, questions of tribute, disputes concerning family, village or tribal landmarks, as well as suits involving the colonial government. The civil laws for the natives are those

established by local usage. Europeans are answerable to the Italian civil code. Penal laws are the same as in Italy, except where modified by local usages. Appeal to the Rome court of cassation is admitted against all penal and civil sentences.

Defence. — Defence is entrusted to a corps of colonial troops, partly Italian and partly native; to a militia {milizia mobile) formed by natives who have already served in the colonial corps; and to the chitet or general levy which, in time of war, places ali male able-bodied inhabitants under arms. The regional commis- sioners and political residents have at their disposal some hundreds of irregular paid soldiers under native chiefs. In war time these irregulars form part of the colonial corps, but in time of peace serve as frontier police. The colonial corps, about 5000 strong, garrisons the chief places of strategic importance, such as Asmara, Keren and Saganeiti. The irregular troops, on foot, or mounted on camels, number about 1000 men. The militia consists of 3500 men of all arms, and is intended in time of war to reinforce the various divisions of the colonial corps. The chitet yields between 3000 and 4000 men, to be employed on the lines of communication or in caravan service. All these troops are intended to ward off a first attack, so as to allow time for the arrival of reinforcements from Italy. The customs and political surveillance along the coast is entrusted, afloat, to the Massawa naval station, and, ashore, to a coastguard company 400 strong stationed at Meder, with detachments at Assab, Massawa,

Raheita, Edd and Taclai.

History. — Traces of the ancient Eritrean civilization are scarce. During the prosperous periods of ancient Egypt, Egyptian squadrons asserted their rule over the west Red Sea coast, and under the Ptolemies the port of Golden Berenice (Adulis?) was an Egyptian fortress, afterwards abandoned. During the early years of the Roman empire, Eritrea formed part of an important independent state — that of the Axumites (Assamites). At the end of the reign of Nero, and perhaps even earlier, the king of the Axumites ruled over the Red Sea coast from Suakin to the strait of Bab-el-Mandeb, and traded constantly with Egypt. This potentate called himself " king of kings," commanded an army and a fleet, coined money, adopted Greek as the official language, and lived on good terms with the Roman empire. The Axumites belonged originally to the Hamitic race, but the immigration of the Himyaritic tribes of southern Arabia speedily imposed a new language and civilization. Therefore the ancjent Abyssinian language, Geez, and its living dialects, Amharic and Tigrina, are Semitic, although modified by the influence of the old Hamitic Agau or Agao. Adulis (Adovlis), slightly to the north of Zula (q.v.), was the chief Axumite port. From Adulis started the main road, which led across the high plateau to the capital Axomis (Axum). Along the road are still to be seen vestiges of cities and inscribed monuments, such as the Himyaritic inscrip- tions on the high plateau of Kohait, the six obelisks with a Saban inscription at Toconda, and an obelisk with an inscription at Amba Sait. Other monuments exist elsewhere, as well as coins of the Axumite period wi,th Greek and Ethiopian inscriptions. After the rise of the Ethiopian empire the history of Eritrea is bound up with that of Ethiopia, but not so entirely 'as to be completely fused. The documents of the Portuguese expedition of the 16th century and other Ethiopian records show that all the country north of the Mareb enjoyed relative autonomy under a vassal of the Ethiopian emperor.

Michael, counsellor of Solomon, who was king of the country north of the Mareb, usurped the throne of Solomon during the reign of the Emperor Atzie Jasu II. (1729-1753), and, after proclaiming himself ras of Tigre and " protector of the empire," ceded the North Mareb country to an enemy of the rightful dynasty. Hence a long struggle between the dispossessed family and the occupants of the North Mareb throne. The coast regions had meantime passed from the control of the Abyssinians. In the 16th century the Turks made themselves masters of Zula, Massawa, &c, and these places were never recovered by the Abyssinians. In 1865 Massawa and the neighbouring coast was acquired by Egypt, the khedive Ismail

entertaining projects for connecting the port by railway with the Nile. The Egyptians took advantage of civil war in Abyssinia to seize Keren and the Bogos country in 1872 1 , an action against which the negus Johannes (King John) , newly come to the throne, did not at the

1 During the Second Empire unsuccessful efforts were made by France to obtain a Red Sea port and a foothold in northern Abyssinia. (See Somaliland : French.)

time protest. In 1875 and 1876 the Egyptians, who sought to increase their conquests, were defeated by the Abyssinians at Gundet and Gura. Walad Michael,the hereditary ruler of Bogos, fought as ally of King John at Gundet and of the Egyptians at Gura. For two years Walad Michael continued to harass the border, but in December 1878 he submitted to King John, by whose orders he was (Sept. 1879) imprisoned upon an amba, or flat-topped mountain, whence he only succeeded in escaping in 1890. In 1879 his territory was given by King John to Ras Alula, who retained it until, in August 1889, the Italians occupied Asmara (see Abyssinia: History).

An Egyptian garrison remained at Keren in the Bogos country until 1884, when in consequence of the revolt of the Mahdi it was withdrawn, Bogos being occupied by Abyssinia on the 12th of September of that year. On the 5th of February 1885 an Italian force, with the approval of Great Britain, occupied Massawa, the Egyptian garrison returning to Egypt. This occupation led to wars with Abyssinia and finally to the estab- lishment of the colony in its present limits. The history of the Italian-Abyssinian relations is fully told in the articles Italy and Abyssinia (history sections).

It was not, however, at Massawa that Italy first obtained a foothold in eastern Africa. The completion of the Suez Canal led Italy as well as Great Britain and France to seek territorial rights on the Red Sea coasts. The purchase of Assab and the neighbouring region for £1880, from the sultan Berehan of Raheita for use as a coaling station by the Italian Rubattino Steamship Company, in March 1870, formed the nucleus of Italy's colonial possessions. This purchase was protested against by Egypt, Turkey and Great Britain; the last named power being willing to recognize an Italian commercial settlement, but nothing more. (The Indian government viewed the establishment of the Italians on the new highway to the East with a good deal of ill-humour.) Eventually, the British opposition being overcome and that of Egypt and Turkey disregarded, Assab, by a decree of the 5th of July 1882, was declared an Italian colony. Between 1883 and 1888 various treaties were concluded with the sultan of Aussa ceding the Danakil coast to Italy and recognizing an Italian protectorate over the whole of his country — through which passes the trade route from Assab Bay to Shoa.

On the 1st of January 1890 the various Italian possessions on the coast of the Red Sea were united by royal decree into one province under the title of the Colony of Eritrea — so named after the Erythraeum Mare of the Romans. At first the government of the colony was purely military, but after the defeat of the Italians by the Abyssinians at Adowa, the administration was placed upon a civil basis (1 898- 1 900) . The frontiers were further defined by a French-Italian convention (24th of January 1900) fixing the frontier between French Somaliland and the Italian possessions at Raheita, and also by various agreements with Great Britain and Abyssinia. A tripartite agreement between Italy, Abyssinia and Great Britain, dated the 15th of May 1902, placed the territory of the Kanama tribe, on the north bank of the Setit, within Eritrea. A convention of the 16th of May 1908 settled the Abyssinian-Eritrean frontier in the Afar country, the boundary being fixed at 60 kilometres from the coast. The task of reconstructing the administration on a civil basis and of developing the commerce of the colony was entrusted to Signor F. Martini, who was governor for nine years (1898-1906) . Under civil rule the colony made steady though somewhat slow progress.

Authorities. — See B. Melli, La Colonia Eritrea dalle sue origini al anno 1901 (Parma, 1901) ; G. B. Penne, Per V Italia Africana. Studio critico (Rome, 1906) ; R. Perini, Di qua dal Mareb (Florence, 1905), a monograph on the Asmara zone ; F. Martini, Nell' Africa Italiana (3rd ed., Milan, 1891); A. B. Wylde, Modern Abyssinia, chaps, v.-ix. (London, 1901) ; E. D. Schoenfeld, Erythraa und der dgyptische Suddn, chaps, i.xii. (Berlin, 1904) ; Luigi Chiala, La Spedizione di Massana(Tur'm,i888) ; Abyssinian Green Books published at intervals in 1895 and 1 896, covering the period from 1870 to the end of the Italo Abyssinian War; Vico Mantegazza, La Guerra in Africa (Florence, 1896); General Baratieri, Memorie d' Africa (Rome, 1898); C. de la Jonquiere, Les Italiens en Erythree (Paris, 1897) ; G. F. H. Berke- ley, The Campaign of Adowa (London, 1902). For orography and geology see an article by P. Verri in Boll. Soc. geog. italiana,

1909, and for climate an article in Rivista coloniale (1906), by A. Tancredi. A. Allori compiled a Piccolo Dizionario eritreo, italiano-arabo-amarico (Milan, 1895).

For Afar consult W. Munzinger, " A Journey through the Afar Country " in Journ. Royal Geog. Soc. for 1869; V. Bottego, " Nella Terra dei Danakil," in Boll. Soc. Geog. Italiana, 1892; Count C. Rossini, " Al Ragali " in L'Espl. Comm. of Milan, I 903-1904; and articles by G. Dainelli and 0. Marinelli in the Riv. Geog. Italiana of Florence for 1906-1908, dealing with the volcanic regions.

Bibliographies will be found in G. Fumagalli's Bibliografia Etiopica (Milan, 1893) and in the Riv. Geog. Italiana for 1907.

ERIVAN, a government of Russia, Transcaucasia, having the province of Kars on the W., the government of Tiflis on the N., that of Elisavetpol on the N. and E., and Persia and Turkish Armenia on the S. It occupies the top of an immense plateau (6000-8000 ft.). Continuous chains of mountains are met with only on its borders, and in the E., but the whole surface is thickly set with short ridges and isolated mountains of volcanic origin, of which Alagoz (14,440 ft.) and Ararat (16,925 ft.) are the most conspicuous and the most important. Both must have been active in Tertiary times. Lake Gok-cha (540 sq. m.) is encircled by such volcanoes, and the neighbourhood of Alexandropol is a " volcanic amphitheatre," being entirely buried under volcanic deposits. The same is true of the slopes leading down to the river Aras; and the valley of the upper Aras is a stony desert, watered only by irrigation, which is carried on with great difficulty owing to the character of the soil. The government is drained by the Aras, which forms the boundary with Persia and flows with great velocity down its stony bed, the fall being 17-22 ft. per mile in its upper course, and 9 ft. at Ordubad, where it quits the government, while lower down it again increases to 23 ft. Many of the small lakes, filling volcanic craters, are of great depth. Timber is very scarce. A variety of useful minerals exists, but only rock-salt is obtained, at'Nakhichevan and Kulp. The climate is extremely varied, the following being the average temperatures and mean annual rainfall at Alexandropol (alt. 5078 ft.) and Aralykh (2755 ft.) respectively: year 42°, January 12°, July 65 , mean rainfall 16-2 in.; and year 53 , January 20-5°, July 79°, rainfall 63 in. The population numbered 829,578 in 1897 (only 375,086 women), of whom 82,278 lived in the towns. An estimate in 1906 gave a total of 909,100. They consist chiefly of Armenians (441,000), Tatars (40%), Kurds (49,389), with Russians, Greeks and Tates. Most of the Armenians belong to the Gregorian (Christian) Church, and only 4020 to the Armenian Catholic Church. The Tatars are mostly Shiite Mussul-mans, only 27, 596 being Sunnites 57772 belong to the peculiar faith of the Yezids. While barley only can be grown on the high parts of the plateau, cotton, mulberry, vines and all sorts of fruit are

cultivated in the valley of the Aras. Cattle-breeding is exten- sively carried on; camels also are bred, and leeches are collected out of the swamps and exported to Persia. Industry is in its infancy, but cottons, carpets, and felt goods are made in the villages. A considerable trade is carried on with Persia, but trade with Asia Minor is declining. The government is divided into seven districts — Erivan, Alexandropol, Echmiadzin (chief town, Vagarshapat), Nakhichevan, Novobayazet, Surmali (chief town, Igdyr), and Sharur-daralagoz (chief town, Norashen). The principal towns are Erivan (see below), Alexandropol (32,018 inhabitants in 1897), Novobayazet (8507), Nakhichevan (8845), and Vagarshapat (3400) .

ERIVAN, or Irwan, in Persian, Rewan, a town of Russia, capital of the government of the same name, situated in 40 14′ N., 44° 38′ E., 234 m. by rail S.S.W. of Tiflis, on the Zanga river, from which a great number of irrigation canals are drawn. Altitude, 3170 ft. Pop. (1873) 11,938; (1897) 29,033. The old Persian portion of the town consists mainly of narrow crooked lanes enclosed by mud walls, which effectually conceal the houses, and the modern Russian portion is laid out in long ill-paved streets. On a steep rock, rising about 600 ft. above the river, stand the ruins of the 16th-century Turkish fortress, containing part of the palace of the former Persian governors, a handsome but greatly dilapidated mosque, a modern Greek church and a cannon foundry. One chamber, called the Hall of the Sardar, bears witness to former splendour in its decorations. The finest

building in the city is the mosque of Hussein Ali Khan, familiarly known as the Blue Mosque from the colour of the enamelled tiles with which it is richly encased. At the mosque of Zal Khan a passion play is performed yearly illustrative of the assassination of Hussein, the son of Ali. Erivan is an Armenian episcopal see, and has a theological seminary. The only manufactures are a little cotton cloth, leather, earthenware and blacksmiths' work. The fruits of the district are noted for their excellence — especially the grapes, apples, apricots and melons. Armenians, Persians and Tatars are the principal elements in the population, besides some Russians and Greeks. The town fell into the power of the Turks in 1582, was taken by the Persians under Shah Abbas in 1604, besieged by the Turks for four months in 1615, and recon^ quered by the Persians under Nadir Shah in the 18th century. In 1780 it was successfully defended against Heraclius, prince of Georgia; and in 1804 it resisted the Russians. At length in 1827 Paskevich took the fortress by storm, and in the following year the town and government were ceded to

Russia by the peace of Turkman-chai. A Tatar poem in celebration of the event has been preserved by the Austrian poet, Bodenstedt, in his Tausend und ein Tage im Orient (1850).

ERLANGEN, a town of Germany, in the kingdom of Bavaria, on a fertile plain, at the confluence of the Schwabach and the Regnitz, 1 1 m. N. W. of Nuremberg, on the railway from Munich to Bamberg. Pop. (1905) 23,720. It is divided into an old and a new town, the latter consisting of wide, straight and well-built streets. The market place is a fine square. Upon it stand the town-hall and the former palace of the margraves of Bayreuth,. now the main building of the university. The latter was founded by the margrave Frederick (d. 1763), who, in 1742, established a university at Bayreuth, but in 1743 removed it to Erlangen. A statue of the founder, erected in 1843 by King Louis I. of Bavaria, stands in the centre of the square and faces the univer- sity buildings. The university has faculties of philosophy, law, medicine and Protestant theology. Connected with it are a library of over 200,000 volumes, geological, anatomical and mineralogical institutions, a hospital, several clinical establishments, labora- tories and a botanical garden. Among the churches of the town (six Protestant and one Roman Catholic), only the new town church, with a spire 220 ft. high, is remarkable. The chief industries of Erlangen are spinning and weaving, and the manu- facture of glass, paper, brushes and gloves. The brewing industry is also important, the beer of Erlangen being famous throughout Germany and large quantities being exported.

Erlangen owes the foundation of its prosperity chiefly to the French Protestant refugees who settled here on the revocation of the edict of Nantes and introduced various manufactures. In 101 7 the place was transferred frornthe bishopric of Wtirzburg to that of Bamberg; in 1361 it was sold to the king of Bohemia. It became a town in 1398 and passed into the hands of the Hohenzollerns, burgraves of Nuremberg, in 1416. There for nearly three centuries it was the property of the margraves of Bayreuth, being ceded with the rest of Bayreuth to Prussia in 1791. In 1810 it came into the possession of Bavaria. Erlangen was for many years the residence of the poet Friedrich Riickert, and of the philosophers Johann Gottlieb Fichte and Friedrich Wilhelm von Schnelling.

See Stein and Mtiller, Die Geschichte von Erlangen (1898).

ERLE, SIR WILLIAM (1 793-1880), English lawyer and judge, was born at Fifehead-Magdalen, Dorset, on the 1st of October 1793, and was educated at Winchester and at New College, Oxford. Having

been called to the bar at the Middle Temple in 1819 he went the western circuit, became counsel to the Bank of England, sat in parliament from 1837 to 1841 for the city of Oxford, and, although of opposite politics to Lord Lynd- hurst, was made by him a judge of the common pleas in 1845. He was transferred to the queen's bench in the following year, and in 1859 came back to the common pleas as chief justice upon the promotion of Sir Alexander Cockburn. He retired in 1866, receiving the highest eulogiums for the ability and impartiality with which he had discharged the judicial office. He died at his estate at Bramshott, Hampshire, on the 28th of January

t88o, and a monument without his name but in his memory (sometimes erroneously supposed to mark the place where an old gibbet was) stands on the top of Hindhead. ! '

See E. Manson, Builders of our Law (1904).

ERLKONIG, or Erl-King, a mythical character in modern German literature, represented as a gigantic bearded man with a golden crown and trailing garments, who carries children' away to that undiscovered country where he himself abides. There is no such personage in ancient German mythology, and the name is linguistically nothing more than the perpetuation of a blunder. It first appeared in Herder's Stimmen der Volker (1778), where it is used in the translation of the Danish song of the Elf-King's Daughter as equivalent to the Danish ellerkonge, or ellekonge, that is, elverkonge, the king of the elves; and the true German word would have been Elbkonig or Elbenkonig, afterwards used under the modified form of Elfenkonig by Wieland in his Oberon (1780). Herder was probably misled by the fact that the Danish word elle signifies not only elf, but also alder tree (Ger. Erie). His mistake at any rate has been perpetuated by both English and French translators, who speak of a " king of the alders," " un roi des aunes," and find an explanation of the myth in the tree-worship of early times, or in the vapoury emanations that hang like weird phantoms round the alder trees at night. The legend was adopted by Goethe as the subject of one of his finest ballads, rendered familiar to English readers by the translations of Lewis and Sir Walter Scott; and since then it has been treated as a musical theme by Reichardt and Schubert.

ERMAN, PAUL (1764-1851), German physicist, was born in Berlin

on the 29th of February 1764. He was the son of the historian Jean Pierre Erman (1735-1814), author of Histoire des rifugiis. He became teacher of science successively at the French gymnasium in Berlin, and at the military academy, and on the foundation of the university of Berlin in 1810 he was chosen professor of physics. He died at Berlin on the nth of October 1851. His work was mainly concerned with electricity and magnetism, though he also made some contributions to optics and physiology. His son, Georg Adolf Erman (1806-1877), was born in Berlin on the 12th of May 1806, and after studying natural science at Berlin and Konigsberg, spent from 1828 to 1830 in a journey round the world, an account of which he published in Reise um die Erde durch Nordasien und die beiden Ozeane (1833-1848). The magnetic observations he made during his travels were utilized by C. F. Gauss in his theory of terrestrial magnetism. He was appointed professor of physics at Berlin in 1839, and died there on the 12th of July 1877. From 1841 to 1865 he 1 edited the Archiv fur wissenschajtliche Kunde von Russland, and in 1874 he published, with H. J. R. Petersen, Die Grundlagen der Gauss' schen Theorie und die Erscheinungen des Erdmagnetismus im Jahre 182Q.

His son Johann Peter Adolf Erman (1854-), a famous Egyptologist, was born in Berlin on the 31st of October 1854. Educated at Leipzig and Berlin, he became extraordinary professor in 1883 and ordinary professor in 1892 of Egyptology in the university of Berlin, and in 1885 he was appointed director of the Egyptian department of the royal museum. For an account of the Egyptological work of Erman and his school, see Egypt: Language.

ERMANARIC (fl. 350-376), king of the East Goths, belonged to the Amali family, and was the son of Achiulf. His name occurs as Ermanaricus (Jordanes), Airmanareiks (Gothic), Eormenric (A. Sax.), Jormunrek (Norse), Ermenrich (M.H. German). Ermanaric built up for himself a vast kingdom, which eventually extended from the Danube to the Baltic and from the Don to the Theiss. He drove the Vandals out of Dacia, compelled the allegiance of the neighbouring tribes of West Goths, procured the submission of the Herules, of many Slav and Finnish tribes, and even of the Esthonians on the shores of the Gulf of Bothnia. In his later days the west Goths threw off his yoke, and, on the invasion of the Huns, rather than witness the downfall of his kingdom he is said by Ammianus Marcellinus to have committed suicide. His fate early became the centre of popular tradition, which found its way into the

narrative of Jordanes or Jornandes (De rebus geticis, chap. 24), who compared him to Alexander the Great and certainly ex- aggerated

the extent of his kingdom. He is there said to have caused a certain Sunilda or Sanielh to be torn asunder by wild horses on account of her husband's traitorous conduct. Her brothers Sarus and Ammius sought to avenge her. They succeeded in wounding, not in killing the Gothic king, whose death supervened in his one hundred and tenth year from the joint effects of his wound and fear of the Hunnish invasion. This is evidently a paraphrase of popular story which sought to supply plausible reasons for Ermanaric's end. In German legend Ermanaric became the typical cruel tyrant, and references to his crimes abound in German epic and in Anglo-Saxon poetry. He is made to replace Odoacer as the enemy of Dietrich of Bern, his nephew, and his history is related in the Norse Vilkina or ThidrekssagA, which chiefly embodies German tradition. His evil genius, Sifka, Sibicho or Bicci, brings about the death of his three sons. The Harlungs, Imbrecke and Fritile,' are his nephews, whom he has strangled for the sake of their treasure, the Brisingo meni. Sonhild or Svanhild becomes the wife of Ermanaric, and the motive for her murder is replaced by an accusation of adultery between Svanhild and her stepson. The story was already connected with the Nibelungen when it found its way to the Scandinavian north by way of Germany. In the Volsunga Saga Svanhild is the daughter of Sigurd and Gudrun. She is given in marriage to the Gothic king Jormunrek (Ermanaric), who sends his son Randver as proxy wooer in company of Bicci, the evil counsellor. Randver is persuaded by Bicci to take his father's bride for himself. Randver is hanged and Svanhild trampled to death by horses in the gate of the castle. Gudrun eggs on Sorli and Hamdir or Hamtheow, her two sons by her third husband, Jonakr the Hun, to avenge their sister. On the way they slay their half-brother Erp, whom they suspect of lukewarmness in the cause; arrived in the hall of Ermanaric they make a great slaughter of the Goths, and hew off the hands and feet of Ermanaric, but they themselves are slain with stones. The tale is told with variations by Saxo Grammaticus (Historia Danica, ed. Miiller, p. 408, &c), and in the Icelandic poems, the Lay of Hamtheow, Gudrun' s Chain of Woe, and in the prose Edda.

Bibliography. — W. Grimm, in Die deutsche Heldensage (2nd ed., Berlin, 1867), quotes the account given by Jordanes, references in Beowulf, in the Wanderer's Song, Exeter Book, in Parcival, in Dietricfis Flucht, the account given in the Quedlinburg Chronicle, by Ekkehard in the Chronicon Urspergense, by Saxo Grammaticus, &c. See also Vigfusson and Powell, Corpus poeticum boreale, vol. i. (Oxford, 1883), and H. Symons, " Die deutsche Heldensage " in Paul's Grundriss d. german. Phil. vol. iii. (Strassburg, 1900).

ERMELAND, or Ermland (Varmia), a district of Germany, in East Prussia, extending from the Frisches Haff, a bay in the Baltic, inland towards the Polish frontier. It is a well-wooded sandy tract of country, has an area of about 1650 sq. m., a population of 240,000, and is divided into the districts of Brauns- berg, Heilsberg, Rossel and Allenstein.

Ermeland was originally one of the eleven districts of old Prussia and was occupied by the Teutonic Knights (Deutsche-; Orden), being made in 1250 one of the four bishoprics of tl o country under their sway. The bishop of Ermeland shortly afterwards declared himself independent of the order, and became a prince of the Empire. In 1466 Ermeland, together with West Prussia, was by the peace of Thorn attached to the crown of Poland, and the bishop had a seat in the Polish senate. In 1772 it was again incorporated with Prussia. Among the bishops of the see, which still exists, with its seat in Frauenberg, may be mentioned Aeneas Sylvius Piccolomini, afterwards Pope Pius II., and Cardinal Stanislaus Hosius (1504-1579), the founder of the Jesuit college in Braunsberg.

See Hipler, Literaturgeschichte des Bisthums Ermeland (Brauns-berg, 1873); the Monumenta historiae Warmiensis (Mainz, 1860-1864, and Braunsberg, 1866-1872, 4 vols.); and Buchholz, Abriss einer Geschichte des Ermlands (Braunsberg, 1903.)

1 Emerka and Fridla (Beowulf, Quedlingburg Chron.), Aki and Etgard (Vilkina Saga). In the original myth the Harlungs, who are not to be confused with the Hartung brothers, were sent to bring home Surya, the bride of the sky-god, Irmintiu.

ERMELO, a district and town of the, Transvaal. The district lies in the south-east of the province and is traversed by the Drakensberg. In it are Lake Chrissie, the only true lake in the country, and the sources of the Vaal, Olifants, Komati, and Usuto rivers, which rise within 30 m. of one another. The region has a general elevation of about 5500 ft. and is fine agricultural and pastoral country, besides containing valuable minerals, including coal and gold. Ermelo town, pop. (1904) 1451, is by rail 175 m. S.E. of Johannesburg, and 74 m. S.S.W. of Machado- dorp on the Pretoria-Delagoa Bay railway. A government experimental farm, with some 1000 acres of plantations, is maintained here.

ERMINE, an alternative name for the stoat (Putorius ermineus), apparently applicable in its proper sense only when the animal is in its white winter coat. This animal measures ioin. inlength exclusive of the tail, which is about 4 in. long, and becomes bushy towards the point. The fur in summer is reddish brown above and white beneath, changing in the winter of northern latitudes to snowy whiteness, except at the tip of the tail, which at all seasons is black. In Scottish specimens this change in winter is complete, but in those found in the southern districts of England it is usually only partial, the ermine presenting during winter a piebald appearance. The white colour is evidently protective, enabling the animals to elude the observations of their enemies, and to steal unobserved on their prey. It also retains heat better

than a dark covering, and may thus serve to maintain an equable 1 temperature at all sea- 'sons within the body. ' The colour change seems • to be due to phagocytes devouring the pigment- bodies of the hair, and not to a moult.

The species is a native of the temperate and subarctic zones of the Old World, and is repre- sented in America by a form which can .scarcely be regarded as specifically distinct. It inhabits thickets and stony places, and frequently makes use of the deserted burrows of moles and other underground mammals. Exceedingly sanguinary in disposition, and agile in its movements, it feeds prin- cipally on rats, water-rats and rabbits, which it pursues with pertinacity and boldness, hence the name stoat, signifying bold, by which it is commonly known. It takes readily to water, and will even climb trees in pursuit of prey. It is. particularly destructive to poultry and game, and has often been known to attack hares, fixing itself to the throat of its victim, and defying all the efforts of the latter to disengage it. The female brings forth five young ones about the beginning of summer. The winter coat of the ermine forms one of the most valuable of commercial furs, and is imported in enormous quantities from Norway, Sweden, Russia and Siberia. It is largely used for muffs and tippets, and as a trimming for state robes, the jet black points of the tails being inserted at regular intervals as an ornament. In the reign of Edward III. the wearing of ermine was restricted to members of the royal family; but it now enters into almost all state robes, the rank and position of the wearer being in many cases indicated by the presence or absence, and the disposition, of the black spots. (See also Fur.)

ERMINE STREET. Documents and writers of the nth and succeeding centuries occasionally mention four " royal roads" in Britain —

Icknield Street, Erning or Ermine Street, Watling Street and Foss Way — as standing apart from all other existing roads and enjoying the special protection of the king. Un- fortunately these authorities are not at all agreed as to their precise course; the roads themselves do not occur as specially privileged in actual legal or other practice, and it is likely that the category of Four Roads is the invention of a lawyer or an antiquary. The names are, however, attested to some extent

Ermine or Stoat (Putorius ermineus).

by early charters which name them among other roads, as boundaries. From these charters we know that Icknield Street ran along the Berkshire downs and the Chilterns, that Ermine Street ran more or, less due north through Huntingdonshire, that Watling Street ran north-west across the midlands from London to Shrewsbury, and Foss diagonally to it from Lincoln or Leicester to Bath and mid-Somerset. This evidence only proves the existence of these roads in Saxon and Norman days, But they all seem to be much older. Icknield Street is probably a prehistoric ridgeway along the downs, utilized perhaps by the Romans near its eastern end, but in general not Roman. Ermine Street coincides with part of a line of Roman roads leading north from London through Huntingdon to Lincoln. This line is followed by the Old North Road through Cheshunt, Bunting- ford, Royston, and Huntingdon to Castor near Peterborough; and thence it can be traced through lanes and byways past Ancaster to Lincoln. Watling Street is the Roman highway from London by St Alban's (Verulamium) to Wroxeter near Shrewsbury (Viroconium). Foss is the Roman highway from Lincoln to Bath and Exeter. Hence it has been supposed, and is still frequently alleged, that the Four Roads were the principal highways of Roman Britain. This, however, is not the case. Icknield Street is not Roman and the three roads which follow Roman lines, Ermine Street, Watling Street, and Foss, held no peculiar position in the Romano-British road system (see Britain: Roman). In later times, the names Ermine Street, Icknield Street and Watling Street have been applied to other roads of Roman or- supposed Roman origin. This, however, is wholly the work of Elizabethan or subsequent antiquaries and deserves no credence.

The derivations of the four names are unknown. Icknield, Ermine and Watling may be from English personal names; Foss, originally Fos, seems to be the Lat. fossa in its occasional medieval sense of a bank of upcast earth or stones, such as the agger of a road. (F. J. H.)

ERMOLDUS NI6ELLUS, or Ermold the Black, was a monk of Aquitaine, who accompanied King Pippin, son of the emperor Louis I., on a campaign into Brittany in 824. Subsequently he was banished from Pippin's court on a charge of inciting the king against his father, and retired to Strassburg, where he sought to regain the emperor's favour by writing a poem on his life and deeds. About 830 he obtained his recall, and has been identified with Hermoldus, who appears as Pippin's chancellor in 838. Ermoldus was a cultured man with a knowledge of the Latin poets, and his poem, In honorem Hludovici imperatoris, has some historical value. It consists of four books and deals with the life and exploits of Louis from 781 to 826. He also wrote two poems in imitation of Ovid, -which were addressed to Pippin.

His writings are published in the Monumenta Germaniae historica. Scriptores, Band 2 (Hanover, 1826 fol.) ; by J. P. Migne in the Patrologia Latina, tome 105 (Paris, 1844); and by E. Dummler in the Po'etae Latini aevi Carolini, Band 2 (Berlin, 1881-1884). See W. O. Henkel, tlber den historischen Werth der Gedichte des Ermoldus Nigettus (Eilenburg, 1876); W. Wattenbach, Deutschlands Ge-schichtsquellen, Band 1 (Berlin, 1904) ; and A. Potthast, Bibliotheca historica, pp. 430-431 (Berlin, 1896).

ERNE, the name of a river and two lakes in the north-west of Ireland. The river rises in Lough Gowna, county Longford, 214 ft. above sea-level, flows north through Lough Oughter with a serpentine course and a direction generally northward, and then broadens into the Upper Lough Erne, a shallow irregular sheet of water 13 m. long, so beset with islands as to present the appearance of a number of water-channels ramify- ing through the land. The river then winds past the town of Enniskillen on its island, and enters Lough Erne, a beautiful lake nearly 18 m. long and 5 m. in extreme width, containing many islands, but less closely covered with them than the upper lough. One of them, Devenish, is celebrated for its antiquarian remains (see Enniskillen). The river then runs westward to Donegal Bay, forming a fine fall at Ballyshannon (g.v.). Lough Erne contains trout and pike. These waters admit of navigation by small steamers, but little trade is carried on. The area of

the Erne basin, which includes a vast number of small loughs, is about 1600 sq. m., and it covers part of the counties Cavan,

Longford, Leitrim, Fermanagh and Donegal. The length of the Erne valley is about 70 m.

ERNEST I. [Ernst Anton Karl Ludwig], duke of Saxe- Coburg-Gotha (1784-1844), was the son of Francis, duke of Saxe-Coburg-Saalfeld, and was born on the 2nd of January 1784. At the time of his father's death (oth of December 1806) the duchy of Coburg was occupied by Napoleon as conquered territory, and Ernest did not come into his inheritance till after the peace of Tilsit (July 1807). Owing to the part he had played in assisting the Prussians at the battle of Auerstadt he continued out of favour with Napoleon, and he threw himself with vigour into the war of liberation against the French. After the battle of Leipzig he was given the command of the V. army corps and reduced Mainz by blockade; he also commanded the Saxon troops during the campaign of 181 5. By the congress of Vienna he was rewarded with the principality of Lichtenberg on the left bank of the Rhine, which received a slight augmentation after the second peace of Paris. These territories he sold to Prussia in 1834 In 1826, in the division of the territories of the duchy of Saxe-Gotha which followed the death of its last duke (February 1825), he received the duchy of Gotha, ceding that of Saalfeld to the duke of Meiningen; and he now exchanged his style of Ernest III. of Saxe-Coburg-Saalfeld for that of Ernest I. of Saxe-Coburg-Gotha. In 1821 he had given a constitution to Coburg, but he did not interfere with the traditional system of estates at Gotha. He died on the 29th of January 1844.

Duke Ernest, who was not only a good soldier and keen sportsman, but an enlightened patron of the arts and sciences, did much for the economic, educational and constitutional development of his territories; and his advice always carried great weight in the councils of the other German sovereigns. It was, however, for the splendid international position attained by the house of Coburg under him that his reign is chiefly dis- tinguished. His younger brother Leopold (q.v.) became king of the Belgians; his brother Ferdinand (b. 1785) married the wealthy princess Antoinette von Kohary (1816) and was the father of the duchess of Nemours and of the future King Ferdinand of Portugal. Of his sisters, Antoinette (17 79-1824) married Duke Alexander of Wurttemberg; Juliane [Alexandra Feodorovna] (1781-1860) married the Russian cesarevich Constantine, from whom she was, however, divorced in 1820; and Victoria (1786-1861), wife of Edward Augustus, duke of Kent, became the mother of Queen Victoria; Duke Ernest was twice married: (1) in 1817 to Louise, daughter of Duke Augustus of Saxe-Gotha, whom he finally divorced in 1826; (2) in 1831 to Maria,

daughter of Duke Alexander of Wurttemberg. Of his sons, by his first wife, Ernest succeeded him in the duchy, and Albert married Queen Victoria.

ERNEST II., duke of Saxe-Coburg-Gotha (1818-1893), was born at Coburg on the 21st of June 1818, being the eldest son of Duke Ernest I. He enjoyed a varied education; he studied at the university of Bonn with his brother Albert; his military training he received in the Saxon army. The widespread connexions of his family opened to him many courts of Europe, and after he became of age he travelled much. The position of his uncle Leopold, who was king of the Belgians, and especially the marriage of his brother Albert to the queen of England, his cousin, gave him peculiar opportunities for becoming acquainted with the political problems of Europe. In 1840-1841 he under- took a journey to Spain and Portugal; in the latter country another cousin, Ferdinand, was king-consort. In 1 844 he succeeded his father. His own character and the influence of the king of the Belgians made him one of the most Liberal princes in Germany. He was able to bring to a satisfactory conclusion disputes with the Coburg estates. He passed through the ordeal of the revolution of 1848 with little trouble, for he anticipated the demands of the people of Gotha for a reform, and in 1852 introduced a new constitution by which the administration of his two duchies was assimilated in many points. The govern- ment of his small dominions did not afford sufficient scope for

his restless and versatile ambition; his desire to play a great part in German affairs was probably increased by the feeling that, though he was the head of his house, he was to some extent overshadowed by the younger branches of the family which ruled in Belgium, England and Portugal. He was one of the foremost supporters of every attempt made to reform the German constitution and bring about the unity of Germany. He took a warm interest in the proceedings of the Frankfort parliament, and it was often said, probably without reason, that he hoped to be chosen emperor himself. However that may be, he strongly urged the king of Prussia to accept that position when it was offered him in 1840; he took a very prominent part in the com- plicated negotiations of the following year, and it was at his suggestion that a congress of princes met at Berlin in 1850. He highly valued the opportunities which this and similar meetings gave him for exercising political influence, and he would have felt most at home as a member of a permanent council of the German princes.

Ambitious also of military distinction, and sympathizing with the rising of the people of Schleswig-Holstein against the Danes in 1849,

Ernest accepted a command in the federal army. In the engagement of Eckernforde in April 1849 the troops under his orders succeeded in capturing two Danish frigates, a remarkable feat of which he was justly proud. His greatest services to Germany were performed during the years of reaction which followed ; almost alone among the German princes he remained faithful to the Liberal and National ideals, and he allowed his dominions to be used as an asylum by the writers and politicians who had to leave Prussia and Saxony. The reactionary parties looked on him with great suspicion, and it was at this time that he formed a friendship with Gustav Freytag, the celebrated novelist, whom he protected when the Prussian government demanded his arrest. His connexion with the English court gave him a position of much influence, but no one was more purely German in his feelings and opinions. The marriage of his niece Victoria with Frederick, the heir to the Prussian throne, strengthened his connexion with Prussia, but caused the Con- servative party to look with increased suspicion on the Coburg influence. He was the first German prince to visit Napoleon III., and was present when Orsini made his celebrated attempt on the emperor's life. After i860 he became the chief patron and protector of the National Verein; he encouraged the newly-formed rifle clubs, andnotwithstandingthestrongdisapproval of his fellow- monarchs, allowed his court to become the centre of the rising national agitation. Still a warm adherent of Prussia, in 1862 he set an example to the other princes by voluntarily making an agreement by which his troops were placed in war under the command of the king of Prussia. Like all the other Nationalists, he was much embarrassed by the policy of Bismarck, and the democratic opinions of the Coburg court, which were shared by the crown prince Frederick, were a serious embarrassment to that minister. The opposition became more accentuated when the duke allowed his dominions to be used as the headquarters of the agitation in favour of Frederick, duke of Augustenburg, who claimed the duchies of Schleswig and Holstein, and it was at this time that Bismarck is reported to have said that if Frederick the Great had been alive the duke would have been in the fortress of Spandau. In 1863 he was present at the Filrstentag in Frankfort, and from this time was in more frequent communica- tion with the Austrian court, where his cousin Alexander, Count Mensdorff, was minister. However, when war broke out in 1866, he at once placed his troops at the disposition of Prussia; Bismarck had in an important letter explained to him his policy and tactics. He was personally concerned in one of the most interesting events of the war; for the Hanoverian army, in its attempt to march south and join the Bavarians, had to pass through Thuringia, and the battle of

Langensalza was fought in the immediate neighbourhood of Gotha. His troops took part in the battle, which ended in the rout of the Prussians, the duke, who was not present during the fight, in vain attempt- ing to stop it. He bore an important share in the negotiations before and after the battle, and his action at this time has been

the. subject of much controversy, for it was suggested that while he offered to mediate he really acted as a partisan of Prussia. For his services to Prussia he received as a present the forest of Schmalkalden. He was with the Prussian headquarters in Bohemia during the latter part of the war.

With the year 1866 the political r61e which Ernest had played ended. The result was perhaps not quite equal to his expecta- tions, but it must be remembered how difficult was the position of the minor German princes; and he quoted with great satis- faction the words used in 1871 by the emperor William at Versailles, that " to him in no small degree was due the establish- ment of the empire." He was a man of varied tastes, a good musician — he composed several operas and songs — and a keen sportsman, a quality in which he differed from his brother. Notwithstanding his Liberalism, he had a great regard for the dignity of his rank and family, and in his support of constitutional government would never have sacrificed the essential prerogatives of sovereignty. He died at Reinhardsbrunn on the 22nd of August 1893. In 1842 the duke married Alexandrine, daughter of the grandduke of Baden; there were no children by this marriage and the succession to Saxe-Coburg-Gotha passed therefore to the children of his younger brother Albert. By Albert's marriage contract the duchy could not be held together with the English crown; thus his eldest son, afterwards Edward VII., was passed over and it came to his second son, Alfred, duke of Edinburgh (1844-1900). When Alfred died without sons in July 1900 the succession to the duchy passed to a younger brother Arthur, duke of Connaught; but the duke and his son, Arthur, passed on their claim to Charles Edward, duke of Albany (b. 1884), who became duke of Saxe-Coburg-Gotha in succession to his uncle Alfred. In 1905 Charles Edward married Victoria Adelaide (b. 1885), princess of Schleswig-Holstein, by whom he has a son John Leopold (b. 1906).

Duke Ernest was something of a writer. He brought out an account of

the travels in Egypt and Abyssinia which he undertook in 1862 as Reise des Herzogs Ernst von Sachsen-Koburg-Gotha nach Agypten (Leipzig, 1864); and he published his memoirs, Aus meinem Leben und aus meiner Zeit (Berlin, 1887-1889). This work is in three volumes and contains much valuable information on a most critical period of German history; there is an English translation by P. Andreae (1888-1890).

See also SirT. Martin, Life of H.R.H. the Prince Consort (1875-1880); Hon. C. Grey, Early Years of the Prince Consort (1867) ; A. Ohorn, llerzog Ernst II., ein Lebensbild (Leipzig, 1894); and E. Temoeltev, Herzo? Ernst von Koburg und das Jahr 1866 (Berlin, 1898). (J- W. He.)

ERNEST AUGUSTUS (1771-1851), king of Hanover and duke of Cumberland, fifth son of the English king George III., was born at Kew on the 5th of June 1771. Having studied at the university of Gottingen, he entered the Hanoverian army, serving as a leader of cavalry when war broke out between Great Britain and France in 1793, and winning a reputation for bravery. He lost the sight of one eye at the battle of Tournai in May 1794, and when Hanover withdrew from the war in 1795 he returned to England, being made lieutenant-general in the British army in 1799. In the same year he was created duke of Cumberland and Teviotdale and granted an allowance of £12,000 a year, after which he held several lucrative military positions in England, and began to attend the sittings of the House of Lords and to take part in political life. A stanch Tory, the duke objected to all proposals of reform, especially to the granting of any relief to the Roman Catholics, and had great influence with his brother the prince regent, afterwards King George IV., in addition to being often consulted by the Tory leaders. In 1810 he was severely injured by an assassin, probably his valet Sellis, who was found dead; and subsequently two men were imprisoned for asserting that the duke had murdered his valet. Recovering from his wounds, Cumberland again proceeded to the seat of war; and having been made a British field-marshal, was in command of the Hanoverian army during the campaigns of 1813 and 1814, being present, although not in action, at the battle of .Leipzig. In May 1815 Ernest married his cousin, Frederica (1778-1841), daughter of Charles II. duke of Mecklenburg-Strelitz and widow

of Frederick, prince of Solms-Braunfels, a union which wai very repugnant to his mother Queen Charlotte, and was disliked in England, where the duke's strong Toryism had made him unpopular. Parliament refused to increase his allowance from £18,000, to which

it had been raised in 1804, to £24,000 a year, and indignant at the treatment he received the duke spent some years in Berlin. Returning to England after the accession of George IV. in 1820, his political power was again considerable, while deaths in the royal family made it likely that he would succeed to the throne. Although his personal influence with the sovereign ceased upon the death of George IV. in 1830, the duke continued to oppose all measures for the extension of civil and religious liberty, including the Reform Bill of 1832; and his unpopularity was augmented by suspicions that he had favoured the formation of Orange lodges in the army. When William IV. died in June 1837, the crowns of Great Britain and Hanover were separated; and Ernest, as the nearest male heir of the late king, became king of Hanover. At once cancelling the constitution which William had given to his kingdom in 1833, he acted as an absolute monarch, and the constitution which he sanctioned in 1840 was permeated with his own illiberal ideas. In German politics he was vigilant and active, and mindful of the material interests of his country. His reign, however, was a stormy one, and serious trouble between king and people had arisen when he died at Herrenhausen on the 18th of November 1851 (see Hanover: History). In spite of his arbitrary rule and his reactionary ideas the king was popular among his subjects, and his statue in Hanover bears the words "Dem Landes Vater sein treues Volk." Ernest, who is generally regarded as the ablest of the sons of George III., left an only child, George, who succeeded him as king of Hanover.

See C. A. Wilkinson, Reminiscences of the Court and Times of King Ernest of Hanover (London, 1886); von Malortie, Konig Ernst August (Hanover, 1861); and the various histories of Great Britain and Hanover for the period.

ERNESTI, JOHANN AUGUST (1707-1781), German theologian and philologist, was born on the 4th of August 1707, at Tennstadt in Thuringia, of which place his father was pastor, besides being superintendent of the electoral dioceses of Thuringia, Salz and Sangerhausen. At the age of sixteen he was sent to the cele- brated Saxon cloister school of Pforta (Schulpforta). At twenty he entered the university of Wittenberg, and studied afterwards at the university of Leipzig. In 1730 he was made master in the faculty of philosophy. In the following year he accepted the office of conrector in the Thomas school of Leipzig, of which J. M. Gesner was then rector, an office to which Ernesti succeeded in 1734. He was, in 1742, named professor extraordinarius of ancient literature in the university of Leipzig, and in 1756 professor ordinarius of rhetoric. In the same year he received the degree of doctor of theology, and in 1759 was

appointed professor ordinarius in the faculty of theology. Through his learning and his manner of discussion, he co-operated with S. J. Baumgarten of Halle (1706-1757) in disengaging the current dogmatic theology from its many scholastic and mystical ex-crescences, and thus paved a way for a revolution in theology. He died, after a short illness, in his seventy-sixth year, on the Iith of September 1781.

It is perhaps as much from the impulse which Ernesti gave to sacred and profane criticism in Germany, as from the intrinsic excellence of his own works in either department, that he must derive his reputation as a philologist or theologian. With J. S. Semler he co-operated in the revolution of Lutheran theology, and in conjunction with Gesner he instituted a new school in ancient literature. He detected grammatical niceties in Latin, in regard to the consecution of tenses which had escaped preceding critics. His canons are, however, not without exceptions. As an editor of the Greek classics, Ernesti hardly deserves to be named beside his Dutch contemporaries, Tiberius Hemsterhuis (1685-1766), L. C. Valckenaer (1715-1785), David Ruhnken (1723-1798), or his colleague J. J. Reiske (1716-1774). The higher criticism was not even attempted by Ernesti. But to him and to Gesner is due the credit of having formed, by discipline

and by example, philologists greater than themselves, and of having kindled the national enthusiasm for ancient learning. It is chiefly in hermeneutics that Ernesti has any claim to eminence as a theologian. But here his merits are distinguished, and, at the period when his Institutio Inlerpretis N. T. was pub- lished (1761), almost peculiar to himself. In it we find the principles of a general interpretation, formed without the assist- ance of any particular philosophy, but consisting of observations and rules which, though already enunciated, and applied in the criticism of the profane writers, had never rigorously been employed in biblical exegesis. He was, in fact, the founder of the grammatico-historical school. He admits in the sacred writings as in the classics only one acceptation, and that the grammatical, convertible into and the same with the logical and historical. Consequently he censures the opinion of those who in the illustra- tion of the Scriptures refer everything to the illumination of the Holy Spirit, as well as that of others who, disregarding all knowledge of the languages, would explain words by things. The ”

analogy of faith," as a rule of interpretation, he greatly limits, and teaches that it can never afford of itself the explana- tion of words, but only determine the choice among their possible meanings. At the same time he seems unconscious of any incon- sistency between the doctrine of the inspiration of the Bible as usually received and his principles of hermeneutics.

Among his works the more important are: — I. In classical literature: Initio, doctrinae Solidioris (1736), many subsequent editions; Initio, rhetorica (1730); editions, mostly annotated, of Xenophon's Memorabilia (1737), Cicero (1737-1739). Suetonius (1748), Tacitus (1752), the Clouds of Aristophanes (1754). Homer (i759 I 764), Callimachus (1761), Polybius (1764), as well as of the Quaestura of Corradus, the Greek lexicon of Hedericus, and the Bibliotheca Latino of Fabricius (unfinished); Archaeologia litteraria (1768), newand improved edition by Martini (1790) ; HoratiusTursel linus De particulis (1769). II. In sacred literature: Antimuratorius sive confutatio disputalionis Muratorianae de rebus liturgicis (175S- 1758); Neue theologische Bibliothek, vols. i. to x. (1760-1769); Institutio interpretis Nov. Test. (3rd ed., 1775); Neueste theologische Bibliothek, vols. i. to x. (1771-1775). Besides these, he published more than a hundred smaller works, many of which have been col- lected in the three following publications: — Opuscula oratorio (1762, 2nd ed., 1767); Opuscula philologica et critica (1764, 2nd ed., 1776); Opuscula theologica (1773). See Herzog-Hauck, Real- encyklopddie; J. E. Sandys, Hist, of Class. Schol. iii. (1908).

ERNESTI, JOHANN CHRISTIAN GOTTLIEB (1756-1802), German classical scholar, was born at Arnstadt, Thuringia, and studied under his uncle, J. A. Ernesti, at the university of Leipzig. On the 5th of June, 1782, he was made supplementary professor of philosophy at his own university; and on the death of his cousin August Wilhelm in 1801 he was for five months

professor of rhetoric. He died on the 5th of June of the following

year.

His principal works are: — Editions of Aesop's Fabulae (1781); of the Glossae sacrae of Hesychius (1785) and Suidas and Phavorinus (1786); and of Silius Italicus Punica (1791-1792); Lexicon Techno- logiae Graecorum rhetoricae (1795); Lexicon technologiae Latinorum rhetoricae (1797), and Cicero's Geist und Kunsi (1799-1802).

ERNST, HEINRICH WILHELM (1814-1865), German violinist and composer, was born at Briinn, in Moravia, in 18 14. He was educated at the Conservatorium of Vienna, studying the violin under Joseph Bohm and Joseph Mayseder, and composition under Ignaz von Seyfried. At the age of sixteen he made a concert tour in south Germany, which established his reputation as a violinist of the highest promise. In 1832 he went to Paris, where he lived for several years. During this period he formed an intimacy with Stephen Heller, which resulted in their charming joint compositions — the Pensees fugitives for piano and violin. In 1843 he paid his first visit to London. The impression which he then made as a violinist was more than confirmed in the follow- ing year, when his rare powers were recognized by the musical public. Thenceforward he visited England nearly every year, until his health broke down owing to long-continued neuralgia of a most severe kind. The last seven years of his life were spent in retirement, chiefly at Nice, where he died on the 8th of October 1865. As a violinist Ernst was distinguished by his almost unrivalled executive power, loftiness of conception, and intensely passionate expression. As a composer he wrote chiefly for his

own instrument, and his Elegit and Otello Fantasia rank among the most treasured works for the violin.

ERODE, a town of British India, in the Coimbatore district of Madras, situated on the right bant of the river Cauvery, which is here crossed by an iron railway girder bridge of 22 spans. Pop. (1901) 15,529. Here the South Indian railway joins the South-Western line of the Madras railway, 243 m. from Madras, There are exports of cotton and saltpetre; and the town has : a steam cotton press.

EROS, a minor planet discovered by Witt at Berlin on the 14th of August 1898, and, so far as yet known, unique in that its perihelion lies far within the orbit of Mars.

EROS, in Greek mythology, the god of love. He is not mentioned in Homer; in Hesiod {Theog. 120) he is one of the oldest and the most beautiful of the gods, whose power neither gods nor men can resist. He also evolves order and harmony out of Chaos by uniting the separated elements. This cosmic Eros, who in Orphic cosmogony sprang from the world-egg which Chronos, or Time, laid in the bosom of Chaos, and which is the origin of all created beings, degenerated, in later mythology into the capricious god of sexual passion, the son of Aphrodite and Zeus, Ares or Hermes. He is commonly represented as a mischievous boy, the tormentor of gods and men, even his own

mother not being proof against his attacks. His brother is Anteros, the god of mutual love, who punishes those who do not return the love of others, without which Eros could not thrive; he is sometimes described as the opponent of Eros. The chief associates of Eros are Pothos and Himeros (Longing and Desire), Peitho (Persuasion), the Muses and the Graces; he himself is in constant attendance on Aphrodite. Later writers (Euripides being the first) assumed the existence of a number of Erotes (like the Roman Amores and Cupidines) with similar attributes. According to the philosophers, Eros was not only the god of sexual love, but also of the loyal and devoted friendship of men; hence the Theban " Sacred Band " was devoted to him, and the Cretans and Spartans offered sacrifice to him before going into battle (Athenaeus xiii. p. 561). In Alexandrian poetry Eros is at one time the powerful god who conquers all, at another the elfish god of love. For the Roman adaptation of Eros see Cupid, and for the later legend of Cupid and Psyche see Psyche.

In art Eros is represented as a beautiful youth or a winged child. His attributes are the bow and arrows and a burning torch. The rose, the hare, the cock and the goat are frequently associated with him. The most celebrated statue of him was at Thespiae, the work of Praxiteles. Other famous representations are the Vatican torso and Eros trying his bow (in the Capitoline museum).

See J. E. Harrison, Prolegomena to the Study of Greek Religion (ˆ03) ; G.. F. Schomann, De Cupidine Cosmogonico (1852); E. Gerhard, Uber den Gott Eros (1850); articles in Roscher's Lexikon der Mythologie, Daremberg and Saglio's Dictionnaire des antiquites, and Pauly-Wissowa's Realencyclopddie.

ERPENIUS (original name van Erpe), THOMAS (1584-1624), Dutch Orientalist, was born at Gorcum, in Holland, on the nth of September 1584. After completing his early education at Leiden, he entered the university of that city, and in 1608 took the degree of master of arts. By the advice of Scaliger he studied Oriental languages whilst taking his course of theology. He afterwards travelled in England, France, Italy and Germany, forming connexions with learned men, and availing himself of the information which they communicated. During his stay at Paris he contracted a friendship with Casaubon, which lasted during his life, and also took lessons in Arabic from an Egyptian, Joseph Barbatus, otherwise called Abu-dakni. At Venice he perfected himself in the Turkish, Persic and Ethiopic languages. After a long absence, Erpenius returned to his own country in 161 2, and on the 10th of February 1613 he was appointed professor of Arabic and other Oriental languages, Hebrew excepted, in the university of

Leiden. Soon after his settlement at Leiden, animated by the example of Savary de Breves, who had estab- lished an Arabic press at Paris at his own charge, he caused new Arabic characters to be cut at a great expense, and erected a press in his own house. In 1619 the curators of the university of Leiden

instituted a second chair of Hebrew in his favour. In 1620 he was sent by the States of Holland to induce Pierre Dumoulin or Andre Rivet to settle in that country; and after a second journey he was successful in inducing Rivet to comply with their request. Some time after the return of Erpenius, the states appointed him their interpreter; and in this capacity he had the duty imposed upon him of translating and replying to the different letters Of the Moslem princes of Asia and Africa. His reputation had now spread throughout all Europe, and several princes, the kings of England and Spain, and the archbishop of Seville made him the most flattering offers; but he constantly refused to leave his native country. He was preparing an edition of the Koran with a Latin translation and notes, and was projecting an Oriental library, when he died prematurely on the 13th .of November 1624.

Among his works may be mentioned his Grammatica Arabica, published originally in 1613 and often reprinted; Rudimenta linguae Arabicae (1620); Grammatica Ebraea generalis (1621); Grammatica Chaldaica et Syria (1628) ; and an edition of Elmacin's History of the Saracens.

ERROLL (or Errol), FRANCIS HAY, oth Earl ot? (d. 1631), Scottish nobleman, was the son of Andrew, 8th earl, and of Lady Jean Hay, daughter of William, 6fh earl. The date of his birth is unrecorded, but he succeeded to the earldom (cr. 1453) in 1585, was early converted to Roman Catholicism, and as the associate of Huntly joined in the Spanish conspiracies against the throne of Elizabeth. A letter written by him, declaring his allegiance to the king of Spain, having been inter- cepted and sent by Elizabeth to James in February 1589, he was declared a rebel by the council. He engaged with Huntly and Crawford in a rebellion in the north of Scotland, but their forces surrendered at Aberdeen on the arrival of the king in April; and in July Erroll gave himself up to James, who leniently refrained from exacting any penalty. In September of the same year he entered into a personal bond with Huntly for mutual assistance;

and in 1590 displeased the king by marrying, in spite of his prohibition, Lady Elizabeth Douglas, daughter of the earl of Morton. He was imprisoned on suspicion of com- plicity in the attempt made by Gray and Bothwell to surprise the king at Falkland in June 1592; and though he obtained his release, he was again proclaimed a rebel on account of the discovery of his signature to two of the " Spanish Blanks," unwritten sheets subscribed with the names of the chief conspirators in a plot for a Spanish invasion of Scotland, to be filled up later with the terms of the projected treaty. After a failure to apprehend him in March 1593, Erroll and his companions were sentenced to abjure Romanism or leave the kingdom ; and on their non-compliance were in 1594 declared traitors. On the 3rd of October they defeated at Glenlivet a force sent against them under Argyll; though Erroll himself was severely wounded, and Slains Castle, his seat, razed to the ground. The rebel lords left Scotland in 1595, and Erroll, on report of his further con- spiracies abroad, was arrested by the states of Zealand, but was afterwards allowed to escape. He returned to Scotland secretly in 1596, and on the 20th of June 1597 abjured Romanisn? and made his peace with the Kirk. He enjoyed the favour of the king, and in 1602 was appointed a commissioner to negotiate the union with England. His relations with the Kirk, however, were not so amicable. The reality of his conversion was disputed, and on the 21st of May 1608 he was confined to the city of Perth " for the better resolution of his doubts," being subsequently declared an obstinate " papist," excommunicated, deprived of his estate, and imprisoned at Dumbarton; and after some further vacillation was. finally released in May 161 1. Lord Erroll died on the 16th of July 163 1, and was buried in the church of Slains. He married (1) Anne, daughter of John, 4th earl of Atholl; (2) Margaret, daughter of the regent Murray; and (3) Elizabeth, daughter of William, 6th earl of Morton. By his third wife he had several children, of whom his eldest son, William, succeeded him. The dispute which began in his lifetime concerning the hereditary office of lord high constable between the families of Erroll and of the Earl Marischal was settled finally in favour of the former; thus establishing the

precedence enjoyed by the earls bf Erroll next after the royal family over all other subjects in Scotland.

See The Erroll Papers (Spalding Club Miscellany, vol. ii. 211); Andrew Lang, Hist, of Scotland, vol. ii. ; Hist. MSS. Comm. MSS. of Earl of Mar and Kellie; D. Calderwood's Hist, of the Church of Scotland; John Spalding's Memorials (Spalding Club, 1850); Collected Essays of T. G. Law, ed. by P. H. Brown (1904); Treason

and Plot, by M. A. S. Hume (1901).

ERROR (Lat. error, from errare, to wander, to err), a mistake, a departure or deviation from what is true, exact or right. For the legal process by which a judgment could be reversed on the ground of error, known as a " writ of error," see Writ and Appeal. The words " error excepted "or " errors and omissions excepted " (contracted to " E.E." " E. & O.E."), are frequently placed at the end of a statement of account or an invoice, so that the accounting party may reserve the right to correct any errors or omissions which may be subsequently discovered, or make further claims in respect of them. In mathematics, " error " is the deviation of an observed or calculated quantity from its true value. The calculus of errors leads to the formulation of the " law of error," which is an analytical expression of the most probably true value of a series of discordant values (see Probability).

ERSCH, JOHANN SAMUEL (1766-1828), the founder of German bibliography, was born at Grossglogau, in Silesia, on the 23rd of June 1766. In 1785 he entered the university of Halle with the view of studying theology; but soon his whole attention became engrossed by history, bibliography and geography. At Halle he made the acquaintance of J. E. Fabri, professor of geography; and when the latter was made professor of history and statistics at Jena, Ersch accompanied him thither, and aided him in the preparation of several works. In 1788 he published the Verzeichnis aller anonymischen Schriften, as a supplement to the 4th edition of Meusel's Gelehrtes Deutschland. The researches required for this work suggested to him the preparation of a Repertorium iiber die allgemeinen deutschen Journale und andere periodische Sammlungen fur Erdbeschreibung, Geschichte, und die damit verwandten Wissenschaften (Lemgo, 1 790-1 792). The fame which this publication acquired him led to his being engaged by Schiitz and Huf eland to prepare an Allgemeines Repertorium der Literatur, published in 8 vols. (Jena and Weimar, 1793-1809), which condensed the literary productions of 15 years (178 5-1 800), and included an account not merely of the books published during that period, but also of articles in periodicals and magazines, and even of the criticisms to which each book had been subjected. While engaged in this great work he also projected La France littiraire, which was published at Hamburg in 5 vols., from 1797 to 1806. In 1795 he went to Hamburg to edit the Neue Hamburger Zeitung, founded by Victor Klopstock, brother of the poet, but returned in 1800 to Jena to take active part in the Allgemeine Literatur- zeitunr. He also obtained in the same year the office of librarian in the university,

and in 1802 was made professor of philosophy. In 1803 he accepted the chair of geography and statistics at Halle, and in 1808 was made principal librarian. He here projected a Handbuch der deutschen Literatur seit der Mitte des 18. Jahrh. bis auf die neueste Zeit (Leipzig, 1812-1814) and, along with Johann Gottfried Gruber (q.v.), the Allgemeine Encyklopddie der Wissenschaften und Kiinste (Leipzig, 1818 ffg.) which he continued as far as the 2 1 st volume. The accuracy and thorough- ness of this monumental encyclopaedia make it still an indis- pensable book of reference. Ersch died at Halle on the 16th of January 1828.

ERSKINE, EBENEZER (1680-1754), Scottish divine, the chief founder of the Secession Church (formed of dissenters from the Church of Scotland), was born on the 22nd of June 1680, most probably at Dryburgh, Berwickshire. His father, Henry Erskine, who was at one time minister at Cornhill, Durham, was ejected in 1662 by the Act of Uniformity, and, after suffering some years' imprisonment, was after the Revolution appointed to the parish of Chirnside, Berwickshire. After studying at the university of Edinburgh, Ebenezer became minister of Portmoak, Kinross-shire. There he remained for twenty-eight

years, aftei which, in the autumn of 1731, he was translated to the West Church, Stirling. Some time before this, he, along with some other ministers, was " rebuked and admonished," by the general assembly, for defending the doctrines contained in the Marrow of Modern Divinity (see Boston, Thomas). A sermon which he preached on lay patronage before the synod of Perth in 1733 furnished new grounds of accusation, and he was compelled to shield himself from rebuke by appealing to the general assembly. Here, however, the sentence of the synod was confirmed, and after many fruitless attempts to obtain a hearing, he, along with William Wilson of Perth, Alexander Moncrieff of Abernethy and James Fisher of Kinclaven, was suspended from the ministry by the commission in November of that year. Against this sentence they protested, and con- stituted themselves into a separate church court, under the name of the associate presbytery. In 1739 they were again summoned before the assembly, and in their corporate capacity declined to acknowledge the authority of the church, and were deposed in the following year. They received numerous accessions to their communion, and remained in harmony with each other till 1747, when a division took

place in regard to the nature of the oath administered to burgesses. Erskine joined with the " burgher " section, and became their professor of theology. He continued also to preach to a numerous congregation in Stirling till his death, which took place on the 2nd of June 1754. Erskine was a very popular preacher, and a man of consider- able force of character; he acted throughout on principle with honesty and courage. The burgher and anti-burgher sections of the Secession Church were reunited in 1820, and in 1847 they united with the relief synod in forming the United Presbyterian Church.

Erskine's published works consist chiefly of sermons. His Life and Diary, edited by the Rev. Donald Fraser, was published in 1840. His Works were published in 1785.

ERSKINE, HENRY (1746-1817), lord advocate of Scotland, the second son of Henry David, 10th earl of Buchan and brother of the lord chancellor Erskine, was born in Edinburgh on the 1st of November 1746. He was educated at the universities of St Andrews, Glasgow and Edinburgh, and was admitted a member of the faculty of advocates in 1768. His reputation as a clever and fluent speaker was first made in the debates of the general assembly, of which he had been early elected an elder. In 1783 he was appointed to the office of lord advocate, which he held during the brief coalition ministry of Fox and North. In 1785 he was elected dean of the faculty of advocates, and was re-elected annually till 1 796, when his conduct in moving a series of resolutions at a public meeting, condemning the govern- ment's sedition and treason bills, brought on him the opposition of the ministerial party, and he was deposed in favour of Robert Dundas. On the formation of the Grenville ministry in 1806 he again became lord advocate and was returned to parliament for the Haddington burghs, which he exchanged at the general election of the same year for the Dumfries burghs. His tenure of the lord advocateship ended in March 1807 on the downfall of the ministry. In 181 1 he gave up his practice at the bar and retired to his country residence of Almondel, in Linlithgowshire, where he died on the 8th of October 181 7.

His eldest son, Henry David (1 783-1857), succeeded as 12th earl of Buchan on his uncle's death in 1829.

Erskine's reputation will survive as the finest and most eloquent orator of his day at the Scottish bar; added to a charm- ing forensic style was a most captivating wit, which, as Lord Jeffrey said, was " all argument, and each of his delightful illustrations a material step in his reasoning." Erskine was also the author of some poems, of

which the best known is " The Emigrant " (1783).

See Lieut. -Col. A. Fergusson's Henry Erskine (1882).

ERSKINE, JOHN (1721-1803), Scottish divine, son, of John Erskine of Carnock, was born on the 2nd of June 1721. He studied law for a time after completing his course in arts at the university of Edinburgh, but was eventually licensed to preach in 1743; and was successively parish minister of Kirkintilloch,

near Glasgow, Culross, in Fifeshire (1753), New Greyfriars church in Edinburgh (1758), and Old Greyfriars church in 1768, where he became the colleague of Principal Robertson, the historian. Here he remained until his death, which took place on the 19th of January 1803. Dr Erskine's writings consist chiefly of controversial pamphlets on theological subjects. His sermons are clear, vigorous expositions of a moderate Calvinism, in which metaphysical argument and practical morality are happily blended. In church politics he was the leader of the evangelical party; and was much beloved for his high character and amiability.

For his life and works see Sir H. Moncreiff Wellwood, Life and Writings of J. Erskine, D.D. (Edinburgh, 1818).

ERSKINE, JOHN, of Carnock (1695-1768), Scottish jurist, son of Lieut. -Colonel John Erskine, was born in 1695. He was admitted a member of the faculty of advocates in 1 7 1 9. Although he never enjoyed much practice at the bar, he acquired a high reputation as a sound and learned lawyer, and in 1737 was appointed professor of Scots law in the university of Edinburgh. In 1754 he published his Principles of the Law of Scotland. He retired from his chair in 1765; and during the remainder of his uneventful life he occupied himself with the preparation of his great, work, the Institutes of the Law of Scotland, which he did not live to publish. He died at Cardross, Perthshire, on the 1st of March 1768.

Erskine's Institutes, although not exhibiting the grasp of principle which distinguished his great predecessor Lord Stair, is so conspicuous for learning, accuracy and sound good sense, that it has always been esteemed of the highest authority on the law of Scotland. The first edition appeared in 1773 and it has been many times reprinted. The Principles, although published first, is substantially an abridgment of the larger work, and is in some respects superior to it, being more concise and direct. It retains its place as the text-book on Scots law, and is frequently being re-

edited.

ERSKINE, JOHN, of Dun (1500-1591), Scottish reformer, the son of Sir John Erskine, laird of Dun, was born in 1509, and was educated at King's College, Aberdeen. At the age of twenty-one Erskine was the cause — probably by accident — of a priest's death, and was forced to go abroad, where he came under the influence of the new learning. It was through his agency that Greek was first taught in Scotland by Petrus de Marsiliers at Montrose. This fact counted for much in the progress of the Reformation. Erskine was also drawn towards the new faith, being a close friend of George Wishart, the reformer, from whose fate he was saved by his wealth and influence, and of John Knox, whose advice openly to discountenance the mass was given in ihe lodgings of the laird of Dun. In the stormy controversies of the time of Mary Stuart and James VI. Erskine was a con- spicuous figure and a moderating influence. He was able to soothe the queen when her feelings had been outraged by Knox's denunciations — being a man " most gentill of nature " — and frequently acted as mediator both between the catholic and reforming parties, and among the reformers themselves. In 1560 he was appointed — though a layman — superintendent of the reformed church of Scotland for Angus and Mearns, and in 1572 he gave his assent to the modified episcopacy proposed by Morton at the Leith convention. Though never himself ordained, he was held in such high esteem by the leaders of the church as to be more than once elected moderator of the general assembly (first in 1564), and he was amongst those who in 1578 drew up the Second Book of Discipline. From 1579 he was a member of the king's council. He died in 1 591 . Erskine owed his peculiar influence among the Scottish reformers to the union — rare in those days — of steadfast convictions with a con- ciliatory manner; Queen Mary described him as "a mild and sweet-natured man, with true honesty and uprightness."

See the " Dun Papers " in the Spalding Club Miscellany, vol. iv. (1849), and the article by T. F. Henderson in the Diet. Nat. Biog.

ERSKINE, RALPH (1685-1752), Scottish divine, brother of Ebenezer Erskine (q.v.), was born on the 18th of March 1685. After studying at the university of Edinburgh, he was in 1711

ordained assistant minister at Dunfermline. He homologated the

protests which his brother laid on the table of the assembly after being rebuked for his synod sermon, but he did not formally withdraw from the establishment till 1737. He was also present, though not as a member, at the first meeting of the associate presbytery. When the severance took place on account of the oath administered to burgesses, he adhered, along with his brother, to the burgher section. He died after a short illness on the 6th of November 1752.

His works consist of sermons, poetical paraphrases and gospel sonnets. The Gospel Sonnets have frequently appeared separately. His Life and Diary, edited by the Rev. D. Fraser, was published in

1842.

ERSKINE, THOMAS, of Linlathen (1788-1870), Scottish theologian, youngest son of David Erskine, writer to the signet in Edinburgh, and of Anne Graham, of the Grahams of Airth, was born on the 13th of October 1788. He was a descendant of John, 1st or 6th earl of Mar, regent of Scotland in the reign of James VI., a grandson of Colonel John Erskine of Carnock. After being educated at the high school of Edinburgh and at Durham, he attended the literary and law classes at the university of Edinburgh, and becoming in 18 10 a member of the Edinburgh faculty of advocates, he for some time enjoyed the intimate acquaintance of Cockburn, Jeffrey, Scott and other distinguished men whose talent then lent lustre to the Scottish bar. In 1816 he succeeded to the family estate of Linlathen, near Dundee, and devoted himself to theology. The writings of Erskine, especially his published letters, are distinguished by a graceful style, and possess originality and interest. His theological views have a considerable similarity to those of Frederick Denison Maurice, who acknowledges having been indebted to him for his first true conception of the meaning of Christ's sacrifice. Erskine had little interest in the " historical criticism " of Christianity, and regarded as the only proper criterion of its truth its conformity or nonconformity with man's spiritual nature, and its adapt- ability or non-adaptability to man's spiritual needs. He con- sidered the incarnation of Christ as the necessary manifestation to man of an eternal sonship in the divine nature, apart from which those filial qualities which God demands from man could have no sanction; by faith as used in Scripture he understood to be meant a certain moral or spiritual activity or energy which virtually implied salvation, because it implied the existence of a principle of spiritual life possessed of an immortal power. This faith, he believed, could be properly awakened only by the manifestation, through Christ, of love as the law of life,

and as identical with an eternal righteousness which it was God's purpose to bestow on every individual soul. As an interpreter of the mystical side of Calvinism and of the psychological con- ditions which correspond with the doctrines of grace Erskine is unrivalled. During the last thirty-three years of his life Erskine ceased from literary work. Among his friends were Madame Vernet, the duchess de Broglie, the younger Mdme de Stael, M. Vinet of Lausanne, Edward Irving, Frederick D. Maurice, Dean Stanley, Bishop Ewing, Dr John Brown and Thomas Carlyle. His wide influence was due to his high character and unassuming earnestness. He died at Edinburgh on the 20th of March 1870.

His principal works are Remarks on the Internal Evidence for the Truth of Revealed Religion (1820), an Essay on Faith (1822), and the Unconditional Freeness of the Gospel (1828). These have all passed through several editions, and have also been translated into French. He is also the author of the Brazen Serpent (1831), the Doctrine of Election (1839), several " Introductory Essays " to editions of Christian Authors, and a posthumous work entitled Spiritual Order and Other Papers (1871). Two vols, of his letters, edited by William Hanna, D.D., with reminiscences by Dean Stanley and Principal Shairp, appeared in 1877.

ERSKINE, THOMAS ERSKINE, ist Baron (1750-1823), lord chancellor of England, was the third and youngest son of Henry David, 10th earl of Buchan, and was born in Edinburgh on the 10th of January 1750. From an early age he showed a strong desire to enter one of the learned professions; but his father, owing to his straitened circumstances, was unable to do more than give him a good school education at the high school

of Edinburgh and the grammar school of St Andrews. In 1764 he was sent as a midshipman on board the " Tartar," but on finding, when he returned to this country after four years' absence in North America and the West Indies, that there was little immediate chance of his rank of acting lieutenant being confirmed, he quitted the service and entered the army, purchas- ing a commission in the ist Royals with the meagre patrimony which had been left to him. But promotion here was as slow as in the navy; while in 1770 he had added greatly to his difficulties by marrying the daughter of Daniel Moore, M.P. for Marlow, an excellent wife, but as poor as himself. However, an accidental visit to an assize court in the town in which he was quartered, and an interview with Lord Mansfield, the presiding judge, confirmed his resolve to quit the army for the law. Accordingly on the 26th of April 1775 he was admitted a student of

Lincoln's Inn. He also on the 13th of January following entered himself as a gentleman commoner on the books of Trinity College, Cam- bridge, but merely that by graduating he might be called two years earlier.

He read in the chambers of Francis Buller (afterwards Mr Justice Buller) and George (afterwards Baron) Wood, and was called to the bar on the 3rd of July 1778. His success was immediate and brilliant. An accident was the means of giving him his first case, Rex v. Baillie, in which he appeared for Captain Thomas Baillie, the lieutenant-governor of Greenwich hospital, who had published a pamphlet animadverting in severe terms upon the abuses which Lord Sandwich, the first lord of the admiralty, had introduced into the management of the hospital, and against whom a rule had been obtained from the court of king's bench to show cause why a criminal information for libel should not be filed. Erskine was the junior of five counsel; and it was his good fortune that the prolixity of his leaders con- sumed the whole of the first day, thereby giving the advantage of starting afresh next morning. He made use of this opportunity to deliver a speech of wonderful eloquence, skill and courage, which captivated both the audience and the court. The rule was discharged, and Erskine's fortune was made. He received, it is said, thirty retainers before he left the court. In 1781 he delivered another remarkable speech, in de'fence of Lord George Gordon — a speech which gave the death-blow to the doctrine of constructive treason. In 1783, when the Coalition ministry came into power, he was returned to parliament as member for Portsmouth. His first speech in the House of Commons was a failure; and he never in parliamentary debate possessed anything like the influence he had at the bar. He lost his seat at the dis- solution in the following year, and remained out of parliament until 1790, when he was again returned for Portsmouth. But his success at the bar continued unimpaired. In 1 783 he received a patent of precedence. His first special retainer was in defence of Dr W. D. Shipley, dean of St Asaph, who was tried in 1784 at Shrewsbury for seditious libel — a defence to which was due the passing of the Libel Act 1792, laying down the principle that it is for the jury, and not for the judge to decide the question whether or no a publication is a libel. In 1 789 he was counsel for John Stockdale, a bookseller, who was charged with seditious libel in publishing a pamphlet in favour of Warren Hastings, whose trial was then proceeding; and his speech on this occasion, probably his greatest effort, is a consummate specimen of the art of addressing a jury. Three years afterwards he brought down the opposition alike of friends and foes by defending Thomas Paine, author of The Rights of

Man — holding that an advocate has no right, by refusing a brief, to convert himself into a judge. As a consequence he lost the office of attorney- general to the prince of Wales, to which he had been appointed in 1786; the prince, however, subsequently made amends by making him his chancellor. Among Erskine's later speeches may be mentioned those for Home Tooke and the other advocates of parliamentary reform, and that for James Hadfield, who was accused of shooting at the king. On the accession of the Gren- ville ministry in 1806 he was made lord chancellor, an office for which his training had in no way prepared him, but which he fortunately held only during the short period his party was in

power. Of the remainder of his life it would be well if nothing could be said. Occasionally speaking in parliament, and hoping that he might return to office should the prince become regent, he gradually degenerated into a state of useless idleness. Never conspicuous for prudence, he aggravated his increasing poverty by an unfortunate second marriage.

His first wife had died in 1805, and he married at Gretna Green a Miss Mary Buck. The date of this marriage is not definitely known. Once only — in his conduct in the case of Queen Caroline — does he recall his former self. He died at Almondell, Linlithgow- shire, on the 17th of November 1823, of pneumonia, caught on the voyage to Scotland.

Erskine's great forensic reputation was, to a certain extent, a concomitant of the numerous political trials of the day, but it was also due to his impassioned eloquence and undaunted courage, which so often carried audience and jury and even the court along with him. As a judge he did not succeed; and it has been questioned whether under any circumstances he could have succeeded. For the office of chancellor he was plainly unfit. As a lawyer he was well read, but by no means profound. His strength lay in the keenness of his reasoning faculty, in his dexterity and the ability with which he disentangled complicated masses of evidence, and above all in his unrivalled power of fixing and commanding the attention of juries. To no depart- ment of knowledge but law had he applied himself systematically, with the single exception of English literature, of which he acquired a thorough mastery in early life, at intervals of leisure in college, on board ship, or in the army. Vanity is said to

have been his ruling personal characteristic; but those who knew him, while they admit the fault, say that in him it never took an offensive form, even in old age, while the singular grace and attractiveness of his manner endeared him to all with whom he came in contact.

By his first wife he had four sons and four daughters. His eldest son, David Montagu (1776-1855), was a well-known diplomatist; his second son, Henry David (1786-1850), was dean of Ripon; and his third son, Thomas (1788-1864), became a judge of the court of common pleas. By his second wife he had one son, born in 1821.

In 1772 Erskine published Observations on the Prevailing Abuses in the British Army, a pamphlet which had a large circulation, and in later life, Armata, an imitation of Gulliver's Travels. His most noted speeches have repeatedly appeared in a collected form. See Campbell's Lives of the Chancellors; Moore's Diaries; Fergusson's Henry Erskine (1882); Dumerit's Henry Erskine, a Study (Paris, 1883); Lord Brougham's Memoir, prefixed to Erskine's Speeches (1847); Romilly's Memoirs; the Croker Papers; Lord Holland's Memoirs.

ERUBESCITE, a native copper-iron sulphide, Cu_6FeS_4, of importance as an ore of copper. It crystallizes in the cubic system, the usual form being that of interpenetrating cubes twinned on an octahedral plane. The faces are usually curved and rough, and the crystals confusedly aggregated together. Compact and granular masses are of more frequent occurrence. The colour on a freshly fractured surface is bronzy or coppery, but in moist air this rapidly tarnishes with iridescent blue and red colours; hence the names purple copper ore, variegated copper ore (Ger. Buntkupfererz), horse-flesh ore, and erubescite (from the Lat. erubescere, " togrowred "). The lustre is metallic, and the streak greyish-black; hardness 3; sp. gr. 5-0. Bornite (after Baron Ignaz von Born, b. 1742, d. 1701) is a name in common use for this mineral, and it predates erubescite, the name given by J. D. Dana in 1850, but afterwards rejected by him; French authors use the name phillipsite, after the English mineralogist, R. Phillips, who analysed the mineral; both these earlier names had, however, been previously used for other minerals.

Owing to the frequent presence of mechanically admixed chalcopyrite and chalcocite, the published analyses of erubescite show wide variations, the copper, for example, varying from 50 to 70%. Even the best Cornish crystals enclose a nucleus of chalcopyrite

(CuFeS 2), and an analysis of these made in 1839 led to the long-accepted formula Cu 3 FeS 3 . Recently, B. J.

Harrington has analysed carefully selected material and obtained the formula Cu 5 FeS 4 .

Erubescite occurs in copper-bearing veins, and has been mined as an ore of copper at Redruth in Cornwall, Montecatini in the province of Pisa, Tuscany, Bristol in Connecticut, Acton in Canada, and other localities in North America. The best crystallized specimens are from the Cam Brea mine and other copper mines in the neighbourhood of Redruth, and from Bristol in Connecticut. Recently a few large isolated crystals with the form of icositetrahedra have been found with calcite and albite in a gold-vein on Frossnitz-Alpe in the Gross-Venediger, Tirol. (L. J. S.)

ERYSIPELAS (a Greek word, probably derived from ipvdpbs, red, and 7reXX

When the erysipelas is of moderate character there is simply a redness of the integument, which feels somewhat hard and thickened, and upon which there often appear small vesications. This redness, though at first circumscribed, tends to spread and affect the neighbouring sound skin, until an entire limb or a large area of the body may become involved in the inflammatory process. There is usually considerable pain, with heat and tingling in the affected part. As the disease advances the portions of skin first attacked become less inflamed, and exhibit a yellowish appearance, which is followed by slight desquamation of the cuticle. The inflammation in general gradually disappears. Sometimes, however, it breaks out again, and passes over the area originally affected the second time. But besides the skin, the'subjacent tissues may become involved in the inflammation, and give rise to the formation of pus. This is termed phleg- monous erysipelas, and is much more apt to occur in connexion with the traumatic variety of the disease. Occasionally the affected parts become gangrenous. Certain complications are apt to arise in erysipelas affecting the surface of the body, par- ticularly inflammation of serous membranes, such as the peri- cardium or pleura.

Erysipelas of the face usually begins with symptoms of. general illness, the patient feeling languid, drowsy and sick, while frequently there is a distinct rigor followed with fever. Sore throat is sometimes felt, but in general the first indication of the local affection is a red and painful spot at the side of the nose or on one of the cheeks or

ears. Occasionally it would appear that the inflammation begins in the throat, and reaches the face through the nasal fossae. The redness gradually spreads over the whole surface of the face, and is accompanied with swelling, which in the lax tissues of the cheeks and eyelids is so great that the features soon become obliterated and the countenance wears a hideous expression. Advancing over the scalp, the disease may invade the neck and pass on to the trunk, but in general the inflammation remains confined to the face and head. While the disease progresses, besides the pain, tenderness and heat of the affected parts, the constitutional symptoms are very severe. The temperature rises often to 105 or higher, remains high for four or five days, and then falls by crisis. Deliriifm is a frequent accompaniment. The attack in general lasts for a week or ten days, during which the inflammation subsides in the parts of the skin first attacked, while it spreads onwards in other directions, and after it has passed away there is, as already observed, some slight desquamation of the cuticle.

Although in general the termination is favourable, serious and occasionally fatal results follow from inflammation of the membranes of the brain, and in some rare instances sudden death

has occurred from suffocation arising from oedema glottidis, the inflammatory action having spread into and extensively involved the throat. One attack of this disease, so far from protecting from, appears rather to predispose to others. It is sometimes a complication in certain forms of exhausting disease, such as phthisis or typhoid fever, and is then to be regarded as of serious import. A very fatal form occasionally attacks new born infants, particularly in the first four weeks of their lives. In epidemics of puerperal fever this form of erysipelas has been specially found to prevail.

The treatment of erysipelas is best conducted on the expectant system. The disease in most instances tends to a favourable termination; and beyond attention to the condition of the stomach and bowels, which may require the use of some gentle laxative, little is necessary in the way of medicine. The employ- ment of preparations of iron in large doses is strongly recommended by many physicians. But the chief point is the administration of abundant nourishment in a light and digestible form. Of the many local applications which may be employed, hot fomentations will be found

among the most soothing. Dusting the affected part with powdered starch, and wrapping it in cotton wadding, is also of use.

In the case of phlegmonous erysipelas complicating wounds, free incisions into the part are necessary.

ERYTHRAE [mod. Litri], one of the Ionian cities of Asia Minor, situated on a small peninsula stretching into the Bay of Erythrae, at an equal distance from the mountains Mimas and Corycus, and directly opposite the island of Chios. In the peninsula excellent wine was produced. The town was said to have been founded by Ionians under Knopos, son of Codrus. Never a large city, it sent only eight ships to the battle of Lade. The Erythraeans owned for a considerable time the supremacy of Athens, but towards the close of the Peloponnesian war they threw off their allegiance to that city. After the battle of Cnidus, however, they received Conon, and paid him honours in an inscription, still extant. Erythrae was the birthplace of two prophetesses — one of whom, Sibylla, is mentioned by Strabo as living in the early period of the city; the other, Athenais, lived in the time of Alexander the Great. The ruins include well-preserved Hellenistic walls with towers, of which five are still visible. The acropolis (280 ft.) has the theatre on its N. slope, and eastwards lie many remains of Byzantine buildings. Modern Litri is a considerable place and port, extending from the ancient harbour to the rcropolis. The smaller coasting steamers call, and there is an active trade with Chios and Smyrna.

ERYTHRITE, the name given to (1) a mineral composed of a hydrated cobalt arsenate, ind (2) in chemistry, a tetra- hydric alcohol. (1) The mineral erythrite has the formula Co 3 (As0 4) 2 -8H20, and crystallizes in the monoclinic system and is isomorphous with vivianite. It sometimes occurs as beautiful radially-arranged groups of blade-shaped crystals with a bright crimson colour and brilliant lustre. On exposure to light the colour and lustre deteriorate. There is a perfect cleavage parallel to the plane of symmetry, on which the lustre is pearly. Cleav- age flakes are soft (H=2), sectile and flexible; specific gravity 2-95. The mineral is, however, more often found as an earthy encrustation with a peach-blossom colour, and in this form was early (1 7 2 7) known as cobalt-bloom (Ger. Kobaltbluthe) . The name erythrite, from hpvdpos, " red," was given by F. S. Beudant in 1382. Erythrite occurs as a product of alteration of smaltite (CoAs 2) and other cobaltiferous arsenides. The finest crystallized specimens are from Schneeberg in Saxony. The earthy variety has been found in Thuringia and Cornwall and some other plates. (2) The alcohol

erythrite has the constitutional formula H0H 2 CCH-CH(0H)-CH 2 0H; it is also known as erythrol, erythroglucin and phycite. It corresponds to tartaric acid, and, like this substance, it occurs in four stereo-isomeric forms. The internally compensated modification, j-erythrite, corresponding to mesotartaric acid, occurs free in the algae Protococcus vulgaris, and as the orsellinate, erythrin, CˆCOHMO-CsHtOsˆ, in many lichens and algae, especially Roccella montagnei. It has a sweet taste, melts at 126 , and boils at 330°. Careful oxidation with

dilute nitric acid gives erythrose or tetrose, which is probably a mixture of a trioxyaldehyde and trioxyketone. Energetic oxidation gives erythritic acid and mesotartaric acid. i-Erythrite and the racemic mixture of the dextro and laevo varieties were synthesized by Griner in 1893 from di vinyl.

ERZERUM, or Arzrum (Arm. Garin), the chief town of an important vilayet of the same name in Asiatic Turkey. It is a military station and a fortress of considerable strategical value, closing the roads from Kars, Olti and other parts of the frontier. Several important routes from Trebizond and various parts of Anatolia converge towards it from the west. It is situated at the eastern end of an open bare plain, 30 m. long and about 12 wide, bordered by steep, rounded mountains and traversed by the Kara Su, or western Euphrates, which has its source in the Dumlu Dagh a few miles north of that town, which lies at an elevation of 6250 ft. above sea-level, while the near hills rise to 10,000 ft. The scenery in the neighbourhood is striking, lofty bare mountains being varied by open plains and long valleys dotted with villages. Just east of the town is the broad ridge of the Deveboyun (" Camel's Neck "), across which the road passes to Kars. To the south is the Palanduken range, from which emerge numerous streams, supplying the town with excellent water. In the plain to the north the Kara Su traverses extensive marshes which afford good wildfowl-shooting in the spring.

The town is surrounded by an earthen enceinte or rampart with some forts on the hills just above it, and others on the Deveboyun ridge facing east, the whole forming a position of considerable strength. The old walls and the citadel have disappeared. Inside the ramparts the town lies rather cramped, with narrow, crooked streets, badly drained and dirty; the houses are generally built of dark grey volcanic stone with flat roofs, the general aspect, owing to the absence of trees, being somewhat gloomy. The water-supply from Palanduken is distributed by wooden pipes to numerous public fountains. The town has a population of about 43,000, including

about 10,000 Armenians, 2000 Persians and a few Jews. It has a garrison in peace of about 5000 men. It is the seat of the British consulate for Kurdistan, and there are other European consulates besides an American mission with schools. The great altitude accounts for very severe winter cold, occasionally io° to 2 5 below zero F., accompanied by blizzards (dpi) sometimes fatal to travellers overtaken by them. The summer heat is moderate (59° to 77).

There are several well-built mosques (none older than the 1 6th century), public baths, and several good khans. There are Armenian and Catholic churches, but the most beautiful building is a medresse erected in the 12th century by the Seljuks, with ornamental doorway and two graceful minarets known as the Chifte Minare.

Situated on the main road from Trebizond into north-west Persia, the town has always a large caravan traffic, principally of camels, but since the improvement of communications in Russia this has declined. A good carriage-road leads to the coast at Trebizond, the journey being made in five or six days. There are also roads to Kars, Bayazid, Erzingan and Kharput. Black- smiths' and coppersmiths' work is better here than in most Turkish towns; horse-shoes and brass work are also famous. There are several tanneries, and Turkish boots and saddles are largely made. Jerked beef (pasdirma) is also prepared in large quantities for winter use. The plain produces wheat, barley, millet and vegetables. Wood fuel is scarce, the present supply being from the Tortum district, whence surface coal and lignite are also brought; but the usual fuel is tezek or dried cow-dung. The bazaars are of no great interest. Good Persian carpets and similar goods can be obtained.

Erzerum is a town of great antiquity, and has been identified with the Armenian Garin Kalakh, the Arabic Kalikale, and the Byzantine Theodosiopolis of the 5th century, when it was a frontier fortress of the empire — hence its name Erzen-er-Rum. It was captured by the Seljuks in 1201, when it was an im- portant city, and it fell into Turkish possession in 1517. In July 1829 it was captured by the Russian general Paskevich, and the

occupation continued until the peace of Adrianople (September 1829). The town was unsuccessfully attacked by the Russians on the 9th of November 1877 after a victory gained by them a short time

*previously on the Deveboyun heights; it was occupied by them during the armistice (7th of February i878)*and restored to Turkey after the treaty of B erlin. In 1 8 59 a severe earthquake destroyed much of the town, and another in November 1901 caused much damage.*

The Erzerum vilayet extends from the Persian frontier at Bayazid, all along the Russian frontier and westward into Anatolia at Baiburt and Erzingan. It is divided into the three sanjaks of Bayazid, Erzerum, and Erzingan. It includes the highest portion of the Armenian plateau, and consists of bare undulating uplands varied by lofty ranges. The deep gorges of the Chorokh and Tortum streams north of the town alone have a different appearance, being well wooded in places. Both arms of the Euphrates have their rise in this country as well as the Aras (Araxes) and the Chorokh (Acampsis). It is an agricultural country with few industries. Besides forests, iron, salt, sulphur and other mineral springs are found. Some of the coal and lignite mines in Tortum have been recently worked to supply fuel for Erzerum. The population is largely Armenian and Kurd with some Turks (Moslems 500,000, Christians 140,000). (C. W. W.; F. R. M.)

ERZGEBIRGE, a mountain chain of Germany, extending in a W.S.W. direction from the Elbe to the Elstergebirge along the frontier between Saxony and Bohemia. Its length from E.N.E. to W.S.W. is about 80 m., and its average breadth about 25 m. The southern declivity is generally steep and rugged, forming in some places an almost per- pendicular wall of the height of from 2000 to 2500 ft.; while the northern, divided at intervals into valleys, sometimes of great fertility and sometimes wildly romantic, slopes gradually towards the great plain of northern Germany. The central part of the chain forms a plateau of an average height of more than 3000 ft. At the extremities of this plateau are situated the highest summits of the range : — in the south-east the Keilberg (4080 ft.) ; in the north-east the Fichtelberg (3980 ft.) ; and in the south-west the Spitzberg (3650 ft.). Between the Keilberg and the Fichtelberg, at the height of about 3300 ft., is situated Gottesgab, the highest town in Bohemia. Geologically, the Erzgebirge range consists mainly of gneiss, mica and phyllite. As its name (Ore Mountains) indicates, it is famous for its mineral ores. These are chiefly silver and lead, the layers of both of which are very extensive, tin, nickel, copper and iron. Gold is found in several places, and some arsenic, antimony, bismuth, man- ganese, mercury and sulphur. The Erzgebirge is celebrated for its lace manufactures, introduced by Barbara Uttmann in 1541, embroideries, silk-weaving and toys. The climate is in winter inclement in the higher elevations, and, as the snow lies deep until the spring, the range is largely frequented by devotees of winter

sport, ski, tobogganning, &c. In summer the air is bracing, and many climatic health resorts have sprung into existence, among which maybe mentioned Kipsdorf, Barenfels and Oberwiesenthal. Communication with the Erzgebirge is provided by numerous lines of railway, some, such as that from Freiberg to Briix, that from Chemnitz to Komotau, and that from Zwickau to Carlsbad, crossing the range, while various local lines serve the higher valleys.

The Elstergebirge, a range some 16 m. in length, in which the Weisse Elster has its source, runs S.W. from the Erzgebirge to the Fichtelgebirge and attains a height of 2630 ft.

See Grcrhmann, Das Obererzgebirge und seine Stadte (1903), and Schurtz, Die Passe des Erzgebirges (1891); also Daniel, Deutschland, vol. ii., and Gebauer, Lander und Vblkerkunde, vol. i.

ERZINGAN, or Erzinjan (A rsinga of the middle ages) , the chief town of a sanjak in the Erzerum vilayet of Asiatic Turkey. It is the headquarters of the IV. army corps, being a place of some military importance, with large barracks and military factories. It is situated at an altitude of 3900 ft., near the western end of a rich well-watered plain through which runs the Kara Su or western Euphrates. It is surrounded by orchards and

gardens, and is about a mile from the right bank of the river, which here runs in two wide channels crossed by bridges. One wide street traverses the town from east to west, but the others are narrow, unpaved and dirty, except near the new government buildings and the large modern mosque of Hajji Izzet Pasha to the north, which are the only buildings of note. The principal barracks, military hospital and clothing factory are at Karateluk on the plain and along the foot-hills to the north 3 m. off, one recent addition to the business buildings having electric power and modern British machinery; some older barracks and a military tannery and boot factory being in the town. The population numbers about 15,000, of whom about half are Armenians living in a separate quarter. The principal industries are the manufacture of silk and cotton and of copper dishes and utensils. The climate is hot in summer but moderate in winter. A carriage-road leads to Trebizond, and other roads to Sivas, Karahissar, Erzerum and Kharput. The plain, almost sur- rounded by lofty mountains, is highly productive with many villages on it and the border hills. Wheat, fruit, vines and cotton are largely grown, and cattle and sheep are bred. Water is everywhere abundant, and there are iron and hot sulphur springs. The battle in which the sultan of Rum (1243) was defeated by the Mongols took place on the plain,

and the cele- brated Armenian monastery of St Gregory, " the Illuminator," lies on the hills 1 1 m. S.W. of the town.

Erzingan occupies the site of an early town in which was a temple of Anaitis. It was an important place in the 4th century when St Gregory lived in it. The district passed -from the Byzantines to the Seljuks after the defeat of Romanus, 107 1, and from the latter to the Mongols in 1243. After having been held by Mongols, Tatars and Turkomans, it was added to the Osmanli empire by Mahommed II. in 1473. In 1784 the town was almost destroyed by an earthquake. (C.W.W. ; F. R. M.)

ESAR-HADDON [Assur-akhi-iddina, " Assur has given a brother "], Assyrian king, son of Sennacherib; before his accession to the throne he had also borne another name, Assur- etil-ilani-yukin-abla. At the time of his father's murder (the 20th of Tebet, 681 B.C.) he was commanding the Assyrian army in a war against Ararat. The conspirators, after holding Nineveh for 42 days, had been compelled to fly northward and invoke the aid of the king of Ararat. On the 12th of Iyyar (680 B.C.) a decisive battle was fought near Malatia, in which the veterans of Assyria won the day, and at the close o'f it saluted Esar-haddon as king. He returned to Nineveh, and on the 8th of Sivan was crowned king. A good general, Esar-haddon was also an able and conciliatory administrator. His first act was to crush a rebellion among the Chaldaeans in the south of Babylonia and then to restore Babylon, the sacred city of the West, which had been destroyed by his father. The walls and temple of Bel were rebuilt, its gods brought back, and after his right to rule had been solemnly acknowledged by the Babylonian priesthood Esar- haddon made Babylon his second capital. A year or two later Media was invaded and Median chiefs came to Nineveh to offer homage to their conqueror. He now turned to Palestine, where the rebellion of Abdi-milkutti of Zidon was suppressed, its leader beheaded, and a new Zidon built out of the ruins of the older city (676-675 B.C.). All Palestine now submitted to Assyria, and 12 Syrian and 10 Cyprian princes (including Manasseh of Judah) came to pay him homage and supply him with materials for his palace at Nineveh. But a more formidable enemy had appeared on the Assyrian frontier (676 B.C.). The Cimmerii (see Scythia) under Teuspa poured into Asia Minor; they were, however, overthrown in Cilicia, and the Cilician mountaineers who had joined them were severely punished. It was next necessary to secure the southern frontier of the empire. Esar-haddon accordingly marched into the heart of Arabia, to a distance of about 900 m., across a burning and waterless desert, and struck terror into the Arabian tribes. At last he was free to complete the

policy of his predecessors by conquering Egypt, which alone remained to threaten Assyrian dominion in the West. Baal of Tyre had transferred his allegiance from Esar-haddon to the Egyptian king Tirhaka and opened to the latter the coast

road of Palestine; leaving a force, therefore, to invest Tyre, Esar-haddon led the main body of the Assyrian troops into Egypt on the 5th of Adar, 673 B.C. The desert was crossed with the help of the Arabian sheikh. Egypt seems to have submitted to the invader and was divided into twenty satrapies. Another campaign, however, was needed before it could be finally subdued. In 670 B.C. Esar-haddon drove the Egyptian forces before him in 15 days (from the 3rd to the 18th of Tammuz) all the way from the frontier to Memphis, thrice defeating them with heavy loss and wounding Tirhaka himself. Three days after Memphis fell, and this was soon afterwards followed by the surrender of Tyre and its king. In 668 B.C. Egypt again revolted, and while on the march to reduce it Esar-haddon fell ill and died on the 10th of Marchesvan. His empire was divided between his two sons Assur-bani-pal and Samas-sum-y-ukin, Assur-bani-pal receiving Assyria and his brother Babylonia, an arrangement, however, which did not prove to be a success. Esar-haddon was the builder of a palace at Nineveh as well as of one which he erected at Calah for Assur-bani-pal.

Authorities. — E: A. W. Budge, History of Esarhaddon (1880); E. Schrader, Keilinschriftliche Bibliothek, ii. (1889) (Abel and Winckler in ii. pp. 120-153); G. Maspero, Passing of the Empires, pp. 345 sqq. ; F. von Luschan, " Ausgrabungen in Sendschirli," i. {Mitteilungen aus den orientalischen Sammlungen, 1893). (A. H. S.)

ESAU, the son of Isaac and Rebecca, in the Bible, and the elder twin brother of Jacob. . He was so called because he was red (admoni) and hairy when he was born, and the name Edom (red) was given to him when he sold his birthright to Jacob for a meal of red lentil pottage (Gen. xxv. 21-34). Another story of the manner in which Jacob obtained the superiority is related in Gen. xxvii. Here the younger brother impersonated the elder, and succeeded in deceiving his blind father by imitating the hairiness of his brother. He thus gained the blessing intended for the first-born, and Esau, on hearing how he had been fore- stalled, vowed to kill him. Jacob accordingly fled to his mother's relatives, and on his return, many years later,

peace was restored between them (xxxii. sq.) . These primitive stories of the relations between the eponymous heads of the Edomites and Israelites are due to the older (Judaean) sources; the late notices of the Priestly school (see Genesis) preserve a different account of the parting of the two (Gen. xxxvi. 6-8), and lay great stress upon Esau's marriages with the Canaanites of the land, unions which were viewed (from the writer's standpoint) with great aversion (Gen. xxvi. 34 sq., xxvii. 46). For " Esau " as a designation of the Edomites, cf. Jer. xlix. 8, Obad. w. 6, 8, and on their history, see Edom.

Esau's characteristic hairiness (Gen. xxv. 25, xxvii. 11) has given rise to the suggestion that his name is properly 'eshav, from a root corresponding to the Arab, 'athiya, to have thick or matted hair. Mt Seir, too, where he resided, etymologically suggests a " shaggy " mountain-land. According to Hommel (Sud-arab. Chrestom. p. 39 sq.) the name Esau has S. Arabian analogies. On the possible identity of the name with Usoos, the Phoenician demi-god (Philo of Byblus, ap. Eusebius, Praep. Evang. i. 10), see Cheyne, Encyc. Bib. col. 1333; Lagrange, Etudes sur les religions semitiques, p. 416 (Paris, 1905) ; Ed. Meyer, Israeliten, 278 sq. (and, on general ques- tions, ib. 128 sq., 329 sqq.). (S. A. C.)

ESBJERG, a seaport of Denmark in the amt (county) of Ribe, 18 m. from the German frontier on the west coast of Jutland. It has railway communication with the east and north of Jutland, and with Germany. It was granted municipal rights in 1900, having grown with astonishing rapidity from 13 inhabitants in 1868 to 13,355 in IQ01 – This growth it owes to the construction of a large harbour in 1868-1888. It is the principal outlet westward for S. Jutland; exports pork and meat, butter, eggs, fish, cattle and sheep, skins, lard and agricultural seeds, and has regular communication with Harwich and Grimsby in England. Three miles S.E. is Nordby on the island of Fan6, the northern- most of the North Frisian chain. It is an arid bank of heathland and dunes, but both Nordby and Sonderho in the south are frequented as seaside resorts. The former has a school of navi- gation. The fisheries are valuable.

ESCANABA, a city and the county-seat of Delta county, Michigan, U.S.A., on Little Bay de Noquette, an inlet of Green Bay, about 60 m. S. of Marquette. Pop. (1890) 6808; (1900)

9549, of whom 3214 were foreign-born; (1910 census) 13,194. It is served by the Chicago & North- Western and the Escanaba & Lake Superior railways. It is built on a picturesque pro- montory which separates the waters of Green Bay from Little Bay de Ntjquette, and

its delightful summer climate, wild landscape scenery and facilities for boating and trout fishing make it a popular summer resort. Escanaba has a water front of 8 m., and is an important centre for the shipment of iron-ore, for which eight large and well-equipped docks are provided — there is an ore-crushing plant here; considerable quantities of lumber and fish are also shipped, and furniture, flooring (especi- ally of maple) and wooden ware (butter-dishes and clothes-pins) are manufactured. There is a large tie-preserving plant here. Good water power is supplied by the Escanaba river. Escanaba was settled in 1863, was incorporated as a village in 1883, and was first chartered as a city in the same year.

ESCAPE (in mid. Eng. eschape or escape, from the O. Fr. eschapper, modern echapper, and escaper, low Lat. escapium, from ex, out of, and cappa, cape, cloak; cf. for the sense develop- ment the Gr. hchbto-Oai., literally to put off one's clothes, hence to slip out of, get away), a verb meaning to get away from, especially from impending danger or harm, to avoid capture, to regain one's liberty after capture. As a substantive, " escape," in law, is the regaining of liberty by one in custody contrary to due process of law. Such escape may be by force, if out of prison it is generally known as " prison-breach " or " prison- breaking," or by the voluntary or negligent act of the custodian. Where the escape is caused by the force or fraud of others it is termed " rescue " (q.v.). " Escape " is used in botany of a cultivated plant found growing wild. The word is also used of a means of escape, e.g. " fire-escape," and of a loss or leakage of gas, current of electricity or water.

ESCHATOLOGY (Gr. ecxaros, last, and X670S, science; the "doctrine of last things"), a theological term derived from the New Testament phrases " the last day " (iv rfj eaxarji ˆjutpp, John vi. 39), " the last times " (en"' hrx&ruv twv xpbvwv, 1 Peter i. 20), " the last'state " (to. arxara, Matt. xii. 45), a conception taken over from ancient prophecy (Is. ii. 2; Mai. iv. 1). It was the common belief in the apostolic age that the second advent of Christ was near, and would give the divine completion to the world's history. The use of the term, however, has been extended so as to include all that is taught in the Scriptures about the future life of the individual as well as the final destiny of the world. The reasons for the belief in a life after death are discussed in the article Immortality. The present article, after a brief glance at the conceptions of the future of the individual or the world found in other religions, will deal with the teaching of the Old and New Testaments, the Jewish and the Christian Church regarding the hereafter.

There is a bewildering variety in the views of the future life and world held by different peoples. The future life may be conceived as simply a continuation of the present life in its essential features, although under conditions more or less favour- able. It may also be thought of as retributive, as a reversal of present conditions so that the miserable are comforted, and the prosperous laid low, or as a reward or punishment for good or evil desert here. Personal identity may be absorbed, as in the transmigration of souls, or it may even be denied, while the good or bad result of one life is held to determine the weal or woe of another. The scene of the future life may be thought of on earth, in some distant part of it, or above the earth, in the sky, sun, moon or stars, or beneath the earth. The abodes of bliss and the places of torment may be distinguished, or one last dwelling-place may be affirmed for all the dead. Sometimes the good find their abiding home with the gods; sometimes a number of heavens of varying degrees of blessedness is recognized (see F. B. Jevons, An Introduction to the History of Religion, chs. xxi. and xxii., 1902; and J. A. MacCulloch's Comparative Theology, xiv., 1902).

(1) Confucius, though unwilling to discuss any questions concerning the dead, by approving ancestor-worship recognized a future life. (2) Taoism promises immortality as the reward of

merit. (3) The Book of the Dead — a guide-book for the departed

on his long journey in the unseen world to the abode of the

blessed — shows the attention the Egyptian religion

Regions. § ave to the state of tne dead – (4) Although the Baby-lonian religion presents a very gloomy view of the world of the dead, it is not without a few faint glimpses of a hope that a few mortals at least may gain deliverance from the dread doom. (5) A characteristic feature of Indian thought is the transmigra- tion of the soul from one mode of life to another, the physical condition of each being determined by the moral and religious character of the preceding. But deliverance from this cycle of existences, which is conceived as misery, is promised by means of speculation and asceticism. Denying the continuance of the soul, Buddhism affirmed a continuity of moral consequences {Karma), each successive life being determined by the total moral result of the preceding life. Its doctrine of

salvation was a guide to, if not absolute non-existence, yet cessation of all consciousness of existence {Nirvana). Later Buddhism has, however, a doctrine of many heavens and hells. (6) In Zoro-astrianism not only was continuance of life recognized, but a strict retribution was taught. Heaven and hell were very clearly distinguished, and each soul according to its works passed to the one or to the other. But this faith did not concern itself only with the future lot of the individual soul. It was also interested in the close of the world's history, and taught a decisive, final victory of Ormuzd over Ahriman, of the forces of good over the forces of evil. It is not at all improbable that Jewish eschatology in its later developments was powerfully influenced by the Persian faith. (7) Mahommedanism reproduces and exaggerates the lower features of popular Jewish and Christian eschatology (see the separate articles on these religions).

In the Old Testament we can trace the gradual development of an ever more definite doctrine of " the final condition of man and the world." This is regarded as the last stage in Old Testa- & m0TSi \ process, a redemptive purpose of God. The eschatology of the Old Testament is thus closely connected with, but not limited by, Messianic hope, as there are eschatological teachings that are not Messianic. As the Old Testament revelation is concerned primarily with the elect nation, and only secondarily (in the later writings) with the individual persons composing it, we follow the order of im-portance as well as of time in dealing first with the people. The universalism which marks the promise to the seed of the woman (Gen. iii. 15) appears also in the blessing of Noah (ix. 25). In the promise to Abraham (xii. 3) this universal good is directly related to God's particular purpose for His chosen people; so also in the blessing of Jacob (xlix.) and of Moses (Deut. xxxiii.). David's last words (2 Sam. xxiii.) blend together his desire that his family should retain the kingship, and his aspiration for a kingdom of righteousness on earth. The conception of the " Day of the Lord " is frequent and prominent in the prophets, and the sense given to the phrase by the people and by the prophets throws into bold relief the contrast between popular beliefs and the prophetic faith. The people simply expected deliverance from their miseries and burdens by the intervention of Yahweh, because He had chosen Israel for His people. The prophets had an ethical conception of Yahweh; the sin of His own people and of other nations called for His intervention in judgment as the moral ruler of the world. But judgment they conceived as preparing for redemption. The day of the Lord is always an eschatological conception, as the term is applied to the final and universal judgment, and not to any less decisive intervention of God

in the course of human history. In the pre-exilic prophets the judgment of God is " primarily on Israel, although it also embraces the nations " ; during the Exile and at the Restoration the judgment is represented as falling on the nations while redemption is being wrought for God's people; after the Restoration the people of God is again threatened, but still the warning of judgment is mainly directed towards the nations and deliverance is promised to Israel. As the manifestation of God in grace as well as judgment, the day of the Lord will bring joy to Israel and even to the world. As

a day of judgment it is accompanied by terrible convulsions of nature (not to be taken figuratively, but probably intended literally by the prophets in accordance with their view of the absolute subordination of nature to the divine purpose for man). It ushers in the Messianic age. While the moral issues are finally determined by this day, yet the world of the Messianic age is painted with the colours of the prophet's own surroundings. Israel is restored to its own land, and to it the other nations are brought into subjugation, by force or persuasion. The contribu- tions of the Old Testament to Christian eschatology embrace these features: " (1) The manifestation or advent of God; (2) the universal judgment; (3) behind the judgment the coming of the perfect kingdom of the Lord, when all Israel shall be saved and when the nations shall be partakers of their salvation; and (4) the finality and eternity of this condition, that which constitutes the blessedness of the saved people being the Presence of God in the midst of them — this last point corresponding to, the Christian idea of heaven " (A. B. Davidson, in Hastings's Bible Dictionary, i. p. 738). This hope is for Che people on this earth though transfigured.

To the individual it would seem at first only old age is promised (Is. lxv. 20; Zech. viii. 4), but the abolition of death itself is also declared (Is. xxv. 8). The resurrection, which appears at first as a revival of the dead nation (Hos. vi. 2 ; Ez. xxxvii. 12-14), i s afterwards promised for the pious individuals (Is. xxvi. 19), so that they too may share in the national restoration.. Only in Daniel xii. 2 is taught a resurrection of the wicked " to shame and everlasting contempt " as well as of the righteous to " everlasting life." It was only at the Exile, when the nation ceased to be, that the worth of the individual came to be recog- nized, and the hopes given to the nation were claimed for the individual. In dealing with the individual eschatology we must carefully distinguish the popular ideas regarding death and the hereafter which Israel shared with the other Semitic peoples, from the intuitions, inferences, aspirations evoked in the pious by the divine revelation itself. The former have not the

moral significance or the religious value of the latter. The starting-point of the development was the common belief that the dead continued to exist in an unsubstantial mode of life, but cut off from fellowship with God and man; but faith left this far behind. Sheol is the common abode of the righteous and the ungodly: life there is shadowy and feeble, but seems to continue in a wavering and dim reflection features of this life. As the present life is, however, determined by moral issues, and as death does not change man's relation to God, moral considerations could not be absolutely excluded from the future life. A forward step had to be taken. Pious men, in fellowship with God, when they faced the fact of death, were led either to challenge its right, or to give a new meaning to it. Either there was a protest against death itself, and a demand for immortality (Ps. xvi. 9-1 1), or death was conceived as something different for the saint and for the sinner; fellowship with God would not and could not be interrupted (Ps. xlix. 14, 15, lxxiii. 17-28). The vision of God is anticipated after death's, sleep (Ps. xvii. 15; Job xix. 25-27). This belief in individual immortality is expressed poetically and obscurely: it is later- than the eschatology of the people. It assumes the moral distinction of the righteous and the ungodly, and seeks a solution for the problem of the lack of harmony of present character and condition. Its deepest motive, however, is religious. The soul once in fellowship with God cannot even by death be separated from God. The individual hoped that he would live to share, the nation's good, and thus the two streams of Old Testament eschatology at last flow together.

It is in the apocryphal and apocalyptic literature of Judaism that the fullest development of eschatology can be traced. Four words may serve to express the difference of the Apocry , doctrine of these writings and the teaching of the Old phaiaud Testament. Eschatology was universalized (God was Apocaiyp- recognized as the creator and moral governor of all c °° s ' the world), individualized (God's judgment was directed, not to nations in a future age, but to individuals in a future life),

transcendentalized (the future age was more and more contrasted

with the present, and the transition from the one to the other

was not expected as the result of historical movements, but of

miraculous divine acts), and dogmatized (the attempt was made to systematize in some measure the vague and varied prophetic anticipations). Only a very brief summary of the conceptions current in these writings can be given. The coming of the Messiah will be preceded by the Last Woes. The Messiah is very variously conceived: (1) " a passive, though supreme member of the Messianic Kingdom"; (2) "an active warrior who slays his enemies with his own hand "; (3) " one who slays his enemies by the word of his mouth, and rules by virtue of his" justice, faith and holiness "; (4) a supernatural person, " eternal Ruler and Judge of Mankind " (R. H. Charles in Hastings's Bible Dictionary, i. p. 748). In some of the writings no Messianic kingdom is looked for; in others only a temporal duration on earth is assigned to it; in others still it abides for ever either on earth as it is, or on earth transformed. The dispersion among' the nations is to return home. Sometimes the Resurrection is narrowed down to the resurrection of the righteous, at others widened out to the resurrection of all mankind for the last judgment. A blessed immortality after judgment, or even after death itself, is sometimes taught without reference to any resurrection. Retribution in human history is recognized, but attention is specially concentrated on the final judgment, which is usually conceived as taking place in two stages. (1) The Messianic is executed by the Messiah or

the saints by victory in war, or by judicial sentence. (2) The final remains in God's hands; but in one writing (the Ethiopic Enoch) is represented as Messiah's function. This judgment either closes the Messianic age, if thought of as temporal, or ushers it in, if conceived as eternal, or closes the world's history, if no Messianic age is expected. The place of torment for the wicked was called Gehenna (the valley of Hinnom or the Sons of Hinnom, where the bodies of criminals were cast out, is described in Is. Ixvi. 24). Here corporal as well as spiritual punishment was endured; it was inflicted on apostate Jews or the wicked generally; the righteous witnessed its initial stages but not its final form. In later Judaism it was the purgatory of faithless Jews, who at last reached Paradise, but it remained the place of eternal torment for the Gentiles. Paradise was sometimes regarded as the division of Sheol to which the righteous passed after death, but at others it was conceived as the heavenly abode of Moses, Enoch and Elijah, to which other saints would pass after the last judgment.

*The eschatology of the New Testament attaches itself not only to that of the Old Testament but also to that of contemporary Judaism, but it avoids the extravagances of the latter. tamen"' ˆ ot a *- a ˆ systematic, it is occasional, practical, poetical and dominantly evangelical, laying stress on the hope of the righteous rather than the doom of the wicked. The teaching of Jesus centres, according to the Synoptists, in the great idea of the " Kingdom of God," which is already present in the teacher Himself, but also future as regards its completion. In some parables a gradual realization of the king- dom is indicated (Matt, xiii.); in other utterances its consum- mation is connected with Christ's own return, His Parousia (Matt. xxiv. 3,37,*

39), the time of which, however, is unknown even to Himself (Mark xiii. 32). In this eschatological discourse (Matt, xxiv., xxv.) He speaks of the destruction of Jerusalem and of the end of the world as near, and seemingly as one. This is in accordance with the characteristic of prophecy, which sees in " timeless sequence " events which are historically separated from one another. While the Return is represented in the Synoptists as an external event, it is conceived in the fourth gospel as an internal experience in the operation of the Spirit on the believer (John xiv. 16-21); nevertheless here also the Parousia in the synoptic sense is looked for (John xxi. 22; cf. 1 John ii. 28) . The object of the Second Coming is the execution of judgment by Christ (Matt. xxv. 31), both individual (xxii. 1-14) and universal (xiii. 36-42). The present subjective judgment, in which men determine their destiny by their attitude to Christ,

on which the fourth gospel lays stress (John iii. 17-21, ix. 39), is not inconsistent with the anticipation of a final judgment (John xii. 48, v. 27). This judgment presupposes the resurrec- tion, belief in which was rejected by the Sadducees, but accepted by the Pharisees and the majority of the Ph ˆ e ˆ s Jewish people, and confirmed by Christ, not only as an aucees. ' individual spiritual renovation (John v. 25, 26), but ' as a universal physical resuscitation (28 and 29; Matt. xxii. 30). This resurrection is of the unjust as well as the just (Matt. v. 29, 30, x. 28; Luke xiv. 14). On the Intermediate State Jesus does not speak clearly. He uses the term Hades twice meta- phorically (Matt. xi. 23, xvi. 18), and once in a parable, the " Rich Man and Lazarus " (Luke xvi. 23), in which he employs the current phrases such as " Abraham's bosom " (verse 22), without any definite doctrinal intention, to unveil the secrets of the hereafter by confirming with His authority the common beliefs of His time. The term Paradise (Luke xxiii. 43) seems to be used " in a large and general sense as a word of hope and comfort," and we need not attach to it any of the more definite associations which it had in Jewish eschatology. When he speaks of death as " sleep " (Luke viii. 52; John xi. n) it is to give men gentler and sweeter thoughts of it, not to inculcate the doctrine of an intermediate state as an unconscious condition. There are words which suggest rather the hope of an immediate entrance of the just into the Father's house and glory (John xiv. 2, 3, xvii. 24). He spoke frequently and distinctly both of final reward for the righteous and final penalty for the wicked. " The recompense of the righteous is described as an inheritance, entrance into the kingdom, treasure in heaven, an existence like the angelic, a place prepared, the Father's house, the joy of the Lord, life, eternal life and the like; and there is no intimation that the reward is capable of change, that the

condition is a terminable one. The retribution of the wicked is described as death, outer darkness, weeping and wailing and gnashing of teeth, the undying worm, the quenchless fire, exclusion from the kingdom, eternal punishment and the like " (S. D. J. Salmond in Hastings's Bible Dictionary, p. 752). Degrees of award are recognized (Luke xii. 47, 48). Gehenna is applied to the condition of the lost (Matt, xviii. 9). Two sayings are held to point to a terminable penalty (Matt. v. 25, 26, xii. 31, 32), but the one is so figurative and the other so obscure, that we are not warranted in drawing any such definite conclusion from either of them. The finality of destiny seems to be unmistakably expressed (Matt. vii. 23, x. 33, xiii. 30, xxv. 46, xxvi. 24; Mark ix. 43-48, viii. 36; Luke ix. 26; John iii. 16, viii. 21, 24). No second opportunity for deciding the issue of life or death is recognized by Jesus.

The apostolic eschatology presents resemblance amid difference. Jude (v. 6), as well as 2 Peter (ii. 4), refers to the judgment of the fallen angels. 2 Peter describes the place of their detention as Tartarus, and teaches that Christ's Parousia is to bring the whole present system of things to its conclusion, and the world itself to an end (iii. 10, 13). After the destruction of the existing order by fire, " a new heaven and a new earth " will appear as the abode of righteousness. The question of greatest interest in 1 Peter is the relation of two passages in it, the preaching to the spirits in prison (iii. 18-22) and the preaching of the Gospel to the dead (iv. 6) to the " larger hope." Peter's discourse also contains a phrase which suggests the belief of a descent of Christ into Hades in the interval between His death and His resur- rection (Acts ii. 31). No certainty has been reached in the interpretation of these passages, but they may suggest to the Christian mind the expectation that the final destiny of no soul can be fixed until in some way or other, in this life or the next, the opportunity of decision for or against Christ has been given. The phrase " the times of restoration of all things " (iii. 21) is too vague in itself, and is too isolated in its context to warrant the dogmatic teaching of universalism, although there are other passages which seem to point towards the same goal. While John's Apocalypse is distinctly eschatological, the Epistles and the Gospels often give these conceptions an ethical and spiritual import, without, however, excluding the eschatological. Life is

present while eternal (1 John v. 12, 13}, but it is also future (ii. 25).

There is expected a future manifestation of Christ as He is, and what the believer himself will be does not yet appear (iii. 2). The writer speaks of the last hour (ii. 18), the Antichrist that cometh (ii. 22, iv. 3), and the Christian's full reward (2 John v. 8) as well as the Parousia (1 John ii. 28). The Apocalypse reproduces much of the current Jewish eschatology. A mil- lennial reign of Christ on earth is interposed between the first resurrection, confined to the saints and especially the martyrs, and the second resurrection for the rest of the dead. A final outburst of Satan's power is followed by his overthrow and the Last Judgment.

Although Paul sometimes describes the Kingdom of God as present (Rom. xiv. 17; 1 Cor. iv. 20; Col. i. 13), it is usually represented as future. The Parousia fills a large place in his thought, and, if more prominent in his earlier writings, is not altogether absent from his later, although the expectation of personal survival does seem to grow less confident (cf. 1 Cor. xv. 51 and Phil. i. 20-24). The doctrines of the Resurrection, the Last Judgment, the Reward of the Righteous and the Punish- ment of the Wicked are not less distinctly expressed than in the other apostolic writings. Peculiar elements in Paul's eschatology are the doctrines of the Rapture of the Saints (1 Thess. iv. 17) and the Man of Sin (2 Thess. ii. 3-6), but these have affinities elsewhere. A reference to the millennial reign of Christ in the period between the two resurrections is sometimes sought in 1 Cor. xv. 22-24; but it is not a chronology of the last things Paul is here giving. So also a justification for the doctrine of purgatory is sought in iii. 12-15 ; but the day and the fire are of the last judgment. A descent of Christ into Hades, implying an extension of the opportunity of grace such as is supposed to be taught in 1 Peter, is also discovered in the obscure statements in Rom. x. 7 (where Paul is freely quoting Deut. xxx. n-14), and Eph. iv. 10 (where he is commenting on Ps. lxviii. 18). Universal restoration is inferred from 1 Cor. xv. 24-28, " God all in all," Phil. ii. 10-n, every knee bowing to, and every tongue confessing Jesus Christ, Eph. i. 9, 10, the summing up of all things in Christ, Col. i. 20, God reconciling all things unto Himself in Christ. These passages inspire a hope, but do not sustain a certainty. Paul's shrinking from the disembodied state and longing to be clothed upon at death in 2 Cor. v. 1-8, cannot be regarded as a proof of an interim body prior to and preparatory for the resurrection body. Paul links the human resurrection with a universal renovation (Rom. viii. 19-23). Paul's eschatology is not free of obscurities and am- biguities; and in the New Testament eschatology generally we are forced to recognize a mixture of inherited Jewish and original Christian elements (see Antichrist).

During the first century of the existence of the Gentile Christian Church, " the hope of the approaching end of the world and the glorious kingdom of Christ " was dominant, although warnings had to be given against doubt and indifference. Redemption was thought of as still future, as the power of the devil had not been broken but rather increased by the First Advent, and the Second Advent was necessary to his complete overthrow. The expectations were often grossly materialistic, as is evidenced by Papias's quotation as the words of the Lord of a group of say- ings from the Apocalypse of Baruch, setting forth the amazing fruitfulness of the earth in the Messianic time.

The Gnostics rejected this eschatology as in their view the enlightened spirit already possessed immortality. Marcion expected that the Church would be assailed by Anti- christ; a visible return of Christ he did not teach, but he recognized that human history would issue in a separation of the good from the bad. Montanism sought to form a new Christian commonwealth which, separated from the world, should prepare itself for the descent of the Jerusalem from above, and its establishment in the spot which by the direction of the Spirit had been chosen in Phrygia. While Irenaeus held fast the traditional eschatological beliefs, yet his conception of the Christian salvation as a deification of man tended to weaken their hold on Christian thought. The Alogi

Gnostics.

Moataa Ism.

in the 2nd century rejected the Apocalypse on account of its chiliasm, its teaching of a visible reign of Christ on earth for a thousand years. Montanism also brought these apocalyptic expectations into discredit in orthodox ecclesiastical circles. The Alexandrian theology strengthened this movement against chiliasm. Clement of Alexandria taught that justice is not merely retributive, that punishment is remedial, that probation continues after death till the final judgment, that Christ and the apostles preached the Gospel in Hades to those who lacked knowledge, but whose heart was right, that a spiritual body will be raised. Origen taught that a germ of the spiritual body is in the present body, and its development depends on the character, that perfect bliss is reached only by stages, that the evil are purified by pain, conscience being symbolized by fire, and that all, even the devil himself, will at last be saved. Both regarded chiliasm with aversion. But in the 5th century there were rejected as heretical (1) " the doctrine of universalism, and the possibility of the

redemption of the devil; (2) the doctrine of the complete annihilation of evil; (3) the conception of the penalties of hell as tortures of conscience; (4) the spiritualizing version of the resurrection of the body ; (5) the idea of the con- tinued creation of new worlds " (A. Harnack, History of Dogma, iii. p. 186).

Epiphanius, following Methodius, insisted on the most perfect identity between the resurrection body and the material body; and this belief, enforced in the West by Jerome, soon established itself as alone orthodox. Augustine made experiments on the flesh of a peacock in order to find physical evidence for the doctrine. He held fast to eternal punishment, but allowed the possibility of mitigations. Some believers, he taught, may pass through purgatorial fires; and this middle class may be helped by the sacraments and the alms of the living. " There are many souls not good enough to dispense with this provision, and not bad enough to be benefited by it " (op. cit. v. 233). This doctrine was sanctioned and developed by Gregory the Great. " After God has changed eternal punishments into temporary, the justified must expiate these temporary penalties for sin in purgatory " (p. 268) . This view was inferred indirectly from Matt. xii. 31, and directly from 1 Cor. iii. 12-15. After- wards purgatory took more and more the place of hell, and was subject to the control of the church. As regards the saints, different degrees of blessedness were recognized; they were sup- posed to wait in Hades for the return of Christ, but gradually the belief gained ground, especially in regard to the martyrs, that their souls at once entered Paradise. The primitive Christian eschatology was preserved in the West as it was not in the East, and in times of exceptional distress the expectation of Antichrist emerged again and again. In the middle ages there was an extravagance of speculation on this subject, which may be seen in the last division of Aquinas' Summa Theologiae. He proposes thirty questions on these matters, among which are the following: " whether souls are conducted to heaven or hell immediately after death"; '• whether the limbus of hell is the same as Abraham's bosom "; " whether the sun and moon will be really obscured at the day of judgment "; " whether all the members of the human body will rise with it "; " whether the hair and nails will reappear"; could thought become "more lawless and uncertain"?

While rejectir-; purgatory, Protestantism took over this eschatology. Souls passed at once to heaven or to hell; a doctrine even less adequate to the complex quality of human life. Luther himself looked for the passing {"^f°I away of the present evil world. Socinianism taught a Theology. new spiritual body, an intermediate state in which the soul is near non-existence, an annihilation of the wicked,

as immortality is the gift of God. Swedenborg discards a physical resurrection, as at death the eyes of men are opened to the spiritual world in which we exist now, and they continue to live essentially as they lived here, until by their affinities they are drawn to heaven or hell. The doctrine of eternal punishment has been opposed on many grounds, such as the disproportion between the offence and the penalty, the moral

and religious immaturity of the majority of men at death, the diminution of the happiness of heaven involved in the knowledge of the endless suffering of others (Schleiermacher), the defeat of the divine purpose of righteousness and grace that the con- tinued antagonism of any of God's creatures would imply, the dissatisfaction God as Father must feel until His whole family is restored. It has been argued that the term " eternal " has reference not to duration of time but quality of being (Maurice) ; but it does seem certain that the writers in the Holy Scriptures who used it did not foresee an end either to the life or to the death to which they applied the term. The contention should not be based on the meaning of a single word, but on such broader considerations as have been indicated above. The doctrine of conditional immortality taught by Socinianism was accepted by Archbishop Whately, and has been most persistently advocated by Edward White, who " maintains that immortality is a truth, not of reason, but of revelation, a gift of God " bestowed only on believers in Christ; but he admits a continued probation after death for such as have not hardened their hearts by a rejection of Christ. According to Albrecht Ritschl " the wrath of God means the resolve of God to annihilate those men who finally oppose themselves to redemption, and the final purpose of the kingdom of God." He thus makes immortality conditional on inclusion in the kingdom of God. The doctrine of universal restoration was maintained by Thomas Erskine of Linlathen on the ground of the Fatherhood of God, and Archdeacon Wilson anticipates such discipline after death as will restore all souls to God. C. I. Nitzsch argues against the doctrine of the annihilation of the wicked, regards the teaching of Scripture about eternal damna- tion as hypothetical, and thinks it possible that Paul reached the hope of universal restoration. I. A. Dorner maintains that hopeless perdition can be the penalty only of the deliberate rejection of the Gospel, that those who have not had the oppor- tunity of choice fairly and fully in this life will get it hereafter, but that the right choice will in all cases be made

we cannot be confident. The attitude of theologians generally regarding individual destiny is well expressed by Dr James Orr, " The conclusion I arrive at is that we have not the elements of a complete solution, and we ought not to attempt it. What visions beyond there may be, what larger hopes, what ultimate harmonies, if such there are in store, will come in God's good time; it is not for us to anticipate them, or lift the veil where God has left it down" (The Christian View of God and the World, 1893, p. 397).

Although in recent theological thought attention has been mainly directed to individual destiny, yet the other elements of Christian eschatology must not be altogether passed over. History has offered the authoritative commentary on the prophecy of the Parousia of Christ. The presence and power of His Spirit, the spread of His Gospel, the progress of His kingdom have been as much a fulfilment of the eschatological teaching of the New Testament' as His life and work on earth were a fulfilment of Messianic prophecy, for fulfilment always transcends prophecy. Even if the common beliefs of the apostolic age have not modified the evangelist's reports of Jesus' teaching, it must be remembered that He used the common prophetic phraseology, the literal fulfilment of which is not to be looked for. Some parables (the leaven, the mustard seed) suggest a gradual progressive realization of His kingdom. The Fourth Gospel interprets both judgment and resurrection spiritually. Accordingly the general resurrection and the last judgment may be regarded as the temporal and local forms of thought to express the universal permanent truths that life survives death in the completeness of its necessary organs and essential functions, and that the character of that continued life is determined by personal choice of submission or antagonism to God's purpose of grace in Christ, the perfect realization of which is the Christian's hope for himself, mankind and the world.

Bibliography. — In addition to the works referred to above the following will be found useful: S. D. F. Salmond, The Christian Doctrine of Immortality (4th ed., 1901); R. H. Charles, A Critical History of the Doctrine of a Future Life in Israel, in Judaism, and in Christianity (1899) ; L. N. Dahle, Life after Death and the Future of the Kingdom of God (Eng. tr. by J. Beveridge, 1895); J. A. Beet,

The Last Things (new. ed., 1905); W. G. T. Shedd, Doctrine of Endless Punishment (New York, 1886) ; F. W. Farrar, The Eternal Hope (1892) ; E. Petavel, The Problem of Immortality (Eng. tr. by F. A. Freer, 1892); E. White, Life in Christ (3rd ed., 1878); also the relevant sections in books on biblical and systematic theology. (A. E. G.)*

ESCHEAT (O. Fr. eschete, from escheoir, to fall to one's share; Lat. excidere, to fall out), in English law, the reversion of lands to the next lord on the failure of heirs of the tenant. " When the tenant of an estate in fee simple dies without having alienated his estate in his lifetime or by his will, and without leaving any heirs either lineal or collateral, the lands in which he held his estate escheat, as it is called, to the lord of whom he held them " (Williams on the Law of Real Property). This rule is explained by the conception of a freehold estate as an interest in lands held by the freeholder from some lord, the king being lord paramount. (See Estate.) The granter retains an interest in the land similar to that of the donor of an estate for life, to whom the land reverts after the life estate is ended. As there are now few freehold estates traceable to any mesne or intermediate lord, escheats, when they do occur, fall to the king as lord paramount. Besides escheat for defect of heirs, there was formerly also escheat propter delictum tenentis, or by the corruption of the blood of the tenant through attainder consequent on conviction and sentence for treason or felony. The blood of the tenant becoming corrupt by attainder was decreed no longer inheritable, and the effect was the same as if the tenant had died without heirs. The land, therefore, escheated to the next heir, subject' to the superior right of the crown to the forfeiture of the lands, — in the case of treason for ever, in the case of felony for a year and a day. All this was abolished by the Felony Act 1870, which provided for the appointment of an administrator to the property of the con- vict. Escheat is also an incident of copyhold tenure. Trust estates were not subject to escheat until the Intestates' Estates Act 1884, but now by that act the law of escheat applies in the same manner as if the estate or interest were a legal estate in corporeal hereditaments.

ESCHENBURG, JOHANN JOACHIM (1743-1820), German critic and literary historian, was born at Hamburg on the 7th of December 1743. After receiving his early education in his native town, he studied at Leipzig and Gottingen. In 1767 he was appointed tutor, and subsequently professor, at the Collegium Carolinum in Brunswick. The title of " Hofrat " was conferred on him in 1786, and in 1814 he was made one of the directors of the Carolinum. He is best known by his efforts to familiarize his countrymen with English literature. He published a series of German translations of the principal English writers on aesthetics, such as J. Brown, D. Webb, Charles Burney, Joseph Priestley and R. Hurd; and Germany owes also to him the first complete translation (in prose) of Shakespeare's plays {William Shakespear's Schauspiele, 13 vols., Zurich, 1775-1782). This is virtually a revised edition of the

incomplete translation published by Wieland between 1762 and 1766. Eschenburg died at Brunswick on the 29th of February 1820.

Besides editing, with memoirs, the works of Hagedorn, Zacharia and other German poets, he was the author of a Harid- buch der klassischen Literatur (1783); Entwurf einer Theorie und Literatur der schonen Wissenschaften (1783); Beispielsammlung zur Theorie und Literatur der schonen Wissenschaften (8 vols., 1788-1795); Lehrbuch der Wissenschaftskunde (1792); and Denkmdler altdeutscher Dichtkunst (1799). Most of these works have passed through several editions. Eschenburg was also a poet of some pretensions, and some of his religious hymns, e.g. Ich will dich noch im Tod erheben and Dir trau' ich, Gott, und wanke nicht, are contained in many hymnals to this day.

ESCHENMAYER, ADAM KARL AUGUST VON (1768-1852), German philosopher and physicist, was born at Neuenburg in Wiirttemberg in July 1768. After receiving his early education at the Caroline academy of Stuttgart, he entered the university of Tubingen, where he received the degree of doctor of medicine. He practised for some time as a physician at Sulz, and then at Kirchheim, and in 181 1 he was chosen extraordinary professor of philosophy and medicine at Tubingen. In 1818 he became

ordinary professor of practical philosophy, but in 1836 he resigned and took up his residence at Kirchheim, where he devoted his whole attention to philosophical studies. Eschenmayer's views are largely identical with those of Schelling, but he differed from him in regard to the knowledge of the absolute. He believed that in order to complete the arc of truth philosophy must be supple- mented by what he called " non-philosophy," a kind of mystical illumination by which was obtained a belief in God that could not be reached by mere intellectual effort (see Hoffding, Hist, of Mod. Phil., Eng. trans, vol. 2, p. 170). He carried this tendency to mysticism into his physical researches, and was led by it to take a deep interest in the phenomena of animal magnetism. He ultimately became a devout believer in demoniacal and spiritual possession; and his later writings are all strongly impregnated with the lower supernaturalism.

His principal works are — Die Philosophic in ihrem Uber gauge zur Nicktphilosophie (1803); Versuch die scheinbare Magie des thieri-

schen Magnetismus aus physiol. und psychischen Gesetzen zu erkldren (1816); System der Moralphilosophie (1818); Psychologie in drei Theilen, als empirische, reine, angewandte (1817, 2nd ed. 1822); Religionsphilosophie (3 vols., 1818-1824); Die HegeVsche Religions- philosophie verglichen mit dem christl. Princip (1834); Der Ischario- tismus unserer Tage (1835) (directed against Strauss's Life of Jesus) ; Konflikt zwischen Himmel und Hblle, an dem Damon eines besessenen Mddchens beobachtet (1837); Grundriss der Naturphilosophie (1832); Grundzuge der christl. Philosophie (1840); and Betrachtungen uber den physischen Weltbau (1852).

ESCHER VON DER LINTH, ARNOLD (1807-1872), Swiss geologist, the son of Hans Conrad Escher (1767-1823), was born at Zurich on the 8th of June 1807. In 1856 he became professor of geology at the Ecole Polytcchnique at Zurich. His researches led him to be regarded as one of the founders of Swiss geology. With B. Studer he produced (1852-1853) the first elaborate geological map of Switzerland. He was the author also of Geologische Bemerkungen uber das nordliche Vorarlberg und einige angrenzenden Gegenden, published at Zurich in 1853. He died on the 12th of July 1872.

ESCHSCHOLTZ, JOHANN FRIEDRICH (1793-1831), Russian traveller and naturalist, was born in November 1793, at Dorpat, where he died in May 183 1. He was naturalist and physician to Otto von Kotzebue's exploring expedition during 1815-1818. On his return he was appointed extraordinary professor of anatomy (1819) and director of the zoological museum of the university at Dorpat (1822), and in 1823-1826 he accompanied Kotzebue on his second voyage of discovery. He became ordinary professor of anatomy at Dorpat in 1828. Among his publications were the System der Akalephen (1829), and the Zoologischer Atlas (1829-1833). The botanical genus Eschscholtzia was named by Adelbert von Chamisso in his honour.

ESCHWEGE, a town of Germany, in the Prussian province of Hesse-Nassau, on the Werra, and the railway Treysa-Leinefelde, 28 m. S.E. of Cassel. Pop. (1905) 11,113. It consists of the old town on the left, the new town on the right, bank of the Werra, and Briickenhausen on a small island connected with the old and new town by bridges. It is a thriving manufacturing town, its chief industries being leather-making, yarn-spinning, cotton- and linen-weaving, the manufactures of cigars, brushes, liquors and oil, and glue- and soap-boiling. It has two ancient buildings, the Nikolai-turm, built in 1455, and the old castle. After being part of Thuringia, Eschwege passed to Hesse in 1263. It was recovered by the landgrave of Thuringia in 1388, but

soon reverted to Hesse, and it became the residence of one of the branches of the Hessian royal house, a branch which died out in

i655-

ESCHWEILER, a town of Germany, in the Prussian Rhine province, on the Inde, and the railways Cologne-Herbesthal and Munich-Gladbach-Stolberg, about 8 m. E.N.E. from Aix- la-Chapelle. Pop. (1905) 20,643. The town has an Evangelical and four Roman Catholic churches, a gymnasium and an orphan- age. The manufacture of iron and steel goods is carried on; other industries include the manufacture of zinc wares, tanning, distilling and brewing. In the neighbourhood there are valuable coal mines.

See Koch. Geschichle der Stadt Eschweiler (Frankfort, 1890).

ESCOBAR Y MENDOZA, ANTONIO (1589-1669), Spanish churchman of illustrious descent, was born at Valladolid in 1589. He was educated by the Jesuits, and at the age of fifteen took the habit of that order. He soon became a famous preacher, and his facility was so great that for fifty years he preached daily, and sometimes twice a day. In addition he was a volumin- ous writer, and his works fill eighty-three volumes. His first literary efforts were Latin verses in praise of Ignatius Loyola (1613) and the Virgin Mary (1618); but he is best known as a writer on casuistry. His principal works belong to the fields of exegesis and moral theology. Of the latter the best known are Summula casuum conscientiae (1627); Liber theologiae moralis (1644), and Universae theologiae moralis probletnata (1652-1666). The first mentioned of these was severely criticised by Pascal in the fifth and sixth of his Provincial Letters, as tending to inculcate a loose system of morality. It contains the famous maxim that purity of intention may be a justification of actions which are contrary to the moral code and to human laws; and its general tendency is to find excuses for the majority of human frailties. His doctrines were disapproved of by many Catholics, and were mildly condemned by Rome. They were also ridiculed in witty verses by Moliere, Boileau and La Fontaine, and gradually the name Escobar came to be used in France as a synonym for a person who is adroit in making the rules of morality harmonize with his own interests. Escobar himself is said to have been simple in his habits, a strict observer of the rules of his order, and unweariedly zealous in his efforts to reform the lives of those with whom he had to deal. It has been said of him that " he purchased heaven dearly for himself, but gave it away cheap to others." He died on the 4th of July 1669.

ESCOIQUIZ, JUAN (1762-1820), Spanish ecclesiastic, politician and writer, was born in Navarre in 1762. His father was a general officer and he began life as a page in the court of King Charles III. He entered the church and was provided for by a prebend at Saragossa. Godoy in his memoirs asserts that Escoiquiz sought to gain his favour by flattery. There is every reason to believe that this is an accurate statement of the case. The mere fact that he was selected to be the tutor of the heirr apparent, Ferdinand, afterwards King Ferdinand VII., is of itself a proof that he exerted himself to gain the goodwill of the reigning favourite. In 1 797 he published a translation of Young's Night Thoughts, which does not of itself show that he was well acquainted with English, for the version may have been made with the help of the French. In 1798 he published a long and worthless so-called epic on the conquest of Mexico. Escoiquiz was in fact a busy and pushing member of the literary clique which looked up to Godoy as its patron. But his position as tutor to the heir to the throne excited his ambition. He began to hope that he might play the part of those court ecclesiastics who had often had an active share in the government of Spain. As Ferdinand grew up, and after his marriage with a Neapolitan princess, he became the centre of a court opposition to Godoy and to his policy of alliance with France. Escoiquiz was the brains, as far as there were any brains, of the intrigue. His activity was so notorious that he was exiled from court, but was consoled by a canonry at Toledo. This half measure was as ineffective as was to have been expected. Escoiquiz continued to be in constant communication with the prince. Toledo is close to Madrid, and the correspondence was easily maintained. He had a large share in the conspiracy of the Escorial which was detected on the 28th of October 1807. He was imprisoned and sent for trial with other conspirators. But as they had appealed to Napoleon, who would not suffer his name to be mentioned, the government had to allow the matter to be hushed up, and the prisoners were acquitted. After the outbreak at Aranjuez on the 17th of March 1808, in which he had a share, he became one of the most trusted advisers of Ferdinand. The new king's decision to go to meet Napoleon at Bayonne was largely inspired by him. In 1814 Escoiquiz published at Madrid his Idea Sencilla de las razones que motivaron el viage del Rey Fernando VII. a Bayona (Honest representation of the causes which inspired the journey of King Ferdinand VII. to Bayonne).

It is a valuable historical document, and contains a singularly vivid

account of an interview with Napoleon. Escoiquiz was far too firmly convinced of his ingenuity and merits to conceal the delusions and follies of himself and his associates. He displays his own vanity, frivolity and futile cleverness with much unconscious humour, but, it is only fair to allow, with some literary dexterity. When the Spanish royal family was imprisoned by Napoleon, Escoiquiz remained with Ferdinand at Valencay. In 1813 he published at Bourges a translation of Milton's Paradise Lost. When Ferdinand was released in 18 14 he came back to Madrid in the hope that his ambition would now be satisfied, but the king was tired of him, and was moreover resolved never to be subjected by any favourite. After a very brief period of office in 181 5 he was sent as a prisoner to Murcia. Though he was afterwards recalled, he was again exiled to Ronda, where he died on the 27 th of November 1820.

ESCOMBE, HARRY (1838-1800), South African statesman, a member of a Somersetshire family, was born at Notting Hill, London, on the 25th of July 1838, and was educated at St Paul's school. After four years in a stockbroker's office, he emigrated, in 1859, to the Cape. The following year he moved to Natal, and, after trying other occupations, qualified as an attorney. He became recognized as the ablest pleader in the colony, and, in 1872, was elected for Durban as a member of the legislative council, and subsequently was also placed on the executive council. In 1880 he secured the appointment of a harbour board for Natal, and was himself made chairman. The transformation of the port of Durban into a harbour available for ocean liners was due entirely to his energy. In 1888-1889 he defended Dinizulu and other Zulu chiefs against a charge of high treason. For several years he opposed the grant of responsible government to Natal, but by 1890 had become convinced of its desirability, and on its conferment in 1893 he joined the first ministry formed, serving under Sir John Robinson as attorney-general. In February 1897, on Sir John's retirement, Escombe became premier, remaining attorney-general and also holding the office of minister of education and minister of defence. In the summer of that year he was in London with the other colonial premiers at the celebration of the Diamond Jubilee of Queen Victoria, and was made a member of the privy council. Cambridge Uni- versity conferred upon him the honorary degree of LL.D. The election that followed his return to Natal proved unfavour- able to his policy, and he resigned office (October 1897). Throughout his life he took an active interest in national defence. He had served in the Zulu War of 1879, was commander of the Natal Naval Volunteers and received the volunteer long service decoration. In October 1899

he went to the northern confines of the colony to take part in preparing measures of defence against the invasion by the Boers. He died on the 27th of December 1899.

The Speeches of the late Right Hon. Harry Escombe (Maritzburg, 1903), edited by J. T. Henderson, contains brief biographical notes by Sir John Robinson and the editor.

ESCORIAL, or Escdrial, in Spain, one of the most remarkable buildings in Europe, comprising at once a convent, a church, a palace and a mausoleum. The Escorial is situated 3432 ft. above the sea, on the south-western slopes of the Sierra de Guadarrama, and thus within the borders of the province of Madrid and the kingdom of New Castile. By the Madrid-Avila railway it is 3 1 m. N. W. of Madrid. The surrounding country is a sterile and gloomy wilderness exposed to the cold and blighting Masts of the Sierra.

According to the usual tradition, which there seems no suffi- cient reason to reject, the Escorial owes its existence to a vow made by Philip II. of Spain (1556-1598), shortly after the battle of St Quentin, in which his forces succeeded in routing the army of France. The day of the victory, the 10th of August 1557, was sacred to St Laurence; and accordingly the building was dedicated to that saint, ar.d received the title of El real monasterio de San Lorenzo del Escorial. The last distinctive epithet was derived from the little hamlet in the vicinity which furnished shelter, not only to the workmen, but to the monks of St Jerome

who were afterwards to be in possession of the monastery; and the hamlet itself is generally but perhaps erroneously supposed to be indebted for its name to the scoriae or dross of certain old iron mines. The preparation of the plans and the super- intendence of the work were entrusted by the king to Juan Bautista de Toledo, a Spanish architect who had received most of his professional education in Italy. The first stone was laid in April 1563; and under the king's personal inspection the work rapidly advanced. Abundant supplies of berroquena, a granite- like stone, were obtained in the neighbourhood, and for rarer materials the resources of both the Old and the New World were put under contribution. The death of Toledo in 1567 threatened a fatal blow at the satisfactory completion of the enterprise, but a worthy successor was found in Juan Herrera, Toledo's favourite pupil, who adhered in the main to his master's designs. On the 13th of September 1584 the last stone of the masonry was laid, and the works were brought to a termination in 1593. Each successive occupant of the Spanish throne has done

something, however slight, to the restoration or adornment of Philip's convent-palace, and Ferdinand VII. (1808-1833) did so much in this way that he has been called a second founder. In all its principal features, however, the Escorial remains what it was made by the genius of Toledo and Herrera working out the grand, if abnormal, desires of their master.

The ground plan of the building is estimated to occupy an area of 396,782 sq. ft., and the total area of all the storeys would form a causeway 1 .metre in breadth and 95 m. in length. There are seven towers, fifteen gateways and, according to Los Santos, no fewer than 12,000 windows and doors. The general arrange- ment is shown by the accompanying plan. Entering by the main entrance the visitor finds himself in an atrium, called the Court of the Kings {Patio de los reyes), from the 16th-century statues of the kings of Judah, by Juan Bautista Monegro, which adorn the facade of the church. The sides of the atrium are unfortun- ately occupied by plain ungainly buildings five storeys in height, awkwardly accommodating themselves to the upward slope of the ground. Of the grandeur of the church itself, however, there can be no question: it is the finest portion of the whole Escorial, and, according to Fergusson, deserves to rank as one of the great Renaissance churches of Europe. It is about 340 ft. from east to west by 200 from north to south, and thus occupies an area of about 70,000 sq. ft. The dome is 60 ft. in diameter, and its height at the centre is about 320 ft. In glaring contrast to the bold and simple forms of the architecture, which belongs to the Doric style, were the bronze and marbles and pictures of the high altar, the masterpiece of the Milanese Giacomo Trezzo, almost ruined by the French in 1808. Directly under the altar is situated the pantheon or royal mausoleum, a richly decorated octagonal chamber with upwards of twenty niches, occupied by black marble urnas or sarcophagi, kept sacred for the dust of kings or mothers of kings. There are the remains of Charles V. (1 516-1556), of Philip II., and of all their successors on the Spanish throne down to Ferdinand VII., with the ex- ception of Philip V. (1700-1746) and Ferdinand VI. (1746-1759). Several of the sarcophagi are still empty. For the other members of the royal family there is a separate vault, known as the Panteon de los Infantes, or more familiarly by the dreadfully suggestive name of El Pudridero. The most interesting room in the palace is Philip II. 's cell, from which through an opening in the wall he could see the celebration of mass while too ill to leave his bed.

The library, situated above the principal portico, was at one time one of the richest in Europe, comprising the king's own collection, the

extensive bequest of Diego de Mendoza, Philip's ambassador to Rome, the spoils of the emperor of Morocco, Muley Zidan (1603-1628) and various contributions from con- vents, churches and cities. It suffered greatly in the fire of 1671, and has since been impoverished by plunder and neglect. Among its curiosities still extant are two New Testament Codices of the 10th century and two of the nth ; various works by Alphonso the Wise (1252-1284), a Virgil of the 14th century, a Koran of the 1 5th, &c. Of the Arabic manuscripts which it contained in the 17th century a catalogue was given in J. H. Hottinger's

Church

1. Principal entrance and portico.

2. Court of the kings (Patio de los reyes).

3. Vestibule of the church.

4. Choir of the seminarists.

5. Centre of the church and projection of the

dome.

6. Greater chapel.

7. High altar.

8. Chapel of St John.

9. Chapel of St Michael.

10. Chapel of St Maurice.

11. Chapel of the Rosary.

12. Tomb of Louisa Carlota.

13. Chapel of the Patrocinio.

Views and Plan of the Escorial. 1

14. Chapel or the Cristo de la buena muerte.

15. Chapel of the Eleven Thousand Virgins.

16. Former Chapel of the Patrocinio.

17. Sacristy.

Palace

18. Principal court of the palace.

19. Ladies' tower.

20. Court of the masks.

21. Apartments of the royal children.

22. Royal oratory.

23. Oratory where Philip II. died.

Seminary

24. Entrance to seminary.

25. Classrooms.

26. Old philosophical hall.

27. Old theological hall.

28. Chamber of secrets.

29. Old refectory.

30. Entrance to the college.

31. College yard.

Convent

32. Clock tower.

33. Principal cloister.

34. Court of the evangelists.

35. Prior's cell.

36. Archives.

37. Old church.

38. Visitors' hall.

39. Manuscript library.

40. Convent refectory.

Promptuarium sive bibliotheca orientalis, published at Heidelberg in 1658, and another in the 18th, in M. Casiri's Bibliotheca Arabico-Hispanica (2 vols., Madrid, 1760-1770). Of the artistic treasures with which the Escorial was gradually enriched, it is sufficient to mention the frescoes of Peregrin or Pellagrino Tibaldi, Luis de Carbajal, Bartolommeo Carducci or Carducho, and Luca Giordano, and the pictures of Titian, Tintoretto and Velasquez. These paintings all date from the 15th or the 17th century. Many of those that are movable have been transferred to Madrid, and many others have

perished by fire or sack. The conflagration of 167 1, already mentioned, raged for fifteen days, and only the church, a part of the palace, and two towers escaped uninjured. In 1808 the whole building was exposed to the ravages of the French soldiers under General La Houssaye. On the night of

the 1st of October 1872, the college and seminary, a part of the palace and the upper library were devastated by fire; but the damage was subsequently repaired. In 1885 the conventual buildings were occupied by Augustinian monks.

The reader will find a remarkable description of the emotional influence of the Escorial in E. Quinet's Vacancy en Espagne (Paris, 1846), and for historical and architectural details he may consult the following works: — Fray Juan de San Geronimo, Memorias sobre la fundacion del Escorial y su fabrica, in the Coleccion de documentos ineditos para la historia de Espana, vol. vii. ; Y. de Herrera, Sumario y breve declaracion de los disefws y estampas de la fab. de S. Lorencio el Real del Escurial (Madrid, 1589); Jos6 de Siguenza, Historia de la orden de San Geronyno, &c. (Madrid, 1590).

1 Reduced from a large plan of the Escorial in the British Museum, Monasterio del Escorial, published at Madrid in 1876.

L. de Cabrera de Cordova, Felipe Segundo (Madrid, 1619) ; James Wadsworth, Further Observations of the English Spanish Ptlgrime (London, 1629, 1630) ; Ilario Mazzorali de Cremona, Le Reali Grandezze del Escuriale (Bologna, 1648); De los Santos, Descripcion del real monasterio, &c. (Madrid, 1657) ; Andres Ximenes, Descripcion, &c. (Madrid, 1764); Y. Quevedo, Historia del Real Monasterio, &c. (Madrid, 1849) ; A. Rotondo, Hist, artistica, . . ■ del monasterio de San Lorenzo (Madrid, 1856-1861) ; W. H. Prescott, Life of Philip II. (London, 1887); J. Fergusson, History of the Modern Styles of Architecture (London, 1891-1893); Sir W. Stirling-Maxwell, Annals of the Artists of Spain (London, 1 891).

ESCOVEDO, JUAN DE (d. 1578), Spanish politician, secretary of Don John of Austria, and chiefly notable as having been the victim of one of the mysteries of the 16th century, began life in the household of Ruy Gomez de Silva, prince of Eboli, the most trusted minister of

the early years of the reign of Philip II. By the will of the prince he was endowed for life with the post of Regidor, or legal representative of the king in the municipality of Madrid. He was also associated with Antonio Perez as one of the secretaries who acted as the agents of the king in all dealings with the various governing boards which formed the Spanish administration. When Don John of Austria, after the battle of Lepanto in 1571, began to launch on a policy of self-seeking adventure, Escovedo was appointed as his secretary with the intention that he should act as a check on these follies. Un- happily for himself and for Don John he went heart and soul into all the prince's schemes. He began to disobey orders from Madrid and became entangled in intrigues to manage or even to coerce the king. In July 1577, and contrary to the king's orders, he came to Spain from Flanders, where Don John was then governor. It is said that he discovered the love intrigue between Antonio Perez and the widowed princess of Eboli, Ana Mendoza de la Cerda. This is, however, mere gossip and supposition. There can be no doubt that he was a busy intriguer, or that the king, acting on the then very generally accepted doctrine that the sovereign has a right to act for the public interest without regard to forms of law, gave orders to Antonio Perez that he was to be put out of the way. After two clumsy attempts had been made to poison him at Perez's table, he was killed by bravos on the night of Easter Monday, the 31st of March 1578. According to an old tradition the murder took place outside the church of St Maria in Madrid, which was pulled down in 1868.

See Gaspar Muro, La Princesse d'Eboli (Paris, 1878) ; and W. H. Prescott, Reign of Philip II. (1855-59). .

ESCUINTLA, the capital of the department of Escuintla, Guatemala; on the southern slope of the Sierra Madre, 45 m. S.W. of Guatemala city. Pop. (1905) about 12, 000. Escuintla is locally celebrated for its hot mineral springs. It is the com- mercial centre of a fertile district, which produces coffee, cane- sugar and cocoa; it has also a brisk transit trade in most of the products or uuatemala, owing to its position on the interoceanic railway between Puerto Barrios on the Atlantic and San Jose (30 m. S.) on the Pacific. A branch railway which goes westward to San Augustin meets this line at Escuintla.

ESCUTCHEON (O. Fr. escucheon, escusson, modern ecusson, through a Late Lat. form from Lat. scutum, shield), an heraldic term for a shield with armorial bearings displayed (see Heraldry). The word is also applied to the shields used on tombs, in the spandrils of doors or in string-courses, and to the ornamented plates from the centre of which door-rings, knockers, &c, are suspended, or which

protect the wood of the key-hole from the wear of the key. In medieval times these were often worked in a very beautiful manner.

ESHER, WILLIAM BALIOL BRETT, ist Viscount (18 17- 1899), English lawyer and master of the rolls, was a son of the Rev. Joseph G. Brett, of Chelsea, and was born on the 13th of August 18 1 7. He was educated at Westminster and at Caius College, Cambridge. Called to the bar in 1840, he went the northern circuit, and became a Q.C. in 1861. On the death of Richard Cobden he unsuccessfully contested Rochdale as a Conservative, but in 1866 was returned for Helston in unique circumstances. He and his opponent polled exactly the same number of votes, whereupon the mayor, as returning officer, gave his casting vote for the Liberal candidate. As this vote

was given after four o'clock, however, an appeal was lodged, and the House of Commons allowed both members to take their seats. Brett rapidly made his mark in the House, and in 1868 he was appointed solicitor-general. On behalf of the crown he prosecuted the Fenians charged with having caused the Clerken- well explosion. In parliament he took a leading part in the promotion of bills connected with the administration of law and justice. He was (August 1868) appointed a justice in the court of common pleas. Some of his sentences in this capacity excited much criticism, notably so in the case of the gas stokers' strike, when he sentenced the defendants to imprisonment for twelve months, with hard labour, which was afterwards reduced by the home secretary to four months. On the reconstitution of the court of appeal in 1876, Brett was elevated to the rank of a lord justice. After holding this position for seven years, he succeeded Sir George Jessel as master of the rolls in 1883. In 1885 he was raised to the House of Lords as Baron Esher. He opposed the bill proposing that an accused person or his wife might give evidence in their own case, and supported the bill which empowered lords of appeal to sit and vote after their re' cement. The Solicitors Act of 1888, which increased the powers of the Incorporated Law Society, owed much to his influence. In 1880 he delivered a remarkable speech in the House of Lords, deprecating the delay and expense of' trials, which he regarded as having been increased by the Judicature Acts. Lord Esher suffered, perhaps, as master of the rolls from succeed ng a lawyer of such eminence as Jessel. He had a caustic tongue, but also a fund of shrewd common sense, and one of his favourite considerations was whether a certain course was " business " or not. He retired from the bench at the close of 1897, and a viscounty was conferred upon him on his retirement, a dignity never given to any judge, lord chancellors excepted, " for mere legal conduct since the time of Lord Coke." He died in London

on the 24th of May 1899.

Lord Esher was succeeded in the title by his only surviving son, Reginald Baliol Brett (b. 1852), who was secretary to the office of works from 1895 to 1902, but subsequently came into far greater public prominence in 1904 as Chairman of the war office reconstitution committee after the South African War.

ESHER, a township in the Epsom parliamentary division of Surrey, England, 14! m. S.W. of London by the London & South Weswiu railway (Esher and Claremont station). It is pleasantly situated on rising ground above the river Mole, 3 m. from its junction with the Thames. To the north-west lie the grounds of Esher Place. Of the mansion-house founded by William of Waynflete, bishop of Winchester (c. 1450), in which Cardinal Wolsey resided for three or four weeks after his sudden fall from power in 1529, only the gatehouse remains. It is known as Wolsey's Tower, but is apparently part of Waynflete's founda- tion. A new mansion was erected in 1803. To the south is Claremont Palace, built by the great Lord Clive (1769) on the site of a mansion of Sir John Vanbrugh. In 1816 it was the residence of Princess Charlotte, wife of Prince (afterwards King) Leopold. She died here in 1817, and on the death of her husband in 1865 the property passed to the crown. Louis Philippe, ex- king of the French, resided here from 1848 until his death in 1850. In 1882 Claremont became the private property of Queer" Victoria. Christ Church, Esher, contains fine memorials ol King Leopold and others, and one of its three bells is said to have been brought from San Domingo by Sir Francis Drake. To the north near the railway station is Sandown Park, where important race meetings are held. Esher is included in the urban district of Esher and The Dittons, of which Thames Ditton is a favourite riverside resort. The whole district is largely residential. Pop. (1901) 9489.

ESKER (O. Irish eiscir), a local name for long mounds of glacial gravel frequently met with in Ireland. Eskers (the Swedish asar) are among the occasionally puzzling relics of the British glacial period. They wind from side to side across glaciated country and have evidently been formed by channels upon or under the ice. " Where streams of considerable size form tunnels under or in the ice these may become more or less filled

with wash, and when the ice melts the aggraded channels appear as long ridges of gravel and sand known as eskers. It has been thought that similar ridges are sometimes formed in valleys cut in the ice from top to bottom, and even that they rise from gravel and sand lodged in super-glacial channels. The latter at least is probably rare, as the surface streams have usually high gradients, swift currents and smooth bottoms, and hence give little opportunity for lodgment. In the case of ice-sheets, too, in which eskers are chiefly developed, there is usually no surface material except at the immediate edge, where the ice is thin and its layers upturned " (T. C. Chamberlin and R. D. Salisbury, Geology, Processes and their Results). Eskers are to be distinguished from kames (q.v.).

ESKILSTUNA, a town of Sweden in the district (Ian) of Sodermanland, on the Hjelmar river, which unites lakes Hjelmar and Malar, 65 m. W. of Stockholm by rail. Pop. (1900) 13,663. The place is mentioned in the 13 th century, and is said to derive its name from Eskil, an English missionary who suffered martyr- dom on the spot. It rose into importance in the reign of Charles X., who bestowed on- it considerable privileges, and gave the first impulse to its manufacturing activity. It is the chief seat in Sweden of the iron and steel industries, its cutlery being especi- ally noted, while damascened work is a specialty. There is a technical school for the metal industries. There are, in the town or its neighbourhood, great engineering, gun-making, and rolling and polishing works and breweries. The largest mechani- cal works are those of Munktell and Tunafors. The Karl Gustaf Stads rifle factory was established in 1814.

ESKIMO, Eskimos or Esquimaux (a corruption of the Abnaki Indian Eskimantsic or the Ojibway Ashkimeq, both terms mean- ing " those who eat raw flesh": they call themselves " Innuit," "the people"), a North American Indian people, inhabiting the arctic coast of America from Greenland to Alaska, and a small portion of the Asiatic shore of Bering Strait. On the American shores they are found, in broken tribes, from East Greenland to the western shores of Alaska — never far inland, or south of the region where the winter ice allows seals to congregate. Even on hunting expeditions they never travel more than 30 m. from the coast. Save a slight admixture of European settlers, they are the only inhabitants of both sides of Davis Strait and Baffin Bay. They extend as far south as about 50° N. lat. on the eastern side of America, and in the west to 60° on the eastern shore of Bering Strait, while 55° to 60° are their southern limits on the shore of Hudson Bay. Throughout all this range there are no other tribes save where the Kennayan and Ugalenze Indians

(of western America) come down to the shore to fish. The Aleutians are closely allied to the Eskimo in habits and language. H. J. Rink divides the Eskimo into the following groups, the most eastern of which would have to travel nearly 5000 m. to reach the most western: (1) The East Greenland Eskimo, few in number, every year advancing farther south, and coming into contact with the next section. (2) The West Greenlanders, civilized, living under the Danish crown, and extending from Cape Farewell to 74° N. lat. (3) The Northern- most Greenlanders — the Arctic Highlanders of Sir John Ross — confined to Smith, Whale, Murchison and Wolstenholme Sounds, north of the Melville Bay glaciers. These — the most isolated and uncivilized of all the Eskimo — had no boats or bows and arrows until about 1868. (4) The Labrador Eskimo, mostly civilized. (5) The Eskimo of the middle regions, occupying the coasts from Hudson Bay to Barter Island, beyond Mackenzie river, inhabiting a stretch of country 2000 m. in length and 800 in breadth. (6) The Western Eskimo, from Barter Island to the western limits in America. (7) The Asiatic Eskimo.

The Eskimo are not a tall race, their height varying from 5 ft. 4 in. to 5 ft. 10 in., but men of 6 ft. are met. Both men and women are muscular and active, the former often inclining to fat. The faces of both have a pleasing, good-humoured expression, and not infrequently are even handsome. The typical face is broadly oval, flat, with fat cheeks; forehead not high, and rather retreating; teeth good, though, owing to the character of the food, worn down to the gums in old age; nose very flat;

eyes rather obliquely set, small, black and bright; head largish, and covered with coarse black hair, which the women fasten up into a knot on the top, and the men clip in front and allow to hang loose and unkempt behind. Their skulls are of the mesocephalic type, the height being greater than the breadth; according to Davis, 75 is the index of the latter and 77 of the former. Some of the tribes slightly compress the skulls of their new-born children laterally (Hall), but this practice is a very local one. The men have usually a slight moustache, but no whiskers, and rarely any beard. The skin has generally- a " bacony" feel, and when cleaned of the smoke, grease and other dirt — the accumulation of which varies according to the age of the individual — is only so slightly brown that red shows in the cheeks of the children and young women. The hands and feet are small and well formed. The Eskimo dress entirely in skins of the seal, reindeer, bear, dog, or even fox, the first two being, however, the most common. The men's and women's dress is much the same, a jacket suit, the trousers tucked into seal-skin boots. The jacket has a

hood, which in cold weather is used to cover the head, leaving only the face exposed. The women's jacket has a large hood for carrying a child and an absurd-looking tail behind, which is, however, usually tucked up. The women's trousers are usually ornamented with eider-duck neck feathers or embroidery of native dyed leather; their boots, which are of white leather, or (in Greenland) dyed of various colours, reach over the knees, and in some tribes are very wide at the top, thus giving them an awkward appearance and a clumsy waddling walk. In winter two suits are worn, one with the hair inside, the other with it outside. They also sometimes wear shirts of bird-skins, and stockings of dog or young reindeer skins. Their clothes are very neatly made, fit beautifully, and are sewn with " sinew- thread," with a bone needle if a steel one cannot be had. In person the Eskimo are usually filthy, and never wash. Infants are, however, sometimes cleaned by being licked by their mother before being put into the bag of feathers which serves as their bed, cradle and blankets.

In summer the Eskimo live in conical skin tents, and in winter usually in half-underground huts of stone, turf, earth and bones, entered by a long tunnel-like passage, which can only be traversed on all fours. Sometimes, if residing temporarily at a place, they will erect neat round huts of blocks of snow with a sheet of ice for a window. In the roof are deposited their spare harpoons, &c; and from it is suspended the steatite basin-like lamp, the flame of which, the wick being of moss, serves as fire and light. On one side of the hut is the bench which is used as sofa, seats and common sleeping place. The floor is usually very filthy, a pool of blood or a dead seal being often to be seen there. Ventilation is almost non-existent; and after the lamp has blazed for some time, the heat is all but unbearable. In the summer the wolfish-looking dogs lie outside on the roof of the huts, in the winter in the tunnel-like passage just outside the family apartment. The Western Eskimo build their houses chiefly of planks, merely covered on the outside with green turf. The same Eskimo have, in the more populous places, a public room for meetings. " Council chambers " are also said to exist in Labrador, but are only known in Greenland by tradition. Some- times in south Greenland and in the Western Eskimo country the houses are made to accommodate several families, but as a rule each family has a house to itself.

The Eskimo are solely hunters and fishers, and derive most of their food from the sea. Their country allows of no cultivation ; and beyond a few berries, roots, &c, they use no vegetable food. The seal, the reindeer and the whale supply the bulk of their food, as well as

their clothing, light, fuel, and frequently also, when driftwood is scarce or unavailable, the material for various articles of domestic economy. Thus the Eskimo canoe is made of seal-skin stretched on a wooden or whalebone frame, with a hole in the centre for the paddler. It is driven by a bone- tipped double-bladed paddle. A waterproof skin or entrail dress is tightly fastened round the mouth of the hole so that, should the canoe overturn, no water can enter. A skilful paddler can turn a complete somersault, boat and all, through the water.

77°

ESKIMO

The Eskimo women use a flat-bottomed skin luggage-boat. The Eskimo sledge is made of two runners of wood or bone — even, in one case on record, of frozen salmon (Maclure) — united by cross bars tied to the runners by hide thongs, and drawn by from 4 to 8 dogs harnessed abreast. Some of their weapons are ingenious — in particular, the harpoon, with its detachable point to which an inflated sealskin is fastened. When the quarry is struck, the floating skin serves to tire it out, marks its course, and buoys it up when dead. The bird-spears, too, have a bladder attached, and points at the sides which strike the creature should the spear-head fail to wound. An effective bow is made out of whale's rib. Altogether, with meagre material the Eskimo show great skill in the manufacture of their weapons. Meat is sometimes boiled, but, when it is frozen, it is often eaten raw. Blood, and the half-digested contents of the reindeer's paunch, are also eaten; and sometimes, but not habitually, blubber. As a rule this latter is too precious: it must be kept for winter fuel and light. The Eskimo are enormous eaters; two will easily dispose of a seal at a sitting; and in Greenland, for instance, each individual has for his daily consumption, on an average, 25 lb of flesh with blubber, and 1 lb of fish, besides mussels, berries, sea-weed, &c, to which in the Danish settle- ments may be added 2 oz. of imported food. Ten pounds of flesh, in addition to other food, is not uncommonly consumed in a day in time of plenty. A man will lie on his back and allow his wife to feed him with tit-bits of blubber and flesh until he is unable to move.

The Eskimo cannot be strictly called a wandering race. They are nomadic only in so far that they have to move about from place to place during the fishing and shooting season, following the game in its migrations. They have, however, no regular property. They possess only the most necessary utensils and furniture, with a stock

of provisions for. less than one year; and these possessions never exceed certain limits fixed upon by tradition or custom. Long habit and the necessities of their life have also compelled those having food to share with those having none — a custom which, with others, has conduced to the stagnant conditions of Eskimo society and to their utter improvidence.

Their intelligence is considerable, as their implements and folk-tales abundantly prove. They display a taste for music, cartography and drawing, display no small amount of humour, are quick at picking up peculiar traits in strangers, and are painfully acute in detecting the weak points or ludicrous sides of their character. They are excellent mimics and easily learn the dances and songs of the Europeans, as well as their games, such as chess and draughts. They gamble a little — but in moderation, for the Eskimo, though keen traders, have a deep- rooted antipathy to speculation. When they offer anything for sale — say at a Danish settlement in Greenland — they always leave it to the buyer to settle the price. They have also a dislike to bind themselves by contract. Hence it was long before the Eskimo in Greenland could be induced to enter into European service, though when they do they pass to almost the opposite extreme — they have no will of their own. Public licentiousness or indecency is rare among them. In their private life their morality is, however, not high. The women are especially erring ; and in Greenland, at places where strangers visit, their extreme laxity of morals, and their utter want of shame, are not more remarkable than the entire absence of jealousy or self-respect on the part of their countrymen and relatives. Theft in Green- land is almost unknown; but the wild Eskimo make very free with strangers' goods — though it must be allowed that the value they attach to the articles stolen is some excuse for the thieves. Among themselves, on the other hand, they are very honest — a result of their being so much under the control of public opinion. Lying is said to be as common a trait of the Eskimo as of other savages in their dealings with Europeans. They have naturally not made any figure in literature. Their folk-lore is, however, extensive, and that collected by Dr Rink shows considerable imagination and no mean talent on the part of the story-tellers. In Greenland and Labrador most of the natives have been taught

by the missionaries to read and write in their own language, Altogether, the literature published in the Eskimo tongue is considerable. Most of it has been printed in Denmark, but some has been " set up " in a small printing-office in Green- land, from which about 280 sheets have issued, beside many lithographic prints. A journal (Atuagagldliutit nalinginarmik tusaruminasassumik univkat,

i.e. " something for reading, accounts of all entertaining subjects ") has been published since 1861.

The Eskimo in Greenland and Labrador are, with few excep- tions, nominally at least, Christians. The native religion is a vague animism, and consists of a belief in good and evil spirits, limited each to its own sphere; in a Heaven and Hell; and a childish faith is placed in the native wizards, who are regarded as intermediaries between mankind and the spirit-powers. The worship of the whale-spirit, so important a factor in their daily economy, is prevalent.

As regards language, the idiom spoken from Greenland to north-eastern Siberia is, with a few exceptions, the same; any difference is only that of dialect. It differs from the whole group of European languages, not merely in the sound of the words, but more especially, according to Rink, in the construction. Its most remarkable feature is that a sentence of a European language is expressed in Eskimo by a single word constructed out of certain elements, each of which corresponds in some degree to one of our words. One specimen commonly given to visitors to Greenland may suffice: Savigiksiniariartokasuar- omaryotittogog, which is equivalent to " He says that you also will go away quickly in like manner and buy a pretty knife." Here is one word serving in the place of 17. It is made up as follows: Savig a knife, ik pretty, sini buy, ariartok go away, asuar hasten, omar wilt, y in like manner, otit thou, tog also, og he says.

The Eskimo have no chiefs or political and military rulers. Fabricius concisely described them in his day: " Sine Deo, domino, reguntur consuetudine." The government is mainly a family one, though a man distinguished for skill in the chase, and for strength and shrewdness, often has considerable power in the village. No political or social tie is recognized between the villages, though general good-fellowship seems to mark their relations. They never go to war with each other; and though revengeful and apt to injure an enemy secretly, they rarely come to blows, and are morbidly anxious not to give offence. Indeed, in their intercourse with each other, all Eskimo indulge in much hyperbolical compliment. But they are not without courage. On the Coppermine and Mackenzie rivers, where they sometimes come into collision with their American- Indian kinsmen, they fight fiercely. Polygamy is rare, but the rights of divorce and re-marriage are unrestricted. The Eskimo have intricate rules governing the ownership of property and the rights of the hunter. As a race they are singularly un- demonstrative. When they met each other they used to rub noses together, but this, though a common custom still

among the wild Eskimo, is entirely abandoned in Greenland except for the petting of children. There is, in Greenland at least, no national mode of salutation, either on meeting or parting. When a guest enters a house, commonly not the least sign is made either by him or his host. On leaving a place they some- times say " inuvdluaritse," i.e. live well, and to a European " aporniakinatit," i.e. do not hurt thy head, viz. against the upper part of the doorway. The Eskimo, excluding the few on the Asiatic coast, are estimated at about 29,000.

Bibliography. — Dr H. J. Rink, Tales and Traditions of the Eskimo (1875); Danish Greenland; its People and its Products (1877); Eskimo Tribes (1887); J. Richardson, Polar Regions (1861), pp. 298-331; Sir Clements Markham, Arctic Papers of the R. G. S. U875), pp. 163-232; Simpson, ibid. pp. 233-275; " Hans Hendriks the Eskimo's Memoirs," Geographical Magazine (Feb. 1878, et seq.) ; Fridtjof Nansen, Eskimo Life (1894) ; R. E. Peary, Northward over the Great Ice, vol. i. appendix ii.; F. Boas, " The Central Eskimo," Sixth Annual Report of Bureau of Ethnology (1884-1885);}. Murdoch, "The Point Barrow Eskimo," Ninth Annual Report (1887-1888); E. W. Nelson, " The Eskimo about Bering Strait," Eighteenth Annual Report, part 1 (1896-1897).

ESKI-SHEHR, a town of Asia Minor, in the Kutaiah sanjak of the Brusa (Khudavendikiar) vilayet. • It is a station on the Haidar Pasha-Angora railway, 104! m. from the former and 164 m. from Angora, and the junction for Konia; and is situated on the right bank of the Pursak Su (Tembris) , a tributary of the Sakaria, at the foot of the hills that border the broad treeless valley. Pop. 20,000 (Moslems 15,000, Christians 5000). Eski- Shehr, i.e. " the old town," lies about a mile from the ruins of the ancient Phrygian Dorylaeum. The latter is mentioned in connexion with the wars of Lysimachus and Antigonus (about 302 B.C.), and frequently figures in Byzantine history as an imperial residence and military rendezvous. It was the scene of the defeat of the Turks under Kilij-Arslan by the crusaders in 1097, and fell finally to the Turks of Konia in 1 1 76. The town is divided by a small stream into a commercial quarter on low ground, in which are the bazaars, khans and the hot sulphur springs (122 F.) which are mentioned as early as the 3rd century by Athenaeus; and a residential quarter on the higher ground. The town is noted for its good climate, the Pursak Su

for the abundance of its fish, and the plain for its fertility. About 18 m. to the E. are extensive deposits of meerschaum. The clay is partly manufactured into pipes in the town, but the greater proportion finds its way to Europe and especially to Germany. The annual output is valued at £272,000.

See Murray's Hdbk. to Asia Minor (1893); V. Cuinet, Turquie d'Asie (Paris, 1894).

ESMARCH, JOHANNES FRIEDRICH AUGUST VON (1823- 1908), German surgeon, was born at Tonning, in Schleswig- Holstein, on the 9th of January 1823. He studied at Kiel and Gottingen, and in 1846 became B. R. K. von Langenbeck's assistant at the Kiel surgical hospital. He served in the Schleswig- Holstein War of 1848 as junior surgeon, and this directed his attention to the subject of military surgery. He was taken prisoner, but afterwards exchanged, and was then appointed as surgeon to a field hospital. During the truce of 1849 he qualified as Privatdocent at Kiel, but on the fresh outbreak of war he returned to the troops and was promoted to the rank of senior surgeon. In 1854 he became director of the surgical clinic at Kiel, and in 1857 head of the general hospital and professor at the university. During the Schleswig-Holstein War of 1864 Esmarch rendered good service to the field hospitals of Flensburg, Sundewitt and Kiel. In 1866 he was called to Berlin as member of the hospital commission, and also to take the superintendence of the surgical work in the hospitals there. When the Franco-German War broke out in i87ohe was appointed surgeon-general to the army, and afterwards consulting surgeon at the great military hospital near Berlin. In 1872 he married Princess Henrietta of Schleswig-Holstein-Sonderburg-Augusten- burg, aunt of the Empress Auguste Victoria. In 1887 a patent of nobility was conferred on him. He died at Kiel on the 23rd of February 1908. Esmarch was one of the greatest authorities on hospital management and military surgery. His Handbuch der kriegschirurgischen Technik was written for a prize offered by the empress Augusta, on the occasion of the Vienna Exhibition of 1877, for the best handbook for the battlefield of surgical appliances and operations. This book is illustrated by admirable diagrams, showing the different methods of bandaging and dressing, as well as the surgical operations as they occur on the battlefield. Esmarch himself invented an apparatus, which bears his name, for keeping a limb nearly bloodless during amputation. No part of Esmarch's work is more widely known than that which deals with " First Aid," his First Aid on the Battlefield and First Aid to the Injured being popular manuals on the subject. The latter is the substance of a course of lectures delivered by him in 1881 to a "

Samaritan School," the first of the kind in Germany, founded by Esmarch in 1881, in imitation of the St John's Ambulance classes which had been ' organized in England in 1878. These lectures were very generally adopted as a manual for first aid students, edition after edition having been called for, and they have been translated into numerous languages, the English version being the work of H.R.H. Princess Christian. No ambulance course would be complete without a

demonstration of the Esmarch bandage. It is a three-sided piece of linen or cotton, of which the base measures 4 ft. and the sides 2 ft. 10 in. It can be used folded or open, and applied in thirty- two different ways. It answers every purpose for temporary dressing and field-work, while its great recommendation is that the means for making it are always at hand. "

ESNA, or Esneh, a town of Upper Egypt on the W. bank of the Nile, 454 m. S.S.E. of Cairo by rail, the railway station being on the opposite side of the river. Pop. (1897) 16,000, mostly Copts. Esna, one of the healthiest towns in Egypt, is noted for its manufactures of pottery and its large grain and live stock markets. It formerly had a large trade with the Sudan. A caravan road to the south goes through the oasis of Kurkur. The trade, almost stopped by the Mahdist Wars, is now largely diverted by railway and steamboat routes. There is, however, considerable traffic with the oasis of Kharga, which lies almost due west of the town. Nearly in the centre of the town is the Ptolemaic and Roman temple of the ram-headed Khnum, almost buried in rubbish and houses. The interior of the pronaos is accessible to tourists, and contains the latest known hiero- glyphic inscription, dating from the reign of Decius (a.d. 249-25 i). With Khnum are associated the goddesses Sati and Neith. In the neighbourhood are remains of Coptic buildings, including a subterranean church (discovered 1895) in the desert half a mile beyond the limits of cultivation. The name Esna is from the Coptic Sne. By the Greeks the place was called Latopolis, from the worship here of the latus fish. In the persecutions under Diocletian a.d. 303, the Christians of Esna, a numerous body, suffered severely. In later times the town frequently served as a place of refuge for political exiles. The so-called Esna barrage across the Nile (built 1906-1908) is 30 m. higher up stream at Edfu.

ESOTERIC, having an inner or secret meaning. This term, and its correlative " exoteric," were first applied in the ancient Greek mysteries to those who were initiated (eaoi, within) and to those who were not (e£a;, outside), respectively. It was then transferred to a

supposed distinction drawn by certain phil- osophers between the teaching given to the whole circle of their pupils and that containing a higher and secret philosophy which was reserved for a select number of specially advanced or privileged disciples. This distinction was ascribed by Lucian {Vit. Auct. 26) to Aristotle (q.v.), who, however, uses efarepucol X6701 (Nic. Ethics) merely of " popular treatises." It was prob- ably adopted by the Pythagoreans and was also attributed to Plato. In the sense of mystic it is used of a secret doctrine of theosophy, supposed to have been traditional among certain disciples of Buddhism.

ESPAGNOLS SUR MER, LES, the name given to the naval victory gained by King Edward III. of England over a Spanish fleet off Winchelsea, on the 29th of August 1350. Spanish ships had fought against England as the allies or mercenaries of France, and there had been instances of piratical violence between the trading ships of both nations. A Spanish merchant fleet was loading cargoes in the Flemish ports to be carried to the Basque coast. The ships were armed and had warships with them. They were all under the command of Don Carlos de la Cerda, a soldier of fortune who belonged to a branch of the Castilian royal family. On its way to Flanders the Spanish fleet had captured a number of English trading ships, and had thrown the crews overboard. Piratical violence and massacre of this kind was then universal on the sea. On the 10th of August, when the king was at Rotherhithe, he announced his intention of attacking the Spaniards on their way home. The rendezvous of his fleet was at Winchelsea, and thither the king went by land, accompanied by his wife and her ladies, by his sons, the Black Prince and John of Gaunt, as well as by many nobles. The ladies were placed in a convent and the king embarked on his flagship, the " Cog Thomas," on the 28th of August. The English fleet did not put to sea but remained at anchor, waiting for the appearance of the Spaniards. Its strength is not known with certainty, but Stow puts it at 50 ships and pinnaces. Carlos de la Cerda was obviously well disposed to give the king a meeting.

He might easily have avoided the English if he had kept well out in the Channel. But he relied on the size and strength of his 40 large ships, and in expectation of an encounter had recruited a body of mercenaries — mostly crossbowmen — in the Flemish ports. In the afternoon of the 29th of August he bore down boldly on King

Edward's ships at anchor at Winchelsea. When the Spaniards hove in sight, the king was sitting on the deck of his ship, with his knights and nobles, listening to his minstrels who played German airs, and to the singing of Sir John Chandos. When the look-out in the tops reported the enemy in sight, the king and his company drank to one another's health, the trumpet was sounded, and the whole line stood out. All battles at that time, whether on land or sea, were finally settled by stroke of sword. The English steered to board the Spaniards. The king's own ship was run into by one of the enemy with such violence that both were damaged, and she began to sink. The Spaniard stood on, and the " Cog Thomas " was laid alongside another, which was carried by boarding. It was high time, for the king and his following had barely reached the deck of the Spaniard before the " Cog Thomas " went to the bottom. Other Spaniards were taken, but the fight was hot. La Cerda's crossbowmen did much execution, and the higher- built Spaniards were able to drop bars of iron or other weights on the lighter English vessels, by which they were damaged. The conflict was continued till twilight. At trie close the large English vessel called " La Salle du Roi," which carried the king's household, and was commanded by the Fleming, Robert of Namur, afterwards a knight of the Garter, was grappled by a big Spaniard, and was being dragged off by him. The crew called loudly for a rescue, but were either not heard or, if heard, could not be helped. The " Salle du Roi " would have been taken if a Flemish squire of Robert of Namur, named Hannequin, had not performed a great feat of arms. He boarded the Spaniard and cut the halyards of her mainsail with his sword. The Spanish ship was taken. King Edward is said to have captured 14 of the enemy. What his o,wn loss was is not stated, but as his own vessel, and also the vessel carrying the Black Prince, were sunk, and from the peril of " La Salle du Roi," we may conclude that the English fleet suffered heavily. There was no pursuit, and a truce was made with the Basque towns the next year.

The battle with " the Spaniards on the sea " is a very typical example of a medieval sea-fight, when the ships were of the size of a small coaster or a fishing smack, were crowded with men, and when the personal prowess of a single knight or squire was an important element of strength.

The only real authority for the battle is Froissart, who was at different times in the service of King Edward or of his wife, Philippa of Hainaut, and of the counts of Namur. He repeated what was told him by men who had been present, and dwells as usual on the " chivalry " of his patrons. See his Chroniques, iv. 91. (D. H.)

ESPALIER (a French word, derived from the Ital. spalliera, something to rest the spalla or shoulder against; the word is ultimately the same as epauliere, a shoulder-piece), a lattice- work or row of stakes, originally shoulder high, on which fruit trees, shrubs and flowers, particularly roses and creepers, are trained. Espaliers are usually made of larch or other wood, iron and metal rails being too great conductors of heat and cold. The advantage of this method of training is that the fruit, &c, is more easily got at, and while protected from wind, is freely exposed to sun and air, and not so open to extreme changes of temperature as when trained on a wall. (See Horticulture.)

ESPARTERO, BALDOMERO (1792-1879), duke of Vitoria, duke of Morella, prince of Vergara, Count Luchana, knight of the Toison d'Or, &c. &c, Spanish soldier and statesman, was born at Granatulu, a town of the province of Ciudad Real, on the 27th of February 1792. He was the ninth child of a carter, who wanted to make him a priest, but the lad at fifteen enlisted in a battalion of students to fight against the armies of Napoleon I. In 181 1 Espartero was appointed a lieutenant of Engineers in Cadiz, but having failed to pass his examination he entered a line regiment. In 181 5 he went to America as a captain under General Morillo, who had been made commander-in-chief to

quell the risings of the colonies on the Spanish Main. For eight years Espartero distinguished himself in the struggle against the colonists. He was several times wounded, and was made major and colonel on the battlefields of Cochabamba and Sapachni. He had to surrender to Sucre at the final battle of Ayacucho, which put an end to Castilian rule. He returned to Spain, and, like most of his companions in arms, remained under a cloud for some time. He was sent to the garrison town of Logrofio, where he married the daughter of a rich landowner, Dona Jacinta Santa Cruz, who eventually survived him. Henceforth Logrofio became the home of the most prominent of the Spanish political generals of the 19th century. Espartero became in 1832, on the death of King Ferdinand VII., one of the most ardent defenders of the rights of his daughter, Isabella II. The government sent him to the front, directly the Carlist War broke out, as com-mandant of the province of Biscay, where he severely defeated the Carlists in many encounters. He was quickly promoted to a divisional command, and then made a lieutenant-general. At times he showed qualities as a guerittero quite equal to those of the Carlists, like Zumalacarregui and Cabrera, by his daring marches and surprises. When he had to move large forces he was greatly superior to them as an organizer and strategist, and he never

disgraced his successes by cruelty or needless severity. Twice he obliged the Carlists to raise the siege of Bilbao before he was appointed commander-in-chief of the northern army on the 17th of September 1836, when the tide of war seemed to be setting in favour of the pretender in the Basque provinces and Navarre, though Don Carlos had lost his ablest lieutenant, the Basque Zumalacarregui. His military duties at the head of the principal national army did not prevent Espartero from showing ' for the first time his political ambition. He displayed such radical and reforming inclinations that he laid the foundations of his popularity among the lower and middle classes, which lasted more than a quarter of a century, during which time the Progressists, Democrats and advanced Liberals ever looked to him as a leader and adviser. In November 1836 he again forced the Carlists to raise the siege of Bilbao. His troops included the British legion under Sir de Lacy Evans. This success turned the tide of war against Don Carlos, who vainly attempted a raid towards Madrid. Espartero was soon at his heels, and obliged him to hurry northwards, after several defeats. In 1839 Espartero carefully opened up negotiations with Maroto and the principal Carlist chiefs of the Basque provinces. These ended in their accepting his terms under the famous convention of Vergara, which secured the recognition of their ranks and titles for nearly 1000 Carlist officers. Twenty thousand Carlist volunteers laid down their arms at Vergara; only the irreconcilables led by Cabrera held out for a while in the central provinces of Spain. Espartero soon, however, in 1840, stamped out the last embers of the rising, which had lasted seven years. He was styled " El pacificador de Espafia," was made a grandee of the first class, and received two dukedoms.

During the last three years of the war Espartero, who had been elected a deputy, exercised from his distant headquarters such influence over Madrid politics that he twice hastened the fall of the cabinet, and obtained office for his own friends. At the close of the war the queen regent and her ministers attempted to elbow out Espartero and his followers, but a pronunciamiento ensued in Madrid and other large towns which culminated in the marshal's accepting the post of prime minister. He soon became virtually a dictator, as Queen Christina took offence at his popularity and resigned, leaving the kingdom very soon afterwards. Directly the Cortes met they elected Espartero regent by 179 votes to 103 in favour of Arguelles, who was appointed guardian of the young queen. For two years Espartero ruled Spain in accordance with his Radical and conciliatory dispositions, giving special attention to the re- organization of the administration, taxation and finances,

declaring all the estates of the church, congregations and religious orders to be national property, and suppressing the diezma, or tenths. He suppressed the Republican risings with as much severity as he did the military pronunciamiento s of

Generals Concha and Diego de Leon. The latter was shot in Madrid. Espartero crushed with much energy a revolutionary rising in Barcelona, but on his return to Madrid was so coldly welcomed that he perceived that his prestige was on the wane. The advanced Progressists coalesced with the partisans of the ex-regent Christina to promote pronunciamientos in Barcelona and many cities. The rebels declared Queen Isabel of age, and, led by General Narvaez, marched upon Madrid. Espartero, deeming resistance useless, embarked at Cadiz on the 30th of July 1843 for England, and lived quietly apart from politics until 1848, when a royal decree restored to him all his honours and his seat in the senate. He retired to his house in Logrono, which he left six years later, in 1854, when called upon by the queen to take the lead of the powerful Liberal and Progressist movement which prevailed for two years. The old marshal vainly endeavoured to keep his own Progressists within bounds in the Cortes of 1854-1856, and in the great towns, but their excessive demands for reforms and liberties played into the hands of a clerical and reactionary court and of the equally retrograde governing, classes. The growing ambition of General O'Donnell constantly clashed with the views of Espartero, until the latter, in sheer disgust, resigned his premiership and left for Logrono, after warning the queen that a conflict was imminent between O'Donnell and the Cortes, backed by the Progressist militia. O'Donnell's pronunciamiento in 1856 put an end to the Cortes, and the militia was disarmed, after a sharp struggle in the streets of the capital. After 1856 Espartero resolutely declined to identify himself with active politics, though at every stage in the onward march of Spain towards more liberal and democratic institutions he was asked to take a leading part. He refused to allow his name to be brought forward as a candidate when the Cortes of 1868, after the Revolution, sought for a ruler. Espartero, strangely enough, adopted a laconic phrase when successive governments on their advent to power invariably addressed themselves to the venerable champion of liberal ideas. To all — to the Revolution of 1868, the Constituent Cortes of 1869, King Amadeus, the Federal Republic of 1873, the nameless government of Marshal Serrano in 1874, the Bourbon restoration in 1875 — he simply said: "

Cumplase la voluntad nacional " (" Let the national will be accomplished "). King Amadeus made him prince of Vergara. The Restoration raised a statue to him near the gate of the Retiro Park in Madrid. Spaniards of all shades, except Carlists and Ultramontanes, paid homage to his memory when he passed away at his Logrono residence on the 8th of January 1879. His tastes were singularly modest, his manners rather reserved, but always kind and considerate for humble folk. He was a typical Spanish soldier- politician, though he had more of the better traits of the soldier born and bred than of the arts of the statesman. His military instincts did not always make it easy for him to accommodate himself to courtiers and professional politicians. (A. E. H.)

ESPARTO, or Spanish Grass, Stipa tenacissima, a grass resembling the ornamental feather-grass of gardens. It is indigenous to the south of Spain and the north of Africa (where it is known as Haifa or Alfa), and is especially abundant in the sterile and rugged parts of Murcia and Valencia, and in Algeria, flourishing best in sandy, ferruginous soils, in dry, sunny situa- tions on the sea coast. Pliny (N.H. xix. 2) described what appears to have been the same plant under the name of spartum, whence the designation campus spartarius for the region sur- rounding New Carthage. It attains a height of 3 or 4 ft. The stems are cylindrical, and clothed with short hair, and grow in dusters of from 2 to 10 ft. in circumference; when young they serve as food for cattle, but after a few years' growth acquire great toughness of texture. The leaves vary from 6 in. to 3 ft. in length, and are grey-green in colour; on account of their tenacity of fibre and flexibility they have for centuries been employed for the making of ropes, sandals, baskets, mats and other articles. Ships' cables of esparto, being light, have the quality of floating on water, and have long been in use in the Spanish navy.

Esparto leaves contain 56% by weight of fibre, or about 10% more than straw, and hence have come into requisition as

a substitute for linen rags in the manufacture of paper. For this purpose they were first utilized by the French, and in 1857 were introduced into Great Britain. When required for paper- making the leaves should be gathered before they are quite matured; if, however, they are obtained too young, they furnish a paper having an objectionable semi-transparent appearance. The leaves are gathered by hand, and from 2 to 3 cwt. may be collected in a day by a single labourer. They are generally obtained during the dry summer months, as at other times their adherence to the stems is so firm as often to cause the uprooting of the plants in the attempt to remove

them. Esparto may be raised from seed, but cannot be harvested for twelve or fifteen years after sowing.

Another grass, Lygeum Spartum, with stiff rush-like leaves, growing in rocky soil on the high plains of countries bordering on the Mediterranean, especially of Spain and Algeria, is also a source of esparto.

For the processes of the paper manufacturer esparto is used in the dry state, and without cutting; roots and flowers and stray weeds are first removed, and the material is then boiled with caustic soda, washed, and bleached with chlorine solution. Sundry experiments have been made to adapt esparto for use in the coarser textile fabrics. Messrs A. Edger and B. Proctor in 1877 directed attention to the composition of the slag resulting from the burning of esparto, which they found to be strikingly similar to that of average medical bottle glass, the latter yielding on analysis 66-3% of silica and 25-1% of alkalies and alkaline earths, and the slag 64.6 and 27-45%of the same respectively.

ESPERANCE, a small seaport on a fine natural harbour on the south coast of West Australia, 275 m. north-east from Albany. It is a summer resort, and in the neighbourhood are interesting caves. Its importance as a seaport is due to its being on the high road between the eastern states and the gold-fields, and the nearest place for the shipment of gold from the Coolgardie fields.

ESPERANTO, an artificial international auxiliary language (see Universal Languages), first published in 1887, seven years after the appearance of its predecessor Volapuk (q.v.), which it has now completely supplanted. Its author was a Russian physician, Dr L. Zamenhof, born in 1859 at Bielostok, where the spectacle of the feuds of the four races — each speaking different languages — which inhabit it (Russians, Poles, Germans and Jews) at an early date suggested to him the idea of remedying the evil by the introduction of a neutral language, standing apart from the existing national languages. His first idea was to resuscitate some dead language. Then he tried to construct a new language on an a priori basis. At the same time he made what he appears to have considered the great discovery that the bulk of the vocabulary of a language consists not of independent roots, but of compounds and derivatives formed from a comparatively small number of roots.

At first he tried to construct his roots a priori by arbitrary combinations of letters. Then he fell back on the plan of taking his

roots ready-made from existing languages, as the inventor of Volapuk had done before him. But instead of taking them mainly from one language, he has selected them from the chief European languages, but not impartially. Like all inventors of artificial languages, he is more ready to experiment with foreign languages than with his own; and hence the Slavonic roots in Esperanto are much less numerous than those taken from the other European languages. Here his choice has been to some extent guided by considerations of internationality, although he has not fully grasped the importance of the principle of maximum internationality, so well worked out in the latest rival of Esper- anto — Idiom Neutral (see Universal Languages). Thus he adopts a large number of international words — generally un- altered except in spelling — such as teatr, tabak, even when it would be easy to form equivalent terms from the roots already existing in the language. Where there is no one international word, he selects practically at random, keeping, however, a certain balance between the Romance words, taken chiefly from Latin (tamen) and French (trotuar), on the one hand, and the Germanic on the other hand, the latter being taken sometimes

from German {nur, ” only “), sometimes from English, the words being generally written more or less phonetically {rajt = right). Most of the Germanic words are badly chosen from the inter- national point of view. Thus the German word quoted above would not be intelligible to any one ignorant of German. Indeed, from the international point of view all specially German words ought to be excluded, or else reduced to the common Germanic form; thus trink ought to be made into drink, the t being a specially German modification of the d, preserved not only in English but in all the remaining Germanic languages. This incongruous mixture of languages is not only jarring and repul- sive, but adds greatly to the difficulty of mastering the vocabulary for the polyglot as well as the monolingual learner.

The inventor has taken great pains to reduce the number of his roots to a minimum; there are 2642 of them in his dictionary, the Universala Vortaro (from Ger. Wort, ” word “), which does not include such international words as poezio, telefono; these the learner is supposed to recognize and furm without help. The most eccentric feature of the vocabulary, and the one to which it owes

much of its brevity, is the extensive use of the prefix mal- to reverse the meaning of a word, as in malamiko, " enemy," and even malbona, " bad."

The phonology of the language is very simple. The vowels are only five in number, a, e, i, 0, u, used without any distinction of quantity, as in Russian. There are six diphthongs, expressed by an unnecessarily complicated notation. The consonant- system is simple enough in itself, but is greatly complicated in writing by the excessive and mostly unnecessary use made of diacritical letters not only for simple sounds but also for consonant-groups, c is used for Is, as in Polish.

The grammar is, like that of Volapiik, partly borrowed from existing languages, partly a priori and arbitrary. The use of the final vowels belongs to the latter category. The use of -a to indicate adjectives and of 0 to indicate nouns as in kara amiko, " dear (male) friend," is a source of confusion to those familiar with the Romance languages, and has proved a bar to the diffusion of Esperanto among the speakers of these languages. On the other hand, the following paradigm will show how faith fully Esperanto can reproduce the defects of conventional European grammar: —

Singular. Plural.

Nominative . . la bona patro la bonaj^ patroj _

Accusative . . la bonan patron la bonajn patrojn.

It is difficult to see why the accusative should be kept when all the other cases are replaced by prepositions.

The verb is better than the noun. Its inflections are -as present, -is preterite, -os future, -us conditional, -u imperative and subjunctive, -i infinitive, together with the following participles : —

Active. Passive.

Present . . . -anta -ata

Preterite . . . -inta -ita

Future . . . -onta -ota

The inventor has followed the good example of his native language in using esti, " to be," as the auxiliary verb both in the passive, where it

is combined with passive participles, and in the secondary tenses of the active (perfect, pluperfect, &c), where it is of course combined with the active participles. The participles can be made into nouns and adverbs by changing the final -a into -0 and -e respectively: thus tenonto, "the future holder," perdinte, " through having lost."

The table of the forty-five correlative pronouns, adjectives and adverbs is also elaborate and ingenious.

Much ingenuity is displayed in the syntax, as well as some happy simplifications. But, on the other hand, there is much in it that is fanciful, arbitrary and vague, as in the use of the definite article — where the author has unfortunately followed French rather than English usage — and in the moods of the verb.

The following specimens will show the general character of this easy-flowing but somewhat heavy and monotonous language — " bad Italian," as it is called by its detractors: —

Patro nia, kiu estas en la cielo, sankta estu via nomo; venu regeco via; estu volo via, kiel en la cielo, tiel ankaii sur la tero.

Panon nian ciutagan donu al ni hodiau; kaj pardonu al ni suldojn niajn, kiel ni ankau pardonas al niaj suldantoj ; kaj ne konduku nin en tenton, sed liberigu nin de la malbono.

Estimata Sinjoro. Per tiu ci libreto mi havas la honoron prezenti al vi la lingvon internacian Esperanto. Esperanto tute ne havas la intencon malfortigi la lingvon naturan de ia popolo. Gi devas nur servi por Ia rilatoj internaciaj kaj por tiuj verkoj au produktoj, kiuj interesas egale la tutan mondon.

In summing up the merits and defects of Esperanto we must begin by admitting that it is the most reasonable and practical artificial language that has yet appeared. Its inventor has had the double advantage of being able to profit by the mistakes of his predecessors, and of being himself, by force of circumstances, a better linguist. It must further be admitted that he has made as good a use of these advantages as was perhaps possible without systematic training in scientific philology in its widest sense. This last defect explains why the enthusiasm which his work has excited in the great world of linguistic dilettantes has not been shared by the philologists: in spite of its superiority to Volapiik, they see in it the same radical defects. Whether they are rash or not in predicting for it a similar fate, remains to be seen. The Esperantists, warned by the fate of Volapiik,

have adopted the wise policy of suppressing all internal disunion by submitting to the dictatorship of the inventor, and so presenting a united front to the enemy. One thing is clear: either Esperanto must be taken as it is without change, or ehe it must crumble to pieces; its failure to work out consist- ently the principle of the maximum of internationality for its root-words is alone enough to condemn it as hopelessly antiquated even from the narrow point of view which regards "international" as synonymous with "European" — a view which political development in the Far East has made equally obsolete. (H. Sw.)

ESPINAY, TIMOLEON D' (1 580-1644), French soldier, was the eldest of the four sons of Francois d'Espinay, seigneur de Saint Luc (1554-1597), and was himself marquis de Saint Luc. In 1603 he accompanied Sully in his embassy to London. In 1622, in his capacity as vice-admiral of France, he gained some advantages over the defenders of La Rochelle, obliging the Huguenot commander, Benjamin de Rohan, seigneur de Soubise, to evacuate the islands of Re and Oleron. In 1627 he was named lieutenant-general of Guienne and marshal of France.

ESPINEL, VICENTE MARTINEZ (1 551-1624), Spanish poet and novelist, was baptized on the 28th of December 1551, and educated at Salamanca. He was expelled from the university in 1572, and served as a soldier in Flanders, returning to Spain in 1584 or thereabouts. He took orders in 1587, and four years later became chaplain at Ronda, absented himself from his living, and was deprived of his cure; but his musical skill obtained for him the post of choirmaster at Plasencia. His Diversas Rimas (1591) are undeniably good examples of technical accom- plishment and caustic wit. Espinel, however, survives as the author of a clever picaresque novel entitled Relaciones de la vida del Escudero Marcos de Obregdn (1618). It is, in many passages, an autobiography of Espinel with picturesque embellish- ments. Marcos is not a chivalresque " esquire," but an adven- turer who seeks his fortune by attaching himself to great men; and the object of the author is to warn young men against such a life. Apart from the unedifying confessions of the hero, the book contains curious anecdotes concerning prominent contemporaries, and the episodical stories are told with great spirit; the style is extremely correct, though somewhat diffuse. Le Sage has not scrupled to borrow from Marcos de Obregdn many of the incidents and characters in Gil Bias- — a circumstance which induced Isla to give to his Spanish translation of Le Sage's work the jesting title, Gil Bias restored to his Country and his Native Tongue. In the 1775 edition of the Siecle de Louis XIV. Voltaire grossly

exaggerates in saying that Gil Bias is taken entirely from Marcos de Obregdn. Espinel was a clever musician and added a fifth string to the guitar. He revived the measure known as decimas or espinelas, consisting of a stanza of ten octosyllabic lines. Most of the poems which he left in manuscript remain unpublished owing to their licentious character.

Bibliography. — J. Perez de Guzman's edition of Marcos de Obregon (Barcelona, 1881) includes a valuable introduction; Leo Claretie, Le Sage romancier (Paris, 1890), discusses exhaustively the question of Le Sage's indebtedness to Espinel. For some previously unpublished poems see Pedro Salva y Mallen, Catdlogo de la biblioteca de Salva, (Valencia, 1 872).

ESPIRITO SANTO, a maritime state of Brazil, bounded N. by Bahia, E. by the Atlantic Ocean, S. by Rio de Janeiro, and W. by Minas Geraes. Pop. (1890) 135,997; (1900) 209, 783; area, 17,316 sq. m. With the exception of Sergipe it is the smallest of the Brazilian states. The western border of the state is traversed by low ranges of mountains forming a northward continuation of the Serra do Mar. The longest and most prominent of these ranges, which are for the most part the eastern escarpments of the great Brazilian plateau, is the Serra dos Aymores, which extends along fully two-thirds of the western frontier. Farther S. the ranges are much broken and extend partly across the state toward the seaboard; the more prominent are known as the Serra do Espigao, Serra da Chibata, Serra dos Piloes and Serra dos Purys. The eastern and larger part of the state belongs to the coastal plain, in great part low and swampy, with large areas of sand barrens, and broken by isolated groups and ranges of hills. With the exception of these sandy plains the country is heavily forested, even the mountain sides being covered with vegetation to their summits. The northern and southern parts are fertile, but the central districts are comparatively poor. The coastal plain comprttes a sandy, unproductive belt immediately on the coast, back of which is a more fertile tertiary plain, well suited, near the higher country, to the production of sugar and cotton. The inland valleys and slopes are very fertile and heavily forested, and much of the Brazilian export of rosewood and other cabinet woods is drawn from this state. There is only one good bay on the coast, that of Espirito Santo, on which the port of Victoria is situated. The river-mouths are obstructed by sand bars and admit small vessels only. The principal

rivers of the state are the Mucury, which rises in Minas Geraes and forms the boundary line with Bahia, the Itaunas, SaoDomingos, Sao Matheus, Doce, Timbuhy, Santa Maria, Jucu, Benevente, Itapemirim, and Itabapoana, the last forming the boundary line with Rio de Janeiro. The Doce, Sao Matheus, and Itapemirim rise in Minas Geraes and flow entirely across the state. The lower courses of these rivers are generally navigable, that of the Rio Doce for a distance of 90 m. The climate of the coastal zone and deeper valleys is hot, humid and unhealthy, malarial fevers being prevalent. In the higher country the temperature is lower and the climate is healthy. Espirito Santo is almost exclusively agricultural, sugar-cane, coffee, rice, cotton, tobacco, mandioca and tropical fruits being the principal products. Agriculture is in a very backward condition, however, and the state is classed as one of the poorest and most unprogressive in the republic. The rivers and shallow coast waters are well stocked with fish, but there are no fishing industries worthy of mention. There are three railway lines in operation in the state — one running from Victoria to Cachoeira do Itapemirim (50 m.,, and thence, by another line, to Santo Eduardo in Rio de Janeiro (58 m.), where connexion is made with the Leopoldina system running into the national capital, and a third running north- westerly from Victoria to Diamantina, Minas Geraes, about 450m. The chief cities and towns of the state, with their popula- tions in 1890, are Victoria, Sao Matheus (municipality, 7761) on a river of the same name 16 m. from the sea, Serra (munici- pality, 6274), Guarapary (municipality, 5310), a small port S. by W. of the capital, Conceicao da Barra (municipality, 5628), the port of Sao Matheus and Cachoeira do Itapemirim (4049), an important commercial centre in the south.

Espirito Santo formed part of one of the original captaincies which were given to Vasco Fernandes Coutinho by thePortuguese crown. The first settlement (1535) was at the entrance to the bay of Espirito Santo, and its name was afterwards given to the bay and captaincy. It once included the municipality of Campos, now belonging to the state of Rio de Janeiro.

The islands of Trinidade and Martim Vaz, which lie about

715 m. E. of Victoria, belong politically to this state. They are uninhabited, but considerable importance is attached to the former because Great Britain has twice attempted to take possession of it. It rises 1200 ft. above sea- level and is about 6 m. in circumference, but it has no value other than that of an ocean cable station. An excellent description of this singular island is to be found in E. F. Knight's Cruise of the " Alerte " (London, 1895).

ESPRONCEDA, JOSE IGNACIO JAVIER ORIOL ENCAR- NACION DE (1808-1842), Spanish poet, son of an officer in the Bourbon regiment, was born at or near Almendralejo de los Barros on the 25th of March 1808. On the close of the war he was sent to the preparatory school of artillery at Segovia, and later became a pupil of the poet Lista, then professor of literature at St Matthew's College in Madrid. In his fourteenth year he had attracted his master's attention by his verses, and had joined a secret society. Sentenced to five years' seclusion in the Franciscan convent at Guadalajara, he began an epic poem entitled Pelayo, of which fragments survive. He escaped to Portugal and thence to England, where he found the famous Teresa whom he had met at Lisbon; here, too, he became a student of Shakespeare, Milton and Byron. In 1830 he eloped with Teresa to Paris, took part in the July revolution, and soon after joined the raid of Chapalangarra on Navarre. In 1833 he ■returned to Spain and obtained a commission in the queen's guards. This, however, he soon forfeited by a political song, and he was banished to Cuellar, where he wrote a poor novel entitled Sancho Saldana 6 el Castellano de Cuellar (1834). He took an active part in the revolutionary risings of 1835 an d 1836, and, on the accession to power of the Liberal party in 1840, was appointed secretary of legation at the Hague; in 1842 he was elected deputy for Almeria, and seemed likely to play a great part in parliamentary life. But his constitution was undermined, and, after a short illness, he died at Madrid on the 23rd of May 1842. His poems, first published in 1840, at once gained for him a reputation which still continues undiminished. The influence of Byron pervades Espronceda's life and work. It is present in an ambitious variant on the Don Juan legend, El Estudiante de Salamanca, Elvira's letter being obviously modelled on Julia's letter in Don Juan; the Cancidn del Pirata is suggested by The Corsair; and the Byronic inspiration is not wanting even in the noble fragment entitled El Diablo Mundo, based on the story of Faust. But in El Mendigo, in El Reo de Muerte, in El . Verdugo, and in the sombre vehement lines, A Jarifa en una orgia, Espronceda approves himself the most potent and original lyrical poet produced by Spain during the 19th century.

Bibliography. — Obras poeticas y escritos en prosa (Madrid, 1884), edited by Blanca Espronceda de Escosura, the poet's daughter (the second volume has not been published) ; E. Rodriguez Soils, Espronceda; su tiempo,- su vida, y sus obras (Madrid, 1883): E. Pifieyro, El Romanticismo en Espana (Paris, 1904).

ESQUIRE (O. Fr. escuyer, Mod. Fr. icuyer, derived through the form escudier from Med. Lat. scutarius, "shield-bearer"), originally the

attendant on a knight, whose helm, shield and lance he carried at the tournament or in the field of battle. The esquire ranked immediately below the knight bachelor, and his office was regarded as the apprentice stage of knighthood. The title was regarded as one of function, not of birth, and was not hereditary. In time, however, its original significance was lost sight of, and it came to be a title of honour, implying a rank between that of knight and valet or gentleman, as it technically still remains. Thus in the later middle ages esquire (armiger) was the customary description of holders of knight's fees who had not taken up their knighthood, whence the surviving custom of entitling the principal landowner in a parish " the squire " (see Squire). Camden, at the close of the 16th century, distinguished four classes entitled to bear the style: (1) The eldest sons of knights, and their eldest sons, in perpetual suc- cession; (2) the eldest sons of the younger sons of peers, and their eldest sons, in like perpetual succession; (3) esquires created by royal letters patent or other investiture, and their eldest sons; (4) esquires by office, e.g. justices of the peace and others who

/

bear any office of trust under the crown. To these the writer in the 3rd edition of the Encyclopaedia Britannica (1797) added Irish peers and the eldest sons of British peers, who, though they bear courtesy titles, have in law only the right to be styled esquires. Officers of the king's courts, and of the royal house- hold, counsellors at law and justices of the peace he described as esquires only "by reputation"; and justices of the peace have the title only as long as they are in commission; while certain heads of great landed families are styled " esquires " by prescription. " But the meaner ranks of people," he adds indignantly, " who know no better, do often basely prostitute this title; and, to the great confusion of all rank and precedence, every man who makes a decent appearance, far from thinking himself in any way ridiculed by finding the superscription of his letters thus decorated, is fully gratified by such an address."

It is clear, however, that the title of esquire was very loosely used at a much earlier date. On this point Selden is somewhat scornfully explicit. " To whomsoever, either by blood, place in the State or other eminency, we conceive some higher attribute should be given, than that sole Title of Gentleman, knowing yet that he hath no other

honorary title legally fixed upon him, we usually style him an Esquire, in such passages as require legally that his degree or state be mentioned; as especially in Indict- ments and Actions whereupon he may be outlawed. Those of other nations who are Barons or great Lords in their own Countries, and no knights, are in legal proceedings stiled with us, Esquires only. Some of our greatest Heralds have their divisions of Esquires applied to this day. I leave them as I see them, where they may easily be found." Coke, too, says that every one is entitled to be termed esquire who has the legal right to call himself a gentleman (2. Institutes, 688).

At the present time the following classes are recognized as esquires on occasions of ceremony or for legal purposes: — (1) All sons of peers and lords of parliament during their fathers' lives, and the younger sons of such peers, &c, after their fathers' deaths; the eldest sons of peers' younger sons, and their eldest sons for ever. (2) Noblemen of all other nations. (3) The eldest sons of baronets and knights. (4) Persons bearing arms and the title of esquire by letters patent. (5) Esquires of the Bath and their eldest sons. (6) Barristers-at-law. (7) Justices of the peace and mayors while in commission or office. (8) The holders of any superior office under the crown. (9) Persons styled esquires by the sovereign in their patents, commissions or appointments. 1 (10) Attorneys in colonies where the functions of counsel and attorney are united (in England solicitors are " gentlemen," not " esquires ").

In practice, however, the title of esquire, now to all intents and purposes meaningless, is given to any one who " can bear the port, charge and countenance of a gentleman." The word has followed the same course as that of " gentleman " (q.v.), and for very similar reasons. It is still not customary in Great Britain to address e.g. a well-to-do person engaged in trade as esquire at his shop; it would be offensive not to do so at his private residence. In America, on the other hand, the use of the word " esquire " is practically obsolete, " Mr " (" Mister " or "Master," at one time the title special to a "gentleman") being the general form of address.

See Selden, Titles of Honor (1672); Camden, Britannia (ed. London, 1594); Coke, Institutes; Enc. of the Laws of England, s. "Esquire"; Du Cange, Glossarium (ed. 1886), s. " Scutarius," " Scutifer " and " Armiger " ; New English Dictionary, s. " Esquire." (W. A. P.)

ESQUIROL, JEAN ETIENNE DOMINIQUE (1772-1840), French alienist, was born at Toulouse on the 3rd of February 1772. In 1794 he became a pupil of the military hospital of Narbonne, and

subsequently studied in Paris at the Salpetriere under P. Pinel, whose assistant he became. In 181 1 he was chosen physician to the Salpetriere, and in 1817 he began a course of lectures on the treatment of the insane, in which he made such revelations of the abuses existing in the lunatic asylums of France that the government appointed a commission

1 In practice this means every one receiving such a patent, commission or appointment.

to inquire into the subject. Esquirol in this and other ways greatly assisted Pinel's efforts for the introduction of humaner methods. The asylums of Rouen, Nantes and Montpellier were built in accordance with his plans. In 1823 he became inspector- general of the university of Paris for the faculties of medicine, and in 1826 chief physician of the asylum at Charenton. He died at Paris on the 13th of December 1840. Besides contributing to the Dictionnaire des sciences medicates and the Encyclopedic des gens du monde, Esquirol wrote Des maladies mentales, con- sider ees sous les rapports medical, hygienique, et medico-legal (2 vols., Paris, 1838).

ESQUIROS, HENRI FRANfOIS ALPHONSE (1812-1876), French writer, was born in Paris on the 23rd of May 1 8 1 2 . After some minor publications he produced L'Evangile du peuple (184c), an exposition of the life and character of Jesus as a social reformer. This work was considered an offence against religion and decency, and Esquiros was fined and imprisoned. He was elected in 1850 as a social democrat to the Legislative Assembly, but was exiled in 1851 for his opposition to the I Empire. Returning to France in 1869 he was again a member of the Legislative Assembly, and in 1876 was elected to the senate. He died at Versailles on the 12th of May 1876. He turned to account his residence in England in L'Angleterre et la vie anglaise (5 vols., 1859-1869). Among his numerous works on social subjects may be noted: — Histoire des Montagnards (2 vols., 1847) ; Paris, ou les sciences, les institutions et les mceurs au XIX' si'ecle (2 vols., 1847); and Histoire des martyrs de la liberie (1851).

ESS, JOHANN HEINRICH VAN (1772-1847), German Catholic theologian, was born at Warburg, Westphalia, on the 15th of February 1772. He was educated at the Dominican gymnasium of his native town, and in 1790 entered, as a novice, the Bene- dictine abbey of Marienmunster, in the bishopric of Paderborn. His Benedictine name was Leander. He was priest at Schwalen- berg from 1799 to 18 12, after which he became extraordinary professor of theology and joint-director of the teachers' seminary at Marburg.

In 1818 he received the doctorate of theology and of canonical law. In 1807, in conjunction with his cousin Karl van Ess, he had published a German translation of the New Testament, and, as its circulation was discountenanced by his superiors, he published in 1808 a defence of his views, entitled A usziige aus den heiligen Vdtern und anderen Lehrern der katho- lischen Kirche uber das nothwendige und niitzliche Bibellesen. An improved edition of this tractate was published in 1816, under the title Gedanken Uber Bibel und Bibellehre, and in the same year appeared Was war die Bibel den ersten Christen? In 1822 he published the first part of a German translation of the Old Testament, which was completed in 1836. In 1822 he resigned his offices at Marburg in order to devote his whole time to the defence of his views regarding Bible reading by the people, and to endeavour to promote the circulation of the scriptures. He was associated first with the Catholic Bible Society of Regensburg, and then with the British and Foreign Bible Society. He died at Affolderbach in the Odenwald on the 13th of October 1847.

ESSAY, ESSAYIST (Fr. essai, Late Lat. exagium, a weighing or balance; exigere, to examine; the term in general meaning any trial or effort). As a form of literature, the essay is a com- position of moderate length, usually in prose, which deals in an easy, cursory way with the external conditions of a subject, and, in strictness, with that subject, only as it affects the writer. Dr Johnson, himself an eminent essayist, defines an essay as " an irregular, undigested piece "; the irregularity may perhaps be admitted, but want of thought, that is to say lack of proper mental digestion, is certainly not characteristic of a fine example. It should, on the contrary, always be the brief and light result of experience and profound meditation, while " undigested " is the last epithet to be applied to the essays of Montaigne, Addison or Lamb. Bacon said that the Epistles of Seneca were " essays," but this can hardly be allowed. Bacon himself goes on to admit that " the word is late, though the thing is ancient." The word, in fact, was invented for this species of writing by Montaigne, who merely meant that these were experiments in

a new kind of literature. This original meaning, namely that these pieces were attempts or endeavours, feeling their way towards the expression of what would need a far wider space to exhaust, was lost in England in the course of the eighteenth century. This is seen by the various attempts made in the nineteenth century to coin a word

which should express a still smaller work, as distinctive in comparison with the essay as the essay is by the side of the monograph; none of these linguistic experiments, such as essayette, essaykin (Thackeray) and essaylet (Helps) have taken hold of the language. As a matter of fact, the journalistic word article covers the lesser form of essay, although not exhaustively, since the essays in the monthly and quarterly reviews, which are fully as extended as an essay should ever be, are frequently termed " articles," while many " articles" in newspapers, dictionaries and encyclopaedias are in no sense essays. It may be said that the idea of a detached work is combined with the word " essay," which should be neither a section of a disquisition nor a chapter in a book which aims at the systematic development of a story. Locke's Essay on the Human Understanding is not an essay at all, or cluster of essays, in this technical sense, but refers to the experimental and tentative nature of the inquiry which the philosopher was undertaking. Of the curious use of the word so repeatedly made by Pope mention will be made below.

The essay, as a species of literature, was invented by Montaigne, who had probably little suspicion of the far-reaching importance of what he had created. In his dejected moments, he turned to rail at what he had written, and to call his essays "inepties" and " sottises." But in his own heart he must have been well satisfied with the new and beautiful form which he had added to literary tradition. He was perfectly aware that he had devised a new thing; that he had invented a way of communicating himself to the world as a type of human nature. He designed it to carry out his peculiar object, which was to produce an accurate portrait of his own soul, not as it was yesterday or will be to-morrow, but as it is to-day. It is not often that we can date with any approach to accuracy the arrival of a new class of literature into the world, but it was in the month of March 1 57 1 that the essay was invented. It was started in the second story of the old tower of the castle of Montaigne, in a study to which the philosopher withdrew for that purpose, surrounded by his books, close to his chapel, sheltered from the excesses of a fatiguing world. He wrote slowly, not systematically; it took nine years to finish the two first books of the essays. In 1574 the manuscript of the work, so far as it was then completed, was nearly lost, for it was confiscated by the pontifical police in Rome, where Montaigne was residing, and was not returned to the author for four months. The earliest imprint saw the light in 1580, at Bordeaux, and the Paris edition of 1588, which is the fifth, contains the final text of the great author. These dates are not negligible in the briefest history of the essay, for they

are those of its revelation to the world of readers. It was in the delightful chapters of his new, strange book that Montaigne introduced the fashion of writing briefly, irregularly, with constant digressions and interruptions, about the world as it appears to the individual who writes. The Essais were instantly welcomed, and few writers of the Renaissance had so instant and so vast a popularity as Montaigne. But whilethe philosophy, and above all the graceful stoicism, of the great master were admired and copied in France, the exact shape in which he had put down his thoughts, in the exquisite negligence of a series of essays, was too delicate to tempt an imitator. It is to be noted that neither Charron, nor Mile de Gournay, his most immediate disciples, tried to write essays. But Montaigne, who liked to fancy that the Eyquem family was of English extraction, had spoken affably of the English people as his " cousins," and it has always been admitted that his genius has an affinity with the English. He was early read in England, and certainly by Bacon, whose is the second great name connected with this form of literature. It was in 1597, only five years after the death of Montaigne, that Bacon published in a small octavo the first ten of his essays. These he increased to 38 in 161 2 and

to 58 in 1625. In their first form, the essays of Bacon had nothing of the fulness or grace of Montaigne's; they are meagre notes, scarcely more than the headings for discourses. It is possible that when be wrote them he was not yet familiar with the style of his predecessor, which was first made popular in England, in 1603, when Florio published that translation of the Essais which Shakespeare unquestionably read. In the later editions Bacon greatly expanded his theme, but he never reached, or but seldom, the freedom and ease, the seeming formlessness held in by an invisible chain, which are the glory of Montaigne, and distinguish the typical essayist. It would seem that at first, in England, as in France, no lesser writer was willing to adopt a title which belonged to so great a presence as that of Bacon or Montaigne. The one exception was Sir William Cornwallis (d. 1631), who published essays in 1600 and 161 7, of slight merit, but popular in their day. No other English essayist of any importance appeared until the Restoration, when Abraham Cowley wrote eleven " Several Discourses by way of Essays," which did not see the light until 1668. He interspersed with his prose, translations and original pieces in verse, but in other respects Cowley keeps much nearer than Bacon to the form of Montaigne. Cowley's essay " Of Myself " is a model of what these little compositions should be. The name of Bacon inspires awe, but it is really not he, but Cowley, who is the father of the English essay; and it is

remarkable that he has had no warmer panegyrists than his great successors, Charles Lamb and Macaulay. Towards the end of the century, Sir George Mackenzie (1636-1691) wrote witty moral discourses, which were, however, essays rather in name than form. When- ever, however, we reach the eighteenth century, we find the essay suddenly became a dominant force in English literature. It made its appearance almost as a new thing, and in combination with the earliest developments of journalism. On the 12th of April 1709 appeared the first number of a penny newspaper, entitled the Tatler, a main feature of which was to amuse and instruct fashionable readers by a series of short papers dealing with the manifold occurrences of life, quicquid agunt homines. But it was not until Steele, the founder of the Tatler, was joined by Addison that the eighteenth-century essay really started upon its course. It displayed at first, and indeed it long retained, a mixture of the manner of Montaigne with that of La Bruyere, combining the form of the pure essay with that of the character- study, as modelled on Theophrastus, which had been so popular in England throughout the seventeenth century. Addison's early Tatler portraits, in particular such as those of " Tom Folio " and " Ned Softly," are hardly essays. But Steele's " Recollec- tions of Childhood " is, and here we may observe the type on which Goldsmith, Lamb and R. L. Stevenson afterwards worked. In January 1711 the Tatler came to an end, and was almost immediately followed by the Spectator, and in 1713 by the Guardian. These three newspapers are storehouses of admirable and typical essays, the majority of them written by Steele and Addison, who are the most celebrated eighteenth-century essayists in England. Later in the century, after the publication of other less successful experiments, appeared Fielding's essays in the Covent Garden Journal (1752) and Johnson's in the Rambler (1750), the Adventurer (1752) and the Idler (1759). There followed a great number of polite journals, in which the essay was treated as " the bow of Ulysses in which it was the fashion for men of rank and genius to try their strength." Gold- smith reached a higher level than the Chesterfields and Bonnel Thorntons had dreamed of, in the delicious sections of his Citizen of the World (1760). After Goldsmith, the eighteenth- century essay declined into tamer hands, and passed into final feebleness with the pedantic Richard Cumberland and the sentimental Henry Mackenzie. The corpus of eighteent h-century essayists is extremely voluminous, and their reprinted works fill some fifty volumes. There is, however, a great sameness about all but the very best of them, and in no case do they surpass Addison in freshness, or have they ventured to modify the form he adopted for his lucubrations. What has survived of them all

is the lightest portion, but it should not be forgot tei/

that a very large section of the essays of that age were deliberately didactic and " moral." A great revival of the essay took place during the first quarter of the nineteenth century, and foremost in the history of this movement must always be placed the name of Charles Lamb. He perceived that the real business of the essay, as Montaigne had conceived it, was to be largely personal. The famous Essays of Elia began to appear in the London Magazine for August 1820, and proceeded at fairly regular intervals until December 1822; early in 1823 the first series of them were collected in a volume. The peculiarity of Lamb's style as an essayist was that he threw off the Addisonian and still more the Johnsonian tradition, which had become a burden that crushed the life out of each conventional essay, and that he boldly went back to the rich verbiage and brilliant imagery of the seventeenth century for his inspiration. It is true that Lamb had great ductility of style, and that, when he pleases, he can write so like Steele that Steele himself might scarcely know the difference, yet in his freer flights we are conscious of more exalted masters, of Milton, Thomas Browne and Jeremy Taylor. ' He succeeded, moreover, in reaching a poignant note of personal feeling, such as none of his predecessors had ever aimed at; the essays called "Dream Children" and " Blakesmoor " are examples of this, and they display a degree of harmony and perfection in the writing of the pure essay such as had never been attempted before, and has never since been reached. Leigh Hunt, clearing away all the didactic and pompous elements which had overgrown the essay, restored it to its old Spectator grace, and was the most easy nondescript writer of his generation in periodicals such as the Indicator (1810) and the Companion (1828). The sermons, letters and pamphlets of Sydney Smith were really essays of an extended order. In Hazlitt and Francis Jeffrey we see the form and method of the essay beginning to be applied to literary criti- cism. The writings of De Quincey are almost exclusively essays, although many of the most notable of them, under his vehe- ment pen, have far outgrown the limits of the length laid down by the most indulgent formalist. His biographical and critical essays are interesting, but they are far from being trust- worthy models in form or substance. In a sketch, however rapid, of the essay in the nineteenth century, prominence must be given to the name of Macaulay. His earliest essay, that on Milton, appeared in the Edinburgh Review in 1825, very shortly after the revelation of*

Lamb's genius in " Elia." No two products cast in the same mould could, however, be more unlike in substance. In the hands of Macaulay the essay ceases to be a confession or an autobiography; it is strictly im- personal, it is literary, historical or controversial, vigorous, trenchant and full of party prejudice. The periodical publica- tion of Macaulay's Essays iri the Edinburgh Review went on until 1844; when we cast our eyes over this mass of brilliant writing we observe with surprise that it is. almost wholly con- tentious. Nothing can be more remarkable than the difference in this respect between Lamb and Macaulay, the former for ever demanding, even cajoling, the sympathy of the reader, the latter scanning the horizon for an enemy to controvert. In later times the essay in England has been cultivated in each of these ways, by a thousand journalists and authors. The " leaders ,: of a daily newspaper are examples of the popularization of the essay, and they point to the danger which now attacks it, that of producing a purely ephemeral or even momentary species of effect. The essay, in its best days, was intended to be as lasting as a poem or a historical monograph; it aimed at being one of the most durable and precious departments of literature. We still occasionally see the production of essays which have this more ambitious aim; within the last quarter of the nine- teenth century the essays of R. L. Stevenson achieved it. His Familiar Studies are of the same class as those of Montaigne and Lamb, and he approached far more closely than any other contemporary to their high level of excellence. We have seen that the tone of the essay should be personal and confidential; in Stevenson's case it was characteristically so. But the voices which please the public in a strain of pure self-study are few

at all times, and with the cultivation of the analytic habit they tend to become less original and attractive. It is possible that the essay. may die of exhaustion of interest, or may survive only in the modified form of accidental journalism.

The essay, although invented by a great French writer, was very late in making itself at home in France. The so-called Essais of Leibnitz, Nicole, Yves Marie Andre and so many others were really treatises. Voltaire's famous Essai sur les moeurs des nations is an elaborate historical disquisition in nearly two hundred chapters. Later, the voluminous essays of Joseph de Maistre and of Lamennais were not essays at all in the literary sense. On the other hand, the admirable Causeries du lundi of Sainte-Beuve (1804-1869) are literary essays in the fulness of the term, and have been the forerunners of a great army of brilliant essay-writing in France. Among those who have specially distinguished themselves as French essayists may be

mentioned Theophile Gautier, Paul de Saint- Victor, Anatole France, Jules Lemaitre, Ferdinand Brunetiere apd Emile Faguet. All these are literary critics, and it is in the form of the analysis of manifestations of intellectual energy that the essay has been most successfully illustrated in France. All the countries of Europe, since the middle of the 10th century, have adopted this form of writing; such monographs or reviews, however, are not perfectly identical with the essay as it was conceived by Addison and Lamb. This last, it maybe supposed, is a definitely English thing, and this view is confirmed by the fact that in several European languages the word " essayist " has been adopted without modification.

In the above remarks it has been taken for granted that the essay is always in prose. Pope, however, conceived an essay in heroic verse. Of this his Essay on Criticism (1711) and his Essay on Man (1732-1734) are not good examples, for they are really treatises. The so-called Moral Essays (1720-1735), on the contrary, might have been contributed, if in prose, either to the Spectator or the Guardian. The idea of pure essays, in verse, however, did not take any root in English literature. (E. G.)

ESSEG, Essegg or Essek (Hung. Esszek; Croatian Osjek), a royal free town, municipality, and capital of the county of Virovitica {V erode), in Croatia-Slavonia, on the right bank of the Drave, 9 m. W. of its confluence with the Danube, and 185 m. S. of Buda-Pest by rail. Pop. (1900) 24,930; chiefly Magyars and Croats, with a few Germans and Jews. At Esseg the Drave is crossed by two bridges, and below these it is navigable by small steamers. The upper town, with the fortress, is under military authority; the new town and the lower town, which is the headquarters of commerce, are under civil authority. The only buildings of note are the Roman Catholic and Orthodox churches, Franciscan and Capuchin monasteries, synagogue, gymnasium, modern school, hospital, chamber of commerce, and law-courts. Esseg has a thriving trade in grain, fruit, live-stock, plum-brandy and timber. Tanning, silk-weaving and glass-blowing are also carried on.

Esseg owes its origin to its fortress, which existed as early as the time of the Romans under the name of Mursia; though the present structure dates only from 1720. At the beginning of the Hungarian revolution of 1848 the town was held by the Hungarians, but on the 4th of February 1849 it was taken by the Austrians under General Baron Trebersberg.

ESSEN, a manufacturing town of Germany, in the Prussian Rhine

province, 22 m. N.E. from Dusseldorf, on the main line of railway to Berlin, in an undulating and densely populated district. Pop. (1849) 8813; (1875) 54,79°; (1905) 229,270. It lies at the centre of a network of railways giving it access to all the principal towns of the Westphalian iron and coal fields. Its general aspect is gloomy; it possesses few streets of any pretensions, though those in the old part, which are mostly narrow, present, with their grey slate roofs and green shutters, a pictur- esque appearance. Of its religious edifices (twelve Roman Catholic, one Old Catholic, six Protestant churches, and a synagogue) the minster, dating from the 10th century, with fine pictures, relics and wall frescoes, is alone especially remark- able. This building is very similar to the Pfalz-Kapelle {capella

in palatio) at Aix-la-Chapelle. Among the town's principal secular buildings are the new Gothic town-hall, the post office and the railway station. There are several high-grade (classical and modern) schools, technical, mining and commercial schools, a theatre, a permanent art exhibition, and hospitals. Essen also has a beautiful public park in the immediate vicinity. The town originally owed its prosperity to the large iron and coal fields underlying the basin in which it is situated. Chief among its industrial establishments are the famous iron and steel works of Krupp (q.v.), and the whole of Essen may be said to depend for its livelihood upon this firm, which annually expends vast sums in building and supporting churches, schools, clubs, hospitals and philanthropic institutions, and in other ways providing for the welfare of its employees. There are also manufactories of woollen goods and cigars, dyeworks and breweries.

Essen was originally the seat of a Benedictine nunnery, and was formed into a town about the middle of the toth century by the abbess Hedwig. The abbess of the nunnery, who held from 1275 the rank of a princess of the Empire, was assisted by a chapter of ten princesses and countesses; she governed the town until 1803, when it was secularized and incorporated with Prussia. In 1807 it came into the possession of the grand dukes of Berg, but was transferred to Prussia in 1814.

See Funcke, Geschichte des Fiirstenthums und der Sladt Essen (Elberfeld, 1851); Kellen, Die Industriestadt Essen in Wort und Bild (Essen, 1902) ; and A. Shadwell, Industrial Efficiency (London,

1906).

ESSENES, a monastic order among the Jews prior to Chris- tianity. Their first appearance in history is in the time of Jonathan the Maccabee (161-144 B.C.). How much older they may have been we have no means of determining, but our authorities agree in assigning to them a dateless antiquity. The name occurs in Greek, in the two forms "Ecrarivoi and 'EcrcraTot. 'Eccrivoi is used by Josephus fourteen times, 'E

The original accounts we have of them are confined to three authors — Philo, Pliny the Elder, and Josephus. Philo describes them in his treatise known as Quod omnis probus liber (§§ 12, 13; ii. 457-460), and also in his " Apology for the Jews," a fragment of which has been preserved by Eusebius (Praep. Ev. viii. n, 12). Pliny (N.H. v. 17) has a short but striking sketch of them, derived in all probability from Alexander Polyhistor, who is mentioned among the authorities for the fifth book of his Natural History. This historian, of whom Eusebius had a very high opinion (Praep. Ev. ix. 17, §1), lived in the time of Sulla. Josephus treats of them at length in his Jewish War (ii. 8), and more briefly in two passages of his Antiquities (xiii. 5, § 9; xviii. 1, § 5). He has also interesting accounts of the prophetic powers possessed by three individual members of the sect — Judas (B.J. i. 3, § 5; Ant. xiii. n, § 2),Menahem (Ant. xv. 10, § 5), and Simon (B.J. ii. 7, § 3; Ant. xvii. 13, § 3). Besides this he mentions an Essene Gate in Jerusalem (B.J. v. 4, § 2) and a person called John the Essene. one of the bravest and most capable leaders in the war against the Romans (B.J. ii. 20, § 4; iii. 2, § 1). Josephus himself made trial of the sect of Essenes in his youth; but from his own statement it appears that he must have been a very short time with them, and therefore could not have been initiated into the

inner mysteries of the society (De vita sua, 2). After this the notices that we have of the Essenes from antiquity are mere reproductions, except in the case of Epiphanius (died a.d. 402), who, however, is so confused a writer as to be of little value. Solinus, who was known as " Pliny's Ape," echoed the words of his master about a century after that writer's death, which took place in a.d. 79. Similarly Hippolytus, who lived in the reign of Commodus (a.d. 180-192), reproduced the account of Josephus, adding a few touches of his own. Porphyry (a.d. 233-306) afterwards did the same, but had the grace to mention Josephus in the context. Eusebius quoted the account as from Porphyry, though he must have known that he had derived it from Josephus (Praep. Ev. ix. 3, §§ 1, 13). But Porphyry's name would impress pagan readers. There is also a mention of the

Essenes by Hegesippus (Eus. H.E. iv. 22) and by Synesius in his life of Dio Chrysostom. It has been conjectured that the Clementine literature emanated from Essenes who had turned Christian. (See Ebionites.)

The Essenes were an exclusive society, distinguished from the rest of the Jewish nation in Palestine by an organization peculiar to themselves, and by a theory of life in which a severe asceticism and a rare benevolence to one another and to mankind in general were the most striking characteristics. They had fixed rules for initiation, a succession of strictly separate grades within the limits of the society, and regulations for the conduct of their daily life even in its minutest details. ' Their membership could be recruited only from the outside world, as marriage and all intercourse with women were absolutely' renounced. They were the first society in the world to condemn slavery both in theory and practice; they enforced and practised the most complete community of goods. They chose their, own priests and public office-bearers, and even their own judges. Though their prevailing tendency was practical, and the tenets of the society were kept a profound secret, it is perfectly clear from the concurrent testimony of Philo and Josephus that they cultivated a kind of speculation, which not only accounts for their spiritual asceticism, but indicates a great deviation from the normal development of Judaism, and a profound sympathy with Greek philosophy, and probably also with Oriental ideas. At the same time we do our Jewish authorities no injustice in imputing to them the patriotic tendency to idealize the society, and thus offer to their readers something in Jewish life that would bear comparison at least with similar manifestations of Gentile life.

There is some difficulty in determining how far the Essenes separated themselves locally from their fellow-countrymen. Josephus informs us that they had no single city of their own, but that many of them dwelt in every city. While in his treatise Quod omnis, &c, Philo speaks of their avoiding towns and preferring to live in villages, in his "Apology for the Jews " we find them living in many cities, villages, and in great and prosperous towns. In Pliny they are a perennial colony settled on the western shore of the Dead Sea. On the whole, as Philo and Josephus agree in estimating their number at 4000 (Philo, Q.O.P.L. § 12; Jos. Ant. xviii. 1, § 5), we are justified in suspect- ing some exaggeration as to the many cities, towns and villages where they were said to be found. As agriculture was their favourite occupation, and as their tendency was to withdraw from the haunts and ordinary interests of mankind, we may assume that with the growing confusion and corruption of Jewish society they felt

themselves attracted from the mass of the population to the sparsely peopled districts, till they found a congenial settlement and free scope for their peculiar view of life by the shore of the Dead Sea. While their principles were consistent with the neighbourhood of men, they were better adapted to a state of seclusion.

The Essenes did not renounce marriage because they denied the validity of the institution or the necessity of it as providing for the continuance of the human race, but because they had a low opinion of the character of women (Jos. B.J. ii. 8, § 2; Philo, " Apol. for the Jews " in Eus. Praep. Ev. viii. n, § 8). They adopted children when very young, and brought them up on

their own principles. Pleasure generally they rejected as evil. They despised riches not less than pleasure; neither poverty nor wealth was observable among them; at initiation every one gave his property into the common stock; every member in receipt of wages handed them over to the funds of the society. In matters of dress the asceticism of the society was very pronounced. They regarded oil as a defilement, even washing it off if anointed with it against their will. They did not change their clothes or their shoes till they were torn in pieces or worn completely away. The colour of their garments was always white. Their daily routine was prescribed for them in the strictest manner. Before the rising of the sun they were to speak of nothing profane, but offered to it certain traditional forms of prayer as if beseech- ing it to rise. Thereafter they went about their daily tasks, working continuously at whatever trade they knew till the fifth hour, when they assembled, and, girding on a garment of linen, bathed in cold water. They next seated themselves quietly in the dining hall, where the baker set bread in order, and the cook brought each a single dish of one kind of food. Before meat and after it grace was said by a priest. After dinner they resumed work till sunset. In the evening they had supper, at which guests of the order joined them, if there happened to be any such present. Withal there was no noise or confusion to mar the tranquillity of their intercourse; no one usurped more than his share of the conversation; the stillness of the place oppressed a stranger with a feeling of mysterious awe. This composure of spirit was owing to their perfect temperance in eating and drinking. Not only in the daily routine of the society, but generally, the activity of the members was controlled by their presidents. In only two things could they take the initia- tive,

helpfulness and mercy; the deserving poor and the destitute were to receive instant relief; but no member could give anything to his relatives without consulting the heads of the society. Their office-bearers were elected. They had also their special courts of justice, which were composed of not less than a hundred members, and their decisions, which were arrived at with extreme care, were irreversible. Oaths were strictly forbidden; their word was stronger than an oath. They were just and temperate in anger, the guardians of good faith, and the ministers of peace, obedient to their elders and to the majority. But the moral characteristics which they most earnestly cultivated and enjoined will best appear in their rules of initiation. There was a novitiate of three years, during which the intending member was tested as to his fitness for entering the society. If the result was satisfactory, he was admitted, but before partaking of the common meal he was required to swear awful oaths, that he would reverence the, deity, do justice to men, hurt no man voluntarily or at the command of another, hate the unjust and assist the just, and that he would render fidelity to all men, but especially to the rulers, seeing that no one rules but of God. He also vowed, if he should bear rule himself, to make no violent use of his power, nor outshine those set under him by superior display, to make it his aim to cherish the truth and unmask liars, to be pure from theft and unjust gain, to conceal nothing from his fellow-members, nor to divulge any of their affairs to other men, even at the risk of death, to transmit their doctrines unchanged, and to keep secret the books of the society and the names of the angels.

Within the limits of the society there were four grades so distinct that if any one touched a member of an inferior grade he required to cleanse himself by bathing in water; members who had been found guilty of serious crimes were expelled from the society, and could not be received again till reduced to the very last extremity of want or sickness. As the result of the ascetic training of the Essenes, and of their temperate diet, it is said that they lived to a great age, and were superior to pain and fear. During the Roman war they cheerfully underwent the most grievous tortures rather than break any of the principles of their faith. In fact, they had in many respects reached the very highest moral elevation attained by the ancient world; they were just, humane, benevolent, and spiritually-minded;

the sick and aged were the objects of a special affectionate regard; and they condemned slavery, not only as an injustice, but as an impious violation of the natural brotherhood of men (Philo ii. 457). There were some of the Essenes who permitted marriage, but strictly with a view to the preservation of the race; in other respects they

agreed with the main body of the society.

It will be apparent that the predominant tendency of the society was practical. Philo tells us expressly that they rejected logic as unnecessary to the acquisition of virtue, and speculation on nature as too lofty for the human intellect. Yet they had views of their own as to God, Providence, the soul, and a future state, which, while they had a practical use, were yet essentially speculative. On the one hand, indeed, they held tenaciously by the traditional Judaism: blasphemy against their lawgiver was punished with death, the sacred books were preserved and read with great reverence, though not without an allegorical interpretation, and the Sabbath was most scrupulously observed. But in many important points their deviation from the strait path of Judaic development was complete. They rejected animal sacrifice as well as marriage; the oil with which priests and kings were anointed they accounted unclean; and the condemnation of oaths and the community of goods were un-mistakable innovations for which they found no hint or warrant in the old Hebrew writings. Their most singular feature, perhaps, was their reverence for the sun. In their speculative hints respecting the soul and a future state, we find another important deviation from Judaism, and the explanation of their asceticism. They held that the body is mortal, and its substance transitory, that the soul is immortal, but, coming from the subtlest ether, is lured as by a sorcery of nature into the prison-house of the body. At death it is released from its bonds, as from long slavery, and. joyously soars aloft. To the souls of the good there is reserved a life beyond the ocean, and a country oppressed by neither rain, nor snow, nor heat, but refreshed by a gentle west wind blowing continually from the sea (cf. Horn. Od. iv. 566-568), but to the wicked a region of wintry darkness and of unceasing torment. Josephus tells us too that the Essenes believed in fate; but in what sense, and what relation it bore to Divine Providence, does not appear.

The above evidence has left students in doubt as to whether Essenism is to be regarded as a pure product of the Jewish mind or as due in part to some foreign influence. On the one hand it might be maintained that the Essenes out-Pharisee'd the Pharisees. They had in common with that sect their venera- tion for Moses and the Law, their Sabbatarianism, their striving after ceremonial purity, and their tendency towards fatalism. But if the Pharisees abstained from good works on the Sabbath, the Essenes abstained even from natural necessities (Jos. B.J. ii. 8, § 0); if the Pharisees washed, the Essenes bathed before dinner; if the Pharisees ascribed some things to Fate, the Essenes ascribed all (Jos. Ant. xiii. 5, § 9). But on the other hand

the Essenes avoided marriage, which the Pharisees held in honour; they offered no animal-sacrifices in the Temple; they refrained from the use of oil, which was customary among the Pharisees (Luke vii. 46) ; above all, they offered prayers to the sun, after the manner denounced in Ezekiel (viii. 16). These and other points of divergences are not explained by Ritschl's interesting theory that Essenism was an organized attempt to carry out the idea of " a kingdom of priests and an holy nation " (Ex. xix. 6).

Granting then that some foreign influence was at work in Essenism, we have four theories offered to us — that this influence was Persian, Buddhist, Pythagorean, or lastly, as maintained by Lipsius, that of the surrounding Syrian heathenism. Each of these views has had able advocates, but it must not be supposed that they are mutually exclusive. If we consider how Philo, while remaining a devout Jew in religion, yet managed to assimilate the whole Stoic philosophy, we can well believe that the Essenes might have been influenced, as Zeller maintained that they were, by Neo-Pythagoreanism. But as Pythagoras himself came from Samos, and his doctrines have a decidedly Oriental tinge, it may very well be that both he and the Essenes drew from a common source; for there is no need to reject, as

is so commonly done, the statements of our authorities as to the antiquity of the Essenes. This common source we may believe with Lightfoot to have been the Persian religion, which we know to have profoundly influenced that of Israel, independently of the Essenes.

The fact that the Pharisees and Sadducees so often figure in the pages of the New Testament, while the Essenes are never mentioned, might plausibly be interpreted to show that the New Testament emanated from the side of the Essenes. So far as concerns the Epistle of St James this interpretation would probably be correct. That work contains the doctrine common to the Essenes with Plato, and suggestive of Persian Dualism, that God is the author of good only. There are also certain obvious points of resemblance between the Essenes and the early Christians. Both held property in common; both had scattered communities which received guests one from the other; both avoided a light use of oaths; both taught passive obedience to political authority. The list might be enlarged, but it would not necessarily prove more than that the early Christians

shared in the ideas of their age. Christianity was to some extent a popularization of Essenism, but there is little reason for believing that Jesus himself was an Essene. De Quincey's contention that there were no Essenes but the early Christians is now a literary curiosity.

The original sources of our knowledge of the Essenes have been mentioned at the beginning of this paper; the best modern discussions of them are to be found in such works as Zeller's Philosophic der Griechen, vol. iii. ; Ewald, Geschichte d. V. Israel, iii. 419-428; Reuss, La Theologie chretienne au siecle apostolique, i. 122-131; Keim, Life of Jesus of Nazara, vol. i.; Lightfoot on the Colossians; Lucius, Der Essenismus in seinem Verhdltniss zum Judenthum; Wellhausen, Israelitische und jiidische Geschichte; Ed. Schiirer, The Jewish People in the Time of Jesus Christ, div. ii. vol. ii. § 30. The copious bibliography in Conybeare's edition of Philo's De vita contemplativa bears upon the Essenes as well as upon the Therapeutes. For a specially Jewish view of the Essenes see Kohler's article in the Jewish Encyclopaedia. They are there re- garded as being " simply the rigorists among the Pharisees." But we are also told that " the Pharisees characterized the Essene as ' a fool who destroyed the world.' " (T. K. ; St G. S.)

ESSENTUKI, a watering-place of south Russia, in the govern- ment of Terek, n m. by rail W. from Pyatigorsk; altitude, 2096 ft. Its alkaline and sulphur-alkaline mineral waters, similar to those of Ems, Selters and Vichy, are much visited in summer. The climate shows great variations in temperature. Pop. (1897) 9974-

ESSEQUIBO, or Essequebo, one of the three settlements of British Guiana, taking its name from the river Essequibo. (See Guiana.)

ESSEX, EARLS OF. The first earl of Essex was probably Geoffrey de Mandeville (q.v.), who became earl about 1139, the earldom being subsequently held by his two sons, Geoffrey and William, until the death of the latter in 1189. In 1199 Geoffrey Fitzpeter or Fitzpiers (d. 1213), who was related to the Mandevilles through his wife Beatrice, became earl of Essex, and on the death of Geoffrey's son William in 1227 the earldom reverted for the second time to the crown. Then the title to the earldom passed by marriage to the Bohuns, earls of Hereford, and before 1239 Humphrey de Bohun (d. 1275) had been re- cognized as earl of Essex. With the earldom of Hereford the earldom of Essex became extinct in 1373; afterwards it was held by Thomas of Woodstock, duke of Gloucester, a son of Edward III. and the husband of Eleanor de Bohun; and from Gloucester it passed to the Bourchiers, Henry Bourchier (d. 1483),

who secured the earldom in 1461, being one of Gloucester's grandsons. The second and last Bourchier earl was Henry's grandson Henry, who died early in 1540. A few weeks before his execution in 1540 Thomas Cromwell (q.v.) was created earl of Essex; then in 1543 William Parr, afterwards marquess of Northampton, obtained the earldom by right of his wife Anne, a daughter of the last Bourchier earl. Northampton lost the earldom when he was attainted in 1553; and afterwards it passed to the famous family of Devereux, Walter Devereux, who was created earl of Essex in 1572, being related to the Bourchiers. Robert, the 3rd and last Devereux earl, died in

1646. In 1661 Arthur Capel was created earl of Essex, and the earldom is still held by his descendants.

ESSEX, ARTHUR CAPEL, ist 1 Earl of (163 2-1 683), English statesman, son of Arthur, ist Baron Capel of Hadham (c. 1641), executed in 1649, and of Elizabeth, daughter and heir of Sir Charles Morrison of Cashiobury in Hertfordshire, was baptized on the 2-8 th of January 1632. In June 1648, then a sickly boy of sixteen, he was taken by'Fairfax's soldiers from Hadham to Colchester, which his father was defending, and carried every day round the works with the hope of inducing Lord Capel to surrender the place. At the restoration he was created Viscount Maiden and earl of Essex (20th of April 1661), with special remainder to the male issue of his father, and was made lord-lieutenant of Hertfordshire and a few years later of Wiltshire. 2

He early showed himself antagonistic to the court, to Roman Catholicism, and to the extension of the royal prerogative, and was coupled by Charles II. with Holies as " stiff and sullen men," who would not yield against their convictions to his solicitations. In 1669 he was sent as ambassador to King Christian V. of Den- mark, in which capacity he gained credit by refusing to strike his flag to the governor of Kronborg. In 1672 he was made a privy councillor and lord-lieutenant of Ireland. He remained in office till 1677, and his administration was greatly commended by Burnet and Ormonde, 3 the former describing it " as a pattern to all that come after him." He identified himself with Irish interests, and took immense pains to understand the constitution and the political necessities of the country, appointing men of real merit to office, and maintaining an exceptional independence from solicitation and influence. He held a just balance between the Roman Catholics, the English Church and the Presbyterians, protecting the former as far as public opinion in England would permit, and governing the native Irish with firmness

and modera- tion. The purity and patriotism of his administration were in strong contrast to the hopeless corruption prevalent in that at home and naturally aroused bitter opposition, as an obstacle to the unscrupulous employment of Irish revenues for the satis- faction of the court and the king's expenses. In particular he came into conflict with Lord Ranelagh, to whom had been assigned the Irish revenues on condition of his supplying the requirements of the crown, and whose accounts Essex refused to pass. He opposed strongly the lavish gifts of forfeited estates to court favourites and mistresses, prevented the grant of Phoenix Park to the duchess of Cleveland, and refused to encumber the administration by granting reversions. Finally the intrigues of his enemies at home, and Charles's continual demands for money, which Ranelagh undertook to satisfy, brought about his recall in April 1677. He immediately joined the country party and the opposition to Danby's government, and on the latter's fall in 1679 was appointed a commissioner of the treasury,' and the same year a member of Sir William Temple's new- modelled council. He followed the lead of Halifax, who advo- cated not the exclusion of James, but the limitation of his sovereign powers, and looked to the prince of Orange rather than to Monmouth as the leader of Protestantism, incurring thereby the hostility of Shaftesbury, but at the same time gaining the confidence of Charles. He was appointed by Charles together with Halifax to hear the charges against Lauderdale. In July he wrote a wise and statesmanlike letter to the king, advising him to renounce his project of raising a new company of guards. Together with Halifax he urged Charles to summon the parliament, and after his refusal resigned the treasury in November, the real cause being, according to one account, 4 a demand upon the treasury by the duchess of Cleveland for £25,000, according to another " the niceness of touching French money," " that makes my Lord Essex's squeasy stomach that it can no longer digest his employment." 5

1 i.e. in the Capel line.

'Hist. MSS. Comtn. ser.; Duke of Beaufort's MSS. 45.

3 Life of Ormonde, by T. Carte, viii. 468 (1851), vol. iv. p. 529.

4 Hist. MSS. Comm. 7th Rep. app. 477b.

5 lb. 6th Rep. app. 741b.

Subsequently his political attitude underwent a change, the exact cause of which is not clear — probably a growing conviction of the dangers threatened by a Roman Catholic sovereign of the character of James. He now, in 1680, joined Shaftesbury's party and supported the Exclusion Bill, and on its rejection by the Lords carried a motion for an association to execute the scheme of expedients promoted by Halifax. On the 25th of January 1 681 at the head of fifteen peers he presented a petition to the king, couched in exaggerated language, requesting the abandonment of the session of parliament at Oxford. He was a jealous prosecutor of the Roman Catholics in the popish plot, and voted for Stafford's attainder, on the other hand interceding for Archbishop Plunket, implicated in the pretended Irish plot. He, however, refused to follow Shaftesbury in his extreme courses, declined participation in the latter's design to seize the Tower in 1682, and on Shaftesbury's consequent departure from England became the leader of Monmouth's faction, in which were now included Lord Russell, Algernon Sidney, and Lord Howard of Escrick. Essex took no part in the wilder schemes of the party, but after the discovery of the Rye House Plot in June 1683, and the capture of the leaders, he was arrested at Cashiobury and imprisoned in tne Tower. His spirits and fortitude appear immediately to have abandoned him, and on the 13th of July he was discovered in his chamber with his throat cut. His death was attributed, quite groundlessly, to Charles and James, and the evidence points clearly if not conclusively to suicide, his motive being possibly to prevent an attainder and preserve his estate for his family. He, was, however, un- doubtedly a victim of the Stuart administration, and the antagon- ism and tragic end of men like Essex, deserving men, naturally devoted to the throne, constitutes a severe indictment of the Stuart rule.

He was a statesman of strong and sincere patriotism, just and unselfish, conscientious and laborious in the fulfilment of public duties, blameless in his official and private life. Evelyn describes him as " a sober, wise, judicious and pondering person, not illiterate beyond the rule of most noblemen in this age, very well versed in English history and affairs, industrious, frugal, methodical and every way accomplished"; and declares he was much deplored, few believing he had ever harboured any seditious designs. 1 He married Lady Elizabeth Percy, daughter of Algernon, 10th earl of Northumberland, by whom, besides a daughter, he had an only son Algernon (1670-1710), who suc- ceeded him as 2nd earl of Essex.

Bibliography. — See the Lives in the Diet, of Nat. Ciography and in Biographia Britannica (Kippis), with authorities there collected; Essex's Irish correspondence is in the Slow Collectionˆ in the British Museum, Nos. 200-217, and selections have been published in Letters written by Arthur Capel, Earl of Essex (1770) and in the Essex Papers (Camden Society, 1890), to which can now be added the Calendars of State Papers, Domestic, which contain a large number of his letters and which strongly support the opinion of his contemporaries concerning his unselfish patriotism and industry; see also Sotners Tracts (1813), x., and for other pamphlets relating to his death the catalogue of the British Museum.

ESSEX, ROBERT DEVEREUX, 2ND 2 Earl of (1566-1601), son of the 1st Devereux earl, was born at Netherwood, Hereford- shire, on the 19th of November 1 566. He entered the university of Cambridge and graduated in 1581. In 1585 he accompanied his stepfather, the earl of Leicester, on an expedition to Holland, and greatly distinguished himself at the battle of Zutphen. He now took his place at court, where so handsome a youth soon found favour with Queen Elizabeth, and in consequence was on bad terms with Raleigh. In 1587 he was appointed master of the horse, and in the following year was made general of the horse and installed knight of the Garter. On the death of Leicester he succeeded him as chief favourite of the queen, a position which injuriously affected his whole subsequent life, and ultimately resulted in his ruin. While Elizabeth was approach- ing the mature age of sixty, Essex was scarcely twenty-one. Though well aware of the advantages of his position, and some- what vain of the queen's favour, his constant attendance on her 1 Diary and Corresp. (1850), ii. 141, 178. 2 i.e. in the Devereux line.

at court was irksome to him beyond all endurance; and when he could not make his escape to the scenes of foreign adventure after which he longed, he varied the monotony of his life at court by intrigues with the maids of honour, He fought a duel with Sir Charles Blount, a rival favourite of the queen, in which the earl was disarmed and slightly wounded in the thigh.

In 1 589, without the queen's consent, he joined the expedition of Drake and Sir John Norris against Spain, but in June he was compelled to obey a letter enjoining him at his " uttermost peril " to return immediately. In 1 590 Essex married the widow of Sir Philip Sidney, but in dread of the queen's anger he kept the marriage secret as long as possible. When it was necessary to avow it, her rage at first knew no bounds, but as the earl did " use it with good temper,"

and " for her majesty's better satisfaction was pleased that my lady should live retired in her mother's house," he soon came to be " in very good favour." In 1 591 he was appointed to the command of a foice auxiliary to one formerly sent to assist Henry IV. of France against the Spaniards; but after a fruitless campaign he was finally recalled from the command in January 1592. For some years after this most of his time was spent at court, where he held a position of unexampled influence, both on account of the favour of the queen and from his own personal popularity. In 1596 he was, after a great many" changes of humour "on the queen's part, appointed along with Lord Howard of Effingham, Raleigh and Lord Thomas Howard, to the command of an expedition, which was successful in defeating the Spanish fleet, capturing and pillaging Cadiz, and destroying 53 merchant vessels. It would seem to have been shortly after this exploit that the beginnings of a change in the feelings of the queen towards him came into existence. On his return she chided him that he had not followed up his successes, and though she professed great pleasure at again seeing him in safety, and was ultimately satisfied that the abrupt termination of the expedition was contrary to his advice and remonstrances, she forbade him to publish anything in justification of his conduct. She doubtless was offended at his growing tendency to assert his independence, and jealous of his increasing popularity with the people; but it is also probable that her strange infatuation regarding her own charms, great as it was, scarcely prevented her from suspecting either that his professed attachment had all along been somewhat alloyed with considerations of personal interest, or that at least it was now beginning to cool. Francis Bacon, at that time his most intimate friend, endeavoured to prevent the threatened rupture by writing him a long letter of advice; and although perseverance in a long course of feigned action was for Essex impossible, he for some time attended pretty closely to the hints of his mentor, so that the queen " used him most graciously." In 1597 he was appointed master of the ordnance, and in the following year he obtained command of an expedition against Spain, known as the Islands or Azores Voyage. He gained some trifling successes, but as the Plate fleet escaped him he failed of his main purpose; and when on his return the queen met him with the usual reproaches, he retired to his home at Wanstead. This was not what Elizabeth desired, and although she conferred on Lord Howard of Effingham the earldom of Nottingham for services at Cadiz, the main merit of which was justly claimed by Essex, she ultimately held out to the latter the olive branch of peace, and condescended to soothe his wounded honour by creating him earl marshal of England. That, never- theless, the irritated feelings neither of Essex nor of the queen

were completely healed was manifested shortly afterwards in a manner which set propriety completely at defiance. In a dis- cussion on the appointment of a lord deputy to Ireland, Essex, on account of some taunting words of Elizabeth, turned his back upon her with a gesture indicative not only of anger but of contempt, and when she, unable to control her indignation, slapped him on the face, he left her presence swearing that such an insult he would not have endured even from Henry VIII.

In 1599, while Ulster was in rebellion under the earl of Tyrone, the office of lieutenant and governor-general of Ireland was conferred on Essex, and a large force put at his command.

His campaign was an unsuccessful one, and by acting in various ways in opposition to the commands of the queen and the council, agreeing with Tyrone on a truce in September, and suddenly leaving the post of duty with the object of privately vindicating himself before the queen, he laid himself open to charges more serious than that of mere incompetency. For these misdemeanours he was brought in June 1600 before a specially constituted court, deprived of all his high offices, and ordered to live a prisoner in his own house during the queen's pleasure. Chiefly through the intercession of Bacon his liberty was shortly afterwards restored to him, but he was ordered not to return to court. For some time he hoped for an improvement in his prospects, but when he was refused the renewal of his patent for sweet wines, hope was succeeded by despair, and half maddened by wounded vanity, he made an attempt (Feb. 7, 1 601) to incite a revolution in his behalf, by parading the streets of London with 300 retainers, and shouting, " For the queen! a plot is laid for my life! " These proceedings awakened, however, scarcely any other feelings than mild perplexity and wonder; and finding that hope of assistance from the citizens was vain, he returned to Essex House, where after defending himself for a short time he surrendered. After a trial — in which Bacon, who prosecuted, delivered a speech against his quondam friend and benefactor, the bitterness of which was quite un- necessary to secure a conviction entailing at least very severe punishment — he was condemned to death, and notwithstanding many alterations in Elizabeth's mood, the sentence was carried out on the 25th of February 1601.

Essex was in person tall and well proportioned, with a counte- nance

which, though not strictly handsome, possessed, on account of its bold, cheerful and amiable expression, a wonderful power of fascination. He was a patron of literature, and himself a poet. His carriage was not very graceful, but his manners are said to have been " courtly, grave and exceedingly comely." He was brave, chivalrous, impulsive, imperious sometimes with his equals, but generous to all his dependants and incapable of secret malice; and these virtues, which were innate and which remained with him to the last, must be regarded as some- what counterbalancing, in our estimation of him, the follies and vices created by temptations which were exceptionally strong.

See Hon. W. B. Devereux, Lives of the Earls of Essex (1853) ; and Bacon and Essex, by E. A. Abbott (1877). Also the article Bacon, Francis, and authorities there.

ESSEX, ROBERT DEVEREUX, 3RD 1 Earl of (1591-1646), son of the preceding, was born in 1591. He was educated at Eton and at Merton College, Oxford. Shottly after the arrival of James I. in London, Essex (whose title was restored, and the attainder on his father removed, in 1604) was placed about the prince of Wales, as a sharer both in his studies and amusements. At the early age of fifteen he was married to Frances Howard, daughter of the earl of Suffolk, but she was his wife only in name; during his absence abroad (1607-1609) she fell in love with Sir Robert Carr (afterwards earl of Somerset) , and on her charging her husband with physical incapacity, the marriage was annulled in 1613. A second marriage which he contracted in 1631 with Elizabeth, daughter of Sir William Paulet, also ended unhappily. From 1620 to 1623 he served in the wars of the Palatinate, and in 1625 he was vice-admiral of a fleet which made an unsuccessful attempt to capture Cadiz. In 1639 he was lieutenant-general of the army sent' by Charles against the Scottish Covenanters; but on account of the irresolution of the king no battle occurred, and the army was disbanded at the end of the year. Essex was discharged " without ordinary ceremony," and refused an office which at that time fell vacant, " all which," says Clarendon, " wrought very much upon his rough, proud nature, and made him susceptible of some impressions afterwards which otherwise would not have found such easy admission." Having taken the side of the parliament against Charles, he was, on the outbreak of the civil war in 1642, appointed to the command of the parlia- mentary army. At the battle of Edgehill he remained master 1 i.e. in the Devereux line.

of the field, and in 1643 he captured Reading, and relieved

Gloucester; but in the campaign of the following year, on account of his hesitation to fight against the king in person, nearly his whole army fell into the hands of Charles. In 1645, on the passing of the self-denying ordinance, providing that no member of parliament should hold a puLlic office, he resigned his commission; but on account of his past services his annuity of £10,000 was continued to him for life. He died on the 14th of September 1646, of a fever brought on by over-exertion in a stag-hunt in Windsor Forest; his line becoming extinct.

See the " Life of Robert Earl of Essex," by Robert Codrington, M.A., printed in Hart. Misc.; Clarendon's History of the Rebellion, and Hon. W. B. Devereux, Lives of the Earls of Essex (1853).

ESSEX, WALTER DEVEREUX, ist 2 Earl of (1 541-1576), the eldest son of Sir Richard Devereux, was born in 1541. His grandfather was the 2nd Baron Ferrers, who was created Viscount Hereford in 1550 and by his mother was a nephew of Henry Bourchier, a former earl of Essex, Walter Devereux succeeded as 2nd Viscount Hereford in 1558, and in 1561 or 1562 married Lettice, daughter of Sir Francis Knollys. In 1569 he served as high marshal of the field under the earl of Warwick and Lord Clinton, and materially assisted them in suppressing the northern insurrection. For his zeal in the service of Queen Elizabeth on this and other occasions, he in 1572 received the Garter and was created earl of Essex, the title which formerly belonged to the Bourchier family. Eager to give proof of " his good devotion to employ himself in the service of her. majesty," he offered on certain conditions to subdue and colonize, at his own expense, a portion of the Irish province of Ulster, at that time completely under the dominion of the rebel O'Neills, under Sir Brian MacPhelim and Tirlogh Luineach, with the Scots under their leader Sorley Boy MacDonnell. His offer, with certain modifications, was accepted, and he set sail for Ireland in July 1 573, accompanied by a number of earls, knights and gentlemen, and with a force of about 1200 men. The beginning of his enterprise was inauspicious, for on account of a storm which dispersed his fleet and drove some of his vessels as far as Cork and the Isle of Man, his forces did not all reach the place of rendezvous till late in the autumn, and he was compelled to entrench himself at Belfast for the winter. Here, by sickness, famine and desertions, his troops were diminished to little more than 200 men. Intrigues of various sorts, and fighting of a guerilla type, followed with disappointing results, and Essex had difficulties both with the deputy Fitzwilliam and with the queen. Essex was in straits himself, and his offensive movements in Ulster took the form of raids and brutal massacres among the O'Neills; in October 1574 he

treacherously captured MacPhelim at a conference in Belfast, and after slaughtering his attendants had him and his wife and brother executed at Dublin. Elizabeth, instigated apparently by Leicester, after encouraging Essex to- prepare to attack the Irish chief Tirlogh Luineach, suddenly commanded him to " break off his enterprise "; but. as she left him a certain discretionary power, he took advantage of it to defeat Tirlogh Luineach, chastise Antrim, and massacre several hundreds of Sorley Boy's following, chiefly women and children, discovered hiding in the caves of Rathlin. He returned to England in the end of 1575, resolved " to live henceforth an untroubled life"; but he was ultimately persuaded to accept the offer of the queen to make him earl marshal of Ireland. He arrived in Dublin in September 1576, and three weeks afterwards died of dysentery. There were suspicions that he had been poisoned by Leicester, who shortly after his death married his widow, but these were not confirmed by the post-mortem examina- tion. The endeavours of Essex to better the condition of Ireland were a dismal failure; and the massacres of the O'Neills and of the Scots of Rathlin leave a dark stain on his reputation.

See Sidney Lee's article in the Diet. Nat. Biog. ; Lives of the Devereux Earls of Essex, by Hon. Walter B. Devereux (1853); Froude's History of England, vol. x. ; J. S. Brewer, Athenaeum (1870), part i. pp. 261, 326.

ESSEX, an eastern county of England, bounded N. by Cam- bridgeshire and Suffolk, E. by the North Sea, S. by the Thames, 2 i.e. in the Devereux line.

dividing it from Kent, W. by the administrative county of London and by Hertfordshire. Its area is 1542 sq. m. Its configuration is sufficiently indicated by the direction of its rivers. Except that in the N.W. the county includes the heads of a few valleys draining northward to the Cam and so to the Great Ouse, all the streams, which are never of great size, run southward and eastward, either into the Thames, or into the North Sea by way of the broad, shallow estuaries which ramify through the flat coast lands. The highest ground lies conse- quently in the north-west, between the Cam basin and the rivers of the county. Its principal southward extension is that between the Lea (which with its tributary the Stort forms a great part of the western boundary) and the Roding, and east of the Roding

valley. The other chief rivers may be specified according to their estuaries, following the coast northward from Shoeburyness at the Thames mouth. That of the Roach ramifies among several islands of which Foulness is the largest, but its main branch joins the Crouch estuary. Next follows the Blackwater, which receives the Chelmer, the Brain and other streams. Following a coast of numerous creeks and islets, with the large island of Mersea, the Colne estuary is reached. The Colne and Black- water may be said to form one large estuary, as they enter the sea by a well-marked common mouth, 5 m. in width, between Sales Point and Colne Point. There is a great irregular inlet (Hamford Water) receiving no large stream, W. of the Naze promontory, and then the Stour, bounding the county on the north, joins its estuary to that of the Orwell near the sea. There are several seaside watering-places in favour owing to their proximity to London, of which Southend-on-Sea above the mouth of the Thames, Clacton-on-Sea, Walton-on-the-Naze, and Dovercourt adjoining Harwich are the chief. These and other stations on the estuaries are also in favour with yachtsmen. The sea has at some points seriously encroached upon the land within historic times. The low soft cliffs at various points are liable to give way against the waves; in other parts dykes and embankments are necessary to prevent inundation. Inland, that is apart from the flat coast-district, the country is pleasantly undulating and for the most part well wooded. It was formerly, indeed, almost wholly forested, the great Waltham Forest stretching from Colchester to the confines of London. Of this a fragment is preserved in Epping Forest (see Epping) between the Lea and the Roding. On the other side of the Roding Hainault Forest is traceable, but was disafforested in 1851. The oak is the principal tree; a noteworthy example was that of Fairlop in Hainault, which measured 45 ft. in girth, but was blown down in 1820.

Geology. — The geological structure of the county is very simple: the greater part is occupied by the London clay with underlying Reading beds and Thanet sands, with here and there small patches of Bagshot gravels on elevated tracts, as at High Beech, Langdon Hill, Brentwood and Rayleigh; and occasionally the same beds are represented by the large boulder-like Sarsen stones on the lower ground. In the north, the chalk, which underlies the Tertiary strata over the whole county, appears at the surface and forms the downs about Saffron Walden, Birdbrook and Great Yeldham; it is brought up again by a small disturbance at Grays Thurrock where it is quarried on a large scale for lime, cement and whiting. Small patches of Pleistocene Red Crag rest upon the Eocene strata at Beaumont and Oakley, and are very well exposed at Walton-on- the-Naze where

they are very fossiliferous. Most of the county is covered by a superficial deposit of glacial drifts, sands, gravel and in places boulder clay, as at Epping, Dunmow and Hornchurch where the drift lies beneath the Thames gravel. An interesting feature in relation to the glacial drift is a deep trough in the Cam valley revealed by borings to be no less than 340 ft. deep at Newport ; this ancient valley is filled with drift. In the southern part of the county are broad spreads of gravel and brick earth, formed by the Thames; these have been excavated for brick-making and building purposes about Ilford, Romford and Grays, and have yielded the remains of hippopotamus, rhinoceros and mammoth. More recent alluvial deposits are found in the valley at Walthamstow and Tilbury, in which the remains of the beaver have been discovered.

The roads of this county with a clay soil foundation were for generations repaired with flints picked by women and children from the surface of the fields. Gravel is difficult of access. With the exception of chalk for lime (mainly obtained at Ballingdon in the north and Grays in the south), septaria for making cement, and clay for bricks, the underground riches of the county are meagre.

Agriculture. — As an agricultural county Essex ranks high. Some four-fifths of the total area is under cultivation, and about one-third of that area is in permanent pasture. Wheat, barley and oats, in that relative order, are the principal grain crops, Essex being one of the chief grain-producing counties. The wheat and barley are in particularly high favour, the wheat of various standard species being exported for seed purposes, while the barley is especially useful in malting. Beans and peas are largely grown, as are vegetables for the London market. Hop-growing was once important. From the comparative dryness of the climate Essex does not excel in pasturage, and winter grazing receives the more attention. The numbers of cattle increase steadily, and store bullocks are introduced in large numbers from Norfolk, Lincolnshire, Ireland and Wales. Of sheep there are but few distinct flocks, and the numbers decrease. Pigs are generally of a high-class Berkshire type.

Other Industries. — The south-west of the county, being con- tiguous to London, is very densely populated, and is the seat of large and varied industries. For example, there are numbers of chemical works, the extensive engine shops and works of the Great Eastern railway at Stratford, government powder works in the vicinity of Waltham Abbey, and powder stores at Purfleet on the Thames. The extensive water-works for east London, by the Lea near Walthamstow, may also be mentioned. The docks at Plaistow and Tilbury on the Thames

employ many hands. Apart from this industrial district, there are consider- able engineering works, especially for agricultural implements, at Chelmsford, Colchester and elsewhere; several silk works, as at Braintree and Halstead; large breweries, as at Brentwood, Chelmsford and Romford; and lime and cement works at Grays Thurrock. The oyster-beds of the Colne produce the famous Colchester natives, and there are similar beds in the Crouch and Roach, for which Burnham-on-Crouch is the centre; and in the Blackwater (Maldon).

Communications. — Railway communications are supplied principally by the Great Eastern railway, of which the main line runs by Stratford, Ilford, Romford, Brentwood, Chelmsford, Witham, Colchester, and Manningtree. The Cambridge and northern line of this company, following the Lea valley, does not touch the county until it diverges along the valley of the Stort. The chief branches are those to Southend and Burnham, Witham to Maldon, Colchester to Brightlingsea, to Clactonand to Walton, and Manningtree to Harwich, on the coast; and Witham to Braintree and Bishop's Stortford, and Mark's Tey to Sudbury and beyond, inland; while there are several branch lines among the manufacturing and residential suburbs in the south-west, to Walthamstow and Buckhurst Hill, Chigwell, Loughton, Epping, Ongar, &c. The London, Tilbury & Southend railway, following the Thames, serves the places named, and the Colne Valley railway runs from Chappel junction near Mark's Tey by Halstead to Haverhill.

On the Thames, besides the great docks at Plaistow (Victoria and Albert) and the deep-water docks at Tilbury, the principal calling places for vessels are Grays, Purfleet and Southend, while Barking on the Roding has also shipping trade, and the Lea affords important water-connexions. Elsewhere, the prin- cipal port is Harwich, at the mouth of the Stour, one of the chief ports of England for European passenger traffic. Other towns ranking as lesser estuarine ports are: Brightlingsea and Wivenhoe on the Colne, forming a member of the Cinque Port of Sandwich; Colchester, Maldon on the Blackwater, and Burnham-on-Crouch. The Stour, Chelmer, and Lea and Stort are the principal navigable inland waterways.

Population and Administration. — The area of the ancient county is 986,975 acres, with a population in 1891 of 785,445 and in 1901 of 1,085,771. The area of the administrative county is 979,532 acres. The county contains nineteen hundreds. It is divided into eight parliamentary divisions, and it also includes the parliamentary boroughs of Colchester and West Ham, the latter consisting of two

divisions. Each of these returns one member. The county divisions are — Northern or Saffron Walden, North-eastern or Harwich, Eastern or Maldon, Western

or Epping, Mid or Chelmsford, South-eastern, Southern or Romford, South-western or Walthamstow, returning one member each. The municipal boroughs are — Chelmsford (12,580), Colchester (38,373), East Ham (96,018), Harwich (10,070), Maldon(5565), Saffron Walden(5896), Southend-on-Sea(28,857), and one county borough, West Ham (267,358). The following are the other urban districts — Barking Town (21,547), Braintree (S33o), Brentwood (4932), Brightlingsea (4501), Buckhurst Hill (4786), Burnham-on-Crouch (2919), Chingford (4373), Clacton (7456), Epping (3789), Frinton-on-Sea (644), Grays Thurrock (13,834), Halstead (6073), Ilford (41,234), Leigh-on-Sea (3667), Leyton (98,912), Loughton (4730), Romford (13,656), Shoebury- ness (4081), Waltham Holy Cross (6549), Walthamstow (95,131), Walton-on-the-Naze (2014), Wanstead (9179), Witham (3454), Wivenhoe (2560), Woodford (13,798). Essex is in the South- eastern circuit, and assizes are held at Chelmsford. The boroughs of Harwich and Southend-on-Sea have separate commissions of the peace, and the boroughs of Colchester, Maldon, Saffron Walden and West Ham have, in addition, separate courts of quarter sessions. The county is ecclesiastically within the diocese of St Albans (with a small portion within that of Ely) and is divided into two archdeaconries; containing 452 parishes or districts wholly or in part. There are 399 civil parishes.

There is a military station and depot for recruits at Warley, and a garrison at Tilbury. At Shoeburyness there are a school of gunnery and an extensive ground for testing government artillery of the largest calibre.

History (see also below under Essex, Kingdom of). — Essex probably originated as a shire in the time of ˆEthelstan. Accord- ing to the Domesday Survey it comprised nineteen hundreds, corresponding very closely in extent and in name with those of the present day. The additional half-hundred of Thunreslan on the Suffolk border has disappeared; Witbrictesherna is now Dengie; and the liberty of Havering-atte-Bower appears to have been taken out of Becontree. Essex and Hertfordshire were under one sheriff until the time of Elizabeth. At the time of the Survey Count Eustace held a vast fief in

Essex, and the court of the Honour of Boulogne was held at Witham. Bentry Heath in Dagenham, Hundred Heath in Tendring and Castle Hedingham in Hinckford were the meeting-places of their respective hundreds. The stewardship of the forest of Essex was held by the earls of Oxford until deprived of it for adherence to the Lancastrian cause. In 142 1 certain parts of Essex in- herited by Henry V. from his mother were brought under the jurisdiction of the duchy of Lancaster.

Essex was part of the see of London from the time of the foundation of the bishopric in the 7th century. The arch- deaconries are first mentioned in 1108; that of Essex extended over the south of the county and in 1291 included eight deaneries; the north of the county was divided between the archdeaconries of Middlesex and Colchester, comprising three and six deaneries respectively. Colchester was constituted a suffragan bishopric by Henry VIII. In 1836 Essex was transferred to the diocese of Rochester, with the exception of nine parishes which remained in London. In 1845 the archdeacon of Middlesex ceased to exercise control in Essex, and the deaneries were readjusted. In 1875 Essex was transferred to the newly created diocese of St Albans, and in 1877 the archdeaconry of Essex was subdivided into eighteen deaneries and that of Colchester into sixteen.*

Owing to its proximity to the capital Essex was intimately associated with all the great historical struggles. The nobility of Essex took a leading part in the struggle for the charter, and of the twenty-four guardians of the charter, four were Essex barons. The castles of Pleshey, Colchester, and Hedingham were held against the king in the Barons' War of the reign of Henry III., and 5000 Essex men joined the peasant rising of 1381. During the Wars of the Roses the Lancastrian cause was supported by the dS Veres, while the Bourchiers and Lord Fitz-Walter were among the Yorkist leaders. Several Essex men were concerned in the Gunpowder Plot, and in the Civil War of the 17th century the county rendered valuable aid to the parliament.

After the Conquest no Englishman retained estates in Essex of any importance, and the chief lay barons at the time of the Survey were Geoffrey de Mandeville and Aubrey de Yere. The de Veres, earls of Oxford, were continuously connected with the county until the extinction of the title two centuries ago. Pleshey was the stronghold of the Mandevilles, and, although the house became extinct in 11 89, its descendants in the female line retained the title of earls of Essex. The Honour of Hatfield Peverel held by Ranulf Peverel after the

Conquest escheated to the crown in the reign of Henry I., and in the same reign the fief of Robert Gernon passed to the house of Mountfichet.

Essex has always been mainly an agricultural county, and the ordinary agricultural pursuits were carried on at the time of the Domesday Survey, which also mentions salt-making, wine-making, bee-culture and cheese-making, while the oyster fisheries have been famous from the earliest historic times. The woollen industry dates back to Saxon times, and for many centuries ranked as the most important industry. Cloth-weaving was introduced in the 14th century, and in the 16th century Colchester was noted for its " bays and says." Colchester also possessed a valuable leather industry in the 16th century, at which period Essex was considered an exceptionally wealthy and prosperous county; Norden, writing in 1594, describes it as " moste fatt, frutefull, and full of all profitable things." The decline of the cloth industry in the 17th century caused great distress, but a number of smaller industries began to take its place. Saffron-culture and silk-weaving were extensively carried on in the 17th century, and the 18th century saw the introduction of the straw-plait industry, potash-making, calico- printing, malting and brewing, and the manufacture of Roman cement.

The county returned four members to parliament in 1290. From 1295 it returned two members for the county and two for Colchester. Maldon acquired representation in 1331 and Harwich in 1604. Under the Reform Act of 1832 the county returned four members in four divisions. Under the Representa- tion of the People Act of 1868 Maldon and Harwich each lost one member, and the county returned six members in three divisions.

Antiquities. — It is supposed by many antiquaries that Saxon masonry can be detected in the foundations of several of the Essex churches, but, with the exception of Ashingdon church' tower, believed to have been erected by Canute after his victory over Edmund Ironside, there is no obviously recognizable building belonging to that period. This is probably to be in part ascribed to the fact that the comparative scarcity of stone and the unusual abundance of timber led to the extensive employment of the latter material. Several of the Essex churches, as Blackmore, Mountnessing, Margaretting, and South Benfleet, have massive porches and towers of timber; and St Andrew's church, Green- stead, with its walls of solid oak, continues an almost unique example of its kind. Of the four round churches in England one is in Essex at Little Maplestead; it is both the smallest and the latest. The churches of

South Weald, Hadleigh, Blackmore, Heybridge and Hadstock may be mentioned as containing Norman work; with the church of Castle Hedingham for its fine Transitional work; Southchurch, Danbury andBoreham as being partly Early English; Ingatestone, Stebbing and Tilty for specimens of Decorated architecture; and Messing, Thaxted, Saffron Walden, and the church of St Peter ad Vincula at the small town of Coggeshall, near Colchester, as specimens of Per- pendicular. Stained glass windows have left their traces in several of the churches, the finest remains being those of Margaretting, which represent a tree of Jesse and the daisy or herb Margaret. Paintings have evidently been largely used for internal decora- tion: a remarkable series, probably of the 12 th century, but much restored in the 14th, exists in the chancel of Copford church; and in the church at Ingatestone there was discovered in 1868 an almost unique fresco representation of the seven deadly sins. The oldest brasses preserved in the county are those of Sir William Fitz-Ralph at Pebmarsh, about 1323; Richard of Beltown, at Corringham, 1340; Sir John Gifford, at Bowers

Gifford, 1348; Ralph de Kneyton, at Aveley, 1370; Robert de Swynbourne, at Little Horkesley, 1391; and Sir Ingelram de Bruyn, at South Ockendon, 1400. The brass of Thomas Heron, aged 14, at Little Ilford, though dating only from 1517, is of interest as a picture of a schoolboy of the period. Ancient wooden effigies are preserved at Danbury, Little Leighs and Little Horkesley.

Essex was rich in monastic foundations, though the greater number have left but meagre ruins behind. The Benedictines had an abbey at Saffron Walden, nunneries at Barking and Wickes, and priories at Earl's or Monk's Colne and Castle Hedingham; the Augustinian canons had an abbey at Waltham (see Waltham Abbey; the portion remaining shows Norman work of the finest character), priories at Thoby, Blackmore, Bicknacre, Little Leighs, Little Dunmow and St Osyth (see Brightlingsea) ; there were Cistercian abbeys at Coggeshall, Stratford and Tilty; the Cluniac monks were settled at Prittie- well, the Premonstratensians at Beleigh Abbey, and the Knights Hospitallers at Little Maplestead. Barking Abbey is said to date its first origin from the 7th century; most of the others arose in the 12th and 13th centuries. Besides the keep at Colchester there is a fine Norman castle at Castle Hedingham, and. two dilapidated round towers still stand at Hadleigh near Southend. Ongar, the house of the

de Lacys, and Pleshey, the seat of the earls of Essex, have left only mounds. Havering-atte-Bower, the palace that was occupied by many queens, is replaced by a modern house; Wickham, the mansion of the bishops of London, no longer stands. New Hall, which was successively occupied by Henry VIII. , Elizabeth, the earl of Essex, George Villiers, duke of Buckingham, and Cromwell, is now a nunnery of the order of the Holy Sepulchre. Audley End, the mansion of Lord Braybrooke, is a noble example of the domestic architecture of the Jacobean period; Layer Marney is an interesting proof of the Italian influences that were at work in the time of Wolsey. Horeham Hall was built by Sir John Cutt in the reign of Henry VII., and Gosfield Hall is of about the same date.

See Norden, Speculi Britanniae Pars: an Hist, and Geogr. Descrip. of the County of Essex (1594) (edited for the Camden Society by Sir Henry Ellis, 1840, from the original MS. in the Marquis of Salisbury's library at Hatfield); Nicholas Tindal, Hist, of Essex (1720); N. Salmon, The Hist, and Antiq. of Essex (London, 1740) — based on the collections of James Strangman of Hadleigh (v. Trans, of Essex Arch. ' Soc. vol. ii.) ; P. Morant, Hist, and Antiq. of the County of Essex (London, 1768) ; P. Muilman, New and Complete Hist, of Essex from a late Survey, by a Gentleman (Chelmsford, 6 vols., 1 770-1 772, London, 1779); Elizabeth Ogbourne, Hist, of Essex (London, part i., 1 8 14); Excursions through Essex, illustrated with one hundred en- gravings (2 vols., London, 1818); T. Wright, Hist, and Topography of Essex (1831); W. Berry, Pedigrees of Families in Essex (1841); A. Suckling, Memorials of the Antiquities, &c, of the County of Essex (London, 1845); W. Andrews (ed.), Bygone Essex (London, 1892); J. T. Page (ed.), Essex in the Days of Old (London, 1898); Victoria County History, Essex; Transactions of the Essex Arch. Soc. from 1858. An account of various MS. collections connected with the county is given by H. W. Kine; in vol. ii. of the Transactions (1863).

ESSEX, KINGDOM OF, one of the kingdoms into which Anglo-Saxon Britain was divided, properly the land of the East Saxons. Of its origin and early history we have no record except the bare statement of Bede that its settlers were of the Old Saxon race. In connexion with this it is interesting to notice that the East Saxon dynasty claimed descent from Seaxneat, not Woden. The form Seaxneat is identical with Saxnot, one of three gods mentioned in a short continental document probably of Old Saxon origin. Bede does not mention this kingdom in his narra- tive until 604, the year of the consecration of Mellitus to the see of London. The boundaries of Essex were in later times the rivers Stour and Thames, but the

original limits of the kingdom are quite uncertain ; towards the west it probably included most if not the whole of Hertfordshire, and in the 7th century the whole of Middlesex. In 604 we find Essex in close dependence upon Kent, being ruled by Saberht, sister's son of ˆEthelberht, under whom the East Saxons received Christianity. The three sons of Saberht, however, expelled Mellitus from his see, and even after their death in battle against the West Saxons, Eadbald of Kent was unable to restore him. In the year 653 we find North-

umbrian influence paramount in Essex, for King Sigeberht at the instance of Oswio became a Christian and received Cedd, the brother of St Chad, in his kingdom as bishop, Tilbury and Ythanceastere (on the Blackwater) being the chief scenes of his work. Swithhelm, the successor of Sigeberht, was on terms of friendship with the East Anglian royal house, King ˆEthelwald being his sponsor at his baptism by Cedd. It was probably about this time that Erconwald, afterwards bishop of London, founded the monastery of Barking. Swithhelm's successors Sigehere and Sebbe were dependent on Wulfhere, the powerful king of Mercia, who on the apostasy of Sigehere sent Bishop Jaruman to restore the faith. There are grounds for believing that an East Saxon conquest of Kent took place in this reign. A forged grant of Ceadwalla speaks of the fall of Kent before Sigehere as a well-known event; and in a Kentish charter dated 676 a king of Kent called Swebhard grants land with the consent of his father King Sebbe. In 692 or 694 Sebbe abdicated and received the monastic vows from Waldhere, the successor of Erconwald at London. His sons Sigeheard and Swefred suc- ceeded him as kings of Essex, Sigehere being apparently dead. As the laws of Ine of Wessex speak of Erconwald as " my bishop," it is possible that the influence of Wessex for a short time prevailed in Essex; but a subsequent charter of Swefred is approved by Coenred of Mercia, and Off a, the son of Sigehere, accompanied the same king to Rome in 709. From this time onwards the history of Essex is almost a blank. In 743 or 745 /Ethelbald of Mercia is found granting privileges at the port of London, and perhaps the western portion of the kingdom had already been annexed, for henceforward London is frequently the meeting-place of the Mercian council. The violent death of Selred, king of Essex, is mentioned in the Saxon Chronicle under the year 746; but we have no more information of historical importance until the defeat of the Mercian king Beornwulf in 825, when Essex, together with Kent, Sussex and Surrey, passed into the hands of Ecgbert, king of Wessex. After 825 we hear of no more kings of Essex, but occasionally of earls. About the year 870 Essex passed into the hands of the Danes and was left to them by the treaty between Alfred

and Guthrum. It was reconquered by Edward the Elder. The 'earldom in the 10th century apparently included several other counties, and its most famous holder was the ealdorman Brihtnoth, who fell at the battle of Maldon in 991.

The following is a list of kings of Essex of whom there is record: Saberht (d. c. 617); three sons of Saberht, including probably Saweard and 'Seaxred; Sigeberht (Parvus); Sigeberht II.; Swuhhelm (d. c. 664) ; Sigehere (reigned perhaps 664-689); Sebbe, son of Seaxred (664-694); Sigeheard (reigning in 693- 694); Swefred (reigning in 693-694 and in 704); the two last being sons of Sebbe; Swebriht (d. 738); Selred (d. 746); Swithred, grandson of Sigeheard (succ. 746); Sigeric,- son of Selered (abd. 798); Sigered, son of Sigeric (reigning in 823).

See Bede, Hist. Eccl., edited by C. Plummer (Oxford, 1896), ii. 3, 5; Saxon Chronicle (Earle and Plummer, Oxford, 1899), s.a. 823, 894, 904, 913, 921, 994; William of Malmesbury, Gesta Regum, Rolls Series (ed. Stubbs, 1887-1889); Simeon of Durham, s.a. 746 (ed. T. Arnold, 1882) and appendix, s.a. 738; Florence of Worcester (ed. B. Thorpe, London, 1848-1849); H. Sweet, Oldest English Texts, p. 179 (London, 1885). (F. G. M. B.)

ESSLINGEN, a town of Germany, in the kingdom of Wurttem- berg, in a fertile district on the Neckar, 9 m. S.E. from Stuttgart, on the railway to Ulm. Pop. (1905) 29,750. It is surrounded by medieval walls with towers and bastions, and has thirteen suburbs, one lying on an island in the river. On a commanding height above the town lies the old citadel. The inner town has an old (1430) and a new Rathaus, the latter, formerly a palace, an exceedingly handsome edifice. The church of Our Lady (Frauenkirche) is a fine Gothic building of the 15th century, and has a beautifully sculptured doorway and a lattice spire 240 ft. high. The church of St Dionysius dated from the 13th century, and possesses a fine screen and a ciborium of i486, Esslingen possesses several schools, a theatre and a richly endowed hospital, while its municipal archives contain much valuable literature bearing especially on the period of the Reformation. The town

has railway, machine and electrical works; cloth, gloves and buttons are also manufactured here, and there are spinning-mills. There is a

large lithographic establishment, and a consider- able trade is done in wine and fruit, the wines of Esslingen being very famous.

Esslingen, which dates from the 8th century, became a town in 886. It was soon a place of importance; it became a free imperial city in 1209 and was surrounded with walls by order of the emperor Frederick II. Its liberty was frequently threatened by the rulers of Wurttemberg, but it did not become part of that country until 1802.

See K. H. S. Pfaff, Geschichte der Reichsstadt Esslingen (Esslingen, 1852) ; and Strohmfeld, Esslingen in Wort und Bild (Esslingen, 1902).

ESTABLISHMENT (0. Fr. establissement, Fr. Uablissement, late Norm. Fr. establishement, from O. Fr. establir, Fr. etablir, Lat. stabilire, to make stable), generally the act of establishing or fact of being established, and so by transference a thing established. Thus we may speak of the establishment (i.e. setting up) of a business, the "long establishment " of a business, and of the manager of " the establishment." In a special sense the word is applied, with something of all the three above- mentioned connotations, to certain religious bodies in their relation to the state. It is with this latter that the present article is concerned.

Perhaps the best definition which can be given, and which will cover all cases, is that establishment implies the existence of some definite and distinctive relation between the state and a religious society (or conceivably more than one) other than that which is shared in by other societies of the same general char- acter. Of course, a certain relationship must needs exist between the state and every society, religious or secular, by virtue of the sovereignty of the state over each and all of its members. Every society must possess certain principles or perform certain acts, and the state may make the profession of such principles unlawful, or impose a penalty upon the performance of such acts; and, moreover, every society is liable before thedaw as to the fulfilment of its obligations towards its members and the due administration of its property should it possess any. With all this establishment has nothing to do. It is not concerned with what pertains to the religious society qua society, or with what is common to all religious societies, but with what is exceptional. It denotes any special connexion with the state, or privileges and responsi- bilities before the law, possessed by one religious society to the exclusion of others; in a word, establishment is of the nature of a monopoly. But it does not imply merely privilege. The state and the Church have mutual obligations towards

one another: each is, to some extent, tied by the existence of this relationship, and each accepts the limitations for the sake of the advantages which accrue to itself. The state does so in view of what it believes to be the good of all its members; for " the true end for which religion is established is not to provide for the true faith, but for civil utility" (Warburton), even if the latter be held to be implied in the former. On the other hand, the Church accepts these relations for the facilities which they involve, i.e. for its own benefit. It will be seen that this definition excludes, and rightly, many current presuppositions. Establishment affirms the fact, but does not determine the precise nature, of the connexion between the state and the religious society. It does not tell us, for example, when or how it began, whether it is the result of an unconscious growth (as with the Gallican Church previous to the French Revolution), or of a determinate legislative act (as with the same Church re-established by the Concordat of 1801). It does not tell us whether an endowment of the religious society by the state is included; what particular privileges are enjoyed by the religious society; and what limitations are placed upon the free exercise of its life. These things can only be ascertained by actual inquiry; for the conditions are precisely similar in no two cases.

To proceed to details. At the present day there is no estab- lished religion in the United States, the German empire as a whole, Holland, Belgium, France and Austria-Hungary (saving,

indeed, " the rights of the sovereign arising from ecclesiastical dignity" 1); whereas there are religious establishments in Russia, Greece, Sweden, Norway, Denmark, Prussia, 2 Spain, Portugal and even in Italy, as well as in England and Scotland. These, however, differ greatly amongst themselves. In Russia the " Orthodox Catholic Eastern " is the state religion. The emperor is, by the fundamental laws of the empire, "the sovereign defender and protector of the dogmas of the dominant faith, who maintains orthodoxy and holy discipline within the Church," although, of course, he cannot modify either its dogmas or its outward order. Further, " the autocratic (i.e. imperial) power acts in the ecclesiastical administration by means of the Most Holy Ruling Synod, created by it "; and all the officers of the Church are appointed by it. The enactments of the Synod do not become law till they have received the emperor's sanction, and are then published, not in its name but in his; and a large part of the revenues of the Church is derived from state subsidies. In Greece " the dominant religion ("H bvinpaTovaa dfyqo-Kua.) is that of the Eastern Orthodox Church of Christ "; and although toleration is otherwise complete, no proselytism from the Church of Greece is

allowed. The king swears to protect it, but no powers pertain to him with regard to it such as those which the tsar enjoys; the present king is not a member of it, but his successors must be. In Sweden, Lutheranism was adopted as the state religion by the synod of Upsala (Upsala mote) in 1593, and the king must profess it. The " Lutheran Protestant Church " retains an episcopal order, and is supported out of its own revenues. Archbishops and bishops are chosen by the king out of those names submitted to him, and he also nominates to royal peculiars. The ecclesiastical law (Kyrkolag), first constituted in 1686, is part of the law of the state, but may not be modified or abrogated without consent of a General Synod; and although ad interim interpretations of that law may be given by the king on the advice of the Supreme Court, since 1866 these have been subject to review and rejection by the next General Synod. In Norway the " Evangelical- Lutheran" is the " official religion," but the Church is supported by the state, its property having been secularized. It is also more subject to the king, who by the constitution is to " regulate all that concerns divine service and the clergy," and to see that the prescribed order is carried out. It is much the same in Denmark, where, however, the " Evangelical-Lutheran Church " has since the fundamental constitutional law of the 5th of June 1 849 been officially described as the National Church (Folkekirche) instead of the State Church (Statskirche) as formerly, • and the constitution provides for its regulation by further legislation, which has not yet been passed. For Prussia, see under that heading; it need only be added that self-government still tends to increase, but that the emperor William II. has exercised his office as summus episcopus more freely than most of his predecessors. In Spain the " Catholic, Apostolic and Roman " religion is that of the state, "the nation binds itself to maintain its worship and its ministers," and the rites of any other religion are only permitted in private. The patriarch of the Indies and the "rchbishops are senators by right, and the king may nominate others from amongst the bishops; only laymen may sit in the chamber of deputies. Convents were suppressed, and their property confiscated, in 1835 and 1836; in 1859 the remaining ecclesiastical property was exchanged for untransferable government securities and the support of the clergy of the State Church is assured by an unrepealed law previous to the present constitu- tion. In Portugal it is much the same, but all the home bishops

1 In effect this involves the establishment of all religious denominations, for none can exist without the express authorization of the state, and all are subject to more or less interference on its part. Thus the emperor-king is, in his capacity of head of the state,

technically " bishop " of the Evangelical Church, the constitution of which was fixed by an imperial patent in 1866 and modified by., another in 1891 (see Herzog-Hauck, Realencykl. ed. 1904, s. " Osterreich "). — [Ed.]

2 Also in the other German Protestant states. The relations of the Roman Catholic Church with the various governments are settled by separate concordats with the papacy (see Concordat).

sit in the upper chamber as peers (Pares do Reino) by right, and there is no restriction on membership of the chamber of deputies. A more important point is that the king confers all ecclesiastical benefices and nominates the bishops, instead of their being chosen, as in Spain, by agreement between the civil power and the papacy. In Italy, in spite of the feud between the papacy and the civil power, the fact remains that, by the Statuto fondamentale, " the Catholic, Apostolic and Roman religion is the sole religion of the state," and the king may nominate " archbishops and bishops of the state " to be senators. The Legge sulle prerogative del Summo Pontifice, &c, or " Law of Guarantees," by which the papal prerogatives are secured, has been declared by the Council of State to be a fundamental law; and while many civil restrictions upon the activities of the Church are removed by it, outside Rome and the suburbicarian dioceses the royal exequatur is still required before a bishop is installed. Moreover, the bulk of Church property having been secularized, the Italian clergy receive a stipend from the state.

Establishment is, of course, a distinctively English term, but it implies precisely the same thing as " Staatsreligion " or " eglise dominante " does elsewhere, neither more nor less. It denotes the existence of a special relationship be-

la Britain, tween Church and state without defining its precise nature. The statement that the Church of England or the Scottish Kirk is " established by law " denotes that it has a peculiar status before the law; but that is all. (a) There is no basis whatever for the once popular assumption that the word " established " as applied to the Church means " created," or the like; on the contrary, the modern use of the word in this sense is a misleading perversion. To

establish is to make firm or stable; and a thing cannot be established unless it is already in existence. A few examples will make it clear that this is the true sense of the word, and that in which it is used here. " Stablish the thing, O God, that thou hast wrought in us " (Ps. lxviii. 28, P.B.; A.V. and R.V. "strengthen") implies that the thing is already wrought; it could not be " stablished " else. " Stablish your hearts " (Jas v. 8) implies that the hearts are already in existence. " Until he had her settled in her raine With safe assuraunce and establishment " {Faerie Queene, v. xi. 35) would have been impossible unless the reign had already begun. This is the meaning of the words in many Tudor acts of parliament, " be it enacted, ordained and established," or the like (21 Hen. VIII. c. 1; 27 Hen. VIII. c. 28, s. 9; 28 Hen. VIII. c. 13 [Ireland]; 28 Hen. VIII. c. 18 [Ireland]; 33 Hen. VIII. c. 27; 1 Eliz. c. 1, ss. 15, 17; 1 Eliz. c. 4, s. 4); that which is then and there enacted is to be valid for the future. (b) Nor is it necessarily implied that establishment is a process completed once for all. Every law touching the Church slightly alters its conditions; everything that affects the relations of Church and state may be regarded as a measure of establishment or the reverse. When the two Houses of Parliament, in an address to William III. after his coronation, spoke of their pro- posed measures of toleration, the king said in his reply, " I do hope that the ease which you design to Dissenters will contribute very much to the establishment of the Church " (Cobbett, Pari. Hist. v. 218). And Defoe (in 1702) published an ironical tract with the title, The Shortest Way with the Dissenters, or Proposals for the Establishment of the Church, (c) Nor is it necessarily implied that there was any specific time at which establishment took place. Such may indeed be the case, as with the Kirk in Scotland; but it certainly cannot be said that the English Church was established at any particular time, or by any particular legislative act. There were, no doubt, periods when the existing relations between Church and state were modified or re-defined, notably in the 16th and 17th centuries; but the relations themselves are far older. In fact, they existed from the very first: the English Church and state grew up side by side, and from the beginning they were in close relations with one another. But although the state of things which it represented was there. from the first, the term " established " or " established by law " only came into use at a later date. Until there was some other religious

society to be compared with it such a distinctive epithet would have had no point. As, however, there arose religious societies which had no status before the law, it became more natural; and yet more so when the formularies of the Church came to be " established " by

civil sanctions (the Books of Common Prayer by 5 and 6 Edw. VI. c. 1, s. 4, &c; the Articles by 13 Eliz. c. 12; the new Ordinal by 13 and 14 Car. II. c. 4, title). Accordingly the Church itself came to be spoken of as established by law; first, it would seem, in the Canons of 1604, and subsequently in many statutes (Act of Settlement, 6 Anne, c. 8 and c. n, &c). In all such cases the Church is described as already established, not as being established by the particular canon or statute. In other words, the constitutional status of the Church is affirmed, but nothing is said as to how it arose.

The legislative changes of the 16th and 17th centuries brought " establishment " into greater prominence and greatly modified its conditions, but a moment's thought will show that it did not begin then. If, e.g., all post-Reformation ecclesiastical statutes were non-existent, the relations between Church and state would be very different, but there would still be an " establishment." The bishops would sit in the House of Lords, the clergy would tax themselves in convocation, the Church courts would possess coercive jurisdiction, and so on. The present relations of Church and state in England may be briefly summed up as follows: —

(1) The personal relation of the crown to the Church, including (a) restraints upon the action of convocation (formulated by 25 Hen. VIII. c. 19); (b) nomination of bishops, &c. (25 Hen. VIII. c. 20); (c) power of supervision as visitor, long disused (26 Hen. VIII. c. 1; 1 Eliz. c. 1, s. 17); (d) power of receiving appeals as the fount of civil justice (25 Hen. VIII. c. 19, &c). In connexion with these, it must be borne in mind that (a) the holder of the crown receives coronation from the church and takes an oath having reference to it (1 Will. III. c. 6), and (b) the crown is held on the condition of communion with the Church of England (Act of Settlement; the conditions of communion are laid down in the Prayer Book, which itself is sanctioned by law).

(2) The relation of the Church to the crownin parliament. Nochange has been permitted in its doctrine or formularies without the sanction of an act of parliament. (3) Privileges of the Church and clergy. Of these may be mentioned (a) the coercive jurisdiction of the Church courts; (b) the right of bishops to sit in the House of Lords. It need hardly be said that establishment in England does not include an endowment of the Church by the state. Nothing of the kind ever took place on any large scale, and the grants for Church purposes in the 18th century are comparable with the regium donum to Nonconformists.

The position of the Church of Ireland until its disestablishment (see below) was not dissimilar. With Scotland the case is different. The establishment of the Kirk was an entirely new process, carried out by a more or less definite series of legislative and ad- ministrative acts. The Convention of Estates which met at Edinburgh in 1560 ordered the drawing up of a new Confession of Faith, which was done in four days by a committee of preachers, and on the 24th of August it passed three acts, one abolishing the pope's authority and all jurisdiction of Catholic prelates, another repealing the old statutes in favour of the Old Church, the third forbidding the celebrating and hearing of mass under penalty of imprisonment, exile and death. The intention was to make a clean sweep of the Old Church, which was denounced as "the Kirk Malignant." 1 The new model thus set up was confirmed by the Scottish act of 1567, c. 6, which declared it to be " the onely true and halie kirk of Jesus Christ within this realme." Again, after the revolution of 1688 had put an end to the attempts of the Stuart kings to impose the episcopal model on Scotland, by the act of 1690, c. 5, the crown and estates " ratifie and establish the Confession of Faith, ... as also they do es- tablish, ratifie and confirm the Presbyterian government and

1 Andrew Lang, Hist, of Scotland, ii. p. 75 ff. Compare with this the position of the reformers generally in England, where even so stout a Puritan as William Harrison (Description of England, 1570; does not dream of separating the organic life of the Church of Eng- land from that of the pre-Reformation Church. (Ed.).

discipline." The " Act of Security " of 1705, as incorporated in the Act of Union 1706, speaking of it " as now by law estab- lished," says that "Her Majesty . . . doth hereby establish and confirm " it, and finally declares this act, " with the Establishment therein contained," to be " a fundamental and essential condition of the Union." Nevertheless, the conditions of establishment in the Scottish Kirk are much easier than those of the Church of England. It is bound by the statutes sanctioning its doctrine and order, but within these limits its legislative and judicial free- dom is unimpaired. A royal commissioner is present at the meetings of the general assembly, but he need not be a member of the Kirk; and there is no constitutional tie between the crown and the Kirk such as there is in

England. There is what may accurately be described as a state endowment, the bulk of the property of the Old Church having been conferred upon the Scottish Kirk.

Not unnaturally the organization of Anglican Churches in the colonies was followed in some cases by their establishment, which included endowment. It was so, for example, in the East and West Indies; and the disestablishment of the West Indian Church in 1868 was followed, in 1 873, by a re-establishment of the Church in Barbados by the colonial legislature. India is the only other part of the empire (outside Great Britain) in which there is to-day a religious establishment.

*Disestablishment is in theory the annulling of establishment; but since an established Church is usually rich, disestablishment generally includes disendowment, even where there 1; !'**_,»" is no state endowment of religion. It is, in short, the abrogation of establishment, coupled with such a confiscation of Church property as the state thinks good in the interests of the community. The disestablishment of the West Indian Church in 1868 has already been referred to; in 1869 the Irish Church Disestablishment Bill was passed. Private bills relating to Scotland have more than once been brought forward. In 1805 the Liberal government introduced a suspensory bill, intended as the preliminary step towards disestablishing and disendowing the Church in Wales; it was withdrawn, however, in the same session, and the question of Welsh disestablishment slumbered until in 1906 a royal commission was appointed by the Liberal government to inquire into the subject, and in 1909 a bill was introduced on much the same lines as in 1895.*

The case of the Irish Church will illustrate the process of dis-establishment, although, of course, the precise details would vary in other cases. The Irish Church Act was passed in 1869 by Gladstone's first government, after considerable opposition, and provided that from January 1, 1871, the union created by statute between the Churches of England and Ireland should be dissolved, and the Church of Ireland should " cease to be estab- lished by law." Existing ecclesiastical corporations were dis- solved, and their rights ceased, compensation being given to all individuals and their personal precedence being secured for life. All rights of patronage, including those of the crown, were abolished, with compensation in the case of private patrons; and the archbishops and bishops ceased to have the right of summons to the House of Lords. All laws restraining the freedom of action of the Church were repealed; the ecclesiastical law, however, to subsist by way of contract amongst the members of

the Church (until altered by a representative body) . Provision was made for the incorporation by charter of the representative body of the Church, should such a body be found, with power to hold landed property. All existing ecclesiastical property was vested in a commission, which was to give compensation for life interests, to transfer to the new representative body the churches, glebe houses, and £500,000 in compensation for endowments by private persons since 1660, and to hold the rest for such purposes as parliament might thereafter determine.

Authorities. — F. R. Dareste, Les Constitutions modernes (Paris, 1891); H. GefTcken, Church and State, trans, by E. F. Taylor (London, 1877) ; P. Schaff, Church and State in the United States (Papers of the American Hist. Association, vol. ii. No. 4), (New York, 1888) ; L. Minghetti, Stato e Chiesa (Milan, 1878), French translation, with Introd. by E. de Laveleye (Paris, 1882); C. Cadorna, Religione,

diritto, liberld, (Milan, 1893); F. Nippold, Die Theorie der Trennung von Kirche und Staat (Bern, 1881); W. Warburton, Alliance between Church and State (London, 1741) {Works, vol. iv., ed. Hurd, London, 1788); Church Problems (ed. by H. H. Henson) (London, 1900); Essays on " Establishment " and " Disendowment "; W. R. Anson, Law and Custom of the Constitution, vol. ii. chap. ix. (Oxford, 1892); Phillimore, Ecclesiastical Law (London, 1 895); J. S. Brewer, En- dowments and Establishment of the Church of England (ed. by L. T. Dibdin, London, 1885); A. T. Innes, Law of Creeds in Scotland (Edinburgh, 1867); E. A. Freeman, Disestablishment and Dis- endowment (London, 1883) ; G. Harwood, Disestablishment (London, 1876); Annates de I'ecole libre des_Sciences politiques, torn. i. (Paris, 1885), art. " La Separation de l'Eglise et de l'Etat en Angleterre," by L. Ayral. (W. E. Co.)

ESTABLISHMENT OF A PORT, the technical expression for the time that elapses between the moon's transit across the meridian at new or full moon at a given place and the time of high water at that place. The interval (constant at any one place) may vary from 6 mins. (Harwich) to 11 hrs. 45 mins. (North Foreland) . At London Bridge it is 1 hr. 58 mins. (See also Tide.)

ESTAING, CHARLES HECTOR, Comte d' (1 729-1 794), French admiral, was born at the chateau of Ruvel, Auvergne, in 1729. He entered the army as a colonel of infantry, and in 1757 he accompanied count de Lally to the East Indies, with the rank of brigadier-general. In 1759 he was made prisoner at the siege of

Madras, but was released on parole. Before the ratifica- tion of his exchange he obtained command of some vessels, and conducted various naval attacks against the English; and having, on his return to France in 1760, fallen accidentally into their hands, he was, on the ground of having broken his parole, thrown into prison at Portsmouth, but as the charge could not be properly substantiated he was soon afterwards released. In 1 763 he was named lieutenant-general in the navy, and in 1777 vice- admiral; and in 1778 he obtained the command of a fleet intended to assist the United States against Great Britain. He sailed on the 13th of April, and between the nth and the 22nd of July, blockaded Howe at Sandy Hook, but did not venture to attack him, though greatly superior in force. In concert with the American generals, he planned an attack on Newport, preparatory to which he compelled the British to destroy some war vessels that were in the harbour; but before the concerted attack could take place, he put to sea against the English fleet, under Lord Howe, when owing to a violent storm, which arose suddenly and compelled the two fleets to separate before engaging in battle, many of his vessels were so shattered that he found it necessary to put into Boston for repairs. He then sailed for the West Indies on the 4th of November. After a feeble attempt to retake Santa Lucia from Admiral Barrington, he captured St Vincent and Grenada. On the 6th of July 1779 he fought a drawn battle with Admiral John Byron, who retired to St Christopher. Though superior in force, D'Estaing would not attack the English in the roadstead, but set sail to attack Savannah. All his attempts, as well as those of the Americans, against the town were repulsed with heavy loss, and he was finally compelled to retire. He returned to France in 1780. He was in command of the com- bined fleet before Cadiz when the peace was signed in 1783; but from that time his chief attention was devoted to politics. In 1787 he was elected to the assembly of the notables; in 1789 he was appointed commandant of the national guard; and in 1792 he was chosen admiral by the National Assembly. Though in favour of national reform he continued to cherish a strong feeling of loyalty to the royal family, and on the trial of Marie Antoinette in 1793 bore testimony in her favour. On this account, and because of certain friendly letters which had passed between him and the queen, he was himself brought to trial, and was executed on the 28th of April 1794.

See Marins et soldats francais en Amerique, by the Viscomte de Noailles (1903); Beatson, Naval and Military Memoirs of Great Britain, vol. v.

ESTATE (through O. Fr. estal, mod. etal, from Lat. status, state,

condition, position, stare, to stand) , the state or condition in which a man lives, now chiefly used poetically and in such phrases as " man's estate," or " of high estate "; " state " has superseded most of the uses of the word except (1) in property and (2) in constitutional law.

79°

ESTATE

i. In the law of property the word is employed in several senses. In the widest sense a man's estate comprises his entire belongings; so much of it as consists of land and certain other interests associated therewith is his "real estate"; the rest is his " personal estate." The word is more particularly applied to interests in land, and in popular and general use " an estate " means the land itself. The strict technical meaning of " an estate " is an interest in lands, and this conception lies at the root of the English theory of property in land. " The first thing that the student has to do," says Joshua Williams {Law of Real Property), " is to get rid of the idea of absolute ownership. Such an idea is quite unknown to the English law. No man is in law the absolute owner of lands. He can only hold an estate in them." That is, the notion of tenure, of holding by a tenant from a lord, prevails. The last lord of all from whom all land was ultimately held was the king. Persons holding directly from the king and granting to others were the king's tenants in capite, and were the mesne lords of their tenants.

Estates in land may be classified according to (i) the quantity of their interest or duration, (2) the time of enjoyment, and (3) the number and connexion of the tenants. According to (1), an estate may be either a freehold of inheritance or a freehold not of inheritance. A freehold of inheritance may be (a) an estate in fee simple, which is the largest estate a man can hold in English law, and comes close to the idea of absolute ownership, repudiated by Williams; an estate in fee simple is inheritable by a man's heirs generally, he has full powers of disposition over it, and may alienate the whole or part. (6) It may also be in limited fees, which are again subdivided into (i.) qualified or base fee, (ii.) fee conditional, so called at the common law, afterwards, on the passing of the statute De Donis Conditionalibus, fee tail, which may be general as to the heirs of a man's body, or special, as to the heirs male (or female) of his body. A freehold not of inheritance may be either (1) conventional, as an estate for life, which may be either an estate for one's own life or for the life of another {pur autre vie) ; (2) legal, or

created by operation of law, as tenancy in tail after possibility of issue extinct {i.e. where an estate is given to a man and the heirs of his body by his present wife, and the wife dies without issue, the husband becomes tenant in tail after possibility of issue extinct); tenancy by curtesy 'see Curtesy); tenancy in dower (see Dower).

Estates not of freehold or less than freehold are subdivided into (i.) estates for years (often called estates for a term of years, the instrument creating it being termed a lease or demise, and the estate itself a leasehold interest); (ii.) estates at will, that is, where lands or tenements are let by one man to another to have and to hold at the will of the lessor; (iii.) estates at sufferance, where one comes into possession of land under a lawful title, and continues in possession after his title has determined.

According to (2), estates are either in possession or in expect- ancy. Estates in expectancy are either (a) in remainder, which may be vested or contingent, or (ft) in reversion (see Remainder, Reversion).

According to (3), estates may be either (i.) in severalty, that is, the holding of an estate by a person in his own right only, without any other person being joined or connected with him in point of interest therein; (ii.) estates in joint tenancy (see Joint); (iii.) coparcenary {q.v.); and (iv.) tenancy in common, where two or more hold the same land, by several and distinct titles, but with unity of possession. (See also Real Property.)

2. In constitutional law an estate is an order or class having a definite share as such in the body politic, and participating either directly or by its representatives in the government. The system of representation by estates took its rise in western Europe during the 13th century, at a time when the feudal system was being broken up through various causes, notably the growing wealth and power of the towns. In the feudal council the clergy and the territorial nobles had alone had a voice; but the 13th century, to quote Stubbs {Const. Hist. ii.

168, ed. 1875), " turns the feudal council into an assembly of estates, and draws the constitution of the third estate from the ancient local machinery which it concentrates." This is, allowing for differences of detail, true of other countries as well as England. To the two estates already existing, clergy and nobles, is added a third, that of the commons (burgesses and knights of the shire) in England, that of the roturiers in France (known as the tiers etat). This division into three estates became the norm, but it was not universal, nor

inevitable. 1 Even in England there was a tendency to create other estates, the king for instance treating with the merchants separately for grants of money to be raised by taxing the general body of merchants in the country; and there was a similar tendency on the part of the lawyers. But for the accident of their sitting and voting together, the burgesses and knights of the shire would also have formed separate estates. In Aragon the cortes contained four estates {brazos or arms), the clergy, the great barons {ricos hombres), the minor barons (knights or infanzones), and the towns. The Swedish diet had also four — clergy, barons, burghers and peasants.

The system of estates, based on the medieval conception of society as divided into definite orders, formed the basis of whatever constitutional forms survived in Europe till the French Revolution. In England, of course, it had early become ob- scured, the House of Commons representing the whole nation outside the narrow order of the peers. The creation of an estate of lesser nobles or landowners had been prevented by the fusion of the knights of the shire with the burgesses ; the spiritual estate was ruled out by the determination of the clergy to deliberate and tax themselves in their own convocation, leaving the bishops, as spiritual peers, to represent their interests in parliament.

The phrase " the three estates of the realm " still survives, but to most men it conveys no clear meaning. The erroneous conception early arose — Hallam says it was current among the popular lawyers of the 17th century — that the " three estates " were king, lords and commons, as representing the three great divisions of legislative authority. Such a conception might be possible in Hungary, where the crown of St Stephen symbolizes not so much the royal power as the co-ordination of the powers of all the organs of the state, including the king; but in England the king represents the whole nation and in no sense a separate interest within it, which is the essence of an estate. The phrase " three estates " as applied to the English constitution at present is, in fact, misleading. It is now usually understood of the lords spiritual, the lords temporal, and the commons.

The conception of the " three estates of the realm " as the great divisions of legislative authority led in England to the coining of the phrase " fourth estate," to indicate some power of corresponding magnitude in the state distinct from them. Fielding thus spoke of "the mob," and Hazlitt of Cobbett; but the phrase is now usually applied to the press, a usage originating in a speech by Burke (Carlyle, Hero-worship, Lect. v.).

In the constitutional struggles of the European continent, from the Revolution onward, the rival theories of representation by estates and of popular representation have played a great part. The crucial moment of the French Revolution was when the vote according to " order " was rejected and the estates of the clergy and nobles were merged with the tiers etat, the states-general thus becoming the National Assembly. This was the precedent followed, generally speaking, during the 19th century in the other countries in which constitutional govern-

1 In Scotland the three estates were the prelates, the tenants-in- chief and the burgesses, the third estate joining the others for the first time about the beginning of the 14th century. In 1428 com- missioners of shires, men elected by the minor tenants-in-chief, were ordered to appear in parliament; the greater tenants-in-chief then coalesced with the prelates and the three estates were the lords, clerical and lay, the commissioners of shires and the burgesses From 1640 to 1660 parliament was reorganized, the prelates being excluded, but at the Restoration the old order was re-established. The Scottish parliament was accustomed to depute much of its work to a committee, composed of members from each of the three orders, and the committee of the estates was very prominent during the struggle between Charles I . and his people,

ment was established. In most of them the medieval estates lingered on in provincial diets (Landtage) , L and the famous Article XIII. of the Federal Act (Bundesakte) of Vienna decreed that " assemblies of estates " should be set up, wherever not already existing, in the German states. The efforts of Metternich and the statesmen of his school were directed, not so much to abolishing the constitutional model, as to establishing it, if need were, on traditional and conservative lines. This is what was meant by the famous reply of the emperor Francis I. to the Magyar deputation: " All the world is playing the fool and demanding fanciful constitutions." When the need for making constitutional concessions became urgent, the attempt was accordingly made to base them on the system of estates. But the central diet convoked in 1847 by Frederick William IV. to Berlin, technically a concentration of provincial estates, quickly converted itself as Metternich had prophesied — into a national assembly; and precisely the same thing happened in the case of the first Austrian parliament in 1848. In Hungary the revolution was in

some respects more conservative in character. The March Laws of 1848 preserved the general character of the House of Magnates, comparable to the British House of Lords, but converted the Lower House from what was practically repre- sentative of the estate of the lesser nobles into a national repre- sentative assembly. Of all the sovereign states of Europe only the grand-duchies of Mecklenburg still (1009) retain the ancient system of estates untouched. The diet, which is common to the two duchies, consists of the Ritterschaft, in which all tenants in chivalry (Rittergutsbesitzer), whether noble or non- noble, have a voice, and the Landschajt, which consists of the chief magistrates of the towns. The former is taken as represent- ative of the peasant proprietors and copy-holders (Hintersassen), the latter of the burghers.

The plural form Estates or States (Fr. Hats, Ger. Stande) is the name commonly given to an assembly of estates (assemblee des etats, Standeversammlung) . When such an assembly is not merely local or provincial it is called the estates-general or states-general (Stats gfneraux), e.g. in France the assembly of the deputies of the three estates of the realm as distinct from the provincial estates which met periodically in the so-called pays d'eiats.

For further details about the estates in England and elsewhere see W. Stubbs, Constitutional History, vol. ii. (1896); H. Hallam, The Middle Ages (1855); F. W. Maitland, Constitutional History of England (1908); A. Luchaire, Histoire des institutions monarchiques de la France (1883-1885); G. Waitz, Deutsche Verfassungsgeschichte (Kiel, 1865-1878); and A. S. Rait, The Scottish Parliament (1901). See also Representation.

ESTATE AND HOUSE AGENTS. A person exercising the calling of a house agent in England is required, under a penalty of £20, to take out yearly a licence upon which £2 is charged as a duty of excise, unless he is licensed as an auctioneer or appraiser, or is an agent employed in the management of landed estates, or a solicitor or conveyancer who has taken out his annual certificate as such. In this connexion a person is deemed to be a house agent if he advertises for sale or for letting, or in any way negotiates for the selling or letting of any furnished house or part of any furnished house (any storey or flat rated and let as a separate tenement being for this purpose a house) ; subject, however, to the qualification that no one is to be deemed to be a house agent by reason of his letting, or offering to let, or in any way negotiating for the letting of, any house the annual rent or value of which does not exceed £25.

A house agent who is merely instructed to act in the usual way of his calling has no authority to bind his employer by a contract. His business is to endeavour to find a person willing to become a purchaser or tenant and then to communicate his offer to the owner. Unless express authority is given to the agent to sell or let, and for that purpose to enter into a binding contract, the principal reserves his right to accept or refuse the offer. As a rule, a house or estate agent has no authority to receive payment on behalf of the principal. Where he is em-

1 These diets are, wherever they still exist, survivals of the "parliaments " of separate territorial units.

ployed to procure a tenant, he must use reasonable diligence to ascertain that the person to whom the property is let through his agency is fit to be a tenant. He does not, however, in any way guarantee the payment of the rent. A house agent may not, for or in expectation of payment, prepare any deed relating to the sale or letting of real or personal estate. There is, however, no similar prohibition as to agreements not under seal, and it is a common practice for house agents to charge for the preparation of them.

House agents are usually remunerated by way of commission. The scale adopted by the Institute of Estate and House Agents embodies the rates usually charged. In the absence of 2xpress provision upon the subject between the principal and the agent, commission is payable only when the latter has found a purchaser or tenant. If, however, he had found a person willing to buy or take property upon the terms upon which the principal intimated to him his willingness to sell or let it, the principal will be liable to pay the amount of the commission, even though in fact he refuses or is unable to sell or let it. Where the agent can show that he has brought about a sale or tenancy he will be entitled to the commission notwithstanding the fact that another agent has been paid, or has recovered in an action, commission in respect of the same sale or tenancy. The agent's authority may be revoked at any time; but, where he has already performed the service tor which he was employed, the principal cannot defeat his right to be paid the amount of the commission by subsequently revoking his authority. If the agent is unsuccess- ful in finding a purchaser or tenant, as the case may be, he will not, as a rule, have any right to remuneration for his efforts in the matter.

Most auctioneers, in addition to holding auctions, carry on the business of house and estate agency. The number of licences issued to house agents and appraisers in England for the year ended 31st

March 1899 was 4429, and for the year ended 31st March 1909, 4618. The number of licences issued to auctioneers in England for the corresponding periods was 6389 and 6543 respectively. '(H. Ha.)

ESTATE DUTY. For purposes of the national revenue in the United Kingdom, the Finance Act 1894 imposed on all property passing by death after the 1st of August 1894 a duty called estate duty, in lieu of certain other duties previously payable. The objects of the act were — (1) simplification of the death duties and equalization as between real and personal property, and (2) aggregation of all the property passing on a death, and taxation at rates graduated according to the value of the whole. Before the act a duty (probate duty) was taken on the free personal property of deceased persons in the hands of the executor or administrator, without regard to the sub- sequent distribution. The legacy and succession duties were levied on distribution of th(property passing on the death, from the persons taking any property under the will or intestacy of the deceased, or under settlement, or by devolution of title on his death. These two latter duties were mutually exclusive, and together covered practically all property passing by death. They were levied at rates graduated according to consanguinity. In 1888 an attempt was made to equalize the rates of the death duties as between property which paid the probate and legacy duties, and property which paid succession duty only. But the Finance Act 1894 replaced the probate duty by a duty extending to all property real or personal passing on or by reference to death, whether by disposition of the deceased or not, without regard to its tenure or destination. The Finance Acts of 1907 and 1909- 1910 increased the scale of duties laid down in 1894.

For this purpose all property passing on a death is aggregated to form one estate, on the capital value of which the duty is charged, at rates graduated from 1 to 15% according to the aggregate value. Besides the property of which the deceased was competent to dispose at his death, the aggregated estate includes property in which he had an interest ceasing on his death, from the cesser of which a benefit accrues, or which was disposed of by him within twelve months of death, or at any time, with reservation of an interest to himself. The extent to

which property is deemed to pass on the cesser of a limited interest is

measured by the proportion of the income to which the interest extended, without regard to the tenure of the deceased or his successor. Property may therefore be included in the aggregate estate at its capital value owing to the passing of a life-interest only, the property being settled so that the absolute ownership does not pass at all. But when the duty has once been paid on property passing under a settlement, the property does not again become chargeable until it passes on the death of a person who is or has been competent to dispose of it. To compensate for this advantage, when property passing under a settlement made after the act pays the estate duty, a further duty of 2 % (settlement estate duty) is taken, except where the only subsequent life-interest is that of the wife or husband of the deceased.

The rate of duty being fixed according to the aggregate capital value of the whole estate, the charge is distributed according to the different modes of disposition of the property comprised in the estate. The duty on the personalty which passes to the executor as such is paid by him, as the probate duty was, and comes out of the general estate. For the other property passing, trustees, or any person to whom it passes for a beneficial interest in possession, are made accountable, and are required to bring in an account of the property and pay the duty. The duty is a first charge on such property, and, when it is paid by a person having a life-interest only, he may charge the corpus of the property with it. The duty on real property included in an account is payable by eight yearly or sixteen half-yearly instalments, becoming due twelve months after the death, and bearing interest at 3 % from that date. On other property, except in a few special cases, the duty bears interest at 3 % from the date of the death. When the estate duty has been paid no further duty is chargeable on property comprised in the estate which passes to lineal relations of the deceased. But on property passing to collaterals or strangers legacy or succession duty, as the case may be, is payable by the devisees or successors, at a rate (which is the same whichever duty be payable) fixed according to consanguinity.

For a detailed account of the provisions of the act of 1894 and subsequent amending acts, and of the practical working of the duty, reference is made to Austen-Cartmell, Finance Acts (1894-1907); Hanson, Death Duties (London, 1904) ; Soward, Handbook to the Estate Duty (4th ed., London, 1900); and to the reports of the commissioners of Inland Revenue for 1894-1895 and subsequent years.

ESTCOURT, RICHARD (1668-1712), English actor, began by playing comedy parts in Dublin. His first London appearance was in 1704 as Dominick, in Dryden's Spanish Friar, and he continued to take important parts at Drury Lane, being the original Pounce in Steele's Tender Husband (1705), Sergeant Kite in Farquhar's Recruiting Officer, and Sir Francis Gripe in Mrs Centlivre's Busybody. He was an excellent mimic and a great favourite socially. Estcourt wrote a comedy, The Fair Example, or the Modish Citizen (1703), and Prunella (1704), an interlude.

ESTE, one of the oldest of the former reigning houses of Italy. It is in all probability of Lombard origin, and descended, according to Muratori, from the princes who governed in Tuscany in Carolingian times. The lordship of the town of Este was first acquired by Alberto Azzo II., who also bore the title of marquis of Italy 1 (d. c. 1097); he married Kunitza or Kune- gonda, sister of Welf or Guelph III., duke of Carinthia. Welf died without issue, and was succeeded by Welf IV. , son of Kunitza, who married a daughter of Otto II., duke of Bavaria, and who obtained the duchy of Bavaria in 1070. Through him the house of Este became connected with the princely houses of Brunswick and Hanover, from which the sovereigns of England are de- scended. The Italian titles and estates were inherited by Folco I. (1060-1135), son of Alberto Azzo by his second wife Gersende, daughter of Herbert I., count of Maine. 2 The house of Este

1 i.e. Margrave of the Empire (marchio Sancli Imperii) in Italy. (See Marquess.)

2 Another son of Azzo and Gersende became count of Maine as Hugh III. (d. 1131).

played a great part in the history of medieval and Renaissance Italy, and it first comes to the front in the wars between the Guelphs and Ghibellines; as leaders of the former party its princes received at different times Ferrara, Modena, Reggio and other fiefs and territories.

Obizzo I., son of Folco, was the first to bear the title of marquis of Este. He entered into the Guelphic league against the emperor Frederick I., and was comprehended in the treaty of Venice of 1177 by which municipal podestds (foreigners chosen as heads of cities to administer justice impartially) were instituted. He was elected podesta of Padua in 11 78, and in 1184 he was reconciled with Frederick, who created him marquis of Cenoa and Milan, a dignity

somewhat similar to that of imperial vicar. By the marriage of his son Azzo to the heiress of the Marchesella family (the story that she was carried off to prevent her marrying an enemy of the Este is a pure legend), he came to acquire great influence in Ferrara, although he was opposed by the hardly less powerful house of Torelli.

Obizzo died in 1194 and Azzo V. having predeceased him, the marquisate devolved on his gratidson Azzo VI. (n 70-1 2 12), who became head of the Guelph party, and to him the people of Ferrara sacrificed their liberty by making him their first lord (1208). But during his lifetime civil war raged in the city, between the Este and the Torelli, each party being driven out again and again. Azzo (also called Azzolino) died in 121 2 and was succeeded by Aldobrandino I., who in 12 13 concluded a treaty with Salinguerra Torelli, the head of that house, to divide the government of the city between them. On his death in 1215 he was succeeded by his brother Azzo VII. (1205-1264), surname'd Novello, but Salinguerra Torelli usurped all power in Ferrara and expelled Azzo (1222). In 1240 Pope Gregory IX. determined on another war against the emperor Frederick II., but deemed it wise to begin by crushing the chief Ghibelline houses. Thus Azzo found himself in league with the pope and various Guelph cities in his attempt to regain Ferrara. That town underwent a four months' siege, and was at last compelled to surrender; Salinguerra was sent to Venice as a prisoner, and Azzo ruled in Ferrara once more. The Ghibelline party was annihilated, but the city enjoyed peace and happiness within, although her citizens took part in the wars raging outside. The Guelph cause triumphed, Frederick being defeated several times, and after his death Azzo helped in crushing the terrible Eccelino da Romano (q.v.) who upheld the imperial cause, at thebattleof Cassano (1259). He died in 1264 and was succeeded by Obizzo II. (1 240-1 293) his grandson, who in 1288 received the lordship of Modena, and that of Reggio in 1289. He was a capable but cruel ruler, and while professing devotion to the Guelph cause, did homage to the German king Rudolph I. when he descended into Italy.

Obizzo II. died in 1293 and was succeeded by his son Azzo VIII., but the latter's brothers, Aldobrandino and Francesco, who were to have shared in the government, were expelled and became his bitter enemies. The misgovernment of Azzo led to the revolt of Reggio and Modena, which shook pff his yoke. Enemies arose on all sides, and he spent his last years in perpetual fighting. He died in 1308, and having no legitimate children, his brothers, his natural son Fresco, and others disputed the succession. A papal legate was appointed, and though the Este returned they were placed under pontifical

tutelage.

The history of the house now becomes involved and of little interest until we come to Nicholas III. (1384-1441), who exercised sway over Ferrara, Modena, Parma and Reggio, waged many wars, was made general of the army of the Church, and in his later years governor of Milan, where he died, not without suspicion of poison. To him succeeded Lionello (1407-1450), a wise and virtuous ruler and a patron of literature and art; then Borso (1413-1471), his brother, who was created duke of Modena and Reggio by the emperor Frederick III., and duke of Ferrara by the pope. In spite of the wars by which all Italy was torn, Ferrara enjoyed a period of peace and prosperity under Borso; he patronized literature, established a printing-press at Ferrara, surrounded himself with learned men, and his court was of

unparalleled splendour. He also protected industry and com-_ merce, and ruled with great wisdom. His brother Ercole I. (1431-1505), who succeeded him in 1471, was less fortunate, and had to engage in a war with Venice, owing to a dispute about the salt monopoly, with the result that by the peace of 1484 he was forced to cede the district of Polesine to the republic. But the last years of his life were peaceful and prosperous, so that afterwards men looked back to the days of Ercole I. as to a golden age; his capital was noted both for its luxury and as the resort of men eminent in literature and art. Boiardo the poet was his minister, and Ariosto obtained his patronage.

Ercole's daughter Beatrice d'Este (1475-1497), duchess of Milan, one of the most beautiful and accomplished princesses of the Italian Renaissance, was bethrothed at the age of five to Lodovico Sforza (known as il Moro), duke of Bari, regent and afterwards duke of Milan, and was married to him in January 1 49 1. She had been carefully educated, and availed herself of her position as mistress of one of the most splendid courts of Italy to surround herself with learned men, poets and artists, such as Niccolo da Gorreggio, Bernardo Castiglione, Bramante, Leonardo da Vinci and many others. In 1492 she visited Venice as ambassador for her husband in his political schemes, which consisted chiefly in a desire to be recognized as duke of Milan. On the death of Gian Galeazzo Sforza, Lodovico's usurpation was legalized, and after the battle of Fornovo (1495) both he and his wife took part in the peace congress of

Vercelli between Charles VIII. of France and the Italian princes, at which Beatrice showed great political ability. But her brilliant career was cut short by death through childbirth, on the 3rd of January 1497. She belongs to the best class of Renaissance women, and was one of the culture influences of the age; to her patronage and good taste are due to a great extent the splendour of the Castello of Milan, of the Certosa of Pavia and of many other famous buildings in Lombardy.

Her sister Isabella d'Este (1474-1539), marchioness of Mantua, was carefully educated both in letters and in the arts like Beatrice, and was married when barely sixteen to Francesco Gonzaga, marquis of Mantua (1490). She showed great diplomatic and political skill, especially in her negotiations with Cesare Borgia (

To Ercole I. succeeded his son Alphonso I. (1486-1534), the husband of Lucrezia Borgia (q.v.), daughter of Pope Alexander VI. During nearly the whole of his reign he was engaged in the Italian wars, but by his diplomatic skill and his military ability he was for many years almost always successful. He was gifted with great mechanical skill, and his artillery was of world-wide reputation. On the formation of the league of Cambrai against Venice in 1508, he was appointed to the supreme command of the papal troops by Julius II.; but after the Venetians had sustained a number of reverses they made peace with the pope and joined him against the French. Alphonso was invited to co-operate in the new combination, and on his refusal war was declared against him; but although he Began by losing Modena and Reggio, he subsequently inflicted several defeats on the

papal troops. He fought on the side of the French at the battle of Ravenna (151 2), from which, although victorious, they derived no advantage. Soon afterwards they retired from Italy, and Alphonso, finding himself abandoned, tried to make his peace with the pope, through the mediation of Fabrizio Colonna. He went to Rome for the purpose and received absolution, but on discovering that Julius meant to detain him a prisoner, he escaped in disguise, and the pope's death in 1513 gave him a brief respite. But Leo X. proved equally bent on the destruction of the house of Este, when he too was cut off by death. Alphonso availed himself of the troubles of the papacy during the reign of the equally hostile Clement VII. to recapture Reggio (1523) and Modena (1527), and was confirmed in his possession of them by the emperor Charles V., in spite of Clement's opposition.

He died in 1534, and was succeeded by his son Ercole II.

(1508-1559), who married Renee, daughter of Louis XII. of France, a princess of Protestant proclivities and a friend of Calvin. On joining the league of France and the papacy against Spain, Ercole was appointed lieutenant-general of the French army in Italy. The war was prosecuted, however, with little vigour, and peace was made with Spain in 1558. The duke and his brother, Cardinal Ippolito the Younger, were patrons of literature and art, and the latter built the magnificent Villa d' Este at Tivoli. He was succeeded by Alphonso II. (1533-1597), re- membered for his patronage of Tasso, whom he afterwards imprisoned. He reorganized the army, enriched the public library, encouraged agriculture, but was extravagant and dissipated. With him the main branch of the family came to an end, and although at his death he bequeathed the duchy to his cousin Cesare (1533-1628), Pope Clement VIII., renewing the Church's hostility to the house of Este, declared that prince to be of illegitimate birth (a doubtful contention), and by a treaty with Lucrezia, Alphonso's sister, Ferrara was made over to the Holy See. Cesare held Modena and Reggio, but with him the Estensj cease to play an important part in Italian politics. For two centuries this dynasty had been one of the greatest powers in Italy, and its court was perhaps the most splendid in Europe, both as regards pomp and luxury and on account of the eminent artists, poets and scholars which it attracted.

The subsequent heads of the family were: Alphonso III., who retired to a monastery in 1629 and died in 1644; Francis I. (1610-1658), who commanded the French army in Italy in 1647; Alphonso IV. (1634-1662), the father of Mary Beatrice, the queen ofi James IL. of England, who fought in the French army during the Spanish War, and founded the picture gallery of Modena; Francis II. (1660-1694), who originated the Este library, also at Modena, and founded the university; Rinaldo (1655-1737), through whose marriage with Charlotte Felicitas of Brunswick-Liineburg the long-separated branches of the house of Este were reunited; Francis III. (1698-1780), who married the daughter of the regent Philip of Orleans. Francis III. wished to remain neutral during the war between Spain and Austria (1740), but the imperialists having occupied and de- vastated his duchy, he took the Spanish side and was appointed generalissimo of the Spanish army in Italy. He was re-established in his possessions by the treaty of Aix-la-Chapelle (1748), and on being reconciled with the empress Maria Theresa, he received from her the title of governor of Lombardy in 1754. With his son Ercole III. Rinaldo (1727-1803), who at the peace of Campo-formio lost his duchy, the male line of the Estensi came to an end. His only daughter, Marie Beatrice (d. 1829), was married to the

archduke Ferdinand, third son of the emperor Francis I. Ferdinand was created duke of Breisgau in 1803, and at his death in 1806 he was succeeded by his son Francis IV. (q.v.), to whom the duchy of Modena was given at the treaty of Vienna in 1814. He died in 1846 and was succeeded by Francis V. (q.v.), who lost his possessions by the events of 1859. With his death in 1875 the title and estates passed to the archduke Francis Ferdinand, heir to the Austro-Hungarian throne. The children of Lady Augusta Murray, daughter of the earl of Dunmore, by her marriage with Augustus Frederick, duke of Sussex, sixth son of George III. of Great Britain, assumed the old name of

d' Este, and claimed recognition as members of the royal family; but as the marriage was in violation of the royal marriages act of 1773, it was declared invalid, and their claims were set aside.

Bibliography.— G. Antonelli, Saggio di una bibliografia storica ferrarese (Ferrara, 1851); L. A. Muratori, Delle antichita estensi ed italiane (3 vols., 1717, &c), the chief and most reliable authority on the subject, containing a quantity of documents; A. Frizzi, Memorie per la storia di Ferrara (2nd ed., Ferrara, 1847); A. Solerti, Ferrara e la corte estense nella seconda meta del sec. X VI. (Citta di Castello, 1900); C. Antolini, 77 dominio estense in Ferrara (Ferrara, 1896), which deals with the siege of 1240 and other special points; E. G. Gardner, Princes and Poets of Ferrara (London, 1904), a bulky volume dealing only with the Renaissance period, full of interesting and unpublished matter, especially about the literary and artistic associations of the house, but not well put together (contains good bibliography) ; G. Bertoni, La Biblioteca estense e la coltura ferrarese ai tempi del duca Ercole I. (Turin, 1903), useful for the literary aspect of the subject; P. Litta, Le Celebri Famiglie italiane, vol. iii. (Milan, 1831), still a valuable work; E. Noyes, The Story of Ferrara (London, 1904); Julia Cartwright's Isabella d' Este (London, 1903), and Beatrice a" Este (1899), pleasantly written but amateurish volumes based on A. Luzio's Mantova e Urbino (Turin, 1893); A. Luzio and R. Renier, " Delle relazioni di Isabella d' Este Gonzaga con Lodovico e Beatrice Sforza " (Milan, 1890, Archivio Storico Lombardo, xvii.). (L. V.)*

ESTE (anc. Aleste, q.v.), a town and episcopal see of Venetia, Italy, in the province of Padua, 20 m. S.S.W. of it by rail. Pop. (1901)

8671 (town) ; 10,779 (commune). It lies 49 ft. above sea- level below the southern slopes of the Euganean Hills. The external walls of the castle still rise above the town on the N., but the interior is now occupied by the cattle-market. A frag- ment of the once enormous Palazzo Mocenigo, of the 16th century, is now occupied by the important archaeological museum (see Ateste). The cathedral was erected in 1 690-1 720, on the site of an older building destroyed by an earthquake in 1688. S. Martino is a church in the Lombard Romanesque style. The archives in the Palazzo Comunale are important.

After the Roman period the history of Este is a blank until the Lombard period, in which it was dependent on Monselice. In the 10th century the family of Este (see above) established itself in the castle above the town. At the end of the 13th century Padua, which had already captured Este more than once, became definitely mistress of it. When the Carrara family succumbed in 1405, Este voluntarily surrendered to Venice and was allowed its independence, under a podesta; and thenceforth it followed the fortunes of Venetia.

ESTEBANEZ CALDER6N, SERAFiN (1799-1867), a Spanish author, best known by the pseudonym of " El Solitario," was born at Malaga on the 27th of December 1 799. His first literary effort was El Liston verde, a poem signed " Safinio" and written to celebrate the revolution of 1820. He was called to the bar, and settled for some time at Madrid, where ue published a volume of verses in 1831 under the assumed name of " El Solitario." He obtained an exaggerated reputation as an Arabic scholar, and played a minor part in the political movements of his time. He died at Madrid on the 5th of February 1867. His most interesting work, Escenas andaluzas (1847), is in a curiouly affected style, the vocabulary being partly archaic and partly provincial; but, despite its eccentric mannerisms, it is a vivid record of picturesque scenes and local customs. Estebanez Calderon is also the author of an unfinished history, De la conquista y pSrdida de Portugal (1883), issued posthumously under the editorship of his nephew, Antonio Canovas del Castillo.

ESTELLA, a town of northern Spain, in the province of Navarre, on the left bank of the river Ega, 15 m. W.S.W. of Pamplona. Pop. (1900) 5736. Estella, which occupies the site of a Roman town of uncertain name, contains several monasteries and churches, a medieval citadel, and a college which was formerly a university. Its principal industries are the manufacture of woollen and linen fabrics and brandy-making; and it has a considerable trade in fruit, wine and cattle. Estella commands several defiles on the roads from

Castile and Aragon, and on that account occupies a position of considerable strategic importance. It was long the headquarters of Don Carlos, who was proclaimed king here in 1833. In 1873 it was the chief stronghold of the

Carlists, and in 1874, when driven from other places, they succeeded in retiring to Estella. On the 16th of February 1876 the Carlists in the town surrendered unconditionally. For an account of the Carlist rising see Spain: History.

ESTERHAZY OF GALANTHA, a noble Magyar family. Its origin has been traced, not without some uncertainty, to Salamon of Estoras, whose sons Peter and Illyes divided their patrimony in 1238. Peter founded the family of Zerhazy, and Illyes that of Illyeshazy, which became extinct in the male line in 1838. The first member of the family to emerge definitely into history was Ferencz Zerhazy (1563-1594), vice lord-lieutenant of the county of Pressburg, who took the name of Esterhazy when he was created Freiherr of Galantha, an estate acquired by the family in 1421. His eldest son, Daniel (d. 1654), founded the house of Czesznek, the third, Pal (d. 1641), the line of Zolyom (Altsohl), and the fourth, Mikl6s, that branch of the family which occupies the most considerable place in Hungarian history, that of Frakno or Forchtenstein.

This Miklos [Nicholas] Esterhazy of Galantha (1582-1645) was born at Galantha on the 8th of April 1582. His parents were Protestants, and he himself, at first, followed the Protestant persuasion; but he subsequently went over to Catholicism and, along with Cardinal Pazmany, his most serious rival at court, became a pillar of Catholicism, both religiously and politically, and a worthy opponent of the two great Protestant champions of the period, Gabriel Bethlen and George I. Rakoczy. In 161 1 he married Orsolya, the widow of the wealthy Ferencz Magocsy, thus coming into possession of her gigantic estates, and in 1622 he acquired Frakno. Matthias II. made him a baron (1613), count of Beregh (1617), and lord-lieutenant of the county of Zolyom and magister curiae regiae (16 18). At the coronation of Ferdinand II., when he officiated as grand-standard- bearer, he received the order of the Golden Fleece and fresh donations. At the diet of Sopron, 1625, he was elected palatine of Hungary. As a diplomatist he powerfully contributed to bring about the peace of Nikolsburg (1622) and the peace of Linz (1645) (see Hungary: History). His political ideal was the consolidation of the Habsburg dynasty as a means towards freeing Hungary from the Turkish yoke. He himself, on one occasion (1623), defeated the Turks on the banks of theNyitra; but anything

like sustained operations against them was then impossible. He was also one of the most eminent writers of his day. He died at Nagy-Heflan on the nth of September 1645, leaving five sons.

See Works of Nicholas Esterhazy, with a biography by Ferencz Toldi (Hung.) (Pest, 1852) ; Nicholas Count Esterhazy, Palatine of Hungary (a biography, Hung.) (Pest, 1863-1870).

His third son Pal [Paul] (1635-1713), prince palatine, founded the princely branch of the family of Esterhazy. He was born at Kis Marton (Eisenstadt) on the 7th of September 1635. In 1663 he fought, along with Miklos Zrinyi, against the Turks, and distinguished himself under Montecuculi. In 1667 he was appointed commander-in-chief in south Hungary, where he defeated the malcontents at Leutschau and Gyork. In 1681 he was elected palatine. In 1683 he participated in the deliverance of Vienna from the Turks, and entered Buda in 1686 at the head of 20,000 men. Thoroughly reactionary, and absolutely de- voted to the Habsburgs, he contributed more than any one else to the curtailing of the privileges of the Magyar gentry in 1687, when he was created a prince of the Empire, with (in 171 2) succession to the first-born of his house. His " aulic tendencies " made him so unpopular that his offer of mediation between the Rakoczy insurgents and the government was rejected by the Hungarian diet, and the negotiations, which led to the peace of Szatmar (see Hungary: History), were entrusted to Janos Pallfy. He died on the 26th of March 1713. He loved the arts and sciences, wrote several religious works, and was one of the chief compilers of the Trophaeum Domus Inclytae Estoratianae.

See Lajos Merenyi, Prince Paul Esterhdzy (Hung.) (Budapest,

1895)-

Prince PAl Antal, grandson of the prince palatine Pal, was a

distinguished soldier, who rose to the rank of field-marshal in

1758. On his death in 1762 he was succeeded by his brother.

Prince Miklos Jozsef [Nicholas Joseph] (1714-1790), also a brilliant soldier, is perhaps best remembered as a patron of the fine arts. For

his services in command of an infantry brigade at Kolin (1757) he was specially mentione'd by Count Daun, and became one of the original members of the order of Maria Theresa. In 1762 he was appointed captain of Maria Theresa's Hungarian bodyguard, in 1764 Feldzeugmeister, and in 1768 field marshal. His other honours included the Golden Fleece and the grade of commander in the order of Maria Theresa. Joseph II. conferred the princely title, which had previously been limited to the eldest- born of the house, on all his descendants, male and female. Esterhazy died in Vienna on the 28th of September 1790. He rebuilt in the Renaissance style Schloss Esterhazy, the splendour of which won for it the name of the Hungarian Versailles. Haydn was for thirty years conductor of his private orchestra and general musical director, and many of his compositions were written for the private theatre and the concerts of this prince.

His grandson, Prince Miklos [Nicholas] (1765-1833) was born on the 12 th of December 1765. He began life as an officer in the guards, subsequently making the grand tour, which first awakened his deep interest in art. He quitted the army for diplomacy after reaching the rank of Feldzeugmeister, and was employed as extraordinary ambassador, on special occasions, when he displayed a magnificence extraordinary even for the Esterhazys. He made at Vienna an important collection of paintings and engravings, which came into the possession of the Hungarian Academy at Budapest in 1865. At his summer palace of Kis Marton (Eisenstadt) he erected a monument to Haydn. His immense expenditure on building and the arts involved the family in financial difficulties for two generations. When the French invaded Austria in 1797, he raised a regiment of 1000 men at his own expense. In 1809, when Napoleon invited the Magyars to elect a new king to replace the Habsburgs, overtures were made to Prince Nicholas, who refused the honour and, further, raised a regiment of volunteers in defence of Austrian interests. He died at Como on the 24th of November 1833.

His son, Prince Pal Antal [Paul Anthony] (1786-1866), entered the diplomatic service. In 1806 he was secretary of the embassy in London, and in 1807 worked with Prince Metternich in the same capacity in Paris. In 1810 he was accredited to the court of Dresden, where he tried in vain to detach Saxony from Napoleon, and in 1814 he accompanied his father on a secret mission to Rome. He took a leading part in all the diplomatic negotiations consequent upon the wars of 1813-1815, especially at the congress of Chatillon, and on the conclusion of peace was, »at the express desire of the prince regent, sent as ambassador to London. In 1824 he represented

Austria as ambassador extraordinary at the coronation of Charles X., and was the premier Austrian commissioner at the London conferences of 1830-1836. In 1842 he quitted diplomacy for politics and attached himself to " the free-principles party." He was minister for foreign affairs in the first responsible Hun- garian ministry (1848), but resigned his post in September bcause he could see no way of reconciling the court with the nation. The last years of his life were spent in comparative poverty and isolation, as even the Esterhazy-Forchtenstein estates were unequal to the burden of supporting his fabulous extravagance and had to be. placed in the hands of curators.

The cadet branch of the house of Frakno, the members ofwhich bear the title of count, was divided into three lines by the sons of Ferencz Esterhazy (1641-1683).

The eldest of these, Count Antal (1676-1722), distinguished himself in the war against Rakoczy in 1703, but changed sides in 1704. and commanded the left wing of the Kuruczis at the engagements of Nagyszombat (1704) and Veresko (1705)- In 1706 he defeated the imperialist general Guido Stahremberg and penetrated to the walls of Vienna. Still more successful were his operations in the campaign of 1708, when he ravaged Styria, twice invaded Austria, and again threatened Vienna, on which occasion the emperor Joseph narrowly escaped falling into his hands. In 1709 he was routed by the superior forces ©f General Sigbert Heister at Palota, but brought off the re-

mainder of his arms very skilfully. In 1710 he joined R£,k6czy in Poland and accompanied him to France and Turkey. He died in exile at Rodosto on -the shores of the Black Sea. His son Balint Jozsef [Valentine Joseph!, by Anna Maria Nigrelli, entered the French army, and was the founder of the Hallewyll, or French, branch of the family, which became extinct in the male line in 1876 with Count Ladislas.

See Count Esterhazy' s Campaign Diary (Hung.), ed. by K. Thaly ■ (Pest, 1901).

Count Balint Miklos (1 740-1805), son of Balint Jozsef, was an enthusiastic partisan of the due de Choiseul, on whose dismissal, in 1764, he resigned the command of the French regiment of which he was the colonel. It was Esterhazy who conveyed to Marie Antoinette the portrait of Louis XVI. on the occasion of their betrothal, and the close relations he maintained with her after her marriage were more than once the occasion of remonstrance on the part of Maria

Theresa, who never seems to have forgotten that he was the grandson of a rebel. At the French court he stood in high favour with the comte d'Artois. He was raised to the rank of marechal de camp, and made inspector of troops in the French service in 1780. At the out- break of the French Revolution, he was stationed at Valenciennes, where he contrived for a time to keep order, and facilitated the escape of the French emigre's by way of Namur; but, in 1790, he hastened back to Paris to assist the king. At the urgent entreaty of the comte d'Artois in 1791 he quitted Paris for Coblenz, accompanied Artois to Vienna, and was sent to the court of St Petersburg the same year to enlist the sympathies ol Catherine II. for the Bourbons. He received an estate from Catherine II., and although the gift was rescinded by Paul I., another was eventually granted him. He died at Grodek in Volhynia on the 23rd of July 1805.

See Memoires, ed. by E. Daudet (Fr.) (Paris, 1905), and Lettres (Paris, 1906).

Two other sons of Count Ferencz (d. 1685), Ferencz and J6zsef, founded the houses of Dotis and Cseklesz (Landschiitz) respectively. Of their descendants, Count Moricz (1807-1890) of Dotis, Austrian ambassador in Rome until 1856, became in 1861 a member of the ministry formed by Anton Schmerling, and in 1865 joined the clerical cabinet of Richard Belcredi. His bitter hostility to Prussia helped to force the government of Vienna into the war of 1866. His official career closed in 1866, but he remained one of the leaders of the clerical party.

See also Count Janos Esterhazy, Description of the Esterhazy Family (Hung., Budapest, 1901). (R. N. B.)

ESTERS, in organic chemistry, compounds formed by the condensation of an alcohol and an acid, with elimination of water; they may also be considered as derivatives of alcohols, in which the hydroxylic hydrogen has been replaced by an acid radical, or as acids in which the hydrogen of the carboxyl group has been replaced by an alkyl or aryl group. In the case of the polybasic acids, all the hydrogen atoms can be replaced in this way, and the compounds formed are known as " neutral esters." If, however, some of the hydrogen of the acid remain undisplaced, then " acid esters " result. These acid esters retain some of the characteristic properties of the acids, forming, for example, salts, with basic oxides. Esters may be prepared by heating the silver salt of an acid with an alkyl iodide; by heating the alcohols or alcoholates with an acid chloride; by distilling the anhydrous sodium salt of an acid with a mixture of the

alcohol and concentrated sulphuric acid; or by heating for some hours on the water bath, a mixture of an acid and an alcohol, with a small quantity of hydrochloric or sulphuric acids (E. Fischer and A. Speier, Ber., 1896, 28, p. 3252).

The esters of the aliohatic and aromatic acids are colourless neutral liquids, which are generally insoluble in water, r»;r. readily dissolve in alcohol and ether. Many possess a fragrant odour and are prepared in large quantities for use as artificial fruit essences. They hydrolyse readily when boiled with solu- tions of caustic alkalies or mineral acids, yielding the constituent acid and alcohol. When heated with ammonia, they yield acid amides (q.v.). They form unstable addition products with sodium ethylate or methylate. With the Grignard reagent, they

form addition compounds which on the addition of water yield tertiary alcohols, except in the case of ethyl formate, where a secondary alcohol is obtained. •

/OMgBr R

/OMgBr /OMgBi

‘■tnr.H. _i. w.r^-R’

R-C0 2 C 2 H 6 -> R-Cn-u^j X R

/OMgBr ■\~OC2H5

-^ R-Cf-R’ ->R’-7C-OH.

\P’ R’/

H-C0 2 C 2 H 6

H-Cf-OC 2 H s N R’

-> H-C^R; ■-> £,>CH-OH.

X R

N. Menschutkin (Ber., 1882, 15, p. 1445; Ann., 1879, 195, p. 334) examined the rate of esterification of many acids with alcohols, it

was found that the normal primary alcohols were all esterified at about the same rate, the secondary alcohols more slowly than the primary, and the tertiary alcohols still more slowly. The investigation also showed that the nature of the acid used affected the result, for in an homologous series of acids it was found that as the molecule of the acid became more complex, the rate of esterification became less. The formation of an ester by the interaction of an acid with an alcohol is a " reversible " or " balanced " action, for as M. Berthelot and L. Pean de St Gilles {Ann. Chim. Phys., 1862 (3), 65, P- 385 ct seq.) have shown in the case of the formation of ethyl acetate from ethyl alcohol and acetic acid, a point of equilibrium is reached, beyond which the reacting system cannot pass, unless the system be disturbed in some way by the removal of one of the products of the reaction. V. Meyer {Ber., 1894, 2 7> P- 5 10 et seq.) showed that in benzenoid compounds ortho-substituents exert a great hindering effect on the esterification of alcohols by acids in the presence of hydrochloric acid, this hindering being particularly marked when two substituents are present in the ortho positions to the carboxyl group. In such a case the ester is best prepared by the action of an alkyl halide on the silver salt of the acid, and when once prepared, can only be hydrolysed with great difficulty.

Ethyl formate, H-C0 2 C 2 H 5 , boils at 55 ° C. and has been used in the artificial preparation of rum. Ethyl acetate (acetic ether), CH 3 - C0 2 C 2 H 6 , boils at 75 C. Isoamylisovalerate, C 4 H 9 -C0 2 C 6 H n , boils at 196 C. and has an odour of apples. Ethyl butyrate, C 3 H7-C0 2 C 2 H 5 , boils at 121° C. and has an odour of pineapple. The fats (q.v.) and waxes {q.v.) are the esters of the higher fatty acids and alcohols. The esters of the higher fatty acids, when distilled under atmospheric pressure, are decomposed, and yield an olefine and a fatty acid.

Esters of the mineral acids are also known and may be prepared by the ordinary methods as given above. The neutral esters are as a rule insoluble in water and distil unchanged; on the other hand, the acid esters are generally soluble in water, are non-volatile, and form salts with bases. Ethyl hydrogen sulphate (sulphovinic acid), C 2 H5-HSC>4, is obtained by the action of concentrated sulphuric acid on alcohol. The ester is separated from the solution by means of its barium salt, and the salt decomposed by the addition of the calculated amount of sulphuric acid. It is a colourless oily liquid of strongly acid reaction; its aqueous solution decomposes on stand- ing and on heating it forms diethyl sulphate and sulphuric acid. Dimethyl sulphate, (CH3HSO4, is a colourless liquid which boils at l87°-l88°C., with partial decomposition. Itisusedasa methylating

agent (F. Ullmann). Great care should be taken in using dimethyl and diethyl sulphates, as the respiratory organs are affected by the vapours, leading to severe attacks of pneumonia. Ethyl nitrate, C 2 H 6 -ON02, is a colourless liquid which boils at 86-3° C. It is pre- pared by the action of nitric acid on ethyl alcohol (some urea being added to the nitric acid, in order to destroy any nitrous acid that might be produced in secondary reactions and which, if not removed, would cause explosive decomposition of the ethyl nitrate). It burns with a white flame and is soluble in water. When heated with ammonia it yields ethylamine nitrate, and when reduced with tin and hydrochloric acid it forms hydroxylamine {q.v.) (W. C. Lossen). Ethyl nitrite, C 2 H 6 -ONO, is a liquid which boils at 18 C; the crude product obtained by distilling a mixture of alcohol, sulphuric and nitric acids and copper turnings is used in medicine under the name of " sweet spirits of nitre." Amyl nitrite, C5H u -ONO, boils at 96 C. and is used in the preparation of the anhydrous diazonium salts (E. Knoevenagel,Ber., 1890,23, p. 2094). It isalso used in medicine.

ESTHER. The Book of Esther, in the Bible, relates how a Jewish maiden, Esther, cousin and foster-daughter of Mordecai, was made his queen by the Persian king Ahasuerus (Xerxes) after he had divorced Vashti; next, how Esther and Mordecai frustrated Haman's endeavour to extirpate the Jews; how Haman, the grand- vizier, fell, and Mordecai succeeded him; how Esther obtained the king's permission for the Jews to destroy all who might attack them on the day which Haman had appointed by lot for their destruction; and lastly, how the feast of Purim (Lots ?) was instituted to commemorate their deliverance. Frequent incidental references are made to Persian court-usages (explanations are given in i. 13, viii. 8), while on the other hand the religious rites of the Jews (except fasting),

and even Jerusalem and the temple, and the name of Israel, are studiously ignored. Even the name of God is not once mentioned, perhaps from a dread of its profanation during the Saturnalia of Purim. The early popularity of the book is shown by the interpolated passages in the Septuagint and the Old Latin versions.

The criticism of Esther began in the 18th century. As soon as the questioning spirit arose, the strangeness of many state- ments in the book leaped into view. A moderate scholar of our day can find no historical nucleus, and calls it a sort of historical romance. 1 The very first verses in the book startle the reader by their exaggerations, e.g. a banquet lasting 180 days, " 127 provinces." Farther on, the improbabilities of the plot are noticeable. Esther, on her elevation,

keeps her Jewish origin secret (ii. 10; cf. vii. 3 ff.), although she has been taken from the house of her uncle, who is known to be a Jew (iii. 4; cf. vi. 13), and has remained in constant intercourse with him (ii. n, 19, 20, 22; cf. iv. 4-17). We are further told that the grand-vizier was. an Agagite or Amalekite (iii. 1, &c); would the nobility of Persia have tolerated this ? Or did Haman too keep his non-Persian origin secret? Also that Mordecai offered a gross affront to Haman, for which no slighter punishment would satisfy Haman than the destruction of the whole Jewish race (iii. 2-6). Of this savage design eleven months' notice is given (iii. 12-14); a "d when the danger has been averted by the cleverness of Esther, the provincial Jews are allowed to butcher 75,000, and those in the capital 800 of their Persian fellow- subjects (ix. 6-16).

It is urged, on the other hand, that the assembly mentioned in i. 3 may be that referred to by Herodotus (vii. 8) as having preceded the expedition against Greece. This hypothesis, how- ever, requires us to suppose that Xerxes had returned from Sardis to Susa by the tenth month of the seventh year of his reign, which is barely credible. In the reckoning of 1 2 7 provinces (cf . Dan. vi. 1 ; 1 Esd. iii. 2) satrapies and sub-satrapies may be confounded. It is at any rate correct to include India among the provinces; this is justified, not only by Herodotus (iii. 94), but by the inscriptions of Darius at Persepolis and Naksh-i-Rustam. Herodotus again (vii. 8) confirms the custom referred to in Esth. ii. 12. But what authority can make the conduct of Mordecai credible ? To-day the harem is impenetrable, while " any one declining to stand as the grand-vizier passes is almost beaten to death." 2 This, surely, is what a real Mordecai would have suffered from a real Haman. Even the capricious Xerxes would never have permitted the entire destruction of one of the races of the empire, nor would a vizier have proposed it.

Serious difficulties of another kind remain. Mordecai is represented as a fellow-captive of Jeconiah (597 B.C.), and grand- vizier in Xerxes's twelfth year (474 B.C.) ! This is parallel to the strange statement in Tobit xiv. 15. And how can we find room for Esther as queen by the side of Amestris (Herod, vii. 14, ix. 112)? How, too, can a Jewess have been a legal queen (see Herod, iii. 84) ? Then take the supposed Persian proper names. " Ahasuerus " may no doubt stand, but very few of the rest (see Noldeke, Ency. Bib. col. 1402). As to the style, the general verdict is that it points to a late date (see Driver, Inlrod. 6 , p. 484). Altogether, critics decline to date the book earlier than the 3rd or even 2nd century B.C.

So far we have only been carrying on 18th-century criticism. In more recent years, however, new lines of inquiry have been opened up. First of all by the great Semitic scholar Lagarde. His thesis (seldom defended now) was that Purim corresponds to Furdigan, the name of the old Persian New Year's and All Souls' festival held in spring, on which the Persians were wont to exchange presents (cf. Esth. ix. 19). In 1891 came a new explanation of Esther from Zimmern. It is true that in its earlier form his theory was very incomplete. But in justice to this scholar we may notice that from the first he looked for light to Babylonia, and that many other critics now take up the same

1 Kautzsch, Old Testament Literature (1898), p. 130.

2 So Morier, the English minister to the Persian court, quoted by Dean Stanley.

position. There is also another new point which has to be mentioned, viz. that, judging from our experience elsewhere, the Book of Esther has probably passed through various stages of development. Here, then, are two points which call for in- vestigation, viz. (i) a possible mythological element in Esther, and (2) possible stages of development prior to that represented by the Hebrew text.

As to the first point. The Second Targum (on Esth. ii. 7) long ago declared that Esther was so called " because she was like the planet Venus." Recent scholars have expressed the same idea more critically. Esther is a modification of Ishtar, the name of the Babylonian goddess of fertility and of the planet Venus, whose myth must have been partially known to the Israelites even in pre-exilic times, 1 and after the fall of the state must have acquired a still stronger hold on Jewish exiles. A general knowledge of the myth of Marduk among the Israelites cannot indeed be proved. Singularly enough, the Babylonian colonists in the cities of Samaria are said to have made idols, not of Marduk, but of a deity called Succoth-benoth 2 (2 Kings xvii. 30). Nor does the Second Targum help us here; it gives a wild explanation of Mordecai as " pure myrrh." Still it is plain that the name of the god Marduk (Merodach) was known to the Jews, and the Cosmogony in Gen. i. is considered by critics to have ultimately arisen out of the myth of Marduk's conflict with the dragon (see Cosmogony). At any rate the name Mordecai (the vocalization is uncertain) looks very much like Marduk, which, with

terminations added, often occurs in cuneiform documents as a personal name. 3 Add to this, that, according to Jensen, Ishtar in mythology was the cousin of Marduk, just as the legend represents Esther as the cousin of Mordecai. 4 The same scholar also accounts for Esther's other name Hadassah (Esth. ii. 7); hadasshatu in Babylonian means "bride," which may have been a title of Ishtar.

But we cannot stop short here. Unless the mythological key can also explain Haman and Vashti, it is of no use. Jensen, now followed by Zimmern, is equal to the occasion. Haman, he says, is a corruption of Hamman or Humman or Uman, the name of the chief deity of the Elamites, in whose capital (Susa) the scene of the narrative is laid, while Vashti is Mashti (or Vashti) , probably the name of an Elamite goddess.

Following the real or fancied light of these names, Prof. Jensen holds that the Esther-legend is based on a mythological account of the victory of the Babylonian deities over those of Elam, which in plain prose means the deliverance of ancient Babylonia from its Elamite oppressors, and that such an account was closely connected with the Babylonian New Year's festival, called Zagmuk, just as the Esther-legend is connected with the festival of Purim.

We are bound, however, to mention some critical objections. (1) The Babylonian festival corresponding to Purim was not the spring festival of Zagmuk, but the summer festival of Ishtar, which is probably the Sacaea of Berossus, an orgiastic festival analogous to Purim. (2) According to Jensen's theory, Mordecai, and not Esther, ought to be the direct cause of Haman's ruin. (3) No such Babylonian account as Jensen postulates can be indicated. (4) The identifications of names are hazardous. Fancy a descendant of Kish called Marduk, and an "Agagite" called Hamman! Elsewhere Mordecai (Ezra ii. 2; Neh. viL 7) occurs among names which are certainly not Persian (Bigvai is no exception), and Haman (Tobit xiv. 10) appears as a nephew of Achiachar, which is not a Persian name. Esther, moreover, ought to be parallel to Judith; fancy likening the representative of Israel to the goddess Ishtar !

Next, as to the preliminary literary phases of Esther. Such phases are probable, considering the later phases represented in the Septuagint. There may have once existed in Hebrew a story of the deadly feud between Mordecai (if that be the original

1 See Zimmern, Die Keilinschriften und das Alte TestS 3 \ p. 438. 5 Ibid. p. 396.

! Johns, Assyrian Deeds, iii. 198-199; Amer. Journ. of Sem. Languages (April 1902), p. 158.

- *So too Zimmern, in Gunkel's Schopfung und Chaos, p. 313, note 2.*

name) and Haman, with elements suggested by the story of the battle between the Supreme God and the dragon (see Cosmogony) . As the legend stands, Mordecai and Esther seem to be in each other's way. In a passage (i. 5 in LXX.) only found in the Septua- gint, but which may have belonged to the original Esther, reference is made to a dream of Mordecai respecting two great dragons, i.e. Mordecai and Haman (x. 7). This seems to confirm the view here mentioned. If so, however, there must also have been an Esther-legend, which was afterwards worked up with that of Mordecai. This is, in fact, the view of Erbt. Winckler takes a different line. Linguistic facts and certain points in the contents seem to him to show that our Esther is a work of the age of the Seleucidae; more precisely he thinks of the time of the revolt of Molon under Antiochus III. Of course there was a Book of Esther before this, and even in its redacted form our Esther reflects the period of three Persian kings, viz. Cyrus, Cambyses and Darius. Lastly, Cheyne (Ency. Bib. " Purim," § 7), while agreeing with Winckler that the book is based on an earlier narrative, holds that that earlier text differed more widely from the present in its geographical and historical setting than Winckler seems to suppose. The problem of the origin of the name Purim, however, can hardly be said to have received a final solution.

Bibliography. — Kuenen, History of Israel, iii. (1875), 148-153; Lagarde, Purim (1887); Zimmern in Stade's Zeitschrift, xi. (1891), pp. 157-169, and Keilinschriften und das Alte Testament < 3) , 485, 515-520, Jensen in Wildeboer's Esther (in Marti's series, 1898), pp. 1 73-1 75 ; Winckler, Keilinschriftenunddas Alte Testament <3> , p. 288, Altorientalische Forschungen, 3rd ser. i. 1-64; Erbt, Die Purimsage (1900) ; Ency. Biblica, articles " Esther " and " Purim " (a composite article). (T. K. C.)

Additions to Book or Esther. These "additions" were written originally in Greek and subsequently interpolated in the Greek translation of the Book of Esther. Here the principle of interpolation has reached its maximum. Of 270 verses, 107 are not to be found in the Hebrew text. These additions are distributed throughout the book in the Greek, but in the Latin Bible they were relegated to the end of the canonical book by Jerome — an action that has rendered them meaningless. In the Greek the additions form with the canonical text

a consecutive history. They were made probably in the time of the Maccabees, and their aim was to supply the religious element which is so completely lacking in the canonical work. The first, which gives the dream of Mordecai and the events which led to his advance- ment at the court of Artaxerxes, precedes chap: i. of the canonical text: the second and fifth, which follow iii. 13 and viii. 12, furnish copies of the letters of Artaxerxes referred to in these verses; the third and fourth, which are inserted after chap, iv., consist of the prayers of Mordecai and Esther, with an account of Esther's approach to the king. The last, which closes the book, tells of the institution of the feast of Purim. The Greek text appears in two widely-differing recensions. The one is supported by ABn, and the other — a revision of the first — by codices 19, 93a, 108b. The latter is believed to have been the work of Lucian. Swete, Old Test, in Greek, ii. 755, has given the former, while Lagarde has published both texts with critical annotations in his LiborumVeteris Testamenti Canonicorum, i. 504-541 (1883), and Scholz in his Kommentar Uber das Buck Esther (1892).

For an account of the Latin and Syriac versions, the Targums, and the later Rabbinic literature connected with this subject, and other questions relating to these additions, see Fritzsche, Exeget. Hand-buch zu den Apok. (1851), i. 67-108; Schlirer (3) , iii. 330-332; Fuller in Speaker's Apocr. i. 360-402; Ryssel in Kautzsch's Apok. u. Pseud. i. 193-212; Siegfried in Jewish Encyc. v. 237 sqq.; Swete, Introd. to the Old Test, in Greek, 257 seq. ; L. B. Paton, " A Text-Critical Apparatus to the Book of Esther" in O.T. and Semitic Studies in Memory of W. R. Harper (Chicago, 1908). (R. H. C.)

ESTHONIA (Ger. Ehstland and Estkland, Esthonian Eesti- maa and Meie-maa, also Viroma and Rahvama; Lettish Iggaun Senna), a Baltic province of Russia, stretching along the south coast of the Gulf of Finland, and having Lake Peipus and Livonia on the S. and the government of St Petersburg on the E. An archipelago of islands, of which Dago is the largest, belongs to this government (Oesel belongs to Livonia). The area is 7818 sq. m., 503 sq. m. of this being insular. The surface is low.

not exceeding ioo ft. in altitude along the coast and alongside Lake Peipus, while in the interior the average elevation ranges from 200 to 300 ft., and nowhere exceeds 450 ft. It was entirely covered with the

bottom moraine of the great ice-sheet of the Glacial Epoch, resting upon Silurian sandstones and limestones. In places sands and clays overlie the glacial deposits. The principal stream is the Narova, which issues from Lake Peipus, flows along the eastern border, and empties into the Gulf of Fin- land. The other drainage arteries are all small, but many in number; while lakes and marshes aggregate fully 225% of the total surface. The climate is severe, great cold being experienced in winter, though moist west winds exercise a moderating in- fluence. Nevertheless the annual mean temperature ranges between 39° and43°Fahr. L11878 the nobility, mostly of German descent, owned and farmed 52% of the land; 42% was farmed, but not owned, by the peasants, mostly Esths or Ehsts, and only 3% was owned by persons outside the ranks of the nobility. Since then one-fourth of the peasantry have been enabled to purchase their holdings, more than half a million acres having passed into their possession. Agriculture is the chief occupation, and it is, on all the larger holdings, carried on with greater scientific knowledge than in any other part of Russia. Of the total area about 16-6% is under cultivation; meadows and grass-lands amount to 41-7%; and forests cover 19%. The principal crops are rye, oats, barley and potatoes, with large quantities of vegetables. Cattle-breeding flourishes, and meat and butter are constantly increasing items of export. The manu- factories consist chiefly of distilleries (over 13,500,000 gallons annually), cotton (at Kranholm falls on the Narova), woollen, flour, paper and saw mills, iron and machinery works, and match factories. Fishing is active along the coast, especially for anchovies. The province is intersected by a railway running from St Petersburg to Reval, with branches from the latter city westwards to Baltic Port and southwards into Livonia, and from Taps south to Yuryev (Dorpat). The chief seaports are Reval, Baltic Port, Hapsal, Kunda and Dago, Esthonia is divided into four districts, the chief towns of which are Reval (pop. in 1897, 66,292), the capital of the province; Hapsal, a lively watering- place (3238); Weissenstein (2509); and Wesenberg (5560). The population, which consists chiefly of Ehstes (365,959 in 1897), Russians (18,000), Germans (16,000), Swedes (5800), and some Jews, is growing fairly fast: in 1870 it numbered 323,960, and in 1897 413,747, of whom 210,199 were women and 76,315 lived in towns; in 1906 it was estimated at 451,700. Ninety-six per cent, of the whole belong to the Lutheran Church. Education is, for Russia, relatively high.

The Esths, Ehsts or Esthonians, who call themselves Tallopoeg and Maamees, are known to the Russians as Chukhni or Chukh- ontsi, to the Letts as Iggauni, and to the Finns as Virolaiset. They belong tb

the Finnish family, and consequently to the Ural-Altaic division of the human race. Altogether they number close upon one million, and are thus distributed : 365,959 in Esthonia (in 1897), 518,594 in Livonia, 64,116 in the government of St Petersburg, 25,458 in that of Pskov, and 12,855 in other parts of Russia. As a race they exhibit manifest evi- dences of their Ural-Altaic or Mongolic descent in their short stature, absence of beard, oblique eyes, broad face, low forehead and small mouth. In addition to that they are an under-sized, ill-thriven people, with long arms and thin, short legs. They cling tenaciously to their native language, which is closely allied to the Finnish, and divisible into two, or according to some authorities into three, principal dialects — Dorpat Esthonian and Reval Esthonian, with Pernau Esthonian. Reval Esthonian, which preserves more carefully the full inflectional forms and pays greater attention to the laws of euphony, is recognized as the literary language. Since 1873 the cultivation of their mother- tongue has been sedulously promoted by an Esthonian Literary Society {Eesti Korjameeste Selts) , which publishes Toimetused, or " Instructions " in all sorts of subjects. They have a decided love of poetry, and exhibit great facility in improvising verses and poems on all occasions, and they sing, everywhere, from morning to night. Like the Finns they possess rich stores of

national songs. These, which bear an unmistakable family likeness to those of the great Finnish epic of the Kalevala, were collected as the Kalevi Poeg, and edited by Kreutswald (1857), and translated into German by Reinthal (1857-1859) and Bertram (1861) and by Lowe (1900). Other collections of Esthnische Volkslieder have been published by Neuss (1850- 1852) and Kreutzwald and Neuss (1854); while Kreutzwald (1866) and Jannsen (1888) have published collections of legends and national tales. The earliest publication in Esthonian was a Lutheran catechism in the 16th century. An Esthonian translation of the New Testament was printed at Reval in 171 5. Between 1813 and 1832 there appeared at Pernau twenty volumes of Beitrage zur genauern Kenntniss der esthnischen Sprache, by Rosenplanter, and from 1840 onwards many valuable papers on Esthonian subjects were contributed to the Verhandlungen der gelehrten esthnischen Gesellschaft zu Dorpat. F. J. Wiedemann, who laboured indefatigably in the registration and preservation of matters connected with Esthonian language and lore, published an Esthnisch-deutsches Worterbuch (1865; 2nd ed. by Hurt, 1 89 1, &c), and in 1903 there appeared at Reval a Deutsch- esthnisches Worterbuch, by Ploompun and Kann.

The Esthonians first appear in history as a warlike and predatory

race, the terror of the Baltic seamen in consequence of their piracies. More than one of the Danish kings made serious attempts to subdue them. Canute VI. invaded their country (1194-1196) and forced baptism upon many of them, but no sooner did his war-ships disappear than they reverted to their former heathenism. In 1219 Waldemar II. undertook a more formidable crusade against them, in the course of which he founded the town and episcopal see of Reval. By his efforts the northern portion of the race were made submissive to the Danish crown; but, though conquered, they were by no means subdued, and were incessantly in revolt, until, after a great rebellion in 1343, Waldemar IV. Atterdag sold for 19,000 marks his portion of Esthonia in 1346, to the order of the Knights of the Sword. These German crusaders had already, after a quarter of a century's fighting, in 1224 gained possession of the regions inhabited by the southern portion of the race, that is those now included in Livonia. From that time for nearly six hundred years or more the Esthonians were practically reduced to a state of serfdom to the German landowners. In 1521 the nobles and cities of Esthonia voluntarily placed themselves under the protection of the crown of Sweden; but after the wars of Charles XII., Esthonia was formally ceded to his victorious rival, Peter the Great, by the peace of Nystad (1721). Serfdom was abolished in 181 7 by Tsar Alexander I.; but the condition of the peasants was so little improved that they rose in open revolt in 1859. Since 1878, however, a vast change for the better has been effected in their economic position (see above) . The determining feature of their recent history has been the attempt made by the Russian government (since 1881) and the Orthodox Greek Church (since 1883) to russify and convert the inhabitants of the province, Germans and Esths alike, by enforcing the use of Russian in the schools and by harsh and repressive measures aimed at their native language.

See Merkel, Die freien Letten und Esthen (1820); Parrot, Versuch einer Entwickelung der Sprache, Abslammung, &c, der Liwen, Ldtten, Eesten (1839); F. Kruse, Urgeschichte des esthnischen Volksstammes (1846); Wiedemann, Grammatik der esthnischen Sprache (1875), and A us dem innern und aussern Leben der Esthen (1876); Koppen, Die Bewohner Esthlands (1847); F. Miiller, Beitrage zur Orographie und Hydrographie von Esthland (1869-1871); Bunge, Das Herzogthum Esthland unter den Konigen von Ddnemark (1877); and Seraphim, Geschichte Liv-, Est-, und Kurlands (2nd ed., 1897) and various papers in the Finnisch- Ugrische Forschungen.

(P. A. K.; J. T. Be.; C. El.)

ESTIENNE (or Etienne; the French form of the name; anglicized to Stephens, and latinized to Stephanus), a French family of scholars and printers.

The founder of the race was Henri Estienne (d. 1520), the scion of a noble family of Provence, who came to Paris in 1502, and soon afterwards set up a printing establishment at the top of the rue Saint-Jean de Beauvais, on the hill of Saint-Genevieve opposite the law school. He died in 1520, and, his three sons

being minors, the business was carried on by his foreman Simon de Colines, who in 1521 married his widow.

Robert Estienne (1503-1559) was Henri's second son. After his father's death he acted as assistant to his stepfather, and in this capacity superintended the printing of a Latin edition of the New Testament in i6mo (1523). Some slight alterations which he had introduced into the text brought upon him the censures of the faculty of theology. It was the first of a long series of disputes between him and that body. It appears that he had intimate relations with the new Evangelical preachers almost from the beginning of the movement, and that soon after this time he definitely joined the Reformed Church. In 1526 he entered into possession of his father's printing estab- lishment, and adopted as his device the celebrated olive-tree (a reminiscence doubtless of his grandmother's family of Mont-olivet), with the motto from the epistle to the Romans (xi. 20), Noli altum sapere, sometimes with the addition sed time. In 1528 he married Perrette, a daughter of the scholar and printer Josse Bade (Jodoous Badius), and in the same year he published his first Latin Bible, an edition in folio, upon which he had been at work for the last four years. In 1532 appeared his Thesaurus linguae Laiinae, a dictionary of Latin words and phrases, upon which for two years he had toiled incessantly, with no other assistance than that of Thierry of Beauvais. A second edition, greatly enlarged and improved, appeared in 1536, and a third, still further improved, in 3 vols, folio, in 1543. Though the Thesaurus is now superseded, its merits must not be forgotten. It was vastly superior to anything of the kind that had appeared before; it formed the basis of future labours, and even as late -as 1734 was considered worthy of being re-edited. In 1539 Robert was appointed king's printer for Hebrew and Latin, an office to which, after the death of Conrad Neobar in 1540, he united that

of king's printer for Greek. In 1 541 he was entrusted by Francis I. with the task of procuring from Claude Garamond, the engraver and type-founder, three sets of Greek type for the royal press. The middle size were the first ready, and with these Robert printed the editio princeps of the Ecclesiasticae Historiae of Eusebius and others (1544). The smallest size were first used for the i6mo edition of the New Testament known as the O mirificam (1546), while with the largest size was printed the magnificent folio of 1550. This edition involved the printer in fresh disputes with the faculty of theology, and towards the end of the following year he left his native town for ever, and took refuge at Geneva, where he published in 1552 a caustic and effective answer to his persecutors under the title Ad censuras theologorum Parisiensium, quibus Biblia a R. Stephano, Typo- grapho Regio, ex usa calumniose notarunt, eiusdem R. S. responsio. A French translation, which is remarkable for the excellence of its style, was published by him in the same year (printed in Renouard's Annates de I'imprinterie des Estienne). At Geneva Robert proved himself an ardent partisan of Calvin, several of whose works he published. He died there on the 7tr: of September 1559.

It is by his work in connexion with the Bible, and especially as an editor of the New Testament, that he is on the whole best known. The text of his New Testament of 1550, either in its original form or in such slightly modified form as it assumed in the Elzevir text of 1634, remains to this day the traditional text. But this is due rather to its typographical beauty than to any critical merit. The readings of the fifteen MSS. which Robert's son Henri had collated for the purpose were merely introduced into the margin. The text was still almost exactly that of Erasmus. It was, however, the first edition ever published with a critical apparatus of any sort. Of the whole Bible Robert printed eleven editions — eight in Latin, two in Hebrew and one in French; while of the New Testament alone he printed twelve — five in Greek, five in Latin and two in French. In the Greek New Testament of 1551 (printed at Geneva) the present division into verses was introduced for the first time. The editiones principes which issued from Robert's press were eight in number, viz. Eusebius, including the Praeparatio evangelica and the Demon- stratio evangelica as well as the Hisloria ecclesiastica already men- tioned (1544-1546), Moschopulus (1545), Dionysius of Halicarnassus (February 1547), Alexander Trallianus (January 1548), Dio Cassius (January 1548), Justin Martyr (1551), Xiphilinus (1551), Appian (155O, the last being completed, after Robert's departure from Paris, by his brother Charles, and appearing under his name. These

editions, all in folio, except the Moschopulus, which is in 4to, are unrivalled for beauty. Robert also printed numerous editions of Latin classics, of which perhaps the folio Virgil of 1 532 is the most noteworthy, and a large quantity of Latin grammars and other educational works, many of which were written by Maturin Cordier, his friend and co-worker in the cause of humanism.

Charles Estienne (1504 or 1505-1564), the third son of Henri, was, like his brother Robert, a man of considerable learning. After the usual humanistic training he studied medicine, and took his doctor's degree at Paris. He was for a time tutor to Jean Antoine de Ba'if, the future poet. In 1551, when Robert Estienne left Paris for Geneva, Charles, who had remained a Catholic, took charge of his printing establishment, and in the same year was appointed king's printer. In 1561 he became bankrupt, and he is said to have died in a debtors' prison.

His principal works are Praedium Rusticum (1554), a collection of tracts which he had compiled from ancient writers on various branches of agriculture, and which continued to be a favourite book down to the end of the 17th century; Dictionarium hisloricum ac poeticum (1553), the first French encyclopaedia; Thesaurus Ciceroni- anus (1557), and De dissectione partium corporis humani libri tres, with well-drawn woodcuts (1548). He also published a translation of an Italian comedy, Gli Ingannati, under the title of Le Sacrifice (1543; republished as Les Abuses, 1549), which had some influence on the development of French comedy; and Paradoxes (1553), an imitation of the Paradossi of Ortensio Landi.

Henri Estienne (1531-1598), sometimes called Henri II., was the eldest son of Robert. In the preface to his edition of Aulus Gellius (1585), addressed to his son Paul, he gives an interesting account of his father's household, in which, owing to the various nationalities of those who were employed on the press, Latin was used as a common language. Henri thus picked up Latin as a child, but by his own request he was allowed to learn Greek as a serious study before Latin. At the age of fifteen he become a pupil of Pierre Danes, at that time the first Greek scholar in France. Two years later he began to attend the lectures of Jacques Toussain, one of the royal professors of Greek, and in the same year (1545) was employed by his father to collate a MS. of Dionysius of Halicarnassus. In 1547 he went to Italy, where he spent three years in hunting for and collating MSS. and in intercourse with learned men. In 1550 he visited England, where he was favourably received by Edward VI., and then Flanders, where he learnt Spanish. In 1551 he joined his father at Geneva,

which henceforth became his home. In 1554 he gave to the world, as the firstfruits of his researches, two first editions, viz. a tract of Dionysius of Halicarnassus and the so-called " Anacreon." In 1556 he discovered at Rome ten new books (xi.-xx.) of Diodorus Siculus. In 1557 he issued from the press which in the previous year he had set up at Geneva three first editions, viz. Athenagoras, Maximus Tyrius, and some fragments of Greek historians, including Appian's 'Avvif3a\iK7), and 'l^ripuct] and an edition of Aeschylus, in which for the first time the Agamemnon was printed in entirety and as a separate play. In 1559 he printed a Latin translation from his own pen of Sextus Empiricus, and an edition of Diodorus Siculus with the new books. His father dying in the same year, he became under his will owner of his press, subject, however, to the condition of keeping it at Geneva. In 1566 he published his best-known French work, the Apologie pour Hfrodole, or, as he himself called it, L' Introduction au traits de la conformiti des merveilles anciennes avec les modernes ou Traitt priparatij a l' Apologie pour Hirodote. Some passages being considered objectionable by the Geneva consistory, he was compelled to cancel the pages containing them. The book became highly popular, and within sixteen years twelve editions were printed. In 1572 he published the great work upon which he had been labouring for many years, the Thesaurus Graecae linguae, in 5 vols. fol. The publication in 1578 of his Deux Dialogues du nouveau franqois Italianize brought him into a fresh dispute with the consistory. To avoid their censure he went to Paris, and resided at the French court for a year. On his return to Geneva he was summoned before the consistory, and, proving contumacious, was imprisoned for a week. From this time his life became more and more of a nomad one. He is to be found

at Basel, Heidelberg, Vienna, Pest, everywhere but at Geneva, these journeys being undertaken partly in the hope of procuring patrons and purchasers, for the large sums which he had spent on such publications as the Thesaurus and the Plato of 1578 had almost ruined him. His press stood nearly at a standstill. A few editions of classical authors were brought out, but each successive one showed a falling off. Such value as the later ones had was chiefly due to the notes furnished by Casaubon, who in 1586 had married his daughter Florence. His last years were marked by ever-increasing infirmity of mind and temper. In 1597 he left Geneva for the last time. After visiting Mont- pellier, where Casaubon was now professor, he started

for Paris, but was seized with sudden illness at Lyons, and died there at the end of January 1598.

Few men have ever served the cause of learning more devotedly. For over thirty years the amount which he produced, whether, as printer, editor or original writer, was enormous. The productions of his press, though printed with the same beautiful type as his father's books, are, owing to the poorness of the paper and ink, inferior to them in general beauty. The best, perhaps, from a typographical point of view, are the Poetae Graeci principes (folio, 1566), the Plutarch (13 vols. 8vo, 1572), and the Plato (3 vols, folio, 1578). It was rather his scholarship which gave value to his editions. He was not only his own press-corrector but his own editor. Though by the latter half of the 16th century nearly all the important Greek and Latin authors that we now possess had been published, his untiring activity still found some gleanings. Eighteen first editions of Greek authors and one of a Latin author are due to his press. The most important have been already mentioned. Henri's reputation as a scholar and editor has increased of late years. His familiarity with the Greek language has always been admitted to have been quite exceptional ; but he has been accused of want of taste and judgment, of carelessness and rashness. Special censure has been passed on his Plutarch, in which he is said to have intro- duced conjectures of his own into the text, while pretending to have derived them from MS. authority. But a late editor, Sintenis, has shown that, though like all the other editors of his day he did not give references to his authorities, every one of his supposed conjectures can be traced to some MS. Whatever [may be said as to his taste or his judgment, it seems that he was both careful and scrupulous, and that he only resorted to conjecture when authority failed him. And, whatever the merit of his conjectures, he was at any rate the first to show what conjecture could do towards restoring a hopelessly corrupt passage. The work, however, on which his fame as a scholar is most surely based is the Thesaurus Graecae linguae. After making due allowance for the fact that considerable materials for the work had been already collected by his father, and that he received considerable assistance from the German scholar Sylburg, he is still entitled to the very highest praise as the producer of a work which was of the greatest service to scholarship and which in those early days of Greek learning could have been produced by no one but a giant. Two editions of the Thesaurus were published in the 19th century — at London by Valpy (1815-1825) and at Paris by Didot (1831-1863).

It was one of Henri Estienne's great merits that, unlike nearly all the French scholars who preceded him, he did not neglect his own

language. In the Trajle de la conformitS du langage francois avec le Grec (published in 1565, but without date; ed. L. Feugere, 1850), French is asserted to have, among modern languages, the most affinity with Greek, the first of all languages. Deux Dialogues du nouveau francois Italianize (Geneva, 1578; ed. P. Ristelhuber, 2 vols., 1885) was directed against the fashion prevailing in the court of Catherine de' Medici of using Italian words and forms. The Project du livre intitule de la Precellence du langage francois (Paris, 1579; ed. E. Huguet, 1896) treats of the superiority of French to Italian. An interesting feature of the Precellence is the account of French proverbs, and, Henry III. having expressed some doubts as to the genuineness of some of them, Henri Estienne published, in 1594, Les Premices ou le I. livre des Proverbes epigrammatizez (never reprinted and very rare).

Finally, there remains the Apologie pour Herodole, his most famous work. The ostensible object of the book is to show that the strange stories in Herodotus may be paralleled by equally strange ones of modern times. Virtually it is a bitter satire on the writer's age, especially on the Roman Church. Put together without any method, its extreme desultoriness makes it difficult to read continuously, but the numerous stories, collected partly from various literary sources, notably from the preachers Menot and Maillard, partly from the writer's own multifarious experience, with which it is packed, make it an interesting commentary on the manners and fashions of the time. But satire, to be effective, should be either humorous or righteously indignant, and, while such humour as there is in the Apologie is decidedly heavy, the writer's indignation is generally forgotten in his evident relish for scandal. The style is, after all, its chief merit. Though it bears evident traces of hurry, it is, like that of all Henri Estienne's French writings, clear, easy and vigorous,

uniting the directness and sensuousness of the older writers with a suppleness and logical precision which at this time were almost new elements in French prose. An edition of the Apologie has recently been published by Liseux (ed. Ristelhuber, 2 vols., 1879), after one of the only two copies of the original uncancelled edition that are known to exist. The very remarkable political pamphlet entitled Discours merveilleux de la vie et actions et deportemens de Catherine de Medicis, which appeared in 1574, has been ascribed to Henri Estienne, but the evidence both internal and external is con- clusive against his being the author of it. Of his Latin writings the most worthy of notice are the.De Latinitate falso suspecta (1576), the Pseudo-Cicero (1577) and the Nizoliodidascalus (1578), all three written against the Ciceronians, and the Franco] or diense Emporium

(1574), a panegyric on the Frankfort fair (reprinted with a French translation by Liseux, 1875). He also wrote a large quantity of indifferent Latin verses, including a long poem entitled Musa monitrix Principum (Basel, 1590).

The primary authorities for an account of the Estiennes are their own works. In the garrulous and egotistical prefaces which Henri was in the habit of prefixing to his editions will be found many scattered biographical details. Twenty-seven letters from Henri to John Crato of Crafftheim (ed. F. Passow, 1830) have been printed, and there is one of Robert's in Herminjard's Correspondence des Reformateurs dans de pays de langue francaise (9 vols, published 1866-1897), while a few other contemporary references to him will be found in the same work. The secondary authorities are Janssen van Almeloveen, De vitis Stephanorum (Amsterdam, 1683); Maittaire, Stephanorum historia (London, 1709); A. A. Renouard, Annates de V imprimerie des Estienne (2nd ed., Paris, 1843); the article on Estienne by A. F. Didot in the Nouv. Biog. gen.; Mark Pattison, Essays, i. 67 ff . (1889) ; L. Clement, Henri Estienne et son oeuvre francaise (Paris, 1899). There is a good account of Henri's Thesaurus in the Quart. Rev. for January 1820, written by Bishop Blomfield. (A. A. T.)

ESTON, an urban district in the Cleveland parliamentary division of the North Riding of Yorkshire, England, 4 m. S.E. of Middlesbrough, on a branch of the North Eastern railway. Pop. (1901) 11,199. This is one of the principal centres from which the great ironstone deposits of the Cleveland Hills are worked, and there are extensive blast-furnaces, iron-foundries and steam sawing-mills in the district. Immediately W. of Eston lies the urban district of Ormesby (pop. 9482), and the whole district is densely populated (see Middlesbrough). Marton, west of Ormesby, was the birthplace of Captain Cook (1 728). Numerous early earthworks fringe the hills to the south.

ESTOPPEL (from O. Fr. estopper, to stop, bar; estoupe, mod. eloupe, a plug of tow; Lat. stuppa), a rule in the law of evidence by which a party in litigation is prohibited from asserting or denying something, when such assertion or denial would be inconsistent with his own previous statements or conduct. Estoppel is said to arise in three ways — (1) by record or judg- ment, (2) by deed, and (3) by matter in pais or conduct. (1) Where a cause of action has been tried and final judgment has been pronounced, the judgment is conclusive — either party attempting to renew the litigation by a new action would be estopped by the judgment. " Every judgment is conclusive proof as

against parties and privies, of facts directly in issue in the case, actually decided by the court, and appearing from the judgment itself to be the ground on which it was based." — Stephen's Digest of the Law of Evidence, Art. 41. (2) It is one of the privileges of deeds as distinguished from simple contracts that they operate by way of estoppel. " A man shall always be estopped by his own deed, or not permitted to aver or prove anything in contradiction to what he has once so solemnly and deliberately avowed " (Blackstone, 2 Com. 295); e.g. where a bond recited that the defendants were authorized by acts of parliament to borrow money, and that under such authority they had borrowed money from a certain person, they were estopped from setting up as a defence that they did not in fact so borrow money, as stated by their deed. (3) Estoppel by conduct, or, as it is still sometimes called, estoppel by matter in pais, is the most important head. The rule practically comes to this that, when a person in his dealings with others has acted so as to induce them to believe a thing to be true and to act on such belief, he may not in any proceeding between himself and them deny the thing to be true: e.g. a partner retiring from a firm without giving notice to the customers, cannot, as against a customer having no knowledge of his retirement, deny that he is a partner.

As between landlord and tenant the principle operates to prevent the denial by the tenant of the landlord's title. So if a person comes upon land by the licence of the person in possession, he cannot deny that the licenser had a title to the possession at the time the licence was given. Again, if a man accepts a bill of exchange he may not deny the signature or the capacity of the drawer. So a person receiving goods as baillee from another cannot deny the title of that other to the goods at the time they were entrusted to him.

Estoppel of whatever kind is subject to one general rule, that it cannot override the law of the land; for example, a corpora- tion would not be estopped as to acts which are ultra vires.

See L. F. Everest and E. Strode, The Law of Estoppel; M. Cababe, Principles of Estoppel.

ESTOUTEVILLE, GUILLAUME D' (1403-1483), French ecclesiastic, was bishop of Angers, of Digne, of Porto and Santa Rufina, of Ostia and Velletri, archbishop of Rouen, prior of Saint Martin des Champs,

abbot of Mont St Michel, of St Ouen at Rouen, and of Montebourg. He was sent to France as legate by Pope Nicholas V. to make peace between Charles VII. and England (1451), and undertook, ex officio, the revision of the trial of Joan of Arc; he afterwards reformed the statutes of the university of Paris. He then went to preside over the assembly of clergy which met at Bourges to discuss the observation of the Pragmatic Sanction (see Basel, Council of), finally returning to Rome, where he passed almost all the rest of his life. He was a great builder, Rouen, Mont St Michel, Pontoise and Gaillon owing many noble buildings to his initiative.

ESTOVERS (from the O. Fr. estover, estovoir, a verb used as a substantive in the sense of that which is necessary; the word is of disputed origin; it has been referred to the Lat. stare, to stand, or studere, to desire), a term, in English law, for the wood which a tenant for life or years may take from the land he holds for repair of his house, the implements of husbandry, and the hedges and fences, and for firewood. The O. Eng. word for estover was bote or boot (literally meaning " good," " profit," the same word as seen in " better "). The various kinds of estovers were thus known as house-bote, cart or plough-bote, hedge or hay-bote, and fire-bote respectively. These rights may, of course, be restricted by express covenants. Copyholders have similar rights over the land they occupy and over the waste of the manor, in which case the rights are known as " Commons of estovers." (See Commons.)

ESTRADA, LA, a town of north-western Spain, in the province of Pontevedra, 15 m. S. by E. of Santiago de Compostela. Pop. (1900) 23,916. La Estrada is the chief town of a densely-popu- lated mountainous district; its industries are agriculture, stock- breeding, and the manufacture of linen and woollen cloth. Timber from the mountain forests is conveyed from La Estrada to the river Ulla, 4 m. N., and thence floated down to the sea- ports on Arosa Bay. The nearest railway-station is Requeijo, 7 m. W., on the Pontevedra-Santiago railway. There are mineral springs at La Estrada and at Caldas de Reyes, 11 m.

w.s.w.

ESTRADE, a French architectural term for a raised platform (see Dais). In the Levant the estrade of a divan is called Sopha (Blondel), from which comes our " sofa."

ESTRADES, GODEFROI, Comte d' (1 607-1 686), French diplomatist and marshal, was born at Agen. He was the son of Francois

d'Estrades (d. 1653), a' partisan of Henry IV., and brother of Jean d'Estrades, bishop of Condom. He became a page to Louis XIIL, and at the age of nineteen was sent on a mission to Maurice of Holland. In 1646 he was named ambassador extra- ordinary to Holland, and took part in the conferences at Miinster. Sent in 1661 to England, he obtained in 1662 the restitution of Dunkirk. In 1667 he negotiated the treaty of Breda with the king of Denmark, and in 1678 the treaty of Nijmwegen, which ended the war with Holland. Independently of these diplomatic missions, he took part in the principal campaigns of Louis XIV., in Italy (1648), in Catalonia (1655), in Holland (1672); and was created marshal of France in 167s. He left Lettres, mSmoires el negotiations en quality d'ambassadeur en Hollande depuis i66j

jusqu' en 1668, of which the first edition in 1709 was followed by a nine-volume edition (London (the Hague), 1743).

Of the sons of Godefroi d'Estrades, Jean Francois d'Estrades was ambassador to Venice and Piedmont; Louis, marquis d'Estrades (d. 1 7 1 1) , succeeded his father as governor of Dunkirk, and was the father of Godefroi Louis, comte d'Estrades,lieutenant- general, who was killed at the siege of Belgrade, 171 7.

See Felix Salomon, Frankreichs Beziehungen zu dem Scottischen Aufstand (1637-1640), containing an excursus on the falsification of the letters of the comte d'Estrades; Philippe Lauzun, Le Marechal d'Estrades (Agen, 1896).

ESTREAT (0. Fr. estrait, Lat. extracta) , originally, a true copy or duplicate of some original writing or record; now used only with reference to the enforcement of a forfeited recognizance. At one time it was the practice to extract and certify into the exchequer copies of entries in court rolls which contained pro- vision^ or orders in favour of the treasury, hence the estreating of a recognizance was the taking out from among the other records of the court in which it was filed and sending it to the exchequer to be enforced, or sending it to the sheriff to be levied by him, and then returned by the clerk of the peace to the lords of the treasury. (See Recognizance.)

ESTREES, GABRIELLE D' (1573-1599), mistress of Henry IV. of France, was the daughter of Antoine d'Estrees, marquis of Cceuvres, and Francoise Babou de la Bourdaisiere. Henry IV., who in November 1590 stayed at the castle of Cceuvres, became violently enamoured of her. Her father, anxious to save his daughter from so perilous an entanglement, married her to Nicholas d'Amerval,

seigneur de Liancourt, but the union proved unhappy, and in December 1592, Gabrielle, whose affection for the king was sincere, became his mistress. She lived with him from December 1592 onwards, and bore him several children, who were recognized and legitimized by him. She possessed the king's entire confidence; he willingly listened to her advice, and created her marchioness of Monceaux, duchess of Beaufort (1597) and Etampes (1598), a peeress of P'rance. The king even proposed to marry her in the event of the success of his suit for the nullification by the Holy See of his marriage with Margaret of Valois; but before the question was settled Gabrielle died, on the 10th of April 1599. Poison was of course suspected; but her death was really caused by puerperal convulsions (eclampsia).

See Adrien Desclozeaux, Gabrielle d'Estrees, Marquise de Monceaux, 8fc. (Paris, 1889).

ESTREMADURA, or Extremadura, an ancient territorial division of central and western Portugal, and of western Spain; comprising the modern districts of Leiria, Santarem and Lisbon, in Portugal, and the modern provinces of Badajoz and Caceres in Spain. Pop. (1900) 2,095,818; area, 23,055 sq. m. The name of Estremadura appears to be of early Romance or Late Latin origin, and probably was applied to all the far western lands (extrema ora) bordering upon the lower Tagus, as.far as the Atlantic Ocean. It is thus equivalent to Land's End, or Finistere. In popular speech it is more commonly used than the names of the modern divisions mentioned above, which were created in the 19th century. As, however, there are many racial, economic and historic differences between Portuguese and Spanish Estre- madura, the two provinces are separately described below.

1. Portuguese Estremadura is bounded on the N. by Beira, E. and S. by Alemtejo, and W. by the Atlantic Ocean. Pop. (1900) 1,221,418; area, 6937 sq. m. The greatest length of the province, from N. to S., is 165 m.; its greatest breadth, from E. to W. , is 7 2 m. The general uniformity of the coast-line is broken by the broad and deep estuaries of the Tagus and the Sado, and by the four conspicuous promontories of Cape Carvoeiro, Cape da Roca, Cape Espichel and Cape de Sines. The Tagus is the great navigable waterway of Portuguese Estremadura, flowing from north-east to south-west, and fed by many minor tributaries, notably the Zezere on the right and the Zatas on the left. It divides the country into two nearly equal portions, wholly dissimilar in surface and character. South of the Tagus the land is almost everywhere low, flat and monotonous, while in several places it is rendered unhealthy by undrained marshes. The

Sado, which issues into Setubal Bay, is the only important river of this region. North of the Tagus, and parallel with its right bank, extends the mountain chain which is known at its northern extremity as the Serra do Aire and, where it terminates above Cape da Roca, as the Serra da Cintra. This ridge, which is buttressed on all sides by lesser groups of hills, and includes part of the famous lines of Torres Vedras (q.v.), exceeds 2200 ft. in height, and constitutes the watershed between the right-hand tributaries of the Tagus and the Liz, Sizandro and other small rivers which flow into the Atlantic. On its seaward side, except for the line of sheer and lofty cliffs between Cape Carvoeiro and Cape da Roca, the country is mostly flat and sandy, with exten- sive heaths and pine forests; but along the fertile and well- cultivated right bank of the Tagus the river scenery, with its terraced hills of vines, olives and fruit trees, often resembles that of the Rhine in Germany. The natural resources of Portu- guese Estremadura, with its inhabitants, industries, commerce, communications, &c, are described under Portugal; for on such matters there is little to be said of this central and most characteristic province which does not apply to the whole kingdom. Separate articles are also devoted to Lisbon, the capital, and Abrantes, Cintra, Leiria, Mafra, Santarem, Setubal, Thomar, Torres Novas and Torres Vedras, the other chief towns. The women of Peniche, a small fishing village on the promontory of Cape Carvoeiro, have long been celebrated throughout Portugal for their skill in the manufacture of fine laces.

2. Spanish Estremadura is bounded on the N. by Leon and Old Castile, E. by New Castile, S. by Andalusia, and W. by the Portuguese province of Beira and Alemtejo, which separate it from Portuguese Estre.nadura. Pop. (1900) 882,410; area, 16,118 sq. m. Spanish Estremadura consists of a tableland separated from Leon and Old Castile by the lofty Sierra de Gredos, the plateau of Bejar and the Sierra de Gata, which form an almost continuous barrier along the northern frontier, with its summits ranging from 6000 to more than 8500 ft. in altitude. On the south the comparatively low range of the Sierra Morena constitutes the frontier of Andalusia; on the east and west there is a still more gradual transition to the plateau of New Castile and the central plains of Portugal. The tableland of Spanish Estremadura is itself bisected from east to west by a line of mountains, the Sierras of San Pedro, Montanchez and Guadalupe (40006000 ft.), which separate its northern half, drained

by the river Tagus, from its southern half, drained by the Guadiana. These two halves are respectively known as Alta or Upper Estremadura (the modern Caceres), and Baja or Lower Estremadura (the modern Badajoz). The Tagus and Guadiana flow from east to west through a monotonous country, level or slightly undulating, often almost uninhabited, and covered with a thin growth of shrubs and grass. Perhaps the most charac- teristic feature of this tableland is the vast heaths of gum-cistus, which in spring colour the whole landscape with leagues of yellow blossom, and in summer change to a brown and arid wilderness.

The climate in summer is hot but not unhealthy, except in the swamps which occur along the Guadiana. The rainfall is scanty; dew, however, is abundant and the nights are cool. Although the high mountains are covered with snow in November, the winters are not usually severe. The soil is naturally fertile, but drought, floods and locusts render agriculture difficult, and sheep-farnrng is the most important of Estremaduran industries. (See . Spain: Agriculture.) In the 19th century, however, this industry lost much of its former importance owing to foreign competition.

Immense herds of swine are bred and constitute a great source of support to the inhabitants, not only supplying them with food, but also forming a great article of export to other provinces — the pork, bacon and hams being in high esteem. The beech, oak and chestnut woods afford an abundance of food for swine, and there are numerous plantations of olive, cork and fruit trees, but a far greater aˆea of forest has been destroyed. For an account of commerce, mining, communications, &c, in Spanish Estremadura, with a list of the chief towns, see Caceres and

Badajoz. In character and physical type, the people of this region are less easily classified than those of other Spanish provinces. They lack the endurance and energy of the Galicians, the independent and enterprising spirit of the Asturians, Basques and Catalans, the culture of the Castilians and Andalusians. Their failure to develop a distinctive local type of character and civilization is perhaps due to the adverse economic history of their country. The two great waterways which form the natural outlet for Estremaduran commerce flow to the Atlantic through a foreign and, for centuries, a hostile territory. Like other parts of Spain, Estremadura suffered severely from the expulsion of the Jews and Moors (1492-1610) ,while the compensating treasure, derived during the same period from Spanish America, never reached a province so remote at once from the sea and from the chief centres of national life. Although

Cortes (1485-1547), the conqueror of Mexico and Pizarro (c. 1471-1541), the con- queror of Peru, were both born in Estremadura, their exploits, far from bringing prosperity to their native province, only en- couraged the emigration of its best inhabitants. Heavy taxation and harsh land-laws prevented any recovery, while the felling of the forests reduced many fertile areas to waste land, and ren- dered worse a climate already unfavourable to agriculture. Few , countries leave upon the mind of the traveller a deeper impression , of hopeless poverty.

ESTREMOZ, a town of Portugal, in the district of Evora, formerly included in the province of Alemtejo; 104 m. by rail E. of Lisbon, on the Casa Branca-Evora-Elvas railway. Pop. (1900) 7920. Estremoz is built at the base of a hill crowned by a large dismantled citadel; its fortifications, which in the 17th century accommodated 20,000 troops and rendered the town one of the principal defences of the frontier, are now obsolete. There are marble quarries in the neighbourhood, and the Estremoz bilhas, red earthenware jars, are used throughout Portugal as water-holders and exported to Spain. At Ameixial (1188) and Montes Claros, near Estremoz, the Spanish were severely defeated by the Portuguese in 1663 and 1665. Villa Vicosa (3841), 10 m. S.E., is a town of pre-Roman origin, containing a royal palace. The altars with Latin inscriptions to the Iberian god Endo- vellicus, found at Villa Vicosa, are preserved in the museum of the Royal Academy of Sciences, Lisbon.

ESTUARY (from the Lat. aestuarium, a place reached by aestus, the tide), an arm of the sea narrowing inwards at the mouth of a river where sea and fresh water meet and are mixed, i.e. the tidal portion of a river's mouth. Structurally the estuary may represent the long-continued action of river erosion and tidal erosion confined to a narrow channel, most effective where most concentrated, or an estuary may be the drowned portion of the lower part of a river-valley. In a map of Britain showing sea-depths it will be observed that under the Severn estuary the sea deepens in a number of steps descending by concentric V's that become blunter towards deep water until the last is a mere indentation pointing towards the long narrow termination of the present estuary. In this and in similar cases the progress of the estuary is indicated upon what is now the continental shelf. The chief interest in estuarine conditions is the mingling of sea and fresh water. Where, as in the Severn and the Thames, the fresh water meets the sea gradually the water is mixed, and there is very little change in salinity at high tide. The fresh water flows over the salt water and there is a continuous rapid change , in salinity towards the sea, for the currents sweeping in and out mix the water

constantly. Where the river brings down a great quantity of fresh water in a narrow channel, the change of salinity at high and low water is very marked. " When, however, the inlet is very large compared with the river, and there is no bar at the opening, the estuarine character is only shown at the upper end. In the Firth of Forth, for example, the landward half is an estuary, but in the seaward half the water has become more thoroughly mixed, the salinity is almost uniform from surface to bottom, and increases very gradually towards the sea. The river-water meets the sea diffused uniformly through a deep mass of water scarcely fresher than the sea itself, so that the two mix uniformly, and the sea becomes slightly freshened

throughout its whole depth for many miles from land" (H. R. Mill, Realm 0} Nature, 1897).

ESZTERGOM (Ger. Gran; Lat. Strigonium), a town of Hungary, capital of the county of the same name, 36 m. N.W. of Budapest by rail. • Pop. (1900) 16,948, mostly Magyars and Roman Catholics. It is situated on the right bank of the Danube, nearly opposite the confluence of the Gran, and is divided into the town proper and three suburbs. The town is the residence of the primate of Hungary, and its cathedral, built in 1821-1870, after the model of St Peter's at Rome, is one of the finest and largest in the country. It is picturesquely built on an elevated and commanding position, 215 ft. above the Danube, and its dome, visible from a long distance, is 260 ft. high, and has a diameter of 52 ft. The interior is very richly decorated, notably with fine frescoes, and its treasury and fine library of over 60,000 volumes are famous. Besides several other churches and two monastic houses, the principal buildings include the handsome palace of the primate, erected in 1883 ; the archiepiscopal library, with valuable incunabula and old MSS.; the seminary for the education of Roman Catholic priests; the residences of the chapter; and the town-hall. The population is chiefly employed in cloth- weaving, wine-making and agricultural pursuits. An iron bridge, 1664 ft. long, connects Esztergom with the market town of Parkany (pop. 2836) on the opposite bank of the Danube.

Esztergom is one of the oldest towns of Hungary, and is famous as the birthplace of St Stephen, the first prince crowned " apostolic king " of Hungary. During the early times of the Hungarian monarchy it

was the most important mercantile centre in the country,. and it was the meeting-place of the diets of 1016, 11 n, 1 1 14 and 1256. It was almost completely destroyed by Tatar hordes in 1241, but was rebuilt and fortified by King Bela IV. In 1543 it fell into the hands of the Turks, from whom it was recovered, in 1595, by Carl von Mansfeld. In 1604 it reverted to the Turks, who held it till 1683, when it was regained by the united forces of John Sobieski, king of Poland, and Prince Charles of Lorraine. It was created an archbishopric in 1001. During the Turkish occupation of the town the archbishopric was re- moved to Tyrnau, while the archbishop himself had his residence in Pressburg. Both returned to Esztergom in 1820. In 1708 it was declared a free city by Joseph I. On the 13th of April 18 18 it was partly destroyed by fire.

For numerous authorities on the see and cathedral of Esztergom see V. Chevalier, Repertoire des sources. Topo-bibliogr. s.v. " Gran." Of these may be mentioned especially F. Knauz, Monumenta Ecclesiae Strigoniensis (3 vols., Eszterg, 1874); Joseph Danko, Geschichtliches . . . aus dem Graner Domschatz (Gran, 1880).

ETAGˆRE, a piece of light furniture very similar to the English what-not, which was extensively made in France during the latter part of the 1 8th century. As the name implies, it consists of a series of stages or shelves for the reception of ornaments or other small articles. Like the what-not it was very often corner- wise in shape, and the best Louis XVI. examples in exotic woods are exceedingly graceful and elegant.

ETAH, a town and district of British India, in the Agra division of the United Provinces. The town is situated on the Grand Trunk road. Pop. (1901) 8796. The district has an area of 1737 sq. m. The district consists for the most part of an elevated alluvial plateau, dipping down on its eastern slope into the valley of the Ganges. The uplands are irrigated by the Ganges canal. Between the modern bed of the Ganges and its ancient channel lies a belt of fertile land, covered with a rich deposit of silt, and abundantly supplied with natural moisture. A long line of swamps and hollows still marks the former course of the river; and above it rises abruptly the original cliff which now forms the terrace of the upland plain. The Kali Nadi, a small stream flowing in a deep and narrow gorge, passes through the centre of the district, and affords an outlet for the surface drainage. Etah was at an early date the seat of a primitive Aryan civilization, and the surrounding country is mentioned by Hsiian Tsang, the Chinese Buddhist pilgrim of the 7th century a.d., as rich in temples and monasteries. But after the bloody repression of

Buddhism before the 8th century, the district seems to have fallen once more into the hands of aboriginal

tribes, from whom it was wrested a second time by Rajputs during the course of their great migration eastward. With the rest of upper India it passed under the sway of Mahmud of Ghazni in 1017, and thenceforth followed the fortunes of the Mahommedan empire. At the end of the 18th century it formed part of the territory over which the wazir of Oudh had made himself ruler, and it came into the possession of the British government in 1801, under the treaty of Lucknow. During the mutiny of 1857 it was the scene of serious disturbances, coupled with the usual anarchic quarrels among the native princes. In 1901 the population was 863,948, showing an increase of 23% in the decade due to the extension of canal irrigation. It is traversed by a branch of the Rajputana railway from Agra to Cawnpore, with stations at Kasganj and Soron, which are the two largest towns. It has several printing presses, indigo factories, and factories for pressing cotton, and there is a considerable agricultural export trade.

ETAMPES, ANNE DE PISSELEU D'HEILLY, Duchesse d' (1508-c. 1580), mistress of Francis I. of France, daughter of Guillaume de Pisseleu, sieur d'Heilly, a nobleman of Picardy. She came to court before 1522, and was one of the maids of honour of Louise of Savoy. Francis I. made her his mistress, probably on his return from his captivity at Madrid (1526), and soon gave up Madame'de Chateaubriant for her. Anne was sprightly, pretty, witty and cultured, and succeeded in keeping the favour of the king till the end of the reign (1547). The liaison received some official recognition; when Queen Eleanor entered Paris (153°), the king and Anne occupied the same window. In 1533 Francis gave her in marriage to Jean de Brosse, whom he created due d'Etampes. The influence of the duchesse d'Etampes, especially in the last years of the reign, was considerable. She upheld Admiral Chabot against the constable de Montmorency, who was .supported by her rival, Diane de Poitiers, the dauphin's mistress. She was a friend to new ideas, and co-operated with the king's sister, Marguerite d'Angouleme. She used her influence to elevate and enrich her family, her uncle, Antoine Sanguin (d. 1559), being made bishop of Orleans in 1535 and a cardinal in 1539. 1 The accusations made against her of having allowed herself to be won over by the emperor Charles V. and of playing the traitor in 1 544 rest on no serious proof. After the death of Francis I. (1547) she was dismissed from the court by Diane de Poitiers, humiliated in every way, and died in obscurity much later, probably in the reign of Henry III.

See Paulin Paris, Etudes sur Francois I" (Paris, 1885).

ETAMPES, a town of northern France, capital of an arrondisse- ment in the department of Seine-et-Oise, on the Orleans railway, 35 m. S. by W. of Paris. Pop. (1906) 8720. Etampes is a long straggling town hemmed in between the railway on the north and the Chalouette on the south; the latter is a tributary of the Juine which waters the eastern outskirts of the town. A fine view of Etampes is obtained from the Tour Guinette, a ruined keep built by Louis VI. in the 1 2th century on an eminence on the other side of the railway. Notre-Dame du Fort, the chief church, dates from the nth and 12th centuries; irregular in plan, it is remarkable for a fine Romanesque tower and spire, and for the crenellated wall which partly surrounds it. The interior contains ancient paintings and other artistic works. St Basile (12th and 16th centuries), which preserves a Roman- esque doorway, and St Martin (12th and 13th centuries), with a leaning tower of the 16th century, are of less importance. The civil buildings offer little interest, but two houses named after Anne de Pisseleu (see above), mistress of Francis I., and Diane de Poitiers, mistress of Henry II., are graceful examples of Renais- sance architecture. In the square there is a statue of the naturalist, Geoffroy Saint-Hilaire, who was born in Etampes. The subprefecture, a tribunal of first instance, and a communal college are among the public institutions of Etampes. Flour-milling,

1 The chateau of Meudon, belonging to the Sanguin family, was handed over to the duchesse d'Etampes in 1539. Sanguin was translated to Limoges in 1546, and became archbishop of Toulouse in 1550.

metal-founding, leather-dressing, printing and the manufacture of boots and shoes and hosiery are carried on; there are quarries of paving-stone, nurseries and market gardens in the vicinity, and the town has important markets for cereals and sheep.

£tampes (Lat. Slampae) existed at the beginning of the 7th century and in the early middle ages belonged to the crown domain. During the middle ages it was the scene of several councils, the most notable of which took place in 1130 and resulted in the recognition of Innocent II. as the legitimate pope. In 1652, during the war of the Fronde it suffered severely at the hands of the royal troops under

Turenne.

Lords, Counts and Dukes of Etampes. — The lordship of Etampes, in what is now the department of Seine et Oise in France, be- longed to the royal domain, but was detached from it on several occasions in favour of princes, or kings' favourites. St Louis gave it to his mother Blanche of Castile, and then to his wife Marguerite of Provence. Louis, the brother of Philip the Fair, became lord of Etampes in 13 17 and count in 1327; he was succeeded by his son and his grandson. Francis I. raised the countship of Etampes to'the rank of a duchy for his mistress Anne de Pisseleu D 'Heilly. The new duchy passed to Diane de Poitiers (I 553)> to Catherine of Lorraine, duchess of Montpensier (1578), to Marguerite of Valois (1582) and to Gabrielle d'Estrees (1598). The latter transmitted it to her son, Cesar of Vendome, and his descendants held it till 17 12. It then passed by inheritance to the families of Bourbon-Conti and of Orleans. . STAPLES, a town of northern France, in the department of Pas-de-Calais, on the right bank of the estuary of the Canche, 3 m. from the Straits of Dover, 17 m. S. of Boulogne by rail. Pop. (1906) 5136. Etaples has a small fishing and commercial port which enjoyed a certain importance during the middle ages. Boat-building is carried on. There is an old church with a statue of the Virgin much revered by the sailors. The Canche is crossed by a bridge over 1600 ft. in length. Le Touquet, in the midst of pine woods, and the neighbouring watering-place of Paris-Plage, 35 m. W. of Etaples at the mouth of the estuary, are much frequented by English and French visitors for golf, tennis and bathing, and Etaples itself is a centre for artists. Antiquarian discoveries in the vicinity of Etaples have led to the conjecture that it occupies the site of the Gallo-Roman port of Quentovicus. In 1492 a treaty was signed here between Henry VII., king of England, and Charles VIII., king of France.

ETAWAH, a town and district of British India, in the Agra division of the United Provinces. The town is situated on the left bank of the Jumna, and has a station on the East Indian railway, 206 m. from Allahabad. Pop. (1901) 42,570. Deep fissures intersect the various quarters of the town, over which broad roads connect the higher portions by bridges and embank- ments. The Jama Masjid (Great Mosque) is the chief archi- tectural ornament of Etawah. It was originally a Hindu temple, and was adapted to its present use by the Mahommedan con- querors. Several fine Hindu temples also stand about the mound on which are the ruins of the ancient fort. Etawah is now only the civil headquarters of the district, the military cantonment having been abandoned in 1861. Considerable trade is carried on by rail and river. The manufactures include cotton cloth,

skin-bottles, combs and horn- ware and sweetmeats.

The District of Etawah has an area of 1691 sq. m. It forms a purely artificial administrative division, stretching across the level plain of the Doab, and beyond the valley of the Jumna, to the gorges of the Chambal, and the last rocky outliers of the Vindhyan range. The district exhibits a striking variety of surface and scenery. The greater portion lies within the Doab or level alluvial plain between the Ganges and the Jumna. This part falls naturally into two sections, divided by the deep and fissured valley of the river Sengar. The tract to the north-east of that stream is rich and fertile, being watered by the Cawnpore and Etawah branches of the Ganges canal, and other important works. The south-western region has the same natural advan- tages, but possesses no great irrigation system, and is con- sequently less fruitful than the opposite slopes. Near the banks of the Jumna, the plain descends into the river valley by a series

of wild ravines and terraces, inhabited only by a scattered race of hereditary herdsmen. Beyond the Jumna again a strip of British territory extends along the tangled gorges of the Chambal and the Kuari Nadi, far into the borders of the Gwalior state. This outlying tract embraces a series of rocky glens and mountain torrents, crowned by the ruins of native strongholds, and inter- spersed with narrow ledges of cultivable alluvium. The climate, once hot and sultry, has now become comparatively moist and equable under the influence of irrigation and the planting of trees.

Etawah was marked out by its physical features as a secure retreat for the turbulent tribes of the Upper Doab, and it was not till the 12th century that any of the existing castes settled on the soil. After the Mussulman conquests of Delhi and the surrounding country, the Hindus of Etawah appear to have held their own for many generations against the Mahommedan power; but in the 16th century Baber conquered the district, with the rest of the Doab, and it remained in the hands of the Moguls until the decay of their empire. After passing through the usual vicissitudes of Mahratta and Jat conquests during the long anarchy which preceded the British rule, Etawah was annexed by the wazir of Oudh in 1773. The wazir ceded it to the East India Company in 1801, but it still remained so largely in the hands of lawless native chiefs that some difficulty was experienced in reducing it to orderly government. During the mutiny of 1857 serious disturbances occurred in Etawah, and the district was occupied by the rebels from June to December; order was not completely restored till the end of 1858. In 1901 the population was 806,798, showing an increase of 11% in the decade. The district is

partly watered by branches of the Ganges canal, and is traversed throughout by the main line of the East Indian railway from Cawnpore to Agra. Cotton, oilseeds and other agricultural produce are exported, and some indigo is made, but manufacturing industry is slight.

ETCHING (Dutch, etsen, to eat), a form of engraving (q.v.) in which, in contradistinction to line engraving {q.v.), where the furrow is produced by the ploughing of the burin, the copper is eaten away or corroded by acid.

To prepare a plate for etching it is first covered with etching- ground, a composition which resists acid. The qualities of a ground are to be so adhesive that it will not quit the copper when a small quantity is left isolated between lines, yet not so adhesive that the etching point cannot easily and entirely remove it; at the same time a good ground will be hard enough to bear the hand upon it, or a sheet of paper, yet not so hard as to be brittle. The ground used by Abraham Bosse, the French painter and engraver (1602-1676) was composed as follows: — Melt 2 oz. of white wax; then add to it 1 oz. of gum-mastic in powder, a little at a time, stirring till the wax and the mastic are well mingled; then add, in the same manner, 1 oz. of bitumen in powder. There are three different ways of applying an etching- ground to a plate. . The old-fashioned way was to wrap a ball of the ground in silk, heat the plate, and then rub the ball upon the surface, enough of the ground to cover the plate melting through the silk. To equalize the ground a dabber was used, which was made of cotton-wool under horsehair, the whole inclosed in silk. This method is still used by many artists, from tradition and habit, but it is far inferior in perfection and convenience to that which we will now describe. When the etching-ground is melted, add to it half its volume of essential oil of lavender, mix well, and allow the mixture to cool. You have now a paste which can be spread upon a cold plate with a roller; these rollers are covered with leather and made (very carefully) for the purpose. You first spread a little paste on a sheet of glass (if too thick, add more oil of lavender and mix with a palette knife), and roll it till the roller is quite equally charged all over, when the paste is easily transferred to the copper, which is afterwards gently heated to expel the oil of lavender. In both these methods of grounding a plate, the work is not completed until the ground has been smoked, which is effected as follows. The plate is held by a hand-vice if a small one, or if large, is fixed at some height, with the covered side downwards. A smoking torch, composed of many thin bees-wax dips twisted

together, is then lighted and passed repeatedly under the plate in every direction, till the ground has incorporated enough lampblack to blacken it. The third way of covering a plate for etching is to apply the ground in solution as collodion is applied by photographers. The ground may be dissolved in chloroform, or in oil of lavender. The plate being grounded, its back and edges are protected from the acid by Japan varnish, which soon dries, and then the drawing is traced upon it. The best way of tracing a drawing is to use sheet gelatine, which is employed as follows. The gelatine is laid upon the drawing, which its trans- parence allows you to see perfectly, and you trace the lines by scratching the smooth surface with a sharp point. You then fill these scratches with fine black-lead, in powder, rubbing it in with the finger, turn the tracing with its face to the plate, and rub the back of it with a burnisher. The black-lead from the scratches adheres to the etching ground and shows upon it as pale grey, much more visible than anything else you can use for tracing. Then comes the work of the etching-needle, which is merely a piece of steel sharpened more or less. J. M. W. Turner used a prong of an old steel fork which did as well as anything, but neater etching-needles are sold by artists' colour- makers. The needle removes the ground or cover and lays the copper bare. Some artists sharpen their needles so as to present a cutting edge which, when used sideways, scrapes away a broad line; and many etchers use needles of various degrees of sharp- ness to get thicker or thinner lines. It may be well to observe, in connexion with this part of the subject, that whilst thick lines agree perfectly well with the nature of woodcut, they are very apt to give an unpleasant heaviness to plate engraving of all kinds, whilst thin lines have generally a clear and agreeable appearance in plate engraving. Nevertheless, lines of moderate thickness are used effectively in etching when covered with finer shading, and very thick lines indeed were employed with good results by Turner when he intended to cover them with mezzotint (q.v.), and to print in brown ink, because their thickness was essential to prevent them from being overwhelmed by the mezzotint, and the brown ink made them print less heavily than black. Etchers differ in opinion as to whether the needle ought to scratch the copper or simply to glide upon its surface. A gliding needle is much more free, and therefore communicates a greater appear- ance of freedom to the etching, but it has the inconvenience that the etching-ground may not always be entirely removed, and then the lines may be defective from insufficient biting. A scratching needle, on the other hand, is free from this serious

inconvenience, but it must not scratch irregularly so as to engrave lines of various depth. The biting in former times was generally done with a mixture of nitric acid and water, in equal proportions; but in the present day a Dutch mordant is a good deal used, which is composed as follows: Hydrochloric acid, 100 grammes; chlorate of potash, 20 grammes; water, 880 grammes. To make it, heat the water, add the chlorate of potash, wait till it is entirely dissolved, and then add the acid. The nitrous mordant acts rapidly and causes ebullition; the Dutch mordant acts slowly and causes no ebullition. The nitrous mordant widens the lines; the Dutch mordant bites in depth, and does not widen the lines to any perceptible degree. The time required for both depends upon temperature. A mordant bites slowly when cold, and more and more rapidly when heated. To obviate irregularity caused by difference of temperature, it is a good plan to heat the Dutch mordant artificially to 95° Fahr. by lamps under the bath (for which a photographer's porcelain tray is most convenient), and keep it steadily to that temperature; the results may then be counted upon; but whatever the temperature fixed upon, the results will be regular if it is regular. To get different degrees of biting on the same plate the lines which are to be pale are " stopped out " by being painted over with Japan varnish or with etching ground dissolved in oil of lavender, the darkest lines being reserved to the last, as they have to bite longest. When the acid has done its work properly the lines are bitten in such various degrees of depth that they will print with the degree of blackness required; but if some parts of the subject require to be made paler, they can \>e lowered by rubbing them with

charcoal and olive oil, and if they have to be made deeper they can be rebitten, or covered with added shading. Rebiting is done with the roller above mentioned, which is now charged very lightly with paste and rolled over the copper with no pressure but its own weight, so as to cover the smooth surface but not fill up any of the lines. The oil of lavender is then expelled as before by gently heating the plate, but it is not smoked. The lines which require rebiting may now be rebitten, and the others preserved against the action of the acid by stopping out. These are a few of the most essential technical points in etching, but there are many matters of detail for which the reader is referred to the special works on the subject.

There are many varieties in the processes of etching, and it is only necessary here to indicate the essential facts. A brief analysis of different styles may be given.

(1) Pure Line. As there is line engraving, so there is line etching; but

as the etching-needle is-a freer instrument than the burin, the line has qualities which differ widely from those of the burin line. Each of the two has its own charm and beauty; the liberty of the one is charming, and the restraint of the other is admirable also in its right place. In line etching, as in line engraving, the great masters purposely exhibit the line and do not hide it under too much shading. (2) Line and Shade. This answers exactly in etching to Mantegna's work in engraving. The most important lines are drawn first throughout, and the shade thrown over them like a wash with the brush over a pen sketch in indelible ink. (3) Shade and Texture. This is used chiefly to imitate oil-painting. Here the line (properly so called) is entirely abandoned, and the attention of the etcher is given to texture and chiaroscuro. He uses lines, of course, to express these, but does not exhibit them for their own beauty; on the contrary, he conceals them.

Of these three styles of etching the first is technically the easiest, and being also the most rapid, is adopted for sketching on the copper from nature; the second is the next in difficulty; and the third the most difficult, on account of the biting, which is never easy to manage when it becomes elaborate. The etcher has, however, many resources; he can make passages paler by burnishing them, or by using charcoal, or he can efface them entirely with the scraper and charcoal; he can darken them by rebiting or by regrounding the plate and adding fresh work; and he need not run the risk of biting the very palest passages of all, because these can be easily done with the dry point, which is simply a well-sharpened stylus used directly on the copper without the help of acid. It is often asserted that any one can etch who can draw, but this is a mistaken assertion likely to mislead. Without requiring so long an apprenticeship as the burin, etching is a very difficult art indeed, the two main causes of its difficulty being that the artist does not see his work properly as he proceeds, and that mistakes or misfortunes in the biting, which are of frequent occurrence to the inexperienced, may destroy all the relations of tone.

Etching, like line engraving, owed much to the old masters, but whereas, with the exception of Albert Diirer, the painters were seldom practical line engravers, they advanced etching not only by advice given to others but by the work of their own hands. Rembrandt did as much for etching as either Raphael or Rubens for line engraving; and in landscape the etchings of Claude had an influence which still continues, both Rembrandt and Claude being practical workmen in etching, and very skilful workmen. Ostade, Ruysdael, Berghem, Paul Potter, Karl Dujardin, etched as they

painted, and so did a greater than any of them, Vandyck. In the earlier part of the 19th century etching was almost a defunct art, except as it was employed by engravers as a help to get faster through their work, of which " engraving " got all the credit, the public being unable to distinguish between etched lines and lines cut with the burin. But from the middle of the century dates a great revival of etching as an independent art, a revival which has extended all over Europe.

Apart from the copying of pictures by etching — which was found commercially preferable to the use of line engraving —

a number of artists and amateurs gradually practised original etching with increasing success, notably Sir Seymour Haden, J. M. Whistler, Samuel Palmer and others in England, Felix Bracquemond, C. F. Daubigny, Charles Jacque, Adolphe Appian, Maxime Lalanne, Jules Jacquemart and others on the continent, besides that singular and remarkable genius, Charles Meryon. Etching clubs, or associations of artists for the publication of original etchings, were gradually founded in England, France, Germany and Belgium. Meryon and Whistler are two of the greatest modern etchers. Among earlier names mention may be made of Andrew Geddes (1783-1844) and of Sir David Wilkie (1785-1841). Geddes was the finer artist with the needle; he it was whom Rembrandt best inspired; his work was in the grand manner. Of the rich and rare dry-points " At Peckham Rye " and " At Halliford-on-Thames," the deepest and most brilliant master of landscape would have no need to be ashamed. David Wilkie's prints were, naturally, not less dramatic than his pictures, but the etcher's particular gift was possessed by him more intermittently: it is shown best in " The Receipt," a strong and vivid, dexterous sketch, quite full of character. J. S. Cotman's (1782-1842) etchings are also historically interest- ing though they were " soft ground " for the most part. They show all his qualities of elegance and freedom as a draughtsman, and much of his large dignity in the distribution of light and shade. T. Girtin (1775-1802), in the preparations for his views of Paris, was notably happy. The work of Sir Francis Seymour Haden (b. 18 18) had a powerful influence on the art in England. Between 1858 and 1879 Seymour Haden — the first president of the Royal Society of Painter Etchers— produced the vast majority of his plates, which have always good draughtsmanship, unity of effect and a personal impression. They

show a strong feeling for nature. If, amongst some two hundred subjects, it were necessary to select one or two for peculiar praise, they might be the " Breaking up of the Agamemnon," the almost perfect " Water Meadow," the masterly presentment of " Erith Marshes," and the later dry-point of " Windmill Hill." Another great etcher — Frenchman by birth, but English by long residence — is Alphonse Legros (q.v.). Great in expression and suggestive draughtsmanship, austere and economical in line, Legros's work is the grave record of the observation and the fancy of an imagina- tive mind. In poetic portraiture nothing can well exceed his etched vision of G. F. Watts; " La Mort du Vagabond " is noticeable for terror and homely pathos; " Communion dans l'Eglise St Medard " is perhaps the best instance of the dignity, vigour and grave sympathy with which he addresses himself to ecclesiastical themes. Something of these latter qualities, in dealing with similar themes, Legros passed on to his pupil, Sir Charles Holroyd (b. 1861) — an etcher in the true vein; whilst an earlier pupil, prolific as himself, as imaginative, and some- times more deliberately uncouth — William Strang, A.R.A. (b. 1859) — carried on in his own way the tradition of that part of Legros's practice, the preoccupation with the humble, for which Legros himself found certain warrant in a portion of the great ceuvre of Rembrandt. Frank Short, A.R.A. (b. 1857), as with the very touch of Turner, carried to completion great designs that Turner left unfinished for the Liber studiorum. The delicacy of " Sleeping till the Flood," the curiously suggestive realism of " Wrought Nails " — a scene in the Black Country — entitle him to a lasting place in the list of the fine wielders of the etching-needle. D. Y. Cameron (b. 1865) betrays the influence of Rembrandt in a noble etching, " Border Towers," and the influence of Meryon in such a print as that of " The Palace, Stirling." His " London Set " is particularly fine. The individu- ality of C. J. Watson is less marked, but his skill, chiefly in architectural work, is noticeable. Admirers of the studiously accurate portraiture of a great monument may be able to set Watson's print of "St Etienne du Mont " by the side of Meryon's august and mysterious and ever-memorable vision. Paul Helleu (b. 1859) in his brilliant sketches, particularly of women, has used the art of etching in a peculiarly individual and delightful way. Among the numerous other modern etchers only a 'bare mention can be made of Oliver Hall, Minna Bolingbroke and

Elizabeth Armstrong (Mrs Watson and Mrs Stanhope Forbes), Alfred East, Robert Macbeth, Walter Sickert, Robert Goff, Mortimer Menpes, Percy Thomas, Raven Hill, and Prof. H. von Herkomer, in England; in France, Roussel, J. F. RaffaSUi (b. 1850), Besnard and

J. J. J. Tissot (1836-1902).

The oldest treatise on etching is that of Abraham Bosse (1645). See also P. G. Hamerton, Etching and Etchers (1868), and Etchers' Handbook (1881); F. Wedmore, Etching in England (1895); Singer and Strang, Etching, Engraving, &c. (1897).

ETEOCLES, in Greek legend, king of Thebes, son of Oedipus and Jocasta (Iocaste). After their father had been driven out of the country, he and his brother Polyneices agreed to reign alternately for a year. Eteocles, however, refused to keep the agreement, and Polyneices fled to Adrastus, king of Argos, whom he persuaded to undertake the famous expedition against Thebes on his behalf. The two brothers met in single combat, and both were slain. The Theban rulers decreed that only Eteocles should receive the honour of burial, but the decree was set at naught by Antigone (q.v.), the sister of Polyneices. The fate of Eteocles and Polyneices forms the subject of the Seven against Thebes of Aeschylus and the Phoenissae of Euripides.

ETESIAN WIND (Lat. etesius, annual; Gr. eros, year), a Mediterranean wind blowing from the north and west in summer for about six weeks annually.

fiTEX, ANTOINE (1808-1888), French sculptor, painter and architect, was born in Paris on the 20th of March 1808. He first exhibited in the salon of 1833, his work including a reproduction in marble of his " Death of Hyacinthus," and the plaster cast of his " Cain and his race cursed by God." Thiers, who was at this time minister of public works, now commissioned him to execute the two groups of " Peace " and " War," placed at each side of the Arc de Triomphe. This last, which established his reputation, he reproduced in marble in the salon of 1839. The French capital contains numerous examples of the sculptural works of Etex, which included mythological and religious subjects besides a great number of portraits. His paintings include the subjects of Eurydice and the martyrdom of Saint Sebastian, and among the best known of his architectural pro- ductions are the tomb of Napoleon I. in the Invalides and a monument of the revolution of 1848. Etex Wrote a number of essays on subjects connected with the arts. The last year of his life was spent at Nice, and he died at Chaville (Seine-et-Oise) on the 14th of July 1888.

See P. E. Mangeant, Antoine j&tex, peintre, sculpteur et architecte, 1808-1888 (Paris, 1894).

ETHER, (C 2 H 5) 2 0, the Aether of pharmacy, a colourless, volatile, highly inflammable liquid, of specific gravity 0-736 at o°, boiling-point 35° C, and freezing-point-ii7°-4 C. (K. Olszewski). It has a strong and characteristic odour, and a hot sweetish taste, is soluble in ten parts of water, and in all proportions in alcohol, and dissolves bromine, iodine, and, in small quantities, sulphur and phosphorus, also the volatile oils, most fatty and resinous substances, guncotton, caoutchouc and certain of the vegetable alkaloids. The vapour mixed with oxygen or air is violently explosive. The making of ether by the action of sulphuric acid on alcohol was known in about the 13th century; and later Basil Valentine and Valerius Cordus described its preparation and properties. The name ether appears to have been applied to the drug only since the times of Frobenius, who in 1730 termed it spiritus aether eus or vini vitriolatus. It was considered to be a sulphur compound, hence it's name sulphur ether; this idea was proved to be erroneous by Valentine Rose in about 1800. Ether is manufactured by the distillation of 5 parts of 90 % alcohol with 9 parts of concentrated sulphuric acid at a temperature of i40°-i45° C, a constant stream of alcohol being caused to flow into the mixture during the opera- tion. The distillate is purified by treatment with lime and calcium chloride, and subsequent distillation. The mechanism of this reaction was explained by A. Williamson in 1850. For other methods of preparation see Ethers. 1

1 See also J. v. Liebig, Ann. Chem. Pharm., 1837, 23, p. 39! 1839, 30, p. 129; E. Mitscherlich, Pogg. Ann., 1836, 31, p. 273:1841, 53, p. 95; A. W. Williamson, Phil. Mag., 1850 (3), 37, p. 350.

The presence of so small a quantity as 1 % of alcohol may be detected in ether by the colour imparted to it by aniline violet ; if water or acetic acid be present, the ether must be shaken with anhydrous potassium carbonate before the application of the test. When heated with zinc dust, it yields ethylene and water. Chromic acid oxidizes it to acetic acid and ozone oxidizes it to ethyl peroxide. In contact with hydriodic acid gas at o° C, it forms ethyl iodide (R. D. Silva, Ber., 1875, 8, p. 903), and with water and a little sulphuric acid at 180 C, it yields alcohol (E. Erlenmeyer, Zeit.f. chemie, 1868,'p. 343). It forms crystalline compounds with bromine and with many metallic salts.

Medicine. — For the anaesthetic properties of ether see Anaesthesia. Applied externally, ether evaporates very rapidly, producing such intense cold as to cause marked local anaesthesia. For this purpose it is best applied as a fine spray, but ethyl chloride is generally found more efficient and produces less sub- sequent discomfort. It aids the absorption of fats and may be used with cod liver oil when the latter is administered by the skin. If it be rubbed in or evaporation be prevented, it acts, like alcohol and chloroform, as an irritant. Ten to twenty minims of ether, subcutaneously injected, constitute perhaps the most rapid and powerful cardiac stimulant known, and are often employed for this purpose in cases of syncope under anaesthesia. Taken internally, ether acts in many respects similarly to alcohol and chloroform, but its stimulant action on the heart is much more marked, being exerted both reflexly from the stomach and directly after its rapid absorption. Ether is thus the type of a rapidly diffusible stimulant. It is also useful in relieving the paroxysms of asthma. The dose for repeated administration is from 10 to 30 minims and for a single administration up to a drachm.

Chronic Poisoning. — A dose of a little more than a drachm (a teaspoonful) will produce a condition of inebriation lasting for one-half to one hour, but the dose must soon be greatly in- creased. The after-effects are, if anything, rather pleasant, and the habit of ether drinking is certainly not so injurious as alcohol- ism. The principal symptons of chronic ether-drinking are a weakening of the activity of the special senses, and notably sight and hearing, a lowering of the intelligence and a degree of general paresis (partial paralysis) of motion.

ETHEREDGE [or Etheeege], SIR GEORGE (c. 1635-1691), English dramatist, was born about the year 1635, and belonged to an Oxfordshire family. He is said to have been educated at Cambridge, but Dennis assures us that " to his certain knowledge he understood neither Greek nor Latin." He travelled abroad early, and seems to have resided in France. It is possible that he witnessed in Paris the performances of some of Moliere's earliest comedies; and he seems, from an allusion in one of his plays, to have been personally acquainted with Bussy Rabutin. On his return to London he studied the law at one of the Inns of Court. His tastes were those of a fine gentleman, and he in- dulged freely in pleasure.

Sometime soon after the Restoration he composed his comedy of The Comical Revenge or Love in a Tub, which introduced him to Lord Buckhurst, afterwards the earl of Dorset. This was brought out at the Duke's theatre in 1664, and a few copies were printed in the same

year. It is partly in rhymned heroic verse, like the stilted tragedies of the Howards and Killigrews, but it contains comic scenes that are exceedingly bright and fresh. The sparring between Sir Frederick and the Widow introduced a style of wit hitherto unknown upon the English stage. The success of this play was very great, but Etheredge waited four years before he repeated his experiment. Meanwhile he gained the highest reputation as a poetical beau, and moved in the circle of Sir Charles Sedley, Lord Rochester and the other noble wits of the day. In 1668 he brought out She would if she could, a comedy in many respects admirable, full of action, wit and spirit, although to the last degree frivolous and immoral. But in this play Etheredge first shows himself a new power in literature; he has nothing of the rudeness of his predecessors or the grossness of his contemporaries. We move in an airy and fantastic world, where flirtation is the only serious business of life. At this time

Etheredge was living a life no less frivolous and unprincipled than those of his Courtals and Freemans. He formed an alliance with the famous actress Mrs Elizabeth Barry; she bore him a daughter, on whom he settled £6000, but who, unhappily, died in her youth. His wealth and wit, the distinction and charm of his manners, won Etheredge the general worship of society, and his tempera- ment is best known by the names his contemporaries gave him, of " gentle George " and " easy Etheredge." Rochester up- braided him for inattention to literature; and at last, after a silence of eight years, he came forward with one more play, un- fortunately his last. The Man of Mode or Sir Fopling Flutter, indisputably the best comedy of intrigue written in England before the days of Congreve, was acted and printed in 1676, and enjoyed an unbounded success. Besides the merit of its plot and wit, it had the personal charm of being supposed to satirize, or at least to paint, persons well known in London. Sir Fopling Flutter was a portrait of Beau Hewit, the reigning exquisite of the hour; in Dorimant the poet drew the earl of Rochester, and in Medley a portrait of himself; while even the drunken shoemaker was a real character, who made his fortune from being thus brought into public notice. After this brilliant success Etheredge retired from literature; his gallantries and his gambling in a few years deprived him of his fortune, and he looked about for a rich match. He was knighted before 1680, and gained the hand and the money of a rich widow. He was sent by Charles II. on a mission to the Hague, and in March 1685 was appointed resident minister in the imperial German court at Regensburg. He was very uncomfortable in Germany, and after three and a half years' residence left for Paris. He had collected a library at Regensburg, some volumes of which are in the

theological college there. His MS. despatches are preserved in the British Museum, where they were discovered and described by Mr Gosse in 1881; they add very largely to our knowledge of Etheredge's career. He died in Paris, probably in 1 69 1 , f or Narcissus Luttrell notes in February 1692 that " Sir George Etherege, the late King James' ambassador to Vienna, died lately in Paris."

Etheredge deserves to hold a more distinguished place in English literature than has generally been allotted to him. In a dull and heavy age, he inaugurated a period of genuine wit and sprightliness. He invented the comedy of intrigue, and led the way for the masterpieces of Congreve and Sheridan. Before his time the manner of Ben Jonson had prevailed in comedy, and traditional " humours " and typical eccentricities, instead of real characters, had crowded the comic stage. Etheredge paints with a light, faint hand, but it is from nature, and his portraits of fops and beaux are simply unexcelled. No one knows better than he how to present a gay young gentleman, a Dorimant, " an un- confinableroverafter amorous adventures." His genius is aslight as thistle-down; he is frivolous, without force of conviction, without principle; but his wit is very sparkling, and his style pure and singularly picturesque. No one approaches Etheredge in delicate touches of dress, furniture and scene; he makes the fine airs of London gentlemen and ladies live before our eyes even more vividly than Congreve does; but he has less insight and less energy than Congreve. Had he been poor or ambitious, he might have been to England almost what Moliere was to France, but he was a rich man living at his ease, and he disdained to excel in literature. Etheredge was " a fair, slender, genteel man, but spoiled his countenance with drinking." His con- temporaries all agree in acknowledging that he was the soul of affability and sprightly good-nature.

The life of Etheredge was first given in detail by Edmund Gosse in Seventeenth Century Studies (1883). His works were edited by A. W. Verity, in 1888. (E. G.)

ETHERIDGE, JOHN WESLEY (1804-1866), English non- conformist divine, was born near Newport, Isle of Wight, on the 24th of February 1804. He received most of his early education from his father. Though he never attended any university he acquired ultimately a thorough knowledge of Greek, Latin, Hebrew, Syriac, French and German. In 1824 he was placed on the Wesleyan Methodist plan as a local preacher. In 1826 his offer to enter the ministry was accepted, and after the usual

probationary trial he was received into full connexion at the conference of 1831. For two years after this he remained at Brighton, and in 1833 he removed to Cornwall, being stationed successively at the Truro and Falmouth circuits. From Falmouth he removed to Darlaston, where in 1838 his health gave way. For a good many years he was a supernumerary, and lived for a while at Caen and Paris, where in the public libraries he found great facilities for prosecuting his favourite Oriental studies. His health having considerably improved, he became, in 1843, pastor of the Methodist church at Boulogne. He returned to England in 1847, and was appointed successively to thecircuitsof Islington, Bristol, Leeds, Penzance, Penryn, Truro and St Austell in east Cornwall. Shortly after his return to England he received the degree of Ph.D. from the university of Heidelberg. He was a patient, modest, hard-working and accurate scholar. He died at Camborne on the 24th of May 1866.

His principal works are Horae Aramaicae (1843) ; History, Liturgies and Literature of the Syrian Churches (1847); The Apostolic Acts and Epistles, from the Peshito or Ancient Syriac (1849); Jerusalem and Tiberias, a Survey of the Religious and Scholastic Learning of the Jews (1856); The Tar gums of Onkelos and Jonathan ben Uzziel (istvol. in 1862, 2nd in 1865). See Memoir, by Rev. Thornley Smith

(1871).

ETHERIDGE, ROBERT (1810-1003), English geologist and palaeontologist, was born at Ross, in Herefordshire, on the 3rd of December 1819. After an ordinary school education in his native town, he obtained employment in a business house in Bristol. There he devoted his spare time to natural history pursuits, and in 1850 was appointed curator of the museum attached to the Bristol Philosophical Institution. He also became lecturer on botany in the Bristol medical school. In 1857, through the influence of Sir Roderick I. Murchison, he was ap- pointed to a post in the Museum of Practical Geology in London, and eventually became palaeontologist to the Geological Survey. In 1865 he assisted Prof. Huxley in the preparation of a Catalogue of Fossils in the Museum, of Practical Geology. His chief work for many years was in naming the fossils collected during the progress of the Geological Survey, and in supplying the lists that were appended to numerous official

memoirs. In this way he acquired an exceptional knowledge of British fossils, and he ultimately prepared an elaborate work entitled Fossils of the British Islands, Stratigraphically and Zoologically arranged. Only the first volume dealing with the Palaeozoic species was published (1888). Etheridge also was author of several papers on the Rhaetic Beds, and of an important essay on the Physical Structure of North Devon, and on the Palaeontological Value of the Devonian Fossils (1867). He edited, and in the main re- wrote, the second part of a new edition of John Phillips' Manual of Geology — entitled Stratigraphical Geology and Palaeontology (1885). He was elected F.R.S. in 1871, and was president of the Geological Society in 1881-1882. In 1881 Etheridge was trans- ferred from the Geological Survey to the geological department of the British Museum, where he served as assistant keeper until 1801. He died at Chelsea, London, on the 18th of December

1903.

Memoir by Dr Henry Woodward (with list of works and portrait) in Geological Magazine, January 1904; also Memoir by H. B. Wood- ward (with portrait) in Proc. Bristol Nat. Soc. x. 175.

ETHERS, in organic chemistry, compounds of the general formula R-O-R', where R, R' = alkyl or aryl groups. They may be regarded as the anhydrides of the alcohols, being formed by elimination of one molecule of water from two molecules of the alcohols; those in which the two hydrocarbon radicals are similar are known as simple ethers, and those in which they are dissimilar as mixed ethers. They may be prepared by the action of concentrated sulphuric acid on the alcohols, alkyl sulphuric acids being first formed, which yield ethers on heating with alcohols. The process may be made a continuous one by running a thin stream of alcohol continually into the heated reaction mixture of alcohol and sulphuric acid. Benzene sul- phonic acid has been used in place of sulphuric acid (F. Krafft, Ber., 1893, 26, p. 2829). A. W. Williamson {Ann., 1851, 77, p. 38; 1852, 81, p. 77) prepared ether by the action of sodium

ethylate on ethyl iodide, and showed that all ethers must possess the structural formula given above (see also Brit. Assoc. Reports, 1850, p. 65). They may also be prepared by heating the alkyl halides with silver oxide.

The ethers are neutral volatile liquids (the first member, methyl ether, is a gas at ordinary temperature). Phosphorus pentachloride converts them into alkyl chlorides, a similar decomposition taking

place when they are heated with the haloid acids. Nitric acid and chromic acid oxidize them in such a mariner that they yield the same products as the alcohols from which they are derived. With chlorine they yield substitution products.

Methyl ether, (CH 3) 2 0, was first prepared by J. B. Dumas and E. Peligot {Ann. chim. phys., 1835, [2] 58, p. 19) by heating methyl alcohol with sulphuric acid. It is best prepared by heating methyl alcohol and sulphuric acid to 140° C. and leading the evolved gas into sulphuric acid. The sulphuric acid solution is then allowed to drop slowly into an equal volume of water, when the methyl ether is liberated (E. Erlenmeyer and A. – Kriechbaumer, Ber., 1874, 7, p. 699). It is a pleasant-smelling gas, which burns when ignited, and may be condensed to a liquid which boils at 23-6° C. It is somewhat soluble in water and readily soluble in alcohol, and concentrated sulphuric acid. It combines with hydrochloric acid gas to form a compound (CH 3) 2 0-HC1 (C. Friedel, Comptes rendus, 1875, 81, p. 152). Methyl ethyl ether, CH 3 -0-C 2 H5, is prepared from methyl iodide and sodium ethylate, or from ethyl iodide and sodium methylate (A. W. Williamson, Ann., 1852, 81, p. 77). It is a liquid which boils at io-8° C.

For diethyl ether see Ether, and for methyl phenyl ether (anisole) and ethyl phenyl ether (phenetole) see Carbolic Acid.

ETHICS, the name generally given to the science of moral philosophy. The word " ethics " is derived from the Gr. iidtxos, that which pertains to rjdos, character.

For convenience in reference, the arrangement followed in this article may be explained at the outset : —

PAGE

I. Definition and Scope 809

II. Historical Sketch 810

A. Greek and Graeco-Roman Ethics . . . 8io

The Age of the Sophists 811

Socrates and his Disciples 811

Plato 812

Plato and Aristotle 8 14

Aristotle 815

Stoicism 816

Hedonism (Epicurus) 818

Later Greek and Roman Ethics . . . 818

Neoplatonism 819

B. Christianity and Medieval Ethics . . . 820

Christian and Jewish ” Law of God ” . . 820

Christian and Pagan Inwardness . . . 820

(Knowledge, Faith, Love, Purity). Distinctive Particulars of Christian Morality 821 Development of Opinion in Early Christi- anity, Augustine, Ambrose …. 823 Medieval Morality and Moral Philosophy . 824

Thomas Aquinas 824

Casuistry and Jesuitry 826

The Reformation; and birth of Modern

Thought 826

C. Modern Ethics 827

Grotius 827

Hobbes 827

The Cambridge Moralists …. 828

(Cudworth, More)

Cumberland 829

Locke 829

Clarke . 829

Shaftesbury 830

Mandeville 830

Butler 831

Wollaston 831

Hutcheson 831

Hume 832

Adam Smith -833

The Intuitional School 833

(Price, Reid, Stewart, Whewell)

The Utilitarian School .... ‘ . 835

(Paley, Bentham, Mill)

C. Modern Ethics — continued PAGE

Association and Evolution 837

Free-will 837

French Influence on English Ethics . . 838

(Helvetius, Comte)

German Influence on English Ethics . . 839

(Kant, Hegel)

D. Ethics since 1879 840

III. Bibliography 845

Section I. contains a general survey of the subject; it shows in what sense ethics is to be regarded as a special field of philosophical investigation — its relations to other departments of thought, especially to psychology, religion and modern physical science. The article makes no attempt to give a detailed, casuistical examination of the matter of ethical theory. For this, reference must be made to special

articles on philosophic schools, writers and terms.

Section II. is a historical sketch in four parts tracing the main lines of development in ethical speculation from its birth to the present day. Here again it has been possible to notice only the salient points or landmarks, leaving all detail to special articles as above. All important writers whose names occur in this sketch are treated in special biographical articles, and references are given as often as possible to supplementary articles which illustrate and explain points which cannot be fully treated here. This is especially the case in connexion with technical terms (whose history and meaning are inevitably taken for granted) and biographical infor- mation about minor ethical writers.

I. Definition and Subject-Matter of Ethics In its widest sense, the term " ethics " would imply an examina- tion into the general character or habits of mankind, and would even involve a description or history of the habits of men in par- ticular societies living at different periods of time. Such a field of study would obviously be too wide for any particular science or philosophy to investigate, and moreover portions of the field are already occupied by history, by anthropology and by the particular sciences (e.g. physiology, anatomy, biology), in so far as the habits and character of men depend upon the material processes which these sciences examine. Even philosophies such as logic and aesthetic would be necessary for such an investigation, if thought and artistic production are normal human habits and elements in character. Ethics then is usually confined to the particular field of human character and conduct so far as they depend upon or exhibit certain general principles commonly known as moral principles. Men in general char- acterize their own conduct and character and that of other men by such general adjectives as good, bad, right and wrong, and it is the meaning and scope of these adjectives, primarily in relation to human conduct, and ultimately in their final and absolute sense, that ethics investigates.

A not uncommon definition of ethics as the " science of conduct " is inexact for various reasons. (1) The sciences are descriptive or experimental. But a description of what acts or what ends of action men in the present or the past call, or have called, " good " or " bad " is clearly beyond human powers. And experiments in morality (apart from the inconvenient practical consequences likely to ensue) are useless for purposes of ethics, because the moral consciousness would itself at one and the same time be required to make the experiment and to provide the subject upon which the experiment is

performed. (2) Ethics is a philosophy and not a science. Philosophy is a process of reflection upon the presuppositions involved in unrefiective thought. In logic and metaphysics it investigates either the process of apprehension itself, or conceptions such as cause, substance, space, time, which the ordinary scientific conscious- ness never criticizes. In moral philosophy the place of the body of sciences, which philosophy as the theory of knowledge investi- gates, is taken by the developed moral consciousness, which already pronounces moral judgment without hesitation, and claims authority to subject to continual criticism the institutions and forms of social life which it has itself helped to create.

When ethical speculation first begins, conceptions such as those of duty, responsibility, the will as the ultimate subject of moral approbation and disapprobation, are already in existence and already operative. Moral philosophy in a certain sense adds nothing to these conceptions, though it sets them in a clearer light. The problems of the moral consciousness at the time at

which it first becomes reflective are not strictly speaking philo- sophical problems at all. It is occupied with just such questions as each individual man who wishes to act rightly is constantly called upon to answer, e.g. questions such as " What particular action will meet the claims of justice under such and such circumstances?" or "What degree of ignorance will excuse this particular person in this particular case from his responsi- bility ? " It tries to attain a knowledge as complete as possible of the circumstances under which thejtct contemplated must be performed, the personalities of the persons whom it may affect, and the consequences (so far as they can be foreseen) which it will produce, and then by virtue of its own power of moral discrimination pronounces judgment. And the ever- recurring problem of the moral consciousness, " What ought to be done ?" is one which receives a clearer and more definite answer as men become more able in the course of moral experience to apply those principles of the moral consciousness which are yet em- ployed in that experience from the outset. Nevertheless there is a sense in which moral philosophy may be said to originate out of difficulties inherent in the nature of morality itself, although it remains true that the questions which ethics attempts to answer are never questions with which the moral consciousness as such is confronted. The fact that men give different answers to moral problems which seem similar in character, or even the mere fact that men disregard, when they act immorally, the dictates and implicit principles of the moral consciousness is certain sooner or later to produce the desire either, on the one hand, to justify immoral action by casting doubt upon the

authority of the moral consciousness and the validity of its principles, or, on the other hand, to justify particular moral judgments either by (the only valid method) an analysis of the moral principle involved in the judgment and a demonstra- tion of its universal acceptation, or by some attempted proof that the particular moral judgment is arrived at by a process of inference from some universal conception of the Supreme Good or the Final End from which all particular duties or virtues may be deduced. It may be that criticism of morality first originates with a criticism of existing moral institutions or codes of ethics; such a criticism may be due to the spon- taneous activity of the moral consciousness itself. But when such criticism passes into the attempt to find a universal criterion of morality — such an attempt being in effect an effort to make morality scientific — and especially when the attempt is seen, as it must in the end be seen, to fail (the moral consciousness being superior to all standards of morality and realizing itself wholly in particular judgments), then ethics as a process of reflection upon the nature of the moral consciousness may be said to begin. If this be true it follows that one of the chief function of ethics must be criticism of mistaken attempts to find a criterion of morality superior to the pronouncements of the moral consciousness itself. The ultimate superiority of the moral consciousness over all other standards is recognized, even by those who impugn its authority, whenever they claim that all men ought to recognize the superior value of the standards which they themselves wish to substitute. Similarly, their opponents refute their arguments by showing that they are based ultimately upon a recognition of certain distinctions which are moral distinctions {i.e. imply a moral consciousness capable of discriminating between right and wrong in particular cases), and that these moral distinctions conflict with the con- clusions which they reach.

This may briefly be illustrated by reference to some of the great fundamental controversies of ethics. None of these originates out of conflicting statements of the moral conscious- ness, i.e. there is no fundamental contradiction in morality itself. No one (if unsophisticated) ever confused the conception of pleasure with the conception of the Good, or thought that the claims of selfish interest were identical with those of duty. But the controversy between hedonists and antihedonists originates as soon as men reflect that a good which is not in some sense " my " good is not good at all, or that no act can be said to be moral which does not satisfy " me." Or, again, the

Theology.

reflection that the mark or sign of the perfect performance of a particular virtuous act or function is the presence of a char- acteristic pleasure which always accompanies it, is opposed to the reflection that it is a mark of the highest morality never to rest satisfied, and out of these seemingly contradictory state- ments of the reflective consciousness might arise a multitude of controversies either concerning pleasure and duty, or the even more difficult and complex conceptions of merit, progress, and the nature of the Supreme Good or Final End.

*When and how fresh controversies in ethics will begin it would be impossible for any one to foretell. Sometimes the dominance of a particular science or branch of study is the occasion Sciences. * an attempt to apply to ethics ideas borrowed from or analogous to the conceptions of that science. False analogies drawn between ethics and mathematics or between morality and the perception of beauty have wrought much mischief in modern and to some degree even in ancient ethics. The influence of ideas borrowed from biology is everywhere manifest in the ethical speculations of modern times. Sometimes, again, whole theories of ethics have been formulated which can be seen in the end to be efforts to subordinate moral conceptions to conceptions belonging properly to institutions or departments of human thought and activity which the moral consciousness has itself originated. Law, for instance, depends, or at least ought to depend, upon men's need for and consciousness of justice. And such institutions as the family and the state are created by the social consciousness, which is the moral conscious- ness from another aspect. Yet morality has been subordinated to legal and social sanctions, and moral advance has been held to be conditioned by political and social necessities which are not moral needs. Similarly no one since civilization emerged from barbarism has ever really been willing to yield allegiance to a deity who is not moral in the fullest and highest sense of the word. God is not superior to moral law. Yet there have been whole systems of theological ethics which have attempted to base human morality upon the arbitrary will of God or upon the supreme authority of a divinely inspired book or code of laws. One of the greatest of all ethical contro- versies, that concerning the freedom of the will, arose directly out of what was in reality a theological problem — the necessity, namely, of reconciling God's foreknowledge with human freedom. The unreflective moral consciousness never finds it difficult to distinguish between a man's*

power of willing and all the forces of circumstance, heredity and the like, which combine to form the temptations to which he may yield or bid defiance; and such facts as " remorse " and " penitence " are a continual testimony to man's sense of freedom. But so soon as men perceive upon reflection an apparent discrepancy between the utterances of their moral consciousness and certain conclusions to which theological speculation (or at a later period metaphysical and scientific inquiries) seems inevitably to lead them, they will not rest satisfied until the belief in the will's freedom (hither- to unquestioned) is upon further reflection justified or condemned. It is clear then that the complexity of the subject-matter of ethics is such that no sharply defined boundary lines can be drawn between it and other branches of inquiry. Just in so far as it presupposes the apprehension of moral facts, it must presuppose a knowledge of the system of social relationships upon which some at least of those facts depend. No one, for instance, could inquire into the nature of justice without being further compelled to undertake an examination of the nature of the state.

It would be difficult to decide how much of the dispute between the advocates of pleasure theories and their opponents turns upon vexed questions of psychology, and how much is strictly relevant to ethics. If, as has already been said, one of the chief tasks of ethics is to prevent the intrusion into its own sphere of inquiry of ideas borrowed from other and alien sources, then obviously these sources must be investigated. One example of this necessity may be given. It is sometimes maintained that the proper method of ethics is the psychological method; ethics, we are told, should examine as its subject-matter moral sentiments wherever found, without

Psy- chology.

raising ultimate questions as to the nature of obligation or moral authority in general. Now if in opposition to such argu- ments the ultimate character of moral obligation be defended, it will be necessary to point out that no one feels moral sentiments except in connexion with particular objects of moral approbation or disapprobation (e.g. gratitude is inexplicable apart from a particular relationship existing between two or more persons), and that these objects are objects of the moral consciousness alone. But such a line of argument is certain to make necessary an inquiry into the nature of the objects of psychological study which may produce quite unforeseen results for psychology.

Nothing therefore is to be gained by confining ethics within limits

which must from the nature of the case be arbitrary. The defender at all events of the supremacy of moral intuitions must be prepared to follow whither the argument leads, into whatever strange quarters it may direct him. But this much may be said by way of delimitation of the scope of ethics: how- ever complicated and involved its arguments and processes of inference may become, the facts from which they start and the conclusions to which they point are such as the moral conscious- ness alone can understand or warrant. (H. H. W.)

II. Historical Sketch A. Creek and Graeco-Roman Ethics. — The ethical speculation of Greece, and therefore of Europe, had no abrupt and absolute beginning. The naive and fragmentary precepts of conduct, which are everywhere the earliest manifestation of nascent mpral reflection, are a noteworthy element in the gnomic poetry of the 7th and 6th centuries b.c. Their importance is shown by the traditional enumeration of the Seven Sages of the 6th century, and their influence on ethical thought is attested by the references of Plato and Aristotle. But from these unscientific utterances to a philosophy of morals was a long process. In the practical wisdom of Thales (q.v.), one of the seven, we cannot discern any systematic theory of morality. In the case of Pythagoras, conspicuous among pre-Socratic philosophers as the founder not merely of a school, but of a sect or order bound by a common rule of life, there is a closer connexion between moral and metaphysical speculation. The doctrine of the Pythagoreans that the essence of justice (conceived as equal retribution) was a square number, indicates a serious attempt to extend to the region of conduct their mathematical view of the universe; and the same may be said of their classification of good with unity, straightness and the like, and of evil with the opposite qualities. Still, the enunciation of the moral precepts of Pytha- goras appears to have been dogmatic, or even prophetic, rather than philosophic, and to have been accepted by his disciples with an unphilosophic reverence as the ipse dixit 1 of the master. Hence, whatever influence the Pythagorean blending of ethical and mathematical notions may have had on Plato, and, through him, on later thought, we cannot regard the school as having really forestalled the Socratic inquiry after a completely reasoned theory of conduct. The ethical element in the " dark " philo- sophizing of Heraclitus (c. 530-470 B.C.), though it anticipates Stoicism in its conceptions of a law of the universe, to which the wise man will carefully conform, and a divine harmony, in the recognition of which he will find his truest satisfaction, is more profound, but even less systematic. It is only when we come to Democritus, a contemporary

of Socrates, the last of the original thinkers whom we distinguish as pre-Socratic, that we find anything which we can call an ethical system. The fragments that remain of the moral treatises of Democritus are sufficient, perhaps, to convince us that the turn of Greek philo- sophy in the direction of conduct, which was actually due to Socrates, would have taken place without him, though in a less decided manner; but when we compare the Democritean ethics with the post-Socratic system to which it has most affinity, Epicureanism, we find that it exhibits a very rudimentary apprehension of the formal conditions which moral teaching must fulfil before it can lay claim to be treated as scientific.

1 This well-known phrase was originally attributed to the Pytha- goreans.

The truth is that no system of ethics could be constructed until attention had been directed to the vagueness and inconsistency of the common moral opinions of mankind. For this purpose was needed the concentration of a philosophic intellect of the first order on the problems of practice. In Socrates first we find the required combination of a paramount interest in conduct and an ardent desire for knowledge. The pre-Socratic thinkers were all primarily devoted to ontological research; but by the middle of the 5th century B.C. the conflict of their dogmatic systems had led some of the keenest minds to doubt the possibility of penetrating the secret of the physical universe. This doubt found expression in the reasoned scepticism of Gorgias, and produced the famous proposition of Protagoras, that human apprehension is the only standard of existence. The same feeling led Socrates to abandon the old physico-metaphysical inquiries. In his case, moreover, it was strengthened by a naive piety that forbade him to search into things of which the gods seemed to have reserved the knowledge to themselves. The regula- tion of human action, on the other hand (except on occasions of special difficulty, for which omens and oracles might be vouch- safed), they had left to human reason. On this accordingly Socrates concentrated his efforts.

Though, however, Socrates was the first to arrive at a proper conception of the problems of conduct, the general idea did not

originate with him. The natural reaction against the Sophists,

metaphysical and ethical dogmatism of the early

thinkers had reached its climax in the Sophists (q.v.). Gorgias and Protagoras are only representatives of what was really a universal tendency to abandon dogmatic theory and take refuge in practical matters, and especially, as was natural in the Greek city-state, in the civic relations of the citizen. The educa- tion given by the Sophists aimed at no general theory of life, but professed to expound the art of getting on in the world and of managing public affairs. In their eulogy of the virtues of the citizen, they pointed out the prudential character of justice and the like as a means of obtaining pleasure and avoiding pain. The Greek conception of society was such that the life of the free-born citizen consisted mainly of his public function, and, therefore, the pseudo-ethical disquisitions of the Sophists satisfied the requirements of the age. None thought of aperl) (virtue or excellence) as a unique quality possessed of an intrinsic value, but as the virtue of the citizen, just as good flute-playing was the virtue of the flute-player. We see here, as in other activities of the age, a determination to acquire technical knowledge, and to apply it directly to the practical issue; just as music was being enriched by new technical knowledge, architecture by modern theories of plans and T-squares (sc. Hippodamus), the handling of soldiers by the new technique of " tactics " and " hoplitics," so citizenship must be analysed afresh, systematized and adapted in relation to modern requirements. The Sophists had studied these matters superficially indeed but with thoroughness as far as they went, and it is not remarkable that they should have taken the methods which were successful in rhetoric, and applied them to the " science and art " of civic virtues. Plato's Protagoras claims, not unjustly, that in teaching virtue they simply did systematically what every one else was doing at haphazard. But in the true sense of the word, they had no ethical system at all, nor did they contribute save by contrast to ethical speculation. They merely analysed conventional formulae, much in the manner of certain modern so-called " scientific " moralists. Into this arena of hazy popular common _ sense Socrates brought a new critical spirit, showing

that these popular lecturers, in spite of their fertile eloquence, could not defend their fundamental assumptions, nor even give rational definitions of what they professed to ex- plain. Not only were they thus " ignorant," but they were also perpetually inconsistent with themselves in dealing with particular instances. Thus, by the aid of his famous " dialectic," Socrates arrived first at the negative result that the professed teachers of the people were as ignorant as he himself claimed to be, and in a measure justified the eulogy of

Aristotle that he rendered to philosophy the service of " introducing induction and definitions."

This description of his work is, however, both too technical and too positive, if we may judge from those earlier dialogues of Plato in which the real Socrates is found least modified. The , pre-eminent wisdom which the Delphic oracle attributed to him was held by himself to consist in a unique consciousness of ignorance. Yet it is equally clear from Plato that there was a most important positive element in the, teaching of Socrates in virtue of which it is just to say with Alexander Bain, " the first important name in ancient ethical philosophy is Socrates." The union of the negative and the positive elements in his work has caused historians no little perplexity, and we cannot quite save the philosopher's consistency unless we regard some of the doctrines attributed to him by Xenophon as merely tentative and provisional. Still the positions of Socrates that are most important in the history of ethical thought not only are easy to harmonize with his conviction of ignorance, but even render it easier to understand his unwearied cross-examination of com- mon opinion. While he showed clearly the difficulty of acquiring knowledge, he was convinced that knowledge alone could be the source of a coherent system of virtue, as error of evil. Socrates, therefore, first in the history of thought, propounds a positive scientific law of conduct. Virtue is knowledge. This principle involved the paradox that no man, knowing good, would do evil. But it was a paradox derived from his unanswerable truisms, " Every one wishes for his own good, and would get it if he could," and " No one would deny that justice and virtue generally are goods, and of all goods the best." All virtues are, therefore, summed up in knowledge of the good. But this good is not, for Socrates, duty as distinct from interest. The force of the paradox depends upon a blending of duty and interest in the single notion of good, a blending which was dominant in the common thought of the age. This it is which forms the kernel of the positive thought of Socrates according to Xenophon. He could give no satisfactory account of Good in the abstract, and evaded all questions on this point by saying that he knew " no good that was not good for something in particular," but that good is consistent with itself. For himself he prized above all things the wisdom that is virtue, and in the task of producing it he endured the hardest penury, maintaining that such life was richer in enjoyment than a life of luxury. This many-sidedness of view is illustrated by the curious blending of noble and merely utilitarian sentiment in his account of friendship: a friend who can be of no service is valueless; yet the highest service that a friend can render is moral

improvement.

The historically important characteristics of his moral philo- sophy, if we take (as we must) his teaching and character together, may be summarized as follows: — (1) an ardent inquiry for knowledge nowhere to be found, but which, if found, would perfect human conduct; (2) a demand meanwhile that men should act as far as possible on some consistent theory; (3) a provisional adhesion to the commonly received view of good, in all its incoherent complexity, and a perpetual readiness to maintain the harmony of its different elements, and demonstrate the superiority of virtue by an appeal to the standard of self- interest; (4) personal firmness, as apparently easy as it was actually invincible, in carrying out consistently such practical convictions as he had attained. It is only when we keep all these points in view that we can understand how from the spring of Socratic conversation flowed the divergent streams of Greek ethical thought.

Four distinct philosophical schools trace their immediate origin to the circle that gathered round Socrates — the Megarian, the Platonic, the Cynic and the Cyrenaic. The impress of the master is manifest on all, in spite of the j[.. wide differences that divide them; they all agree in Schools. holding the most important possession of man to be wisdom or knowledge, and the most important knowledge to be knowledge of Good. Here, however, the agreement ends. The more philosophic part of the circle, forming a group in which Euclid of Megara (see Megarian School) seems at first to have taken the lead, regarded this Good as the object of a still un- fulfilled i.uest, and were led to identify it with the hidden secret

Aris- tippus.

of the universe, and thus to pass from ethics to metaphysics. Others again, whose demand for knowledge was more easily satisfied, and who were more impressed with the positive and practical side of the master's teaching, made the quest a much simpler affair. They took the Good as already known, and held philosophy to consist in the steady application of this knowledge to conduct. Among these were Antisthenes the Cynic and Aristippus of Cyrene. It is by their recognition of the duty of living consistently by theory instead of mere impulse or custom, their sense of the new value given to life through this rationaliza- tion, and their effort to maintain the easy, calm, unwavering firmness of the Socratic temper, that we recognize both Antis- thenes and Aristippus as " Socratic men," in spite of the complete- ness with which they divided their master's positive doctrine into systems diametrically opposed. Of their contrasted prin- ciples we may perhaps say that, while Aristippus took the most obvious logical step for reducing the teaching of Socrates to clear dogmatic unity, Antisthenes certainly drew the most natural inference from the Socratic life.

Aristippus (see Cyrenaics) argued that, if all that is beautiful or admirable in conduct has this quality as being useful, i.e. productive of some further good; if virtuous action is essentially action done with insight, or rational apprehension of the act as a means to this good, this good must be pleasure. Bodily pleasures and pains Aristippus held to be the keenest, though he does not seem to have main- tained this on any materialistic theory, as he admitted the existence of purely mental pleasures, such as joy in the prosperity of one's native land. He fully recognized that his good was capable of being realized only in successive parts, and gave even exaggerated emphasis to the rule of seeking the pleasure of the moment, and not troubling oneself about a dubious future. It was in the calm, resolute, skilful culling of such pleasures as circumstances afforded from moment to moment, undisturbed by passion, prejudices or superstition, that he conceived the quality of wisdom to be exhibited; and tradition represents him as realizing this ideal to an impressive degree. Among the prejudices from which the wise man was free he included all regard to customary morality beyond what was due to the actual penalties attached to its violation; though he held, with Socrates, that these penalties actually render conformity reason- able. Thus early in the history of ethical theory appeared the most thoroughgoing exposition of hedonism.

Far otr erwise was the Socratic spirit understood by Antisthenes and the Cynics (?.!).). They equally held that no speculative research

was needed for the discovery of good and C^lcs virtue, and maintained that the Socratic wisdom was y ‘ exhibited, not in the skilful pursuit, but in the rational disregard of pleasure, — in the clear apprehension of the intrinsic worthlessness of this and most other objects of men’s ordinary desires and aims. Pleasure, indeed, Antisthenes declared roundly to be an evil; ” Better madness than a surrender to pleasure.” He did not overlook the need of supplementing merely intellectual insight by ” Socratic force of soul “; but it seemed to him that, by insight and self-mastery combined, an absolute spiritual independence might be attained which left nothing wanting for perfect well-being (see also Diogenes) . For as for poverty, painful toil, disrepute, and such evils as men dread most, these, he argued, were positively useful as means of progress in spiritual freedom and virtue. There is, however, in the Cynic notion of wisdom, no positive criterion beyond the mere negation of irrational desires and prejudices. We saw that Socrates, while not claiming to have found the abstract theory of good or wise conduct, practically understood by it the faithful performance of customary duties, maintaining always that his own happiness was therewith bound up. The Cynics more boldly discarded both pleasure and mere custom as alike irrational; but in so doing they left the freed reason with no definite aim but its own freedom. It is absurd, as Plato urged, to say that knowledge is the good, and then when asked “knowledge of what ?” to have no positive reply but “of the good”; but the Cynics do not seem to have made any serious effort to escape from this absurdity.

Plato.

The ultimate views of these two Socratic schools we shall have to notice presently when we come to the post-Aristotelian schools. We must now proceed to trace the fuller development of the Socratic theory in the hands of Plato and Aristotle.

The ethics of Plato cannot properly be treated as a finished result, but rather as a continual movement from the position of Socrates towards the more complete, articulate system of Aristotle; except that there are ascetic and mystical suggestions in some parts of Plato’s teaching which find no counterpart in Aristotle, and in fact disappear from Greek philosophy soon after Plato’s death until they are revived and fantastically developed in Neopythagoreanism and Neo- platonism. The first stage at which we can distinguish Plato’s ethical view from that of Socrates is presented in the Protagoras, where he makes a serious, though clearly tentative effort to define the object of that knowledge which he with his master regards as the

essence of all virtue. Such knowledge, he here maintains, is really mensuration of pleasures and pains, whereby the wise man avoids those mistaken under-estimates of future feelings in comparison with present which we commonly call " yielding to fear or desire." This hedonism has perplexed Plato's readers needlessly (as we have said in speaking of the Cyrenaics) , inasmuch as hedonism is the most obvious corollary of the Socratic doctrine that the different common notions of good — the beautiful, the pleasant and the useful — were to be somehow interpreted by each other. By Plato, however, this conclusion could have been held only before he had accomplished the movement of thought by which he carried the Socratic method beyond the range of human conduct and developed it into a metaphysical system.

This movement may be expressed thus. " If we know," said Socrates, " what justice is, we can give an account or definition of it "; true knowledge must be knowledge of the general fact, common to all the individual cases to which we apply our general notion. But this must be no less true of other objects of thought and discourse; the same relation of general notions to particular examples extends through the whole physical universe; we can think and talk of it only by means of such notions. True or scientific knowledge then must be general knowledge, relating, not to individuals primarily, but to the general facts or qualities which individuals exemplify; in fact, our notion of an individual, when examined, is found to be an aggregate of such general qualities. But, again, the object of true knowledge must be what really exists ; hence the reality of the universe must lie in general facts or relations, and not in the individuals that exemplify them.

So far the steps are plain enough; but we do not yet see how this logical Realism (as it was afterwards called) comes to have the essentially ethical character that especially interests us in Platonism. Plato's philosophy is now concerned with the whole universe of being; yet the ultimate object of his philosophic contemplation is still " the good," now conceived as the ultimate ground of all being and knowledge. That is, the essence of the universe is identified with its end, — the " formal " with the " final " cause of things, to use the later Aristotelian phraseology. How comes this about ?

Perhaps we may best explain this by recurring to the original application of the Socratic method to human affairs. Since all rational activity is for some end, the different arts or functions of human industry are naturally defined by a statement of their ends or uses ; and similarly, in giving an account of the different artists and

functionaries, we necessarily state their end, " what they are good for." In a society well ordered on Socratic principles, every human being would be put to some use; the essence of his life would consist in doing what he was good for (his proper tpyov). But again, it is easy to extend this view throughout the whole region of organized life; an eye that does not attain its end by seeing is without the essence of an eye. In short, we may say of all organs and instruments that they are what we think them in proportion as they fulfil their function and attain their end. If, then, we conceive the whole universe organically, as a complex arrangement of means to ends, we shall

understand how Plato might hold that all things really were, or (as we say) " realized their idea," in proportion as they accom- plished the special end or good for which they were adapted. Even Socrates, in spite of his aversion to physics, was led by pious reflection to expound a teleological view of the physical world, as ordered in all its parts by divine wisdom for the realiza- tion of some divine end; and, in the metaphysical turn which Plato gave to this view, he was probably anticipated by Euclid of Megara, who held that the one real being is " that which we call by many names, Good, Wisdom, Reason or God," to which Plato, raising to a loftier significance the Socratic identification of the beautiful with the useful, added the further name of Absolute Beauty, explaining how man's love of the beautiful finally reveals itself as the yearning for the end and essence of being.

Plato, therefore, took this vast stride of thought, and identified the ultimate notions of ethics and ontology. We have now to see what attitude he will adopt towards the practical inquiries from which he started. What will now be his view of wisdom, virtue, pleasure and their relation to human well-being?

The answer to this question is inevitably somewhat com- plicated. In the first place we have to observe that philosophy has now passed definitely from the market-place into the lecture- room. The quest of Socrates was for the true art of conduct for a man living a practical life among his fellows. But if the objects of abstract thought constitute the real world, of which this world of individual things is but a shadow, it is plain that the highest, most real life must lie in the former region and not in the latter. It is in contemplating the abstract reality which concrete things obscurely exhibit, the type or ideal

which they imperfectly imitate, that the true life of the mind in man must consist; and as man is most truly man in proportion as he is mind, the desire of one's own good, which Plato, following Socrates, held to be permanent and essential in every living thing, becomes in its highest form the philosophic yearning for knowledge. This yearning, he held, springs — like more sensual impulses — from a sense of want of something formerly possessed, of which there remains a latent memory in the soul, strong in proportion to its philosophic capacity; hence it is that in learning any abstract truth by scientific demonstration we merely make explicit what we already implicitly know; we bring into clear consciousness hidden memories of a state in which the soul looked upon Reality and Good face to face, before the lapse that imprisoned her in an alien body and mingled her true nature with fleshly feelings and im- pulses. We thus reach the paradox that the true art of living is really an " art of dying " as far as possible to mere sense, in order more fully to exist in intimate union with absolute goodness and beauty. On the other hand, since the philosopher must still live and act in the concrete sensible world, the Socratic identifica- tion of wisdom and virtue is fully maintained by Plato. Only he who apprehends good in the abstract can imitate it in such transient and imperfect good as may be realized in human life, and it is impossible that, having this knowledge, he should not act on it, whether in private or public affairs. Thus, in the true philosopher, we shall necessarily find the practically good man, who being " likest of men to the gods is best loved by them "; and also the perfect statesman, if only the conditions of his society allow him a sphere for exercising his statesmanship.

The characteristics of this practical goodness in Plato's matured thought correspond to the fundamental conceptions in his view of the universe. The soul of man, in its good or normal condition, must be ordered and harmonized under the guidance of reason. The question then arises, "Wherein does this order or harmony precisely consist?" In explaining how Plato was led to answer this question, it will be well to notice that, while faithfully maintaining the Socratic doctrine that the highest virtue was inseparable from knowledge of the good, he had come to recognize an inferior kind of virtue, possessed by men who were not philosophers. It is plain that if the good that is to be known is the ultimate ground of the whole of things, it is attainable only by a select and carefully trained few. Yet we can hardly restrict all virtue to these alone. What

Virtue a harmony.

account, then, was to be given of ordinary ” civic ” bravery, temperance and justice? It seemed clear that men who did their duty, resisting the seductions of fear and desire, must have right opinions, if not knowledge, as to the good and evil in human life; but whence comes this right ” opinion “? Partly, Plato said, it comes by nature and ” divine allotment, ” but for its adequate development ” custom and practice ” are required. Hence the paramount importance of education and discipline for civic virtue; and even for future philosophers such moral culture, in which physical and aesthetic training must co-operate, is indispensable; no merely intellectual preparation will suffice. His point is that perfect knowledge cannot be implanted in a soul that has not gone through a course of preparation including much more than physical training. What, then, is this prepara- tion? A distinct step in psychological analysis was taken when Plato recognized that its effect was to produce the ” harmony ” above mentioned among different parts of the soul, by sub- ordinating the impulsive elements to reason. These non-rational elements he further distinguished as appetitive (to eKLdvurjTVKov) and spirited (to dvnoadks or dvfws) — the practical separate- ness of which from each other and from reason he held to be established by our inner experience.

On this triple division of the soul he founded a systematic view of the four kinds of goodness recognized by the common moral consciousness of Greece, and in later times known as the Cardinal Virtues (q.v.). Of these the two most fundamental were (as has been already indicated) wisdom — in its highest form philosophy — and that harmonious and regulated activity of all the elements of the soul which Plato regards as the essence of uprightness in social relations (SiKaiocrvvrj) . The import of this term is essentially social; and we can explain Plato’s use of it only by reference to the analogy which he drew between the individual man and the community. In a rightly ordered polity social and individual well-being alike would depend on that harmonious action of diverse elements, each performing its proper function, which in its social application is more naturally termed SiKaioaiivr). We see, moreover, how in Plato’s view the funda- mental virtues, Wisdom and Justice in their highest forms, are mutually involved. Wisdom will necessarily maintain orderly activity, and this latter consists in regulation by wisdom, while the two more special virtues of Courage (avdpda) and Temper- ance (

Such, then, are the forms in which essential good seemed to manifest itself in human life. It remains to ask whether the statement of these gives a complete account of human well-being, or whether pleasure also is to be included. On this point Plato’s view seems to have gone

through several oscillations. After apparently maintaining (Protagoras) that pleasure is the good, he passes first to the opposite extreme, and denies it (Phaedo, Gorgias) to be a good at all. For (1), as concrete and transient, it is obviously not the real essential good that the philosopher seeks; (2) the feelings most prominently recognized as pleasures are bound up with pain, as good can never be with evil; in so far, then, as common sense rightly recognizes some pleasures as good, it can only be from their tendency to produce some further good. This view, however, was too violent a divergence from Socratism for Plato to remain in it. That pleasure is not the real absolute good, was no ground for not including it in the good of concrete human life; and after all only coarse and vulgar pleasures were indissolubly linked to the pains of want. Accordingly, in the Republic he has no objection to trying the question of the intrinsic superiority of philosophic or virtuous 1 life by the standard of pleasure, and argues that the philosophic (or good) man alone enjoys real pleasure, while the sensualist spends his life in oscillat- ing between painful want and the merely neutral state of pain- lessness, which he mistakes for positive pleasure. Still more

1 It is highly characteristic of Platonism that the issue in this dialogue, as originally stated, is between virtue and vice, whereas, without any avowed change of ground, the issue ultimately discussed is between the philosophic life and the life of vulgar ambition or sensual enjoyment.

emphatically is it declared in the Laws that when we are " dis- coursing to men, not to gods," we must show that the life which we praise as best and noblest is also that in which there is the greatest excess of pleasure over pain. But though Plato holds this inseparable connexion of best and pleasantest to be true and important, it is only for the sake of the vulgar that he lays this stress on pleasure. For in the most philosophical com- parison in the Philebus between the claims of pleasure and wisdom the former is altogether worsted; and though a place is allowed to the pure pleasures of colour, form and sound, and of intellectual exercise, and even to the " necessary " satisfaction of appetite, it is only a subordinate one. At the same time, in his later view, Plato avoids the exaggeration of denying all positive quality of pleasure even to the coarser sensual gratifications; they are un- doubtedly cases of that " replenishment " or " restoration " to its " natural state " of a bodily organ, in which he

defines pleasure to consist (see Timaeus, pp. 64, 65) ; he merely maintains that the common estimate of them is to a large extent illusory, or a false appearance of pleasure is produced by contrast with the ante- cedent or concomitant painful condition of the organ. It is not surprising that this somewhat complicated and delicately balanced view of the relations of " good " and " pleasure " was not long maintained within the Platonic school, and that under Speusippus, Plato's successor, the main body of Platonists took up a simply anti-hedonistic position, as we learn from the polemic of Aristotle. In the Philebus, however, though a more careful psychological analysis leads him to soften down the exaggerations of this attack on sensual pleasure, the antithesis of knowledge and pleasure is again sharpened, and a desire to depreciate even good pleasures is more strongly shown; still even here pleasure is recognized as a constituent of that philosophic life which is the highest human good, while in the Laws, where the subject is more popularly treated, it is admitted that we cannot convince man that the just life is the best unless we can also prove it to be the pleasantest.

When a student passes from Plato to Aristotle, he is so forcibly impressed by the contrast between the habits of mind of the two authors, and the literary manners Aristotle. °^ tne tw0 philosophers, that it is easy to under- stand how their systems have come to be popularly conceived as diametrically opposed to each other; and the uncompromising polemic which Aristotle, both in his ethical and in his metaphysical treatises, directs against Plato and the platonists, has tended strongly to confirm this view. Yet a closer inspection shows us that when a later president of the Academy (Antiochus of Ascalon) repudiated the scepticism which for two hundred years had been accepted as the traditional Platonic doctrine, he had good grounds for claiming Plato and Aristotle as consentient authorities for the ethical position which he took up. For though Aristotle's divergence from Plato is very conspicuous when we consider either his general concep- tion of the subject of ethics, or the details of his system of virtues, still his agreement with his master is almost complete as regards the main outline of his theory of human good; the difference between the two practically vanishes when we view them in relation to the later controversy between Stoics and Epicureans. Even on the cardinal point on which Aristotle entered into direct controversy with Plato, the definite disagreement between the two is less than at first appears; the objections of the disciple hit that part of the master's system that was rather imagined than thought ; the main positive result of Platonic speculation only gains

in distinctness by the application of Aristotelian analysis.

Plato, we saw, held that there is one supreme science or wisdom, of which the ultimate object is absolute good; in the knowledge of this, the knowledge of all particular goods — that is, of all that we rationally desire to know — is implicitly contained; and also all practical virtue, as no one who truly knows what is good can fail to realize it. But in spite of the intense conviction with which he thus identified meta- physical speculation and practical wisdom, we find in his writings no serious attempt to deduce the particulars of human well-being

from his knowledge of absolute good, still less to unfold from it the particular cognitions of the special arts and sciences. Indeed, we may say that the distinction which Aristotle explicitly draws between speculative science or wisdom and practical wisdom (on its political side statesmanship) is really indicated in Plato's actual treatment of the subjects, although the express recognition of it is contrary to his principles. The discussion of good (e.g.) in his Philebus relates entirely to human good, and the respective claims of Thought and Pleasure to constitute this; he only refers in passing to the Divine Thought that is the good of the ordered world, as something clearly beyond the limits of the present discussion. So again, in his last great ethico-political treatise (the Laws) there is hardly a trace of his peculiar metaphysics. On the other hand, the relation between human and divine good, as presented by Aristotle, is so close that we can hardly conceive Plato as having definitely thought it closer. The sub- stantial good of the universe, in Aristotle's view, is the pure activity of universal abstract thought, at once subject and object, which, itself changeless and eternal, is the final cause and first source of the whole process of change in the concrete world. And both he and Plato hold that a similar activity of pure speculative intellect is that in which the philosopher will seek to exist, though he must, being a man, concern himself with the affairs of ordinary human life, a region in which his highest good will be attained by realizing perfect moral excellence. No doubt Aristotle's demonstration of the inappropriateness of attributing moral excellence to the Deity seems to contradict Plato's doctrine that the just man as such is " likest the gods," but here again the discrepancy is reduced when we remember that the essence of Plato's justice (SutatxxrvvT)) is harmonious activity. No doubt, too, Aristotle's attribution of pleasure to the Divine Existence shows a profound metaphysical divergence from Plato; but it is a divergence which has no practical importance. Nor, again, is Aristotle's divergence from the Socratic principle that all " virtue is knowledge " substantially

greater than Plato's, though it is more plainly expressed. Both accept the paradox in the qualified sense that no one can deliberately act contrary to what appears to him good, and that perfect virtue is inseparably bound up with perfect wisdom or moral insight. Both, however, recog- nize that this actuality of moral insight is not a function of the intellect only, but depends rather on careful training in good habits applied to minds of good natural dispositions, though the doctrine has no doubt a more definite and prominent place in Aristotle's system. The disciple certainly takes a step in advance by stating definitely, as an essential characteristic of virtuous action, that it is chosen for its own sake, for the beauty of virtue alone; but herein he merely formulates the conviction that his master inspires. Nor, finally, does Aristotle's account of the rela- tion of pleasure to human well-being (although he has to combat the extreme anti-hedonism to which the Platonic school under Speusippus had been led) differ materially from the outcome of Plato's thought on this point, as the later dialogues present it to us. Pleasure, in Aristotle's view, is not the primary constituent of well-being, but rather an inseparable accident of it; human well-being is essentially well-doing, excellent activity of some kind, whether its aim and end be abstract truth or noble conduct; knowledge and virtue are objects of rational choice apart from the pleasure attending them; still all activities are attended and in a manner perfected by pleasure, which is better and more desirable in proportion to the excellence of the activity. He no doubt criticizes Plato's account of the nature of pleasure, arguing that we cannot properly conceive pleasure either as a " process " or as " replenishment " — the last term, he truly says, denotes a material rather than a psychical fact. But this does not interfere with the general ethical agreement between the two thinkers; and the doctrine that vicious pleasures are not true or real pleasures is so characteristically Platonic that we are almost surprised to find it in Aristotle.

In so far as there is any important difference between the Platonic and the Aristotelian views of human good, we may observe that the latter has substantially a closer correspond- ence to the positive element in the ethical teaching of Socrates,

though it is presented in a far more technical and scholastic form, and involves a more distinct rejection of the fundamental Socratic paradox. The same result appears when ethics C S we compare the

methods of the three philosophers. Although the Socratic induction forms a striking feature of Plato's dialogues, his ideal method of ethics is purely deductive; he admits common sense only as supplying provisional steps and starting-points from which the mind is to ascend to knowledge of absolute good, through which knowledge alone, as he conceives, the lower notions of particular goods are to be truly conceived. Aristotle, discarding the transcendental- ism of Plato, naturally retained from Plato's teaching the original Socratic method of induction from and verification by common opinion. Indeed, the windings of his exposition are best under stood if we consider his literary manner as a kind of Socratic dialogue formalized and reduced to a monologue. He first leads us by an induction to the fundamental notion of ultimate end or good for man. All men, in acting, aim at some result, either for its own sake or as a means to some further end; but obviously not everything can-be sought merely as a means; there must be some ultimate end. In fact men commonly recognize such an end, and agree to call it well-being 1 (evdai/jovia) . But they take very different views of its nature; how shall we find the true view ? We observe that men are classified according to their functions; all kinds of man, and indeed all organs of man, have their special functions, and are judged as functionaries and organs according as they perform their functions well or ill. May we not then infer that man, as man, has his proper function, and that the well-being or " doing well " that all seek really lies in fulfilling well the proper function of man, — that is, in living well that life of the rational soul which we recognize as man's distinctive attribute ?

Again, this Socratic deference- to common opinion is not shown merely in the way by which Aristotle reaches his funda- mental conception; it equally appears in his treatment of the conception itself. In the first place, though in Aristotle's view the most perfect well-being consists in the exercise of man's " divinest part," pure speculative reason, he keeps far from the paradox of putting forward this and nothing else as human good; so far, indeed, that the greater part of his treatise is occupied with an exposition of the inferior good which is realized in practical life when the appetitive or impulsive (semi-rational) element of the soul operates under the due regulation of reason. Even when the notion of " good performance of function " was thus widened, and when it had further taken in the pleasure that is inseparably connected with such functioning, it did not yet correspond to the whole of what a Greek commonly understood as " human well-being." We may grant, indeed, that a moderate provision of material wealth is indirectly included, as an indis- pensable pre-

requisite of a due performance of many functions as Aristotle conceives it — his system admits of no beatitudes for the poor; still there remain other goods, such as beauty, good birth, welfare of progeny, the presence or absence of which influenced the common view of a man's well-being, though they could hardly be shown to be even indirectly important to his " well-acting." These Aristotle attempts neither to exclude from the philosophic conception of well-being nor to include in his formal definition of it. The deliberate looseness which is thus given to his fundamental doctrine characterizes more or less his whole discussion of ethics. He plainly says that the subject does not admit of completely scientific treatment; his aim is to give not a definite theory of human good, but a practic- ally adequate account of its most important constituents.

The most important element, then, of well-being or good life for ordinary men Aristotle holds to consist in well-doing as determined by the notions of the different moral excellences.

'This cardinal term is commonly translated " happiness "; and it must be allowed that it is the most natural term for what we (in English) agree to call " our being's end and aim." But happiness so definitely signifies a state of feeling that it will not admit the interpretation that Aristctie (as well as Plato and the Stoics) ex- pressly gives to eiSai/iovta ; the confusion is best avoided by render- ing the word by the less familiar " well-being."

In expounding these, he gives throughout the pure result of analytical observation of the common moral consciousness of his age. Ethical truth, in his view, is to be attained by careful comparison of particular moral opinions, just as physical truth is •to be obtained by induction from particular physical observations. On account of the conflict of opinion in ethics we cannot hope to obtain certainty upon all questions; still reflection will lead us to discard some of the conflicting views and find a reconcilia- tion for others, and will furnish, on the whole, a practically sufficient residuum of moral truth. This adhesion to common sense, though it involves a sacrifice of both depth and complete- ness in Aristotle's system, gives at the same time an historical interest which renders it deserving of special attention as an analysis of the current Greek ideal of " fair and good life " (KaXoKayadla). His virtues are not arranged on any clear philosophic plan; the list shows no serious attempt to consider human life exhaustively, and exhibit the standard of excellence appropriate to its different departments or aspects. He seems to have taken as a starting-point Plato's four cardinal virtues. The two comprehensive notions of Wisdom and Justice (8ik

The abundant store of just and close analytical observation contained in Aristotle's account of these notions give it a per- manent interest, even beyond its historical value as a delineation of the Greek ideal of " fair and good " life. 2 But its looseness of arrangement and almost grotesque co-ordination of qualities widely differing in importance are obvious. Thus his famous general formula for virtue, that it is a mean or middle state, always to be found somewhere between the vices which stand to it in the relation of excess and defect, scarcely avails to render his treatment more systematic. It was important, no doubt, to express the need of observing due measure and proportion, in order to attain good results in human life no less than in artistic products; but the observation of this need was no new thing in Greek literature; indeed, it had already led the Pytha- goreans and Plato to find the ultimate essence of the ordered universe in number. But Aristotle's purely quantitative state- ment of the relation of virtue and vice is misleading, even where it is not obviously inappropriate; and sometimes leads him to such eccentricities as that of making simple veracity a mean between boastfulness and mock-modesty. 3

2 Aristotle follows Plato and Socrates in identifying the notions of / caXos (" fair," " beautiful ") and ayaSos ("good") in their application to conduct. We may observe, however, that while the latter term is used to denote the virtuous man, and (in the neuter) equivalent to End generally, the former is rather chosen to express the quality of virtuous acts- which in any particular case is the end of the virtuous agent. Aristotle no doubt faithfully represents the common sense of Greece in considering that, in so far as virtue is in itself good to the virtuous agent, it belongs to that species of good which we dis- tinguish as beautiful. In later Greek philosophy the term ko.\qv (" honestum ") became still more technical in the signification of " morally good."

3 The above account is considerably expanded in H. Sidgwick's Hist, of Ethics (5th ed., 1902), pp. 59-70.

It ought to be said that Aristotle does not present the formula just discussed as supplying a criterion of good conduct in any particular case; he expressly leaves this to be determined by " correct reasoning, and the judgment of the practically-wise man (6 0p6w/ uos)." We cannot, however, find that he has furnished any

substantial principles for its determination; indeed, he hardly seems to have formed a distinct general idea of the practical syllogism by which he conceives it to be effected. 1 The kind of reasoning which his view of virtuous conduct requires is one in which the ultimate major premise states a distinctive characteristic of some virtue, and one or more minor premises show that such characteristic belongs to a certain mode of con- duct under given circumstances; since it is essential to good conduct that it should contain its end in itself, and be chosen for its own sake. But he has not failed to observe that practical reasonings are not commonly of this kind, but are rather con- cerned with actions as means to ulterior ends; indeed, he lays stress on this as a characteristic of the " political " life, when he wishes to prove its inferiority to the life of pure speculation. Though common sense will admit that virtues are the best of goods, it still undoubtedly conceives practical wisdom as chiefly exercised in providing those inferior goods which Aristotle, after recognizing the need or use of them for the realization of human well-being, has dropped out of sight; and the result is that, in trying to make clear his conception of practical wisdom, we find ourselves fluctuating continually between the common notion, which he does not distinctly reject, and the notion required as the keystone of his ethical system.

On the whole, there is probably no treatise so masterly as Aristotle's Ethics, and containing so much close and valid thought, that yet leaves on the reader's mind so strong Transl- an _ impression of dispersive and incomplete work. Stoicism. It ' s on ly by dwelling on these defects that we can understand the small amount of influence that his system exercised during the five centuries after his death, as compared with the effect which it has had, directly or indirectly, in shaping the thought of modern Europe. Partly, no doubt, the limited influence of his disciples, the Peripatetics (q.v.), is to be attributed to that exaltation of the purely speculative life which distinguished the Aristotelian ethics from other later systems, and which was too alien from the common moral consciousness to find much acceptance in an age in which the ethical aims of philosophy had again become paramount. Partly, again, the analytical distinctness of Aristotle's manner brings into special prominence the difficulties that attend the Socratic effort to reconcile the ideal aspirations of men with the principles on which their practical reasonings are commonly conducted. The conflict between these two elements of Common Sense was too profound to be compromised; and the moral conscious- ness of mankind demanded a more trenchant partisanship than Aristotle's. Its demands were met by the Stoic school which separated the moral from the worldly view of life, with an

absoluteness and definiteness that caught the imagination; which regarded practical goodness as the highest manifestation of its ideal of wisdom; and which bound the common notions of duty into an apparently coherent system, by a formula that comprehended the whole of human life, and exhibited its relation to the ordered process of the universe. The intellectual descent of its ethical doctrines is principally to be traced to Socrates through the Cynics, though an important element in them seems attributable to the school that inherited the " Academy " of Plato. Both Stoic and Cynic maintained, in its sharpest form, the fundamental tenet that the practical knowledge which is virtue, with the condition of soul that is inseparable from it, is alone to be accounted good. He who exercises this wisdom or knowledge has complete well-being; all else is indifferent to

1 There is a certain difficulty in discussing Aristotle's views on the subject of practical wisdom, and the relation of the intellect to moral action, since it is most probable that the only accounts that we have of these views are not part of the genuine writings of Aristotle. Still books vi. and vii. of the Nicomachean Ethics contain no doubt as pure Aristotelian doctrine as a disciple could give, and appear to supply a sufficient foundation for the general criticism expressed in the text.

Stoicism.

him. It is true that the Cynics were more concerned to emphasize the negative side of the sage's well-being, while the Stoics brought into more prominence its positive side. This difference, however, did not amount to disagreement. The Stoics, in fact, seem generally to have regarded the eccentricities of Cynicism as an emphatic manner of expressing the essential antithesis between philosophy and the world; a manner which, though not necessary or even normal, might yet be advantageously adopted by the sage under certain circumstances. 2

Wherein, then, consists this knowledge or wisdom that makes free and perfect? Both Cynics and Stoics {q.v.) agreed that the most important part of it was the knowledge that the sole good of man lay in this knowledge or wisdom itself. It must be understood that by wisdom they meant wisdom realized in act; indeed, they did not conceive the existence of wisdom as separable from such realization. We may observe, too, that the Stoics rejected the divergence which we have seen gradually taking place in Platonic-Aristotelian thought from the position of Socrates, " that no one aims at what he knows to be bad." The stress that their psychology laid on the essential unity

of the rational self that is the source of voluntary action prevented them from accepting Plato's analysis of the soul into a regulative element and elements needing regulation. They held that what we call passion is a morbid condition of the rational soul, involving erroneous judgment as to what is to be sought or shunned. From such passionate errors the truly wise man will of course be free. He will be conscious indeed of physical appetite; but he will not be misled into supposing that its object is really a good; he cannot, therefore, hope for the attainment of this object or fear to miss it, as these states involve the conception of it as a good. Similarly, though like other men he will be subject to bodily pain, this will not cause him mental grief or disquiet, as his worst agonies will not disturb his clear conviction that it is really indifferent to his true reasonable self.

That this impassive sage was a being not to be found among living men the later Stoics at least were fully aware. They faintly suggested that one or two moral heroes of old time might have realized the ideal, but they admitted that all other philosophers (even) were merely in a state of progress towards it. This ad- mission did not in the least diminish the rigour of their demand for absolute loyalty to the exclusive claims of wisdom. The assurance of its own unique value that such wisdom involved they held to be an abiding possession for those who had attained it; 3 and without this assurance no act could be truly wise or virtuous. Whatever was not of knowledge was of sin; and the distinction between right and wrong being absolute and not admitting of degrees all sins were equally sinful; whoever broke the least commandment was guilty of the whole law. Similarly, all wisdom was somehow involved in any one of the manifesta- tions of wisdom, commonly distinguished as particular virtues; though whether these virtues were specifically distinct, or only the same knowledge in different relations, was a subtle question on which the Stoics do not seem to have been agreed.

Aristotle had already been led to attempt a refutation of the Socratic identification of virtue with knowledge; but his attempt had only shown the profound difficulty of attacking the paradox, so long as it was admitted that no one could of deliberate pur- pose act contrary to what seemed to him best. Now, Aristotle's divergence from Socrates had not led him so far as to deny this; while for the Stoics who had receded to the original Socratic position, the difficulty was still more patent. This theory of virtue led them into two dilemmas. Firstly, if virtue is know- ledge, does it follow that vice is involuntary? If not, it must be that ignorance is voluntary. This alternative is the less danger- ous to morality, and as such the Stoics chose it. But they were

2 It has been suggestively said that Cynicism was to Stoicism what monasticism was to early Christianity. The analogy, however, must not be pressed too far, since orthodox Stoics do not ever seem to have regarded Cynicism as the more perfect way.

s The Stoics were not quite agreed as to the immutability of virtue, but they were agreed that, when once possessed, it could only be lost through the loss of reason itself.

not yet at the end of their perplexities; for while they were thus driven to an extreme extension of the range of human volition, their view of the physical universe involved an equally thorough-going determinism. How could the vicious man be responsible if his vice were strictly pre-determined? The Stoics answered that the error which was the essence of vice was so far voluntary that it could be avoided if men chose to exercise their reason. No doubt it depended on the innate force and firmness 1 of a man's soul whether his reason was effectually exercised; but moral responsibility was saved if the vicious act proceeded from the man himself and not from any external cause.

With all this we have not ascertained the positive practical content of this wisdom. How are we to emerge from the barren circle of affirming (1) that wisdom is the sole good and unwisdom the sole evil, and (2) that wisdom is the knowledge of good and evil; and attain some method for determining the particulars of good conduct? The Cynics made no attempt to solve this difficulty; they were content to mean by virtue what any plain man meant by it, except in so far as their sense of independence led them to reject certain received precepts and prejudices. The Stoics, on the other hand, not only worked out a detailed system of duties — or, as they termed them, " things meet and fit " (KadriKovra) for all occasions of life; they were further especially concerned to comprehend them under a general formula. They found this by bringing out the positive significance of the notion of Nature, which the Cynic had used chiefly in a negative way, as an antithesis to the " consentions " (vo/ jlos), from which his knowledge had made him free. Even in this negative use of the notion it is necessarily implied that whatever active tendencies in man are found to be " natural "• — that is, independent of and uncorrupted by social customs and conventions — will properly take effect in outward acts, but the adoption of "

conformity to nature " as a general positive rule for outward conduct seems to have been due to the influence on Zeno of Academic teaching. Whence, however, can this authority belong to the natural, unless nature be itself an expression or embodiment of divine law and wisdom? The conception of the world, as organized and filled by divine thought, was common, in some form, to all the philosophies that looked back to Socrates as their founder, — some even maintaining that this thought was the sole reality. This pantheistic doctrine harmonized thoroughly with the Stoic view of human good; but being unable to conceive substance idealistically, they (with considerable aid from the system of Heraclitus) supplied a materialistic side to their pantheism, — conceiving divine thought as an attribute of the purest and most primary of material substances, a subtle fiery aether. This theological view of the physical universe had a double effect on the ethics of the Stoic. In the first place it gave to his cardinal conviction of the all-sufficiency of wisdom for human well-being a root of cosmical fact, and an atmosphere of religious and social emotion. The exercise of wisdom was now viewed as the pure life of that particle of divine substance which was in very truth the " god within him "; the reason whose supremacy he maintained was the reason of Zeus, and of all gods and reasonable men, no less than his own; its realization in any one individual was thus the common good of all rational beings as such; " the sage could not stretch out a finger rightly without thereby benefiting all other sages," — nay, it might even be said that he was " as useful to Zeus as Zeus to him." 2 But again, the same conception served to harmonize the higher and the lower elements of human life. For even in the physical or non-rational man, as originally con- stituted, we may see clear indications of the divine design, which it belongs to his rational will to carry into conscious execution; indeed, in the first stage of human life, before reason is fully developed, uncorrupted natural impulse effects what is afterwards the work of reason. Thus the formula of " living according to nature," in its application to man as the " rational animal,"

1 Hence some members of the school, without rejecting the definition of virtue = knowledge, also defined it as " strength and force."

2 It is apparently in view of this union in reason of rational beings that friends are allowed to be " external goods " to the sage, and that the possession of good children is also counted a good.

may be understood both as directing that reason is to govern, and as indicating how that government is to be practically exer- cised. In

man, as in every other animal, from the moment of birth natural impulse prompts to the maintenance of his physical frame; then, when reason has been developed and has recognized itself as its own sole good, these " primary ends of nature " and whatever promotes these still constitute the outward objects at which reason is to aim; there is a certain value (aˆLa) in them, in proportion to which they are " preferred " (irpor]yneva) and their opposites " rejected " (airorpoˆyiMva) ; indeed it is only in the due and consistent exercise of such choice that wisdom can find its practical manifestation. In this way all or most of the things commonly judged to be " goods " — health, strength, wealth, fame, 1 &c, — are brought within the sphere of the sage's choice,, though his real good is solely in the wisdom of the choice, and not in the thing chosen.

The doctrine of conformity to Nature as the rule of conduct was not peculiar to Stoicism. It is found in the theories of Speusippus, Xenocrates, and also to some extent in those of the Peripatetics. The peculiarity of the Stoics lay in their refusing to use the terms " good and evil " in connexion with " things indifferent," and in pointing out that philosophers, though independent of these things, must yet deal with them in practical life.

So far we have considered the " nature " of the individual man as apart from his social relations; but the sphere of virtue, as commonly conceived, lies chiefly in these, and this was fully recognized in the Stoic account of duties (KadTfKovTa) ; indeed, in their exposition of the " natural " basis of justice, the evidence that man was born not for himself but for mankind is the most important part of their work in the region of practical morality. Here, however, we especially notice the double significance of " natural," as applied to (1) what actually exists everywhere or for the most part, and (2) what would exist if the original plan of man's life were fully carried out; and we find that the Stoics have not clearly harmonized the two elements of the notion. That man was " naturally " a social animal Aristotle had already taught; that all rational beings, in the unity of the reason that is common to all, form naturally one community with a common law was (as we saw) an immediate inference from the Stoic conception of the universe as a whole. That the members of this " city of Zeus " should observe their contracts, abstain from mutual harm, combine to protect each other from injury, were obvious points of natural law; while again, it was clearly necessary to the preservation of human society that its members should form sexual unions, produce children, and bestow care on their rearing and training. But beyond this nature did not seem to go in determining the relations of the sexes; accordingly, we find that community of

wives was a feature of Zeno's ideal commonwealth, just as it was of Plato's; while, again, the strict theory of the school recognized no government or laws as true or binding except those of the sage; he alone is the true ruler, the true king. So far, the Stoic " nature " seems in danger of being as revolutionary as Rousseau's. Practically, however, this revolutionary aspect of the notion was kept for the most part in the background; the rational law of an ideal community was not distinguished from the positive ordinances and customs of actual society; and the " natural " ties that actually bound each man to family, kinsmen, fatherland, and to unwise humanity generally, supplied the outline on which the external manifesta- tion of justice was delineated. It was a fundamental maxim that the sage was to take part in public life; and it does not appear that his political action was to be regulated by any other principles than those commonly accepted in his community. Similarly, in the view taken by the Stoics of the duties of social decorum, and in their attitude to the popular religion, we find a fluctuating compromise between the disposition to repudiate what is conventional, and the disposition to revere what is

1 The Stoics seem to have varied in their view of " good repute," ti>5o£ia; at first, when the school was more under the influence of Cynicism, they professed an outward as well as an inward indifference to it; ultimately they conceded the point to common sense, and included it among vporiyixiva.

established, each tendency expressing in its own way the principle of " conforming to nature."

Among the primary ends of nature, in which wisdom recog- nized a certain preferability, the Stoics included freedom from

bodily pain; but they refused, even in this outer hedonists. court °f wisdom, to find a place for pleasure. They

held that the latter was not an object of uncor- rupted natural impulse, but an " aftergrowth " (kiri.ykvvriixa). They thus endeavoured to resist Epicureanism even on the ground where the latter seems prima facie strongest; in its appeal, namely, to the natural pleasure-seeking of all living things. Nor did they merely mean by pleasure (fiSovrj) the gratification of bodily appetite; we

find (e.g.)Chrysippus urging, as a decisive argument against Aristotle, that pure speculation was " a kind of amusement; that is, pleasure." Even the "' joy and gladness " (x a P°-y evpoarvvn) that accompany the exercise of virtue seem to have been regarded by them as merely an in- separable accident, not the essential constituent of well-being. It is only by a later modification of Stoicism that cheerfulness or peace of mind is taken as the real ultimate end, to which the exercise of virtue is merely a means. At the same time it is probable that the serene joys of virtue and the grieflessness which the sage was conceived to maintain amid the worst tortures, formed the main attractions of Stoicism for ordinary minds. In this sense it may be fairly said that Stoics and Epicureans made rival offers to mankind of the same kind of happiness ; and the philosophical peculiarities of either system may be traced to the desire of being undisturbed by the changes and chances of life. The Stoic claims on this head were the loftiest; as the well-being of their sage was independent, not only of external things and bodily conditions, but of time itself; it was fully realized in a single exercise of wisdom and could not he increased by duration. This paradox is violent, but it is quite in harmony with the spirit of Stoicism; and we are more startled to find that the Epicurean sage, no less than the Stoic, is to be happy even on the rack; that his happiness, too, is unimpaired by being restricted in duration, when his mind has apprehended the natural limits of life; that, in short, Epicurus makes no less strenuous efforts than Zeno to eliminate imperfection from the conditions of human existence. This characteristic, however, is the key to the chief differences between Epicureanism and the more na'ive hedonism of Aristippus. The latter system gave the simplest and most obvious answer to the inquiry after ultimate good for man; but besides being liable, when developed con- sistently, to offend the common moral consciousness, it con- spicuously failed to provide the " completeness " and " security " which, as Aristotle says, " one divines to belong to man's true Good." Philosophy, in the Greek view, should be the art as well as the science of good life ; and hedonistic philosophy would seem a bungling and uncertain art of pleasure, as pleasure is ordinarily conceived. Nay, it would even be found that the habit of philosophical reflection often operated adversely to the attainment of this end, by developing the thinker's self-consciousness, so as to disturb that normal relation to external objects on which the zest of ordinary enjoyment depends. Hence we find that later thinkers of the Cyrenaic school felt themselves compelled to change their fundamental notion; thus Theodorus defined the good as " gladness " (xapa) depending on wisdom, as distinct from mere pleasure, while Hegesias proclaimed that

happiness was unattainable, and that the chief function of wisdom was to render life painless by producing indifference to all things that give pleasure. But by such changes their system lost the support that it had had in the pleasure- seeking tendencies of ordinary men. It was clear that if philo- sophic hedonism was to be established on a broad and firm basis, it must in its notion of good combine what the plain man naturally sought with what philosophy could plausibly offer. Such a combination was effected, with some little violence, by Epicurus; whose system with all its defects showed a remarkable power of standing the test of time, as it attracted the unqualified adhesion of generation after generation of disciples for a period of some six centuries.

In the fundamental principle of his philosophy Epicurus is not original. Aristippus (cf. also Plato in the Protagoras and Eudoxus) had already maintained that pleasure Balcuras is the sole ultimate good, and pain the sole evil; that no pleasure is to be rejected except for its painful consequences, and no pain to be chosen except as a means to greater pleasure; that the stringency of all laws and customs depends solely on the legal and social penalties attached to their violation; that, in short, all virtuous conduct and all speculative activity are empty and useless, except as contributing to the pleasantness of the agent's life. And Epicurus assures us that he means by pleasure what plain men mean by it; and that if the gratifica- tions of appetite and sense are discarded, the notion is emptied of its significance. So far the system would seem to suit the inclinations of the most thorougn-going voluptuary. The originality of Epicurus lay in his theory that the highest point of pleasure, whether in body or mind, is to be attained by the mere removal of pain or disturbance, after which pleasure admits of variation only and not of augmentation; that therefore the utmost gratification of which the body is capable may be pro- vided by the simplest means, and that " natural wealth " is no more than any man can earn. When further he teaches that the attainment of happiness depends almost entirely upon insight and right calculation, fortune having very little to do with it; that the pleasures and pains of the mind are far more important than those of the body, owing to the accumulation of feeling caused by memory and anticipation; and that an indispensable condition of mental happiness lies in relieving the mind of all superstitions, which can be effected only by a thorough knowledge of the physical universe — he introduces an ample area for the exercise of the philosophic intellect. So again, in the stress that he lays on the misery which the most secret wrong-doing must necessarily cause from the perpetual fear of discovery, and in his

exuberant exaltation of. the value of disinterested friendship, he shows a sincere, though not completely successful, effort to avoid the offence that consistent egoistic hedonism is apt to give to ordinary human feeling. As regards friendship, Epicurus was a man of peculiarly unexclusive sympathies. 1 The genial fellowship of the philosophic community that he collected in his garden remained a striking feature in the tradi- tions of his school; and certainly the ideal which Stoics and Epicureans equally cherished of a brotherhood of sages was most easily realized on the Epicurean plan of withdrawing from political and dialectical conflict to simple living and serene leisure, in imitation of the gods apart from the fortuitous con- course of atoms that we call a world. No doubt it was rather the practical than the theoretical side of Epicureanism which gave it so strong a hold on succeeding generations.

The two systems that have just been described were those that most prominently attracted the attention of the ancient world, so far as it was directed to ethics, from their , . almost simultaneous origin to the end of the 2nd areek century a.d., when Stoicism almost vanishes from our phiio- view. But side by side with them the schools of Plato Vf?f' and Aristotle still maintained a continuity of tradition, la # ome ˆ and a more or less vigorous life; and philosophy, as a recognized element of Graeco-Roman culture, was understood to be divided among these four branches. The internal history, however, of the four schools was very different. We find no development worthy of notice in Aristotelian ethics (see Peri- patetics). The Epicureans, again, from their unquestioning acceptance of the " dogmas " 2 of their founder, almost deserve to be called a sect rather than a school. On the other hand, the changes in Stoicism are very noteworthy; and it is the more easy to trace them, as the only original writings of this school which we possess are those of the later Roman Stoics. These changes may be attributed partly to the natural inner develop- ment of the system, partly to the reaction of the Roman mind

1 It is noted of him that he did not disdain the co-operation either of women or of slaves in his philosophical labours.

2 The last charge of Epicurus to his disciples is said to have been, rcof 5oy [IQ.T03V fxepvTJadai.

on the essentially Greek doctrine which it received, — a reaction all

the more inevitable from the very affinity between the Stoic sage and the ancient Roman ideal of manliness. It was natural that the earlier Stoics should be chiefly occupied with delineating the inner and outer characteristics of ideal wisdom and virtue, and that the gap between the ideal sage and the actual philo- sopher, though never ignored, should yet be somewhat overlooked. But when the question "What is man's good?" had been answered by an exposition of perfect wisdom, the practical question " How may a man emerge from the folly of the world, and get on the way towards wisdom ? " naturally attracted attention; and the preponderance of moral over scientific interest, which was characteristic of the Roman mind, gave this question especial prominence. The sense of the gap between theory and fact gives to the religious element of Stoicism a new force; the soul, conscious of its weakness, leans on the thought of God, and in the philosopher's attitude towards external events, pious resignation preponderates over self-poised indiffer- ence; the old self-reliance of the reason, looking down on man's natural life as a mere field for its exercise, makes room for a positive aversion to the flesh as an alien element imprisoning the spirit; the body has come to be a " corpse which the soul sustains," 1 and life a "sojourn in a strange land"; 2 in short, the ethical idealism of Zeno has begun to borrow from the metaphysical idealism of Plato.

In no one of these schools was the outward coherence of

tradition so much strained by inner changes as it was in Plato's.

The alterations, however, in the metaphysical position

History of f tne Academics had little effect on their ethical teach-

pinto S

school. i n 8) as even during the period of Scepticism, they appear to have presented as probable the same general view of human good which Antiochus afterwards dogmatically announced as a revival of the common doctrine of Plato and Aristotle. And during the period of a century and a half between Antiochus and Plutarch, we may suppose the school to have maintained the old controversy with Stoicism on much the same ground, accepting the formula of " life according to nature," but demanding that the " good " of man should refer to his nature as a whole, the good of his rational part being the chief element, and always preferable in case of conflict, but yet not absolutely his sole good. In Plutarch, however, we see the same tendencies of change that we have noticed in later Stoicism. The*

conception of a normal harmony between the higher and lower elements of human life has begun to be disturbed, and the side of Plato's teaching that deals with the inevitable imperfec- tions of the world of concrete experience becomes again pro- minent. For example, we find Plutarch amplifying the sugges- tion in Plato's latest treatise (the Laws) that this imperfection is due to a bad world-soul that strives against the good,— a suggestion which is alien to the general tenor of Plato's doctrine, and had consequently been unnoticed during the intervening centuries. We observe, again, the value that Plutarch attaches, not merely to the sustainment and consolation of rational religion, but to the supernatural communications vouchsafed by the divinity to certain human beings in dreams, through oracles, or by special warnings, like those of the genius of Socrates. For these flashes of intuition, he holds, the soul should be pre- pared by tranquil repose and the subjugation of sensuality through abstinence. The same ascetic effort to attain by aloof- ness from the body a pure receptivity for supernatural influences, is exhibited in Neo-Pythagoreanism. But the general tendency that we are noting did not find its full expression in a reasoned system until we come to the Egyptian Plotinus.

The system of Plotinus (205-270 a.d.) is a striking develop- ment of that element of Platonism which has had most fascina- tion for the medieval and even for the modern mind, but which had almost vanished out of sight in the controversies of the post T Aristotelian schools. At the same time the differences are the more noteworthy from the reverent adhesion which the Neoplatonists always maintain to Plato. Plato identified good with the real essence of things; 1 Epictetus. 2 Marcus Aurelius.

Neo- platonism.

with that in them which is definitely conceivable and knowable. It belongs to this view to regard the imperfection of things as devoifl of real being, and so incapable of being definitely thought or known; accordingly, we find that Plato has no technical term for that in the concrete sensible world which hinders it from perfectly expressing the abstract ideal world, and which in Aristotle's system is distinguished as absolutely formless matter (v\r)). And so, when we pass from the ontology to the ethics of Platonism, we find that, though the highest life is only to be realized by turning away from concrete human affairs and their material environment, still the sensible world is not yet an object of positive moral aversion; it is rather something which the philosopher is seriously concerned to make as harmonious, good and beautiful as possible. But in Neoplatonism the inferiority of the

condition in which the embodied human soul finds itself is more intensely and painfully felt ; hence an express recognition of formless matter (CX97) as the " first evil," from which is derived the "second evil," body (croj/ua), to whose influence all the evil in the soul's existence is due. Accordingly the ethics of Plotinus represent, we may say, the moral idealism of the Stoics cut loose from nature. The only good of man is the pure existence of the soul, which in itself, apart from the con- tagion of the body, is perfectly free from error or defect; if only it can be restored to the untrammelled activity of its original being, nothing external, nothing bodily, can positively impair its perfect welfare. It is only the lowest form of virtue — the " civic " virtue of Plato's Republic — that is employed in regu- lating those animal impulses whose presence in the soul is due to its mixture with the body; higher or philosophic wisdom, temperance, courage and justice are essentially purifications from this contagion; until finally the highest mode of goodness is reached, in which the soul has no community with the body, and is entirely turned towards reason. It should be observed that Plotinus himself is still too Platonic to hold that the absolute mortification of natural bodily appetites is required for purifying the soul; but this ascetic inference was drawn to the fullest extent by his disciple Porphyry.

There is, however, a yet higher point to be reached in the upward ascent of the Neoplatonist from matter; and here the divergence of Plotinus from Platonic idealism is none the less striking, because it is a bona fide result of reverent reflection on Plato's teaching. The cardinal assumption of Plato's metaphysic is, that the real is definitely thinkable and knowable in proportion as it is real; so that the further the mind advances in abstrac- tion from sensible particulars and apprehension of real being, the more definite and clear its thought becomes. Plotinus, however, urges that, as all thought involves difference or duality of some kind, it cannot be the primary fact in the universe, what we call God. He must be an essential unity prior to this duality, a Being wholly without difference or determination; and, accord- ingly, the highest mode of human existence, in which the soul apprehends this absolute, must be one in which all definite thought is transcended, and all consciousness of self lost in the absorbing ecstasy. Porphyry tells us that his master Plotinus attained the highest state four times during the six years which he spent with him.

Neoplatonism, originally Alexandrine, is often regarded as Hellenistic rather than Hellenic, a product of the mingling of Greek with Oriental civilization. But however Oriental may have been the cast of mind that welcomed this theosophic asceticism, the forms of

thought by which these views were philosophically reached are essentially Greek; and it is by a thoroughly intelligible process of natural development, in which the intensification of the moral consciousness represented by Stoicism plays an important part, that the Hellenic pursuit of knowledge culminates in a preparation for ecstasy, and the Hellenic idealization of man's natural life ends in a settled antipathy to the body and its works. At the same time we ought not to overlook the affinities between the doctrine of Plotinus and that remarkable combination of Greek and Hebrew thought which Philo Judaeus had expounded two centuries before; nor the fact that Neoplatonism was developed in

conscious antagonism to the new religion which had spread from Judea, and was already threatening the conquest of the Graeco-Roman world, and also to the Gnostic systems (see Gnosticism) ; nor, finally, that it furnished the chief theoretical support in the last desperate struggle that was made under Julian to retain the old polytheistic worship.

B. Christianity and Medieval Ethics. — In the present article we are not concerned with the origin of the Christian religion, nor with its outward history. Nor have we to consider the special doctrines that have formed the bond of union of the Christian communities except in their ethical aspect, their bearing on the systematization of human aims and activities. This aspect, however, must necessarily be prominent in discussing Christianity, which cannot be adequately treated merely as a system of theological beliefs divinely revealed, and special observances divinely sanctioned; for it claims to regulate the whole man, in all departments of his existence. It was not till the 4th century a.d. that the first attempt was made to offer a systematic exposition of Christian morality; and nine centuries more had passed away before a genuinely philosophic intellect, trained by a full study of Aristotle, undertook to give complete scientific form to the ethical doctrine of the Catholic church. Before, however, we take a brief survey of the progress of systematic ethics from Ambrose to Thomas Aquinas, it may be well to examine the chief features of the new moral consciousness that had spread through Graeco-Roman civilization, and was awaiting philosophic synthesis. It will be convenient to consider first the new form or universal characteristics of Christian morality, and afterwards to note the chief points in the matter or particulars of duty and virtue which received development

or emphasis from the new religion.

The first point to be noticed is the new conception of morality as the positive law of a theocratic community possessing a Christian written code imposed by divine revelation, and and Jewish sanctioned by divine promises and threatenings. It "law of ; s t rue that we find in ancient thought, from Socrates a ° a " downwards, the notion of a law of God, eternal and immutable, partly expressed and partly obscured by the shifting codes and customs of actual human societies. But the sanctions of this law were vaguely and, for the most part, feebly imagined; its principles were essentially unwritten, and thus referred not to the external will of an Almighty Being who claimed un- questioning submission, but rather to the reason that gods and men shared, by the exercise of which alone they could be adequately known and defined. Hence, even if the notion of law had been more prominent than it was in ancient ethical thought, it could never have led to a juridical, as distinct from a philosophical, treatment of morality. In Christianity, on the other hand, we early find that the method of moralists determining right conduct is to a great extent analogous to that of juris- consults interpreting a code. It is assumed that divine sommands have been implicitly given for all occasions of life, and that they are to be ascertained in particular cases by interpretation of the general rules obtained from texts of scripture, and by inference from scriptural examples. This juridical method descended naturally from the Jewish theocracy, of which Christendom was a universalization. Moral insight, in the view of the most thoughtful Jews of the age immediately preceding Christianity, was conceived as knowledge of a divine code, emanating from an authority external to human reason which had only the function of interpreting and applying its rules. This law was derived partly from Moses, partly from the utterances of the later prophets, partly from oral tradition and from the commentaries and supplementary maxims of generations of students. Christianity inherited the notion of a written divine code acknowledged as such by the " truelsrael " — now potentially including the whole of mankind, or at least the chosen of all nations, — on the sincere acceptance of which the Christian's share of the divine promises to Israel depended. And though the ceremonial part of the old Hebrew code was altogether rejected, and with it all the supplementary jurisprudence resting on tradition and erudite commentary, still God's law

was believed to be contained in the sacred books of the Jews, supplemented by the teaching of Christ and his apostles. By the recognition of this law the church was constituted as an ordered community, essentially distinct from the State; the distinction

between the two was emphasized by. the withdrawal of the early Christians from civic life, to avoid the performance of idolatrous ceremonies imposed as official expressions of loyalty, and by the persecutions which they had to endure, when the spread of an association apparently so hostile to the framework of ancient society had at length alarmed the imperial government. Nor was the distinction obliterated by the recogni- tion of Christianity as the state religion under Constantine.

Thus the jural form in which morality was conceived only emphasized the fundamental difference between it and the laws of the state. The ultimate sanctions of the moral code were the infinite rewards and punishments awaiting the immortal soul hereafter; but the church early felt the necessity of with- drawing the privileges of membership from apostates and allowing them to be gradually regained only by a solemn ceremonial expressive of repentance, protracted through several years. This formal and regulated " penitence " was extended from apostasy to other grave — or, as they were subsequently called, " deadly " — sins; while for minor offences all Christians were called upon to express contrition by fasting and abstinence from ordinarily permitted pleasures, as well as verbally in public and private devotions. " Excommunication " and " penance " thus came to be temporal ecclesiastical sanctions of the moral law. As the graduation of these sanctions naturally became more minute, a correspondingly detailed classification of offences was rendered necessary, and thus a system of ecclesiastical jurisprudence was gradually produced, somewhat analogous to that of Judaism. At the same time this tendency to make prominent a scheme of external duties has always been counter- acted in Christianity by the remembrance of its original antithesis to Jewish legalism. We find that this antithesis, as exaggerated by some of the Gnostic sects of the 2nd and 3rd centuries a.d., led, not merely to theoretical antinomianism, but even (if the charges of their orthodox opponents are not entirely to be dis- credited) to gross immorality of conduct. A similar tendency has shown itself at other periods of church history. And though such antinomianism has always been sternly repudiated by the moral consciousness of Christendom, it has never been forgotten that " inwardness," Tightness of heart or spirit, is the pre-eminent characteristic of Christian goodness. It must not, of course, be supposed that the need of something more than mere fulfilment of external duty was ignored even by the later Judaism. Rabbinic erudition could not forget the repression of vicious desires in the tenth commandment, the stress laid in Deuteronomy on the necessity of service to God, or the inculcation by later prophets of humility

and faith. ” The real and only Pharisee,” says the Talmud, ” is he who does the will of his Father because he loves Him.” But it remains true that the contrast with the ” righteousness of the scribes and pharisees ” has always served to mark the requirement of ” inwardness ” as a distinctive feature of the Christian code — an inwardness not merely negative, tending to the repression of vicious desires as well as vicious acts, but also involving a positive rectitude of the inner state of the soul.

*In this aspect Christianity invites comparison with Stoicism, and indeed with pagan ethical philosophy generally, if we except the hedonistic schools. Rightness of purpose, christian preference of virtue for its own sake, suppression of and Pagan vicious desires, were made essential points by the inward- Aristotelians, who attached the most importance to ” ess * outward circumstances in their view of virtue, no less than by the Stoics, to whom all outward things were indifferent. The fundamental differences between pagan and Christian ethics depend not on any difference in the value set on rightness of heart, but on different views of the essential form or conditions of this inward rightness. In neither case is it presented purely and simply as moral rectitude. By the pagan philosophers it was always conceived under the form of Knowledge or Wisdom,*

it being inconceivable to all the schools sprung from Socrates that a man could truly know his own good and yet deliberately choose anything else. This knowledge, as Aristotle held, might be permanently precluded by vicious habits, or temporarily obliterated by passion, but if present in the mind it must produce Tightness of purpose. Or even if it were held with some of the Stoics that true wisdom was out of the reach of the best men actually living, it none the less remained the ideal condition of perfect human life. By Christian teachers, on the other hand, the inner springs of good conduct were generally conceived as Faith and Love. Of these notions the former has a somewhat complex ethical import; it seems to blend several elements differently prominent in different minds. Its simplest and commonest meaning is that emphasized in the contrast of “faith” with “sight”; where it signifies belief in the invisible divine order represented by the church, in the actuality of the law, the threats, the promises of God, in spite of all the influences in man’s natural life

that tend to obscure this belief. Out of this contrast there ultimately grew an essentially different opposition between faith and knowledge or reason, according to which the theological basis of ethics was contrasted with the philosophical; the theologians maintaining sometimes that the divine law is essentially arbitrary, the expression of will, not reason; more frequently that its reason- ableness is inscrutable, and that actual human reason should confine itself to examining the credentials of God's messengers, and not the message itself. But in early Christianity this latter antithesis was as yet undeveloped; faith means simply force in clinging to moral and religious conviction, whatever their rational grounds may be; this force, in the Christian conscious- ness, being inseparably bound up with personal loyalty and trust towards Christ, the leader in the battle with evil, the ruler of the kingdom to be realized. So far, however, there is no ethical difference between Christian faith and that of Judaism, or its later imitation, Mahommedanism ; except that the personal affection of loyal trust is peculiarly stirred by the blending of human and divine natures in Christ, and the rule of duty impressively taught by the manifestation of his perfect life. A more distinctively Christian, and a more deeply moral, significance is given to the notion in the antithesis of " faith " and " works." Here faith means more than loyal acceptance of the divine law and reverent trust in the lawgiver; it implies a consciousness, at once continually present and continually transcended, of the radical imperfection of all human obedience to the law, and at the same time of the irremissible condemnation which this imperfection entails. The Stoic doctrine of the worthlessness of ordinary human virtue, and the stern paradox that all offenders are equally, in so far as all are absolutely, guilty, find their counterparts in Christianity; but the latter (maintaining this ideal severity in the moral standard, with an emotional consciousness of what is involved in it quite unlike that of the Stoic) overcomes its practical exclusiveness through faith. This faith, again, may be conceived in two modes, essentially distinct though usually combined. In one view it gives the believer strength to attain, by God's supernatural aid or " grace," a goodness of which he is naturally incapable; in the other view it gives him an assurance that, though he knows himself a sinner deserving of utter condemnation, a perfectly just God still regards him with favour on account of the perfect services and suffering of Christ. Of these views the former is the more catholic, more universally present in the Christian consciousness; the latter more deeply penetrates the mystery of the Atonement, as expounded in the Pauline epistles.

But faith, however understood, is rather an indispensable pre-

requisite than the essential motive principle of Christian good conduct. This motive is supplied by the other central notion, love. On love depends the " fulfilling of the law," and the sole moral value of Christian duty — that is, on love to God, in the first place, which in its fullest develop- ment must spring from Christian faith; and, secondly, love to all mankind, as the objects of divine love and sharers in the

Love.

humanity ennobled by the incarnation. This derivative phil- anthropy characterizes the spirit in which all Christian perform- ance of social duty is to be done; loving devotion to God being the fundamental attitude of mind that is to be maintained throughout the whole of the Christian's life. But further, as regards abstinence from unlawful acts and desires ParH prompting to them, we have to notice another form in which the inwardness of Christian morality manifests itself, which, though less distinctive, should yet receive attention in any comparison of Christian ethics with the view of Graeco- Roman philosophy. The profound horror with which the Christian's conception of a suffering as well as an avenging divinity tended to make him regard all condemnable acts was tinged with a sentiment which we may perhaps describe as a ceremonial aversion moralized — the aversion, that is, to foulness or impurity. In Judaism, as in other, especially Oriental, religions, the natural dislike of material defilement has been elevated into a religious sentiment, and made to support a com- plicated system of quasi-sanitary abstinences and ceremonial purifications; then, as the ethical element predominated in the Jewish religion, a moral symbolism was felt to reside in the ceremonial code, and thus aversion to impurity came to be a common form of the ethico-religious sentiment. Then, when Christianity threw off the Mosaic ritual, this religious sense of purity was left with no other sphere besides morality; while, from its highly idealized character, it was peculiarly well adapted for that repression of vicious desires which Christianity claimed as its special function.

The distinctive features of Christian ethics are obedience, unworldliness, benevolence, purity and humility. „. They are naturally connected with the more general par ticu- characteristics just stated; though many of them lars of may also be referred directly to the example and chrlstlaB precepts of Christ, and in several cases they are clearly mora yi due to both causes, inseparably combined.

1. We may notice, in the first place, that the conception of morality

as a code which, if not in itself arbitrary, is yet to be accepted by men with unquestioning submission, tends naturally to bring into prominence the virtue of obedience to authority; just as the philosophic view of goodness as the realization of reason gives a special value to selj -determination and independence (as we see more clearly in the post-Aristotelian schools where ethics is distinctly separated from politics).

2. Again, the opposition between the natural world and the spiritual order into which the Christian has been born anew led not merely to a contempt equal to that of the Stoic for wealth, fame, power, and other objects of worldly pursuit, but also, for some time at least, to a comparative depreciation of the domestic and civic relations of the natural man. This tendency was exhibited most simply and generally in the earliest period of the church's history. In the view of primitive Christians, ordinary human society was a world temporarily surrendered to Satanic rule, over which a swift and sudden destruction was impending; in such a world the little band who were gathered in the ark of the church could have no part or lot, — the only attitude they could maintain was that of passive alienation. On the other hand, it was difficult practically to realize this alienation, and a keen sense of this difficulty induced the same hostility to the body as a clog and hindrance, that we find to some extent in Plato, but more fully developed in Neoplatonism, Neopythagoreanism, and other products of the mingling of Greek with Oriental thought. This feeling is exhibited in the value set on fasting in the Christian church from the earliest times, and in an extreme form in the self-torments of later monasticism; while both tendencies, anti-worldliness and anti- sensualism, seem to have combined in causing the preference of celibacy over marriage which is common to most early Christian writers. 1 Patriotism, again, and the sense of civic duty, the most elevated of all social sentiments in the Graeco-Roman civilization, tended, under the influence of Christianity, either to expand itself into universal philanthropy, or to concentrate

1 E.g. Justin Martyr, Origen, Tertullian, Cyprian.

Benevol- ence.

itself on the ecclesiastical community. " We recognize one commonwealth, the world," says Tertullian; " we know," says

Origen, " that we have a fatherland founded by the word of God." We might further derive from the general spirit of Christian unworldliness that repudiation of the secular modes of conflict, even in a righteous cause, which substituted a passive patience and endurance for the old pagan virtue of courage, in which the active element was prominent. Here, however, we clearly trace the influence of Christ's express prohibition of violent resistance to violence, and his inculcation, by example and precept, of a love that was to conquer even natural resent- ment. An extreme result of this influence is shown in Tertullian's view, that no Christian could properly hold the office of a secular magistrate in which he would have to doom to death, chains, imprisonment; but even more sober writers, such as Ambrose, extend Christian passivity so far as to preclude self-defence even against a murderous assault. The common sense of Christendom gradually shook off these extravagances; but the reluctance to shed blood lingered long, and was hardly extin- guished even by the growing horror of heresy. We have a curious relic of this in the later times of ecclesiastical persecution, when the heretic was doomed to the stake that he might be punished in some manner " short of bloodshed." 1

3. It is, however, in the impulse given to practical beneficence in all its forms, by the exaltation of love as the root of all virtues, that the most important influence of Christianity on the particulars of civilized morality is to be found; although the exact amount of this influence is here somewhat difficult to ascertain, since it merely carries further a development traceable in the history of pagan morality. This development appears when we compare the different post- Socratic systems of ethics. In Plato's exposition of the different virtues there is no mention whatever of benevolence, although his writings show a keen sense of the importance of friendship as an element of philosophic life, especially of the intense personal affection naturally arising between master and disciple. Aristotle goes somewhat further in recognizing the moral value of friend- ship (0iXta); and though he considers that in its highest form it can be realized only by the fellowship of the wise and good, he yet extends the notion so as to include the domestic affections, and takes notice of the importance of mutual kindness in binding together . all human societies. Still in his formal statement of the different virtues, positive beneficence is discernible only under the notion of " liberality," in which form its excellence is hardly distinguished from that of graceful profusion in self- regarding expenditure (Nic. Eth. iv. 1). Cicero, on the other hand, in his paraphrase of a Stoic treatise on external duties {De officiis), ranks the rendering of positive services

to other men as a chief department of social duty; and the Stoics gener- ally recognized the universal fellowship and natural mutual claims of human beings as such. Indeed, this recognition in later Stoicism is sometimes expressed with so much warmth of feeling as to be hardly distinguishable from Christian philan- thropy. Nor was this regard for humanity merely a doctrine of the school. Partly through the influence of Stoic and other Greek philosophy, partly from the natural expansion of human sympathies, the legislation of the Empire, during the first three centuries, shows a steady development in the direction of natural justice and humanity; and some similar progress may be traced in the general tone of moral opinion. Still the utmost point that this development reached fell considerably short of the standard of Christian charity. Without dwelling on the immense impetus given to the practice of social duty generally by the religion that made beneficence a form of divine service, and identified " piety " with " pity," we have to put down as def nite changes introduced by Christianity — (1) the severe condemnation and final suppres- sion of the practice of exposing infants; (2) effective abhorrence of the barbarism of gladiatorial combats; (3) immediate moral mitigation of slavery, and a strong encouragement of emancipa- tion; (4) great extension of the eleemosynary provision made for the sick and the poor. As regards almsgiving, however — 1 Citra sanguinis eff usionem.

the importance of which has caused it to usurp, in modern languages, the general name of " charity " — it ought to be observed that Christianity merely universalized a duty which has always been inculcated by Judaism, within the limits of the chosen people.

4. The same may be said of the stricter regulation which Christianity enforced on the relations of the sexes; except so far as the prohibition of divorce is concerned, and the stress laid on " purity of heart " as contrasted with merely outward chastity.

5. Even the peculiarly Christian virtue of humility, which presents so striking a contrast to the Greek " highmindedness," was to some extent anticipated in the Rabbinic teaching. Its far greater prominence under the new dispensation may be partly referred to the express teaching and example of Christ; partly, in so far as the virtue is manifested in the renunciation of external rank and dignity, or the glory of merely secular gifts and acquirements, it is one aspect of the unwordliness which we have already noticed; while the deeper humility that represses the claim of personal merit even in the saint belongs to the strict self-examination, the continual sense of imperfection, the utter reliance on strength not his own, which

characterize the inner moral life of the Christian. Humility in this latter sense, " before God," is an essential condition of all truly Christian goodness.

We have, however, yet to notice the enlargement of the sphere of ethics due to its close connexion with theology; for while this added religious force and sanction to ordinary moral obliga- tions, it equally tended to impart a moral aspect to religious belief and worship. " Duty to God " — as distinct from duty to man — had not been altogether unrecognized by pagan moralists; but the rather dubious relations of even the more orthodox philosophy to the established polytheism had generally prevented them from laying much stress upon it. Again, — just as the Stoics held wisdom to be indispensable to real rectitude of conduct, while at the same time they included under the notion of wisdom a grasp of physical as well as ethical truth, — so the similar emphasis laid on inwardness in Christian ethics caused orthodoxy or correctness of religious belief to be regarded as essential to goodness, and heresy as the most fatal of vices, corrupting as it did the very springs of Christian life. To the philosophers (with the single exception of Plato), however, con- vinced as they were that the multitude must necessarily miss true well-being through their folly and ignorance, it could never occur to guard against these evils by any other method than that of providing philosophic instruction for the few; whereas the Christian clergy, whose function it was to offer truth and eternal life to all mankind, naturally regarded theological misbelief as insidious preventible contagion. Indeed, their sense of its deadliness was so keen that, when they were at length able to control the secular administration, they rapidly overcame their aversion to bloodshed, and initiated that long series of religious persecutions to which we find no parallel in the pre-Christian civilization of Europe. It was not that Christian writers did not feel the difficulty of attributing criminality to sincere ignor- ance or error. But the difficulty is not really peculiar to theology; and the theologians usually got over it (as some philosophers had surmounted a similar perplexity in the region of ethics proper) by supposing some latent or antecedent voluntary sin, of which the apparently involuntary heresy was the fearful fruit.

Lastly, we must observe that, in proportion as the legal con- ception of morality as a code of which the violation deserves supernatural punishment predominated over the philosophic view of ethics as the method for attaining natural felicity, the question of man's freedom of will to obey the law necessarily became prominent. At the same time it cannot be broadly said that Christianity took a decisive side in the metaphysical controversy on free-will and necessity; since, just

as in Greek philosophy the need of maintaining freedom as the ground of responsibility clashes with the conviction that no one deliberately chooses his own harm, so in Christian ethics it clashes with the

attribution of all true human virtue to supernatural grace, as well as with the belief in divine foreknowledge. All we can say is that in the development of Christian thought the conflict of conceptions was far more profoundly felt, and far more serious efforts were made to evade or transcend it.

In the preceding account of Christian morality, it has been already indicated that the characteristics delineated did not all j. 1 m exhibit themselves simultaneously to the same extent, mentot or 'with perfect uniformity throughout the church. opinion Changes in the external condition of Christianity, in early the different degrees of civilization in the societies anlty. " °^ wn i cn it was the dominant religion, and the natural process of internal development, continually brought different features into prominence; while again, the important antagonisms of opinion within Christendom frequently involved ethical issues — even in the Eastern Church — until in the 4th century it began to be absorbed in the labour of a dogmatic construction. Thus, for example, the anti-secular tendencies of the new creed, to which Tertullian (160-220) gave violent and rigid expression, were exaggerated in the Montanist heresy which he ultimately joined; on the other hand, Clement of Alexandria, in opposition to the general tone of his age, main- tained the value of pagan philosophy for the development of Christian faith into true knowledge (Gnosis), and the value of the natural development of man through marriage for the normal perfecting of the Christian life. So again, there is a marked difference between the writers before Augustine and those that succeeded him in all that concerns the internal conditions of Christian morality. By Justin and other apologists the need of redemption, faith, grace is indeed recognized, but the theological system depending on these notions is not sufficiently developed 1 to come into even apparent antagonism with the freedom of the will. Christianity is for the most part conceived as essentially a proclamation through the Divine Word, to immortal beings gifted with free choice, of the true code of conduct sanctioned by eternal rewards and punishments. This legalism contrasts strikingly with the efforts of pagan philosophy to exhibit virtue as its

own reward; and the contrast is triumphantly pointed out by more than one early Christian writer. Lactantius {circa 300 a.d.), for example, roundly declares that Plato and Aristotle, referring everything to this earthly life, " made virtue mere folly "; though himself maintaining, with pardon- able inconsistency, that man's highest good did not consist in mere pleasure, but in the consciousness of the filial relation of the soul to God. It is plain, however, that on this external legalistic view of duty it was impossible to maintain a difference in kind between Christian and pagan morality; the philosopher's conformity to the rules of chastity and beneficence, so far as it went, was indistinguishable from the saint's. But when this inference was developed in the teaching of Pelagius, it was repudiated as heretical by the church, under the powerful leadership of Augustine (354-430); and the doctrine of man's Augustine, incapacity to obey God's law by his unaided moral energy was pressed to a point at which it was diffi- cult to reconcile it with the freedom of the will. Augustine is fully aware of the theoretical indispensability of maintaining Free Will, from its logical connexion with human responsibility and divine justice; but he considers that these latter points are sufficiently secured if actual freedom of choice between good and evil is allowed in the single case of our progenitor Adam. 2 For since the natura seminalis from which all men were to arise already existed in Adam, in his voluntary preference of self to God, humanity chose evil once for all; for which ante-natal guilt all men are justly condemned to perpetual absolute sinful-

\ To show the crudity of the notion of redemption in early Christi- anity, it is sufficient to mention that many fathers represent Christ's ransom as having been paid to the devil; sometimes adding that by the concealment of Christ's divinity under the veil of humanity a certain deceit was (fairly) practised on the great deceiver.

2 It is to be observed that Augustine prefers to use " freedom " not, for the power of willing either good or evil, but the power of willing good. The highest freedom, in his view, excludes the possi- bility of willing evil.

ness and consequent punishment, unless they are elected by God's unmerited grace to share the benefits of Christ's redemption. Without this grace it is impossible for man to obey the " first greatest commandment " of love to God; and, this unfulfilled, he is guilty of the whole law, and is only free to choose between degrees of sin; his apparent external virtues have no moral value, since inner rightness of intention is wanting. "All that is not of faith is of sin "; and faith

and love are mutually involved and inseparable; faith springs from the divinely imparted germ of love, which in its turn is developed by faith to its full strength, while from both united springs hope, joyful yearning towards ultimate perfect fruition of the object of love. These three Augustine (after St Paul) regards as the three essential elements of Christian virtue; along with these he recognizes the fourfold division of virtue into prudence, temper- ance, courage and justice according to their traditional interpre- tation; but he explains these virtues to be in their true natures only the same love to God in different aspects or exercises. The uncompromising mysticism of this view may be at once compared and contrasted with the philosophical severity of Stoicism. Love of God in the former holds the same absolute and unique position as the sole element of moral worth in human action, which, as we have seen, was occupied by knowledge of Good in the latter; and we may carry the parallel further by observing that in neither case is this severity in the abstract estimate of goodness necessarily connected with extreme rigidity in practical precepts. Indeed, an important part of Augustine's work as a moralist lies in the reconciliation which he laboured to effect between the anti-worldly spirit of Christianity and the necessities of secular civilization. For example, we find him arguing for the legitimacy of judicial punishments and military service against an over-literal interpretation of the Sermon on the Mount; and he took an important part in giving currency to the distinction between evangelical " counsels " and " com- mands," and so defending the life of marriage and temperate enjoyment of natural good against the attacks of the more extravagant advocate of celibacy and self-abnegation; although he fully admitted the superiority of the latter method of avoiding the contamination of sin.

The attempt to Christianize the old Platonic list of virtues, which we have noticed in Augustine's system, was probably due to the influence of his master Ambrose, in whose Ambrose , treatise De officiis ministrorum we find for the first time an exposition of Christian duty systematized on a plan borrowed from a pre-Christian moralist. It is interesting to compare Ambrose's account of what subsequently came to be known as the " four cardinal virtues " with the corresponding delineations in Cicero's s De officiis which served the bishop as a model. Christian Wisdom, so far as it is speculative, is of course primarily theological; it has God, as the highest truth, for its chief object, and is therefore necessarily grounded on faith. Christian Fortitude is essentially firmness in withstanding the seductions of good and evil fortune, resoluteness in the conflict perpetually waged against wickedness without carnal weapons —

though Ambrose, with the Old Testament in his hand, will not quite relinquish the ordinary martial application of the term. " Temperantia " retains the meaning of " observance of due measure " in all conduct, which it had in Cicero's treatise; though its notion is partly modified by being blended with the newer virtue of humility. Finally in the exposition of Christian Justice the Stoic doctrine of the natural union of all human interests is elevated to the full height and intensity of evangelical philanthropy; the brethren are reminded that the earlh was made by God a common possession of all, and are bidden to administer their means for the common benefit; Ambrose, we should observe, is thoroughly aware of the fundamental union of these different virtues in Christianity, though he does

3 Cicero's works are unimportant in the history of ancient ethics, as their philosophical matter was entirely borrowed from Greek treatises now lost; but the influence exercised by them (especially by the De officiis) over medieval and even modern readers was very considerable.

not, like Augustine, resolve them all into the one central affection of love of God.

Under the influence of Ambrose and Augustine, the four car- dinal virtues furnished a basis on which the systematic ethical

theories of subsequent theologians were built. With astieal them the triad of Christian graces, Faith, Hope and morality Love, and the seven gifts of the Spirit (Isaiah xi. 2) la the were often combined. In antithesis to this list, an

1°,, enumeration of the " deadly sins " obtained currency.

These were at first commonly reckoned as eight; but a preference for mystical numbers characteristic of medieval theologians finally reduced them to seven. The statement of them is variously given, — Pride, Avarice, Anger, Gluttony, Unchastity, are found in all the lists; the remaining two (or three) are variously selected from among Envy, Vainglory, and the rather singular sins Gloominess (tristitia) and Languid Indifference (acidia or acedia, from Gr. axridia.). These latter notions show plainly, what indeed might be inferred from a study of the list as a whole, that it represents the moral experience of the monastic life, which for some centuries was more

and more unquestioningly regarded as in a peculiar sense " religious." It should be observed that the (also Augustinian) distinction between " deadly " and " venial " sins had a technical reference to the quasi-jural administration of ecclesiastical discipline,' which grew gradually more organized as the spiritual power of the church established itself amid the ruins of the Western empire, and slowly developed into the theocracy that almost dominated Europe during the latter part of the middle ages. " Deadly " sins were those for which formal ecclesiastical penance was held to be necessary, in order to save the sinner from eternal damnation; for " venial " sins he might obtain forgiveness, through prayer, almsgiving, and the observance of the regular fasts. We find that " penitential books " for the use of the confessional, founded partly on traditional practice and partly on the express decrees of synods, come into general use in the 7th century. At first they are little more than mere inventories of sins, with their appropriate ecclesiastical punishments; gradually cases of conscience come to be discussed and decided, and the basis is laid for that system of casuistry which reached its full development in the 14th and 15th centuries. This ecclesiastical jurisprudence, and indeed the general relation of the church to the ruder races with which it had to deal during this period, necessarily tended to encourage a somewhat external view of morality. But a powerful counterpoise to this tendency was continually maintained by the fervid inwardness of Augus- tine, transmitted through Gregory the Great, Isidore of Seville, Alcuin, Hrabanus Maurus, and other writers of thephilosophically barren period between the destruction of the Western empire and the rise of Scholasticism.

Scholastic ethics, like scholastic philosophy, attained its completest result in the teaching of Thomas Aquinas. But Medieval before giving a brief account of the ethical part of his moral system, it will be well to notice the salient points in philo- the j on g an(j ac tive discussion that led up to it. In sopny. the pantheistic system of Erigena (q.v.) (circa 810-877) the chief philosophic element is supplied by the influence of Plato and Plotinus, transmitted through an unknown author of the 5th century, who assumed the name of Dionysius the Areopagite. Accordingly the ethical side of this doctrine has the same negative and ascetic character that we have observed in Neoplatonism. God is the only real Being; evil is essentially unreal and incognizable; the true aim of man's life is to return to perfect union with God out of the degraded material existence into which he has fallen. This doctrine found little acceptance among Erigena's contemporaries, and was certainly unorthodox enough to justify the

condemnation which it subsequently received from Honorius III. ; but its influence, together with that of the Pseudo-Dionysius, had a considerable share in developing the more emotional orthodox mysticism of the 12th and rjth centuries; and Neoplatonism (or Platonism received through a Neoplatonic tradition) remained a distinct element in medieval thought, though obscured in the period of mature scholasticism

by the predominant influence of Aristotle. Passing on to Anselm (I 033 _ i 109), we observe that the Augustinian doctrine of original sin and man's absolute need of unmerited grace is retained in his theory of salvation; he also follows Augustine in defining freedom as the " power not to sin "; though in saying that Adam fell " spontaneously " and " by his free choice," though not " through its freedom," he has implicitly made the distinction that Peter the Lombard afterwards expressly draws between the freedom that is opposed to necessity and freedom from the slavery to sin. Anselm further softens the statement of Augustinian predestinationism by explaining that the freedom to will is not strictly lost even by fallen man ; it is inherent in a rational nature, though since Adam's sin it only exists potentially in humanity, except where it is made actual by grace.

In a more real sense Abelard (1079-1142) tries to establish the connexion between man's ill desert and his free consent. He asserts that the inherited propensity to evil is not strictly a sin, which is only committed when the conscious self yields to vicious inclination. With a similar stress on the self-conscious side of moral action, he argues that Tightness of conduct depends solely on the intention, at one time pushing this doctrine to the paradoxical assertion that all outward acts as such are indiffer- ent. 1 In the same spirit, under the reviving influence of ancient philosophy (with which, however, he was imperfectly acquainted and the relation of which to Christianity he extravagantly misunderstood), he argues that the old Greek moralists, as inculcating a disinterested love of good — and so implicitly love of God as the highest good — were really nearer to Christianity than Judaic legalism was. Nay, further, he required that the Christian " love to God " should be regarded as pure only if purged from the self-regarding desire of the happiness which God gives. The general tendency of Abelard's thought was suspiciously regarded by contemporary orthodoxy; 2 and the over-subtlety of the last-mentioned distinction provoked vehement replies from orthodox mystics of the age. Thus, Hugo of St Victor (1077-1141) argues that all love is necessarily so far " interested " that it involves a desire for union with the beloved; and since eternal happiness consists in this union, it cannot truly be desired apart from God; while Bernard of

Clairvaux (1001-1153) more elaborately distinguishes four stages by which the soul is gradually led from (1) merely self- regarding desire for God's aid in distress, to (2) love him for his loving-kindness to it, then also (3) for his absolute goodness, until (4) in rare moments this love for himself alone becomes the sole all-absorbing affection. This controversy Peter the Lombard endeavoured to compose by the scholastic art of taking distinctions, of which he was a master. In his treatise, Libri sententiarum, mainly based on Augustinian doctrine, we find a distinct softening of the antithesis between nature and grace and an anticipation of the union of Aristotelian and Christian thought, which was initiated by Albert the Great and completed by Thomas Aquinas.

The moral philosophy of Aquinas is Aristotelianism with a Neoplatonic tinge, interpreted and supplemented by a view of Christian dogma derived chiefly from Augustine. All action or movement of all things irrational as well as Aquiaas. rational is directed towards some end or good, — that is, really and ultimately towards God himself, the ground and first cause of all being, and unmoved principle of all movement. This universal though unconscious striving after God, since he is essentially intelligible, exhibits itself in its highest form in rational beings as a desire for knowledge of him; such know- ledge, however, is beyond all ordinary exercise of reason, and may be only partially revealed to man here below. Thus the summum bonum for man is objectively God, subjectively the happiness to be derived from loving vision of his perfections; although there is a lower kind of happiness to be realized here

1 Abelard afterwards retracted this view, at least in its extreme • form ; and in fact does not seem to have been fully conscious of the

difference between (1) unfulfilled intention to do an act objectively right, and (2) intention to do what is merely believed by the agent to be right.

2 He was condemned by two synods, in 1 121 and 1140.

below in a normal human existence of virtue and friendship, with mind and body sound and whole and properly trained for the needs of life. The higher happiness is given to man by free grace of God; but

it is given to those only whose heart is right, and as a reward of virtuous actions. Passing to consider what actions are virtuous, we first observe generally that the morality of an act is in part, but only in part, determined by its particular motive; it partly depends on its external object and circum- stances, which render it either objectively in harmony with the " order of reason " or the reverse. In the classification of particular virtues and vices we can distinguish very clearly the elements supplied by the different teachings which Aquinas has imbibed. He follows Aristotle closely in dividing the " natural " virtues into intellectual and moral, giving his preference to the former class, and the intellectual again into speculative and practical; in distinguishing within the specu- lative class the " intellect " that is conversant with principles, the " science " that deduces conclusions, and the " wisdom " to which belongs the whole process of knowing the sublimest objects of knowledge; and in treating practical wisdom as inseparably connected with moral virtues, and therefore in a sense moral. His distinction among moral virtues of the justice that renders others their due from the virtues that control the appetites and passions of the agent himself, represents his interpretation of the Nicomachean Ethics; while his account of these latter virtues is a simple transcript of Aristotle's, just as his division of the non-rational element of the soul into " concupiscible " and " irascible " is the old Platonic one. In arranging his list, however, he defers to the established doctrine of the four cardinal virtues (derived from Plato and the Stoics through Cicero); accordingly, the Aristotelian ten have to stand under the higher genera of (1) the prudence which gives reasoned rules of conduct, (2) the temperance which restrains misleading desire, and (3) the fortitude that resists misleading fear of dangers or toils. But before these virtues are ranked the three " theologic " virtues, faith, love and hope, super- naturally " instilled " by God, and directly relating to him as their object. By faith we obtain that part of our knowledge of God which is beyond the range of mere natural wisdom or philosophy; naturally (e.g.), we can know God's existence, but not his trinity in unity, though philosophy is useful to defend this and other revealed verities; and it is essential for the soul's welfare that all articles of the Christian creed, however little they can be known by natural reason, should be apprehended through faith; the Christian who rejects a single article loses hold altogether of faith and of God. Faith is the substantial basis of all Christian morality, but without love — the essential form of all the Christian virtues — it is " formless " (informis). Christian love is conceived (after Augustine) as primarily love to God (beyond the natural yearning of the creature after its ultimate good), which expands into love

towards all God's creatures as created by him, and so ultimately includes even self-love. But creatures are only to be loved in their purity as created by God; all that is bad in them must be an object of hatred till it is destroyed. In the classification of sins the Christian element predominates; still we find the Aristotelian vices of excess and defect, along with the modern divisions into " sins against God, neighbour and self," " mortal and venial sins," and so forth.

From the notion of sin — treated in its jural aspect — Aquinas passes naturally to the discussion of Law. The exposition of this conception presents to a great extent the same matter that was dealt with by the exposition of moral virtues, but in a different form; the prominence of which may perhaps be attributed to the growing influence of Roman jurisprudence, which attained in the 12th century so rapid and brilliant a revival in Italy. This side of Thomas's system is specially important, since it is just this blending of theological conceptions with the abstract theory of the later Roman law that gave the starting-point for independent ethical thought in the modern world. Under the general idea of law, defined as an " ordinance of reason for the common good, promulgated by him who has

charge of the community," Thomas distinguishes (1) the eternal law or regulative reason of God which embraces all his creatures, rational and irrational; (2) " natural law," being that part of the eternal law that relates to rational creatures as such ; (3) human law, which properly consists of more particular deductions from natural law particularized and adapted to the varying circumstances of actual communities; (4) divine law specially revealed to man. As regards natural law, he teaches that God has implanted in the human mind a knowledge of its immutable general principles; and not only knowledge, but a disposition, to which he applies the peculiar scholastic name synderesis, 1 that unerringly prompts to the realizaticn of these principles in conduct, and protests against their violation. All acts of natural virtue are implicitly included within the scope of this law of nature; but in the application of its principles to particular cases — to which the term " conscience " should be restricted — man's judgment is liable to err, the light of nature being obscured and perverted by bad education and custom. Human law is required, not merely to determine the details for which natural law gives no intuitive guidance, but also to supply the force necessary for practically securing, among imperfect men, the observance of the most necessary rules of mutual behaviour. The rules of this law must be either deductions from principles of natural law, or determinations of particulars which it leaves indeterminate; a rule contrary to nature could not be valid as law at all. Human law,

however, can deal with outward conduct alone, and natural law, as we have seen, is liable to be vague and obscure in particular applications. Neither natural nor human law, moreover, takes into account that supernatural happiness which is man's highest end. Hence they need to be supplemented by a special revelation of divine law. This revelation is distinguished into the law of the old covenant and the law of the gospel; the latter of these is productive as well as imperative since it carries with it the divine grace that makes its fulfilment possible. We have, however, to distinguish in the case of the gospel between (1) absolute commands and (2) " counsels," which latter recommend, without positively ordering the monastic life of poverty, celibacy and obedience as the best method of effectively turning the will from earthly to heavenly things.

But how far is man able to attain either natural or Christian perfection? This is the part of Thomas's system in which the cohesion of the different elements seems weakest. He is scarcely aware that his Aristotelianized Christianity inevitably combines two different difficulties in dealing with this question: first, the old pagan difficulty of reconciling the proposition that will is a rational desire always directed towards apparent good, with the freedom of choice between good and evil that the jural view of morality seems to require; and, secondly, the Christian difficulty of harmonizing this latter notion with the absolute dependence on divine grace which the religious consciousness affirms. The latter difficulty Thomas, like many of his predecessors, avoids by supposing a " co-operation " of free-will and grace, but the former he does not fully meet. It is against this part of his doctrines that the most important criticism, in ethics, of his rival Duns Scotus (c, 1 266-1 308) was directed. He

Dujtss

urged that will could not be really free if it were bound scotue to reason, as Thomas (after Aristotle) conceives it; a really free choice must be perfectly indeterminate between reason and unreason. Scotus consistently maintained that the divine will is similarly independent of reason, and that the divine ordering of the world is to be conceived as absolutely arbitrary. On this point he was followed by the acute intellect of William of Occam (d. c. 1347). This doctrine is obviously hostile to all reasoned morality; and in fo

1 Synderesis{Gr.ovvriipr)(nf, from awrriptiv, to watch closely, observe) is used in this sense in Jerome (Com. in Ezek. i. 4-10).

system out of the heterogeneous data furnished by Scripture, the fathers, the church and Aristotle — equally unquestioned, if not equally venerated, authorities. Whatever philosophic quality is to be found in the work of Thomas belongs to it in spite of , not in consequence of , its method. Still, its influence has been great and long-enduring, — in the Catholic Church primarily, but indirectly among Protestants, especially in England, since the famous first book of Hooker's Ecclesiastical Polity is to a great extent taken from the Summa theologiae.

Partly in conscious antagonism to the schoolmen, yet with close affinity to the central ethico-theological doctrine which they read out of or into Aristotle, the mystical manner mysachm. °i thought continued to maintain itself in the church. Philosophically it rested upon Neoplatonism, but its development in strict connexion with Christian orthodoxy begins in the 12th century with Bernard of Clairvaux and Hugo of St Victor. It blended the Christian element of love with the ecstatic vision of Plotinus, sometimes giving the former a decided predominance. In its more moderate form, keeping wholly within the limits of ecclesiastical orthodoxy, this mysticism is represented by Bonaventura and Gerson; while it appears more independent and daringly constructive in the German Eckhart, advancing in some of his followers to open breach with the church, and even to practical immorality.

In the brief account above given of the general ethical view of Thomas Aquinas no mention has been made of the detailed discussion of particular duties included in the Summa theologiae; in which, for the most part, an excellent combination of moral elevation with sobriety of judgment is shown, though on certain points the scholastic pedantry of definition and distinction is unfavourable to due delicacy of treatment. As the properly philosophic interest of scholasticism faded in the 14th and 15th centuries, the quasi-legal treatment of morality came again into prominence, borrowing a good deal of matter from Thomas and other schoolmen. One result of this was a marked development and systematization of casuistry. The best known Summae casuum conscientiae, compiled for the conduct of auricular confession, belong to the 14th and 15th centuries. The oldest, the Astesana, from Asti in Piedmont, is arranged as a kind of text-book of morality on a scholastic basis; later manuals are merely lists of questions and

answers. It was inevitable that, in proportion as this casuistry assumed the character of a systematic penal jurisprudence, its precise deter- mination of the limits between the prohibited and the allowable, with all doubtful points closely scrutinized and illustrated by fictitious cases, would have a tendency to weaken the moral sensibilities of ordinary minds; the greater the industry spent in deducing conclusions from the diverse authorities the greater necessarily became the number of points on which doctors disagreed; and the central authority that might have repressed serious divergences was wanting in the period of moral weakness 1 that the church went through after the death of Boniface VIII. A plain man perplexed by such disagreements might naturally hold that any opinion maintained by a pious and orthodox writer must be a safe one to follow; and thus weak consciences were subtly tempted to seek the support of authority for some desired relaxation of a moral rule. It does not, however, appear that this danger assumed formidable proportions until after the Reformation; when, in the struggle made by the Catholic church to recover its hold on the world, the principle of authority was, as it were, forced into keen, balanced and prolonged conflict with that of reliance on private judgment. To the Jesuits, the foremost champions in this struggle, it seemed iridis- Jesuits. pensable that the confessional should be made attrac- tive; for this purpose ecclesiastico-moral law must be somehow " accommodated " to worldly needs; and the theory of " Probabilism " supplied a plausible method for effecting this accommodation. The theory proceeded thus: A layman could not be expected to examine minutely into a point on which*

1 The refusal of the council of Constance to condemn Jean Petit's advocacy of assassination is a striking example of this weakness. Cf . Milman, Lat. Christ, book xiii. c. 9.

the learned differed; therefore he could not fairly be blamed

for following any opinion that rested on the authority of even

a single doctor; therefore his confessor must be authorized to

hold him guiltless if any such " probable" opinion could be

produced in his favour; nay, it was his duty to suggest such

an opinion, even though opposed to his own, if it would relieve

the conscience under his charge from a depressing burden.

The results to which this Probabilism, applied with an earnest desire to avoid dangerous rigour, led in the 17th century were revealed to the world in the immortal Lettres provinciates of Pascal.

In tracing the development of casuistry we have been carried beyond the great crisis through which Western Christianity passed in the 16th century. The Reformation which Luther initiated may be viewed on several sides, „L,' 0,y ! .. .11. 1 • , ■ 1 . mation. even if we consider only its ethical principles and Transition effects. It maintained the simplicity of Apostolic to modern Christianity against the elaborate system of a corrupt et ?! 1 ca J hierarchy, the teaching of Scripture alone against the sop hy. commentaries of the fathers and the traditions of the church, the right of private judgment against the dictation of ecclesiastical authority, the individual responsibility of every human soul before God in opposition to the papal control over purgatorial punishments, which had led to the revolting degrada- tion of venal indulgences. Reviving the original antithesis between Christianity and Jewish legalism, it maintained the in- wardness of faith to be the sole way to eternal life, in contrast to the outwardness of works; returning to Augustine, and expressing his spirit in a new formula, to resist the Neo-Pelagianism that had gradually developed itself within the apparent Augustinianism of the church, it maintained the total corruption of human nature, as contrasted with that " congruity " by which, according to the schoolmen, divine grace was to be earned; renewing the fervent humility of St Paul, it enforced the universal and absolute imperativeness of all Christian duties, and the inevitable un- worthiness of all Christian obedience, in opposition to the theory that " condign " merit might be gained by " supererogatory " conformity to evangelical " counsels." It will be seen that these changes, however profoundly important, were, ethically con- sidered, either negative or quite general, ralating to the tone and attitude of mind in which all duty should be done. As regards all positive matter of duty and virtue, and most of the prohibitive code for ordinary men, the tradition of Christian teaching

was carried 011 substantially unchanged by the Reformed churches. Even the old method of casuistry was maintained 2 during the 16th and 17th centuries; though Scriptural texts, interpreted and supplemented by the light of natural reason, now furnished the sole principles on which cases of conscience were decided.

In the 17th century, however, the interest of this quasi-legal treatment of morality gradually faded; and the ethical studies of educated minds were occupied with the attempt, renewed after so many centuries, to find an independent fem> philosophical basis for the moral code. The renewal of this attempt was only indirectly due to the Reformation; it is rather to be connected with the more extreme reaction from the medieval religion which was partly caused by, partly expressed in, that enthusiastic study of the remains of old pagan culture that spread from Italy over Europe in the 15th and 16th centuries. To this " humanism " the Reformation seemed at first more hostile than the Roman hierarchy; indeed, the extent to which this latter had allowed itself to become paganized by the Renais- sance was one of the points that especially roused the Reformers' indignation. Not the less important is the indirect stimulus given by the Reformation towards the development of a moral philosophy independent alike of Catholic and Protestant assump- tions. Scholasticism, while reviving philosophy as a handmaid to theology, had metamorphosed its method into one resembling that of its mistress; thus shackling the renascent intellectual

2 As the chief English casuists we may mention Perkins, Hall, Sanderson, as well as the more eminent Jeremy Taylor, whose Ductor dubitantium appeared in 1660.

activity which: it stimulated by the double bondage to Aristotle and to the church. When the Reformation shook the traditional authority in one department, the blow was necessarily felt in the other. Not twenty years after Luther's defiance of the pope, the startling thesis " that all that Aristotle taught was false " was prosperously maintained by the youthful Ramus before the university of Paris; and almost contemporaneously the group of remarkable thinkers in Italy who heralded the dawn of modern physical 'science — Cardanus, Telesio, Patrizzi, Campanella, Bruno — began to propound their Aristotelian theories of the con- stitution of the physical universe. It was to be foreseen that a similar assertion of independence would

make itself heard in ethics also; and, indeed, amid the clash of dogmatic convictions, and the variations of private judgment, it was natural to seek for an ethical method that might claim universal acceptance from all sects.

C. Modern Ethics. — The need of such independent principles was most strongly felt in the region of man's civil and political relations, especially the mutual relations of com- munities. Accordingly we find that modern ethical controversy began in a discussion of the law of nature. Albericus Gentilis (1557-1611) and Hugo Grotius (1583-1645) were the first to give a systematic account. Natural law, according to Grotius and other writers of the age, is that part of divine law which follows from the essential nature of man, who is distin- guished from animals by his " appetite " for tranquil association with his fellows, and his tendency to act on general principles. It is therefore as unalterable, even by God himself, as the truths of mathematics, although its effect may be overruled in any particular case by an express command of God; hence it is cognizable a priori, from the abstract consideration of human-nature, though its existence may be known a posteriori also from its universal acceptance in human societies. The conception, as we have seen, was taken from the later Roman jurists; by them, however, the law of nature was conceived as something that underlay existing law, and was to be looked for through it, though it might ultimately supersede it, and in the meanwhile represented an ideal standard, by which improvements in legislation were to be guided. Still the language of the jurists in some passages (cf. Inst, of Justinian, ii. 1, 2) clearly implied a period of human history in which men were governed by natural law alone, prior to the institution of civil society. Posidonius had identified this period with the mythical " golden age"; and such ideas easily coalesced with the narrative in Genesis. Thus there had become current the conception of a " state of nature " in which individuals or single families lived side by side — under none other than those " natural " laws which prohibited mutual injury and interference in the free use of the goods of the earth common to all, and upheld parental authority, fidelity of wives, and the observance of compacts freely made. This conception Grotius took, and gave it additional force and solidity by using the principles of this natural law for the determination of international rights and duties, it being obvious that independent nations, in their corporate capacities, were still in that " state of nature " in their mutual relations. It was not, of course, assumed that these laws were universally obeyed; indeed, one point with which Grotius is especially concerned is the natural right of private war, arising out

of the violation of more primary rights. Still a general observance was involved in the idea of a natural law as a " dictate of right reason indicating the agreement or disagreement of an act with man's rational and social nature"; and we may observe that it was especially necessary to assume such a general observance in the case of contracts, since it was by an " express or tacit pact " that the right of property (as distinct from the mere right to non- interference during use) was held by him to have been instituted. A similar " fundamental pact " had long been generally regarded as the normal origin of legitimate sovereignty.

The ideas above expressed were not peculiar to Grotius; in particular the doctrine of the " fundamental pact " as the jural basis of government had long been maintained, especially in England, where the constitution historically established

readily suggested such a compact. At the same time the rapid and remarkable success of Grotius's treatise (De jure belli et pads) brought his view of Natural Right into prominence, and suggested such questions as — " What is man's ultimate reason for obeying these laws? Wherein exactly does this their agree- ment with his rational and social nature consist? How far, and in what sense, is his nature really social?"

It was the answer which Hobbes (1588-1670) gave to these fundamental questions that supplied the starting-point for independent ethical philosophy in England. The nature of this answer was determined by the psycho- logical views to which Hobbes had been led, possibly to some extent under the influence of Bacon, 1 partly perhaps through associatipn with his younger contemporary Gassendi, who, in two treatises, published between the appearance of Hobbes's De cive (1642) and that of the Leviathan (1651), endeavoured to revive interest in Epicurus. Hobbes's psychology is in the first place materialistic; he holds, that is, that in any of the psycho- physical phenomena of human nature the reality is a material process of which the mental feeling is a mere " appearance." Accordingly he regards pleasure as essentially motion " helping vital action," and pain as motion " hindering " it. There is no logical connexion between this theory and the doctrine that appetite of desire has always pleasure (or the absence of pain) for its object; but a materialist, framing a system of psychology, will naturally direct his attention to the impulses arising out of bodily wants, whose obvious end is the preservation of the agent's organism; and this, together with a philosophic wish to simplify, may lead him to the conclusion that all human impulses are similarly self regarding. This,

at any rate, is Hobbes's cardinal doctrine in moral psychology, that each man's appetites or desires are naturally directed either to the preservation of his life, or to that heightening of it which he feels as pleasure. 2 Hobbes does not distinguish instinctive from deliberate pleasure seeking; and he confidently resolves the most apparently unselfish emotions into phases of self-regard. Pity he finds to be grief for the calamity of others, arising from imagination of the like calamity befalling oneself; what we admire with seeming disinterestedness as beautiful (pulckrum) is really " pleasure in promise "; when men are not immediately seeking present pleasure, they desire power as a means to future pleasure, and thus have a derivative delight in the exercise of power that prompts to what we call benevolent action. Since, then, all the voluntary actions of men tend to their own preservation or pleasure, it cannot be reasonable to aim at anything else; in fact, nature rather than reason fixes this as the end of human action; it is reason's function to show the means. Hence if we ask why it is reasonable for any individual to observe the rules of social behaviour that are commonly called moral, the answer is obvious that this is only indirectly reasonable, as a means to his own preservation or pleasure. It is not, however, in this, which is only the old Cyrenaic or Epicurean answer, that the distinctive point of Hobbism lies. It is rather in the doctrine that even this indirect reasonableness of the most fundamental moral rules is entirely conditional on their general observance, which cannot be secured apart from government. For example, it is not reasonable for me to perform my share of a contract, unless I have reason for believing that the other party will per- form his; and this I cannot have, except in a society in which he will be punished for non-performance. Thus the ordinary rules of social behaviour are only hypothetically obligatory; they are actualized by the establishment of a " common power "

1 This influence was not exercised in the region of ethics. Bacon's brief outline of moral philosophy (in the Advancement of Learning, ii. 20-22) is highly pregnant and suggestive. But Bacon's great task of reforming scientific method was one which, as he conceived it, left morals on one side; he never made any serious effort to reduce his ethical views to a coherent system, methodically reasoned on an independent basis. The outline given in the Advancement was never filled in, and does not seem to have had any effect on the subsequent course of ethical speculation.

2 He even identifies the desire with the pleasure, apparently re-garding the stir of appetite and that of fruition as two parts ol the same " motion."

that may " use the strength and means of all " to enforce on all the observance of rules tending to the common benefit. On the other hand Hobbes yields to no one in maintaining the para- mount importance of moral regulations. The precepts of good faith, equity, requital of benefits, forgiveness of wrong so far as security allows, the prohibition of contumely, pride, arrogance, — which may all be summed up in the formula, " Do not that to another which thou wouldest not have done to thyself " (i.e. the negative of the " golden rule ") — he still calls " immutable and eternal laws of nature " — meaning that,, though a man is not unconditionally bound to realize them, he is, as a reasonable being, bound to desire that they should be realized. The pre-social state of man, in his view, is also pre-moral; but it is therefore utterly miserable. It is a state in which every one has a right to everything that may conduce to his preservation; 1 but it is therefore also a state of war — a state so wretched that it is the first dictate of rational self-love to emerge from it into social peace and order. Hence Hobbes's ideal constitution naturally comes to be an unquestioned and unlimited— though not necessarily monarchical — despotism. Whatever the govern- ment declares to be just or unjust must be accepted as such, since to dispute its dictates would be the first step towards anarchy, the one paramount peril outweighing all particular defects in legislation and administration. It is perhaps easy to understand how, in the crisis of 1640, when the ethico-political system of Hobbes first took written shape, a peace-loving philosopher should regard the claims of individual conscience as essentially anarchical, and dangerous to social well-being; but however strong might be men's yearning for order, a view of social duty, in which the only fixed positions were selfishness everywhere and unlimited power somewhere, could not but appear offensively paradoxical.

There was, however, in his theory an originality, a force, an apparent coherence which rendered it undeniably impressive; in fact, we find that for two generations the efforts to construct morality on a philosophical basis take more or less the form of answers to Hobbes. From an ethical point of view Hobbism divides itself naturally into two parts, which by Hobbes's peculiar political doctrines are combined into a coherent whole, but are not otherwise necessarily connected. Its theoretical basis is the principle of egoism; while, for practically determining the particulars of duty it makes morality entirely dependent on positive law and institution. It thus

affirmed the relativity of good and evil in a double sense; good and evil, for any individual citizen, may from one point of view be defined as the objects respectively of his desire and his aversion; from another, they may be said to be determined for him by his sovereign. It is this latter aspect of the system which is primarily attacked by the first generation of writers that replied to Hobbes. This, attack, or rather the counter-exposition of orthodox doctrine, is conducted on different methods by the Cambridge moralists and by Cumberland respectively. Cumberland is content with the legal view of morality, but endeavours to establish the validity of the laws of nature by taxing them on the single supreme principle of rational regard for the " common good of all," and showing them, as so based, to be adequately supported by the divine sanction. The Cambridge school, regarding morality primarily as a body of truth rather than a code of rules, insist on its absolute character and intuitive certainty.

Cudworth was the most distinguished of the little group of thinkers at Cambridge in the 17th century, commonly known as the Cambridge Platonists (q.v.). In his treatise on Eternal and Immutable Morality his main aim is to maintain the

1 In spite of Hobbes's uncompromising egoism, there is a noticeable discrepancy between his theory of the ends that men naturally seek and his standard for determining their natural rights. This latter is never Pleasure simply, but always Preservation— though on occasion he enlarges the notion of " preservation " into " preservation of life so as not to be weary of it." His view seems to be that in a state of nature most men will fight, rob, &c, " for delectation merely " or " for glory," and that hence all men must be allowed an indefinite right to fight, rob, &c, " for preservation."

More.

" essential and eternal distinctions of good and evil " as independent of mere will, whether human or divine. These distinctions, he insists, have an objective reality, The cognizable by reason no less than the relations of Cambridge space or number; and he endeavours to refute t ˜i aUs ˆ Hobbism — which he treats as a " novantique philo- sophy," a mere revival of the relativism of Protagoras — chiefly by the following argumentum ad hominem. He argues that Hobbes's atomic materialism involves the conception of an objective physical world, the object not of passive sense that varies from man to man, but of the active intellect that is the same in all; there is therefore, he urges, an inconsistency in refusing to admit a similar

exercise of intellect in morals, and an objective world of right and wrong, which the mind by its normal activity clearly apprehends as such.

Cudworth, in the work above mentioned, gives no systematic exposition of the ethical principles which he holds to be thus intuitively apprehended. But we may supply this deficiency from the Enchiridion Eihicum of Henry More, another thinker of the same school. More gives a list of 23 Noemata Moralia, the truth of which will, he says, be immediately manifest. Some of these admit of a purely egoistic application, and appear to be so understood by the author — as (e.g.) that goods differ in quality as well as in duration, and that the superior good or the lesser evil is always to be preferred; that absence of a given amount of good is preferable to the presence of equivalent evil; that future good or evil is to be regarded as much as present, if equally certain, and nearly as much if very probable. Objections, both general and special, might be urged by a Hobbist against these modes of formulating man's natural pursuit of self-interest; but the serious controversy between Hobbism and modern Platonism related not to such principles as these, but to others which demand from the in- dividual a (real or apparent) sacrifice for his fellows. Such are the evangelical principle of " doing as you would be done by "; the principle of justice, or " giving every man his own, and letting him enjoy it without interference"; and especially what More states as the abstract formula of benevolence, that " if it be good that one man should be supplied with the means of living well and happily, it is mathematically certain that it is doubly good that two should be so supplied, and so on." The question, however, still remains, what motive any individual has to conform to these social principles when they conflict with bis natural desires. To this Cudworth gives no explicit reply, and the answer of More is hardly clear. On the one hand he maintains that these principles express an absolute good, which is to be called intellectual because its essence and truth are apprehended by the intellect We might infer from this that the intellect, so judging, is itself the proper and complete determinant of the will, and that man, as a rational being, ought to aim at the realization of absolute good for its own sake. In spite, however, of possible inferences from his definition of virtue, this does not seem to be really More's view. He explains that though absolute good is discerned by the intellect, the " sweetness and flavour " of it is apprehended, not by the intellect proper, but by what he calls a " boniform faculty "; and it is in this sweetness and flavour that the motive to virtuous conduct lies; ethics is the " art of living well and happily," and true happiness lies in " the pleasure which the soul

derives from the sense of virtue." In short, More's Platonism appears to be really as hedonistic as Hobbism; only the feeling to which it appeals as ultimate motive is of a kind that only a mind of exceptional moral refinement can habitually feel with the decisive intensity required.

It is to be observed that though More lays down the abstract principle of regarding one's neighbour's good as much as one's own with the full breadth with which Christianity inculcates it, yet when he afterwards comes to classify virtues he is too much under the influence of Platonic-Aristotelian thought to give a distinct place to benevolence, except under the old form of liberality. In this respect his system presents a striking contrast to Cumberland's, whose treatise De Legibus Naturae

(1672), though written like More's in Latin, is yet in its ethical matter thoroughly modern. Cumberland is a thinker both original

and comprehensive, and, in spite of defects in style and laad "~ clearness, he is noteworthy as having been the first to

lay down that " regard for the common good of all " is the supreme rule of morality or law of nature. So far he may be fairly called the precursor of later utilitarianism. His funda- mental principle and supreme " Law of Nature " is thus stated: " The greatest possible benevolence of every rational agent towards all the rest constitutes the happiest state of each and all, so far as depends on their own power, and is necessarily required for their happiness; accordingly Common Good will be the Supreme Good." It is, however, important to notice that in his " good " is included not merely happiness but " perfec- tion "; and he does not even define perfection so as to exclude from it the notion of absolute moral perfection and save his theory from an obvious logical circle. A notion so vague could not possibly be used with any precision for determining the subordinate rules of morality; but in fact Cumberland does not attempt this; his supreme principle is designed not to rectify, but merely to support and systematize, common morality. This principle, as was said, is conceived as strictly a law, and therefore referred to a lawgiver, God, and provided with a sanction in its effects on the agent's happiness. That the divine will is expressed by it, Cumberland, " not being so fortunate as to possess innate ideas," tries to prove by a

long inductive examina- tion of the evidences of man's essential sociality exhibited in his physical and mental constitution. His account of the sanction, again, is sufficiently comprehensive, including both the internal and the external rewards of virtue and punishments of vice; and he, like later utilitarians, explains moraf obligation to lie in the force exercised on the will by these sanctions; but as to the precise manner in which individual is implicated with universal good, and the operation of either or both in determin- ing volition, his view is indistinct if not actually inconsistent.

*The clearness which we see*k in vain from Cumberland is found to the fullest extent in Locke, whose Essay on the Human*

Understanding (1690) was already planned when

Cumberland's treatise appeared. Yet Locke's ethical opinions have been widely misunderstood; since from a con- fusion between " innate ideas " and " intuitions," which has been common in recent ethical discussion, it has been supposed that the founder of English empiricism must necessarily have been hostile to " intuitional " ethics. The truth is that, while Locke agrees entirely with Hobbes as to the egoistic basis of rational conduct, and the interpretation of " good " and " evil " as " pleasure " and " pain," or that which is productive of pleasure and pain, he yet agrees entirely with Hobbes's opponents in holding ethical rules to be actually obligatory independently of political society, and capable of being scientifically constructed on principles intuitively known, — though he does not regard these principles as implanted in the mind at birth. The aggregate of such rules he conceives as the law of God, carefully distinguish- ing it, not only from civil law, but from the law of opinion or reputation, the varying moral standard by which men actually distribute praise and blame; as being divine it is necessarily sanctioned by adequate rewards and punishments. He does not, indeed, speak of the scientific construction of this code as having been actually effected, but he affirms its possibility in language remarkably strong and decisive. " The idea," he says, " of a Supreme Being, infinite in power, goodness, and wisdom, whose workmanship we are, and upon whom we depend, and the idea of ourselves, as understanding rational beings, being such as are clear in us, would, I suppose, if duly considered and pursued, afford such foundations of our duty and rules of action, as might place morality among the sciences capable of demonstra- tion; wherein, I doubt not, but from self-evident propositions, by necessary consequences as incontestable as those in mathe- matics, the measure of right and wrong might be made out." As Locke cannot consistently mean by God's " goodness "

anything but the disposition to give pleasure, it might be inferred that the ultimate standard of right rules of action ought to be

Locke.

Clarke.

the common happiness of the beings affected by the action; but Locke does not explicitly adopt this standard. The only instances which he gives of intuitive moral truths are the purely formal propositions, " No government allows absolute liberty," and " Where there is no property there is no injustice," — neither of which has any evident connexion with the general happiness. As regards his conception of the Law of Nature, he takes it in the main immediately from Grotius and Pufendorf, more remotely from the Stoics and the Roman jurists.

We might give, as a fair illustration of Locke's general con- ception of ethics, a system which is frequently represented as diametrically opposed to Lockism; namely, that expounded in Clarke's Boyle lectures on the Being and Attributes of God (1704). It is true that Locke is not particu- larly concerned with the ethico-theological proposition which Clarke is most anxious to maintain, — -that the fundamental rules of morality are independent of arbitrary will, whether, divine or human. But in his general view of ethical principles as being, like mathematical principles, 1 essentially truths of relation, Clarke is quite in accordance with Locke; while of the four fundamental rules that he expounds, Piety towards God, Equity, Benevolence and Sobriety (which includes self-preservation), the first is obtained, just as Locke suggests, by " comparing the idea " of man with the idea of an infinitely good and wise being on whom he depends; and the second and third are axioms self-evident on the consideration of the equality or similarityof human individuals as such. The principle of equity — that " whatever I judge reasonable or unreasonable for another to do for me, that by the same I declare reasonable or unreasonable that I in the like case should do for him," is merely a formal statement of the golden rule of the gospel. We may observe that, in stating the principle of benevolence, " since the greater good is always most fit and reasonable to be done, every rational creature ought to do all the good it can to its fellow-creatures," Clarke avowedly follows Cumberland, from whom he quotes the further sentence that " universal love and benevolence is as plainly the most direct, certain and effectual means to this good as the flowing of a point is to produce a line." The quotation may remind us that the analogy between ethics and mathematics ought to be traced further back than Locke; in fact, it results from the

influence exercised by Cartesianism over English thought generally, in the latter half of the 17th century. It must be allowed that Clarke is misled by the analogy to use general ethical terms (" fitness," " agreement " of things, &c), which overlook the essential distinction between what is and what ought to be; and even in one or two expressions to overleap this distinction extravagantly, as (e.g.) in saying that the man who " wilfully acts contrary to justice wills things to be what they are not and cannot be." What he really means is less paradoxically stated in the general proposition that " originally and in reality it is natural and (morally speaking) necessary that the will should be determined in every action by the reason of the thing and the right of the case, as it is natural and (absolutely speaking) necessary that the understanding should submit to a demonstrated truth." But though it is an essential point in Clarke's view that what is right is to be done as such, apart from any consideration of pleasure or pain, it is to be inferred that he is not prepared to apply this doctrine in its unqualified form to such a creature as man, who is partly under the influence of irrational impulses. At least when he comes to argue the need of future rewards and punishments we find that his claim on behalf of morality is startlingly reduced. He now only contends that " virtue deserves to be chosen for its own sake, and vice to be avoided, though a man was sure for his own particular neither to gain nor lose anything by the practice of either." He fully admits that the question is altered when vice is attended by pleasure and profit to the vicious man, virtue by loss and calamity; and even that it is " not truly reasonable that men by adhering to virtue should part with their lives,

1 It should be noticed, however, that it is only in his treatment of Equity and Benevolence that he really follows out the mathematical analogy (cf. Sidgwick's History of Ethics, 5th ed., pp. 1 80-1 81).

Shaftes bury.

if thereby they deprived themselves of all possibility of receiving any advantage from their adherence."

Thus, on the whole, the impressive earnestness with which Clarke enforces the doctrine of rational morality only rendered more manifest the difficulty of establishing ethics on an inde- pendent philosophical basis ; so long at least as the psychological egoism of

Hobbes is not definitely assailed and overthrown. Until this is done, the utmost demonstration of the abstract reasonableness of social duty only leaves us with an irreconcilable antagonism between the view of abstract reason and the self-love which is allowed to be the root of man's appetitive nature. Let us grant that there is as much intellectual absurdity in acting unjustly as in denying that two and two make four; still, if a man has to choose between absurdity and unhappiness, he will naturally prefer the former; and Clarke, as we have already seen, is not really prepared to maintain that such preference is irrational. 1

It remains to try another psychological basis for ethical construction; instead of presenting the principle of social duty as abstract reason, liable to conflict to any extent with natural self-love, we may try to exhibit the naturalness of man's social affections, and demonstrate a normal harmony between these and his self-regarding impulses. This is the line of thought which Shaftesbury (1671-1713) may be said to have initiated. This theory had already been advanced by Cumberland and others, but Shaftesbury was the first to make it the cardinal point in his system; no one had yet definitely transferred the centre of ethical interest from the Reason, con- ceived as apprehending either abstract moral distinctions or laws of divine legislation, for the emotional impulses that prompt to social duty; no one had undertaken to distinguish clearly, by analysis of experience, the disinterested and self-regarding elements of our appetitive nature, or to prove inductively their perfect harmony. In his Inquiry concerning Virtue and Merit he begins by attacking the egoism of Hobbes, which, as we have seen, was not necessarily excluded by the doctrine of rational intuitions of duty. This interpretation, he says, would be true only if we considered man as a wholly unrelated individual. Such a being we might doubtless call " good," if his impulses were adapted to the attainment of his Own felicity. But man we must and do consider in relation to a larger system of which he forms a part, and so we call him " good " only when his impulses and dispositions are so balanced as to tend towards the good of this whole. And again we do not attribute goodness to him merely because his outward acts have beneficial results. When we speak of a man as good, we mean that his dispositions or affections are such as tend of themselves to promote the good or happiness of human society. Hobbes's moral man, who, if let loose from governmental constraint, would straightway spread ruin among his fellows, is not what we commonly agree to call good. Moral goodness, then, in a " sensible creature " implies primarily disinterested affections, whose direct object is the good of others; but Shaftesbury does not mean (as

he has been mis- understood to mean) that only such benevolent social impulses are good, and that these are always good. On the contrary, he is careful to point out, first, that immoderate social affections defeat themselves, miss their proper end, and are therefore bad; secondly, that as an individual's good is part of the good of the whole " self-affections " existing in a duly limited degree are morally good. Goodness, in short, consists in due combination, in just proportion, of both sorts of " affections," tendency to promote general good being taken as the criterion of the right degrees and proportions. This being established, the main aim of Shaftesbury's argument is to prove that the same balance of private and social affections, which tends naturally to public good, is also conducive to the happiness of the individual in whom it exists. Taking the different impulses in detail, he first shows how the individual's happiness is promoted by developing

1 It should be observed that, while Clarke is sincerely anxious to prove that most principles are binding independently of Divine appointment, he is no less concerned to show that morality requires the practical support of revealed religion.

his social affections, mental pleasures being superior to bodily; and the pleasures of benevolence the richest of all. In discussing this he distinguishes, with well-applied subtlety, between the pleasurableness of the benevolent emotions themselves, the sympathetic enjoyment of the happiness of others, and the pleasure arising from a consciousness of their love and esteem. He then exhibits the unhappiness that results from any excess of the self -regarding impulses, bodily appetite, desire of wealth emulation, resentment, even love of life itself; and ends by dwelling on the intrinsic painfulness of all malevolence. 2*

One more special impulse remains to be noticed. We have seen that goodness of character consists in a certain harmony of self-regarding and social affections. But virtue, in Shaftesbury's view, is something more; it implies a recognition of moral goodness and immediate preference of it for its own sake. This immediate pleasure that we take in goodness (and displeasure in its opposite) is due to a susceptibility which he calls the " reflex " or " moral " sense, and compares with our susceptibility to beauty and deformity in external things; it furnishes both an additional direct impulse to good conduct, and an additional gratification to be taken into account in the reckoning which proves the coincidence of virtue and happiness. This doctrine of the moral sense is sometimes represented as Shaftesbury's cardinal tenet; but though characteristic and

important, it is not really necessary to his main argument; it is the crown rather than the keystone of his ethical structure.

The appearance of Shaftesbury's Characteristics (1713) marks a turning-point in the history of English ethical thought. With the generation of moralists that followed, the consideration of abstract rational principles falls into the background, and its place is taken by introspective study of the human mind, observa- tion of the actual play of its various impulses and sentiments. This empirical psychology had not indeed been neglected by previous writers. More, among others, had imitated Descartes in a discussion of the passions, and Locke's essay had given a still stronger impulse in the sariie direction ; still, Shaftesbury is the first moralist who distinctly takes psychological experience as the basis of ethics. His suggestions were developed by Hutcheson into one of the most elaborate systems of moral philosophy which we possess; through Hutcheson, if not directly, they influenced Hume's speculations, and are thus connected with later utilitarianism. Moreover, the substance of Shaftesbury's main argument was adopted by Butler, though it could not pass the scrutiny of that powerful and cautious intellect without receiving important modifications and additions. On the other hand, the ethical optimism of Shaftesbury, rather broadly impressive than exactly reasoned, and connected as it was with a natural theology that implied the Christian scheme to be superfluous, challenged attack equally from orthodox divines and from cynical freethinkers. Of these latter Mandeville, the author of The Fable of the Bees, or Y ˆ e " Private Vices Public Benefits (1723), was a conspicuous if not a typical specimen. He can hardly be called a " moralist " ; and though it is impossible to deny him a considerable share of philosophic penetration, his anti-moral paradoxes have not even apparent coherence. He is convinced that virtue (where it is more than a mere pretence) is purely artificial; but not quite certain whether it is a useless trammel of appetites and passions that are advantageous to society, or a device creditable to the politicians who introduced it by playing upon the " pride and vanity " of the " silly creature man." The view, however, to which he gave audacious expression, that moral regulation is something alien to the natural man, and imposed on him from without, seems to have been very current in the polite society of his time, as we learn both from Berkeley's Alciphron and from Butler's more famous sermons.

The view of " human nature " against which Butler preached was not exactly Mandeville's, nor was it properly to be called

2 Three classes of impulses are thus distinguished by Shaftesbury : —

(1) ” Natural Affections,” (2) ” Self affections,” and (3) ” Un natural Affections.” Their characteristics are further considered in the History of Ethics, p. 186 seq.

Hobbist, although Butler fairly treats it as havmg a philo- sophical basis in Hobbes’s psychology. It was, so to say, Hobbism turned inside out, — rendered licentious and anarchical instead of constructive. Hobbes had said ” the natural state of man is non-moral, unregulated; moral rules are means to the end of peace, which is a means to the end of self-preservation.” On this view morality, though dependent for its actuality on the social compact which establishes govern- ment, is actually binding on man as a reasonable being. But the quasi-theistic assumption that what is natural must be reasonable remained in the minds of Hobbes’s most docile readers, and in combination with his thesis that egoism is natural, tended to produce results which were dangerous to social well-being. To meet this view Butler does not content himself, as is sometimes carelessly supposed, with insisting on the natural claim to authority of the conscience which his opponent repudiated as artificial; he adds a subtle and effective argument ad hominem. He first follows Shaftesbury in exhibiting the social affections as no less natural than the appetites and desires which tend directly to self-preservation; then reviving the Stoic view of the prima naturae, the first objects of natural appetites, he argues that pleasure is not the primary aim even of the impulses which Shaftesbury allowed to be “self-affections”; but rather a result which follows upon their attaining their natural ends. We have, in fact, to distinguish self-love, the ” general desire that every man hath of his own happiness ” or pleasure, from the particular affections, passions, and appetites directed towards objects other than pleasure, in the satisfaction of which pleasure consists. The latter are ” necessarily pre- supposed ” as distinct impulses in ” the very idea of an interested pursuit “; since, if there were no such pre-existing desires, there would be no pleasure for self-love to aim at. Thus the object of hunger is not the pleasure of eating but food; hunger is therefore, strictly speaking, no more ” interested ” than benevolence; granting that the pleasures of the table are an important element in the happiness at which self-love aims, the same at least may be said for the pleasures of love and sympathy. Further, so far from bodily appetites (or other particular desires) being forms of self-love, there is no one of them which under certain circumstances may not come into conflict with it. Indeed, it is

common for men to sacrifice to passion what they know to be their true interests; at the same time we do not consider such conduct " natural " in man as a rational being; we rather regard it as natural for him to govern his transient impulses. Thus the notion of natural unregulated egoism turns out to be a psychological chimera. Indeed, we may say that an egoist must be doubly self-regulative, since rational self-love ought to restrain not only other impulses, but itself also; for as happiness is made up of feelings that result from the satisfaction of impulses other than self-love, any over-develop- ment of the latter, enfeebling these other impulses, must pro- portionally diminish the happiness at which self-love aims. If, then, it be admitted that human impulses are naturally under government, the natural claim of conscience or the moral faculty to be the supreme governor will hardly be denied.

But has not self-love also, by Butler's own account, a similar authority, which may come into conflict with that of conscience? Butler fully admits this, and, in fact, grounds on it an important criticism of Shaftesbury. We have seen that in the latter's system the " moral sense " is not absolutely required, or at least is necessary only as a substitute for enlightened self-regard; since if the harmony between prudence and virtue, self-regarding and social impulses, is complete, mere self-interest will prompt a duly enlightened mind to maintain precisely that " balance " of affections in which goodness consists. But to Butler's more cautious mind the completeness of this harmony did not seem sufficiently demonstrable to be taken as a basis of moral teaching; he has at least to contemplate the possibility of a man being con- vinced of the opposite; and he argues that unless we regard con- science as essentially authoritative — which is not implied in the term " moral sense " — such a man is really bound to be vicious; " since interest, one's own happiness, is a manifest obligation."

Still on this view, even if the authority of conscience 'be asserted, we seem reduced to an ultimate dualism of our rational nature. Butler's ordered polity of impulses turns out to be a polity with two independent governments. Butler does not deny this, so far as mere claim to authority is concerned ; 1 but he maintains that, the dictates of conscience being clear and certain, while the calculations of self-interest lead to merely probable conclusions, it can never be practically reasonable to disobey the former, even apart from any proof which religion may furnish of the absolute coincidence of the two in a future life.

This dualism of governing principles, conscience and self-love, in

Butler's system, and perhaps, too, his revival of the Platonic conception of human nature as an ordered and governed w ,. . community of impulses, is perhaps most nearly antici- pated in Wollaston's Religion of Nature Delineated (1722). Here, for the first time, we find "moral good " and " natural good " or " happiness " treated separately as two essentially distinct objects of rational pursuit and investigation; the harmony between them being regarded as matter of religious faith, not moral knowledge. Wollaston's theory of moral evil as con- sisting in the practical contradiction of a true proposition, closely resembles the most paradoxical part of Clarke's doctrine, and was not likely to approve itself to the strong common sense of Butler; but his statement of happiness or pleasure as a " justly desirable " end at which every rational being " ought " to aim corresponds exactly to Butler's conception of self-love as a naturally govern- ing impulse; while the " moral arithmetic " with which he compares pleasures and pains, and endeavours to make the notion of happiness quantitatively precise, is an anticipation of Benthamism.

There is another side of Shaftesbury's harmony which Butler was ultimately led to oppose in a more decided manner, — the opposition, namely, between conscience or the moral sense and the social affections. In the Sermons, indeed (i72g),Butlerseems to treat conscience and calm benevolence as permanently allied though distinct principles, but in the Dissertation on Virtue, appended to the Analogy. (1739), he maintains that the conduct dictated by conscience will often differ widely from that to which mere regard for the production of happiness would prompt. We may take this latter treatise as representing the first in the development of English ethics, at which what were afterwards called "utilitarian" and "intuitional" morality were first formally opposed; in earlier systems the antithesis is quite latent, as we have incidentally noticed in the case of Cumberland and Clarke. The argument in Butler's dissertation was probably directed chiefly against Hutcheson, who in his Inquiry u utc i, eson into the Original of our Ideas of Beauty and Virtue had definitely identified virtue with benevolence. The identification is slightly qualified in Hutcheson's posthumously published System of Moral Philosophy (1755), in which the general view of Shaftesbury is more fully developed, with several new psychologi- cal distinctions, including Butler's separation of " calm " bene- volence — as well as, after Butler, " calm self-love " — from the " turbulent " passions, selfish or social. Hutcheson follows Butler again in laying stress on the regulating and controlling function of the moral sense; but he still regards "kind affec- tions " as theprincipal objects of moral approbation — the " calm" and "

extensive " affections being preferred to the turbulent and narrow — together with the desire and love of moral excellence which is ranked with universal benevolence, the two being equally worthy and necessarily harmonious. Only in a secondary sense is approval due to certain " abilities and dispositions immediately connected with virtuous affections," as candour, veracity, fortitude, sense of honour; while in a lower grade still are placed sciences and arts, along with even bodily skills and gifts; indeed, the approbation we give to these is not strictly moral, but is referred to the " sense of decency or dignity," which (as well as the sense of honour) is to be distinguished from

1 In a remarkable passage near the close of his eleventh sermon Butler seems even to allow that conscience would have to give way to self-love, if it were possible (which it is not) that the two should come into ultimate and irreconcilable conflict.

the moral sense. Calm self-love Hutcheson regards as morally indifferent; though he enters into a careful analysis of the elements of happiness, 1 in order to show that a true regard for private interest always coincides with the moral sense and with benevolence. While thus maintaining Shaftesbury's "harmony" between public and private good, Hutcheson is still more careful to establish the strict disinterestedness of benevolent affections. Shaftesbury had conclusively shown that these were not in the vulgar sense selfish; but the very stress which he lays on the pleasure inseparable from their exercise suggests a subtle egoistic theory which he does not expressly exclude, since it may be said that this " intrinsic reward " constitutes the real motive of the benevolent man. To this Hutcheson replies that no doubt the exquisite delight of the emotion of love is a motive to sustain and develop it; but this pleasure cannot be directly obtained, any more than other pleasures, by merely desiring it; it can be sought only by the indirect method of cultivating and indulging the disinterested desire for others' good, which is thus obviously distinct from the desire for the pleasure of benevolence. He points to the fact that the imminence of death often intensifies instead of diminishing a man's desire for the welfare of those he loves, as a crucial experiment proving the disinterestedness of love ; adding, as confirmatory evidence, that the sympathy and admiration commonly felt for self-sacrifice depends on the belief that it is something different from refined self-seeking.

It remains to consider how, from the doctrine that affection is the proper object of approbation, we are to deduce moral rules or " natural laws " prescribing or prohibiting outward acts. It is obvious that all actions conducive to the general good will deserve our highest approbation if done from disinterested benevolence; but how if they are not so done ? In answering this question, Hutcheson avails himself of the scholastic distinction between " material " and " formal " goodness. " An action," he says, " is materially good when in fact it tends to the interest of the system, so far as we can judge of its tendency, or to the good of some part consistent with that of the system, whatever were the affections of the agent. An action is formally good when it flowed from good affection in a just proportion." On the pivot of this distinction Hutcheson turns round from the point of view of Shaftesbury to that of later utilitarianism. As regards "material" goodness of actions, he adopts explicitly and unreservedly the formula afterwards taken as fundamental by Bentham; hold- ing that " that action is best which procures the greatest happiness for the greatest numbers, and the worst which in a like manner occasions misery." Accordingly his treat- ment of external rights and duties, though decidedly inferior in methodical clearness and precision, does not differ in principle from that of Paley or Bentham, except that he lays greater stress on the immediate conduciveness of actions to the happiness of individuals, and more often refers in a merely supplementary or restrictive way to their tendencies in respect of general happi- ness. It may be noticed, too, that he still accepts the "social compact " as the natural mode of constituting government, and regards the obligations of subjects to civil obedience as normally dependent on a tacit contract; though he is careful to state that consent is not absolutely necessary to the just establishment of beneficent government, nor the source of irrevocable obligation to a pernicious one.

An important step further in political utilitarianism was taken by Hume in his Treatise on Human Nature (1739). Hume concedes that a compact is the natural means of peace- fully instituting a new government, and may therefore be properly regarded as the ground of allegiance to it at the outset; but he urges that, when once it is firmly established the duty of obeying it rests on precisely the same combination of private and general interests as the duty of keeping promises; it is therefore absurd to base the former on the latter. Justice, veracity, fidelity to compacts and to governments, are all co-

1 It is worth noticing that Hutcheson's express definition of the object of self-love includes " perfection " as well as " happiness "; but in the working out of his system he considers private good ex-

clusively as happiness or pleasure.

Hume.

ordinate; they are all " artificial " virtues, due to civilization, and not belonging to man in his " ruder and more natural " condition; our approbation of all alike is founded on our per- ception of their useful consequences. It is this last position that constitutes the fundamental difference between Hutcheson's ethical doctrine and Hume's. 2 The former, while accepting utility as the criterion of " material goodness," had adhered to Shaftesbury's view that dispositions, not results of action, were the proper object of moral approval; at the same time, while giving to benevolence the first place in his account of personal merit, he had shrunk from the paradox of treating it as the sole virtue, and had added a rather undefined and unexplained train of qualities, — veracity, fortitude, activity, industry, sagacity, — immediately approved in various degrees by the " moral sense " or the " sense of dignity." This naturally suggested to a mind like Hume's, anxious to apply the experimental method to psychology, the problem of reducing these different elements of personal merit — or rather our approval of them — to some common principle. The old theory that referred this approval entirely to self-love, is, he holds, easy to disprove by " crucial experiments " on the play of our moral sentiments; rejecting this, he finds the required explanation in the sympathetic pleasure that attends our perception of the conduciveness of virtue to the interests of human beings other than ourselves. He endeavours to establish this inductively by a survey of the qualities, com- monly praised as virtues, which he finds to be always either useful or immediately agreeable, either (1) to the virtuous agent himself or (2) to others. In class (2) he includes, besides the Benevolence of Shaftesbury and Hutcheson, the useful virtues, Justice, Veracity and Fidelity to compacts; as well as such immediately agreeable qualities as politeness, wit, modesty and even cleanliness. The most original part of his discussion, however, is concerned with qualities immediately useful to their possessor. The most cynical man of the world, he says, with whatever " sullen incredulity " he may repudiate virtue as a hollow pretence, cannot really refuse his approbation to " dis- cretion, caution, enterprise, industry, frugality, economy, good sense, prudence, discernment"; nor again, to "temperance, sobriety, patience, perseverance, considerateness, secrecy, order, insinuation, address, presence of mind, quickness of con- ception, facility of expression." It is evident that the merit of these qualities in our eyes is chiefly due to our perception of their tendency to serve the person possessed of them; so that the cynic in praising them is really

exhibiting the unselfish sympathy of which he doubts the existence. Hume admits the difficulty that arises, especially in the case of the " artificial " virtues, such as justice, &c, from the undeniable fact that we praise them and blame their opposites without consciously reflecting on useful or pernicious consequences; but considers that this may be explained as an effect of " education and acquired habits." 3

So far the moral faculty has been considered as contemplative rather than active; and this, indeed, is the point of view from which Hume mainly regards it. If we ask what actual motive we have for virtuous conduct, Hume's answer is not quite clear. On the one hand, he speaks of moral approbation as derived from " humanity and benevolence," while expressly recognizing, after Butler, that there is a strictly disinterested element in our benevolent impulses (as also in hunger, thirst, love of fame and other passions). On the other hand, he does not seem to think that moral sentiment or " taste " can " become a motive to action," except as it " gives pleasure or pain, and thereby constitutes happiness or misery." It is difficult to make these views quite consistent; but at any rate Hume emphatically maintains that " reason is no motive to action," except so far as it " directs the impulse received from appetite or inclination ";

2 Hume's ethical view was finally stated in his Inquiry into the Principles of Morals (1751), which is at once more popular and more purely utilitarian than his earlier work.

3 Hume remarks that in some cases, by " association of ideas," the rule by which we praise and blame is extended beyond the principle of utility from which it arises ; but he allows much less scope to this explanation in his second treatise than in his first.

Adam Smith,

and recognizes— in his later treatise at least— no " obligation " to virtue, except that of the agent's interest or happiness. He attempts, however, to show, in a summary way, that all the duties which his moral theory recommends are also " the true interest of the individual," — taking into account the importance to his happiness of " peaceful reflection on one's own conduct." But even if we consider the moral consciousness merely as a particular kind of

pleasurable emotion, there is an obvious question suggested by Hume's theory, to which he gives no adequate answer. If the essence of " moral taste " is sympathy with the pleasure of others, why is not this specific feeling excited by other things beside virtue that tend to cause such pleasure ? On this point Hume contents himself with the vague remark that " there are a numerous set of passions and sentiments, of which thinking rational beings are by the original constitution of nature the only proper objects." The truth is, that Hume's notion of moral approbation was very loose, as is sufficiently shown by the list of " useful and agreeable " qualities which he considers worthy of approbation. 1 It is therefore hardly surpris- ing that his theory should leave the specific quality of the moral sentiments a fact still needing to be explained. An original and ingenious solution of this problem was offered by his contem- porary Adam Smith, in his Theory of Moral Sentiments (1759)- Without denying the actuality or importance of that sympathetic pleasure in the perceived or inferred effects of virtues and vices he yet holds that the essential part of common moral sentiment is constituted rather by a more direct sympathy with the impulses that prompt to action or expression. The spontaneous play of this sympathy he treats as an original and inexplicable fact of human nature, but he considers that its action is powerfully sustained by the pleasure that each man finds in the accord of his feelings with another's. By means of this primary element, compounded in various ways, Adam Smith explains all the phenomena of the moral consciousness. He takes first the semi-moral notion of " pro- priety" or "decorum," and endeavours to show inductively that our application of this notion to the social behaviour of another is determined by our degree of sympathy with the feeling ex- pressed in such behaviour. Thus the prescriptions of good taste in the expression of feeling may be summed up in the principle, " reduce or raise the expression to that with which spectators will sympathize." When the effort to restrain feeling is exhibited in a degree which surprises as well as pleases, it excites admiration as a virtue or excellence; such excellences Adam Smith quaintly calls the " awful and respectable," contrasting them with the " amiable virtues " which consist in the opposite effort to sympathize, when exhibited in a remarkable degree. From the sentiments of propriety and admiration we proceed to the sense of merit and demerit. Here a more complex phenomenon presents itself for analysis; we have to distinguish in the sense of merit — (1) a direct sympathy with the sentiments of the agent, and (2) an indirect sympathy with the gratitude of those who receive the benefit of his actions. In the case of demerit there is a direct antipathy to the feelings of the misdoer, but the chief sentiment excited is sympathy with those injured by the

misdeed. The object of this sympathetic resentment, impelling us to punish, is what we call injustice; and thus the remarkable stringency of the obligation to act justly is explained since the recognition of any action as unjust involves the admission that it may be forcibly obstructed or punished. Moral judgments, then, are expressions of the complex normal sympathy of an impartial spectator with the active impulses that prompt to and result from actions. In the case of our own conduct what we call conscience is really sympathy with the feelings of an imagi- nary impartial spectator. Adam Smith gives authority to his moral system by saying 1 In earlier editions of the Inquiry Hume expressly included all approved qualities under the general notion of " virtue." In later editions he avoided this strain on usage by substituting or adding " merit " in several passages — allowing that some of the laudable qualities which he mentions would be more commonly called " talents," but still maintaining that " there is little distinction made in our internal estimation " of " virtues " and " talents."

that " moral principles are justly to be regarded as the laws of the Deity"; but this he never proves. So Hume insists emphatically on the "reality of moral obligation"; but is found to mean no more by this than the real existence of the likes and dislikes that human beings feel for each other's qualities. The fact is that amid the analysis of feelings aroused by the sentimentalism of Shaftesbury's school, the fundamental questions " What is right?" and " Why?" had been allowed to drop into the background, and the consequent danger to morality was manifest. The binding force of moral rules becomes evanescent if we admit, with Hutcheson, that the " sense " of them may properly vary from man to man as the palate does; and it seems only another way of putting Hume's doctrine, that reason is not concerned with the ends of action, to say that the mere existence of a moral sentiment is in itself no reason for obeying it. A reaction, in one form or another, against the tendency to dissolve ethics into psychology was inevitable ; since mankind generally could not be so far absorbed by the interest of psychological hypothesis as to forget their need of establishing practical principles. It was obvious, too, that this reaction might take place in either of the two lines of thought, which, having been peacefully allied in Clarke and Cumberland, had become distinctly opposed to each other in Butler and Hutcheson. It might either fall back on the moral principles commonly accepted, and, affirming their objective validity, endeavour to exhibit them as a coherent and complete set of ultimate ethical truths; or it might take the utility or con- ducive ness to pleasure, to which Hume had referred for the origin of most

sentiments, as an ultimate end and standard by which these sentiments might be judged and corrected. The former is the line adopted with substantial agreement by Price, Reid, Stewart and other members of the still existing Intuitional school; the latter method, with considerably more divergence of view and treatment, was employed independently and almost simultaneously by Paley and Bentham in both ethics and politics, and is at the present time widely maintained under the name ■of Utilitarianism.

Price's Review of the Chief Questions and Difficulties of Morals was published in 1757, two years before Adam Smith's treatise. In regarding moral ideas as derived from the " intuition of truth or immediate discernment of the nature of things by the understanding," Price revives the general view of Cudworth and Clarke; but with several specific differences. Firstly, his conception of " right " and " wrong " as " single ideas " incapable of definition or analysis — the notions " right," " fit," " ought," " duty," " obligation," being coincident or identical — at least avoids the confusions into which Clarke and Wollaston had been led by pressing the analogy between ethical and physical truth. Secondly, the emotional element of the moral consciousness, on which attention had been con- centrated by Shaftesbury and his followers, though distinctly recognized as accompanying the intellectual intuition, is carefully subordinated to it. While right and wrong, in Price's view, are " real objective qualities " of actions, moral " beauty and deformity " are subjective ideas; representing feelings which are partly the necessary effects of the perceptions of right and wrong in rational beings as such, partly due to an " implanted sense " or varying emotional susceptibility. Thus, both reason and sense of instinct co-operate in the impulse to virtuous conduct, though the rational element is primary and paramount. Price further follows Butler in distinguishing the perception of merit and demerit in agents as another accompaniment of the percep- tion of right and wrong in actions; the former being, however, only a peculiar species of the latter, since, to perceive merit in any one is to perceive that it is right to reward him. It is to be obgerved that both Price and Reid are careful to state that the merit of the agent depends entirely on the intention or " formal Tightness " of his act; a man is not blameworthy for unintended evil, though he may of course be blamed for any wilful neglect (cf. Arist., Eth. Nic, iii. 1), which has caused him to be ignorant of his real duty. When we turn to the subject matter of virtue, we find that Price, in comparison with More or Clarke is decidedly

Price.

Reid.

laxer in accepting and stating his ethical first principles; chiefly owing to the new antithesis to the view of Shaftesbury and Hutcheson by which his controversial position is complicated. What Price is specially concerned to show is the existence of ultimate principles beside the principle of universal benevolence. Not that he repudiates the obligation either of rational bene- volence or self-love; on the contrary, he takes more pains than Butler to demonstrate the reasonableness of either principle. " There is not anything," he says, " of which we have more undeniably an intuitive perception, than that it is. ' right to pursue and promote happiness,' whether for ourselves or for others." Finally, Price, writing after the demonstration by Shaftesbury and Butler of the actuality of disinterested impulses in human nature, is bolder and clearer than Cudworth or Clarke in insisting that right actions are to be chosentiecause they are right by virtuous agents as such, even going so far as to lay down that an act loses its moral worth in proportion as it is done from natural inclination.

On this latter point Reid, in his Essays on the Active Powers of the Human Mind (1788), states a conclusion more in harmony with common sense, only maintaining that " no act can be morally good in which regard for what is right has not some influence." This is partly due to the fact that Reid builds more distinctly than Price on the foundation laid by Butler; especially in his acceptance of that duality of govern- ing principles which we have noticed as a cardinal point in the latter's doctrine. Reid considers " regard for one's good on the whole " (Butler's self-love) and " sense of duty " (Butler's conscience) as two essentially distinct and co-ordinate rational principles, though naturally often comprehended under the one term, Reason. The rationality of the former principle he takes pains to explain and establish; in opposition to Hume's doctrine that it is no part of the function of reason to determine the ends which we ought to pursue, or the preference due to one end over another. He urges that the notion of " good 1 on the whole " is one which only a reasoning being can form, involving as it does abstraction from the objects of all particular desires, and com- parison of past and future with present feelings; and maintains that it is a contradiction to suppose a rational being to have the notion of its Good on the Whole without a desire for it, and that such a desire must naturally regulate

all particular appetites and passions. It cannot reasonably be subordinated even to the moral faculty; in fact, a man who doubts the coincidence of the two — which on religious grounds we must believe to be complete in a morally governed world — is reduced to the " miser- able dilemma whether it is better to be a fool or a knave." As regards the moral faculty itself, Reid's statement coincides in the main with Price's; it is both intellectual and active, not merely perceiving the " Tightness " or " moral obligation " of actions (which Reid conceives as a simple unanalysable relation between act and agent), but also impelling the will to the performance of what is seen to be right. Both thinkers hold that this perception of right and wrong in actions is accompanied by a perception of merit and demerit in agents, and also by a specific emotion; but whereas Price conceives this emotion chiefly as pleasure or pain, analogous to that produced in the mind by physical beauty or deformity, Reid regards it chiefly as benevolent affection, esteem and sympathy (or their opposites), for the virtuous (or vicious) agent. This " pleasurable good-will," when the moral judgment relates to a man's own actions, becomes " the testimony of a good conscience — the purest and most valuable of all human enjoyments." Reid is careful to observe that this moral faculty is not " innate " except in germ; it stands in need of " education, training, exercise (for which society is indispensable), and habit," in order to the attain- ment of moral truth. He does not with Price object to Jts being called the " moral sense," provided we understand by 1 It is to be observed that whereas Price and Stewart (after Butler) identify the object of self-love with happiness or pleasure, Reid conceives this " good " more vaguely as including perfection and happiness; though he sometimes use& " good " and happiness as convertible terms, and seems practically to have the latter in view in all that he says of self-live.

this a source not merely of. feelings or notions, but of " ultimate truths." Here he omits to notice the important question whether the premises of moral reasoning are universal or individual judgments; as to which the use of the term "sense" seems rather to suggest the second alternative. Indeed, he seems himself quite undecided on this question; since, though he generally represents ethical method as deductive, he also speaks of the " original judgment that this action is right and that wrong."

The truth is that the construction of a scientific method of ethics is a matter of little practical moment to Reid. Thus, though he offers a list of first principles, by deduction from which these common opinions may be confirmed, he does not present it with any claim to

completeness. Besides maxims relating to virtue in general, — such as (1) that there is a right and wrong in conduct, but (2) only in voluntary conduct, and that we ought (3) to take pains to learn our duty, and (4) fortify ourselves against temptations to deviate from it — Reid states five funda- mental axioms. The first of these is merely the principle of rational self-love, " that we ought to prefer a greater to a lesser good, though more distinct, and a less evil to a greater," — the mention of which seems rather inconsistent with Reid's distinct separation of the " moral faculty " from " self-love." The third is merely the general rule of benevolence stated in the somewhat vague Stoical formula, that " no one is born for himself only." The fourth, again, is the merely formal principle that " right and wrong must be the same to all . in all circumstances," which belongs equally to all systems of objective morality; while the fifth prescribes the religious duty of " veneration or submission to God." Thus, the only principle which ever appears to offer definite guidance as to social duty is the second, " that so far as the intention of nature appears in the constitution of man, we ought to act according to that intention," the vagueness 3 of which is obvious. (For Reid's views on moral freedom see A. Bain, Mental Science, pp. 422, seq.)

A similar incompleteness in the statement of moral principles is found if we turn to Reid's disciple, Dugald Stewart, whose Philosophy of the Active and Moral Powers of Man (1828) contains the general view of Butler and Reid, stewart. and to some extent that of Price, — expounded with more fulness and precision, but without important original additions or modifications. Stewart lays stress on the obligation of justice as distinct from benevolence; but his definition of justice represents it as essentially impartiality, — a virtue which (as was just now said of Reid's fourth principle) must equally find a place in the utilitarian or any other system that lays down universally applicable rules of morality. Afterwards, however, Stewart distinguishes " integrity or honesty " as a branch of justice concerned with the rights of other men, which form the subject of " natural jurisprudence." In this depart- ment he lays down the moral axiom " that the labourer is entitled to the fruit of his own labour " as the principle on which complete rights of property are founded; maintaining that occupancy alone would only confer a transient right of possession during use. The only other principles which he discusses are veracity and fidelity to promises, gratitude being treated as a- natural instinct prompting to a particular kind of just actions.

It will be seen that neither Reid nor Stewart offers more than a very meagre and tentative contribution to that ethical science by which,

as they maintain, the received rules of morality may be rationally deduced from self-evident first principles. A more ambitious attempt in the same direction was made by Whewell in his Elements of Morality (1846). Whewell's general moral view differs from that of his Scottish predecessors chiefly in a point where we may trace the influence of Kant — viz. in his rejection of self-love as an independent rational and governing principle, and his consequent refusal to admit happiness, apart from duty, as a reasonable end for

2 E.g. Reid proposes to apply this principle in favour of monogamy, arguing from the proportion of males and females born; without explaining why, if the intention of nature hence inferred excludes occasional polygamy, it does not also exclude occasional celibacy.

Whewell.

the individual. The moral reason, thus left in sole supremacy, is represented as enunciating five ultimate principles,-ˆthose of benevolence, justice, truth, purity and order. With a little straining these are made to correspond to five chief divisions of Jus, — personal security (benevolence being opposed to the ill-will that commonly causes personal injuries\ property, contract, marriage and government; while the first, second and fourth, again, regulate respectively the three chief classes of human motives, — affections, mental desires and appetites. Thus the list, with the addition of two general principles, "earnest- ness " and " moral purpose," has a certain air of systematic completeness. When, however, we look closer, we find that the principle of order, or obedience to government, is not seriously intended to imply the political absolutism which it seems to express, and which English common sense emphatically re- pudiates; while the formula of justice is given in the tautological or perfectly indefinite proposition " that every man ought to have his own." Whewell, indeed, explains that this latter formula must be practically interpreted by positive law, though he inconsistently speaks as if it supplied a standard for judging laws to be right or wrong. The principle of purity, again, " that the lower parts of our nature ought to be subject to the higher," merely particularizes that supremacy of reason over non-rational impulses which is involved in the very notion of reasoned morality. Thus, in short, if we ask for a clear and definite fundamental intuition, distinct from regard for happiness, we find really nothing in

Whewell's doctrine except the single rule of veracity (including fidelity to promises); and even of this the axiomatic character becomes evanescent on closer inspection, since it is not maintained that the rule is practically unqualified, but only that it is practically undesirable to formulate its qualifications.

On the whole, it must be admitted that the doctrine of the intuitional school of the 18th and 19th centuries has been developed Intuitional with less care and consistency than might have been andutin- expected, in its statement of the fundamental axioms tartan or intuitively known premises of moral reasoning. sc 00 s. ˆ n(j jf j.jj e con t roversv w hich this school has conducted with utilitarianism had turned principally on the determination of the matter of duty, there can be little doubt that it would have been forced into more serious and systematic effort to define precisely and completely the principles and method on which we are to reason deductively to particular rules of conduct. 1 But in fact the difference between intuitionists and utilitarians as to the method of determining the particulars of the moral code was complicated with a more fundamental disagreement as to the very meaning of " moral obligation." This Paley and Bentham (after Locke) interpreted as merely the effect on the will of the pleasures or pains attached to the observance or viola- tion of moral rules, combining with this the doctrine of Hutcheson that " general good " or " happiness " is the final end and standard of these rules; while they eliminated all vagueness from the notion of general happiness by defining it to consist in " excess of pleasure over pain " — pleasures and pains being regarded as " differing in nothing but continuance or intensity." The utilitarian system gained an attractive air of simplicity by thus using a single perfectly clear notion — pleasure and its negative quantity pain — to answer both the fundamental questions of mortals, "What is right?" and "Why should I do it ? " But since there is no logical connexion between the answers that have thus come to be considered as one doctrine, this apparent unity and simplicity has really hidden fundamental disagreements, and caused no little confusion in ethical debate.

1 We may observe that some recent writers, who would generally be included in this school, avoid in various ways the difficulty of constructing a code of external conduct. Sometimes they consider moral intuition as determining the comparative excellence of conflicting motives (James Martineau), or the comparative quality of pleasures chosen (Laurie), which seems to be the same view in a hedonistic garb ; others hold that what is intuitively perceived is the Tightness or wrongness of individual acts — -a view which obviously renders

ethical reasoning nractically superfluous.

In Paley 's Principles of Moral and Political Philosophy (1785), the link between general pleasure (the standard) and private pleasure or pain (the motive) is supplied by the conception of divine legislation. To be " obliged " Pa,e y- is to be " urged by a violent motive resulting from the command of another"; in the case of moral obligation, the command proceeds from God, and the motive lies in the expectation of being rewarded and punished after this life. The commands of God are to be ascertained " from scripture and the light of nature combined." Paley, however, holds that scripture is given less to teach morality than to illustrate it by example and enforce it by new sanctions and greater certainty, and that the light of nature makes it clear that God wills the happiness of his creatures. Hence, his method in deciding moral questions is chiefly that of estimating the tendency of actions to promote or diminish the general happiness. To meet the obvious objec- tions to this method, based on the immediate happiness caused by admitted crimes (such as " knocking a rich villain on the head "), he lays stress on the necessity of general rules in any kind of legislation; 3 while, by urging the importance of forming and maintaining good habits, he partly evades the difficulty of cal- culating the consequences of particular actions. In this way the utilitarian method is freed from the subversive tendencies which Butler and others had discerned in it; as used by Paley, it merely explains the current moral and jural distinctions, exhibits the obvious basis of expediency which supports most of the received rules of law and morality and furnishes a simple solution, in harmony with common sense, of some perplexing casuistical questions. Thus (e.g.) " natural rights " become rights of which the general observance would be useful apart from the institution of civil government; as distinguished from the no less binding " adventitious rights," the utility of which depends upon this institution. Private property is in this sense "natural" from its obvious advantages in encouraging*

2 The priginality — such as it is— of Paley's system (as of Bentham's) lies in its method of working out details rather than in its principles of construction. Paley expressly acknowledges his obligations to the original and suggestive, though diffuse and whimsical, work of Abraham Tucker (Light of Nature Pursued, 1768-1774). In this treatise, as in Paley's, we find " every man's own satisfaction, the spring that actuates all his motives," connected with " general good, the root whereout all our rules of conduct and sentiments of honour are to branch," by means of natural theology demonstrating the " unniggardly goodness of the author of nature.

Tucker is also careful to explain that satisfaction or pleasure is " one and the same in kind, however much it may vary in degree,

. . . whether a man is pleased with hearing music, seeing pros- pects, tasting dainties, performing laudable actions, or making agreeable reflections," and again that by " general good " he means

" quantity of happiness," to which " every pleasure that we do to our neighbour is an addition." There is, however, in Tucker's theo- logical link between private and general happiness a peculiar in- genuity which Paley's common sense has avoided. He argues that men having no free will have really no desert ; therefore the divine equity must ultimately distribute happiness in equal shares to all; therefore I must ultimately increase my own happiness most by conduct that adds most to the general fund which Providence administers.

But in fact the outline of Paley's utilitarianism is to be found a generation earlier — in Gay's dissertation prefixed to Law's edition of King's Origin of Evil — as the following extracts will show:—" The idea of virtue is the conformity to a rule of life, directing the actions of all rational creatures with respect to each other's happiness; to which every one is always obliged. . . . Obligation is the necessity of doing or omitting something in order to be happy. . . . Full and complete obligation which will extend to all cases can only be that arising from the authority of God. . . . The will of God [so far as it directs behaviour to others] is the immediate rule or criterion of virtue . . . but it is evident from the nature of God that he could have no other design in creating mankind than their happiness; and therefore he wills their happiness; therefore that my behaviour so far as it may be a means to the happiness of mankind should be such ; so this happiness of mankind may be said to be the criterion of virtue once removed."

The same dissertation also contains the germ of Hartley's system, as we shall presently notice.

3 It must be allowed that Paley's application of this argument is somewhat loosely reasoned, and does not sufficiently distinguish the consequence of a single act of beneficent manslaughter Jrom the consequences of a general permission to commit such acts.

labour, skill, preservative care; though actual rights of property depend on the general utility of conforming to the law of the land by which they are determined. We observe, however, that Paley's method is often mixed with reasonings that belong to an alien and older manner of thought; as when he supports the claim of the poor to charity by referring to the intention of mankind "when they agreed to a separation of the common fund," or when he infers that monogamy is a part of the divine design from the equal numbers of males and females born. In other cases his statement of utilitarian considerations is frag- mentary and unmethodical, and tends to degenerate into loose exhortation on rather trite topics.

In unity, consistency and thoroughness of method, Bentham's utilitarianism has a decided superiority over Paley's. He considers actions solely in respect of their pleasurable and his an(ˆ painful consequences, expected or actual; and he school. recognizes the need of making a systematic register of these consequences, free from the influences of common moral opinion, as expressed in the "eulogistic " and "dyslogistic " terms in ordinary use. Further, the effects that he estimates are all of a definite, palpable, empirically ascertainable quality; they are such pleasures and pains as most men feel and all can observe, so that all his political or moral inferences lie open at every point to the test of practical experience. Every one, it would seem, can tell what value he sets on the pleasures of alimentation, sex, the senses generally, wealth, power, curiosity, sympathy, antipathy (malevolence), the goodwill of individuals or of society at large, and on the corresponding pains, as well as the pains of labour and organic disorders; 1 and can guess the rate at which they are valued by others; therefore if it be once granted that all actions are determined by pleasures and pains, and are to be tried by the same standard, the art of legislation and private conduct is apparently placed on an empirical, basis. Bentham, no doubt, seems to go beyond the limits of experience proper in recognizing "religious " pains and pleasures in his fourfold division of sanctions, side by side with the "physical, " "political," and "moral" or "social "; but the truth is that he does not seriously take account of them, except in so far as religious hopes and fears are motives actually operating, which therefore admit of being observed and measured as much as any other motives. He does not himself use the will of an omnipotent and benevolent being as a means of logically connecting individual and general happiness. He thus undoubtedly simplifies his system, and avoids the doubtful inferences from nature and Scripture in which Paley's position is involved; but this gain is dearly purchased. For in answer to the question that immediately arises, How then are

the sanctions of the moral rules which it will most conduce to the general happiness for men to observe, shown to be always adequate in the case of all the individuals whose observance is required? he is obliged to admit that "the only interests which a man is at all times sure to find adequate motives for consulting are his own." Indeed, in many parts of his work, in the department of legislative and constitutional theory, it is rather assumed that the interests of some men will continually conflict with those of their fellows, unless we alter the balance of prudential calculation by a readjustment of penalties. But on this assumption a system of private conduct on utilitarian principles cannot be constructed until legislative and constitutional reform has been perfected. And, in fact, "private ethics, " as conceived by Bentham, does not exactly expound such a system; but rather exhibits the coincidence, so far as it extends, between private and general happiness, in that part of each man's conduct that lies beyond the range of useful legislation. It was not his place, as a practical philan- thropist, to dwell on the defects in this coincidence; 2 and since what men generally expect from a moralist is a completely

1 This list gives twelve out of the fourteen classes in which Ben- tham arranges the springs of action, omitting the religious sanction (mentioned afterwards), and the pleasures and pains of self-interest, which include all the other classes except sympathy and antipathy.

2 In the Deontology published by Bowring from MSS. left after Bentham's death, the coincidence is asserted to be complete.

reasoned account of what they ought to do, it is not surprising that some of Bentham's disciples should have either ignored or endeavoured to supply the gap in his system. One section of the school even maintained it to be a cardinal doctrine of utilitarianism that a man always gains his own greatest happiness by promoting that of others; another section, represented by John Austin, apparently returned to Paley's position, and treated utilitarian morality 3 as a code of divine legislation; others, with Grote, are content to abate the severity of the claims made by "general happiness " on the individual, and to consider utilitarian duty as practically limited by reciprocity; while on the opposite side an unqualified subordination of private to general happiness was advocated by J. S. Mill, who did more than any other member of the school to spread and popularize utilitarianism in ethics and politics.

The fact is that, there are several different ways in which a utilitarian system of morality may be used, without deciding whether

the sanctions attached to it are always Varieties adequate, (i) It may be presented as practical of utiu- guidance to all who choose "general good " as their tariaa ultimate end, whether they do so on religious grounds, r " e "

or through the predominance in their minds of impartial sym- pathy, or because their conscience acts in harmony with utilitarian principles, or for any combination of these or any other reasons; or (2) it may be offered as a code to be obeyed not absolutely, but only so far as the coincidence of private and general interest may in any case be judged to extend; or again (3) it may be proposed as a standard by which men may reasonably agree to praise and blame the conduct of others, even though they may not always think fit to act on it. We may regard morality as a kind of supplementary legislation, supported by public opinion, which we may expect the public, when duly enlightened, to frame in accordance with the public interest. Still, even from this point of view, which is that of the legislator or social reformer rather than the moral philosopher, our code of duty must be greatly influenced by our estimate of the degrees in which men are normally influenced by self-regard (in its ordinary sense of regard for interests not sympathetic) and by sympathy or benevo- lence, and of the range within which sympathy may be expected to be generally effective. Thus, for example, the moral standard for which a utilitarian will reasonably endeavour to gain the support of public opinion must be essentially different in quality, according as he holds with Bentham that nothing but self-regard will "serve for diet," though "for a dessert benevolence is a very valuable addition " ; or with J. S.Mill that disinterested j s mn public spirit should be the prominent motive in the performance of all socially useful work, and that even hygienic precepts should be inculcated, not chiefly on grounds of prudence, but because " by squandering our health we disable ourselves from rendering services to our fellow-creatures."

Not less important is the interval that separates Bentham's polemical attitude towards the moral sense from Mill's con- ciliatory position, that " the mind is not in a state conformable to utility unless it loves virtue as a thing desirable in itself." Such love of virtue Mill holds to be in a sense natural, though not an ultimate and inexplicable fact of human nature; it is to be explained by the " Law of Association " of feelings and ideas, through which objects originally desired as a means to some further end come to be directly pleasant or desirable. Thus, the miser first sought money as a means to comfort, bur ends by sacrificing comfort to money; and similarly though the first promptings to justice (or any other virtue) spring from the non-moral

pleasures gained or pains avoided by it, through the link formed by repeated virtuous acts the performance of them ultimately comes to have that immediate satisfaction attached to it which we distinguished as moral. Indeed, the acquired tendency to virtuous conduct may become so strong that the habit of willing it may continue, " even when the reward which

8 It should be observed that Austin, after Bentham, more fre- quently uses the term " moral " to connote what he more distinctly calls " positive morality," the code of rules supported by common opinion in any society.

the virtuous man receives from the consciousness of well-doing is anything but an equivalent for the sufferings he undergoes or the wishes he may have to renounce." It is thus that the before-mentioned self-sacrifice of the moral hero is conceived by Mill to be possible and actual. The moral sentiments, on this view, are not phases of self-love as Hobbes held; nor can they be directly identified with sympathy, either in Hume's way or in Adam Smith's; in fact, though apparently simple they are really derived in a complex manner from self-love and sympathy combined with more primitive impulses. Justice (e.g.) is regarded by Mill as essentially resentment moralized by enlarged sympathy and intelligent self-interest; what we mean by injustice is harm done to an assignable individual by a breach of some rule for which we desire the violator to be punished, for the sake both of the person injured and of society at large, including ourselves. As regards moral sentiments generally, the view suggested by Mill is more definitely given by the chief living representative of the associationist school, Alexander Bain; by whom the distinctive characteristics of conscience are traced to " education under government or authority," though prudence, disinterested sympathy and other emotions combine to swell the mass of feeling vaguely denoted by the term moral. The combination of antecedents is some- what differently given by different writers; but all agree in representing the conscience of any individual as naturally correlated to the interests of the community of which he is a member, and thus a natural ally in enforcing utilitarian rules, or even a valuable guide when utilitarian calculations are difficult and uncertain.

This substitution of hypothetical history for direct analysis of the moral sense is really older than the utilitarianism of Paley and

Bentham, which it has so profoundly modified. Hon and The effects of association in modifying mental pheno- tvoiution. mena were noticed by Locke, and made a cardinal point in the metaphysic of Hume; who also referred to the principle slightly in his account of justice and other " artificial " virtues. Some years earlier, Gay, 1 admitting Hutcheson's proof of the actual disinterestedness of moral and benevolent impulses, had maintained that these (like the desires of knowledge or fame, the delight of reading, hunting and planting, &c.) were derived from self-love by " the power of association." But a thorough and systematic application of the principle to ethical psychology is first found in Hartley's Observations on Man (1748). Hartley, too, was the first to conceive association as producing, instead of mere cohesion of mental phenomena, a quasi-chemical combination of these into a compound apparently different from its elements. He shows elaborately how the pleasures and pains of " imagination, ambition, self-interest, sympathy, theopathy, and the moral sense " are developed out of the elementary pleasures and pains of sensation; by the coalescence into really complex but apparently single ideas of the " miniatures " or faint feelings which the repetition of sensations contemporaneously or in immediate succession tends to produce in cohering groups. His theory assumes the correspondence of mind and body, and is applied pari passu to the formation of ideas from sensations, and of " compound vibratiuncules in the medullary substance " from the original vibrations that arise in the organ of sense. 2 The same general view was afterwards developed with much vigour and clearness on the psychical side alone by James Mill in his Analysis of the Human Mind. The whole theory has been persistently controverted by writers of the intuitional school, who (unlike Hartley) have usually thought that this derivation

1 In the before-mentioned dissertation. Cf. note 2 to p. 835. Hartley refers to this treatise as having supplied the starting-point for his own system.

2 It should be noticed that Hartley's sensationalism is far from leading him to exalt the corporeal pleasures. On the contrary, he tries to prove elaborately that they (as well as the pleasures of imagination, ambition, self-interest) cannot be made an object of primary pursuit without a loss of happiness on the whole — one of his arguments being that these pleasures occur earlier in time, and " that which is prior in the order of nature is always less perfect than that which is posterior."

of moral sentiments from more primitive feelings would be

detrimental to the authority of the former. The chief argument against this theory has been based on the early period at which these sentiments are manifested by children, which hardly allows time for association to produce the effects ascribed to it. This argument has been met in recent times by the application to mind of the physiological theory of heredity, according to which changes produced in the mind (brain) of a parent, by association of ideas or otherwise, tend to be inherited by his offspring; so that the development of the moral sense or any other faculty or susceptibility of existing man may be hypo- thetically carried back into the prehistoric life of the human race, without any change in the manner of derivation supposed. At present, however, the theory of heredity is usually held in conjunction with Darwin's theory of natural selection; accord- ing to which different kinds of living things in the course of a series of generations come gradually to be endowed with organs, faculties and habits tending to the preservation of the individual or species under the conditions of life in which it is placed. Thus we have a new zoological factor in the history of the moral sentiments; which, though in no way opposed to the older psychological theory of their formation through coalescence of more primitive feelings, must yet be conceived as controlling and modifying the effects of the law of association by preventing the formation of sentiments other than those tending to the preservation of human life. The influence of the Darwinian theory, moreover, has extended from historical psychology to ethics, tending to substitute " preservation of the race under its conditions of existence " for " happiness " as the ultimate end and standard of virtue.

Before concluding this sketch of the development of English ethical thought from Hobbes to the thinkers of the 19th century, it will be well to notice briefly the views held by different moralists on the question of free-will,— so far, that is, as Free ' wUL they have been put forward as ethically important. We must first distinguish three meanings in which " freedom " is attributed to the will or " inner self " of a human being, viz. (1) the general power of choosing among different alternatives of action without a motive, or against the resultant force of conflicting motives;

(2) the power of choice between the promptings of reason and those of appetites (or other non-rational impulses) when the latter conflict with reason; (3) merely the quality of acting rationally in spite of conflicting impulses, however strong, the non posse peccare of the medieval theologians. 3 It is obvious that " free- dom " in this third sense is in no way incompatible with complete determination; and, indeed, is rather an ideal state after which the moral agent ought to

aspire than a property which the human will can be said to possess. In the first sense, again, as distinct from the second, the assertion of " freedom " has no ethical significance, except in so far as it introduces a general uncertainty into all our inferences respecting human conduct. Even in the second sense it hardly seems that the freedom of a man's will can be an element to be considered in examining what it is right or best for him to do (though of course the clearest convictions of duty will be fruitless if a man has not sufficient self-control to enable him to act on them) ; it is rather when we ask whether it is just to punish him for wrong-doing that it seems important to know whether he could have done otherwise. But in spite of the strong interest taken in the theological aspect of this question by the Protestant divines of the 17th century, it does not appear that English moralists from Hobbes to Hume laid any stress on the relation of free-will either to duty generally or to justice in particular. Neither the doctrine of Hobbes, that deliberation is a mere alternation of competing desires, voluntary action immediately following the " last appetite," nor the hardly less decided Determinism of Locke, who held that the will is always moved by the greatest present uneasiness, appeared to either author to require any reconciliation with the belief in human responsibility. Even in Clarke's system, where Indeterminism is no doubt a cardinal notion, its importance is metaphysical

8 It may be observed that in the view of Kant and others (2) and

(3) are somewhat confusingly blended.

rather than ethical; Clarke's view being that the apparently arbitrary particularity in the constitution of the cosmos is really only explicable by reference to creative free-will. In the ethical discussion of Shaftesbury and sentimental moralists generally this question drops naturally out of sight; and the cautious Butler tries to exclude its perplexities as far as possible from the philosophy of practice. But since the reaction, led by Price and Reid, against the manner of philosophizing that had culmin- ated in Hume, free-will has been generally maintained by the intuitional school to be an essential point of ethics; and, in fact, it is naturally connected with the judgment of good and ill desert which these writers give as an essential element in their analysis of the moral consciousness. An irresistible motive, it is forcibly said, palliates or takes away guilt; no

one can blame himself for yielding to necessity, and no one can properly be punished for what he could not have prevented. In answer to this argument some necessarians have admitted that punishment can be legitimate only if it be beneficial to the person punished; others, again, have held that the lawful use of force is to restrain lawless force; but most of those who reject free-will defend punishment on the ground of its utility in deterring others from crime, as well as in correcting or restraining the criminal on whom it falls.

In the preceding sketch we have traced the course of English ethical speculation without bringing it into relation with con- Prenci, temporary European thought on the same subject. influence And in fact almost all the systems described, from oa English Hobbes downward, have been of essentially native ethics. growth, showing hardly any traces of foreign influence. We may observe that ethics is the only department in which this result appears. The physics and psychology of Descartes were much studied in England, and his metaphysical system was certainly the most important antecedent of Locke's; but Descartes hardly touched ethics proper. So again the con- troversy that Clarke conducted with Spinoza, and afterwards with Leibnitz, was entirely confined to the metaphysical region. Catholic France was a school for Englishmen in many subjects, but not in morality; the great struggle between Jansenists and Jesuits had a very remote interest for them. It was not till near the close of the 18th century that the impress of the French revolutionary philosophy began to manifest itself in England; and even then its influence was mostly political rather than ethical. It is striking to observe how even in the case of writers such as Godwin, who were most powerfully affected by the French political movement, the moral basis, on which the new social order of rational and equal freedom is constructed, is almost entirely of native origin; even when the tone and spirit are French, the forms of thought and manner of reasoning are still purely English. In the derivation of Benthamism alone — which, it may be observed, first becomes widely known in the French paraphrase of Dumont — an important element is supplied by the works of a French writer, Helvetius; as Bentham himself was fully conscious. It was from Helvetius that he learnt that, men being universally and solely governed by self-love, the so-called moral judgments are really the common judgments of any society as to its common interests; that it is therefore futile on the one hand to propose any standard of virtue, except that of conduciveness to general happiness, and on the other hand useless merely to lecture men on duty and scold them for vice; that the moralist's proper function is rather to exhibit the

coincidence of virtue with private happiness; that, accordingly, though nature has bound men's interests together in many ways, and education by developing sympathy and the habit of mutual help may much extend the connexion, still the most effective moralist is the legislator, who by acting on self-love through legal sanctions may mould human conduct as he chooses. These few simple doctrines give the ground plan of Bentham's indefatigable and lifelong labours.

So again, in the modified Benthamism which the persuasive exposition of J. S. Mill afterwards made popular in England, the influence of Auguste Comte (Philosophic positive, 1829-1842, and Systlme de politique positive, 1851-1854) appears as the chief

Comte.

modifying element. This influence, so far as it has affected moral as distinct from political speculation, has been exercised primarily through the general conception of human progress; which, in Comte's view, consists in the ever- growing preponderance of the distinctively human attributes over the purely animal, social feelings being ranked highest among human attributes, and highest of all the most universalized phase of human affection, the devotion to humanity as a whole. Accordingly, it is the development of benevolence in man, and of the habit of " living for others," which Comte takes as the ultimate aim and standard of practice, rather than the mere increase of happiness. He holds, indeed, that the two are in- separable, and that the more altruistic any man's sentiments and habits of action can be made, the greater will be the happiness enjoyed by himself as well as by others. But he does not seriously trouble himself to argue with egoism, or to weigh carefully the amount of happiness that might be generally attained by the satisfaction of egoistic propensities duly regulated; a supreme unquestioning self-devotion, in which all personal calculations are suppressed, is an essential feature of his moral ideal. Such a view is almost diametrically opposed to Bentham's conception of normal human existence; the newer utilitarianism of Mill represents an endeavour to find the right middle path between the two extremes.

It is to be observed that, in Comte's view, devotion to humanity is the principle not merely of morality, but of religion; i.e. it should not merely be practically predominant, but should be manifested and sustained by regular and partly symbolical forms of expression, private and public. This side of Comte's system, however, and the details of his ideal reconstruction of society, in which this religion plays an important part, have had but little influence either in

England or elsewhere. It is more important to notice the general effect of his philosophy on the method of determining the particulars of morality as well as of law (as it ought to be). In the utilitarianism of Paley and Bentham the proper rules of conduct, moral and legal, are determined by comparing the imaginary consequences of different, modes of regulation on men and women, conceived as specimens of a substantially uniform and unchanging type. It is true that Bentham expressly recognizes the varying influences of climate, race, religion, government, as considerations which it is important for the legislator to take into account; but his own work of social construction was almost entirely independent of such considerations, and his school generally appear to have been convinced of their competence to solve all important ethical and political questions for human beings of all ages and countries, without regard to their specific differences. But in the Comtian conception of social science, of which ethics and politics are the practical application, the knowledge of the laws of the evolution of society is of fundamental and continually increasing import- ance ; humanity is regarded as having passed through a series of stages, in each of which a somewhat different set of laws and institutions, customs and habits, is normal and appropriate. Thus present man is a being that can only be understood through a knowledge of his past history; and any effort to construct for him a moral and political ideal, by a purely abstract and un- historical method, must necessarily be futile; whatever modifi- cations may at any time be desirable in positive law and morality can only be determined by the aid of " social dynamics." This view extends far beyond the limits of Comte's special school or sect, and has been widely accepted.

When we turn from French philosophy to German, we find the influence of the latter on English ethical thought almost insignificant until a very recent period. In the 17 th oerman century, indeed, the treatise of Pufendorf on the Law of influence Nature, in which the general view of Grotius was re- on English stated with modifications, partly designed to effect a etblcs ' compromise with the doctrine of Hobbes, seems to have been a good deal read at Oxford and elsewhere. Locke includes it among the books necessary to the complete education of a gentle- man. But the subsequent development of the theory of conduct in Germany dropped almost entirely out of the cognizance of

Kant.

Englishmen; even the long dominant system of Wolff (d. 1754) was hardly known. Nor had Kant any serious influence in England until the second quarter of the 19th century. We find, however, distinct traces of Kantian influence in Whewell and other writers of the intuitional school, and at a later date it became so strong that its importance on subsequent ethical thought can scarcely be over-estimated.

The English moralist with whom Kant has most affinity is Price; in fact, Kantism, in the ethical thought of modern Europe, holds a place somewhat analogous to that formerly occupied by the teaching of Price and Reid among English moralists. Kant, like Price and Reid, holds that man as a rational being is unconditionally bound to conform to a certain rule of right, or " categorical imperative " of reason. Like Price he holds that an action is not good unless done from a good motive, and that this motive must be essentially different from natural inclination of any kind; duty, to be duty, must be done for duty's sake; and he argues, with more subtlety than Price or Reid, that though a virtuous act is no doubt pleasant to the virtuous agent, and any violation of duty painful, this moral pleasure (or pain) cannot strictly be the motive to the act, because it follows instead of preceding the recognition of our obligation to do it. 1 With Price, again, he holds that Tightness of intention and motive is not only an indispensable condition or element of the Tightness of an action, but actually the sole determinant of its moral worth; but with more philosophical consistency he draws the inference — of which the English moralist does not seem to have dreamt — that there can be no separate rational principles for determining the " material " Tightness of conduct, as distinct from its "formal" Tightness; and therefore that all rules of duty, so far as universally binding, must admit of being exhibited as applications of the one general principle that duty ought to be done for duty's sake. This Cate . deduction is the most original part of Kant's doctrine.*

gorical The dictates of reason, he points out, must necessarily impera- be addressed to all rational beings as such ; hence, my tiye ' intention cannot be right unless I am prepared to will

the principle on which I act to be a universal law. He considers that this fundamental rule or imperative " act on a maxim which thou canst will to be law universal " supplies a sufficient criterion for determining particular duties in all cases. The rule excludes wrong conduct with two degrees of stringency. Some offences, such as making promises with the intention of breaking them, we cannot even conceive universalized; as soon as every one broke promises no one would care to have promises made to him. Other maxims, such as that of leaving persons in distress to shift for themselves, we can easily conceive to be universal laws, but we cannot without contradiction will them to be such; for when we are ourselves in distress we cannot help desiring that others should help us.

Another important peculiarity of Kant's doctrine is his development of the connexion between duty and free-will. He holds that it is through our moral consciousness that we know that we are free; in the cognition that I ought to do what is right because it is right and not because I like it, it is implied that this purely rational volition is possible; that my action can be determined, not " mechanically," through the necessary operation of the natural stimuli of pleasurable and painful feelings, but in accordance with the laws of my true, reasonable self. The realization of reason, or of human wills so far as rational, thus presents itself as the absolute end of duty;

1 Singularly enough, the English writer who approaches most nearly to Kant on this point is the utilitarian Godwin, in his Political Justice. In Godwin's view, reason is the proper motive to acts conducive to general happiness : reason shows me that the happiness of a number of other men is of more value than my own ; and the perception of this truth affords me at least some inducement to prefer the former to the latter. And supposing it to be replied that the motive is really the moral uneasiness involved in choosing the selfish alternative, Godwin answers that this uneasiness, though a " constant step " in the process of volition, is a merely " accidental " step — " I feel pain in the neglect of an act of benevolence, because benevolence is judged by me to be conduct which it becomes me to adopt. "

and we get, as a new form of the fundamental practical rule, " act so as to treat humanity, in thyself or any other, as an end always, and never as a means only." We may observe, too, that the notion of freedom connects ethics with jurisprudence in a simple and striking manner. The fundamental aim of jurisprudence is to realize external freedom by removing the hindrances imposed on each one's free

action through the interferences of other wills. Ethics shows how to realize internal freedom by resolutely pursuing rational ends in opposition to those of natural inclination. If we ask what precisely are the ends of reason, Kant's proposition that " all rational beings as such'are ends in themselves for every rational being" hardly gives a clear answer. It might be interpreted to mean that the result to be practically sought is simply the development of the rationality of all rational beings — such as men — whom we find to be as yet imperfectly rational. But this is not Kant's view. He holds, indeed, that each man should aim at making himself the most perfect possible instrument of reason; but he expressly denies that the perfection of others can be similarly prescribed as an end to each. It is, he says, " a contradiction to regard myself as in duty bound to promote the perfection of another, … a contradiction to make it a duty for me to do something for another which no other but himself can do." In what practical sense, then, am I to make other rational beings my ends? Kant's answer is that what each is to aim at in the case of others is not Perfection, but Happiness, i.e. to help them to attain those purely subjective ends that are determined for each not by reason, but by natural inclination. He explains also that to seek one's own happiness cannot be prescribed as a duty, because it is an end to which every man is inevitably impelled by natural inclination: but that just because each inevitably desires his own happiness, and therefore desires that others should assist him in time of need, he is bound to make the happiness of others his ethical end, since he cannot morally demand aid from others, without accepting the obligation of aiding them in like case. The exclusion of private happiness from the ends at which it is a duty to aim contrasts strikingly with the view of Butler and Reid, that man, as a rational being, is under a " manifest obligation " to seek his own interest. The difference, however, is not really so great as it seems; since in another part of his system Kant fully recognizes the reasonable ness of the individual's regard for his own happiness. Though duty, in his view, excludes regard for private happiness, the summum bonum is not duty alone, but happiness combined with moral worth; the demand for happiness as the reward of duty is so essentially reasonable that we must postulate a universal connexion between the two as the order of the universe; indeed, the practical necessity of this postulate is the only adequate rational ground that we have for believing in the existence of God.

Before the ethics of Kant had begun to be seriously studied in England, the rapid and remarkable development of meta- physical view and method of which the three chief stages are represented by

Fichte, Schelling and Hegel respectively had already taken place; and the system of the latter was occupying the most prominent position in the philo- sophical thought of Germany. 2 Hegel's ethical doctrine (ex- pounded chiefly in his Philosophic des Rechts, 1821) shows a close affinity, and also a striking contrast, to Kant's. He holds,

2 In Kantism, as we have partly seen, the most important onto- logical beliefs — in God, freedom and immortality of the soul — are based on necessities of ethical thought. In Fichte's system the con- nexion of ethics and metaphysics is still more intimate; indeed, we may compare it in this respect to Platonism; as Plato blends the most fundamental notions of each of these studies in the one idea ot good, so Fichte blends them in the one idea free-will. " Freedom," in his view, is at once the foundation of all being and the end of all moral action. In the systems of Schelling and Hegel ethics falls again into a subordinate place; indeed, the ethical view of the former is rather suggested than completely developed. Neither Fichte nor Schelling has exercised more 'than the faintest and most indirect influence on ethical philosophy in England ; it therefore seems best to leave the ethical doctrines of each to be explained in connexion with the rest of his system.

Hegel.

with Kant, that duty or good conduct consists in the conscious realization of the free reasonable will, which is essentially the same in all rational beings. But in Kant's view the universal content of this will is only given in the formal condition of "only acting as one can desire all to act," to be subjectively applied by each rational agent to his own volition; whereas Hegel conceives the universal will as objectively presented to each man in the laws, institutions and customary morality of the com- munity of which he is a member. Thus, in his view, not merely natural inclinations towards pleasures, or the desires for selfish happiness, require to be morally resisted; but even the prompting of the individual's conscience, the impulse to do what seems to him right, if it comes into conflict with the common sense of his community. It is true that Hegel regards the conscious effort to realize one's own conception of good as a higher stage of moral development than the mere conformity to the jural rules establishing property, maintaining contract and allotting punishment to crime, in which the universal will is first expressed; since in such

conformity this will is only accomplished acci- dentally by the outward concurrence of individual wills, and is not essentially realized in any of them. He holds, however, that this conscientious effort is self-deceived and futile, is even the very root of moral evil, except it attains its realization in harmony with the objective social relations in which the individual finds himself placed. Of these relations the first grade is conˆ stituted by the family, the second by civil society, and the third by the state, the organization of which is the highest manifestation of universal reason in the sphere of practice.

Hegelianism appears as a distinct element in modern English ethical thought; but the direct influence of Hegel's system is perhaps less important than that indirectly exercised through the powerful stimulus which it has given to the study of the historical development of human thought and human society. According to Hegel, the essence of the universe is a process of thought from the abstract to the concrete; and a right under- standing of this process gives the key for interpreting the evolution in time of European philosophy. So again, in his view, the history of mankind is a history of the necessary development of the free spirit through the different forms of political organiza- tion: the first being that of the Oriental monarchy, in which freedom belongs to the monarch only; the second, that of the Graeco-Roman republics, in which a select body of free citizens is sustained on a basis of slavery; while finally in the modern societies, sprung from the Teutonic invasion of the decaying Roman empire, freedom is recognized as the natural right of all members of the community. The effect of the lectures (posthumously edited) in which Hegel's " Philosophy of History " and " History of Philosophy " were expounded, has extended far beyond the limits of his special school; indeed, the predomin- ance of the historical method in all departments of the theory of practice is not a little due to their influence. (H. S.; X.)

D. Ethics since i8yg. — Ethical controversies, like most other speculative disputes, have, during the latter part of the 19th and the beginning of the 20th century, centred round Darwinian theories. The chief characteristic of English moral philosophy in its previous history has been its comparative isolation from great movements, sometimes contemporary movements, of philosophical or scientific thought. Ethics in England no less than on the continent of Europe suffered until the time of Bacon from the excessive domination of theological dogma and the traditional scholastic and Aristotelian philosophy. But the moral philosophy of the 18th century, freed from scholastic trammels, was a genuine native product, arising out of the

real problem of conduct and reaching its conclusions, at least ostensibly, by an analysis of, and an appeal to, the facts of conduct and the nature of morality. Even at the beginning of the 19th century, when the main interest of writers who belonged to the Utilitarian school was mainly political, the influence of political theories upon contemporary moral philosophy was upon the whole an influence of which the moral philosophers themselves were unconscious; and from the nature of things moral and political philosophy have a tendency to become one

and the same inquiry. Mill, it is true, and Comte both encouraged the idea that society and conduct alike were susceptible of strictly scientific investigation. But the attempt not only to treat ethics scientifically, but actually to subordinate the principles of conduct to the principles of existing biological science or group of sciences biological in character, was reserved for post- Darwinian moral philosophers. That attempt has not, in the opinion of the majority of critics, been successful, and perhaps what is most permanent in the contribution of modern times to ethical theory will ultimately be attributed to philosophers antagonistic to evolutionary ethics. Nevertheless the application of the historical method to inquiries concerning the facts of morality and the moral life — itself part of the great movement of thought to which Darwin gave the chief impetus — has caused moral problems to be presented in a novel aspect; while the influence of Darwinism upon studies which have considerable bearing upon ethics, e.g. anthropology or the study of comparative religion, has been incalculable.

The other great movement in modern moral philosophy due to the influence of German, and especially Hegelian, idealism followed naturally for the most part from the revival of interest in metaphysics noticeable in the latter half of the 19th century.

But metaphysical systems of ethics are no novelty even in England, and, while the increased interest in ultimate issues of philosophy has enormously deepened and widened men's appreciation of moral problems and the issues involved in conˆ duct, the actual advance in ethical theory produced by such speculations has been comparatively slight. What is of lasting importance is the re-affirmation upon metaphysical grounds of the right of the moral consciousness to state and solve its own difficulties, and the successful repulsion of the claims of particular sciences such as biology to include the sphere of conduct within their scope and methods. And both evolutionary and idealistic ethics agree in repudiating the standpoint of narrowindividualism, alike insist upon the necessity of regarding the

self as social in character, and regard the end of moral progress as only realizable in a perfect society.

It is perhaps too much to hope that the long-continued contro- versy between hedonists and anti-hedonists has been finally settled. But certainly few modern moral philosophers would be found in the present day ready to defend the crudities of hedon- istic psychology as they appear in Bentham and Mill. A certain common agreement has been reached concerning the impossibility of regarding pleasure as the sole motive criterion and end of moral action, though different opinions still prevail as to the place occupied by pleasure in the summum bonum, and the possibility of a hedonistic calculus.

The failure of " laissez-faire " individualism in politics to produce that common prosperity and happiness which its advocates hoped for caused men to question the egoistic basis upon which its ethical counterpart was constructed. Similarly the comparative failure of science to satisfy men's aspirations alike in knowledge and, so far as the happiness of the masses is concerned, in practice has been largely instrumental in pro- ducing that revolt against material prosperity as the end of conduct which is characteristic of idealist moral philosophy. To this revolt, and to the general tendency to find the principle of morality in an ideal good present to the consciousness of all persons capable of acting morally, the widespread recognition of reason as the ultimate court of appeal alike in religion or politics, and latterly in economics also, has no doubt contributed largely. In the main the appeal to reason has followed the traditional course of such movements in ethics, and has re- affirmed in the light of fuller reflection the moral principles implicit in the ordinary moral consciousness. It is only in the present day that there are noticeable signs of dissatisfaction with current morality itself, and a tendency to substitute or advocate a new morality based ostensibly upon conclusions derived from the facts of scientific observation.

Darwin himself seems never to have questioned, in the sceptical direction in which his followers have applied his principles, the absolute character of moral obligation. What interested

him chiefly, in so far as he made a study of morality, was the development of moral conduct in its preliminary stages. Dsrwin He was principally concerned to show that in morality, as in other

departments of human life, it was not necessary to postulate a complete and abrupt gap between human and merely animal existence, but that the instincts and habits which contribute to survival in the struggle for existence ‘ among animals develop into moral qualities which have a similar value for the preservation of human and social life. Regarding the social tendency as originally itself an instinct developed out of parental or filial affection, he seems to suggest that natural selection, which was the chief cause of its develop- ment in the earlier stages, may very probably influence the transition from purely tribal and social morality into morality in its later and more complex forms. But he admits that natural selection is not necessarily the only cause, and he refrains from identifying the fully developed morality of civilized nations with the ” social instinct.” Moreover, he recognizes that qualities, e.g. loyalty and sympathy, which may have been of great service to the tribe in its primitive struggle for existence, may become a positive hindrance to physical efficiency (leading as they do to the preservation of the unfit) at a later stage. Nevertheless to check our sympathy would lead to the “deteriora- tion of the noblest part of our nature,” and the question, which is obviously of vital importance, whether we should obey the dictates of reason, which would urge us only to such conduct as is conducive to natural selection, or remain faithful to the noblest part of our nature at the expense of reason, he leaves unsolved.

It was in Herbert Spencer, the triumphant ” buccinator novi temporis,” that the advocates of evolutionary ethics found Spencer. tneir protagonist. Spencer looked to ideas derived from the biological sciences to provide a solution of all the enigmas of morality, as of most other departments of life; and he conceived it “to be the business of moral science to deduce from the laws of life and the conditions of existence what kinds of action necessarily tend to produce happiness and what kinds to produce unhappiness.” It is clear, therefore, that any moral science which is to be of value must wait until the “laws of life” and “conditions of existence” have been satisfactorily determined, presumably by biology and the allied sciences; and there are few more melancholy instances of failure in philosophy than the paucity of the actual results attained by Spencer in his lifetime in his application of the so- called laws of evolution to human conduct — a failure recognized by Spencer himself. His own contribution to ethics was vitiated at the outset by the fact that he never shook himself free from the trammels of the philosophy which his own system was intended to supersede. He began by disclaiming any affinity to Utilitarianism on the part of his own philosophy. He

pointed out that the principle of the greatest happiness of the greatest number is a principle without any definite meaning, since men are nowhere unanimous in their standard of happiness, but regard the conception of happiness rather as a problem to be solved than a test to be applied. Universal happiness would require omniscience to legislate for it and the " normal " or, as some would say, " perfect " man to desire it; neither of these conditions of its realization is at present in existence. Further, the principle that " everybody is to count for one, nobody for more than one," is equally unsatisfactory. It may be taken to imply that the useless and the criminal should be entitled to as much happiness as the useful and the virtuous. While it gives no rule for private as distinct from public conduct, it provides no real guidance for the legislator. For neither happi- ness, nor the concrete means to happiness, nor finally the condi- tions of its realization can be distributed; and in the end " not general happiness becomes the ethical standard by which legislative action is to be guided, but universal justice." Yet the implications of this latter conclusion Spencer never fully thought out. He accepted bodily without farther questioning the hedonistic psychology by which the Utilitarians sought to justify their theory while he rejected the theory itself. Good,

e.g. defined by him " as conduct conducive to life," is also further defined as that which is " conducive to a surplus of pleasures over pains." Happiness, again, is always regarded as consisting in feeling, ultimately in pleasant feeling, and there is no attempt to apply the same principles of criticism which he had successfully applied to the Utilitarians' " happiness " to the conception of " pleasure." And, though he maintains as against the Utili- tarians the existence of certain fundamental moral intuitions which have come to be quite independent of any present conscious experience of their utility, he yet holds that they are the results of accumulated racial experiences gradually organized and inherited. Finally, side by side with a theory of the nature of moral obligation thus fundamentally empirical and a posteriori in its outlook, he maintains in his account of justice the existence of the idea of justice as distinct from a mere sentiment, carrying with it an a priori belief in its existence and identical in its a priori and intuitive character with the ultimate criterion of Utilitarianism itself. The fact is that any close philosophical analysis of Spencer's system of ethics can only result in the discovery of a multitude of mutually conflicting and for the most part logically untenable theories. It is frequently impossible to discover whether he wishes by an appeal to evolutionary prin- ciples to reinforce the sanctions and emphasize the absolute character of the traditional

morality which in the main he accepts without question from the current opinions about con- duct of his age, or whether he wishes to discredit and disprove the validity of that morality in order to substitute by the aid of the biological sciences a new ethical code. The argument, for instance, that intuitive and a priori beliefs gain their absolute character from the fact that they are the result of continued transmission and accumulation of past nervous modifications in the history of the race would, if taken seriously, lead us to the belief that ultimate ethical sanctions are to be sought, not by an appeal to the moral consciousness, but by the investigation of brain tissue and the relation of man's bodily organism to its environment. Yet such a view would be totally at variance with much that Spencer says (especially in his treatment of justice) concerning the trustworthiness and inevitable character of men's constant appeal to the intuitions of their moral conscious- ness. Moreover, the very fact itself of the possibility of inheriting acquired moral characteristics is still hotly debated by those biologists with whom should rest the ultimate verdict. Again, the argument that " conduct is good or bad according as its total effects are pleasurable or painful," and that ultimately " pleasure-giving acts are life-sustaining acts," seems to involve Spencer in a multitude of unverified assumptions and con- tradictory theories. In the first place it is never clear whether Spencer regards the fact that a particular course of conduct is accompanied by a feeling of pleasure as a test of its life-preserving and life-sustaining character, or whether he wishes us to use as our criterion of what is pleasant in conduct the fact that the conduct in question seems conducive to the continued existence of man's organic life. He apparently passes from one criterion to the other as best suits the purpose of the moment. He does not prove the coincidence of life-sustaining and pleasant activities. He assumes throughout that the pleasant is the opposite of what is painful, and seems unaware of the difficulty of determining by means of terms so highly abstract the specific character of moral action. We find in his theory no satisfactory attempt to discriminate between the pleasure aimed at by the altruist and the immediate pleasure of egoistic action. Similarly he disregards the distinction between pleasant feeling as an im- mediate motive of conduct and the idea of the attainment of future pleasure whether by the race or by the individual. Spencer is involved in effect in most of the confusions and contradictions of hedonistic psychology.

Nor is his attempt to construct a scientific criterion out of data derived from the biological sciences productive of satisfactory results. He is hampered by a distinction between " absolute " and "

relative " ethics definitely formulated in the last two chapters of The Data of Ethics. Absolute ethics would deal with such laws as would regulate the conduct of ideal man in an ideal

society, i.e. a society where conduct has reached the stage of complete adjustment to the needs of social life. Relative ethics, on the other hand, is concerned only with such conduct as is advantageous for that society which has not yet reached the end of complete adaptation to its environment, i.e. which is at present imperfect. It is hardly necessary to say that Spencer does not tell us how to bring the two ethical systems into corre- lation. And the actual criteria of conduct derived from biological considerations are almost ludicrously inadequate. Conduct, e.g., is said to be more moral in proportion as it exhibits a tendency on the part of the individual or society to become more " definite," " coherent " and " heterogeneous." Or, again, we should recognize as a test of the " authoritative " character of moral ideas or feelings the fact that they are complex and re- presentative, referring to a remote rather than to a proximate good, remembering the while that " the sense of duty is transi- tory, and will diminish as fast as moralization increases." In fact, no acceptable scientific criterion emerges, and the outcome of Spencer's attempt to ascertain the laws of life and the con- ditions of existence is either a restatement of the dictates of the moral consciousness in vague and cumbrous quasi-scientific phraseology, or the substitution of the meaningless test of " survivability " as a standard of perfection for the usual and intelligible standards of " good " and " right."

A similar criticism might fairly be passed upon the majority of philosophers who approach ethics from the standpoint of

evolution. Sir Leslie Stephen, for instance, wishes to Stephen substitute the conception of " social health " for that

of universal happiness, and considers that the con- ditions of social health are to be discovered by an examination of the " social organism " or of " social tissue," the laws of which can be studied apart from those laws by which the individuals composing society regulate their conduct. " The social evolution means the evolution of a strong social tissue; the best type is the type implied by the strongest tissue." But on the important question as to what

constitutes the strongest social tissue, or to what extent the analogy between society as at present con- stituted and organic life is really applicable, we are left without certain guidance. The fact is that with few exceptions evolution- ary moral philosophers evade the choice between alternatives which is always presented to them. They begin, for the most part, with a belief that in ethics as in other departments of human knowledge " the more developed must be interpreted by the less developed " — though frequently in the sequel complexity or posteriority of development is erected as a standard by means of which to judge the process of development itself. They are not content to write a history of moral development, applying to it the principles by which Darwinians seek to explain the develop- ment of animal life. But the search of origins frequently leads them into theories of the nature of that moral conduct whose origin they are anxious to find quite at variance with current and accepted beliefs concerning its nature. The discovery of the so-called evolution of morality out of non-moral conditions is very frequently an unconscious subterfuge by which the evolu- tionist hides the fact that he is making a priori judgments upon the value of the moral concepts held to be evolved. To accept such theories of the origin of morality would carry with it the conviction that what we took for " moral " conduct was in reality something very different, and has been so throughout its history. The legitimate inference which should follow would be the denial of the validity of those moral laws which have hitherto been regarded as absolute in character, and the substitution for all customary moral terms of an entirely new set based upon biological considerations. But it is precisely this, the only logical inference, which most evolutionary philosophers are unwilling to draw. They cannot give up their belief in customary morality. Professor Huxley maintained, for example, in a famous lecture that " the ethical progress of society depends not on imitating the cosmic process, still less in running away from it, but in combating it " (Romanes Lecture, ad fin.). And very frequently arguments are adduced by evolutionists to prove that men's belief in the absolute character of moral precepts is one of the

necessary means adopted by nature to carry out her designs for the social welfare of mankind. Yet the other alternative, to which such reasoning points, they are reluctant to accept. For the belief that moral obligation is absolute in character, that it is alike impossible to explain its origin and transcend its laws, would make the search for a scientific criterion of conduct to be deduced from the laws of life and conditions of existence meaningless, if not absurd.

Perhaps the one European thinker who has carried evolution- ary

principles in ethics to their logical conclusion is Friedrich Nietzsche. Almost any system of morality or im- morality might find some justification in Nietzsche's writings, which are extraordinarily chaotic and full of the wildest exaggerations. Yet it has been a true instinct which has led popular opinion as testified to by current literature to find in Nietzsche the most orthodox exponent of Darwinian ideas in their application to ethics. For he saw clearly that to be suc- cessful evolutionary ethics must involve the " transvaluation of all values," the " demoralization " of all ordinary current morality. He accepted frankly the glorification of brute strength. superior cunning and all the qualities necessary for success in the struggle for existence, to which the ethics of evolution necessarily tend. He proclaimed himself, before everything else, a physio- logist, and looked to physiology to provide the ultimate standard for everything that has value; and though his own ethical code necessarily involves the disappearance of sympathy, love, toleration and all existing altruistic emotions, he yet in a sense finds room for them in such altruistic self-sacrifice as prepares the way for the higher man of the future. Thus, after a fashion, he is able to reconcile the conflicting claims of egoism and altruism and succeed where most apostles of evolution fail. The Christian virtues, sympathy for the weak, the suffering, &c, represent a necessary stage to be passed through in the evolution of the Ubermensch, i.e. the stage when the Weak and suffering combine in revolt against the strong. They are to be superseded, not so much because all social virtues are to be scorned and re- jected, as because in their effects, i.e. in their tendency to per- petuate and prolong the existence of the weak and those who are least well equipped and endowed by nature, they are anti-social in character and inimical to the survival of the strongest and most vigorous type of humanity. Consequently Nietzsche in effect maintains the following paradoxical position: he explains the existence of altruism upon egoistical principles ; he advocates the total abolition of all altruism by carrying these same egoistical principles to their logical conclusion; he nevertheless appeals to that moral instinct which makes men ready to sacrifice their own narrow personal interests to the higher good of society — an instinct profoundly altruistic in character — as the ultimate justification of the ethics he enunciates. Such a position is a reductio ad absurdum of the attempt to transcend the ultimate character of those intuitions and feelings which prompt men to benevolence. Thus, though incidentally there is much to be learned from Nietzsche, especially from his criticism of the ethics of pessimism, or from the strictures he passes upon the negative morality of extreme asceticism or quietism, his system inevitably provides its own refutation. For no

philosophy which travesties the real course of history and distorts the moral facts is likely to commend itself to the sober judgment of mankind however brilliant be its exposition or ingenious its arguments. Finally, the conceptions of strength, power and masterfulness by which Nietzsche attempts to determine his own moral ideal, become, when examined, as relative and unsatisfactory as other criteria of moral action said to be deduced from evolutionary principles. Men desire strength or power not as ends but as means to ends beyond them; Nietzsche is most convincing when the Uber mensch is left undefined. Imagined as ideal man, i.e. as morality depicts him, he becomes intelligible; imagined as Nietzsche describes him he reels back into the beast, and that distinction which chiefly separates man from the animal world out of which he has emerged, viz. his unique power of self-consciousness and self-criticism, is obliterated.

It was upon this crucial difficulty, i.e. the transition in the

evolution of morality from the stage of purely animal and unconscious action to specifically human action, — i.e. action th (ire directed by self-conscious and purposive intelligence 'to an end conceived as good, — that the polemic of T. H. Green and his idealistic followers fastened. And it is perhaps unfortunate that metaphysical doctrines enunciated chiefly for the purposes of criticism not in themselves vitally necessary to the theory of morality propounded should have been regarded as the main contribution to ethical theory of idealist writers, and as such treated severely by hostile critics. Green's principal objection to evolutionary moral philosophy is contained in the argument that no merely " natural " explanation of the facts of morality is conceivable. The knowing consciousness, — i.e. so far as conduct is concerned the moral consciousness, — can never become an object of knowledge in the sense in which natural phenomena are objects of scientific knowledge. For such knowledge implies the existence of a knowing consciousness as a relating and uniting intelligence capable of distinguishing itself from the objects to which it relates. And more particularly the existence of the moral consciousness implies " the transition from mere want to consciousness of wanted object, from impulse to satisfy the want to effort for the realization of the wanted objects, implies the presence of the want to a subject which distinguishes itself from it." Consequently the facts of moral

development imply with the emergence of human consciousness the appearance of something qualitatively different from the facts with which physiology for instance deals, imply a stratum as it were in development which no examination of animal tissues, no calculation of consequences with regard to the pre- servation of the species can ever satisfactorily explain. However far back we go in the history of humanity, if the presence of consciousness be admitted at all, it will be necessary to admit also the presence to consciousness of an ideal which can be accepted or rejected, of a power of looking before and after, and aiming at a future which is not yet fully realized. But unfortunately the temporary exigencies of criticism made it necessary for Green to emphasize the metaphysic of the self, i.e. to insist upon the necessity of a critical examination of the pre-requisites of any form of self-consciousness and especially of the knowing consciousness, to such an extent that critics have lost sight of the real dependence of his metaphysic upon the direct evidence of the moral consciousness. The philosophic value, the sincerity, the breadth and depth of his treatment of moral facts and institutions have been fully recognized. What has not been adequately realized is that the metaphysical basis of his system of ethics— the argument, for example, contained in the introduction to the Prolegomena — is unfairly treated if divorced from his treatment of morals as a whole, and that it can be justly estimated only if interpreted as much as the con- clusion as the starting-point of moral theory. The doctrine of the eternity of the self, for instance, against which much criticism (e.g. Taylor, The Problem of Conduct, chap, ii.) has been directed, though it is chiefly expressed in the language of epistemology, has its roots nevertheless in the direct testimony of moral experience. For morality implies a power in the individual of rising above the interests of his own narrower self and identifying himself in the pursuit of a universal good with the true interests of all other selves. Similarly the conception of the self as a moral unity arises'naturally out of the impossibility of finding the summum bonum in a succession of transient states of consciousness such as hedonism for example postulates. Good as a true universal can only be realized by a true self, and both imply a principle of unity not wholly expressible in terms of the particulars which it unifies. But whether the idealistic inter- pretation of the nature of universal good be the true one, i.e. whether we are justified in identifying that self-consciousness which is capable of grasping the principle of unity with the principle of unity which it grasps is a metaphysical and theistic problem comparatively irrelevant to Green's moral theory. It would be quite possible to accept his criticisms of naturalism and hedonism while rejecting many of the metaphysical inferences which he draws. A

somewhat similar answer might be returned

to those critics who find Green's use of the term " self-realization " or " self-development " as characteristic of the moral ideal un-satisfactory. It is quite easy to exhibit the futility of such a conception if understood formally for the practical purposes of moral philosophy. If the phrase be understood to mean the realization of some capacities of the self it does not appear to discriminate sufficiently between the good and bad capacities; while the realization under present conditions of all the capacities of a self is impossible. And to aim so far as is possible at all- round development would again ignore the distinction between vice and virtue. But used in the sense in which Green habitually uses it self-realization implies, as he puts it, the fulfilment by the good man of his rational capacity or the idea of a best that is in time, i.e. the distinction between the good and the bad self is never ignored, but is the fundamental assumption of his theory. And if it be urged that the expression is in any case tautological, i.e. that the good is defined in terms of self-realization and self- realization in terms of the good, it may be doubted whether any rational system of ethics can avoid a similar imputation. Green would admit that in a certain sense the conception of " good " is indefinable, i.e. that it can only be recognized in the particulars of conduct of which it is the universal form. Only, therefore, to those philosophers who believe in the existence of a criterion of morality, i.e. a universal test such as that of pleasure, happiness and the like, by which we can judge of the worth of actions, will Green's position seem absurd; since, on the contrary, such concep- tions as those of " self-development " or " self-realization " seem to have a definite and positive value if they call attention to the metaphysical implications of morality and accurately characterize the moral facts. What ambiguity they possess arises from the ambiguity of morality itself. For moral progress consists in the actualization of what is already potentially in existence. The striking merit of Green's moral philosophy is that the idealism which he advocates is rooted and grounded in moral habits and institutions: and the metaphysic in which it culminates is based upon principles already implicitly recognized by the moral consciousness of the ordinary man. Nothing could be farther from Green's teaching than the belief that constructive meta- physics could, unaided by the intuitions of the moral conscious- ness, discover laws for the regulation of conduct.

But although Green's loyalty to the primary facts of the moral consciousness prevented him from constructing a rationalistic system of morals based solely upon the conclusions of metaphysics, it was

perhaps inevitable that the revival of interest in meta- physics so prominent in his own speculations should lead to a more daring criticism of ethical first principles in other writers. Bradley's Ethical Studies had presented with great brilliancy an idealist theory of morality not very far removed from that of Green's Prolegomena. But the publication of Appearance and Reality by the same author marked a great advance in philosophical criticism of ethical postulates, and a growing dissatisfaction with current reconciliations between moral first principles and the conclusions of metaphysics. Appearance and Reality was not primarily concerned with morals, yet it inevitably led to certain conclusions affecting conduct, and it was no very long time before these conclusions were elaborated in detail. Professor A. E. Taylor's Problem of Conduct (1901) is one of the most noteworthy and independent contributions to Moral Philosophy published in recent years. But it nevertheless follows in the main Bradley's line of criticism and may therefore be regarded as representative of his school. There are two principal positions in Professor Taylor's work: — (1) a refusal to base ethics upon metaphysics, and (2) the discovery of an irreconcilable dualism in the nature of morality which takes many shapes, but may be summarized roughly as consisting in an ultimate opposition between egoism and altruism. With regard to the first of these Taylor says (op. cit. p. 4) that his object is to show that " ethics is as indepen- dent of metaphysical speculation for its principles and methods as any of the so-called ' natural sciences ' ; that its real basis must be sought not in philosophical theories about the nature of the Absolute or the ultimate constitution of the Universe,

Taylor.

but in the empirical facts of human life as they are revealed to us in our concrete everyday experience of the world and mankind, and sifted and systematized by the sciences of psychology and sociology. . . . Ethics should be regarded as a purely ' positive ' or ' experimental ' and not as a ' speculative ' science." With regard to the second position one quotation will suffice {op. cit. p. 183). "Altruism and egoism are divergent developments from the common psychological root of primitive ethical senti- ment. Both developments are alike unavoidable, and each is ultimately irreconcilable with the other. Neither egoism nor altruism can be made the sole basis of moral theory without mutilation of the facts,

nor can any higher category be discovered by the aid of which their rival claims may be finally adjusted."

Professor Taylor expounds these two theories with great brilliance of argument and much ingenuity, yet neither of them will perhaps carry complete conviction to the minds of the majority of his critics. It is curious, in the first place, to find the independence of moral philosophy upon metaphysics sup- ported by metaphysical arguments. For whatever may be the real character of the interrelation of moral and metaphysical first principles it is obvious that Taylor's own dissatisfaction with current moral principles arises from an inability to believe in their ultimate rationality, i.e. a belief that they are untenable from the standpoint of ultimate metaphysics; and perhaps the most interesting portion of his book is the chapter entitled " Beyond Good and Bad," in which the highest and final form of the ethical consciousness of mankind is subjected to searching criticism. But further, it is becoming increasingly apparent that psychology (upon which Taylor would base morality) itself involves metaphysical assumptions; its position in fact cannot be stated except as a metaphysical position, whether that of subjective idealism or any other. And the need which most philosophers have felt for some philosophical foundation for morality arises, not from any desire to subordinate moral insight to speculative theory, but because the moral facts themselves are inexplicable except in the light of first principles which metaphysics alone can criticize.

Taylor himself attempts to find the roots of ethics in the moral sentiments of mankind, the moral sentiments being primarily feelings or emotions, though they imply and result in judgment s of approval and disapproval upon conduct. But it may be doubted whether he succeeds in clearly distinguishing ethical feelings from ethical judgments, and if they are to be treated as synonymous it seems difficult to avoid the conclusion that the implications of moral " judgment " must involve a reference to metaphysics.

Moreover, it is obvious that a great part of Taylor's quarrel with current moral ideals arises from the fact that they do not commend themselves to the moral judgment, i.e. from the standpoint of real goodness they are unsatisfactory, being tainted with evil. Hence it appears difficult to reconcile what is in effect a belief in the validity of the judgments of the moral consciousness with a belief that the real source and justification of that consciousness are to be found in the very sentiments and vague mass of floating feelings upon which it pronounces. Scepticism seems to be the only possible result of such a position. Taylor's polemic against metaphysical systems of ethics is

based throughout upon an alleged discrepancy and separation between the facts of moral " experience," the judgments of the moral consciousness, and theories as to the nature of these which the philosophers whom he attacks would by no means accept. There is no doubt a distinction between morality as a form of consciousness and reflection upon that morality. But such a distinction neither corresponds to, nor testifies to, the existence of a distinction between morality as " experience " and morality as " theory " or " idea."

Taylor is more persuasive when he is developing his second main thesis — that of the alleged existence of an ultimate dualism in the nature of morality. His accounts of the genesis of the conceptions of obligation and responsibility as of most of the ultimate conceptions with which moral philosophy deals will be accepted or rejected to the extent to which the main contention

concerning the psychological basis of ethics commends itself to the reader. But in his exposition of the fundamental contradic- tion involved in morality elaborated with much care and illustra- tive argument he appeals for the most part to facts familiar to the unphilosophical moral consciousness. He begins by finding an ultimate opposition between the instincts of self-assertion and instincts which secure the production and protection of the coming generation even in the infra-ethical world with which biology deals. He traces this opposition into the forms in which it appears in the social life of mankind (as, e.g., in the difficulty of reconciling the conflicting claims of individual self-development and self culture and social service), and finds " a hidden root of insincerity and hypocrisy beneath all morality " (p. 243), inasmuch as it is not possible to pursue any one type of ideal without some departure from singleness of purpose. And he finds all the conceptions by which men have hoped to reconcile admitted antagonisms and divergencies between moral ideals claiming to be ultimate and authoritative alike unsatisfactory (p. 285). Progress is illusory; there is no satisfactory goal to which moral development inevitably tends; religion in which some take refuge when distressed by the inexplicable contradic tions of moral conduct itself " contains and rests upon an element of make believe " (p. 489).

With Taylor's presentation of the difficulties with which morality is expected to grapple probably few would be found, seriously to disagree, though they might consider it unduly pessimistic. But when he turns what is in effect a statement of certain forms of moral difficulty into an attack upon the logical and coherent character of morality itself, he is not so likely to command assent. For the

difficulty all men meet with in realizing goodness, or in being moral, is not in itself evidence of an inherent contradiction in the nature of goodness as such. And what perhaps would first strike an unprejudiced critic in Taylor's examples of conflicting ideals or antagonistic yet ultimate moral judgments would be the perception that they are not necessarily moral ideas or judgments at all, and hence necessarily not ultimate.

The claims of self-culture and of social service may when considered in the abstract or in some hypothetical case appear antagonistic and irreconcilable. But when they present them- selves to the individual moral consciousness it may be safely asserted (1) that there can be only one moral choice possible, i.e. that their opposition (where they are opposed) involves no conflict of duties; and (2) that whichever ideal is in the end preferred, opportunities will nevertheless be provided within its realization for the concurrent realization of activities and capacities ordinarily associated with the ideal alleged to be contradictory. For just as there is no self-realization which does not involve self-sacrifice, so there is no room for that species of egoism within the confines of morality which is in- compatible with social service.

It will be clear from the foregoing account of Taylor's work that the tendency of his thought, as of that of Bradley, is by no means directed to the confirmation or re-establishment of those principles of conduct recognized by the ordinary moral con- sciousness. Psychology or metaphysics tend in their systems to usurp the place of authority formerly assigned to ethics proper.

It would be true on the whole to assert that evolutionary systems of ethics such as those of Herbert Spencer, Sir Leslie Stephen or Professor S. Alexander {Moral Order and Mart j neaa Progress, 1899), together with the metaphysical theories of morals of which T. H. Green and Bradley and Taylor are the chief representatives, have dominated the field of ethical speculation since 1870. Nevertheless it is only necessary to mention such a work as Martineau's Types of Ethical Theory to dispel the notion that the type of moral philosophy most characteristically English, i.e. consisting in the patient analysis of the form and nature of the moral consciousness itself, has given way or is likely to give way to more ambitious and constructive efforts. Martineau's chief endeavour was, as he himself says, to. interpret, to vindicate, and to systematize the moral senti- ments, and if the actual exhibition of what is involved, e.g., in

moral choice is the vindication of morality Martineau may be said to have been successful. It is with his interpretation and systematization of the moral sentiments that most of Martineau's critics have found fault. It is impossible, e.g., to accept his ordered hierarchy of " springs of action " without perceiving that the real principle upon which they can be arranged in order at all must depend upon considerations of circumstances and consequences, of stations and duties, with which a strict intuitionalism such as that of Martineau would have no dealing. 1 Similarly the notion of Conscience as a special faculty giving its pronouncements immediately and without reflection cannot be maintained in the face of modern psychological analysis and is untrue to the nature of moral judgment itself. And Martineau is curiously unsympathetic to the universal and social aspect of morality with which evolutionary and idealist moral philosophers are so largely occupied. Nevertheless there have been few moral philosophers who have, apart from the idiosyncrasies of their special prepossessions, set forth with clearer insight or with greater nobility of language the essential nature of the moral consciousness.

Equal in importance to Martineau's work is Professor Sidg- wick's Methods of Ethic which appeared in 1874. The two works are alike in loftiness of outlook and in the fact that Sidgwick. they are devoted t0 the r e-examination of the nature

of the moral consciousness to the exclusion of alien branches of inquiry. In most other respects they differ. Martineau is much more in sympathy with idealism than Sidgwick, whose work consists in a restatement from a novel and independent standpoint of the Utilitarian position. And Sidgwick has been far more successful than any other moral philosopher with the exception of T. H. Green and Bradley in founding a school of thought. Many of his most acute critics would be the first to admit how much they owe to his teaching. Chief among the more recent of these is G. E. Moore, whose book Principia Ethica is an important original contribution to ethical thought. And although Dr Hastings Rashdall {The Theory of Good and Evil, Oxford, 1907) is not in agreement with Sidgwick's own particular type of hedonistic theory in his own philosophical position, he occupies a point of view somewhat similar to that of Sidgwick's main attitude of Rational Utilitarianism. Rashdall's two volumes exhibit also a welcome return on the part of English thought to the proper business of the moral philosopher — the examination of the nature of moral conduct. Other works, such as Professor L. T. Hobhouse's Morals in Evolution or Professor

E. A. Westermarck's Origin and Development of the Moral Ideas, testify to a continued interest in the history of morality and in the anthropological inquiries with which moral philosophy is closely connected.

Much that is of importance for moral philosophy has recently been written upon problems that more properly belong to the philosophy of religion and the theory of knowledge. J. F. M'Taggart's Studies in Hegelian Cosmology, and his later work, Some Dogmas of Religion, contain interesting contributions to the theory of pleasure and of the problem of free will and determinism. A notable instance of this tendency is seen in the developments of the theory of pragmatism (q.v.), for which

F. C. S. Schiller has proposed the general term " humanism." Such aspects as concern ethics include, for example, the limited indeterminism involved in the theory, the attitude of the religious consciousness expressed by William James (Will to Believe and Pragmatism), and the pragmatic conception of the good. And the widespread interest in social problems has produced a revival of speculation concerning questions partly political and party ethical in character, e.g. the nature of justice. Finally it has become apparent that many problems hitherto left for political economy to solve belong more properly to the moralist, if not to the moral philosopher, and it may be confidently ex- pected that with the increased complexity of social life and the disappearance of many sanctions of morality hitherto regarded as inviolable, the future will bring a renewed and practical

1 Cf. A. Seth Pringle-Pattison, The Philosophical Radicals. Martineau's Philosophy, p. 92.

interest in the theory of conduct likely to lead to fresh develop- ments in ethical speculation.

Bibliography. — The literature of the subject is so large in all languages that only a small selection can be given here. For further works reference may be made to subsidiary articles. See also Baldwin's Diet, of Philos. and Psychol, vol. iii. (i9°5). PP- 8l2 & > "• (bibliography).

I. Historical. — Sir L. Stephen, History of English Thought tn the 18th Century (1876, 3rd ed. 1892); W. E. H. Lecky, History of

European Morals from Augustus to Charlemagne (1869, many editions); works of Ed. Zeller (q.v.); G. H. Lewes, History of Philosophy (1880) ; W. Gass, Geschichte der christlichen Ethik (1881) ; A. W. Benn, The Greek Philosophers (1882); F. J5dl, Geschichte der Ethik in der neueren Philos. (2 vols., 1882-1889) ; L. Schmidt, Ethik der alten Griechen (1882) ; E. Howley, The Old Morality traced Historic- ally (1885); J. Martineau, Types of Ethical Theory (Oxford, 1885, 3rd ed. 1891); Th. Ziegler, Gesch. d. christl. Ethik (1886); Ch. Letourneaux, V 'Evolution de la morale (1887); K. Kostlin, Gesch. der Ethik (1887) ; C. E. Luthardt, Die antike Ethik in ihrer geschicht- lichen Entwicklung (1887), and Hist, of Christian Ethics (1888); C. M. Williams, A Review of the Systems of Ethics founded on the Theory of Evolution (1893); J. Watson, Hedonistic Theories from Aristippus to Spencer (1895); L. A. Selby-Bigge, British Moralists (1897); R. Mackintosh, From Comte to Benjamin Kidd (1899); S. Patten, The Development of English Thought (1899); A. B. Bruce, The Moral Order of the World in Ancient and Modern Thought (1899) ; Sir L. Stephen, The English Utilitarians (1901); Henry Sidgwick, Outlines of the History of Ethics (5th ed., 1902) ; Paul Janet, History of the Problems of Philosophy (1902-1903), Eng. trans. Ada Monahan, vol. ii. " Ethics "; W. R. Sorley, Recent Tendencies in Ethics (1904).

II. Constructive and Critical. — Besides the works mentioned above the following may be mentioned: — J. M. Guyau, La Morale anglaise (1879), Education el heredite (1889; Eng. trans. Greenstreet, with introd. by G. F. Stout, 1891), Esquisse d'une morale sans obligation ni sanction (Eng. trans., 1898); G. H. Lewes, Problems of Life and Mind (1879); Sir L. Stephen, Science of Ethics (1882); P. Janet, The Theory of Morals (Eng. trans., 1884); W. R. Sorley, On the Ethics of Naturalism (1885); W. L. Courtney, Constructive Ethics (1886); Wilson and Fowler, Principles of Morals (1886); H. Hoff- ding, Ethik (1888), Psychologie (1882, 1892; trans. Lowndes, 1892); W. Wundt, Ethik (1886; trans. Titchener and others, 1897);

F. Paulsen, Ethik (1889, 1893; trans. Thilly, 1899); H. Sidgwick, Method of Ethics (1890); J. T. Bixby, The Crisis in Morals: An Examination of Rational Ethics (1891); J. Seth, Freedom an Ethical Postulate (1891); J. H. Muirhead, Elements of Ethics (1892); G. Simnel, Einleitung in die Moralwissenschaft (1892, 1893) ; T. Ziegler, Social Ethics (1892); T. H. Huxley, Evolution and Ethics (1893); W. Knight, The Christian Ethic (1893); J. S. Mackenzie, Manual of Ethics (1893); F. Ryland, Ethics (1893); J. Seth. A Study of Ethical Principles (1894, 6th ed. 1902); C. F. DArcy, Short Study of Ethics (1895); J. H. Hyslop, The Elements of Ethics (1895); J.

Kidd, Morality and Religion (1895); Sir L. Stephen, Social Rights and Duties (1896); J. M. Baldwin, Social and Ethical Interpretations in Mental Development (1897); Th. Ribot, Psychology of Emotions (1897); A. Se.th Pringle-Pattison, Man's Place in the Cosmos (1897); H. R. Marshall, Instinct and Reason (1898); W. Wallace, Natural Theology and Ethics (1898); F. Paulsen, Partei-politik und Moral (1900); A. E. Taylor, Problem of Conduct (1901); G. T. Ladd, Philosophy of Conduct (1902); H. Sidgwick, Ethics of Green, Spencer, Martineau (1902); D. Irons, Study in Psychology of Ethics (1903);

G. E. Moore, Principia Ethica (1903) ; R. Eucken, Geislige Strbmungen der Gegenwart (1904), and other works (see Eucken, Rudolf); works of A. Fouillee (q.v.); G. Santayana, Life of Reason (1905); E. A. Westermarck, Origin and Development of Moral Ideas (1906); George Gore, Scientific Basis of Morality (1899), and New Scientific Basis of Morality (1906), containing an interesting if unconvincing attempt to explain ethics on purely physical principles. (H. H. W.)

ETHIOPIA, or Aethiopia (Gr. AWio-xLa), the ancient classical name of a district of north-eastern Africa, bounded on the N. by Egypt and on the E. by the Red Sea. 1 The application of the name has varied considerably at different times. In the Homeric poems the Aethiopes are the furthest of mankind both eastward and westward ; the gods go to their banquets and probably the Sun sets in their country. With the growth of scientific, geo- graphy they came to be located somewhat less vaguely, and indeed their name was employed as the equivalent of the Assyrian and Hebrew Cush (q.v.), the Kesh or Ekosh of the Hieroglyphics (first found in Stele of Senwosri I.), i.e. a country extending from about the 24th to the 10th degree of N. lat., while its limits to the E. and W. were doubtful. The etymology of the name, which to a Greek ear meant " swarthy-faced," is unknown, nor can we say why in official inscriptions of the Axumite dynasty the word is used as the equivalent of Habashat (whence the

1 For the topography and later history see Sudan and Abyssinia.

modern Abyssinia), which, from the context would appear to denote a tribe located in S. Arabia, whose name was rendered by the Greek

geographers as Abaseni and Abissa.

The inhabitants of Ethiopia, partly perhaps owing to their honourable mention in the Homeric poems, attracted the atten- tion of many Greek researchers, from Democritus onwards. Herodotus divides them into two main groups, a straight-haired race and a woolly-haired race, dwelling respectively to the East and West, and this distinction is confirmed by the Egyptian monuments. From his time onwards various names of tribes are enumerated, and to some extent geographically located, most of these appellations being Greek words, applied to the tribes by strangers in virtue of what seemed to be their leading character- istics, e.g. " Long-lived," " Fish-eaters," " Troglodytes," &c. The bulk of our information is deiived from Egyptian monu- ments, whence it appears that, originally occupied by independent tribes, who were raided (first by Seneferu or Snefru, first king of the IVth or last of the IHrd Dynasty) and gradually subjected by Egyptian kings (the steps in this process are traced by E. W. Budge, The Egyptian Sudan, 1907, i. 505 sqq.),undertheXVIIIth Dynasty it became an Egyptian province, administered by a viceroy (at first the Egyptian king's son), called prince of Kesh, and paying tributes in negroes, oxen, gold, ivory, rare beads, hides and household utensils. The inhabitants frequently rebelled and were as often subdued; records of these repeated conquests were set up by the Egyptian kings in the shape of steles and temples; of the latter the temple of Amenhotep (Amenophis) III. at Soleb or Sulb seems to have been the most magnificent. Ethiopia became independent towards the nth century B.C., when the XXIst Dynasty was reigning in Egypt. A state was founded, having for its capital Napata (mod. Merawi) at the foot of Jebel Barkal, " the sacred mountain," which in time became formidable, and in the middle of the 8th century conquered Egypt; an Egyptian campaign is recorded in the famous stele of King Pankhi. The fortunes of the Ethiopian (XXVth) Dynasty belong to the history of Egypt (q.v.). After the Ethiopian yoke had been shaken off by Egypt, about 660 B.C., Ethiopia continued independent, under kings of whom not a few are known from inscriptions. Besides a number whose names have been discovered in cartouches at Jebel Barkal, the following, of whom all but the third have left important steles, can be roughly dated: Tandamane, son of Tirhaka (667-650), Asperta (630-600), Pankharer (600-560), Harsiotf (560-525), Nastasen (525-500). From the evidence of the stele of the second (the Coronation Stele) and that of the fifth it has been inferred that the sovereignty early in this period became elective, a deputation of the various orders in the realm being (as Diodorus states), when a vacancy occurred, sent to Napata, where the chief god Amen selected

out of the members of the royal family the person who was to succeed, and who became officially the god's son; and it seems certain that the priestly caste was more influential in Ethiopia than in Egypt both before and after this period. Another stele (called the Stele of Excommunication) records the expulsion of a priestly family guilty of murder (H. Schafer, Klio, vi. 287): the name of the sovereign who expelled them has been obliterated. The stele of Harsiotf contains the record of nine expeditions, in the course of which the king subdued various tribes south of Meroe' and built a number of temples. The stele of the last of these sovereigns, now in the Berlin Museum, and edited by H. Schafer (Leipzig, 1901), contains valuable information con- cerning the state of the Ethiopian kingdom in its author's time. Shortly after his accession he was threatened with invasion by Cambyses, the Persian conqueror of Egypt, but (according to his own account) destroyed the fleet sent by the invader up the Nile, while (as we learn from Herodotus) the land-force succumbed to famine (see Cambyses). It further appears that in his time and that of his immediate predecessors the capital of the kingdom had been removed from Napata, where in the time of Harsiotf the temples and palaces were already in ruins, to Merce' at a distance of 60 camel-hours to the south-east. But Napata retained its importance as the religious metropolis; it was thither that the king went to be crowned, and there too the chief god

delivered his oracles, which were (it is said) implicitly obeyed. The local names in Nastasen's inscription, describing his royal circuit, are in many cases obscure. A city named Pnups (Hierogl. Pa-Nebes) appears to have constituted the most northerly point in the empire. These Ethiopian kings seem to have made no attempt to reconquer Egypt, though they were often engaged in wars with the wild tribes of the Sudan. For the 5th and 4th centuries B.C. the history of the country is a blank. A fresh epoch was, however, inaugurated by Ergamenes, a contemporary of Ptolemy Philadelphus, who is said to have massacred the priests at Napata, and destroyed sacerdotal influence, till then so great that the king might at the priests' order be compelled to destroy himself; Diodorus attributes this measure to Erga- menes' acquaintance with Greek culture, which he introduced into his country. A temple was built by this king at Pselcis (Dakka) to Thoth. Probably the sovereignty again became hereditary. Occasional notices of Ethiopia occur from this time onwards in Greek and Latin authors, though the special treatises by Agatharchides and others are lost. According to these the country came to be ruled by queens named Candace. One of them was involved in war with the Romans in 24 and 23 B.C. ; the land was

invaded by C. Petronius, who took the fortress Premis or Ibrim, and sacked the capital (then ISiapata); the emperor Augustus, however, ordered the evacuation of the country without even demanding tribute. The stretch of land between Assuan (Syene) and Maharraka (Hiera Sycaminus) was, however, regarded as belonging to the Roman empire, and Roman cohorts were stationed at the latter place. To judge by the monuments it is possible that there were queens who reigned alone. Pyramids were erected for queens as well as for kings, and the position of the queens was little inferior to that of their consorts, though, so far as monumental representations go, they always yielded precedence to the latter. Candace appears to be found as the name of a queen for whom a pyramid was built at Meroe. A great builder was Netekamane, who is represented with his queen Amanetari on temples of Egyptian style at many points up the Nile — at Amara just above the second cataract, and at Napata, as well as at Meroe, Benaga and Naga in the distant Isle of Meroe. He belongs, probably, to the Ptolemaic age. Later, in the Roman period, the type in sculpture changed from the Egyptian. The figures are obese, especially the women, and have pronounced negro features, and the royal person is loaded with bulging gold ornaments. Of this period also there is a royal pair, Netekamane and Amanetari, imitating the names of their conspicuous predecessors. In the 4th century a.d. the state of Meroe was ravaged by the Nubas (?) and the Abyssinians, and in the 6th century its place was taken by the Christian state of Nubia (see Dongola).

Contrary to the opinion of the Greeks, the Ethiopians appear to have derived their religion and civilization from the Egyptians. The royal inscriptions are written in the hieroglyphic character and the Egyptian language, which, however, in the opinion of experts, steadily deteriorate after the separation of Ethiopia from Egypt. About the time of Ergamenes, or (according to some authorities) before, a vernacular came to be employed in inscriptions, written in a special alphabet of 23 signs in parallel hieroglyphic and cursive forms. The cursive is to be read from right to left, the hieroglyphic, contrary to the Egyptian method, in the direction in which the figures face. The Egyptian equiva- lents of six characters have been made out by the aid of bilingual cartouches. Words are divided from each other by pairs of dots, and it is clear that the forms and values of the signs are largely based on Egyptian writing; but as yet decipherment has not been attained, nor can it yet be stated to what group the language should be assigned (F. LI. Griffith in D. R. Maclver's Areika, Oxford, 1909, and later researches).

Notices in Greek authors are collected by P. Paulitschke, Die

geographische Erforschung des afrikanischen Continents (Vienna, 1880); the inscriptions were edited and interpreted by G. Maspero, Revue archeol. xxii., xxv. ; Melanges d'Assyriologie et d'Egyptologie, ii., iii. ; Records of the Past, vi. ; T.S.B.A. iv. ; Schafer, I.e., and Zeit- schriftfilr agyptische Sprache, xxxiii. See also J. H. Breasted, " The Monuments of Sudanese Nubia," in American Journal of Semitic

Languages (October 1908), and the work of E. W. Budge cited above. A description of the chief ruins and the results of Dr D. R. Maclver's researches in northern Nubia, begun in 1907, will be found under Sudan : A nglo-Egyptian.

The A xumite Kingdom. — About the 1st century of the Christian era a new kingdom grew up at Axum (q.v.), of which a king Zoscales is mentioned in the Periplus Maris Erythraei. Frag- ments of the history of this kingdom, of which there is no authentic chronicle, have been made out chiefly by the aid of inscriptions, of which the following is a list: — (1) Greek in- scription of Adulis, copied' by Cosmas Indicopleustes in 545, the beginning, with the king's name, lost. (2) Sabaean inscrip- tion of Ela Amida in two halves, discovered by J. Theodore Bent at Axum in 1893, and completed by E. Littmann in 1906. (3) Ethiopic inscription probably of the same king, imperfect (Littmann). (4) Trilingual inscription of Aeizanes, the Greek version discovered by Henry Salt in 1805, the Sabaean by Bent, and the Ethiopic (Geez) by Littmann. (5) Ethiopic inscription of Aeizanes (so Littmann), son of Ela Amida, discovered by Eduard Ruppell in 1833. (6) Ethiopic inscriptions of Hetana- Dan'el, son of Dabra Efrem. These are all long inscriptions giving details of wars, &c. The sixth is later than the rest, which are to be attributed to the most flourishing period of the kingdom, the 4th and 5th centuries a.d. The fourth is pagan, the fifth Christian, Aeizanes having in the interval embraced Christianity. It was to this king that the emperor Constantius addressed a letter in 356 a.d.

Aeizanes and his successors style themselves kings of the Axumites, Homerites (Himyar), Raidan, the Ethiopians (Habasat), the Sabaeans, Silee, Tiamo, the Bugaites (Bega) and Kasu. This style implies considerable conquests in South Arabia, which, however, must have been lost to the Axumites by a.d. 3 78. They claim to rule

the Kasu'or Meroitic Ethiopians ; and the fifth inscription records an expedition along the Atbara and the Nile to punish the Nuba and Kasu, and a fragment of a Greek inscription from Meroe was recognized by Sayce as commemorating a king of Axum. Except for these inscriptions Axumite history is a blank until in the 6th century we find the Axumite king sending an expedition to wreck the Jewish state then existing in S. Arabia, and reducing that country to a state of vassalage: the king is styled in Ethiopian chronicles Caleb (Kaleb), in Greek and Arabic documents El-Esbaha. In the 7th century a successor to this king, named Abraha or Abraham, gave refuge to the persecuted followers of Mahomet at the beginning of his career (see Arabia: History, ad init.). A few more names of kings occur on coins, which were struck in Greek characters till about a.d. 700, after which time that language seems definitely to have been displaced in favour of Ethiopic or Geez: the condition of the script and the coins renders them all difficult to identify with the names preserved in the native lists, which are too fanciful and mutually contradictory to furnish of themselves even a vestige of history. For the period between the rise of Islam and the beginning of the modern history of Abyssinia there are a few notices in Arabic writers; so we have a notice of a war between Ethiopia and Nubia about 687 (C. C. Rossini in Giorn. Soc. Asiat. Ital. x. 141), and of a letter to George king of Nubia from the king of Abyssinia some time between 978 and 1003, when a Jewish queen Judith was oppressing the Christian population (I. Guidi, ibid. iii. 176, 7).

The Abyssinian chronicles, it may be noted, attribute the foundation of the kingdom to Menelek (or Ibn el-Hakim), son of Solomon and the queen of Sheba. The Axumite or Menelek dynasty was driven from northern Abyssinia by Judith, but soon after another Christian dynasty, that of the Zagues, obtained power. In 1268 the reigning prince abdicated in favour of Yektino Amlak, king of Shoa, a descendant of the monarch over- thrown by Judith (see Abyssinia).

See A. Dillman, Die Anfange des axumitischen Reiches (Berlin, 1879); E. Drouin, Revue archeol. xliv. (1882); T. Mommsen, Geschichte der romischen Provinzen, chap. xiii. ; W. Dittenberger, Orientis Craeci Inscriptiones selectae, Nos. 199, 200; Littmann u. Kroncker, Vorbericht der deutschen Aksum-Expedition (Berlin, 1906), and Littman's subsequent researches.

Ethiopic Literature

The employment of the Geez or Ethiopic language for literary purposes appears to have begun no long time before the introduc-

tion of Christianity into Abyssinia, and its pagan period is represented by two Axumite inscriptions (published by D. H. Miiller in J. T. Bent's Sacred City of the Ethiopians, 1893), and an inscription at Matara (published by C. C. Rossini, Rendiconti Accad. Lined, 1896). As a literary language it survived its use as a vernacular, but it is unknown at what time it ceased to be the latter. In Sir W. Cornwallis Harris's Highlands of Aethiopia (1844) there is a list of rather more than 100 works extant in Ethiopic; subsequent research has chiefly brought'to light fresh copies of the same works, but it has contributed some fresh titles. A conspectus of all the MSS. known to exist in Europe (over 1200 in number) was published by C. C. Rossini in 1899 (Rendiconti Accad. Lincei, ser. v. vol. viii.); of these the largest collection is that in the British Museum, but others of various sizes are to be found in the chief libraries of Europe. R. E. Littmann (in the Zeitschrift fur Assyriologie, xv. andxvi.) describes two collections at Jerusalem, one of which contains 283 MSS.; and Rossini (Rendiconti, 1904) a collection of 35 MSS. belonging to the Catholic mission at Cheren. Other collections' exist in Abyssinia, and many MSS. are in private hands. In 1893 besides portions of the Bible some 40 Ethiopic books had been printed in Europe (enumerated in L. Goldschmidt's Biblio- theca Aethiopica), but many more have since been published.

Geez literature is ordinarily divided into two periods, of which the first dates from the establishment of Christianity in the 5th century, and ends somewhere in the 7th; the second from the re-establishment of the Salomonic dynasty in 1268, continuing to the present time. It consists chiefly of translations, made in the first period from Greek, in the second from Arabic. It has no authors of the first or even of the second rank. Its character as a sacred and literary language is due to its translation of the Bible, which in the ordinary enumeration is made to contain 81 books, 46 of the Old Testament, and 35 of the New. These figures are most probably obtained by adding to the ordinary canonical books Maccabees, Tobit, Judith, Wisdom, Ecclesiasticus, Baruch, Jubilees, Enoch, the Ascension of Isaiah, Ezra IV ., Shepherd of Hernias, the Synodos (Canons of the Apostles), the Book of Adam, and Joseph Ben Gorion. For the distinction between canonical and apocryphal appears to be unknown to the Ethiopic Church, whose chief service to Biblical literature consists in its preservation of various apocryphal works which other parts of Christendom have lost or possess only in an imperfect form (see Enoch; Jubilees, Book of, &c). It should be observed that the Maccabees of the Ethiopic Bible is an entirely different work from the books of that name included in the

Septuagint, of which, however, the Abyssinians have a recent version made from the Vulgate; specimens of their own Maccabees have been published by J. Horovitz in the Zeitschrift fiir Assyriologie, vol. xx. The MSS. of the Biblical books vary very much, and none of them can claim any great antiquity; the oldest extant MS. of the four Books of Kings appears to be one in the Museo Borgiano, presented by King Amda Sion (13 14) to the Virgin Mary in Jerusalem (described by N. Roupp, ibid. xvi. 296-342) . Hence P. de Lagarde supposed the Ethiopic version to have been made from the Arabic, which indeed is in accordance with a native tradition. This opinion is held by few; C. F. A. Dillman distinguished in the case of the Old Testament three classes of MSS., a versio antiqua, made from the Septuagint (probably in the Hesychian text) , a class revised from Greek MSS., and a class revised from the Hebrew (probably through the medium of an Arabic version). An examination of ten chapters of St Matthew by L. Hackspill (ibid. vol. xi.) led to the result that the Ethiopic version of the Gospels was made about a.d. 500, from a Syro-occidental text, and that this original translation is represented by Cod. Paris. Aeth. 32; whereas most MSS. and all printed editions contain a text influenced by the Alexandrian Vulgate, and show traces of Arabic. Rossini (ibid. x. 232) has made it probable that the

Abba Salama, whom the native tradition identifies with Fru- mentius, evangelist of Abyssinia, to whom the translation of the Bible was ascribed, was in reality a Metropolitan of the early 14th century, who revised the corrupt text then current. Of the ancient translation the latest book is said to be Ecclesiasticus, translated in the year 678. The New Testament has been published repeatedly (first in Rome, 1548-1549; some letters about its publication were edited by I. Guidi in the Archivio della Soc. Rom. di Storia Patria, 1886), and C. F. A. Dillmann edited a critical text of most of the Old Testament and Apocrypha, but did not live to complete it; portions have been edited by J. Bachmann and others.

Other translations thought to belong to the first period are the Sherata Makhbdr, ascribed to S. Pachomius; the Kerilos, a collection of homilies and tracts, beginning with Cyril of Alexandria De recta fide; and the Physiologus, a fanciful work on Natural History (edited by F. Hommel, Leipzig, 1877).

Of the works belonging to the second period much the most important are those which deal with Abyssinian history. A court official, called sahdfe te'ezdzenet (secretary) , having under him a staff of scribes, was employed to draw up the public annals year by year; and on these official compositions the Abyssinian histories are based. The earliest part of the Axum chronicle preserved is that recording the wars of Amda Sion (1314-1344) against the Moslems; it is doubtful, however, whether even this exists in its original form, as some scholars think; according to its editor (J. Perruchon in the Journ. Asiat. for 1889) it is preserved in a recension of the time of King Zar'a Ya'kub. Under Kirig Lebna Dengel (1 508-1 540) the annals of his four pre- decessors, Zar'a Ya'kub, Baeda Maryam, Eskender and Na'od (1434-1508) were drawn up; those of the first two were published by J. Perruchon (Paris, 1893); in the Journ. Asiat. for 1894 the same scholar published a further fragment of the history of Baeda Maryam, written by the tutor to the king's children, and the history of Eskender, Amda Sion II. and Na'od as com- piled in Lebna Dengel's time. The history of Lebna Dengel was published by the same scholar {Journ. Semit. i. 274) and Rossini {Rendiconti, 1894, v. p. 617); that of his successor Claudius (1540-1559) by Conzelmann (Paris, 1895); that of his successor Minas (1550-1563) by F. M. E. Pereira (Lisbon, 1888); those of the three following kings, Sharsa Dengel, Za Dengel, and Ya'kub, by Rossini {Rendiconti, 1893). The history of the next king Sysenius (1606-1632) by Abba Meherka Dengel and Tekla Shelase was edited by Pereira (Lisbon, 1892); the chronicles of Joannes I., Iyasu I. and Bakaffa (1682-1730) by I. Guidi, with a French translation (Paris, 1903-1905); all are con- temporary, and the names of the chroniclers of the last two kings are recorded. Besides these we have the partly fabulous chronicle of Lalibela (of uncertain date, but before the Salo- monian dynasty was restored), edited by Perruchon (Paris, 1892) ; and a brief chronicle of Abyssinia, drawn up in the reign of Iyasu II. (1729-1753), embodying materials abridged, but often unaltered, was published by R. Basset, in the Journ. Asiat. for 1882 (cf. Rossini in the Rendiconti, 1893-1894, p. 668), and has since formed the basis for Abyssinian history. Many compilations of the sort exist in MS. in libraries, and great praise is bestowed on the one which E. Rtippell, when travelling in Abyssinia, ordered to be drawn up for his use. It is now in the collection of his MSS. at Frankfurt. Ethiopic scholars speak of a special " historical style " which comes from the mixture of the styles of different periods, and the admixture of Amharic phrases and idioms. The historian of the wars of Amda Sion is credited with some literary merit; most of the chroniclers have little.

The remaining literature of the second period is thought to begin somewhat earlier than these chronicles. To the time of King Yekuno Amlak (1 268-1 283) the historical romance called Kebra Nagaset (Glory of Kings) is assigned by its editor, C. Bezold (Bavarian Academy, 1004); other scholars gave it a somewhat later date. Its purpose is to glorify the Salomonian dynasty, whence, in spite of a colophon which declares it to be a translation, it was regarded as an original work; since, how- ever, it shows evident signs of having been translated from Arabic,

Bezold supposes that its author, Ishak, was an immigrant whose native language was Arabic, in which therefore he would natur- ally write the first draft of his book. To the time of Yagbea Sion {ob. 1294) belongs the Vision of the Prophet Habakkuk in Kattasd, as also the works of Abba Salama, regarded as the founder of the Ethiopic renaissance, one of whose sermons is preserved in a Cheren MS. With his name are connected the Acts of the Passion, the Service for the Dead and the translation of Philexius, i.e. Philoxenus. King Zar'a Ya'kub composed or had composed for him as many as seven books; the most important of these is the Book of Light (Mashafa Berhan) , paraphrased as Kirchenordnung, by Dillmann, who gave an analysis of its contents {Uber die Regierung des Konigs Zar'a Ya'kob, Berl. Acad., 1884). He also organized the compilation of the Miracles of the Virgin Mary, one of the most popular of Ethiopic books; a magnificent edition was printed by E. W. Budge in the Meux collection (London, 1900). In the same reign the Arabic chronicle of al-Makin was translated into Geez. Under Lebna Dengel {ob. 1540), besides the above-mentioned collection of chronicles, we hear of the translation from the Arabic of the history and martyrdom of St George, the Commentary of J. Chrysostom on the Epistle to the Hebrews, and the ascetic works of J. Saba called Aragawi manfasdwi. Under Claudius (1540-15 59) Maba Sion is said to have translated from the Arabic The Faith of the Fathers, a vast compilation, including the Didascalia Apostolorum (edited by Piatt, London, 1834), and the Creed of Jacob Baradaeus (pub- lished by Cornill, ZDMG. xxx. 417-466), and to the same reign belong the Book of Extreme Unction {Mashafa Kandil), and the religious romance Barlaam et Joasaph also paraphrased from the Arabic (partly edited by A. Zotenberg in Notices et Extraits, vol. xxviii.). The Confession of Faith of King Claudius has been repeatedly printed. The reign of Sharsa Dengel {ob. 1595) was marked by many literary monuments, such as the religious and controversial compilation called Mazmura Chrestos, and the translation, by a certain Salik, of the religious encyclopaedia (Mashafa Haia) of the

monk Nikon; an Arab merchant from Yemen, who took on conversion the name AnbakSm (Habakkuk), translated a number of books from the Arabic. Under Ya'kub {ob. 1605) the valuable chronicle of John of Nikiou was translated from Arabic (edited by A. Zotenberg with French translation in Notices et extraits, vol. xxiv.). Under John, about 1687, the Spiritual Medicine of Michael, bishop of Adtrib and Malig, was translated. The literature that is not accurately dated consists largely of liturgies, prayers and hymns; Ethiopic poetry is chiefly, if not entirely, represented by the last of these, the most popular work of the kind being an ode in praise of the Virgin, called Weddase Maryam (edited by K. Fries, Leipzig, 1892). Various hymn-books bear the names Degua, Zemmare and Mawas'et (Antiphones) ; there is also a biblical history in verse called Mashafa Madbal or Mestlra Zamdn. Homilies also exist in large numbers, both original and translated, sometimes after the Arabic fashion in rhymed prose. Hagiology is naturally an important department in Ethiopic literature. In the great collection called Synaxar (translated originally from Arabic, but with large additions) for each day of the year there is the history of one or more saints; an attempt has been made by H. Diinsing (1900) to derive some actual history from it. Many texts containing lives of individual saints have been issued. Such are those of Maba Sion and Gabra Chrestos, edited by Budge in the Meux collection (London, 1899); the Acts of S. Mercurius, of which a fragment was edited by Rossini (Rome, 1904); the unique MS. of the original, one of the most extensive works in the Geez language, was burned by thieves who set fire to the editor's house. The same scholar began a series of Vitae Sanctorum antiquiorum, while Monumenta Aethiopiae hagiologica and Vitae Sanctorum indigenarum have been edited by B. Turaiev (Leipzig and St Petersburg, 1902, and Rome, 1905). Other lives have been edited by Pereira, Guidi, &c. Similar in historical value to these works is the History of the Exploits of Alexander, of which various recensions have been edited by Budge (London, 1895). See further Alexander the Great, section on the legends, ad fin. Of Law the most important monument is the Fatha Nagaset

(Judgment of Kings), of which an official edition was issued by I. Guidi (Rome, 1899), with an Italian translation; it is a version probably made in the early 16th century of the Arabic code of Ibn 'Assal, of the 12th century, whose work, being meant for Christians living under Moslem rule, was not altogether suitable for an

independent Christian kingdom; yet the need for such a code made it popular and authoritative in Abyssinia. The translator was not quite equal to his task, and the Brit. Mus. MS. 800 exhibits an attempt to correct it from the original.

Science can scarcely be said to exist in Geez literature, unless a medical treatise, of which the British Museum possesses a copy, comes under this head. Philosophy is mainly represented by mystical commentaries on Scripture, such as the Book of the Mystery of Heaven and Earth, by Ba-Hailu Michael, probably of the 15th century, edited by Perruchon and Guidi (Paris, 1903). There is, however, a translation of the Book of the Wise Philo- sophers, made by Michael, son of Abba Michael, consisting of various aphorisms; specimens have been edited by Dillmann in his Chrestomathy, and J. Cornill (Leipzig, 1876). There is also a translation of Secundus the Silent, edited by Bachmann (Berlin, 1888). Far more interesting than these is the treatise of Zar'a Ya'kub of Axum, composed in the year 1660 (edited by Litt- manri, 1904), which contains an endeavour to evolve rules of life according to nature. The author reviews the codes of Moses, the Gospel and the Koran, and decides that all contravene the obvious intentions of the Creator. He also gives some details of his own life and his occupation of scribe. A less original treatise by Walda Haywat accompanies it. Epistolo- graphy is represented by the diplomatic correspondence of some of the kings with the Portuguese and Spanish courts; some documents of this sort have been edited by C. Beccari, Documenti inediti per la storia d' Etiopia (Rome, 1903); lexicography, by the vocabulary called Sawasew. The first Ethiopic book printed was the Psalter (Rome, 1513), by John Potken of Cologne, the first European who studied the language.

See C. C. Rossini, " Note per la storia letteraria Abissina," in Rendiconti delta R. Accad. dei Lincei (1899) '< Fumagalli, Bibliografia Etiopica (1893); Basset, Etudes sur Vhistoire de V&hiopie (1882); Catalogues of various libraries, especially British Museum (Wright), Paris (Zotenberg), Oxford and Berlin (Dillmann), Frankfurt (Gold- schmidt). Plates illustrating Ethiopic palaeography are to be found in Wright's Catalogue; an account of the illustrations in Ethiopic MSS. is given by Budge in his Life of Maba Sion; and a collection of inscriptions in the church of St Stefano dei Mori, in Rome, by Gallina in the Archivio delta Soc. Rom. di Storia Patria (1888).

(D. S. M.)*

ETHNOLOGY and ETHNOGRAPHY (from the Gr. Wvos, race, and

X670S, science, or 7 pafaiv , to write), sciences which in their narrowest sense deal respectively with man as a racial unit (mankind), i.e. his development through the family and tribal stages into national life, and with the distribution over the earth of the races and nations thus formed. Though the etymology of the words permits in theory of this line of division between ethnology and ethnography, in practice they form an indivisible study of man's progress from the point at which anthropology (q.v.) leaves him.

Ethnology is thus the general name for investigations of the widest character, including subjects which in this encyclopaedia are dealt with in detail under separate headings, such as Archae- ology, Art (and allied articles), Commerce, Geography (and the headings for countries and tribes), Family, Name, Ethics, Law, Mythology, Folk-Lore (and allied articles), Philology (and allied articles), Agriculture, Architecture, Religion, Sociology, &c, &c. It covers generally the whole history of the material and intellectual development of man, as it has passed through the stages of (a) hunting and fishing, (b) sheep and cattle tending, (c) agriculture, (d) industry. It investigates his food, his weapons, tools and implements, his housing, his social, economic and commercial organization, forms of govern- ment, language, art, literature, morals, superstitions and religious systems. In this sense ethnology is the older term for what now is called sociology. At the present day the progress of research has in practice, however, restricted the "ethnologist" as a rule to the study of one or more branches only of so wide a

subject, and the word " ethnology " is used with a somewhat vague meaning for any ethnological study; each country or nation has thus its own separate ethnology. It becomes more convenient, therefore, to deal with the ethnology as a special subject in each case. " Ethnography," in so far as it has a distinctive province, is then conveniently restricted to the scientific mapping out of different racial regions, nations and tribes; and it is only necessary here to refer the reader to the separate articles on continents, &c, where this is done. The only fundamental problem which need here be referred to is that of the whole question of the division of mankind into separate races at all, which is consequential on the earlier problem (dealt with in the article Anthropology) as to man's origin and antiquity.

If we assume that man existed on the earth in remote geological time, the question arises, was this pleistocene man specifically one? What evidence is there that he represented in his different habitats a series of varieties of one species rather than a series of species? The

evidence is of three kinds, (1) anatomical, (2) physiological, (3) cultural and psychical.

1. Dr Robert Munro, in his address to the Anthropological section of the British Association in 1893, said: " All the osseous remains of man which have hitherto been collected and examined point to the fact that, during the larger portion of the quarternary period, if not, indeed, from its very commencement, he had already acquired his human characteristics." By " characteristics " is here meant those anatomical ones which distinguish man from other animals, not the physical criteria of the various races. Do, then, these anatomical characteristics of pleistocene man show such differences among themselves and between them and the types of man existing to-day as to justify the assumption that there has ever been more than one species of man?

The undoubted " osseous remains " of pleistocene man are few. Burial was not practised, and the few bones found are for the most part those which have by mere chance been preserved in caves or rock-shelters. Of these the three chief " finds," in order of probable age, are the Trinil (Java) brain-cap, the lowest human skull yet described, characterized by depressed cranial arch, with a cephalic index of 70; the Neanderthal (Germany) skull, remarkable for its flat retreating curve with an index of 73-76; and the two nearly perfect skeletons found at Spy (Belgium), the skulls of which exhibit enormous brow ridges with cranial indices of 70 and 75. All these skulls, taken in conjunction with other well-authenticated human remains such as those found at La Naulette (Belgium), Shipka (Balkan Peninsula), Olmo (Italy), Predmert (Bohemia) and in Argentina and Brazil, make it possible to reconstruct anatomically the vary- ing types of pleistocene man, and to establish the fact that in essential features the same primitive type has persisted through all time. The skeleton bones show differences so slight as to admit of pathological or other explanation. What Professor Kollmann says of man to-day was true in the remotest ages. Referring to Cuvier's statement that from a single bone it is possible to determine the very species to which an animal belongs, he says, " Precisely on this ground I have mainly concluded that the existence of several human species cannot be recognized, for we are unacquainted with a single tribe from a single bone of which we might with certainty determine to what species it belonged." Such differences as the bones exhibit are progressive modifications towards the higher neolithic and modern types, and are in themselves entirely incapable of supporting the theory that the owner of the Trinil skull, say, and the '■' man of Spy " belonged to separate species. All these " osseous remains "

belong to the palaeolithic period, and from the cranial indices it is thus clear that palaeolithic man was long-headed. Neolithic man is, speaking generally, round-headed, and it has been urged that round-headedness is entirely synchronous with the neolithic age, and that the long-headed palaeolithic species of mankind gave place all at once to the round-headed neolithic species. The point thus raised involves the physiological as well as, indeed more than, the anatomical proofs of man's specific unity.

2. All physiologists agree that species cannot breed with species. Darwin himself laid it down as a fundamental principle. If then the palaeolithic and neolithic types represented separate species, they would be found to remain distinct through all time. This is not the case. There is evidence that extreme dolicho- cephaly continued into neolithic times, and was only slowly modified into brachycephaly. In the neolithic caves of Italy, Austria, Bejgium, and the barrows of Great Britain, skulls of all types are found. The later cave-dwellers and early dolmen builders of Europe were at first long-headed, then of medium type, and finally in some places exclusively round-headed. In England the round-heads appear to be synchronous with the metal age, as shown by the contents of the barrows, and, as on the continental mainland, the two types gradually blended. Permanent fertility between them in prehistoric Europe is thus proved. And this is the case throughout the habitable globe. An examination of the osseous remains of American man supports the view that the human species has not varied since quaternary times. The palaeolithic type is to be found among modern European populations. Certain skulls from South Australia seem cast in almost the same mould as the Neanderthal. After thousands of years nearly pure descendants of quaternary man are found among living races. And man's mutual fertility in prehistoric is repeated throughout historic times: strict racial purity is almost unknown. Thus the unity of the species man is proved by the test of fertility.

3. The works of early man everywhere present the most startling resemblance. The palaeolithic implements all over the globe are all of one pattern. " The implements in distant lands," writes Sir J. Evans, " are so identical in form and character with the British specimens that they might have been manufactured by the same hands. . . . On the banks of the Nile, many hundreds of feet above its present level, implements of the European types have been discovered; while in

Somaliland, in an ancient river- valley at a great elevation above the sea, Sir H.W. Seton-Karr has collected a large number of implements formed of flint and quartzite, which, judging from their form and character, might have been dug out of the drift-deposits of the Somme and the Seine, the Thames or the ancient Solent." This identity in the earliest arts is repeated in the later stages of man's culture; his arts and crafts, his manners and customs, exhibit a similarity so close as to compel the presumption that all the races are but divisions of one family. But perhaps the greatest psychical proof of man's specific unity is his common possession of language. Theodore Waitz writes : "Inasmuch as the possession of a language of regular grammatical structure forms a fixed barrier between man and brute, it establishes at the same time a near relationship between all people in psychical respects. ... In the presence of this common feature of the human mind, all other differences lose their import " (Anthropology, p. 273). As Dr J. C. Prichard urged, " the same inward and mental nature is to be recognized in all races of men. When we compare this fact with the observa- tions, fully established, as to the specific instincts and separate psychical endowments of all the distinct tribes of sentient beings in the Universe we are entitled to draw confidently the conclusion that all human races are of one species and one family." It has been argued that stock languages imply stock races, but this assumption is untenable. . There are some fifty irreducible stock languages in the United States and Canada, yet, taking into consideration the physical and moral homogeneity of the American Indian races, he would be a reckless theorist who held that there were therefore fifty separate human species. If it were so, how have they descended? There are no anthropoid apes in America, none of the ape family higher than the Cebidae, from which it is impossible to trace men. Again, in Australia there is certainly one stock language, yet there are not even Cebidae. In Caucasia, there are many distinct forms of speech, yet all the peoples belong to the Caucasic division of mankind.

Man, then, may be regarded as specifically one,and thus he must have had an original cradle-land, whence the peopling of the earth was brought about by migration. The evidence tends to prove that the world was peopled by a generalized proto-

human form. Each division of mankind would thus have had its pleistocene ancestors, and would have become differentiated into races by the influence of climatic and other surroundings. As to the man's cradle-land there have been many theories, but the weight of evidence is in favour of Indo-Malaysia.

Of all animals man's range alone coincides with that of the habitable globe, and the real difficulty of the " cradle-land " theory lay in explaining how the human race spread to every land. This problem has been met by geology, which proves that the earth's surface has undergone great changes since man's appearance, and that continents, long since submerged, once existed, making a complete land communication from Indo- Malaysia. The evidence for the Indo-African continent has been summed up by R. D. Oldham, 1 and proofs no less cogent are available of the former existence of an Eurafrican continent, while the extension of Australia in the direction of New Guinea is mare than probable. Thus the ancestor of man was free to move in all directions over the eastern hemisphere. The western hemisphere was more than probably connected with Europe and Asia, in Tertiary times, by a continent, the existence of which is evidenced by a submarine bank stretching from Scotland through the Faeroes and Iceland to Greenland, and on the other side by continuous land at what is now the Behring Straits.

Acclimatization has been urged as an argument against the cradle-land theory, but the peopling of the globe took place in inter-Glacial if not pre-Glacial ages, when the climate was much milder everywhere, and thus pleistocene man met no climatic difficulties in his migrations.

Probably before the close of Palaeolithic times all the primary divisions of man were specialized in their several habitats by the influence of their surroundings. The profound effect of climate is seen in the relative culture of races. Thus, tropical countries are inhabited by savage or semi-savage peoples, while the higher races are confined to temperate zones. The primary divisions of mankind, Ethiopic, Mongolic, Caucasic, were certainly differentiated in neolithic times, and these criteria had almost certainly occurred not consecutively in one area but simultane- ously in several areas. A Negro was not metamorphosed into a Mongol, nor the latter into a White, but the several semi-simian precursors under varying environments developed into general- ized Negro, generalized Mongol, generalized Caucasian.

Taking, then, these three primary divisions as those into

1 Writing in the Geographical Journal, March 1894, on " Evolution of Indian Geography," he says: " The plants of Indian and African coal measures are without exception identical, and among the few animals which have been found in India one is indistinguishable from an African species, another is closely allied, and both faunas are

characterized by the very remarkable genus group of reptiles comprising the Dicynodon and other allied forms (see Manual of Geology of India, 2nd ed. p. 203). These, however, are not the only analogies, for near the coast of South Africa there are developed a series of beds containing the plant fossils in the lower part and marine shells in the upper, known as the Uitenhage series, which corresponds exactly to the small patches of the Rajmahal series along the east coast of India. The few plant forms found in the lower beds of Africa are mostly identical with or closely allied to the Rajmahal species, while of the very few marine shells in the Indian outcrops, which are sufficiently well preserved for identification, at least one species is identical with an African form. These very close relationships between the plants and animals of India and Africa at this remote period appear inexplicable unless there were direct land communications between them over what is now the Indian Ocean. On the east coast of India in the Khasi Hills, and on the coast of South Africa, the marine fossils of late Jurassic and early cretaceous age are largely identical with, or very closely allied to each other, showing that they must have been inhabitants of one and the same great sea. In western India the fossils of the same age belong to a fauna which is found in the north of Madagascar, in northern and eastern Africa, in western Asia, and ranges into Europe ■ — a fauna differing so radically from that of the eastern exposures that only a few specimens of world-wide range are found in both. Seeing that the distances between the separate outcrops containing representatives of the two faunas are much less than those separating the outcrops from the nearest ones of the same fauna, the only possible explanation of the facts is that there was a continuous stretch of dry land connecting South Africa and India and separating two distinct marine zoological provinces."

which it is most reasonable broadly to divide mankind they may be analysed as to their racial constituents and their habitats as follows: —

1. Caucasic or White Man is best divided, following Huxley, into (a) Xanthochroi or " fair whites " and (ft) Melanochroi or " dark whites." (a) The first — tall, with almost colourless skin, blue or grey eyes, hair from straw colour to chestnut, and skulls varying as to proportionate width — are the prevalent inhabitants of Northern Europe, and the type may be traced into North Africa and eastward

as far as India. On the south and west it mixes with that of the Melanochroi and on the north and east with that of the Mongoloids. (6) The " dark whites " differ from the fair whites in the darkening of the complexion to brownish and olive, and of the eyes and hair to black, while the stature is somewhat lower and the frame lighter. To this division belong a large part of those classed as Celts, and of the popula- tions of Southern Europe, such as Spaniards, Greeks and Arabs, extending as far as India, while endless intermediate grades between the two white types testify to ages of intermingling. Besides these two main types, the Caucasic division of mankind has been held with much reason to include such aberrant types as the brown Polynesian races of the Eastern Pacific, Samoans, Hawaiians, Maoris, &c, the proto-Malay peoples of the Eastern archipelago, sometimes termed Indonesians, represented by the Dyaks of Borneo and the Battaks of Sumatra, the Todas of India and the Ainus of Japan.

2. Mongolic or Yellow Man prevails over the vast area lying east of a line drawn from Lapland to Siam. His physical charac- teristics are a short squat body, a yellowish-brown or coppery complexion, hair lank, straight and black, flat small nose, broad skull, usually without prominent brow-ridges, and black oblique eyes. Of the typical Mongolic races the chief are the Chinese, Tibetans, Burmese, Siamese; the Finnic group of races occupy- ing Northern Europe, such as Finns, Lapps, Samoyedes and Ostyaks, and the Arctic Asiatic group represented by the Chukchis and Kamchadales; the Tunguses, Gilyaks and Golds north of, and the Mongols proper west of, Manchuria; the pure Turkic peoples and the Japanese and Koreans. Less typical, but with the Mongolic elements so predominant as to warrant inclusion, are the Malay peoples of the Eastern archipelago. Lastly, though differentiated in many ways from the true Mongol, the American races from the Eskimo to the Fuegians must be reckoned in the Yellow division of mankind.

3. Negroid or Black Man is primarily represented by the Negro of Africa between the Sahara and the Cape district, including Madagascar, The skin varies from dark brown to brown-black, with eyes of the same colour, and hair usually black and always crisp or woolly. The skull is narrow, with orbital ridges not prominent, the jaws protrude, the nose is flat and broad, and the lips thick and everted. Two important families are classed in this division; some authorities hold, as special modifications of the typical Negro to-day, others as actually nearer the true generalized Negroid type of neolithic times. First are the Bushman of South Africa, diminutive in stature and of a yellowish-brown colour: the neighbouring Hottentot

is believed to be the result of crossing between the Bushman and the true Negro. Second are the large Negrito family, represented in Africa by the dwarf races of the equatorial forests, the Akkas, Batwas, Wochuas and others, and beyond Africa by the Andaman Islanders, the Aetas of the Philippines, and probably the Senangs and other aboriginal tribes of the Malay Peninsula. The Negroid type seems to have been the earliest predominant in the South Sea islands, but it is impossible to say certainly whether it is itself derived from the Negrito, or the latter is a modification of it, as has been suggested above. In Melanesia, the Papuans of New Guinea, of New Caledonia, and other islands, represent a more or less Negroid type, as did the now extinct Tasmanians.

Excluded from this survey of the grouping of Man are the aborigines of Australia, whose ethnical affinities are much disputed. Probably they are to be reckoned as Dravidians, a very remote blend of Caucasic and Negro man. For a detailed

discussion of the branches of these three main divisions of Man the reader must refer to articles under race headings, and to Negro; Negritos; Mongols; Malays; Indians, North American; Australia; Africa; &c, &c.

Bibliography. — J. C. Prichard, Natural History of Man (London, 1843), Researches into the Physical History of Mankind (5 vols., 1836-1847); T. H. Huxley, Man's Place in Nature (London, 1863), and " Geographical Distribution of Chief Modifications of Man-kind," in Journ. Anthropological Institute for 1870; Theodore Waitz, Anthropologie der Naturvolker (1859-1871); A. de Quatrefages, Histoire generate des races humaines (Paris, 1889); E. B. Tylor, Anthropology (1881); Lord Avebury, Prehistoric Times (1865; 6th ed., 1900) and Origin of Civilization (1870; 6th ed., 1902); F. Ratzel, History of Mankind (Eng. trans., 1897); A. H. Keane, Ethnology (2nd ed., 1897), an d Man: Past and Present (2nd ed., 1899); G. de Mortillet, Le Prehistorique (Paris, 1882; 3rd ed., 1900) ; D. G. Brinton, Races and Peoples (1890) ; J. Deniker, The Races of Man (London, 1900) ; Hutchinson's Living Races of Man- kind (1906).

ETHYL, in chemistry, the name given to the alkyl radical C_2H_5. The compounds containing this radical are treated under other headings; the hydride is better known as ethane, the alcohol, C_2H_6OH, is the ordinary alcohol of commerce, and the oxide $(C_2H_5)_2$ is ordinary ether.

ETHYL CHLORIDE, or Hydrochloric Ether, C 2 H 6 C1, a chemical compound prepared by passing dry hydrochloric acid gas into absolute alcohol. It is a colourless liquid with a sweetish burning taste and an agreeable odour. It is extremely volatile, boiling at 12-5° C. (54-5° F.), and is therefore a gas at ordinary room temperatures; it is stored in glass tubes fitted with screw- capped nozzles. The vapour burns with a smoky green-edged flame. It is largely used in dentistry and slight surgical opera- tions to produce local anaesthesia (q.v.), and is known by the trade-name kelene. More volatile anaesthetics such as anestile or anaesthyl and coryl are produced by mixing with methyl chloride; a mixture of ethyl and methyl chlorides with ethyl bromide is known as somnoform.

ETHYLENE, or Ethene, C 2 H 4 , or H 2 C:CH 2) the first repre- sentative of the series of olefine hydrocarbons, is found in coal gas. It is usually prepared by heating a mixture of ethyl alcohol and sulphuric acid. G. S. Newth (Jour. Chem. Soc, 1901, 79, p. 915) obtains a purer product by dropping ethyl alcohol into syrupy phosphoric acid (sp. gr. 1-75) warmed to 200 C, sub- sequently raising the temperature to 220 C. It can also be obtained by the action of sodium on ethylidene chloride (B. Tollens, Ann., 1866, 137, p. 311); by the reduction of copper acetylide with zinc dust and ammonia; by heating ethyl bromide with an alcoholic solution of caustic potash; by passing a mixture of carbon bisulphide and sulphuretted hydrogen over red-hot copper; and by the electrolysis of a concentrated solution of potassium succinate,

(CH 2 C0 2 K) 2 +2H 2 = C 2 H 4 +2C02|-2KOH-l-H 2 . It is a colourless gas of somewhat sweetish taste; it is slightly soluble in water, but more so in alcohol and ether. It can be liquefied at-i-i° C, under a pressure of 425 atmos, Itsolidifies at-181 C. and melts at-169 C. (K. Olszewski); it boils at -105° C. (L. P. Cailletet), or-io2° to-103 C. (K. Olszewski). Its critical temperature is 13 C, and its specific gravity is 0-9784 (air= 1). The specific gravity of liquid ethylene is 0-386 (3° C.). Ethylene burns with a bright luminous flame, and forms a very explosive mixture with oxygen. For the combustion of ethylene see Flame. On strong heating it decomposes, giving, among other products, carbon, methane and acetylene (M. Berthelot, Ann., 1866, 139, p. 277). Being an unsaturated hydrocarbon, it is capable of forming addition products, e.g. it combines with hydrogen in the presence of platinum black, to form ethane, C 2 H 6 , with sulphur trioxide to form carbyl sulphate, C 2 H.j(S03)2, with hydrobromic and hydriodic acids at ioo° C. to form ethyl bromide, C 2 H 5 Br, and ethyl iodide, C 2 H E I, with sulphuric acid at 160-170 C. to form ethyl sulphuric acid, C 2 H 5 -

HS04, and with hypochlorous acid to form glycol chlorhydrin, Cl-CH 2 -CH 2 -OH. Dilute potassium permanganate solution oxidizes it to ethylene glycol, HO-CH 2 -CH 2 -OH, whilst fuming nitric acid converts it into oxalic acid. Several compounds of ethylene and metallic

chlorides are known; e.g. ferric chloride in the presence of ether at 150° C. gives C 2 H4-FeCl 8 -2H 2 (J. Kachtler, Ber., 1869, 2, p. 510), while platinum bichloride in concentrated hydrochloric acid solution absorbs ethylene, forming the compound C 2 HrPtCl2 (K. Birnbaum, Ann., 1868, 145, p. 69).

ETIENNE, CHARLES GUILLAUME (1778-1845), French dramatist and miscellaneous writer, was born near Saint Dizier, Haute Marne, on the 5th of January 1778. He held various municipal offices under the Revolution and came in 1796 to Paris, where he produced his first opera, Le Rive, in 1799, in collaboration with Antoine Frederic Gresnick. Although Etienne continued to write for the Paris theatres for twenty years from that date, he is remembered chiefly as the author of one comedy, which excited considerable controversy. Les Deux Gendres was represented at the Theatre Francais on the nth of August 1810, and procured for its author a seat in the Academy. A rumour was put in circulation that Etienne had drawn largely on a manuscript play in the imperial library, entitled Conaxa, ou les gendres dupes. His rivals were not slow to take up the charge of plagiarism, to which Etienne replied that the story was an old one (it existed in an old French fabliau) and had already been treated by Alexis Piron in Les Fils ingrats. He was, however, driven later to make admissions which at least showed a certain lack of candour. The bitterness of the attacks made on him was no doubt in part due to his position as editor-in-chief of the official Journal de V Empire. His next play, L' Intrigante (18 12), hardly maintained the high "level of Les Deux Gendres; the patriotic opera L'Oriflamme and his lyric masterpiece Joconde date from 1814. Etienne had been secretary to Hugues Bernard Maret, due de Bassano, and in this capacity had accompanied Napoleon throughout his campaigns in Italy, Germany, Austria and Poland. During these journeys he produced one of his best pieces, Brueys et Palaprat (1807). During the Restoration Etienne was an active member of the opposition. He was seven times returned as deputy for the department of Meuse, and was in full sympathy with'the revolution of 1830, but the reforms

actually carried out did not fulfil his expectations, and he gradually retired from public life. Among his other plays may be noted: Les Deux Meres, Le Pacha de Suresnes, and La Petite Ecole des peres, all produced in 1802, in collaboration with his friend Gaugiran de Nanteuil (1 778-1830). With Alphonse Dieudonne Martainville (1779-1830) he wrote an Hisloire du Thedtre Francais (4 vols., 1802) during the revolutionary period. Etienne was a bitter opponent of the romanticists, one of whom, Alfred de Vigny, was his successor and panegyrist in the Academy. He died on the 13th of March 1845.

His CEuvres (6 vols., 1846-1853) contain a notice of the author by L. Thiesse.

ETIQUETTE, a term for ceremonial usage, the rules of be- haviour observed in society, more particularly the formal rules of ceremony to be observed at court functions, &c, the pro- cedure, especially with regard to precedence and promotions in an organized body or society. Professions, such as the law or medicine, observe a code of etiquette, which the members must observe as protecting the dignity of the profession and preventing injury to its members. The word is French. The O. Fr. estiquette or estiquet meant a label, or " ticket," the true English derivative. The ultimate origin is Teutonic, from sticken, to post up, stick, affix. Cotgrave explains the word in French as a billet for the benefit or advantage of him that receives it, a form of introduction and also a notice affixed at the gate of a court of law. The development of meaning in French from a label to ceremonial rules is not difficult in itself, but, as the New English Dictionary points out, the history has not been clearly established.

ETNA (Gr. KLtvtj, from aWu, burn; Lat. Aetna), a volcano on the east coast of Sicily, the summit of which is 18 m. N. by W. of Catania. Its height was ascertained to be 10,758 ft. in 1900, having decreased from 10,870 ft. in 1861. It covers about 460 sq. m., and by rail the distance round the base of the mountain is 86 m., though, as the railway in some places travels high, the correct measurement is about 91 m. The height cannot have

been very different in ancient times, for the so-called Torre del Filosofo, which is only 1188 ft. below the present summit, is a building of Roman date. The shape is that of a truncated cone, interrupted on the west by the Valle del Bove, a huge sterile abyss, 3 m. wide, bounded on three sides by perpendicular cliffs (2000 to 4000 ft.). Its south-west portion, which is the deepest, was perhaps the original crater. There are also some 200 subsidiary cones, some of them over 3000 ft. high, which have risen over lateral fissures. On

the slopes of the mountain there are three distinct zones of vegetation, distinguished by Strabo (vi. p. 273 ff.). The lowest, up to about 3000 ft., is the zone of cultivation, where vegetables, and above them where water is more scanty, vines and olives flourish. Owing to its extraordinary fertility it is dense y populated, having 930 inhabitants per sq. m. below 2600 ft., and 3056 inhabitants per sq. m. in the triangle between Catania, Nicolosi and Acireale. The next zone is the wooded zone, and is hardly inhabited, only a few isolated houses occurring. The lower part of it (up to about 6000 ft.) consists chiefly of forests of evergreen pines (Pinus nigricans), the upper (up to about 6800 ft.) of birch woods (Betula alba). A few oaks and red beeches occur, while chestnut trees grow anywhere between 1000 and 5300 ft. In the third and highest zone the vegetation is stunted, and there is a narrow zone of sub-Alpine shrubs, but no Alpine flora. In the last 2000 ft. five phanerogamous species only are to be found, the first three of which are peculiar to the mountain: Senecio Etnensis (which is found quite close to the crater), Anthemis Etnensis, Robertsia taraxacoides, Tanacetum vulgar e and A stragalus siculus. No trace of animal life is to be found in this zone; for the greater part of the year it is covered with snow, but by the end of summer this has almost all melted, except for that preserved in the covered pits in which it is stored for use for cooling liquids, &c, in Catania and elsewhere. The ascent is best undertaken in summer or autumn. From the village of Nicolosi, 9 m. to the N.W. of Catania, about 7 or 8 hours are required to reach the summit. Thucydides mentions eruptions in the 8th and 5th centuries B.C., and others are mentioned by Livy in 1 25, 121 and 43 B.C. Catania was overwhelmed in 1169, and many other serious eruptions are recorded, notably in 1669, 1830, 1852, 1865, 1879, 1886, 1892, 1899 and March 1910.

According to Lyell, Etna is rather older than Vesuvius — perhaps of the same geological age as the Norwich Crag. At Trezza, on the eastern base of the mountain, basaltic rocks occur associated with fossiliferous Pliocene clays. The earliest erup- tions of Etna are older than the Glacial period in Central and Northern Europe. If all the minor cones and monticules could be stripped from the mountain, the diminution of bulk would be extremely slight. Lyell concluded that, although no approxima- tion can be given of the age of Etna, " its foundations were laid in the sea in the newer Pliocene period." From the slope of the strata from one central point in the Val del Bue he further concluded that there once existed a second great crater of permanent eruption. The rocks erupted by Etna have always been very constant in composition, viz. varieties of basaltic lava and tuff

containing little or no olivine — the rock type known as labradorite. At Acireale the lava has assumed the prismatic or columnar form in a striking manner; at the rock of Aci it is in parts spheroidal. The Grotte des Chevres has been regarded as an enormous gas-bubble in the lava. The remarkable stability of the mountain appears to be due to the innumerable dikes which penetrate the lava flows and tuff beds in all directions and thus bind the whole mass together.

From the earliest times the mountain has naturally been the subject of legends. The Greeks believed it to be either the mountain with which Zeus had crushed the giant Typhon (so Pindar, Pyth. i. 34 seq.; Aeschylus, Prometheus Vinclus, 351 seq.; Strabo xiii. p. 626), or Enceladus (Virgil, Georg. i. 471; Oppian, Cyn. i. 273), or the workshop of Hephaestus and the Cyclopes (Cic. De divin. ii. 19; cf. Lucil., Aetna, 41 seq., Solin, 11). Several Roman writers, on the other hand, attempted to explain the phenomena which it presented by natural causes (e.g. Lucretius vi. 639 seq.; Lucilius, Aetna, 511 seq.). Ascents

of the mountain were not infrequent in those days — one was made by Hadrian.

See Sartorius von Waltershausen, Atlas des Atna (Leipzig, 1880); E. Chaix, Carta Volcanologica e topographica dell' Etna (showing lava streams up to 1892) ; G. de Lorenzo, L'Etna (Bergamo, 1907).

ETNA, a borough of Allegheny county, Pennsylvania, U.S.A., in the western part of the state, on the W. bank of the Allegheny river (about 5 m. from its junction with the Monongahela), and about 2 m. N. of the city of Pittsburg, of which it is a suburb. Pop. (1880) 2334; (1890) 3767; (1900) 5384 (1702 foreign-born); (1910) 5830. It is served by the Pennsylvania railway and by electric lines. Among its industrial establishments are .rolling mills, tube and pipe works, furnaces, steel mills, a brass foundry, and manufactories of electrical railway supplies, boxes, asbestos coverings, enamel work and ice. The city's industrial history dates from 1 8 20, when a small factory for the manufacture of scythes and sickles was set up. Natural gas, piped from Butler county, was early used here as a fuel in the iron mills. Etna, formerly called Steuart's Town, was incorporated as a borough in 1869.

ETON, a town of Buckinghamshire, England, on the north (left) bank of the river Thames, opposite Windsor, within which parliamentary borough it is situated. Pop. of urban district (1901) 3301. It is famous for its college, the largest of the ancient English public schools. The " King's College of Our Lady of Eton beside Windsor " was founded by Henry VI. in 1440-1441, and endowed mainly from the revenues of the alien priories sup- pressed by Henry V. The founder followed the model established by William of Wykeham in his foundations of Winchester and New College, Oxford. The original foundation at Eton consisted of a provost, 10 priests, 4 clerks, 6 choristers, a school- master, 25 poor and indigent scholars, and the same number of poor men or bedesmen. In 1443, however, Henry considerably altered his original plans ; the number of scholars was increased to 70, and the number of bedesmen reduced to 13. A con- nexion was then established, and has been maintained ever since, though in a modified form, between Eton and Henry's foundation of King's College, Cambridge. One of the king's chief advisers was William of Waynflete, who had been master of Winchester College, and was appointed provost of Eton in 1443. Among further alterations to the foundation in this year was the establish- ment of commensales or commoners, distinct from the scholars; and these under the name of " oppidans " now form the principal body of the boys. The college survived with difficulty the un- settled period at the close of Henry's reign; while Edward IV. curtailed its possessions, and was at first desirous of amalgamat- ing it with the ecclesiastical foundation of St George, Windsor Castle. In 1506 the annual revenue amounted to £652; and through benefactions and the rise in the value of property the college has grown to be very richly endowed. In 1870 com- missioners under an act of 1868 appointed the governing body of the college to consist of the provost of Eton, the provost of King's College, Cambridge, five representatives nominated re- spectively by the university of Oxford, the university of Cam- bridge, the Royal Society, the lord chief justice and the masters, and four representatives chosen by the rest of the governing body. By this body the foundation was in 1872 made to consist of a provost and ten fellows (not priests, but merely the members of the governing body other than the provost), a headmaster of the school, and a lower master, at least seventy scholars (known as " collegers "), and not more than two chaplains or conducts. Originally it was necessary that the scholars should be born in England, of lawfully married parents, and be between eight and sixteen years of age; but according to the statutes of 1872 the scholarships are open to all boys who are British subjects, and (with certain limitations as to the exact date of birth) between twelve and fifteen years of age. A

number of foundation scholarships for King's College, Cambridge, are open for com- petition amongst the boys; and there are besides several other valuable scholarships and exhibitions, most of which are tenable only at Cambridge, someat Oxford, and some at either university. The teaching embraces the customary range of classical and

modern subjects; but until the first half of the 19th century the normal course of instruction remained almost wholly classical; and although there were masters for other subjects, they were unconnected with the general business of the school, and were attended at extra hours.

The school buildings were founded in 144 1 and occupied in part by 1443, but the whole original structure was not completed till fifty years later. The older buildings consist of two quad- rangles, built partly of freestone but chiefly of brick. The outer quadrangle, or school-yard, is enclosed by the chapel, upper and lower schools, the original scholars' dormitory (" long chamber "), now transformed, and masters' chambers. It has in its centre a bronze statue of the royal founder. The buildings enclosing the inner or lesser quadrangle contain the residence of the fellows, the library, hall and various offices. The chapel, on the south side of the school-yard, represents only the choir of the church which the founder originally intended to build; but as this was not completed Waynflete added an ante-chapel. The chapel was built upon a raised platform of stone, as was the hall, in order to lift it above the flood-level of the Thames. It contains some interesting monuments of provosts of the college and others, and at the west end of the ante-chapel is a fine marble statue of the founder in his royal robes, by John Bacon. A chantry contains the tomb of Roger Lupton (provost 1503-1535), whose most notable monument is the fine tower between the school- yard and the cloisters to the east; though other parts of his building also remain. The space enclosed by two buttresses on the north side of the chapel, at the point where steps ascend to the north door, is the model of the peculiar form of court for the game of fives which takes name from Eton, with its " but- tress " (represented by the projecting balustrade), the ledges round the walls, and the step dividing the floor into two levels. From the foundation of the college the chapel was used as the parish church until 1854, and not until 1875, after the alteration of the ancient constitution had secularized the foundation, was the parish of Eton created into a separate vicarage. The chapel does not accommodate the whole school; and a new chapel, from the designs of Sir Arthur Blomfield, is used by the lower school. The library contains many manuscripts (notably an Oriental

and Egyptian collection) and rare books ; and there is also a library for the use of the boys. The college in modern times has far outgrown its ancient buildings, and new buildings, besides the lower chapel, include the new schools, with an observatory, a chemical laboratory, science schools and boarding- houses. In 1908 King Edward VII. opened a fine range of build- ings erected in honour of the Old Etonians who served in the South African War, and in memory of those who fell there. The architect was Mr L. K. Ball, an old [Etonian. The buildings include a school hall, a domed octagonal library, and a classical museum.

The principal annual celebration is held on the 4th of June, the birthday of King George III., who had a great kindness for the school. This is the speech-day; and after the ceremonies in the school a procession of boats takes place on the Thames. In the sport of rowing Eton occupies a unique position among the public schools, and a large proportion of the oarsmen in the annual Oxford and Cambridge boat-race are alumni of the school. Another annual celebration is the occasion of the contest between collegers and oppidans at a peculiar form of football known as the wall game, from the fact that it is played against a wall bordering the college playing-field. This game takes place on St Andrew's Day, the 30th of November. The field game of football commonly played at Eton has also peculiar rules. The annual cricket match between Eton and Harrow schools, at Lord's ground, London, is always attended by a large and fashionable gathering. A singular custom termed the Montem, of unknown origin, but first mentioned in 1561, was observed here triennially on Whit- Tuesday. The last celebration took place in 1844, the ceremony being abolished just before it fell due in 1847. It consisted of a procession of the boys in a kind of military order, with flags and music, headed by their " captain," to a small mound called Salt Hill, near the Bath road, where they levied contributions,

or "salt," from the passers-by and spectators. The sum collected sometimes exceeded £iooo-ˆthe surplus, after deducting certain expenses, becoming the property of the captain of the schooL The average number of pupils at Eton exceeds iooo.

See E. S. Creasy, Memi irs of Eminent Etonians, with Notices of the Early History of the College (1850); Sketches of Eton (1873); Sir H. C. Maxwell Lyte, History of Eton College from 1440 to 1875 (1875)

> J. Heneage Jesse, Memoirs of Celebrated Etonians (1875) ; The Eton Portrait Gallery, by a Barrister of the Inner Temple (1875) ; A. C. Benson, Fasti Etonienses (1899) ; L. Cust, History of Eton College

(1899).

ETRETAT, a watering-place of France, in the department of Seine-Inferieure, on the coast of the English Channel, 163 m. N. by E. of Havre by road. Pop. (1906) 1982. It is situated between fine cliffs in which, here and there, the sea has worn archways, pinnacles and other curious forms. The small stream traversing the valley, at the extremity of which Etretat lies, flows underground for some distance but rises to the surface on the beach. A Roman road and aqueduct and other Roman and Gallic remains have been discovered. The church of Notre- Dame, a Romanesque building, with a nave of the 1 ith century and a central tower and choir of the 13th century, is a fine example of the Norman architecture of those periods. Fishing is carried on, though there is no port and the fishermen haul their boats up the beach ; the old hulks (caloges) serve as sheds and even as dwellings. Etretat sprang into popularity during the latter half of the 19th century, largely owing to the frequent references to it in the novels of Alphonse Karr.

ETRURIA, an ancient district of Italy, the extent of which varied considerably, and, especially in the earliest periods, is very difficult to define (see section Language). The name is the Latin equivalent of the Greek Hvpprjvia or Tvpcrivla, which is used by Latin writers also in the forms Tyrrhenia, Tyrrhenii; the Romans also spoke of Tusci, whence the modern Tuscany (q.v.). In early times the district appears to have included the whole of N. Italy from the Tiber to the Alps, but by the end of the 5th century B.C. it was considerably diminished, and about the year 100 B.C. its boundaries were the Arnus (Arno), the Apennines and the Tiber. In the division of Italy by Augustus it formed the seventh regio and extended as far north as the river Macra, which separated it from Liguria.

History. — The authentic history of Etruria is very meagre, and consists mainly in the story of its relations with Carthage, Greece and Rome. At some period unknown, prior to the 6th century, the Etrurians became a conquering people and extended their power not only northwards over, probably, Mantua, Felsina, Melpum and perhaps \Hadria and Ravenna (Etruria Circumpadana), but also southwards into Latium and Campania. The chronology of this expansion is entirely unknown, nor can we recover with certainty the names of the cities which con- stituted the two leagues of twelve

founded in the conquered districts on the analogy of the original league in Etruria proper (below). In the early history of Rome the Etruscans play a prominent part. According to the semi-historical tradition they were the third of the constituent elements which went to form the city of Rome. The tradition has been the subject of much controversy, and is still an unsolved problem. It is practically certain, however, that there is no foundation for the ancient theory (cf. Prop. iv. [v.] 1. 31) that the third Roman tribe, known as Luceres, represented an Etruscan element of the population, and it is held by many authorities that the tradition of the Tarquin kings of Rome represents, not an immigrant wave, but the temporary domination of Etruscan lords, who extended their conquests some time before 600 B.C. over Latium and Campania. This theory is corroborated by the fact that during the reigns of the Tarquin kings Rome appears as the mistress of a district including part of Etruria, several cities in Latium, and the whole of Campania, whereas our earliest picture of re- publican Rome is that of a small state in the midst of enemies. For this problem see further under Rome: History, section " The Monarchy."

After the expulsion of the Tarquins the chief events in Etruscan history are the vain attempt to re-establish themselves in Rome

under Lars Porsenaof Clusium.the defeat of Octavius Mamilius, son-in-law of Tarquinius Superbus, at Lake Regillus, and the treaty with Carthage. This last event shows that the Etruscan power was formidable, and that by means of their fleet the Etruscans held under their exclusive control the commerce of the Tyrrhenian Sea. By this treaty Corsica was assigned to the Etruscans while Carthage obtained Sardinia. Soon after this, decay set in. In 474 the Etruscan fleet was destroyed by Hiero I. (q.v.) of Syracuse; Etruria Circumpadana was occupied by the Gauls, the Campanian cities by the Samnites, who took Capua (see Campania) in 423, and in 396, after a ten years' siege, Veii fell to the Romans. The battle of the Vadimonian Lake (309) finally extinguished Etruscan independence, though for nearly . two centuries still the prosperity df the Etruscan cities far exceeded that of Rome itself. Henceforward Etruria is finally merged in the Roman state.

Etktjscan Antiquities

The large recent discoveries of Etruscan objects have not materially altered the conclusions arrived at a generation ago. It is not so much our appreciation of the broad lines of the manners and arts of the Etruscans that has altered as our understanding of the geographic

and social causes which made them what they were. One great difficulty in the study of the remains is that a very large portion of them have been found by unofficial excavators who have been naturally unwilling to tell whence they came, and that certain other excavations, such as those carried out by Comm. Barnabei for the Villa Giulia museum, have been carried out under conditions which help but little towards increasing our knowledge. 1 The increase has, however, , been steady, even if not all one could wish.

Ethnology.— The origin of the Etruscans will most likely never be absolutely fixed, 2 but their own tradition (Tacitus, Ann. iv. 55) that they came out of Lydia seems not impossible. Hero dotus (i. 94) and Strabo (v. 220) tell of Lydians landing at the mouth of the Po and crossing the Apennines into Etruria. Thus it seems certain that though the earliest immigrants, known to the later Etruscans as the Rasena, may have come down from the north, still they were joined by a migration from the east before they had developed a civilization of their own, and it is this double race that became the Etruscans as we know them in tradition and by their works. To give a date to the migration of the Rasena from the north, for which the only evidence is the fact that the Etruscan language is found in various parts of north Italy, 3 is impossible, but we can perhaps give an approximate one to the coming of the Lydians or Tyrrhenians (Thuc. iv. 109; Herod, i. 57). We know that there was a great wave of migration from Greece to Italy about 1000 B.C., and as the earliest imported Greek objects found in the tombs cannot be dated many generations later than this, this year may be considered as giving us roughly the time when the real Etruscan civilization began.

It has been, and still is, a common mistake to speak of the Etruscans as though they were closely confined to that part of Italy called Etruria on the maps, but it is quite certain that in the early stages of their development they were differentiated from the Umbrians on the north-east and the Latins on the south in ways due rather to the locality than to race or essential character. 4 To primitive peoples open seas or deserts are a greater hindrance to intercourse than mountains or rivers, and even these did not cut off Etruria from the neighbouring regions of Italy. The Apennines that separated her from Umbria were not difficult to cross, and the Tiber which formed the boundary

1 For Barnabei's excavations see Fausto Benedetti, Gli Scam di Narce ed il Museo di Villa Giulia (1900).

2 For a further discussion see ad fin., section Language.

3 See Pauli, Altitalische Forschungen, vol. i. ; also sect. Language (below).

4 Cf. the contents of the graves found by Boni in the Roman Forum (Notizie degli Scavi, 1902, 1903, 1905) with the objects represented in the plates of Montelius, La Civilisation primitive en Italie, pt. i. For the cemeteries at Novilara cf. Brizio, Monumenti antichi, vol. v.

between her and Latium has been a far greater element of separation in the minds of modern authors than it ever was in reality. Narrow, not particularly swift, often shallow, such a stream can never have caused more than a moment's delay to the hardy Etruscans. When Rome was founded, the river of course could be used like a moat round a castle as a means of defence, but that is very different from its being a permanent bar to the spread of a given culture. The fact that the alphabets used in other parts of Italy besides Etruria are derived from the Etruscan or from similar Grecian sources, that Rome was ruled by Etruscan kings, that the temple of Jupiter on the Capitoline was decorated by Etruscan artists (Livy x. 23; Pliny, H.N. xxxv. 157), that the decorations of the temple found by Signor Mazzoleni near Conca (Notizie degli scavi, 1896) are of the same kind as others found in Etruria, show that the influences which grew to their clearest development in the region west of the Tiber had a marked effect over a broader region than is usually ad- mitted. This too was the belief of the Greek historians, many of whom considered Rome as a Tyrrhenian city. 1

Cities and Organization. — The chief cities of Etruria proper were Veii, Tarquinii, Falerii, Caere, Volci, Volsinii, Clusium, Arretium, Cortona, Perusia, Volaterrae (Volterra), Rusellae, Populonium and Faesulae. That the country was thickly settled is made plain by the ruins that have been found. It was governed by kings who were elected for life, but whose power depended largely on the leaders (lucumones) of the separate states or regions and on the aristocracy (Censorinus, De die natali, iv. 13). Later the office of king was abolished and re- placed by annual magistrates (Livy v. 1). Below the aristocracy came the free people, who were divided into curiae (Serv. ad Aen. x. 202), and then the slaves. There can be little doubt

that the early organization of the people at Rome was typical of Etruria (Niebuhr, Rom. Gesch. 2nd ed. i. 389).

‘ A league of twelve cities is mentioned by the ancients (Livy iv. 23), whose delegates met at the temple of Voltumna, but we are not told which cities formed the league, and there can be little doubt that the list changed from time to time. A glance at the map makes clear some of the general relations of these cities to one another and to the outer world. They are well spread all over the country, and by no means only along the coast. None of the important ones is among the mountains. This means that the earliest inhabitants of the country were not roving traders like the Mycenaean Greeks, and that the cities drew their wealth and strength from agricultural pursuits, for which the country was well suited, as the three rivers, Arnus, Umbro and Tiber, with their feeders (not to mention several lesser streams) , channel it in all directions. We get a hint as to the government of the cities from the fact that many of the Roman forms and apanages of office were derived from the Etruscans (Dion. Hal. iii. 61); for instance, the diadem worn by those honoured with a triumph, the ivory sceptre and the embroidered toga (Tertull.De Cor. 13) , and so too the golden bulla and the praetexta (Festus, s.v. ” Sardi “)• Such things give us an idea as to the aristocratic basis of the government. Of the actual laws we know something also. Cicero (Div. ii. 23) tells the story of the miraculous uncovering by a ploughboy of a child who had the wisdom of a sage, and how the child’s words were written down by the amazed folk, and became their archives and the source of their law. Coming down to historic times we find that their code, known as the libri disciplinae Etruscae, consisted of various parts (Festus, s.v. “Ritualis”). There were the libri haruspicini (Cic. Div. i. 33, 72), which dealt with the interpretation of the will of the gods by means of sacrifice; the libri fulgurates, which explained the messages of the gods in the thunder and lightning; and finally the libri rituales, which held the rules for the conduct of daily life — how to found cities, where to place the gates, how to take the census, and the general ordering of the people both in peace and war.

Natural Resources and Commerce. — Such was the country

1 tvv re ‘Paipriv abrrif tuv ffvyy pa(f>koiv TvppfjvlSa t6\iv eli>ai far£Xa$ov, Dion Hal. i. 29; but see sect. Language for meaning of “Yvppyvia.

and such the laws. The people were a warrior stock with little commercial skill. Much of their wealth was due to trade, but they were not the restless, conquering blood that goes in search of new

markets. They waited for the buyers to come to them. That their wealth and consequent power were gathered con- temporaneously with that of Greece is shown by various facts. One of these is that Dionysius of Phocaea settled in Sicily after the Ionian revolt (in which his native city took part) had been quelled by Darius, and thence harried the Etruscans (Herod, vi. 17). Their power is also shown by the fact that they made an alliance with the Carthaginians, with the result that they obtained control of Corsica (Herod, i. 166), and this union con- tinued for many generations. 2 That this treaty was no excep- tional one is shown by Aristotle {Pol. iii. 96, Op. ii. 261), who says that there were numerous treatises, concerning their alliances and mutual rights, between the two peoples. That the Greeks held the Etruscans in. considerable dread is suggested by the fact that Hesiod (Theog. ion foil.) names one of their leaders Agrios, " the Wild Man," and by the fear they had of the straits of Messina, where they imagined Scylla and Charybdis, which, unless the whirlpools were of very different character then than now, were as likely to be the pirate bands of Carthaginians and Etruscans who guarded the channel. And this explanation is strengthened by Euripides (Med. 1342, 1359), whose Medea compares herself to " Scylla, who dwells on the Tyrrhenian shore." The wealth that was the source of this power of the Etruscans must in the main have been drawn from agriculture and forestry. ' The rich land with its many streams could scarcely be surpassed for the raising of crops and cattle, and the hills were heavily timbered. That it was such material as this, which leaves no trace with the passing of time, that they sold cannot be doubted, for there is plenty of evidence that their country was visited by foreign traders of many lands, and that ■they bought largely of them, especially of metals. Metals also suggest that another source of their wealth was that of the middleman. Their towns were the centres of exchange, where the north and west met the south and east. They had no mines of gold or tin, but the carriers of tin, iron or amber 3 from the north met in the markets of Etruria the Phoenician and Greek merchants bringing gold and ivory and the other luxuries of the East. The quantities of gold, silver and bronze found in Etruscan tombs prove this clearly. Of these metals the only one found in unworked form, in what are practically pigs, is bronze. This in the form of aes rude has frequently been found in con- siderable quantities, and the larger and better formed bits of metals known as aes signatum are not rare. Both forms are usually spoken of as the earliest forms of money, but as the aes rude generally bears no marks of valuation or of any mint, and as the aes signatum is far too large and heavy for ordinary circulation, it is probable that these shapes of metal are not to be considered strictly or alone as coins,

but as forms given to the alloy of tin and copper made and sold by the Etruscans to the foreigners for purposes of manufacture. This of course does not exclude their use as money. Where the copper for this bronze came from is not certain, but probably a great part was from the mines at Volaterrae. Still another proof that what the Etruscans sold was the product of their fields or crude metals imported from the north, is the fact that though in the museum at Carthage and elsewhere there are a few vases and other objects which probably come from Etruria, still such objects are extremely uncommon. On the other hand, articles obviously imported from the East are by no means uncommon in Etruria. Such are the ostrich shells from Volci, 4 the Phoenician cups from

2 For the wars of the Greeks against the Carthaginians and the Etruscans see Busolt, Griechische Geschichte, ii. 218 ff.

3 Pliny (H.N. xxxvii. 11). He says that amber was brought by the Germans down the valley of the Po. Thence the trade-route crossed the Apennines to Pisa (Scylax in Geographi minores, ed. Didot, i. p. 25). In the consideration of problems suggested by amber it is too often forgotten that a very beautiful dark amber is found in Sicily.

4 Montelius, Civilization primitive en Italie, ii. pi. 265 ; cf . Petrie, Naukratis, i. pi. 20, fig. 15, and Perrot-Chipiez, Histoire de I'art, iii.

Palestrina, 1 the Egyptian glazed vases and scarabs found on more than one site. 2 All this goes to show that the Etruscans lacked in their earlier days skilful workers in the arts and crafts.

Habits and Customs. — The lack of literary remains of the Etruscans does not cramp our knowledge of their habits as much as might be supposed, owing to the numerous paintings that are left. These paintings are on the walls of the tombs at Veii, Corneto, Chiusi (Clusium), and elsewhere, 3 and give a varied picture of the dress, utensils and habits of the people. The evidence of many ancient authors cannot be questioned that as a race the Etruscans in historic times were much given to luxurious living. So much so in fact that Virgil (Georg. ii. 193) speaks of the pinguis Tyrrhenus (a trumpeter at the altar) and Catullus (xxxix. n) of the obesus Etruscus. Diodorus (v. 40) gives a succinct account in which he says that "

their country was sq fertile they derived therefrom not only sufficient for their needs but enough to supply them with luxuries. Twice a day they partook of elaborate repasts at which the tables were decked with embroidered cloths and vessels of gold and silver. The servants were numerous and noticeable for the richness of their attire. The houses, too, were large and commodious. In fact, giving themselves up to sensuous enjoyments they had naturally lost the glorious reputation their ancestors had won in war." This last remark shows that Diodorus recognized the important difference between the early Etruscans who built up the country and the later ones who merely enjoyed it. Naturally courtesans flourished in such a community. Timaeus and Theopompus tell how the women lived and ate and even exercised with the men (Athen. xii. 14; cf. iv. 38), habits which of course gave the Roman satirists many openings for attack (Plaut. Cist. ii. 3. 563; cf. Herod, i. 98; Strabo xi. 14). In dress they differed but little from the Romans, both wearing the toga and the tunic. Hats too, often of pointed form, were common (Serv. ad Aen. ii. 683), as the paintings show, but it was their shoes for which they were particularly famous. One author (Lydus, de Magistr. i. 17. 36) suggests that Romulus borrowed from Etruria the type of shoe he gave the senators, and this may well be true, though the form mentioned, the kampagus, is of late origin. At any rate oavbaKia. Tvppnvuca are frequently mentioned. From the pictures and remains we know that they had wooden soles strengthened with bronze, and that the uppers were of leather and bound with thongs.

Their occupations of trade and agriculture have been already mentioned. For their leisure hours they had athletic games including gladiatorial shows (Athen. iv. 153; cf. Livy ix. 40. 7; Strabo v. 250), hunting, music and dancing. All these are shown in the tomb pictures, and all, with the exception of the hunting, developed first as a part of religious service, and their importance is shown by the strictness of the rules that governed them (Cicero, De harusp. resp. ii. 23). Did a dancer lose step, or an attendant lift his hand from the chariot, the games lost their value as a religious service. An idea of the splendour of the triumphs that accompanied victorious generals and of the parades at the games is given by Appian (De reb. Punic, viii. 66) and Dionysius (vii. 92). The music that was an accompaniment of all their occupations, even of hunting (Aelian, De natur. anim. xii. 46), was mainly produced by the single or double flute, the mastery of which by the Etruscans was known to all the world. They also had small harps and trumpets.

For the regularization of all these duties and pleasures there was a calendar and time-division for the day. It is noteworthy that the

beginning of the day was for them the moment when the sun was at the zenith (Serv. ad Aen. v. 738). In this they differed from the Greeks, who began their day with the sunset, and the Romans, who reckoned theirs from midnight. The weeks were of eight days, the first being market day and the day when the people could appeal to the king, and the months were lunar.

1 Monumenli dell' Inst. Arch. Rom. x. pi. 31; Museo Etrusco Vaticano, i. pi. 63-69; cf. Annali dell' Inst. Arch., 1896, p. 199 ff.

2 Vase with hieroglyphs found at Santa Marinella, Boltettino del- i' Inst. Arch., 1 841, p. in; Mon. antichi, viii. p. 88.

3 G. Dennis, Cities and Cemeteries of Etruria.

The years were kept numbered by the annual driving of a nail into the walls of the temple of Nortia at Volsinii (Livy vii. 3. 7), a custom later adopted by the Romans, who used the Capitoline temple for the same purpose. In Rome this rite was performed on the Ides of September, and it is likely that it took place in Etruria on the same date, the natural end of the year among an agricultural folk. A still longer measure of time wasthtsaeculum, which was supposed to be the length of the longest life of all those born in the year in which the preceding oldest inhabitant died (Censorinus, De die natali, 17. 5; cf. Zosimus ii. 1). Accord- ing to later writers 4 the Etruscan race was to last ten saecula, and the emperor Augustus in his memoirs (Serv. ad. Bucol. ix. 47) says that the comet of the year 44 B.C. was said by the priests to betoken the beginning of the tenth saeculum. The earliest saecula had been, according to Varro, 100 years long. The later ones varied in length from 105 to 123 years. The round number 100 is obviously an ex post facto approximation, and the accuracy of the others is probably more apparent than real, but if we reckon back some 900 years from the date given by Augustus we arrive at just about the time when the archaeological evidence leads us to believe that the Etruscans in Italy were beginning to recognize their individuality.

Religion. — To retrace the religious development of the Etruscans from its mystic beginnings is beyond our power, and it is unlikely that any future discoveries will help us much. We are, however, able to draw a clear, if not a detailed, picture of the worship paid to the various divinities, partly from the direct infor- mation we have concerning them and partly from the analogies which may safely be drawn between them and the Romans.

The frequency of sacrifice among them and their belief in the short duration of the race 5 show clearly their belief in a good and a bad principle, and the latter seems to have been pre- dominant in their minds. Storms, earthquakes, the birth of deformities, all gave evidence of evil powers, which could be appeased sometimes only by human sacrifice. We miss here the Greek joy in human life and the beauties of earth. The gods (aesar) were divided into two main groups, the Dii Consentes and a vaguer set of powers, the Dii Involuti (Seneca, Quaest. Nat. ii. 41), to whom even Jupiter bowed. They all dwelt in various parts of the heavens (Martianus Capella, De nupt. Phil. i. 41 ff.). Of the Dii Consentes the most important group consisted of Jupiter (Tinia), Juno (Uni) and Minerva (Menrva). In some towns, such as Veii and Falerii, Juno was the chief deity, and at Perusia she was worshipped like the Greek Aphrodite in conjunction with Vulcan (the Greek Hephaestus) . This shows that though in exterior form the Etruscan gods were influenced by the Greeks, still their character and powers betoken different beliefs. An interesting point to note about Minerva (Menrva) is that she was the goddess of the music of flutes and horns. The myth of Athena and Marsyas probably originated in Asia Minor, and a Pelasgian Tyrrhenian founded in Argos the temple of Athena Salpinx (Paus. ii. 21. 3). The evident connexion between Asia Minor and Etruria in these facts cannot be over- looked. Besides these deities there were Venus (Turan) , Bacchus (Fufluns), Mercury (Turms), Vulcan (Sethlans). Of these, Seth- lans is in a way the most important, for he shows a connexion in prehistoric times between Etruria and the East. 6 Other deities of Greek origin there were — Ares, Apollo, Heracles, the Dioscuri; in fact, as the centuries passed, the Greek divinities were adopted almost without exception. Besides these there were also many gods of Latin or Sabine origin, of whom little is known but their names; these may often be local appellations for the same god. Among these were Voltumna at Volsinii and Vertumnus at Rome, Janus, Nortia, goddess of Fortuna, Fgronia, whose temple was at a town of the same name at the foot of Soracte, 7 Mantus, Pales, Vejovis, Eileithyia and Ceres.

4 Varro ap. Serv. ad Aen. viii. 526 ; see Helbig, Bull, dell' Inst. Arch.

(1876), 227.

6 Censorinus, De Die Nat. 17.

6 See Prellc, Rom. Myth. s.v. " Volcanus." Opposed to this see Wissowa, Religion u. Kultus der Romer, who seems to misinterpret the evidence.

7 Strabo v. 2. 39; cf. Livy i. 30; Dion. Hal. iii. 32.

Such were the leading gods; in addition there was the world of spirits whom we know in Rome as the Manes, Lares and Penates. The latter were of four classes, pertaining to Jove, Neptune, the gods of the lower world, and to men. 1 The Lares too were of various sorts (familiares, compitales, viales) , and with them the souls of the dead, after the performance of due expiatory rites, took their place as dii animates (Serv. ad Aen. iii. 168 and 302). The Manes are the vaguest group of all and were confined almost wholly to the lower world (Festus, s.v. " Mundus " ; Apuleius, De deo Socratis). Over all these ruled Mantus and Mania, the counterparts of Pluto and Persephone in Greece. As a result of this complete hierarchy of divine powers the priesthood of Etruria was large, powerful, and of such fame that Etruscan haruspices were sent for from distant places to interpret the sacrifices and the oracles (Livy v. i. 6, xxvii. 37. 6).

Art. — The evidence drawn from tradition and custom which we have so far considered in relation to the origin and beliefs of the Etruscans has taken us into the prehistoric times much earlier than those when the handicrafts developed into true fine arts. The contents of the earliest graves 2 show but few traces of any feeling for art either in architecture or in the lesser forms of household and personal decoration. Gradually, however, as one comes down towards the more fixed historic periods, certain objects, obviously imported from the eastern Mediterranean, occur, and these are the first signs of an interest in the beauty or curiosity of things, an interest that local workmen could not yet satisfy, but which stirred them to endeavour. It was probably during the 9th century that this began, not long after the period when foreign trade began to flourish.

The history of Etruscan art has usually been wrongly estimated owing to the widespread delusion that objects found in Etruria were in the true sense products of native artists and indicative of native-grown culture. It is only recently, and not even yet completely, that the term " Etruscan" has been given up as the name for the terra-cotta vases (which were found in the 19th century by the earlier archaeologists of the modern scientific school in great quantities in the Etruscan tombs); these are now known to have been made by

Greek potters. There are few books on the subject of Etruscan art. The best known is Jules Martha's L' Art etrusque (2nd ed., 1889), a book which, though full of accurate data, shows absolute lack of discrimination between those works that are of Etruscan fabric and those that were brought from other lands, particularly Greece and the Greek colonies of Magna Graecia and Sicily. These latter are too generally forgotten in the study both of Greek and of Etruscan art, and all works which show the Greek spirit are vaguely supposed to have been produced on the Greek mainland. As much of the following must be to some extent controversial in character, a concrete illustration may serve to prevent mis- conception as to this important distinction. The beautiful throne in the Ludovisi collection representing the birth of Aphrodite is commonly spoken of as though made by some sculptor in Greece. It seems at least as likely that it comes from Sicily. Not only is the character of the modelling similar to what we find on Sicilian sculptures and coins, and not quite so sharp as on most works from Greece, but there is a lyrical feeling for nature in the pose of the figures and in the pebbled soil on which the main group stands, which seems to answer to the Sicilian feeling as we know it in poetry rather than to the Greek.

The houses of the earliest times were, to judge by the burial urns known from their shape as hut-urns, small single-room constructions of rectangular plan similar to certain types of the capanne used by the shepherds to-day. Probably the walls were wattled and the roofs were certainly thatched, for the urns show plainly the long beams fastened together at the top and hanging from the ridge down each side. Tombs cut in the rock offer other and later models of

1 Nigidius Figulus ap. Arnob. adv. Nat. iii. 40; cf. Nig. Fig. reliquiae, ed. Ant. Swoboda (1888), p. 83.

2 Montelius, Civ. Prim, en Italie.

house construction, but give no suggestion that the Etruscans had any artistic sense in architecture. Such tombs are mostly later than the 5th century B.C., and show the most simple form of wood construction. Posts or columns hold up the walls and the sloping roofs, the latter made of beams with boards laid lengthwise, covered by others from ridge to eave, the intervening space forming a coffer, sometimes decorated. Though the walls of such tombs are often covered with paintings, the relation of the various parts (and, let it be remembered, these tombs represent the houses of the living) shows

but the coarsest sense of proportion. The elements of the decoration, such as capitals, mouldings, rosettes, patterns, are borrowed from Greece, Egypt or elsewhere, and are used redundantly and with no refinement. 3

The temples did not differ from those in Greece in any essential principal of construction except that they were generally square, from the desire to make them answer to the iemplum or quadri-partite division of the heavens elaborated by the priests. In Roman time " Etruscan style " was the term used for colonnades with wide intercolumniations, and this shows how the early builders used wood with its possibility of long architrave beams rather than stone as in Greece. The interior arrangements of the temple also varied from the Grecian models, for owing to the fact that the gods of Etruria were often worshipped in groups of three the cella was divided into three chambers. The decoration — metopes, friezes, acroteria, &c. — was of terra-cotta fastened by nails to the wooden walls.*

Though we know that the Etruscans were famous for their games, 4 still there are no remains of circi, and so too, though the satyristae were well known, 6 no theatres are left. They were obviously a race of no literary taste or culture. The theatre at Fiesole which is often referred to as Etruscan unquestionably dates from Roman times.

Underground tombs have already been mentioned in their relation to house-architecture, but there are the tumuli such as that called la Cucumella at Volci, that of the Curiatii at Albano, or that of Porsena at Clusium, which Pliny describes as one of the wonders of Italy (H.N. xxxvi. 19). These great walled-in mounds with their complex of interior chambers are interesting as reminiscent of tombs in Lydia, but architecturally they are barbaric and show no developed skill.

There remains one monument which has always been supposed to show a real advance made by the Etruscans in the art of architecture — the cloaca maxima in Rome. This round-arched drain was supposed to have been built by Etruscans, and it was only in 1903 that Commendatore Boni in excavating the Forum proved that the drain was originally uncovered, and that the arch was built at the end of the Republic. Thus the honour, not of discovering the arch, for it was known to the East, but of popularizing its use, does not belong to the Etruscans, though they did use it at a comparatively late time for city gates, as at Volterra. 6 The false arch and dome of the Mycenaeans seems to have been familiar to them, though there are but few cases of its use on a large scale. The best-known instances are the Tullianum or Mamertine prison in Rome, the Regulini-Galassi

tomb at Cervetri, 7 one at Sesto Fiorentino near Florence, 8 at Cortona, 9 at Chiusi, and also those in Latium. 10

Although there was, therefore, but little development in the greater arts of literature and architecture among the Etrus- cans, it is evident enough that there was much desire to possess the products of the lesser arts, such as sculpture, jewelry and household ornaments. But here too the study has been made difficult by the failure to distinguish between native and im- ported products. Before studying the objects themselves it is well to recall the legendary character of Etruscan chronology as

3 For an illustration of the Corneto tomb see Architecture, vol. ii. p. 559.

4 Appian viii. 66; Tertullian, De sped. 5; Plutarch, Qu. Rom.

107.

6 Dion. Hal. vii. 72.

6 Montelius, Civ. Prim. ii. pi. 172.

7 lb. pi. 333 ; cf . 343. % lb. pi. 166. » lb. pi. 173.

10 Monum. Ant. xv. p. 151; Bull. d. Com. Arch, di Roma, 1898, p. ill

reckoned in saecula. Helbig 1 showed that we cannot consider any of the traditional dates as being accurate until about 644 B.C., the beginning, that is, of the fifth saeculum. This is probably about one hundred years after the introduction of the Chalcidian (Ionic) alphabet into the country. One of the earliest examples of the use of it is on a vase found in the Regulini-Galassi tomb. In considering the trade of the country it has been pointed out that its chief political connexions were with Carthage, but the artistic sense of Carthaginians or other Phoenicians was not more developed than that of the Etruscans. They were traders, and doubtless brought the Etruscans some of the Egyptian and Eastern objects which have been found in their tombs, articles that date from the 7th and 6th

centuries B.C. But beside the Phoenicians the Ionian Greeks from the gth century had been trading and colonizing in Sicily and Italy. Herodotus (i. 163) tells how the Phocaeans were the first of the Greeks to take long voyages, and that they discovered the Adriatic and Tyrrhenian seas and Iberia. Thucydides(vi.3. 1) says that it was Chalcidians from Euboea who first settled in Sicily. Pliny {Hist. Nat. xxxv. 12. 43) writes in the same sense, for he tells of Demaratus who came from Corinth with the artists Eucheir, Diopus, Eugrammus, about 650 B.C., and first started sculpture in Italy. These tradi- tions of the coming of Ionian Greeks to Italy are completely borne out by the archaeological remains found in Ionian lands and in Etruria, and it is agreed that a great part of what has hitherto been considered Etruscan is no more Etruscan than the Moorish plates of the 15th century found in Italy are Florentine. The best works in most of the smaller arts are almost without exception Greek, the earlier Ionian, the later Attic; the remainder are made with the distinct intention of imitating Greek models, and so should be considered as Greek, inasmuch as they do not show a natural, original expression of feeling on the part of the Etruscan workman. The Etruscans were dull artists in all lines. They were skilful copyists, nothing more, as is absolutely proved by the simple fact that we know of no Etruscan artist byname. If one takes the articles which are of obviously local manufacture, such as the burial urns 2 or the ordinary bronze mirrors, or the pottery, it would be hard to find a similar quantity of work by any other race so lacking in originality of conception or high excellence of technique.

In the study of the monuments a division must be made distinguishing between the obviously Greek works, the works done with a desire to copy Greek models and the work of native artists. To separate the objects in the way suggested required a very considerable familiarity with Greek art, and though in many cases the result may be doubtful, still so much must be taken from the Etruscans that they are shown to have little more artistic feeling than the Romans. In the earlier centuries a strong eastern influence appears in the copying of sphinxes and similar eastern motives, but this soon gave way to the stronger Greek influence, as was natural, for the intercourse with the Phoenicians was spasmodic whereas that with the Greeks was constant. But even with the Greeks to kindle their imagina- tions, the Etruscans produced no school of art; no steady progression is traceable. In various towns there were various fashions of pottery or jewelry, but good, bad and indifferent constantly occur together in a way possible only among a people who possessed no natural artistic capacities and had no wide- spread standards of cultivated taste. The

Ionians have been mentioned as having strongly affected the arts in Etruria, and, though in the later centuries Athens undoubtedly exported heavy consignments to Italy, the taste of the Etruscans seems generally to have preferred the rather heavy loose style of the Ionians, even when direct contact with them was lost and its place taken by direct relations with Athens and her colonies.

Pottery 3 practised enormously by the Etruscans shows as clearly as possible their essential Strength and weakness as

1 Annali dell' Inst. Arch., 1876, 230.

8 Gerhard, Etruskische Spiegel; Korte, Rilievi delleurne Etrusche.

3 See Pottier, Catalogue des vases antiques, II. L'Ecole lonienne, Boehlau, Aus ionischen und italischen Nekropolen; Karo, De arte vascularia antiquissima; Endt, Ionische Vasenmalerei. See further Ceramics, § Etruscan.

Pottery.

artists. Even the black ware called bucchero is now known to have been manufactured in other lands and not to be an exclusively Etruscan style. In the earlier tombs this ware is present in greater numbers than any other, and the vases exhibit considerable dexterity of manufacture so far as form goes. But it is evident from comparisons with early Ionian vases that the better proportioned of the shapes are direct copies of the Ionian. The decoration of the bucchero is either engraved, in which case it is almost always extremely rude, or formed by figures modelled or pressed by a mould on to the body of the vase. In these two last cases the figures are often suggestive of the farther East (Egyptian and Mesopotamia) , but still more frequently they are taken from Greek originals, and the natural tendency of the Etruscan artist to be a copyist is very marked. Whence the moulds for these vases came is not known, but analogy with other classes of work makes it practically certain that some were imported and some made by the imitating workmen. There are other classes of vases which at first sight look as though they were imported from Greece, but by the nature of their clay are recognized to be Etruscan imitations of Greek originals. The imitation is often very skilful, for the Etruscan artist rivalled his Grecian master in deftness of hand, if not in imagination. Such, for instance, are the large amphoras decorated with bands of animals in the Corinthian style. Besides these native Vases the tombs have yielded great quantities of others which used to be called Etruscan,

but are now known to have been imported from Greece. Until the 6th century B.C. these vases are mostly Ionian, but at that time the trade of the Phocaeans was waning before that of Athens, and henceforward the Athenian ware is the commonest. Intercourse with Athens, however, came to an end about 480, when the Sicilian Greeks mastered the trade of the western Mediterranean, so that in the Etruscan tombs later than this date we find fewer and fewer imported vases, and more and more native imitations. It is generally taken for granted that these Attic vases were brought to Etruria by Greek traders, but considering how little the Greek historians, even Herodotus, knew of that country, this is unlikely. Then, too, the chief products Etruria had to give Greece were metals, so it is more likely that it was the Etruscan traders who, having carried metal to Greece (where Etruscan bronze was famous 4) , brought back the vases.

Though most collections make no distinction between Greek and Etruscan scarabs the differences, though slight, are quite certain, and consist in the greater elaboration of the borders, edges and backs of the Etruscan examples. The commonest material for these gems is red carnelian, and agate frequently occurs. The beetle shape is undoubtedly due to the Phoenicians, who familiarized the Etruscans with the Egyptian scarab and with its signification as an amulet; while in technique they are more Greek, in use they are more Egyptian, for they were used not only as seals but as ornaments — as in the decoration of necklaces. 5 What we learn from them merely serves to strengthen what we learn from the pottery — that the Etruscans depended on the Greek world for their artistic conceptions. Though many Phoenician gems (in fact, scarcely any other kind) have been found in Sardinia, these are comparatively rare in Etruria, where the earliest gems occur about 650 B.C. Some of these earliest show the Ionian influence, which is also shown in certain gold rings, but most of them represent the Attic style as seen on the black-figured vases of Athens. To under- stand them one has but to know Attic sculpture, the complete history of which is repeated in these small and beautifully worked stones. At first one finds the single figures, awkward in form and modelling, but full of life in composition — one finds the same mistakes in anatomy (i.e. the muscles of the stomach); and then come the figures beautifully worked and accurately observed, but with the slight hardness and rigidity that belongs to all pre-Raphaelite work; and finally one sees the figures carved with the easy assurance of the master,

4 Athen. i. 28. – 6 Martha, L'Art etrusque, pi. 1, 4; Bull. dell'Inst. (1837) p. 46.

Bronze.

sometimes single, sometimes in groups, but always Attic in their unrivalled representation of the beauties of the human figure, and in the innumerable lovely scenes taken from everyday life. Not infrequently inscriptions are cut in the gem, but these are not as on Greek gems the name of the carver or the owner, but the name of the Greek hero represented. In regard to technique one point is specially noteworthy. Many of the gems are carved with the round drill, and the disks made by this are not modelled into any real semblance of a figure. This is not a sign of the antiquity of the gem, for there are examples in which together with this method will be seen a figure finished with the greatest care; it is thus evident that the gem-cutter left the marks of his round drill because of their decorative value. This they undoubtedly possess, and it is one of the few cases in which the Etruscans showed any art sense.

Bronze was used extensively. Weapons of course were fashioned of it, but these are simple in shape and decoration; no such examples as those from Mycenae occur. Objects of large size, as the bronze doors of Veii, 1 the chariots of Perugia in the New York museum, or large tripods or shields, show that the artisans had large quantities of the material at their disposal. As with the vases or gems, so in these metal objects the distinction must be drawn between pure Etruscan work and the work that was done by Greek workmen or by artisans copying the Greek style. As Etruscan art has been wrongly estimated through forgetfulness of the Greek influence, so Greek bronzes have possibly received credit that does not belong to them. Etruscan candelabra and vases were famous among the Greeks (Ath. i. 28. 6; xv. 700 c). The chariots above mentioned and the tripods in the Harvard museum are plainly Greek; the round shields with ornament in bands are native. Antefixes of tombs were of bronze, and in some cases the eyes of the figures were inlaid with glass paste. The best-known articles of bronze are the mirrors, 2 which are very dependent on Greece for their models, though the poor style in which the scenes that decorate them are in most cases carved shows that these articles of common use were produced, as was natural, mainly by ordinary workmen. In rare cases the figures are not engraved but are given in low relief. These mirrors seem to have been mainly intended for

women, and the scenes on them in large numbers of cases are of such a character as to bear out this idea; for instead of scenes of battle such as occur on the gems, scenes with satyrs and maenads are commoner, or the story of Helen or the labours of Hercules. So far as development goes they pass through the same stages as the gems, though owing to their larger surface they are more generally decorated with groups of figures. 3 An- other well-known class of work is the cistae or cylindrical bronze boxes found mostly at Praeneste, where they seem to have been especially popular. The engraved figures on them are of the same character as those on the mirrors, and it is noteworthy that these figures are often better in style than the figures modelled in the round that serve as handles, or than the legs which also are modelled. This, taken together with the fact that the same figures are repeated in several cases on more than one gem or mirror, makes it probable that the workmen, like the later potters of Arezzo, had a stock of models brought from Greece, which they repeated and combined to suit their fancy.

The paintings and contents of the tombs have made it plain that the wealth of the Etruscans was very considerable, and that they spent much on jewelry, gold and silver. 4 Their extravagance in this regard was well known, 6 and the rings, the necklaces, the diadems, the bracelets and the earrings show that there was a large class of well-to-do people. The eastern and Greek influences are clearly marked in the figures used in decoration, and in certain shapes of rings, but in

1 Plutarch, Camillus, 12.

2 Gerhard, Etr. Spiegel (continued by Klugmann and Korte).

3 Mirrors of Greek style, Gerhard, ill, 112, 116, 240, 305, 352; Klugmann- Korte, 107, 131, 1 60.

4 See plates in Martha and in Monumenti dell' Inst., also Mon. Ant. iv. and Milani's Studie materiali.

' Juvenal v. 164; Ovid, Am. iii. 13. 25 ff.

Gold and silver.

Sculpture.

one technical matter the Etruscans seem to have made a dis- covery: it was in the use of granulated ornament, that is, ornament made by soldering on to the gold object infinitely small globules of the same metal laid in various designs and patterns, each globule soldered by

itself. Though this style of ornament occurs in Egypt, Cyprus, Rhodes and Magna Graecia, nowhere is it accomplished with such extraordinary minuteness as in Etruria. That they should do this was natural. The difficulty of it seems to have pleased them, for it is commoner than the earlier filigree work made of wire soldered on to the gold base. Reference has been made to the scarabs set as ornament in the gold necklaces, and similarly we find amber used and, in the later work, precious stones and pearls.

As in Greece the Etruscans first carved their figures out of wood, 6 but what these figures were like we can only imagine. The earliest known figures in the round are even less successful than the contemporary Greek work. An early attempt at a female bust 7 is made not by casting but by riveting plates of bronze together. A half life size bust in the Tyszkiewicz collection 8 made probably about 600 «.c. is cast solid. Later they learned the art of hollow-casting, but their attempts to reproduce figures in the round are generally lacking in skill. One reason for this was the lack of good marble, the quarries at Carrara not having been used till Roman times. Terra-cotta was the material most commonly used, and their skill in modelling and colouring this was great. The earlier statues of large size have perished; but there are three famous sarcophagi which show the work of Ionian Etruscan artists; 9 one is in the British Museum, one in the Louvre and one in the Villa di Papa Giulio at Rome. The elaborate detail and careful work, the types of the figures and the style of their dress all point to the same Ionic origin as that of the bronze chariots already mentioned. The type of sarcophagus illustrated by these ex- amples became very common, and in the figures that decorate the covers can be traced the various influences that affected the whole of Etruscan art. In an example from Void 10 the later Attic influence is strongly marked. Such work shows little power of origination, but much of the interest taken by careful workmen by copying carefully, and the tendency that such workmen almost invariably display of overloading the subject with too much ornament and detail. The small ash-urns, either of stone or terra-cotta, are in certain ways more interesting than the more elaborate sarcophagi, for on these urns the heads of the figures reclining on one elbow which form the usual decoration of the covers are often obvious attempts at portraiture. Single busts 11 show this same desire for accurate likeness of the person represented, and in this one line of art the Etruscans showed a new feeling, one that found its finest expression in the hands of the later Roman portraitists. The main difference between such portraits and the Greek ones is that the Greek artist thought of his subject as illustrating character that

showed itself in ways of repose and thought — the essential, lasting individuality. The Etruscan and Roman portraitist thought, on the other hand, of his subject as illustrating character in ways of action; hence pure Etruscan and Roman portraits are much more tense in line, and the expression of the eye is not dreamy but distinctly focussed. They are different, but, as art, one is as fine as the other. The scenes on the sides of these urns are, as in the case of the gems and mirrors, very frequently taken from Greek story, and often are scenes of battle. 12 Work in relief for the friezes and the other decorations of temples was very common, and shows remarkable skill in the mere processes of modelling and baking the slabs of terra-cotta that were fastened by nails to the beams. So far as the figures themselves are concerned, they seem to have but little meaning in connexion with the building they decorate.

6 Pliny, H.N. xiv. 9; xvi. 216.

7 From the Polledrara tomb at Vulci, Martha fig. 335. r 8 Coll. Tyszkiewicz, pi. 13.

9 Mon. dell' Inst. vi. pi. 59, cf. Annali (1861), p. 402; Mon. Ant. viii. pi. xiii.-xiv.

10 Mon. dell' Inst. viii. pi. 20; Martha p. 347.

11 Martha pp. 333, 348.

12 See Korte, Rilievi delle urne Etrusche.

Satyrs and maenads, chariot-races and such scenes taken over from Greek models are perhaps the commonest. In none of the obviously native work is there any more instinctive feeling for the greater qualities of sculpture than in the gems. Little is original, almost everything dependent on earlier masters. There is no absorption of the artist by his work which produces great work, great because the beholder thinks rather of the work pro- duced than of the artist who produces it. For this reason such figures as the bronze chimaera or the bronze Athena in the Florence museum are presumably not Etruscan but Greek.

There is no evidence that the Etruscans had easel-paintings

like the Greeks, but their skill in painting is well illustrated

by the pictures with which they frequently covered

" ' the inner walls of their tombs. The wall was prepared with a coating of fine white stucco on which the figures were painted with a large variety of tints. The best of them have been found at Tarquinii, Chiusi, Volci, Caere, Veii. 1 The paintings exhibit the usual Greek influences. They show a certain ponderous realism, but as works of art they are of little value. As picture of the life and customs of the people they are of great importance.

As works of art their coins 2 are the worst efforts of the Etruscans. Gold, silver and bronze were used, but no examples Colas can k e dated earlier than the beginning of the 5th

century B.C. The coins are struck according to four different standards of weight, due perhaps to different trade- connexions. The bronze coinage shows a distinct scale of reduc- tion in weight due to the increasing use of the precious metals. Many examples show a design only on one side. The designs of the majority of the types are taken from Greek models, but strangely enough the die-cutters show no such skill as that of the makers of gems.

Arms and Armour.— la. the early periods the chief weapons (besides bows and arrows which bore flint or bronze heads) were few and simple, and were of bronze. Iron ones have been found, and their rarity is doubtless partly due to their. having rusted away. Spears of very various weights were common and also swords and daggers. These latter had straight two-edged blades with the handle either of the same piece or of some other material fastened on with rivets. The blades of the daggers are generally engraved with lines and zigzags. Shields were of circular and oval shape. These two were of bronze, the round ones decorated in Homeric fashion with concentric circles of ornament, the motives being geometric patterns or an animal repeated endlessly. Breastplates with overlapping shoulder-straps and belts, broader in front than behind, with decoration of the same kind as the bucchero vases, are not uncommon. Greaves and helmets completed their equipment. The former seem to have been less ornate than those the Greeks wore; the latter were of various shapes, the commonest being round caps with a knob on the top, or a deeper shape with a crest from front to back. Some are shown with side-pieces raised like wings, but these are perhaps merely cheek-pieces

raised on hinges. In later times they had trumpets and axes, and their arms became practically the same as the Roman, as one sees from the representations in the tombs. (R. N.)

Language

1. By " Etruscan " is meant the language spoken by the people called Etrusci (more commonly Tusci) by the Romans, Turskum numen {i.e. Tuscum nomen) by their neighbours the Umbrians of Iguvium (q.v.), and Tvpayvoi (later, e.g. in Strabo's time, Tvppqvol) by the Greeks. Their own name for themselves was Rasinna (or Rasina), according to Dionysius Halic. (i. 30), but it seems now to be fairly probable that this was no more than the name of a leading house (represented later on in Pisa and elsewhere) dominant at some fairly early date in some one

1 See Mon. dell' Inst. i. pi. 32-33, v. 16, 17, 33, 34, vi. 30-32, 79, viii. 36, ix. 13-15; Micali, Mon. Ined. pi. 58. Cf. Helbig, Annali (1863) p. 336, (1870) pp. 5-74; Brunn, ib. (1866), p. 442.

2 Mommsen, Rom. Miinzwesen; G. F. Hill, Handbook of Greek and Roman Coins; Deecke, Etruskische Forschungen; also article Numismatics.

locality (see below). Niebuhr attempted on slender grounds {Rom. Hist., ed. 3 [Eng. trans.], i. p. 41) to distinguish between the Tvppqvol and the Tusci in order to accept the strongly supported tradition of a Lydian origin for the " Tyrrhenes " (see below), while rejecting it for the " Tuscans," but no one has since attempted to maintain the distinction (Dittenberger, Hermes, 1906, p. 85, footnote, regards the form in -r/vol as a " Graecized form of a local name " equivalent to Tusci), and we now know enough of the morphology of Etruscan names to recognize Tur-s-co- and Tur-s-eno- as closely parallel Etrusco- Latin stems, cf. Venu-c-ius: Venu-senus both from Etr. venu (Schulze, Lat. Eigennamen, p. 405) and Ras-ena: Ras-c-anius {ibid. p. 92); or Voluscus, Volscus: Volusenus (where the forma- tive suffixes in each word are Etrusco-Latin whether the root be the same or not). But the analysis of the names cannot be entirely satisfactory until the first syllable of Etrusci — in Greek writers sometimes "Etpouckoi, e.g. in Strabo — ed. Meineke — has been explained.

2. The extent of territory over which this language was spoken varied considerably at different epochs, but we have only a few fixed points of chronology. From two separate sources, both traditional and

probably sound (Dion. Hal. i. 26, and Plutarch, Sulla, 7; cf. Varro, quoted by Censorinus c. 17. 6), we should ascribe the first appearance of the Etruscans in Italy to the 12th century B.C. The intimate connexion in form between the names Roma, Romulus and the Etruscan gentes rumate, rumulna {Romatia, Romilia, &c), and the fact that many of the early names in Rome {e.g. Ratumenna, Capena, Tities, Luceres, Ramnes) are characteristically Etruscan, justifies the conclusion that the foundation of the city, in the sense at least of its earliest fortifi- cation, was due to Etruscans (Schulze, p. 580). The most likely interpretation of Cato's date for the Etruscan "foundation" of Capua is 598 B.C. (Conway, Italic Dialects, pp. 99 and 83). In 524 B.C. (Dion. Hal. vii. 2) the Etruscans were defeated by Aristodemus of Cumae, and in 474 by Hiero of Syracuse in a great naval battle off Cumae. Between 445 and 425 {It. Dial. I.e.) they were driven out of Capua by the Samnites, but they lingered in parts of Campania (as far south as Salernum) till at least the next century, as inscriptions show {ib. pp. 94 ff., 53), as at Praeneste and Tusculum {ib. p. 310 ff.) till the 3rd century or later. In Etruria itself the oldest inscriptions (on the stelae of Faesulae and Volaterrae) can hardly be later than the 6th century B.C. (C. Pauli, Altital. Forsch. ii. part 2, 24 ff.); the Romans had become dominant early in the 3rd century (C.I.L. xi. 1 passim), but the bulk of the Etruscan inscriptions show later forms than those found in the old town of Volsinii destroyed by the Romans in 280 B.C. (C. Pauli, ib. i. 127). In the north of Italy we find Etruscan written in two alphabets (of Sondrio and Bozen) between 300 and 150 B.C. {id. ib. pp. 63 and 126). The evidence of an Etruscan linen book wrapped round a mummy (see below) seems to suggest that there was some Etruscan colony at Alex- andria in the period of the Ptolemies. At least one Etruscan suffix has passed into the Romance languages, -ida or -ita in Etr. lautniBa (from lautni " familiaris," or "libertus "),and Etr.-Lat. Iulitta, which became Ital. -etta, Fr.-Eng. -ette.

3. Finally must be mentioned the remarkable pre-Hellenic epitaph discovered on the island of Lemnos in 1885 (Pauli, Altital. Forsch. ii. 1 and 2), the language of which offers remark- able resemblances to Etruscan, especially in the phrase Sialxveiz aviz (? = "fifty years old "); cf. Etr. ceal\us avils (? " twenty years old ") ; and the pair of endings -ezi, -ale in consecutive words ; cf. Etr. lardiale hulxniesi; the style of the sculptural figure has also parallels in the oldest type of Etruscan monuments. The alphabet of this inscription is identical (Kirchhoff , Stud. Griech. Alphab., 4th ed., p. 54) with that of the older group of Phrygian inscriptions, which mention King Midas and are therefore older than 620 B.C. With this should be combined the

fact that a marked peculiarity of the South-Etruscan alphabet {'f=f, but earlier = the Greek digamma) has demonstrably arisen out of 9=?) on Phrygian soil, see Class. Rev. xii., 1898, p. 462. Despite the reasonable but not unanswerable difficulty of Kretschmer {Einleitung in d. Gesckichte d. griech. Sprache, 1896, p. 240), the

weight of the evidence appears to be distinctly in favour of the Etruscan character of the language, and Pauli's view is now generally accepted by students of Etruscan; hence the inclusion of the inscription in the Corpus Inscc. Etruscarum.

4. The first attempt to interpret Etruscan inscriptions was made by Phil. Buonarroti (Explic. et conject. ad monum. &c, Florence, 1726), who, as was almost inevitable at that epoch, tried to explain the language as a dialect of Latin. But no real study was possible before the determination of the alphabet by Lepsius {Inscc. Umbr. et Oscae, Leipzig, 1841), and his discovery that five of the Tables of Iguvium (q.v.), though written in Etruscan alphabet, contained a language akin to Latin but totally different from Etruscan, though some of the non-Italic peculiarities of Etruscan had been already pointed out by Ottfried Miiller (Die Etrusker, Breslau, 1828). The earliest in-scriptions, e.g. the terra-cotta stele of Capua of the 5th century B.C., are written in "serpentine boustrophedon," but in its common form of the 3rd century B.C. the alphabet is retrograde, and has the following nineteen letters: —

·Dˆta'QNWMiMqatvts

*a, c, e, v, z, h, 6, i. L m, n. p, s', r, s. t, u, x> * On older monuments }s| = k occurs as an archaic form of c ; 9 = ?; t><3, a sibilant of some kind; and C = $, this last mostly in foreign words. In the earlier monuments the cross-bars of e and v and h have a more decidedly oblique inclination, and s is often angular (*

■ˆ The determination of the alphabet was followed by a large number of different attempts to explain the Etruscan forms from words in some other language to which it was supposed that Etruscan might be akin; Scandinavian and Basque and Semitic have been tried among the rest. These attempts, how- ever ingenious, have all proved fruitless; even the latest and least fanciful (Remarques sur le parenti

de la langue Urusque, Copenhagen, 1899; Bulletin de V Academie Royale des Sciences et des Lettres de Danemark, 1899, p. 373),inwhichfeaturesof some living dialects of the Caucasus are cautiously compared by Prof. V. Thomsen (as independently by Pauli, see § 12), is at the best premature, and as tc the numerals probably misleading. Worst of all was the effort of W. Corssen {Die Sprache der Etrusker, 1875), in whom learning and enthusiasm were combined with loose methods of both epigraphy and grammar, to revive the view of Buonarroti. The only solid achievement in the period of Corssen's influence (1860-1880) was the description of the works of art (tombs, vases, mirrors and the like) from the different centres of Etruscan population; Dennis's Cities and Cemeteries of Etruria (1st ed., 1848; 2nd, 1878) contributes something even to the study of the language, because many of the figures in the scenes sculptured or engraved bear names in Etruscan form (e.g. usils, " sun "; or " of the sun," on the templum of Placentia; fuflunS, "Bacchus"; lu\ulxa, a demon or fury; see Dennis, Cities, 2nd ed., frontispiece, and p. 354).

6. The reaction against Corssen's method was led first by W. Deecke, Corssen und die Sprache der Etrusker (1876), Etruski- sche Forschungen (1875-1880), and continued by Carl Pauli at first jointly with Deecke and afterwards singly with greater power (Etruskische Studien, 1873), Etr. Forschungen u. Studien (Gottingen-Stuttgart, 1881-1884), Altitalische Studien (Hanover,

1883-1887); Altitalische Forschungen (Leipzig, 1885-1894). Of the work achieved during the last generation by him and the few but distinguished scholars associated with him (Danielsson, Schaefer, Skutsch and Torp) it may perhaps be said that, though the positive knowledge yet reaped is scanty, so much has been done in other ways that the prospect is full of promise. In the first place, the only sound method of dealing with an unknown language, that of interpreting the records of the language by their own internal evidence in the first instance (not by the use of imaginary parallels in better known languages whose kinship with the problematic language is merely assumed), has been finally established and is now followed even by scholars like Elia Lattes, who still retain some affection for the older point of view. By this means enough certainty has been obtained on many characteristic features of the language to bring about a general recognition of the fact that Etruscan, if we put aside its borrowings from the neighbouring dialects of Italy, is in no sense an Indo-European language. In the second place, the great undertaking of the Corpus Inscriptionum Etruscarum, founded by Carl Pauli, with the support of the Berlin Academy, conducted by him from 1893 till his

death in 190 1, and continued by Danielsson, Herbig and Torp, for the first time provided a sound basis for the study in a text of the inscriptions, edited with care and arranged according to their provenance. The first volume contains over four thousand inscriptions from the northern half of Etruria. Thirdly, the discoveries of recent years have richly increased the available material, especially by two documents each of some length. (1) The 5th-century stele of terra-cotta from S. Maria di Capua already cited, published by Buecheler in Rhein. Museum, lv., 1900, p. 1) and now in the Royal Museum at Berlin, is the longest Etruscan inscription yet found. Its best preserved part contains some two hundred words of continuous text, and is divided into paragraphs, of which the third may be cited in the reading approved by Daniels- son and Torp, and with the division of words adopted by Torp (in his Bemerkungen zur etrusk. Inschr. von S. Maria di Capua, Christiania, 1905), to which the student may be referred. " isvei tule ilucve, an prii laruns ilucuflux, nun: tifluaial x ues xa0c(e) anulis mulu rizile, ziz riin puiian acasri, ti-m an tule, le0am sul; ilucu-per pris an ti, ar vus; ta aius, nunfleri." (2) The linen wrappings of an Egyptianmummy (of the Ptolemaic period) preserved in the Agram museum were observed to show on their inner surface some writing, which proved to be Etruscan and to contain more than a thousand words of largely continuous text (Krall, " Die etruskischen Mumienbinden des Agramer. Museums," Denkschr. d. k. Akad. d. Wissenschaften, 41, Vienna, 1892). The writing has probably nothing to do with the mummy as it is on the inner surface of the bands, and these are torn fragments of the original book. The alphabet is of about the 3rd century B.C.

7. From the recurrence of a number of particular formulae with frequent numerals at intervals, the book seems to be a liturgical document. Torp has pointed out that the two documents have some forty words in common, and, with Lattes (" Primi Apprenti sulla grande iscriz. Etrusca," &c, in Rendic. d. Reale Inst. Lomb., serie ii. vol. xxxviii., 1900, p. 345 ff.), has shown that both contain lists of offerings made to certain gods (among them Suri, LeOam, and Calu); and Skutsch (Rhein. Mus. 56, 1901, p. 639) has added a plausible conjecture as to the occasions of the offerings, based on the phrase "flerxva neflunsl " " Neptuni statua" (or " statuae pars") ; Torp has made it very probable that the words vacl (or vacil) and nun, which recur at regular intervals in both, mean " address," " recite," " pray," or the like, preceding or following spoken parts of the ritual.

8. Along with the growth of the material, some positive increase in knowledge of the language has been attained. Independently of the

work done upon particular inscriptions, such as that which has just been described, a considerable addition has come from the elaborate study of Latin proper names already mentioned by Prof. W. Schulze of Berlin (Zur Geschichte lateinischer Eigennamen, Berlin, 1904), which has incidentally embodied and somewhat extended the points of Etruscan nomenclature previously observed. The chief results for our purpose may be briefly stated. It will be convenient to use the following terms : — ■

(1) praenomen = personal name of the individual.

e.g. Vet or Lar of a man, LarOi or Oana of a woman.

(2) nomen = family name.

*, Tile or Vipi or Tetna, of men. ■ *' I Titi or Vipinei or Tetinei, of women.*

(3) cognomen = additional family name.

e.g. Faru or Petru of men, Farui, Vetui of women.

(4) agnomen = special cognomen derived from the cognomen of the father.

e.g. Hanusa (in Latin spelling Hannossa) or Pultusa (also Pultus) of a man ; Hanunia of a woman. All these are commonly in the " nominative " (as the examples just quoted from Schulze, pp. 316-327) in sepulchral inscriptions.

Besides these, we have certain other descriptions used in forms which may be called a " genitive-dative " case, or a " derivative possessive " Adjective. These may be entitled: — •

(5) paternum (a) = praenomen of father, used generally after the nomen of son or daughter.

e.g. arndal " of Arn0." more commonly simply ar, so Is for

Laris-al, to which dan " son," often abbreviated c, and

sex or sec (abbrev. s) " daughter," are sometimes added.

paternum (b) — nomen of father, used only after the praenomen of

a daughter (e.g. Oana velBurnas, " Thana daughter of Velthurna"),

to which sex " daughter," often abbreviated s, is sometimes added.

(6) maternum (0) = nomen of mother.

e.g. pumpunial, " of Pumpuni " (in Lat. form Pomponia); alfnal " of Alfnei " (Lat. Alfia); hetarias, " of Hetaria." maternum (6) = cognomen of mother.

e.g. vetnal, " of Vetui," or " of Vetonia," hesual, " of Hesui." maternum © = agnomen of mother.

e.g. cumerunias, " of Cumerunia," i.e. " of a daughter of the cumeru- f a.mi\y."

(7) maritole — (i.) nomen, or (ii.) cognomen, or (iii.) agnomen of husband, used directly after the nomen of the wife, the word puia, " wife," being often added.

e.g. (i.) larBi cencui larcnasa, " Larthia Cenconia, wife of a Largena"; (ii.) larBia pulfnei spaspusa, "Larthia Pul- fennia, wife of a Spaspo "; this form being the same as that used for the agnomen of a man (see above) — (iii.) hastia cainei leusla, " Hastia Caia, wife of a son of a Leo "; and with a longer and possibly not synonymous form of suffix. Bania titi latinial §ec hanuslisa, ' Thania Titia, daughter of Latinia, wife of a Hanusa " — these secondary deriva- tives in sla, &c, being an example of what is called gene tivus genetivi, a characteristic Etruscan formation, not confined to this feminine use. These examples will probably enable the reader to interpret the great mass of the names on Etruscan tombs. It should be added (1) that no clear distinction can be drawn between the use of the cognomina and the nomina, though it is probable that in origin the cognomen came from some family connected with the gene by marriage; and (2)' that the praenomen generally comes first, but sometimes second (especially when both nomen and praenomen are added in the genitive to the name of a son or daughter).

9. The examples given illustrate also the few principles of in- flexion

and word-formation that are reasonably certain, for example, the various " genitival " endings. Those in -s and I are also found in dedications where in Latin a dative would be used: — e.g. (mi) BuplBai alpan turce " (hoc) deae Thupelthae donum dedit," where turce shows the only verbal inflection yet certainly known; cf. amce, " was," arce, " made," zilacnuce, " held the office of a Zilax," lupuce, " passed away." More important are the formative prin ciples which the proper names display. Endings -a, -«, -e and -mo are common in the " Nominative " — and in Etruscan there appears to be no distinction between this case and the Accusative— of men's names; the endings -i, -ei, -nei, -nia and -unia are among the commonest for women's names. But no trace of gender has yet been observed in common nouns or adjectives. Nor is it always easy to distinguish a " Case " from a noun-stem. The women's names corresponding to the men's names in -u are sometimes ui, some times -nei, sometimes longer forms (ves-acnei, beside ves-u, hanunia from hanu). And the so-called Genitives can themselves be inflected, as we have seen. The form neBunsl " of Neptune," may even have swallowed up the nominatival -j of the Italic Neptunus.

10. In view of the protracted discussion as to the numerals and the dice on which the first six are written, it should be added that only the following points are certain: (1) that wax = one; (2) that the next five numbers are somehow represented by ci, $u, hud, sa and zal; (3) and the next three somehow by cezp-, semifr- and muv; (4) that the suffix alx denotes the tens, or some of them, e.g. cealx- beside ci (? 50 and 5) ; (5) that the suffix -2 or -s is multiplicative (es(a)ls from zal). It is almost certain that zal must mean either 2 or 6, and of these a stronger case can, perhaps, be made for the latter meaning. Zathrum appears to be the corresponding ten (? 60). Skutsch's article in Indogerm. Forschungen, v. p. 256, remains the best account.

In close connexion with the numerals on sepulchral inscriptions appear the words ril, " old, aged," avils, " annorum," or " aetatis," and tivr, " month " (from tiv, " moon ").

11. Schulze has shown (e.g., p. 410) that a large number of familiar endings (e.g. those which when Latinized become -acius, -alius, -annius, -arius, -asius, -alius, -avus, -avius, -ax, and a similar series with 0, -ocius, &c), and further those with the elements, Ino,

lino, -enna, eno, tern, turn, trie, &c, exhibit different methods by which nomina were built up from praenomina in Etruscan. Finally it is of considerable historical importance to observe that a great mass

of the praenomina used for this purpose are clearly of Italic origin, e.g. Helva, Barba, Vespa, Nero, Pedo, from all of which (and many more) there are derivatives which at one stage or other were certainly or probably Etruscan. It is this incorporation of Italic elements into the Etruscan nomenclature — itself a familiar and inevitable feature of the pirate-type of conquest and settlement, under which many women who bear and nurse and first name the children belong to the conquered race — that has entrapped so many scholars into the delusion that the language itself was Indo-European.

12. So far the language has been discussed without any reference to ethnology. But the facts stated above in regard to the extension of the language in space and time are clearly adverse to the hypothesis that it came into Italy from the north, and fully bear out Livy's account (v. 33. 11) that the Etruscans of the Alpine valleys had been driven into that isolation by the invasion of the Gauls (beginning about 400 b.C;). And the accumulating evidence of a connexion with Asia Minor (see e.g. above §3) justifies confidence in the unbroken testimony of every Roman writer, which cannot but represent the traditions of the Etruscans themselves, and the evidence of similar traditions from the Asiatic side given by Herodotus (i. .97) to the effect that they came to Italy by sea from, Lydia. Against this there has never been anything to set but the silence of " the Lydian historian Xanthus " (Dion. Hal. i. 28; cf. 30) who may have had many excellent reasons for it other than a disbelief of the tradition, and of whom in any case we know nothing save the vague commendation of Dionysius. And it is not merely the miscellanies of Athenaeus (e.g. xii. 519) but the unimpeachable testimony of the Umbrian Plautus (Cistellaria, 2.3. 19), singularly neglected since Dennis's day, that convicts the Etruscans of an institution practised by the Lydians and other non-Indo-European peoples of Asia Minor, but totally repugnant to all the peoples among whom the Etruscans moved in their western settlement. The reader may be referred to Dennis's introductory chapter for a very serviceable collection of the other ancient testimony as to their origin. In the present state of our knowledge of the language it is best to disregard its apparent or alleged resemblances to various features of various Caucasian dialects pointed out by Thomsen (see above) and Pauli (Altit. Forsch. ii. 2, p. 147 ff.), and to acquiesce in Kretschmer's (op. cit. p. 408) non liquet as to the particular people of Asia Minor from whom the Etruscans sprang. But meanwhile it is clear that such evidence as has been obtained by epigraphic and linguistic research is not in any sense hostile but distinctly favourable to the tradition of their origin

which they themselves must have maintained.

Authorities. — Beside those mentioned in the text, see Professor F. Skutsch's article " Etruskisch," in the new current (1908) edition of Pauly-Wissowa's Encyclopaedia; A. Torp's Etruskische Beitrage, and other shorter writings; E. Lattes's Correzioni, giunte, postUle al C.I. Etrusc. (Florence, 1904), and his most valuable Iscriz. paleolatine di provenienza Etrusca (1895); Schaefer's articles in Pauli's Altitalische Studien (see above), and, with caution, Deecke's revision of Miiller's Etrusker (Stuttgart, 1877). Some account of the relations of Etruscans with different Italic communities will be found in the relevant chapters of R. S. Conway's edition of the remains of The Italic Dialects (1897). Newly discovered Etruscan inscriptions are regularly published in the Notizie degli scavi di anlichita, the official Italian journal of excavations (published by the Reale Accad. dei Lincei, but procurable separately). Fabretti's Corpus Inscc. Italicarum with its supplements was formerly useful, but in any doubtful reading its authority is worth little, and its commentary and glossary represent the epoch of Corssen. The regular contributions of Prof. Skutsch (under the general heading "Lateinische Sprache") to Vollmer's Jahresbericht f. d. Fortschritte der romanischen Sprachwissenschaft; and of Prof. Herbig to Bursian's Jahresbericht uber die Fortschritte der classischen Altertumswissenschaft will both be of service. The present writer is indebted to both Professor Skutsch and Professor Torp for valuable guidance and instruction. (R. S. C.)

ETTENHEIM, a town of Germany, in the grand-duchy of Baden, pleasantly situated on the Ettenbach, under the western slope of the Black Forest, 7 m. E. from the Rhine by rail. Pop. (1900) 3106. It has a handsome Roman Catholic church, with ceiling frescoes, and containing the tomb of Cardinal Rohan, the last prince bishop of Strassburg, who resided here from 1790 till 1803; a Protestant church and a medieval town-hall.

Its industries include the manufacture of tobacco, soap and leather, and there is a considerable trade in wine and agricultural produce. Founded in the 8th century by Eddo, bishop of Strassburg, Ettenheim remained attached to that see until 1802, when it passed to Baden. Louis Antoine Henri de Bourbon- Conde, duke of Enghien (17 7 2-1804), who had taken refuge here in 1801, was arrested in Ettenheim on the 15th of March 1804 and conveyed to Paris, where

he was shot on the 20th of March following. The Benedictine abbey of Ettenheimmunster, which was founded in the 8th century and which was dissolved in 1803, occupied a site south of the town.

ETTINGSHAUSEN, CONSTANTIN, Baron von (1826-1897), Austrian geologist and botanist, was born in Vienna on the 16th of June 1826. He graduated as a doctor of medicine in Vienna, and became in 1854 professor of botany and natural history at the medical and surgical military academy in that city. In 187 1 he was chosen professor of botany at Graz, a position which he occupied until the close of his life. He was distinguished for his researches on the Tertiary floras of various parts of Europe, and on the fossil floras of Australia and New Zealand. He died at Graz on the 1st of February 1897.

Publications. — Die Farnkrauter der Jetztwelt zur Untersuchung und Bestimmung der in den Formationen der Erdrinde einge- schlossenen fiber reste von vorweltlichen A rten dieser Ordnung nach dent Fldchen-Skelet bearbeitet (1865); Physiographie der Medicinal-Pflanzen (1862); A Monograph of the British Eocene Flora (with J. Starkie Gardner), Palaeontograph. Soc. vol. i. (Filices, 1879-

1882).

ETTLINGEN, a town of Germany, in the grand-duchy of Baden, on the Alb, and the railway Mannheim-Basel, 45 m. S. of Karlsruhe. Pop. (1905) 8040. It is still surrounded by old walls and ditches, and presents a medieval and picturesque appearance. Among its more striking edifices are an old princely residence, with extensive grounds, an Evangelical and two Roman Catholic churches, and the buildings of a former monastery. There are also many Roman remains, notable among them the " Neptune " sculpture, now embedded in the wall of the town-hall. Its chief manufactures are paper-making, spinning, weaving and machine building. The cultivation of wine and fruit is also largely carried on, and in these products considerable trade is done.

The first notice of Ettlingen dates from the 8th century. It became a town in 1227 and was presented by the emperor Frederick II. to the margrave of Baden. In 1689 it was pillaged by the French, and near the town Moreau defeated the archduke Charles on the 9th and 10th of July 1796.

See Schwarz, Geschichte der Stadt Ettlingen (Carlsruhe, 1900).

ETTMULLER, ERNST MORITZ LUDWIG (1802-1877), German philologist, was born at Gersdorf near Lobau, in Saxony, on the 5th of October 1802. He was privately educated by his father, the Protestant pastor of the village, entered the gym- nasium at Zittau in 1816 and studied from 1823 to 1826 at the university of Leipzig. After a period of about two years during which he was partly abroad and partly at Gersdorf, he proceeded to Jena, where in 1830 he delivered, under the auspices of the university, a course of lectures on the old Norse poets. Three years later he was called to occupy the mastership of German language and literature at the Zurich gymnasium; and in 1863 he left the gymnasium for the university, with which he had been partially connected twenty years before. He died at Zurich in April 1877. To the study of English Ettmuller contributed by an alliterative translation of Beowulf (1840), an Anglo-Saxon chrestomathy entitled Engla and Seaxna scopas and boceras (1850), and a well-known Lexicon Anglo-Saxonicum (1851), in which the explanations and comments are given in Latin, but the words unfortunately are arranged according to their etymological affinity, and the letters according to phonetic relations. He edited a large number of High and Low German texts, and to the study of the Scandinavian literatures he contri- buted an edition of the Voluspa (183 1), a translation of the Lieder der Edda von den Nibelungen (1837) and an old Norse reading book and vocabulary. He was also the author of a Handbuch der deutschen Literatur geschichte (1847), which includes

the treatment of the Anglo-Saxon, the Old Scandinavian, and the Low German branches; and he popularized a great deal of literary information in his Herbstabende und Winlernachle : Gesprdche ilber Dichtungenund Dichter (1865-1867). The allitera- tive versification which he admired in the old German poems he himself employed in his Deutsche Stammkonige (1844) and Das verhdngnissvolle Zahnweh, oder Karl der Grosse und der Heilige Goar (1852).

ETTMULLER, MICHAEL (1644-1683), German physician, was born at Leipzig on the 26th of May 1644, studied at his native place and at Wittenberg, and after travelling in Italy, France and England was recalled in 1668 to Leipzig, where he was admitted a member of the faculty of medicine in 1676. About the same time the university confided to him the chair of botany, and appointed him extraordinary professor of surgery and anatomy. He died on the 9th of March 1683, at Leipzig. He enjoyed a great reputation as a lecturer, and wrote many tracts on medical and chemical subjects. His collected works were published in 1708 by his son, Michael Ernst Ettmuller (1673-1732), who was successively professor of medicine

(1702), anatomy and surgery (1706), physiology (1719) and pathology (1724) at Leipzig.

ETTRICK, a river and parish of Selkirkshire, Scotland. The river rises in Capel Fell (2223 ft.), a hill in the extreme S.W. of the shire, and flows in a north-easterly direction for 32 m. to its junction with the Tweed, its principal affluent being the Yarrow. In the parish of Ettrick were born James Hogg, the " Ettrick shepherd " (the site of the cottage being marked by a monument erected in 1898), Tibbie (Elizabeth) Shiel (1782-1878), keeper of the famous inn at the head of St Mary's Loch, both of whom are buried in the churchyard, and Thomas Boston (1713-1767), one of the founders of the Relief church. About 2 m. below Ettrick church is Thirlestane Castle, the seat of Lord Napier and Ettrick, a descendant of the Napiers of Merchiston, and beside it is the ruin of the stronghold that belonged to John Scott of Thirlestane, to whom, in reward for his loyalty, James V. granted a sheaf of spears as a crest, and the motto, " Ready, aye ready." Two miles up Rankle Burn, a right-hand tributary, lies the site of Buccleuch, another strong- hold of the Scotts, which gave them the titles of earl (1619) and duke (1663). Only the merest fragment remains of Tushielaw tower, occupying high ground opposite the confluence of the Rankle and the Ettrick, the home of Adam Scott, " King of the Border," who was executed for his misdeeds in 1530. Lower down the dale is Deloraine, recalling one of the leading characters in The Lay of the Last Minstrel. If the name come from the Gaelic dail Orain, " Oran's field," the district was probably a scene of the labours of St Oran (d. 548), an Irish saint and friend of Columba. It seems that Sir Walter Scott's rhythm has caused the accent wrongly to be laid on the last, instead of the penultimate syllable. Carterhaugh, a corruption of Carelhaugh, occupying the land where Ettrick and Yarrow meet, was the scene of the ballad of "Young Tamlane," and of the historic football match in 18 15, under the auspices of the duke of Buccleuch, between the burghers of Selkirk, championed by Walter Scott, sheriff of the Forest (not yet a baronet), and the men of Yarrow vale, championed by the Ettrick shepherd.

ETTY, WILLIAM (1787-1849), British painter, was born at York, on the 10th of March 1787. His father had been in early life a miller, but had finally established himself in the city of York as a baker of spice-bread. Aftei, some scanty instruction of the most elementary kind, the future painter, at the age of eleven and a half, left the paternal roof, and was bound apprentice in the printing-office of the Hull Packet. Amid many trials and discouragements he completed his term of seven years' servitude, and having in that period come by

practice, at first surreptitious, though afterwards allowed by his master " in lawful hours," to know his own powers, he removed to London.

The kindness of an elder brother and a wealthy uncle, William Etty, himself an artist, stood him in good stead. He commenced his training by copying without instruction from nature, models, prints, &c. — his first academy, as he himself says, being a

plaster-cast shop in Cock Lane, Smithfield. Here he made a copy from an ancient cast of Cupid and Psyche, which was shown to Opie, and led to his being enrolled in 1807 as student of the Academy, whose schools were at that time conducted in Somerset House. Among his fellow scholars at this period of his career were some who in after years rose to eminence in their art, such as Wilkie, Haydon, Collins, Constable. His uncle generously paid the necessary fee of one hundred guineas, and in the summer of 1807 he was admitted to be a private pupil of Sir Thomas Lawrence, who was at the very acme of his fame. Etty himself always looked on this privilege as one of incalculable value, and till his latest day regarded Lawrence as one of the chief ornaments of British art. For some years after he quitted Sir Thomas's studio, even as late as 1816, the influence of his preceptor was traceable in the mannerism of his works. Though he had by this time made great progress in his art, his career was still one of almost continual failure, hardly cheered by even a passing ray of success. In 181 1, after repeated rejections, he had the satisfaction of seeing his " Telemachus rescuing Antiope " on the walls of the Academy. It was badly hung, however, and attracted little notice. For the next five years he persevered with quiet and constant energy in overcoming the disadvantages of his early training with yearly growing success, and he was even beginning to establish something like a name when in 1816 he resolved to improve his knowledge of art by a journey to Italy. After an absence of three months, however, he was compelled to return home without having penetrated farther south than Florence. Struggles and vexations still continued to harass him) but he bore up against them with patient endur- ance and force of will. In 1820 his " Coral-finders," exhibited at the Royal Academy, attracted much attention, and its success was more than equalled by that of " Cleopatra's arrival in Cilicia," shown in the following year. In 1822 he again set out on a tour to Italy, taking Paris on his way, and astonishing his fellow-students at

the Louvre by the rapidity and fidelity with which he copied from the old masters in that gallery. On arriving at Rome he immediately resumed his studies of the old masters, and elicited many expressions of wonder from his Italian fellow-artists for the same qualities which had gained the admiration of the French. Though Etty was duly impressed by the grand chefs-d'oeuvre of Raphael and Michelangelo at Rome, he was not sorry to exchange that city for Venice, which he always regarded as the true home of art in. Italy. His own style as a colourist held much more of the Venetian than of any other Italian school, and he admired his prototypes with a zeal and exclusiveness that sometimes bordered on extravagance.

Early in 1824 he returned home to find that honours long unjustly withheld were awaiting him. In that year he was made an associate of the Royal Academy, and in 1828 he was promoted to the full dignity of an Academician. In the interval between these dates he had produced the " Combat (Woman interceding for the Vanquished)," and the first of the series of three pictures on the subject of Judith, both of which ultimately came into the possession of the Scottish Academy. Etty's career was from this time one of slow but uninterrupted success. In 1830 he again crossed the channel with the view to another art tour through the continent; but he was overtaken in Paris by the insurrection of the Three Days, and was so much shocked by the sights he was compelled to witness in that time that he returned home with all convenient speed. During the next ten years of his life the zeal and unabated assiduity of his studies were not at all diminished. He was a constant attendant at the Academy Life School, where he used to work regularly along with the students, notwithstanding the remonstrances of some of his fellow- Academicians, who thought the practice undignified. The course of his studies was only interrupted by occasional visits to his native city, and to Scotland, where he was welcomed with the utmost enthusiasm, and feted with the most gratifying heartiness by his brother-artists at Edinburgh. On the occasion of one of these visits he gave the finishing touches to his trio of Judiths. In 1840, and again in 1841, Etty undertook a pilgrimage to the Netherlands, to seek and examine for himself the masterpieces

of Rubens in the churches and public galleries there. Two years , later he once more visited France with a view to collecting materials for what he called " his last epic," his famous picture of " Joan of Arc." This subject, which would have tasked to the full even his great powers in the prime and vigour of manhood, proved almost too serious an undertaking for him in his old age. It exhibits, at least, amid great excellences, undeniable proofs of decay on the part of the

painter; yet it brought a higher price than any of his earlier and more perfect works, £2500. In 1848, after completing this work, he retired to York, having realized a comfortable independence. One wish alone remained for him now to gratify; he desired to see a " gathering " of his pictures. With much difficulty and exertion he was enabled to assemble the great majority of them from various parts of the British Islands; and so numerous were they that the walls of the large hall he engaged in London for their exhibition were nearly covered. This took place in the summer of 1849; on the 13th of November of that same year he died. He received the honours of a public funeral in his native city.

Etty holds a secure place among English artists. His drawing was frequently incorrect, but in feeling and skill as a colourist he has few equals. His most conspicuous defects as a painter were the result of insufficient general culture and narrowness of sympathy.

See Etty's autobiography, published in the Art Journal for 1849, and the Life of William Etty, R.A., by Gilchrist (2 vols., 1855).

ETYMOLOGY (Gr. irvfios, true, and X670S, account), that part or branch of the science of linguistics which deals with the origin or derivation of words. The Greek word arupos, in so far as it was applied to words, referred to the real underlying meaning rather than to the origin. It was the Stoics who asserted that the discovery of rd ervfwv would explain the essence of the things and ideas represented by words. Plato in the Cratylus makes a nearer approach to the modern view when he connects, e.g. yvvrj, woman, with yovrj, seed, while he jests at such ety- mological feats as the derivation of ovpavos, heaven, 6.tto tov bpav to. avoi, from looking at things above, or avdpw-iros, man, from 6 avadp&v a eKunrev, he who looks up at what he sees. Until the comparative study of philology and the development of the laws underlying phonetic changes, the derivation of words was a matter mostly of guess-work, sometimes right but more often wrong, based on superficial resemblances of form and the like. This popular etymology, to which the Germans have given the name Volksetymologie or folk-etymology, has had much influence in the form which words take (e.g. " crawfish " or " crayfish," from the French crevis, modern icrevisse, or " sand-blind," from samblind, i.e. semi-, half -blind), and has frequently been the occasion of homonyms. W. W. Skeat has embodied in certain canons or rules some well-known principles which should be observed in giving the etymology of a word; these may be usefully given here: " (1) Before attempting an etymology, ascertain the earliest form and use of the word, and observe chronology. (2) Observe history and geography;

borrowings are due to actual contact. (3) Observe phonetic laws, especially those which regulate the mutual relation of consonants in the various Aryan languages, at the same time comparing the vowel sounds. (4) In comparing two words, A and B, belonging to the same language, of which A contains the lesser number of syllables, A must be taken to be the more original word, unless we have evidence of contraction or other corruption. (5) In comparing two words, A and B, belonging to the same language and consisting of the same number of syllables, the older form can usually be distinguished by observing the sound of the principal vowel. (6) Strong verbs, in the Teutonic languages, and the so-called " irregular verbs " in Latin, are commonly to be considered as primary, other related forms being taken from them. (7) The whole of a word, and not a portion only, ought to be reasonably accounted for; and, in tracing changes of form, any infringement of phonetic laws is to be regarded with suspicion. (8) Mere resemblances of form and apparent con- nexion in sense between languages which have different phonetic laws or no necessary connexion are commonly a delusion, and

are not to be regarded. (9) When words in two different languages are more nearly alike than the ordinary phonetic laws would allow, there is a strong probability that one language has borrowed the word from the other. Truly cognate words ought not to be too much alike. (10) It is useless to offer an explanation of an English word which will not also explain all the cognate forms " (Introduction to Etymological Dictionary of the English Language,

1898).

An English word is either " the extant formal representative or direct phonetic descendant of an earlier (Teutonic) word; or it has been adopted or adapted from some foreign language," adoption being a popular, and adaptation being a literary or learned process; finally, there is formation, i.e. the " combination of existing words (foreign or native) or parts of words with each other or with living formatives, i.e. syllables which no longer exist as separate words, but yet have an appreciable signification which they impart to the new product " (see Introduction to the Oxford New English Dictionary, p. xx). A further classification of words according to their origin is that into (1) naturals, i.e. purely native words, like "mother," "father," "house"; (2) those which become perfectly naturalized, though of

foreign origin, like "cat," "mutton," "beef"; (3) denizens, words naturalized in usage but keeping the foreign pronunciation, spelling and inflections, e.g. "focus," "camera"; (4) aliens, words for foreign things, institutions, offices, &c, for which there is no English equivalent, e.g., menu, table d'hdte, impi, lakh, mollah, tarbush; (5) casuals, e.g., bloc, Ausgleich, sabotage, differing only from " aliens " in their temporary use. The full etymology of a word should include the phonetic descent, the source of the word, whether from a native or from a foreign origin, and, if the latter, whether by adoption or adaptation, or, if a formed word, the origin of the parts which go to make it up. In the present edition of the Encyclopaedia Britannica such full ety- mologies, which would be necessary and in place in an etymo- logical dictionary, have not been given in every instance, but brief etymological notes are appended, showing in outline the sources and history, and in many cases the development in meaning. (See also Dictionary.)

EU, a town of north-western France, in the department of Seine-Inferieure, on the river Bresle, 64 m. N.N.E. of Rouen on the Western railway, and 2 m. E.S.E. of Le Treport, at the mouth of the Bresle, which is canalized between the two towns. Pop. (1906) 4865. The extensive forest o{ Eu lies to the south- east of the town. Eu has three buildings of importance — the beautiful Gothic church of St Laurent (12th and 13th centuries) of which the exterior of the choir with its three tiers of ornamented buttressing and the double arches between the pillars of the nave are architecturally notable; the chapel of the Jesuit college (built about 1625), in which are the tombs of Henry, third duke of Guise, and his wife, Katherine of Cleves; and the chateau. The latter was begun by Henry of Guise in 1578, in place of an older chateau burnt by Louis XL in 1475 to prevent its capture by the English. It was continued by Mademoiselle de Mont- pensier in the latter half of the 17th century, and restored by Louis Philippe who, in 1843 and 1845, received Queen Victoria within its walls. In 1902 the greater part of the building was destroyed by fire. The town has a tribunal of commerce and a communal college, Hour-mills, manufactories of earthenware, biscuits, furniture, casks, and glass and brick works; the port has trade in grain, timber, hemp, flax, &c.

Eu (Augusta) was in existence under the Romans. The first line of its counts, supposed to be descended from the dukes of Normandy, had as heiress Alix (died 1227), who married Raoul (Ralph) de Lusignan, known as the Sire d'Issoudun from his lordship of that name. Through their grand-daughter Marie, the countship of Eu passed by marriage to the house of Brienne, two members of which, both named Raoul, were constables of France. King John confiscated

the countship in 1350, and gave it to John of Artois (1352). His great-grandson, Charles, son of Philip of Artois, count of Eu, and Marie of Berry, played a conspicuous part in the Hundred Years' War. He was taken prisoner at the battle of Agincourt (1415), and remained in

England twenty-three years, in accordance with the dying injunctions of Henry V. that he was not to be let go until his son, Henry VI., was of age to govern his dominions. He accompanied Charles VII. on his campaigns in Normandy and Guyenne, and was made lieutenant-general of these two provinces. It was he who effected a reconciliation between the king and the dauphin after the revolt of the latter. He was created a peer of France in 1458, and made governor of Paris during the war of the League of the Public Weal (1465). He died on the 15th of July 1472 at the age of about seventy-eight, leaving no children. His sister's son, John of Burgundy, count of Nevers, now received the countship, which passed through heiresses, in the 1 5th century, to the house of Cleves, and to that of Lorraine -Guise. In 1660 Henry II. of Lorraine, duke of Guise, sold it to " Mademoiselle," Anne Marie Louise d'Orleans, duchesse de Montpensier (q.v.), who made it over (1682) to the duke of Maine, bastard son of Louis XIV., as part of the price of the release of her lover Lauzun. The second son of the duke of Maine, Louis Charles de Bourbon (1 701-17 7 5), bore the title of count of Eu. In 1755 he inherited from his elder brother, Louis Auguste de Bourbon (1700-1755), prince de Dombes, great estates, part of which he sold to the king. The remainder, which was still considerable, passed to his cousin the duke of Penthievre. These estates were confiscated at the Revolution; but at the Restoration they were bestowed by Louis XVII. on the duchess-dowager of Orleans who, in 1821, bequeathed them to her son, afterwards King Louis Philippe. They were again confiscated in 1852, but were restored to the Orleans family by the National Assembly after the Franco-German War. The title of count of Eu was revived in the 19th century in favour of the eldest son of the duke of Nemours, second son of King Louis Philippe.

EUBOEA (pronounced Evvia in the modern language), Euripos, or Negropont, the largest island of the Grecian archipelago. It is separated from the mainland of Greece by the Euboic Sea. In general outline it is long and narrow; it is about 90 m. long, and varies in breadth from 30′ m. to 4. Its general direction is from N.W. to S.E., and it is traversed throughout its length by a mountain range, which forms part of the chain that bounds Thessaly on the E., and is continued south of Euboea in the lofty islands of Andros, Tenos and

Myconos. The principal peaks of this range are grouped in three knots which divide the island into three portions. Towards the north, opposite the Locrian territory, the highest peaks are Mts. Gaetsades (4436 ft.) and Xeron (3232 ft.). The former was famed in ancient times for its medicinal plants, and at its foot are the celebrated hot springs, near the town of Aedepsus (mod. Lipsos), called the Baths of Heracles, used, we are told, by the dictator L. Cornelius Sulla, and still frequented by the Greeks for the cure of gout, rheumatism and digestive disorders. These springs, strongly sulphurous, rise a short distance inland at several points, and at last pour steaming over the rocks, which they have yellowed with their deposit, into the Euboic Sea. Opposite the entrance of the Maliac Gulf is the promontory of Cenaeum, the highest point (2221 ft.) behind which is now called Lithada, a corruption of Lichades, the ancient name of the islands off the extremity of the headland. Here again we meet with the legends of Heracles, for this cape, together with the neighbouring coast of Trachis, was the scene of the events connected with the death of that hero, as described by Sophocles in the Trachiniae. Near the north-east extremity of the island, and almost facing the entrance of the Gulf of Pagasae, is the pro- montory of Artemisium, celebrated for the great naval victory gained by the Greeks over the Persians, 480 B.C. Towards the centre, to the N.E. of Chalcis, rises the highest of its mountains, Dirphysor Dirphe,now Mount Delphi (5725 ft.), the bare summit of which is not entirely free from snow till the end of May, while its sides are clothed with pines and firs, and lower down with chestnuts and planes. It is one of the most conspicuous summits of eastern Greece, and from its flanks the promontory of Cher- sonesus projects into the Aegean. At the southern extremity the highest mountain is Ocha, now called St Elias (4830 ft.).

The south-western promontory was named Geraestus, the south-eastern Caphareus; the latter, an exposed point, attracts the storms, which rush between it and the neighbouring cliffs of Andros as through a funnel. The whole of the eastern coast is rocky and destitute of harbours, especially the part called Coela, or " the Hollows," where part of the Perisan fleet was wrecked. So greatly was this dreaded by sailors that the principal line of traffic from the north of the Aegean to Athens used to pass by Chalcis and the Euboic Sea.

Euboea was believed to have originally formed part of the mainland,

and to have been separated from it by an earthquake. This is the less improbable because it lies in the neighbourhood of a line of earthquake movement, and both from Thucydides and from Strabo we hear of the northern part of the island being shaken at different periods, and the latter writer speaks of a fountain at Chalcis being dried up by a similar cause, and a mud volcano formed in the neighbouring plain. Evidences of volcanic action are also traceable in the legends connected with Heracles at Aedepsus and Cenaeum, which here, as at Lemnos and elsewhere in Greece, have that origin. Its northern extremity is separated from the Thessalian coast by a strait, which at one point is not more than a mile and a half in width. In the neighbourhood of Chalcis, both to the north and the south, the bays are so confined as readily to explain the story of Agamemnon's fleet having been detained there by contrary winds. At Chalcis itself, where the strait is narrowest, it is called the Euripus, and here it is divided in the middle by a rock, on which formerly a castle stood. The channel towards Boeotia, which is now closed, is spanned by a stone bridge. The other, which is far the deeper of the two, is crossed by an iron swing-bridge, allow- ing for the passage of vessels. This bridge, which dates from 1896, replaced a smaller wooden swing-bridge erected in 1856. The extraordinary changes of tide which take place in this passage have been a subject of wonder from classical times. At one moment the current runs like a river in one direction, and shortly afterwards with equal velocity in the other. Strabo speaks of it as varying seven times in the day, but it is more accurate to say, with Livy, that it is irregular. A bridge was first constructed here in the twenty-first year of the Pelopon- nesian War, when Euboea revolted from Athens; and thus the Boeotians, whose work it was, contrived to make that country " an island to every one but themselves." The Boeotians by this means secured a powerful weapon of offence against Athens, being able to impede their supplies of gold and corn from Thrace, of timber from Macedonia, and of horses from Thessaly. The name Euripus was corrupted during the middle ages into Evripo and Egripo, and in this latter form transferred to the whole island, whence the Venetians, when they occupied the district, altered it to Negroponte, referring to the bridge which connected it with the mainland.

The rivers of Euboea are few in number and scanty in volume. In the north-eastern portion the Budorus flows into the Aegean, being formed by two streams which unite their waters in a small plain, and were perhaps the Cereus and Neleus concerning which the story was told that sheep drinking the water of the one became white, of the other black. On the north coast, near Histiaea, is the Callas; and on

the western side the Lelantus, near Chalcis, flowing through the plain of the same name. This plain, which intervenes between Chalcis and Eretria, and was a fruitful source of contention to those cities, is the most consider- able of the few and small spaces of level ground in the island, and was fertile in corn. Aristotle, when speaking of the aristo- cratic character of the horse, as requiring fertile soil for its support, and consequently being associated with wealth, instances its use among the Chalcidians and Eretrians, and in the former of those two states we find a class of nobles called Hippobotae. This rich district was afterwards occupied by Athenian cleruchs. The next largest plain was that of Histiaea, and at the present day this and the neighbourhood of the Budorus (Ahmet-Aga) are the two best cultivated parts of Euboea, owing to the exer- tions of foreign colonists. The mountains afford excellent pasturage for sheep and cattle, which were reared in great

quantities in ancient times, and seem to have given the island its name; these pastures belonged to the state. The forests are extensive and fine, and are now superintended by government officials, called da.v\aKes, in spite or with the connivance of whom the timber is being rapidly destroyed — partly from the merciless way in which it is cut by the proprietors, partly from its being burnt by the shepherds, for the sake of the rich grass that springs up after such conflagrations, and partly owing to the goats, whose bite kills all the young growths. In the mountains were several valuable mines of iron and copper; and from Karystos, at the south of the island, came the green and white marble, the modern Cipollino, which was in great request among the Romans of the imperial period for architectural purposes, and the quarries of which belonged to the emperor. The scenery of Euboea is perhaps the most beautiful in Greece, owing to the varied combinations of rock, wood and water; for from the uplands the sea is almost always in view, either the wide island-studded expanse of the Aegean, or the succession of lakes formed by the Euboic Sea, together with mountains of ex- quisite outline, while the valleys and maritime plains are clothed either with fruit trees or with plane trees of magnificent growth.

On the other hand, no part of Greece is so destitute of interest- ing remains of antiquity as Euboea. The only site which has attracted archaeologists is that of Eretria (

Like most of the Greek islands, Euboea was originally known under other names, such as Macris and Doliche from its shape, and Ellopia and Abantis from the tribes inhabiting it. The races by which it was occupied at an early period were different in the three districts, into

which, as we have seen, it was naturally divided. In the northern portion we find the Histiaei and Ellopes, Thessalian races, which probably had passed over from the Pagasaean Gulf. In central Euboea were the Curetes and Abantes, who seem to have come from the neighbouring continent by way of the Euripus; of these the Abantes, after being rein- forced by Ionians from Attica, rose to great power, and exercised a sort of supremacy over the whole island, so that in Homer the inhabitants generally are called by that name. The southern part was occupied by the Dryopes, part of which tribe, after having been expelled from their original seats in the south of Thessaly by the Dorians, migrated to this island, and established themselves in the three cities of Karystos, Dystos and Styra. The population of Euboea at the present day is made up of elements not less various, for many of the Greek inhabitants seem to have immigrated, partly from the mainland, and partly from other islands; and besides these, the southern portion is occupied by Albanians, who probably have come from Andros; and in the mountain districts nomad Vlach shepherds are found. iHistory. — The history of the island is for the most part that of its two principal cities, Chalcis and Eretria, the latter of which was situated about 15 m. S.E. of the former, and was also on the shore of the Euboic Sea. The neighbourhood of the fertile Lelantian or Lelantine plain, and their proximity to the place of passage to the mainland, were evidently the causes of the choice of site, as well as of their prosperity. Both cities were Ionian settlements from Attica, and their importance in early times is shown by their numerous colonies in Magna Graecia and Sicily, such as Cumae, Rhegium and Naxos, and on the coast of Macedonia, the projecting portion of which, with its three peninsulas, hence obtained the name of Chalcidice. In this way they opened new trade routes to the Greeks, and extended the field of civilization. How great their commerce was is shown by the fact that the Euboic scale of weights and measures was in use at Athens (until Solon, g.v.) and among the Ionic cities generally. They were rival cities, and at first appear to have been equally powerful; one of the earliest of the sea-fights mentioned in Greek history took place between them, and in this we are told that many of the other Greek states took part. It was in consequence of the aid which the people of Miletus lent to the Eretrians on this occasion that Eretria sent five ships to aid the Ionians in their revolt against the Persians (see Ionia); and owing to this, that city was the first piper-

in Greece proper to be attacked by Datis and Artaphernes in 490 B.C. It was utterly ruined on that occasion, and its inhabitants were transported to Persia. Though it was restored after the battle of Marathon, on a site at a little distance from its original position, it never regained its former eminence, but it was still the second city in the island. From this time its neighbour Chalcis, which, though it suffered from a lack of good water, was, as Strabo says, the natural capital from its com- manding the Euripus, held an undisputed supremacy. Already, however, this city had suffered from the growing power of Athens. In the year 506, when the Chalcidians joined with the Boeotians and the Spartan king Cleomenes in a league against that state, they were totally defeated by the Athenians, who established 4000 Attic settlers (see Cleruchy) on their lands, and seem to have reduced the whole island to a condition of dependence. Again, in 446, when Euboea endeavoured to throw off the yoke, it was once more reduced by Pericle's, and a new body of settlers was planted at Histiaea in the north of the island, after the inhabitants of that town had been expelled. This event is re- ferred to by Aristophanes in the Clouds (212), where the old farmer, on being shown Euboea on the map " lying outstretched in all its length," remarks, — " I know; we laid it prostrate under Pericles." The Athenians fully recognized its importance to them, as supplying them with corn and cattle, as securing their commerce, and as guaranteeing them against piracy, for its proximity to the coast of Attica rendered it extremely dangerous to them when in other hands, so that Demosthenes, in the De corona, speaks of a time when the pirates that made it their headquarters so infested the neighbouring sea as to prevent all navigation. But in the 2 1st year of the Peloponnesian war the island succeeded in regaining its independence. After this we find it taking sides with one or other of the leading states, until, after the battle of Chaeronea, it passed into the hands of Philip II. of Macedon, and finally into those of the Romans. By Philip V. of Macedon Chalcis was called one of the three fetters of Greece, Demetrias on the Gulf of Pagasae and Corinth being the other two.

In modern history Euboea or Negropont comes once more prominently into notice at the time of the fourth crusade. In the partition of the Eastern empire by the Latins which followed that event the island was divided into three fiefs, the occupants of which ere long found it expedient to place themselves under the protection of the Venetian republic, which thenceforward became the sovereign power in the country. For more than two centuries and a half during which the Venetians remained in possession, it was one of the most

valuable of their dependencies, and the lion of St Mark may still be seen, both over the sea gate of Chalcis and in other parts of the town. At length in 1470, after a valiant defence, this well-fortified city was wrested from them by Mahommed II., and the whole island fell into the hands of the Turks. One desperate attempt to regain it was made by Francesco Morosini (d. 1694) in 1688, when the city was besieged by land and sea for three months; but owing to the strength of the place, and the disease which thinned their ranks, the assailants were forced to withdraw. At the conclusion ot the Greek War of Independence, in 1830, the island was delivered from the Turkish sway, and constituted a part of the newly established Greek state. Euboea at the present time produces a large amount of grain, and its mineral wealth is also considerable, great quantities of magnesia and lignite being exported. In 1899 it was constituted a separate nome (pop. 1907, 116,903).

Bibliography. — -H. N. Ulrichs, Reisen und Forschungen in Griechenland, vol. ii. (Berlin, 1863) ; C. Bursian, Geographie von Griechenland, vol. ii. (Leipzig, 1872); C. Neumann and J. Partsch, Physikalische Geographie von Griechenland (Breslau, 1885) ; Baedeker's Greece (3rd ed., Leipzig, 1905) ; for statistics see Greece: Topography. (H. F. T.)

EUBULIDES, a native of Miletus, Greek philosopher and successor of Eucleides as head of the Megarian school. Nothing is known of the events of his life. Indirect evidence shows that he was a contemporary of Aristotle, whom he attacked with great bitterness. There was also a tradition that Demosthenes was one of his pupils. His name has been preserved chiefly by some

celebrated, though false and captious, syllogisms of which he was the reputed author. Though mainly examples of verbal quibbling, they serve to show the difficulties of language and of explaining the relations of sense-given impressions. Eubulides wrote a treatise on Diogenes the Cynic and also a number of comedies. (See Megarian School of Philosophy.)

EUBULUS, of Anaphlystus, Athenian demagogue during the time of Demosthenes. He was a persistent opponent of that statesman, and was chiefly instrumental in securing the acquittal of Aeschines (who had been his own clerk) when accused of treachery in connexion with the embassy to Philip of Macedon. Eubulus took little interest in military affairs, and was (at any rate at first) a strong advocate of peace at any price. He devoted himself to matters of administration, especially in the department of finance, and although he is said to

have increased the revenues and to have done real service to his country, there is no doubt that he took advantage of his position to make use of the material forces of the state for his own aggrandizement. His proposal that any one who should move that the Theoric Fund should be applied to military purposes should be put to death may have gained him the goodwill of the people, but it was not in the true interest of the state. Later, Eubulus himself seems to have recognized this, and to have been desirous of modifying or repealing the regulation, but it was too late; Athens had lost all feelings of patriotism; cowardly and indolent, she rivalled even Tarentum in her luxury and extravagance (Theopompus in Athenaeus iv. p. 166). As one of the chief members of an embassy to Philip, Eubulus allowed himself to be won over, and henceforth did his utmost to promote the cause of the Macedonian. The indignant remonstrances of Demosthenes failed to weaken Eubulus's hold on the popular favour, and after his death (before 330) he was distinguished with special honours, which were described by Hypereides in a speech (LTept tuv Eu/3oi>Xou SoopeHv) now lost. Eubulus was no doubt a man of considerable talent and reputation as an orator, but none of his speeches has survived, nor is there any appreciation of them in ancient writers. Aristotle (ketone, i. 15. 15) mentions a speech against Chares, and Theopompus (in his Philippica) had given an account of his life, extracts from which are preserved in Harpocration.

See Demosthenes, De corona, pp. 232, 235; De falsa legatione, pp. 434, 435, 438; Adversus Leptinem, p. 498; In Midiam, pp. 580, 581 ; Aeschines, De falsa legatione, ad fin. ; Index to C. W. Miiller's Oratores Attici; A. D. Schafer, Demosthenes und seine Zeit (1885).

EUBULUS, Athenian poet of the Middle comedy, flourished about 370 B.C. Fragments from about fifty of the 104 plays attributed to him are preserved in Athenaeus. They show that he took little interest in political affairs, but confined himself chiefly to mythological subjects, ridiculing, when opportunity offered, the bombastic style of the tragedians, especially Euri- pides. His language is pure, and his versification correct.

Fragments in T. Kock, Comicorum Atticorum fragmenta, ii. (1884).

EUCALYPTUS, a large genus of trees of the natural order Myrtaceae, indigenous, with a few exceptions, to Australia and Tasmania. In Australia the Eucalypti are commonly called " gum-trees " or " stringy-bark trees," from their gummy or resinous products, or fibrous bark. The genus, from the evidence of leaf-remains, appears

to have been represented by several species in Eocene times. The leaves are leathery in texture, hang obliquely or vertically, and are studded with glands which contain a fragrant volatile oil. The petals cohere to form a cap 1 which is discarded when the flower expands. The fruit is sur- rounded by a woody cup-shaped receptacle and contains very numerous minute seeds. The Eucalypti are rapid in growth, and many species are of great height, E. amygdalina, the tallest known tree, attaining to as much as 480 ft., exceeding in height the Californian big- tree (Sequoia gigantea), with a diameter of 81 ft. E. globulus, so called from the rounded form of its cap— like corolla, is the blue gum tree of Victoria and Tasmania. The leaves of trees from three to five years of age are large, sessile and of a glaucous-white colour, and grow horizontally;

1 Whence the name (dkaXwrros, well-covered) given by L'Heritier,

1788.

those of older trees are ensiform, 6-12 in. long, and bluish- green in hue, and are directed downwards. The flowers are single or in clusters, and nearly sessile. This species is one of the largest trees in the world, and attains a height of 375 ft. Since 1854 it has been successfully introduced into the south of Europe, Algeria, Egypt, Tahiti, New Caledonia, Natal and India, and has been extensively planted in California, and, with the object of lessening liability to droughts, along the line of the Central Pacific railway. It would probably thrive in any situation having a mean annual temperature not below 6o° F., but it will not endure a temperature of less than 27 F. Its supposed property of reducing the amount of malaria in marshy districts is attribut- able to the drainage effected by its roots, rather than to the antiseptic exhalations of its leaves. To the same cause also is ascribed the gradual disappearance of mosquitoes in the neigh- bourhood of plantations of this tree, as at Lake Fezara, in Algeria. Since about 1870, when the tree was planted in its cloisters, the monastery of St Paolo a la tre Fontana has become habitable throughout the year, although situated in one o"f the most fever- stricken districts of the Roman Campagna. An essential oil is obtained by aqueous distillation of the leaves of this and other species of Eucalyptus, which is a colourless or straw-coloured fluid when freshly prepared, with a characteristic odour and taste, of sp. gr. 0.910 to 0.930, and soluble in its own weight of alcohol. This

consists of many different bodies, the most important of which is eucalyptol, a volatile oil, which constitutes about 70%. This is the portion of eucalyptus oil which passes over between 347° and 351° F., and crystallizes at 30° F. It consists chiefly of a terpene and cymene. Eucalyptus oil also contains, after exposure to the air, a crystallizable resin derived from eucalyptol. The dose of the oil is 5 to 3 minims. Eucalyptol may be given in similar doses, and is preferable for purposes of inhalation. The oil derived from E. amygdalina contains a large quantity of phellandrene, which forms a crystalline nitrate, and is very irritating when inhaled. The oils from different species of Eucalyptus vary widely in composition.

Eucalyptus oil is probably the most powerful antiseptic of its class, especially when it is old, as ozone is formed in it on exposure to air. Internally it has the typical actions of a volatile oil in marked degree. Like quinine, it arrests the normal amoeboid movements of the polymorphonuclear leucocytes, and has a definite antiperiodic action; but it is a very poor substitute for quinine in malaria. In large doses it acts as an irritant to the kidneys, by which it is largely excreted, and as a marked nervous depressant, abolishing the reflex functions of the spinal cord and ultimately arresting respiration by its action on the medullary centre. An emulsion, made by shaking up equal parts of the oil and powdered gum-arabic with water, has been used as a urethral injection, and has also been given internally in drachm doses in pulmonary tuberculosis and other microbic diseases of the lungs and bronchi. The oil has somehow acquired an extraordinary popular reputation in influenza, but there is no evidence to show that it has any marked influence upon this disease or that its use tends to lessen the chances of infection. It has been used as an antiseptic by surgeons, and is an ingredient of " catheter oil," used for sterilizing and lubricating urethral catheters, now that carbolic oil, formerly employed, has been shown to be practically worthless as an antiseptic. Eucalyptus rostrata and other species yield eucalyptus or red gum, which must be distinguished from Botany Bay kino. Red gum is very powerfully astringent and is given internally, in doses of 2 to 5 grains, in cases of diarrhoea and pharyngeal inflammation. It is prepared by the pharmacist in the form of tinctures, insuffla- tions, syrups, lozenges, &c. Red gum is official in Great Britain. E. globulus, E. resinifera, and other species, yield what is known as Botany Bay kino, an astringent dark-reddish amorphous resin, which is obtained in a semi-fluid state by making incisions in the trunks of the trees. The kino of E, gigantea contains a notable proportion of gum. J. H. Maiden enumerates more than thirty species as kino-yielding. From the leaves and young bark of E.

mannifera and E. viminalis is procured Australian manna, a hard, opaque, sweet substance, containing melitose.

On destructive distillation the leaves yield much gas, 10,000 cub. ft. being obtained from one ton. The wood is extensively used in Australia as fuel, and the timber is of remarkable size, strength and durability. Maiden enumerates nearly 70 species as timber-yielding trees including E. amygdalina, the wood of which splits with remarkable facility, E. bolryoides, hard, tough and durable and one of the finest timbers for shipbuilding, E. diversicolor or " karri," E. globulus, E. leucoxylon or ironbark, E. marginata or " jarrah " (see Jarrah Wood), E. obliqu-a, E. resinifera, E. siderophloia and others. The timber is often very hard, tough and durable, and useful for shipbuilding, building, fencing, planks, &c. The bark of different species of Eucalyptus has been used in paper-making and tanning, and in medicine as a febrifuge.

For further details see Baron von Muller's monograph of the genus, Eucalyptographia (Melbourne, 1879-1884); J. H. Maiden, Useful Native Plants of Australia (1889).

EUCHARIS, in botany, a genus of the natural order AmaryL-lidaceae, containing a few species, natives of Columbia. Eucharis amazonica or grandiflora is the best-known and most gener- ally cultivated species. It is a bulbous plant with broad stalked leaves, and an erect scape 15 to 2 ft. long, bearing an umbel of three to ten large white showy flowers. The flowers resemble the daffodil in having a prominent central cup or corona, which is sometimes tinged with green. It is propagated by removing the offsets, which may be done in spring, potting them singly in 6-in. pots. It requires good loamy soil, with sand enough to keep the compost open, and should have a good supply of water and a temperature of 65° to 70 during the night, with a rise of 8° or io° in the day. During summer growth is to be encouraged by repotting, but the plants should afterwards be slightly rested by removal to a night temperature of about 60°, water being withheld for a time, though they must not go too long dry, the plant being an evergreen. By the turn of the year they may again have more heat and more water, and this will probably induce them to flower. After this is over they may be shifted and grown again as before; and, as they get large, either be divided to form new plants or allowed to develop into nobler specimens. With a stock of the smaller plants to start them in succession, they may be had in flower all the year round. A few years ago the bulbs of E. amazonica were badly inflicted with a disease known as the Eucharis mite, and all kinds of remedies were tried without avail, although steeping in Condy's fluid

appeared to give the best results. The disease appears to have died out agajn. Other species of Eucharis now met with in gardens are E. Bakeriana, E. Mastersii, E. Lowii and E. Sanderii. A remarkable hybrid was raised a few years ago between Eucharis and the allied genus Urceolina, to which the compound name Urceocharis was given.

EUCHARIST (Gr. euxapicma, thanksgiving), in the Christian Church, one of the ancient names of the sacrament of the Lord's Supper or Holy Communion. The term e&xapiaria, was at first applied to the act of thanksgiving associated with the sacrament; later, so early as the 2nd century, to the objects, e.g. the sacra- mental bread and wine, for which thanks were given; and so to the whole celebration. The term Mass, which has the same connotation, is derived from the Lat. missa or missio, because the children and catechumens, or unbaptized believers, were dismissed before the eucharistic rite began. Other names express various aspects of the rite: Communion (Gr. Koivoivia.) , the fellowship between believers and union with Christ; Lord's Supper, so called from the manner of its institution; Sacrament as a consecration of material elements; the Mystery (in Eastern churches) because only the initiated participated; the Sacrifice as a rehearsal of Christ's passion. In this article the history of the rite is first traced up to a.d. 200 in documents taken in their chronological order; differences of early and later usage are then discussed; lastly, the meaning of the original rite is examined.

St Paul (1 Cor. xi. 17-34) attests that the faithful met regularly in church, i.e. in religious meetings, to eat the dominical or Lord's Supper, but that this aim was frustrated by some who ate up their provisions before others, so that the poor were left hungry

while the rich got drunk; and the meetings were animated less by a spirit of brotherhood and charity than of division and faction. He directs that, when they so meet, they shall wait for one another. Those who are too hungry to wait shall eat at home ; and not put to shame those who have no houses (and presumably not enough food either), by bringing their viands to church and selfishly eating them apart.

It was therefore not the quantity or quality of the food eaten that constituted the meal a Lord's Supper; nor even the circum- stances

that they ate it " in church," as was assumed by those guilty of the practices here condemned; but only the pervading sense of brotherhood and love. The contrast lay between the Dominical Supper or food and drink shared unselfishly by all with all, and the private supper, the feast of Dives, shamelessly gorged under the eyes of timid and shrinking Lazarus. By way of enforcing this point Paul repeats the tradition he had received direct from the Lord, and already handed on to the Corinthians, of how " the Lord Jesus on the night in which he was betrayed " (not necessarily the night of Passover) " took bread and having given thanks brake it and said, This is my body, which is for your sake; this do in remembrance of me. In like manner also the cup, after supper, saying, This cup is the new covenant through my blood: this do, as oft as ye drink it, in remembrance of me." Paul adds that this rite commemorated the Lord's death and was to be continued until he should come again, as in that age they expected him to do after no long interval: " As often as ye eat this bread and drink the cup, ye do (or ye shall) proclaim the Lord's death till he come."

The same epistle (x. 17) attests that one loaf only was broken and distributed: " We who are many, are one loaf (or bread), one body; for we all partake of the one loaf (or bread)." As a single loaf could not satisfy the hunger of many, the rehearsal in these meals of Christ's own action must have been a crowning episode, enhancing their sanctity. The Fractio Panis probably began, as the drinking of the cup certainly ended, the supper; the interval being occupied with the common consumption by the faithful of the provisions they brought. This much is implied by the words " after supper." If, in any case, all present had eaten in their homes beforehand, the giving of the cup would immediately follow on the breaking and eating of the one loaf, but Paul's words indicate that the common meal within the church was the norm. Those who ate at home marked them- selves out as both greedy and lacking in charity. There is no demand that they should come fasting, or Paul could not recom- mend in (xi. 34) that those who were too hungry to wait until all the brethren were assembled in church, should eat at home and beforehand.

Mark xiv. 22-23, Matt. xxvi. 26-29, Luke xxii. 14-20, are, in order of time, our next accounts, Mark representing the oldest tradition. They all in substance repeat Paul's account; but identify the night on which Jesus was betrayed with that of the Pascha. In Matthew and Mark, Jesus says of the bread " Take ye it, this is my body," omitting the idea of sacrifice imported by Paul's addition "which is for you"; but in them Jesus enunciates the same idea when he says of the cup: " This is my blood of the covenant which is poured out for many,"

Mathew adding " for the remission of sins," a phrase which savours of Heb. ix. 22: "apart from the shedding of blood there is no remission." It is a later addition, and so may be the words " which is poured out for many." But the words which follow have an antique ring: " Amen, I say unto you, I will no more drink of the fruit of the vine, until that day when I drink it new in the kingdom of God." For here Jesus affirms his conviction, in view of his impending death, which unlike his disciples he foresaw, that, when the kingdom of God is instituted on earth, he will take his place in it. But this is the last time he will sit down upon earth with his disciples at the table of the millen- arist hope. These sources do not hint that the Last Supper is to be repeated by Christ's followers until the advent of the kingdom. Luke's account is too much interpolated from Paul, and the texts of his oldest MSS. too discrepant, for us to rely on it except so far as it supports the other gospels. It emphasizes |

the fact that the Last Supper was the Pascha. " With desire have I desired to eat this Passover, before I suffer "; and places the bread after the wine, unless indeed the Pauline interpolation comprises the whole of verse 19.

The fourth gospel, written perhaps a.d. 90-100, sublimates the rite, in harmony with its general treatment of the life of Jesus: " I am the living bread which cometh down out of heaven, that a man may eat thereof and not die " (John vi. 51). As in 1 Cor. x. the flesh of Christ is contrasted with the manna which saved not the Jews from death, so here the latter ask: " How can this man give us his flesh to eat? " and Jesus answers: " Amen, Amen I say unto you, Except ye eat the flesh of the Son of Man and drink his blood, ye have not life in yourselves. . . . He that eateth my flesh and drinketh my blood abideth in me and I in him." In an earlier passage, again in reference to the manna, Jesus is called " the bread of God, which cometh down out of heaven, and giveth life unto the world." They ask: " Lord, ever more give us this bread," and he answers: " I am the bread of life: he that cometh to me shall not hunger, and he that believeth on me shall never thirst." This writer's thought is coloured by the older speculations of Philo, who in metaphor called the Logos the heavenly bread and food, the cupbearer and cup of God; and he seems even to protest against a literal interpretation of the words of institution, since he not only pointedly omits them in his account of the Last Supper, but in v. 63 of this chapter writes: " It is the Spirit that quickeneth; the flesh profiteth nothing: the words that I have spoken unto you are spirit and are life."*

In Acts ii. 46 we read that, " the faithful continued steadfastly with

one accord in the temple "; at the same time " breaking bread at home they partook of food with gladness and singleness of heart, praising God." All such repasts must have been sacred, but we do not know if they included the Eucharistic rite. The care taken in the selecting and ordaining of the seven deacons argues a religious character for the common meals, which they were to serve. Their main duty was to look after the duty of the Hellenistic widows, but inasmuch as meats strangled or conse- crated to idols were forbidden, it probably devolved on the deacons to take care that such were not introduced at these common meals. The Essenes, similarly, appointed houses all over Palestine where they could safely eat, and priests of their own to prepare their food. Some Christians escaped the diffi- culties of their position by eating no meat at all. " He that is weak," says Paul (Rom. xiv. 1), "eateth herbs"; that is, becomes a vegetarian. Rather than scandalize weaker brethren, Paul was willing to eat herbs the rest of his life.

The travel-document in Acts often refers to the solemn breaking of bread. Thus Paul in xxvii. 35, having invited the ship's company of 276 persons to partake of food, took bread, gave thanks to God in the presence of all, and brake it and began to eat. The rest on board then began to be of good cheer, and themselves also took food. Here it is not implied that Paul shared his food except with his co-believers, but he ate before them all. Whether he repeated the words of institution we cannot say.

In Acts xx. 7 the faithful of Troas gather together to break bread " on the first day of the week " after sunset. After a discourse Paul, who was leaving them the next morning, broke bread and ate. This was surely such a meeting as we read of in 1 Cor. x., and was held on Sunday by night; but long before dawn, since after it Paul " talked with them a long while, even till break of day." In 1 Cor. xvi. 1 Paul bids the Corinthians, as he had bidden the churches of Galatia, lay up in store on the first of the week, each one of them, money for the poor saints of Jerusalem. This is the first notice of Sunday Eucharistic collections of alms for the poor.

Here seems to belong in the order of development the Cathar Eucharist (see Cathars). The Cathars used only the Lord's prayer in consecrating the bread and used water for wine.

The next document in chronological order is the so-called Teaching of the Apostles (a.d. 90-110). This assigns prayers and rubrics for the celebration of the Eucharist : —

IX.

" I. Now with regard to the Thanksgiving, thus give ye thanks.

" 2. First concerning the cup : — We give thanks to thee,Our Father, for the holy vine 1 of David thy servant, which thou didst make known to us through Jesus thy servant; 2 to thee be the glory for ever.

" 3. And concerning the broken bread : — We give thanks to thee, our Father, for the life and knowledge which thou didst make known to us through Jesus thy servant; to thee be the glory for ever.

"4. As this broken bread was (once) scattered on the face of the mountains and, gathered together, became one, 3 even so may thy Church be gathered together from the ends of the earth into thy kingdom; for thine is the glory and the power through Jesus Christ for ever.

"5. But let no one eat or drink of your Thanksgiving (Eucharist), but they who have been baptized into the name of the Lord; for concerning this the Lord hath said, Give not that which is holy unto the dogs. 4

X.

" I. Then, after being filled, thus give ye thanks: —

"2. We give thanks to thee, holy Father, for thy holy name, which thou hast caused to dwell in our hearts, and for the knowledge and faith and immortality which thou didst make known to us through Jesus Christ thy servant; to thee be the glory forever.

" 3. Thou Almighty Sovereign, didst create all things forthy name's sake, and food and drink thou didst give to men for enjoyment, that they should give thanks unto thee; but to us thou didst of thy grace give spiritual food and drink and life eternal through thy servant.

" 4. Before all things, we give thee thanks that thou art mighty; to thee be the glory for ever.

"5. Remember, Lord, thy church to deliver it from all evil, and to

perfect it in thy love, and gather it together from the four winds, 5 the sanctified, unto thy kingdom, which thou hast prepared for it; for thine is the power and the glory for ever.

" 6. Come grace, and pass this world away. Hosanna to the God of David! If any one is holy, let him come. If any one is not, let him repent. Maranatha. 6 Amen.

" But allow the prophets to give thanks as much as they will."

From a subsequent section, ch. xiv. 1, we learn that the Eucharist was on Sunday: — " Now when ye are assembled together on the Lord's day of the Lord, break bread and give thanks, having first confessed your transgressions, so that your sacrifice may be pure."

The above, like the uninterpolated Lucan account, places the cup first and has no mention of the body and blood of Christ. But in this last and other respects it contrasts with the other synoptic and with the Pauline accounts. The cup is not the blood of Jesus, but the holy vine of David, revealed through Jesus; and the holy vine can but signify the spiritual Israel, the Ecclesia or church or Messianic Kingdom, into which the faithful are to be gathered.

The one loaf, as in Paul, symbolizes the unity of the ecclesia, but the cup and bread, given for enjoyment, are symbols at best of the spiritual food and drink of the life eternal given of grace by the Almighty Father through his servant (lit. boy) Jesus. The bread and wine are indeed an offering to God of what is his own, pure because offered in purity of heart; but they are not interpreted of the sacrifice of Jesus' body broken on the cross, or of his blood shed for the remission of sin. It is not, as in Paul, a meal commemorative of Christ's death, nor connected with the Passover, as in the Synoptics. Least of all is it a sacramental eating of the flesh and drinking of the blood of Jesus, a perpetual renewal of kinship, physical and spiritual, with him. The teaching rather breathes the atmosphere of the fourth gospel, which sets the Last Supper before the feast of the Passover (xiii. 1), and pointedly omits Christ's institution of the Eucharist, substituting for it the washing of his disciples' feet. The blessing of the Bread and Cup, as an incident in a feast of Christian brotherhood, is all that the Didache has in common with Paul and the Synoptists. The use of the words " after being filled," in x. 1, implies that the brethren ate heartily, and that the cup and bread formed no isolated episode. The Baptized alone are admitted to this Supper, and they only after confession of their sins. Every Sunday at least they are to celebrate it. A prophet can "in the Spirit appoint a

table," that is, order a Lord's 1 Ps. lxxx. 8-19. 2 Acts iv. 25, 27.

8 1 Cor. x. 17; Soph. iii. 10. 4 Matt. vii. 6.

6 Matt. xxiv. 31. 6 1 Cor. xvi. 22.

Supper to be eaten, whenever he is warned by the Spirit to do so. But he must not himself partake of it— a very practical rule. The prophets are to give thanks as they like at these " breakings of bread," without being restricted to the prayers here set forth. In xv. 3 the overseers or bishops and deacons, though their functions are less spiritual than administrative and economic, are allowed to take the place of the prophets and teachers. The phrase used is \uTovpyetv Tr \v \uTovpjlo.v, " to liturgize the liturgy." This word " liturgy " soon came : to connote the Eucharist. The prophets who normally preside over the Suppers are called " your high-priests," and receive from the faithful the first-fruits of the winepress and threshing- floor, of oxen and sheep, and of each batch of new-made bread, and of oil. Out of these they provide the Suppers held every Lord's day, offering them as " a pure sacrifice." Bishops and deacons hold a subordinate place in this document; but the contemporary Epistle of Clement of Rome attests that these bishops " had offered the gifts without blame and holily." The word " liturgy " is also used by Clement.

Pliny's Letter (Epist. 96), written a.d. 112 to the emperor Trajan, about the Christians of Bithynia, attests that on a fixed day, stato die (no doubt Sunday), they met before dawn and recited antiphonally a hymn " to Christ as to a god." They then separated, but met again later to partake of a meal, which, however, was of an ordinary and innocent character. Pliny regarded their meal as identical in character with the common meals of hetairiae, i.e. the trade-gilds or secret societies, which were then, as now, often inimical to the government. Even benefit societies were feared and forbidden by the Roman autocrats, and the " dominical suppers " of the Christians were not likely to be spared. Pliny accordingly forbade them in Bithynia, and the renegade Christians to whom he owed his information gave them up. These suppers included an Eucharist ; for it was because the faithful ate in the latter of the flesh and blood of the Son of God that the charge of devouring children was made against them. If, then, this afternoon meal did not include it, Pliny's remark that their food was ordinary and innocent is unintelligible.

Ignatius, about a.d. i 20, in his letter to the Ephesians, defines the one bread broken in the Eucharist as a " drug of immortality, and antidote that we should not die, but live for ever in Jesus Christ." He

also rejects as invalid any Eucharist not held " under the bishop or one to whom he shall have committed it." For the Christian prophet has disappeared, and with him the custom of holding Eucharists in private dwellings.

In the Epistle to Diognetus, formerly assigned to Justin Martyr, we read (v. 7) that " Christians have in vogue among themselves a table common, yet not common " (i.e. unclean). In Justin's first apology (c. 140) we have two detailed accounts of the Eucharist, of which the first, in ch. 65, describes the first communion of the newly baptized: —

" After we have thus washed the person who has believed and conformed we lead him to the brethren so called, where they are gathered together, to offer public prayer both for ourselves and for the person illuminated, and for all others everywhere, earnestly, to the end that having learned the truth we may be made worthy to be found not only in our actions good citizens, but guardians ot the things enjoined.

" We salute one another with a kiss at the end of the prayers. Then there is presented to the president of the brethren bread and a cup of water (and of a mixture,) 7 and he having taken it sends up praise and glory to the father of all things by the name of the Son and Holy Spirit, and he offers at length thanksgiving (eucharistia) for our having been made worthy of these things by him. But when he concludes the prayer and thanksgiving all the people present answer with acclamation ' Amen.' But the word ' Amen ' in Hebrew signifies ' so be it.' And when the president has given thanks, and all the people have so answered, those who are called by us deacons distribute to each of those present, for them to partake of the bread (and wine) 8 and water, for which thanks have been given, and they carry portions away to those who are not present. And this food is called by us Eucharistia, and of it none may partake save those who believe our teachings to be true and have been washed in the bath which is for remission of sin and rebirth, and who so live as

7 We should probably omit the words bracketed.

8 The codex Othcbonianus omits the words bracketed.

Christ taught. For we do not receive these things as- comrrion bread

or common drink. For as Jesus Christ our Saviour was made flesh by Word of God and possessed flesh and blood for our sake ; so we have been taught that the food blessed (lit. thanked for) by prayer of Word spoken by him, food by which our blood and flesh are by change of it (into them) nourished, is both flesh and blood of Jesus so made flesh. For the apostles in the memorials made by them, which are called gospels, have so related it to have been enjoined on them: to wit, that Jesus took bread, gave thanks and said: This do ye in memory of me; this is my body, and the cup likewise he took and gave thanks and said, This is my blood; and he dis- tributed to them alone. And this rite too the evil demons by way of imitation handed down in the mysteries of Mithras. For that bread and a cup of water is presented in the rites of their initiation with certain conclusions {or epilogues), you either know or can learn."

The second account, in ch. 67, adds that the faithful both of town and country met for the rite on Sunday, that the prophets were read as well as the gospels, that the president after the reading delivered an exhortation to imitate in their lives the goodly narratives; and that each brought offerings to the president out of which he aided orphans and widows, the sick, the prisoners and strangers sojourning with them. These contributions of the faithful seem to be included by Justin along with the bread and cup as sacrifices acceptable to God. But he also particularly specifies (Dialog. 345) that perfect and pleasing sacrifices alone consist in prayers and thanksgivings (tkusia). The elements are gifts or offerings. Justin was a Roman, but may not represent the official Roman church. The rite as he pictures it agrees well with the developed liturgies of a later age.

Irenaeus (Gaul and Asia Minor, before 190) in his work against heresies, iv. 31, 4, points to the sacrament in proof that the human body may become incorruptible :

" As bread from the earth on receiving unto itself the invocation of God is no longer common bread, but is an Eucharist, composed of two elements, an earthly and a heavenly, so our bodies by partak- ing of the Eucharist cease to be corruptible, and possess the hope of eternal resurrection."

There is a similar passage in the 36th fragment (ed. Harvey ii. p. 500), sketching the rite and calling the elements antitypes:

" The oblation of the Eucharist is not fleshly, but spiritual and so pure. For we offer to God the bread and the cup of blessing (tb\oyia), thanking him for that he bade the earth produce these fruits for our

sustenance. And therewith having finished the offering (irpoo-ˆiopd) we invoke the Holy Spirit to constitute this offering, both the bread body of Christ and the cup the blood of Christ, that those who partake of these antitypes (ivrlTima, i.e. surrogates) may win remission of sins and life eternal."

Here we note the stress laid on the Invocation of the Spirit to operate the transformation of the elements, though in what sense they are transformed is not defined. This Epiklesis sur- vives in the Greek liturgies, but in the Roman a prayer takes its place that the angel of the Lord may take the oblation laid on the visible altar, and carry it up to the altar sublime into the presence of the divine majesty. We must not forget that the church of Irenaeus was Greek.

To the second century, lastly, belongs in part the evidence of the catacombs, on the walls of which are depicted persons reclining at tables supporting a fish, accompanied by one or more baskets of loaves, and more rarely by flasks of wine or water. The fish represents Christ; and in the Inscription of Abercius, bishop of Hierapolis about a.d. 160, we have this symbolism enshrined in a literary form: " In company with Paul I followed, while everywhere Faith led the way, and set before me the fish from the fountain, mighty and stainless, whom a pure virgin grasped, and gave this to friends to eat always, having good wine and giving the mixt cup with bread." This representation of baskets of loaves and several fishes, or of one fish and several loaves, seems to contradict the usage of one loaf. It may represent the agapi or Lord's Supper as a whole, of which the one loaf and cup formed an episode. Or the entire stock of bread may have been regarded as flesh of Jesus in virtue of the initial consecration of one single loaf.

To the second century also belong two gnostic uses. Firstly, that of Marcus, a Valentrnian, of South Gaul about 150, whose influence ext6n.de,d to Asia. Minor. Irenaeus relates (Bk. I., ch. vii.

*2), that this " magician "used in the Eucharist cups apparently mixt with wine, but really containing water',- : and duringlong invocations made them appear " purple and red, as if the universal Grace x< *P« dropped some of her blood into the cup through his invocation, and by way of inspiring wdrshippers with a passion to taste the cup and drink deep of the influence termed Charis;';' Such a rite presupposes a belief in a real change of the elements; and water must have been used. In the sequel Irenaeus' recites the Invocation read by Marcus before the communicants :— . . ■ i " Grace that is before all things, that passeth understanding and words, replenish*

thy inner man, and make to abound in thee the knowledge, of her, sowing in the good soil the grain of mustard seed."

The Acts of .Thomas, secondly, ch. 46, attest an Eucharistie usage, somewhat apart from the orthodox. The apostle spreads a linen cloth on a bench, lays on it bread of blessing (evXoyLa), and says; ' ,

" Jesus Christ, Son of God, who hast made us worthy to commune in the Eucharist of thy holy body and precious blood, Lo, we venture on the thanksgiving' (Etickaristid) and invocation of thy blessed name, come now and communicate with us. And he began to speak and said: Come Pity supreme, come communion of the male,. come Lady who knowest the mysteries of the Elect one, . . . come secret mother . . . come and communicate with us in this Eucharist which we 1 perform 'in thy name and in the love (agape) in which we are met at thy calling. And having said this he made a cross upon the bread, and brake it and began to distribute it. And first he gave to the woman, saying : This shall be to thee for remission of sins and release of eternal transgressions. And after her he gave also to all the rest that had received the seal."

In the 2nd century the writer who nearest approaches to,the later idea of Transubstantiation is the gnostic Theodotus (c. 160) :

" The bread no less than the oil is hallowed by the power of the name. They remain the same in outward appearance as they were received, but by that power they are transformed into a spiritual power. So the water when it is exorcised and becomes baptismal, not only drives out the evil principle, but also contracts a power of hallowing." ,

In the Fathers of the first three or four centuries can be traced the same tendency to spiritualize the Eucharist as we encountered in the fourth gospel, and in the Didache. Ignatius, though in Smyrn. 7 he asserts the Eucharist to be Christ's " flesh which suffered for our sins," elsewhere speaks of the blood as being " joy eternal and lasting," as " hope," as " love incorrupt 7 ible," and of the flesh as " faith " or as " the gospel." Clement of Alexandria (c. 180) regards the rite as an initiation in divine knowledge and immortality. The only food he recognizes is spiritual; e.g. knowledge of the divine Essence is " eating and drinking of the divine Word." So Origen declares the bread which God the Word asserted was his body to be that which nourishes souls, the word from God the Word proceeding, the Bread from the heavenly Bread. Not the visible bread held in his hand, nor the visible cup, were Christ's body and blood, but the word

in the mystery of which the bread was to be broken and the wine to be poured out. " We drink Christ's blood," he says elsewhere, " when we receive His words in which standeth Life." So the author of the Contra Marcellum writes in view of John vi. 63 as follows (De eccl. Theol. p. 180):

" In these words he instructed them to interpret in a spiritual sense his utterances about his flesh and blood. Do not, he said, think that I mean the flesh which invests and covers me, and bid you eat that; nor suppose either that I command you to drink my sensible and somaticblood. Nay, you know well that my words which I have spoken unto you are spirit and life. , It follows that the very words and discourses are his flesh and blood, of which he that constantly partakes, nourished as it were upon heavenly bread, will partake of the heavenly life. Let not then, he says, this scandalize you which I have said about eating of my flesh and about drinking of my blood. Nor let the obvious and first hand meaning of what I said about my flesh and blood disturb you when you hear it. For these words avail nothing if heard and understood literally (or sensibly). But it is the spirit which quickens them that can understand spiritually what they hear."

But these views were not those of the uninstructed pagans who filled the churches and needed a rite which brought them, as their old sacrifices had done, into physical contact and union with their god. Their point of view was better expressed in the scruples of priests, who, as Tertullian (c. 200) records {De

Corona, iii.), were careful lest a crumb of the bread or a drop of the wine should fall on the ground, and by such incidents the body of Christ be harassed and attacked!

The Eucharist as a Sacrifice. — Before the 3rd century we cannot trace the view that in the Eucharistic rite the death of Christ, regarded from the Pauline standpoint as an atoning or redemptive sacrifice for the sins of mankind, is renewed and repeated, though the germ out of which it would surely grow is already present in the words " My blood . . . which is shed for many " of Matt, and Mark; yet more surely in Paul's " my body which is in your behoof " and " this do in commemoration of me," where the Greek word for do, Gr. iroieire, Lat. facite, could to pagan ears mean " this do ye sacrifice."

In the first two centuries the rite is spoken of as an offering and as a bloodless sacrifice; but it is God's own creations, the bread and wine, alms and first-fruits, which, offered with a pure conscience, he receives as from friends, and bestows in turn on the poor; it is the praise and prayers which are the sacrifice. In these centuries baptism was the rite for the remission of sin, not the Eucharist; it is the prophet in the Didache who presides at the Lord's Supper, not the Levitically conceived priest; nor as yet has the Table become an Altar. Among Christians, prayers, supplications and thanksgivings have taken the place of the sacrifices of the old covenant.

In Cyprian of Carthage (c. 250) we first find the Eucharist regarded as a sacrifice of Christ's body and blood offered by the priest for the sins of the living and dead. We cannot drink the blood of Christ unless Christ has been first trodden under foot and pressed. ... As Jesus our high priest offered himself as a sacrifice to his Father, so- the human priest takes Christ's place, and imitates his action by offering in church a true and full sacrifice to God the Father (Ep. 63). He speaks of the dominical host (hostia), and takes the verb to do in Paul's letter in the sense of to sacrifice. As early as Tertullian prayers for the dead, who were named, were offered in the rite; but there was as yet no idea of the sacrifice of Christ being reiterated in their behalf. After Cyprian's day this view gains ground in the West, and almost obscures the older view that the rite is primarily an act of communion with Christ. In harmony with Cyprian's new conception is another innovation of his age and place, that of children communicating; both were the natural accompaniment of infant baptism, of which we first hear in his letters. In the East we do not hear of the sacrifice of the body and blood before Eusebius, about the year 300. In the Armenian church of the 1 2th century the idea of a reiterated sacrificial death of Christ still seemed bizarre and barbarous. 1 But as early as 558 in Gaul the bread was arranged on the altar in the form of a man, so that one believer ate his eye, another his ear, a third his hand, and so on, according to their respective merits! This was for- bidden by Pope Pelagius I.; but in the Greek church the custom survives, the priest even stabbing with " the holy spear " in its right side the human figure planned out of the bread, by way of rehearsing in pantomime the narrative of John xix. 34.

The change from a commemoration of the Passion to a re- enacting of it came slowly in the Greek church. Thus Chrysostom (Ham. 17, ad Heb.), after writing " We offer (irotovpev) not another sacrifice, but the same," instantly corrects himself and adds: " or rather we perform a commemoration of the sacrifice." This was exactly the

position also of the Armenian church.

Wine or Water ? — Justin Martyr perhaps contemplated the use of water instead of wine, and Tatian his pupil used it. The Marcionites, the Ebionites, or Judaeo-Christians of Palestine, the Montanists of Phrygia, Africa and Galatia, the confessor Alcibiades of Lyons, c. a.d. 177 (Euseb. Hist. Eccl. v. 3. 2), equally used it. Cyprian (Ep. 63) affirms (c. 250) that his predecessors on the throne of Carthage had used water, and that many African bishops continued to do so, " out of ignorance," he says, " and simplemindedness, and God would forgive them." Pionius, the Catholic martyr of Smyrna, c. 250, also used water. In the Acts of Thomas it is used. Such uniformity of language

1 See Nerses of Lambron, Opera Armenice (Venice, 1847), pp. 74, 75, ioi, &c.

has led Prof. Harnack to suppose that in the earliest age water was used equally with wine, and Eusebius the historian, who had means of judging which we have not, saw no difficulty in identify- ing with the first converts of St Mark the Therapeutae of Philo who took only bread and water in their holy repast.

Abercius and Irenaeus are the first to speak of wine mixt with water, of a krama (icpd.ua.) or temperamentum. In the East, then as now, no one took wine without so mixing it. Cyprian insists on the admixture of water, which he says represented the humanity of Jesus, as wine his godhood. The users of water were named Aquarii or hydroparastatae in the 4th century, and were liable to death under the code of Theodosius. Some of the Monophysite churches, e.g. the Armenian, eschewed water and used pure wine, so falling under the censure of the council in Trullo of a.d. 692. Milk and honey was added at first com- munions. Oil was sometimes offered, as well as wine, but it would seem for consecration only, and not for consumption along with the sacrament. With the bread, however, was sometimes consecrated cheese, e.g. by the African Montanists in the 2nd century. Bitter herbs also were often added, probably because they were eaten with the Paschal lamb. Many early canons forbid the one and the other. Hot water was mixt with the wine in the Greek churches for some centuries, and this custom is seen in catacomb paintings. It increased the resemblance to real blood.

Position of the Faithful at the Eucharist. — Tertullian, Eusebius, Chrysostom and others represent the faithful as standing at the Eucharist. In the art of the catacombs they sit or recline in the

ordinary attitude of banqueters. In the age of Christ standing up at the Paschal meal had been given up, and it was become the rule to recline. Kneeling with a view to adoration of the elements was unheard of in the primitive church, and the Ar- menian Fathers of the 12th century insist that the sacrament was intended by Christ to be eaten and not gazed at (Nerses, op. cit. p. 167). Eucharistic or any other liturgical vestments. were unknown until late in the 5th century, when certain bishops were honoured with the same pallium worn by civil officials (see Vestments).

In the Latin and in the Monophysite churches of Armenia and Egypt unleavened bread is used in the Eucharist on the somewhat uncertain ground that the Last Supper was the Paschal meal. The Greek church uses leavened.

Transubstantiation. — In the primitive age no one asked how Christ was present in the Eucharist, or how the elements became his body and blood. The Eucharist formed part of an agapt or love feast until the end of the 2nd century, and in parts of Christendom continued to be so much later. It was, save where animal sacrifices survived, the Christian sacrifice, par excellence, the counterpart for the converted of the sacrificial communions of paganism; and though charged with higher significance than these, it yet reposed on a like background of religious usage and beliefs. But when the Agape on one side and paganism on the other receded into a dim past, owing to the enhanced sacro- sanctity of the Eucharist and because of the severe edicts of the emperor Theodosius and his successors, the psychological back- ground fell away, and the Eucharist was left isolated and hanging in the air. Then men began to ask themselves what it meant. Rival schools of thought sprang up, and controversy raged over it, as it had aforetime about the homoousion, or the two natures. Thus the sacrament which was intended to be a bond of peace, became a chief cause of dissension and bloodshed, and was often discussed as if it were a vulgar talisman.

Serapion of Thmuis in Egypt, a younger contemporary of Athanasius, in his Eucharistic prayers combines the language of the Didache with a high sacramentalism alien to that document which now only survived in the form of a grace used at table in the nunneries of Alexandria (see Agape). He entreats " the Lord of Powers to fill this sacrifice with his Power and Participa- tion," and calls the elements a " living sacrifice, a bloodless offering." The bread and wine before consecration are " like- nesses of his body and blood," this in virtue of the words pro- nounced over them by Jesus on the night of his betrayal. The

prayer then continues thus: " O God of truth, let thy holy Word settle upon this bread, that the bread may become body of the word, and on this cup, that the cup may become blood of the truth. And cause all who communicate to receive a drug of life for healing of every disease and empowering of all moral advance and virtue." Here the bread and wine become by consecration tenements in which the Word is reincarnated, as he aforetime dwelled in flesh. They cease to be mere likenesses of the body and blood, and are changed into receptacles of divine power and intimacy, by swallowing which we are benefited in soul and body. Cyril of Jerusalem in his catechises 5 l enunciates the same idea of nerafioKi] or transformation.

Gregory of Nyssa also about the same date (in Migne, Patrolog. Graeca, vol. 46, col. 581, oration on the Baptism) asserts a " transformation " or " transelementation " (p,eraaTOLxtiuxns) of the elements into centres of mystic force; and assimilates their consecration to that of the water of baptism, of the altar, of oil or chrism, of the priest. He compares it also to the change of Moses' rod into a snake, of the Nile into blood, to the virtue inherent in Elijah's mantle or in the wood of the cross or in the clay mixt of dust and the Lord's spittle, or in Elisha's relics which raised a corpse to life, or in the burning bush. All these, he says, " were parcels of matter destitute of life and feeling, but through miracles they became vehicles of the power of God absorbed or taken into themselves. ' ' He thus views the consecra- tion of the elements as akin to other consecrations; and, like priestly ordination, as involving " a metamorphosis for the better," a phrase which later on became classical. John of Damascus (c. 750) believed the bread to be mysteriously changed into the Christ's body, just as when eaten it is changed into any human body; and he argued that it is wrong to say, as Irenaeus had said, that the elements are mere antitypes after as before consecration. In the West, Augustine, like Eusebius and Theodoret, calls the elements signs or symbols of the body and blood signified in them; yet he argues that Christ " took and lifted up his own body in his hands when he took the bread." At the same time he admits that " no one eats Christ's flesh, unless he has first adored" (nisi prius adoraverit). But he qualifies this " Receptionist " position by declaring that Judas received the sacrament, as if the unworthiness of the recipient made no difference.

Out of this mist of contradictions scholastic thought strove to emerge

by means of clear-cut definitions. The drawback for the dogmatist of such a view as Serapion broaches in his prayers was this, that although it explained how the Logos comes to be immanent in the elements, as a soul in its body, nevertheless it did not guarantee the presence in or rather substitution for the natural elements of Christ's real body and blood. It only provided an Lvt'itvkov or surrogate body. In 830-850, Paschasius Radbert taught that after the priest has uttered the words of institution, nothing remains save the body and blood under the outward form of bread and wine; the sub- stance is changed and the accidents alone remain. The elements are miraculously recreated as body and blood. This view harmonized with the docetic view which lurked in East and West, that the manhood of Jesus was but a likeness or semblance under which the God was concealed. So Marcion argued that Christ's body was not really flesh and blood, or he could not have called it bread and wine. Paschasius shrank from the logical outcome of his view, namely, that Christ's body or part of it is turned into human excrement, but Ratramnus, another monk of Corbey, in a book afterwards ascribed to Duns Scotus, drew this inference in order to discredit his antagonists, and not because he believed it himself. The elements, he said, remain physically what they were, but are spiritually raised as symbols to a higher power. Perhaps we may illustrate his position by saying that the elements undergo a change analogous to what takes place in iron, when by being brought into an electric field it becomes magnetic. The substance of the elements remain as well as their accidents, but like baptismal water they gain by consecra- tion a hidden virtue benefiting soul and body. Ratramnus's view thus resembled Serapion's, after whom the elements furnish

a new vehicle of the Spirit's influence, a new body through which the Word operates, a fresh sojourning among us of the Word, though consecrated bread is in itself no more Christ's natural body than are we who assimilate it. Other doctors of the 9th century, e.g. Hincmar of Reims andHaimoof Halberstadt, took the side of Paschasius, and affirmed that the substance of the bread and wine is changed, and that God leaves the colour, taste and other outward properties out of mercy to the wor- shippers, who would be overcome with dread if the underlying real flesh and blood were nakedly revealed to their gaze !
.

Berengar in the nth century assailed this view, which was really that of transubstantiation, alleging that there is no substance in matter apart from the accidents, and that therefore Christ cannot be corporally present in the sacrament; because, if so, he must be spatially present, and there will be two material bodies in one space;

moreover his body will be in thousands of places at once. Christ, he said, is present spiritually, so that the elements, while remaining what they were, unremoved and undestroyed, are advanced to be something better: omne cut a Deo benedicatur, non absumi, non auferri, non destrui, sed manere et in melius quam erat necessario provehi. This was the phrase of Gregory of Nyssa.

Berengar in a weak moment in 1059 was forced by the pope to recant and assert that " the true body and blood are not only a sacrament, but in truth touched and broken by the hands of the priests and pressed by the teeth of the faithful," and this position remains in every Roman catechism. Such dilemmas as whether a mouse can devour the true body, and whether it is not involved in all the obscenities of human digestive processes, were ill met by this ruling. Each party dubbed the other stercoranists (dung-feasters), and the controversy was often marred by indecencies.

As in the 3rd century the Roman church decided in respect of baptism that the sacrament carries the church and not the church the sacrament, so in the dispute over the Eucharist it ended, in spite of more spiritual views essayed by Peter Lombard, by insisting on the more materialistic view at the fourth Lateran Council in 1215, whose decree runs thus: — " The body and blood of Jesus Christ are truly contained in the sacrament of the altar under the species of bread and wine, the bread and wine re- spectively being transubstantiated into body and blood by divine power, so that in order to the perfecting of the mystery of unity we may ourselves receive from his (body) what he himself receives from ours." In 1264 Urban IV. instituted the Corpus Christi Feast by way of giving liturgical expression to this view.

Communion in One Kind. — Up to about 1100 laymen in the West received the communion in both kinds, and except in a few disciplinary cases the wine was not refused. In 1099, by a decree of Pope Paschal II., children might omit the wine and invalids the bread. The communion of the laity in the bread alone was enjoined by the council of Constance in 1415, and by the council of Trent in 1562. The reformed churches of the West went back to the older rule which Eastern churches had never forsaken.

Mass.- — Thetermwow,whichsurvivesinCandlemas,Christmas, Michaelmas, is from the Latin missa, which was in the 3rd century a technical term for the dismissal of any lay meeting, e.g. of a law-court, and was adopted in that sense by the church as early as Ambrose (c. 350). The catechumens or unbaptized, together with the

penitents, remained in church during the Litany, collect, three lections, two psalms and homily. The deacon then cried out: " Let the catechumens depart. Let all cate- chumens go out." This was the missa of the catechumens. The rest of the rite was called missa fidelium, because only the initiated remained. Similarly the collect with which often the rite began is the prayer ad collectam, i.e. for the congregation met together or collected. The corresponding Greek word was synaxis.

After the catechumens were gone the priest said: " The Lord be with you, let us pray," and the service of the mass followed.

In the West, says Duchesne (Origines, p. 179), not only

catechumens, but the baptized who did not communicate left the church before the communion of the faithful began (? after the communion of the clergy). In Anglican churches non-communir cants used to leave the church after the prayer for the Church Militant. Ritualists now keep unconfirmed children in church during the entire rite, through ignorance of ancient usage, in order that they may learn to adore the consecrated elements. For this moment of homage to material elements ritually filled with divine potency may be so exaggerated as to obscure the rite's ancient significance as a communion of the faithful in mystic food.

Ideas of Reformers. — The 16th-century reformers strove to avoid the literalism of the words " This is my body," accepted frankly by the Roman and Eastern churches, and urged a Receptionist view, viz. that Christ is in the sacrament only spiritually consumed by worthy recipients alone, the material body not being actually chewed. This is seen by a comparison Of other confessions with the Profession of Catholic Faith in accordance with the council of Trent, in the bull of Pius IV., which runs thus:—.

" I profess that in the Maw is offered to God a true, proper and propitiatory sacrifice, for the living and the dead, and that in the. most holy sacrament of the Eucharist there is truly really andTn substance the body and blood, together with the soul and divinity of our Lord Jesus Christ, and that there does take place a con- version of the entire substance of the bread into the body, and of the entire substance of the wine into the blood, which conversion the Catholic

Church doth call Transubstantiation. I also admit that under one of the other species elone the entire and whole Christ and the true sacrament is received."

The 28th Article of Religion of the Church of England is as follows: —

" The Supper of the Lord . . . is a Sacrament of our Redemption by Christ's death; insomuch that to such as rightly; worthily, and with faith, receive the same, the Bread which we break is a partaking of the Body of Christ, and likewise the Cup of Blessing is a partak- ing of the Blood of Christ.

" Transubstantiation . . . cannot be proved by holy writ. . . .

" The Body of Christ is given, taken and eaten, in the Supper, only after a heavenly and spiritual manner. And the mean whereby the Body of Christ is received and eaten in the Supper is Faith.

" The Sacrament of the Lord's Supper was not by Christ's ordinance reserved, carried about, lifted up, or worshipped."

At the end of the communion rite the prayer-book, in view of the ordinance to receive the Sacrament kneeling, adds the following: —

" It is hereby declared, that thereby no adoration is intended, Or ought to be done, either unto the Sacramental Bread or Wine, there bodily received, or unto any Corporal Presence of Christ's natural Flesh and Blood. For the Sacramental Bread and Wine remain still in their very natural substances, and therefore may not be adored (for that were idolatry, to be abhorred of all faithful Christians) ; and the natural Body and Blood of our Saviour Christ are in Heaven, and not here; it being against the truth of Christ's natural Body to be at one time in more places than one."

These monitions and prescriptions are rapidly becoming a dead-letter, but they possess a certain historical interest. ˆ

The Helvetic Confession 1 of a.d. 1566 {caput xxi. De sacra coena Domini) runs as follows: —

" That it may be more rightly and clearly understood how the flesh and blood of Christ can be food and drink of the faithful, and be received by them unto eternal life, let us add these few remarks. Chewing is not of one kind alone. For there is a corporeal chewing, by which food is taken into the mouth by man, bruised with the teeth

and swallowed down into the belly …. As the flesh of Christ cannot be corporeally chewed without wickedness and truculence, so it is not food of the belly …. There is also a spiritual chewing of the body of Christ, not such that by it we understand the very food to be changed into spirit, but such that, the body and blood of the Lord abiding in their essence and peculiarity, they are spiritually communicated to us, not in any corporeal way, but in a spiritual, through the Holy Spirit which applies and bestows on us those things which were prepared through the flesh and blood of the Lord betrayed for our sake to death, to wit, remission of sins, liberation and life eternal, so that Christ lives in us and we in him ….

"In addition to the aforesaid spiritual chewing, there is also a sacramental chewing of the Lord's body, by which the faithful not only partakes spiritually and inwardly of the true body and blood of the Lord, but outwardly by approaching the Lord's table, receives the-

1 This represents the views of Calvin.

visible sacrament of his body and blood. . . . But he who without faith approaches the sacred table, albeit he communicate in the sacrament, yet he perceives not the matter of the sacrament, whence is life and salvation. …"

The Augustan Confession presented by the German electors to Charles V. in the section on the Mass merely protests against the view that " the Lord's Supper is a work (opus) which being performed by a priest earns remission of sin for the doer and for others, and that in virtue of the work done (ex opere operato), without a good motive on the part of the user. Also that being applied for the dead, it is a satisfaction, that is to say, earns for them remission of the pains of purgatory."

The Saxon Confession of Wittenberg, June 1551, while protest- ing against the same errors, equally abstains from trying to define narrowly how Christ is present in the sacrament.

Consubstantialion. — The symbolical books of the Lutheran Church, following the teaching of Luther himself, declare the doctrine of the real presence of Christ's body and blood in the eucharist, together with the bread and wine (consubstantiation) , as well as the ubiquity of his body, as the orthodox doctrine of the church. One consequence of this view was that the unbelieving recipients are held to be as really partakers of the body of Christ in, with and under the bread as the faithful, though they receive it to their own hurt. (Hagenbach,

Hist, of Doclr. ii, 360.)

Of all the Reformers, the teaching of Zwingli was the farthest removed from that of Luther. At an early period he asserted that the Eucharist was nothing more than food for the soul, and had been instituted by Christ only as an act of commemora- tion and as a visible sign of his body and blood (Chrislenliche Ynleitung, 1523, quoted by Hagenbach, Hist, of Doclr. ii. 296, Clark's translation). But that Zwingli did not reject the higher religious Significance of the Eucharist, and was far from degrading the bread and wine into " nuda et inania symbola," as he was accused of doing, we see from his Fidei ratio ad Carolum Impera- torem (ib. p. 297).

Original Significance of the Eucharist. — It is doubtful if the attempts of reformers to spiritualize the Eucharist bring us, except so far as they pruned ritual extravagances, nearer to its Original significance; perhaps the Roman, Greek and Oriental churches have better preserved it. This significance remains to be discussed; the cognate question of how far the development of the Eucharist was influenced by the pagan mysteries is discussed in the article Sacrament.

That the Lord's Supper was from the first a meal symbolic Of Christian unity and commemorative of Christ's death is questioned by none. But Paul, while he saw this much in it, saw tnuch more; or he could not in the same epistle, x. 18-22 assimilate communion in the flesh and blood of Jesus, on the one hand, to the sacrificial communion with the altar which made Israel after the flesh one; and on the other to the communion with devils attained by pagans through sacrifices offered before idols. It has been justly remarked of the Pauline view, that —

" The union with the Lord Himself, to which those who partake of the Lord's Supper have, is compared with the union which those who partake of a sacrifice have with the deity to whom the altar is devoted— in the case of the Israelites with God, of the heathen with demons. This idea that to partake of sacrifice is to devote one- self to the deity, lies at the root of the ancient idea of worship, whether Jewish Or heathen; and St Paul uses it as being readily understood. In this connexion the symbol is never a mere symbol, but a means of real union. ' The cup is the covenant ' " (Prof. Sanday in Hastings' Dictionary of the Bible, 3, 149).

Paul caps his argument thus: — " Ye cannot drink the cup of the Lord and the cup of demons: ye cannot partake of the table of the

Lord and of the table of demons. Or do we provoke the Lord to jealousy? Are we stronger than he?" And these words with their context prove that Paul, like the Fathers of the church, regarded the gods and goddesses as real living supernatural beings, but malignant. They were the powers and principalities with whom he was ever at war. The Lord also is jealous of them, if any one attempt to combine their cult with his, for to do so is to doubt the supremacy of his name above all names. Both in its inner nature then and outward

effects the Eucharist was the Christian counterpart of these two other forms of communion of which one, the heathen, was excluded from the first, and the other, the Jewish, soon to dis- appear. It is their analogue, and to understand it we must understand them, not forgetting that Paul, as a Semite, and his hearers, as converted pagans, were imbued with the sacrificial ideas of the old world.

" A kin," remarks W. Robertson Smith (Religion of the Semites, 1894), " was a group of persons whose lives were so bound up together, in what must be called a physical unity, that they could be treated as parts of one common life. The members of one kindred looked on themselves as one living whole, a single animated mass of blood, flesh and bones, of which no member could be touched without all the members suffering." " In later times," observes the same writer (op. cit. p. 313), " we find the conception current that any food which two men partake of together, so that the same substance enters into their flesh and blood, is enough to establish some sacred unity of life between them; but in ancient times this significance seems to be always attached to participation in the flesh of a sacrosanct victim, and the solemn mystery of its death is justified by the consideration that only in this way can the sacred cement be procured, which creates or keeps alive a living bond of union between the worshippers and their god. This cement is nothing else than the actual life of the sacred and kindred animal, which is conceived as residing in its flesh, but specially in its blood, and so, in the sacred meal, is actually distributed among all the participants, each of whom incorporates a particle of it with his own individual life."

The above conveys the cycle of ideas within which Paul's reflection worked. Christ who knew no sin (2 Cor. v. 21) had been made sin, and sacrificed for us, becoming as it were a new Passover (1 Cor. v.

7). By a mysterious sympathy the bread and wine over which the words, " This is my body which is for you," and " This cup is the new covenant in my blood," had been uttered, became Christ's body and blood; so that by partaking of these the faithful were united with each other and with Christ into one kinship. They became the body of Christ, and his blood or life was in them, and they were members of him. Participation in the Eucharist gave actual life, and it was due to their irregular attendance at it that many members of the Corinthian church " were weak and sickly and not a few slept " (i.e. had died). As the author already cited adds (p. 313) : " The notion that by eating the 'flesh, or particularly by drinking the blood, of another living being, a man absorbs its nature or life into his own, is one which appears among primitive peoples in many forms."

But this effect of participation in the bread and cup was not in Paul's opinion automatic, was no mere opus operatum; it depended on the ethical co-operation of the believer, who must not eat and drink unworthily, that is, after refusing to share his meats with the poorer brethren, or with any other guilt in his soul. The phrases " discern the body " and " discern ourselves " in 1 Cor. xi. 29, 31 are obscure. Paul evidently plays on the verb, krind, diakrind, katdkrind (icplvci>, Siaicplvio, KaraKplvdi) . The general sense is clear, that those who consume the holy food without a clear conscience, like those who handle sacred objects with impure hands, will suffer physical harm from its contact, as if they were undergoing the ordeal of touching a holy thing. The idea, therefore, seems to be that as we must distinguish the holy food over which the words " This is my body" have been uttered from common food, so we must separate ourselves before eating it from all that is guilty and impure. The food that is taboo must only be consumed by persons who are equally taboo or pure. If they are not pure, it condemns them.

The " one " loaf has many parallels in ancient sacrifices, e.g. the Latin tribes when they met annually at their common temple partook of a " single " bull. And in Greek Panegureis or festivals the sacrificial wine had to be dispensed from one common bowl: " Unto a common cup they come together, and from it pour libations as well as sacrifice," says Aristides

Rhetor in his Isthmica in Neptunum, p. 45. To ensure the con- tinued unity of the bread, the Roman church ever leaves over from a preceding consecration half a holy wafer, called fer- mentum, which is added in the next celebration.

With what awe Paul regarded the elements mystically identi- fied

with Christ's body and life is clear from his declaration in 1 Cor. xi. 27, that he who consumes, them unworthily is guilty or holden of the Lord's body and blood. This is the language of the ancient ordeal which as a test of innocence required the accused to touch or still better to eat a holy element. A wife who drank the holy water in which the dust of the Sanctuary was mingled (Num. v. 17 foil.) offended so deeply against it, if unfaithful, that she was punished with . dropsy and wasting. The very point is paralleled in the Acts of Thomas, ch. xlviij. A youth who has murdered his mistress takes the bread of the Eucharist in his mouth, and his two hands are at once withered up. The apostle immediately invites him to confess the crime he must have committed, " for, he says, the Eucharist of the Lord hath convicted thee."

It has been necessary to consider at such length St Paul's account of the Eucharist, both because it antedates nearly by half a century that of the gospels, and because it explains the significance which the rite had no less for the Gnostics than for the great church. The synoptists' account is to be understood thus: Jesus, conscious that he now for the last time lies down to eat with his disciples a meal which, if not the Paschal, was any- how anticipatory of the Millennial Regeneration (Matt. xix. 28), institutes, as it were, a blood-brotherhood between himself and them. It is a covenant similar to that of Exodus xxiv., when after the peace-offering of oxen, Moses took the blood in basins and sprinkled half of it on the altar and on twelve pillars erected after the twelve tribes, and the other half on the people, to whom he had first read out the writing of the covenant and said, " Behold the blood of the covenant which the Lord hath made with you concerning all these words."

But the covenant instituted by Jesus on the eve of his death was hardly intended as a new covenant with God, superseding the old. This reconstruction of its meaning seems to have been the peculiar revelation of the Lord to Paul, who viewed Christ's crucifixion and death as an atoning sacrifice, liberating by its grace mankind from bonds of sin which the law, far from snap- ping, only made more sensible and grievous. This must have been the gist of the special revelation which he had received from Christ as to the inner character of a supper which he already found a ritual observance among believers. The Eucharist

intelligible appeal. It belongs to the same order of ideas that the headship of the Messianic ecclesia in Judea was assigned after the death of Jesus to his eldest brother James, and after him for several generations to the eldest living representative of his family.

To the modern mind it is absurd that an image or symbol should be taken for that which is imaged or symbolized, and that is why the early history of the Eucharist has been so little understood by ecclesiastical writers. And yet other religions, ancient and modern, supply many parallels, which are considered in the article Sacrament.

Authorities. — Robertson Smith, Religion of the Semites; Goetz, Die Abendmahlsfrage; G. Anrich, Das antike Mysterienwesen (Gottingen, 1894) ; Sylloge confessionum (Oxford, 1804) ; Duchesne, Origins of Christian Culture; Funk's edition of Constitutiones Apostolicae; Hagenbach, History of Doctrines, vol. ii. ; Geo. Bickell, Messe und Pascha; idem. " Die Entstehung der Liturgie," Ztsch. f. Kath. Theol. iv. Jahrg. 94 (1880), p. 90 (shows how the prayers of the Christian sacramentaries derive from the Jewish Synagogue) ; Goar, Rituale Graecorum; F. E. Brightman, Eastern Liturgies; Cabrol and Leclercq, Monumenta liturgica, reliquiae liturgicae vetustissimae (Paris, 1900); Harnack, History of Dogma; Jas. Martineau, Seat of Authority in Religion, bk. iv. (London, 1890); Loots, art. " Abendmahlsfeier " in Herzog's Realencyklopadie (1896.) Spitta, Urchristentum (Gottingen, 1893); Schultzen, Das Abend- mahl im N.T. (Gottingen, 1895); Kraus, Real-Encykl. d. christl. Altert. (for the Archaeology); art. " Eucharistic " ; Ch. Gore, Dissertations (1895); Hoffmann, Die Abendmahlsgedanken Jesu Christi (Konigsberg, 1896); Sanday, art. "Lord's Supper" in Hastings' Dictionary of the Bible; Th. Harnack, Der christl. Getneindegottesdienst. (F. C. C.)

Reservation of the Eucharist The practice of reserving the sacred elements for the purpose of subsequent reception prevailed in the church from very early times. The Eucharist being the seal of Christian fellowship, it was a natural custom to send portions of the consecrated ele- ments by the hands of the deacons to those who were not present (Justin Martyr, Apol. i. 65). From this it was an easy develop- ment, which prevailed before the end of the 2nd century, for churches to send the consecrated Bread to one another as a sign of communion (the evxapwria mentioned by Irenaeus, ap. Eus. H.E. v. 24), and for the faithful to take it to their own homes and reserve it in arcae or caskets for the purpose of communicat- ing themselves (Tert. ad Uxor. ii. 5, De oral. 19; St Cypr. De lapsis,

132). Being open to objection on grounds both of superstition and of irreverence, these customs were gradually put down by the council of Laodicea in a.d. 360. But some irregular forms of reservation still continued; the prohibition as regards the lay people was not extended, at any rate with any strictness, to the clergy and monks; the Eucharist was still carried on journeys; occasionally it was buried with the dead; and in a few cases the pen was even dipped in the chalice in subscribing important writings. Meanwhile, both in East and West, the general practice has continued unbroken of reserving the Eucharist, in order that the " mass of the presanctified " might take place on certain "aliturgic" days, that the faithful might be able to communicate when there was no celebration, and above all that it might be at hand to meet the needs of the sick and dying. It was reserved in a closed vessel, which took various forms from time to time, known in the East as the apro(j>6pu)v, and in the West as the turris, the capsa, and later on as the pyx. In the East it was kept against the wall behind the altar; in the West, in a locked aumbry in some part of the church, or (as in England and France) in a pyx made in the form of a dove and suspended over the altar.

In the West it has been used in other ways. A portion of the consecrated Bread from one Eucharist, known as the " Fer- ment um," was long made use of in the next, or sent by the bishop to the various churches of his city, no doubt with the object of emphasizing, the solidarity and the continuity of " the one Eucharist "; and amongst other customs which prevailed for some centuries, from the 8th onward, were those of giving it to the newly ordained in order that they might communicate themselves, and of burying it in or under the altar-slab of a newly consecrated church. At a later date, apparently early in the

14th century, began the practice of carrying the Eucharist in procession in a monstrance; and at a still later period, apparently after the middle of the 16th century, the practice of Benediction with the reserved sacrament, and that of the " forty hours' exposition," were introduced in the churches of the Roman communion. It should be said, however, that most of these practices met with very considerable opposition both from councils and from theologians and canonists, amongst others from the English canonist William Lyndwood {Provinciate, lib. iii. c. 26), on the following grounds amongst others: that the Body of Christ is the food of the soul, that it ought not to be reserved except for the benefit of the sick, and that it ought not to be applied to any other use than that for which it was instituted.

In England, during the religious changes of the 16th century, such of these customs as had already taken root were abolished; and with them the practice of reserving the Eucharist in the churches appears to have died out too. The general feeling on the subject is expressed by the language of the 28th Article, first drafted in 1553, to the effect that " the sacrament of the Lord's Supper was not by Christ's ordinance reserved, carried about, lifted up or worshipped," and by the fact that a form was provided for the celebration of the Holy Eucharist for the sick in their own homes. This latter practice was in accordance with abundant precedent, but had become very infrequent, if not obsolete, for many years before the Reformation. The first Prayer-Book of Edward VI. provided that if there was a celebra- tion in church on the day on which a sick person was to receive the Holy Communion, it should be reserved, and conveyed to the sick man's house to be administered to him; if not, the curate was to visit the sick person before noon and there celebrate according to a form which is given in the book. At the revision of the Prayer-Book in 1352 all mention of reservation is omitted, and the rubric directs that the communion is to be celebrated in the sick person's house, according to a new form; and this service has continued, with certain minor changes, down to the present day. That the tendency of opinion in the English Church during the period of the Reformation was against reservation is beyond doubt, and that the practice actually died out would seem to be equally clear. The whole argument of some of the controversial writings of the time, such as Bishop Cooper on Private Mass, depends upon that fact; and when Cardinal du Perron alleged against the English Church the lack of the reserved Eucharist, Bishop Andrewes replied, not that the fact was otherwise, but that reservation was unnecessary in view of the English form for the Communion of the Sick: " So that reservation needeth not; the intent is had without it" (Answers to Cardinal Perron, &c, p. xg, Library of Anglo- Catholic Theology). It does not follow, however, that a custom which has ceased to exist is of necessity forbidden, nor even that what was rejected by the authorities of the English Church in the 16th century is so explicitly forbidden as to be unlawful under its existing system; and not a few facts have to be taken into account in any investigation of the question. (1) The view has been held that in the Eucharist the elements are only con- secrated as regards the particular purpose of reception in the service itself, and that consequently what remains unconsumed may be put to common uses. If this view were held (and it has more than once made its appearance in church history, though it has never prevailed), reservation might be open to objection on theological grounds. But such is not the view of the Church of

England in her doctrinal standards, and there is an express rubric directing that any that remains of that which was con- secrated is not to be carried out of the church, but reverently consumed. There can therefore be no theological obstacle to reservation in the English Church: it is a question of practice only. (2) Nor can it be said that the rubric just referred to is in itself a condemnation of reservation: it is rather directed, as its history proves, against the irreverence which prevailed when it was made; and in fact its wording is based upon that of a pre-Reformation order which coexisted with the practice of reservation (Lyndwood, Provinciate, lib. iii. tit. 26, note q). (3) Nor can it be said that the words of the 28th Article (see

above) constitute in themselves an express prohibition of reserva- tion, strong as their evidence may be as to the practice and feeling of the time. The words are the common property of an earlier age which saw nothing objectionable in reservation for the sick. (4) It has indeed been contended (by Bishop Wordsworth of Salisbury) that reservation was not actually, though tacitly, continued under the second Prayer-Book of Edward VI., since that book orders that the curate shall " minister," and not " celebrate," the communion in the sick person's house. But such a tacit sanction on the part of the compilers of the second Prayer-Book is in the highest degree improbable, in view of their known opinions on the subject; and an examination of contemporary writings hardly justifies the contention that the two words are so carefully used as the argument would demand. Anyhow, as the bishop notes, this could not be the case with the Prayer-Book of 1 66 1, where the word is "celebrate." (5) The Elizabethan Act of Uniformity contained a provision that at the universities the public services, with the exception of the Eucharist, might be in a language other than English; and in 1560 there appeared a Latin version of the Prayer-Book, issued under royal letters patent, in which there was a rubric prefixed to the Order for the Communion of the Sick, based on that in the first Prayer-Book of Edward VI. (see above), and providing that the Eucharist should be reserved for the sick person if there had been a celebration on the same day. But although the book in question was issued under letters patent, it is not really a translation of the Elizabethan book at all, but simply a reshaping of Aless's clever and inaccurate translation of Edward VI. 's first book. In the rubric in question words are altered here and there in a way which shows that its reappearance can hardly be a mere printer's error; but in any case its importance is

very slight, for the Act of Uniformity specially provides that the English service alone is to be used for the Eucharist. (6) It has been pointed out that reservation for the sick prevails in the Scottish Episcopal Church, the doctrinal standards of which correspond with those of the Church of England. But it must be remembered that the Scottish Episcopal Church has an additional order of its own for the Holy Communion, and that consequently its clergy are not restricted to the services in the Book of Common Prayer. Moreover, the practice of reservation which has prevailed in Scotland for over 1 50 years would appear to have arisen out of the special circumstances of that church during the 18th century, and not to have prevailed continuously from earlier times. (7) Certain of the divines who took part in the framing of the Prayer-Book of 1661 seem to speak of the practice as though it actually prevailed in their day. But Bishop Sparrow's words on the subject {Rationale, p. 349) are not free from difficulty on any hypothesis, and Thorndike (Works, v. 578, Library of Anglo-Catholic Theology) writes in such a style that it is often hard to tell whether he is describing the actual practice of his day or that which in his view it ought to be. (8) There appears to be more evidence than is commonly supposed to show that a practice analogous to that of Justin Martyr's day has been adopted from time to time in England, viz. that of conveying the sacred elements to the houses of the sick during, or directly after, the celebration in church. And in 1899 this practice received the sanction of Dr Westcott, then bishop of Durham. (9) On the other hand, the words of the oath taken by the clergy under the 36th of the Canons of 1604 are to the effect that they will use the form prescribed in the Prayer-Book and none other, except so far as shall be otherwise ordered by lawful authority; and the Prayer-Book does not even mention the reservation of the Eucharist, whilst the Articles mention it only in the way of depreciation.

The matter has become one of no little practical importance owing to modern developments of English Church life. On the one hand, it is widely felt that neither the form for the Com- munion of the Sick, nor yet the teaching with regard to spiritual communion in the third rubric at the end of that service, is sufficient to meet all the cases that arise or may arise. On the other hand, it is probable that in many cases the desire for reservation has arisen, in part at least, from a wish for some-

thing analogous to the Roman Catholic customs of exposition and benediction; and the chief objection to any formal practice of reservation, on the part of many who otherwise would not be opposed to it, is doubtless to be found in this fact. But however that

may be, the practice of reservation of the Eucharist, either in the open church or in private, has become not uncommon in recent days.

The question of the legality of reservation was brought before the two archbishops in 1899, under circumstances analogous to those in the Lambeth Hearing on Incense (q.v.). The parties ■ concerned were three clergymen, who appealed from the direction of their respective diocesans, the bishops of St Albans and Peterborough and the archbishop of York: in the two former cases the archbishop (Temple) of Canterbury was the principal and the archbishop of York (Maclagan) the assessor, whilst in the latter case the functions were reversed. The hearing extended from 17th to 20th July; counsel were heard on both sides, evidence was given in support of the appeals by two of the clergy concerned and by several other witnesses, lay and clerical, and the whole matter was gone into with no little fulness. The archbishops gave their decision on the 1st of May 1900 in two separate judgments, to the effect that, in Dr Temple's words, "the Church of England does not at present allow reservation in any form, and that those who think that it ought to be allowed, though perfectly justified in endeavouring to get the proper authorities to alter the law, are not justified in practising reser- vation until the law has been so altered." The archbishop of York also laid stress upon the fact that the difficulties in the way of the communion of the sick, when they are really ready for communion, are not so great as has sometimes been suggested.

See W. E. Scudamore, Notitia eucharistica (2nd ed., London, 1876); and art. "Reservation" in Dictionary of Christian Anti- quities, vol. ii. (London, 1893); Guardian newspaper, July 19 and 26, 1899, and May 2, 1900; The Archbishops of Canterbury and York on Reservation of the Sacrament (London, 1900); J. S. Franey, Mr Dibdin's Speech on Reservation, and some of the Evidence (London, 1899) ; F. C. Eeles, Reservation of the Holy Eucharist in the Scottish Church (Aberdeen, 1899); Bishop J. Wordsworth, Further Con- siderations on Public Worship (Salisbury, 1901). (W. E. Co.)

EUCHRE, a game of cards. The name is supposed by some to be a corruption of icarte, to which game it bears some resem- blance; others connect it with the Ger. Juchs or Jux, a joke, owing to the presence in the pack, or " deck," of a special card called " the joker "; but neither derivation is quite satisfactory. The " deck " consists of 32 cards, all cards between the seven and ace being rejected from an ordinary pack. Sometimes the sevens and eights are rejected as well. The "joker" is the best card, i.e. the highest trump. Second in value is the " right bower" (from Dutch boer, farmer, the name of the knave),

or knave of trumps; third is the " left bower," the knave of the other suit of the same colour as the right bower, also a trump: then follow ace, king, queen, &c, in order. Thus if spades are trumps the order is (1) the joker, (2) knave of spades, (3) knave of clubs, (4) ace of spades, &c. The joker, however, is not always used. When it is, the game is called " railroad " euchre. In suits not trumps the cards rank as at whist. Euchre can be played by two, three or four persons. In the cut for deal, the highest card deals, the knave being the highest and the ace the next best card. The dealer gives five cards to each person, two each and then three each, or vice versa: when all have received their cards the next card in the pack is turned up for trumps.

Two-handed Euchre. — If the non-dealer, who looks at his cards first, is satisfied, he says " I order it up," i.e. he elects to play with his hand as it stands and with the trump suit as turned up. The dealer then rejects one card, which is put face downwards at the bottom of the pack, and takes the trump card into his hand. If, however, the non-dealer is not satisfied with his original hand, he says " I pass," on which the dealer can either " adopt," or " take it up," the suit turned up, and proceed as before, or he can pass, turning down the trump card to show that he passes. If both players pass, the non-dealer can make any other suit trumps, by saying " I make it spades," for example, or he can pass again, when the dealer can either make another suit trumps or pass. If both players pass, the hand is at an end. If the trump card is black and either player makes the other black suit trumps, he " makes it next " ; if he makes

a red suit trumps he " crosses t;he suit " ; the same applies to trumps in a red suit, mutatis mutaridts. The non-dealer leads; the dealer must follow suit if he can, but he need not win the trick, nor need he trump if unable to follow suit. The left bower counts as a trump, and a trump must be played to it if led. The game is five up. If the player who orders up or adopts makes five tricks (a " march ") he scores two points; if four or three tricks, one point; if he makes less than three tricks, he is " euchred " and the other player scores two. A rubber consists of three games, each game counting one, unless the loser has failed to score at all, when the winner counts two for that game. This is called a " lurch." When a player wins three tricks, he is said to win the " point." The rubber points are two, as at whist. All three games are played out, even if one player win the first two. It is

sometimes agreed that if a score ” laps,” i.e. if the winner makes more than five points in a game, the surplus may be carried on to the next game. The leader should be cautious about ordering up, since the dealer will probably hold one trump in addition to the one he takes in. If the point is certain, the leader should pass, in case the dealer should take up the trump. If the dealer ” turns it down,” it is not wise to ” make it,” unless the odds on getting the point against one trump are two to one. With good cards in two suits, it is best to make it ” next,” as the dealer is not likely to have a bower in that suit. The dealer, if he adopts, should discard a singleton, unless it is an ace. If the dealer’s score is three,’ only a very strong hand justifies one in ” ordering up.” It is gener- ally wise in play to discard a singleton and not to unguard; another suit. With one’s adversary at four, the trump should be adopted even on a light hand.

Three-handed (cut-throat) Euchre. — In this form of the game the option of playing or passing goes round in rotation, beginning with the player on the dealer’s left. The player who prders up, takes up, »r makes, plays against the other two; if he is euchred his adver- saries score two each ; by other laws he is set back two points, and should his score be at love, he has then to make seven points. The procedure is the same as in two-handed euchre.

Four-handed Euchre. — The game is played with partners, cutting and sitting, and the deal passing, as at whist. If the first player passes, the second may say ” I assist,” which is the same as .” order ing up,” or he may pass. If the first player has ordered up, his partner may say ” I take it from you,’ which means that he will play alone against the two adversaries, the first player’s cards being put face downwards on the table, and not being used in that hand. Any player can similarly play “a lone hand,’ his partner taking no part in the play. Even if the first hand plays alone, the third may take it from him. Similarly the dealer rnay take it from the second hand, but the second hand cannot take it from the dealer. If all four players pass, the first player can pass, make it, or play alone, naming the suit he makes. The third hand can “take it ‘ from the first, or play alone in the suit made by the first, the dealer having a similar right over his own partner. If all four pass again, the hand is at an end and the deal passes. The game is five up,

Eoints being reckoned as before. If a lone player makes five tricks is side scores four: if three tricks, one: if he fails to make three tricks the opponents score four. It is not wise for the first hand to order up or cross the suit unless very strong. It is good policy to lead trumps through a hand that assists, bad policy to do so when the leader

adopts. Trumps should be led to a partner who has ordered up or made it. It is sometimes considered wise for the first hand to " keep the bridge," i.e. order up with a bad hand, to prevent the other side from playing alone, if their score is only one or two and the leader's is four. This right is lost if a player reminds his partner, after the trump card has been turned, that they are at the point 0/ bridge. If the trump under these circumstances is not ordered up, the dealer should turn down, unless very strong. The second hand should not assist unless really strong, except when at the point of four-all or four-love. When led through, it is generally wise, ceteris paribus, to head the trick. The dealer should always adopt with two trumps in hand, or with one trump if a bower is turned up. At four-all and four-love he should adopt on a weaker hand. Also, being fourth player, he can make it on a weaker hand than other players. If the dealer's partner assists, the dealer should lead him a trump at the first opportunity; it is also a good opportunity for the dealer to play alone if moderately strong. If a player who generally keeps the bridge passes, his partner should rarely play alone.

Extracts from Rules. — If the dealer give too many or too few cards to any player, or exposes two cards in turning up, it is a misdeal and the deal passes. If there is a faced card in the pack, or the dealer exposes a card, he deals again. If any one play with the wrong number of cards, or the dealer plays without discarding, trumps being ordered up, his side forfeits two points (a lone hand four points) and cannot score during that hand. The revoke penalty is three points for each revoke (five in the case of a lone hand), and no score can be made that hand ; a card may be taken back, before the trick is quitted, to save a revoke, but it is an exposed card. If a lone player expose a card, no penalty; if he lead out of turn, the card led may be called. If an adversary of a lone player plays out of turn to his lead, all the cards of both adversaries can be called, and are exposed on the table.

Bid Euchre. — This game resembles " Napoleon " (q.v.). It is

Clayed with a euchre deck, each player receiving five cards, the others eing left face-downwards. Each player " bids," i.e. declares and makes a certain number of tricks, the highest bidder leading and his first card being a trump. When six play, the player who bids highest claims as his partner the player who has the best card of the trump suit, not in the bidder's hand : if it is among the undealt cards, which is ascertained by the fact that no one else holds it, he calls for the next best and so on. The partners then play againet the other four.

EUCKEN, RUDOLF CHRISTOPH (1846-), German philosopher, was born on the 5th of January 1846 at Aurich in East Friesland. His father died when he was a child, and he was brought up by his mother, a woman of considerable activity. He was educated at Aurich, where one of his teachers was the philosopher Wilhelm Reuter, whose influence was the dominating factor in the development of his thought. Passing to the uni- versity of Gottingen he took his degree in classical philology and ancient history, but the bent of his mind was definitely towards the philosophical side of theology. Subsequently he studied in Berlin, especially under Trendelenburg, whose ethical tendencies and historical treatment of philosophy greatly attracted him. From 1871 to 1874 Eucken taught philosophy at Basel, and in 1874 became professor of philosophy at the university of Jena. In 1 968 he was awarded the Nobel prize for literature. Eucken's philosophical work is partly historical and partly constructive, the former side being predominant in his earlier, the latter in his later works. Their most striking feature is the close organic relationship between the two parts. The aim of the historical works is to show the necessary connexion between philosophical concepts and the age to which they belong; the same idea is at the root of his constructive speculation. All philosophy is philosophy of life, the development of a new culture, not mere intellectualism, but the application of a vital religious inspiration to the practical problems of society. This practical idealism Eucken described by the term " Activism." In accordance with this principle, Eucken has given considerable attention to social and educational problems.

His chief works are: — Die Methode der aristolelischen Forschung (1872) ; the important historical study on the history of conceptions, Die Grundbegriffe der Gegenwart (1878; Eng. trans, by M. Stuart Phelps, New York, 1880; 3rd ed. under the title Geistige Stromungen der Gegenwart, 1904; 4th ed., 1909); Geschichte der philos. Ter- minologie (1879) ; Prolegomena zu Forschungen uber die Einheit des Geisteslebens (1885) ; Beitrdge zur Geschichte der neueren Philosophie (1886, 1905) ; Die Einheit des Geisteslebens (1888) ; Die Lebens- anschauungen der grossen Denker (1890; 7th ed., 1907; Eng. trans., W. Hough and Boyce Gibson, The Problem of Human Life, 1909) ; Der Wahrheitsgehalt der, Religion (1901 ; 2nd ed., 1905); Thomas von Aquino und Kant (1901); Gesammelte Aufsdtze zu Philos. und Lebensanschauung (1903); Philosophie der Geschichte (1907); Der Kampf um einen geistigen Lebensinhalt (1896, 1907) ; Grundlinien einer neuen Lebensanschauung (1907) ; Einfiihrung in die Philosophie der Geisteslebens (1908; Eng, trans., The Life of the Spirit, F. L. Pogson, 1909, Crown Theological Library) ; Der Sinn

und Wert des Lebens (1908; Eng. trans., 1909); Hauptprobleme der Religions- philosophie der Gegenwart (1907). The following of Eucken's works also have been translated into English : — Liberty in Teaching in the German Universities (1897); Are the Germans still a Nation of Thinkers? (1898) ; Progress of Philos. in the ipth Century (1899) ; The Finnish Question (1899); The Present Status of Religion in Germany (1901). See W. R. Boyce Gibson, Rudolf Eucken's Philo- sophy of Life (2nd ed., 1907), and God with Us (1909); for the his- torical work, Falckenberg's Hist, of Philos. (Eng. trans., 1895, index) ; also H. Pohlmann, R. Euckens Theologie mit ihren philosophischen Grundlagen dargestellt (1903) ; O. Siebert, R. Euckens Welt- und Lebensanschauung (1904);

EUCLASE, a very rare mineral, occasionally cut as a gem-stone for the cabinet. It bears some relation to beryl in that it is a silicate containing beryllium and aluminium, but hydrogen is also present, and the analyses of euclase lead to the formula HBeAlSi0 6 or Be(A10H)Si0 4 . It crystallizes in the monoclinic system, the crystals being generally of prismatic habit, striated vertically, and terminated by acute pyramids. Cleavage is perfect, parallel to the clinopinacoid, and this suggested to R. J. Haiiy the name euclase, from the Greek ed, easily, and kX&oxs, fracture. The ready cleavage renders the stone fragile with a tendency to chip, and thus detracts from its use for personal ornament. The colour is generally pale-blue or green, though sometimes the mineral is colourless. When cut it resembles

certain kinds of beryl (aquamarine) and topaz, from which it may be distinguished by its specific gravity (3-1). Its hardness (7 • 5) is rather less than that of topaz. Euclase occurs with topaz at Boa Vista, near Ouro Preto (Villa Rica) in the province of Minas Geraes, Brazil. It is found also with topaz and chrysa- beryl in the gold-bearing gravels of the R. Sanarka in the South Urals; and is met with as a rarity in the mica-schist of the Rauris in the Austrian Alps.

EUCLID [Eucleides], of Megara, founder of the Megarian (also called the eristic or dialectic) school of philosophy, was born c. 450 B.C., probably at Megara, though Gela in Sicily has also been named as his birthplace (Diogenes Laertius ii. 106), and died in 374. He was one of the most devoted of the disciples of Socrates. Aulus Gellius (vi. 10) states that, when a decree was passed forbidding the Megarians to enter Athens, he regularly visited his master by night in

the disguise of a woman; and he was one of the little band of intimate friends who listened to the last discourse. He withdrew subsequently with a number of fellow disciples to Megara, and it has been conjectured, though there is no direct evidence, that this was the period of Plato's residence in Megara, of which indications appear in the Theaeietus. He is said to have written six dialogues, of which only the titles have been preserved. For his doctrine (a combination of the principles of Parmenides and Socrates) see Megarian School.

EUCLID, Greek mathematician of the 3rd century B.C.; we are ignorant not only of the dates of his birth and death, but also of his parentage, his teachers, and the residence of his early years. In some of the editions of his works he is called Megarensis, as if he had been born at Megara in Greece, a mistake which arose from confounding him with another Euclid, a disciple of Socrates. Proclus (a.d. 412-485), the authority for most of our information regarding Euclid, states in his commentary on the first book of the Elements that Euclid lived in the time of Ptolemy I., king of Egypt, who reigned from 323 to 285 B.C., that he was younger than the associates of Plato, but older than Eratosthenes (276- 106 B.C.) and Archimedes (287-212 bx.). Euclid is said to have founded the mathematical school of Alexandria, which was at that time becoming a centre, not only of commerce, but of learn- ing and research, and for this service to the cause of exact science he would have deserved commemoration, even if his writings had not secured him a worthier title to fame. Proclus preserves a reply made by Euclid to King Ptolemy, who asked whether he could not learn geometry more easily than by studying the Elements — " There is no royal road to geometry." Pappus of Alexandria, in his Mathematical Collection, says that Euclid was a man of mild and inoffensive temperament, unpretending, and kind to all genuine students of mathematics. This being all that is known of the life and character of Euclid, it only remains therefore to speak of his works.

Among those which have come down to us the most remarkable is the Elements (Sroix«ta) (see Geometry). They consist of thirteen books; two more are frequently added, but there is reason to believe that they are the work of a later mathematician, Hypsicles of Alexandria.

The question has often been mooted, to what extent Euclid, in his Elements, is a discoverer or a compiler. To this question no entirely satisfactory answer can be given, for scarcely any of the writings of earlier geometers have come down to our times. We are mainly dependent on Pappus and Proclus for the scanty notices we have of

Euclid's predecessors, and of the problems which engaged their attention; for the solution of problems, and not the discovery of theorems, would seem to have been their principal object. From these authors we learn that the property of the right-angled triangle had been found out, the principles of geometrical analysis laid down, the restriction of constructions in plane geometry to the straight line and the circle agreed upon, the doctrine of proportion, for both commensurables and in- commensurables, as well as loci, plane and solid, and some of the properties of the conic sections investigated, the five regular solids (often called the Platonic bodies) and the relation between the volume of a cone or pyramid and that of its circumscribed cylinder or prism discovered. Elementary works h?d been

written, and the famous problem of the duplication of the cube reduced to the determination of two mean proportionals between two given straight lines. Notwithstanding this amount of dis- covery, and all that it implied, Euclid must have made a great advance beyond his predecessors (we are told that " he arranged the discoveries of Eudoxus, perfected those of Theaetetus, and reduced to invincible demonstration many things that had previ- ously been more loosely proved "), for his Elements supplanted all similar treatises, and, as Apollonius received the title of " the great geometer," so Euclid has come down to later ages as " the elementator."

For the past twenty centuries parts of the Elements, notably the first six books, have been used as an introduction to geometry. Though they are now to some extent superseded in most countries, their long retention is a proof that they were, at any rate, not unsuitable for such a purpose. They are, speaking generally, not too difficult for novices in the science; the demon- strations are rigorous, ingenious and often elegant; the mixture of problems and theorems gives perhaps some variety, and makes their study less monotonous; and, if regard be had merely to the metrical properties of space as distinguished from the graphical, hardly any cardinal geometrical truths are omitted. With these excellences are combined a good many defects, some of them inevitable to a system based on a very few axioms and postulates. Thus the arrangement of the propositions seems arbitrary; associated theorems and problems are not grouped together; the classification, in short, is imperfect. Other objections, not to mention minor blemishes, are the pro- lixity of the style, arising partly from a defective nomenclature, the treatment of parallels depending on an axiom which is not axiomatic, and the sparing use of superposition as a method of proof.

Of the thirty-three ancient books subservient to geometrical analysis, Pappus enumerates first the Data (AtSoijAva.) of Euclid. He says it contained 90 propositions, the scope of which he describes; it now consists of 95. It is not easy to explain this discrepancy, unless we suppose that some of the propositions, as they existed in the time of Pappus, have since been split into two, or that what were once scholia have since been erected into propositions. The object of the Data is to show that when certain things — lines, angles, spaces, ratios, &c. — are given by hypothesis, certain other things are given, that is, are determin- able. The book, as we are expressly told, and as we may gather from its contents, was intended for the investigation of problems; and it has been conjectured that Euclid must have extended the method of the Data to the investigation of theorems. What prompts this conjecture is the similarity between the analysis of a theorem and the method, common enough in the Elements, of reductio ad absurdum — the one setting out from the supposition that the theorem is true, the other from the supposition that it is false, thence in both cases deducing a chain of consequences which ends in a conclusion previously known to be true or false.

The Introduction to Harmony (Elaa'yoiyri apuovudj), and the Section 0} the Scale (KaTa.ro/x17 Kavbvos), treat of music. There is good reason for believing that one at any rate, and probably both, of these books are not by Euclid. No mention is made of them by any writer previous to Ptolemy (a.d. 140), or by Ptolemy himself, and in no ancient codex are they ascribed to Euclid.

The Phaenomena (Qaivoneva) contains an exposition Of the appearances produced by the motion attributed to the celestial sphere. Pappus, in the few remarks prefatory to his sixth book, complains of the faults, both of omission and commission, of writers on astronomy, and cites as an example of the former the second theorem of Euclid's Phaenomena, whence, and from the interpolation of other proofs, David Gregory infers that this treatise is corrupt.

The Optics and Catoptrics ('OirriKa, KaroirrpiKd) are ascribed to Euclid by Proclus, and by Marinus in his preface to the Data, but no mention is made of them by Pappus. This latter circum- stance, taken in connexion with the fact that two of the proposi- tions in the sixth book of the Mathematical Collection prove the

same things as three in the Optics, is one of the reasons given by Gregory for deeming that work spurious. Several other reasons will be found in Gregory's preface to his edition of Euclid's works.

In some editions of Euclid's works there is given a book on the Divisions of Superficies, which consists of a few propositions, showing how a straight line may be drawn to divide in a given ratio triangles, quadrilaterals and pentagons. This was supposed by John Dee of London, who transcribed or translated it, and entrusted it for publication to his friend Federico Commandino of Urbino, to be the treatise of Euclid referred to by Proclus as to irepi bioLipiotoiv /3i/3\ioc Dee mentions that, in the copy from which he wrote, the book was ascribed to Machomet of Bagdad, and adduces two or three reasons for thinking it to be Euclid's. This opinion, however, he does not seem to have held very strongly, nor does it appear that it was adopted by Commandino. The book does not exist in Greek.

The fragment, in Latin, De Levi et ponder oso, which is of no value, and was printed at the end of Gregory's edition only in order that nothing might be left out, is mentioned neither by Pappus nor Proclus, and occurs first in Bartholomew Zamberti's edition of 1537. There is no reason for supposing it to be genuine.

The following works attributed to Euclid are not now extant : —

1. Three books on Porisms (Ilept tS>v iropurfiaTWv) are mentioned both by Pappus and Proclus, and the former gives an abstract of them, with the lemmas assumed. (See PorjSM.)

2. Two books are mentioned, named T&ircav irpos tTKbavdq., which is rendered Locorum ad superficiem by Commandino and subsequent geometers. These books were subservient to the analysis of loci, but the four lemmas which refer to them and which occur at the end of the seventh book of the Mathematical Collection, throw very little light on their contents. R. Simson's opinion was that they treated of curves of double curvature, and he intended at one time to write a treatise on the subject. (See Trail's Life of Dr Simson).

3. Pappus says that Euclid wrote four books on the Conic Sections (/3i(3\ia recraapa Kuvikuiv) , which Apollonius amplified, and to which he added four more. It is known that, in the time of Euclid, the parabola was considered as the section of a right- angled cone, the ellipse that of an acute-angled cone, the hyper- bola that of an obtuse-angled cone, and that Apollonius was the first who showed that the three sections could be obtained from any cone. There is

good ground therefore for supposing that the first fouf books of Apollonius's Conies, which are still extant, resemble Euclid's Conies even less than Euclid's Elements do those of Eudoxus and Theaetetus.

4. A book on Fallacies (Ilepi ij/evdapiojv) is mentioned by Proclus, who says that Euclid wrote it for the purpose of exercis- ing beginners in the detection of errors in reasoning.

This notice of Euclid would be incomplete without some account of the earliest and the most important editions of his works. Passing over the commentators of the Alexandrian school, the 'first European translator of any part of Euclid is Boetius (500), author of the De consolatione philosophise. His Euclidis Megarensis geometriae libri duo contain nearly all the definitions of the first three books of the Elements, the postulates, and most of the axioms. The enunciations, with diagrams but no proofs, are given of most of the propositions in the first, second and fourth books, and a few from the third. Some centuries afterwards, Euclid was translated into Arabic, but the only printed version in that language is the one made of the thirteen books of the Elements by Nasir Al-DIn Al- Tusi (13th century), which appeared at Rome in 1594.

The first printed edition of Euclid was' a translation Of the fifteen books of the Elements from the Arabic, made, it is supposed, by Adelard of Bath (12th century), with the comments of Campanus of Novara. It appeared at Venice in 1482, printed by Erhardus Ratdolt, and dedicated to the doge Giovanni Mocenigo. This edition represents Euclid very inadequately; the comments are often foolish, propositions are sometimes omitted, sometimes joined together, useless cases are interpolated, and now and then Euclid's order changed.

The first printed translation from the Greek is that of Bartholo- mew Zamberti, which appeared at Venice in 1505. Its contents will be seen from the title: Euclidis megaresis philosophi platonici MathematicaruQ disciplinary Janitoris: Habent in hoc volumine quicuqQ ad mathemaiica substantia aspirat: elemetorum libros xiii cu expositione Theonis insignis mathematici . . . Quibus . . . ad- juncta. Deputatum scilicet Euclidi volume xiiii cu expositioe Hypsi.

Alex. ItideqB Phaeno. Specu. Perspe. cum expositione Theonis ac mirandus tile liber Datorum cum expositioe Pappi Mechanici una cu Marini dialectici protheoria. Bar. Zaber. Vene. Interpte.

The first printed Greek text was published at Basel, in 1533, with the

title Ei>/cAei5ot; Srotxetoji' $t/3A. ik ck tu>v Qkojvos avvovaicov. It was edited by Simon Grynaeus from two MSS. sent to him, the one from Venice by Lazarus Bayfius, and the other from Paris by John Ruellius. The four books of Proclus's commentary are given at the end from an Oxford MS. supplied by John Claymundus.

The English edition, the only one which contains all the extant works attributed to Euclid, is that of Dr David Gregory, published at Oxford in 1703, with the title, EvkKuSov to au^biieva. Euclidis quae supersunt omnia. The text is that of the Basel edition, corrected from the MSS. bequeathed by Sir Henry Savile, and from Savile's annotations on his own copy. The Latin translation, which accompanies the Greek on the same page, is for the most part that of Commandino. The French edition has the title, Les (Euvres d'Euclide, traduites en Latin et en FranQais, d'apres un manuscrit tres-ancien qui etait reste inconnu jusqu'einos jours. Par F. Peyrard, Traducteur des ceuvres d'Archimede. It was published at Paris in three volumes, the first of which appeared in 1814, the second in 1816 and the third in 1818. It contains the Elements and the Data, which are, says the editor, certainly the only works which remain to us of this ever-celebrated geometer. The texts of the Basel and Oxford editions were collated with 23 MSS., one of which belonged to the library of the Vatican, but had been sent to Paris by the comte de Peluse (Monge). The Vatican MS. was supposed to date from the 9th century ; and to its readings Peyrard gave the greatest weight. What may be called the German edition has the title Evk\(ISov XToixeia- Euclidis Elementa ex optimis libris in usum Tironum Graece edita ab Ernesto Ferdinando August. It was pub- lished at Berlin in two parts, the first of which appeared in 1826 and the second in 1829. The above mentioned texts were collated with three other MSS. Modern standard editions are by,Dr Heiberg of Copenhagen, Euclidis Elementa, edidit et Latine interpretatus est J. L. Heiberg. vols. i.-v. (Lipsiae, 1883-1888), and by T. L. Heath, The Thirteen Books of Euclid's Elements, vols, i.-iii. (Cambridge, 1908).

Of translations of the Elements into modern languages the number is very large. The first English translation, published at London in 1570, has the title, The Elements of Geometrie of the most auncient Philosopher Euclide of Megara. Faithfully {now first) translated into the Englishe toung, by H. Billingsley, Citizen of London. Whereunto are annexed certaine Scholies, Annotations and Inventions, of the best Mathematiciens, both of time past and in this our age. The first French translation of the whole of the Elements has the title, Les Quinze Livres des Elements d'Euclide. Traduicts de Latin en Frangois. Par D. Henrion, Mathematicien. The first edition of it was

pub- lished at Paris in 1615, and a second, corrected and augmented, in 1623. Pierre Forcadei de Bezies had published at Paris in 1564 a translation of the first six books of the Elements, and in 1565 of the seventh, eighth and ninth books. An Italian translation, with the title, Euclide Megarense acutissimo philosopho solo introduttore delle Scientie Mathematice. Diligentemente rassettato, et alia integrity ridotto, per il degno professore di tal Scientie Nicolb Tartalea Brisciano, was published at Venice in 1569, and Federico Commandino's translation appeared at Urbino in 1575; a Spanish version, Los Sets Libros primeros de la geometria de Euclides. Traduzidos en legua Espanola por Rodrigo Camorano, Astrologo y Mathematico, at Seville in 1576; and a Turkish one, translated from the edition of J. Bonnycastle by Husaln Rifki, at Bulak in 1825. Dr Robert Simson's editions of the first six and the eleventh and twelfth books of the Elements, and of the Data.

Authorities. — The authors and editions above referred to; Fabricius, Bibliotheca Graeca, vol. iv. ; Murhard's Litteratur der mathematischen Wissenschaften; Heilbronner's Historia matheseos universae; De Morgan's article " Eucleides " in Smith's Dictionary of Biography and Mythology ; Moritz Cantor's Geschichte der Mathe- matik, vol. i. (J. S. M.)

EUCRATIDES, king of Bactria (c. 175-129 B.C.), came to the throne by a rebellion against the dynasty of Euthydemus, whose son Demetrius had conquered western India. His authority was challenged by a great many other pretenders and Greek dynasts in Sogdiana, Aria (Herat), Drangiana (Sijistan), &c, whose names — Pantaleon, Agathocles, Anti- machus, Antalcidas "the victorious" (w/ojˆopos) , Plato, whose unique coin is dated from the year 147 of the Seleucid era (= 166 B.C.), and others — are known only from coins with Greek and Indian legends. In the west the Parthian king Mithradates I. began to enlarge his kingdom and attacked Eucratides; he succeeded in conquering two provinces between Bactria and Parthia, called by Strabo " the country of Aspiones and Turiua," two Iranian names. But the principal opponent of Eucratides was Demetrius {q.v.) of India, who attacked him with a large army "of 300,000 men"; Eucratides fled with 300 men into a fortress and was besieged. But at last he beat

Demetrius, and conquered a great part of western India. Accord- ing

to Apollodorus of Artemita, the historian of the Parthians, he ruled over iooo towns (Straboxv. 686; transferred to Diodotus of Bactria in Justin 41, 4. 6); and the extent of his kingdom over Bactria, Sogdiana (Bokhara), Drangiana (Sijistan), Kabul and the western Punjab is confirmed by numerous coins. On these coins, which bear Greek and Indian legends (in Kharoshti writing, cf. Bactria), he is called " the great King Eucratides." On one his portrait and name are associated on the reverse with those of Heliocles and Laodice; Heliocles was probably his son, and the coin may have been struck to celebrate his marriage with Laodice, who seems to have been a Seleucid princess. In Bactria Eucratides founded a Greek city, Eucratideia (Strabo xi. 516, Ptolem. vi. n. 8). On his return from India Eucratides was (about 150 B.C.) murdered by his son, whom he had made co-regent (Justin 41, 6). This son is probably the Heliocles just mentioned, who on his coins calls himself " the Just " 03aVII. Sidetes tried once more to restore the Seleucid dominion in 130, Phraates allied himself with the Scythians (Justin 42, 1. 1); but after his decisive victory in 129 he was attacked by them and fell in the battle. The changed state of affairs is shown by the numerous coins of Heliocles; while his predecessors maintained the Attic standard, which had been dominant throughout the Greek east, he on his later coins passes over to a native silver standard, and his bronze coins became quite barbarous. Besides his coins we possess coins of many other Greek kings of these times, most of whom take the epithet of "invincible" (avUriTos) and "saviour"

EUDAEMONISM (from Gr. evdainovia, literally the state of being under the protection of a benign spirit, a " good genius "), in ethics, the name applied to theories of morality which find the chief good of man in some form of happiness. The term Eudaemonia has been taken in a large number of senses, with consequent variations in the meaning of Eudaemonism. To Plato the " happiness " of all the members of a state, each accord- ing to his own capacity, was the final end of political development. Aristotle, as usual, adopted " eudaemonia " as the term which in popular language most nearly represented his idea and made it the keyword of his ethical doctrine. None the less he greatly expanded the content of the word, until the popular idea was practically lost: if a man is to be called evdal/xcov, he must have all his powers performing their functions freely in accordance with virtue, as well as a reasonauia degree of material well-being; the highest conceivable good of mail is the life of contemplation. Aristotle further held that the good man in achieving virtue must experience pleasure (1760ˆ17), which is, therefore, not the same as, but the sequel to or concomitant of eudaemonia. Sub-

sequent thinkers have to a greater or less degree identified the two ideas, and much confusion has resulted. Among the ancients the Epicureans expressed all eudaemonia in terms of pleasure. On the other hand attempts have been made to separate hedonism, as the search for a continuous series of physical pleasures, from eudaemonism , a condition of enduring mental satisfaction. Such a distinction involves the assumptions that bodily pleasures

are generically different from mental ones, and that there is in practice a clearly marked dividing line, — both of which hypo- theses are frequently denied. Among modern writers, James Seth (Ethical Princ, 1894) resumes Aristotle's position, and places Eudaemonism as the mean between the Ethics of Sensibility (hedonism) and the Ethics of Rationality, each of which over- looks the complex character of human life. The fundametal difficulty which confronts those who would distinguish between pleasure and eudaemonia is that all pleasure is ultimately a mental phenomenon, whether it be roused by food, music, doing a moral action or committing a theft. There is a marked dis position on the part of critics of hedonism to confuse "pleasure" with animal pleasure or " passion," — in other words, with a pleasure phenomenon in which the predominant feature is entire lack of self-control, whereas the word "pleasure." has strictly no such connotation. Pleasure is strictly nothing more than the state of being pleased, and hedonism the theory that man's chief good consists in acting in such a way as to bring about a continuous succession of such states. That they are in some cases produced by physical or sensory stimuli does not constitute them irrational, and it is purely arbitrary to confine the word pleasure to those cases in which such stimuli are the proximate causes. The value of the term Eudaemonism as an antithesis to Hedonism is thus very questionable.

EUDOCIA AUGUSTA (c. 401-c. 460), the wife of Theodosius II., East Roman emperor, was born in Athens, the daughter of the sophist Leontius, from whom she received a thorough training in literature and rhetoric. Deprived of her small patrimony by her brothers' rapacity, she betook herself to Constantinople to obtain redress at court. Her accomplishments attracted Theodosius' sister Pulcheria, who took her into her retinue and destined her to be the emperor's wife. After receiving baptism and discarding her former name, Athenais, for that of Aelia Llcinia Eudocia, she was married to Theodosius in 421; two years later, after the birth of a daughter, she received the title Augusta. The new empress repaid her brothers by making them consuls and prefects, and used her large influence at court to protect pagans and Jews. In 438-439 she made an ostenta-

tious pilgrimage to Jerusalem, whence she brought back several precious relics; during her stay at Antioch she harangued the senate in Hellenic style and distributed funds for the repair of its buildings. On her return her position was undermined by the jealousy of Pulcheria and the groundless suspicion of an intrigue with her protege Paulinus, the master of the offices. After the latter's execution (440) she retired to Jerusalem, where she was made responsible for the murder of an officer sent to kill two of her followers and stripped of her revenues. Never- theless she retained great influence; although involved in the revolt of the Syrian monophysites (453), she was ultimately reconciled to Pulcheria and readmitted into the orthodox church. She died at Jerusalem about 460, after devoting her last years to literature. Among her works were a paraphrase of the Octateuch in hexameters, a paraphrase of the books of Daniel and Zechariah, a poem on St Cyprian and on her husband's Persian victories. A Passion History compiled out of Homeric verses, which Zonaras attributed to Eudocia, is perhaps of different authorship.

See W. Wiegand, Eudokia (Worms, 1871); F. Gregorovius, Athenais (Leipzig, 1892); C. Diehl, Figures byzantines (Paris, 1906), pp. 25-49; also Theodosius. On her works cf. A. Ludwich, Eudociae Augustae carminum reliquiae (Konigsberg, 1893).

EUDOCIA MACREMBOLITISSA {c. 1021-1096), daughter of John Macrembolites, was the wife of the Byzantine emperor Constantine X., and after his death (1067) of Romanus IV. She had sworn to her first husband on his deathbed not to marry again, and had even imprisoned and exiled Romanus, who was suspected of aspiring to the throne. Perceiving, however, that she was not able unaided to avert the invasions which threatened the eastern frontier of the empire, she revoked her oath, married Romanus, and with his assistance dispelled the impending danger. She did not live very happily with her new husband, who was warlike and self-willed, and when he was taken prisoner by the Turks (1071) she was compelled to vacate the throne in

favour of her son Michael and retire to a convent, where she died. The dictionary of mythology entitled 'IwwA (" Collection of Violets "), which formerly used to be ascribed to her, was not composed till 1543 (Constantine Palaeokappa).

See J. Flach, Die Kaiserin Eudokia Makrembolitissa (Tubingen, 1876); P. Pulch, De Eudociae quod fertur Violario (Strassburg, 1880); and in Hermes, xvii. (1882), p. 177 ff.

EUDOXIA LOPUKHINA (1669-1731), tsaritsa, first consort of Peter the Great, was the daughter of the boyarin Theodore Lopukhin. Peter, then a youth of seventeen, married her on the 27th of January 1689 at the command of his mother, who hoped to wean him from the wicked ways of the German suburb of Moscow by wedding him betimes to a lady who was as pious as she was beautiful. The marriage was in every way un- fortunate. Accustomed from her infancy to the monastic seclusion of the terem, or women's quarter, Eudoxia's mental horizon did not extend much beyond her embroidery-frame or her illuminated service-book. From the first her society bored Peter unspeakably, and after the birth of their second, short- lived son Alexander, he practically deserted her. In 1698 she was unceremoniously sent off to the Pokrovsky monastery at Suzdal for refusing to consent to a divorce, though it was not till June 1699 that she disappeared from the world beneath the hood of sister Elena. In the monastery, however, she was held in high honour by the archimandrite; the nuns persisted in regarding her as the lawful empress; and she was permitted an extraordinary degree of latitude, unknown to Peter, who dragged her from her enforced retreat in 17 18 on a charge of adultery. As the evidence was collected by Peter's creatures, it is very doubtful whether Eudoxia was guilty, though she was compelled to make a public confession. She was then divorced and con- signed to the remote monastery of Ladoga. Here she remained for ten years till the accession of her grandson, Peter II., when the reactionaries proposed to appoint her regent. She was escorted with great ceremony to Moscow in 1728 and ex- hibited to the people attired in the splendid, old-fashioned robes of a tsaritsa; but years of rigid seclusion had dulled her wits, and her best friends soon convinced themselves that a convent was a much more suitable place for her than a throne. An allowance of 60,000 roubles a year was accordingly assigned to her, and she disappeared again in a monastery at Moscow, where

she died in 1 73 1.

See Robert Nisbet Bain, Pupils of Peter the Great (London, 1895), chaps ii. and iv.; and The First Romanovs (London, 1905), chaps. viii. and xii. (R – N – B -)

EUDOXUS, of Cnidus, Greek savant, flourished about the middle of the 4th century B.C. It is chiefly as an astronomer that his name has

come down to us (see Astronomy and Zodiac). From a life by Diogenes Laertius, we learn that he studied at Athens under Plato, but, being dismissed, passed over into Egypt, where he remained for sixteen months with the priests of Helio- polis. He then taught physics in Cyzicus and the Propontis, and subsequently, accompanied by a number of pupils, went_ to Athens. Towards the end of his life he returned to his native place, where he died. Strabo states that he discovered that the solar year is longer than 365 days by 6 hours; Vitruvius that he invented a sun-dial. The Phaenomena of Aratus is a poetical account of the astronomical observations of Eudoxus. Several works have been attributed to him, but they are all lost; some fragments are preserved in the extant Twv 'Aparov mi Ev86£ov 4>a.ivoiikvo>v ifyyiiotuv jStjSXia rpia of the astronomer Hipparchus (ed. C. Manitius, 1894). According to Aristotle {Ethics p. 2), Eudoxus held that pleasure was the chief good, because (1) all beings sought it and endeavoured to escape its contrary, pain; (2) it is an end in itself, not a relative good. Aristotle, who speaks highly of the sincerity of Eudoxus's convictions, while giving a qualified approval to his arguments, considers him wrong in not distinguishing the different kinds of pleasure and in making pleasure the summum bonum.

See J A. Letronne, Sur les ecrites et les travaux d'Euioxe de Cnide, d'apresL. Ideler (1841); G. V. Schiaparelli, Le Sfere omocentriche di Eudosso (Milan, 1876) ; T. H. Martin in Academic des inscriptions, 3rd of October, 1879; article in Ersch and Gruber's Allgemeine Encyklopadie.

EUDOXUS, of Cyzicus, Greek navigator, flourished about 130 B.C. He was employed by Ptolemy Euergetes, who sent out a fleet under him to explore the Arabian Sea. After two suc- cessful voyages, Eudoxus left the Egyptian service, and proceeded to Cadiz with the object of fitting out an expedition for the purpose of African discovery; and we learn from Strabo, who utilized the results of his observations, that the veteran explorer made at least two voyages southward along the coast of Africa.

There is a good account of Eudoxus in E. H. Bunbury, History of Ancient Geography, ii. (1879); see also P. Gaffarel, Eudoxe de Cyzique (1873).

EUGENE OF SAVOY [Francois Eugene], Prince (1663- 1736), fifth son of Prince Eugene Maurice of Savoy-Carignano, count of Soissons, and of Olympia Mancini, niece of Cardinal Mazarin, was born at Paris on the 1 8th of October 1 663 . Origin- ally destined

for the church, Eugene was known at court as the petit abbe, but his own predilection was strongly for the army. His mother, however, had fallen into disgrace at court, and his application for a commission, repeated more than once, was refused by Louis XIV. This, and the influence of his mother, produced in him a lifelong resentment against the king. Having quitted France in disgust, he proceeded to Vienna, where his relative the emperor Leopold I. received him kindly, and he served with the Austrian army during the campaign of 1683 against the Turks. He displayed his bravery in a cavalry fight at Petronell (7th July) and in the great battle for the relief of Vienna. The emperor now gave him the command of a regiment of dragoons. At the capture of Buda in 1686 he received a wound (3rd August), but he continued to serve up to the siege of Belgrade in 1688, in which he was dangerously wounded. At the instigation of Louvois, a decree of banishment from France was now issued against all Frenchmen who should continue to serve in foreign armies. " The king will see me again," was Eugene's reply when the news was communicated to him; he continued his career in foreign service.

Prince Eugene's next employment was in a service that required diplomatic as well as military skill (1689). He was sent by the emperor Leopold to Italy with the view of binding the duke of Savoy to the coalition against France and of co- operating with the Italian and Spanish troops. Later in 1689 he served on the Rhine and was again wounded. He returned to Italy in time to take part in the battle of Staffarda, which resulted in the defeat of the coalition at the hands of the French marshal Catinat; but in the spring of 1691 Prince Eugene, having secured reinforcements, caused the siege of Coni to be raised, took possession of Carmagnola, and in the end completely defeated Catinat. He followed up his success by entering Dauphine, where he took possession of Embrun and Gap. After another campaign, which was uneventful, the further prosecution of the war was abandoned owing to the defection of the duke of Savoy from the coalition, and Prince Eugene returned to Vienna, where he soon afterwards received the command of the army in Hungary, on the recommendation of the veteran count Riidiger von Starhemberg, the defender of Vienna in 1683. It was about this time that Louis XIV. secretly offered him the baton of a marshal of France, with the government of Champagne which his father had held, and also a pension. But Eugene rejected these offers with indignation, and proceeded to operate against the Turks commanded by Kara Mustapha. After some skilful manoeuvres, he surprised the enemy (September nth, 1697) at Zenta, on the Theiss. His attack was

vigorous and daring, and the victory was one of the most complete and important ever won by the Austrian arms. Formerly it was often stated that the battle of Zenta was fought against express orders from the court, that Eugene was placed under arrest for violating these orders, and that a proposal to bring him before a council of war was frustrated only by the threatening attitude of the citizens of Vienna. This story, minute in details as it is, is entirely without foundation. After a further period of manoeuvres, peace was at length concluded at Karlowitz on the 26th of January

1609.

\ Two years later he was again in active service in the War of

the Spanish Succession (q.v.). At the beginning of the year 1 701 he was sent into Italy once more to oppose his old antagonist Catinat. He achieved a rapid success, crossing the mountains from Tirol into Italy in spite of almost insurmountable difficulties (Journal d. militarwissensch. Verein, No. 5, 1907), forcing the French army, after sustaining several checks, to retire behind the Oglio, where a series of reverse's equally unexpected and severe led to the recall of Catinat in disgrace. The incapable duke of Villeroi, who succeeded to the command of which Catinat had been deprived, ventured to attack Eugene at Chiari, and was repulsed with great loss. And this was only the forerunner of more signal reverses; for, in a short time, Villeroi was forced to abandon the whole of the Mantuan territory and to take refuge in Cremona, where he seems to have considered himself secure. By means of a stratagem, however, Eugene penetrated into the city during the night, at the head of 2000 men, and, though he found it impossible to hold the town, suc- ceeded in carrying off Villeroi as a prisoner. But as the duke of Vendome, a much abler general, replaced the captive, the incursion, daring though it was, proved anything but advan- tageous to the Austrians. The generalship of his new opponent, and the fact that the French army had been largely reinforced, while reinforcements had not been sent from Vienna, forced Prince Eugene to confine himself to a war of observation. The campaign was terminated by the sanguinary battle of Luzzara, fought on the 1st of August 1702, in which each party claimed the victory. Both armies having gone into winter quarters, Eugene returned to Vienna, where he was appointed president of the council of war. He then set out for Hungary in order

to combat the insurgents in that country; but his means proving insufficient, he effected nothing of importance. The collapse of the revolt, however, soon freed the prince for the more important campaign in Bavaria, where, in 1704, he made his first campaign along with Marlborough. Similarity of tastes, views and talents soon established between these two great men a friendship which is rarely to be found amongst military chiefs, and contributed in the fullest measure to the success which the allies obtained. The first and perhaps the most im- portant of these successes was that of Hochstadt or Blenheim (q.v.) on the 3rd of August 1704, where the English and imperial troops triumphed over one of the finest armies that France had ever sent into Germany.

But since Prince Eugene had quitted Italy, Vendome, who commanded the French army in that country, had obtained various successes against the duke of Savoy, who had once more joined Austria. The emperor deemed the crisis so serious that he recalled Eugene and sent him to Italy to the assistance of his ally. Vendome at first opposed great obstacles to the plan which the prince had formed for carrying succours into Piedmont; but after a variety of marches and counter-marches, in which both commanders displayed signal ability, the two armies met at Cassano (August 16, 1705), where a deadly engagement ensued, and Prince Eugene received two severe wounds which forced him to quit the field. This accident decided the fate of the battle and for the time suspended the prince's march towards Piedmont. Vendome, however, was recalled, and La Feuillade (who succeeded him) was incapable of long arresting the progress of such a commander as Eugene. After once more passing several rivers in presence of the French army, and executing one of the most skilful and daring marches he had ever performed, the latter appeared before the entrenched camp at Turin, which place the French were now besieging with an army eighty thousand strong. Prince Eugene had only thirty thousand men ; but his antagonist the duke of Orleans, though full of zeal and courage, wanted experience, and Marshal Marsin, his adlatus, held powers from Louis XIV. which could not fail to produce dissensions in the French headquarters. With equal courage and address, Eugene profited by the misunderstandings between the French generals; and on the 7th of September 1706 he attacked the French army in its entrenchments and gained a victory which decided the fate of Italy. In the heat of the battle Eugene received a wound, and was thrown from his horse.

His recompense for this important service was the government of the Milanese, of which he took possession with great pomp on the 16th of April 1707. He was also made lieutenant-general to the emperor

Joseph I.

The attempt which he made against Toulon in the course of the same year failed completely, because the invasion of the kingdom of Naples retarded the march of the troops which were to have been employed in it, and this delay afforded Marshal de Tesse time to make good dispositions. Obliged to renounce his project, therefore, the prince went to Vienna, where he was received with great enthusiasm both by the people and by the court. " I am very well satisfied with you," said the emperor, " excepting on one point only, which is, that you expose yourself too much." This monarch immediately despatched Eugene to Holland, and to the different courts of Germany, in order to forward the necessary preparations for the campaign of the following year, 1708 (see Spanish Succession, War of the).

Early in the spring of 1708 the prince proceeded to Flanders, in order to assume the command of the German army which his diplomatic ability had been mainly instrumental in assembling, and to unite his forces with those of Marlborough. The campaign was opened by the victory of Oudenarde (q.v.), to which the perfect union of Marlborough and Eugene on the one hand, and the misunderstanding between Vendome and the duke of Burgundy on the other, seem to have equally contributed. The French immediately abandoned the Low Countries, and, remaining in observation, made no attempt whatever to prevent Eugene's army, covered by that of Marlborough, making the siege of Lille. The French governor, Boufflers, made a glorious defence, and Eugene paid a flattering tribute to his valour in inviting him to prepare the articles of capitulation himself, with the words " I subscribe to everything beforehand, well persuaded that you will not insert anything unworthy of yourself or of me." After this important conquest, Eugene and Marlborough pro- ceeded to the Hague, where they were received in the most flatter- ing manner by the public, by the states-general, and above all, by their esteemed friend the pensionary Heinsius. Negotiations were then opened for peace, but proved fruitless. In 1709 France put forth a supreme effort, and placed Marshal Villars, her best living general, in command. The events of this year were very different to those of previous campaigns, and the bloody battle of Malplaquet (q.v.), though a victory for Marlborough and Eugene, led to little result, and this at the cost of enormous losses. The Dutch army, it is said, never recovered from the slaughter of Malplaquet; indeed, the success was so dearly bought that the allies found themselves soon afterwards out of all condition to undertake anything. Their army accordingly went into winter

quarters, and Prince Eugene returned to Vienna, whence the emperor almost immediately despatched him to Berlin. From the king of Prussia the prince obtained everything which he had been instructed to require; and having thus fulfilled his mission, he returned into Flanders, where, excepting the capture of Douai, Bethune and Aire, the campaign of 17 10 presented nothing remarkable. On the death of the emperor Joseph I. in April 1711, Prince Eugene, in concert with the empress, exerted his utmost endeavours to secure the crown to the archduke, who afterwards ascended the imperial throne under the name of Charles VI. In the same year the changes which had occurred in the policy, or rather the caprice, of Queen Anne, brought about an approximation between England and France, and put an end to the influence which Marlborough had hitherto possessed. When this political revolution became known, Prince Eugene immediately repaired to London, charged with a mission from the emperor to re- establish the credit of his illustrious companion in arms, as well as to re-attach England to the coalition. The mission having proved unsuccessful, the emperor found himself under the necessity of making the campaign of 171 2 with the aid of the Dutch alone. The defection of the English, however, did not induce Prince Eugene to abandon his favourite plan of invading France. He resolved, at whatever cost, to penetrate into Champagne; and in order to support his operations by the

possession of some important places, he began by making himself master of Quesnoy. But the Dutch, having been surprised and beaten in the lines of Denain, where Prince Eugene had placed them at too great a distance to receive timely support in case of an attack, he was obliged to raise the siege of Landreties, and to abandon the project which he had so long cherished. This was the last campaign in which Austria acted in conjunction with her allies. Abandoned first by England and then by Holland, the emperor, notwithstanding these desertions, still wished to maintain the war in Germany; but Eugene was unable to relieve either Landau or Freiburg, which' were success- sively obliged to capitulate; and seeing the Empire thus laid open to the armies of France, and even the Austrian hereditary states themselves exposed to invasion, the prince counselled his master to make peace. Sensible of the prudence of this advice, the emperor immediately entrusted Eugene with full powers to negotiate a treaty of peace, which was concluded at Rastadt on the 6th of March 17 14. On his return to Vienna, Prince Eugene was employed for a time in political matters', and at this time he exchanged the government of the Milanese for that of the Austrian Netherlands.'

It was not long, however, before he was again called on to assume the command of the army in the field. In the spring of 1 7 16 the emperor, having concluded an offensive alliance with Venice against Turkey, appointed Eugene to command the army of Hungary; and at Peterwardein he gained (5th of August 1716) a signal victory over a Turkish army of more than twice his own strength. In recognition of this service to Christendom the pope sent to the victorious general the consecrated hat and sword which the court of Rome was accustomed to bestow upon those who had triumphed over the infidels. Eugene won another victory in this campaign at Temesvar, But the ensuing campaign, that of 1717, was still niore remarkable on account of the battle of Belgrade. After having besieged the city for a month Eugene found himself in a most critical, if not hopeless situation. He had to deal not only with the garrison of 30,000 men, but with a relieving army of 200,000, and his own force was only about 40,000 strong. In these circumstances the only possible deliver- ance was by a bold and decided stroke. Accordingly on the morning of the 16th of August 1717 Prince Eugene ordered a general attack, which resulted in the total defeat of the enemy with an enormous loss, and in the capitulation of the city six days afterwards. The prince was wounded in the heat of the action, this being the thirteenth time that he had been hit upon the field of battle. On his return to Vienna he received,

among other testimonies of gratitude, a sword valued at 80,000 florins from the emperor. The popular -song " Prinz Eugen, der edle Ritter," commemorates the victory of Belgrade. In thef ollowing year, 1718, after some fruitless negotiations with a view to the conclusion of peace, he again took the field; but the treaty of Passarowitz (July 21, 1718) put an end to hostilities at the moment when the prince had well-founded hopes of obtaining still more important successes than those of the last campaign, and even of reaching Constantinople, and dictating a peace on the shores of the Bosporus.

As the government of the Netherlands, up to 1724 held by Eugene, had now for some reason been bestowed on a sister of the emperor, the prince was appointed vicar-general of Italy, with a pension of 300,000 florins. Though still retaining his official position and much of his influence at court, his personal relations with the emperor were not so cordial as before, and he suffered from the intrigues of the Spanish or anti-German party. The most remarkable of these political intrigues was the con : spiracy of Tedeschi and Nimptsch against the prince in 17 19. On discovering this the prince went to the emperor and threatened to lay down all his offices if the conspirators were not punished, and after some resistance he achieved his purpose. During the years of peace between the treaty of Passarowitz and the War of the Polish Succession, Eugene occupied himself with the arts and with literature, to which he had hitherto been able to devote little of his time. This new interest led him to correspond with many of the most eminent men in Europe. But the contest

which, arose out of the succession of Augustus II. to the throne of Poland having afforded Austria a pretext for attacking France, war was resolved on, contrary to the advice of Eugene (1734)1 In' spite of this, however, he was appointed to command the army destined to act upon the Rhine, which from the commencement had very superior forces opposed to it; and if it could not prevent the capture of Philipsburg after a long siege, it at least prevented the enemy from entering Bavaria. Prince Eugene, having now attained bis seventy-first year, no longer possessed the vigour and activity necessary for a general in the field, and he welcomed the peace which was concluded on the 3rd of October 1735. On his return to Vienna his health declined more and more, and he died in that capital on the 21st of April 1736, leaving an immense inheritance to his niece, the princess Victoria of Savoy. . Of a character cold and severe, Prince Eugene had almost no other passion than that of glory. He died unmarried, and seemed so little susceptible to female influence that he was styled a Mars without a Venus. That he was one of the great captains of

history is universally admitted. He was strangely unlike the commanders of his time in many respects, .though as a matter; of course. he was, when he saw fit to follow the accepted rides, iequal to any in careful and methodical strategy. The special characteristics of his generalship were imagination, fiery energy, and a tactical resolution which was rare indeed in the 1 8th century. Despising the lives of his soldiers as much as he exposed his own, it was always by persevering efforts and great sacrifices that he obtained victory. His almost invariable success raised the reputation of the Austrian army to a point which it never reached either before or since his day. War was with him a passion. 'Always on the march, in camps, or on the field of battle during more than fifty years, and under the reigns of three emperors, he had scarcely passed two years together without fighting. Yet his political activity was not inconsiderable, and Ms advice was always sound and well-considered; while in his government of the Netherlands, which he exercised through the marquis de Prie, he set himself resolutely to oppose the many wild schemes, such as Law's Mississippi project, in which the times were so fertile. His interest in literature and art has been alluded to above. His palace in Vienna, and the Belvedere near that city, his library, and his collection of paintings, were re- nowned. Prince Eugene was a man of the middle size, but, upon the whole, well made; the cast of his visage was somewhat long, his mouth moderate and almost always open; his eyes were black and animated, and his complexion such as became a warrior.

See A. v. Afneth, PrinzEugen (3 vols., Vienna, 1858 ; 2nded., 1864) ; H. v. Sybel, Prinz Eugen von Savoyen (Munich, 1868); Austrian official history, Feldziige del Prinzen Eugen von Savoyen (Vienna, 1876); Malleson, Prince Eugene (London, 1888); Heller, Mili- tariscke Korrespondenz des Prinzen Eugens (Vienna, 1848) ; Keym, Prinz Eugen (Freiburg, _ 1899) ; Osterr. mililarische Zeitschrift (" Streffleur ") ; Ridler's Osterr. Archiv fur Geschichte (1831-1833); Archivia storico Italico, vol. 17; Mitteil. des Instituts fur osterr. Geschichtsforschung, vol, 13.

The political memoirs attributed to Prince Eugene (ed. Sartori, Tubingen, 1812] are spurious; see B6hm, Die Samml-ung der hinter- laSsenen politischen Schriften des Prinzen Eugens (Freiburg, 1900).

EUGENE, a city and the county-seat of Lane county, Oregon, U.S.A., on the Willamette river, at the head of navigation, about 125 m. S. of Portland. Pop. (1900) 3236, of whom 237 were foreign-born; (1910 Federal census) 9009. Eugene is served by the Southern Pacific railroad ■ and by interurban electric railway. It is situated

on the edge of a broad and fertile prairie, at the foot of a ridge of low hills and within view of the peaks of the Coast Range; the streets are pleasantly shaded with Oregon maples. The city is most widely known as the seat of the University of Oregon. This institution, opened in 1876 and having 95 instructors and 734 students in 1907-1908, occupies eight buildings on a grassy slope along the river bank, and embraces a college of literature, science and the arts, a college of engineering, a graduate school, and (at Portland) a school of law and a school of medicine. In the city is the Eugene Divinity School of the Disciples of Christ, opened in 1895. Eugene is the commercial centre of ah extensive agricultural district; does a large business

in grain, fruit, hops, cattle, wool and lumber; and has various manufactures, including flour, lumber, woollen goods and canned fruit. Eugene was settled in 1854, and was first incorporated in 1864.

EUGENICS (from the Gr. evytvris, well born), the modern name given to the science which deals with the influences which improve the inborn qualities of a race, but more particularly with those which develop them to the utmost advantage, and which generally serves to disseminate knowledge and encourage action in the direction of perpetuating a higher racial standard. The founder of this science may be said to be Sir Francis Galton (q.v.), who has done much to further its study, not only by his writings, but by the establishment of a research fellowship and scholarship in eugenics in the university of London. The aim of the science as laid down by Gallon' is to bring as many in- fluences as can reasonably be employed, to cause the useful classes in the community to contribute more than their proportion to the next generation. It can hardly be said that the science has advanced beyond the stage of disseminating a knowledge of the laws of heredity, so far as they are surely known, and endeavouring to promote their further study. Useful work has been done in the compilation of statistics of the various condi- tions affecting the science, such as the rates with which the various classes of society in ancient and modern nations have contributed in civic usefulness to the population at various times, the in- heritance of ability, the influences which affect marriage, &c.

Works by Galton bearing on eugenics are: Hereditary Genius (2nd

ed., 1892), Human Faculty (1883), Natural Inheritance (1889), Huxley Lecture of the Anthropol. Inst, on the Possible Improvement of the Human Breed under the existing Conditions of Law and Sentiment (1901); see also Biomctrika (a journal for the statistical study of biological problems, of which the first volume was published in

1902).

EUGENIE [Marie-Eugenie-Ignace-Augustine de Montijo] (1826-), wife of Napoleon III., emperor of the French, daughter of Don Cipriano Guzman y Porto Carrero, count of Teba. subsequently count of Montijo and grandee of Spain, was born at Grenada on the 5th of May 1826. Her mother was a daughter of William Kirkpatrick, United States consul at Malaga, a Scotsman by birth and an American by nationality. Her childhood was spent in Madrid, but after 1834 she lived with her mother and sister chiefly in Faris, where she was educated, like so many French girls of good family, in the convent of the Sacre Cceur. When Louis Napoleon became president of the Republic she appeared frequently with her mother at the balls given by the prince president at the Elysee, and it was here that she made the acquaintance of her future husband. In November 1852 mother and daughter were invited to Fontaine bleau, and in the picturesque hunting parties the beautiful young Spaniard, who showed herself an expert horsewoman, was greatly admired by all present and by the host in particular. Three weeks later, on the 2nd of December, the Empire was formally proclaimed, and during a series of fetes at Compiegne, which lasted eleven days (19th to 30th December), the emperor became more and more fascinated. On New Year's Eve, at a ball at the Tuileries, Mdlle de Montijo, who had necessarily excited much jealousy and hostility in the female world, had reason to complain that she had been insulted by the wife of an official personage. On hearing of it the emperor said to her, " Je vous vengerai "; and within three days he made a formal proposal of marriage. In a speech from the throne on the 22nd of January he formally announced his engagement, and justified what some people considered a mesalliance. " I have preferred," he said, ; " a woman whom I love and respect to a woman unknown to me, with whom an alliance would have had advantages mixed with sacrifices." Of her whom he had chosen he ventured to make a prediction: " Endowed with all the qualities of the soul, she will be the ornament of the throne, and in the day of danger she will become one of its courageous supports." The marriage was celebrated with great pomp at Notre Dame on the 30th of January 1853. On the 16th of March 1856 the empress gave birth to a son, who received the title of Prince

Imperial. ‘ The emperor’s prediction regarding her was not belied by events. By her

beauty, elegance and charm of maimer she contributed largely to the brilliancy of the imperial regime, and when the end Came, she was, as the official Enqutle made by her enemies proved, one of the very few who showed calmness and courage in face of the rising tide of revolution. The empress acted three times as regent during the absence of the emperor,~in 1859, 1865 and 1870, — and she was generally consulted on important questions. When the emperor vacillated between two lines of policy she generally urged on him the bolder course; she deprecated everything ■ tending to diminish the temporal power of the papacy, and she disapproved of the emperor’s liberal policy at the close of his reign. On the collapse of the Empire she fled to England, and settled with the emperor and her son at Chislehurst. After the emperor’s death She removed to Farnborough, where she built a mausoleum to his memory. In 1879 her son was killed in the Zulu War, and in the following year she visited the spot and brought back the body to be interred beside that of his father. At P’arnborough. and in a villa she built at Cap Martin on the Riviera, she continued to live in retirement, following closely the course of events, but abstaining from all interference in French politics.

EUGENIUS, the name of four popes.

Eugenius I.,. pope from 654 to 657. Elected on the banish- ment of Martin I. by the emperor Constans II., and at the height of the Monothelite crisis, he showed greater deference than his predecessor to the emperor’s wishes, and made no public stand against the patriarchs of Constantinople. He, however, held no communication with them, being closely watched in this respect by Roman opinion.

Eugenius II., pope, was a native of Rome, and was chosen to succeed Pascal I. in 824. His election did not take place without difficulty. Eugenius was the candidate of the nobles, and the clerical faction brought forward a competitor. But the monk Wala, the representative of the emperor Lothair, succeeded in arranging matters, and Eugenius was elected. Lothair, however, came to Rome in person, and took advantage of this opportunity to redress many abuses in the papal administration, to vest the election of the pope in the nobles, and to confirm the statute that no pope should be consecrated until his election had the approval of the emperor. A council which assembled at Rome during the reign of Eugenius passed several enactments for the restoration of church discipline, took measures for the foundation of schools and chapters, and decided against

*priests wearing a secular dress or engaging in secular occupations. Eugenius also adopted various provisions for the care of the poor and of widows and orphans. He died in 8*27. (L. D.*)*

Eugenius III. (Bernardo Paganelli), pope from the 15th ci February 1145 to the 8th of July 1153, a native of Pisa, was abbot of the Cistercian monastery of St Anastasius at Rome when suddenly elected to succeed Lucius II. His friend and instructor, Bernard of Clairvaux, the most influential ecclesiastic of the time, remonstrated against his election on account of his " innocence and simplicity," but Bernard soon acquiesced and continued to be the mainstay of the papacy throughout Eu» genius's pontificate. It was to Eugenius that Bernard addressed his famous work De consider atione. Immediately after his election, the Roman senators demanded the pope's renunciation of temporal power. He refused and fled to Farfa, where he was consecrated on the 17th of February. By treaty of December 1 145 he recognized the republic under his suzerainty, substituted a papal prefect for the " patrician " and returned to Rome. The celebrated schismatic, Arnold of Brescia, however, put himself again at the head of the party opposed to the temporal power of the papacy, re-established the patricianate, and forced the pope to leave Rome. Eugenius had already, on hearing of the fall of Edessa, addressed a letter to Louis VII. of France (December 1145), announcing the Second Crusade and granting plenary indulgence under the usual conditions to those who would take the cross; and in January 1147 he journeyed to France to further preparations for the holy war and to seek aid in the constant feuds at Rome. After holding synods at Paris, Reims and Trier, he returned to Italy in June 1148 and +ookup

his residence at Viterbo. The following month he excommuni- cated Arnold of Brescia in a synod at Cremona, and thenceforth devoted most of his energies to the recovery of his see. As the result of negotiations between Frederick Barbarossa and the Romans, Eugenius was finally enabled to return to Rome in December 1152, but died in the following July. He was suc- ceeded by Anastasius IV. Eugenius retained the stoic virtues of monasticism throughout his stormy career, and was deeply reverenced for his personal character. His tomb in St Peter's acquh?d fame for miraculous cures, and he was pronounced blessed by Pius IX. in 1872.

The chief sources for the career of Eugenius III. are his letters in J. P. Migue, Patrol. Lat., vols. 106, 180, 182, and in Bibliothegue de I'Ecole dts Charles, vol. 57 (Paris, 1896) ; the life by Cardinal Boso in J. M. Watterich, Pontij. Roman, vitae, vol. 2; and the life by John of Salisbury in Monumenta Germaniae historica. Scriptores, vol. 20.

See J. Langen, Geschichte der rbmischen Kirche von Gregor VII. bis Innocenz III. (Bonn, 1893); F. Gregorovius, Rome in the Middle Ages, vol. 4, trans, by Mrs G. W. Hamilton (London, 1900-1902) ; K. J. von Hefelq, Conciliengeschichte, Bd. 5, 2nd ed.; Jaffe-Wattenbach, Regesta pontij. Roman. (1885-1888); M. Jocham, Geschichte des Lebens u. der Verehrung des seligen Papstes Eugen III. (Augsburg, 1873) ; G. Sainaci, Vita del bealo Eugenia III (Pisa, 1868) ; J. Jastrow and G. Winter, Deutsche Geschichte im Zeitalter der Hohenstaufen, i. (Stuttgart, 1897); C. Neumann, Bernhard von Clairvaux u. die Anfange der zweiten Kreuzzuges (Heidelberg, 1882) ; B. Kugler, Analekten zur Geschichte des zweiten Kreuzzugs (Tubingen, 1878, 1883). (C. H. Ha.)

Eugenius IV. (Gabriel Condulmieri) , pope from the 3rd of March 143 1 to the 23rd of February 1447, was born at Venice of a merchant family in 1383. He entered the Celestine order and came into prominence during the pontificate of his uncle, Gregory XII., by whom he was appointed bishop of Siena, papal treasurer, protonotary , cardinal-priest of St Marco e St Clemente, and later cardinal-priest of Sta Maria in Trastevere. His violent measures, as pope, against the relations of his predecessor, Martin V., at once involved him in a serious contest with the powerful house of Colonna. But by far the most important feature of Eugenius's pontificate was the great struggle between pope and council. On the 23rd of July 1431 his legate opened the council of Basel which had been convoked by Martin, but, distrustful of its purposes and moved by the small attendance, the pope issued a bull on the 18th of December 143 1, dissolving the council and calling a new one to meet in eighteen months at Bologna. The council refused to dissolve, renewed the revolutionary resolutions by which the council of Constance had been declared superior to the pope, and cited Eugenius to appear at Basel. A compromise was arranged by Sigisfnund, who had been crowned emperor at Rome on the 31st of May 1433, by which the pope recalled the bull of dissolution, and, reserving the rights of the Holy See, acknowledged the council as ecumenical (15th of December 1433). The establishment of an insurrectionary re- public at Rome drove him into exile in May 1434, and, although the city was restored to obedience in the following October, he remained at Florence and Bologna. Meanwhile the

struggle with the council broke out anew. Eugenius at length convened a rival council at Ferrara on the 8th of January 1438 and ex- communicated the prelates assembled at Basel. The result was that the latter formally deposed him as a heretic on the 25th of June 1439, an(i m the following November elected the ambitious Amadeus VIII., duke of Savoy, antipope under the title of Felix V. The conduct of France and Germany seemed to warrant this action, for Charles VII. had introduced the decrees of the council of Basel, with slight changes, into the former country through the Pragmatic Sanction of Bourges (7th of July 1438) , and the diet of Mainz had deprived the pope of most of his rights in the latter country (26th of March 1439). At Florence, whither the council of Ferrara had been transferred on account of an outbreak of the plague, was effected in July 1439 a union with the Greeks, which, as the result of political necessities, proved but temporary. This union was followed by others of even less stability. Eugenius signed an agreement with the Armenians on the 22nd of November 1439, an d with a part of the Jacobites in 1443; and in 1445 he received the Nestorians and

Maronites. He did his best to stem the Turkish advance, pledging one-fifth of the papal income to the crusade which set out in 1443, but which met with overwhelming defeat. His rival, Felix V., meanwhile obtained small recognition, and the latter's ablest adviser, Aeneas Sylvius Piccolomini, made peace with Eugenius in 1442. The pope's recognition of the claims to Naples of King Alphonso of Aragon withdrew the last important support from the council of Basel, and enabled him to make a victorious entry into Rome on the 28th of September 1443, after an exile of nearly ten years. His protests against the Pragmatic Sanction of Bourges were ineffectual, but by means of the Concordat of the Princes, negotiated by Piccolomini with the electors in February 1447, the whole of Germany declared against the antipope. Although his pontificate had been so stormy and unhappy that he is said to have regretted on his death-bed that he ever left his monastery, nevertheless Eugenius's victory over the council of Basel and his efforts in behalf of church unity contributed greatly to break down the conciliar movement and restore the papacy to the position it had held before the Great Schism. Eugenius was dignified in demeanour, but inexperienced and vacillating in action and excitable in temper. Bitter in his hatred of heresy, he yet displayed great kindness to the poor. He laboured to reform the monastic orders, especially the Franciscan, and was never guilty of nepotism. Although a type of the austere monk in his private life, he was a sincere friend of art and learning, and in 1431 re-established finally the university at Rome. He died on the 23rd of

February 1447, and was succeeded by Nicholas V.

See L. Pastor, History of the Popes, vol. I., trans, by F. I. Antrobus (London, 1899) ; M. Creighton, History of the Papacy, vol. 3 (London, 1899); F. Gregorovius, Rome in the Middle Ages, vol. 7, trans, by Mrs G. VV. Hamilton (London, 1900-1902) ; K. J. von Hefele, Conciliengeschichte, Bd. 7, 2nd ed. ; H. H. Milman, Latin Christianity, vol. 8 (London, 1896) ; G. Voigt, Enea Silvio de Piccolomini, Bd. 1-3 (Berlin, 1856); Aus den Annaten-Registern der Pdpste Eugen IV., Pius II., Paul II. u. Sixtus IV., ed. by K. Hayn (Cologne, 1896). There is an admirable article by Tschackert in Hauck's Realency- klopddie, 3rd ed. vol. 5. (C. H. Ha.)

EUGENOL (allyl guaiacol, eugenic acid), C10H.12O2, an odoriferous principle; it is the chief constituent of oil of cloves, and occurs in many other essential oils. It can be synthetically prepared by the reduction of con ifery 1 alcohol, (HO) (CH 3 0) C 6 H 3 • CH :CH • CH 2 OH, which occurs in combination with glucose in the glucoside coniferin, Ci 6 H 2 20 8 . It is a colourless oil boiling at 247° C, and having a spicy odour. On oxidation with potassium per-manganate it gives homovanillin, vanillin, &c; with chromic acid in acetic acid solution it is converted into carbon dioxide and acetic acid, whilst nitric acid oxidizes it to oxalic acid. By the action of alkalis it is converted into iso-eugenol, which on oxidation yields vanillin, the odorous principle of vanilla (q.v.). This transformation of allyl phenols into propenyl phenols is very general (see Ber., 1889, 22, p. 2747; 1890, 23, p. 862). Alkali fusion of eugenol gives protocatechuic acid. The amount of eugenol in oil of cloves can be estimated by acetylation, in presence of pyridine (A. Verley and Fr. Baelsing, Ber., 1901, 34, P- 3359)- Chavibetol, an isomer of eugenol, occurs in the ethereal oil obtained from Piper betle. The structural relations are:

OH OCII3

on 0CH3

OH

0CH3

n

ch;ch:ch 2

Eugenol.

CII:CH.CH 3 Iso-eugenol

N/

CHO Vanillin

OCH3

Pi ”

\/ CH.CH:CH5 Chavibetol

EUHEMERUS [Euemerus, Evemerus], Greek mythographer, born at Messana, in Sicily (others say at Chios, Tegea, or Messene in Peloponnese), flourished about 300 B.C., and lived at the court of Cassander. He is chiefly known by his Sacred History (“Iepct avaypa

imaginary. In this work he for the first time systematized an old Oriental (perhaps Phoenician) method of interpreting the popular myths, asserting that the gods who formed the chief objects of popular worship had been originally heroes and conquerors, who had thus earned a claim to the veneration of their subjects. This system spread widely, and the early Chris- tians especially appealed to it as a confirmation of their belief that ancient mythology was merely an aggregate of fables of human invention. Euhemerus was a firm upholder of the Cyrenaic philosophy, and by many ancient writers he was regarded as an atheist. His work was translated by Ennius into Latin, but the work itself is lost, and of the translation only a few fragments, and these very short, have come down to us.

This rationalizing method of interpretation is known as Euhemerism. There is no doubt that it contains an element of truth ; as among the Romans the gradual deification of ancestors and the apotheosis of emperors were prominent features of religious development, so among primitive peoples it is possible to trace the evolution of family and tribal gods from great chiefs and warriors. All theories of religion which give prominence to ancestor worship and the cult of the dead are to a certain extent Euhemeristic. But as the sole explanation of the origin of the idea of gods it is not accepted by students of comparative religion. It had, however, considerable vogue in France. In the 1 8th century the abbe Banier, in his Mythologie et la fable ex- pliquies par I’histoire, was frankly Euhemeristic; other

leading Euhemerists were Clavier, Sainte-Croix, Raoul Rochette, Em. Hoffmann and to a great extent Herbert Spencer.

See Raymond de Block, EvMmere, son lime et sa doctrine (Mons, 1876) ; G. N. Nemethy, Euhemeri relliquiae (Budapest, 1889) ; Ganss, Quaestiones Euhemereae (Kempen, i860) ; Otto Sieroka, De Euhemero (1869); Susemihl, Geschichte der griechischen Lilteratur in der Alexandrinerzeit, vol. i. (Leipzig, 1891); and works on comparative religion and mythology.

EULENSPIEGEL [Ulenspiegel], TILL, the name of a German folk-hero, and the title of a popular German chapbook on the subject, of the beginning of the 1 6th century. The oldest existing German text of the book was printed at Strassburg in 151 5 (Ein kurtzweilig lesen von Dyl Vlenspiegel geboren vss dem land zu Brunsswick) , and again in 1519. This is not in the original dialect, which was undoubtedly Low Saxon, but in High German, the translation having been formerly ascribed — but on insufficient evidence — to the Catholic satirist Thomas Murner. Its hero, Till Eulenspiegel or Ulenspiegel, the son of a peasant, was born at Kneitlingen in Brunswick, at the end of the 13th or at the beginning of the 14th century. He died, according to tradition, at Molln near Liibeck in 1350. The jests and practical jokes ascribed to him were collected — if we may believe a statement in one of the old prints — in 1483; but in any case the edition of 1 51 5 was not even the oldest High German edition. Eulen- spiegel himself is locally associated with the Low German area extending from Magdeburg to Hanover, and from Luneburg to the Harz Mountains. He is the wily peasant who loves to exercise his wit and roguery on the tradespeople of the towns, above all, on the innkeepers; but priests, noblemen, even princes, are also among his victims. His victories are often pointless, more often brutal; he stoops without hesitation to scurrility and obscenity, while of the finer, sharper wit which the humanists and the Italians introduced into the anecdote, he has little or nothing. His jests are coarsely practical, and his satire turns on class distinctions. In fact, this chapbook might be described as the retaliation of the peasant on the townsman who in the 14th and 15th centuries had begun to look down upon the country boor as a natural inferior.

In spite of its essentially Low German character, Eulenspiegel was extremely popular in other lands, and, at an early date, was translated into Dutch, French, English, Latin, Danish, Swedish, Bohemian and Polish. In England, " Howleglas " (Scottish, Holliglas) was long a familiar figure; his jests were rapidly adapted to English conditions, and appropriated in the collections associated with Robin

Goodfellow, Scogan and others. Ben Johnson refers to him as " Howleglass " and " Ulenspiegel " in his Masque of the Fortunate Isles, Poetaster, Alchemist and

Sad Shepherd, and a verse by Taylor the " water poet " would seem to imply that the " Owliglasse " was a familiar popular type. Till Eulenspiegel's " merry pranks " have been made the subject of a well-known orchestral symphony by Richard Strauss. In France, it may be noted, the name has given rise to the words espitgle and espieglerie.

The Strassburg edition of 1515 (British Museum) has been re-printed by H. Knust in the Neudrucke deutscher Literaturwerke des 16. undi7. Jahrh. No. 55-56 (1885) ; that of I5i9by J. M . Lappenberg, Br Thomas Murners Vlenspiegel (1854). W. Scherer (" Die Anfange des Prosaromans in Deutschland," in Quellen und Forschungen, vol. xxi., 1877, pp. 28 ff. and 78 ff.) has shown that there must have been a still earlier High German edition. See also C. Walter in Niederdeutsches Jahrbuch, xix. (1894), pp. 1 ff. Further editions appeared at Cologne, printed by Servais Kruffter, undated (repro- duced in photo-lithography from the two imperfect copies in Berlin and Vienna, 1865); Erfurt, 1532, I533~i537 and 1538; Cologne, 1539; Strassburg, 1539; Augsburg, 1540 and 1 54 1; Strassburg, J543; Frankfort on the Main, 1545; Strassburg, 1551; Cologne, !554. & c – Johann Fischart published an adaptation in verse, Der Eulenspiegel Reimensweis (Strassburg, 1571), K. Simrock a modern- ization in 1864 (2nd ed., 1878); there is also one by K. Pannier in Reclam's Universalbibliothek (1883). The earliest translation was that into Dutch, printed by Hoochstraten at Antwerp (Royal Lib., Copenhagen) ; it is undated, but may have appeared as early as 1512. See facsimile reprint by M. Nijhoff (the Hague, 1898). This served as the basis for the first French version: Ulenspiegel, de sa vie, de ses cenvres et merveilleuses aduentures par luy faictes .... nouuellement translate et corrige de Flamant en Francoys (Paris, 1532). Reprint, edited by P. Jannet (1882). This was followed by upwards of twenty French editions down to the beginning of the 18th century. The latest translation is that by J. C. Delepierre (Bruges, 1835 and 1840). Cf. Prudentius van Duyse, Atude litteraire sur_ Tiel VEspiegle (Ghent, 1858). The first complete English trans- lation was also made from the Dutch, and bears the title: Here beginneth a merye Jest of a man called Howleglas, Sue., printed by Copland in three editions, probably between 1548 and 1560. Re- print by F. Ouvry (1867). This, however, was itself merely a re- print of a still older English edition (1518?), of which the British Museum possesses fragments. Reprinted by F. Brie, Eulenspiegel in England (1903). In 1720 appeared The German

Rogue, or the Life and Merry Adventures of Tiel Eulenspiegel. Made English from the High-Dutch; and an English illustrated edition, adapted by K. R. H. Mackenzie in 1880 (2nd ed., 1890). On Eulenspiegel in England, see especially C. H. Herford, Studies in the Literary Relations of England and Germany in the Sixteenth Century (1888), pp. 242 ff., and F. Brie's work already referred to. (J. G. R.)

EULER, LEONHARD (1 707-1 783), Swiss mathematician, was born at Basel on the 15th of April 1707, his father Paul Euler, who had considerable attainments as a mathematician, being Calvinistic pastor of the neighbouring village of Riechen. After receiving preliminary instructions in mathematics from his father, he was sent to the university of Basel, where geometry soon became his favourite study. His mathematical genius gained for him a high place in the esteem of Jean Bernoulli, who was at that time one of the first mathematicians in Europe, as well as of his sons Daniel and Nicolas Bernoulli. Having taken his degree as master of arts in 1723, Euler applied himself, at his father's desire, to the study of theology and the Oriental languages with the view of entering the church, but, with his father's consent, he soon returned to geometry as his principal pursuit. At the same time, by the advice of the younger Ber- noullis, who had removed to St Petersburg in 1725, he applied himself to the study of physiology, to which he made a happy application of his mathematical knowledge; and he also attended the medical lectures at Basel. While he was engaged in physio- logical researches, he composed a dissertation on the nature and propagation of sound, and an answer to a prize question concerning the masting of ships, to which the French Academy of Sciences adjudged the second rank in the year 1727.

In 1727, on the invitation of Catherine I., Euler took up his residence in St Petersburg, and was made an associate of the Academy of Sciences. In 1730 he became professor of physics, and in 1733 he succeeded Daniel Bernoulli in the chair of mathe- matics. At the commencement of his new career he enriched the academical collection with many memoirs, which excited a noble emulation between him and the Bernoullis, though this did not in any way affect their friendship. It was at this time that he carried the integral calculus to a higher degree of perfection, invented the Calculation of sines, reduced analytical operations

to a greater simplicity, and threw new light on nearly all parts of pure mathematics. In 1 73 5 a problem proposed by the academy, for the solution of which several eminent mathematicians had demanded the space of some months, was solved by Euler in three days,but the effort threw him into a fever which endangered his life and deprived him of the use of his right eye. The Academy of Sciences at Paris in 1738 adjudged the prize to his memoir on the nature and properties of fire, and in 1740 his treatise on the tides shared the prize with those of Colin Maclaurin and Daniel Bernoulli — a higher honour than if he had carried it away from inferior rivals.

In 1 741 Euler accepted the invitation of Frederick the Great to Berlin, where he was made a member of the Academy of Sciences and professor of mathematics. He enriched the last volume of the Melanges or Miscellanies of Berlin with five memoirs, and these were followed, with an astonishing 'rapidity, by a great number of important researches, which are scattered throughout the annual memoirs of the Prussian Academy. At the same time he continued his philosophical contributions to the Academy of St Petersburg, which granted him a pension in 1742. The respect in which he was held by the Russians was strikingly shown in 1760, when a farm he occupied near Char- lottenburg happened to be pillaged by the invading Russian army. On its being ascertained that the farm belonged to Euler, the general immediately ordered compensation to be paid, and the empress Elizabeth sent an additional sum of four thousand crowns.

In 1766 Euler with difficulty obtained permission from the king of Prussia to return to St Petersburg, to which he had been originally invited by Catherine II. Soon after his return to St Petersburg a cataract formed in his left eye, which ultimately deprived him almost entirely of sight. It was in these circum- stances that he dictated to his servant, a tailor's apprentice, who was absolutely devoid of mathematical knowledge, his Anleitung sur Algebra (1770), a work which, though purely elementary, displays the mathematical genius of its author, and. is still reckoned one of the best works of its, class. Another task to which he set himself immediately after his return to St Petersburg was the preparation of his Lettres A une princesse d' Allemagne sur quelques sujets de physique et de philosophic (3 vols.,. 1768 :iyjz). They were written at the request of the princess of Anhalt-Dessau, and contain an admirably clear exposition of the principal facts of mechanics, optics, acoustics and physical astronomy. Theory, however, is frequently unsoundly applied in it, and it is to be observed generally that Euier's strength lay rather in pure than in applied mathematics.

In 1755 Euler had been elected a foreign member of the Academy of Sciences at Paris, and some time afterwards the academical prize was adjudged to three of his memoirs Concerning the Inequalities in the Motions of the Planets. The two prize- questions proposed by the same academy for 1770 and 1772 were designed to obtain a more perfect theory of the moon's motion. Euler, assisted by his eldest son Johann Albert, was a competitor for these prizes, and obtained both. In the second memoir he reserved for further consideration several, inequalities of the moon's motion, which he could not determine in his first theory on account of the complicated calculations in which the method he then employed had engaged him. He afterwards reviewed his whole theory with the assistance of his son and W. L. Krafft and A. J. Lexell, and pursued his researches until he had con-' structed the new tables, which appeared in his Theoria motuum lunae (1772). Instead of confining himself, as before, to the fruitless integration of three differential equations of the second degree, which are furnished by mathematical principles, he re- duced them to the three co-ordinates which determine the place ; of the moon; and he divided into classes all the inequalities of that planet, as far as they depend either on the elongation of the sun and moon, or upon the eccentricity, or the parallax, or the inclination of the lunar orbit. The inherent difficulties of this task were immensely enhanced by the fact that Euler was ; virtually blind, and had to carry all the elaborate computations it involved in his memory. A further difficulty arose from

the burning of his house and the destruction of the greater part of his property in 1 771. His manuscripts were fortunately preserved. His; own life' was only saved by the courage of a native of Basel, Peter Grimmon, who carried him out of the burning- house.

Some time after this an operation restored Euier's sight; but a too harsh use of the recovered faculty, along with some careless- ness on the part of the surgeons, brought about a relapse. With the assistance of his sons, and of Krafft and Lexell, however, he continued his labours, neither the loss of his sight nor the in>- firmities of an advanced age being sufficient to check his activity. Having engaged to furnish the Academy of St Petersburg with as many memoirs as would be sufficient to complete its Acta for twenty years after his death, he in seven years- transmitted to the academy above seventy memoirs, and left above two hundred more, which were revised and completed by another hand.

Euier's' knowledge was more general than might have been expected in one who had pursued with such unremitting ardour mathematics

and' astronomy as his favourite studies. He had made very considerable progress in medical, botanical and chemical science, and he was an excellent classical scholar, and extensively read in general literature. He was much indebted to an uncommon memory, which seemed to retain every idea that was conveyed to it, either from reading or meditation. He could repeat the Aeneid of Virgil from the beginning to the end without hesitation, and indicate the first and last line of every page of the edition which he used. Euier's constitution was uncommonly vigorous, and his general health was always good. ; He was enabled to continue his labours to the very close of his life. His last subject of investigation was the motion 1 of balloons, and the last subject on which he conversed was the newly discovered planet Herschel. (Uranus) . He died of apoplexy on the 1 8th of September 1783, whilst he was amusing himself at tea with one of his grandchildren.

Euier's genius was great and his industry still greater. His works, if printed in their completeness, would occupy from 60 to 80 quarto volumes; He was simple and upright in his character, and had a strong religious faith. He was twite married; his second wife being a half-sister of his first, and he had a numerous: family, several of whom attained to distinction. His tloge was written for the French Academy by the marquis de Condorcet, and an account of his life, with a list of his works, was written by Von Fuss, the secretary to the Imperial Academy of St Petersburg. .■■.,.■ . ■ ,-■

The works which Euler published separately are: Dissertatio physica de sono (Basel, 1727, in 4to) ■; Mechaniea, sive motus scientia analytice exposita (St Petersburg, 1736, in 2 vols. 4to) ; Einleitung in die Arithmetik (ibid., 1738, in 2 vols. 8vo), in German and Russian; Tentamen novae iheoriae musicae (ibid. 1739, in 4to) ; Methodus inveniendi tineas tunas, tnaximi minimive prbprietale gaudenles (Lausanne, 1744, in 4to) ; Theoria motuum planetarum et cometarum (Berlin, '1744, in 4to) ; BeanHvortung, &c, or Answers to Different Questions respecting Comets (ibid., 1744, m Svo).; Neue Grundsdtze, &c, or New Principles of Artillery, translated from the English of Benjamin Robins, with notes and illustrations (ibid., 1745, in 8vo) ; Opuscula varii argumenti (ibid., 1746-1751, in 3 vols. 4to) ; Novae et correctae tabulae ad loca lunae computanda (ibid., 1746, in 4to); Tabulae astrqnomicae solis et lunae (ibid., 4to) ; Gedanken, &c., or Thoughts on the Elements of Bodies (ibid, 4to) ; Rettung der gott- lichen Offenbarung, &c, Defence of Divine Revelation against Free- thinkers (ibid., 1747, in 4to) ; Introductio in analysin infinitorum (Lausanne, 1748, in 2 vols. 4to) ; Scientia navalis, sen tractatus de constv.uendis ac dirigendis navibus (St

Petersburg, 1749, in 2 vols. 4to) ; Theoria motus lunae (Berlin, 1753, in 4to) ; Dissertatio de principio tninimae actionis, una cum examine objectionum cl. prof. Koenigii (ibid., 1753, in 8vo) ; Institutiones calculi diffierentialis, cum ejus usu in analy si . Infinitorum ac doctrina serierum (ibid., 1755, in 4to) ; Constructio lentium objectivarum, &c. (St Petersburg, 1762, in 4to) ; Theoria motus corporum solidorum seu rigidorum (Rostock, 1765, in 4to); Institutiones .calculi integralis (St Petersburg, 1 768-1 770, in 3 vols. 4to) ; Lettres ci une Princesse d' Allemagne sur quelques sujets de physique et de philosaphie (St Petersburg, 1768-1772, in 3 vols. Svo) ; Anleitung zur Algebra, or Introduction to Algebra (ibid., 1770, in 8vo); Dioptrica (ibid., 1767-1771, in 3 vols. 4to) ; Theoria motuum lunae nova methodo pertractata (ibid., 1772, in 4T0); Novae tabulae lunares (ibid;, in 8vo) ; Thebrie complete de la construction et de la manoeuvre des vaisseaux (ibid., 1773, in 8vo); Eclaircissements. svr

itablissements en faveur tant des veuves que des mor.ts, without a date; Opuscula analytica (St Petersburg, 1783-1785, in 2 vols. 4to).

See Rudio, Leonhard Euler (Basel, 1884) ; M.. Cantor, Geschichte der Mathematik.

EUMENES, the name of two rulers of Pergamum.

1. Eumenes I. succeeded his uncle Philetaerus in 263 B.C. The only important event in his reign was his victory near Sardis over Antiochus Soter, which enabled him to "secure possession of the districts round his capital. (See Pergamum.)

2. Eumenes II., son of Attalus I., was king of Pergamum from 197-159 B.C. During the greater part of his reign he was a loyal ally of the Romans, who bestowed upon him signal marks of favour. He materially contributed to the defeat of Antiochus of Syria at the battle of Magnesia (190), and as a reward for his services the Thracian Chersonese and all Antiochus's possessions as far as the Taurus were bestowed upon Kim, including a pro- tectorate of such Greek cities as had not been declared free. In his quarrels with his neighbours the Romans intervened on his behalf, and on the occasion of his visit to Rome to complain of the conduct of Perseus, king of Macedonia,, he was received with the greatest distinction. On his

return journey he narrowly escaped assassination by the emissaries of Perseus. Although he supported the Romans in the war against Macedonia, he dis- played so little energy and interest (even recalling, his auxiliaries) that he was suspected of intriguing with the enemy. According to Polybius there was some foundation for the suspicion, 'but Eumenes declared that he had merely been negotiating for an exchange of prisoners.. Nothing, however, came, of these negotia- tions, whatever may have been their real object; and Eumenes, in order to avert suspicion, sent his congratulations to Rome by his brother Attalus after the defeat of Perseus '(1 68) . Attalus was received courteously but coldly; and Eumenes in alarm set out to visit Rome in person, but on his arrival at Brundusium was ordered to leave Italy at once. Eumenes never regained the good graces of the Romans, who showed especial favpur to Attalus on his second visit to Rome, probably with the object of setting him against Eumenes; but the ties of kinship proved too strong. The last years of his reign were disturbed by renewed hostilities against Prusias of Bithynia and the Celts of Galatia, and probably only his death prevented a war with Rome. Eumenes, although physically weak, was a shrewd and vigorous ruler and politician, who raised his little state from insignificance to a powerful monarchy. During his reign Pergamum became a flourishing city, where men of learning, were always welcome, among them Crates of Mallus, the founder of the Pergamene school of criticism. Eumenes adorned the city with splendid buildings, amongst them the great altar with the frieze repre- senting the Battle of the Giants; but the greatest monument of his liberality was the foundation of the library, which was second only to that of Alexandria.

See Livy xxxix. 51, xlii. 11-16; Polybius xxi.-xxxii. ; Appian, Syriaca; Livy, Epit. 46; Cornelius Nepos, Hannibal, 10; A. G. van Cappelle, Commentatio de regibus et antiquitatibus Pergamenis (Amsterdam, 1841). For the altar of Zeus, see Pergamum; for treaty with Cretan cities (183 B.C.) see Monumenti antichi, xviii. 177.

EUMENES (c. 360-316 B.C.), Macedonian general, was a native of Cardia in the Thracian Chersonesus. At a very early age he was employed as private secretary by Philip II. of Macedon, and on the death of that prince, by Alexander, whom he accom- panied into Asia. In the division of the empire on Alexander's death, Cappadocia and Paphlagonia were assigned to Eumenes; but as they were not yet subdued, Leonnatus and Antigonus were charged by Perdiccas to put him in possession. Antigonus, however, disregarded the order, and Leonnatus in vain attempted to induce Eumenes to accompany him to Europe and share in his far-reaching designs. Eumenes joined

Perdiccas, who in- stalled him in Cappadocia. When Craterus and Antipater, having reduced Greece, determined to pass into Asia and over- throw the power of Perdiccas, their first blow was aimed at Cappadocia. Craterus and Neoptolemus, satrap of Armenia, were completely defeated by Eumenes-(32i); Neoptolemus was killed, and Craterus died of his wounds. After the murder of Perdiccas in Egypt by his own soldiers, the Macedonian generals

condemned Eumenes to death, and charged Antipater and Anti- gonus with the execution of their Order. Eumenes, tjeing de- feated through the treachery of one of his officers, fled to Nora, a strong fortress on the confines of Cappadocia and Lycaonia, where he defended himself for more than a year. The death of Antipater (319) produced complications. He left the regency to his friend Polyperchon over the head of his son Cassander, who entered into an alliance with Antigonus and Ptolemy against Polyperchon, supported by Eumenes, who, having escaped from Nora, was threatening Syria . and Phoenicia. In 318 Antigonus marched against him, and Eumenes withdrew east to join the satraps of the provinces beyond the Tigris. After two indecisive battles in Iran, Eumenes was betrayed by his own soldiers to Antigonus and put to death. He was an able soldier, who did his utmost to maintain the unity of Alexander's empire in Asia; but his efforts were frustrated by the generals and satraps, who hated and despised the "secretary" and " foreigner."

See Plutarch, Eumenes; Cornelius Nepos, Eumenes; Diod. Sic. xviii., xix.,; Axrian, Anabasis, vii. ; Quintus Curtius x. 4. 10; Justin xiii. 8 ; A. Vezin, Eumenes von Kardia. Ein Beitrag zur Geschichte der Diadochenzeit (Munster i. W-, 1907). Also Macedonian Empire.

EUMENIDES (from Gr. evfievrjS, kindly; ev, well, and fievos, disposition), the " kindly ones," a euphemism for the Furies or Erinyes (q.v.). They give their name to a famous play by Aeschylus (q.v.), written in glorification of the old religion and aristocratic government of Athens, in opposition to the new democracy of the Periclean period.

EUMENIUS (c. a.d. 260-311), one of the Roman panegyrists, was born at Augustodunum (Autun) in Gallia Lugdunensis. He was of Greek descent; his grandfather, who had migrated from Athens to Rome, finally settled at Autun as a teacher of rhetoric. Eumenius probably took his place, for it was from Autun that he went to be magister memoriae (private secretary) to Constantius Chlorus, whom he accompanied on several of his campaigns. In 296 Chlorus determined to restore the famous schools (scholae Maenianae) oi

Autun, which had be'en greatly damaged by the inroads of the Bagaudae (peasant ban- ditti), and appointed Eumenius to the management of them, allowing him to retain his offices at court and doubling his salary-. Eumenius generously gave up a considerable portion of his emoluments to the improvement of the schools. There is na doubt that Eumenius was a heathen, not even a nominal follower of Christianity, like Ausonius and other writers from Gaul. Nothing is known of his later years; but he must have lived at least till 311, if the Gratiarum Actio to Constantine is by him. Of the twelve discourses included in the collection of Panegyrici Latini (ed. E. Bahrens, 1874), the following are probably by Eumenius. (1) Pro restaurandis (or instaurandis) scholis, delivered (297) in the forum at Autun before the governor of the province. Its chief object is to set forth the steps necessary to restore the schools to their former state of efficiency, and the author lays stress upon the fact that he intends to assist the good work out of his own pocket. (2) An address (297) to the Caesar Constantius Chlorus, congratulating him on his victories over Allectus and Carausius in Britain, and containing information of some value as to the British methods of fighting. (3) A panegyric on Constantine (310). (4) An address of thanks (311) from the inhabitants of Autun (whose name had been changed from Augustodunum to Flavia)to Constantine for the remission of taxes and other benefits. (5) A festal address (307) on the marriage of Constantine and Fausta, the daughter of Maximian. All these' speeches, with the exception of (1), were delivered at Augusta Trevirorum (Treves), whose birthday is celebrated iri (3). Eumenius is far the best of the orators of his time, and superior to the. majority of the writers of imperial panegyrics. He shows greater self-restraint and moderation in his language; which is simple and pure, and on the whole is free from the gross flattery which characterizes such productions. This fault – is most conspicuous in (3), which led Heyne (Opuscula, vi. 80) to deny the authorship of Eumenius on the ground that, it was unworthy of him.

There are treatises on Eumenius by B. Kilian (Wurzburg, 1869), S. Brandt (Freiburg im Breisgau, 1882), and H. Sachs (Halle, 1885); see also Gaston Boissier, " Les Rheteurs gaulois du IV e siecle," in Journal des savants (1884).

EUMOLPUS (" sweet singer "), in Greek mythology, son of Poseidon and Chione, the daughter of Boreas, legendary priest, poet and

warrior. He finally settled in Thrace, where he became king. During a war between the Eleusinians and Athenians under Erechtheus, he went to the assistance of the former, who on a previous occasion had shown him hospitality, but was slain with his two sons, Phorbas and Immaradus. According to another tradition, Erechtheus and Immaradus lost their lives; the Eleu- sinians then submitted to Athens on condition that they alone should celebrate the mysteries, and that Eumolpus and the daughters of Celeus should perform the sacrifices. It is asserted by others that Eumolpus with a colony of Thracians laid claim to Attica as having belonged to his father Poseidon (Isocrates, Panath. 193). The Eleusinian mysteries were generally con- sidered to have been founded by Eumolpus, the first priest of Demeter, but, according to some, by Eumolpus the son of Musaeus, Eumolpus the Thracian being the father of Keryx, the ancestor of the priestly family of the Kerykes. As priest, Eumolpus purines Heracles from the murder of the Centaurs; as musician, he instructs him (as well as Linus and Orpheus) in playing the lyre, and is the reputed inventor of vocal accompani- ments to the flute. Suidas reckons him one of the early poets and a writer of hymns of consecration, and Diodorus Siculus quotes a line from a Dionysiac hymn attributed to Eumolpus. He is also said to have been the first priest of Dionysus, and to have introduced the cultivation of the vine and fruit trees (Pliny, Nat. Hist. vii. 1 99) . His grave was shown at Athens and Eleusis. His descendants, called Eumolpidae, together with the Kerykes, were the hereditary guardians of the mysteries (g.v.).

See Apollodorus ii. 5, iii. 15; Pausanias i. 38. 2; Hyginus, Fab. 273; Homeric Hymn to Demeter, 476; Strabo vii. p. 321; Diod. Sic. i. 11; article " Eumolpidai," by J. A. Hild in Daremberg and Saglio's Dictionnaire des antiquitis.

EUNAPIUS, Greek sophist and historian, was born at Sardis, a.d. 347. In his native city he studied under his relative the sophist Chrysanthius, and while still a youth went to Athens, where he became a favourite pupil of Proaeresius the rhetorician. He possessed a considerable knowledge of medicine. In his later years he seems to have resided at Athens, teaching rhetoric. Initiated into the Eleusinian mysteries, he was admitted into the college of the Eumolpidae and became hierophant. There is evidence that he was still living in the reign of the younger Theodosius (408-450). Eunapius was the author of two works, one entitled Lives of the Sophists (Btoi i\cxr64>oiv ko.1 (touttS)v) , and the other consisting of a continuation of the history of Dexippus (q.v.). The former work is still extant; of the latter only excerpts remain, but the facts are largely incorporated in the work of Zosimus. It embraced the history

of events from a.d. 270-404. The Lives of the Sophists, which deals chiefly with the contemporaries of the author, is valuable as the only source for the history of the neo-Platonism of that period. The style of both works is bad, and they are marked by a spirit of bitter hostility to Christianity. Photius (cod. 77) had before him a " new edition " of the history in which the passages most offensive to the Christians were omitted.

Edition of the Lives by J. F. Boissonade (1822), with notes by D. Wyttenbach; history fragments in C. W. Miiller, Fragmenta Hist. Craecorum, iv. ; V. Cousin, Fragments philosophiques (1865).

EUNOMIUS (d. c. 393), one of the leaders of the extreme or "anomoean" Arians, who are sometimes accordingly called Eunomians, was born at Dacora in Cappadocia early in the 4th century. He studied theology at Alexandria under Aetius, and afterwards came under the influence of Eudoxius of Antioch, where he was ordained deacon. On the recommendation of Eudoxius he was appointed bishop of Cyzicus in 360. Here his free utterance of extreme Arian views led to popular com- plaints, and Eudoxius was compelled, by command of the emperor, Constantius II., to depose him from the bishopric within a year of his elevation to it. During the reigns of Julian

and Jovian, Eunomius resided in Constantinople in close inter- course with Aetius, consolidating an heretical party and con- secrating schismatical bishops. He then went to live at Chal- cedon, whence in 367 he was banished to Mauretania for harbour- ing the rebel Procopius. He was recalled, however, before he reached his destination. In 383 the emperor Theodosius, who had demanded a declaration of faith from all party leaders, punished. Eunomius for continuing to teach his distinctive doctrines, by banishing him to Halmyris in Moesia. He after- wards resided at Chalcedon and at Caesarea in Cappadocia, from which he was expelled by the inhabitants for writing against their bishop Basil. His last days were spent at Dacora his birth- place, where he died about 393. His writings were held in high reputation by his party, and their influence was so much dreaded by the orthodox, that more than one imperial edict was issued for their destruction (Cod. Theod. xvi. 34). Consequently his commentary on the epistle to the Romans, mentioned by the historian Socrates, and his epistles, mentioned by Philo- storgiusand Photius, are no longer extant. His first apologetical work ('AToKoyrp-iKos) , written probably about 360 or 365, has been entirely recovered from the celebrated refutation of it by Basil, and may be found in J. A. Fabricius, Bibl. Gr. viii. pp.

262-305. A second apology, written before 379 ('Tirep airoKoylas diroXoYia), exists only in the quotations given from it in a refutation by Gregory of Nyssa. The exposition of faith ("E/c0e

The teaching of the Anomoean school, led by Aetius and Eunomius, starting from the conception of God as 6 kykwriTos, argued that between the aytwriros and yewi)TOS there could be no essential, but at best only a moral, resemblance. " As the Unbegotten, God is an absolutely simple being; an act of generation would involve a contradiction of His essence by introducing duality into the Godhead." According to Socrates (v. 24), Eunomius carried his views to a practical issue by altering the baptismal formula. Instead of baptizing in the name of the Trinity, he baptized in the name of the Creator and into the death of Christ. This alteration was regarded by the orthodox as so serious that Eunomians on returning to the church were rebaptized, though the Arians were not. The Eunomian heresy was formally condemned by the council of Constantinople in 381. The sect maintained a separate existence for some time, but gradually fell away owing to internal divisions.

See C. R. W. Klose, Geschichte und Lehre des Eumonius (Kiel, 1833); F. Loofs in Hauck-Herzog, Realencyk. fur prot. Theol.; Winston's Eunomianismus redivivus contains an English trans- lation of the first apology. See also Arius.

EUNUCH (Gr.eiieoOxos), an emasculated male. From remote antiquity among the Orientals, as also at a later period in Greece, eunuchs were employed to take charge of the women, or generally as chamberlains — whence the name 01 rriv evvriv 'ixovrts, i.e. those who have charge of the bed-chamber. Their confi- dential position in the harems of princes frequently enabled them to exercise an important influence over their royal masters, and even to raise themselves to stations of great trust and power (see Harem) . Hence the term eunuch came to be applied in Egypt to any court officer, whether a castratus or not. The common idea that eunuchs are necessarily deficient in courage and in intellectual vigour is amply refuted by history. We are told, for example, by Herodotus that in Persia they were especi- ally prized for their fidelity; and they were frequently promoted to the highest offices. Narses, the famous general under Justinian, was a eunuch, as was also Hermias, governor of Atarnea in Mysia, to whose manes the great Aristotle offered sacrifices, besides celebrating the praises of his patron and friend in a poem (still extant) addressed to Virtue (see Lucian's dialogue entitled Eunuchus). The capacity of eunuchs for public affairs is strikingly illustrated by the histories of Persia, India and

China; and considerable- power was exercised by the eunuchs under the later Roman emperors. The hideous trade of castrating boys to be sold as eunuchs for Moslem harems has continued

to modern times, the principal district whence they are taken being north-central Africa (Bagirmi, &c). As the larger propor- tion of children die after the operation (generally total removal) owing to unskilful surgery, such as recover fetch at least three or four times the ordinary price of slaves. Even more vile, as being practised by a civilized European nation, was the Italian practice of castrating boys to prevent the natural development of the voice, in order to train them as adult soprano singers, such as might formerly be heard in the Sistine chapel. Though such mutilation is a crime punishable with severity, the supply of " soprani " never failed so long as their musical powers were in demand in high quarters. Driven long ago from the Italian stage by public opinion, they remained the musical glory and moral shame of the papal choir till the accession of Pope Leo XIII. , one of whose first acts was to get rid of them. Mention must here also be made of the class of voluntary eunuchs, who have emasculated themselves, or caused the operation to be performed on them, for the avoidance of sexual sin or temptation. This unnatural development of asceticism appears in early Christian ages, its votaries acting on the texts Matt. xix. 12, v. 28-30. Origen's case is the most celebrated example, and by the 3rd century there had arisen a sect of eunuchs, of whom Augustine says (De haeres. c. 37), " Valesii et seipsos castrant et hospites suos, hoc modo existimantes Deo se debere servire " (see Neander, History of Chr. Church, vol. ii. p. 462; Bingham, Antiq. Chr. Church, book iv. chap. 3.) Such practices have been always opposed by the general body of the Christian churches, but have not even now ceased. A secret sect of the kind exists in Russia, whose practice of castration is expressed in their name of Skopzi. (E. B. T.)

EUNUCH FLUTE, or Onion Flute (Fr. flute eunuque, flute a I'onion, mirliton; Ger. Zwiebelflote), a wind instrument in use during the 16th and 17th centuries, producing music akin to the comb-music of the nursery, and still manufactured as a toy (mirliton). The onion flute consists of a wooden tube widening out slightly to form a bell. The upper end of the tube is closed by means of a very fine membrane similar to an onion skin stretched across the aperture like the vellum of a drum. The mouthpiece, a simple round hole, is

pierced a couple of inches below the membrane; into this hole the performer sings, his voice setting up vibrations in the membrane, which thus in- tensifies the sound and changes its timbre to a bleating quality. A movable cap fits over the membrane to protect it. Mersenne 1 has given a drawing of the eunuch flute together with a descrip- tion; he states that the vibrations of the membrane improve the sound of the voice, and by reflecting it, give it an added charm. There were concerts of these flutes in four or five parts in France, adds Mersenne, and they had the advantage over other kinds of reproducing more nearly the sound of the voice.

EUQNYMUS, in botany, a genus of deciduous or evergreen shrubs or small trees, widely distributed in the north temperate zone, and represented in Britain by E. europaeus, the spindle tree, so called from its hard tough wood being formerly used for spindles. It is a shrub or small tree growing in copses or hedges, with a grey smooth bark, four-angled green twigs, opposite leaves and loose clusters of small greenish-white flowers. The ripe fruit is a pale crimson colour and splits into four lobes ex- posing the bright orange-coloured seed. E. japonicus is a hardy evergreen shrub, often variegated and well known in gardens. The Greek name evxvvfios, of good name, lucky, is probably a euphemism; the flowering was said to foretell plague.

EUPALINUS, of Megara, a Greek architect, who constructed for the tyrant Polycrates of Samos a remarkable tunnel to bring water to the city, passing under a hill. This aqueduct still exists, and is one of the most remarkable constructions in Greece (see Aqueduct: Greek).

EUPATORIA (Russ. Evpatoria; also known as Kozlov and to the Turks as Gezlev), a seaport of Russia, in the government of Taurida, on the W. coast of the Crimea, 20 m. N.W. of Simferopol, on a sandy promontory on the north of Kalamita Bay, in 45 12′ N. and 33° 40′ E. Pop. (1871) 8294; (1897) 17,915. This number

1 L'Harnwnie ttniverselle (Paris, 1636), livrevprop. iv. pp. 228-229.

includes many Jews, the Karaite sect having here their principal synagogue. Here too resides the spiritual head (gakhan) of the sect. Of its numerous ecclesiastical buildings three are of interest — the synagogue of the Karaite Jews; one of the mosques, which has fourteen cupolas and is built (1552) after the plan of St Sophia in Constantinople; and the Greek Catholic cathedral (1898). The port or rather roadstead has a sandy bottom, and is exposed to violent storms from the N.E. The trade is principally in cereals, skins, cow-hair, felt, tallow and salt. Eupatoria has some repute as a sea-

bathing resort.

According to some authorities it was near this spot that a military post, Eupalorium, was established in the 1st century a.d. by Diophantus, the general of Mithradates the Great, king of Pontus. Towards the end of the 15th century the Turks built the fortress of Gezleveh on the present site, and it became the capital of a khanate. It was occupied by the Russians under Marshal Munnich in 1736, and in 1771 by Prince Dolgorukov. Its annexation to Russia took place in 1783. In 1854 the Anglo- French troops were landed in the neighbourhood of Eupatoria, and in February 1855 the town was occupied by the Turkish forces.

EUPATRIDAE (Gr. ev, well; xarijp, father, i.e. "Sons of noble fathers "), the ancient nobility of Attica. Tradition ascribes to Theseus, whom it also regards as the author of the union (synoecism) of Attica round Athens as a political centre, the division of the Attic population into three classes, Eupatridae, Geomori and Demiurgi. The lexicographers mention as char- acteristics of the Eupatridae that they are the autochthonous population, the dwellers in the city, the descendants of the royal stock. It is probable that after the time of the synoecism the nobles who had hitherto governed the various independent communities wˆre obliged to reside in Athens, now the seat of government; and at the beginning of Athenian history the noble clans form a class which has the monopoly of political privilege. It is possible that in very early times the Eupatridae were the only full citizens of Athens; for the evidence suggests that they alone belonged to the phratries, and the division into phratries must have covered the whole citizen body. It is indeed just possible that the term may originally have signified " true member of a clan," since membership of aphratry was a char- acteristic of each clan (ykvos). It is not probable that the Eu- patrid families were all autochthonous, even in the loose sense of that term. Some had no doubt immigrated to Attica when the rest had long been settled there. Traces of this union of immi- grants with older inhabitants have been detected in the combina- tion of Zeus Herkeios with Apollo Patroos as the ancient gods of the phratry.

The exact relation of the Eupatridae to the other two classes has been a matter of dispute. It seems probable that the Eupatridae were the governing class, the only recognized nobility, the Geomori the country inhabitants of all ranks, and the Demiurgi the commercial and artisan population. The division attributed to Theseus is always spoken of by ancient authorities as a division of the entire population; but Busolt has recently maintained the view that the

three classes represent three elements in the Attic nobility, namely, the city nobility, the landed nobility and the commercial nobility, and exclude altogether the mass of the population. At any rate it seems certain from the little we know of the early constitutional history of Athens, that the Eupatridae represent the only nobility that had any political recognition in early times. The political history of the Eupatridae is that of a gradual curtailment of privilege. They were at the height of their power in the period during the limitation of the monarchy. They alone held the two offices, those of polemarch and archon, which were instituted during the 8th century B.C. to restrict the powers of the kings. In 712 B.C. the office of king (f3a

code by Draco (q.v.), which was followed by the more detailed and permanent code of Solon (c. 504 B.C.), who further threw open the highest offices to any citizen possessed of a certain amount of landed property (see Solon), thus putting the claims of the Eupatridae to political influence on a level with those of the wealthier citizens of all classes. The most highly coveted office at this time wasnot that of BacnXeus, which, like that of the rex sacrorum in Rome, had been stripped' of all save its religious authority, but that of the Archon; soon after the legis- lation of Solon repeated struggles for this office between the Eupatridae arid leading members of the other two classes resulted in a temporary change. Ten archons 1 were appointed, five of whom were to be Eupatridae, three Agroeci (i.e. Geomori), and two Demiurgi (Arist. Ath. Pol. xiii. 2). This arrangement, though short-lived, is significant of the decay of the political influence of the Eupatridae, and it is not likely that they re- covered, even in practice, any real control of the government. By the middle of the 6th century the political influence of birth ■ was at an end.

The name Eupatridae survived in historical times, but the Eupatridae were then excluded from the cult of the " Semnae " at Athens, and also held the hereditary office of " expounder of the law " (kˆrryrˆrˆ) in connexion with purification from the guilt of murder. The combination of these two characteristics suggests some connexion with the legend of Orestes. Again, Isocrates (xvi. 25) says of Alcibiades that his grandfather was a Eupatrid and his grandmother an Alcmaeonid, which suggests 1 that in the 5th century the Eupatrids were a single clan, like the Alcmaeonids, and that the name had acquired a new Signification. A pursuit of these two

suggestions has established the probability that this . ” Eupatrid ” clan traced its origin to Orestes, and derived its name from the hero, who was above %11 a benefactor of his father. The word will well bear this sense in the two passages in which Sophocles (Electra, 162, 859) applies it to Orestes; and it is likely enough that after the disappearance of the old Eupatridae as a political corporation, the name was adopted in a different sense, but not without a claim to the distinction inherent in the older sense, by one of the oldest of the clans.

Bibliography.— G. Busolt, Die griechischen Staats- und Rechts-altertiimer (Mtiller, Handbuch der klassischen Altertumsivissenschaft,- iv. 1), pp. 127 et seq., 155 et seq., 248 (Munich, 1892); G. Gilbert, Greek Constitutional Antiquities, p. 101 et seq. (Eng. trans., London, !895); for Eupatridae in historical times, J. Topffer, Attische Genealogie, p. 175 et seq. (Berlin, 1889). See also the articles Areo- pagus, Archon. (A. M. Cjl.)

EUPEN (Fr. Neau), a town of Germany, in the Prussian Rhine province, in a beautiful valley at the confluence of the Helle and Vesdre, 9 m. S. of Aix-la-Chapelle by rail. Pop. (1905) 14,297. It is a flourishing commercial place, and besides cloth and buckskin mills it has net and ‘glove manufactories, soapworks, dyeworks, tanneries and breweries, and also carries on a con- siderable trade in cattle and’ dairy produce. It has a Protestant and four Roman Catholic churches, a Franciscan monastery, a ptogymnasium, an orphanage, a hospital, and a chamber of commerce. As part of the duchy of Limburg, Eupen was under the government of Austria until the peace of Luneville in 1801, when it passed to France. In 18 14 it came into the possession of Prussia.

EUPHEMISM (from Gr. eftcfanas, having a sound of good omen; «5, well, and 0i7M‘7> sound or voice), a figure of speech in which an unpleasant or coarse phrase is replaced by a softer or less offensive expression. A euphemism has sometimes a metaphorical sense, as in the substitution of the word ” sleep ” for ” death.”

EUPHONIUM (Fr. baryton; Ger. Tenor Tube), a modern brass wind instrument, known in military bands as euphonium and in the orchestra as tuba. The euphonium consists of a brass tube with a conical bore of wide calibre ending in a wide-mouthed bell; it is played by means of a cup-shaped mouthpiece. The sound is produced as in the bombardon, which is the bass of the euphonium, by the varied tension of the lips across the mouth- 1 For a discussion of this see Archon.

piece, whereby the natural open notes or harmonics, consisting of the series here shown, are obtained.

The intervening notes of the chromatic scale are obtained by means of valves or pistons usually four in number, which by opening a passage

£-jJi=

into additional lengths of tubing lower the pitch gg one, half , one-and-a-half , — two-and-a-half tones (see Bombardon; Tuba; Valves). The euphonium first note of the harmonic above the eighth.

V±

-$i

&

**-*

bm

~...

gives out the fundamental, or series, readily, but no harmonic Euphoniums are made in C and in Bt>, the latter being more generally used. By means of all the valves used at once, the B[>, an octave below the fundamental, can be reached, giving a compass of four octaves, with chromatic intervals. The bass clef is used in notation. The euphonium is treated by: French and German composers as a transposing instrument ; ; in England the real notes are usually written, except when the treble clef is used. The quality of tone is rich and full, harmonizing well with that of the trombone. The, euphonium speaks readily in the lower register, but slowly, of course, owing to the long dip of the pistons. Messrs Rudall Carte have removed this difficulty by their patent short action pistonSj which have but half the dip of the old pistons. On these instruments it is easy to execute rapid passages.

The euphonium is;frequently said to be a saxhorn, correspond- ing to the baryton member of that family, but the statement is misleading. The bombardon and euphonium, like the saxhorns, are the outcome of the application of valves to the bugle family, but there is a radical difference in construction; the tubas (bombardon and euphonium) have a conical bore of sufficiently wide calibre to allow of the

production of the fundamental harmonic, which is absent in the saxhorns. The Germans classify brass wind instruments as whole and half 1 according to whether, having the wide bore of the bugle, the whole length of the tube is available and gives the fundamental proper to an organ pipe of the same length or whether by reason of the narrow bore in proportion to the length, only half the length of the instrument is of practical utility, the harmonic series beginning with the second harmonic. (See Bombardon.) (K. S.)

EUPHORBIA, in botany, a . large genus of plants from which the order Euphorbiaceae takes its name. It includes more than 600 species and is of almost world-wide distribution. It is represented in Britain by the spurges- — small, generally smooth, herbaceous plants with simple leaves and inconspicuous flowers arranged in small cup-like heads (cyathia) . The cy athium is a characteristic feature of the genus, and consists of a number of male flowers, each reduced to a single stamen, surrounding a central female flower which consists only of a stalked pistil; the group ,of flowers is enveloped in a cup formed by the union of four or five bracts, the upper part of which bears thick, con- spicuous, gland-like structures, which in exotic species are often brilliantly coloured, giving the cyathium the appearance of a single flower; , Another characteristic is the presence of a milky juice, or, latex; in the tissues of the plant. In one section of the genus the plants, resemble cacti, having a thick succulent stem and 'branches with the leaves either very small or completely reduced to a small wart-like excrescence, with which is generally associated a tuft of spines (a reduced shoot) . These occur in the warmer parts of the world as a type of dry country or desert vegetation. The only species of note are E. fulgens and E. jacquiniaeflora, for the warm greenhouse; E. Cyparissias (the Cypress spurge), E. Wulfeni, E. Lathyris and E. Myrsinites, for the open air.

EUPHORBIACEAE, in botany, a large natural order of flowering plants, containing more than 220 genera with about

1 See Dr Schafhautl's article on " Musical Instruments " in sect, iv. of Bericht der Beurtheilungs- Commission bei der Allg. deutschen Industrie Ausstellung (Munich, 1854), pp. 169-170; also Fried. Zam- rniner, Die Musik und die Musikinstrumente in Hirer Beziehung zu den Ccsetzen der Akustik (Giesscn, 1855).

4000 species, chiefly tropical, but spreading over the whole earth

with the exception of the arctic and cold alpine zones. They are represented in Britain by the spurges (Euphorbia, q.v.) (fig. 1) and dog's mercury (Mercurialis) (fig. 2), which are herba- ceous plants, but the greater number are woody plants and often; trees. The large genus Euphorbia shows great variety in habit; many species, like the English spurges, are annual herbs, others form bushes, while in the desert regions of tropical Africa and the Canary Islands species occur re-

Fig. 1. Shoot of Euphorbia hypericin 8.

folia, about 3 nat. size. 9.

A partial inflorescence, cya~

thium,' bearing the petaloid 10.

glands. A similar one at a later stage,

cut open to show the single-

stamened (monandrous)male

flowers and the central long- b,

stalked female flower. A cyathium without petaloid a'b'

glandular appendages. A similar one at a later stage

with nearly ripe fruit. a'b

An anther dehiscing.

Seed.

Seed cut lengthwise expos- ing the embryo.

Diagram of the inflorescence of Euphorbia, illustrating the dichasial cymose ar- rangement of the ultimate branches.

Bract subtending the central terminal cyathium I.

, Bracteoles of the first order subtending the secon- dary cyathia II.

', Bractebles of the second order subtending the ter- tiary cyathia III.

7. Fruit dehiscing and expos- ing one of the three seeds, In the

central cyathium I. are, shown, the details of, the arrange- ment of the male flowers in monochasial cymes, m, and the central female flower, /. ‘ ‘

sembling cacti, having thick fleshy stems and leaves reduced to spines. Another large genus, PhyllanthuSj contains small annual herbs as well as trees, while jn some species the leaves are reduced to scales, and the branches are flattened, forming phylloclades. The leaves also show great variety in form and arrangement, being simple and entire as in the English spurges, or deeply cut as in Ricinus. (castor-oil) (fig. 3), and Manihot or sometimes palmately compound (Hevea). The majority contain a milky juice or latex in their tissues which exudes on cutting or bruising. In Hevea, Manihot, and others the latex yields caoutchouc. The flowers are unisexual; male and female flowers are borne on the same, as in the spurges (fig. 1), or on different plants, as in dog’s mercury (fig. 2). Their arrangement shows considerable variation, but the flowers are generally grouped in crowded definite partial inflorescences, which are themselves arranged in spikes or stand in the axils of the upper leaves. These partial inflorescences are generally

unisexual, the male often containing numerous flowers while the female flowers are solitary. The partial inflorescence {cyathium} of Euphorbia (fig. 1) resembles superficially a hermaphrodite flower. It contains a central terminal flower, consisting of a naked pistil; below this are borne four or five bracts which unite to form a cup-shaped involucre resembling a calyx; each of these bracts subtends a small cyme of male flowers each consisting only of one stamen. Between the segments of the cup are large oval or crescent-shaped glands which are often brightly coloured, forming petal-like structures.

The form of the flower shows great variety. The most complete type occurs in Wielandia, a shrub from the Seychelles Islands, in which the flowers have their parts in fives, a calyx and corolla being succeeded in the male flower by 5 stamens, in the female by 5 carpels. Generally, however, only 3 carpels are present, as in Euphorbia; Mercurialis (fig. 2) has minute apetatous flowers with 3 sepals, followed in the male by 8 to 20 stamens, in the female by a bicarpellary pistil. In the large tropical genus Croton a pentamerous calyx and corolla are generally present, the stamens are often very numerous, and the female flower has three carpels. In Manihot, a large tropical American genus to which belongs the manioc or cassava (M. utilissima), the calyx is often large and petaloid. Iff a great many genera the corolla is absent. The most reduced type of flower is that

Fig. 2.— Dog ? s Mercury (Mercurialis perennis}.

1. Male plant. 5. Fruit beginning to split open.

2. Female plant ; $ nat. size. 6. Seed cut lengthwise showing

3. Female flower. the embryo.

4. Male flower.

described in Euphorbia, where the male consists of one stamen separated from its pedicel by a joint, and the female of a naked tricarpellary pistil. The stamens are sometimes more 03- less united (monadelphous), and in castorroil (Ricinus) (fig. 3) are much branched. The ovary generally contains three chambers, and bears three simple or more often bipartite styles; each chamber contains one or two pendulous ovules, which generally

bear a cap-like outgrowth or caruncle, which persists in the seed (well shown in castor oil, fig. 3).

As the stamens and pistil are borne by different flowers, cross-fertilization is necessary. In Mercurialis and others with inconspicuous flowers pollination is effected by the wind, but in many Cases insects are attracted to the flower by the highly-coloured bracts, as in many Euphorbias and Dalechampia, or by the coloured calyx as in Manihot; the presence of honey is also frequently an attraction, as in the honey-glands on the bracts of the cyathium of Euphorbia. The fruit is generally a capsule which splits into three divisions {cocci), separating from the central column, and splitting lengthwise into two valves. In the mancinil (Hippomane mancinella) of Central America the fruit is a drupe like a plum, and in some genera berries occur. In the sandbox tree (Hura crepitans) of tropical America the ovary consists of numerous carpels, and forms when mature a capsule which splits with great violence and a loud report into a number of woody cocci. The seeds contain abundant endosperm and a large straight or bent embryo.

Several members of the order are of economic importance.

From Bentley and Trimen's Medicinal Plants, by permission of J. & A. Churchill. Fig. 3. — Castor OU(Ricinus communis). End of shoot

with flower- spike; about I nat. size. I. Section of male flower, about nat. size. Group of stamens

3. Fruit.

4. Seed.

5 and 6. Vertical and transverse

sections of seed showing

embryo in position.

Manihot utilissima, manioc or cassava (q.v.), is one of the most important tropical food-plants, its thick tuberous root being rich in starch; it is the source of Brazilian arrowroot. Caout- chouc or india-rubber is obtained from species of Hevea, Mabea, Manihot and Sapium. ■ Castor oil (q.v.) is obtained from the seeds of Ricinus communis. The seeds of Aleurites moluccana and Sapium sebiferum also yield oil. Resin is obtained from species of Croton and Euphorbia. Many of the species are poisonous; e.g. the South African Toxicodendron is one of the most poisonous plants known. Many, such as Euphorbia, Mercurialis, Croton, Jatropha, Tragia, have been, or still are, used as medicines. Species of Codiaeum (q.v.), Croton, Euphorbia, Phyllanthus, Jatropha and others are used as ornamental plants in gardens.

The box (Buxus) and a few allied genera which were formerly included in Euphorbiaceae are now generally regarded as forming a distinct order — Buxaceae, differing from Euphor- biaceae in the position of the ovule in the ovary-chamber and in the manner of splitting of the fruit.

EUPHORBIUM, an acrid dull-yellow or brown resin, consisting of the concreted milky juice of several species of Euphorbia, cactus-like perennial plants indigenous to Morocco. It dissolves in alcohol, ether and turpentine; in water it is only slightly soluble. It consists of two or more resins and a substance

euphorbone, C20H36O or C15H24O. Pliny states that the name of the drug was given to it in honour of Euphorbus, the physician of Juba II., king of Mauretania. In former times euphorbium was valued in medicine for its drastic, purgative and emetic properties.

EUPHORBUS, son of Panthous, one of the bravest of the Trojan heroes, slain by Menelaus (Iliad, xvii. 1-60). Pythagoras, in support

of his doctrine of the transmigration of souls, declared that he had once been this Euphorbus, whose shield, hung up in the temple of Argos by Menelaus, he claimed as his own (Horace, Odes, i. 28. n; Diog. Laert. viii. 1).

EUPHORION, Greek poet and grammarian, born at Chalcis in Euboea about 275 B.C. He spent much of his life in Athens, where he amassed great wealth. About 221 he was invited by Antiochus the Great to the court of Syria. He assisted in the formation of the royal library at Antioch, of which he held the post of librarian till his death. He wrote mythological epics, amatory elegies, epigrams and a satirical poem ('Apal, " curses ") after the manner of the Ibis of Callimachus. Prose works on antiquities and history are also attributed to him. Like Lyco- phron, he was fond of using archaic and obsolete expressions, and the erudite character of his allusions rendered his language very obscure. His elegies were highly esteemed by the Romans- they were imitated or translated by Cornelius Gallus and also by the emperor Tiberius.

Fragments in Meineke, " De Euphorionis Chalcidensis vita et scriptis," in his Analecta Alexandrina (1843); for a recently dis- covered fragment of about 30 lines see Berliner Klassikertexte, v. 1

(1907).

EUPHRANOR, of Corinth (middle of the 4th century B.C.), the only Greek artist who excelled both as a sculptor and as a painter. In Pliny we have lists of his works; among the paint- ings, a cavalry battle, a Theseus, and the feigned madness of Odysseus; among the statues, Paris, Leto with her children Apollo and Artemis, Philip and Alexander in chariots. Un- fortunately we are unable among existing statues to identify any which are copies from works of Euphranor (but see a series of attributions by Six in Jahrbuch, 1909, 7 foil.). He appears to have resembled his contemporary Lysippus, notably in the attention he paid to symmetry, in his preference for bodily forms slighter than those usual in earlier art, and in his love of heroic subjects. He wrote a treatise on proportions.

EUPHRATES (Babylon. Purattu, Heb. Perath, Arab. Frdt or Furdt, Old Pers. Ufratu, Gr. Evˆpartis) , the largest river of western Asia. It may be divided into three divisions, upper, lower and middle, each of which is distinguished by special physical features, and has played a conspicuous part in the world's history, retaining to the present day monumental evidence of the races who have lined its banks.

Upper Division. — The upper Euphrates consists of two arms, which, rising on the Armenian plateau, and flowing west in long shallow valleys parallel to Mount Taurus, eventually unite and force their way southward through that range to the level of Mesopotamia. The northern or western and shorter arm, called by the Turks Kara Su, " black water," or Frat Su (Armenian, Ephrat or Y ephrat; Arab. Nahr el-Fur at or Frdt), well known to occidentalists as the Euphrates, from its having been the boundary of the Roman empire, is regarded also by Orientals as the main stream. It rises in the Dumlu Dagh, N.N.W. of Erzerum, in a large circular pool (altitude, 8625 ft.), which is venerated by Armenians and Moslems, and flows south-east to the plain of Erzerum (5750 ft.). Thence it continues through a narrow valley W.S.W. to Erzingan (3900 ft.), receiving on its way the Ovajik Su (right), the Tuzla Su (left), and the Merjan and Chanduklu (right). Below Erzingan the Frat flows south-west through a rocky gorge to Kemakh (Kamacha; Armenian, Gamukh) , where it is crossed by a bridge and receives the Kumur Su (right). At Avshin it enters a canon, with walls over 1000 ft. high, which extends to the bridge at Pingan, and lower down it is joined from the west by the Chalta Irmak (Lycus; Arab. Lilkiya), on which stands Divrik (Tephrike). Then, entering a deep gorge with lofty rock walls and magnificent scenery, it runs

south-east to its junction with the Murad Su. The Frat, separ- ated by the easy pass of Deve-boyun from the valley of the Araxes (Aras), marks the natural line of communication between northern Persia and the West — a route followed by the nomad Turks, Mongols and Tatars on their way to the rich lands of Asia Minor. It is a rapid river of considerable volume, and below Erzingan is navigable, down stream, for rafts. The southern or eastern and longer arm, called by the Turks Murad Su (Ar- sanias Fl.; Armenian, Aradzani; Arab. Nahr Arsanas), rises south-west of Diadin, in the northern flank of the Ala Dagh (11,500 ft.), and flows west to the Alashgerd plain. Here it is joined by the Sharian Su from the west, and the two valleys form a great trough through which the caravan road from Erzerum to Persia runs. The united stream breaks through the mountains to the south, and, receiving on its way the Patnotz Su (left) and the Khinis Su (right), flows south-west, west and south, through the rich plain of Bulanik to the plain of Mush. Here it is joined by the Kara Su (Teleboas), which, rising near Lake Van, runs past Mush and waters the plain. The river now runs W.S.W. through a deep rocky gorge, in

which it receives the Gunig Su (right), to Palu (where there are cuneiform inscrip- tions) ; and continues through more open country to its junction with the Frat Su. About 10 m. E.N.E. of Kharput the Murad is joined by its principal tributary, the Peri Su, which drains the wild mountain district, Dersim, that lies in the loop between the two arms. The Murad Su is of greater volume than the Frat, but its valley below Mush is contracted and followed by no great road. Below the junction of the two arms the Euphrates flows south-west past the lead mines of Keban Maden, where it is 1 20 yds. wide, and is crossed by a ferry (altitude, 2425 ft.), on the Sivas-Kharput road. It then runs west, south and east round the rock-mass of Musher Dagh, and receives (right) the Kuru Chai, down which the Sivas-Malatia road runs, and the Tokhma Su, from Gorun (Gauraina) and Darende. At the ferry on the Malatia-Kharput road (cuneiform inscription) it flows eastwards in a valley about a quarter of a mile wide, but soon afterwards enters a remarkable gorge, and forces its way through Mount Taurus in a succession of rapids and cataracts. After running south-east through the grandest scenery, and closely approaching the source of the western Tigris, it turns south-west and leaves the mountains a few miles above Samsat (Samosata; altitude, 1500 ft.). The general direction of the great gorges of the Euphrates, Pyramus (Jihun) and Sarus (Sihun) seems to indicate that their formation was primarily due to the same terrestrial movements that produced the Jordan-' Araba depression to the south. The length of the Frat is about 275 m.; of the Murad, 415 m.; and of the Euphrates from the junction to Samsat, iiS m.

Middle Division. — The middle division, which extends from Samsat to Hit, is about 720 m. long. In this part of its course the Euphrates runs through an open, treeless and sparsely peopled country, in a valley a few miles wide, which it has eroded in the rocky surface. The valley bed is more or less covered with alluvial soil, and cultivated in places by artificial irrigation. The method of this irrigation is peculiar. Three or four piers or sometimes bridges of masonry are run out into the bed of the river, frequently from both sides at once, raising the level of the stream and thus giving a water power sufficient to turn the gigantic wheel or wheels, sometimes almost 40 ft. in diameter, which lift the water to a trough at the top of the dam, whence it is distributed among the gardens and melon patches, rice, cotton, tobacco, liquorice and durra fields, between the immediate bed of the river and the rocky banks which shut it out from the desert. The wheels, called naoura, are of the most primitive construction, made of rough branches of trees, with palm leaf paddles, rude clay vessels being slung on the outer edge to catch the

water, of which they raise a prodigious amount, only a comparatively small part of which, however, is poured into the aqueducts on top of the dams. These latter are exceedingly picturesque, often consisting of a series of well-built Gothic arches, and give a peculiar char- acter to the scenery; but they are also great impediments to navigation. In some parts of the river 300 naouras have been

counted within a space of 130 m., but of late years many have fallen into decay. By far the larger part of the valley is quite uncultivated, and much of it is occupied by tamarisk jungles, the home of countless wild pigs. Where the valley is still cultivated, the jerd, a skin raised by oxen, is gradually being substituted for the naoura, no more of the latter being con- structed to take the place of those which fall into decay.

In this part of its course the rocky sides of the valley, which sometimes closely approach the river, are composed of marls and gypsum, with occasional selenite, overlaid with sandstone, with a topping of breccia or conglomerate, and rise at places to a height of 200 ft. or more. At one point, however, 26 m. above Deir, where lie the ruins of Halebiya, the river breaks through a basaltic dike, el-Hamme, some 300 to 500 ft. high. On either side of the river valley a steppe-like desert, covered in the spring with verdure, the rest of the year barren and brown, stretches away as far as the eye can see. Anciently the country on both sides of the Euphrates was habitable as far as the river Khabur; at the present time it is all desert from Birejik down- ward, the camping ground of Bedouin Arabs, the great tribe of Anazeh occupying esh-Sham, the right bank, and the Shammar the left bank, Mesopotamia of the Romans, now called el-Jezlreh or the island. To these the semi-sedentary Arabs who sparsely cultivate the river valley, dwelling sometimes in huts; sometimes in caves, pay a tribute, called kubbe, or brotherhood, as do also the riverain towns and villages, except perhaps the very largest. The Turkish government also levies taxes on the inhabitants of the river valley, and for this purpose, and to maintain a caravan route from the Mediterranean coast to Bagdad, maintains stations of a few zaptiehs or gens d'armes, at intervals of about 8 hours (caravan time), occupying in general the stations of the old Persian post road. The only riverain towns of any importance on this stretch of the river to-day are Samsat, Birejik, Deir, 'Ana and Hit. ;

In early times the Euphrates was important as a boundary. It was the theoretical eastern limit of the Jewish kingdom; for a long time it separated Assyria from the Khita or Hittites; it divided the eastern

from the western satrapies of Persia (Ezra iv. 17; Neh. ii. 7); and it was at several periods the boundary of the Roman empire. Until the advent of the nomads from central Asia, and the devastation of Mesopotamia and the opposite Syrian shore of the river, there were many flourishing cities along its course, the ruins of which, representing all periods, still dot its banks. Samsat itself represents the ancient Samosata, the capital of the Seleucid kings of Commagene (Kumukh of the Assyrian inscriptions), and here the Persian Royal Road from Sardis to Susa is supposed to have crossed the river. Below Samsat the river runs S.W. to Rum-Kaleh, or " castle of the Romans" (Armenian, Hrhomgla). At this point was another passage of the river, defended by the castle which gives its name to the spot, and which stands on a high hill overhanging the right bank, its base washed by an abundant stream, the Sanjeh (Gr. ULyyas), which enters the Euphrates on the west. From this point the river runs rather east of south for about 25 m. past Khalfat (ferry) to Birejik or Bir, the ancient Birtha, where it is only no m. from the Mediterranean, the bed of the river being 6285 ft. above that sea. This was the Apamea-Zeugma, where the high road from east to west crossed the river, and it is still one of the most frequented of all the passages into Meso- potamia, being the regular caravan route from Iskanderun and Aleppo to Urfa, Diarbekr and Mosul. From Birejik the river runs sluggishly, first a little to the east, then a little to the west of south, over a sandy or pebbly bed, past Jerablus (? Europus, Carchemish, the ancient Hittite capital), near which the Sajur (Sagura; Sangar of the Assyrian inscriptions) enters from the west, to Meskene, 2 m. southward of which are the ruins of Barbalissus (Arab. Balis), the former port of Aleppo, now, owing to changes in the bed, some distance from the water. Six miles below this the ruins of Kal'at Dibse mark the site of the ancient Thapsacus (Tiphsah of 1 Kings iv. 24), the most important passage of the middle Euphrates, where both Cyrus, on his expedition against his brother, and Alexander the Great crossed

that river, and the ancient port of Syria. Here the river turns quite sharply eastward* : A day's journey/ beyond Meskene are fhe remains of Siffin (Roman Sephe), where Moawiya defeated the caliph Ali in 657 (see Caliphate), and opposite this, on the west bank, a picturesque ruin called Kal'at Ja'ber (Dausara).- A day's journey beyond this, on the Syrian side, stand the remains of ancient Sura* a frontier fortress of the Romans against the Parthians; 20 m.*

S. of which, inland, lie the well-preserved ruins of Reseph (Assyrian, Resafa or Rosafa). Half a day's journey beyond Sura, on the Mesopotamian side of the river, are the extensive ruins of Haragla (Heraclea) and Rakka, once the capital of Harun alrRashid {Nicephorium of Alexander; Callinicus of the Seleucids and Romans). Here the Belikh (Bilechas) joins the Euphrates, flowing southward through the biblical Aram Naharaim from Urfa {Edessa>) and Harran (Carrkae); and from this point to el-Kaim four days' below Deir, the course of the river is south-easterly. Two days' journey beyond Rakka, where the Euphrates breaks through the basalt dike of el-Hamme, are two admirably preserved ruins, built of gypsum and basalt, that on the Mesopotamian side called Zelebiya (Chanuga), and that on the Syrian, much the finerof the two, Halebiya.or Zenobiya, the ancient Zenobia. Twenty- six miles farther down lies the town of Deir (q.v.), where the river divides into two channels and the river valley opens out in tp quite extensive plains. Here the roads from Damascus, by way of Palmyra, and from Mosul, by way of the Khaibur, reach the Euphrates, and here there must always have been a town, of considerable commercial and strategic importance; < The region is to-day covered with' ruins and ruin mounds. A little below Deir the river is joined by the Khabur (Khaboras, Biblical Khabor), the frontier of the Roman empire from Diocletian's time, which rises in the Karaja Dagh/ arid, with its tributary, the Jaghijagh (Mygdonius; Arab. Hirmas) flows south through the land of Gozan in which Sargon settled the deported Israelites in 721 B.C. At the mouth of the Khabur stood the Roman frontier fortress of Circesium (Assyrian, Sirki; Arab. Kirkessie) now el-Buseira. The corresponding border town on the Syrian side is represented by the picturesque and finely preserved ruins called Salahiya, the Ad-dalie or Dalie (Adalia) of Arabic times, two days below Deir, whose more ancient name is as yet un- known. Between Salahiya and Deir, on an old canal, known in Arabic times as Said, leaving the Euphrates a little below Deir and rejoining it above Salahiya, stand the almostmore picturesque ruins of the once important Arabic fortress of Rahba.*

As far as the Khabur Mesopotamia seems to have been a well-inhabited country from at least the 15th century B.C., when^it constituted the Hittite kingdom of Mitanni, down to about the 12th century a.d., and the same is true of the country on the Syrian side of the Euphrates as far as the eastern limit of the Palmyrene. Below this point the back country on the Syrian side has always been a complete desert. On the Mesopotamian side there would seem, from the accounts of Xenophon and Ptolemy, to have been an affluent

which joined the Euphrates between Deir and 'Ana, called Araxes by the former, Saocoras by the latter; but no trace of such a stream has been found by modern explorers and the country in general has always been uninhabited. Below Salahiya the river-bed narrows and becomes more rocky. A day's journey beyond Salahiya, on a bluff on the Mesopotamian side of the river, are the conspicuous ruins Of el-'Irsi (Corsote?). Half a day's journey beyond, at a point where two great wadis enter the Euphrates, on the Syrian side, stands Jabriya, an unidentified ruined town of Babylonian type ; with walls of unbaked brick, instead of the stone heretofore encountered. At this point the river turns sharply a little north of east, continuing on that course somewhat over 40 m. to "Ana, where it bends again to the south-east. Just above 'Ana are rapids, and from this point to Hit the river is full of islandsˆ while the bed is for the most part narrow, leaving little cultivable land between it and the bluffs. 'Ana itself, a very ancient town, of Babylonian origin, once sacred probably to the goddess of the same name, lay originally on several islands in the stream, where ruins, principally of the Arabic and late Persian period, are

visible. Hererjalm trees, which had, begun to appear singly at Deir, grow in large groves, the olive disappears entirely, and we have definitely passed over from the Syrian to the Babylonian flora and climate. Between 'Ana and' Hit there were anciently at least four island cities or fortresses, and at the present time three such towns, insignificant relics of former greatness, Haditha, Alus or el-'Uzz and Jibba still occupy the old sites. Of these Alus is evidently the ancient Auzara or Uzzanesopolis, the city of the old- Arabic goddess 'Uzza; Haditha, an important town under the Abbasids, was earlier known as Baia Malcha; while Jibba has not been identified. The fourth city, Thilutha or Olabus, once occupied the present deserted island of Telbeis, half a day's journey below 'Ana. About half-way between 'Ana and Hit, in the neighbourhood of Haditha, the river has a breadth of 300 yds., with a depth of iS ft. , and a flood speed of 4 knots. At this point we begin to encounter sulphur springs and bitter streams redolent with bitumen, a formation which reaches its climax at Hit (?-.».), where a small stream (the "river of Ahava " of Ezra viii. 21) enters the Euphrates from the Syrian side, on which, about 8 m. from its mouth, stands the small town of Kubeitha.

The middle Euphrates, from Samsat to Hit, is to-day an avenue of ruins, of which only the more conspicuous or im- portant have been indicated here. It was from a remote period, antedating certainly 3000 B.C., the highway of empire and of commerce between 1 east and west, more specifically between Babylonia or Irak and Syria,

and numerous empires, peoples and civilizations have left their records on its shores. Its time of greatest prosperity and importance was the period of the Abbasid caliphate; and Arabic geographers as late as a.d. 1200 mention an astonishingly large number of important cities situated on its shores or islands. The Mongol invasion, in the latter part of that century, wrought their ruin, however, and from that time to the present there has been a steady decline iii the commercial importance of the Euphrates route, and consequently also of the towns along its course, until at the present time it is only an avenue of ruins.

Lower Division. — Hit stands almost at the head of the alluvial deposit, about 550 m. from the Persian. Gulf, separated from it by a couple of small spurs of the Syrian plateau, and may be said to mark the beginning of the lower Euphrates. Thence the river flows S.E. and:S;S.E. to its junction with the Tigris below Korna; through an unbrbken plain, with no natural hills, except a few sand (or sandstone ?) hills in the neighbourhood of Warka, and no trace of rock, except at el-Haswa, above Hillah. At Hit the river is from 30 to 35 ft. in depth, with a breadth of 250 yds., and a current of 4 rn. an hour,but from this point it diminishes ‘ in volume, receiving no new affluents but dissipating itself in canals and lagoons. At Feluja, in the latitude of Bagdad, the Euphrates and Tigris closely approach each other, and then, widening out, enclose the plain of Babylonia (Arab. Sawdd). Through this part of its course the current of the river, except where restricted by floating bridges — at Feluja, Mussa’ib, Hillah, Diwanieh and Samawaˆ-does not normally exceed a mild an hour, and both on the main stream and on its canals the jerd or ox- bucket takes the place of the naoura or water-wheel for purposes of’ irrigation.

In early times irrigating canals distributed the waters over the plain, and made it one of the richest countries of the East, so that historians report three crops of wheat to have been raised in B abylonia annually. As main arteries for this circulation of water through its system great canals, constituting in reality so many branches of the river, connected all parts of Babylonia, and formed a natural means both of defence and also of trans- portation from one part of the country to another. The first of these canals, taken off on the right bank of the. river a little below Hit, followed the extreme skirt of the alluvium the whole way to the Persian Gulf near Basra, and thus formed an outer barrier, strengthened at intervals with watch-towers and fortified posts, to protect the cultivated land of the Sawad against the incursions of the desert Arabs. This gigantic work, the line of which may still-be traced throughout its course, was

called the Khandak Sabiir or " Sapor's trench," being ascribed to the Sassanian king, Shapur I. Dholahtaf, but is now known as the Cherra-Saadeh, and is in the popular tradition said to have been excavated by a man from Basra at the behest of a woman of Hit whom he desired to make his wife. How early this work was begun is not clear, but it would appear to have been at least largely reconstructed in the time of the great Nebuchadrezzar. The next important canal, the Dujayl (Dojail) , left the Euphrates on the left, about a league above Ramadiya (Ar-Mabb),. and flowed into the Tigris between Ukbara and Bagdad. The Tsa, which is largely identical with the modern Sakhlawiya; left the Euphrates a little below Anbar (Perisabora) and joined the Tigrii at Bagdad. This canal still carries water and was navigable for steamboats until about 1875. Sarsar, the modern Abu-Ghurayb; leaves the Euphrates three leagues lower down and enters the Tigris between Bagdad and Ctesiphon. The Nahr Malk or royal river, modern Radhwaniya, leaves the Euphrates five leagues below this and joins the Tigris three leagues below Ctesiphon; while the Kutha, modern Habl-Ibrahim, leaving the Euphrates three leagues below the Malk joins the Tigris ten leagues below Ctesiphon. In the time of the Arabs these were the chief canals, and the cuts from the main channels of the Nahr Isa, Nahr Sarsar, Nahr Malk (or Nahr Malcha),, and:Nahr Kutha, reticulating the entire country between the rivers, con verted it into a continuous and luxuriant garden.

Just below Mussaib there has been for all ages a great bifurca- tion of the river. The right arm was the original bed, and the left arm, on which Babylon was built, the artificial deviation, as is clear from the cuneiform inscriptions. In the time of Alexander the nomenclature was reversed, the right arm being known as Pallacopas. Under the Arabs the old designation again prevailed and the Euphrates is always described by the Arabian geographers as the river which flows direct to Kufa, while the present stream, passing along the ruins of Babylon to Hillah and Diwanieh, has been universally known as the Nahr Sura. Occidental geographers, however, have followed the Greek use, and so to-day we call the river of Babylon or Nahr Sura the Euphrates and the older westerly channel the Hindieh canal. At the present time the preservation of the embankments about the point of bifurcation demands the constant care of the

Bagdad government. The object is to allow sufficient water to drain off to the westward for the due irrigation of the land, while the Hillah bed still retains the main volume of the stream, and is navigable to the sea. But it frequently happens that the dam at the head of the Hindieh is carried away, and, a free channel being thus opened for the waters of the river to the westward, the Hillah bed shoals to 2 or 3 ft., or even dries up alto- gether, while the country to the west of the river is turned into lakes and swamps. Below the bifurcation the river of Babylon was again divided into several streams, and indeed the most famous of all the ancient canals was the Arakhat (Archous of the Greeks and Serrdt and Nil of the Arabs), which left that river just above Babylon and ran due east to the Tigris, irrigating all the central part of the Jezireh, and sending down a branch through Nippur and Erech to rejoin the Euphrates a little above the modern Nasrieh. The Narss, also, the modern Daghara, which is still navigable to Nippur and beyond, left the Sura a little below Hillah; and at the present day another large. Canal, the Kehr, branches off near Diwanieh. It is easy to distinguish the great primitive watercourses from the lateral ducts which they fed, the latter being almost without banks and merely traceable by the winding curves of the layers of alluvium in the bed, while the former are hedged in by high banks of mud, heaped up during centuries of dredging.

Not a hundredth part of the old irrigation system is now in working order. A few of the mouths of the smaller canals are kept open so as to receive a limited supply of water at the rise of the river in May, which then distributes itself over the lower lying lands in the interior, almost without labour on the part of the cultivators, giving birth in such localities to the most abundant crops, but by far the larger portion of the region between the rivers is at present an arid howling wilderness

dotted with Ids or ruin-heaps, strewn in the most part with broken pottery, the evidence of former habitation, and bearing nothing but the camel-thorn, the wild caper, the colocynth-apple, wormwood and other weeds of the desert. The swamps are full of huge reeds, bordered with tamarisk jungles, and in its lower reaches, where the water stretches out into great marshes, the river is clogged with a growth of agrostis. To obtain a correct idea of this region it must be borne in mind also that the course of the. river and the features of the country on both banks are subject to constant fluctuation. The Hindieh canal and the main stream, the ancient Sura, rejoin one another at Samawa. Down to this point, the bed of the Euphrates being higher than that of the Tigris, the canals run from the former

to the latter, but below this the situation is reversed. At Nasrieh the Shatt- el-Ha'i, at one time the bed of the Tigris, and still navigable during the greater part of the year, joins the Euphrates. From this point downward, and to some extent above this as far as Samawa, the river forms a succession of reedy lagoons of the most hopeless character, the Paludes Chaldaici of antiquity, el Batihat of the Arabs. Along this part of its course the river is apt to be choked with reeds and, except where bordered by lines of palm trees, the channel loses itself in lakes and swamps. The inhabitants of this region are wild and inhospitable and utterly beyond the control of the Turkish authorities, and navigation of the river between Korna and Suk-esh-Sheiukh is unsafe owing to the attacks of armed pirates. From Garmat Ali, where the Tigris and Euphrates at present unite, 1 under the title of Shattˆ el-Arab, the river sweeps on to Basra, 1000 yds. in width and from 3 to ,5 fathoms deep, navigable for steamers of good sizei From Korna to Basra the banks of the river are well cultivated and the date groves almost continuous; indeed this is the greatest dateˆproducing region of the world. Twenty-five miles below Basra the river Karun from Shushter and Dizful throws off an arm, which seems to be artificial, into the Euphrates. This, arm is named the Haffar, and at the confluence is situated the Persian town of Muhamrah, a place most conveniently located for. trade. In this vicinity was situated, at the time of the Christian era, the Parthian city of Spasini-Charax, which was succeeded by Bahman Ardashir (Bamishir) under the Sassanians, and by Moharzi under the Arabs. The left bank of the river from this point belongs to Persia. It consists of an island named Abbadan, about 45 m. long, formed by alluvial deposits during the last fifteen centuries. (For the character of this alluvium and its rate of deposit see Irak.)

Even more than the upper and middle Euphrates the lower Euphrates, from Hit downward, abounds in ruins of ancient towns and cities, from the earliest prehistoric period onward to the close of the Caliphate (see Irak). The fact also that many of the most ancient of these ruins, like Ur, Lagash (Sirpurla), Larsa, Erech, Nippur, Sippara and Babylon, were situated on the banks of the great canals would indicate that the control of the waters of the rivets by a system of canalization and irrigation was orte of the first achievements of civilization. This ancient ■, system of canalization was inherited from the Persians (who, in turn, inherited it from their predecessors), by the Arabs, who long maintained it in working order, and the astonishing fertility and consequent prosperity of the country watered by the Euphrates, its tributaries and its canals, is noticed by all ancient writers. The land itself, an alluvial deposit, is very

fruitful. Wh«at and the date palm seem to have been indigenous, and the latter is still one of the chief poductions of the country, but in later years rice has taken the place of wheat as the staff of life. The decline of the country dates from the appearance of Turkish nomads in the nth century; its ruin was completed by the Shammar Arabs in the 17th century; but, if the ancient system of irrigation were restored, sufficient grain could be grown to alter the conditions of the wheat supply of the world. At the present time, instead of the innumerable

1 The confluence for about 500 years was at Korna, over 30 m. higher up. Sir W. -Willcocks discovered (1909) that from Suk-esh-Sheiukh the Euphrates had formed a new channel through the marshes. (See Ccog. Journal, Jan. 1910).

cities of former days, there is a succession of small towns along the course of the river — Ramadiya, Feluja, Mussaib, Hillah, Diwanieh, Samawa, el-Khudr (an ancient daphne or sacred grove, 31 n' 58″ N., 76 6′ 9″ E., the only one anywhere which preserves to this day its ancient charter of the inviolability of all life within its precincts), Nasrieh and Suk-esh-Sheiukh — by means of which the Turkish government controls the river and levies taxes on a small part of the adjacent territory. At such settlements the river is lined with gardens and plantations of palms. The greater part of the region, however, even along the river shores, is inhabited only by roaming Bedouin or half- savage Ma'dan Arabs (see Irak).

Navigation. — The length of the Euphrates from its source at Diadin to the sea is about 1800 m., and its fall during the last 1200 m. about 10 ins. per mile. The river begins to rise in the end of March and attains its greatest height between the 21st and the 28th of May. It is lowest in November, and rocks, shallows, and the remains of old dams then render it almost unnavigable. In antiquity, however, it was evidently in use for the transportation of merchandise and even of armies. Boats built in Syrian ports were placed on the Euphrates by Sennacherib and Alexander, and Herodotus states (i. 185) that in his day the river was a frequented route followed by merchants on their way from the Mediterranean to Babylon. As the most direct line of transit between the Mediterranean and the Persian Gulf, offering an alternative means of communication with India not greatly inferior to the Egyptian route, the Euphrates route early attracted the

attention of the British government. During the Napoleonic wars, indeed, and up to the time when the intro- duction of steam navigation rendered the Red Sea accessible at all seasons of the year, the political correspondence of the home and Indian governments usually passed by the Euphrates route. Various plans were suggested for the development of this route as a means of goods as well as postal conveyance, and in 1835 Colonel F. R. Chesney was sent out at the head of an expedition with instructions to transport two steamers from the Mediterranean to the Euphrates, and, after putting them together at Birejik, to attempt the descent of the river to the sea. One of these steamers was lost in a squall during the passage down the river near el-Trsi, but the other performed the voyage in safety and thus demonstrated the practicability of the downward navigation. Following on this first experiment, the East India Company, in 1841, proposed to maintain a permanent flotilla on the Tigris and Euphrates, and set two vessels, the " Nitocris " and the " Nimrod," under the command of Captain Campbell of the Indian navy, to attempt the ascent of the latter river. The experiment was so far successful that, with incredible difficulty, the two vessels did actually reach Meskene, but the result of the expedition was to show that practically the river could not be used as a high-road of commerce, the continuous rapids and falls during the low season, caused mainly by the artificial obstructions of the irrigating dams, being insurmount- able by ordinary steam power, and the aid of hundreds of hands being thus required to drag the vessels up the stream at those points by main force. Under Midhat Pasha, governor-general of Bagdad from 1866 to 1871, an attempt was made by the Turkish authorities to establish regular steam navigation on the Euphrates. Midhat caused many of the dams to be destroyed and for some years occasional steamers were run between Meskene and Hillah in flood time, from April to August. But with the transfer of Midhat this feeble attempt at navigation was aban- doned. At the present time the river is navigated by sailing craft of some size from Hit downward. Above that point there is no navigation except by the native rafts (kellek), which descend the river and are broken up on arrival at their point of destination. There is, however, little travel of this sort on the Euphrates in comparison with the amount on the Tigris.

When it became evident that, under present conditions at least, the navigation of the middle Euphrates was impracticable, attention was turned, owing to the peculiarly advantageous geographical position of its valley, to schemes for connecting the Mediterranean and Persian Gulf by railway as an alternative

means of communication with India, and various surveys were made for this purpose and various routes laid out. All these schemes, however, fell through either on the financial question, or on the unwillingness of the Turkish government to sanction any line not connected directly with Constantinople. With the acquisition of the Suez Canal, moreover, the value of this route from the British standpoint was so greatly diminished that the scheme, so far as England was concerned, was quite abandoned. (For further notice of the railway question see Bagdad.)

Bibliography.— Gen.F.K.Chesney, Euphrates Expedition (1850); W. F. Ainsworth, Researches in Assyria and Babylonia (1838), and Personal Narrative of the Euphrates Expedition (1888); A. H. Layard, Nineveh and Babylon (1853); W. K. Loftus, Chaldaea and Susiana (1857); Geo. Rawlinson, Herodotus, bk. I, essay ix. (1862); A. Blunt, Bedouin Tribes of the Euphrates (1873); Josef Cernik, Studien-Expedition (1873); H. Kiepert, Ruinenfelder Babyloniens (1883); Ed. Sachau, Reise in Syrien u. Mesopotamien (1883), and Am Euphrat u. Tigris (1900); Guy Le Strange, " Description of Mesopotamia," in Journal of the Royal Asiatic Society (1895), and Baghdad under the Abbasid Caliphate (1901); J. P. Peters, Nippur (1897); M. v. Oppenheim, Vom Miltelmeer zum Persischen Golf (1900) ; H. V. Geere, By Nile and Euphrates (1904) ; Baedeker, Palestine and Syria (1906); Murray, Handbook to Asia Minor, &c section iii. (H. C. R. ; C. W. W.; J. P. Pe.)

EUPHRONIUS, the most noted of the group of great vase- painters, who lived in Athens in the time of the Persian wars, and worked upon red-figured vases (see Greek Art and Ceramics). There is a monograph by W. Klein dealing with the artist. As all the great paintings of Greece have disappeared, we are obliged to trust to the designs on vases for our knowledge of Greek drawing and composition. Euphronius is stiff and archaic in style, but his subjects are varied, his groupings original and striking, and his mastery of the line decided. In their way, the vases which he painted will hold their own in comparison with those of any nation; for simplicity, truthfulness and charm they can scarcely be matched.

EUPHROSYNE, the name of two Byzantine empresses.

1. Euphrosyne, a daughter of Constantine VI. Although she had taken a monastic vow she became the second wife of Michael II. (q.v.), a marriage which was practically forced upon her by Michael, who was anxious to strengthen his claims to the throne by an alliance with the last representative of the Isaurian dynasty, and

secured the compliance of senate and patriarch with his desire. No issue was born of this union, and after the death of her husband and accession of her stepson Theophilus Euphrosyne again retired into a convent.

2. Euphrosyne, the wife of Alexius III. (q.v.). After securing the election of her husband to the throne by wholesale bribery she virtually took the government into her hands and restored the waning influence of the monarchy over the nobles. In spite of her talent for government she went far to hasten the empire's downfall by her unbounded extravagance, and made the dynasty unpopular by her open profligacy, which went unpunished but for one short term of banishment. She followed her husband into exile in 1203 and died seven years later in Epirus.

EUPHUISM, the peculiar mode of speaking and writing brought into fashion in England towards the end of the reign of Elizabeth by the vogue of the fashionable romance of Eupkues, published in 1 578 by John Lyly. As early as 1 570 Ascham in his Schoolmaster had said that " Euphues " (that is, a man well- endowed by nature, from the Gr. tv, 4>vrj, well, growth) is " he that is apt by goodness of wit, and appliable by readiness of will, to learning, having all other qualities of the mind and parts of the body that must another day serve learning." Lyly adopted this word as the name of the hero of his romance, and it is with him that the vogue of Euphuism began. John Lyly, " always averse to the crabbed studies of logic and philosophy, and his genie being naturally bent to the pleasant paths of poetry," devoted himself exclusively to the service of the ladies, a thing absolutely unprecedented in English literature. He addressed himself to " the gentlewomen of England," and he had the audacity, in that grave age, to say that he would rather see his books " lie shut in a lady's casket than open in a scholar's study." In order to attain this object, he set himself to create a

superfine style in writing, and to illustrate this in his com- positions. He undertook to produce a pleasurable literature for the boudoir and the bower. Lyly was twenty-six when he pub- lished in 1579 the first part of Euphues: the Anatomy of Wit: a second part, entitled Euphues and his England, appeared in 1580. His object was diametrically opposed to that of writers who had striven to instruct, reprove or edify their contempo- raries. Lyly, assuming that women only will

read his book, says: — " After dinner, you may overlook it to keep you from sleep, or if you be heavy to bring you asleep, for to work upon a full stomach is against physic, and therefore better were it to hold Euphues in your hands, though you let him fall when you be willing to wink, than to sew in a closet and prick your fingers when you begin to read."

For a comprehension of the nature of Euphuism it is necessary to remember that the object of its invention was to attract and to disarm the ladies by means of an ingenious and playful style, of high artificiality, which should give them the idea that they were being entertained by an enthusiastic adorer, not instructed by a solemn pedagogue, For fifty years the romance of Euphues retained its astonishing popularity. As late as 1 63 2 the publisher Edward Blount (i56o?i632), recalling the earliest enthusiasm of the public, wrote of John Lyly, " Oblivion shall not so trample on a son of the Muses, and such a son as they called their darling. Our nation are in his debt for a new English which he taught them. Euphues and his England began first that language. All our ladies were then his scholars, and that beauty in Court, which could not parley Euphuism, was as little regarded, as she which, now there, speaks not French." Among those who applied themselves to this " new English," one of the most ardent was Queen Elizabeth herself, who has been styled by J. R. Green " the most affected and destestable of euphuists." At the height of the popularity of this strange dialect, it was said by William Webbe, in his Discourse of English Poetry (1586), to consist in a combination of " singular eloquence and brave composition of apt words and sentences, in fit phrases, in pithy sentences, in gallant tropes, in flowing speech," while a French poet of the same age calls Lyly a " raffineur " of the English speech; another panegyrist describes him as " alter Tullius," meaning that, in inventing Euphuism, he had introduced into English the refine ments of a Ciceronian style.

When we put aside these excessive compliments, and no less the attacks from which the style suffered as soon as it began to go out of fashion, we are able to observe merits as well as faults in this very curious experiment. Euphuism did not attempt to render the simplicity of nature. On the contrary, in order to secure refinement, it sought to be as affected, as artificial, as high-pitched as possible. Its most prominent feature was an incessant balancing of phrases in chains of antitheses, thus: — " Though the tears of the hart be salt, yet the tears of the boar be sweet, and though the tears of some women be counterfeit to deceive, yet the tears of many be current to try their love "; or this: — " Reject it not because it proceedeth from

one which hath been lewd, no more than ye would neglect the gold because it lieth in the dirty earth, or the pure wine for that it cometh out of a homely presse, or the precious stone aetites which is found in the filthy nests of the eagle, or the precious gem dracon- ites, that is ever taken out of the poisoned dragon." This second excerpt, moreover, suggests another of the main characteristics of Euphuism, the incessant use, for purposes of ornament, of similes taken from fabulous records of zoology, or relating to mythical birds, fishes or minerals. This was a feature of the " new English " which was excessively admired, and copied with a senseless extravagance. Instances of it are found on every page of Lyly's books, thus:—" Although the worm entereth almost into every wood, yet he eateth not the cedar- tree; though the stone cylindrus at every thunder-clap roll from the hill, yet the pure sleek stone mounteth at the noise; though the rust fret the hardest steel, yet doth it not eat into the emerald; though polypus change his hue, yet the salamander keepeth his colour "; and so on, ad infinitum. That lady was considered most proficient in euphuism who could keep up

longest these chains of similes taken out of fabulous natural history. Alliteration was also a particular ornament of the euphuistic style, as : " The bavin, though it burn bright, is but a blaze," but the use of this artifice by Lyly himself was rarely exaggerated; for instances of its excess we have rather to turn to his imitators. In the following passage the typical forms of Euphuism, in its pure and original conditions, are so combined and illustrated as to require no further commentary: " Do we not commonly see that in painted pots is hidden the deadliest poison ? that in the greenest grass is the greatest serpent ? in the clearest water the ugliest toad ? Doth not experience teach us that in the most curious sepulchre are enclosed rotten bones? that the cypress tree beareth a fair leaf, but no fruit? that the ostrich carrieth fair feathers, but rank flesh?" — and so forth. It will be noticed that these characteristics differ in many respects from the specimens of euphuism which are most familiar to a modern reader, namely the extravagant speech placed in the mouth of Sir Piercie Shafton in Sir Walter Scott's romance of The Monastery. Scott modelled this character on what he called that " forgotten and obsolete model of folly, once fashionable," Lyly's novel of Euphues, but he had not studied the original to sufficient purpose, and the bombastic ravings of Sir Piercie, who simply talks like a lunatic, have deceived many readers as to the real characteristics of Euphuism. Scott betrays his own error when he says that " the extravagance of Euphuism . . . predominates in the romances of Calprenede and Scuderi," in which it is true that a tone of

preposterous gallantry finds a language of its own, but that is not the language of Euphues. What Sir Piercie Shafton talks is a mixture of the style of these French romances, with the ostentation of Sir Fopling Flutter and the extravagances of the Scotch translator of Rabelais. But these various sorts of pretentious eloquence have little or nothing in common with the balanced and conceited style of Euphues.

We find that the genuine sort of this kind of superfine conver- sation was originally called " Euphues," simply, as Overbury speaks of a man " who speaks Euphues, not so gracefully as heartily." The earliest instance of the word " Euphuism " which has been traced occurs in a letter, written by Gabriel Harvey in 1592, when he speaks of a man, who would be smart, as talking " a little Euphuism." Dekker, in the Gull's Hornbook of 1609, uses the word as an adjective, and denounces " Euphuised gentlewomen." When the practice was going out of fashion we find it thus severely stigmatized by Michael Drayton, a poet who had little sympathy with the artificial refinement of Lyly. In an elegy, printed in 1627, Drayton refers to the merit of Sir Philip Sidney, who recalled English prose to sanity, and

" did first reduce Our tongue from Lyly's writings then in use, Talking of stones, stars, plants, of fishes, flies, Playing with words and idle similes, As th' English apes and very zanies be Of everything that they do hear and see, So imitating nis ridiculous tricks They spake and writ, all like mere lunatics."

This severe censure of Euphuism may serve to remind us that hasty critics have committed an error in supposing the Arcadia of Sidney to be composed in the fashionable jargon. That was certainly not the intention of the author, and in fact the publica- tion of the Arcadia, eleven years after that of Euphues, marks the beginning of the downfall of the popularity of the latter. Sidney's prose, it is true, was extremely ornamented, but it was instinct with romantic fancy, and it affected a chivalrous and florid fulness which was artificial enough, but wholly distinct from the more homely elegance of Euphuism as we have defined it. The publication of the Arcadia was a severe blow to the Euphuists. Immediately the ladies began to desert their former favourite, and the object at court became, as Ben Jonson noted, to " observe as pure a phrase and use as choice figures in ordinary conference as any be in the Arcadia." But, in the meantime, Lyly had found in Greene, Lodge, Dickenson, Nicholas Breton and others enthusiastic disciples who had learned all the formulas of Euphuism, and could bring them forth as

iuently and elegantly as he could himself. Nevertheless the trick wore but, with the taste that it had created, and by the close of the reign of James I. Euphuism had become a dead language.

Critics have not failed to insist, on the other hand, that a species of Euphuism existed before Euphues was thought of. It has been supposed that a translation of the familiar epistles, or, as they were called, the "Golden Letters," of a Spanish monk, Antonio de Guevara, led Lyly to conceive the extraordinary style which bears the name of his hero. Between is 74 and 1578 Edward Hellowes (fl. 1550-1600) translated into a very extrava- gant English prose three of the works of Guevara. Earlier than this, in 1557, Sir Thomas North hadpublished a version of the same Spanish writer's Rtloj de Principes (The Dial of Princes) , a moral and philosophical romance which is not without a certain likeness in plan and language to Euphues. It is extremely difficult to know to what extent these translations, which were not strikingly' unlike many other specimens of the ornamented English prose of their period, can be said to be responsible for the production of Euphuism. At all events no one can doubt that it was Lyly who concentrated the peculiarities of mannerism, and who gave to it the stamp of his own remarkable talent.

See Landmann, Der Euphuismus (1881); Arber's edition of Euphues (1869); R. W. Bond's Complete Works of Lyly (1902); Hallam, Jusserand, S. Lee, passim. (E. G.)

EUPION (Gr. tv, well, iriuv, fat) , a hydrocarbon of the paraffin series, probably a pentane, C5H12, discovered by.K. Reichenbach in wOod-tar. It is also formed in the destructive distillation of many substances, as wood, coal, caoutchouc, bones, resin and the fixed oils. It is a colourless highly volatile and inflammable liquid, having at 20° C. a specific gravity of 0-65.

EUPOLIS (c. 446-411 B.C.), Athenian poet of the Old Comedy, flourished in the time of the Peloponnesian War. Nothing whatever is known of his personal history. With regard to his death, he is said to have been thrown into the sea by Alcibiades, whom he had attacked in one of his plays, but it is more likely that he died fighting for his country. He is ranked by Horace (Sat. i. ,4, 1), along with Cratinus and Aristophanes, as the greatest writer of his school. With a lively

and fertile fancy Eupolis combined a sound practical judgment; he was reputed to equal Aristophanes in the elegance and purity of his diction, and Cratinus in his command of irony and sarcasm. Although he was at first on good terms with Aristophanes, their relations subsequently became strained, and they accused each other, in most virulent terms, of imitation and plagiarism. Of the 17 plays attributed to Eupolis, with which he obtained the first prize seven times, only fragments remain. Of these the best known were: the Kolakes, in which he pilloried the spendthrift Callias, who wasted his substance on sophists and parasites; Maricas, an attack on Hyperbolus, the successor of Cleon, under a fictitious name; the Baplae, against Alcibiades and his clubs, at which profligate foreign rites were practised. Other objects of his attack were Socrates and Cimon. The Demoi and Poleis were political, dealing with the desperate condition of the state and with the allied (or tributary) cities.

Fragments in T. Kock, Comicorum Atiicorum fragmenta, i. (1880).

EUPOMPUS, the founder of the great school of painting which flourished in the 4th century at Sicyon in Greece. He was eclipsed by his successors, and is chiefly remembered for the advice which he is said to have given to Lysippus to follow nature rather than any master.

EURASIAN, a term originally confined to India, where for upwards of half a century it was used to denote children born of Hindu mothers and European (especially Portuguese)fathers. Following the geographical employment of the word Eurasia to describe the whole of the great land mass which is divided into the continents of Europe and Asia, Eurasian has come to be descriptive of any half-castes born of parents representing the races of the two continents. It has further an ethnological sense, A. H. Keane (Ethnology, 1896) proposing to find in the Eurasian Steppe the true home of the primitive Aryan groups.

Joseph Deniker (Anthropology, 1900) makes a Eurasian group to include such peoples (Ugrians, Turko-Tatars, &c.) as'are represented in both continents. Giuseppe Sergi, in his Medi- terranean Race (London, 1901), uses Eurasiatic to denote that variety of man which " brought with it into Europe (from Asia in the later Neolithic period) fiexional languages of Aryan or Indo-European type."

EURE,- a department of north-western France, formed in 1790 from a portion of the old province of Normandy, together with the

countship of Evreux and part of Perche. Pop. (1906) 330,140. Area, 2330 sq. m. It is bounded N. by the department of Seine Inferieure, W. by Calvados, S.W. by Orne, S. by Eure-et Loir, and E. by Seine-et-Oise and Oise. The territory of Eure, which nowhere exceeds 800 ft. in altitude, is broken up by its rivers into well- wooded plateaus with a general inclination from south to north. Forests cover about one-fifth of the department. The Seine flows from S.E. to N.W. through the E. of the department, and after touching the frontier at two or three points' forms near its mouth part of the northern boundary. All the rivers of the department flow into the Seine, — on the right bank the' Andelle and the Epte, and on the left the Eure with its tributaries the Avre and the Iton, and the Risle with its tributary the Charentonne. The Eure, from which the depart- ment takes its name, rises in Orne, and flowing through Eure-et- Loir, falls into the Seine above Pont de l'Arche, after a course of 44 m. in the department. • The Risle likewise rises in Orne, and flows generally northward to its mouth in the estuary of the Seine. The climate is mild, but moist and variable. The soil is for the most part clayey, resting on a bed of chalk, and is, in general, fertile and well tilled. The chief cereal cultivated is wheat; oats, colza, flax and beetroot are also grown. There is a wide extent of pasturage, on which are reared a considerable number of cattle and sheep, and especially those horses of pure Norman breed for Which the department has long been celeˆ-brated. Fruit is very abundant, especially apples and pears, from which much cider and perry are made. The mineral products of Eute include freestone, marl, lime and brick-clay. The chief industries are the spinning ; of cotton and wool, and the weaving, dyeing and printing of fabrics of different kinds. Brewˆ ing, flour-milling, distilling, turnery, cotton-bleaching, cider- making, metal-founding, tanning, and the manufacture of glass, paper, iron ware, hails, pins, wind-instruments, bricks and sugar are also carried on. Coal and raw materials for its industries are the chief imports of Eure; its exports include cattle, poultry, eggs, butter, grain and manufactured goods. The department is served chiefly by the Western railway; the Seine, Eure and Risle provide 87 m. of navigable waterway. Eure is divided into the following arrondissements (containing 36 cantons, 700 communes) : — Evreux, Louviers, Les Andelys, Bernay, and Pont- Audemer. Its capital is Evreux, which is the seat of a bishopric of the ecclesiastical province of Rouen. The department belongs to the III. Army Corps and to the academie (educational division) of Caen. Its court of appeal is at Rouen.

Evreux, Les Andelys, Bernay, Louviers, Pont-Audemerˆ Verneuil, Vernon and Gisors are the principal towns of the depart- ment. At

Gaillon there are remains of a celebrated chateau of the archbishops of Rouen (see Louviers). Pont de l'Arche has a fine Gothic church, with stained-glass windows of the 16th and 17th centuries; the church of Tillieres-sur-Arvre is a graceful specimen of the Renaissance style. The churches of Conches (15th or 16th century) and of Rugles (13th, 15th and 16th centuries), and the chateau of Beaumesnil (16th century) are also of architectural interest.

EURE-ET-LOIR, an inland department of north-western France, formed in 1796 of portions of Orl6anais and Normandy. Pop. (1906) 273,823. Area, 2293 sq. m. It is bounded N. by the, department of Eure, W. 'by Orne and Sarthe, S. by Loir-et-Cher, S.E. by Loiret, and E. by Seine-et-Oise. The Perche in the south- west and the Thimerais in the north-west are districts of hills and valleys, woods, lakes and streams. The region of the east and south is a level and uniform expanse, consisting for the most part of the riverless but fertile plain of Beauce, sometimes called

the " granary of France." The northern part of Eure-et-Loir is watered by the Eure, with its tributaries the Vegre, Blaise and Avre, a small western portion by the Huisne, and the south by the Loir with its tributaries the Conie and the Ozanne. The air is pure, the climate mild, dry and not subject to sudden changes. The soil consists, for the most part, either of clay intermixed with sand or of calcareous earth, and is on the whole fruitful. Agriculture is better conducted than in most of the departments of France, and the average yield per acre is greater. Cereals occupy half the surface, wheat and oats being chiefly cultivated. Among the other agricultural products are barley, hemp, flax and various vegetables, including good asparagus. Wine is not extensively produced, nor is it of the best quality; but in some parts, especially in the Perche, there is an abundant supply of apples, from which cider is made as the common drink of the inhabitants. The extensive meadows supply pasturage for a large number of cattle and sheep, and the horses raised in the Perche have a wide reputation as draught animals. Bee- farming is commonly prosecuted. The department produces lime, grindstones and brick-clay. The manufactures are not extensive; but there are flour- and saw-mills, tanneries and leather-works, copper and iron foundries, starch-works, dye- works, distilleries, breweries and potteries; and agricultural implements, cotton and woollen goods, and yarn, hosiery, boots and shoes, sugar, felt hats and paper are made. Eure-

et-Loir exports the products of its soil and live-stock; its imports include coal, wine and wearing apparel. It is served by the rail- ways of the Western and the Orleans Companies and by those of the state, but it has no navigable waterways. The department has Chartres for its capital, and is divided into the arrondisse- ments of Chartres, Chateaudun, Dreux and Nogent-le-Rotrou (24 cantons and 426 communes). It forms the diocese of Chartres (province of Paris), and belongs to the academie (educational division) of Paris and the region of the IV. Army Corps. Its court of appeal is at Paris.

Chartres, Dreux, Chateaudun, Nogent-le-Rotrou and Anet are the more noteworthy places in the department (q.v.). At Bonneval the lunatic asylum occupies the 18th-century buildings of a former Benedictine abbey. The abbey church belonged to the 13th century, but only a gateway flanked by two massive towers is left. The chateau of Maintenon dating from the 16th and 17th centuries was presented by Louis XIV. to Madame de Maintenon, by whom additions were made; the aqueduct (17th century) in the park was designed to carry the water of the Eure to Versailles, but was not completed. There is a fine chateau of the late 1 5th century, restored in modern times, at Montigny- le-Gannelon, and another of the 15th, 16th and 17th centuries, at one time the property of Sully, at Villebon. St Lubin-des- Joncherets has a handsome church of the nth century, in which there are stained-glass windows dating from the 16th century.

EUREKA, a city, port of entry, and the county seat of Hum- boldt County, California, U.S.A., on the E. shore of Humboldt Bay. Pop. (1880) 2639; (1890)4858; (1900) 7327 (2035 foreign- born); (1910) 11,845. It has a good harbour, greatly improved by the National government, and is connected with San Fran- cisco, Portland and other coast ports by steamship lines. In 1909 a railway (the Northwestern Pacific), to connect Eureka with San Francisco, was under construction. The district owes its reputation as a health resort to its equable climate and to the protection afforded by the wide coast timber belt. Eureka is the principal point for the shipment of redwood lumber, and saw- milling is carried on here on an enormous scale. Several short railways run from Eureka and Areata (pop. in 1900, 952) across the bay, into the forests, and bring lumber to the mills, most of which are in or near Eureka. Humboldt county was organized in 1853. Eureka was then already the centre of an important lumber trade, principally in spars. It was incorporated in 1856, displacing Union (now Areata) as the county-seat in the same year.

EUREKA SPRINGS, a city and health resort, one of the county- seats — Berryville being the other — of Carroll county, in the extreme north-western part of Arkansas, U.S.A., in the Ozark

uplift, 1800 ft. above the sea-leveli Pop. (1890) 3766; (1900) 3572 (142 of negro descent); (1910) 3228. There is a transient population of thousands of visitors during the year. The city is built picturesquely on the sides of a gulch, down which runs the Missouri & North Arkansas railway. A creek running through the city empties into the White river, only a few miles distant. The surrounding country varies in character from mountains to rolling prairie. The encircling hills are laden with a covering of pine. The normal mean temperature for the year is about 59 F. (42° F. in winter, 6i° F. in spring, 75 F. in summer, and 58° F. in autumn); the average rainfall, about 33 in. The atmosphere is dry and clear. Apart from its share in the agri- cultural interes'ts of the surrounding region, — devoted mainly to Indian corn, small grains and fruits,— the entire economy of Eureka Springs centres in its medicinal springs, more than forty of which, lying within the Corporate limits, are held in trust by the city for the' free use of the public. The temperature of the springs varies from about 57 F. to 64 F. Each gallon of their waters contains about 28-5 cub. in. of gaseous matter and from 6 to 9 grains of solids held in solution. The city waterworks are owned by the municipality. The springs have been exploited since 1879, when the first settlement was made. The city was chartered in 1880.

EURIPIDES (480-406 B.C.), the great Greek dramatic poet, was born in 480 B.C., on the very day, according to the legend, of the Greek victory at Salamis, where his Athenian parents had taken refuge; and a whimsical fancy has even suggested that his name — son of Euripus —wns meant to commemorate: the first check of the Persian fleet at Artemisium. His father Mnesarchus was at least able to give him a liberal education; it was a favourite taunt with the comic poets that his mother Clito had been a herb-seller — a quaint instance of the tone which public satire could then adopt with plausible effect. At first he was intended, we are told, for the profession of an athlete, — a calling of which he has recorded his opinion with something like the courage of Xenophanes. He seems also to have essayed painting; but at five-and-twenty he brought out his first play, the Pdiodes, and thenceforth he was a tragic poet. At thirty- nine he gained the first prize, and in his career of about fifty years he gained it only five times in all. This fact is perfectly consistent with his unquestionably great and growing popularity in his own day. Throughout life he had to compete with Sophocles, and with other poets who represented tragedy of the type consecrated by tradition. The hostile criticism of

Aristoˆ phanes was witty; and, moreover, it was true, granting the premise from which Aristophanes starts, that the tragedy of Aeschylus and Sophocles is the only right model. Its unfairness, often extreme, consists in ignoring the changing conditions of public feeling and taste, and the possibilities, changed accord- ingly, of an art which could exist only by continuing to please large audiences. It has usually been supposed that the unsparing derision of the comic poets contributed not a little to make the life of Euripides at Athens uncomfortable; and there is certainly one passage in a fragment of the Melanippe (Nauck, Frag., 495), which would apply well enough to his persecutors: —

&.v$po)v Si iroWoi tou ykXoiros ovvena. ao-Kovcri x&Pi Ta -S KepTopovs' £yc!> 5k irws Itiaw ye\oiovs } oXrives

AxttXlv' ˆXOUˆt (JTOlXtXTO..

(To raise vain laughter, many exercise The arts of satire; but my spirit loathes These mockers whose unbridled mockery Invades grave themes.)

The infidelity of two wives in succession is alleged to explain the poet's tone in reference to the majority of their sex, and to complete the picture of an uneasy private life. He appears to have been repelled by the Athenian democracy, as it tended to become less the rule of the people than of the mob. Thoroughly the son of his day in intellectual matters, he shrank from the coarser aspects of its political and social life. His best word is for the small farmer (avrpvpyos), who does not often come to town, or soil his rustic honesty by contact with the crowd of the market-place.

go2

EURIPIDES

About 409 B.C. Euripides left Athens, and after a residence in the Thessalian Magnesia repaired, on the invitation of King Archelaus, to the Macedonian court, where Greeks of distinction were always welcome. In his Archelaus Euripides celebrated that legendary son of Temenus, and head of the Temenid dynasty, who had founded Aegae; and in one of the meagre fragments he evidently alludes to the beneficent energy of his royal host in opening up the wild land of the North. It was at Pella, too, that Euripides composed or completed, and perhaps produced, the Bacchae. Jealous courtiers, we are told, contrived to have him attacked and killed by savage dogs. It

is odd that the fate of Actaeon should be ascribed, by legend, to two distinguished Greek writers, Euripides and Lucian; though in the former case at least the fate has not such appropriateness as the Byzantine biographer discovers in the latter, on the ground that its victim " had waxed rabid against the truth." The death of Euripides, whatever its manner, occurred in 406 B.C., when he was seventy-four. Sophocles followed him in a few months, but not before he had been able to honour the memory of his younger rival by causing his actors to appear with less than the full costume of the Dionysiac festival. Soon afterwards, in the Frogs, Aristo- phanes pronounced the epitaph of Attic comedy on Attic tragedy.

The historical interest of such a life as that of Euripides consists in the very fact that its external record is so scanty — that, unlike Aeschylus or Sophocles, he had no place in the public action of his time, but dwelt apart as a student and a thinker. He has made his Medea speak of those who, through following quiet paths, have incurred the reproach of apathy (fxˆdvu'iav). Undoubtedly enough of the old feeling for civic life remained to create a prejudice against one who held aloof from the affairs of the city. Quietness (airpaynoovvrj), in this sense, was still regarded as akin to indolence (d/ryta). Yet here we see how truly Euripides was the precursor of that near future which, at Athens, saw the more complete divergence of society from the state.

In an age which is not yet ripe for reflection or for the subtle analysis of character, people are content to express in general types those primary facts of human nature which strike every one. Achilles will stand well enough for the young chivalrous warrior, Odysseus for the man of resource and endurance. In the case of the Greeks, these types had not merely an artistic and a moral interest; they had, further, a religious interest, because the Greeks believed that the epic heroes, sprung from the gods, were their own ancestors. Greek tragedy arose when the choral worship of Dionysus, the god of physical rapture, had engrafted upon it a dialogue between actors who represented some persons of the legends consecrated by this faith. The dramatist was accordingly obliged to refrain from multiplying those minute touches which, by individualizing the characters too highly, would detract from their general value as types in which all Hellenic humanity could recognize its own image glorified and raised a step nearer to the immortal gods. This necessity was further enforced by the existence of the chorus, the original element of the drama, and the very essence of its nature as an act of Dionysiac worship. Those utterances of the chorus, which to the modern sense are so often platitudes, were not so to the

Greeks, just because the moral issues of tragedy were felt to have the same typical generality as these comments themselves.

An unerring instinct keeps both Aeschylus and Sophocles within the limits imposed by this law. Euripides was only fifteen years younger than Sophocles. But, when Euripides began to write, it must have been clear to any man of his genius and culture that, though an established prestige might be main- tained, a new poet who sought to construct tragedy on the old basis would be building on sand. For, first, the popular religion itself — the very foundation of tragedy — had been undermined. Secondly, scepticism had begun to be busy with the legends which that religion consecrated. Neither gods nor heroes com- manded all the old unquestioning faith. Lastly, an increasing number of the audience in the theatre began to be destitute of the training, musical and poetical, which had prepared an earlier

generation to enjoy the chaste and placid grandeur of ideal tragedy.

Euripides made a splendid effort to maintain the place of tragedy in the spiritual life of Athens by modifying its interests in the sense which his own generation required. Could not the heroic persons still excite interest if they were made more real, — if, in them, the passions and sorrows of every-day life were portrayed with greater vividness and directness? And might not the less cultivated part of the audience at least enjoy a thrilling plot, especially if taken from the home-legends of Attica ? Euripides became the virtual founder of the romantic drama. In so far as his work fails, the failure is one which probably no artistic tact could then have wholly avoided. The frame within which he had to work was one which could not be stretched to his plan. The chorus, the masks, the narrow stage, the conventional costumes, the slender opportunities for change of scenery, were so many fixed obstacles to the free development of tragedy in the new direction. But no man of his time could have broken free from these traditions; in attempting to do so he must have wrecked either his fame or his art. It is not the fault of Euripides if in so much of his work we feel the want of harmony between matter and form. Art abhors compromise; and it was the misfortune of Attic tragedy in his generation that nothing but a compromise could save it. Two devices have become common phrases of reproach against him — the prologue and the deus ex machina. Doubtless the prologue is a slipshod and sometimes ludicrous expedient. But the audiences of his days were far from being so well versed as their fathers in the mythic lore, and, on the other hand, a dramatist who wished to avoid trite themes had now to go into the

byways of mythology. A prologue was often perhaps desirable or necessary for the instruction of the audience. As regards the deus ex machina, a distinction should be observed between those cases in which the solution is really mechanical, as in the Andromache and perhaps the Orestes, and those in which it is warranted or required by the plot, as in the Hippolytus and the Bacchae. The choral songs in Euripides, it may be granted, have often nothing to do with the action. But the chorus was the greatest of difficulties for a poet who was seeking to present drama of romantic tendency in the plastic form consecrated by tradition. So far from censuring Euripides on this score, we should be disposed to regard his management of the chorus as a signal proof of his genius, originality and skill.

*Euripides is said to have written 92 dramas, including 8 satyr- plays. The best critics of antiquity allowed 75 as genuine. Nauck has collected n 17 Euripidean fragments. Among these, w . numbers 1092-1117 are doubtful or spurious; numbers "<"**• 842-1091 are from plays of uncertain title; numbers 1-841 represent fifty-five lost pieces, among which some of the best known are the 'Andromeda, Antiope, 1 Bellerophon, Cresphontes, Erechtheus, Oedipus, Phaelhon, and Telephus.*

I. The Alcestis, as the didascaliae tell us, was brought out in 01. 85. 2, i.e. at the Dionysia in the spring of 438 B.C., as the fourth play of a tetralogy comprising the Cretan Women, the Akmaeon al Psophis, and the Telephus. The Alcestis is altogether removed from the character, essentially grotesque, of a mere satyric drama On the other hand, it has features which distinctly separate it from a Greek tragedy of the normal type. First, the subject belongs to none of the great cycles, but to a byway of mythology, and involves such strange elements as the servitude of Apollo in a mortal household, the decree of the fates that Admetus must die on a fixed day, and the restoration of the dead Alcestis to life. Secondly, the treatment of the subject is romantic and even fantastic, — strikingly so in the passage where Apollo is directly confronted with the daemonic figure of Thanatos. Lastly, the boisterous, remorseful, and generous Heracles makes, not, indeed, a satyric drama, but a distinctly satyric scene — a scene which, in the frank original, hardly bears the subtle interpretation which in Balaustion is hinted by the genius of Browning, that Heracles got drunk in order to keep up other people's spirits. When the happy ending is taken into account, it is not surprising that some should have called the Alcestis a tragi-comedy. But we cannot so regard it. The slight and purely incidental strain of comedy is but a moment of relief between the tragic sorrow and

1 A considerable fragment of the Antiope was discovered in Egypt in the latter part of the 19th century; ed. J. P. Mahaffy in vol. viii. of the Cunningham Memoirs (Dublin, 1891); and quite recently fragments, probably from the Hypsipyle, the Phaethon. and the Cretans (see Berliner Klassikerlexte, v. 2, 1907).

terror of the opening and the joy, no less solemn, of the conclusion. In this respect the Alcestis might more truly be compared to such a drama as the Winter's Tale; the loss and recovery of Hermioneby Leontes do not form a tragi-comedy because we are amused between-whiles by Autolycus and the clown. It does not seem improbable that the Alcestis — the earliest of the extant plays — may represent an attempt to substitute for the old satyric drama an after-piece of a kind which, while preserving a satyric element, should stand nearer to tragedy. The taste and manners of the day were perhaps tiring of the merely grotesque entertainment that old usage appended to the tragedies; just as, in the sphere of comedy, we know from Aristophanes that they were tiring of broad buffoonery. An original dramatist may have seen an opportunity here. However that may be, the Alcestis has a peculiar interest for the history of the drama. It marks in the most signal manner, and perhaps at the earliest moment, that great movement which began with Euripides, — the movement of transition from the purely Hellenic drama to the romantic.

2. The Medea was brought out in 431 b.c. with the Philoctetes, the Dictys, and a lost satyr- play called the Reapers (Theristae). Euripides gained the third prize, the first falling to Euphorion, the son of Aeschylus, and the second to Sophocles. If it is true that Euripides modelled his Medea on the work of an obscure predecessor, Neophron, at least he made the subject thoroughly his own. Hardly any play was more popular in antiquity with readers and spectators, with actors, or with sculptors. Ennius is said to have translated and adopted it. We do not know how far it may have been used by Ovid in his lost tragedy of the same name; but it certainly inspired the rhetorical performance of Seneca, which may be regarded as bridging the interval between Euripides and modern adaptations. We may grant at once that the Medea of Euripides is not a faultless play; that the dialogue between the heroine and Aegeus is not happily conceived ; that the murder of the children lacks an adequate dramatic motive; that there is something of a moral anti-climax in

the arrangements of Medea, before the deed, for her personal safety. But the Medea remains a tragedy of first-rate power. It is admir- able for the splendid force with which the character of the strange and strong-hearted woman, a barbarian friendless among Hellenes, is thrown out against the background of Hellenic life in Corinth.

3. The extant Hippolytus (429 B.C.) — sometimes called Stephanephoros, the " wreath-bearer," from the garland of flowers which, in the opening scene, the hero offers to Artemis — was not the first drama of Euripides on this theme. In an earlier play of the same name, we are told, he had shocked both the moral and: the aesthetic sense of Athens. In this earlier Hippolytus, Phaedra herself had confessed her love to her step-son, and, when repulsed, had falsely accused him to Theseus, who doomed him to death; at the sight of the corpse, she had been moved to confess her crime, and had atoned for it by a voluntary death. This first Hippolytus is cited as Hippolytus the Veiled (na\inrT6nivos) , either, as Toup and Welcker thought, from Hippolytus covering his face in horror, or, as Bentley with more likelihood suggested, because the youth's shrouded corpse was brought upon the scene. It can scarcely be doubted that the chief dramatic defect of our Hippolytus is connected with the unfavourable reception of its predecessor. Euripides had been warned that limits must be observed in the dramatic portrayal of a morally repulsive theme. In the later play, accordingly, the whole action is made to turn on the jealous feud between Aphrodite, the goddess of love, and Artemis, the goddess of chastity. Phaedra not only shrinks from breathing her secret to Hippolytus, but destroys herself when she learns that she is rejected. But the natural agency of human passion is now replaced by a supernatural .machinery; the slain son and the bereaved father are no longer the martyrs of sin, the tragic witnesses of an inexorable law; rather they and Phaedra are alike the puppets of a divine caprice, the scapegoats of an Olympian quarrel in which they have no concern. But if the dramatic effect of the whole is thus weakened, the character of Phaedra is a fine psychological study; and, as regards form, the play is one of the most brilliant. Boeckh (De tragoediae Graecae principiis, p. 180 f.) is perhaps too ingenious in finding an allusion to the plague at Athens (430 B.C.) in the

w kKˆiv' 'A6rjvSiv IIaXXa5os 6′ dpiaˆara, olov (rTcptitread' 6.v5pos, and the reply of the chorus, kmvov t6S' &xos, &c, contain a reference to the recent death of Pericles (429 B.C.).

4. The Hecuba may be placed about 425 B.C. Thucydides (iii. 104) notices the purification of Delos by the Athenians, and the

restoration of the Panionic festival there, in 426 B.C. — an event to which the choral passage, v. 462 f., probably refers. It appears more hazard- ous to take v. 650 f. as an allusion to the Spartan mishap at Pylos. The subject of the play is the revenge of Hecuba, the widowed queen of Priam, on Polymestor, king of Thrace, who had murdered her youngest son Polydorus, after her daughter Polyzena had already been sacrificed by the Greeks to the shade of Achilles. The two calamities which befall Hecuba have no direct connexion with each other. In this sense the play lacks unity of design. On the other hand, both events serve the same end — viz. to heighten the tragic pathos with which the poet seeks to surround the central figure of

Hecuba. The drama illustrates the skill with which Euripides, while failing to satisfy the requirements of artistic drama, could sustain interest by an ingeniously woven plot. It is a representative Intriguenstuck, and well exemplifies the peculiar power which recommended Euripides to the poets of the New Comedy.

5. The Andromache, according to a notice in the scholia Veneta (446) , was not acted at Athens, at least in the author's life-time ; though some take the words in the Greek argument (to 5pap.a tCiv Stvripar) to mean that it was among those which gained a second prize. The invective on the Spartan character which is put into the mouth of Andromache contains the words, ASUus eit i>x«t' &"' 'EXXdSa, and this, with other indications, points to the Peloponnesian successes of the years 424-422 B.C. Andromache, the widow of Hector, has become the captive and concubine of Neoptolemus, son of Achilles. During his absence, her son Molossus is taken from her, with the aid of Menelaus, by her jealous rival Hermione. Mother and son are rescued from death by Peleus; but meanwhile Neoptolemus is slain at Delphi through the intrigues of Orestes. The goddess Thetis now appears, ordains that Andromache shall marry Helenus, and declares that Molossus shall found a line of Epirote kings, while Peleus shall become immortal among the gods of the sea. The Andromache is a poor play. The contrasts, though striking, are harsh and coarse, and the compensations dealt out by the deus ex machina leave the moral sense wholly unsatisfied. Technically the piece is noteworthy as bringing on the scene four characters at once — Andromache, Molossus, Peleus and Menelaus (v. 545 f.).

6. The Ion is an admirable drama, the finest of those plays which' deal with legends specially illustrating the traditional glories of Attica. It is also the most perfect example of the poet's skill in the structure of dramatic intrigue. For its place in the chrono- logical

order there are no data except those of style and metre. Judging by these, Hermann would place it " neither after Ol. 89, nor much before " — i.e. somewhere between 424 and 421 B.C.; and this may be taken as approximately correct. The scene is laid throughout at the temple of Delphi. The young Ion is a priest in the temple of Delphi when Xuthus and his wife Creusa, daughter of Erechtheus, come to inquire of the god concerning their child- lessness; and it is discovered that Ion is the son of Creusa by the god Apollo. Athena herself appears, and commands that Ionshall be placed on the throne of Athens, foretelling that from him shall spring the four Attic tribes, the Teleontes (priests), Hopletes (fight- ing-men), Argadeis (husbandmen) and Aigikoreis (herdsmen). The play must have been peculiarly effective on the Athenian stage, not only by its situations, but through its appeal to Attic sympathies.

7. The Suppliants who give their name to the play are Argive women, the mothers of Argive warriors slain before the walls Of Thebes, who, led by Adrastus, king of Argos, come as suppliants to the altar of Demeter at Eleusis. Creon, king of Thebes, has refused burial to their dead sons. The Athenian king Theseus demands of Creon that he shall grant the funeral rites; the refusal is followed by a battle in which the Thebans are vanquished, and the bodies of the Argive dead are then brought to Eleusis. At the close the goddess Athena appears, and ordains that a close alliance shall be formed between Athens and Argos. Some refer the play to 417 B.C., when the democratic party at Athens rose against the oligarchs. But a more probable date is 420 B.C., when, through the agency of Alcibiades, Athens and Argos concluded a defensive alliance. The play has a strongly marked rhetorical character, and is, in fact, a panegyric, with an immediate political aim, on Athens as the cham- pion of humanity against Thebes.

8. The Heracleidae — a companion piece to the Suppliants, and of the same period — is decidedly inferior in merit. Here, too, there are direct references to contemporary history. The defeat of Argos by the Spartans in 418 B.C. strengthened the Argive party who were in favour of discarding the Athenian for the Spartan alliance (Thus. v. 76). In the Heracleidae, the sons of the dead Heracles, persecuted by the Argive Eurystheus, are received and sheltered at Athens. Thus, while Athens is glorified, Sparta, whose kings are descendants of the Heracleidae, is reminded how unnatural would be an alliance between herself and Argos.

9. The Heracles Mainomenos 1 (Hercules Furens), which, on grounds of style, can scarcely be put later than 420-417 B.C., shares with the

two last plays the purpose of exalting Athens in the person of Theseus. Heracles returns from Hades — whither, at the command of Eurystheus, he went to bring back Cerberus — just in time to save his wife Megara and his children from being put to death by Lycus of Thebes, whom he slays. As he is offering lustral sacrifice after the deed, he is suddenly stricken with madness by Lyssa (Fury), the daemonic agent of his enemy the goddess Hera, and in his frenzy he slays his wife and children. Theseus finds him, in his agony of despair, about to kill himself, and persuades him to come to Athens, there to seek grace and pardon from the gods. The unity of the plot may be partly vindicated by observing that the slaughter of Lycus entitled Heracles to the gratitude of Thebes, whereas the slaughter of his own kinsfolk made it unlawful that he should remain there ; thus, having found a refuge only to lose it, Heracles has no hope left but in Athens, whose praise is the true theme of the entire drama.

1 (Originally simply Heracles, the addition Mainomenos being due to the Aldine ed.)

io. Iphigenia among the Tauri, which metre, and diction mark as one of the later plays, is also one of the best — excellent both in the management of a romantic plot and in the delineation ; of char j acter. The scene is laid at the temple of Artemis in the Tauric Chersonese (the Crimea) — on the site of the modern Balaklava. Iphigenia, who had been doomed to die at Aulis for the Greeks;, had been snatched from that death by Artemis, and had become priestess of the goddess at the Tauric shrine, where human victims were immolated. Two strangers, who had landed among the Tauri, have been sentenced to die at the altar. She discovers in them her brother Orestes and his friend Pylades. They plan an escape, are recaptured, and are finally delivered by the goddess Athena, who commands Thoas, king of the land, to permit their departure. Iphigenia, Orestes and Pylades return to Greece, and establish , the worship of the Tauric Artemis at Brauron and Halae in Attica. The drama of Euripides necessarily suggests a comparison with that of Goethe; and many readers will probably also feel that, while Goethe is certainly not inferior in fineness of ethical portraiture, he has the advantage in his management of the catastrophe. But it is only just to Euripides to remember that, while his competitor had free scope of treatment, he, a Greek dramatist, was bound to the motive of the Greek legend, and was obliged to conclude with the foundation of the Attic worship.*

ii. The Troades appeared in 415 B.C. along with the Alexander, the Palamedes, and' a satyr-play, the Sisyphus. It is a picture of the miseries endured by noble Trojan dames — Hecuba, Andromache, Cassandra — immediately after the capture of Troy. There is hardly a plot in the proper sense — only an accumulation of sorrows on the heads of the passive sufferers. The piece is less a drama than a pathetic spectacle, closing with the crash of the Trojan towers in flame and ruin. The Troades is indeed remarkable among Greek tragedies for its near approach to the character of melodrama. It must be observed that there is no ground for the inference — sometimes made an accusation against the poet — that the choral passage, v. 794 f., was intended to encourage the Sicilian expedition, sent forth in the same year (415 B.C.). The mention of the " land pf Aetna over against Carthage " (v. 220) speaks of it as "renowned, for the trophies of prowess " — a topic, surely, not of encouragement but of warning. ,.•'.,...

12. The Helena — produced, as we learn from the Aristophanic scholia, in 412 B.C., the year of the lost Andromeda— is not one of its author's happier efforts. It is founded on a strange variation of the Trojan myth, first adopted by Stesichorus in his Palinode— that only a wraith of Helen passed to Troy, while the real Helen was detained in Egypt. In this play she is rescued from the Egyptian king, Theoclymenus, by a ruse of her husband Menelaus, who brings her safely back to Greece. The romantic element thus engrafted on the Greek myth is more than fantastic: it is well-nigh grotesque The comic poets — notably Aristophanes in the Thesmophdriazusae— felt this; nor can we blame them if they ridiculed a piece in which the mode of treatment was so discordant with the spirit of Greek tradition, and so irreconcilable with all that constituted the higher, meaning of Greek tragedy.*

13. The Phoenissae was brought out, with the Oenomaus and the Chrysippus, in 411 B.C., the year in which the recall of Alcibiades was decreed by the army at Samos, and, after the fall of the Four Hundred, ratified by the Assembly at Athens, (Thuc. viii. 81, 97). The dialogue between Iocaste and Polynices on the griefs of banishment (ti to arkpeaBai TrarpLSos, v. 388 f .) has a certain emphasis which certainly looks like an allusion to the pardon of the famous exile. The subject of the play is the same as that of the Aeschylean Seven against Thebes — the war of succession in which Argos supported Polynices against his brother Eteocles. The Phoenician maidens who form the chorus are imagined to have been on their way from Tyre to Delphi, where they were destined for service in the temple, when they were detained at Thebes by the outbreak of the

war— a device which affords a contrast to the Aeschylean chorus of Theban elders, and which has also a certain fitness in view of the legends connecting Thebes with Phoenicia. But Euripides has hardly been successful in the rivalry — which he has even pointed by direct allusions— with Aeschylus. The Phoenissae is full of brilliant passages, but it is rather a series of effective scenes than an impressive drama.

14. Plutarch {Lys. 15) says that, when Athens had surrendered to Lysander (404 B.C.) and when the fate of the city was doubtful, a Phocian officer happened to sing at a banquet of the leaders the first song of the chorus in the Electra of Euripides —

'Ayankfxvovos w Kopa, ˆXufloe, 'HXturpa, irorl aav iyporipay aftXae, and that " when they heard it, all were touched, so that it seemed a cruel deed to destroy for ever the city so famous once, the mother of such men." The character of the Electra, in metre and i'n diction, seems to show that it belongs to the poet's latest years. If Miiller were right in referring to the Sicilian expedition the closing passage in which the Dioscuri declare that they haste " to the Sicilian sea,' to save ships upon the deep " (v. 1347), then the play could not te later than 413 B.C. But it may with more probability be placed shortly before the Orestes, which in some respects it much resembles: perhaps in or about the year 410 B.C. No play of Euripides lias been

niofe. severely criticized'.- The reason is' evident. The ChoepkoH of Aeschylus and the ,Electra> of Sophocles appear to invite a direct comparison with this drama. But, as R. C. Jebb' suggested,' 1 such criticism as that of Schlegel should remember that works of art are proper subjects of direct comparison "only when the theories of art which they represent have a corrimdn basis. It is surely unmeaning to contrast the elaborate homeliness of the Euripidean Electra with the severe grandeur of its rivals. Aeschylus and Sophocles, as dif ferent exponents of an artistic Conception which is fundamentally the>same, may be profitably compared ; Euripides interprets another conception and must be tried by other principles. .His Electra is, i'tttrjith; a daring experiment-ˆdaririg, because the theme is one which the elder school had made peculiarly its own: . 15. The Orestes, acted in 408, bears the mark of the age in the prominence which Euripides gives to the assembly of Argos— which has to decide the ■ fate of Orestes and Electra— and to rhetorical pleading. The plot proceeds with sufficient clearness to the point at which Orestes and Electra have been condemned to death. But the later portion of the play, containing the intrigues for their rescue and the final achievement of their deliverance, is' both too involved and too*

inconsequent for a really tragic effect. Just as in the Electra, the heroic persons of the drama are reduced to the level of common-place; There is not a little which borders on the ludicrous, and it can be seen how easy would have been the passage from such tragedy as this to the restrained parody in which the Middle Comedy de lighted. It is, however, inconceivable that, as some have supposed, the Orestes can have been a deliberate compromise between tragedy and: farce. It cannot have been meant to be played, as a fourth piece, instead of a regular satyric drama. Rather it indicates the level to which the heroic tragedy itself had descended under the treatment of a school which was at least logical. The celebrity of the iplay in the ancient world — as Paley observes, there are more ancient quotations from the Oesfes thari from all the extant playsi of Aeschylus and Sophocles together— is perhaps partly explained by the unusually frequent combination in this 'piece of striking sentiment with effective situation.

16. The Iphigenia at Aulis, like the Bacchae, was brought out only after the death of Euripides. It is a very brilliant and beautiful play, — ˆprobably left by the author in an unfinished state, — and has suffered from interpolation more largely, perhaps, than any other of his works. ' As regards its subject, it forms a prelude to the Iphigenia in Tauris. Iphigenia has been doomed by her father Agamemnon to die at Aulis, as Calchas declares that Artemis claims such a sacrifice before the adverse winds can fall.

The genuine play, as we have it, breaks off at v. 1508, when Iphigenia has been led to the sacrificial altar. A spurious epilogue, of wretched workmanship (v. 1509-1628), relates; in the speech of a messenger, how Artemis saved the maiden.

17. The Bacchae, unlike the preceding play, appears to have been finished by its author, although it is said not to have been acted, on the Athenian stage at least, till after his death. It was composed, or completed', during the residence of Euripides with Archelaus, and in all probability was originally designed for representation in Macedonia— a region with whose traditions of orgiastic Worship the Dionysus myth was so congenial. The play is sometimes quoted as the Pentheus. It has been justly observed that Euripides seldom named a piece from the chorus, unless the chorus bore an important part'in the action or the leading action was divided between several

Eersons. Possibly, however, in this instance he may designedly ave chosen a title which would at once interest the Macedonian public; Pentheus would suggest a Greek legend about which they might know

or care little. The Bacchae would at once announce a theme connected with rites familiar fo the northern land.

It is a magnificent play, alone among extant Greek tragedies in picturesque splendour, and in that sustained glow of Dionysiac enthusiasm to which the keen irony' lends the strength of contrast. If Euripides had left nothing else, the Bacchae would place him in the first rank of poets, and would prove his possession of a sense rarely manifested by Greek poets,' — perhaps by no one of his own contemporaries in equal measure except Aristophanes, — a feeling for naturalbeauty lit up by the play of fancy. R. V. Tyrrell, in his edition of the Bacchae, has given the true answer to the theory that the Bacchae is a recantation. Euripides had never rejected the facts which formed the basis of the popular religion. ; He had rather sought to interpret them in a manner consistent with belief in a benevolent Providence. The really striking thing in the Bacchae is the spirit of contentment and. of composure which it breathes, — :as if the poet had ceased to be vexed by the seeming contradictions which had troubled him before. ,' Nor should it be forgotten that, for the Greek mind of. his age, the victory of Dionysus in the Bacchae carried a moral even more direct than the victory of Aphrodite in the Hi'ppolytusi, The great nature-powers who give refreshment to mortals cannot be robbed of their due tribute without provoking a nemgsisi The refusal of such a homage is not, so the Greeks deemed, a virtue in itself; in the sight of the gods it may. be only a cold forni of vfipis, overweening self-reliance— the quality personi- fied in. Pentheus,. ... : ,:..,;

- *Introduction to the Electra of Sophocles, p. xiii., in Catena Clasii- cortt'm, 2nd ed.*

f f

i .;..:

JEUMPIDES

9°5

'The Bacchae was always an exceptionally popular play— partly because its opportunities as aspectacle fitted. It for 'gorgeous repre- sentation, and so recommended it for performance at courts 'and on great public occasions. "Demetrius the Cynic v (says Lucian, Adt. Indoctum, 19) "saw an illiterate person at Corinth' reading a very beautiful poem— the Bacchae o(Euripides, I think it was; He was at

the place where the messenger narrates the doom 1 of Peritheus and the deed of Agave. Demetrius- snatched the book from him and tore it up, saying, ‘ It is better for Pentheus tb be torn up at once by me than to be mangled over and over again by youl’ ”

18. The Cyclops, of uncertain date, is the only extant example of a satyric drama. The plot’ is taken mainly; from the story of Odysseus and Polyphemus in the 9th book of the Odyssey. > Iniorder to be really successful in farce of this kind; a poet should have a fresh feeling for the nature of the art parodied. It is because Euripides was not in accord with the spirit of the heroic myths that he is not strong in mythic travesty. His own tragedies-ˆ-such asthe Helen, the Electro, and the Orestes— had, in their several wkys, contributed to destroy the meaning of satyric drama; They had ddneigravely very much what satyric drama aimed at doing grotesquely. They had made the heroic ‘persons act and talk like ordinary men and women. The finer side of .such parody had: lost its edge; only broad comedy remained. ■’■■.’■ . , ■.■:■ >•

19. The Rhesus is still held by some to be what the didascaliae and the grammarians call it — a work of Euripides ;’ and P&ley has ably supported’ this view. But the scepticism first declared by Valcknaer has gained ground, and the Rhesus is now almost univer sally recognized as spurious. The art and the style still more «vi-< dently the feeling and the mind, of Euripides are absent. ' If it cannot be ascribed to a disciple of his matured school, it is still less like the work of ah Alexandrian. The most probable view seems to be that which assigns it to a versifier of small dramatic power in the latest days of Attic tragedy. It has this literary interest, that it is the only extant play of which the subject is directly taken from our Iliad, of which the tenth book—the AvMivaa — has been followed by the playwright with a closeness which is sometimes mechanical. .*

When the first protests of the comic poets were over, Euripides was secure of a , wide and lasting renown. As the old life of Athens passed away, as the old faiths lost their meaning Literary an d the peculiarly Greek instincts in art lost their Euripides, truth and freshnesSj Aeschylus and Sophocles might cease to be fully enjoyed save by a few; but Euripides could still charm by qualities more readily and more universally recognized. ‘The comparative nearness of, his diction to the idiom of ordinary life rendered him less attractive to the gram- marians of Alexandria than authors whose erudite form afforded a better scope for the display of learning or the exercise of in genuity. But there were two aspects in which he engaged their attention. They loved to trace the variations which he*

had introduced into the standard legends. And they. sought to free his text from the numerous interpolations which even! then had resulted from his popularity on the stage. – Philochorus (about 306-260 B.C.), best known for his A tthis, dealt, in his treatise on Euripides, especially with the mythology of the plays. ,From 300 B.C. to the age of Augustus a long series of critics busied themselves with this poet. The first systematic arrangement of his reputed works is ascribed to Dicaear'chus and Callimachus in the early part of the 3rd century B.C. Among those who furthered the exact study of his text, and of whose work some traces remain in the extant scholia, were Aristophanes of By- zantium, CaUistratus,. Apollodorus of Tarsus, Timachidas, and pre-eminenriy Didymus; probably also Crates of Pergamum and Aristarchus. At Rome Euripides was early . made known through the translations of Ennius and the 'freer adaptations of Pacuvius. When Hellenic civilization was spread through; the East, the mixed populations of the new settlements welcomed a dramatic poet whose taste and whose sentiment, were. not too severely or exclusively Attic. The Parthian' :t Orodes' &rid his court were witnessing the Bacchae oi Euripides when the Agive of the hour was suddenly enabled to lend' a ghastly reality to the terrible scene of frenzied triumph by displaying the' gory head of the Roman Crassus. Mommsen has noted the moment as" one in which the power of Rome and the genius' of Greece, were simultaneously abased in the presence of sultanism. ' So 'far 1 as Euripides is concerned, the incident may suggest another and a more pleasing reflection; it may remind us hpw the charrh of his humane genius had penetrated the recesses of the barbarian' East, and had brought to rude and fierce peoples at least sdrne' dim and distant apprehension of that gracious world in which the '

great spirits of ancient Hollas had moved. A quaintly significant testimony to ' the popularity of Euripides is afforded by the Byzantine Xpurros Trcurxoiv: This drama, narrating the events Which preceded and attended the Passion, is a cento of no less than 26ro verses, taken from the plays of Euripides, principally from the Bacchae, the Troades and the Rhesus. The traditional ascription of the authorship to Gregory of Nazianzus is now generally rejected; another conjecture assigns it to Apollinaris of Laodicea, and places the date of composition at about a.d. 330." Although the text used by the author of the cento jnay not have 'been a good one, the value of the piece for the diplomatic criticism -of Euripides is necessarily very considerable; and it was diligently used both by Valcknaer and by Porson.

1 Dante, who does not mention.Aeschylus or Sophocles, places

Euripides, with the tragic poets Antiphon and Agathon, and the lyrist Simonides, in the first circle of Purgatory (xxii. 106), among those ‘ ;

-■■..., . ‘ piue

,, Greci, che gia di lauro ornar la fronte.”

Casaubon, in a letter to Scaliger, salutes that scholar as worthy to have lived at Athens with; Aristophanes and Euripides— a compliment which certainly implies respect for his correspond- ent’s powers as a peacemaker. In popular literature, too, where Aeschylus and Sophocles were as yet little known, the 16th and 17th centuries testify to the favour bestowed upon Euripides. G. Gascoigne’s and Francis Kinwelmersh’s Jocasla, played at Gray’s Inn in 1566, is a literal translation of Lodovico Dolce’s Giocasta; which derives from the Phoenissae, probably through the Latin translation of R. Winter (Basel, 1541). Among early French translations from Euripides may be mentioned the version of the Iphigenia in Tauris by Thomas Sibilet in 1549, and that of the Hecuba by Bouchetel in 1550. About a century later Racine gave the world his Andromaque, his Iphiginie and his Phedre; and jnany have held that, at least in the last-named of these) ” the disciple of Euripides” has excelled his master. Bernhardy notices that the performance of the Hippolytus at Berlin in 1851 seemed to show that, for the modern stage, the Phedre has the advantage of its Greek original. Racine’s great English contemporary seems to have known and to have liked Euripides better than the other Greek tragedians. In the Reason of Church Government Milton certainly speaks of ” those dramatic constitutions in which j Sophocles and Euripides reign “; in the preface to his own drama, again, he joins the names of Aeschylus, Sophocles and Euripides, — ” the three tragic poets unequalled yet by any.” ■ But the Samson Agonisles itself clearly shows that Milton’s chief model in this kind was the dramatist whom he himself has called — as if to suggest the skill of Euripides in the delineation of pathetic women — ” sad Electra’s poet “; and the work bears a special mark of this preference in the use of Euripidean monodies. In the second half of the 18th century such men as J. J. Winckelmann (1717-1768) and G. E. Lessing (1729-1781) gave a new life to the study of the antique. Hitherto the art of the old world had been better known through Roman than through Greek interpreters. The basis of the revived classical taste- had been Latin. But now men gained a finer perception’ of those characteristics which belong to the Greek work of the great time, a fuller sense of the difference between the. Greek and the Roman genius where each is at its best, and

generally a clearer recognition of the qualities which distinguish ancient art in its highest purity from modern romantic types. Euripides now became the object of criticism from a new point of view. , He was compared with Aeschylus and Sophocles as representatives of that ideal Greek tragedy which ranges with the purest type of sculpture. Thus tried, he was found wanting; arid he was condeftined with all the rigour of a newly illuminated zeal. B. G. Niebuhr (1776-1831) judged him harshly; but no critic approached A. W. Schlegel (1767-1845) in severity of one- sided censure. Schlegel, in fact, will scarcely allow that Euripides is tolerable except by comparison with Racine. L. Tieck (1773- 1853) showed truer appreciation for a brother artist when he

1 (According to Karl Krumbacher, Gesch. der byz. Lit., it is an I ith-century production of unknown authorship.)

described the work of Euripides as the dawn of a romantic poetry haunted . by dim yearnings and forebodings. Goethe — who, according to Bernhardy, knew Euripides only " at a great distance "—certainly admired him highly, and left an interesting memorial of Euripidean study in his attempted reconstruction of the lost Phaethon. There are some passages in Goethe's conver- sations with Eckermann which form effective quotations against the Greek poet's real or supposed detractors. " To feel and respect a great personality, one must be something oneself. All those who denied the sublime to Euripides were either poor wretches incapable of comprehending such sublimity or shame- less charlatans who, in their presumption, wished to make more of themselves than they were." " A poet whom Socrates called his friend, whom Aristotle lauded, whom Alexander admired, and for whom Sophocles and the city of Athens put on mourning on hearing of his death, must certainly have been some one. If a modern man like Schlegel must pick out faults in so great an ancient, he ought only to do it upon his knees " (J. A. Sy- monds, Greek Poets, i. 230). We yield to no one in admiration of Goethe; but we cannot think that these rather bullying utterances are favourable examples of his method in aesthetic discussion; nor have they any logical force except as against those — if there be any such — who deny that Euripides is a great poet. One of the most striking of modern criticisms on Euripides is the sketch by Mommsen in his history of Rome (bk. iii. ch. 14). It is, in our opinion, less than just to Euripides as an artist. But it indicates, with true historical insight, his place in the development of his art, the operation of those external conditions which made him what he was, and the nature of his influence on succeeding ages.

The manuscript tradition of Euripides has a very curious and instructive history. It throws a suggestive light on the capricious nature of the process by which some of the greatest literary treasures have been saved or lost. Nine plays of Euripides were selected, probably in early Byzantine times, for popular and educational use. These were — ' Alcestis, Andromache, Hecuba, Hippolytus, Medea, Orestes, Phoenissae, Rhesus, Troades. This list includes at least two plays, the Andromache and the Troades, which, even in the small number of the extant dramas, are universally allowed to be of very inferior merit — to say nothing of the Rhesus, which is gener- ally allowed to be spurious. On the other hand, the list omits at least

three plays of first-rate beauty and excellence, the very flower, indeed, of the extant collection — the Ion, the Iphigenia in Tauris, and the Bacchae — the last certainly, in its own kind, by far the most splendid work of Euripides that we possess. Had these three plays been lost, it is not too much to say that the modern estimate of Euripides must have been decidedly lower. But all the ten plays not included in the select list had a narrow escape of being lost, and, as it is, have come to us in a much less satisfactory condition.

A. Kirchhoff was the first, in his editions, thoroughly to investigate the history and the affinities of the Euripidean manuscripts. 1 AH our MSS. are, he thinks, derived from a lost archetype of the 9th or 10th century, which contained the nineteen plays (counting the Rhesus) now extant. From this archetype a copy, also lost, was made about a.d. i 100, containing only the nine select plays. This copy became the source of all our best MSS. for those plays. They are — (1) Mafcianus 471, in the library of St Mark at Venice (12th century): Andromache, Hecuba, Hippolytus (to v. 1234), Oreste?, Phoenissae; (2) Vaticanus 909, 12th century, nine plays; (3) Parisinus 2712, 13th century, 7 plays (all but Troades and Rhesus). Of the same stock, but inferior, are (4) Marcianus 468, 13th century : Hecuba, Orestes, Medea (v. 1-42), Orestes, Phoenissae; (5) Havniensis (from Hafnia, Copenhagen, according to Paley), a late transcript from a MS. resembling Vat. 909, nine plays. A second family of MSS. for the nine plays, sprung from the same copy, but modified by a Byzantine recension of the 13th century, is greatly inferior.

The other ten plays have come to us only through the preservation of two MSS., both of the 14th century, and both ultimately derived, as Kirchhoff thinks, from the archetype of the 9th or 10th century. These are (1) Palatinus 287, Kirchhoff's B, usually called Rom. C, thirteen plays, viz. six of the select plays (Androm., Med., Rhes., Hipp., Ale, Troad.), and seven others — Bacchae, Cyclops, Heracleidae, Supplices, Ion, Iphigenia in Aulide, Iphigenia in Tauris; and (2) Flor. 2, Elmsley's C, eighteen plays, viz. all but the Troades. This MS. is thus the only one for the Helena, the Electra, and the Hercules Furens. By far the greatest number of Euripidean MSS. contain

1 See also a clear account in the preface to vol. iii. of Paley's edition.

only three plays, — the Hecuba, Orestes and Phoenissae, — these having been chosen out of the select nine for school use — probably in the 14th century.

It is to be remembered that, as a selection, the nine chosen plays of Euripides correspond to those seven of Aeschylus and those seven of Sophocles which alone remain to us. If, then, these nine did not include the Iphigenia in Tauris, the Ion 6r the Bacchae, may we not fairly infer that the lost plays of the other two dramatists comprised works at least equal to any that have been preserved? May we not even reasonably doubt whether we have received those masterpieces by which their highest excellence should have been judged?

The extant scholia on Euripides are for the nine select plays only. The first edition of the scholia on seven of these plays (all but the Troades and Rhesus) was published by Arsenius — a scholia Cretan whom the Venetians had named as bishop of Monemvasia, but whom the Greeks had refused to recognize — at Venice in 1534. The scholia on the Troades and Rhesus were first published by, L. Dindorf, from Vat. 909, in 182 1. The best complete edition is that of W. Dindorf (1863). 2 The collection, though loaded with rubbish — including worthless analyses of the lyric metres by Demetrius Triclinius — includes some invaluable comments derived from the Alexandrian critics and their followers,

Editiones Principes. — 1496. J. Lascaris (Florence), Medea, Hip- polytus, Alcestis, Andromache. 1503. M. Musurus (Aldus, Venice), Eur. Tragg. XVII., to which in vol. ii. the Hercules Furens was added as an 18th; i.e. this edition contained all the extant plays except the Electra, which was first given to the world by P. Vic- torius from Florentinus C. in 1545. The Aldine edition was re- printed at Basel in 1537.

The complete edition of Joshua Barnes (1694) is no longer of any critical value. The first thorough work done on Euripides was by L. C. Valcknaer in his edition of the Phoenissae (1755), and his Diatribe in Eur. perdilorum dramatum relliquias (1767), in which he argued against the authenticity of the Rhesus.

Principal Editions of Selected Plays. — J. Markland (1763- 1771), Supplices, Iphigenia A., Iphigenia T.; Ph. Brunck (1779- 1780), Andromache, Medea, Orestes, Hecuba; R. Porson (1797- 1801), Hecuba, Orestes, Phoenissae, Medea; H. Monk (1811-1818), Hippolytus, Alcestis, Iphigenia A., Iphigenia T.; P. Elmsley (1813- 1821), Medea, Bacchae, Heraclidae, Supplices; G. Hermann (1831-

1841), Hecuba (animadv. ad R. Porsoni notas, first in 1800), Orestes, Alcestis, Iphigenia A., Iphigenia T., Helena, Ion, Hercules Furens; C. Badham (1851-1853), Iphigenia T., Helena, Ion; H. Weil, Hipp., Medea, Hec, Iph. in T., Iph. in A., Electra, Orestes (2nd ed., 1890). It is impossible to give a list of. the English and foreign editions of single plays, but mention may be made of the Bacchae, by J. E. Sandys (4th ed., 1900) and R. Y. Tyrrell (1892); Medea, by A. W. Verrall(1883) ; Hippolytus, by J. P. Mahaffy (1881) ; and of the Hercules Furens, by Wilamowitz-Mollendorff (2nd ed., 1895), with a comprehensive introduction on the literature of Euripides. A selected list (up to 1896) will be found in J. B. Mayor's Guide to the Choice of Classical Books; see also N. Wecklein in C. Bursian's Jahresbericht, xxviii. (I897), and for the earlier literature W. Engelmann, Scriplores Graeci (1881). The little volumes on Euripides by J. P. Mahaffy (1879) and W. B. Donne in Blackwood's " Ancient Classics for English Readers " will be found generally useful; see also P. Decharme, Euripide el V esprit de son thedlre (1893); A. W. Verrall, Euripides the Rationalist (1895), and Essays on Four Plays of Euripides (1905); N. J. Patin, Elude sur Euripide (1872); O. Ribbeclc, Euripides und seine Zeit; and (for the life of the poet) Wilamowitz's ed. of the Hercules Furens (i. 1-42) ; P. Masqueray, Euripide el ses idees (1908).

Modern Complete Editions. — W. Dindorf (1870, in Poet. Scenici, ed. 5); A. Kirchhoff (1855, ed. min. 1867); F. A. Paley (2nd ed., 1872-1880), with commentary; A. Nauck (1880-1887, Teubner series) ; G. G. Murray in Oxford Scriptorum Classicorum bibliotheca (1902, foil.).

English Translations. — Among these may be noted the com- plete verse translation by A. S. Way (1894-1898) ; that in prose by E. P. Coleridge {1896); and G. G. Murray's verse translations (1902-1906). A literary interest attaches to Robert Browning^s " Transcript " of the Alcestis in his Balaustion, and to Goethe's reconstruction of Euripides' lost Phaethon in the 1840 edition of his works, vol. xxxiii. pp. 22-43. (R- C. J.; X.)

EUROCLYDON (Gr. evpos, east wind; kKvSuv, wave), a stormy wind from the N.E. or N.N.E. in the eastern Mediterranean. Where the Authorized Version of the Bible (Acts xxvii. 14) mentions euroclydon, the Revised Version, taking the reading evpanvhuv, has euraquilo, or north-easter. The word is sometimes used for the Bora (q.v.).

EUROPA (or rather, Europe), in Greek mythology, according to

Homer (Iliad, xiv. 321), the daughter of Phoenix or, in a later story, of Agenor, king of Phoenicia. The beauty of Europa fired the love of Zeus, who approached her in the form of a white bull and carried her away from her native Phoenicia to Crete, where 2 New ed. by E. Schwartz (1887-1891).

she became the mother of Minos, Rhadamanthys and Sarpedon. She was worshipped under the name of Hellotis in Crete, where the festival Hellotia, at which her bones, wreathed in myrtle, were carried round, was held in her honour (Athenaeus xv. p. 678). Some consider Europa to be a moon-goddess; others explain the story by saying that she was carried off by a king of Crete in a ship decorated with the figure-head of a bull! O. Gruppe (De Cadmi Fabula, 1801) endeavours to show that the myth of Europa is only another version of the myth of Persephone.

See Apollodorus iii. 1 ; Ovid, Metam. ii. 833 ; articles by Helbig in Roscher's Lgxikon der Mythologie, and by Hild in Daremberg and Saglio's Dictionnaire des anliquites. Fig. 26 in the article Greek Art (archaic metope from Palermo) represents the journey of Europa over the sea on the back of the bull.

EUROPE, the smallest of those principal divisions of the land-surface of the globe which are usually distinguished by the conventional name of continents.

1. Geography and Statistics It has justly become a commonplace of geography to describe Europe as a mere peninsula of Asia, but while it is necessary indlvldu- t0 Dear tn ' s m mind in some aspects of the geography aiityof of the continent, more particularly in relation to the the con- climate, the individuality of the continent is established tinea . j n ^ e c i earest manner by the course of history and the resultant distribution of . population. The earliest mention of Europe is in the Homeric Hymn to Apollo, but there Europe is not the name of a continent, but is opposed to the Peloponnesus and the islands of the Aegean. The distinction between Europe and Asia is found, however, in Aeschylus in the 5th century B.C., but there seems to be little doubt that this opposition was learnt by the Greeks from some Asiatic people. On Assyrian monu- ments the contrast between asu, " (the land of) the rising sun," and ereb or irib, " (the land of) darkness " or " the setting sun," is frequent, and these names were

probably passed on by the Phoenicians to the Greeks, and gave rise to the names of Asia and Europe. Where the names originated the geographical dis- tinction was clearly marked by the intervention of the sea, and this intervention marked equally clearly the distinction between Europe and Libya (Africa). As the knowledge of the world extended, the difficulty, which still exists, of fixing the boundary between Europe and Asia where there is land connexion, caused uncertainty in the application of the two names, but never obscured the necessity for recognizing the distinction. Even in the 3rd century B.C. Europe was regarded by Eratosthenes as including all that was then known of northern Asia. But the character of the physical features and climate finally determined the fact that what we know as Europe came to be occupied by more or less populous countries in intimate relation with one another, but separated on the east by unpeopled or very sparsely peopled areas from the countries of Asia, and the boundary be- tween the two continents has long been recognized as running somewhere through this area. Within the limits thus marked out on the east and on other sides by the sea " the climatic conditions are such that inhabitants are capable of and require a civilization of essentially the same type, based upon the cultiva- tion of our European grains." 1 Those inhabitants have had a common history in a greater measure than those of any other continent, and hence are more thoroughly conscious of their dissimilarities from, than of their consanguinity with, the peoples of the east and the south.

On the subject of the boundaries of Europe there is still divergence of opinion. While some authorities take the line of the Caucasus as the boundary in the south-east, others take the line of the Manych depression, between the upper end of the Sea of Azov and the Caspian Sea, nearly parallel to the Caucasus. Various limits are assigned to the continent on the east. Officially the crest of the Caucasus and that of the Urals are regarded in Russia as the boundaries between Europe and Asia on the south-east and east respec-

1 H. Wagner's edition of Guthe's Lehrbuch der Geographic (5th ed., Hanover 1882).

tively, 2 although in neither case does the boundary correspond with the great administrative divisions, and in the Urals it is impossible to mark out any continuous crest. Reclus, without attempting to assign any precise position to the boundary line between the two continents,

makes it run through the relatively low and partly depressed area north of the Caucasus andeastof the Urals. The Manych depression, marking the lowest line of this area to the north of the Caucasus, has been taken as the boundary of Europe on the south-east by Wagner in his edition of Guthe's Lehrbuch der Geographic, 3 and the same limit is adopted in Kirehhoff's Ldnderkunde des Erdteils Europa and Stanford's Compendium of Geography and Travel. In favour of this limit it appears that much weight ought to be given to the consideration put forward by Wagner, that from time immemorial the valleys on both sides of the Caucasus have formed a refuge for Asiatic peoples, especially when it is borne in mind that this contention is reinforced by the circumstance that the steppes to the north of the Caucasus must interpose a belt of almost unpeopled territory between the more condensed populations belonging undoubtedly to Asia and Europe respectively. Continuity of population would be an argument in favour of assigning the whole of the Urals to Europe, but here the absence of any break in such continuity on the east side makes it more difficult to fix any boundary line outside of that system. Hence on this side it is perhaps reasonable to attach greater importance to the fact that the Urals form a boundary not only orographically, but to some extent also in respect of climate and vegetation, 5 and on that account to take a line following the crest of the different sections of that system as the eastern limit between the two continents. 6 Obviously, however, any eventual agreement among geographers on this head must be more or less arbitrary and conventional. In any case it must be borne in mind that, whatever conventional boundary be adopted, the use of the name Europe as so limited must be confined to statements of extent or implying extent. The facts as to climate, fauna and flora have no relation to any such arbitrary boundary, and all statistical statements referring to the countries of Europe must include the part of Russia beyond the Urals up to the frontier of Siberia. In such statements, however, in the present article the whole of the lieutenancy of the Caucasus will be left out of account. As to extent it is provisionally advisable to give the area of the continent within different limits.*

*The following calculations in English square miles (round numbers) of the area of Europe, within different limits, are given in Behm and Wagner's Bevolkerung der Erde, No. viii. (Gotha, Justus Perthes, 1891), p. 53: — Europe, within * ea ' the narrowest physical limits (to the crest of the Urals and the Manych depression, and including the Sea of Azov, but excluding the Caspian Steppe, Iceland, Novaya Zemlya, Spitsbergen and Bear Island) 3,570,000 sq. m. The same,*

with the addition of the Caspian Steppe up to the Ural river and the Caspian Sea, 3 1687 ,7 50 sq. m. The same, with the addition of the area between the Manych depression and the Caucasus, 3,790,500 sq. m. The same, with the addition of territories east of the Ural Moun- tains, the portion of the Caspian Steppe east of the Ural river as far as the Emba, and the southern slopes of the Caucasus,

2 At the summit of each of the Trans-Ural railways (Perm- Tyumen and Ufa-Chelyabinsk) and that of the road across the Caucasus from Vladikavkaz to Tiflis, sign-posts, with the name Europe on one side, Asia on the other, mark this boundary.

3 Fifth edition, vol. ii. pp. 24-25. 4 Pt. i. pp. 11-12.

6 Griesbach, on the strength of Middendorff's observations, remarks that, in addition to European fruit trees, oak, maples, elms, ashes and the black alder do not cross the Urals, while the lime tree is reduced to the size of a shrub {La Vegetation du globe, translated by Tchihatchef, i. p. 181).

6 On the history of the boundary between Asia and Europe see F. G. Hahn in the Milteilungen des Vereins filr Erdkunde zu Leipzig (1881), pp. 83-104. Hahn, on the ground that true mountain sys- tems must be regarded as forming geographical units, pronounces against the practice of making " natural boundaries " run along mountain crests, and assigns the whole of the Caucasus region to Europe as all belonging to such a system, but orographically quite different from the Armenian plateau (p. 103). But surely it is no less different from the European plain.

3,988,500 s

The most northern point of the mainland area is Cape Nordkyn in Norway, 71° 6′ N.; its most southern, Cape Tarifa in Spain, in 36° o' N. ; its most western, Cape da Roca in Portugal, Extreme o , w . an(j ; ts most eastern, a spot near the north points. end of the Ural Mountains, in 66° 20′ E.- ' A line drawn from Cape St Vincent in Portugal to the Ural Mountains near Ekaterinburg has a length of 3293 m., and finds its centre m the W of Russian Poland. From the mouth of the Kara to the mouth of the Ural river the direct distance

is 1600 m., but the boundary line has a length of 2400 m. .

Two of the most striking features in the general iconformationot Europe are the great number of its primary and secondary peninsulas, and the consequent exceptional development _ of Const- j ts coas t-Hne — an irregularity arid development which

Unem have been one of the most potent of the physical factors

of its history. The total length of coast-line was estimatedby Reuschle in 1869 at 19,820 m., of which about 3600 were counted as belonging to the Arctic Ocean, 8390 to the Atlantic, and 7830 to the Black Sea and Mediterranean. This estimate, however, does not take into account minor indentations. Reclus's estimate, including the more important indentations, brings the coast-line up to 26 700 m., and that of Strelbitsky up to 47,790 m. (smaller-islands not included), or I m. of coast for about 75 sq. m. of area. Rohrbach calculated the mean distance of all points in the interior of Europe from the sea at 209 m. as compared with 292 m. in the case of North America, the continent which ranks next in this respect. It must be pointed out, however, that, such calculations are apt to be very misleading, inasmuch as the commercial value of the relations thus determined depends not merely on the existence of natural harbours or the presence of facilities for the construction of artificial harbours, but also on the presence of natural facilities for communication between such harbours and a productive interior.

The consideration just mentioned gives great significance to the fact that while the coast-line of Europe is in its general features very much the same as it was at, the beginning of the true Changes historic period, it' has undergone a number of important of coast- j ocal changes, some at least of which are due to causes Uae% that are at work over very extensive areas. , These

changes may be conveniently classified under four heads : _ the formation of deltas by the alluvium of rivers; the increase of the land-surface due to upheaval; the advance of the sea by reason of its own erosive activity; and the advance of the sea through the subsidence of the land. The actual form of the coast, however, is frequently due to the simultaneous or successive action of several of the causes— sea and river and subterranean forces helping or resisting each other. That changes in the coast-line on the shores of the Gulf of Bothnia have taken place within historical times through elevation of the land seems now to be generallyˆdmitted- The commune of Hvittisbofjard north of Bjorneborg on the V inland side

of that gulf gained about 2\ sq. m. between 1784 and 1894, an amount greater than could be accounted for by the most liberal estimates of alluvial deposit, and the most careful investigation seems to show that on the Swedish coast of that gulf a rise has taken place in recent years on the east coast of Sweden from about 57 20′ N. increasing in amount towards the north up to 62 20 IN., where it reaches an average of about two-fifths of an inch annually. 2 Our information is naturally most complete in regard to 1 the Mediterranean coasts, as these were the best known to the first book-writing nations. There we find that all the great rivers have been successfully at work— more especially the Rhone, the Ebro and the Po. The activity of the Rhone, indeed, as a maker of new land, is' astonishing. The tower of St Louis, erected on the coast in 1737, is now up- wards of four miles inland; the city of Artes is said to be nearly twice as far from the sea as it was in the Roman period. The present St Gilles was probably a harbour when the Greeks founded Mar- seilles, and Aigues Mortes, which took its place in the middle ages, was no longer on the coast in the time of St Louis (13th century), but Narbonne' continued to be a seaport till the 14th century. At the mouth of the Herault, according to Fischer, 3 the coast advances at least two metres or about 7 ft. annually ; and it requires great labour to keep the harbour of Cette from being silted up. The Fo is even more efficient than the Rhone, if the size of its basin be taken into account. Ravenna, which was at one time an insular city like Venice, has now a wide stretch of downs partly covered with pirie forest between it and the sea. Aquileia, one of the greatest seaports

1 Petermanns Mitteilungen (1890), p. 91.

2 See Supan's Physische Erdkunde, 4th ed., pp. 37o-377. and the authorities there quoted. ..

- *" Kiistenveranderungen im Mittelmeergebiet, in Ztschr. der Ges. fur Erdkunde s« Berlin (1878).*

of, tfbfc Mediterranean in, the, eapty centuries, of the Christian era, r is now 7 m., from, the coast, and Adria, which gives its name to the sea. is 13. The islands on which Venice is built have sunk about 3′ ft. since the 1 6th cerit'irry: ' the pavement'of the square 1 of St Mark's has frequently required to. be raised; and the boring of a well has sholvn that a layer of vegetable remaiˆSj indicating a flora identical with that observed at present; on the neighbouring mainland, exists 4t adepth of 400 ft. below the alluvial deposits. A tittle to the south of Rovigno oh the Istriari coast on the opposite. side of the Adriatic a

diver found at 'the depth of about 85 ft. the remains pf a town, which has been identified with, the island town of Cissa, of which nothing had been known after the year 079. 4 At Zara., ancient pavements and mosaics are found below the sea-level, and the district at, the mouth of the Narenta has beenchanged into a swamp by the.advance of the se;,a. A process of elevation, on the other hand, is indicated along nearly, all'the coasts of Sicily,' at the southern end of Sardinia, the east" of Corsica, and perhaps in the neighbourhood of Nice, while the west coast/ o'f Italy from the latitude of Rome to the southern shores of the Gulf of : Salerno has undergone' consider- able oscillations' of level within historical times. About the time of the settlement of the Greeks the coast : stood at -least 20 ft. above the level of the present day. Depression began in Roman times, though then the land was still 16 ft. higher than now. A more rapid depression began in the middle ages, so that the sea-level rose from 18 to 20 ft. above- the present zero, and the coast began gradually to rise again at the close of the ,15th century. 6 Passing eastward to the Balkan peninsula,, we find considerable changes on the coast- line 1 of Greece; but as they are only repetitions on a smaller scale pf the phenomena already described, it is sufficient to indicate the Gulf of Arta and the moiith of the Spe'rcheios as two of the more important localities. The;; latter especially is interesting to the historianas well as to the geologist,, as the river has greatly altered the physical features of" one of the world's most famous scenes — trip battlefield of Thermopylae. ",""""*

■'•;■■■■ "" : '. ' '.

If we proceed to the Atlantic seaboard' we observe, as We might expect; great modifications in the embouchures, of the Garonne and- the Loire, but by far. the most remarkably variations, qf,sea and land have taken place in the region extending from the south of Belgium' in the' neighbourhood of the'Straits of Dover to the mototh of the Elbe and the'west coast of Schleswig-Holstein. Here there has been a prolonged struggle between man and nature,, in which on the whole nature has hitherto had the best of the battle. While, as is well known, much land below sea-level in the Low Countries has been protected against the sea by dikes and reclaimed, and the Coast-line has been, On the whole, advanced between the Elbe and the Eider, 6 there has beenagreat loss of land in the interior of Holland since the beginning of the Christian era, and, on the balance a large loss.of land north of the Eider since the first half of the 13th century. 7 In'the 1st century A.Dl the Zuider Zee appears to have been represented only by a comparatively small inland lake, the dimensions of which were increased by different inroads of the sea, the last and

greatest of which occurred in 1395. Among the local changes , of European; significance within this area may be mentioned the silting up towards the end of the 15th century of the channel known as the Zwin running north-eastwards ‘ from Bruges, which through that cause lost its shipping and in the end all its former renown as a seat of commerce. , ,-...■•■*

The, Baltic .shores of Germany display the same phenomena of local gain and loss. In the western section inroads of the sea have been extensive’: the island of Rugen would no longer serve for the disembarkation Of an army like that of Gustavus Adolphus; Wollin and Usedom are, growing gradually less; large stretches of the mainland are fringed with submerged forests; and at intervals the sites of well-known villages are occupied by the sea. Towards the ea : st the great” rivers are “successfully working in the opposite direction. In the Gulfof Danzig the alluvial deposits of the Vistula cover a,n area of 615 sq. m.; in the 13th century the knights of Marienburg enclosed with dikes about 350 sq. m. ; and an area of about 76 sq. m. was added in the course of the 14th. The Memel is silting up the Kurisches Haff, which, like the Frisches Haff, is separated from the open sea by a line of dunes comparable with those of the Landes in France. The sorcalled strand or coast-lines at various altitudes round the Scandinavian peninsula, though belonging for the most part to glacial times, speak also of relative changes of level in the pdst-glacial period.

The changes briefly indicated above take place so gradually for the most part that it requires careful observation and comparison of data to, establish, their reality. : It is very different V olcanoes with thosechanges which we usually ascribe to volcanic aadeart „. agency. Besides the great outlying “hearth ” of Iceland, quateSy .-, there are four centres of volcanic activity in Europe — all of them, however, situated in the Mediterranean. Vesuvius on the western coast of Italy, Etna in the, island of Sicily, and Stromboli — : — ~ ” 1 : ~ ‘■

4 See Milteil. der Wiener Geog. Gesellschafl (1890), P- 333- :

5 See R. T.‘Gunther, Contributions to the Study of Earth-Movements in the Bay of Naples (Oxford, 1903), and ” Earth-Movements in the Bay of Naples,” in the Geog. Journ. vol. xxii. pp. 121-149, 269-285.

6 See J>etermanns Milteil. (1891),, PI. 8. 7 lb. (1893), PI. 12. ,

in the Lipari group, have been familiarly known from the earliest historic times ; but the fourth ha only attracted particular attention since the 18th century.; It lies in the Archipelago, on thesoutherri edge of the Cyclades,. near the little group of islets called Santorin. iThe region was evidently highly volcanic at an earlier .period, for Milo, one of the nearest ofthe islands,* simply a ruined crater still present- ing smoking solfataras and other traces of former activity. - ■■ The devastations produced by the eruptions of the. European yolcanoes are usually confined within very narrow limits; and it is only at long intervals that any part of the continent is visited by a really formidable earthquake. The only part of : Europe, .however, for which there are no recorded earthquakes, is .central and northern Russia ; and thq Alps and Carpathians, especially the intra-Car- pathian area of depression, Greece, Italy, especially Calabria and the adjoining part of Sicily, the Sierra Nevada and the Pyrenees, the Lisbon district andthe rift valley of the upper Rhines (between the Vosges and the Black Forest) are all regions specially liable to earthquake shocks and occasionally to shocks of considerable in- tensity. One well-marked seismic line extends along the south side of the Alps from Lake Garda by Udine and Gorz to Fiume, and another forms a curve, convex towards the south-east passing first through Calabria, then through the north-east of Sicily to the south of the Peloritan Mountains. 1 Of all European earthquakes in modern times, the most destructive are that of Lisbon in 1755, and that of Calabria in 1 7.83 ; the devastation produced by the former has become a classical instance of such disasters in popular literature, and by the latter 100,000 people are said to have lost their lives. • Calabria again suffered severely in 1865,' 1870, 1894, 1905 and 1908*

If the European mountains are arranged according to their greatest elevations, they rank as follows: — -(l) the Swiss Alps, with Relief their highest peaks above 15,000 ft.; (2) the Sierra

' Nevada, the Pyrenees, and Etna, about ji,ooq ft.; (3)

the Apennines,the Corsican Mountains, the Carpathians,the Balkans, and the Despoto Dagh, from 8000 to 9000; (4) the Guadarrama, the Scandinavian Alps, the Dinaric Alps, the Greek Mountains, and the Cevennes, between 6000 and 8000; (5) the mountains, of Auvergne, the Jura, the Riesengebirge, the mountains of Sardinia, Majorca,

Minorca, arid the Crimea, the Black Forest, thfe Vosges; and the Scottish Highlands, from 4000 to 6000.

The following estimates are based on those contained in the fifth edition, by ; Dr Hermann Wagner, of Guthe's Lehrbuch . der Geo- eraphie. In the original the figures are given in German sq. m. and in sq. kilometres in round numbers, and the equivalents here given in English sq. m. are similarly treated :—

■ ■ ' Sq. m. The great European plain in its widest sense . 2;66o,ooo The same exclusive of inland seas . . . 2,300,000 : The same exclusive of the Scandinavian and

British lowlands. 2,125,000

All other European lowlands 385,000

The Hungarian plain . . . 38,000

The Po plain 2t,ooo

The Scandinavian highlands 190,000

The Ural Mountains 127,000

The Alps . . 85,000

The Carpathians . 72,000

The Apennines . , ... 42,500

The Pyrenees . , ,- ■ . . .: ■ . . 21,500

Several estimates have been made of the average elevation of the tontinent, but it is enough to give here the main results. In the following list, where a conversion from metres into feet has been necessary, the nearest multiple of 5 ft. has been given: — Humboldt, 675ft.; Leipoldt, 2 975 ft. ; De Lapparent, 3 960 ft. ; Murray, 4 939 ft.; Supan, 5 950 ft.; von Tillo, 8 1040 ft. ; Heiderich, 7 1230 ft.; Penck, 8 1085 ft. The exceptionally high estimate of Heiderich is due to the fact that by him Transcaucasia and the islands of Noyaya Zemlya, Spitsbergen and Iceland are reckoned as included in Europe.*

Of more geographical significance than these estimates are the facts with regard, to the arrangement of the highlands, of the con- tinent. It is indeed this arrangement combined with the Arrange- f orm f j ne coast-line which has indirectly given to Europe its individuality. .

Three points .have to be noted under this head:— (1.) t;he fact that the .highlands of Europe are so.distrihuted as to allow of the penetration of westerly winds far to the east ; (2) the fact that the principal series of high-: lands .has a direction from east to. west, Europe in this point resem- bling Asia, but differing from North America.; and. ,(3), that in, Europe the : mountain systems belonging to the series of highlands

1 See. Ed. Suess, The Face of the Earth, translated by H. B- Ci Sollas, vol. i. (Oxford, 1904) ;"'J. Milne, Seismology (London, 1886); R. Homes, Erdbebenkunde (Leipzig, 1 893). " '

1 Die mitttere r H She Europas (Pla'tren,'i874).

3 Tratli de %iolo£ie (Paris, 1883). 4 Scot.Geog. Afag.(l888), p.23. ! & Petertnanns Mitteilungen (1889), P- l 7 , s Trans. (Izvestiva) Imp. Rus. Geag. Soc. (1889),. p, 113.

7 Die mittleren Erhebungsverhatinisse, der Erdoberfidche, pt. i., in Penck.'s Geographische A-bhandlungentVoY. v. (Vienna, 1.891). ,,.!

8 Morpnologie der Erdoberflac%e,vo. i. ' ... , ,;

meat of tire high

1

Length in English Miles.

Area of Basin in sq. m. .

Name of River.

Strelbitsky.

Other Authorities.

Strelbitsky.

Volga ....;. . .

1977 '

2107 2

563.300

Danube . ; . .. .

1644

315-435 .

Ural, ...

1446:

14772

96,350

Dnieper (Dnyepr) .

1064

13282

203,460

Kama . . . . , .

984

1115 2

202,615

Dpn (Russia) . .

980

1123 2

166,125

Pechora ...

915

1024 2

127,225

Rhine ... . .

709

63,265

Oka ; .., . . ., . .

706

914 2

93.205

Dniester (Dnyestr)

646

835 2

29.675

Elbe ■■ ...., ...

612

55.340

Vistula > ..

596

646 2

73.905

Vyatka , :'. . .

596

680 2

50,555

Tagus. . . . . ,.

566

31.865 3

Theiss (Tisza) .

550

59.350

Loire . . . .

543

46,755

Save ... ..

535

37.595

Meuse

, 53°

12,740

Metfen! . . ■”. • . .

496

507 2

30,410

Donets . . . ‘ . r ;

487

613 2

37.890

Douro . . .

485

36,705

Diina (S. Dvina): .... .,

47o.

576 2

32,975

Ebro '; ., ... , ■

. : 470

38,580 »

Rhone . . . . .

447

38,180

Desna ...;'.

438

590 2

33.535

Niemen (Nyeman)

437

537 2

34.965

434

15.745

Bug (Southern)

, ... 428

477 2

26,225

Seine .....

425

30,030

Oder .....

424

I7.I50

Kuban . . ..

. 405

509 2

21 ,490

387

563 2

23,120

Maros . . ...

390

16,975

Pripet ■ >. _ . ...

378

404 2

46,805

Guadalquivir . .

• 374

21,580'

Pruth (Prutii) . i .■ .

368

503 2

10,330

Northern Dvina .

358

447 2

141.075

Weser-Werra . . . . .

355 ;

19.925

Po . . . . . .

354

28,920 ‘

Garonne-Gironde .

342

32,745

328

464 2

14,325

Pinega . . . . .

328

407 2

17,425

Glommen . .

326

352 4

15,930

Bug (Western) .

. 318

450 2

22,460

Guadiaha .. . . . .

: 316

25,300 3

Aluta (Alt, Oltuy . , .

308

9.095

Mosel . . . , . .

3OO

10,950

Main :■• . . ’■.,

3OO

10,600

Maritsa . . ‘.. ■ .. .

272

20,790

ijucar ;. . . ..

270

7,620 3

Mologa . . ...

268

338 2

15,005 ,

Tornea . ...

268

13,045

Inn . . ...

268

9,825

Sa6ne . . . ...

268

8,295

Moldau ...

255

267 4

10,860

249

371 2

19,090

Ljusna, ■.■ . . : .

243

7,700

Mur . . . . . .

242

5,200

Morava, Servian

235

15,715

Klar ; ; .

224

4,520

Voronezh . ...

218

305 2

7,760

Berezina . . ...•'.

218

285 2

9.295

Saale . . . . ,

215

8,970

Onega . . ...

212

245 2

22,910

Vag (Waag) . ., ,

212

6,245

Dema . ..-.,(., .

209

275 2

4.830

.San ,._,.,.,.; . .:

203

444 2

6.135

1 Moskva .

I89

305 2

5,9io

Western Manych .

176

295 2

37,820

Klyazma .; . .

159

394 2

15,200

. V The equivalent of the figures given in Superficie de V Europe. A Ujter measurement by Strelbitsky yielded a result equal to 2215 English miles.'

,' General von Tillo, in Transactions (Izvesliya) Imp. Rus. Geog. Soc. vol. xix. (1883), pp. i6o-i6r.

8 Dr AL Bludau in Petermanns Mitteilungen (1898), pp. 185-187, has given new calculations of the areas of the basins of certain European rivers, namely, the Tagus, 31,250 sq. m.; Ebro, 32,810 sq.m.; Guadalquivir, 21,620 sq. m.; Po, 28,800 sq. m.; Guadiana, 25,810 sa/rri.; and Jucar, 8245 sq. m.

4 St Martin, Diet, degeog./univ.

referred to not only have more or less well-marked breaks between them, but are themselves so notched by passes and cut by transverse valleys as to present great facilities for crossing in proportion to their average altitude. The first and second of these points have special importance with reference to the climate and will accordingly be considered more fully under that head. The second is also of importance with reference to the means of communication, to which the third also refers, and detailed consideration of these points in that relation will be reserved for that heading. Here, however, it may be noted that in Europe the distribution of the natural resources for the maintenance of the inhabitants is such that, if we leave out of account Russia, which is almost entirely outside of the series of highlands running east and west, the population north of the mountains is roughly about 50 % greater than that south of the mountains, whereas in Asia the population north of the east and west highland barrier is utterly insignificant as compared with that to the south.

From the table given on p. 909 (col. 1) it will be seen that the most extensive of the highland areas of Europe is that of Scandinaviaj which has a general trend from south-south-west to north-north-east, and is completely detached by seas and plains from the highland area to the south. There are other completely detached highland areas in Iceland, the British Isles, the Ural Mountains, the small Yaila range in the south of the Crimea, and the Mediterranean islands. The connected series of highlands is that which extends from the Iberian peninsula to the Black Sea stretching in the middle of Germany north- wards to about 52° N. Inthe Iberian peninsula we

have the most marked example of the table- land form in Europe, and these tablelands are bounded on the north by the Cantabrian Mountains, which descend to the sea, and the Pyrenees, which, except at their extremities, cut off the Iberian peninsula from the adjoin- ing country more extensively than any other chain in the continent. Between the foot-hills of the Pyrenees, however, and those of the central plateau of France the ground sinks in the Passage of Naurouse or Gap of Carcassonne to a well-marked gap establishing easy com- munication between the valley of the Garonne and the lower part of that of the Rhone. The highlands in the north spread northwards and then north-eastwards till they join the Vpsges, but sink in elevation towards the north-east so as to allow of several easy crossings. East of the Vosges the Rhine valley forms an important trough running north and south through the highlands of Western Germany. To the south of the Vosges again undulating country of less than 1500 ft. in elevation, the well-known Burgundy Gate or Gap of Beifort, constitutes a well-marked break between those mountains and the Jura, and establishes easy communication between the Rhine and the Sa6ne- Rhone valleys. The latter valley divides in the clearest manner the highlands of central France from both the Alps and the Jura, while between these last two systems there lies the wedge of the Swiss midlands contracting south-westwards to a narrow but important gap at the outlet of the Lake of Geneva. Between the Alps and the mountains of the Italian and Balkan peninsulas the orographical lines of demarcation are less distinct, but on the north the valley of the Danube mostly forms a wide separation between the Alps and the mountains of the Balkan peninsula on the south and the highlands of Bohemia and Moravia, the Carpathians and the Transyl- vanian Alps on the north. The valleys of the Eger and the Elbe form distinct breaks in the environment of Bohemia, and the Sudetes on the north-east of Bohemia , and Moravia are even more clearly divided from the Carpathians by the valley of the upper Oder, the Moravian Gate, as it is called, which forms the natural line of communication between the south-east of Prussia and Vienna.

An estimate has been made by Strelbitsky of the length and of the area of the basins of all the principal rivers of Europe. In the _. table on p. 909 all the estimates given without any special

ve ‘ authority are based on Strelbitsky’s figures, but it should be mentioned that the estimates of length made by him evidently do not take into account minor windings, and are therefore generally less than those given by ethers. The authorities are separately cited for the originals of all other figures given in the table. 1

1 In other parts of this work areas of river-basins and lakes, and other measurements, may be observed to conflict in some degree with those given here. Various authorities naturally differ, both in methods of estimating and in standards of precision.

The observations on the temperature of European rivers have been collected and discussed by Dr Adolf E. Forster. 2 He finds that the dominant factor in determining that temperature is the temperature of the air above, but that rivers are divisible into four groups with respect to the relation between these temperatures at different seasonˆjf the year. These groups are rivers flowing from glaciers, in which the temperature is warmer than the air in winter, colder in summer; rivers flowing from lakes, characterized by peculiarly high winter temperatures, in consequence of which the mean temperature for the year is always above that of the air ; rivers flowing from springs, which, at least near their source, are more rapidly cooled by low than warmed by high air temperatures; and rivers of the plains, which have a higher mean temperature than the air in all months of the year.

In various parts of Europe, more particularly in calcareous regionsˆ such as the Jura, the Causses in the south-east of France, and the Karst in the north-west of the Balkan peninsula, there are numerous subterranean or partly subterranean rivers. Several of the more important rivers are of very irregular flow, and some are subject to really formidable floods. This is particularly the case with rivers a large' part of whose basin is made up of crystalline or other impervious rocks with steep slopes, like those of the Loire in France and the Ebro in Spain. The Danube and its tributaries, the great rivers of Germany, above all eastern Germany, and those of Italy, are also

Name of Lake and Country.

Height

above

Sea.

Area.

Greatest Depth.

Mean Depth.

Volume. Millions of Cub. Ft.

Ft.

Sq. m.

Ft.

Ft.

Ladoga, Russia ....

15

7004

730

Onega, ,, – .

“5

3765

About 1200

Vener, Sweden . . .

H5

2149

280

Chudskoye or Peipus, Russia

100

1357 3

90

‘.’.

Vetter, Sweden .! .

290

733 680

*4*5*

Saima, Russia

255

185

Pajane, „ .

255

608

Enare, „ ....

490

549

, t

Segozero, „ ....

481

140

Malar, Sweden . . . .

i-6

449

170

Byelo-Ozero, Russia

400

434

35

Pielis, Russia . .

305

422

Topozero, Russia ,

411

Ulea, „'.!'. . .

375

380

60

Ilmen, „ .

107

358

Vigozero, ,, .

332

Imandra, „ ...

3 2 9

Balaton, Hungary

350

266

13

Geneva, France and Switzer-

1220

225

1015

500

3,140,000

Kovdozero, Russia .

225

Constance, Germany and

Switzerland

1295

208

825

295

1,711,000

Hjelmar, Sweden

79

187

60

Neagh, Ireland ….

48

153

113

Kubinskoye, Russia

152

Mjosen, Norway

395

152

1485

Garda, Italy and Austria .

215

143

“35

H5

1.757.000

Torne-trask, Sweden

1 140

139

Neusiedler-see, Hungary

37o

137

T 3

Scutari, Turkey ...

20

About 130

33

12J

45.900

Siljan, Sweden ....

123

Virzjarvi, Russia

115

107

24

Seliger, „ . . .

825

100

105

Stor Afvan, Sweden

1370

92

925

Yalpukh, Russia

89

Neuchatel, Switzerland

1415

85

500

210

500,000

Ylikitkakarvi, Russia .

680

85

30

Maggiore, Italy and Switzer-

645

82

1220

575

1,316,000

Corrib, Ireland ....

30

71

152

655

56

1360

Lakes and marshes.

notorious for their inundations. In southern Europe, where the summers are nearly rainless, most of the rivers disappear altogether in' that season.

For many European lakes, especially the smaller ones, estimates have been made of the mean depth and the volume. A list of all the European lakes for which the altitude, extent, and greatest depth could be ascertained, compiled by Dr K. Peucker, is published in the Geog. Zeitschrift (1896), pp. 606-616, where estimates of the mean depth and the volume are also given where procurable. The table given above, comprising only the larger lakes, is mainly based on this list, where the original author- ities are mentioned. The figures entered in the table not taken

1 Penck's Geogrophische Abhandlungen, vol. v. pt. iv. (Vienna, 1894); noticed in Geog. Journ. vol. vi. p. 264.

' Including L. Pskov as well as the connecting arm known as Teploye.

from this list are after Strelbitsky, the Geog. Universelle of V. de St Martin, or, in the case of Swedish lakes, from the official hand- book of Sweden. 1

The Alpine lakes break up into a southern and northern sub- division — the former consisting of the Lago Maggiore, and the lakes of Lugano and Como, Lago d'Iseo, and Lago di Garda, all connected by affluents with the system of the Po; and the latter the Lake of Geneva threaded by the Rhone, Lakes Constance, Zurich, Neu- chatel, Biel and other Swiss lakes belonging to the basin of the Rhine, and a few of minor importance belonging to the Danube. The north Russian lakes, Ladoga, Onega, &c, are mainly noticeable as the largest members of what in some respects is the most remark- able system of lakes in the continent — the Finno-Russian, which consists of an almost countless number of comparatively small irregular basins formed in the surface of a granitic plateau. In Finland proper they occupy no less than a twelfth of the total area.

A few of the number are very shallow. The Neusiedler See, for example (the Peiso Lacus of the Latins and FertS-tava of the Hun- garians), completely dried up in 1693, 1738 and 1864, and left its bed covered for the most part with a deposit of salt. 2 Lakes Copais in Boeotia and Fucino Celano in Italy have been entirely turned into dry land. The progress of agriculture has greatly diminished the extent of marsh land in Europe. The Minsk marshes in Russia form the largest area of this character still left, and on these large encroach- ments are gradually being made. Extensive marshes in northern Italy have been completely drained. The partial draining of the Pomptine marshes in Italy made Pope Pius VII. famous in the 18th century, and further reclamation works are still in progress there and elsewhere in the same country. (G. G. C.)

The geological history of Europe 3 is, to a large extent, a history of the formation and destruction of successive mountain chains. . Four times a great mountain range has been raised across

Qeology. t j lg area w hich now is Europe. Three times the mountain range has given way ; portions have sunk beneath the sea, and have been covered by more recent sediments, while other portions re- mained standing and now rise as isolated blocks above the later beds which surround them. The last of the mountain ranges still stands, and is known under the names of the Alps, the Carpathians, the Balkans, the Caucasus, &c, but the work of destruction has already begun, and gaps have been formed by the collapse of parts of the chain. The Carpathians were once continuous with the Alps, and the

Caucasus was probably connected with the Balkans across the site of the Black Sea.

These mountain chains were not raised by direct uplift. They consist of crumpled and folded strata, and are, in fact, wrinkles in the earth's outer crust, formed by lateral compression, like the puckers which appear in a tablecloth when we push it forward against a book or other heavy object lying upon it. How the lateral or tangential pressures originated is still matter of controversy, but the usually accepted explanation is as follows. The interior of the earth in cooling contracts more rapidly than the exterior, and, if no other change took place, the outer crust would be left as a hollow sphere without any internal support. But the materials of which it is composed are not strong enough to bear its enormous weight, and, like an arch which is too weak in its abutments, it collapses upon the interior core. Where the crust is rigid it fractures, as an ordinary arch would fracture; and some portions fall inward, while other parts may even be wedged a little outward. Where, on the other hand, the crust is made of softer rock, it crumples and folds, and a mountain chain is produced. Such a mountain chain, for want of a better term, is called a folded mountain chain. The folding is most intense where a flexible portion of the crust lies next to a more rigid part. Where the folding has occurred, the rocks which were once comparatively soft become hard and rigid, and the next series of wrinkles will usually be formed beyond the limits of the old one. This is what has happened in the European area.

The oldest mountain chain lay in the extreme north-west of Europe, and its relics are seen in the outer Hebrides, the Lofoten Islands and the north of Norway. The rocks of this ancient chain have since been converted into gneiss, and they were folded and denuded before the deposition of the oldest known fossiliferous sediments. The mountain system must therefore have been formed in Pre-Cambrian times, and it has been called by Marcel Bertrand the Huronian chain. It is probable that a great land-mass lay towards the north-west; but in the sea which certainly existed south-east of the chain, the Cambrian, Ordovician and Silurian beds were deposited. In Russia and South Sweden these beds still lie flat and undisturbed; but in Norway, Scotland, the Lake District, North Wales and the north of Ireland they were crushed against the north-western continent and were not only intensely folded but

1 Sweden, its People arid its Industry (Stockholm, 1904).

2 See Ascherson, " Die Austrocknung des Neusiedler Sees," in Z. der

Ges. fur Erdkunde zu Berlin (1865).

*3 See Suess, The Face of the Earth; M. Bertrand, " Sur la distribution geographique des roches eruptives en Europe," Bull. Soc. Geol. France, ser. 3, vol. xvi. (1887-1888), pp. 573-617. A translation of a lecture by Suess, giving a short summary of his views on the structure of Europe, will be found in the Canadian Record of Science, vol. vii. pp. 235-2*6.*

were pushed forward over the old rocks of the Huronian chain. Thus was formed the Caledonian mountain system of Ed. Suess, in which the folds run from south-west to north-east. It was raised at the close of the Silurian period.

Then followed, in northern Europe, a continental period. By the elevation of the Caledonian chain the northern land-mass had grown southward and now extended as far as the Bristol Channel. Upon it the Old Red Sandstone was laid down in inland seas or lakes, while farther south contemporaneous deposits were formed in the open sea.

During the earlier part of the Carboniferous period the sea spread over the southern shores of the northern continent; but later the whole area again became land and the Coal Measures of northern Europe were laid down. Towards the close of the Carboniferous period the third great mountain chain was formed. It lay to the south of the Caledonian chain, and its northern margin stretched from the south of Ireland through South Wales, the north of France and the south of Belgium, and was continued round the Harz and the ancient rocks of Bohemia, and possibly into the south of Russia. It is along this northern margin, where the folded beds have been thrust over the rocks which lay to the north, that the coalfields of Dover and of Belgium occur. The general direction of the folds is approximately from west to east; but the chain consisted of two arcs, the western of which is called by Suess the Armorican chain and the eastern the Variscian, The two arcs together, which were undoubtedly formed at the same period, have been named by Bertrand the Hercynian chain. Everywhere the chief folding seems to have occurred before the deposition of the highest beds of the Upper Carboniferous, which lie unconformably upon the folded older beds. The Hercynian chain appears to have been of considerable breadth, at least in western Europe, for the Palaeozoic rocks of Spain and Portugal are thrown into folds which have the same general direction and which were formed at approximately the same period. In eastern Europe the evidence is less complete, because the Hercynian folds are buried beneath more recent deposits and have in some cases been masked by

the superposition, of a later series of folds.

The formation of this Carboniferous range was followed in northern Europe by a second continental period somewhat similar to that ol the Old Red Sandstone, but the continent extended still farther to the south. The Permian and Triassic deposits of England and Ger many were laid down in inland seas or upon the surface of the land itself. But southern Europe was covered by the open sea, and here, accordingly, the contemporaneous deposits were marine.

The Jurassic and Cretaceous periods were free from any violent folding or mountain building, and the sea again spread over a largf part of the northern continent. There were indeed several oscil-lations, but in general the greater part of southern and central Europe lay beneath the waters of the ocean. Some of the fragments of the Hercynian chain still rose as islands above the waves, and at certain periods there seems to have been a more or less complete barriei between the waters which covered northern Europe and those which lay over the Mediterranean region. Thus, while the estuarine deposits of the Upper Jurassic and Lower Cretaceous were laid down in England and Germany, the purely marine Tithonian formation, with its peculiar fauna, was'^deposited in the south ; and while the Chalk was formed in northern Europe, the Hippurite limestone was laid down in the south.

The Tertiary period saw fundamental changes in the geography of Europe. The formation of the great mountain ranges of the south, the Alpine system of Suess, perhaps began at an earlier date, but il; was in the Eocene and Miocene periods that the chief part of the elevation took place. Arms of the sea extended up the valley of the Rhone and around the northern margin of the Alps, and also spread over the plains of Hungary and of southern Russia. Towards the middle of the Miocene period some of these arms were completely cut off from the ocean and large deposits of salt were formed, as at Wieliczka. At a later period south-eastern Europe was covered by a series of extensive lagoons, and the waters of these lagoons gradu-ally became brackish, and then fresh, before the area was finally converted into dry land. Great changes also took place in the Mediterranean region. The Black Sea, the Aegean, the Adriatic and the Tyrrhenian Sea were all formed at various times during the Tertiary period, and the depression of these areas seems to be closely connected with the elevation of the neighbouring mountain' chains.

Exactly what was happening in northern Europe during these great changes in the south it is not easy to say. The basaltic flows of the

north of Ireland, the western islands of Scotland, the Faeroe Islands and Iceland are mere fragments of former extensive plateaus. No sign of marine Tertiary deposits of earlier age than Pliocene has been found in this northern part of Europe, and on the other hand plant remains are abundant in the sands and clays interbedded with the basalts. It is probable, therefore, that in Eocene times a great land-mass lay to the north-west of Europe, over which the basalt lavas flowed, and that the formation of this part of the Atlantic and perhaps of the North Sea did not take place until the Miocene period.

At a later date the climate, for some reason which has not yet been fully explained, grew colder over the whole of Europe, and the northern part was covered by a great ice-sheet which extended south-ward nearly as far as lat. 50? N., and has left its marks over tr-»

whole of the northern part of the continent. With the final melting and disappearance of the ice-sheet, the topography of Europe assumed nearly its present form, and man came upon the scene. Minor changes, such as the separation of Great Britain from the continent, may have occurred at a later date ; but since the Glacial period there have, apparently, been no fundamental modifications in the configuration of Europe.

The elevation of each of the great mountain systems already described was accompanied by extensive eruptions of volcanic rocks, and the sequence appears to have been similar in every case. The volcanoes of the Mediterranean are the last survivors of the great eruptions which accompanied the elevation of the Alpine mountain system. (P. La.)

In western Europe by far the most prevalent wind is the S.W. or W.S.W. It represents 25% of the annual total; while the N. is only 6%, the N.E. 8, the E. 9, the S. 13, the W. 17 and Winds. t [j e n.W. 11. Of the summer total it represents 22%, while the N. is 9, N.E. 8, E. 7, S.E. 7» W. 2.1 and N.W. 17. In south-eastern Europe, on the other hand, the prevailing winds are from the N. and E. — the E. having the preponderance in winter and autumn. 1 Of local winds the most remarkable are the fohn, in the Alps, distinguished for its warmth and dryness; the Rotenturm wind of Transylvania, which has

similar characteristics: the bora of the Upper Adriatic, so noticeable , for its violence; the mistral of southern France; the etesian winds of the Mediterranean; and the sirocco, which proves so destructive to the southern vegetation. Though it is only at comparatively rare intervals that the winds attain the development of a hurricane, the destruction of life and property which they occasion, both by sea and land, is in the aggre- gate of no small moment. About .six or seven storms from the west pass over the continent every winter, usually appearing later in the southern districts, such as Switzerland or the Adriatic, than in the northern districts, as Scotland and Denmark.

The great determining factors of the climate of Europe are these. The northern 1 borders of the continent are within the Arctic Circle; the most southern points of the mainland are 135° or Climate. more north of the Tropic of Cancer; to the east extends for about 3000 m. the continuous land surface of Asia; to the west lie the waters of the north Atlantic, which penetrate in great inland seas to the north and south of the great European peninsula ; the prevailing winds in western Europe as already stated are more or less south-westerly ; and the arrangement of the highlands is such as to allow of the penetration of winds with a westerly element in their direction far to the east. The first two of these factors are not distinguishing influences. They affect the climate of Europe in the same manner as they do that of any other land surface in the same latitudes.

The remaining factors, however, are of the highest importance. It is to them in fact that Europe owes in a very large measure those physical conditions which are the basis of its recognition as a separate continent. In estimating the value of those factors one must bear in mind, first, that the waters of the north Atlantic are exceptionally warm, especially on the European side of the ocean. The Gulf Stream carries a large body of warm water northwards to near the parallel of 40 N., and to the north of the Gulf Stream prevailing south-westerly winds, especially during the winter months, drift onwards to the western and northern shores of Europe, even as far east as Spitsbergen, large bodies of water of an exceptionally high temperature. Secondly, one must bear in mind that these relatively high temperatures over the ocean promote evaporation and thus favour the presence of a relatively large amount of water-vapour in the air over those parts of the ocean which adjoin the continent ; and, thirdly, that, as the winds are the sole means of carrying water-vapour from one part of the earth's surface to the other, and the sole means of carrying heat and cold from the ocean to the land, the prevailing south-westerly winds are allowed by the superficial configuration to bring a relatively high rainfall and a

relatively large amount of heat in winter to land farther in the interior than in any corresponding latitudes. During the summer the winds referred to have a cooling effect, but not to the same degree as those of winter tend to raise the temperature. From the point of view just indicated the only part of the world that is fairly com- parable with Europe is the west of North America ; but, as there the outline and superficial configuration are quite different, the oceanic influences affect only a narrow strip of seaboard and not any extent of land which could be regarded as of continental rank. It is owing to these influences that in the greater part of Europe there is a more or less continuous population dependent on agriculture. On the east side of Europe, again, the existence of the continent of Asia has a marked effect on the climate which also aids in. giving to Europe its individual character. It is owing to that circumstance that the south-east of the continent, which has temperatures as favourable to agriculture as the corresponding latitudes of eastern Asia or eastern North America, is without the copious rains which make those temperatures so valuable, and hence forms part of the desert that divides the populations of Europe and Asia,

1 Vesselovski, as quoted by Voeikpv, Die atmosph&rische Circula- tion.

On the local distribution of rainfall and temperature, the physical configuration of the continent has very marked effects. Here as elsewhere there is a striking difference both in the amount of rainfall and the temperature on the weather and lee Prettfpl- sides of mountains and even low hills. But with reference « a "0«i to this it should not be forgotten that water- vapour, heat and cold may be carried farther into the land by winds blowing in a different direction from that of those by which they were introduced from the ocean, and, with reference to rainfall, that the condensation of water-vapour may be brought out by different winds from those by which the, water- vapour was brought to the area in which it is condensed. Water-vapour that may have been introduced by a south-westerly wind may be driven against a mountain side by a northerly or easterly wind, and thus cause rain on the northern or eastern side of; the mountain. Still, any rainfall map of Europe indicates clearly enough the origin of the water- vapour to which the rainfall is due. Such a map, taking into account the results of more detailed investigations of different parts of the continent, is that of Joseph Reger. 8 This map shows the rainfall or rather total precipitation in seven tints at intervals of 250 mm. (about 10 in.) up to 1000 mm., and beyond that at intervals of 500 mm. up to 2000 mm. In some parts of the continent the limits of a rainfall of 200 mm. and 600

mm. are also shown. The picture there given is too complicated for brief description except by saying quite generally that it shows on the whole a diminution in the total amount of precipitation from west to east, and that the heaviest precipitation is indicated on the west or south and most exposed sides of moun- tains. The areas; of scantiest rainfall lie to the north and north-west of the Caspian Sea and in the interior of the Kola Peninsula, north- west of the White Sea. The Stye in the English Lake District, some 2 m. from and 650 ft. higher than Seathwaite, has long been reputed to be the station recording the heaviest rainfall in Europe, but it has been shown to have a rival in Crkvice, a station immedi-' ately to the north of the Bocche di Cattaro on the Dalmatian coast. In the period 1881-1890 the average rainfall at the Stye amounted to 177 in., in 1891-1900 that at Crkvice amounted to about 179 in. 3

The amount of the snowfall as distinguished from the rest of the precipitation is now coining to be recognized as an important climatological element. ... So far, however, the only European country in which a record of the snowfall . is St "i v '»tL kept is Russia, but it may be pointed out that the scantiness of the winter precipitation and accordingly of snow in trie south-east of Europe almost entirely prevents the cultivation of winter wheat, which is thus left without the protective blanket enjoyed in some other parts of the world with cold winters.

The important subject of the seasonal distribution of the rainfall of Europe has received attention from Drs A. J. Herbertson, Koppen and Supan, and Mr A. Angot. The rainfall of each month in Europe as in the other continents is shown by Dr A. J. ™ /21 Herbertson in. The Distribution of Rainfall over the Land. » ' s '™ u * On plate 19 of the Atlas of Meteorology, by J. G. Bartholo- "?,"?.,. mew and A. J. Herbertson, Dr Koppen has furnished maps showing the months of maximum rainfall and the seasons of maximum and minimum rain frequency in different parts of Europe. Mr A. Angot's work on the subject is published in two papers in the A nnales du bureau central meteor, de France, a series of memoirs in which the rainfall observations of Europe for the thirty years 1861- 1890 are recorded and discussed. The first paper (1893, B, pp. l 57- 1 9A) deals with the Iberian Peninsula, the second (1895, B, pp. I55-I9 2) with western Europe (from about 43 to 58° N. and as far east as aboutl9° to 21 ° E.). Both papers are accompanied by maps showing by six tints the mean rainfall for each month as well as for the entire year; and that on western Europe, by maps extending in the west as far south as Avila, the proportion of the rainfall occurring during the winter, spring, autumn and summer months respectively. But the*

*most instructive maps on the subject embrac- ing the whole of Europe are four maps prepared by Dr Supan *> to show the percentage of the total rainfall of the year occurring in spring, summer, autumn and winter respectively. From the maps it appears that all the southern and western coasts of Europe have a high proportion of rain in autumn, and that this is true also of the whole of the Italian peninsula and the islands of the western half of the Mediterranean, of all the south-west of the Balkan peninsula, including the Peloponnesus, of the SaSne-Rhoue valley and both sides of the Gulf of Bothnia, and that a high winter rainfall is characteristic of Iceland, the extreme western coasts of Scotland, Ireland, France and the Iberian peninsula, as well as of the greater part of the Mediterranean region, but more particularly the south-east, while in this region, and, again more particularly in the south-east, there is a great scarcity of summer rains, which, on the other hand, form the highest percentage in the interior and eastern parts of the continent. If the year be divided into a winter and summer half, the area with a predominance of summer rains begins in the east of Great Britain*

2 Plate 1 in Petermanns Mitteilungen (1903).

3 See a paper on " Das regenreichste Gebiet Europas," by Prof, Kassner, Berlin, ir Petermanns Mitteilungen (1904), p. 281.

4 London, 1901 (one of the publications of the Royal Geog. Society).

•Plate 21 in Petermanns Mitteilungen (19Q0).

and extends eastwards, while the Mediterranean region generally is one of rainy winters and relatively dry summers. The consequence is that with similar conditions of soil and superficial configuration the Mediterranean region is agriculturally much less productive, except where there are means of irrigation, than the corresponding latitudes in the east of Asia and the east of North America, where there are corresponding summer temperatures but an opposite seasonal distribution of rainfall.

In connexion with the seasonal distribution of rainfall may be noticed the prevalence of sunshine and cloud. The map accompany- _ h . ing Konig's paper on the duration of sunshine 1 shows

” 5 ‘ on the whole, outside of the Mediterranean peninsulas, an increase from north-west to south-east (Orkney Islands, 1 145 hours =26% of the total possible; Sulina, 2411 hours =55%)- In the Mediterranean peninsulas the duration is everywhere great — greatest, so far as the records go, at Madrid, 2908 hours = 66 %. Dr P. Elfert’s 2 map illustrating cloud-distribution in central Europe embraces the region from Denmark to the basin of the Arno, and from the confluence of the Loire and Allier to the mouths of the Danube.

The temperature of the continent has been illustrated by Dr Supan in an interesting series of maps based on actual observations not Temoera- reduced to sea-level, and snowing the duration in months . p ‘ of the periods within which the mean daily temperature lies within certain ranges (at or below 32° F.; 50 °-68° F.; above 68° F.). 3 The first of these maps strikingly illustrates the effect on temperature of the strong westerly winds of winter, and, in the south, that of winds from the Mediterranean Sea as well as the protection afforded to the Mediterranean countries against cold winds from the north by the barrier of mountains. South of the parallel of 60° there is no lowland area in the west of Europe where the average daily temperature is at or below the freezing point for as much as one month, and in the Mediterranean region only the higher parts of the mountains besides the northern part of the Balkan Peninsula are characterized by such prolonged frosts. On the other hand, on the parallel of 50° N. the duration of such low temperatures increases at first rapidly, afterwards more gradually, from west to east. The second map illustrating the duration of average daily temperatures between 50° and 68° F., that is, the temperatures favourable to the ordinary vegetation of the temperate zone, shows that the duration of such temperatures increases on the whole from south to north, and that by far the greater part of thecontinent south of 53° N. has at least six months within those limits, and south of 58° N. at least five months. The third of the maps shows that the high temperatures which it illustrates are prolonged for a month or more throughout the Mediterranean region, but outside of that region hardly anywhere except in the south-western plains of France, the Rhone valley and a large area in the south-east of Russia. Without doubt an important cause of the prolonged dura- tion of high temperatures in this last area is the relatively long duration of sunshine already mentioned as shown by Konig’s map to be characteristic of south-eastern Europe.

Mention should here be made also of Bruckner’s remarkable treatise on the variations of climate in time. Though it deals with such variations over the entire land-surface of the globe, a large

proportion of the data are derived from Europe, for which continent, accord- ingly, it furnishes a great number of particulars with regard to secular variations in temperature, rainfall, the date of the vintage, the frequency of cold winters, the level of rivers and lakes, the duration of the ice-free period of rivers (in this case all Russian), and other matters. Those relating to the date of the vintage are of peculiar interest. They apply to 29 stations in France, south-west Germany and Switzerland, and for one station (Dijon) go back with few breaks to the year 1 391; and as the variations of climate of which they give an indication correspond precisely to the indications derived from temperature and rainfall in those periods in which we have corresponding data for these meteorological elements, they may be taken as warranting conclusions with regard to these points even-"for periods for which direct data are wanting. A period of early vintages corresponds to one of comparatively scanty rains and high temperatures. It is accordingly interesting to note that the data referred to indicate, on the whole, for Dijon an earlier vintage for the average of all periods of five years down to 1435 than for the average of the periods of the same length from 1816 1880; but that the figures generally show no regular retardation from period to period, but more or less regular oscillations, differing in their higher and lower limits in different periods of long duration.

Much light has been thrown on the present state of agriculture in Europe by. the publication of Engelbrecht's Landbauzonen der Cultivated aussertropischen Lander. 1 Of the two chief bread-plants plants. OI Europe, wheat and rye, wheat is cultivated as far north as about 69 ° N. both in Norway and Finland, but the limit of the area in which more wheat is cultivated than rye to the west and south, more rye than wheat to the east and north, runs parallel to the west coast of the Netherlands and Belgium, then strikes

1 Nova Acta Leop. Karol. d. deutschen Akad. d. Naturforscher, vol. lxvii. No. 3 (Halle, 1896).

- *Petermanns Mitteilungen (1890), pi. 11 (text pp. 137-145).*

3 lb. (1887), pi. 10 (text pp. 165-172).

4 Berlin, 3 vols, (one made up of maps), 1898-1899.

south-eastwards so as to include nearly all Germany except Alsace-Lorraine and the south-west of Wurttemberg, also eastern Switzerland, nearly all the Alpine provinces of Austria and nearly the whole region north of the Carpathians, as well as the greater part of

Bohemia within the area in which rye predominates, while in Russia the limit runs east-north-east from about 44 ° N, in the west to about 55° N in the Urals. On one side of this line wheat makes up more than 80% of the] entire grain area 5 in western Rumania, in Italy and a large part of the south-west of France, and from 40% to 60% in the south-east of England. Spelt is cultivated in the south-west of Germany, Belgium and northern Switzerland, on the middle Volga and in Dalmatia and Servia. Rye covers more than 50% of the grain area in the east of Holland and Belgium, in the north-west of Germany, in central and eastern Germany and in middle Russia. Oats are more cultivated than all varieties of wheat in Ireland, in the west and the northern half of Great Britain, in Finland and in the greater part of Denmark and Schleswig-Holstein. Barley is more largely cultivated than oats both in the extreme north and the south of the continent. Maize is cultivated to a gVeat extent in the north-west of the Iberian Peninsula, in the south-west of France, in northern Italy and in the lands bordering the lower Danube ; in many parts covering an area equal to or greater than that occupied by all grain crops. Millets (various species of panicum) are most extensively cultivated in the south-east of Europe. The kind of millet known as guinea-corn or durra {Sorghum vulgare Pers.), so extensively cultivated in Africa and India, is grown to a small extent on the east side and in the interior of Istria. Buckwheat is cultivated in the west and east of the continent — in the west from the Pyrenees to Jutland, in the east throughout southern and middle Russia. The potato is very largely cultivated in western, northern and central Europe, but has made comparatively little progress in Russia. The cultivation of lentils is most largely pursued in the west and south-west of Germany and in the south and north of France. That of. lupines has spread with great rapidity since 1840 in the dry sandy regions of eastern Germany, where lupines have proved as well adapted for such soils as the more widely cultivated sainfoin has done for dry chalky and other limestone soils. Sugar beet is most largely cultivated in the extreme north of France and the adjoining parts of Belgium and in central German}', to a less but still considerable extent in south-eastern Germany, northern Bohemia and the south-west of Russia. Flax, like other industrial plants, shows a tendency to concentrate itself on specially favourable dis-tricts. It is most extensively grown in Russia from the vicinity of Riga north-eastwards, even crossing in the north-east the 70th parallel of latitude ; but it is also an important crop in the north-east of Ireland, in Belgium and Holland, in Lombardy and in northern Tirol. Hemp is more extensively cultivated in central and southern Europe, above all in Russia. Teasels are grown in various spots in the

south-east of France and in south Germany. The cultivation of madder is not yet extinct in Holland and Belgium, that of weld {Reseda luteola), woad {Isatis linctoria) and saffron not yet in France.

The vine can be grown without protection in southern Scandinavia, and has been known to ripen its grapes in the open air at Christiansund in 63° 7'; but its cultivation is of no importance north of 47!° on the Atlantic coast, 504° on the Rhine, and from 50 to 52 in eastern Germany, the limit falling rapidly southwards to the east of 17 E. The olive, with its double crop, is one of the principal objects, of cultivation in Italy, Spain and Greece, and is not without its importanceˆ in Portugal, Turkey and southern Austria. Tobacco is grown to a considerable extent in many parts of western, central and southern Europe, for the mast part under government regulation- The most important tobacco districts are the Rhine valley in Baden and Alsace, Hungary, Rumania, the banks of the Dnieper, Bosnia and the south-west and other parts of France. The cultivation is even carried on in Sweden and Great Britain, but the most northerly area in which it occupies as much as o-i % of the grain area is the Danish island of Fyen (Ftinen).

Hop-growing is hardly known in the south, but forms an important industry in England, Austria, Germany and Belgium. Among the exotics exclusively cultivated in the south are the sugar-cane, the cotton plant, and rice. The first, which is found in Spain and Sicily, is of little practical moment; the second holds a secondary position in Turkey and Greece ; and the third is pretty extensively grown in special districts of Italy, more particularly in the valley of the Po. Even pepper is cultivated to a small extent in the extreme south of Spain. Of the Vast number of fruit trees which flourish in different parts of the continent only a few can be mentioned. Their produce furnishes articles of export to Austria-Hungary, Germany, France, Belgium, Italy and Spain. In Sardinia the acorn of the Quercus BaUola is still used as a food, and in Italy, France and Austria the chestnut is of very common consumption. In the Mediterranean region the prevailing forms— which the Germans conveniently sum together in the expression SudirHchte, or southern fruits — are the orange, the citron, the almond, the pomegranate, the fig and the carob tree. The palm trees have a very limited range : the date palm {Phoenix dactylifera) ripens only in southern Spain with careful culture; the dwarf palm {Chamaerops humilis) forms thickets along

6 By this term {Getreideflache) Engelbrecht designates the area occupied by wheat and other varieties of triticum, rye, oats and barley.

the Spanish coast and in Sicily, and appears less frequently in southern Italy and Greece.

Special interest attaches to the two main bread crops of Europe, „,. , wheat and rye, the average annual production of which

drve ln ttle different countries of the continent at three periods ” ‘ is shown in the following tables.

Average Production of Wheat in

Millions of Bushels.

	1872-1876. 1	1881-1890. 2	1894-1903. 3
Austria-Hungary *	137	161	191
Belgium	22	18	15
Bulgaria 6	40	36	
Denmark .			

4-7

5

3-6

France .

277

309

335

Germany .

IOI

93

127

Greece .

7

4

Italy . .

140

122

131

Netherlands

6

6

6

Norway

o-3

0-3

0-4

Portugal .

9

8

8

Rumania 6

50

57

*Russia **

275

242

325

Servia •

8

11

Spain 7 .

168

73

IOI

Sweden

3

3-7

4-5

Switzerland

2

2-6

5

Turkey in Europe 6

38

18

United Kingdom .

9i

78

57

Average Production of Rye in Millions of Bushels in the chief Rye-producing Countries of Europe?

1872-1876.

1881-1890.

I894-I9O3.

Austria-Hungary .

129

122

124

Belgium

16

17

20

Denmark .

15

17

22

France .

69

69

73

Germany .

209

228

368

Netherlands

10

II

16

Russia 9

715

713

971

Spain .

32

21

23

Sweden

. 18

20

27

Perhaps the most striking facts revealed by these two tables are

Acreage under Rye.

Period.

Germany.

‘ — — — – —

Russia (ex- Poland) .

1881-1890 1883-1887 1899-1903

14-50 14-74

646 65-5

These figures show that the increased production is only in part, in some cases in small part, attributable to increase in area, and the following figures giving the average annual yield of wheat per acre (a) in the period preceding 1885, and (b) generally in the period of five years preceding 1905, shows that an improvement in yield in recent years has been very general.

(a)

W I

(a)

W

Austria Hungary . Belgium

France …. Germany .

15-8 15-5 24-5 18-0

18-5

17-3 17-5 34-5 19-2

28-2

Italy ....

Netherlands Russia .... Poland . . . United Kingdom .

12-0 25-0

8-0 29

12-8

30-7

9-7

14-8

29-9

When the Aryan peoples began their immigration into Europe a large part of the surface must have been covered with primeval forest ; for even after long centuries of human occupation p ores ts. the Roman conquerors found vast regions where the axe had made no lasting impression. The account given by Julius Caesar of the Silva Hercynia is well known: it extended, he tells us, for sixty days' journey from Helvetia eastward, and it probably included what are now called the Schwarzwald, the Odenwald, the Spessart, the Rhon, the Thuringerwald, the Harz, the Fichtelgebirge, the Erzgebirge and the Riesengebirge. Since then the progress of population has subjected many thousands of square miles to the plough, and in some parts of the continent it is only where the ground is too sterile or too steep that the trees have been allowed to retain possession. Several countries, where the destruction has been most reckless, have been obliged to take systematic measures to control the exploitation and secure the replantation of exhausted areas. To this they have been constrained not only by lack of timber and fuel, but also by the prejudicial effects exerted on the climate and the irrigation of the country by the denudation of the high grounds. But even now, on the whole, Europe is well wooded, and two or three countries find an extensive source of wealth in the export of timber and other forest productions, such as turpentine, tar, charcoal, bark, bast and potash.

Acreage under Wheat. 10

Period.

United Kingdom.

France.

Italy.

Germany.

Austria.

Hungary.

Russia (ex- Poland).

Rumania.

Average, 1881-1885 .

1886-1890 .

1891-1895 .

,, 1896-1900 .

1901-1903 .

2-8

2-5

2-0 2-0

i-7

17-2

17-3 16-7 169 163

n-7 11 10-9 ll n-3 11 u-3 11

12-0

4-6 4-8 4.9 4.9 4.4

2-6

2-8

27

2-6 2-6

6-5 7-1

8-3

8-2

90

28-9 12

32-5 36-9

42-8

3-5 3-8 3-9

these; first, that the United Kingdom is the only great wheat- growing country which has shown a great decline in the amount of production in two successive periods; and, second, that both Germany and Russia show a great advance under both wheat and rye between the last two periods. This gives interest to statistics of acreage under these two crops, and some data under that head are given in the adjoining tables.

I Based on Scherzer, Das wirtschaftliche Leben der Volker, p. 12. ‘ From the Fifth Report of the United Slates Department of Agri-culture, Division of Statistics, Miscellaneous Series, p. 13.

3 Based on the Corn Trade Year-bo&k (1904), p. 284.

4 Exclusive of Bosnia and Herzegovina, in which the average production in 1894-1903 was about 2§ million bushels.

6 The estimates for Bulgaria, Rumania, Servia and Turkey in Europe for 1872-1876 are not comparable with those of the two later periods on account of the territorial changes since that date. Those for Bulgaria in the period 1881-1890 include Eastern Rumelia.

6 Including Poland.

‘ Spanish statistics very imperfect.

8 Based on the same authorities as the wheat table. In the original, however, the figures for 1894-1903 are given in " quarters of 480 lb," while the figures given above are calculated on an average quarter of 462 lb.

9 Including Poland, but not Finland, in which the average production of rye is estimated at about 1 1 ,000,000 bushels.

10 Mainly from or based on the Agricultural Returns for Great Britain, 1905.

II Single years.

u Period 1883-1887.

The following estimates of the forest areas of European countries are given in G. S. Boulger's Wood : —

Countries.

Thousands of Acres.

Per cent, of Total Area.

Austria-Hungary .

Germany ....

Norway

Italy

United Kingdom . Switzerland .... Greece

Holland

469,500

43,000

42,624

20,642

20,465

20,047

17,290

9,031

5,958

2,500

1,905 1,886 1,107

1,073 486

364

34 24 29

19

16-3

25-6

25 18

14 3-8 18-8

u-8

5 12 6 4-6

Horse-breeding is a highly important industry in almost all European countries, and in several, as Russia, France, Hungary and Spain, the state gives it exceptional support. Almost every district of the continent has a breed of its own: Russia reckons those of the Bashkirs, the Kalmucks, the Don-Cossacks, the Esthonians and the Finlanders as among its best ; France sets store by those of Flanders, Picardy, Normandy, Limousin

Domestic animals.

PRODUCTS]

EUROPE

*9*5*

and Auvergne; Germany by those of Hanover, Oldenburg and Mecklenburg, which indeed rank among the most powerful in the

world ; and Great Britain by those of Suffolk and Clydesdale. The English racers are famous throughout the world, and Iceland and the Shetland Islands are well known for their hardy breed of diminu- tive ponies. The ass and the mule are most abundant in the southern parts of the continent, more especially in Spain, Italy and Greece. The camel is not popularly considered a European animal ; but it is reared in Russia in the provinces of Orenburg, Astrakhan and Taurtd, in Turkey on the Lower Danube, and in Spain at Madrid and Cadiz ; and it has even been introduced into Tuscany. A much more important beast of burden in eastern and southern Europe is the ox: the long lines of slow-moving wains in Rumania, for example, are not unlike what one would expect in Cape Colony. In western Europe it is mainly used for the plough or fattened for its flesh. It is estimated that there are about 100 distinct local varieties or breeds in Europe, and within the last hundred years an enormous advance has been made in the development anispecialization of the finer types. The cows of Switzerland and of Guernsey may be taken as the two extremes in point of size, and the " Durhams " and " Devonshires " of England as examples of the results of human supervision and control. The Dutch breed ranks very high in the production of milk. The buffalo is frequent in the south of Europe, more especi- ally in the countries on the Lower Danube and in southern Italy. Sheep are of immense economic value : to most European countries, above all to Spain and Portugal, Great Britain, France, Hungary, the countries of the Balkan Peninsula, the Baltic provinces of Germany and the south-east of Russia. The local varieties are even more numerous than in the case of the horned cattle, and the development of remarkable breeds quite as wonderful. In all the more mountainous countries the goat is abundant, especially in Spain, Italy and Germany. The pig is distributed throughout the whole continent, but in no district does it take so high a place as in Servia. In the rearing and management of poultry France is the first country in Europe, and has consequently a large surplus of both fowls and eggs. In Pomerania, Brandenburg, West Prussia, Mecklen- burg and Wiirttemberg the breeding of geese has become a great source of wealth, and the town of Strassburg is famous all the world over for its p&tes de foie gras. Under -this heading may also be mentioned the domesticated insects, the silkworm, the bee and the cantharis. The silkworm is most extensively reared in northern Italy, but also in the southern parts of the Rhone valley in France, and to a smaller extent in several other Mediterranean and southern countries. Bee-keeping is widespread. The cantharis is largely reared in Spain, but also in other countries in southern and central Europe.

The most important mineral products of Europe are coal and iron ore. In order of production the leading coal-producing countries have long been the minerals. United Kingdom, Germany, France and Belgium. Since 1897 Russia has held the fifth place, followed by Austria-Hungary, Spain and Sweden. The production in other countries is insignificant. Besides coal, lignite is produced in great amount in Germany and Austria-Hungary, and to a small amount in France, Italy and a few other countries. Down to 1895 the United Kingdom stood first among the iron-ore produc- ing countries of Europe, but since 1896 the order under this head has been the German Customs' Union, the United Kingdom, Spain, France, Russia, Sweden, Austria-Hungary and Belgium. By far the most important iron-ore producing district of Europe is that which lies on different slopes of the hills in which German Lorraine, the grand duchy of Luxemburg and France meet, the district producing all the ore of Luxemburg and the principal supplies of Germany and France. Another important producing district is what is known as the Siegerland on the confines of the Prussian provinces of the Rhine and Westphalia. Next in importance to these are the iron-ore deposits of the United Kingdom, the chief being those of the Cleveland district south of the Tees, and the hematite fields of Cumberland and Furness.

With regard to the mineral production of Europe generally, perhaps the most notable fact to record is the relatively lower place taken by the United Kingdom in the production both of coal and iron. Here it is enough to state the main results. In the production of coal the United Kingdom is indeed still far ahead of all other European countries, but notwithstanding the fact that the British export of coal has been increasing much more rapidly than the production, this country has not been able to keep pace with Ger- many and Russia in the rate of increase of production. In 1878 the production of coal in the German empire was only about 34 % of that of the United Kingdom, but in 1906 it had grown to nearly 50%. This, too, was exclusive of lignite, the production of which in Germany is increasing still more rapidly. It was equal to little more than one-fourth of the coal production in 1878, but more than two-fifths in 1906. The coal production of Russia (mainly European

Russia) is still relatively small, but it is increasing more rapidly than that of a'ny other European country. While in 1878 it was little more than 2 % of that of the United Kingdom, in 1906 the corresponds ing ratio was above 8 %. In the production of iron ores the decline in the position of the United Kingdom is much more marked. The production reached a maximum in 1882 (18,032,000 tons), and

since then it has sunk in one year (1893) as low as 11,200,000 tons, while, on the other hand, there was a rapid increase in the production of such ores in the German Zollverein (including Luxemburg), France, Spain, Sweden and Russia, down to 1900, with a more progressive movement, in spite of fluctuations, in all these countries than in the United Kingdom in more recent years. In the total amount of production the United Kingdom in 1905 took the second place. While in 1878 the production of iron ores in the German Zollverein was little more than a third of that in the United Kingdom, in 1905 it exceeded that of the United Kingdom by nearly

60%. _ _

An indication of the relative importance of different European countries in the production of ores and metals of less aggregate value than coal and iron is given in the following tables x :—

Gold.

Silver.

Quicksilver Ore.

Tin Ore.

kilos.

kilos.

m.t.

m.t.

Austria

126

38,940

91,494

54

German Empire

121

177,183

134

Hungary

3.738

13,642

Italy ….

80,638

Norway

6,367

Portugal

29

22

Russia

8,202 2

? 4

Spain

?'»

26,186

86

United Kingdom

58

4,614

7,268 5

Kilos = kilograms.

M.t. = metric tons.

Copper Ore.

Lead Ore.

Manganese Ore,

Zinc Ore.

m.t.

m.t.

m.t.

m.t.

Austria

20,255

19,683

13402

32,037

Belgium

121

120

3,858

Bosnia-Herzegovina .

765

7,651

31

France

2,547

n,795 9

11,189

53,466

German Empire

768,523

140,914

52,485

704,590

Greece

? 10

10,040

26,258

Hungary

1,338-

564

10,895

Italy ....

147,135

40,945

3,060

155,821

Norway

32,203

(see zinc)

3,308 ”

Portugal

352,689 6

5ii

22

1,267

Russia

?7

? 12

9,612

Spain

2,888,777 s

263,519″

62,822

170,383

Sweden

19,655

1,938 9

2,680

52,552 ”

United Kingdom

7,598

31,289

23,127

23,190

M.t. = metric tons.

Platinum has hitherto been obtained nowhere in Europe except in the auriferous sands in the Russian government of Perm. Nickel is ■ derived from Germany, Norway and Sweden ; antimony from Germany and Hungary; bismuth from Saxony and Bohemia. Bauxite, which is used in the manufacture of aluminium, is obtained from France, Styria and Ireland. In order of importance the chief salt-producing countries are the United Kingdom (in which for some years the amount produced has been for the most part stationary or declining), Germany (which is rapidly increasing its production), Russia, France, Spain, Italy, Austria-Hungary, Rumania and Switzerland. Besides common salt Germany has for many years been producing a rapidly increasing amount of potash salts, of which it has almost a monopoly. Italy (chiefly Sicily) is by far the most

1 Based on Mines and Quarries: General Report and Statistics for iqo6, pt. iv. (Cd. 4145), 1908.

2 Production in the Ural districts only. 3 See note 1 1 .

4 A considerable quantity of quicksilver is produced in the government of Ekaterinoslav.

5 Dressed.

6 Cupreous pyrites and cupreous iron pyrites, besides Which a considerable quantity of copper precipitate is produced.

7 A small quantity of copper ore is produced in Finland, but the bulk of the Russian production is in the Asiatic provinces.

8 Mainly cupreous iron pyrites. 9 Argentiferous.

10 In 1906 Greece produced 12,308 m.t. of argentiferous pig lead.

11 Of which 158,424 m.t. argentiferous.

12 A considerable quantity of manganese ore is produced in the government of Ekaterinoslav, but the main seat of Russian pro duction is the Caucasus.

13 Zinc and lead ore.

14 In addition to 28,891 m.t. of calcined zinc ore.

important producer of sulphur. Among other mineral -products may be mentioned the boric acid and statuary marble o£ Tuscany, the statuary marble of Greece, the asphalt of Switzerland, Italy, Germany and Austria-Hungary, the slates of Wales, Scotland and France, the kaolin of Germany, England and France, and the abund- and glass, sands of Belgium, France and Bohemia.

With regard to commerce, industries and railways, as a whole* Europe may be said to be characterized by the rapid development of manufacturing at the expense of agricultural industry. With few exceptions the countries of Europe that export agricultural products are able to spare a diminishing proportion of the aggregate of such produce for export. Other countries are becoming more and more dependent on imported agricultural products. Most European countries, even if not able to export a large proportion of manufactured articles, are at least securing a greater and greater command of the home market for such products. 1 Inland centres of manufacturing in- dustry are extending the range of their markets. All these changes have been largely, if not chiefly, promoted by the improvements in the means of communication, and the methods of transport by sea and land. Larger ships more economically propelled have brought grain at a cheaper and cheaper rate from all partsof the world, and improved methods of refrigeration have made fresh meat, butter and other perishable commodities even from the southern! hemisphere articles of rapidly growing importance in European markets. Im- provements in transport have likewise tended to cheapen British coal in many parts of the mainland of Europe. On the other hand, the extension of the railway network of the continent has brought a wider area within the domain of the manufacturing regions associated with the coalfields occurring at intervals in central Europe from the upper Oder to the basin of the Ruhr, as well as some of the more detached coalfields of Russia. As affecting the relative advantages of different European countries for carrying on manufacturing in- dustry, three inventions or discoveries of recent years may be mentioned as of capital importance: (i) the invention in 1879 of the Thomas process for the manufacture of ingot iiron and steel from the phosphoric iron ores, an invention which gave a

greatly enhanced value to the ores on the borders of Lorraine, Luxemburg and Alsace, as well as others both in England and on the continent ;

(2) the invention of efficient machines for the application of power by means of electricity, an invention which gave greatly increased importance to the water-power of mountainous countries; and

(3) the discovery of the fact that from lignite an even higher grade of producer gas may be obtained than from coal, a discovery obviously of special importance, for the great lignitcproducing districts pf Germany and Bohemia.

: Such particulars as can be procured with regard to the utilization of water-power in the countries of Europe which use that water- source of power most largely are given in the following P° wer – table:-*

few European countries are mostly based on- such problematical data that they are not worth giving. One very uncertain element in such calculations is the; amount of water-power that is capable of being artificially created by the construction of valley-dams, such as have been erected on a small scale in the Harz and other mining and smelting regions of Germany from an early date, and are now being built on a much larger scale in the Rhine region and other parts of Europe, or is incidentally provided in the construction of canals.

*The commercial history of Europe has illustrated from the earliest times the influence of the outline and physical features in determining great trade-routes along certain lines. At all periods _, land routes have connected the southern seas with the / Vˆ X, J C ? J *” Baltic and the North Sea, effecting the great saving of uae ” tal distance more or less indicated by the following table : — routes –*

St Petersburg-Odessa . Riga-Odessa . . Danzig-Odessa ‘■■ . Stettin-Triest Lubeck-Venice Hamburg-Triest . Hamburg-Venice . Hamburg-Genoa . Antwerp-Venice . Antwerp-Genoa . . Antwerp-Marseilles Calais-Genoa Calais-Marseilles . Havre-Marseilles . Bordeaux-Cette . Calais-Constantinople . Calais-Salonica Christiania-Stockholm Lulea-Narvik (Ofotenfjord)

Distance

Direct

Distance

by Sea.

Distance.

by Rail.

st. m.

m.

m.

5240

930

1217

4985

765

1022

4735

745

1009

4065

550

854

3920

640

871

3820

560

945

3805

555

. 886

2845

640

880

3500

515

850

‘2535

515

778

2350

?

725

2400

555

780

2215

535

721

2135

475

678

1945

227

295

35IO

H45

2134

337o

1215

1911

780

260

357

1970

240

295

1 ‘ ”

Total Horse-

Total Horse-

Percentage

Countries.

Date.

power used in Mechanical

power in Hydraulic

belonging to ” Hydraulic

Industry.

Installations.

Installations.

Thousands.

Thousands.

Per cent.

Germany ....

1895

3427

629

18

France . . . j

1899 1904

2581 2

575 650 2

25

Austria-Hungary

1902

. 437

Italy .....

1899

2209

337

15

Sweden

1903

453

about 50 a

Norway . . . .

1904

254

186

73

f

1895

153

88

58

1895

153

*95**

62

Switzerland . . -J

1901

320

185

58

|

1901

320

223 V

70

I

1905

516

?

?

The figures derived from the three recent industrial censuses of Switzerland are very instructive, especially if one is justified in including the electric among the hydraulic installations. The estimates that have been made of the total available water-power in a

1 Probably the most complete synopsis_ of the evidence on this point is to be found in Prince Kropotkin's Fields, Factories and Workshops (London, 1899).

2 The total horse-power used in mechanical industries is obtained by adding 650,000, the estimated total of horse-power in hydraulic installations given in an article in the Annates de geographic for January 1904, to the total steam-power in fixed engines officially given for 1903, and accordingly excludes gas and other engines not driven by steam- or water-power.

3 The proportion estimated in the official publication entitled Sweden: its People and its Industry, edited by G. Sundbarg (Stockholm, 1904).

4 Including the installations returned in the Swiss industrial censuses as electric, most if not all of which are probably driven by water-power.

From the form of the continent it obviously results that the farther east the route lies the greater is the saving of distance. The precise direction of the routes has been very largely fixed, however, by the physical features ; by the course of the rivers where navigable rivers formed parts of the routes; in other cases by .the situation and form

of the mountains, or the direct'on of the river valleys which is implied in the form of the mountains. From the Black Sea the most convenient starting-point is obviously towards the west, and two connecting routes with the Baltic lie wholly to the east of the mountains^ One route makes use of the Bug or the Dniester, the San and the Vistula so far as possible, while another starting in the same way proceeds round the foot-hills of the Carpathians, thus finding easy crossing places on the head-streams of the rivers, as far as the Oder and then down that stream. Another route is up the Danube to the neighbourhood of Vienna, and then north-eastwards through the open- ing between the Carpathians and the Sudetic range to the head-waters of the Oder, crossing a water-parting little more than 1000 ft. in altitude. The first route was certainly used again and again by the ancient Greeks, starting from Olbia near the mouth of the Bug, the objective point being the coast in the south-east of the Baltic supplying the amber which was so important an article of commerce in early times. This route was again much used in the middle ages, when Visby, on Gotland, undoubtedly selected on account of the security afforded by an island station, was for hundreds of years an important centre of trade both in northern products (of which furs were the most valuable) and those of the)East (pepper and other spices, silks and other costly articles). Numerous coins, Roman, Byzantine and Arabic, found not merely in Gotland itself but also at various points along the route indicated, testify to the long-continued importance of this route. In the middle ages the Oder route was also largely used whether reached by rounding the Carpathians or ascending the Danube, and in connexion with that route the island of Bornholm long formed a focus of commerce answering to that in Gotland farther east. The Danube route was also made use of farther west, and formed a large part of a great route connecting the East with the north-west of Europe. The valuable goods of the Orient could be conveyed up-stream as high as Ratisbon (Regensburg), and thence north-westward across Nuremberg to Frankfort-on-Main, from which access was had to the Rhine gorge leading on to Cologne and the ports of Dordrecht and Rotterdam, Bruges and Ghent; or they could be carried still farther up-stream to Ulm, thence by a route winding through the north of the Black Forest to Strassburg and from that point north of the Vosges to the Marne and Seine.

Farther west use was made at an early date of passes by which the whole system of the Alps could be crossed, or partly crossed and partly rounded, in a single rise. The ancient Etruscans.in exchanging their earthenware and bronzes for the amber found largely in those

at the end of the

loth. Century

English Miles o 50 100 200 300 400 500

fcmeiy Walker sc

RAILWAYS]

EUROPE

917

times not only in the Baltic but also on the eastern shores of the Nbrth Sea north of the Rhine mouths, made regular Use of at least-three such passes. One of these was the Brenner, the summit of which is under 4500 ft. in height, approached on the south side by the valley of the Adige and its tributary the Eisak, on the other side by the Inn valley and that of its small tributary the Sill. By this route the Alps at about their widest are crossed with exceptional ease; and hence it was natural that it should have been used by the Etruscans to reach the amber shores of the Baltic, and in all subse-

?uent periods in intercourse between central Europe and northern taly. In their trade with the mouth of the Rhine the Etruscans appear to have used only the passes approached by the Dora Baltea, which leads equally to the Little St Bernard, to the south of Mont Blanc, and so to the Isere valley and the Rhone, and to the Great St Bernard, to the east of Mont Blanc, and so directly to the Rhone valley above the Lake of Geneva, by which route the remainder of the Alps could be rounded on the west and the Rhine valley reached by crossing the northern Jura. Roman roads were afterwards made across all these passes, although that across the Great St Bernard (the highest of all, above 8100 ft.) seems never to have been made practicable for carriages. The Romans also made use of three inter-vening passes by which in a single rise from the Po basin the heads of valleys leading right down to the head of Lake Constance Could be reached. These were the Bernardino, Spltlgen and Septimer, to mention them in the order from west to east. By the Romans the Simplon was also made use of as affording the most direct connexion between Milan and the upper Rhone valley. All these passes were likewise in use in the middle ages when Venice and Genoa were the great intermediaries in the trade in pepper and spices and other Oriental products. The Brenner afforded the most direct connexion between Venice and southern Germany, on a route leading also to

northern Germany by way of Ratisbon and afterwards the rivers of the Elbe basin, and finally (from the end of the 14th century) by a canal to Liibeck, which was the great distributing centre of these and other products for the Baltic. To take the most direct route to the Rhine valley and north-western Europe some other pass (the Seefeld or the Fern) in the Bavarian Alps had to be crossed and the Rhine valley reached by Augsburg, and thence either by way of Ulm or Frankfort. From Genoa the routes in the early middle ages were by way of Milan to the Lake of Constance, and thence by way of Ulm if the Rhine valley was the goal, and by Way of Augsburg if it was the Baltic. The St Gotthard route, the most direct connexion between Milan and the north of the Alps, was added about the end of the 13th century. The Mont Cenis pass from an early date afforded the most direct connexion between Genoa and the middle Rhone valley by way of Turin. When modern carriage roads came to be built it was still the same routes that were chosen. The road across the Brenner, completed in 1772, was the first of these. The building of the great Swiss carriage roads across the passes in the early part of the ro,th century was inaugurated by Napoleon's road across the Simplon completed in 1805. A later paragraph will show that modern railways follow much the same, if not exactly the same, routes. On the early use of the SaSne-Rhone valleys, and the route between the foothills of the Cevennes and the Pyrenees, it is not necessary to insist, but it may be mentioned that English tin was sometimes conveyed to the Mediterranean (Marseilles) by this latter route in Roman times. Since the introduction of railways inland waterways have in most countries taken a very inferior position as means of transport. The articles on the different countries supply the necessary information with respect to those which have a purely national in- terest, but here mention must be made of those which have significance as belonging to trans-European routes or have an international value. The importance of shortening the water-route between the op- posite sides of the great European isthmus separating the Baltic and the Black Sea is brought into prominence by the constant revival of projects for a ship-canal con- necting those coasts, A definite step taken with a view to carrying out such a project was the sanction given by the tsar in April I905 for the appointment of a special commission to inquire into the practicability of a scheme for the excavation of a canal about 28 ft. deep between Riga and Kher- son, utilizing the waters of the Duna or Western Dvina, the Berezina and Dnieper^ Since the completion in 1845 of the Ludwigs or Danube-Main Canal, running from the Main near Bamberg to Kelheim on the Danube, it has been possible to go by water from the mouth of the Rhine to the mouth of the Danube ; but this canal has in reality no trans-European

*significance. It cannot take barges of a greater capacity than 12*5 tons, is not adapted for steamers, and carries only a very small amount of traffic. But projects for connecting the Danube with*

Inland water- ways.

northern Europe by water are still entertained. Of these the most advanced are those for establishing connexions through Austria. On the nth of June I901 the Austrian diet passed an act prescribing the construction of a canal connecting the Oder with the Danube through the Morava, and another connecting the Danube at Liraz with the Moldau-Elbe, and the improvement of the navigation on theconnected waterways. The Oder- Danube canal thus authorized would havfc to cross a watershed of little more than 1000 ft: in altitude as against 1 1365 ft. in the case of the Ludwigs Canal ; but the Elbe- Danube Canal, would have to cross one of about 2250 ft. Under the provisions of; the act the work is to be completedby 1924. In Germany projects have been actively agitated for improving the Danube-Main con- . nexion either wholly or partly along the route of the present canal,! and for establishing" a new connexion by means of a canal of at least 6j ft. in depth by way of the Neckar, the Rema and the B-renz, joining the Danube at Lauingen about midway between Ulm and Donauworth. The Moldau-Elbe is itself an important international waterway, inasmuch as it allows of steamer traffic from Prague in Bohemia to Hamburg, and by means of a connecting canal to Lubeok. But the most important of all international waterways in Europe is the Rhine, on which even sea-going steamers regularly ascend to Cologne, and an amount of traffic crosses the Dutch frontier three: or four times as great as that which makes use of the Manchester ship-canal. The river is also navigable to Basel. in Switzerland, though above Strassburg the river is little used, being replaced, since 1834 by the Rhine and Rhone canal, which connects the two rivers through the 111 and the Sa6ne. The Rhine is also connected- with the Seine by the Marne and Rhine canal passing north of the Vosges.and its tributary the Moselle is also navigable from France into Germany. The Meuse again is navigable from Francethrough Belgium into Holland, and is connected by more than one route with the Seine, and in the densely peopled mining and manufacturing country in the north of France and the adjoining parts of Belgium numerous waterways ramify in different directions. Even in an article on Europe the entirely French canals connecting the Seine andRhone (Burgundy canal, summit-level 1230 ft., completed 1832), the Loire and Rhone (Canal du Centre, summit-level; 990 ft., com- pleted in 1793), and the Canal du Midi, connecting the Garonneat Toulouse with Cette on the Mediterranean,

may be mentioned inas-i much as they establish communication between different seas. The last is of special interest because it is the oldest (completed its 1681), because it makes use of the lowest crossing, surmounting the passage of Naurouse, or Gap of Carcassonne, at an altitude of 625 ft,,i and because it effects the greatest shortening of distance from sea to sea. On this account the project of establishing a ship-canal of modern dimensions along this route has been as often revived as that of the Black Sea and Baltic canal. In the east of Europe the Vistuli and Memel are both international waterways, but' they are of li;ttle : importance compared with those in the west. The Kaiser Wilhelni or North Sea and Baltic canal, opened in 1895, has, however, no little international value, inasmuch as it shortens the sea-route. to the Baltic for all North Sea ports to the south of Newcastle, and affords the means of avoiding a rather dangerous passage round the north of; Jutland. A minor degree of international, interest belongs to: the. ship-canal through the Isthmus of Corinth, opened on the 6th of August 1893.

The following table gives a summary statement of the progress of railway construction in European countries down to the end of the 19th century:— : Railways,

■ *Railways in European Countries.*

Date of opening of

Miles open. :

first line.

1875-

1880.

1885.

1890.

1895.

-190O.

1.,

Austria . . .

1337

6,402

7,083

8ˆ70

9,506

10,180

1 1, 9 12

Belgium . .

l &5

2,171

2,39?

,2,740

2,810

2,839

2,851

Bosnia-Herzegovina .

: 1S79

34 2

471

”

Bulgaria

1866

535

921

Denmark .

, 1847

689

975

1. 195

1,217

i,37i

1 ,809 r

France

1828

13.529

16,275

20,177

20,666

22,505

26,739

German Empire

1835

17,376

20,693

22,640

25,4"

.27,392

30,974

Great Britain . , ;

1825

14,510

15,563

16,594

17,281

18,001

18,680

Greece . . .

1869

7

■*7,*

278

452′

? ‘

64’f

Hungary . . .

1846

3,992

4,421 .

5,605

6,984

8,65t

10,624

Ireland . . .

1834

2,148

2,370

2,575

2,792

3,173

1 3,183

Italy . . • •

1836

4.771

5,340

6,408

7,983

9,579

9,864

Luxemburg Netherlands

1873

no

*t '**

270

1839

1,006

1,143

i,653

1,869

‘ 2,007

Norway

•■1&54,

345

652

970

970

1,071

1,231:

Portugal . . , . :

1856

643

710

949

1,316

1,336

1,346-

Rumania -. . . •■

1869

766

‘ 859

1, too

1.599

1,617

1,920

*Russia * . .*

1838

12,166

14,026

15,934 ;

18,059

21,948

27,345

Servia . . .

1884

. 155

335

335

355

Spain .

1848

3,801

4.550

5,547

6,2lf

7,483

8,206

Sweden

1856

2,171

3.654

4,279 .

‘ 4,980

6,058

7,018

Switzerland

1844

1,257

1.596

1,795

2,014.

2,233

2,401

Turkey

1872

727

.657’

657

935

- ..,.’ ‘ ....

1 Excluding Finland:

[RAILWAYS

The chief railways of most European countries are on the same gauge as that originally adopted in Great Britain, namely, 4 ft. 8£ in. Irish railways are, however, on the gauge of 5 ft. 3 in. The standard gauge in Russia is 5 ft., that of Spain and Portugal about 5 ft. 6 in. The still isolated railway system of Greece is upon a narrow gauge. The very general use of a common gauge obviously greatly facilitates international trade. It allows, for example, of wagons from Germany entering every country on its frontier except Russia. It allows of German coal being carried without break of bulk to Paris, Milan and the mainland ot Denmark. By means of train- ferries German trains can also be conveyed to Copenhagen by way of Warnemiinde and Gjedser and then across the channel separating Falster and Zealand ; and there is a similar means of communication between Copenhagen and Malmo (Sweden) and between Lindau in Bavaria on the Lake of Constance and Romanshorn on the same lake in the Swiss canton of Thurgau. The establishment of this method of transport between England and France has been urged in opposi- tion to the Channel Tunnel scheme.

Of the railway systems of the mainland of Europe as a whole the main features are these. There is a broad belt running from the' North Sea eastwards between the lines marked by Amsterdam and Hanover on the north, and Calais, Liege, Diisseldorf and Halle on the south, in which important lines of railway run from west to east. About 12° E. those lines begin to converge on Berlin. This belt is crossed in the Rhine valley by a much narrower but very important belt running north and south, now connected with the Italian railway system through the St Gotthard tunnel. To the south of the west end of the west-to-east belt lies the principal railway focus in western Europe, Paris, from which important lines radiate in all directions; two of these radiating lines now establish com- munication with the Italian railway system, through the Mont Cenis and Simplon tunnels respectively, and other two connecting with the Spanish system round the ends of the Pyrenees. Berlin in central Europe is perhaps an even more important railway focus. Among the chief lines radiating from it are one through Leipzig and Munich and connecting with the Italian railway system by the Brenner route, and another

through Dresden and Prague to Vienna, and then by the Semmering pass by one route to Triest and by another to Venice. East of Berlin the railways of Europe begin to form wider meshes. Two main lines diverge towards the north-east, one by Kiistrin and Konigsberg and the other by Frankfort on the Oder and Thorn, both uniting at Eydtkuhnen to the east of Konigsberg before crossing the Prussian frontier and passing on to St Petersburg. From Thorn a line branches off by Warsaw to Moscow, the chief railway focus in eastern Europe. South-east from Berlin there runs another im- portant line through Breslau, Cracow and Lemberg to Odessa, skirting to a large extent the foot-hills of the Carpathians like the ancient trade route from Olbia to the Baltic. Two routes on which there are services organized by the International Sleeping Car Company connect London with Constantinople, and it is noteworthy that both of these indicate the importance of the physical feature which has determined the position of the great north-south belt of railways above mentioned, and also of towns famous as commercial centres in the middle ages. One of these is the route of the Orient Express, which goes by Calais, Paris and Strassburg, then east of Strassburg runs north in the Rhine valley for about 40 m. to Karls- ruhe, then winds through the hilly country between the Black Forest proper and the Odenwald to Stuttgart, proceeding thence by Ulm, Augsburg and Munich to Linz and then by the valley of the Danube through Vienna and Budapest to Belgrade, and thence by the valleys of the Morava, Nishava and Maritza to Constantinople. The other is that of the Ostend-Vienna express, going by Ostend to Brussels, and through Aix-la-Chapelle to Cologne, then up the Rhine gorge southwards to Bingen and eastwards to Mainz and on to Frankfort (on the Main), thence south-eastwards by the route so celebrated in the middle ages through Nuremberg to Regensburg (Ratisbon), and thence down the valley of the Danube coinciding with the Orient Express route from a point a few miles above Linz. From the Orient Express route a branch crosses from the valley of the Morava to that of the Vardar, establishing a connexion with Salonica.

In the development of this railway system the mountains have proved the most formidable of natural obstacles, and at the head of the mountains in this respect as in others stand the Alps. The first railway to cross one of the main chains of the Alps was the Semmering line on the route from Vienna to the Adriatic, constructed in 1848- 1854. I ts summit is in a tunnel less than I m. long, 2940 ft. above sea-level or nearly 300 ft. below the level of the pass. South of the Semmering, however, various other passes have to be crossed, and it was not till 1857 that the railway to Triest (by Laibach) was

completed, and not till the late seventies that the more direct route to Venice across the Tarvis pass in Carinthia was established. Of the route from Triest by Gorz across the Karawanken and Tauern Alps to Salzburg and south-eastern Germany the first section was opened only in 1906. After the Semmering the next railway to cross the Alps was that following the Brenner route which crosses the summit of the pass at the height of 4490 ft., and, as already stated, is the only pass that has to be crossed on the way from Munich to the plains of Italy. Next followed in 1871 the western route through the so-called Mont Cenis tunnel, really under the Col de Frejus, to the west of the Mont Cenis pass, and effecting a crossing between

the valleys of the Arc (Rhone basin) and the Dora Riparia (Po basin) at an altitude of 4380 ft., or nearly 2500 ft. lower than the pass previously used, but only by piercing the mountains in a tunnel more than 7J m. long. Next in order was the St Gotthard route, opened in 1882, the most direct route between northern Italy and western Germany, connecting the Lake of Lucerne with the valley of the Ticino. Here the altitude is reduced to 3785 ft., about 3150ft. below the sumit-level of the pass, but the tunnel length is increased to rather more than 9! m. The Simplon route opened in June 1906, between the upper Rhone valley and the Toce valley, shortening the route between Milan and northern France, effects the crossing at an altitude of only 2300 ft., nearly 4300 ft.. lower than the pass, but by increasing the tunnel length to 12J m. Steps were subsequently taken to continue the Simplon route northwards by a tunnel through the Lotschberg in the Bernese Alps, and a project is entertained for continuing the Vintschgau (upper Adige) railway across or under the Reschenscheideck to the Inn valley. An important east- west crossing of the Alps was effected when the Arlberg tunnel (6-37 m. long, summit-level 4300 ft.) connecting the Inn valley with that of the Rhine above the Lake of Constance was opened in 1884.

Several lines wind through and cross the Jura. That which in 1857 pierced the Hauenstein, in the north of Switzerland, attained international importance on the opening of the St Gotthard tunnel, inasmuch as it lies on the route thence through Lucerne to the Rhine valley at Basel; and that which crosses the Col de Jougne between Vallorbe and Pontarlier acquired similar importance on the completion of the Simplon tunnel. Further projects are entertained for shortening the connexion between this tunnel and the north of France by making a more direct line from Vallorbe to the French side of the Jura, or by making a railway across or under the Col de la Faucille (4340 ft.), north-west of Geneva.

Of the two railways that pass round the extremity of the Pyrenees, the western was the first to be constructed, the eastern was not opened till 1878. Hitherto the intervening mountains have proved more of a railway barrier than the mightier system of the Alps, but in 1904 a convention was concluded between the French and Spanish governments providing for the establishment of railway connexion between the two countries at three points of the great chain.

There are several railways across the Carpathians, mostly by passes under 3000 ft. in height. The fact that the Tomos Pass, on the direct route from Hungary through Transylvania to Bucharest, attains an altitude of 3370 ft. was undoubtedly one reason why the railway following this route, completed in December 1879, passing through several tunnels, was one of the last to be constructed. But the obstruction of mountains has not been the only cause of delay in the building of railways. Sparseness of population and general economic backwardness have also proved hindrances, especially in Russia and the Balkan Peninsula. The railways to Constantinople and Salonica were completed only in 1888, and yet the highest altitude on the Constantinople line is only 2400 ft., that on the Salonica line 1750 ft. Among other important railways of recent date and of more than merely national significance may be mentioned that bringing Bucharest into connexion with the Black Sea port of Costantza by means of a bridge across the Danube at Chernavoda (opened in September 1 895) ; a line across the Carpathians connecting Debreczen with Lemberg, the continuation of the line eastwards from Lemberg to Kiev; a network bringing the coalfield of the Donets basin into connexion with ports on the Sea of Azov; a line in the south-east of Russia connecting Novocherkask with Vladikavkaz, and branches running from the same point connecting that line with Novorossiysk on the Black Sea on the one hand, and with Tsaritsyn at the last angle of the Volga on the other hand; a line in northern Russia bringing Archangel into connexion with the European system at Vologda (opened in 1 898) ; a detached line in the north-east across the Urals from Perm by Ekaterinburg (completed in 1878) to Tyumen (completed in 1884). Chelyabinsk on the Siberian railway has a branch running northwards to Ekaterinburg, and this line now affords uninterrupted communication with the northern Dvina, inasmuch as the railway which originally started at Perm has been carried westwards through Vyatka and then northwards to Kotlas at the point of origin of that river, to which point it was opened in 1900; and a line in the east connecting the European system at Samara with the great mining centre at Zlatoust, already in 1890 continued across the Urals to Miyas, and since then carried farther

east as the great Siberian railway.

The result of the construction of the numerous transcontinental railways has been to bring rail and sea-routes and ports on opposite sides of the continents into competition with one another to a greater degree than is possible in any other continent. The more valuable, and above all perishable commodities may be sent right across the continent even through the mountains. Even from Great Britain, which is bound to carry on its external commerce in part by sea, goods are sometimes sent far south in Italy by railways running from one or other of the North Sea ports. It will hence be readily understood that for inland trade on the mainland the competition between ports on opposite sides of the continent and between different railways will be very keen, greatly to the advantage of the inland centres to which that competition extends. This competition is inevitably all the more keen now that the trade of Europe with

the East is once more carried on through the Mediterranean as it was in ancient times and the middle ages. The great shortening of the sea-route in this trade at such ports as Marseilles, Triest, Venice and Genoa, indicated by the figures below, goes far to counterbalance the extra cost even of railway transport across the mountains.

London

Bremen

Hamburg .

Stettin

St Petersburg

Distance in Nautical Miles from Port Said.

3215 3502

352o

3749 4300

Marseilles

Genoa

Venice

Brindisi

Odessa

1506 1426

I33Q

930 1 130

An enormous amount of investigation with regard to European ethnology has been carried on in recent years. These labours Ba . have chiefly consisted in the study of the physical type

noogy. ˆ (iiff eren t countries or districts, but it is not necessary to consider in detail the results arrived at. It should, however, be pointed out that the idea of an Aryan race may be regarded as definitely abandoned. One cannot even speak with assurance ef the diffusion of an Aryan civilization. It is at least not certain that the civilization that was spread by the migration of peoples speaking Aryan tongues originated amongst and remained for a time peculiar to such' peoples. The utmost that can be said is that the Aryan languages must in their earliest forms have spread from some geographical centre. That centre, however, is no longer sought for in Asia, but in some part of Europe, so that we can no longer speak of any detachment of Aryan-speaking peoples entering Europe.

The most important works, summarizing the labours of a host of specialists on the races of Europe, are those of Ripley and Deniker. 1 Founding upon a great multitude of data that have been collected with regard to the form of the head, face and nose, height, and colour of the hair and eyes, most of the leading anthropologists seem to have come to the conclusion that there are three great racial types variously and intricately intermingled in Europe. As described and named by Ripley, these are: (1) the Teutonic, characterized by long head and face and narrow aquiline nose, high stature, very light hair and blue eyes; (2) the Alpine, characterized by round head, broad face, variable rather broad heavy nose, medium height and " stocky " frame, light chestnut hair and hazel grey eyes; and (3) the Mediterranean, characterized by long head and face, rather broad nose,

medium stature and slender build, dark brown or black hair and dark eyes. The Teutonic race is entirely confined to north- western Europe, and embraces some groups speaking Celtic languages. It is believed by Ripley to have been differentiated in this continent, and to have originally been one with the other long-headed race, sometimes known as the Iberian, and to the Italians as the Ligurian race, which " prevails everywhere south of the Pyrenees, along the southern coast of France, and in southern Italy, including Sicily and Sardinia," and which extends beyond the confines of Europe into Africa. The Alpine race is geographically intermediate between these two, having its centre in the Alps, while in western Europe it is spread most widely over the more elevated regions, and in eastern Europe " becomes less pure in proportion as we go east from the Carpathians across the great plains of European Russia." This last race, which is most persistently characterized by the shape of the head, is regarded by Ripley as an intrusive Asiatic element which once advanced as a wedge amongst the earlier long-headed population as far as Brittany, where it still survives in relative purity, and even into Great Britain, though not Ireland, but afterwards retired and contracted its area before an advance of the long-headed races. Deniker, basing his classification on essentially the same data as Ripley and others, while agreeing with them almost entirely with regard to the distribution of the three main traits (cephalic index, colour of hair and eyes, and stature) on which anthropologists rely, yet proceeds further in the subdivision of the races of Europe. He recognizes six principal and four secondary races. The six principal races are the Nordic (answering approximately to the Teutonic of Ripley) , the Littoral or Atlanto-Mediterranean, the Ibero-Insular, the Oriental, the Adriatic or Dinaric and the Occidental or Cevenole. 1 See bibliography at the, ?nd

Although language is no test of race, it is the bes't evidence for present or past community of social or political life; and nothing is better fitted to give a true impression of the /__,_■• position and relative importance of the peoples of Europe than a survey of their linguistic differences and affinities. 2 The following table contains the names of the various languages which are still spoken on the continent, as well as of those which, though now extinct, can be clearly traced in other forms. Two asterisks are employed to mark those which are emphatically dead languages, while one indicates those which have a kind of artificial life in ecclesiastical or literary usage.

I. INDO-EUROPEAN.

1. Indic branch, represented by

2. Iranic branch, „ „

3. Hellenic branch, ,, t ,

4. Italic branch, „ ‘ „

Neo-Latin

5. Celtic branch, represented by .

6. Teutonic branch, represented by

Scandinavian

Low German

High German

7. Slavonic branch, represented by

Souih-Eastern

Western

8. Lettic branch, represented by .

i Netherlandish.

9. Unattached

II. SEMITIC.

1. Canaanitic branch, represented by

2. Arabic branch, represented by .

III. FINNO-TATARIC (Turanian, Ural-Altaic, 1. Finno-Ugric languages

2. Tatar-Turkish languages

3. Mongolian languages.

4. Unattached.

Gipsy dialects.

(a) Ossetian.

*(5) Armenian. *(a) Greek.*

(b) Romaic.

*(c) Neo-Hellenic. *(*

- *Oscan.*

- *Umbrian, &c.*

id) French.

(e) Walloon.

(/) Provencal.

(g) Italian.

(h) Ladin (Rumonsh, Rumansh, Rheto-Romance).

(t) Spanish.

(/') Portuguese.

(k) Rumanian.

(a) Irish.

(b) Erse or Gaelic.

(c) Manx. –

*(d) Welsh. **(c) Cornish.*

*(/) Low Breton. **(*

*'**(*) Norse or Old Norse. (c) Icelandic and Faeroese. id) Norwegian, (c) Swedish. (/) Danish. **(g) Saxon, Anglo-Saxon, or First ' English. (h) English. *(i) Old Saxon. 0) Piatt – Deutsch or Low*

*German. (k). Flemish (/) Dutch (m) Frisic. *(k) Old High German. (0) Middle High German. (i>) New High or Literary*

*German. *(a) Church Slavonic. (b) Russian.*

(<;) Ruthenian, Rusniak, or Little- Russian, (rf) White Russian or Bielo- Russian.

(e) Bulgarian. (/) Servo-Croatian, (g) Slovenian. (h) Czech (Bohemian). (i) Slovakish.

(f) Polish. (k) Sorbian (Wendic, Lusatian).

*J *(/) Polabian. **(«) Old Prussian. (4) Lettish.*

*(g) Lithuanian. **?(u) Old Dacian.*

(b) Albanian.

- *Hebrew.*
- *Phoenician or Punic.*
- *Arabic.*
- *Mozarabic.*

(c) Maltese. &c).

(a) Samoyede.

(b) Finnish or Suomi.

(c) Esthonian, Livonian, Vepsisb,

Votish.

(d) Lappish.

(■e) Cheremissian.

(/) Mordvinian.

(g) Ziryenian and Permian.

(h) Votiak.

(i) Magyar.

(a) Turkish.

(6) Kazan Tatar, Crimean Tatar,

Bashkir, Kirghiz. (c) Chuvash. Kalmuk. , Basque-

From this conspectus it appears that there are still about 60 distinct languages spoken in Europe, without including Latin, Greek, Old Slavonic and Hebrew, which are still used in literature

2 See on the whole subject Hovelacque's Science of Language, Latham's Nationalities of Europe, and the same author's Philology.

bound- aries.

92P

or ecclesiasticalrKturgies. Besides all those which are spoken Over extensive 'territories, and some even which ace confined within very narrow limit3, are brokeui up into several distinct dialects.' • -. ■ ■ . ■ • . :'■■ '•■'< '■< : ■■■ !■■ ■

The, boundaries of European countries have of course ; been determined -by history ,and in some cases only historical everts dan be held to account for itheir general situation, Political t jje influence of geographical conditions being seen only iOn' a, minute examination, of details. In, most cases, however, it is otherwise. .The present: political boundaries were all settled when the general . distribution: of population in the continent was in a large measure determined by the geographical conditions, and accordingly: the lines along which they run for the most part show the influence of such con- ditions very clearly, and thus present in many cases a marked contrast to the political boundaries in America and Australia, where the boundaries have often been marked out in advance of the population. In Europe the general rule is that the boundaries tend to run through some thinly peopled strip or tract of country, such as is formed.by mountain ranges, elevated tablelands too bleak for cultivation, relatively high ground of no great altitude where soil and climate are less favourable to cultivation than the lower land on either side, or low ground occupied by heaths or marshes or some other sterile soil; but it is the exception for important navigable rivers to form boundaries between countries or even between important administrative divisions of countries, and for such exceptions a special explanation can generally be found. Navigable

rivers unite rather than separate, , for the obvious reason that they generally flow through populous valleys, and the vessels that pass up and down cars touch as easily on one side as the other. Minpr rivers, on the other hand, flowing thrpiugh sparsely peopled valleys frequently form portions of political boundaries simply because they are convenient lines of demarcation. A brief examination of the present political ni'ap of Europe will serve to illustrate these rules'. The eastern frontier of the Netherlands begins by running southwards through a marsh nearly parallel to the Ems,but nowhere touching it, fhen winds south or south-westwards through a rather sparsely peopled district to the Rhine. This river it crosses. It then approaches but does not touch the Meuse, but runs for a considerable distance roughly parallel to that river along higher ground, where the population is much more scanty than, in the valley. On the side of Belgium the Dutch boundary is for the most part thoroughly typical, winding between the dreariest parts of the Dutch or Belgium provinces of North Brabant, Limburg and Antwerp. The Scheldt nowhere forms a boundary, between countries, not even at its- wide estuary. ! The eastern frontier of Belgium is quite typical both on the side of Germany and Luxem- burg. It is otherwise, however, on the south, there that country confines with France, and indeed the whole of the north-east frontier of France may be called a historical frontier, showing the influence of geographical conditions only in details. One of these details, however, deserves attention, the tongue in which it advances north- wards into Belgium so as to give to France the natural fortress of Givet, a tongue, be it noted, the outline of which is as typical a boundary as is to be seen in Europe in respect of scantiness of population, apart from the fortress.

The mountainous frontiers of France on the east and south require hardly any comment. Only in the Burgundy Gate between the Vosges and the Jura has an artificial boundary had to be drawn, and even that in a minor degree illustrates the general rule. The division of the Iberian peninsula between Spain and Portugal goes back in effect to the Christian reaction against the Moors. The valley of the Mino and its tributaries establishes a natural connexion between Galicia and the rest of Spain-, but an independent crusade against the MoorS starting from the,, lower part of the valley, of the Douro resulted in < the formation of the kingdom of Portugal, which found its natural eastern limit on the scantily peopled margin of the Iberian tableland, where the rivers cease to be navigable- and flow through- harrow gorges, that

EKXRXlXfE

of the. Tagus,; wheire the : river marks- the frontier, being almost without inhabitants, especially on the Spanish side. ;

The greater part of the Italian boundary is very clearly marked geographically, though we have to ,kjpk back to the weakness «f divided: Italy to account for the instances in which northern mountaineers have pushed their way into southern Alpine valleys. Even in these parts, however, there are interesting illustrations of geographical influence in the way in which the Italian boundary crosses the northern ends of the Lkgo Magglore and the Lake of Garda, and cuts off portions of Lake Lugano both in the east and west. In all these cases the frontier crosses from one steep unpeopled slope to another, assigning the population at different ends or on different sides, of the lakes to the country to which belongs the adjacent population not lying on their shores. '

Of the Swiss frontier? all that it is necessary to remark is that the river Rhine in more than one place marks the boundary, Jn. one, however; where -it traverses alluvial flats liable, to inundation (on the side of Austria) rin the other place where it rushes through a gorg_e below the falls pf Schaff hausen. The southern frontier of Germany is almost throughout typical, the northern is the sea, except where a really artificial boundary runs through Jutland. – _■

'In the east of Germany and the north-east of Austria the winding

- frdntier through low, plains is the result of the partition of Poland, but in: spite of the absence of, marked, physical features it is for the most part in its' details almost as typical as the mountainous frontier oh the south of Germarry. AH the great rivers are crossed. Most of the line runs through a tract of strikingly scanty population, and the dense populatkmin one part of it, where upper Silesia confines with

: Russian Poland, has been developed. since the boundary was fixed. , In the !Balkan .Peninsula the. most striking facts are that the Balkans do hot, and the Danube to a large extent does form a boundary. Geographical features, however, bring the valley of the Maritsa (eastern Rumelia) into intimate relation with upper Bulgaria, the connexion of which with Bulgaria north of the Balkans had long been established by the valley ofthe Isker, narrow as that, valley is. On the side of Rumania, again, it is the marshes on the left bank of rite Danubs even'rhoi'e than the river itself that make of that river a frontier. An examination, of the eastern boundary of all that

is included in Russia, »n Europe will furnish further illustrations of

the general rulei.

. Finally, on the north-west of Russia it was only natural that. the Tornea'and the Tana 'should be' taken as lines of demarcation in that thinly peopled region, and hVwas equally natural that where the

;

Area.

Population.'

Pop. per sq. m.

Countries,

..' English

About

About

About

■ *, s 9- -PV .*

1880,

1890, , ,

1900.

Austria-Hungary .

'241,466

37384

4l;358

45,405"

' 188

Bosnia- Herzegovina");*

19,735

‘ : 1,336 l

■ 1,568 12 :

81

Liechtenstein ,-:;.., . .;

- £1

,

“9 1

147 .

Belgium • .■

“i373

5,520

6,069

6,694 IC

589

Denmark (6) ‘■ . ‘.’ ‘ .

I5.43I

: 1,980

2,185 ”-‘

2,465 »

160

France . .-‘■’. ■’ . ‘

207,206”-‘

■ 38,343 7

38,596 »

186

Monaco ; , . : .

, 8 :

15″

German Empire ,..

208,760,

45.234

49,428

56,345 1C

270

Luxemburg .- . .

1 ,003 ‘

237 ‘ 6

247 .’

Greece . ...’..

24,974

2,187 8

2,434 IS

97

Italy . . . .” :

1 10,676

28,460 2

32,450 H

293

San Marino . .

33 ‘

11 ”

435 – -

Montenegro …

3.50Q

228 15

6 5 . ,

Netherlands .

13,741

4.0!3 3

.4<5U 8

5,103″

400

Portugal .’ . . , .

‘ 34.347 w

” 4,160 4

4,660

5,423 w

‘ 153

Rumania . . . .

50,588

5,913 ”

117

Russia . . ‘. ‘.

‘i 1951,249

‘, 89,685′

103,671 18

53

Finland . ....

T44.255

„ -2,176 l

2,555 .”

18

Servia ■■ , , ; .

18,762

1,908 5

2,494 1S

133

Spain <°> . . . ‘ .

191,994

16,432 6

17,262 9

18,618 le

“97

Andorra . ■’:

175′

5

29

Sweden . – . : ■ • ‘: .

173,968

4.566

, 4,785

5,136 JS

30

Norway . ‘■ j ., ,.’ , .

126,053

2,001 7

2,231 16

18

Switzerland ‘ . , .

15.976

2,846

2,933 lc

3,3H ,6

207

Turkey (Europe)’”’ .*

66,840 ,

,5.892 ?

90

Bulgaria f /> ‘ . . :i

37.323

2,008 2

3,154 10;

3.7‘33 u

100

Crete . ...

3.328

302 9

304 16

91

Thasos . . ■’..-..

:■-.; !52:

12 ?

79

United Kingdom . .

I2f,742

35,026 2

,37,881 ‘

4L455 ”

34i

<"> Annexed by imperial decree to Austria- Hungary in 1908.

O Including Faeroe Islands.

w Area exclusive of Tagus and Sado inlets (together 161 sq. m.j. _

, <■ Excluding Canary Islands. ‘ . (,) With Novi-bazar.

(ft Bulgaria proclaimed its independence of Turkey in 1908. ..-,.

M885 2 i88i. « 187,9. "1878. ,.?i88 4 . . 6 i8?7-. '1891.

8 1889. : » Census 1890. I0 1888. u Census 1900. 12 Census 1895.

"■ Estimate I1897. 14 Census T901. " Census 1896. 16 Census 1900.

17 -Census f 899. 18 Census 1897:

EUROPE

Middle of 16th. Century

(Time of Charles V.)

English Miles o 50 100 200 300 400 500

th f£ bd! , cati .?? 1 Philip II (Spanish line I |

of Charles V) V 1 1

morocco/ k ˆ

POPULATION]

EUR0EE

boundary between Norway and Sweden descends from the fjejd in the, south it should leave to Norway both sides of the. valley of the Glommen. ˆ

The preceding table shows the arqa of the countries of Europe, Population. witn their estimated or' enumerated populations in ' thousands (ooo omitted) at different dates.

A noteworthy feature , of the distribution of population in Europe, especially in western, southern and central Europe, in modern times, is the high degree of aggregation hi towns, which is exhibited in the following table 1 for the different countries of regions of the continent: — . (t . t

Percentage

in' Towns,

All Towns : over

Over

100,000.

From:

20,000 to

100,000.

20,000.

England and Wales .

34-8

23-5

58-3 ■

Scotland .

29-7 :

99

397

Ireland .

14-2

5 3

19-5,

Norway ....

io-8

6-8

17-6

Sweden . . • .

8-3

2-6

ii-2 ‘

Denmark ….

19.4

6-6

26-0

German Empire .

170

1 1 -2

28-2

Netherlands

22-3

I50

,37:3

Belgium ….

18-6

120

306 ,

France

137

10-3

24-0

Spain and Portugal

10-5

57

16-2

Bosnia, Servia and Bulgaria.

4-2 .

4-2

Rumania .

4-6.

7-2 ;

U-8

Hungary ....

37,

91

12-8

Galicia and Bukovina .

2-0

4-8

6-8

Cis-Leithan provinces of

Austria (exclusive of the

, two latter) . . .

12-4 :

•59

18-3

Poland

106

4-2

• 14-8

Baltic Provinces, Russia

It-4

.8-3

197,

Moscow region 2 . .

96

5‘4

15-0

Black earth governments,

Great Russia 3 .

07

4-9

5‘6

Governments of middle and

lower Volga 4 .

3-3.

4-0

7-3”

South Russia 5

7-0 • ‘

8-5

I5 : 5′ ”

Finland

3-8

4-3

8-1

The following table contains a list of the towns with more than 100,000 inhabitants, not in every case according to the most recent census, but, in order to make the populations. faiEly com- parable with one another, ; according to the nearest census or available estimate to 1900. Population in thousands (oop omitted): — ■>

**London (Greater, 1901) . London (Registration,*

1901) . . .

**Paris (w. subs.)*

” (City, 1901)

**Berlin (w. subs.)*

(1900) .

Vienna (1900) .

“St Petersburg (w. subs.,

1897) . . .

‘Constantinople (w. subs.). Moscow (w. subs., 18.97) • ‘Glasgow (w. subs., 1901) . Hamburg-Altona (1900) . Liverpool (w. subs., 1901) Manchester-Salford (1901) Budapest (1900) Warsaw (1897) . fBirmingham (w. subs.,

1901)

“Naples (comm., 1 901)

1 Taken from a paper by Professor Voeikov on ” Verteilung der Bevolkerung auf der Erde unter dem Einfluss der Naturverhaltnisse

und der menschlichcn Tatigkeit," in Petermanns Mitteil. (1906), p. 249, where corresponding figures are given for other parts of the world.

4 Kaluga, Smolensk, Tver, Moscow, Yaroslav, Kostromer' and Vladimir. '

3 Kursk, Orel, Tula, Ryazan, Tambov, Voronezh and Penza.

4 Nizhniy Novgorod, Kazan, Simbirsk, Samara, Saratov and Astrakhan.

5 Bessarabia, Kherson, Taurida, Ekaterintaslav and Don Province.

6,581

Brussels (r9oi) . . .

563

**Madrid (1900) . . .*

.540

4536

Amsterdam (1902) .

<540

2877

"Barcelona (1900)

533

2661

Munich (1900) .

500

2673

Marseilles (1901)

495

1884

“Milan (comrn., 1901).

493

1662

Copenhagen (w. subs.

. ;

1901) . . .

477

1267

**Rome (comm., 190I)*

4°3

1200

Lyons (1901)

460

1036

Leipzig (1900) .

455

910

Leeds (w. subs., 1901)

444

867

Breslau (1900) ,

423

767

Odessa (1897) .

405

765

Dresden (1900) .

395

732

Edinburgh-Leith (1901) .

393

638

Sheffield (1901) . .

381

Dublin (w. subs., 1901) ;.

‘ 373

599

Cologne (1900) .

372

565

“Lisbon (1900)

35°

: Belfast. (1901).,. •/ •’• ■ ■■• 349

Rotterdam :{J902ˆ ... 348,

, Turin (qomm., 19P1) • 335′ Bristol, (1901) ,.. – -329 Newcastler Gateshead. . (I90l) : ...■;. i .325

Prague (wˆ subs. j 1900) 317

Lodz (1897) ..... , 315.

“Palermo (comm., 190,1) . ,310 Stockholm (1902X1, . .306,

Elberfeld-Banaien (1901) • 299,

Bordeaux (w. subs.,, 1896) 289

■ *Frankfort-on-Main ... . – 288*

■*Riga (w. subs., 1897) • 2 83*

Bucharest: (1899) . • • 2 82 :

Bradford (1901) . . 280

Antwerp: (1901) , , ., i :. ,273

{West Ham (1901) . . 267

Nuremberg (1900) . . 26(

Kiev (1897) .. , . . 247

Hull (1901) , . . 241

Nottingham (190(1) . . 240 Hanover (i960) » . .237

Genoa (comm., (1901) . 235

Magdeburg (1900) . . 230

Christiania 1 (1900) : .. ‘.- . 226

The Hague (1902) . . 222

Roubaix-Tourcoing (1901) 220

Dusseldorf (1900) . . 214

“Valencia (1900) . , . 214

Florence (comm., 1901) . 205

Leicester (1901) . . 212

Lille (196 1) : ; . . 211

Chemnitz (1900) . . 207

Portsmouth (1901) . . 189

Charlottenburg (1900) . 189

Konigsberg (i960) ■’■■.’■ ■>. 188

Triest (i960) . . ‘■ .’;’■ 179 Plymouth-Devonport

■-, (1901) > . . . -. i 177

Stuttgart (1900) . -.-■ 176

Kharkov (1897) . . ‘■ 174

Bolton (1901) . ■■;■ . 168

Oporto (1900) . . . 168

Cardiff (1901) . . . 164

Bremen (1900) . . ‘ . 163

Ghent (1901 1) “• . ■■ . . 162

‘Dundee (1901) ; . ■ . . 161

Vilna (1897) ‘ . ‘■’. . 160.

Brighton-Hove (1901) . 160

Lemberg (1906) ■ .’ . 160

Liege! (1901) . . . 160

Halle a S. (1900) ‘ . . : 157

Aberdeen (1901) . . 153

9%£

Bologna ijcomm., 190,1),, .. . 152

“Venice (comm-, 1901) 152

Catania (comm., 1,901) .150 Messina, (comm., 1901,) , . 150

Salonica • ■ • .’ 150

Strassburg (1900) . – . 150

,Ziirich (comm,, 1900) . 150

Seville (1900) . ; . 148

St.Etienne (1901) ,. . 147

Sunderland (190,1) ■. ..- . •.■,•147 Dortmund (1900) . ,-... 14?

Danzig (1900) ■ 141

Mannheim (1900) . .140

Stettin (1895) .’...■ .140

Croydon (1901), ... 139 Graz (1900) 138

Oldham (1901) . . . 137

Saratov (1897) . ; . , 137

Aachen (1900) ;. ■ . . 135

Gothenburg (1902) . . 134

Toulouse (1896) . .134

Nantes (1.901) . . . 133

Kazan(i897) . . . 132 Malaga (1900) : 130

Havre (1901) . j •„■■.-. 130

Blackburn (1901) . . 128

Brunswick (1900) . . 128

Ekaterinoskv (1897) . 121

‘ Rostovon-Dbn (1897) , 120

Essen (1900) . . . 119

Posen (1,900) ■■. .! . 117

Preston (1961) . . . 113 Astrakhan (1897) . ■>.. 113

Norwich (1901) . : . , 1 12

Murcia (1900) . . > . ■:> 112

Birkenhead (1901) . . Hi

Athens (1896) . .. . ill I

nTula (1897) : ill

Briinn (1900) . ‘ ;. . ■ no

Kishinev (1897) •’ ‘ • ,K) 9

Basel (comm., 1900) ‘ .■! 109

Utrecht (1902) . . . 109

Kiel (1900) . ■■:■ . io8

Reims (1901) . . . 10B

Krefeld (1900) . . i . . ■ 107

Derby (1901) . . . 106

Kassel (1900) . l' .■•' 106

Halifax (1901) . . • v 105

Nice {1901) . . .105

Southampton (1901) . 105

Nancy (1901) ■■.' . . 103

Szeged (1900) . . .103

■Toulon (1901) . •' ■' . . 102

Cartagena (1900) . . " 100

Comm. ■= cohimune. w, , subs. = with suburbs. AuT.noˆLiTiES.-ˆElisee Reclus, vols. i.,to y. of Nouvdle GeogmpMe universale (fans, 1876-1880), .translated by E. G. Ravenstein and A. H. Keane'(vol. i. Southern Europe, vol. ii. France and Switzerland, vol. iii. Austria-Hungary, Germany, Belgium and the Netherlands, vol. iv. The British Isles; vol. v. Scandinavia, Russia in Europe, and the Eurqpean islands, translation undated) ; G. G. Chisholm, ," Europe " (2 vols.) in Stanford's Compendium of Geography and Travel (London, 1899, 1902) ; Kirchhoff and others, Die Landerkunde des Erdteils Eufopd, Vols. ii. and iii. of Vnier Wissen von der Erde (comprising' all the countries of Europe except Russia) (Vienna, &c., 1887-1893);, A. Philippson and L. . Neumanni Europa, eine allge meine Landerkunde (Leipzig, 1895, 2-nd edition, by A.. Philippson, 1906) ; Joseph Paftsch, Central Europe (London, 1903) (embraces Belgium, the Netherlands, Germany, Austria-Hungary, Rumania, Servia, Bulgaria and Montenegro treated from a general point of view); Joseph . Partsch, Milteleuropa (Gotha, 1904) (the same work in German,, extended and furnished with additional coloured maps); M. Fallex and A. Moirey, L'Europe moins la France (Paris, 1906) (no index); A. Hettnef, Europa (Leipzig, 1967) (a:ri important feature of this

work is the division of Europe into natoral regions) ; Vidal de la Blache, Tableau de la geographie de la France (Paris, 1903) (contains a most instructive map embracing western apd central Europe to about 42° N. and 24°-26° E., showing the former extent of forfet, the distribution of soils earliest, fit' : for cultivation, of littoral alluvium and of the mines of salt and tin which were so important in early European commence); H. B. George, The Relations of Geography and History (Oxford, 1901). (deals very largely

- *In 1800 only those to which ah asterisk is prefixed rose abdye 100,600. Thirty-four out of the 144 towns enumerated in the list above belong to the British Isles. ...*

f The contiguous parliamentary boroughs of Birmingham and Aston Manor. ' t Part of Greater London.

with Europe); W. Z. Ripley, The Races of Europe (London, 1900) ; J. Deniker, The Races of Man (London, 1900); R. G. Latham, The Nationalities of Europe (London, 2 vols., 1863); J. G. Bartholomew, •" The Mapping of Europe," in Scot. Geog. Magazine (1890), p; 293; Joseph Prestwich, Geological Map of Europe (Oxford, 1880) ; A Supan, Die Bevolkerung der Erde (viii. Gotha, 1891, and x. Gotha, 1899) ; Strelbitsky, La Superficie de V Europe (St Petersburg, 1882) ; Oppel, " Die progressive Zunahme der Bevolkerung Europas, Petermanns Mitteil. (Gotha, 1886); Dr W. Koch, Handbuch filr den Eisenbihn-Gilterverkehr (Berlin), published annually (gives railway distances on all the lines of Europe except those of the British Isles, Greece, Portugal and Spain); Verkehrsatlas von EurOpa (Leipzig), frequently re-issued; Grosser Atlas der Eisenbahnen von Mitteleuropa (Leipzig) ; Verlagfiir B or sen and Finanzliteratur, frequently re-issued (gives kilometric distances between a great number of places and a great variety of other information in the text); K. Wiedenfeld, Die nordwesteuropdischen Welthdfen (Berlin, 1903) (an important work discussing the geographical basis of the commercial importance of the seaports of London, Liverpool, Hamburg, Bremen, Amsterdam, Rotterdam, Antwerp and Havre). Papers relating to the climate of Europe: J. Hann, " Die Vertheilung des Luftdruckes (iber Mittel- und Sud-Europa " (based on monthly and annual means for the period

1851-1880), in Penck's Geograph. Abhandlungen (vol. ii. No. 2, Vienna, 1887); A. Supan, " Die mittlere Dauer der Haupt- Warme-perioden in Europa," Petermanns Mitteil. (1887), plˆio, and pp. 165-172; Joseph Reger, " Regenkarte von Europa," in Petermanns Mitteil. (1003), pi. 1; A. Supan, " Die jahreszeithche Verteilung der Niederschlage in Europa," &c, ibid. (1890), pi. 21, and pp. 296-297 ; P. Elfert, " Die Bewolkung in Mitteleuropa mit Einschluss der Karpatenlander," ibid. (1890),' pi. 11 and pp. 137-145; K6nig, " Die Dauer des Sonnenscheins in Europa," in Nova Acta Leopoldina Karol. der deutschen Akad. der Naturforscher, vol. lxvii. No. 3 (Halle, 1896); E. Ihne, " Phanologische Karte des Fruhlings- einzugs in Mitteleuropa," in Petermanns Mitteil. (1905), pi. 9, and pp. 97-108; A. Angot, " Regime des pluies de la peninsule iberique," in Annates du bur. cent, meteor, de France (1893, B. pp. 157-194). and " Regime des pluies de l'Europe occidentale," ibid. (1895, B. pp. 155-192); E. D. Bruckner, " Die Klimaschwankungen seit 1700," in Penck's Geographische Abhandlungen, iv. PI. 2 (Vienna, 1890) ; Supan, " Die Verschiebung der Bevolkerung in Mitteleuropa mit Einschluss der Karpatenlander," Petermanns Mitteil. (1892); Block, L'Europe politique et sociale (2nd ed., 1892); E. Reclus, " Hegemonie de l'Europe, " in La Societe nouvelle (Brussels, 1894). Publications relating to the measurement of a degree of longitude on the parallel of 52° N. from Valentia (Ireland) to the eastern frontier of Russia: (1) Stebnitsky, account of the Russian section of this work in the Memoirs (Zapiski) of the Milit. Topog. Section of the Russian General Staff, vols. xlix. and 1. (St. Petersburg, 1893) (in Russian, see notice in Petermanns Mitteil. (1894), Litteratur- bericht, No. 289); (2) and (3) Die europdische Ldngengradmessung in 52° Br. von Greenwich bis Warschau; (2) Part i., Helmert, Haupt- dreiecke und Grundlinienanschliisse von England bis Polen (Berlin, 1893) ; (3) Part ii., Bcrsch and Kriiger, Geoddtische Linien, Parallel- bogen, und Lothabweichungen zwischen Feaghmain und Warschau (Berlin, 1896); J. G. Kohl, Die geographische Lage der Hauptstddte Europas (Leipzig, 1874); Paul Meuriot, Des agglomerations urbaines dans l'Europe contemporaine (Paris, 1898); Scharff, The History of 'the European Fauna (London, 1899). (G. G. C.)

2. Political History The origin of the name of Europe has been dealt with above, and the difficulty of any exact definition of the geographical limits covered by this term has been pointed out. A similar difficulty meets us when we come to deal with European history. We know what we mean when we speak of European civilization, though in its origins, as in its modern developments, this was not confined to Europe. In one sense the history of Europe is the

history of this civilization and of the forces by which it was produced, preserved and developed; for a separate history of Europe could never have been written but for the alien powers by which this civilization was for centuries confined within the geographical limits of the European continent. Moreover, within these geographical limits the tradition of the Roman empire, and above all the organization of the Catholic Church, gave to the European nations, and the states based upon them, a homogeneity which without them could not have survived. The name of Europe, indeed, remained until modern times no more than "a geographical expression"; its diplomatic use, in the sense of a group of states having common interests and duties, is, indeed, no older than the 19th century; in the middle ages its place was taken by the conceptions of the Church and the Empire, which, though theoretically universal, were practic- ally European. Yet the history of the states system of Europe,

though enormously influenced by outside forces, possesses from the first a character of its own, which enables it to be treated as a separate unit. This historical Europe, however, has never been exactly commensurate with Europe considered as a geographical division. Russia, though part of Europe geographically — even if we set the limits of Asia at the Don with certain old geographers — had but slight influence on European history until the time of Peter the Great. The Ottoman empire, though its influence on the affairs of Europe was from the first profound, was essentially an Asiatic power, and was not formally introduced into the European system until the treaty of Paris of 1856. It still remains outside European civilization.

Europe, then, as we now conceive the term in its application to the political system and the type of culture established in this part of the world, may, broadly speaking, be traced to four principal origins: (1) The Aegean civilization (Hellenic and pre- Hellenic); (2) the Roman empire; (3) Christianity; (4) the break-up of the Roman empire by the Teutonic invasions. All these forces helped in the development of Europe as we now know it. To the Aegean civilization, whether transformed by contact with Rome, and again transformed by the influence of Chris- tianity and the religious genius of the middle ages — or re- discovered during the classical Renaissance — Europe owes the characteristic qualities of its thought and of its expression in literature and art. From republican Rome it largely draws its conceptions of law and of administrative order. From the Roman empire it inherited a tradition of political unity which survived, in visible form, though but as a shadowy symbol, until the last Holy Roman emperor abdicated in 1806; survived also, more fruitfully, in

the rules of the Roman lawyers which developed into modern international law. Yet more does Europe owe to Christianity, an Asiatic religion, but modified by contact with Greek thought and powerfully organized on the lines of the Roman administrative system. The Roman Church remained a reality when the Roman empire had become little more than a name, and was throughout the period of chaos and transforma- tion that followed the collapse of the Roman empire the most powerful instrument for giving to the heterogeneous races of Europe a common culture and a certain sense of common interests.

The history of Europe, then, might well begin with the origins of Greece and Rome, and trace the rise of the Roman empire and the successive influence upon it of Hellenism and Christianity. These subjects are, however, very fully dealt with elsewhere (see Aegean Civilization; Greece; Rome; Church History); and it will, therefore, be more convenient to begin this account with the Teutonic invasions and the break-up of the Roman empire, events which mark the definite beginning of the modern European states system.

In a sense the Roman empire had been already " barbarized " before the invasions of the barbarians en masse. Land left vacant by the dwindling of the population was colonized by immigrants, Teutonic and other, from beyond the frontiers; the Roman legions were largely recruited from Germans and other non- Romans, some of whom even rose to the imperial purple. Thus, in the end, the Roman emperor, with his guard and his household, ruling over an empire mercilessly exploited to fill his treasury, was essentially indistinguishable from those barbarian chiefs, with their antrustions and their primitive fiscal methods, who entered into portions of his inheritance and carried on the traditions of his rule.

The history of the Teutonic peoples prior to their organized invasions of the empire is dealt with elsewhere (see Teutonic Peoples). It was in the 4th century that the pressure of their advance was first felt on the frontiers, and this led to a change in the government of the empire which was to have notable consequences. In a.d. 330 Ccnstantine had transferred the capital from Rome to Byzantium (Constantinople), but the empire, from the Forth to the Tigris, continued to be administered successfully from a single centre. Not, however, for long: the increasing perils from without made a closer supervision essential, and after the death of Theodosius I. (395) the empire was divided

EUROPE IN THE VI CENTURY

Boundary of the Roman Empire at the death of Theodorle 628.

(Prankish Kingdom circa 500

[Conquered from the West Goths SOTSV

Cast Gothic Kingdom at the death of Theodorle. : _

'Scale, 1:38,000,00c

*Emt*yW«]kcrt**

between emperors of the East and West. It was the beginning not only of the break-up of the empire, but of that increasing divergence between the eastern and western types of European religion and culture which has continued to this day.

The pressure of the Teutonic invasions became increasingly strong during the reigns of the emperor Valens and his successors. These invasions were of two types, (1) migrations of whole peoples with their old German patriarchal organization com- plete, (2) bands, larger or smaller, of emigrants in search of land to settle on, without tribal cohesion, but organized under the leadership of military chiefs. The earlier invaders, Goths and Vandals, and later the Burgundians and Lombards were of the first type; to the second belonged the Franks, " free " men from the Saxon plain, and the Saxon invaders of Britain. The distinction was a vital one; for the Goths, Vandals, Burgundians and Lombards never took root in the soil, and succumbed in turn, while the Frankish and Saxon immigrants, each man lord in his own estate, not only maintained themselves, but set up at the cost of the Roman organization and of the power of their own kings a wholly new polity, based on the independence of the territorial unit, which later on was to develop into feudalism.

It was owing to the pressure of Turanian invaders from the East that the Teutonic peoples were first forced to take refuge within the empire. In 378 the Goths defeated and £ fie slew the emperor Valens in a battle near Adrianople;

invasions. m 4 IQ Alaric, king of the West Goths, sacked Rome; and

shortly after his death the Goths passed into Gaul and Spain. In 429 Gaiseric, king of the Vandals, at the invita- tion, it is said, of the governor Bonifacius, passed over from Spain to Roman Africa, which became the centre of another Teutonic kingdom, soon established as a great naval power which for a while commanded the Mediterranean and devastated the coasts of Italy and Sicily with its piracies.

Meanwhile the Franks and Burgundians were pressing into Germany and Gaul, while from 449 onwards the Saxons, the Angles and the Jutes invaded and occupied Britain. For a moment it was doubtful if the Aryan or Turanian- races would be supreme, but in 431 Attila, king of the Huns, was decisively beaten in the battle of Chalons by a combination of Franks, Goths and Romans, under the Roman general Aetius and Theodosius, king of the Goths. This battle decided that Europe

was to be Christian and independent of Asia and Africa. In 476 the succession of Western emperors came to an end with Odoacer's occupation of Rome, and with the decision of the Roman senate that one emperor was enough, and that the Eastern emperor, Zeno, should rule the whole empire. For a time Theodoric, king of the East Goths, ruled Italy, Gaul and Spain; but after his death in 526 the empire of the East Goths was shattered, and changes took place which led to the rise of independent Teutonic kingdoms in Gaul and Spain. In Gaul Clovis (d. 511), the king of the Franks, had already established his power, and in Spain, the West Gothic kingdom, with its capital at Toledo, ; now asserted its Teutonic independence. Under the 5 emperor Justinian (527-565), indeed, the Roman empire seemed in a fair way to recover its supremacy; the Vandal kingdom in Africa was destroyed; in 555 the Byzantine general Narses finally shattered the power of the East Goths in Italy, and the exarcriHtp of Ravenna was established in dependence on the Eastern emperor; the West Goths were forced to give up the south of Spain; and the Persians were checked. But with the death of Justinian troubles began. In 568 the Lombards, under Alboin, appeared in Italy, which they overran as far south as the Tiber, establishing their kingdom on the ruins of the exarˆ chate. Though in Asia the emperor Heraclius, in a series of victorious campaigns, broke the Persian power and succeeded even in extending the Roman dominion, Italy, save for a while Ravenna itself and a few scattered sea-coast towns, was thence- forth lost to the empire of which in theory it still formed a part k

This catastrophe produced one result the importance of which it is impossible to exaggerate; the development of the political power of

*the papacy. At the beginning of the 6th century Rome, under Theodoric the Goth, was still the city of the Caesars; the tradition of its ancient life was yet unbroken; at the endj of the century Rome, under Pope Gregory the Great (590-604); had become the city of the popes. And with the city the popes entered into some of the inheritance of the Caesars; in the world-wide activity of Gregory we already have a foreshadowing of universal claims, often effectively asserted, which m*de the great medieval popes, in a truer sense than the medieval emperors, the representatives of the idea of Roman imperial unity (see Rome, sec. ii. Middle Ages; Papacy).*

*The next event that profoundly affected the histqryjjf Europe was the rise of Mahommedanism. T£s&.& & iˆ sittuferl yeaifii tfj, e fc~ ""after Gregory 's~(ft"Mˆ"oec«rred • the fˆSi : dJif4jf'ay'e>{ glra, a. D. Mahomet from 'Meccja, to Medjjia, \|hich fixed the 622. Rise memorable era of Yhe'Heˆira. The .full force of the ptMahom-miiitantreligion founded- by the Arab "prophet was not f • felt till after his death (6*3ˆ. The emperor Heraclius,*

the vigour of his manhood passedi'.tyas'unable to. meet this new pieril; the Arabs, strong in their 1 hardy simplicity, and new-born religious fanaticism, and' aided by tbe-tieason and cowardice of the decadent Roman governing glasses, overran Asia Minor, Conquered Egypt arid theˆole of northern Africa, overwhelfrised the Go"trHcAmgd tejsti : a.Ji – tivilfzajfion* became gradually confided to Europe,; saftiat1\|jE,ˆvas' that] jfiej trade .routes 'to the East. were clˆged t» tjEˆ:,;iV5reˆ;er ; ri nations, -The conquest-of …N.arbonne marked the Irwtf 'of * the advance of I?lam in westprffEurj(Jpej»*fc>r iff "73 a theyyjalar'were bverfchfawˆ by Charles Martel/in the battle of Tours, and a few years later were driven ouh£>f Gaul. In Spain, however, they succeeded in maintaininjf themselves throughout the middle ages* developing %'mghtype of civilization which had ˆ"considerable influence on the intellectual life of medieval Europe} and it was not till 1494 that Granada, their last posses sion jnthe peninsula, was eqnquered by. the .Christian mpnarcjs, Ferdinand and Isabella. ■:,*■■■■-. ■.■.ˆ■'■a-*

I Thfc battle of Tours emphasized and increased- the power and Reputation of Charles Martfel, As a mayor of thepateeetothe

; . decadent Merqvjngian successors .ef J£io.v.is,. he was

tiogians. virtually ruler of the Franks, and, after his death, the last of the rois faineants of the house '.of Merovech was deposed, and Pippin; Charles's son, was elected king of the Franks. The prestige of the Carolingian house i (to give it the name it was later known by) was increased when, at the urgent entreaty of Pope Stephen ! IIL, Pippin marched into Italy and saved Rome from the Lombards, who were; endeavouring to extend their power southwards. Pippin's son Charles (Charle magne) finally conquered the Lombards in 774 and thus added part of northern Italy to his dominions.

In 797 an event- of the highest importance to the European world took place. The emperor Constantine VI." was deposed Tfi i ro i. bylus mother Irene, who seized the throne. Thereupon atloa of Pope Leo; and the 'Roman people definitely threw Charles the off the authority of the emperors of Constantinople, Great as on t jj e g roun(j that a woman could not hold the position ggoˆ""""' of Caesar. In 8©o Leo 1 crowned Charlemagne emperor at Rome, and henceforth till 1453, when Constantinople was conquered by the Turks, there was an Eastern.and a Western

Charlemagne's Empire at its gr eatest extent. ',

Boundary of Empirt .

Europe after the death of Chiirle- magna.

Division of the Empire by the Treftty of Verd un, 843 Ghmln theBoldˆ ESB

empire. f Till jris death ,ip 814 Charlemagne was king of the

"rinks k.% wSaf "ai-irhperorˆ His kingdom embraced not only all

"S-errnarryand modern France, but -inctudecl a large part of

Italy and Spairi- ; as iaras ,the- Ebro. Under, his rule western'

Europe was united in a powerful empire, in the organization of

which the principles of Roman and. Teutonic administration;

were blended'; ancL,- after his death, he left ..to his successors,.

the Frankish and German ■•.kings,." the tradition of a centralized'

*government which survived the. chaos of the period that followed,' 'and. the prescriptive right to the title and prestige of Roman elnrjerors-r-a „;traditibn and a claim that were to exercise a. nobble effeCt |oh the, development of European history for: cerrfurieg trf corae. (See France': History and Charlemagne;): The period frotn the death of Charfemagne (.814) to the rath; Cgftt^irjf, is characterized in western Europe by the general weaJa*nifig/of tile idea, of central government and hy > ; tb&$se^tff. : feudalism, During the same period the Jt#&' Iffifetkifeiir Byzantine; empire escaped disruption*

- *aitd, "-.presirfving the traditions of Roman, civil "and military 5 ' administration, formeti an effective barrier fair Europe and Christendom against the advancing tide of Islam J At the sam£ time, however, the growing divergence between; ..the Ffa'stern a,Jkl Western. Churches, which had been accentuated' ;%» t the iconoclastic controversy (see Iconoclasts), and wasj destined in 1053 to culminate in a definite schism, was gradually widening the breach between the two types of European civiliza- 1 tipn, which came into violent conflict at the beginning of the' ibthi -Century, when crusaders from western Europe captured, Constantinople and set up a Latin empire 1 in the East (see 1 Roman .,JEMPiUE r lX.AiEa; . Church Histosy;.,. Crusades). .In' western Europe, meanwhile, the unity of the empire did not long ! survive Charlemagne. Its definite break-up dates from the treaty*

of Verdun (843), by which Charles the Bald received Neustria, Aquitaine and western Burgundy, Louis the German Bavaria, Swabia, Saxony and Thuringia, and the emperor Lothair the middle kingdom known by his name, the regnum Lotharii or Lotharingia (see Lorraine). By the partition of Mersen (870) Lotharingia itself was divided between the West and East Frankish realms— France and Germany, terms which from this time 'begin to represent true national divisions. With the treaties, of Verdun and Mersen the history of the European state , system may, -be said :to begin.

At first, indeed, it seemed as though the nascent states were about to be dissolved by disruption from within and attacks from without. AH alike were subject to the attacks of: the Norse sea-rovers, hardy pirates who not only fjuˆ a °f sm- scourged all the . coasts of Europe but penetrated, burning and harrying, far inland up the great waterways. Meanwhile, the weakening of central government due to dynastic

The Westers Ethpke afte the Partiftori < >f Mersen 85®*

Uwrrwaon «

i&uiytr&fibtf It

EUROPE

in 1810

English Miles o 50 100 200 500 400 500

Boundary of France 1792 ..... — .-~ >

Boundary of Confed? of the Rlut

France at the end ofjS62 —

Acquisitions 1803-5.

Acquisitions 1805-10 „ T .~.

Kingdom of Italy directly ruled t Dependent States . Kingdom of Sard! 1 Sweden ...

taiy | ,

by Napoleon .„^ . j , ,

ates ... J ... _.„ I 1*

ardinia . r ....^..- |

Emery Wftiktr K.

HISTORY]

EUROPE

struggles lad led to the growth of independent or semHlmdepend- erit powers within the states themselves. The Frank: landowners had successfully asserted their independence of the jurisdiction of the king (or emperor) and his officials; thei imperial officials themselves, dukes or counts, had received grants of lands with similar immunities (benefida), and these had become hereditary. Thus sprang up a class of great territorial nobles to whom, amid the growing anarchy, men looked for protection rathef than to the weak and remote central power; and so; out of the chaos that followed the break-up of the empire of Chairlemagne, Was born the feudal system of the middle ages (see Feudalism). This organization was admirable for defence; and with its' aid, before the close of the first decade of the ioth century), the frontiers of France and Germany had been made safe against the northern barbarians, who had either been driven off and barriers erected against their teturn — e.g. the marks established by Henry the Fowler along the middle Elbe — or, as in the case of the Normans; absorbed into a system well' adapted for such a process. By the treaty of St : Claife-sur-Epte (on) between Charles the Simple and Rollo; chief of the Norsemen, the Normans were established in the country since known as Normandy (

Feudalism, by the time the Northmen had been suEdued by its aid; was quite firmly established in the western part of ' Eta-ope, During the 1 1 th century it was carried by the Normans aaci Uy mt0 England, into Sicily and southern Italy, and by the feudalism, nobles of the first crusade into the newly established kingdom of Jerusalem (1009). By the kings of France, England and Germany, however,*

who saw themselves in danger of being stripped of all but the semblance of power by its delega- tion to their more or less nominal vassals, the feudal organization was early recognized as impossible as a form of state government, if the state was to be preserved; and the history of the three great European powers during the succeeding centuries it mainly that of the struggle of the sovereigns against the disruptive 'am 1 bitions of the great feudal nobles. In England the problem was, from! the outset, simplified; for though William the Conqueror introduced the system of feudal land tenure iht<5 England in 1066 he refused to set it up as his system of government; retaining alongside of it the old English national policy. In France, on the other hand, feudalism as a system of government had become firmly established; and it was not till the days of Philip Augustus (1180-1223) and Louis IX. (1226-1270} that the monarchy began to get the upper hand. From this time until the* 17 th century the power of the French monarchy, in spite of occasional lapses, grew steadily stronger. The reverse was the case with the German kingship. Its association with the; undefined claims involved in the title of Roman emperor, traditionally attached to it, and notably those to authority in Italy, necessitated con- cession after concession to the 1 feudal nobles, in-order to purchase their support for their assertion. The kingship, "moreover^ became elective ; the imperial title Was obtainable only at Rome at the hands of the pope; and the German kings "thus' became entangled in contests, not only with their own vassals, but : with the tremendous spiritual force of the medieval papacy by which, for its own ends, the spirit of feudal insubordination was from time to time fomented. Thus in Germany the feudal hoblgs gradually acquired a sovereign status which, in sohte cases; has survived the territorial rearrangements of the 10th century and left its mark on the federal constitution of modern Germany; while the kingship and the imperial title grew more and more ! shadowy till in 1806 it vanished altogether., (See English History; France: History; Germany: History.)'" " '"*

*In France the process by which a stforig hereditary monarchy i was. established was a slow one. During the' greater part of the 10th Century the Carolingians, stripped 'of the vast ™ erts * o/ domains which had been the basis of the power of of Capet Pippin, owed their continued existence to the for- bearance of Hugh the Great, cbutit of Paris. In 087, however, the last Carolingian king died, and Hugh Capet, son of*

*Hugh- the. Great, Vhe mostspowerful of the territorial: magnates, was chesen/ki'ng *»f.Franee,i, With liis election dates. thej^eaJ ! beginning of thes French monarchy, and under him and his suc-*

cessors Paris became, ithe capital of >France. Hugh's .ele'&ft>n, 'however, was the? work: of. the great feudatories, and jˆVe remained divided among: a number of great. fiefs, of which the chief were Brittany, Anjou, Flanders, Vermandois, Champagrie', Burgundy, Aquitaine,Poitou-jGascony, Toulouse and Normandy.

While the ceatral power ', in France advanced slowly; but steadily, the development of the royal authority in- Gerjmany was in; the iothrand :nth centuries more rapid. In > ■■ .

$ri the 4 – German magnates had elected Conrad the. T L ny i Franconian to reign over them, and in 919 Henry aermaay. " the Fowler " of Saxony; " whose reign forms one of : ,: ; the great 'turning-points in- the history of the. German nation-" He: defeated ithe 'Hungarians, the Slavs and the Danes, alnd. by encouraging the growth aind development of towns he- contributed greatly tothb faranationof the German kingdom. His immediate successors; "Otto the Great and Otto II., continued his work, which was only, interrupted for- a short time during the reign of the idealist -Otto HI., 'whose "cosmopolitan imperialism ■'■' brought him into' collision with the German Church and tosome extent witb the German nobles. Henry II. (1002-1025) asserted with" success his authority over Germany, and his successor Conrad IL , who belonged to the Salian or Franconiaiit line, did mu>ch to secure unity and- prosperity to the Empire. His son'and successor Henry III. (1039-1056) governed Germany wisely, and his reign 'witnessed the culminating point of the Holy Roman Empire. At the tirrie-of his death it seemed probable that Germany, like England and France, would gradually escape from the thraldom of- the' great feudatories. The future of the German monarchy- depended upon the ability of future kings, to suppress the forces of feudal disintegration >in Germany, and to withstand the temptation of struggling to establish their influence over Italy.- Unfortunately for German kingship Henry IV. (1036 tto6) was only six years old on his accession, and when he became a man he found that the papacy under Hildebrand's influence was practically independent of the emperor. 1 Had: Henry ; confined his 1 efforts' to coercing the German barons he might, like : the Normans and Angevins in England, and like the Capetians in France, have proved successful. Unfortunately for Germany Henry entered upon the famous contest with the papacy under Gregory VII. (1073-1080), which ended in the 13th century in the defeat of the Empire in the person of Frederick II. The struggle began in 1073 over' the question of investiture (ˆs;), and widened into a duel between the spiritual and temporal powers. During the early years Of the contest the influence ot the papacy reached a high pitch and made itself felt in the crusad-*

ing movement; which received its first impetus from Pope Urban IL', 1 who ap'pealed to Europe at the council of Clermont iri 1005 to recover the Holy Places from the Turks.

During'the nth century the Eastern Empire was attacked by the Russians, ' the' Normans : and the Seljuks. The emperor Alexius ConihenUs found himself on his accession in '. _. 'r ■ 108 1 threatened by the Seljuks (the victors in the de eastern – cisivebattle of Manzikertin 1071) and by the Sicilian Empire Normans who in 1081 besieged Durazzo. In 1083 he l n< "? defeated the r Normans in the battle of Durazzo, and with the death of Robert Guiscard in 1085 all danger from a fresh Norman invasion 'passed away. ■ But the first crusade brought new ' anxieties' to Alexius, for he feared that the crusaders might attack 'Constantinople. That fear removed, he took 'advantage of the increased connexion between eastern and western Europe by bestowing commercial privileges upon the Italian trading republics, who thus gained access to the ports of the Empire on easy terms. ■ •'!! " ' ■■"*

With the era of the Crusades'; 'tthich lasted till the middle of the 13th century, Europe entered upon a period of change; the importance of which is realized by contrasting the condition of western Christendom fti the' irth with its condition in the ijjth century. Between the opening and close of the 'Crusading movement Europe underwent a complete revolution. Wb*le the*

Crusades tended to enhance the prestige anu authority of the papacy and the power of European monarchs, they also led to increased knowledge of the East, to the rapid de- Jadesaad velopment of commerce, to the introduction of new theHlUe- industries, to the rapid decline of the influence of the brandlne feudal nobility, and to the rapid development of town nforma- jjf e ˆ see c 0MMUNE). At the same time the Hilde- brandine reformation was having an immense influence upon the intellectual condition of Europe. The 12th century saw the establishment of many new monastic orders (see Monasti- cism), and at the same time a remarkable speculative and literary revival (see Scholasticism). This movement owed not a little of its success to the influence of the Crusades, which stirred up intellectual as well as commercial activity. This intellectual activity,

as well as the fruits of commercial expansion, were — since learning was still a monopoly of the clerical order — weapons In the hands of the papacy, which in the 12th century attained the height of its power, if not of Us pretensions. It is, indeed, impossible to exaggerate the influence of the Roman Church upon the development of Europe at this period. The popes, in fact, represented Europe in a sense that could not be predicated of the emperors; the terror of their spiritual power, their vast wealth derived from the tribute of all the West, their unique experience of international affairs, and— in the case of the great popes of this epoch — the superiority of their minds and characters, made them not only the spiritual rulers of Europe, but the effec- tive centres of whatever political unity it possessed. As a Byzantine observer was to observe of Innocent III., they had become the successors of the Caesars rather than of Peter (see Papacy).

Nowhere were the beneficial effects of the Crusades seen more clearly than in France. The smaller fiefs were steadily absorbed Growth of by the greater lordships, which in their turn fell the royal victims to the royal power. It might almost be said power lo tnat < < mo dern France is a creation of the Crusades." ranee. ˆg e ff e cts of the crusading movement were felt in France as early as the reign of Louis VI. (1108-1137). Aided by his able minister Suger, Louis managed before his death to add to the possessions of his house the lie de France and a prospective claim to Poitou and Aquitaine. Under his successor Louis VII. (1137-1180) the consolidation movement was checked owing to the marriage of Eleanor of Aquitaine (after her divorce from Louis VII.) to Henry II. of England. By the addition of his wife's lands (Gascony and Guienne) to those which he had already inherited from his father and mother (Normandy, Anjou, Touraine and Maine) Henry was enabled to form the powerful though short-lived Angevin empire. But the lost ground was rapidly recovered by Philip Augustus (1180-1223), who took advantage of the weakness and folly of John of England, and before 1215 had united firmly to France Normandy, Maine, Anjou and Touraine. Louis VIII. and Louis IX. adhered firmly to the policy of Philip IV., and in 1258, by the treaty of Paris, Henry III. of England recognized the loss of Poitou. There thus remained to England out of the vast continental domains of Henry II. only Gascony and Guienne.

The rest of Europe was also in various degrees affected by the Crusades. While Spain was occupied in a crusade of her own General against the Moors and gradually driving them into results Granada, Germany, Italy, and to some extent England, o/

rusa es. a g a j nst t jj e Turks. During the absence of many of the nobles in the East the growth of towns and the development of the mercantile class proceeded without interruption. The trading classes demanded strong governments and equal justice, and vigorously supported the monarchs in' their suppression of feudalism.

During the 12th and 13th centuries the Crusades thus proved a large factor in the commercial prosperity of the Italian mari- time states, an " open door " between East and West was secured, and reinforcements from Europe, were poured into Syria as long as the peoples of the West regarded the stability of the Latin kingdom of Syria as a matter of prime importance.

During the crusading period a check was placed to the tide of Mahommedan conquest, while to the caliphate the Crusades proved a perpetual drain upon its material resources. To the Mahommedans the possession of the Holy Places by the Chris- tians was as great a humiliation as their desecration by the Mahommedans was to the crusaders. Unfortunately the Cru- sades led to a disastrous schism between the Byzantine empire and western Christendom, which had calamitous results. The decay of the crusading spirit was a necessary result of the growth of the consolidation of the European nations, but the price paid was the fall of Constantinople and the establishment of the Turks in eastern Europe. The Crusades thus not only postponed the conquest of Constantinople by the Turks for some two hundred years, but led, as had already been said, to a vast expansion of commerce, as seen in the rapid growth and develop- ment of the Italian cities, and to a striking development of town life.

*The Crusades had enormously strengthened the power and prestige of the papacy, and indirectly contributed to its victory over the Empire in the person of Frederick II. From the reign of the emperor Henry IV. to the death of \truggie Frederick II. in 1250 the struggle between the Empire between and the papacy continued, and is coincident in point the Empire of time with the Crusades. The reign of Frederick * ndthe Barbarossatii52-noo) saw that struggle at its height, papacr ' and during that reign it became apparent that the emperor's efforts to unite Italy and Germany under one crown were doomed to failure. The rise and success of the alliance of Italian republics known as the Lombard League no doubt contributed to the success of the papacy, but in their contest with the popes the emperors never had any chance of gaining a permanent victory. Frederick II. continued with great energy to attempt the hope- less task of dominating the papacy, but his possession of Sicily only made the popes more determined than ever to establish their predominance in Italy. Frederick's death*

in 1250 marked not only the triumph of the papacy in Italy, but also that of feudalism in Germany. He has been called the ” most dazzling of the long line of imperial failures,” and with him ends the Empire as it was originally conceived. Henceforward the Holy Roman Empire, which implied the unity of Italy and Germany, and the close alliance of pope and emperor, no longer exists save in name, and its place is taken by a glorified German kingship presiding over a confederation of turbulent German nobles.

Thus with the later years of the 13th century Europe had arrived at the definite close of one epoch and the beginning of another. The period of the Crusades was over, the „ theory of the Holy Roman Empire had broken down. the˚uth The period from the beginning of the 14th to the close andisth of the 15th century might well be styled the latter «”»<«"». days of medieval Europe.*

During the 14th and 15th centuries the idea of regarding Europe as one state in which emperor and pope presided over a number of subordinate kings gave way before the spirit of nationalism and particularism. England, France and Spain were rapidly becoming strong centralized monarchies which stood in striking contrast to the weakened Empire. Partly no doubt owing to the failure of the Empire and papacy to work together, a great impetus had been given to the formation of national monarchies. While Frederick II. had failed, Louis IX. and Philip IV. of France, Ferdinand III. of Castile (1217-1252), James the Conqueror, king of Aragon (12 13-1276) and Edward I. of England (1239-1307) succeeded in laying the foundations of strong monarchies which after two centuries of struggles with the dying efforts of feudalism were established on a firm basis. In spite of the intellectual activity and political developments which characterized the 13th, 14th and 15th centuries it remains true that the later middle ages were marked by the decay of those remarkable social and political forces which had been such striking characteristics of the earlier period (see Middle Ages).

Thus the 14th and 15th centuries have characteristics which differentiate them from all preceding and succeeding centuries,

The triumph of the papacy over the Empire had been short-lived.

Owing to the disturbed state of Italy, Clement V. was in 1305 compelled to take refuge at Avignon, and till 1377— a Sam ”’ ar y period known as the Babylonish captivity— the popes character- remained in France. While the Empire and papacy istks of steadily decline, while the Byzantine empire falls the 14th before the Turks, strong monarchies are gradually notaries, formed in England, France, Spain, and Portugal, and in Italy the Renaissance movement covers the later years of the 15th century with glory (see Renaissance). During these centuries there is common to Europe no one principle which is to be found in all kingdoms. But while the old system, founded on belief in the unity of Europe under the Empire and papacy, declines amid chaos and turbulence, there is much intellectual and political activity which portends the appearance of an entirely new state of things. The 14th and 15th centuries may truly be styled a period of transition.

From the death of Conrad IV., the son of Frederick II., in 1254 to 1273, when Rudolph of Habsburg became king, chaos _ reigned in Germany, and the period is known as the

of the Great Interregnum. The forces of decentralization

*Empire, strengthened themselves, and the emperors found that 12 / iq~ *- ne formation of a strong and united German kingdom*

was an impossibility. Rudolph of Habsburg (1273- 1291), realizing what were the limits of his power in Germany and the futility of attempting to establish his hold upon Italy, began that policy of family aggrandizement which was continued so notably by successive members of his house. His reign witnessed the firm establishment of the house of Anjou in Naples, and, after the Sicilian Vespers in 1282, the supremacy of the house of Aragon in Sicily. Refusing to follow the example of Frederick II. and to take part in distant expeditions, Rudolph conquered Austria, Styria, Carinthia and Carniola, Vienna became the capital of the Habsburg dominions in Germany, and his son Albert of Austria, who was king from 1298 to 1308, was careful to continue the policy of his father. Though no Habsburg was again elected to the imperial throne till 1438, when the long succession of emperors began which continued unbroken till 1742, the establishment of the Habsburgs in Austria by Rudolph proved an event of European importance. From that time the. leading members of the Habsburg family never lost an opportunity of aggrandizement. In 1335 they received Carinthia, in 1363 the Tirol. While, however, the Habsburgs, the Wittelsbachs and later the house of Brandenburg were strengthening themselves, the Empire was

steadily declining in power and influence. The 14th century saw Switzerland shake itself free from the Austrian house and establish its independence, which was, however, not formally acknowledged till the treaty of Westphalia in 1648.

During the 14th century the weakness of the Empire became more and more accentuated under the weak rule of Louis IV. On his death in 1346 his successor Charles of Luxemburg, known as the emperor Charles IV., made a celebrated attempt to form a strong centralized German monarchy. With that object he issued in 1356 the Golden Bull, by which it was hoped that all matters connected with the imperial election would be settled. The number of imperial electors was settled, and henceforth they were to consist of the archbishops of Cologne, Mainz and Trier, and of the king of Bohemia, the duke of Saxony, the margrave of Brandenburg and the count palatine of the Rhine. Charles hoped to concentrate gradually in his house all the chief German provinces, and having by the Golden Bull endeavoured to check the growth of the towns, he expected to establish firmly the imperial influence in Germany. But the towns were too strong to be coerced, and during his reign the Swabian cities formed a union ; and though the marriage of his Son Sigismund to the heiress of the king of Hungary and Poland, and the possession of Brandenburg, which fell to him in 1373, seemed steps towards the realization of his hopes, his death in 1378 left his work unfinished. Moreover, his son and successor Wenceslaus (1378-1400) proved, like Richard II. of England and Charles VI. of France, unequal to the task of checking the growing

Sigis- mund, emperor,

1411- 1437,

independence of the nobles and the cities. The Hanseatic League (q.v.) was at the height of its power, and in 1381 the Rhenish towns formed a confederation. Wenceslaus, like Richard II., had fallen upon evil time's. The advance westwards by the Turks occupied the attention of his brother Sigismund, now king of Hungary; he was himself unpopular in Bohemia, and at the same time was exposed 1 to the intrigues of his cousin Jobst of Moravia, who had secured Brandenburg. In 1400 Wenceslaus was formally deposed by the electors, and spent the rest of his life in Bohemia, where he died in 1419. His successor Rupert of the palatinate reigned from 1400 to 1410, and during his reign the council of Pisa endeavoured to bring to an end the great schism which had followed upon the return of Pope Urban VI. from Avignon to Rome in 1377. Two popes had been

elected, one living at Rome, the other at Avignon, and Christian Europe was scandalized at the sight of two rival pontiffs. On Rupert's death the electors chose Sigismund the brother of Wenceslaus, and he ruled as emperor from 141 1 to 1437.

Thus at the beginning of the 15th century the papacy was seen to have fallen from the high position which it occupied at the time of the death of Frederick II. The Avignon captivity followed by the great schism weakened its D ft h ''' e temporal as well as its spiritual power and prestige, papacy. while national developments and dynastic ambitions, such as led to the Hundred Years' War, diverted men's minds from religious to purely temporal concerns. The work of Wycliffe and Hus illustrated not only the decline of papal prestige but also the general opinion that reform in the papacy was necessary. Sigismund's reign as emperor was rendered noteworthy by the part which he took in the council of Constance (q.v.), and by his successful efforts to sup- press the Hussite movement in Bohemia (see Hussites). That country on the death of Wenceslaus in 1419 fell to Sigismund, but it was not till 1431, after a long and sanguinary war, that the opposition to the union of Bohemia with the Empire was suppressed. Led by Zizka and other able chiefs, the Bohemians who were Slavs utilized the Hussite movement in a vigorous attempt to secure their independence. In 1436 Sigismund was formally acknowledged king of Bohemia. In 1431, the year of the final overthrow of the Bohemians and the Hussites, he opened the council of Basel (q.v.), being resolved to establish a religious peace in Europe and to prevent the Hussite doctrines from spreading into Germany. In 1438 Sigismund died, leaving Germany involved in a quarrel with the papacy, but having successfully withstood the efforts of the Bohemians to acquire independence. Sigismund's death marks an epoch in the history of the Empire, for his successor Albert of Austria proved to be the first of a long line of Habsburg emperors. Albert himself reigned only from 1438 to 1440, but On his death the imperial dignity was conferred upon another member of the Habsburg house, Frederick, duke of Styria and Carinthia, known as the emperor Frederick III. With his accession the imperial throne became practically hereditary in the Habsburg family. Frederick's long reign, which lasted from 1440 to 1493, was of little benefit to Germany; for he showed no administrative skill and proved a weak and incapable ruler. Undoubtedly his lot fell upon evil days, for not only were the Turks at the height of their power, but both Bohemia and Hungary gave him much anxiety. The imminent fall of Constantinople, the last barrier of Christendom against Islam in the East, was a threat not only to the Empire, but to all Christian

Europe. But western "^Turks Europe was too much occupied with internecine feuds to unite effectively against the common enemy. In vain the emperor John VI. had gone in person to solicit aid at the various courts of the West; in vain he had humbled himself to pay the price asked, by subscribing to the abnegation of the distinctive tenets of the Orthodox Church, which secured the ephemeral reunion of Christendom at the council of Florence (1438). The crusading spirit was dead; the European powers stirred no finger to save the imperial city; and in 1453 Sultan Mahommed II. rode through the breach over the body of the last of the Eastern

The taking of Con- stantln-

Caesars, and planted the crescent on the dome of the metropolitan dhurch. of Eastern Christendom (see .Torke; and Roman Empire, Later). :,*

The faH of Constantinople marked the definite establishment on European soil of a power alien and hostile to all that was characteristic of European civilization. It was a power, more- over i which could live only by expanding; and for over two hundred years to come the dread of Ottoman aggression was a dominant factor in the politics of eastern Europe. The ■tide, of Turkish advance could have been arrested by a union of Europe; but the appeals of Pope Nicholas V. fell unheeded upon a sceptical age, intent only on its dynastic and particularist ambitions, To the emperor the ousting of the< Ottomans from the Balkan peninsula seemed of less importance than the consolidation of the Habsburg power in Germany, and its extension over the neighbouring kingdoms of Hungary and Bohemia. France was exhausted by the long agony of the Hundred Years' War, which came to an end the very year of the fall of Constantinople, and the French kings — especially Louis XI. (1461-1483) — were busy for the rest of the century crushing out the remnants of feudalism and consolidating the power of the monarchy. As for Italy, with its petty tyrants and its condotlieri, there was no hope of uniting it for any purpose whatever, least of all a religious purpose, and Spain was busy with her own crusades against; the Moors. The exploits of John Hunyadi, king of Hungary, against the. Turks, therefore, remained isolated and unsupported. In 1456 he checked

their advance northwards by a brilliant victory which led to the relief of Belgrade; but he died the same year, and his death was followed by a struggle for the succession between Hungarians and Bohemians. The racial and religious quarrels of the Balkan peoples had made it possible for the Turks to obtain a foothold in Europe; the jealousies and internecine struggles of the Christian states made possible the vast expansion of the Ottoman power, which in the 17th century was to advance the frontiers of Islam to those of Germany and to reduce the emperors, in their relations with the Porte, to the status of tributary princes. , . . , ,

The victory of Ladislaus, son of Casimir, king of Poland, who succeeded in uniting in his own person the crowns of Bohemia, Hungary and Poland, threatened to result in the permanent independence of those countries of the house of Habsburg, But in 1400 Ladislaus was compelled by Maximilian, son of Frederick III., to sign the treaty of Pressburg, providing for the eventual succession of the Habsburgs to Hungary and Bohemia.

In other ways the reign of Frederick III. laid the foundations of the greatness of his family- In 147 7 Maximilian married Mary, Coaselida- duchess of Burgundy and heiress of Charles the Bold, tion o/III. and it proved no idle boast. Maximilian I., the son of Frederick III., reigned from 1493 to 1519, and during his reign Europe passed from medieval to modern times. Some reforms in the Empire were carried out, but the events of his reign made it apparent that it was impossible to set up a central- ized monarchy in Germany (see Maximilian I.; Germany and Austria.: History). , . ,

Far different developments were taking place during the 14th and 15th centuries in France, Spain, the Scandinavian France in north and in England. During the greater part of the the 13th 14th century France was engaged in foreign wars and and Nth j n internal complications, and it seemed doubtful if a centuries. stron g centralized monarchy would be firmly estab- lished. The failure of Philip VI. (1328-1350) and John (1350- 1364) in their contest with England weakened the central power in France, and, though Charles V. (1364-1389),. owing to his own sagacity and the weakness of the English government, managed to regain for France many of her lost provinces, the French power both M home and abroad again declined under the rule of

the incapable, Charles VII. 1(1380-1422). , In fact the year 1432 may be said to mark the lowest stage in the history of the French monarchy. From, that year an improvement gradually set in. A

national sentiment, as exemplified in the career of Joan of Arc (VIII. (1483-1498), Brittany was annexed, and France, secure from ajl danger of a feudal reaction, entered with the invasion of Italy in 1404 by Charles VIII. upon modern times. A similar process is observable in England and Spain. In England the Wars of the Roses were followed by the establishment of a strong monarchy under Henry, VII., while in Spain Ferdinand and Isabella estab- lished, in place of anarchy the royal authority, and during their reign suppressed all attempts at provincial independence. In 149 1 the consolidation of Spain was completed by the conquest of Granada. In 1397, by the union of Calmar, the three kingdoms of Norway, Sweden and Denmark were united under Eric XIII. This union was, however, short-lived, and in the early years of the 1 6th century came definitely to an end (see Norway; Sweden; Denmark).

The close of the middle ages and the beginning of modern times was marked by several noteworthy events. The invention of printing, the discovery of America and the invasion Tne ctose of Italy by Charles VIII. all occurred before the end of the of the ,15th century, while in the early years of the 16th middle century the ideal of civil and ecclesiastical unity was ages ‘ finally shattered by the Reformation and by the development of the modern states system, accompanied by the prominence henceforward attached to the question of the balance of power. :

During the whole of the 1 5 th pentury Europe had been affected by what is known as the Renaissance movement, which marked the transition from the medieval to the modern order. This movement, caused by the growth of learning, na f S sance. had its first home in Italy, which had witnessed a marvellous revival of interest in classical antiquity, in painting and in sculpture, accompanied by a keen intellectual activity in religious and political, no less than in literary matters. Criti- cism of existing beliefs was developed, knowledge became widely diffused, and, while the way was prepared for the sub- stitution of individualism for the old ecclesiastical system, the development of commerce coincident with the discovery of America and the establishment of monarchical systems destroyed feudalism (see Renaissance). The later years of the 15th, and the early years of the i6th, centuries may be described as the transition from medievalism to modern times, from feudalism to individualism, from the idea of a world church and a world empire to one in which national consolidation was the chief feature and monarchical government a necessity.

From the beginning of the 16th century Europe entered upon modern

times. Many events marked the close of the middle ages. The discovery of America, the decay of Venice, summafr thedevelopment of the European states system, the rise ofEuro- of diplomacy as a permanent international system (see pean Diplomacy), the wars of religion — all these are the ˆl t("?c 00 general characteristics of the new period upon which Europe now enters.. With the growth of monarchies arises the belief in the divine right of kings, the development of territorial sovereignty, and wars of ambition like those waged by Louis XIV.

With the 1 8th century democratic ideas first begin to appear side by side with the rule of the enlightened despots such as Frederick the Great, Catherine II. and Joseph II. The outbreak of the French Revolution brings to an end the old European system, upsets the ideas on which it was founded, and leads to important territorial changes.

CJ 1

ˆ 2 s 9

Q 2"s"

s

I

$

Cd «-

HISTORY!

EUROPE

939

The advent of the Reformation, as has already been pointed out, finally shattered that ideal of civil and religious unity which had been the main characteristic of the middle balance of a S eS- Thus from the beginning of the 16th century power ana Europe sees the development of the modern states the begin- system and becomes the scene of national wars in ntogof w hich the idea of the balance of power was the leading times. principle (see Balance or Power). That principle did not allow of the recognition of the rights of nation- alities, and till the wars of the French Revolution the interests of the

various European states were usually subordinated to the dynastic aims of their rulers. During the ensuing centuries the balance of power in Europe was seriously threatened; during the first half of the 16th century by Charles V., during the latter half of the same century by Philip II., in the first half of the 17th century by the house of Habsburg, and in the latter half by Louis XIV.

The close of the Seven Years' War seemed to prelude a period of British ascendancy on the continent, but that danger passed away with the outbreak, of the war between Great Britain and her American colonies. For a time the balance of power in Europe was completely shattered by Napoleon's brilliant conquests, but his fall, while to a great extent restoring the political equilibrium, gave an opportunity to Alexander of Russia to dominate Europe. Thus the 16th century definitely marked the beginning of modern times both from a political as well as from a religious point of view.

With the accession of Francis I. to the French and Charles V. to the imperial throne began the long rivalry between France and the house of Habsburg, which continued with few matlon and interruptions till 1756. In the struggle between the rivalry Charles V. and Francis I., which began in 1521, the 0/ Charles former had the advantage, and the battle of Pavia Francis I (I 5 2 5) seemed likely to lead to the permanent pre- eminence of the imperial cause. But unexpected allies were found by Francis in the German reformers and in the Turks. The nailing by Luther of his ninety-five theses to the door of the Wittenberg church, followed by the decisions of the diet of Worms in 1521, led to a rapid development of Lutheran opinions among the princes of the north of Germany. Charles V.'s victory over France in 1525 and his reconciliation with the papacy in 1520 seemed, however, to prelude the suppression of the Protestant opinions. But Francis I. again took up arms, while the invasions of Suleiman the Magnificent, during whose reign the Turkish influence was not only felt in Hungary and Germany but extended to the west basin of the Mediterranean, forced Charles to temporize. When in 1544 the conclusion of the peace of Crepy with Francis I. enabled Charles to turn his attention to the rapid growth of Protestantism, it was too late to adopt with any chance of success a policy of suppression. In 1552 he found himself compelled to agree to the treaty of Passau which implied the adoption of a policy of compromise, and which in 1555 was followed by a definite arrangement at Augsburg, which admitted the principle of cujus regio, ejus religio. Till the outbreak of the Thirty Years' War in 161 8, the settlement of Augsburg tended to keep peace between the Catholics and the Protestants. Equally unsuccessful were Charles's later efforts against France; in 1553 he

lost Metz, Toul and Verdun, and in 1556 he retired to Spain, leaving the Empire to his brother Ferdinand, and Spain, the Netherlands and his Italian possessions to his son Philip. The latter, after winning the battle of St Quentin in 1557, made peace with Herry II. of France by the treaty of Cateau-Cambresis in ISS9-

By this peace a term was put to the struggle between France on the one hand and the Empire and Spain on the other, and the The kings of France and Spain were enabled to turn their

Counter- attention to the issues raised by the immense growth JWJ>™"- of Protestantism since 1521. While Charles V. had been engaged in his struggles with the Turks and the French, Protestantism had rapidly developed. In Sweden, in Denmark, in England, in various parts of Germany, and in

France Protestant principles had; been largely adopted (see Reformation). ■.'.-■ „

Though the forces of Roman Catholicism had for a time been vanquished they had still to be counted with. From the middle of the 1 6th century the growth of Protestantism began to be checked, and a period of reaction against the Reformation set 'in, For a time it seemed that the efforts of Roman Catholicism would be successful and that the cause of Protestantism would be permanently weakened. The papacy since the beginning of the 16th century had reformed itself, the council of Trent (q.v:), which closed its sittings in 1564, had given Roman Catholicism a "clearly and sharply defined body of doctrine," and the Catholic Church had become " more united, less wordly, and more dependent on herself." In this work of reorganizatidh the' Jesuits had played a great part, and the success of the Counter-Reformation was largely due to their efforts (see Jesuits). Paul III., Pius IV. and V., Gregory XIII. and Sixtus V. are all good examples of the reforming popes of the 1 6th century. Under them the Jesuits worked; they restored Catholicism in Poland, Bohemia and south Germany; and supported by them the Inquisition crushed Protestantism out, of Spain and Italy. .

The interest of the Counter-Reformation movement from 1559 to 1618 centres round Philip II. of Spain. While Pius V. (1566-1572) is the best example of the Counter- – . " Reformation popes, Philip II. took the lead among otn'/up'li. European Catholic monarchs in working for the ex- ■ :

tinction of Protestantism. His recovery of the southern Nether- lands

for the Catholic cause,. his attempt to conquer England, his intention of subjugating France, were all parts of a scheme to advance simultaneously his own power and that of the Counter-Reformation.

Circumstances combined to aid Philip, and while he was endeavouring to carry out his political aims, the Jesuits. were busily occupied in winning back large portions of Europe to allegiance to the papacy. But failure attended most of Philip's projects. Though he succeeded in recovering the southern or Walloon provinces of the Netherlands, he was unable to conquer the northern provinces, which under William of Orange formed themselves into the Dutch republic (see Holland: History): His scheme for the conquest of England failed, and the Spanish Armada was totally defeated in 1588. Nor was his plan for the subjection of France more successful. After a tedious civil war between the Catholics and Huguenots, Henry of Navarre appeared as a national leader, who, having overcome the armies of the League with which Philip was allied, concluded the peace of Vervins in 1508. In consenting to this treaty Philip acknowledged that his schemes for the establishment of his influence over France had failed. Thus, when the 16th century closed, England's independence was assured, the Dutch republic was established, the French monarchy was rapidly recovering from the effects of the religious wars and the decadence of the Spanish monarchy had set in. But the religious question Was still unsettled, religious passions ran high, and no satisfactory agreement between Catholicism and Protestantism had been, or seemed likely to be arrived at. The successes of the Counter- Reformation under the Jesuits and such men as Ferdinand 1 of Styria (afterwards the emperor Ferdinand II.) and Maximilian of Bavaria only roused strenuous opposition on the part of Calvinist princes such as Frederick IV., the elector palatine.

*Various events had indicated the approach of a final struggle between Protestantism and Catholicism during the early years of the 17th century. The seizure of Donauworth, a Theg _■' town with Protestant sympathies, by Maximilian of proachot Bavaria in 1607, the formation of the Protestant Union ■ the Thirty in 1608 and of the Catholic League in 1609, the ques- . JJ ar *' tions raised in 1600 by the Cleves-Juiich affair, the pre- parations of Henry IV. of France for an anti-Habsburg campaign —all these showed that the political atmosphere was charged with electricity. Till 1618, however, an open conflict between Protest- antism and Catholicism in Germany was averted; in that year the acceptance, by the Calvinist Frederick, the elector palatine,*

of the crown of Bohemia, proved the starting-point of the Thirty Years' War.

Till the death of Gustavus Adolphus in 1632 that war preserved a religious or semi-religious character. The emperor Ferdinand II., Philip III. of Spain and Maximilian of Bavaria The Thirty un d ubtedly hoped to suppress Protestantism in Ger- Mˆ, r . many, while Wallenstein, the great imperialgeneral, was

prepared to conquer Denmark, Sweden and Norway, and to convert the Baltic into an Austrian lake. Though the resistance of Christian IV. of Denmark was vain, the jealousy felt by the Catholic princes of Wallenstein and the skill of Gustavus Adolphus caused the total failure of these ambitious schemes. All hope of seeing the imperial flag waving over the Baltic was dispelled by the victory of Breitenfeld, and that of Liitzen in 1632, and though Gustavus Adolphus fell in the last-named battle, he had saved north Germany from falling into the hands of the Jesuits.

With his death the Thirty Years' War became in the main a political struggle between France and the Habsburgs— a con- tinuation of the wars of Francis I. and Henry II. France 'into a 8 a i nst Charles V., and of the war between Henry IV. the war. and Philip II. Ferdinand II. had attempted to carry back the religious history of the Empire moro than seventy years, and had failed. He had endeavoured to make the Empire a reality and to revive and carry out the designs of Charles V. His failure was now complete. The edict of Restitu- tion issued in 1629 remained a dead letter, and from 1632 to 1648 he and his successor Ferdinand III. had to employ all their energies in defending their possessions from the attacks of the French and Swedes.

The death of Gustavus Adolphus followed in 1634 by the assassination of Wallenstein proved an admirable opportunity for the entry of France into the Thirty Years' War. And till 1648, in spite of occasional reverses, the French and their allies gradually wore down their adversaries. After the death of Henry IV. in 1610 France had temporarily retired from a foremost place in the politics of Europe, and for some thirty years her ministers were busy in coercing the Huguenots and establishing the supremacy of the crown which was threatened by the nobles. Once united at home France was ready and

eager to seize the opportunity for inflicting a severe blow upon the Habsburgs in Spain and Austria. The time for such action was well chosen. Austria was weakened by the war which had been waged since 1618, while Spain, exhausted by her efforts in the preceding century, had entered upon a long period of decay, and was about to see Portugal regain its independence. The Protestant princes in the north of Germany were ready to ally with France and Sweden against the emperor, even the Catholic Bavarian duke was to prove a doubtful ally of the Habsburg house. In 1642 Richelieu and in 1643 Louis XIII. died, but though Louis XIV. was an infant, and the French nobles by their cabals hindered the work of the regency, Mazarin successfully carried out the anti-Habsburg policy of his predecessors and brought the war against Austria to a successful conclusion. (See further Thirty Years' War.)

The peace of Westphalia in 1648 marked the virtual close of religious conflicts in Europe. It also marked the end of the The peace attempts of the Habsburgs to establish a monarchical at West- system throughout all Germany. By that peace the phalla, practical independence of the German princes was assured. Henceforward each prince could decide what form of religion was to be observed in his dominions. Thus Lutheranism, Calvinism and Catholicism were alike tolerated, and this recognition of the principle of compromise prepared the way for a wider toleration. Moreover, the petty principalities jf the Empire, which numbered over 300, were allowed the right of concluding alliances with any foreign power, of making their own laws, and of carrying on war. Thus, in consequence of this most important concession of the emperor, the Empire lost all cohesion and became little more than a confederation. The states had firmly established their " liberties," the princes were now emancipated from imperial control, and it was evident that,

unless by some means the house of Austria could re-establish its ascendancy, the eventual dissolution of the Empire must sooner or later follow. The peace of Westphalia thus marks for Europe, and in a special sense for Germany, the end. of an important epoch. For Germany the changes introduced into its political life amounted to nothing less than a revolution, for there " the mainspring of the national life was broken." For Europe the Thirty Years' War brought to a close " the mighty impulses which the great movements of the Renaissance and Reformation had imparted to the aspirations " of men in all parts of the western world.

It was not, however, till the treaties of the Pyrenees (1659) and Oliva (1660) were signed that the echoes of the Thirty Years'. War

died away, and Europe entered upon a period in The treaties which the political ambitions of Louis XIV. threatened otthe Pyre- xiae, interests of Europe and absorbed the attention of nees aad all European statesmen. During the intervening va ‘ years from 1648 to 1659 Spain and France continued the struggle, while Charles X. of Sweden in 1654 entered upon a career of aggression and conquest in the north of Europe, which was only ended with his death on the 23rd of February 1660. Upon the balance of power in the north of Europe the wars of Charles X. had little permanent effect, and the peace of Oliva to a great extent merely marked the restoration of the status quo. But the peace of the Pyrenees was far more important. During its struggle with France, Spain found itself also involved in hostilities with England, and the real rottenness of the Spanish monarchy became rapidly apparent. Any assistance which might have been hoped for from the emperor was prevented by the formation of leagues of German princes — lay and ecclesiastical — in 1657 and 1658, which had the full support of France. The effect of the formation of the second league was at once apparent: all hope, of assistance to Spain from the emperor was seen to have disappeared, and the conclusion of a pacific settlement between France and Spain was at once arrived at. The peace of the Pyrenees was a . triumph for the Rheinbund, no less than for France.

With the beginning of the personal rule of Louis XIV. in 1661, and the return of Charles II. to England in 1660, a new period in the history of personal monarchy in Europe began. At the time of the peace of Westphalia the monarchy Loukxiv. in Europe was under a cloud. In England the cause of Charles I. was lost tn France the Fronde was holding its own against Mazarin; in Germany the princes had triumphed over the emperor; even in Russia the nobles were aiming at the curtailment of the power of the crown. But from 1660 it became evident that these attempts to secure the curtailment of the monarchical power were, with few exceptions, not destined to be successful. Though all chance of the establishment of a strong central authority in Germany had disappeared, the various states composing the Empire now entered upon a new period in their history and speedily formed miniature despotisms. Of these Brandenburg, Saxony and Bavaria were the most important. In Denmark Frederick III. made his crown hereditary, and his establishment of an absolutism was imitated by Charles XL of Sweden a few years later.

Thus when Louis XIV. took into his own hands the government of France, the absolutist principle was triumphant all over Europe. The period of his personal rule lasted from 1661 to his death :n 1715, and is known as ” the age of Louis XIV.” During that period France

was the leading monarchy in Europe, and the most conspicuous not only in arms but also in all the arts of civilization. While Turenne, Luxemburg, Villars and many others exemplified, till the rise of Marlborough, the pre-eminence of French generals, Pascal, Racine, Corneille, Moliere and Fenelon testified to the commanding position taken by France in the world of literature. The building of Versailles and the establishment of the French court there was an event of importance not only in the history of France, but also in the history of Europe. The history of Europe may without ex- aggeration be said during the reign of Louis XIV. to centre round Versailles. ,;

HISTORY]

EUROPE

93i

During his reign France took the lead in European politics, and established her supremacy all the more easily, owing partly Th nu- t0 tne wea kness of most of the European countries, ca'coadi-' partly to the aggressions of the Turks, whose invasions tioa of of eastern Europe occupied from 1683 to 1690 the Burope ' attention of the Poles and of the Austrians. The weakness or neutrality of the various European states was due to various causes. England was prevented till 1689 from taking a part in opposing the ambitious schemes of Louis XIV. owing to the personal aims of Charles II. and James II. Philip IV. and Charles II. of Spain could do nothing to resist the growing ascendancy of France, owing to the increasing weakness and rapid decadence of Spain, whose disappearance from the rank of great powers was one of the most striking features in the history of Europe during the second half of the 17th century. The weakness of Germany from the peace of Westphalia to the end of the century, due partly to the establishment of the independence of the princes of the Empire, partly to the unrest in Hungary, partly to the aggressions of the Turks, was obviously an immense gain to Louis XIV.

Realizing the strength of his own position and the weakness of that of most of the European states, he entered in 1667 into the Devolution war and secured several fortresses in ˆnlt'lons. the Spanish Netherlands. From 1672 to 1678 he was again at war with Holland, and from 1673 with the emperor, Spain and Brandenburg as well. At the same time the Turks invaded Poland, but were successfully resisted by John Sobieski. In 1676, however, they made the favourable treaty of Zurawna, securing Kamenets and portions of Podolia and the Ukraine. Thus, while the Turks were threatening the

inde- pendence of eastern Europe, Louis XIV. was attacking the independence of western Europe. In 1678 he made the treaty of Nijmwegen, securing great advantages for France. Till the end of the century Europe was faced with two serious problems: Could she successfully cope with the Turks on her eastern frontier? And could she resist the continued aggressions of France on her western frontier ? Consequently the years from 1678 to the end of the century were of vital importance to the European world. For during that period the French and Turks made unceasing efforts to extend their frontiers at the expense of Germany. Encouraged by the weakness of the chief European states, Louis set up the Chambers of Reunion, seized Strassburg in time of peace and attempted to annex Luxemburg. At the same time it seemed that an independent Gallican Church would be set up, and that Louis, like Henry VIII. , would sever all connexion with Rome. The persecution of the Jansenists and the revocation of the edict of Nantes in 1685 established some- thing akin to religious uniformity in France. Buoyed up by his successes abroad and at home, and conscious that he had nothing to fear from England or from Spain, Louis prepared to carry out his schemes, with regard to the extension of his territory east- wards, at the expense of Germany. Simultaneously with Louis' aggressions in western Europe, the Turks had made an attempt to capture Vienna in 1683. Fortunately the efforts of the emperor Leopold, aided by John Sobieski, king of Poland, were successful, and the Turkish tide of conquest was gradually but successfully checked. It was not, however, till the accession of William III. to the English throne that the tide of French conquest in western Europe was in like manner successfully resisted, and it was not till the treaty of Ryswick in 1697 that Louis realized that Europe had set a limit to his conquests. That treaty inflicted a blow on the prestige of France, just as the treaty of Karlowitz, concluded in 1699, was an important step in the decline of the Ottoman power. By that treaty, which marks a definite beginning in the history of the Austro-Hun- garian monarchy, the hands of the emperor were freed, and he was able to devote his attention to the Spanish succession question, which already engrossed the attention of all Europe.

The decadence of Spain had been obvious to all Europe since the middle of the century, and in anticipation of the death of the Spanish king Charles II., Louis XIV. and William III. had made a partition treaty in October 1698, which was superseded in

March 1 700 by a second partition treaty. However, on the death of King Charles on the 1st of November 1700 Louis repudiated the partition treaties and accepted the crown of Spain _. _ for his

grandson Philip, who became Philip V. of i s f, sue- Spain. Not content with this success Louis committed cession a number of aggressive acts which led to the War War ‘ of the Spanish Succession in 1702. That war continued till 1713, when the treaty of Utrecht, followed in 17 14 by the treaties of Rastadt and Baden, ended a struggle which had many results of vital importance to Europe. Great Britain, strengthened by the possession of Gibraltar and Minorca, by her establishment in Canada, and by trading rights in South America, henceforward stood forth as a rising colonial power to whom the command of the sea was essential. Austria obtained not only Belgium, which she held till the French Revolution, but also a firm foothold in Italy, which she maintained till 1859. To Spain the war in- directly brought unexpected benefits. Freed from her expensive possessions in Belgium and Italy, and now ruled by a new dynasty, Spain, so far from meeting with the fate which later attended Poland, entered upon a new period in her career, and throughout the 18th century showed considerable power of resistance to the colonial policy of Great Britain.

With all its defects the treaty of Utrecht proved in many ways an excellent settlement. Till 1740, although a few short wars took place, Europe as a whole enjoyed peace. But with the settlement of Utrecht Europe seemed century. to have lost all touch with the high ideals which occasionally, as in the career of Gustavus Adolphus, or in the English great rebellion, or in the defence of Vienna by John Sobieski, were met with. The 18th century was marked by the dominance of a perverted system of the balance of power, which regarded such acts as the Prussian seizure of Silesia and the partition of Poland as justifiable on the ground that might is right.

Before many years had passed after the treaty of Utrecht it became evident that two new nations were forcing themselves into the front rank of European powers. These were Burooean Russia and Prussia. The treaty of Nystad in 1721 politics— was to the north of Europe what the treaty of Utrecht ‘ 7ISm was to the western and southern nations. It marked l740 ‘ the decline of Sweden and the rise of Russia, which henceforth played an important part in European politics. Nevertheless till 1740 with the exception of the short polish Succession War 1733-35 an d the equally short war of 1737-39, m which Russia and Austria fought against Turkey, no general European struggle took place. That this was so was due in great measure to the alliance of 17 17 between Great Britain and France, to the subsequent peace policy upheld by Walpole, Fleury, Patifio and Horn (the English, French, Spanish and Swedish ministers), to the hostility between the courts of Vienna and Madrid — only

momentarily healed by the treaty of Vienna in 1725 — and to the uncertain character of Russian politics.

During those years from 1713 to 1740 the great powers were slowly forming themselves into groups, bound together by motives of interest. Thus Spain and France after 1729 began to realize that both countries were interested in checking Great Britain's colonial developments, while Spain was also ready to seize every opportunity of increasing her possessions in Italy at the expense of Austria.

With the year 1740 Europe entered upon a new epoch. The rivalry of Austria and Prussia for the leadership of Germany definitely began, and the struggle between Great Britain and France for supremacy in India, Canada eooc ˆ " ew and the West Indies entered upon an acute phase. The War of the Austrian Succession (1740-48) holds therefore an important place in the history of Europe, and proved with the Seven Years' War, which was practically a continuation of it, of very real interest to Europe.

In April 1748 Great Britain, France and Holland signed preliminaries of peace, which on the 18th of October became the definitive treaty of Aix-ra-Chapelle. The other powers con- cerned agreed to the treaty with reluctance, Spain on the 20<;h ii October, Austria on the 8th of November, and Sardinia on the

20th of November. By the terms of the peace France and Great" Britain restored the conquests in America, India and' Europeˆ The Treaty w ˆich each had made from the other. As regards the ofAU'ia- other powers, the peace left serious heart-burnings. Chapelh, Sardinia, though gaining territory in the Milanese, ' was compelled to relinquish her hold on Piacenza and

its territory, and to restore Finale to Genoa; Austria had to yield Parma and Piacenza to Don Philip, and to recognize the loss of Silesia to Prussia; Spain was compelled to forgo all hope of regaining Gibraltar. The importance of the terms of this treaty lies in the fact that they indicate not only the lines followed by later European settlements, but also the tendency of later European developments. To Great Britain the treaty was only a pause in her expansion in Canada and in her advance to the establishment of her influence

over all India. To France the treaty was equally a presage of future disasters in India and Canada. The retention of Silesia by Prussia was a pronounce- ment to all Europe that a new power had arisen which was destined in 1866 to oust Austria from her dominant position in Germany. The gains won by Sardinia, too, indicated that the real danger to Austria's position in Italy would come from the house of Savoy.

The Seven Years' War (1756-63) opened with a diplomatic revolution as important as that of 17 17, when France and Great

Britain made an alliance. In May 1756, as a reply Yeats' War. t0 ˆhe treaty of Westminster the Second, .made in

January between Great Britain and Prussia, France and Austria, united in the treaty of Versailles. This unexpected union, which lasted till the French Revolution, between two powers which had been hostile to each other from the beginning of the 16th century, amazed all Europe. However, it had not the results expected, for although Russia, which was allied with Austria, sent large armies headed by capable generals to the war, Frederick the Great remained unconquered. This result was partly due to the English alliance, partly to the incapable French generals, and partly to the state of internal politics in Russia. The treaties of Paris (February 10, 1763) and Hubertsburg (February 15) marked an important stage in the history of Europe. By the first Great Britain emerged from the war an imperial power with possessions all over the world, by the second Prussia was recognized as the equal of Austria in Europe. .

The period from the close of the Seven Years' War to. the French Revolution saw all the special characteristics and

tendencies of the 1 8th century in an accentuated form. the S Se˚ven Benevolent despotism found representatives not only Years' War in Frederick the Great and Maria Theresa, but also in to the Joseph II., Catherine II., Charles III. of Spain, and volution' Leopbld of Tuscany. Reforming ministers, too,*

flourished in the persons of Tanucci, Turgot, Squillaci,; Florida Blanca, D'Aranda and many others. Instances, t.ooj of the low state of political morality are to be found. The indefensible seizure of Silesia by Frederick the Great was followed in 1772 by the equally immoral partition of Poland, and it was clearly apparent that monarchs, though ostensibly actuated by a desire for the Welfare of their subjects, were resolved that reforms should come from above

and not from below. The chief Euro- pean events during these years were (1) the partition of Poland; (2) the war of the Bavarian Succession; (3) the alliance of Russia with Prussia in 1764 and with Austria in! 1781; (4) the entry of France and Spain into war between Great Britain and; her American colonies; (5) the combined attack of Russia and Austria against Turkey (1787-92); (6) the Triple Alliance of 1788. No sooner was the Seven Years' War ended than France and Spain, having made the third family compact in 1761 (the other two were signed in 1733 and 1743), prepared to take revenge upon Great Britain at the first favourable opportunity. The result of this determination, and of Great Britain's absorp- tion in internal politics, was that Russia, Prussia and Austria were enabled to carry out the first partition of Poland in 1772. The entry of France into the American war of independence rendered it impossible for Joseph II., single-handed, to carry out his project of exchanging the Austrian Netherlands for Bavaria,

and he was compelled, after a' short war, to give up for the time his project and to agree to the treaty of Teschen (1779). The continuance of the American War proved of great value to Russia arid enhanced her position in Europe. Not only had she, together with France, brought about the treaty of Teschen, but in 1780 she headed the league of armed neutrality, and between 1780 and 1784 annexed the Crimea. The conclusion of the war of American Independence enabled Great Britain to regain her influence in Europe, and when Russia and Austria combined to attack; Turkey, and when France threatened to re-establish 1 her influence in Holland, Pitt formed with the Prussian king and the stadtholder the famous Triple Alliance of 1788. During the ensuing four years the influence of that alliance made itself felt in an unmistakable way. All hope of the establishment of French influence in Holland was destroyed ; Denmark was forced to relinquish an attack on. Sweden, then at war with Russia; and after Leopold of Tuscany had succeeded Joseph II. as emperor in 1 790, the revolution in the Netherlands was brought to- an end. Moreover, through the influence of Leopold the hostility of Prussia to Austria was removed, and the two powers in July 1790 made the treaty of Reichenbach. Great Britain, the chief member of the Triple Alliance, had supported the pacific solution of all these questions so menacing to European peace, and Pitt was aided in his policy by the emperor Leopold, who in 1791 made the treaty of Sistovawith the Turks. Danger to the peace of Europe was, however, caused by the attempt of the Spaniards to annex Nootka Sound, and by the continuance of the war between Russia and Turkey. The former difficulty was, however,

removed in November 17.90 by an agreement between Great Britain and Spain, and in January 1792 Russia made the treaty of Jassy with Turkey.

Instead of Europe remaining at peace the year 1792 saw the beginning of a series of wars which did not come to a final conclusion till the battle of Waterloo. While the east Prencn of Europe was. engaged in war, and while the Triple /tevoJu- Alliance was busy attempting to restore peace toEurope, tion, the French Revolution had broken out in 1789. The tT89h assistance given by France to the American colonists had brought the country to bankruptcy, and no course was left to Louis XVI. except to summon the states-general in May 1 789. In that year a revolution against the reforms of Joseph II. had taken place in the Netherlands, and a revolution was being prepared in Poland for the overthrow of the aristocratic constitution and for the establishment of an hereditary monarchy. At first the revolu- tion in France was entirely occupied with internal reforms, but after the dissolution of the Constituent Assembly in September 1 791 the Girondists, whose influence became paramount, deter- mined by the advice of Brissot to insist upon a policy of menace towards the Empire which would inevitably lead to war. War would, they hoped, result in the downfall of monarchy in France. On the other hand, Lafayette and his party advocated war on the ground that it would strengthen the cause of monarchy. In April 1792 war was accordingly declared upon Austria, then in' alliance with Prussia. After a short period of failure the. French in September won the battle of Valmy, and in November the battle of. Jemappes. French armies advanced to the Rhine, Belgium was occupied, the Scheldt was declared open, and Holland was threatened. In consequence of the danger to Holland, Pitt adopted a warlike tone, and in February 1793 France declared war upon Great Britain. In ˆwar"' that war Spain, Sardinia and Tuscany joined, so that between France was practically fighting all Europe. Neverthe- P f an

HISTORY]

EIM0PB

933

and

Amiens.

and the peace of CL.npo Formio with Austria,' Only Great Britain remained at war with France. Iri 1799, taking advantage Tbe of the absence of Napoleon. in Egypt, the Second

treaties of Coalition was formed by Russia,. Great Britain and Luneville Austria. Though the French were driven from Italy, Massena defeated the Russians in Switzerland, and the English were forced to retire from Holland. The return of Napoleon from Egypt was followed by the establishment of the Consulate in November 1799, by the overthrow of the Austrians at Marengo and Hohenlinden, by the treaty of Luneville with the emperor, and by the treaty of Amiens in 1802 with the English government. (See French Revolutionary Wars.)

Up to this point the Revolution may be said to have benefited Europe and to have shaken to its base the 18th-century ideas of The government. During the years succeeding the peace

German of Campo Formio a revolution was effected in Germany. Revotu- The Holy Roman Empire had become an anachronism, and as soon as France became possessed of the left bank of the Rhine it was obvious that the imperial constitution required revision. The jealousies existing among the German princes and the overthrow of Austria at Austerlitz.- enabled Napoleon to- carry out a revolution in Germany according to his own ideas. At, first, in 1804, new arrangements were made with regard to the character and formation of the diet. The constitution of that assembly was so altered that a Protestant majority free from Austrian influence was now assured. . The middle states, such as Prussia, Baden, Bavaria, Wurttemberg and Hanover, received additions of territory, taken either from the ecclesiastical states or from the lands belonging to the imperial knights. After Austerlitz Napoleon in 1806 established the Confederationˆ the Rhine, and the Holy Roman Empire came finally to an end. A great European revolution, had now been effected, but much remained to be done before; a feeling of nationality could be aroused among the people of central Europe. ,

Already before the peace of Amiens Pitt had tried to stir up national feeling in Austria and Prussia, the means which he The suggested for opposing Napoleon being in great

causes of measure those which were adopted in 1813 and 1814. Napoleon's % u t during Pitt's lifetime central Europe, was not moved by any feeling of nationality or of patriotism. During the war of the Second Coalition in 1799 Austria had acted without any

regard for her allies, while Prussia, from motives of jealousy of and from want of confidence in Austria had refused to move. It was not till the small states which; hitherto had formed independent units had been destroyed and Austria 1 and Prussia trampled under foot by Napoleon thata strong national spirit in Germany was evoked. Until the treaty of Tilsit had been signed in' 1807 these was no visible growth of a national uprising in any part of Europe. During the .intervening years Prussia had been crushed at Jena and her kingdom eut short (1806), while Alexander I. of Russia, after a fierce campaign against Napoleon, had agreed in 1807 to the treaty of 'Tilsit, which apparently placed Europe at the feet of France and Russia. Napoleon was, as he thought, now, in fc position to Napoleon bringabout the humiliation of Great Britain. Already aims at the in November 1806, realizing that he could not ruin destruction England by direct invasion, he had issued the first Berlin Decree, which ordered the exclusion of British goods from the continent. The-Continental System necessitated by the victory of Trafalgar was thus definitely set up. After Tilsit he proposed to become supreme in the Baltic, and, by securing the dependence of Spain and Portugal, to dominate the Mediterranean, and to resume his plans for con- quests in the East, and for the destruction of the British power in India. Thus the effects of the British naval victories of. the Nile and Trafalgar would be completely nullified, the Mediter- ranean would be closed to British ships, Great Britain's Indian possessions would be lost, and Great Britain herself would be forced by starvation into surrender. Fortunately for Europe various circumstances hindered the realization of these ambitious schemes. Alexander, who feared that the French emperor desired Constantinople; never proved a very helpful ally, the*

ot Great Britain.

measures taken by Great Britain seriously interfered with Napoleon's, schemes, and, before he had subjugated Spain, first Austria in 1809 and then Russia in 1812 offered an active resist- ance to' his projects. The first note of opposition to Napoleon's plans was struck by Canning, when in 1807 he carried off- the Danish fleet to England. Then the British fleet conveyed to Brazil in safety the Portuguese royal family when Portugal was invaded by Junot, while the surrender of 30,000 French troops at Baylen in July 1808, which was followed in August by the convention of Cintra, indicated that Spanish patriotism was, when roused, as effective as in the days of the Spanish Succession War. Austria was the first country to follow the example of Spain, and though she was defeated at Wagram and forced to accept Napoleon's hard terms, the national feeling aroused

in Germany in 1809 rapidly developed. But Napoleon was apparently unconscious of the growth and importance of a national sentiment in any of the subject countries. In 1810 he had married Marie, Louise of Austria, on the 20th of March 181 1 a son was born, to him, and he now seems to have resolved upon 1 the establishment of a strictly hereditary empire with Paris its capital and Rome its second city. In extent, his empire would be vaster than that of Charlemagne, and the pope was to be completely subordinate to the emperor. This conception of- the establishment of a reformed Holy Roman Empire with its centre at. Paris did not appear unrealizable in 1811 when every- thing seemed to favour the new , Charlemagne. Napoleon's power was apparently securely established, and during the years 1 8 1.0 and ' 1 82 1 < he was again returning to his vast oriental designs A sudden -check, however, was about to be placed upon, his ambitious schemes.

*The establishment of French influence in Italy and Germany had stirred up in both countries a national feeling, the growth of which was encouraged by the example of. Spain.: No, jhe greater! mistake was ever made by Napoleon than triumph ot when, ignoring the strength of the Spanish resistance, "pation- and the development of a national , movement in a *' Germany, he resolved to enter upon the Russian campaign and to march to Moscow,. Unconsciously Napoleon "had called into vigorous life the forces of Democracy and Nationality in Germany and Italy." The failure of the Moscow campaign led at once to a national rising in Prussia, and as soon as Austria had 'united her forces with those of Prussia and Russia, the over- throw of Napoleon at Leipzig in October 1813 was the result, and " the- imperial yoke was. shaken from the neck of the German people." Napoleon's wars had roused feelings of patriotism in Italy, Germany, Russia and Spain. It was at least realized by the nations of continental Europe, what had long been apparent to Englishmen, that a nation to be strong must be united. To " the subversive cosmopolitanism " of the French Revolution was now opposed the modern idea of nationality, against, which the Napoleonic legions hurled themselves in vain. (See Napoleon I.; Napoleonic Campaigns; French Revolution; Alexander I., emperor of Russia; Metternich.) (A. Hi..) .*

The downfall of Napoleon involved that of the political system of Europe which he had constructed. The changes wrought by the revolutionary period .in the old states system were, however, too profound to admit of any. attempt at a "^ con ' complete restoration, even had the interests of the ofBurope. allied powers been consistent with; such a course. The object of the four great powers in whose

hands the settlement of Europe now lay, was rather, after taking precautions to confine France within her " legitimate boundaries," to arrange such a " just equilibrium " in Europe that no individual state should for the future be in a position to overset the balance of power. The first object was to be attained by the re-establishˆ ment of , the ancient dynasty in France, as a guarantee to Europe against a renewal of the revolutionary propaganda; the congress second was the work of the congress of Vienna, by otvienna, which, between September 1814 and June 1815, the j? 14 ‘ reconstruction of Europe was taken in hand. The opening of the congress, in which for the first time all Europe seemed, to be united fpr the friendly settlement of common

interests, was hailed as the dawn of a new era. In a sense it was so; but hardly in the manner nor to the degree that some had hoped. In its councils the arts of the old diplomacy, still inspired by the traditional principles or lack of principles, were directed to the old ends; and the world, as though the popular upheaval of the Revolution had never been, was treated as real estate to be parcelled out by the executors of Napoleon’s empire among sovereigns by divine right, regardless of the wishes of the popu- lations, which figured in the protocols merely as numbers to be balanced and bartered one against the other.

This process of " dividing the spoils," as Gentz called it, was naturally pregnant with possibilities of quarrels. Of these the most dangerous was that provoked by the resolution of the emperor Alexander I. at all costs to keep the former grand-duchy of Warsaw for himself, while compensating Prussia for the loss of some of her Polish territories by the annexation to her of all Saxony. The deadlock caused by the stubborn insistence on this plan, which the other great powers were equally determined to frustrate, all but led to war, and by a secret treaty signed on the 3rd of January 181 5, Great Britain, France, and Austria agreed to make common cause in that event against Russia and Prussia. It needed Napoleon’s return from Elba (March 1815) to remind the powers that their particular interests must still be subordinated to those of Europe. The common peril restored the broken harmony; and while the armies of the Alliarice were closing in for the final struggle with the French

emperor, the congress hurried on its deliberations, and on the 9th of June 1815, a few days before the battle of Waterloo, by which Napoleon's power was finally shattered, the Final Act, embodying the treaties of Vienna, was signed.

The territorial arrangements thus effected were for half a century the basis of the states system of Europe, and the . treaties in which they were defined the charter of adjust- international relations. It was in central Europe, meats of where Napoleon's policy had most profoundly affected the Vienna ˆ e p re -revolutionary system, that the greatest changes were made. No attempt, indeed, was made to restore the Holy Roman Empire, in spite of the protest of the pope against the failure to re-establish " the centre of political unity "; but the Confederation of the Rhine having come to an end, Germany was reconstituted as a confederation of sovereign states, in which all the former members of the Empire which had survived the revolutionary epoch found a place (see Ger- many). Austria, in virtue of the imperial tradition of the house of Habsburg, received the presidency of the federal diet; but the bulk of her territories lay outside the frontiers of the Con- federation, and the non-German character of the Habsburg monarchy was accentuated by the other arrangements at the congress. In Italy Lombardo-Venetia was erected into a kingdom under the Austrian crown; while the dynastic settle- ments in the other Italian states tended to make Austrian influence supreme in the peninsula (see Italy). In return for this, Austria surrendered her claim to her former possessions in the Low Countries, which were annexed to the crown of Holland, so as to form, under the title of the United Netherlands, an efficient barrier to French aggression northwards. The function of defender of Germany on the Rhine frontier which Austria thus abandoned was assigned to Prussia, an arrangement pregnant with momentous issues. In compensation for her disappoint- ment in the matter of Saxony, half of which was ultimately restored to the dynasty of Wettin, she received a large accession of territory in the Rhine provinces, carved partly out of the suppressed kingdom of Westphalia, partly out of the former ecclesiastical states, and comprising the imperial city of Aix-la-Chapelle and the former electorate of Cologne. To Prussia also was conceded the right to garrison the federal fortress of Luxemburg.

Of the other German states, Bavaria, which alone was suffi- ciently powerful to be of any great importance in the general affairs of Europe, reaped the reward of her timely defection from the cause of her protector Napoleon. She had, indeed, to restore to Austria the territories annexed to her at the expense

of the Habsburg monarchy by the French emperor: Tirol, the Quarters of the Inn and of the Hausruck, and part of Salzburg. But she received ample compensation elsewhere, notably the former Bavarian Palatinate with a strip of territory to connect it with Bavaria proper. The right to garrison the federal fortress of Mainz was also ultimately conceded to her. Bavaria was thus placed in a position to continue her traditional policy of aiming at the position of a European great power and holding the balance between Austria and Prussia (see Bavaria: History). The two other German states whose elevation to kingdoms had symbolized a similar ambition, Saxony and Wiirttemberg, were henceforth relegated to a position of third-rate importance; Saxony depended for her very existence on the rivalry of her more powerful neighbours: Wiirttemberg protested in vain against the dictatorship of the great powers to which she was forced to submit. Finally, the electorate of Hanover, partly out of compliment to the king of Great Britain, partly because with the abolition of the Holy Empire the title elector had fallen obsolete, was elevated to a kingdom. The request of the elector of Hesse for a similar concession in his case was refused by the powers assembled at Aix-la-Chapelle in 1818.

Of great importance were the changes effected in the north and east of Europe. The affairs of the Ottoman empire, which the treaty of Bucharest (181 2) between Russia and Turkey had left in a very unsatisfactory condition, were not dealt with by the congress, in spite of the efforts of Great Britain to bring them into discussion. But the concessions made to the emperor Alexander elsewhere represented a notable advance in the European position of Russia. The possession of Finland, conquered from the Swedes in 1808, was confirmed to her; and, above all, the erection of the former grand-duchy of Warsaw into a constitutional kingdom of Poland under the Russian crown not only thrust the Muscovite power like a wedge into the heart of Germany, but seemed to threaten the Polish possessions of Austria and Prussia by setting up a quasi-independent Poland as a centre of attraction to the scattered elements of the Polish nation; though in the sequel the establishment of the city of Cracow and its territory as an independent republic, to avoid the difficult question of its assignment elsewhere, proved a more fruitful source of nationalist unrest. In the north the settlement confirmed by the congress marked the definite withdrawal of the Scandinavian Powers from any active influence on the affairs of the continent. Alone of the parvenu monarchs of the Napoleonic age Bernadotte retained the crown of Sweden, to which, by the treaty of Kiel, that of Norway had been added. On the other hand, by the cession of Swedish Pomerania

to Prussia, Sweden finally withdrew from the southern shores of the Baltic. The Scandinavian states ceased henceforth to play any determining part in European politics. In the south, on the other hand, the restoration of Savoy and Piedmont to Victor Emmanuel I., king of Sardinia, and the incorporation in his dominions of the territories of the former republic of Genoa, were factors pregnant with mighty issues. The object of this increase of the power of the house of Savoy was but to erect a barrier against any possible renewal of French aggression in Italy; in effect it established the nucleus of the power which was to struggle successfully with Austria for the hegemony of Italy.

The gains of Great Britain in Europe were comparatively small, though by no means unimportant. By the retention of Malta she secured her power in the Mediterranean, and this was further increased by the treaty of Paris (November 5, 1815), by which the powers recognized her protectorate over the Ionian Islands. (See Vienna, Congress or.)

But for the episode of the Hundred Days, France would have emerged from the congress with recovered prestige and mistress of at least some of the territorial gains of the revolution- The ary wars; though Napoleon had thrown away, during power the negotiations at Chatillon, the chance of preserving p°jf oce for her her " natural frontiers " of the Rhine, the Alps and the Pyrenees. After Napoleon's second downfall she was in serious danger of dismemberment, for which the German powers*

clamoured as essential to their safety. That Louis XVIII. continued to rule over the territories " handed down to him by his ancestors " was due to the magnanimity, or policy, of the emperor Alexander I. (q.v.), and the commonsense of Castlereagh and Wellington, who saw well that the " just equilibrium," which it was their object to establish, could not be secured if France were unduly weakened, and that peace could never be preserved if the French people were left to smart under a sense of permanent injury. By the second peace of Paris, signed on the 20th of November 1815, France retained her traditional boundaries. The unsatisfied ambition to secure her " national frontiers " was to bear troublesome fruit later.

That the treaties embodied in the Final Act of Vienna repre- sented a settlement of all outstanding questions was believed by nobody. They had been negotiated for weary months in an atmosphere of diplomatic and feminine intrigue; they had been concluded in a hurry, under the influence of the panic caused by Napoleon's return from Elba. To Friedrich von Gentz they were at best but " partial arrangements," useful as forming an authoritative basis for the establishment of a more complete and satisfactory system. The history of the international politics of Europe for the years immediately succeeding the congress of Vienna is that of the attempt to establish such a system.

After a quarter of a century of almost ceaseless wars, what Europe needed above all things was peace and time to recuperate. Treaty of ^^' s conviction was common to all the powers who had Nov. 20, inherited Napoleon's dictatorship in Europe; but on wis, and the question of the method by which peace should be th t e p 0acert secured, and the principles which should guide their action, a fateful divergence of view soon became apparent within their councils. All were agreed that France still represented the storm centre of Europe; and a second treaty, signed on the 20th of November 181 5, renewed the provisions of the treaty of Chaumont, in view of any fresh outburst of the French revolutionary spirit. But the new treaty went further. By its 6th article it was declared that " in order to consolidate the intimate tie that unites the four sovereigns for the happiness of the world, the High Contracting Powers have agreed to renew at fixed intervals . . . meetings consecrated to great common objects and to the examination of such measures as at each of these epochs shall be judged most salutary for the peace and prosperity of the nations and for the maintenance of the peace of Europe." This was the formal charter of the concert of the great powers by which for the next seven years Europe was governed, a concert to which the

name " Holy Alliance " has been commonly but erroneously applied. The Holy Alliance, drawn up AiUanee ˆ v t ‘ le em P eror Alexander L, and signed by him, the emperor Francis, and King Frederick William III. of Prussia on the 26th of September 18 15, represented a different and conflicting ideal. Actually it was not a treaty at all, but at best a declaration of principles to which any Christian could subscribe, at worst — to quote Castlereagh — "a piece of sublime mysticism and nonsense " from the political point of view (see Holy Alliance). It gained its sole political importance from the persistent efforts of the tsar and his ministers to replace the committee of the great powers, established by the treaty of the 20th of November, by a " Universal Union " of all the powers, great and small, who had signed the Holy Alliance, and thus to establish that " Confedera- tion of Europe " of which the autocratic idealist had borrowed the conception from the theorists of the 18th century (see Alexander I., emperor of Russia). It was clear from the first that any attempt to set up such a central government of Europe under a " universal guarantee " would imperil the and the independence of the sovereign states; and from the Concert. first Great Britain, represented by Castlereagh, pro- tested against it. She would consent to take common action on the basis of the treaties she had actually signed, consulting with her allies on each case as it arose; but to vague and general engagements she refused to commit herself. The attitude of Austria and Prussia was from the outset less clear. Metternich was torn between dread of revolution and dread of Russia; the Holy Alliance, though essentially " verbiage,"

might be useful in holding the imperial Jacobin in check; the " universal guarantee " could not but be discouraging to the " sects "; on the other hand, the extreme willingness of the tsar to march 200,000 Russians for any " European " purpose in any direction convenient or inconvenient to Austria, was — to say the leasts- disconcerting. Frederick William III., on the other hand, though he too had signed the Holy Alliance with reluctance, in moments of panic saw in the " universal guarantee " his best defence against the renewed attack by France which was his nightmare. In effect, owing to the firm attitude of Castlereagh at the congress of Aix-la-Chapelle, " the transparent soul of the Holy Alliance " never received a body, though attempts were subsequently made at the congresses of Troppau, Laibach and Verona to apply some of its supposed principles — attempts that led to the definitive breach of Great Britain with the Alliance.

The highwater-mark of the activity of the Allies as a central government for Europe was reached at the congress of Aix-la-

Chapelle {q.v.) in 1818. France was now admitted to congress the Alliance, the objects of which were reaffirmed by a ofAix-ia- public declaration to which she adhered; but at the Chapelle, same time a secret treaty renewed the compact of m8 ‘ Chaumont between the four other powers. Certain questions outstanding from the congress of Vienna were referred for settle- ment to a ministerial conference to meet at Frankfort in the following year. The treaty which was the result of this con- ference was signed on the 20th of July 1819. The bulk of it was concerned with territorial settlements in Germany: between Austria and Bavaria, and Bavaria and Baden; but some of the articles arranged for the cession of the border fortresses Philippe-ville and Mariembourg to the Netherlands, defined the frontiers of Savoy, and settled the reversion of the Italian duchies held by the empress Marie Louise.

*Meanwhile the balance of forces within the European concert had shown a tendency to shift. At the outset the restless activity of the emperor Alexander, his incalculable Alexano * er idealism, and his hardly veiled ambitions had drawn /. / Austria and Great Britain togetherincommonsuspicion Russia and of an influence that threatened to be little less disturb- Meter- ing to the world’s peace than that of Napoleon. But ” ” at Aix Metternich had begun to realize that, in the long-run, the system of repression which he held to be essential to the stability of the European, and above all of the Austrian, polity would receive little effective aid from Great Britain, fettered as she was by constitutional forms; while Alexander, alarmed at the discovery of revolutionary plots against his person, had already shown gratifying signs of repentance. The ” Jacobin ” propaganda of the tsar’s agents continued, it is true, especially in Italy; and, in spite of the murder of the dramatist Kotzebue, as a Russian emissary, by the fanatical ” Bursche ” Karl Sand, Alexander joined with Castlereagh in protesting against the reactionary policy embodied in the Carlsbad Decrees of October 1810. But the murder of the duke of Berri on the 13th of February 1820 completed the Russian autocrat’s ” conversion.” At the congress of Troppau, which met in the autumn of the same year, he was a ” changed man,” committed henceforth heart and soul to Metternich and his policy. The outcome of this new understanding was the famous Troppau Protocol, commsa published to the world on the 19th of November 1820, and pro- and signed by Austria, Prussia and Russia. The tocol of immediate occasion of this manifesto was the military Troppau, insurrection, under General Pepe, at Naples, by which the Spanish constitution of 181 2 had been forced on the king (see Naples: History). But the protocol embodied a general principle involving*

issues infinitely more important than any arising out of this particular question. " States which have undergone a change of government due to revolution," it de- clared, " the results of which threaten other states, ipso facto cease to be members of the European alliance, and remain excluded from it till their situation gives guarantees for legal order and stability. If, owing to such alterations, immediate danger threatens other states, the powers bind themselves, by

peaceful means, or if need be by arms, to bring back' the guilty state into the bosom of the Great Alliance." ' ■■,.■;.

1 This was, in effect, an attempt to apply the principle of the Carlsbad Decrees to all the world; and, had the attempt suc- ceeded, all Europe would have been turned into a- confederation on the model of that of Germany; for a political alliance, charged with the safeguarding of the territorial settlement defined by treaty, would have been substituted a central diet of the great powers, armed with undefined authority; and the sovereign independence of the nations would have been at an end. To any such principle, and therefore to the protocol in which it was embodied, Great Britain offered an uncompromising opposition. In vain Metternieh Urged upon Castlereagh that the protocol was but the logical conclusion drawn from premises to which he was already committed; for, if the alliance was to be effective in maintaining peace, it must interfere wherever and whenever peace should be threatened, and therefore to crush internal revolutions which could not but have an external result. The logic was perfect; the proposition that on which every " pr6ject of peace " must eventually break. Castlereagh's reply was, in brief, that Great Britain could never admit a principle which she would not in any circumstances allow to be applied in her own case.

The absence of the signatures of Great Britain and France from the Troppau protocol marked the first rift in the alliance,

a rift that was soon to develop into a breach. For the First rift time, indeed, the crack was " papered over." Castle- alliance. reagh was prepared to leave Austria a free hand to

deal with the risings in Naples and Piedmont, since she had treaty

rights in the former case and her interests, as an Italian power, were threatened in both. Great Britain was even represented at the congress which reassembled at Laibach in January 1821, though Lord Stewart, the ambassador at Vienna,

was not armed with full powers. Castlereagh had

Congress approved of the invitation sent to the king of Naples of Laibach, , r ,,- , ., • 1 • « ?• ±- >f

*tell; -■ *° attend the congress, as implying negotiation, an*

improvement on the dictatorial attitude of the protocol. But everything in the conferences tended still further to shatter the unstable foundations of the alliance. Capo dTstria, as though the debates of Aix-la-Chapelle had never been, raised once more the spectre of the " Universal Union " which Castlereagh believed he had laid for ever. Metternieh, anxious to prove to the Italian Liberals - that the tsar was no longer their friend, welcomed the demonstration, and Prussia followed obediently in Austria's wake. " It is clear," wrote Lord Stewart," that a Triple Understanding has been created which binds the parties' to carry forward their own views in spite of any difference of opinion which may exist between them and the two great constitutional governments." (See Troppau and Laibach.)

But the narrower " Holy Alliance " of the three autocratic

monarchies, as opposed to the two western constitutional

' monarchies, was not in fact destined to take shape

e,teC f°J tillafter the Paris revolution of 1830. Several factors

in Spain, delayed the process, notably the revolt of the Greeks

against the Ottoman rule, and the Spanish question, which latter formed the main subject of discussion at the con- gress of Verona in 1822. In the Eastern Question the interests of Austria and Great Britain were identical; both desired to maintain the integrity of Turkey; both saw that this integrity was in the greatest peril owing to the possible intervention of the Orthodox tsar in favour of his co-religionists in revolt ; and both agreed that the best means of preventing such intervention was to bind the Russian emperor to the European concert by using his devotion to the principles of the Holy Alliance. At Verona, however,' the Eastern question was entirely overshadowed

by that of Spain, and in this matter the views of Great of Verona Britain were diametrically opposed to those of the I822. ‘ other powers of the alliance. She shared indeed with

France and Austria the strenuous objection to the emperor Alexander’s proposal to march 1 50,000 Russians into Piedmont in order to deal with Jacobinism whether in France or Spain; but she protested equally strenuously against the counter-

proposal of France, which was ultimately adopted, that a French army should march into Spain to liberate the king from his constitutional fetters in the name of Europe. George Canning, carrying on the tradition of Castlereagh, once more protested, through Wellington, as British plenipotentiary at the congress, against the whole principle of intervention; and when, in spite of the British protest, the other powers persisted, the breach of Great Britain with the continental alliance was proclaimed to all the world. When, on the 7th of April 1823, the French army under the duke of Angouleme crossed the Bidassoa, the great experiment of governing Europe through a central committee of the great powers was at an end. (See Verona, Congress of; Alexander I. ; Londonderry, Robert Stewart, 2nd marquess of; Canning, George.)

Henceforth, though the treaties survived, and with them the principle of the concert on which they were based, ” Europe ” as a diplomatic conception tends to sink into the back- End tthe ground and to be replaced by the old international “Confeae- anarchy of the 1 8th century. To Canning this develop- rati °n or ment seemed wholly welcome. He applied to the Europe – rivalry of states the Liberal principle of free competition as the sole condition of healthy growth. ” Villele is a minister of thirty years ago,” he wrote to Bagot on the 3rd of January 1823, ” no revolutionary scoundrel: but constitutionally hating England, as Cholseul and Vergennes used to hate us, and so things are getting back to a wholesome state again. Every nation for itself, and God for us all.” But the essential difference between the rivalries of the 1 8th and 19th centuries was in the conception of the “nation.” To Canning, as to the diplomatists of the congress of Vienna, ” nation ” was synonymous with “state,” and national boundaries were those denned by the treaties, which Canning was as bent on preserving as any of his reactionary contemporaries. The conception of the Pr,aciole divine right of every nationality to readjust political a]„y m frontiers to suit its own ideals was as foreign to him as to Metternieh. Yet this principle of nationality, which was destined during the 19th century to wreck the political structure consecrated at Vienna, and to leave to the

succeeding age a host of unsolved and insoluble problems, found in Canning its earliest champion in the higher councils of Europe. The recognition of the independence of the South American republics and of the belligerent rights of the Greek insurgents were both in the:first instance motived by the particular interests of Great Britain; but they were none the less hailed as concessions to the principles of nationality, to which they gave an impetus which was destined to continue till the face of Europe had been transformed.

This in fact constitutes the main significance for Europe of the War of Greek Independence, which lasted from the first rising of the Greeks in the Morea in 1821 till the E signature of the treaty of London on the 7th of May ana the 1832 (see Greek Independence, War oe; Turkey: revolt of History). Its actual outcome, so far as the political areece – structure of Europe was concerned, was but to add an insignificant kingdom to the European states system. But its moral effect was immense. The sacrosanctity of the status quo had been violated, and violated with the active aid of three of the powers of the continental alliance: Russia, France and Great Britain. Metternieh was right when he said that, in principle, there was no difference between the Greek insurgents and any other "rebels against legitimate authority," and the Liberals of all Europe, forced into inactivity by the Austrian police system, hailed in the Greeks the champions of their own cause. Phil- hellenism, beyond its proper enthusiasm, served as a convenient veil for agitations that had little concern with Greece. Other forces making for political change were simultaneously at work. The peace secured by the concert of the powers had given free play to the mechanical and industrial innovations _„ that heralded the marvellous economic revolution of progress; the coming age; wealth increased rapidly, and with it riseofthe the influence and the ambition of the middle classes. m,tMle The revolution of July 1830, which established the bourgeois monarchy in France, marked their first triumph. Iti

Countries less economically advanced, e.g. Germany and Italy, the attempt to follow French example ended in failure; but the revolt of the Belgians, far reasons partly economic and

partly national, against the domination of the Dutch, Rewlu- resulted

in the establishment of the independent king- 1830. dom of Belgium — the first actual breach in the terriˆ

torial settlement of 1815. In Great Britain the agitation of the disfranchised middle classes, which' seemed to threaten a violent revolution, ended in 1832 in the passing of the Reform Bill and their admission to political power. (See France; Germany; Italy; Belgium; English History.)

The easy success of the revolutions in the west of Europe had been due, not to any reluctance of the reactionary powers to interfere on the basis of the old agreements, but to their preoccupation with the national' revolt in Poland (q.v.). In view of this, and of the attitude of Great Britain, they had to recognize the title of Louis Philippe as king of the French, merely stipulating that he should guarantee to maintain the treaties. In spite of the overthrow of the legitimate dynasty in France, and of the partition of the kingdom of the Netherlands, the territorial settlement of Vienna remained, after the revolution of 1830, substantially intact. Outside the limits of the. treaties, however, fateful changes were in- progress. These were deter- mined, broadly speaking, by the two main questions that dominated international politics between the years 1831 and 1 841: (1) the antagonism between the western constitutional powers, France and Great Britain, and the eastern autocratic powers, Russia, Austria and Prussia; and (2) the crisis in the Eastern question resulting from the revolt of Mehemet Ali, pasha of Egypt, against the Porte.

The strained relations between Great Britain and France, resulting from the French policy of aggression in the Spanish

peninsula, which had :more than once brought the Anglo- two p 0wers to the verge of war, had been eased before "entente." trj e fall of the government of Charles X. The peril of

a French hegemony over the vast colonial empire of Spain had been forestalled by Canning's recognition of the independence of the South American republics; the intrigues of France in favour of the partisans of Dom Miguel in Portugal had been checkmated by a politic breach, on behalf of the Portuguese Liberals, of the British principle of non-intervention, and finally the chief cause of offence had been removed, in 1827, by the withdrawal of the French army of occupation from Spain. In the Greek question the two powers had acted cordially in concert; and this good understanding even the French conquest of Algiers in 1830, which laid the foundations of

the French empire in Africa, had not availed to shatter; for the eyes of the Tory ministry were still fixed on France as the potential focus of revolutionary propaganda, and any over-sea possessions she might acquire were, in Wellington's opinion, so many hostages for her good behaviour given. to British sea-power. The results of the July revolution in Paris were accepted by Great Britain so soon as it became clear that Louis Philippe stood for peace and not for revolutionary aggression ; the armed intervention of France in favour of the Belgians in August 1831 was stopped by the firm language of Palmerston; the French occupation of Ancona, as a countermove to Austrian aggressions in Italy, was accepted as "an incident of the balance of power"; and the intention of the king of the French to abide by the treaties, which became clearer with the consolidation of : his power at home, paved the way for that entente between the two Liberal powers which lasted until 1840.

The cleavage between the fundamental principles of the two groups of autocratic and constitutional powers was not only The con- a PP arent – in their general attitude towards constitu- stitutlonal tional and national movements, but affected also the v. the position taken up by them during the crisis of the

autocratic Eastern question evoked by the revolt of Mehemet

Ali, pasha of Egypt, a crisis by which between 1839 and 1 84 1 all other diplomatic issues were overshadowed. (See Mehemet Ali.) During the Greek revolt the efforts of Austria had been directed to preventing a Russian attack upon Turkey;

these efforts had failed, and Metternich's worst fears seemed to be realized when the Russo-Turkish campaigns of 1828-29 issued in the treaty of Adrianople (September 14, 1829) and the apparently complete vassalage of the sultan to Eastern the tsar. But when, in 1832, Sultan Mahmud appealed question, in his despair to the emperor Nicholas to save him Mehemet from ruin at the; hands of the Egyptian rebels, and, as the result, the treaty of Unkiar Skelessi (July 8; 1833) seemed to place definitely in the hands of Russia the keys of the Black Sea, it was- left to France and Great Britain to give voice to the protest of Europe. Austria, alarmed by the revolutionary movements of 1830, accepted the fact of Russian preponderance at Constantinople, rather than risk a breach with the autocrat who was now the main pillar of the Holy Alliance. The emperor Nicholas, for his part, was equally prepared to surrender some of his ambitions in the East for the sake of the common cause, the more so since to Russian statesmen the maintenance of Turkey in a condition of

weakness and dependence now seemed preferable to any attempt to break it up. : The result of these dispositions was the convention of Miinchen- ; tf °2ˆ/' gratz (September 18,1833) between Russia, Austria and Miinchen. Prussia, by which the. three powers undertook to gratxand guarantee the integrity of the Ottoman empire. In ™Tj ' < the following month a secret convention was signed at Berlin between the same powers (October 15), reaffirming the right of the powers to intervene in the internal affairs of a friendly state at the request of its legitimate sovereign, a right with which no third power would be allowed to interfere, such interference to be regarded by the three powers as an act of hostility directed against all of them. ;*

*This reconstitution of the " Holy Alliance " on a narrower basis was the work of the emperor Nicholas, whose masterful personality had by this time quite overshadowed the f ne x sar influence of Metternich in the councils of the autocratic Nicholas I. powers. ' There was no formal breach of the Grand and Pal- ; Alliance; the " treaties " remained in force; but the merstoa – French revolution of 1830 had produced a practical disruption which was every day accentuated- by the attitude of the British government under the influence of Palmerston. ■ For Palmerston had now become fl the firebrand of Europe," openly proclaiming his contempt for international law and equally openly posing as the protector of " oppressed nationalities." ' " If these two powers (France and England)," wrote the tsar to King Frederick William of Prussia, " have the courage to profess toiidly rebellion and the overturn of all stability, we ought to have the right and the courage to support Divine right." This deep cleavage of principles was immediately exhibited in the attitude of the powers towards the troubles in the Spanish peninsula. In Septerhber 1833 Ferdinand VII.. of Spain died, and, under the Pragmatic Sanction, his daughter Isabella succeeded under the regency of Queen Christina; in July, Dom Miguel, the spahta°nd absolutist pretender to. the throne of Portugal, had; Portugal. made himself master of Lisbon; In Spain Don Carlos, .Quadruple Ferdinand's brother, claimed thecrownasthelegitimate Jlgjj 6 – heir, and began the long agony of the Carlist wars; in Portugal: the constitutionalists upheld in arms the rights 6*f Queen Maria da Gloria (see Spain and Portugal) 1 Carlists and Miguelists, making common cause, had the moral support of the allies of Miincbengratz; while France and Great Britain took the side of the Liberals. >A formal alliance between: the two western powers, proposed by Talleyrand, was indeed refused by Palmerston, who had no wish to commit Great Britain to an irrevocable breach with Austria and Russia, and was suspicious of the ambitions of France in*

Spain; but ultimately a triple alliance between Great Britain, Spain and Portugal-r-with the object of restoring order in the peninsula — was .converted, under pressure from the French government, into the Quadruple Alliance of the 22nd of April 1834.

The entente implied by this formal instrument was, however, more apparent than real. When; in the spring of 1835, Queen Christina applied to the Allies for help against a renewed Carlist rising, Palmerston's suspicions were again aroused by

the somewhat naive suggestion of Thiers that France should

once more intervene as in 1823, a suggestion that was firmly

rejected. Palmerston's counter-proposal of an English

Nicholas!, expedition met with as little favour in Paris. The

and Great r .

Britain. Anglo-l 1 rench entente was proving but a cardboard alliance," as Wellington called it; and the emperor Nicholas, to whom the existence of Louis Philippe as king of the French was at once a sacrilege and a menace, began with a good hope to work for its destruction. The fears roused by the Reform Act of 1832 had been belied by its results; the conservative temper of the British electorate had restored to Great Britain the prestige of a legitimate power; and the pledge of the tsar's renewed confidence and goodwill was the visit of the cesarevich (afterwards the emperor Alexander II.) to the English court in Breach of I ˆ3 0- This was not without its effect on the public Anglo- sentiment; but the triumph of the tsar's diplomacy French was due to fresh complications in the Eastern question, "u/J' eate " due to the renewed effort of Sultan Mahmud to crush the hated viceroy of Egypt. These events will be found outlined in the article Mehemet All Here it will suffice to say that the convention of London of the 15th of July 1840, signed by Great Britain, Austria, Prussia and Russia without calling France into counsel, marked the definite breach of the Anglo- French entente, a breach which was but imperfectly healed by the Straits' Convention signed by all the powers on the 13th of July 1841.

The Straits' Convention was hailed by Count Nesselrode, the Russian foreign secretary, as having re-established " the federa- Oreat ˆ ve system of the European states on its old basis."

Britain This was true, in so far as it created yet another and precedent for the concerted action of the European

France. p OWe rs, and once more consecrated the right of " Europe " to decide in common on questions of first-rate inter- national importance. But the divergence of interests and principles within the concert were too great to be healed by the settlement of a single issue, however important, and this diver- gence increased as events moved towards the revolutionary outbreaks of 1848. When, in 1846, the independent republic of Cracow was suppressed by agreement of the three autocratic powers, on the ground that it had become a dangerous centre of revolutionary agitation, it was Great Britain and France that protested against an arbitrary infraction of the treaties by the very governments which had laid the greatest stress upon their sanctity. The entente between the two Liberal powers had been patched up after the closure of the Egyptian Question; it was cemented by visits of Queen Victoria and the prince consort to the Chateau d'Eu (1843 and 1845), and of King Louis Philippe to Windsor (1844); and it survived, in spite of several causes of friction, notably the crisis in Morocco (q.v.), until 1846, when the affair of the Spanish Marriages brought it to a somewhat dramatic conclusion.

The attempt to secure the succession to the Spanish throne for his descendants by pressing on the marriage of the duke of T!le Montpensier with the infanta Luisa, before that of

" Spanish the young queen Isabella had been proved to be fruitful Mar – in children, was on the part of Louis Philippe more

riages. tnan a breach of faith with Great Britain (how deeply it was resented may be learnt from Queen Victoria's letters); it was a breach of faith with the revolution that had made him king. Since 1840, indeed, the whole tendency of the king's policy had been to revert to the traditional standpoint of the Bourbons; internally, " resistance " to the growing claims of the democracy; externally, dynastic ambition. But in en- deavouring to win the goodwill of the reactionary powers he only succeeded in losing that of the classes of his own people on which The "Feb- hi s authority was based. In 1847 he joined with the ruaryHe- three autocratic powers in supporting the clerical and volution," reactionary Sonderbund in Switzerland, in

defiance of 1848. jjjg p ro t es t s f Great Britain and the attitude of the

majority of Frenchmen. Wheli, in February 1848, the revolution broke out in Paris, the bourgeois monarchy, utterly discredited, fell withou. a struggle (see France and Louis Philippe).*

The revolution in Paris was not the cause of the political upheaval which in the year 1848 convulsed Europe from Ireland to the banks of the Danube; it had indeed been pre- Revolution ceded by the triumph of Liberalism in Switzerland, of 1848 by successful revolutions in Naples and Palermo, and outside by the grant of a constitution in Piedmont; but France – flaming up as it were in the revolutionary centre of Europe, it acted as the beacon signal for the simultaneous outbreak of movements which, though long prepared, might but for this have been detached and spasmodic. It was this simultaneity which gave to the revolutions of 1848 their European character and their formidable force. They were the outcome of various, dissimilar and sometimes contradictory impulses — political, social, racial. In France the issue resolved itself into a struggle between the new working-class ideal of Socialism and the bourgeois ideal of the great Revolution; in England the Chartist movement presented, in a less degree, the same char- acter; in Germany, in the Austrian empire, in Italy, on the other hand, the dominant motives were constitutional and nationalist, and of these two the latter became in the end the determining factor. The events of the different revolutions are described elsewhere (see France; Austria; Germany; Hungary; Italy). From the point of view of Europe such unity as they possessed was due to their being, so far as Central Europe was concerned, directed against the system of " stability " associated with the name "f Metternich. In hatred of this system German, Czech, Magyar, and Italian were united; Kossuth's great speech of the 3rd of March echoed far beyond the frontiers of Hungary; the fall of Metternich (March f 3) was a victory, not only for the populace of Vienna, but for all the peoples and races which had worn the Austrian fetters. It was the signal for revolutions in Hungary (the passing of the " March Laws "), in Bohemia, in Prussia (March 15), in Milan; on the 23rd of March, Charles Albert of Sardinia, placing himself at the head of the Italian national movement, declared war against Austria. Against a movement so widespread and apparently inspired by a common purpose the governments were powerless. The collapse of the Austrian administration, of which the inherent rottenness was now revealed, involved that of those reactionary powers which had leaned upon it. One by one they accepted what seemed to be the inevitable; even

Pope Pius IX. sent troops to fight under the banner of St Peter for the Italian cause; while in Berlin Frederick William IV., wrapped in the gold and black colours of imperial Germany, posed as the leader of " the glorious German revolution." When, on the 18th of May, the parliament of United Germany was opened at Frankfort, it seemed as though pan-German dreams were on the threshold of realization; while in Italy, early in the same month, Lombardy, Modena, Parma and Piacenza declared by plebiscites for incorporation in the north Italian kingdom, Venice following suit on the 4th of June. A profound modification of the European states system seemed inevitable.

That, in the event, the revolutions of 1848 left the territorial settlement of Vienna intact, was due in the main to the marvellous resisting power of the Habsburg monarchy, the strength of which lay in the traditional loyalty of the J^"^, army and the traditional policy of balancing race fthe against race within the empire. The triumph of revolu- democracy in Germany was made possible only by the tlonar y temporary collapse of the Habsburg power, a collapse men t s , due to the universality and apparent unanimity of the onslaught upon it. But it was soon clear that the unanimity was more apparent than real. The victory of the democratic forces had been too easy, too seemingly overwhelming; the establishment of the constitutional principle in the main centres of autocracy seemed to make common action against the powers of reaction of secondary importance, and free play was allowed to the racial and national antagonisms that had been present from the first. The battle of German, as well as of Italian, liberty was being fought out on the plains of Lombardy; yet the German demo- crats, whether in Vienna or Frankfort, hailed the victories of the veteran Radetzky as triumphs of Germanism. In Bohemia the

revolution was wrecked on the rivalry of German and Czech; and when the Hungarians drew the sword against Austria, the imperial government was reinforced by the hatred of the southern Slavs for their Magyar task-masters.

Thus, from the chaos of warring races, the old order began slowly to reappear. So early as the 15th of June 1848 Prince victory of

Windischgratz had restored order in Prague and re- the con- ceived the thanks of the Frankfort parliament; on servatlve the 25th of July Radetzky's victory at Custozza set forces. £ ree £jj e ; m p er iai; s t army in Italy; on the 4th of September Jellachich, ban of Croatia, invaded Hungary in the name of the united empire; on the 1st of November Windisch- gratz entered democratic Vienna. The alliance of the army and the Slav races had won the victory over German democracy. The combating of Hungarian nationalism proved a longer and a harder task; but the Austrian victory of Kapolna (February 26-27, 1849) encouraged Schwarzenberg to dissolve the rump of the Reichsrath at Kremsier and proclaim a new constitution for the whole empire, including Hungary. The Magyar victories that followed issued in the proclamation, on the 14th of April, of the independence of Hungary. But though the Austrian arms had not been strong enough to crush the Hungarian revolt, they had proved at least the vitality of the conservative principle. The emperor Nicholas I. of Russia had watched in disgusted silence the weak spirit of concession with which the revolutions had been everywhere met ; so long as the sovereigns seemed to forget their divine mission he had held rigorously aloof, and had only broken silence to congratulate Windischgratz on his capture of Vienna and Schwarzenberg on his reassertion of vigorous principles. Now, however, that Divine Right was in arms against the forces of disorder, he was prepared to listen to the prayer of the emperor Francis Joseph for assistance against the Hungarian rebels. The engagements of 1833 were remembered; and in the brotherly spirit of the Holy Alliance, Hungary was subdued by Russian armies and handed over, without quid pro quo, to her legitimate king.

Gorgei's capitulation of Vilagos (August 14, 1849) cleared the ground for the complete restoration of the system destroyed by the March revolutions of the year before. The refusal Prussia f Frederick William IV. of Prussia to accept the Austria. imperial crown (April 21, 1849) had already advertised Conven- the failure of the constitutional and unionist movement tion of j n Germany; and Prussia, her military prestige re- 18S0. ' stored, stood once more face to face with Austria in rivalry for the hegemony of Germany. In the diplomatic contest that followed Prussia was worsted, her claims to an independent supremacy in the north were defeated, and the con- vention of Olmiitz (November 29, 1850) restored the status quo of the Confederation as established in 181 5.

Within three years of the great upheaval of 1848 the forces of revolution seemed everywhere to have been subdued, the states system of Europe to have been re-established on the Napoleon basis

of the treaties of Vienna. In reality, however, Europe. tn i s restoration was only on the surface ; the cracks in the structure of the European sygtem had — to use Bismarck's phrase applied to another occasion — only been "papered over"; and soon ominous rents revealed the fact that the forces that had threatened it with sudden ruin were still at work. One fateful breach in the treaties had, indeed, been accepted as beyond repair; when the dust of the revolutionary turmoil was at length laid a Bonaparte was once more firmly seated on the throne of France. The emperor Nicholas, watching from the calm of Russia, had realized all that the recognition of this fact would involve; he had proposed to set in motion the somewhat rusty machinery of the Grand Alliance, but the other autocratic powers were in no case to support a legitimist crusade, and when Napoleon in 1852 assumed the title of emperor, all Europe recognized his right to do so, even Nicholas being fain to content himself with refusing to treat the parvenu monarch as his " brother," and to admit his style of " third " Napoleon, which seemed to imply a dynastic claim. Napoleon, indeed, was accepted by the powers, as he was wel-

comed by the French people, as the " saviour of society " from the newly revealed perils of the social revolution. For new and ominous forces had made their appearance since the revolu- tion of 1830 had established the middle classes in power. The industrial development had proceeded in the west of Europe with astonishing rapidity, with its resulting concentra- tion of vast populations in factories and factory cities ; socialism. and this " proletariat," excluded from any voice in the government, and exposed in accordance with the prevailing economic theories of doctrinaire Liberalism to the horrors of unrestricted competition, had begun to organize itself in a movement, of which the catchword was " the right to work " and the banner the red flag of the socialist commune. The reign of Charles X. had been the reductio ad absurdum of the principle of legitimacy; that of Louis Philippe had discredited for ever government based solely on the bourgeoisie; the social- istic experiments of 1848 in Paris had collapsed amid the anarchy and bloodshed of the June days. At this opportune moment Louis Napoleon Bonaparte proclaimed to the French people the " Napoleonic Idea " as conceived by " Tbe himself. The great Napoleon had been the incarnation /jˆ.f °" " of the Revolution, had " sprung armed from the Revolution, like Minerva from the head of Jupiter " ; he had rifled because to him the people, by whom the Revolution had been made, had delegated the duty of representing, protecting and guiding it. Of this idea Louis Napoleon conceived himself to be the heir; and when by a double

plebiscite the French nation had established him in supreme power, first as president for life (1851), then as emperor (1852), he was able to claim that he represented the people in a far more immediate sense than could be asserted of the chance majority of any representative assembly.

It was clear that, sooner or later, Napoleon III. would prove a disturbing force in Europe. His title to rule was that he repre- sented France; it followed therefore that he must be ˆ fc hostile to " the treaties," by which the traditional revolu- aspirations of France, e.g. for her " natural boundaries " Hon in of Rhine, Alps and Pyrenees, were restrained. He Burooe – reigned as "emperor of the French"; it followed that he represented that principle of nationality which the treaties ignored. He could not afford — as Metternich had said of Ferdinand of Naples — " to treat his throne as an arm-chair "; and any activity he might display would be almost certainly at the expense of the established order. At the outset, indeed, it was his policy to pose as its custodian. To conciliate the French clericals he supported the pope against the Italian Liberals; but otherwise he proclaimed aloud his devotion to the arts of peace. A period of rapid material expansion succeeded the unrest of the revolutionary years; engineers and men of science were quickly producing a change in all the material conditions of life, greater than could have been effected by any political revolution; especially the face of Europe was gradually being covered with a network of railways, which it was hoped would draw the Euro- pean nations not only materially but morally closer together. The first universal exhibition, opened under the auspices of the prince consort at London in 1851, was intended to advertise and consecrate the dawn of a new era of international peace and goodwill. The Crystal Palace at Sydenham, once hailed as the " bright Koh-i-nur of the West," remains the dismal monument of a hope so soon to be belied by the hard logic of events. For no period since 181 5 has been so occupied with wars and the rumours of war as the twenty years that followed the opening of this great temple of peace.

One question, that of the ultimate destination of the duchies of Schleswig and Holstein, which threatened the tranquillity of the West, was temporarily settled by the conference of London in 1852 (see Schleswig-Holstein Question). The But about the same time anxious watchers noticed on the political horizon in the East a cloud, no bigger than a man's hand, that threatened a serious storm. At first this was no more than a quarrel between Greek and Latin monks about the custody of certain holy places and things in Palestine.

Crimean War.

94-0

EUROPE

[HISTORY

It soon, however, became clear that behind these insignificant combatants loomed the figures of the emperors of Russia and France. The motives that induced Napoleon to take up the cause of the rights of the Latin church in this matter were partly political, partly personal. He resented the tsar's attitude towards himself; he wished to gain the firm support of the clergy for his throne; he desired to win prestige for himself and his dynasty by reasserting the traditional influence of France in the Ottoman empire. The events that led up to the Crimean War, and those of the war itself, are told elsewhere (see Crimean War). Great Britain had been drawn into the war by her traditional policy of preserving the Ottoman empire as a barrier against the advance of Russia to the Mediterranean and the consequent danger to the British empire in India. It is now generally conceded that, so far as these objects were concerned, the war was a tragic mistake. The hopes that were built on the capacity of Turkey to reform itself were disappointed; the re- strictions imposed upon Russia were repudiated at the first opportunity, during the Franco-German War in 1870; and the results of the Russo-Turkish War of 1876 have shown that a far more effective barrier against Russia than the weakened Ottoman

empire has been furnished by the young and vigorous ofl/Srls national states of the Balkan Peninsula. None the t856. less, the treaty of Paris (1856), by which the war was

closed, marks an important • epoch in the diplomatic history of Europe; and it is impossible to say that the blood spilled in the Crimea was wholly wasted. At the time the main success of the allied powers seemed to be in the thrusting back of Russia from the Danube by the cession of Bessarabia, the extinction of Russian sea-power in the Black Sea, the formal repudiation of the tsar's claim to a special right of interference in Turkey. But the true significance of the work of the congress of Paris lies in the impetus given by it to the development of an effective international law. The concert of Europe was conse- crated anew by the solemn admission of the Ottoman empire to an equality of status with the European powers and the declara- tion of the collective obligations of Europe towards it. The

congress, moreover, acted in some sort as the legislative body of Europe; it established the principle of the free navigation of the Danube and of the right of all nations to carry their commerce into the Black Sea; by a declaration, signed by all the powers present, it abolished the practice of granting letters of marque to privateers in war time. The question was even dis- cussed of establishing some sanction by which the rules of international law agreed upon should be enforced upon recal- citrant states; and, though nothing was settled, a vwu to this effect was entered upon the protocol. The congress of Paris thus set a precedent more hopeful than those of the congresses held earlier in the century, because the issues were not confused by the supposed necessity for upholding "legitimacy" at all costs; it was a stage in the progress from the ideals of the Grand Alliance to those of the Hague Conference.

The conclusion of the Crimean War left the emperor Napoleon the most influential personage in Europe; and Paris, the seat

of the congress,- became also the centre of the diplo- Prepog- mafic world. Russia had been bled almost to death France. °y tne war > Austria was discredited and isolated

owing to the dubious part she had played in it; Prussia • had not recovered from the humiliation of Olmutz; ■■ Great Britain was soon plunged into the critical struggle of the Indian Mutiny. The time was obviously opportune for the realization of some of the aspirations implied in the Napoleonic idea. The opportunity came from the side of Italy. By sending Napoleon Sardinian troops to fight in a quarrel not their own, and Italy, alongside the Allies in the Crimea, Cavour had pur- War of chased for Piedmont the right to be heard in the

councils of the powers— a right of which he had made use at the Paris congress to denounce before all Europe the Austrian misrule in Italy. The Italian unionists were at one with Napoleon in desiring to overset " the treaties "; and the Franco^ Italian alliance which, in 1859, drove the Austrians out of Lombardy and established the nucleus of the Italian kingdom

was the beginning of a process which, within twelve years, was to change the balance of Europe. It was ominous of the future that it was largely thei menace of Prussian intervention that persuaded Napoleon to conclude the armistice of Villafranca (July 11, 1850), which, contrary to his agreement with Victor Emmanuel, left Venice to the Austrians. In spite of the peace of Zurich (November 10) ,

indeed, the union of Italy continued during the succeeding years, and Savoy and Nice were the reward of the French emperor's connivance (see Italy). France thus once more gained her " natural . frontier " of the Alps; the question was whether she would be able to regain her other natural frontier on the Rhine. The times were not unpropitious for an enterprise which was undoubtedly one of the main objects of Napoleon's policy. The European concert had ceased to ■ exist as an effective force; the treaties had been vio lated with impunity; in Germany,, where the tension a ^° eon between the two great powers had not been eased by Germany. Prussia's dubious attitude during the war, there was little prospect of a united opposition to French aggression, and the conditions seemed highly favourable for reviving the tradi- tional policy of exploiting German disunion for the aggrandize- ment of France: -Prussia was arming, but her armaments were directed not against Napoleon but against Austria; and the beginning of the reign of William I., who had become regent in 1858 and king in 1861, pointed to the development of a situation in which the French emperbr would once again become ; the arbiter of Germany. On the 29th of March 1862 Prussia signed a commercial treaty with France on a basis that involved the exclusion of Austria from the Zollverein, and replied to the protests of the court of Vienna by recognizing the new kingdom of Italy. In September of the same year King William placed the supreme direction of Prussian policy in the hands of Otto von Bismarck, whose views on the exclusion of Austria from Germany were known to all the world. \ .

The outcome of the Polish insurrection of 1863, however, again altered the aspect of things, and in a direction unfavourable to France (see Poland: H istory). Napoleon had been forced by French public opinion to come forward as jvapafeoij'j the protector of the Poles; but the spectacle of a influence. Bonaparte: posing as the champion of " the treaties " was not impressive; his brave words were not translated into action; and he only succeeded in offending Russia by his protests and alienating Great Britain by his tergiversations. The proffered intervention of Austria, France and Great Britain tvas rejected in a note of Prince Gorchakov to Baron Brunnow, the Russian ambassador in London (July 1, 1863); no action followed; and the last effort to put forward the- treaties of Vienna as the common law of Europe ended in a fiasco. British ministers, who had been made to look somewhat ridiculous, henceforth began to be chary of active intervention in continental affairs; Austria and France were alike discredited and isolated. Prussia which, under Bismarck's auspices, had aided Russia in suppress- ing the Poles (convention of February 8, 1863) alone

emerged from the crisis with increased prestige. Bismarck, indeed, was too wary to accept the tsar's suggestion of an offensive alliance and an immediate combined attack on Austria and France; but in the coming struggle for the hegemony of Germany he was assured at least of Russia's neutrality.

The final act in this long rivalry began with the opening up of the Schleswig-Holstein question on the death of Frederick VII. of Denmark and the accession of the " protocol- king " Christian IX; (November 15, 1863). The Russia German claim to the Elbe duchies, the Danish claim to and at least Schleswig as: an integral part of the northern Austria. kingdom, were but subordinate issues of questions far HoisteTnˆ more fateful, the developments of which once more question. illustrated the hopeless enfeeblement of the idea of the Europeanconcert. In the struggle for thepossession of the duchies the general sentiment of Germany was on one side, that of Europe on the other. By the protocol of 1852 the duchies had been treated as an integral part of Denmark, and France and Great Britain, as signatory powers, alike protested against the action

of Austria and Prussia in asserting the German claim by force of arms. But, as in the case of Poland, protests were not followed by action; Napoleon in the end contented himself with proposing his favourite " Napoleonic idea " of a plebiscite, to discover the wishes of the populations concerned; Palmerston, who realized some of the important issues involved, allowed his warlike attitude, under exalted influences, to evaporate in words. Thus Great Britain earned the lasting resentment of Germans, without succeeding in preventing the establishment of German sea-power in the Baltic. For the Prussian war-harbour of Kiel and the Kiel canal were in Bismarck's mind from the outset. Throughout Austro- he intended to make the duchies a part of Prussia and Prussian to use the whole question as a means for the solution %66° f of that of Germany. The Austro-Prussian War of Prussia 1866 grew inevitably out of the Dano-German War of supreme 1864; and the treaty of Prague (Aug. 23, 1866), which J? excluded Austria from Germany and established the

rwa "y- North German Confederation under the headship of Prussia, not only absorbed into Prussia the North German states which had

sided with Austria, but by the annexation to her of Schleswig and Holstein laid the foundations of German power in the North Sea, and of German rivalry with England in the future.

More immediate were the effects of the campaign of Konig- gratz on France. The rapid and overwhelming victory of Prussia overthrew all the calculations of Napoleon, who had ˆapoeoa | 00 ˆ e(ˆ to intervening as arbiter between exhausted Prussia. combatants. The sudden menace of the new German power alarmed him, and he sought to secure the Rhine, frontier for France, by negotiations with Prussia, in the form of "compensations " at the expense of the South German states. He succeeded only in placing a fresh weapon in Bismarck's hands. The communication of the French overtures to the South German courts was enough to throw them into the arms of Prussia; and treaties of offensive and defensive alliance were signed in August 1866 between Prussia and Wiirttemberg (3rd), Baden (17th), and Bavaria (22nd), by which the king of Prussia was to receive the supreme command of the allied armies in time of war. In vain Napoleon tried to retrieve his damaged prestige by securing compensation elsewhere. His proposal that the grand-duchy of Luxemburg, which had not been included in the new German Confederation, should fall to France by agreement with Prussia was no more successful than his other demands for "compensation." Luxemburg was declared a neutral state by the convention of London in 1867 (see Luxemburg), and the French proposal, published by Bismarck in The Times at the outset of the war of 1870, only damaged the French emperor's cause in the eyes of Europe.

Meanwhile public feeling in France had become seriously excited by this sudden menace of a hostile power on; her eastern frontier, and this excitement was raised to fever heat when it became known that the vacant throne of Spain had been offered to and accepted by a prince of the house of Hohenzollern. Napoleon's policy had become hopelessly discredited by the suc- cessive fiascos in Poland, Mexico and Germany, and even the establishment of a liberal constitution in 1869 could not avail to restore confidence in him. He knew the risk he ran in challenging a conflict with a power whose military efficiency had been so strikingly displayed; but by refusing to do so, in the excited state of public feeling, he would have risked his throne. He reckoned on the traditional jealously of the South German states for Prussia and their traditional friendship with France; he was assured, too, of the support of Austria, in the event of a victorious openingof the campaign. On the other hand Bismarck was bent on war, which, in accordance with his policy of " blood and iron," he believed to.be the sole effective means of binding the heterogeneous

elements of Germany into a coherent whole. The device of the " Ems telegrams" (see Bismarck) was sufficient to end the hesitations of Napoleon by giving an irresist- ible volume to the cry of the war party in France; and on the 19th of July the French emperor's declaration of war was handed in at Berlin.

*The story of the struggle that followed is told elsewhere (see- Franco^German War). The hopes that Napoleon had based on the action of the South German courts was belied; „ and the first crushing German victories (Weissenburg, . Franco- August 4, and Worth, August 6) not only removed all German chance of Austrian coroperation but broughtdown with Wa *> a crash the imposing facade of the Second Empire. On t8TI ~ the 2nd of September Napoleon surrendered, with his . , •■ army, at Sedan; and two days later the Empire was overthrown arid a provisional republican government set up at Paris. • On the 1 9th Paris itself was invested and, after a heroic defence, Capitu lated on the 28th of January 1871. On the 18th of January, at the palace of Versailles, William I., king of Prussia, was pro- claimed German emperor. On the' 26th of February were signed the preliminaries. of peace, by which France Q e tman agreed to cede to the German empire Alsace (except Empire. Belfort and its territory) and Germail Lorraine, with Metz and Thionville (Diedenhofen), and to pay a war indemnity of five milliards of francs (£200,000,000) in three years, to be secured by the occupation of , French territory. The definitive treaty was signed at Frankfort-on-Main on the 10th of May 1871.*

The most important outcome of the events which culminated in the Franco-German War and its result was the establishment of a powerful German empire, which was destined to dominate the continent for years to come, and the expansive ambitions of which remain pregnant with menace for the future. So great an overturn,' however, involved other changes in the territorial system, which may be briefly summarized. The most notable of these was the reconstruction of the Austrian monarchy as; a result of the, war of 1866. By the treaty of Vienna (October 3, 1866) between Austria and Italy, Austria recognized the Italian kingdom and ceded to it the city and territory of Venice, thus surrendering the traditional claim of the Habsburgs to domina- tion in Italy. This was followed in 1867 by the establishment of the Dual Monarchy in the Habsburg dominions under r> ua i the auspices of Bismarck's rival, Count Beust,'— Francis system In Joseph being crowned king of Hungary,, and a separate ^" strlam constitution being established for Hungary and the u " zaT y- Cis-Leithan dominions of the ^Austrian emperor (see Austria: History). In Italy, meanwhile, the unification of the

kingdom had continued after the conclusion of the war of 1859 by the treaty of Zurich. In i860 Tuscany, Parma and Modena were ‘ united to the monarchy of Victor Emmanuel, at the cost of the cession of Nice and Savoy to Napoleon. In May of the same year Garibaldi and. his ” Thousand ” landed in Sicily, which he reduced by the end of June; in August he crossed to the main- land, and the capitulation of Francis II. of the Two Sicilies at Gaeta on the 13th of February 1861 ended the Bourbon kingdom in southern Italy. On the 17th of March Victor Emmanuel II. was proclaimed king of United Italy, itaiy” This title, as mentioned above, was recognized by Austria in 1866, when Italy was increased by the cession of, Venice. Finally, Rome, which had been preserved to the papacy by Napoleon’s troops, was on their withdrawal occupied by the Italians on the 20th of September 1870. Thus the temporal power of the popes came to an end; and the unification of Italy was completed (see Italy: History).

Another significant outcome of the collapse of France was the denunciation by Russia of the ” Black Sea ” clauses of the treaty of Paris of 1856, an action rendered possible by the entente between the governments of Berlin and St Petersburg. In the note addressed to the signatory powers announcing that Russia no longer felt herself bound by- the clauses of the treaty limiting her sovereign rights in the Black Sea, Prince Gorchakov wrote: ” It would be difficult to affirm that the written law founded on the respect for treaties, as the basis of public right and rule, of the relations of states, has preserved the same moral sanction as in former times.” The action of Russia was, in fact, a practical illustration of Bismarck’s dicta that ” rebus . sic stantibus is involved in all treaties that require performance ” (Mem., ii. 280), and.that ” ultro posse nemo obligatur holds good in spite of all treaty obligations whatsoever, nor can any treaty guarantee

the discharge of obligations when the private interest of those who lie under them no longer reinforces the text ” (ib. ii. 270). Great Britain did her best to counteract a doctrine so subversive of international confidence. For a moment at least a diplomatic breach with Russia

seemed inevitable. At Bismarck's suggestion, however, a conference was held at London to arrange the affair. There was, in the circumstances, no chance of forcing Russia to recede from her position; but in order "to reconcile facts with principles " the conference on the 17th of January 1871 agreed on a formula announcing that " contracting powers can only rid themselves of their treaty engagements by an understanding with their co-signatories." Thus the principle of the European concert was saved. But, for the time at least, it seemed that the triumph of Bismarck's diplomacy had re-established . . . the simple plan That they should take who have the power And they should keep who can.

Beust was not far wrong when he exclaimed, " Je ne vois plus del'Europe!" (W. A. P.)

By the Franco-German War of 1870-71 and the creation of the German empire the political condition of Europe was profoundly changed. Germany became for a time the leading power on the continent of Europe, and German statesmanship had to devise means for preventing, until the new edifice was thoroughly consolidated, the formation of a hostile coalition of jealous rivals. The first thing to be done in this direction was to secure the support of Russia and Austria to the new order of things.

With regard to Russia there was little cause for apprehension. She had aided Bismarck to carry out his audacious schemes in Bus Ian ˆe P ast > an< ˆ there was no reason to suppose that she poiky would change her policy in the immediate future. The towards rapprochement dated from the Polish insurrection of Germany. jg6 3j when the governments of France and England, yielding to popular excitement, made strong diplomatic repre- sentations to Russia in favour of the Poles, whereas Bismarck not only refused to join in the diplomatic campaign, but made a convention with the cabinet of St Petersburg by which the Russian and German military authorities on the frontiers should aid each other in suppressing the disturbances. From that time the friendship ripened steadily. The relations between the two powers were not, it is true, always without a cloud. More than once the bold designs of Bismarck caused uneasiness and dis-satisfaction in St Petersburg, especially during the Schleswig-Holstein complications of 1864 and the Austro-Prussian conflict of 1866; but the wily statesman of Berlin, partly by argument and partly by dexterously manipulating the mutual trust and affection between the two sovereigns, always succeeded in having his own way without producing a rupture, so that during the Franco- German War of 1870-71 Russia maintained an extremely benevolent neutrality,

and prevented Austria and Italy from taking part in the struggle. So benevolent was the neutrality that the emperor William at the end of the campaign felt con- strained to write to the tsar that he owed to His Majesty the happy issue of the campaign and would never forget the fact. Having thus helped to create the German empire, Alexander II. was not likely to take an active part in destroying it, and Bismarck could look forward confidently to a long continuance of the cordial relations between the two courts.

The second part of the German chancellor's programme, the permanent conciliation of Austria, was not so easily carried out. Austrian Austria na d been the great sufferer, more perhaps even relations than France, from Bismarck's aggressive policy. For with generations she had resisted strenuously and success-

Oermany. £ u jj y tne en – orts f tne Hohenzollerns to play the leading part in Germany, and she had always considered her own influence in Germany as essential to the maintenance of her position as a first-class power. By the disastrous campaign of 1866 and the consequent treaty of Prague, Austria had been formally excluded from all direct influence in German affairs. With these events still fresh in his recollection, the emperor Francis Joseph could hardly be expected to support the new empire created by his

rival at Austria's expense, and it was known that on the eve of the Franco-German War he had been negotiating with the French government for a combined attack on Prussia. To an ordinary statesman the task of permanently conciliating such a power might well have seemed hopeless, but Bismarck did not shrink from it, and even before the signature of the treaty of Prague he had prepared the way for attaining his object. " With regard to Austria," he himself explained on one occasion, " I had two courses open to me after her defeat, either to destroy her entirely or to respect her integrity and prepare for our future reconciliation when the fire of revenge had died out. I chose the latter course, because the former would have been the greatest possible act of folly. Supposing that Austria had dis- appeared, consider the consequences." He then described very graphically those probable consequences, and drew the con- clusion: " for the sake of our own life Austria must live. I had no hesitation, therefore, and ever since 1866 my constant effort has been to stitch up the great torn texture and to re-establish amicable relations with our ancient associate of the Confedera- tion." For this purpose he tried to soothe Austrian suscepti- bilities, and suggested confidentially that compensation for the losses of territory, influence and prestige in Italy and Germany might be found in south-eastern

Europe, especially by the acquisition of Bosnia arid Herzegovina; but so long as his rival Count Beust was minister for foreign affairs in Vienna, and Austria had the prospect of being able to recover her lost position by the assistance of Russia and France, these efforts had no success. It was only when Prince Gorchakov had declined Count Beust's advances, which took the form of suggesting the abolition of the Black Sea clauses of the treaty of Paris, and when France had been paralysed for some years by her war with Germany, that a rapprochement between the cabinets of Vienna and Berlin became possible. Bismarck lost no time in making advances. From the German headquarters at Versailles he sent a despatch to Vienna suggesting the establishing of more cordial relations between the two countries, and Count Beust replied in an equally amicable tone. The emperor Francis Joseph, finding himself isolated, had evidently accepted the inevitable with his customary resignation, and abandoned his dreams of again playing the leading part in Germany. As a further proof of the change in his disposition and aims he replaced Count Beust by Count Andrassy, who was a personal friend/of Bismarck, and who wished, as a Hungarian, to see Austria liberated from her German entanglement, and he consented to pay a visit to Berlin for the purpose of drawing still closer the relations between the two governments.

Bismarck was delighted at this turn of affairs, but he advanced with his usual caution. He gave it to be clearly understood that improvement in his relations with Vienna must not disturb the long-established friendship with St Peters- The Drel- burg. The tsar, on hearing privately of the intended bun"' meeting, gave a hint to Prince Reuss, the German ambassador, that he expected an invitation, and was invited accordingly. The meeting of the three sovereigns took place at Berlin at the end of August 1872. The three ministers, Prince Bismarck, Prince Gorchakov and Count Andrassy, held daily conferences, on the basis that the chief aim in view should be the maintenance of peace in Europe, and that in all important international affairs the three powers should consult with each other and act in concert. As a result of three days' consultation the Three Emperor's League was founded, without any formal treaty being signed. In this way the danger of a powerful coalition being formed against the young German empire was averted, for in the event of a conflict with France, Germany could count on at least the benevolent neutrality of Russia and Austria, and from the other powers she had nothing to fear. What ulterior designs Bismarck may have had in forming the league, or " Alliance " as it is often called, must be to some extent a matter of conjecture, but we shall probably not be far

wrong in adopting the view of a competent Russian authority, who defines the policy of the German chancellor thus: " To make Austria accept definitively her deposition as a Germanic power, to put

her in perpetual conflict with Russia in the Balkan Peninsula, and to found on that irreconcilable rivalry the hegemony of Germany."

For more than two years there was an outward appearance of extreme cordiality between the three powers. They acted together diplomatically, and on all suitable occasions the three allied monarchs exchanged visits and sent each other con- gratulations and good wishes. There was, however, from the beginning very little genuine confidence between them. Before the breaking up of the conferences at Berlin, Alexander II. and his chancellor had conversations with the French ambassador, in which they not only showed that they had suspicions of future aggressive designs on the part of Germany, but also gave an assurance that so long as France fulfilled her engagements to Germany she had nothing to fear. A few months later, when the emperor William paid his return visit to the tsar in St Petersburg, a defensive convention was concluded by the two monarchs behind the back of their Austrian ally. Without knowing any- thing about the existence of this convention, the Austrian ally did not feel comfortable in his new position. In Vienna the old anti-Prussian feeling was still strong. The so-called party of the archdukes and the military resisted the policy of Andrassy, and sought to establish closer relations with Russia, so that German support might be unnecessary, but as Bismarck has himself testified, " Russia did not yet respond. The wound caused by the conduct of Austria during the Crimean War was not yet healed. Andrassy made himself very popular in the court society of St Petersburg during his visit there with his imperial master, but the traditional suspicion of Austrian policy remained." Altogether, the new league was not a happy family. So long as all the members of it were content to accept the status quo, the latent germs of dissension remained hidden from the outside world, but as soon as the temporary state of political quietude was replaced by a certain amount of activity and initia- tive, they forced their way to the surface. No one of the three powers regarded the status quo as a satisfactory permanent arrangement. In Berlin much anxiety was caused by the rapid financial and military

recovery of France, and voices were heard suggesting that a new campaign and a bigger war indemnity might be necessary before the recuperation was complete. In St Petersburg there was a determination to take advantage of any good opportunity for recovering the portion of Bessarabia ceded by the treaty of Paris, and thereby removing the last tangible results of the Crimean War. In Vienna there was a desire to obtain in the Balkan Peninsula, in accordance with the suggestion of Bismarck, compensation for the losses in Italy and Germany. Thus each of the members of the league was hatching secretly a little aggressive scheme for its own benefit, and the danger for the rest of Europe lay in the possibility of their reconciling their schemes so far as to admit of an agreement for action in common. Fortunately for the onlookers there were important conflicting interests, and the task of reconciling them was extremely difficult, as the subsequent course of events proved.

The first of the three powers to move was Germany. In February 1875 M. de Radowitz was despatched to St Petersburg The on a secret mission in order to discover whether, in

storm- the event of hostilities between Germany and France, cloud of Russia would undertake to maintain a neutral attitude as she had done in 1870-1871; in that case Germany might be relied on to co-operate with her in her great designs in the East. Prince Gorchakov did not take the bait with the alacrity that was expected. Having overcome in some measure his hatred of Austria, which had distorted for so many years his political vision, he had come to understand that it was not for the interests of his own country to have as neighbour a powerful united Germany instead of a weak confederation of small states, and he now perceived that it would be a grave error of policy to allow Germany to destroy still more to her own advantage the balance of power in Europe by permanently weakening France. No doubt he desired to recover the lost portion of Bessarabia and to raise Russian prestige in the East, but he did not wish to run the

risk of exciting a great European war, and he believed that what he desired might be effected without war by the diplomatic skill which had warded off European intervention during the Polish troubles of 1863, and had recovered for Russia her freedom of action in the Black Sea during the Franco-Prussian War of 1870-71. In reply, therefore, to M. de Radowitz's inquiries and suggestions, he declared that the Russian court fostered no ambitious designs in the East or in the West, and desired only peace and the maintenance of the status quo, with possibly an amelioration in the miserable condition of the

Christian subjects of the sultan. This rebuff did not suffice to dispel the gathering storm. The warlike agitation in the German inspired press continued, and the French government became thoroughly alarmed. General Lefl6, the French ambassador in St Peters- burg, was instructed to sound the Russian government on the subject. Prince Gorchakov willingly assured him that Rassia would do all in her power to incline the Berlin cabinet to modera- tion and peace, and that the emperor would take advantage of his forthcoming visit to Berlin to influence the emperor William in this sense. A few days later General Leflo received similar assurances from the emperor himself, and about the same time the British government volunteered to work likewise in the cause of peace. Representations were accordingly made by both governments during the tsar's visit to Berlin, and both the emperor William and his chancellor declared that there was no intention of attacking France. The danger of war, Russia which the well-informed German press believed to be and " in sight," was thus averted, but the incident sowed ˆ r f˜"ˆ y the seeds of future troubles, by awakening in Bismarck a bitter personal resentment against his Russian colleague. By certain incautious remarks to those around him, and still more by a circular to the representatives of Russia abroad, dated Berlin and beginning with the words maintenant la paix est assurSe, Gorchakov seemed to take to himself the credit of having checkmated Bismarck and saved Europe from a great war. Bismarck resented bitterly this conduct on the part of his old friend, and told him frankly that he would have reason to regret it. In the Russian official world it is generally believed that he took his revenge in the Russo-Turkish War and the congress of Berlin. However this may be, he has himself explained that "the first cause of coldness " was the above incident, " when Gorchakov, aided by Decazes, wanted to play at my expense the part of a saviour of France, to represent me as the enemy of European peace, and to procure for himself a triumphant quos ego to arrest by a word and shatter my dark designs!" In any case the incident marks the beginning of a new phase in the relations of the three powers; henceforth Bismarck can no longer count on the unqualified support of Russia, and in controlling the Russo-Austrian rivalry in south-eastern Europe, while professing to be impartial, he will lean to the side of Count Andrassy rather than to that of Prince Gorcha- kov. He is careful, however, not to carry this tendency so far as to produce a rapprochement between Russia and France. The danger of a Franco-Russian alliance hostile to Germany is already appearing on the political horizon, but it is only a little cloud no bigger than a man's hand.

The next move in the aggressive game was made by Austria, with the connivance of Russia. During the summer of 1875 an insurrection of the Christian Slavs in Herzegovina, which received support from the neighbouring principalities of Monte- negro and Servia, was fostered by the Austrian authorities and encouraged by the Russian consuls on the Adriatic coast. A European concert was formed for the purpose of settling the disturbance by means of local administrative reforms, but the efforts of the powers failed, because the insurgents hoped to obtain complete liberation from Turkish rule; and in the beginning of July, with a view to promoting this solution, Servia and Montenegro declared war against the Porte. There- upon Russia began to show her hand more openly. The govern- ment allowed volunteers to be recruited in Moscow and St Petersburg, and the Russian general Chernayev, who had distinguished himself in Central Asia, was appointed to the

Command of the Servian army. When the ball' had thusbeeh set rolling the two powers chiefly concerned considered that the Austro- t ˆ me ˆ a< ˆ come for embodying the result of their ih- Russlan formal confidential pourparlers in a secret agreement, agree- whichisknownastheconventionofReichstadt, because llVi 1 ' it- was signed at a meeting of. the two emperors in the little Bohemian town of that name. It bore the date of the 8th of July 1876— exactly a week after Servia a.nd Montenegro had declared war — and it contained the following stipulations:: (1) That so long as the struggle which had just begun remained undecided, the two sovereigns should refrain from interference, and that in the event of the principalities being defeated, any modification of the territorial or political status quo ante to their detriment should be prevented; (2) that in the event of the principalities proving victorious, and territorial changes taking place, Austria should claim : compensation ; in Bosnia and Herzegovina, and Russia should demand the resti- tution of the portion of Bessarabia which she. had lost by the Crimean War; (3) that in the event of the collapse of the Ottoman empire, the two powers should act together to create autonomous principalities in European Turkey, to unite Thessaly and Crete to Greece, and to proclaim Constantinople a free town. The contracting parties evidently expected that the two priori' palities would be victorious in their struggle with the Porte, and that the compensations mentioned*

would be secured without a great European war. Their expectations were disappointed. Montenegro made a brave stand against superior forces, but before five months had passed Servia was at the mercy of the Turkish army, and Russia had to come to the assistance of her proteg£. A Russian ultimatum stopped the advance of the Turks on Belgrade, arid an armistice, subsequently transformed into a peace, was signed.

Russia and Austria had now to choose between abandoning their schemes and adopting some other course of action, and un- foreseen incidents contributed towards making them Question, select the latter alternative. In June 1876 an attempt at insurrection in Bulgaria had been repressed with savage brutality by the Turks, and the details, as they became known some weeks later, produced much indignation all over Europe. In England the excitement, fanned by the eloquence of Gladstone, became intense, and compelled the Disraeli cabinet to take part, very reluctantly, in a diplomatic campaign, with the object of imposing radical reforms on Turkey. In Russia the excitement and indignation were equally great, and the tsar gradually formed the resolution that if the powers would not act collectively and energetically, so as to compel the Porte to yield, he would undertake the work single-handed. This resolution he announced publicly in a speech delivered at Moscow on the 10th of November 1876. The powers did not like the idea of separate Russian action, and in order to prevent it they agreed to hold a conference in Constantinople for the purpose of inducing the Porte to introduce the requisite reforms. The Portewas at that moment under the influence of popular patriotic excitement which made it indisposed to accept orders, or even well-meant advice, from governments more or less hostile to it, and the inconsiderate mode of procedure suggested by General Ignatiev, and adopted by the other delegates, made' it still more un-conciliatory. At the first plenary sitting of the conference the proceedings were disturbed by the sound of artillery, and the Turkish representative explained that the salvo was in honour of the new Ottoman constitution, which was being promulgated by the sultan. The inference suggested was that a> Turkey had spontaneously entered on the path of liberal and constitutional reform for all Ottoman subjects, it became superfluous and absurd to talk of small reforms for' particular provinces, such as the conference was about to propose. The deliberations continued, but finally the Porte refused to accept what the plenipotentiaries considered an irreducible minimum, and the conference broke up without obtaining any practical result. The tsar's Moscow declaration about employing singles handed the requisite coercive measures now came to be

fulfilled. In order to make a successful aggressive move oh Turkey,

Russia had first of' all to secure her tear and flank by an arrangement with her two alhes. Iii Berlin she encountered no diffi- culties. Bismarck had no objection to seeing Russia weaken herself in a struggle with Turkey, provided she did not upset the balance of power in south-eastern Eiirope, and he felt confident that he could prevent by diplomatic means any such catastrophe;

\ He was inclined, therefore, to encourage rather than restrain the bellicose tendencies of St Petersburg. In Vienna the; task of coming to a definite arrangement was much more difficult, and it was only after protracted and laborious negotiations that? a convention was concluded on the 15th of January 1877, and formally signed three months later. It was a development of the agreement of Reichstadt, modified according to the changes in

i the situation, but retaining the essential principle that in the event of the territorial status quo being altered, Russia should recover the lost portion of Bessarabia, and Austria should get

\ Bosnia and a part of Herzegovina. Having made these pre- liminary arrangements, Russia began the campaign simultane- ously in Europe and 'Asia Minor, and after many reverses and enormous: sacrifices of blood and treasure, she succeeded in imposing on the Turks the " preliminary peace " of San Stefano (3rd March 1878). ; That peace was negotiated with very little consideration for the interests of the other powers, and as soon as the terms- »f it became known in Vienna and London; there was an outburst of indignation. In negotiating the treaty General Ignatiev had ignored the wishes of stefano. Austria,- and had even, according to the contention of Andrassy, infringed the convention signed at the beginning of the war. 1 However this may be, the peace of San Stefano brought to the surface the latent conflict of interests between the two empires. Russia's aim was to create a big Bulgaria under the influence of St. Petersburg, and to emancipate Servia and Montenegro as far as possible from Austrian influence, whereas. Austria objected to the creation of any large Slav state in the Balkan Peninsula, and insisted on maintaining her influence at Belgrade and Tsetigne (Cetinje). In vain Prince Gorchakov endeavoured to conciliate Austria and to extract from Count Andrassy a dear statement of the terms he would accept. Count Andrassy wasin no hurry to extricate Russia from her difficulties, and suggested that the whole question should be submitted to a European congress The suggestion was endorsed by Great Britain, Which, likewise objected to the San Stefano arrange-*

ments, and Bismarck declined to bring any pressure to bear on the cabinet of Vienna.

Deceived in her expectations of active support from her two allies, Russia found herself in an awkward position. From a military: point of view it was absolutely necessary for her to come to an arrangement either with Austria or with England, because the communications of her army before Constantinople with its base could be cut by these two powers acting in concert —the land route being dominated by Austria, and the Black Sea route by the British fleet, which was at that time anchored in the Sea of Marmora. As soon, therefore, as the efforts to obtain the support of her two allies against the demands of England had failed, negotiations were opened in London, and on the 30th of May a secret convention was signed by Lord Salisbury and Count Schuvalov. By that agreement ihe obstacles to the assembling of the congress were removed. The congress met; in Berlin on the 13th of June, and after many prolonged sittings and much secret negotiation congress the treaty of Berlin was signed on the 13th of July. By that treaty the preliminary peace of San Stefano was considerably modified. The big Bulgaria denned by General Ignatiev was divided into three portions, the part between the Danube and the Balkans being transformed into a vassal princi- pality, the part between the Balkans and the Rhodope being made into an autonomous province, called Eastern Rumelia, under a Christian governor named by the sultan with the assent of the powers, and the remainder being placed again under the direct rule of the Porte. •■ The independence of Montenegro, Servia and Rumania was formally recognized, and each of these principalities received a considerable accession of territory. Ruma nia, however.

in return for the Dobrudja, which it professed not to desire, was obliged to give back to Russia the portion of Bessarabia ceded after the- Crimean War. In Asia Minor Russia agreed to confine her annexations to the districts of Kars, Ardahan and Batum, and to restore to Turkey the remainder of the occu- pied territory. As a set-off against the large acquisitions of the Slav races, the powers recommended that the sultan should cede to the kingdom of Greece the greater part of Thessaly and Epirus, under the form of a rectification of frontiers. At first the sultan refused to act on this

recommendation, but in March r88i a compromise was effected by which Greece obtained Thessaly without Epirus. Bosnia and Herzegovina were to be occupied and administered by Austria-Hungary, and the Austrian authorities were to have the right of making roads and keep- ing garrisons in the district of Novi-Bazar, which lies between Servia and Montenegro. In all the provinces of European Turkey for which special arrangements Were not made in the treaty, the Porte undertook (Art. 23) to introduce organic statutes similar to that of Crete, adapted to the local conditions; This article, like many of the subordinate stipulations of the treaty, remained a dead letter. We may mention specially Art. 61, in which the Sublime Porte undertook to realize without delay the ameliorations and reforms required in the provinces inhabited by Armenians, and to guarantee their safety against the Circassians and Kurds. Equally unreliable proved the scheme of Lord Beaconsfield to secure good administration throughout the whole of Asia Minor by the introduction of reforms Under British control, and to prevent the further expansion of Russia in that direction by a defensive alliance with the Porte. Cyprus j± convention to that effect was duly signed at Con- veatioa, stantinople a few days before the meeting of the con- gress (4th June 1878), but the only part of it which was actually realized was the occupation and administration of Cyprus by the British government. The new frontiers stipulated in the treaty of San Stefano, and subsequently rectified by the treaty of Berlin, are shown in the accompanying sketch-map.

The secret schemes of Russia and Austria, in so fat as they were defined in the agreement of Reichstadt and the subsequent Austro-Russian treaty of Vienna, had thus been realized. Russia had recovered the lost portion of Bessarabia, and Austria had practically annexed Bosnia and Herzegovina, though the nominal suzerainty of the sultan over the two provinces was maintained. But Russia was far from satisfied with the results, which seemed to her not at all commensurate with the sacrifices imposed on her by the war, and her dissatisfaction led to a new group- ing of the powers. Before the opening of the Berlin congress Bismarck had announced publicly that he would refrain from taking sides with any of the contending parties, and would confine himself to playing the part of an honest broker. The announcement was received by the Russians with astonishment and indignation. What they expected was not an impartial arbiter, but a cordial and useful friend in need. In 1871 the emperor William, as we have seen, had spontaneously declared to the tsar that Germany owed to His Majesty the happy issue of the war, and that she would never forget it, and we may add that on that

occasion he signed himself " Your ever grateful Friend." Now, in 1878, when the moment had come for pay- ing at least an instalment of this 1 debt, and when Russia was being compelled to make concessions which she described as incompatible with her dignity, Bismarck had nothing better to offer than honest brokerage. The indignation in all classes Russian was mtense , an d the views commonly held regard- resent- ing Bismarck's "duplicity" and "treachery" were meat supposed to receive ample confirmation during the

Wsm&vi. s i ttm & s °f tne congress and the following six months. On the 4th of February 1879 Prince Gorchakov wrote to the ambassador in Vienna: " Needless to say, that in our eyes the Three Emperors' Alliance is practically torn in pieces by the conduct of our two allies. At present it remains for us merely to terminate the liquidation of the past, and to seek henceforth support in ourselves alone." The same view of the situation was taken in Berlin and Vienna, though the result was attributed, of

course, to different causes, and the danger of serious complica- tions became so great that Bismarck concluded with Andrassy in the following October (1879) a formal defensive alliance, which was avowedly directed against- Russia, and which subsequently developed into the Triple Alliance, directed against Russia and France.

The causes of the rupture are variously described by the different parties interested. According to Bismarck the Russian government began a venomous campaign against Germany in the press, and collected, with apparently hostile intentions, enormous masses of troops near the German and Austrian frontiers, whilst the tsar adopted in his correspondence with the emperor William an arrogant and menacing tone which could not be tolerated. On the other hand, the Russians declare that the so-called Press-Campaign was merely the spontaneous public expression of the prevailing disappointment among all classes in Russia, that the military preparations had a purely defensive character, and that the tsar's remarks, which roused Bismarck's ire, did not transgress the limits of friendly expostulation such as sovereigns in close friendly relations might naturally .employ.

Subsequent revelations tend rather to confirm the Russian view. After an exhausting war and without a single powerful ally, Russia was not likely to provoke wantonly a great war with Germany and Austria. The press attacks were not more violent than those which

frequently appear in newspapers which draw their inspiration from the German foreign office, and the accusa- tions about the arrogant attitude and menacing tone of Alexander II. are not at all in harmony with his known character, and are refuted by the documents since published by Dr Busch. The truth seems to be that the self-willed chancellor was actuated by nervous irritation and personal feeling more than by con- siderations of statecraft. His imperial master was not convinced by his arguments, and showed great reluctance to permit the conclusion of a separate treaty with Austria. Finally, with much searching of heart, he yielded to the importunity of his minister; but in thus committing an unfriendly act towards his old ally, he so softened the blow that the personal good relations between the two sovereigns suffered merely a momentary inter- ruption. Bismarck himself soon recognized that the permanent estrangement of Russia would be a grave mistake of policy, and the very next year (1880), negotiations for a treaty of defensive alliance between the two cabinets were begun. Nor did the accession to the throne of Russia of Alexander III., who had long enjoyed the reputation of being systematically hostile to Germans, produce a rupture, as was expected. Six months after his father's death, the young tsar met the old kaiser at Danzig

(September 1881), and some progress was made towards a com- plete renewal of the traditional friendship. Immediately after- wards a further step was taken towards re-establishing the old state of things with regard also to Austria. On his return to St Petersburg, Alexander III. remembered that he had received some time previously a telegram of congratulation from the emperor Francis Joseph, and he now replied to it very cordially, referring to the meeting at Danzig, and describing the emperor William as " that venerable friend with whom we are united in the common bonds of a profound affection." The words foreshadowed a revival of the Three Emperors' League, which actually took place three years later.

The removal of all immediate danger of a Franco-Russian alliance did not prevent Bismarck from strengthening in other ways the diplomatic position of Germany, and the

*?f˚^ ? f result of his efforts soon became apparent in the alliance the Triple , T , . , , , r * ■ _ ,*

Alliance, 01 Italy with the two central powers. Ever since the

Franco-German War of 1870-71, and more especially since the congress of Berlin in 1878, the Italian government had shown itself restless and undecided in its foreign policy. As it was to France that Italy owed her emancipation from Austrian rule, it seemed natural that the two countries should remain allies, but anything like cordial co-operation was prevented by conflicting interests and hostile feeling. The French did not consider the acquisition of Savoy and Nice a sufficient com- pensation for the assistance they had given to the cause of Italian unity, and they did not know, or did not care to remember, that their own government was greatly to blame for the passive attitude of Italy in the hour of their great national misfortunes. On the other hand, a considerable amount of bitterness against France had been gradually accumulating in the hearts of the Italians. As far back as the end of the war of 1859, popular opinion had been freely expressed against Napoleon III., because he had failed to keep his promise of liberating Italy "from the Alps to the Adriatic." The feeling was revived and intensified when it became known that he was opposing the annexation of central and southern Italy, and that he obtained Savoy and Nice as the price of partly withdrawing his opposition. Subsequently, in the war of 1866, he was supposed to have insulted Italy by making her conclude peace with Austria, on the basis of the cession of Venetia, before she could wipe out the humiliation of her defeats at Custozza and Lissa. Then came the French protection of the pope's temporal power as a constant source of irritation, producing occasional explosions of violent hostility, as when the new Chassepot rifles were announced to have " worked wonders " among the Garibaldians at Mentana. When the Second Empire was replaced by the Republic, the relations did not improve. French statesmen of the Thiers school had always condemned the imperial policy of permitting and even encouraging the creation of large, powerful states on the French frontiers, and Thiers himself publicly attributed to this policy the misfortunes of his country. With regard to Italy, he said openly that he regretted what had been done, though he had no intention of undoing it. The first part of this statement was carefully noted in Italy, and the latter part was accepted with scepticism. In any case his hand might perhaps be forced, for in the first republican chamber the monarchical and clerical element was very strong, and it persistently attempted to get something done in favour of the temporal power. Even when the party of the Left undertook the direction of affairs in 1876, the

government did not become anti-clerical in its foreign policy, and Italian statesmen resigned themselves to a position of political isolation. The position had its advantages. Events in the Balkan Peninsula foreshadowed a great European war, and it seemed that in the event of Europe's being divided into two hostile camps, Italy might have the honour and the advantage of regulating the balance of power. By maintaining good rela- tions with all her neighbours and carefully avoiding all in- convenient entanglements, she might come forward at the critical moment and dictate her own terms to either of the contending parties, or offer her services to the highest bidder. This Machia- vellian policy did not give the expected results. Being friends

with everybody in a general way may be the best course for aii old, conservative country which desires merely the maintenance of the status quo, but it does not secure the energetic diplomatic support required by a young enterprising state which wishes to increase its territory and influence. At the congress of Berlin, when several of the powers got territorial acquisitions, Italy got nothing. The Italians, who were in the habit of assuming, almost as a matter of principle, that from all European com- plications they had a right to obtain some tangible advantage, were naturally disappointed, and they attributed their misfortune to their political isolation. The policy of the free hand conse- quently fell into disrepute, and the desire for a close, efficient alliance revived. But with what power or powers should an alliance be made? The remnants of the old party of action, who still carried the Italia Irredenta banner, had an answer ready. They recommended that alliances should be concluded with a view to wresting from Austria the Trentino and Trieste, with Dalmatia, perhaps, into the bargain. On the other hand, the Conservatives and the Moderates considered that the question of the Trentino and Trieste was much less important than that of political influence in the Mediterranean. A strong Austria was required, it was said, to bar the way of Russia to the Adriatic, and France must not be allowed to pursue unchecked her policy of transforming the Mediterranean into a French lake. Con- siderations of this kind led naturally to the conclusion that Italy should draw closer to the powers of central Europe. So the question appeared from the standpoint of " la haute politique." From the less elevated standpoint of immediate political in- terests, it presented conflicting considerations. A rapprochement with the central powers might prevent the conclusion of a commercial treaty with France, and thereby increase the financial and economic difficulties with which the young kingdom was struggling, whereas a rapprochement with France would certainly

excite the hostility of Bismarck, who was retiring from the Kulturkampf and journeying towards Canossa, and who might possibly conciliate the pope by helping him to recover his temporal sovereignty at the expense of Italy. Altogether the problem was a very complicated one. The conflicting currents so nearly balanced each other, that the question as to which way the ship would drift might be decided by a little squall of popular senti- ment. A very big squall was brewing.

During the congress of Berlin the French government was very indignant when it discovered that Lord Beaconsfield had recently made a secret convention with the sultan for the British occupation of Cyprus, and in order to calm Tunis. "" its resentment Lord Salisbury gave M. Waddington to understand that, so far as England was concerned, France would be allowed a free hand in the Regency of Tunis, which she had long coveted. Though the conversations on the subject and a subsequent exchange of notes were kept strictly secret, the Italian government soon got wind of the affair, and it was at first much alarmed. It considered, in common with Italians gener- ally, that Tunis, on the ground of historic right and of national interests, should be reserved for Italy, and that an extension of French territory in that direction would destroy, to the detriment of Italy, the balance of power in the Mediterranean. These apprehensions were calmed for a time by assurances given to the Italian ambassador in Paris. M. Gambetta assured General Cialdini that he had no intention of making Italy an irreconcilable enemy of France, and M. Waddington declared, on his word of honour, that so long as he remained minister of foreign affairs nothing of the sort would be done by France without a previous understanding with the cabinet of Rome. M. Waddington honourably kept his word, but his successor did not considei himself bound by the assurance; and when it was found that the Italians were trying systematically to establish their influence in the Regency at the expense of France, the French authorities, on the ground that a Tunisian tribe called the Kroumirs had committed depredations in Algeria, sent an armed force into the Regency, and imposed on the bey the Bardo treaty, which transformed Tunis into a French protectorate.

The establishment of a French protectorate over a country

which the Italians had marked out for themselves as necessary for the defence and colonial expansion of the kingdom had the effect which Gambetta had foreseen — it made Italy, for a time at least, the irreconcilable enemy of France. Whilst the French were giving free expression to their patriotic exultation, and even Gambetta himself, in defiance of what he had said to Cialditti, was congratulating Jules Ferry on having restored France to her place among the nations, the Italians were trying to smother their indignation and to discover some means of retrieving what they had lost. The only remedy seemed to be to secure foreign alliances, and there was now no hesitation as to where they should be sought. Simple people in Italy imagined that if aft alliance had been concluded sooner with Germany and Austria, these powers would have prevented France from trampling on the sacred interests of Italy. This idea was entirely erroneous, because Austria had little or no interest in the Tunisian Question, and Bismarck was not at all sorry to see France embark on an enterprise which distracted her attention from Alsace-Lorraine and removed all danger of a Franco-Italian alliance. The illusion, however, had a powerful influence on Italian public opinion. The government was now urged to conclude without further delay an alliance with the central powers, and the recommendation was not unwelcome to the king, because most of the Italian Gallophils had anti-dynastic and republican tendencies, and he was naturally disposed to draw nearer to governments which proclaimed themselves the defenders of monarchical institutions and the opponents of revolutionary agitation. After protracted negotiations, in which Italy tried in vain to secure protection for her own separate interests in the Mediterranean, defensive treaties of alliance were concluded with the cabinets of Vienna Triple and Berlin in May 1882. Though the Italian statesmen Alliance did not secure by these treaties all they Wanted, they signed felt that the kingdom was protected against any ,882 ‘ aggressive designs which might be entertained by

France or the Vatican, and when the treaties were renewed in 1887 they succeeded in getting somewhat more favourable conditions.

By the creation of this Triple Alliance, which still subsists, the diplomatic position of Germany was greatly strengthened, but Bismarck was still haunted by the apprehension of a Franco- Russian alliance, and he made repeated attempts to renew the old cordial relations with the court of St Petersburg. He was bold enough to hope that, notwithstanding the Austro-German treaty of October 1879, avowedly directed against Russia, and the new Triple Alliance, by which the Austro-German Alliance was strengthened, he might

resuscitate the Three Emperors' League in such a form as to ensure, even more effectually than he had done on the former occasion, the preponderance of Germany in the arrangement. With this object he threw out a hint to the Russian ambassador, M. Sabourof, in the summer of 1883, that the evil results of the congress of Berlin might be counteracted by a formal agreement between the three emperors. The suggestion was transmitted privately by M. Sabourof to the tsar, and was favourably received. Alexander III. was disquieted by the continuance of the Nihilist agitation, and was not averse from drawing closer to the conservative powers; and as he desired tranquillity for some time in the Balkan Peninsula, he was glad to have security that his rival would do nothing in that part of the world without a previous understanding. M. de Giers, who had now succeeded Prince Gorchakov in the direction of foreign affairs, was accordingly despatched to Friedrichsruh to discuss the subject with Bismarck. The practical result of the meeting was that negotiations between the two governments were begun, and on the 21st of March 1884 a formal document was signed in Berlin. About six months later, in the month of September, the three emperors met at Skiernevice and ratified Orel- the agreement. Thus, without any modification of the

kaiserbund Triple Alliance, which was directed against Russia, the revived ld Three Emperors' League, which included Russia, was revived. Germany and Austria, being members of both, were doubly protected, for in the event of being attacked they could count on at least the benevolent neutrality

of both Russia and Italy. France was thereby completely isolated.

In drawing up the secret treaty of Skiernevice, which may bfc regarded as the chef-d'muvre of Bismarckian diplomacy, the German chancellor's chief aims evidently were to paralyse Russia by yoking her to Germany and Austria, to isolate France, and to realize his old scheme of holding the balance between Russia and Austria in the Balkan Peninsula. With a view to attaining the first two objects it was stipulated that if any One of the three powers were forced to make war on a fourth power, the two other contracting parties should observe a benevolent neutrality towards their ally. If we may believe a well-informed Russian authority, Bismarck wished it to be understood that in the event of two of the powers being at war with a fourth, the stipulation about benevolent neutrality should still hold good, but Alexander III. objected, on the ground that he could not remain a passive spectator of a duel in which France would be confronted by two antagonists. In his third object Bismarck was

successful, for it was expressly laid down that in all cases of a disagreement between two of the parties in the affairs of the Balkan Peninsula, the third power should decide between them. This meant, of course, that in all discussions between Russia and Austria, the two great rivals in the Eastern Question, Bismarck should always have a casting vote. In return for all this, Russia obtained two small concessions: firstly, that Germany and Austria should seek to restrain the sultan from permitting the passage of the Dardanelles to an English fleet, as he had done in 1878, when the Russian army was before Constantinople; and, secondly, that they should not oppose the union of Bulgaria and Eastern Rumelia, if it was accomplished by the force of things and within the limits traced by the congress of Berlin.

This new form Of the Three Emperors' League had all the organic defects of its predecessor, and was destined to be still more shortlived. The claims of Russia and Austria might be reconcilable in theory, but in practice they were sure to conflict; and however much Bismarck might try to play the part of an honest broker, he was certain to be suspected of opposing Russia and favouring Austria. It was therefore only during a period of political stagnation in south-eastern Europe that the arrangement could work smoothly. The political stagnation did not last long. Prince Alexander of Bulgaria had for some time been fretting under the high-handed interference of the Russian agents in the principality, and had begun to oppose systematically what the Russians considered their legitimate influence. Relations between Sofia and St Petersburg had consequently become strained, when a crisis was suddenly brought about by the revolution of Philip- f."J^ ria " poporb in September 1885. The conspirators arrested and expelled the governor-general, who had been appointed by the sultan with the assent of the powers, and at the same time proclaimed the union of the autonomous province of Eastern Rumelia with the principality of Bulgaria, in defiance of the stipulations of the treaty of Berlin. The revolution had been effected with the connivance and approval of the regularly accredited Russian agents in Philippopolis, but it had not received the sanction of the Russian government, and was resented as a new act of insubordination on the part of Prince Alexander. When he arrived in Philippopolis and accepted the declaration of union, the cabinet of St Petersburg protested against any such infraction of the Berlin treaty, and the Porte prepared to send an army into the province. It was restrained from taking this step by the ambassadors in Constantinople, so that an armed conflict between Turks and Bulgarians was prevented; but no sooner had the Bulgarians been

relieved from this danger on their eastern frontier, than they were attacked from the west by the Servians, who were determined to get ample compensation for any advantage which the Bul- garians might obtain. The Bulgarian army defeated the Servians at Slivnitza (November 10-20, 1885), and was marching on Belgrade when its advance was stopped and an armistice arranged by the energetic intervention of the Austrian government. Following the example of the Servians, the Greeks were preparing

to exact territorial compensation likewise; but as their mobiliza- tion was a slow process, the powers had time to restrain them from entering on active hostilities, first by an ultimatum (April 26, 1886), and afterwards by a blockade of their ports (May 1886). By that time, thanks to the intervention of the powers, a peace between Bulgaria and Servia had been signed at Bucharest (March 3); and with regard to Eastern Rumelia a compromise had been effected by which the formal union with the principality was rejected, and the prince was appointed governor-general of the province for a term of five years. This was in reality union in disguise.

The diplomatic solution of the problem averted the danger of a European war, but it left a great deal of dissatisfaction, which soon produced new troubles. Not only had Prince Alexander escaped punishment for his insubordination to Russia, but he and the anti-Russian party among the Bulgarians had obtained a decided success. This could not well be tolerated. Before six months had passed (August 21, 1886) Prince Alexander was kidnapped by conspirators in his palace at Sofia and con- veyed secretly to. Russian Bessarabia. As soon as the incident was reported to the tsar, the prince was released, and he at once returned to Sofia, where a counter-revolution had been effected in his favour; but he considered his position untenable, and formally abdicated. A fortnight after his departure General Kaulbars arrived from St Petersburg with instructions from the tsar to restore order in accordance with Russian interests. In St Petersburg it was supposed that the Bulgarian people were still devoted to Russia, and that they were ready to rise against and expel the politicians of the Nationalist party led by Stam- bolof. General Kaulbars accordingly made a tour in the country and delivered speeches to the assembled multitudes, but

Stam- bolof's political organization counteracted all his efforts, and on the 20th of November he left Bulgaria and took the Russian consuls with him. Stambolof maintained his position, suppressed ' energetically several insurrectionary movements, and succeeded in getting Prince Ferdinand of Coburg elected prince (July 7, 1887), in spite of the opposition of Russia, who put forward as candidate a Russian subject, Prince Nicholas of Mingrelia. Prince Ferdinand was not officially recognized by the sultan and the powers, but he continued to reign under the direction of Stambolof, and the Russian government, passively accepting the accomplished facts, awaited patiently a more convenient moment for action.

These events in the Balkan Peninsula necessarily affected the mutual relations of the powers composing the Three Emperors' League. Austria could not remain a passive and disinterested spectator of the action of Russia in Bulgaria. Her agents had given a certain amount of support to Prince Alexander in his efforts to emancipate himself from Russian domination; and when the prince was kidnapped and induced to abdicate, Count Kalnoky had not concealed his intention of opposing further aggression. Bismarck resisted the pressure brought to bear on him from several quarters in favour of the anti-Russian party in Bulgaria, but he was suspected by the Russians of siding with Austria and secretly encouraging the opposition to Russian Russian influence. This revived the hatred against Oermany? nim which had been created by his pro-Austrian leanings after the Russo-Turkish War. The feeling was assiduously fomented by the Russian press, especially by M. Katkoff, the editor of the Moscow Gazette, who exercised great influence on public opinion and had personal relations with Alexander III. On the 31st of July 1886, three weeks before the kidnapping of Prince Alexander, he had begun a regular journal- istic campaign against Germany, and advocated strongly a new orientation of Russian policy. M. de Giers, minister of foreign affairs, was openly attacked as a partisan of the German alliance, and his " pilgrimages to Friedrichsruh and Berlin " were com- pared to the humiliating journeys of the old Russian grand-princes to the Golden Horde in the time of the Tatar domination. The moment had come, it was said, for Russia to emancipate herself from German diplomatic thraldom, and for this purpose a rapprochement with France was suggested. The idea was well

received by the public, and it seemed to be not unpalatable to the tsar, for the Moscow Gazette was allowed to continue its attacks on M. de Giers's policy of maintaining the German alliance. In Berlin such significant facts could not fail to produce uneasiness, because one of the chief aims of Bismarck's policy had always been to

prevent a Russo-French entente cordiale. The German press were instructed to refute the arguments of their Russian colleagues, and to prove that if Russia had really lost her influence in the Balkan Peninsula, the fact was due to the blunders of her own diplomacy. The con- troversy did not produce at once a serious estrangement between the two cabinets, but it marked the beginning of a period of vacil- lation on the part of Alexander III. When the treaty of Skierne- vice was about to expire in 1887, he positively refused to renew the Three Emperors' League, but he consented to make, without the cognizance of Austria, a secret treaty of alliance with Germany for three years. Not satisfied with this guarantee against the danger of a Franco-Russian alliance, Bismarck caused attacks to be made in the press on Russian credit, which was rapidly gaining a footing on the Paris bourse, and he imprudently showed his hand by prohibiting the Reichsbank from accepting Russian securities as guarantees. From that moment the tsar's attitude changed. All his dormant suspicions of German policy revived. When he passed through Berlin in November 1887, Bismarck had a long audience, in which he defended himself with his customary ability, but Alexander remained unmoved in his con- viction that the German government had systematically opposed Russian interests, and had paralysed Russian action in the Balkan Peninsula for the benefit of Austria; and he failed to understand the ingenious theory put forward by the German chancellor, that two powers might have a severe economic struggle without affecting their political relations. Bismarck had to recognize that, for the moment at least, the Three Emperors' League, which had served his purposes so well, could not be re- suscitated, but he had still a certain security against the hostility of Russia in the secret treaty. Soon, however, this link was also to be broken. When the treaty expired in 1890 it was not renewed. By that time Bismarck had been dismissed, and he subsequently reproached his successor, Count Caprivi, with not having renewed it, but in reality Count Caprivi was not to blame. Alexander III. was determined not to renew the alliance, and was already gravitating slowly towards an understanding with France.

No treaty or formal defensive engagement of any kind existed between Russia and France, but it was already tolerably certain that in the event of a great war the two nations would be found fighting on the same side, and the military Franco- authorities in both countries felt that if no arrange- entente. ments were made beforehand for concerted action, — such arrangements having been long ago completed by the powers composing the Triple Alliance,— they would begin the campaign at a great disadvantage. This was

perfectly understood by both governments; and after some hesitation on both sides, Generals Vannovski and Obruchev, on the one side, and Generals Saussier, Miribel and Boisdeffre on the other, were permitted to discuss plans of co-operation. At the same time a large quantity of Lebel rifles were manufactured in France for the Russian army, and the secret of making smokeless powder was communicated to the Russian military authorities. The French government wished to go further and conclude a defensive alliance, but the tsar was reluctant to bind himself with a government which had so little stability, and which might be induced to provoke a war with Germany by the prospect of Russian support. Even the military convention was not formally ratified until 1894. The enthusiastic partisans of the alliance flattered themselves that the tsar's reluctance had been overcome, when he received very graciously Admiral Gervais and his officers during the visit of the French fleet to Cronstadt in the summer of 1891, but their joy was premature. The formal rapprochement between the two governments was much slower than the unofficial rapprochement between the two nations. More than two years passed before the Cronstadt visit was returned by the Russian

fleet, under Admiral Avelan. The enthusiastic ovations which the' admiral and his subordinates received in Toulon and Paris (October 1893) showed how eager and anxious the French people were for an alliance with Russia, but the Russian government was in no hurry to gratify their wishes. Of the official action all we know with certainty is, that immediately after the Cronstadt visit in 1891 a diplomatic protocol about a defensive alliance was signed; that during the special mission of General Boisdeffre to St Petersburg in 1892 negotiations took place about a military convention; that in 1894 the military convention was ratified; that in the summer of 1895 M. Ribot, when prime minister, first spoke publicly of an alliance; and that during the visit of the president of the French Republic to St Petersburg, in August 1897, France and Russia were referred to as allies in the compli- mentary speeches of the tsar and of M. Felix Faure. Though we are still in the dark as to the precise terms of the arrangement, there is no doubt that close friendly relations were established between the two powers, and that in all important international affairs they sought to act in accord with each other. It

is equally certain that for some years Russia was the predominant partner, and that, in accordance with the pacific tendencies of the tsar, she systematically exercised a restraining influence on France.

The great expectations excited among the French people by the entente cordiale were consequently not realized, and there _ . . appeared gradually premonitory symptoms of a re- eateate action in public opinion, but the alliance between the and the two governments was maintained, and though the Tr 'f le Triple Alliance was weakened by the internal troubles of Austria-Hungary and by a tendency on the part of Italy to gravitate towards France, the grouping of the great powers was not radically changed till the Russo-Japanese War of 1904-5. By that war the balance of power in Europe was seriously disturbed. Russia inadvertently provoked a struggle with Japan which made such a drain on her energies and material resources that her political influence in Europe necessarily suffered a partial eclipse. Thus the Triple Alliance outweighed its rival, and there was a danger of the German emperor's taking advantage of the situation to secure for himself a diplomatic predominance in Europe. France at once perceived that there was a grave danger for herself, and naturally looked about for some diplomatic support to replace that of Russia, which had lost much of its value. From her uncomfortable isolation there were only two possible exits — a rapprochement with Germany or a rapprochement with England. Both of these demanded sacrifices. The former required a formal abandonment of all ideas of re- covering Alsace and Lorraine; the latter a formal recognition of British predominance in Egypt. Under the influence of M. Delcasse the French government chose what seemed the lesser of two evils, and concluded with the English foreign office in April 1904 a general agreement, of which the most important stipulation was that France should leave England a free hand in Egypt, and that England in return should allow France, within certain limits, a free hand in Morocco. On that basis was effected a rapprochement between the two governments which soon developed into an entente cordiale between the two nations. The efforts of the German emperor to undermine the entente by insisting on the convocation of a conference to consider the Morocco question caused M. Delcasse to resign, and produced considerable anxiety throughout Europe, but the desired result was not attained. On the contrary, the conference in question, which met at Algeciras in January 1906, ended in strengthening the entente and in accentuating the partial isolation of Germany.

The grouping of the great continental states into two opposite but not necessarily hostile camps helped to preserve the balance of power

and the peace of Europe. The result was that the causes of conflict which arose from time to time up to the end of the 19th century were localized. Some of the principal questions involved may be more particularly mentioned.

The Armenian Question was brought prominently before Europe by the Russo-Turkish War of 1877-78. In the treaties of San Stefano and Berlin the Sublime Porte undertook " to carry out without delay the ameliorations and reforms required by local

Armenia.

needs in the provinces inhabited by the Armenians, and to guarantee their security against the Circassians and the Kurds." This stipulation remained a dead letter, and the relations between the Armenians and the Mussulmans became worse than before, because the protection of the powers encouraged in the oppressed nationality far-reaching political aspirations, and the sultan regarded the political aspirations and the intervention of the powers as dangerous for the integrity and independence of his empire. For some fifteen years the Armenians continued to hope for the efficacious intervention of their protectors, but when their patience became exhausted and the question seemed in danger of being forgotten, they deter- mined to bring it again to the front. Some of them confined themselves to agitating abroad, especially in England, in favour of the cause, whilst others made preparations for exciting an insurrectionary movement in Constantinople and Asia Minor. These latter knew very well that an insurrection could be sup- pressed by the Turkish government without much difficulty, but they hoped that the savage measures of repression which the Turks were sure to employ might lead to the active inter- vention of Europe and ensure their liberation from Turkish rule, as the famous " atrocities " of 1876 had led to the political emancipation of Bulgaria. In due course — 1895-1896 — the ex- pected atrocities took place, in the form of wholesale massacres in Constantinople and various towns of Asia Minor. The sultan was subjected to diplomatic pressure and threatened with more efficient means of coercion. In the diplomatic campaign England took the lead, and was warmly supported by Italy, but Germany, Austria and France showed themselves lukewarm, not to say indifferent, and Russia, departing from her traditional policy of protecting the Christians of Turkey, vetoed the employment of force for extracting concessions from the sultan. In these circumstances the Porte naturally confined itself to making a few reforms on paper, which were never carried out. Thus the last state of the Armenians was worse than the first, but the so-called

European concert was maintained, and the danger of a great European war was averted.

The next attempt to raise the Eastern Question was made by the Greeks. In 1896 a semi-secret society called the Ethnik6 Hetairia began a Panhellenic agitation, and took Crete. advantage of one of the periodical insurrections in Crete to further its projects. In February 1897 the Cretan revolutionary committee proclaimed the annexation of the island to the Hellenic kingdom, and a contingent of Greek regular troops landed near Canea under the command of Colonel Vassos to take possession of the island in the name of King George. The powers, objecting to this arbitrary proceeding, immediately occupied Canea with a mixed force from the ships of war which were there at the time, and summoned the Greek government to withdraw its troops. The summons was disregarded, and the whole of the Greek army was mobilized on the frontier of Thessaly and Epirus. In consequence of a raid into Turkish territory the Porte declared war on the 17th of April, and the short campaign ended in the defeat of the Greeks. The powers intervened to put an end to the hostilities, and after prolonged negotiations a peace was concluded by which Greece had to consent to a strategical rectification of frontier and to pay a war indemnity ofr £4,000,000. Thus a second time the European concert acted effectually in the interests of peace, but it did not stand the strain of the subsequent efforts to solve the Cretan Question. Finding the Turks less conciliatory after their military success, and being anxious to remain in cordial relations with the Porte, Germany withdrew from further co-operation with the powers, and Austria followed her example. They did not, however, offer any active opposition, and the question received a temporary solution by the appointment of Prince George, second son of the king of Greece, as high commissioner and governor-general of the island. (See Crete.)

The conflicting desires of several of the powers to obtain colonial possessions in various parts of the world, and to forestall their competitors in the act of taking possession, were bound to introduce complications in which England, as the greatest

of colonial powers, would generally be involved; and as the

unappropriated portions of the earth's surface at the beginning of the period under discussion were to be found chiefly in Africa, it was in the Dark Continent that the conflicts of interests mostly took place. England's chief com petitors were France and Germany. Her traditional policy, except in the south of the continent, where the conditions of soil and climate were favourable to European colonists, had been purely commercial. She had refrained from annexation of territory, as involving too much expenditure and responsibility, and confined her protection to the trading stations on the coast. When France came into the field this policy had to be abandoned. The policy of France was also commercial in a certain sense, but the methods she adopted were very different. She en- deavoured to bring under her authority, by annexation or the establishment of protectorates, the largest possible extent of territory, in order to increase her trade by a system of differential tariffs; she encroached on the hinterland of British settle- ments, and endeavoured to direct artificially the native inland trade towards her own ports. A glance at the map of the African West Coast will suffice to show the success with which this policy was carried out. When the British government awoke to the danger, all that could be done was to prevent further en- croachments by likewise annexing territory. The result is shown in the article Africa: § 5. In her dealings with France about the partition of Africa, England was generally conciliatory, but she was always inflexible in guarding carefully the two entrances to the Mediterranean. There was, therefore, a permanent danger of conflict in Egypt and Morocco. When England in 1882 con- sidered it necessary to suppress the Arabi insurrection, she in- vited France to co-operate, but the French government declined, and left the work to be done by England alone. England had no intention of occupying the country permanently, but she had to take precautions against the danger of French occupation after her withdrawal, and these precautions were embodied in an Anglo-Turkish convention signed at Constantinople in May 1887. France prevented the ratification of the convention by the sultan, with the result that the British occupation has been indefinitely prolonged. She still clung persistently, however, to the hope of obtaining a predominant position in the valley of the Nile, and she tried to effect her purpose by gaining a firm foothold on the upper course of the river. The effort which she made in 1898 to attain this end, by simultaneously despatching the Marchand mission from her Congo possessions and inciting the emperor Menelek of Abyssinia to send a force from the east to join hands with Major Marchand at Fashoda, was defeated by the overthrow of the Khalifa and the British occupation of Khartum. For a few days the two nations seemed on the brink of war, but the French government,*

receiving no encouragement from St Petersburg, consented to withdraw the Marchand mission, and a convention was signed defining the respective spheres of influence of the two countries.

In Morocco the rivalry between the two powers was less acute but not less persistent and troublesome. France aspired to incorporate the sultanate with her north African possessions, whilst England had commercial interests to defend and was firmly resolved to prevent France from getting unfettered possession of the southern coast of the Straits of Gibraltar. As in Egypt, so in Morocco the dangers of conflict were averted, in 1904, by a general agreement, which enabled France to carry out in Morocco, as far as England was concerned, her policy of pacific penetration, but debarred her from erecting fortifications in the vicinity of the straits. Germany thereafter strongly opposed French claims in Morocco, but after a period of great tension, and the holding of an ineffectual conference at Algeciras in 1906, an understanding was come to in 1909 (see Morocco: History) .

With Germany likewise, from 1880 onwards, England had some diplomatic difficulties regarding the partition of Africa, but they never reached a very acute phase, and were ultimately settled by mutual concessions. By the arrangement of 1890, in which several of the outstanding questions were solved, Heligoland

Asia.

was ceded to Germany in return for concessions in East Africa. A conflict of interests in the southern Pacific was amicably arranged by the Anglo-German convention of April 188.6, in which a line of demarcation was drawn between the respective spheres of influence in the islands to the north and east of the Australian continent, and by the convention of 1899, in virtue of which Germany gained possession of Samoa and renounced in favour of England all pretensions to the Tonga Archipelago.

In Asia the tendencies of the European powers to territorial expansion, and their desire to secure new markets for their trade and industry, have affected from time to time their mutual relations. More than once England and Russia have had disputes about the limits of their respective spheres of influence in central Asia, but the causes of friction have steadily diminished as the work of frontier delimitation has advanced. The important agreement of 1872-1873 was supplemented by the protocol of the 22nd of July 1887 and the Pamir delimitation of 1895, so that the Russo-Afghan frontier, which

is the dividing line between the Russian and British spheres of influence, has now been carried right up to the frontier of the Chinese empire. The delimitation of the English and French spheres of influence in Asia has also progressed. In 1885 France endeavoured to get a footing on the Upper Irrawaddy, the hinterland of British Burma, and England replied in the following year by annexing the dominions of King Thebaw, including the Shan States as far east as the Mekong. Thereupon France pushed her Indo-Chinese frontier westwards, and in 1893 made an attack on the kingdom: of Siam, which very nearly brought about a conflict with England. After prolonged negotiations an arrangement was reached and embodied in a formal treaty (January 1896), which clearly foreshadows a future partition between the two powers, but guarantees the independence of the central portion of the kingdom, the Valley of the Meiiam, as a buffer-state. Farther north, in eastern China, the aggressive tendencies and mutual rivalries of the European powers have produced a problem of a much more complicated kind. Firstly Germany, then Russia, next England, and finally France took portions of Chinese terri- tory, under the thin disguise of long leases. They thereby excited in the Chinese population and government an intense anti-foreign feeling, which produced the Boxer movement and culminated in the attack on the foreign legations at Pekin in the summer of 1900. (See China: History.)

In 1899-1901 the relations of the European powers were disturbed by the Boer War in South Africa. In nearly every country of Europe popular feeling was much excited against England, and in certain influential quarters the idea was enter- tained of utilizing this feeling for the formation of a coalition against the British empire; but in view of the decided attitude assumed by the British government, and the loyal enthusiasm displayed by the colonies, no foreign government ventured to take the initiative of intervention, and it came gradually to be recognized that no European state had any tangible interest in prolonging the independence and maladministration of the Boer republics.

One permanent factor in the history of Europe after the war of 1870-71 was the constant increase of armaments by all the great powers, and the proportionate increase of taxation. The fact made such an impression on the young emperor of Russia, Nicholas II., that he invited the powers to consider whether the further increase of the burdens thereby imposed on the nations might not be arrested by mutual agreement; and a con- ference for this purpose as convened at the Hague (May 18- July 29, 1899), but the desirable object in

view was not attained. (See Arbitration, International.) (D. M. W.)

Though neither the first Hague Conference nor the second, which met in 1907, did much to fulfil the expectations of those who hoped for the establishment of a system which progress / should guarantee the world against the disasters of the Peace war, they undoubtedly tended to create a strong public move- opinion in favour of peaceful methods in the solution of men ‘ international problems which has not been without its effect. Any attempt to organize the concert of the powers must always

fail, as it failed in the early part of the 19th century, so long as the spirit of national and racial rivalry is stronger than the conscious- ness of common interests; and the early years of the 20th century showed no diminution, but rather an accentuation of this rivalry. The court of arbitration established at the Hague early in 1901 may deal effectively with questions as to which both parties desire a modus vivendi, and the pacific efforts of King Edward VII., which did so much to prevent misunderstandings likely to lead to war, resulted from 1903 onwards in a series of arbitration treaties between Great Britain and other powers which guaranteed the Hague court an effective activity in such matters. But more perilous issues, involving deep-seated antagonisms, have con- tinued to be dealt with by the methods of the old diplomacy backed by the armed force of the powers. How far the final solution of such problems has been helped or hindered by the general reluctance to draw the sword must for some time to come remain an open question. Certainly, during the early years of the 20th century, many causes of difference which a hundred years earlier would assuredly have led to war, were settled, or at least shelved, by diplomacy. Of these the questions of Crete, of Armenia, and of contested claims in Africa have already been mentioned. Other questions of general interest which might have led to war, but which found a peaceful solution, were those of the separation of Norway and Sweden, and the rivalry of the powers in the northern seas. In October 1905 Sweden formally recog- nized the separate existence of Norway (see Norway: History and Sweden: History). On the 23rd of April 1908 were signed the ” Declarations “; the one, signed by the four Baltic littoral powers, recognized ” in principle ” the maintenance of the terri- torial status quo in that sea;

the other — to which Great Britain, France, Germany, Denmark, Sweden and Holland were the parties — sanctioned a similar principle in regard to the North Sea. These were followed, in June of the same year, by two agreements intended to 'apply the same principles to the southern European waters, signed by France and Spain and Great Britain and Spain respectively. Another agreement, that signed between Russia and Great Britain in 1907 for the delimitation of their spheres of influence in Persia and the northern borders of the Indian empire, though having no direct relation to European affairs, exercised considerable influence upon them by helping to restore the international prestige of Russia, damaged by the disasters of the war with Japan and the internal disturbances that followed. The new cordial understanding between the British and Russian governments was cemented by the meeting of King Edward VII. and the emperor Nicholas II. at Reval in June 1908. More perilous to European peace, however, than any of these issues was the perennial unrest in Macedonia, which threatened _ , . sooner or later to open up the whole Eastern Question of the once more in its acutest form. The situation was due Eastern to the internecine struggle of the rival Balkan races — Question. Q ree] i; Bulgarian, Servian — to secure the right to the reversion of territories not yet derelict. But behind these lesser issues loomed the great secular rivalries of the powers, and beyond these again the vast unknown forces of the Mahommedan world, ominously stirring. The very vastness of the perils involved in any attempt at a definitive settlement compelled the powers to accept a compromise which, it was hoped, would restore toler- able conditions in the wretched country. But the " Miirzsteg programme," concerted between the Austrian and Russian em- perors in 1903, and imposed upon the Porte by the diplomatic pressure of the great powers, did not produce the effects hoped for. The hideous tale of massacres of helpless villagers by organized Greek bands, and of equally hideous, if less wholesale, reprisals by Bulgarian bands, grew rather than diminished, and reached its climax in the early months of 1908. The usefulness of the new gendarmerie, under European officers, which was to have co-operated with the Ottoman authorities in the restoration of order, was from the outset crippled by the passive obstruction of the Turkish government. The sultan, indeed, could hardly be blamed for watching with a certain cynical indifference the mutual slaughter of those " Christians" whose avowed ideal was the overthrow of Mahommedan rule,

nor could he be expected to desire the smooth working of a system against which he had protested as a violation of his sovereign rights.

In 1908 the powers were still united in bringing pressure to bear on the Porte to make the reforms effective; but the proposal of Great Britain to follow the precedent of the Lebanon and commit the administration of Macedonia to a Mussulman governor appointed by the sultan, but removable only by consent of the powers, met with little favour either at Constantinople or among the powers whose ulterior aims might have been hampered by such an arrangement.

Such was the condition of affairs when in October 1908 the revolution in Turkey altered the whole situation. The easy and apparently complete victory of the Young Turks, and Young the re-establishment without a struggle of the constitu- Turkish tion which had been in abeyance since 1S76, took the revolution, whole world by surprise, and not least those who believed themselves to be most intimately acquainted with the conditions prevailing in the Ottoman empire. The question of the Near East seemed in fair way of settlement by the action of conflicting races themselves, who in the enthusiasm of new- found freedom appeared ready to forget their ancient internecine feuds and to fraternize on the common ground of constitutional liberty (see Turkey: History). By the European powers the proclamation of the constitution was received, at least out-wardly, with unanimous approval, general admiration being expressed for the singular moderation and self-restraint shown by the Turkish leaders and people. Whatever views, however, may have been openly expressed, or secretly held, as to the revolution so far as it affected the Ottoman empire itself, there could be no doubt that its effects on the general situation in Europe would be profound. These effects were not slow in revealing themselves. On the 5th of October rUst/fts?" Prince Ferdinand of Bulgaria proclaimed himself king (tsar) of the Bulgarians; and two days later the emperor Francis Joseph issued a rescript announcing the annexation of Bosnia and Herzegovina to the Habsburg monarchy (see Bulgaria: History and Bosnia and Herzegovina: History). Whatever cogent reasons there may have been for altering the status of these countries in view of the changed conditions in Turkey, there could be no doubt that the method employed was a violation of the public law of Europe. By the declaration of London of 1871, to which Austria-Hungary herself had been a principal party, it had been laid down that " contracting powers could only rid themselves of their treaty engagements by an under- standing with their co-signatories." This solemn reaffirmation of a principle on which the whole imposing structure of inter-national law had, during the 19th century, been laboriously built up was now cynically violated. The other powers, con- fronted with the _, ail accompli, protested; but the astute states- man who had staked

his reputation as foreign minister of the Dual Monarchy on the success of this coup had well gauged the character and force of the opposition he would have to meet. Baron von Aehrenthal,himself more Slavthan German, g uropeaa in spite of his name, had served a long apprenticeship crisis in diplomacy at Belgrade and St Petersburg; he knew provoked how fully he could rely upon the weakness of Russia, b y Austrla – and that if Russian Pan-Slav sentiment could be cowed, he need fear nothing from the resentment of the Servians. He was strong, too, in the moral and — in case of need — the material support of Germany. With Germany behind her, Austria-Hungary had little to fear from the opposition of the powers of the triple entente, Great Britain, France and Russia. This diagnosis of the situation was justified by the event. For months, indeed, Europe seemed on the verge of a general war. During the autumn the nationalist excitement in Servia and Montenegro rose to fever- heat, and Austria responded by mobilizing her forces on the frontiers and arming the Catholic Bosnians as a precaution against a rising of their Orthodox countrymen. Only the winter seemed to stand between Europe and a war bound to become general, and men looked forward with apprehension to the melting of the snows. It is too early as yet to write the history of the diplomatic activities by which this disaster was avoided. Their general

outline, however, is clear enough. The protests of Turkey at a violation of treaty rights, doubly resented as likely to damage the prestige of the new constitutional regime, were sympathetically received by the powers of the triple entente. An international conference was at once suggested as the only proper authority for carrying out any modifications of the treaty of Berlin necessi- tated by the new conditions in Turkey; the right of Austria- Hungary to act on her own initiative was strenuously denied; Bulgarian independence and Prince Ferdinand's title of king were meantime refused recognition. In the assertion of these principles Great Britain, Russia and France were united. Germany, on the other hand, maintained an attitude of reserve, though diplomatic- ally " correct "; she accepted the principle of a conference, but made her consent to its convocation conditional on that of her ally Austria-Hungary. But the latter refused to agree to any conference in which the questions at issue should be re- opened; the most that she would

accept was a conference summoned merely to register the fait accompli and to arrange " compensations " not territorial but financial.

For a while it seemed as though Baron Achrenthal's ambition had o'erleaped itself. The reluctance of the Russian government, Tae conscious of its military and political weakness, to

German- take extreme measures seemed likely to be overborne Austrian by the Pan-Slav enthusiasm of the Russian people, victory. an(j ^ Austrian statesman's policy to have placed him in an impasse from which it would be difficult to extricate himself, save at an expense greater than that on which he had calculated. At this point Germany, conscious throughout of holding the key to the situation, intervened with effect. Towards the end of March 1909 the German ambassador at St Petersburg, armed with an autograph letter from the emperor William II., had an interview with the tsar. What were the arguments he used is not known; but the most powerful are supposed to have been the German forces which had been mobilized on the Polish frontier. In any case, the result was immediate and startling. Russia, without previous discussion with her allies, dissociated herself from the views she had hitherto held in common with them, and accepted the German-Austrian standpoint. All question of a conference was now at an end; and all that the . powers most friendly to Turkey could do was to persuade her to make the best of a bad bargain. The Ottoman government, preoccupied with the internal questions which were to issue in the abortive attempt at counter-revolution in April, was in no condition to resist friendly or unfriendly pressure. The principle of a money payment in compensation for the shadowy rights of the sultan over the lost provinces was accepted, 1 and Bulgarian independence under King Ferdinand was recognized on the very eve of the new victory of the Young Turks which led to the deposition of Abd-ul-Hamid II. and the proclamation of Sultan Mahommed V. (see Turkey: History).

The change made by these events in the territorial system of Europe was of little moment. A subject principality, long . practically independent, became a sovereign state; the Almanack de Gotha was enriched with a new royal title; the sentiment of the Bulgarian people was gratified by the restoration of their historic tsardom. Two provinces long annexed to the Habsburg monarchy de facto became so de jure, and the vision of a Serb empire with a free outlet to the sea, never very practicable, was finally dissolved. Of vastly greater importance were the moral and international issues involved. The whole conception of an effective concert of Europe, or of the World,

based on the supposed sacred obligation of treaties and the validity of international law, was revealed, suddenly and brutally, as the baseless fabric of a dream. The most momentous outcome of the international debates caused by Austria's high- handed action was the complete triumph of Bismarck's principle that treaties cease to be valid " when the private interest of those who lie under them no longer reinforces the text." Hence- forth, it was felt, no reaffirmation of a principle of international

1 The Austro-Turkish protocol had been signed at Constantinople on the 5th of March ; it was now ratified by the Turkish parliament on the 5th of April.

comity and law, so successfully violated, could serve to disguise the brutal truth that in questions between nations, in the long- run, might is right — that there is no middle term between the naked submission preached by Tolstoy and his disciples and Napoleon's dictum that " Providence is with the big battalions." In Great Britain, especially, public opinion was quick to grasp this truth. It was realized that it was the immense armed power of Germany that had made her the arbiter in a question vitally affecting the interests of all Europe. Germany alone emerged from the crisis with prestige enormously enhanced; for without her intervention Austria could not have resisted the pressure of the powers. The cry for disarmament, encouraged by the action of Sir Henry Campbell-Bannerman's government, suddenly died down in England; and the agitation in favour of an increased ship-building programme, that followed the revelation by the first lord of the admiralty (April 1909) of Germany's accelerated activity in naval construction, showed that public opinion had been thoroughly awakened to the necessity of maintaining for Great Britain her maritime supremacy, on which not only her position in Europe but the existence of her over-sea empire depended.

Bibi tographicalNote. — (i)Bibliographies. — Lists of the principal works on the history of the various European countries, and of their main sources, are given in the bibliographies attached to the separate articles (see also those appended to the articles Papacy; Church History; Diplomacy; Crusades; Feudalism, &c). For the sources of the medieval history of Europe see Ulysse Chevalier's monumental Repertoire des sources historiques du moyen Age; Bio- Bibliographie (Paris, 1877, &c), which with certain limitations (notably as regards the Slav, Hungarian and Scandinavian countries) gives references to published documents for all names of people, however obscure, occurring in medieval history. In 1894 M. Chevalier began the

publication of a second series of his Repertoire, under the somewhat misleading title of Topo-Bibliographie, intended as a compendious guide to the places, institutions, &c, of the middle ages; though very useful, this is by no means so complete as the Bio-Bibliographie. August Potthast's Bibliotheca historica medii aevi (2nd ed., Berlin, 1895-1896) gives a complete catalogue of all the annals, chronicles and other historical works which appeared in Europe between the years 375 and 1500 and have since been printed, with short notes on their value and significance, and references to critical works upon them. See also the article Record. For authorities on the history of Europe from the end of the 15th to the 19th centuries inclusive the excellent bibliographies appended to the volumes of the Cambridge Modern History are invaluable

(2) Works. — Of general works the most important are the Hlsloire generate duIV"" siecle a nos jours, published under the direction of E. Lavisse and A. Rambaud (Paris, 1894, &c), in 12 vols., covering the period from the 4th to the end of the 19th century: Leopold von Ranke's Weltgeschichte (Leipzig, 1881, &c), in 9 vols., covering (i.) the oldest group of nations and the Greeks; (ii.) the Roman Republic ; (iii.) the ancient Roman Empire ; (iv.) the East Roman empire and the origin of the Romano-German kingdoms; (v.) the Arab world-power and the empire of Charlemagne ; (vi.) dissolution of the Carolingian and foundation of the German empire; (vii.) zenith and decay of the German empire; the hierarchy under Gregory VII.; (viii.) crusades and papal world-power (12th and 13th centuries); (ix.) period of transition to the modern world (14th and 15th centuries). To this may be added Ranke's works on special periods: e.g. Die Fursten und Volker von Sud-Europa im i6ten und Iften Jahrhundert (2nd ed., Leipzig, 1837-1839); Ceschichten der romanischen und germanischen Volker, 1494-1514 (2nd ed., Leipzig, 1874, Eng. trans. 1887). In English the most important general work is the Cambridge Modern History (1903, &c), produced by the collaboration of English and foreign scholars, and covering the ground from the end of the 15th to the 19th century inclusive. The Historians' History oj the World, edited by Dr H. Smith Williams (1908), is a compilation from the works of eminent historians of all ages, and the value of its various parts is therefore that of the historians responsiole for them. Its chief merit is that it makes accessible to English readers many foreign or obscure sources which would otherwise have remained closed to the general reader. It also contains essays by notable modern scholars on the principal epochs and tendencies of the world's history, the texts of a certain number of treaties, &c, not included as yet in other collections, and

comprehensive bibliographies. On a less ambitious scale are the volumes of the " Periods of European History " series (London, 1893, &c): Per. I. The Dark Ages, 476-018, by C. W. C. Oman (1893); Per. II. The Empire and the Papacy, 018-1273, by T. F. Tout (1898) ; Per. III. The Close of the Middle Ages, 1273-1404, by R. Lodge (1901) ; Europe in the 16th Century, 1404-1508, by A. H. Johnson (1897); The Ascendancy of France, by H. O. Wakeman (1894); The Balance of Power, by A. Hassal (1896); Revolutionary Europe, by H. Morse Stephens (1893); Modern Europe, by W. Alison Phillips (1901,

5th ed., 1908). See also T. H. Dyer, History of Modern Europe from the fall of Constantinople, revised and continued to the end of the 19th century by A. Hassal (6 vols., London, 1901). Besides the above may be mentioned, for European history since the outbreak of the French Revolution, A. Sorel, L'Europe et la Revolution Francaise (7 vols., Paris, 1885, &c), a work of first-class importance; A. Stern, Geschichte Europas seit den Wiener Vertrdgen von 1815 (Stuttgart and Berlin, 1894, &c), based on the study of much new material, still in progress (1908); C. Seignobos, Histoire politique de I'Europe contemporaine (Paris, 1897), a valuable text-book with copious bibliography (Eng. trans., London, 1901); C. M. Andrews, Historical development of Europe, 2 vols. (New York, 1896-1898).

(3) Published Documents. — For the vast mass of published sources reference must be made to the bibliographies mentioned above. It must be borne in mind, however, that these represent but a fraction of the unpublished material, and that the great development of original research is constantly revealing fresh sources, throwing new light on old problems, and not seldom upsetting conclusions long established as final. For these latest developments of scholarship the numerous historical and archaeological reviews published in various countries should be consulted : e.g. The English Historical Review (London); The Scottish Hist. Rev. (Glasgow); The American Hist. Rev. (London and New York) ; the Revue historique (Paris) ; the Historische Zeitschrift (Munich). The most notable collections of treaties are J. Dumont's Corps diplomatique, covering the period from A.D. 800 to 1731 (Amsterdam and the Hague, 1726-1731); F. G. de Martens and his continuators, Recueil des traites, &c. (1791, &c), covering with its supplements the period from 1494 to 1874; F. (T. T.) de Martens, Recueil des traites conclus par la Russie, &c. (14

vols., St Petersburg, 1874, &c.) ; A. and J. de Clercq, Recueil des traites de la France (Paris, 1864; new ed., 1880, &c); L. Neu- mann, Recueil des traites conclus par I'Autriche (from 1763), (6 vols., Leipzig, 1855) ; new series, by . L. Neumann and A. de Plason (16 vols., Vienna, 1877-1903); Osterreichische Staatsvertrdge (vol. i. England, 1526-1748), published by the Commission for the modern history of Austria (Innsbruck, 1907), with valuable introductory notes; British and Foreign State Papers (from the termination of the war in 1814), compiled at the Foreign Office by the Librarian and Keeper of the Papers (London, 1819, &c); Sir E. Hertslet, The Map of Europe by Treaty (from I814), (4 vols., London, 1875- 1891). See the article Treaties. (W. A. P.)

EUROPIUM, a metallic chemical element, symbol Eu, atomic weight 152-0 (0=i6). The oxide Eu/) 3 occurs in very small quantity in the minerals of the rare earths, and was first obtained in 1896 by E, A. Demarcay from Lecoq de Boisbaudran's samarium; G. Urbain and H. Lacombe in 1904 obtained the pure salts by fractional crystallization of the nitric acid solution with magnesium nitrate in the presence of bismuth nitrate. The salts have a faint pink colour, and show a faint absorption spectrum; the spark spectrum is brilliant and well characterized.

EURYDICE (Evpvd'ucri), in- Greek mythology, the wife of Orpheus (q.v.). She was the daughter of Nereus and Doris, and died from the bite of a serpent when fleeing from Aristaeus, who wished to offer her violence (Virgil, Georgics, iv. 454-527; Ovid, Metam. x. 1 ff.).

EURYMEDON, one of the Athenian generals during the Peloponnesian War. In 428 B.C. he was sent by the Athenians to intercept the Peloponnesian fleet which was on the way to attack Corcyra. On his arrival, finding that Nicostratus with a small squadron from Naupactus had already placed the island in security, he took the command of the combined fleet, which, owing to the absence of the enemy, had no chance of distinguish- ing itself. In the following summer, in joint command of the land forces, he ravaged the district of Tanagra; and in 425 he was appointed, with Sophocles, the son of Sostratides, to the command of an expedition destined for Sicily. Having touched at Corcyra on the way, in order to assist the democratic party against the oligarchical exiles, but without taking any steps to prevent the massacre of the latter, Eurymedon proceeded to Sicily. Immediately after his arrival a pacification was con- cluded by Hermocrates, to which Eurymedon and Sophocles were induced to agree. The terms of the pacification did not, however, satisfy the Athenians, who attributed its conclusion

to bribery; two of the chief agents in the negotiations were banished, while Eurymedon was sentenced to pay a heavy fine. In 414 Eurymedon, who had been sent with Demosthenes to reinforce the Athenians at the siege of Syracuse, was defeated and slain before reaching land (Thucydides iii., iv., vii.; Diod. Sic. xiii. 8, 11, 13).

EUSDEN, LAURENCE (1688-1730), English poet, son of the Rev. Laurence Eusden, rector of Spofforth, Yorkshire, was baptized on the 6th of September 1688. He was educated at St Peter's school, York, and at Trinity College, Cambridge. He became a minor fellow of his college in 1 71 1, and in the next year was admitted to a full fellowship.' He was made poet laureate in 1 718 by the lord chancellor, the duke of Newcastle, as a reward for a flattering poem on his marriage. He was rector of Coningsby, Lincolnshire, where he died on the 27 th of September 1730. His name is less remembered by his translations and gratulatory poems than by the numerous satirical allusions of Pope, e.g. " Know, Eusden thirsts no more fcr sack or praise; He sleeps among the dull of ancient days."

Dunciad, bk. i. 11. 293-294.

EUSEBIUS (Gr. Ewre/3ios, from eiiatˆs, pious, cf. the Latin name Pius), a name borne by a large number of bishops and others in the early ages of the Christian Church. Of these the most important are separately noticed below. No less than 25 saints of this name (sometimes corrupted into Eusoge, Euruge, Usoge, Usuge, Uruge and St Sebis) are venerated in the Roman Catholic Church, of whom 23 are included in the Bollandist Ada Sanctorum; many are obscure martyrs, monks or anchorites, but two deserve at least a passing notice.

Eusebius, bishop of Vercelli (d. 371), is notable not only as a stout opponent of Arianism, but also as having been, with St Augustine, the first Western bishop to unite with his clergy in adopting a strict monastic life after the Eastern model (see Ambrose, Ep. 63 ad Vercellenses, § 66). The legend that he was stoned to death by the Arians was probably invented for the edification of the Orthodox.

Eusebius, bishop of Samosata (d. 380), played a considerable part in the later stages of the Arian controversy in the East. He is first mentioned among the Homoean and Homoeusian bishops who in 363 accepted the Homousian formula at the synod of Antioch presided over by Meletius, with whose views he seems to have identified himself (see Meletius or Antioch). Accord- ing to Theodoret (5, 4, 8) he was killed at Doliche in Syria, where he. had gone to consecrate a

bishop, by a stone cast by an Arian woman. He thus became a martyr, and found a place in the Catholic calendar (see the article by Loofs in Herzog- Hauck, Realencykl., ed. 1898, v. p. 620).

Eusebius of Laodicea, though not included among the saints, was noted for his saintly life. He was an Alexandrian by birth, and gained so great a reputation for his self-denial and charity that when in 262 the city was besieged by the troops of the emperor Gallienus he obtained permission, together with Ana- tolius, from their commander Theodotus, to lead out the non- combatants, whom he tended " like a father and physician." He went with Anatolius to Syria, and took part in the controversy against Paul of Samosata, bishop of Antioch. He became bishop of Laodicea, probably in the following year (263), and died some time before 268. His friend Anatolius succeeded him as bishop in the latter year (see the article by E. Hennecke in Herzog- Hauck, v. 619).

EUSEBIUS, bishop of Rome for four months under the emperor Maxentius, in 309 or 310. The Christians in Rome, divided on the question of the reconciliation of apostates, on which Eusebius held the milder view, brought forward a competitor, Heraclius. Both competitors were expelled by the emperor, Eusebius dying in exile in Sicily. He was buried in the cemetery of St Calixtus at Rome; and the extant epitaph, in eight hexameter lines, set up here by his successor Damasus, contains all the information there is about his life.

EUSEBIUS [of Caesarea] (c. 260 -c. 340), ecclesiastical historian, who called himself Eusebius Pamphili, because of his devotion to his friend and teacher Pamphilus, was born probably in Palestine between a.d. 260 and 265, and died as bishop of Caesarea in the year 339 or 340. We know little of his youth beyond the fact that he became associated at an early day with Pamphilus, presbyter of the Church of Caesarea, and founder of a theological school there (see Hist. Eccl. vii. 32). Pamphilus gathered about him a circle of earnest students who

devoted themselves especially to the study of the Bible and the transcription of Biblical codices, and also to the defence and spread of the writings of Origen, whom they regarded as their master. Pamphilus had a magnificent library, which Eusebius made diligent use of, and a catalogue of which he published in his lost Life of

Pamphilus (Hist. Eccl. vi. 32). In the course of the Diocletian persecution, which broke out in 303, Pamphilus was imprisoned for two years, and finally suffered martyrdom. During the time of his imprisonment (307-309) Eusebius dis- tinguished himself by assiduous devotion to his friend, and assisted him in the preparation of an apology for Origen's teaching (Hist. Eccl. vi. a), the first book of which survives in the Latin of Rufinus (printed in Routh's Reliquiae sacrae, iv. 339 sq., and in Lommatzsch's edition of Origen's Works, xxiv. p. 293 sq.). After the death of Pamphilus Eusebius withdrew to Tyre, andlater, while the Diocletian persecution was still raging, went to Egypt, where he seems to have been imprisoned, but soon released. He became bishop of Caesarea between 313 and 315, and remained such until his death. The patriarchate of Antioch was offered him in 33 1, but declined (Vita Constantini, iii. 59 sq.). Eusebius was a very important figure in the church of his day. He was not a great theologian nor a profound thinker, but he was the most learned man of his age, and stood high in favour with the emperor Constantine. At the council of Nicaea in 325 he took a prominent part, occupying a seat at the emperor's right hand, and being appointed to deliver the panegyrical oration in his honour. He was the leader of the large middle party of Moderates at the council, and submitted the first draft of the creed which was afterwards adopted with important changes and additions. In the beginning he was the most influential man present, but was finally forced to yield to the Alexandrian party, and to, vote for a creed which completely repudiated the position of the Arians, with whom he had himself been hitherto more in sympathy than with the Alexandrians. He was placed in a difficult predicament by the action of the council, and his letter to the Caesarean church explaining his conduct is ex- ceedingly interesting and instructive (see Socrates, Hist. Eccl. i. 8, and cf. McGiffert's translation of Eusebius' Church History, p. 15 sq.). To understand his conduct, it is necessary to look briefly at his theological position. By many he has been called an Arian, by many his orthodoxy has been defended. The truth is, three stages are to be distinguished in his theological develop- ment. The first preceded the outbreak of the Arian controversy, when, as might be expected in a follower of Origen, his interest was anti-Sabellian and his emphasis chiefly upon the sub- ordination of the Son of God. In his works written during this period (for instance, the Praeparatio evangelica and Demonstratio evangelica), as in the works of Origen himself and other ante- Nicene fathers, expressions occur looking in the direction of Arianism, and others looking in the opposite direction. The second stage began with the outbreak of the controversy in 318, and continued until the Nicene Council. During

this period he took the side of Arius in the dispute with Alexander of Alexandria, and accepted what he understood to be the position of Arius and his supporters, who, as be supposed, taught both the divinity and subordination of the Son. It was natural that he should take this side, for in his traditional fear of Sabellianism, in which he was one with the followers of Origen in general, he found it difficult to approve the position of Alexander, who seemed to be doing away altogether with the subordination of the Son. And, moreover, he believed that Alexander was misrepresenting the teaching of Arius and doing him great injustice (cf . his letters to Alexander and Euphration preserved in the proceedings of the second council of Nicaea, Act. vi. torn. 5: see Mansi's Concilia, xiii. 316 sq.; English translation in McGiffert, op. cit. p. 70). Meanwhile at the council of Nicaea he seems to have discovered that the Alexandrians were right in claiming that Arius was carrying his subordinationism so far as to deny all real divinity to Christ. To this length Eusebius himself was unwilling to go, and so, convinced that he had misunderstood Arius, and that the teaching of the latter was imperilling the historic belief in the divinity of Christ, he gave his support to the opposition,

and voted for the Nicene Creed, in which the teachings of the Arians were repudiated. From this time on he was a supporter of Nicene orthodoxy over against Arianism (cf., e.g., his Contra Marcellum, De ecclesiastica theologia, and Theophania). But he never felt in sympathy with the extreme views of the Athanasian party, for they seemed to him to savour of Sabellianism, which always remained his chief dread (cf. his two works against Marcellus of Ancyra). His personal friends, moreover, were principally among the Arians, and he was more closely identified with them than with the supporters of Athanasius. But he was always a man of peace, and while commonly counted one of the opponents of Athanasius, he did not take a place of leadership among them as his position and standing would have justified him in doing, and Athanasius never spoke of him with bitterness as he did of other prominent men in the party. (For a fuller description of the development of Eusebius' Christology and of his attitude throughout the Arian controversy, see McGiffert, op. cit. p. 11 sq.)

Eusebius was one of the most voluminous writers of antiquity, and his labours covered almost every field of theological learning. If we look in his works for brilliancy and originality we shall be disappointed. He was not a creative genius like Origen or Augustine. His claim to greatness rests upon his vast erudition and his sound judgment. Nearly all his works possess genuine and solid merits which raise them above the commonplace, and many of them still

remain valuable. His exegesis is superior to that of most of his contemporaries, and his apologetic is marked by fairness of statement, breadth of treatment, and an instinctive appreciation of the difference between important and unimportant points. His style, it is true, is involved and obscure, often rambling and incoherent. This quality is due in large part to the desultory character of his thinking. He did not always clearly define his theme before beginning to write, and he failed to subject what he produced to a careful revision. Ideas of all sorts poured in upon him while he was writing, and he was not always able to resist the temptation to insert them whether pertinent or not. His great learning is evident everywhere, but he is often its slave rather than its master. It is as an historian that he is best known, and to his History of the Christian Church he owes his fame and his familiar title " The Father of Church History." This work, which was published in its final form in ten books in 324 or early in 325, is the most important ecclesiastical history produced in ancient times. The reasons leading to the great undertaking, in which Eusebius 'had no predecessors, were in part historical, in part apologetic. He believed that he was living at the beginning of a new age, and he felt that it was a fitting time, when the old order of things was passing away, to put on record for the benefit of posterity the great events which had occurred during the generations that were past. He thus wrote, as any historian might, for the information and instruction of his readers, and yet he had all the time an apologetic purpose, to exhibit to the world the history of Christianity as a proof of its divine origin and efficacy. His plan is stated at the very beginning of the work: —

" It is my purpose to write an account of the successions of the holy Apostles as well as of the times which have elapsed from the day of our Saviour to our own ; to relate how many and important events are said to have occurred in the history of the church; and to mention those who have governed and presided over the church in the most prominent parishes, and those who in each generation havej proclaimed the divine word either orally or in writing. It is my purpose also to give the names and number and times of those who through love of innovation have run into the greatest errors, and proclaiming themselves discoverers of knowledge, falsely so called, have like fierce wolves unmercifully devastated the flock of Christ. It is my intention, moreover, to recount the misfortunes which immediately came on the whole Jewish nation in consequence of their plots against our Saviour, and to record the ways and times in which the divine word has been attacked by the Gentiles, and to describe the character of those who at various periods have

contended for it in the face of blood and tortures, as well as the confessions which have been made in our own day, and the gracious and kindly succour which our Saviour has accorded them all."

The value of the work does not lie in its literary merit, but in the wealth of the materials which it furnishes for a knowledge

of the early church. Many prominent figures of the first three centuries are known to us only from its pages. Many fragments, priceless on account of the light which they shed upon movements of far-reaching consequence, have been preserved in it alone. Eusebius often fails to appreciate the significance of the events which he records; in many cases he draws unwarranted con- clusions from the given premises; he sometimes misinterprets his documents and misunderstands men and movements; but usually he presents us with the material upon which to form our own judgment, and if we differ with him we must at the same time thank him for the data that enable us independently to reach other results. But the work is not merely a thesaurus, it is a history in a true sense, and it has an intrinsic value of its own, independent of its quotations from other works. Eusebius possessed extensive sources of knowledge no longer accessible to us. The number of books referred to as read is enormous. He also had access to the archives of state, and gathered from them information beyond the reach of most. But the value of his work is due, not simply to the sources employed, but also to the use made of them. Upon this matter there has been, it is true, some diversity of opinion among modern scholars, but it is now generally admitted, and can be abundantly shown, that he was not only diligent in gathering material, but also far more thorough-going than most writers of antiquity in discriminating between trustworthy and untrustworthy reports, frank in ac- knowledging his ignorance, scrupulous in indicating his authorities in "doubtful cases, less credulous than most of his contemporaries, and unfailingly honest. His principal faults are his carelessness and inaccuracy in matters of chronology, his lack of artistic skill in the presentation of his material, his desultory method of treatment, and his failure to look below the surface and grasp the real significance and vital connexion of events. He commonly regards an occurrence as sufficiently accounted for when it is ascribed to the activity of God or of Satan. But in spite of its defects the Church History is a monumental work, which need only be compared with its continuations by Socrates,

Sozomen, Theodoret, Rufinus and others, to be appreciated at its true worth.

In addition to the Church History we have from Eusebius' pen a Chronicle in two books (c. 303;_later continued down to 325), the first containing an epitome of universal history, the second chronological tables exhibiting in' parallel columns the royal succession in different nations, and accompanied by notes marking the dates of historical events. A revised edition of the second book with a continuation down to his own day was published in Latin by St Jerome, and this, together with some fragments of the original Greek, was our only source for a knowledge of the Chronicle until the discovery of an Armenian version of the whole work, which was published by Aucher in 1818 (Latin translation in Schoene's edition), and of two Syriac versions published in Latin translation respectively in 1866 (by Roediger in Schoene's edition) and in 1884 (by Siegfried and Gelzer). Other historical works still extant are the Martyrs of Palestine and the Life of Conslanline. The former is an account of martyrdoms occurring in Palestine during the years 303 to 310, of most of which Eusebius himself was an eye-witness. The work exists in a longer and a shorter recension, the former in a Syriac version (published with English translation by Cureton, 1861), the latter in the original Greek attached to the Church History in most MSS. (printed with the History in the various editions). The Life of Constantine, in four books, published after the death of the emperor, which occurred in 337, is a panegyric rather than a sober history, but contains much valuable material. Of Eusebius' apolo- getic works we still have the Contra Hieroclem, Praeparatio evangelica, Demonstratio evangelica, and Theophania. The first is a reply to a lost work against the Christians written by Hierocles, a Roman governor and contemporary of Eusebius. The second and third, taken together, are the most elaborate and important apologetic work of the early church. The former, in fifteen books, aims to show that the Christians are justified in accepting the sacred writings of the Hebrews, and in rejecting the religion and philosophy of the Greeks. The latter, in twenty books, of which only the first ten and fragments of the fifteenth are extant, endeavours to prove from the Hebrew Scriptures themselves that the Christians are right in going beyond the Jews and adopting new principles and practices. The former is thus a preparation for the latter, and the two together constitute a defence of Christianity against all the world, heathen as well as Jews. In grandeur of conception, comprehensiveness of treatment, and breadth of learning, this apology surpasses all other similar works of antiquity. The Praeparatio is also valuable because of its

large number of quotations from classical literature, many of

them otherwise unknown to us. The Theophania, though we have many fragments of the original Greek, is extant as a whole only in a Syriac version first published by Lee in 1842. Its subject is the manifestation of God in the incarnation of the Word, and it aims to give with an apologetic purpose a brief exposition of the divine authority and influence of Christianity. Of Eusebius' dogmatic and polemic writings, we still have two works against his contem- porary, Marcellus, bishop of Ancyra, the one known as Contra Marcellum, the other as De theologia ecclesiastica. The former and briefer aims simply to expose the errors of Marcellus, whom Eusebius accuses of Sabellianism, the latter to refute them. We also have parts of a General Introduction ('H Ka66\ov otoix«"»>$1s tivaywyri) , which consisted of ten- books (the sixth to the ninth books and a few other fragments still extant), under the title of Prophetical Extracts (IIpoˆTiicaJ ticXayai). Although this formed part of a larger work it was complete in itself and circulated separately. It contains prophetical passages from the Old Testament relating to the person and work of Christ, accompanied by explanatory notes. Of Biblical and exegetical works we have a considerable part of Eusebius' Commentaries on the Psalms and oh Isaiah, which are monuments of learning, industry and critical acumen, though marred by the use of the allegorical method characteristic of the school of Origen; also a work on the names of places mentioned in Scripture, or the Onomasticon, the only one extant of a number of writings on Old Testament topography; and an epitome and some fragments of a work in two parts on Gospel Questions and Solutions, the first part dealing with the genealogies of Christ given in Matthew and Luke, the second with the apparent discrepancies between the various gospel accounts of the resurrection. Other important works which have perished wholly or in large part, and some orations and minor writings still extant, it is not necessary to refer to more particularly. (See Preuschen's list in Harnack's Alt-christliche Litter aturgeschichte, i. 2, p. 55 sq. Preuschen gives thirty-eight titles, besides orations and letters, but it is doubtful whether all of the Commentaries mentioned really existed.)

Bibliography. — The only edition of Eusebius' extant works which can lay claim even to relative completeness is that of Migne (Patrologia graeca, torn, xix.-xxiv.). The publication of a new critical edition was begun in 1902 in the Berlin Academy's Greek Fathers (Die griechischen christlichen Schriflsteller der ersten drei Jahrhunderte, Leipzig). Many of Eusebius' works have been published separately. Thus the Church History, first by Stephanus

(Paris, 1554) ; by Valesius with copious notes, together with the Life of Constantine, the Oration in Praise of Constantine, and the Histories of Socrates, Sozomen, Theodoret, &c. (best edition that of Reading (Cambridge, 1720), in three volumes, folio); by Heinichen (1827, second edition 1868-1870 in three volumes, a very useful edition, containing also the Life of Constantine and the Oration in Praise of Constantine, with elaborate notes); by Burton (1838; a handy reprint in a single volume by Bright, 1881), and by many ethers. The most recent and best edition is that of Schwartz in the Berlin Academy's Greek Fathers, of which the first half has appeared, accompanied by the Latin version of Rufinus edited by Mommsen. Thq history was early put into Syriac (edited by Bedjan, Leipzig, 1897; also by Wright, McLean and Merx, London, 1898), Armenian (edited by Djarian, Venice, 1877), and Latin, and has been translated into many modern languages, the latest English version being that of McGiffert, in the Nicene and Posl-Nicene Fathers, second' series, volume i. (New York, 1890). Of the Chronicle, the best edition is by Schoene in two volumes (Berlin, 1866-1875). The Life of Constantine and the Oration in Praise of Constantine are published by Valesius, Heinichen and others in their editions of the Church History, also in the first volume of the Berlin Academy's edition (ed. by Heikel), and an English translation by Richardson in the volume containing McGiffert's translation of the Church History. Gaisford published the Prophetical Extracts (Oxford, 1842), the Praeparatio evangelica (1843), the Demonstratio evangelica (1852), and the works against Hierocles and Marcellus (1852); and the works against Marcellus have appeared in the edition of the Berlin Academy (vol. iv.). The Onomasticon has been published frequently, among others by Lagarde (Gottingen, 1870; 2nd ed., 1887), and is contained in the edition of the Berlin Academy (vol. hi.). The Thcjphania was first published by Lee (Syriac version, 1842 ; English translation, 1843). A German translation of the Syriac version, with the extant fragments of the original Greek, is given in the edition of the Berlin Academy (vol. iii.).

Acacius, the pupil of Eusebius and his successor in the see of Caesarea, wrote a life of him which is unfortunately lost. His own writings contain little biographical material, but we get information from Athanasius, Philostorgius, Socrates, Sozomen, Theodoret, Jerome's De vir. ill., and Photius. Among the many modern accounts in church histories, histories of Christian literature, encyclopaedias, &c, may be mentioned a monograph by Stein, Eusebius Bischof von Caesarea (Wiirzburg, 1859), meagre but useful as far as it goes; the

magnificent article by Lightfoot in the Dictionary of Christian Biography; the account by McGiffert in his translation of the Church History; Erwin Preuschen's article in Herzog-Hauck, Realencyklop. (3rd ed., 1898) ; the treatment of the Chronology of Eusebius writings in Harnack's Alt-christliche Litteraturgeschichte, ii. 2, p. 106 sq.; and Bardenhewer's Patrologie, p. 2260 f. The many

special discussions of Eusebius' separate works, particularly of his Church History, and of his character as an historian, cannot be referred to here. Elaborate bibliographies will be found in McGiffert's translation, and in Preuschen's article in Herzog-Hauck. (A.C. McG.)

EUSEBIUS [or Emesa] (d. c. '360), a learned ecclesiastic of the Greek church, was born at Edessa about the beginning of the 4th century. After receiving his early education in his native town, he studied theology at Caesarea and Antioch and philo- sophy and science at Alexandria. Among his teachers were Eusebius of Caesarea and Patrophilus of Scythopolis. The reputation he acquired for learning and eloquence led to his being offered the see of Alexandria in succession to the deposed Athan- asius at the beginning of 339, but he declined, and the council (of Antioch) chose Gregory of Cappadocia, " a fitter agent for the rough work to be done." Eusebius accepted the small bishopric of Emesa (the modern Horns) in Phoenicia, but his powers as mathematician and astronomer led his flock to accuse him of practising sorcery, and he had to flee to Laodicea. A reconciliation was effected by the patriarch of Antioch, but tradition says that Eusebius finally resigned his charge and lived a studious life in Antioch. His fame as an astrologer commended him to the notice of the emperor Constantius II., with whom he became a great favourite, accompanying him on many of his expeditions. The theological sympathies of Eusebius were with the semi-Arian party, but his interest in the controversy was not strong. His life was written by his friend George of Laodicea. He was a man of extraordinary learning, great eloquence and considerable intellectual power, but of his numerous writings only a few fragments are now in existence.

See Migne, Patrol. Graec. vol. lxxxvi.

EUSEBIUS [of Myndus], Greek philosopher, a distinguished Neoplatonist and pupil of Aedesius who lived in the time of Julian,

and who is described by Eunapius as one of the " Golden Chain " of Neoplatonism. He ventured to criticize the magical and theurgic side of the doctrine, and exasperated the emperor, who preferred the mysticism of Maximus and Chrysanthius. He devoted himself principally to logic. Stobaeus in the Sermones collected a number of ethical dicta of one Eusebius, who may perhaps be identical with the Neoplatonist.

The fragments have been collected by Mullach in his Fragmenla Phil. Graec, and by Orelli, in Opuscula veter. graec. sentenl. et moral.

EUSEBIUS [or Nicomedia] (d. 341?), Greek bishop and theo- logian, was the defender of Arius in a still more avowed manner than his namesake of Caesarea, and from him the Eusebian or middle party specially derived its name, giving him in return the epithet of Great. He was a contemporary of the bishop of Caesarea, and united with him in the enjoyment of the friendship and favour of the imperial family. He is said to have been connected by his mother with the emperor Julian, whose early tutor he was. His first bishopric was Berytus (Beirut) in Phoe- nicia, but his name is especially identified with the see of Nico- media, which, from the time of Diocletian till Constantine established his court at Byzantium, was regarded as the capital of the eastern part of the empire. He warmly espoused the cause of Arius in his quarrel with his bishop Alexander, and wrote a letter in his defence to Paulinus, bishop of Tyre, which is pre- served in the Church History of Theodoret. Trained in the school of Lucian of Antioch, his views appear to have been identical with those of Eusebius of Caesarea in placing Christ above all created beings, the only begotten of the Father, but in refusing to recognize him to be " of the same substance " with the Father, who is alone in essence and absolute being.

At the council of Nicaea Eusebius of Nicomedia earnestly opposed, along with his namesake of Caesarea, the insertion of the Homousian clause, but after being defeated in his object he also signed the creed in his own sense of o/ioios Kar' ovoiav. He refused, however, to sign the anathema directed against the Arians, not, as he afterwards explained, because of his variance from the Athanasian theology, but " because he doubted whether Arius really held what the anathema imputed to him " (Sozom. ii. 15). After the council he continued vigorously to espouse the Arian cause, and was so far carried away in his zeal against

the Athanasians that he was temporarily banished from his see as a disturber of the peace of the church. But his alienation from the

court was of short duration. He retained the confidence of the emperor's sister Constantia, through whose influence he was promoted to the see of Nicomedia, and by her favour he was restored to his position, and speedily acquired an equal ascend- ancy over the emperor. He was selected to administer baptism to him in his last illness. There seems no doubt that Eusebius of Nicomedia was more of a politician than a theologian. He was certainly a partisan in the great controversy of his time, and is even credited (although on insufficient evidence) with having used unworthy means to procure the deposition of Eustathius, the " orthodox " bishop of Antioch (Theodoret i. 21). His rest- less ambition and love of power are not to be denied. To the last he defended Arius, and at the time of the latter's sudden death, 336, it was chiefly through his menace, as representing the emperor, that the church of Constantinople was thrown into anxiety as to whether the leader should be readmitted to the bosom of the church. The death of Constantine followed hard upon that of Arius; and Eusebius, who was promoted in 339 to the see of Constantinople, became the leader of the anti- Nicene party till his own death in (probably) 341. The real activity of Eusebius and his party must be studied in connexion with the Arian controversy (see Arius).

EUSKIRCHEN, a town of Germany, in the Prussian Rhine province, on a plateau lying to the E. of the Eifel range, at the junction of railways from Cologne and Bonn and 10 m. W. of the latter. Pop. (1905) 10,285. It has an Evangelical and a Roman Catholic church, and its industries include cloth, sugar and stocking manufactures, besides breweries and tanneries.

EUSTACE, the name of four counts of Boulogne.

Eustace I., a son of Count Baldwin II., held the county from 1046 until his death in 1049.

His son, Eustace II. (d. 1093), count of Boulogne, was the husband of Goda, daughter of the English king jEthelred the Unready, and aunt of Edward the Confessor. Eustace paid a visit to England in 1051, and was honourably received at the Confessor's court. A brawl in which he and his servants became involved with the citizens of Dover led to a serious quarrel between the king and Earl Godwine. The latter, to whose juris- diction the men of Dover were subject, refused to punish them. His contumacy was made the excuse for the outlawry of himself and his family. In 1066 Eustace came to England with Duke William, and fought at the battle of Hastings. In the following year, probably because he was dissatisfied with his share of

the spoil, he assisted the Kentishmen in an attempt to seize Dover Castle. The conspiracy failed, and Eustace was sentenced to forfeit his English fiefs. Subsequently he was reconciled to the Conqueror, who restored a portion of the confiscated lands.

Eustace died in 1093, and was succeeded by his son, Eustace III., who went on crusade in 1096, and died about 1125. On his death the county of Boulogne came to his daughter, Matilda, and her husband Stephen, count of Blois, afterwards king of England, and in 1 1 50 it was given to their son, Eustace IV.

Eustace IV. (d. 1153) became the heir- apparent to his father's possessions by the death of an elder brother before 1135. In 1 137 he did homage for Normandy to Louis VII. of France, whose sister, Constance, he subsequently married. Eustace was knighted in 1147, at which date he was probably from sixteen to eighteen years of age; and in 1151 he joined Louis in an abortive raid upon Normandy, which had accepted the title of the empress Matilda, and was now defended by her husband, Geoffrey of Anjou. At a council held in London on the 6th of April 1152 Stephen induced a small number of barons to do homage to Eustace as their future king; but the primate, Theobald, and the other bishops declined to perform the coronation ceremony on the ground that the Roman curia had declared against the claim of Eustace. The death of Eustace, which occurred during the next year, was hailed with general satisfaction as opening the possibility of a peaceful settlement between Stephen and his rival, the young Henry of Anjou. The Peterborough Chronicle, not content with voicing this sentiment, gives Eustace a bad

character. " He was an evil man and did more harm than good wherever he went; he spoiled the lands and laid thereon heavy taxes." He had used threats against the recalcitrant bishops, and in the war against the Angevin party had demanded contributions from religious houses; these facts perhaps suffice to account for the verdict of the chronicler.

See Sir James Ramsay, Foundations of England, vol. ii. (London, 1898); J. M. Lappenberg, History of England under the Norman Kings (trans. B. Thorpe, Oxford, 1857); and E. A. Freeman, History of the Norman Conquest (Oxford, 1867-1879).

EUSTATHIUS, of Antioch, sometimes styled " the Great " (fl. 325), was a native of Side in Pamphylia. About 320 he was bishop of Beroea, and he was patriarch of Antioch before the council of Nicaea in 325. In that assembly he distinguished himself by his zeal against the Arians, though the Allocutio ad Imperatorem with which he has been credited is hardly genuine. His anti-Arian polemic against Eusebius of Caesarea made him unpopular among his fellow-bishops in the East, and a synod convened at Antioch in 330 passed a sentence of deposition, which was confirmed by the emperor. He was banished to Trajanopolis in Thrace, where he died, probably about 337, though possibly not till 360.

The only complete work by Eustathius now extant is the De Engastrimytho contra Origenem (ed. by A. Jahn in Texte und Unter-suchungen, ii. 4). Other fragments are enumerated by F. Loofs in Herzog-Hauck's Realencyklopddie.

EUSTATHIUS, or Eumathius, surnamed Macrembolites (" living near the long bazaar "), the last of the Greek romance writers, flourished in the second half of the 12th century a.d. His title Protonobilissimus shows him to have been a person of distinction, and if he is also correctly described in the MSS. as fieyas xapro < £iiXa£ (chief keeper of the ecclesiastical archives), he must have been a Christian. He was the author of The Story ofHysmine and Hysminias, in eleven books, a tedious and inferior imitation of the Cleitophon and Leucippe of Achilles Tatius. There is nothing original in the plot, and the work is tasteless and often coarse. Although the author borrowed from Homer and other Attic poets, the chief source of his phraseology was the rhetorician Choricius of Gaza. The style is remarkable for the absence of hiatus and an extremely laboured use of antithesis. The digressions on works of art, apparently the result of personal observation, are the best part of the work. A collection of eleven Riddles, of which solutions were written by the grammarian Manuel Holobolos, is also attributed to Eustathius.

The best edition of both romance and riddles is by I. Hilberg (1876, who fixes the date of Eustathius between 850 and 988), with critical apparatus and prolegomena, including the solutions; of the Riddles alone by M. Treu (1893). On Eustathius generally, see J. C. Dunlop, History of Fiction (1888, new ed. in Bohn's Standard Library); E. Rohde, Der griechische Roman (1900); K. Krum- bacher, Geschichte der byzantinischen Litteratur (1897). There are many translations in modern languages, of which that by r. le Bas (1825) may be recommended; there is an English version from the French by L. H. le Moine (London and Paris, 1788).

EUSTATHIUS, archbishop of Thessalonica, Byzantine scholar and author (probably a native of Constantinople), flourished during the second half of the 12th century. He was at first a monk, and afterwards deacon of St Sophia and teacher of rhetoric in his native city. In n 74 he was chosen bishop of Myra in Lycia, but in 1175 was transferred to Thessalonica. He was out- spoken and independent, and did not hesitate to oppose the emperor Manuel, when the latter desired an alteration in the formula of abjuration necessary for converts from Mahom- medanism. In 1185, when Thessalonica was captured by the Normans under William II. of Sicily, Eustathius secured religious toleration for the conquered. He died about 1193. His best known work is his Commentary on the Iliad and Odyssey of Homer (wapecfioKal, critical compilations), valuable as containing numerous extracts from the scholia of other critics, whose works have now perished. He also wrote a commentary on the geographical epic of Dionysius Periegetes, in which much of Stephanus of Byzantium and the lost writings of Arrian is pre- served. A commentary on Pindar has been lost, with the exception of the preface, which contains an essay on lyric poetry,

a life of Pindar, and an account of the Olympic games. A history of the conquest of Thessalonica by the Normans, a congratulatory address to the emperor Manuel, a plea for an improved water- supply for Constantinople, and an extensive correspondence with clerical and lay dignitaries, are evidence of his versatility. He is also the author of various religious works, chiefly directed against the prevailing abuses of his time, which almost anticipate, though in a milder form, the denunciations of Luther; the most important of these is The Reform of Monastic Life. A commentary on the pentecostal hymn of John of Damascus may also be mentioned.

Editions: Homer Commentary, by G. Stallbaum (1825-1830); preface to Pindar Commentary, by F. W. Schneidewin (1837); Dionysius Commentary in C. W. Midler, Geographici Graeci minores, ii. ; pentecostal hymn, in A. Mai. Spicilegium Romanum, v. 2 (1841). The smaller works have been edited (1832) and the De Thessalonica (1839) by L. F. Tafel; many will be found in J. P. Migne, Patrologia Graeca, cxxxv., cxxxvi. Five new speeches have been edited by W. Regel, Pontes rerum Byzanlinarum, i. (1892).

EUSTYLE (from Gr. tv, well, and orDXos, column), the archi- tectural term for the intercolumniation defined by Vitruvius (iii. 3) as being of the best proportion, i.e. two and a half diameters (see Intercolumniation) .

EUTAWVILLE, a town of Berkeley county, South Carolina, U.S.A., about 55 m. N.N.W. of Charleston. Pop. (1900) 305; (1910) 405. It is served by the Atlantic Coast Line railway. The town lies on high ground near the Santee river, in a region abounding in swamps, limestone cliffs and pine forests. At present its chief interest is in lumber, but in colonial days it was a settlement of aristocratic rice planters. The neighbouring Eutaw Springs issue first from the foot of a hill and form a large stream of clear, cool water, but this, only a few yards away, again rushes underground to reappear about | m. farther on. At Eutaw Springs, on the 8th of September 1781, was fought the last battle in the field in the Southern States during the War of American Independence. About 2300 Americans under General Nathanael Greene here attacked a slightly inferior force under Colonel Alexander Stewart; at first the Americans drove the British before them, but later in the day the latter took a position in a brick house and behind palisades, and from this position the Americans were unable to drive them. On the night of the 9th, however, Colonel Stewart retreated toward Charleston, abandoning 1000 stand of arms. The battle has been classed as a tactical victory for the British and a strategical victory for the Americans, terminating a campaign which left General Greene in virtual possession of the Carolinas, the British thereafter confining them- selves to Charleston. The Americans lost in killed and wounded 408 men (including Colonel William Washington, wounded and captured); the British, 693.

EUTHYDEMUS, a native of Magnesia, who overturned the dynasty oi Diodotus of Bactria, and became king of Bactria about 230 B.C. (Polyb. xi. 34; Strabo xi. 515 wrongly makes him the first king). In 208 he was attacked by Antiochus the Great, whom he tried in vain to resist on the shores of the river Arius, the modern Herirud (Polyb. x. 49). The war lasted three years, and was on the whole fortunate for Antiochus. But he saw that he was not able to subdue Bactria and Sogdiana, and so in 206 concluded a peace with Euthydemus, through the mediation of his son Demetrius, in which he recognized him as king (Polyb. xi. 34). Soon afterwards Demetrius (q.v.) began the conquest of India. There exist many coins of Euthydemus; those on which he is called god are struck by the later king Agathocles. Other coins with the name Euthydemus, which show a youthful face, are presumably those of Euthydemus II., who cannot have ruled long and was probably a son oi Demetrius. – (Ed. M.)

EUTIN, a town of Germany, capital of the principality oi Lubeck, which is an enclave in the Prussian province of Schleswig- Holstein and belongs to the grand-duchy of Oldenburg, pic- turesquely

situated on the Lake Eutin, 20 m. N. from Lubeck by the railway to Kiel. Pop. (1905) 5204. It possesses a Roman Catholic and two Protestant churches, a palace with a fine park, and a monument to Weber, the composer, who was

bom here. Towards the end of the 18th century Eutin acquired some fame as the residence of a group of poets and writers, of whom the best-known were Johann Heinrich Voss, the brothers Stolberg, and Friedrich Heinrich Jacobi. In the neighbourhood is a beautiful tract of country, rich in beech forests and fjords, known as " the Holstein Switzerland," largely frequented in summer by the Hamburgers.

Eutin was, according to tradition, founded by Count Adolf II. of Holstein. In 1155 it fell to the bishopric of Liibeck and was often the residence of the prelates of that see. After some vicissitudes of fortune during the middle ages and the Thirty Years' War, it came into the possession of the house of Holstein, and hence to Prussia in 1866.

EUTROPIUS, Roman historian, flourished in the latter half of the 4th century a.d. He held the office of secretary (magister memoriae) at Constantinople, accompanied Julian on his expedi- tion against the Persians (363), and was alive during the reign of Valens (364-378), to whom he dedicates his history. This work (Breviarium historiae Romanae) is a complete compendium, in ten books, of Roman history from the foundation of the city to the accession of Valens. It was compiled with considerable care from the best accessible authorities, and is written generally with impartiality, and in a clear and simple style. Although the Latin in some instances differs from that of the purest models, the work was for a long time a favourite elementary school-book. Its independent value is small, but it sometimes fills a gap left by the more authoritative records. The Breviarium was enlarged and continued down to the time of Justinian by Paulus Diaconus (q.v.) ; the work of the latter was in turn enlarged by Landolfus Sagax (c. 1000), and taken down to the time of the emperor Leo the Armenian (813-820) in the Historia Miscella.

Of the Greek translations by Capito Lycius and Paeanius, the version of the latter is extant in an almost complete state. The best edition of Eutropius is by H. Droysen (1879), containing the Greek version and

the enlarged editions of Paulus Diaconus and Landolfus; smaller critical editions, C. Wagener (1884), F. Riihl (1887). J. Sorn's Der Sprachgebrauch des Historikers Eutropius (1892) contains a systematic account of the grammar and style of the author. There are numerous English school editions and translations.

EUTYCHES (c. 380-e. 456), a presbyter and archimandrite at Constantinople, first came into notice in a.d. 431 at the council of Ephesus, where, as a zealous adherent of Cyril (q.v.) of Alexandria, he vehemently opposed the doctrine of the Nestorians (q.v.). They were accused of teaching that the divine nature was not incarnated in but only attendant on Jesus, being superadded to his human nature after the latter was completely formed. In opposition to this Eutyches went so far as to affirm that after the union of the two natures, the human and the divine, Christ had only one nature, that of the incarnate Word, and that there- fore His human body was essentially different from other human bodies. In this he went beyond Cyril and the Alexandrine school generally, who, although they expressed the unity of the two natures in Christ so as almost to nullify their duality, yet took care verbally to guard themselves against the accusation of in any way circumscribing or modifying his real and true humanity. It would seem, however, that Eutyches differed from the Alex- andrine school chiefly from inability to express his meaning with proper safeguards, for equally with them he denied that Christ's human nature was either transmuted or absorbed into his divine nature. The energy and imprudence of Eutyches in asserting his opinions led to his being accused of heresy by Domnus of Antioch and Eusebius, bishop of Dorylaeum, at a synod presided over by Flavian at Constantinople in 448. As his explanations were not considered satisfactory, the council deposed him from his priestly office and excommunicated him; but in 449, at a council held in Ephesus convened by Dioscurus of Alexandria and overawed by the presence of a large number of Egyptian monks, not only was Eutyches reinstated in his office, but Eusebius, Domnus and Flavian, his chief opponents, were deposed, and the Alexandrine doctrine of the " one nature " received the sanction of the church. This judgment is the more interesting as being in distinct conflict with the opinion of the bishop of Rome — Leo — who, departing from the policy of his

predecessor Celestine, had written very strongly to Flavian in support of the doctrine of the two natures and one person. Meanwhile the emperor Theodosius died, and Pulcheria and Marcian who succeeded summoned, in October 451, a council (the fourth ecumenical) which met at Chalcedon (q.v.) . There the synod of Ephesus was declared to have been a "robber synod," its proceedings were annulled, and, in

accordance with the rule of Leo as opposed to the doctrines of Eutyches, it was declared that the two natures were united in Christ, but without any alteration, absorption or confusion. Eutyches died in exile, but of his later life nothing is known. After his death his doctrines obtained the support of the Empress Eudocia and made con- siderable progress in Syria. In the 6th century they received a new impulse from a monk of the name of Jacob, who united the various divisions into which the Eutychians, or Mono- physites (q.v.), had separated into one church, which exists at the present time under the name of the Jacobite Church, and has numerous adherents in Armenia, Egypt and Ethiopia.

See R. L. Ottley, The Doctrine of the Incarnation, ii. 97 ff. ; A. Harnack, History of Dogma, iv. passim; F. Loofs, Dogmengeschichte (4th ed., 1906), 297 f., and the art. in Herzog-Hauck, Realencyk. fur prot. Theol.,' with a full bibliography.

EUTYCHIANUS, pope from 275 to 283. His original epitaph was discovered in the catacombs (see Kraus, Roma sotterranea, p. 154 et seq.), but nothing more is known of him.

EUTYCHIDES, of Sicyon in Achaea, Greek sculptor of the latter part of the 4th century B.C., was a pupil of Lysippus. His most noted work was a statue of Fortune, which he made for the city of Antioch, then newly founded. The goddess, who embodied the idea of the city, was seated on a rock, crowned with towers, and having the river Orontes at her feet. There is a small copy of the statue in the Vatican (see Greek Art). It was imitated by a number of Asiatic cities; and indeed most statues of cities since erected borrow something from the work of Eutychides.

EUYUK, or Eyuk (the eu pronounced as in French), a small village in Asia Minor, in the Angora vilayet, 12 m. N.N.E. of Boghaz Keui (Pteria), built on a mound which contains some remarkable ruins of a large building — a palace or sanctuary — anterior to the Greek period and belonging to the same civiliza- tion as the ruins and rock-reliefs at Pteria. These ruins consist of a gateway and an approach enclosed by two lateral walls, 15 ft. long, from the outer end of which two walls return outwards at right angles, one to right and one to left. The gateway is flanked by two huge blocks, each carved in front into the shape of a sphinx, while on the inner face is a relief of a two-headed eagle with wings displayed. Of the approach and its returning walls only the lower courses remain: they consist of large blocks adorned with a series of bas-reliefs similar in type to those carved on the rocks of Boghaz Keui. Behind the gateway is another

vestibule leading to another portal which gives entrance to the building, the lateral walls and abutments of the portal being also decorated with reliefs much worn. These reliefs belong to that pre-Greek oriental art generally called Hittite, of which there are numerous remains in the eastern half of the peninsula. It is now generally agreed that the scenes represented are religious processions. On the left returning wall is a train of priestly attendants headed by the chief priest and priestess (the latter carrying a lituus), clad in the dress of the deities they serve and facing an altar, behind which is an image of a bull on a pedestal (representing the god); then comes an attendant leading a goat and three rams for sacrifice, followed by more priests with litui or musical instruments, after whom comes a bull bearing on his back the sacred cista (?). On the lateral walls of the approach we have a similar procession of attendants headed by the chief priestess and priest, who pours a libation at the feet of the goddess seated on her throne; while on the right returning wall are fragments of a third procession approaching another draped figure of the goddess on her throne (placed at the angle opposite the bull on the pedestal) , the train being again brought up by a bull.

These are all scenes in the ritual of the indigenous naturalistic

religion which was spread, in slightly varying forms, all over Asia Minor, and consisted in the worship of the self -reproductive powers of nature, personified in the great mother j goddess (called by various names Cybele, Leto, Artemis, &c.) and the god her husband-and-son (Attis, Men, Sabazios, &c), representing the two elements of the ultimate divine nature (see Great Mother of the Gods). Here, as in the oriental mysteries generally, the goddess is made more prominent. Where Greek influence affects the native religion, emphasis tends to be laid on the god, but the character of the religion remains everywhere ultimately the same (see Ramsay, Cities and Bishoprics of Phrygia, ch. iii.).

Authorities. — Perrot, Explor. de la Galatie (1862) and IJist. de I' art (Eng. trans., 1890) ; Humann and Puchstein, Reisen in Klein-asien u. Nordsyrien (1890); Hogarth in Murray's Handbook to Asia Minor (1895); Chantre, Mission en Cappadoce (1898). See also Hittites. (J. G. C. A.)

EVAGORAS, son of Nicocles, king of Salamis in Cyprus 410- 374 B.C. He claimed descent from Teucer, half-brother of Ajax, son of Telamon, and his family had long been rulers of Salamis until supplanted by a Phoenician exile. When the usurper was in turn driven out by a Cyprian noble, Evagoras, fearing that his life was in danger, fled to Cilicia. Thence he returned secretly in 410, and with the aid of a small band of adherents regained possession of the throne. According to Isocrates, whose panegyric must however be read with caution, Evagoras was a model ruler, whose aim was to promote the welfare of his state and of his subjects by the cultivation of Greek refinement and civilization, which had been almost obliterated in Salamis by a long period of barbarian rule. He cultivated the friendship of the Athenians, and after the defeat of Conon at Aegospotami he afforded him refuge and hospitality. For a time he also main- tained friendly relations with Persia, and secured the aid of Artaxerxes II. for Athens against Sparta. He took part in the battle of Cnidus (394), in which the Spartan fleet was defeated, and for this service his statue was placed by the Athenians side by side with that of Conon in the Ceramicus. But the energy and enterprise of Evagoras soon roused the jealousy of the Great King, and relations between them became strained. From 391 they were virtually at war. Aided by the Athenians and the Egyptian Hakor (Acoris), Evagoras extended his rule over the greater part of Cyprus, crossed over to Asia Minor, took several cities in Phoenicia, and persuaded the Cilicians to revolt. After the peace of Antalcidas (387), to which he refused to agree, the Athenians withdrew their support, since by its terms they recognized the lordship of Persia over Cyprus. For ten years Evagoras carried on hostilities single-handed, except for occasional aid from Egypt. At last he was totally defeated at Citium, and compelled to flee to Salamis. Here, although closely blockaded, he managed to hold his ground, and took advantage of a quarrel between the Persian generals to conclude peace (376). Evagoras was allowed to remain nominally king of Salamis, but in reality a vassal of Persia, to which he was to pay a yearly tribute. The chronology of the last part of his reign is uncertain. In 374 he was assassinated by a eunuch from motives of private revenge.

The chief authority for the life of Evagoras is the panegyric of Isocrates addressed to his son Nicocles; see also Diod. Sic. xiv. 115, xv. 2-9; Xenophon, Hellenica, iv. 8; W. Judeich, Kleinasiatische Sludien (Marburg, 1892), and art. Hellenism.

EVAGRIUS (c. 536-600), surnamed Scholasticus, Church historian, was born at Epiphania in Coele-Syria. His surname shows him to have been an advocate, and it is supposed that he practised at

Antioch. He was the legal adviser of Gregory, patriarch of that city, whom he successfully defended at Constanti- nople against certain serious charges. Through this connexion he was brought under the notice of the emperor Tiberius Con- stantine, who honoured him with the rank of quaestorian; Maurice Tiberius made him master of the rolls. His influence and reputation were so considerable that on the occasion of his second marriage a public festival was celebrated in his honour, which was interrupted by a terrible earthquake. Evagrius's name has been preserved by his Ecclesiastical History in six books, extending over the period from the third general council

(that of Ephesus, 431) to the year 593. It thus continues the work of Eusebius, Socrates, Sozomen and Theodoret. Though not wholly trustworthy, and often very credulous, this work is on the whole impartial, and appears to have been compiled from original documents, from which many valuable excerpts are given. It is particularly helpful to the Student of the history of dogma during the 5th and 6th centuries, while the political history of the time is by no means neglected. Evagrius made use of the writings of Eustathius, John of Epiphania, John Malalas, Procopius, and (possibly) Menander Protector.

The best edition of the History is that of L. Parmentier and J. Bidez (London, 1898), which contains the Scholia; it is also included in Migne's Patrologia Graeca, lxxxvi. There is an English translation in Bohn's Ecclesiastical Library. See Krumbacher, Geschichte der byzanlinischen Lilleralur (1897); F. C. Baur, Die Epochen der kirchlichen Geschichtsschreibung (1852) ; L. Jeep, Quellenunlersu- chungen zu den griechischen Kirchenhistorikern (1884).

EVANDER (Gr. Euaj-Spos, " good man "), in Roman legend, son of Mercury and Carmenta, or of Echemus, king of Arcadia. According to the story, Evander left the Arcadian town of Pallantion about sixty years before the Trojan War and founded Pallanteum or Palatium on the hill afterwards called the Palatine. This is only one of the many Greek legends adopted by the Romans for the purpose of connecting places in Italy with others of like- sounding name in Greece. To Evander was attributed the intro- duction of Greek rites and customs into his new country; of writing, music and other arts; of the worship of Pan (called Faunus by the Italians) and the festival of Lupercalia. In Virgil he receives Aeneas hospitably, and assists him against Turnus. Probably Evander was identical with the god Faunus (the " favourer "), and the tale of his Arcadian origin was due to the desire to establish connexion with Greece; the name of his reputed mother (or wife) Carmenta is genuinely Italian.

See Livy i. 6. 7; Ovid, Fasti, i. 471, v. 99; Dion. Halic. i. 31-33; Virgil, Aeneid, viii. 335.

EVANGELICAL ALLIANCE, an association of individual Christians of different denominations formed in London in August 1846, at a conference of over 900 clergymen and laymen from all parts of the world, and representing upwards of fifty sections of the Protestant church. The idea originated in Scotland in the preceding year, and was intended " to associate and concentrate the strength of an enlightened Protestantism against the en- croachments of popery and Puseyism, and to promote the interests of a scriptural Christianity," as well as to combat religious indifference. A preliminary meeting was held at Liverpool in October 1845. The movement obtained wide support in other countries, more especially in America, and organizations in connexion with it now exist in the different capitals throughout the world. The object of the alliance, according to a resolution of the first conference, is "to enable Christians to realize in themselves and to exhibit to others that a living and everlasting union binds all true believers together in the fellowship of the church." At the same conference the following nine points were adopted as the basis of the alliance: " Evangelical views in regard to the divine inspiration, authority and sufficiency of the Holy Scriptures; the right and duty of private judgment in the interpretation of the Holy Scriptures; the unity of the Godhead and the Trinity of persons therein; the utter depravity of human nature in consequence of the fall; ' the incarnation of the Son of God, His work of atonement for sinners of mankind, and His mediatorial intercession and reign; the justification of the sinner by faith alone; the work of the Holy Spirit in the conversion and sanctifkation of the sinner; the immortality of the soul, the resurrection of the body, the judgment of the world by our Lord Jesus Christ, with the eternal blessedness of the righteous and the eternal punishment of the wicked; the divine institution of the Christian ministry, and the obligations and perpetuity of the ordinances of Baptism and the Lord's Supper," it being understood, however, (1) that such a summary " is not to be regarded in any formal or ecclesi- astical sense as a creed or confession," and (2) that " the selection of certain tenets, with the omission of others, is not to

be held as implying that the former constitute the whole body of important truth, or that the latter are unimportant."

Annual conferences of branches of the alliance are held in England, America and several continental countries; and it is provided that a general conference, including representatives of the whole alliance, be held every seventh year, or oftener if it be deemed necessary. Such conferences have been held in London in 1851; Paris, 1855; Berlin, 1857; Geneva, 1861; Amsterdam, 1867; New York, 1873; Basel, 1879; Copenhagen, 1885; Florence, 1891; London, 1896 and 1907. They are occupied with the discussion of the " best methods of counter- acting infidelity, Romanism and ritualism, and the desecration of the Lord's Day," and of furthering the positive objects of the alliance. The latter are sometimes stated as follows: (a) " The World girdled by prayer "; a world-wide week of prayer is held annually, beginning on the first Sunday in the year. (6) " The maintenance of religious liberty throughout the world." (c) " The relief of persecuted Christians in all parts "; the alliance has agents in many countries to help the persecuted by distribut- ing relief, &c, and in Russia there is a travelling agent who endeavours to help the Stundists. (d) " The manifestation of the unity of all believers and the upholding of the evangelical faith."

The following publications may be mentioned : — The Evangelical Alliance Monthly Intelligencer, The Evangelical Alliance Quarterly, both published in London; A. J. Arnold, History of the Evangelical Alliance (London, 1897); and the reports of the proceedings of the different conferences. . '

EVANGELICAL ASSOCIATION of North America, a religious denomination, founded about the beginning of the 19th century by Jacob Albright (17 59-1808), a German Lutheran of Pennsyl- vania. About 1790 he began an itinerant mission among his fellow-countrymen, chiefly in Pennsylvania; and meeting with considerable success, he was, at an assembly composed of ad- herents from the different places he had visited, elected in 1800 presiding elder or chief pastor, and shortly afterwards rules of government were adopted somewhat- similar to those of the Methodist Episcopal Church. The theological standards of the two bodies are also in close agreement. In 1807 Albright was appointed bishop of the community, which adopted its present name in 1818. In 1816 the first annual conference was held, and in 1843 there was instituted a general conference, composed of delegates chosen by the annual conferences and constituting the highest legislative and judicial authority in the church. The members of the general conference hold office for four years. In 1891 a long internal controversy resulted in a division. A law-suit awarded the property to the branch making its head-quarters at Indianapolis, whereon the other party, numbering

40,000, that met at Philadelphia, constituted themselves the United Evangelical Church. The Association in 1906 had about 105,000 members, besides some 10,000 in Germany and Switzerland, and has nearly 2000 churches and 1200 itinerant and other preachers. There are four bishops. It distributes much evangelical literature, and supports a mission in Japan.

PilNIED m U.S -i.

VOL10_EVANG_CH-FRANCIS_JOSEPH_I

Britannica

THE

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

FIRST edit

ion, published in three volumes, 1768 — 1771.

SECOND ,

, „ ten ,

, 1777— 1784.

THIRD ,

, „ ˆeighteen ,

, 1788— 1797.

FOURTH ,

, „ twenty ,

, 1801 — 1810.

FIFTH ,

, „ twenty ,

, 1815—1817.

SIXTH ,

, „ twenty ,

, 1823 — 1824.

SEVENTH ,

, „ twenty-one ,

, 1830 — 1842.

EIGHTH ,

, „ twenty-two ,

, 1853— 1860

NINTH ,

, „ twenty-five ,

, 1875—1889.

TENTH ,

, ninth edition and eleven

supplementary volumes,

1902 — 1903.

ELEVENTH ,

, published in twenty-nine volume

s, 1910 — 1911.

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the ,

UNIVERSITY OF CAMBRIDGE

All rights reserved

THE

ENCYCLOPEDIA BRITANNICA

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME X

EVANGELICAL CHURCH to FRANCIS JOSEPH

New York

Encyclopaedia Britannica, Inc. 342 Madison Avenue

Copyright, in the United States of America, 1910,

by

The Encyclopaedia Britannica Company.

INITIALS USED IN VOLUME X. TO IDENTIFY INDIVIDUAL

CONTRIBUTORS, 1 WITH THE HEADINGS OF THE

ARTICLES IN THIS VOLUME SO SIGNED.

A. B. R.

A.D. A. F. B. A. F. P.

A.G.

A. Go * A. H.-S. A. L. A. L. B.

A.N. A. S.

A. M. C. A. W. A. W. R.

A. W. W. C. EI.

C. F. B. C. F. C.

Alfred Barton Rendle, M.A., D.Sc., F.R.S., F.L.S.

Keeper, Department of Botany, British Museum. Author of Text Book on Classi- fication oj ‘Flowering Plants; &c.

Austin Dobson, LL.D.

See the biographical article: Dobson, H. Austin.

Aldred Farrer Barker, M.Sc.

Professor of Textile Industries at Bradford Technical College.

Albert Frederick Pollard, M.A., F.R.Hist.Soc.

Professor of English History in the University of London. Fellow of All Souls' College, Oxford. Assistant Editor of the Dictionary of National Biography, 1893- 1901. Lothian Prizeman, Oxford, 1892; Arnold Prizeman, 1898. Author of England under Protector Somerset ; Henry VIII. ; Life of Thomas Cranmer ; &c.

Major Arthur George Frederick Griffiths (d. 1908).

H.M. Inspector of Prisons, 1878-1896. Author of The Chronicles of Newgate; Secrets of the Prison House ; &c.

Rev. Alexander Gordon, M.A.

Lecturer on Church History in the University of Manchester.

Sir A. Houtum-Schindler, CLE.

General in the Persian Army. Author of Eastern Persian Irak.

Andrew Lang.

See the biographical article : Lang, Andrew.

Alfred Lys Baldry.

Art Critic of the Globe, 1893-1908. Author of Modern Mural Decoration and biographies of Albert Moore, Sir H. von Herkomer, R.A., Sir J. E. Millais, P.R.A.

Flower.

I Fielding, Henry.

Felt.

Ferrer, Bishop; Fox, Edward; Fox, Richard.

-I Finger Prints.

rFaber, Basil, Jacobus and

< Johann;

iFamilists; Farel, G.; Flacins.

f Fars;

\ Firuzabad.

f Fairy; L Family.

■I Fortuny.

Marcus Stone, R.A., and G. H. Boughton, R.A

Alfred Newton, F.R.S.

See the biographical article: Newton, Alfred.

Arthur Smithells, F.R.S.

Professor of Chemistry in the University of Leeds. Author of Scientific Papers on -J Flame Flame and Spectrum Analysis.

Agnes Mary Clerke.

See the biographical article: Clerke, A. M.

Arthur Watson.

Secretary in the Academic Department, University of London.

Alexander Wood Renton, M.A., LL.B.

Puisne Judge of the Supreme Court of Ceylon. Editor of Encyclopaedia of the Laws of England.

("Falcon; Fieldfare; Finch \ Flycatcher; Fowl.

Flams teed.

{

■j Examinations {in part)

Fixtures; Flat.

Adolphus William Ward, D.Litt., LL.D. See the biographical article : Ward, A, W.

f Foote, Samuel; \ Ford, John.

Sir Charles Norton Edgcumbe Eliot, K.C.M.G., C.B., M.A., LL.D., D.C.L. Vice-Chancellor of Sheffield University. Formerly Fellow of Trinity College, Oxford. H.M.‘s Commissioner and Commander-in-Chief for the British East Africa -| FinnO-Ugrian. Protectorate; Agent and Consul-General at Zanzibar; Consul-General for German East Africa, 1900-1904.

Charles Francis Bastable, M.A., LL.D. r

Regius Professor of Laws and Professor of Political Economy in the University of J . *Dublin. Author of Public Finance; Commerce of Nations; Theory of International’] finance, Trade; &c. [*

C. F. Cross, B.Sc. (Lond.), F.C.S. F.I.C. /Fibres

Analytical and Consulting Chemist. \ lores.

1 A complete list, showing all individual contributors, appears in the final volume.

VI

c. r. r.

C. H. T.*

C J.

y. j. b. m.

C. J. N. F.

C. L. K.

C. P. I.

C. W. A.

D. H.

D. Mn.

D. N. P.

D.S. M.*

E. B.

E. Ca. Ed. C* E. C. B.

e. c. q.

E. D. R. E. E. A. E. E. H.

E. 6.

E. H. P. E. K.

E. M. Ha.

Joint Editor of the Domesday Survey for the “j Exchequer {in part).

INITIALS AND HEADINGS OF ARTICLES

Charles Francis Richardson, A.M., Ph.D.

Professor of English at Dartmouth College, Hanover, New Hampshire, U.S.A. Author of A Story of English Rhyme; A History of American Literature; &c.

Crawford Howell Toy, A.M.

See the biographical article : Toy, Crawford Howell.

Charles Johnson, M.A.

Clerk in H.M. Public Record Office. Victoria County History: Norfolk.

Charles John Bruce Marriott, M.A.

Clare College, Cambridge. Secretary of the Rugby Football Union.

Charles James Nicol Fleming.

H.M. Inspector of Schools, Scotch Education Department.

Charles Lethbridge Kingsford, M.A., F.R.Hist.Soc, F.S.A.

Assistant Secretary to the Board of Education. Author of ‘Life of Henry V. Editor of Chronicles of London and Stow’s Survey of London.

Sir Courtenay Peregrine Ilbert, K.C.B., K.C.S.I., CLE.

Clerk of the House of Commons. Chairman of Statute Law Committee.

Parlia- mentary Counsel to the Treasury, 1 899-1901 . Legal Member of Council of Governor- General of India, 1882-1886; President, 1886. Fellow of the British Academy. . Formerly Fellow and Tutor of Balliol College, Oxford. Author of The Government of India ; Legislative Method and Forms.

Charles William Alcock. (d. 1907).

Formerly Secretary of the Football Association, London.

David Hannay.

Formerly British Vice-Consul at Barcelona. Navy ; Life of Emilio Castelar ; &c.

Rev. Dugald Macfadyen, M.A.

Minister of South Grove Congregational Church, Highgate. Missionary Society.

Fiske, John. ■j Ezekiel.

i Football: Rugby {in part). \ Football: Rugby {in part).

J Fabyan; \ Fastolf .

Evidence.

Author of Short History of the Royal

\ Football: Association {in part).

j First of June, Battle of the; [Fox, Charles James.

Director of the London ~{ Excommunication.

DIarmid Noel Paton, M.D., F.R.C.P. (Edin.).

Regius Professor of Physiology in the University of Glasgow. Formerly Super- intendent of Research Laboratory of Royal College of Physicians, Edinburgh. Biological Fellow of Edinburgh University, 1884. Author of Essentials of Human Physiology; &c.

David Samuel Margoliouth, M.A., D.Litt.

Laudian Professor of Arabic, Oxford. Fellow of New College. Author of Arabic Papyri ‘of the Bodleian Library ; Mohammed and the Rise of

Islam ; Cairo, Jerusalem and Damascus.

Edward Breck, M.A., Ph.D.

Formerly Foreign Correspondent of the New York Herald and the New York Times. Author of Fencing; Wilderness Pets; Sporting in Nova Scotia; &c.

Egerton Castle, M.A., F.S.A.

Trinity College, Cambridge. Author of Schools and Masters of Fence ; &c.

The Hon. Edward Evan Charteris. Barrister-at-Law, Inner Temple.

Rt. Rev. Edward Cuthbert Butler, O.S.B., M.A., D.Litt.

Abbot of Downside Abbey, Bath. Author of ” The Lausiac History of Palladius,” in Cambridge Texts and Studies, vol. vi.

Edmund Crosby Quiggin, M.A.

Fellow and Lecturer in Modern Languages and Monro Lecturer in Celtic, Gonville and Caius College, Cambridge.

Lieut. -Colonel Emilius C. Delme Radcliffe.

Author of Falconry: Notes on the Falconidae used in India in Falconry.

Ernest E. Austen.

Assistant in Department of Zoology, Natural History Museum, South Kensington.

Rev. Edward Everett Hale.

See the biographical article : Hale, E. E.

EdMund Gosse, LL.D.

See the biographical article : GossB, Edmund.

Fever.

f

■j Fatimites.

J Foil-fencing;

L Football: American {in part).

j Fencing.

j Fair {in part).

T Fontevrault;

-j Francis of Assisi, St;

I Francis of Paola, St.

Finn mac Cool.

Falconry.

Flea.

Everett, Edward.

Edward Henry Palmer, M.A.

See the biographical article : Palmer, E. H.

Edmund Knecht, Ph.D., M.Sc.Tech. (Manchester), F.I.C.

Professor of Technological Chemistry, Manchester University. Head of Chemical Department, Municipal School of Technology, Manchester. Examiner in Dyeing, City and Guilds of London Institute. Author of A Manual of Dyeing; &c. Editor of Journal of the Society of Dyers and Colourists.

Ernest Maes Harvey.

Partner in Messrs. Allen Harvey & Ross, Bullion Brokers, London.

Ewald, Johannes; Fabliau; Fabre, Ferdinand; Feuillet; Finland: Literature; FitzGerald, Edward; Flaubert; .Flemish Literature; Forssell.

-! Firdousi {in part).

Finishing. J Exchange.

INITIALS AND HEADINGS OF ARTICLES

E 0.*

E.O.S.

E.Pr.

E. Re. E.Tn. E. W.H.

F.C.C.

P. G. P.

F» J« if*

F« J* W* F» R* v* F.S. G. A. B.

G. A. Be.

G. B. A. G. C. L.

Fistula.

Fire and Fire Extinction.

Falcao; Ferreira.

Fire.

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc.

Consulting Surgeon to St Mary's Hospital, London, and to the Children's Hospital, Great Ormond Street, London. Chevalier of the Legion of Honour. Late Examiner ■ in Surgery at the University of Cambridge, London and Durham. Author of A Manual of A natomy for Senior Students.

Edwin Otho Sachs, F.R.S. (Edin.), A.M.Inst.M.E.

Chairman of the British Fire Prevention Committee. Vice-President, National Fire Brigades Union. Vice-President, International Fire Service Council. Author of Fires and Public Entertainments ; &c.

Edgar Prestage.

Special Lecturer in Portuguese Literature at the University of Manchester. Com- . mendador, Portuguese Order of S. Thiago. Corresponding Member of Lisbon Royal Academy of Sciences and

Lisbon Geographical Society.

Elisee Recltjs.

See the biographical article: Reclus, J. J. E.

Rev. Ethelred Leonard Taunton, (d. 1907). f Feckenham;

Author of The English Black Monks of St Benedict ; History of the Jesuits in England. \ Fisher, John.

Ernest William Hobson, M.A., D.Sc, F.R.S. , F.R.A.S. (

Fellow and Tutor in Mathematics, Christ's College, Cambridge. Stokes Lecturer X Fourier's Series. in Mathematics in the University. [

Frederick Cornwallis Conybeare, M.A., D.Th. (Giessen). f

Fellow of the British Academy. Formerly Fellow of University College, Oxford. – Author of The Ancient Armenian Texts of Aristotle; Myth, Magic and Morals; &c.

Frederick Gymer Parsons, F.R.C.S., F.Z.S., F.R.Anthrop.Inst.

Vice-President, Anatomical Society of Great Britain and Ireland. Lecturer on Anatomy at St Thomas's Hospital and the London School of Medicine for Women. Formerly Huntenan Professor at the Royal College of Surgeons. I

Francis John Haverfield, M.A., LL.D., F.S. A.. r

Camden Professor of Ancient History in the University of Oxford. Fellow of J p„_ Brasenose College. Ford's Lecturer, 1906-1907. Fellow of the British Academy. 1 * osse ' Author of Monographs on Roman History, especially Roman Britain; &c. I

Extreme Unction.

Eye: Anatomy.

Frederick Joseph Wall, F.C.S. .

Secretary to the Football Association.

France: Colonies.

{

J Fable.

Eye: Diseases.

G.E.

G. F. Z. G. G. P.* G.P.

G. W. T.

J, Football: Association {in par*).

Frank R. Cana.

Author of South Africa from the Great Trek to the Union.

Francis Storr, M.A.

Editor of the Journal of Education, London. Officier d'Academie, Paris.

George A. Boulenger, D.Sc, Ph.D., F.R.S. r

In charge of the Collections of Reptiles and Fishes, Department of Zoology, British -j Flat-fish. Museum. Vice-President of the Zoological Society of London. [

George Andreas Berry, M.B., F.R.C.S., F.R.S. (Edin.).

Hon. Surgeon Oculist to His Majesty in Scotland. Formerly Senior Ophthalmic Surgeon, Edinburgh Royal Infirmary, and Lecturer on Ophthalmology in the Uni- versity of Edinburgh. Vice-President, Ophthalmological Society. Author of Diseases of the Eye; The Elements of Ophthalmoscopic Diagnosis; Subjective Symptoms in Eye Diseases ; &c.

George Burton Adams, A.M., B.D., Ph.D., Litt.D. r

Professor of History, Yale University. Editor of American Historical Review. J _ . Author of Civilization during the Middle Ages; Political History of England, 1066-] Feudalism. 1216 ; &c. ■ [

George Collins Levey, C.M.G.

Member of Board of Advice to Agent-General of Victoria. Formerly Editor and Proprietor of the Melbourne Herald. Secretary, Colonial Committee of Royal Commission to Paris Exhibition, 1900. Secretary, Adelaide Exhibition, 1887. Secretary, Royal Commission, Hobart

Exhibition, 1 894-1 895. Secretary to Com- missioners for Victoria at the Exhibitions in London, Paris, Vienna, Philadelphia and Melbourne, 1873, 1876, 1878, 1880-1881.

Rev. George Edmundson, M.A., F.R.Hist.S. r

Formerly Fellow and Tutor of Brasenose College, Oxford. Ford's Lecturer, 1909. J v , . Hon. Member, Dutch Historical Society, and Foreign Member, Netherlands Associa-] Flanaers – , tion of Literature. I

George Frederick Zimmer, A.M.Inst.C.E. Author of Mechanical Handling of Material.

George Grenville Phillimore, M.A., B.C.L.

Christ Church, Oxford. Barrister-at-Law, Middle Temple.

Gifford Pinchot, A.M., D.Sc, LL.D.

Professor of Forestry, Yale University. Formerly Chief Forester, U.S.A. of the National Conservation Association. Member of the Society of

Exhibition.

f Flour and Flour Manufacture. I Fishery, Law of.

Foresters, Royal English Arboricultural Society, &c. A Primer of Forestry ; &c.

President

_- American

Author of The White Pine;

Forests and Forestry:

United States.

Rev. Griffiths Wheeler Thatcher, M.A., B.D. f Fairfizabadi;

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and Old J Fakhr ud-DIn R5zi; Testament History at Mansfield College, Oxford. FarabI' FarazdaQ.

H. B. S.

H. Ch.

H. De.

H. F. G.

H. L. S. H.St.

H. W. C. D.

H. W. S. LA.

J. A. C. J. A. H.

J. A. S. J. B.* J. B. P.

J. Bt.

INITIALS AND HEADINGS OF ARTICLES

J.

c.

M.

J.

E.

C. B.

J.

E.

P. W

J.

F.

St.

J.

G.

H.

J.

G.

R.

J. H. P.*

J. HI. R.

J. H. R.

Rev. Henry Barclay Swete, M.A., D.D., Litt.D.

Regius Professor of Divinity, Cambridge University. Fellow of Gonville and Caius College, Cambridge. Fellow of King's College, London. Fellow of British Academy. " Hon. Canon of Ely Cathedral. Author of The Holy Spirit in the New Testament ; &c.

Hugh Chisholm, M.A.

Formerly Scholar of Corpus Christi College, Oxford. Editor of the nth Edition" of the Encyclopaedia Brilannica; Co-Editor of the ioth edition. L

Hippolyte Delehaye, S.J. C

Assistant in the compilation of the Bollandist publications: Analecta Bollandiana -i and Acta Sanctorum. {.

Hans Friedrich Gadow, F.R.S., Ph.D.

Strickland Curator and Lecturer on Zoology in the University of Cambridge. – Author of " Amphibia and Reptiles," in the Cambridge Natural History.

Fathers of the Church.

Forster.

Fiacre, Saint; Florian, Saint.

Flamingo.

Flag.

Fechner;

Feuerbach, Ludwig A.

Fitz Neal;

Fitz Peter, Geoffrey;

Fitz Stephen, William;

Fitz Thedmar; Flambard;

Florence of Worcester.

Fabrizi.

H. Lawrence Swinburne (d. 1909).

Henry Sturt, M.A.

Author of Idola Tkealri ; The Idea of a Free Church ; Personal Idealism.

Henry William Carless Davis, M.A.

Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls' College, Oxford, – 1895-1902. Author of England under the Normans and Angevins; Charlemagne.

H. Wickham Steed.

Correspondent of The Times at Vienna. Correspondent of The Times at Rome, –

1 897- 1 902.

Israel Abrahams, M.A- ' _

Reader in Talmudic and Rabbinic Literature, University of Cambridge. President, Jewish Historical Society of England. Author of A Short History of Jewish Litera- ' ture; Jewish Life in the Middle Ages.

Sir Joseph Archer Crowe, K.C.M.G.

See the biographical article: Crowe, Sir Joseph A.

John Allen Howe, B.Sc.

Curator and Librarian of the Museum of Practical Geology, London. Author of" The Geology of Building Stones.

John Addington Symonds, LL.D.

See the biographical article: Symonds, John A.

Joseph Burton.

Partner in Pilkington's Tile and Pottery Co., Clifton Junction, Manchester.

James Bell Pettigrew, M.D., LL.D., F.R.S., F.R.C.P. (Edin.) (1834-1908). Chandos Professor of Medicine and Anatomy, University of St Andrews, 1875- * 1908. Author of Animal Locomotion; &c.

James Bartlett.

Lecturer on Construction, Architecture, Sanitation, Quantities, &c, at King's^ College, London. Member of Society of Architects. Member of Institute of* Junior Engineers.

James Clerk Maxwell, LL.D.

See the biographical article: Maxwell, James Clerk.

John Edward Courtenay Bodley, M.A. f

BalliolCollege, Oxford. Corresponding Member of the Institute of France. Author-! France: History, i^'j^-igio. of France ; The Coronation of Edward VII. ; &c. (_

John Edward Power Wallis, M.A. f

Puisne Judge, Madras. Vice-Chancellor of Madras University. Inns of Courts Extradition. Reader in Constitutional Law, 1892-1897. Formerly Editor of Slate Trials. L

John Frederick Stenning, M.A.

Dean and Fellow of Wadham College, Oxford. University Lecturer in Aramaic. – Lecturer in Divinity and Hebrew at Wadham College.

Joseph G. Horner, A.M.I. Mech.E.

Author of Plating and Boiler Making ; Practical Metal Turning ; &c.

John George Robertson, M.A., Ph.D.

Professor of German at the University of London. Formerly Lecturer on the English Language, Strassburg University. Author of History of German Literature;' . &c.

John Hungereord Pollen, M.A. (d. 1908).

Formerly Professor of Fine Arts in Catholic University of Dublin. Fellow of Merton College, Oxford. Cantor Lecturer, Society of Arts, 1885. Author of. Ancient and Modern Furniture and Woodwork; Ancient and Modern Gold and Silversmith's Work ; The Trajan Column ; &c.

John Holland Rose, M.A., Litt.D.

Lecturer on Modern History to the Cambridge University Local Lectures Syndicate. Author of Life of Napoleon I. ; Napoleonic Studies ; The Development of the European ' Nations ; The Life of Pitt ; chapters in the Cambridge Modern History.

John Horace Round, M.A., LL.D. (Edin.).

Author of Feudal England; Studies in Peerage and Family History; Peerage and Pedigree; &c.

Exilarch; Eybeschutz.

Eyck, Van.

France: Geology.

Ficino; . Filelfo.

Firebrick (in part). Flight and Flying (in part).

Foundations. Faraday.

Exodus, Book of.

" Forging; . Founding.

Fouque. Baron.

Fan.

Fouche.

Ferrers: Family; Fitzgerald: Famuy.

INITIALS AND HEADINGS OF ARTICLES

IX

J. I.

J. K. L.

-I Francis I. of France.

J. L. B.

J. Ma. J. M. S.

J. Pa.

J. P. E.

J. R. C. J. R. F.* J. R. J. J. J. S. Bl.

J. S. F. J. S. K.

J. T. Be.

K S. L.D.* L. F. S. L.J.

Farragut; Fitzroy.

John Macdonald.

Jules Isaac.

. Professor of History at the Lycde of Lyons.

Sir John Knox Laughton, M.A., Litt.D.

Professor of Modern History, King's College, London. Secretary of the Navy Records Society. Served in the Baltic, 1854-1855; in China, 1856-1859. Mathe- matical and Naval Instructor, Royal Naval College, Portsmouth, 1866-1873; Greenwich, 1873-1885. President, Royal Meteorological Society, 1882-1884. Honorary Fellow, Gonville and Caius College, Cambridge. , Fellow, King's College, London. Author of Physical Geography in its Relation to the Prevailing Winds and Currents; Studies in Naval History; Sea Fights and Adventures; &c.

Julian Levett Baker, F.I.C. f

Analytical and Consulting Chemist. Examiner in Brewing to the City and Guilds J »-_«_*„«.„, of London Institute, Department of Technology. Hon. Secretary of the Institute 1 * ermelua ” on ‘ of Brewing. Author of The Brewing Industry ; &c. I

i Fair (in part).

James Montgomery Stuart. -f Fnsrnln

Author of The History of Free Trade in Tuscany ; Reminiscences and Essays.]_ oscoio.

James Paton, F.L.S. r

Superintendent of Museums and Art Galleries of Corporation of Glasgow. Assistant

in. Museum of Science and Art, Edinburgh, 1861-1876. President of Museumsˆ Feather (in part). Association of United Kingdom, 1896. Editor and part-author of Scottish National Memorials, 1890. t

Jean Paul Hippolyte Emmanuel Adhemar Esmein. r

Professor of Law in the University of Paris. Officer of the Legion of Honour. J r< ranr ,p. j m „ n „j T„.t,-f,.ˆ nttr Member of the Institute of France. Author of Cours elementaire d'histoire du droit 1 " 1<4nce –ˆ aw ana msmmtons. frangais; &c. I

Joseph Rogerson Cotter, M.A.

Assistant to the Professor of Natural and Experimental Philosophy, Trinity College, Dublin. Editor of 2nd edition of Preston’s Theory of Heat.

Joseph R. Fisher.

Editor of the Northern Whig, the Press ; &c.

Fluorescence.

Belfast. Author of Finland and the Tsars; Law of< Finland,

Julian Robert John Jocelyn.

Colonel, R.A. Formerly Commandant, Ordnance College; Member of Ordnance Committee; Commandant, Schools of Gunnery.

Fireworks: History.

Britannica. Joint Editor of the J Fasting;

Critical History of the Christian 1 Feasts and Festivals.

Rev. John Sutherland Black, M.A., LL.D. Assistant Editor, 9th edition, Encyclopaedia Encyclopaedia Biblica. Translated Ritschl's Doctrine of Justification and Reconciliation.

John Smith Flett, D.Sc, F.G.S. r

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in Edin- J Felsite; burgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby 1 p"]jn.t Medallist of the Geological Society of London. |_

John Scott Keltie, LL.D., F.S.S.. F.S.A. (Scot.). r

Secretary, Royal Geographical Society. Knight of Swedish Order of North Star. Finland (in i>art)' Commander of the Norwegian Order of St Olaf. Hon.' Member, Geographicalˆ „.. , \ t It Societies of Paris, Berlin, Rome, &c. Editor of Statesman's Year Book. Editor of rlmaers. the Geographical Journal. I

John T. Bealby. i

Joint Author of Stanford's Europe. Formerly Editor of the Scottish Geographical-} Fens;

Magazine. Translator of Sven Hedin's Through Asia, Central Asia and Tibet; &c. [Ferghana (in part).

Kathleen Schlesinger.

Author of The Instruments of the Orchestra.

Louis Duchesne.

See the biographical article: Duchesne, L. M. O.

Leslie Frederic Scott, M.A., K.C.C. Barrister-at-Law, Inner Temple.

Fiddle; Fife; Flageolet; Flute (in part).

Formosus.

{

Factor.

Lieut.-Colonel Louis Charles Jackson, R.E., C.M.G. r

Assistant Director of Fortifications and Works, War Office. Formerly Instructor]—.-,,

Fortification, R.M.A., Woolwich. Instructor in Fortification and Military 1 Fortification and Siegecraft.

Engineering, School of Military Engineering, Chatham

L.V.'

Luigi Villari.

Italian Foreign Office (Emigration Dept.). Formerly Newspaper Correspondent in east of Europe. Italian Vice-Consul in New Orleans, 1906; Philadelphia, 1907; Boston, U.S.A., 1907-1910. Author of Italian Life in Town and Country; Fire and Sword in the Caucasus ; &c.

Faliero; Fanti, Manfredo; Farini, Luigi Carlo; Farnese: Family; Ferdinand I. and IV. of Naples; Ferdinand II. of the Two

Sicilies; Fiesco; Filangieri, C; Florence; Foscari; Fossombroni; Francis II. of the Two

Sicilies; Francis IV. and V. of Modena.

X

M. Ha.

N. W. T. 0. H.*

INITIALS AND HEADINGS OF ARTICLES

Marcus Hartog, M.A., D.Sc, F.L.S.

Professor of Zoology, University College, Cork. Author of " Protozoa," in Cam- bridge Natural History; and papers for various scientific journals.

Northcote Whitbridge Thomas, M.A.

Government Anthropologist to Southern Nigeria. Corresponding Member of the Soctete' d Anthropologic de Paris. Author of Thought Transference; Kinship and Marriage in Australia; &c.

Otto Hehner, F.I.C., F.C.S. f

Public Analyst. Formerly President of Society of Public Analysts. ViceTPresident J Food Preservation. of Institute of Chemistry of Great Britain and Ireland. Author of works on Butter | Analysis; Alcohol Tables; &c. L

J Flagellate; I Foraminifera.

Faith Healing;

Fetishism;

Folklore.

0.

H.

A.

A.K.

C. Y.

CM.

David Orme Masson, M.A., D.Sc, F.R.S.

Professor of Chemistry, Melbourne University. the transactions of various learned societies.

Author of papers on chemistry in \ Fireworks: Modern.

Paul Daniel Alphandery.

Professor of the History of Dogma, Ecole Pratique des Hautes Etudes, Sorbonne, Paris. Author of Les Id6es morales chez les heterodoxes latines au debut du XIII' siecle.

Prince Peter Alexeivitch Kropotkin.

. See the biographical article: Kropotkin, P. A.

f

Evolution.

l

P. G. K. P. J. H.

P. W.

R. Ad.

R. A. S. M.

3. H. C.

R. J. ffl. R. L.*

R. N. B.

R. Po. R. P. S.

R. S. C. R, Tr.

Philip Chesney Yorke, M.A. Magdalen College, Oxford.

Peter Chalmers Mitchell, F.R.S. , F.Z.S., D.Sc, LL.D.

Secretary to the Zoological Society of London. University Demonstrator in Com- parative Anatomy and Assistant to Linacre Professor at Oxford, 1881-1891. Examiner in Zoology to the University of London, 1903. Author of Outlines of Biology; &c.

Paul George Konody.

Art Critic of the Observer and the Daily Mail. Formerly Editor of The Artist. Author of The Art of Waller Crane; Velasquez, Life and Work; &c.

Philip Joseph Hartog, M.A., L. es Sc. (Paris).

Academic Registrar of the University of London. Author of The Writing of English, and articles in the Special Reports on educational subjects of the Board of Edu- cation.

Paul Wiriath.

Director of the Ecole Superieure Pratique de Commerce et d'lndustrie, Paris.

Robert Adamson, LL.D.

See the biographical article : Adamson, R.

Robert Alexander Stewart Macalister, M.A., F.S.A. f

St John's College, Cambridge. Director of Excavations for the Palestine Ex- -i Font. ploration Fund. I

Rev. Robert Henry Charles, M.A., D.D., D.Litt. (Oxon.).

Grinfield Lecturer and Lecturer in Biblical Studies, Oxford. Fellow of the British Academy. Formerly Senior Moderator of Trinity College, Dublin. Author and – Editor of Book of Enoch; Book of Jubilees; Apocalypse of Baruch; Assumption of Moses; Ascension of Isaiah; Testaments of the XII. Patriarchs; &c.

Flagellants.

f Ferghana {in part) ; L Finland (in part).

f Falkland; Fanshaw; Fawkes, Guy; Fell, John; Forteseue, Sir John.

Fiorenzo di Lorenzo; Fragonard.

Examinations (in part).

•I France: History to 1870.

j" Fiehte;

\ Fourier, F. C. M.

Ronald John McNeill, M.A.

Christ Church, Oxford. Barrister-at-Law. Formerly Editor of the St James's • Gazette, London.

Richard Lydekker, F.R.S., F.G.S., F.Z.S.

Member of the Staff of the Geological Survey of India, 1874-1882. Author of Catalogue of Fossil Mammals, Reptiles and Birds in British

Museum; The Deer of all Lands; The Game Animals of Africa; &c.

Robert Nisbet Bain (d. 1909).

Assistant Librarian, British Museum, 1883-1909. Author of Scandinavia: the Political History of Denmark, Norway and Sweden, 1513-1900; The First Romanovs, 1613-1725 ; Slavonic Europe : the Political History of Poland and Russia from 1469 to 1796 ; &c.

Rene Poupardin, D. es L.

Secretary of the Ecole des Chartes. Honorary Librarian at the Bibliotheque Nationale, Paris. Author of Le Royaume de Provence sous les Carolingiens; Recueil des chartes de Saint-Germain ; &c.

R. Phene Spiers, F.S.A., F.R.I.B.A.

Formerly Master of the Architectural School, Royal Academy, London. Past President of Architectural Association. Associate and Fellow of King's College, London. Corresponding Member of the Institute of France. Editor of Fergusson's History of Architecture. Author of Architecture: East and West; &c.

Robert Seymour Conway, M.A., D.Litt. (Cantab.).

Professor of Latin and Indo-European Philology in the University of Manchester. Formerly Professor of Latin in University College, Cardiff ; and Fellow of Gonville and Caius College, Cambridge. Author of The Italic Dialects.

Roland Truslove, M.A.

Formerly Scholar of Christ Church, Oxford. Fellow, Dean and Lecturer in Classics at Worcester College, Oxford.

Ezra: Third and Fourth Books of.

Fenians;

Fitzgerald, Lord Edward;

Flood, Henry.

Flying-Squirrel; Fox.

-j Franche-Comte.

r

-j Flute: Architecture.

\ Falisci.

■I France: Statistics.

INITIALS AND HEADINGS OF ARTICLES

xx

8. A. C. S.C.

stc.

S. E. B.

S. E. S.-R. f. A. L T. As.

T. Ba. T. H. H.*

T. K. C. T. Se.

T.Wo. V.M.

W. A. B. C.

W. A. P. W. B.* W. Ca. W. Ga.

W. He. W.M.B.

Exodus, The;

Ezra and Nehemiah, Books o£

/Fine Arts; Finiguerra; I Flaxman.

Stanley Arthur Cook, M.A.

Editor for Palestine Exploration Fund. Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904-1908. Author of Glossary of Aramaic Inscrip- tions ; The Laws of Moses and the Code of Hammurabi ; Critical Notes on Old Testa- ment History; Religion of Ancient Palestine; &c.

Sidney Colvin, LL.D.

See the biographical article : Colvin, S.

Viscount St Cyres.

See the biographical article: Iddesleigh, ist Earl of

Hon. Simeon Eben Baldwin, M.A., LL.D.

Professor of Constitutional and Private International Law in Yale University. Director of the Bureau of Comparative Law of the American Bar Association. – Formerly Chief Justice of Connecticut. Author of Modern Political Institutions; American Railroad Law; &c.

Stephen Edward Spring-Rice, M.A., C.B. (1856-1902).

Formerly Principal Clerk, H.M. Treasury, and Auditor of the Civil List. Fellow of \ Exchequer (in part). Trinity College, Cambridge.

{

Fenelon.

Extradition: U.S.A.

Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.

Thomas Ashby, M.A., D.Litt. (Oxon.), F.S.A.

Director of British School of Archaeology at Rome. Formerly Scholar of Christ Church, Oxford. Craven Fellow, 1897. Corresponding Member of the Imperial ■* German Archaeological Institute. Author of the Classical Topography of the Roman

Campagna ; &c.

Sir Thomas Barclay, M.P. j

Member of the Institute of International Law. Member of the Supreme Council of ˆ the Congo Free State. Officer of the Legion of Honour. Author of Problems of International Practice and Diplomacy; &c. M.P. for Blackburn, 1910.

Sir Thomas Hungerford Holdich, K.C.M.G., K.C.I.E., D.Sc, F.R.G.S.

Colonel in the Royal Engineers. Superintendent, Frontier Surveys, India, 1892- 1898. Gold Medallist, R.G.S., London, 1887. H.M. Commissioner for the* Persia-Beluch Boundary, 1896. Author of The

Indian Borderland; The Gates of India; &c.

Rev. Thomas Kelly Cheyne, D.D.

See the biographical article : Cheyne, T.

-j Explosives: Law.

Faesulae; Falerii; Falerio; Fanum Fortunae; Ferentino; Fermo; Flaminia Via; Florence: Early History; Fondi; Fonni; Forum AppiL

Exterritoriality.

K.

Everest, Mount

-j Eve (in part).

Flax.

Thomas Seccombe, M A.

Lecturer in History, East London and Birkbeck Colleges, University of London

Stanhope Prizeman, Oxford, 1887. Formerly Assistant Editor of Dictionary of ‘J Fawceit, Henry,

National Biography, 1891-1901. Joint-author of The Bookman History of English

Literature. Author of The Age of Johnson ; &c.

Thomas Woodhouse. r

Head of .Weaving and Textile Designing Department, Technical College, Dundee. |

Victor Charles Mahillon. r

Principal of the Conservatoire Royal deMusique at Brussels. Chevalier of the Legion J Flute (in ■pari) of Honour. | *

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G S., Ph.D. (Bern), f

Fellow of Magdalen College, Oxford. Professor of English History, St

David's) w.iji.-. y, College, Lampeter, 1880-1881. Author of Guide to Switzerland; The Alps in\ * elaKlrcn ' Nature and in History; &c. Editor of the Alpine Journal, 1880-1889. I

Walter Alison Phillips, M.A. r E xce j] encv . Faust*

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, \ t, u – •' '

Oxford. Author of Modern Europe; &c. \ Febromamsm.

William Burton, M.A., F.C.S. r

Chairman, Joint Committee of Pottery Manufacturers of Great Britain. Author of ■< Firebrick (in part).

English Stoneware and Earthenware ; &c. I

Walter Camp, A.M. r

Member of Yale University Council. Author of American Football; Football Facts \ Football: American (in pari). and Figures; &c. I

Walter Garstang, M.A., D.Sc

Professor of Zoology at the University of Leeds. Scientific Adviser to H.M. Delegates on the International Council for the Exploration of the Sea, 1901-1907. Formerly Fellow of Lincoln College, Oxford. Author of The Races and Migrations of the Mackerel ; The Impoverishment of the Sea ; &c.

Walter Hepworth. r

Formerly Commissioner of the Council of Education, Science and Art Department, \ F00L

South Kensington. I

William Michael Rossetti. f Ferrari, Gaudenzio;

See the biographical article : Rossetti, Dante G. -j Fielding, Copley;

[Franceschi, Piero; Francia.

Fisheries.

INITIALS AND HEADINGS OF ARTICLES

w. P. P. W„ N. S.

W. P. R.

Wa A* S*

W. R. E. H. W. Sch. W. W. F.* W. W. R.*

William Plane Pycraft, F.Z.S.

Assistant in the Zoological Department, British Museum. Formerly Assistant . Linacre Professor of Comparative Anatomy, Oxford. Vice-President of the Selborne Society. Author of A History of Birds ; &c.

William Napier Shaw, M.A., LL.D., D.Sc, F.R.S.

Director of the Meteorological Office. Reader in Meteorology in the University of London. President of Permanent International Meteorological Committee. „ Member of Meteorological Council, 1897-1905. Hon. Fellow of Emmanuel College, Cambridge. Fellow of Emmanuel College, 1877-1899; Senior Tutor, 1890-1899. Joint Author of Text Book of Practical Physics ; &c.

Hon. William Pember Reeves. .

Director of London School of Economics. Agent-General and High Commissioner for New Zealand, 1896-1909. Minister of Education, Labour and Justice, New-j p ox Sir William. 6. Author of The Long White Cloud, a History of New Zealand ; ‘

Feather (in pari).

Fog.

Zealand, 1891- &c.

William Robertson Smith, LL.D.

See the biographical article: Smith, W. R.

{

Eve (in part).

William Richard Eaton Hodgkinson, Ph.D., F.R.S. r

Professor of Chemistry and Physics, Ordnance College, Woolwich. Formerly J _ , Professor of Chemistry and Physics, R.M.A., Woolwich. Part Author of Vaientin- j -Explosives. Hodgkinson's Practical Chemistry; &c. [

Sir Wilhelm Schlich, K.C.I.E., M.A., Ph.D., F.R.S., F.L.S. r

Professor of Forestry at the University of Oxford. Hon. Fellow of St John's College. J _ . . _ .^ Author of A Manual of Forestry; Forestry in the United Kingdom; The Outlook of] forests and Forestry. the World's Timber Supply; &c. [_

William Warde Fowler, M.A. r

Fellow of Lincoln College, Oxford. Sub-rector, 1881-1904. Gifford Lecturer, J _ . Edinburgh University, 1908. Author of The City-State of the Greeks and Romans; | Fortuna. The Roman Festivals of the Republican Period ; &c. [

William Walker Rockwell, Lic.Theol. f

Assistant Professor of Church History, Union Theological Seminary, New York. -I Ferrara-Florence, Council oL Author of Die Doppelehe des Landgrafen Philipp von Hessen. [

PRINCIPAL UNSIGNED ARTICLES

Evil Eye.

Fault.

Fig.

Excise.

Federal Government.

Filigree

Execution.

Federalist Party.

Fir.

Executors and Adminis-

Fehmic Courts.

Fives.

trators.

Felony.

Fleurus.

Exeter.

Fez.

Florida.

Exile.

Fezzan.

Foix.

Eylau.

Fictions.

Fold.

Famine.

Fife.

Fontenelle.

Fontenoy.

Foot and Mouth Disease.

Forest Laws.

Forfarshire.

Forgery.

Formosa.

Foundling Hospitals.

Fountain.

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

VOLUME X

EVANGELICAL CHURCH CONFERENCE, a convention of delegates from the different Protestant churches of Germany. The conference originated in 1848, when the general desire for political unity made itself felt in the ecclesiastical sphere as well. A preliminary meeting was held at Sandhof near Frankfort in June of that year, and on the 21st of September some five hundred delegates representing the Lutheran, the Reformed, the United and the Moravian churches assembled at Wittenberg. The gathering was known as Kirchentag (church diet), and, while leaving each denomination free in respect of constitution, ritual, doctrine and attitude towards the state, agreed to act unitedly in bearing witness against the non-evangelical churches and in defending the rights and liberties of the churches i.i the federation. The organization thus closely resembles that of the Free Church Federation in England. The movement exercised considerable influence during the middle of the 19th century. Though no Kirchentag, as such, has been convened since 1871, its place has been taken by the Kongrcss fur innere Mission, which holds annual meetings in different towns. There is also a biennial conference of the evangelical churches held at Eisenach to discuss matters of general interest. Its decisions have no legislative force.

EVANGELICAL UNION, a religious denomination which originated in the suspension of the Rev. James Morison (1816- 1893), minister of a United Secession congregation in Kilmarnock, Scotland, for certain views regarding faith, the work of the Holy Spirit in salvation, and the extent of the atonement, which were regarded by the supreme court of

his church as anti-Calvinistic and heretical. Morison was suspended by the presbytery in 1841 and thereupon definitely withdrew from the Secession Church. His father, who was minister at Bathgate, and two other ministers, being deposed not long afterwards for similar opinions, the four met at Kilmarnock on the 16th of May 1843 (two days before the ” Disruption ” of the Free Church), and, on the basis of certain doctrinal principles, formed themselves into an association under the name of the Evangelical Union, ” for the purpose of countenancing, counselling and otherwise aiding one another, and also for the purpose of training up spiritual and devoted young men to carry forward the work and ‘ pleasure of the Lord.’ ” The doctrinal views of the new de- nomination gradually assumed a more decidedly anti-Calvinistic

form, and they began also to find many sympathizers among the Congregationalists of Scotland. Nine students were expelled from the Congregational Academy for holding ” Morisonian ” doctrines, and in 1845 eight churches were disjoined from the Congregational Union of Scotland and formed a connexion with the Evangelical Union. The Union exercised no jurisdiction over the individual churches connected with it, and in this respect adhered to the Independent or Congregational form of church government; but those congregations which originally were Pres- byterian vested their government in a body of elders. In 1889 the denomination numbered 93 churches; and in 1896, after prolonged negotiation, the Evangelical Union was incorporated with the Congregational Union of Scotland.

See The Evangelical Union Annual; History of the Evangelical Union, by F. Ferguson (Glasgow, 1876); The Worthies of the E.U. (1883) ; W. Adamson, Life of Dr James Morison (1898).

EVANS, CHRISTMAS (1766-1838), Welsh Nonconformist divine, was born near the village of Llandyssul, Cardiganshire, on the 25th of December 1766. His father, a shoemaker, died early, and the boy grew up as an illiterate farm labourer. At the age of seventeen, becoming servant to a Presbyterian minister, David Davies, he was affected by a religious revival and learned to read and write in English and Welsh. The itinerant Calvinistic Methodist preachers and the members of the Baptist church at Llandyssul further influenced him, and he soon joine<{ the latter denomination. In 1789 he went into North Wales as a preacher and settled for two years in the desolate peninsula of Lleyn, Carnarvonshire, whence he removed to Llangefni in Anglesey. Here, on a stipend of £17 a year, supplemented by a little tract-selling, he built up a strong Baptist community, modelling his organization to some extent on that of the Calvin- istic Methodists. Many new chapels

were built, the money being' collected on preaching tours which Evans undertook in South Wales.

In 1826 Evans accepted an invitation to Caerphilly, where he remained for two years, removing in 1828 to Cardiff. In 1832, in response to urgent calls from the north, he settled in Carnarvon and again undertook the old work of building and collecting. He was taken 01 on a tour in South Wales, and died at Swansea on the 19th of July 1838. In spite of his early dis- advantages and personal disfigurement (he had lost an eye in a

youthful brawl), Christmas Evans was a remarkably powerful preacher. To a natural aptitude for this calling he united a nimble mind and an inquiring spirit; his character was simple, his piety humble and his faith fervently evangelical. For a time he came under Sandemanian influence, and when the Wesleyans entered Wales he took the Calvinist side in the bitter controversies that were frequent from 1800 to 1810. His chief characteristic was a vivid and affluent imagination, which absorbed and controlled all his other powers, and earned for him the name of ” the Bunyan of Wales.”

His works were edited by Owen Davies in 3 vols. (Carnarvon, 1895-1897). See the Lives by D. R. Stephens (1847) and Paxton Hood (1883).

EVANS, EVAN HERBER (1836-1896), Welsh Nonconformist divine, was born on the 5th of July 1836, at Pant yr Onen near Newcastle Emlyn, Cardiganshire. As a boy he saw something of the ” Rebecca Riots,” and went to school at the neighbouring village of Llechryd. In 1853 he went into business, first at Pontypridd and then at Merthyr, but next year made his way to Liverpool. He decided to enter the ministry, and studied arts and theology respectively at the Normal College, Swansea, and the Memorial College, Brecon, his convictions being deepened by the religious revival of 1858-1859. In 1862 he succeeded Thomas Jones as minister of the Congregational church at Morriston near Swansea. In 1865 he became pastor of Salem church, Carnarvon, a charge which he occupied for nearly thirty years despite many invitations to English pastorates.” In 1894 he became principal of the Congregational college at Bangor. He died on the 30th of December 1896. He was chairman of the Welsh Congregational Union in 1886 and of the Congregational Union of England and Wales in

1892; and by his earnest ministry, his eloquence and his literary work, especially in the denominational paper Y Dysgedydd, he achieved a position of great influence in his country.

See Life by H. Elvet Lewis.

EVANS, SIR GEORGE DE LACY (1787-1870), British soldier, was born at Moig, Limerick, in 1787. He was educated at Woolwich Academy, and entered the army in 1806 as a volunteer, obtaining an ensigncy in the 22nd regiment in 1807. His early service was spent in India, but he exchanged into the 3rd Light Dragoons in order to take part in the Peninsular War, and was present in the retreat from Burgos in 181 2. In 1813 he was at Vittoria, and was afterwards employed in making a military survey of the passes of the Pyrenees. He took part in the campaign of 1 8 14, and was present at Pampeluna, the Nive and Toulouse; and later in the year he served with great distinction on the staff in General Ross's Bladensburg campaign, and took part in the capture of Washington and of Baltimore and the operations before New Orleans. He returned to England in the spring of 181 s, in time to take part in the Waterloo campaign as assistant quartermaster-general on Sir T. Picton's staff. As a member of the staff of the duke of Wellington he accompanied the English army to Paris, and remained there during the occupation of the city by the allies. He was still a substantive captain in the 5th West India regiment, though a lieutenant- colonel by brevet, when he went on half-pay in 1818. In 1830 he was elected M.P. for Rye in the Liberal interest; but in the election of 1832 he was an unsuccessful candidate both for that borough and for Westminster. For the latter constituency he was, however, returned in 1833, and, except in the parliament of 1841-1846, he continued to represent it till 1865, when he retired from political life. His parliamentary duties did not, however, interfere with his career as a soldier. In 1835 he went out to Spain in command of the Spanish Legion, recruited in England, and 9600 strong, which served for two years in the Carlist War on the side of the queen of Spain. In spite of great difficulties the legion won great distinction on the battlefields of northern Spain, and Evans was able to say that no prisoners had been taken from it in action, that it had never lost a gun or an equipage, and that it had taken 27 guns and 1100 prisoners from the en,emy. He received several Spanish orders, and on his return in 1839 was made a colonel and K.C.B. In 1846 he became

major-general; and in 1854, on the breaking-out of the Crimean War, he was made lieutenant-general and appointed to command the 2nd division of the Army of the East. At the battle of the Alma, where he received a severe wound, his quick comprehension of the features of

the combat largely contributed to the victory. On the 26th of October he defeated a large Russian force which attacked his position on Mount Inkerman. -Illness and fatigue compelled him a few days after this to leave the command of his division in the hands of General Pennefather; but he rose from his sick-bed on the day of the battle of Inkerman, the 5th of November, and, declining to take the command of his division from Pennefather, aided him in the long-protracted struggle by his advice. On his return invalided to England in the following February, Evans received the thanks of the House of Commons. He was made a G.C.B., and the university of Oxford conferred on him the degree of D.C.L. In 1861 he was promoted to the full rank of general. He died in London on the pth of January 1870.

EVANS, SIR JOHN (1823-1908)-; English ‘archaeologist and geologist, son of the Rev. Dr A. B. Evans, head master of Market Bosworth grammar school, was born at Britwell Court, Bucks, on the 17th of November 1823. He was for many years head of the extensive paper manufactory of Messrs John Dickin- son at Nash Mills, Hemel Hempstead, but was especially dis- tinguished as an antiquary and numismatist. He was the author of three books, standard in their respective departments: The Coins of the Ancient Britons (1864); The Ancient Stone Imple- ments, Weapons and Ornaments of Great Britain (1872, 2nd ed. 1897); and The Ancient Bronze Implements, Weapons and Ornaments of Great Britain and Ireland (1881). He also wrote a number of separate papers on archaeological and geological sub- jects — notably the papers on ” Flint Implements in the Drift ” communicated in i860 and : 1862 to Archaeologia, the orgariof the Society of Antiquaries. Of that society he was president from 1885 to 1892, and he was president of the Numismatic Society from 1874 to the time of his death. Pie also presided over the Geological Society, 1874-1876; the Anthropological Institute, 1877-1879; the Society of Chemical Industry, 1892-1893; the British Association, 1897-1898; and for twenty years (1878- 1898) he was treasurer of the Royal Society. As president of the Society of Antiquaries he was an ex officio trustee of the British Museum, and subsequently he became a permanent trustee. His academic honours included honorary degrees from several universities, and he was a corresponding member of the Institut de France. He was created a K.C.B. in 1892. He died at Berkhamsted on the 31st of May 1908.

His eldest son, Arthur John Evans, born in 1851, was educated at Brasenose College, Oxford, and Gottirigen. He be- came fellow of Brasenose and in 1884 keeper of the Ashmolean Museum at Oxford. He travelled in Finland and Lapland in 1873-1874, and in 1875 made a special study of archaeology and ethnology in the Balkan States. In

1893 he began his investigations in Crete, which have resulted in discoveries of the utmost importance concerning the early history of Greece and the eastern Mediterranean (see Aegean Civilization and Crete). He is a member of all the chief archaeological societies in Europe, holds honorary degrees at Oxford, Edinburgh and Dublin, and is a fellow of the Royal Society. His chief publi- cations are: Cretan Pictographs and Prae- Phoenician Script (1896); Further Discoveries of Cretan and Aegean Script (1898); The Mycenaean Tree and Pillar Cult (1901); Scripta Minoa (1909 foil.); and reports on the excavations. He also edited with additions Freeman's History of Sicily, vol. iv.

EVANS, OLIVER (1755-1819), American mechanician, was born at Newport, Delaware, in 1755. He was apprenticed to a wheelwright, and at the age of twenty-two he invented a machine for making the card-teeth used in carding wool and cotton. In 1780 he became partner with his brothers, who were practical millers, and soon introduced various labour-saving appliances which both cheapened and improved the processes of flour* milling. Turning his attention to the steam engine, he employed steam at a relatively high pressure, and the plains of his invention which he sent over to England in 1787 and in 1 794-1 795 are said

to have been seen by R. Trevithick, whom in that case he anticipated in the adoption of the high-pressure principle. He made use of his engine for driving mill machinery; and in 1803 he constructed a steam dredging machine, which also propelled itself on land. In 1819 a disastrous fire broke out in his factory at Pittsburg, and he did not long survive it, dying at New York on the 21st of April 1819.

EVANSON, EDWARD (1731-1805), English divine, was born on the 21st of April 1731 at Warrington, Lancashire. After graduating at Cambridge (Emmanuel College) and taking holy orders, he officiated for several years as curate at Mitcharh. In 1768 he became vicar of South Mimms near Barnet; and in November 1769 he was presented to the rectory of Tewkesbury, with which he held also the vicarage of Longdon in Worcester- shire. In the course of his studies he discovered what he thought important variance between the teaching of the Church of Eng- land and that of the Bible, and he did not conceal his convictions. In reading the service he altered or omitted phrases which seemed to him untrue, and in reading the Scriptures pointed out errors in the translation. A crisis was brought on by his sermon on

the resurrection, preached at Easter 1771; and in November 1773 a prosecution was instituted against him in the consistory court of Gloucester. He was charged with " depraving the public worship of God contained in the liturgy of the Church of England, asserting the same to be superstitious and unchristian, preaching, writing and conversing against the creeds and the divinity of our Saviour, and assuming to himself the power of making arbitrary alterations in his performance of the public worship." A protest was at once signed and published by a large number of his parishioners against the prosecution. The case was dis- missed on technical grounds, but appeals were made to the court of arches and the court of delegates. Meanwhile Evanson had made his views generally known by several publications. In 1772 appeared anonymously his Doctrines of a Trinity and the Incarnation of God, examined upon the Principles of Reason and Common Sense. This was followed in 1777 by A Letter to Dr Hurd, Bishop of Worcester, wherein the Importance of the Prophecies of the New Testament and the Nature of the Grand Apostasy pre- dicted in them are particularly and impartially considered. He also wrote some papers on the Sabbath, which brought him into controversy with Joseph Priestley, who published the whole discussion (1792). In the same year appeared Evanson's work entitled The Dissonance of the four generally received Evangelists, to which replies were published by Priestley and David Simpson (1793). Evanson rejected most of the books of the New Testa- ment as forgeries, and of the four gospels he accepted only that of St. Luke. In his later years he ministered to a Unitarian congregation at Lympston, Devonshire. In 1802 he published Reflections upon the State of Religion in Christendom, in which he attempted to explain and illustrate the mysterious foreshadow- ings of the Apocalypse. This he considered the most important of his writings. Shortly before his death at Colford, near Crediton, Devonshire, on the 25th of September 1805, he com- pleted his Second Thoughts on the Trinity, in reply to a work of the bishop of Gloucester.

His sermons (prefaced by a Life by G. Rogers) were published in two volumes in 1807, and were the occasion of T. Falconer's Bampton Lectures in 181 1. A narrative of the circumstances which led to the prosecution of Evanson was published by N. Havard, the town-clerk of Tewkesbury, in 1778.

EVANSTON, a city of Cook county, Illinois, U.S.A., on the shore of Lake Michigan, 12 m. N. of Chicago. Pop. (1900) 19,259, of whom 4441 were foreign-born; (1910 U. S. census) 24,978. It is served by the Chicago & North-Western, and the Chicago, Milwaukee & St Paul railways, and by two electric lines. The city is an important residential

suburb of Chicago. In 1908 the Evanston public library had 41,430 volumes. In the city are the College of Liberal Arts (1855), the Academy (i860), and the schools of music (1895) and engineering (1908) of North- western University, co-educational, chartered in 185 1, opened in 1855, the largest school of the Methodist Episcopal Church in America. In 1909-1910 it had productive funds amounting to about $7, 500,000, and, including all the allied schools, a faculty of

418 instructors and 4487 students; its schools of medicine (1869), law (1859), pharmacy (1886), commerce (1908) and dentistry (1887) are in Chicago. In 1909 its library had 114,869 volumes and 79,000 pamphlets (exclusive of the libraries of the professional schools in Chicago) ; and the Garrett Biblical Institute had a library of 25,671 volumes and 4500 pamphlets. The university, maintains the Grand Prairie Seminary at Onarga, Iroquois county, and the Elgin Academy at Elgin, Kane county. Enjoy- ing the privileges of the university, though actually independent of it, are the Garrett Biblical Institute (Evanston Theological Seminary), founded in 1855, situated on the university campus, and probably the best-endowed Methodist Episcopal theological seminary in the. United States, and affiliated with the Institute, the Norwegian Danish Theological school; and the Swedish Theological Seminary, founded at Galesburg in 1870, removed to Evanston in 1882, and occupying buildings on the university campus until 1907, when it removed to Orrington Avenue and Noyes Street. The Cumnock School of Oratory, at Evanston, also co-operates with the university. By the charter of the university the sale of intoxicating liquors is forbidden within 4 m. of the university campus. The manufacturing importance of the city is slight, but is rapidly increasing. The principal manufactures are wrought iron and steel pipe, bakers' machinery and bricks. In 1905 the value of the factory products was $2,550,529, being an increase of 207‘3% since 1900. , In Evanston are the publishing offices of the National Woman's Christian Temperance Union. Evanston was incorporated as a town in 1863 and as a village in 1872, and was chartered as a city in 1892. The villages of North Evanston and South Evanston were annexed to Evanston in 1874 and 1892 respectively.

EVANSVILLE, a city and the county-seat of Vanderburg county, Indiana, U.S.A., and a port of entry, on the N. bank of the Ohio river, 200 m. below Louisville, Kentucky — measuring by the windings of the river, which double the direct distance., Pop. (1890) 50,756; (1000) 59.007; (1010 census) 69,647. Of the total population in 1900, 5518 were negroes, 5626 were foreign-born (including 4380 from Germany and 384 from Eng- land), and 17,419 were of foreign parentage (both parents foreign-born), and of these 13,910 were of

German parentage- Evansville is served by the Evansville & Terre Haute, the Evansville & Indianapolis, the Illinois Central, the Louisville & Nashville, the Louisville, Henderson & St Louis, and the Southern railways, by several interurban electric lines, and by river steam- boats. The city is situated on a plateau above the river, and has a number of fine business and public buildings, including the court house and city hall, the Southern Indiana hospital for the insane, the United States marine hospital, and the Willard library and art gallery, containing in 1908 about 30,000 volumes. The city's numerous railway connexions and its situation in a coal-producing region (there are five mines within the city limits) and on the Ohio river, which is navigable nearly all the. year, combine to make it the principal commercial and manu- facturing centre of Southern Indiana. It is in a tobacco-growing region, is one of the largest hardwood lumber markets in the country, and has an important shipping trade in pork, agricul- tural products, dried fruits, lime and limestone, flour and tobacco. Among its manufactures in 1905 were flour and grist mill products (value, $2,638,914), furniture ($1,655,246), lumber and timber products ($1,229,533), railway cars ($1,118,376),- packed meats ($998,428), woollen and cotton goods, cigars and cigarettes, malt liquors, carriages and wagons, leather and canned goods The value of the factory products increased from $12,167,524 in 1900 to $19,201,716 in 1905, or 57-8%, and in the latter year. Evansville ranked third among the manufacturing cities in the state. The waterworks are owned and operated by the city. First settled about 1812, Evansville was laid out. in 1817, and was named in honour of Robert Morgan Evans (1783-1844), one of its founders, who was an officer under General W. H. Harrison in the war of 181 2. It soon became a thriving commercial town. with an extensive river trade, was incorporated in 1819, and received a city charter in 1847. The completion of the Wabash

& Erie Canal, in 1853, from Evansville to Toledo, Ohio, a distance of 400 m., greatly accelerated the city's growth.

EVARISTUS, fourth pope (c. 98-105), was the immediate successor of Clement.

EVARTS, WILLIAM MAXWELL (1818-1901), American lawyer, was born in Boston on the 6th of February 1818. He graduated at Yale in 1837, was admitted to the bar in New York in 1 84 1, and soon took high rank in his profession. In i860 he was chairman of the New York delegation to the Republican national convention. In 1861 he was an

unsuccessful candidate for the United States senatorship from New York. He was chief counsel for President Johnson during the impeachment trial, and from July 1868 until March 1869 he was attorney-general of the United States. In 1872 he was counsel for the United States in the ” Alabama ” arbitration. During President Hayes’s ad- ministration (1877-1881) he was secretary of state; and from 1885 to 1891 he was one of the senators from New York. As an orator Senator Evarts stood in the foremost rank, and some of his best speeches were published. He died in New York on the 28th of February 1901.

EVE, the English transcription, through Lat. Eva and Gr. Efia, of the Hebrew name “i* Hawah, given by Adam to his wife because she was ” mother of all living,” or perhaps more strictly, ” of every group of those connected by female kinship ” (see W. R. Smith, Kinship, 2nd ed., p. 208), as if Eve were the per- sonification of mother-kinship, just as Adam (” man “) is the personification of mankind.

[The abstract meaning ” life ” (LXX. Z«ˆ), once favoured by Robertson Smith, is at any rate unsuitable in a popular story. Wellhausen and Noldeke would compare the Ar. hayyatun, ” serpent,” and the former remarks that, if this is right, the Israelites received their first ancestress from the Hivvites (Hivites), who were originally the serpent-tribe {Composition des Hexateuchs, p. 343; cf. Reste arabischen Heidentums, 2nd ed., p. 1 54). Cheyne, too, assumes a common origin for Hawah and the Hiwites.]

[The account of the origin of Eve (Gen. iii. 21-23) runs thus: ” And Yahweh-Elohim caused a deep sleep to fall upon the man, and he slept. And he took one of his ribs, and closed 0/ Eve. U P tne A es b m ‘ ts ste ad, and the rib which Yahweh- Elohim had taken from the man he built up into a woman, and he brought her to the man.” Enchanted at the sight, the man now burst out into elevated, rhythmic speech: ” This one,” he said, ” at length is bone of my bone and flesh of my flesh,” &c; to which the narrator adds the comment, ” Therefore doth a man forsake his father and his mother, and cleave to his wife, and they become one flesh (body).” Whether this comment implies the existence of the custom of beena, marriage (W.R.Smith, Kinship, 2nd ed., p. 208), seems doubtful. It is at least equally possible that the expression ” his wife ” simply reflects the fact that among ordinary Israelites circum- stances had quite naturally brought about the prevalence of monogamy. 1 What the narrator gives is not a doctrine of marriage, much less a precept, but an explanation of a simple and natural phenomenon. How is it, he asks, that a man is so irresistibly drawn towards a woman? And he answers: Because the first woman

was built up out of a rib of the first man. At the same time it is plain that the already existing tendency towards monogamy must have been powerfully assisted by this presenta- tion of Eve's story as well as by the prophetic descriptions of Yahweh's relation to Israel under the figure of a monogamous union.]

[The narrator is no rhetorician, and spares us a description of the ideal woman. But we know that, for Adam, his strangely Stw produced wife was a " help (or helper) matching or

Testament corresponding to him "; or, as the Authorized Version

OoaT" puts ifc ' " a help meet for him " (ii- l8 ^' This does not, of course, exclude subordination on the part of the

WMnan; what is excluded is that exaggeration of natural

subordination which the narrator may have found both in his

1 That polygamy had not become morally objectionable is shown by the stories of Lantech, Abraham and Jacob.

own and in the neighbouring countries, and which he may have regarded as (together with the pains of parturition) the punish- ment of the woman's transgression (Gen. iii. 16). His own ideal of woman seems to have made its way in Palestine by slow degrees. An apocryphal book (Tobit viii. 6, 7) seems to contain the only reference to the section till we come to the time of Christ, to whom the comment in Gen. ii. 24 supplies the text for an authori- tative prohibition of divorce, which presupposes and sanctifies monogamy (Matt. x. 7, 8; Matt. xix. 5). For other New Testament applications of the story of Eve see 1 Cor. xi. 8, 9 (especially); 2 Cor. xi. 3; 1 Tim. ii. 13, 14; and in general cf. Adam, and Ency. Biblica, " Adam and Eve."]

[The seeming omissions in the Biblical narrative have been filled up by imaginative Jewish writers.] The earliest source

which remains to us is the Book of Jubilees, or Lepto- , ,

t»i •• \ / e- » . -^4-T^. . imaglna*

genesis, a Palestinian work (referred, by R. H. Charles tlve or

to the century immediately preceding the Christian era ; legendary see Apocalyptic Literature) . In this book, which was ^j5 P " largely used by Christian writers, we find a chronology of the lives of Adam and

Eve and the names of their daughters — Avan and Azura. 2 The Targum of Jonathan informs us that Eve was created from the thirteenth rib of Adam's right side, thus taking the view that Adam had a rib more than his descendants. Some of the Jewish legends show clear marks of foreign influence. Thus the notion that the first man was a double being, afterwards separated into the two persons of Adam and Eve (Berachot, 61; Erubin, 18), may be traced back to Philo (De mundi opij. §53; cf. Quaest. in Gen. lib. i. §25), who borrows the idea, and almost the words, of the myth related by Aristophanes in the Platonic Symposium (189 D, 190 a), which, in extravagant form, explains the passion of love by the legend that male and female originally formed one body.

[A recent critic 3 (F. Schwally) even holds that this notion was originally expressed in the account of the creation of man in Gen. i. 27. This involves a textual emendation, and one must at least admit that the present text is not without difficulty, and that Berossus refers to the existence of primeval monstrous androgynous beings according to Babylonian mythology.] There is an analogous Iranian legend of the true man, which parted into man and woman in the Bundahish 4 (the Parsi Genesis), and an Indian legend, which, according to Spiegel, has presumably an Iranian source. 5

[It has been remarked elsewhere (Adam, §16) that though the later Jews gathered material for thought very widely, such guidance as they required in theological reflection was course of mainly derived from Greek culture. What, for in- Jewish and stance, was to be made of such a story as that in Gen. Christian ii.-iv.? To " minds trained under the influence of the ˆfoˆf" Jewish Haggada, in which the whole Biblical history is freely intermixed with legendary and parabolic matter," the question as to the literal truth of that story could hardly be formulated. It is otherwise when the Greek leaven begins to work.]

Josephus, in the prologue to his Archaeology, reserves the problem of the true meaning of the Mosaic narrative, but does not regard everything as strictly literal. Philo, the great repre- sentative of Alexandrian allegory, expressly argues that in the nature of things the trees of life and knowledge cannot be taken otherwise than symbolically. His interpretation of the creation of Eve is, as has been already observed, plainly suggested by a Platonic myth. The longing for reunion which love implants in the divided halves of the original dual man is the source of sensual pleasure (symbolized by the serpent), which in turn is the beginning of all transgression. Eve represents the sensuous or perceptive part of man's nature, Adam the reason. The serpent, therefore, does not venture to attack Adam

directly.

- See West's authoritative translation in PaHlavi Texts (Sacred Books of the East).

3 " Die bibl. Schopfungsberichte " (Archivfiir Religionswissenscha.fi, ix. 171 ff.).

4 Spiegel, Erdnische Alterthumskunde, i. 51 1.

8 Muir, Sanscrit Texts, vol. i. p. 25; cf. Spiegel, vol. i. p. 458.

It is sense which yields to pleasure, and in turn enslaves the reason and destroys its immortal virtue. This exposition, in which the elements of the Bible narrative become mere symbols of the abstract notions of Greek philosophy, and are adapted to Greek conceptions of the origin of evil in the material and sensuous part of man, was adopted into Christian theology by Clement and Origen, notwithstanding its obvious inconsistency with the Pauline anthropology, and the difficulty which its supporters felt in reconciling it with "the Christian doctrine of the excellence of the married state (Clemens Alex. Stromata, p. 174). These difficulties had more weight with the Western church, which, less devoted to speculative abstractions and more deeply in- fluenced by the Pauline anthropology, refused, especially since Augustine, to reduce Paradise and the fall to the region of pure intelligibilia; though a spiritual sense was admitted along with the literal (Aug. Civ. Dei, xiii. 21). 1

The history of Adam and Eve became the basis of anthropo- logical discussions which acquired more than speculative import- ance from their connexion with the doctrine of original sin and the meaning of the sacrament of baptism. One or two points in Augustinian teaching may be here mentioned as having to do particularly with Eve. The question whether the soul of Eve was derived from Adam or directly infused by the Creator is raised as an element in the great problem of traducianism and creationism (De Gen. ad lit. lib. x.). And it is from Augustine that Milton derives the idea that Adam sinned, not from desire for the forbidden fruit, but because love forbade him to dissociate his fate from Eve's (ibid. lib. xi. sub fin.). Medieval discussion moved mainly in the lines laid down by Augustine. A sufficient sample of the way in which the subject was treated by the school- men may be found in the Summa of Thomas, pars i. qu. xcii. De productione mulieris.

The Reformers, always hostile to allegory, and in this matter especially influenced by the Augustinian anthropology, adhered strictly to the literal interpretation of the history of the Proto- plasts, which has continued to be generally identified with Protestant orthodoxy. The disintegration of the confessional doctrine of sin in last century was naturally associated with new theories of the meaning of the biblical narrative; but neither renewed forms of the allegorical interpretation, in which every- thing is reduced to abstract ideas about reason and sensuality, nor the attempts of Eichhorn and others to extract a kernel of simple history by allowing largely for the influence of poetical form in so early a narrative, have found lasting acceptance. On the other hand, the strict historical interpretation is beset with difficulties which modern interpreters have felt with in- creasing force, and which there is a growing disposition to solve by adopting in one or other form what is called the mythical theory of the narrative. But interpretations pass under this now popular title which have no real claim to be so designated. What is common to the ” mythical ” interpretations is to find the real value of the narrative, not in the form of the story, but in the thoughts which it embodies. But the story cannot be called a myth in the strict sense of the word, unless we are prepared to place it on one line with the myths of heathenism, produced by the unconscious play of plastic fancy, giving shape to the impressions of natural phenomena on primitive observers. Such a theory does no justice to a narrative which embodies profound truths peculiar to the religion of revelation. Other forms of the so-called mythical interpretation are little more than abstract allegory in a new guise, ignoring the fact that the biblical story does not teach general truths which repeat themselves in every individual, but gives a view of the purpose of man’s creation, and of the origin of sin, in connexion with the divine plan of redemption. Among his other services in refutation of the unhistorical rationalism of last century, Kant has the merit of having forcibly recalled attention to the fact that the narrative of Genesis, even if we do not take it literally, must be regarded as

1 Thus in medieval theology Eve is a type of the church, and her formation from the rib has a mystic reason, inasmuch as blood and water (the sacraments of the church) flowed from the side of Christ on the cross (Thomas, Summa, par. i. qu. xcii.).

presenting a view of the beginnings of the history of the human race (Muthmasslicher Anfang der Menschengeschichte, 1786) Those who recognize this fact ought not to call themselves or be called by others adherents of the mythical theory, although they also recognize that in the nature of things the divine truths brought out in the history of the

creation and fall could not have been expressed either in the form of literal history or in the shape of abstract metaphysical doctrine; or even although they may hold' — as is done by many who accept the narrative as a part ol supernatural revelation — that the specific biblical truths which the narrative conveys are presented through the vehicle of a story which, at least in some of its parts, may possibly be shaped by the influence of legends common to the Hebrews with their heathen neighbours. (W. R. S.; [T. K. C.])

EVECTION (Latin for " carrying away "), in astronomy, the largest inequality produced by the action of the sun in the monthly revolution of the moon around the earth. The deviation expressed by it has a maximum amount of about i° 1 5′ in either direction. It may be considered as arising from a semi-annual variation in the eccentricity of the moon's orbit and the position of its perigee. It was discovered by Ptolemy.

EVELETH, a city of St Louis county, Minnesota, U.S.A., about 71 m. N.N.W. of Duluth. Pop. (1900) 2752; (190,5, state census) 5332, of whom 2975 were foreign-born (1145 Finns, 676 Aus- trians and 325 Swedes); (1910) 7036. Eveleth is served by the Duluth, Missabe & Northern and the Duluth & Iron Range rail- ways. It lies in the midst of the great red and brown hematite iron-ore deposits of the Mesabi Range — the richest in the Lake Superior district — and the mining and shipping of this ore are its principal industries. The municipality owns and operates the water-works, the water being obtained from Lake Saint Mary, one of a chain of small lakes lying S. of the city. Eve- leth was first chartered as a city in 1902.

EVELYN, JOHN (1620-1706), English diarist, was born at Wotton House, near Dorking, Surrey, on the 31st of October 1620. He was the younger son of Richard Evelyn, who owned large estates in the county, and was in 1633 high sheriff of Surrey and Sussex. When John Evelyn was five years old he went to live with his mother's parents at Cliffe, near Lewes. He refused to leave his " too indulgent " grandmother for Eton, and when on her husband's death she married again, the boy went with her to Southover, where he attended, the free school of the place. He was admitted to the Middle Temple in February 1637, and in May be became a fellow commoner of Balliol College, Oxford. He left the university without taking a degree, and in 1640 was residing in the Middle Temple. In that year his father died, and in July 1641 he crossed to Holland. He was enrolled as a volunteer in Apsley's company, then encamped before Genep on the Waal, but his commission was apparently complimentary, his military experience being limited to six days of camp life, during which,

however, he took his turn at ” trailing a pike.” He returned in the autumn to find England on the verge of civil war. Evelyn’s part in the conflict is best told in his own words : —

” 12th November was the battle of Brentford, surprisingly fought. ... I came in with my horse and arms just at the retreat; out was not permitted to stay longer than the 15th by reason of the army marching to Gloucester; which would have left both me and my brothers exposed to ruin, without any advantage to his Majesty . . . and on the 10th [December] returned to Wotton, nobody knowing of my having been in his Majesty’s army.”

At Wotton he employed himself in improving his brother’s property, making a fishpond, an island and other alterations in the gardens. But he found it difficult to avoid taking a side; he was importuned to sign the Covenant, and ” finding it im- possible to evade doing very unhandsome things,” he obtained leave in October 1643 from tne kin S to travel abroad. From this date his Diary becomes full and interesting. He travelled in France and visited the cities of Italy, returning in the autumn of 1646 to Paris, where he became intimate with Sir Richard Browne, the English resident at the court of France. In June of the following year he married Browne’s daughter and heiress, Mary, then a child of not more than twelve years of age. Leaving

his wife in the care of her parents, he returned to England to settle his affairs. He visited Charles I. at Hampton Court in 1647, and during the next two years maintained a cipher correr spondence with his father-in-law in the royal interest. In 1649 he obtained a pass to return to Paris, but in 1650 paid a short visit to England. The defeat of Charles II. at Worcester in 1651 convinced him that the royalist cause was hopeless, and he decided to return to England, He went in 1652 to Saves Court at Dept- ford, a house which Sir Richard Browne had held on a lease from the crown. This had been seized by the parliament, but Evelyn was able to compound with the occupiers for £3500, and after the Restoration his possession was secured. Here his wife joined him, their eldest son, Richard, being born in August 1652. Under the . Commonwealth Evelyn amused himself with his favourite occupation of gardening, and made many friends among the scientific inquirers of the time. He was one of the promoters of the scheme for the Royal Society, and in the king’s charter in 1662 was nominated a member of

its directing council. Mean- while he had refused employment from the government of the Commonwealth, and had maintained a cipher correspondence with Charles. In 1659 he published an Apology for the Royal Party, and in December of that year he vainly tried to persuade Colonel Herbert Morley, then lieutenant of the Tower, to forestall General Monk by declaring for the king. From the Restoration onwards Evelyn enjoyed unbroken court favour till his death in 1706; but he never held any important political office, although he filled many useful and often laborious minor posts. He was commissioner for improving the streets and buildings of London, for examining into the affairs of charitable foundations, com- missioner of the Mint, and of foreign plantations. In 1664 he accepted the responsibility for the care of the sick and wounded and the prisoners in the Dutch war. He stuck to his post throughout the plague year, contenting himself with sending his family away to Wotton. He found it impossible to secure sufficient money for the proper discharge of his functions, and in 1688 he was still petitioning for payment of his accounts in this business. Evelyn was secretary of the Royal Society in 1672, and as an enthusiastic promoter of' its interests was twice (in 1682 and 1691) offered the presidency. Through his influence Henry Howard, duke of Norfolk, was induced to present the Arundel marbles to the university of Oxford (1667) and the valuable Arundel library to Gresham College (1678). In the reign of James II., during the earl of Clarendon's absence in Ireland, he acted as one of the commissioners of the privy seal. He was seriously alarmed by the king's attacks on the English Church, and refused on two occasions to license the illegal sale of Roman Catholic literature. He concurred in the revolution of 1688, in 1695 was entrusted with the office of treasurer of Green- wich hospital for old sailors, and laid the first stone of the new building on the 30th of June 1696. In 1694 he left Sayes Court to live at Wotton with his brother, whose heir he had become, and whom he actually succeeded in 1 699. He spent the rest of his life there, dying on the 27th of February 1706. Evelyn's house at Sayes Court had been let to Captain, afterwards Admiral John Benbow, who was not a " polite " tenant. He sublet it to Peter the Great, who was then visiting the dockyard at Deptford. The tsar did great damage to Evelyn's beautiful gardens, and, it is said, made it one of his amusements to ride in a wheelbarrow along a thick holly hedge planted especially by the owner. The house was subsequently used as a workhouse, and is now alms- houses, the grounds having been converted into public gardens by Mr Evelyn in 1886.

It will be seen that Evelyn's politics were not of the heroic order. But he was honourable and consistent in his adherence to the monarchical

principle throughout his life. With the court of Charles II. he could have had no sympathy, his dignified domestic life and his serious attention to religion standing in the strongest contrast with the profligacy of the royal surroundings. His Diary is therefore . a valuable chronicle of contemporary events from the standpoint of a moderate politician and a devout adherent of the Church of England. He had none of Pepys's love of gossip, and was devoid of his all-embracing curiosity,

as of his diverting frankness of self-revelation. Both were admir- able civil servants, and they had a mutual admiration for each other's sterling qualities. Evelyn's Diary covers more than half a century (1640-1706) crowded with remarkable events, while Pepys only deals with a few years of Charles II. 's reign.

Evelyn was a generous art patron, and Grinling Gibbons was introduced by him to the notice of Charles II. His domestic affections were. very strong. He had six sons, of whom John (1655-1699), the author of some translations, alone reached manhood. He has left a pathetic account of the extraordinary accomplishments of his son Richard, who died before he was six years old, and of a daughter Mary, who lived to be twenty, and probably wrote most of her father's Mundus muliebris (1690). Of his two other daughters, Susannah, who married William Draper of Addiscombe, Surrey, survived him.

Evelyn's Diary remained in MS. until 1818. It is in a quarto volume containing 700 pages, covering the years between 1641 and 1697, and is continued in a smaller book which brings the narrative down to within three weeks of its author's death. A selection from this was edited by William Bray, with the permission of the Evelyn family, in 1818, under the title of Memoirs illustrative of the Life and Writings of John Evelyn, comprising his Diary from 1641 to 1705I6, and a Selection of his Familiar Letters. Other editions followed, the most notable being those of Mr H. B. Wheatley (1879) and Mr Austin Dobson (3 vols., 1906). Evelyn's active mind produced many other works, and although these have been overshadowed by the famous Diary they are of considerable interest. They include: Of Liberty and Servitude . . . (1649), a translation from the French of Frangois de la Mothe le Vayer, Evelyn's own copy of which contains a note that he was " like to be call'd in question by the Rebells for this booke "; The State of France, as it stood in the IXth year of . . . Louis XIII. (1652) ; An Essay on the First Book of T. Lucretius Carus de Rerum Natura. Interpreted and made English verse by J. Evelyn (1656) ; The Golden Book of St John Chrysoslom, concerning the Education of Children. Translated out of the Greek by J. E. (printed 1658, dated 1659); The

French Gardener: instructing how to cultivate all sorts of Fruit-trees . . . (1658), translated from the French of N. de Bonnefons; A Character of England . . . (1659), describing the customs of the country as they would appear to a foreign observer, reprinted in Somers' Tracts (ed. Scott, 1812), and in the Harleian Miscellany (ed. Park, 18 13); The Late News from Brussels unmasked . . . (1660), in answer to a libellous pamphlet on Charles I. by Marchmont Needham; Fumifugium, or the incon- venience of the Aer and Smoak of London dissipated (1661), in which he suggested that sweet-smelling trees should be planted in London to purify the air; Instructions concerning erecting of a Library . . , (1661), from the French of Gabriel Naude; Tyrannus or the Mode, in a Discourse of Sumptuary Laws' (1661) ; Sculptura: or the History and Art of Chalcography and Engraving in Copper . . . (1662); Sylva, or a Discourse of Forest Trees . . . to which is annexed Pomona . . .Also Kalendarium Hortense . . . (1664); A Parallel of the Ancient Architecture with the Modern . . . (1664), from the French of Roland Frcart ; The History of the three late famous Imposlers, viz. Padre Otlomano, Mahomed Bei, and Sabatei Sevi . . . (1669); Navigation and Commerce . . .in which his Majesties title to the Dominion of the Sea is asserted against the Novel and later Pretenders (1674), which is a preface to a projected history of the Dutch wars undertaken at the request of Charles II., but countermanded on the conclusion of peace; A Philosophical Dis- course of Earth . . . (1676), a treatise on horticulture, better known by its later title of Terra; The Compleal Gardener . . . (1693), from the French of J. de la Quintinie; Numismata . . . (1697). Some of these were reprinted in The Miscellaneous Writings of John Evelyn, edited (1825) by William Upcott. Evelyn's friendship with Mary Blagge, afterwards Mrs Godolphin, is recorded in the diary, when he says he designed " to consecrate her worthy life to posterity." This he effectually did in a little masterpiece of religious biography which remained in MS. in the possession of the Harcourt family until it was edited by Samuel Wilberforce, bishop of Oxford, as the Life of Mrs Godolphin (1847), reprinted in the " King's Classics " (1904). The picture of Mistress Blagge's saintly life at court is heightened in interest when read in connexion with the scandalous memoirs of the comte de Gramont, or contemporary political satires on the court. Numerous other papers and letters of Evelyn on scientific subjects and matters of public interest are preserved, a collection of private and official letters and papers (1642-1712) by, or addressed to, Sir Richard Browne and his son-in-law being in the British Museum (Add. MSS. 15857 and 15858).

Next to the Diary Evelyn's most valuable work is Sylva. By the glass

factories and iron furnaces the country was being rapidly depleted of wood, while no attempt was being made to replace the damage by planting. Evelyn put in a plea for afforestation, and besides producing a valuable work on arboriculture, he was able to assert in his preface to the king that he had really induced landowners to plant many millions of trees.

EVERDINGEN, ALLART VAN (i62i-?i67s), Dutch painter and engraver, the son of a government clerk at Alkmaar, was born, it is said, in 1621, and educated, if we believe an old tradi- tion, under Roeland Savery at Utrecht. He wandered in 1645 to Haarlem, where he studied under Peter de Molyn, and finally settled about 1657 at Amsterdam, where he remained till his death. It would be difficult to find a greater contrast than that which is presented by the works of Savery and Everdingen. Savery inherited the gaudy style of the Breughels, which he carried into the 17th century; whilst Everdingen realized the large and effective system of coloured and powerfully shaded landscape which marks the precursors of Rembrandt. It is not easy on this account to believe that Savery was Everdingen's master, while it is quite within the range of probability that he acquired the elements of landscape painting from de Molyn. Pieter de Molyn, by birth a Londoner, lived from 1624 till 1661 in Haarlem. He went periodically on visits to Norway, and his works, though scarce, exhibit a broad and sweeping mode of execution, differing but slightly from that transferred at the opening of the 17th century from Jan van Goyen to Solomon Ruysdael. His etchings have nearly the breadth and effect of those of Everdingen. It is still an open question when de Molyn wielded influence on his clever disciple. Alkmaar, a busy trading place near the Texel, had little of the picturesque for an artist except polders and downs or waves and sky. Accordingly we find Allart at first a painter of coast scenery. But on one of his expeditions he is said to have been cast ashore in Norway, and during the repairs of his ship he visited the inland valleys, and thus gave a new course to his art. In early pieces he cleverly represents the sea in motion under varied, but mostly clouded, aspects of sky. Their general intonation is strong and brown, and effects are rendered in a powerful key, but the execution is much more uniform than that of Jacob Ruysdael. A dark scud lowering on a rolling sea near the walls of Flushing characterizes Everdingen's " Mouth of the Schelde " in the Hermitage at St Petersburg. Storm is the marked feature of sea-pieces in the Staedel or Robartes collections ; and a strand with wreckers at the foot of a cliff in the Munich Pinakothek may be a reminis- cence of personal adventure in Norway. But the Norwegian coast was studied in calms

as well as in gales; and a fine canvas at Munich shows fishermen on a still and sunny day taking herrings to a smoking hut at the foot of a Norwegian crag. The earliest of Everdingen's sea-pieces bears the date of 1640. After 164s we meet with nothing but representations of inland scenery, and particularly of Norwegian valleys, remarkable alike for wildness and a decisive depth of tone. The master's favourite theme is a fall in a glen, with mournful fringes of pines inter- spersed with birch, and log-huts at the base of rocks and craggy slopes. The water tumbles over the foreground, so as to entitle the painter to the name of " inventor of cascades." It gives Everdingen his character as a precursor of Jacob Ruysdael in a certain form of landscape composition; but though very skilful in arrangement and clever in effects, Everdingen remains much more simple in execution; he is mucji less subtle in feeling or varied in touch than his great and incomparable countryman. Five of Everdingen's cascades are in the museum of Copenhagen alone: of these, one is dated 1647, another r649. In the Hermit- age at St Petersburg is a fine example of 1647; another in the Pinakothek at Munich was finished in 1656. English public galleries ignore Everdingen; but one of his best-known master-pieces is the Norwegian glen belonging to Lord Listowel. Of his etchings and drawings there are much larger and more numerous specimens in England than elsewhere. Being a col- lector as well as an engraver and painter, he brought together a large number of works of all kinds and masters; and the sale of these by his heirs at Amsterdam on the nth of March 1676 gives an approximate clue to the date of the painter's death.

His two brothers, Jan and Caesar, were both painters. Caesar van Everdingen (1606-1679), mainly known as a portrait nainter, enjoyed some vogue during his life, and many of his pictures are to be seen in the museums and private houses of

Holland. They show a certain cleverness, but are far from entitling him to rank as a master.

EVEREST, SIR GEORGE (1790-1866), British surveyor and geographer, was the son of Tristram Everest of Gwerndale, Brecknockshire, and was born there on the 4th of July 1790. From school at Marlow he proceeded to the military academy at Woolwich, where he attracted the special notice of the mathe- matical master, and passed so well in his examinations that he was declared fit for a commission before attaining the necessary age. Having gone to India in 1806 as a cadet in the Bengal Artillery, he was selected by Sir Stamford Raffles to take part in the reconnaissance of Java (1814-1816); and after being em- ployed in various engineering works

throughout India, he was appointed in 1818 assistant to Colonel Lambton, the founder of the great trigonometrical survey of that country. In 1823, on Colonel Lambton's death, he succeeded to the post of super- intendent of the survey; in 1830 he was appointed by the court of directors of the East India Company surveyor-general of India;, and from that date till his retirement from the service in 1843 he continued to discharge the laborious duties of both offices. During the rest of his life he resided in England, where he became fellow of the Royal Society and an active member of several other scientific associations. In 1861 he was made a C.B. and received the honour of knighthood, and in 1862 he was chosen vice-president of the Royal Geographical Society. He died at Greenwich on the 1 st of December 1 866 . The geodetical labours of Sir George Everest rank among the finest achievements of their kind; and more especially his measurement of the meri- dional arc of India, n|° in length, is accounted as unrivalled in the annals of the science. In great.part the Indian survey is what he made it.

His works are purely professional: — A paper in vol. i. of the Memoirs of the Royal Astronomical Society, pointing out a mistake in La Caille's measurement of an arc of the meridian which he had discovered during sick-leave at the Cape of Good Hope; An account of the measurement of the arc of the meridian between the parallels of 18 3′ and 24° 7', being a continuation of the Grand Meridional Arc of India, as detailed by Lieut.-Col. Lambton in the volumes of the Asiatic Society of Calcutta (London, 1830); An account of the measurement of two sections of the Meridional Arc of India bounded by the parallels of 18 3′ 15", 24 7′ n", and 20° 30′ 48″ (London, 1847).

EVEREST, MOUNT, the highest mountain in the world. It is a peak of the Himalayas situated in Nepal almost precisely on the intersection of the meridian 87 E. long, with the parallel 28 N. lat. Its elevation as at present determined by trigonoˆ metrical observation is 29,002 ft., but it is possible that further investigation into the value of refraction at such altitudes will result in placing the summit even higher. It has been confused with a peak to the west of it called Gaurisankar (by Schlagint- weit), which is more than 5000 ft. lower; but the observations of Captain Wood from peaks near Khatmandu, in Nepal, and those of the same officer, and of Major Ryder, from the route between Lhasa and the sources of the Brahmaputra in 1904, have definitely fixed the relative position of the two mountain masses, and conclusively proved that there is no higher peak than Everest in the Himalayan system. The peak possesses no distinctive native, name and has been called Everest after Sir George Everest (q.v.), who completed the trigonometrical survey of the Himalayas in 1841 and first fixed its

position and altitude. (T. H. H.*)

EVERETT, ALEXANDER HILL (1790-1847), American author and diplomatist, was born in Boston, Massachusetts, on the 19th of March 1790. He was the son of Rev. Oliver Everett (I 7S3~i8o2), a Congregational minister in Boston, and the brother of Edward Everett. He graduated at Harvard in 1806, taking the highest honours of his year, though the youngest member of his class. He spent one year as a teacher in Phillips Academy, Exeter, New Hampshire, and then began the study of law in the office of John Quincy Adams. In 1809 Adams was appointed minister to Russia, and Everett accompanied him as his private secretary, remaining attached to the American legation in Russia until 181 1 . He was secretary of the American legation at The Hague in 1815-1816, and chargi d'affaires there

from 1818 to 1824. From 1825 to 1829, during the presidency of John Quincy Adams, he was the United States minister to Spain. At that time Spain recognized none of the governments established by her revolted colonies, and Everett became the medium of all communications between the Spanish government and the several nations of Spanish origin which had been estab- lished, by successful revolutions, on the other side of the ocean. Everett was a member of the Massachusetts legislature in 1830- 1835, was president of Jefferson College in Louisiana in 1842- 1844, and was appointed commissioner of the United States to China in 1845, but did not go to that country until the follow- ing year, and died on the 29th of May 1847 at Canton, China. Everett, however, is known rather as a man of letters than as a diplomat. In addition to numerous articles, published chiefly in the North American Review, of which he was the editor from 1829 to 1835, he wrote: Europe, or a General Survey of the Political Situation of the Principal Powers, with Conjectures on their Future Prospects (1822), which attracted considerable attention in Europe and was translated into German, French and Spanish; New Ideas on Population (1822); America, or a General Survey of the Political Situation of the Several Powers of the Western Continent, with Conjectures on their Future Pros- pects (1827), which was translated into several European lan- guages; a volume of Poems (1845); an< i Critical and Miscellane- ous Essays (first series, 1845; second series, 1847).

EVERETT, CHARLES CARROLL (1829-1900), American divine and

philosopher, was born on the 19th of June 1829, at Brunswick, Maine. He studied at Bowdoin College, where he graduated in 1850, after which he proceeded to Berlin. Subse- quently he took a degree in divinity at the Harvard Divinity School. From 1859 to 1869 he was pastor of the Independent Congregational (Unitarian) church at Bangor, Maine. This charge he resigned to take the Bussey professorship of theology at Harvard University, and, in 1878, became dean of the faculty of theology. Interested in a variety of subjects, he devoted himself chiefly to the philosophy of religion, and published The Science of Thought (Boston, 1869; revised 1891). He also wrote Fichte's Science of Knowledge (1884); Poetry, Comedy and Duty (r888); Religions before Christianity (1883); Ethics for Young People (1891) ; The Gospel of Paul (1892). He died at Cambridge on the 1 6th of October 1900.

EVERETT, EDWARD (1794-1865), American statesman and 'Orator, was born in Dorchester, Massachusetts, on the nth of April 1794. He was the son of Rev. Oliver Everett and the brother of Alexander Hill Everett (q.v.). His father died in 1802, and his mother removed to Boston with her family after her husband's death. At seventeen Edward Everett graduated from Harvard College, taking first honours in his class. While at college he was the chief editor of The Lyceum, the earliest in the series of college journals published at the American Cambridge. His earlier predilections were for the study of law, but the advice of Joseph Stevens Buckminster, a distinguished preacher in Boston, led him to prepare for the pulpit, and as a preacher he at once distinguished himself. He was called to the ministry of the Brattle Street church (Unitarian) in Boston before he was twenty years old. His sermons attracted wide attention in that community, and he gained a considerable reputation as a theologian and a controversialist by his pub- lication in 1 8 14 of a volume entitled Defence of Christianity, written in answer to a work, The Grounds of Christianity Exa- mined (1813), by George Bethune English (1787-1828), an adventurer, who, born in Cambridge, Massachusetts, was in turn a student of law and of theology, an editor of a newspaper, and a soldier of fortune in Egypt. Everett's tastes, however, were then, as always, those of a scholar; and in 1815, after a service of little more than a year in the pulpit, he resigned his charge to accept a professorship of Greek literature in Harvard College.

After nearly five years spent in Europe in preparation, he entered with enthusiasm on his duties, and, for five years more, gave a vigorous impulse, not only to the study of Greek, but to all the work of the college. In January 1820 he assumed the charge of the North American Review, which now became a

quarterly; and he was indefatigable during the four years : of his editorship in contributing on a great variety of subjects. From 1825 to 1835 he was a member of the National House of Representatives, supporting generally the administration of President J. Q. Adams and opposing that of Jackson, which succeeded it. He bore a part in almost every important debate, and was a member of the committee of foreign affairs during the whole time of his service in Congress. Everett was a member of nearly all the most important select committees, such as those on the Indian relations of the state of Georgia, the Apportion- ment Bill, and the Bank of the United States, and drew the report either of the majority or the minority. The report on the congress of Panama, the leading measure of the first session of the Nineteenth Congress, was drawn up by Everett, although he was the youngest member of the committee and had just entered Congress. He led the unsuccessful opposition to the Indian policy of General Jackson (the removal of the Cherokee and other Indians, without their consent, from lands guaranteed to them by treaty).

In 1835 he was elected governor of Massachusetts. He brought to the duties of the office the untiring diligence which was the characteristic of his public life. We can only allude to a few of the measures which received his efficient support, e.g. the establishment of the board of education (the first of such boards in the United States), the scientific surveys of the state (the first of such public surveys), the criminal law commission, and the preservation of a sound currency during the panic of 1837.

Everett filled the office of governor for four years, and was then defeated by a single vote, out of more than one hundred thousand. The election is of interest historically as being the first important American election where the issue turned on the question of the prohibition of the retail sale of intoxicating liquors. In the following spring he made a visit with his family to Europe. In 1 841, while residing in Florence, he was named United States minister to Great Britain, and arrived in London to enter upon the duties of his mission at the close of that year. Great ques- tions were at that time open between the two countries — the north-eastern boundary, the affair of M'Leod, the seizure of American vessels on the coast of Africa, in the course of a few months the affair of the " Creole," to which was soon added the Oregon question. His position was more difficult by reason of the frequent changes that took place in the department at home, which, in the course of four years, was occupied successively by Messrs Webster, Legare, Upshur, Calhoun and Buchanan. From all these gentlemen Everett received marks of approbation and confidence.

By the institution of the special mission of Lord Ashburton, however, the direct negotiations between the two governments were, about the time of Everett's arrival in London, transferred to Washington, though much business was transacted at the American legation in London.

Immediately after the accession of Polk to the presidency Everett was recalled. From January 1846 to 1849, as the successor of Josiah Quiney, he was president of Harvard College. On the death, in October 1852, of his friend Daniel Webster, to whom he had always been closely attached, and of whom he was always a confidential adviser, he succeeded him as secretary of state, which post he held for the remaining months of Fillmore's administration, leaving it to go into the Senate in 1853, as one of the representatives of Massachusetts. Under the work of the long session of 1853-1854 his health gave way. In May 1854 he resigned his seat, on the orders of his physician, and retired to what was called private life.

But, as it proved, the remaining ten years of his life most widely established his reputation and influence throughout America. As early as 1820 he had established a reputation as an orator, such as few men in later days have enjoyed. He was frequently invited to deliver an " oration" on some topic of historical or other interest. With him these " orations," instead of being the ephemeral entertainments of an hour, became careful studies of some important theme. Eager to avert, if possible, the im- pending conflict of arms between the North and South, Everett

prepared an " oration " on George Washington, which he de- livered in every part of America. In this way, too, he raised more than one hundred thousand dollars, for the purchase of the old home of Washington at Mount Vernon. Everett also prepared for the Encyclopaedia Britannica a biographical sketch of Washington, which was published separately in i860. In i860 Everett was the candidate of the short-lived Consti- tutional-Union party for the vice-presidency, on the ticket with John Bell (q.v.), but received only 39 electoral votes. During the Civil War he zealously supported the national government and was called upon in every quarter to speak at public meetings. He delivered the last of his great orations at Gettysburg, after the battle, on the consecration of the national cemetery there. On the 9 th of January 1865 he spoke at a public meeting in Boston to raise funds for the southern poor in Savannah. At that meeting he caught cold, and the immediate result was his death on the 15th of January 1865.

In Everett's life and career was a combination of the results of diligent training, unflinching industry, delicate literary tastes and unequalled acquaintance with modern international politics. This combination made him in America an entirely exceptional person. He was never loved by the political managers; he was always enthusiastically received by assemblies of the people. He would have said himself that the most eager wish of his life had been for the higher education of his countrymen. His orations have been collected in four volumes (1850-1850). A work on international law, on which he was engaged at his death, was never finished. Allibone records 84 titles of his books and published addresses. (E. E. H.)

EVERETT, a city of Middlesex county, Massachusetts, U.S.A., adjoining Chelsea and 3 m. N. of Boston, of which it is a resi- dential suburb. Pop. (1880) 4159; (1890) 11,068; (1900) 24,336, of whom 6882 were foreign-born; (1910 census) 33,484. It covers an area of about 3 sq. m. and is served by the Boston & Maine railway and by interurban electric lines. Everett has the Frederick E. Parlin memorial library (1878), the Shute memorial library C1898), the Whidden memorial hospital and Woodlawn cemetery (176 acres). The principal manufac- tures are coke, chemicals and boots and shoes; among others are iron and structural steel. According to the U.S. Census of Manufactures (1905), " the coke industry in Everett is unique, inasmuch as illuminating gas is the primary product and coke really a by-product, while the coal used is brought from mines located in Nova Scotia." The value of the city's total factory product increased from $4,437,180 in 1900 to $6,135,650 in 1905 or 38-3%. Everett was first settled about 1630, remaining a part of Maiden (and being known as South Maiden) until 1870, when it was incorporated as a township. It was chartered as a city in 1892.

EVERETT, a city, a sub-port of entry, and the county-seat of Snohomish county, Washington, U.S.A., on Puget Sound, at the mouth of the Snohomish river, about 35 m. N. of Seattle. Pop. (1900) 7838; (1910 U. S. census) 24,814. The city is served by the Northern Pacific and the Great Northern railways, being the western terminus of the latter's main transcontinental line, by interurban electric railway, and by several lines of Sound and coasting freight and passenger steamboats. Everett has a fine harbour with several large iron piers. Among its principal buildings are a Carnegie library, a Y.M.C.A. building and two hospitals. The buildings of the Pacific College were erected here by the United Norwegian Lutheran Church in 1908. The city is in a rich lumbering, gardening, farming, and copper-, gold- and silver-mining district. There is a U.S. assayer's office here, and there are extensive shipyards, a large paper mill, iron works, and, just

outside the city limits, the smelters of the American Smelters Securities Company, in connexion with which is one of the two plants in the United States for saving arsenic from smelter fumes. Lumber interests, however, are of most importance, and here are some of the largest lumber plants in the Pacific Northwest. Red-cedar shingles are an important product. Everett was settled in 189 1 and was incorporated in 1893. Its rapid growth is due to its favourable situation as a

commercial port, its transportation facilities, and its nearness to extensive forests whence the material for its chief industries is obtained.

EVERGLADES, an American lake, about 8000 sq. m. in area, in which are numerous half submerged islands; situated in the southern part of Florida, U.S.A., in Lee, De Soto, Dade and St Lucie counties. West of it is the Big Cypress Swamp. The floor of the lake is a limestone basin, extending from Lake Okechobee in the N. to the extreme S. part of the state, and the lake varies in depth from 1 to 12 ft., its water being pure and clear. The surface is above tide level, and the lake is enclosed, probably on all sides, within an outcropping limestone rim, averaging about 10 ft. above mean low tide, and approach ing much nearer to the Atlantic on the E. than to the gulf on the W. There are several small outlets, such as the Miami river and the New river on the E. and the Shark river on the S.W., but no streams empty into the Everglades, and the water-supply is furnished by springs and precipitation. There is a general south- easterly movement of the water. The soil of the islands is very fertile and is subject to frequent inundations, but gradually the water area is being replaced by land. The vegetation is luxuriant, the live oak, wild lemon, wild orange, cucumber, papaw, custard apple and wild rubber trees being among the indigenous species; there are, besides, many varieties of wild flowers, the orchids being especially noteworthy. The fauna is also varied; the otter, alligator and crocodile are found, also the deer and panther, and among the native birds are the ibis, egret, heron and limpkin. There are two seasons, wet and dry, but the climate is equable.

Systematic exploration has been prevented by the dense growth of saw grass (Cladium effusum), a kind of sedge, with sharp, saw-toothed leaves, which grows everywhere on the muck- covered rock basin and extends several feet above the shallow water. The first white man to enter the region was Escalente de Fontenada, a Spanish captive of an Indian chief, who named the lake Laguno del Espiritu Santo and the islands Cayos del Espiritu Santo. Between 1841 and 1856 various

United States military forces penetrated the Everglades for the purpose of attacking and driving out the Seminoles, who took refuge here. The most important explorations during the later years of the 19th century were those of Major Archie P. Williams in 1883, James E. Ingraham in 1892 and Hugh L. Willoughby in 1897. The Seminole Indians were in 1909 practically the only inhabi- tants. In 1850 under the ” Arkansas Bill,” or Swamp and Over- flow Act, practically all of the Everglades, which the state had been urging the federal government to drain and reclaim, were turned over to the state for that purpose, with the provision that all proceeds from such lands be applied to their reclamation. A board of trustees for the Internal Improvement Fund, created in 1855 and having as members ex officio the governor,, comp- troller, treasurer, attorney-general and commissioner-general, sold and allowed to railway companies much of the grant. Between 1881 and 1896 a private company owning 4,000,000 acres of the Everglades attempted to dig a canal from Lake Okechobee through Lake Hicpochee and along the Caloosa- hatchee river to the Gulf of Mexico; the canal was closed in 1902 by overflows. Six canals were begun under state control in 1905 from the lake to the Atlantic, the northernmost at Jensen, the southernmost at Ft. Lauderdale; the total cost, estimated at $1,035,000 for the reclamation of 12,500 sq. m., is raised by a drainage tax (not to exceed 10 cents per acre) levied by the trustees of the Internal Improvement Fund and Board of Drainage commissioners. The small area reclaimed prior to that year (1905) was found very fertile and particularly adapted to raising sugar-cane, oranges and garden truck.

See Hugh L. Willoughby’s Across the Everglades (Philadelphia, 1898), and especially an article ” The Everglades of Florida ‘ by Edwin A. Dix and John M. MacGonigle, in the Century Magazine for February 1905.

EVERGREEN, a general term applied to plants which are always in leaf, as contrasted with deciduous trees which are bare for some part pf the year (see Horticulture). In

temt#rate or colder zones where a season favourable to vegeta- tion is succeeded by an unfavourable or winter season, leaves of evergreens must be protected from the frost and cold drying winds, and are therefore tougher or more leathery in texture than those of deciduous trees, and frequently, as in pines, firs and other conifers, are needle-like, thus exposing a much smaller surface to the drying action of cold

winds. The number of seasons for which the leaves last varies in different plants; every season some of the older leaves fall, while new ones are regularly produced. The common English bramble is practically ever- green, the leaves lasting through winter and until the new leaves are developed next spring. In privet also the leaves fall after the production of new ones in the next year. In other cases the leaves last several years, as in conifers, and may sometimes be found on eleven-year-old shoots.

EVERLASTING, or Immortelle, a plant belonging to the division Tubtdiflorae of the natural order Compositae, known botanically as Helichrysum orientale. It is a native of North Africa, Crete, and the parts of Asia bordering on the Mediter- ranean; and it is cultivated in many parts of Europe. It first became known in Europe about the year 1629, and has been culti- vated since 1815. In common with several other plants of the same group, known as ” everlastings,” the immortelle plant possesses a large involucre of dry scale-like or scarious bracts, which preserve their appearance when dried, provided the plant be gathered in proper condition. The chief supplies of Helichry- sum orientale come from lower Provence, where it is cultivated in large quantities on the ground sloping to the Mediterranean, in positions well exposed to the sun, and usually in plots sur- rounded by dry stone walls. The finest flowers are grown on the slopes of Bandols and Ciotat, where the plant begins to flower in June. It requires a light sandy or stony soil, and is very readily injured by rain or heavy dews. It can be propagated in quantity by means of offsets from the older stems. The flowering stems are gathered in June, when the bracts are fully developed, all the fully-expanded and immature flowers being pulled off and re- jected. A well-managed plantation is productive for eight or ten years. The plant is tufted in its growth, each plant produc- ing 60 or 70 stems, while each stem produces an average of 20 flowers. About 400 such stems weigh a kilogramme. A hectare of ground will produce 40,000 plants, bearing from 2,400,000 to 2,800,000 stems, and weighing from sJ to 65 tons, or from 2 to 3 tons per acre. The colour of the bracts is a deep yellow. The natural flowers are commonly used for garlands for the dead, or plants dyed black are mixed with the yellow ones. The plant is also dyed green or orange-red, and thus employed for bouquets or other ornamental purposes.

Other species of Helichrysum and species of allied genera with scarious heads of flowers are also known as ” everlastings.” One of the best known is the Australian species H. bracteatum, with several varieties, including double forms, of different colours; H. vestitum (Cape of Good Hope) has white satiny heads. Others are species of

Helipterum (West Australia and South Africa), Ammobium and Waitzia (Australia) and Xeranthemum (south Europe). Several members of the natural order Amarantaceae have also ” everlasting ” flowers; such are Gomphrena globosa, with rounded or oval heads of white, orange, rose or violet, scarious bracts, and Celosia pyramidalis, with its elegant, loose, pyramidal inflorescences. Frequently these everlastings are mixed with bleached grasses, as Lagurus ovatus, Briza maxima, Bromus brizaeformis, or with the leaves of the Cape silver tree (Leucadendron argenteum), to form bouquets or ornamental groups.

EVERSLEY, CHARLES SHAW LEFEVRE, Viscount (1794- speaker of the British House of Commons, eldest son of

Mr Charles Shaw (who assumed his wife’s name of Lefevre in addition to his own on his marriage) , was born in London on the 22nd of February 1794, and educated at Winchester and at Trinity College, Cambridge. He was called to the bar in 1819, and though a diligent student was also a keen sportsman. Marrying a daughter of Mr Samuel Whitbread, whose wife was the sister of Earl Grey, afterwards premier, he thus became

connected with two influential political families, and in 183Q he entered the House of Commons as member for Downton, in the Liberal interest. In 1831 he was returned, after a severe contest, as one of the county members for Hampshire, in which he resided ; and after the passing of the Reform Act of 1832 he was elected for the Northern Division of the county. For some years Mr Shaw Lefevre was chairman of a committee on petitions for private bills. In 1835 he was chairman of a committee on agricultural distress, but as his report was not accepted by the House, he published it as a pamphlet addressed to his con- stituents. He acquired a high reputation in the House of Commons for his judicial fairness, combined with singular tact and courtesy, and when Mr James Abercromby retired in 1839, he was nominated as the Liberal candidate for the chair. The Conseryatives put forward Henry Goulburn, but Mr Shaw Lefevre was elected by 317 votes to 299. The period was one of fierce party conflict, and the debates were frequently very acrimonious; but the dignity, temper and firmness of the new speaker were never at fault. In 1857 he had served longer than any of his predecessors, except the celebrated Arthur Onslow (1691-1768), who was speaker for more than 33 years in five successive parliaments. Retiring on a pension, he was raised to the peerage as Viscount Eversley of Heckfield, in the county of Southampton. His appearances in the House of Lords were very infrequent, but in his own county he was active in the public service.

From 1859 he was an ecclesiastical commissioner, and he was also appointed a trustee of the British Museum. He died on the 28th of December 1888, the viscountcy becoming extinct.

His younger brother, Sir John George Shaw Lefevre (1797- 1879), who was senior wrangler at Cambridge in 1818, had a long and distinguished career as a public official. He was under- secretary for the colonies, and had much to do with the intrO' duction of the new poor law in 1834, and with the foundation of the colony of South Australia; then having served on several important commissions he was made clerk of the parliaments in 1855, and in the same year became one of the first civil service commissioners. He helped to found the university of London, of which he was vice-chancellor for twenty years, and also the Athenaeum Club. He died on the 20th of August 1879.

The latter's son, George John Shaw Lefevre (b. 1832), was created Baron Eversley in 1906, in recognition of long and prominent services to the Liberal party. He had filled the following offices: — civil lord of the admiralty, 1856; secretary to the board of trade, 1860-1871; under-secretary, home office, 1871; secretary to the admiralty, 1871-1874; first commissioner of works, 1881-1883; postmaster-general, 1883- 1884; first commissioner of works, 1892-1893; president of local government board, 1 894-1 895; chairman of royal com- mission on agriculture, 1893-1896.

EVESHAM, a market-town and municipal borough in the Evesham parliamentary division of Worcestershire, England, 107 m. W.N.W. of London by the Great Western railway, and 15 m. S.E. by E. of Worcester, with a station on the Redditch- Ashchurch branch of the Midland railway. Pop. (1901) 7101. It lies on the right (north) bank of the Avon, in the rich and beautiful Vale of Evesham. The district is devoted to market- gardening and orchards, and the trade of the town is mainly agricultural. Evesham is a place of considerable antiquity, a Benedictine house having been founded here by St Egwin in the 8th century. It became a wealthy abbey, but was almost wholly destroyed at the Dissolution. The churchyard, however, is entered by a Norman gateway, and there survives also a magnificent isolated bell-tower dating from 1533, of the best ornate Perpendicular workmanship. The abbey walls surround the churchyard, but almost the only other remnant is a single Decorated arch. Close to the bell-tower, however, are the two parish churches of St Lawrence and of All Saints, the former of the 1 6th century, the latter containing Early English work, and the ornate chapel of Abbot Lichfield, who erected the bell- tower. Other buildings include an Elizabethan town hall, the grammar

school, founded by Abbot Lichfield, and the picturesque

EVIDENCE

il

almonry. The borough includes the parish of Bengeworth St Peter, on the left bank of the river. Evesham is governed by a mayor, 4 aldermen and 12 councillors. Area, 2265 acres.

Evesham (Homme, Ethomme) grew up around the Benedictine abbey, and had evidently become of some importance as a trad- ing centre in 1055, when Edward the Confessor gave it a market and the privileges of a commercial town. It is uncertain when the town first became a borough, but the Domesday statement that the men paid 20s. may indicate the existence of a more or less organized body of tradesmen. Before 1482 the burgesses were holding the town at a fee farm rent of twenty marks, but the abbot still had practical control of the town, and his steward presided over the court at which the bailiffs were chosen. After the Dissolution the manor with the markets and fairs and other privileges was granted to Sir Philip Hoby, who increased his power over the town by persuading the burgesses to agree that, after they had nominated six candidates for the office of bailiff, the steward of the court instructed by him should indicate the two to be chosen. This privilege was contested by Queen Elizabeth, but when the case was taken before the court of the exchequer it was decided in favour of Sir Philip's heir, Sir Edward Hoby. In 1604 James I. granted the burgesses then- first charter, but in the following year, by a second charter, he incorporated Evesham with the village of Bengeworth, and granted that the borough should be governed by a mayor and seven aldermen, to whom he gave the power of holding markets and fairs and several other privileges which had formerly belonged to the lord of the manor. Evesham received two later charters, but in 1688 that of 1605 was restored and still remains the govern- ing charter of the borough. Evesham returned two members to parliament in 1295 and again in 1337, after which date the privilege lapsed until 1604. Its two members were reduced to one by the act of 1867, and the borough was disfranchised in 1885.

Evesham gave its name to the famous battle, fought on the 4th of August 1265, between the forces of Simon de Montfort, earl of Leicester, and the royalist army under Prince Edward. After a masterly campaign, in which the prince had succeeded in defeating Leicester in the valleys of the Severn and Usk, and had destroyed the forces of the younger Montfort at Kenilworth before he could effect a junction with

the main body, the royalist forces approached Evesham in the morning of the 4th of August in time to intercept Leicester's march towards Kenilworth. Caught in the bend of the river Avon by the converging columns, and surrounded on all sides, the old earl attempted to cut his way out of the town to the northward. At first the fury of his assault forced back the superior numbers of the prince; but Simon's Welsh levies melted away and his enemies closed the last avenue of escape. The final struggle took place on Green Hill, a little to the north-west of the town, where the devoted friends of de Montfort formed a ring round their leader, and died with him. The spot is marked with an obelisk.

EVIDENCE (Lat. evidentia, evideri, to appear clearly), a term which may be defined briefly as denoting the facts presented to the mind of a person for the purpose of enabling him to decide a disputed question. Evidence in the widest sense includes all such facts, and reference may be made to the article Logic for the science or art of dealing with the proper way of drawing correct conclusions and the nature of proof. In a narrower sense, however, evidence includes in English law only such facts as are allowed to be so presented in the course of judicial pro-ceedings. Thus. we say that a fact is not evidence, meaning thereby that it is not admissible as evidence in accordance with the rules of English law. The law of legal evidence is part of the law of procedure. It determines the kinds of evidence which may be produced in judicial proceedings, and regulates the mode in which, and the conditions under which, evidence may be produced and tested.

The English law of evidence is of comparatively modern growth.

It enshrines certain maxims, some derived from Roman law,

History some invented by Coke, who, as J. B. Thayer says,

" spawned Latin maxims freely." But for the most

part it was built up by English judges in the course of the

1 8th century, and consists of this judge-made law, as modified by statutory enactments of the 19th century. Early Teutonic procedure knew nothing of evidence in the modern sense, just as it knew nothing of trials in the modern sense. What it knew was " proofs." There were two modes of proof, ordeals and oaths. Both were appeals to the supernatural. The judicial combat was a bilateral ordeal. Proof followed, instead of pre- ceding, judgment. A judgment of the court, called by German writers the Beweisurteil, and by M. M. Bigelow the "

medial judgment," awarded that one of the two litigants must prove his case, by his body in battle, or by a one-sided ordeal, or by an oath with oath-helpers, or by the oaths of witnesses. The court had no desire to hear or weigh conflicting testimony. To do so would have been to exercise critical faculties, which the court did not possess, and the exercise of which would have been foreign to the whole spirit of the age. The litigant upon whom the burden of furnishing proof was imposed had a certain task to perform. If he performed it, he won; if he failed, he lost. The number of oath-helpers varied in different cases, and was determined by the law or by the court. They were probably, at the outset, kinsmen, who would have had to take up the blood-feud. At a later stage they became witnesses to character. In the cases, comparatively rare, where the oaths of witnesses were admitted as proof, their oaths differed materially from the sworn testimony of modern courts. As a rule no one could testify to a fact unless, when the fact happened, he was solemnly " taken to witness." Then, when the witness was adduced, he came merely to swear to a set formula. He did not make a promissory oath to answer questions truly. He merely made an assertory oath in a prescribed form.

In the course of the 12th and 13th centuries the old formal accusatory procedure began to break down, and to be super- seded by another form of procedure known as inquisitio, inquest, or enquite. Its decay was hastened by the decree of the fourth Lateran Council in 12 15, which forbade ecclesiastics to take part in ordeals. The Norman administrative system introduced into England by the Conquest was familiar with a method of ascer- taining and determining facts by means of a verdict, return or finding made on oath by a body of men drawn from the locality. The system may be traced to Carolingian, and even earlier, sources. Henry II. , by instituting the grand assize and the four petty assizes, placed at the disposal of litigants in certain actions the opportunity of giving proof by the verdict of a sworn inquest of neighbours, proof " by the country." The system was gradually extended to other cases, criminal as well as civil. The verdict given was that of persons having a general, but not neces- sarily a particular, acquaintance with the persons, places and facts to which the inquiry related. It was, in fact, a finding by local popular opinion. Had the finding of such an inquest been treated as final and conclusive in criminal cases, English criminal procedure might, like the continental inquisition, the French enquite, have taken the path which, in the forcible lan- guage of Fortescue (De laudibus, &c.) " leads to hell " (semita ipsa est ad gehennam) . Fortunately English criminal procedure took a different course. The spirit of the old accusatory pro- cedure was applied to the new procedure by inquest. In serious cases

the words of the jurors, the accusing jurors, were treated not as testimony, but as accusation, the new indictment was treated as corresponding to the old appeal, and the preliminary finding by the accusing jury had to be supplemented by the verdict of another jury. In course of time the second jury were required to base their findings not on their own knowledge, but on evidence submitted to them. Thus the modern system of inquiry by grand jury and trial by petty jury was gradually developed.

A few words may here be said about the parallel development of criminal procedure on the continent of Europe. The tendency in the 12th and 13th centuries to abolish the old formal methods of procedure, and to give the new procedure the name of inquisi- tion or inquest, was not peculiar to England. Elsewhere the old procedure was breaking down at the same time, and for similar reasons. It was the great pope Innocent III., the pope

of the fourth Lateran Council, who introduced the new in- quisitorial procedure into the canon law. The procedure was applied to cases of heresy, and, as so applied, especially by the Dominicans, speedily assumed the features which made it infamous. ” Every safeguard of innocence was abolished or disregarded; torture was freely used. Everything seems to have been done to secure a conviction.” Yet, in spite of its monstrous defects, the inquisitorial procedure of the ecclesiastical courts, secret in its methods, unfair to the accused, having torture as an integral element, gradually forced its way into the temporal courts, and may almost be said to have been adopted by the common law of western Europe. In connexion with this in- quisitorial procedure continental jurists elaborated a theory of evidence, or judicial proofs, which formed the subject of an extensive literature. Under the rules thus evolved full proof (plena probatio) was essential for conviction, in the absence of confession, and the standard of full proof was fixed so high that it was in most cases unattainable. It therefore became material to obtain confession by some means or other. The most effective means was torture, and thus torture became an essential feature in criminal procedure. The rules of evidence attempted to graduate the weight to be attached to different kinds of testi- mony and almost to estimate that weight in numerical terms. ” Le parlement de Toulouse,” said Voltaire, ” a un usage tres singulier dans les preuves par temoins. On admet ailleurs des demi-preuves, . . . mais a. Toulouse on admet des quarts et des huitiemes de preuves.”

Modern continental procedure, as em- bodied in the most recent codes, has removed the worst features of inquisitorial procedure, and has shaken itself free from the trammels imposed by the old theory and technical rules of proof. But in this, as in other branches of law, France seems to have paid the penalty for having been first in the field with codification by lagging behind in material reforms. The French Code of Criminal Procedure was largely based on Colbert's Ordonnance of 1670, and though embodying some reforms, and since amended on certain points, still retains some of the features of the un- iformed procedure which was condemned in the 18th century by Voltaire and the philosophes. Military procedure is in the rear of civil procedure, and the trial of Captain Dreyfus at Rennes in 1899 presented some interesting archaisms. Amdng these were the weight attached to the rank and position of witnesses as compared with the intrinsic character of their evidence, and the extraordinary importance attributed to confession even when made under suspicious circumstances and supported by flimsy evidence.

The history of criminal procedure in England has been traced by Sir James Stephen. The modern rules and practice as to evidence and witnesses in the common law courts, both in civil and in criminal cases, appear to have taken shape in the course of the 1 8th century. The first systematic treatise on the English law of evidence appears to have been written by Chief Baron Gilbert, who died in 1726, but whose Law of Evidence was not published until 1761. In writing it he is said to have been much influenced by Locke. 1 It is highly praised by Black- stone as " a work which it is impossible to abstract or abridge without losing some beauty and destroying the charm of the whole"; but Bentham, who rarely agrees with Blackstone, speaks of it as running throughout " in the same strain of anility, garrulity, narrow-mindedness, absurdity, perpetual mis- representation and indefatigable self-contradiction." In any case it remained the standard authority on the law of evidence throughout the remainder of the 18th century. Bentham wrote his Rationale of Judicial Evidence, specially applied to English Practice, at various times between the years 1802 and 1812.

1 Reference may be made to a well-known passage in the Essay concerning Human Understanding (Book iv. ch. xv.) : " The grounds of probability are — First, the conformity of anything with our own knowledge, observation and experience. Second, the testimony of others touching their observation and experience. In the testimony of others is to be considered (1) the number, (2) the integrity, (3) the skill of the witnesses. (4) The design of the author, where it is a testimony out of a book cited. (5) The consistency of the parts and

circumstances of the relation. (6) Contrary testimonies."

By this time he had lost the nervous and simple styie of his youth, and required an editor to make him readable. His great interpreter, Dumont, condensed his views on evidence into the Traits des preuves judiciaires, which was published in 1823. The manuscript of the Rationale was edited for English reading, and to a great extent rewritten, by J. S. Mill, and was published in five volumes in 1827. The book had a great effect both in England and on the continent. The English version, though crabbed and artificial in style, and unmeasured in its invective, is a storehouse of comments and criticisms on the principles of evidence and the practice of the courts, which are always shrewd and often profound. Bentham examined the practice of the courts by the light of practical utility. Starting from the principle that the object of judicial evidence is the discovery of truth, he condemned the rules which excluded some of the best sources of evidence. The most characteristic feature of the common-law rules of evidence was, as Bentham pointed out, and, indeed, still is, their exclusionary character. They excluded and prohibited the use of certain kinds of evidence which would be used in ordinary inquiries. In particular, they disqualified certain classes of witnesses on the ground of interest in the subject-matter of the inquiry, instead of treating the interest of the witness as a matter affecting his credibility. It was against this confusion between competency and credibility that Bentham directed his principal attack. He also attacked the system of paper evidence, evidence by means of affidavits instead of by oral testimony in court, which prevailed in the court of chancery, and in ecclesiastical courts. Subsequent legislation has endorsed his criticisms. The Judicature Acts have reduced the use of affidavits in chancery proceedings within reasonable limits. A series of acts of parliament have removed, step by step, almost all the disqualifications which formerly made certain witnesses incompetent to testify.

Before Bentham's work appeared, an act of 1814 had removed the incompetency of ratepayers as witnesses in certain cases relating to parishes. The Civil Procedure Act 1833 enacted that a witness should not be objected to as incompetent, solely on the ground that the verdict or judgment would be admissible in evidence for or against him. An act of 1840 removed some doubts as to the competency of ratepayers to give evidence in matters relating to their parish. The Evidence Act 1843- enacted broadly, that witnesses should not be excluded from giving evidence by reason of incapacity from crime or interest. The Evidence Act 1851 made parties to legal proceedings ad-missible witnesses subject to a proviso that " nothing herein contained shall render any person who in any criminal proceed- ing is charged

with the commission of any indictable offence, or any offence punishable on summary conviction, competent or compellable to give evidence for or against himself or herself, or shall render any person compellable to answer any question tending to criminate himself or herself, or shall in any criminal proceeding render any husband competent or compellable to give evidence for or against his wife, or any wife competent or com- pellable to give evidence for or against her husband." The Evidence (Scotland) Act 1853 made a similar provision for Scot- land. The Evidence Amendment Act 1853 made the husbands and wives of parties admissible witnesses, except that husbands and wives could not give evidence for or against each other in criminal proceedings or in proceedings for adultery, and could not be compelled to disclose communications made to each other during marriage. Under the Matrimonial Causes Act 1857 the petitioner can be examined and cross-examined on oath at the hearing, but is not bound to answer any question tending to show that he or she has been guilty of adultery. Under the Matrimonial Causes Act 1859, on a wife's petition for dissolution of marriage on the ground of adultery coupled with cruelty or desertion, husband and wife are competent and compellable to give evidence as to the cruelty or desertion. The Crown Suits &c. Act 1865 declared that revenue proceedings were not to be treated as criminal proceedings for the purposes of the acts of 1851 and 1853. The Evidence Further Amendment Act 1869 declared that parties to actions for breach of promise of marriage

were competent to give evidence in the action, subject to a proviso that the plaintiff should not recover unless his or her testimony was corroborated by some other material evidence. It also made the parties to proceedings instituted in consequence of adultery, and their husbands and wives, competent to give evidence, but a witness in any such proceeding, whether a party or not, is not to be liable to be asked or bound to answer any question tending to show that he or she has been guilty of adultery, unless the witness has already given evidence in the same proceeding in disproof of the alleged adultery. There are similar provisions applying to Scotland in the Conjugal Rights (Scotland) Amendment Act 1861, and the Evidence Further Amendment (Scotland) Act 1874. The Evidence Act 1877 enacts that " on the trial of any indictment or other proceeding for the non-repair of any public highway or bridge, or for a nuisance to any public highway, river, or bridge, and of any other indictment or proceeding instituted for the purpose of trying or enforcing a civil right only,

every defendant to such indictment or proceeding, and the wife or husband of any such defendant shall be admissible witnesses and compellable to give evidence." From 1872 onwards numerous enactments were passed making persons charged with particular offences, and their husbands and wives, competent witnesses. The language and effect of these enactments were not always the same, but the insertion of some provision to this effect in an act creating a new offence, especially if it was punishable by summary proceedings, gradually became almost a common form in legis- lation. In the year 1874 a bill to generalize these particular provisions, and to make the evidence of persons charged with criminal offences admissible in all cases was introduced by Mr Gladstone's government, and was passed by the standing com- mittee of the House of Commons. During the next fourteen years bills for the same purpose were repeatedly introduced, either by the government of the day, or by Lord Bramwell as an independent member of the House of Lords. Finally the Criminal Evidence Act 1898, introduced by Lord Halsbury, has enacted in general terms that " every person charged with an offence, and the wife or husband, as the case may be, of the person so charged, shall be a competent witness for the defence at every stage of the proceedings, whether the person so charged is charged solely or jointly with any other person." But this general enactment is qualified by some special restrictions, the nature of which will be noticed below. The act applies to Scotland but not to Ireland. It was not to apply to proceedings in courts-martial unless so applied by general orders or rules made under statutory authority. The provisions of the act have been applied by rules to military courts-martial, but have not yet been applied to naval courts-martial. The removal of dis- qualifications for want of religious belief is referred to below under the head of " Witnesses."

The act of 1898 finishes for the present the history of English legislation on evidence. For a view of the legal literature on the , . . subject it is necessary to take a step backwards. Early Literature. ; n t | ie jg t fj cen tury Chief Baron Gilbert was superseded as an authority on the English law of evidence by the books of Phillips (18 14) and Starkie (1824), who were followed by Roscoe (Nisi Prius, 1827; Criminal Cases, 1835), Greenleaf (American, 1842), Taylor (based on Greenleaf, 1848), and Best (1849). In 1876 Sir James Fitzjames Stephen brought out his Digest of the Law of Evidence, based upon the Indian Evidence Act 1872, which he had prepared and passed as law member of the council of the governor-general of India. This Digest obtained a rapid and well-deserved success, and has materially influenced the form of subsequent writings on the English law of evidence. It sifted out what Stephen conceiyed to be the main rules of

evidence from the mass of extraneous matter in which they had been em- bedded. Roscoe's Digests told the lawyer what things must be proved in order to sustain particular actions or criminal charges, and related as much to pleadings and to substantive law as to evidence proper. Taylor's two large volumes were a vast storehouse of useful information, but his book was one to consult, not to master. Stephen eliminated much of this ex) raneous matter, and summed up his rules in a series of succinct propositions, supplemented by apt illustrations, and couched in such a form that they could be easily read and remembered. Hence the English Digest, like the Indian Act, has been of much educational value. Its most original feature, but unfortunately also its weakest point, is its theory of relevancy.

Pondering the multitude of " exclusionary " rules which had been laid down by the English courts, Stephen thought that he had discovered the general principle on which those rules reposed, and could devise a formula by which the principle could be expressed. " My study of the subject," he says, " both practically and in books has convinced me that the doctrine that all facts in issue and relevant to the issue, and no others, may be proved, is the unexpressed principle which forms the centre of and gives unity to all the express negative rules which form the great mass of the law. ' ' The result was the chapter on the relevancy of facts in the Indian Evidence Act, and the definition of relevancy in s. 7 of that act. This definition was based on the view that a distinction could be drawn between things which were and things which were not causally connected with each other, and that relevancy depended on causal connexion. Subsequent criticism convinced Stephen that his definition was in some respects too narrow and in others too wide, and eventually he adopted a definition out of which all reference to causality was dropped. But even in their amended form the provisions about relevancy are open to serious criticism. The doctrine of relevancy, i.e. of the probative effect of facts, is a branch of logic, not of law, and is out of place both in an enactment of the legislature and in a compendium of legal rules. The necessity under which Stephen found himself of extending the range of relevant facts by making it include facts "deemed to be relevant," and then narrowing it by enabling the judge to exclude evidence of facts'which are relevant, illustrates the difference between the rules of logic and the rules of law. Relevancy is one thing; admissibility is another; and the confusion between them, which is much older than Stephen, is to be regretted. Rightly or wrongly English judges have, on practical grounds, declared inadmissible evidence of facts, which are relevant in the ordinary sense of the term, and which are so treated in non- judicial inquiries. Under these circumstances the attempt so to

define relevancy as to make it conterminous with admissibility is misleading, and most readers of Stephen's Act and Digest would find them more intelligible and more useful if " admissible " were substituted for " relevant " throughout. Indeed it is hardly too much to say that Stephen's doctrine of relevancy is theoretically unsound and practically useless. The other parts of the work contain terse and vigorous statements of the law, but a Procrustean attempt to make legal rules square with a preconceived theory has often made the language and arrangement artificial, and the work, in spite of its compression, still contains rules which, under a more scientific treatment, would find their appropriate place in other branches of the law. These defects are characteristic of a strong and able man, who saw clearly, and expressed forcibly what he did see, but was apt to ignore or to deny the existence of what he did not see, whose mind was vigorous rather than subtle or accurate, and who, in spite of his learning, was somewhat deficient in the historical sense. But notwithstanding these defects, the con- spicuous ability of the author, his learning, and his practical experience, especially in criminal cases, attach greater weight to Fitzjames Stephen's statements than to those of any other English writer on the law of evidence.

The object of every trial is, or may be, to determine two classes of questions or issues, which are usually distinguished as questions of law, and questions of fact, although „ .

the distinction between them is not so clear as might appear on a superficial view. In a trial by jury these two classes of questions are answered by different persons. The judge lays down the law. The jury, under the guidance of the judge, find the facts. It was with reference to trial by jury that the English rules of evidence were originally framed; it is by the peculiarities of this form of trial that many of them are to be explained; it is to this form of trial alone that some of the most important of them are exclusively applicable. The negative, exclusive, or exclusionary rules which form the characteristic features of the English law of evidence, are the rules in accordance with which the judge guides the jury. There is no difference of principle between the method of inquiry in judicial and in non-judicial proceedings. In either case a person who wishes to find out whether a particular event did or did not happen, tries, in the first place, to obtain information from persons who were present and saw what happened (direct evidence), and, failing this, to obtain information from persons who can tell him about facts from which he can draw an inference as to whether the event did or did not happen (indirect evidence). But in judicial inquiries the information given must be given on oath, and be liable to be tested by cross-examination. And there are rules of law

which exclude from the consideration of the jury certain classes of facts which, in an ordinary inquiry, would, or might, be taken into consideration. Facts so excluded are said to be ” not admissible as evidence,” or ” not evidence,” according

as the word is used in the wider or in the narrower sense. And the easiest way of determining whether a fact is or is not evidence in the narrower sense, is first to consider whether it has any bearing on the question to be tried, and, if it has, to consider whether it falls within any one or more of the rules of exclusion laid down by English law. These rules of exclusion are peculiar to English law and to systems derived from English law. They have been much criticized, and some of them have been repealed or materially modified by legislation. Most of them may be traced to directions given by a judge in the course of trying a particular case, given with special reference to the circumstances of that case, but expressed in general language, and, partly through the influence of text-writers, eventually hardened into general rules. In some cases their origin is only intelligible by reference to obsolete forms of pleading or practice. But in most cases they were originally rules of convenience laid down by the judge for the assistance of the jury. The judge is a man of trained experience, who has to arrive at a conclusion with the help of twelve untrained men, and who is naturally anxious to keep them straight, and give them every assistance in his power. The ixclusion of certain forms of evidence assists the jury by con- centrating their attention on the questions immediately before them, and by preventing them from being distracted or be- wildered by facts which either have no bearing on the question before them, or have so remote a bearing on those questions as to be practically useless as guides to the truth. It also prevents a jury from being misled by statements the effect of which, through the prejudice they excite, is out of all proportion to their true weight. In this respect the rules of exclusion may be compared to blinkers, which keep a horse’s eyes on the road before him. In criminal cases the rules of exclusion secure fair play to the accused, because he comes to the trial prepared to meet a specific charge, and ought not to be suddenly confronted by statements which he had no reason to expect would be made against him. They protect absent persons against statements affecting their character. And lastly they prevent the infinite waste of time which would ensue in the discussion of a question of fact if an inquiry were allowed to branch out into all the subjects with which that fact is more or less connected. The purely

practical grounds on which the rules are based, according to the view of a great judge, may be illustrated by some remarks of Mr Justice Willes (1814-1872). In discussing the question whether evi- dence of the plaintiff's conduct on other occasions ought to be admitted, he said: —

" It is not easy in all cases to draw the line and to define with accuracy where probability ceases and speculation begins; but we are bound to lay down the rule to the best of our ability. No doubt the rule as to confining the evidence to that which is relevant and pertinent to the issue is one of great importance, not only as regards the particular case, but also with reference to saving the time of the court, and preventing the minds of the jury from being drawn away from the real point they have to decide. . . . Now it appears to me that the evidence proposed to be given in this case, if admitted, would not have shown that it was more probable that the contract was subject to the condition insisted upon by the defendant. The question may be put thus, Does the fact of a person having once or many times in his life done a particular act in a particular way make it more probable that he has done the same thing in the same way upon another and different occasion? To admit such speculative evidence would, I think, be fraught with great danger. ... If such evidence were held admissible it would be difficult to say that the defendant might not in any case, where the question was whether or not there had been a sale of goods on credit, call witnesses to prove that the plaintiff had dealt with other persons upon a certain credit ; or, in an action for an assault, that the plaintiff might not give evidence of former assaults'committed by the defendant upon other persons, or upon other persons of a particular class, for the purpose of showing that he was a quarrelsome individual, and therefore that it was highly probable that the particular charge of assault was well founded. The extent to which this sort of thing might be carried is inconceivable. ... To obviate the prejudices, the injustice, and the waste of time to which the admission of such evidence would lead, and bearing in mind the extent to which it might be carried, and that litigants are mortal, it is necessary not only to adhere to the rule, but to lay it down strictly. I think, therefore, the fact that the plaintiff had entered into contracts of a particular kind with other persons on other occasions could not be properly admitted in evidence Where no

custom of trade to make such contracts, and no connexion between such and the one in question, was shown to exist " {Hollingham v. Head, 1858, 4 C.B. N.S. 388).

There is no difference between the principles of evidence in civil and

in criminal cases, although there are a few special rules, such as those relating to confessions and to dying declarations, which are only applicable to criminal proceedings. But in civil proceedings the issues are narrowed by mutual admissions of the parties, more use is made of evidence taken out of court, such as affidavits, and, generally, the rules of evidence are less strictly applied. It is often impolitic to object to the admission of evidence, even when' the objection may be sustained by previous rulings. The general tendency of modern procedure is to place a more liberal and less technical construction on rules of evidence, especially in civil cases. In recent volumes of law reports cases turning on the admissibility of evidence are conspicuous by their rarity. Various causes have operated in this direction. One of them has been the change in the system of pleading, under which each party now knows before the actual trial the main facts on which his opponent relies. Another is the interaction of chancery and common-law practice and traditions since the Judicature Acts. In the chancery courts the rules of evidence were always less carefully observed, or, as Westminster would have said, less understood, than in the courts of common law. A judge trying questions of fact alone might naturally think that blinkers, though useful for a jury, are unnecessary for a judge. And the chancery judge was apt to read his affidavits first, and to deter- mine their admissibility afterwards. In the meantime they had affected his mind.

The tendency of modern text-writers, among whom Professor J. B. Thayer (1831-1902), of Harvard, was perhaps the most independent, instructive and suggestive, is to restrict materially the field occupied by the law of evidence, and to relegate to other branches of the law topics traditionally treated under the head of evidence. Thus in every way the law of evidence, though still embodying some principles of great importance, is of less comparative importance as a branch of English law than it was half a century ago. Legal rules, like dogmas, have their growth and decay. First comes the judge who gives a ruling in a parti- cular case. Then comes the text-writer who collects the scattered rulings, throws them into the form of general propositions, connects them together by some theory, sound or unsound, and often ignores or obscures their historical origin. After him comes the legislator who crystallizes the propositions into enact- ments, not always to the advantage of mankind. So also with decay. Legal rules fall into the background, are explained away, are ignored, are denied, are overruled. Much of the English law of evidence is in a stage of decay.

The subject-matter of the law of evidence may be arranged differently according to the taste or point of view of the writer. It will be

arranged here under the following heads: — I. Prelimin- ary Matter; II. Classes of Evidence; III. Rules of Exclusion; IV. Documentary Evidence; V. Witnesses.

I. Preliminary Matter

Under this head may be grouped certain principles and con- siderations which limit the range of matters to which evidence relates.

1. Law and Fact. — Evidence relates only to facts. It is therefore necessary to touch on the distinction between law and facts. Ad quaestionem facti non respondent judices; ad quaestionem juris non respondent juratores. Thus Coke, attribut- ing, after his wont, to Bracton a maxim which may have been invented by himself. The maxim became the subject of political controversy, and the two rival views are represented by Pul- teney's lines —

" For twelve honest men have decided the cause Who are judges alike of the facts and the laws,"

and by Lord Mansfield's variant —

" Who are judges of facts, but not judges of laws."

The particular question raised with respect to the law of libel

was settled by Fox's LibelAct 1792. Coke's maxim describes in a broad general way the distinction between the functions of the judge and of the jury, but is only true subject to important quaLifications. Judges in jury cases constantly decide what may be properly called questions of fact, though their action is often disguised by the language applied or the procedure em- ployed. Juries, in giving a general verdict, often practically take the law into their own hands. The border-line between the two classes of questions is indicated by the " mixed questions of law and fact," to use a common phrase, which arise in such cases as those relating to "necessaries," "due diligence," " negligence," " reasonableness," " reasonable and probable cause." In the treatment of these cases the line has been drawn differently at different times, and two conflicting tendencies are discernible. On the one hand, there is the natural tendency to generalize common inferences into legal rules, and to fix legal standards of duty. On the other hand, there is the sound instinct that it is a mistake to define and refine too much in

these cases, and that the better course is to leave broadly to the jury, under the general guidance of the judge, the question what would be done by the ” reasonable ” or ” prudent ” man in particular cases. The latter tendency predominates in modern English law, and is reflected by the enactments in the recent acts codify- ing the law on bills of exchange and sale of goods, that certain questions of reasonableness are to be treated as questions of fact. On the same ground rests the dislike to limit the right of a jury to give a genera) verdict in criminal cases. Questions of custom begin by being questions of fact, but as the custom obtains general recognition it becomes law. Many of the rules of the English mercantile law were ” found ” as customs by Lord Mansfield’s special juries. Generally, it must be remembered that the jury act in subordinate co-operation with the judge, and that the extent to which the judge limits or encroaches on the province of the jury is apt to depend on the personal idiosyn- crasy of the judge.

2. Judicial Notice— It may be doubted whether the subject of judicial notice belongs properly to the law of evidence, and whether it does not belong rather to the general topic of legal or judicial reasoning. Matters which are the subject of judicial notice are part of the equipment of the judicial mind. It would be absurd to require evidence of every fact; many facts must be assumed to be known. The judge, like the juryman, is sup posed to bring with him to the consideration of the question which he has to try common sense, a general knowledge of human nature and the ways of the world, and also knowledge of things that ” everybody is supposed to know.” Of such matters judicial notice is said to be taken. But the range of general knowledge is indefinite, and the range of judicial notice has, for reasons of convenience, been fixed or extended, both by rulings of the judges and by numerous enactments of the legislature. It would be impossible to enumerate here the matters of which judicial notice must or may be taken. These are to be found in the text-books. For present purposes it must suffice to say that they include not only matters of fact of common and certain knowledge, but the law and practice of the courts, and many matters connected with the government of the country.

3. Presumptions. — A presumption in the ordinary sense is an inference. It is an argument, based on observation, that what has happened in some cases will probably happen in others of the like nature. The subject of presumptions, so far as they are mere inferences or arguments, belongs, not to the law of evidence, or to law at all, but to rules of reasoning. But a legal presump- tion, or, as it is sometimes called, a presumption of law, as dis- tinguished from a presumption of fact, is something more. It may be described, in Stephen’s language, as

” a rule of law that courts and judges shall draw a particular inference from a particular fact, or from particular evidence, unless and until the truth” (perhaps it would be better to say ‘soundness’) ” of the inference is disproved.” Courts and legislatures have laid down such rules on grounds of public policy or general con- venience, and the rules have then to be observed as rules of positive law, not merely used as part of the ordinary process of

reasoning or argument. Some so-called presumptions are rules of substantive law under a disguise. To this class appear to belong ” conclusive presumptions of law,” such as the common- law presumption that a child under seven years of age cannot commit a felony. So again the presumption that every one knows the law is merely an awkward way of saying that ignorance of the law is not a legal excuse for breaking it. Of true legal presumptions, the majority may be dealt with most appropriately under different branches of the substantive law, such as the law of crime, of property, or of contract, and accordingly Stephen has included in his Digest of the Law of Evidence only some which are common to more than one branch of the law. The effect of a presumption is to impute to certain facts or groups of facts a prima facie significance or operation, and thus, in legal pro- ceedings, to throw upon the party against whom it works the duty of bringing forward evidence to meet it. Accordingly the subject of presumptions is intimately connected with the subject of the burden of proof, and the same legal rule may be expressed in different forms, either as throwing the advantage of a presump- tion on one side, or as throwing the burden of proof on the other. Thus the rule in Stephen’s Digest, which says that the burden of proving that any person has been guilty of a crime or wrongful act is on the person who asserts it, appears in the article entitled ” Presumption of Innocence.” Among the more ordinary and more important legal presumptions are the presumption of regularity in proceedings, described generally as a presumption omnia esse rite acta, and including the presumption that the holder of a public office has been duly appointed, and has duly performed his official duties, the presumption of the legitimacy of a child born during the mother’s marriage, or within the period of gestation after her husband’s death, and the presump- tions as to life and death. ” A person shown not to have been heard of for seven years by those (if any) who, if he had been alive, would naturally have heard of him, is presumed to be dead unless the circumstances of the case are such as to account for his not being heard of without assuming his death; but there is no presumption as to the time when he died, and the burden of proving his death at any particular time is upon the person who asserts it. There is no presumption ” (i.e. legal

presumption) ” as to the age at which a person died who is shown to have been alive at a given time, or as to the order in which two or more persons died who are shown to have died in the same accident, shipwreck or battle” (Stephen, Dig. , art. 99). A document proved or purporting to be thirty years old is presumed to be genuine, and to have been properly executed and (if necessary) attested if produced from the proper custody. And the legal presumption of a ” lost grant,” i.e. the presumption that a right or alleged right which has been long enjoyed without interrup- tion had a legal origin, still survives in addition to the common law and statutory rules of prescription.

4. Burden of Proof. — The expression onus probandi has come down from the classical Roman law, and both it and the Roman maxims, Agenti incumbit probatio, Necessitas probandi incumbit ei qui dicit non ei qui negat, and Reus excipiendo fit actor, must be read with reference to the Roman system of actions, under which nothing was admitted, but the plaintiff’s case was tried first; then, unless that failed, the defendant’s on his exceptio; then, unless that failed, the plaintiff’s on his replicatio, and so on. Under such a system the burden was always on the ” actor.” In modern law the phrase ” burden of proof ” may mean one of two things, which are often confused — the burden of establish- ing the proposition or issue on which the case depends, and the burden of producing evidence on any particular point either at the beginning or at a later stage of the case. The burden in the former sense ordinarily rests on the plaintiff or prosecutor. The burden in the latter sense, that of going forward with evidence on a particular point, may shift from side to side as the case proceeds. The general rule is that he who alleges a fact must prove it, whether the allegation is couched in affirmative or negative terms. But this rule is subject to the effect of presump- tions in particular cases, to the principle that in considering the amount of evidence necessary to shift the burden of proof regard

must be had to the opportunities of knowledge possessed by the parties respectively, and to the express provisions of statutes directing where the burden of proof is to lie in particular cases. Thus many statutes expressly direct that the proof of lawful excuse or authority, or the absence of fraudulent intent, is to lie on the person charged with an offence. And the Summary Jurisdiction Act 1848 provides that if the information or com- plaint in summary proceedings negatives any exemption, excep- tion, proviso, or condition in the statute on

which it is founded, the prosecutor or complainant need not prove the negative, but the defendant may prove the affirmative in his defence.

II. Classes of Evidence Evidence is often described as being either oral or document- ary. To these two classes should be added a third, called by Bentham real evidence, and consisting of things presented immediately to the senses of the judge or the jury. Thus the judge or jury may go to view any place the sight of which may help to an understanding of the evidence, and may inspect any- thing sufficiently identified and produced in court as material to the decision. Weapons, clothes and things alleged to have been stolen or damaged are often brought into court for this purpose. Oral evidence consists of the statements of witnesses. Documentary evidence consists of documents submitted to the judge or jury by way of proof. The distinction between primary and eecondary evidence relates only to documentary evidence, and will be noticed in the section under that head. A division of evidence from another point of view is that into direct and indirect, or, as it is sometimes called, circumstantial evidence. By direct evidence is meant the statement of a person who saw, or otherwise observed with his senses, the fact in question. By indirect or circumstantial evidence is meant evidence of facts from which the fact in question may be inferred. The difference between direct and indirect evidence is a difference of kind, not of degree, and therefore the rule or maxim as to ” best evidence ” has no application to it. Juries naturally attach more weight to direct evidence, and in some legal systems it is only this class of evidence which is allowed to have full probative force. In some respects indirect evidence is superior to direct evidence, because, as Paley puts it, ” facts cannot lie,” whilst witnesses can and do. On the other hand facts often deceive; that is to say, the inferences drawn from them are often erroneous. The circumstances in which crimes are ordinarily committed are such that direct evidence of their commission is usually not obtainable, and when criminality depends on a state of mind, such as intention, that state must necessarily be inferred by means of indirect evidence.

III. Rules of Exclusion

It seems desirable to state the leading rules of exclusion in their crude form instead of obscuring their historical origin by attempting to force them into the shape of precise technical propositions forming parts of a logically connected system. The judges who laid the foundations of our modern law of evidence, like those who first discoursed on the duties of trustees, little dreamt of the elaborate and artificial system which was to be based upon their remarks. The rules will be found, as might be expected, to be vague, to overlap each other, to require

much explanation, and to be subject to many exceptions. They may be stated as follows: — (1) Facts not relevant to the issue cannot be admitted as evidence. (2) The evidence produced must be the best obtainable under the circumstances. (3) Hearsay is not evidence. (4) Opinion is not evidence.

1. Ride of Relevancy. — The so-called rule of relevancy is some- times stated by text-writers in the form in which it was laid down by Baron Parke in 1837 (Wright v. Doe and Tatham, 7 A. and E. 384), when he described “one great principle ” in the law of evidence as being that ” all facts which are relevant to the issue may be proved.” Stated in different forms, the rule has been made by Fitzjames Stephen the central point of his theory of evidence. But relevancy, in the proper and natural sense, as we have said, is a matter not of law, but of logic. If Baron

Parke’s dictum relates to relevancy in its natural sense it is not true; if it relates to relevancy in a. narrow and artificial sense, as equivalent to admissible, it is tautological. Such practical importance as the rule of relevancy possesses consists, not in what it includes, but in what it excludes, and for that reason it seems better to state the rule in a negative or exclusive form. But whether the rule is stated in a positive or in a negative form its vagueness is apparent. No precise line can be drawn between ” relevant ” and ” irrelevant ” facts. The two classes shade into each other by imperceptible degrees. The broad truth is that the courts have excluded from consideration certain matters which have some bearing on the question to be decided, and which, in that sense, are relevant, and that they have done so on grounds of policy and convenience. Among the matters so excluded are matters which are likely to mislead the jury, or to complicate the case unnecessarily, or which are of slight, remote, or merely conjectural importance. Instances of the classes of matters so excluded can be given, but it seems difficult to refer their exclusion to any more general principle than this. Rules as to evidence of character and conduct appear to fall under this principle. Evidence is not admissible to show that the person who is alleged to have done a thing was of a disposition or char- acter which makes it probable that he would or would not have done it. This rule excludes the biographical accounts of the prisoner which are so familiar in French trials, and is an im- portant principle in English trials. It is subject to three excep- tions: first, that evidence of good character is admissible in favour of the prisoner in all criminal cases; secondly, that a prisoner indicted for rape is entitled to call evidence as to the immoral character of the prosecutrix; and thirdly, that a witness may be called to say that he would not believe a previous witness on his oath. The exception

allowing the good character of a prisoner to influence the verdict, as distinguished from the sentence, is more humane than logical, and seems to have been at first admitted in capital cases only. The exception in rape cases does not allow evidence to be given of specific acts of im- morality with persons other than the prisoner, doubtless on the ground that such evidence would affect the reputations of third parties. Where the character of a person is expressly in issue, as in actions of libel and slander, the rule of exclusion, as stated above, does not apply. Nor does it prevent evidence of bad character from being given in mitigation of damages, where the amount of damages virtually depends on character, as in cases of defamation and seduction. As to conduct there is a similar general rule, that evidence of the conduct of a person on other occasions is not to be used merely for the purpose of showing the likelihood of' his having acted in a similar way on a particular occasion. Thus, on a charge of murder, the prosecutor cannot give evidence of the prisoner's conduct to other persons for the purpose of proving a bloodthirsty and murderous disposition. And in a civil case a defendant was not allowed to show that the plaintiff had sold goods on particular terms to other persons for the purpose of proving that he had sold similar goods on the same terms to the defendant. But this general rule must be carefully construed. Where several offences are so connected with each other as to form parts of an entire transaction, evidence of one is admissible as proof of another. Thus, where a prisoner is charged with stealing particular goods from a particular place, evidence may be given that other goods, taken from the same place at the same time, were found in his possession. And where it is proved or admitted that a person did a particular act, and the question is as to his state of mind, that is to say, whether he did the act knowingly, intentionally, fraudulently, or the like, evidence may be given of the commission by him of similar acts on other occasions for the purpose of proving his state of mind on the occasion. This principle is most commonly applied in charges for uttering false documents or base coin, and not uncom- monly in charges for false pretences, embezzlement or murder. In proceedings for the receipt or possession of stolen property, the legislature has expressly authorized evidence to be given of the possession by the prisoner of other stolen property, or of his previous conviction of an offence involving fraud or dishonesty

(Prevention of Crimes Act 187 1). Again, where there is a question whether a person committed an offence, evidence may be given of any

fact supplying a motive or constituting prepara- tion for the offence, of any subsequent conduct of the person accused, which is apparently influenced by the commission of the offence, and of any act done by him, or by his authority, in consequence of the offence. Thus, evidence may be given that, after, the commission of the alleged offence, the prisoner ab- sconded, or was in possession of the property, or the proceeds of the property, acquired by the offence, or that he attempted to conceal things which were or might have been used in com- mitting the offence, or as to the manner in which he conducted himself when statements were made in his presence and hearing. Statements made to or in the presence of a person charged with an offence are admitted as evidence, not of the facts stated, but of the conduct or demeanour of the person to whom or in whose presence they are made, or of the general character of the trans- action of which they form part (under the res gestae rule men- tioned below).

2. Best Evidence Rule. — Statements to the effect of the best evidence rule were often made by Chief Justice Holt about the beginning of the 18th century, and became familiar in the courts. Chief Baron Gilbert, in his book on evidence, which must have been written before 1726, says that ” the first and most signal rule in relation to evidence is this, that a man must have the utmost evidence the nature of the fact is capable of.” And in the great case of Omichund v. Barker (1744), Lord Hardwicke went so far as to say, ” The judges and sages of the law have laid down that there is but one general rule of evidence, the best that the nature of the case will admit ” (1 Atkyns 49). It is no wonder that a rule thus solemnly stated should have found a prominent place in text-books on the law of evidence. But, apart from its application to documentary evidence, it does not seem to be more than a useful guiding principle which underlies, or may be used in support of, several rules.

It is to documentary evidence that the principle is usually applied, in the form of the narrower rule excluding, subject to exceptions, secondary evidence of the contents of a document where primary evidence is obtainable. In this form the rule is a rule of exclusion, but may be most conveniently dealt with in connexion with the special subject of documentary evidence. As noticed above, the general rule does not apply to the differ- ence between direct and indirect evidence. And, doubtless on account of its vague character, it finds no place in Stephen’s Digest.

3. Hearsay.— The term ” hearsay ” primarily applies to what a witness has heard another person say in respect to a fact in dispute. But it is extended to any statement, whether reduced to writing or not, which

is brought before the court, not by the author of the statement, but by a person to whose knowledge the statement has been brought. Thus the hearsay rule excludes statements, oral or written, made in the first instance by a person who is not called as a witness in the case. Historically this rule may be traced to the time when the functions of the witnesses were first distinguished from the functions of the jury, and when the witnesses were required by their formula to testify de visu suo et auditu, to state what they knew about facts from the direct evidence of their senses, not from the information of others. The rule excludes statements the effect of which is liable to be altered by the narrator, and which purport to have been made by persons who did not necessarily speak under the sanction of an oath, and whose accuracy or veracity is not tested by cross- examination. It is therefore of practical utility in shutting out many loose statements and much irresponsible gossip. On the other hand, it excludes statements which are of some value as evidence, and may indeed be the only available evidence. Thus, a statement has been excluded as hearsay, even though it can be proved that the author of the statement made it on oath, or that it was against his interest when he made it, or that he is prevented by insanity or other illness from giving evidence him- self, or that he has left the country and disappeared, or that he is dead.

Owing to the inconveniences which would be caused by a strict application of the rule, it has been so much eaten into by exceptions that some persons doubt whether the rule and the exceptions ought not to change places. Among the exceptions the following may be noticed : (a) Certain sworn statements. ^\n many cases statements made by a person whose evidence is material, but who cannot come before the court, or could not come before it without serious difficulty, delay or expense, may be admitted as evidence under proper safeguards. Under the Indictable Offences Act 1848, where a person has made a deposition before a justice at a preliminary inquiry into an offence, his deposition may be read in evidence on proof that the deponent is dead, or too ill to travel, that the deposition was taken in the presence of the accused person, and that the accused then had a full opportunity of cross-examining the deponent. The deposition must appear to be signed by the justice before whom it purports to have been taken. Depositions taken before a coroner are admissible under the same principle. And the principle probably extends to cases where the deponent is insane, or kept away by the person accused. There are other statutory provisions for the admission of depositions, as in the Criminal Law Amendment Act 1867; the Foreign Jurisdiction Act 1890; and the Children Act 1908, incor- porating an act of 1894. In civil cases the rule excluding statements not made in court at the trial

is much less strictly applied. Frequent use is made of evidence taken before an examiner, or under a com- mission. Affidavits are freely used for subordinate issues or under an arrangement between the parties, and leave may be given to use evidence taken in other proceedings. The old chancery practice, under which evidence, both at the trial and at other stages of a proceeding, was normally taken by affidavit, irrespectively of consent, was altered by the Judicature Acts. Under the existing rules of the supreme court evidence may be given by affidavit upon any motion, petition or summons, but the court or a judge may, on the application of either party, order the attendance for cross-examina- tion of the person making the affidavit, (b) Dying declarations. — In a trial for murder or manslaughter a declaration by the person killed as to the cause of his death, or as to any of the circumstances of the transaction which resulted in his death, is admissible as evidence. But this exception is very strictly construed. It must be proved that the declarant, at the time of making the declaration, was in actual danger of death, and had given up all hope of recovery. (c) Statements in pedigree cases. — On a question of pedigree the statement of a deceased person, whether based on his own personal knowledge or on family tradition, is admissible as evidence, if it is proved that the person who made the statement was related to the person about whose family relations the statement was made, and that the statement was made before the question with respect to which the evidence is required had arisen, (d) Statements as to matters of public or general interest.— Statements by deceased per- sons are admissible as evidence of reputation or general belief in questions relating to the existence of any public or general right or custom, or matter of public and general interest. Statements of this kind are constantly admitted in questions relating to right of way, or rights of common, or manorial or other local customs. Maps, copies of court rolls, leases and other deeds, and verdicts, judgments, and orders of court fall within the exception in cases of this kind. («) Statements in course of duty or business. — A statement with respect to a particular fact made by a deceased person in pursuance of his duty in connexion with any office, employment or business, whether public or private, is admissible as evidence of that fact, if the statement appears to have been made from personal knowledge, and at or about the time when the fact occurred. This exception covers entries by clerks and other employees. (/) Statements against interest. — A statement made by a deceased person against his pecuniary or proprietary interest is admissible as evidence, without reference to the time at which it was made. Where such a statement is admissible the whole of it becomes admissible, though it may contain matters not against the interest of the person who made it, and though the total

effect may be in his favour. Thus, where there was a question whether a particular sum was a gift or a loan, entries in an account book of receipt of interest on the sum were admitted, and a statement in the book that the alleged debtor had on a particular date acknowledged the loan was also admitted. (g) Public documents. — Under this head may be placed recitals in public acts of parliament, notices in the London, Edinburgh, or Dublin Gazette (which are made evidence by statute in a large number of cases), and entries made in the performance of duty in official registers or records, such as registers of births, deaths or marriages, registers of companies, records injudicial proceedings, and the like. An entry in a public document may be treated as a statement made in the course of duty, but it is admissible whether the person who made the statement is alive or dead, and without any evidence as to personal knowledge, or the time at which the statement is made. (h) Admissions. — By the term ” admission,” as here used, is meant a statement made out of the witness-box by a party to the proceedings, whether civil or criminal, or by some person whose statements are binding on that party, against the interest of that party. The term includes admissions made in answer to interrogatories, or to a notice to admit facts, but not admissions made on the pleadings. Admis- sions, in this sense of the term, are admissible as evidence against the person by whom they are made, or on whom they are binding,

without reference to the life or death of the person who made them. A person is bound by the statements of his agent, acting within the scope of his authority, and barristers and solicitors are agents for- their clients in the conduct of legal proceedings. Conversely, a person suing or defending on behalf of another, e.g. as agent or trustee, is bound by the statements of the person whom he repre- sents. Statements respecting property made by a predecessor in title bind the successor. Where a statement is put in evidence as an admission by, or binding on, any person, that person is entitled to have the whole statement given in evidence. The principle of this rule is obviously sound, because it would be unfair to pick out from a man’s statement what tells against him, and to suppress what is in his favour. But the application of the rule is sometimes attended with difficulty. An admission will not be allowed to be used as evidence if it was made under a stipulation, express or implied, that it should not be so used. Such admissions are said to be made ” without prejudice.” (i) Confessions. — A confession is an admission by a person accused of an

offence that he has committed the offence of which he is accused. But the rules about admitting as evidence confessions in criminal proceedings are much more strict than the rules about admissions in civil proceedings. The general rule is, that a confession is not admissible as evidence against any person except the person who makes it. But a confession made by one accomplice in the presence of another is admissible against the latter to this extent, that, if it implicates him, his silence under the charge may be used against him, whilst on the other hand his prompt repudiation of the charge might tell in his favour. In other words, the confession may be used as evidence of the conduct of the person in whose presence it was made. A confession cannot be admitted as evidence unless proved to be voluntary. A confession is not treated as being voluntary if it appears to the court to have been caused by any inducement, threat or promise which proceeded from a magistrate or other person in authority concerned in the charge, and which, in the opinion of the court, gave the accused person reasonable ground for supposing that by making a confession he would gain some advantage or avoid some evil in reference to the proceedings against him. This applies to any inducement, threat or promise having reference to the charge, whether it is addressed directly to the accused person or is brought to his knowledge indirectly. But a confession is not involuntary merely because it appears to have been caused by the exhortations of a person in authority to make it as a matter of religious duty, or by an inducement collateral to the proceedings, or by an inducement held out by a person having nothing to do with the apprehension, prosecution or examination of the prisoner. Thus, a confession made to a gaol chaplain in con- sequence of religious exhortation has been admitted as evidence. So also has a confession made by a prisoner to a gaoler in consequence of a promise by the gaoler, that if the prisoner confessed he should be allowed to see his wife. To make a confession involuntary, the inducement must have reference to the prisoner's escape from the charge against him, and must be made by some person having power to relieve him, wholly or partially, from the consequences of the charge. A confession is treated as voluntary if, in the opinion of the court, it was made after the complete removal of the impression produced by any inducement, threat or promise which would have made it involuntary. Where a confession was made under an inducement which makes the confession involuntary, evidence may be given of facts discovered in consequence of the confession, and of so much of the confession as distinctly relates to those facts. Thus, A. under circumstances which make the confession involuntary, tells a policeman that he, A., had thrown a lantern into the pond. Evidence may be given that the lantern was found in the pond, and that A. said

he had thrown it there. It is of course improper to try to extort a confession by fraud or under the promise of secrecy. But if a confession is otherwise admissible as evidence, it does not uecome inadmissible merely because it was made under a promise of secrecy, or in consequence of a deception practised on the accused person for the purpose of obtaining it, or when he was drunk, or because it was made in answer to questions, whether put by a magistrate or by a private person, or because he was not warned that he was not bound to make the confession, and that it might be used against him. If a confession is given in evidence, the whole of it must be given, and not merely the parts disadvantageous to the accused person. Evidence amounting to a confession may be used as such against the person who gave it, though it was given on oath, and though the proceeding in which it was given had reference to the same subject-matter as the proceeding in which it is to be used, and though the witness might have refused to answer the questions put to him. But if, after refusing to answer such questions, the witness is improperly compelled to answer, his answers are not a voluntary confession. The grave jealousy and suspicion with which the English law regards confessions offer a marked contrast to the importance attached to this form of evidence in other systems of procedure, such as the inquisitorial system which long prevailed, and still to some extent prevails, on the continent. (7) Res gestae. — Statements are often admitted as evidence on the ground that they form part of what is called the ” transaction,” or res gestae, the occurrence or nature of which is in question. For instance, where an act may be proved, statements accompanying and explaining the act made by or to the person doing it, may be given in evidence.

There is no difficulty in understanding the principle on which this exception from the hearsay rule rests, but there is often practical difficulty in applying it, and the practice has varied. How long is the ” transaction ” to be treated as lasting? What ought to be treated as ” the immediate and natural effect of continuing action,” and, for that reason, as part of the res gestae ? When an act of violence is committed, to what extent are the terms of the complaint made by the sufferer, as distinguished from the fact of a complaint having been made, admissible as evidence ? These are some of the questions raised. The cases in which statements by a person as to his bodily or mental condition may be put in evidence may perhaps be treated as falling under the same principle. In the Rugeley. poisoning case, statements by the deceased person before his illness as to his state of health, and as to his symptoms during illness, were admitted as evidence for the prosecution. Under the same principle may also be brought the rule as to statements in conspiracy cases. ‘ In charges of

conspiracy, after evidence has been given of the existence of the plot, and of the connexion of the accused with it, the charge against one conspirator may be supported by evidence of anything done, written, or said, not only by him, but by any other of the conspirators, in furtherance of the common purpose. On the other hand, a state- ment made by one conspirator, not in execution of the common purpose, but in narration of some event forming part of the con- spiracy, would be treated, not as part of the " transaction," but as a statement excluded by the hearsay rule. Thus the admissibility of writings in conspiracy cases may depend on the time when they can be shown to have been in the possession of a fellow-conspirator, whether before or after the prisoner's apprehension, (k) Complaints in rape cases, &c. — In trials for rape and similar offences, the fact that shortly after the commission of the alleged offence a complaint was made by the person against whom the offence was committed, and also the terms of the complaint, have been admitted as evidence, not of the facts complained of, but of the consistency of the com- plainants conduct with the story told by her in the witness-box, and as negativing consent on her part.

4. Opinion. — The rule excluding expressions of opinion also dates from the first distinction between the functions of wit- nesses and jury. It was for the witnesses to state facts, for the jury to form conclusions. Of course every statement of fact involves inference, and implies a judgment on phenomena ob- served by the senses. And the inference is often erroneous, as in the answer to the question, " Was he drunk?" A prudent wit- ness will often guard himself, and is allowed to guard himself, by answering td the best of his belief. But, for practical purposes, it is possible to draw a distinction between a statement of facts observed and an expression of opinion as to the inference to be drawn from these facts, and the rule telling witnesses to state facts and not express opinions is of great value in keeping their statements out of the region of argument and conjecture. The evidence of " experts," that is to say, of persons having a special knowledge of some particular subject, is generally described as constituting the chief exception to the rule. But perhaps it would be more accurate to say that experts are allowed a much wider range than ordinary witnesses in the expression of their opinions, and in the statement of facts on which their opinions are based. Thus, in a poisoning case, a doctor may be asked as an expert whether, in his opinion, a particular poison produces particular symptoms. And, where lunacy is set up as a defence, an expert may be asked whether, in his opinion, the symptoms exhibited by the alleged lunatic commonly show unsoundness of mind, and whether such unsoundness of mind usually

renders persons incapable of knowing the nature of their acts, or of knowing that what they do is either wrong or contrary to the law. Similar principles are applied to the evidence of engineers, and in numerous other cases. In cases of disputed handwriting the evidence of experts in handwriting is expressly recognized by statute (Evidence and Practice on Criminal Trials 1865).

IV. Documentary Evidence Charters and other writings were exhibited to the jury at a very early date, and it is to writings so exhibited that the term ” evidence ” or ” evidences ” seems to have been originally applied par excellence. The oral evidence of witnesses came later. Where a document is to be used as evidence the first question is how its contents are to be proved. To this question the principle of ” best evidence ” applies, in the form of the rule that primary evidence must be given except in the cases where secondary evidence is allowed. By primary evidence is meant the document itself produced for inspection. By secondary

evidence is meant a copy of the document, or verbal accounts of its contents.

The rule as to the inadmissibility of a copy ot a document is applied much more strictly to private than to public or official documents. Secondary evidence may be given of the contents of a private document in the following cases :

(a) Where the original is shown or appears to be in the possession

of the adverse party, and he, after having been served with reasonable notice to produce it, does not do so.

(b) Where the original is shown or appears to be in the possession

or power of a stranger not legally bound to produce it, and he, after having been served with a writ of subpoena duces tecum, or after having been sworn as a witness and asked for the document, and having admitted that it is in court, refuses to produce it.

(c) Where it is shown that proper search has been made for the

original, and there is reason for believing that it is destroyed or lost.

(d) Where the original is of such a nature as not to be easily

movable, as in the case of a placard posted on a wall, or of a tombstone, or is in a country trom which it is not permitted to be removed. («) Where the original is a document for the proof of which special provision is made by any act of parliament, or any law in force for the time being. Documents of that kind are practically treated on the same footing as private docu- ments. if) Where the document is an entry in a banker's book, provable according to the special provisions of the Bankers' Books Evidence Act 1879. Secondary evidence of a private document is usually given either by producing a copy and calling a witness who can prove the copy to be correct, or, when there is no copy obtainable, by calling a witness who has seen the document, and can give an account of its contents. No general definition of public document is possible, but the rules of evidence applicable to public documents are expressly applied by statute to many classes of documents. Primary evidence of any public document may be given by producing the document from proper custody, and by a witness identifying it as being what it professes to be. Public documents may always be proved by secondary evidence, but the particular kind of secondary evidence required is in many cases defined by statute. Where a document is of such a public nature as to be admissible in evidence on its mere production from the proper custody, and no statute exists which renders its contents provable by means of a copy, any copy thereof or extract therefrom is admissible as proof of its contents, if it is proved to be an examined copy or extract, or purports to be signed or certified as a true copy or extract by the officer to whose custody the original is entrusted. Many statutes provide that various certificates, official and public documents, documents and proceed- ings of corporations and of joint stock and other companies, and certified copies of documents, by-laws, entries in registers and other books, shall be receivable as evidence of certain particulars in courts of justice, if they are authenticated in the manner prescribed by the statutes. Whenever, by virtue of any such provision, any such certificate or certified copy is receivable as proof of any parti- cular in any court of justice, it is admissible as evidence, if it purports to be authenticated in the manner prescribed by law, without calling any witness to prove any stamp, seal, or signature required for its authentication, or the official character of the person who appears to have signed it. The Documentary Evidence Acts 1868, 1882 and 1895, provide modes of proving the contents of several classes of proclamations, orders and regulations.

If a document is of a kind which is required by law to be attested,

but not otherwise, an attesting witness must be called to prove its due execution. But this rule is subject to the following exceptions :

(a) If it is proved that there is no attesting witness alive, and capable of giving evidence, then it is sufficient to prove that the attestation of at least one attesting witness is in his handwriting, and that the signature of the person executing the document is in the handwriting of that person.

(6) If the document is proved, or purports to be, more than thirty years old, and is produced from what the court considers to be its proper custody, an attesting witness need not be called, and it will be presumed without evidence that the instrument was duly executed and attested.

Where a document embodies a judgment, a contract, a grant, or disposition of property, or any other legal transaction or " act in the law," on which rights depend, the validity of the transaction may be impugned on the ground of fraud, incapacity, want of consideration, or other legal ground. But this seems outside the law of evidence. In this class of cases a question often arises whether extrinsic evidence can be produced to vary the nature of the transaction embodied in the document. The answer to this question seems to depend on whether the docu-

; ment was or was not intended to be a complete and final state- ment of the transaction which it embodies. If it was, you cannot go outside the document for the purpose of ascertaining the nature of the transaction. If it was not, you may. But the mere statement of this test shows the difficulty of formulating precise rules, and of applying them when formulated. Fitz- James Stephen mentions, among the facts which may be proved in these cases, the existence of separate and consistent oral agreements as to matters on which the document is silent, if there is reason to believe that the document is not a complete and final statement of the transaction, and the existence of any usage or custom with reference to which a contract may be presumed to

have been made. But he admits that the rules on the subject are “by no means easy to apply, inasmuch as from the nature of the case an enormous number of transactions fall close on one side or the other of most of them.” The underlying principle appears to be a. rule of substantive law rather than of evidence. When parties to an arrangement have reduced the terms of the arrangement to a definite, complete, and final written form, they should be bound exclusively by the terms embodied in that form. The question in each case is under what circumstances they ought to be treated as having done so.

The expression “parol evidence,” which includes written as well as verbal evidence, has often been applied to the extrinsic evidence produced for the purpose of varying the nature of the transaction embodied in a document. It is also applied to ex- trinsic evidence used for another purpose, namely, that of ex- plaining the meaning of the terms used in a document. The two questions, What is the real nature of the transaction referred to in a document? and, What is the meaning of a document? are often confused, but are really distinct from each other. The rules bearing on the latter question are rules of construction or interpretation rather than of evidence, but are ordinarily treated as part of the law of evidence, and are for that reason included by Fitz James Stephen in his Digest. In stating these rules he adopts, with verbal modifications, the six propositions laid down by Vice-Chancellor Wigram in his Examinations of the Rules of Law respecting the admission of Extrinsic Evidence in Aid of the Interpretation of Wills. The substance of these propositions appears to be this, that wherever the meaning of a document cannot be satisfactorily ascertained from the document itself) use may be made of any other evidence for the purpose of elucidating the meaning, subject to one restriction, that, except in cases of equivocation, i.e. where a person or thing is described in terms applicable equally to more than one, resort cannot be had to extrinsic expressions of the author’s intention. V. Witnesses

1. Attendance. — If a witness does not attend voluntarily he can be required to attend by a writ of subpoena.

2. Competency. — As a general rule every person is a com- petent witness. Formerly persons were disqualified by crime or interest, or by being parties to the proceedings, but these disqualifications have now been removed by statute, and the circumstances which formerly created them do not affect the competency, though they may often affect the credibility, of a witness.

Under the general law as it stood before the Criminal Evidence Act

189S came into force, a person charged with an offence was not competent to give evidence on his own behalf. But many exceptions had been made to this rule by legislation, and the rule itself was finally abolished by the act of 1898. Under that law a pe son charged is a competent witness, but he can only give evidence for the defence, and can only give evidence if he himself applies to do so. Under the law as it stood before 1898, persons jointly charged and being tried together were not competent to give evidence either for or against each other. Under the act of 1898 a person charged jointly with another is a competent witness, but only for the defence, and not for the prosecution. If, therefore, one of the persons charged applies to give evidence his cross-examination must not be conducted with a view to establish the guilt of the other. Consequently, if it is thought

desirable to use against one prisoner the evidence of another who is being tried with him, the latter should be released, or a separate verdict of not guilty taken against him. A prisoner so giving evidence is popularly said to turn king's evidence. It follows that, subject to what has been said above as to persons tried together, the evidence of an accomplice is admissible against his principal, and vice versa. The evidence of an accom- plice is, however, always received with great jealousy and caution. A conviction on the unsupported testimony of an accomplice may, in some cases, be strictly legal, but the practice is to require it to be confirmed by unimpeachable testimony in some material part, and more especially as to his identification of the person or persons against whom his evidence may be received. The wife of a person charged is now a competent witness, but, except in certain special cases, she can only give evidence for the defence, and can only give evidence if her husband applies that she should do so. The special cases in which a wife can be called as a witness either for the prosecution or for the defence, and without the consent of the person charged, are cases arising under parti- cular enactments scheduled to the act of 1898, and relating mainly to offences against wives and children, and cases in which the wife is by common law a competent witness against her husband, i.e. where the proceeding is against the husband for bodily injury or violence inflicted on his wife. The rule of ex- clusion extends only to a lawful wife. There is no ground for supposing that the wife of a prosecutor is an incompetent witness. A witness is incompetent if, in the opinion of the court, he is prevented by extreme youth, disease affecting his mind, or any other cause of the same kind, from recollecting the matter on which he is to

testify, from understanding the questions put to him, from giving rational answers to those questions, or from knowing that he ought to speak the truth. A witness unable to speak or hear is not incompetent, but may give his evidence by writing or by signs, or in any other manner in which he can make it in- telligible. The particular form of the religious belief of a witness, or his want of religious belief, does not affect his competency. This ground of incompetency has now been finally removed by the Oaths Act 1888. It will be seen that the effect of the successive enactments which have gradually removed the disqualifications attaching to various classes of witnesses has been to draw a distinction between the competency of a witness and his credibility. No person is disqualified on moral or religious grounds, but his character may be such as to throw grave doubts on the value of his evidence. No relationship, except to a limited extent that of husband and wife, excludes from giving evidence. The parent may be examined on the trial of the child, the child on that of the parent, master for or against servant, and servant for or against master. The relationship of the witness to the prose- cutor or the prisoner in such cases may affect the credibility of the witness, but does not exclude his evidence.

3. Privilege. — It does not follow that, because a person is competent to give evidence, he can therefore be compelled to do so.

No one, except a person charged with an. offence when giving evidence on his own application, and as to the offence where- with he is charged, is bound to answer a question if the answer would, in the opinion of the court, have a tendency to expose the witness, or the wife or husband of the witness, to any criminal charge, penalty, or forfeiture, which the court regards as reason- ably likely to be preferred or sued for. Accordingly, an accom- plice cannot be examined without his consent, but if an accom- plice who has come forward to give evidence on a promise of pardon, or favourable consideration, refuses to give full and fair information, he renders himself liable to be convicted on his own confession. However, even accomplices in such circum- stances are not required to answer on their cross-examination as to other offences. Where, under the new law, a person charged with an offence offers himself as a witness, he may be asked any question in cross-examination, notwithstanding that it would tend to criminate him as to the offence charged. But he may not be asked, and if he is asked must not be required to answer, any question tending to show that he has committed, or been

convicted of, or been charged with, any other offence, or is of bad character, unless: —

(i.) The proof that he has committed, or been convicted of, the other offence is admissible evidence to show that he is guilty of the offence with which he is then charged; or, (ii.) He has personally, or by his advocate, asked questions of the witnesses for the prosecution, with a view to establish his own good character, or has given evidence of his good character, or the nature or conduct of the defence is such as to involve imputations on the character of the prose- cutor or the witnesses for the prosecution; or, (iii.) He has given evidence against any other person charged with the same offence.

He may not be asked questions tending to criminate his wife.

The privilege as to criminating answers does not cover answers merely tending to establish a civil liability. No one is excused from answering a question or producing a document only because the answer or document may establish or tend to establish that he owes a debt, or is otherwise liable to any civil proceeding. It is a privilege for the protection of the witness, and therefore may be waived by him. But there are other privileges which cannot be so waived. Thus, on grounds of public policy, no one can be compelled, or is allowed, to give evidence relating to any affairs of state, or as to official communications between public officers upon public affairs, except with the consent of the head of the department concerned, and this consent is refused if the production of the information asked for is considered detri- mental to the public service.

Again, in cases in which the government is immediately con- cerned, no witness can be compelled to answer any question the answer to which would tend to discover the names of persons by or to whom information was given as to the commission of offences. It is, as a rule, for the court to decide whether the per- mission of any such question would or would not, under the circumstances of the particular case, be injurious to the ad- ministration of justice.

A husband is not compellable to disclose any communication made to him by his wife during the marriage; and a wife is not compellable to disclose any communication made to her by her husband during the marriage.

A legal adviser is not permitted, whether during or after the termination of his employment as such, unless with his client's express consent, to disclose any communication, oral or docu- mentary, made to him as such legal adviser, by or on behalf of his client, during, in the course of, and for the purpose of his employment, or to disclose any advice given by him to his client during, in the course of, and for

the purpose of such employment. But this protection does not extend to —

(a) Any such communication if made in furtherance of any criminal purpose; nor

(b) Any fact observed by a legal adviser in the course of his employment as such, showing that any crime or fraud has been committed since the commencement of his employment, whether his attention was directed to such fact by or on behalf of his client or not; nor

(c) Any fact with which the legal adviser became acquainted otherwise than in his character as such.

Medical men and clergymen are not privileged from the dis- closure of communications made to them in professional con- fidence, but it is not usual to press for the disclosures of com- munications made to clergymen.

4. Oaths. — A witness must give his evidence under the sanction of an oath, or of what is equivalent to an oath, that is to say, of a solemn promise to speak the truth. The ordinary form of oath is adapted to Christians, but a person belonging to a non- Christian religion may be sworn in any form prescribed or recognized by the custom of his religion. (See the article Oath.)

5. Publicity. — The evidence of a witness at a trial must, as a general rule, be given in open court in the course of the trial. The secrecy which was such a characteristic feature of the ” inquisition ” procedure is abhorrent to English law, and, even where publicity conflicts with decency, English courts are very reluctant to dispense With or relax the safeguards for justice which publicity involves.

6. Examination.— The normal course of procedure is this. The party who begins, i.e. ordinarily the plaintiff or prosecutor, calls his witnesses in order. Each witness is first examined on behalf of the party for whom he is called. This is called the examination in chief. Then he is liable to be cross-examined on behalf of the other side. And, finally, he may be re-examined on behalf of his own side. After the case for the other side has been opened, the same procedure is adopted with the witnesses for that side. In some cases the party who

began is allowed to adduce further evidence in reply to his opponent's evidence. The examination is conducted, not by the court, but by or on behalf of the contending, parties. It will be seen that the prin- ciple underlying this procedure is that of the duel, or conflict between two contending parties, each relying on and using his own evidence, and trying to break down the evidence of his opponent. It differs from the principle of the " inquisition " procedure, in which the court takes a more active part, and in which the cases for the two sides are not so sharply distinguished. In a continental trial it is often difficult to determine whether the case for the prosecution or the case for the defence is proceed- ing. Conflicting witnesses stand up together and are " con- fronted " with each other. In the examination in chief questions must be confined to matters bearing on the main question at issue, and a witness must not be asked leading questions, i.e. questions suggesting the answer which the person putting the question wishes or expects to receive, or suggesting disputed facts about which the witness is to testify. But the rule about leading questions is not applied where the questions asked are simply introductory, and form no part of the real substance of the inquiry, or where they relate to matters which, though material, are not disputed. And if the witness called by a person appears to be directly hostile to him, or interested on the other side, or unwilling to reply, the reason for the rules applying to examination in chief' breaks down, and the witness may be asked leading questions and cross-examined, and treated in every respect as though he was a witness called on the other side, except that a party producing a witness must not impeach his credit by general evidence of bad character (Evidence and Practice on Criminal Trials Act 1865). In cross-examination questions not bearing on the main issue and leading questions may be put and (subject to the rules as to privilege) must be answered, as the cross-examiner is entitled to test the examination in chief by every means in his power. Questions not bearing on the main issue are often asked in cross-examination merely for the purpose of putting off his guard a witness who is supposed to have learnt up his story. In cross-examination questions may also be asked which tend either to test the accuracy or credibility of the witness, or to shake his credit by impeaching his motives or in- juring his character. The licence allowed in cross-examination has often been seriously abused, and the power of the court to check it is recognized by one of the rules of the supreme court (R.S.C. xxxvi. 39, added in 1883). It is considered wrong to put questions which assume that facts have been proved which have not been proved, or that answers have been given contrary to the fact. A witness ought not to be pressed in cross-examination as to any facts which, if admitted, would not affect the question at issue or the credibility of the witness. If the cross-

examiner intends to adduce evidence contrary to the evidence given by the witness, he ought to put to the witness in cross-examination the substance of the evidence which he proposes to adduce, in order to give the witness an opportunity of retracting or explain- ing. Where a witness has answered a question which only tends to affect his credibility by injuring his character, it is only in a limited number of cases that evidence can be given to contra- dict his answer. Where he is asked whether he has ever been convicted of any felony or misdemeanour, and denies or refuses to answer, proof may be given of the truth of the facts suggested (28 & 29 Vict. c. 15, s. 6). The same rule is observed where he is asked a question tending to show that he is not impartial. Where a witness has previously made a statement inconsistent with his evidence, proof may be given that he did in fact make it. But before such proof is given the circumstances of the alleged

statement, sufficient to designate the particular occasion, must be mentioned to the witness, and he must be asked whether he did or did not make the statement. And if the statement was made in, or has been reduced to, writing, the attention of the witness must, before the writing is used against him, be called to those parts of the writing which are to be used for the purpose of contradicting him (Evidence and Practice on Criminal Trials Act 1865, ss. 4, 5). The credibility of a witness may be impeached by the evidence of persons who swear that they, from their knowledge of the witness, believe him to be unworthy of credit on his oath. These persons may not on their examina- tion in chief give reasons for their belief, but they may be asked their reasons in cross-examination, and their answers cannot be contradicted. When the credit of a witness is so impeached, the party who called the witness may give evidence in reply to show that the witness is worthy of credit. Re- examination must be directed exclusively to the explanation of matters referred to in cross-examination, and if new matter is, by the permission of the court, introduced in re-examination, the other side may further cross-examine upon it. A witness under examination may refresh his memory by referring to any writing made by himself at or about the time of the occurrence to which the writing relates, or made by any other person, and read and found accurate by the witness at or about the time. An expert may refresh his memory by reference to professional treatises.

For the history of the English law of evidence, see Brunner, Entslehung der Schwurgerichte; Bigelow, History of Procedure in England ; Stephen (Sir J. F.), History of the Criminal Law of England ; Pollock and Maitland, History of English Law, bk. ii. ch. ix. ; Thayer, Preliminary Treatise on Evidence at the Common Law. The principal

text-books now in use are — Roscoe, Digest of the Law of Evidence on the Trial of Actions at Nisi Prius (18th ed., 1907); Roscoe, Digest of the Law of Evidence in Criminal Cases (13th ed., 1908); Taylor, Treatise on the Law of Evidence (10th ed., 1906); Best, Principles of the Law of Evidence (10th ed., 1906); Powell, Principles and Practice of the Law of Evidence (8th ed., 1904); Stephen, Digest of Die Law of Evidence (8th ed.., 1907) ; Wills, Theory and Practice of the Law of Evidence (1907). For the history of the law of criminal evidence in France, see Esmein, Hist, de la procedure criminelle en France. For Germany, see Holtzendorff, Encyclopadie der Rechtswissenschaft (passages indexed under head "'Beweis"); Holtzendorff, Rechlslexikon (" Beweis "). (C. P. I.)

EVIL EYE. The terror of the arts of " fascination," i.e. that certain persons can bewitch, injure and even kill with a glance, has been and is still very widely spread. The power was not thought to be always maliciously cultivated. It was as often 1 supposed to be involuntary (cf. Deuteronomy xxviii. 54) ; and a story is told of a Slav who, afflicted with the evil eye, at last blinded himself in order that he might not be the means of injur- ing his children (Woyciki, Polish Folklore, trans, by Lewenstein, p. 25). Few of the old classic writers fail to refer to the dread power. In Rome the " evil eye " was so well recognized that Pliny states that special laws were enacted against injury to crops by incantation, excantation or fascination. The power was styled fiamavia by the Greeks and fascinatio by the Latins. Children and young animals of all kinds were thought to be speci- ally susceptible. Charms were worn against the evil eye both by man and beast, and in Judges viii. 21 it is thought there is a reference to this custom in the allusion to the " ornaments " on the necks of camels. In classic times the wearing of amulets was universal. They were of three classes: (1) those the in- tention of which was to attract on to themselves, as the light- ning-rod the lightning, the malignant glance; (2) charms hidden in the bosom of the dress; (3) written words from sacred writ- ings. Of these three types the first was most numerous. They were oftenest of a grotesque and generally grossly obscene nature. They were also made in the form of frogs, beetles and so on. But the ancients did not wholly rely on amulets. Spitting was among the Greeks and Romans a most common antidote to the poison of the evil eye. According to Theocritus it is necessary to spit three times into the breast of the person who fears fascina- tion. Gestures, too, often intentionally obscene, were regarded as prophylactics on meeting the dreaded individual. The evil eye was believed to have its impulse in envy, and thus it came

to be regarded as unlucky to have any of your possessions praised. Among the Romans, therefore, it was customary when praising anything to add Praefiscini dixerim (Fain Evil! I should say). This custom survives in modern Italy, where in like circumstances is said Si mal occhio non ci fosse (May the evil eye not strike it). The object of these conventional phrases was to prove that the speaker was sincere and had no evil designs in his praise. Though there is no set formula, traces of the custom are found in English rural sayings, e.g. the Somersetshire ” I don’t wish ee no harm, so I on’t zay no more.” This is what the Scots call ” fore – speaking,” when praise beyond measure is likely to be followed by disease or accident. A Manxman will never say he is very well: he usually admits that he is ” middling,” or qualifies his ad- mission of good health by adding ” now ” or ” just now.” The belief led in many countries to the saying, when one heard any- body or anything praised superabundantly, ” God preserve him or it.” So in Ireland, to avoid being suspected of having the evil eye, it is advisable when looking at a child to say ” God bless it” ; and when passing a farm-yard where cows are collected at milking time it is usual for the peasant to say, ” The blessing of God be on you and all your labour.” Bacon writes: ” It seems some have been so curious as to note that the times when the stroke ... of an envious eye does most hurt are particularly when the party envied is beheld in glory and triumph.”

The powers of the evil eye seem indeed to have been most feared by the prosperous. Its powers are often quoted as almost limitless. Thus one record solemnly declares that in a town of Africa a fascinator called Elzanar killed by his evil art no less than 80 people in two years (W. W. Story, Castle St Angelo, 1877, p. 149). The belief as affecting cattle was universal in the Scottish Highlands as late as the 18th century and still lingers. Thus if a stranger looks admiringly on a cow the peasants still think she will waste away, and they offer the visitor some of her milk to drink in the belief that in this manner the spell is broken. The modern Turks and Arabs also think that their horses and camels are subject to the evil eye. But the people of Italy, especially the Neapolitans, are the best modern instances of implicit believers. The jettatore, as the owner of the evil eye is called, is so feared that at his approach it is scarcely an ex- aggeration to say that a street will clear: everybody will rush into doorways or up alleys to avoid the dreaded glance. The jettatore di bambini (fascinator of children) is the most dreaded of all. The evil eye is still much feared for horses in

India, China, Turkey, Greece and almost everywhere where horses are found. In rural England the pig is of all animals oftenest " overlooked." While the Italians are perhaps the greatest believers in the evil eye as affecting persons, the superstition is rife in the East. In India the belief is universal. In Bombay the blast of the evil eye is supposed to be a form of spirit-pos- session. In western India all witches and wizards are said to be evil-eyed. Modern Egyptian mothers thus account for the sickly appearance of their babies. In Turkey passages from the Koran are painted on the outside of houses to save the in- mates, and texts as amulets are worn upon the person, or hung upon camels and horses by Arabs, Abyssinians and other peoples. The superstition is universal among savage races.

For a full discussion see Evil Eye by F. T. Elworthy (London, 1895); also W. W. Story, Castle St Angelo and the Evil Eye (1877); E. N. Rolfe and H. Ingleby, Naples in 1888 (1888); Johannes Christian Frommann, Tractalus de fascinaliorie novus el smgularis, &c, &c. (Nuremburg, 1675) ; R. C. Maclagan, Evil Eye in the Western Highlands (1902).

EVOLUTION. The modern doctrine of evolution or " evolv- ing," as opposed to that of simple creation, has been defined by Prof. James Sully in the 9th edition of this encyclopaedia as a "natural history of the cosmos including organic beings, ex- pressed in physical terms as a mechanical process." The follow- ing exposition of the historical development of the doctrine is taken from Sully's article, and for the most part is in his own words.

In the modern doctrine of evolution the cosmic system appears as a natural product of elementary matter and its laws. The various grades of life on our planet are the natural consequences

of certain physical processes involved in the gradual transfor- mations of the earth. Conscious life is viewed a3 conditioned by physical (organic and more especially nervous) processes, and as evolving itself in close correlation with organic evolution. Finally, human development, as exhibited in historical and pre- historical records, is regarded as the highest and most complex result of organic and physical evolution. This modern doctrine of evolution is but an expansion and completion of those physical theories (see below) which opened the history of speculation. It differs from them in being grounded on exact and verified research. As such, moreover, it is a much more limited theory of evolution than the ancient. It does not necessarily concern itself about the question of the infinitude of worlds in space and in time. It is content to explain the origin and

course of develop- ment of the world, the solar or, at most, the sidereal system which falls under our own observation. It would be difficult to say what branches of science had done most towards the establish- ment of this doctrine. We must content ourselves by referring to the progress of physical (including chemical) theory, which has led to the great generalization of the conservation of energy; to the discovery of the fundamental chemical identity of the matter of our planet and of other celestial bodies, and of the chemical relations of organic and inorganic bodies; to the advance of astronomical speculation respecting the origin of the solar system, &c; to the growth of the science of geology which has necessi- tated the conception of vast and unimaginable periods of time in the past history of our globe, and to the rapid march of the biological sciences which has made us familiar with the simplest types and elements of organism; finally, to the development of the science of anthropology (including comparative psycho- logy; philology, &c), and to the vast extension and improverr-ent of all branches of historical study.

History of the Idea of Evolution. — The doctrine of evolution in its finished and definite form is a modern product. It required for its formation an amount of scientific knowledge which could only be very gradually acquired. It is vain, therefore, to look for clearly defined and systematic presentations of the idea among ancient writers. On the other hand, nearly all systems of philo- sophy have discussed the underlying problems. Such questions as the origin of the cosmos as a whole, the production of organic beings and of conscious minds, and the meaning of the observable grades of creation, have from the dawn of speculation occupied men's minds; and the answers to these questions often imply a vague recognition of the idea of a gradual evolution of things. Accordingly, in tracing the antecedents of the modern philosophic doctrine we shall have to glance at most of the principal systems of cosmology, ancient and modern. Yet since in these systems inquiries into the esse and fieri of the world are rarely distin- guished with any precision, it will be necessary to indicate very briefly the general outlines of the system so far as they are necessary for understanding their bearing on the problems of evolution.

Mythological Interpretation. — The problem of the origin of the world was the first to engage man's speculative activity. Nor was this line of inquiry pursued simply as a step in the more practical problem of man's final destiny. The order of ideas observable in children suggests the reflection that man began to discuss the "whence " of existence before the " whither." At first, as in the case of the child, the problem of the genesis of things was conceived anthropomorphically: the question " How did the world arise?" first shaped itself to the human

mind under the form ” Who made the world?” As long as the problem was conceived in this simple manner there was, of course, no room for the idea of a necessary self-conditioned evolution. Yet the first indistinct germ of such an idea appears to emerge in combination with that of creation in some of the ancient systems of theogony. Thus, for example, in the myth of the ancient Parsees, the gods Ormuzd and Ahriman are said to evolve themselves out of a primordial matter. It may be sup- posed that these crude fancies embody a dim recognition of the physical forces and objects personified under the forms of deities, and a rude attempt to account for their genesis as a natural

process. These first unscientific ideas of a genesis of the per- manent objects of nature took as their pattern the process of organic reproduction and development, and this, not only because these objects were regarded as personalities, but also because this particular mode of becoming would most impress these early observers. This same way of looking at the origin of the material world is illustrated in the Egyptian notion of a cosmic egg out of which issues the god (Phta) who creates the world.

Indian Philosophy. — Passing from mythology to speculation properly so called, we find in the early systems of philosophy of India theories of emanation which approach in some respects the idea of evolution. Brahma is conceived as the eternal self- existent being, which on its material side unfolds itself to the world by gradually condensing itself to material objects through the gradations of ether, fire, water, earth and the elements. At the same time this eternal being is conceived as the all-embracing world-soul from which emanates the hierarchy of individual souls. In the later system of emanation of Sankhya there is a more marked approach to a materialistic doctrine of evolution. If, we are told, we follow the chain of causes far enough back we reach unlimited eternal creative nature or matter. Qut of this ” principal thing ” or ” original nature ” all material and spiritual existence issues, and into it will return. Yet this prim- ordial creative nature is endowed with volition with regard to its own development. Its first emanation as plastic nature contains the original soul or deity out of which all individual souls issue.

Early Greek Physicists. — Passing by Buddhism, which, though

teaching the periodic destruction of our world by fire, &c, does not seek to determine the ultimate origin of the cosmos, we come to those early Greek physical philosophers who distinctly set themselves to eliminate the idea of divine interference with the world by representing its origin and changes as a natural process. The early Ionian physicists, including Thales, Anaximander and Anaximenes, seek to explain the world as generated out of a primordial matter (Gr. iiXr;; hence the name ” Hylozoists “), which is at the same time the universal support of things. This substance is endowed with a generative or transmutative force by virtue of which it passes into a succession of forms. They thus resemble modern evolutionists, since they regard the world with its infinite variety of forms as issuing from a simple mode of matter. More especially the cosmology of Anaximander resembles the modern doctrine of evolution in its conception of the indeterminate (to aweipov) out of which the particular forms of the cosmos are differentiated. Again, Anaximander may be said to prepare the way for more modern conceptions of material evolution by regarding his primordial substance as eternal, and by looking on all generation as alternating with destruction, each step of the process being of course simply a transformation of the indestructible substance. Once more, the notion that this indeterminate body contains potentially in itself the funda- mental contraries — hot, cold, &c. — by the excretion or evolution of which definite substances were generated, is clearly a fore- casting of that antithesis of potentiality and actuality which from Aristotle downwards has been made the basis of so many theories of development. In conclusion, it is noteworthy that though resorting to utterly fanciful hypotheses respecting the order of the development of the world, Anaximander agrees with modern evolutionists in conceiving the heavenly bodies as arising out of an aggregation of diffused matter, and in assigning to organic life an origin in the inorganic materials of the primitive earth (pristine mud). The doctrine of Anaximenes, who unites the conceptions of a determinate and indeterminate original substance adopted by Thales and Anaximander in the hypothesis of a primordial and all-generating air, is a clear advance on these theories, inasmuch as it introduces the scientific idea of con- densation and rarefaction as the great generating or transforming agencies. For the rest, his theory is chiefly important as em- phasizing the vital character of the original substance. The primordial air is conceived as animated. Anaximenes seems to have inclined to a view of cosmic evolution as throughout

involving a quasi-spiritual factor. This idea of the air as the original principle and source of life and intelligence is much more clearly

expressed by a later writer, Diogenes of Apollonia. Diogenes made this conception of a vital and intelligent air the ground of a teleological view of climatic and atmospheric pheno- mena. It is noteworthy that he sought to establish the identity of organic and inorganic matter by help of the facts of vegetal and animal nutrition. Diogenes distinctly taught that the world is of finite duration, and will be renewed out of the primitive substance.

Heraclitus again deserves a prominent place in a history of the idea of evolution. Heraclitus conceives of the incessant process of flux in which all things are involved as consisting of two sides or moments — generation and decay — which are re- garded as a confluence of opposite streams. In thus making transition or change, viewed as the identity of existence and non-existence, the leading idea of his system, Heraclitus antici- pated in some measure Hegel's peculiar doctrine of evolution as a dialectic process. 1 At the same time we may find expressed in figurative language the germs of thoughts which enter into still newer doctrines of evolution. For example, the notion of conflict (iroXejuos) as the father of all things and of harmony as arising out of a union of discords, and again of an endeavour by individual things to maintain themselves in permanence against the universal process of destruction and renovation, cannot but remind one of certain fundamental ideas in Darwin's theory of evolution.

Empedocles. — Empedocles took an important step in the direc- tion of modern conceptions of physical evolution by teaching that all things arise, not by transformations of some primitive form of matter, but by various combinations of a number of permanent elements. Further, by maintaining that the elements are con- tinually being combined and separated by the two forces love and hatred, which appear to represent in a figurative way the physical forces of attraction and repulsion, Empedocles may be said to have made a considerable advance in the construction of the idea of evolution as a strictly mechanical process. It may be observed, too, that the hypothesis of a primitive com- pact mass (sphaerus), in which love (attraction) is supreme, has some curious points of similarity to, and contrast with, that notion of a primitive nebulous matter with which the modern doctrine of cosmic evolution usually sets out. Empedocles tries to explain the genesis of organic beings, and, according to Lange, anticipates the idea of Darwin that adaptations abound, because it is their nature to perpetuate themselves. He further recog- nizes a progress in the production of vegetable and animal forms, though this part of his theory is essentially crude and unscientific. More important in relation to the modern problems of evolution is his thoroughly materialistic way of explaining the origin of sensation and knowledge

by help of his peculiar hypothesis of effluvia and pores. The supposition that sensation thus rests on a material process of absorption from external bodies natur- ally led up to the idea that plants and even inorganic subtances are precipient, and so to an indistinct recognition of organic life as a scale of intelligence.

Atomists. — In the theory of Atomism taught by Leudppus and Democritus we have the basis of the modern mechanical conceptions of cosmic evolution. Here the endless harmonious diversity of our cosmos, as well as of other worlds supposed to coexist with our own, is said to arise through the various com- bination of indivisible material elements differing in figure and magnitude only. The force which brings the atoms together in the forms of objects is inherent in the elements, and all their motions are necessary. The origin of things, which is also theii substance, is thus laid in the simplest and most homogeneous elements or principles. The real world thus arising consists only of diverse combinations of atoms, having the properties of magnitude, figure, weight and hardness, all other qualities being relative only to the sentient organism. The problem of the genesis of mind is practically solved by identifying the soul,

1 This is brought out by F. Lassalle, Die Philosophic Herakleitos, p. 126.

or vital principle, with heat or fire which pervades in unequal proportions, not only man and animals, but plants and nature as a whole, and through the agitation of which by incoming effluvia all sensation arises.

Aristotle. — Aristotle is much nearer a conception of evolution than his master Plato. It is true he sets out with a transcendent Deity, and follows Plato in viewing the creation of the cosmos as a process of descent from the more to the less perfect accord- ing to the distance from the original self-moving agency. Yet on the whole Aristotle leans to a teleological theory of evolution, which he interprets dualistually by means of certain meta- physical distinctions. Thus even his idea of the relation of the divine activity to the world shows a tendency to a pantheistic notion of a divine thought which gradually realizes itself in the process of becoming. Aristotle's distinction of form and matter,

and his conception of becoming as a transition from actuality to potentiality, provides a new ontological way of conceiving the process of material and organic evolution. 1 To Aristotle the whole of nature is instinct with a vital impulse towards some higher manifestation. Organic life presents itself to him as a progressive scale of complexity determined by its final end, namely, man. 2 In some respects Aristotle approaches the modern view of evolution. Thus, though he looked on species as fixed, being the realization of an unchanging formative prin- ciple {(j > bavs), he seems, as Ueberweg observes, to have inclined to entertain the possibility of a spontaneous generation in the case of the lowest organisms. Aristotle's teleological concep- tion of organic evolution often approaches modern mechanical conceptions. Thus he says that nature fashions organs in the order of their necessity, the first being those essential to life. So, too, in his psychology he speaks of the several degrees of mind as arising according to a progressive necessity. 3 In his view of touch and taste, as the two fundamental and essential senses, he may remind one of Herbert Spencer's doctrine. At the same time Aristotle precludes the idea of a natural develop- ment of the mental series by the supposition that man contains, over and above a natural finite soul inseparable from the body, a substantial and eternal principle (coGs) which enters into the individual from without. Aristotle's brief suggestions respect- ing the origin of society and governments in the Politics show a leaning to a naturalistic interpretation of human history as a development conditioned by growing necessities.

Strato. — Of Aristotle's immediate successors one deserves to be noticed here, namely, Strato of Lampsacus, who de- veloped his master's cosmology into a system of naturalism. Strato appears to reject Aristotle's idea of an original source of movement and life extraneous to the world in favour of an immanent principle. All parts of matter have an inward plastic life whereby they can fashion themselves to the best advantage, according to their capability, though not with consciousness.

The Stoics. — In the cosmology of the Stoics we have the germ of a monistic and pantheistic conception of evolution. All things are said to be developed out of an original being, which is at once material (fire) and spiritual (the Deity), and in turn they will dissolve back into this primordial source. At the same time the world as a developed whole is regarded as an organism which is permeated with the divine Spirit, and so we may say that the world-process is a self-realization of the divine B eing. The forma- tive principle or force of the world is said to contain the several rational germinal forms of things. Individual things are sup- posed to arise out of the original being, as animals and plants

out of seeds. Individual souls are an efflux from the all-compassing world-soul. The necessity in the world's order is regarded by the Stoics as identical with the divine reason, and this idea is used as the basis of a teleological and optimistic view of nature. Very curious, in relation to modern evolutional ideas, is the Stoical doctrine that our world is but one of a series of exactly

1 Zeller says that through this distinction Aristotle first made possible the idea of development.

2 See this well brought out in G. H. Lewes's Aristotle, p. 187.

‘ Grote calls attention to the contrast between Plato’s and Aris- totle’s way of conceiving the gradations of mind {Aristotle, ii. 171).

identical ones, all of which are destined to be burnt up and destroyed.

The Epicureans — Lucretius. — The Epicureans differed from the Stoics by adopting a purely mechanical view of the world- process. Their fundamental conception is that of Democritus; they seek to account for the formation of the cosmos, with its order and regularity, by setting out with the idea of an original (vertical) motion of the atoms, which somehow or other results in movements towards and from one another. Our world is but one of an infinite number of others, and all the harmonies and adaptations of the universe are regarded as a special case of the infinite possibilities of mechanical events. Lucretius regards the primitive atoms (first beginnings or first bodies) as seeds out of which individual things are developed. All living and sentient things are formed out of insentient atoms {e.g. worms spring out of dung). The peculiarity of organic and sentient bodies is due to the minuteness and shape of their particles, and to their special motions and combinations. So, too, mind consists but of ex- tremely fine particles of matter, and dissolves into air when the body dies. Lucretius traces, in the fifth book of his poem, the progressive genesis of vegetal and animal forms out of the mother-earth. He vaguely anticipates the modern idea of the world as a survival of the fittest when he says that many races may have lived and died out, and that those which still exist have •been protected either by craft, courage or speed. Lucretius touches on the development of man out of a primitive, hardy, beast-like condition. Pregnant hints are given respecting a natural development of language which has its germs in sounds of quadrupeds and birds, of religious ideas out of dreams and waking hallucinations, and of the art of music by help of the suggestion of natural sounds. Lucretius thus recognizes the whole range of existence to which the doctrine of evolution may be applied.

Neoplatonists. — In the doctrines of the Neoplatonists, of whom Plotinus is the most important, we have the world- process represented after the example of Plato as a series of descending steps, each being less perfect than its predecessors, since it is further removed from the first cause. 4 The system of Plotinus, Zellar remarks, is not strictly speaking one of emanation, since there is no communication of the divine essence to the created world; yet it resembles emanation inas- much as the genesis of the world is conceived as a necessary physical effect, and not as the result of

volition. In Proclus we find this conception of an emanation of the world out of the Deity, or the absolute, made more exact, the process being re- garded as threefold — (1) persistence of cause in effect, (2) the departure of effect from cause, and (3) the tendency of effect to revert to its cause.

The Fathers. — The speculations of the fathers respecting the origin and course of the world seek to combine Christian ideas of the Deity with doctrines of Greek philosophy. The common idea of the origin of things is that of an absolute creation of matter and mind alike. The course of human history is regarded by those writers who are most concerned to refute Judaism as a progressive divine education. Among the Gnostics we meet with the hypothesis of emanation, as, for example, in the curious cosmic theory of Valentinus.

Middle Ages — Early Schoolmen. — In the speculative writings of the middle ages, including those of the schoolmen, we find no progress towards a more accurate and scientific view of nature. The cosmology of this period consists for the most part of the Aristotelian teleological view of nature combined with the Christian idea of the Deity and His relation to the world. In certain writers, however, there appears a more elaborate trans- formation of the doctrine of creation into a system of emanation. According to John Scotus Erigena, the nothing out of which the world is created is the divine essence. Creation is the act by which God passes through the primordial causes, or universal ideas, into the region of particular tnings {processio), in order finally to return to himself {reversio). The transition from the

- Zeller observes that this scale of decreasing perfection is a necessary consequence of the idea of a transcendent deity.

universal to the particular is of course conceived as a descent or degradation. A similar doctrine of emanation is to be found in the writings of Bernhard of Chartres, who conceives the process of the unfolding of the world as a movement in a circle from the most general to the individual, and from this back to the most general. This movement is said to go forth from God to the animated heaven, stars, visible world and man, which represent decreasing degrees of cognition.

Arab Philosophers. — Elaborate doctrines of emanation, largely based on Neoplatonic ideas, are also propounded by some of the Arabic philosophers, as by FarabI and Avicenna. The leading thought is that of a descending series of intelligences, each emanating from its predecessor, and having its appropriate region in the universe.

Jewish Philosophy. — In the Jewish speculations of the middle ages may be found curious forms of the doctrine of emanations uniting the Biblical idea of creation with elements drawn from the Persians and the Greeks. In the later and developed form of the Kabbala, the origin of the world is represented as a gradu- ally descending emanation of the lower out of the higher. Among the philosophic Jews, the Spanish Avicebron, in his Fons Vitae, expounds a curious doctrine of emanation. Here the divine will is viewed as an efflux from the divine wisdom, as the inter- mediate link between God, the first substance, and all things, and as the fountain out of which all forms emanate. At the same time all forms, including the higher intelligible ones, are said to have their existence only in matter. Matter is the one universal substance, body and mind being merely specifica- tions of this. t Thus Avicebron approaches, as Salomon Munk observes, 1 a pantheistic conception of the world, though he distinctly denies both matter and form to God.

Later Scholastics.— Passing now to the later' schoolmen, a bare mention must be made of Thomas Aquinas, who elaborately argues for the absolute creation of the world out of nothing, and of Albertus Magnus, who reasons against the Aristotelian idea of the past eternity of the world. More importance attaches to Duns Scotus, who brings prominently forward the idea of a progressive development in nature by means of a process of determination. The original substance of the world is the materia primo-prima, which is the immediate creation of the Deity. This serves Duns Scotus as the most universal basis of existence, all angels having material bodies. This matter is differentiated into particular things (which are not privations but perfections) through the addition of an individualizing principle (haecceitas) to the universal (quidditas). The whole world is represented by the figure of a tree, of which the seeds and roots are the first indeterminate matter, the leaves the accidents, the twigs and branches corruptible creatures, the blossoms the rational soul, and the fruit pure spirits or angels. It is also described as a bifurcation of two twigs, mental and bodily creation out of a common root. One might almost say that Duns Scotus recognizes the principle of a gradual physical evolution, only that he chooses to represent the mechanism by which the process is brought about by means of quaint scholastic fictions.

Revival of Learning. — The period of the revival of learning, which was also that of a renewed study of nature, is marked by a considerable amount of speculation respecting the origin of the universe. In some of these we see a return to Greek theories, though the influence of physical discoveries, more especially those of Copernicus, Kepler and Galileo, is distinctly traceable.

Telesio. — An example of a return to early Greek speculation is to be met with in Bernardino Telesio. By this writer the world is explained as a product of three principles — dead matter, and two active forces, heat and cold. Terrestrial things arise through % confluence of heat, which issues from the heavens, and cold, which comes from the earth. Both principles have sensibility, And thus all products of their collision are sentient, that is, feel pleasure and pain. The superiority of animals to plants and metals in the possession of special organs of sense is connected with the greater complexity and heterogeneity of their structuie. 1 Melanges de philosophic juive et arabe, p. 225.

Giordano Bruno. — In the system of Giordano Bruno, who sought to construct a philosophy of nature on the basis of new scientific ideas, more particularly the doctrine of Copernicus, we find the outlines of a theory of cosmic evolution conceived as an essentially vital process. Matter and form are here identi- fied, and the evolution of the world is presented as the unfolding of the world-spirit to its perfect forms according to the plastic substratum (matter) which is but one of its sides. This process of change is conceived as a transformation, in appearance only, of the real unchanging substance (matter and form). All parts of matter are capable of developing into all forms; thus the materials of the table and chair may under proper circumstances be developed to the life of the plant or of the animal. The elementary parts of existence are the minima, or monads, which are at once material and mental. On their material side they are not absolutely unextended, but spherical. Bruno looked on our solar system as but one out of an infinite number of worlds. His theory of evolution is essentially pantheistic, and he does not employ his hypothesis of monads in order to work out a more mechanical conception.

Campanella. — A word must be given to one of Bruno's contemporary compatriots, namely Campanella, who gave poetic expression to that system of universal vitalism which Bruno developed. He argues, from the principle quicquid est in efectibus esse et in causis, that the elements and the whole world have sensation, and thus he appears to derive the organic part of nature out of the so-called " inorganic."

Boehme. — Another writer of this transition period deserves a passing reference here, namely, Jacob Boehme the mystic, who by his conception of a process of inner diremption as the essential character of all mind, and so of God, prepared the way for later German theories of the origin of the world as the self-differentiation and self-externalization of the absolute spirit.

Hobbes and Gassendi.— The influence of an advancing study of nature, which was stimulated if not guided by Bacon's writings, is seen in the more careful doctrines of materialism worked out almost simultaneously by Hobbes and Gassendi. These theories, however, contain little that bears directly on the hypothesis of a natural evolution of things. In the view of Hobbes, the difficulty of the genesis of conscious minds is solved by saying that sensation and thought are part of the reaction of the organ- ism on external movement. . Yet Hobbes appears (as Clarke points out) to have vaguely felt the difficulty; and in a passage of his Physics (chap. 25, sect. 5) he says that the universal exist- ence of sensation in matter cannot be disproved, though he shows that when there are no organic arrangements the mental side of the movement (phantasma) is evanescent. The theory of the origin of society put forth by Hobbes, though directly opposed in most respects to modern ideas of social evolution, deserves mention here by reason of its enforcing that principle of struggle (bellum omnium contra omnes) which has played so conspicuous a part in the modern doctrine of evolution. Gassendi, with some deviations, follows Epicurus in his theory of the formation of the world. The world consists of a finite number of atoms, which have in their own nature a self-moving force or principle. These atoms, which are the seeds of all things, are, however, not eternal but created by God. Gassendi dis- tinctly argues against the existence of a world-soul or a principle of life in nature.

Descartes. — In the philosophy of Descartes we meet with a dualism of mind and matter which does not easily lend itself to the conception of evolution. His doctrine that consciousness is confined to man, the lower animals being unconscious machines (automata), excludes all idea of a progressive development of mind. Yet Descartes, in his Principia Philosophiae, laid the foundation of the modern mechanical conception of nature and of physical evolution. In the third part of this work he inclines to a thoroughly natural hypothesis respecting the genesis of the physical world, and adds in the fourth part that the same kind of explanation might be applied to the nature and formation of plants and animals. He is indeed careful to keep right with

the orthodox doctrine of creation by saying that he does not believe the world actually arose in this mechanical way out of the three kinds of elements which he here supposes, but that he simply puts out his hypothesis as a mode of conceiving how it m.‘ght have arisen. Descartes ‘s account of the mind and its passions is thoroughly materialistic, and to this extent he works in the direction of a materialistic explanation of the origin of mental life.

Spinoza. — In Spinoza’s’pantheistic theory of the world, which regards thought and extension as but two sides of one substance, the problem of becoming is submerged in that of being. Al- though Spinoza’s theory attributes a mental side to all physical events, he rejects all teleological conceptions and explains the order of things as the result of an inherent necessity. He recog- nizes gradations of things according to the degree of complexity of their movements and that of their conceptions. To Spinoza (as Kuno Fischer observes) man differs from the rest of nature in the degree only and not in the kind of his powers. So far Spinoza approaches the conception of evolution. He may be said to furnish a further contribution to a metaphysical con- ception of evolution in his view of all finite individual things as the infinite variety to which the unlimited productive power of the universal substance gives birth. Sir F. Pollock has taken pains to show how nearly Spinoza approaches certain ideas contained in the modern doctrine of evolution, as for example that of self-preservation as the determining force in things.

Locke. — In Locke we find, with a retention of certain. anti-evolutionist ideas, a marked tendency to this mode’of viewing the world. To Locke the universe is the result of a direct act of creation, even matter being limited in duration and created. Even if matter were eternal it would, he thinks, be incapable of producing motion; and if motion is itself conceived as eternal, thought can never begin to be. The first eternal being is thus spiritual or ” cogitative,” and contains in itself all the perfections that can ever after exist. He repeatedly insists on the impos- sibility of senseless matter putting on sense. 1 Yet while thus placing himself at a point of view opposed to that of a gradual evolution of the organic world, Locke prepared the way for this doctrine in more ways than one. First of all, his genetic method as applied to the mind’s ideas — which laid the foundations of

English analytical psychology — was a step in the direction of a conception of mental life as a gradual evolution. Again he works towards the same end in his celebrated refutation of the scholastic theory of real specific essences. In this argument he emphasizes the vagueness of the boundaries which mark off organic species with a view to show that these do not correspond to absolutely fixed divisions in the objective world, that they are made by the mind, not by nature. 2 This idea of the continuity of species is developed more fully in a remarkable passage (Essay, bk. iii. ch. vi. § 12), where he is arguing in favour of the hypothesis, afterwards elaborated by Leibnitz, of a graduated series of minds (species of spirits) from the Deity down to the lowest animal intelligence. He here observes that ” all quite down from us the descent is by easy steps, and a continued series, of things, that in each remove differ very little from one another.” Thus man approaches the beasts, and the animal kingdom is nearly joined with the vegetable, and so on down to the lowest and ” most inorganical parts of matter.” Finally, it is to be observed that Locke had a singularly clear view of organic arrangements (which of course he explained according to a theistic teleology) as an adaptation to the circumstances of the environment or to ” the neighbourhood of the bodies that surround us.” Thus he suggests that man has not eyes of a microscopic delicacy, because he would receive no great advan- tage from such acute organs, since though adding indefinitely to his speculative knowledge of the physical world they would

1 Yet he leaves open the question whether the Deity has annexed thought to matter as a faculty, or whether it rests on a distinct spiritual principle.

2 Locke half playfully touches on certain monsters, with respect to which it is difficult to determine whether they ought to be called men. (Essay, book iii. ch. vi. sect. 26, 27.)

not practically benefit their possessor (e.g. by enabling him to avoid things at a convenient distance) . 3

Idea of Progress in History. — Before leaving the 17th century we must just refer to the writers who laid the foundations of the essentially modern conception of human history as a gradual upward progress. According to Flint, 4 there were four men who in this and the preceding century seized and made prominent this idea, namely, Bodin, Bacon, Descartes and Pascal. The former distinctly argues against the idea of a deterioration of man in the past. In this way we see that just as advancing natural science was preparing the way for a doctrine of physical evolution, so advancing historical research was

leading to the application of a similar idea to the collective human life.

English Writers of the 18th Century — Hume. — The theological discussions, which make up so large a part of the English specu- lation of the 18th century cannot detain us here. There is, however, one writer who sets forth so clearly the alternative suppositions respecting the origin of the world that he claims a brief notice. We refer to David Hume. In his Dialogues con- cerning Natural Religion he puts forward tentatively, in the person of one of his interlocutors, the ancient hypothesis that since the world resembles an animal or vegetal organism rather than a machine, it might more easily be accounted for by a pro- cess of generation than by an act of creation. Later on he develops the materialistic view of Epicurus, only modifying it so far as to conceive of matter as finite. Since a finite number of particles is only susceptible of finite transpositions, it must happen (he says), in an eternal duration that every possible order or position will be tried an infinite number of times, and hence this world is to be regarded (as the Stoics maintained) as an exact reproduction of previous worlds. The speaker seeks to make intelligible the appearance of art and contrivance in the world as a result of a natural settlement of the universe (which passes through a succession of chaotic conditions) into a stable condition, having a constancy in its forms, yet without its several parts losing their motion and fluctuation.

French Writers of the 18th Century. — Let us now pass to the French writers of the 18th century. Here we are first struck by the results of advancing physical speculation in their bearing on the conception of the world. Careful attempts, based on new scientific truths, are made to explain the genesis of the world as a natural process. Maupertuis, who, together with Voltaire, introduced the new idea of the universe as based on Newton's discoveries, sought to account for the origin of organic things by the hypothesis of sentient atoms. Buffon the naturalist specu- lated, not only on the structure and genesis of organic beings, but also on the course of formation of the earth and solar system, which he conceived after the analogy of the development of organic beings out of seed. Diderot, too, in his varied intellectual activity, found time to speculate on the genesis of sensation and thought out of a combination of matter endowed with an elementary kind of sentience. De la Mettrie worked out a materialistic doctrine of the origin of things, according to which sensation and consciousness are nothing but a development out of matter. He sought (L'Homme-machine) to connect man in his original condition with the lower animals, and emphasized (L'Homme-plante) the essential unity of plan of all living things. Helvetius, in his work

on man, referred all differences between our species and the lower animals to certain peculiarities of organization, and so prepared the way for a conception of human development out of lower forms as a process of physical evolution. Charles Bonnet met the difficulty of the origin of conscious beings much in the same way as Leibnitz, by the supposition of eternal minute organic bodies to which are attached immortal souls. Yet though in this way opposing himself to the method of the modern doctrine of evolution, he aided the development of this doctrine by his view of the organic world as an ascending

3 A similar coincidence between the teleological and the modern evolutional way of viewing things is to be met with in Locke's account of the use of pain in relation to the preservation of our being (bk. ii. ch. vii. sect. 4).

4 Philosophy of History (1893), p. 103, where an interesting sketch of the growth of the idea of progress is to be found.

scale from the simple to the complex. Robinet, in his treatise De la nature, worked out the same conception of a gradation in organic existence, connecting this with a general view of nature as a progress from the lowest inorganic forms of matter up to man. The process is conceived as an infinite series of variations or specifications of one primitive and common type. Man is the chef-d'xuvre of nature, which the gradual progression of beings was to have as its last term, and all lower creations are regarded as pre-conditions of man's existence, since nature " could only realize the human form by combining in all imagin- able ways each of the traits which was to enter into it." The formative force in this process of evolution (or " metamor- phosis ") is conceived as an intellectual principle (idie gineratrice) . Robinet thus laid the foundation of that view of the world as wholly vital, and as a progressive unfolding of a spiritual for- mative principle, which was afterwards worked out by Schelling. It is to be added that Robinet adopted a thorough-going materialistic view of the dependence of mind on body, going even to the length of assigning special nerve-fibres to the moral sense. The system of Holbach seeks to provide a consistent materialistic view of the world and its processes. Mental opera- tions are identified with physical movements, the three con-

ditions of physical movement, inertia, attraction and repulsion, being in the moral world self-love, love and hate. He left open the question whether the capability of sensation belongs to all matter, or is confined to the combinations of certain materials. He looked on the actions of the individual organism and of society as determined by the needs of self-preservation. He conceived of man as a product of nature that had gradually developed itself from a low condition, though he relinquished the problem of the exact mode of his first genesis and advance as not soluble by data of experience. Holbach thus worked out the basis of a rigorously materialistic conception of evolution.

The question of' human development which Holbach touched on was one which occupied many minds both in and out of France during the 18th century, and more especially towards its close. The foundations of this theory of history as an upward progress of man out of a barbaric and animal condition were laid by Vico in his celebrated work Principii di scienza nuova. In France the doctrine was represented by Turgot and Condorcet.

German Writers of the 18th Century — Leibnitz. — In Leibnitz we find, if not a doctrine of evolution in the strict sense, a theory of the world which is curiously related to the modern doctrine. The chief aim of Leibnitz is no doubt to account for the world in its static aspect as a co-existent whole, to conceive the ultimate reality of things in such a way as to solve the mystery of mind and matter. Yet by his very mode of solving the problem he is led on to consider the nature of the world-process. By placing substantial reality in an infinite number of monads whose essen- tial nature is force or activity, which is conceived as mental (representation), Leibnitz was carried on to the explanation of the successive order of the world. He prepares the way, too, for a doctrine of evolution by his monistic idea of the substantial similarity of all things, inorganic and organic, bodily and spiritual, and still more by his conception of a perfect gradation of existence from the lowest " inanimate " objects, whose essential activity is confused representation, up to the highest organized being — man — with his clear intelligence. 1 Turning now to Leibnitz's conception of the world as a process, we see first that he supplies, in his notion of the underlying reality as force which is repre- sented as spiritual (quelque chose d'analogique an sentiment et a I'appetit), both a mechanical and a teleological explanation of its order. More than this, Leibnitz supposes that the activity of the monads takes the form of a self-evolution. It is the follow- ing out of an inherent tendency or impulse to a series of changes, all of which were virtually pre-existent, and this process cannot be interfered with from without.. As the individual monad, so the whole system which makes up the world is a

gradual

1 G. H. Lewes points out that Leibnitz is inconsistent in his account of the intelligence of man in relation to that of lower animals, since when answering Locke he no longer regards these as differing in degree only.

development. In this case, however, we cannot say that each step goes out of the other as in that of individual development. Each monad is an original independent being, and is determined to take this particular point in the universe, this place in the scale of beings. We see how different this metaphysical conception is from that scientific notion of cosmic evolution in which the lower stages are the antecedents and conditions of the higher. It is probable that Leibnitz's notion of time and space, which approaches Kant's theory, led him to attach but little importance to the successive order of the world. Leibnitz, in fact, presents to us an infinite system of perfectly distinct though parallel developments, which on their mental side assume the aspect of a scale, not through any mutual action, but solely through the determination of the Deity. Even this idea, however, is incomplete, for Leibnitz fails to explain the physical aspect of development. Thus he does not account for the fact that organic beings — which have always existed as preformations (in the case of animals as animaux spermatiques) — come to be developed under given conditions. Yet Leibnitz prepared the way for a new conception of organic evolution. The modern 'monistic doctrine, that all material things consist of sentient elements, and that consciousness arises through a combination of these, was a natural transformation of Leibnitz's theory. 2

Lessing. — Of Leibnitz's immediate followers we may mention Lessing, who in his Education of the Human Race brought out the truth of the process of gradual development underlying human history, even though he expressed this in a form incon- sistent with the idea of a spontaneous evolution.

Herder. — Herder, on the other hand, Lessing's contemporary, treated the subject of man's development in a thoroughly naturalistic spirit. In his Ideen zur Philosophie der Geschichte, Herder adopts Leibnitz's idea of a graduated scale of beings, at the same time conceiving of the lower stages as the conditions of the higher. Thus man is said to be the highest product of nature, and as such to be dependent on all lower products. All material things are assimilated to one another as organic, the vitalizing principle being inherent in all matter. The develop- ment of man is explained in connexion with that of the earth,

and in relation to climatic variations, &c. Man's mental faculties are viewed as related to his organization, and as developed under the pressure of the necessities of life. 3

Kant. — Kant's relation to the doctrine of evolution is a many-sided one. In the first place, his peculiar system of sub- jective idealism, involving the idea that time is but a mental form to which there corresponds nothing in the sphere of noiimenal reality, serves to give a peculiar philosophical inters pretation to every doctrine of cosmic evolution. Kant, like Leibnitz, seeks to reconcile the mechanical and teleological views of nature, only he assigns to these different spheres. The order of the inorganic world is explained by properly physical causes. In his Natur geschichte des Himmels, in which he antici- pated the nebular theory afterwards more fully developed by Laplace, Kant sought to explain the genesis of the cosmos as a product of physical forces and laws. The worlds, or systems of worlds, which fill infinite space are continually being formed and destroyed. Chaos passes by a process of evolution into a cosmos, and this again into chaos. So far as the evolution of the solar system is concerned, Kant held these mechanical causes as adequate. For the world as a whole, however, he postulated a beginning in time (whence his use of the word creation), and further supposed that the impulse of organization which was conveyed to chaotic matter by the Creator issued from a central point in the infinite space spreading gradually outwards. 4 While

2 Both Lewes and du Bois Reymond have brought out the points of contact between Leibnitz's theory of monads and modern bio- logical speculations {Hist, of Phil. ii. 287, and Leibnitzsche Gedanken in der modernen Natunvissenschaft, p. 23 seq.).

3 For Herder's position in relation to the modern doctrine of evolu- tion see F. von BSrenbach's Herder ah Vorganger Darwins, a work which tends to exaggerate the proximity of the two writers.

4 Kant held it probable that other planets besides our earth are inhabited, and that their inhabitants form a scale of beings, their perfection increasing with the distance of the planet which they inhabit from the sun.

in his cosmology Kant thus relies on mechanical conceptions, in his

treatment of organic life his mind is, on the contrary, domin- ated by teleological ideas. An organism was to him something controlled by a formative organizing principle. It was natural, therefore, that he rejected the idea of a spontaneous generation of organisms (which was just then being advocated by his friend Forster), not only as unsupported by experience but as an in- adequate hypothesis. Experience forbids our excluding organic activity from natural causes, also our excluding intelligence from purposeful (zwecktdligen) causes; hence experience forbids our defining the fundamental force or first cause out of which living creatures arose. 1 Just as Kant thus sharply marks off the regions of the inorganic and the organic, so he sets man in strong oppo- sition to the lower animals. His ascription to man of a unique faculty, free-will, forbade his conceiving our species as a link in a graduated series of organic developments. In his doctrine of human development he does indeed recognize an early stage of existence in which our species was dominated by sensuous enjoyment and instinct. He further conceives of this stage as itself a process of (natural) development, namely, of the natural disposition of the species to vary in the greatest possible manner so as to preserve its unity through a process of self-adaptation (Anarten) to climate. This, he says, must not be conceived as resulting from the action of external causes, but is due to a natural disposition (Anlage). From this capability of natural development (which already involves a teleological idea) Kant distinguishes the power of moral self-development or self- liberation from the dominion of nature, the gradual realization of which constitutes human history or progress. This moral development is regarded as a gradual approach to that rational, social and political state in which will be realized the greatest possible quantity of liberty. Thus Kant, though he appropriated and gave new form to the idea of human progress, conceived of this as wholly distinct from a natural (mechanical) process. In this particular, as in his view of organic actions, Kant dis- tinctly opposed the idea of evolution as one universal process swaying alike the physical and the moral world.

Schelling. — In the earlier writings of Schelling, containing the philosophy of identity, existence is represented as a becom- ing, or process of evolution. Nature and mind (which are the two sides, or polar directions, of the one absolute) are each viewed as an activity advancing by an uninterrupted succession of stages. The side of this process which Schelling worked out most completely is the negative side, that is, nature. Nature is essentially a process of organic self-evolution. It can only be understood by subordinating the mechanical conception to the vital, by conceiving the world as one organism

animated by a spiritual principle or intelligence (Weltseele) . From this point of view the processes of nature from the inorganic up to the most complex of the organic become stages in the self-realization of nature. All organic forms are at bottom but one organization, and the inorganic world. shows the same formative activity in various degrees or potences. Schelling conceives of the gradual self-evolution of nature in a succession of higher and higher forms as brought about by a limitation of her infinite productivity, showing itself in a series of points of arrest. The detailed exhi- bition of the organizing activity of nature in the several processes of the organic and inorganic world rests on a number of fanciful and unscientific ideas. Schelling's theory is a bold attempt to revitalize nature in the light of growing physical and physio- logical science, and by so doing to comprehend the unity of the world under the idea of one principle of organic development. His highly figurative language might leave us in doubt how far he conceived the higher stages of this evolution of nature as following the lower in time. In the introduction to his work Von der Weltseele, however, he argues in favour of the possibility of a transmutation of species in periods incommensurable with ours. The evolution of mind (the positive pole) proceeds by

1 Kant calls the doctrine of the transmutation of species " a hazardous fancy of the reason." Yet, as Strauss and others have shown, Kant's mind betrayed a decided leaning at times to a more mechanical conception of organic forms as related by descent.

way of three stages — theoretic, practical and aesthetical activity. Schelling's later theosophic speculations do not specially concern us here.

Followers of Schelling. — Of the followers of Schelling a word or two must be said. Heinrich Steffens, in his Anthropologie, seeks to trace out the origin and history of man in connexion with a general theory of the development of the earth, and this again as related to the formation of the solar system. All these processes are regarded as a series of manifestations of a vital principle in higher and higher forms. Oken, again, who carries Schelling's ideas into the region of biological science, seeks to reconstruct the gradual evolution of the material world out of original matter, which is the first immediate appearance of God, or the absolute. This process is an upward one, through the formation of the solar system and of our earth with its inorganic bodies, up to the production of man. The process is essentially a polar linear action, or differentiation from a common centre. By means of this process the bodies of the solar system separate themselves, and the order of cosmic evolution is repeated in that of terrestrial

evolution. • The organic world (like the world as a whole) arises out of a primitive chaos, namely, the infusorial slime. A somewhat similar working out of Schelling's idea is to be found in H. C. Oersted's work entitled The Soul in Nature (Eng. trans.). Of later works based on Schelling's doctrine of evolution mention may be made of the volume entitled Natur und Idee, by G. F. Carus. According to this writer, existence is nothing but a becoming, and matter is simply the momentary product of the process of becoming, while force is this process constantly revealing itself in these products.

Hegel. — Like Schelling, Hegel conceives the problem of exist- ence as one of becoming. He differs from him with respect to the ultimate motive of that process of gradual evolution which reveals itself alike in nature and in mind. With Hegel the absolute is itself a dialectic process which contains within itself a principle of progress from difference to difference and from unity to unity. " This process (W. Wallace remarks) knows nothing of the distinctions between past and future, because it implies an eternal present." This conception of an immanent spontaneous evolution is applied alike both to nature and to mind and history. Nature to Hegel is the idea in the form of hetereity; and finding itself here it has to remove this exteriority in a progressive evolution towards an existence for itself in life and mind. Nature (says Zeller) is to Hegel a system of grada tions, of which one arises necessarily out of the other, and is the proximate truth of that out of which it results. There are three stadia, or moments, in this process of nature — (i) the mechanical moment, or matter devoid of individuality; (2) the physical moment, or matter which has particularized itself in bodies— the solar system; and (3) the organic moment, or organic beings, beginning with the geological organism — or the mineral kingdom, plants and animals. Yet this process of development is not to be conceived as if one stage is naturally produced out of the other, and not even as if the one followed the other in time. Only spirit has a history; in nature all forms are contemporaneous. 2 Hegel's interpretation of mind and history as a process of evolu- tion has more scientific interest than his conception of nature. His theory of the development of free-will (the objective spirit), which takes its start from Kant's conception of history, with its three stages of legal right, morality as determined by motive and instinctive goodness (Sittlichkeit) , might almost as well be expressed in terms of a thoroughly naturalistic doctrine of human development. So, too, some of his conceptions respecting the development of art and religion (the absolute spirit) lend themselves to a similar interpretation. Yet while, in its applica- tion to history, Hegel's theory of evolution has points of re- semblance with those doctrines which

seek to explain the world- process as one unbroken progress occurring in time, it constitutes on the whole a theory apart and sui generis. It does not conceive of the organic as succeeding on the inorganic, or of conscious life

2 Hegel somewhere says that the question of the eternal duration of the world is unanswerable : time as well as space can be predicated I of finitudes onlyi

as conditioned in time by lower forms. In this respect it re- sembles Leibnitz's idea of the world as a development; the idea of evolution is in each case a metaphysical as distinguished from a scientific one. Hegel gives a place in his metaphysical system to the mechanical and the teleological views; yet in his treatment of the world as an evolution the idea of end or purpose is the predominant one.

Of the followers of Hegel who have worked out his peculiar idea of evolution it is hardly necessary to speak. A bare reference may be made to J. K. F. Rosenkranz, who in his work Hegel's Naturphilosophie seeks to develop Hegel's idea of an earth- organism in the light of modern science, recognizing in crystalliza- tion the morphological element.

Schopenhauer. — Of the other German philosophers immediately following Kant, there is only one who calls for notice here, namely, Arthur Schopenhauer. This writer, by his conception of the world as will which objectifies itself in a series of gradations from the lowest manifestations of matter up to conscious man, gives a slightly new shape to the evolutional view of Schelling, though he deprives • this view of its optimistic character by denying any co-operation of intelligence in the world-process. In truth, Schopenhauer's conception of the world as the activity of a blind force is at bottom a materialistic and mechanical rather than a spiritualistic and teleological theory. Moreover, Schopenhauer's subjective idealism, and his view of time as something illusory, hindered him from viewing this process as a sequence of events in time. Thus he ascribes eternity of existence to species under the form of the " Platonic ideas." As Ludwig Noire observes, Schopenhauer has no feeling for the problem of the origin of organic beings. He says Lamarck's original animal is something

metaphysical, not physical, namely, the will to live. ” Every species (according to Schopenhauer) has of its own will, and according to the circumstances under which it would live, determined its form and organization, — yet not as something physical in time, but as something metaphysical out of time.”

Von Baer. — Before leaving the German speculation of the first half of the century, a word must be said of von Baer, to whose biological contributions we shall refer later in this article, who recognized in the law of development the law of the universe as a whole. In his Entwickelungsgeschichte der Thiere (p. 264) he distinctly tells us that the law of growing individuality is ” the fundamental thought which goes through all forms and degrees of animal development and all single relations. It is the same thought which collected in the cosmic space the divided masses into spheres, and combined these to solar systems; the same which caused the weather-beaten dust on the surface of our metallic planet to spring forth into living forms.” Von Baer thus prepared the way for Herbert Spencer’s generalization of the law of organic evolution as the law of all evolution.

Comte. — As we arrive at the 19th century, though yet before the days of Darwin, biology is already beginning to affect the general aspect of thought. It might suffice to single out the influence of Auguste Comte, as the last great thinker who wrote before Darwinism began to permeate philosophic speculation. Though Comte did not actually contribute to a theory of cosmic organic evolution, he helped to lay the foundations of a scientific con- ception of human history as a natural process of development determined by general laws of human nature together with the accumulating influences of the past. Comte does not recognize that this process is aided by any increase of innate capacity, on the contrary, progress is to him the unfolding of fundamental faculties of human nature which always pre-existed in a latent condition; yet he may perhaps be said to have prepared the way for the new conception of human progress by his inclusion of mental laws under biology.

Development of the Biological Doctrine. — In the 19th century the doctrine of evolution received new biological contents and became transformed from a vague, partly metaphysical theory to the dominant modern conception. At this point it is con- venient to leave the guidance of Professor J. Sully and to follow closely T. H. Huxley, who in the 9th edition of this encyclopaedia

traced the history of the growth of the biological idea of evolution from its philosophical beginnings to its efflorescence in Charles

Darwin.

In the earlier half of the 18th century the term ” evolution ” was introduced into biological writings in order to denote the mode in which some of the most eminent physiologists of that time conceived that the generation of living things took place; in opposition to the hypothesis advocated, in the preceding century, by W. Harvey in that remarkable work 1 which would give him a claim to rank among the founders of biological science, even had he not been the discoverer of the circulation of the blood.

One of Harvey’s prime objects is to defend and establish, on the basis of direct observation, the opinion already held by Aristotle, that, in the higher animals at any rate, the formation of the new organism by the process of generation takes place, not suddenly, by simultaneous accretion of rudiments of all or the most important of the organs of the adult, nor by sudden metamorphosis of a formative substance into a miniature of the whole, which subsequently grows, but by epigenesis, or successive differentiation of a relatively homogeneous rudiment into the parts and structures which are characteristic of the adult.

” Et primo, quidem, quoniam per epigenesin sive partium super-exorientium additamentum pullum fabricari certum est: quaenam pars ante alias omnes exstruatur, et quid de ilia ejusque generandi modo observandum veniat, dispiciemus. Ratum sane est et in ovo manifeste apparet quod Arisloteles de perfectorum animalium genera- tione enuntiat: nimirum, non omnes partes simul fieri, sed ordine aliam post aliam; primumque existere particulam genitalem, cujus virtute postea (tanquam ex principio quodam) reliquae omnes partes prosiliant. Qualem in plantarum seminibus (fabis, puta, aut glandibus) gemmam sive amcem protuberantem cernimus, totius futurae arboris principium. Estque haec parlicula velul filius eman- cipatus seorsumque collocaius, et principium per se vivens; undi postea membrorum ordo describilur; et quaecunque ad absolvendum animal pertinent, disponuntur. 2 Quoniam enim nulla pars se ipsam general; sed poslquam generata est, se ipsam jam augel; ideo earn primum oriri necesse est, quae principium augendi conlineat (sive enim planta, sive animal est, aeque omnibus inesl quod vim habeat vegetandi, sive nutriendi), 3 simulque reliquas omnes partes suo quamque ordine distinguat et formet; proindeque in eadem primo- genita particula anima primario inest, sensus, motusque, et totius vitae auctor et principium.” (Exercilatio 51.)

Harvey proceeds to contrast this view with that of the ” Medici,” or

followers of Hippocrates and Galen, who, ” badly philosophizing,” imagined that the brain, the heart, and the liver were simultaneously first generated in the form of vesicles; and, at the same time, while expressing his agreement with Aristotle in the principle of epigenesis, he maintains that it is the blood which is the primal generative part, and not, as Aristotle thought, the heart.

In the latter part of the 17th century the doctrine of epigenesis thus advocated by Harvey was controverted on the ground of direct observation by M. Malpighi, who affirmed that the body of the chick is to be seen in the egg before the punctum sanguineutn makes it appearance. But from this perfectly correct observa- tion a conclusion which is by no means warranted was drawn, namely, that the chick as a whole really exists in the egg ante- cedently to incubation; and that what happens in the course of the latter process is no addition of new parts, ” alias post alias natas,” as Harvey puts it, but a simple expansion or unfolding of the organs which already exist, though they are too small and inconspicuous to be discovered. The weight of Malpighi’s observations therefore fell into the scale of that doctrine which Harvey terms metamorphosis, in contradistinction to epigenesis.

The views of Malpighi were warmly welcomed on philosophical grounds by Leibnitz, 4 who found in them a support to his

1 The Exercitationes de generatione animalium, which Dr George Ent extracted from him and published in 1651. 1 De generatione animalium, lib. ii. cap. x.

3 De generatione animalium, lib. ii. cap. iv.

4 ” Cependant, pour revenir aux formes ordinaires ou aux ames materielles, cette duree qu’il leur faut attribuer, a la place de celle qu’on avoit attribute aux atomes pourroit faire douter si elles ne vont pas de corps en corps; ce qui seroit la metempsychose, a peu pres comme quelques philosophes ont cru la transmission du mouvement

hypothesis of monads, and by Nicholas Malebranche; 1 while, in the middle of the 18th century, not only speculative considera- tions, but a great number of new and interesting observations on the phenomena

of generation, led the ingenious Charles Bonnet and A. von Haller, the first physiologist of the age, to adopt, advocate and extend them.

Bonnet affirms that, before fecundation, the hen's egg contains an excessively minute but complete chick; and that fecundation and incubation simply cause this germ to absorb nutritious matters, which are deposited in the interstices of the elementary structures of which the miniature chick, or germ, is made up. The consequence of this intussusceptive growth is the " develop- ment " or " evolution " of the germ into the visible bird. Thus an organized individual (tout organise) " is a composite body consisting of the original, or elementary, parts and of the matters which have been associated with them by the aid of nutrition "; so that, if these matters could be extracted from the individual (tout), it would, so to speak, become concentrated in a point, and would thus be restored to its primitive condition of a germ; " just as, by extracting from a bone the calcareous substance which is the source of its hardness, it is reduced to its primitive state of gristle or membrane." 2

" Evolution " and " development " are, for Bonnet, synony- mous terms; and since by "evolution" he means simply the expansion of that which was invisible into visibility, he was naturally led to the conclusion, at which Leibnitz had arrived by a different line of reasoning, that no such thing as generation, in the proper sense of the word exists in nature. The growth of an organic being is simply a process of enlargement, as a particle of dry gelatine may be swelled up by the intussusception of water; its death is a shrinkage, such as the swelled jelly might undergo on desiccation. Nothing really new is produced in the living world, but the germs which develop have existed since the beginning of things; and nothing really dies, but, when what we call death takes place, the living thing shrinks back into its germ state. 3

et celle des esp£ces. Mais cette imagination est bien eloignee de la nature des choses. II n'y a point de tel passage; et c'est ici ou les transformations de Messieurs Swammerdam, Malpighi, et Leewenhoek, qui sont des plus excellens observateurs de notre terns, sont venues a mon secours et m'ont fait admettre plus aisement, que 1 'animal, et toute autre substance organisee ne commence point lorsque nous le croyons, et que sa generation apparente n'est qu'un developpement et une espece d 'augmentation. Aussi ai-je remarque que l'auteur de la Recherche de laverite, M. Regis, M. Hartsceker, et d'autres habiles hommes n'ont pas ete fort efoignes de ce senti- ment." Leibnitz, Systeme nouveau de la nature (1 695) . The doctrine of " Emboitement " is contained in the Considerations sur le principe de

vie (1705) ; the preface to the Theodicee (1710) ; and the Principes de la nature et de la grdce (§ 6) (1718).

1 ” 11 est vrai que la pensee la plus raisonnable et la plus conforme a l’experience sur cette question tres difficile de la formation du foetus; c’est que les enfans sont deja presque tout formes avant mime Taction par laquelle ils sont congus; et que leurs meres ne font que leur donner l’accroissement ordinaire dans le temps de la grossesse.” De la recherche de la verite, livre ii. chap. vii. p. 334 (7th ed., 1 721).

2 Considerations sur les corps organises, chap. x.

3 Bonnet had the courage of his opinions, and in the Palingenesie philosophique, part vi. chap, iv., he develops a hypothesis which he terms ” evolution naturelle “; and which, making allowance for his peculiar views of the nature of generation, bears no small resemblance to what is understood by ” evolution ” at the present day: —

” Si la volonte divine a cree par un seul Acte l’Universalite des itres, d’ou venoient ces plantes et ces animaux dont Moyse nous deCrit la Production au troisieme et au cinquieme jour du renouvelle- ment de notre monde ?

” Abuserois-je de la liberte de conjectures si je disois, que les Plantes et les Animaux qui existent aujourd’hui sont parvenus par une sorte devolution naturelle des Etres organises qui peuplaient ce premier Monde, sorti immediatement des Mains du Createur ? . . .

” Ne supposons que trois revolutions. La Terre vient de gortir des Mains du Createur. Des causes pr£par£es par sa Sagesse font developper de toutes parts les Germes. Les Etres organises commen- cent a jouir de l’existence. Ils etoient probablement alors bien differens de ce qu’ils sont aujourd’hui. Ils l’etoient autant que ce premier Monde differoit de celui que nous habitons. Nous manquons de moyens pour juger de ces dissemblances, et peut-ˆtre que le plus habile Naturaliste qui auroit ete place dans ce premier Monde y auroit entierement meconnu nos Plantes et nos Animaux.”

The two parts of Bonnet’s hypothesis, namely, the doctrine that all living things proceed from pre-existing germs, and that these contain, one enclosed within the other, the germs of all future living things, which is the hypothesis of ” emboitement,” and the doctrine that every germ contains in miniature all the organs of the adult,- which is the hypothesis of evolution or development, in the primary senses of these words, must be carefully distinguished. In fact, while holding

firmly by the former, Bonnet more or less modified the latter in his later writings, and, at length, he admits that a ” germ ” need not be an actual miniature of the organism, but that it may be merely an ” original preformation ” capable of producing the latter. 4

But, thus defined, the germ is neither more nor less than the “particula genitalis” of Aristotle, or the “primordium vegetale” or ” ovum ” of Harvey; and the ” evolution ” of such a germ would not be distinguishable from ” epigenesis.”

Supported by the great authority of Haller, the doctrine of evolution, or development, prevailed throughout the whole of the 1 8th century, and Cuvier appears to have substantially adopted Bonnet’s later views, though probably he would not have gone all lengths in the direction of “emboitement.” In a well-known note to Charles Leopold Laurillard’s £loge, prefixed to the last edition of the Ossemens fossiles, the ” radical de l’Stre ” is much the same thing as Aristotle’s ” particula genitalis ” and Harvey’s ” ovum.” 6

Bonnet’s eminent contemporary, Buffon, held nearly the same views with respect to the nature of the germ, and expresses them even more confidently.

” Ceux qui ont cru que le cceur £toit le premier forme, se ! sont trompes; ceux qui disent que c’est le sang se trompent aussi: tout est forme en mime temps. Si Ton ne consulte que 1’observarion, le poulet se voit dans Toeuf avant qu’il ait 6te couve.” 6

” J’ai ouvert une grande quantite d’oeufs k differens temps avant et apres 1’incubation, et je me suis convaincu par mes yeux que le poulet existe en entier dans le milieu de la cicatrule au moment qu’il sort du corps de la poule.” 7

The ” moule interieur ” of Buffon is the aggregate of ele- mentary parts which constitute the individual, and is thus the equivalent of Bonnet’s germ, 8 as defined in the passage cited above. But Buffon further imagined that innumerable ” mol6- cules organiques ” are dispersed’ throughout the world, and that alimentation consists in the appropriation by the parts of an organism of those molecules which are analogous to them. Growth, therefore, was, on this hypothesis, partly a process of simple evolution, and partly of what has been termed syn- genesis. Buffon’s opinion is, in fact, a sort of combination of views, essentially similar to those of Bonnet, with others, some- what similar to those of the ” Medici ” whom Harvey condemns. The ” molecules organiques ” are physical equivalents of Leib- nitz’s ”

monads.”

It is a striking example of the difficulty of getting people to use their own powers of investigation accurately, that this form of the doctrine of evolution should have held its ground so long; for it was thoroughly and completely exploded, not long after its enunciation, by Caspar Frederick Wolff, who in his Theoria generationis, published in 1759, placed the opposite theory of epigenesis upon the secure foundation of fact, from which it has never been displaced. But Wolff had no immediate

4 ” Ce mot (germe) ne designera pas seulement un corps organise reduit en petit; il designera encore toute espece de preformation originelle dont un Tout organique peut resulter comme de son principe immediat.” — Palingenesie philosophique, part. x. chap. ii.

6 ” M. Cuvier considerant que tous les toes organises sont derives de parens, et ne voyant dans la nature aucune force capable de produire l’organisation, croyait k la pre-existence des germes; non pas a la pre-existence d’un Stre tout forme, puisqu’il est bien evident que ce n’est que par des developpemens successifs que l’Stre acquiert sa forme; mais, si Ton peut s’exprimer ainsi, k la pre-existence du radical de I’etre, radical qui existe avant que la serie des evolutions ne commence, et qui remonte certainement, suivant la belle observa- tion de Bonnet, k plusieurs generations.” — Laurillard, tloge de Cuvier, note 12.

6 Hisioire naturelle, torn. ii. ed. ii. (1750), p. 350.

7 Ibid. p. 351. 6 See particularly Buffon, I.e. p. 4.1.

successors. The school of Cuvier was lamentably deficient in embryologists; and it was only in the course of the first thirty years of the 19th century that Prevost and Dumas in France, and, later on, Dbllinger, Pander, von Bar, Rathke, and Remak in Germany, founded modern embryology; and, at the same time, proved the utter incompatibility of the hypothesis of evolution as formulated by Bonnet and Haller with easily demonstrable facts.

Nevertheless, though the conceptions originally denoted by ”

evolution ” and ■’ development ” were shown to be unten- able, the words retained their application to the process by which the embryos of living beings gradually make their appearance; and the terms” development,” ” Entwickelung,“and ” evolutio ” are now indiscriminately used for the series of genetic changes exhibited by living beings, by writers who would emphatically deny that ” development ” or ” Entwickelung ” or ” evolutio,” in the sense in which these words were usually employed by Bonnet or Haller, ever occurs.

Evolution, or development, is, in fact, at present employed in biology as a general name for the history of the steps by which any living being has acquired the morphological and the physiological characters which distinguish it. As civil history may be divided into biography, which is the history of individuals, and universal history, which is the history of the human race, so evolution falls naturally into two categories — the evolution of the individual (see Embryology) and the evolution of the sum of living beings.

The Evolution of the Sum of Living Beings. — The notion that all the kinds of animals and plants may have come into existence by the growth and modification of primordial germs is as old as speculative thought; but the modern scientific form of the doctrine can be traced historically to the influence of several converging lines of philosophical speculation and of physical observation, none of which go further back than the 17th century. These are: —

1. The enunciation by Descartes of the conception that the physical universe, whether living or not living, is a mechanism, and that, as such, it is explicable on physical principles.

2. The observation of the gradations of structure, from extreme simplicity to very great complexity, presented by living things, and of the relation of these graduated forms to one another.

3. The observation of the existence of an analogy between the series of gradations presented by the species which compose any great group of animals or plants, and the series of embryonic conditions of the highest members of that group.

4. The observation that large groups of species of widely different habits present the same fundamental plan of structure; and that parts of the same animal or plant, the functions of which are very different, likewise exhibit modifications of a common plan.

5. The observation of the existence of structures, in a rudi- mentary and apparently useless condition, in one species of a group, which are fully developed and have definite functions in other species of the same group.

6. The observation of the effects of varying conditions in modifying living organisms.

7. The observation of the facts of geographical distribution.

8. The observation of the facts of the geological succession of the forms of life.

1. Notwithstanding the elaborate disguise which fear of the powers that were led Descartes to throw over his real opinions, it is impossible to read the Principes de la philosophic without acquiring the conviction that this great philosopher held that the physical world and all things in it, whether living or not living, have originated by a process of evolution, due to the continuous operation of purely physical causes, out of a primitive relatively formless matter. 1

1 As Buffon has well said: — ” L'idee de ramener l'explication de tous les phenomenes a des principes mecaniques est assurement grande et belle,ce pas est le plus hardi qu'on peut faire en philosophie, et c'est Descartes qui l'a fait.” — I.e. p. 50.

The following passage is especially instructive: —

” Et tant s'en faut que je veuille que Ton croie toutes les choses que j'ecrirai, que mime je pretends en proposer ici quelques-unes que je crois absolument itre fausses; & savoir, je ne doute point que le monde n'ait ete cree au commencement avec autant de per- fection qu'il en a; en sorte que le soleil, la terre, la lune, et les etoiles ont ete des lors; et que la terre n'a pas eu seulement en soi les semences des plantes, mais que les plantes meme en ont couvert une partie; et qu'Adam et Eve n'ont pas ete crees enfans mais en &ge d'hommes parfaits. La religion chretienne veut que nous le croyons ainsi, et la raison naturelle nous persuade entierement cette verite; car si nous considerons la toute puissance de Dieu, nous devons juger que tout ce qu'il a fait a eu des le commencement toute la perfection qu'il devoit avoir. Mais neanmoins, comme on connoitroit beaucoup mieux quelle a ete la nature d'Adam et celle des arbres de Paradis si on avoit examine comment les enfants se forment peu a peu dans le ventre de leurs meres et comment les plantes sortent de leurs semences, que si on avoit seulement considere quels ils ont ete quand Dieu les a crees :

tout de mime., nous ferons mieux entendre quelle est generalement la nature de toutes les choses qui sont au monde si nous pouvons imaginer quelques prin- cipes qui soient fort intelligibles et fort simples, desquels nous puissions voir clairement que les astres et la terre et enfin tout ce monde visible auroit pu e”tre produit ainsi que de quelques semences (bien que nous sachions qu’il n’a pas ete produit en cette facon) que si nous la decrivions seulement comme il est, ou bien comme nous croyons qu’il a ete cree. Et parceque je pense avoir trouve des principes qui sont tels, je tacherai ici de les expliquer.” 2

If we read between the lines of this singular exhibition of force of one kind and weakness of another, it is clear that Descartes believed that he had divined the mode in which the physical universe had been evolved; and the Traiti de Vhomme and the essay Sur les passions afford abundant additional evidence that he sought for, and thought he had found, an explanation of the phenomena of physical life by deduction from purely physical laws.

Spinoza abounds in the same sense, and is as usual perfectly candid —

” Naturae leges et regulae, secundum quas omnia fiunt et ex unis formis in alias mutantur, sunt ubique et semper eadem.” s

Leibnitz’s doctrine of continuity necessarily led him in the same direction; and, of the infinite multitude of monads with which he peopled the world, each is supposed to be the focus of an endless process of evolution and involution. In the Protogaea, xxvi., Leibnitz distinctly suggests the mutability of species —

” Alii mirantur in saxis passim species videri quas vel in orbe cognito, vel saltern in vicinis locis frustra quaeras. Ita Cornua Ammonis, quae ex nautilorum numero habeantur, passim et forma et magnitudine (nam et pedali diametro aliquando reperiuntur) ab omnibus illis naturis discrepare dicunt, quas praebet mare. Sed quis absconditos ejus recessus aut subterraneas abyssos pervesti- gavit ? quam multa nobis animalia antea ignota offert novus orbis ? Et credibile est per magnas illas conversiones etiam animalium species plurifnum immutatas.”

Thus in the end of the 17th century the seed was sown which has at intervals brought forth recurrent crops of evolutional hypotheses, based, more or less completely, on general reasonings.

Among the earliest of these speculations is that put forward by Benoit de Maillet in his Telliamed, which, though printed in 1 735, was not

published until twenty-three years later. Con- sidering that this book was written before the time of Haller, or Bonnet, or Linnaeus, or Hutton, it surely deserves more respectful consideration than it usually receives. For De Maillet not only has a definite conception of the plasticity of living things, and of the production of existing species by the modification of their predecessors, but he clearly apprehends the cardinal maxim of modern geological science, that the explanation of the structure of the globe is to be sought in the deductive application to geological phenomena of the principles established inductively by the study of the present course of nature. Somewhat later, P. L. M. de Maupertuis 4 suggested a curious hypothesis as to the causes of variation, which he thinks may be sufficient to account for the origin of all animals

2 Principes de la philosophie, Troisierne partie, § 45.

3 Ethices, Pars tertia, Praefatio.

4 Sysleme de la Nature. Essai sur la formation des corps organises, 1 75 1, xiv.

from a single pair.. Jean Baptiste Ren6 Robinet 1 followed out much the same line of thought as De Maillet, but less soberly; and Bonnet's speculations in the Palingenisie, which appeared in 1769, have already been mentioned. Buffon (1753-1778), at first a partisan of the absolute immutability of species, subse- quently appears to have believed that larger or smaller groups of species have been produced by the modification of a primitive stock; but he contributed nothing to the general doctrine of evolution.

Erasmus Darwin (Zoonomia, 1794), though a zealous evolu- tionist, can hardly be said to have made any real advance on his predecessors; and, notwithstanding the fact that Goethe had the advantage of a wide knowledge of morphological facts, and a true insight into their signification, while he threw all the power of a great poet into the expression of his conceptions, it may be questioned whether he supplied the doctrine of evolution with a firmer scientific basis than it already possessed. Moreover, whatever the value of Goethe's labours in that field, they were not published before 1820, long after evolutionism had taken a new departure from the works of Treviranus

and Lamarck — the first of its advocates who were equipped for their task with the needful large and accurate knowledge of the phenomena of life as a whole. It is remarkable that each of these writers seems to have been led, independently and contemporaneously, to invent the same name of ” biology ” for the science of the phenomena of life; and thus, following Buffon, to have recog- nized the essential unity of these phenomena, and their contra- distinction from those of inanimate nature. And it is hard to say whether Lamarck or Treviranus has the priority in pro- pounding the main thesis of the doctrine of evolution; for though the first volume of Treviranus’s Biologie appeared only in 1802, he says, in the preface to his later work, the Erschei- nungen und Gesetze des organiscken Lebens, dated 183 1, that he wrote the first volume of the Biologie ” nearly five-and-thirty years ago,” or about 1796.

Now, in 1794, there is evidence that Lamarck held doctrines which present a striking contrast to those which are to be found in the Philosophic zoologique, as the following passages show:—

” 685. Quoique mon unique objet dans cet article n’ait 6te que de traiter de la cause physique de l’entretien de la vie des §tres organiques, raalgre cela j’ai ose avancer en debutant, que l’existence de ces Itres etonnants n’appartiennent nullement a la nature; que tout ce qu’on peut entendre par le mot nature, ne pouvoit donner la vie, c’est-a-dire, que toutes les qualites de la matiere, jointes a toutes les circonstances possibles, et m§me a l’activite repandue dans l’univers, ne pouvaient point produire un 6tre muni du mouve- ment organique, capable de reproduire son semblable, et sujet a la mort.

” 686. Tous les individus de cette nature, qui existent, proviennent d’individus semblables qui tous ensemble constituent l’espece entiere. Or, je crois qu’il est aussi impossible a l’homme de connoitre la cause physique du premier individu de chaque espece, que d’assigner aussi physiquement la cause de l’existence de la matiere ou de l’univers entier. C’est au moins ce que le resultat de mes con- naissances et de mes reflexions me portent a penser. S’il existe beaucoup de varietes produites par l’effet des circonstances, ces varietes ne denaturent point les especes; mais on se trompe, sans doute souvent, en indiquant comme espece, ce qui n’est que variete; et alors je sens que cette erreur peut tirer a consequence dans les raisonnements que Ton fait sur cette matiere.” 2

The first three volumes of Treviranus’s Biologie, which contains his general views of evolution, appeared between 1802 and 1805. The Recherches sur I’ organisation des corps vivants, which sketches out

Lamarck's doctrines, was published in 1802; but the full development of his views in the Philosophic zoologique did not take place until 1809.

1 Considerations philosophiques sur la gradation naturelle des formes de Vitre; ou les essais de la nature qui apprend & faire l'homme

(1768).

2 Recherches sur les causes des principaux fails physiques, par J. B. Lamarck. Paris. Secondeanneedela Republique. In the preface, Lamarck says that the work was written in 1776, and presented to the Academy in 1780; but it was not published before 1794, and at that time it presumably expressed Lamarck's mature views. It would be interesting to know what brought about the change of opinion manifested in the Recherches sur I' organisation des corps vtvants, published only seven years later.

The Biologie and the Philosophie zoelogique are both very remarkable productions, and are still worthy of attentive study, but they fell upon evil times. The vast authority of Cuvier was employed in support of the traditionally respectable hypo- theses of special creation and of catastrophism; and the wild speculations of the Discours sur les revolutions de la surface du globe were held to be models of sound scientific thinking, while the really much more sober and philosophical hypotheses of the Hydrogiologie were scouted. For many years it was the fashion to speak of Lamarck with ridicule, while Treviranus was altogether ignored.

Nevertheless, the work had been done. The conception of evolution was henceforward irrespressible, and it incessantly reappears, in one shape or another, 3 up to the year 1858, when Charles Darwin and A. R. Wallace published their Theory of Natural Selection. The Origin of Species appeared in 1859; and thenceforward the doctrine of evolution assumed a position and acquired an importance which it never before possessed. In the Origin of Species, and in his other numerous and important contributions to the solution of the problem of biological evolution, Darwin confined himself to the discussion of the causes which have brought about the present condition of living matter, assuming such matter to have once come into existence. On the other hand, Spenctr 4 and E. Haeckel 5 dealt with the whole problem of evolution. The profound and vigorous writings of Spencer embody the spirit of Descartes in the know- ledge of our own day, and may be regarded as the Principes de la philosophie of the 19th century; while, whatever hesita- tion may not unfrequently be felt by

less daring minds in following Haeckel in many of his speculations, his attempt to systematize the doctrine of evolution and to exhibit its influence as the central thought of modern biology, cannot fail to have a far-reaching influence on the progress of science.

If we seek for the reason of the difference between the scientific position of the doctrine of evolution in the days of Lamarck and that which it occupies now, we shall find it in the great accumulation of facts, the several classes of which have been enumerated above, under the second to the eighth heads. For those which are grouped under the second to the seventh of these classes, respectively, have a clear significance on the hypothesis of evolution, while they are unintelligible if that hypothesis be denied. And those of the eighth group are not only unin- intelligible without the assumption of evolution, but can be proved never to be discordant with that hypothesis, while, in some cases, they are exactly such as the hypothesis requires. The demonstration of these assertions would require a volume, but the general nature of the evidence on which they rest may be briefly indicated.

2, The accurate investigation of the lowest forms of animal life, commenced by Leeuwenhoek and Swammerdam, and continued by the remarkable labours of Reaumur, Abraham Trembley, Bonnet, and a host of other observers in the latter part of the 17 th and the first half of the 18th centuries, drew the attention of biologists to the gradation in the complexity of organization which is presented by living beings, and culminated in the doctrine of the echelle des Ures, so powerfully and clearly stated by Bonnet, and, before him, adumbrated by Locke and by Leibnitz. In the then state of knowledge, it appeared that all the species of animals and plants could be arranged in one series, in such a manner that, by insensible gradations, the mineral passed into the plant, the plant into the polype, the polype into the worm, and so, through gradually higher forms of life, to man, at the summit of the animated world.

But, as knowledge advanced, this conception ceased to be tenable in the crude form in which it was first put forward. Taking into account existing animals and plants alone, it became obvious that they fell into groups which were more or less sharply separated from one another; and, moreover, that even

3 See the ” Historical Sketch ” prefixed to the last edition of the Origin of Species.

4 First Principles and Principles of Biology (1860-1864). 6 Generelle

Morphologie (1866).

the species of a genus can hardly ever be arranged in linear series. Their natural resemblances and differences are only to be expressed by disposing them as if they were branches springing from a common hypothetical centre.

Lamarck, while affirming the verbal proposition that animals form a single series, was forced by his vast acquaintance with the details of zoology to limit the assertion to such a series as may be formed out of the abstractions constituted by the common characters of each group. 1

Cuvier on anatomical, and Von Baer on embryological grounds, made the further step of proving that, even in this limited sense, animals cannot be arranged in a single series, but that there are several distinct plans of organization to be observed among them, no one of which, in its highest and most complicated modification, leads to any of the others.

The conclusions enunciated by Cuvier and Von Baer have been confirmed in principle by all subsequent research into the structure of animals and plants. But the effect of the adoption of these conclusions has been rather to substitute a new metaphor for that of Bonnet than to abolish the conception expressed by it. Instead of regarding living things as capable of arrangement in one series like the steps of a ladder, the results of modern in- vestigation compel us to dispose them as if they were the twigs and branches of a tree. The ends of the twigs represent in- dividuals, the smallest groups of twigs species, larger groups genera, and so on, until we arrive at the source of all these ramifications of the main branch, which is represented by a common plan of structure. At the present moment it is im- possible to draw up any definition, based on broad anatomical or developmental characters, by which any one of Cuvier'sgreat groups shall be separated from all the rest. On the contrary, the lower members of each tend to converge towards the lower members of all the others. The same may be said of the vegetable world. The apparently clear distinction between flowering and flowerless plants has been broken down by the series of grada- tions between the two exhibited by the

Lycopodiaceae, Rhizo- carpeae, and Gymnospermeae, The groups of Fungi, Lichcneae and Algae have completely run into one another, and, when the lowest forms of each are alone considered, even the animal and vegetable kingdoms cease to have a definite frontier.

If it is permissible to speak of the relations of living forms to one another metaphorically, the similitude chosen must un- doubtedly be that of a common root, whence two main trunks, one representing the vegetable and one the animal world, spring; and, each dividing into a few main branches, these subdivide into multitudes of branchlets and these into smaller groups of twigs.

As Lamarck has well said: — 2

" II n'y a que ceux qui se sont longtemps et fortement occupes de la determination des especes, et qui ont consulte de riches collections, qui peuvent savoir jusqu'a quel point les especes, parrai les corps vivants, se fondent les unes dans les autres, et qui ont pu se con- vaincre que, dans les parties ou nous voyons des especes isolees, cela n'est ainsi que parcequ'il nous en manque d'autres qui en sont plus voisines et que nous n'avons pas encore recueillies.

" Je ne veux pas dire pour cela que les animaux qui existent forment une serie tres-simple et partout egalement nuancee; mais je dis qu'ils forment une serie rameuse, irregulierement graduee et qui n'a point de discontinuity dans ses parties, ou qui, du moins, n'en a toujours pas eu, s'il est vrai que, par suite de quelaues especes perdues, il s'en trouve quelque part. II en resulte que les especes qui terminent chaque rameau de la serie generale tiennent, au moins d'un cSte, a d'autres especes voisines qui se nuancent avec elles. Voila ce que l'etat bien connu des choses me met maintenant a portee de demontrer. Je n'ai besoin d'aucune hypothese ni d'aucune supposition pour cela : j'en atteste tous les naturalistes observateurs."

3. In a remarkable essay 3 Meckel remarks: — " There is no good physiologist who has not been struck by the observation that the original form of all organisms is one and the

1 " II s'agit done de prouver que la serie qui constitute l'echelle animate reside essentiellement dans la distribution des masses princi- pals qui la composent et non dans celle des especes ni meme toujours oans celle des genres." — Phil, zoologique, chap. v.

2 Philosophie zoologique, premiere partie, chap. iii.

3 " Entwurf einer Darstellung der zwischen dem Embryozustande der

hoheren Thiere und dem per mancnten der niederen stattfindenden Parallele," Beytrdge zur vergleichenden Anatomie, Bd. ii. 181 1.

same, and that out of this one form, all, the lowest as well as the highest, are developed in such a manner that the latter pass through the permanent forms of the former as transitory stages. Aristotle, Haller, Harvey, Kielmeyer, Autenrieth, and many others have either made this observation incidentally, or, especially the latter, have drawn particular attention to it, and drawn therefrom results of permanent importance for physiology."

Meckel proceeds to exemplify the thesis, that the lower forms of animals represent stages in the course of the development of the higher, with a large series of illustrations.

After comparing the salamanders and the perenni-branchiate Urodela with the tadpoles and the frogs, and enunciating the law that the more highly any animal is organized the more quickly does it pass through the lower stages, Meckel goes on to say: — ■

" From these lowest Vertebrata to the highest, and to the highest forms among these, the comparison between the embryonic Conditions of the higher animals and the adult states of the lower can be more completely and thoroughly instituted than if the survey is extended to the Invertebrata, inasmuch as the latter are in many respects constructed upon an altogether too dissimilar type ; indeed they often differ from one another Tar more than the lowest vertebrate does from the highest mammal; yet the following pages will show that the comparison may be also extended to them with interest. In fact, there is a period when, as Aristotle long ago said, the embryo of the highest animal has the form of a mere worm, and, devoid of internal and external organization, is merely an almost structureless lump of polype-substance. Notwithstanding the origin of organs, it still for a certain time, by reason of it's want of an internal bony skeleton, remains worm and mollusk, and only later enters into the series of the Vertebrata, although traces of the vertebral column even in the earliest periods testify its claim to a place in that series. " — Op. cil. pp. 4, 5.

If Meckel's proposition is so far qualified, that the comparison of adult with embryonic forms is restricted within the limits of one type of organization; and if it is further recollected, that the resemblance between the permanent lower form and the embryonic stage of a higher form is not special but general, it is in entire accordance with modern embryology; although there is no branch of biology which has

grown so largely, and improved its methods so much since Meckel's time, as this. In its original form, the doctrine of " arrest of development," as advocated by Geoffroy Saint-Hilaire and Serres, was no doubt an over-state- ment of the case. It is not true, for example, that a fish is a reptile arrested in its development, or that a reptile was ever a fish; but it is true that the reptile embryo, at one stage of its development, is an organism which, if it had an independent existence, must be classified among fishes; and all the organs of the reptile pass, in the course of their development, through conditions which are closely analogous to those which are permanent in some fishes.

4. That branch of biology which is termed morphology is a commentary upon, and expansion of, the proposition that widely different animals or plants, and widely different parts of animals or plants, are constructed upon the same plan. From the rough comparison of the skeleton of a bird with that of a man by Pierre Delon, in the 16th century (to go no further back), down to the theory of the limbs and the theory of the skull at the present day; or, from the first demonstration of the homologies of the parts of a flower by C. F. Wolff, to the present elaborate analysis of the floral organs, morphology exhibits a continual advance towards the demonstration of a fundamental unity among the seeming diversities of living structures. And this demonstration has been completed by the final establishment of the cell theory (see Cytology), which involves the admission of a primitive conformity, not only of all the elementary structures in animals and plants respectively, but of those in the one of these great divisions of living things with those in the other. No a priori difficulty can be said to stand in the way of evolution, when it can be shown that all animals and all plants proceed by modes of development, which are similar in principle, from a fundamental protoplasmic material.

5. The innumerable cases of structures, which are rudimentary and apparently useless, in species, the close allies of which possess well-developed and functionally important homologous

n

structures, are readily intelligible on the theory of evolution, while it is hard to conceive their raison d'Ure on any other hypothesis. However, a cautious reasoner will probably rather explain such cases deductively from the doctrine of evolution than endeavour to support the doctrine of evolution by them. For it is almost impossible to prove that any structure, however rudimentary, is useless — that is to say, that it plays no part whatever, in the economy; and, if it is in the slightest degree useful, there is no reason why, on the hypothesis of direct creation, it should not have been created. Nevertheless; double-edged as is the argument from rudimentary organs, there is probably none which has produced a greater effect in promoting the general acceptance of the theory of evolution.

6. The older advocates of evolution sought for the causes of the process exclusively in the influence of varying conditions, such as climate and station, or hybridization, upon living forms. Even Treviranus has got no further than this point. Lamarck introduced the conception of the action of an animal on itself as a factor in producing modification. Starting from the well- known fact that the habitual use of a limb tends to develop the muscles of the limb, and to produce a greater and greater facility in using it, he made the general assumption that the effort of an animal to exert an organ in a given direction tends to develop the organ in that direction. But a little consideration showed that, though Lamarck had seized what, as far as it goes, is a true cause of modification, it is a cause the actual effects of which are wholly inadequate to account for any considerable modifica- tion in animals, and which can have no influence at all in the vegetable world; and probably nothing contributed so much to discredit evolution, in the early part of the ioth century, as the floods of easy ridicule which ' were poured upon this part of Lamarck's speculation. The theory of natural selection, or survival of the fittest, was suggested by William Charles Wells in 1 8 13, and further elaborated by Patrick Matthew in 183 1. But the pregnant suggestions of these writers remained practically unnoticed and forgotten, until the theory was independently devised and promulgated by Charles Robert Darwin and Alfred Russell Wallace in 1858, and the effect of its publication was immediate and profound.

Those who were unwilling to accept evolution, without better grounds than such as are offered by Lamarck, and who therefore preferred to suspend their judgment on the question, found in the principle of selective breeding, pursued in all its applications with marvellous knowledge and skill by Darwin, a valid explanation of the occurrence of varieties and races; and they saw clearly that, if the explanation would apply to species, it would not only solve the problem of their

evolution, but that it would account for the facts of teleology, as well as for those of morphology; and for the persistence of some forms of life unchanged through long epochs of time, while others undergo comparatively rapid metamorphosis.

How far ” natural selection ” suffices for the production of species remains to be seen. Few can doubt that, if not the whole cause, it is a very important factor in that operation; and that it must play a great part in the sorting out of varieties into those which are transitory and those which are permanent.

But the causes and conditions of variation have yet to be thoroughly explored; and the importance of natural selection will not be impaired, even if further inquiries should prove that variability is definite, and is determined in certain directions rather than in others, by conditions inherent in that which varies. It is quite conceivable that every species tends to produce varieties of a limited number and kind, and that the effect of natural selection is to favour the development of some of these, while it opposes the development of others along their pre- determined lines of modification.

7. No truths brought to light by biological investigation were better calculated to inspire distrust of the dogmas intruded upon science in the name of theology than those which relate to the distribution of animals and plants on the surface of the earth. Very skilful accommodation was needful, if the limitation of sloths to South America, and of the Ornithorhynchus to

Australia, was to be reconciled with the literal interpretation of the history of the Deluge; and, with the establishment of the existence of distinct provinces of distribution, any serious belief in the peopling of the world by migration from Mount Ararat came to an end.

Under these circumstances, only one alternative was left for those who denied the occurrence of evolution; namely, the supposition that the characteristic animals and plants of each great province were created, as such, within the limits in which, we find them. And as the hypothesis of ” specific centres,” thus formulated, was heterodox from the theological point oi view, and unintelligible under its scientific aspect, it may be passed over without further notice, as a phase of transition from the creational to the evolutional hypothesis.

8. In fact, the strongest and most conclusive arguments in favour of evolution are those which are based upon the facts of geographical, taken in conjunction with those of geological, distribution.

Both Darwin and Wallace lay great stress on the close relation which obtains between the existing fauna of any region and that of the immediately antecedent geological epoch in the same region; and rightly, for it is in truth inconceivable that there should be no genetic connexion between the two. It is possible to put into words the proposition, that all the animals and plants of each geological epoch were annihilated, and that a new set of very similar forms was created for the next epoch, but it may be doubted if any one who ever tried to form a distinct mental image of this process of spontaneous generation on the grandest scale ever really succeeded in realizing it.

In later years the attention of the best palaeontologists has been withdrawn from the hodman's work of making " new species " of fossils, to the scientific task of completing our knowledge of individual species, and tracing out the succession of the forms presented by any given type in time.

Evolution at the Beginning of the 20th century. — Since Huxley and Sully wrote their masterly essays in the oth edition of this encyclopaedia, the doctrine of evolution has outgrown the trammels of controversy and has been accepted as a fundamental principle. Writers on biological subjects no longer have to waste space in weighing evolution against this or that philosophical theory or religious tradition; philosophical writers have frankly accepted it, and the supporters of religious tradition have made broad their phylacteries to write on them the new words. A closer scrutiny of the writers of all ages who preceded Charles Darwin, and, in particular, the light thrown back from Darwin on the earlier writings of Herbert Spencer, have made plain that without Darwin the world by this time might have come to a general acceptance of evolution; but it seems established as a historical fact that the world has come to accept evolution, first, because of Darwin's theory of natural selection, and second, because of Darwin's exposition of the evidence for the actual occurrence of organic evolution. The evidence as set out by Darwin has been added to enormously; new knowledge has in many cases altered our conceptions of the mode of the actual process of evolution, and from time to time a varying stress has been laid on what are known as the purely Darwinian factors in the theory. The balance of these tendencies has been against the attachment of great importance to sexual selection, and in favour of attaching a great importance to natural selection; but the dominant feature in the recent history of the theory has been its universal acceptance and the recognition that this general acceptance has come from the stimulus given by Darwin.

A change has taken place in the use of the word evolution. Huxley,

following historical custom, devoted one section of his article to the ” Evolution of the Individual.” The facts and theories respecting this are now discussed under such headings as Embryology; Heredity; Variation and Selection; under these headings must be sought informa- tion on the important recent modifications with regard to the theory of the relation between the development of the individual and the development of the race, the part played by the environ- ment on the individual, and the modern developments of the

Ontogeny.

PHYLOGENY]

EVOLUTION

35

old quarrel between evolution and epigenesis. The most striking general change has been against seeing in the facts of ontogeny any direct evidence as to phylogeny. The general proposition as to a parallelism between individual and ancestral development is no doubt indisputable, but extended knowledge of the very different ontogenetic histories of closely allied forms has led us to a much fuller conception of the mode in which stages in embryonic and larval history have been modified in relation to their surroundings, and to a consequent reluctance to attach detailed importance to the embryological argument for evolution.

The vast bulk of botanical and zoological work on living and extinct forms published during the last quarter of the ioth _. . century increased almost beyond all expectation the

‘ evidence for the fact of evolution. The discovery of a single fossil creature in a geological stratum of a wrong period, the detection of a single anatomical or physiological fact irrecon- cilable with origin by descent with modification, would have been destructive of the theory and would have made the reputation of the observer. But in the prodigious number of supporting discoveries that have been made no single negative factor has appeared, and the evolution from their predecessors of the forms of life existing now or at any other period must be taken as proved. It is necessary to notice, however, that although the general course of the stream of life is certain, there is not the same certainty as to the actual individual pedigrees of the existing forms. In the attempts to place existing creatures in approximately phylogenetic order, a striking change, due to a more logical

consideration of the process of evolution, has become established and is already resolving many of the earlier difficulties and banishing from the more recent tables the numerous hypo- thetical intermediate forms so familiar in the older phylogenetic trees. The older method was to attempt the comparison between the highest member of a lower group and the lowest member of a higher group — to suppose, for example, that the gorilla and the chimpanzee, the highest members of the apes, were the existing representatives of the ancestors of man and to compare these forms with the lowest members of the human race. Such a comparison is necessarily illogical, as the existing apes are separated from the common ancestor by at least as large a number of generations as separate it from any of the forms of existing man. In the natural process of growth, the gap must necessarily be wider between the summits of the twigs than lower down, and, instead of imagining " missing links," it is necessary to trace each separate branch as low down as possible, and to institute the comparisons between the lowest points that can be reached. The method is simply the logical result of the fact that every existing form of life stands at the summit of a long branch of the whole tree of life. A due consideration of it leads to the curious paradox that if any two animals be compared, the zoologically lower will be separated froni the common ancestor by a larger number of generations, since, on the average, sexual maturity is reached more quickly by the lower form. Naturally very many other factors have to be considered, but this alone is a sufficient reason to restrain attempts to place existing forms in linear phylogenetic series. In embryology the method finds its expression in the limitation of comparisons to the correspond- ing stages of low and high forms and the exclusion of the com- parisons between the adult stages of low forms and the embryonic stages of higher forms. Another expression of the same method, due to Cope, and specially valuable to the taxonomist, is that when the relationship between orders is being considered, characters of subordinal rank must be neglected. It must not be supposed that earlier writers all neglected this method, or still less that all writers now employ it, but merely that formerly it was frequently overlooked by the best writers, and now is neglected only by the worst. The result is, on the one hand, a clearing away of much fantastic phylogeny, on the other, an enormous reduction of the supposed gaps between groups.

There has been a renewed activity in the study of existing forms from the point of view of obtaining evidence as to the nature and origin of species. Comparative anatomists have been learning to refrain from basing the diagnosis of a species, or the

description of the condition of an organ, on the evidence of a single

specimen. Naturalists who deal specially with museum collections have been compelled, it is true, for other reasons to attach an increasing importance to what is c ompara- called the type specimen, but they find that this insist- tomy. ence on the individual, although invaluable from the point of view of recording species, is unsatisfactory from the point of view of scientific zoology; and propositions for the ameliora- tion of this condition of affairs range from a refusal of Linnaean nomenclature in such cases, to the institution of a division between master species for such species as have been properly revised by the comparative morphologist, and provisional species for such species as have been provisionally registered by those working at collections. Those who work with living forms of which it is possible to obtain a large number of specimens, and those who make revisions of the provisional species of palaeonto- logists, are slowly coming to some such conception as that a species is the abstract central point around which a group of variations oscillate, and that the peripheral oscillations of one species may even overlap those of an allied species. It is plain that we have moved far from the connotation and denotation of the word species at the time when Darwin began to discuss the origin of species, and that the movement, on the one hand, tends to simplify the problem philosophically, and, on the other, to make it difficult for the amateur theorist.

The conception of evolution is being applied more rigidly to the comparative anatomy of organs and systems of organs. When a series of the modifications of an anatomical structure has been sufficiently examined, it is frequently possible to decide that one particular condition is primitive, ancestral or central, and that the other conditions have been derived from it. Such a condition has been termed, with regard to the group of animals or plants the organs of which are being studied, archecentric. The possession of the character in the archecentric condition in (say) two of the members of the group does not indicate that these two members are more nearly related to one another than they are to other members of the group; the archecentric condition is part of the common heritage of all the members of the group, and may be retained by any. On the other hand, when the ancestral condition is modified, it may be regarded as having moved outwards along some radius from the arche- centric condition. Such modified conditions have been termed apocentric. It is obvious that the mere apocentricity of a char- acter can be no guide to the affinities of its possessor. It is necessary to determine if the modification be a simple change that might have occurred in independent cases, in fact if it be a multiradial apocentricity, or if it

involved intricate and precisely combined anatomical changes that we could not expect to occur twice independently; that is to say, if it be a uniradial apocentricity. Multiradial apocentricities lie at the root of many of the phenomena that have been grouped under the designation . convergence. Especially in the case of manifest adaptations, organs possessed by creatures far apart genealogic- ally may be moulded into conditions that are extremely alike. Sir E. Ray Lankester's term, homoplasy, has passed into currency as designating such cases where different genetic material has been pressed by similar conditions into similar moulds. These may be called heterogeneous homoplasies, but it is necessary to recognize the existence of homogeneous homoplasies, here called multiradial apocentricities. A complex apocentric modification of a kind which we cannot imagine to have been repeated independently, and which is to be designated as uniradial, frequently forms a new centre around which new diverging modifications are produced. With reference to any particular group of forms such a new centre of modification may be termed a metacentre, and it is plain that the archecentre of the whole group is a metacentre of the larger group of which the group under consideration is a branch. Thus, for instance, the archecentric condition of any Avian structure is a meta- centre of the Sauropsidan stem. A form of apocentricity extremely common and often perplexing may be termed pseudo- centric; in such a condition there is an apparent simplicity that

reveals its secondary nature by some small and apparently meaningless complexity.

Another group of investigations that seems to play an im- portant part in the future development of the theory of evolution relates to the study of what is known as organic aomics. symmetry. The differentiations of structure that char- acterize animals and plants are being shown to be orderly and definite in many respects; the relations of the various parts to one another and to the whole, the modes of repetition of parts, and the series of changes that occur in groups of repeated parts appear to be to a certain extent inevitable, to depend on the nature of the living material itself and on the necessary conditions of its growth. Closely allied to the study of symmetry is the study of the direct effect of the circumambient media on embryonic

young and adult stages of living beings (see Embryology: Physiology; Heredity; and Variation and Selection), and a still larger number of observers have added to our knowledge of these. It is impossible here to give even a list of the names of the many observers who in recent times have made empirical study of the effects of growth-forces and of the symmetrical limitations and definitions of growth. It is to be noticed, however, that, even after such phenomena have been properly grouped and designated under Greek names as laws of organic growth, they have not become explanations of the series of facts they correlate. Their importance in the theory of evolution is none the less very great. In the first place, they lessen the number of separate facts to be explained; in the second, they limit the field within which explanation must be sought, since, for instance, if a particular mode of repetition of parts occur in mosses, in flowering-plants, in beetles and in elephants, the seeker of ultimate explanations may exclude from the field of his inquiry all the conditions individual to these different organic forms, and confine himself only to what is common to all of them; that is to say, practically only the living material and its environment. The prosecution of such inquiries is beginning to make unnecessary much in- genious speculation of a kind that was prominent from 1880 to 1900; much futile effort has been wasted in the endeavour to find on Darwinian principles special ” selection-values ” for phenomena the universality of which places them outside the possibility of having relations with the particular conditions of particular organisms. On the other band, many of those who have been specially successful in grouping diverse pheno- mena under empirical generalizations have erred logically in posing their generalizations against such a vera causa as the preservation of favoured individuals and races. The thirty years which followed the publication of the Origin of Species were characterized chiefly by anatomical and embryological work; .since then there has been no diminution in anatomical and embryological enthusiasm, but many of the continually increasing body of investigators have turned again to bionomical work. Inasmuch as Lamarck attempted to frame’a theory of evolution in which the principle of natural selection had no part, the interpretation placed on their work by many bicnomical investigators recalls the theories of Lamarck, and the name Neo-Lamarckism has been used of such a school of biologists, particularly active in America. The weakness of the Neo- Lamarckian view lies in its interpretation of heredity; its strength lies in its zealous study of the living world and the detection therein of proximate empirical laws, a strength shared by very many bionomical investigations, the authors of which would prefer to call themselves Darwinians, or to leave them- selves without sectarian designation.

Statistical inquiry into the facts of life has long been employed, and in particular Francis Galton, within the Darwinian period, has advocated its employment and developed its methods. metrics. Within quite recent years, however, a special school has arisen with the main object of treating the pro- cesses of evolution quantitatively. Here it is right to speak of Karl Pearson as a pioneer of notable importance. It has been the habit of biologists to use the terms variation, selection, elimination, correlation and so forth, vaguely; the new school,

which has been strongly reinforced from the side of physical science, insists on quantitative measurements of the terms. When the anatomist says that one race is characterized by long heads, another by round heads, the biometricist demands numbers and percentages. When an organ is stated to be variable, the biometricist demands statistics to show the range of the varia- tions and the mode of their distribution. When a character is said to be favoured by natural selection, the biometricist demands investigation of the death-rate of individuals with or without the character. When a character is said to be transmitted, or to be correlated with another character, the biometricist declares the statement valueless without numerical estimations of the inheritance or correlation. The subject is still so new, and its technical methods (see Variation and Selection) have as yet spread so little beyond the group which is formulating and defining them, that it is difficult to do more than guess at the importance of the results likely to be gained. Enough, however, has already been done to show the vast importance of the method in grouping and codifying the empirical facts of life, and in so preparing the way for the investigation of ultimate ” causes.” The chief pitfall appears to be the tendency to attach more meaning to the results than from their nature they can bear. The ultimate value of numerical inquiries must depend on the equivalence of the units on which they are based. Many of the characters that up to the present have’ been dealt with by biometrical inquiry are obviously composite. The height or length of the arm of a human being, for instance, is the result of many factors, some inherent, some due to environment, and until these have been sifted out, numerical laws of inheritance or of correlation can have no more than an empirical value. The analysis of composite characters into their indivisible units and statistical inquiry into the behaviour of the units would seem to be a necessary part of biometric investigation, and one to which much further attention will have to be paid.

It is well known that Darwin was deeply impressed by differ- ences in flora and fauna, which seemed to be functions of locality, and not the result of obvious dissimilarities of environment. A. R. Wallace’s

studies of island life, aˆ*” and the work of many different observers on local races of animals and plants, marine, fluviatile and terrestrial, have brought about a conception of segregation as apart from differences of environment as being one of the factors in the differentiation of living forms. The segregation may be geo- graphical, or may be the result of preferential mating, or of seasonal mating, and its effects plainly can be made no more of than proximate or empirical laws of differentiation, of great importance in codifying and simplifying the facts to be explained. The minute attention paid by modern systematists to the exact localities of subspecies and races is bringing together a vast store of facts which will throw further light on the problem of segregation, but the difficulty of utilizing these facts is in- creased by an unfortunate tendency to make locality itself one of the diagnostic characters.

Consideration of phylogenetic series, especially from the palaeontological side, has led many writers to the conception that there is something of the nature of a growth-force „ . inherent in organisms and tending inevitably towards divergent evolution. It is suggested that even in the absence of modification produced by any possible Darwinian or Lamarckian factors, that even in a neutral environment, divergent evolution of some kind would have occurred. The conception is necessarily somewhat hazy, but the words bathmism and bathmic Evolution have been employed by a number of writers for some such conception. Closely connected with it, and probably under- lying many of the facts which have led to it, is a more definite group of ideas that may be brought together under the phrase ” phylogenetic limitation of variation.” In its simplest form, this phrase implies such an obvious fact as that whatever be the future development of, say, existing cockroaches, it will be on lines determined by the present structure of these creatures. In a more general way, the phrase implies that at each successive branching of the tree of life, the branches become more specialized,

more defined, and, in a sense, more limited. The full implications of the group of ideas require, and are likely to receive, much attention in the immediate future of biological investigation, but it is enough at present to point out that until the more obvious lines of inquiry have been opened out much more fully, we cannot be in a position to guess at the existence of a residuum, for which such a metaphysical conception as bathmism would serve even as a convenient disguise for

ignorance.

Almost every side of zoology has contributed to the theory of evolution, but of special importance are the facts and theories associated with the names of Gregor Mendel, A. Weismann and Hugo de Vries. These are discussed under the headings Heredity; Mendelism; and Variation and Selection. It has been a feature of great promise in recent contributions to the theory of evolution, that such contributions have received attention almost directly in proportion to the new methods of observation and the new series of facts with which they have come. Those have found little favour who brought to the debate only formal criticisms or amplifications of the Darwinian arguments, or re-marshallings of the Darwinian facts, however ably conducted. The time has not yet come for the attempt to synthesize the results of the many different and often apparently antagonistic groups of workers. The great work that is going on is the simplification of the facts to be explained by grouping them under empirical laws; and the most general state- ment relating to these that can yet be made is that no single one of these laws has as yet shown signs of taking rank as a vera causa comparable with the Darwinian principle of natural selection.

For evolution in relation to society see Sociology.

References. — Practically, every botanical and zoological pub- lication of recent date has its bearing on evolution. The following are a few of the more general works: Bateson, Materials for the Study of Variation; Bunge, Vitalismus und Mechanismus; Cope, Origin of the Fittest, Primary Factors of Organic Evolution, Darwin's Life and Letters; H. de Vries, Species and Varieties and their Origin by Mutation; Eimer. Organic Evolution; Gulick, " Divergent Evolution through Cumulative Segregation," Jour. Linn. Soc. xx. ; Haacke, Schopfung des Menschen: Mitchell, " Valuation of Zoo- logical Characters," Trans. Linn. Soc. viii. pt. ?; Pearson, Grammar of Science; Romanes, Darwin and after Darwin; Sedgwick, Presi- dential Address to Section Zoology, Brit. Ass. Rep. 1899; Wallace, Darwinism; Weismann, The Germ-Plasm. Further references of great value will be found in the works of Bateson and Pearson referred to above, and in the annual volumes of the Zoological Record, particularly under the head " General Subject." (P. C. M.)

EVORA, the capital of an administrative district in the province of Alemtejo, Portugal; 72 m. E. by S. of Lisbon, on the Casa Branca-Evora-Elvas railway. Pop. (1900) 16,020. Evora occupies a fertile valley enclosed by low hills. It is sur- rounded by ramparts flanked

with towers, and is further defended by two forts; but the neglected condition of these, combined with the narrow arcaded streets and crumbling walls of Roman or Moorish masonry, gives the city an appearance corresponding with its real antiquity. Evora is the see of an archbishop, and has several churches, convents and hospitals, barracks, a diocesan school and a museum. A university, founded in 1550, was abolished on the expulsion of the Jesuits in the 18th century. The cathedral, originally a Romanesque building erected 1 186-1204, was restored in Gothic style about 1400; its richly decorated chancel was added in 1761. The church of Sao Francisco (1507-1525) is a good example of the blended Moorish and Gothic architecture known as Manoellian. The art gallery, formerly the archbishop's palace, contains a collection of Portuguese and early Flemish paintings. An ancient tower, and the so-called aqueduct of Sertorius, 9 m. long, have been partly demolished to make room for the market- square, in which one of the largest fairs in Portugal is held at midsummer. Both tower and aqueduct were long believed to have been of Roman origin, but are now known to have been constructed about 1540-1555 in the reign of John III., at the instance of an antiquary named Resende. The aqueduct was probably constructed on the site of the old Roman one. A small Roman temple is used as a public library; it is usually known as the temple of Diana, a name for which no valid authority

exists. Evora is of little commercial importance, except as an agricultural centre, but its neighbourhood is famous for its mules and abounds in cork-woods; there are also mines of iron, copper, and asbestos and marble quarries.

Under its original name of Ebora, the city was from 80 to 72 B.C. the headquarters of Sertorius, and it long remained an important Roman military station. It was called Liberalitas Juliae on account of certain municipal privileges bestowed on it by Julius Caesaj (c. 100-44 B.C.). Its bishopric, founded in the 5th century, was raised to an archbishopric in the 16th. In 712 Evora was conquered by the Moors, who named it Jabura; and it was only retaken in 1166. Fom 1663 to 1665 it was held by the Spaniards. In 1832 Dom Miguel, retreating befofe Dom Pedro, took refuge in Evora; and here was signed the convention of Evora, by which he was banished. (See Portugal.)

The administrative district of Evora coincides with the sentral part of Alemtejo (q.v.); pop. (1900) 128,062; area, 2856 sq. m.

EVREUX, a town of north-western France, capital of the department of Eure, 67 m. W.N.W. of Paris on the Western railway to Cherbourg.

Pop. (1906) town, 13,773; commune, 18,971. Situated in the pleasant valley of the Iton, arms of which traverse it, the town, on the south, slopes up toward the public gardens and the railway station. It is the seat of a bishop, and its cathedral is one of the largest and finest in France. Part of the lower portion of the nave dates from the nth century; the west facade with its two ungainly towers is, for the most part, the work of the late Renaissance, and various styles of the intervening period are represented in the rest of the church. A thorough restoration was completed in 1896. The elaborate north transept and portal are in the flamboyant Gothic; the choir, the finest part of the interior, is in an earlier Gothic style. Cardinal de la Balue, bishop of Evreux in the latter half of the 15th century, constructed the octagonal central tower, with its elegant spire; to him is also due the Lady chapel, which is remark- able for some finely preserved stained glass. Two rose windows in the transepts and the carved wooden screens of the side chapels are masterpieces of 16th-century workmanship. The episcopal palace, a building of the 15th century, adjoins the south side of the cathedral. An interesting belfry, facing the handsome modern town hall, dates from the 15th century. The church of St Taurin, in part Romanesque, has a choir of the 14th century and other portions of later date; it contains the shrine of St Taurin, a work of the 13th century. At Vieil Evreux, 3! m. south-east of the town, the remains of a Roman theatre, a palace, baths and an aqueduct have been discovered, as well as various relics which are now deposited in the museum of Evreux. Evreux is the seat of a prefect, a court of assizes, of tribunals of first instance and commerce, a chamber of commerce and a board of trade arbitrators, and has a branch of the Bank of France, a lycee and training colleges for teachers. The making of ticking, boots and shoes, agricultural implements and gas motors, and metal-founding and bleaching are carried on.

Vieil-Evreux {Mediolanum Aulercorum) was the capital of the Gallic tribe of the A ulerci Eburovices and a flourishing city dur- ing the Gallo-Roman period. Its bishopric dates from the 4th century.

The first family of the counts of Evreux which is known was descended from an illegitimate son of Richard I., duke of Normandy, and became extinct in the male line with the death of Count William in 1 1 18. The countship passed in right of Agnes, William's sister, wife of Simon de Montfort-l'Amaury (d. 1087) to the house of the lords of Montfort-l'Amaury. Amaury III. of Montfort ceded it in 1200 to King Philip Augustus. Philip the Fair presented it (1307) to his brother Louis, for whose benefit Philip the Long raised the countship of Evreux into a peerage of France (13 17). Philip of Evreux, son of

Louis, became king of Navarre by his marriage with Jeanne, daughter of Louis the Headstrong (Hutin), and their son Charles the Bad and their grandson Charles the Noble were also kings of Navarre. The latter ceded his countships of Evreux, Champagne and Brie to King Charles VI. (1404). In 1427 the countship of Evreux was bestowed by King Charles VII. on Sir John Stuart of

Darnley (c. 1365-1429), the commander of his Scottish body- guard, who in 1423 had received the seigniory of Aubigny and in February 1427/8 was granted the right to quarter the royal arms of France for his victories over the English (see Lady Elizabeth Cust, Account of the Stuarts of Aubigny in France, 1422-1672, 1891). On Stuart's death (before Orleans during an attack on an English convoy) the countship reverted to the crown. It was again temporarily alienated (1569-1584) as an appanage for Francis, duke of Anjou, and in 1651 was finally

EWALD, GEORG HEINRICH AUGUST VON (1803-1875), German Orientalist and theologian, was born on the 16th of November 1803 at Gottingen, where his father was a linen- weaver. In 181 5 he was sent to the gymnasium, and in 1820 he entered the university of his native town, where under J. G. Eichhorn and T. C. Tychsen he devoted himself specially to the study of Oriental languages. At the close of his academical career in 1823 he was appointed to a mastership in the gymnasium at Wolfenbuttel, arid made a study of the Oriental manuscripts in the Wolfenbuttel library. But in the spring of 1824 he was recalled to Gottingen as repetent, or theological tutor, and in 1827 (the year of Eichhorn's death) he became professor extra-ordinarius in philosophy and lecturer in Old Testament exegesis. In 1 83 1 he was promoted to the position of professor ordinarius in philosophy; in 1833 he became a member of the Royal Scientific Society, and in 1835, after Tychsen 's death, he entered the faculty of theology, taking the chair of Oriental languages.

Two years later occurred the first important episode in his studious life. In 1837, on the 18th of November, along with six of his colleagues he signed a formal protest against the action of King Ernst August (duke of Cumberland) in abolishing the liberal constitution of 1833, which had been granted to the Hanoverians by his predecessor William IV. This bold procedure of the seven professors led to their speedy expulsion from the university (14th December). Early in 1838 Ewald received a call to Tubingen, and there for upwards of ten years

he held a chair as professor ordinarius, first in philosophy and afterwards, from 1 841, in theology. To this period belong some of his most important works, and also the commencement of his bitter feud with F. C. Baur and the Tubingen school. In 1847, ” the great shipwreck-year in Germany,” as he has called it, he was invited back to Gottingen on honourable terms — the liberal constitution having been restored. He gladly accepted the invitation. In 1862-1863 he took an active part in a movement for reform within the Hanoverian Church, and he was a member of the synod which passed the new constitution. He had an important share also in the formation of the Protestantenverein, or Protestant association, in September 1863. But the chief crisis in his life arose out of the political events of 1866. His loyalty to King George (son of Ernst August) would not permit him to take the oath of allegiance to the victorious king of Prussia, and he was therefore placed on the retired list, though with the full amount of his salary as pension. Perhaps even this degree of severity might have been held by the Prussian authorities to be un- necessary, had Ewald been less exasperating in his language. The violent tone of some of his printed manifestoes about this time, especially of his Lob des Konigs u. des Volkes, led to his being deprived of the venia legendi (1868) and also to a criminal process, which, however, resulted in his acquittal (May 1869). Then, and on two subsequent occasions, he was returned by the city of Hanover as a member of the North German and German parliaments. In June 1874 he was found guilty of a libel on Prince Bismarck, whom he had compared to Frederick II. in ” his unrighteous war with Austria and his ruination of religion and morality,” to Napoleon III. in his way of ” picking out the best time possible for robbery and plunder.” For this offence he was sentenced to undergo three weeks’ imprisonment. He died in his 72nd year of heart disease on the 4th of May 1875.

Ewald was no common man. In his public life he displayed many noble characteristics, — perfect simplicity and sincerity, intense moral earnestness, sturdy independence, absolute

fearlessness. As a teacher he had a remarkable power of kindling enthusiasm; and he sent out many distinguished pupils, among whom may be mentioned Hitzig, Schrader, Noldeke, Diestel and Dillmann. His disciples were not all of one school, but many eminent scholars who apparently have been untouched by his influence have in fact developed some of the many ideas which he suggested. His numerous writings, from 1823 onwards, were the reservoirs in which the entire energy of a life was stored. His Hebrew Grammar inaugurated’ a new era in biblical philology. All subsequent works in that department have been avowedly based on his, and to him will always belong the

honour of having been, as Hitzig has called him, ” the second founder of the science of the Hebrew language.” As an exegete and biblical critic no less than as a grammarian he has left his abiding mark. His Geschichte des Volkes Israel, the result of thirty years’ labour, was epoch-making in that branch of research. While in every line it bears the marks of intense individuality, it is at the same time a product highly characteristic of the age, and even of the decade, in which it appeared. If it is obviously the outcome of immense learning on the part of its author, it is no less manifestly the result of the speculations and researches of many laborious predecessors in all departments of history, theology and philo- sophy. Taking up the idea of a divine education of the human race, which Lessing and Herder had made so familiar to the modern mind, and firmly believing that to each of the leading nations of antiquity a special task had been providentially assigned, Ewald felt no difficulty about Israel’s place in universal history, or about the problem which that race had been called upon to solve. The history of Israel, according to him, is simply the history of the manner in which the one true religion really and truly came into the possession of mankind. Other nations, indeed, had attempted the highest problems in religion; but Israel alone, in the providence of God, had succeeded, for Israel alone had been inspired. . Such is the supreme meaning of that national history which began with the exodus and culminated (at the same time virtually terminating) in the appearing of Christ. The historical interval that separated these two events is treated as naturally dividing itself into three great periods, — those of Moses, David and Ezra. The periods are externally indicated by the successive names by which the chosen people were called — Hebrews, Israelites, Jews. The events prior to the exodus are relegated by Ewald to a preliminary chapter of primitive history; and the events of the apostolic and post- apostolic age are treated as a kind of appendix. The entire con- struction of the history is based, as has already been said, on a critical examination and chronological arrangement of the available documents. So far as the results of criticism are still uncertain with regard to the age and authorship of any of these, Ewald’s conclusions must of course be regarded as unsatisfactory. But his work remains a storehouse of learning and is increasingly recognized as a work of rare genius.

Of his works the more important are: — Die Composition der Genesis krilisch untersucht (1823), an acute and able attempt to account for the use of the two names of God without recourse to the document-hypothesis; he was not himself, however, permanently convinced by it; De metris carminum Arabicorum (1825); Das Hohelied Salomo’s iibersetzl u. erkldrt (1826; 3rd ed., 1866) ; Kritische Grammatik der

hebr. Sprache (1827) — this afterwards became the Ausfiihrliches Lehrbuch der hebr. Sprache (8th ed., 1870); and it was followed by the Hebr. Sprachlehre fur Anfdnger (4th ed., 1874); Uber einige dltere Sanskritmetra (1827); Liber Vakedii de Meso- potamiae expugnalae historia (1827); Commentarius in Apocalypsin Johannis (1828); Abhandlungen zur biblischen u. orientalischen Literatur (1832); Grammatica critica linguae Arabicae (1831-1833); Die poetischen Biicher des alien Bundes (1835-1837, 3rd ed., 1866- 1867); Die Propheten des alten Bundes (1840-1841, 2nd ed., 1867- 1868); Geschichte des Volkes Israel (1843-1859, 3rd ed., 1864-1868); Alterthumer Israels (1848); Die drei ersten Evangelien ubersetzt u. erkldrt (1850); Uber das dlhiopische Buch Henoch (1854); Die Sendschreiben des Apostels Paulus ubersetzt u. erkldrt (1857); Die J ohanneischen Schriften ubersetzt u. erkldrt (1861-1862); Uber das vierle Esrabuch (1863); Sieben Sendschreiben des neuen Bundes (1870); Das Sendschreiben an die Hebrder u. Jakobos' Rundschreiben (1870); Die Lehre der Bibel von Golt, oder Theologie des alten u. neuen Bundes (1871-1875). The Jahrbiicher der biblischen Wissen- schaft (1849-1865) were edited, and for the most part written, by him. He was the chief promoter of the Zeilschrift fur die Kunde det

Morgenlandes, begun in 1837; and he frequently contributed on various subjects to the Gotting. gelehrte Anzeigen. He was also the author of many pamphlets of an occasional character.

The following have been translated into English: — Hebrew Gram- mar, by John Nicholson (from 2nd German edition) (London 1836) ; Introductory Hebrew Grammar (from 3rd German edition) (London, 1870); History of Israel, 5 vols, (corresponding to vols, i.-iv. of the German), by Russell Martineau and J. Estlin Carpenter (London, 1867-1874); Antiquities of Israel, by H. S. Solly (London, 1876); Commentary on the Prophets of the Old Testament, by J. Frederick Smith (2 vols., London, 1876-1877) ; Isaiah the Prophet, chaps, i.- xxxiii., by O. Glover (London, 1869); Life of Jesus Christ, also by O. Glover (London, 1865).

See the article in Herzog-Hauck; T. Witton Davies, Heinrich Ewald (1903) ; and cf. T. K. Cheyne, Founders of Old Testament Criticism (1893) ; F. Lichtenberger, History of German Theology in the Nineteenth Century (1889).

EWALD, JOHANNES (1743-1781), the greatest lyrical poet of Denmark, was the son of a melancholy and sickly chaplain at Copenhagen, where he was born on the 18th of November 1743. At the age of eleven he was sent to school at Schleswig, his father's birthplace, and returned to the capital only to enter the university in 1758. His father was by that time dead, and in his mother, a frivolous and foolish woman, he found neither sympathy nor moral support. At fifteen he fell passionately in love with Arense Hulegaard, a girl whose father afterwards married the poet's mother; and the romantic boy resolved on various modes of making himself admired by the young lady. He began to learn Abyssinian, for the purpose of going out as a missionary to Africa, but this scheme was soon given up, and he persuaded a brother, four years older than himself, to run away that they might enlist as hussars in the Prussian army. They managed to reach Hamburg just when the Seven Years' War was commencing and were allowed to enter a regiment. But the elder brother soon got tired and ran away, while the poet, after a series of extraordinary adventures, deserted to the Austrian army, where from being drummer he rose to being sergeant, and was only not made an officer because he was a Protestant. In 1 760 he was weary of a soldier's life and deserted again, getting safe back to Denmark. For the next two years he worked with great diligence at the university, but the Arense for whom he had gone through so much hardship and taken so much pains married another man almost immediately after Ewald's final and very successful examination. The disappoint- ment was one from which he never recovered, but his own weakness of will was largely to blame for it. He plunged into dissipation of every kind, and gave his serious thoughts only to poetry.

In 1763 his first work, a perfunctory dissertation, De pyrologia sacra, first saw the light. In 1 764 he made a considerable success with a short prose story in the popular manner of Sneedorf, Lykkens Tempel (The Temple of Fortune), which was translated into German and Icelandic. On the death of Frederick V., how- ever, Ewald first appeared prominently as a poet; he published in 1766 three Elegies over the dead king, which were received with universal acclamation, and of which one, at least, is a veritable masterpiece. But his dramatic poem Adam og Eva (Adam and Eve), by far the finest imaginative work produced in Denmark up to that time, was rejected by the Society of Arts in 1767 and was not published until 1769. At the latter date, however, its merits were perceived. In 1770 Ewald attained success with Philet, a narrative and lyrical poem, and still more with his splendid Rolf Krage, the first original Danish tragedy. For the next ten years Ewald was occupied in producing one brilliant poetical work

after another, in rapid succession. In 1771 he published De brutale Klappers (The Brutal Clappers), a tragi- comedy or parody satirizing the dispute then raging between the critics and the manager of the Royal Theatre; in 1772 he translated from the German the lyrical drama of Philemon and Baucis, and brought out his versified comedy of Harlequin Patriot, a satire on the passion for political scribbling created by Struensee's introduction of the liberty of the press. In 1773 he published Pebersvendene (Old Bachelors), a prose comedy. In 177 1 he had already collected some of his lyrical poems under the title of Adskilligt af Johannes Ewald (Miscellanies). In 1774

appeared the heroic opera of Balder' s Dbd (Balder's Death), and in 1779 the finest of his works, the lyrical drama Fiskerne (The Fishers), which contains the Danish National Song, " King Christian stood by the high Mast," his most famous lyric. In the two poems last mentioned, however, Ewald passed beyond contemporary taste, and these great works, the pride of Danish literature, were coldly received. But while the new poetry was slowly winning its way into popular esteem, the poet did not lack admirers, and at the head of these he founded in 1775 the Danish Literary Society, a body which became influential, and which made the study of Ewald a cultus. But the poet's health had broken; when he was writing Rolf Krage he was already an inmate of the consumptive hospital, and when he seemed to be recovering, his health was shattered again by a night spent in the frosty streets. He embittered his existence by the recklessness of his private life, and finally, through a fall from a horse, he ended by becoming a complete invalid. His last ten years were full of acute suffering; his mother treated him with cruelty, his family with neglect, and but few even of his friends showed any manliness or generosity towards him. In 1 7 74 he was placed in the house of an inspector of fisheries at Rungsted, where Anna Hedevig Jacobsen, the daughter of the house, tended the wasted poet with infinite tenderness and skill. He stayed in this house for three years, and wrote there some of his finest later lyrics. Meanwhile he had fallen deeply in love with the charming solace of his sufferings and won her consent to a marriage. This step, however, was prevented by his family, who roughly removed him to their own keeping near Kronborg. Here he was treated so infamously that he insisted on being taken back to Copenhagen in 1777, where he found an older, but no less tender nurse, in Ane Kirstine Skou. Here he wrote Fiskerne with his imagination full of the familiar shore at Hornbaek, near Rungsted. In 1780 he was a little better, and managed to be present at the theatre at the first performance of his poem. But this excitement hastened his end, and after months of extreme agony he died on the 17th of March

1781, and was carried to the grave by a large assembly of his admirers, since he was now just recognized by the public for the first time as the greatest national poet. Among his papers were found fragments of three dramas, two on old Scandinavian subjects, entitled Frode and Helgo, and the third a tragedy on the story of Hamlet, which he meant to treat in a way wholly distinct from Shakespeare's.

Ewald belongs to the race of poetical reformers who appeared in all countries of Europe at the end of the 18th century; but it is interesting to observe that in point of time he preceded all of them. He was born six years earlier than Goethe and Alfieri, sixteen years before Schiller, nine years before Andre Chenier, and twenty-seven years earlier than Wordsworth, but he did for Denmark what each of these poets did for his own country. Ewald found Danish literature given over to tasteless rhetoric, and without art or vigour. He introduced vivacity of style, freshness and brevity of form, and an imaginative study of nature which was then unprecedented. But perhaps his greatest claim to notice is the fact that he was the first person to call the atten- tion of the Scandinavian peoples to the treasuries of their ancient history and mythology, and to suggest the use of these in imagina- tive writing. With a colouring more distinctly modern than that of Collins and Gray, his lyrics yet resemble the odes of these his English contemporaries more closely than those of any continental poet; from another point of view his ballads remind us of those of Schiller, which they preceded. His dramas, which had an immense influence on the Danish stage, are now chiefly of anti- quarian interest, with the exception of " The Fishers," a work that must always live as a great national poem. In personal character and in fate Ewald seems to have been not unlike Heinrich Heine.

The first collected edition of Ewald's works began to appear in his lifetime. It is in four volumes, 1780-1784. His works have constantly been reprinted, but the standard edition is that by Liebenberg, in 8 vols., 1 850-1 855. The best biographies of him are those by C. Molbech (1831), Hammerich (i860) and Andreas Dolleris (1900)- (E. G.)

EWART, WILLIAM (1798-1869), English politician, was born in Liverpool on the 1st of May 1798. He was educated at Eton and Christ Church, Oxford, gaining the Newdigate prize for English verse. He was called to the bar at the Middle Temple in 1827, and the next year

entered parliament for the borough of Bletchingley in Surrey. He subsequently sat for LiverpDol from 1830 to 1837, for Wigan in 1839, and for Dumfries Burghs from 1841 until his retirement from public life in 1868. He died at Broadleas, near Devizes, on the 23rd of January 1869, Ewart, who was an advanced liberal in politics, was responsible during his long political career for many useful measures. In 1834 he carried a bill for the abolition of hanging in chains, and in 1837 he was successful in getting an act passed for abolishing capital punishment for cattle-stealing and other offences. In 1850 he carried a bill for establishing free libraries supported out of the rates, and in 1864 he was instrumental in getting an act passed for legalizing the use of the metric system of weights and measures. He was always a strong advocate for the abolition of capital punishment, and on his motion in 1864 a select com- mittee was appointed to consider the subject. Other reforms which he advocated and which have since been carried out were an annual statement on education, and the examination of candidates for the civil service and army.

EWE, a group of Negro peoples of the Slave Coast, West Africa. By the natives their country is called Ewe-me, ” Land of the Ewe.” The Ewe family forms five linguistic groups: the Anlo or Anglawa on the Gold Coast frontier, the Krepi of Anfueh speech, the Jeji, the Dahomeyans and the Mahi.

See further Dahomey, and A. B. Ellis, The Ewe-Speaking Peoples of the Slave Coast . . . (London, 1890). . , ■

EWELL, RICHARD STODDERT (1817-1872), American soldier, lieutenant-general in the Confederate army, was born in Georgetown, now a part of Washington, D.C., on the 2nd of February 1817, and graduated at West Point in 1840. As a cavalry officer he saw much’active service in the Mexican War and later in Indian warfare in New Mexico. He resigned his commission at the outbreak of the Civil War, and entered the Confederate service. He commanded a brigade in the first Bull Run campaign, and a division in the famous Valley Campaign of ” Stonewall ” Jackson, to whom he was next in rank. At Cross Keys he was in command of the forces which defeated General Fremont. E well’s division served with Jackson, in the Seven Days and in the campaign of Second Bull Run. At the action of Groveton Ewell lost a leg, but did not on that account retire from active service, though other generals led his men in the sanguinary battles of Antietam (where they lost 47% of their numbers) and Fredericksburg. After the death of ” Stonewall ” Jackson, Ewell was promoted lieutenant-general and appointed to command the 2nd Corps, with which he had served from the beginning of the Valley Campaign. His

promotion set aside General J. E. B. Stuart, the temporary commander of Jackscn's corps; that Ewell, crippled as he was, was preferred to the brilliant cavalry leader was a marked testimony to his sterling qualities as a soldier. The invasion of Pennsylvania soon followed, Ewell's corps leading the advance of Lee's army. A federal force was skilfully cut off and destroyed near Winchester, Va., and Ewell's corps then raided Maryland and southern Pennsylvania unchecked. At the battle of Gettysburg, the 2nd Corps decided the fighting of the first day in favour of the Confederates, driving the enemy before them; ort the second day it fought a desperate action on Lee's left wing. Ewell took part in the closing operations of 1863 and in all the battles of the Wilderness and Petersburg campaigns. In the final campaign 0L1865 he and the remnant of his corps were cut off and forced to surrender at Sailor's Creek, a few days before his chief capitulated to Grant at Appomattox. After the war General Ewell lived in retirement. He died near Spring Hill, Maury County, Tennessee, on the 25th of January 1872.

EWING, ALEXANDER (1814-1873), Scottish divine, was born of an old Highland family in Aberdeen on the 25th of March 1814. In October 1838 he was admitted to deacon's orders, and after his return from Italy he took charge of the

episcopal congregation at Forres, and was ordained a, presbyter in the autumn of 1841. In 1846 he was elected first bishop of the newly restored diocese of Argyll and the Isles, the duties of which position he discharged till his death on the. 2 2nd of May 1873. In 1851 he received the degree of D.C.L. from the univer- sity of Oxford; Though hampered by a delicate bodily constitu- tion, he worked in a spirit of buoyant cheerfulness. By the charm of his personal manner and his catholic sympathies he gradually attained a prominent position. In theological dis- cussion he contended for the exercise of a wide tolerance, and attached little importance to ecclesiastical authority and organization. His own theological position had close affinity with that of Thomas Erskine of Linlathen and Frederick Denison Maurice; but his opinions were the fruit of his own meditation, ahd were coloured by his own individuality; The trend of his teaching is only to be gathered from fragmentary publications— letters to the newspapers, pamphlets, special sermons, essays contributed to the series of Present Day Papers, of which he was the editor, and a volume of sermons entitled Revelation considered as Light.

Besides his strictly theological writings, Ewing was the author of the Cathedral or Abbey Church of Iona (1865), the first part of which contains drawings and descriptive letterpress of the ruins, and the

second a history of the early Celtic church and the mission of St Columba. See Memoir of Alexander Ewing, D.C.L., by A. J. Ross (1877).

EWING, JULIANA HORATIA ORR (1841-1885), English writer of books for children, daughter of the Rev. Alfred Gatty and of Margaret Gatty (q.v.), was born at Ecclesfield, Yorkshire, in 1841. One of a large family, she was accustomed to act as nursery story-teller to her brothers and sisters, and her brother Alfred Scott Gatty provided music to accompany her plays. She was well educated in classics and modern languages, and at an early age began to publish verses, being a contributor to Aunt Judy's M agazine, which her mother started in 1866. The Land of Lost Toys and many other of Juliana's stories appeared in this magazine. In 1867 she married Major Alexander Ewing, himself an author, and the composer of the well-known hymn "Jerusalem the Golden." From this time until her death (13th may 1885), previously to which she had been a constant invalid, Mrs Ewing produced a number of charming children's stories. The best of these are: The Brownies (1870) , A Flat-iron for a Farthing (187 3), Lob-lie-by the Fire (1874), The Story of a Short Life (1885) and Jackanapes (1884), the two last-named, in particular, obtaining great success; among others may be mentioned Mrs Over-the-Way's Remembrances (1869), Six to Sixteen, Jan of the Windmill (1876), A Great Emergency (1877), We and the World (1881), Old-Fashioned Fairy Tales, Brothers of Pity (1882), The Doll's Wash, Master Fritz, Our Garden, A Soldier's Children, Three Little Nest-Birds, A Week Spent in a Glass-House, A Sweet Little Dear, and Blue- Red (1883). Many of these were published by the S.P.C.K. Simple and unaffected in style, and sound and wholesome in matter, with quiet touches of humour and bright sketches of scenery and character, Mrs Ewing's best stories have never been surpassed in the style of literature to which they belong.

EWING, THOMAS (1789-18.71), American lawyer and states- man, was born near the present West Liberty, West Virginia, on the 28th of December 1789. His father, George Ewing, settled at Lancaster, Fairfield county, Ohio, in 1702. Thomas graduated at Ohio University, Athens, Ohio, in 181 5, and in August 181 6 was admitted to the bar at Lancaster, where he won high rank as an advocate. He was a Whig member of the United States senate in 1831-1837, and as such took a prominent part in the legislative struggle over the United States Bank, whose re- chartering he favoured and which he resolutely defended against President Jackson's attack, opposing in able speeches the with- drawal of deposits and Secretary Woodbury's " Specie Circular " of 1836. In March 1841 he became secretary of the treasury in President

W. H. Harrison's cabinet. When, however, after President Tyfer's accession, the relations between the President and the Whig Party became strained, he retired (September 1841) and was succeeded by Walter Forward (1786-1852).

Subsequently from March 1849 to July 1850 he was a member of President Taylor's cabinet as the first secretary of the newly established department of the interior. He thoroughly organized the department, and in his able annual report advocated the construction by government aid of a railroad to the Pacific Coast. In 1850-1851 he filled the unexpired term of Thomas . Corwin in the U.S. Senate, strenuously opposing Clay's com- promise measures and advocating the abolition of slavery in the District of Columbia. He was subsequently a delegate to the Peace Congress in 1861, and was a loyal supporter of President Lincoln's war policy. He died at Lancaster, Ohio, on the 26th of October 1871.

His daughter was the wife of General William T. Sherman. His son, Hugh Boyle Ewing (1S26-1905), served throughout the Civil War in the Federal armies, rising from the rank of colonel (1861) to that of brigadier-general (1862) and brevet major- general (1S65), and commanding brigades at An.tietam and Vicksburg and a division at Chickamauga; and was minister of the United States to the Netherlands in];866-i 870. Another son, Thomas Ewing (1829-1896), studied at Brown University in 1852-1854 (in 1894, by a special vote, he was placed on the list of graduates in the class of 1856) ; he was a lawyer and a free- state politician in Kansas in 1857-1861, and was the first chief- justice of the Kansas supreme court (1861-1862). In the Civil War he attained the rank of brigadier-general (March 1863) and received the brevet of major-general (1865). He was sub- sequently a representative in Congress from Ohio in 1877-1881; and from 1882 to 1896 practised law in New York City, where he was long one of the recognized leaders of the bar.

EXAMINATIONS. The term " examination " (i.e. inspecting, weighing and testing; from Lat. examen, the tongue of a balance) is used in the following article to denote a systematic test of knowledge, and of either special or general capacity or fitness, carried out under the authority of some public body.

1. History.— The oldest known system of examinations in history is

that used in China for the selection of officers for the public service (c. 1115 B.C.), and the periodic tests which they undergo after entry (c. 2200 B.C.). See China; alsoW.A.P. Martin, The Lore of Cathay (1901), p. 311 et seq.; T. L. Bullock, ” Competitive Examinations in China ” {Nineteenth Century, July 1894); and Etienne Zi, Pratique des examens litteraires en Chine (Shanghai, 1894). The abolition of this system was announced in 1906, and, as a partial substitute, it was decided to hold an annual examination in Peking of Chinese graduates educated abroad {Times, 22nd of October 1906).

The majority of examinations in western countries are derived from the university examinations of the middle ages. The first universities of Europe consisted of corporations of teachers and of students analogous to the trade gilds and merchant gilds of the time. In the trade gilds there were apprentices, companions, and masters. No one was admitted to mastership until he had served his apprenticeship (q.v.), nor, as a rule, until he had shown that he could accomDlish a piece of work to the satisfaction of the gild.

The object of the universities was to teach; and to the three classes established by the gild correspond roughly the scholar, the bachelor or pupil-teacher (see Rashdall i. 209, note 2, and 22,1, note 5), and the master or doctor (two terms at first equivalent) who, having served his apprenticeship and passed a definite technical test, had received permission to teach. The early universities of Europe, being under the same religious authority and animated by the same philosophy, resembled each other very closely in curriculum and general organization and examinations, and by the authority of the emperor, or of the pope in most cases, the permission to teach granted by one university was valid in all (jus ubicunque docendi).

The earliest university examinations of which a description is available are those in civil and in canon law held at Bologna at a period subsequent to 12 19. The student was admitted without examination as bachelor after from four to six years’ study, and after from six to eight years’ study became qualified as a candidate for the doctorate. He might obtain

the doctorate in both branches of law in ten years (Rashdall i.

221-222).

The doctoral examination at Bologna in the i3th-i4th centuries consisted of two parts — a private examination which was the real test, and a public one of a ceremonial character (conventus). The

candidate first took an “oath that he had complied with all the statutable conditions, that he would give no more than the statutable fees or entertainments to the rector himself, the doctor or his fellow-students, and that he would obey the rector.” He was then presented to the archdeacon of Bologna by one or. more doctors, who were required to have satisfied themselves of his fitness by private examination. On the morning of the examination, after attending mass, he was assigned by one of the doctors of the assembled college two passages (puncta) in the civil or canon law, which he retired to his house to study, possibly with the assistance of the presenting doctor. Later in the day he gave a lecture on, or exposition of, the prepared passages, and was examined on them by two of the doctors appointed by the college. Other doctors might then put supplementary questions on law arising out of the passages, or might suggest objections to his answers. The vote of the doctors present was taken by ballot, and the fate of the candidate was determined by the majority. The successful candidate, who received the title of licentiate, was, on payment of a heavy fee and other expenses, permitted to proceed to the conventus or final public examination. This consisted in the delivery of a speech and the defence of a thesis on some point of law, selected by the candidate, against opponents selected from among the students. The successful candidate received from the arch-deacon the formal ” licence to teach ” by the authority of the pope in the name of the Trinity, and was invested with the insignia of office. At Bologna, though not at Paris, the “per- mission to teach ” soon became fictitious, only a small number of doctors being allowed to exercise the right of teaching in that university (Rashdall) .

In the faculty of arts of Paris, towards the end of the 13th century, the system was already more complicated than at Bologna. The baccalaureate, licentiateship, and mastership formed three distinct degrees. For admission to the baccalaureate a preliminary test or ” Responsions ” was first required, at which the candidate had to dispute in grammar or logic with a master. The examiners then inspected the certificates (schedulae) of residence and of having attended lectures in the prescribed subjects, and examined him in the contents of his books. The successful candidate was admitted to maintain a thesis against an opponent, a process called ” determination ” (see Rashdall i. 443 et seq.), and as bachelor was then permitted to give “cursory” lectures. After five or six years from the date of begin- ning his studies (matriculation) and being twenty years of age (these conditions varied at different, periods), a bachelor was permitted to present himself for the examination for the licentiate-ship, which was divided into two parts. The first part was conducted

in private by the chancellor and four examiners (temptatores in cameris), and included an inquiry into the candidate's residence, attendance at lectures, and performance of exercises, as well as examination in prescribed books; those candidates adjudged worthy were admitted to the more im- portant examination before the faculty, and the names of successful candidates were sent to the chancellor in batches of eight or more at a time, arranged in order of merit. (The order of merit at the examination for the licentiateship existed in Paris till quite recently.) Each successful candidate was then required to maintain a thesis chosen by himself (quodlibetica) in St Julian's church, and was finally submitted to a purely formal public examination (collalio) at either the episcopal palace or the abbey of Ste Genevieve, before receiving from the chancellor, in the name of the Trinity, the licence to incept or begin to teach in the faculty of arts. After some six months more the licentiate took part " in a peculiarly solemn disputa- tion known as his 'Vespers,' " then gave his formal inaugural lecture or disputation before the fa.culty, and was received into the faculty as master. This last process was called " inception."

In discussing the value of medieval examinations of the kind described, Paulsen {The German Universities (1906) , p. 25) asserts that they were well adapted to increase a student's alertness, his power of comprehending new ideas, and his ability quickly and surely to assimilate them to his own, and that " they did more to enable [students] to grasp a subject than the mute and solitary reviewing and cramming of our modern examinations can possibly do." At their best they fulfilled precisely the technical purpose for which they were intended; they fully tested the capacity of the candidate to teach the subjects which he was required to teach in accordance with the methods which he was required to use. The limitations of the test were the limitations of the educational and philosophic ideals of the time, in which a dogmatic basis was presupposed to all knowledge and criticism was limited to the superstructure. At their worst, even with venal examiners (and additional fees were often offered as a bribe), Rashdall regards these examinations (at the end of the 13th century) as probably " less of a farce than the pass examinations of Oxford and Cambridge almost within the memory of persons now living." It is, however, to be pointed out that the standard in Paris and elsewhere at a later date became scandalously low in some cases. In some universities the sons of nobles were regularly excused certain

examinations. At Cam- bridge in 1774 Fellow Commoners were examined with such precipitation to fulfil the formal requirements of the statutes that the ceremony was termed ” huddling for a degree ” (Jebb, Remarks upon the Present Mode of Education in the University of Cambridge, 4th ed., 1774, p. 32). The last privileges of this kind were abolished at Cambridge by a grace passed on the 20th of March 1884.

In the medieval examinations described above we find most of the elements of our present examinations: certificates of previous study and good conduct, preparation of set-books, questioning on subjects not specially prepared, division of examinations into various parts, classification in order of merit, payment of fees, the presentation of a dissertation, and the defence and publication of a thesis (a term of which the meaning has now become extended).

The requirement to write answers to questions written or dictated, to satisfy a practical test (other than in teaching), and a clinical test in medicine, appear to be of later date. 1 The medieval candidate for the doctorate in medicine, although required to have attended practice before presenting himself, discussed as his thesis a purely theoretical question, often semi-theological in character, of which as an extreme example may be quoted ” whether Adam had a navel.”

The competitive system was developed considerably at Louvain, and in the 1 5th century the candidates for the master- ship of arts were divided into three classes {rigor osi, honour-men; transibiles, pass-men; gratiosi, charity-passes), while a fourth, which was not published, contained the names of those who failed. In the 1 7th century the first class comprised the names of twelve, and the second, of twenty-four, candidates, who were divided on the report of their teachers into classes before the examination, and finally arranged in order of merit by the examiners (Vernulaeus, quoted by Sir W. Hamilton, Discussions, 1852; p. 647; Rashdall, loc. cit. ii. 262). At the Cambridge tripos (as described by Jebb in 1774, Remarks, &c, pp. 20-31) the first twenty-four candidates were also selected by a preliminary test; they were then divided further into ” wranglers” (the disputants, par excellence) and Senior Optimes, the next twelve on the list being called the Junior Optimes. These names have in the mathematics tripos survived the procedure. (The name Tripos is derived from the three-legged stool on which ” an old bachilour,” selected for the purpose, sat during his disputation with the senior bachelor of the year, who was required to pro- pound two questions to him.)

1 W. W. Rouse Ball in his History of the Study of Mathematics at Cambridge (1889), p. 193, states that he can find no record of any European examinations by means of written papers earlier than those introduced by R. Bentley at Trinity College, Cambridge, in

1702.

The subjects in which the medieval universities examined were (i.) those of the trivium and quadrivium in the faculty of arts; (ii.) theology; (iii.) medicine; and (iv.) civil and canon law. The number of subjects in which examinations are held has since grown immensely. We can only sketch in outline the transformations of certain typical university systems of examinations.

At Oxford there is no record of a process of formal examination on books similar to that of Paris (Rashdall, ii. 442 et seq.), disputations being apparently the only test applied in its early history. Examinations were definitely introduced for the B.A. and M.A. degrees by Laud in 1636-1638 (Brodrick, History of Oxford, p. 114), but the standard prescribed was so much beyond the actual requirements of later times that it may be doubted if it was enforced. The studies fell in the 18th century into an " abject state," from which they were first raised by a statute passed in 1800 {Report of Oxford University Commission of 1830-18 j2, p. 60 et seq.), under which distinctions were first allotted to the ablest candidates for the bachelor's degree. Further changes were made in 1807 and 1825; and in 1830 a distinction was made between honours examinations of a more difficult character, at which successful candidates were divided into four classes, and pass examinations of an easier character. By the statutes of 1849 and 1858 an intermediate " Moderations " examination was instituted between the preliminary examination called " Rcsponsions " and the final examination. Since 1850, although fresh subjects of examination have been introduced, no considerable change of system has been made.

The bachelor's degree at Oxford tended from an early period to be postponed to an advanced stage of studies, while the require- ments for the master's degree diminished until, in 1807, the examination for the M.A. was abolished. It is now awarded to bachelors of three years' standing on payment of a fee.

Cambridge in early times followed the example of Oxford, and here also the bachelor's degree became more and more important (Bass Mullinger, History of the University of Cambridge from 1535 . . . , p. 414), and the M.A. has been finally reduced to a mere formality,

awarded on terms similar to those of the sister university. The standard of examinations was raised in Cam- bridge at an earlier date than at Oxford, and in the 18th century the tripos ” established the reputation of Cambridge as a School of Mathematical Science.” The school, however, produced few, if any, great mathematicians between Newton and George Green. It was only between 1830 and 1840 that the standard of the tripos became a high one. At Cambridge there is no intermediate examination between the ” Previous Examination ” (commonly called “Little-go”), which corresponds to Oxford ” Responsions ” or ” Smalls ” and the triposes and examinations for the ” Poll ” degree, which correspond to the Oxford final honours and pass examinations respectively. But most of the triposes have been divided into two parts, of which the second is not obligatory in order to obtain a degree. The ‘ ‘ senior wrangler ” was the first candidate in order of merit in the first part of the mathematical tripos. The abolition of order of merit at this examination was decided on in 1906, and names of candidates appeared in this order for the last time in 1909.

-At the Scottish universities the B.A. degree has become extinct, and the M.A., awarded on the results of examination, is the first degree in the faculty of arts.

The incorporation of the university of London in 1836 marks an era in the history of examinations; the teaching and examining functions of a university were dissociated for the first time. Until 1858 the London examinations were open only to students in affiliated colleges, and the teachers had no share in the appoint- ment of the examiners or indetermining the curricula for examina- tions; in 1858 the examinations were thrown open to all comers, and no requirements were insisted on with regard to courses of study except for degrees in the faculty of medicine. The sole function of the university was to examine, and its examinations for matriculation and for degrees in arts and science were carried on by means of written papers not only in London but in many centres in the United Kingdom and the colonies. From the

first the degrees were (unlike, those of Oxford and Cambridge until 1871) open to all male persons without religious distinctions; and in 1878 they were opened to women. (Tripos examinations were thrown open to women at Cambridge by the grace of 24th Feb. 1881, and at Oxford women were admitted to examinations for honours by statute

of 29th April 1884. Proposals to admit women to university degrees were rejected by Oxford and Cambridge in 1896 and 1897 respectively.)

The standard of difficulty set by the university of London was a high one, very much higher for its pass degrees than the corresponding standards at Oxford and Cambridge, while the standard for honours was equally high. In medicine the examinations were made both wider in range and more searching than those of any other examining body. But, for reasons dealt with below, great discontent was roused by the new system. In 1880 the Victoria University, Manchester, was established, in which teaching and examining were again united; and in the universities since established, with the exception of the Royal University of Ireland (which was created in 1880 as an examining body on the model of London, but which was dissolved under the Irish Universities Act 1908, and replaced by the National Univer- sity of Ireland and the Queen's University of Belfast), the pre- cedent of Victoria has been followed. By an act passed in 1898, of which the provisions came into force in 1900, the university of London was reconstituted as a teaching university, although provision was made for the continuance of the system of examina- tions by " external examiners " for " external students," together with " internal examinations " for " internal students," in which the teachers and the external examiners of the university are associated. The examinations in music and the final examina- tions in law and medicine are carried on [1910] both for " internal " and " external " students by " external " examiners only, who are, however, appointed on the recommendation of boards of studies consisting mainly of London teachers.

At the university of Dublin, examinations have been main- tained both for the B.A. and M.A. degrees, and students may be admitted to the examinations in subjects other than divinity, law, medicine, and engineering without attendance at university courses.

The examinations of the newer universities, the Victoria Uni- versity of Manchester, Birmingham, Liverpool, Leeds, Sheffield and Wales, are open only to students at these universities, and are conducted by the teachers in association with one or more external examiners for each subject. In some universities, e.g. Manchester, the M.A. degree is given after examination to students who have taken a pass, and without examination to those who have taken an honours degree.

The universities which have departed furthest from the medieval system of examinations, at any rate in appearance, are those of

Germany. The baccalaureate has disappeared, but students cannot be matriculated without having passed the Abituriejiten-examen (see below), probably the most severe of all entrance examinations (foreign students may be exempted under certain conditions). The student desiring to proceed to the doctorate is free from examinations thereafter until he presents his thesis for the doctor's degree, 1 when, if it is accepted, he is submitted to a public oral examination not only in his principal subject (Hauptfach), but also as a rule in two or more collateral subjects (Nebenfacher). The doctor's degree does not give the right to teach in a faculty (venia legendi). To acquire this a doctor must present a further thesis (Habilitationsschrift), and must deliver two lectures, one before the faculty, followed by a discussion (colloquium), the other in public; but these lectures " seem to be merely secondary and are tending to become so more and more"; "scientific productiveness is so sharply emphasized among the conditions for admission that it over- shadows all the rest " (Paulsen, loc. cit. p. 165).

1 It should be mentioned that the professors of chemistry of a number of German, Austrian and Swiss universities, have, by agree- ment, instituted an intermediate examination in that subject which students are required to pass before beginning work on the doctoral thesis. The examination of the students is conducted by the teachers concerned.

In France the examination for the baccalaureate, though conducted in part by university examiners, has become a school- leaving examination (see below). The licentiateship has been preserved in the faculties of arts, science and laws, and is in point of difficulty about equal to the pass degree examinations of the university of London, though differing in the nature of the tests. In the faculty of sciences, the three subjects of examina- tion selected may, under a recent regulation, be taken separately. Until a few years ago the successful candidates at the licentiate- ship were arranged in order of merit. For the doctorate in the faculty of letters two theses must be submitted, of which the subject and plan must be approved by the faculty (until recently one of them was required to be written in Latin) . Permission to print the theses is given by the rector or vice-rector after report from one or more professors, and they are then discussed publicly by the faculty and the candidate (soutenance de these). In this public discussion the " disputation " of the middle ages survives in its least changed form. The literary theses required by French universities are, as a rule, volumes of several hun- dred pages, and more important in character even than the German Habilitationsschrift. The possession of the doctorate is a sine qua non for eligibility to a university chair, and to a lectureship in the university of Paris.

In the faculty of sciences a candidate for the doctorate may submit two theses, or else submit one thesis and undergo an oral examination.

For the doctorate in law, a thesis and two oral examinations are required.

In the faculty of medicine there is no licentiateship, but for the doctorate six examinations must be passed and a thesis submitted.

There is also a special doctorate, the ” doctoral d’ Universite,” awarded on a thesis and an oral examination; and there are diplomas (Dipldmes d’Htudes superieures) awarded on disserta-» tions and examinations on subjects in philosophy, history and geography, classics or modern languages, selected mainly by the candidate and approved by the faculty.

2. Professional Examinations, (a) Teaching. — University examinations for degrees having ceased to be used as technical tests of teaching capacity, new examinations have been devised for this purpose. The test for German university teachers has been described above. For secondary teachers, W. von Hum- boldt instituted a special examination in 18 10 (Paulsen, Gesch. des gelehrlen Unlerrichts, ii. pp. 283 and 393), and an examina- tion for primary teachers was instituted in Prussia in 1794.

In France there is a competitive examination for secondary teachers, the agregation, originally established in 1766. Agrigts have a right to state employment and they alone can occupy the highest teaching post (chaire de professeur) in a state secondary school, other posts being open to licentiates. There are also examinations for primary teachers. The tests for teachers are different for the two sexes.

In England there is no obligatory test for secondary teachers. The universities and the College of Preceptors conduct examina- tions for teaching diplomas. The Board of Education holds special examinations (Preliminary Certificate examination and Certificate examination, &c.) for primary teachers.

(b) Medicine. — See Medical Education.

(c) Other Professions. — A system of professional examinations carried on by professional bodies, in some cases with legal sanction, was developed in England during the 19th century. Those in the following subjects are the most important: Accountancy (Institute of Chartered Accountants and Society of Accountants and Auditors),

actuarial work (Institute of Actuaries), music (Royal Academy of Music, Royal College of Music, Trinity College of Music, Royal College of Organists, and the Incorporated Society of Musicians) , pharmacy (Pharmaceuti- cal Society), plumbing (the Plumbers' Company), surveying (Surveyors' Institution), veterinary medicine (Royal College of Veterinary Surgeons), technical subjects, e.g. cotton-spinning, dyeing, motor-manufacture (City & Guilds of London Institute), architecture (Royal Institute of British Architects), commercial

subjects, shorthand (the Society of Arts and London Chamber of Commerce), engineering (Institutions of Civil Engineers, of Mechanical Engineers, and of Electrical Engineers).

3. School-leaving Examinations. — The faculty of arts in medieval universities covered secondary as well/as higher education in the subjects concerned. The division in arts subjects between secondary and university education has been drawn at different levels in different countries. Thus the first two years of the arts curriculum in English and American universities correspond, roughly speaking, to the last two years spent in a secondary school of Germany or' France, and the continental " school-leaving examinations " correspond to the intermediate examinations of the newer English universities and to the pass examinations for the degree at Oxford and Cambridge (Mark Pattison, Suggestions on Academical Organization, 1868, p. 238, and Matthew Arnold, Higher Schools and Universities in Germany, 1892, p. 209).

A tabular summary is given (see Tables I., II., III., IV.) of the requirements of the secondary school-leaving examinations of France, Prussia (for the nine-year secondary schools) and Scotland, and of the university of London.

There are in England a number of school examinations which, under prescribed conditions, also serve as school-leaving examina- tions, and give entrance to certain universities, especially the Oxford and Cambridge local examinations (both established in 1858), and the examinations of the Oxford and Cambridge "Joint Board." A movement to reduce the number of entrance examina- tions and to secure uniformity in their standard was set on foot in 1 90 1. In that year the General Medical Council communicated to the Board of Education a memorial on the subject from the Headmasters'

Conference. The memorial was further com- municated to various professional bodies concerned. Conferences were held by the consultative committee of the Board of Educa- tion in 1903, with representatives of the universities, the Head- masters' Conference, the Association of Head-Masters, the Association of Head-Mistresses, the College of Preceptors, the Private Schools' Association, and with representatives of pro- fessional bodies. The committee were of opinion that a central board, consisting of representatives of the Board of Education and the different examining bodies, should be established, to co-ordinate and control the standards of "the examinations, and to secure interchangeability of certificates, &c, as soon as a sufficient number of such bodies signified their willingness to be represented on the board. They recommended that the examination should be conducted by external and internal ex- aminers, representing in each case the examining body and the school staff respectively, and that reports on the school work of candidates should be available for reference by the examiners (circular of the Board of Education of 12th of July 1904).

The " accrediting " system in the United States was started by the university of Michigan in 187 1. A school desiring to be accredited is submitted to inspection without previous notice. If the inspection is satisfactory, the school is accredited by a university for from one to three years, and upon the favourable report of its principal any of its students are admitted to the university by which it has been accredited without any entrance examination. In practice it is found that many students whom their teachers refuse to certify are able to pass the university entrance examination. The statistics of nine years show that the standard of the certified students is higher than that of non- certified students. Two hundred and fifty schools are accredited by the university of Michigan. In 1904 it was stated that the system was gaining favour in the east, 1 and that it had been adopted more or less by all the eastern colleges and universities with the exception of Harvard, Yale, Princeton and Columbia.

4. Methods of Examination. — Examinations may test (i.) knowledge, or, more exactly, the power of restating facts and arguments of a kind that may be learnt by rote; (ii.) the power

1 See E. E. Brown in Monographs on Education in the United States (ed. by N. M. Butler, 1900, i. 164), and T. Gregory Foster and H. R. Reichel, Report of Mosely Educational Commission (1904), pp. 117-119 and 288-289.

Written.

of doing something, e.g. of making aprScis of a written document, of writing a letter or a report on a particular subject with a particular object in view, of translating from or into a foreign language, of solving a mathematical problem, of criticizing a passage from a literary work, of writing an essay on an historical or literary subject with the aid of books in a library, of diagnosing the malady of a patient, of analysing a chemical mixture or com- pound; and (the highest form under the rubric) of making an original contribution to learning or science as the result of personal investigation or experiment. Examinations are carried out at present by means of (1) written papers; (2) oral examina- tions; (3) practical, including in medicine clinical, tests; (4) theses; or a combination of these.

In written examinations the candidates are, as a rule, supplied with a number of printed questions, of which they must answer all, or a certain proportion, within a given time, varying, as a rule, from ij to 3 hours, the latter being the duration most generally adopted for higher examinations in England. Whereas in France and Germany the questions are generally few in number and require long answers, showing constructive skill and mastery of the mother-tongue on the part of the candidates, such “essay-papers” are comparatively rare in England. In many subjects, the written examinations test memory rather than capacity. It has been suggested that sets of questions to be answered in writing should as a rule be divided into two parts: (i.) a number of questions requiring short answers and intended to test the range of the candidate’s knowledge; (ii.) questions requiring long answers, intended to test its depth, and the candidate’s powers of co-ordination and reflection. A necessary condition for the application of the second kind of test is that time should be given for reflection and for rewriting, say one-third or one-quarter of the whole time allowed. A further distinction is important, especially in such subjects as mathematics or foreign languages, in which it is legitimate to ask what precise power on the part of a candidate the passing of an examination shall signify. Owing to a prevailing confusion between tests of memory and tests of capacity, the allowance for chance fairly applied to the former is apt to be unduly extended to the latter. In applying tests of memory, it may be legitimate to allow a candidate to pass who answers correctly from 30 to 50% of the questions; such an allowance if applied to a test of capacity, such as the performance of a sum in addi- tion, the solution of triangles by means of trigonometrical tables, or the translation of an easy passage from a foreign language, appears to be irrational. A candidate who obtains only 50% of the marks in performing such operations cannot be regarded as being able to perform them; and, if the examination is to

be treated as a test of his capacity to perform them, he should be rejected unless he obtains full marks, less a certain allowance (say 10, or at most 20%) in view of the more or less artificial conditions inherent in all examinations.

The oral examination is better suited than the written to discover the range of a candidate's knowledge; it also serves as a test of his powers of expression in his mother- tongue, or in a foreign language, and may be used (as in the examination for entrance to the Osborne Naval College) to test the important qualities (hardly tested in any other examinations at present), readiness of wit, common-sense and nerve. It may be objected that candidates are heavily handi- capped by nervousness in oral examinations, but this objec- tion does not afford sufficient ground for rejecting the test, provided that it is supplemented by others. Oral tests are used almost invariably in medical examinations; and there is a growing tendency to make them compulsory in dealing with modern languages. Oral examinations are much more used abroad than in England, where the pupils during their school years receive but little exercise in the art of consecutive speaking.

The laboratory examination may be used in subjects like physics, chemistry, geology, zoology, botany, anatomy, physio- logy, to test powers of manipulation and knowledge of experimental methods. In some cases (e.g. in certain honours

Oral

EXAMINATIONS

45

TABLE I.— PRUSSIA : ABITURIENTEN EXAMEN

I.

II."

III.

IV.

V.

VI.

VII.

Name of . Examination.

Minimum Age for Entry.

Length of Course of Study.

Subjects.

Co-ordination with Teaching.

Examiners.

Nature of Examination and General Remarks.

Abilurienten

Age only limited

9 years.

In Gymnasium.

The object of the ex-

The Examining Board

The written examination

Exam en (established in

by condition of length of school

Candidates who

■ f German essay. S Mathematics. £-< Translation into Latin. > Translation from Greek into ■ “■* L German.

amination is defined as being a test of

consists of a govern- ment inspector (der

extends over four or five days. Only one paper is

1788).

course. The usual age is

17-38.

have not at- tended the 9

years’ school

whether the candi- date has fulfilled the aims laid down in the

K’dnigliche Kommis- sar) acting as chair- man, the headmaster

given each day, for which 3 to 5J hours are allowed ($i hours fpr the German

course may be

curricul a, &c ., pre-

of the school, and the

essay). For essays _ in

admitted to the

f Latin.

scribed for a Gym-

teachers of the high-

foreign languages diction-

examination on

. Greek.

nasium, Real-gym-

est classes in the

aries may be used.

special ap-

*t3 J English or French.

nasium or Ober-real-

school. The inspector

plication.

O j Religion.

History.

schule, as the case may be, and the sub- jects of examination

may nominate: a ‘ deputy, who is, as a

[_ Mathematics.

rule, the headmaster

In Real -Gymnasium.

are those prescribed in the curricula for

of the school.

Each teacher con-

.

Lrerman essay. Mathematics. Translation from Latin. Translation from German into, or essay in, English or French.

the kind of school

cerned selects for (he

g

concerned.

written examination

1-

The report on the

three alternative sub-

£

school Work of each

jects in his branch,

candidate in his

from which, after

_ Physics.

various subjects is

receiving a report

” Latin.

laid before the Exam-

: thereon from the

English.

ining Board before

headmaster, the in-

_;

French.

the beginning of the

spector makes a final

u.-

Physics or Chemistry.

examination.

choice.

•

Religion. History. Mathematics.

The papers are marked by the teachers concerned,

1

In Ol?er-Rcalsckule.

and circulated to the whole Board of Ex-

|

German essay.

aminers, who then

1

Mathematics.

decide whether in-

1

An exercise in French and in

dividual candidates

]

.5

English (an essay in one lan-

shall be (i.) rejected,

1

£

guage and a translation from

(ii.) admitted with

I

the other into German).

exemption from the

i

Physics or Chemistry.

oral examination, or

r English.

(iii.) submitted to the

French.

oral examination.

■

Physics.

d-

Chemistry.

Religion. History. t Mathematics.

TABLE II.— FRANCE : BACCALAUREAT

Name of Examination.

Baccalaurcat dc I’cnseignement secondaire.

This examina- tion has been carried on under different forms since 180S. The reg- ulations sum- marized here date fromigo2. when the bacc a laureat described re- place d the baccalaurCat- es-U’ tires, bac- calaurcat- es- scicnccs, and baccalaurta I de Venseifnc- ment moderne.

II.

Minimum Age

for Entry.

Part I., 16, or,

with special permission, 15. Part II. may not be taken within a n academic year after pass- ing Part I.

III.

Length of Course of Study.

There is no re- quirement of attendance. Part I. of the examination corresponds ex- actly to the subjects taken in the “second cycle”of secon- dary education, and Part II. to the (lasse de philosophic and classe de math e m a- liqttes.

See also under V.

IV. Subjects.

Part I. is divided into four Branches, viz.: —

(1) Latin-Greek.

(2) Latin-modern languages.

(3) Latin-science.

(4) Science-modern languages.

In each Branch the examination is divided into two parts, viz., written and oral. The nature of the ex- amination may be indicated by the following requirements in Branch (1): —

(i.) French composition.

(ii.) Translation from Latin. (iii.) Translation from Greek.

(i.) Explanation of a Greek

text. (ii.) Explanation of a Latin

text. (iii.) Explanation of a French

text. (iv.) Test in a modern foreign

language, (v.) Interrogation on ancient

history. (vi.) Interrogation on modern

history. (vii.) Interrogation on geo

graphy. (viii.) Interrogation on mathe- matics. (ix.) Interrogation on physics. Part II. is divided into two Branches, viz.: —

(1) Philosophy.

(2) Mathematics.

The nature of the examination may be indicated by the following re- quirements in Branch (1): —

(i.) An essay in French on a philosophical subject, (ii.) An examination in physical

and natural science, (i.) Interrogation on philosophy and philosophical writers. (ii.) Interrogation on contem- porary history. (ui.) Interrogation on physical

science. (iv.) Interrogation on natural science.

Co-ordination with Teaching.

The syllabus of the ex- amination is that pre- scribed for the higher classes in the Gov- ernment secondary schools.

The candidate may submit his livret scolaire, or school record, which will be taken into account.

1/

VI. Examiners.

The Board of Exam- . iners (or “jury”) consists of (i.) Uni- versity examiners being members of a faculty of letters or facul ty of sciences ; (ii.) secondary teachers, active or retired, selected by the minister of public instruction. The Board consists of from four to six ex- aminers, of whom, when the number is even, half are chosen from either category.

VII.

Nature of Examination and

General Remarks.

The written portion of Part I. extends over from 9 to 10 hours in all (not on a single day), in periods of 3 or 4 hours each; the written portion of Part II. extends over from 6 to 9 hours. The oral examination for each part lasts \ hour on the average, and is public.

TABLE III— SCOTLAND: SCHOOL-LEAVING EXAMINATION

Name of Examination.

Scottish school- leaving exam- ination (estab- lished 1888). (See pamphlet on the “Leav- ing Certificate Examination ” issued by the Scottish Edu- cation Depart- ment, 1908.)

Minimum Age for Entry.

17 onxstof Janu- ary following the year in which the can- didate passes the last of the written exam- inations.

Length of Course of Study.

IV.

Subjects.

Candidates roust pass in four subjects on the higher grade standard, or in three subjects on the higher grade standard and two on the lower. A pass in drawing is accepted in lieu of one of the two lower grade passes. A pass in Gaelic is reckoned as a pass on the lower grade. All candidates must have passed in higher English and in either higher or lower grade mathematics. The remaining sub- jects may be either science with one or more languages (Latin, Greek, French, German, Spanish, or Italian), or languages only. But where two or more languages other than English are taken, the candi- date's group must include either higher or lower grade Latin. A pass in Spanish, Italian, or science (in which subjects there is only one examination) is reckoned as a pass on the higher grade standard.

Co-ordination with Teaching.

Schools are inspected, and the course 01 instruction must be approved by the Scot- tish Education De- partment, but the examinations are con- ducted by external examiners with whom teachers are not associated.

VI.

Examiners.

The examiners are ap- pointed by the Scot- tish Education De- partment.

VII.

Nature of Examination and General Remarks.

The examination consists of a written examination and an oral examination, on which stress is laid. The length of the ex- amination varies with the subjects selected. The periods of examination vary from 1 to 2£ hours. If the candidate selects on the higher grade,

English, Latin, mathe- matics, and French, the examination extends over ia£ hours.

TABLE IV.— UNIVERSITY OF LONDON SCHOOL EXAMINATION, MATRICULATION STANDARD

1.

Name of

Examination.

School examina- tion, matricula- tion standard (established in

1902).

Note — A higher school leaving certificate is awarded to pupils who(i.) have pursued an approved course of study for a period of years at a school or schools under inspection ap proved by the University; and (ii.) being matriculated students, have passed the higher school examination" in at least three subjects at one and the same examination.

II.

Minimum Age

For Entry.

The

minimum age of entry is 15, but if the candidate is under 16 he must remain at school until he is 16 years of age in order to be qualified for the school-leav- ing certificate, and cannot be registered as a student of the University un- til he has reached that age.

III.

Length of Course

of Study.

The curriculum of each school is considered ,on its own merits.

IV.

Subjects.

Pupils must satisfy the examiners in not less than five subjects, as follows: — •

(1) English.

(a) Elementary mathematics.

(3) Latin, or elementary mechanics,

or elementary physics — heat, light and sound, or elementary chemistry, or elementary botany, or general elementary science.

(4) and (5) Two of the following

subjects, neither of which has already been taken under section (3). If Latin be not taken, one of the other subjects selected must be another language, either ancient or modern, from the list, and languages other than those included in the list may be taken if approved by the University, provided that the language is included irf the regular curriculum : — Latin, Greek, French, German, ancient history, modern history, history and geography, physical and general geography, logic, geo- metrical and mechanical draw- ing, mathematics (more ad- vanced), elementary mechanics, elementary chemistry, elemen- tary physics — heat, light and sound, elementary physics — electricity and magnetisrp, ele- mentary biology — botany, ele- mentary biology — zoology, gen- eral elementary science (chem- istry and physics).

Co-ordination with Teaching.

Schools under approved inspection, and course of instruction ap- proved by the Uni- versity.

The papers are ordinarily set on the matriculation sylla- bus, but papers may be specially set more closely in accordance with the school curriculum provided that the syllabus pro- posed is approved by the University as at least equivalent to that for which it is substituted.

VI.

Examiners.

The examiners are ordinarily those ap-

&ointed by the niversity for the ordinary matricula- tion examination.

VII.

Nature of Examination and General Remarks.

The examination extends over at least 18 hours, and includes _ an oral ex- amination . in modern languages.

Practical.

examinations) the examination may be prolonged over one or more days, and may test higher powers of investigation. But such powers can only be fully tested by the perform- ance of original work, under conditions difficult to fulfil in the examination room or laboratory. At the French examinations for the prix de Rome the candidates are required to execute a painting in a given number of days, under strict supervision (en loge).

In medicine the clinical examination of a patient is a test carried out under conditions more nearly approaching those of actual work than any other; and distinction in medical examina- tions is probably more often followed by distinction in after life than is the case in other examinations.

For the doctor's degree (where this is not an honorary dis- tinction) a thesis or dissertation is generally, though not in- variably, required in England. Of recent years the thesis has been introduced into lower examinations; it is required for the master's degree at London in the case of internal students, in subjects other than mathematics (1910);

Thesis.

both at Oxford and London, the B.Sc. degree, and at Cambridge the B.A. degree, may be given for research, although the number of students proceeding to a degree in this way is at present relatively small. In certain of the honours B.A. and B.Sc. examinations at Manchester and Liverpool, candidates may take the written portion of the examination at the end of the second year's course of study and submit a dissertation at the end of the third year. Theses are generally examined by two or more specialists.

5. Competitive Examinations. — The arrangement of students in order of merit led naturally to the use of examinations not only as a qualifying but also as a selective test, and to the offering of money prizes (including exhibitions, scholarships and fellowships) on the results. In 1854 selection by examination as a method of appointment to posts in the English public service was first substituted for the patronage system, which had caused grave dissatisfaction (see Macaulay's speech on the subject, The Times of the 25th of June

1853). The first public competitive examina- tion for the Royal Military Academy, Woolwich, took place in

1855, and in 1870 the principle of open competition for the civil service was adopted as a general rule. (For further details see Civil Service.)

In the Wurttemberg civil service candidates are admitted to a year's probation after passing a theoretical examination, at the conclusion of which they must pass an examination of a more practical character (A. Herbert, Sacrifice of Education . . .,1889, p. in).

In the award of scholarships, &c, it should be definitely decided whether the scholarship is to be awarded (1) for attainment, in which case the examination-test pure and simple may suffice, or (2) for promise, in which case personal information and a curriculum vitae are necessary. To take a simple instance: a candidate partly educated in Germany may obtain more marks in German at a scholarship examination than another who is more gifted, but whose opportunities have been less; the question at once arises, are the examiners to take the circumstances of the candidate into account or not ? It is understood that at the colleges of the older universities such circumstances are con- sidered. It must again be decided whether the financial circum- stances of candidates are to be taken into account; are scholar- ships intended as prizes, or as a means of enabling poor students to obtain a university education ? In some cases wealthy students have been known to return the emoluments of scholar- ships. It many universities of the United States there is a definite understanding that emoluments shall only be accepted by those needing them. It would not be difficult to ask candi- dates to make a confidential declaration on this subject on entrance and to establish in Great Britain a tradition similar to that of the United States, and steps in this direction have been taken both at Oxford and Cambridge (LordCurzonof Kedleston, University Reform, p. 86).

A special allowance may be made for age. In certain scholar- ship examinations held formerly by the London County Council a percentage was added to the marks of each candidate pro- portionate to the number of months by which his age fell short of the maximum age for entry. The whole subject of entrance scholarships at English schools and universities, and especially their tendency to produce

premature specialization, has recently been much discussed.

6. The Organization and Conduct of Examinations.- — The organization and conduct of examinations, in such a way that each candidate shall be treated in precisely the same way as every other candidate, is a complex matter, especially where several thousand candidates are concerned. The greatest precautions must be taken to ensure the secrecy of the examina- tion papers before the examination, and the effective isolation of individual candidates during the examination. The super- vision should be adequate to remove all temptation to copying. The hygienic conditions should be such as to reduce the strain to a minimum. The question of the mental fatigue produced by examinations has been studied by certain German observers, but has not yet been fully investigated.

7. Marking, Classification and Errors of Detail. — In applying a single test in a qualifying examination it would be sufficient to mark candidates as passing or failing. But examinations consist as a rule of a number of tests, each one of which is complex; and a mark is recorded in respect of each test or portion of a test in order to enable the examining body to estimate the per- formance, considered as a whole, of the candidate. At Oxford the marks are not numerical, but the papers are judged as of this or that supposed ” class,” and various degrees of merit are indicated by the symbols a, fi, 7, 8, to which the signs + or — may be prefixed, according as they are above or below a certain standard within each class. At Cambridge, numerical marks are used. The advantage of numerical marks is that they are more easily manipulated than symbols; the disadvantage, that they produce the false impression that merit can be estimated with mathematical accuracy. Professor F. Y. Edgeworth, in two papers on ” The Statistics of Examinations ” and the ” Element of Chance in Competitive Examinations ” (Journal of the Royal Statistical Society, 1888 and 1890), has dealt with

the subject, although on somewhat limited lines. His investiga- tions show clearly that with candidates near the border-line of failure, which must necessarily be fixed at a given point (subject to certain allowances, where more than one subject is considered), the element of chance necessarily enters largely into the question of pass and failure. The fact may be stated in this way: — the general efficiency of the test being granted, it is true to say that the large majority of those who pass an examination will be superior in efficiency to those who fail; but a few of those who fail may be superior to a few of those who pass. These errors are not peculiar to the examination system, they are inherent in all human judgments. It is necessary to allow for them in

considering the failure of an individual candidate as an index of inefficiency.

The element of chance, which prevails in the region on either side of the border between pass and failure, obviously prevails equally on either side of the border between ” classes,” where candidates are classified; it has been suggested by Dr Schuster that numerical order should accompany classification so as to avoid the creation of an artificial gap between the last candidate in one class and the highest in the next. Edgeworth’s objection to such an argument is that the number of uncertainties is far less when candidates are classed than when they are placed in ostensible order of merit.

The difficulties of comparison of marks are further complicated when students take different subjects and it is necessary to compare their merit by means of marks allotted by different examiners and added together. In a pass examination the question has to be considered how far, if at all, excellence in one subject shall compensate for deficiency in another, a question which is indeterminate until the precise object of the whole examination is formulated. In the competitive examination for the Indian civil service, places are allotted on the aggregate of marks obtained in a number of subjects selected by the candidate from a list of thirty-two. The successful candidates are compared a year later on the results of another examination in which there is again a choice, though a much more limited one. The order of merit in the two examinations is, as a rule, very different.

Two further points may be noted. An examiner may have underestimated the time required to answer the questions which he has set; this will be obvious if with a large number of candidates (say 300 or 400) none approaches the maximum mark. In this case the maximum should be reduced. Again, it is generally recognized to be undesirable to give marks for a smattering. In order to avoid this various devices are adopted. The simplest is to award a proportion of marks (say 10 to 15, or even 20%) for ” general impression.” In some examinations, unless say 20% or more marks are obtained for a particular subject, no credit is given for the paper in that subject. Latham (The Action of Examinations, 1877, p. 490) describes other numerical adjustments used to meet this difficulty, especially that used in English civil service examinations. The numerical results of the civil service examinations are reduced so as to conform to a certain symmetrical “frequency-curve,” of which the abscissae represent percentages of marks between definite limits and the ordinates the number of candidates obtaining marks between those limits. C. E. Fawsitt (The Education of the Examiner, Royal

Philosophical Society of Glasgow, 1905) shows that frequency-curves deduced from actual investigation of class-marks are not symmetrical, but have two maxima corresponding to the performance of ” non-workers ” and of ” workers.” In pass examinations of a well-known character there is a maximum just beyond the pass mark, this being the point of efficiency at which many students aim.

8. The Object and Efficiency of Examinations, and their Indirect Effects. — In order to estimate the efficiency of an examination as a test, the precise question should be asked in each case — – what is it intended to test? Much of the evil attributed to, and resulting from, examinations is due to the fact that this question has not been definitely put, and that a test legitimate for certain purposes has been used for others to which it is unsuited. Examinations are suited in the first instance for the

purpose for which they were originally designed in medieval universities — the test of technical and professional capacity; it has never been proposed to abolish qualifying examinations for doctors, pharmaceutical chemists, &c.; the tests applied are (or should be) direct tests of capacity carried out under con- ditions as nearly as possible like those of actual practice. If a student can auscultate correctly, or make up a prescription, at an examination, he will in all probability be able to do so in other circumstances.

Examinations as tests of the knowledge of isolated facts are necessarily of relatively small value, because the memory of such facts is transient; and memorization of a large number of facts for examination purposes is generally admitted to be specially transient; the ” knowledge-test,” considered apart from a test of capacity, is in fact not a test of permanent knowledge, but of the power of retaining facts for a length of time which it is impossible to estimate and which with some candidates extends over a few weeks only. When used as tests of ” general culture,” examinations, in the view of Paulsen, based on a study of German education, not only fail in their purpose, but tend to destroy the faculties which it is desired to develop (Geschichte des gelehrten Unterrichts, ii. 684 et seq.); to prepare ready answers to the numberless questions which an examiner may ask on a large variety of subjects is to paralyse the natural and free activity of the mind (cf. A. C. Benson on the results of English secondary classical education, From a College Window, 3rd ed., 1906, pp. 154-177). If

pushed to its logical conclusion the view of Paulsen must, it is submitted, lead to the complete abandonment at examinations of tests of ” knowledge ” as distinguished from direct tests of capacity. Thus isolated questions on details of grammar would disappear from papers on the mother-tongue and on foreign languages, in which the test would consist mainly or entirely of composition and translation. Erudition would be tested by the power of writing, at leisure, a dissertation on some subject selected by the examiners or the candidate or, in the case of a teacher, by the delivery of a lecture on the subject. At the French agregation candidates are given twenty-four hours for the preparation of a lecture of this kind. Such examina- tions would test the ” skill in the manipulation of facts which is the true sign of a trained intelligence ” (cf. K. Pearson, ” The Function of Science in the Modern State,” Ency. Brit. 10th ed. xxxii. Prefatory essay). They might possibly be supplemented by easy oral examinations to test both range of knowledge and readiness of ‘mind. But in the case of a pupil who had passed through a good secondary school it would be as safe to rely for supplementary information under this head on the testimony of his teachers, as it is to rely on their evidence with regard to the fundamental and all-important element on which no examina- tion supplies direct information — personal character.

The main arguments of those opposed to the examination system may be summarized as follows: (i.) Examinations tend to destroy natural interests and exclude from the attention of the pupil all matters outside the purview of the examination (they would not do so if examinations were so limited in character that preparation therefor could absorb only a fraction of the pupil’s time) ; (ii.) they tend to cultivate a personal judgment where no personal basis of judgment is possible (this argument, directed mainly against the Oxford essay system, applies not to examinations in general, but to the character of the subjects set for essays) ; (iii.) competitive examinations on the home and Indian civil services scheme tend to diffuse mental energy over too many subjects (but see (xviii.) below) ; (iv.) examinations, especially competitive examinations, tend to become more and more difficult, difficulty being confused with efficiency — this has shown itself with the Cambridge mathematical tripos, in which for years questions of increasing difficulty were set on relatively unimportant subjects, until the examination was reformed (reply: all examinations should be overhauled periodically) ; (v.) they tend to paralyse the powers of exposition, all statements of knowledge being thrown into a form suitable, not for an uninstructed person, but for one who already possesses it, the examiner (this tendency should be counteracted by

definite

training in composition); iyi.) the sample of knowledge and capacity yielded at an examination is frequently not a fair sample; it is liable to extreme variations in a favourable sense, if the candidate happens to have prepared the precise questions asked; in an unfavourable sense, if the candidate is suffering from misfortune or from accidental ill-health, the latter, owing to the periodic function, occurring much more frequently in the case of women than of men — [the reform of examination methods may remove to a great extent the element of chance in questions set; in a competitive examination it is impossible to allow for ill-health; in a qualifying examination it is difficult to make any allowance unless the examination is definitely conducted in whole ot in part by the teachers, and the past record of the candidate is taken into account (cf. Paulsen, The German Universities, pp. 344-345)]; (vii.) examinations of several hundred candidates at a time cannot be rationally conducted so as to be equally fair to the individuality of all candidates; the individual test is the only complete one (it is admitted that examinations on a large scale necessarily involve a margin of error; but this error may be reduced to a minimum, especi- ally by a combination of oral and practical with written work) ; (viii.) the multiplicity of school examinations required for different reasons produces confusion in our secondary education (there is a growing tendency to admit equivalence of ” school- leaving ” and entrance examinations; thus entrance examina- tions of Oxford, Cambridge and London, and the Northern Universities Joint Board are interchangeable under certain conditions); (ix.) the multiplicity of examinations tends to ” Underselling ” (the success of the London examinations in medicine proves that a high standard attracts candidates as well as a low one ; possibly intermediate standards may be killed in the competition; it is by no means obvious that a uniform system of examinations would conduce to efficiency) ; (x.) examinations produce physical damage to health, especially in the case of women-students (on this point more statistical evidence is needed; see, however, Engelmann quoted by G. Stanley Hall, Adolescence, 1905, ii. 588 et seq.); (xi.) examina- tions have in England mechanically cast the education of women into the same mould as that of men, without reference to the different social functions of the two sexes (the remedy is obvious); (xii.) it is unjustifiable to give a man a university position on the results of his performance in the examination room, a practice common in England though almost unknown on the continent; a just estimate of a man’s powers in research or for teaching can only be properly based on his performance. The present system merely leads to the transmission of

the sterile art of passing examinations. (At Oxford and Cambridge many fellowships are now awarded on the results of examination ; it is sometimes stated, in defence of this system, that young men can- not be expected to carry out research in classics or philosophy.) On the other hand, the defenders of examinations reply that (xiii.) examinations are necessary in order to test the efficiency of schools to which grants of public money are given (this argument has become somewhat out of date owing to the recent substitution of ” inspection ” for examination as a test of the efficiency of schools; a combination of inspection and examina- tion is also sometimes used); (xiv.) they serve as a necessary incentive to steady and concentrated work 1 (the reply made to this is that the incentive is a bad one, and that with efficient teachers it is unnecessary); (xv.) they show both student and teacher where they have failed (unnecessary for efficient teachers) ; (xvi.) though possibly harmful to the highest class of men, they are good for the mass (reply: no system which damages the highest class of men is tolerable); (xvii.) they are indispensable as an impartial means of selecting men for the civil service; (xviii.) in a difficult examination like the first class civil service examination the qualities of quickness of com- prehension, industry, concentration, power of rapidly passing

1 The Oxford commissioners of 1852 reported that ” the ex- aminations have become the chief instruments not only for testing the proficiency of the students but also for stimulating and directing the studies of the place ” {Report, p. 61).

from one subject to another, good health, are necessary for success, though not tested directly, and these qualities are valuable in any kind of work (this appears to be incontrovertible); (xix.) examination records show that success in examinations is generally followed by success in after-life, and the test is therefore efficient (it does not follow that certain rejected candidates may not be extremely efficient) ; (xx.) as a plea for purely ” external examinations,” teachers cannot be trusted to be impartial and it is better for a boy to ” cram ” than to curry favour with his teacher (Latham).

The brief comments in brackets, appended above to the argu- ments, merely indicate what has beer, said or can be said on the other side. It can scarcely be doubted that in spite of the powerful objections that have been advanced against examina- tions, they are, in the view of

the majority of English people, an indispensable element in the social organization of a highly specialized democratic state, which prefers to trust nearly all decisions to committees rather than to individuals. But in view of the extreme importance of the matter, and especially of the evidence that, for some cause or other (which may or may not be the examination system), intellectual interest and initiative seem to diminish in many cases very markedly during school and college life in England, the whole subject seems to call for a searching and impartial inquiry.

Sources of Information. — The works mentioned above, and T. D. Acland, Some Account of the Origin and Objects of the New Oxford Examinations for the Title of Associate in Arts (London, 1858); Matthew Arnold, Higher Schools and Universities in Germany (1874); Graham Balfour, The Educational Systems of Great Britain and Ireland (2nd ed., Oxford, 1903); W. W. Rouse Ball, Origin and History of the Mathematical' Tripos (Cambridge, 1880) ; Adolf Beier, Die hoheren Schulen in Preussen und Hire LeHrer (1902-1906) (in progress) ; Cloudesley Brereton, " A New Method of awarding Scholarships," School World, 1907, p. 409; G. C. Brodrick, A History of the University of Oxford (London, 1886) ; F. Buisson, Diclionnaire de pedagogie (1880-1887); Lord Curzon of Kedleston, Principles and Methods of University Reform (1909); J. Demogeot and H. Montucci, De I 'enseignement superieur en Angleterre et en Ecosse (1870) ; H. Denifle, Die Universildten des Mittelalters bis 1400 (Berlin, 1885); F. Y. Edgeworth, " The Statistics of Examina- tions," and " The Element of Chance in Competitive Examinations," Journal of the Statistical Society, 1888 and 1890 respectively; H. W. Eve, Lecture " On Marking," in The Practice of Education (Cambridge, 1883) ; Charles E. Fawsitt, The Education of thz Ex- aminer (Royal Philosophical Society of Glasgow) (Glasgow, 1905) ; J. G. Fitch, " The Proposed Admission of Girls to the University Local Examination," Education Miscellanies (1865), vol. x. ; W. Garnett, "The Representation of certain Examination Results," Journ. Statist. Soc._ (Jan. 1910) ; G. Stanley Hall, Adolescence (London, 1905) ; Sir W. Hamilton, Discussions on Philosophy (London, 1853) ; P. J. Hartog, " Universities, Schools and Ex- aminations " in the University Review (July 1905) ; P. J. Hartog and Mrs A. H. Langdon, The Writing of English (1907); Auberon Herbert (edited by), The Sacrifice of Education to Examination, Letters from " All Sorts and Conditions of Men " (1889); Influence of Examinations, Report by a Committee, British Association Reports for 1903, p. 434. and for 1904, p. 360; John Jebb, Remarks upon the Present Mode of Education in the University of Cambridge (4th ed., 1774); Henry Latham, On the Action of Examinations (Cambridge,

1877); H. C. Maxwell Lyte, A History of the University of Oxford to the Year 1530 (London, 1886); W. A. P. Martin, The Lore of Cathay (Edinburgh and London, 1901); J. B. Mullinger, The University of Cambridge (Cambridge, 1873); How to pass Examinations successfully, by an Oxford Coach; Mark Parti- san, Suggestions on Academical Organization (Edinburgh, 1868); Friedrich Paulsen, The, German Universities and University Study (London, 1906) and Geschichte des gelehrten Unterrichts (Leipzig, 1896); George Peacock, Observations on the Statutes of the University of Cambridge (1841); Programme des examens du nouveau bacca- laureat de V enseignement secondaire, Delalain freres, Paris; Hastings Rashdall, The Universities of Europein'the Middle Ages (Oxford, 1895); Rein's Encyklopadisches Handbuch der Padagogik (2nded., 1902, &c), articles " Prufungen " (by F. Paulsen), &c. ; Third Report of the Royal Commissioners on Scientific Instructions, 1873; J. E. Thorold Rogers, Education in Oxford (1861); M. E. Sadler, " Memorandum on the Leaving Examinations … in the Secondary Schools of Prussia," in Report of Royal Commission on Secondary Education, vol. v. p. 27 (1895); C. A. Schmid, Geschichte der Erziehung "(Stutt- gart, 1884, &c), and Encyklopadie des gesammten Erziekungs- und Unterrichtsivesens (2nd ed., 1876-87), articles" Prufung," " Schulpru- fungen," " Versetzungsprufungen," &c. ; Scholarships, various papers on, by H. B. Baker, A. A. David, H. A. Miers, M. E. Sadler and H. Bompas Smith, and others, British Association Report, 1907,

pp. 707-718; Arthur Schuster, article on "Universities and Examinations " in the University Review (May 1905) ; W. H. Sharp, The Educational System of Japan (Office of the Director-General of Education in India) (Bombay, 1906) ; Special Educational Reports, issued by the Board of Education, passim; A. M. M. Stedman, Oxford: its Life and Schools (London, 1887); I. Todhunter, Conflict of Studies (1873) ; William Whewell, Of a Liberal Education (London, 1845) ; Christopher Wordsworth, Scholae academicae (Cambridge, 1877) ; Etienne Zi (or Siu or Seu), Pratique des examens litteraires en Chine (Shanghai, 1894). Private information from Professor M. E. Sadler and Mr A. E. Twentyman. (P. J. H.; A. Wn.)

EXARCH (e£apxos, a chief person or leader), a title that has been conferred at different periods on certain chief officers or governors, both in secular and ecclesiastical matters. Of these, the most important were the exarchs of Ravenna (?.».). In the ecclesiastical organization the exarch of a diocese (the word being here used of the political division) was in the 4th and 5th centuries the same as primate. This dignity was intermediate between the patriarchal and the metropolitan, the name patriarch being restricted after a.d. 451 to

the chief bishops of the most important cities (see Patriarch). The title of Exarch was also formerly given in the Eastern Church to a general or superior over several monasteries, and to certain ecclesiastics deputed by the patriarch of Constantinople to collect the tribute payable by the Church to the Turkish government. In the modern Greek Church an exarch is a deputy, or legate a latere, of the patriarch, whose office it is to visit the clergy and churches in the provinces allotted to him. The title of exarch has been borne by the head of the Bulgarian Church (see Bulgaria), since in 1872 it repudiated the jurisdiction of the Greek patriarch of Constantinople. Hence the names of the politico-religious parties in the recent history of the Near East: ” Exarchists ” and ” Patriarchists.”

EXCAMBION (a word connected with a large class of Low Latin and Romance forms, such as cambium, concambium, scambium, from Lat. cambire, Gr. Kanfieiv or Ka/jxretv, to bend, turn or fold), in Scctslaw, the exchange (q.v.) of one heritable subject for another. The modern Scottish excambion may consist in the exchange of any heritable subjects whatever, e.g. a patronage or, what often occurs, a portion of a glebe for servitude. Writing is not, by the law of Scotland, essential to an excambion. Chiefly in favour of the class of cottars and small feuars, and for con- venience in straightening marches, the law will consider the most informal memoranda, and even a verbal agreement, if supported by the subsequent possession. The power to excamb was gradu- ally conferred on entailed proprietors. The Montgomery Act, which was passed in 1 7 70, to facilitate agricultural improvements, permitted 50 acres arable and 100 acres not fit for the plough to be excambed. This was enlarged by the Rosebery Act in 1836, under which one-fourth of an entailed estate, not. including the mansion-house, home farm and policies, might be excambed, provided the h«irs took no higher grassum (O.E. gersum, fine) than £200. The power was applied to the whole estate by the Rutherford Act of 1848, and the necessary consents of substitute heirs are now regulated by the Entail (Scotland) Act 1882.

EXCELLENCY (Lat. excellentia, excellence), a title or predicate of honour. The earliest records of its use are associated with the Frank and Lombard kings; e.g. Anastasius Bibliothecarius (d. c. 886) in his life of Pope Honorius refers to Charlemagne as ” his excellency ” {ejus excellentia) ; and during the middle ages it was freely applied to or assumed by emperors, kings and sovereign princes generally, though rather as a rhetorical flourish than as a part of their formal style. Its use is well illustrated in the various charters in the Red Book of the exchequer, where the addresses to the king vary between “your excellency,” “your dignity” {vestra dignitas), “your sublimity ”’ (vestra

sublimitas) and the like, according to the taste and inventiveness of the writers. Du Cange also gives examples of- the style excellentia being applied to the pope and even to a bishop (in a charter of 1182). With the gradual stereotyping of titles of honour that of ” excellency ” was definitively superseded in the case of sovereigns of the highest rank, about the beginning of the 15th century, by those of “highness ” and ” grace,” and later by ” majesty,” first assumed in England by King Henry VIII.

5°

EXCHANGE

Dukes and counts of the Empire and the Italian reigning princes continued, however, to be ” excellencies ” for a while longer. In 1593 the bestowal of the title of excellence by Henry IV. of France on the due de Nevers, his ambassador at Rome, set a precedent that was universally followed from the time of the treaty of Westphalia (1648). This, together with the reservation in 1640 of the title ” eminence ” (q.v.) to the cardinals, led the Italian princes to adopt the style of ” highness ” (altezza) instead of ” excellency.” In France, from 1654 onwards, the title of excellence was given to all high civil and military officials, and this example was followed in Germany in the 18th century.

The subsequent fate of the title varies very greatly in different countries. In Great Britain it is borne by the viceroy of India, the lord-lieutenant of Ireland, all governors of colonies and ambassadors. In the United States it is part of the official style of the governors of states, but not of that of the president; though diplomatic usage varies in this respect, some states (e.g. France) conceding to him the style of ” excellency,” others (e.g. Belgium) refusing it. The custom of other republics differs: in France the president is addressed as excellence by courtesy; in Switzerland the title is omitted; in the South American republics it is part of the official style (Pradier-Fodere, Cours de droit diplom. i. 89). In Spain the title of excelencia properly belonged to the grandees and to those who had the right to be covered in the royal presence, but it was extended also to high officials, viceroys, ministers, captains-general, lieutenants-general, ambassadors and knights of the Golden Fleece. In Austria the title Exzellenz belongs properly to privy councillors. It has, however, gradually been extended by custom to all the higher military commands from lieutenant-field-marshal upwards. Ministers, even when not privy councillors, are styled Exzellenz. In Germany the title is borne by the imperial chancellor, the principal secretaries of state, ministers and

Oberprasidenten in Prussia, by generals from the rank of lieutenant-general upwards, by the chief court officials, and it is also sometimes bestowed as a title of honour in cases where it is not attached to the office held by its recipient. In Russia the title is very common, being borne by all officers from major-general upwards and by all officials above the rank of acting privy councillor. Officers and officials of the highest rank have the title of ” high ex- cellency.” Finally, in Italy, the title eccelenza, which had come to be used in the republics of Venice and Genoa as the usual form of address to nobles, has become as meaningless as the English title of “esquire” or the address of “sir,” being, especi- ally in the south, the usual form of address to any stranger.

In the diplomatic service the title of excellency is technically reserved to ambassadors, but in addressing envoys also this form is commonly used by courtesy. (W. A. P.)

EXCHANGE, in general, the action of mutual giving and receiving objects, interests, benefits, rights, &c. The word comes through the French from the Late Lat. excambium (see Ex- Cambion). The present article deals with the theory and practice of exchange in monetary transactions, but this may conveniently be prefaced by a brief statement as to the law relating to the exchange of property and other matters. In English law exchange is defined as the mutual grant of equal interests, the one in consideration of the other. The ancient common law conveyance had certain restrictions, e.g. identity in quantity of interest, fee-simple for fee-simple, &c, entry to perfect the conveyance, and an implied warranty of title and right of entry by either party in case of eviction. Such exchanges are now effected by mutual conveyances with the usual covenants for title. Exchanges are also frequently made by order of the Board ‘of Agriculture under the Inclosure Acts, and there are also statutes enabling ecclesiastical corporations to exchange benefices with the approval of the ecclesiastical commissioners. The international exchange of territories is effected by treaties. The exchange of prisoners of war is regulated by documents called ” cartels ” (Med. Lat. cartellus, diminutive of carta, paper, bill), which specify a certain agreed-on value for each rank of prisoners. The practice superseded the older one of ransom at the end of a war. By the Regimental Exchanges Act

1875 the sovereign may by regulation authorize exchanges by officers from one regiment to another. (For ” labour exchanges ” see Unemployment.)

Exchange in relation to money affairs denotes a species of barter not

of goods but of the value of goods, a payment in one place being exchanged for a payment in another place. The popular statement of the theory of exchange represents four principals involved in two transactions. A and B are two persons residing in one place different from the domicile of C and D; A sells goods to C; B buys goods from D; A sells his claim on C to B, who remits it to D in satisfaction of his debt, and D receives the cash from C, so that, assuming the two transactions to be of equal value, one piece of paper satisfies the four parties to these two transactions, and the trouble, expense and risk of sending money from both places are avoided. The piece of paper which performs the service may be a telegraphic order, cheque or bill of exchange. In this elementary proposition there would be no difficulty of exchange, as the full value of A's claim on C would be paid for by B, who is under the necessity of sending in exactly similar amount of money to D ; but it can be seen that in actual practice the claims of one place on another place would not be exactly balanced by the necessities of the one place to meet obligations in the other place; thus arises the complication of exchange, which may best be described as the price of monetary claims on distant debtors.

Supposing, for example, that A in London had a claim on C in Edinburgh amounting to £100, and that B in London did not require to remit more than £90 to D in Edinburgh, it is evident that B in London must be offered some inducement to take over the whole of A's claim. B might give A £99: 19: o, and could then, after satisfying his debt to D, have £10 to his credit in Edinburgh, which he could retain there at interest until he had incurred further liability to D, or he could have the balance of £10 returned him in coin at an expense, say, of sixpence; this would leave B with a profit of sixpence on the transaction, and, assuming that these figures are reasonable, exchange on Edin- burgh in London wouTd be one shilling discount per £100. Supposing the necessities of B induced him to offer A only £99:14:0 for his £100 claim, A would then prefer that C remitted him £100 in coin, which, on the above scale of expenses would cost 5s. and A would receive £99:15:0 net. On these premises, exchange on Edinburgh in London cannot fall below 1 % discount, and the same circumstances prevent it from rising above i% premium, for B, in no case, would pay more for A's claim than £100 plus the cost of sending coin to Scotland. If this basis is appreciated, all exchange problems between different countries can be mastered, and the quotations in the daily papers of cable payments, sight drafts (cheques) and long bills are then understood and supply an interesting indication of the state of international financial relations. As shown above, the balance of indebtedness must eventually be remitted by coin, and consequently

when exchange in any city is quoted at one or other of the limit points given in our example as \% discount o f 4% premium, this exchange immediately acquires a very serious importance, because with the development of modern monetary systems under which enormous trade is carried on with a most moderate foundation of actual coin the weakening or strengthening of that foundation is a very vital matter.

While the understanding of the theory is essential for any facile interpretation of an exchange, there are of course in- numerable details of practice which require to be known to identify the limit points of exchange in any particular city. The limit points can only be taken advantage of by banking experts, and, although we assume a trader remitting his indebtedness in coin when he is asked to pay too high a price for his bill of exchange, in actual affairs the banker will supply the cheque or bill and himself will do the professional business of sending away bullion. Similarly, we have represented one trader drawing on another trader and selling his draft to a third trader who remits the draft to a fourth. In actual practice, however, No. 1 draws on No. 2 and disposes of his draft to a banker; No. 4 draws on No. 3 and sells his draft to a banker; because, speaking generally, whenever

goods are shipped, the shipper immediately requires his money ; he draws a bill against the goods, and it is the function of a banker to help, as a sort of debt-collecting agency, by buying these drafts; and the bank, being a mart for all forms of remittance, gets an immense variety of demand for cable payments, cheques and bills on all centres. This does not affect the theory, for it must be remembered that the banker is a necessary link between the buyer and seller of exchange, because the seller can only sell what he has and the buyer must have exactly what he wants.

To return to the question of limit points: if a universal currency system existed, with the same monetary standard that is used in England, and the coinage kept in a proper con- dition of weight and fineness, and the coin readily supplied to meet every reasonable claim — if, in fact, the pound sterling were the prevalent coin and the English banking system obtained everywhere, then we should find all exchange quotations as simple as our case of London and Edinburgh, that is to say, all exchanges would be quoted at par or a premium or a discount. The limit points in any place of the exchange on London would represent simply and obviously the cost of the transmission of

the coin. These limit points would vary at each place according to the distance from London, the cost of freight, the risk involved in the transmission and the local rate of interest. On the con- tinent of Europe some advance has been made in the direction of a universal coinage. Countries subscribing to the Latin Union have agreed on the franc as a common unit, and Belgium, Switzerland, France and Italy quote exchange between them- selves at a premium or discount. Greece, Spain and other countries are also parties to the arrangement, but their currencies are in a bad state, and the exchange quotations involve a con- siderable element of speculation. We have, however, to deal with another factor in international finance, namely, the enormous variety of currency systems; and we have then to discover, in each case, the exchange which represents par and corresponds to our £100 for £100 in the London-Edinburgh example. The United States furnishes perhaps the easiest problem, and we must find out how many dollars in gold contain exactly the same amount of the precious metal as is contained in one hundred sovereigns. The answer is 4865, and the arithmetic is a question of the mint laws of the two countries. Gold coin in the United States contains one-tenth alloy and in England one-twelfth alloy. Ten dollars contain 258 grains of gold, nine-tenths fine. One pound contains 123-274 grains of gold, eleven-twelfths fine, consequently £100 is worth $486}, or, to be exact, $4865, and when cable payments between London and New York are quoted at 4-86§ for the £1 sterling, exchange is about par. As a cable payment is an immediate transfer from one city to another, no question of interest or other charge is involved. Owing to the cost of sending gold as detailed above, the New York cable exchange varies from about 4-84 to 4-895; at the former point gold leaves London for New York, and at the latter point gold comes to England. Besides insurance, freight, packing, commission and interest, there must also be considered the circumstance that coin taken in bulk is always a little worn and under full weight, and in the process of turning sovereigns into dollars, the result would not bear out the calculation based on the mint regulations: consequently, when taking gold from London, the demand would first fall on the raw metal as received from South Africa or Australia to be minted in the United States, then on any stock of American coin the Bank of England might have and be willing to sell by weight (which would be accounted by tale in New York) , and lastly the demand would be satisfied by sovereigns taken by tale from the Bank of England and con- verted by weight in America.

The instance of the American quotation may be further taken to explain some of the numerous points which the study of the exchange

involves. In the first place, it will be noted that we have quoted the price in dollars. In London, business in bills, &c, on New York is quoted either in pence or in dollars, that is to say, payments are negotiated for so many dollars either at 49 tˆt pence per dollar, or at the equivalent rate $4-88 for the pound. In practice it is much more convenient to quote in

London in the money of the foreign country, as it makes com- parison with the foreign rate on London very simple. Some foreign countries quote exchange on London in pence, and then, of course, in relation to those countries the same practice will obtain in England, but the majority of the exchange quotations on London are in francs, marks, gulden, lire, kronen or other foreign money. Another point which must be explained is the reason why exchange varies between what we have called the limit points; why there is sometimes so much demand for bills on London and why at other times so many bills are being offered. Similar causes operate on other exchanges, and if we develop the New York case we shall provide explanations for exchange movements in other countries.

At one time the financial relations between England and America were as follows. England was the principal creditor of the United States, and the latter country had to remit continually very large amounts in payment of interest on English money and profits on English investments, in payment for shipping freights, for banking commissions, insurance premiums and an immense variety of services, besides paying for the large imports which crossed the Atlantic from English ports. In the fall of the year these payments would be more than offset by the enormous exports of food-stuffs, cotton, tobacco, &c, so that during the first half of the year exchange would be at or about the limit of 4-89! and gold would have to be sent from New York to supplement the deficient quantity of bills. In the autumn the produce bills would flood the exchange market and gold would be sent from London as exchange got to the other limit point of 4-84. These conditions are still very potent, but latterly another element has entered into the position, and the new development is so powerful as to reverse sometimes what we may call the natural and legitimate movement in the exchange. This new element is the more intimate banking and financial relation- ship which has been established between the two countries. As American conditions have become more stable, with better security for capital and an assured feeling about the currency of the United States, bankers in London have gladly allowed their banking friends in New York and other large cities to draw bills on London whenever there was a good demand for sterling remittances. We have, therefore, to consider a fresh type of

bill of which the drawer has no claim on the drawee, but, on the other hand, incurs a debt to the drawee. To take a very usual method, a banker in Wall Street, New York, will advance money to stockbrokers, investors and speculators against bonds and shares with a 20 % margin. He deposits this security with a trust company in New York which acts both for the American and English banker. The Wall Street banker then draws a bill at 60 days' sight or 90 days' sight on the banker in Lombard Street and sells this draft to supply the money he lends the stockbroker. Two or three months hence the New York banker must send money to London with which to meet the bill, so that, whereas, in the case of a commercial bill, the produce is despatched and in due course the consignee must find the money for the bill, in the case of a finance bill, as it is called, the bill is drawn and in due course the drawer must send the value with which it is to be honoured. In any event the acceptor, the London banker, has to pay the bill, so that it will be easily understood that relations of the greatest confidence are necessary between the drawer and drawee before finance bills of this class can be created.

The profit arising from the transaction we have sketched is realized by the separate parties in this way. The New York banker lends money for three months, say, at 5 % per annum, he pays a commission of -g J 2 "% to the trust company which has custody of the security, a charge equivalent to § % interest per annum. He draws on London at 90 days' sight and sells the bill at 4-83!, the cable rate being 4-87ˆ, the buyer of a three months' bill making the allowance for the English bill stamp of J per mille and the London discount rate of 3 . The drawer of the bill must also pay a commission of tV to the London banker who accepts the draft; this is equivalent to another |% per annum in the rate of discount, so that money raised in this way costs |% for the trust company, 3% the London discount rate,

about i % for bill stamps, and f % for London commission — altogether, 4s ; and, as the money is loaned at 5, there appears to be 5 % profit to the drawer of the bill. This, however, is on the assumption that the cable rate is still 4-87! when the bill falls due for payment and that the drawer would have to pay that price to telegraph the money to meet the draft. But exchange on London can go up or down between 4-84 and 4-895, and if at the end of the three months the cable rate is 4-84 the New York banker will be able to cover his bill at almost the same rate at which he sold it and will only be out of pocket

to the extent of the commissions and stamps, so that the accommodation will only cost him i|% and his profit will be 3!%. If he has to pay more than 4-87! for his cable at the maturity of the bill his profit will be less than $ %, and he may even be a loser on the transaction.

It is obvious, then, that a high rate of interest in New York, with a high rate of exchange on London and a low rate of dis- count in England, would induce the creation of these finance bills. The supply of these bills would prevent New York ex- change reaching the limit point at which gold leaves the United States, and the maturity of these bills in the autumn would ensure a demand for the produce bills and possibly prevent exchange from falling to the other limit point at which London has to send gold to New York.

We have pointed out the essential difference between these finance bills and what we have called produce bills, but there is another very striking difference, that of the question of supply. These finance bills are obviously very difficult to limit in their amounts; produce bills are, of course, limited by the extent of the surplus crops of the United States and by the demand for the produce in Europe, but so long as it is mutually satisfactory to the big finance houses in both countries to draw on credit granted in London, so long may these accommodation bills be created, and the pressure of the bills in New York may depress exchange so much that gold leaves London at a time when it is required in other directions. In such a case the embarrassment caused by this artificial drain of the gold reserve would much more than offset the amount of the commission earned by the accepting houses. The Bank of England may have to raise its ■ rate of discount at the expense of the entire home trade; prob- ably, also, with the rise in the value of money, consequent on the diminished resources, all investment securities fall in value and more onerous terms must be submitted to by the government, corporations and colonies, in the issue of any loans they may require. It will, therefore, be appreciated that, although these finance bills may be perfectly safe, their excessive creation is viewed with great disfavour, and considerable apprehension is felt when the adventures of speculators in New York make great demands for loans against stocks and shares, and, through the instrumentality of these finance bills, shift the burden on to the shoulders of the London discount market. The effect of this is to level money rates as between New York and London, and in the process the pressure falls on London and the relief goes to America. Eventually, of course, the bills must be met and funds sent for that purpose from across the Atlantic, but in the meanwhile the disturbance of the gold supply is an incon- venience.

We have explained the process of employing credits granted in London to finance Wall Street; there are, also, many other types of bill to which the acceptor lends his name on the assurance that he will in, due course be supplied with the funds required to meet the acceptance. In the case of the produce bills, a London banker will accept the bills in order that they may be more easily marketable than if they were drawn direct on the actual consignee of the cotton, tobacco or wheat. The consignees in Liverpool, &c, pay a commission for this assistance and reimburse the London bank as the produce is gradually disposed of. The transaction appears slightly more complicated when English bankers accept bills for produce shipped from the United States to merchants living in Hamburg, Genoa, Singapore and all other great ports, but the principle is the same, and the influence of such business on the exchange affects, in the first

instance, the quotation between America and London, but afterwards, when money must be sent to London with which to honour the bills, the exchanges with Germany, Italy or the Straits Settlements bear their share in the eventual adjustment, the spinners, tobacco manufacturers and corn factors requiring drafts on London where so much of the trade of the -world is financed.

We shall have to consider later the reasons which ensure to London this peculiar and predominant position. We have so far used the American exchange as an example to explain causes which produce fluctuations in all the principal exchanges on London and to show the points between which fluctuations are limited. The fact that America is still developing at a much greater rate than the Old World makes an important distinction between the financial position in New York and the financial position of the big capitals in Europe. There is not in America the huge accumulation of savings and investment money which the Old World has collected, so that whereas Europe helps to finance the United States, the latter country has so many home enterprises that she can spare none of her funds to assist Europe. It would not be possible for London to draw on New York such bills as we have described as finance bills, for they could never be discounted there except on the most onerous terms, and there is nothing in America which corresponds to the London money market.

We have to deal with dollars and cents in America, with francs in France, with marks in Germany, and different money units iri nearly every country; but, given the mint regulations, the theoretical par of exchange and the theoretical limit points are arrived at by simple arithmetic. An exhaustive statement with reference to every country would involve an amount of tedious repetition, so that for the

purposes of this article it is more instructive to consider the essential differences between the important exchanges than to go into the details of coinage, which would appeal rather to the numismatist than to the ex- change expert.

The United States, offering as it does a vast field for profitable investment, must annually remit huge amounts for interest on bonds and shares held by Europeans; coupons and dividend warrants payable in America are offered for sale daily in London, and at the end of the quarters the amount of these claims, coupons and drawn bonds is very large, and a considerable set off to the indebtedness of Europe for American produce. It is often asserted that the United States is rapidly getting sufficiently wealthy to repurchase all these bonds and shares; but whenevel trade conditions are exceptionally good in the States, fresh- evidence is forthcoming that assistance from London and Europe is essential to finance the commercial development of the United States. This illustrates a feature common to all new countries, and the effect is that they make annual payments to the oldeJ countries and especially to England.

A government loan or Other large borrowing arranged abroad will immediately move the exchange in favour of the borrowing country. A tendency adverse to the United States results from the drafts and letters of credit of the large number of holiday makers who cross the Atlantic and spend so much money in Europe. When remittance is made of the incomes of Americans who have taken up their residence in the Old World the exchange is affected in a similar manner.

In one respect the United States stands far superior to most of the older countries. There are no restrictions on the free export of gold when exchange reaches the limit point showing that the demand for bills on London exceeds the supply. New York (with London and India) is a free gold market, and this is undoubtedly one of the reasons why money is so readily advanced to the United States, and the finance bills, to which we referred above, would not be allowed to the same extent were it not for the fact that New York will remit gold when other forms of 1 remittance are insufficient to satisfy foreign creditors. When exchange between Paris and London reaches the theoretical limit point of 25-32 (25 francs 32 centimes for the £1 Sterling), gold does not leave Paris for London unless the Bank of France is

willing to allow it. By law, silver is also legal tender in France, and if the State Bank is pressed for gold a premium will be charged for it if it is supplied. Gold may be collected on cheaper terms in small amounts from the great trading corporations or from the offices of the railways, but a large shipment can only be made by special arrangement with the Bank of France. Similarly, in Germany, where a gold standard is supposed to obtain, if a banker requires a large amount of gold from the Reichsbank he is warned that he had better not take it, and if he persists he incurs the displeasure of the government institution to the prejudice of his business, so that the theoretical limit point of 20 marks 52 pf. to the pound sterling has no practical significance, and gold cannot be secured from Berlin when exchange is against that city, and Germany has, when put to the test, an inconvertible and sometimes a debased currency. There is no state bank in the United States, and no government inter- ference with the natural course of paying debts. On the other hand, when monetary conditions in New York indicate a great shortage of funds, and rates of interest are uncomfortably high, the United States treasury has sometimes parted with some of its revenue accumulations to the principal New York bankers on condition that they at once engage a similar amount of gold for import from abroad, which shall be turned over to the treasury on arrival. As these advances are made free of interest the effect is to adjust the limit point of 484 to about 485, and the United States treasury seems to have taken a leaf out of the book of the German Reichsbank, which frequently offers similar facilities to gold importers and creates an artificial limit point in the Berlin Exchange. The Reichsbank gives credit in Berlin for gold that has only got as far as Hamburg, and sometimes gives so many days' credit that the agent in London of German banking houses can afford an extravagant price for bar gold and even risk the loss in weight on a withdrawal of sovereigns, although the exchange may not have fallen to the other limit point of 20-32. In England the only effort that is made to attract gold is some action by the Bank of England in the direction of raising discount rates; occasionally, also, the bank outbids other purchasers for the arrivals of raw gold from South Africa, Australia and other mining countries. Quite exceptionally, for instance during the Boer War, the Bank of England allowed advances free of interest against gold shipped to London.

Many of the principal banking houses in all the important capitals receive continually throughout the day telegraphic information of the tendency and movement of all the exchanges, and on the smallest margin of profit a large business is done in what is called arbitrage (q.v.). For instance, cheques or bills on London will be bought by X in

Paris and remitted to Y in London. X will recoup himself by selling a cable payment on Z in New York. Z will put himself in funds to meet the cable payment by selling 60 days' sight drafts on Y, who pays the 60 days' drafts at maturity out of the proceeds of the cheques or bills received from Paris, and this complicated transaction, involving no outlay of capital, must show some minute profit after all expense of bill stamps, discount, cables and commissions has been allowed for. Such business is very difficult and very technical. The arbitrageur must be in first-class credit, must make the most exact calculation, and be prompt to take advantage of the small differences in exchange, differences which can be only temporary, as these operations soon bring about an adjustment.

The European exchanges with which London is chiefly con- cerned are Paris and Berlin, through which centres most of the financial business of the rest of Europe is conducted; for example, Scandinavia, Russia and Austria bank more largely with Berlin than elsewhere. Italy, Switzerland, Belgium and Spain bank chiefly in Paris. European claims on London or debts to London are settled mostly through Germany or France, and consequently the German and French rates of exchange are affected by the relation of England with the rest of the Continent. The ex- changes on Paris and Berlin are therefore most carefully watched by all those big interests which are concerned with the rate of discount and the value of money in London.

If the Paris cheque falls to 25-12, gold arrivals in the London bullion market will be taken by French bankers unless the profit shown by the exchange on some other country enables other buyers to pay more for the gold than Paris can afford. If the Paris cheque falls still further, it would pay to take sovereigns from the Bank of England for export, and so much would be taken as would satisfy the demand to send money to France, or until the consequent scarcity of money in London made rates of interest so high in England that French bankers would prefer to leave money and perhaps increase their balances. As between London and Paris and Berlin the greatest factor operating the exchanges is the relative value of money in the three centres. There is no great excess of trade balance at any season in favour of Germany or France and against England. On the other hand the banking relations between those countries are very intimate, and if funds can be very profitably employed in one of these places, there will be a good demand for remittance, and exchange will move in favour of that place, that is to say > exchange will go towards that limit point at which gold will be sent. The great pastoral and agricultural countries like South America, Egypt and India are in a position to draw very largely on London when their crops or other products are ready for

shipment. In the early months of the year gold goes freely to South America to pay for the cereals, hides and meat, and in the autumn Egypt and India send such quantities of cotton and wheat that exchange moves “heavily in favour of those countries, and gold must go to adjust the trade balance. During the rest of the year the gold tends to return as these countries always require bills on London or some form of payment to meet interest and dividends on European money invested in their government debts, railways and trading enterprises, and to pay for the European manu- factures which they import. Exchange then moves in favour of England, and the Bank of England can replenish its reserve. Over the greater part of the world the rate of exchange on London is an indication simply of the trade balance. The greater part of the world receives payment for food stuffs, and has to pay for European manufactures, shipping freights, banking services and professional commissions.

The greatest complication in exchange questions arises when we have to deal with a country employing a silver standard, and, fortunately for the development of trade, this problem has disappeared of late years in the case of India, Ceylon, Japan, Mexico and the Straits Settlements, and now the only important country using silver as a standard is China. When the monetary standard in one country is only a commodity in another country we are as far removed from the ideal of an international currency as can be imagined. We can fix no limit points to the exchange and we cannot settle any theoretical par of exchange. The price of silver in the gold-using country may vary as much as the price of copper or tin, and in the silver-using country gold is dealt in just as any other metal. In both cases the only metal of constant price is the metal which is used as the money standard. The easiest method of explaining the position is to consider that any one in a gold-using country having a claim in currency on a silver-using country has to offer for sale so many ounces of silver, and vice versa the exporter in a silver-using country sending produce to London has to offer a draft representing so many ounces of gold. This introduces a very unsatisfactory element. To take a practical example :-ˆa tea-grower in China has raised his crop in spite of the usual experience of weather and labour difficulties and the endless risks that a planter must face; the tea is then sent to London to take its chance of good or bad prices, and at the same time the planter has a draft to sell repre- senting locally a certain weight of gold; now, in addition to all the risks of weather and trading conditions, and the chances of the fluctuations in the tea market, he is compelled to gamble in the metal market on the price of gold. Some years ago when a large number of important countries employed a silver standard it was seriously

suggested that a fixed ratio should be agreed internationally at which gold and silver should be exchanged. This advocacy of bimetallism (q.v.) was especially persistent at a time when silver had suffered a very great fall in price and the

prominent exponents could generally bt identified either as extremely practical men who were interested in the price of silver, or as very inexperienced theorists. The difficulty of the two standards was successfully solved by discarding the use of silver, and the chief silver-using countries adopted a gold standard which has given greater security for the investment of foreign capital, has simplified business and brought about a large increase of trade.

In the case of a country of which the government has been subject to great financial difficulties, gold has been shipped to satisfy foreign creditors so long as the supply held out, and the exchange with such a country will continue to move adversely with every fresh political embarrassment and any other economic cause reflecting on the national credit. With the collapse of the monarchy in Brazil the value of the milreis fell from 2”jd. to 5d., and all the Spanish-American countries have from time to time afforded most distressing examples of the demoralizing effects on the currency of unstable and, reckless administration. In Europe similar results have been shown by the mistrust inspired by the governments of Spain, Greece, Italy and some other states. The raising of revenue by the use of the printing press creates an inconvertible and depreciating paper currency which frightens foreign capital and severely taxes the unfortunate country which must make payment abroad for the service of debt and other obligations. With the tardy appreciation of the old proverb that ” honesty is the best policy ” nearly every country of importance has made strenuous efforts to improve the integrity of its money. • Exchange quotations are not published from many of the British colonies, as their financial business is in the hands of a comparatively few excellently managed banks, which establish, by agreement, conventional exchanges fixed for a considerable period, notably in the case of Australia, New Zealand and South Africa. The Scottish and Irish banks supply similar examples of a monopoly in exchange.

The following table taken from the money article of a London daily paper indicates the exchanges which are of most interest to England: —

Foreign Exchanges.

June 14.

June 15.

June 16.

Paris, cheques

25 f. 18 c.

25 f. 18 c.

25 f. 18 c.

,, Mkt. discount .

2§-f p.c.

2-i p.c.

2§-| p.C.

Brussels, cheques

25 f. 23 c.

ˆ5 f- 23i c.

Berlin, sight .

20 m. 48! pf.

20 m. 48J pf.

20 m. 48 pf.

,, 8 days

20 m. 46ˆ pf.

20 m. 46J pf.

20 m. 45! pf.

,, Mkt. discount

3j P- c –

3s P-c

3» P-c-

Vienna, sight .

Holiday

24 kr. 02 J h.

24 kr. 02 -J h.

Amsterdam, sight

12 fl. 13! c.

12 fl. 1 3 J- c.

Italy, sight

Holiday

25 lire 15 c.

Madrid, sight.

,,

27 ps. 68

Lisbon, sight .

,,

St Petersburg, 3ms. .

94 r. 10

94 r. 10

Bombay, T.T.

is. 4d.

is. 4d.

is. 4d.

Calcutta, T.T.

is. 4d.

is. 4d.

is. 4d.

Hong-Kong, T.T.

2s. ij’cd.

2s. ii’„d.

2s. ii’ B d.

Shanghai, T.T.

2s. iojd.

2s. iofd.

2s. iofd.

Singapore, T.T. .

2s. 4i] 6 d.

2s. 4 I V,d.

2s. 4jV1.

Yokohama, T.T. .

2s. ofd.

2s. ofd.

2S. ofd.

*Rio de Jan’ro, 90 days

i6Ad.

i6,» 6 d.

i6J|d.

“Valparaiso, 90 days

Coml

I4sd.

Hfd.

14-id.

*B. Ayres, 90 days

48id.

48d.

48d.

- These rates are telegraphed on the day preceding their receipt.

In the case of Paris and Berlin it will be noticed that the local rate of discount is also given, as the value of money in these centres, in relation to the value of money in London, is the most important factor in a movement of the exchange. Vienna has become important owing to the improvement in the financial position of Austria, and still greater improvement is shown in the case of Italy, whose currency stands in the above list better even than that of France. Spain, which should stand at about the same rate, still has a depreciated paper currency. Lisbon stands also at a discount, as the milreis should be worth 53ˆ pence.

In Russia the exchange showing 94.10 roubles to £10 is care-

fully and cleverly controlled in spite of the bad internal position. The India exchanges move slightly, as the currency is firmly established at the rate of 15 rupees to the £1. Hong-Kong quotes for the old Mexican dollar and a British trade dollar; Shanghai for the tael containing on an average 51 75 grains of fine silver. The Straits Settlements have fixed their money on a gold basis at 2s. 4d. per dollar, on the lines of the arrangement made in India. In Japan there is a gold standard, and par of exchange is 2s. oˆd. for the yen. Brazil, Chile and Argentina have a depreciated paper currency, and the last quotation of 48d. is for the gold dollar equal to five francs, but there is a premium on gold in the River Plate of 127.27!% and for the present a gold standard is

re-established on this basis. The letters T.T. with the eastern exchanges signify telegraphic transfer or the rate for payments made by cable. The very important New York rates are always given in another part of the daily paper with other details of American commercial interest.

These rates are all quotations for payments in England, and all over the world the exchange on London is the exchange of the greatest importance. This unique position was gained originally, probably, through the geographical position of the United Kingdom, and has been maintained owing to several reasons which secure to London a peculiar position by comparison with any other capital. Britain's colossal trade ensures a supply of and a demand for English remittances. Even when goods or produce are dealt in between foreign countries a credit is opened in London, so that the shipper of the produce can offer in the local market a bill of exchange which is readily saleable. With the highly developed banking system a large amount of deposits is collected in London, and the result is that bills of any usance up to six months can be immediately discounted, and the pro- ceeds, if required, can be handed over in gold. There are in London a great number of wealthy banks and banking houses whose reputation and solidity allow any one of them to accept bills for amounts varying from one to ten millions sterling, whereby large commissions are earned.

These four advantages, namely, a free gold market, a huge trade, an enormous accumulation of wealth, and a discount market such as exists nowhere else, have made London an unrivalled financial centre, and consequently bills on London are an international money and the best medium of exchange.

Authorities. — A B C of the Foreign Exchanges, by George Clare; Foreign Exchanges, by Goschen; Arbitrage, by Deutsch; Arbitrages et Parites, by Ottomar Haupt; Swoboda, Arbitrage (12th edition), by Max Fuerst. (E. M. Ha.)

EXCHEQUER. The word " exchequer " is the English form of the Fr. echiquier, low Lat. scaccarium, and its primary meaning is a chess-board (see Chess). As the name of a government department dealing with accounts it is derived from the exchequer or the " abacus " by means of which such accounts were kept, such a contrivance being almost universally in use before the introduction of the Arabic notation. In England the department or court of accounts was named originally " the tallies " from the notched sticks or tallies which constituted the primitive means of account-keeping (which were only

abolished in 1826), and was only subsequently, probably in the reign of Henry I., named the exchequer from the use of the abacus. Both the name and the general features of the institution may reasonably be attributed to Norman influence, since we find both in Normandy and in the Norman kingdom of Sicily, as well as in Scotland and Ireland; the two latter cases being directly due to English example. As a court of law the exchequer owed its existence in England, as elsewhere, to the necessity of deciding legal questions arising from matters of account, and its secondary activities soon overshadowed its original functions.

We cannot say whether the exchequer, as known in England, is older than the beginning of the 12th century. The treasury, which may be regarded as one of its constituents, dates from before the conquest, and the officers of the exchequer who were drawn from the treasury staff can be traced back to Domesday. But our earliest information about the exchequer itself, apart from that afforded by the pipe rolls (see Record), rests on a

treatise (Dialogus de Scaccario) written about a.d. 1179 by Richard, bishop of London and treasurer of England. His father, Nigel, bishop of Ely, had been treasurer of Henry I., and nephew to that king's great financial minister Roger, bishop of Salisbury. Nigel is said to have reconstituted the exchequer after the troubles of Stephen's reign upon the model which he inherited from his uncle. The Angevin, or rather the Norman, exchequer cannot be regarded in strictness as a permanent department. It consisted of two parts: the lower exchequer, which was closely connected with the permanent treasury and was an office for the receipt and payment of money; and the upper exchequer, which was a court sitting twice a year to settle accounts and thus nearly related to the Curia Regis (q.v.). We dare hardly say that either exchequer existed in vacation; indeed the word (like the word " diet ") seems to have been limited at first to the actual sitting of the king's courtfor financial purposes. The Michaelmas and Easter exchequers were the sessions of this court '■' at the exchequer " or chess-board as it had previously sat " at the tallies." The constitution of the court was that of the normal Frankish curia. The king was the nominal president, and the court consisted of his great officers of state and his barons, or tenants-in-chief, and it is doubtless due to the fact that the exchequer was originally the curia itself sitting for a special purpose that its unofficial judges retained the name of " barons " until recent

times. Of the great officers we may probably find the steward in the person of the justiciar, the normal president of the court. He sat at the head of the exchequer table. The butler was not represented. The chan- cellor sat on the justiciar's left; he was custodian ex officio of the seal of the court, and thus responsible for the issue of all writs and summonses, and moreover for the keeping of a duplicate roll of accounts embodying the judgments of the court. On the left of the chancellor, and thus clear of the table, since their services might be required elsewhere at any moment, sat the constable, the two chamberlains and the marshal. The constable was the chief of the outdoor service of the court, and was responsible for everything connected with the army, or with hunting and hawking. The two chamberlains were the lay colleagues of the treasurer, and shared with him the duty of receiving and paying money, and keeping safe the seal of the court, and all the records and other contents of the treasury. The marshal, who was subordinate to the constable, shared his duties, and was specially responsible for the custody of prisoners and of the vouchers produced by accountants. At the head of the table on the justiciar's right sat, in Henry II. 's time, an extraordinary member of the court, the bishop of Winchester. The treasurer, like thS chancellor a clerk, sat at the head of the right-hand side of the table. He charged the accountants with their fixed debts, and dictated the contents of the great roll of accounts (or pipe roll) which embodied the decisions of the court as to the indebtedness of the sheriffs and other accountants. These persons with certain subordinates constituted the court of accounts, or upper ex- chequer, whereas the lower exchequer, or exchequer of receipt, consisted almost exclusively of the subordinates of the treasurer and chamberlains. In the upper exchequer the justiciar appointed the calculator, who exhibited the state of each account by means of counters on the exchequer table, so that the proceedings of the court might be clear to the presumably illiterate sheriff. The calculator sat in the centre of the side of the table on the president's left. The chancellor's staff consisted of the Magister Scripiorii (probably the ancestor of the modern master of the rolls), whose duties are not stated; a clerk (the modern chancellor of the exchequer) who settled the form of all writs and summonses, charged the sheriff with all fines and amercements, and acted as a check on the treasurer in the com- position of the great roll; and a scribe (afterwards the comp- troller of the pipe) , who wrote out the writs and summonses and kept a duplicate of the great roll, known as the chancellor's roll. The constable's subordinates were the marshal and a clerk, who, besides the duty of paying outdoor servants of the crown, had the special task of producing duplicates of all writs issued by the Curia Regis. The treasurer and chamberlains, being colleagues,

had a joint staff, the clerical or literate members of which were servants of the treasurer, while the lay or illiterate members depended on the chamberlains. Hence while the treasurer and his clerks kept their accounts by means of rolls, the chamberlains and their Serjeants duplicated them so far as possible by means of tallies. Thus the great roll was written by the treasurer's scribe (the engrosser, afterwards the clerk of the pipe), while the payments on account and other allowances to be credited to the sheriff were registered by the tally cutter of the chamberlains.

In the exchequer of receipt the staff was similarly divided between the treasurer and chamberlains; the treasurer having a clerk who kept the issue and receipt rolls (the later clerk of the pells) and four tellers, while each of the chamberlains was repre- sented by a knight (afterwards the deputy chamberlains), who controlled the clerk's account by means of tallies, and held their lands by this serjeanty; these three had joint control of the treasury, and could not act independently. The other Serjeants were the knight or " pesour " who weighed the money, the melter who assayed it, and the ushers of the two exchequers. It should be noted that all the lay offices of the treasury in both exchequers were hereditary. Henry II. had also a personal clerk who supervised the proceedings personally in the upper, and by deputy in the lower, exchequer.

The business of the ancient exchequer was primarily financial, although we know that some judicial business was done there and that the court of common pleas was derived from it rather than from the curia proper. The principal accountants were the sheriffs, who were bound, as the king's principal financial agents in each county, to give an account of their stewardship twice a year, at the exchequers of Easter and Michaelmas. Half the annual revenue was payable at Easter, and at Michaelmas the balance was exacted, and the accounts made up for the year, and formally enrolled on the pipe roll. The fixed revenue con- sisted of thefarms of the king's demesne lands within the counties, of the county mints, and of certain boroughs (see Borough) which paid annual sums as the price of their liberties. Danegeld was also regarded as fixed revenue, though after the accession of Henry II. it was not frequently levied. There were also rents of assarts and purprestures and mining and other royalties. The casual revenue consisted of the profits of the feudal incidents (escheat, wardship and marriage) , of the profits of justice (amerce- ments, and goods of felons and outlaws) , and of fines, or payments made by the king's subjects to secure grants of land, wardships or marriages, and of immunities, as well as for the hastening and sometimes the delaying of justice. Besides this, there were the revenues arising from aids and

scutages of the kfng's military tenants, tallages of the crown lands, customs of ports, and special " gifts," or general assessments made on particular occasions. For the collection of all these the sheriff was primarily responsible, though in some cases the accountants dealt directly with the exchequer, and were bound to make their appearance in person on the day when the sheriff accounted.

We gather both from tradition and from the example of the Scottish exchequer that the farms of demesne lands were origin- ally paid in kind, by way of purveyance for the royal household, and although such farms are expressed even in Domesday Book in terms of money, the tradition that there was a system of customary valuation is a sufficient explanation, and not of itself incredible. At some date, possibly under the administration of Roger of Salisbury, the inconvenience of this arrangement led to the substitution of money payments at the exchequer. The rapid deterioration of a small silver coinage led to successive efforts to maintain the value of these payments, first by a "scale " deduction of 6d. in the £ for wear, then by the substitution of payment by weight for payment by tale, and finally by the reduction of most of such payments to their pure silver value by means of an assay, a process originally confined to payments from particular manors. Only the farms of counties, however, were so treated, and not all of those. The amount to be deducted in these cases was settled by the weighing and assaying of a specimen pound of silver in the presence of the sheriff by the pesour and the melter in the lower exchequer. The casual

revenue was paid by tale, and for the determination of its amount it was necessary to have copies of all grants made in the chancery on which rents were reserved, or fines payable.' These were known first as contrabrevia and later as originalia; the profits ˆf justice were settled by the delivery of "estreats" from the justices, while for certain minor casualties the oath of the sheriff was at first the only security. At a later date' many of them were determined by copies of inquisitions sent in from the chancery. All this business might be transacted anywhere in England, and though convenience placed the exchequer first at Winchester (where the treasury was), and afterwards usually at Westminster, it held occasional sessions at other towns even in the 14th century.

The Angevin exchequer, described by Richard the Treasurer, remained

the ideal of the institution throughout its history, and the lineaments of the original exemplar were never completely effaced; but the rapid increase both of financial and judicial business led to a multiplication of machinery and a growing complexity of constitution. Even in the time of Henry II. we gather that the great officers of state, except the treasurer and chancellor, commonly attended by deputy. In the reign of Henry III. the chancellor had also ceased to attend, and his clerk acquired the title of chancellor of the exchequer. To the same period belongs the institution of the king's and lord treasurer's remembrancers. These at first had common duties and kept duplicate rolls, but by the ordinance of 1323 their functions were differentiated. Henceforward the king's remembrancer was more particularly concerned with the casual, and the lord treasurer's remembrancer with the fixed revenue. The former put all debts in charge, while the latter saw to their recovery when they had found their way on to the great roll. Hence the preliminary stages of each account, the receiving and registering of the king's writs to the treasurer and barons, and the drawing up of all particulars of account, lay with the Icing's remembrancer, and he retained the corresponding vouchers. The lord treasurer's remembrancer exacted the " remanets " of such accounts as had been enrolled, as well as reserved rents and fixed revenue, and so became closely connected with the clerk of the pipe. Before the end of the 14th century these three offices had already crystallized into separate departments.

In the meantime the increasing length and variety of accounts, as well as the growth of judicial business, had led to various efforts at reform. As early as 22 Henry II. it became necessary to remove from the great roll the debts which it seemed hopeless to levy, and further ordinances to the same end were made by statute in 54 Henry III. and in 12 Edward I. By this last a special " exannual roll " was established in which the " desperate debts " were recorded, in order that the sheriff might be reminded of them yearly without their overloading the great roll. But the largest accession of financial business arose from the " foreign accounts," that is to say, the accounts of national services, which did not naturally form part of the account of any county. These did not in the reign of Henry II. form a part of the exchequer business. Such expenses as appear on the pipe roll were paid by the sheriffs, or by the bailiffs of "honours"; payments out of the treasury itself would only appear on the receipt and issue rolls, and the " spending departments " probably drew their supplies from the camera curie, and not directly from the exchequer. In the course of the 13th century the exchequer gradually acquired partial control of these national accounts. Even in 18 Henry II. there is an account for the forests of

England, and soon the mint, the wardrobe and the escheators followed. The undated statute of the exchequer (probably about 1276) provides for escheators, the earldom of Chester, the Channel Islands, the customs and the wardrobe. During the reign of Edward I., the wardrobe account became unmanageable, since it not only financed the household, army, navy and diplomatic service, but raised money on the customs independently of the exchequer. The reform of 1323-1326, due to Walter de Stapledon, in remedying this state of things, greatly increased the number of “foreign accounts ” by making the great wardrobe (the storekeeping department), the butler,

purveyors, keepers of horses or of the stud, the clerk of the ” hamper ” of the chancery (who took the fees for the great seal),ˆahd the various ambassadors, directly accountable to the exchequer. At the same time the sheriffs’ accounts were ex- pedited by the further simplification of the great roll, and by appointing a special officer, the ” foreign apposcr,” to take the account of the ” green wax,” or estreats, so that two accounts could go on at once. Another baron (the 5th or cursitor baron) was appointed, and the whole business of foreign accounts was transferred to a separate building where one baron and certain auditors spent their whole time in settling the balances due on the accounts already mentioned, as well as those of castles, &c, not let to farm, Wales, Gascony, Ireland, aids (clerical and lay), temporalities of vacant bishoprics, abbeys, priories and dignities, mines of silver and tin, ulnage and so forth. These balances were accounted for in the exchequer itself, and entered on the pipe roll, but the preliminary accounts were filed by the king’s remembrancer, and enrolled separately by the treasurer’s remembrancer as a supplement to the pipe roll.

The next important change, about the end of the 1 5th century, was the gradual substitution of special auditors appointed by the crown, known as the auditors of the prests (the predecessors of the commissioners for auditing public accounts), for the auditors of the exchequer. Accounts when passed by them were presented in duplicate and ” declared ” before the treasurer, under-treasurer and chancellor. Of the two copies, one, on paper, was retained by the auditors, the other, on parchment, was successively enrolled by the king’s and lord treasurer’s remembrancers, and finally by the clerk of the pipe, to secure the levying of any ” remanets ” or ” supers ” by process of the exchequer.

Besides the two great difficulties of the postponement of financial to legal business, and of preventing the sheriffs from exacting the same debt twice, the exchequer was, as has been seen, hampered in its

functions by the interference of other departments in financial matters. Its own branches even acquired a certain independence. The exchequer of the Jews, which came to an end in 18 Edward I., was such a branch. In 27 Henry VIII. the. court of augmentations was established to deal with forfeited lands of monasteries. This was followed in 32 & 33 Henry VIII. by the courts of first-fruits and tenths and of general surveyors. These were reabsorbed by the ex- chequer in 1 Mary, but remained as separate departments within it. But the development of the treasury, which succeeded to the functions of the camera curie or the king's chamber, ultimately reduced the administrative functions of the exchequer to unimportance, and the audit office took over its duties with regard to public accounts. So that when the. statute of 3 & 4 William IV. cap. 99, removed the sheriff's accounts also from its competence, and brought to an end the series of pipe rolls which begins in 1130, the ancient exchequer may be said to have come to an end. (C. J.)

In 1834 an act was passed abolishing the old offices of the exchequer, and creating a new exchequer under a comptroller- general, the detailed business of payments formerly made at the exchequer being transferred to the paymaster-general, whose office was further enlarged in 1836 and 1848. And in 1866, as the result of a select committee reporting unfavour- ably on the system of exchequer control as established in 1834, the exchequer was abolished altogether as a distinct department of state, and a new exchequer and audit depart- ment established.

The ancient term exchequer now survives mainly as the official title of the national banking account of the United Kingdom. This central account is commonly called the ex- chequer, and its statutory title is "His Majesty's Exchequer." It may also be described with statutory authority as "The Account of the Consolidated Fund of Great Britain and Ireland." This account is, in fact, divided between the Banks of England and Ireland. At the head office of each of these institutions receipts are accepted and payments made on account of the exchequer; but in published documents the two accounts are

consolidated into one, the balances only at the two banks being shown separately.

Operations affecting the exchequer are regulated by the Exchequer

and Audit Departments Act 1866. Section 10 pre-ˆ scribes that the gross revenue of the United Kingdom (less drawbacks and repayments, which are not really revenue) is payable, and must sooner or later be paid into the exchequer. Section 11 directs that payments should be made from the fund so formed to meet the current requirements of spending departments. Sections 13, 14, 15 lay down the conditions under which money can be drawn from the exchequer. Drafts on the exchequer require the approval of an officer independent of the executive government, the comptroller and auditor- general. But the description of the formal procedure required by statute cannot adequately express the actual working of the system, or the part it plays in the national finance. The simplicity of the system laid down by the act of 1866 has been disturbed by the diversion of certain branches or portions of revenue from the exchequer to ” Local Taxation Accounts,” under a system initiated by the Local Government Act 1888, and much extended since.

While the exchequer is, as already stated, the central account, it is not directly in contact with the details of either revenue or expenditure. As regards revenue, the produce of taxes and other sources of income passes, in the first instance, into the separate accounts of the respective receiving departments — mainly, of course, those of the customs, inland revenue and post office. A not inconsiderable portion is received in the provinces, and remitted to London or Dublin by bills or otherwise, and the ultimate transfers to the exchequer are made (in round sums) from the accounts of the receiving departments in London or in Dublin. Thus, there are always considerable sums due to the exchequer by the revenue departments; on the other hand> as floating balances are (for the sake of economy) used temporarily for current expenses, there are generally amounts due by the exchequer to the receiving departments; such cross claims are adjusted periodically, generally once a month. The finance accounts of the United Kingdom show the gross amounts due to the exchequer from the departments, and likewise the amounts payable out of the gross revenue in priority to the claim of the exchequer. On the expenditure side a similar system prevails. No detailed payments are made direct from the exchequer, but round sums are issued from it to subsidiary accounts, from which the actual drafts for the public services are met. For instance, the interest on the national debt is paid by the Bank of England from a separate account fed by transfers of round sums from the exchequer as required. Similarly, payments for army, navy and most civil services are met by the paymaster- general out of an account of his own, fed by daily transfers from the exchequer.

This system has two noticeable effects. Firstly, it secures the simplicity

and finality of the exchequer accounts, and therefore of all ordinary statements of national finance. Every : evening the chancellor of the exchequer can tell his position so far as the exchequer is concerned; on the first day of every quarter the press is able to comment on the national income and expenditure up to the evening before. The annual account is closed on the evening of the 31st of March, and there can be no reopening of the budget of a past year such as may occur under other financial systems. The second effect of the system is to introduce a certain artificiality into the financial statements. Actual facts cannot be reduced to the simplicity of exchequer figures; there is always (as already explained) revenue received by government which has not yet reached the exchequer; and there must always be a considerable outstanding liability in the form of cheques issued but not yet cashed. The suggested criticism is, how- ever, met if it can be shown that, on the whole, the differences between the true revenue and the exchequer receipts, or between the true (or audited) expenditure and the exchequer issues, are not, taking one year with another, relatively con- siderable. The following figures (ooo's omitted) illustrate this point: —

Expenditure.

Year.

Exchequer

Issues.

Audited Expenditure.

....

Difference.

1 888- 1 889 1 889- 1 890 1890-1891 1891-1892 1 892- 1 893 1893-1894 1 894- 1 895 1895-1896 1 896- 1 89 7 1897-1898

£85,674

86,083

87,732 89,928

90,375 91,303 93,919 97,764 101,477 102,936

£86,070

86,033 87,638 90,125 90,164 91,530

93,8i8

97,667

ioi,543

103,010

£+396

- 50

- 94 + 197

- 211 +227

— 101

- 97 + 66

+ 74

Total for) 10 years \

£927,191

£927,598

£+407

Revenue.

Year.

1888-1889 1889-1890 1890-1891 1 891-1892 1 892-1 893 1 893-1 894 1 894- 1 895 1 895-1 896 1 896-1 897 1897-1898

Total for / 10 years)

Exchequer Receipts.

£88,473

89,304 89,489

90,995

90,395

91,133

94,684

101,974

103,960

106,614

£947,on

Actual Revenue.

£88,038

89,416 89,282 91,428 90,181 91,265

94,873 102,031 104,089 106,691

£947,294

Difference.

£-435

+ 112

— 207

+433

— 214

+ 132 + 189

+ 57 + 129

+ 77

£+273

Surplus.

Year.

Exchequer Accounts.

Diff. between Actual Rev. and Aud. Exp.

Difference.

1888-1889 1889-1890 1 890-1 89 1 1891-1892 1 892- 1 893
1893-1894 1 894- 1 895 1895-1896 1896-1897 1897-1898

£2,799

3,221

i,757

1,067

20

—170

765 4,210

2,473 3,678

£1,968

3,383 1,644 1,303 17 -265

1-055 4,364 2,546 3,681

£-831

+ 162

-113 +236

- 3

- 95 +290

+ 154 + 73 + 3

Total for) 10 years (

£19,820

£19,696

The third column in the above shows the price which has to be paid (in the form of discrepancies between facts and figures) for the simplicity secured. to statements and records of the national finance by the present system embodied in the term exchequer. Probably few will think the price too high in consideration of the advantages secured.

The principal official who derives a title from the exchequer in its living sense is, of course, the chancellor of the exchequer. He is the person named second in the patent appointing com- missions for executing the office of lord high treasurer of Great Britain and Ireland; but he is appointed chancellor of the exchequer for Great Britain and chancellor of the exchequer for Ireland by two additional patents. Although, in fact, the finance minister of the United Kingdom, he has no statutory power over the exchequer apart from his position as second commissioner of the treasury; but in virtue of his office he is by statute master of the mint, senior commissioner for the reduction of the national debt, a trustee of the British Museum, an ecclesiastical commissioner, a member of the board of agri- culture, a commissioner of public works and buildings, local government, and education, a commissioner for regulating the offices of the House of Commons, and has certain functions connected with the office of the secretary of state for India. The only other exchequer officer requiring mention is the

comptroller and auditor-general, whose functions as comptroller-general of the exchequer have been already described.

The ancient name of the national banking account has been attached to two of the forms of unfunded national debt. Ex- chequer bills, which date from the reign of William and Mary (they took the place of the tallies, previously used for the same purpose), became extinct in 1897, but exchequer bonds (first issued by Mr Gladstone in 1853) still possess a practical import- ance. An exchequer bond is a promise by government to pay a specified sum after a specified period, generally three or five years, and meanwhile to pay interest half-yearly at a specified rate on that sum. Government possesses no general power to issue exchequer bonds; such power is only conferred by a special act, and for specified purposes; but when the power has been created, exchequer bonds issued in pursuance of it are governed by general

statutory provisions contained in the Exchequer Bills and Bonds Act 1866, and amending acts. These acts create machinery for the issue of exchequer bonds and for the payment of interest thereon, and protect them against forgery.

Some traces may be mentioned of the ancient uses of the name exchequer which still remain. The chancellor of .the exchequer still presides at the ceremony of ” pricking the list of sheriffs,” which is a quasi-judicial function; and on that occasion he wears a robe of black silk with gold embroidery, which suggests a judicial costume. In England the last judge who was styled baron of the exchequer (Baron Pollock) died in 1897. In Scotland the jurisdiction of the barons of the exchequer was transferred to the court of session in 1856, but the same act requires the appointment of one of the judges as ” lord ordinary in exchequer causes,” which office still exists. In Ireland Lord Chief Baron Palles was the last to retain the old title. A street near Dublin Castle is called Exchequer Street, recalling the separate Irish exchequer, which ceased in 181 7. The old term also survives in the full title of the treasury repre- sentative in Scotland, which is ” The King’s and the Lord Treasurer’s Remembrancer in Exchequer,” while his office in the historic Parliament Square is styled ” Exchequer Chambers.”

(S. E. S.-R.)

Bibliography. — For the early exchequer Thomas Madox’s History and Antiquities of the Exchequer (London, 1711) remains the standard authority, and in it the Dialogus de Scaccario of Richard the Treasurer (1179) was first printed (edited since by A. Hughes, C. G. Crump and C. Johnson, Oxford, 1902). The publications of the Pipe Roll Society (London, 1884 et seq.), the Pipe Rolls and Chancellor’s Roll, printed by the Record Commission (London, 1833 and 1844), and H. Hall’s edition of the Receipt Roll of the Exchequer $1 Henry II. (London, 1899) should also be consulted. A popular account is in H. Hall’s Court Life under the Plantagenets (London, 1901), and a careful study in Dr Parow’s thesis, Compotus Vice- comitis (Berlin, 1906). For the 13th and 14th centuries H. Hall’s edition of the Red Book of the Exchequer (London, Rolls Series, 1896) is essential, as also the Public Record Office List of Foreign Accounts (London, 1900). Later practice may be gathered from the similar List and Index of Declared Accounts (London, 1893), and from such books as Sir T. Fanshawe’s Practice of the Exchequer Court, written about a.d. 1600 (London, 1658) ; Christopher Vernon’s The Exchequer Opened (London, 1661), or Sir Geoffrey Gilbert’s Treatise on the Court of Exchequer (London, 1758), as well as from the statutes abolishing various offices in the

exchequer. H. Hall's Antiquities of the Exchequer (London, 1891) gives many interesting details of various dates. For the Scottish exchequer The Exchequer Rolls of Scotland (Edinburgh, 1878 et seq.) should be consulted, while Gilbert's book noted above gives some details on that of Ireland. See also Appendix 13 to the great account of Public Income and Expenditure from 1688 to i86q, in three volumes, prepared for parliament by H. W. Chisholm (1869); and for sidelights on the working of the office from 1825 to 1866 the reminiscences of the 6ame author (the last chief clerk of the exchequer) in Temple Bar (January to April 1891).

EXCISE (derived through the Dutch, excijs or accijs, possibly from Late Lat. accensare, — ad, to, and census, tax; the word owes something to a confusion with excisum, cut out), a term now well known in public finance, signifying a duty charged on home goods, either in the process of their manufacture, or before their sale to the home consumers. This form of taxation implies a commonwealth somewhat advanced in manufactures, markets and general riches; and it interferes so directly with the industry and liberty of the subject that it has seldom been

introduced save in some supreme financial exigency, and has as seldom been borne, even after long usage, with less than the ordinary impatience of taxation. Yet excise duties can boast a respectable antiquity, having a distinct parallel in the vectigal rerum venalium (or toll levied on all commodities sold by auction, or in public market) of the Romans. But the Roman excise was mild compared with that of modern nations, having never been more than centesima, or 1%, of the value; and it was much shorter lived than the modern examples, having been first imposed by Augustus, reduced for a time one-half by Tiberius, and finally abolished by Caligula, a.d. 38, so that the Roman excise cannot have had a duration of much more than half a century. Its remission must have been deemed a great boon in the marts of Rome, since it was commemorated by tlie issue of small brass coins with the legend Remissis Centesimis, specimens of which are still to be found in collections. .

The history of this branch of revenue in the United Kingdom dates from the period of the civil wars, when the republican government, following the example of Holland, established, as a means of defraying the heavy expenditure of the time, various duties of excise, which the royalists when restored to power found too convenient or too necessary to be abandoned, notwithstanding their origin and their general unpopularity. On the contrary, they were destined to be steadily increased both in number and in amount. It is curious that the

first commodities selected for excise were those on which this branch of taxation, after great extension, had again in the period of reform and free trade been in a manner permanently reduced, viz. malt liquors, and such kindred beverages as cider perry and spruce beer. The other excise duties remaining are chiefly in the form of licences, such as to kill game and to use and carry guns, to sell gold and silver plate, to pursue the business of appraisers or auctioneers, hawkers or pedlars, pawnbrokers or patent-medicine vendors, to manufacture tobacco or snuff, to deal in sweets or in foreign wines, to make vinegar, to roast malt, or to use a still in chemistry or otherwise. It may be presumed that the policy of the licence duties was at first not so much to collect revenue, though in the aggregate they yielded a large sum, as to guard the main sources of excise, and to place certain classes of dealers, by registration and an annual payment to the exchequer, under a .direct legal responsibility. The excise system of the United Kingdom as now pruned and reformed, however, while still the most prolific of all the sources of revenue, is simple in process, and is contentedly borne as compared with what was the case in the 18th, and the beginning of the 19th century. The wars with Bonaparte strained the government resources to the uttermost, and excise duties were multiplied and increased in every practicable form. Bricks, candles, calico prints, glass, hides and skins, leather, paper, salt, soap, and other commodities of home manufacture and consumption were placed, with their respective industries, under excise surveillance and fine. When the duties could no longer be increased in number, they were raised in rate. The duty on British spirits, which had begun at a few pence per gallon in 1660, rose step by step to ns. 8|d. per gallon in 1820; and the duty on salt was augmented to three or fourfold its value.

The old unpopularity of excise, though now somewhat out of date, must have had real enough grounds. It breaks out in English literature, from songs and pasquinades to grave political essays and legal commentaries. Blackstone, in quoting the declaration of parliament in 1649 that ” excise is the most easy and indifferent levy that can be laid upon the people,” adds on his own authority that ” from its first original to the present time its very name has been odious to the people of England ” (book i. cap. 8, tenth edition, 1786); while the definition of “excise” gravely inserted by Dr Johnson in the Dictionary, at the imminent risk of subjecting the eminent author to a prosecution for libel — viz. “a hateful tax levied upon commodities, and adjudged not by the common judges of property, but wretches hired by those to whom excise is paid” — can hardly be ever forgotten.

The duties of excise in the United Kingdom were, until the passing of the Finance Act 1908, under the control of the

commissioners of inland revenue; they are now under the control of the commissioners of customs; the amount raised, apart from changes in the rate, shows a fairly constant tendency to increase, and is usually regarded as one of the best tests of the prosperity of the working classes.

The spirit duty is levied according to the quantity of ” proof spirit ” contained in the product of distillation, and the charge is taken at three different points in the process of manufacture, the trader being liable for the result of the highest of the three calculations. What is known as ” proof spirit ” is obtained by mixing nearly equal weights of pure alcohol and water, the quantity of pure alcohol being in bulk about 57% of the whole. Owing to the high rate of duty as compared with the volume and intrinsic value of the spirits, the whole process of manufacture is carried on under the close supervision of revenue officials. All the vessels used are measured by them and are secured with revenue locks; the premises are under constant survey; and notice has to be given by the distiller of the materials used and of the several stages of his operations. Though the charge for duty is raised at the ‘ time when the process of distillation is completed, the duty is not actually paid until the spirits are required for consumption. In the meanwhile they may be retained in an approved ” warehouse,” which is also subject to close supervision.

The beer duty dates from 1880, in which year it was substituted for the duty on malt. The specific gravity of the worts depends chiefly on the amount of sugar which they contain, and is ascertained by the saccharometer.

Excise licences may be divided into — (a) licences for the sale or manufacture of excisable liquors, (b) licences for other trades, such as tobacco dealers or manufacturers, auctioneers, pawn- brokers, &c, (c) licences for male servants, carriages, motors and armorial bearings, and (d) gun, game and dog licences. Nearly the whole of the licence duties is paid over to the local taxation account.

The railway passenger duty, which was made an excise duty by the Railway Passenger Duty Act 1847, applies only to Great Britain. It is

levied on all passenger fares exceeding id. per mile, the rate being 2 % on urban and 5 % on other traffic.

The other items which go to make up the excise revenue are the charges on deliveries from bonded warehouses, and the duties on coffee mixture labels and on chicory.

For more detailed information reference should be made to Highmore's Excise Laws, and the annual reports of the commissioners of inland revenue, especially those issued in 1870 and 1885. See also Taxation ; English Finance.

EXCOMMUNICATION (Lat. ex, out of, away from; communis, common), the judicial exclusion of offenders from the rights and privileges of the religious community to which they belong. The history of the practice of excommunication may be traced through (1) pagan analogues, (2) Hebrew custom, (3) primitive Christian practice, (4) medieval and monastic usage, (5) modern survivals in existing Christian churches.

1. Among pagan analogues are the Gr. xtprtfav e'Lpyeadai (Demosth. 505, 14), the exclusion of an offender from purification with holy water. This exclusion was enforced in the case of persons whose hands were defiled with bloodshed. Its con- sequences are described Aesch. Choeph. 283, Eum. 625 f-, Soph. Oed. Tyr. 236 ff. The Roman exsecratio and dirts devolio was a solemn pronouncement of a religious curse by priests, intended to call down the divine wrath upon enemies, and to devote them to destruction by powers human and divine. The Druids claimed the dread power of excluding offenders from sacrifice (Caes. B.G. vi. 13). Primitive Semitic customs recognize that when persons are laid under a ban or taboo (herem) restrictions are imposed on contact with them, and that the breach of these involves supernatural dangers. Impious sinners, or enemies of the community and its god, might be devoted to utter destruction.

2. Hebrew Custom.-rln a theocracy excommunication is necessarily both a civil and a religious penalty. The word used in the New Testament to describe an excommunicated person,

avaBina (1 Cor. xvi. 22, Gal. i. 8-9, Rom. ix. 3), is the Septuagint rendering of the Hebrew herem. The word means " set apart " (cf. harem), and does not distinguish originally between things set apart because devoted to God and things devoted to destruction. Lev. xxvii. 16-34 defines the law for dealing with " devoted " things; according to v. 28 " No devoted thing that a man shall devote unto the Lord, of all

that he hath, whether of man or beast, or of the field of his possession, shall be sold or redeemed. None devoted shall be ransomed, he shall surely be put to death.” As in Greece and Rome whole cities or nations might be devoted to destruction by pronounce- ment of a ban (Numbers xxi. 2, 3, Deut. ii. 34, iii. 6, vii. 2). Occasionally Israelites as well as aliens fall under the curse (Judg. xxi. 5, 11). A milder form of penalty was the temporary separation or seclusion (niddah) prescribed for ceremonial unclean- ness. This was the ordinary form of religious discipline. In the time of Ezra the Jewish ” magistrates and judges ” among their ecclesiastico-civil functions have the right of pronouncing sentence whether it be unto death, or to ” rooting out,” or to confiscation of goods, or to imprisonment (Ezra vii. 26). There is also a lighter form of excommunication which ” devotes ” the goods of an offender, but only separates him from the congregation. Both major and minor kinds of excommunication are recognized by the Talmud. The lesser (niddah) involved exclusion from the synagogue for thirty days, and other penalties, and might be renewed if the offender remained impenitent. The major excommunication (herem) excluded from the Temple as well as the synagogue and from all association with the faithful. Spinoza was excommunicated (July 16, 1656) for contempt of the law. Seldon (De jure nat. et gen., iv. 7) gives the text of the curse pronounced on the culprit. The Exemplar Humanae Vitae of Uriel d’Acosta also deserves reference. The practice of the Jewish courts in New Testament times may be inferred from certain passages in the Gospels. Luke vi. 22, John ix. 22, xii. 42 indicate that exclusion from the synagogue was a recognized penalty, and that it was probably inflicted on those who confessed Jesus as the Christ. John xvi. 2 (” Whosoever killeth you,” &c.) may point to the power of inflicting the major penalty. The Talmud itself says that the judgment of capital cases was taken away from Israel forty years before the destruction of the Temple. ” Forty ” is probably a round number without historical value, but the circumstance recorded by this tradition and confirmed by the evangelist’s aecount of the trial of Jesus is historical, and is to be regarded as one of several restrictions imposed on the Jewish courts in the time of the Roman procurators.

3. Primitive Christian Practice. — The use of excommunication as a form of Christian discipline is based on the precept of Christ and on apostolic practice. The general principles which govern the exclusion of members from a religious community may be gathered from the New Testament writings. Matt, xviii. 15-17 prescribes a threefold admonition, first privately, then in the presence of witnesses (cf. Titus iii. 10), then before the church. This is a graded procedure as in the Jewish synagogue and makes exclusion a last resort. Nothing is said as

to the nature and effects of excommunication. The tone of the passage when compared with the disciplinary methods of the synagogue indicates that its purpose was to introduce elements of reason and moral suasion in place of sterner methods. Its object is rather the protection of the church than the punishment of the sinner. The offender is only treated as a heathen and publican when the purity and safety of the church demand it. In the locus classicus on this subject (1 Cor. v. 5) Paul refers to a formal meeting of the Corinthian church at which the incestuous person is ” delivered unto Satan for the destruction of the flesh that the spirit may be saved in the day of the Lord Jesus.” These are mysterious words implying (1) a formal ecclesiastical censure, (2) a physical penalty, (3) the hope of a spiritual result. The form of penalty which would meet these conditions is not explained. There is a reference in 2 Cor. ii. 6-1 1 to a case of discipline which may or may not be the same. If it be the same it indicates that the excommunication had not been final; the offender had been received back. If it be not the same it shows the Corinthian

church exercising discipline independently of apostolic advice. Up to this point there is no established formal practice, i Tim. i. 20 (” Hymenaeus and Alexander whom I delivered unto Satan that they might be taught not to blaspheme “) seems to refer to an excommunication, but it does not appear whether the apostle had acted as representing a church, nor is there anything to explain the exact consequences or limits of the deliverance to Satan, i Cor. xvi. 22, Gal. i. 8, 9, Rom. ix. 3 refer to the practice of regarding a person as anathema. Taking these passages as a whole they seem to point to an exclusion from church fellowship rather than to a final cutting off from the hope of salvation. In the pastoral letters there is already a formal and recognized method of procedure in cases of church discipline. 1 Tim. v. 19, 20 requires two or three witnesses in the case of an accusation against an elder, and a public reproof. Tit. iii. 20 recognizes a factious spirit as a reason for excommunication after two admonitions (cf. Tim. vi. and 2 John v. 10). In 3 John v. 9-10 Diotrephes appears to have secured an excommunication by the action of a party in the church. It is clear from these illustrations that within the New Testament there is development from spontaneous towards strictly regulated methods; also that the use of excommunication is chiefly for disciplinary and protective rather than punitive purposes. A process which is intended to produce penitence and ultimate restoration cannot at the same time contemplate handing the offender

over to eternal punishment.

4. Medieval and Monastic Usage. — The writings of the church Fathers give sufficient evidence that two degrees of excommunication, the d<ˆopt

A new chapter in the history of the church censure may be said to have begun with the publication of those imperial edicts against heresy, the first of which, De summa trinitate et fide catholica, dates from 380. Till then exclusion from church privileges had been a spiritual discipline merely; thenceforward it was to expose a man to serious temporal risks. Excommunica- tion still continued to be occasionally used in the spirit of genuine Christian fidelity, as by Ambrose in the case of Theodosius himself (39c); but the temptation to wield it as an instrument of secular tyranny too often proved to be irresistible. The church fell back on carnal weapons in her warfare and invoked the secular powers to uphold the ecclesiastical. In the formula used by Synesius (410) which is to be found in Bingham's Antiquities,

we already find the attention of magistrates specially called to the censured person. The history of the next thousand years shows that the magistrates were seldom slow to respond to the appeal. Even the hastiest survey of that long and interesting period enables the student to notice a marked development in the theory and practice of excommunication. One or two points may be specially noted. (1) When the Empire became nominally Christian and the quality of the church life was sacrificed to the quantity of its adherents, the original character of excommunica- tion was lost. The power of excommunication was transferred from the community to the bishop, and was liable to abuse from personal motives: Gregory the Great rebukes a bishop for using for private ends power conferred for the public good (Epist. ii. 34). Excommunication became a common penalty applied in numberless cases (see the Penitential of Archbishop Theodosius: Haddan and Stubbs, Councils and Documents, iii. 1737), and was invested with superstitious terrors. (2) While it had been held as an undoubted principle by the ancient church that this sentence could only be passed on living individuals whose fault had been distinctly stated and fully proved, we find the medieval church on the one hand sanctioning the practice of excommunica- tion of the dead (Morinus, De poenit. x. c. 9), and, on the other hand, by means of the papal interdict, excluding whole countries and kingdoms at once from the means of grace. The earliest well-authenticated instance of such an interdict is that which was passed (998) by Pope Gregory V. on France, in consequence of the contumacy of King Robert the Wise. Other instances are those laid respectively on Germany in 1102 by

Gregory VII. (Hildebrand) , on England in 1208 by Innocent III., on Rome itself in 1155 by Adrian IV. (3) While in the ancient church the language used in excommunicating had been carefully measured, we find an amazing, recklessness in the phraseology employed by the medieval clergy. The curse of Ernulphus or Arnulphus of Rochester (c. i'ioo), often quoted by students of English literature, is a very fair specimen of that class of composition. With it may be compared the formula transcribed by Dr Burton in his History of Scotland (iii. 317 ff .), To the spoken word was added the language of symbol. By means of lighted candles violently dashed to the ground and extinguished the faithful were graphically taught the meaning of the greater excommuni- cation — though in a somewhat misleading way, for it is a fundamental principle of the canon law that disciplina est excommunicato, non eradicatio. The first instance, however, of excommunication by " bell, book and candle " is comparatively late (c. 1 190).

5. Modem Survivals in Existing Christian Churches. — At the Reformation the necessity for church discipline did not cease to be recognized; but the administration of it in many Reformed churches has passed through a period of some confusion. In some instances the old episcopal power passed more or less into the hands of the civil magistrate (a state of matters which was highly approved by Erastus and his followers), in other cases it was conceded to the presbyterial courts. In the Anglican Church the bishops (subject to appeal to the sovereign) have the right of excommunicating, and their sentence, if sustained, may , in certain cases carry with it civil consequences. But this right is in practice never exercised. In the law of England sentence of excommunication, upon being properly certified by the bishop, was followed by the writ de excommunicato capiendo for the arrest of the offender. The statute 5 Eliz. c. 23 pro- vided for the better execution of this writ. By the 53 Geo. III. c. 127 (which does not, however, extend to Ireland) it was enacted that " excommunication, together with all proceedings following thereupon, shall in all cases, save those hereafter to be specified, be discontinued." Disobedience to or contempt of the ecclesi- astical courts is to be punished by a new writ, de contumace capiendo, to follow on the certificate of the judge that the defender is contumacious and in contempt. Sect. 2 provides that nothing shall prevent " any ecclesiastical court from pronouncing or declaring persons to be excommunicate on definite sentences pronounced as spiritual censures for offences of ecclesiastical cognizance." No persons so excommunicated

shall incur any civil penalty or incapacity whatever, save such sentence of imprisonment, not exceeding six months, as the court shall direct and certify to the king in chancery.

In the churches which consciously shaped their polity at or after the Reformation the principle of excommunication is preserved in the practice of church discipline. Calvin devotes a chapter in the Institutes (bk. iv. chap, xii.) to the " Discipline of the Church; its Principal Use in Censure and Excommunication." The three ends proposed by the church in such discipline are there stated to be, (i) that those who lead scandalous lives may not to the dishonour of God be numbered among Christians, seeing that the church is the body of Christ; (2) that the good may not be corrupted by constant association with the wicked; (3) that those who are censured or excommunicated, confounded with shame, may be led to repentance. He differentiates decisively between excommunication and anathema. " When Christ promises that what his ministers bind on earth shall be bound in heaven, he limits the power of binding to the censure of the church; by which those who are excommunicated are not cast into eternal ruin and condemnation, but by having their life and conduct condemned are also certified of their final condemnation unless they repent. For excommunication differs from anathema: anathema which ought to be very rarely, or never, resorted to, in precluding all pardon, execrates a person, and devotes him to eternal perdition: whereas excommunication rather censures and punishes his conduct. Yet in such a manner by warning him of his future condemnation it recalls him to salvation " {Inst. bk. iv. chap. xii. 10). The Reformed churches in England and America accepted the distinction between public and private offences. The usual provision is that private offences are to be dealt with according to the rule in Matt. v. 23-24, xviii. 15-17; public offences are to be dealt with according to the rule in 1 Cor. v. 3-5, 13. The public expulsion or suspension of the offender is necessary for the good repute of the church, and its influence over the faithful members. The expelled member may be readmitted on showing the fruits of repentance.

In Scotland three degrees of church censure are recognized — admonition, suspension from sealing ordinances (which may be called temporary excommunication), and excommunication properly so-called. Intimation of the last-named censure may occasionally (but very rarely) be given by authority of a pres- bytery in a public and solemn manner, according to the following formula: — " Whereas thou N. hast been by sufficient proof convicted (here mention the sin)

and after due admonition and prayer remainest obstinate without any evidence or sign of true repentance: Therefore in the name of the Lord Jesus Christ, and before this congregation, I pronounce and declare thee N. excommunicated, shut out from the communion of the faithful, debar thee from privileges, and deliver thee unto Satan for the destruction of thy flesh, that thy spirit may be saved in the day of the Lord Jesus." This is called the greater excommunication. The congregation are thereafter warned to shun all unnecessary converse with the excommunicate (see Form of Process, c. 8). Formerly excommunicated persons were deprived of feudal rights in Scotland; but in 1690 all acts enjoining civil pains upon sentences of excommunication were finally repealed (Burton's History, vii. 435).

The question whether the power of excommunication rests in the church or in the clergy has been an important one in the history of English and American churches. Hooker lays down {Survey, pt. 3, pp. 33-46) four necessary conditions for the execution of a sentence involving church discipline. " (1) The cause exactly recorded is fully and nakedly to be presented to the consideration of the congregation. (2) The elders are to go before the congregation in laying open the rule so far as reacheth any particular now to be considered, and to express their judg- ment and determination thereof, so far as appertains to them- selves. (3) Unless the people be able to convince them of errors and mistakes in their sentence, they are bound to joyn their judgment with theirs to the compleating of the sentence. (4) The sentence thus compleatly issued is to be solemnly passed and pronounced upon the delinquent by the ruling Elder whether

it be of censure or excommunication." In this passage it is clear that the effective power of discipline is regarded as being wholly in the power of the individual church or congregation. Hooker expressly denies the power of synods to excommunicate: " that there should be Synods, which have potestatem juridicam is nowhere proved in Scripture because it is not a truth" {Survey, pt. 4, pp. 48, 40)-

The confession of faith issued by the London-Amsterdam church (the original of the Pilgrim Fathers' churches) in 1596 declares that the Christian congregation having power to elect its minister has also power to excommunicate him if the case so require (Walker, Creeds and Platforms of Congregationalism, p. 66). In 1603 the document known as " Points of Difference " {i.e. from the established Anglicanism) submitted to James I. sets forth: " That all particular Churches ought to be so con- stituted as, having their owne peculiar Officers, the whole body of every Church may meet together in one place, and jointly performe their duties to God and one towards

another. And that the censures of admonition and excommunication be in due manner executed, for sinne, convicted, and obstinately stood in. This power also to be in the body of the Church whereof the partyes so offending and persisting are members." The Cambridge Platform of 1648 by which the New England churches defined their practice, devotes ch. xiv. to " excommunication and other censures." It follows in the main the line of Hooker and Calvin, but adds (§6) an important definition: "Excommunica- tion being a spirituall punishment it doth not prejudice the ex- communicate in, nor deprive him of his civil rights, therfore toucheth not princes, or other magistrates, in point of their civil dignity or authority. And, the excommunicate being but as a publican and a heathen, heathen being lawfully permitted to come to hear the word in church assemblyes; wee acknowledg therfore the like liberty of hearing the word, may be permitted to persons excommunicate, that is permitted unto heathen. And because wee are not without hope of his recovery, wee are not to account him as an enemy but to admonish him as a brother." The Savoy Declaration of 1658 defines the theory and practice of the older English Nonconformist churches in the section on the " Institution of Churches and the Order appointed in them by Jesus Christ" (xix.). The important article is as follows: — " The Censures so appointed by Christ, are Admonition and Excommunication; and whereas some offences are or may be known onely to some, it is appointed by Christ, that those to whom they are so known, do first admonish the offender in private: in publique offences where any sin, before all; or in case of non-amendment upon private admonition, the offence being related to the Church, and the offender not manifesting his repentance, he is to be duely admonished in the Name of Christ by the whole Church, by the Ministery of the Elders of the Church, and if this Censure prevail not for his repentance, then he is to be cast out by Excommunication with the consent of the Church."

In contemporary English Free Churches the purity of the church is commonly secured by the removal of persons unsuitable for membership from the church books by a vote of the re- sponsible authority. • (D. Mn.)

EXCRETION (Lat. ex, out of, cernere, crelum, to separate), in plant and animal physiology, the separation from an organ of some substance, also the substance separated. The term usually refers to the separation of waste or harmful products, as dis- tinguished from " secretion," which refers to' products that play a useful or necessary part in the functions of the organism.

EXECUTION (from Lat. ex-sequor, exsecutus, follow or carry out), the

carrying into effect of anything, whether a rite, a piece of music, an office, &c. ; and so sometimes involving a notion of skill in the performance. Technically, the word is used in law in the execution of a deed (its formal signing and sealing), an execution (see below) by the sheriff's officers under a " writ of execution " (the enforcement of a judgment on a debtor's goods); and execution of death has been shortened to the one word to denote Capital Punishment {q.v.).

Civil Execution may be defined as the process by which the

judgments or orders of courts of law are made effectual. In Roman law the earliest mode of execution was the seizure, legalized by the actio per manus injectionem, of the debtor as a slave of the creditor. During the later Republic, imprisonment took the place of slavery. Under the regime of the actio per manus injectionem, the debtor might dispute the debt — the issue being raised by his finding a substitute (vindex) to conduct the case for him. By the time of Gaius (iv. 25) the actio per manus injectionem had been superseded by the actio judicati, the object of which was to enable the creditor to take payment of the debt or compel the debtor to find security (pignus in causa judicati captum: Cautio judicatum solvi), and in a.d. 320 Constantine abolished imprisonment for debt, unless the debtor were con- tumacious. The time allowed for payment of a judgment debt was by the XII. Tables 30 days; it was afterwards extended to two months, and ultimately, by Justinian, to four months. The next stage in the Roman law of execution was the recognition of bankruptcy either against the will of the bankrupt (missio in bona) or on the application of the bankrupt (cessio bonorum; and see Bankruptcy). Lastly, in the time of Antoninus Pius, judgment debts were directly enforced by the seizure and sale of the debtor's property. Slaves, oxen and implements of husbandry were privileged; and movable property was to be exhausted before recourse was had to land (see Hunter, Roman Law, 4th ed. pp. 1029 et seq., Sohm, Inst. Rom. Law, 2nd ed. pp. 302-305).

Great Britain. — The English law of execution is very compli- cated, and only a statement of the principal processes can here be attempted.

High Court. — Fieri Facias. A judgment for the recovery of money or costs is enforced, as a rule, by writ of fieri facias addressed to the sheriff, and directing him to cause to be made {fieri facias) of the goods and chattels of the debtor a levy of a sum sufficient to satisfy

the judgment and costs, which carry interest at 4% per annum. The seizure effected by the sheriff or his officer, under this writ, of the property of the debtor, is what is popularly known as ” the putting-in ” of an execution. The seizure should be carried out with all possible despatch. The sheriff or his officer must not break open the debtor’s house in effecting a seizure, for ” a man’s house is his castle” (Semayne’s Case [1604], 5 Coke Rep. 91); but this principle applies only to a dwelling-house, and a barn or outhouse unconnected with the dwelling-house may be broken into. The sheriff on receipt of the writ endorses on it the day, hour, month and year when he received it; and the writ binds the debtor’s goads as at the date of its delivery, except as regards goods sold before seizure in market overt, or purchased for value, without notice before actual seizure (Sale of Goods Act 1893, s. 26, which supersedes s. 16 of the Statute of Frauds and s. I of the Mercantile Law Amend- ment Act 1856). This rule is limited to goods, and does not apply to the money or bank notes of the debtor which are not bound by the writ till seized under it {Johnsonv. Pickering, Oct. 14, 1907, C.A.). The mere seizure of the goods, however, although, subject to such exceptions as those just stated, it binds the interest of the debtor, and gives the sheriff such an interest in the goods as will enable him to sue for the recovery of their possession, does not pass the property in the goods to the sheriff. The goods are in the custody of the law. But the property remains in the debtor who may get rid of the execution on payment of the claim and fees of the sheriff [as to which see Sheriffs Act 1887, s. 20, and order of 21st of August 1888, Annual Practice (1908), vol. ii. p. 278]. The wearing apparel, bedding, tools, &c, of the debtor to the value of £5 are protected. Competing claims as to the ownership of the goods seized are brought before the courts by the procedure of ” interpleader.” After seizure, the sheriff must retain possession, and, in default of payment by the execution debtor, proceed to sell. Where the judgment debt, including legal expenses, exceeds £20, the sale must be by public auction, unless the Court otherwise orders, and must be publicly advertised. The proceeds of sale, after deduction of the sheriff’s fees and expenses, become the property of the execution creditor to the extent of his claim. The Bankruptcy Act 1890 (53 & 54 Vict. c. 71, s. 11 [2]) requires the sheriff in case of sale under a judgment for a sum exceeding £20 to hold the proceeds for 14 days in case notice of bankruptcy proceedings should be served upon him (see Bankruptcy). The form of the writ of fieri facias requires the sheriff to make a return to the writ. In practice this is seldom done unless the execution has been ineffective or there has been delay in the execution of the writ; but the judgment creditor may obtain an order calling on the sheriff to make a return. A sheriff or his officer, who is

guilty of extortion in the execution of the writ, is liable to committal for contempt, and to forfeit £200 and pay all damages suffered by the person aggrieved (Sheriffs Act 1887 [50 & 51 Vict. c. 55], s. 29 [2]), besides being civilly liable to such person. Imprisonment for debt in execution of civil judgments is

now abolished except in cases of default in the nature of contempt, unsatisfied judgments for penalties, defaults by persons in a fiduciary character, and defaults by judgment debtors (Debtors Act 1869 [32 & 33 Vict. c. 62]; Bankruptcy Act 1883 [46 & 47 Vict. c. 52], ss. 53, 103). Imprisonment for debt has been abolished within similar limits in Scotland (Debtors [Scotland] Act 1880 [43 & 44 Vict. c. 34] and Ireland, Debtors [Ireland] Act 1872, 35 & 36 Vict. c. 57). There may still be imprisonment in England, under the writ — rarely used in practice — ne exeat regno, which issues to prevent a debtor from leaving the kindgom.

Writ of Elegit. — The writ of elegit is a process enabling the creditor to satisfy his judgment debt out of the lands of the debtor. It derives its name from the election of the creditor in favour of this mode of recovery. It is founded on the Statute of Westminster (1285, 13 Ed. I. c. 18), under which the sheriff was required to deliver to the creditor all the chattels (except oxen and beasts of the plough) and half the lands of the debtor until the debt was satisfied. By the Judgments Act 1838 the remedy was extended to all the debtor's lands, and by the Bankruptcy Act 1883 the writ no longer extends to the debtor's goods. The writ is enforceable against legal interests whether in possession or remainder {Hood-Barrs v. Cathcart, 1895, 2 Ch. 411), but not against equitable interests in land {Earl of Jersey v. Vxbridge Rural Sanitary Authority, 1891, 3 Ch. 183). When the debtor's interest is equitable, recourse is had to equitable execution by the appointment of a receiver or to bankruptcy proceedings.

The writ is directed to the sheriff, who, after marking on it the date of its receipt, at once in pursuance of its directions holds an inquiry with a jury as to the nature and value of the interest of the debtor in the lands extended under the writ, and delivers to the creditor at a reasonable price and extent in accordance with the writ, the lands of which the debtor was possessed in the bailiwick. When the sheriff has returned and filed a record (in the central office of the High Court) of the writ and the execution thereof, the execution creditor becomes " tenant to the elegit." Where the land is freehold the creditor acquires only a chattel interest in it; where the land is leasehold he acquires the whole of the debtor's interest {Johns v. Pink, 1900, 1 Ch. 296). The creditor is entitled to hold the land till his debt is satisfied, or

enough to satisfy it is tendered to him, and under the Judgments Act 1864 the creditor may obtain an order for sale. Until the land is delivered on execu- tion and the writs which have effected the delivery are registered in the Land Registry, the judgment does not create any charge on the land so as to fetter the debtor's power of dealing with it. Land Charges Registration Acts 1888 and 1900. (See R.S.C., O. xliii.)

Writs of Possession and Delivery. — Judgments for the recovery or for the delivery of the possession of land are enforceable by writ of possession. The recovery of specific chattels is obtained by writ of delivery (R.S.C., O. xlvii., xlviii.).

Writ of Sequestration. — Where a judgment directing the payment of money into court, or the performance by the defendant of any act within a limited time, has not been complied with, or where a corporation has wilfully disobeyed a judgment, a writ of sequestra- tion is issued, to not less than four sequestrators, ordering them to enter upon the real estate of the party in default, and " sequester" the rents and profits until the judgment has been obeyed (R.S.C., O. xliii. r. 6).

Equitable Execution.— -Where a judgment creditor is otherwise unable to reach the property of his debtor he may obtain equitable execution, usually by the appointment of a receiver, who collects, the rents and profits of the debtor's land for the benefit of the creditor (R.S.C., O. 1. rr. 15A-22). But receivers may be appointed of interests in personal property belonging to the debtor by virtue of the Judicature Act 1873, s. 25 (8).

Attachment. — A judgment creditor may " attach " debts due by third parties to his debtor by what are known as garnishee proceed- ings. Stock and shares belonging to a judgment debtor may be charged by a charging order, so as, in the first instance, to prevent transfer of the stock or payment of the dividends, and ultimately to enable the judgment creditor to realise his charge. A writ of attachment of the person of a defaulting debtor or party may be obtained in a variety of cases akin to contempt {e.g. against a person failing to comply with an order to answer interrogatories, or against a solicitor not entering an appearance in an action, in breach of his written undertaking to do so), and in the cases where imprisonment for debt is still preserved by the Debtors Act 1869 (R.S.C., O. xliv.). Contempt of Court {q.v.) in its ordinary forms is also punishable by summary committal.

County Courts. — In the county courts the chief modes of execution

are ” warrant of execution in the nature of a writ of fieri facias “; garnishee proceedings; equitable execution; warrants of possession and delivery, corresponding to the writs of possession and delivery above mentioned; committal, where a judgment debtor has, or, since the date of the judgment has had, means to pay his debt; and attachment of the person for contempt of court. If the judg- ment debtor assaults the bailiff or his officer or rescues the goods, he is liable to a fine not exceeding £5.

Scotland. — The principal modes of execution or ” diligence ” in Scots law are (i.) Arrestment and furthcoming, which corresponds to the English garnishee proceedings; (ii.) arrestment jurisdictionis fundandae causa, i.e. the seizure of movables within the jurisdiction

to found jurisdiction against their owner, being a foreigner; this precedure, which is not, however, strictly a ” diligence,” as it does not bind the goods, is analogous to the French saisie-arret, and to the obsolete practice in the mayor’s court of London known as ” foreign attachment ” (see Glyn and Jackson, Mayor’s Court Practice, 2nd ed., vii. 260); (iii.) arrestment under meditatione fugae warrant, corresponding to the old English writ of ne exeat regno, and applicable in the case of a debtor who intends to leave Scotland to evade an action; (iv.) arrestment on dependence, i.e. of funds in security; (v.) poinding, i.e. valuation and sale of the debtor’s goods; (vi.) sequestration, e.g. of tenant’s effects under a landlord’s hypothec for rent ; (vii.) action of adjudication, by which a debtor’s ” heritable ” {i.e. real) estate is transferred to his judgment creditor in satisfaction of his debt or security therefor. In Scots law ” multiplepoinding ” is the equivalent of ” interpleader.”

Ireland. — The law of execution in Ireland (see R.S.C., 1905, Orders xli.-xlviii.) is practically the same as in England.

British Possessions. — The Judicature Acts of most of the Colonies have also adopted English Law. Parts of the French Code de procedure civile are still in force in Mauritius. But its provisions have been modified by local enactment (No. 19 of 1868) as regards realty, and the rules of the Supreme Court 1903 have introduced the English forms of writs. Quebec and St Lucia, where French law formerly prevailed, have now their own codes of Civil Procedure. The law of execution under the Quebec Code resembles the French, that under

the St Lucia Code the English system. In British Guiana and Ceylon, in which Roman Dutch law in one form or another prevailed, the English law of execution has now in substance been adopted (British Guiana Rules of Court, 1900, Order xxxvi.)., Ceylon (Code of Civil Procedure, No. 2 of 1889) ; the modes of exe- cution in the South African Colonies are also the subject of local enactment, largely influenced by English law (cf. the Sheriffs' Ordinance, 1902, No. 9 of 1902), (Orange River Colony) and (Pro- clamation 17 of 1902), Transvaal (Nathan, Common Law of South Africa, vol. iv. p. 2206) ; and generally, Van Zyl, Judicial Practice of South Africa, pp. 198 et seq.

United States. — Execution in the United States is founded upon English law, which it closely resembles. Substantially the same forms of execution are in force. The provisions of the Statute of Frauds making the lien of execution attach only on delivery to the sheriff were generally adopted in America, and are still law in many of the states. The law as to the rights and duties of sheriffs is substantially the same as in England. The " homestead laws " (q.v.) which are in force in nearly all the American States exempt a certain amount or value of real estate occupied by a debtor as his homestead from a forced sale for the payment of his debts. This homestead legislation has been copied in some British colonies, e.g. Western Australia (No. 37 of 1898, Pt. viii.), Quebec (Rev. Stats., ss. 1743-1748), Manitoba (Rev. Stats., 1902, c. 58, s. 29, c. 21, s. 9), Ontario (Rev. Stats., 1897, c. 29), British Columbia (Rev. Stats., 1897, c. 93), New South Wales (Crown Lands Act 1895, Pt. iii.), New Zealand (Family Homes Protection Act 1895, No. 20 of 1895).

France. — Provisional execution (saisie-arret) with a view to obtain security has been already mentioned. Execution against personalty (saisie-execution) is preceded by a commandement or summons, personally served upon, or left at the domicile of the debtor calling on him to pay. The necessary bedding of debtors and of their children residing with them, and the clothes worn by them, cannot be seized in execution under any circumstances. Objects declared by law to be immovable by destination (immeubles par destination), such as beasts of burden and agricultural implements, books relating to the debtor's profession, to the value of 300 francs, workmen's tools, military equipments, provisions and certain cattle cannot be seized, even for a debt due to Government, unless in respect of provisions furnished to the debtor, or amounts due to the manu facturers or vendors of protected articles or to parties who advanced moneys to purchase, manufacture or repair them. Growing fruits cannot be seized except during the six weeks preceding the ordinary period when they become ripe. Execution against immovable property (la saisie immobiliere) is

preceded also by a summons to pay, and execution cannot issue until the expiry of 30 days after service of such summons (see further Code Proc. Civ., Arts. 673-689). Imprisonment for debt was abolished in all civil and commercial matters by the law of 22nd of July 1867, which extends to foreigners. It still subsists in favour of the State for non-payment of fines, &c. The French system is in substance in forco in Belgium (Code Civ. Proc, Arts. 51 et seq.), the Netherlands (CodeCiv. Proc, Arts. 430 et seq.), Italy (Code Civ. Proc, Arts. 553 et seq., 659 et seq.), and Spain.

Germany. — Under the German Code of Civil Prodecure (Arts. 796 et seq.), both the goods and (if the goods do not offer adequate security) the person of the debtor may be seized (the process is called arrest) as a guarantee of payment. The debtor's goods cannot be sold except in pursuance of a judgment notified to the debtor either before or within a prescribed period after the execution (Art. 809 [3], and law of 30th of April 1886). Imprisonment for debt in civil and commercial matters has been abolished or limited on the lines of the French law of 1 867 in many countries (e.g. Italy, law of the 6th of December 1877; Belgium, law of the 27th of July 1871 ; Greece, law of the 9th of March 1900; Russia, decree of the 7th of March 1879).

Authorities. — Anderson, Execution (London, 1889) ; Annual Practice (London, 1908) ; Johnston Edwards, Execution (London, 1888); Mather, Sheriff Law (London, 1903). As to Scots law, Mackay, Manual of Practice (Edinburgh, 1893). As to American law, Bingham, Judgments and Executions (Philadelphia, 1836); A. C. Freeman, Law of Execution, Civil Cases (3rd ed., San Francisco, 1900) ; H. M. Herman, Law of Executions (New York,-i875) ; American Notes to tit. " Execution," in Ruling Cases (London and Boston, 1897) ; Bouvier, Law Diet., ed. Rawle (1897), s.v. " Execution."

EXECUTORS AND ADMINISTRATORS, in English law, those persons upon whom the property of a deceased person both real and personal devolves according as he has or has not left a will. Executors differ from administrators both in the mode of their creation and in the date at which their estate vests. An executor can only be appointed by the will of his testator; such appoint- ment may be express or implied, and in the latter case he is said to be an executor "according to the tenor." The estate of an executor vests in him from the date of the testator's death. An administrator on the other hand is appointed by the probate division of the High Court, and his estate does not vest till such appointment, the title to the property being vested till then in the judge of the probate division. As to whom the court will appoint administrators and the various kinds of administrators see under

Administration. Apart from these two points the rights and liabilities of executors and administrators are the same, and they may be indifferently referred to as the repre- sentative of the deceased. As to their appointment before the establishment of the court of probate see articles Will and Intestacy. Before the Land Transfer Act 1897, the real estate of the deceased did not devolve upon the representative but vested directly in the devisee or heir-at-law, but by that act it was provided that the personal representative should be also the real representative, and therefore it may now be said broadly that the representative takes the whole estate of the deceased. There are, however, a few minor exceptions to this rule, of which the most important are lands held in joint tenancy and copyhold lands. As the representative stands in the shoes of the deceased he is" entitled to sue upon any contract or for any debt which the deceased might have sued in his lifetime.

The duties of a representative are as follows: 1. To bury the deceased in a manner suitable to the estate he leaves behind him; and the expenses of such funeral take precedence of any duty or debt whatever; but extravagant expenses will not be allowed. No rule can be laid down as to what is a reasonable allowance for this purpose, as it is impossible to know at the time of the funeral what the estate of the deceased may amount to. The broad rule is that the representative must allow such sum as seems reasonable, having regard to all the circumstances of the case and the conditions in life of the deceased, remembering that if he should exceed this he will be personally liable for such excess in the event of the estate proving insolvent.

2. He must obtain probate or letters of administration to the deceased within six months of the death, or, if such grant be dis- puted, within two months of the determination of such suit. The penalty for not doing so is fixed by the Stamp Act 1815, § 37, at £100, and an additional stamp duty at the rate of 10 %• As to the formalities of Probate see that article.

3. Strictly speaking, he must compile an inventory of all the estate of the deceased, whether in possession or outstanding, and he is to deliver it to the court on oath. He is to collect all the goods so inventoried and to commence actions to get in all those outstanding, and he is responsible to creditors for the whole of such estate, whether in possession or in action. This duty is thrown upon the representative by an act of 1529, but it is not the modern practice to exhibit such inventory unless he be cited for it in the spiritual court at the instance of a party interested. It is, however, necessary to file an affidavit setting out the value of the estate of the deceased upon applying for a

grant of probate or letters of administration.

4. The representative must pay the debts of the deceased according to their priority. Next to the legitimate funeral expenses come the costs of proving and administering the estate; in the event, however, of the funeral and testamentary expenses being charged by the will upon any particular fund, they will be primarily payable out of that fund. The representative must be careful to pay the debts according to the rules of priority, otherwise he will become personally liable to the creditors of one degree if he has exhausted the estate in paying creditors of a lesser degree. First of all, a solicitor has a lien for his costs upon any fund or duty which he has recovered for the deceased ; next in order come debts due to the crown by record or speciality; then debts given a priority by statute, as, for example, by the Poor Relief Act 1743, money due by an overseer of the poor to his parish. Next, debts of record, i.e.

judgment recovered against the deceased in any court of record; all such debts are equal among themselves, but a judgment creditor who has sued out execution is preferred to one who has not; another class of debts of record are statutes merchant and staple, or recog- nizances in the nature of statute staple, i.e. bonds of record acknow- ledged before the lord mayor of London or the mayor of the staple. Last in the order of debts come specialty and simple contract debts, which by Hinde Palmer's Act (the Executors Act 1869) are of equal degree, though as between specialty debts bonds given for value rank before voluntary bonds unless assigned for value, and as between simple contract debts those due to the crown have priority. Though the creditors can if necessary take all the estate of the deceased to satisfy their claims, yet as between the various classes of assets the representative must pay the debts out of assets in the following order: (i.) General personal estate not specifically be- queathed nor exempted from payment of debts; (ii.) real estate appropriated to debts; (iii.) real estate descended; (iv.) real estate devised charged with payment of debts; (v.) general pecuniary legacies pro rata; (vi.) specific legacies and devises; (vii.) real estate over which a general power of appointment has been exercised by will; (viii.) the widow's paraphernalia.

5. The debts of the deceased being satisfied, the representative must next proceed to satisfy the legacies and devises left by the testator. In

order to enable him to do this with safety to himself, it is provided that he cannot be compelled to divide the estate among the legatees or next of kin until twelve months from the death of the deceased (this is commonly known as " the executor's year "), though if there is no doubt as to the solvency of the estate he may do so at once. As a further protection the representative may give notice by advertisement for creditors to send in their claims against the estate, and on expiration of the notices he may proceed to divide .the estate, though even then the creditor may follow the assets to the person who has received them and recover for his debt. As between legatees the following priorities must be observed: (1) Specific legatees and devisees, (2) demonstrative legatees, and (3) general legatees ; and as to this last class the testator can give priority to one over another. If there are not sufficient assets to pay the general legatees they must abate rateably. Legacies were not payable out of the real estate prior to the Land Transfer Act 1897, unless the testator charged the realty with them. Even then unless the testator exonerates his personalty from payment of the legacies the personalty will be the first fund chargeable. It has been suggested that the effect of the act is to make the realty chargeable pro rata with the personalty, but this is doubtful.

6. The residue, after all legacies and devises are satisfied, must, if there be a will, be paid to the residuary legatee therein named, and if there be no will the real estate will go to the heir (see In- heritance) and the personalty to the next of kin (see Intestacy). It was held at one time that in default of a residuary legatee the residue fell to the executor himself, but now nothing less than the expressed intention of the testator can give it to him.

The liabilities of the representative may be shortly stated. He is liable in his representative capacity in all cases where the deceased would be liable were he alive. To this general rule there are some exceptions. The representative cannot be sued for breach of a contract for personal services which can be performed only in the lifetime of the person contracting, nor again can he be sued in a case where unliquidated damages only could have been recovered against the deceased. He is liable in his personal capacity in the following cases: if he contracts to pay .a debt due by the deceased, or if having admitted that he had assets in his hands sufficient to pay a debt or legacy he has misapplied such assets so that he cannot satisfy them; or lastly, if by mismanaging the estate and effects of the deceased he has made himself liable for a devastavit. Shortly stated, a representative is bound to exercise the ordinary care of a business man in administering the estate of the deceased, and he will be liable for the loss to the estate caused by his own negligence, or by the negligence

of a co-representative which his act or neglect has rendered possible. Though the general rule of delegatus non potest delegari holds good of a representative, yet in certain cases he may ” rely upon skilled persons in matters in which he cannot be expected to be experienced,” e.g. he must employ solicitors to conduct a lawsuit.

The privileges of the representative are these: he may prefer one creditor to another of equal degree; he may retain a debt owing to him from the deceased as against other creditors of equal degree (see Retainer) ; he may reimburse himself out of the estate all expenses incurred in the execution of his trust.

An executor de son tort is one who, without any title to do so, wrongfully intermeddles with the assets of the deceased, dealing with them in such a way as to hold himself out as executor. In such a case he is subject to all the liabilities of an executor, and can claim none of the privileges. He may be treated by the creditor as the executor, and, if he is really assuming to act as executor, creditors and legatees will get a good title from him, but he is liable to be sued by the rightful representative for damages for interfering with the property of the deceased.

Scotland. — Executor in Scots law is a more extensive term than in English. He is cither nominative or dative, the latter appointed by the court and corresponding; ia most respects to the English

administrator. Caution is required from the latter, not from the former. By the common law doctrine of passive representation the heir or executor was liable to be sued for implement of the deceased’s obligations. The Roman principle of bemficium inventarii was first introduced by an act of 1695. As the law at present stands, the heir or executor is liable only to the value of the succession, except where there has been vitious intromission in movables, and in gestio pro haerede (behaviour as heir) and other cases in herit- ables. The present inventory duty on succession to movables and heritables depends on the Finance Acts i894-i909(see Estate Duty) . In England the executor is bound to pay the debts of the deceased in a certain order, but in Scotland they all rank pari passu except privileged debts (see Privilege).

Authorities. — R. L. Vaughan Williams, The Law of Executors and Administrators; W. G. Walker, Compendium on the Law of Executors and Administrators; James Schouler, Law of Executors and Administrators (3rd ed., Boston, 1901).

EXEDRA, or Exhedra (from Gr. eij, out, and eSpa, a seat), an architectural term originally applied to a seat or recess out of doors, intended for conversation. Such recesses were generally semicircular, as in the important example built by Herodes Attieus at Olympia. In the great Roman thermae (baths) they were of large size, and like apses were covered with a hemispheri- cal vault. An example of these exists at Pompeii in the Street of the Tombs. From Vitruvius we learn that they were often covered over, and they are described by him (v. 11) as places leading out of porticoes, where philosophers and rhetoricians could debate or harangue;

EXELMANS, RENE JOSEPH ISIDORE, Count (1775-1852), marshal of France, was born at Bar-le-Duc on the 13th of November 1775. He volunteered into the 3rd battalion of the Meuse in 1791, became a lieutenant in 1797, and in 1798 was aide- de-camp to General Eble, and in the following year to General Broussier. In his first campaign in Italy he greatly distinguished himself; and in April 1799 he was rewarded for his services by the grade of captain of dragoons. In the same year he took part with honour in the conquest of Naples and was again pro- moted, and in 1801 he became aide-de-camp to General Murat. He accompanied Murat in the Austrian, Prussian and Polish campaigns of 1805, 1806 and 1807. At the passage of the Danube, and in the action of Wertingen, he specially distin- guished himself; he was made colonel for the valour which he displayed at Austerlitz, and general of brigade for his conduct at Eylau in 1807. In 1808 he accompanied Murat to Spain, but was there made prisoner and conveyed to England. On regaining his liberty in 181 1 he went to Naples, where King Joachim Murat appointed him grand-master of horse. Exelmans, however, rejoined the French army on the eve of the Russian campaign, and on the field of Borodino won the rank of general of division. In the retreat from Moscow his steadfast courage was conspicuously manifested on several occasions. In 1813 he was made, for services in the campaign of Saxony and Silesia, grand-officer of the Legion of Honour, and in 1814 he reaped additional glory by his intrepidity and skill in the campaign of France. When the Bourbons were restored, Exelmans retained his position in the army. In January 181 5 he was tried on an accusation of having treasonable relations with Murat, but was acquitted. Napoleon on his return from Elba made Exelmans a peer of France and placed him in command of the II. cavalry corps, which he commanded in the Waterloo campaign, the battle of Ligny and Grouchy's march on Wavre. In the closing operations round Paris Exelmans won great distinction. After the second Restora- tion he denounced, in the House of Peers, the execution of Marshal Ney as an " abominable assassination ";

thereafter he lived in exile in Belgium and Nassau for some years, till 1819, when he was recalled to France. In 1828 he was appointed inspector-general of cavalry; and after the July revolution of 1830 he received from Louis Philippe the, grand cross of the Legion of Honour, and was reinstated as a peer of France. At the revolution of 1848 Exelmans was one of the adherents 01 Louis Napoleon; and in 1851 he was, in recognition of his long and brilliant military career, raised to the dignity of a marshal of France. His death, which took place on the 10th of July 1852, was the result of a fall from his horse.

EXEQUATUR, the letter patent, issued by a foreign office and signed by a sovereign, which guarantees to a foreign – consul the rights and privileges of his office, and ensures his recognition in the state in which he is appointed to exercise them. If a consul is not appointed by commission he receives no exequatur; and a notice in the Gazette in this case has to suffice. The exe- quatur may be withdrawn, but in practice, where a consul is obnoxious, an opportunity is afforded to his government to recall him.

EXETER, EARL, MARQUESS AND DUKE OF. These English titles have been borne at different times by members of the families of Holand or Holland, Beaufort, Courtenay and Cecil. The earls of Devon of the family of de Redvers were sometimes called earls of Exeter; but the 1st duke of Exeter was John (c. 13 55-1400), a younger son of Thomas Holand, earl of Kent (d. 1360). John's mother, Joan (d. 1385), a descend- ant of Edward I., married for her third husband Edward the Black Prince, by whom she was the mother of Richard II., and her son John was thus the king's half-brother, a relationship to which he owed his high station at the English court. He married Elizabeth (d. 1426), a daughter of John of Gaunt, duke of Lancaster, and was constantly in Richard's train until 1385, when his murder of Ralph Stafford disturbed these friendly relations. John then went to Spain as constable of the English army under John of Gaunt; but after his return to England in 1387 he was created earl of Huntingdon, was made admiral of the fleet and chamberlain of England, and was again high in the king's favour. He was Richard's chief helper in the proceedings against the lords appellant in 1397, was created duke of Exeter in September of this year, and went with the king to Ireland in 1399. After the accession of his brother-in-law, Henry IV., Holand was tried for his share in the events of 1397, and was reduced to his earlier rank of earl of Huntingdon. He was soon plotting against

Henry's life, and after the projected rising in 1400 had failed he was captured and was probably beheaded at Pleshey in Essex on the 16th of January 1400. 1 He was afterwards attainted and his titles and lands were forfeited.

In 1416 Thomas Beaufort, earl of Dorset, was created duke of Exeter; but this dignity was only granted for his life, and consequently it expired on his death in 1426.

In 1416 John (1395-1447), son of John Holand, the former duke of Exeter, was allowed to take his father's earldom of Huntingdon. This nobleman rendered great assistance to Henry V. in his conquest of France, fighting both on sea and on land. He was marshal of England, admiral of England and governor of Aquitaine under Henry VI.; was one of the king's representatives at the conference of Arras in 1435; and in 1443 was created duke of Exeter. When he died on the 5th of August 1447 his titles passed to his son Henry (1430-1473), who,' although married to Anne (d. 1476), daughter of Richard, duke of York, fought for Henry VI. during the Wars of the Roses. After having been imprisoned by York at Pontefract, he was present at the battle of Towton, sailed with Henry's queen, Margaret of Anjou, to Flanders in 1463, and was wounded at Barnet in 1471. In 1461 he had been attainted and his dukedom declared forfeited, and he died without sons, probably in 1473.

Coming to the family of Courtenay the title of marquess of Exeter was borne by Henry Courtenay (c. 1496-1538), earl of Devon, who was made a marquess in T525. A grandson of Edward IV., Courtenay was a prominent figure at the court of Henry VIII. until Thomas Cromwell rose to power, when his high birth, his great wealth and his independent position made him an object of suspicion. Some slight discontent in the west of England gave the occasion for his arrest, and he was tried and beheaded on the 9th of December 1538. A few days later he was declared a traitor and his titles were forfeited; although his only son, Edward (c. 1526-1556), who was restored to the

1 There is some difference of opinion about the place and manner of the earl's death, and this question has an important bearing upon the privilege of trial by peers of the realm. See L. W. Vernon- Harcourt, His Grace the Steward and Trial of Peers (1907).

earldom of Devon in 1553 and was a suitor for the hand of Queen Mary, is sometimes called marquess of Exeter.

The title of carl of Exeter was first bestowed upon the Cecils (see Cecil: Family) in 1605 when Thomas, 2nd Lord Burghley (1542-1623), the eldest son of William Cecil, Lord Burghley, was made earl of Exeter by James I. Thomas had been a member of parliament during the reign of Queen Elizabeth, who knighted him in 1575, and had fought under the earl of Leicester in the Netherlands. After his father's death in 1598 he became president of the Council of the North and was made a knight of the Garter. He died on the 7th or 8th of February 1623. His direct descendants continued to bear the title of earl of Exeter, and in 1801 Henry (1754-1804), the 10th earl, was advanced to the dignity of marquess of Exeter, the present marquess being his lineal descendant. It may be noted that the 1st marquess is Tennyson's " lord of Burghley."

See G. E. C(okayne), Complete Peerage (1887-1898).

EXETER, a city and county of a city, municipal, county and parliamentary borough, and the county town of Devonshire, England, 172 m. W.S.W. of London, on the London & South Western and the Great Western railways. Pop. (1901) 47,185. The ancient city occupies a broad ridge of land, which rises steeply from the left bank of the Exe. At the head of the ridge is the castle, on the site of a great British earthwork. The High Street and its continuation, called Fore Street, are narrow, but very picturesque, with many houses of the 16th arid 17th centuries. There is a maze of lesser streets within the ancient walls, the line of which may be traced. All the gates have disappeared. The suburbs, which have greatly extended since the beginning of the 19th century, contain many good streets, terraces and detached villas. The surrounding country is rich, fertile and of great beauty. Extensive views are commanded in the direction of Haldon, a stretch of high moorland which may be regarded as an outlier of Dartmoor. The lofty mpund of the castle is laid out as a promenade, with fine trees and broad walks.

The cathedral, although not one of the largest in England, is unsurpassed in the. beauty of its architecture and the richness of its details. With the exception of the Norman transeptal towers, the general character is Decorated, ranging from about 1280 to 1369. Transeptal towers occur elsewhere in England only in the collegiate church of Ottery St Mary, in Devonshire, for which Exeter cathedral served as a model. The west front is of later date than the rest (probably 1369-1394), and the porch is wholly covered with statues. Within, the most note- worthy features are the long unbroken roof, extending throughout nave and choir, with no central tower or lantern; the beautiful sculpture of bosses and corbels; the minstrel's

gallery, projecting from the north triforium of the nave; and the remarkable manner in which the several parts of the church are made to correspond. The window tracery is much varied; but each window answers to that on the opposite side of nave or choir; pier answers to pier, aisle to aisle, and chapel to chapel, while the transeptal towers complete the balance of parts. A complete restoration under Sir G. G. Scott was carried out between 1870 and 1877. The modern stall work, the reredos, the choir pave- ment of tiles, rich marbles and porphyries, the stained glass and the sculptured pulpits in choir and nave are meritorious. The episcopal throne, a sheaf of tabernacle work in wood, was erected by Bishop Stapeldon about 1320, and in the north transept is an ancient clock. The most interesting monuments are those of bishops of the 12th and 13th centuries, in the choir and lady chapel. Some important MSS., including the famous book of Saxon poetry given by Leofric to his cathedral, are preserved in the chapter-house. The united sees of Devonshire and Cornwall were fixed at Exeter from the installation there of Leofric (1050) by the Confessor, until the re-erection of the Cornish see in 1876. The bishop's palace embodies Early English portions. The diocese covers the greater part of Devon- shire, with a very small part of Dorsetshire.

The guildhall in the High Street is a picturesque Elizabethan building, which contains some interesting portraits; among them being one of General Monk, who was a native of Devon,

and another of Henrietta, duchess of Orleans, given by her brother Charles II. Both are by Sir Peter Lely. The assize hall and sessions house dates from 1774. The Albert Memorial Museum contains a school of art, an excellent free library, a reading-room, and a museum of natural history and antiquities. There is a good collection of local birds, and some remarkable pottery and bronze relics extracted from barrows near Honiton or found in various parts of Devonshire. Of the castle, called Rougemont, the chief architectural remnant is a portion of a gateway tower which may be late Norman. Traces are also seen of the surrounding earthworks, which may have belonged to the original British stronghold. Beneath the castle wall is the pleasant promenade of Northernhay. The churches of Exeter are of little importance, being mostly small, and closely beset with buildings, but the modern church of St Michael (i860) deserves notice. The Devon and Exeter

Institution, founded in 1 8 13, contains a large and valuable library, and among educational establishments may be noticed the technical and university extension college, the diocesan training college and school; and the grammar school, which was founded under a scheme of Walter de Stapeldon, bishop of Exeter and founder of Exeter College, Oxford, in 1332, and refounded in 1629, but occupies modern buildings (1886) outside the city . It is endowed with a large number of leaving exhibitions, and about 150 boys are educated. There are two market-houses in the city, many hospitals and many charitable institutions, including the pictur- esque hospital or almshouse of William Wynard, recorder of Exeter (1439).

Exeter is one of the principal railway centres in the south-west, and it also has some shipping trade, communicating with the sea by way of the Exeter ship-canal, originally cut in the reign of Elizabeth (1564), and enlarged in 1675 and 1827. This canal is an interesting work, being the first canal carried out in the United Kingdom for the purpose of enabling sea-going vessels to pass to an inland port. The river Exe was very early utilized by small craft trading to Exeter, parliament having granted powers for the improvement of the navigation by the construc- tion of a canal 3 m. long from Exeter to the river; at a later date this canal was extended lower down to the tidal estuary of the Exe. Previous to the year 1820 it was only available for vessels of a draft not exceeding 9 ft., but by deepening it, raising the banks, and constructing new locks, vessels drawing 14 ft. of water were enabled to pass up to a basin and wharves at Exeter. These works were carried out under the advice of Thomas Telford. A floating basin is accessible to vessels of 350 tons. Larger vessels lie at Topsham, at the junction of the canal with the estuary of the Exe; while at the mouth of the estuary is the port of Exmouth. Imports are miscellaneous, while paper, grain, cider and other goods are exported. Brewing, paper-making and iron-founding are carried on, and the city is an important centre of agricultural trade. The parliamentary borough returns one member. The city is governed by a mayor, 14 aldermen and 42 councillors. Area, 3158 acres. The eastern suburb of Heavitree, where is the Exeter city asylum, is an urban district with a population (1901) of 7529.

Exeter was the Romano-British country town of Isca Dam- noniorum—-the most westerly town in the south-west of Roman Britain. Mosaic pavements, potsherds, coins and other relics have been found, and probably traces of the Roman walls survive here and there in the medieval walls. It is said to be the Caer I see of the Britons, and its importance as a British stronghold is shown by the great earthwork which the Britons threw up to defend it, on the site of which the castle

was afterwards built, and by the number of roads which branch from it. Exeter is famous for the number of sieges which it sustained as the chief town in the south-west of England. In 1001 it was unsuccessfully besieged by the Danes, but in the following year was given by King ˆEthelred to Queen Emma, who appointed as reeve, Hugh, a Frenchman, owing to whose treachery it was taken and destroyed by Sweyn in 1003. By 1050, however, it had recovered, and was chosen by Leofric as the new seat of the bishops of Devon. In 1068, after a siege of eighteen days, Exeter surrendered to

the Conqueror, who threw up a castle which was called Rouge- mont, from the colour of the rock on which it stood. Again in 1 137 the town was held for Matilda by Baldwin de Redvers for three months and surrendered, at last, owing to lack of water. Three times subsequently Exeter held out successfully for the king ■ — in 1467 against the Yorkists, in 1497 against Perkin Warbeck, and in 1549 against the men of Cornwall and Devon, who rose in defence of the old religion. During the civil wars the city declared for parliament, but was in 1643 taken by the royalists, who held it until 1646. The only other historical event of importance is the entry of William, prince of Orange, in 1688, shortly after his arrival in England. Exeter was evidently a borough by prescription some time before the Conquest, since the burgesses are mentioned in the Domesday Survey. Its first charter granted by Henry I. gave the burgesses all the free customs which the citizens of London enjoyed, and was confirmed and enlarged by most of the succeeding kings. By 1227 govern- ment by a reeve had given place to that by a mayor and four bailiffs, which continued until the Municipal Reform Act of 1835. Numerous trade gilds were incorporated in Exeter, one of the first being the tailors' gild, incorporated in 1466. This by 1482 had become so powerful that it interfered with the government of the town, and was dissolved on the petition of the burgesses. Another powerful gild was that of the merchant adventurers, incorporated in 1550, which is said to have dictated laws to which the mayor and bailiffs submitted. From 1295 to 1885 Exeter was represented in parliament by two members, but in the latter year the number of representatives was reduced to one. Exeter was formerly noted for the manufacture of woollen goods, introduced in Elizabeth's reign, and the value of its exports at one time exceeded half a million sterling yearly. The trade declined partly owing to the stringent laws of the trade gilds, and by the beginning of the 19th century had entirely dis- appeared, although at the time of its greatest prosperity it had been surpassed in value and importance only by that of Leeds.

See Victoria County History, Devon; Richard Izacke, Antiquities of the

City of Exeter (1677) ; George Oliver, The History of the City of Exeter (1861); and E. A. Freeman, Exeter (" Historic Towns " series) (London, 1887), in the preface to which the names of earlier historians of the city are given.

EXETER, a town and one of the county-seats of Rockingham county, New Hampshire, U.S.A., on the Squamscott river, about 12 m. S.W. of Portsmouth and about 51 m. N. by E. of Boston, Mass. Pop. (1890) 4284; (1900) 4922 (1066 foreign- born); (1910) 4897; area, about 17 sq. m. It is served by the Western Division of the Boston & Maine railway. The town has a public library and some old houses built in the colonial period, and is the seat of Phillips Exeter Academy (incorporated in 1 781 and opened in 1783). In its charter this institution is described as " an academy for the purpose of promoting piety and virtue, and for the education of youth in the English, Latin and Greek languages, in writing, arithmetic, music and the art of speaking, practical geometry, logic and geography, and such other of the liberal arts and sciences or languages, as opportunity may hereafter permit." It was founded by Dr John Phillips (1719-1795), a graduate of Harvard College, who acquired considerable wealth as a merchant at Exeter and gave nearly all of it to the cause of education. The academy is one of the foremost secondary schools in the country, and among its alumni have been Daniel Webster, Edward Everett, Lewis Cass (born in Exeter in a house still standing), John Parker Hale, George Bancroft, Jared Sparks, John Gorham Palfrey, Richard Hildreth and Francis Bowen. The government of the academy is vested in a board of six trustees, regarding whom the founder provided that a majority should be laymen and not inhabitants of Exeter. In 1909-1910 the institution had 20 buildings, 32 acres of recreation grounds, 16 instructors and 488 students, representing ˆ8 states and territories of the United States and 4 foreign countries. At Exeter also is the Robinson female seminary (1867), with 14 instructors and 272 students in 1906- 1907. The river furnishes water-power, and among the manu- factures of the town are shoes, machinery, cottons, brass, &c.

The town is one of the oldest in the state; it was founded in 1638 by Rev. John Wheelwright, an Antinomian leader who with a number of followers settled here after his banishment from Massachusetts. For their government the settlers adopted (1639) a plantation covenant. There was disagreement from the first, however, with regard to the

measure of loyalty to the king, and in 1643, when Massachusetts had asserted her claim to this region and the other three New Hampshire towns had submitted to her jurisdiction, the majority of the inhabitants of Exeter also yielded, while the minority, including the founder, removed from the town. In 1680 the town became a part of the newly created province of New Hampshire. During the French arid Indian wars it was usually protected by a garrison, and some of the garrison houses are still standing. From 1776 to 1784 the state legislature usually met at Exeter.

See C. H. Bell, History of the Town of Exeter (Exeter, 1888).

EXETER BOOK [Codex Exoniensis], an anthology of Anglo- Saxon poetry presented to Exeter cathedral by Leofric, 1 bishop of Exeter, England, from 1050 to 107 1, and still in the possession of the dean and chapter. It contains some legal documents, the poems entitled Crist, Guthlac, Phoenix, Juliana, The Wanderer and others, and concludes with between eighty and ninety riddles. It was first described in Humphrey Wanley's Catalogus . . . (1705) in detail but with many inaccuracies; subse- quently by J. J. Conybeare, Account of a Saxon Manuscript (a paper read in 1812; printed with some extracts from the MS. in Archaeologia, vol. xvii. pp. 180-197, 1814). A complete transcript made (1831) by Robert Chambers is in the British Museum (Addit. MS. 9067). It was first printed in 1842 by Benjamin Thorpe for the Soc. of Antiq., London, as Codex Exoniensis . . . with an English Translation, Notes and Indexes. More recent editions, chiefly based on Thorpe's text, are: — in Chr. Grein's Bibliothek der A.S. Poesie (vol. iii. part 1, ed. R. Wiilker, Leipzig, 1897, with a bibliography), J. Schipper in Pfeiffer's Germania, vol. xix. pp. 327-339, and Israel Gollancz, The Exeter Book, pt. i. (1895), with English translation, for the Early English Text Society.

A detailed account, with bibliographies of the separate poems, is given by R. Wiilker, in Grundriss . . . der A.S. Literatur, pp. 218-236 (Leipzig, 1885) ; see also the introduction to The Crist of Cynewulf . . . , edited by Prof. A. S. Cook, with introduction, notes and a glossary (Boston, U.S.A., 1900). For the poems contained in the MS. see also Cynewulf and Riddles.

EXHIBITION, a term, meaning in general a public display, 2 which has a special modern sense as applied to public shows of goods for the promotion of trade (Fr. exposition). The first exhibition in this sense of which there is any account, in either sacred or profane history, was that held by King Ahasuerus, who, according to the Book of Esther, showed in the third year of his reign "the riches of his glorious

kingdom, and the honour of his excellent majesty, many days, even a hundred and four- score days." The locale of this function was Shushan, the palace and the exhibits consisted of " white, green and blue hangings, fastened with cords of fine linen and purple to silver rings and pillars of marble: the beds were of gold and silver, upon a pavement of red, and blue, and white and black marble. And they gave them drink in vessels of gold, the vessels being diverse one from another." The first exhibition since the Christian] era was at Venice during the dogeship of Lorenzo Tiepolo, in 1268. On that occasion there was a grand display, consisting of a water fete, a procession of the trades and an industrial exhibition. The various gilds of the Queen City of the Seas marched through the narrow streets to the great square of St Mark, and their leaders asked the dogaressa to inspect the products of their industry. Other medieval exhibitions were the fairs held at Leipzig and Nizhni Novgorod in Europe, at Tanta in Egypt, and in 1689 that by the Dutch at Leiden.

, l For Leofric, see F. E. Warren, The Leofric Missal (1883).

2 An " exhibition," in the sense of a minor scholarship, or annual payment to a student from the funds of a school or college, is a modern survival from the obsolete meaning of " maintenance " or " endowment " (cf. Late Lat. exhibitio et tegumentum, i.e. food and raiment).

The first modern exhibition was held at London in 1756 by the Society of Arts, which offered prizes for improvements in the manufacture of tapestry, carpets and porcelain, the exhibits being placed side by side. Five years afterwards, in 1761, the same society gave an exhibition of agricultural machinery. In 1797 a collective display of the art factories of France, includ- ing those of Sevres, the Gobelins and the Savonnerie, was made in the palace of St Cloud, and the exhibition was repeated during the following year in the rue de Varennes, Paris. This experiment was so successful that in the last three days of the same year an exhibition under official auspices, at which private exhibitors were allowed to compete, was held in the Champ de Mars. Four years later, in 1801, there was a second official exhibition in the grand court of the Louvre. Upon that occasion juries of practical men examined the objects shown, and the winners of a gold medal were invited to dine with Napoleon, who was at that time First Consul. In the report of the jury the following remarkable sentence appeared: — " There is not an artist or inventor who, once obtaining thus a public recognition of his ability, has not found his reputation and his business largely increased." The third Paris Exhibition, held in 1802, was the first to publish an official catalogue. There were 540

exhibitors, including J. E. Montgolfier, the first aeronaut, and J. M. Jacquard, the inventor of the loom which bears his name. The fourth exhibition was held in 1806 in the esplanade in front of the Hotel des Invalides, and attracted 1422 exhibitors. There were no more exhibitions till after the fall of the empire, but in 1819 the fifth was held during the reign of Louis XVIII., with 1622 exhibitors. Others were held at Paris at various intervals, that in 1849 having 4500 exhibitors.

Other exhibitions, though on a smaller scale, were held in Dublin, London, and in various parts of Germany and Austria during the first half of the 19th century — that in 1844, held at Berlin, having 3040 exhibitors. Switzerland, Holland, Belgium, Sweden, Russia, Poland, Italy, Spain and Portugal all held exhibitions, and there was a Free Trade Bazaar of British Manufactures at Covent Garden theatre in 1845, which at the time created a great deal of interest. But all these exhibitions were confined to the products of the country in which they took place, and the first great International Exhibition was held in London in 1851 by the Society of Arts, under the presidency of the prince consort. All nations were invited to compete; a site was obtained in Hyde Park, and a building 20 acres in extent was erected, after the design of Sir Joseph Paxton, at a cost of £193,168. The exhibition was open for five months and fifteen days. The receipts amounted to £506,100, and the surplus was £186,000. The number of visitors was 6,039,195, and the money taken at the doors was £423,792. The total, number of exhibitors was 13,937, of which Great Britain contributed 6861, the British colonies 520 and foreign countries 6556. The International Exhibition of 1851 was followed by those of New York and Dublin in 1853, Melbourne and Munich in 1854, and Paris in 1855 — this latter was held in the Palais d' Industrie, which remained in existence until pulled down to make room for the two Palais des Beaux Arts, which formed one of the attractions of the 1900 exhibition. The exhibitors numbered 20,839 an d the visitors 5,162,330. There were national exhibitions during the following years in several European countries, but the next great world's fair was held at London in 1862. The total space roofed in amounted to 988,000 sq. ft., 22-65 acres, the number of visitors was 6,211,103, and the amount received at the doors £408,530. The death of the prince consort had a depressing effect upon the enterprise. In 1865 an exhibition was held at Dublin, the greater proportion of the funds being supplied by Sir Benjamin Lee Guinness. The number of attendances during six months was 900,000, and the exhibition was opened at night. An Italian exhibition was held at Rome in 1862.

The Paris Exhibition of 1867 was upon a far larger scale than that of

1855. It was held, like those that preceded and succeeded it, at the Champ de Mars, and covered 41 acres. The building resembled an exaggerated gasometer. The external ring ‘was

devoted to machinery,, the internal to the gradual develop- ment of civilization, commencing with the stone age and con- tinuing to the present era,. A great feature of the exhibition was the park, which was studded with specimens of every style of modern architecture — Turkish mosques, Swedish cottages, English lighthouses, Egyptian palaces and Swiss chalets. The number of attendances was 6, 805,969. The exhibitors numbered 43,217, and the total amount received for entrances, concessions, &c, was £420,735. This was the first exhibition at which there were international restaurants. The cost of the exhibition was defrayed partly by the state and partly by private subscriptions.

Small exhibitions were held in various parts of Europe between 1867 and 1870, and in the latter year a series of international exhibitions, confined to one or two special descriptions of produce or manufactures, was inaugurated in London at South Kensington. These continued till 1874, but they failed to attract any very large attendance of the public and were abandoned. A medal was given to each exhibitor, and reports on the various exhibits were published, but there was no examination of the exhibits by jurors. . In 1873 there was an International Exhibi- tion at Vienna. The main building, a rotunda, was erected in the beautiful park of the Austrian capital. There were halls for machinery and agricultural products, and hundreds of buildings, erected by different nations, were scattered amongst the woodlands of the Prater. Unfortunately, an outbreak of cholera diminished the attendance of visitors, and the receipts were only £206,477, although the visitors were said to have reached 6,740,500, and the number of exhibitors was 25,760.

None of the International Exhibitions held between 1857 and 1873 had attracted as many as 7,000,000 visitors, but the gradual extension of education amongst the masses, and the greater facilities for locomotion, brought about by the growth of the railway system in all portions of the civilized world, largely. increased the attendances at subsequent World’s Fairs. The Centennial Exhibition of 1876, to celebrate the one-hundredth anniversary of American Independence, was held at Fairmount Park, Philadelphia. The funds were raised

partly by private subscriptions, and partly by donations from the city of Phila- delphia, from Pennsylvania and some of the neighbouring states. The central government at Washington made a large loan, which was subsequently repaid. The principal buildings, five in number, occupied an area of 485 acres, and there were several smaller structures, which in the aggregate must have filled half as much space more, the largest being that devoted to the ex- hibits of the various departments of the United States govern- ment, which covered 7 acres. Several novelties in exhibition management were introduced at Philadelphia. Instead of gold, silver and bronze medals, only one description, bronze, was issued, the difference between the merits of the different exhibits being shown by the reports. Season tickets were not issued, and the price of admission, the same on all occasions, was half a dollar, or about 2s. id. The exhibition was not open at night or on Sundays, thus following the British, and not the con- tinental, precedent. The number of visitors was 9,892,625, of whom 8,004,214 paid for admission, the balance being exhibitors, officials and attendants. The total receipts amounted to £763,899. Upon one occasion, the Pennsylvania day, 274,919 persons — the largest number that had visited any exhibition up to that date — passed through the turnstiles. The display of machinery was the finest ever made, that of the United States occupying 480,000 sq. ft. The motive-power was obtained from a Corliss engine of 1600 horse-power. At this exhibition the United Kingdom and the British Colonies of Canada, Victoria, New South Wales, New Zealand, Cape Colony and Tasmania made a very fine display, which was only excelled by that of the United States,

The Paris Exhibition of 1878 was upon a far larger scale in every respect than any which had been previously held in any part of the world. The total area covered not less than 66 acres, the main building in the Champ de Mars occupying 54 acres. The French exhibits filled one-half the entire space, the remaining moiety being occupied by the other nations of the world. The

United Kingdom, British India, Canada, Victoria, New South Wales, Queensland, South Australia, Cape Colony and some of the British crown colonies occupied nearly one-third of the space set aside for nations outside France. Germany was the only great country which was not represented, but there were a few German paintings. The display of fine arts and machinery was upon a very large and comprehensive scale, and the Avenue des Nations, a street 2400 ft. in length, was devoted to specimens of the domestic architecture of nearly every country in Europe, and of several in Asia, Africa and America. The palace of the Trocadero, on the northern bank of the

Seine, was erected for the exhibition. It was a handsome structure, with towers 250 ft. in height and flanked by two galleries. The rules for admission were the same as those at Philadelphia, and every person — exhibitor, journalist or official — who had the right of entrance was compelled to forward two copies of his or her photograph, one of which was attached to the card of entry. The ordinary tickets were not sold at the doors, but were obtainable at various government offices and shops, and from numerous pedlars in all parts of the city and suburbs. The buildings were somewhat unfinished upon the opening day, political complications having prevented the French government and the French people from paying much attention to the exhibition till about six months before it was opened; but the efforts made in April were pro- digious, and by June 1st, a month after the opening, the exhibi- tion was complete, and afforded an object-lesson of the recovery of .France from the calamities of ,1870-1871. The decisions arrived at by the international juries were accompanied by medals of gold, silver and bronze. The expenditure by the United Kingdom was defrayed out of the consolidated revenue, each British colony defraying its own expenses. The display of the United Kingdom was under the control of a royal commission, of which the prince of Wales was president. The number of paying visitors to the exhibition was 13,000,000, and the cost of the enterprise to the French government, which supplied all the funds, was a little less than a million sterling, after allowing for the value of the permanent buildings and the Trocadero Palace, which were sold to the city of Paris. The total number of persons who visited Paris during the time the exhibition was open was 571,792, or 308,974 more than came to the French metropolis during the year 1877, and 46,021 in excess of the visitors during the previous exhibition of 1867. It was stated at the time that, in addition to the impetus given to the trade of France, the revenue of the Republic and of the city of Pari3 from customs and octroi duties was increased by nearly three millions sterling as compared with the previous year.

Exhibitions on a scale of considerable magnitude were held at Sydney and Melbourne in 1879 and 1880, and many continental and American manufacturers took advantage of them in order to bring the products of their industry directly under the notice of Australian consumers, who had previously purchased their supplies through the instrumentality of British merchants. The United Kingdom and India made an excellent display at both cities, but the effect of the two great Australian exhibitions was to give a decided impetus to German, American, French and Belgian trade. One of the immediate results was that lines of steamers to Melbourne and Sydney commenced to run

from Marseilles and Bremen; another, that for the first time in the history of the Australian colonies, branches of French banks were opened in the two principal cities. The whole cost of these exhibitions was defrayed by the local governments.

Exhibitions were held at Turin and Brussels during 1880, and smaller ones at Newcastle, Milan, Lahore, Adelaide, Perth, Moscow, Ghent and Lille during 1881 and 1882, and at Zurich, Bordeaux and Caraccas in Venezuela during 1883. The next of any importance was held at Amsterdam in the latter year. On that occasion a new departure in exhibition management was made. The government of the Netherlands was to a certain extent responsible for the administration of the exhibition, but the funds were obtained from private sources, and a charge was made to each nation represented for the space it occupied. The United Kingdom, India, Victoria and New South Wa'es

took part in the exhibition, but there was no official representa- tion of the mother country. Exhibitions on somewhat similar lines were held at Nice and Calcutta in the winter of 1883 and 1884, and at Antwerp in 1895.

A series of exhibitions, under the presidency of the then prince of Wales, and managed by Sir Cunliffe Owen, was commenced at South Kensington in 1883. The first was devoted to a display of the various industries connected with fishing; the second, in 1884, to objects connected with hygiene; the third, in 1885, to inventions; and the fourth, in 1886, to the British Colonies and India. These exhibitions attracted a large number of visitors and realized a substantial profit. They might have been con- tinued indefinitely if it had not been that the buildings in which they were held had become very dilapidated, and that the ground covered by them was required for other purposes. There ,was no examination of the exhibits by juries, but a tolerably liberal supply of instrumental music was supplied by military and civil bands. The Crystal Palace held a successful International Exhibition in 1884, and there was an Italian Exhibition at Turin, and a Forestry Exhibition at Edinburgh, during the same year. A World's Industrial Fair was held at New Orleans in 1884-1885, and there were universal Exhibitions at Montenegro and Antwerp in 1885, at Edinburgh in 1886, Liverpool, Adelaide, Newcastle and Manchester in 1887, and at Glasgow, Barcelona and Brussels in 1888. Melbourne held an International Exhibition in 1888- 1889 to celebrate the Centenary of Australia. Great Britain, Germany, France, Austria and the United States were officially represented, and an expenditure of £237,784 was incurred by the local government.

The Paris Exhibition of 1889 marked an important change in the policy which had previously characterized the management of these gatherings. The funds were contributed partly by the state, which voted 17,000,000 francs, and by the municipality of Paris, which gave 8,000,000. A guarantee fund amounting to 23,124,000 francs was raised, and on this security a sum of 18,000,000 francs was obtained and paid into the coffers of the administration. The bankers who advanced this sum recouped themselves by the issue of 1,200,000 " bons," each of 25 francs, Every bon contained 25 admissions, valued at 1 franc, and certain privileges in the shape of participation in a lottery, the grand prix being £20,000. The calculations of the promoters were tolerably accurate. The attendances reached the then unprecedented number of 32,350,297, of whom 25,398,609 paid in entrance tickets and 2,723,366 entered by season tickets. A sum of 2,307,999 francs was obtained by concessions for restaurants and " side-shows," upon which the administration relied for much of the attractiveness of the exhibition. The total expenditure was 44,000,000 francs, and there was a small surplus. The space covered in the Champ de Mars, the Trocadero, the Palais d'Industrie, the Invalides and the Quai d'Orsay was 72 acres, as compared with 66 acres in 1878 and 41

acres in 1867. Amongst the novelties was the Eiffel Tower, 1000 ft. in height, and a faithful reproduction of a street in Cairo. The system of international juries was continued, but instead of gold, silver and copper medals, diplomas of various merits were granted, each entitling the holder to a uniform medal of bronze. Some of the ” side-shows,” although perhaps pecuniary successes, did not add to the dignity of the exhibition. The date at which it was held, the Centenary of the French Revolution, did not commend it to several European governments. Austria, Hungary, Belgium, China, Egypt, Spain, Great Britain, Italy, Luxemburg, Holland, Peru, Portugal, Rumania and Russia took part, but not officially, while Germany, Sweden, Turkey and Montenegro were conspicuous by their absence. On the other hand, Argentina, Bolivia, Chile, the United States, Greece, Guatemala, Morocco, Mexico, Nicaragua, Norway, Paraguay, Salvador, the South African Republic, Switzerland, Uruguay and Venezuela sent commissioners, who were accredited to the government of the French Republic. The total number of exhibitors was 61,722, of which France contributed 33,937, and the rest of the world 27,785. The British and colonial section was under the management of the Society of Arts, which obtained

a guarantee fund of £16,800, and, in order to recoup itself for its expenditure, made a charge to exhibitors of 5s. per sq. ft. for the space occupied. There were altogether 1149 British exhibitors, of whom 429 were in the Fine Arts section. One of the features of the exhibition was the number of congresses and conferences held in connexion with it.

During the year 1890 there was a Mining Exhibition at the Crystal Palace, and a Military Exhibition in the grounds of Chelsea Hospital; in 1891 a Naval Exhibition at Chelsea and an International at Jamaica. In 1891-1892 there were exhibi- tions at Palermo and at Launceston in Tasmania; in 1892, a Naval Exhibition at Liverpool, and one of Electrical Appliances at the Crystal Palace. A series of small national exhibitions under private management was held at Earl’s Court between 1887 and 1891. The first of the series was that of the United States — Italy followed in 1888, Spain in 1889, France in 1890 and Germany in 1891.

The next exhibition of the first order of magnitude was at Chicago in 1893, and was held in celebration of the 400th anni- versary of the discovery of America by Columbus. The financial arrangements were undertaken by a company, with a capital of £2,000,000. The central government at Washington allotted £20,000 for the purposes of foreign exhibits, and £300,000 for the erection and administration of a building for exhibits from the various government departments. The

exhibition was held at Jackson Park, a place iot public recreation, 586 acres in extent, situated on the shore of Lake Michigan} on the southern side of the city, with which it was connected by railways and tramways. Special provision was made for locomotion in the grounds themselves by a continuous travelling platform and an elevated electric railway. The proximity of the lake, and of some artificial canals which had been constructed, rendered possible the service of electric and steam launches; The exhibition remained open from the 1st of May to the 30th of October, and was visited by 21,477,212 persons, each of whom paid half a dollar (about 2s. id.) for admission. The largest number of visitors on any one day was 716,881. In addition to its direct vote of £320,000, Congress granted £500,000 to the exhibition in a special coinage, which sold at an enhanced price. The receipts from admissions were £2,120,000; from concessions, £750,000; and the miscel- laneous receipts, £159,000: total, £3,029,000. The total expenses were £5,222,000. Of the sums raised by the Company, £400,000 was returned to the subscribers. Speaking roughly, it may be said that the total outlay on the Chicago Exhibition was six millions sterling, of which three millions were earned by the Fair, two millions subscribed by Chicago and a million provided by the United States government, , The sums expended by the participating foreign governments were estimated at £1,440,000. The total area occupied by buildings at Chicago was as nearly as possible 200 acres, the largest building, that devoted to manu- factures, being 1687 ft. by 787, and 30-5 acres. The funds for the British commission, which was under the control of the Society of Arts, were provided by the imperial government, which granted £60,000. The number of British exhibitors was 2236, of whom 597 were Industrial, 501 Fine Arts and 1138 Women's work. In this total were included 18 Indian exhibi- tors. The space occupied by Great Britain was 306,285 sq. ft.; and, in addition, separate buildings were erected in the grounds. These were Victoria House,- the headquarters of the British commission; the Indian Pavilion, erected by the Indian Tea Association; the Kiosk of the White Star Steamship Company; and the structure set up by the Maxim-Nordenfelt Company. Canada and New South Wales had separate buildings, which covered 100,140 and 50,951 sq. ft. respectively; and Cape Colony occupied 5250, Ceylon 27,574, British Guiana 3367, Jamaica 4250, Trinidad 3400 and India 3584, sq. ft. in the several buildings. The total space occupied by the British Colonies was therefore 193,660 sq. ft. The system of awards was considered extremely unsatisfactory. Instead of inter- national juries, a single judge was appointed for each class, and the recompenses were all of one grade, a bronze medal and a diploma, on which was stated the reasons which induced the

judge to make his decision. Some judges took a high standard, and refused to make awards except to a small proportion of selected exhibits ; others took a low one, and gave awards indiscriminately. About 1183 awards were made to British exhibitors. The French refused to accept any awards. The value of the British goods exhibited was estimated, exclusive of Fine Arts, at £430,000, and the expenses of showing them at £200,000. A large expenditure was incurred in the erection of buildings, which were more remarkable for their beauty and grandeur than for their suitableness to the purposes for which they were intended. Considerable areas were devoted to ” side-shows,” and the Midway Plaisance, as it was termed, resembled a gigantic fair. Every country in the world contributed some- thing. There were sights and shows of every sort from every- where. The foreign countries represented were Argentina, Austria, Belgium, Bolivia, Brazil, Bulgaria, Chile, Colombia, Costa Rica, Cuba, Curacoa, Denmark, Danish West Indies, Ecuador, France, Germany, Greece, Guatemala, Honduras, Hayti, Japan, Johore, Korea, Liberia, Mexico, Monaco, Nether- lands, Norway, Orange Free State, Paraguay, Persia, Portugal, Russia, Siam, Spain, Sweden, Turkey, United Kingdom and Colonies, Uruguay and Venezuela.

Exhibitions were held at Antwerp, Madrid and Bucharest in 1894; Hobart in 1894-1895; Bordeaux, 1895; Nizhni Novgorod, Berlin and Buda-Pest in 1896; Brussels and Brisbane in 1897. A series of exhibitions, under the management of the London Exhibitions Company, commenced at Earl’s Court in 1895 and continued in successive years.

The Paris Exhibition of 1900 was larger than any which had been previously held in Europe. The buildings did not cover so much ground as\those at Chicago, but many of those at Paris had two or more floors. In addition to the localities occupied in 1889, additional space was obtained at the Champs Elysees, the park of Vincennes, on the north bank of the Seine between the Place de la Concorde, and at the Trocadero. The total superficial area occupied was as follows: Champ de Mars, 124 acres; Esplanade des Invalides, 30 acres; Trocadero Gardens, 40 acres; Champs Elysees, 37 acres; quays on left bank of Seine, 23 acres; quays on right bank of Seine, 23 acres; park at Vincennes, 270 acres : total, 549 acres. The space occupied by buildings and covered in amounted to 4,865,328 sq. ft., mj acres. The French section covered 2,691,000 sq. ft., the foreign 1,829,880, and

those at the park of Vincennes 344,448 sq. ft. About one hundred French and seventy-five foreign pavilions and detached buildings were erected in the grounds in addition to the thirty-six official pavilions,' which were for the most part along the Quai d'Orsay. Funds were raised upon the same system as that adopted in 1889. The French government granted £800,000, and a similar sum was contributed by the munici- pality of Paris. £2,400,000 was raised by the issue of 3,250,000 " bons," each of the value of 20 francs, and containing 20 tickets of admission to the exhibition of the face value of one franc each, and a document which gave its holder a right either to a reduced rate for admission to the different " side-shows " or else to a diminution in the railway fare to and from Paris, together with a participation in the prizes, amounting to six million francs, drawn at a series of lotteries. Permission to erect restaurants, and to open places of amusement in buildings erected for that purpose, were sold at high prices, and for these privileges, which only realised 2,307,999 francs in 1889, the concessionaires agreed to pay 8,864,442 francs in 1900. The results did not justify the expectations which had been formed, and the administration finally consented to receive a much smaller sum. The administration calculated that they would have 65,000,000 paying visitors, though there were only 13,000,000 in 1878 and 25,398,609 in 1889. A very few weeks after the opening day, April 15th, it became evident that the estimated figures would not be reached, since a large number of holders of " bons " threw them on the market, and the selling price of an admission ticket declined from the par value of one franc to less than half that amount, or from 30 to 50 centimes. The proprietors of the restaurants and " side-shows " discovered

that they had paid too much for their concessions, that the buildings they had erected were far too handsome and costly to be profitable, and that the public preferred the exhibition itself to the so-called attractions. The exhibition was largely visited by foreigners, but various causes kept away many persons of wealth and position. Although many speculators were ruined, the exhibition itself was successful. The attendance was unprecedentedly large, and during the seven months the exhibition was open, 39,000,000 persons paid for admission with 47,000,000 tickets, since from two to five tickets were demanded at certain times of the day and on certain occasions. The entries of exhibitors, attendants and officials totalled 9,000,000. The receipts were 114,456,213 francs (£4,578,249), and the ex- penditure 116,500,000 (£4,660,000), leaving a deficiency of rather more than two millions of francs (£80,000). It was calculated that the expenditure of the foreign nations which took part in the exhibition

was six millions sterling, and of the French exhibitors and concessionaires three millions sterling.

A new plan of classifying exhibits was adopted at Paris, all being displayed according to their nature, and not according to their country of origin, as had been the system at previous exhibitions. One-half the space in each group was allotted to France, so that the exhibitors of that nation were enabled to overwhelm their rivals by the number and magnitude of the objects displayed by them. All the agricultural implements, whatever their nationality, were in one place, all the ceramics in another, so that there was no exclusively British and no exclusively German court. The only exception to this rule was in the Trocadero, where the French, British, Dutch, and Portu- guese Colonies, Algeria, Tunis, Siberia, the South African Republic, China and Japan were allowed to erect at their own cost separate pavilions. The greater number of the nationalities represented had palaces of their own in the rue des Nations along the Quai d'Orsay, in which thoroughfare were to be seen the buildings erected by Italy, Turkey, the United States, Denmark, Portugal, Austria, Bosnia, Herzegovina, Peru, Hungary, the United Kingdom, Persia, Belgium, Norway, Luxemburg, Finland, Germany, Spain, Bulgaria, Monaco, Sweden, Rumania, Greece, Servia and Mexico. Scattered about the grounds, in addition to those in the Trocadero, were the buildings of San Marino, Morocco, Ecuador and Korea. Nearly every civilized country in the world was represented at the exhibition, the most conspicuous absentees being Argentina, Brazil, Chile, and some other South and Central American Republics, and a number of the British colonies. The most noteworthy attractions of the exhibition were the magnificent effects produced by electricity in the palace devoted to it in the Chateau d'Eau and in the Hall of Illusions, the two palaces of the Fine Arts in the Champs Elysees, and the Bridge over the Seine dedicated to the memory of Alexander II. These permanent Fine Art palaces were devoted, the one to modern painting and sculpture, the other to the works of French artists and art workmen who flourished from the dawn of French art up to the end of the 18th century.

The United Kingdom was well but not largely represented both in Fine Arts and Manufactures, the administration of the section being in the hands of a royal commission, presided over by the prince of Wales. The British pavilion contained an important collection of paintings of the British school, chiefly by Reynolds, Gainsborough and their contemporaries, and by Turner and Burne-Jones. Special buildings had been erected by the British colonies and by British India. Canada, West Australia and Mauritius occupied the former, India and Ceylon the latter. For the first time since the war of 1870 Germany took part

in a French International Exhibition, and the exhibits showed the great industrial progress which had been made since the foundation of the empire in 1870. The United States made a fine display, and fairly divided the honours with Germany. Re- markable progress was manifested in the exhibits of Canada and Hungary. France maintained her superiority in all the objects in which good taste was the first consideration, but the more utilitarian exhibits were more remarkable for their number than

their quality, except those connected with electrical work and display, automobiles and iron-work. The number of exhibitors in the industrial section from the British empire, including India and the colonies, was 1250, who obtained 1647 awards, as many persons exhibited in several classes. There were, in addition, 465 awards for " collaborateurs," that is, assistants, engineers, foremen, craftsmen and workmen who had co-operated in the production of the . exhibits. In the British Fine Arts section there were 429 exhibits by 282 exhibitors and 175 awards.

In later years, important international exhibitions have been held at Glasgow, and at Buffalo, New York, in 1001, at St Louis (commemorating the Louisiana purchase) in 1904, at Liege in 1905, at Milan in 1906, at Dublin in 1907, and in London (Franco – British), 1908. In the artistic taste and magnificence of their buildings and the interest of their exhibits these took their cue from the great Paris Exhibition, and even in some cases went beyond it, notably at Buffalo (q.v.), St Louis (q.v.) and London. And it might well be thought that the evolution of this type of public show had reached its limits. (G. C. L.)

EXHUMATION (from Med. Lat. exhumare; ex, out of, and humus, ground) , the act of digging up and removing an object from the ground. The word is particularly applied to the removal of a dead body from its place of burial. For the offence of exhuming a body without legal authority, and the process of obtaining such authority, see Burial and Burial Acts.

EXILARCH, in Jewish history, "Chief or Prince of the Captivity." The Jews of Babylonia, after the fall of the first temple, were termed by Jeremiah and Ezekiel the people of the " Exile." Hence the head of the Babylonian Jews was the exilarch (in Aramaic Resh Galulha). The

office was hereditary and carried with it considerable power. Some traditions regarded the last king of Davidic descent (Jehoiachin) as the first exilarch, and all the later holders of the dignity claimed to be scions of the royal house of Judah. Under the Arsacids and Sassanids the office continued. In the 6th century an attempt was made to secure by force political autonomy for the Jews, but the exilarch who led the movement (Mar Zutra) was executed. For some time thereafter the office was in abeyance, but under Arabic rule there was a considerable revival of its dignity. From the middle of the 7th till the nth centuries the exilarchs were all descendants of Bostanai, through whom ” the splendour of the office was renewed and its political position made secure ” (Bacher). The last exilarch of importance was David, son of Zakkai, whose contest with Seadiah (q.v.) had momentous consequences. Hezekiah (c. 1040) was the last Babylonian exilarch, though the title left its traces in later ages. Benjamin of Tudela (Itinerary, p. 61) names an exilarch Daniel b. Hisdai in the 12th century. Petahiah (Travels, p. 17) records that this Daniel’s nephew succeeded to the office jointly with a R. Samuel. The latter, according to Petahiah, had a learned daughter who ” gave instruction, through a window, remaining in the house while the disciples were below, unable to see her.”

Our chief knowledge of the position and function of the exilarch concerns the period beginning with the Arabic rule in Persia. In the age succeeding the Mahommedan conquest tKe exilarch was noted for the stately retinue that accompanied him, the luxurious banquets given at his abode, and the courtly etiquette that prevailed there. A brilliant account has come down of the ceremonies at the installation of a new exilarch. Homage was paid to him by the rabbinical heads of the colleges (each of whom was called Gaon, q.v.); rich gifts were presented; he visited the synagogue in state, where a costly canopy had been erected over his seat. The exilarch then delivered a discourse, and in the benediction or doxology (Qaddish) his name was inserted. Thereafter he never left his house except in a carriage of state and in the company of a large retinue. He would frequently have audiences of the king, by whom he was graciously received. He derived a revenue from taxes which he was empowered to exact. The exilarch could excommunicate, and no doubt had considerable jurisdiction over the Jews. A spirited description of the glories of the exilarch is given in Disraeli’s novel Ahoy.

See Neubauer, Mediaeval Jewish Chronicles, ii. 68 seq.; Zacuto, Yuhasin ; Graetz, Geschichte, vols, iv.-vi. ; Benjamin of Tudela, Itinerary, ed. Adler, pp. 39 seq. ; Bacher, Jewish Encyclopaedia, vol. v. 288. (I. A.)

EXILE (Lat. exsilium or exilium, from exsul or exul, which is derived from ex, out of, and the root sal, to go, seen in salire, to leap, consul, &c. ; the connexion with solum, soil, country is now generally considered wrong), banishment from one's native country by the compulsion of authority. In a general sense exile is applied to prolonged absence from one's country either through force of circumstances or when undergone voluntarily. Among the Greeks, in the Homeric age, banishment (4>vyrj) was sometimes inflicted as a punishment by the authorities for crimes affecting the general interests, but is chiefly known in connexion with cases of homicide. With these the state had nothing to do; the punishment of the murderer was the duty and privilege of the relatives of the murdered man. Unless the relatives could be induced to accept a money payment by way of compensation (ttolvt], weregeld; see especially Homer, Iliad, xviii. 497), in which case the murderer was allowed to remain in the country, his only means of escaping punishment was flight to a foreign land. If, during his self-imposed exile, the relatives expressed their willingness to accept the indemnity, he was at liberty to return and resume his position in society.

In later times banishment is (1) a legal punishment for particular offences; (2) voluntary.

1. Banishment for life with confiscation of property was inflicted upon those who destroyed or uprooted the sacred olives at Athens; upon those who remained neutral during a sedition (by a law of Solon, which subsequently fell into abeyance) ; upon those who gave refuge to or received on board ship a man who had fled to avoid punishment; upon those who wounded with intent to kill and those who prompted them to such an act (it is uncertain whether in this case exile was for life or temporary) ; upon any one who wilfully murdered an alien; for impiety. Certain political crimes were also similarly punished — treason, laconism, sycophancy (see Sycophant), attempts to subvert existing decrees. For the peculiar form of banishment called Ostracism, see separate article.

In cases of voluntary homicide the punishment was death; but (except in cases of parricide) the murderer could leave the country unmolested after the first day of the trial. He was bound to remain outside Attica, and when on foreign soil was not allowed to appear at the public games, to enter the temples or take part in sacrifices; but provided that he adhered to the prescribed regulations, he was accorded a certain amount of protection. Even when a general amnesty was proclaimed, he was not allowed to return; if he did so, he might at once be put to death.

Temporary exile (the period of which is uncertain) without confiscation, was the punishment for involuntary homicide. As soon as the relatives of the deceased became reconciled to the man who had slain him, the latter was permitted to return; further, since banishment was only temporary, it is reasonable to suppose that the law insisted upon such reconciliation.

2. Citizens sometimes voluntarily left the country for other reasons (debt, inability to pay a fine). Since extradition was only demanded in cases of high treason or other serious offences against the state, the fugitive was not interfered with. He was at liberty to return after a certain time had elapsed.

Little is known about exile as it affected Sparta and other Greek towns, but it is probable that the same conditions pre- vailed as at Athens.

At Rome, in early times, exile was not a punishment, but rather a means of escaping punishment. Before judgment had been finally pronounced it was open to any Roman citizen condemned to death to escape the penalty by voluntary exile (solum verlere exsilii causa). To prevent his return, he was interdicted from the use of fire and water; if he broke the interdict and returned, any one had the right to put him to death. The aquae et ignis (to which et lecti “shelter” is sometimes added) inlcrdiclio is variously explained as exclusion from the necessaries of life,

from the symbols of civic communion, or from ” the marks of a pure society, which the criminal would defile by his further use of them.” Subsequently (probably at the time of the Gracchi) it became a recognized legal penalty, practically equivalent to ” exile,” taking the place of capital punishment. The criminal was permitted to withdraw from the city after sentence was pronounced; but in order that this withdrawal might as far as possible bear the character of a punishment, his departure was sanctioned by a decree of the people which declared his exile permanent. Authorities are not agreed whether this exile by interdiction entailed loss of civitas; accord- ing to some this did not ensue until (as in earlier times) the criminal had assumed the citizenship of the state in which he had taken refuge and thereby lost his rights as a citizen of Rome, while others hold that it was not until the time of Tiberius (a.d. 23) that capitis deminutio

media became the direct con- sequence of trial and conviction. Interdictio was the punishment for treason, murder, arson and other serious offences which came under the cognizance of the quaestiones perpetuae (permanent judicial commissions for certain offences); confiscation of property was only inflicted in extreme cases.

Under the Empire interdictio gradually fell into disuse and a new form of banishment, introduced by Augustus, called depor- tatio, generally in insulam, took its place. For some time the two probably existed side by side. Deportatio consisted in trans- portation for life to an island (or some place prescribed on the mainland, not of Italy), accompanied by loss of civitas and all civil rights, and confiscation of property. The most dreaded places of exile were the islands of Gyarus, Sardinia, an oasis in the desert {quasi in insulam) of Libya; Crete, Cyprus and Rhodes were considered more tolerable. Large bodies of persons were also transported in this manner; thus Tiberius sent 4000 freedmen to Sardinia for Jewish or Egyptian superstitious practices. Deportatio was originally inflicted upon political criminals, but in course of time became more particularly a means of removing those whose wealth and popularity rendered them objects of suspicion. It was also a punishment for the following offences: adultery, murder, poisoning, forgery, em- bezzlement, sacrilege and certain cases of immorality.

Relegatio was a milder form of deportatio. It either excluded the person banished from one specified district only, with permission to choose a residence elsewhere, or the place of exile was fixed. Relegatio could be either temporary or for life, but it did not in either case carry with it loss of civitas or property, nor was the exile under military surveillance, as in the case of deportatio. Thus, Ovid, when in exile at Tomi, says (Trislia, v. n) : ” he (i.e. the emperor) has not deprived me of life, nor of wealth, nor of the rights of a citizen … he has simply ordered me to leave my home.” He calls himself relegatus, not exsul.

In later writers the word exsilium is used in the sense of all its three forms — aquae et ignis interdictio, deportatio and relegatio.

In England the first enactment legalizing banishment dates from the reign of Elizabeth (39 Eliz. c. 4), which gave power to banish from the realm “such rogues as are dangerous to the inferior people.” A statute of Charles II. (18 Car. II. c. 3) gave power to execute or to transport to America for life the moss- troopers of Cumberland and Northumberland. Banishment or transportation for criminal offences was regulated by an act of 1824 (5 Geo. IV. s. 84) and finally abolished by the Penal Servi- tude Acts 1853 and 1857 (see further

Deportation). The word exile has sometimes, though wrongly, been applied to the sending away from a country of those who are not natives of it, but who may be temporary or even permanent residents in it (see Alien; Expatriation; Expulsion).

Bibliography. — J. J. Thonissen, Le Droit penal de la republique athenienne (Brussels' 1875) ; G. F. Schomann, Griechische Alter- tiimer (4th ed., 1897), p. 46; T. Mommsen, Romisches Strafrecht (1899), pp. 68, 964, and Romisches Staatsrecht (1887), Hi. p. 48; L. M. Hartmann, De exilio apud Romanos (Berlin, 1887); F. von Holtzendorff-Vietmansdorf, Die Deportationsstrafe im romischen Alterthum (Leipzig, 1859); articles in Smith's Diet, of Greek and Roman Antiquities (3rd" ed., 1890) and Daremberg and Saglio's Diet, ties antiquitSs (C. Lecrivain and G. Humbert).

EXILI, an Italian chemist and poisoner in the 17th century. His real name was probably Nicolo Egidi or Eggidio. Few authentic details of his life exist. Tradition, however, credits him with having been originally the salaried poisoner at Rome of Olympia Maidalchina, the mistress of Pope Innocent X. Subse- quently he became a gentleman in waiting to Queen Christina of Sweden, whose taste for chemistry may have influenced this appointment. In 1663 his presence in France aroused the suspicions of the French government, and he was imprisoned in the Bastille. Here he is said to have made the acquaintance of Godin de Sainte-Croix, the lover of the marquise de Brin- villiers (q.v.). After three months' imprisonment, powerful influences secured Exili's release, and he left France for England. In 1 68 1 he was again in Italy, where he married the countess Fantaguzzi, second cousin of Duke Francis of Modena.

EXMOOR FOREST, a high moorland in Somersetshire and Devonshire, England. The uplands of this district are bounded by the low alluvial plain of Sedgemoor on the east, by the lower basin of the Exe on the south, by the basin of the Taw (in part) on the west, and by the Bristol Channel on the north. The area thus defined, however, includes not only Exmoor but the Brendon and Quantock Hills east of it. Excluding these, the total area in the district lying at an elevation exceeding 1000 ft. is about 1 20 sq. m. The geological formation is Devonian. The ancient forest had an area of about 20,000 acres, and was enclosed in 181 5. Large tracts are still uncultivated; and the wild red deer and native Exmoor pony are characteristic of the district. The highest point is Dunkery Beacon in the east (1707 ft.), but Span Head in the south-west is 1618 ft., and a height of 1500 ft. is exceeded at several points. The Exe, Barle, Lyn and other streams, traversing deep picturesque valleys except in their uppermost courses, are in favour

with trout fishermen. The few villages, such as Exford, Withypool and Simonsbath, with Lynton and Lynmouth on the coast, afford centres for tourists and sportsmen. Exmoor is noted for its stag hunting. The district has a further fame through Richard Blackmore's novel, Lorna Doone.

EXMOUTH, EDWARD PELLEW, ist Viscount (1757-1-833), English admiral, was descended from a family which came originally from Normandy, but had for many centuries been settled in the west of Cornwall. He was born at Dover, on the 19th of April 1757. At the age of thirteen he entered the navv. and even then his smartness and activity, his feats of daring, and his spirit of resolute independence awakened remark, and pointed him out as one specially fitted to distinguish himself in his pro- fession. He had, however, no opportunity of active service till 1776, when, at the battle of Lake Champlain, his gallantry, promptitude and skill, not only saved the "Carleton" — whose command had devolved upon him during the progress of the battleˆ — from imminent danger, but enabled her to take a prominent part in sinking two of the enemy's ships. For his services on this occasion he obtained a lieutenant's commission, and the command of the schooner in which he had so bravely done his duty. The following year, in command of a brigade of seamen, he shared in the hardships and perils of the American campaign of General Burgoyne. In 1782, in command of the " Pelican," he attacked three French privateers inside the lie de Batz, and compelled them to run themselves on shore — a feat for which he was rewarded by the rank of post-captain. On the outbreak of the French War in 1793, he was appointed to the " Nymphe," a frigate of 36 guns; and, notwithstanding that for the sake of expedition she was manned chiefly by Cornish miners, he captured, after a desperate conflict, the French frigate " La Cleopatre," a vessel of equal strength. For this act he obtained the honour of knighthood. In 1794 he received the command of the " Arethusa " (38), and in a fight with the French frigate squadron off the lie de Batz he com- pelled the " Pomona " (44) to surrender. The same year the western squadron was increased and its command divided, the second squadron being given to Sir Edward Pellew in the " In- defatigable " (44). While in command of this squadron he, on several occasions, performed acts of great personal daring;

and for his bravery in boarding the wrecked transport " Dutton," and

his promptitude and resolution in adopting measures so as to save the lives of all on board, he was in 1 796 created a baronet. In 1708 he joined the channel fleet, and in command of the ” Impetueux ” (74) took part in several actions with great distinction. In 1802 Sir Edward Pellew was elected member of parliament for Dunstable, and during the time that he sat in the Commons he was a strenuous supporter of Pitt. In 1804 he was made rear-admiral of the blue, and appointed commander- in-chief in India, where, by his vigilance and rapidity of move- ment, he entirely cleared the seas of French cruisers, and secured complete protection to English commerce. He returned to England in 1809, and in 1810 was appointed commander-in-chief in the North Sea, and in 18 1 1 commander-in-chief in the Mediter- ranean. In 18 14 he was created Baron Exmouth of Canonteign, and in the following year was made K.C.B., and a little later G.C.B. . When the dey of Algiers, in 1816, violated the treaty for the abolition of slavery, Exmouth was directed to attack the town. Accordingly, on the 26th of August, he engaged theAlgerine battery and fleet, and after a severe action of nine hours’duration, he set on fire the arsenal and every vessel of the enemy’s fleet, and shattered the sea defences into ruins. At the close of the action the dey apologized for his conduct, and agreed to a renewal of the treaty, at the same time delivering up over three thousand persons of various nationalities who had been Algerine slaves. For this splendid victory Exmouth was advanced to the dignity of viscount. Shortly before his death, which took place on the 23rd of January 1833, he was made vice-admiral.

He had married Susan (d. 1837), daughter of James Frowde of Knoyle, Wiltshire, who bore him four sons and two daughters”. His eldest son, Pownoll Bastard Pellew (1786-1833), became 2nd Viscount Exmouth, and his descendant, Edward Addington Hargreaves Pellew (b. 1890), became the 5th viscount in 1899.

Exmouth’s second son, Sir Fleetwood Broughton Reynolds Pellew (1 789-1861), was like his father an admiral. The third son was George Pellew (1793-1866), author and divine, who married ‘Frances (d. 1870), daughter of the prime minister, Lord Sidmouth, and wrote his father-in-law’s life (The Life and Correspondence of Henry Addington, 1st Viscount Sidmouth, 1847).

Exmouth had a brother, Sir Israel Pellew (1758-1832), also an admiral, who was present at the battle of Trafalgar.

A Life of the 1st viscount, by Edward Osier, was published in

1835-

EXMOUTH, a market-town, seaport and watering-place in the Honiton parliamentary division of Devonshire, England, at the mouth of the river Exe, io| m. S.E. by S. of Exeter by the London & South-Western railway. Pop. of urban district (1901) 10,485. In the 18th century it consisted of a primitive fishing village at the base of Beacon Hill, a height commanding fine views over the estuary and the English Channel. After its more modern terraces were built up the hillside, Exmouth became the first seaside resort in Devon. Its excellent bathing and the beauty of its coast and moorland scenery attract many visitors in summer, while it is frequented in winter by sufferers from pulmonary disease. The climate is unusually mild, as a range of hills shelters the town on the east. A promenade runs along the sea wall; there are golf links and public gardens, and the port is a favourite yachting centre, a regatta being held annually. Near the town is a natural harbour called the Bight. The local industries include fishing, brick-making and the manufacture of Honiton lace. Exmouth was early a place of importance, and in 1347 contributed 10 vessels to the fleet sent to attack Calais. It once possessed a fort or " castelet," designed to command the estuary of the Exe. This fort, which was garrisoned for the king during the Civil War, was blockaded and captured by Colonel Shapcoate in 1646.

EXODUS, BOOK OF, in the Bible, a book of the Old Testa- ment which derives its name, through the Greek, from the event which forms the most prominent feature of the history it narrates, viz. the deliverance of Israel from Egypt. Strictly speaking, however, this title is applicable to the first half only, the historical portion of the book, and takes no account of those I

chapters which describe the giving of the Law on Mt. Sinai, nor of those which deal with the Tabernacle and its furniture. By the Jews it is usually styled «iter its opening words ntof .-tjw (We'eleh Shimoth) or, more briefly, niDf (Shemotk).

In its present form the book sets forth (a) the oppression of the Israelites in Egypt (ch. i.), (b) the birth and education of Moses, and his flight to the land of Midian (ch. ii.), (c) the theo- phany at Mt. Horeb (the Burning Bush), and the subsequent commission of Moses and Aaron (iii. i-iv. 17), (d) the return of Moses to Egypt, and his appeal to Pharaoh which results in the further oppression of Israel (iv. 18-vii. 7), (e) the plagues of Egypt (vii. 8-xi. 10), (/) the institution of the Passover and of the Feast of Unleavened Cakes, the last plague, and Israel's departure from Egypt (xii. i-xiii. 16), (g) the crossing of the Red Sea and the discomfiture of the Egyptians, the Song of Triumph, the sending of the manna and other incidents of the

journeying through the wilderness (xiii. 17-xviii. 27), (h) the giving of the Law, including the Decalogue and the so-called Book of the Covenant, on Sinai-Horeb (xix.-xxiv.), (i) directions for the building of the Tabernacle and for the consecration of the priests (xxv.-xxxi.), (j) the sin of the Golden Calf, and another earlier version of the first legislation (xxxii.-xxxiv.), (k) the construction of the Tabernacle and its erection (xxxv.xl.) . The book of Exodus, however, like the other books of the Hexa teuch, is a composite work which has passed, so to speak, through many editions; hence the order of events given above cannot lay claim to any higher authority than that of the latest editor. Moreover, the documents from which the book has been compiled belong to different periods in the history of Israel, and each of them, admittedly, reflects the standpoint of the age in which it was written. Hence it follows that the contents of the book are not of equal historical value; and though the claim of a passage to be considered historical is not necessarily determined by the age of the source from which it is derived, yet, in view of the known practice of Hebrew writers, greater weight naturally attaches to the earlier documents in those cases in which the sources are at variance with one another. Any attempt, there- fore, at restoring the actual course of history must be preceded by an inquiry into the source of the various contents of the book.

The sources from which the book of Exodus has been compiled are the same as those which form the basis of the book of Genesis, while the method of composition is very similar. Here, too, the strongly marked characteristics of P, or the Priestly Document, as opposed to JE, enable us to determine the extent of that document with comparative ease; but the absence, in some cases, of conclusive criteria prevents any final judgment as to the exact limits of the two strands which have been united in the composite JE. The latter statement applies especially to the legislative portions of the book: in the historical sections the separation of the two sources gives rise to fewer difficulties, It does not, however, lie within the scope of the present article to examine the various sources underlying the narrative with any minuteness, but rather to sum up those results of modern criticism which have been generally accepted by Old Testament scholars. To this end it will be convenient to treat the subject- matter of the book under three main heads: (a) the historical portion (ch. i.-xviii.), (b) the sections dealing with the giving of the Law (xix.-xxiv., xxxii.-xxxiv.). and © the construction of the Tabernacle and its furniture (xxv.-xxxi., xxxv.-xl.).

(a) Israel in Egypt and the Exodus (ch. i.-xviii.). (1) i. i-vii. 13. — The analysis of these chapters shows that the history, in- the main, has

been derived from the two sources J and E, chiefly the former, and that a later editor has included certain passages from P, besides introducing a slight alteration of the original order and other re-dactional changes. The combined narrative of JE sets forth the rise of a new king in Egypt, who endeavoured to check the growing strength of the children of Israel; it thus prepares the way for the birth of Moses, his early life in Egypt, his flight to Midian and marriage with Zipporah, the theophany at Mt. Horeb, and his divine commission to deliver Israel from Egypt.

At the very outset the two sources betray their divergent origin and point of view. According to J (i. 6, 8-12, 206) the Israelites dwell apart in the province of Goshen, and their numbers become so great as to call for severe measures of repression, the method employed being that of forced labour. E, on the other hand (i. 15-200,

21, 22), represents them as living among the Egyptians, and so few in number that two midwives satisfy their requirements. It is to this latter source that we owe the account of the birth of Moses and of his education at the court of Pharaoh (ii. l-io). On reaching manhood Moses openly displays his sympathy with his brethren by slaying an Egyptian, and has, in consequence, to flee to Midian, where he marries Zipporah, the daughter of the priest of Midian (ii, 11-22). In this section the editor has undoubtedly made use of the parallel narrative of J, though it is impossible to determine the exact point at which J's account is introduced: certainly ii. 156-22 belong to that source. 1 The narrative of the call of Moses is by no means uniform, and shows obvious traces of twofold origin (J iii. 2-40, 5, 7, 8, 16-18; iv. 1-12 (13-16), 29-31; E iii. I, 46, 6, 9-14, 21, 22; iv. 17, 18, 206, 27, 28). These two sources present striking points of difference, which reappear in the subsequent narrative. According to E, Moses with Aaron is to demand from Pharaoh the release of Israel, which will be effected in spite of his opposition; in assurance thereof the promise is given that they shall serve God upon this mountain; moreover, the people on their departure are to borrow raiment and jewels from their Egyptian neighbours. According to J, on the other hand, the spokesmen are to be Moses and the elders; and their request is for a temporary departure only, viz. "three days' journey into the wilderness"; their departure from Egypt is a hurried one. Yet another difficulty, which dis- appears as soon as the composite character of the narrative is recog- nized, is that of the signs. In J three signs are given for the purpose of reassuring Moses, only one of which is wrought with the rod (iv. 1-9), but in iv. 17 (E) the reference is clearly to

entirely different signs, probably the plagues of Egypt, which according to E were invariably wrought by ” the rod of God.” Further, it is question- able if the passage iv. 13-16 really forms part of the original narrative of J, and is not rather to be ascribed to the redactor of JE. The name of Aaron has certainly been introduced by a later hand in J’s account of the plague of frogs (viii. 12), and the only passage in J in which Aaron is represented as taking an active part is iv. 29-31, where the mention of his name causes no little difficulty. 2 In E, on the other hand, Aaron is sent by God to meet Moses at Mt. Horeb, after the latter had taken leave of Jethro, and, later on, accompanies him into the presence of Pharaoh. The succeeding narrative (v. i-vi. 1) is mainly taken from J, though E’s account of the first interview with Pharaoh has been partially retained in v. 1,2, 4. Moses and the elders ask leave to go three days’ journey into the wilderness to sacrifice to Yahweh, a request which is met by an increase of the burdensome work of brick-making : henceforward the Israelites have to provide their own straw. The people complain bitterly to Moses, who appeals to Yahweh and is assured by him of the future deliverance of Israel ” by a strong hand.”

With the exception of the genealogical list (i. 1-5) and the brief notices of the increase of Israel (i. 7) and of its oppression at the hands of the Egyptians (i. 13, 14; ii. 236-25), the narrative so far exhibits no traces of P 3 . But in vi. 2-yii. 13 we are confronted with a narrative which carries us back to ii. 236-25 and gives practic- ally a parallel account to that of JE in ch. iii.-v. Thus the revelation of the divine name, vi.2f., finds its counterpart in iii. lof., the message to be delivered to Israel (vi. 6 f.) is very similar to that of ch. iii. 16 f., while the demand which is to be addressed to Pharaoh is identical

1 The fact that the father-in-law of Moses is called Reuel in v. 18, as contrasted with the name Jethro, which occurs in iii. 1 f. and in all subsequent passages from E, cannot be taken as conclusive on this’point, since critics are agreed that ” Reuel ” in this verse is a later addition: had it been original we should have expected the name to be given at v. 16 rather than at v. 18. But, if no argument can be based on the discrepancy between the two names, we may at least assume that the namelessness of the priest in v. 16 f. points to a different source for those verses from that of iii. I f . Elsewhere J speaks of ” Hobab, the son of Reuel the Midianite, Moses’ father-in- law ” (Num. x. 29) ; the addition, ” the priest of Midian,” only occurs in the (secondary) passages iii. I, xviii. I (E). Probably RJE omitted the name in ii. 16 and added ” the priest of Midian ” in iii. I, xviii 1, from harmonizing motives. Further, w. 1 5ˆ-22 speak of one son being born to Moses at this period, a statement which is borne out by iv. 20, 25 (”

sons ” in iv. 20 is obviously a correction), whereas ch. xviii. (E) mentions two sons.

The original order of events in J seems to have been as follows: after the death of Pharaoh (ii. 23a; the Septuagint repeats this notice before iv. 19) Moses returns to Egypt with his wife and son (iv. 19, 20) in obedience to Yahweh’s command. On the way he is seized with a sudden illness, which Zipporah attributes to the fact that he has not been circumcised and seeks to avert by circumcising her son (iv. 24-26). The scene of the theophany, therefore, according to J, is to be placed on the way from Midian to Goshen. Probably the displacement of iv. 19, 20, 24-26 is due to the editor of JE, who was thus enabled to combine the two narratives of the theophany.

2 Cf. iv. 30; Aaron had received no command to do the signs, and the words ” and he did the signs ” are most naturally referred to Moses.

s The expansion in iii. 8c, 15, 176; iv. 22, 23, are probably the work of a Deuteronomistic redactor.

with that which had been already refused in ch. v. No allusion, however, is made by Moses to this previous demand; he merely urges the same objection as that put forward in iv. 10 f . With the resumption 4 of the story in vi. 28 f . Moses reiterates his objection, and is told that Aaron shall be his ” prophet ” and speak for him, and shall also perform the sign of the rod (cf. iv. 2-4). The sign, however, has no effect on Pharaoh (vii. 13), and we thus reach the same point in the narrative as at vi. 1. Apart from the literary characteristics which clearly differentiate this narrative from the preceding accounts of J and E, the following points of variation are worthy of consideration: (1) The people refuse to listen to Moses; (2) Aaron is appointed to be Moses’ spokesman, not with the people, but with Pharaoh; (3) one sign is given (not three) and performed before Pharaoh; (4) the rod is turned into a reptile {tannin), not a serpent (no-hash).

(2) vii. 14-xi. 10. The First Plagues of Egypt. — In this section the analysis again reveals three main sources, which are clearly marked off from one another both by their linguistic features and by their difference of representation. The principal source is J, from which are derived six plagues, viz. killing of the fish in the river (vii. 14, 16, 17a, 18, 21a, 24, 25), frogs (viii. 1-4, 8-150), insects (viii. 20-32), murrain (ix. 1-7), hail (ix. 13-18, 236, 246, 256-34), locusts (x. la, 3-1 1, 136,

146, 15a, c-19, 24-26, 28, 29), the threat to slay all the first-born (xi. 4-8). The most striking characteristic of this narrative is that the plagues are represented as mainly due to natural causes and follow a natural sequence. Thus Yahweh smites the river so that the fish die and render the water undrinkable. This is suc- ceeded by a plague of frogs. The swarms of flies and insects, which next appear, are the natural outcome of the decaying masses of frogs, and these, in turn, would form a natural medium for the spread of cattle disease. Destructive hailstorms, again, though rare, are not unknown in Egypt, while the locusts are definitely stated to have been brought by a strong east wind. Other distinctive features of J's narrative are: (1) Moses alone is bidden to interview Pharaoh (vii. 14 f. ; viii. I f., 20 f. ; ix. I f., 13 f.; x. I f.); (2) on each occasion he makes a forma! demand; (3) on Pharaoh's refusal the plague is announced, and takes place at a fixed time without any human intervention ; (4) when the plague is sent, Pharaoh sends for Moses and entreats his intercession, promising in most cases to accede in part to his request ; when the plague is removed, however, the promise is left unfulfilled, the standing phrase being " and Pharaoh's heart was heavy ("02), " or " and Pharaoh made heavy (■vaan) his heart " ; (5) the plagues do not affect the children of Israel in Goshen. E's account (water turned into blood, vii. 15, 176, 206, 23; hail, ix. 22, 23a, 24a, 25a, 35; locusts, x. 12, 130, 14a, 156) is more fragmentary, having been doubtless superseded in most cases by the fuller and more graphic narrative of J, but the plague of darkness (x. 20-23, 27) is found only in this source. As contrasted with J the narrative emphasizes the miraculous character of the plagues. They are brought about by " the rod of God," which Moses wields, the effect being instantaneous and all-embracing. The Israelites are represented as living among the Egyptians, and enjoy no immunity from the plagues, except that of darkness. Their departure from Egypt is deliberate; the people have time to borrow raiment and jewels from their neighbours. E regularly uses the phrase " and Pharaoh's heart was strong (pin)," or "and Yahweh made strong (pnn) Pharaoh's heart " and " he would not let the children of Israel (or, them) go." In the priestly narrative (P) the plagues assume the form of a trial of skill between Aaron, who acts at Moses' command, and the Egyptian magicians, and thus connect with vii. 8-13. The magicians succeed in turning the Nile water into blood (vii. 19, 200, 216, 22), and in bringing up frogs (viii. 5-7), but they fail to bring forth lice (viii. 156-19), and are themselves smitten with boils (ix. 8-12) : the two last-named plagues have no parallel either in J or E. Throughout the P sections Aaron is associated with Moses, and the regular command given to the latter is "Say unto Aaron": no demand is ever made to Pharaoh, and the description of the plague is quite short. The

formula employed by P is ” and Pharaoh’s heart was strong (pin),” or, ” and Pharaoh made strong (p’m) his heart,” as in E, but it is distinguished from E’s phrase by the addition of ” and he hearkened not unto them as Yahweh had spoken.”

(3) xii. i-xiii. 16. The Last Plague, the Deliverance from Egypt, the Institution of the Passover and of the Feast of Unleavened Cakes, the Consecration of the First-born. — This section presents the usual phenomena of a composite narrative, viz. repetitions and inconsistencies. Thus J’s regulations for the Passover (xii. 21-23, 276) seem at first sight simply to repeat the commands given to Moses and Aaron in xii. 1-13 (P), but in reality they are a parallel and divergent account. In w. 1-13 the choice of the lamb and the manner in which it is to be eaten constitute the essential feature, the smearing with the blood being quite secondary; in w. 21 f. the latter point is all-important, and no regulations are given for the paschal meal (which, possibly, formed no part of J’s original account). Similarly the institution of the Feast of Mazzoth, or Unleavened Cakes (xiii. 3-10J), does not form the sequel to the regulations laid down in xii.

4 The genealogy of Moses and Aaron (w. 14-27) appears to be a later addition.

14-20 (P), but is independent of them: it omits all reference to the ” holy convocations ” and to the abstinence from labour, and is obviously simpler and more primitive. J’s account, again, makes important exceptions (xiii. n-13) to the severe enactment of P with reference to the first-born (xiii. 1). The description of the smiting of the first-born of Egypt is derived from J (xii. 29-34, 37-39), who clearly sees in the Feast of Mazzoth a perpetual reminder of the haste with which the Israelites fled from Egypt; the editor of JE, however, has included some extracts from E (xii. 31, 35, 36), which point to a more deliberate departure. The section has been worked over by a Deuteronomistic editor, whose hand can be clearly traced in the additions xii. 24-270; xiii. 36, 5, 8, 9, 14-16.

(4) xiii. 17-xv. 2i. The Crossing of the Red Sea. — According to J the children of Israel departed from Egypt under the guidance of Yahweh, who leads them by day in a pillar of cloud and by night in a pillar of fire (xiii. 21, 22). On hearing of their flight Pharaoh at once starts in pursuit. The Israelites, terrified by the approach of the Egyptians,

upbraid Moses, who promises them deliverance by the hand of Yahweh (xiv. 5, 6,-76, 10a, 11-14, 196). Yahweh then causes a strong east wind to blow all that night, which drives back the waters from the shallows, and so renders it possible for the host of Israel to cross over. The Egyptians follow, but the progress of their chariots is hindered by the soft sand, and in the morning they are caught by the returning waters (xiv. 216, 24, 25, 276, 286, 30). The story, however, has been combined with the somewhat different account of E, which doubtless Covered the same ground, and also with that of P. According to the former, Elohim did not permit the Israelites to take the shorter route to Canaan by the Mediterranean coast, for fear of the Philistines, but led them southwards to the Red Sea, whither they were pursued by the Egyptians (xiii. 17-19). The remainder of E's account has only been preserved in a frag- mentary form (xiv. 70a, 106, 150, 19a, 20a), from which it may be gathered that Moses divided the waters by stretching out his rod, thus presupposing that the crossing took place by day, and that the dark cloud which divided the two hosts was miraculously caused by the angel of God. P also represents the sea as divided by means of Moses' rod, but heightens the effect by describing the crossing as taking place between walls of water (xiii. 20; xiv. 1-4, 8, 9, 156, 166-18, 21a, c, 22, 23, 26, 270, 28a, 29).

J's version of the Song of Moses probably does not extend beyond xv. I , and has its counterpart in the very similar song of Miriam (E) , in w. 20, 21. The rest of the song (w. 2-18) is probably the work of a later writer ; for these verses set forth not only the deliverance from Egypt, but also the entrance of Israel into Canaan (w. 13-17), and further presuppose the existence of the temple (vv. 136, 17ft). These phenomena have been explained as due to later expansion, but the poem has all the appearance of being a unity, and the language, style and rhythm all point to a later age. Verse 19 is probably the work of the redactor (R p) who inserted the song.

(5) xv. 22-xviii. 27. Incidents in the Wilderness. — The narrative of the first journeying in the wilderness (xv. 22-xvii. 7) presents a series of difficulties which probably owe their origin to the editorial activity of R p , who appears to have transferred to the beginning of the wanderings a number of incidents which rightly belong to the end. The concluding verses of ch. xv. contain J's account of the sweetening of the waters of Marah, with which has been incorporated a fragment of E's story of Massah (xv. 256) and a Deuteronomic expansion in v. 26. Then follows (ch. xvi.) P's version of the sending of the manna and quails. In its present form, this narrative con- tains a number of conflicting elements, which can only be the result of editorial activity.

Thus vv. 6, 7 must? originally have preceded vv. 11, 12, though the redactor has attempted to evade the difficulty by inserting v. 8. Again, the account of the quails, which is obviously incomplete, is undoubtedly derived from Num. xi. ; but the latter account, which admittedly belongs to JE, places the incident at the end of the wanderings. Closer examination also of P's narrative of the manna shows that its true- position is after the departure from Mt. Sinai ; cf. the expressions used in vv. 9, 10, 33, 34, implying the existence of the ark and the tabernacle. P's account of the manna, however, can hardly have stood originally in close juxta- position with his account of the quails (cf. Num. xi. 6), but the two narratives were probably combined by R p before they were trans- ferred to their present position. The same redactor doubtless added v. 8 (and possibly vv. 17, 18) by way of explanation, and vv. 5 and 22-30, which imply that the law of the Sabbath was already known, and introduce a fresh element into the story. A plausible ex- planation of R p 's action is supplied by the theory that an earlier account of the giving of the manna already existed at this point of the narrative. We know from Deuteronomy viii. 2 f., 16 that JE contained an account of the manna, which included the explanation of Ex. xvi. 15, and also emphasized, as the motive for the gift, Yahweh's desire "to prove thee {i.e. test thy disposition) . . . whether thou wouldst keep his commandments, or no." Fragments of this early story of Massah (testing) were incorporated by R p in his story of the manna and the quails, viz. xv. 256; xvi. 4, 15, 160, 196-21. These verses must be assigned to E, for in xvii. 3, 2c (wherefore do ye tempt the Lord ?), ya (to Massah), c (because they tempted . . ., &c), we find yet another version (J) of the same incident, according to which the people tempted (tested) Yahweh. It was owing to the combination of this latter account with E's

further description of the striving of the people for water at Meribah that the double name Massah-Meribah arose, xvii. 16-7 (ia belongs to P), though Deut. xxxiii. 8 makes it clear that Massah and Meribah were separate localities (cf. Deut. ix. 22, 2 f., 16, where Massah occurs alone) : P's version of striving at Meribah, in which traces of J's account have been preserved, is given at Num. xx. 1-13.

xvii. 8-16. The Battle with Amalek at Rephidim. — This incident is derived from E, but is clearly out of place in its present context. Its close connexion with the end of the wanderings is shown by (a) the description of Moses as an infirm old man; (6) the r&le played by Joshua in contrast with xxiv. 13, xxxiii. 11, where he is intro- duced as a young man and Moses' minister; and © the references elsewhere to the home of the Amalekites : according to Num. xiii.- 29, xiv. 25, xliii. 45, they dwelt in the S. or S.W. of Judah near Kadesh (cf. I Sam.

xv. 6 f., 30; Gen. xiv. 7 ; xxxvi. 12).

Ch. xviii. The visit of Jethro to Moses and the appointment of judges. — This story, like the preceding one, is mainly derived from E and is also out of place. Allusions in the chapter itself point unmistakably to a time just before the departure from Sinai-Horeb, and this date is confirmed both by Deut. i. 9-16 and by the parallel account of J in Num. x. 29-32. The narrative, however, displays signs of compilation, and it is not improbable that R' a has incorporated in w. 7- 1 1 part of J's account of the visit of Moses' father-in-law (cf. the use of Yahweh).

(6) Ch. xix.-xxiv., xxxii., xxxiv. — The contents of these chapters, which, owing to their contents, form the most important section in the book of Exodus, may be briefly analysed as follows. In ch. xix. we have a twofold description of the theophany on Mt. Sinai (or Horeb), followed by the Decalogue in xx. 1-17. Alongside of this code we find another, dealing in part with the civil and social (xxi. 2-xxii. 17), in part with the religious life of Israel, the so-called Book of the Covenant, xx. 22-xxiii. 19. Ch. xxiv. contains a com- posite narrative of the ratification of the covenant. In chs. xxxii. and xxxiii. we have again two narratives of the sin of the people and of Moses' intercession, while in ch. xxxiv. we are confronted with yet another early code, which is practically identical with the religious enactments of xx. 22-26; xxii. 29, 30; xxiii. 10-19.

With but few exceptions the provenance of the individual sections may be said to have been finally determined by the labours of the critics, but even a cursory examination of their contents makes it evident that the sequence of events, which they now present, cannot be original, but is rather the outcome of a long process of revision,* during which the text has suffered considerably from alterations, omissions, dislocations and additions. Yet owing to the method cf composition employed by Hebrew editors, or revisers, it is possible jn this case, as in others, not only to determine the source of each individual passage, but also to trace with considerable confidence the various stages in the process by which it reached its final form and position. It must, however, be admitted that the evidence at our disposal is, in some cases, capable of more than one interpre- tation. Hence a final conclusion can hardly be expected, but with certain modifications in detail the following solution of the problem may be accepted as representing the point of view of recent criticism.

Ch. xix. contains two parallel accounts of the theophany on Horeb-Sinai, from E and J respectively, which differ materially from one

another. According to the former, Moses is instructed by God (Elohim) to sanctify the people against the third day (vv. 9a, 10, 1 1 a). This is done and the people are brought by Moses to the foot of the mountain (Horeb), where they hear the divine voice (14-17, 19). A noticeable feature of this narrative, of which xx. 18-21 forms a natural continuation, is the fact that the theophany is addressed to the people, who are too frightened to remain near the mountain itself. In J, on the other hand, it is the priests who are sanctified, and great care must be taken to prevent the people from " breaking through to gaze " (20-22). In this account the mountain is called " Sinai " throughout, and " Yahweh " appears instead of " Elohim " (116, 18, 20 f.). Moreover, Moses and Aaron and the priests are summoned to the top of the mount (in v. 246 render " thou and Aaron with thee, and the priests: but let not the people," &c). Vv. 36-8, which have been expanded by a Deutero- nomic editor, have been transferred from their original context after xx. 21 ; the introductory verses 1, 20 form part of P's itinerary.

Of the succeeding legislation in xx.-xxiii., xxxii.xxxiv., un doubtedly the earlier sections are xx. 22-26; xxii. 29, 30; xxiii. 10-19, and xxxiv. 10-26, which contain regulations with regard to worship and religious festivals, and form the basis of the covenant made by Yahweh with Israel on Sinai-Horeb, as recorded by E and J respectively. The narrative which introduces the covenant laws of J has been preserved partly in its present context, ch. xxxiv., partly in xxiv. 1, 2, 9-1 1; the narrative of E, on the other hand, has in part disappeared owing to the interpolation of later material, in part has been retained in xxiv. 3-8. J's narrative xxiv. 1 f., 9-11 clearly forms the continuation of xix. 20 f., 116, 13, 25, but the introductory words of v. 1," and unto Moses he said," point to some omission. Originally, no doubt, it included the recital of the divine instructions to the people in accordance with xix. 21 f., 1 16-13, the statement that Yahweh came down on the third day, and that a long blast was blown on the trumpet (or ram's horn [hy, as opposed to isv E]). From xxiv. I f. we learn that Moses and Aaron, Nadab and Abihu, and seventy of the elders were summoned to the top

of the mountain, but that Moses alone was permitted to approach Yahweh. Then followed the theophany, and, as the text stands, the sacrificial meal (9-11). 1 The conclusion of J's narrative is given in ch. xxxiv., 2 which describes how Moses hewed two tables of stone at

Yahweh's command, and went up to the top of the mountain, where he received the words of the covenant and wrote them on the tables. As it stands, however, this chapter represents the legislation which it contains as a renewal of a former covenant, also written on tables of stone, which had been broken (lb, 4a). But the docu- ment from which the chapter, as a whole, is derived, is certainly J, while the previous references to tables of stone and to Moses' breaking them belong to the parallel narrative of E. Moreover, the covenant here set forth (v. 10 f.) is clearly a new one, and contains no hint of any previous legislation, nor of any breach of it by the people. In view of these facts we are forced to conclude that lb (" like unto the first . . . brakest "), 4a (" and he hewed . . . the first ") and v.. 28 (" the ten words ") formed no part of the original narrative, 3 but were inserted by a later Deuteronomic redactor. In the view of this editor the Decalogue alone formed the basis of the covenant at Sinai-Horeb, and in order to retain J's version, he represented it as a renewal of the tables of stone which Moses had broken. 4

The legislation contained in xxxiv. 10-26, which may be described as the oldest legal code of the Hexateuch, is almost entirely religious. It prohibits the making of molten images (v. 17), the use of leaven in sacrifices (25a), the retention of the sacrifice until the morning (25b), 5 and the seething of a kid in its mother's milk (266); and enjoins the observance of the three annual feasts and the Sabbath (18a, 21-23), an d the dedication of the first-born (19, 20, derived from xiii. 11-13) and of the first-fruits (26a).

The parallel collection of E is preserved in xx. 24-26, xxiii. 10-19, to which we should probably add xxii. 29-31 (for which xxiii. 190 was afterwards substituted). The two collections resemble one another so closely, both in form and extent, that they can only be regarded as two versions of the same code. E has, however, pre- served certain additional regulations with regard to the building of altars (xx. 24-26) and the observance of the seventh year (xxiii. 10, n), and omits the prohibition of molten images (xx. 22, 23, appear to be the work of a redactor); xxiii. 20-33, the promises attached to the observance of the covenant, probably formed no part of the original code, but were added by the Deuteronomic redactor; cf. especially vv. 23-253, 27, 28, 316-33. The narrative of E relative to the delivery of these laws has disappeared, 6 but xxiv. 3-8 (which manifestly have no connexion with their immediate context) clearly point back to some such narrative. These verses describe how Moses wrote all the words of the Lord in a book and recited them to the people (v. 7) as the basis of a covenant, which was solemnly ratified by the sprinkling of the blood of the accompany- ing sacrifices.

In the existing text the covenant laws of E (xx. 24-26, xxii. 29-31, xxiii. 10-19) are combined with a mass of civil and other legislation; hence the title " Book of the Covenant " (referred to above, xxiv. 7) has usually been applied to the whole section, xx. 22-xxiii. 33. But this section includes three distinct elements: (a) the "words " (D'-rn.-i) found in xx. 24-26, xxii. 29-31, xxiii. 1-10; (b) the "judg- ments" (D'ostran) , xxi. 2-xxii. 17; and © a group of moral and ethical enactments, xxii. 18-28, xxiii. 1-9; and an examination of their contents makes it evident that, though the last two groups are unmistakably derived from E, they cannot have formed part of the original "Book of the Covenant"; for the "judgments," which are expressed in a hypothetical form, consist of a number of legal decisions on points of civil law. The cases dealt with fall into five divisions: (1) The rights of slaves, xxi. 2-11; (2) capital offences, xxi. 12-16 (v. 17 has probably been added later) ; (3) injuries inflicted by man or beast, xxi. 18-32; (4) losses incurred by culpable negligence or theft, xxi. 33-xxii. 6; (5) cases arising out of deposits, loans, seduction, xxii. 7-17. It is obvious, from their very nature, that these legal precedents could not have been included in the covenant which the people (xxiv. 3) promised to observe, and it is

1 Unless we follow Riedel and read simply " and worshipped " (vnnE"i) instead of " and drank " (inm), treating " and ate " (lˆN'i) as a later addition ; cf . HDB, extra vol. p. 631 note.

2 Vv. 6-9 are out of place here: they belong to the story of Moses' intercession in ch. xxxiii.

3 This view is confirmed by (a) a comparison of v. lb (" and I will write") with vv. 27, 28; according to the latter, Moses wrote the words of the covenant; and (b) the tardy mention of Moses in 46; the name would naturally be given at the beginning of the verse. _

4 Others suppose that the present position of ch. xxxiv. is due, in the first instance, to RJE, but in view of the other Deuteronomic expansions in w. 106-16, 23, 24, it is more probable that J's version was discarded by RJE in favour of E's, and was afterwards restored by RD.

5 Reading " the sacrifice of my feasts " for " the sacrifice of the least of the Passover."

6 Unless, with Bacon, we are to regard xxiv. 12-14, 186 as original. More probably a later editor has worked up old material of E (of Which there are unmistakable traces) in order to include the whole of

xx.-xxiii. in the covenant: xxiv. !5-i8a are an addition from P.

now generally admitted that the words “and the judgments” (which are missing in c. I b) have been inserted ia xxiv. 3a by the redactor to whom the present position of the ” judgments ” is due. 7 The majority of critics, therefore, adopt Kuenen’s conjecture that the ” judgments ” were originally delivered by Moses on the borders of Moab, and that when D’s revised version of Ex. xxi. -xxiii. was combined with JE, the older code was placed alongside of E’s other legislation at Horeb. The third group of laws (xxii. 18-28, xxiii. 1-9) appears to have been added somewhat later than the bulk of xxi.-xxiii. Some of the regulations are couched in hypothetical form, but their contents are of a different character to the ” judgments,” e.g. xxii. 25 f., xxiii. 4 f . ; others, again, are of a similar nature, but differ in form, e.g. xxii. 18 f. Lastly, xxii. 20-24, xxiii. 1-3 set forth a number of moral injunctions affecting the individual, which cannot have found place in a civil code. At the same time, these additions must for the most part be prior to D, since many of thern are included in Deut. xii.-xxvi., though there are traces of Deuteronomic revision.

Now it is obvious that the results obtained by the foregoing analysis of J and E have an important bearing on the history of the remaining section of E’s legislation, viz. the Decalogue (q.v.), Ex. xx. 1-17 (= Deut. v. 6-21). At present the “Ten Words” stand in the forefront of E’s collection of laws, and it is evident that they were already found, in that position by the author of Deuteronomy, who treated them as the sole basis of the covenant at Horeb. The evidence, however, afforded (a) by the parallel version cf Deutero- nomy and (b) oy the literary analysis of J and E not only fails to support this tradition, but excites the gravest suspicions as to the originality both of the form and of the position in which the Decalogue now appears. For when compared with Ex. xx. 1-17 the parallel version of Deut. v. 6 ff. is found to exhibit a number of variations, and, in particular, assigns an entirely different reason for the observance of the Sabbath. But these variations are practically limited to the explanatory comments attached to the 2nd, 4th, 5th and 10th commandments; and the majority of critics are now agreed that these comments were added at a later date, and that all the commandments, like the 1st and the 6th to the 9th, were originally expressed in the form of a single short sentence. This view is confirmed by the fact that the additions, or comments, bear, for the most part, a close resemblance to the style of D. They can scarcely, however, have been transferred from Deuteronomy to Exodus (or vice versa), owing to the variations between the two versions : we must rather regard them as the work of a Deuteronomic redactor. But the expansion and revision of the

Decalogue were not limited to the Deuteronomic school. Literary traces of J and E in the 2nd, 3rd, 4th and 10th commandments point to earlier activity on the part of RJ E , while the addition of v. 11, which bases the observance of the Sabbath on P ‘s narrative of the Creation (Gen. ii. 1-3), can only be ascribed to a priestly writer: its absence from Deut. v. 6 ff. is otherwise inexplicable. Thus the Decalogue, as given in Exodus, would seem to have passed through at least three stages before it assumed its present form. But even in its original form it could hardly have formed part of E’s Horeb legislation; for (a) both J and E have preserved a different collection of laws (or ” words “) inscribed by Moses, which are definitely set forth as the basis of the covenant at Sinai-Horeb (Ex. xxxiv. 10, xxiv. 3 f.), and (b) the further legislation of E in ch. xx.-xxiii. – affords close parallels to all the commandments (except the 7th and the 10th), and a comparison of the two leaves no doubt as to which is the more primitive. Hence we can only conclude that the Decalogue, in its original short form, came into existence during the period after the completion of E, but before the promulgation of Deuteronomy. Its present position is, doubtless, to be ascribed to a redactor who was influenced by the same conception as the author of Deuteronomy. This redactor, however, did not limit the Horeb covenant to the Decalogue, but retained E’s legislation alongside of it. The insertion of the Decalogue, or rather the point of view which prompted its insertion, naturally involved certain consequential changes of the existing text. The most important of these, viz. the harmonistic additions to ch. xxxiv., by means of which J’s version of the covenant was represented as a renewal of the Decalogue, has already been dis cussed ; other passages which show traces of similar revision are xxiv. 12-153, 186, and xxxiv. 1-6.

The confusion introduced into the legislation by later additions, with the consequent displacement of earlier material, has not been without effect on the narratives belonging to the different sources. Hence the sequence of events after the completion of the covenant on Sinai-Horeb is not always easy to trace, though indications are not wanting in both J and E of the probable course of the history. The two main incidents that precede the departure of the children of Israel from the mountain (Num. x. 29 ff.) are (1) the sin of the people, and (2) the intercession of Moses, of both of which a double account has been preserved.

7 The present text of xxiv. 12 also has probably been transposed in accordance with the view that the ” judgment ” formed part of the covenant, cf. Deut. v. 31. Originally the latter part of the verse must have run, ” That I may give thee the tables of stone which I have

written, and may teach thee the law and the commandment. ” For further details see Bacon, Triple Tradition of Exodus, pp. in f., 132 f.

(i) The Sin of the People.— According to J (xxxii. 25-29) the people, during the absence of Moses, ” break loose,” i.e. mutiny. Their behaviour excites the anger of Moses on his return, and in response to his appeal the sons of Levi arm themselves and slay a large number of the people : as a reward for their services they are bidden to consecrate themselves to Yahweh. The fragmentary form of the narrative — we miss especially a fuller account of the ” breaking loose ” — is doubtless due to the latter editor, who substituted the story of the golden calf (xxxii. 1-6, 15-24, 35), according to which the sin of the people consisted in direct violation of the 2nd command- ment. At the instigation of the people Aaron makes a molten calf out of the golden ornaments brought from Egypt ; Moses and Joshua, on their return to the camp, find the people holding festival in honour of the occasion; Moses in his anger breaks the tables of the covenant which he is carrying: he then demolishes the golden calf, and ad- ministers a severe rebuke to Aaron. The punishment of the people is briefly recorded in v. 35. This latter narrative, which is obviously inconsistent with the story of J, shows unmistakable traces of E. In its present form, however, it can hardly be original, but must have been revised in accordance with the later Deuteronomic conception which represented the sin committed by the people as a breach of the 2nd commandment. Possibly vv. 7-14 are also to be treated as a Deuteronomicexpansion (cf. Deut. ix. 12-14). Though they show clear traces of J, it is extremely difficult to fit them into that narrative in view of Moses’ action in vv. 25-29 and of his intercession in ch. xxxiii.; in any case, vv. 8 and 13 must be regarded as redactional.

(2) Moses’ Intercession. — The time for departure from the Sacred Mount had now arrived, and Moses is accordingly bidden to lead the people to the promised land. Yahweh himself refuses to accom- pany Israel owing to their disobedience, but in response to Moses’ passionate appeal finally consents to let his presence go with them. The account of Moses’ intercession has been preserved in J, though the narrative has undergone considerable dislocation. The true sequence of the narrative appears to be as follows: Moses is com- manded to lead the people to Canaan (xxxiii. 1-3); he pleads that he is unequal to the task (Num. xi. 10c, 11, 12, 14, 15), and, presum- ably, asks for assistance, which is promised (omitted). Moses then asks for a

fuller knowledge of Yahweh and his ways (xxxiii. 12, 13) : this request also is granted (v. 17), and he is emboldened to pray that he may see the glory of Yahweh ; Yahweh replies that his prayer can only be granted in part, for ” man shall not see me and live “; a partial revelation is then vouchsafed to Moses (xxxiii. 18-23, xxxiv. 6-8) : finally, Moses beseeches Yahweh to go in the midst of his people, and is assured that Yahweh’s presence shall accompany them (xxxiv. 9, xxxiii. 14-16). The passage’ from Numbers xi., which is here included, is obviously out of place in its present context (the story of the quails), and supplies in part the necessary ante- cedent to Ex. xxxiii. 12, 13; the passage is now separated from Ex. xxxiii. by Ex. xxxiv. (J), which has been wrongly transferred to the close of the Horeb-Sinai incidents (see above), and by the priestly legislation of Ex. xxxv.— xl., Leviticus and Num. i.-x. ; but originally it must have stood in close connexion with that chapter. A similar displacement has taken place with regard to Ex. xxxiv. 6-9, which clearly forms the sequel to xxxiii. 17-23. The latter passage, how- ever, can hardly represent the conclusion of the interview, which is found more naturally in xxxiii. 14-16. E’c account of Moses’ intercession seems to have been retained, in part, in xxxii. 30-34, but the passage has probably been revised by a later hand ; in any case its position before instead of after the dismissal would seem to be redactional.

It is a plausible conjecture that the original narratives of J and E also contained directions for the construction of an ark, 1 as a sub- stitute for the personal presence of Yahweh, and also for the erection of a ” tent of meeting ” outside the camp, and that these commands were omitted by R p in favour of the more elaborate instructions given in ch. xxv.-xxix. (P). The subsequent narrative of J (Num. x. 33-36, xiv. 44) implies an account of the making of the ark, while the remarkable description in Ex. xxxiii. 7- 11 (E) of Moses’ practice in regard to the ” tent of meeting ” points no less clearly to some earlier statement as to the making of this tent.

The history of Exodus in its original form doubtless concluded with the visit of Moses’ father-in-law and the appointment of judges (ch. xviii.), the departure from the mountain and the battle with Amalck (xvii. 8-16). •

(c) The Construction of the Tabernacle and its Furniture (ch. xxv.-xxxi., xxxv.xl.). — It has long been recognized that the elaborate description of the Tabernacle and its furniture, and the accompanying directions for the dress and consecration of the priests, contained in ch. xxv.~xx.xi., have no claim to be regarded as an historical present ment of the Mosaic Tabernacle and its service. The language, style and

contents of this section point unmistakably to the hand of P; and it is now generally admitted that these chapters form part of an ideal representation of the post-exilic ritual system, which has been transferred to the Mosaic age. According to this

‘According to Deut. x. I f., which is in the main a. verbal excerpt from Ex. xxxiv. 1 f., Yahweh ordered Moses to make an ark of acacia wood before he ascended the mountain.

representation, Moses, on the seventh day after the conclusion of the covenant, was summoned to the top of the mountain, and there received instructions with regard to (a) the furniture of the sanctuary, viz. the ark, the table and the lamp-stand (ch. xxv.) ; (&) the Tabernacle (ch. xxvi.); (c) the court of the Tabernacle and the altar of: burnt- offering (ch. xxvii.); (d) the dress of the priests (ch. xxviii.); {e) the consecration of Aaron and his sons (xxix. 1-37) ; arid (/) the daily burnt-offering (xxix. 38-42) : the section ends with a formal con- clusion (xxix. 43-46). The two following chapters contain further, instructions relative to the altar of incense (xxx. I- 10), the payment of the half-shekel (11-16), the brazen laver (17-21), the anointing oil (22-33), the incense (34-38), the appointment of Bezaleel and Oholiab (xxxi. 1-1 1) and the observance of the Sabbath (12-17). It is hardly doubtful, however, that these two chapters formed no part of P’s original legislation, but were added by a later hand. 2 For (1) the altar of incense is here mentioned for the first time, and was appar- ently unknown to the author of ch. xxv.xxix. Had he known of its existence, he could hardly have failed to include it with the rest of the Tabernacle furniture in ch. xxvi., and must have mentioned it at xxvi. 34 f., where the relative positions of the contents of the Taber nacle are defined : further, the ritual of the Day of Atonement (Lev. xvi. referred to in xxx. 10) ignores this altar, and mentions only dree altar (cf. ” the altar,” xxvii. 1), viz. that of burnt-offering; (2) the command as to the half-shekel presupposes the census of Num. i., and appears to have been unknown in the time of Nehemiah (N.eh. x. 32) (Heb. 33) ; (3) the instructions as to the brazen laver would naturally be expected alongside of those for the altar of burnt- offering in ch. xxvii. ; (4) the following section relating to the anointˆ ing oil presupposes the altar of incense {v. 28), and further expends the ceremony of anointing to Aaron’s sons, though, elsewhere, the ceremony is confined to Aaron (xxix. 7, Lev. viii. 12), cf. the title “anointed priest” applied to the high priest (Lev. iv. 3, &c.j; (5) the directions for compounding the incense connect naturally with xxx. 1-10, while (6) the appointment of Bezaleel and Oholiah cannot be separated from the rest of ch. xxx.-xxxi. The concluding section on the Sabbath (xxxi. 12-17) shows marks of resemblance to H (Lev. xvii.-xxvi.), especially in vv. 12-140,

which appear to have been expanded, very possibly by the editor who inserted the passage. The continuation of P's narrative is given in xxxiv. 29-35, which describe Moses' return from the mount. The subsequent chapters (xxxv.-xl.), however, can hardly belong to the original stratum of P., if only because they presuppose ch. xxx., xxxi., and were probably added at a later stage than the latter chapters. They narrate how the commands of ch. xxv.— xxxi. were carried out, and practically repeat the earlier chapters verbatim, merely thetenses being changed, the most noticeable omissions being xxvii. 20 f. (oil for the lamps), xxviii. 30 (Urim and Thummim), xxix. 1-37 (the consecration of the priests, which recurs in Lev. viii.) and xxix. 38-42 (the daily burnt- offering). Apart from the omissions the most striking difference between the two sections is the variation in order, the different sections of ch. xxv.xxxi. being here set forth in their natural sequence, The secondary character of these concluding chapters receives con siderable confirmation from a comparison of the Septuagint text. For this version exhibits numerous cases of variation, both as regards order and contents, from the Hebrew text ; moreover the translation, more particularly of many technical terms, differs from that of ch. xxv.-xxxi., and seems to be the work of different translators. Hence it is by no means improbable that the final recension of these chapters had not been completed when the Alexandrine version was made.

Authorities. — In addition to the various English and German commentaries on Exodus included under the head of the Pentateuch, the following English works are especially worthy of mention: S. R. Driver, Introd. to the Literature of the O.T., and " Exodus " in the Camb. Bible; B. W. Bacon, The TrMe Tradition of the Exodus (Hartford, U.S.A., 1894), and A. H. McNeile, The Book of Exodus (Westminster Commentaries) (1908) ; also the articles on " Exodus " by G. Harford-Battersby (Hastings, Diet. Bib. vol. i.) and by G. F. Moore, Ency. Biblica, vol. ii. (J. F. St.)

EXODUS, THE, the name given to the journey (Gr. e£odos) of the Israelites from Egypt into Palestine, under the leadership of Moses and Aaron, as described in the books of the Bible from Exodus to Joshua. These books contain the great national epic of Judaism relating the deliverance of the people from bondage in Egypt, the overthrow of the pursuing Pharaoh and his army, the divinely guided wanderings through the wilderness and the final entry into the promised land. Careful criticism of the narratives 3 has resulted in the separation of later accretions from the earliest records, and the tracing of the elaboration of older traditions under the influence of developing religious and social institutions. In the story of the Exodus there have

been ■ incorporated codes of laws and institutions which were to be observed by the descendants of the Israelites in their future

2 To the same hand are to be ascribed also xxvii. 6, 20, 21; xxviii. 41; xxix. 21, 38-41.

3 See the articles on the books in question.

home, and these, really of later origin, have thus been thrown back to the earlier period in order to give them the stamp of authority. So, although a certain amount of the narrative could date from the days of Moses, the Exodus story has been made the vehicle for the aims and ideals of subsequent ages, and has been adapted from time to time to the requirements of later stages of thought. The work of criticism has brought to light important examples of fluctuating tradition, singular lacunae in some places and unusual wealth of tradition in others, and has demonstrated that much of that which had long been felt to be impossible, and incredible was due to writers of the post-exilic age many centuries after the presumed date of the events.

The book of Genesis closes with the migration of Jacob's family into Egypt to escape the famine in Canaan. Jacob died and was buried in Canaan by his sons, who, however, returned again to the pastures which the Egyptian king had granted them in Goshen. Their brother Joseph on his death-bed promised that God would bring them to the land promised to their fore- fathers and solemnly adjured them to carry up his bones (Gen. L). In the book of Exodus the family has become a people. 1 The Pharaoh is hostile, and Yahweh, the Israelite deity, is moved to send a deliverer; on the events that followed see Exodus, Book of; Moses. It has been thought that dynastic changes occasioned the change in Egyptian policy (e.g. the expulsion of the Hyksos), but if the Israelites built Rameses and Pithom (Ex. i. n), cities which, as excavation has shown, belong to the time of Rameses II. (13th century B.C.), earlier dates are in- admissible. On these grounds the Exodus may have taken place under one of his successors, and since Mineptah or Merneptah (son of Rameses) , in relating his successes in Palestine, boasts that Ysiraal is desolated, it would seem that the Israelites had already returned. On the other hand, it has been suggested that when Jacob and his family entered Egypt, some Israelite tribes had remained behind and that it is to these that Mineptah 's inscription refers. The problem is complicated by the fact

that, from the Egyptian evidence, not only was there at this time no remarkable emigration of oppressed Hebrews, but Bedouin tribes were then receiving permission to enter Egypt and to feed their flocks upon Egyptian soil. It might be assumed that the Israelites (or at least those who had not remained behind in Palestine) effected their departure at a somewhat later date, and in the time of Mineptah's successor, Seti II., there is an Egyptian report of the pursuit of some fugitive slaves over the eastern frontier. The value of all such evidence will naturally depend largely upon the estimate formed of the biblical narra- tives, but it is necessary to observe that these have not yet found Egyptian testimony to support them. Although the information which has been brought to bear upon Egyptian life and customs substantiates the general accuracy of the local colouring in some of the biblical narratives, the latter contain several inherent improbabilities, and whatever future research may yield, no definite trace of Egyptian influence has so far been found in Israelite institutions.

No allusions to Israelites in Egypt have yet been found on the monuments; against the view that the Aperiu (or Apury) of the inscriptions were Hebrews, see S. R. Driver in D. G. Hogarth, Authority and Archaeology, pp. 56 sqq. ; H. W. Hogg, Ency. Bib. col. 1 3 10. The plagues of Egypt have been shown to be those to which the land is naturally subject (R. Thomson, Plagues of Egypt), but the description of the relations of Moses and Aaron to the court raises many difficult questions (H. P. Smith, O.T. Hist. pp. 57-60). Those who reject Ex. i. 1 1 and hold that 480 years elapsed between the Exodus and the foundation of the temple (1 Kings vi. 1, see Bible: Chronology) place the former about the time of Tethmosis (Thothmes) III., and suppose that the hostile Habiri (Khabiri) who

1 There is a lacuna between the oldest traditions in Genesis and those in Exodus: the latter beginning simply " and there arose a new king over Egypt which knew not Joseph. ' The interval between Jacob's arrival in Egypt and the Exodus is given varyingly as 400 or 430 years (Gen. xv. 13, Ex. xii. 40 seq., Acts vu. 6); but the Samaritan and Septuagint versions allow only 215 years (Ex. loc. cit.\ and a period of onlv four generations is presupposed in Gen. xv. 16 (cf. the length of the genealogies between the contemporaries of Joseph and those of Moses in Ex. vi. 10-20).

troubled Palestine in the 15th century are no other than Hebrews (the equation is philologically sound), i.e. the invading Israelites. 2 But although the evidence of the Amarna tablets might thus support the biblical tradition in its barest outlines, the view in question, if correct, would necessitate the rejection of a great mass of the biblical

narratives as a whole.

In the absence of external evidence the study of the Exodus of the Israelites must be based upon the Israelite records, and divergent or contradictory views must be carefully noticed. Regarded simply as a journey from Egypt into Palestine it is the most probable of occurrences: the difficulty arises from the actual narratives. The first stage is the escape from the land of Goshen (q.v.), the district allotted to the family of Jacob (Gen. xlvi. 28-34, xlvii. 1, 4, 6). 3 As to the route taken across the Red Sea (Yam Siiph) scholars are not agreed (see W. M. Miiller, Ency. Bib. col. 1436 sqq.); it depends upon the view held regarding the second stage of the journey, the road to the mountain of Sinai or Horeb and thence to Kadesh. The last- mentioned place is identified with Ain Kadis, about 50 m. south of Beersheba; but the identification of the mountain is uncertain, and it is possible that tradition confused two distinct places. According to one favourite view, the journey was taken across the Sinaitic peninsula to Midian, the home of Jethro. Others plead strongly for the traditional site Jebel Musa or Serbal in the* south of the peninsula (see J. R. Harris, Diet. Bible, iv. pp. 536 sqq.; H. Winckler, Ency. Bib. col. 4641). The latter view implies that the oppressed Israelites left Egypt for one of its dependencies, and both theories find only conjectural identifications in the various stations recorded in Num. xxxiii. But this list of forty names, corresponding to the years of wandering, is from a post-exilic source, and may be based merely upon a knowledge of caravan-routes; even if it be of older origin, it is of secondary value since it represents a tradition differing notably from that in the earlier narratives themselves, and these on inspection confirm Judg. xi. 16 seq., where the Israelites proceed immediately to Kadesh.

Ex. xvi.xviii. presuppose a settled encampment and a law giving, and thus belong to a stage after Sinai had been reached (Ex. xix. sqq.). They are closely related, as regards subject matter, &c, to the narratives in Num. x. 29-xi., xx. 1-13 (Sinai to Kadesh), and the initial step is the recognition that the latter is their original context (see G. F. Moore, Ency. Bib. col. 1443 [v.J). Further, internal peculiarities associating events now at Sinai-Horeb with those at Kadesh support the view that Kadesh was their true scene, and it is to be noticed that in Ex. xv. 22 seq. the Israelites already reach the wilderness of Shur and accomplish the three days' journey which had been their original aim (cf. Ex. iii. 18, v. 3, viii. 27). The wilderness of Shur (Gen. xvi. 7, xx. 1 ; I Sam. xv. 7, xxvii. 8) is the natural scene 'of conflicts with Amalekites (Ex. xvii. 8 sqq.), and its sanctuary of Kadesh or En Mishpat (" well of judgment," Gen. xiv. 7) was doubtless associated with traditions of the giving of statutes and ordinances. The detour to

Sinai-Horeb appears to belong to a later stage of the tradition, and is connected with the introduction of laws and institutions of relatively later form. It is foreshadowed by the injunction to avoid the direct way into Palestine (see Ex. xiii. 17-19), since on reaching Kadesh the Israelites would be within reach of hostile tribes, and the conflicts which it was pro- posed to avoid actually ensued. 4 The forty years of wandering in the wilderness is characteristic of the Deuteronomic and post-exilic narratives ; in the earlier sources the fruitful oasis of Kadesh is the centre, and even after the tradition of a detour to Sinai-Horeb was developed, only a brief period is spent at the holy mountain.

From Kadesh spies were sent into Palestine, and when the people were dismayed at their tidings and incurred the wrath of Yahweh, the penally of the forty years' delay was pronounced

2 Sec, e.g., J. Orr, Problem of the O.T. pp. 422 sqq. ; Ed. Meyer, Die Israeliten, pp. 222 sqq. Some, too, find in the Amarna tablets the historical background for Joseph's high position at the Egyptian court (see Cheyne, Ency. Bib. art. " Joseph ").

3 For the varying traditions regarding the number of the people and their residence (whether settled apart, cf., e.g., Gen. xlvi. 34, Ex. viii. 22, ix. 26, x. 23, or in the midst of the Egyptians) see the recent commentaries.

4 See further J. Wellhausen, Prolegomena, PR. 342 sqq.; G. F. Moore, Ency. Bib. col. 1443; S. A. Cook, Jew. Quart. Rev. (1906), pp. 741 sqq. (1907), p. 122, and art. Moses. Ex. xiii. 17-19 forbids the compromise which would place Sinai-Horeb in the neighbour- hood of Kadesh (A. E. Hayncs, Pal. Explor. Fund, Quart. Statem. (1896), pp. 175 sqq.; C. F. Kent [see Lit. below], p. 381).

(Num. xiii. seq.). Originally Caleb alone was exempt and for his faith received a blessing; later tradition adds Joshua and in Deut. i. 37 seq. alludes to some unknown offence of Moses. According to Num. xxi. 1-3 the Israelites (a generalizing ampli- fication) captured Hormah, on the way to Beersheba, and subsequently the clan Caleb and the Kenites (the clan of Moses' father-in-law) are found in Judah (Judg. i. 16). Although the traditions regard their efforts as part of a common movement (from Gilgal, see below) , it is more probable that these

(notably Caleb) escaped the punishment which befell the rest of the Israelites, and made their way direct from Kadesh into the south of Palestine. 1 On the other hand, according to the pre- vailing tradition, the attempt to break northwards was frustrated by a defeat at Hormah (Num. xiv. 40-45), an endeavour to pass Edom failed, and the people turned back to the Yam Silph (here at the head of the Gulf of Akabah) and proceeded up to the east of Edom and Moab. Conflicting views are represented (on which see Moab), but at length Shittim was reached and pre- parations were made to cross the Jordan into the promised land. This having been effected, Gilgal became the base for a series of operations in which the united tribes took part. But again the representations disagree, and to the overwhelming campaigns depicted in the book of Joshua most critics prefer the account of the more gradual process as related in the opening chapter of the book of Judges (see Jews: History, § 8).

Thus, whatever evidence may be supplied by archaeological research, the problem of the Exodus must always be studied in the light of the biblical narratives. That the religious life of Israel as portrayed therein dates from this remote period cannot be maintained against the results of excavation or against the later history, nor can we picture a united people in the desert when subsequent vicissitudes represent the union as the work of many years, and show that it lasted for a short time only under David and Solomon. During the centuries in which the narratives were taking shape many profound changes occurred to affect the traditions. Developments associated with the Deuteronomic reform and the reorganization of Judaism in post-exilic days can be unmistakably recognized, and it would be unsafe to assume that other vicissitudes have not also left their mark. Allowance must be made for the shifting of boundaries or of spheres of influence (Egypt, Edom, Moab), for the incorporation of tribes and of their own tribal traditions, and in particular for other movements {e.g. from Arabia). 2 If certain clans moved direct from Kadesh into Judah, it is improbable that others made the lengthy detour from Kadesh by the Gulf of Akabah, but this may Well be an attempt to fuse the traditions of two distinct migrations. Among the Joseph-tribes (Ephraim and Manasseh), the most important of Israelite divisions, the traditions of an ancestor who had lived and died in Egypt would be a cherished possession, but although most writers agree that not all the tribes were in Egypt, it is impossible to determine their number with any certainty. At certain periods, intercourse with Egypt was especially intimate, and there is much in favour of the view that the name Mizraim (Egypt) extended beyond the borders of Egypt proper. Refer- ence has already been made to other cases of geographical vagueness,

and one must recognize that in a body of traditions such as this there was room for the inclusion of the most diverse elements which it is almost hopeless to separate, in view of the scantiness of relevant evidence from other sources, and the literary intricacy of the extant narratives. That many different beliefs have influenced the tradition is apparent from what has been said above, and is especially noticeable from a study of the general features. Thus, although the Israelites possessed cattle (Ex. xvii. 3, xix. 13, xxiv. 5, xxxii. 6, xxxiv. 3; Num. xx. 19), allusion is made to their lack of meat in order to magnify the wonders of the journey, and among divinely sent aids to guide

1 So B. Stade, Steuernagel, Guthe, G. F. Moore, H. P. Smith, C. F. Kent, &c. See Caleb; Jerahmeel; Judah; Kenites; Levites; and Jews: History, §§ 5, 20 (end).

2 An instructive parallel to the last-mentioned is afforded by Dissard's account of the migration of Arab tribes into Palestine in the 18th century A.D. {Revue biblique, July 1905).

and direct the people upon the march not only does Moses require the assistance of a human helper (Jethro or Hobab), but the angel, the ark, the pillar of cloud and of fire and the mysterious hornet are also provided.

In addition to the references already given, see J. W. Colenso, Pentateuch and Book of Joshua (on internal difficulties) ; A. Jeremias, Alte Test, im Lichte d. alt. Orients 2 (pp. 402′ sqq., on later references in Manetho, &c, with which cf. also R. H. Charles, Jubilees, p. 245 seq.); art. "Exodus" in Ency. Bib.; Ed. Meyer, Israeliten {passim); Bonhoff, Theolog. Stud. u. Krit. (1907), pp. 159-217; the histories of Israel and commentaries on the book of Exodus. Among the numerous special works, mention may be made of G. Ebers, Durch Cosen zum Sinai; E. H. Palmer, Desert of the Exodus; O. A. Toffteen, The Historic Exodus; fuller information is given in L. B. Paton, Hist, of Syria and Palestine, p. 34 (also ch. viii.) ; and C. F. Kent, Beginnings of Heb. Hist. p. 355 seq. (S. A. C.)

EXOGAMY (Gr. e£a>, outside; and ydjuos, marriage), the term proposed by J. F. McLennan for the custom compelling marriage " out of the tribe " (or rather " out of the totem ") ; its converse is endogamy {q.v.). McLennan would find an explanation of exogamy in the prevalence of female infanticide, which, " render ing women scarce, led at once to polyandry within the tribe, and the capturing of women from without." Infanticide of girls is, and no doubt ever has been, a very common practice among savages, and for obvious

reasons. Among tribes in a primitive stage of social organization girl-children must always have been a hindrance and a source of weakness. They had to be fed and yet they could not take part in the hunt for food, and they offered a temptation to neˆhbouring tribes. Infanticide, how- ever, is not proved to have been so universal as McLennan suggests, and it is more probable that the reason of exogamy is really to be found in that primitive social system which made the ” captured ” woman the only wife in the modern sense of the term. In the beginnings of human society children were related only to their mother; and the women of a tribe were common property. Thus no man might appropriate any female or attempt to maintain proprietary rights over her. With women of other tribes it would be different, and a warrior who captured a woman would doubtless pass unchallenged in his claim to possess her absolutely. Infanticide, the evil physical effects of ” in-and-in ” breeding, the natural strength of the impulse to possess on the man’s part, and the greater feeling of security and a tendency to family life and affections on the woman’s, would combine to make exogamy increase and marriages within the tribe decrease. A natural impulse Would in a few generations tend to become a law or a custom, the violation of which would be looked on with horror. Physical capture, too, as soon as in-creasing civilization and tribal intercommunication removed the necessity for violence, became symbolic of the more permanent and individual relations of the sexes. An additional explanation of the prevalence of exogamy may be found in the natural tendency of exogamous tribes to increase in numbers and strength at the expense of those communities which moved towards decadence by in-breeding. Thus tradition would harden into a prejudice, strong as a principle of religion, and exogamy would become the inviolable custom it is found to be among many races. In Australia, Sir G. Grey writes: ” One of the most remarkable facts connected with the natives is that they are divided into certain great families, all the members of which bear the same name . . . these family names are common over a great portion of the continent and a man cannot marry a woman of his own family name.” In eastern Africa, Sir R. Burton says: ” The Somal will not marry one of the same, or even of a consanguineous family,” and the Bakalahari have the same rule. Paul B. du Chaillu found exogamy the rule and blood marriages regarded as an abomination throughout western Equatorial Africa. In India the Khasias, Juangs, Waralis, Ofaons, Hos and other tribes are strictly exogamous. The Kalmucks are divided into hordes, and no man may marry a woman of the same horde. Circassians and Samoyedes have similar rules. The Ostiaks regard endogamy (marriage within the clan) as a crime, as do the Yakuts of Siberia. Among the Indians of America severe rules

prescribing exogamy prevail. The Tsimsheean Indians of British Columbia are divided into

tribes and totems, or ” crests which are common to all the tribes,” says one writer. ” The crests are the whale, the porpoise, the eagle, the coon, the wolf and the frog. . . . The relationship existing between persons of the same crest is nearer than that between members of the same tribe. . . . Members of the same tribe may marry, but those of the same crest are not allowed to under any circumstances; that is, a whale may not marry a whale, but a whale may marry a frog, &c.” : The Thlinkeets, the Mayas of Yucatan and the Indians of Guiana are exogamous, observing a custom which is thus seen to exist throughout Africa, in Siberia, China, India, Polynesia and the Americas.

Authorities. — J. F. McLennan, Primitive Marriage (1865), and Studies in Anc. Hist. (1896); Lord Avebury, Origin of Civilisation (1902) ; Westermarck, History of Human Marriage (1894) ; A. Lang, Social Origins (1903); L. H. Morgan, Ancient Society (1877); J. G. Frazer, Totemism and Exogamy (1910) ; see also Totem.

EXORCISM (Gr. e£op/dfe«’, to conjure out), the expulsion of evil spirits from persons or places by incantations, magical rites or other means. As a corollary of the animistic theory of diseases and of belief in Possession {q.v.), we find widely spread customs whose object is to get rid of tne evil influen:es. These customs may take the form of a general expulsion of evils, either once a year or at irregular intervals; the evils, which are often regarded as spirits, sometimes as the souls of the dead, may be expelled, according to primitive philosophy, either immediately by spells, purifications or some form of coercion; or they may be put on the back of aˆcapegoat or other material vehicle. Among the means of compelling the evil spirits are assaults with warlike weapons or sticks, the noise of musical instruments or of the human voice, the use of masks, the invoca- tion of more powerful good spirits, &c. ; both fire and water are used to drive them out, and the use of iron is a common means of holding them at bay.

The term exorcism is applied more especially to the freeing of an individual from a possessing or disease-causing spirit; the means adopted are frequently the same as those mentioned above; in the East Indies the sufferer sometimes dances round a small ship, into which the spirit passes and is then set adrift. The patient may be beaten or

means may be employed whose efficiency depends largely on their suggestive nature. Among the Dakota Indians the medicine-man chants hi-le-li-lahl at the bed of the sick man and accompanies his chant with the rattle; he then sucks at the affected part till the possessing spirit is supposed to come out and take its flight, when men fire guns at it from the door of the tent. The Zulus believe that they can get rid of the souls of the dead, which cause diseases, by sacrifices of cattle, or by expostulating with the spirits; so too the shaman or magician in other parts of the world offers the possessing spirit objects or animals.

The professional exorcist was known among the Jews; in Greece the art was practised by women, and it is recorded that the mothers of Epicurus and Aeschines belonged to this class; both were bitterly reproached, the one by the Stoics, the other by Demosthenes, with having taken part in the practices in question. The prominence of exorcism in the early ages of the Christian church appears from its frequent mention in the writings of the fathers, and by the 3rd century there was an order of exorcists (see Exorcist). The ancient rite of exorcism in connexion with baptism is still retained in the Roman ritual, as is also a form of service for the exorcising of possessed persons. The exorcist signs the possessed person with the figure of the \ cross, desires him to kneel, and sprinkles him with holy water; ‘ after which the exorcist asks the devil his name, and abjures him by the holy mysteries of the Christian religion not to afflict the person possessed any more. Then, laying his right hand on the demoniac’s head, he repeats the form of exorcism as follows: ” I exorcise thee, unclean spirit, in the name of Jesus Christ; tremble, O Satan, thou enemy of the faith, thou foe of mankind, who hast brought death into the world, who hast deprived men of life, and hast rebelled against justice, thou seducer of mankind, thou root of evil, thou source of avarice, discord and envy.” Houses and other places supposed to be haunted by unclean

spirits are likewise to be exorcised with similar rites, and in general exorcism has a place in all the ceremonies for consecrating and blessing persons or things (see Benediction).

See Tylor, Primitive Culture; Skeat, Malay Magic, p. 427 seq.; Frazer, Golden Bough, vol. iii. 189; Krafft, Ausfuhrliche Historie von Exorcismus; Koldeweg, Der Exorcismus im Herzogthum Braun-schweig ; Brecher, Das Transcendentale, Magie, etc. im Talmud, pp. 195- 203: Zeitschr. fur Assyriologie (Dec. 1893, April” 1894); Herzog, Realencykl., s.v. “Exorcismus”; Waldmeier, Autobiography, p. 64; L. W. King, Babylonian Magic; Maury, La Magie; R. C. Thompson, Devils

and Evil Spirits of Babylonia.

EXORCIST (Lat. exorcista, Gr. eijop/acmjs), in the Roman Catholic church, the third grade in the minor orders of the clergy, between those of acolyte and reader. The office, which involves the right of ceremonially exorcising devils (see Exorcism), is actually no more than a preliminary stage of the priesthood. The earliest record of the special ordination of exorcists is the 7th canon of the council of Carthage (a.d. 256). ” When they are ordained,” it runs, ” they receive from the hand of the bishop a little book in which the exorcisms are written, receiving power to lay hands on the energumeni, whether baptized or cate- chumens.” Whatever its present position, the office of exorcist was, until comparatively recent times, by no means considered a sinecure. ” The exorcist a terror to demons ” (Paulinus, Epist. 24) survived the Reformation among Protestants, with the belief, expressed by Firmilianus in his epistle to St Cyprian, that ” through the exorcists, by the voice of man and the power of God, the devil may be whipped, and burnt and tortured.”

EXOTIC (Gr. e|coruc6s, foreign, from e£a>, outside), of foreign origin, or belonging to another country. The term is now used in the restricted sense of something not indigenous or native, and is mostly applied to plants introduced from foreign countries, which have not become acclimatized. Figura- tively, ” exotic “is used to convey the sense of something rare, delicate or extravagant.

EXPATRIATION (from Late Lat. expatriare, to exile, and palria, native land) : , a term used in a general sense for the banish- ment of a person from his own country. In international law expatriation is the renunciation or change of- allegiance to one’s native or adopted country. It may take place either by a voluntary act or by operation of law. Some countries, as France and England, disclaim their subjects if they become naturalized in another country, others, again, passively permit expatriation whether a new nationality has been acquired or not; others, as Germany, make expatriation the consequence of continued absence from their territory. (See Alien; Allegiance; Naturalization.)

EXPERT (Lat. expertus, from experiri, to try), strictly, skilled, or one who has special knowledge; as used in law, an expert is a person, selected by a court, or adduced by a party to a cause, to give his opinion on some point in issue with which he is peculiarly conversant. In Roman law questions of dis- puted handwriting were referred to experts; and in France, whenever the court considers that a report by experts is necessary, it is ordered by a judgment clearly setting forth

the objects of the expertise (Code Proc. Civ. art. 302). Three experts are then to be appointed, unless the parties agree upon one only (art. 303). The experts are required to take an oath (art. 305), but in practice this requirement is frequently dispensed with. They may be challenged on the same grounds as witnesses (art. 310). The necessary documentary and other evidence is laid before them (art. 317), and they make a single report to the court, even if they express different opinions: in that case the grounds only of the different opinions are to be stated, and not the personal opinion of each of the experts (art. 318). If the court is not satisfied with the report, new experts may be appointed (art. 322); the judges are not bound to adopt the opinion of the experts (art. 323). " This procedure in regard to experts is common to both the civil and commercial courts, but it is much more frequently resorted to in the commercial court than in the civil court, and the investigation is usually conducted by special experts officially attached to each of these courts " (Bodington, French Law of Evidence, London, 1904, p. 102).

EXPLOSIVES

8-i

A similar system is to be found in force in many other European countries; see e.g. Codes of Civil Procedure of Holland, arts. 222 et seq.; Belgium, arts. 302 et seq.; Italy, arts. 252 etseq.; as well as in those colonies where French law has been followed (Codes of Civil Procedure of Quebec, arts. 392 et seq.; St Lucia, arts. 286 et seq.). In Mauritius the articles of the French law, summarized above, are still nominally in force; but in practice each side calls its own expert evidence, as in England.

There is some evidence that in England the courts were in early times in the habit of ; ummoning to their assistance, apparently as assessors, persons specially qualified to advise upon any scientific or technical question that required to be determined. Thus " in an appeal of maihem (i.e. wounding) . . . the court did not know how to adjudge because the wound was new, and then the defendant took issue and prayed the court that the maihem might be examined, on which a writ was sent to the sheriff to cause to come medicos chirurgieos de melioribus London, ad informandum dominum regent el curiam de his quae eis ex parte domini regis injungerentur (Year Book, 21 Hen. VII. pi. 30, p. 33). The practice ,of calling in expert assistance in judicial inquiries was not confined to medico-legal cases. " If matters arise," said Justice Saunders in Buckley v. Rice Thomas (1554, Plowden, 124 a), " which concern other faculties, we commonly apply for the aid of

that science or faculty which it concerns." English procedure, however, being litigious, and not, like continental European procedure, inquisitorial, in its character, the expert soon became, and still is, simply a witness to speak to matters of opinion.

There is a considerable body of law in England as to expert evidence. Only a few points can be touched upon here. (1) An expert is permitted to refresh his memory in regard to any fact by referring to anything written by himself or under his direction at the time when the fact occurred or at a time when it was fresh in his memory. This is also law generally in the United States (see e.g. New York Civil Code, s. 1843). In Scotland, medical and other scientific reports are lodged in process before the trial, and the witness reads them as part of his evidence and is liable to be examined or cross-examined on their contents. (2) In strictness, an expert will not be allowed, in cases of alleged insanity, to say that a litigating or incriminated party is insane or the reverse, and so to usurp the prerogative of the court or jury. But he may be asked whether certain facts or symptoms, assuming them to he proved, are or are not indicative of insanity. But in practice this rule is relaxed both in England and in Scotland, and (where it exists) to a still greater extent in America. (3) Foreign law can only be proved in English courts — and the same rule applies in Scotland — (a) by obtaining an opinion on the subject from a superior court of the country whose laws are in dispute under the Foreign Law Ascertainment Act 1861 or the British Law Ascertainment Act 1859, or (b) by the evidence of a lawyer of the country whose law is in question, or who has studied it in that country, or of an official whose position requires, and therefore presumes, a sufficient knowledge of that law. (4) The weightof authority both in England and in America supports the view that an expert is not bound to give evidence as to matters of opinion unless upon an undertaking by the party calling him to pay a reasonable remuneration for his evidence.

Statutory provision has been made in England for the summon- ing of expert assistance by the legal tribunals in various cases. In the county courts the judge may, if he thinks fit, on the application of either party, call in as assessor one or more persons of skill and experience as to the matters in dispute (County Courts Act 1888, s. 103), and special provision is made for calling in an assessor in employers' liability cases (act of 1880, s. 6) and admiralty matters (see County Courts Admiralty Jurisdiction Acts of 1868 and 1869). In the High Court and court of appeal one or more specially qualified assessors may be called in to assist in the hearing of any cause or matter except a criminal proceeding by the crown (Judicature Acts 1873, s. 56), and a like power is given to both these courts and the judicial committee of the

privy council in patent cases (Patents, &c, Act

1883,5. 28). Maritime causes, whether original or on appeal from county courts, are usually taken in the presence of Elder Brethren of the Trinity House, who advise the judge without having any right to control or any responsibility for his decision (see the “Beryl,” 1884, 9 P.D. 1), and on appeal in maritime causes nautical assessories are usually called in by the court of appeal, and may be called in by the House of Lords (Judicature Act 1 89 1, s. 3); a like provision is made as to maritime causes in Scottish courts (Nautical Assessors [Scotland] Act 1894). The judicial committee of the privy council, besides its power to call in assessors in patent cases, is authorized to call them in in ecclesiastical causes (Appellate Jurisdiction Act 1876, s. 14).

In addition to the authorities cited in the text, see Taylor, Law of Evidence (9th ed., London, 1895) ; J. D. Lawson, Law of Expert and Opinion Evidence (1900).

EXPLOSIVES, a general term for substances which by certain treatment ” explode,” i.e. decompose or change in a violent manner so as to generate force. From the manner and degree of violence of the decomposition they are classified into ” pro- pellants ” and ”” detonators,” but this classification is not capable of sharp delimitation. In some cases the same substance may be employed for either purpose under altered external conditions; but there are some substances which could not possibly be em- ployed as propellants, and others which can scarcely be induced to explode in the manner known as ” detonation.” A propellant may be considered as a substance that on explosion produces such a disturbance that neighbouring substances are thrown to some distance; a detonator or disruptor may produce an extremely violent disturbance within a limited area without projecting substances to any great distance. Time is an im- portant, perhaps the most important, factor in this action. A propellant generally acts by burning in ‘a more or less rapid and regular manner, producing from a comparatively small volume a large volume of gases; during this action heat is also developed, which, being expended mostly on the gaseous products, causes a further expansion. The noise accompanying an explosion is due to an air wave, and is markedly different in the case of a detonator from a real propellant. Some cases of ordinary combustion can be accelerated into explosions by increasing the area of contact between the combustible and the oxygen supplier, for instance, ordinary gas or dust explosions. Neither tempera- ture nor quantity of heat energy necessarily gives an explosive action. Some metals, e.g. aluminium and magnesium, will, in oxidizing, produce a great thermal effect, but unless there be some gaseous products no

real explosive action.

Explosives may be mechanical mixtures of substances capable of chemical interaction with the production of large volumes of gases, or definite chemical compounds of a peculiar class known as " endothermic," the decomposition of which is also attended with the evolution of gases in large quantity.

All chemical compounds are either "endothermic" or "exo- thermic." In endothermic compounds energy, in some form, has been taken up in the act of formation of the compound. Some of this energy has become potential, or rather the compound formed has been raised to a higher potential. This case occurs when two elements can be united only under some compulsion such as a very high temperature, by the aid of an electric current, or spark, or as a secondary product whilst some other reactions are proceeding. For example, oxygen and nitrogen combine only under the influence of an electric spark, and carbon and calcium in the electric furnace. The formation of chlorates by the action of chlorine on boiling potash is a good instance of a complex compound (potassium chlorate), being formed in small quantity as a secondary product whilst a large quantity of primary and simpler products (potassium chloride and water) is forming. In chlorate formation the greater part of the reaction represents a running down of energy and formation of exothermic compounds, with only a small yield of an endothermic substance. Another idea of the meaning of endothermic is obtained from acetylene. When 26 parts by weight of this substance are burnt, the heat produced will warm up 310,450 parts of water i°C. Acetylene consists of 24 parts of carbon and 2 of hydrogen by weight. The 24 parts of carbon will, if in the form of pure charcoal, heat 192,000 parts of water 1°, and the 2 parts of hydrogen will heat 68,000 parts of water 1°, the total heat production being 260,000 heat units. Thus 26 grams of acetylene give an excess of 50,450 units over the amount given by the constituents. This excess of

heat energy 1 is due to some form of potential energy in the compound which becomes actual heat energy at the moment of dissolution of the chemical union. The manner in which a substance is endothermic is of importance as regards the practical employment of explosives. Some particular endothermic state or form results from the mode of formation and the consequent internal structure of the

molecule. Physical structure alone can be the cause of a relative endothermic state, as in the glass bulbs known as Rupert's drops, &c, or even in chilled steel. Rupert's drops fly in pieces on being scratched or cut to a certain depth. The cause is un- doubtedly to be ascribed to the molecular state of the glass brought about by chilling from the melted state. The molecules have not had time to separate or arrange themselves in easy positions. In steel when melted the carbide of iron is no doubt diffused equally throughout the liquid. When cooled slowly some carbide separates out more or less, and the steel is soft or annealed. When chilled the carbides are retained in solid solution. The volume of chilled glass or steel differs slightly from that in the annealed state.

Superfused substances are probably in a similar state of physical potential or strain. Many metallic salts, and organic compounds especially, will exhibit this state when completely melted and then allowed to cool in a clean atmosphere. On touching with a little of the same substance in a solid state the liquids will begin to crystallize, at the same time becoming heated almost up to their melting-points. The metal gallium shows this excellently well, keeping liquid for years until touched with the solid metal, when there is a considerable rise of temperature as solidification takes place.

All carbon compounds, excepting carbon dioxide, and many if not all compounds of nitrogen, are endothermic. Most of the ex- plosives in common use contain nitrogen in some form.

Exothermic compounds are in a certain sense the reverse of endothermic; they are relatively inert and react but slowly or not at all, unless energy be expended upon them from outside. Water, carbon dioxide and most of the common minerals belong to this class.

The explosives actually employed at the present time include mixtures, such as gunpowders and some chlorate compositions, the ingredients of which separately may be non-explosive; compounds used singly, as guncotton, nitroglycerin (in the form of dynamite), picric acid (as lyddite or melinite), trinitrotoluene, nitrocresols, mercury fulminate, &c; combinations of some explosive compounds, such as cordite and the smokeless pro- pellants in general use for military purposes; and, finally, blasting and detonating or igniting compositions, some of which contain inert diluting materials as well as one or more high explosives. Many igniting compositions are examples of the last type, consisting of a high explosive diluted with a neutral substance, and frequently containing in addition a composition which is inflamed by the explosion of the diluted high explosive, the

flame in turn igniting the actual propellant.

Explosive Mixtures. — The explosive mixture longest known is undoubtedly gunpowder (q.v.) in some form — that is, a mixture of charcoal with sulphur and nitre, the last being the oxygen provider. Besides the nitrates of metals and ammonium nitrate, there is a limited number of other substances capable of serving in a sufficiently energetic manner as oxygen providers. A few chlorates, perchlorates, permanganates and chromates almost complete the list. Of these the sodium, potassium and barium chlorates are best known and have been actually tried, in admixture with some combustible substances, as practical ex- plosives. Most other metallic chlorates are barred from prac- tical employment owing to instability, deliquescence or other property.

Of -the chlorates those of potassium and sodium are the most stable, and mixtures of either of these salts with sulphur or sulphides, phosphorus, charcoal, sugar, starch, finely-ground cellulose, coal or almost any kind of organic, i.e. carbon, com- pound, in certain proportions, yield an explosive mixture. In many cases these mixtures are not only fired or exploded by heating to a certain temperature, but also by quite moderate friction or percussion. Consequently there is much danger in manufacture and storage, and however these mixtures have been made up, they are quite out of the question as propellants on account of their great tendency to explode in the manner of a detonator. In addition they are not smokeless, and leave a

1 Not necessarily heat energy entirely. A number of substances — acetylides and some nitrogen compounds, such as nitrogen chloride – — decompose with extreme violence, but little heat is produced.

considerable residue which in a gun would produce serious fouling.

Mixtures of chlorates with aromatic compounds such as the nitro- or dinitro-benzenes or even naphthalene make very powerful blasting agents. The violent action of a chlorate mixture is due first to the rapid evolution of oxygen, and also to the fact that a chlorate can be detonated when alone. A drop of sulphuric acid will start the combustion of a chlorate mixture. In admixture with sulphur, sulphides and especially phosphorus, chlorates give extremely sensitive compositions, some of which form the basis of friction tube and firing mixtures.

Potassium and sodium perchlorates and permanganates make similar but slightly less sensitive explosive mixtures with the above-

mentioned substances. Finely divided metals such as aluminium or magnesium give also with permanganates, chlorates or perchlorates sensitive and powerful explosives. Bichromates, although containing much available oxygen, form but feeble explosive mixtures, but some compounds of chromic acid with diazo compounds and some acetylides are extremely powerful as well as sensitive. Ammonium bichromate is a self-com- bustible after the type of ammonium nitrate, but scarcely an explosive.

Explosive Compounds. — Nearly all the explosive compounds in actual use either for blasting purposes or as propellants are nitrogen compounds, and are obtained more or less directly from nitric acid. Most of the propellants at present employed consist essentially of nitrates of some organic compound, and may be viewed theoretically as nitric acid, the hydrogen of which has been replaced by a carbon complex; such compounds are expressed by M-0-N0 2 , which indicates that the carbon group is in some manner united by means of oxygen to the nitrogen group. Guncotton and nitroglycerin are of this class. Another large class of explosives is formed by a more direct attachment of nitrogen to the carbon complex, as represented by M-N0 2 . A number of explosives of the detonating type are of this class. They contain the same proportions of oxygen and nitrogen as nitrites, but are not nitrites. They have been termed nitro- derivatives for distinction. One of the simplest and longest- known members of this group is nitrobenzene, C 6 H 5 N0 2 , which is employed to some extent as an explosive, being one ingredient in rack-a-rock and other blasting compositions. The dinitro- benzenes, C 6 H 4 (N02)2, made from it are solids which are some- what extensively employed as constituents of some sporting powders, and in admixture with ammonium nitrate form a blast- ing powder of a ” nameless ” variety which is comparatively safe in dusty or “gassy” coal seams.

Picric acid or trinitrophenol, C 6 H 2 OH(N0 2) s is employed as a high explosive for shell, &c. It requires, however, either to be enclosed and heated, or to be started by a powerful detonator to develop its full effect. Its compounds with metals, such as the potassium salt, C 6 H 2 OK(N0 2) 3 , are when dry very easily detonated by friction or percussion and always on heating, whereas picric acid itself will burn very quietly when set fire to under ordinary conditions. Trinitrotoluene, C6H 2 -CH 3 (N0 2) 3 , is a high explosive resembling picric acid in the manner of its ex plosion (to which in fact it is a rival), but differs therefrom in not forming salts with metals. The nitronaphthols, Ci H 6 -OH-NO 2 , and higher nitration products may be counted in the list. Their salts with metals behave much liˆe the picrates.

All these nitro compounds can be reduced by the action of nascent hydrogen to substances called amines {q.v.), which are not always explosive in themselves, but in some cases can form nitrates of a self-combustible nature. Aminoacetic acid, for instance, will form a nitrate which burns rapidly but quietly, and might be employed as an explosive. By the action of nitrous acid at low temperatures on aromatic amines, e.g. aniline, $C_6H_5NH_2$, diazo compounds are produced. These are all highly explosive, and when in a dry state are for the most part also extremely sensitive to friction, percussion or heat. As many of these diazo compounds contain no oxygen their explosive nature must be ascribed to the peculiar state of union of the nitrogen. This state is attempted to be shown by the formulae such as, for

instance, CeHs-NˆN-X, which maybe some compound of diazo-benzene. Probably the most vigorous high explosive at present known is the substance called hydrazoic acid or azoimide (q.v.). It forms salts with metals such as AgN_3, which explode in a peculiar manner. The ammonium compound, NH_4N_3, may become a practical explosive of great value.

Mercuric fulminate, $HgC_2N_2O_2$, is one of the most useful high explosives known. It is formed by the action of a solution of mercurous nitrate, containing some nitrous acid, on alcohol. It is a white crystalline substance almost insoluble in cold water and requiring 130 times its weight of boiling water for solution. It may be heated to 180° C. before exploding, and the explosion so brought about is much milder than that produced by per- cussion. It forms the principal ingredient in cap compositions, in many fuses and in detonators. In many of these compositions the fulminate is diluted by mixture with certain quantities of inert powders so that its sensitiveness to friction or percussion is just so much lowered, or slowed down, that it will fire another mixture capable of burning with a hot flame. For detonating dynamite, guncotton, &c, it is generally employed without admixture of a diluent.

Smokeless Propellants. — Gunpowders and all other explosive mixtures or compounds containing metallic salts must form smoke on combustion. The solids produced by the resolution of the compounds are in an extremely finely-divided state, and on being ejected into the atmosphere become more or less attached to water vapour, which is

so precipitated, and consequently adds to the smoke. The simplest examples of propellants of the smoke- less class are compressed gases. Compressed air was the pro- pellant for the Zalinski dynamite gun. Liquefied carbon dioxide has also been proposed and used to a slight extent with the same idea. It is scarcely practical, however, because when a quantity of a gas liquefied by pressure passes back again into the gaseous state, there is a great absorption of heat, and any remaining liquid, and the containing vessel, are considerably cooled. Steam guns were tried in the American Civil War in 1864; but a steam gun is not smokeless, for the steam escaping from the long tube or gun immediately condenses on expansion, forming white mist or smoke.

At the earliest stage of the development of guncotton the advantage of its smokeless combustion was fully appreciated (see Guncotton). That it did not at once take its position as the smokeless propellant, was simply due to its physical state — a fibrous porous mass — which burnt too quickly or even detonated under the pressure required in fire-arms of any kind. In the early eighties of the 19th century it was found that several substances would partly dissolve or at least gelatinize guncotton, and the moment when guncotton proper was obtained as a colloid or jelly was the real start in the matter of smokeless propellants.

Guncotton is converted into a gelatinous form by several substances, such as esters, e.g. ethyl acetate or benzoate, acetone and other ketones, and many benzene compounds, most of which are volatile liquids. On contact with the guncotton a jelly is formed which stiffens as the evaporation of the gelatinizing agent proceeds, and finally hardens when the evaporation is complete. Whilst in a stiff pasty state it may be cut, moulded or pressed into any desired shape without any danger of ignition. In fact guncotton in the colloid state may be hammered on an anvil, and, as a rule, only the portion struck will detonate or fire. Guncotton alone makes a very hard and somewhat brittle mass after treatment with the gelatinizing agent and complete drying, and small quantities of camphor, vaseline, castor oil and other substances are incorporated with the gelatinous guncotton to moderate this hard and brittle state.

All the smokeless powders, of which gelatinized guncottons or nitrated celluloses are the base, are moulded into some con- veniently shaped grain, e.g. tubes, cords, rods, disks or tablets, so that the rate of burning may be controlled as desired. The Vieille powder, invented in 1887 and adopted in France for a magazine rifle, consisted of ‘gelatinized guncotton with a little picric acid. Later a mixture of two varieties of guncotton

gelatinized together was used. In addition to guncottons other explosive or non-explosive substances are contained in some of these powders. Guncotton alone in the colloid state burns very slowly if in moderate-sized pieces, and when subdivided or made into thin rods or strips it is still very mild as an explosive, partly from a chemical reason, viz. there is not sufficient oxygen in it to burn the carbon to dioxide. Many mixtures are consequently in use, and many more have been proposed, which contain some metallic salt capable of supplying oxygen, such as barium or ammonium nitrate, &c, the idea being to accelerate the rate of burning of the guncotton and if possible avoid the production of smoke.

The discovery by A. Nobel that nitroglycerin could be incor- porated with collodion cotton to form blasting gelatin (see Dynamite) led more or less directly to the invention of ballistite, which differs from blasting gelatin only in the relative amounts of collodion, or soluble nitrated cotton, and nitroglycerin. Ballis- tite was adopted by the Italian government in 1890 as a military powder. Very many substances and mixtures have been proposed for smokeless powder, but the two substances, gun- cotton and nitroglycerin, have for the most part kept the field against all other combinations, and for several reasons. Nitro- glycerin contains a slight excess of oxygen over that necessary to convert the whole of the carbon into carbon dioxide; it burns in a more energetic manner than guncotton; the two can be incorporated together in any proportion whilst the guncotton is in the gelatinous state; also all the liquids which gelatinize guncotton dissolve nitroglycerin, and, as these gelatinizing liquids evaporate, the nitroglycerin is left entangled in the gun- cotton jelly, and then shares more or less its colloidal character. In burning the nitroglycerin is protected from detonation by the gelatinous state of the guncotton, but still adds to the rate of burning and produces a higher temperature.

Desirable Qualities. — Smokelessness is one only of the desirable properties of a propellant. All the present so-called smokeless powders produce a little fume or haze, mainly due to the conden- sation of the steam which forms one of the combustion products. There is often also a little vapour from the substances, such as oils, mineral jelly, vaseline or other hydrocarbon added for lubrication or to render the finished material pliable, &c. The gases produced should neither be very poisonous nor exert a corrosive action on metals, &c. The powder itself should have good keeping qualities, that is, not be liable to chemical changes within ordinary ranges of temperature or in different climates when stored for a few years. In these powders slight chemical changes are generally followed by noticeable ballistic

changes. All the smokeless powders of the present day produce some oxide of nitrogen, traces of which hang about the gun after firing and change rapidly into nitrous and nitric acids. Nitrous acid is particularly objectionable in connexion with metals, as it acts as a carrier of oxygen. The fouling from modern smokeless powders is a slight deposit of acid grease, and the remedy consists in washing out the bore of the piece with an alkaline liquid. The castor oil, mineral jelly or camphor, and similar substances added to smokeless powders are supposed to act as lubricants to some extent. They are not as effective in this respect as mineral salts, and the rifling of both small-arms and ordnance using smokeless powders is severely gripped by the metal of the projectile. The alkaline fouling produced by the black and brown powders acted as a preventive of rusting to some extent, as well as a lubricant in the bore.

Danger in Manufacture. — In the case of the old gunpowders, the most dangerous manufacturing operation was incorporation. With the modern colloid propellants the most dangerous operations are the chemical processes in the preparation of nitroglycerin, the drying of guncotton, &c. After once the gelatinizing solvent has been added, all the mechanical operations can be conducted, practi- cally, with perfect safety. This statement appears to be correct for all kinds of nitrated cellulose powders, whether mixed with nitro- glycerin or other substances. Should they become ignited, which is possible by a rise of temperature (to say 180°) or contact with a flame, the mixture burns quickly, but does not detonate.

As a rule naval and military smokeless powders are shaped into flakes, cubes, cords or cylinders, with or without longitudinal perfora- tions. All the modifications in shape and size are intended to regulate the rate of burning. Sporting powders are often coloured for trade distinction. Some powders are blackleaded by glazing with pure graphite, as is done with black powders. One object of this glazing is to prevent the grains or pieces becoming joined by pressure; for rods or pieces of some smokeless powders might possibly unite under considerable pressure, producing larger pieces and thus altering the rate of burning. Most smokeless powders are fairly

insensitive to shock. All these gelatinized powders are a little less easily ignited than black powders. A slightly different cap com- position is required for small-arm cartridges, and cannon cartridges

generally require a small primer or starter of powdered black gun-powder.

It is desired that a propellant shall produce the maximum velocity with the minimum pressure. The pressure should start gently so that the inertia of the projectile is overcome without any undue local strain on the breech near the powder chamber, and more especially that as more and more space is given to the gases by the movement of the projectile up the gun to the muzzle, gas should be produced with sufficient rapidity to keep the pressure nearly uniform or slightly increasing along the bore. The leading idea for im- provements in relation to propellants is to obtain the greatest possible pressure regularly developed, and at the same time the lowest temperatures. (W. R. E. H.)

Law. — In i860 an act was passed in England ” to amend the law concerning the making, keeping and carriage of gunpowder and compositions of an explosive nature, and concerning the manufacture and use of fireworks ” (23 & 24 Vict. c. 139), whereby previous acts on the same subject were repealed, and minute and stringent regulations introduced. Amending acts were passed in 1861 and 1862. In 1875 was passed the Ex- plosives Act (38 & 39 Vict. c. 17), which repealed the former acts, and dealt with the whole subject in a more comprehensive manner. This act, containing 122 sections, and applying to Scotland and Ireland, as well as to England, constitutes, with various orders in council and home office orders, a complete code. The act of 1875 was based on the report of a committee of the House of Commons, public opinion having been greatly excited on the subject by a terrible explosion on the Regent’s Canal in 1874. Explosives are thus defined: (1) Gunpowder, nitro- glycerin, dynamite, gun-cotton, blasting powders, fulminate of mercury or of other metals, coloured fires, and every other substance, whether similar to those above-mentioned or not, used or manufactured with a view to produce a practical effect by explosion or a pyrotechnic effect, and including (2) fog-signals, fireworks, fuses, rockets, percussion caps, detonators, cartridges, ammunition of all descriptions, and every adaptation or prepara- tion of an explosive as above defined. Part i. deals with gun-powder, providing that it shall be manufactured only at factories lawfully existing or licensed under the act; that it shall be kept (except for private use) only in existing or new magazines or stores, or in registered premises, licensed under the act. Private persons may keep gunpowder for their own use to the amount of thirty pounds. The act also prescribes rules for the proper keep- ing of gunpowder on registered premises. Part ii. deals with nitro-giycerin and other explosives; part iii. with inspection, accidents, search, &c; part iv.

contains various supplementary provisions. By order in council the term ” explosive ” may be extended to any substance which appears to be specially dangerous to life or property by reason of its explosive properties, or to any process liable to explosion in the manufacture thereof, and the provisions of the act then extend to such substance just as if it were included in the term ” explosive ” in the act. The act lays down minute and stringent regulations for the sale of gun-powder, restricting the sale thereof in public thoroughfares or places, or to any child apparently under the age of thirteen; requiring the sale of gunpowder to be in closed packages labelled; it also lays down general rules for conveyance, &c. The act also gives power by order in council to define, from time to time, the composition, quality and character of any explosive, and to classify explosives, and such orders in council are frequently made including new substances; those in force will be found in the Statutory Rules and Orders, tit. ” explosive substance.” The Merchant Shipping Act 1894 imposes restrictions on the carriage of dangerous goods in a British or foreign vessel, ” dangerous goods ” meaning aquafortis, vitriol, naphtha, benzine, gunpowder, lucifer matches, nitro-glycerin, petroleum and any explosive within the meaning of the Explosives Act 1875. The act is administered by the home office, and an annual report is pub- lished containing the proceedings of the inspectors of explosives and an account of the working of the act. Each annual report gives a list of explosives at the time authorized for manufacture

or importation, and appendices containing information as tr> accidents, experiments, &c.

Practically every European country has legislated on the line: of the English act of 1875, Austria taking the lead, in 1877, with an explosives ordinance almost identical with the English act. The United States and the various English colonies also have explosives acts regulating the manufacture, storage and importa- tion of explosives. (See also Petroleum.) (T. A. I.)

Bibliography. — M. Berthelot, Sur la force des matieres explosives (Paris, 1883); P. F. Chalon, Les Explosifs modernes (Paris, 1886); W. H. Wardell, Handbook of Gunpowder and Guncotton (London, 1888); J. P. Cundill, A Dictionary of Explosives (London, 1889 and 1897) ; M. Eissler, A Handbook of Modern Explosives (London, 1896, new ed. 1903); J. A. Longridge, Smokeless Powder and its Influence on Gun Construction (London, 1890) ; C. Napier Hake and W. Macnab, Explosives and their Power (London, 1892); G. Coralys, Les Explosifs (Paris, 1893); A. Ponteaux, La Poudre sans f unite et les poudres anciennes (Paris, 1893) ; F. Salvati, Vocabolario di polveri ed explosivi

(Rome, 1893) ; C. Guttmann, The Manufacture of Explosives (London, 1895 and later) ; S. J. von Romocki, Geschichte der Sprengstoffchemie, der Sprengtechnik und des Torpedowesens bis zum Beginn der neusten Zeit (Berlin, 1895) ; Geschichte ‘der Explosiv-stojfe, die rauchschwachen Pulver (Berlin, 1896) ; P. G. Sanford, Nitro-explosives (London, 1896); L. Gody, Traite theorique et pratique des matieres explosives (Namur, 1896); R. Wille, Der Plastomerite (Berlin, 1898) ; E. Sarrau, Introduction d. la theorie des explosifs (1893) ‘< Theorie des explosifs (1896) ; O. Guttmann, Manufacture of Explosives (London, 1895) ; E. M. Weaver, Notes on Military Explosives (New York, 1906) ; M. Eissler, The Modern High Explosives (New York, 1906) ; Treatise on Service Explosives, published by order of the secretary of state for war (London, 1907). Most of the literature on modern explosives, e.g. dynamite, &C, is to be found in papers contributed to scientific journals and societies. An index to those which have appeared in the Journal of the Society of Chemical Industry is to be found in the decennial index (1908) compiled by F. W. Renant.

EXPRESS (through the French from the past participle of the Lat. exprimere, to press out, by transference used of representing objects in painting or sculpture, or of thoughts, &c. in words), a word signifying that which is clearly and definitely set forth or represented, explicit, and thus used of a meaning, a law, a con- tract and the like, being specially contrasted with ” implied.” Thus in law, malice, for which there is actual evidence, as apart from that which may be inferred from the acts of the person charged, is known as ” express.” The word is most frequently used with the idea of something done with a definite purpose; the term ” express train,” now meaning one that travels at a high speed over long distances with few intermediate stoppages, was, in the early days of railways, applied to what is now usually called a ” special,” i.e. a train not running according to the ordinary time-tables of the railway company, but for some specific purpose, or engaged by a private person. About 1845 this term became used for a train running to a particular place without stopping. Similarly in the British postal service, express delivery is a special and immediate delivery of a letter, parcel, &c, by an express messenger at a particular increased rate. The system was adopted in 189 1.

In the United States of America, express companies for the rapid transmission of parcels and luggage and light goods gener- ally perform the function of the post office or the railways in the United Kingdom and the continent of Europe. Not only do they deliver goods, but by the cash on delivery system (see Cash) the express companies

act as agents both for the purchaser and seller of goods. They also serve as a most efficient agency for the transmission of money, the express money order being much more easily convertible than the postal money orders, as the latter can only be redeemed at offices in large and important towns. The system dates back to 1839, when one William Frederick Harnden (1813-1845), a conductor on the Boston and Worcester railway, undertook on his own account the carrying of small parcels and the performance of small commissions. Obliged to leave the company's service or abandon his enterprise, he started an " express " service between Boston and New York, carrying parcels, executing commissions and collecting drafts and bills. Alvin Adams followed in 1840, also between Boston and New York. From 1840 to 1845 the system was adopted by many others between the more important towns

throughout the States. The attempt to carry letters also was, stopped by the government as interfering v/ith the post office. In 1854 began the amalgamation of many of the companies. Thus under the name of the Adams Express Company the services started by Harnden and Adams were consolidated. The lines connecting the west and east by Albany, Buffalo and the lakes were consolidated in the American Express Company, under the direction of William G. Fargo (q.v.), Henry Wells and Johnston Livingston, while another company, Wells, Fargo & Co., operated on the Pacific coast. The celebrated " Pony Express " was started in i860 between San Francisco and St Joseph, Missouri, the time scheduled being eight days. The service was carried on by relays of horses, with stations 25 m. apart. The charge made for the service was $2.50 per I oz. The completion of the Pacific Telegraph Company line in 1861 was followed by the discontinuance of the regular service.

The name " express " is applied to a rifle having high velocity, flat trajectory and long fixed-sight ranges; and an " express- bullet " is a light bullet with a heavy charge of powder used in such a rifle (see Rifle).

EXPROPRIATION, the taking away or depriving of property (Late Lat. expropriare, to take away, proprium, i. e. that which is one's own) . The term is particularly applied to the compulsory acquisition of private property by the state or other public authority.

EXPULSION (Lat. expulsio, from expellere), the act of driving out, or of removing a person from the membership of a body or the holding of an office, or of depriving him of the right of attending a meeting, &c. In the United Kingdom the House of Commons can by resolution expel a member. Such ˆresolution cannot be questioned by any court of law. But expulsion is only resorted to in cases where members are guilty of offences rendering them unfit for a seat in the House, such as being in open rebellion, being guilty of forgery, perjury, fraud or breach of trust, misappropriation of public money, corruption, conduct unbecoming the character of an officer and a gentleman, &c. It is customary to order the member, if absent, to attend in his place, before an order is made for his expulsion (see May, Parlia- mentary Practice, 1906, p. 56 seq.). Municipal corporations or other local government bodies have no express power to expel a member, except in such cases where the law declares the member to have vacated his seat, or where power is given by statute to declare the member's seat vacant. In the cases of officers and servants of the crown, tenure varies with the nature of the office. Some officials hold their offices ad vitam aut culpam or dum bene se gesserunt, others can be dismissed at any time and without reason assigned and without compensation. In the case of membership of a voluntary association (club,- &c.) the right of expulsion depends upon the rules, and must be exercised in good faith. Courts of justice have jurisdiction to prevent the improper expulsion of the member of a voluntary association where that member has a right of property in the association. In the case of meetings, where the meeting is one of a public body, any person not a member of the body is entitled to be present only on sufferance, and may be expelled on a resolution of the body. In the case of ordinary public meetings those who convene the meeting stand in the position of licensors to those attending and may revoke the licence and expel any person who creates disorder or makes himself otherwise objectionable.

Expulsion of Aliens. — Under the Naturalization Act of 1870, the last of the civil disqualifications affecting aliens in England was removed. The political disqualifications which remained only applied to electoral rights. In the very exceptional cases in which it was retained in the statute book, expulsion was considered to have fallen into desuetude, but it has been revived by the Aliens Act of 1905 (5 Edw. VII. c. 13). Under this act powers are given to the secretary of state to make an order requiring an alien to leave the United Kingdom within a time fixed by the order and thereafter to remain outside the United Kingdom, subject to certain conditions, provided it is certified

to him that the alien has been convicted of any felony or mis-

demeanour or other offence for which the court has power to impose imprisonment without the option of a fine, &c, or that he has been sentenced in a foreign country with which there is an extradition treaty, for a crime not being an offence of a political character. There are also provisions applicable within one year, after the alien has entered the United Kingdom in the case of pauper aliens. Precautions are taken to prevent, as far as possible, any abuse of the power of expulsion. Under the French law of expulsion (December 3, 1849) there are no such precautions, the minister of the interior having an absolute discretion to order any foreigner as a measure of public policy to leave French territory and in fact to have him taken immediately to the frontier.

EXTENSION (Lat. ex, out; tendere, to stretch), in general, the action of straining or stretching out. It is usually employed metaphorically (cf. the phrase an "extension of time," a period allowed in excess of what has been agreed upon). It is used as a technical term in logic to describe the total number of objects to which a given term may be applied; thus the meaning of the term " King " in " extension " means the kings of England, Italy, Spain, &c. (cf. Denotation), while in "intension" it means the attributes which taken together make up the idea of kinghood (see Connotation). In psychology the literal sense of extension is retained, i.e. " spread-outness." The perception of space by the senses of sight and touch, as opposed to semi- spatial perceptions by smell and hearing, is that of " continuous expanse composed of positions separated and connected by distances " (Stout) ; to this the term " extension " is applied. The perception of separate objects involves position and distance, but these taken together are not extension, which necessarily implies continuity. To move one's finger along the keys of a piano gives both the position and the distance of the keys; to move it along the frame gives the idea of extension. By expanding this idea we obtain the conception of all space as an extended whole. To this perception are necessary both form and material. It should be observed the actual quality of a stimulus (rough, smooth, dry, &c.) has nothing to do with the spatial perception as such, which is concerned purely with what is known as " local signature." The elementary undifferentiated sensation excited by the stimuli exerted by a continuous whole is known as its " extensive quantity " or " extensity." The term has to do not with the kind of object which excites the sensation, but simply with the vague massiveness of the latter. As such it is distinguishable in thought from extension, though it is not easy to say whether and if so how far the quantitative aspect of space can exist apart from spatial order. Extensity as an element in the complex of extension must be carefully

distinguished from intensity. Mere increase of pressure implies increase of intensity of sensation; to increase the extensity the area, so to speak, of the exciting stimulus must be increased. Thus the extensity (also called ” voluminousness,” or ” massive- ness “) of the sensation produced by a roll of thunder is greater than that produced by a whistle or the bark of a dog. It should be observed that this application of the idea of extensity to sensation in general, rather than to the matter which is the exciting stimulus, is only an analogy, an attempt to explain a common psychic phenomenon by terminology which is in- trinsically suitable to the physical. As a natural consequence the term represents different shades of meaning in different treatises, verging sometimes towards the physical, sometimes towards the psychic, meaning.

In connexion with extension elaborate psycho-physical experiments have been devised,. e.g. with the object of comparing the accuracy of tactual and visual perception and discovering what are the least differences which each can observe. At a distance two lights appear as one, just as two stars distinguishable through a telescope are one to the naked eye (see Vision) : again if the points of a compass are brought close together and pressed lightly on the skin the sensation, though vague and diffused, is a single one.

See Psychology and works there quoted; also Space and Time.

EXTENUATING CIRCUMSTANCES. This expression is used in law with reference to crimes, to describe cases in which, though an offence has been committed without legal justification or excuse, its gravity, from the point of view of punishment or moral opprobrium, is mitigated or reduced by reason of the facts leading up to or attending the commission of the offence. Ac- cording to English procedure, the jury has no power to determine the punishment to be awarded for an offence. The sentence, with certain exceptions in capital cases, is within the sole discre- tion of the judge, subject to the statutory prescriptions as to the kind and maximum of punishment. It is common practice for juries to add to their verdict, guilty or not guilty, a rider recom- mending the accused to mercy on the ground of grave provocation received, or other circumstances which in their view should mitigate the penalty. This form of rider is often added on a verdict of guilty of wilful murder, a crime as to which the judge has no discretion as to punishment, but the recommendation is sent to the Home Office for consideration in advising as to exercise of the prerogative of mercy. Quite independently of any recommendation by

the jury, the judge is entitled to take into account matters proved during the trial, or laid before him after verdict, as a guide to him in determining the quantum of punishment.

Under the French law {Code d' instruction criminelle, art. 345), it is the sole right and the duty of a jury in a criminal case to pronounce whether or not the commission of the offence was attended by extenuating circumstances {cir Constances attenuantes) . They are not bound to say anything about the matter, but the whole or the majority may qualify the verdict by finding extenuation, and if they do, the powers of the court to impose the maximum punishment are taken away and the sentence to be pronounced is reduced in accordance with the scale laid down in art. 463 of the Code p6nal. The most important result of this rule is to enable a jury to prevent the infliction of capital punish- ment for murder. In cases of what is termed " crime passionel," French juries, when they do not acquit, almost invariably find extenuation; and a like verdict has become common even in the case of cold-blooded and sordid murders, owing to objections to capital punishment.

EXTERRITORIALITY, a term of international law, used to denominate certain immunities from the application of the rule that every person is subject for all acts done within the boundaries of a state to its local laws. It is also employed to describe the quasi-extraterritorial position, to borrow the phrase of Grotius, of the dwelling-place of an accredited diplomatic agent, and of the public ships of one state while in the waters of another. Latterly its sense has been extended to all cases in which states refrain from enforcing their laws within their territorial juris- diction. The cases recognized by the law of nations relate to: (1) the persons and belongings of foreign sovereigns, whether incognito or not; (2) the persons and belongings of ambassadors, ministers plenipotentiary, and other accredited diplomatic agents and their suites (but not consuls, except in some non- Christian countries, in which they sometimes have a diplomatic character); (3) public ships in foreign waters. Exterritoriality has also been granted by treaty to the subjects and citizens of contracting Christian states resident within the territory of certain non- Christian states. Lastly, it is held that when armies or regiments are allowed by a foreign state to cross its territory, they necessarily have exterritorial rights. " The ground upon which the immunity of sovereign rulers from process in our courts," said Mr Justice Wills in the case of Mighell v. Sultan of Johore, 1804, "is recognized by our law, is that it would be absolutely inconsistent with the status of an independent sovereign that he should be subject to the process of a foreign tribunal," unless he deliberately submits to its juris- diction. It has, however, been held where the foreign

sovereign was also a British subject {Duke of Brunswick v. King of Hanover, 1844), that he is amenable to the jurisdiction of the English Courts in respect of transactions done by him in his capacity as a subject. A ” foreign sovereign ” may be taken to include the president of a republic, and even a potentate whose inde-

pendence is not complete. Thus in the case, cited above, of Mighell v. Sultan »f Johore, the sultan was ascertained to have abandoned all right to contract with foreign states, and to have placed his territory under British protection. The court held that he was, nevertheless, a foreign sovereign in so far as immunity from British jurisdiction was concerned. The im- munity of a foreign diplomatic agent, as the direct representative of a foreign sovereign (or state), is based on the same grounds as that of the sovereign authority itself. The international practice in the case of Great Britain was confirmed by an act of parliament of the reign of Queen Anne, which is still in force. The preamble to this act states that ” turbulent and disorderly persons in a most outrageous manner had insulted the person of the then ambassador of his Czarish Majesty, emperor of Great Russia,” by arresting and detaining him in custody for several hours, ” in contempt to the protection granted by Her Majesty, contrary to the law of nations, and in prejudice of the rights and privileges which ambassadors and other public ministers, authorized and received as such, have at all times been thereby possessed of, and ought to be kept sacred and inviolable.” This preamble has been repeatedly held by our courts to be declaratory of the English common law. The act provides that all suits, writs, processes, against any accredited ambassador or public minister or his domestic ‘servant, and all proceedings and judg- ments had thereupon, are ” utterly null and void,” and that any person violating these provisions shall be punished for a breach of the public peace. Thus a foreign diplomatic agent cannot, like the sovereign he represents, waive his immunity by submitting to the British jurisdiction. The diplomatic im- munity necessarily covers the residence of the diplomatic agent, which some writers describe as assimilated to territory of the state represented by the agent; but there is no consideration which can justify any extension of the immunity beyond the needs of the diplomatic mission resident within it. It is different with public ships in foreign waters. In their case the ex- territoriality attaches to the vessel. Beyond its bulwarks captain and crew are subject to the ordinary jurisdiction of the state upon whose territory they happen to be. By a foreign public ship is now understood any ship in the service of a foreign state. It was even held in the case of the ” Parlement Beige ” (1880), a packet belonging to the Belgian government, that the character of the vessel as a public

ship was not affected by its carrying passengers and merchandise for hire. In a more recent case an action brought by the owners of a Greek vessel against a vessel belonging to the state of Rumania was dismissed, though the agents of the Rumanian government had entered an appearance unconditionally and had obtained the release of the vessel on bail, on the ground that the Rumanian government had not authorized acceptance of the British jurisdiction (The " Jassy," 1906, 75 L.J.P. 93).

Writers frequently describe the exterritoriality of both em- bassies and ships as absolute. There is, however, this differ- ence, that the exterritoriality of the latter not being, like that of embassies, a derived one, there seems to be no ground for limitation of it. It was, nevertheless, laid down by the arbitrators in the " Alabama " case (Cockburn dissenting), that the privilege of exterritoriality accorded to vessels had not been admitted into the law of nations as an absolute right, but solely as a proceeding founded on the principle of courtesy and mutual deference between different nations, and that it could therefore "never be appealed to for the protection of acts done in violation of neutrality."

The exterritorial settlements in the Far East, the privileges of Christians under the arrangements made with the Ottoman Porte, and other exceptions from local jurisdictions, are subject to the conditions laid down in the treaties by which they have been created. There are also cases in which British communities have grown up in barbarous countries without the consent of any local authority. All these are regulated by orders in council, issued now in virtue of the Foreign Jurisdiction Act 1890, an act enabling the crown to exercise any jurisdiction it may have " within a foreign country " in as ample a manner

as if it had been acquired " by cession or conquest of territory." A very exceptional case of exterritoriality is that granted to the pope under a special Italian enactment. (T. Ba.)

EXTORTION (Lat. extorsio, from extorquere, to twist out, to take away by force), in English law the term applied to the exaction by public officers of money or money's worth not due at all, or in excess of what is due, or before it is due. Such exaction, unless made in good faith (i.e. in honest mistake as to the sum prqperly payable) , is a

misdemeanour by the common law and is punishable by fine and (or) imprisonment. Besides the punishment above stated, an action for twice the value of the thing extorted lies against officers of the king (1275,3 Edw. I. c. 26). There are numerous provisions for the punishment of particular officers who make illegal exactions or take illegal fees: e.g. sheriffs and their officers (Sheriffs Act 1887), county court bailiffs (County Courts Act 1888), clerks of courts of justice, and gaolers who exact fees from prisoners. A gaoler is also punishable for detaining the corpse of a prisoner as security for debt. The term ” public officer ” is not limited to offices under the crown; and there are old precedents of criminal proceedings for extortion against churchwardens, and against millers and ferrymen who demand tolls in excess of what is customary under their franchise.

The term extortion is also applied to the exaction of money or money’s worth by menaces of personal violence or by threats to accuse of crime or to publish defamatory matter about another person. These offences fall partly under the head of robbery and partly under blackmail, or what in French is termed chantage.

See Russell on Crimes (6th ed., vol. i. p. 423; vol. iii. p. 348).

EXTRACT (from Lat. exlrahere, to draw out), in pharmacy, the name given to preparations formed by evaporating or con- centrating solutions of active principles; tinctures are solutions which have not been subjected to any evaporation. ” Liquid extracts ” are those of a syrupy consistency, and are generally prepared by treating the drug with the solvent (water, alcohol, &c.) and concentrating the solution until it attains the desired consistency. ” Ordinary extracts ” are thick, tenacious and sometimes even dry preparations ; they are obtained by evaporat- ing solutions as obtained above, or the juices expressed from the plants.

/Extraction, in chemical technology, is a process for separating one substance from another by taking advantage of the varying solubility of the components in some chosen solvent. The term ” lixiviation ” is used when water is the solvent. In laboratory practice all the common solvents are employed. With small quan- tities it may suffice to shake the substance with the solvent, the mixture being heated if necessary, filter and distil or otherwise remove the solvent from the distillate. For larger quantities continuous extraction is advisable. This may be carried out in many forms of apparatus; one of the most convenient is the Soxhlet extractor, in which the extract siphons into the flask containing the solvent, and so maintains the quantity of available solvent practically constant. Continuous extraction is generally the

practice in technology. One of the most im- portant applications is in the fat and gelatine industries.

EXTRADITION (Lat. ex, out, and traditio, handing over), the surrender of an alleged criminal for trial by a foreign state where he has taken refuge, to the state against which the alleged offence has been committed. When a person who has committed an offence in one country escapes to another, what is the duty of the latter with regard to him? Should the country of refuge try him in its own courts according to its own laws, or deliver him up to the country whose laws he has broken? To the general question international law gives no certain answer. Some jurists, Grotius among them, incline to hold that a state is bound to give up fugitive criminals, but the majority appear to deny the obligation as a matter of right, and prefer to put it on the ground of comity. And the universal practice of nations is to surrender criminals only in consequence of some special treaty with the country which demands them.

There are two practical difficulties about extradition which

have probably prevented the growth of any uniform rule on the subject. One is the variation in the definitions of crime adopted by different countries. The second is the possibility of the process of extradition being employed to get hold of a person who is wanted by his country, not really for a criminal, but for a political offence. In modern states, and more particularly in England, offences of a political character have always been carefully excluded from the operation of the law of extradition.

1. United Kingdom. — The Extradition Acts 1870-1873 (33 & 34 Vict. cc. 62, and 36 & 37 Vict. c. 60) and the Fugitive Offenders Act 1881 (44 & 45 Vict. c. 69) deal with different branches of the same subject, the recovery and surrender of fugitive criminals. The Extradition Acts apply in the case of countries with which Great Britain has extradition treaties. The Fugitive Offenders Act applies — (1) as between the United Kingdom and any British possession, (2) as between any two British possessions, and (3) as between the United Kingdom or a British possession and certain foreign countries, such as Turkey and China, in which the crown exercises foreign juris- diction.

Conditions of Surrender. — In spite of some earlier authorities it has long been settled that in English law there is no power to surrender fugitive criminals to a foreign country without express statutory authority. Such authority is now given by the Extradition Acts 1870-1873, but only in the case of the offences therein specified, and

with regard to countries with which an arrangement has been entered into, and to which the acts have been applied by order in council. The acts are further to be applied, subject to such ” conditions, exceptions and qualifica- tions as may be deemed expedient ” (s. 2) ; and these conditions, &c, are invariably to be found in the extradition treaty which is set out in the order in council applying the Extradition Acts to a particular country. To support a demand for extradition from Great Britain it is therefore necessary to show that the offence is one of those enumerated in the Extradition Acts, and also in the particular treaty, and that the acts charged amount to the offence according to the laws both of Great Britain and of the state demanding the surrender.

Surrender of Subjects. — A further question arises where a state is called on to surrender one of its own subjects. Some of the treaties, such as those with France and Germany, stipulate that neither contracting party shall surrender its own subjects, and in such cases a British subject cannot be surrendered by his own country. The treaties with Spain, Switzerland and Luxemburg provide for the surrender by Great Britain of her own subjects, but there is no reciprocity. Other treaties, such as those with Austria, Belgium, Russia and the Netherlands, give each party the option of surrendering or refusing to surrender its own subjects in each particular case. Under such treaties British subjects are surrendered unless the secretary of state intervenes to forbid it. Lastly, some treaties, such as that with the United States, contain no restriction of this kind, and the subjects of each power are freely surrendered to the other. Surrender by Great Britain is also subject to the following restrictions contained in s. 3 of the Extradition Act 1870: — (1) that the offence is not of a political character, and the requisi- tion has not been made with a view to try and punish for an offence of a political character; (2) that the prisoner shall not be liable to be tried for any but the specified extradition offences; (3) that he shall not be surrendered until he has been tried and served his sentence for offences committed in Great Britain; and (4) that he shall not be actually given up until fifteen days after his committal for extradition, so as to allow of an applica- tion to the courts.

Political Offences. — The question as to what constitutes a political offence is one of some nicety. It was discussed in In re Castioni (1890, 1 Q.B. 149), where it was held, following the opinion of Mr Justice Stephen in his History of the Criminal Law, that to give an offence a political character it must be ” incidental to and form part of political disturbances.” Extradition was accordingly refused for homicide committed in the course of an armed rising against the constituted authorities. In the more

recent case of In re Meunier (1894, 2 Q.B. 415), an Anarchist was charged with causing two explosions in Parisˆone at the Cafe Very resulting in the death of two persons, and the other at certain barracks. It was not contended that the outrage at the cafe was a political crime, but it. was argued that the explosion at the barracks came within tihe description. The court, however, held that to constitute a political offence there must be two or more parties in the state, each seeking to impose a government of its own choice on the other, which was not the case with regard to Anarchist crimes; The party of anarchy was the enemy of all governments, and its effects were directed primarily against the general body of citizens. The test applied in the earlier case is perhaps the more satisfactory of the two.

With regard to the provision that surrender shall not be granted if the requisition has in fact been made with a view to try and punish for an offence of a political character, it, was decided in the case of Arton (1896, 1 Q.B. 108) that a mere sug- gestion, that after his surrender for a non-political crime, the prisoner would be interrogated on political matters (his alleged complicity in the Panama scandal) , and punished for his refusal to answer, was not enough to bring him within the provision. The court also held that it had no jurisdiction to entertain a suggestion that the request of the French government for his extradition was not made in good faith and in the interests of justice.

Extradition Offences. —The following is a list of crimes in respect of which extradition may be provided for under the Extradition Acts 1870-1873, and the Slave Trade Act 1873. Extradition Act 1870: — (1) Murder; (2) Attempt to murder; (3) Conspiracy to murder; (4) Manslaughter; (5) Counter- feiting and altering money, uttering counterfeit or altered money; (6) Forgery, counterfeiting, and altering and uttering what is forged or counterfeited or altered; (7) Embezzlement and larceny; (8) Obtaining money or goods by false pretences; (9) Crimes by bankrupts against bankruptcy law; (10) Fraud by a bailee, banker, agent, factor, trustee or director, or member or public officer of any company made criminal by any law for the time being in force; (11) Rape; (12) Abduction; (13) Child-stealing; (14) Burglary and housebreaking; (15) Arson; (16) Robbery with violence; (17) Threats by letter or otherwise with intent to extort; (18) Crimes committed at sea: (a) Piracy by the law of nations; (b) Sinking or destroying a vessel at sea, or attempting or conspiring to do

so; (c) Assault on a ship on the high seas, with intent to destroy life or to do grievous bodily harm ; (d) Revolt , or conspiring to revolt, by two or more persons on board a ship on the high seas against the authority of the master; (19) Bribery. Extradition Act 1873 :— (20) Kidnapping and false imprisonment; (21) Perjury and subornation of perjury. This act also extends to indictable offences under 24 & 25 Vict. cc. 96, 97, 98, 99, 100, and amending and substituted acts. Among such offences included in various extradition treaties are the following: — (22) Obtaining valuable securities by false pretences; (23) Receiving any money, valuable security or other property, knowing the same to have been stolen or unlaw- fully obtained; (24) Falsification of accounts (see In re Arton, 1896, 1 Q.B. 509); (25) Malicious injury to property, if such offence be indictable;. (26) Knowingly making, without lawful authority, any instrument, tool or engine adapted and intended for the counterfeiting of coin of the realm; (27) Abandoning children; exppsing or unlawfully detaining them; (28) Any malicious act done with intent to endanger the safety of any person in a railway train; (29) Wounding or inflicting grievous bodily harm; (30) Assault occasioning actual bodily harm; (31) Assaulting a magistrate or peace or public officer; (32) Indecent assault; (33) Unlawful carnal knowledge, or any attempt to have unlawful carnal knowledge, of a girl under age; (34) Bigamy; (35) Administering drugs or using instruments with intent to procure the miscarriage of women; (36) Any indictable offence under the laws for the time being in force in relation to bankruptcy. .S'/iiz'C Trade Act 1873 (36 & 37 Vict. c. 88, s. 27): — (37) Dealing in slaves in such manner as to constitute a criminal offence against the laws of both states.

The United Kingdom has extradition treaties with practically all civilized foreign countries; and. though it is nor practicable to state which of the statutory extradition offences are included in each, it may be said generally that. crimes 1 to 17 inclusive are covered in all, though Rumania has reserved the right to refuse, and Portugal does refuse, to surrender for a crime punish- able with death.

The act of 1873 provides for the surrender of accessories before and after the fact to extradition crimes, and most of the treaties contain a clause by which extradition is to be granted for participation in any of the crimes specified in the treaty, provided that such participation is punishable by the laws of both countries. Several of the treaties also contain clauses, providing for optional surrender in respect of any crime not expressly mentioned for which extradition can be granted by the laws of both countries..

It is further to be noted that the restrictions on surrender in the Extradition Acts apply only to surrenders by Great Britain. Foreign countries may surrender fugitives to Great Britain without any treaty, if they are willing to do so and their law allows of it, and such surrenders have not infrequently been made. But when surrendered for an extradition crime, the prisoner cannot be tried in England for any other crime com- mitted before such surrender, until he has been restored, or has had an opportunity of .returning, to the foreign state from which he was extradited.

Procedure.— To obtain from a foreign country the extradition of a fugitive from the United Kingdom, it is necessary to procure a warrant for his arrest, and to send it, or a certified copy, to the home secretary together with such further evidence as is required by the treaty with the country in question. In most, cases an information or deposition containing evidence which would justify a committal for trial in Great Britain will be required. The home secretary will then communicate through the foreign secretary and the proper diplomatic channels with the foreign authorities, and in case of urgency will ask them by telegraph for a provisional arrest. For the arrest in the United Kingdom of fugitive criminals whose extradition is requested by a foreign state, two procedures are provided in ss. 7 and 8 of the act of 1870: — (1) On a diplomatic requisition supported by the warrant of arrest and documentary evidence, the home secretary, if he thinks the crime is not of a political character, will order the chief magistrate at Bow Street to proceed; and such magistrate will then issue a warrant of arrest on such evidence as would be required if the offence had been committed in the United King dom. (2) More summarily, any magistrate or justice of the peace may issue a provisional warrant of arrest on evidence which would support such a warrant if the crime had been committed within his jurisdiction. In practice a sworn information is re- quired, but this may be based on a telegram from the foreign authorities. The magistrate or justice must then report the issue of the warrant to the home secretary, who may cancel it and discharge the prisoner. When arrested on the provisional warrant, the prisoner will be brought up before a magistrate and remanded to Bow Street, and will then be further remanded until the magistrate at Bow Street is notified that a formal requisition for surrender has been made ; and unless such requisition is made in reasonable time the prisoner is entitled to be discharged. The examination of the prisoner prior to his committal for extradition ordinarily takes place at Bow Street, The magistrate is required to hear evidence that the alleged offence is of a political character or is not an extradition crime. If satisfied in these respects, and if the foreign warrant of arrest is duly authenticated, and

evidence is given which according to English law would justify a committal for trial, if the prisoner has not yet been tried, or would prove a conviction if he has already been convicted, the magistrate will commit him for extradition. Under the Extradition Act, 1 895 the home secretary, if of opinion that removal to Bow Street would be dangerous to the prisoner's life, or prejudicial to his health, may order the case to be taken by a magistrate at the place where the prisoner was apprehended, or then is, and the magistrate may order the

prisoner to be detained in such place. After committal for extra- dition, every prisoner has fifteen days in which to apply for habeas corpus, and after such period, or at the close of the habeas corpus proceedings if they are unsuccessful, the home secretary issues his warrant for surrender, and the prisoner is handed over to the officers of the foreign government.

The Extradition Acts apply to the British colonies, the, governor being substituted for the secretary of state. Their operation may, however, be suspended by order in council, as in the case of Canada, where the colony has passed an Extradition Act of its own (see Statutory Rules and Orders).

Fugitive Offenders Act. — There are no extradition treaties with certain countries in which the crown exercises foreign juris- diction, such as Cyprus, Turkey, Egypt, China, Japan, Corea, Zanzibar, Morocco, Siam, Persia, Somali, &c. In these countries the Fugitive Offenders Act 1881 (44 & 45 Vict. c. 69) has been applied, pursuant to s. 36 of that statute, and the measures for obtaining surrender of a fugitive criminal are the same as in a British colony. The act, however, only applies to persons over whom the crown has jurisdiction in these territories, and generally is expressly restricted to British subjects.

Under this act a fugitive from one part of the king's dominions to another, or to a country where the crown exercises foreign jurisdiction, may be brought back by a procedure analogous to extradition, but applicable only to treason, piracy and offences punishable with twelve months' imprisonment with hard labour or more. The original warrant of arrest must be endorsed by one of several authorities where the offenders happen to be, — in practice by the home secretary in the United Kingdom and by the governor in a colony. Pending the arrival of the original warrant a provisional arrest

may be made, as under the Ex tradition Acts. The fugitive must then be brought up for examination before a local magistrate, who, if the endorsed warrant is duly authenticated, and evidence is produced " which, according to the law administered by the magistrate, raises a strong or probable presumption that the offender committed the offence, and that the act applies to it," may commit him for re- turn. An interval of fifteen days is allowed for habeas corpus pro- ceedings, and (s. 10) the court has a large discretion to discharge the prisoner, or impose terms, if it thinks the case frivolous, or that the return would be unjust or oppressive, or too severe a punishment. The next step is for the home secretary in the United Kingdom, and the governor in a colony, to issue a warrant for the return of the prisoner. He must be removed within a month, in the absence of reasonable cause to the con- trary.. If not prosecuted within six months after arrival, or if acquitted, he is entitled to be sent back free of cost.

In the case of fugitive offenders from one part of the United Kingdom to another, it is enough to get the warrant of arrest backed by a magistrate having jurisdiction in that part of the United Kingdom where the offender happens to be. A warrant issued by a metropolitan police magistrate may be executed, without backing, by a metropolitan police officer any- where, and there are certain other exceptions, but as a rule a warrant cannot be executed without being backed by a local magistrate. (J. E. P. W.)

2. United States. — Foreign extradition is purely an affair of the United States, and not for the individual states themselves. Upon a demand upon the United States for extradition, there is a preliminary examination before a commissioner or judge before there can be a surrender to the foreign government (Revised Statutes, Title LXVI.; 22 Statutes at Large, 215). It is enough to show probable guilt (Ornelas v. Ruiz, 161 United States Reports, 502). An extradition treaty covers crimes previously committed. If a Power, with which the United States have such a treaty, surrenders a fugitive charged with a crime not included in the treaty, he may be tried in the United States for such crime. Inter-state extradition is regulated by act of Con- gress under the Constitution of the United States (Article IV. s. 2; United States Revised Statutes, s. 5278). A surrender may be demanded of one properly charged with an act which con- stitutes a crime under the laws of the demanding state, although

it be no crime in the other state. A party improperly surrendered may be released by writ of habeas corpus, either from a state or United States court (Robb v. Conolly, in U.S. Reports, 624). On his return to the state from which he fled, he is subject. to prosecu- tion for any

crime, though on a foreign extradition the law is other- wise (Lascelles v. Georgia, 148 U.S. Reports, 537). (S. E. B.).

See Sir E. Clarke, Treatise upon the Law of Extradition (4th ed., 1904) ; Birori and Chalmers, Law and Practice 0} Extradition (1903).

EXTRADOS {extra, outside, Fr. dos, back), the architectural term for the outer boundary of the voussoirs of an arch (q.v.).

EXTREME UNCTION, a sacrament of the Roman Catholic Church. In James v. 14 it is ordained that, if any believer is sick, he shall call for the elders of the church; and they shall pray over him, anointing him with oil in the name of the. Lord; and the prayer of faith shall save him that is sick, and the Lord shall raise him up; and if he have committed sins, it shall be forgiven him.

Origen reprobated medical art on the ground that the prcr scription here cited is enough; modern faith-healers and Peculiar People have followed in his wake. The Catholic Church has more wisely left physicians in possession, and elevated the anointing of the sick into a sacrament to be used only in cases of mortal sickness, and even then not to the exclusion of the healing art.

It has been general since the 9th century. The council of Florence a.d. 1439 thus defined it:—

” The fifth sacrament is extreme unction. Its matter is olive oil, blessed by a bishop. It shall not be given except to a sick person whose death is apprehended. He shall be anointed in the following places: the eyes, ears, nostrils, mouth, hands, feet, reins. The form of the sacrament, is this: Through this anointing of thee and through its most pious mercy, be forgiven all thy sins of sight, &c. . . . and so in respect of the other organs. A priest can administer this sacrament. But its effect is to make whole the mind, and, so far as it is expedient, the body as well.”

This sacrament supplements that of penance (viz. remission of post-baptismal sin) in the sense that any guilt unconfessed or left over after normal penances imposed by confessors is purged thereby. It was discussed in the 12th century whether this sacrament is indelible like baptism, or whether it can be repeated ; and the latter view, that of Peter Lombard, prevailed.

It was a popular opinion in’ the middle ages that extreme unction extinguishes all ties and links with this world, so that he who has received it must, if he recovers, renounce the eating of flesh and matrimonial relations. A few peasants of Lombardy still believe that

one who has received extreme unction ought to be left to die, and that sick people may be starved to death through the withholding of food on superstitious grounds. Such opinions, combated by bishops and councils, were due to the influence of the consolamentum of the Cathars (q.v.). In both sacraments the death-bed baptism of an earlier age seems to survive, and they both fulfil a deep-seated need of the human spirit.

Some Gnostics sprinkled the heads of the dying with oil and water to render them invisible to the powers of darkness; but in the East generally, where the need to compete with the Cathar sacrament of Consolatio was less acutely felt, extreme unction is unknown. The Latinizing Armenians adopted it from Rome in the crusading epoch. At an earlier date, however, it was usual to anoint the dead.

In the Roman Church the bishop blesses the oil of the sick used in extreme unctions on Holy Thursday at the Chrismal Mass, 1 using the following prayer of the sacramentaries of Gelasius and Hadrian: —

” Send forth, we pray Thee, O Lord, Thy holy spirit, the Paraclete from Heaven, into this fatness of oil, which Thou hast deigned to produce from the green wood for refreshment of mind and body ; and through Thy holy benediction may it be for all that anoint, taste, touch, a protection of mind and body, of soul and spirit, unto the easing away of all pain, all weakness, all sickness of mind and body ; wherefore Thou hast anointed priest, kings and prophets and martyrs with thy chrism, perfected by Thee, O Lord, blessed and abiding in our bowels in the name of our Lord Jesus Christ.” _

See L. Duchesne, Origines du Culte Chretien (Paris, 1898). .

(F. C.C.)

1 The oil left over from the year before is burnt.

9°

EYBESCHttTZ, JONATHAN (1690-1764), German rabbi, was from 1750 rabbi in Altona. He was a man of erudition, but he owed his fame chiefly to his personality. Few men of the period so profoundly impressed their mark on Jewish life. He became specially notorious because of a curious controversy that arose concerning the amulets which Eybeschutz was sus- pected of issuing. These amulets recognized the Messianic claims of Sabbatai Sebi (q.v.), and a famous rabbinic con- temporary of Eybeschutz, Jacob Emden, boldly accused him of heresy. The controversy was a momentous incident in the

Jewish life of the period, and though there is insufficient evidence against Eybeschutz, Emden may be credited with having crushed the lingering belief in Sabbatai current even in some orthodox circles. (I. A.)

EYCK, VAN, the name of a family of Flemish painters in whose works the rise and mature development of art in western Flanders are represented. Though bred in the valley of the Meuse, they finally established their professional domicile in Ghent and in Bruges; and there, by skill and inventive genius, they changed the traditional habits of the earlier schools, remodelled the primitive forms of Flemish design, and introduced a complete revolution into the technical methods of execution familiar to their countrymen.

1. Hubert (Huybrecht) van Eyck (? 1366-1426) was the oldest and most remarkable of this race of artists. The date of his birth and the records of his progress are lost amidst the ruins of the earlier civilization of the valley of the Meuse. He was born about 1366, at Maeseyck, under the shelter or protection of a Benedictine convent, in which art and letters had been cultivated from the beginning of the 8th century. But after a long series of wars — when the country became insecure, and the schools which had flourished in the towns decayed — he wandered to Flanders, and there for the first time gained a name. As court painter to the hereditary prince of Burgundy, and as client to one of the richest of the Ghent patricians, Hubert is celebrated. Here, in middle age, between 1410 and 1420, he signalized himself as the inventor of a new method of painting. Here he lived in the pay of Philip of Charolais till 1421. Here he painted pictures for the corporation, whose chief magistrates honoured him with a state visit in 1424. His principal masterpiece, the ” Worship of the Lamb,” commissioned by Jodocus Vijdts, lord of Pamele, is the noblest creation of the Flemish school, a piece of which we possess all the parts dispersed from St Bavon in Ghent to the galleries of Brussels and Berlin, — one upon which Hubert laboured till he died, leaving it to be completed by his brother. Almost unique as an illustration of contemporary feeling for Christian art, this great composition can only be matched by the ” Fount of Salvation,” in the museum of Madrid. It represents, on numerous panels, Christ on the judgment seat, with the Virgin and St John the Baptist at His sides, hearing the songs of the angels, and contemplated by Adam and Eve, and, beneath him, the Lamb shedding His blood in the presence of angels, apostles, prophets, martyrs, knights and hermits. On the outer sides of the panels are the Virgin and the angel annunciate, the sibyls and prophets who foretold the coming of the Lord, and the donors in prayer at the feet of the Baptist and Evangelist. After this great work was finished it was

placed, in 1432, on an altar in St Bavon of Ghent, with an inscription on the framework describing Hubert as ” maior quo nemo repertus,” and setting forth, in colours as imperishable as the picture itself, that Hubert began and John afterwards brought it to perfection. John van Eyck certainly wished to guard against an error which ill-informed posterity showed itself but too prone to foster, the error that he alone had composed and carried out an altarpiece executed jointly by Hubert and himself. His contemporaries may be credited with full know- ledge of the truth in this respect, and the facts were equally well known to the duke of Burgundy or the chiefs of the corpora- tion of Bruges, who visited the painter’s house in state in 1432, and the members of the chamber of rhetoric at Ghent, who reproduced the Agnus Dei as a tableau vivanl in 1456. Yet a later generation of Flemings forgot the claims of Hubert,

and gave the honours that were his due to his brother John exclusively.

The solemn grandeur of church art in the 15th century never found, out of Italy, a nobler exponent than Hubert van Eyck. His representation of Christ as the judge, between the Virgin and St John, affords a fine display of realistic truth, combined with pure drawing and gorgeous colour, and a happy union of earnest- ness and simplicity with the deepest religious feeling. In contrast with earlier productions of the Flemish school, it shows a singular depth of tone and great richness of detail. Finished with sur- prising skill, it is executed with the new oil medium, of which Hubert shared the invention with his brother, but of which no rival artists at the time possessed the secret, — a medium which consists of subtle mixtures of oil and varnish applied to the moistening of pigments after a fashion, only kept secret for a time from gildsmen of neighbouring cities, but unrevealed to the Italians till near the close of the 1 5th century. When Hubert died on the 18th of September 1426 he was buried in the chapel on the altar of which his masterpiece was placed. According to a tradition as old as the 16th century, his arm was preserved as a relic in a casket above the portal of St Bavon of Ghent. During a life of much apparent activity and surprising successes he taught the elements of his art to his brother John, who sur- vived him.

2. John (Jan) van Eyck (? 1385-1440). The date of his birth is not more accurately known than that of his elder brother, but he was born much later than Hubert, who took charge of him and made him his ” disciple.” Under this tuition John learnt to draw and paint, and

mastered the properties of colours from Pliny. Later on, Hubert admitted him into partnership, and both were made court painters to Philip of Charolais. After the breaking up of the prince's household in 1421, John became his own master, left the workshop of Hubert, and took an engagement as painter to John of Bavaria, at that time resident at the Hague as count of Holland. From the Hague he returned in 1424 to take service with Philip, now duke of Burgundy, at a salary of 100 livres per annum, and from that time till his death John van Eyck remained the faithful servant of his prince, who never treated him otherwise than graciously. He was frequently employed in missions of trust; and following the fortunes of a chief who was always in the saddle, he appears for a time to have been in ceaseless motion, receiving extra pay for secret services at Leiden, drawing his salary at Bruges, yet settled in a fixed abode at Lille. In 1428 he joined the embassy sent by Philip the Good to Lisbon to beg the hand of Isabella of Portugal. His portrait of the bride fixed the duke's choice. After his return he settled finally at Bruges, where he married, and his wife bore him a daughter, known in after years as a nun in the convent of Maeseyck. At the christening of this child the duke was sponsor, and this was but one, of many distinctions by which Philip the Good rewarded his painter's merits. Numer- ous altarpieces and portraits now give proof of van Eyck's extensive practice. As finished works of art and models of conscientious labour they are all worthy of the name they bear, though not of equal excellence, none being better than those which were completed about 1432. Of an earlier period, a ■" Consecration of Thomas a Becket " has been preserved, and may now be seen at Chatsworth, bearing the date of 142 1; no doubt this picture would give a fair representation of van Eyck's talents at the moment when he started as an independent master, but that time and accidents of omission and commission have altered its state to such an extent that no conclusive opinion can be formed respecting it. The panels of the " Worship oi the Lamb " were completed nine years later. They show that John van Eyck was quite able to work in the spirit of his brother. He had not only the lines of Hubert's compositions to guide him, he had also those parts to look at and to study which Hubert had finished. He continued the work with almost as much vigour as his master. His own experience had been increased by travel, and he had seen the finest varieties of landscape in Portugal and the. Spanish provinces. This enabled him to transfer to his pictures the charming scenery of lands

more sunny than those of Flanders, and this he did with accuracy and not without poetic feeling. We may ascribe much of the success which attended his efforts to complete the altarpiece of Ghent to the cleverness with which he [reproduced the varied aspect of changing scenery, reminiscent here of the orange groves of Cintra, there of the bluffs and crags of his native valley. In all these backgrounds, though we miss the scientific rules of perspective with which the van Eycks were not familiar, we find such delicate perceptions of gradations in tone, such atmosphere, yet such minuteness and perfection of finish, that our admiration never flags. Nor is the colour less brilliant or the touch less firm than in Hubert's panels. John only differs from his brother in being less masculine and less sternly religious. He excels in two splendid likenesses of Jodocus Vijdts and his wife Catherine Burluuts. The same vigorous style and coloured key of harmony characterizes the small " Virgin and Child " of 1432 at Ince, and the " Madonna," probably of the same date, at the Louvre, executed for Rollin, chancellor of Burgundy. Contemporary with these, the male portraits in the National Gallery, and the " Man with the Pinks," in the BerlinMuseum (1432-1434), show no relaxation of power; but later creations display no further progress, unless we accept as progress a more searching delicacy of finish, counterbalanced by an excessive softness of rounding in flesh contours. An unfaltering minute- ness of hand and great tenderness of treatment may be found, combined with angularity of drapery and some awkwardness of attitude in the full length portrait couple (John Arnolfini and his wife) at the National Gallery (1434), in which a rare insight into the detail of animal nature is revealed in a study of a terrier dog. A ' Madonna with Saints," at Dresden, equally soft and minute, charms us by the mastery with which an architectural background is put in. The bold and energetic striving of earlier days, the strong bright tone, are not equalled by the soft blending and tender tints of the later ones. Sometimes a crude ruddi- ness in flesh strikes us as a growing defect, an instance of which is the picture in the museum of Bruges, in which Canon van der Paelen is represented kneeling before the Virgin under the protection of St George (1434). From first to last van Eyck retains his ability in portraiture. Fine specimens are the two male likenesses in the gallery of Vienna (1436), and a female, the master's wife, in the gallery of Bruges (1439). His death in 1440/41 at Bruges is authentically recorded. He was buried in St Donat. Like many great artists he formed but few pupils. Hubert's disciple, Jodocus of Ghent, hardly does honour to his master's teaching, and only acquires importance after he has thrown off some of the peculiarities of Flemish teaching. Petrus Cristus, who was taught by John, remains immeasurably behind him in everything that relates to art. But if the personal

influence of the van Eycks was small, that of their works was immense, and it is not too much to say that their example, taken in conjunction with that of van der Weyden, determined the current and practice of painting throughout the whole of Europe north of the Alps for nearly a century.

See also Waagen, Hubert and Johann van Eyck (1822); Voll> Werke des Jan van Eyck (1900) ; L. Kammerer on the two families in Knackfuss's Kiinstler-Monographien (1898). (J. A. C.)

EYE, a market-town and municipal borough in the Eye parliamentary division of Suffolk; England; 945 m. N.E. from London by the Great Eastern railway, the terminus of a branch from the Ipswich-Norwich line. Pop. (1901) 2004. The church of St Peter and St Paul is mainly of Perpendicular flint work, with Early English portions and a fine Perpendicular rood screen. It was formerly attached to a Benedictine priory. Slight fragments of a Norman castle crown a mound of probably earlier construction. There are a town hall, corn exchange, and grammar school founded in 1566. Brewing is the chief industry. The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 4410 acres.

Eye (Heya, Aye) was once surrounded by a stream, from which it is said to have derived its name. Leland says it was situated in a marsh and had formerly been accessible by river vessels from Cromer, though the river was then only navigable

to Burston, 12 m. from Eye. From the discovery of numerous bones and Roman urns and coins it has been thought that the place was once the cemetery of a Roman camp. William I. gave the lordship of Eye to Robert Malet, a Norman, who built a castle and a Benedictine monastery which was at first subordinate to the abbey of Bernay in Normandy. Eye is a borough by prescription. In 1203 King John granted to the townsmen a charter freeing them from various tolls and customs and from the jurisdiction of the shire and hundred courts. Later charters were granted by Elizabeth in 1558 and 1574, by James I. in 1604, and by William III. in 1697. In 1574 the borough was newly incorporated under two bailiffs, ten chief and twenty-four inferior burgesses, and an annual fair on Whit-Monday and a market on Saturday were granted. Two members were returned to each parliament from 1571 till 1832, when the Reform Act reduced the membership to one. By the Redistribution Act of 1885 the representation was merged in the Eye division of the county. The making of pillow-lace was formerly carried on extensively, but practically ceased with the introduction of machinery.

EYE (0. Eng. edge, Ger. Auge; derived from an Indo-European root also seen in Lat. oc-ulus, the organ of vision (q.v.).

Anatomy. — The eye consists of the eyeball, which is the true organ of sight, as well as of certain muscles which move it, and of the lachrymal apparatus which keeps the front of it in a moist condition. The eyeball is contained in the front of the orbit and is a sphere of about an inch (24 mm.) in diameter. From the front of this a segment of a lesser sphere projects slightly and forms the cornea (fig. 1, co). There are three coats

h

R Sc

Fig. 1. — Diagrammatic Section

through the Eyeball.

cj,

Conjunctiva.

L,

Lens.

CO,

Cornea.

V,

Vitreous body.

Sc,

Sclerotic.

z,

Zonule of Zinn, the ciliary

ch,

Choroid.

process being removed to

pc,

Ciliary processes.

show it.

mc,

Ciliary muscle.

P,

Canal of Petit.

0,

Optic nerve.

m,

Yellow spot.

R,

Retina.

The dotted line behind the

I,

Iris.

[humour.

cornea represents its pos-

aq. Anterior chamber of aqueous

terior epithelium.

to the eyeball, an external (protective), a middle (vascular), and an internal (sensory). There are also three refracting media, the aqueous humour, the lens and the vitreous humour or body.

The protective coat consists of the sclerotic in the posterior five-sixths and the cornea in the anterior sixth. The sclerotic (fig. 1, Sc) is a firm fibrous coat, forming the ” white of the eye,” which posteriorly is pierced by the optic nerve and blends with the sheath of that nerve,

while anteriorly it is continued into the cornea at the corneoscleral junction. At this point a small canal, known as the canal of Schlemm, runs round the margin of the cornea in the substance of the sclerotic (see fig. 1). Between the sclerotic and the subjacent choroid coat is a lymph space traversed by some loose pigmented connective tissue, — the

lamina fusca. The cornea is quite continuous with the sclerotic but has a greater convexity. Under the microscope it is seen to consist of five layers. Most anteriorly there is a layer of stratified epithelium, then an anterior elastic layer, then the substantia propria of the cornea which is fibrous with spaces in which the stellate corneal corpuscles lie, while behind this is the posterior elastic layer and then a delicate layer of endothelium. The transparency of the cornea is due to the fact that all these structures have the same refractive index.

The middle or vascular coat of the eye consists of the choroid, the ciliary processes and the iris. The choroid (fig. i , ch) does not come quite as far forward as the corneo-scleral junction: it is composed of numerous blood-vessels and pigment cells bound together by connective tissue and, superficially, is lined by a delicate layer of pigmented connective tissue called the lamina suprachoroidea in contact with the already-mentioned peri- choroidal lymph space. On the deep surface of the choroid is a structureless basal lamina.

The ciliary processes are some seventy triangular ridges, radially arranged, with their apices pointing backward (fig. i, pc), while their bases are level with the corneo-scleral junction. They are as vascular as the rest of the choroid, and contain in their interior the ciliary muscle, which consists of radiating and circular fibres. The radiating fibres (fig. i, mc) rise, close to the canal of Schlemm, from the margin of the posterior elastic lamina of the cornea, and pass backward and outward into the ciliary processes and anterior part of the choroid, which they pujl forward when they contract. The circular fibres lie just internal to these and are few or wanting in short-sighted people.

The iris (fig. i, /) is the coloured diaphragm of the eye, the centre of which is pierced to form the pupil; it is composed of a connective tissue stroma containing blood-vessels, pigment cells and muscle fibres. In front of it is a reflection of the same layer of eadothelium which lines the back of the cornea, while behind both it and the ciliary processes is a double layer of epithelium, deeply pigmented, which really belongs to the retina. The pig- ment in the substance of the iris is variously coloured in different individuals, and is often deposited after birth, so that, in newly- born European children, the colour of the eyes is of ten slate-blue owing to the black pigment at the back of the iris showing through. White, yellow or reddish-brown pigment is deposited later in the substance of the iris, causing the appearance, with the black pigment behind, of grey, hazel or brown eyes. In blue-eyed people very little interstitial pigment is formed, while in Albinos the posterior pigment is also absent and the blood-

vessels give the pink coloration. The muscle fibres of the iris are described as circular and radiating, though it is still uncertain whether the latter are really muscular rather than elastic. On to the front of the iris, at its margin, the posterior layer of the posterior elastic lamina is continued as a series of ridges called the ligamentum pectinatum iridis, while between these ridges are depressions known as the spaces of Fontana.

The inner or sensory layer of the wall of the eyeball is the retina; it is a delicate transparent membrane which becomes thinner as the front of the eye is approached. A short distance behind the ciliary processes the nervous part of it stops and forms a scalloped border called the ora serrata, but the pigmented layer is continued on behind the ciliary processes and iris, as has been mentioned, and is known as the pars ciliaris retinae and pars iridica retinae. Under the microscope the posterior part of the retina is seen to consist of eight layers. In its passage from, the lens and vitreous the light reaches these layers in the following order: — (i) Layer of nerve fibres; (2) Layer of ganglion cells; (3) Inner molecular layer; (4) Inner nuclear layer; (5) Outer molecular layer; (6) Outer nuclear layer; (7) Layer of rods and cones; (8) Pigmented layer.

The layer of nerve fibres (fig. 2, 2) is composed of the axis-cylinders only of the fibres of the optic nerve which pierce the sclerotic, choroid and all the succeeding layers of the retina to radiate over its surface.

The ganglionic layer (fig. 2, 3) consists of a single stratum of large ganglion cells, each of which is continuous with a fibre of the preceding layer Which forms its axon. Each also gives off a number of finer processes (dendrites) which arborize in the next layer.

The inner molecular layer (fig. 2,

The inner nuclear layer (fig. 2, 5) contains three different kinds of cells, but the most important and numerous are large bipolar cells, which send one process into the inner molecular layer, as has just been mentioned, and the other into the outer molecular layer, where they arborize with the ends of the rod and cone fibres.

The outer molecular layer (fig. 2, 6) is very narrow and is formed by the arborizations just described; The outer nuclear layer (fig. 2, 7), like the inner, consists of oval cells, which are of two kinds.. The rod granules are transversely striped, and are connected ex- ternally with the rods, while internally processes pass into the outer molecular layer to end in a knob around which the arborizations of the inner nuclear

cells lie. The cone granules are situated more externally, and are in close contact with the cones ; internally their processes form a foot-plate in the outer molecular layer from which arborizations extend.

The layer of rods and cones (fig. 2, p) contains these structures, the rods being more numerous than the cones. The rods are spindle-shaped bodies, of which the inner segment is thicker than the outer. The cones are thicker and shorter than the rods, and resemble Indian clubs, the handles of which are directed outward and are transversely striped. In the outer part of the rods the visual purple or rhodopsin is found.

The pigmented layer consists of a single layer of hexagonal cells containing pigment, which is capable of moving towards the rods and cones when the eye is' exposed to light and away from them in the dark.

Supporting the delicate nervous structures of the retina are a series of connective tissue rods known as the fibres of Mutter (fig. 2, Ct) ; these run through the thickness of the retina at

Fig. 2. — Diagrammatic section through the retina to show th& several layers, which are numbered as in the text. Ct, The radial fibres of the supporting connective tissue.

right angles to its surface, and are joined together on the inner side of the layer of nerve fibres to form the inner limiting mem-' brane.. More externally, at the bases of the rods and cones, they unite again to form the outer limiting membrane.

When the retina is looked at with the naked eye from in front two small marks are seen on it. One of these is an oval depression about 3 mm. across, which, owing to the presence of pigment, is of a yellow colour and is known as the yellow spot (macula lutea); it is situated directly in. the antero-posterior axis of the eyeball, and at its margin the nerve fibre layer is thinned and the ganglionic layer thickened. At its centre, however, both these layers are wanting, and in the layer of rods and cones only the cones are present. This central part is called the fovea centralis and is the point of acutest vision. The second mark is situated a little below and to the inner side of the yellow spot; it is a circular disk with raised margins and a depressed centre and is called the optic disk; in structure it is a complete contrast to the yellow spot, for all the layers except that of the nerve fibres are wanting, and consequently, as light cannot be appreciated here, it is known as the " blind spot." It marks the point of entry of the optic nerve, and at its

centre the retinal artery appears and divides into branches. An appreciation of the condition of the optic disk is one of the chief objects of the ophthalmoscope.

The crystalline lens (fig. 1, L) with its ligament separates the aqueous from the vitreous chamber of the eye; it is a biconvex lens the posterior surface of which is more curved than the an- terior. Radiating from the anteriorjand posterior poles are three faint lines forming a Y, the posterior Y being erect and the anterior inverted. Running from these figures are a series of lamellae, like the layers of an onion, each of which is made up of a number of fibrils called the lens fibres. On the anterior surface of the lens is a layer of epithelial cells, which, towards the margin or equator, gradually elongate into lens fibres. The whole lens is enclosed in an elastic structureless membrane, and, like the

cornea, its transparency is due to the fact that all its constituents have the same refractive index.

The ligament of the lens is the thickened anterior part of the hyaloid membrane which surrounds the vitreous body; it is closely connected to the iris at the ora serrata, and then splits into two layers, of which the anterior is the thicker and blends with the anterior part of. the elastic capsule of the lens, so that, when its attachment to the ora serrata is drawn forward by the ciliary muscle, the lens, by its own elasticity, increases its con- vexity. Between the anterior and posterior splitting of the hyaloid membrane is a circular lymph space surrounding the margin of the lens known as the canal of Petit (fig. i, p).

The aqueous humour (fig. i, aq) is contained between the lens and its ligament posteriorly and the cornea anteriorly. It is practically a very weak solution of common salt (chloride of sodium 1-4%). The space containing it is imperfectly divided into a large anterior and a small posterior chamber by a per- forated diaphragm — -the iris.

The vitreous body or humour is a jelly which fills all the contents of – the eyeball behind the lens. It is surrounded by the hyaloid membrane, already noticed, and anteriorly is concave for the reception of the lens.

From the centre of the optic disk to the posterior pole of the lens a lymph canal formed by a tube of the hyaloid membrane stretches through the centre of the vitreous body; this is the canal yf Stilling, which in the embryo transmitted the hyaloid artery to the lens. The composition of the vitreous is practically the same as that of the aqueous humour.

The arteries of the eyeball are all derived from the ophthalmic branch of the internal carotid, and consist of the retinal which ‘enters the optic nerve far back in the orbit, the two long ciliaries, which run forward in the choroid and join the anterior ciliaries, from muscular branches of the ophthalmic, in the circulus iridis major round the margin of the iris, and the six to twelve short ciliaries which pierce the sclerotic round the optic nerve and supply the choroid and ciliary processes.

The veins of the eyeball emerge as four or five trunks rather behind the equator; these are called from their appearance venae vorticosae, and open into the superior ophthalmic vein. In addition to these there is a retinal vein which accompanies its artery.

Accessory Structures of the Eye. — The eyelids are composed of the following structures from in front backward: (i) Skin; (2) Superficial fascia; (3) Orbicularis palpebrarum muscle; (4) Tarsal plates of fibrous tissue attached to the orbital margin by the superior and inferior palpebral ligaments, and, at the junction of the eyelids, by the external and internal tarsal ligaments of which the latter is also known as the tendo oculi; (5) Meibomian glands, which are large modified sebaceous glands lubricating the edges of the lids and preventing them adhering, and Glands of Moll, large sweat glands which, when inflamed, cause a “sty “; (6) the conjunctiva, a layer of mucous membrane which lines the back of the eyelids and is reflected on to the front of the globe, the reflection forming the fornix: on the front of the cornea the conjunctiva is continuous with the layer of epithelial cells already mentioned.

The lachrymal gland is found in the upper and outer part of the front of the orbit. It is about the size of an almond and has an upper (orbital) and a lower (palpebral) part. Its six to twelve ducts open on to the superior fornix of the conjunctiva.

The lachrymal canals (canaliculi) (see fig. 3, 2 and 3) are superior and inferior, and open by minute orifices (puncta) on to the free margins of the two eyelids near their inner point of junction. They collect the tears, secreted by the lachrymal gland, which thus pass right across

the front of the eyeball, con- tinually moistening the conjunctiva. The two ducts are bent round a small pink tubercle called the caruncula lachrymalis (fig. 3, 4) at the inner angle of the eyelids, and open into the lachrymal sac (fig. 3, 5), which lies in a groove in the lachrymal bone. The sac is continued down into the nasal duct (fig. 3, 6'), which is about \ inch long and opens into the inferior meatus of the nose, its opening being guarded by a valve.

Fig. 3.-

The orbit contains seven muscles, six of which rise close to the optic foramen. The levator palpebrae superioris is the highest, and passes forward to the superior tarsal plate and fornix of the conjunctiva. The superior and inferior recti are inserted into the upper and lower sur- faces of the eyeball re- spectively; they make the eye look inward as well as up or down. The external and in- ternal recti are inserted into the sides of the eyeball and make it look outward or in- ' ward. The superior oblique runs forward to a pulley in the inner and front part of the roof of the orbit, round which it turns to be inserted into the outer and back part of the 1 , Orbicular muscle, eyeball. It turns the 2, Lachrymal canal. glance downward and # > Punctum. outward. The inferior •*' Caruncula. .

oblique rises from the inner and front part of the floor of the orbit, and is also inserted into the outer and back part of the eyeball. It directs the glance upward and outward. Of all these muscles the superior oblique is supplied by the fourth cranial nerve, the external rectus by the sixth and the rest by the third.

The posterior part of the eyeball and the anterior parts of the muscles are enveloped in a lymph space, known as the capsule of Tenon, which assists their movements.

Embryology. — As is pointed out in the article Brain, the optic vesicles grow out from the fore-brain, and the part nearest the brain becomes constricted and elongated to form the optic stalk (see figs. 4 and 5,./3). At the same time the ectoderm covering the side of the head thickens and becomes invaginated to form the lens vesicle (see figs. 4 and 5, 5), which later loses its connexion with the surface and approaches the optic vesicle, causing that structure to become cupped for its reception, so that what was the optic vesicle becomes the optic cup and consists of an external and an internal layer of cells (fig. 6 /3 and 8). Of these the outer cells become the retinal pigment, while the inner form the other layers of the retina. The invagination of the optic cUp extends, as the choroidal fissure (not shown in the

-Lachrymal Canals and Duct.

5, Lachrymal sac.

6, Lachrymal duct.

7, Angular artery.

Fig. 4. Diagram of Developing

Eye (1st stage). a, Forebrain. ff, Optic vesicle. 7, Superficial ectoderm. S, Thickening for lens.

Fig. 5. Diagram of Developing

Eye (2nd stage). 18, Optic cup. 5, Invagination of lens. Other letters as In fig. 4.

diagrams), along the lower and back part of the optic stalk, and into this slit sinks some of the surrounding mesoderm to form the vitreous body and the hyaloid arteries, one of which persists. 1 When this has happened the fissure closes up. The anterior epithelium of the lens vesicle remains, but from the posterior the lens fibres are developed and these gradually fill up the cavity. The superficial layer of head ectoderm, from which the lens has been invaginated and separated, becomes the anterior

1 Some embryologists regard the vitreous body as formed from the ectoderm (see Quain's Anatomy, vol. i., 1908).

epithelium of the cornea (fig. 6, e), and between it and the lens the mesoderm sinks in to form the cornea, iris and anterior chamber of the eye, while surrounding the optic cup the meso- derm forms the sclerotic and choroid ‘ coats (fig. 7,7; and f). Up to the seventh month the pupil is closed by the mem- brana papillaris, derived from the cap- sule of the lens which is part of the mesodermal ingrowth through the choroidal fissure already mentioned. The hyaloid artery remains, as a pro- longation of the retinal artery to the lens, until just before birth, but after Diagram of Developing tnat its sheath forms the canal of Eye (3rd stage). Stilling. Most of the fibres of the S, Solid lens. optic nerve

are centripetal and begin

t, Corneal epithelium. as the axons of the gang ii on i c ce U s of

Other letters as in ., , . , t. .. •

the retina; a few, however, are centri- fugal and come from the nerve cells in the brain.

The eyelids are developed as ecto- dermal folds, which blend with one another about the third month and separate again before birth in Man (fig. 7, k). The lachrymal sac and duct are formed from solid ectoder-

Fig. 6.

figs. 4 and 5.

Fig. 7.

Diagram of Developing – a _ a i: 7p j Eye (4th stage). canallzecl – The mesodermal tissues are dotted. Choroid and Iris.

mal thickenings which later become

It will thus be seen that the optic nerve and retina are formed from the brain ectoderm; the lens, anterior epi-

0, Vitreous 3 ˆ thelium of the cornea > skin of the e y elids >

«,' Aqueous. conjunctiva and lachrymal apparatus

k, Eyelids. from the superficial ectoderm; while the

sclerotic, choroid, vitreous and aqueous humours as well as the iris and cornea are derived from the mesoderm.

See Human Embryology, by C. S. Minot (New York); Quain's Anatomy, vol. i. (1908) ; " Entwickelung dcs Auges der Wirbel- tiere," by A. Froriep, in Handbuch der vergleichenden und experi- mentellen Entwickelungslehre der Wirbeltiere (O. Hertwig, Jena,

1905)-

Comparative Anatomy. — The Acrania, as represented by Amphioxus (the lancelet), have a patch of pigment in the fore part of the brain which is regarded as the remains of a degenerated eye. In the Cyclostomata the hag (Myxine) and larval lamprey (Ammocoetes)

have ill-developed eyes lying beneath the skin and devoid of lens, iris, cornea and sclerotic as well as eye muscles. In the adult lamprey (Petromyzon) these structures are developed at the metamorphosis, and the skin becomes transparent, render- ing sight possible. Ocular muscles are developed, but, unlike most vertebrates, the inferior rectus is supplied by the sixth nerve while all the others are supplied by the third. In all vertebrates the retina consists of a layer of senso-neural cells, the rods and cones, separated from the light by the other layers which together represent the optic ganglia of the invertebrates; in the latter animals, however, the senso-neural cells are nearer the light than the ganglia.

In fishes the eyeball is flattened in front, but the flat cornea is cornpensated by a spherical lens, which, unlike that of other .vertebrates, is adapted for near vision when at rest. The iris in some bony fishes (Teleostei) is not contractile. In the Teleostei, too, there is a process of the choroid which projects into the vitreous chamber and runs forward to the lens; it is known as the processus falciformis, and, besides nourishing the lens, is concerned in accommodation. This specialized group of fishes is also remarkable for the possession of a so-called choroid gland, which is really a rete mirabile (see Arteries) between the choroid and sclerotic. The sclerotic in fishes is usually chondrified and sometimes calcified or ossified. In the retina the rods and cones are about equal in number, and the cones are very large. In the cartilaginous fishes (Elasmobranchs)

there is a silvery layer, called the tapetum lucidum, on the retinal surface of the choroid.

In the Amphibia the cornea is more convex than in the fish, but the lens is circular and the sclerotic often chondrified. There is no processus falcifcrmis or tapetum lucidum, but the class is interesting in that it shows the first rudiments of the ciliary muscle, although accommodation is brought about by shifting the lens. In the retina the rods outnumber the cones and these latter are smaller than in any other animals. In some Amphibians coloured oil globules are found in connexion with the cones, and sometimes two cones are joined, forming double or twin cones.

In Reptilia the eye is spherical and its anterior part is often protected by bony plates in the sclerotic (Lacertilia and Chelonia) . The ciliary muscle is striated, and in most reptiles accommodation is effected by relaxing the ciliary ligament as in higher vertebrates, though in the snakes (Ophidia) the lens is shifted as it is in the lower forms. Many lizards have a vascular projection of the choroid into the vitreous,

foreshadowing the pecten of birds and homologous with the processus falciformis of ‘fishes. In the retina the rods are scarce or absent.

In birds the eye is tubular, especially in nocturnal and raptorial forms: this is due to a lengthening of the ciliary region, which is always protected by bony plates in the sclerotic. The pecten, already mentioned in lizards, is a pleated vascular projection from the optic disk towards the lens which in some cases it reaches. In Apteryx this structure disappears. In the retina the cones outnumber the rods, but are not as numerous as in the reptiles. The ciliary muscle is of the striped variety.

In the Mammalia the eye is largely enclosed in the orbit, and bony plates in the sclerotic are only found in the monotremes. The cornea is convex except in aquatic mammals, in which it is flattened. The lens is biconvex in diurnal mammals, but in nocturnal and aquatic it is spherical. There is no pecten, but the numerous hyaloid arteries which are found in the embryo represent it. The iris usually has a circular pupil, but in some ungulates and kangaroos it is a transverse slit. In the Cetacea this transverse opening is kidney-shaped, the hilum of the kidney being above. In many carnivores, especially nocturnal ones, the slit is vertical, and this form of opening seems adapted to a feeble light, for it is found in the owl, among birds. The tapetum lucidum is found in Ungulata, Cetacea and Carnivora. The ciliary muscle is unstriped. In the retina the rods are more numerous than the cones, while the macula lutea only appears in the Primates in connexion with binocular vision.

Among the accessory structures of the eye the retractor bulbi muscle is found in amphibians, reptiles, birds and many mam- mals; its nerve supply shows that it is probably a derivative of the external or posterior rectus. The nictitating membrane or third eyelid is well-developed in amphibians, reptiles, birds and some few sharks; it is less marked in mammals, and in Man is only represented by the little plica semilunaris. When functional it is drawn across the eye by special muscles derived from the retractor bulbi, called the bursalis and pyramidalis. In connexion with the nictitating membrane the Harderian gland is developed, while the lachrymal gland secretes fluid for the other eyelids to spread over the conjunctiva. These two glands are specialized parts of a row of glands which in the Urodela (tailed amphibians) are situated along the lower eyelid; the outer or posterior part of this row becomes the lachrymal gland, which in higher vertebrates shifts from the lower to the upper eyelid, while the inner or anterior part becomes the Harderian gland. Below the amphibians glands are not necessary, as the water keeps the eye moist.

The lachrymal duct first appears in the tailed amphibians; in snakes and gecko lizards, however, it opens into the mouth.

For literature up to 1900 see R. Wiedersheim's VergleichenOe Anatomie der Wirbeltiere (Jena, 1902). Later literature is noticed in the catalogue of the Physiological Series of the R. College of Surgeons of England Museum, vol. iii. (London, 1906). (F. G. P.)

Eye Diseases. — The specially important diseases of the eye are those which temporarily or permanently interfere with

sight. In considering the pathology, of the eye it may be re- membered that (i) it is a double organ, while (2) either eye may have its own trouble.

1. The two eyes act together, under normal conditions, for all practical purposes exactly as if there were but one eye placed in the middle of the face. All impressions made upon either retina, to the one side of a vertical line through the centre, the fovea centralis, before giving rise to conscious perception cause a stimulation of the same area in the brain. Impressions formed simultaneously, for instance, on the right side of the right retina and on corresponding areas of the right-side of the left retina, are conveyed to the same spots in the right occipital lobe of the brain. Pathological processes, therefore, which are localized in the right or left occipital lobes, or along any part of the course of the fibres which pass from the right or left optic tracts to these " visual centres," cause defects in function of the right or left halves of the two retinae. Hemianopia, or half- blindness, arising from these pathological changes, is of very varying degrees of severity, according to the nature and extent of the particular lesion. The blind areas in the two fields of vision, corresponding to the outward projection of the paralysed retinal areas, are always symmetrical both in shape and degree. The central lesion may for instance be very small, but at the same time destructive to the nerve tissue. This will be revealed as a sector-shaped or insular symmetrical complete blindness in the fields of vision to the opposite side. Or a large central area, or an area comprising many or all of the nerve fibres which pass to the visual centre on one side, may be involved in a lesion which causes impairment of function, but no actual destruction of the nerve tissue.

There is thus caused a symmetrical weaken- ing of vision {amblyopia) in the opposite fields. In such cases the colour vision is so much more evidently affected than the sense of form that the condition has been called hemiachroma- topsia or half-colour blindness. Hemianopia may be caused by haemorrhage, by embolism, by tumour growth which either directly involves the visual nerve elements or affects them by compression and by inflammation. Transitory hemianopia is rare and is no doubt most frequently of toxic origin.

The two eyes also act as if they were one in accommodating. It is impossible for the two eyes to accommodate simultaneously to different extents, so that where there is, as occasionally happens, a difference in focus between them, this difference remains the same for all distances for which they are adapted. In such cases, therefore, both eyes cannot ever be accurately adapted at the same time, though either may be alone. It often happens as a consequence that the one eye is used to receive the sharpest images of distant, and the other of near objects. Any pathological change which leads to an interference in the accommodating power of one eye alone must have its origin in a lesion which lies peripherally to the nucleus of the third cranial nerve. Such a lesion is usually one of the third nerve itself. Consequently, a unilateral accommodation paresis is almost invariably associated with pareses of some of the oculo-motor muscles. A bilateral accommodation paresis is not uncommon. It is due to a nuclear or more central cerebral disturbance. Unlike a hemianopia, which is mostly permanent, a double accommodation paresis is frequently transitory. It is often a post-diphtheritic condition, appearing alone or associated with other paresis.

Both eyes are also normally intimately associated in their movements. They move in response to a stimulus or a com- bination of stimuli, emanating from different centres of the brain, but one which is always equally distributed to the corre- sponding muscles in both eyes, so that the two lines of fixation meet at the succession of points on which attention is directed. The movements are thus associated in the same direction, to the right or left, upwards or downwards, &c. In addition, owing to the space which separates the two eyes, convergent movements, caused by stimuli equally distributed between the two internal recti, are required for the fixation of nearer and nearer-lying objects. These movements would not be necessary in the case of a single eye. It would merely have to accommodate.

The converging movements of the double eye occur in association with accommodation, and thus a close connexion becomes established between the stimuli to accommodation and con- vergence. All

combinations of convergent and associated movements are constantly taking place normally, just as if a single ‘centrally-placed eye were moved in all. directions and altered its accommodation according to the distance, in any direction, of the object which is fixed.

Associated and convergent movements may be interfered with pathologically in different ways. Cerebral lesions may lead to their impairment or complete abolition, or they may give rise to involuntary spasmodic action, as the result of paralysing or irritating the centres from which the various co-ordinated impulses are controlled or emanate. Lesions which do not involve the centres may prevent the response to associated impulses in one eye alone by interfering with the functional activity of one or more of the nerves along which the stimuli are conveyed. Paralysis of oculo-motor nerves is thus a common cause of defects of association in the movements of the double eye. The great advantage of simultaneous binocular vision — viz. the appreciation of depth, or stereoscopic vision — is thus lost for some, or it may be all directions of fixation. Instead of seeing singly with two eyes, there is then double-vision (diplopia). This persists so long as the defect of association continues, or so long as the habit of mentally suppressing the image of the faultily-directed eye is not acquired.

In the absence of any nerve lesions, central or other, interfering with their associated movements, the eyes continue throughout life to respond equally to the stimuli which cause these move- ments, even when, owing to a visual defect of the one eye, binocular vision has become impossible. It is otherwise, however, with the proper co-ordination of convergent movements. These are primarily regulated by the unconscious desire for binocular vision, and more or less firmly associated with accommodation. When one eye becomes blind, or when binocular vision for other reasons is lost, the impulse is gradually, as it were, unlearnt. This is the cause of divergent concomitant squint. Under some- what similar conditions a degree of convergence, which is in excess of the requirements of fixation, may be acquired from different causes. This gives rise to convergent concomitant squint.

For Astigmatism, &c, see the article Vision.

2. Taking each eye as a single organ, we find it to be subject to many diseases. In some cases both eyes may be affected in the same way, e.g. where the local disease is a manifestation of some general disturbance. Apart from the fibrous coat of the eye, the sclera, which is little prone to disease, and the external muscles and other adnexa,

the eye may be looked upon as composed of two elements, (a) the dioptric media, and (b) the parts more or less directly connected with perception. Patho- logical conditions affecting either of these elements may interfere with sight.

The dioptric media, or the transparent portions which are con- cerned in the transmission of light to, and the formation of images upon, the retina, are the following: the cornea, the aqueous humour, the crystalline lens and the vitreous humour. Loss of transparency in any cf these media leads to blurring of the retinal images of external objects. In addition to loss of transparency the cornea may have its curvature altered by pathological pro- cesses. This necessarily causes imperfection of sight. The crystalline lens, on the other hand, may be dislocated, and thus cause image distortion.

The Cornea. — The transparency of the cornea is mainly lost by imflammation {keratitis), which causes either an infiltration of its tissues with leucocytes, or a more focal, more destructive ulcerative process.

Inflammation of the cornea may be primary or secondary, i.e. the inflammatory changes met with in the corneal tissue may be directly connected with one or more foci of inflammation in the cornea itself or the focus or foci may be in some other part of the eye. Only the very superficial forms of primary keratitis, those confined to the epithelial layer, leave no permanent change;

there is otherwise always a loss of tissue resulting from the inflammation and this loss is made up for by more or less densely intransparent connective tissue (nebula, leucoma). These accord- ing to. their site and extent cause greater or less visual disturb- ance. Primary keratitis may be ulcerative or non-ulcerative, superficial or deep, diffuse or circumscribed, vascularized or , non-vascularized. It may be complicated by deeper inflamma- tions of the eye such as iritis and cyclitis. In some cases the anterior chamber is invaded by pus {hypopyon). The healing of a corneal ulcer is characterized by the disappearance of pain where this has been a symptom and by the rounding off of its sharp margins as epithelium spreads over them from the surround- ing healthy parts. Ulcers tend to extend either in

depth or superficially, rarely in. both manners at the same time. A deep ulcer leads to perforation with more or less serious consequences according to the extent of the perforation. Often an eye bears permanent traces of a perforation in adhesion of the iris to the back of a corneal scar or in changes in the lens capsule (cap- sular cataract). In other cases the ulcerated cornea may yield to pressure from within, which causes it to bulge forwards (staphyloma) .

The principal causes of primary keratitis are traumata and infection from the conjunctiva. Traumata are most serious when the body causing the wound is not aseptic or when micro- organisms from some other source, often the conjunctiva and tear-sac, effect a lodgment before healing of the wound has sufficiently advanced. In infected cases a complication with iritis is not uncommon owing to the penetration of toxines into the. anterior chamber.

Inflammations of the cornea are the most important diseases of the eye, because they are among the most frequent, because of the value of the cornea to vision and because much good can often be done by judicious treatment and much harm result frorn wrong interference and neglect. The treatment of primary keratitis must vary according to the cause. Generally speaking the aim should be to render the ulcerated portions, as aseptic as possible without using applications which are apt to cause a great deal of irritation and thus interfere with healing. On this account it is important to be able to recognize when healing is. taking place, for as soon as this is the case, rest, along with frequent irrigation of the conjunctiva with sterilized water at the body temperature, and occasionally mild antiseptic irrigation of the nasal mucous membrane is all that is required. It is a common and dangerous mistake to over treat.

Of local antiseptics which are of use may be mentioned the actual cautery, chlorine water, freshly prepared silver nitrate or protargol, and the yellow oxide of mercury. These different agents are of course not all equally applicable in any given case ; it depends upon the severity as well as upon the nature, of the inflammation which is the most suitable. For instance, the actual cautery is employed only in the case of the deeper septic or malignant ulcers, in which the destruction of tissue is already considerable and tending to spread further. Again the yellow oxide of mercury should only be used in the more superficial, strumous forms of inflammation. Many other substances are also in use, but need not here be referred to.

Secondary keratitis takes the form of an interstitial deposit of leucocytes between the layers of the cornea as well as often of

vascularization, sometimes intense, from the deeper network of vessels (anterior ciliary) surrounding the cornea. The duration of- a secondary keratitis is usually prolonged, often lasting many months. More or less complete restoration of transparency is the rule, however, eventually.

No local treatment is called for except the shading of the eyes and in most cases the use of a mydriatic to prevent synechiae when the iris is involved. Often it is advisable to do something for the general health. In young people there is probably nothing better than cod-liver oil and syrup of the iodide of iron. In- herited syphilis, tuberculous and other inflammations are the causes of secondary keratitis.

Neuroparalytic Keratitis— -When the fifth nerve is paralysed there is a tendency for the cornea to become inflamed. Different

forms of inflammation may then occur which all, besides anaes- thesia, show a marked slowness in healing. The main cause of neuro- paralytic keratitis lies in the greater vulnerability of the cornea. The prognosis is necessarily bad. The treatment consists in as far as possible protecting the eye from external influences, by keeping it tied up, and by frequently irrigating with antiseptic lotions.

■ Certain non-inflammatory and degenerative changes are met with in the cornea. Of these may be mentioned keratoconus or conical corneaj in which, owing to some disturbance of vitality, the nature ef which has not been discovered, the normal curvature of the cornea becomes altered to something more of a hyberboloid of revolution, with consequent impairment of vision: arms senilis, a whitish opacity due to fatty degeneration, extending round the corneal margin, varying in thickness in different subjects and usually only met with in old people: transverse calcareous film, consisting of a finely punctiform opacity extend- ing, in a tolerably uniformly wide band, occupying the zone of the cornea which is left uncovered when the lids are half closed.

Tumours of the cornea are not common. Those chiefly met with are dermoids, fibromata, sarcomata and epitheliomata.

Srfen/w.— Inflammation of the sclera is confined to its anterior part which is covered by conjunctiva. Scleritis may occur in circumscribed patches or may be diffused in the shape of a belt round the cornea. The former is usually more superficial and uncomplicated, the latter deeper and complicated with corneal infiltration, irido-cyclitis and anterior choroiditis. Superficial scleritis or, as it is often called, episcleritis, is a long-continued disease which is associated with very

varying degrees of dis- comfort. The chronic nature of the affection depends mainly upon the tendency that the inflammation has to recur in successive patches at different parts of the sclera. Often only one eye at a time is affected. Each patch lasts for a month or two and is succeeded by another after an interval of varying duration. Months or years may elapse between the attacks. The cicatricial site of a previous patch is rarely again attacked. The scleral infiltration causes a firm swelling, often sensitive to touch, over which the conjunctiva is freely movable. The overlying con- junctiva is always injected. The infiltration itself at the height of the process is densely vascularized. Seen through the con- junctiva its vessels have a darker, more purplish hue than the superficial ones. The swelling caused by the infiltration gradu- ally subsides, leaving a cicatrix to which the overlying conjunctiva becomes adherent. The cicatrix has a slaty porcellanous-looking colour. Superficial scleritis occurs in both sexes with about equal frequency. No definite cause for the inflammation is known. The treatment ‘on the whole is unsatisfactory. Burning down the nodules with the actual cautery, and sub- sequently a visit to such baths as Harrogate, Buxton, Homburg and Wiesbaden, may be recommended.

Deep scleritis with its attendant complications is altogether a more serious disease. Etiologically it is equally obscure. Bpth eyes are almost always attacked. It more generally occurs in young people, mostly in young women. Deep scleritis is more persistent and less subject to periods of intermission than episcleritis. The deeper and more wide-spread inflammatory infiltrations of the sclera lead eventually to weakening of that coat, and cause it to yield to the intra-ocular pressure. Vision suffers from extension of the infiltration to the cornea, or from iritis with its attendant synechiae, or from anterior choroiditis, and sometimes also from secondary glaucoma. The treatment is on the whole unsatisfactory. Iridectomy, especially if done early in the process, may be of use.

The Aqueous Humour. — Intransparencyof the aqueous humour is always due to some exudation. This comes either from the iris or the ciliary processes, and may be blood, pus or fibrin. An exudation in this situation tends naturally to gravitate to the most dependent part, and, in the case of biood or pus, is known as hyphaema or hypopyon.

The Crystalline Lens Cataract. — Intransparency of the crys- talline lens is technically known as cataract. Cataract may be idiopathic and uncomplicated, or traumatic, or secondary to

disease in the deeper parts of the eye. The modified epithelial structure of which the lens is composed is always being added to throughout life. The older portions of the lens are consequently the more central. They are harder and less elastic. This arrangement seems to predispose to difficulties of nutrition. In many people, in the absence altogether of general or local disease, the transparency of the lens is lost owing to degeneration of the incompletely-nourished fibres. This idiopathic cataract mostly occurs in old people; hence the term senile cataract. So-called senile cataract is not, however, necessarily associated with any general senile changes. An idiopathic uncomplicated cataract is also met with as a congenital defect due to faulty development of the crystalline lens. A particular and not uncommon form of this kind of cataract, which may also develop during infancy, is lamellar or zonular cataract. This is a partial and stationary form of cataract in which, while the greater part of the lens retains its transparency, some of the lamellae are intransparent. Traumatic cataract occurs in two ways : by laceration or rupture of the lens capsule, or by nutritional changes consequent upon injuries to the deeper structures of the eye. The transparency of the lens is dependent upon the integrity of its capsule. Penetrating wounds of the eye involving the capsule, or rupture of the capsule from severe blows on the eye without perforation of its coats, are followed by rapidly develop- ing cataract. Severe non-penetrating injuries, which do not cause rupture of the capsule, are sometimes followed, after a time, by slowly-progressing cataract. Secondary cataract is due to abnormalities in the nutrient matter supplied to the lens owing to disease of the ciliary body, choroid or retina. In some diseases, as diabetes, the altered general nutrition tells in the same way on the crystalline lens. Cataract is then rapidly formed. All cases of cataract in diabetes are not, however, necessarily true diabetic cataracts in the above sense. Disloca- tions of the lens are traumatic or congenital. In old-standing disease of the eye the suspensory ligament may yield in part, and thus lead to lens dislocation. The lens is practically always cataractous before this takes place.

The Vitreous Humour. — The vitreous humour loses its trans- parency owing to exudation from the inflamed ciliary body or choroid. The exudation may be fibrinous or purulent; the latter only as a result of injuries by which foreign bodies or septic matter are introduced into the eye or in metastatic choroiditis. Blood may also be effused into the vitreous from rupture of retinal, ciliary or choroidal vessels. The

pathological significance of the various effusions into the vitreous depends greatly upon the cause. In many cases effusion and absorption are constantly taking place simultaneously. The extent of possible clearing depends greatly upon the preponderance of the latter process.

Diseases of the Iris and Ciliary Body.— Inflammation of the iris, iritis, arises from different causes. The various idiopathic forms have relations to constitutional disturbances such as rheumatism, gout, albuminuria, tuberculosis, fevers, syphilis, gonorrhoea and others, or they may come from cold alone. Traumatic and infected cases are attributable to accidents, the presence of foreign bodies, operations, &c. In addition, iritis may be secondary to keratitis, scleritis or choroiditis. The beginning of an attack of inflammation of the iris is char- acterized by alterations in its colour due to hyperaemia and by circumcorneal injection. Later on, exudation takes place into the substance of the iris, causing thickening and also a loss of gloss of its surface. According to the nature and severity of the exudation there may be deposits formed on the back of the cornea, attachments between the iris and lens capsule (synechiae) , or even gelatinous-looking coagulations or pus in the anterior chamber.

The subjective symptoms to which the inflammation may give rise are dread of light (photophobia), pain, generally most severe at night and often very great, also more or less impairment of sight. Along with the pain and photophobia there is lacryma- tion. An acute attack of iritis usually lasts about six weeks. Some cases become chronic and last much longer. Others are x. 4

chronic from the first, and in one clinical type of iritis, in which the ciliary body is also at the same time affected, viz. iritis serosa, there is usually comparatively little injection of the eye or pain, so that the patient's attention may only be directed to the eye owing to the gradual impairment of sight which results. In some cases, and more particularly in men, there is a tendency to the recurrence at longer or shorter intervals of attacks ol iritis (recurrent iritis). In these cases, as well as in all cases oi plastic iritis which have not been properly treated, serious consequences to sight are apt to follow from the binding down of the iris to the lens capsule and the occlusion of the pupil by exudation.

Inflammation of the ciliary body, cyclitis, is frequently asso- ciated with iritis. This association is probable in all cases where there are deposits on the posterior surface of the cornea. It is certain where there are changes in the intra-ocular tension. Often in cyclitis there is

a very marked diminution in tension. Cyclitis is also present when the degree of visual disturbance is greater than can be accounted for by the visible changes in the pupil and anterior chamber. The exudation may, as in iritis, be serous, plastic or purulent. It passes from the two free surfaces of the ciliary body into the posterior aqueous, and into the vitreous, chambers. This produces, what is a constant sign of cyclitis, more or less intransparency of the vitreous humour. Where there has been excessive exudation into the vitreous, subsequent shrinking and liquefaction take place, leading to detachment of the retina and consequent blindness.

The treatment of iritis necessarily differs to some extent according to the cause. The general treatment applicable to all cases need only be here considered. What should be aimed at, at the time of the inflammation, is to put the eye as far as possible at rest, to prevent the formation of synechiae and alleviate the pain. An attempt should be made to get the pupil thoroughly dilated with atropine. The dilatation should be kept up as long as any circumcorneal injection lasts. If a case of iritis be left to itself or treated without the use of a mydriatic, posterior synechiae almost invariably form. Some fibrinous exudation may even organize into a membrane stretching across, and more or less completely occluding, the pupil. Synechiae, though not of themselves causing impairment of vision, increase the risk that- the eye runs from subsequent attacks of iritis. It should however be remembered that as the main call for a mydriatic is to prevent synechiae, the raison d'etre for its use no longer exists when, having been begun too late, the pupil cannot properly be dilated by it. Under these conditions it may even do harm. The eyes should also be kept shaded from the light by the use of a shade or neutral-tinted glasses. During an attack any use of the eyes for reading or sewing or work of any kind calling for accommodation must be prohibited. This applies equally to the case of inflammation in one eye alone and in both.

Pain is best relieved by hot fomentations, cocain, and in many cases the internal use of salicin or phenacetin. The treatment sometimes required for cases of old iritis is iridectomy. The operation is called for in two different classes of cases. In the first place, to improve vision where the pupil is small, and to a great extent occluded, though the condition has not so far led to serious nutritive changes; and in the second place, with the object as well of preventing the complete destruction of vision which either the existing condition or the danger of recurrence of the inflammation has threatened. Iridectomy for iritis should be performed when the inflammation has entirely subsided. The portion of iris excised should be large. The operation is urgently called for where the condition of iris bombans exists.

Iris tumours, either simple or malignant, are of rare occurrence.

A frequent result of a severe blow on the eye is a separation of a portion of the iris from its peripheral attachment (iridodi- alysis). Of congenital anomalies the most commonly met witl) are coloboma and more or less persistence of the foetal pupillary membrane. The most serious form of irido-cyclitis is that which may follow penetrating wounds of the eye. Under certain

conditions this leads to a similar inflammation in the other eye. This so-called sympathetic ophthalmitis is of a malignant type, causing destruction of the sympathizing eye.

The Retina. — Choroidal inflammations are generally patchy, various foci of inflammation being scattered over the choroid. These patches may in course of time become more or less con- fluent. The effect upon vision depends upon the extent to which the external or percipient elements of the retina become involved. It is especially serious when the more central portions of the retina, are thus affected (choroido-retinitis centralis).

A peculiar and grave pathological condition of the eye is what is known as glaucoma. A characteristic of this condition is increase of the intra-ocular tension, which has a deleterious effect on the optic nerve end and its ramifications in the retina. The cause of the rise of tension is partly congestive, partly mechanical. The effect of glaucoma, when untreated, is to cause ever-increasing loss of sight, although the time occupied by the process before it leads to complete blindness varies within such extraordinary wide limits as from a few hours to many years. The uveal tract may be the site of sarcoma.

The retina is subject to inflammation, to detachment from the choroid, to haemorrhages from the blood-vessels and to tumour. Retinal inflammation may primarily affect either the nerve elements or the connective tissue framework. The former is usually associated with some general disease such as albuminuria or diabetes and is bilateral. The tissue changes are oedema, the formation of exudative patches, and haemorrhage. Where the connective tissue elements are primarily affected, the condition is a slow one, similar to sclerosis of the central nervous system. The gradual blindness which this causes is due to

compression of the retinal nerve elements by the connective tissue hyperplasia, which is always associated with characteristic changes in the disposition of the retinal pigment. This retinal sclerosis is consequently generally known as retinitis pigmentosa, a disease to which there is a hereditary predisposition. Besides occurring during inflammation, haemorrhages into the retina are met with in phlebitis of the central retinal vein, which is almost invariably unilateral, and in certain conditions of the blood, as pernicious anaemia, when they are always bilateral.

The optic nerve is subject to inflammation (optic neuritis) and atrophy. Double optic neuritis, affecting, however, only the intra-ocular ends of the nerves, is an almost constant accompaniment of brain tumour. Unilateral neuritis has a different causation, depending upon an inflammation, mainly perineuritic, of the nerve in the orbit. It is analogous to peripheral inflammation of other nerves, such as the third, fourth, sixth and seventh cranial nerves.

Diseases of the Conjunctiva. — These are the most frequent diseases of the eye with which the surgeon has to deal. They generally lead to more or less interference with the functional activity of the eye and often indeed to great impairment of vision owing to the tendency which there is for the cornea to become implicated.

Many different micro-organisms are of pathogenetic importance in connexion with the conjunctiva. Microbes exist in the normal conjunctival sac. These are mostly harmless, though it is usual to find at any rate a small proportion of others which are known to be pyogenetic. This fact is of great importance in connexion both with problems of etiology and the practical question of operations on the eye.

Hyperaemia. — When the conjunctiva becomes hyperaemic its colour is heightened and its transparency lessened. Some- times too it becomes thickened and its surface altered in appear- ance. The often marked heightening of colour is due to the very superficial position of the dilated vessels. This is specially the case with that part of the membrane which forms the transition fold between the palpebral and the ocular conjunctiva. Con- sequently it is there that the redness is most marked, while it is seen to diminish towards the cornea. An important diagnostic mark is thus furnished between purely conjunctival hyperaemia and what is called circumcorneal congestion, which is always an indication of more deep-seated vascular dilatation. It also

differs materially from a scleral injection, in which there is a visible dilatation of the superficial scleral vessels.

When a conjunctival hyperaemia has existed for some time the papillae become swollen, and small blebs form on the surface of the membrane: sometimes too, lymph follicles begin to show. The enlargement and compression of adjacent papillae give rise to a velvety appearance of the surface.

Hyperaemia of the conjunctiva where not followed by in- flammation causes more or less lacrymation but no alteration in the character of its secretion. The hyperaemia may be acute and transitory or chronic. Much depends upon the cause as weli as upon the persistence of the irritation which sets it up.

Traumata, the presence of foreign bodies in the conjunctival sac, or the irritations of superficial chalky infarcts in the Meibomian ducts, cause more or less severe transitory congestion. Continued subjection to irritating particles such as flour, stones, dust, &c, causes a more continued hyperaemia which is often circumscribed and less pronounced. Bad air in schools, barracks, workhouses, &c, also causes a chronic hyperaemia in which it is common to find a follicular hyperplasia. Long exposure to too intense light, astigmatism and other ocular defects which cause asthenopia lead also to chronic hyperaemia. Anaemic individuals are often subject to discomfort from hyperaemia of this nature.

The treatment of conjunctival hyperaemia consists first in the removal of the cause when it can be discovered. Often this is difficult. In addition the application of hot sterilized water is useful and soothing.

Conjunctivitis. — When the conjunctiva is actually inflamed the congested membrane is brought into a condition of heightened secreting action. The secretions become more copious and more or less altered in character. A sufficiently practical though by no means sharply defined clinical division of cases of conjuncti- vitis is arrived at by taking into consideration the character of the secretion from the inflamed membrane and the visible tissue alterations which the membrane undergoes. The common varieties of conjunctivitis which may thus be distinguished are the following: (a) Catarrhal conjunctivitis, (0) Purulent conjuncti- vitis, (7) Phlyctenular conjunctivitis, (5) Granular conjunctivitis and (e) Diphtheritic conjunctivitis.

However desirable a truly etiological classification might appear to be,

it is doubtful whether such could satisfactorily be made. So much is certain at all events, that not only can identically the same clinical appearance result from the actions of quite different pathogenetic organisms, but that various concomitant circumstances may lead to very different clinical signs being set up by one and the same microbe. As regards contagion there is no doubt that the secretion in the case of a true conjunctivitis (i.e. not merely a hyperaemia) is always more or less contagious. The degree of virulence varies not only in different cases, but the effect of contagion from the same source may be different in different individuals. Healthy conjunctivae may thus react differently, not only as regards the degree of severity, but even according to different clinical types, when infected by secretion from the same source. There are no doubt different reasons for this, such as the stage at which the inflamma- tion has arrived in the eye from which the secretion is derived, differences in the surroundings and in the susceptibility of the infected individuals, the presence of dormant microbes of a virulent type in the healthy conjunctiva which has been infected, &c. Many points in this connexion are very difficult to investi- gate and much remains to be elucidated. Contagion usually takes place directly and not through the air. Often in this way one eye is first affected and may in some cases, when sufficient care is afterwards taken, be the only one to suffer.

The treatment in all severer forms of conjunctivitis should be undertaken with the primary object in view of preventing any implication of the cornea.

Catarrhal conjunctivitis, which is characterized by an increased mucoid secretion accompanying the hyperaemia, is usually bilateral and may be either acute or chronic. Acute conjuncti- vitis lasts as a rule only for a week or two: the chronic type may persist, with or without occasional exacerbations, for

years. The subjective symptoms vary in intensity with the severity of the inflammation. There is always more or less troublesome ” burning ” in the eyes with a tired heavy feeling in the lids. This is aggravated by reading, which is most dis- tressing in a close or smoky atmosphere and by artificial light. In acute cases, indeed, reading is altogether impossible. In all cases of catarrhal conjunctivitis the symptoms are

also more marked if the eyes have been tied up, even though this may produce a temporary relief.

A curious variety of acute catarrhal conjunctivitis, in which the hyperaemia and lacrymation are the predominant features, is the so-called hay-fever. In this condition the mucous mem- brane of the nose and throat are similarly affected, and there is at the same time more or less constitutional disturbance. Hay-fever is due to irritation from the pollen of many plants, but principally from that of the different grasses. Some people are so susceptible to it that they invariably suffer every year during the early summer months. Here it is difficult to remove the cause, but many cases can be cured and almost all are alleviated be means of a special antitoxin applied locally.

Other ectogenetic causes of catarrhal conjunctivitis which have been studied are mostly microbic. Of these the most common are the Morax-Axenfeld and the Koch-Weeks con- junctivitis.

The Morax-Axenfeld bacillus sets up a conjunctivitis which affects individuals of all ages and conditions and which is con- tagious. The inflammation is usually chronic, at most subacute. It is often sufficiently characteristic to be recognized without a microscopical examination of the secretions. In typical cases the lid margin, palpebral conjunctiva, and it may be a patch of ocular conjunctiva at the outer or inner angle are alone hyperaemic: the secretion is not copious and is mostly found as a greyish coagulum lying at the inner lid-margin. The subjective symptoms are usually slight. Complications with other varieties of catarrhal conjunctivitis are not uncommon. This mild form of conjunctivitis generally lasts for many months, subject to more or less complete disappearance followed by recurrences. It can be rapidly cured by the use of an oxide of zinc ointment, which should be continued for some time after the appearances have altogether passed off.

The conjunctivitis caused by the Koch-Weeks microbe is still more common. It is a more acute type, affects mostly children, and is very contagious and often epidemic. Here the hyperaemia involves both the ocular and the palpebral con- junctiva, and usually there is considerable swelling of the lids and a copious secretion. Both eyes are always affected. Occasionally the engorged conjunctival vessels give way, caus- ing numerous small extravasations (ecchymoses). Complications with phlyctenulae {vide infra) are common in children. The acute symptoms last for a week or ten days, after which the course is more chronic. Treatment with nitrate of silver in solution is generally satisfactory. Other less frequent microbic causes of catarrhal

conjunctivitis yield to the same treatment.

A form of epidemic muco-purulent conjunctivitis is not un- common, in which the swelling of the conjunctival folds and lids is much more marked and the secretions copious. It is less amenable to treatment and also apt to be complicated by corneal ulceration. The microbe which gives rise to this con- dition has not been definitely established. This inflammation is also known as school ophthalmia. This is extremely contagious, so that isolation of cases becomes necessary. The treatment with weak solutions of sub-acetate of lead during the acute stage, provided there be no corneal complication, and sub- sequently with a weak solution of tannic acid, may be recom- mended.

Purulent Conjunctivitis. — Some of the severer forms of catarrhal conjunctivitis are accompanied not only by a good deal of swelling of both conjunctiva and lids but also by a decidedly muco-purulent secretion. Nevertheless there is a sufficiently sharply-defined clinical difference between the catarrhal and purulent types of inflammation. In purulent conjunctivitis the oedema of the lids is always marked, often

excessive, the hyperaemia of the whole conjunctiva is intense: the membrane is also infiltrated and swollen (chemosis), the papillae enlarged and the secretion almost wholly purulent. Although this variety of conjunctivitis is principally due to infection by gonococci, other microbes, which more frequently set up a catarrhal type, may lead to the purulent form.

All forms are contagious, and transference of the secretion to other eyes usually sets up the same type of severe inflamma- tion. The way in which infection mostly takes place is by direct transference by means of the hands, towels, &c, of secretions containing gonococci either from the eye or from some other mucous membrane. The poison may also sometimes be carried by flies. The dried secretion loses its virulence.

In new-born children (ophthalmia neonatorum) infection takes place from the maternal passages during birth. Not- withstanding the great changes which occur during the progress of a purulent conjunctivitis, there is on recovery a complete restitutio ad integrum so far as the conjunctiva is concerned. Owing to the tendency to severe ulceration of the cornea, more or less serious destructions of that membrane, and consequently more or less interference with sight, may result before the inflammation has passed off. This is a special danger in the case of adults. For this reason when only one eye is affected the first point to

be attended to in the treatment is to secure the second eye from contagion by efficient occlusion. The appliance known as Buller's shield, a watch-glass strapped down by plaster, is the best for this purpose. It not only admits of the patient seeing with the sound eye, but allows the other to remain under direct observation. The treatment otherwise consists in frequent removal of the secretions from the affected eye, and the use of nitrate of silver solution as a bactericide applied directly to the conjunctival surface; sometimes it is necessary to cut away the chemotic conjunctiva immediately surrounding the cornea. When the cornea has become affected efforts may be made with the thermo-cautery or otherwise to limit the area of destruction and thus admit of something being done to improve the vision after all inflammation has subsided. The greatest cleanliness as well as proper antiseptic precautions should of course be observed by every one in any way connected with the treatment of such cases.

Phlyctenular conjunctivitis is an acute inflammation of the ocular conjunctiva, in which little blebs or phlyctenules form, more particularly in the vicinity of the corneal margin, as well as on the epithelial continuation of the conjunctiva which covers the cornea. The inflammation is characterized by being dis- tributed in little circumscribed foci and not diffused as in all other forms of conjunctivitis. In it the conjunctival secretion is not altered, unless there should exist at the same time a com- plication with some other form of conjunctivitis. This condition is most frequent in children, particularly such as are ill-nourished or are recovering from some illness, e.g. measles. The suscepti- bility occurs in fact mainly where there exists what used to be called a " strumous " diathesis. In many cases, therefore, there is some kind of tubercular basis for the manifestations. This basis has to do with the susceptibility only, at all events to begin with. The local changes are not tuberculous; their exact origin has not been clearly established. They are in all probability produced by staphylococci.

Many children suffering from phlyctenular conjunctivitis get after a short time an eczematous excoriation of the skin of the nostrils. This excoriated, scabby area contains crowds of staphylococci which find a nidus here, where the copious tear- flow down the nostrils has excoriated and irritated the skin. Lacrymation is indeed a very common concomitant of phlyc- tenular conjunctivitis. Another frequently distressing symptom is a pronounced dread of light (photophobia), which often leads to convulsive and very persistent closing of the lids (blepharo- spasm). Indeed the relief of the photophobia is often the most important point to be considered in the treatment of phlyc- tenular conjunctivitis. The photophobia may be

very severe when the local changes are slight. The eyes should be shaded but not bandaged. Cocain may be freely used. The best

local application is the yellow oxide of mercury used as an ointment.

Phlyctenular conjunctivitis, and the corneal complications with which it is so often associated, constitute a large proportion (from |- to J) of all eye affections with which the surgeon has to deal.

■Granular Conjunctivitis. — This disease, which also goes by the name of trachoma, is characterized by an inflammatory infiltra- tion of the adenoid tissue of the conjunctiva. The inflammation is accompanied by the formation of so-called granules, and at the same time by a hyperplasia of the papillae. The changes further lead in the course of time to cicatricial transformations, so that a gradual and progressive atrophy of the conjunctiva results. The disease takes its origin most frequently in the conjunc- tival fold of the upper lid, but eventually as a rule involves the coraea arid the deeper tissues of the lid, particularly the tarsus.

The etiology of trachoma is unknown. Though a perfectly distinctive affection when fully established, the differential diagnosis from other forms of conjunctivitis, particularly those associated with much follicular enlargement or which have begun as purulent inflammation, may be difficult. Trachoma is mostly chronic. When occurring in an acute form it is more amenable to treatment and less likely to end in cicatricial changes. Fully half the cases of trachoma which occur are complicated by pannus, which is the name given to the affection when it has spread ‘to the cornea. Pannus is a superficial vascularized in- filtration of the cornea. The veiling which it produces causes more or less defect of sight.

Various methods of treatment are in use for trachoma. Ex- pression by means of roller-forceps or repeated grattaga are amongst the more effective means of surgical treatment, while local applications of copper sulphate or of alum are certainly useful in suitable cases. ‘ ■

Diphtheritic conjunctivitis is characterized ‘ by an infiltration into the conjunctival tissues which, owing to great coagulability, rapidly interferes with the nutrition of the invaded area and thus leads to necrosis of the diphtheritic membrane. Con- junctival diphtheria may or may not be associated with diphtheria of the throat. It is essentially

a disease of early childhood, not more than 10% of all cases occurring after the age of four. The cornea is exposed to great risk, more particularly during the first few days, and may be lost by necrosis. Subsequent ulceration is not uncommon, but may often be arrested before complete destruction has taken place. The disease is generally confined to one eye, and complicated by swelling of the preauricular glands of that side. It may prove fatal. In true conjunctival diphtheria the exciting cause is the Klebs-Leffler bacillus. The inflammation occurs in very varying degrees of severity. The secretion is at first thin and scant, afterwards purulent arid more copious. In severe cases there is great chemosis with much tense swelling of the lids, which are often of an ashy-grey colour. A streptococcus infection pro- duces somewhat similar and often quite as disastrous results.

The treatment must be both general with antitoxin and local with antiseptics. Of rarer forms of conjunctivitis may be mentioned .. Parihaud's conjunctivitis and the so-called spring catarrh.

N on-infiammatory Conjunctival Affections. — These are of less importance than conjunctivitis, either on account of their com- parative infrequency or because of their harmlessness. The following conditions may be shortly referred to.

Amyloid degeneration, in which waxy-looking masses grow from the palpebral conjunctiva of both lids, often attaining very considerable dimensions. The condition is not uncommon in China and elsewhere in the East.

Essential Shrinking of the Conjunctiva. — This is the result of pemphigus, in which the disease has attacked the conjunctiva and led to its atrophy.

Pterygium is a hypertrophic thickening of the conjunctiva of triangular shape firmly attached by its apex to the superficial layers of the cornea. It is a common condition in warm climates

owing to exposure to sun and dttst, and often calls for operative interference.

Tuwours of the Conjunctiva. — These may be malignant or benign, also syphilitic and tubercular. (G. A. Be.)

EYEMOUTH, a police burgh of Berwickshire, Scotland. Pop. (iooi) 2436. It is situated at the mouth of the Eye, 75 ril N.N.W. of Berwick-on-Tweed by the North British railway via Burnmouth. Its public buildings are the town hall, library and masonic hall. The main

industry is the fishing and allied trades. The harbour was enlarged in 1887, and the bay is easily accessible and affords good anchorage. Owing to the rugged character of the coast and its numerous ravines and caves the whole district was once infested with smugglers. The promon- tory of St Abb's Head is 3 m. to the N.W.

EYLAU (Preussisch-Eylau) , a town of Germany, in east Prussia, on the Pasmar, 23 m. S. by E. of Konigsherg by rail on the line Pillau-Prostken. It has an Evangelical church, a teachers' seminary, a hospital, foundries and saw mills. Pop. 3200. Eylau was founded in 1336 by Arnolf Von Eilenstein, a knight of the Teutonic Order. It is famous as the scene of a battle between the afmy'of Napoleon and the Russians and Prussians commanded by General Bennigsen, fought on the 8th of February 1807. • ■

The battle was preceded by a severe general engagement on the 7th. The head of Napoleon's column (cavalry and infantry) , advancing from the soUth-west, found itself opposed at, the outlet of- the Griinhofchen defile by a strong Russian rearguard which held the (frozen) lakes on either side of the Eylau road, and attacked at once, dislodging the enemy after a sharp conflict. The French turned both wings of the enemy, and Bagration, who commanded the Russian rearguard, retired through Eylau to the main army, which was now arrayed for battle east of Eylau. Barclay de Tolly made a strenuous resistance in Eylau itself, and in the churchyard, and these localities changed hands several times before remaining finally in possession of the French. It is very dbubtful whether Napoleon actually ordered this attack upon Eylau, and it is suggested that the French soldiers were encouraged to a premature assault by the hope of obtaining quarters in the village. There is, however, no reason to suppose that this attack was prejudicial to Napoleon's chance, of success, for his own army was intended, to pin the enemy in front, while the outlying " masses of manoeuvre " closed upon his flanks and rear (see Napoleonic Campaigns). In this case the vigour of the " general advanced guard " was superfluous, for Bennigsen stood to fight of his'own free will.

The foremost line of the French bivouacs extended, from; Rothenen to Freiheit, but a large proportion of the army spent the night in quarters farther back. The Russian army on the other hand spent the night bivouacked in order of battle, the right at Schloditten and the left at Serpallen. The cold was extreme, 2° F. being registered in the early morning, and food was scarce in both armies. The ground was covered at the time of battle with deep snow, and all the lakes and marshes were frozen, so that troops of all arms could pass everywhere, so far as the snow permitted. Two of Napoleon's corps (Davout and Ney) were

still absent, and Ney did not receive his orders until the morning of the 8th. His task was to descend upon the Russian right, and also to prevent a Prussian corps under Lestocq from coming on to the battlefield. Davout's corps advancing from the south-east on Mollwitten was destined for the attack of Bennigsen's left wing about Serpallen and Klein Sausgarten. In the meantime Napoleon with his forces at and about Eylau made the preparations for the frontal attack. His infantry extended from the windmill, through Eylau, to Rothenen, and the artillery was deployed along the whole front; behind each infantry corps and on the wings stood the, cavalry. The Guard was in second line south of Eylau, and an army reserve stood near the Waschkeiten lake. Bennigsen's army was drawn up in line from Schloditten to Klein Sausgarten, the front likewise covered by guns, in which arm he was numerically much superior. A detachment occupied Serpallen.

The battle opened in a dense snowstorm. About 8 a.m.'

Bennigseirs guns opened fire on Eylau, and after a fierce but undecided artillery fight the French delivered an infantry attack from Eylau. This was repulsed with heavy losses, and the Russians advanced towards the windmill in force. Thereupon Napoleon ordered his centre, the VII. corps of Augereau,to move forward from the church against the Russian front, the division of St Hilaire on Augereau's right participating in the attack. If we conceive of this first stage of the battle as the action of the " general advanced guard," Augereau must be held to have overdone his part. The VII. corps advanced in dense masses, hut in the fierce snowstorm lost its direction. St Hilaire attacked directly and unsupported; Augereau's corps was still less fortunate. Crossing obliquely the front of the Russian line, as if making for Schloditten, it came under a feu d'enfer andi was practically annihilated. In the confusion the Russian cavalry charged with the utmost fury downhill and with the wind behind them. Three thousand men only out of about fourteen thousand appeared at the evening, parade of the corps. The rest were killed, wounded, prisoners or dispersed. The marshal and every senior officer was amongst the killed and wounded, and one regiment, the 14th of the Line, cut off in the midst of the Russians and refusing to surrender, fell almost to a man. The Russian

Molwitten

BmeryValkcr sc.

3 Miles

counterstroke penetrated into Eylau itself and Napoleon himself was in sericjus danger. With the utmost coolness, however, he judged the pace of the Russian advance and ordered up a battalion of the Guard at the exact moment required. In the streets of Eylau the Guard had the Russians at their mercy, and few escaped. Still the situation for the French was desperate and the battle had to be maintained at all costs. Napoleon now sent forward the cavalry along the whole line. In the centre the charge was led by Murat and Bessieres, and the Russian horsemen were swept off the field. The Cuirassiers under D'Hautpoult charged through the Russian guns, broke through the first line of infantry and then through the second, penetrating to the woods of Anklappen.

The shock of a second wave of cavalry broke the lines again, and though in the final retirement the exhausted troopers lost terribly, they had achieved their object. The wreck of Augereau's and other divisions had been reformed, the Guard brought up into first line, and, above all, Davout's leading troops had oc- cupied Serpallen. Thence, with his left in touch with Napoleon/ s right (St Hilaire), and his right extending gradually towards Klein Sausgarten, the marshal pressed steadily upon the Russian left, rolling it up before him, until his right had reached Kutschitten and his centre Anklappen. By that time the troops under Napoleon's immediate command, pivoting their left on Eylau church, had wheeled gradually inward until the general

line extended from the. church to Kutschitten. The Russian army was being driven westward, when the advance of Lestocq gave them fresh steadiness. The Prussian corps had been fighting a continuous flank-guard action against Marshal Ney to the. north- west of Althof, and Lestocq had finally succeeded- in disengaging his main body, Ney being held up at Althof by a small rearguard, while the Prussians, gathering as they went the fugitives of the Russian army, hastened to oppose Davout. The impetus of these fresh troops led by Lestocq and his staff- officer Scharnhorst was. such as to check even the famous divisions of Davout's corps which had won the battle of Auerstadt single-handed. The French were now gradually forced back until their right was again at Sausgarten and their centre on the Kreege Berg.

Both sides were now utterly exhausted; for the Prussians, also had

been marching and fighting all day against Ney. The battle died away at nightfall, Ney's corps being unable effectively to intervene owing to the steadiness of the Prussian detachment left to oppose him, and the extreme difficulty of the roads. A severe conflict between the Russian extreme, right and Ney's corps which at last appeared on the field at Schloditten ended the battle. Bennigsen retreated during the night through Schmo- ditten, Lestocq through Kutschitten. The numbers engaged in the first stage of the battle may be taken as — Napoleon, 50,000, Bennigsen, 67,000, to which later were added on the one side Ney and Davout, 29,000, on the other Lestocq, 7000. The losses were roughly, 15,000 men to the French, 18,000 to the Allies, or 21 and 27% respectively of the troops actually engaged. The French lost 5 eagles and 7 other colours, the Russians 16 colours and 24 guns..

EYRA (Felis eyra), a South American wild cat, of weasel-like build, and uniform coloration, varying in different individuals from reddish-yellow to chestnut. It is found in Brazil, Guiana and Paraguay, and extends its range to the Rio del Norteˆbut is rare north of the isthmus of Panama. Little is known of its habits in a wild state, beyond the fact that it is a forest-dweller, active in movement and fierce in disposition. Several have been exhibited in the London Zoological Gardens, and some have grown; gentle in captivity. Don Felix de Azara wrote of one which he kept on a chain that it was " as gentle and playful as any kitten could be." The name is sometimes applied to, the jaguarondi.

EYRE, EDWARD JOHN (181 5-1901), British colonial governor, the son of a Yorkshire clergyman, was born on the 5th of August 181 5. He was intended for the army, but delays having arisen in producing a commission, he went out to New South Wales, where he engaged in the difficult but very necessary undertaking of transporting stock westward to the new colony of South Australia, then in great distress, and where he became magistrate and protector of the aborigines, whose interests he warmly advocated. Already experienced as an Australian traveller, he undertook the most extensive and difficult journeys in the desert country north and west of Adelaide, and after encountering the greatest hardships, proved the possibility of land communica- tion between South and West Australia. In 1845 he returned to England and published the narrative of his travels. In 1846 he was appointed lieutenant-governor of New Zealand, where he served under Sir George Grey. After successively governing St Vincent and Antigua, he was in 1862 appointed acting-governor of Jamaica and in 1864 governor. In October 1865 a negro insurrection broke out and was repressed with laudable vigour, but the unquestionable severity and alleged illegality of Eyre's subsequent proceedings raised

a storrn at home which induced the government to suspend him and to despatch a special commission of investigation, the effect of whose inquiries, declared by his successor, Sir John Peter Grant, to have been ” admirably conducted,” was that he should not be reinstated in his office. The government, nevertheless, saw nothing in Eyre’s conduct to justify legal proceedings; indictments pre- ferred by amateur prosecutors at home against him and military officers who had acted under his direction, resulted in failure, and he retired upon the pension of a colonial governor. As an

explorer Eyre must be classed in the highest rank, but opinion’s are always likely to differ as to his action in the Jamaica rebellion. He died on the 30th of November 1901.

EYRE, SIR JAMES (1 734-1 709), English judge, was the son of the Rev. Thomas Eyre, of Wells, Somerset. He was educated at Winchester College and at St John’s College, Oxford, which, however, he left without taking a degree. He was called to the bar at Gray’s Inn in 1755, and commenced practice in the lord mayor’s and sheriffs’ courts, having become by purchase one of the four counsel to the corporation of London. He was appointed recorder of London in 1763. He was counsel for the plaintiff in the case of Wilkes v. Wood, and made a brilliant speech in condem- nation of the execution of general search warrants. His refusal to voice the remonstrances of the corporation against the exclusion of Wilkes from parliament earned him the recognition of the ministry, and he was appointed a judge of the exchequer in 1772. From June 1792 to January 1793 he was chief commissioner of the great seal. In 1793 he was made chief justice of the common pleas, and presided over the trials of Home Tooke, Thomas Crosfield and others, with great ability and impartiality. He died on the 1st of July 1799 and was buried at Ruscombe, Berkshire.

See Howell, State Trials, xix. (1154-1 155) ; Foss, Lives of the Judges.

EYRIE, the alternative English form of the words Aerie or Aery, the lofty nest of a bird of prey, especially of an eagle, hence any lofty place of abode; the term is also used of the brood of the bird. The word derives from the Fr. aire, of the same meaning, which comes from the Lat. area, an open space, but was early connected with aerius, high in the air, airy, a confusion that has affected the spelling of the word. The forms ” eyrie ” or ” eyry ” date from a 17th century

attempt to derive the word from the Teutonic ey, an egg.

EZEKIEL Cˆ pTi 1 , “God strengthens” or “God is strong”; Sept. ‘Iefe/ coˆX; Vulg. Ezechiel), son of Buzi, one of the most vigorous and impressive of the older Israelite thinkers. He was a priest of the Jerusalem temple, probably a member of the dominant house of Zadok, and doubtless had the literary training of the cultivated priesthood of the time, including acquaintance with the national historical, legal and ritual traditions and with the contemporary history and customs of neighbouring peoples. In the year 597 (being then, prob- ably, not far from thirty years of age) he was carried off to Babylonia by Nebuchadrezzar with King Jehoiachin and a large body of nobles, military men and artisans, and there, it would seem, he spent the rest of his life. His prophecies are dated from this year (” our captivity,” xl. 1), except in i. 1, where the meaning of the date ” thirtieth year ” is obscure; it cannot refer to his age (which would be otherwise expressed in Hebrew), or to the reform of Josiah, 621 (which is not else- where employed as an epoch); possibly the reference is to the era of Nabopolassar (626 according to the Canon of Ptolemy), if chronological inexactness be supposed (34 or 33 years instead of 30), a supposition not at all improbable. That the word ” thirtieth ” is old, appears from the fact that a scribe has added a gloss (w. 2, 3) to bring this statement into accord with the usual way of reckoning in the book: the “thirtieth” year, he explains, is the fifth year of the captivity of Jehoiachin. The exiles dwelt at Tell-abib (” Hill of the flood “), one of the mounds or ruins made by the great floods that devastated the country, 1 near the ” river ” Chebar (Kebar), probably a large canal not far south of the city of Babylon. Here they had their own lands, and some form of local government by elders, and appear to have been prosperous and contented; probably the ‘only demand made on them by the Babylonian government was the payment of taxes.

Ezekiel was married (xxiv. 18), had his own house, and com- ported himself quietly as a Babylonian subject. But he was a profoundly interested observer of affairs at home and among

1 The Assyrian term abubu is used of the great primeval deluge (in the Gilgamesh epic), and also of the local floods common in the country.

the exiles: as patriot and ethical teacher he deplored alike the political blindness of the Jerusalem government (King Zedekiah revolted in 588) and the immorality and religious superficiality and apostasy of the people. He, like Jeremiah, was friendly to Nebuchadrezzar, regarding him as Yahweh’s instrument for the chastisement of the

nation. Convinced that opposition to Babylonian rule was suicidal, and interpreting historical events, in the manner of the times, as indications of the temper of the deity, he held that the imminent political destruction of the nation was proof of Yahweh's anger with the people on account of their moral and religious depravity; Jerusalem was hope- lessly corrupt and must be destroyed (xxiv.). On the other hand, he was equally convinced that, as his predecessors had taught (Hos. xi. 8, 9; Isa. vii. 3 al.), Yahweh's love for his people would not suffer them to perish utterly — a remnant would be saved, and this remnant he naturally found in the exiles in Babylonia, a little band plucked from the burning and kept safe in a foreign land till the wrath should have passed (xi. 14 ff.). This conception of the exiles as the kernel of the restored nation he further set forth in the great vision of ch. i., in which Yahweh is represented as leaving Jerusalem and corning to take up his abode among them in Babylonia for a time, intending, however, to return to his own city (xliii. 7).

This, then, was Ezekiel's political creed — destruction of Jeru- salem and its inhabitants, restoration of the exiles, and mean- time submission to Babylon. His arraignment of the Judeans is violent, almost malignant (vi. xvi. al.) . The well-meaning but weak king Zedekiah he denounces with bitter scorn as a perjured traitor (xvii) . He does not discuss the possibility of successful resistance to the Chaldeans; he simply assumes that the attempt is foolish and wicked, and, like other prophets, he identifies his political programme with the will of God. Probably his judgment of the situation was correct; yet, in view of Sennacherib's failure at Jerusalem in 701 and of the admitted strength of the city, the hope of the Jewish nobles could not be considered wholly un- founded, and in any case their patriotism (like that of the national party in the Roman siege) was not unworthy of admiration. The prophet's predictions of disaster continued, according to the record, up to the investment of the city by the Chaldean army in 588 (i.-xxiv.); after the fall of the city (586) his tone changed to one of consolation (xxxiii.xxxix.) — the destruction of the wicked mass accomplished, he turned to the task of reconstruction. He describes the safe and happy establishment of the people in their own land, and gives a sketch of a new constitution, of which the main point is the absolute control of public religion by the priest hood (xl.-xlviii.).

The discourses of the first period (i.xxiv.) do not confine them selves to political affairs, but contain much interesting ethical and religious material. The picture given of Jerusalemke morals is an appalling one. Society is described as honeycombed with crimes and vices; prophets, priests, princes and the people generally are said to practise

unblushingly extortion, oppression, murder, falsehood, adultery (xxii.) . This description is doubtless exaggerated. It may be assumed that the social corruption in Jerusalem was such as is usually found in wealthy communities, made bolder in this case, perhaps, by the political unrest and the weakness of the royal government under Zedekiah. No such charges are brought by the prophet against the exiles, in whose simple life, indeed, there was little or no opportunity for flagrant violation of law. Ezekiel's own moral code is that of the prophets, which insists on the practice of the fundamental civic virtues. He puts ritual offences, however, in the same category with offences against the moral law, and he does not distinguish between immorality and practices that are survivals of old recognized customs: in ch. xxii. he mentions "eating with the blood " 2 along with murder, and failure to observe ritual regula- tions along with oppression of the fatherless and the widow; the old customary law permitted marriage with a half-sister (father's daughter), with a daughter-in-law, and with a father's wife (Gen. xx. 12, xxxviii. 26; 2 Sam. xvi. 21, 22), but the more refined

2 So we must read (as Robertson Smith has pointed out) in xxii. 9 and xviii. 6, instead of "eating on the mountains."

feeling of the later time frowned on the custom, and Ezekiel treats it as adultery. 1 However, notwithstanding the insistence on ritual, natural in a priest, his moral standard is high; follow- ing the prescription of Ex. xxii. 21 [20] he regards oppression of resident aliens (a class that had not then received full civil rights) as a crime (xxii. 7), and in his new constitution (xlvii. 22, 23) gives them equal rights with the homeborn. His strongest denunciation is directed against the religious practices of the time in Judea — the worship of the Canaanite local deities (the Baals), the Phoenician Tammuz, and the sun and other Baby- lonian and Assyrian gods (vi., viii., xvi., xxiii.); he maintained vigorously the prophetic struggle for the sole worship of Yahweh. Probably he believed in the existence of other gods, though he does not express himself clearly on this point; in any case he held that the worship of other deities was destructive to Israel. His conception of Yahweh shows a mingling of the high and the low. On the one hand, he regards him as supreme in power, controlling the destinies of Babylonia and Egypt as well as those of Israel, and as inflexibly just in dealing with ordinary offences against morality. But he conceives of him, on' the other hand, as limited locally and morally — as having his special abode in. the Jerusalem temple, or elsewhere

in the midst of the Israelite people, and as dealing with other nations solely in the interests of Israel. The bitter invectives against Ammon, Moab, Edom, Philistia, Tyre, Sidon and Egypt, put into Yahweh's mouth, are based wholly on the fact that these peoples are regarded as hostile and hurtful to Israel; Babylonia, though nowise superior to Egypt morally, is favoured and applauded because it is believed to be the instrument for securing ultimately the pros- perity of Yahweh's people. The administration of the affairs of the world by the God of Israel is represented, in a word, as determined not by ethical considerations but by personal prefer- ences. There is no hint in Ezekiel's writings of the grandiose conception of Isa. xl.-lv., that Israel's mission is to give the knowledge of religious truth to the other nations of the world; he goes so far as to say that Yahweh's object in restoring the fortunes of Israel is to establish his reputation among the nations as a powerful deity (xxxvi. 20-23, xxxvii. 28, xxxix. 23). The prophet regards Yahweh's administrative control as immediate: he introduces no angels or other subordinate supernatural agents — the cherubs and the " men " of ix. 2 and xl. 3 are merely imaginative symbols or representations of divine activity. His high conception of God's transcendence, it may be supposed, led him to ignore intermediary agencies, which are common in the popular literature, and later, under the influence of this same conception of transcendence, are freely employed.

The relations between the writings of Ezekiel and those of Jeremiah is not clear. They have so much in common that they must have drawn from the same current bodies of thought, or there must have been borrowing in one direction or the other. In one point, however, — the attitude toward the ritual — the two men differ radically. The finer mind of the nation, represented mainly by the prophets from Amos onward, had denounced unsparingly the superficial non-moral popular cult. The struggle between ethical religion and the current worship became acute toward the end of the 7th century. There were two possible solutions of the difficulty. The ritual books of our Pentateuch were not then in existence, and the sacrificial cult might be treated with contempt as not authoritative. This is the course taken by Jeremiah, who says boldly that God requires only obedience (Jer. vii. 21 ff.). On the other hand the better party among the priests, believing the ritual to be necessary, might undertake to moralize it; of such a movement, begun by Deuteronomy, Ezekiel is the most eminent representative. Priest and prophet, he sought to unify the national religious consciousness by preserving the sacrificial cult, discarding its abuses and vitalizing it ethically. The event showed that he judged the situation rightly — the religious scheme announced by him, 'though

not accepted in all its details, became the dominant policy of the later time, and he has been justly called

1 The stricter marriage law is formulated in Lev. xviii. 8-15, xx. 11 ff.

” the father of Judaism.” He speaks as a legislator, citing no authority; but he formulates, doubtless, the ideas and perhaps the practices of the Jerusalem priesthood. His ritual code (xliii.xlvi.), which in elaborateness stands midway between that of Deuteronomy and that of the middle books of the Penta teuch (resembling most nearly the code of Lev. xvii.-xxvi.) shows good judgment. Its most noteworthy features are two. Certain priests of idolatrous Judean shrines (distinguished by him as ” Levites “) he deprives of priestly functions, degrading them to the rank of temple menials; and he takes from the civil ruler all authority over public religion, permitting him merely to furnish material for sacrifices. He is, however, much more than a ritual reformer. He is the first to express clearly the conception of a sacred nation, isolated by its religion from all others, the guardian of divine law and the abode of divine majesty. This kingdom of God he conceives of as moral: Yahweh is to put his own spirit into the people, 2 creating in them a disposition to obey his commandments, which are moral as well as ritual (xxxvi. 26, 27). The conception of a sacred nation controlled the whole succeeding Jewish development; if it was narrow in its exclusive regard for Israel, its intensity saved the Jewish religion to the world.

Text and Authorship. — The Hebrew text of the book of Ezekiel is not in good condition — it is full of scribal inaccuracies and additions. Many of the errors may be corrected with the aid of the Septuagint (e.g. the 430 — 390 + 40— of iv. 5, 6 is to be changed to 190), and none of them affect the general thought. The substantial genuineness of the discourses is now accepted by the great body of critics. The Talmudic tradition (Baba Bathra 14&) that the men of the Great Synagogue ” wrote ” Ezekiel, may refer to editorial work by later scholars. 3 There is no validity in the objections of Zunz {Goltesdienstl. Vortr.) that the specific prediction concerning Zedekiah (xii. 12 f.) is non- Prophetic, and that the drawing-up of a new constitution soon after the destruction cf the city and the mention of Noah, Daniel, Job and Persia are improbable. The prediction in question was doubtless added by Ezekiel after the event; the code belongs precisely in his time, and the constitution was natural for a priest; Noah, Daniel and Job are old legendary Hebrew figures; and it is not probable that the prophet’s ” Paras ” is our ” Persia.” Havet’s contention (in La Modernite des pro- phetes) that Gog represents the Parthians (40 B.C.) has little or nothing in its support. There are

additions made post eventum, as in the case mentioned above and in xxix. 17*20, and the description of the commerce of Tyre (xxvii. 96-250), which interrupts the comparison of the city to a ship, looks like an insertion whether by the prophet or by some other; but there is no good reason to doubt that the book is substantially the work of Ezekiel. Ezekiel's style is generally impetuous and vigorous, somewhat smoother in the consolatory discourses (xxxiv., xxxvi., xxxvii.); he produces a great effect by the cumulation of details, and is a master of invective; he is fond of symbolic pictures, proverbs and allegories; his " visions " are elaborate literary productions, his prophecies show less spontaneity than those of any preceding prophet (he receives his revelations in the form of a book, ii. 9), and in their present shape were hardly pronounced in public — a fact that seems to be hinted at in the statement that he was " dumb " till the fall of Jerusalem (iii.26, xxxiii. 22); in private interviews the people did not take him seriously (xxxiii. 30-33). His book was accepted early as part of the sacred literature: Ben-Sira (c. 180 B.C.) mentions him along with Isaiah and Jeremiah (Ecclus. xlix. 8) ; he is not quoted directly in the New Testament, but his imagery is employed largely in the Apocalypse and elsewhere. His diver- gencies from the Pentateuchal code gave rise to serious doubts, but, after prolonged study, the discrepancies were explained, and the book was finally canonized (Shab. 136). According to

2 Yahweh's spirit, thought of as Yahweh's vital principle, as man's spirit is man's vital principle, is to be breathed into them, as, in Gen. ii. 7, Yahweh breathes his own breath into the lifeless body. The spirit in the Old Testament is a refined material thing that may come or be poured out on men.

3 The " Great Synagogue " is semi-mythical.

Jerome (Preface to Comm. on Ezek.) the Jewish youth were forbidden to read the mysterious first chapter (called the markaba, the " chariot “) and the concluding section (xl.-xlviii.) till they reached the age of thirty years.

The book divides itself naturally into three parts : the arraignment of Jerusalem (i.xxiv.); denunciation of foreign enemies (xxv. xxxii.); consolatory construction of the future (xxxiii.-xlviii.). The opening " vision " (i.), an elaborate symbolic picture, is of the nature of a

general preface, and was composed probably late in the prophet's life. Out of the north (the Babylonian sacred mountain) comes a bright cloud, wherein appear four Creatures (formed on the model of Babylonian composite figures), each with four faces (man, lion, bull, eagle) and attended by a wheel; the wheels are full of eyes, and move straight forward, impelled by the spirit dwelling in the Creatures (the spirit of Yahweh). Supported on their heads is something like a crystalline firmament, above which is a form like a sapphire throne (cf. Ex. xxiv. 10), and on the throne a man-like form (Yahweh) surrounded by a rainbow brightness. The wheels symbolize divine omniscience and control, and the whole vision represents the coming of Yahweh to take up his abode among the exiles. The prophet then receives his call (ii., iii.) in the shape of a roll of a book, which he is required to eat (an indication of the literary form now' taken by prophecy). He is informed that the people to whom he is sent are rebellious and stiff-necked (this indi- cates his opinion of the people, and gives the keynote of the following discourses) ; he is appointed watchman to warn men when they sin, and is to be held responsible for the consequences if he fail in this duty. To this high conception of a preacher's function the prophet was faithful throughout his career. Next follow minatory discourses (iv.-vii.) predicting the siege and capture of Jerusalem— perhaps revised after the event. There are several symbolic acts descriptive of the siege. One of these (iv. 4 ff.) gives the duration of the national punishment in loose chronological reckoning: 40 years (a round number) for Judah, and 150 more (according to the corrected text) for fsrael, the starting-point, probably, being the year 722, the date of the capture of Samaria ; the procedure described in v. 8 is not to be understood literally. In vi. the idolatry of the nation is pictured in darkest colours. Next follows (viii.-xi.) a detailed description, in the form of a vision, of the sin of Jerusalem : within the temple-area elders and others are worshipping beast- forms, Tammuz and the sun (probably actual cults of the time) ; l men approach to defile the temple and slay the inhabitants of the city (ix.). In ch. x. the imagery of ch. i. reappears, and the Creatures are identified with the cherubs of Solomon's temple. This appears to be an independent form of the vision, which has been brought into connexion with that of i. by a harmonizing editor. There follow a symbolic prediction of the exile (xii.) and a denunciation of non-moral prophets and prophetesses (xrii.)— though Yahweh deceive a prophet, yet he and those who consult him will be punished ; and so corrupt is the nation that the presence of a few eminently good men will not save it (xiv.). 2 After a comparison of Israel to a worthless wild vine (xv.) come two allegories, one portraying idolatrous Jerusalem as the unfaithful spouse of Yahweh (xvi.), the other describing the fate of

Zedekiah (xvii.). The fine insistence on individual moral responsibility in xviii. (cf. Deut. xxiv. 16, Jer. xxxi. 29 f.), while it is a protest against a superficial current view, is not to be understood as a denial of all moral relations between successive generations. This latter question had not presented itself to the prophet's mind; his object was simply to correct the opinion of the people that their present misfortunes were due riot to their own faults but to those of their predecessors. A more sympathetic attitude appears in two elegies (xix.), one on the kings Jehoahaz and Jehoiachin, the other on the nation. These are followed by a scathing sketch of Israel's religious career (xx. 1-26), in which, contrary to the view of earlier prophets, it is declared that the nation had always been disobedient. From this point to the end of xxiv. there is a mingling of threat and promise. 3 The allegory of xxiii. is similar to that of xvi., except that in the latter Samaria is relatively treated with favour, while in the former it (Aholah) is involved in the same condemnation as that of Jerusalem. At this point is introduced (xxv.-xxxii.) the series of discourses directed against foreign nations. The description of the king of Tyre (xxviii. 11-19) as dwelling in Eden, the garden of God, the sacred mountain, under the protection of the cherub, bears a curious resemblance to the narrative in Gen. ii., iii., of which, however, it seems to be in- dependent, using different Babylonian material ; the text is corrupt. The section dealing with Egypt is one of remarkable imaginative power and rhetorical vigour: the king of Egypt is compared to a magnificent cedar of Lebanon (in xxxi. 3 read : " there was a cedar in Lebanon '■') and to the dragon of the Nile, and the picture of his

1 In viii. 17 the unintelligible expression " they put the branch to their nose " is the rendering of a corrupt Hebrew text; a probable emendation is: " they are sending a stench to my nostrils."

2 The legendary figure of Daniel (xiv. 14) is later taken by the author of the book of Daniel as his hero.

3 For a reconstruction of the poem in xxi. 10, II, see the English Ezekiel in Haupt's Sacred Books.

descent into Sheol is intensely tragic. Whether these discourses were all uttered between the investment of Jerusalem and its fall, or were here inserted by Ezekiel or by a scribe, it is not possible to say. In xxxiii. the function of the prophet as watchman is described at length (expansion of the description in iii.) and the news of the capture of the city is received. The following chapters (xxxiv.- xxxix.) are devoted to reconstruction: Edom, the detested enemy of Israel, is to be crushed ;

the nation, politically raised from the dead, with North and South united (xxxvii.), is to be established under a Davidide king; a final assault, made by Gog, is to be suc- cessfully met, 4 and then the people are to dwell in their own land in peace for ever ; this Gog section is regarded by some as the beginning of Jewish apocalyptic writing. In the last section (xl.xlviii.), put as a vision, the temple is to be rebuilt, in dimensions and arrange ments a reproduction of the temple of Solomon (cf. I Kings vi., vii.), the sacrifices and festivals and the functions of priests and prince are prescribed, a stream issuing from under the temple is to vivify the Dead Sea and fertilize the land (this is meant literally), the land is divided into parallel strips and assigned to the tribes. The prophet's thought is summed up in the name of the city : Yahweh Shamma.h, " Yahweh is there," God dwelling for ever in the midst of his people.

Literature. — For the older works see the Introductions of J. G. . Carpzov (1757) and C. H. H. Wright (1890). For legends: Pseud.-Epiphan. , De vit. prophet. ; Benjamin of Tudela, Itin. ; Hamburger, Realencycl. ; Jew. Encycl. On the Hebrew text; C. H. Cornill, Ezechiel (1886) (very valuable for text and ancient versions); H. Graetz, Emendationes (1893).; C. H. Toy, "Text of Ezek."

(1899) in Haupt's Sacred Books of the Old Test. Commentaries: F. Hitzig (1847); H. Ewald (1868); E. Reuss (French ed., 1876; Germ, ed., 1892); Currey (1876) in Speaker's Comm.; R. Smend (revision of Hitzig) (1880) in Kurzgefasst. exeget. Handbuch; A. B. Davidson (1882) in Cambr. Bible for Schools; J. Skinner (1895) in Expos. Bible; A. Bertholet (1897) in Marti's Kurz. Hand-Comm.; C. H. Toy (1899) in Haupt's Sacr. Bks. (Eng. ed.) ; R. Kraetzschmar

(1900) in W. Nowack's Handkommentar. See also Duhm, Theol. d. Propheten (1875); A. Kuenen,ˆ Prophets and Prophecy (1877); Gautier, La Mission du prophete Ezechiel (1891) ; Montefiore, Hibbert Lectures (1892); A. Bertholet, Der Verfassungsentwurf des Hesekiel (1896); articles in Herzog-Hauck, Realencykl.; Hastings, Bibl. Diet.; Cheyne, Encycl. Bibl., Jew. Encycl.; F. Bleek, Introd. (Eng. tr., 1875), and Bleek- Wellhausen (Germ.) (1878); Wildeboer, Letterkunde d. Oud. Verbonds (1893), and Germ, transl., Litt. d. Alt. Test. ; Perrot and Chipiez, Hist, de I' art, &c, in which, however, the restoration of Ezekiel's temple (by Chipiez) is probably untrust- worthy. (C. H. T.*)

EZRA (from a Hebrew word meaning " help "), in the Bible, the famous scribe and priest at the time of the return of the Jews in the reign of the Persian king Artaxerxes 1. (458 B.C.). His book and that of Nehemiah form one work (see Ezra and Nehemiah, Books or), apart

from which we have little trust- worthy evidence as to his life. Even in the beginning of the 2nd century B.C., when Ben Sira praises notable figures of the , exilic and post-exilic age (Zerubbabel, Jeshua and Nehemiah), Ezra is passed over (Ecclesiasticus xlix. 11-13), and he is not mentioned in a still later and somewhat fanciful description of Nehemiah ‘s work (2 Mace. i. 18-36). Already well known as a scribe, Ezra’s labours were magnified by subsequent tradition. He was regarded as the father of the scribes and the founder of the Great Synagogue. According to the apocryphal fourth book of Ezra (or 2 Esdras xiv.) he restored the law which had been lost, and rewrote all the sacred records (which had been destroyed) in addition to no fewer than seventy apocryphal works. The former theory recurs elsewhere in Jewish tradition, and may be associated with the representation in Ezra-Nehemiah which connects him with the law. But the story of his many literary efforts, like the more modern conjecture that he closed the canon of the Old Testament, rests upon no ancient basis.

See Bible, sect. Old Testament (Canon and Criticism) ; Jews (history, §21 seq.). The apocryphal books, called 1 and 2 Esdras (the Greek form of the name) in the English Bible, are dealt with below as Ezra, Third Book of, and Ezra, Fourth Book of, while the canonical book of Ezra is dealt with under Ezra and Nehemiah.

EZRA, THIRD BOOK OF [1 Esdras]. The titles of the various books of the Ezra literature are very confusing. The Greek, the Old Latin, the Syriac, and the English Bible from 1560

4 Gog probably represents a Scythian horde (though such an invasion never took place) — certainly not Alexander the Great, who would have been called “king of Greece,” and would have been regarded not a6 an enemy but as a friend.

onwards designate this book as 1 Esdras, the canonical books Ezra and Nehemiah being 2 Esdras in the Greek. In the Vulgate, however, our author was, through the action of Jerome, degraded into the third place and called 3 Esdras, whereas the canonical books Ezra and Nehemiah (see Ezra and Nehemiah, Books of, below) were called 1 and 2 Esdras, and the Apocalypse of Ezra 4 Esdras. Thus the nomenclature of our book follows, and possibly wrongly, the usage of the Vulgate. 1 In the Ethiopic version a different usage prevails. The Apocalyspe is called 1 Esdras, our author 2 Esdras, and Ezra and

Nehemiah 3 Esdras, or 3 and 4 Esdras. Throughout this article we shall use the best attested designation of this book, i.e. 1 Esdras.

Contents. — With the exception of one original section, namely, that of Darius and the three young men, our author contains essentially the same materials as the canonical Ezra and some sections of 2 Chronicles and Nehemiah. To the various explana- tions of this phenomenon we shall recur later. The book may be divided as follows (the verse division is that of the Cambridge LXX) :—

Chap. i. = 2 Chron. xxxv. i-xxxvi. 21. — Great passover of Josiah: his death at Megiddo. His successors down to the destruction of Jerusalem and the Captivity. (Verses i. 21-22 are not found else- where, though the LXX of 2 Chron. xxxv. 20 exhibits a very distant parallel.)

Chap. ii. 1-14 = Ezra i. — The edict of Cyrus. Restoration of the sacred vessels through Sanabassar to Jerusalem.

Chap. ii. 15-25 = Ezra iv. 6-24. — First attempt to rebuild the Temple: opposition of the Samaritans. Decree of Artaxerxes: work abandoned till the second year of Darius.

Chap. iii. i-v. 6. — This section is peculiar to our author. The contest between the three pages waiting at the court of Darius and the victory of the Jewish youth " Zerubbabel," to whom as a reward Darius decrees the return of the Jews and the restoration of the Temple and worship. Partial list of those who returned with " Joachim, son of Zerubbabel."

Chap. v. 7-70 = Ezra ii.-iv. 5. — List of exiles who returned with Zerubbabel. Work on the Temple begun. Offer of the Samaritans' co-operation rejected. Suspension of the work through their intervention till the reign of Darius.

Chap. vi. i-vii. 9 = Ezra v. i-vi. 18. — Work resumed in the second year of Darius. Correspondence between Sisinnes and Darius with reference to the building of the Temple. Darius' favourable decree. Completion of the work by Zerubbabel.

Chap. vii. 10-15 = Ezra vi. 19-22. — Celebration of the completion of the Temple.

Chap. viii. l-ix. 36 = Ezra vii.-x. — Return of the exiles under Ezra. Mixed marriages forbidden.

Chap. ix. 37-55 = Nehemiah vii. 73-viii. 12. — The reading of the

Law.

Thus, apart from iii. i-v. 3, which gives an account of the pages' contest, the contents of the book are doublets of the canonical Ezra and portions of 2 Chronicles and Nehemiah. The beginning of the book seems imperfect, with its abrupt opening "And Josiah held the passover": its conclusion is mutilated, as it breaks off in the middle of a sentence. As Thackeray suggests, it probably continued the history of the feast of Tabernacles described in Neh. viii. — a view that is supported by Joseph. Ant. xi. 5. 5, " who describes that feast using an Esdras word bravopdcacns and . . . having hitherto followed Esdras as his authority passes on to the Book of Nehemiah."

Claims to Canonicity. — It would seem that even greater value was attached to 1 Esdras than to the Hebrew Ezra. (1) For in the best MSS. (BA) it stands before 2 Esdras — the verbal translation of the Hebrew Ezra and Nehemiah. (2) It is used by Josephus, who in fact does not seem aware of the existence of 2 Esdras. (3) 1 Esdras is frequently quoted by the Greek fathers — Clem. Alex., Origen, Eusebius, and by the Latin — Tertullian, Cyprian, Augustine. The adverse judgment of the church is due to Jerome, who, from his firm attachment to the Hebrew Old Testament, declined to translate the "dreams " of 3 and 4 Esdras. This judgment influenced alike the Council

1 " At the Council of Trent (when the Septuagint Canon was virtually accepted as authoritative), by a most curious aberration, Esdras iii. and iv. and the Epistle of Manasseh were alone excluded from the canon and remitted to our appendix." — Howorth, " Un- conventional Views on the Text of the Bible," in the P.S.B.A., 1901, p. 149.

of Trent and the Lutheran church in Germany; for Luther also refused to translate Esdras and the Apocalypse of Ezra.

Origin and Relation to the Canonical Ezra. — Various theories have been given as to the relation of the book and the canonical Ezra. ■ ,'

1 . Some scholars, as Keil, Bissell and formerly Schiirer, regarded 1 Esdras as a free compilation from the Greek of 2 Esdras (2 Chron. and Ezra-Nehemiah) . This theory has now given place to others more accordant with the facts of the case.

2. Others, as Ewald, Hist, of Isr. v. 126-128, and Thackeray in Hastings' Bible Dictionary, assume a lost Greek version of Chronicles, Ezra and Nehemiah, from which were derived 1 Esdras — a free redaction of the former and 2 Esdras. Thackeray claims that we have "

a satisfactory explanation of the coincidences in translation and deviation from the Hebrew in 1 Esdras and 2 Esdras, if we suppose both are to some extent dependent on a lost Greek original.”. But later in the same article Thackeray is compelled to modify this view and admit that 1 Esdras is not a mere redaction of a no longer extant version of the canonical books, but shows not only an independent knowledge of the Hebrew text but also of a Hebrew text superior in not a few passages to the Massoretic text, where 2 Esdras gives either an inaccurate version or a version reproducing the secondary Massoretic text.

3. Others like Michaelis, Trendelenburg, Pohlmann, Herzfeld, Fritzsche hold it to be a direct and independent translation of the Hebrew. There is much to be said in favour of this view. It presupposes in reality two independent recensions of the Hebrew text, such as we cannot reasonably doubt existed at one time of the Book of Daniel. Against this it has been urged that the story of the three pages was written originally in Greek (Ewald, Schiirer, Thackeray). The only grounds for this theory are the easiness of -the Greek style and the paronomasia in iv. 62 htaw koX &4>e

4. Sir H. H. Howorth in the treatises referred to at the close of this article has shown cogent grounds for regarding 1 Esdras as the original and genuine Septuagint translation, and 2 Esdras as probably that of Theodotion. For this view he adduces among others the following grounds: (i.) Its use by Josephus, who apparently was not acquainted with 2 Esdras. (ii.) Its precedence of 2 Esdras in the great uncials, (iii.) Its origin at a time when Chronicles, Ezra and Nehemiah formed a single work, (iv.) Its preservation of a better Hebrew text in many instances than 2 Esdras. (v.) The fact that 1 Esdras and the Septuagint of Daniel go back to one and the same translator, as Dr Gwynn {Diet. Christ. Biog. iv. 977) has pointed out (cf. 1 Esdr. vi. 31, and Dan. ii. 5).

This contention of Howorth has been accepted by Nestle, Cheyne, Bertholet, Ginsburg and other scholars, though they regard the question of an Aramaic original of chapters iii. i-v. 6 as doubtful. Howorth’s further claim that he has established the historical credibility of the book as a whole and its chrono- logical accuracy as against the canonical Ezra has not as yet met with acceptance; but his arguments have not been fairly met and answered.

5. Volz {Encyc. Bill. ii. 1490) thinks that the solution of the problem is to be found in a different direction. The text is of unequal value, and the inequalities are so great as to exclude the supposition that the

Greek version was produced aus einem Guss. iii. i-v. 3 is an independent narrative written originally in Greek and itself a composite production, the praise of truth being an addition, vi. i-vii. 15, ii. 15-25(1 is a fragment of an Aramaic narrative. Some in Josephus {Ant. xi. 4. 9) an account of Samaritan intrigues is introduced immediately after 1 Esdras vii. 15, it is natural to infer that something of the same kind

has fallen out between vi. and ii. 15-25. The Aramaic text behind 1 Esdras here is better than that behind the canonical Ezra. Next, viii.-ix. is from the Ezra document (= Ezra vii.-x. ; Neh. vii. 73, viii. 1 sqq.), though implying a different Hebrew text, ii. 1-15; v. 7-73; vii. 2-4, 6-15 are from the Chronicles: likewise i. is from 2 Chron. xxxv.-vi., 2 Esdras being at the same time before the translator.

Dale. — -The book must be placed between 300 B.C. and a.d. 100, when it was used by Josephus. It is idle to attempt any nearer limits until definite conclusions have been reached on the chief problems of the book.

MSS. and Versions. — The book is found in B and A. The latter seems to have preserved the more ancient form of the text, as it is generally that followed by Josephus. The Old Latin in two recensions is published by Sabatier, Bibliorum sacrorum Latinae versiones antiquae, iii. Another Latin transla- tion is given in Lagarde .{Septuag. Studien, ii., 1892). In Syriac the text is found only in the Syro-Hexaplar of Paul of Telia (a.d. 616). See Walton's Polyglott. There is also an Ethiopic version edited by Dillmann (Bibl. Vet. Test. Aeth. v., 1894) and an Armenian.

Literature. — Exegesis: Fritzsche, Exeget. Handb. zu den Apokr. (1851); Zockler, Die Apokryphen, 155-161 (1891) ; Bissell inLange-Schaff's Comm. (1880); Lupton in Speaker's Comm. (1888); Ball, notes to 1 Esdr. in the Variorum Apocrypha. Introduction and critical Inquiries: Trendelenburg, " Apocr. Esra," in Eichhorn's Allgem. Bibl. der bibl. Litt. i. 178-232 (1787); Pohlmann, " Uber das Ansehen des apokr. dritten Buchs Esras," in Tubingen Theol. Quartalschrifl, 257-275 (1859); Sir H. Howorth, "Character and Importance of 1 Esdras," in the Academy (1893), pp. 13, 60, 106, 174, 326, 524; and further studies entitled " Some Unconventional Views on the Text of the Bible," in the Proceedings of the Society of Biblical Archaeology,

1901, pp. 147-159; 306-330, 1902, June and November. (R. H. C.)

EZRA, FOURTH BOOK (or Apocalypse) OF. This is the most profound and touching of the Jewish Apocalypses. It stands in the relation of a sister work to the Apocalypse of Baruch, but though the relation is so close, they have many points of divergence. Thus, whereas the former represents the ordinary Judaism of the 1st century of the Christian era, the teaching of 4 Ezra on the Law, Works, Justification, Original Sin and Free Will approximates to the school of Shammai and serves to explain the Pauline doctrines on those subjects; but to this subject we shall return.

Original Language and Versions. — In the Latin version our book consists of sixteen chapters, of which, however, only iii.-xiv. are found in the other versions. To iii.-xiv., accordingly, the present notice is confined. After the example of most of the Latin MSS. we designate the book 4 Ezra (see Bensly-James, Fourth Book of Ezra, pp. xxiv-xxvii). In the First Arabic and Ethiopic versions it is called 1 Ezra; in some Latin MSS. and in the English Authorized Version it is 2 Ezra, and in the Armenian 3 Ezra. Chapters i.-ii. are sometimes called 3 Ezra, and xv.-xvi. 5 Ezra. All the versions go back to a Greek text. This is shown by the late Greek apocalypse of Ezra (Tischendorf, Apocalypses Apocryphae, 1866, pp. 24-33), the author of which was acquainted with the Greek of 4 Ezra; also by quotations from it in Barn, iv. 4; xii. 1 = 4 Ezra xii. 10 sqq., v. 5; Clem. Alex. Strom, iii. 16 (here first expressly cited) = 4 Ezra v. 35, &c. (see Bensly-James, op. cit. pp. xx vii- xxx viii. The derivation of the Latin version from the Greek is obvious when we consider its very numerous Graecisms. Thus the genitive is found after the comparative (v. 13) horum majora; xi. 29 duorum capitum majus, even the genitive absolute as in x. 9, the double negative, de and ex with the genitive. Peculiar genders can only be accounted for by the influence of the original forms in Greek, as x. 23 signaculum (o-a.\ri) . . . sed et ipsa. In vi. 25 we have the Greek attraction of the relative — omnibus istis quibus praedixi tibi. In his Messias Judaeorum (1869), pp. 36-110, Hilgenfeld has given a reconstruction of the Greek text. Till 1896 only Ewald believed that 4 Ezra was written originally in Hebrew. In that year Wellhausen {Gait. Gel. Anz. pp. 12-13) and Charles (Apoc. Bar. p. Ixxii) pointed out that a Hebrew original must be assumed on various grounds; and

this view the former established in his Skizzen u. Vorarbeiten, vi. 234-240 (1899). Of the numerous grounds for this assumption it will be necessary only to adduce such constructions as ” de qvto me interrogas de eo,” iv. 28, and xiii. 26, ” qui per semet ipsum liberabit ” (= ta-i$ > is) = “through whom he will deliver,” or to point to such a

mistranslation as vii. 33, ” longanimitas con- gregabitur,” where for ” congregabitur ” (= <]dk-) we require " evanescet," which is another and the actual meaning of the Hebrew verb in this passage. The same mistranslation is found in the Vulgate in Hosea iv. 3. Gunkel has adopted this view in his German translation of the book in Kautzsch's Apok. und Pseud, des A. Testaments, ii. 332-333, and brought forward in confirmation the following remarkable instance in viii. 23, where though the Latin, Syriac, Ethiopic, Arabic and Armenian Versions read testificatur, the Second Arabic version and the Apostolic Constitutions have nem els tov al&va, which are to be explained as translations of (i>?) iJ2? moy. Another interesting case is found in xiv. 3, where the Latin and all other versions but Arabic 2 read super rubum and the Arabic 2 in monte Sinai. Here there is a corruption of ”“«d ” bush ” into ‘J’d ” Sinai.”

Latin _ Version. — All the older editions of this version, as those of Fabricius, Sabatier, Volkmar, Hilgenfeld, Fritzsche, as well as in the older editions of the Bible, are based ultimately on only one MS., the Codex Sangermanensis (written a.d. 822), as Gilde- meister proved in 1865 from the fact that the large fragment between verses 36 and 37 in chapter vii., which is omitted in all the above • editions, originated through the excision of a leaf in this MS. A splendid edition of this version based on MSS. containing the missing fragment, which have been subsequently discovered, has been pub lished by Bensly-James, op. cit. This edition has taken account of all the important MSS. known, save one at Leon in Spain.

Syriac Version. — This version, found in the Ambrosian Library in Milan, was translated into Latin by Ceriani, Monumenla sacra et profana, II. ii. pp. 99-124 (1866). Two years later this scholar edited the Syriac text, op. cit. V. i. pp. 4-111, and in 1883 repro- duced the MS.’ by photo-lithography (Translatio Syra PeshiUo V.T. II. iv. pp. 553-572). Hilgenfeld incorporated Ceriani’s Latin trans- lation in his Messias Judaeorum. This translation needs revision and correction.

Ethiopic Version. — First edited and translated by Laurence, Primi Ezrae libri versio Aethiopica (1820). Laurence’s Latin translation was corrected by Praetorius and reprinted in Hilgen- feld’s Messias Judaeorum. In 1894 Dillmann’s text based on ten MSS. was published — V.T. Aeth. libri apocryphi, v. 153-193.

A rabic Versions. — The First Arabic version was translated from a MS. in the Bodleian Library into English by Ockley (in Whiston’s Primitive Christianity, vol. iv. 171 1). This was done into Latin and corrected by Steiner for Hilgenfeld’s Mess. Jud. The Second Arabic

version, which is independent of the first, has been edited from a Vatican MS. and translated into Latin by Gildemeister, 1877.

Armenian Version. — First printed in the Armenian Bible (1805). Translated into Latin by Petermann for Hilgenfeld's Mess. Jud.; next with Armenian text and English translation by Issaverdens in the Uncanonical Writings of the Old Testament, pp. 488 sqq. (Venice,

1901).

Georgian Version. — According to F. C. Conybeare an accurate Georgian version made from the Greek exists in an 1 ith-century MS. at Jerusalem.

Relation of the above Versions. — These versions stand in the order of worth as follows: Latin, Syriac, Ethiopic. The remaining versions are paraphrastic and less accurate, and are guilty of addi- tions and omissions. All the versions, save the Second Arabic one, go back to the same Greek version. The Second Arabic version presupposes a second Greek version.

Modern Versions. — All the English versions are now antiquated, except those in the Variorum Apocrypha and the Revised Version of the Apocrypha, and even these are far from satisfactory. Simi- larly, all the German versions are behindhand, except the excellent version of Gunkel in Apok. u. Pseud, ii. 252-401, which, however, needs occasional correction.

Contents. — The book (iii.-xiv.) consists of seven visions or parts, like the apocalypse of Baruch. They are : (i)iii. i-v. 19; (2) v. 20-vi. 34; (3) vi. 35-ix. 25; (4) ix. 26-x. 60; (5) xi. i-xii. 51; (6) xiii.; (7) xiv. These deal with (1) religious problems and speculations and (2) eschatological questions. The first three are devoted to the discussion of religious problems affecting in the main the individual. The presuppositions underlying these are in many cases the same as those in the Pauline Epistles. The next three visions are principally concerned with eschato- logical problems which relate to the nation. The seventh vision

is a fragment of the Ezra Saga recounting the rewriting of the Scriptures, which had been destroyed. This has no organic connexion with what precedes.

First Vision, iii.-v. 19. — ” In the thirtieth year after the ruin of the city I Salathiel (the same is Ezra) was in Babylon and lay troubled upon my bed.” In a long prayer Ezra asks how the deso lation of Sion and the prosperity of Babylon can be in keeping with the justice of God. The angel Uriel answers that God’s ways are unsearchable and past man’s understanding. When Ezra asks when the end will be and what are the signs of it, the angel answers that the end is at hand and enumerates the signs of it.

Second Vision, v. 14-vi. 34. — Phaltiel, chief of the people, reproaches Ezra for forsaking his flock. Ezra fasts, and in his prayer asks why God had given up his people into the hands of the heathen. Uriel replies: ” Lovest thou that people better than He that made them?” Man cannot find out God’s judgment. The end is at hand ; its signs are recounted.

Third Vision, vi. 35-ix. 25. — Ezra recounts the works of creation, and asks why Israel does not possess the world since the world was made for Israel. The answer is that the present state is a necessary stage to the coming one. Then follows an account of the Messianic age and the resurrection: the punishment of the wicked and the blessings of the righteous. There can be no inter- cession for the departed. Few will be saved — only as it were a grape out of a cluster or a plant out of a forest.

Fourth Vision, ix. 26-x. 60. — Ezra eats of herbs in the field of Ardat, and sees in a vision a woman mourning for her only son. Ezra reminds her of the greater desolation of Sion. Suddenly she is transfigured and vanishes, and in her place appears a city. The woman, Uriel explains, represents Sion.

Fifth Vision, xi. i-xii. 39. — Vision of an eagle with three heads, twelve wings and eight winglets, which is rebuked by a lion and ■destroyed. The eagle is the fourth kingdom seen by Daniel, and the lion is the Messiah.

Sixth Vision, xiii. — Vision of a man (i.e. the Messiah) arising from the sea, who destroys his enemies who assemble against him, and gathers to him another multitude, i.e. the lost Ten Tribes.

Seventh Vision, xiv. — Ezra is told of his approaching translation. He asks for the restoration of the Law, and is enabled by God to dictate in forty days ninety-four books (the twenty-four canonical books of the Old Testament that were lost, and seventy secret books for the. wise among the people).

Ezra's translation is found in the Canon only in the Oriental Versions. In the Latin it was omitted when xv.-xvi. were added.

Integrity. — According to Gunkel (Apok. u. Pseud, ii. 335-352) the whole book is the work of one writer. Thus down to vii. 16 he deals with the problem of the origin of suffering in the -world, and from vii. 17 to ix. 25 with the question who is worthy to share in the blessedness of the next world. As regards the first problem the writer shows, in the first vision, that suffering and death come from sin — no less truly on the part of Israel than of all men, for God created man to be immortal; that the end is nigh, when wrongs will be righted; God's rule will then be recognized. In the second he emphasizes the consolation to he found in the coming time, and in the third he speaks solely of the next world, and then addresses himself to the second problem. The fourth, fifth and sixth visions are eschatological. In these the writer turns aside from the religious problems of the first three visions and concerns himself only with the future national supremacy of Israel. Zion's glory will certainly be revealed (vision four), Israel will destroy Rome (five) and the hostile Gentiles (six). Then the book is brought to a close with the legend of Ezra's restoration of the lost Old Testament Scriptures.

In the course of the above work there are many inconsistencies and contradictions. These Gunkel explains by admitting that the writer has drawn largely on tradition, both oral and written, for his materials. Thus he concedes that eschatological materials in v. 1-13, vi; 18-28, vii. 26 sqq., also ix. 1 sqq., are from this source, and apparently from an originally independent work, as Kabisch urges, but that it is no longer possible to separate the borrowed elements from the text. Again, in the four last visions he is obliged to make the same concession on a very large scale. Vision four is based on a current novel, which the author has taken up and put into an allegorical form. Visions five and six are drawn from oral or written tradition, and relate only to the political expectations of Israel, and seven is a reproduction of a legend, for the independent existence of which evidence is furnished by the quotations in Bensly-James pp. xxxvii-xxxviii.

Thus the chief champion of the unity of the book makes so many concessions as to its dependence on previously existing sources that, to the student of eschatology, there is little to choose between his view and that of Kabisch. In fact, if the true meaning of the borrowed materials is to be discovered, the sources must be disentangled. Hence the need of some such analysis as that of Kabisch (Das vierte Buck Ezra, 1889): S = an Apocalypse of Salathiel, c. a.d. 100, preserved in

a fragmentary condition, hi. 1-31, iv. 1-51, v. 136-vi. 10, 30-vii. 25, vii. 45-viii. 62, ix. 13-x. 57, xii. 40-48, xiv. 28-35. E = an Ezra Apocalypse, c. 31 B.C., iv. 52-v. 13a, vi. 13-28, vii. 26-44, viii. 63-ix. 12. A = an Eagle Vision, c. a.d. 90, x. 60-xii. 35. M = a Son-of-Man Vision, xiii. E 2 = an Ezra fragment, c. a.d. 100, xiv. r-iia, 18-27, 36-47. All these, according to Kabisch, were edited by a Zealot, c. 120, who supplied the connecting links and made many small additions. In the main this analysis is excellent. If we assume that the editor was also the author of S, and that such a vigorous stylist, as he shows himself to be, recast to some extent the materials he borrowed, there remains but slight difference between the views of Kabisch and Gunkel. Neither view, however, is quite satisfactory, and the problem still awaits solution. Other attempts, such as Ewald's (Gcsch. d. Volkes Israel 3 , vii. 69-83) and De Faye's (Apocalypses juives, 155-165), make no contribution.

School of the Author. — The author or final redactor of the book was a pessimist, and herein his book stands in strong contrast with the Apocalypse of Baruch. Thus to the question pro- pounded in the New Testament — "Are there few that be saved? " he has no hesitation in answering, " There be many created, but few that be saved " (viii. 3) : " An evil heart hath grown up in us which hath led us astray . . . and that not a few only but wellnigh all that have been created " (vii. 48) . In the Apocalypse of Baruch on the other hand it is definitely maintained that not a few shall be saved (xxi. 11). Moreover, the sufferings of the wicked are so great in the next world it were better, according to 4 Ezra (as also to the school of Shammai), that man had not been born. " It is much better (for the beasts of the field) than for us; for they expect not a judgment and know not of torments " (vii. 66) : yet " it would have been best not to have ' given a body to Adam, or that being done, .to have restrained him from sin; for what profit is there that man should in the present life live in heaviness and after death look for punishment" (vii. 116, 117). In iv. 12 the nexus of life, sin and suffering just referred to, is_put still more strongly: " It were better we had not been at all than that we should be born and sin and suffer." 1 The different attitude of these two writers towards this question springs from their respective views on the question of free will. The author of Baruch declares (iv. 15, 19) : " For though Adam sinned and brought untimely death upon all, yet of those who were born from him each one of them prepared for his own soul torment to come, and again each one of them has chosen for himself glories to come . . . each one of us has been the Adam of his own soul/' Though the writer of Ezra would admit the possibility of a few Israelites attaining to salvation through the most strenuous endeavour,

yet he holds that man is all but predoomed through his original evil disposition or through the fall of Adam (vii. 118). ” O Adam, what hast thou done: for though it was thou that sinned, the evil is not fallen on thee alone, but upon all of us that come of thee,”

Another contrast between the two books is that while Baruch shows some mercy to the Gentiles (lxxii. 4-6) in the Messianic period, none according to 4 Ezra and the Shammaites (Toseph. Sank. xiii. 2) will be extended to them, hi. 30, ix. 22 sq., xii. 34, xiii. 37 sq.).

On the above grounds it is not unreasonable to conclude that whereas the Apocalypse of Baruch owes its leading character- istics to a pupil of Hillel’s school, 4 Ezra shows just as clearly its derivation from that of Shammai. Kohler (Jewish Encyc.

1 In the Apocalypse of Baruch, x. 6, we find a similar expression: ” Blessed is he who was not born, or being born has died.” But here death is said to be preferable to witnessing the present woes of Jerusalem.

v. 221) points out that the view of 4 Ezra that the Ten Tribes will return was held by the Shammaites, whereas it was denied by Aqiba. The Apocalypse of Baruch is silent on this point.

Time and Place. — The work was written towards the close of the 1st century (iii. 1, 29), and somewhere in the east.

Literature. — In addition to the authorities mentioned above, see Dillmann, Herzog’s Real-Encyk. 2 xii. 353 sqq. ; Schiirer, Gesch. des jtid. Volkes 3 , iii. 246 sqq. ; and the articles on 4 Esdras in Hastings’ Bible Dictionary ana th&EncyclopaediaBiblicahyThacktray and James respectively. (R. H. C.)

EZRA AND NEHEMIAH, BOOKS OF, in the Old Testament. The .two canonical books entitled Ezra and Nehemiah in the English Bibie 1 correspond to the 1 and 2 Esdras of the Vulgate, to the 2 Esdras of the Septuagint, and to the Ezra and Nehemiah of the Massoretic (Hebrew) text. Though for many centuries they have thus been treated as separate compositions, we have abundant evidence that they were anciently regarded as forming but one book, and a careful examination proves that together with the book of Chronicles they constitute one single work. The two books may therefore be

conveniently treated together.

1. Position and Date. — Origen (Euseb, H.E.vi. 25), expressly enumerating the twenty-two books of the old covenant as acknowledged by the Jews and accepted by the Christian church, names ” the First and Second Ezra in one book “; Melito of Sardis (Euseb. H.E. iv. 26) in like manner mentions the book of Ezra only. So also the Talmud (in Babd bathra, 14. 2), nor can it be supposed that Josephus in his enumeration (c. Ap. i. 8) reckoned Nehemiah as apart from Ezra. That the Jews themselves recognized no real separation is shown by the fact that no Massoretic notes are found after Ezra x., but at the end of Nehemiah the contents of .both are reckoned together, and it is stated that Neh. iii. 22 is the middle verse of the book. Their position in the Hebrew Bible before the book of Chronicles is, however, illogical. The introductory verses of Ezra i. are identical with the conclusion of 2 Chron. xxxvi., whilst in the version of 1 Esdras no less than two chapters (2 Chron. xxxv. sq.) overlap. The cause of the separation is probably to be found in the late reception of Chronicles into the Jewish canon. Further proof of the unity of the three is to be found in the general simi- larity of style and treatment. The same linguistic criteria recur, and the interest in lists and genealogies, in priests and Levites, and in the temple service point unmistakably to the presence of the same hand (the so-called ” chronicler “) in Chronicles Ezra-Nehemiah. See Bible (sect. Canon); Chronicles.

The period of history covered by the books of Ezra and Nehemiah extends from the return of the exiles under Zerubbabel in S37-S36 B.C. to Nehemiah’s second visit to Jerusalem in 432 B.C. In their present form, however, the books are considerably later, and allusions to Nehemiah in the past (Neh. xii. 26, 47), to the days of Jaddua (the grandson of Nehemiah’s contem- porary Joiada; ib. xii. 11), to Darius (Nothus 423 B.C. or rather Codomannus 336 B.C., ib. v. 22), and the use of the term ” king of Persia,” as a distinctive title after the fall of that empire (332 B.C.), are enough to show that, as a whole, they belong to the same age as the book of Chronicles.

2. Contents. — Their contents may be divided into four parts : — (a) The events preceding the mission of Ezra (i.-vi.). — In the

first year of his reign Cyrus was inspired to grant a decree per- mitting the Jews to return to build the temple in Jerusalem (i.); a list of families is given (ii.). The altar of burnt-offering was set up, and in the second year of the return the foundations of the new temple were laid with great solemnity (iii.). The ” adversaries of Judah and Benjamin ” offered to assist but were repulsed, and they raised such opposition to

the progress of the work that it ceased until the second year of Darius (521- 520 B.C.). Aroused by the prophets Haggai and Zechariah the building was then resumed, and despite fresh attempts to hinder the work it was completed, consecrated and dedicated

1 References to 1 Esdras in this article are to the book discussed above as Ezra, Third Book of.

in the sixth year of that king (vi.). The event was solemnized by the celebration of the Passover (cf. 2 Chron. xxx., Hezekiah; xxxv. Josiah).

(b) An interval of fifty-eight years is passed over in silence, and the rest of the book of Ezra comprises his account of his mission to Jerusalem (vii. x.). Ezra, a* scribe of repute, well versed in the laws of Moses, returns with a band of exiles in order to reorganize the religious community. A few months after his arrival (seventh year of Artaxerxes, 458 B.C.) he insti tuted a great religious reform, viz. the prohibition of inter- marriage with the heathen of the land (cf. already vi. 21). In spite of some opposition (x. 15 obscurely worded) the reform was accepted, and the' foundations of a new community were laid.

(c) Twelve years elapse before the return of Nehemiah, whose description of his work is one of the most interesting pieces of Old Testament narrative (Neh. i.-vi.). In the twentieth year of Artaxerxes (445 B.C.), Nehemiah the royal cup-bearer at Shushan (Susa, the royal winter palace) was visited by friends from Judah and was overcome with grief at the tidings of the miserable con- dition of Jerusalem and the pitiful state of the Judaean remnant which had escaped the captivity. He obtained permission to return, and on reaching the city made a secret survey of the ruins and called upon the nobles and rulers to assist in repairing them. Much opposition was caused by Sanballat the Horonite (i.e. of the Moabite Horonaim or Beth-horon, about 15 m. N.W. of Jerusalem), tobiah the Ammonite, Geshem (orGashmu) the Arabian, and the Ashdodites, whose virulence increased as the rebuilding of the walls continued. But notwithstanding attempts upon the city and upon the life of Nehemiah, and in spite of intrigues among certain members of the Judaean section, in fifty-two days the city walls were complete (Neh. vi. 15). The hostility, however, did not cease, and measures were taken to ensure the safety of the city (vi. 16-vii. 4). A valuable account is given of Nehemiah's economical reforms, illustrating the internal social conditions of the period and the general character of the former governors who had been placed in charge (v., cf. the laws codified in Lev. xxv. 35 sqq.).

{d) The remaining chapters carry on the story of the labours of both “Ezra, and Nehemiah. The list of those who returned under the decree of Cyrus is repeated (Neh. vii.), and leads up to the reading of the Law by Ezra, a great national confession of guilt, and a solemn undertaking to observe the new covenant, the provisions of which are detailed (x. 28-39) • After sundry lists of the families dwelling in Jerusalem and its neighbourhood (xi. 1 sqq., apparently a sequel to vii. 1-4), 2 and of various priests and Levites, an account is given of the dedication of the walls (xii. 27-43), the arrangements for the Levitical organization (vv. 44- 47), and a fresh separation from the heathen (Moabites and Ammonites, xiii. 1-3; cf. Deut. xxiii. 3 seq.). The book concludes with another extract from Nehemiah’s memoirs dealing with the events of a second visit, twelve years later (xiii. 4-31). On this occasion he vindicated the sanctity of the temple by expelling Tobiah, reorganized the supplies for the Levites, took measures to uphold the observance of the Sabbath, and pro- tested energetically against the foreign marriages. In the course of his reforms he thrust out a son of Joiada (son of Eliashib, the high-priest), who had married the daughter of Sanballat, an incident which had an important result (see Samaritans).

That these books are the result of compilation (like the book of Chronicles itself) is evident from the many abrupt changes; the inclusion of certain documents written in an Aramaic dialect (Ezr. iv. 8-vi. 18, vii. 12-26) 3 ; the character of the name-lists; the lengthy gaps in the history; the use made of two distinct sources, attributed to Ezra and Nehemiah respectively, and from the varying form in which the narratives are cast. The

2 With Neh. xi. 4-19 cf. 1 Chron. ix. 3-17; with the list xii. 1-7 cf. w 12-21 and x 3-9; and with xii. 10 sq. cf. I Chron. vi. 3-13 (to which it forms the sequel). See further Smend, Listen d. Esra u. Neh. (1881).

3 Sometimes wrongly styled Chaldee {q.v.) ; see Semitic Lan- guages.

chronicler’s hand can usually be readily recognized. There are relatively few traces of it in Nehemiah’s memoirs and in the Aramaic documents, but elsewhere the sources are largely coloured, if not written from the standpoint of his age. Ex- amples of artificial arrangement appear notably in Ezr. ii.-iii. 1 compared with Neh. vii. 6-viii. 1 (first clause); in the present position of Ezr. iv. 6-23; and in the dislocation of certain portions of the two memoirs in Neh. viii.-

xiii. (see below). It should be noticed that the present order of the narratives involves the theory that some catastrophe ensued after Ezr. x. and before Neh. i.; that the walls had been destroyed and the gates burnt down; that some external opposition (with which, however, Ezra did not have to contend) had been successful; that the main object of Ezra's mission was delayed for twelve years, and, finally, that only through Nehemiah's energy was the work of social and religious reorganization successful. These topics raise serious historical problems (see Jews: History, § 21).

3. Criticism of Ezra i.vi. — The chronicler's account of the destruction of Jerusalem, the seventy years' interval (2 Chron. xxxvi. 20 sq.; cf. Jer.xxv. n, xxix. 10, also Is. xxiii. 17), and the return of 42,360 of the exiles (Ezr. ii. 64 sqq.) represent a special view of the history of the period. The totals, as also the detailed figures, in Ezr., Neh. and 1 Esdr. v. vary considerably; the number is extremely large (contrast Jer. lii. 30) ; it includes the common people (contrast 2 Kings xxiv. 14, xxv. 12), and ignores the fact that Judah was not depopulated, that the Jews were carried off to other places besides Babylon and that many remained behind in Babylon. According to this view, Judah and Jerusalem were practically deserted until the return. The list in Ezr. ii. is that of families which returned " every man unto his city " under twelve leaders (including Nehemiah, Azariah [cf. Ezra], Zcrubbabel and Jeshua) ; it recurs with many varia tions in a different and apparently more original context in Neh. vii., and in 1 Esdr. v. is ascribed to the time of Darius. The families (to judge from the northwards extension of Judaean territory) are probably those • of the population in the later Persian period, hardly those who returned to the precise homes of their ancestors (see C. F. Kent, Israel's Hist, and Biogr. Narratives, p. 379). The offerings which are for the temple-service in Neh. vii. 70-72 (cf. 1 Chron. xxix. 6-8) are for the building of the temple in Ezr. ii. 68-70; and since the walls are not yet built, the topographical details in Neh. viii. 1 (see 1 Esdr. v. 47) are adjusted, and the event of the seventh month is not the reading of the Law amid the laments of the people (Neh. viii.; see vv. 9-1 1) but the erection of the altar by Jeshua and Zerub- babel under inauspicious circumstances (cf. Ezr. iii. 3 with 1 Esdr. v. 50).

The chronologically misplaced account of the successful opposi- tion in the time of Ahasuerus (i.e. Xerxes) and Artaxerxes (the son and grandson of Darius respectively) breaks the account of the temple under Cyrus and Darius, and is concerned with the city walls (iv. 6-23) '; there is some obscurity in vv. 7-9: Rehum and Shimshai evidently take the lead, Tabeel may be an Aram- aized equivalent of Tobiah. A recent return is implied (iv. 12) and the record hints that a

new decree may be made (v. 21). The account of the unsuccessful opposition to the temple in the time of Darius (v. sq.; for another account see Jos. Ant. xi. 4, 9) is independent of iv. 7-23, and throws another light upon the decree of Cyrus (vi. 3-5, contrast i. 2-4). It implies that Shesh- bazzar, who had been sent with the temple vessels in the time of Cyrus, had laid the foundations and that the work had continued without cessation (v. 16, contrast iv. 5, 24). The beginning of the reply of Darius is wanting (vi. 6 sqq.), and the decree which had been sought in Babylon is found at Ecbatana. Chap. vi. 15

1 Its real position in the history of this period is not certain. Against the supposition that the names refer to Cambyses and Pseudo-Smerdis who reigned after Cyrus and before Darius, see H. E. Ryle, Camb. Bible, ” Ezra and Neh.,” p. 65 sq. Against the view that Darius is D. ii. Nothus of 423-404 B.C., see G. A. Smith, Minor Prophets, ii. 191 sqq. The ignorance of the compiler regarding the sequence of the kings finds a parallel in that of the author of the book of Daniel (q.v.) ; see C. C. Torrey, Amer. Journ. of Sem. Lang. (1907), p. 178, n. 1.

sqq. follow more naturally upon v. 1-2, but v. 14 with its difficult reference to Artaxerxes now seems to presuppose the decree in iv. 21 and looks forward to the time of Ezra or Nehemiah. As regards this section (Ezr. i.-vi.) as a whole, there is little doubt that i. iii. i-iv. 5, vi. i5->22 are from the chronicler, whose free treatment of his materialis seen in the use he has made of ch. ii. Notwithstanding the unimpeachable evidence for the tolerant attitude of Persian kings and governors towards the religion of subject races, it is probable that the various decrees incorporated in the book (cf. also 1 Esdr. iv. 42 sqq.) have been reshaped from a Jewish standpoint. A noteworthy example appears in the account of the unique powers entrusted to Ezra (vii. 11-26), the introduction to whose memoirs, at all events, is quite in the style of the chronicler.

4. Memoirs of Nehemiah and Ezra.— The memoirs of Ezra and Nehemiah do not appear to have been incorporated without some adjustment. The lapse of time between Neh. i. 1 and ii. 1 is noteworthy, and with the prayer in i. 5-1 1 cf. Ezr. ix. 6-15, Dan. ix. 4 sqq. (also parallels in Deuteronomy); chap. i. in its present form may be a compiler’s introduction. The important topographical list in ch. iii. is probably from another source; the styie is different, Nehemiah is absent, and the high-priest is unusually prominent. 2 Chap, v., where Nehemiah reviews his past conduct as governor, turns aside to economic reforms and scarcely falls within the fifty-two days of the building of the walls. The chapter is closely associated with the contents of xiii. and breaks the account of the opposition. Anticipated

already in ii. 10, the hostility partly arises from the repudiation of Samaritan religious claims (ii. 20; cf. Ezr. iv. 3) and is partly political. It is difficult to follow its progrees clearly, and the account ceases abruptly in. vi. 17-19 with the notice of the conspiracy of Tobiah and the nobles of Judah. The chronicler's style can be recognized in vii. 1-5 (in its present form), where steps are taken to protect and to people Jerusalem; the older sequel is now found in ch. xi. Whilst the account of the dedica- tion of the walls is marked by the use of the pronoun " I " (xii. 31, 38, 40), it is probably now due as a whole to the chronicler, and when the more trustworthy memoirs of Nehemiah are resumed (xiii. 4 sqq.) the episodes, although placed twelve years later (ver. 6), are intimately connected with the preceding reforms (cf. xii. 44-xiii. 3 with xiii. 10 sqq., 23 sqq.). 3 Nehemiah's attitude towards intermarriage is markedly moderate in contrast to the drastic measures of Ezra, whose mission and work the simpler and perhaps earlier narratives of Nehemiah originally ignored, and the relation between the two is complicated further by the literary character of the memoir of Ezra.

To the last mentioned are prefixed (a) the scribe's genealogy, which traces him back to Aaron and names as his immediate ancestor, Seraiah, who had been slain 130 years previously (Ezr. vii. 1-5), and (b) an independent account of the return {vv. 6-10) with a reference to Ezra's renown, obviously not from the hand of Ezra himself. Whatever the original prelude to Ezra's thanksgiving may have been (vii. 27 seq.), we now have the essentially Jewish account of the letter of Artaxerxes with its unusual concessions. 4 The list of those who returned amounts to the moderate total of 1496 males (viii., but 1690 in 1 Esdr. viii. 30 sqq.). Ezra's mission was obviously concerned with the Law and Temple service (vii. 6, 10, 14 sqq., 25; viii. 17, 24-30, 33 sq.), but four months elapse between his return in the fifth month (vii. 9) and the preparations for the marriage reforms in the ninth (x. 9), and there is a delay of twelve years before the Law is read (Neh. viii.). The Septuagint version (1 Esdr. ix.; cf. Josephus, Antiq. xi. 5. 5 and some modern scholars) would place

2 See further H. G. Mitchell, Journ. of Bibl. Lit. (1903), pp. 88 sqq.

3 The chronological difficulties will be seen from xiii. 6 (" before this "), which would imply that the dedication of the walls was on the occasion of Nehemiah's later visit (see G. A. Smith, Expositor, July 1906, p. 12). His previous departure is perhaps foreshadowed in vii. 2.

4 See Ency. Bib. col. 1480. Papyri from a Jewish colony in Elephantine (407 B.C.) clearly show the form which royal permits

could take, and what the Jews were prepared to give in return ; the points of resemblance are extremely interesting, but compared with the biblical documents the papyri reveal some striking differences.

no

the latter after Ezr. x., but more probably this event (dated in the seventh month) should precede the great undertaking in Ezr. ix. 1 That the adjustment was attended with considerable revision of the passages appears from a careful comparison of Neh. viii. sq. with Ezr. ix. sq. With Ezra's confession (ix. 6 sqq.) compare the prayer in Neh. ix. 5 sqq., which the Septuagint ascribes to him. In Ezr. x. (written in the third person) the number of those that had intermarried with the heathen is relatively small considering the general trend of the preliminaries, and the list bears a marked resemblance to that in ch. ii. It ends abruptly and obscurely (x. 44; cf. 1 Esdr. ix. 30), and whilst as a whole the memoirs of Ezra point to ideas later than those of Nehemiah, the present close literary connexion between them is seen in the isolated reference to Johanan the son of Eliashib in Ezra x. 6, which seems to be connected with Neh. xiii. 7, and (after W. R. Smith) in the suitability of ib. xiii. 1, 2 between Ezr. x. o and 10. The list of signatories in Neh. x. 1-27 should be compared with the names in xii. and 1 Chron. xxiv.; the true connexion of ix. 38 is very obscure, and the relation to Ezr. ix. seq. is complicated by the reference to the separation from the heathen in Neh. ix. 2. The description of the covenant CNeh. x. 28 sqq., marked by the use of " we ") is closely connected with xii. 43-xiii. 3 (from the same or an allied source), and anticipates the parallel though somewhat preliminary measures detailed in the more genuine memoirs (Neh. xiii. 4 sqq.).. Finally, the specific allusion in xiii. 1-3 to Ammon and Moab is possibly intended as an introduction to the references to Tobiah and Sanballat respectively (w. 4 seq., 28).

5. Summary. — The literary and historical criticism of Ezra- Nehemiah is closely bound up with that of Chronicles, whose characteristic features it shares. Although the three formed a unit at one stage it may seem doubtful whether two so closely related chapters as 1 Chron. ix. and Neh. xi. would have appeared in one single work, while the repetition of Neh. vii. 6— viii. 1 in Ezr. ii.-iii. 1 is less unnatural if they had originally appeared in distinct sources. Thus other hands apart from the compiler of Chronicles may have helped to shape the narratives, either before their union with that book or after their separation. 2 The present intricacy is also due partly to specific historical theories regarding the post-exilic period. Here the recension in 1 Esdras especially merits attention for its text, literary structure and for its variant traditions. 3 Its account of a return in the time of Darius scarcely arose after Ezr. i.-iii. (Cyrus) ; the reverse seems more probable, and the possibility of some confusion or of an intentional adjustment to the earlier date is emphasized by the relation between the popular feeling in Ezr. iii. 12 (Cyrus) and Hag. ii. 3 (Darius), and between the grant by Cyrus in iii. 7 (it is not certain that he held Phoenicia) and the permit of Darius in 1 Esdr. iv. 47-57 (see v. 48). To the latter context belongs the list of names which reappears in Ezr. ii. (Cyrus). But from the independent testimony of Haggai and Zechariah it is doubtful whether the chronicler's account of the return under Cyrus is at all trustworthy. The list in 1 Esdr. v., Ezr. ii., as already observed, appears to be in its more, original context in Neh. vii., i.e. in the time of Artaxerxes, and it is questionable whether the earliest of the surviving detailed traditions in Ezra-Nehemiah went back before this reign. It is precisely at this age that there is evidence for a return, apparently other than that of Ezra or Nehemiah (see Ezr. iv. 12), yet no account seems to be preserved unless the records were used for the history of earlier periods (cf . generally Ezr. iii. 1 2 sq. with Neh.

1 C. C. Torrev, Comp. and Hist. Value of Ezra-Nek. (Beihefte of Zeit.f. alttest. Wissens., 1896), pp. 30-34; C. F. Kent, Israel's Hist, and Biog. Narratives, pp. 32, 369. Since Neh. vii. 70-73 is closely joined to viii., the suggested transposition would place its account of the contributions to the temple in a more appropriate context (cf. Ezr. viii. 24-30, 33 sq.). .

2 For linguistic evidence reference should be made to J. Geissler, Vie litterarischen Beziehungen d. Esramemoiren (Chemnitz, 1899).

3 See especially Sir Henry Howorth, Proc. of Society of Bibl. Arch. (1901-1904), passim; C. C. Torrey, Ezra Studies (Chicago, 1910). For the text, see A. Klostermann, Real-Ency. f. prot. Tkeol. v. 501 sqq.; H.

Guthe in Haupt's Sacred Books of Old Testament (1899); and S. A. Cook in R. H. Charles, Apocrypha and Pseudepigrapha.

viii. 9-1 1 ; Ezr. iii. 7 with the special favour enlisted on behalf of the Jews in vi. 7 sq., 13, vii. 21; Neh. ii. 7 sq.). But the account of the events in the reign of Artaxerxes is extremely perplexing. Since the building of the walls of Jerusalem must have begun early in the fifth month (Neh. vi. 15), an allowance of three days (ii. n) makes the date of Nehemiah 's arrival practically the anniversary of Ezra's return (Ezr. vii. 9, viii. 32). Considering the close connexion between the work of the two men this can hardly be accidental. The compiler, however, clearly intends Neh. vi. 15 (25th of sixth month) to be the prelude to the events in Neh. vii. 73, viii. (seventh month), but the true sequence of Neh. vi. sqq. is uncertain, and thf possibility of artificiality is suggested by the unembellished statement of Josephus that the building of the walls occupied, not fifty-two days, but two years four months {Ant. xi. 5. 8). The present chronological order of Nehemiah's work is confused (cf. §4, n. 3), and the obscure interval of twelve years in his work corresponds very closely to that which now separates the records of Ezra's labours. However, both the recovery of the compilers' aims and attempted reconstructions are precluded from finality by the scantiness of independent historical evidence. (See further Jews: History, §21 seq.)

Bibliography. — S. R. Driver, Lit. of the 0. T. (1909), pp. 540 sqq. and the commentaries of H. E. Ryle (Camb. Bible, 1893), C. Siegfried (1901), A. Bertholet (1902), and T. W. Davies (Cent. Bible, 1909). Impetus to recent criticism of these books starts with Van Hoonacker (Neh. et Esd. [1890]; see also Expos. Times [1897], pp. 351-354, and M.-J. Lagrange, Rev. biblique, iii. 561-585 [1894], iv. 186-202 [1895]) and W. H. Kosters (Germ, ed., Wiederherstellung Israels, 1895). The latter's important conclusions (for which see his article with Cheyne's additions in Ency. Bib. col. 1473 sqq., 3380 sqq.) have been adversely criticized, especially by J. Wellhausen (Nachrichlen of the Univ. of Gottingen, 1895, pp. 166-186), E. Meyer (Entslehung d. Judentums, 1896), J. Nikel (Wiederherstellung d. jiid. Gemein., 1900), and S. Jampel in Monatsschrift f. Gesch. u. Wissens. d. Judentums, vols, xlvi.-xlvii. (1902-1903). The negative criticisms of Kosters have, however, been strengthened by his replies (in the Dutch Theolog. Tijdschrift) , and by the discussions of C. C. Torrey and C. F. Kent (op. oil) and of G. Jahn (Esra u. Neh. pp. i-lxxviii ; 1909), and his general position appears to do more justice to the biblical evidence as a whole. (S. A. C.)

EZZO, or Ehrenfried (c. 954-1024), count palatine in Lor- raine, was

the son of a certain Hermann (d. c. 1000), also a count palatine in Lorraine who had possessions in the neighbourhood of Bonn. Having married Matilda (d. 1025), a daughter of the emperor Otto II., Ezzo came to the front during the reign of his brother-in-law, the emperor Otto III. (983-1002); his power was increased owing to the liberal grant of lands in Thuringia and Franconia which he received with his wife, and some time later his position as count palatine was recognized as an hereditary dignity. Otto's successor, the emperor Henry II., was less friendly towards the powerful count palatine, though there was no serious trouble between them until ion; but some disturb- ances in Lorraine quickly compelled the emperor to come to terms, and the assistance of Ezzo was purchased by a gift of lands. Henceforward the relations between Henry and his vassal appear to have been satisfactory. Very little is known about Ezzo's later life, but we are told that he died at a great age at Saalfeld on the 2 1st of March 1024. He left three sons, among them being Hermann, who was archbishop of Cologne from 1036 to 1056, and Otto, who was for a short time duke of Swabia; and seven daughters, six of whom became abbesses. Ezzo founded a monastery at Brauweiler near Cologne, the place where his marriage had been celebrated. This was dedicated in 1028 by Piligrim, archbishop of Cologne, and here both Ezzo and his wife were buried.

EZZOLIED, or Anegenge, an old German poem, written by Ezzo, a scholar of Bamberg. It was written about 1060, but not, as one authority asserts, composed while the author was making a pilgrimage to Jerusalem. The subject of the poem is the life of Christ. Very popular during the later middle ages, the Ezzolied had a great influence on the poetry of south Germany, and is valuable as a monument of the poetical literature of the time.

The text is printed in the Denkmaler deutscher Poesie und Prosa aus dem 8-12. Jahrhundert (Berlin, 1892) of C. V. Miillenhoff and VV. Scherer.

F— FABER, F. W.

m

FThis is the sixth letter of the English alphabet as it was of the Latin. In the ordinary Greek alphabet the symbol has disappeared, although it survived far into historical times in many Greek dialects as F, the digamma, the use of which in early times was inductively proved by Bentley, when comparatively little was known of the local alphabets and dialects of Greece. The so-called stigma r, which serves for the

numeral 6, is all that remains to represent it. This symbol derives its name from its resemblance in medieval MSS. to the abbreviation for or. The symbol occupying the same posi- tion in the Phoenician alphabet was Vau (f-j- ˆy-‘), which seems to be represented by the Greek T, the Latin V, at the end of the early alphabet. Many authorities therefore contend that F is only a modification of the preceding symbol E and has nothing to do with the symbol Vau. In some early Latin inscriptions F is represented by I 1 , as E is by 1 1. It must be admitted that the resemblance between the sixth symbol of the Phoenician alphabet and the corresponding symbol of the European alphabet is not striking. But the position of the limbs of symbols in early alphabets often varies surprisingly. In Greek, besides F we find for /in Pamphylia (the only Greek district in Asia which possesses the symbol) ˆ, and in Boeotia, Thessaly, Tarentum, Cumae and on Chalcidian vases of Italy the form E, though except at Cumae and on the vases the form F exists contemporaneously with E or even earlier. At the little town of Falerii (Civita Castellana) , whose alphabet is undoubtedly of the same origin as the Latin, F takes the form / f. Though uncertain, therefore, it seems not impossible that the original symbol of the Phoenician alphabet, which was a consonant like the English w, may have been differentiated in Greek into two symbols, one indicating the consonant value w and retaining the position of the Phoenician consonant Vau, the other having the vowel value u, which ultimately most dialects changed to a modified sound like French u or German ii. Be this as it may, the value of the symbol F in Greek was w, a bilabial voiced sound, not the labio-dental unvoiced sound which we call /. When the Romans adopted the Greek alphabet they took over the symbols with their Greek values. But Greek had no sound corresponding to the Latin /, for 4> was pronounced p-h, like the final sound of lip in ordinary English or the initial sound of pig in Irish English. Consequently in the very old inscription on a gold fibula found at Praeneste and published in 1887 (see Alphabet) the Latin /is represented by FB. Later, as Latin did not use F for the consonant written as v in vis, &c, H was dropped and F received a new special value in Latin as repre- sentative of the unvoiced labio-dental spirant. In the Oscan and Umbrian dialects, whose alphabet was borrowed from Etruscan, a special form appears for /, viz. 8, the old form E being kept for the other consonant v (i.e. English w). The 8 has generally been asserted to be developed out of the second element in the combination FB, its upper and lower halves being first converted into lozenges, §, which naturally changed to 8 when inscribed without lifting the writing or incising im- plement. Recent discoveries, however, make this doubtful (see Alphabet). (P. Gi.)

FABBRONI, ANGELO (1732-1803), Italian [biographer, was born at Marradi in Tuscany on the 25th of September 1732. After studying at Faenza he entered the Roman college founded for the education of young Tuscans. On the conclusion of his studies he continued his stay in Rome, and having been introduced to the celebrated Jansenist Bottari, received from him the canonry of Santa Teresa in Trastevere. Some time after this he was chosen to preach a discourse in the pontifical chapel before Benedict XIV. and made such a favourable impression that the pontiff settled on him an annuity, with the possession of which Fabbroni was able to devote his whole time to study. He was

intimate with Leopold I., grand-duke of Tuscany, but the Jesuits disliked him on account of his Jansenist views. Besides his other literary labours he began at Pisa in 1771 a literary journal, which he continued till 1796. About 1772 he made a journey to Paris, where he formed the acquaintance of Condorcet, Diderot, d'Alembert, Rousseau and most of the other eminent Frenchmen of the day. He also spent four months in London. He died at Pisa on the 22nd of September 1803.

The following are his principal works: — Vitae Italorum doctrina excellentium qui saeculis XVII. et XVIII. floruerunt (20 vols., Pisa, 1778-1799, 1804-1805), the last two vols., published post- humously, contain a life of the author; Laurentii Medicei Magnifici Vita (2 vols., Pisa, 1784), a work which served as a basis for H. Roscoe's Life of Lorenzo dei Medici; Leonis X. pontiUcis maximi Vita (Pisa, 1797) ; and Elogi ii Dante Alighieri, di Angelo Poliziano, di Lodovico Ariosto, e di Torq. Tasso (Parma, 1800).

FABER, the name of a family of German lead-pencil manu- facturers. Their business was founded in 1760 at Stein, near Nuremberg, by Kaspar Faber (d. 1784). It was theninherited by his son Anton Wilhelm (d. 18 19). Georg Leonhard Faber suc- ceeded in 1810 (d. 1839), and the business passed to JohannLothar von Faber (1817-1896), the great-grandson of the founder. At the time of his assuming control about twenty hands were em- ployed, under old-fashioned conditions, and owing to the inven- tion of the French crayons ContSs of Nicolas Jacques Conte (q.v.) competition had reduced the entire Nuremberg industry to a low ebb (see Pencil) . Johann introduced improvements in machinery and methods, brought his factory to the highest state of efficiency, and it became a model for all the other German and Austrian manu- facturers. He established branches in New York, Baris, London and Berlin, and agencies in Vienna, St Petersburg and Hamburg, and made his greatest coup in

1856, when he contracted for the exclusive control of the graphite obtained from the East Siberian mines. Faber had also branched out into the manufacture of water-colour and oil paints, inks, slates and slate-pencils, and engineers' and architects' drawing instruments, and built additional factories to house his various industries at New York and at Noisy-le-Sec, near Paris, and had his own cedar mills in Florida. For his services to German industry he received a patent of nobility and an appointment as councillor of state. After the death of his widow (1903) the business was inherited by his grand-daughter Countess Otilie von Faber- Castell and her husband, Count Alexander.

FABER, BASIL (1520-c. 1576), Lutheran schoolmaster and theologian, was born at Sorau, in lower Lusatia, in 1520. In 1538 he entered the university .of Wittenberg, studying as pauper gratis under Melanchthon. Choosing the schoolmaster's profession, he became successively rector of the schools at Nordhausen, Tennstadt (1555), Magdeburg (1557) and Quedlin- burg (1560). From this last post he was removed in December 1570 as a Crypto-Calvinist. In 1571 he was appointed to the Raths-gymnasium at Erfurt, not as rector, but as director (Vorsteher). In this situation he remained till his death in 1575 or 1576. His translation of the first twenty-five chapters of Luther's commentary on Genesis was published in 1557; in other ways he promoted the spread of Lutheran views. He was a contributor to the first four of the Magdeburg Centuries. He is best known by his Thesaurus eruditionis scholasticae (1571; last edition, improved by J. H. Leich, 1749, folio, 2 vols.); this wasfollowed by his Libellus de disciplina scholastica (1572).

See Wagenmann and G.Muller in Herzog-Hauck's Realencyklopddie (1898). (A. Go.*)

FABER, FREDERICK WILLIAM (1814-1863), British hymn writer and theologian, was born on the 28th of June 1814 at Calverley, Yorkshire, of which place his grandfather, Thomas Faber, was vicar. He attended the grammar school of Bishop Auckland for a short time, but a large portion of his boyhood was spent in Westmorland. He afterwards went to Harrow

and to Balliol College, Oxford. In 1835 he obtained a scholar- ship at University College; and in 1836 he gained the Newdigate prize for a poem on " The Knights of St John," which elicited special praise from

Keble. Among his college friends were Dean Stanley and Roundell Palmer, 1st earl of Selborne. In January 1837 he was elected fellow of University College. Meanwhile he had given up the Calvinistic views of his youth, and had become an enthusiastic follower of John Henry Newman. In 1841 a travelling tutorship took him to the continent; and on his return a book appeared called Sights and Thoughts in Foreign Churches and among Foreign Peoples (London, 1842), with a dedication to his friend the poet Wordsworth. He accepted the rectory of Elton in Huntingdonshire, but soon after went again to the continent, in order to study the methods of the Roman Catholic Church; and after a prolonged mental struggle he joined the Roman Catholic communion in November 1845. He founded a religious community at Birmingham, called Wilf ridians, which was ultimately merged in the oratory of St Philip Neri, with John Henry Newman as Superior. In 1849 a branch of the oratory — subsequently independent — was established in London, first in King William Street, and afterwards at Brompton, over which Faber presided till his death on the 26th of September 1863. In spite of his weak health, an almost incredible amount of work was crowded into those years. He published a number of theological works, and edited the Oratorian Lives of the Saints. He was an eloquent preacher, and a man of great charm of character. It is mainly as a hymn-writer, however, that Faber is remembered. Among his best-known hymns are: — ” The Greatness of God,” ” The Will of God,” ” The Eternal Father,” ” The God of my Childhood, ” ” Jesus is God,” ” The Pilgrims of the Night,” ” The Land beyond the Sea,” ” Sweet Saviour, bless us ere we go,” ” I was wandering and weary,” and ” The Shadow of the Rock.” The hymns are largely used in Protestant collections. In addition to many pamphlets and translations, Faber published the following works: All for Jesus; The Precious Blood; Bethlehem; The Blessed Sacrament; The Creator and the Creature; Growth of Holiness; Spiritual Con- ferences; The Foot of the Cross (8 vols., London, 1853-1860).

See his Life and Letters, by Father J. E. Bowden (London, 1869), and A Brief Sketch of the Early Life of the late F. W. Faber, D.D., by his brother the Rev. F. A. Faber (London, 1869).

FABER, Fabri or Fabry (surnamed Stapulensis), JACOBUS [Jacques Lefevre d’Etaples] (c. 1455-e. 1536), a pioneer of the Protestant movement in France, was born of humble parents at Etaples, in Pas de Calais, Picardy, about 1455. He appears to have been possessed of considerable means. He had already been ordained priest when he entered the university of Paris for higher education. Hermonymus of Sparta was his master in Greek. He visited Italy before i486, for he heard the lectures of Argyro- pulus, who died in that year; he formed

a friendship with Paulus Aemilius of Verona. In 1492 he again travelled in Italy, studying in Florence, Rome and Venice, making himself familiar with the writings of Aristotle, though greatly influenced by the Platonic philosophy. Returning to Paris, he became professor in the college of Cardinal Lemoine. Among his famous pupils were F. W. Vatable and Farel; his connexion with the latter drew him to the Calvinistic side of the movement of reform. At this time he began the publication, with critical apparatus, of Boetius (De Arithmetica) , and Aristotle's Physics (1492), Ethics (1497), Metaphysics (1501) and Politics (1506). In 1507 he took up his residence in the Benedictine Abbey of St Germain des Pr6s, near Paris; this was due to his connexion with the family of Briconnet (one of whom was the superior), especially with William Bri- connet, cardinal bishop of St Malo (Meaux). He now began to give himself to Biblical studies, the first-fruit of which was his Quintuplex Psallerium: Gallicum, Romanum, Hebraicum, Vetus, Conciliatum (1509); the Conciliatum was his own version. This was followed by 5. Pauli Epistolae xiv. ex vulgata editione, adjecla intelligentia ex Graeco cum commentariis (1512), a work of great independence and judgment. His De Maria Magdalena et triduo Christi disceptatio (15 17) provoked violent controversy and was condemned by the Sorbonne (1521). He had left Paris

during the whole of 1520, and, removing to Meaux, was appointed (May 1, 1523) vicar-general to Bishop Brigonnet, and published his French version of the New Testament (1523). This (con- temporary with Luther's German version) has been the basis of all subsequent translations into French. From this, in the same year, he extracted the versions of the Gospels and Epistles " a l'usage du diocese de Meaux." The prefaces and notes to both these expressed the view that Holy Scripture is the only rule of doctrine, and that justification is by faith alone. He incurred much hostility, but was protected by Francis I. and the princess Margaret. Francis being in captivity after the battle of Pavia (February 25, 1525), Faber was condemned and his works suppressed by commission of the parlement; these measures were quashed on the return of Francis some months later. He issued Le Psaulier de David (1525), and was appointed royal librarian at Blois (1526); his version of the Pentateuch appeared two years later. His complete version of the Bible (1530), on the basis of Jerome, took the same place as his version of the New Testament. Margaret (now queen of Navarre) led him to take refuge (1 531) at Nerac from persecution. He is said to have been visited (1533) by Calvin on his flight from France. He died in 1536 or 1537.

See C. H. Graf, Essai sur la vie et les ecrits (1842); G. Bonet- Maury, in

A. Herzog-Hauck's Realencyklopadie (1898). (A. Go.*)

FABER (or Lefevre), JOHANN (1478-1541), German theo- logian, styled from the title of one of his works " Malleus Haereticorum," son of one Heigerlin, a smith (faber), was born at Leutkirch, in Swabia, in 1478. His early life is obscure; the tradition that he joined the Dominicans is untenable. He studied theology and canon law at Tubingen and at Freiburg im Breisgau, where he matriculated on the 26th of July 1509, and graduated M.A. and doctor of canon law. He was soon appointed vicar of Lindau and Leutkirch, and shortly afterwards canon of Basel. In 1 5 18 Hugo von Landenberg, bishop of Constance, made him one of his vicars-general, and Pope Leo X. appointed him papal protonotary. He was an advocate of reforms, in sympathy with Erasmus, and corresponded (1510-1520) with Zwingli. While he defended Luther against Eck, he was as little inclined to adopt the position of Luther as of Carlstadt. His journey to Rome in the autumn of 152 1 had the result of estranging him from the views of the Protestant leaders. He published Opus adversus nova quaedam dogmata Lulheri (1522), and appeared as a disputant against Zwingli at Zurich (1523). Then followed his Malleus in haeresin Lutheranam (1524). Among his efforts to stem the tide of Protestant innovation was the establishment of a training- house for the maintenance and instruction of popular preachers, drawn from the lower ranks, to compete with the orators of reform. In 1526 he became court preacher to the emperor Ferdinand, and in 1527 and 1528 was sent by him as envoy to Spain and England. He approved the death by burning of Balthasar Hubmeier, the Baptist, at Vienna on the 10th of March 1528. In 1531 he was consecrated bishop of Vienna, and combined with this (till 1538) the administration of the diocese of Neustadt. He died at Vienna on the 21st of May 1541. His works were collected in three volumes, 1537, 1539 and 1541.

See C. E. Kettner, Diss, de J. Fabri Vita Scriptisque (1737); Waeenmann and Egli in Herzog-Hauck's Realencyklopadie (1898).

(A. Go.*)

FABERT, ABRAHAM DE (1599-1660), marshal of France, was the son of Abraham Fabert, seigneur de Moulins (d. 1638), a famous printer who rendered great services, civil and military, to Henry IV. At the age of fourteen he entered the Gardes francaises, and in 1618 received a commission in the Piedmont regiment, becoming major in 1627. He distinguished himself repeatedly in the constant wars of the period, notably in La Rochelle and at the siege of Exilles in 1630. His bravery and engineering skill were again displayed in the sieges of Avesnes

and Maubeuge in 1637, and in 1642 Louis XIII. made him governor of the recently-acquired fortress of Sedan. In 1651 he became lieutenant-general, and in 1654 at the siege of Stenay he intro- duced new methods of siegecraft which anticipated in a measure the great improvements of Vauban. In 1658 Fabert was made a marshal of France, being the first commoner to attain that rank. He died at Sedan on the 17th of May 1660.

See Histoire du marechal de Fabert (Amsterdam, 1697); P. Barre, Vie de Fabert (Paris, 1752); A. Feillet, Le Premier Marechal de France plebeien (Paris, 1869) ; Bourelly, Le Marechal Fabert (Paris,

1880).

FABIAN [Fabianus], SAINT (d. 250), pope and martyr, was chosen pope, or bishop of Rome, in January 236 in succession to Anteros. Eusebius (Hist. Eccl. vi. 29) relates how the Christians, having assembled in Rome to elect a new bishop, saw a dove alight upon the head of Fabian, a stranger to the city, who was thus marked out for this dignity, and was at once proclaimed bishop, although there were several famous men among the candidates for the vacant position. Fabian was martyred during the persecution under the emperor Decius, his death taking place on the 20th of January 250, and was buried in the catacomb of Calixtus, where a memorial has been found. He is said to have baptized the emperor Philip and his son, to have done some build- ing in the catacombs, to have improved the organization of the church in Rome, to have appointed officials to register the deeds of the martyrs, and to have founded several churches in France. His deeds are thus described in the Liber Pontificalis: ” Hie regiones dividit diaconibus et fecit vii subdiacones, qui vii notariis imminerent, ut gestas martyrum integro fideliter col- ligerent, et multas fabricas per cymiteria fieri praecepit.” Although there is very little authentic information about Fabian, there is evidence that his episcopate was one of great importance in the history of the early church. He was highly esteemed by Cyprian, bishop of Carthage; Novatian refers to his nobilissimae memoriae, and he corresponded with Origen. One authority refers to him as Flavian.

See the article on ” Fabian ” by A. Harnack in Herzog-Hauck’s Realencyklopddie, Band v. (Leipzig, 1898).

FABIUS, the name of a number of Roman soldiers and statesmen. The Fabian gens was one of the oldest and most distinguished patrician families of Rome. Its members claimed descent from Hercules and a daughter of the Arcadian Evander. From the earliest times it played a prominent part in Roman history, and was one of the two gentes exclusively charged with the management of the most ancient festival in Rome — the Lupercalia (Ovid, Fasti, ii. 375). The chief family names of the Fabian gens or clan, in republican times, were Vibulanus, Am- bustus, Maxim us, Buteo, Pictor, Dorso, Labeo; with surnames Verrucosus, Rullianus, Gurges.. Aemilianus, Allobrogicus (all of the Maximus branch). The most important members of the family are the following:—

1. Marcus Fabius Ambustus, pontifex maximus in the year of the capture of Rome by the Gauls (390). His three sons, Quintus, Numerius and Caeso, although they had been sent as ambassadors to the Gauls when they were besieging Clusium, subsequently took part in hostilities (Livy v. 35). The Gauls thereupon demanded their surrender, on the ground that they had violated the law of nations; the Romans, by way of reply, elected them consular tribunes in the following year. The result was the march of the Gauls upon Rome, the battle of the Allia, and the capture of the city (Livy vi. 1).

2. Q. Fabius Maximus, surnamed Rullianus or Rullus, master of the horse in the second Samnite War to L. Papirius Cursor, by whom he was degraded for having fought the Samnites contrary to orders (Livy viii. 30), in spite of the fact that he gained a victory. In 315, when dictator, he was defeated by the Samnites at Lautulae (Livy ix. 23). In 310 he defeated the Etruscans at the Vadimonian Lake. In 295, consul for the fifth time, he defeated, at the great battle of Sentinum, the combined forces of the Etrurians, Umbrians, Samnites and Gauls (see Rome: History, II. ” The Republic “). As censor (304) he altered the arrangement of Appius Claudius Caecus, whereby the freedmen were taken into all the tribes, and limited them to the four city tribes. For this he is said to have received the title of Maximus, as the deliverer of the comitia from the rule of the mob (Livy ix. 46), but there is reason to think that this title was first conferred on his grandson. It is probable that his achievements are greatly exaggerated by historians favourable to the Fabian house.

3. Quintus Fabius Maximus, surnamed Verrucosus (from a

wart on his lip), Ovicula (” the lamb,.” from his mild disposition), and Cunctalor (” the delayer,” from his cautious tactics in the war against Hannibal) , grandson of the preceding. He served his first consulship

in Liguria (233 B.C.), was censor (230) and consul for the second time (228). In 218 he was sent to Carthage to demand satisfaction for the attack on Saguntum (Livy xxi. 18). According to the well-known story, he held up a fold of his toga and offered the Carthaginians the choice between peace and war. When they declared themselves indifferent, he let fall his toga with the words, ” Then take war.” After the disastrous cam- paign on the Trebia, and the defeat on the banks of the Trasimene Lake, Fabius was named dictator (Livy calls him pro-dictator, since he was nominated, not by the consul, but by the people) in 2 17, and began his tactics of ” masterly inactivity.” Manoeuv- ring among the hills, where Hannibal’s cavalry were useless, he cut off his supplies, harassed him incessantly, and did everything except fight. His steady adherence to his plan caused dissatisfac- tion at Rome and in his own camp, and aroused the suspicion that he was merely endeavouring to prolong his command. Minucius Rufus, his master of the horse, seized the opportunity, during the absence of Fabius at Rome, to make an attack upon the enemy which proved successful. The people, more than ever convinced that a forward movement was necessary, divided the command between Minucius and Fabius (Livy xxii. 15. 24; Polybius iii. 88). Minucius was led into an ambuscade by Hannibal, and his army was only saved by the opportune arrival of Fabius. Minucius confessed his mistake and henceforth submitted to the orders of Fabius (Livy xxiii. 32). At the end of the legal time of six months Fabius resigned the dictatorship and the war was carried on by the consuls. The result of the abandonment of Fabian tactics was the disaster of Cannae (216). In 215 and 214 (as consul for the third and fourth times) he was in charge of the operations against Hannibal together with Claudius Marcellus (Livy xxiii. 39). He laid siege to Capua, which had gone over to Hannibal after Cannae, and captured the important position of Casilinum; in his fifth consulship (209) he retook Tarentum, which had been occupied by Hannibal for three years (Livy xxvii. 15; Polybius xiii. 4; Plutarch, Fabius). He died in 203. Fabius was a strenuous opponent of the new aggressive policy, and did all he could to prevent the invasion of Africa by Scipio. He was distinguished for calmness and prudence, while by no means lacking in courage when it was required. In his later years, however, he became morose, and showed jealousy of rising young men, especially Scipio (Life by Plutarch; Livy xx.xxx.; Poly bius iii. 87-106).

4. Q. Fabius Maximus Aemilianus, eldest son of L. Aemilius Paullus, adopted by Fabius Cunctator. He served in the last Macedonian War (168), and, as consul, defeated Viriathus in Spain (Livy, Epit. 52). He was the pupil and patron of Polybius (Polybius xviii., xxix. 6, xxxii.

8-10; Livy xliv. 35).

5. Q. Fabius Maximus Allobrogicus, son of the above, consul 121 in Gaul. He obtained his surname from his victory over the Allobroges and Arverni in that year (Veil. Pat. ii. 10; Eutropius iv. 22). As censor (108) he erected the first triumphal arch.

6. Q. Fabius Vibulanus, with his brothers Caeso and Marcus, filled the consulship for seven years in succession (485-479 B.C.). In the last year there was a reaction against the family, in con- sequence of Caeso espousing the cause of the plebeians. Thereupon the Fabii— to the number, it is said, of 306 patricians, with some 5000 dependents — emigrated from Rome under the leadership of Caeso, and settled on the banks of the Cremera, a few miles above Rome. For two years the exiles continued to be the city's chief defence against the Veientes, until at last they were surprised and cut off. The only survivor of the gens was Quintus, the sen of Marcus, who apparently took no part in the battle. The story ˆhat he had been left behind at Rome on account of his youth can- not be true, as he was consul ten years afterwards. This Quintus was consul in 467, 465 and 459, and a member of the second decern virate in 450, on the fall of which he went into voluntary exile (Livy ii. 42, 48-50, iii. 1, 9, 41, 58, vi. 1; Dion. Halic. viii. 82-86, ix. 14-22: Ovid, Fasti, ii. 195).

The Fabian name is met with as late as the 2nd century a.d. A complete list of the Fabii will be found in de Vit's Onomasticon ; see also VV. N. du Rieu, Disputatio de Gente Fabia (1856), containing an account of 57 members of the family.

FABIUS PICTOR, QUINTUS, the father of Roman history, was born about 254 B.C. He was the grandson of Gaius Fabius, who received the surname Pictor for his painting of the temple of Salus (302). He took an active part in the subjugation of the Gauls in the north of Italy (225), and after the battle of Cannae (216) was employed by the Romans to proceed to Delphi in order to consult the oracle of Apollo. He was the earliest prose writer of Roman history. His materials consisted of the Annates Maximi, Commentarii Consulares, and similar records; the chronicles of the great Roman families; and his own experiences in the Second Punic War. He is also said to have made much use of the Greek historian Diocles of Peparethus. His work, which was written in Greek, began with the arrival of Aeneas in Italy,

and ended with the Hannibalic war. Although Polybius and Dionysius of Halicarnassus frequently find fault with him, the first uses him as his chief authority for the Second Punic War. A Latin version of the work was in existence in the time of Cicero, but it is doubtful whether it was by Fabius Pictor or by a later writer with whom he was confused — Q. Fabius Maximus Ser- vilianus (consul 142); or there may have been two annalists of the name of Fabius Pictor.

Fragments in H. Peter, Historicorum Romanorum Fragmenta (1883) ; see also Annalists and Livy, and Teuffel-Schwabe, History of Roman Literature, § 116.

FABLE (Fr. fable, Lat. f alula). With certain restrictions, the necessity of which will be shown in the course of the article, we may accept the definition of ” fable ” which Dr Johnson pro- poses in his Life of Gay: ” A fable or apologue seems to be, in its genuine state, a narrative in which beings irrational, and some- times inanimate (arbores loquuntur, non tantum ferae) , are, for the purpose of moral instruction, feigned to act and speak with human interests and passions.” The description of La Fontaine, the greatest of fabulists, is a poetic rendering of Johnson’s definition: ” Fables in sooth are not what they appear; Our moralists are mice, and such small deer. We yawn at sermons, but we gladly turn To moral tales, and so amused we learn.” The fable is distinguished from the myth, which grows and is not made, the spontaneous and unconscious product of primitive fancy as it plays round some phenomenon of natural or historical fact. The literary myth, such as, for instance, the legend of Pandora in Hesiod or the tale of Er in the Republic of Plato, is really an allegory, and differs from the fable in so far as it is self interpreting; the story and the moral are intermingled throughout. Between the parable and the fable there is no clear line of demarcation, and theologians like Trench have unwarrant ably narrowed their definition of a parable to fit those of the New Testament. The soundest distinction is drawn by Neander. In the fable human passions and actions are attributed to beasts; in the parable the lower creation is employed only to illustrate the higher life and never transgresses the laws of its kind. But whether Jotham’s apologue of the trees choosing a king, perhaps the first recorded in literature, should be classed as a fable or a parable is hardly worth disputing. Lastly, we may point out the close affinity between the fable and the proverb. A proverb is often a condensed or fossilized fable, and not a few fables are amplified or elaborated proverbs.

The history of the fable goes back to the remotest antiquity, and Aesop has even less claim to be reckoned the father of the fable than

has Homer to be entitled the father of poetry. The fable has its origin in the universal impulse of men to express their thoughts in concrete images, and is strictly parallel to the use of metaphor in language. It is the most widely diffused if not the most primitive form of literature. Though it has fallen from its high place it still survives, as in J. Chandler Harris's Uncle Remusˆ and Rudyard Kipling's Jungle Book. The Arab of to-day will invent a fable at every turn of the conversation as the readiest form of argument, and in the Life of Coventry Patmore it is told how an impromptu fable of his about the pious dormouse found its way into Catholic books of devotion.

With the fable, as we know it, the moral is indispensable. As La Fontaine puts it, an apologue is composed of two parts, body and soul. The body is the story, the soul the morality. But if we revert to the earliest type we shall find that this is no longer the case. In the primitive beast-fable, which is the direct progenitor of the Aesopian fable, the story is told simply for its own sake, and is as innocent of any moral as the fairy tales of Little Red Riding-Hood and Jack and the Beanstalk. Thus, in a legend of the Flathead Indians, the Little Wolf found in cloud-land his grandsires the Spiders with their grizzled hair and long crooked nails, and they spun balls of thread to let him down to earth; when he came down and found his wife the Speckled Duck, whom the Old Wolf had taken from him, she fled in con- fusion, and this is why she lives and dives alone to this very day. Such animal myths are as common in the New World as in the Old, and abound from Finland and Kamtchatka to the Hottentots and Australasians. From the story invented, as the one above quoted, to account for some peculiarity of the animal world, or told as a pure exercise of the imagination, just as a sailor spins a yarn about the sea-serpent, to the moral apologue the transition is easy; and that it has been effected by savages unaided by the example of higher races seems sufficiently proved by the tales quoted by E. B. Tylor (Primitive Culture, vol. i. p. 411). From the beast-fables of savages we come next to the Oriental apologues, which we still possess in their original form. The East, the land of myth and legend, is the natural home of the fable, and Hindu- stan was the birthplace, if not of the original of these tales, at least of the oldest shape in which they still exist. The Pancha Tantra (2nd century B.C.), or fables of the Brahma Vishnu Sarman, have been translated from Sanskrit into almost every language and adapted by most modern fabulists. The Kalilah and Dimna (names of two jackals), or fables of Bidpai (or Pilpai), passed from India to western Europe through the successive stages of Pahlavi (ancient Persian), Arabic, Greek, Latin. By the end of the 16th century there were Italian, French and English versions. There is an excellent Arabic edition (Paris,

1816) with an introduction by Sylvestre de Sacy. The Hitopadesa, or ” friendly instruction,” is a modernized form of the same work, and of it there are three translations into English by Dr Charles Wilkins, Sir William Jones and Professor F. Johnson. The Hitopadesa is a complete chaplet of fables loosely strung together, but connected so as to form something of a continuous story, with moral reflections freely interspersed, purporting to be written for the instruction of some dissolute young princes. Thus, in the first fable a flock of pigeons see the grains of rice which a fowler has scattered, and are about to descend on them, when the king of the pigeons warns them by telling the fable of a traveller who being greedy of a bracelet was devoured by a tiger. They neglect his warning and are caught in the net, but are afterwards delivered by the king of the mice, who tells the story of the Deer, the Jackal and the Crow, to show that no real friendship can exist between the strong and the weak, the beast of prey and his quarry, and so on to the end of the volume. Another book of Eastern fables is well worthy of notice, Buddhaghosha’ s Parables, a commentary on the Dhammapada or Buddha’s Paths of Virtue. The original is in Pali, but an English translation of the Burmese version was made by Captain T. Rogers, R.E.

From Hindustan the Sanskrit fables passed to China, Tibet and Persia; and they must have reached Greece at an early age, for many of the fables which passed under the name of Aesop are identical with those of the East. Aesop to us is little more than a name, though, if we may trust a passing notice in Herodotus (ii. 134), he must have lived in the 6th century B.C. Probably his fables were never written down, though several are ascribed tohimby Xenophon, Aristotle, Plutarch and other Greek writers, and Plato represents Socrates as beguiling his last days by versifying such as he remembered. Aristophanes alludes to them as merry tales, and Plato, while excluding the poets from his ideal republic, admits Aesop as a moral teacher. Of the various versions of Aesop’s Fables, by far the most trustworthy is that of Babrius or Babrias, a Greek probably of the 3rd century A.D., who rendered them in choliambic verse. These,

which were long known in fragments only, were recovered in a MS. found by M. Minas in a monastery on Mount Athos in 1842, now in the British Museum. 1 An inferior version of the same in Latin iambics was made by Phaedrus, a slave of Thracian origin, brought to Rome in the time of Augustus and manumitted by him. Phaedrus professes to

polish in senarian verse the rough-hewn blocks from Aesop's quarry; but the numerous allusions to contemporary events, as, for example, his hit at Sejanus in the Frogs and the Sun, which brought upon the author disgrace and imprisonment, show that many of them are original or free adapta- tions. For some time scholars doubted as to the genuineness of Phaedrus's fables, but their doubts have been lately dispelled by a closer examination of the MSS. and by the discovery of two verses of a fable on a tomb at Apulum in Dacia. Phaedrus's style is simple, clear and brief, but dry and unpoetical; and, as Lessing has pointed out, he often falls into absurdities when he deserts his original. For instance, in Aesop the dog with the meat in his mouth sees his reflection in the water as he passes over a bridge; Phaedrus makes him see it as he swims across the river.

To sum up the characteristics of the Aesopian fable, it is artless, simple and transparent. It affects no graces of style, and we hardly need the text with which each concludes, 6 nfflos SijXoi on, k.t.X. The moral inculcated is that of Proverbial Philosophy and Poor Richard's A Imanacks. Aesop is no maker of phrases, but an orator who wishes to gain some point or induce some course of action. It is the Aesopian type that Aristotle has in view when he treats of the fable as a branch of rhetoric, not of poetry.

The Latin race was given to moralizing, and the language lent itself to crisp and pointed narrative, but they lacked the free play of fancy, the childlike " make-believe," to produce a national body of fables. With the doubtful exception of Phaedrus, we possess nothing but solitary examples, such as the famous apologue of Menenius Agrippa to the Plebs and the exquisite Town Mouse and Country Mouse of Horace's Satires.

The fables of the rhetorician Aphthonius about a.d. 400 in Greek prose, and those in Latin elegiac verse by Avianus, used for centuries as a text-book in schools, form in the history of the apologue a link between classical and rfledieval times. In a Latin dress, sometimes in prose, sometimes in regular verse, and sometimes in rhymed stanzas, the fable contributed, with other kinds of narratives, to make up the huge mass of stories which has been bequeathed to us by the monastic libraries. These served more uses than one. They were at once easier and safer reading than the classics. To the lazy monk they stood in place of novels; to the more industrious and gifted they fur- nished an exercise on a par with Latin verse composition in our public schools; the more original transformed them into fabliaux, or embodied them in edifying stories, as in the Gesta Romanorum. It is not in the Speculum Doclrinale of Vincent de Beauvais, a Dominican of the 12th

century, nor in the collection of his contemporary Odo de Cerinton, an English Cistercian, nor in Planudes of the 14th century, whose one distinction is to have added to the fables a life of Aesop, that the direct lineage of La Fontaine must be traced. It is the fabliaux that inspired some of his best fables — the Lion's Court, the Young Widow, the Coach and the Fly.

As the supremacy of Latin declined and modern languages began to be turned to literary uses, the fable took a new life. Not only were there numerous adaptations of Aesop, known as Ysopets, but Marie de France in the 13th century composed many original fables, some rivalling La Fontaine's in simplicity and gracefulness. Later, also, fables were not wanting, though not numerous, in the English tongue. Chaucer has given us one, in his Nonne Preste's Tale, which is an expansion of the fable Don Coc et don Werpil of Marie de France; another is Lydgate's tale of The Churl and the Bird.

Several of Odo's tales, like Chaucer's story, can be ultimately

1 M. Minas professed to have discovered under the same circumstances another collection of ninety-four fables by Babrius. This second part was accepted by Sir G. C. Lewis, but J. Conington conclusively proved it spurious, and probably a forgery. See Babrius.

traced to the History of Reynard the Fox. This great beast-epic has been referred by Grimm as far back as the 10th century, and is known to us in three forms, each with independent episodes, but all woven upon a common basis. The Latin form is probably the earliest, and the poems Reinardus and Ysengrinus date from the 10th or nth century. Next come the German versions. The most ancient, that of a minnesinger Heinrich der Glichesaere (probably a Swabian) , was analysed and edited by Grimm in 1 840. The French poem of more than 30,000 lines, the Roman du RSnard, belongs probably to the 13th century. In 1498 appeared Reynke de Voss, .almost a literal version in Low Saxon of the Flemish poem of the 12th century, Reinaert de Vos. Hence the well-known version of Goethe into modern German hexameters was taken. The poem has been well named " an unholy world Bible." In it the Aesopian fable received a development which was in several respects quite original. We have here no short and unconnected stories. Materials, partly borrowed from older apologues, but in a much greater proportion new, are worked up into one long and systematic tale. The moral, so prominent in the fable proper, shrinks so far into the background, that the epic might be considered a work of pure fiction, an animal romance. The attempts to discover in it personal satire have signally failed; some critics deny even the

design to represent human conduct at all; and we can scarcely get nearer to its signification than by regarding it as being, in a general way, what Carlyle has called " a parody of human life." It represents a contest maintained successfully, by selfish craft and audacity, against enemies of all sorts, in a half -barbarous and ill-organized society. With his weakest foes, like Chaunteclere the Cock, Reynard uses brute-force; over the weak who are protected, like Kiward the Hare and Belin the Ram, he is victorious by uniting violence with cunning; Bruin, the dull, strong, formidable Bear, is humbled by having greater power than his own enlisted against him; and the most dangerous of all the fox's enemies, Isengrim, the obstinate, greedy and implacable Wolf, after being baffled by repeated strokes of malicious ingenuity, forces Reynard to a single combat, but even thus is not a match for his dexterous adversary. The knavish fox has allies worthy of him in Grimbart the watchful badger, and in his own aunt Dame Rukenawe, the learned She-ape; and he plays at his pleasure on the simple credulity of the Lion-King, the image of an impotent feudal sovereign. The characters of these and other brutes are kept up with a rude kind of consistency, which gives them great liveliness; many of the incidents are devised with much force of humour; and the sly hits at the weak points of medieval polity and manners and religion are incessant and palpable.

It is needless to trace the fable, or illustrations borrowed from fables, that so frequently occur as incidental ornaments in the older literature of England and other countries. It has appeared in every modern nation of Europe, but has nowhere become very important, and has hardly ever exhibited much originality either of spirit or of manner. In English, Prior transplanted from France some of La Fontaine's ease of narration and artful artlessness, while Gay took as his model the Contes rather than the Fables.' Gay's fables are often political satires, but some, like the Fox on his Deathbed, have the true ring, and in the Hare with many Friends there is genuine pathos. To Dryden's spirited remodel- lings of old poems, romances and fabliaux, the name of fables, which he was pleased to give them, is quite inapplicable. In German, Hagedorn and Gellert, both famous in their day and the latter extolled by Goethe, are quite forgotten; and even Lessing's fables are read by few but schoolboys. In Spanish, Yriarte's fables on literary subjects are sprightly and graceful, but the critic is more than the fabulist. A spirited version of the best appeared in Blackwood's Magazine, 1839. Among Italians Pignotti is famous for versatility and command of rhythm, as amongst Russians is Kriloff for his keen satire on Russian society. He has been translated into English by Ralston.

France alone in modern times has attained any pre-eminence in the

fable, and this distinction is almost entirely owjuig to one author. Marie de France in the 13th century, Gilles Corrozet, Guillaume Haudent and Guillaume Gueroult in the 16th, are now

studied mainly as the precursors of La Fontaine, from whom he may have borrowed a stray hint or the outline of a story. The unique character of his work has given a new word to the French language: other writers of fables are called fabidistes, La Fontaine is named le fablier. He is a true poet; his verse is exquisitely modulated; his love of nature often reminds us of Virgil, as do his tenderness and pathos (see, for instance, The Two Pigeons and Death and the Woodcutter). He is full of sly fun and delicate humour; like Horace he satirizes without wounding, and ” plays around the heart.” Lastly, he is a keen observer of men. The whole society of the 17th century, its greatness and its foibles, its luxury and its squalor, from Le grand monarque to the poor manant, from his majesty the lion to the courtier of an ape, is painted to the life. To borrow his own phrase, La Fontaine’s fables are ” une ample comedie a cent actes divers.” Rousseau did his best to discredit the Fables as immoral and corruptors of youth, but in spite of Emile they are studied in every French school and are more familiar to most Frenchmen than their breviary. Among the successors of La Fontaine the most distinguished is Florian. He justly estimates his own merits in the pretty apologue that he prefixed to his Fables. He asks a sage whether a fabulist writing after La Fontaine would not be wise to consign his work to the flames. The sage replies by a question: ” What would you say did some sweet, ingenuous Maid of Athens refuse to let herself be seen because there was once a Helen of Troy ? ”

The fables of Lessing represent the reaction against the French school of fabulists. ” With La Fontaine himself,” says Lessing, ” I have no quarrel, but against the imitators of La Fontaine I enter my protest.” His attention was first called to the fable by Gellert’s popular work published in 1 746. Gellert’s fables were closely modelled after La Fontaine’s, and were a vehicle for lively railings against the fair sex, and hits at contemporary follies. Lessing’s early essays were in the same style, but his subsequent study of the history and theory of the fable led him to discard his former model as a perversion of later times, and the ” Fabeln,” published in 1759, are the outcome of his riper views. Lessing’s fables, like all that he wrote, display his vigorous common sense. He has, it is true, little of La Fontaine’s curiosa felicitas, his sly humour and lightness of touch; and

Frenchmen would say that his criticism of La Fontaine is an illustration of the fable of the sour grapes. On the other hand, he has the rare power of looking at both sides of a moral problem; he holds a brief for the stupid and the feeble, the ass and the lamb; and in spite of his formal protest against poetical ornament, there' is in not a few of his fables a vein of true poetry, as in the Sheep (ii. 13) and Jupiter and the Sheep (ii. 18). But the monograph which introduced the Fabeln is of more inportance than the fables themselves. According to Lessing the ideal fable is that of Aesop. All the elaborations and refinements of later authors, from Phaedrus to La Fontaine, are perversions of this original. The fable is essentially a moral precept illustrated by a single example, and it is the lesson thus enforced which gives to the fable its unity and makes it a work of art. The illustration must be either an actual occurrence or represented as such, because a fictitious case invented ad hoc can appeal but feebly to the reader's judgment. Lastly, the fable requires a story or connected chain of events. A single fact will not make a fable, but is only an emblem. We thus arrive at the following definition: — " A fable is a relation of a series of changes which together form a .whole. The unity of the fable consists herein, that all the parts lead up to an end, the end for which the fable was invented being the moral precept."

We may notice in passing a problem in connexion with the fable which had long been debated, but never satisfactorily resolved till Lessing took it in hand — -Why should animals have been almost universally chosen as the chief dramatis personae ? The reason, according to Lessing, is that animals have distinct characters which are known and recognized by all. The fabulist who writes of Britannicus and Nero appeals to the few who know Roman history. The Wolf and the Lamb comes home to every one whether learned or simple. But, besides this,

human sympathies obscure the moral judgment; hence it follows that the fable, unlike the drama and the epos, should abstain, from all that is likely to arouse our prejudices or our passions. In this respect the Wolf and the Lamb of Aesop is a more perfect fable than the Rich Man and the Poor Man's Ewe Lamb of Nathan. Lessing's analysis and definition of the fable, though he seems himself unconscious of the scope of his argument, is in truth its death-warrant. The beast-fable arose in a primitive age when men firmly believed that beasts could talk and reason, that any wolf they met might be a were-wolf, that a peacock might be a Pythagoras in disguise, and an ox or even a cat a being worthy of their worship. To this succeeded the second age of the fable, which belongs to the same stage of culture as the Hebrew

proverbs and the gnomic poets of Greece. That honesty is the best policy, that death is common to all, seemed to the men of that day profound truths worthy to be embalmed in verse or set off by the aid of story or anecdote. Last comes an age of high literary culture which tolerates the trite morals and ha ckneyed tales for the sake of the exquisite setting, and is amused at the wit which introduces topics and characters of the day under the transparent veil of animal life. Such an artificial product can be nothing more than the fashion of a day, and must, like pastoral poetry, die a natural death. A serious moralist would hardly choose that form to inculcate, like Mandeville in his Fable of the Bees, a new doctrine in morals, for the moral of the fable must be such that he who runs may read. A true poet will not care to masquerade as amoral teacher, or show his wit by refurbishing some old-world maxim. Yet Taine in France, Lowell in America, and J. A. Froude in England have proved that the fable as one form of literature js not yet extinct, and is capable of new and unexpected developments.

Bibliography. — Pantschatanlrum, ed. Kosegarten (Bonn, 1848); Hitopadesa, ed. Max Muller (1864) ; Silvestre de Sacy, Calilah et Dimna, ou Fables de Bidpai, en Arabe, precedees d'un memoire sur Vorigine de ce livre (Paris, 1816), translated by the Rev. Wyndham Knatchbull (Oxford, 1819); Comparetti, Ricerche intorno al Libro di Sindebad (Milan, 1869); Max Muller, " Migration of Fables," Chips from a German Workshop, vol. iv. (1875); Keller, Vnter- suchungen tiber die Geschichte der griechischen Fabel (Leipzig, 1862); Babrius, ed. W. G. Rutherford, with excursus on Greek fables (1883); L. Hervieux, Les Fabulistes latins (1884); Jakob Grimm, Reinhart Fuchs (Berlin, 1834); A. C. M. Robert, Fables inediles des XII', XIII" et XIV siecles, &c. (Paris, 1825); Taine, Essai sur les fables de La Fontaine (1853); Saint-Marc Girardin, La Fontaine et les fabulistes (Paris, 1867). (F. S.)

FABLIAU. The entertaining tales in eight-syllable rhymed verse which form a marked section of French medieval litera- ture are called fabliaux, the word being derived by Littre from fablel, a diminutive of fable. It is a mistake to suppose, as is frequently done, that every legend of the middle ages is a fabliau. In a poem of the 12th century a clear distinction is drawn between songs of chivalry, war or love, and fabliaux, which are recitals of laughter. A fabliau always related an event; it was usually brief, containing not more than 400 lines; it was neither sentimental, religious nor supernatural, but comic and gay. MM, de Montaiglon and Raynaud, who have closely investigated this class of literature, consider that about 150 fabliaux have come down to us more or less intact; a vast number have doubtless disappeared. It

appears from a phrase in the writings of the trouvere, Henri d' Andeli, that the fabliau was not thought worthy of being copied out on parchment. The wonder, then, is that so many of these ephemeral compositions have been preserved. Arguments brought forward by M. Joseph Bedier, however, tend to show that we need not regret the disappearance of the majority of the fabliaux, as those which were copied into MSS. were those which were felt to be of the greatest intrinsic value. As early as the 8th century fabliaux must have existed, since the faithful are forbidden to take pleasure in these' fabulas inanes by the Paenitentiale of Egbert. But it appears that all the early examples are lost.

In the opinion of the best scholars, the earliest surviving fabliau is that of Richeut, which dates from 11 59. This is a rough and powerful study of the coarse life of the day, with little plot, but engaged with a realistic picture of manners.

Such poems, but of a more strictly narrative nature, continued to be produced, mainly in the north and north-east of France, until the middle of the 14th century. Much speculation has been expended on the probable sources of the tales which the trouveres told. The Aryan theory, which saw in them the direct influence of India upon Europe, has now been generally abandoned. It does not seem probable that any ancient or exotic influences were brought to bear upon the French jongleurs, who simply invented or adapted stories of that universal kind which springs unsown from every untilled field of human society. More remarkable than the narratives themselves is the spirit in which they are told. This is full of the national humour and the national irony, the true esprit gaulois. A very large section of these popular poems deals satirically with the pretensions of the clergy. Such are the famous Prctre aux mures, the Pretre qui dit la Passion and Les Perdrix. Some of these are innocently merry; others are singularly depraved and obscene. Another class of fabliaux is that which comprises jests against the professions; in this, the most prominent example is Le Vilain Mire, a satire on doctors, which curiously predicts the Medecin malgre lui of Moliere. There are also tales whose purpose is rather voluptuous than witty, and whose aim is to excuse libertinage and render marriage ridiculous. Among these are prominent Court Mantel and Le Dit de Berenger. Yet another class repeated, with a strain of irony or oddity, such familiar classical stories as those of Narcissus, and Pyramus and Thisbe. It is rarely that any elevation of tone raises

these poems above a familiar and even playful level, but there are some that are almost idealistic. Among these the story of a sort of Sisyphus errant, Le Chevalier de Barizel, offers an ethical interest which lifts it in certain respects above all other surviving fabliaux. An instance of the pathetic fabliau is Housse Partie, a kind of primitive version of the story of King Lear.

In composing these pieces, of very varied character, the jongleurs have practised an art which was in many respects rudimentary, but sincere and simple. The student of language finds the rich vocabulary of the fabliaux much more attractive to him than the conventionality of the serious religious and amatory poems of the same age. The object of the writers was the immediate amusement of their audience; by reference to familiar things, they hoped to arouse a quick and genuine merriment. Hence their incorrectness and their negligence are balanced by a delightful ease and absence of pedantry, and in the fabliaux we get closer than elsewhere to the living diction of medieval France. It is true that if we extend too severe a judgment to these pieces, we may find ourselves obliged to condemn them altogether. An instructed French critic, vexed with their faults, has gone so far as to say that ” the subjects of these tales are degrading, their inspiration nothing better than flat and cruel derision, their distinguishing features rascality, vulgarity and platitude of style.” From one point of view, this condemnation of the fabliau is hardly too severe. But such scholars as Gaston Paris and Paul Meyer have not failed to emphasize other sides to the question. They have praised, in the general laxity of style and garrulity of the middle ages, the terseness of the jongleurs; in the period of false ornament, their fidelity to nature; in a time of general vagueness, the sharp and picturesque outlines of their art. One feature of the fabliaux, however, cannot be praised and yet must not be over- looked. In no other section of the world’s literature is the scorn and hatred of women so prominent. It is difficult to account for the anti-feminine rage which pervades the fabliaux, and takes hideous shapes in such examples as Le Valet aux deux femmes, Le Pecheur de Pont-sur -Seine and Chicheface et Bigome. Probably this was a violent reaction against the extravagant cult of woman as expressed in the contemporary lais as well as in the legends of saints. The exaggeration was not greater in the one case than in the other, and it is probable that the exaltation was made endurable to those who listened to the trouveres by the corresponding degradation. We must remember, too, that those who listened were not nobles or clerks, they were the common people. The fabliaux were fabcllac ignobilium, little

stories told to amuse persons of low degree, who were irritated by the moral pretensions of their superiors.

The names of about twenty of the authors of fabliaux have been preserved, although in most cases nothing is known of their personal history. The most famous poet of this class of writing is the man whose name, or more probably pseudonym, was Rutebeuf. He wrote Frere Denyse and Le Sacristain, while to him is attributed the Dit d'Aristote, in the course of which Aristotle gives good advice to Alexander. Fabliaux, however, form but a small part of the work of Rutebeuf, who was a satirical poet of wide accomplishment and varied energy. Most of the jongleurs who wrote these merry and indecent tales in octosyllabic verse were persons of less distinction. Henri d'Andeli was an ecclesi- astic, attached, it is supposed, to the cathedral of Rouen. Jean de Conde, who flourished in the court of Hainaut from 13 10 to 1340, and who is the latest of the genuine writers of fabliaux, lived in comfort and security, but most of the professional jongleurs seem to have spent their years in a Bohemian existence, wandering among the clergy and the merchant class, alternately begging for money and food and reciting their mocking verses.

The principal authorities for the fabliaux are MM. Anatole de Montaiglon and Gaston Raynaud, who published the text, in 6 vols., between 1872 and 1890. This edition corrected and supplemented the very valuable labours of Meon (1808-1823) and Jubinal (1839- 1842). The works of Henri d'Andeli were edited by M. A. Heron in 1880, and those of Rutebeuf were made the subject of an ex- haustive monograph by M. Leon Cledat in 1891. See also the editions of separate fabliaux by Gaston Paris, Paul Meyer, Ebeling, August Scheler and other modern scholars. M. Joseph Bedier's Les Fabliaux (1895) is a useful summary of critical opinion on the entire subject. {E. G.)

FABRE, FERDINAND (1830-1898), French novelist, was born at Bedarieux, in Herault, a very picturesque district of the south of France, which he made completely his own in literature. He was the son of a local architect, who failed in business, and Ferdinand was brought up by his uncle, the Abbe Fulcran Fabre, at Camplong among the mulberry woods. Of his childhood and early youth he has given a charming account in Ma Vocation (1889). He was destined to the priesthood, and was sent for that purpose to the seminary of St Pons de Thomieres, where, in 1848, he had, as he believed, an ecstatic vision of Christ, who warned him " It is not the will of God that thou shouldst be a priest." He had now to look about for a profession, and, after attempting medicine at Montpellier, was articled as a lawyer's clerk in Paris. In 1853 he published a volume of verses, Feuilles de lierre, broke down in health, and crept back, humble and apparently without ambition, to his old home at Bedarieux. After some eight or nine years of country life he reappeared in Paris, with the MS. of his

earliest novel, Les Courbezon (1862), in which he treated the subject which was to recur in almost all his books, the daily business of country priests in the Cevennes. This story enjoyed an immediate success with the literary class of readers; George Sand praised it, Sainte-Beuve hailed in its author ” the strongest of the disciples of Balzac,” and it was crowned by the French Academy. From this time forth Fabre settled down to the production of novels, of which at the time of his death he had published about twenty. Among these the most important were Le Chewier (1868), unique among his works as written in an experimental mixture of Cevenol patois and French of the 16th century; L ‘Abbe Tigrane, candidat a la papaute (1873), by common consent the best of all Fabre’s novels, a very powerful picture of unscrupulous priestly ambition; Mon Oncle Celestin (1881), a study of the entirely single and tender-hearted country abbe; and Lucifer (1884), a marvellous gallery of serious clerical portraits. In 1883 Fabre was appointed curator of the Mazarin Library, with rooms in the Institute, where, on nth February 1808, he died after a brief attack of pneumonia. Ferdinand Fabre occupies in French literature a position somewhat analogous to that of Mr Thomas Hardy amongst English writers of fiction. He deals almost exclusively with the population of the mountain villages of Herault, and particularly with its priests. He loved most of all to treat of the celibate virtues, the strictly ecclesiastical passions, the enduring tension of the young soul drawn between the spiritual

vocation and the physical demands of nature. Although never a priest, he preserved a comprehension of and a sympathy with the clerical character, and he always indignantly denied that he was hostile to the Church, although he stood just outside her borders. Fabre possessed a limited and a monotonous talent, but within his own field he was as original as he was wholesome and charming.

, See also J. Lemaitre, Les Contemporains, vol. ii. ; G. Pellissier, Etudes de litterature conlemporaine (1898); E. W. Gosse, French Profiles (1905). (E. G.)

FABRE D’EGLANTINE, PHILIPPE FRANCOIS NAZAIRE

(17 50-1 794), French dramatist and revolutionist, was born at Carcassonne on the 28th of July 1750. His real name was simple Fabre, the ” d’Eglantine ” being added in commemora- tion of his

receiving the golden eglantine of Clemence Isaure from the academy of the floral games at Toulouse. After travelling through the provinces as an actor, he came to Paris, and produced an unsuccessful comedy entitled Les Gens de lettres, ou le pro- vincial a Paris (1787). A tragedy, Augusta, produced at the Theatre Francais, was also a failure. One only of his plays, Philinte, ou la suite du Misanthrope (1790), still preserves its reputation. It professes to be a continuation of Moliere's Misanthrope, but the hero of the piece is of a different character from the nominal prototype — an impersonation, indeed, of pure and simple egotism. On its publication the play was introduced by a preface, in which the author mercilessly satirizes the Optimiste of his rival J. F. Collin d'Harleville, whose Chdteaux en Espagne had gained the applause which Fabre's Prisomptueux (1789) had failed to win. The character of Philinte had much political significance. Alceste received the highest praise, and evidently represents the citizen patriot, while Philinte is a dangerous aristocrat in disguise. Fabre was president and secretary of the club of the Cordeliers, and belonged also to the Jacobin club. He was chosen by Danton as his private secretary, and sat in the National Convention. He voted for the king's death, supporting the maximum and the law of the suspected, and he was a bitter enemy of the Girondins. After the death of Marat he published a Portrait de V Ami du Peuple. On the abolition of the Gregorian calendar he sat on the committee entrusted with the formation of the republican substitute, and to him was due a large part of the new nomenclature, with its poetic Prairial and Floreal, its prosaic Primidi and Duodi. The report which he made on the subject, on the 24th of October, has some scientific value. On the 12th of January 1794 he was arrested by order of the committee of public safety on a charge of malversation and forgery in connexion with the affairs of the Compagnie des Indes. Documents still existing prove that the charge was altogether groundless. During his trial Fabre showed the greatest calmness and sang his own well-known song of // pleut, il pleut, bergire, rentre tes blancs moutons. He was guillotined on the 5th of April 1794. On his way to the scaffold he distributed his manuscript poems to the people.

A posthumous play, Les Precepteurs, steeped with the doctrines of Rousseau's Entile, was performed on the 17th of September 1794, and met with an enthusiastic reception. Among Fabre's other plays are the gay and successful Convalescent de qualite (1791), and L'Inlrigue epistolaire (1791). In the latter play Fabre is supposed to have drawn a portrait 'of the painter Jean Baptiste Greuze.

The author's (Euvres melees et posthumes were published at Paris 1802, 2 vols. See Albert Maurin, Galerie hist, de la Revolution

francaise, tome 11; Jules Janin, Hist, de la I'M. dram.; Chenier, Tableau de la Hit. francaise; F. A. Aulard in the Nouvelle Revue (July 1885).

FABRETTI, RAPHAEL (1618-1700), Italian antiquary, was born in 1618 at Urbino in Umbria. He studied law at Cagli and Urbino, where he took the degree of doctor at the age of eighteen. While in Rome he attracted the notice of Cardinal Lorenzo Imperiali, who employed him successively as treasurer and auditor of the papal legation in Spain, where he remained thirteen years. Meanwhile, his favourite classical and anti- quarian studies were not neglected; and on his return journey he made important observations of the relics and monuments of

Spain, France and Italy. At Rome he was appointed judge of appellation of the Capitol, which post he left to be auditor of the legation at Urbino. After three years he returned to Rome, on the invitation of Cardinal Carpegna, vicar of Innocent XL, and devoted himself to antiquarian research, examining with minute care the monuments and inscriptions of the Campagna. He always rode a horse which his friends nicknamed " Marco Polo," after the Venetian traveller. By Innocent XII. he was made keeper of the archives of the castle St Angelo, a charge which he retained till his death. He died at Rome on the 7th of January 1700. His collection of inscriptions and monuments was purchased by Cardinal Stoppani, and placed in the ducal palace at Urbino, where they may still be seen.

His work De Aquis et ■ Aquae-ductibus veteris Romae (1680), three dissertations on the topography of ancient Latium, is inserted in Graevius's Thesaurus, iv. (1677). His interpretation of certain passages in Livy and other classical authors involved him in a dispute with Gronovius, which bore a strong resemblance to that between Milton and Salmasius, Gronovius addressing Fabretti as Faber Rusticus, and the latter, in reply, speaking of Grunnovius and his titivilitia. In this controversy Fabretti used the pseudonym Iasitheus, which he afterwards took as his pastoral name in the Academy of the Arcadians. His other works, De Columna Trajani Syntagma (Rome, 1683), and Inscriptionum Antiquarum Explicatio (Rome, 1699), throw much light on Roman antiquity. In the former is to be found his explication of a bas-relief, with inscriptions, now in the Capitol at Rome, representing the war and taking of Troy, known as the Iliac table. Letters and other shorter works of Fabretti are to be found in publications of the time, as the Journal des Savants.

See Crescimbeni, Le Vite degli Arcadi illuslri; Fabroni, Vitae Italorum,

vi. 174; Niceron, iv. 372; J. Lamius, Memorabilia Italorum eruditione praestantium (Florence, 1 742-1 748).

FABRIANI, SEVERINO (1792-1849), Italian author and teacher, was born at Spilamberto, Italy, on the 7th of January 1792. Entering the Church, he took up educational work, but in consequence of complete loss of voice he resolved to devote himself to teaching deaf mutes, and founded a small school specially for them. This school the duke of Modena made into an institute, and by a special authority from the pope a teaching staff of nuns was appointed. Fabriani's method of instruction is summed up in his Logical Letters on Italian Grammar (1847). He died on the 27th of April 1849.

FABRIANO, a town of the Marches, Italy, in the province of Ancona, from which it is 44 m. S.W. by rail, 1066 ft. above sea-level. Pop. (1901) town 9586, commune 22,996. It has been noted since the 13th century for its paper mills, which still produce the best paper in Italy. A school of painting arose here, one of the early masters of which is Allegretto Nuzi (1308-1385) ; and several of the churches contain works by him and other local masters. His pupil, Gentile da Fabriano (1370-1428), was a painter of considerably greater skill and wider knowledge; but there are no important works of his at Fabriano. The sacristy of S. Agostino also contains some good frescoes by Ottaviano Nelli of Gubbio. The municipal picture gallery contains a collection of pictures, and among them are some primitive frescoes, attributable to the 12th century, which still retain traces of Byzantine influence. The Archivio Comunale contains documents on watermarked paper of local manufacture going back to the 13th century. The Ponte dell' Acra, a bridge of the 15th century, is noticeable for the ingenuity and strength of its construction. The hospital of S. Maria Buon Gesu is a fine work of 1456, attributed to Rossellino.

See A. Zonghi, Antiche Carte Fabrianesi. (T. As.)

FABRICIUS, GAIUS LUSCINUS (i.e. " the one-eyed "), Roman general, was the first member of the Fabrician gens who settled in Rome. He migrated to Rome from Aletrium (Livy ix. 43), one of the Hernican towns which was allowed to retain its independence as a reward for not having revolted. In 285 he was one of the ambassadors sent to the Tarentines to dissuade them from making war on the Romans. In 282 (when consul) he defeated the Bruttians and Lucanians, who had besieged

Thurii (Livy, Epit. 12). After the defeat of the Romans by Pyrrhus at Heraclea (280), Fabricitfs was sent to treat for the ransom and exchange of the prisoners. All attempts to bribe him were unsuccessful, and Pyrrhus is said to have been so impressed that he released the prisoners without ransom (Plutarch, Pyrrhus, 18). The story that Pyrrhus attempted to frighten Fabricius by the sight of an elephant is probably a fiction. In 278 Fabricius was elected consul for the second time, and was successful in negotiating terms of peace with Pyrrhus, who sailed away to Sicily. Fabricius afterwards gained a series of victories over the Samnites, the Lucanians and the Bruttians, and on his return to Rome received the honour of a triumph. Notwithstanding the offices he had filled he died poor, and pro- vision had to be made for his daughter out of the funds of the state (Val. Max. iv. 4, 10). Fabricius was regarded by the Romans of later times as a model of ancient simplicity and incorruptible integrity.

FABRICIUS, GEORG (1516-1571), German poet, historian and archaeologist, was born at Chemnitz in upper Saxony on the 23rd of April 1516, and educated at Leipzig. Travelling in Italy with one of his pupils, he made an exhaustive study of the antiquities of Rome. He published the results in his Roma (1550), in which the correspondence between every discoverable relic of the old city and the references to them in ancient literature was traced in detail. In 1546 he was appointed rector of the college of Meissen, where he died on the 17 th of July 1571. In his sacred poems he affected to avoid every word with the slightest savour of paganism; and he blamed the poets for their allusions to pagan divinities.

Principal works: editions of Terence (1548) and Virgil (1551); Po'ematum sacrorum libri xxv. (1560); Poetarum veterum ecclesia-slicorum opera Christiana (1562) ; De Re Po'eiica libri septem (1565) ; Rerum Misnicarum libri septem (1569); (posthumous) Originum illustrissimae stirpis Saxonicae libri septem (1597) ; Rerum Germaniae magnae el Saxoniae universal memorabilium mirabiliumqve volumina duo (1609). A life of Georg Fabricius was published in 1839 by D. C. W. Baumgarten-Crusius, who in 1845 also issued an edition of Fabricius's Epistolae ad W. Meurerum et alios aequales, with a short sketch De Vita Ge. Fabricii et de gente Fabriciorum ; see also F. Wachter in Ersch and Gruber's Allgemeine Encyclopddie.

FABRICIUS, HIERONYMUS [Fabrizio, Geronimo] (1537- 1619), Italian anatomist and embryologist, was surnamed Acquapendente from the episcopal city of that name, where he was born in 1537. At Padua,

after a course of philosophy, he studied medicine under G. Fallopius, whose successor as teacher of anatomy and surgery he became in 1562. From the senators of Venice he received numerous honours, and an anatomical theatre was built by them for his accommodation. He died at Venice on the 21st of May 1619. His works include De visione, voce et auditu (1600), De formato foetu (1600), De venarum ostiolis (1603), De formatione ovi et pulli (1621), His collected works were published at Leipzig in 1687 as Opera omnia Ana- tomica et Physiologica, but the Leiden edition, published by Albinus in 1738, is preferred as containing a life of the author and the prefaces of his treatises. (See Anatomy; Embryology.)

FABRICIUS, JOHANN ALBERT (1668-1736), German classical scholar and bibliographer, was born at Leipzig on the nth of November 1668. His father, Werner Fabricius, director of music in the church of St Paul at Leipzig, was the author of several works, the most important being Deliciae Harmonicae (1656). The son received his early education from his father, who on his deathbed recommended him to the care of the theologian Valentin Alberti. He studied under J. G. Herrichen, and after- wards at Quedlinburg under Samuel Schmid. It was in Schmid's library, as he afterwards said, that he found the two books, F. Barth's Adversaria and D. G. Morhof's Polyhistor Literarius, which suggested to him the idea of his Bibliothecae, the works on which his great reputation was founded. Having returned to Leipzig in 1686, he published anonymously (two years later) his first work, Scriptorum recentiorum decas, an attack on ten writers of the day. His Decas Decadum, sive plagiariorum et pseudonymorum centuria (1689) is the only one ot his works to which be signs the name Faber. He then applied himself to the study of medicine, which, however, he relinquished for that

of theology; and having gone to Hamburg in 1693, he proposed to travel abroad, when the unexpected tidings that the expense of his education had absorbed his whole patrimony, and even left him in debt to his trustee, forced him to abandon his project. He therefore remained at Hamburg in the capacity of librarian to J. F. Mayer. In 1696 he accompanied his patron to Sweden; and on his return to Hamburg, not long afterwards, he became, a candidate for the chair of logic and philosophy. The suffrages being equally divided between Fabricius and Sebastian Edzardus, one of his opponents, the appointment was decided by lot in favour of Edzardus; but in 1699 Fabricius succeeded Vincent Placcius in the chair of rhetoric and ethics, a post which he held till his death, refusing invitations to Greifswald, Kiel, Giessen and Wittenberg. He died at Hamburg on the 30th of April 1736.

Fabricius is credited with 128 books, but very many of them were only books which he had edited. One of the most famed and laborious of these is the Bibliotheca Latina (1697, republished in an improved and amended form by J. A. Ernesti, 1773). The divisions of the compilation are — the writers to the age of Tiberius ; thence to that of the Antonines ; and thirdly, to the decay of the language ; a fourth gives fragments from old authors, and chapters on early Christian literature. A supplementary work was Bibliotheca Latina mediae et inftmae Aetatis (1734-1736; supplementary volume by C. Schottgen, 1746; ed. Mansi, 1754). His chef-d'oeuvre, however, is the Bibliotheca Graeca (1705-1728, revised and continued by G. C. Harles, 1 790-1812), a work which has justly been denominated maximus antiquae erudiiionis thesaurus. Its divisions are marked off by Homer, Plato, Christ, Constantine, and the capture of Con- stantinople in 1453, while a sixth section is devoted to canon law, jurisprudence and medicine. Of his remaining works we may mention: — Bibliotheca Antiquaria, an account of the writers whose works illustrated Hebrew, Greek, Roman and Christian antiquities (1713); Centifolium Lutheranum, a Lutheran bibliography (1728); Bibliotheca Ecclesiastica (1718). His Codex Apocryphus (1703) is still considered indispensable as an authority on apocryphal Christian literature.

The details of the life of Fabricius are to be found in De Vita et Scriptis J. A. Fabricii Commentarius, by his son-in-law, H. S. Reimarus, the well-known editor of Dio Cassius, published at Hamburg, 1737 ; see also C. F. Bahr in Ersch and Gruber's Allgemeine- Encyclopddie, and J. E. Sandys, Hist. Class. Schol. iii. (1908).

FABRICIUS, JOHANN CHRISTIAN (1 745-1 808), Danish entomologist and economist, was born at Tondern in Schleswig on the 7th of January 1745. After studying at Altona and Copenhagen, he was sent to Upsala, where he attended the lectures of Linnaeus. He devoted his attention professionally to political economy, and, after lecturing on that subject in 1769, was appointed in 1775 professor of natural history, economy and finance at Kiel, in which capacity he wrote various works, chiefly referring to Denmark, and of no special interest. He also published a few other works on general and natural history, botany and travel (including Reise nach Norwegen, 1779), and, although his professional stipend was small, he extended his personal researches into every town in northern and central Europe where a natural history museum was to be found. It is as an entomologist that his memory survives, and for many years his great scientific reputation rested upon the system of classification which he founded upon the structure of the mouth- organs instead of the wings. He had a keen eye for specific differences, and possessed the art of terse and

accurate description. He died on the 3rd of March 1808.

A complete list of his entomological publications (31) will be found in Hagen's Bibliotheca Entomologiae ; the following are the chief: — Systema Entomologiae (1775); Genera Insectorum (1776); Philosophia Entomologica (1778); Species insectorum (1781); Man- tissa Insectorum (1787); Entomologia Systematica (1792-1794), with a supplement (1798); Systema Eleulheratorum (1801), Rhyngolorum (18O3), Piezatorum (1804), and Antliatorum (1805). Full particulars of his life will be found, with a portrait, in the Transactions of the Entomological Society of London (1845), 4, pp. i-xvi, where his auto- biography is translated from the Danish.

FABRIZI, NICOLA (1804-1885), Italian patriot, was born at Modena on the 4th of April 1804. He took part in the Modena insurrection of 1831, and attempted to succour Ancona, but was arrested at sea and taken to Toulon, whence he proceeded to Marseilles. Afterwards he organized with Mazzini the ill-fated Savoy expedition. Taking refuge in Spain, he fought against the Carlists, and was decorated for valour on the battlefield (18th I July 1837). At the end of the Carlist War he established a

centre of conspiracy at Malta, endeavoured to dissuade Mazzini from the Bandiera enterprise, but aided Crispi in organizing the Sicilian revolution of 1848. With a company of volunteers he distinguished himself in the defence of Venice, afterwards proceeding to Rome, where he took part in the defence of San Pancrazio. Upon the fall of Rome he returned to Malta, accumu- lating arms and stores; which he conveyed to Sicily; after having, in 1859, worked with Crispi to prepare the Sicilian revolution of i860. While Garibaldi wassailing from Genoa towards Marsala Fabrizi landed at Pizzolo, and, after severe fighting, joined Garibaldi at Palermo. Under the Garibaldian Dictatorship he was appointed governor of Messina and minister of war. Return- ing to Malta after the Neapolitan plebiscite, which he had vainly endeavoured to postpone, he was recalled to aid Cialdini in suppressing brigandage. While on his way to Sicily in 1862, to induce Garibaldi to give up the Aspromonte. enterprise,. he was arrested at Naples by Lamarmora. £ > uriiig the war of. 1866 he became Garibaldi's chief of staff, and in ; i867 fought at Mentana. In parliament he endeavoured to promote agreement between the chiefs. of the Left, and from 1878 onwards worked to secure the return of

Crispi to power, but died on the 31st of March 1885, two years before the realization of his object Ilia whole life was characterized by ardent patriotism and unim- peachable integrity. (H. W. S.)

FABROT, CHARLES ANNIBAL (1580-1659), French juris- consult, was born at Aix in Provence on the 15th of September 1580. At an early age he made! great progress in the ancient languages and in the civil and the canon law; and in 1602 he received the degree of doctor of law, and was made avocat to the parlement of Aix. In 1609 he obtained a professorship in the university of his native town. He is best known by his- translation of the Basilica, which may be said to have formed the code of the Eastern empire till its destruction. This work was published at Paris in 1647 in 7 vols, fol., and obtained for its author a considerable pension from the chancellor, Pierre Seguier, to whom it was dedicated. Fabrot likewise rendered great service' to the science of jurisprudence by his edition of Cujas, which comprised several treatises of that great jurist previously ' uii-' published. He also edited the works of several Byzantine historians, and was besides the author of various antiquarian and legal treatises. He died at Paris on the 1 6th of January 1 659.

FABYAN, ROBERT (d. 1513), English chronicler, belonged to an Essex family, members of which had been connected with trade in London. He was a member of the Drapers company, alderman of Farringdon Without, and served as sheriff in 1403- 1494. In 1496 he was one of those appointed to make repre- sentations to the king on the new impositions on English cloth in Flanders. Next year he was one of the aldermen employed in keeping watch at the time of the Cornish rebellion. He resigned his aldermanry in 1502, on the pretext of poverty, apparently in order to avoid the expense of mayoralty. He had, however, acquired considerable wealth with . his wife Elizabeth Pake, by whom he had a numerous family. He spent his latter years on his estate of Halstedys at Theydon Garnon in Essex. He died on the 28th of February 1513 (Inquisitiones post mortem for London, p. 29, edited by G. S. Fry, 1896); his will, dated the nth of July 1511, was proved on the 12th of July 1 5 13. Fabyan's Chronicle was first published by Richard Pynson in 15 16 as The new chronicles of England and of France. In this edition it ends with the reign of Richard III., and this probably represents the work as Fabyan left it, though with the omission of an autobiographical note and some religious verses, which form the Envoi of his history. The note and verses are first found in the second edition, printed by John Rastell in 1533 with continuations down to 1509. A third edition appeared in 1542, and a fourth in 155*9 with additions to that year. The only modern edition is that of Sir Henry Ellis,, 181 1.

In the note above mentioned Fabyan himself says: “arid here I make an ende of the vii. parte and hole werke, the vii. day of November in the yere of our Lord Jesu Christes In- carnacion M.vc. and iiij.” This seems conclusive that in 1504 he did not contemplate any extension of his chronicles beyond

1485. The continuations printed by Rastell are certainly not Fabyan’s work. But Stow in his Collections (ap. Survey of London, ii. 305-306, ed. C. L. Kingsford) states that Fabyan wrote

1 ” a Chronicle of London, England and of France, beginning at the creation and endynge in the third year of Henry VIII., which both I have in written hand.” In his Survey of London (i. 191, 209,:ii. 55, 1 16) Stow several times quotes Fabyan as his authority for statements which are not to be found in the printed continua- tion’s of Rastell. Some further evidence may be found in other notes of Stow’s (ap. Survey of London, ii. .280, 283, 365-366), and in the citation by Hakluyt of an unprinted work of Fabyan as the authority for his note of Cabot’s voyages. That Fabyan had continued his Chronicle to 151 1 may be accepted as certain, but no trace of the manuscript can now be found.

It is only the seventh part of Fabyan’s Chronicle, from the Norman Conquest onwards, that possesses any historical value. For his French history he followed chiefly, the Compendium super Francorum geslis of Robert Gaguin, printed at Paris in 1497. For English history his best source was the old Chronicles of London, from which he borrowed also the arrangement of his work in civic form. From 1440 to 1485 he follows, as a rule with great fidelity, the original of the London Chronicle in Cotton MS. Vitellius A. XVI. (printed in Chronicles of London, 1905, pp. 153-264).

Fabyan’s own merits are little more than those of an industrious compiler, who strung together the accounts of his different authorities without any critical capacity. He says expressly that his work was ” gaderyd without understand ynge,” and

I speaks of himself as “of cunnynge full destitute.” Nevertheless he deserves the praise which he has received as an early worker, and for having, made public information which through Hall and Holinshed has become the common property of later historians, and has only recently been otherwise accessible. Bale alleges that the first edition was burnt by order of Cardinal Wolsey because it reflected on the wealth of the clergy; this probably refers to his version of the Lollards Bill of 1410, which Fabyan extracted from one of the London

Chronicles.

See further Ellis' Introduction; W. Busch, England under the Tudors (trans. A. M. Todd, 1895), i. 405-410; and C. L. Kingsford, Chronicles of London, pp. xxvi-xxxii (1905). (C. L. K.)

FAC/ADE, a French architectural term signifying the external face of a building, but more generally applied to the principal front.

FACCIOLATI, JACOPO (1682-1769), Italian philologist, was born at Torriglia, in the province of Padua, in 1682. He owed his admission to the seminary of Padua to Cardinal Barberigo, who had formed a high opinion of the boy's talents. As professor of logic, and regent of the schools, Facciolati was the ornament- of the Paduan university during a period of forty-five years. He published improved editions of several philological works, such as the Thesaurus Ciceronianus of Nizolius, and the polyglot vocabulary known under the name of Calepino. The latter work, in which he was assisted by his pupil Egidio Forcellini, he completed in four years — 1715 to 1719. It was written in seven languages, and suggested to the editor the idea of his opus magnum, the Tolius Lalinitatis Lexicon, which was ultimately published at Cardinal Priole's expense, 4 vols, fol., Padua, 1771 (revised ed. by de Vit, 1858-1887). In the compilation of this work the chief burden seems to have been borne by Facciolati's pupil Forcellini, to whom, however, the lexicographer allows a very scanty measure of justice. Perhaps the best testimony to the learning and industry of the compiler is the well-known observation that the whole body of Latinity, if it were to perish, might be restored from this lexicon. Facciolati's mastery of Latin style, as displayed in his epistles, has been very much admired for its purity and grace. In or about 1739 Facciolati undertook the continuation of Papadopoli's history of the university of Padua, carrying it en to his own day. Facciolati was known over all Europe as one of the most enlightened and zealous teachers of the time; and among the many flattering invitations which he received, but always declined, was cne frcm the king of Portugal, to accept the directorship of a college at

Lisbon for the young nobility. He died in 1 769. His history of the university was published in 1757, under the name Fasti Gymnasii Patavini. In 1808 a volume containing nine of his Epistles, never before published, was issued at Padua.

See J. E. Sandys, Hist. Class. Schol. ii. (1908).

FACE (from Lat. fades, derived either from facere, to make, or from a root fa-, meaning ” appear “; cf. Gr. (paiveiv), a word whose various meanings of surface, front, expression of counT tenance, look or appearance, are adaptations of the application of the word to the external part of the front portion of the head, usually taken to extend from the top of the forehead to the point of the chin, and from ear to ear (see Anatomy: Superficial and Artistic; and Physiognomy).

FACTION (through the French, from Lat. f actio, z, company of persons combined for action, facere, to do; from the other French derivative facon comes “fashion”), a term, used especi- ally with an opprobrious meaning, for a body of partisans who put their party aims and interests above those of the state or public, and employ unscrupulous or questionable means; it is thus a common term of reciprocal abuse between parties. In the history of the Roman and Later Roman empires the factions (factiones) of the circus and hippodrome, at Rome and Constanti- nople, played a prominent part in politics. The faclibnes were properly the four companies into which the charioteers were divided, and distinguished by the colours they wore. Originally at Rome there were only two, white (albala) and red (nissata), when each race was open to two chariots only; on the increase to four, the green (prasina) and blue (veneta) were added. At Constantinople the last two absorbed the red and white factions.

For a brilliant description of the factions at Constantinople under ‘ Justinian, and the part they played in the celebrated Nika riot in January 532, see Gibbon’s Decline and Fall, ch. xl. ; and J. B. Bury’s Appendix 10 in vol. iv. of his edition (1898), for a discus- sion of the relationship between the factiones and the denies of Constantinople.

FACTOR (from Lat. facere, to make or do), strictly ” one Who makes “; thus in ordinary parlance, anything which goes to the composition of anything else is termed one of its ” factors,” and in mathematics the term is used of those quantities which, when multiplied together, produce a given product. In a special sense, however — and that to which this article is devoted— ” factor ” is the name given to a mercantile agent (of the class known as ” general agents “) employed to buy or sell goods for a commission. When employed to sell, the possession of the goods is entrusted to him by his principal, and when employed to buy it is his duty to obtain possession of the goods and to consign them to his principal. , In this he differs from a broker (g.v.), who has not such possession, and it is this distinguishing characteristic which gave rise in England to the series of statutes known as the

Factors Acts. By these acts, consolidated and extended by the act of 1889, third parties buying or taking pledges from factors are protected as if the factor were in reality owner; but these enactments have in no way affected the contractual relations between the factor and his employer, and it will be convenient to define them before discussing the position of third parties as affected by the act.

I. Factor and Principal A factor is appointed or dismissed in the same way as any other agent. He may be employed for a single transaction or to transact all his principal's business of a certain class during a limited period or till such time as his authority may be deter- mined. A factors duty is to sell or buy as directed; to carry out with care, skill and good faith any instructions he may receive; to receive or make payment; to keep accounts, and to hand over to his principal the balance standing to his principal's credit, without any deduction save for commission and expenses. All express instructions he must carry out to the full, provided they do not involve fraud or illegality. On any point not covered by his express instructions he must follow the usual practice of his particular business, if not inconsistent with his instructions or his position as factor. Many usages of businesses in which factors are employed have been proved in court, and may now

be regarded as legally established. For instance, he may, unless otherwise directed, sell in his own name, give warranties as to goods sold hy him, sell by sample (in most businesses), give such credit as is usual in his business, receive payment in cash or as customary; and give receipts in full discharge, sell by indorsement of bills of lading, and insure the goods. It is his duty to clear the gOods at the customs, take charge of them and keep them safely, give such notices to his principal and others as may be required, and if necessary take legal proceedings for the protection of the goods. On the other, hand, be has not authority to delegate his employment,, or to barter; and as between himself and his pi incipal he has no right to pledge the goods, although as between the principal and the pledgee, an unauthorized pledge made by the factor may by virtue of the Factors Act 1889 be binding upon the principal. It is, moreover, inconsistent with his employment as agent that he should buy or sell on his own account from or to his principal. A factor has no right to follow any usage which is inconsistent with the ordinary duties and authority of a factor unless his principal has expressly or impliedly given his consent.

On the due performance of his duties the factor is entitled to his commission, which is usually a percentage on the value of the goods sold or bought by him on account of his principal, regulated in

amount by, the usages of each business, Sometimes the factor makes himself personally responsible for the solvency of the persons with whom he deaJs, in order that his principal may avoid the risk., entailed by the usual trade credit. In such a case the .factor is said to; be employed on del credere terms, and is entitled to a higher rate of commission, usually 25% extra. Such an arrangement is not a contract of guarantee within the Statute of Frauds, and therefore need not be in writing. Besides his remuneration, the factor is entitled to be reimbursed by his principal for any expenses, and to.be indemnified against any liabilities which he may have properly incurred in the execution of his principal's instructions. For the purpose of enforcing his rights a factor has,: without legal proceedings, two remedies. Firstly, by virtue of his general lien (q.v.) he may hold any of his principal's goods which come to his hands as security for the payment to him of any commission, out-of-pocket expenses, or even general balance of account in his, favour. Although he pannot sell the goods, he may refuse to give them up until he is paid. Secondly, where he has consigned goods to his principal but not been paid, he may .." stop in transit " subject to the same rules of law as an ordinary vendor; that is to say, he must exer- cise his right before the transit ends; and his right may be defeated by his principal transferring the document of title to the goods to some third person, who takes it in good faith and for valuable consideration (Factors Act 1889, section 10). If the factor does not carry out his principal's instructions, or carries them out so negligently or unskilfully that his principal gets no benefit thereby, the factor loses his commission and his right to reimbursement and indemnity. If by such failure or negli- gence the principal suffers any loss, the latter may recover it as damages. So too if the factor fails to render proper accounts his principal may by proper legal proceedings obtain an account and payment of what is found due; and threatened breaches of duty may be summarily stopped by an injunction. Criminal acts by the factor in relation to his principal's goods are dealt with by section 78 of the Larceny Act i860.

II. Principal and Third Party (a) At Common Law.- — The actual authority of a factor is defined by the same limits as his duty, the nature of which has been just described; i.e. firstly, by his principal's express instructions; secondly, by the rules of law and usages of trade, in view of which those instructions were expressed. But his power to bind his principal as regards third parties is often wider than his actual authority; for it would not be reasonable that third parties should be prejudiced by secret instructions, given in derogation of the authority ordinarily conferred by the custom of trade; and, as regards them, the factor is said to have " apparent " or " ostensible "

authority, or to be held out as having

authority to do what is customary, even though he may in fact have been expressly forbidden so to do by his principal. But this rule is subject to the proviso that if the third party have notice of the factor's actual instructions, the " apparent " authority will not be greater than the actual. *' The general principle of law," said Lord Blackburn in the case of Cole v. North-Western Bank, 1875, L.R. 10, C.P. 363, " is that when the true owner has clothed any one with apparent authority to act as his agent, he is bound to those who deal with the agent on the assumption that he really is an agent with that authority, to the same extent as if the apparent authority were real." Under such circumstances the principal is for reasons of common fairness precluded, or, in legal phraseology, estopped, from denying his agent's authority. On the same principle of estoppel, but not by reason of any trade usages, a course of dealing which has been followed between a factor and a third party with the assent of the principal will give the factor apparent authority to continue dealing on the same terms even after the principal's assent has been withdrawn; provided that the third party has no notice of the withdrawal.

Such apparent authority binds the principal both as to acts done in excess of the actual authority and also when the actual authority has entirely ceased. For instance, A.B . receives goods from C. D. with instructions not to sell below is. per lb; A. B. sells at io\A., the market price; the buyer is entitled to the goods at io|d., because A. B. had apparent authority, although he exceeded his actual authority. On the same principle the buyer would get a good title by buying from A. B. goods entrusted to him by C. D., even though at the time of the sale C. D. had revoked A. B.'s authority and instructed him not to sell at all. In either case the factor is held out as having authority to sell, and the principal cannot afterwards turn round and say that his factor had no such authority. As in the course of his business the factor must necessarily make representations preliminary to the contracts into which he enters, so the principal will be bound by any such representations as may be within the factor's actual or apparent authority to the same degree as by the. factor's contracts.

(b) Under the Factors Act i88g. — The main object of the Factors Acts, in so far as they relate to transactions carried out by factors, has been to add to the number of cases in which third parties honestly buying

or lending money on the security of goods may get a good title from persons in whose possession the goods are with the consent, actual or apparent, of the real owners, thus calling in aid the principle of French law that ” possession vaut litre ” as against the doctrine of the English common law that ” nemo dat quod non habet.” The chief change in the law relating specially to factors has been to put pledges by factors on the same footing as sales, so as to bind a principal to third parties by his factor’s pledge as by his factor’s sale. The Factors Act 1889 in part re-enacts and in part extends the provisions of the earlier acts of 1823, 1825, 1842 and 1877; and is, so far as it relates to sales by factors, in large measure mereiy declaratory of the law as it previously existed. Its most important provisions concerning factors are as follows: — ■

Section I., s.s. I. The expression mercantile agent shall mean a mercantile agent having in the customary course of his business as such agent authority either to sell goods, or to consign goods for the purpose of sale, or to buy goods, or to raise money on the security of goods;

2. A person shall be deemed to be in possession of goods or of the documents or title to goods when the goods or documents are in his actual custody or are held by any other person subject to his control or for him on his behalf.

4. The expression ” document of title ” shall include any bill of lading, dock warrant, warehouse keeper’s certificate, and warrant or order for the delivery of goods, and any other document used in the ordinary course of business as proof of the possession or control of goods, or authorizing or purporting to authorize, either by in- dorsement or by delivery, the possessor of the document to transfer or receive goods thereby, represented.

Section II., s.s. 1. Where a mercantile agent is, with the consent of the owner, in possession of goods or of the documents or title to goods, any sale, pledge or other disposition of the goods made by him when acting in the ordinary course of business of a mercantile agent shall, subject to the provisions of this act, be as valid as if

he were expressly authorized by the owner of the goods to make the same; provided that the person taking under the disposition acts in good faith, and has not at the time of the disposition notice that the person making the disposition has not authority to make the same.

2. Where a mercantile agent has, with the consent of the owner, been

in possession of goods or of the documents of title to goods, any sale, pledge or other disposition which would have been valid if the consent had continued shall be valid notwithstanding the determination of the consent; provided that the person taking under the disposition has not at the time thereof notice that the consent has been determined.

3. Where a mercantile agent has obtained possession of any documents of title to goods by reason of his being or having been, with the consent of the owner, in possession of the goods repre- sented thereby, or of any other documents of title to the goods, his possession of the first-mentioned documents shall, for the purposes of the act, be deemed to be with the consent of the owner.

III. Enforcement or Contracts

1. Where a factor makes a contract in the name of his principal and himself signs as agent only, he drops out as soon as the contract is made, and the principal and third party alone can sue or be sued upon it. As factors usually contract in their own name this is not a common case. It is characteristic of brokers rather than of factors.

2. Where a factor makes a contract for the principal without disclosing his principal's name, the third party may, on dis- covering the principal, elect whether he will treat the factor or his principal as the party to the contract; provided that if the factor contract expressly as factor, so as to exclude the idea that he is personally responsible, he will not be liable. The principal may sue upon the contract, so also may the factor, unless the principal first intervene.

3. Where a factor makes a contract in his own name without disclosing the existence of his principal, the third party may, on discovering the existence of the principal, elect whether he will sue the factor or the principal. Either principal or factor may sue the third party upon the contract. But if the factor has been permitted by the principal to hold himself out as the principal, apd the person dealing with the factor has believed that the factor was the principal and has acted on that belief before ascertaining his mistake, then in an action by the principal the third party may set up any defences he would have had against the factor if the factor had brought the action on his own account as principal.

4. Where a factor has a lien upon the goods and their proceeds for advances made to the principal it will be no defence to an action by him for the third party to plead that he has paid the principal, unless

the factor by his conduct led the third party to believe that he agreed to a settlement being made with his principal.

5. The factor who acts for a foreign principal will always be personally liable unless it is clear that the third party has agreed to look only to the principal.

6. If a factor contract by deed under seal he alone can sue or be sued upon the contract; but mercantile practice makes contracts by deed uncommon.

Authorities. — Story, Commentaries on the Law of Agency (Boston, 1882); Boyd and Pearson, The Factors Acts 1823 to 1877 (London, 1884) ; Blackwell, The Law relating to Factors (London, 1897). (L. F. S.)

FACTORY ACTS, the name given generally to a long series of acts constituting one of the most important chapters in the history of English labour legislation (see Labour Legislation) ; the term ” factory ” itself being short for manufactory, a building or collection of buildings in which men or women are employed in industry.

FACULA (diminutive of fax, Lat. for ” torch “), in astronomy, a minute shining spot on the sun’s disk, markedly brighter than the photosphere in general, usually appearing in groups. Faculae are most frequent in the neighbourhood of spots. (See Sun.)

FACULTY (through the French, from the Lat. facultas, ability to do anything, from facilis, easy, facere, to do; another form of the word in Lat. facilitas, facility, ease, keeps the original meaning), power or capacity of mind or body for particular kinds

of activity, feeling, &c. In the early history of psychology the term was applied to various mental processes considered as causes or conditions of the mind — a treatment of ” class concepts of mental phenomena as if they were real forces producing these phenomena” (G. F. Stout, Analytic Psychology, vol. i. p. 17). In medieval Latin facultas was used to translate diivanis in the Aristotelian application of the word to a branch of learning or knowledge, and thus it is particularly applied to the various departments of knowledge as taught in a university and to the body of teachers of the particular art or science taught. The principal ” faculties ” in the medieval universities were theology,

canon and civil law, medicine and arts (see Universities). A further extension of this use is to the body of members of any particular profession.

In law, ” faculty ” is a dispensation or licence to do that which is not permitted by the common law. The word in this sense is used only in ecclesiastical law. A faculty may be granted to be ordained deacon under twenty- three years of age; to hold two livings at once (usually called a licence or dispensation, but granted under the seal of the office of faculties; see Benefice); to be married at any place or time (usually called a special licence; see Marriage; Licence); to act as a notary public (q.v.). Any alteration in a church, such as an addition or diminution in the fabric or the utensils or ornaments of the church, cannot strictly be made without the legal sanction of the ordinary, which can only be expressed by the issue of a faculty. So a faculty would be required for a vault, for the removal of a body, for the purpose of erecting monuments, for alterations in a parsonage house, for brick graves, for the apportionment of a seat, &c. Cathedrals, however, are exempt from the necessity for a faculty before making alterations in the fabric, utensils or ornaments.

The court of faculties is the court of the archbishop for granting faculties. It is a court in which there is no litigation or holding of pleas. Its chief officer is called the master of faculties, and he is one and the same with the judge of the court of arches. Attached to the court of faculties are a registrar and deputy registrars, a chief clerk and record-keeper, and a seal keeper. In Scotland the society of advocates of the court of session, and local bodies of legal practitioners, are described as faculties.

FAED, THOMAS (1826-1900), British painter, born in Kirkcudbrightshire, was the brother of John Faed, R.S.A., and received his art education in the school of design, Edinburgh. He was elected an associate of the Royal Scottish Academy in 1849, came to London three years later, was elected an associate of the Royal Academy in 1861, and academician in 1864, and retired in 1893. He had much success as a painter of domestic genre, and had considerable executive capacity. Three of his pictures, ” The Silken Gown,” ” Faults on Both Sides,” and ” The Highland Mother.” are in the National Gallery of British Art.

See William D. McKay, The Scottish School of Painting (1906).

FAENZA (anc. Faventia), a city and episcopal see of Emilia, Italy, in the province of Ravenna, from which it is 31 m. S.W. by rail, no ft.

above sea-level. It is 31 m. S.E. of Bologna by rail, on the line from Bologna to Rimini, and it is the junction of a line to Florence through the Apennines. Pop. (1901) 21,809 (town), 39,757 (commune). The town is surrounded by walls which date from 1456. The cathedral of S. Costanzo stands in the spacious Piazza Vittorio Emanuele in the centre of the town. It was begun in 1474 by Giuliano da Maiano; the facade is, however, incomplete. In the interior is the beautiful early Renaissance tomb of S. Savinus with reliefs showing scenes from his life, of fine and fresh execution, by Benedetto da Maiano; and later tombs by P. Bariloto, a local sculptor. Opposite the cathedral is a fountain with bronze ornamentation of 1583-1621. The clock tower alongside the cathedral belongs to the 17th century. Beyond it is the Palazzo Comunale, formerly the residence of the Manfredi, but entirely reconstructed. The other churches of the town have been mostly restored, but S. Michele (and the Palazzo Manfredi opposite it) ‘ are fine early Renaissance buildings in brickwork. The municipal art gallery contains an altar-piece by Girolamo da Treviso (who

also painted a fresco in the Chiesa della Commenda), a wooden St Jerorne by Donatello, and a bust of the young St John by Antonio Rossellino (?), and some fine specimens of majolica, a variety of which, faience, takes its name from the town. It was largely manufactured in the 15th and 16th centuries, and the industry has been revived in modern times with success.

The ancient Faventia, on the Via Aemilia, was obviously from its name founded by the Romans and had the citizenship before the Social War. It was the scene of the defeat of C. Papirius Carbo and C. Norbanus by Q. Caecilius Metellus Pius in 82 B.C. In the census of Vespasian a woman of Faventia is said to have given her age as 135. Pliny speaks of the whiteness of its linen, and the productiveness of its vines is mentioned. It is noticeable that some of the fields in the territory of the ancient Faventia still preserve the exact size of the ancient Roman centuria of 200 iugeri (E. Bormann in Corp. Inscr. Lat. xi., Berlin, 1888, p. 121). When the exarchate was established, the town became part of it, and in 748 it was taken by Liutprand. Desiderius gave it to the church with the duchy of Ferrara. In the nth century it began to increase in importance. In the wars of the 12th and 13th centuries it at first took the imperial side, but in 1240 it stood a long siege from Frederick II. and was only taken after eight months. After further struggles between Guelphs and Ghibellines, the Manfredi made themselves masters of the place early in the 14th century, and remained in power until 1501, when the town- was taken by Caesar Borgia and the last legitimate members of the house of the Manfredi were drowned in the Tiber; and, after falling for a few years into the

hands of the Venetians, it became a part of the states of the church in 1509. (T. As.)

FAEROE (also written Faroe or The Faeroes, Danish Faeroerne or FdrSerne, “the sheep islands”), a group of islands in the North Sea belonging to Denmark. They are situated between Iceland and the Shetland Islands, about 200 m. N.W. of the latter, about the intersection of 7 E. with 62 N. The total land area of the group is 511 sq. m., and there are twenty- one islands (excluding small rocks and reefs), of which seventeen are inhabited. The population in 1880 amounted to 11,220, and in 1900 to 15,230. The principal islands are StromS, on which is the chief town, Thorshavn, with a population of 1656; Ostero, Sudero, Vaago, Sando and Bordo. They consist throughout of rocks and hills, separated from each other by narrow valleys or ravines; but, though the hills rise abruptly, there are often on their summits, or at different stages of their ascent, plains of considerable magnitude. Almost everywhere they present to the sea perpendicular cliffs, broken into fantastic forms, affording at every turn, to those who sail along the coast, the most picturesque and varied scenery. The highest hills are Slattare- tindur in Ostero, and Kopende and Skellingfjeld in Stromo, which rise respectively to 2894, 2592 and 2520 ft. The sea pierces the islands in deep fjords, or separates them by narrow inlets through which tidal currents set with great violence, at speeds up to seven or eight knots an hour; and, as communica- tions are maintained almost wholly by boat, the natives have need of expert watermanship. There are several lakes in which trout are abundant, and char also occur; the largest is Sorvaag Lake in Vaago, which is close to the sea, and discharges into it by a sheer fall of about 160 ft. Trees are scarce, and there is evidence that they formerly flourished where they cannot do

The fundamental formation is a series of great sheets of columnar basalt, 70 to 100 ft. thick, in which are intercalated thin beds of tuff. Upon the basalt rests the so-called Coal formation, 35 to 50 ft. thick ; the lower part of this is mainly fireclay and sandstone, the upper part is weathered clay with thin layers of brown coal and shale. The coal is found in Sudero and in some of the other islands in sufficient quantity to make it a matter of exploitation. Above these beds there are layers of dolerite, 15 to 20 ft. thick, with nodular segregations and abundant cavities which are often lined with zeolites. As the rocks lie in a horizontal position, on most of the islands of the group only the basalts or dolerite are visible. The crater from which the volcanic rocks were outpoured probably lies off the Faeroe Bank some distance to the south-west of Sudero. The basalts are submarine flows which formed the basis of the land

upon which grew the vegetation which gave rise to the coals ; the effusion of dolerite which covered up the Coal formation was sub-aerial. The existing land features, with the fjords, are due to ice erosion in the glacial period. 1

The climate is oceanic; fogs are common, violent storms are frequent at all seasons. July and August are the only true summer months, but the winters are not very severe. It seldom freezes for more than one month, and the harbours are rarely ice-bound. The methods of agriculture are extremely primitive and less than 3 % of the total area is under cultivation. As the plough is ill-suited to the rugged surface of the land, the ground is usually turned up with the spade, care being taken not to destroy the roots of the grass, as hay is the principal crop. Horses and cows are few, and the cows give little milk, in conse-quence of the coarse hay upon which they are fed. The number of sheep, however, justifies the name of the islands, some indi- viduals having flocks of from three to five hundred, and the total number in the islands considerably exceeds ten thousand. The northern hare (Lepus alpinus) is pretty abundant in Stromo and Ostero, having been introduced into the islands about 1 840-1 8 50. The catching of the numerous sea-birds which build their nests upon the face of the cliffs forms an important source of subsistence to the inhabitants. Sometimes the fowler is let down from the top of the cliff; at other times he climbs the rocks, or, where possible, is pushed upwards by poles made for the purpose. The birds and the contents of the nests are taken in nets mounted on poles; shooting is not practised, lest it should permanently scare the birds away. Fowling has some- what decreased in modern times, as the fisheries have risen in importance. The puffin is most commonly taken for its feathers. The cod fishery is especially important, dried fish being exported in large quantity, and the swim-bladders made into gelatine, and also used and exported for food. The whaling industry came into importance towards the close of the 19th century, and stations for the extraction of the oil and whalebone have been established at several points, under careful regulations designed to mitigate the pollution of water, the danger to live- stock from eating the blubber, &c. The finner whale is the species most commonly taken.

The trade of the Faeroe Islands was for some time a monopoly in the hands of a mercantile house at Copenhagen, and this monopoly was afterwards assumed by the Danish government, but by the law of the

21st of March 1855 all restrictions were removed. The produce of the whaling and fishing industries, woollen goods, lamb skins and feathers, are the chief exports, while in Thorshavn the preserving of fish and the manufacture of carpets are carried on to some extent. Thorshavn is situated on the S.E. side of Stromo, upon a narrow tongue of land, having creeks on each side, where ships may be safely moored. It is the seat of the chief government and ecclesiastical officials, and has a government house and a hospital. The houses are generally built of wood and roofed with birch bark covered with turf. The character of the people is marked by simplicity of manners, kindness and hospitality. They are healthy, and the population increases steadily. The Faeroes form an amt (county) of Denmark. They have also a local parliament (lagthing), consisting of the amtmann and nineteen other members. Among other duties, this body elects a representative to the upper house of parliament {landsthing) in Denmark; the people choose by vote a representative in the lower house (folkething). The islands are included in the Danish bishopric of Zealand.

History. — The early history of the Faeroes is not clear. It appears that about the beginning of the 9th century Grim Kamban, a Norwegian emigrant who had left his country to escape the tyranny of Harold Haarfager, settled in the islands. It is said that a small colony of Irish and Scottish monks were found in Sudero and dispersed by him. The Faeroes then already bore their name of Sheep Islands, as these animals had been found to flourish here exceedingly. Early in the nth century Sigmund or Sigismund Bresterson, whose family had flourished in the southern islands but had been almost exterminated by

See Hans von Post, ” Om Faroarnes uppkomst,” Geologiska

Fbreningens i Stockholm Forhandlingar, vol. xxiv. (1902).

invaders from the northern, was sent from Norway, whither he had escaped, to take possession of the islands for Olaf Trygvason, king of Norway. He introduced Christianity, and, though he was subsequently murdered, Norwegian supremacy was upheld, and continued till 1386, when the islands were transferred to Denmark. English adventurers gave great trouble to the in- habitants in the 16th century, and the name of Magnus Heineson, a native of Stromo, who was sent by Frederick II. to clear the seas, is still celebrated in many songs and stories. There was formerly a bishopric at Kirkebo, S. of Thorshavn, where remains of the cathedral may be seen; but it was abolished at the introduction of Protestantism by Christian III. Denmark re- tained

possession of the Faeroes at the peace of Kiel in 181 5. The native literature of the islands consists of the Faereyinga Saga, dealing with the period of Sigmund Bresterson, and a number of popular songs and legends of early origin.

Bibliography. — Lucas Jacobson Debes, Feroa Reserata (Copen- hagen, 1673; Eng. transl. London, 1675); Torfaeus, De rebus gestis Faereyensium (Copenhagen, 1695) ; I. Landt, Beskrivelse over Fdroerne (1800), and Descriptions of the Feroe Islands (London, 1810) ; A. J. Symington, Pen and Pencil Sketches of Faroe and Iceland (1862); J. Russel-Jeaffreson, The Faroe Islands (1901); J. Falk Ronne, Beskrivelse over Fdroerne (Copenhagen, 1902) ; C. H. Osten- feld, E. Warming and others, Botany of the Faeroes (Copenhagen, 1901-1903); Annandale, The Faroes and Iceland (Oxford, 1905). The Faereyinga Saga was translated by F. York Powell (London, 1896); for folk-songs and legends see S. Kraeth, Die fdroischen Lieder von Sigurd (Paderborn, 1877) ; V. U. Hammershaimb, Faerbisk Anthologi (Copenhagen, 1886-1891).

FAESULAE (mod. Fiesole, q.v.), an ancient city of Etruria, on the height 3 m. to the N.E. of Florentia, 970 ft. above sea- level. Remains of its walls are preserved on all sides, especially on the N.E., in one place to a. height of 12 to 14 courses. The blocks are often not quite rectangular, and the courses sometimes change; but the general tendency is horizontal and the walls are not of remote antiquity, the irregularities in them being rather due to th« hardness of the material employed, the rock of the hill itself. The courses vary in height from 1 to 3 ft., and some blocks are as long as 12ˆ ft. In this portion of the wall are two drains, below one of which is a phallus. The site of an ancient gate, and the road below it, can be traced; a little farther E. was an archway, conjectured by Dennis to be a gate of the Roman period, destroyed in 1 848. The whole circuit of the walls extended for about if m. The Franciscan monastery (1130 ft.) occupies the site of the acropolis, once encircled by a triple wall, of which no traces are now visible. Here was also the Capitolium of Roman times, as an inscription found here in 1 879 records (Corpus Inscr. Lat. xi., Berlin, 1888, No. 1545)- The Roman theatre, below the cathedral to the N.E., has 19 tiers of stone seats and is 3 7 yds. in diameter. Above it is an embanking wall of irregular masonry, and below it some remains of Roman baths, including five parallel vaults of concrete. Just outside the town on the E. a reservoir, roofed by the convergence of its sides, which were of large regular blocks, was discovered in 1832, but filled in again. Over 1000 silver denarii, all. coined before 63 B.C., were found at Faesulae in 1829. A small museum contains the objects found in the excavations of the theatre.

Though Faesulae was an Etruscan city, we have no record of it in history until 215 B.C., when the Gauls passed near it in their march on Rome. Twelve years later Hannibal seems to have taken this route in his march south after the victory of the Trebia. It appears to have suffered at the hands of Rome in the Social War, and Sulla expelled some of the inhabitants from their lands to make room for his veterans, but some of the latter were soon driven out in their turn by the 1 former occupiers. Both the veterans, who soon wasted what they had acquired, and the dispossessed cultivators joined the partisans of Catiline, and Manlius, one of his supporters, made his headquarters at Faesulae. Under the empire we hear practically nothing of it; in a.d. 405 Radagaisus was crushed in the neighbouring hills, and Belisarius besieged and took it in a.d. 539.

See L. A. Milani, Rendiconti dei Lincei, ser. vi. vol. ix. (1900), 289 seq., on the discovery of an archaic altar of the Locus sacer of Florence, belonging to Ancharia (Angerona), the goddess of Fiesole.

(T. As.)

FAFNIR, in Scandinavian mythology, the son of the giant Hreidmar. He was the guardian of the hoard of the Nibelungs and was killed by Sigurd.

FAGGING (from “fag,” meaning “weary”; of uncertain etymology), in English public schools, a system under which, generally with the full approval of the authorities, a junior boy performs certain duties for a senior. In detail this custom varies slightly in the different schools, but its purpose — the maintenance of discipline among the boys themselves — is the same. Dr Arnold of Rugby defined fagging as ” the power given by the supreme authorities of the school to the Sixth Form, to be exercised by them over the lower boys, for the sake of securing a regular government among the boys themselves, and avoiding the evils of anarchy; in other words, of the lawless tyranny of brute force.” Fagging was a fully established system at Eton and Winchester in the 16th century, and is probably a good deal older. That the advantages of thus granting the boys a kind of autonomy have stood the test of time is obvious from the fact that in almost all the great public schools founded during the 19th century, fagging has been deliberately adopted by the authorities. The right to fag carries with it certain well-defined duties. The fag-master is the protector of

his fags, and responsible for their happiness and good conduct. In cases of bullying or injustice their appeal is to him, not to the form or house master, and, except in the gravest cases, all such cases are dealt with by the fag-master on his own responsibility and without report to the master. Until recent years a fag's duties included such humble tasks as blacking boots, brushing clothes, and cooking breakfasts, and there was no limit as to hours; almost all the fag's spare time being so monopolized. This is now changed. Fagging is now restricted to such light tasks as running errands, bringing tea to the "master's " study, and fagging at cricket or football. At Eton there is no cricket fagging, and at most schools it is made lighter by all the fags taking their turn in regular order for one hour, so that each boy has to " fag " but once in so many weeks. At Rugby there is "study-fagging" — two fags being assigned to each Sixth Form boy and made responsible for the sweeping out and tidying up of his study alternately each week, — and " night-fagging "— running errands for the Sixth between 8.30 and 9.30 every evening, — and each boy can choose whether he will be a study- fag or night-fag. The right to fag is usually restricted to the Sixth Form, but at Eton the privilege is also granted the Fifth, and at Marlborough and elsewhere the Eleven have a right to fag at cricket, whether in the Sixth or not.

FAGGOT, a bundle of sticks used for firewood. The word is adapted from the Fr. fagot, and appears in Italian as fagotto, the name given to the bassoon (q.v.). " Faggot " is frequently used with reference to the burning of heretics, and recanted heretics wore an embroidered faggot on the arm as a symbol of the punishment they had escaped. In the 18th century the word is used of a " dummy " soldier, appearing on the rolls of a regiment. It is this use, coupled with the idea of a bundle of sticks as being capable of subdivision, that appears in the expression " faggot-vote," a vote artificially created by the minute splitting up of property so as to give a bare qualification for the franchise.

FAGNIEZ, GUSTAVE CHARLES (1 842-) , French historian and economist, was born in Paris on the 6th of October 1842. Trained at the Ecole des Chartes and the Ecole des Hautes Etudes, he made his first appearance in the world of scholarship as the author of an excellent book called Etudes sur I'industrie etlaclasse induslrielle d Paris au XIII* et au XIV' siecle (1877). This work, composed almost entirely from documents, many unpublished, opened a new field for historical study. Twenty years later he supplemented this book by an interesting collection of Documents relatifs a I'histoire de I'industrie et du commerce en France (2 vols., 1898-1900), and in 1897 he published L' Exonomie sociale de la France sous Henri IV, a, volume

containing the results of very minute research. He did not, however, confine himself to economic history. His Le Pere Joseph et Richelieu (1894), though somewhat frigid and severe, is based on a mass

of unpublished information, and shows remarkable psychologic grasp. In 1878 his Journal parisien de Jeaji de Maupoint, prieur de Ste Cather.ine-de-la-Couture was published in vol. iv. of the Memoires de la sociite de I'histoire de Paris et de Pile de France. He wrote numerous articles in the Revue historique (of which he was co-director with Gabriel Monod for some years) and in other learned reviews, such as the Revue des questions historiques and the Journal des savants. -In 1901 he was elected member of the Academieˆes Sciences Morales et Politiques.

FAGUET, EMILE (1847-), French critic and man of letters, was born at La Roche sur Yon on the 17th of December 1847. He was educated at the normal school in Paris, and after teaching for some time in La Rochelle and Bordeaux he came to Paris. After acting as assistant professor of poetry in the uni- versity he became professor in 1897. He was elected to the academy in 1900, and received the ribbon of the Legion of Honour in the next year. He acted as dramatic critic to the Seleil; from 1892 he was literary critic to the Revue bleue; and in 1896 took the place of M. Jules Lemaitre on the Journal des debais. Among his works are monographs on Flaubert (1899), Andre Chenier (1902), Zola (1903); an admirably concise Histoire de la litterature francaise depuis le XVII' siecle jusqu'a nos jours; series of literary studies on the 17th, 18th and 19th centuries; Questions politiques (1899); Propos litteraires (3 series, 190.2- 1905); Le Liberalisme (1902); and L' Anticlericalisme (1906).

See A. Seche, Emile Faguet (1904).

FA-HIEN (fl. a.d. 399-414), Chinese Buddhist monk, pilgrim- traveller, and writer, author of one of the earliest and most valuable Chinese accounts of India. He started from Changgan or Si-gan-fu, then the capital of the Tsin empire, and passing the Great Wall, crossed the " River of Sand ' or Gobi Desert beyond, that home of " evil demons and hot winds," which he vividly describes,— where the only way-marks were the bones of the dead, where no bird appeared in the air above, no animal on the ground below. Arriving at Khotan, the traveller witnessed a great Buddhist festival; here, as in Yarkand, Afghanistan and other parts thoroughly Islamized before the close of the middle ages, Fa-Hien shows us Buddhism still prevailing. India was reached by a perilous descent of " ten thousand cubits " from the " wall-like hills " of the Hindu Kush into the Indus valley (about a.d. 402); and

the pilgrim passed the next ten years in the ” central ” Buddhist realm, — making journeys to Peshawur and Afghanistan (especially the Kabul region) on one side, and to the Ganges valley on another. His especial concern was the explora- tion of the scenes of Buddha’s life, the copying of Buddhist texts, and converse with the Buddhist monks and sages whom the Brahmin reaction had not yet driven out. Thus we find him at Buddha’s birthplace on the Kohana, north-west of Benares; in Patna and on the Vulture Peak near Patna; at the Jetvana, monastery in Oudh; as well as at Muttra on the Jumna, at Kanauj, and at Tamluk near the mouth of the Hugli. But now the narrative, which in its earlier portions was primarily historical and geographical, becomes mystical and theological; miracle- stories and meditations upon Buddhist moralities and sacred memories almost entirely replace matters of fact. From the Ganges delta Fa-Hien sailed with a merchant ship, in fourteen days, to Ceylon, where he transcribed all the sacred books, as yet unknown in China, which he could find; witnessed the festival of the exhibition of Buddha’s tooth; and remarked the trade of Arab merchants to the island,, two centuries before Mahomet. He returned by sea to the mouth of the Yangtse-Kiang, changing vessels at Java, and narrowly escaping shipwreck or the fate of Jonah.

Fa-Hien’s work is valuable evidence to the strength, and in many places to the dominance, of Buddhism in central Asia and in India at the time of the collapse of the Roman empire in western Europe. His tone throughout is that of the devout, learned, sensible, rarely hysterical pilgrim-traveller. His record is careful and accurate, and most of his positions can be identi- fied; his devotion is so strong that it leads him to depreciate China as a ” border-land,” India the home of Buddha being the true ” middle kingdom ” of his creed.

See Jarae6 Legge, Record of Buddhistic Kingdoms, being an account by the Chinese Monk Fd-hien of his. travels in India and Ceylon ; translated and edited, with map, &c. (Oxford, 1886); S. Beal, Travels of Fah-Hian and Sung- Yun, Buddhist pilgrims from China to India, 400 and 518 a.d., translated, with map, &c. (1869); C. R. Be&zley, Dawn of Modern Geography, vol. i. (1897), pp. 478-485.

FAHLCRANTZ, CHRISTIAN ERIK (1790-1866), Swedish author, was born at Stora Tuna in Sweden on the 30th of August 1790. His brothers, Carl Johan- (1774-1861), the landscape- painter, and Axel Magnus (1780-1854), the sculptor, became hardly less distinguished

than himself. In 1804 he entered the university of Upsala; in 182 1 he became tutor in Arabic, and in 1825 professor of Oriental languages. In 1828 he entered the church, but earlier than this, in 1825, he published his Noachs Ark, a successful satire on the literary and social life of his time, followed in 1826 by a second part. In' 1835 Fahlcrantz brought out the first part of his epic of Ansgarius, which was completed in 1846, in 14 cantos. In 1842 he was made a member of the Swedish Academy, and in 1849 he was made bishop of Vesteras, his next literary work being an archaeological study on the beautiful ancient cathedral of his diocese. In the course of the years 1858-1861 appeared the five volumes of his Rom] 'on och nu (Rome as it was and is), a theological polemic, mainly directed against the Jesuits. He died on the 6th of August 1866. His complete works (7 vols., Orebro, 1863-1866) were issued mainly under his own superintendence.

FAHRENHEIT, GABRIEL DANIEL (1686-1736), German physicist, was born at Danzig on the 14th of May 1686. For the most part he lived in England and Holland, devoting himself to the study of physics and making a living, apparently, by the manufacture of meteorological instruments. He was the author of important improvements in the construction of thermometers, and he introduced the thermometric scale known by his name and still extensively used in Great Britain and the United States (see Thermometry). He also invented an improved form of hygrometer, a description of which, together with accounts of various observations and experiments made by him, was pub- lished in the Phil. Trans, for 1724. He died in Holland on the 16th of September 1736.

FAIDHERBE, LOUIS LEON CESAR (1818-1889), French general and colonial administrator, was born on the 3rd of June 1818, at Lille, received his military education at the Ecole Poly technique and at Metz, and entered the engineers in 1840. From 1844 to 1847 he served in Algeria, then two years in the West Indies, and again in Algeria, taking part in many expedi- tions against the Arabs. In 1852 he was transferred to Senegal as sub-director of engineers, and in 1854 was promoted chef de bataillon and appointed governor of the colony. He held this post with one brief interval until July 1865. The work he accomplished in West Africa constitutes his most enduring monument. At that time France possessed in Senegal little else than the town of St Louis and a strip of coast. Explorers had, however, made known the riches and possibilities of the Niger regions, and Faidherbe formed the design of adding those countries to the French dominions. He even dreamed of creating a French African empire stretching from Senegal to the Red Sea. To accomplish even the first part of his design he had very inadequate resources, especially in view

of the aggressive action of Omar Al-Hadji, the Moslem ruler of the countries of the middle Niger. By boldly advancing the French outposts on the upper Senegal Faidherbe stemmed the Moslem advance, and by an advantageous treaty with Omar in i860 brought the French possessions into touch with the Niger. He also brought into subjection the country lying between the Senegal and Gambia. When he resigned his post French rule had been firmly established over a very considerable and fertile area and the foundation laid upon which his successors built up the predominant position occupied now by France in West Africa. In 1863 he became general of brigade. From 1867 to the early part of 1870 he commanded the subdivision of Bona in Algeria, and was com- manding the Constantine division at the commencement of the Franco-German War. Promoted general of division inNovember 1870, he was on the 3rd of December appointed by the Govern-

ment of National Defence to be commander-in-chief of the army of the North. In this post he showed himself to be possessed of the highest military talents, and the struggle between the I. German army and that commanded by Faidherbe, in which were included the hard-fought battles of Pont Noyelles, Bapaume and St Quentin, was perhaps the most honourable to the French army in the whole of the People's War. Even with the inadequate force of which he disposed he was able to maintain a steady resistance up to the end of the war. Elected to the National Assembly for the department of the Nord, he resigned his seat in consequence of its reactionary proceedings. For his services he was decorated with the grand cross, and made chancellor of the order of the Legion of Honour. In 1872 he went on a scientific mission to Upper Egypt, where he studied the monu- ments and inscriptions. An enthusiastic geographer, philologist and archaeologist, he wrote numerous works, among which may be mentioned Collection des inscriptions numidiques (1870), Epigraphie pMnicienne (1873), Essai sur la langue poul (1875), and Le Zenaga des tribes sSnegalaises (1877), the last a study of the Berber language. He also wrote on the geography and history of Senegal and the Sahara, and La Campagne de I'armie du Nord (1872). He was elected a senator in 1879, and, in spite of failing health, continued to the last a close student of his favourite subjects. He died on the 29th of September 1889, and received a public funeral. Statues and monuments to his memory were erected at Lille, Bapaume, St Quentin and St Louis, Senegal.

FAIENCE, properly the French term for the porzellana di Facnza, a fine kind of glazed and painted earthenware made at Faenza in Italy, hence a term applied generally to all kinds of pottery other than unglazed pottery or porcelain. It is often particularly applied to the

translucent earthenware made in Persia (see Ceramics).

FAILLY, PIERRE LOUIS CHARLES DE (1810-1892), French general, was born at Rozoy-sur-Serre (Aisne) on the 21st of January 1810, and entered the army from St Cyr in 1828. In 1 85 1 he had risen to the rank of colonel, and Napoleon III., with whom he was a favourite, made him general of brigade in 1854 and general of division in 1855, after which for a time De Failly was his aide-de-camp. In the war of 1859 De Failly commanded a division, and in 1867 he defeated Garibaldi at Mentana, this action being the first in which the chassepot was used. In 1870 De Failly commanded the V. corps. His in- activity at Bitsch on the 6th of August while the I. corps on his right and the II. corps on his left were crushed at Worth and Spicheren respectively, gave rise to the greatest indignation in France, and his military career ended, after the V. corps had been severely handled at Beaumont on the 30th of August, with the catastrophe of Sedan. The rest of his life was spent in retirement. De Failly wrote Campaigne de 1870, Operations et marche du f"' corps jusqu'au 30 aout (Brussels, 1871).

FAIN, AGATHON JEAN FRANCOIS (1778-1837), French historian, was born in Paris on the nth of January 1778. Having gained admittance to the offices of the Directory, he became head of a department. Under the Consulate he entered the office of the secretary of state, in the department of the archives. In 1806 he was appointed secretary and archivist to the cabinet particulier of the emperor, whom he attended on his campaigns and journeys. He was created a baron of the empire in 1809, and, on the fall of Napoleon, was first secretary of the cabinet and confidential secretary. Compelled by the second Restoration to retire into private life, he devoted his leisure to writing the history of his times, an occupation for which his previous employ- ments well fitted him. He published successively Manuscrit de 1814, contenant I'histoire des six derniers mois du regne de Napoleon (1823; new edition with illustrations, 1906); Manuscrit de 1813, contenant le precis des evinements de cette annie pour servir d I'histoire de I'empereur Napolion (1824); Manuscrit de 18 12 (1827); and Manuscrit de Van Hi. (jjg4-ijgˆ), contenant les premihres transactions de V Europe avec la ripublique francaise et le tableau des derniers evinements du rigime conventionnel (1828), all of which are remarkable for accuracy and wide range of knowledge, and are a very valuable source for the history of

Napoleon I. Of still greater importance for the history of Napoleon are Fain's Mimoires, which were published posthum- ously in 1908; they relate more particularly to the last five years of the empire, and give a detailed picture of the emperor at work on his correspondence among his confidential secretaries. Immediately after the overthrow of Charles X., King Louis Philippe appointed Fain first secretary of his cabinet (August 1830). Fain was a member of the council of state and deputy from Montargis from 1834 until his death, which occurred in Paris on the 16th of September 1837.

FAIR, a commercial institution, defined as a " greater species of market recurring at more distant intervals": both "fair" and " market " (q.v.) have been distinguished by Lord Coke from "mart," which he considers as a greater species of fair; and all three may be defined as periodic gatherings of buyers and sellers in an appointed place, subject to special regulation by law or custom. Thus in England from a strictly legal point of view there can be no fair or market without a franchise; and a franchise of fair or market can only be exercised by right of a grant from the crown, or by the authority of parliament or by prescription presupposing a grant. In the earliest times periodical trading in special localities was necessitated by the difficulties of communication and the dangers of travel. Public gatherings, whether religious, military or judicial, which brought together widely scattered populations, were utilized as opportunities for commerce. At the festivals of Delos and at the Olympic games trade, it is said, found important outlets, while in Etruria the annual general assembly at the temple of Voltumna served at the same time as a fair and was regularly attended by Roman traders. Instances of a similar nature might be multiplied; but it was above all with religious festivals which recurred with regularity and convoked large numbers of persons that fairs, as distinguished from markets, are most intimately associated.

The most commonly accepted derivation of the word "fair" is from the Latin feria, a name which the church borrowed from Roman custom and applied to her own festivals. A fair was generally held during the period of a saint's feast and in the precincts of his church or abbey, but in England this desecration of church or churchyard was first forbidden by the Statute of Winton (c. Edward I.). Most of the famous fairs of medieval England and Europe, with their tolls or other revenues, and, within certain limits of time and place, their monopoly of trade, were grants from the sovereign to abbots, bishops and other ecclesiastical dignitaries. Their "holy day" associations are preserved in the German word for fairs, Messen; as also in the kirmiss, " church mass," of the people of Brittany. So very intimate was the connexion between the fair and the feast of the saint that the former has very

commonly been regarded as an off-shoot or development of the latter. But there is every reason to suppose that fairs were already existing national institutions, long before the church turned or was privileged to turn them to her own profit.

The first charter of the great fair of Stourbridge, near Cambridge, was granted by King John for the maintenance of a leper hospital; but the origin of the fair itself is ascribed to Carausius, the rebel emperor of Britain, a.d. 207. At all events, it may be seen from the data given in Herbert Spencer's Descriptive Sociology that the country had then arrived at the stage of development where fairs might have been recognized as a necessity. The Romans also appear to have elaborated a market-law similar to that in force throughout medieval Europe — though it must be observed that the Roman nundinae, which some have regarded as fairs, were weekly markets. It has also been supposed that the ancient fairs of Lyons were a special privilege granted by the Roman conquerors; and Sidonius Apollinaris, a.d. 427, alludes to the fairs of the district afterwards known as the county of Champagne, as if they were then familiarly known institutions. Fairs, in a word, would not only have arisen naturally, wherever the means of communication between indi- vidual centres of production and consumption were felt to be inadequate to the demand for an interchange of commodities; but, from their very nature, they might be expected to show

some essential resemblances, even in points of legislation, and where no international transmission of custom could have been possible. Thus, the fair courts of pre-Spanish Mexico corre- sponded very closely to those of the Beaucaire fair. They resembled the English courts of piepowder. The Spaniards, when first they saw the Mexican fairs, were reminded of the like institutions in Salamanca and Granada. The great fair or market at the city of Mexico is said to have been attended by about 40,000 or 50,000 persons, and is thus described by Prescott: —

" Officers patrolled the square, whose business it was to keep the peace, to collect the dues imposed on the various kinds of merchan- dise, to see that no false measures or fraud of any kind were used, and to bring offenders at once to justice. A court of twelve judges sat in one part of the tianguez clothed with those ample and summary powers which, in despotic countries, are often delegated even to petty tribunals. The extreme severity with which they exercised those powers, in more than one instance, proves that they were not a dead letter."

But notwithstanding the great antiquity of fairs, their charters are comparatively modern — the oldest known being that of St Denys, Paris, which Dagobert, king of the Franks, granted (a.d. 642) to the monks of the place ” for the glory of God, and the honour of St Denys at his festival.”

In England it was only after the Norman conquest that fairs became of capital importance. Records exist of 2800 grants of franchise markets and fairs between the years 1199 and 1483. More than half of these were made during the reigns of John and Henry III., when the power of the church was in ascendancy. The first recorded grant, however, appears to be that of William the Conqueror to the bishop of Winchester, for leave to hold an annual ” free fair ” at St Giles’s hill. The monk who had been the king’s jester received his charter of Bartholomew fair, Smithfield, in the year 1133. And in 1248 Henry III. granted a like privilege to the abbot of Westminster, in honour of the ” translation ” of Edward the Confessor. Sometimes fairs were granted to towns as a means for enabling them to recover from the effects of war and other disasters. Thus, Edward III. granted a ” free fair ” to the town of Burnley in Rutland, just as, in subsequent times, Charles VII. favoured Bordeaux after the English wars, arid Louis XIV. gave fair charters to the towns of Dieppe and Toulon. The importance attached to these old fairs may be understood from the inducements which, in the 14th century, Charles IV. held out to traders visiting the great fair of Frankfort-on-Main. The charter declared that both during the continuance of the fair, and for eighteen days before and after it, merchants would be exempt from imperial taxation, from arrest for debt, or civil process of any sort, except such as might arise from the transactions of the market itself and within its precincts. Philip of Valois’s regulations for the fairs of Troyes in Champagne might not only be accepted as typical of all subsequent fair-legislation of the kingdom, but even of the English and German laws on the subject. The fair had its staff of notaries for the attestation of bargains, its court of justice, its police officers, its sergeants for the execution of the market judges’ decrees, and its visitors — of whom we may mention the prud’ hommes , — whose duty it was to examine the quality of goods exposed for sale, and to confiscate those found unfit for consumption. The confiscation required the consent of five or six representatives of the merchant community at the fair. The effect of these great ” free fairs ” of England and the continent on the development of society was indeed great. They helped to familiarize the western and northern countries with the banking anS financial systems of the Lombards and Florentines, who resorted to them under the protection of the sovereign’s ” firm peace,” and the ghostly terrors of the pope. They

usually became the seat of foreign agencies. In the names of her streets Provins preserved the memory of her 12th-century intercourse with the agents and merchants of Germany and the Low Countries, and long before that time the Syrian traders at St Denys had established their powerful association in Paris. Like the church on the religious side, the free fairs on the com- mercial side evoked and cherished the international spirit. And during long ages, when commercial ” protection ” was regarded

as indispensable to a nation’s wealth, and the merchant was compelled to ” fight his way through a wilderness of taxes,” they were the sole and, so far as they went, the complete sub- stitute for the free trade of later days.

Their privileges, however, were, from their very nature, destined to grow more oppressive and intolerable the more the towns were multiplied and the means of communication increased. The people of London were compelled to close their shops during the days when the abbot of Westminster’s fair was open. But a more curious and complete instance of such an ecclesiastical monopoly was that of the St Giles’s fair, at first granted for the customary three days, which were increased by Henry III. to sixteen. The bishop of Winchester was, as we have seen, the lord of this fair. On the eve of St Giles’s feast the magistrates of Winchester surrendered the keys of the city gates to the bishop, who then appointed his own mayor, bailiff and coroner, to hold office until the close of the fair. During the same period, Winchester and Southampton also — though it was then a thriving trading town- — were forbidden to transact their ordinary commercial, business, except within the bishop’s fair, or with his special permission. The bishop’s officers were posted along the highways, with power to forfeit to his lordship all goods bought and sold within 7 m. of the fair — in whose centre stood ” the pavilion,” or bishop’s court. It is clear, from the curious record of the Establishment and Expenses, of the Household of Percy, 5th earl of Northumberland, that fairs were the chief centres of country traffic even as late as the 16th century. They began to decline rapidly after 1759, when good roads had been constructed and canal communication established between Liver- pool and the towns of Yorkshire, Cheshire and Lancashire. In the great towns their extinction was hastened in consequence of their evil effects on public morals. All the London fairs were abolished as public nuisances before 1855 —

the last year of the ever famous fair of St Bartholomew; and the fairs of Paris were swept away in the storm of the Revolution.

English Fairs and Markets. — For the general reasons apparent from the preceding sketch, fairs in England, as in France and Germany, have very largely given way to markets for specialities. Even the live-stock market of the metropolis is being superseded by the dead-meat market, a change which has been encouraged by modern legislation on cattle disease, the movements of home stock and the importation of foreign animals. Agricultural markets are also disappearing before the ” agencies ” and the corn exchanges in the principal towns. Still there are some considerable fairs yet remaining. Of the English fairs for live stock, those of Weyhill in Hampshire (October 10), St Faith’s, near Norwich (October 17), as also several held at Devizes, Wiltshire, are among the largest in the kingdom. The first named stands next to none for its display of sheep. Horncastle, Lincoln- shire, is the largest horse fair in the kingdom, and is regularly visited by American and continental dealers. The other leading horse fairs in England are Howden in Yorkshire (well known for its hunters) ,Woodbridgc (on Lady Day) for Suffolk horses, Barnet, in Hertfordshire, and Lincoln. Exeter December fair has a large display of cattle, horses and most kinds of commodities. Large numbers of Scotch cattle are also brought to the fairs of Carlisle and Ormskirk. Nottingham has a fair for geese. Ipswich has a fair for lambs on the 1st of August, and for butter and cheese on the 1st of September. Gloucester fair is also famous for the last-named commodity. Falkirk fair, or tryst, for cattle and sheep, is one of the largest in Scotland; and Ballinasloe, Galway, holds a like position among Irish fairs. The Ballinasloe cattle are usually fed for a year in Leinster before they are considered fit for the Dublin or Liverpool markets.

French Fairs. — In France fairs and markets are held under the authority of the prefects, new fairs and markets being estab- lished by order of the prefects at the instance of the commune interested. Before the Revolution fairs and markets could only be established by seigneurs jusliciers, but only two small markets have survived the law of 1790 abolishing private ownership of market rights, namely, the Marche Ste Catherine and the Marche des cnfanls rouges, both in Paris. Under the present system

markets and fairs are held in most of the towns and villages in France; and at all such gatherings entertainments form an important feature. The great fair of Beaucaire instituted in 1 1 68) has steadily declined since the opening of railway com- munication, and now ranks with the fairs of ordinary provincial towns. Situated at the junction of the

Rh6ne and the Canal du Midi, and less than 40 m. from the sea, it at one time attracted merchants from Spain, from Switzerland and Germany, and from the Levant and Mediterranean ports, and formed one of the greatest temporary centres of commerce on the continent. One trade firm alone, it is said, rarely did less than 1 ,000,000 francs worth of business during the fortnight that the fair lasted.

German Fairs. — In Germany the police authorities are con- sidered the market authorities, and to them in most cases is assigned the duty of establishing new fairs and markets, subject to magisterial decision. The three great fairs of Germany are those of Frankfort-on-Main, Frankfort-on-Oder and Leipzig, but, like all the large fairs of Europe, they have declined rapidly in importance. Those of Frankfort-on-Main begin on Easter Tuesday and on the nearest Monday to September 8 respectively, and their legal duration is three weeks, though the limit is regu- larly extended. The fairs of the second-named city are Remini- scere, February or March; St Margaret, July; St Martin, November. Ordinarily they last fifteen days, which is double the legal term . The greatest of the German fairs are those of Leipzig, whose display of books is famous all over the world. Its three fairs are dated January 1, Easter, Michaelmas. The Easter one is the book fair, which is attended by ail the principal booksellers of Germany, and by many more from the adjoining countries. Most German publishers have agents at Leipzig. As many as 5000 new publications have been entered in a single Leipzig catalogue. As in the other instances given, the Leipzig fairs last for three weeks, or nearly thrice their allotted duration. Here no days of grace are allowed, and the holder of a bill must demand payment when due, and protest, if necessary, on the same day, otherwise he cannot proceed against either drawer or endorser.

Russian Fairs. — In Russia fairs are held by local authorities. Landed proprietors may also hold fairs on their estates subject to the sanction of the local authorities; but no private tolls may be levied on commodities brought to such fairs. In Siberia and the east of Russia, where more primitive conditions foster such centres of trade, fairs are stiil of considerable importance. Throughout Russia generally they are very numerous. The most important, that of Nijni Novgorod, held annually in July and August at the confluence of the rivers Volga and Kama, was instituted in the 17th century by the tsar Michael Fedoro- vitch. In 1 88 1 it was calculated that trade to the value of 246,000,000 roubles was carried on within the limits of the fair. It still continues to be of great commercial importance, and is usually attended by upwards of 100,000 persons from all parts of Asia and eastern Europe. Other fairs of consequence are those of Irbit in Perm, Kharkoff (January and August) , Poltava (August and P'ebruary),

Koreunais in Koursk, Ourloupinsknia in the Don Cossack country, Krolevetz in Tchernigoff, and a third fair held at Poltava on the feast of the Ascension.

Indian Fairs. — The largest of these, and perhaps the largest in Asia, is that of Hurdwar, on the upper course of the Ganges. The visitors to this holy fair number from 200,000 to 300,000; but every twelfth year there occurs a special pilgrimage to the sacred river, when the numbers may amount to a million or upwards. Those who go solely for the purposes of trade are Nepalese, Mongolians, Tibetans, central Asiatics and Mahom- medan pedlars from the Punjab, Sind and the border states. Persian shawls and carpets, Indian silks, Kashmir shawls, cottons (Indian and English), preserved fruits, spices, drugs, &c, together with immense numbers of cattle, horses, sheep and camels, are brought to this famous fair.

American Fairs. — The word ” fair,” as now used in the United States, appears to have completely lost its Old World meaning. It seems to be exclusively applied to industrial exhibitions and to what in England are called fancy bazaars. Thus, during the Civil War, large sums were collected at the “sanitary fairs,”

for the benefit o£ the sick and wounded. To the first-named class belong the state and county fairs, as they are called. Among the first and best-known of these was the ” New York World’s Fair,” opened in 1853 by a company formed in 1851. (See Exhibition.)

Law of Fairs. — As no market or fair can be held in England without a royal charter, or right of prescription, ‘so any person establishing a fair without such sanction is liable to be sued under a writ of Quo warranto, by any one to whose property the said market may be inj urious. Nor can a fair or market be legally held beyond the time specified in the grant; and by 5 Edward III. c. 5 (1331) a merchant selling goods after the legal expiry of the fair forfeited double their value. To be valid, a sale must take place in ” market-overt ” (open market) ; ” it will not be binding if it carries with it a presumption of fraudulence.” These regulations satisfied, the sale ” transfers a complete property in the thing sold to the vendee; so that however injurious or illegal the title of the vendor may be, yet the vendee’s is good against all men except the king.” (In Scottish law, the claims of the real owner would still remain valid.) However, by 21 Henry VIII.

c. 2 (1529) it was enacted that, ” if any felon rob or take away money, goods, or chattels, and be indicted and found guilty, or otherwise attainted upon evidence given by the owner or party robbed, or by any other by their pro- curement, the owner or party robbed shall be restored to his money, goods or chattels,” but only those goods were restored which were specified in the indictment, now could the owner recover from a bona fide purchaser in market-overt who had sold the goods before conviction. For obvious reasons the rules of market-overt were made particularly stringent in the case of horses. Thus, by 2 Philip & Mary c. 7 (1555) and 31 Eliz. c. 12 (1589) no sale of a horse was legal which had not satisfied the following conditions; — Public exposure of the animal for at ‘least an hour between sunrise and sunset; identification of the vendor by the market officer, or guarantee for his honesty by ” one sufficient and credible person ” ; entry of these particulars, together with a description of the animal,’ and a statement of the price paid for it, in the market officer’s book. Even if his rights should have been violated in spite of all these precautions, the lawful owner could recover, if he claimed within six months, produced witnesses, and tendered the price paid to the vendor. Tolls were not a ” necessary incident ” of a fair — i.e. they were illegal unless specially granted in the patent, or recognized by custom. As a rule, they were paid only by the vendee, and to the market clerk, whose record of the payment was an attestation to the genuineness of the purchase. By 2 & 3 Philip & Mary c. 7 every lord of a fair entitled to exact tolls was bound to appoint a clerk to collect and enter them. It was also this functionary’s business to test measures and weights. Tolls, again, are sometimes held to include ” stallage ” and ” picage,” which mean respectively the price for permission to erect stalls and to dig holes for posts in the market grounds. But toll proper belongs to the lord of the market, whereas the other two are usually regarded as the property of the lord of the soil. The law also provided that stallage might be levied on any house situated in the vicinity of a market, and kept open for business during the legal term of the said market. Among modern statutes, one of the chief is the Markets and Fairs Clauses Act 1847, the chief purpose of which was to consolidate previous measures. By the act no proprietors of a new market were per- mitted to “let stallages, take tolls, or in any way open their ground for business, until two justices of the peace certified to the completion of the fair or market. After the opening of the place for public use, no person other than a licensed hawker may sell anywhere within the borough, his own house or shop excepted, any articles in respect of which tolls are legally exigible in the market. A breach of this provision entails a penalty of forty shillings. Vendors of unwhole- some meat are liable to a penalty of £5 for each offence; and the

“inspectors of provisions ” have full liberty to seize the goods and institute proceedings against the owners. They may also enter ” at all times of the day, with or without assistance, ‘ the slaughter-house which the undertaker of the market may, by the special act, have been empowered to construct. For general sanitary reasons, persons are prohibited from killing animals anywhere except in these slaughter-houses. Again, by the Fairs Act 1873, times of holding fairs are determined by the secretary of state; while the Fairs Act 1871 empowers him to abolish any fair on the represent- ation of the magistrate and with the consent of the owner. The preamble of the act states that many fairs held in England and Wales are both unnecessary and productive of ” grievous immorality.”

The Fair Courts. — The piepowder courts, the lowest but most expeditious courts of justice in the kingdom, as Chitty calls them, were very ancient. The Conqueror’s Jaw De Empofiis shows their pre-existence in Normandy. Their name was derived from pied poudreux, i. e. ” dusty-foot. ‘ * The lord of the fair or his representa- tive was the presiding judge, and usually he was assisted by a jury of traders chosen on the spot. Their jurisdiction was limited by the legal time and precincts of the fair, and to disputes about

1 In Med. Lat. pede-puherosus meant an itinerant merchant or pedlar. In Scots borough law ” marchand travelland ” and ” dusty fute ” are identical.

contracts, ” slander of wares,” attestations, the preservation of order, &c.

Authorities. — See Herbert Spencer’s Descriptive Sociology (1873), especially the columns and paragraphs on ” Distribution”; Pres- cott’s History of Mexico, for descriptions of fairs under the Aztecs; Giles Jacob’s Law Dictionary (London, 1809) ; Joseph Chitty’s Treatise on the Law of Commerce and Manufactures, vol. ii. chap. 9 (London, 1824) ; Holinshed’s and Grafton’s Chronicles, for lists, &c, of English fairs; Meyer’s Das grosse Conversations-Lexicon (1852), under “Messen”; article ” Foire ” in Larousse’s Dictionnaire universelle du XIX’ siecle (Paris, 1866-1874), and its references to past authorities; and especially, the second volume, commercial series, of the Encyclopedie methodique (Paris, 1783); M’Culloch’s Dictionary of Commerce (1869-1871) ; Wharton’s History of English Poetry, pp. 185, 186 of edition of 1870 (London, Murray & Son), for a description of the Winchester Fair, &c. ; a note by Professor Henry Morley in p.

498, vol. vii. Notes and Queries, second series; the same author's unique History of the Fair of St Bartholomew (London, 1859) ; Wharton's Law Lexicon (Will's edition, London, 1876) ; P. Huvelin's Essai historique sur le droit des marches et des foires (Paris, 1897); Report of the Royal Commission on Market Rights and Tolls, vols. i. (1889), xiv. (1891); Final Report (1891); Walford's Fairs, Past and Present (1883); The Law relating to Markets and Fairs, by Pease and Chitty (London, 1899). (J. Ma.; Ev. C.*)

FAIRBAIRN, ANDREW MARTIN (1838-), British Non- conformist divine, was born near Edinburgh on the 4th of November 1838. He was educated at the universities of Edin- burgh and Berlin, and at the Evangelical Union Theological Academy in Glasgow. He entered the Congregational ministry and held pastorates at Bathgate, West Lothian and at Aberdeen. From 1877 to 1886 he was principal of Airedale College, Bradford, a post which he gave up to become the first principal of Mansfield College, Oxford. In the transference to Oxford under that name of Spring Hill College, Birmingham, he took a considerable part, and he has exercised influence not only over generations of his own students, but also over a large number of undergraduates in the university generally. He was granted the degree of M.A. by a decree of Convocation, and in 1903 received the honorary degree of doctor of literature. Pie was also given the degrees of doctor of divinity of Edinburgh and Yale, and doctor of laws of Aberdeen. His activities were not limited to his college work. He delivered the Muir lectures at Edinburgh University (1878- 1882), the Gifford lectures at Aberdeen (1892-1894), the Lyman Beecher lectures at Yale (1891-1892), and the Haskell lectures in India (1898-1899). He was a member of the Royal Commis- sion of Secondary Education in 1894-1895, and of the Royal Commission on the Endowments of the Welsh Church in 1906. In 1883 he was chairman of the Congregational LTm'on of England and Wales. He is a prolific writer on theological subjects. He resigned his position at Mansfield College in the spring of 1909.

Among his works are : — Studies in the Philosophy of Religion and History (1876); Studies in the Life of Christ (1881); Religion in History and in Modern Life (1884; rev. 1893); Christ in Modern Theology (1893); Christ in the Centuries (1893) ; Catholicism Roman and Anglican (1899) ; Philosophy of the Christian Religion (1902) ; Studies in Religion and Theology (1909).

FAIRBAIRN, SIR WILLIAM, Bart. (1789-1874), Scottish engineer, was born on the 19th of February 1789 at Kelso, Roxburghshire, where his father was a farm-bailiff. In 1803 he obtained work at three shillings a

week as a mason's labourer on the bridge then being built by John Rennie at Kelso; but within a few days he was incapacitated by an accident. Later in the same year, his father having been appointed steward on a farm connected with Percy Main Colliery near North Shields, he obtained employment as a carter in connexion with the colliery. In March 1804 he was bound an apprentice to a mill- wright at Percy Main, and then found time to supplement the deficiencies of his early education by systematic private study. It was at Percy Main that he made the acquaintance of George Stephenson, who then had charge of an engine at a neighbouring colliery. For some years subsequent to the expiry of his appren- ticeship in 1811, he lived a somewhat roving life, seldom remain- ing long in one place and often reduced to very hard straits before he got employment. But in 1817 he entered into partnership with a shopmate, James Lillie, with whose aid he hired an old shed in High Street, Manchester, where he set up a lathe and began business. The firm quickly secured a good reputation,

and the improvements in mill-work and water-wheels introduced by Fairbairn caused its fame to extend beyond Manchester to Scotland and even the continent of Europe. The partnership was dissolved in 1832.

In 1830 Fairbairn had been employed by the Forth and Clyde Canal Company to make experiments with the view of determin- ing whether it were possible to construct steamers capable of traversing the canal at a speed which would compete successfully with that of the railway; and the results of his investigation were published by him in 1831, under the title Remarks on Canal Navigation. His plan of using iron boats proved inadequate to overcome the difficulties of this problem, but in the develop- ment of the use of this material both in the case of merchant vessels and men-of-war he took a leading part. In this way also he was led to pursue extensive experiments in regard to the strength of iron. In 1835 he established, in connexion with his Manchester business, a shipbuilding yard at Millwall, London, where he constructed several hundred vessels, including many for the royal navy; but he ultimately found that other engage- ments prevented him from paying adequate attention to the management, and at the end of fourteen years he disposed of the concern at a great loss. In 1837 he was consulted by the sultan of Turkey in regard to machinery for the

government workshops at Constantinople. In 1845 he was employed, in conjunction with Robert Stephenson, in constructing the tubular railway bridges across the Conway and Menai Straits. The share he had in the undertaking has been the subject of some dispute; his own version is contained in a volume he published in 1849, An Account oj the Construction of the Britannia and Conway Tubular Bridges. In 1849 he was invited by the king of Prussia to submit designs for the construction of a bridge across the Rhine, but after various negotiations, another design, by a Prussian engineer, which was a modification of Fairbairn's, was adopted. Another matter which engaged much of Fairbairn's attention was steam boilers, in the construction of which he effected many improve- ments. Amid all the cares of business he found time for varied scientific investigation. In 1851 his fertility and readiness of invention greatly aided an inquiry carried out at his Manchester works by Sir William Thomson (Lord Kelvin) and J. P. Joule, at the instigation of William Hopkins, to determine the melting points of substances under great pressure; and from 1861 to 1865 he was employed to guide the experiments of the govern- ment committee appointed to inquire into the " application of iron to defensive purposes." He died at Moor Park, Surrey, on the 18th of August 1874. Fairbairn was a member of many learned societies, both British and foreign, and in 1861 served as president of the British Association. He declined a knighthood in 1861, but accepted a baronetcy in 1869.

His youngest brother, Sir Peter Fairbairn (1799-1861), founded a large machine manufacturing business in Leeds. Starting on a small scale with flax-spinning machinery, he subsequently extended his operations to the manufacture of textile machinery in general, and finally to that of engineering tools. He was knighted in 1858.

See The Life of Sir William Fairbairn, partly written by himself and edited and completed by Dr William Pole (1877).

FAIRBANKS, ERASTUS (1792-1864), American manufacturer, was born in Brimfield, Massachusetts, on the 28th of October 1792. He studied law but abandoned it for mercantile pur- suits, finally settling in St Johnsbury, Vermont, where in 1824 he formed a partnership with his brother Thaddeus for the manu- facture of stoves and ploughs. Subsequently the scales invented by Thaddeus were manufactured extensively. Erastus was a member of the state legislature in 1836-1838, and governor of Vermont in 1852-1853 and 1860-1861, during his second term rendering valuable aid in the equipment and despatch of troops in the early days of the Civil War. His son Horace (1820-1888) became president of E. & T. Fairbanks &

Co. in 1874, and was governor of Vermont from 1876 to 1878.

His brother, Thaddeus Fairbanks (1796-1886), inventor, was born at Brimfield, Massachusetts, on the 17th of January 1796. He early manifested a genius for mechanics and designed

the models from which he and his brother manufactured stoves and ploughs at St Johnsbury, In 1826 he patented a cast-iron plough which was extensively used. The growing of hemp was an important industry in the vicinity of St Johnsbury, and in 1831 Fairbanks invented a hemp-dressing machine. By the old contrivances then in use, the weighing of loads of hemp-straw was tedious and difficult, and in 1831 Fairbanks invented his famous compound-lever platform scale, which marked a great advance in the construction of machines for weighing bulky and heavy objects. He subsequently obtained more than fifty patents for improvements or innovations in scales and in machinery used in their manufacture, the last being granted on his ninetieth birthday. His firm, eventually known as E. & T. Fairbanks & Co., went into the manufacture of scales of all sizes, in which these inventions were utilized. He, with his brothers, Erastus and Joseph P., founded the St Johnsbury Academy. He died at St Johnsbury on the 12th of April 1886.

The latter's son Henry, born in 1830 at St Johnsbury, Vermont, graduated at Dartmouth College in 1853 and at Andover Theological Seminary in 1857, and was professor of natural philosophy at Dartmouth from 1859 to 1865 and of natural history from 1865 to 1868. In the following year he patented a grain-scale and thenceforth devoted himself to the scale manufacturing business of his family. Altogether he obtained more than thirty patents for mechanical devices.

FAIRFAX, EDWARD (c. 1580-1635), English poet, translator of Tasso, was born at Leeds, the second son of Sir Thomas Fairfax of Denton (father of the 1st Baron Fairfax of Cameron). His legitimacy has been called in question, and the date of his birth has not been ascertained. He is said to have been only about twenty years of age when he published his translation of the Gerusalemme Liberala, which would place his birth about the year 1580. He preferred a life of study and retirement to the military service in which his brothers were distinguished. He married a sister of Walter Laycock, chief alnager of the northern counties, and lived on a small estate at Fewston, Yorkshire. There his time was spent in his literary pursuits, and in the education of his children and those of his elder brother, Sir Thomas Fairfax, afterwards baron of Cameron. His translation appeared in

1600, — Godfrey of Bulloigne, or the Recoverie of Jerusalem, done into English heroicall Verse by Edw. Fairefax, Gent., and was dedicated to the queen. It was enthusiastically received. In the same year in which it was published extracts from it were printed in England's Parnassus. Edward Phillips, the nephew of Milton, in his Theatrum Poetarum, warmly eulogized the translation. Edmund Waller said he was indebted to it for the harmony of his numbers. It is said that it 'was King James's favourite English poem, and that Charles I. entertained himself in prison with its pages. Fairfax employed the same number of lines and stanzas as his original, but within the limits of each stanza he allowed himself the greatest liberty. Other translators may give a more literal version, but Fairfax alone seizes upon the poetical and chivalrous character of the poem. He presented, says Mr Courthope, " an idea of the chivalrous past of Europe, as seen through the medium of Catholic orthodoxy and classical humanism." The sweetness and melody of many passages are scarcely excelled even by Spenser. Fairfax made no other appeal to the public. He wrote, however, a series of eclogues, twelve in number, the fourth of which was published, by permission of the family, in Mrs Cooper's Muses' Library (1737). Another of the eclogues and a Discourse on Witchcraft, as it was acted in the Family of Mr Edward Fairfax of Fuystone in the county of York in 1621, edited from the original copy by Lord Houghton, appeared in the Miscellanies of the Philobiblon Society (1858-1859). Fairfax was a firm believer in witchcraft. He fancied that two of his children had been bewitched, and he had the poor wretches whom he accused brought to trial, but without obtaining a conviction. Fairfax died at Fewston and was buried there on the 27th of January 1635.

FAIRFAX OF CAMERON, FERDINANDO FAIRFAX, 2ND Baron (1 584-1 648), English parliamentary general, was a son of Thomas Fairfax of Denton (1560-1640), who in 1627 was

created Baron Fairfax of Cameron in the peerage of Scotland. Bom on the 29th of March 1584, he obtained his military educa- tion in the Netherlands, and was member of parliament for Boroughbridge during the six parliaments which met between 1614 and 1629 and also during the Short Parliament of 1640. In May 1640 he succeeded his father as Baron Fairfax, but being a Scottish peer he sat in the English House of Commons as one of the representatives of Yorkshire during the Long Parliament from 1640 until his death; he took the side of the

parliament, but held moderate views and desired to maintain the peace. In the first Scottish war Fairfax had commanded a regiment in the king's army; then on the outbreak of the Civil War in 1642 he was made commander of the parliamentary forces in York- shire, with Newcastle as his opponent. Hostilities began after the repudiation of a treaty of neutrality entered into by Fairfax with the Royalists. At first he met with no success. He was driven from York, where he was besieging the Royalists, to Selby; then in 1643 to Leeds; and after beating off an attack at that place he was totally defeated on the 30th of June at Adwalton Moor. He escaped to Hull, which he successfully defended against Newcastle from the 2nd of September till the nth of October, and by means of a brilliant sally caused the siege to be raised. Fairfax was victorious at Selby on the nth of April 1644, and joining the Scots besieged York, after which he was present at Marston Moor, where he commanded the infantry and was routed. He was subsequently, in July, made governor of York and charged with the further reduction of the county. In December he took the town of Pontefract, but failed to secure the castle. He resigned his command on the passing of the Self-denying Ordinance, but remained a member of the committee for the government of Yorkshire, and was appointed, on the 24th of July 1645, steward of the manor of Pontefract. He died from an accident on the 14th of March 1648 and was buried at Bolton Percy. He was twice married, and by his first wife, Mary, daughter of Edmund Sheffield, 3rd Lord Sheffield (afterwards 1st earl of Mulgrave), he had six daughters and two sons, Thomas, who succeeded him as 3rd baron, and Charles, a colonel of horse, who was killed at Marston Moor. During his command in Yorkshire, Fairfax engaged in a paper war with Newcastle, and wrote The Answer of Ferdinando, Lord Fairfax, to a Declaration of William, earl of Newcastle (1642; printed in Rushworth, pt. iii. vol. ii. p. 139); he also published A Letter from . . . Lord Fairfax to . . . Robert, Earl of Essex (1643), describing the victorious sally at Hull.

FAIRFAX OF CAMERON, THOMAS FAIRFAX, 3RD Baron (161 2-167 1), parliamentary general and commander-in-chief during the English Civil War, the eldest son of the 2nd lord, was born at Denton, near Otley, Yorkshire, on the 17th of January 1612. He studied at St John's College, Cambridge (1626-1629), and then proceeded to Holland to serve as a volunteer with the English army in the Low Countries under Sir Horace (Lord) Vere. This connexion led to one still closer; in the summer of 1637 Fairfax married Anne Vere, the daughter of the general.

The Fairfaxes, father and son, though serving at first under Charles I. (Thomas commanded a troop of horse, and was knighted by the king

in 1640), were opposed to the arbitrary prerogative of the crown, and Sir Thomas declared that ” his judgment was for the parliament as the king and king- dom’s great and safest council.” When Charles endeavoured to raise a guard for his own person at York, intending it, as the event afterwards proved, to form the nucleus of an army, Fairfax was employed to present a petition to his sovereign, entreating him to hearken to the voice of his parlia- ment, and to discontinue the raising of troops. This was at a great meeting of the freeholders and farmers of Yorkshire convened by the king on Heworth Moor near York. Charles evaded receiving the petition, pressing his horse forward, but Fairfax followed him and placed the petition on the pommel of the king’s saddle. The incident is typical of the times and of the actors in the scene. War broke out, Lord Fairfax was appointed general of the Parliamentary forces in the north,

and his son, Sir Thomas, was made lieutenant-general of the horse under him. Both father and son distinguished themselves in the campaigns in Yorkshire (see Great Rebellion). Some- times severely defeated, more often successful, and always energetic, prudent and resourceful, they contrived to keep up the struggle until the crisis of 1644, when York was held by the marquess of Newcastle against the combined forces of the English Parliamentarians and the Scots, and Prince Rupert hastened with all available forces to its relief. A gathering of eager national forces within a few square miles of ground naturally led to a battle, and Marston Moor (q.v.) was decisive of the struggle in the north. The younger Fairfax bore himself with the greatest gallantry in the battle, and though severely wounded managed to join Cromwell and the victorious cavalry on the other wing. One of his brothers, Colonel Charles Fairfax, was killed in the action. But the marquess of Newcastle fled the kingdom, and the Royalists abandoned all hope of retrieving their affairs. The city of York was taken, and nearly the whole north submitted to the parliament.

In the south and west of England, however, the Royalist cause was still active. The war had lasted two years, and the nation began to complain of the contributions that were exacted, and the excesses that were committed by the military. Dis- satisfaction was expressed with the military commanders, and, as a preliminary step to reform, the Self-denying Ordinance was passed. This involved the removal of the earl of Essex from the supreme command, and the reconstruction of the armed forces of the parliament. Sir Thomas Fairfax was selected as the new lord general with Cromwell as his lieutenant-general and cavalry commander, and after a short preliminary campaign the ” New Model ” justified its existence, and ” the rebels’ new brutish general,”

as the king called him, his capacity as com- mander-in-chief in the decisive victory of Naseby (q.v.). The king fled to Wales. Fairfax besieged Leicester, and was suc- cessful at Taunton, Bridgwater and Bristol. The whole west was soon reduced.

Fairfax arrived in London on the 12th of November 1645. In his progress towards the capital he was accompanied by applauding crowds. Complimentary speeches and thanks were presented to him by both houses of parliament, along with a jewel of great value set with diamonds, and a sum of money. The king had returned from Wales and established himself at Oxford, where there was a strong garrison, but, ever vacillating, he withdrew secretly, and proceeded to Newark to throw himself into the arms of the Scots. Oxford capitulated, and by the end of September 1646 Charles had neither army nor garrison in England. In January 1647 he w as delivered up by the Scots to the commissioners of parliament. Fairfax met the king beyond Nottingham, and accompanied him during the journey to Holmby, treating him with the utmost consideration in every way. ” The general,” said Charles, ” is a man of honour, and keeps his word which he had pledged to me.” With the collapse of the Royalist cause came a confused period of negotiations between the parliament and the king, between the king and the Scots, and between the Presbyterians and the Independents in and out of parliament. In these negotiations the New Model Army soon began to take a most active part. The lord general was placed in the unpleasant position of intermediary between his own officers and parliament. To the grievances, usual in armies of that time, concerning arrears of pay and indemnity for acts committed on duty, there was quickly added the political propaganda of the Independents, and in July the person of the king was seized by Joyce, a subaltern of cavalry — an act which sufficiently demonstrated the hopelessness of controlling the army by its articles of war. It had, in fact, become the most formidable political party in the realm, and pressed straight on to the overthrow of parliament and the punishment’ of Charles. Fairfax was more at home in the field than at the head of a political committee, and, finding events too strong for him, he sought to resign his commission as commander-in-chief. He was, however, persuaded to retain it. He thus remained the titular chief of the army party, and with the greater part of its objects

he was in complete, sometimes most active, sympathy. Shortly before

the outbreak of the second Civil War, Fairfax succeeded his father in the barony and in the office of governor of Hull; In the field against the English Royalists in 1648 he displayed his former energy and skill, and- his operations culminated in the successful siege of Colchester, after the surrender of which place he approved the execution of the Royalist leaders Sir Charles Lucas and Sir George Lisle, holding that these officers had broken their parole. At the same time Cromwell's great victory; of Preston crushed the Scots, and the Independents became practically all-powerful.

Milton, in a sonnet written during the siege of Colchester, called upon the lord general to settle the kingdom, but the crisis was now at hand. Fairfax was in agreement with Cromwell and the army leaders in demanding the punishment of Charles, and he was still the effective head of the army. He approved, if he did not take an active part in, Pride's Purge (December 6th, 1648), but on the last and gravest of the questions at issue he set himself in deliberate and open opposition to the policy of the officers. He was placed at the head of the judges who were to try the king, and attended the preliminary sitting of the court. Then, convinced at last that the king's death was in- tended, he refused to act. In calling over the court, when the crier pronounced the name of Fairfax, a lady in the gallery called out " that the Lord Fairfax was not there in person, that he would never sit among them, and that they did him wrong to name him as a commissioner." This was Lady Fairfax, who could not forbear, as Whitelocke says, to exclaim aloud against the proceedings of the High Court of Justice. His last service as commander-in-chief was the suppression of the Leveller mutiny at Burford in May 1649. He had given his adhesion to the new order of things, and had been reappointed lord general. But he merely administered the affairs of the army, and when in 1650 the Scots had declared for Charles II., and the council of state resolved to send an army to Scotland in order to prevent an invasion of England, Fairfax resigned his commission. Cromwell was appointed his successor, " captain-general and commander-in-chief of all the forces raised or to be raised by authority of parliament within the commonwealth of England." Fairfax received a pension of £5000 a year, and lived in retirement at his Yorkshire home of Nunappleton till after the death of the Protector. The troubles of the later Commonwealth recalled Lord Fairfax to political activity, and for the last time his appearance in arms helped to shape the future of the country, when Monk invited him to assist in the operations about to be undertaken against Lambert's army. In December 1659 he appeared at the head of a body of Yorkshire gentlemen, and such was the influence of Fairfax's name and reputation that 1200 horse quitted

Lambert's colours and joined him. This was speedily followed by the breaking up of all Lambert's forces, and that day secured the restoration of the monarchy. A " free " parliament was called; Fairfax was elected member for Yorkshire, and was put at the head of the commission appointed by the House of Commons to wait upon Charles II, at the Hague and urge his speedy return. Of course the " merry monarch, scandalous and poor," was glad to obey the summons, and Fairfax provided the horse on which Charles rode at his coronation. The remaining eleven years of the life of Lord Fairfax were spent in retirement at his seat in Yorkshire. He must, like Milton, have been sorely grieved and shocked by the scenes that followed — the brutal indignities offered to the remains of his companions in arms, Cromwell and Ireton, the sacrifice of Sir Harry Vane, the neglect or desecration of all that was great, noble or graceful in England, and the flood of immorality which, flowing from Whitehall, sapped the founda- tions of the national strength and honour. Lord Fairfax died at Nunappleton on the 1 2th of November 167 1, and was buried at Bilborough, near York. As a soldier he was exact and methodical in planning, in the heat of battle "so highly transported that scarce any one durst speak a word to him" (Whitelocke), chivalrous and punctilious in his dealings with his own men and the enemy. Honour and conscientiousness were equally the

characteristics of his private and public character. But his modesty and distrust of his powers made him less effectual as a statesman than as a soldier, and above all he is placed at a dis- advantage by being both in war and peace overshadowed by his associate Cromwell.

Lord Fairfax had a taste for literature. He translated some of the Psalms, and wrote poems on solitude, the Christian war- fare, the shortness of life, &c. During the last year or two of his life he wrote two Memorials which have been published — one on the northern actions in which he was engaged in 164 2- 1644, and the other on some events in his tenure of the chief command. At York and at Oxford he endeavoured to save the libraries from pillage* and he enriched the Bodleian with some valuable MSS. His only daughter, Mary Fairfax, was married to George Villiers, the profligate duke of Buckingham of Charles II. 's court.

His correspondence, edited by G. W. Johnson, was published in 1 848-1 849 in four volumes (see note thereon in Diet. Nat. Biogr., s.v.), and a life of him by Clements R. Markham in 1870. See also S. R. Gardiner, History of the Great Civil War (1893).

His descendant Thomas, 6th baron (1692-1782), inherited from his

mother, the heiress of Thomas, 2nd Baron Culpepper, large estates in Virginia, U.S.A., and having sold Denton Hall and his Yorkshire estates he retired there about 1 746, dying a bachelor. He was a friend of George Washington. Thomas found his cousin William Fairfax settled in Virginia, and made him his agent, and Bryan (1737-1802), the son of William Fairfax, eventually inherited the title, becoming 8th baron in 1793. His claim was admitted by the House of Lords in 1800. But it was practically dropped by the American family, until, shortly before the coronation of Edward VII., the successor in title was discovered in Albert Kirby Fairfax (b. 1870), a descendant of the 8th baron, who was an American citizen. In November 1908 Albert's claim to the title as 12th baion was allowed by the House of Lords.

FAIRFIELD, a township in Fairfield county, Connecticut, U.S.A., near Long Island Sound, adjoining Bridgeport on the E. and Westport on the W. Pop. (1890) 3868; (1900) 4489 (1041 being foreign-born) ; (1910) 6134. It is served by the New York, New Haven & Hartford railway. The principal villages of the township are Fairfield, Southport, Greenfield Hill and Stratfield. The beautiful scenery and fine sea air attract to the township a considerable number of summer visitors. The township has the well-equipped Pequot and Fairfield memorial libraries (the former in the village of Southport, the latter in the village of Fairfield), the Fairfield fresh air home (which cares for between one and two hundred poor children of New York during each summer season), and the Gould home for self-supporting women. The Fairfield Historical Society has a museum of antiquities and a collection of genealogical and historical works. Among Fairfield's manufactures are chemicals, wire and rubber goods. Truck-gardening is an important industry of the township. In the Pequot Swamp within the present Fairfield a force of Pequot Indians was badly defeated in 1637 by some whites, among whom was Roger Ludlow, who, attracted by the country, founded the settlement in 1639 and gave it its present name in 1645. Within its original limits were included what are now the townships of Redding (separated, 1767), Weston (1787) and Easton (formed from part of Weston in 1845), and parts of the present Westport and Bridgeport. During the colonial period Fairfield was a place of considerable importance, but subsequently it was greatly outstripped by Bridgeport, to which, in 1870, a portion of it was annexed. On the 8th of July 1779 Fairfield was burned by the B ritish and Hessians under Governor William Try on. Among the prominent men who have lived in Fairfield are Roger Sher- man, the first President Dwight of Yale (who described Fairfield in his Travel's and in his poem Greenfield Hill) , Chancellor James Kent, and Joseph Earle Sheffield.

See Frank S. Child, An Old New England Town, Sketches of Life, Scenery and Character (New York, 1895); and Mrs E. H. Schenck, History of Fairfield (2 vols., New York, 1889-1905).

FAIRFIELD, a city and the county-seat of Jefferson county, Iowa, U.S.A., about 51 m. W.byN. of Burlington. Pop. (1890) 3391; (1900) 4689, of whom 206 were foreign-born and 54 were

negroes; (1905) 5009; (1910) 4970. Area, about 2-25 sq. m. Fairfield is served by the Chicago, Burlirigton & Quincy, and the Chicago, Rock Island & Pacific railways, The city is in a blue grass country, in which much live stock is bred; and it is an important market for draft horses. It is the seat of Parsons College (Presbyterian, co-educational, 1875), endowed by Lewis Baldwin Parsons, Sr. (1798-1855), a merchant of Buffalo, N.Y. The college offers classical, philosophical and scientific courses, and has a school of music and an academic department; in 1907-1908 it had 19 instructors and 257 students, of whom 93 were in the college and 97 were in the school of music. Fairfield has a Carnegie library (1892), and a museum with a collection of laces. Immediately E. of the city is an attractive Chautauqua Park, of 30 acres, with an auditorium capable of seating about 4000 persons; and there is an annual Chautauqua assembly. The principal manufactures of Fairfield are farm waggons, farming implements, drain-tile, malleable iron, cotton gloves and mittens and cotton garments. The municipality owns its water- works and an electric-lighting plant. Fairfield was settled in 1839; was incorporated as a town in 1847; and was first chartered as a city in the same year.

See Charles H. Fletcher, Jefferson County, Iowa: Centennial History (Fairfield, 1876).

FAIRHAVEN, a township in Bristol county, Massachusetts, U.S.A., on New Bedford Harbor, opposite New Bedford. Pop. (1890) 2919; (1900) 3567 (599 being foreign-born); (1905, state census) 4235; (1910) 5122. Area, about 13 sq. m. Fairhaven is served by the New York, New Haven & Hartford railway and by electric railway to Mattapoisett and Marion, and is connected with New Bedford by two bridges, by electric railway, and by the New York, New Haven & Hartford ferry line. The principal village is Fairhaven; others are Oxford, Naskatucket and Sconticut Neck. As a summer resort Fairhaven is widely known. Among the principal buildings are the

following, presented to the township by Henry H. Rogers (1840-1909), a native of Fairhaven and a large stockholder and long vice-president of the Standard Oil Co.; the town hall, a memorial of Mrs Rogers, the Rogers public schools; the Millicent public library (17,500 vols, in 1908), a memorial to his daughter; and a fine granite memorial church (Unitarian) with parish house, a memorial to his mother; and there is also a public park, of 13 acres, the gift of Mr Rogers. From 1830 to 1857 the inhabitants of Fairhaven were chiefly engaged in whaling, and the fishing interests are still important. Among manufactures are tacks, nails, iron goods, loom-cranks, glass, yachts and boats, and shoes.

Fairhaven, originally a part of New Bedford, was incorporated as a separate township in 1812. On the 5th of September 1778 a fleet and armed force under Earl Grey, sent to punish New Bedford and what is now Fairhaven for their activity in privateer- ■ ing, burned the shipping and destroyed much of New Bedford. The troops then marched to the head of the Acushnet river, and down the east bank to Sconticut Neck, where they camped till the 7th of September, when they re-embarked, having meanwhile dismantled a small fort, built during the early days of the war, on the east side of the river at the entrance to the harbour. On the evening of the 8th of September a landing force from the fleet, which had begun to set fire to Fairhaven, was driven off by a body of about 150 minute-men commanded by Major Israel Fearing; and on the following day the fleet departed. The fort was at once rebuilt and was named Fort Fearing, but as early as 1784 it had become known as Fort Phoenix; it was one of the strongest defences on the New England coast during the war of 1 81 2. The township of Acushnet was formed from the northern part of Fairhaven in i860.

See James L. Gillingham and others, A Brief History of the Town of Fairhaven, Massachusetts (Fairhaven, 1903).

FAIRHOLT, FREDERICK WILLIAM (1814-1866), English antiquary and wood engraver, was born in London in 1814. His father, who was of a German family (the name was originally Fahrholz), was a tobacco manufacturer, and for some years Fairholt himself was employed in the business. For a time he was a drawing-master, afterwards a scene-painter, and in 1835 he became assistant to S. Sly, the wood engraver. Some pen

and ink copies made by him of figures from Hogarth's plates led to his being employed by Charles Knight on several of his illustrated publications. His first published literary work was a contribution to

Hone's Year-Book in 1831. His life was one of 'almost uninterrupted quiet labour, carried on until within a few days of death. Several works on civic pageantry and some collections of ancient unpublished songs and dialogues were edited by him for the Percy Society in 1842. In 1844 he was elected fellow of the Society of Antiquaries. He published an edition of the dramatic works of Lyly in 1856. His principal independent works are Tobacco, its History, and Association (1859); Gog and Magog (r86o); Up the Nile and Home Again (1862); many articles and serials contributed to the Art Journal, some of which were afterwards separately published, as Costume in England (1846); Dictionary of Terms in Art (1854). These works are illustrated by numerous cuts, drawn on the wood by his own hand. His pencil was also employed in illustrating Evans's Coins of the Ancient Britons, Madden's Jewish Coinage, Halliwell's folio Shakespeare and his Sir John Maundeville, Roach Smith's Richborough, the Miscellanea Graphica of Lord Londesborough, and many other works. He died on the 3rd of April 1866. His books relating to Shakespeare were bequeathed to the library at Stratford-on-Avon; those on civic pageantry (between 200 and 300 volumes) to the Society of Antiquaries; his old prints and works on costume to the British Museum; his general library he desired to be sold and the proceeds devoted to the Literary Fund.

FAIRMONT, a city and the county-seat of Marion county, West Virginia, U.S.A., on both sides of the Monongahela river, about 75 m. S.E. of Wheeling. Pop. (1890) 1023; (1900) 5655, of whom 283 were negroes and 182 foreign-born; (1910) 9711. It is served by the Baltimore & Ohio railway. Among its manu- factures are glass, machinery, flour and furniture, and it is an important shipping point for coal mined in the vicinity. The city is the seat of one of the West Virginia state normal schools. Fairmont was laid out as Middletown in 1819, became the county- seat of the newly established Marion county in 1842, received its present name about 1844, and was chartered as a city in 1899.

FAIR OAKS, a station on a branch of the Southern railway, 6 m. E. of Richmond, Virginia, U.S.A. It is noted as the site of one of the battles of the Civil War, fought on the 31st of May and the 1st of June 1862, between the Union (Army of the Potomac) under General G. B. McClellan and the Confederate forces (Army of Northern Virginia) commanded by General J. E. Johnston. The attack of the Confederates was made at a moment when the river Chickahominy divided the Federal army into two unequal parts, and was, moreover, swollen to such a degree as to endanger the bridges. General Johnston stationed part of his troops along the river to prevent the Federals sending aid

to the smaller force south of it, upon which the Con- federate attack, commanded by General Longstreet, was directed. Many accidents, due to the inexperience of the staff officers and to the difficulty of the ground, hindered the development of Longstreet's attack, but the Federals were gradually driven back with a loss of ten guns, though at the last moment reinforce- ments managed to cross the river and re-establish the line of defence. At the close of the day Johnston was severely wounded, and General G. W. Smith succeeded to the command. The battle was renewed on the 1st of June but not fought out. At the close of the action General R. E. Lee took over the command of the Confederates, which he held till the final surrender in April 1865. So far as the victory lay with either 'side, it was with the Union army, for the Confederates failed to achieve their purpose of destroying the almost isolated left wing of McClellan's army, and after the battle they withdrew into the lines of Richmond. The Union losses were 5031 in killed, wounded and missing; those of the Confederates were 6134. The battle is sometimes known as the battle of Seven Pines.

FAIRUZABADl [Abu-t-Tahir ibn Ibrahim Majd ud-Din td- Fairuzabadl] (1329-1414), Arabian lexicographer, was born at Karazin near Shiraz. His student days were spent in Shiraz, Wasit, Bagdad and Damascus. He taught for ten years in

Jerusalem, and afterwards travelled in western Asia and Egypt. In 1368 he settled in Mecca, where he remained for fifteen years. He next visited India and spent some time in Delhi, then remained in Mecca another ten years. The following three years were spent in Bagdad, in Shiraz (where he was received by Timur), and in Ta'iz. In 1395 he was appointed chief cadi (qadi) of Yemen, married a daughter of the sultan, and died at Zabld in 1414. During this last period of his life he converted his house at Mecca into a school of Malikite law and established three teachers in it. He wrote a huge lexicographical work of 60 or 100 volumes uniting the dictionaries of Ibn Slda, a Spanish philologist (d. 1066), and of Sajani (d. 1252). A digest of or an extract from this last work is his famous diction- ary al-Qamus (" the Ocean "), which has been published in Egypt, Constantinople and India, has been translated into Turkish and Persian, and has itself been the basis of several later dictionaries. (G. W. T.)

FAIRY (Fr. fee, faerie-, Prov. fada; Sp. hada; Ital. fata; med. Lat. fatare, to enchant, from Lat. fatum, fate, destiny), the common term for a supposed race of supernatural beings who magically intermeddle in human affairs. Of all the minor creatures of mythology the fairies are the most beautiful, the most numerous, the most memorable in literature. Like all organic growths, whether of nature or of the fancy, they are not the immediate product of one country or of one time; they have a pedigree, and the question of their ancestry and affiliation is one of wide bearing. But mixture and connexion of races have in this as in many other cases so changed the original folk-product that it is difficult to disengage and separate the different strains that have gone to the making or moulding of the result as we have it.

It is not in literature, however ancient, that we must look for the early forms of the fairy belief. Many of Homer's heroes have fairy lemans, called nymphs, fairies taken up into a higher region of poetry and religion; and the fairy leman is notable in the story of Athamas and his cloud bride Nephele, but this character is as familiar to the unpoetical Eskimo, and to the Red Indians, with their bird-bride and beaver-bride (see A. Lang's Custom and Myth, " The Story of Cupid and Psyche "). The Gandharvas of Sanskrit poetry are also fairies.

One of the most interesting facts about fairies is the wide distribution and long persistence of the belief in them. They are the chief factor in surviving Irish superstition. Here they dwell in the " raths," old earth-forts, or earthen bases of later palisaded dwellings of the Norman period, and in the subter- ranean houses, common also in Scotland. They are an organized people, often called " the army," and their life corresponds to human life in all particulars. They carry off children, leaving changeling substitutes, transport men and women into fairyland, and are generally the causes of all mysterious phenomena. Whirls of dust are caused by the fairy marching army, as by the being called Kutchi in the Dieri tribe of Australia. In 1907, in northern Ireland, a farmer's house was troubled with flying stones (see Poltergeist). The neighbours said that the fairies caused the phenomenon, as the man had swept his chimney with a bough of holly, and the holly is " a gentle tree," dear to the fairies. The fairy changeling belief also exists in some districts of Argyll, and a fairy boy dwelt long in a small farm-house in Glencoe, now unoccupied.

In Ireland and the west Highlands neolithic arrow-heads and flint chips are still fairy weapons. They are dipped in water, which is given to ailing cattle and human beings as a sovereign remedy for diseases. The writer knows of " a little lassie in green " who is a fairy and, according to the percipients, haunts the banks of the Mukomar pool

on the Lochy. In Glencoe is a fairy hill where the fairy music, vocal and instrumental, is heard in still weather. In the Highlands, however, there is much more interest in second sight than in fairies, while in Ireland the reverse is the case. The best book on Celtic fairy lore is still that of the minister of Aberfoyle, the Rev. Mr Kirk (ob. 1692). His work on The Secret Commonwealth of Elves, Fauns and Fairies, left in MS. and incomplete (the remainder is in the Laing

MSS., Edinburgh University library), was published (a hundred copies) in 1815 by Sir Walter Scott, and in the Bibliotheque de Carabas (Lang) there is a French translation. Mr Kirk is said (though his tomb exists) to have been carried away by fairies. He appeared to a friend and said that he would come again, when the friend must throw a dirk over his shoulder and he would return to this world. The friend, however, lost his nerve and did not throw the dirk. In the same way a woman re-appeared to her husband in Glencoe in the last generation, but he was wooing another lass and did not make any effort to recover his wife. His character was therefore lost in the glen.

It is clear that in many respects fairyland corresponds to the pre-Christian abode of the dead. Like Persephone when carried to Hades, or Wainamoinen in the Hades of the Finns (Manala), a living human being must not eat in fairyland; if he does, he dwells there for ever. Tamlane in the ballad, however, was ” fat and fair of flesh,” yet was rescued by Janet: probably he had not abstained from fairy food. He was to be given as the kane to Hell, which shows a distinction between the beliefs in hell and in the place of fairies.

It is a not uncommon theory that the fairies survive in legend from prehistoric memories of a pigmy people dwelling in the subterranean earth-houses, but the contents of these do not indicate an age prior to the close of the Roman occupation of Britain; nor are pigmy bones common in neolithic sepulchres. The ” people of peace ” (Daoine Shie) of Ireland and Scotland are usually of ordinary stature, indeed not to be recognized as varying from mankind except by their proceedings (see J. Curtin, Irish Folk-tales).

The belief in a species of lady fairies, deathly to their human lovers, was found by R. L. Stevenson to be as common in Samoa (see Island Nights’ Entertainments) as in Strathfinlas or on the banks of Loch Awe. In New Caledonia a native friend of J. J. Atkinson (author of Primal Law) told him that he had met and caressed the girl of his heart in the forest, that she had vanished and must have been a fairy. He therefore would die in three days, which (Mr Atkinson informs the writer) he punctu- ally did. The Greek sirens of Homer are clearly a

form of these deadly fairies, as the Nereids and Oreads and Naiads are fairies of wells, mountains and the sea. The fairy women who come to the births of children and foretell their fortunes {Fata, Moerae, ancient Egyptian Hathors, Fees, Dominae Fatales), with their spindles, are refractions of the human ” spae-women ” (in the Scots term) who attend at birth and derive omens of the child’s future from various signs. The custom is common among several savage races, and these women, represented in the spiritual world by Fata, bequeath to us the French fee, in the sense of fairy. Perrault also uses fee for anything that has magical quality; ” the key was fee,” had nana, or wakan, savage words for the supposed ” power,” or ether, which works magic or is the vehicle of magical influences.

Though the fairy belief is universally human, the nearest analogy to the shape which it takes in Scotland and Ireland — the ” pixies ” of south-western England — is to be found in Jan or Jinnis of the Arabs, Moors and people of Palestine. In stories which have passed through a literary medium, like The Arabian Nights, the geni or Jan do not so much resemble our fairies as they do in the popular superstitions of the East, orally collected. The Jan are now a subterranean commonwealth, now they reside in ruinous places, like the fairies in the Irish raths. Like the fairies they go about in whirls of dust, or the dust-whirls them- selves are Jan. They carry off men and women ” to their own herd,” in the phrase of Mr Kirk, and are kind to mortals who are kind to them. They chiefly differ from our fairies in their greater tendency to wear animal forms; though, like the fairies, when they choose to appear in human shape they are not to be distinguished from men and women of mortal mould. Like the fairies everywhere they have amours with mortals, such as that of the Queen of Faery with Thomas of Ercildoune. The herb rue is potent against them, as in British folk-lore, and a man long captive among the Jan escaped from them by observing their avoidance of rue, and by plucking two handfuls

thereof. They, like the British brownies (a kind of domesticated fairy), are the causes of strange disappearances of things. To preserve houses from their influences, rue, that ” herb of grace,” is kept in the apartments, and the name of Allah is constantly invoked. If this is omitted, things are stolen by the Jan.

They often bear animal names, and it is dangerous to call a cat or dog

without pointing at the animal, for a Jinni of the same name may be present and may take advantage of the invocation. A man, in fun, called to a goat to escort his wife on a walk: he did not point at the goat, and the wife disappeared. A Jinni had carried her off, and her husband had to seek her at the court of the Jan. Euphemistically they are addressed as mubdrakin, ” blessed ones,” as we say ” the good folk ” or ” the people of peace.” As our fairies give gold which changes into withered leaves, the Jan give onion peels which turn into gold. Like our fairies the Jan can apply an ointment, kohl, to human eyes, after which the person so favoured can see Jan, or fairies, which are invisible to other mortals, and can see treasure wherever it may be concealed (see Folk-lore of the Holy Land, by J. E. Hanauer, 1907).

It is plain that fairies and Jan are practically identical, a curious proof of the uniformity of the working of imagination in peoples widely separated in race and religion. Fairies naturally won their way into the poetry of the middle ages. They take lovers from among men, and are often described as of delicate, unearthly, ravishing beauty. The enjoyment of their charms is, however, generally qualified by some restriction or compact, the breaking of which is the cause of calamity to the lover and all his race, as in the notable tale of Melusine. This fay by enchantment built the castle of Lusignan for her husband. It was her nature to take every week the form of a serpent from the waist below. The hebdomadal transformation being once, contrary to compact, witnessed by her husband, she left him with much wailing, and was said to return and give warning by her appearance and great shrieks whenever one of the race of Lusignan was about to die. At the birth of Ogier le Danois six fairies attend, five of whom give good gifts, which the sixth overrides with a restriction. Gervaise of Tilbury, writing early in the 13th century, has in his Otia Imperialia a chapter, De lamiis et nocturnis larvis, where he gives it out, as proved by individuals beyond all exception, that men have been lovers of beings of this kind whom they call Fadas, and who did in case of infidelity or infringement of secrecy inflict terrible punishment — the loss of goods and even of life. There seems little in the characteristics of these fairies of romance to dis- tinguish them from human beings, except their supernatural knowledge and power. They are not often represented as diminutive in stature, and seem to be subject to such human passions as love, jealousy, envy and revenge. To this class belong the fairies of Boiardo, Ariosto and Spenser.

There is no good modern book on the fairy belief in general. Keightley’s Fairy Mythology is full of interesting matter; Rhys’s Celtic Mythology is especially copious about Welsh fairies, which are practically identical with those of Ireland and Scotland. The works of

Mr Jeremiah Curtin and Dr Douglas Hyde are useful for Ireland; for Scotland, Kirk's Secret Commonwealth has already been quoted. Scott's dissertation on fairies in The Border Minstrelsy is rich in lore, though necessarily Scott had not the wide field of comparative study opened by more recent researches. There is a full description of French fairies of the 15th century in the evidence of Jeanne d ' Arc at her trial (143 1) in Quicherat's Procesde Jeanne d'A re, vol. i. pp. 67, 68, 187, 209, 212, vol. ii. pp. 390, 404, 450. (A. L.)

FAIRY RING, the popular name for the circular patches of a dark green colour that are to be seen occasionally on permanent grass-land, either lawn or meadow, on which the fairies were supposed to hold their midnight revels. They mark the area of growth of some fungus, starting from a centre of one or more plants. The mycelium produced from the spores dropped by the fungus or from the " spawn " in the soil, radiates outwards, and each year's successive crop of fungi rises from the new growth round the circle. The rich colour of the grass is due to the fertilizing quality of the decaying fungi, which are peculiarly rich in nitrogenous substances. The most complete and symmetrical grass rings are formed by Marasmius orcudes.

the fairy ring champignon, but the mushroom and many other species occasionally form rings, both on grass-lands and in woods. Observations were made on a ring in a pine-wood for a period of nine years, and it was calculated that it increased from centre to circumference about 8£ in. each year. The fungus was never found growing within the circle during the time the ring was under observation, the decaying vegetation necessary for its growth having become exhausted.

FAITHFULL, EMILY (1835-1895), English philanthropist, was the youngest daughter of the Rev. Ferdinand Faithfull, and was born at Headley Rectory, Surrey, in 1835. She took a great interest in the conditions of working-women, and with the object of extending their sphere of labour, which was then painfully limited, in i860 she set up in London a printing estab- lishment for women. The " Victoria Press," as it was called, soon obtained quite a reputation for its excellent work, and Miss Faithfull was shortly afterwards appointed printer and publisher in ordinary to Queen Victoria. In 1863 she began the publication of a monthly organ, The Victoria Magazine, in which for eighteen years she continuously and earnestly advocated the claims of women to remunerative employment. In 1868 she published a novel, Change upon Change. She also appeared as a lecturer, and with the object of furthering the interests of her sex, lectured widely and successfully both in England and the United States, which latter she

visited in 1872 and 1882. In 1888 she was awarded a civil list pension of £50. She died in Manchester on the 31st of May 1895.

FAITH HEALING, a form of “mind cure,” characterized by the doctrine that while pain and disease really exist, they may be neutralized and dispelled by faith in Divine power; the doctrine known as Christian Science (q.v.) holds, however, that pain is only an illusion and seeks to cure the patient by instilling into him this belief. In the Christian Church the tradition of faith healing dates from the earliest days of Christianity; upon the miracles of the New Testament follow cases of healing, first by the Apostles, then by their successors; but faith healing proper is gradually, from the 3rd century onwards, transformed into trust in relics, though faith cures still occur sporadically in later times. Catherine of Siena is said to have saved Father Matthew from dying of the plague, but in this case it is rather the healer than the healed who was strong in faith. With the Reformation faith healing proper reappears among the Moravians and Waldenses, who, like the Peculiar People of our own day, put their trust in prayer and anointing with oil. In the 16th century we find faith cures recorded of Luther and other reformers, in the next century of the Baptists, Quakers and other Puritan sects, and in the 18th century the faith healing of the Methodists in this country was paralleled by Pietism in Germany, which drew into its ranks so distinguished a man of science as Stahl (1660-1734). In the 19th century Prince Hohenlohe-Waldenburg- Schillingsfurst, canon of Grosswardein, was a famous healer on the continent; the Mormons and Irvingites were prominent among English-speaking peoples; in the last quarter of the 19th century faith healing became popular in London, and Bethshan homes were opened in 1881, and since then it has found many adherents in England.

Under faith healing in a wider sense may be included (1) the cures in the temples of Aesculapius and other deities in the ancient world; (2) the practice of touching for the king’s evil, in vogue from the nth to the 18th century; (3) the cures of Valentine Greatrakes, the ” Stroker ” (1629-1683); and (4) the miracles of Lourdes, and other resorts of pilgrims, among which may be mentioned St Winifred’s Well in Flintshire, Treves with its Holy Coat, the grave of the Jansenist F. de Paris in the 18th century, the little town of Kevelaer from 1641 on-wards, the tombs of St Louis, Francis of Assisi, Catherine of Siena and others.

An animistic theory .of disease was held by Pastor J. Ch. Blumhardt, Dorothea Trudel, Boltzius and other European faith healers. Used in this sense faith healing is indistinguishable from much of savage

leech-craft, which seeks to cure disease by expelling the evil spirit in some portion of the body. Although

it is usually present, faith in the medicine man is not essential for the efficacy of the method. The same may be said of the lineal descendant of savage medicine — the magical leech-craft of European folk-lore; cures for toothache, warts, &c, act in spite of the disbelief of the sufferer; how far incredulity on the part of the healer would result in failure is an open question.

From the psychological point of view all these different kinds of faith healing, as indeed all kinds of mind cure, including those of Christian Science and hypnotism, depend on suggestion (q.v.). In faith healing proper not only are powerful direct suggestions used, but the religious atmosphere and the auto- suggestions of the patient co-operate, especially where the cures take place during a period of religious revival or at other times when large assemblies and strong emotions are found. The suggestibility of large crowds is markedly greater than that of individuals, and to this and the greater faith must be attributed the greater success of the fashionable places of pilgrimage.

See A. T. Myers and F. W. H. Myers in Proc. Soc. Psychical Re- search, ix. 160-209, on the miracles of Lourdes, with bibliography; A. Feilding, Faith. Healing and Christian Science; O. Stoll, Sug- gestion una” Hypnotismus in der Volkerpsychologie; article ” Great- rakes ” in Diet. Nat. Biog. (N. W. T.)

FAITHORNE, WILLIAM (1626 or 1627-1691), English painter and engraver, was born in London and was apprenticed to Robert Peake, a painter and printseller, who received the honour of knighthood from Charles I. On the outbreak of the Civil War he accompanied his master into the king’s service, and being made prisoner at Basinghouse, he was confined for some time to Aldersgate, where, however, he was permitted to follow his profession of engraver, and among other portraits did a small one of the first Villiers, duke of Buckingham. At the earnest solicitation of his friends he very soon regained his liberty, but only on condition of retiring to France. There he was so fortunate as to receive instruction from Robert Nanteuil. He was permitted to return to England about 1650, and took up a shop near Temple Bar, where, besides his work as an engraver, he carried on a large business as a printseller. In 1680 he gave up his shop and retired to a house in

Blackfriars, occupying himself chiefly in painting portraits from the life in crayons, although still occasionally engaged in engraving. It is said that his life was shortened by the misfortunes, dissipation, and early death of his son William. Faithorne is especially famous as a portrait engraver, and among those on whom he exercised his art were a large number of eminent persons, including Sir Henry Spelman, Oliver Cromwell, Henry Somerset, the marquis of Worcester, John Milton, Queen Catherine, Prince Rupert, Cardinal Richelieu, Sir Thomas Fairfax, Thomas Hobbes, Richard Hooker, Robert second earl of Essex, and Charles I. All his works are remarkable for their combination of freedom and strength with softness and delicacy, and his crayon paintings unite to these the additional quality of clear and brilliant colouring. He is the author of a work on engraving (1622).

His son William (1656-1686), mezzotint engraver, at an early age gave promise of attaining great excellence, but became idle and dissipated, and involved his father in money difficulties. Among persons of note whose portraits he engraved are Charles II., Mary princess of Orange, Queen Anne when princess of Denmark, and Charles XII. of Sweden.

The best account of the Faithornes is that contained in Walpole's Anecdotes of Painting. A life of Faithorne the elder is preserved in the British Museum among the papers of Mr Bayford, librarian to Lord Oxford, and an intimate friend of Faithorne.

FAIZABAD, a town of Afghanistan, capital of the province of Badakshan, situated on the Kokcha river. In 1821 it was destroyed by Murad Beg of Kunduz, and the inhabitants removed to Kunduz. But since Badakshan was annexed by Abdur Rahman, the town has recovered its former importance, and is now a considerable place of trade. It is the chief cantonment for eastern Afghanistan and the Pamir region, and is protected by a fort built in 1904.

FAJARDO, a district and town on the E. coast of Porto Rico, belonging to the department of Humacao. Pop. (1899) of the district, 16,782; and of the town, 3414. The district is highly

fertile and is well watered, owing in great measure to its abundant rainfall. Sugar production is its principal industry, but some attention is also given to the growing of oranges and pineapples. The town, which was founded in 1774, is a busy commercial centre standing i| m. from a large and well-sheltered bay, at the entrance to which is the cape called Cabeza de San Juan. It is the market town for a number of small islands off the E. coast, some of which produce cattle for export.

FAKHR UD-DlN RAZI (1 149-1209), Arabian historian and theologian, was the son of a preacher, himself a writer, and was born at Rai (Rei, Rhagae), near Tehran, where he received his earliest training. Here and at Maragha, whither he followed his teacher Majd ud-Din ul-Jili, he studied philosophy and theology. He was a Shafi'ite in law and a follower of Ash'arl (q.v.) in theology, and became renowned as a defender of orthodoxy. During a journey in Khwarizm and Mawara'1-nahr he preached both in Persian and Arabic against the sects of Islam. After this tour he returned to his native city, but settled later in Herat, where he died. His dogmatic positions may be seen from his work Kitab ul-Muhassal, which is analysed by Schmolders in his Essai sur les Scoles philosophiques chez les Arabes (Paris, 1842). Extracts from his History of the Dynasties were published by Jourdain in the Fundgruben des Orients (vol. v.), and by D. R. Heinzius (St Petersburg, 1828). His greatest work is the Mafdtih ul-Ghaib (" The Keys of Mystery "), an extensive commentary on the Koran published at Cairo (8 vols., 1890) and elsewhere; it is specially full in its exposition of Ash'arite theology and its use of early and late Mu'tazilite writings.

For an account of his life see F. Wiistenf eld's Geschichte der arabischen Arzte, No. 200 (Gcittingen, 1840); for a list of his works cf. C. Brockelmann's Gesch. der arabischen Literatur, vol. 1 (Weimar, 1898), pp. 506 ff. An account of his teaching is given.by M. Schreiner in the Zeitschrift der deutschen morgenlandischen Gesellschaft (vol. 52, pp. 505 ff-)- (G. W. T.)

FAKIR (from Arabic faqir, ” poor “), a term equivalent to Dervish (q.v.) or Mahommedan religious mendicant, but which has come to be specially applied to the Hindu devotees and ascetics of India. There are two classes of these Indian Fakirs, (1) the religious orders, and (2) the nomad rogues who infest the country. The ascetic orders resemble the Franciscans of Christi- anity. The bulk lead really excellent lives in monasteries, which are centres of education and poor-relief; while others go out to visit the poor as Gurus or teachers. Strict celibacy is not enforced among them. These orders are of very ancient date, owing their establishment to the ancient Hindu rule, followed by the Buddhists, that each ” twice-born ” man should lead in the woods the life of an ascetic. The second class of Fakirs are simply disreputable beggars who wander round extorting, under the guise of religion, alms from the charitable and practising on the superstitions of the villagers. As a rule they make no real pretence of leading a religious life. They are said to number nearly a million. Many of them are known as ” Jogi,” and lay claim to miraculous powers which they declare have become theirs by the practice of abstinence and extreme austerities. The tortures which some of these wretches will inflict upon themselves are almost incredible. They will hold their arms over their heads until the muscles atrophy, will keep their fists clenched till the nails grow through the palms, will lie on beds of nails, cut and stab themselves, drag, week after week, enormous chains loaded with masses of iron, or hang themselves btfore a fire near enough to scorch. Most of them are inexpressibly filthy and verminous. Among the filthiest are the Aghoris, who preserve the ancient cannibal ritual of the followers of Siva, eat filth, and use a human skull as a drinking-vessel. Formerly the fakirs were always nude and smeared with ashes; but now they are compelled to wear some pretence of clothing. The natives do not really respect these wandering friars, but they dread their curses.

See John Campbell Oman, The Mystics, Ascetics and Saints of India (1903), and Indian Census Reports.

FALAISE, a town of north-western France, capital of an arrondissement in the department of Calvados, on the right bank of the Ante, 19 m. S. by E. of Caen by road. Pop. (1906)

FALASHAS— FALCAO

*37

6215. The principal object of interest is the castle, now partly in ruins,

but formerly the seat of the dukes of Normandy and the birthplace of William the Conqueror. It is situated on a lofty crag overlooking the town, and consists of a square mass defended by towers and flanked by a small donjon and a lofty tower added by the English in the 15th century; the rest of the castle dates chiefly from the 12th century. Near the castle, in the Place de la Trinite, is an equestrian statue in bronze of William the Conqueror, to whom the town owed its prosperity. The churches of La Trinite and St Gervais combine the Gothic and Renaissance styles of architecture, and St Gervais also includes Romanesque workmanship. A street passes by way of a tunnel beneath the choir of La Trinite. Falaise has populous suburbs, one of which, Guibray, is celebrated for its annual fair for horses, cattle and wool, which has been held in August since the nth century. The town is the seat of a subprefecture and has tribunals of first instance and commerce, a chamber of arts and manufacture, a board of trade-arbitrators and a communal college. Tanning and important manufactures of hosiery are carried on.

From 141 7, when after a siege of forty-seven days it succumbed to Henry V., king of England, till 1450, when it was retaken by the French, Falaise was in the hands of the English.

FALASHAS (i.e. exiles; Ethiopic falas, a stranger), or “Jews of Abyssinia,” a tribe of Hamitic stock, akin to Galla, Somali and Beja, though they profess the Jewish religion. They claim to be descended from the ten tribes banished from the Holy Land. Another tradition assigns them as ancestor Menelek, Solomon’s alleged son by the queen of Sheba. There is little or no physical difference between them and the typical Abyssinians, except perhaps that their eyes are a little more oblique; and they may certainly be regarded as Hamitic. It is uncertain when they became Jews: one account suggests in Solomon’s time; another, at the Babylonian captivity; a third, during the 1st century of the Christian era. That one of the earlier dates is correct seems probable from the fact that the Falashas know nothing of either the Babylonian or Jerusalem Talmud, make no use of phylacteries (tefillin), and observe neither the feast of Purim nor the dedication of the temple. They possess — not in Hebrew, of which they are altogether ignorant, but in Ethiopic (or Geez) — • the canonical and apocryphal books of the Old Testament; a volume of extracts from the Pentateuch, with comments given to Moses by God on Mount Sinai; the Te-e-sa-sa Saribat, or laws of the Sabbath; the Ardit, a book of secrets revealed to twelve saints, which is used as a charm against disease; lives of Abraham, Moses, &c; and a translation of Josephus called Sana Aihud. A copy of the Orit or Mosaic law is kept in the holy of holies in every synagogue. Various pagan observances are mingled

in their ritual: every newly-built house is considered uninhabitable till the blood of a sheep or fowl has been spilt in it; a woman guilty of a breach of chastity has to undergo purification by leaping into a flaming fire; the Sabbath has been deified, and, as the goddess Sanbat, receives adoration and sacrifice and is said to have ten thousand times ten thousand angels to wait on her commands. There is a monastic system, introduced it is said in the 4th century a.d. by Aba Zebra, a pious man who retired from the world and lived in the cave of Hoharewa, in the province of Armatshoho. The monks must prepare all their food with their own hands, and no lay person, male or female, may enter their houses. Celibacy is not practised by the priests, but they are not allowed to marry a second time, and no one is admitted into the order who has eaten bread with a Christian, or is the son or grandson of a man thus contaminated. Belief in the evil eye or shadow is universal, and spirit-raisers, soothsayers and rain-doctors are in repute. Education is in the hands of the monks and priests, and is confined to boys. Fasts, obligatory on all above seven years of age, are held on every Monday and Thursday, on every new moon, and at the passover (the 2 1 st or 2 2nd of April) . The annual festivals are the passover, the harvest feast, the Baala Mazalat or feast of tabernacles (during which, however, no booths are built), the day of covenant or assembly and Abraham's day. It is believed that after death the soul remains in a place of darkness till the third day, when the

first sacrifice for the dead is offered; prayers are read in the synagogue for the repose of the departed, and for seven days a formal lament takes place every morning in his house. No coffins are used, and a stone vault is built over the corpse so that it may not come into direct contact with the earth.

The Falashas are an industrious people, living for the most part in villages of their own, or, if they settle in a Christian or Mahom- medan town, occupying a separate quarter. They had their own kings, who, they pretend, were descended from David, from the 10th century until 1800, when the royal race became extinct, and they then became subject to the Abyssinian kingdom of Tigre. They do not mix with the Abyssinians, and never marry women of alien religions. They are even forbidden to enter the houses of Christians, and from such a pollution have to be purified before entering their own houses. Polygamy is not practised; early marriages are rare, and their morals are generally better than those of their Christian masters. Unlike most Jews, they have no liking for trade, but are skilled in agriculture, in the manufacture of pottery, ironware and cloth, and are good masons. Their numbers are variously estimated at from one hundred to one

hundred and fifty thousand.

Bibliography. — M. Flad, Zwblf Jahre in Abyssinia (Basel, 1869), and his Falashas of Abyssinia, translated from the German by S. P. Goodhart (London, 1869); H. A. Stern, Wanderings among the Falashas in Abyssinia (London, 1862); Joseph Halevy, Travels in Abyssinia (trans. London, 1878); Morais, “The Falashas” in Penn Monthly (Philadelphia, 1880); Cyrus Adler, “Bibliography of the Falashas ” in American Hebrew (16th of March 1894) ; Lewin, ” Ein veriassener Bruderstamm,” in Bloch’s Wochenschrift (7th February 1902), p. 85; J. Faitlovitch, Notes d’un voyage chez les Falachas (Paris, 1905).

FALCAO, CHRISTOVAO DE SOUSA (? 1512-1557), Portuguese poet, came of a noble family settled at Portalegre in the Alemtejo, which had originated with John Falcon or Falconet, one of the Englishmen who went to Portugal in 1386 in the suite of Philippa of Lancaster. His father, Joao Vaz de Almada Falcao, was an upright public servant who had held the captaincy of Elmina on the West African coast, but died, as he had lived, a poor man. There is a tradition that in boyhood Christovao fell in love with a beautiful child and rich heiress, D. Maria Brandao, and in 1526 married her clandestinely, but parental opposition prevented the ratification of the marriage. Family pride, it is said, drove the father of Christovao to keep his son under strict surveillance in his own house for five years, while the lady’s parents, objecting to the youth’s small means, put her into the Cistercian convent of Lorvao, and there endeavoured to wean her heart from him by the accusation that he coveted her fortune more than her person. Their arguments and the promise of a good match ultimately prevailed, and in 1534 D. Maria left the convent to marry D. Luis de Silva, captain of Tangier, while the broken-hearted Christovao told his sad story in some beautiful lyrics and particularly in the eclogue Chrisfal. He had been the disciple and friend of the poets Bernardim Ribeiro and Sa de Miranda, and when his great disappointment came, Falcao laid aside poetry and entered on a diplomatic career. There is documentary evidence that he was employed at the Portuguese embassy ip Rome in 1542, but he soon returned to Portugal, and we find him at court again in 1548 and 1551. The date of his death, as of his birth, is uncertain. Such is the story accepted by Dr Theophilo Braga, the historian of Portuguese literature, but Senhor Guimaraes shows that the first part is doubtful, and, putting aside the testimony of a contemporary and grave writer, Diogo do Couto, he even denies the title of poet to Christovao Falcao, arguing from internal and other evidence that Chrisfal is the work of Bernardim Ribeiro; his destructive criticism is, however, stronger than his constructive work.

The eclogue, with its 104 verses, is the very poem of saud'ade, and its simple, direct language and chaste and tender feeling, enshrined in exquisitely sounding verses, has won for its author lasting fame and a unique position in Portuguese literature. Its influence on later poets has been very considerable, and Camoens used several of the verses as proverbs.

The poetical works of Christovao Falcao were published anonymously, owing, it is supposed, to their personal nature and allusions.

and, in part or in whole, they have been often reprinted. There is a modern critical edition of Chrisfal and a Carta (letter) by A. Epiphanio da Silva Dias under the title Obras de Christovao Falcao (Oporto, 1893), and one of the Cantigas and Esparsas by the same scholar appeared in the Revista Lusitana, vol. 4, pp. 142-179 (Lisbon, 1896), under the name Fragmento de um Cancioneiro do Seculo XVI. See Bernardim Ribeiro e Bucolismo, by Dr T. Braga (Oporto, 1897), and Bernardim Ribeiro (0 Poeta Crisfal), by Delfim Guimaraes (Lisbon, 1908). (E. Pr.)

FALCK, ANTON REINHARD (1777-1843), Dutch statesman, was born at Utrecht on the 19th of March 1777. He studied at the university of Leiden, and entered the Dutch diplomatic service, being appointed to the legation at Madrid. Under King Louis Napoleon he was secretary-general for foreign affairs, but resigned office on the annexation of the Batavian republic to France. He took a leading part in the revolt of 1813 against French domination, and had a considerable share in the organiza- tion of the new kingdom of the Netherlands. As minister of education under William I. he reorganized the universities of Ghent, Louvain and Liege and the Royal Academy of Brussels. Side by side with his activities in education he directed the departments of trade and the colonies. Falck was called in Holland the king's good genius, but William I. presently tired of his counsels and he was superseded by Van Maanen. He was ambassador in London when the disturbances of 1830 convinced him of the necessity of the separation of Belgium from Holland. He consequently resigned his post and lived in close retirement until 1839, when he became the first Dutch minister at the Belgian court. He died at Brussels on the 16th of March 1843. Besides some historical works he left a correspondence of considerable political interest, printed in Brieven van A. R. Falck, 1795-1843 (2nd ed. The Hague, 1861), and Ambtsbrieven van A. R. Falck {ibid. 1878).

FALCON, the most northern state of Venezuela, with an extensive coast line on the Caribbean Sea and Gulf of Venezuela. Pop. (1905 est.) 173,968. It lies between the Caribbean on the N. and the state of Lara on the S., with Zulia and the Gulf of Venezuela on the W. Its surface is much broken by irregular ranges of low mountains, and extensive areas on the coast are sandy plains and tropical swamps. The climate is, hot, but, being tempered by the trade winds, is not considered unhealthy except in the swampy districts. The state is sparsely settled and has no large towns, its capital, Coro, being important chiefly because of its history, and as the entrepot for an extensive inland district. The only port in the state is La Vela de Coro, on a small bay of the same name, 7 m. E. of the capital, with which it is connected by railway.

FALCON (Lat. Falco; 1 Fr. Faucon; Teutonic, Falk or V alien), a word now restricted to the high-couraged and long-winged birds of prey which take their quarry as it moves; but formerly it had a very different meaning, being by the naturalists of the 18th and even of the 19th century extended to a great number of birds comprised in the genus Falco of Linnaeus and writers of his day, 2 while, on the other hand, by falconers, it was, and still is, technically limited to the female of the birds employed by them in their vocation (see Falconry), whether ” long-winged ” and therefore ” noble,” or ” short-winged ” and ” ignoble.”

According to modern usage, the majority of the falcons, in the sense first given, may be separated into five very distinct groups: (1) the falcons pure and simple (Falco proper); (2) the large northern falcons (Hierofalco, Cuvier); (3) the ” desert falcons ” (Gennaea, Kaup); (4) the merlins (Aesalon, Kaup); and (5) the hobbies (Hypotriorchis, Boie). A sixth group, the kestrels

1 Unknown to classical writers, the earliest use of this word is said to be by Servius Honoratus (circa a.d. 390-480) in his notes on Aen. x. 145. It seems possibly to be the Latinized form of the Teutonic Falk, though falx is commonly accounted its root.

The nomenclature of nearly all the older writers on this point is extremely confused. What many of them, even so lately as Pen- nant’s time, termed the ” gentle falcon ” is certainly the bird we now call the goshawk (i.e. goose-hawk), which name itself may have been transferred to the Astur palumbarius of modern ornitho- logists, from one of the long-winged birds of prey.

(Tinnunculus, Vieillot), is often added. This, however, appears to have

been justifiably reckoned a distinct genus.

The typical falcon is by common consent allowed to be that almost cosmopolitan species to which unfortunately the English epithet ” peregrine ” (i.e. strange or wandering) has been attached. It is the Falco peregrinus of Tunstall (1771) and of most recent ornithologists, though some prefer the specific name communis applied by J. F. Gmelin a few years later (1788) to a bird which, if his diagnosis be correct, could not have been a true falcon at all, since it had yellow irides — a colour never met with in the eyes of any bird now called by naturalists a ” falcon. ” This species inhabits suitable localities throughout the greater part of the globe, though examples from North America have by some received specific recognition as F. anatum (the ” duck- hawk “), and those from Australia have been described as distinct under the name of F. melanogenys. Here, as in so many other cases, it is almost impossible to decide as to which forms should, and which should not, be accounted merely local races. In size not surpassing a raven, this falcon (fig. 1) is perhaps the most powerful bird of prey for its bulk that flies, and its courage is not less than its power. It is the species, in Europe, most commonly

Fig. I. — Peregrine Falcon.

trained for the sport of hawking (see Falconry). Volumes have been written upon it, and to attempt a complete account of it is, within the limits now available, impossible. The plumage of the adult is generally blackish-blue above, and white, with a more or less deep cream-coloured tinge, beneath — the lower parts, except the chin and throat, being barred transversely with black, while a black patch extends from the bill to the ear-coverts, and descends on either side beneath the mandible. The young have the upper parts deep blackish-brown, and the lower white, more or less strongly tinged with ochraceous-brown, and striped longitudinally with blackish-brown. From Port Kennedy, the most northern part of the American continent, to Tasmania, and from the shores of the Sea of Okhotsk to Mendoza in the Argentine territory, there is scarcely a country in which this falcon has not been found. Specimens have been received from the Cape of Good Hope, and it is only a question of the technical differentiation of species whether it does not extend to Cape Horn. Fearless as it is, and adapting itself to almost every circumstance, it will form its eyry equally on the sea-washed cliffs, the craggy mountains, or (though more rarely) the drier spots of a marsh in the northern hemisphere, as on trees (says H. Schlegel) in the forests of Java or the waterless ravines of Australia. In the United Kingdom it was formerly very common, and hardly a hiah rock from the Shetlands to the Isle of

but had a pair as its tenants. But the British gamekeeper has long held the mistaken faith that it is his worst foe, and the number of pairs now allowed to rear their brood unmolested in the British Islands is very small. Yet its utility to the game- preserver, by destroying every one of his most precious wards that shows any sign of infirmity, can hardly be questioned by reason, and G. E. Freeman (Falconry) has earnestly urged its claims to protection. 1 Nearly allied to this falcon are several species, such as F. barbarus of Mauretania, F. minor of South Africa, the Asiatic F. babylonicus, F. peregrinator of India (the shaheen), and perhaps F. cassini of South America, with some others.

Next to the typical falcons comes a group known as the ” great northern ” falcons (Hierofalco). Of these the most re- markable is the gyrfalcon (F. gyrfalco), whose home is in the Scandinavian mountains, though the young are yearly visitants to the plains of Holland and Germany. In plumage it very much resembles F. peregrinus, but its flanks have generally a bluer tinge, and its superiority in size is at once manifest. Nearly allied to it is the Icelander (F. islandus), which externally differs in its paler colouring and in almost entirely wanting the black mandibular patch. Its proportions, however, differ a good deal, its body being elongated. Its country is shown by its name, but it also inhabits south Greenland, and not unfrequently makes its way to the British Islands. Very close to this comes the Greenland falcon (F. candicans), a native of north Greenland, and perhaps of other countries within the Arctic Circle. Like the last, the Greenland falcon from time to time occurs in the United Kingdom, but it is always to be distinguished by wearing a plumage in which at every age the prevailing colour is pure white. In north-eastern America these birds are replaced by a kindred form (F. labradorus) , first detected by Audubon and subsequently recognized by Dresser {Orn. Miscell. i. 135). It is at once distinguished by its very dark colouring, the lower parts being occasionally almost as deeply tinted at all ages as the upper.

All the birds hitherto named possess one character in common. The darker markings of their plumage are longitudinal before the first real moult takes place, and for ever afterwards are transverse. In other words, when young the markings are in the form of stripes, when old in the form of bars. The variation of tint is very great, especially in F.

peregrinus; but the experience of falconers, whose business it is to keep their birds in the very highest condi- tion, shows that a falcon of either of these groups if light-coloured in youth is light-coloured when adult, and if dark when young is also dark when old — age, after the first moult, making no difference in the complexion of the bird. The next group is that of the so-called ” desert falcons ” (Gennaea), wherein the differ- ence just indicated does not obtain, for long as the bird may live and often as it may moult, the original style of markings never gives way to any other. Foremost among these are to be con- sidered the lanner and the saker (commonly termed F. lanarius and F. sacer)', both well known in the palmy days of falconry, but only since about 1845 readmitted to full recognition. Both of these birds belong properly to south-eastern Europe, North Africa and south-western Asia. They are, for their bulk, less powerful than the members of the preceding group, and though they may be trained to high flights are naturally captors of humbler game. The precise number of species is very doubtful, but among the many candidates for recognition are especially to be named the lugger (F. jugger) of India, and the prairie falcon (F. mexicanus) of the western plains of North America.

The systematist finds it hard to decide in what group he should place two somewhat large Australian species (F . hypoleucus

1 It is not to be inferred, as many writers have done, that falcons habitually prey upon birds in which disease has made any serious progress. Such birds meet their fate from the less noble Accipitres or predatory animals of many kinds. But when a bird is first affected by any disorder, its power of taking care of itself is at once impaired, and hence in the majority of cases it may become an easy victim under circumstances which would enable a perfectly sound bird to escape from the attack even of a falcon.

and F. subniger), both wf which are rare in collections — the latter especially.

A small but very beautiful group comes next — the merlins 2 (Aesalon of some writers, Lithofalco of others). The European merlin (F. aesalon) is perhaps the boldest of the Accipitres, not hesitating to attack birds of twice its own size, and even on

Fig. 2. — Merlin.

occasion threatening human beings. Yet it readily becomes tame, if not affectionate, when reclaimed, and its ordinary prey consists of the smaller Passeres. Its ” pinion of glossy blue ” has become almost

proverbial, and a deep ruddy blush suffuses its lower parts; but these are characteristic only of the male — the female maintaining very nearly the sober brown plumage she wore when as a nestling she left her lowly cradle in the heather. Very close to this bird comes the pigeon-hawk (F. columbarius) of North America — so close, indeed, that none but an expert ornithologist can detect the difference. The turumti of Anglo- Indians [F. chicquera), and its representative from southern Africa {F. ruficollis), also belong to this group, but they are considerably larger than either of the former.

Lastly, the Hobbies (Hypotriorchis) comprise a greater number of forms — though how. many seems to be doubtful.

wKgf%^^*~*- . i ’”-”

*Q&

Fig. 3. — Hobby.

They are in life at once recognizable by their bold upstanding position, and at any time by their long wings. The type of this group is the English hobby (F. subbuteo), a bird of great power of flight, chiefly shown in the capture of insects, which form its

3 French, Umirillon; Icelandic, Smirill.

ordinary food. It is a summer visitant to most parts of Europe, including the British Islands, and is most wantonly and need- lessly destroyed by gamekeepers. A second European species of the group is the beautiful F. eleonorae, which hardly comes farther north than the countries bordering the Mediterranean, and, though in some places abundant, is an extremely local bird. The largest species of this section seems to be the Neotropical F. femoralis, for F. diroleucus though often ranked here, is now supposed to belong to the group of typical falcons. (A. N.)

FALCONE, ANIELLO (1600-1665), Italian battle-painter, was the son of a tradesman, and was born in Naples. He showed his ‘ artistic tendency at an early age, received some instruction from a relative, and then studied under Ribera (Lo Spagnoletto), of whom he ranks as the most eminent pupil. Besides battle- pictures, large and small, taken from biblical as well as secular history, he painted various

religious subjects, which, however, count for little in his general reputation. He became, as a battle- painter, almost as celebrated as Borgognone (Courtois), and was named ” L’ Oracolo delle Battaglie.” His workshave animation, variety, truth to nature, and careful colour. Falcone was bold, generous, used to arms, and an excellent fencer. In the insur- rection of Masaniello (1647) he resolved td be bloodily avenged for the death, at the hands of two Spaniards, of a nephew and of a pupil in the school of art which he had established in Naples. He and many of his scholars, including Salvator Rosa and Carlo Coppola, formed an armed band named the Compagnia della Morte (“Company of Death”; see Rosa, Salvator). They scoured the streets by day, exulting in slaughter; at night they were painters again, and handled the brush with impetuous zeal. Peace being restored, they had to decamp. Falcone and Rosa made off to Rome; here Borgognone noticed the works of Falcone, and became his friend, and a French gentleman induced him to go to France, where Louis XIV. became one of his patrons. Ultimately Colbert obtained permission for the painter to return to Naples, and there he died in 1665. Two of his battle-pieces are to be seen in the Louvre and in the Naples museum; he painted a portrait of Masaniello, and engraved a few plates. Among his principal scholars, besides Rosa and Coppola (whose works are sometimes ascribed to Falcone himself), were Domenico Gargiuolo (named Micco Spadaro), Paolo Porpora and Andrea di Lione.

FALCONER, HUGH (1808-1865), British palaeontologist and botanist, descended from an old Scottish family, was born at Forres on the 29th of February 1808. In 1826 he graduated at Aberdeen, where he manifested a taste for the study of natural history. He afterwards studied medicine in the university of Edinburgh, taking the degree of M.D. in 1829; during this period he zealously attended the botanical classes of Prof. R. Graham (1786-1845), and those on geology by Prof. R. Jameson. Proceeding to India in 1830 as assistant-surgeon on the Bengal establishment of the East India Company, he made on his arrival an examination of the fossil bones from Ava in the possession of the Asiatic Society of Bengal, and his description of the collection, published soon afterwards, gave him a recog- nized position among the scientists of India. Early in 1831 he was appointed to the army station at Meerut, in the North- Western Provinces, but in the same year he was asked to officiate as superintendent of the botanic garden of Saharanpur, during the ill-health and absence of Dr J. F. Royle; and in 1832 he succeeded to this post. He was thus placed in a district that proved to be rich in palaeontological remains; and he set to work to investigate its natural history and geology. In 1834 he published a geological description of the Siwalik hills, in the Tertiary strata of

which he had in 1831 discovered bones of crocodiles, tortoises and other animals; and subsequently, with conjoint labourers, he brought to light a sub-tropical fossil fauna of unexampled extent and richness, including remains of Mastodon, the colossal ruminant Sivatherium, and the enormous tortoise Colossochelys Atlas. For these valuable discoveries he and Captain (afterwards Sir Proby T.) Cautley (1802-1871) received in 1837 the Wollaston medal in duplicate from the Geological Society of London. In 1834 Falconer was appointed

to inquire into the fitness of India for the growth of the tea- plant, and it was on his recommendation that it was introduced into that country.

He was compelled by illness to leave India in 1842, and during his stay in England he occupied himself with the classifica- tion and arrangement of the Indian fossils presented to the British Museum and East India House, chiefly by himself and Sir Proby T. Cautley. He then set to work to edit the great memoir by Cautley and himself, entitled Fauna Antiqua Siva- lensis, of which Part I. text was issued in 1846, and a series of 107 plates during the years 1846-1849. Unfortunately the work, owing partly to Dr Falconer's absence from England and partly to ill-health, was never completed. He was elected F. R. S. in 1845. In 1847 he was appointed superintendent of the Calcutta botanical garden, and professor of botany in the medical college; and on entering on his duties in the following year he was at once employed by the Indian government and the Agricultural and Horticultural Society as their adviser on all matters connected with the vegetable products of India. He prepared an important report on the teak forests of Tenasserim, and this was the means of saving them from destruction by reckless felling; and through his recommendation the cultivation of the cinchona bark was introduced into the Indian empire. Being compelled by the state of his health to leave India in 1855, he spent the remainder of his life chiefly in examining fossil species in England and the Continent corresponding to those which he had discovered in India, notably the species of mastodon, elephant and rhinoceros; he also described some new mammalia from the Purbeck strata, and he reported on the bone-caves of Sicily, Gibraltar, Gower and Brixham. In the course of his researches he became interested in the question of the antiquity of the human race, and actually commenced a work on " Primeval Man," which, however, he did not live to finish. He died on the 31st of January 1865. Shortly after his death a committee was formed for the promotion of a " Falconer Memorial." This took the shape of a marble bust, which was placed in the rooms of the Royal Society of London, and of a Falconer scholarship of the annual value of £100, open for competition to

graduates in science or medicine of the university of Edinburgh.

Dr Falconer's botanical notes, with 450 coloured drawings of Kashmir and Indian plants, have been deposited in the library at Kew Gardens, and his Palaeontological Memoirs and Notes, com- prising all his papers read before learned societies, have been edited, with a biographical sketch, by Charles Murchison, M.D. (London, 1868). Many reminiscences of Dr Falconer, and a portrait of him, were published by his niece, Grace, Lady Prestwicn, in her Essays descriptive and biographical (1901).

FALCONER, WILLIAM (1732-1769), British poet, was born

in Edinburgh on the nth of February 1732. His father was a wig-maker, and carried on business in one of the small shops with wooden fronts at the Netherbow Port, an antique castellated structure which remained till 1764, dividing High Street from the Canongate. The old man became bankrupt, then tried business as a grocer, and finally died in extreme poverty. William, the son, having received a scanty education, was put to sea. He served on board a Leith merchant vessel, and in his eighteenth year obtained the appointment of second mate of the " Britannia," a vessel employed in the Levant trade, and sailed from Alexandria for Venice. The "Britannia" was over- taken by a dreadful storm off Cape Colonna and was wrecked, only three of the crew being saved. Falconer was happily one of the three, and the incidents of the voyage and its disastrous termination formed the subject of his poem of The Shipwreck (1762). Meanwhile, on his return to England, Falconer, in his nineteenth year, printed at Edinburgh an elegy on Frederick, prince of Wales, and afterwards contributed short pieces to the Gentleman's Magazine. Some of these descriptive and lyrical effusions possess merit. The fine naval song of " The Storm " (" Cease, rude Boreas"), reputed to be by George Alexander Stevens, the dramatic writer and lecturer, has been ascribed to Falconer, but apparently on no authority. The duke of York, to whom The Shipwreck had been dedicated, advised Falconer

to enter the royal navy, and before the end of 1762 the poet- sailor was rated as a midshipman on board the " Royal George." But as this ship was paid off at the peace of 1763, Falconer received an appointment as purser of the " Glory " frigate, a situation which he held until that vessel was laid up on ordinary at Chatham. In 1764 he

published a new and enlarged edition of The Shipwreck, and in the same year a rhymed political tirade against John Wilkes and Charles Churchill, entitled The Dema- gogue. In 1769 appeared his Universal Marine Dictionary, in which retreat is defined as a French manoeuvre, ” not properly a term of the British marine.” While engaged on this dictionary, J. Murray, a bookseller in Fleet Street, father of Byron’s munifi- cent publisher and correspondent, wished him to join him as a partner in business. The poet declined the offer, and became purser of the ” Aurora ” frigate, which had been commissioned to carry out to India certain supervisors or superintendents of the East India Company. Besides his nomination as purser, Falconer was promised the post of private secretary to the commissioners. Before sailing he published a third edition of his Shipwreck, which had again undergone ” correction,” but not improvement. The poet sailed in the ” Aurora ” from Spithead on the 20th of September 1769. The vessel arrived safely at the Cape of Good Hope, and left on the 27th of December. She was never more heard of, having, as is supposed, foundered at sea. The Ship- wreck, the poem with which Falconer’s name is connected, had a great reputation at one time, but the fine passages which pleased the earlier critics have not saved it from general oblivion. See his Poetical Works in the ” Aldine Edition ” (1836), with a life by J. Mitford.

FALCONET, fiTIENNE MAURICE (1716-1791), French sculptor, was born in Paris. His parents were poor, and he was at first apprenticed to a carpenter, but some of his clay-figures, with the making of which he occupied his leisure hours, attracted the notice of the sculptor Lemoine, who made him his pupil. He found time to study Greek and Latin, and also wrote several brochures on art. His artistic productions are characterized by the same defects as his writings, for though manifesting consider- able cleverness and some power of imagination, they display in many cases a false and fantastic taste, the result, most probably, of an excessive striving after originality. One of his most successful statues was one of Milo of Crotona, which secured his admission to the membership of the Academy of Fine Arts in 1754. At” the invitation of the empress Catherine he went in 1766 to St Petersburg, where he executed a colossal statue of Peter the Great in bronze. In 1788 he became director of the French Academy of Painting. Many of Falconet’s works, being placed in churches, were destroyed at the time of the French Revolution. His ” Nymphe descendant au bain ” is in the Louvre.

Among his writings are Reflexions sur la sculpture (Paris, 1768), and Observations sur la statue de Marc-Aurele (Paris, 1771). The whole were collected under the title of QLuvres litteraires (6 vols., Lausanne,

1 781-1782; 3 vols., Paris, 1787).

FALCONRY (Fr. fauconnerie, from Late Lat. falco, falcon), the art of employing falcons and hawks in the chase, often termed Hawking. Falconry was for many ages one of the principal sports of the richer classes, and, since many more efficacious methods and appliances for the capture of game undoubtedly existed, it is probable that it has always been carried on as a pure sport. The antiquity of falconry is very great. There appears to be little doubt that it was practised in Asia at a very remote period, for which we have the concurrent testimony of various Chinese and Japanese works, some of the latter being most quaintly and yet spiritedly illustrated. It appears to have been known in China some 2000 years B.C., and the records of a king Wen Wang, who reigned over a province of that country 689 B.C., prove that the art was at that time in very high favour. In Japan it appears to have been known at least 600 years B.C., and probably at an equally early date in India, Arabia, Persia and Syria. Sir A. H. Layard, in his Nineveh and Babylon, considered that in a bas-relief found by him in the ruins of Khorsabad " there appeared to be a falconer bearing a hawk on his wrist," from which it would appear to have been known

there some 1 700 years B.C. In all the above-mentioned countries of Asia it is practised at the present day.

Little is known of the early history of falconry in Africa, but from very ancient Egyptian carvings and drawings it seems to have been known there many ages ago." It was probably also in vogue in the countries of Morocco, Oran, Algiers, Tunis and Egypt, at the same time as in Pˆurope. The older writers on falconry, English and continental, often mention Barbary and Tunisian falcons. It is still practised in Egypt.

Perhaps the oldest records of falconry in Europe are supplied by the writings of Pliny, Aristotle and Martial. Although their notices of the sport are slight and somewhat vague, yet they are quite sufficient to show clearly that it was practised in their days — between the years 384 B.C. and a.d. 40. It was probably introduced into England from the continent about a.d. 860, and from that time down to the middle of the 17th century falconry was followed with an ardour that perhaps no English sport has ever called forth, not even fox-hunting. Stringent laws and enactments, notably in the reigns of William the Conqueror, Edward III., Henry VIII. and Elizabeth, were passed from time to time in its interest. Falcons and hawks were allotted to degrees and orders of men according to rank and station — for instance, to the emperor the eagle and vulture, to royalty the jerfalcons, to an earl the

peregrine, to a yeoman the goshawk, to a priest the sparrow-hawk, and to a knave or servant the useless kestrel. The writings of Shakespeare furnish ample testimony to the high and universal estimation in which it was held in his days. About the middle of the 17th century falconry began to decline in England, to revive somewhat at the Restora- tion. It never, however, completely recovered its former favour, a variety of causes operating against it, such as enclosure of waste lands, agricultural improvements, and the introduction of fire-arms into the sporting field, till it fell, as a national sport, almost into oblivion. Yet it has never been even temporarily extinct, and it is successfully practised even at the present day.

In Europe the game or ” quarry ” at which hawks are flown consists of grouse (confined to the British Isles), black-game, pheasants, partridges, quails, landrails, ducks, teal, woodcocks, snipes, herons, rooks, crows, gulls, – magpies, jays, blackbirds, thrushes, larks, hares and rabbits. In former days geese, cranes, kites, ravens and bustards were also flown at. Old German works make much mention of the use of the Iceland falcon for taking the great bustard, a flight scarcely alluded to by English writers. In Asia the list of quarry is longer, and, in addition to all the foregoing, or their Asiatic representatives, various kinds of bustards, sand grouse, storks, ibises, spoonbills, pea-fowl, jungle-fowl, kites, vultures and gazelles are captured by trained hawks. In Mongolia and Chinese Tartary, and among the nomad tribes of central Asia, the sport still flourishes; and though some late accounts are not satisfactory either to the falconer or the naturalist, yet they leave no doubt that a species of eagle is still trained in those regions to take large game, as antelopes and wolves. Mr Atkinson, in his account of his travels in the country of the Amur, makes particular mention of the sport, as does also Mr Shaw in his work on Yarkand; and in a letter from the Yarkand embassy, under Mr Forsyth, C.B., dated Camp near Yarkand, Nov. 27, 1873, the following passage occurs:— ” Hawking appears also to be a favourite amusement, the golden eagle taking the place of the falcon or hawk. This novel sport seemed very successful.” It is questionable whether the bird here spoken of is the golden eagle. In Africa gazelles are taken, and also partridges and wildfowl.

The hawks used in England are the three great northern falcons, viz. the Greenland, Iceland and Norway falcons, the peregrine falcon, the hobby, the merlin, the goshawk and the sparrow-hawk. In former days the saker, the lanner and the Barbary or Tunisian falcon were also employed. (See Falcon.)

Of the foregoing the easiest to keep, most efficient in the field, and most suitable for general use are the peregrine falcon and the goshawk.

In all hawks, the female is larger and more powerful than the male.

Hawks are divided by falconers all over the world into two great classes. The first class comprises ” falcons,” i.e. ” long- winged hawks,” or ” hawks of the lure,” distinguished by Eastern falconers as ” dark-eyed hawks.” In these the wings are pointed, the second feather in the wing is the longest, and the iris is of a deep, dark-brown hue. Merlins must, however, be excepted; and here it would seem that the Eastern distinction is the better, for though merlins are much more falcons than they are hawks, they differ from falcons in having the third feather in the wing the longest, while they are certainly ” dark-eyed hawks.”

The second class is that of ” hawks,” i.e. ” short-winged hawks,” or ” hawks of the fist,” called by Eastern falconers ” yellow (or rose) eyed hawks.” In these the wings are rounded, the fourth feather is the longest in the wing, and the iris is yellow, orange or deep-orange.

The following glossary of the principal terms used in falconry may assist the reader in perusing this notice of the practice of the art. Useless or obsolete terms are omitted: —

Austringan. — A falconer.

Bate. — A hawk is said to ” bate ” when she nutters off from the fist,

perch or block, whether from wildness, or for exercise, or in

the attempt to chase. Bewits. — Straps of leather by which the bells are fastened to a

hawk’s legs. Bind. — A hawk is said to ” bind ” when she seizes a bird in the

air and clings to it. Block. — The conical piece of wood, of the form of an inverted flower- pot, used for hawks to sit upon; for a peregrine it should be

about 10 to 12 in. high, 5 to 6 in diameter at top, and 8 to 9 in

diameter at base. Brail. — A thong of soft leather used to secure, when desirable, the

wing of a hawk, ft has a slit to admit the pinion joint, and the

ends are tied together. Cadge. — The wooden frame on which hawks, when numerous, are

carried to the field. Cadger. — The person who carries the cadge. Calling off. — Luring a hawk (see Lure) from the hand of an

assistant. Carry. — A hawk is said to ” carry ” when she flies away with the

quarry on the approach of the falconer. Cast. — Two hawks which may be used for flying together are called

a ” cast,” not necessarily a pair. Casting. — The oblong or egg-shaped ball, consisting of feathers,

bones, &c, which all hawks (and insectivorous birds) throw

up after the nutritious part of their food has been digested.

Also the fur or feathers given them to assist the process. Cere. — The naked wax-like skin above the beak. Check. — A hawk is said tc fly at ” check ” when she flies at a bird

other than the intended object of pursuit. Clutching. — Taking the quarry in the feet as the short-winged hawks

do. Falcons occasionally ” clutch.” Come to. — A hawk is said to ” come to ” when she begins to get

tame. Coping. — Cutting the beak or talons of a hawk. Crab. — To fight. Creance. — A long line or string. Crop, to put away. — A hawk is said to ” put away her crop ” when

the food passes out of the crop into the stomach. Deck feathers. — The two centre tail-feathers. Eyas. — A hawk which has been brought up from the nest (nyas,

from Fr. niais). Eyry. — The nest of a hawk. Foot. — A hawk is said to ” foot ” well or to be a ” good footer ”

when she is successful in killing. Many hawks are very fine

fliers without being ” good footers.” Frounce. — A disease in the mouth and throat of hawks. Get in. — To go up to a hawk fahen she has killed her quarry. Hack. — The state of partial liberty in which young hawks must

always at first be kept. Haggard. — A wild-caught hawk in the adult plumage. Hood. — (See fig.) Hoodshy. — A hawk is said to be ” hoodshy ” when she is afraid of,

or resists, having her hood put on. Hunger trace. — A mark, and a defect, in the tail feathers, denoting

a weak point ; generally due to temporary starvation as a

nestling. Imping. — The process of mending broken feathers iscalled ” imping.”

(See fig.) Imping needle. — A piece of tough soft iron wire from about \ to

2 \ in. long, rough filed so as to be three-sided and tapering

from the middle to the ends. (See fig.) Intermewed. — A hawk moulted in confinement is said to be ” inter- mewed.”

Jack. — Mate of the merlin.

Jerkin. — Mate of the jerfalcon.

Jesses— Strips of light but very tough leather, some 6 to 8 in. long,

which always remain on a hawk’s legs — one on each leg. (See

fig.) Jonk. — To sleep. Leash. — A strong leathern thong, some 2 1 or 3 ft. long, with a knot

or button at one end, used to secure a hawk. (See fig.) Lure.— The instrument used for calling long-winged hawks — a dead

pigeon, or an artificial lure made of leather and feathers or wings

of birds, tied to a string, with meat attached to it. Mail. — The breast feathers. Make hawk. — A hawk is called a ” make hawk ” when, as a

thoroughly trained and steady hawk, she is flown with young

ones to teach them their work. Man a hawk. — To tame a hawk and accustom her to strangers.

Implements used

1. Hood.

2. Back view of hood, showing

braces a, a, b, b; by drawing 6 the braces b, b, the hood, now open, is closed. 7

3. Rufter hood. 8 4.. Imping-needle.

5. Jess; d is the space for the hawk's leg; the point and slit a, a are brought round the leg, and passed through slit \b, after which the point c and slit c, and also the whole remaining length of jess, are pulled through slits a and b ; c is the slit to which

in Falconry.

the upper ring of swivel is attached. .

. Hawk's leg with bell a, bewit b, jessc.

. Jesses, swivel and leash.

i. Portion of first wing-feather of male peregrine falcon, " tiercel," half natural size, in process of imping; a, the living hawk's feather; b, piece supplied from an- other tiercel, with the imp- ing needle c pushed half its length into it and ready to be pushed home into the living bird's feather.

Mantle. — A hawk is said to " mantle " when she stretches out a leg and a wing simultaneously, a common action of hawks when at ease; also when she spreads out her wings and feathers to hide any quarry or food she may have seized from another hawk, or from man. In the last case it is a fault.

Mew. — A hawk is said to " mew " when she moults. The place where a hawk was kept to moult was in olden times called her " mew." Buildings where establishments of hawks were kept were called " mews."

Musket. — Male of the sparrow-hawk.

Mutes (mutings). — Excrement of hawk.

Pannel. — The stomach of a hawk, corresponding with the gizzard of a fowl, is cailed her pannel. In it the casting is formed.

Passage. — The line herons take over a tract of country on their way to and from the heronry when procuring food in the breeding season.

Passage hawks. — Hawks captured when on their passage or migration.

Pelt. — The dead body of any quarry the hawk has killed.

Pitch. — The height to which a hawk, when waiting for game to be flushed, rises in the air.

Plume. — A hawk is said to ” plume ” a bird when she pulls off the

feathers. Point. — A hawk ” makes her point ” when she rises in the air over

the spot where quarry has saved itself from capture by dashing

into a hedge, or has otherwise secreted itself. Pounces. — A hawk’s claws. Pull through the hood. — A hawk is said to pull through the hood

when she eats with it on. Put in.— A bird is said to ” put in ” when it saves itself from the

hawk by dashing into covert or other place of security. Quarry. — The. bird or beast flown at. Rake out. — A hawk is said to ” rake out ” when she flies, while

” waiting on ” (see Wait on), too far and wide from her master. Ramage. — Wild. Red hawk. — Hawks of the first year, in the young plumage, are

called ” red hawks.” Ringing. — A bird is said to ” ring ” when it rises spirally in the air. Rufter hood. — An easy fitting hood, not, however, convenient for

hooding and unhooding — used only for hawks when first

captured. (See fig.) Sails. — The wings of a hawk. Seeling. — Closing

the eyes by a fine thread drawn through the lid

of each eye, the threads being then twisted together above the

head — a practice long disused in England. Serving a hawk. — Driving out quarry which has taken refuge, or

has ” put in.” Stoop. — The hawk’s rapid plunge upon the quarry. Take the air. — A bird is said to ” take the air ” when if seeks to

escape by trying to rise higher than the falcon. Tiercel. — The male of various falcons, particularly of the peregrine,

also tar cell, tassell or tercel; the term is also applied to the male

of the goshawk. Trussing. — A hawk is said to ” truss ” a bird when she catches it

in the air, and comes to the ground with it in her talons: this

term is not applied to large quarry. (See Bind.) Varvels. — Small rings, generally of silver, fastened to the end of the

jesses, and engraved with the owner’s name. Wait on. — A hawk is said to ” wait on ” when she flies above her

master waiting till game is sprung. Weathering. — Hawks are ” weathered ” by being placed unhooded

in the open air. Passage hawks which are not sufficiently

reclaimed to be left out by themselves unhooded on blocks are

” weathered ” by being put out for an hour or two under the

falconer’s eye. Yarak. — An Eastern term, generally applied to short-winged

hawks. When a hawk is keen, and in hunting condition, she

is said to be ” in yarak.”

The training of hawks affords much scope for judgment, experience and skill on the part of the falconer, who must care- fully observe the temper and disposition as well as the constitu- tion of each bird. It is through the appetite principally that hawks, like most wild animals, are tamed; but to fit them for use in the field much patience,

gentleness and care must be used. Slovenly taming necessitates starving, and low condition and weakness are the result. The aim of the falconer must be to have his hawks always keen, and the appetite when they are brought into the field should be such as would induce the bird in a state of nature to put forth its full powers to obtain its food, with, as near as possible, a corresponding condition as to flesh. The following is an outline of the process of training hawks, beginning with the management of a wild-caught peregrine falcon. When first taken, a rufter hood should be put on her head, and she must be furnished with jesses, swivel, leash and bell. A thick glove or rather gauntlet must be worn on the left hand (Eastern falconers always carry a hawk on the right), and she must be carried about as much as possible, late into the night, every day, being constantly stroked with a bird's wing or feather, very lightly at first. At night she should be tied to a perch in a room with the window darkened, so that no light can enter in the morning. The perch should be a padded pole placed across the room, about 4! ft. from the ground, with a canvas screen underneath. She will easily be induced to feed in most cases by drawing a piece of beefsteak over her feet, brushing her legs at the time with a wing, and now and then, as she snaps, slipping a morsel into her mouth. Care must be taken to make a peculiar sound with the lips or tongue, or to use a low whistle as she is in the act of swallowing; she will very soon learn to associate this sound with feeding, and it will be found that directly she hears it, she will gripe with her talons, and bend down to feel for food. When the falconer perceives this and other signs of her " coming to," that she no longer

starts at the voice or touch, and steps quietly up from the perch when the hand is placed under her feet, it will be time to change her rufter hood for the ordinary hood. This latter should be very carefully chosen — an easy fitting one, in which the braces draw closely and yet easily and without jerking. An old one previously worn is to be recommended. The hawk should be taken into a very dark room — one absolutely dark is best — and the change should be made if possible in total darkness. After this she must be brought to feed with her hood off; at first she must be fed every day in a darkened room, a gleam of light being admitted. The first day, the hawk having seized the food and begun to pull at it freely, the hood must be gently slipped off, and after she has eaten a moderate quantity, it must be replaced as slowly and gently as possible, and she should be allowed to finish her meal through the hood. Next day the hood may be twice re- moved, and so on; day by day the practice should be continued, and more light gradually admitted, until the hawk will feed freely in broad daylight, and suffer the hood to be taken oft and replaced

without opposition. ‘ Next she must be accustomed to see and feed in the presence of strangers and dogs, &c. A good plan is to carry her in the streets of a town at night, _at first where the gas-light is not strong, and where persons passing by are few, unhooding and hooding her from time to time, but not letting her get frightened. Up to this time she should be fed on lean beefsteak with no castings, but as soon as she is tolerably tame and submits well to the hood, she must occasionally be fed with pigeons and other birds. This should be done not later than 3 or 4 p.m., and when she is placed on her perch for the night in the dark room, she must be unhooded and left so, of course being carefully tied up. The falconer should enter the room about 7 or 8 a.m. next day, admitting as little light as possible, or using a candle. He should first observe if she has thrown her casting; if so, he will at once take her to the fist, giving her a bite of food, and re-hood her. If her casting is not thrown it is better for him to retire, leaving the room quite dark, and come in again later. She must now be taught to know the voice — the shout that is used to call her in the field — and to jump to the fist for food, the voice being used every time she is fed. When she comes freely to the fist she must be made ac- quainted with the lure. Kneeling down with the hawk on his fist, and gently unhooding her, the falconer casts oul a lure, which may be either a dead pigeon or an artificial lure garnished with beefsteak tied to a string, to a distance of a couple or three feet in front of her. When she jumps down to it, she should be allowed to eat a little on it — the voice being used — the while receiving morsels from the falconer’s hand; and before her meal is finished she must be taken off to the hand, being induced tc forsake the lure for the hand by a tempting piece of meat. This treatment will help to check her inclination hereafter to carry her quarry. This lesson is to be continued till the falcon feeds very boldly on the lure on the ground, in the falconer’s presence — till she will suffer him to walk round her while she is feeding. All this time she will have been held by the leash only, but in the next step a strong, but light creance must be made fast to the leash, and an assistant holding the hawk should unhood her, as the falconer, standing at a distance of 5 to 10 yds., calls her by shouting and casting out the lure. Gradually day after day the distance is increased, till the hawk will come 30 yds. or so without hesitation; then she may be trusted to fly to the lure at liberty, and by degrees from any distance, say 1000 yds. This accomplished, she should learn to stoop at the lure. Instead of allowing the hawk to seize upon it as she comes up, the falconer should snatch the lure away and let her pass by, and immediately put it out that she may readily seize it when she turns round to look for it. This should be done at first only once, and then progressively until she will stoop backwards and forwards at

the lure as often as desired. Next she should be entered at her quarry. Should she be intended for rooks or herons, two or three of these birds should be procured. One should be given her from the hand, then one should be released close to her, and a third at a considerable distance. If she take these keenly, she may be flown at a wild bird. Care must, however, be taken to

let her have every possible advantage in her first flights — wind and weather, and the position of the quarry with regard to the surrounding country, must be considered.

Young hawks, on being received by the falconer before they can fly, must be put into a sheltered place, such as an outhouse or shed. Their basket or hamper should be filled with straw. A hamper is best, with the lid so placed as to form a platform for the young hawks to come out upon to feed. This should be fastened to a beam or prop a few feet from the ground. The young hawks must be most plentifully fed on the best fresh food obtainable — good beefsteak and fresh-killed birds; the falconer when feeding them should use his voice as in luring. As they grow old enough they will come out, and perch about the roof of their shed, by degrees extending their flights to neighbour- ing buildings or trees, never failing to come at feeding time to the place where they are fed. Soon they will be continually on the wing, playing or fighting with one another, and later the falconer will observe them chasing other birds, as pigeons and rooks, which may be passing by. As soon as one fails to come for a meal, it must be at once caught with a bow net or a snare the first time it comes back, or it will be lost. It must be borne in mind that the longer hawks can be left at hack the better they are likely to be for use in the field — those hawks being always the best which have preyed a few times for themselves before being caught. Of course there is great risk of losing hawks when they begin to prey for themselves. When a hawk is so caught she is said to be ” taken up ” from hack. She will not require a rufter hood, but a good deal of the management described for the passage falcon will be necessary. She must be carefully tamed and broken to the hood in the same manner, and so taught to know the lure; but, as might be expected, very much less difficulty will be experienced. As soon as the eyas knows the lure sufficiently well to come to it sharp and straight from a distance, she must be taught to ” wait on.” This is effected by letting the hawk loose in an open place, such as a down. It will be found that she will circle round the falconer looking for the lure she

has been accustomed to see — perhaps mount a little in the air, and advantage must be taken of a favourable moment when the hawk is at a little height, her head being turned in towards the falconer, to let go a pigeon which she can easily catch. When the hawk has taken two or three pigeons in this way, and mounts immediately in expectation, in short, begins to wait on, she should see no more pigeons, but be tried at game as soon as possible. Young peregrines should be flown at grouse first in preference to partridges, not only because the season commences earlier, but because, grouse being the heavier birds, they are not so much tempted to ” carry ” as with partridges.

The training of the great northern falcons, as well as that of merlins and hobbies, is conducted much on the above principles, but the jerfalcons (gerfalcons or gyrfalcons) will seldom wait on well, and merlins will not do it at all.

The training of short-winged hawks is a simpler process. They must, like falcons, be provided with jesses, swivel, leash and bell. In these hawks a bell is sometimes fastened to the tail. Sparrow-hawks can, however, scarcely carry a bell big enough to be of any service. The hood is seldom used for short-winged ‘ hawks — never in the field. They must be made as tame as possible by carriage on the fist and the society of man, and taught to come to the fist freely when required — at first to jump to it in a room, and then out of doors. When the goshawk comes freely and without hesitation from short distances, she ought to be called from long distances from the hand of an assistant, but not oftener than twice in each- meal, until she will come at least iooo yds., on each occasion being well rewarded with some food she likes very much, as a fresh-killed bird, warm. When she does this freely, and endures the presence of strangers, dogs, &c, a few bagged rabbits should be given to her, and she will be ready to take the field. Some accustom the goshawk to the use of the lure, for the purpose of taking her if she will not come to the fist in the field when she has taken stand in a tree after being baulked of her quarry, but it ought not to be necessary to use it.

Falcons or long-winged hawks are either ” flown out of the hood,” i.e. unhooded and slipped when the quarry is in sight, or they are made to ” wait on ” till game is flushed. Herons and rooks are always taken by the former method. Passage hawks are generally employed for flying at these birds, though some- times good eyases are quite equal to the work. For heron- hawking a well-stocked heronry is in the first place necessary. Next an open country which can be ridden over — over which herons are in the constant habit of passing to and from their heronry on their fishing excursions, or making their ” passage.” A

heron found at his feeding-place at a brook or pond affords no sport whatever. If there be little water any peregrine falcon that will go straight at him will seize him soon after he rises. It is sometimes advisable to fly a young falcon at a heron so found, but it should not be repeated. If there be much water the heron will neither show sport nor be captured. It is quite a different affair when he is sighted winging his way at a height in the air over an open tract of country free from water. Though he has no chance whatever of competing with a falcon in straight- forward flight, the heron has large concave wings, a very light body proportionately, and air-cells in his bones, and can rise with astonishing rapidity, more perpendicularly, or, in other words, in smaller rings, than the falcon can, with very little effort. As soon as he sees the approach of the falcon, which he usually does almost directly she is cast off, he makes play for the upper regions. Then the falcon commences to climb too to get above him, but in a very different style. She makes very large circles or rings, travelling at a high rate of speed, due to her strength and weight and power of flying, till she rises above the heron. Then she makes her attack by stooping with great force at the quarry, sometimes falling so far below it as the blow is evaded that she cannot spring up to the proper pitch for the next stoop, and has to make another ring to regain her lost command over the heron, which is ever rising, and so on — the ” field ” meanwhile galloping down wind in the direction the flight is taking till she seizes the heron aloft, ” binds ” to him, and both come down together. Absurd stories have been told and pictures drawn of the heron receiving the falcon on its beak in the air. It is, however, well known to all practical falconers that the heron has no power or inclination to fight with a falcon in the air; so long as he is flying he seeks safety solely from his wings. When on the ground, however, should the falcon be deficient in skill or strength, or have been mutilated by the coping of her beak and talons, as was sometimes formerly done in Holland with a view to saving the heron’s life, the heron may use his dagger-like bill with dangerous effect, though it is very rare for a falcon to, be injured. It is never safe to fly the goshawk at a heron of any description. Short-winged hawks do not immediately kill their quarry as falcons do, nor do they seem to know where the life lies, and seldom shift their hold once taken even to defend themselves; and they are therefore easily stabbed by a heron. Rooks are flown in the same manner as herons, but the flight is generally inferior. Although rooks fly very well, they seek shelter in trees or bushes as soon as possible.

For game-hawking eyases are generally used, though un- doubtedly passage or wild-caught hawks are to be preferred. The best game

hawks we have seen have been passage hawks, but there are difficulties attending the use of them. It may perhaps be fairly said that it is easy to make all passage hawks ” wait on ” in grand style, but until they have got over a season or two they are very liable to be lost. Among the advantages attending the use of eyases are the following: they are easier to obtain and to train and keep; they also moult far better and quicker than passage hawks, while if lost in the field they will often go home by themselves, or remain about the spot where they were liberated. Experience, and, we must add, some good fortune also, are requisite to make eyases good for waiting on for game. Slight mistakes on the part of the falconer, false points from dogs, or bad luck in serving, will cause a young hawk to acquire bad habits, such as sitting down on the ground, taking stand in a tree, raking out wide, skimming the ground, or lazily flying about at no height. A good game hawk in proper

flying order goes up at once to a good pitch in the air— the higher she flies the better — and follows her master from field to field, always ready for a stoop when the quarry is sprung. Hawks that have been successfully broken and judiciously worked become wonderfully clever, and soon learn to regulate their flight by the movements of their master. Eyases were not held in esteem by the old falconers, and it is evident from their writings that these hawks have been very much better understood and managed in the 19th century than in the middle ages. It is probable that the old falconers procured their passage and wild-caught hawks with such facility, having at the same time more scope for their use in days when quarry was more abundant and there was more waste land than there now is, that they did not find it necessary to trouble themselves about eyases. Here may be quoted a few lines from one of the best of the old writers, which may be taken as giving a fair account of the estimation in which eyases were generally held, and from which it is evident that the old falconers did not understand flying hawks at hack. Simon Latham, writing in 1633, says of “eyases :

They will be verie easily brought to familiaritie with the man, not in the house only, but also abroad, hooded or unhooded; nay, many of them will be more gentle and quiet when unhooded than when hooded, for if a man doe but stirre or speake in their hearing, they will crie and bate as though they did desire to see the man. Likewise some of them being unhooded, when they see the man will cowre and

crie, shewing thereby their exceeding fondness and fawning love towards him . . .

. . . These kind of hawks be all (for the most part) taken out of the nest while verie young, even in the downe, from whence they are put into a close house, whereas they be alwaies fed and familiarly brought up by the man, untill they bee able to flie, when as the summer approaching verie suddenly they are continued and trained up in the same, the weather being alwaies warm and temperate; thus they are still irfured to familiaritie with the man, not knowing from whence besides to fetch their relief or sustenance. When the summer is ended they bee commonly put up into a house again, or else kept in some warm place, for they cannot endure the cold wind to blow upon them. . . . But leaving to speak of these kind of scratching hawks that I never did love should come too neere my fingers, and to return unto the faire conditioned haggard faulcon. . . .

The author here describes with accuracy the condition of unhacked eyases, which no modern falconer would trouble himself to keep. Many English falconers in modern times have had eyases which have killed grouse, ducks and other quarry in a style almost equalling that of passage hawks. Rooks also have been most successfully flown, and some herons on passage have been taken by eyases. No sport is to be had at game without hawks that wait on well. Moors, downs, open country where the hedges are low and weak are best suited to game hawking. Pointers or setters may be used to find game, or the hawk may be let go on coming to the ground where game is known to lie, and suffered, if an experienced one, to ” wait on ” till game is flushed. However, the best plan with most hawks, young ones especially, is to use a dog, and to let the hawk go when the dog points, and to flush the birds as soon as the hawk is at her pitch. It is not by any means necessary that the hawk should be near the birds when they rise, provided she is at a good height, and that she is watching; she will come at once with a rush out of the air at great speed, and either cut one down with the stoop, or the bird will save itself by putting in, when every exertion must be made, especially if the hawk be young and inexperienced, to ” serve ” her as soon as possible by driving out the bird again while she waits overhead. If this be successfully done she is nearly certain to kill it at the second flight. Perhaps falcons are best for grouse and tiercels for partridges.

Magpies afford much sport. Only tiercels should be used for hunting magpies. A field is necessary — at the very least 4 or 5 runners to beat the magpie out, and perhaps the presence of a horseman is an advantage. Of course in open flight a magpie would be almost

immediately caught by a tiercel peregrine, and there would be no sport, but the magpie makes up for his want of power of wing by his cunning and shiftiness; and he is, moreover, never to be found except where he has shelter under his lee for security from a passing peregrine. Once in a hedge

or tree he is perfectly safe from the wild falcon, but the case is otherwise when the falconer approaches with his trained tiercel, perhaps a cast of tiercels, waiting on in the air, with some active runners in his field. Then driven from hedge to hedge, from one kind of shelter to another, stooped at every instant when he shows himself ever so little away from cover by the watchful tiercels overhead, his egg-stealing days are brought to an end by a fatal stroke — sometimes not before the field is pretty well exhausted with running and shouting. The magpieˆ always manoeuvres towards some thick wood, from which it is the aim of the field to cut him off. At first hawks must be flown in easy country, but when they understand their work well they will kill magpies in very enclosed country — with a smart active field a .magpie may even be pushed through a small wood. Magpie hawking affords excellent exercise, not only for those who run to serve the hawks, but for the hawks also; they get a great deal of flying, and learn to hunt in company with men — any number of people may be present. Blackbirds may be hunted with tiercels in the same way. Woodcock afford capital sport where the country is tolerably open. It will generally be found that after a hawk has made one stoop at a woodcock, the cock will at first try to escape by taking the air, and will show a very fine flight. When beaten in the air it will try to get back to covert again, but when once a hawk has outflown a woodcock, he is pretty sure to kill it. Hawks seem to pursue woodcock with great keenness; something in the flight of the cock tempts them to exertion. The laziest and most useless hawks — hawks that will scarcely follow a slow pigeon— will do their best at woodcock, and will very soon, if the sport is continued, be im proved in their style of flying. Snipe may be killed by first-class tiercels in favourable localities. Wild duck and teal are only to be flown at when they can be found in small pools or brooks at a distance from much water — where the fowl can be suddenly flushed by men or dogs while the falcon is flying at her pitch overhead. For duck, falcons should be used; tiercels will kill teal well.

The merlin is used for flying at larks, and there does not seem to be any other use to which this pretty little falcon may fairly be put. It is very active, but far from being, as some authors have stated, the swiftest of all hawks. Its flight is greatly inferior in speed and power to that of the peregrine. Perhaps its diminutive size, causing it to be soon lost to view, and a limited acquaintance with the flight of the wild

peregrine falcon, have led to the mistake.

The hobby is far swifter than the merlin, but cannot be said to be efficient in the field; it may be trained to wait on beauti- fully, and will sometimes take larks; it is very much given to the fault of "carrying."

The three great northern falcons are not easy to procure in proper condition for training. They are very difficult to break to the hood and to manage in the field. They are flown, like the peregrine, at herons and rooks, and in former days were used for kites and hares. Their style of flight is magnificent; they are considerably swifter than the peregrine, and are a most deadly " footers." They seem, however, to lack somewhat of the spirit and dash of the peregrine.

For the short- winged hawks an open country is not required; indeed they may be flown in a wood. Goshawks are flown at hares, rabbits, pheasants, partridges and wild-fowl. Only very strong females are able to take hares; rabbits are easy quarry for any female goshawk, and a little too strong for the male. A good female goshawk may kill from 10 to 15 rabbits in a day, or more. For pheasants the male is to be preferred, certainly for partridges; either sex will take duck and teal, but the falconer must get close to them before they are flushed, or the goshawk will stand a poor chance of killing. Rabbit hawking may be practised by ferreting, and flying the hawk as the rabbits bolt, but care must be taken or the hawk will kill the ferret. Where rabbits sit out on grass or in turnip fields, a' goshawk may be used with success, even in a wood when the holes are not too near. From various causes it is impossible, or nearly so, to have goshawks in England in the perfection to which

they are brought in the East. In India, for instance, there is a far greater variety of quarry suited to them, and wild birds are much more approachable; moreover, there are advantages for training which do not exist in England. Unmolested — and scarcely noticed except perhaps by others of his calling or tastes — the Eastern falconer carries his hawk by day and night in the crowded bazaars, till the bird becomes perfectly indifferent to men, horses, dogs, carriages, and, in short, becomes as tame as the domestic animals.

The management of sparrow-hawks is much the same as that of

goshawks, but they are far more delicate than the latter. They are flown in England at blackbirds, thrushes and other small birds; good ones will take partridges well till the birds get too wild and strong with the advancing season. • In the East large numbers of quail are taken with sparrow-hawks.

It is of course important that hawks from which work in the field is expected should be kept in the highest health, and they must be carefully fed; no bad or tainted meat must on any account be given to them — at any rate to hawks of the species used in England. Peregrines and the great northern falcons are best kept on beefsteak, with a frequent change in the shape of fresh-killed pigeons and other birds. The smaller falcons, the merlin and the hobby, require a great number of small birds to keep them in good health for any length of time. Goshawks should be fed like peregrines, but rats and rabbits are very good as change of food for them. The sparrow-hawk, like the small falcons, requires small birds. All hawks require castings frequently. It is true that hawks will exist, and often appear to thrive, on good food without castings, but the seeds of probable injury to their health are being sown the whole time they are so kept. If there is difficulty in procuring birds, and it is more con- venient to feed the hawks on beefsteak, they should frequently get the wings and heads and necks of game and poultry. In addition to the castings which they swallow, tearing these is good exercise for them, and biting the bones prevents the beaks from overgrowing. Most hawks, peregrines especially, require the bath. The end of a cask, sawn off to give a depth of about 6 in., makes a very good bath. Peregrines which are used for waiting on require a bath at least twice a week. If this be neglected, they will not wait long before going off in search of water to bathe, however hungry they may be.

The most agreeable and the best way, where practicable, of keeping hawks is to have them on blocks on the lawn. Each hawk's block should stand in a circular bed of sand — about 8 ft. in diameter; this will be found very convenient for keeping them clean. Goshawks are generally placed on bow perches, which ought not to be more than 8 or 9 in. high at the highest part of the arc. It will be several months before passage or wild- caught falcons can be kept out of doors; they must be fastened to a perch in a darkened room, hooded, but by degrees as they get thoroughly tame may be brought to sit on the lawn. In England (especially in the south) peregrines, the northern falcons and goshawks may be kept out of doors all day and night in a sheltered situation. In very wild boisterous weather, or in snow or sharp frost, it will be advisable to move them to the shelter of a shed, the floor of which should be laid with sand to a depth of 3 or 4 in.

Merlins and hobbies are too tender to be kept much out of doors. An eastern aspect is to be preferred — all birds enjoy the morning sun, and it is very beneficial to them. The more hawks confined to blocks out of doors see of persons, dogs, horses, &c, moving about the better, but of course only when there is no danger of their being frightened or molested, or of food being given to them by strangers. Those who have only seen wretched ill-fed hawks in cages as in zoological gardens or menageries, pining for exercise, with battered plumage, torn shoulders and bleeding ceres, from dashing against their prison bars, and overgrown beaks from never getting bones to break, can have little idea of the beautiful and striking-looking birds to be seen pluming their feathers and stretching their wings at their ease at their blocks on the falconer's lawn, watching with their large bright keen eyes everything that moves in the sky and everywhere else within the limits of their view. Contrary

to the prevailing notion, hawks show a good deal of attachment when they have been properly handled. It is true that by hunger they are in a great measure tamed and controlled, and the same may be said of all undomesticated and many domesti- cated animals. And instinct prompts all wild creatures when away from man's control to return to their former shyness, but hawks certainly retain their tameness for a long time, and their memory is remarkably retentive. Wild-caught hawks have been retaken, either by their coming to the lure or upon quarry, from 2 to 7 days after they had been lost, and eyases after 3 weeks. As one instance of retentiveness of memory displayed by hawks we may mention the case of a wild-caught falcon which was recaptured after being at liberty more than 3 years, still bearing the jesses which were cut short close to the leg at the time she was released; in five days she was flying at the lure again at liberty, and was found to retain the peculiar ways and habits she was observed to have in her former existence as a trained hawk. It is useless to bring a hawk into the field unless she has a keen appetite; if she has not, she will neither hunt effectually nor follow her master. Even wild-caught falcons, however,' may sometimes be seen so attached to their owner that, when sitting on their blocks on a lawn with food in their crops, they will on his coming out of the house bate hard to get to him, till he either go up to them and allow them to jump up to his hand or withdraw from their sight. Goshawks are also known to evince attachment to their owner. Another prevailing error regarding hawks is that they are supposed to be lazy birds, requiring the stimulus of hunger to stir them to action. The reverse is the truth; they are birds of very active habits, and exceedingly restless, and the notion of their being lazy has been propagated by those who have seen little or

nothing of hawks in their wild state. The wild falcon requires an immense deal of exercise, and to be in wind, in order to exert the speed and power of flight necessary to capture her prey when hungry; and to this end instinct prompts her to spend hours daily on the wing, soaring and playing about in the air in all weathers, often chasing birds merely for play or exercise. Sometimes she takes a siesta when much gorged, but unless she fills her crop late in the evening she is soon moving again — before half her crop is put over. Goshawks and sparrow-hawks, too, habitually soar in the air at about 9 or 10 a.m., and remain aloft a consider- able time, but these birds are not of such active habits as the falcons. The frequent bating of thoroughly tame hawks from their blocks, even when not hungry or frightened, proves their restlessness and impatience of repose. So does the wretched condition of the caged falcon (before alluded to) , while the really lazy buzzards and kites, which do not in a wild state depend on activity or power of wing for their sustenance, maintain them- selves for years, even during confinement if properly fed, in good case and plumage. Such being the habits of the falcon in a state of nature, the falconer should endeavour to give the hawks under his care as much flying as possible, and he should avoid the very common mistake of keeping too many hawks. In this case a favoured few are sure to get all the work, and the others, possibly equally good if they had fair play, are spoiled for want of exercise.

The larger hawks may be kept in health and working order for several years — 15 or 20 — barring accidents. The writer has known peregrines, shaheens and goshawks to reach ages between 1 5 and 20 years. Goshawks, however, never fly well after 4 or 5 seasons, when they will no longer take difficult quarry; they may be used at rabbits as long as they live. Shaheens may be seen in the East at an advanced age, killing wild-fowl beautifully. The shaheen is a falcon of the peregrine type, which does not travel, like the peregrine, all over the world. It appears that the jerfalcons also may be worked to a good age. Old Simon Latham tells us of these birds — ” I myself have known one of them an excellent Hearnor (killer of herons), and to continue her goodnesse very near twentie yeeres, or full out that time.”

Authorities. — Schlegel’s Traite de fauconnerie contains a very large list of works on falconry in the languages of all the principal countries of the Old World. Bibliotheca accipitraria, by J. E.

Harting (1891), gives a complete bibliography. See Coursing and Falconry in the Badminton Library; and The Art and Practice of Hawking, by E. B. Michell (1900), the best modern book on the subject. Perhaps the most useful of the old works are The Booke of Faulconrie or Hawking, by George Turberville (1575), and The Faulcon's Lure and Cure, by Simon Latham (1633). (E. D. R.)

FALDSTOOL (from the O.H. Ger. falden or fallen, to fold, and stuol, Mod. Ger. Sluhl, a stool; from the medieval Latin faldistolium is derived, through the old form faudesteuil, the Mod. Fr.fauteuil), properly a folding seat for the use of a bishop when not occupying the throne in his own cathedral, or when officiating in a cathedral or church other than his own; hence any movable folding stool used for kneeling in divine service. The small desk or stand from which the Litany is read is some- times called a faldstool, and a similar stool is provided for the use of the sovereign at his coronation.

FALERII [mod. Civitd Castellana (<7.i>.)], one of the twelve chief cities of Etruria, situated about 1 rri. W. of the ancient Via Flaminia, 1 32 m. N. of Rome. According to the legend, it was of Argive origin; and Strabo's assertion that the population, the Falisci (q.v.), were of a different race from the Etruscans is proved by the language of the earliest inscriptions which have been found here. Wars between Rome and the Falisci appear to have been frequent. To one of the first of them belongs the story of the schoolmaster who wished to betray his boys to Camillus; the latter refused his offer, and the inhabitants thereupon surrendered the city. At the end of the First Punic War, the Falisci rose in rebellion, but were soon conquered (241 B.C.) and lost half their territory. Zonaras (viii. 18) tells us that the ancient city, built upon a precipitous hill, was destroyed and another built on a more accessible site oh the plain. The description of the two sites agrees well with the usual theory that the original city occupied the site of the present Civita Castellana, and that the ruins of Falleri (as the place is now called) are those of the Roman town which was thus trans- ferred 3 m. to the north-west. After this time Falerii hardly appears in history. It became a colony (Junonia Faliscorum) perhaps under Augustus, though according to the inscriptions apparently not until the time of Gallienus. There were bishops of Falerii up till 1033, when the desertion of the place in favour of the present site began, and the last mention of it dates from a.d. 1064.

The site of the original Falerii is a plateau, about 1100 yds. by 400, not higher than the surrounding country (475 ft.) but separated from it by gorges over 200 ft. in depth, and only connected with it on the western side, which was strongly fortified with a mound and ditch;

the rest of the city was defended by walls constructed of rectangular blocks of tufa, of which some remains still exist. Remains of a temple were found at Lo Scasato, at the highest point of the ancient town, in 1888, and others have been excavated in the outskirts. The attribution of one of these to Juno Quiritis is uncertain. These buildings were of wood, with fine decorations of coloured terra- cotta (Notizie degli scavi, 1887, p. 92; 1888, p. 414). Numerous tombs hewn in the rock are visible on all sides of the town, and important discoveries have been made in them; many objects, both from the temples and from the tombs, are in the Museo di Villa Giulia at Rome. Similar finds have also been made at Calcata,‘6 m. S., and Corchiano, 5 m. N.W. The site of the Roman Falerii is now entirely abandoned. It lay upon a road which may have been (see H. Nissen, Italische Landeskunde, ii. 361) the Via Annia, a by-road of the Via Cassia; this road approached it from the south passing through Nepet, while its prolongation to the north certainly bore the name Via Amerina. The circuit of the city is about 2250 yds., its shape roughly triangular, and the walls are a remarkably fine and well-preserved specimen of Roman military architecture. They are constructed

1 The Roman town lay 3 m. farther N.W. on the Via Annia. The Via Flaminia, which did not traverse the Etruscan city, had two post-stations near it, Aquaviva, some 2\ m. S.E., and Aequum Faliscum, 4J m. N.N.E. ; the latter is very possibly identical with the Etruscan site which G. Dennis (Cities and Cemeteries of Etruria, London, 1883, i. 121) identified with Fescennium (q.v.). See O. Cuntz in Jahreshefte des bsterr. arch. Inst. ii. (1899), 87.

of rectangular blocks of tufa two Roman ft. in height; the walls themselves reach in places a height of 56 ft. and are 7 to 9 ft. thick. There were about 80 towers, some 50 of which are still preserved. Two of the gates also, of which there were eight, are noteworthy. Of the buildings within the walls hardly any- thing is preserved above ground, though the forum and theatre (as also the amphitheatre, the arena of which measured 180 by 108 ft. outside the walls) were all excavated in the 19th century. Almost the only edifice now standing is the 12th-century abbey church of S. Maria. Recent excavations have shown that the plan of the whole city could easily be recovered, though the buildings have suffered considerable devastation (Notizie degli scavi, 1903, 14).

See G. Dennis, Cities and Cemeteries of Etruria (London, 1883), i. 97; for philology and ethnology see Falisci. (T. As.)

FALERIO (mod. Falerone), an ancient town of Picenum, Italy, about

10 m. S.E. of Urbs Salvia. We know almost nothing of the place except from inscriptions, from which, and from the remains of its buildings, it appears to have been of some import- ance. It was probably founded as a colony by Augustus after his victory at Actium. A question arose in the time of Domitian between the inhabitants of Falerio and Firmum as to land which had been taken out of the territory of the latter (which was recolonized by the triumvirs), and, though not distributed to the new settlers, had not been given back again to the people of Firmum. The emperor, by a rescript, a copy of which in bronze was found at Falerio, decided in favour of the people of Falerio, that the occupiers of this land should remain in possession of it (Th. Mommsen in Corp. Inscr. Latin, ix., Berlin, 1883, No. 5, 420). Considerable remains of a theatre in concrete faced with brickwork, erected, according to an inscription, in 43 B.C., and 161 ft. in diameter, were excavated in 1838 and are still visible; and an amphitheatre, less w.ell preserved, also exists, the arena of which measures about 180 by 150 ft. Between the two is a water reservoir (called Bagno della Regina) connected with remains of baths.

See G. de Minicis in Giornale Arcadico, lv. (1832), 160 seq. ; Annali dell' Istituto (1839), 5 seq. (T. As.)

FALGUIERE, JEAN ALEXANDRE JOSEPH (1831-1900), French sculptor and painter, was born at Toulouse. A pupil of the Ecole des Beaux Arts he won the Prix dc Rome in 1859; he was awarded the medal of honour at the Salon in 1868 and was appointed officer of the Legion of Honour in 1878. His first bronze statue of importance was the " Victor of the Cock-Fight " (1864), and " Tarcisus the Christian Boy-Martyr " followed in 1867; both are now in the Luxembourg Museum. His more important monuments are those to Admiral Courbet (1890) at Abbeville and the famous " Joan of Arc." Among more ideal work are " Eve " (1880), " Diana " (1882 and 1891), " Woman and Peacock," and " The Poet," astride his Pegasus spreading wings for flight. His " Triumph of the Republic " (1881-1886), a vast quadriga for the Arc de Triomphe, Paris, is perhaps more amazingly full of life than others of his works, all of which reveal this quality of vitality in superlative degree. To these works should be added his monuments to " Cardinal Lavigerie " and " General de La Fayette " (the latter in Washington), and his statues of " Lamartine " (1876) and " St Vincent de Paul " (1879), as well as the " Balzac," which he executed for the SocietS des gens de lettres on the rejection of that by Rodin; and the busts of " Carolus-Duran "• and " Coquelin cadet " (1896). _^

Falguiere was a painter as well as a sculptor, but somewhat inferior in

merit. He displays a fine sense of colour and tone, added to the qualities of life and vigour that he instils into his plastic work. His ” Wrestlers ” (1875) and ” Fan and Dagger ” (1882; a defiant Spanish woman) are in the Luxembourg, and other pictures of importance are ” The Beheading of St John the Baptist ” (1877), ” The Sphinx ” (1883), ” Acis and Galatea ” (1885), “Old Woman and Child” (1886) and “In the Bull Slaughter-House.” He became a member of the Institute (Academie des Beaux-Arts) in 1882. He died in 1900.

See Leonce Benedite, Alexandre Falguiere, Librairie de 1’art (Paris).

FALIERO (or Falier), MARINO (1279-1355), doge of Venice, belonged to one of the oldest and most illustrious Venetian families and had served the republic with distinction in various capacities. In 1346 he commanded the Venetian land forces at the siege of Zara, where he was attacked by the Hungarians under King Louis the Great and totally defeated them; this victory led to the surrender of the city. In September 1354, while absent on a mission to Pope Innocent IV. at Avignon, Faliero was elected doge, an honour which apparently he had not sought. His reign began, as it was to end, in disaster, for very soon after his election the Venetian fleet was completely destroyed by the Genoese off the island of Sapienza, while plague and a declining commerce aggravated the situation. Although a capable commander and a good statesman, Faliero possessed a violent temper, and after his election developed great ambition. The constitutional restrictions of the ducal power, which had been further curtailed just before his election, and the insolence of the nobility aroused in him a desire to free Himself from ail control, and the discontent of the arsenal hands at their treat- ment by the nobles offered him his opportunity. In concert with a sea-captain named Bertuccio Ixarella (who had received a blow from the noble Giovanni Dandolo), Filippo Calendario, a stonemason, and others, a plot was laid to murder the chief patricians on the 15th of April and proclaim Faliero prince of Venice. But there was much ferment in the city and disorders broke out before the appointed time; some of the conspirators having made revelations, the Council of Ten proceeded to arrest the ringleaders and to place armed guards all over the town. Several of the conspirators were condemned to death and others to various terms of imprisonment. The doge’s complicity having been discovered, he was himself arrested; at the trial he confessed everything and was condemned and executed on the 17th of April 1355.

The story of the insult written by Michele Steno on the doge's chair is a legend of which no record is found in any contemporary authority. The motives of Faliero are not altogether clear, as his past record, even in the judgment of the poet Petrarch, showed him as a wise, clear-headed man of no unusual ambition. But possibly the attitude of the aristocracy and the example offered by the tyrants of neighbouring cities may have induced him to attempt a similar policy. The only result of the plot was to consolidate the power of the Council of Ten.

Bibliography. — An account of Marino Faliero's reign is given in S. Romanin's Storia documentata di Venezia, lib. ix. cap. ii. (Venice, 1855) ; M. Sanudo, Le Vite dei Dogi in new edition of Muratori fasc, 3, 4, 5 (Citta di Castello, 1900). For special works see V. Lazzerini's " Genealogia d. M. Faliero " in the Archivio Veneto of 1892; " M. Faliero avanti il Dogado," ibid. (1893), and his exhaustive study " M. Faliero, la Congiura," ibid. (1897). The most recent essay on the subject is contained in Horatio Brown's Studies in Venetian History (London, 1907), wherein all the authorities are set forth. (L. V. *)

FALISCI, a tribe of Sabine origin or connexions, but speaking a dialect closely akin to Latin, who inhabited the town of Falerii {q.v.), as well as a considerable tract of the surrounding country, probably reaching as far south as to include the small town of Capena. But at the beginning of the historical period, i.e. from the beginning of the 5th century B.C., and no doubt earlier, the dominant element in the town was Etruscan; and all through the wars of the following centuries the town was counted a member, and sometimes a leading member, of the Etruscan league (cf. Livy iv. 23, v. 17, vii. 17).

In spite of the Etruscan domination, the Faliscans preserved many traces of their Italic origin, such as the worship of the deities Juno Quiritis (Ovid, Fasti, vi. 49) and Feronia (Livy xxvi. n), the cult of Dis Soranus by the Hirpi or fire-leaping priests on Mount Soracte (Pliny, Nat. Hist. vii. 2, 19; Servius, ad Aen. xi. 785, 787), above all their language. This is preserved for us in some 36 short inscriptions, dating from the 3rd and 2nd centuries B.C., and is written in a peculiar alphabet derived from the Etruscan, and written from right to left, but showing some traces of the influence of the Latin alphabet. Its most characteristic signs are —

n* > h > ti. ft*, y

1

As a specimen of the dialect may be quoted the words written round

the edge of a picture on a patera, the genuineness of which is established by the fact that they were written before the glaze was put on: ” foied vino pipafo, era carefo,” i.e. in Latin ” hodie vinum bibam, eras carebo” (R. S. Conway, Italic Dialects, p. 312, b). This shows some of the phonetic characteristics Of the Faliscan dialect, viz. : —

1. The retention of medial / which in Latin became b;

2. The representation of an initial Ind.-Eur. gh by/ (foied, contrast Latin hodie) ; ■ • ■

3. The palatalization of d+ consonant i into some sound denoted merely by i- the central sound of foied, .{rom fo-died;

4. The loss of final s, at all events before certain following sounds (era beside Latin eras) ;

Other characteristics, appearing elsewhere, are :

5. The retention of the velars (Fal. cuando** Latin quando; contrast Umbrian pan(nˆu) ;

6. The assimilation of some final consonants to the initial letter of the next word: ” pretod de zenatuo sententiad (Conway, lib. cit. 321), i.e. ” praetor de senatus sententia ” (zenatuo for senaiuos., an archaic genitive). For further details see Conway, ib. pp. 370 ff., especially pp. 384-385, where the relation of the names Falisci, Falerii to the local hero Halaesus (e.g. Ovid, Fasti, iv. 73) is discussed, and where reason is given for thinking that the change of initial / (from an original bh or dh) into an initial h was a genuine mark of Faliscan dialect.

It seems probable that the dialect lasted on, though being gradually permeated with Latin, till at least 150 B.C.

In addition to the remains found in the graves (see Falerii), which belong mainly to the period of Etruscan domination and give ample evidence of material prosperity and refinement, the earlier strata have yielded more primitive remains from the Italic epoch- A large number of inscriptions consisting mainly of proper names may be regarded as Etruscan rather than Faliscan, and they have been disregarded in the account of the dialect just given. It should perhaps be mentioned that there was a town Feronia in Sardinia, named probably after their native goddess by Faliscan settlers, from some of whom we have a votive inscription found at S. Maria di Falleri(Conway, ib. p. 335).

Further information may be sought from W. Deecke, Die Falisker (a

useful but somewhat uncritical collection of the evidence access- ible in 1888); E. Bormann, in C.I.L. xi. pp. 465 ff., and Conway, op, cit. (R. S. C.)

FALK, JOHANN DANIEL (1768-1826), German author and philanthropist, was born at Danzig on the 28th of October 1768, After attending the gymnasium of his native town, he entered the university of Halle with the view of studying theology, but preferring a non-professional life, gave up his theological studies and went to live at Weimar. There he published a volume of satires which procured him the notice and friendship of Wieland, and admission into literary circles. After the battle of Jena, Falk, on the recommendation of Wieland, was appointed to a civil post under the French official authorities and rendered his townsmen such good service that the duke of Weimar created him a counsellor of legation. In 18 13 he established a society foe friends in necessity (Gesellschaft der Freunde in der Nof), and about the same time founded an institute for the care and education of neglected and orphan children, which, in 1829, was taken over by the state and still exists as the Falksches Institul. The first literary efforts of Falk took the form chiefly of satirical poetry, and gave promise of greater future excellence than was ever completely fulfilled; his later pieces, directed more against individuals than the general vices and defects of society, gradu- ally degenerated in quality. In 1806 Falk founded a critical journal under the title of Elysium und Tartarus. He also contributed largely to contemporary journals. He enjoyed the acquaintance and intimate friendship of Goethe, and his account of their intercourse was posthumously published under the title Goethe aus naherem personlichen Umgange dargestellt (1832) (English by S. Austin). Falk died on the 14th of February 1826.

Falk's Saiirische Werke appeared in 7 vols. (181 7 and 1826); his Auserlesene Schriften (3 vols., 1819). See Johannes Falk: Erinnerungs~ blatter aus Brief en und Tagebiichern, gesammelt von dessen Tochter Rosalie Falk (1868); Heinzelmann, Johannes Falk und die Gesell- schaft der Freunde in der Not (1879); A. Stein, /. Falk (1881); S. Schultze, Falk und Goethe (1900).

FALK, PAUL LUDWIG ADALBERT (1827-1900), German politician, was born at Matschkau, Silesia, on the 10th of August 1827. In 1847 he entered the Prussian state service, and in 1853 became public

prosecutor at Lyck. In 1858 he was elected a deputy, joining the Old Liberal party. In 1868 he became a privy-councillor in the ministry of justice. In 1872 he was made minister of education, and in connexion with Bismarck's policy of the Kultur-kampf he was responsible for the famous May Laws against the Catholics (see Germany: History). In 1879 his position became untenable, owing to the death of Pius IX. and the change of German policy with regard to the Vatican, and he resigned his office, but retained his seat in the Reichstag till 1882. He was then made president of the supreme court of justice at Hamm, where he died in 1900.

FALKE, JOHANN FRIEDRICH GOTTLIEB (1823-1876), German historian, was born at Ratzeburg on the 20th of April 1823. Entering the university of Erlangen in 1843, he soon began to devote his attention to the history of the German language and literature, and in 1848 went to Munich, where he remained five years, ■ and diligently availed himself of the use of the government library for the purpose of prosecuting his historical studies. In 1856 he was appointed secretary of the German museum at Nuremberg, and in 1859 keeper of the manu- scripts. With the aid of the manuscript collections in the museum he now turned his attention chiefly to political history, and, with Johann H. Miiller, established an historical journal under the name of Zeitschrift fiir deutsche Kulturgeschichte (4 vols., Nuremberg, 1856-1859). To this journal he contributed a history of German taxation and commerce. On the latter subject he published separately Geschichle des deutschen Har.dels (2 vols., Leipzig, 1850-1860) and Die Hansa als deutsche See-und Handels- macht (Berlin, 1862). In 1862 he was appointed secretary of the state archives at Dresden, and, a little later, keeper. He there began the study of Saxon history, still devoting his attention chiefly to the history of commerce and economy, and published Die Geschichte des Kurfiirsten August von Sachsen in volks- wirthschafilicher Beziehung (Leipzig, 1868) and Geschichte des deutschen Zollwesens (Leipzig, 1869). He died at Dresden on the 2nd of March 1876.

FALKIRK, a municipal and police burgh of Stirlingshire, Scotland. Pop. (1891) 19,769; (1901) 29,280. It is situated on high ground overlooking the fertile Carse of Falkirk, n m. S.E. of Stirling, and about midway between Edinburgh and Glasgow. Grangemouth, its port, lies 3 m. to the N.E., and the Forth & Clyde Canal passes to the north, and the Union Canal to the south of the town. Falkirk now comprises the suburbs of Laurieston (E.), Grahamston and Bainsford (N.), and Camelon (W.). The principal structures include the burgh and county buildings, town hall, the Dollar free library and Camelon fever hospital. The present church, with a steeple 146 ft. high, dates only

from 1811. In the churchyard are buried Sir John Graham, Sir John Stewart who fell in the battle of 1298, and Sir Robert Munro and his brother, Dr Duncan Munro, killed in the battle of 1746. The town is under the control of a council with provost and bailies, and combines with Airdrie, Hamilton, Lanark and Linlithgow (the Falkirk group of burghs) to return a member to parliament. The district is rich in coal and iron, which supply the predominant industries, Falkirk being the chief seat of the light casting trade in Scotland; but tanning, flour-milling, brewing, distilling and the manufacture of explosives (Nobel's) and chemicals are also carried on. Trysts or sales of cattle, sheep and horses are held thrice a year (August, September and October) on Stenhousemuir, 3 m. N.W. They were transferred hither from Crieff in 1770, and were formerly the most important in the kingdom, but have to a great extent been replaced by the local weekly auction marts. Carron, 2 m. N.N.W., is famous for the iron- works established in 1760 by Dr John Roebuck (1718-1794), whose advising engineers were successively John Smeaton and James Watt. The short iron guns of large calibre designed by General Robert Melville, and first cast in 1779, were called carronades from this their place of manufacture.

Falkirk is a town of considerable antiquity. Its original name

was the Gaelic Eaglais breac, " church of speckled or mottled stone,",, which Simeon of Durham (fl. 1130) transliterated as Egglesbreth. By the end of the 13th century appears the form Faukirke (the present local pronunciation), which is merely a translation of the Gaelic fau or Jaw, meaning " dun," " pale red." The first church was built by Malcolm Canmore (d. 1093). Falkirk was made a burgh of barony in 1600 and a burgh of regality in 1646, but on the forfeiture of the earl of Linlithgow in 1715, its superiority was vested in the crown. Callender House, immediately to the S., was the seat of the earl and his ancestors. The mansion was visited by Queen Mary, captured by Cromwell, and occupied by Generals Monk and Ha wley. The wall of Antoninus ran through, the grounds, and the district is rich in Roman remains, Camelon, about 2 m. W., being the site of a Roman settlement; Merchiston Hall, to the N.W., was the birthplace of Admiral Sir Charles Napier. The eastern suburb of Laurieston was first called Langtoune, then Merchis- town, and received its present name after Sir Lawrence Dundas of Kerse, who had promoted its welfare. At Polmont, farther east, which gives the title of baron to the duke of Hamilton, is the school of Blair Lodge, besides coal-mines and other industries.

Batiks of Falkirk. — The battle of the 22nd of July 1298 was fought

•‘between the forces of King Edward I. of England and those of the Scottish national party under Sir William Wallace. The latter, after long baffling the king’s attempts to bring him to battle, had taken up a strong position south of the town behind a morass. They were formed in four deep and close masses (” schiltrons “) of pikemen, the light troops screening the front and flanks and a body of men-at-arms standing in reserve. It was perhaps hoped that the English cavalry would plunge into the morass, for no serious precautions were taken as to the flanks, but in any case Wallace desired no more than to receive an attack at the halt, trusting wholly to his massed pikes. The English right wing first appeared, tried the morass in vain, and then set out to turn it by a long detour; the main battle under the king halted in front of it, while the left wing under Antony Bee, bishop of Durham, was able to reach the head of the marsh without much delay. Once on the enemy’s side of the obstacle the bishop halted to wait for Edward, who was now following him, but his undisciplined barons, shouting ” ‘Tis not for thee, bishop, to teach us war. Go say mass ! ” drove off the Scottish archers and men-at-arms and charged the nearest square of pikes, which repulsed them with heavy losses. On the other flank the right wing, its flank march completed, charged with the same result. But Edward, who had now joined the bishop with the centre or “main battle,” peremptorily ordered the cavalry to stand fast, and, taught by his experience in the Welsh wars, brought up his archers. The longbow here scored its first victory in a pitched battle. Before long gaps appeared in the close ranks of pike heads, and after sufficient preparation Edward again launched his men-at-arms to the charge. The shaken masses then gave way one after the other, and the Scots fled in all directions.

The second battle of Falkirk, fought on the 17th of January 1746 between the Highlanders under Prince Charles and the British forces under General Hawley, resulted in the defeat of the latter. It is remarkable only for the bad conduct of the British dragoons and the steadiness of the infantry. Hawley retreated to Linlithgow, leaving all his baggage, 700 prisoners and seven guns in the enemy’s hands.

FALKLAND, LUCIUS CARY, 2nd Viscount (c. 1610-1643), son of Sir Henry Cary, afterwards 1st Viscount Falkland (d. 1633), a member of an ancient Devonshire family, who was lord deputy of Ireland from 1622 to 1629ˆ and of Elizabeth (1585- 1639), only daughter of Sir Lawrence Tanfield, chief baron of the exchequer, was born either in 1609 or 1610, and was educated at Trinity College, Dublin. In 1625 he inherited from his grandfather the manors of Great Tew and Burford in Oxford- shire, and, about the age of 21, married Lettice, daughter of Sir Richard Morrison, of Tooley Park in Leicestershire.

Involved in a quarrel with his father, whom he failed to propitiate by

offering to hand over to him his estate, he left England to take service in the Dutch army, but soon returned. In 1633. by the death of his father, he became Viscount Falkland. His mother had embraced the Roman Catholic faith, to which it wis now sought to attract Falkland himself, but his studies and reflections led him, under the influence of Chillingworth, to the interpreta- tion of religious problems rather by reason than by tradition or authority. At Great Tew he enjoyed a short but happy period of study, and he assembled round him many gifted and learned men, whom the near neighbourhood of the university and his own brilliant qualities attracted to his house. He was the friend of Hales and Chillingworth, was celebrated by Jonson, Suckling, Cowley and Waller in verse, and in prose by Clarendon, who is eloquent in describing the virtues and genius of the ” incomparable ” Falkland, and draws a delightful picture of his society and hospitality.

Falkland’s intellectual pleasures, however, were soon inter- rupted by war and politics. He felt it his duty to take part on the king’s side as a volunteer under Essex in the campaign of 1639 against the Scots. In 1640 he was returned for Newport in the Isle of Wight to the Short and Long Parliaments, and took an active part on the side of the opposition. He spoke against the exaction of shipmoney on the 7th of December 1640, denoun- cing the servile conduct of Lord Keeper Finch and the judges. 1 He supported the prosecution of Strafford, at the same time endeavouring on more than one occasion to moderate the measures of the Commons in the interests of justice, and voted for the third reading of the attainder on the 21st of April 1641. On the great question of the church he urged, in the debate of the 8th of February 1641, that the interference of the clergy in secular matters, the encroachments in jurisdiction of the spiritual courts, and the imposition by authority of unnecessary cere- monies, should be prohibited. On the other hand, though he denied that episcopacy existed jure divino, he was opposed to its abolition; fearing the establishment of the Presbyterian system, which in Scotland had proved equally tyrannical. Triennial parliaments would be sufficient to control the bishops, if they meditated any further attacks upon the national liberties, and he urged that ” where it is not necessary to change, it is necessary not to change.” Even Hampden still believed that a compromise with the episcopal principle was possible, and assured Falkland that if the bill taken up to the Lords on the 1st of

May 1641, excluding the bishops from the Lords and the clergy from secular offices, were passed, ” there would be nothing more attempted to the prejudice of the church.” Accordingly the bill was supported by Falkland. The times, however, were not favourable to compromise. The bill was lost in the Lords, and on the 27th of May the Root and Branch Bill, for the total abolition of episcopacy, was introduced in the House of Commons. This measure Falkland opposed, as well as the second bill for excluding the bishops, introduced on the 2 1st of October. In the discussion on the Grand Remonstrance he took the part of the bishops and the Arminians. He was now opposed to the whole policy of the opposition, and, being reproached by Hampden with his change of attitude, replied ” that he had formerly been persuaded by that worthy gentleman to believe many things which he had since found to be untrue, and therefore he had changed his opinion in many particulars as well as to things as to persons.” 2

On the 1st of January 1642, immediately before the attempted arrest of the five members, of which, however, he was not cognizant, he was offered by the king the secretaryship of state, and was persuaded by Hyde to accept it, thus becoming involved directly in the king’s policy, though evidently possessing little influence in his counsels. He was one of the peers who signed the protestation against making war, at York on the 1 5th of June 1642. On the 5th of September he carried Charles’s overtures for peace to the parliament, when he informed the leaders of the opposition that the king consented to a thorough reformation of religion. The secret correspondence connected with the Waller plot passed through his hands. He was present with the

1 His speeches are in the Thomason Tracts, E 196 (9), (26), (36).

2 Clarendon’s Hist. iv. 94, note.

king at Edgehill and at the siege of Gloucester. By this time the hopelessness of the situation had completely overwhelmed him. The aims and principles of neither party in the conflict could satisfy a man of Falkland’s high ideals and intellectual vision. His royalism could not suffer the substitution, as the controlling power in the state, of a parliament for the monarchy, nor his conservatism the revolutionary changes in church and state now insisted upon by the opposite faction. The fatal character and policy of the king, the most incapable of men and yet the man upon whom all depended, must have been by now thoroughly understood by Falkland. Compromise had long been out of the question. The victory of either side could only bring misery; and the prolongation of the war was a prospect equally unhappy. Nor could Falkland find any support or consolation in his own inward

convictions or principles. His ideals and hopes were now destroyed, and he had no definite political convictions such as inspired and strengthened Strafford and Pym. In fact his sensitive nature shrank from contact with the practical politics of the day and prevented his rise to the place of a leader or a statesman. Clarendon has recorded his final relapse into despair. ” Sitting amongst his friends, often, after a deep silence and frequent sighs (he) would with a shrill and sad accent ingeminate the word Peace, Peace, and would passionately profess that the very agony of the war, and the view of the calamities and desolation the kingdom did and must endure, took his sleep from him and would shortly break his heart.” At Gloucester he had in vain exposed himself to risks. On the morning of the battle of Newbury, on the 20th of September 1643, he declared to his friends, who would have dissuaded him from taking part in the fight, that ” he was weary of the times and foresaw much misery to his own Country and did believe he should be out of it ere night.” 3 He served during the engagement as a volunteer under Sir John Byron, and, riding alone at a gap in a hedge commanded by the enemy’s fire, was immediately killed.

His death took place at the early age of 33, which should be borne in mind in every estimate of his career and character. He was succeeded in the title by his eldest son Lucius, 3rd Viscount Falkland, his male descent becoming extinct in the person of Anthony, 5th viscount, in 1694, when the viscounty passed to Lucius Henry (1687-1730), a descendant of the first viscount, and the present peer is his direct descendant.

Falkland wrote a Discourse of Infallibility, published in 1646 (Thomason Tracts, E 361 [1]), reprinted in 1650, in 1651 (E 634 [1]) ed. by Triplet with replies, and in 1660 with the addition of two discourses on episcopacy by Falkland. This is a work of some importance in theological controversy, the general argu- ment being that ” to those who follow their reason in the inter- pretation of the Scriptures God will either give his grace for assistance to find the truth or his pardon if they miss it. And then this supposed necessity of an infallible guide (with the supposed damnation for the want of it) fall together to the ground.” Also A Letter . . . 30 Sept. 1642 concerning the late conflict before Worcester (1642); and Poems, in which he shows himself a follower of Ben Jonson, edited by A. B. Grosart in Miscellanies of the Fuller Worthies Library, vol. in. (1871).

The chief interest in Falkland docs not lie in his writings or in the incidents of his career, but in his character and the distinction of his intellectual position, in his isolation from his contemporaries seeking

reformation in the inward and spiritual life of the church and state and not in its outward and material form, and as the leader and chief of rationalism in an age dominated by violent intolerance and narrow dogmatism. His personal appearance, according to Clarendon, was insignificant, ” in no degree attrac- tive or promising. His stature was low and smaller than most men; his motion not graceful … but that little person and small stature was quickly found to contain a great heart. . : all mankind could not but admire and love him.” 4

Authorities. — There is a Life and Times by J. A- R. Marriott (1907); see also S. R. Gardiner’s Hist, of England; Hist, of the Civil War; the same author’s article in the Diet, of Nat. Biography

3 Whitelocke, p. 73.

4 Life, i. 37.

and references there given; Clarendon’s Hist, of the Rebellion, passim and esp. vii. 217-234; Clarendon’s Life; Rational Theology . . . in the iyth Century, by John Tulloch (1874), i. 76; Life of Lady Falkland from a MS. in the imperial library at Lille (1861); Life of the same by Lady Georgiana Fullerton (1883) ; Jonson’s Ode Pindaric to the memory and friendship of . . . Sir Lucius Cary and Sir Henry Morrison; W. J. Courthope, History of English .Poetry (1903), iii. 291; Life of Falkland, by W. H. Trale in the English- man’s Library, vol. 22 (1842); D. Lloyd, Memoires (1668), 331; and the Life of Falkland, by Lady M. T. Lewis in Lives of the Friends . . . of Lord Chancellor Clarendon, vol. i. p. 3. John Duncan’s account of Lettice, Lady Falkland, was edited in 1908 by M. F. Howard. (P. C. Y.)

FALKLAND, a royal and police burgh of Fifeshire, Scotland. Pop. (1901) 809. It is situated at the northern base of the hill of East Lomond (1471 ft. high), 2% m. from Falkland Road station (with which there is communication by ‘bus), on the North British railway company’s main line to Dundee, 21 m. N. of Edinburgh as the crow flies. It is an old-world- looking place, many of the ancient houses still standing. Its industries are chiefly concerned with the weaving of linen and the brewing of ale, for which it was once specially noted; and it has few public buildings save the town hall. The palace of the Stuarts, however — more beautiful than Holyrood and quite as romantic — lends the spot its fame and charm. The older edifice that

occupied this site was a hunting-tower of the Mac- duffs, earls of Fife, and was transferred with the earldom in 1371 to Robert Stewart, earl of Fife and Menteith, afterwards duke of Albany, second son of Robert II. Because of his father's long illness and the incapacity of Robert III., his brother Albany was during many years virtual ruler of Scotland, and, in the hope of securing the crown, caused the heir-apparent — David, duke of Rothesay — to be conveyed to the castle by force and there starved to death, in 1402. The conversion of the Thane's tower into the existing palace was begun by James III. and completed in 1538. The western part had two round towers, similar to those at Holyrood, which were also built by James V., and the southern elevation was ornamented with niches and statues, giving it a close resemblance to the Perpendicular style of the semi-ecclesiastical architecture of England. The palace soon became the 5avourite summer residence of the Stuarts. From it James V. when a boy fled to Stirling by night from the custody of the earl of Angus, and in it he died in 1542.

Here, too, Queen Mary spent some of her happiest days, playing the country girl in its parks and woods. When the court was held at Falkland the Green was the daily scene of revelry and dance, and " To be Falkland bred " was a proverb that then came into vogue to designate a courtier. James VI. delighted in the palace and especially in the deer. He upset the schemes of the Gowrie conspirators by escaping from Falkland to St Andrews, and it was while His Majesty was residing in the palace that the fifth earl of Bothwell, in 1592, attempted to kidnap him. In September 1 596 an intensely dramatic interview took place in the palace between the king and Andrew Melville and other Presbyterian ministers sent by the general assembly at Cupar to remonstrate with him on allowing the Roman Catholic lords to return to Scotland. In 1654 the eastern wing was accidentally destroyed by fire, during its tenancy by the soldiers of Cromwell, by whose orders the fine old oaks in the park were cut down for the building of a fort at Perth. Even in its neglected state the mansion impressed Defoe, who declared the Scottish kings owned more palaces than their English brothers. In 1715 Rob Roy garrisoned the palace and failed not to levy dues on the burgh and neighbourhood. Signs of decay were more evident when Thomas Carlyle saw it, for he likened it to "a black old bit of coffin or protrusive shin-bone striking through the soil of the dead past." But a munificent protector at length.appeared in the person of the third marquess of Bute, who acquired the estate and buildings in 1888, and forth- with undertook the restoration of the palace.

Falkland became a royal burgh in 1458 and its charter was renewed in

1595, and before the earlier date it had been a seat of the Templars. It gives the tit le of viscount to the English family of Cary, the patent having been granted in 1620 by James VI.

The town's most distinguished native was Richard Cameron, the Covenanter. His house — a three-storeyed structure with yellow harled front and thatched roof — still stands on the south side of the square in the main street. The Hackstons of Rathillet also had a house in Falkland.

FALKLAND ISLANDS (Fr. Malouines; Span. Malvinas), a group of islands in the South Atlantic Ocean, belonging to Britain, and lying about 250 m. E. of the nearest point in the mainland of South America, between 51° and 53° S., and 57° 40′ and 61° 25′ W. With the uninhabited dependency of South Georgia Island, to the E.S.E., they form the most southerly colony of the British empire. The islands, inclusive of rocks and reefs, exceed 100 in number and have a total area of 6500 sq. m. ; but only two are of considerable size; the largest of these, East Falkland, is 95 m. in extreme length, with an average width of 40 m., and the smaller, West Falkland, is 80 m. long and about 25 m. wide. The area of East Falkland is about 3000 sq. m., and that of West Falkland 2300. Most of the others are mere islets, the largest 16 m. long by 8 m. wide. The two principal islands are separated by Falkland Sound, a narrow strait from 18 to 27 m. in width, running nearly N.E. and S.W. The general appearance of the islands is not unlike that of one of the outer Hebrides. The general colouring, a faded brown, is somewhat dreary, but the mountain heights and promontories of the west display some grandeur of outline. The coast-line of both main islands is deeply indented and many of the bays and inlets form secure and well-protected harbours, some of which, however, are difficult of access to sailing ships.

East Falkland is almost bisected by two deep fjords, Choiseul and Brenton Sounds, which leave the northern and southern portions connected only by an isthmus a mile and a half wide. The northern portion is hilly, and is crossed by a rugged range, the Wickham Heights, running east and west, and rising in some places to a height of nearly 2000 ft. The remainder of the island consists chiefly of low undulating ground, a mixture of pasture and morass, with many shallow freshwater tarns, and small streams running in the valleys. Two fine inlets, Berkeley Sound and Port William, run far into the land at the north- eastern extremity of the island. Port Louis, formerly the seat of government, is at the head of Berkeley Sound, but the anchorage there having been found rather too exposed, about the year 1844 a town was laid out, and the necessary public buildings were

erected on Stanley Harbour, a sheltered recess within Port William. West Falkland is more hilly near the east island; the principal mountain range, the Hornby Hills, runs north and south parallel with Falkland Sound. Mount Adam, the highest hill in the islands, is 2315 ft. high.

The little town of Stanley is built along the south shore of Stanley harbour and stretches a short way up the slope; it has a population of little more than 900. The houses, mostly white with coloured roofs, are generally built of wood and iron, and have glazed porches, gay with fuchsias and pelargoniums. Government House, grey, stone-built and slated, calls to mind a manse in Shetland or Orkney. The government barrack is a rather imposing structure in the middle of the town, as is the cathedral church to the east, built of stone and buttressed with brick. Next to Stanley the most important place on East Falkland is Darwin on Choiseul Sound — a village of Scottish shepherds and a station of the Falkland Island Company.

The Falkland Islands consist entirely, so far as is known, of the older Palaeozoic rocks, Lower Devonian or Upper Silurian, slightly metamorphosed and a good deal crumpled and distorted, in the low grounds clay slate and soft sandstone, and on the ridges hardened sandstone passing into the conspicuous white quartzites. There do not seem to be any minerals of value, and the rocks are not such as to indicate any probability of their discovery. Galena is found in small quantity, and in some places it contains a large percentage of silver. The dark bituminous layers of clay slate, which occur intercalated among the quartzites, have led, here as elsewhere, to the hope of coming upon a seam of coal, but it is contrary to experience that coal of any value should be found in rocks of that age.

*52

FALKLAND ISLANDS

Many of the valleys in the Falklands are occupied by pale glistening masses which at a little distance much resemble small glaciers. Examined more closely these are found to be vast accumulations of blocks of quartzite, irregular in form, but having a tendency to a rude diamond shape, from 2 to 20 ft. in length, and half as much in width, and of a thickness corresponding with that of the quartzite ridges on the hills above. The blocks are angular, and rest irregularly one upon another, supported in all positions by the angles and edges of those beneath. . The whole mass looks as if it were, as it is, slowly sliding down the valley to the sea. These ” stone runs ” are looked upon with

great wonder by the shifting population of the Falklands, and they are shown to visitors with many strange speculations as to their mode of formation. Their origin is attributed by some to the moraine formation of former glaciers. Another out of many theories ‘ is that the hard beds of quartzite are denuded by the disintegration of the softer layers. Their support being removed they break away in the direction of natural joints, and the fragments fall down the slope upon the vegetable soil. This soil is spongy, and, undergoing alternate contraction and expansion from being alternately comparatively dry and satur- ated with moisture, allows the heavy blocks to slip down by their own weight into the valley, where they become piled up, the valley stream afterwards removing the soil from among and over them.

The Falkland Islands correspond very nearly in latitude in the southern hemisphere with London in the northern, but the climatic influences are very different. The temperature is equable, the average of the two midsummer months being about 47 Fahr., and that of the two midwinter months 37° Fahr. The extreme frosts and heats of the English climate are unknown, but occasional heavy snow-falls occur, and the sea in shallow inlets is covered with a thin coating of ice. The sky is almost constantly overcast, and rain falls, mostly in a drizzle and in frequent showers, on about 250 days in the year. The rainfall is not great, only about 20 in., but the mean humidity for the year is 80, saturation being 100. November is considered the only dry month. The prevalent winds from the west, south-west and south blow continuously, at times approaching the force of a hurricane. ” A region more exposed to storms both in summer and winter it would be difficult to mention ” (Fitzroy, Voyages of ” Adventure ” and ” Beagle,” ii. 228). The fragments of many wrecks emphasize the dangers of navigation, which are increased by the absence of beacons, the only lighthouse being that maintained by the Board of Trade on Cape Pembroke near the principal settlement. Kelp is a natural danger-signal, and the sunken rock, ” Uranie,” is reputed to be the only one not buoyed by the giant seaweed.

Of aboriginal human inhabitants there is no trace in the Falk- lands, and the land fauna is very scanty. A small wolf, the loup-renard of de Bougainville, is extinct, the last having been seen about 1875 on the West Falkland. Some herds of cattle and horses run wild; but these were, of course, introduced, as were also the wild hogs, the numerous rabbits and the less common hares. All these have greatly declined in numbers, being profitably replaced by sheep. Land-birds are few in kind, and are mostly strays from South America. They include, however, the snipe and military starling, which on account of its

scarlet breast is locally known as the robin. Sea-birds are abundant, and, probably from the islands having been com- paratively lately peopled, they are singularly tame. Gulls and amphibious birds abound in large variety; three kinds of penguin have their rookeries and breed here, migrating yearly for some months to the South American mainland. Stray specimens of the great king penguin have been observed, and there are also mollymauks (a kind of albatross), Cape pigeons and many carrion birds. Kelp and upland geese abound, the latter being edible; and their shooting affords some sport.

The Falkland Islands form essentially a part of Patagonia, with which they are connected by an elevated submarine plateau,

1 See R Stechele, in Munchencr geographische Studicn, xx.(ioo6), and Geographical Journal (December 1907).

and their flora is much the same as that of Antarctic South America. The trees which form dense forest and scrub in southern Patagonia and in Fuegia are absent, and one of the largest plants on the islands is a gigantic woolly ragweed (Senecio candicans) which attains in some places a height of 3 to 4 ft. A half shrubby veronica (V. decussata) is found in some parts, and has also received cultivation. The greater part of the ” camp ” (the open country) is formed of peat, which in some places is of great age and depth, and at the bottom of the bed very dense and bituminous. The peat is different in character from that of northern Europe: cellular plants enter but little into its composition, and it is formed almost entirely of the roots and stems of Empetrum rubrum, a variety of the common crow berry of the Scottish hills with red berries, called by the Falk- landers the ” diddle-dee ” berry ; of Myrtus nummularia, a little creeping myrtle whose leaves are used by the shepherds as a substitute for tea; of Callha appendiculata, a dwarf species of marsh-marigold; and of some sedges and sedge-like plants, such as Astelia pumila, Gaimardia australis and Boslkovia grandiflora. Peat is largely used as fuel, coal being obtained only at a cost of £3 a ton.

Two vegetable products, the ” balsam bog ” (Bolar glebaria) and the ” tussock grass ” (Dactylis caespitosa) have been objects of curiosity and interest ever since the first accounts of the islands were given. The first is a huge mass of a bright green colour, living to a great age, and when dead becoming of a grey and stony appearance. When cut open, it displays an infinity of tiny leaf-buds and stems, and at intervals there exudes from it an aromatic resin, which from its astringent properties is used by the shepherds as a vulnerary, but has not been converted to any commercial purpose. The ” tussock grass ” is a

wonderful and most valuable natural production, which, owing to the intro- duction of stock, has become extinct in the two main islands, but still flourishes elsewhere in the group. It is a reed-like grass, which grows in dense tufts from 6 to 10 ft. high from stool-like root-crowns. It forms excellent fodder for cattle, and is regularly gathered for that purpose. It is of beautiful appearance, and the almost tropical profusion of its growth may have led to the early erroneous reports of the densely-wooded nature of these islands.

The population slightly exceeds 2000. The large majority of the inhabitants live in the East Island, and the predominating element is Scottish — Scottish shepherds having superseded the South American Gauchos. In 1867 there were no settlers on the west island, and the government issued a proclamation offering leases of grazing stations on very moderate terms. In 1868 all the available land was occupied. These lands are fairly healthy, the principal drawback being the virulent form assumed by simple epidemic maladies. The occupation of the inhabitants is almost entirely pastoral, and the principal industry is sheep- farming. Wool forms by far the largest export, and tallow, hides, bones and frozen mutton are also exported. Trade is carried on almost entirely with the United Kingdom; the approximate annual value of exports is £120,000, and of imports a little more than half that sum. The Falkland Islands Company, having its headquarters at Stanley and an important station in the camp at Darwin, carries on an extensive business in sheep-farming and the dependent industries, and in the general import trade. The development of this undertaking necessitated the establish- ment of stores and workshops at Stanley, and ships can be repaired and provided in every way ; a matter of importance since not a few vessels, after suffering injury during heavy weather off Cape Horn, call on the Falklands in distress. The maintenance of the requisite plant and the high wages current render such repairs somewhat costly. A former trade in oil and sealskin has decayed, owing to the smaller number of whales and seals remaining about the islands. Communications are maintained on horseback and by water, and there are no roads except at Stanley. There is a monthly mail to and from England, the passage occupying about four weeks.

The Falkland Islands are a crown colony, with a governor and executive and legislative councils. The legislative council

consists of the governor and three official and two unofficial

nominated members, and the executive of the same, with the exception that there is only one unofficial member; The colony is self-supporting, the revenue being largely derived from the drink duties, and there is no public debt. The Falklands are the seat of a colonial bishop. Education is compulsory. The government maintains schools and travelling teachers; the Falkland Islands Company also maintains a school at Darwin, and there is one for those of the Roman Catholic faith in Stanley. There is also on Keppel Island a Protestant missionary settlement for the training in agriculture of imported Fuegians. Stanley was for some years a naval station, but ceased to be so in

1904.

The Falkland Islands were first seen by Davis in the year 1502, and Sir Richard Hawkins sailed along their north shore in 1 594. The claims of Amerigo Vespucci to a previous discovery are doubtful. In 1598 Sebald de Wert, a Dutchman, visited them, and called them the Sebald Islands, a name which they bear on some Dutch maps. Captain Strong sailed through between the two principal islands in 1690, landed upon one of them, and called the passage Falkland Sound, and from this the group afterwards took its English name. In 1764 the French explorer De Bougainville took possession of the islands on behalf of his country, and established a colony at Port Louis on Berkeley Sound. But in 1767 France ceded the islands to Spain, De Bougainville being employed as intermediary. Meanwhile in 1765 Commodore Byron had taken possession on the part of England on the ground of prior discovery, and had formed a settlement at Port Egmont on the small island of Saunders. The Spanish and English settlers remained in ignorance, real or assumed, of each other's presence until 1 769-1 770, when Byron's action was nearly the cause of a war between England and Spain, both countries having armed fleets to contest the barren sover- eignty. In 1 77 1, however, Spain yielded the islands to Great Britain by convention. As they had not been actually colonized by England, the republic of Buenos Aires claimed the group in 1820, and subsequently entered into a dispute with the United States of America concerning the rights to the products of these islands. On the representations of Great Britain the Buenos Aireans withdrew, and the British flag was once more hoisted at Port Louis in 1833, and since that time the Falkland Islands have been a regular British colony.

In 1845 Mr S. Lafone, a wealthy cattle and hide merchant on the river Plate, obtained from government a grant of the southern portion of the island, .a peninsula 600,000 acres in extent, and possession of all the wild cattle on the island for a period of six years, for a payment of £10,000 down, and £20,000 in ten years from January 1, 1852. In

1851 Mr Lafone's interest in Lafonia, as the peninsula came to be called, was purchased for £30,000 by the Falkland Islands Company, which had been incorporated by charter in the same year.

See Pernety, Journal historique d'une voyage faite aux ties Ma- louines en 1763 et 1764 (Berlin, 1767); S. Johnson, Thoughts on the late Transactions respecting Falkland's Islands (1771); L. A. de Bougainville, Voyage autour du monde (1771) ; T. Falkner, Description of Patagonia and the Falkland Islands (1774); B. Penrose, Account of the last Expedition to Port Egmont in the Falkland Islands (1775) ; Observations on the Forcible Occupation of Malvinas by the British Government in 1833 (Buenos Ayres, 1833); Reclamation ael Gobierno de las provincias Vnidas de la Plata contra el de S.M. Britanica sobre la soverania y possesion de las Islas Malvinas (London, 1841); Fitzroy, Narrative of the Surveying Voyage of H. M.S. " Adventure " and " Beagle " (1839); Darwin, Voyage of a Naturalist round the World (1845); S. B. Sullivan, Description of the Falkland Islands (1849); W. Hadfield, Brazil, the Falkland Islands, &c. (1854) ; W. Parker Snow, Two Years' Cruise off the Tierra del Fuego, the Falkland Islands, &c. (1857); Sir C. Wyville Thomson, Voyage of the " Challenger " (1877) ; C. P. Lucas, Historical Geography of the British Colonies, vol. ii. "The West Indies" (Oxford, 1890); Colonial Reports Annual; MS. Sloane, 3295.

FALLACY (Lat. fall-ax, apt to mislead), the term given generally to any mistaken statement used in argument; in Logic, technically, an argument which violates the laws of correct demonstration. An argument may be fallacious in mutter (i.e. misstatement of facts), in wording (i.e. wrong use of

words), or in the process of inference. Fallacies have, therefore, been classified as: I. Material, II. Verbal, III. Logical or Formal; II. and III. are often included under the general description Logical, and in scholastic phraseology, following Aristotle, are called fallacies in dictione or in voce, as opposed to material fallacies in re or extra dictionem.

I. Material: — The. classification widely adopted by modern logicians and based on that of Aristotle, Organon (Sophistici elenchi), is as follows: — (1) Fallacy of Accident, i.e. arguing erroneously from a general rule to a particular case, without proper regaxd to particular conditions which vitiate the applica- tion of the general rule; e.g. if manhood suffrage be the law, arguing that a criminal or a lunatic must, therefore, have a vote; (2) Converse Fallacy of Accident, i.e. arguing from a special case to a general rule; (3) Irrelevant

Conclusion, or Ignoratio Elenchi, wherein, instead of proving the fact in dispute, the arguer seeks to gain his point by diverting attention to some extraneous fact (as in the legal story of ” No case. Abuse the plaintiff’s attorney”). Under this head come the so-called argumentum (a) ad hominem, (b) adpopulum, (c) ad baculunii (d) ad verecundiam, common in platform oratory, in which the speaker obscures the real issue by appealing to his audience on the grounds of (a) purely personal considerations, (b) popular sentiment, (c) fear, (d) conventional propriety- This fallacy has been illustrated by ethical or theological arguments wherein the fear of punish- ment is subtly substituted for abstract right as the sanction of moral obligation. (4) Petitio principii (begging the question) or Circulus in probando (arguing in a circle), which consists in demonstrating a conclusion by means of premises which pre- suppose that conclusion. Jeremy Bentham points out that this

; fallacy may lurk in a single word, especially in an epithet, e.g.

• if a measure were condemned simply on the ground that it is alleged to be ” un-English “; (5) Fallacy of the Consequent, really a species of (3), wherein a conclusion, is drawn from premises which do not really support it; (6) Fallacy of False Cause, or Non Sequitur._(” it does not follow “), wherein one thing is in- correctly assumed as the cause of another, as when the ancients attributed a public calamity to a meteorological phenome- non; (7) Fallacy of Many Questions (Plurium Interrogationum) , wherein several questions are improperly grouped in the form of one, and a direct categorical answer is demanded, e.g. if a prosecut- ing counsel asked theprisoner ” What time was it when you met this man? ” with the intention of eliciting the tacit admission that such a meeting had taken place.

II. Verbal Fallacies are those in which a false conclusion is obtained by improper or ambiguous use of words. They are generally classified as follows. (1) Equivocation consists in employing the same word in two or more senses, e.g. in a syllogism, the middle term being used in one sense in the major and another in the minor premise, so that in fact there are four not three terms (” All fair things are honourable; This woman is fair; therefore this woman is honourable,” the second ” fair ” being in reference to complexion).., (2) Amphibology is the result of ambiguity of grammatical structure, e.g. of the position of the adverb “only” in careless writers (“He only said that,” in which sentence, as experience shows, the adverb has been intended to qualify any one of the other three words). (3) Com- position, a species of (1), which results from the confused use of collective terms (” The angles of a triangle are less than two right angles ” might refer to the angles

separately or added together). (4) Division, the converse. of the preceding, which consists in employing the middle term distributively in the minor and collectively in the major premise. (5) Accent, which occurs only in speaking and consists of emphasizing the wrong word in a sentence (" He is a fairly good pianist," according to the emphasis on the words, may imply praise of a beginner's progress, or an expert's depreciation of a popular hero, or it may imply that the person in question is a deplorable violinist). (6) Figure of Speech, the confusion between the metaphorical and ordinary uses of a word or phrase.

III. The purely Logical or Formal fallacies consist in the violation of the formal rules of the Syllogism (q.v.). They are

(a) fallacy of Four Terms (Quaternio lerminorum) ; (b) of Un-distributed Middle; (c) of Illicit process of the major or the minor term ; (d) of Negative Premises.

Of other classifications of Fallacies in general the most famous are those of Francis Bacon and J. S. Mill. Bacon (Novum organum, Aph. i. 33, 38 sqq.) divided fallacies into four Idola (Idols, i.e. False Appearances), which summarize the various kinds of mistakes to which the human intellect is prone (see Bacon, Francis) . With these should be compared the Offendicula of Roger Bacon, contained in the Opus mains, pt. i. (see Bacon, Roger). J. S. Mill discussed the subject in book v. of his Logic, and Jeremy Bentham's Book of Fallacies (1824) contains valuable remarks.

See Rd. Whateley's Logic, bk. v. ; A. de Morgan, Formal Logic (1847); A. Sidgwick, Fallacies (1883) and other text-books. See also article Logic, and for fallacies of Induction, see Induction.

FALLIERES, CLEMENT ARM AND (1841-), president of the French republic, was born at Mezin in the department of Lot-et-Garonne, where his father was clerk of the peace. He studied law and became an advocate at Nerac, beginning his public career there as municipal councillor (1868), afterwards mayor (1871), and as councillor-general of the department of Lot-et-Garonne (1871). Being an ardent Republican, he lost this position in May 1873 upon the fall of Thiers, but in February 1876 was elected deputy for Nerac. In the chamber he sat with the Republican Left, signed the protestation of the 18th of May 1877, and was re-elected in October by his constituency. In 1 880

he became under-secretary of state in the department of the interior in the Jules Ferry ministry (May 1880 to November 1881). From the 7th of August 1882 to the 20th of February 1883 he was minister of the interior, and for a month (from the 29th of January 1883) was premier. His ministry had to face the question of the expulsion of the pretenders to the throne of France, owing to the proclamation by Prince Jerome Napoleon (January 1883), and M. Fallieres, who was ill at the time, was not able to face the storm of opposition, and resigned when the senate rejected his project. In the following November, however, he was chosen as minister of public instruction by Jules Ferry, and carried out various reforms in the school system. He resigned with the ministry in March 1885. Again becoming minister of the interior in the Rouvier cabinet in May 1887, he exchanged his portfolio in December for that of justice. He returned to the ministry of the interior in February 1880, and finally took the department of justice from March 1890 to February 1892. In June 1890 his department (Lot-et-Garonne) elected him to the senate by 41 7 votes to 23. There M. Fallieres remained somewhat apart from party struggles, although main- taining his influence among the Republicans. In March 1899 he was elected president of the senate, and retained that position until January 1906, when he was chosen by a union of the groups of the Left in both chambers as candidate for the presidency of the republic. He was elected on the first ballot by 449 votes againt 371 for his opponent, Paul Doumer.

FALL-LINE, in American geology, a line marking the junction between the hard rocks of the Appalachian Mountains and the softer deposits of the coastal plain. The pre-Cambrian and metamorphic rocks of the mountain mass form a continuous ledge parallel to the east coast, where they are subject to denuda- tion and form a series of ” falls ” and rapids in the river courses all along this line. The relief of the land below the falls is very slight, and this low country rarely rises to a height of 200 ft., so that the rivers are navigable up to the falls, while the falls themselves are a valuable source of power. A line of cities may be traced upon the map whose position will thus be readily understood in relation to the economic importance of the fall-line. They are Trenton on the Delaware, Philadelphia on the Schuyl- kill, Georgetown on the Potomac, Richmond on the James, and Augusta on the Savannah. It will be readily understood that the softer and more recent rocks of the coastal plain have been more easily washed away, while the harder rocks of the moun- tains, owing to differential denudation, are left standing high above them, and that the trend of the edge of this great lenticular

mass of ancient rock is roughly parallel to that of the Appalachian

system.

FALLMERAYER, JAKOB PHILIPP (1790-1861), German traveller and historical investigator, best known for his opinions in regard to the ethnology of the modern Greeks, was born, the son of a poor peasant, at Tschotsch, near Brixen in Tirol, on the 10th of December 1790. In 1809 ne absconded from the cathedral choir school at Brixen and made his way to Salzburg, where he supported himself by private teaching while he studied theology, the Semitic languages, and history. After a year's study he sought to assure to himself the peace and quiet necessary for a student's life by entering the abbey of Kremsmiinster, but difficulties put in his way by the Bavarian officials prevented the accomplishment of this intention. At the university of Landshut, to which he removed in 1812, he first applied himself to jurisprudence, but soon devoted his attention exclusively to history and philology. His immediate necessities were pro- vided for by a rich patron. During the Napoleonic wars he joined the Bavarian infantry as a subaltern in 1813, fought at Hanau (30th October 1813), and served throughout the campaign in France. He remained in the army of occupation on the banks of the Rhine until Waterloo, when he spent six months at Orleans as adjutant to General von Spreti. Two years of garrison life at Lindau on Lake Constance after the peace were spent in the study of modern Greek, Persian and Turkish.

Resigning his commission in 1818, he was successively engaged as teacher in the gymnasium at Augsburg and in the pro- gymnasium and lyceum at Landshut. In 1827 he won the gold medal offered by the university of Copenhagen with his Geschichle des Kaisertums von Trapezunt, based on patient investigation of Greek and oriental MSS. at Venice and Vienna. The strictures on priestcraft contained in the preface to this book gave offence to the authorities, and his position was not improved by the liberal views expressed in his Geschichle der Halbinsel Morea wahrend des Mittelalters (Stuttgart, 1830-1836, 2 pts.). The three years from 1831 to 1,834 he spent in travel with the Russian count Ostermann Tolstoy, visiting Egypt, Palestine, Syria, Cyprus, Rhodes, Constantinople, Greece and Naples. On his return he was elected in 1835 a member of the Royal Bavarian Academy of Sciences, but he soon after left the country again on account of political troubles, and spent the greater part of the next four years in travel, spending the winter of 1839-1840 with Count Tolstoy at Geneva. Constantinople, Trebizond, Athos, Macedonia, Thessaly and Greece were visited by him during 1840-1841; and after some years' residence in Munich he returned in 1847 to the East, and travelled in Palestine, Syria and Asia Minor. The authorities continued to regard him with suspicion, and university students were forbidden to attend

the lectures he delivered at Munich. He entered, however, into friendly relations with the crown prince Maximilian, but this intimacy was destroyed by the events following on 1848. At that period he was appointed professor of history in the Munich University, and made a member of the national congress at Frankfort-on-Main. He there joined the left or opposition party, and in the following year he accompanied the rump-parlia- ment to Stuttgart, a course of action which led to his expulsion from his professorate. During the winter of 1849-1850 he was an exile in Switzerland, but the amnesty of April 1850 enabled him to return to Munich. He died on the 26th of April 1861.

His contributions to the medieval history of Greece are of great value, and though his theory that the Greeks of the present day are of Albanian and Slav descent, with hardly a drop of true Greek blood in their veins, has not been accepted in its entirety by other investigators, it has served to 'modify the opinions of even his greatest opponents. A criticism of his views will be found in Hopf's Gcschichte Griechenlands (reprinted from Ersch and Gruber's Encykl.) and in Finlay's History of Greece in the Middle Ages. Another theory which he propounded and defended with great vigour was that the capture of Constanti- nople by Russia was inevitable, and would lead to the absorption by the Russian empire of the whole of the Balkan and Grecian

peninsula; and that this extended empire would constitute a standing menace to the western Germanic nations. These views he expressed in a series of brilliant articles in German journals. His most important contribution to learning remains his history of the empire of Trebizond. Prior to his discovery of the chronicle of Michael Panaretos, covering the dominion of Alexus Comnenus and his successors from 1 204 to 1426, the history of this medieval empire was practically unknown.

His works are — Geschichte des Kaiserthums Trapezunt (Munich, 1827-1848) ; Geschichte der Halbinsel Morea im Mittelalter (Stuttgart, 1830-1836); tJber die Entstehung der Neugriechen (Stuttgart, 1835); " Originalfragmente, Chroniken, u.s.w., zur Geschichte des K. Trapezunts " (Munich, 1843), in Abhandl. der hist. Classe der K. Bayerisch. Akad. v. Wiss.; Fragmente aus dem Orient (Stuttgart, 1845) ; Denkschrift iiber Golgotha und das heilige Grab (Munich, 1852), and

Das Todte Meer (1853) — both of which had appeared in the Abhandlungen of the Academy; Das albanesische Element in Griechenland, iii. parts, in the Abhandl. for 1860-1866. After his death there appeared at Leipzig in 1861, under the editorship of G. M. Thomas, three volumes of Gesammelte Werke, containing Neue Fragments aus dem Orient, Kritische Versuche, and Studien und Erinnerungen aus meinem Leben. A sketch of his life will also be found in L. Steub, Herbsttage in Tyrol (Munich, 1867).

FALLOPIUS (or Fallopio), GABRIELLO (1523-1562), Italian anatomist, was born about 1523 at Modena, where he became a canon of the cathedral. He studied medicine at Ferrara, and, after a European tour, became teacher of anatomy in that city. He thence removed to Pisa, and from Pisa, at the instance of Cosmo I., grand-duke of Tuscany, to Padua, where, besides the chairs of anatomy and surgery and of botany, he held the office of superintendent of the new botanical garden. He died at Padua on the oth of October 1562. Only one treatise by Fallopius appeared during his lifetime, namely the Observations anatomicae (Venice, 1561). His collected works, Opera genuina omnia, were published at Venice in 1584. (See Anatomy.)

FALLOUX, FREDERIC ALFRED PIERRE, Comte de (1811- French politician and author, was born at Angers on

the nth of May 1811. His father had been ennobled by Charles X., and Falloux began his career as a Legitimist and clerical journalist under the influence of Mme Swetchine. In 1846 he entered the legislature as deputy for Maine-et-Loire, and with many other ultra-Catholics he gave real or pretended support to the revolution of 1848. Louis Napoleon made him minister of education in 1849, but disagreements with the president led to his resignation within a year. He had neverthe- less secured the passage of the Loi Falloux (March 15, 1850) for the organization of primary and secondary education. This law provided that the clergy and members of ecclesiastical orders, male and female, might exercise the profession of teaching without producing any further qualification. This exemption was extended even to priests who taught in secondary schools, where a university degree was exacted from lay teachers. The primary schools were put under the management of the cures. Falloux was elected to the French Academy in 1856. His failure to secure re-election to the legislature in 1866, 1869, 1870 and 187 1 was due to the opposition of the stricter Legitimists, who viewed with suspicion his attempts to reconcile the Orleans princes with Henri, comte de Chambord. In spite of his failure to enter the National Assembly his influence was very great, and was increased by the intimacy of his personal relations with Thiers. But in

1872 he offended both sections of the monarchical party at a conference arranged in the hope of effecting a fusion between the partisans of the comte de Chambord and of the Orleans princes, divided on the vexed question of the flag. He suggested that the comte de Chambord might recede from his position with dignity at the desire of the National Assembly, and not content with this encroachment on royalist principles, he insinuated the possibility of a transitional stage with the due d'Aumale as president of the republic. His disgrace was so complete that he was excommunicated by the bishop of Angers in 1876. He died on the 16th of January 1886.

Of his numerous works the best known are his Histoire de Louis XVI (1840); Histoire de Saint Pie (1845); De la contre- revolution (1876); and the posthumous Memoires d'un royaliste (2 vols., 1

FALLOW, land ploughed and tilled, but left unsown, usually for a year, in order, on the one hand, to disintegrate, aerate anfl free it from weeds, and, on the other, to allow it to re- cuperate. The word was probably early confused with "fallow " (from 0. Eng. fealu, probably cognate with Gr. xoXios, grey), of a pale-brown or yellow colour, often applied to soil left unfilled and unsown, but chiefly seen in the name of the " fallow deer." The true derivation is from the O. Eng. fealga, only found in the plural, a harrow, and the ultimate origin is a Teutonic root meaning " to plough," cf. the German falgen. The recognition that continuous growing of wheat on the same area of land robs the soil of its fertility was universal among ancient peoples, and the practice of " fallowing " or resting the soil is as old as agriculture itself. The " Sabbath rest " ordered to be given every seventh year to the land by the Mosaic law is a classical instance of the " fallow." Improvements in crop rotations and manuring have diminished the necessity of the " bare fallow," which is uneconomical because the land is left unproductive, and because the nitrates in the soil unintercepted by the roots of plants are washed away in the drainage waters. At the present time bare fallowing is, in general, only advisable on stiff soils and in dry climates. A " green fallow " is land planted with turnips, potatoes or some similar crop in rows, the space between which may be cleared of weeds by hoeing. The " bastard fallow " is a modification of the bare fallow, effected by the growth of rye, vetches, or some other rapidly growing crop, sown in autumn and fed off in spring, the land then undergoing the processes of ploughing, grubbing and harrowing usual in the bare fallow.

FALLOW-DEER (that is, Dun Deer, in contradistinction to the red deer, Cervus [Dama] dama), a medium-sized repre- sentative of the family Cervidae, characterized by its expanded or palmated antlers, which

generally have no bez-tine, rather long tail (black above and white below), and a coat spotted with white in summer but uniformly coloured in winter. The shoulder height is about 3 ft. The species is semi-domesticated in British parks, and occurs wild in western Asia, North Africa, the south of Europe and Sardinia. In prehistoric times it occurred throughout northern and central Europe. One park-breed has no spots. Bucks and does live apart except during the pairing- season; and the doe produces one or two, and sometimes three fawns at a birth. These deer are particularly fond of horse- chestnuts, which the stags are said to endeavour to procure by striking at the branches with their antlers. The Persian fallow- deer (C. [D.] mesopotamicus), a native of the mountains of Luristan, is larger than the typical species, and has a brighter coat, differing in some details of colouring. The antlers have the trez-tine near the small brow-tine, and the palmation beginning near the former. Here may be mentioned the gigantic fossil deer commonly known as the Irish elk, which is perhaps a giant type of fallow-deer, and if so should be known as Cervus {Dama) giganteus. If a distinct type, its title should be C. (Megaceros) giganteus. This deer inhabited Ireland, Great Britain, central and northern Europe, and western Asia in Pleistocene and prehistoric times; and must have stood 6 ft. high at the shoulder. The antlers are greatly palmated and of enormous $,ize, fine specimens measuring as much as n ft. between the tips.

FALL RIVER, a city of Bristol county, Massachusetts, U.S.A., situated on Mount Hope Bay, at the mouth of the Taunton river, 49 m. S. of Boston. Pop. (1890) 74,398 ; (1900) 104,863 ; (estimated, 1906) I05J942; 1 (1910 census) 119,295. It is the third city in size of the commonwealth. Of the population in 1900, 50,042, or 47-7%, were foreign-born, 90,244 were of foreign parentage {i.e. either one or both parents were foreign), and of these 81,721 had both foreign father and foreign mother. Of the foreign-born, 20,172 were French Canadians, 2329 were English Canadians, 12,268 were from England, 1045 were from Scotland, 7317 were from Ireland, 2805 were from Portugal, and 1095 were from Russia, various other countries being represented by smaller

1 The small increase between 1900 and 1906 was due in large part to the emigration of many of the inhabitants during the great strike of 1904-1905.

numbers. Fall River is served by the New York, New Haven & Hartford railway, and has good steamer connexions with Pro- vidence > Newport and New York, notably by the " Fall River Line," which is much used, in connexion with the N.Y., N.H.& Hˆ railway, by travellers between New York and Boston. The harbour is large, deep and easy of access. The city lies on a plateau and on slopes that rise rather steeply from the river, and is irregularly laid out. Granite underlying the city furnishes excellent building material; among the principal buildings are the state armoury, the county court house, the B.M.C. Durfee high school, the custom house, Notre Dame College, the church of Notre Dame, the church of St Anne, the Central Congregational church and the public library. The common- wealth aids in maintaining a textile school (the Bradford Durfee textile school), opened in 1904. The city library contained in 1908 about 78,500 volumes. There is considerable commerce, but it is as a manufacturing centre that Fall River is best known. Above the city, on the plateau, about 2 m. from the bay, are the Watuppa Lakes, 7 m. long and on an average three-fourths of a mile wide, and from them runs the Fall (Quequechan) river, with a constant flow and descending near its mouth through 127 ft. in less than half a mile. The conjunction of water transportation and water power is thus remarkable, and accounts in great part for the city's rapid growth. The waters of the North Watuppa Lake (which is fed by springs and drains out a very small area) are also exceptionally pure and furnish an excellent water-supply. The Fall river runs directly through the city (passing beneath the city hall) , and along its banks are long rows of cotton mills; formerly many of these were run by water power, and their wheels were placed directly in the stream bed, but steam power is now used almost exclusively. According to the special census of manufactures of 1905, the value of all factory products for the calendar year 1904 was $43,473,105, of which amount $35,442,581, or 81-5%, consisted of cotton goods and dyeing and finishing, making Fall River the largest producer of cotton goods among American cities. 1 A large hat manufactory (the Marshall Brothers' factory) furnishes the United States army with hats. Until forced by the competition of mills in the Southern states to direct attention to finer pro- ducts, the cotton manufacturers of Fall River devoted themselves almost exclusively to the making of print cloth, in which respect the city was long distinguished from Lawrence and Lowell, whose products were more varied and of higher grade. The number of spindles increased from 265,328 in 1865 to 1,269,043 in 1875, 3,000,000 in 1900, and to about 3,500,000 in 1906. Excellent drainage and sewerage systems contribute to the city's health. The birth-rate was in 1900 the highest (38-75) of any city in the country of above 30,000 inhabitants (three

of the four next highest being Massachusetts towns). The social conditions and labour problems of Fall River have long been exceptional. The mills supplement the public schools in the mingling of races and the work for Americanization, and labour disturbances, for which Fall River was once conspicuous, have become less frequent and less bitter, the great strike of 1904-1905— perhaps the greatest in the history of the textile industry in the United States — being marked by little or no violence. Fall River has become a ” city of homes,” and tenements are giving way to • dwellings for one or two families. The lists of the city’s corpora- tion stockholders show more than 10,000 names. The municipal police is controlled (as nowhere else in the state save in Boston) by a state board; this arrangement is generally regarded as having worked for better order. Lowell was about three times as large as Fall River in 1850, and Lawrence was larger until after 1870. Fall River was originally a part of Freetown; it was incorporated as a township in 1803 (being known as “Troy” in 1804-1834), and was chartered as a city in 1854. In 1861 it was increased by certain territory secured from Rhode Island,

1 The above figures do not show adequately the full importance of Fall River as a cotton manufacturing centre, for during six months of the census year the great strike was in progress ; this strike, caused by a reduction in wages, lasted from the 25th of July 1904 to the 1 8th of January 1905.

the city having spread across the state boundary and become subject to a divided jurisdiction. In 1902 the city received a new charter. Its manufactures amounted to little before the War of 181 2. A disastrous fire occurred in 1843 (loss above $500,000). In 1904 Fall River became the see of the Roman Catholic diocese of that name.

See H. H. Earl, Centennial History of Fall River . . . 1656-1876 (New York, 1877); and the report of Carroll D. Wright on Fall River, Lowell and Lawrence , in 13th annual report of the Massachusetts Bureau of Statistics of Labor (1882), which, however, was regarded as unjust and partial by the manufacturers of Fall River.

FALMOUTH, a municipal and contributary parliamentary borough and seaport of Cornwall, England, 306 m. W.S.W. of London, on a branch of the Great Western railway. Pop. (iyoi) 11,789. It is finely situated on the west shore of the largest of the many estuaries which open upon the south coast of the county. This is entered by several streams, of which the largest is the Fal. Falmouth harbour lies within Pendennis Point, which shelters the estuary from the more open Falmouth Bay. The Penryn river, coming in from the north-west, forms

one of several shallow, winding arms of the estuary, the main channel of which is known as Carrick Roads. To the east Pendennis Castle stands on its lofty promontory, while on the opposite side of the roads the picturesque inlet of the Porthcuel river opens between Castle Point on the north, with St Mawes' Castle, and St Anthony Head and Zoze Point on the south. The shores of the estuary as a rule slope sharply up to about 250 ft., and are beautifully wooded. The entrance is 1 m. across, and the roads form one of the best refuges for shipping on the south coast, being accessible at all times by the largest vessels. Among the principal buildings and institutions in Falmouth are the town hall, market-house, hall of the Cornwall Polytechnic Society, a meteorological and magnetic observatory, and a submarine mining establishment. The Royal Cornwall Yacht Club has its headquarters here, and in the annual regatta the principal prize is a cup given by the prince of Wales as duke of Cornwall. Engineering, shipbuilding, brewing and the manufacture of manure are carried on, and there are oyster and trawl fisheries, especially for pilchard. The inner harbour, under the jurisdiction partly of commissioners and partly of a dock company, is enclosed between two breakwaters, of which the eastern has 23 ft. of water at lowest tides alongside. The area of the harbour is 42 acres, with nearly 70b lineal yards of quayage. There are two graving docks, and repairing yards. Grain, timber, coal and guano and other manures are imported, and granite, china clay, copper ore, ropes and fish exported. Falmouth is also in favour as a watering-place. The parlia- mentary borough of Penryn and Falmouth returns one member. The municipal borough is under a' mayor, 4 aldermen and 12 councillors. Area, 790 acres.

Falmouth (Falemuth) as a haven and port has had a place in the maritime history of Cornwall from very early times. The site of the town, which is comparatively modern, was formerly known as Smithick and Pennycomequick and formed part of the manor of Arwenack held by the family of Killigrew. The corporations of Penryn, Truro and Helston opposed the under- taking, but the lords in council, to whom the matter was referred, decided in Killigrew's favour. In 1652 the House of Commons considered that it would be advantageous to the Commonwealth to grant a Thursday market to Smithick. This market was confirmed to Sir Peter Killigrew in 1660 together with two fairs, on the 30th of October and the 27th of July, and also a ferry between Smithick and Flushing. By the charter of incorporation granted in the following year the name was changed to Falmouth, and a mayor, recorder, 7 aldermen and 12 burgesses constituted a common council with the usual rights and privileges. Three years later an act creating the borough a separate ecclesiastical

parish empowered the mayor and aldermen to assess all buildings within the town at the rate of sixteen pence in the pound for the support of the rector. This rector's rate occasioned much ill-feeling in modern times, and by act of parliament in 1896 was taken over by the corporation, and provision made for its eventual extinction. The disfranchisement of Penryn, which

had long been a subject of debate in the House of Commons, was settled in 1832, by uniting Penryn with Falmouth for parlia- mentary purposes and assigning two members to the united boroughs. By the Redistribution of Seats Act 1885, the number of members was reduced to one. The fairs granted in 1660 are no longer held, and a Saturday market has superseded the chartered market. In the 17th and 18th centuries Falmouth grew in importance owing to its being a station of the Packet Service for the conveyance of mails.

FALSE POINT, a landlocked harbour in the Cuttack district of Bengal, India. It was reported by the famine commissioners in 1867 to be the best harbour on the coast of India from the Hugh to Bombay. It derives its name from the circumstance that vessels proceeding up the Bay of Bengal frequently mistook it for Point Palmyras, a degree farther north. The anchorage is safe, roomy and completely landlocked, but large vessels are obliged to lie out at some distance from its mouth in an exposed roadstead. The capabilities of False Point as a harbour remained long unknown, and it was only in i860 that the port was opened. It was rapidly developed, owing to the construction of the Orissa canals. Two navigable channels lead inland across the Maha- nadi delta, and connect the port with Cuttack city. The trade of False Point is chiefly with other Indian harbours, but a large export trade in rice and oil-seeds has sprung up with Mauritius, the French colonies and France. False Point is now a regular port of call for Anglo-Indian coasting steamers. Its capabilities were first appreciated during the Orissa famine of 1866, when it afforded almost the only means by which supplies of rice could be thrown into the province. A lighthouse is situated a little to the south of the anchorage, on the point which screens it from the southern monsoon.

FALSE PRETENCES, in English law, the obtaining from any other person by any false pretence any chattel, money or valuable security, with intent to defraud. It is an indictable misde- meanour under the Larceny Act of 1861. The broad distinction between this offence and larceny is that ill the former the owner intends to part with his property, in the latter he does not. This offence dates as a statutory crime practically from 1756. At common law the only remedy originally available for an owner who had been deprived of his goods by fraud was an indictment for the crime of cheating, or a civil action for deceit. These remedies were insufficient to coyer all cases where money or other properties had been obtained by false pretences, and the offence was first partially created by a statute of Henry VIII. (1541), which enacted that if any person should falsely and deceitfully obtain any money, goods, &c, by means of any false token or

counterfeit letter made in any other man's name, the offender should suffer any punishment other than death, at the discretion of the judge. The scope of the offence was enlarged to include practically all false pretences by the act of 1756, the provisions of which were embodied in the Larceny Act 1861.

The principal points to notice are that the pretence must be a false pretence of some existing fact, made for the purpose of inducing the prosecutor to part with his property (e.g. it was held not to be a false pretence to promise to pay for goods on delivery), and it may be by either words or conduct. The property, too, must have been actually obtained by the false pretence. The owner must be induced by the pretence to make over the absolute and immediate ownership of the goods, other- wise it is " larceny by means of a trick." It is not always easy, however, to draw a distinction between the various classes of offences. In the case where a man goes into a restaurant and orders a meal, and, after consuming it, says that he has no means of paying for it, it was usual to convict for obtaining food by false pretences. But R. v. Jones, 1898, L.R. 1 Q.B. 119 decided that it is neither larceny nor false pretences, but an offence under the Debtors Act 1869, of obtaining credit by fraud. (See also Cheating; Fraud; Larceny.)

United States. — American statutes on this subject are mainly copied from the English statutes, and the courts there in a general way follow the English interpretations. The statutes of each state must be consulted. There is no Federal statute, though

there are Federal laws providing penalties for false personation of the lawful owner of public stocks, &c, or of persons entitled to pensions, prize money, &c. (U.S. Rev. Stats. § 5435), or the false making of any order purporting to be a money order (id. § 5463).

In Arizona, obtaining money or property by falsely personating another is punishable as for larceny (Penal Code, 1901, § 479). Obtaining credit by false pretences as to wealth and mercantile character is punishable by six months' imprisonment and a fine not exceeding three times the value of the money or property obtained (id. § 481).

In Illinois, whoever by any false representation or writing signed by him, of his own respectability, wealth or mercantile correspondence or connexions, obtains credit and thereby de- frauds any person of money, goods, chattels or any valuable thing, or who procures another to make a false report of his honesty, wealth, &c, shall return the money, goods, &c, and be fined and imprisoned for a term not

exceeding one year (Crim. Code, 1903, ch. xxxviii. §§ 96, 97). Obtaining money or property by bogus cheques, the ” confidence game ” (Dorr v. People, 1907, § 228, 111. 216), or ” three card monte,” sleight of hand, fortune-telling, &c, is punishable by imprisonment for from one to ten years (id. §§ 98, 100). Obtaining goods from warehouse, mill or wharf by fraudulent receipt wrongly stating amount of goods de- posited—by imprisonment for not less than one nor more than ten years (id. § 124). Fraudulent use of railroad passes is a misdemeanour (id. 125a).

In Massachusetts it is simple larceny to obtain by false pre- tences the money or personal chattel of another (Rev. Laws, 1902, ch. ccviii. § 26). Obtaining by a false pretence with intent to defraud the signature of a person to a written instrument, the false making whereof would be forgery, is punishable by imprisonment in a state prison or by fine (id. § 27).

In New York, obtaining property by false pretences, felonious breach of trust and embezzlement are included in the term ” larceny ” (Penal Code, § 528; Paul v. Dumar, 106 N.Y. 508; People v. Taltlekan, 1907, 104 N.Y. Suppl. 805), but the methods of proof required to establish each crime remain as before the code. Obtaining lodging and food on credit at hotel or lodging house with intent to defraud is a misdemeanour (Pen. Code, § 382). Purchase of property by false pretences as to person’s means or ability to pay is not criminal when in writing signed by the party to be charged (Pen. Code, § 544) .

FALTICHENI (Falticent), the capital of the department of Suceava, Rumania, situated on a small right-hand tributary of the Sereth, among the hills of north-west Moldavia, and 2 m. S.E. of the frontier of Bukovina. Pop. (1900) 9643, about half being Jews. A branch railway runs for 15 m. to join the main line between Czernowitz in Bukovina, and Galatz. The Suceava department (named after Suceava or Suciava, its former capital, now Suczawa in Bukowina) is densely forested; its considerable timber trade centres in Falticheni. For five weeks, from the 20th July onwards, Russians and Austro-Hungarians, as well as Rumans, attend the fair which is held at Falticheni, chiefly for the sale of horses, carriages and cattle.

FALUN, a town of Sweden, capital of the district (Ian) of Kopparberg, 153 m. N.W. of Stockholm by rail. Pop. (1900) 9606. It is situated in a bare and rocky country near the western shore of lake Runn. Here are the oldest and most celebrated copper mines in Europe. Their produce has gradually decreased since the 17th century, and is now unimportant, but sulphate of copper, iron pyrites, and some gold,

silver, sulphur and sulphuric acid, and red ochre are also produced. The mines belong to the Kopparberg Mining Company (Stora Kopparbergs Bergslags Ahticbolag, formerly Kopparbergslagen) . This is the oldest industrial corporation in Sweden, and perhaps the oldest still existing in the world; it is known to have been established before 1347. Since its reorganization as a joint-stock company in 1890 many of the shares have been held by the crown, philan- thropic institutions and other public bodies. The company also owns iron mines, limestone and quartz quarries, large iron-works at Domnarfvet and elsewhere, a great extent of forests and

saw-mills, and besides the output of the copper mines it pro- duces manufactured iron and steel, timber, wood-pulp, bricks and charcoal. Falun has also railway rolling-stock factories. There are museums of mineralogy and geology, a lower school of mining, model room and scientific library. The so-called “Gothenburg System” of municipal control over the sale of spirits was actually devised at Falun as early as 1850.

FAMA (Gr. ˆrmv, “Oacra), in classical mythology, the personi- fication of Rumour. The Homeric equivalent Ossa (Iliad, ii. 93) is represented as the messenger of Zeus, who spreads reports with the rapidity of a conflagration. Homer does not personify Pheme, which is merely a presage drawn from human utterances, whereas Ossa (until later times) is associated with the idea of divine origin. A more definite character is given to Pheme by Hesiod (Works and Days, 764), who calls her a goddess; in Sophocles (Oed. Tyr. 158) ,she is the immortal daughter of golden Hope and is styled by the orator Aeschines (Contra Timarchum, § 1 28) one of the mightiest of goddesses. According to Pausanias (i. 17. 1) there was a temple of Pheme at Athens, and at Smyrna (ib. ix. 11, 7), whose inhabitants were especially fond of seeking the aid of divination, there was a sanctuary of Cledones (sounds or rumours supposed to convey omens).

There does not seem to have been any cult of Fama among the Romans, by whom she was regarded merely as “a figure of poetical religion.” The Temple of Fame and Omen (Pheme and Cledon) mentioned by Plutarch (Moralia, p. 319) is due to a con- fusion with Aius Locutius, the divinity who warned the Romans of the coming attack of the Gauls. There are well-known descriptions of Fame in Virgil (Aeneid, iv. 173) and Ovid (Meiatn. xii. 39); see also Valerius

Flaccus (ii. 116), Statius (Thebais, iii. 425). An unfavourable idea gradually became attached to the name; thus Ennius speaks of Fama as the personification of ” evil ” reputation and the opposite of Gloria (cp. the adjective famosus, which is not used in a good sense till the post-Augustan age). Chaucer in his House of Fame is obviously imitating Virgil and Ovid, although he is also indebted to Dante’s Divina Commedia.

FAMAGUSTA (Gr. Ammochostos), a town and harbour on the east cost of Cyprus, 25 m. S. of the ruins of Salamis. The population in 1901 was 818, nearly all being Moslems who live within the walls of the fortress; the Christian population has migrated to a suburb called Varosia (pop. 2948). The foundation of Salamis (q.v.) was ascribed to Teucer: it was probably the most important town in early Cyprus. The revolt of the Jews under Trajan, and earthquakes in the time of Constantius and Constantine the Great helped in turn to destroy it. It was restored by Fl. Constantius II. (a.d. 337-361) as Constantia. Another town a little to the south, built by Ptolemy Phila- delphus in 274 B.C., and called Arsinoe in honour of his sister, received the refugees driven from Constantia by the Arabs under Mu’awiyah, became the seat of the orthodox archbishopric, and was eventually known as Famagusta. It received a large accession of population at the fall of Acre in 1291; was annexed by the Genoese in 1376; reunited to the throne of Cyprus in 1464; and surrendered, after an investment of nearly a year, to the Turks in 1571- The fortifications, remodelled by the Venetians after 1489, the castle, the grand cathedral church of St Nicolas, and the remains of the palace and many other churches make Famagusta a place of unique interest. Acts ii. and v. of Shakespeare’s Othello pass there. In 1903 measures were taken to develop the fine natural harbour of Famagusta. Basins were dredged to give depths of 15 and 24 ft. respectively at ordinary low tides, and commodious jetties and quays were constructed.

FAMILIAR (through the Fr. familier, from Lat. famtiiaris, of or belonging to the familia, family), an adjective, properly meaning belonging to the family or household, but in this sense the word is rare. The more usual meanings are: friendly, intimate, well known; and from its application to the easy relations of intimate friends the term may be used in an invidious sense of ” free and easy ” conduct on the part of any one not justified by any close relationship, friendship or intimacy.

” Familiar” is, however, also used as a substantive, especially of the spirit or demon which attended on a wizard or magician, and was summoned to execute his master’s wishes. The idea underlies the

notion of the Christian guardian angel and of the Roman genius nalalis (see Demonology; Witchcraft). In the Roman Church the term is applied to persons attached to the household of the pope or of bishops. These must actually do some domestic service. They are supported by their patron, and enjoy privileges which in the case of the papal familiars are considerable. ” Familiars of the Holy Office ” were lay officers of the Inquisition, whose functions were chiefly those of police, in making arrests, &c, of persons charged.

FAMILISTS, a term of English origin (later adopted in other languages) to denote the members of the Familia Caritatis (Hus der Lief ten; Huis der Liefde; Haus der Liebe; ” Family of Love “), founded by Hendrik Niclaes (born on the 9th or 10th of January 1501 or 1502, probably at Minister; died after 1570, not later than 1581, probably in 1580). His calling was that of a merchant, in which he and his son Franz prospered, becoming ultimately wealthy. Not till 1540 did he appear in the character of one divinely endowed with “the spirit of the true love of Jesus Christ.” For twenty years (1540-1560) Emden was the headquarters at once of his merchandise and of his propaganda; but he travelled in both interests to various countries, visiting England in 1552 or 1553. To this period belong most of his writings. His primary work was Den Spegel der Gherechticheit dorch den Geist der Liefden unde den vergodeden Mensch H.N. uth de hemmelische Warheit beluget. It appeared in an English form with the author’s revision, as An Introduction to the holy Understanding of the Glasse of Righteousness (1575?; reprinted in 1649). None of his works bear his name in full; his initials were mystically interpreted as standing for Homo Novus. His ” glass of righteousness ” is the spirit of Christ as interpreted by him. The remarkable fact was brought out by G. Arnold (and more fully by F. Nippold in 1862) that the printer of Niclaes’s works was Christopher Plantin, of Antwerp, a specially privileged printer of Roman Catholic theology and liturgy, yet secretly a steadfast adherent of Niclaes. It is true that Niclaes claimed to hold an impartial attitude towards all existing religious parties, and his mysticism, derived from David Joris, was undogmatic. Yet he admitted his followers by the rite of adult baptism, and set up a hierarchy among them on the Roman model (see his Evangelium Regni, in English A Joyfull Message of the Kingdom, 1574?; reprinted, 1652). His pantheism had an antinomian drift; for himself and his officials he claimed impeccability; but, whatever truth there may be in the charge that among his followers were those who interpreted ” love ” as licence, no such charge can be sustained against the morals of Niclaes and the other leaders of the sect. His chief apostle in England was Christopher Vitel, a native of Delft, an ” illumi- nate elder,” living

at Colchester and Southwark, who ultimately recanted. The society spread in the eastern counties, in spite of repressive measures; it revived under the Commonwealth, and lingered into the early years of the 18th century; the lead- ing idea of its ” service of love ” was a reliance on sympathy and tenderness for the moral and spiritual edification of its members. Thus, in an age of strife and polemics, it seemed to afford a refuge for quiet, gentle spirits, and meditative temperaments.

See F. Nippold, ” H. Niclaes u. das Haus der Liebe,” in Zeitschrift fur die histor. Theol. (1862); article ” H. Niclaes” in A. J. van der Aa, Biog. Woordenboek der Nederlanden (1868); article ” H. Nicholas,” by C. Fell Smith, in Diet. Nat. Biog. (1894) ; article ” Familisten,” by Loofs, in Herzog-Hauck’s Realencyklopadie (1898). (A! Go.*)

FAMILY, a word of which the etymology but partially illustrates the meaning. The Roman familia, derived from the Oscan famel (servus), originally signified the servile property, the thralls, of a master. Next, the term denoted other domestic property, in things as well as in persons. Thus, in the fifth of the laws of the Twelve Tables, the rules are laid down: si-

INTESTATO • MORITUR • CUI ■ SUUS • HERES • NEC ■ SIT • ADGNATUS •

PROXIMUS • FAMILIAM • HABETO, and SI ■ AGNATUS • NEC • ESCIT ■

gentilis • familiam • nancitor; that is, if a man die intestate, leaving no natural heir who had been under his poteslas, the nearest agnate, or relative tracing his connexion with the deceased exclusively through males, is to inherit the familia, or family fortune of every sort. Failing an agnate, a member of the gens of the dead man is to inherit. In ,a third sense, familia was applied to all the persons who could prove themselves to be descended from the same ancestor, and thus the word almost corresponded to our own use of it in the widest meaning, as when we say that a person is ” of a good family ” (Ulpian, Dig. so, 16, igsfin.).

i. Leaving for awhile the Roman terms, to which it will be necessary to

return, we may provisionally define Family, in the modern sense, as the small community formed by the union of one man with one woman, and by the increase of children born to them. These in modern times, and in most European countries, constitute the household, and it has been almost universally supposed that little natural associations of this sort are the germ-cell of early society. The Bible presents the growth of the Jewish nation from the one household of Abraham. His patriarchal family differed from the modern family in being polygamous, but, as female chastity was one of the conditions of the patriarchal family, and as descent through males was therefore recognized as certain, the plurality of wives makes no real difference to the argument. In the same way the earliest formal records of Indian, Greek and Roman society present the family as firmly established, and generally regarded as the most primitive of human associations. Thus, Aristotle derives the first household (olria irpdcrri) from the combination of man's possession of property — in the slave or in domesticated animals — with man's relation to woman, and he quotes Hesiod: oZkov ixev irpwricrra yvvaiKa rt fiovv t' aporripa. {Politics, i. 2. 5). The village, again, with him is a colony or offshoot of the household, and monarchical government in states is derived from the monarchy of the eldest male member of the family. Now, though certain ancient terms, introduced by Aristotle in the chapters to which we refer, might have led him to imagine a very different origin of society, his theory is, on the face of it, natural and plausible, and it has been almost universally accepted. The beginning of society, it has been said a thousand times, is the family, a natural association of kindred by blood, composed of father, mother and their descendants. In this family, the father is absolute master of his wife, his children and the goods of the little community; at his death his eldest son succeeds him; and in course of time this associa- tion of kindred, by natural increase and by adoption, develops into the clan, gens, or yevos. As generations multiply, the more distant relations split off into other clans, and these clans, which have not lost the sense of primitive kinship, unite once more into tribes. The tribes again, as civilization advances, ac- knowledge themselves to be subjects of a king, in whose veins the blood of the original family runs purest. This, or something like this, is the common theory of the growth of society.

2. It was between 1866 and 1880 that the common opinion began to be seriously opposed. John Ferguson McLennan, in his Primitive Marriage and his essays on The Worship of criticism. Plants and Animals (see his Studies in Ancient History, second series), drew attention to the wide prevalence of the custom of inheriting the

kinship name through mothers, not fathers; and to the law of ” Exogamy ” (q.v.). The former usage he attributed to archaic uncertainty as to fatherhood; the natural result of absolute sexual promiscuity, or of Polyandry (q.v.). Either practice is inconsistent, prima facie, with the primitive existence of the Family, whether polygamous or monogamous, whether patriarchal or modern. The custom of Exogamy, again, — here taken to mean the unwritten law which makes it incest, and a capital offence, to marry within the real or supposed kin denoted by the common name of the kinship, — pointed to an archaic condition of family affairs all unlike our Table of prohibited degrees. This law of Exogamy was found, among many savage races, associated with Totems, that is plants,

animals and other natural objects which give names to the various kinships, and are themselves, in various degrees, rever- enced by members of the kinships. (See Totem and Totemism.) Traces of such kinships, and of Totemism, also of alleged promis- cuity in ancient times, were detected by McLennan in the legends, folk-lore and institutions of Greece, Rome and India. Later, Prof. Robertson Smith found similar survivals, or possible survivals, among the Semitic races (Kinship in Early Arabia). Others have followed the same trail among the Celts (S. Reinach, Cultes, mythes el religions, 1904).

If arguments founded on these alleged survivals be valid, it may be that the most civilized races have passed through the stages of Exogamy, Totemism and reckoning descent in the female line. McLennan explained Exogamy as a result of scarcity of women, due to female infanticide. Women being scarce, the men of a group would steal them from other groups, and it would become shameful, and finally a deadly sin, for a man to marry within his own group-name, or name of kinship, say Wolf or Raven. Meanwhile, owing to scarcity of women, one woman would be the mate of many husbands (polyandry); hence, paternity being undetermined, descent would be reckoned through mothers.

Such are the outlines of McLennan’s theory, which, as a whole, has been attacked by many writers, and is now, perhaps, accepted by none. McLennan’s was the most brilliant pioneer work; but his supply of facts was relatively v ˆ”” a ” S scanty, and his friend Charles Darwin stated objections which to many seem final, as regards the past existence of a stage of sexual promiscuity. C. N. Starcke (The Primitive Family, 1889), Edward Alexander Westermarck (History of Human Marriage, 1891), Ernest Crawley (The Mystic Rose), Herbert Spencer, Emile Durkheim, Lord Avebury and many others, have criticized McLennan, who, however, in coining the term Exogamy, and drawing

scientific attention to Totemism, and reckoning of kin through mothers, founded the study of early society. Here it must be observed that ” Matriarchate ” (q.v.) is a misleading term, as is ” Gynaecocracy,” for the custom of deducing descent on the spindle side. Women among totemistic and exogamous savages are in a degraded position, nor does the deriving and inheriting of the kinship name, or anything else, on the spindle side, imply any ignorance of paternal relations; even where, as among Central Australian tribes, the facts of reproduction are said to be unknown.

3. Simultaneous with McLennan’s researches and speculations were the works of Lewis H. Morgan. He was the discoverer of a custom very important in its bearing on the history of society. In about two-thirds of the globe, persons dorian in addressing a kinsman do not discriminate between grades of relationship. All these grades are merged in large categories. Thus, in what Morgan calls the ” Malayan system,” ” all consanguinei, near or far, fall within one of these relation- ships — grandparent, parent, brother, sister, child and grand-child.” No other blood-relationships are recognized (Ancient Society). This at once reminds us of the Platonic Republic. ” We devised means that no one should ever be able to know his own child, but that all should imagine themselves to be of one family, and should regard as brothers and sisters those who were within a certain limit of age; and those who were of an elder generation they were to regard as parents and grandparents, and those who were of a younger generation as children and grandchildren ” (Timaeus, 18, Jowett’s translation, first edition, vol. ii., 187 1). This system prevails in the Polynesian groups and in New Zealand. Next comes what Morgan chooses to call the Turanian system. ” It was universal among the North American aborigines,” whom he styles Ganowanians. ” Traces of it have been found in parts of Africa ” (Ancient Society), and ” it still prevails in South India among the Hindus, who speak the Dravidian language,” and also in North India, among other Hindus. The system, Morgan says, ” is simply stu- pendous.” It is not exactly the same among all his miscellaneous ” Turanians,” but, on the whole, assumes the following shapes. Suppose the speaker to be a male, he will style his nephew and.

niece in the male line, his brother’s children, ” son ” and ” daughter,” and his grand-nephews and grand-nieces in the male line, “grandson” and “granddaughter.” Here the Turanian and the Malayan systems

agree. But change the sex; let the male speaker address his nephews and nieces in the female line, — the children of his sister,— he salutes them as “nephew” and “niece,’ and they hail him as “uncle.” Now, in the Malay system, nephews and nieces on both sides, brother’s children or sisters, are alike named ” children ” of the uncle. If the speaker be a female, using the Turanian style, these terms are reversed. Her sister’s sons and daughters are saluted by her as ” son ” and ” daughter,” her brother’s children she calls ” nephew ” and ” niece.” Yet the children of the persons thus styled ” nephew ” and ” niece ” are not recognized in conversation as ” grand-nephew ” and ” grand-niece,” but as ” grandson ” and “granddaughter.” It is impossible here to do more than indicate these features of the classificatory nomenclature, from which the others may be inferred. The reader is referred for particular to Morgan’s Systems of Consanguinity and Affinity of the Human Race.

The existence of the classificatory system is not an entirely novel discovery. Nicolaus Damascenus, one of the inquirers into early society, who lived in the first century of our era, noticed this mode of address among the Galactophagi. Lafitau found it among the Iroquois. To Morgan’s perception of the importance of the facts, and to his energetic collection of reports, we owe our knowledge of the wide prevalence of the system. From an examination of the degrees of kindred which seem to be indicated by the ” Malayan ” and ” Turanian ” modes of address, he has worked out a theory of the evolution of the modern family. A brief comparison of this with other modern theories will close our account of the family. The main points of the theory are shortly stated in Systems of Consanguinity, &fc., and in Ancient Society. From the latter work we quote the following description of the five different and successive forms of the family : — •

“I. The Consanguine Family. — It was founded upon the inter-marriage of brothers and sisters, own and collateral, in a group.

” II. The Punaluan Family.— It was founded upon the inter- marriage of several sisters, own and collateral, with each others’ husbands, in a group — the joint husbands not being necessarily kinsmen of each other; also, on the intermarriage of several brothers, own and collateral, with each others’ wives in a group— these wives not being necessarily of kin to each other, although often the case in both instances (sic). In each case the group of men were conjointly married to the group of women.

” III. The Syndyasmian or Pairing Family. — It was founded upon

marriage between single pairs, but without an exclusive cohabitation. The marriage continued during the pleasure of the parties.

” IV. The Patriarchal Family. — It was founded upon the marriage of one man with several wives, followed in general by the seclusion of the wives.

” V. The Monogamian Family. — It was founded upon marriage between single pairs with an exclusive cohabitation.

” Three of these forms, namely, the first, second, and fifth, were radical, because they were sufficiently general, and influential to create three distinct systems of consanguinity, all of which still exist in living forms. Conversely, these systems are sufficient of themselves to prove the antecedent existence of the forms of the family and of marriage with which they severally stand connected.”

Morgan makes the systems of nomenclature proofs of the existence of the Consanguine and Punaluan fa milies. Unhappily, there is no other proof, and the same systems have been explained on a very different principle (McLennan, Studies in Ancient History). Looking at facts, we find the Consanguine family nowhere, and cannot easily imagine how early groups abstained from infringing on each other, and created a systematic marriage of brothers and sisters. St Augustine, however {De civ. Dei, xv. 1 6), and Archinus in his Thessalica (Odyssey, xi. 7, scholia B, Q) agree more or less with Morgan. Next, how did the Consanguine family change into the Punaluan ? Morgan says (Ancient Society) brothers ceased to marry their sisters, because “the evils of it could not for ever escape human observation.” Thus the Punaluan family was hit upon, and ” created a distinct system of consanguinity ” (Ancient Society), the Turanian.

Again, ” marriages in Punaluan groups explaiti the relationships in the system.” But Morgan provides himself with another explanation, ” the Turanian system owes its origin to marriage in the group and to the gentile organization.” He calls exogamy ” the gentile organization,” though, in point of fact, the only gentes we know, the Roman gentes, show scarcely a trace of exogamy. Again, ” the change of relationships which resulted from substituting Punaluan in the place of Consanguine marriage turns the Malayan into the Turanian system.” On the same page Morgan attributes the change to the ” gentile organization,” and, still on the same page, uses both factors in his working out of the problem. Now, if the Punaluan marriage is a sufficient explanation, we do not need the ” gentile organization.” Both, in Morgan’s opinion, were efforts of conscious moral reform. In

Systems of Consanguinity the gentile organization (there called tribal), that is, exogamy, is said to have been ” designed to work out a reformation in the intermarriage of brothers and sisters.” But the Punaluan marriage had done that, otherwise it would not have produced (as Morgan says it did) the change from the Malayan to the Turanian system, the difference in the two systems, as exemplified in Seneca and Tamil, being ” in the relationships which depended on the intermarriage or non- intermarriage of brothers and sisters ” (Ancient Society). Yet the Punaluan family, though itself a reform in morals and in “breed- ing,” “did not furnish adequate motives to reform the Malay system,” which, as we have seen, it did reform. The Punaluan family, it is suspected, ” frequently involved own bi others and sisters “; had it not been so, there would have been no need of a fresh moral reformation,—” the gentile organization.” Yet even in the Punaluan family (Ancient Society) ” t ‘others ceased to marry their own sisters.” What, then, didthe ” gentile organiza- tion” do for men? As they had already Ceased to marry their own sisters, and as, under the gentile organization, they were still able to marry their half-sisters, the reformatory ” ingenuity” of the inventors of the organizations was at once superfluous and useless. It is impossible to understand the Punaluan system. Its existence is inferred from a system of nomenclature which it does (and does not) produce; it admits (and excludes) own brothers and sisters. Morgan has intended, apparently, to represent the Punaluan marriage as a long transition to the definite custom of exogamy, but it will be seen that his language is not very clear nor his positions assured. He does«hot adduce sufficient proof that the Punaluan family ever existed as an institution, even in Hawaii. There is, if possible, a greater absence of historical testimony to the existence of the Con- sanguine family. It is difficult to believe that exogamy was a conscious moral and social reformation, because, ex hypoihesi, the savages had no moral data, nothing to cause disgust at relations which seem revolting to us. It is as improbable that they dis- covered the supposed physical evils of breeding in and in. That discovery could only have been made after a long experience, and in the Consanguine family that experience was impossible. Thus, setting moral reform aside as inconceivable, we cannot understand how the Consanguine families ever broke up. Morgan’s ingenious speculations as to a transitional step- towards the gens (as he calls what we style the totem-kindred), supposed to be found in the ” classes ” and marriage laws of the Kamilaroi, are vitiated by the weakness and contradictory nature of the evidence (see Pritchard; J. D. Lang’s Queensland, Appendix; Proceedings of American Academy of Arts, &c, vol. viii. 412; Nature, October 29, 1874). Further, though Morgan calls the Australian “gentile organization ” ” incipient,” he admits

(Ancient Society) that the Narrinyeri have totem groups, in which ” the children are of the clan of the father.” ■ Far from being ” incipient,” the gens of the Narrinyeri is on the footing of the ghotra of Hindu custom. Lastly, though Morgan frequently declares that the Polynesians have not the gens (for he thinks them not sufficiently advanced), W. W. Gill (Myths and Songs from the South Pacific, London, 1876) has shown that unmistakable traces of the totem survive in Polynesian mythology. ■ ‘ ‘ ‘

4. Morgan’s theory was opposed by McLennan (Studies in Ancient History, 1876), who maintained that the names; fof

relationships, in the ” classrficatory system,” were merely terms ■of address, as among ourselves when a preacher calls any adult male “brother,” when an old woman is addressed as “mother,” when an elder man calls a junior “my son.” He also showed that his own system accounted for the terms. The controversy is still alive; one set of writers regarding the savage terms of relationship as indicating a state of things in which human beings dwelt in a ” horde,” with promiscuous intercourse; another set holding that the terms do not indicate consanguineous kinship, but degrees of age, status, and reciprocal obligations in a local tribe, and therefore that they do not yield any presumption that there was a past of promiscuity or of what is called ” group marriage.” On Morgan’s side (not of course accepting all his details) are L. Fison and A. W. Howitt, and Baldwin Spencer and F. J. Gillen. Against him are Starcke, Westermarck, A. Lang, Dr Durkheim, apparently, Crawley and many others.

5. A second presumption in favour-of original promiscuity has been drawn by the eminent Australian students, Baldwin Evidence Spencer and F. J. Gillen, and by A. W. Howitt, from of original the customs of some Australian aborigines. In each promts- tribe, owing to customary laws which are to be eB y ‘ examined later, only men and women of a given status are intermarriageable inupa, noa, unawa) with each other. Though child-betrothals are usual, and though the woman is specialized to one man, who protects and nourishes her and all her children, and though their union is immediately preceded by an extended jus primae noctis (such as Herodotus describes among the Nasamones), yet, among certain tribes, the following custom prevails.

At great meetings the tribal leaders assign a woman as paramour (with what amount of permanence remains obscure) to a man (pirrauru) ; one woman may have several pirrauru men, one man several pirrauru women, in addition to the" – regularly betrothed {tippa malku) wives and husbands. The husband occasionally shows fight, and bitter jealousies prevail, but, at the great ceremonial meetings, complaisance is enforced under penalty of strangling. Thenceforth, if the husband permits, the male pirrauru has matrimonial rights over the other man's tippa malku wife when they meet. A symbolic ceremony of union precedes the junction of the pirrauru people. This institu- tion, as far as reported, is peculiar to a group of tribes near Lake Eyre, the Dieri, Urabunna, and their congeners,— or perhaps to all who have the same " phratry " names as the Dieri' and Urabunna {Kiraru and Mattera, in various dialectic forms).

Elsewhere the pirrauru custom is not known: but almost everywhere there are licentious festivals, in which all marriage rules except those which forbid incest (in our sense of the word, namely between the closest relations) are thrown to the winds. Also a native travelling among alien tribes is lent women of the status into which he may legally marry.

Baldwin Spencer and F. J. Gillen, and A. W. Howitt, regard

pirrauru as " group marriage " and as a proof that, at one time,

all intermarriageable people were actually husbands

Group ˆ w j ves wn ile the other examples of licence are also

marriage* 7 y ■ . j

survivals, in a later stage of decay, of promiscuity, and

" group marriage." To this it is replied that " group marriage "

is a misnomer; that if pirrauru be in a sense marriage it is

status, not group marriage. Again, it is urged, pirrauru is a

modification of tippa malku, which comes first; a woman is

"specialized " to a man before she can be made pirrauru to

another, and her tippa malku husband continues to support her,

and to recognize her children as his own, after she has become pirrauru to another man or other men. Without the foregoing tippa malku union, the pirrauru unions are not conceivable; they are mere legalized paramourships, modifying the tippa malku marriage (like the Italian cicisbeism) ; procuring a protector for a woman in her husband's absence, and supplying legal loves for bachelors. The custom is peculiar to a given set of kindred tribes. The festivals are the legalized, restricted and more or less permanent modification of the casual orgies of feasts of licence, or Saturnalia, which have their analogies among many people, ancient and modern. Pirrauru is 'no more a survival

of and a proof of primitive promiscuity, than is the legalized incest of ancient Egypt or ancient Peru. If these views be correct the argument for primitive promiscuity derived from pirrauru falls to the ground.

6. The questions at issue obviously are, was mankind originally promiscuous, with no objections to marriage between persons of the nearest kin; and was the first step in advance

the prohibition of marriage (or of amatory intercourse) historical between brothers and sisters; or did mankind origin- problem. ally live in very small groups, under a jealous sire, who imposed restrictions on intercourse between the young males, his sons, and all the females of the " hearth-circle," who constituted his harem ? The problem has been studied, first, in the institutions of savages, notably of the most backward savages, the black natives of Australia; and next, in the light of the habits of the higher mammalia.

As regards Australian matrimonial institutions, it has been known since the date of the Journals of two Expeditions of Discovery, by Sir George Grey (1837-1839), that they are very complex and peculiar, in points strongly resembling the customary laws of the more backward Red Indian tribes of North America. Information came in, while McLennan was working, from G. Taplin {The Narrinyeri, 1874), from

A. W. Howitt and L. Fison, and many other inquirers (in Brough Smyth's Aborigines of Victoria, 1878), from Howitt and Fison again (in Kamilaroi and Kurnai, 1880), and many essays by these authors, and finally, in Native Tribes of Central Australia (1899) and Northern Tribes of Central Australia (1904), by Baldwin Spencer and F. J. Gillen; and in Howitt's Native Tribes of South-East Australia (1904), with R. Roth's North-West Central Queensland Aborigines (1897). All of these are works of very high merit. Knowledge is now much more wide, minute and securely based than it was when McLennan's Studies in Ancient History, second series, was posthumously published (1896). We know with certainty that in Australia, among archaic savages who have neither metals, agriculture, pottery nor domesticated animals, a graduated scale of matrimonial institutions exists. First there are local tribes, each tribe having its own dialect; holding a recognized area of territory; and living on friendly terms with neighbouring tribes. Territorial conquest is never attempted. In many cases a knot of tribes of allied dialects and kindred rites may be, or at least is, spoken of as a " nation " by our authorities.

7. Customary law is administered by the Seniors, the wise, the magically skilled, who in many cases are " headmen " of local groups or of sets of kindred. As to marriage, Primitive persons may wed within the local tribe, or into a restrio neighbouring local tribe, at will, provided that they <*"* s °o obey the restrictions of customary law. The local a age ' tribe is neither exogamous nor endogamous, any more than is an English county. The restrictions, except where they have become obsolete, fall into six main categories: — •

(1) In the most primitive, each tribe consists of two inter- marrying and exogamous divisions, which are often styled phratries. Each such division has a name, which, when it can be translated, is the name of an animal: in the majority of cases, however, the meaning of the phratry name is lost. In one instance, that of the Euahlayi tribe of north-west New South Wales, the phratry names are said (by Mrs Langloh Parker) to mean " Light Blood " and " Dark Blood." This, as in the theory of the Rev. J. Mathews, Eagle and Crow, might be taken to indicate a blending of two distinct races.

Taking, for the sake of clearness, tribes whose phratry names mean " Crow " and " Eagle Hawk," every member of the tribe belongs either to Eagle Hawk phratry or to Crow phratry : if to Crow, the man or woman can only marry an Eagle Hawk, if to Eagle Hawk, can only marry a Crow. The children invariably belong to the phratry of the mother, in this most primitive type. Within Eagle Hawk phratry is one set of totem kins, named usually after various species of animals and

plants; within Crow phratry is another set of totem kins, named always (except in one region of Central Australia) after a different set of plants and animals. With the exception mentioned (that of the Arunta

” nation “), in no tribe does the same totem ever occur in both phratries. Totems and totem names are inherited by the children from the mother, in this primitive type. Thus a man, Eagle Hawk by phratry, Snipe by totem, marries a woman Crow by phratry, Black Duck by totem. His children by her are of phratry Crow, of totem Black Duck. Obviously no person can marry another of his or her own totem, because, in the phratry into which he or she must marry, no man or woman of his or her totem exists. The prohibition extends to members of alien and remote tribes, if of the same totem name.

The same rules exist in the more primitive North American tribes, but as the phratry there has generally, though not always, decayed, the rule, where this has occurred, merely forbids marriage within the totem kin.

(2) We find this type of organization, where the child inherits phratry and totem from the father, not from the mother.

(3) We find tribes in which phratry and totem are inherited from the mother, but an additional rule prevails: the rule of ” Matrimonial Classes.” By this device, in phratry ” Dilbi,” there are two ‘ classes, ” Muri ” and ” Kubi.” In phratry ” Kupathin ” are two classes, ” Ipai ” and ” Kumbo ” (all these names are of unknown meaning) . Each child inherits its mother’s phratry name and totem name, and also the name of that class of the two in the mother’s phratry to which the mother does not belong. No person may marry into his or her own class — practically into his or her own generation: the rule makes parental and filial marriages impossible, — but these never occur even among more primitive tribes which have not the institution of classes. Suppose that the class names are really names of animals and other objects in nature — as in a few cases they actually are. Then the rules, where classes exist, would amount to this: no person may marry another who, by phratry, totem or generation, owns the same hereditary animal name as himself or herself. In practice, where phratries exist, a man who knows a woman’s phratry name knows whether or not he may marry her. Where class names exist (even though the phratry

name be lost), a man who knows a woman's class name knows whether or not he may marry her. Nothing can be simpler in practice.

(4) The same rules as under (3) exist, but the phratry, totem and class are inherited through the father: the class of the child of course not being the father's, but the linked class in his phratry.

(5) In the fifth category (Central North Australia), while phratry name (if not lost) and totem name are inherited from the father, by a refinement of law which is spreading southwards there are jour classes in each phratry (or main exogamous division unnamed), and the choice of a partner in life is thus more restricted than in more primitive tribes.

(6) Finally we reach the institutions of the group of tribes called, from the name of the most powerful tribe in the set,

" the Arunta nation." They occupy the Macdonnell Ranges and other territory in the very centre of Australia. The Arunta reckon kinship in the male line : their phratry names they have forgotten, in place of phratries eight matrimonial classes regulate marriage. In these respects they resemble most of the central and northern tribes, but present this unique peculiarity, that the same totems may and do exist in both of the opposed intermarrying exogamous divisions con- sisting of four classes each. It thus results that a man, in the Arunta tribe, may marry a woman of his own totem, if she be in the class with which he may intermarry. This licence is un- known in every other part of the totemic world, and even in the Kaitish tribe of the Arunta nation intertotemic marriages, in practice, almost never occur.

Among the Arunta the totems are only prominent in magical ceremonies, unknown in South-Eastern Australia. At these ceremonies (Intichiuma) the men of the totem do co-operative magic for the benefit of their plant or animal, as part of the tribal food-supply. The members of the totem taste it sparingly on these occasions, apparently under the belief that to do so increases their magical power: the rest of the tribe eat freely. But, as far as denoting kinship or regulating marriage is con-

cerned, the totems, among the Arunta, have no legally importaitf existence. Men and women of the same totem may intermarry, their children need not belong to the totem of either father or mother.

The process by which Arunta totems came thus to differ from those of

all other savages is easily understood. Like the other tribes from the centre to the north (including the Urabunna nation, which reckons descent through women), the Arunta believe that the souls of the primal semi-bestial ancestors of the Alcheringa or ” dream time ” are perpetually reincarnated. This opinion does not affect by itself the usual exogamous character of totemism among the other tribes. The Arunta nation, however, cultivates an additional myth, namely that the primal ancestors, when they sank into the ground, left behind them certain oval stone slabs, with archaic markings, called churinga nanja, or ” sacred things of the nanja.” The nanja, again, is a tree or rock, fabled to have risen up to mark the spot where a group of primal ancestors, all of one and the same totem in each case (Cats here, Grubs there, Ducks elsewhere), ” went into the ground.” The souls of these ancestors haunt such spots, especially they haunt the nanja tree or rock, and the stone churinga nanja. Each district, therefore, has its own oknanikilla (or local totem centre of the ghosts), Cat ghosts, Grub ghosts, Hakea flower ghosts and so on. These spirits enter into women and are reborn as children. When a child comes to birth, the mother names the oknanikilla in which she conceived it, and, whatever the ghost totem of that place may be, it is the child’s totem. Its mother may be a Grub, its father may be a Crow, but if the child was conceived in a Duck, or Cat, or Opossum or Kangaroo locality, it is, by totem, a Cat, Opossum, Duck or Kangaroo. The churinga nanja of its primal ancestor is sought for at the place of the child’s conception, and is put into the sacred repository of such objects.

Thus the child does not inherit its totem from father, or from mother, as everywhere else, but does inherit the right to do ceremonies for the paternal totem: a proof that, of old, totems were inherited, as elsewhere, and that in the male line. If totems among the Arunta, as everywhere else, were once arranged on the plan that the same totem never occurs in both exogamous moieties, that arrangement has been destroyed, as was in- evitable, by the existing method of allotting totems to children, — not by inheritance, — but at haphazard. By this means (a consequence of the unique Arunta belief about churinga nanja) the same totems have got into both exogamous moieties, so that persons of the same totem, but of appropriate matrimonial classes, may marry. This licence is absolutely confined to the limited region in which stone churinga nanja occur.

The whole system is impossible except where descent is reckoned in the male line, for there alone is local totemism possible, and the Arunta system is based on local totemism, plus the churinga nanja and reincarnation beliefs. With reckon- ing of descent in the female line, no locality can possibly have its local totem: all the totems

indiscriminately distributed everywhere: and thus no woman can say in what totemic locality her. child was conceived, for there is not and cannot be, with female descent, any totemic locality. Now it is admitted that reckoning by female descent is the earlier method, and it is granted that in rites and ceremonies the Arunta are of a relatively advanced and highly organized pattern. Their social organiza- tion is local, and they have a kind of local magistracies, hereditary in the male line.

In spite of these facts, Spencer and Gillen conceive that the peculiar totemism of the Arunta is the most primitive type extant (cp. Spencer, J.A.I. (N.S.), vol. i. 275-281; and Frazer, ibid. 281-288). It is not easy to understand this position, as, without male kinship and consequent local totemism (which are not primitive), and without the churinga nanja (which exist only in a strictly limited area), the Arunta system of non-exogamoiK totems cannot possibly exist. Again, the other tribes cannot have passed through the Arunta stage, for, if they had, their totems would have existed, as among the Arunta, in both exogamous moieties, and would there remain when they came to be inherited;

so that the totems of all these tribes would still benon-exogamous, like those of the Arunta. But this is not the case. Once more, it is clear that the Arunta system has but recently reached their neighbours, the Kaitish, for though they have the churinga nanja belief, and the haphazard method of acquiring totems by local accident, these things have not yet overcome the old traditional reluctance to marry within the totem name. It is not unlawful among the Kaitish; but it is hardly ever done.

Despite these objections, however, Spencer and Gillen hold, as we have said, that, originally, there were no restrictions (or no known restrictions) on marriage. Totems were merely the result of the formation of co-operative magical societies, in, the interest of the tribal food supply. Then, in some unknown way, regulations as to marriage were introduced for some unknown purpose, or were involved in some manner not understood. ” The traditions of the Arunta,” says Spencer, ” point to a very definite introduction of an exogamous system long after the totemic groups were fully developed, and, further, they point very clearly to the fact that the introduction was due to the deliberate action of certain ancestors. Our knowledge of the natives leads us to the opinion that it is quite possible that this

really took place, that the exogamic groups were deliberately introduced so as to regulate marital relations."

Thus the wisdom of men living promiscuously as regards marriage, but organized in magical societies for the benefit of the common food supply of the local tribe (a complex institution postulated as already in being at this early stage), induced them to institute exogamy. Why they did this, what harm they saw in their promiscuity, we are not informed. Spencer goes on, " by this we do not mean that the regulations had anything whatever to do with the idea of incest, or of any harm accruing from the union of individuals who were regarded as too nearly related. . . . There was felt the need of some kind of organiza- tion, and this gradually resulted in the development of exogamous groups." But as " it is quite possible that the exogamous groups were deliberately introduced to regulate marital relations," and as they could only do so by introducing exogamy, we do not see how that system can be the result of the gradual develop- ment of an organization quelconque, — of unknown nature. A magical organization already existed {Journal of the Anthropo- logical Institute, New Series, i. pp. 284-285).

The traditions of the Arunta seem here to be first accepted: " quite possibly " they are correct in stating that an exogamic system was purposefully introduced, long after totemic groups had arisen, by " the deliberate action of certain ancestors," and then that myth is rejected, in favour of the gradual develop- ment of exogamy, " out of some form of organization," unknown.

People who, like the Arunta, have lost memory of the very names of the phratries, cannot conceivably remember the nature of the origin of exogamy. Accustomed as they now are to tribal councils which introduce new rules, they fancy that, in the beginning, new rules were thus introduced.

Meanwhile the working of magic for the behoof of the totem animals and plants, or rather for the name-giving animals of C a 1 la ma 8 lca l societies, is not known to Howitt among the as to tribes of primitive social organization, while it is well

Spencer's known among agricultural natives of the Torres f/fT Strait Islands and among the advanced Sioux and

Omaha of North America. The practice seems to belong rather to the decadence than to the dawn of totemism. On the whole, then, there seem to be insuperable difficulties in the way of Spencer's hypothesis

that mankind were pro- miscuous, as regards marriage, but were organized into co- operative magical groups, athwart which came, in some un- explained way, the rule of exogamy; while, when it did come, all savages except the Arunta arranged matters so that totem kins were exogamous. The reverse was probably the case, totem kins were originally exogamous', and ceased to be so, and even to be kins among the Arunta, in consequence of the churinga nanja creed, becoming co-operative magical societies (Hartland, Marett, Durkheim and others).

8. Spencer and Gillen leave the origin of exogamy an open

question. Howitt supposes that, in the shape of the phratriac division of the tribe into two exogamous moieties, the scheme may have been introduced to the tribal °^ a headmen by a medicine man " announcing to his exogamy. fellow headman a command received from some super- natural being . . ." (Natives of South- East Australia, pp. 89, go). The Council, so to speak, of " headmen " accept the divine decree, and the assembled tribe pass the Act. But this explana- tion explains nothing. Why did the prophet wish to introduce exogamy? Why were names of animals given, in so many cases, to the two exogamous divisions ? As Howitt asks {op. cit. p. 1 53) , " How was it that men assumed the names of objects, which in fact must have been the commencement of totemism ? "

It is apparent that any theory which begins by postulating the existence of early mankind in promiscuous groups or hordes, into which exogamous moieties are introduced by tribal decree, takes for granted that the tribe, with its headman, councils and great meetings (not to mention its inspired prophet, with the tribal " All Father " who inspires him), existed before any rules regulating " marital relations " were evolved. Even if all this were probable, we are not told why a promiscuous tribe thought good to establish exogamous divisions. Some native myths attribute the institution to certain wise ancestors; some to the supernatural " All Father," say Baiame; some to a treaty between Eagle Hawk and Crow, beings of cosmogonic legend, who give names to the phratries. Such myths are mere hypo- theses. It is impossible to imagine how early savages, ex hypo- thesi promiscuous, saw anything to reform in their state of promiscuity. They now think certain unions wrong, because they are forbidden: they were not forbidden, originally, because they were thought wrong.

Westermarck has endeavoured to escape the difficulty thus: " Among the ancestors of man, as among other animals, there was no doubt a time when blood relationship was no bar to sexual intercourse. But

variations here, as marfk" elsewhere, would naturally present themselves, and those of our ancestors who avoided in and in breeding would survive," while the others would die out. This appears to be orthodox evolutionary language, but it carries us no further. Human societies are not animals or plants, in whose structure various favourable " accidents " occur, producing better types, which survive. We ask why in human society did " variations present themselves"; why did certain sets of human beings "avoid in and in breeding"? We are merely told that some of our ancestors became exogamous and survived, while others remained promiscuous and perished. No light is thrown on the problem, — wherefore did some of our ancestors avoid in and in breeding, and become exogamous ? Nothing is gained by saying " thus an instinct would be developed which would be powerful enough, as a rule, to prevent injurious unions." There is no " instinct," there is a tribal law of exogamy. If there had been an " instinct," it might account for the avoidance of " in and in breeding "—that is, it might account for exogamy, ab initio. But that is left unaccounted for by the theory which, after maintaining that the avoidance produced the instinct, seems to argue that the instinct produced the avoidance. Westermarck goes on to say that " exogamy, as a natural extension of the instinct, would arise when single families united in small hordes." But, if the single families already had the " instinct," they would not marry within the family: they would be exogamous, — marrying only into other families, — before they " united in small hordes." The difficulty of accounting for exogamy does not seem to have been overcome, and no attempt is made to explain the animal names of totem kins and phratries. Westermarck, however, says that " there is no reason why we should assume, as so many anthropologists have done, that primitive men lived in small c-ndogamous groups, practising incest in every degree," although, as he also says, " there was no doubt a time when blood relationship was no bar to sexual intercourse." If there was no bar, people would " practise incest in every degree," — what was there to prevent them? {History of Human Marriage, pp. 352, 353 (1891)).

164.

FAMILY

So far we have seen no luminous and consistent account of how mankind became exogamous, if they began by being D kh 1 promiscuous. The theories rest on the idea that man, dwelling in an " undivided horde " (except so far as it was divided into co-oparative magical societies), bisected it into two exogamous intermarrying moieties. Durkheim has put forward a theory which is not at all points

easily understood. He supposes that, ” at tht beginning of societies of men, incest was not prohibited . . . before each horde (peuplade) divided itself into two primitive ‘ clans ‘ at least ” (L’ Annie sociologique, i. pp. 62, 63). Each of the two ” clans ” claimed descent from a different animal, which was its totem, and its “god.” The two clans were exogamous,— out of respect to the blood of their totem (with which every member of the clan is mystically one), and, being hostile, the two clans raided each other for women. Each clan threw off colonies, which took new totems, new “gods,” though still owning some regard to their original clan, from which they had seceded, while abandoning its ” god.” When the two “primary clans ” made alliance and connubium, they became the phratries in the local tribe, and their colonies became the totem kins within the phratries.

We are not told why the original horde was disrupted into two hostile and intermarrying “clans”: we especially wonder why the horde, if it wanted an animal god, did not choose one animal for the whole community; and we may suspect that a difference of taste in animal ” gods ” caused the hostility of the two clans. Nor do we see why, if things occurred thus, the totem kins should not represent twenty or thirty differences of religious taste, in the original horde, as to the choice of animal gods. If the horde was going to vary in opinion, it is unlikely that only two factions put forward animal candidates for divinity. Again, a ” clan ” (a totem kin, with exogamy and descent derived through mothers) cannot overflow its territorial area and be therefore obliged to send out colonies, for such a clan (as Durkheim himself remarks) has no territorial area to overflow. It is not a local institution at all.

While these objection’s cannot but occur, Durkheim does provide a valid reason for the existence of exogamy. When once the groups (however they got them) had totems, with the usual taboos on any sort of use of the totem by his human kinsfolk, the women of the kin would be tabooed to the men of the same kin. In marrying a maiden of his own totem, a man inevitably violates the sanctity of the blood of the totem (L’ Annie socio- logique, i. pp. 47-57. Cf. Reinach, Cultes, mythes et religions, vol. i. pp. 162-166).

Here at last we have a theory which accounts for the ” religious horror ” that attaches to the violation of the rule of totemic exogamy: a mysterious entity, the totem, is hereby offended. But how did totems, animals, plants and so on, come to be mystically solidaires with their human namesakes and kinsmen? We do not observe that Dr Durkheim ever explains why two divisions of one horde chose each a different animal god, or why the supposed colonies thrown off by these primary

clans deserted their animal gods for others, or why ˆ and on what principle, they all chose new ” gods,”— afresh animals,; plants and other objects. His hereditary totem is, in practice, the last thing that a savage changes. The only case of change on record is a recent attempt to increase the range of legal marriages in a waning Australian tribe, on whose lands certain species of animals are perishing.

Theories based on a supposed > primal state of promiscuity certainly encounter, when explaining the social oganization of Australian savages, difficulties which they do not surmount. But Howitt has provided (apparently without fully realizing the merit of his own suggestions) a way out of the perplexities caused by the conception of early mankind dwelling promiscuously in ” undivided communes.” The way out is practically to say that, in everyday life, they lived in nothing of the sort. Howitt writes (Native Tribes of South-East Australia, p. 173): “A study of the evidence . . . has led me to the conclusion that the state of society among the early Australians was that of an ‘ Undivided Commune.’. . .

Howitt’s solution.

It is, however, well to guard this expression. I do not desire to imply necessarily the existence of complete and continuous communism between the sexes. The character of the country, the necessity of moving from one point to another in search of game and vegetable food, would cause any Undivided Commune, when it assumed dimensions greater than the immediate locality could provide with food, to break up into two or more Communes of the same character.. In addition to this it is clear . . . that in the past as now, individual likes and dislikes must have existed, so that, admitting the existence of common rights between the members of the Commune, these rights would remain in abeyance, so far as the separated parts of the Commune were concerned. But at certain gatherings . . . or on great cere- monial occasions, all the segments of the original Commune would reunite,” and would behave in the fashion now common in great licentious festive meetings.

In the eaily ages contemplated, how can we postulate ” great ceremonial occasions ” or even peaceful assemblies at fruit- bearing spots? How can we postulate a surviving-.. ... sense of solidarity arriong the scattered segments of promiscuity the Commune, obviously very small, owing to lack of latprob- supplies, and perpetually disintegrated? But, taking ab,e ‘ the original groups as very small, and as ruled by likes and dislikes, by affection and jealousy, we are no longer concerned with a promiscuous horde, but

with a little knot of human beings, in whom love, parental affection and the jealousy of sires, would promptly make discriminations between this person and that person, as regards sexual privileges. Thus we have edged away from the hypothesis of the promiscuous indiscriminating horde to the opinion of Darwin. ” We may conclude,” he says, ” from what we know of the jealousy of all male quadrupeds, armed as many of them are with special weapons for battling with their rivals, that promiscuous intercourse in a state of Nature is extremely improbable. . . . The most probable view is that Man originally lived in small communities, each (man) with a single wife, or, if powerful, with -several, whom he jealously guarded against all other men.” But, in a community of this early type, to guard women jealously would mean constant battle, at least when Man became an animal who makes love all the year round. So Darwin adds: ” Or man may not have been a social animal, and yet have lived with several wives, like the Gorilla,— for all the natives agree that but one adult male is seen in a band; when the young male grows up a contest takes place for the mastery, and the strongest, by killing or driving out the others, establishes himself as head of the Community. Younger males, being thus expelled and wandering about, would, when at last successful in finding a partner, prevent too close interbreeding within the limits of the same family ” (Descent of Man, ii. pp.

361, 363 (1871)).

Here, then, we have practical Exogamy, as regards unions of brothers and sisters, among man still brutish, while the Sire is husband of the whole harem of females, probably unchecked as regards his daughters.

On this Darwinian text J. J. Atkinson builds his theory of the evolution of exogamy and of savage society in his Primal Law (Social Origins and Primal Law, by Lang and Atkinson, 1003). Paternal jealousy “gave birth to Primal Law, ? A ^°’ , ‘ S prohibitory of marriage between certain members of a family or local group, and thus, in natural sequence, led to forced connubial selection beyond its circle, that is, led to Exogamy . . . as a habit, not as an expressed law. . . .” The ” expressed law ” was necessarily a later development; conditioned by the circum- stances which produced totemism, and sanctioned, as on Durk- heim’s scheme, by the totemic taboo. Atkinson worked out his theory by a minute study of customs of avoidance between near kin by blood or affinity; by observations on the customs of animals, and by hypotheses as to the very gradual evolution of human restrictions through many modifications. He also gave a theory of the ” classificatory ” system of names for relation- ships opposed to that of Morgan. The names are based merely ” on reference to

relativity of age of a class in relation to the group.” The exogamous moieties cf a tribe (phratries) are not

the result of a reformatory legislative bisection of the tribe, but of the existence of ” two intermarrying totem clan groups.” The whole treatise, allowing for defects caused by the author’s death before the book was printed, is highly original and in- genious. The author, however, did not touch on the evolution of totemism.

9. The following system, as a means of making intelligible the evolution of Australian totemic society, is proposed by the present writer. We may suggest that men originally ‘system lived in the state of ” the Cyclopean family ” of Atkinson; that is, in Darwin’s ” family group,” con- taining but one adult male, with the females, the adolescent males being driven out, to find each a female mate, or mates, elsewhere if they can. With increase of skill, improvements in implements and mitigation of ferocity, such groups may become larger, in a given area, but men may retain the habit of seeking mates outside the limits of the group of contiguity; the ” avoid- ance ” of brothexs and sisters may already have arisen. Among the advanced Arunta, now, a man may speak freely to his elder sisters; to younger sisters, or ” tribal sisters,” he may not speak, ” or only at such a distance that the features are indistinguish- able.” This archaic rule of avoidance would be a step facilitating the permission to adult males to dwell in their paternal group, avoiding their sisters. Such groups, whether habitually exoga- mous or not, will require names for each other, and various reasons would yield a preference to names derived from animals. These are easily signalled in gesture language; are easily presented in pictographs and tattooing; are even now, among savages and boys, the most usual sort of personal nicknames; and are widely employed as group names of villagers in European folk-lore. Among European rustics such group sobriquets are usual, but are resented. The savage, with his ideas of the equality or superiority of animals to himself, sees nothing to resent in an animal sobriquet, and the names, originally group sobriquets, would not find more difficulty in being accepted than ” Whig,” ” Tory,” ” Huguenot,” ” Cavalier,” ” Christian,” ” Cameronian,” — all of them originally nicknames given from without. Again, ” Wry Nose ” and ” Crooked Mouth ” are derisive nicknames, but they are the translations of the ancient Celtic clan names Cameron and Campbell. The nicknames ” Naked Dogs,” ” Liars,” ” Buffalo Dung,” ” Men who do not laugh,” ” Big Topknots,”

have been thoroughly accepted by the ” gentes ” of the Blackfoot Indians, now passing out of Totemism (Grinnell, Blackfoot Lodge Tales, pp. 208-225).

As Howitt writes, ” the assumption of the names of objects by men must in fact have been the origin of totemism.” Howitt does not admit the theory that the totem names came to arise in this way, but this way is a vera causa. Names must be given either from within or from without. A group, in savagery, has no need of a name for itself; ” we ” are ” we,” or are “The Men “; for all other adjacent groups names are needed. The name of one totem, Thaballa, ” The Laughing Boy ” totem, among the Warramunga and another tribe, is quite transparently a nickname, as is Karti, ” The Grown-up Men ” (Spencer and Gillen, Northern Tribes of Central Australia, p. 207).

There is nothing, prima facie, which renders this origin of animal, plant and other such names for early savage groups at all improbable. They would not even be resented, as now are the animal names for villagers in the Orkneys, the Channel Islands, France, Cornwall and in ancient Israel (for examples see. Social Origins, pp. 295-301). The names once accepted, and their origin forgotten, would be inevitably regarded as implying a mystic rapport between the bestial and the human namesakes, Crow, Eagle Hawk, Grub, Bandicoot, Opossum, Emu, Kangaroo and so on (see Name). On this subject it is enough to cite J. G. Frazer, in The Golden Bough (2nd ed., vol. i. pp. 404- 446). Here will be found a rich and satisfactory collection of proof that community of name implies mystic rapport. Professor Rhys is quoted for the statement that probably ” the whole Aryan race believed at one time not only that the name was a part of the man, but that it was that part of him which is termed the soul.” In such a mental stage the

men ” Crows ” identify themselves with the actual Crow species: the birds are now ” of their flesh,” are fabled to be their ancestors, or the men have been evolved out of the birds. The Crow is sacro-sanct, a friend and protector, and a centre of taboos, one of which is the prohibition preventing a Crow man from intercourse with a Crow woman, ” however far apart their hunting grounds may have been.” All men and women Crows are recognized as brothers and sisters in the Crow, and are not intermarriageable.

On these lines the prohibition to infringe the totem taboo by marriage within the totem name is intelligible, but the system of phratries has yet to be accounted for. It is obvious that the names could only have been given originally to local groups: the people who held this or that local habitation received the name. Suppose that the rule of each such

group, or heart circle, had been ” no marriage within the local group or camp,” as in Atkinson’s scheme. When the groups accept their new names, the rule becomes, ” no marriage within local group Eagle Hawk, group Crow,” and so on. So far the animal giving the group name may not yet have become a revered totem. The result of the rule would inevitably be, in three or four generations, that in groups Crow or Eagle Hawk, there were no Crows or Eagle Hawks by descent, if the children took the names of descent from their mothers; for the sake of differentia- tion: the Ant woman’s children in local group Crow being Ants, the Grub woman’s children being Grubs, the Eagle Hawk woman’s children being Eagle Hawks, — all in local group Crow, and inheriting the names of the local groups whence their mothers were brought into local group Crow.

By this means (indicated first by McLennan) each member of a local group would have a local group name, say Eagle Hawk, and a name by female descent, say Kangaroo, in addition, as now, to his or her personal name. In this way, all members of each local group would find, in any other local group, people of his name of descent, and, as the totem belief grew to maturity, kinsmen of his in the totem. When this fact was realized, it would inevitably make for peace among all contiguous groups. In place of taking women by force, at the risk of shedding kindred blood, peaceful betrothals between men and women of different local group names and of different names by descent could be arranged. Say that local groups Eagle Hawk and Crow took the lead in this arrangement of alliance and connubium, and that (as they would naturally flourish in the strength con- ferred by union) the other local groups came into it, ranging themselves under Eagle Hawk and Crow, we should have the existing primitive type of organization: Local Groups Eagle Hawk {Mukwara) and Crow {Kilpara) would have become the widely diffused phratries, Mukwara and Kilpara, with all the totem kins within them.

But, on these lines, some members of any totem kin, say Cat, would be in phratry Eagle Hawk, some would be in phratry Kilpara as now (for the different reason already indicated) among the Arunta. Such persons were in a quandary. By phratry law, as being in opposite phratries, a Cat in Eagle Hawk’ phratry could marry a Cat in Crow phratry. But, by totem law, this was impossible. To avoid the clash of law, all Cats had to go into one phratry or the other, either into Eagle Hawk or into Crow.

Two whole totem kins were in the same unhappy position. The persons who were Eagle Hawks by descent could not be in Eagle Hawk local group, now phratry, as we have already shown. They were

in Crow phratry, they could not, by phratry law, marry in their own phratry, and to marry in Eagle Hawk was to break the old law, ” no marriage within the local group name.” Their only chance was to return to Eagle Hawk phratry, while Crow totem kin went into Crow phratry, and thus we often find, in fact, that in Australian phratries Mukwara (Eagle Hawk) there is a totem kin Eagle Hawk, and in Kilpara phratry (Crow) there is a totem kin Crow. This arrangement — the totem kin within the phratry of its own name — has long been known to exist in America. The Thlinkets have Raven phratry, with totem kins Raven, Frog, Goose, &c, and Wolf phratry, with

totem kins Wolf, Bear, Eagle, &c. (Frazer, Totemism, pp. 61, 62 (1887)). In Australia the fact has hitherto escaped observa- tion, because so many phratry names are not translated, while, though Mukwara and Kilpara are translated, the Eagle Hawk and Crow totem kins within them bear other names for the same birds, more recent names, or tribal native names, such as Biliari and Waa, while Mukwara and Kilpara may have been names borrowed, within the institution of phratries, from some alien tribe now perhaps extinct.

We have now sketched a scheme explanatory of the most primitive type of social organization in Australia. The tendency is for phratries first to lose the meanings of their names, and, next, for their names to lapse into oblivion, as among the Arunta; the work of regulating marriage being done by the opposed Matrimonial Classes.

These classes are obviously an artificial arrangement, intended to restrict marriage to persons on the same level as generations. The meanings of the class names are only known with certainty in two cases, and then are names of animals, while there is reason to suspect that animal names occur in four or five of the eight class-names which, in different dialect forms, prevail in central and northern Australia. Conceivably the new class regulations made use of the old totemic machinery of nomen- clature. But until Australian philologists can trace the original meanings of Class names, further speculation is premature.

10. Much might be said about the way out of totemism. When once descent and inheritance are traced through males, the social side of totemism begins to break up. One Breaking wa y out j s tne Arunta way, where totems no longer “totemism. designate kinships. In parts

of America totems are simply fading into heraldry, or into magical societies, while the ” gentes,” once totemic, have acquired new names, often local, as among the Sioux, or mere sobriquets, as among the Blackfeet. In Melanesia the phratries, whether named or nameless, have survived, while the totems have left but a few traces which some consider disputable {Social Origins, pp. 176- 184). Among the Bantu of South Africa the tribes have sacred animals (Siboko), which may be survivals of the totems of the chief local totem group, with male descent in the tribe, the whole of which now bears the name of the sacred animal. Even in Australia, among tribes where there is reckoning of descent in the male line, and where there are no matrimonial classes, the tendency is for totems to dwindle, while exogamy becomes local, the rule being to marry out of the district, not out of the kin (Howitt, Native Tribes of South- East Australia, pp. 270-272; cf. pp. 135-137).

The problem as to why, among savages all on the same low level of material culture, one tribe derives descent through women, while its nearest neighbouring tribe, with ceremonies, rites, beliefs and myths like its own, and occupying lands of similar character in a similar climate, traces descent through men, seems totally insoluble. Again, we find that the civilized Lycians, as described by Herodotus (book i. ch. 173), reckoned lineage in the female line, while the naked savages of north and central Australia reckon in the male line. Our knowledge does not enable us to explain the change from female to male tracing of lineage. Yet the change was essential for the formation of the family system of civilized life. The change may be observed taking place in the region of North- West America peopled by the Thlinket, Haida and Salish tribes; the first are pure totemists, the last have arrived, practically, in the south, at the modern family, while a curious intermediate stage pervades the inter- jacent region.

The best authority on the Family developed in different shapes in North-West America is Charles Hill-Tout (cf. ” Origin of the Totemism of the Aborigines of British Columbia,” Transactions of the Royal Society of Canada, vol. vii. sect, n, 1001). He, like many American and some English and continental students, applies the term ” totem ” not only to the hereditary totem of the exogamous kin, but to the animal familiars of individual men or women, called manitus, naguals, nyarongs and yunbeai, among North American Indians, in South America, in Borneo

and in the Euahlayi tribe of New South Wales. These animal familiars are chosen by individuals, obeying the monition of dreams, or are assigned to them at birth, or at puberty, by the tribal magicians. It has

often been suggested that totemism arose when the familiar of an individual became hereditary among his descendants. This could not occur under a system of reckoning descent and inheriting the kin name through women, but as a Tsimshian myth says that a man's sister adopted his animal familiar, the bear, and transmitted it to her offspring, Hill-Tout supposes that this may have been the origin of totemism in tribes with reckoning of descent in the female line. Instances, however, are not known to exist in practice, and myths are mere baseless savage hypotheses.

Exogamy, in his opinion, is the result of treaties of political alliance with exclusive inter connubium between two sets of kins- folk by blood, totemism being a mere accidental concomitant. This theory evades the difficulties raised by the hypothesis of deliberate reformatory legislation introducing the bisection of the tribe into exogamous societies.

Authorities. — The study of the History of the Family has been subject to great fluctuation of opinion, as unexpected evidence has kept pouring in from many quarters. The theory of primal promis- cuity, which in 1870 succeeded to Sir Henry Maine's patriarchal theory, has endured many attacks, and there is a tendency to return, not precisely to the " patriarchal theory," but to the view that the jealousy of the Sire of the " Cyclopean family," or "Gorilla family" indicated by Darwin, has had much to do with laying the bases of " primal law." The whole subject has been especially studied by English-speaking writers, as the English and Americans are brought most into contact with the most archaic savage societies. Among foreigners, in addition to Starcke, Westermarck and Durkheim, already cited, may be mentioned Professor J. Kohler, Zur Ur- geschichte der Ehe (Stuttgart, 1897). Professor Kohler is in favour of a remote past of "collective marriage," indicated, as in Morgan's hypothesis, by the existing savage names of relationships, which are expressive of relations of consanguinity. E. S. Hartland (Primi- tive Paternity, 1910) discusses myths of supernatural birth in relation to the history of the Family.

A careful and well-reasoned work by Herr Cunow (Die Verwandt- sckafts Organisationen der Australneger, Stuttgart, 1894) deals with the Matrimonial Classes of Australian tribes. Cunow supposes that descent was originally reckoned in the male line, and that tribes with this organization (such as the Narrinyeri) are the more primitive. In this opinion he has few allies: and on the origin of Exogamy he seems to possess no definite ideas. Pikler's Ursprung des Totemismus (Berlin, 1900) explains Totemism as arising from the need of names for early groups of men: names which could be expressed in picto- graphs and

tattooing, to which we may add ” gesture language.” This is much akin to the theory which we have already suggested, though Pikler seems to think that the pictograph (say of a Crow or an Eagle Hawk) was prior to the group name. But, he remarks, like Howitt, ” the germ of Totemism is the naming ” ; and the com- munity of name between the animal species and the human group led to the belief that there was an important connexion between the men and their name-giving animal.

Other useful sources of information are the annual Reports of the Bureau of Ethnology (Washington), the Journal of the Institute of the Anthropological Society, Folk Lore (the organ of the Folk Lore Society), and Durkheim’s L’Annee sociologique. Tabou et totemisme a Madagascar, by M. A. van Gennep (Leroux, Paris, 1904) is a valuable contribution to knowledge.

For India, where vestiges of totemism linger in the hill tribes, see Risley and Crooke, Tribes and Castes, vols, i., ii., hi., iv. ; and Crooke, Popular Religion; also Crooke in J.A.I. (N.S.), vol. i. pp. 232-244. (A. L.)

FAMINE (Lat. fames, hunger), extreme and general scarcity of food, causing distress and deaths from starvation among the population of a district or country. Famines have caused wide- spread suffering in all countries and ages. A list of the chief famines recorded by history is given farther on. The causes of famine are partly natural and partly artificial. Among the natural causes may be classed all failures of crops due to excess or defect of rainfall and other meteorological phenomena, or to the ravages of insects and vermin. Among the artificial causes may be classed war and economic errors in the production, transport and sale of food-stuffs.

The natural causes of famine are still mainly outside our control, though science enables agriculturists to combat them more successfully, and the improvement in means of transport allows a rich harvest in one land to supplement the defective

‘crops in another. In tropical countries drought is the commonest cause of a failure in the harvest, and where great droughts are not uncommon — as in parts of India and Australia — the hydraulic engineer comes to the rescue by devising systems of water-storage and

irrigation. It is less easy to provide against the evils of excessive rainfall and of frost, hail and the like. The experience of the French in Algiers shows that it is possible to stamp out a plague e f locusts, such as is the greatest danger to the farmer in many parts of Argentina. But the ease with which food can nowadays be transported from one part of the world to another minimizes the danger of famine from natural causes, as we can hardly conceive that the whole fo£ > d-producing area of the world should be thus affected at once.

The artificial causes of famine have mostly ceased to be operative on any large scale. Chief among them is war, which may cause a shortage of food – supplies, either by its direct ravages or by depleting the supply of agricultural labour. But only local famines are likely to arise from this cause. Legislative interference with agricultural operations or with the distribution of food-supplies, currency restrictions and failure of transport, which have all caused famines in the past, are unlikely thus to operate again; nor is it probable that the modern speculators who attempt to make ” corners ” in wheat could produce the evil effects contemplated in the old statutes against forestallers and regrators.

Such local famines as may occur in the 20th century will probably be attributable to natural causes. It is impossible to regulate the rainfall of any district, or wholly to supply its failure by any system of water-storage. Irrigation is better able to bring fertility to a naturally arid district than to avert the failure of crops in one which is naturally fertile. The true palliative of famine is to be found in the improvement of methods of transport, which make it possible rapidly to convey food from one district to another. But the efficiency of this preventive stops short at the point of saving human life. It cannot prevent a rise in prices, with the consequent suffering among the poor. Still, every year makes it less likely that the world will see a renewal of the great famines of the past, and it is only the countries where civilization is still backward that are in much danger of even a local famine.

Great Famines. — Amongst the great famines of history may be named the following: — B.C. 436 Famine at Rome, when thousands of starving

people threw themselves into the Tiber. .D. 42 Great famine in Egypt.

650 Famine throughout India.

879 Universal famine.

941, 1022 Great famines in India, in which entire provinces

and 1033 were depopulated and man was driven to canni- balism.

1005 Famine in England.

1016 Famine throughout Europe.,

1064-1072 Seven years' famine in Egypt.

1148-1159 Eleven years' famine in India.

1 1 62 Universal famine.

1344-1345 Great famine in India, when the Mogul emperor was unable to obtain the necessaries for his house- hold. The famine continued for years and thousands upon thousands of people perished of want.

1396-1407 The Durga Devi famine in India, lasting twelve years.

1 586 Famine in England which gave rise to the Poor Law

system.

1 66 1 Famine in India, when not a drop of rain fell for

two years.

1769-1770 Great famine in Bengal, when a third of the popu- lation (10,000,000 persons) perished.

1783 The Chalisa famine in India, which extended from

the eastern edge of the Benares province to Lahore and Jaramu.

1790-1792 The Doji Bara, or skull famine, in India, so-called because the people died in such numbers that they could not be buried. According to tradition this was one of the severest famines ever known. It extended over the whole of Bombay into Hyderabad and affected the northern districts of Madras. Relief works were first opened during this famine in Madras.

a.d. 1838 Intense famine in North-West Provinces (United

Provinces) of India; 800,000 perished.

1846-1847 Famine in Ireland, due to the failure of the potato- crop. Grants were made by parliament amount- ing to £10,000,000.

1861 Famine in North-West India.

1866 Famine in Bengal and Orissa ; one million perished.

1869 Intense famine in Rajputana; one million and a

half perished. The government initiated the policy of saving life.

1874 Famine in Behar, India. Government relief ir”

excess of the needs of the people.

1876-1878 Famine in Bombay, Madras and Mysore; five millions perish. Relief insufficient.

1877-1878 Severe famine in north China. Nine and a half millions said to have perished.

1887-1889 Famine in China.

1891-1892 Famine in Russia.

1897 Famine in India. Government policy of saving Iff j

successful. Mansion House fund £550,000.

1 899-1901 Famine in India. One million people perished. Estimated loss to India £50,000,000. The govern- ment spent £10,000,000 on relief, and at one time there were 4,500,000 people on the relief works.

1905 Famine in Russia.

Famines in India. — Owing to its tropical situation and its almost entire dependence upon the monsoon rains, India is more liable than any other country in the world to crop failures, which upon occasion deepen into famine. Every year sufficient rain falls in India to secure an abundant harvest if it were evenly distributed over the whole country; but as a matter of fact the distribution is so uneven and so uncertain that every year some district suffers from insufficient rainfall. In fact, famine is, to all intents and purposes, endemic in India, and is a problem to reckon with every year in some portion of that vast area. The people depend so entirely upon agriculture, and the harvest is so entirely destroyed by a single monsoon failure, that

wherever a total failure occurs the landless labourer is immediately thrown out of work and remains out of work for the whole year. The question is thus one of lack of employment, rather than lack of food. The food is there, perhaps at a slightly enhanced price, but the unemployed labourer has no money to buy it. The problem is very much the same as that met by the British Poor Law system. Every year in England a poor rate of some £22,000,000 is expended for a population of 40 millions; while it is only in an exceptional year in India that £10,000,000 are spent on a population of 300 millions.

Famines seem to recur in India at periodical intervals, which have been held to be in some way dependent on the sun-spot period. Every five or ten years the annual scarcity widens its area and becomes a recognized famine; every fifty or a hundred years whole provinces are involved, loss of life becomes widespread, and a great famine is recorded. In the 140 years since Warren Hastings initiated British rule in India, there have been nineteen famines and five severe scarcities. For the period preceding British rule the records have not been so well pre- served, but there is ample evidence to show that famine was just as frequent in its incidence and infinitely more deadly in its effects under the native rulers of India. In the great Bengal famine of 1769-1770, which occurred shortly after the foundation of British rule, but while the native officials were still in power, a third of the population, or ten millions out of thirty millions, perished. From this it may be guessed what occurred in the centuries under Mogul rule, when for years there was no rain, when famine lasted for three, four or twelve years, and entire cities were left without an inhabitant. In the famine of 1901, the worst of recent years, the loss of life in British districts was 3% of the population affected, as against 33% in the Bengal famine of 1770.

The native rulers of India seem to have made no effort to relieve the sufferings of their subjects in times of famine; and even down to 1866 the British government had no settled famine policy. In that year the Orissa famine awakened the public conscience, and the commission presided over by Sir George Campbell laid down the lines upon which subsequent famine-relief was organized. In the Rajputana famine of 1869 the humane principle of saving every possible life was first

enunciated. In the Behar famine of 1874 this principle was even carried to an extreme, the cost was enormous, and the people were in

danger of being pauperized. The resulting reaction caused a regrettable loss of life in the Madras and Bombay famine of 187 6-1878; and the Famine Commission of 1880, followed by those of 1898 and 1901, laid down the principle that every possible life must be saved, but that the wages on relief works must be so regulated in relation to the market rate of wages as not to undermine the independence of the people. The experience gained in the great famines of 1898 and 1901 has been garnered by these commissions, and stored up in the " famine codes " of each separate province, where rules are provided for the treatment of famine directly a crop failure is seen to be probable. The first step is to open test works; and directly they show the necessity, regular relief works are established, in which the people may earn enough to keep them from starva- tion, until' the time comes to sow the next crop.

As a result of the severe famine of 1878-1879, Lord Lytton's government instituted a form of insurance against famine known as the Famine Insurance Grant. A sum of Rs. 1,500,000 was to be yearly set aside for purposes of famine relief. This scheme has been widely misunderstood; it has been assumed that an entirely separate fund was created, and that in years when the specified sum was not paid into this fund, the purpose of the government was not carried out. But Sir John Strachey, the author of the scheme, explains in his book on India that the original intention was nothing more than the annual applica- tion of surplus revenue, of the indicated amount, to purposes of famine relief; and that when the country was free from famine, this sum should be regularly devoted to the discharge of debt, or to the prevention of debt which would otherwise have been incurred for the construction of railways and canals. The sum of if crores is regularly set aside for this purpose, and is devoted as a rule to the construction of protective irriga- tion works, and for investigating and preparing new projects falling under the head of protective works.

The measures by which the government of India chiefly endeavours to reduce the liability of the country to famine are the promotion of railways; the extension of canal and well irrigation; the reclamation of waste lands, with the establish- ment of fuel and fodder reserves; the introduction of agricultural improvements; the multiplication of industries; emigration; and finally the improvement where necessary of the revenue and rent systems. In times of famine the function of the railways in distributing the grain is just as important as the function of the irrigation-canals in increasing the amount grown. There is always enough grain within the boundaries of India for the needs of the people; the only difficulty is to transport it to the tract where it is required at a particular moment. Owing to the ex- tension of railways,

in the famines of 1898 and 1901 there was never any dearth of food in any famine-stricken tract; and the only difficulty was to find enough rolling-stock to cope with the demand. Irrigation protects large tracts against famine, and has immensely increased the wheat output of the Punjab; the Irrigation Commission of 1903 recommended the addition of 6| million acres to the irrigated area of India, and that recommenda- tion is being carried out at an annual cost of ij millions sterling for twenty years, but at the end of that time the list of works that will return a lucrative interest on capital will be practically exhausted. Local conditions do not make irrigation everywhere possible.

As five-sixths of the whole population of India are dependent upon the land, any failure, of agriculture becomes a national calamity. If there were more industries and manufactures in India, the dependence on the land would not be so great and the liability to lack of occupation would not be so uniform in any particular district. The remedy for this is the extension of factories and home industries; but European capital is difficult to obtain in India, and the native capitalist prefers to hoard his rupees. The extension of industries, therefore, is a work of time.

It is sometimes alleged by native Indian politicians that famines are growing worse under British rule, because India is becoming

exhausted by an excessive land revenue, a civil service too expensive for her needs, military expenditure on imperial objects, and the annual drain of some £15,000,000 for ” home charges.” The reply to this indictment is that the British land revenue is £16,000,000 annually, whereas Aurangzeb’s over a smaller area, allowing for the difference in the value of the rupee, was £110,000,000; though the Indian Civil Service is expensive, its cost is more than covered by the fact that India, under British guarantee, obtains her loans at 35% as against 10% or more paid by native rulers; though India has a heavy military burden, she pays no contribution to the British navy, which protects her seaboard from invasion; the drain of the home charges cannot be very great, as India annually absorbs 6 millions sterling of the precious metals; in 1899-1900, a year of famine, the net imports of gold and # silver were 130 millions. Finally, it is estimated by the census commissioners that in the famine of 1901 three million people died in the native states and only one million in British territory.

See Cornelius Walford, ” On the Famines of the World, Past and Present ” {Journal of the Statistical Society, 1878-1879) ; Romesh C. Dutt, Famines in India (1900); Robert Wallace, Famine in India (1900); George Campbell, Famines in India (1769-1788);

Chronological List of Famines for all India (Madras Administration Report, 1885) ; J. C. Geddes, Administrative Experience in Former Famines (1874); Statistical Atlas of India (1895); F. H. S. Mere-wether, Through the Famine Districts of India (1898) ; G. W. Forrest, The Famine in India (1898) ; E. A. B. Hodgetts, In the Track of the Russian Famine (1892); W. B. Steveni, Through Famine- stricken Russia (1892); Vaughan Nash, The Great Famine (1900); Lady Hope, Sir Arthur Cotton (1900); Lord Curzon in India (1905); T. W. Holderness, Narrative of the Famine of i8q6-i8q7 {c. 8812 of "°"° 1 " the Indian Famine Commission reports of 1880, 1898 and

1900; report of the Indian Irrigation Commission (1901-1903); C. W. McMinn, Famine Truths, Half-Truths, Untruths (1902); Theodore Morison, Indian Industrial Organization (1906).

FAN (Lat. vannus; Fr. eventail), in its usually restricted meaning, a light implement used for giving motion to the air in order to produce coolness to the face; the word is, however, also applied to the winnowing fan, for separating chaff from grain, and to various engineering appliances for ventilation, &c. Ventilabrum and flabellum are names under which ecclesiastical fans are mentioned in old inventories. Fans for cooling the face have. been in use in hot climates from remote ages. A bas-relief in the British Museum represents Sennacherib with female figures carrying feather fans. They were attributes of royalty along with horse-hair fly-flappers and umbrellas. Examples may be seen in plates of the Egyptian sculptures at Thebes and other places, and also in the ruins of Persepolis. In the museum of Boulak, near Cairo, a wooden fan handle showing holes for feathers is still preserved. It is from, the tomb of Amen- hotep, of the 18th dynasty, 17th century B.C. In India fans were also attributes of men in authority, and sometimes sacred emblems. A heart-shaped fan, with an ivory handle, of unknown age, and held in great veneration by the Hindus, was given to King Edward VII. when prince of Wales. Large punkahs or screens, moved by a servant who does nothing else, are in common use in hot countries, and particularly India.

Fans were used in the early middle ages to keep flies from the sacred elements during the celebrations of the Christian mysteries. Sometimes they were round, with bells attached— of silver or silver gilt. Notices of such fans in the ancient records of St Paul's, London, Salisbury cathedral and many other churches exist still. For these purposes they are no longer used in the Western church, though they are retained in some Oriental rites. The large feather fans, however, are still carried in the state processions of the supreme pontiff in Rome, though not used during the celebration of the mass. The fan of

Queen Theodo- linda (7th century) is still preserved in the treasury of the cathedral of Monza. Fans made part of the bridal outfit, or mundus muliebris, of Roman ladies.

Folding fans had their origin in Japan, and were imported thence to China. They were in the shape still used—a segment of a circle of paper pasted on a light radiating framework of bamboo, and variously decorated, some in colours, others of white paper on which verses or sentences are written. It is a

compliment in China to invite a friend or distinguished guest to write some sentiment on your fan as a memento of any special occasion, and this practice has continued. A fan that has Some celebrity in France was presented by the Chinese ambassador to the comtesse de Clauzel at the coronation of Napoleon I. in 1804. When a site was given in 1635, on an artificial island, for the settlement of Portuguese merchants in Nippo in Japan, the space was laid out in the form of a fan as emblematic of an object agreeable for general use. Men and women of every rank both in China and Japan carry fans, even artisans using them with one hand while working with the other. In China they are often made of carved ivory, the sticks being plates very thin and sometimes carved on both sides, the intervals between the carved parts pierced with astonishing delicacy, and the plates held together by a ribbon. The Japanese make the two outer guards of the stick, which cover the others, occasionally of beaten iron, extremely thin and light, damascened with gold and other metals.

Fans were used by Portuguese ladies in the 14th century, and were well known in England before the close of the reign of Richard II. In France the inventory of Charles V. at the end of the 14th century mentions a folding ivory fan. They were brought into general use in that country by Catherine de' Medici, probably from Italy, then in advance of other countries in all matters of personal luxury. The court ladies of Henry VIII. 's reign in England were used to handling fans. A lady in the "Dance of Death" by Holbein holds a fan. Queen Elizabeth is painted with a round feather fan in her portrait at Gorham- bury; and as many as twenty-seven are enumerated in her inventory (1606). Coryat, the English traveller,in 1608 describes them as common in Italy. They also became of general use from that time in Spain. In Italy, France and Spain fans had special conventional uses, and various actions in handling them grew into a code of signals, by which

ladies were supposed to convey hints or signals to admirers or to rivals in society. A' paper in the Spectator humorously proposes to establish a regular drill for these purposes.

The chief seat of the European manufacture of fans during the 17th century was Paris, where the sticks or frames, whether of wood or ivory, were made, and the decorations painted on mounts of very carefully prepared vellum (incorrectly called chicken skin) — a material stronger and tougher than paper, which breaks at the folds. Paris makers exported fans unpainted to Madrid and other Spanish cities, where they were decorated by native artists. Many were exported complete; of old fans called Spanish a great number were in fact made in France. Louis XIV. issued edicts at various times to regulate the manu- facture. Besides fans mounted with parchment, Dutch fans of ivory were imported into Paris, and decorated by the heraldic painters in the process called " Vernis Martin," after a famous carriage painter and inventor of colourless lac varnish. Fans of this kind belonging to Queen Victoria and the baroness de Rothschild were exhibited in 1870 at Kensington. A fan of the date of 1660, representing sacred subjects, is attributed to Philippe de Champagne, another to Peter Oliver in England in the 17th century. Cano de Arevalo, a Spanish painter of the 17th century, devoted himself to fan painting. Some harsh expressions of Queen Christina to the young ladies of the French court are said to have caused an increased ostentation in the splendour of their fans, which were set with jewels and mounted in gold. Rosalba Carriera was the name of a fan painter of celebrity in the 17th century. Le Brun and Romanelli were much employed during the same period. Klingstet, a Dutch artist, enjoyed a considerable reputation in the latter part of the 17 th and the first thirty years of the 18th century.

The revocation of the edict of Nantes drove many fan-makers out of France to Holland and England. The trade in England was well established under the Stuart sovereigns. Petitions were addressed by the fan-makers to Charles II. against the im- portation of fans from India, and a duty was levied upon such fans in consequence. This importation of Indian fans, according to Savary, extended also to France. During the reign of Louis XV. carved Indian and China fans displaced to some extent those

formerly imported from Italy, which had been painted on swanskin parchment prepared with various perfumes.

During the 18th century all the luxurious ornamentation of the day was bestowed on fans as far as they could display it. The sticks were

made of mother-of-pearl or ivory, carved with extraordinary skill in France, Italy, England and other countries. They were painted from designs of Boucher, Watteau, Lancret and other ” genre ” painters; Hebert, Rau, Chevalier, Jean Boquet, Mme. Verite, are known as fan-painters. These fashions were followed in most countries of Europe, with certain national differences. Taffeta and silk, as well as fine parchment, were used for the mounts. Little circles of glass were let into the stick to be looked through, and small telescopic glasses were sometimes contrived at the pivot of the stick. They were occasionally mounted with the finest point lace. An interesting fan (belonging to Madame de Thiac in France), the work of Le Flamand, was presented by the municipality of Dieppe to Marie Antoinette on the birth of her son the dauphin. From the time of the Revolution the old luxury expended on fans died out. Fine examples ceased to be exported to England and other countries. The painting on them represented scenes or per- sonages connected with political events. At a later period fan mounts were often prints coloured by hand. The events of the day mark the date of many examples found in modern collections. Among the fan-makers of modern days the names of Alexandre, Duvelleroy, Fayet, Vanier became well known in Paris; and the designs of Charles Conder (1868-1909) have brought his name to the front in this art. Painters of distinction often design and paint the mounts, the best designs being figure subjects. A great impulse was given to the manufacture and painting of fans in England after the exhibition which took place at South Kensington in 1870. Modern collections of fans take their date from the emigration of many noble families from France at the time of the Revolution. Such objects were given as souvenirs, and occasionally sold by families in straitened circumstances. A large number of fans of all sorts, principally those of the 18th century, French, English, German, Italian, Spanish, &c, have been bequeathed to the South Kensington (Victoria and Albert) Museum.

The sticks of folding fans are called in French brins, the two outer guards panaches, and the mount feuille.

See also Blondel, Histoire des eventails (1875); Octave Uzanne, L’eventail (1882); and especially G. Wooliscroft Rhead, History of tlie Fan (1909). (J. H. P.*)

FANCY (a shortened form, dating from the 15th century, of ” fantasy,” which is derived through the O. Fr.fantasie, modern fantaisie. from the Latinized form of the Gr. (pavracria, 4 > avTa.$tiv , aivuv, to show), display, showing forth, as a philosophical term, the presentative power of the mind. The word ” fancy ” and the older

form ” fantasy,” which is now chiefly used poetic- ally, was in its early application synonymous with imagination, the mental faculty of creating representations or images of things not present to the senses; it is more usually, in this sense, applied to the lighter forms of the imagination. ” Fancy ” also commonly means inclination, whim, caprice. The more learned form ” phantasy,” as also such words as ” phantom ” and ” phantasm,” is chiefly confined to visionary imaginings.

FANG (Fan, Fanwe, Panwe, Pahouin, Paouen, Mpangwe), a powerful African people occupying the Gabun district north of the Ogowe’ river in French Congo. Their name means ” men.” They call themselves Pa n we, Fa n we and Fa n with highly nasalized n. They are a finely-made race of chocolate colour; some few are very dark, but these are of slave origin. They have bright expressive oval faces with prominent cheek-bones. Many of them file their teeth to points. Their hair, which is woolly, is worn by the women long, reaching below the nape of the neck. The men wear it in a variety of shapes, often building it up over a wooden base. The growth of the hair appears abundant, but that on the face is usually removed. Little clothing is worn; the men wear a bark waist-cloth, the women a plantain girdle, sometimes with a bustle of dried grass. A chief wears a leopard’s skin round the shoulders. Both sexes tattoo and paint the body,

and delight in ornaments of every kind. The men, whose sole occupations are fighting and hunting, all carry arms — muskets, spears for throwing and stabbing, and curious throwing-knives with blades broader than they are long. Instead of bows and arrows they use crossbows made of ebony, with which they hunt apes and birds. In battle the Fang used to carry elephant hide shields; these have apparently been discarded.

When first met by T. E. Bowdich (1815) the Paamways, as he calls the Fang, were an inland people inhabiting the hilly plateaus north of the Ogowe affluents. Now they have become the neighbours of the Mpongwe (q.v.) of Glass and Libreville on the Komo river, while south of the Gabun they have reached the sea at several points. Their original home is probably to be placed somewhere near the Congo. Their language, according to Sir R. Burton, is soft and sweet and a contrast to their harsh voices, and the vocabularies collected prove it to be of the Bantu- Negroid linguistic family. W. Win wood Reade

(Sketch Book, i. p. 108) states that ” it is like Mpongwe (a pure Bantu idiom) cut in half; for instance, njina (gorilla) in Mpongwe is nji in Fan.” The plural of the tribal name is formed in the usual Bantu way, Ba-Fang.

Morally the Fang are superior to the negro. Mary Kingsley writes: ” The Fan is full of fire, temper, intelligence and go, very teachable, rather difficult to manage, quick to take offence, and utterly indifferent to human life.” This latter characteristic has made the Fang dreaded by all their neighbours. They are noted cannibals, and ferocious in nature. Prisoners are badly treated and are often allowed to starve. The Fang are always fighting, but the battles are not bloody. After the fall of two or three warriors the bodies are dragged off to be devoured, and their friends disperse. Burton says that their cannibalism is limited to the consumption of slain enemies; that the sick are not devoured; and that the dead are decently buried, except slaves, whose bodies are thrown into the forest. Mary Kingsley, on the other hand, believed their cannibalism was not limited. She writes: ” The Fan is not a cannibal for sacrificial motives, like the negro. He will eat his next door neighbour’s relation and sell his own deceased to his next door neighbour in return, but he does not buy slaves and fatten them up for his table as some of the middle Congo tribes do. He has no slaves, no prisoners of war. no cemeteries, so you must draw your own conclusions.” Among certain tribes the aged alone are permitted to eat human flesh, which is taboo for all others. There is no doubt that the cannibalism of the Fang is diminishing before the advance of civilization. Apart from their ferocity, the Fang are an agreeable and industrious people. They are skilful workers in iron and have a curious coinage called bike i, little iron imitation axeheads tied up in bundles called ntet, ten to a bundle; these are used chiefly in the purchase of wives. They are energetic traders and are skilled in pottery and in gardening. Their religion appears to be a cpmbination of primitive animism and ancestor worship, with a belief in sympathetic magic.

Bibliography. — Paul du Chaillu, Explorations in Equatorial Africa (1861) ; Sir R. Burton, ” A Day with the Fans,” Transactions of Ethnological Society, new series, vols. 3-4 ; Mary Kingsley, Travels in West Africa (1897) ; Oscar Lenz, Skizzen aus West Africa (1878) ; R. E. Dennett, Notes on the Folklore of the Fjort (1898); William Winwood Reade, The African Sketch Book (1873); and (chiefly) A. L. Bennett, ” Ethnographical Notes on the Fang,” Joum. Anthr. Inst. N.S., ii. p. 66, and L. Martron in Anthropos, t. i. (1906), fasc. 4.

FANO (anc. Fanum Fortunae, q.v.), a town and episcopal sec of the

Marches, Italy, in the province of Pesaro and Urbino, 8 m. S.E. of the former by rail, and 46 ft. above sea-level, on the N.E. coast of Italy. Pop. (1901), town 10,535, commune 24,730. The cathedral has a 13th century portal, but the interior is unimportant. The vestibule of S. Francesco contains the tombs of some members of the Malatesta family. S. Croce and S. Maria Nuova contain works by Giovanni Santi, the father of Raphael; the latter has also two works by Perugino, the predella of one of which is attributed to Raphael. S. Agostino contains a painting of S. Angelo Custode (" the Guardian Angel "), which is the subject of a poem by Robert Browning. The fine Gothic Palazi-j della Ragione (1299) has been converted into a theatre.

The palace of the Malatesta, with fine porticos and Gothic windows, was much damaged by an earthquake in 1874. S. Michele, built against the arch of Augustus, is an early Renais- sance building (1475-1490), probably by Matteo Nuzio of Fano, with an ornate portal. The facade has an interesting relief showing the colonnade added by Constantine as an upper storey to the arch of Augustus and removed in 1463.

Fano in the middle ages passed through various political vicissitudes, and in the 14th century became subject to the Malatesta. In 1458 Pius II. added it to the states of the Church. Julius II. established here in 15 14 the first printing press with movable Arabic type. The harbour was restored by Paul V. but is now unimportant.

FANSHAWE, SIR RICHARD, Bart. (1 608-1666), English poet and ambassador, son of Sir Henry Fanshawe, remembrancer of the exchequer, of Ware Park, Hertfordshire, and of Elizabeth, daughter of Thomas Smith or Smythe, was born early in June 1608, and was educated in Cripplegate by the famous school- master, Thomas Farnaby. In November 1623 he was admitted fellow-commoner of Jesus College, Cambridge, and in January 1626 he entered the Inner Temple; but the study of the law being distasteful to him he travelled in France and Spain. On his return, an accomplished linguist, in 1 63 5, he was appointed secretary to the English embassy at Madrid under Lord Aston. At the outbreak of the Civil War he joined the king, and while at Oxford in 1644 married Anne, daughter of Sir John Harrison of Balls, Hertfordshire. About the same time he was appointed secretary at war to the prince of Wales, with whom he set out in 1645 for the western counties, Scilly, and afterwards Jersey. He compounded in 1646 with the parliamentary authorities, and was allowed to live in London till October 1647, visiting Charles I. at Hampton Court. In 1647 he published his transla- tion of the Pastor Fido of Guarini, which he reissued in 1648 with the addition of

several other poems, original and translated. In 1648 he was appointed treasurer to the navy under Prince Rupert. In November of this year he was in Ireland, where he actively engaged in the royalist cause till the spring of 1650, when he was despatched by Charles II. on a mission to obtain help from Spain. This was refused, and he joined Charles in Scotland as secretary. On the 2nd of September 1650 he had been created a baronet. He accompanied Charles in the expedition into England, and was taken prisoner at the battle of Worcester on the 3rd of September 1651. After a confinement of some weeks at Whitehall, he was allowed, with restrictions, and under the supervision of the authorities, to choose his own place of residence. He published in 1652 his Selected Parts of Horace, a translation remarkable for its fidelity, felicity and elegance. In 1654 he completed translations of two of the comedies of the Spanish poet Antonio de Mendoza, which were published after his death, Querer per solo querer: To Love only for Love's Sake, in 1670, and Fiestas de Aranjuez in 167 1. But the great labour of his retirement was the translation of the Lusiad, by Camoens published in 1655. It is in ottava rima, with the translation prefixed to it of the Latin poem Furor Petroniensis. In 1658 he published a Latin version of the Faithful Shepherdess of Fletcher.

In April 1659 Fanshawe left England for Paris, re-entered Charles's service and accompanied him to England at the Restoration, but was not offered any place in the administration. In 1661 he was returned to parliament for the university of Cambridge, and the same year was sent to Portugal to negotiate the marriage between Charles II. and the infanta. In January 1662 he was made a privy councillor of Ireland, and was appointed ambassador again to Portugal in August, where he remained till August 1663. He was sworn a privy councillor of England on the 1st of October. In January 1664 he was sent as ambassador to Spain, and arrived at Cadiz in February of that year. He signed the first draft of a treaty on the 17th of December/which offered advantageous concessions to English trade, but of which one condition was that it should be confirmed by his government before a certain date. In January 1666 Fanshawe went to Lisbon to procure the adherence of Portugal to this agreement. He

returned to Madrid, having failed in his mission, and was almost immediately recalled by Clarendon on the plea that he had exceeded his instructions. He died very shortly afterwards before leaving

Madrid, on the 26th of June 1666. He had a family of fourteen children, of whom five only survived him, Richard, the youngest, succeeding as second baronet and dying unmarried in 1694.

As a translator, whether from the Italian, Latin, Portuguese or Spanish, Fanshawe has a considerable reputation. His Pastor Fido and his Lusiad have not been superseded by later scholars, and his rendering of the latter is praised by Southey and Sir Richard Burton. As an original poet also the few verses he has left are sufficient evidence of exceptional literary talent.

Authorities. — Memoirs of Lady Fanshawe, written in 1676 and published 1829 (from an inaccurate transcript); these were re- printed from the original manuscript and edited by H. C. Fanshawe (London, 1907) ; article in the Diet, of Nat. Biography and authorities there quoted ; Biographia Brit. (Kippis) ; Original Letters of Sir R. F. (2 vols., 1724), the earlier edition of 1702 with portrait being only vol. i. of this edition ; Notes Genealogical and Historical of tlw Fanshawe Family (1868-1872); funeral sermon by H. Bagshaw; Nicholas Papers (Camden Society) ; Quarterly Review, xxvii. I ; Macmillan's Mag. lvii. 279 ; Camoen's Life and Lusiads, by Sir F. Burton, i. 135; Clarendon's State Papers, Calendars of State Papers, Autobiography and Hist, of the Rebellion; Athenaeum (1883), i. 121; Add. MSS. British Museum, 15,228 (poems); Harl. MSS. Brit. Mus. 7010 (letters). (P. C. Y.)

FANTAN, a form of gambling highly popular among the Chinese. The game is simple. A square is marked in the centre of an ordinary table, or a square piece of metal is laid on it, the sides being marked 1, 2, 3 and 4. The banker puts on the table a double handful of small coins — in China " cash " — or similar articles, which he covers with a metal bowl. The players bet on the numbers, setting their stakes on the side of the square which bears the number selected. When all have staked, the bowl is removed, and the banker or croupier with a small stick removes coins from the heap, four at a time, till the final batch is reached. If it contains four coins, the backer of No. 4 wins; if three, the backer of No. 3 wins, and so on. Twenty-five per cent is deducted from the stake by the banker, and the winner receives five times the amount of his stake thus reduced. In Macao, the Monte Carlo of China, play goes on day and night, every day of the week, and bets can be made from 5 cents to 500 dollars, which are the limits.

Fantan is also the name of a card game, played with an ordinary pack, by any number of players up to eight. The deal decided, the cards are dealt singly, any that are left over forming a stock, and being placed face downwards on the table. Each player contributes a fixed stake or

” ante.” The first player can enter if he has an ace; if he has not he pays an ” ante ” and takes a card from the stock; the second player is then called upon and acts similarly till an ace is played. This (and the other aces when played) is put face upwards on the table, and the piles are built up from the ace to the king. The pool goes to the player who first gets rid of all his cards. If a player fails to play, having a playable card, he is fined the amount of the ante for every card in the other players’ hands.

FANTASIA (Italian for ” fantasy,” a causing to be seen, from Greek, 4 > aiveiv, to show), a name in music sometimes loosely used for a composition which has little structural form, and appears to be an improvization; and also for a combination or medley of familiar airs connected together with original passages of more or less brilliance. The word, however, was originally applied to more formal compositions, based on the madrigal, for several instruments. Fantasias appear as distinct com- positions in Bach’s works, and also joined to a fugue, as in the ” Great Fantasia and Fugue ” in A minor, and the ” Fantasia cromatica ” in D minor. Brahms used the name for his shorter piano pieces. It is also applied to orchestral compositions ” not long enough to be called symphonic poems and not formal enough to be called overtures ” (Sir C. Hubert Parry, in Grove’s Dictionary of Music, ed. 1906). The Italian word is still used in Tunis, Algeria and Morocco, with the meaning of ” showing off,” for an acrobatic exhibition of horsemanship by the Arabs.

The riders fire their guns, throw them and their lances into the air, and catch them again, standing or kneeling in the saddle, all at a full gallop.

FANTI, MANFREDO (1806-1865), Italian general, was born at Carpi and educated at the military college of Modena. In 183 1 he was implicated in the revolutionary movement organized by Ciro Menotti (see Francis IV., of Modena), and was con- demned to death and hanged in effigy, but escaped to France, where he was given an appointment in the French corps of engineers. In 1833 he took part in Mazzini’s abortive attempt to invade Savoy, and in 1835 he went to Spain to serve in Queen Christina’s army against the Carlists. There he remained fo»’ thirteen years, distinguishing himself in battle and rising to a high staff appointment. But on the outbreak of the war between Piedmont and Austria in 1848 he hurried back to Italy, and although at first his services were rejected both by the Pied- montese government and the Lombard provisional government, he was afterwards given the command of a Lombard brigade. In the general confusion following on Charles Albert’s defeat on the Mincio and his

retreat to Milan, where the people rose against the unhappy king, Fanti's courage and tact saved the situation. He was elected member of the Piedmontese chamber in 1849, and on the renewal of the campaign he again commanded a Lombard brigade under General Ramorino. After the Pied- montese defeat at Novara (23rd of March) peace was made, but a rising broke out at Genoa, and Fanti with great difficulty restrained his Lombards from taking part in it. But he was suspected as a Mazzinian and a soldier of fortune by the higher Piedmontese officers, and they insisted on his being court- martialled for his operations under Ramorino (who had been tried and shot). Although honourably acquitted, he was not employed again until the Crimean expedition of 1855. In the second Austrian war in 1859 Fanti commanded the 2nd division, and contributed to the victories of Palestro, Magenta and San Martino. After the peace of Villafranca he was sent to organize the army of the Central Italian League (composed of the pro- visional governments of Tuscany, Modena, Parma and Romagna), and converted it in a few months into a well-drilled body of 45,000 men, whose function was to be ready to intervene in the papal states on the outbreak of a revolution. He showed statesmanlike qualities in steering a clear course between the exaggerated prudence of Baron Ricasoli, who wished to recall the troops from the frontier, and the impetuosity of Garibaldi, his second-in-command, who was anxious to invade Romagna prematurely, even at the risk of Austrian intervention. Fanti's firmness led to Garibaldi's resignation. In January i860 Fanti became minister of war and marine under Cavour, and incorporated the League's army in that of Piedmont. In the meanwhile Garibaldi had invaded Sicily with his Thousand, and King Victor Emmanuel decided at last that he too must intervene; Fanti was given the chief command of a strong Italian force which invaded the papal states, seized Ancona and other fortresses, and defeated the papal army at Castel- fidardo, where the enemy's commander, General Lamoriciere, was captured. In three weeks Fanti had conquered the Marche and TJmbria and taken 28,000 prisoners. When the army entered Neapolitan territory the king took the chief command, with Fanti as chief of the staff. After defeating a large Neapolitan force at Mola and organizing the siege operations round Gaeta, Fanti returned to the war office at Turin to carry out important army reforms. His attitude in opposing the admission of Garibaldi's 7000 officers into the regular army with their own grades made him the object of great unpopularity for a time, and led to a severe reprimand from Cavour. On the death of the latter (7th of June 1861) he resigned office and took command of the VII. army corps. But his health had now broken down, and after four years' suffering he died in Florence on the 5th of April 1865. His lose was greatly felt in the war of 1866.

See Carandini, Vita di M. Fanti (Verona, 1872); A. Di Giorgio, II Generate M. Fanti (Florence, 1906). (L.V.*)

FANTI, a nation of Negroes, inhabiting part of the seaboard of the Gold Coast colony, British West Africa, and about 20,000

sq. m. of the interior. They number about a million. They have many traditions of early migrations. It seems probable that the Fanti and Ashanti were originally one race, driven from the north-east towards the sea by more powerful races, possibly the ancestors of Fula and Hausa. There are many words in Fanti for plants and animals not now existing in the country, but which abound in the Gurunsi and Moshi countries farther north. These regions have been always haunted by slave-raiders, and possibly these latter may have influenced the exodus. At any rate, the Fanti were early driven into the forests from the open plains and slopes of the hills. The name Fanti, an English version of Mfantsi, is supposed to be derived from fan, a wild cabbage, and ti, di or dz, to eat ; the story being that upon the exile of the tribe the only available food was some such plant. They are divided into seven tribes, obviously totemic, and with rules as to exogamy still in force. (1) Kwonna, buffalo; (2) Etchwi, leopard; (3) Eso, bush-cat; (4) Nitchwa, dog; (5) Nnuna, parrot; (6) Ebradzi, lion; and (7) Abrutu, corn-stalk; these names are obsolete, though the meanings are known. The tribal marks are three gashes in front of the ear on each side in a line parallel to the jaw-bone. The Fanti language has been associated by A. B. Ellis with the Ashanti speech as the principal descendant of an original language, possibly the Tshi (pronounced Tchwi), which is generally considered as the parent of Ashanti, Fanti, Akim, Akwapim and modern Tshi.

The average Fanti is of a dull brown colour, of medium height, with negroid features. Some of the women, when young, are quite pretty. The women use various perfumes, one of the most usual being prepared from the excrement of snakes. There are no special initiatory rites for the youthful Fanti, only a short seclusion for girls when they reach the marriageable age. Marriage is a mere matter of sale, and the maidens are tricked out in all the family finery and walk round the village to indicate that they are ready for husbands. The marriages frequently end in divorce. Polygamy is universally practised. The care of the children is left exclusively to the mothers, who are regarded by the Fanti with deep veneration, while little attention is paid to the

fathers. Wives never eat with their husbands, but always with the children. The rightful heir in native law is the eldest nephew, i.e. the eldest sister's eldest son, who invariably inherits wives, children and all property. As to tenure of land, the source of ownership of land is derived from the possession of the chief's " stool," which is, like the throne of a king, the symbol of authority, and not even the chief can alienate the land from the stool. Females may succeed to property, but generally only when the acquisition of such property is the result of their succeeding to the stool of a chief. The Fanti are not permanent cultivators of the soil. Three or at most five years will cover the period during which land is continuously cultivated. The commonest native dishes are palm-oil chop, a bowl of palm oil, produced by boiling freshly ground palm nuts, in which a fowl or fish is then cooked; and ficfu, " white," a boiled mash of yams or plantains. The Fanti have a taste for shark-flesh, called locally " stink-fish." It is sliced up and partly sun-dried, and is eaten in a putrid state. The Fanti are skilful sailors and fishermen, build excellent canoes, and are expert weavers. Pottery and goldsmithery are trades also followed. Their religion is fetishism, every Fanti having his own " fetish " or familiar spirit, but there is a belief in a beneficent Creative Being. Food is offered the dead, and a ceremony of purification is said to be indulged in at funerals, the bearers and mourners plunging into the sea or river after the interment.

See Journal of Anthropological Institute of Great Britain, vol. 26j pp. 128 et seq.; A. B. Ellis, The Tshi-speaking Peoples of the Gold Coast (London, 1887).

FANTIN-LATOUR, IGNACE HENRI JEAN THEODORE

(1836-1904), French artist, was born at Grenoble on the 14th of January 1836. He studied first with his father, a pastel painter, and then at the drawing school of Lecoq de Boisbaudran, and later under Couture. He was the friend of Ingres, Dalacroix, Corot, Courbet and others. He exhibited in the Salon of 1861, and many of his more important canvases appeared on its walls

in later years, though 1863 found him with Harpignies, Manet, Legros and Whistler in the Salon des Refuses. Whistler intro- duced him to English artistic circles, and he lived for some time in England, many of his portraits and flower pieces being in English galleries. He died on the 28th of August 1904. His portrait groups, arranged somewhat after the manner of the Dutch masters, are as interesting from their subjects as they are from the artistic point of view. " Homniaged Delacroix " showed portraits of Whistler and Legros, Baudelaire, Champfleury and

himself; ” Un Atelier a Batignolles ” gave portraits of Monet, Manet, Zola and Renoir, and is now in the Luxembourg; ” Un Coin de table ” presented Verlaine, Rimbaud, Camille Peladan and others; and ” Autour du Piano ” contained portraits of Chabrier, DTndy and other musicians. His paintings of flowers are perfect examples of the art, and form perhaps’ the most famous section of his work in England. In his later years he devoted much attention to lithography, which had occupied him as early as 1862, but his examples were then considered so revolutionary, with their strong lights and black shadows, that the printer refused to execute them. After ” L’ Anniversaire ” in honour of Berlioz in the Salon cf 1876, he regularly exhibited ; lithographs, some of which were excellent examples of delicate portraiture, others being elusive and imaginative drawings illustrative of the music of Wagner (whose cause he championed in Paris as early as 1864), Berlioz, Brahms and other composers. He illustrated Adolphe Jullien’s Wagner (1886) and Berlioz (1888). There are excellent collections of his lithographic work at Dresden, in the British Museum, and a practically complete set given by his widow to the Louvre. Some were also exhibited at South Kensington in 1 898-1899, and at the Dutch gallery in 1904.

A catalogue of the lithographs of Fantin-Latour was drawn up by Germain Hediard in Les Maitres de la lithographie (1898-1899). A volume of reproductions, in a limited edition, was published (Paris, 1907) as L’CEuvre lithographique de Fantin-Latour. See A. Jullieft, Fantin-Latour, sa vie et ses amities (Paris, 1909).

FANUM FORTUNAE (mod. Fano), an ancient town of Umbria, Italy, at the point where the Via Flaminia reaches the N.E. coast of Italy. Its name shows that it was of Roman origin, but of its foundation we know nothing. It is first mentioned, with Pisaurum and Ancona, as held by Julius Caesar in 49 B.C. Augustus planted a colony there, and round it constructed a wall (of which some remains exist), as is recorded in the inscrip- tion on the triple arch erected in his honour at the entrance to the town (a.d. 9-10), which is still standing. Vitruvius tells us that there was, during Augustus’s lifetime, a temple in his honour and a temple of Jupiter, and describes a basilica of which he himself was the architect. The arch of Augustus bears a subsequent inscription in honour of Constantine, added after his death by L. Turcius Secundus, corrector Flaminiae et Piceni, who also constructed a colonnade above the arch. Several Roman statues and heads, attributable to members of the Julio- Claudian dynasty, were found in the convent of S. Filippo in 1899. These and other objects are now in the municipal museum (E. Brizio in Notizie degli scavi, 1899, 249 seq.). Of the temple of Fortune from which the town took its name no

traces have been discovered. (T. As.)

FAN VAULT, in architecture, a method of vaulting used in the Perpendicular style, of which the earliest example is found in the cloisters of Gloucester cathedral, built towards the close of the 14th century. The ribs are all of one curve and equidistant, and their divergency, resembling that of an open fan, has suggested the name. One of the finest examples, though of later date (1640), is the vault over the staircase of Christ Church, Oxford._ For the origin of its development see Vault.

FARABI [Abu Nasr Muhammad ibn Tarkhan ul-Farabi] (ca. 870-950), Arabian philosopher, was born of Turkish stock at Farab in Turkestan, where also he spent his youth. Thence he journeyed to Bagdad, where he learned Arabic and gave himself to the study of mathematics, medicine and philosophy, especially the works of Aristotle. Later he went to the court of the Hamdanid Saif addaula, from whom he received a warm welcome and a small pension. Here he lived a quiet if not an ascetic life.

He died in Damascus, whither he had gone with his patron. His works are very clear in style, though aphoristic rather than systematic in the treatment of subjects. Unfortunately the success of Avicenna seems to have led to the neglect of much of his work. In Europe his compendium of Aristotle's Rhetoric was published at Venice, 1484. Two of his smaller works appear in Alpharabii opera omnia (Paris, 1638), and two are translated in F. A. Schmolders' Documcnta philosophise Arabum (Bonn, 1836). More recently Fr. Dieterici has published at Leiden: Alfarabi's philosophische Abhandlungen (1890; German trans. 1892); Alfarabi's Abhandlung des Musterstaats (1895; German trans, with an essay " tlber den Zusammenhang der arabischen und griechischen Philosophie," 1900); Die Staatsleitung von A Ifarabi in German, with an essay on " Das Wesen der arabischen Philosophie" (1904).

For Farabi's life see McG. de Slane's translation of Ibn Khallikan (vol. 3, pp. 307 ff.) ; and for further information as to his works M. Steinschneider's article in the Memoires de VAcademie (St Petersburg, serie 7, torn. 13, No. 4, 1869); and C. Brockelmann's Gesch. derarab. Litteratur, vol. i. (Weimar, 1898), pp. 210-213. (G. W.T.)

FARADAY, MICHAEL (1 791-1867), English chemist and physicist, was born at Newington, Surrey, on the 22nd of Sep- tember 1791. His parents had migrated from Yorkshire to London, where his father worked as a blacksmith. Faraday him- self became apprenticed to a bookbinder. The letters written to his friend Benjamin Abbott at this time give a lucid account of his aims in life, and of his methods of self-culture, when his mind was beginning to turn to the experimental study of nature. In 18 1 2 Mr Dance, a customer of his master, took him to hear four lectures by Sir Humphry Davy. Faraday took notes of these lectures, and afterwards wrote them out in a fuller form. Under the encouragement of Mr Dance, he wrote to Sir H. Davy, enclosing these notes. ” The reply was immediate, kind and favourable.” He continued to work as a journeyman bookbinder till the 1st of March 1813, when he was appointed assistant in the laboratory of the Royal Institution of Great Britain on the recommendation of Davy, whom he accompanied on a tour through France, Italy and Switzerland from October 1813 to April 181 5. He was appointed director of the laboratory in 1825; and in 1833 he was appointed Fullerian professor of chemistry in the institution for life, without the obligation to deliver lectures. He thus remained in the institution for fifty- four years. He died at Hampton Court on the 25th of August

1867.

Faraday’s earliest chemical work was in the paths opened by Davy, to whom he acted as assistant. He made -a special study of chlorine, and discovered two new chlorides of carbon. He also made the first rough experiments on the diffusion of gases, a phenomenon first pointed out by John Dalton, the physical importance of which was more fully brought to light by Thomas Graham and Joseph Loschmidt. He succeeded in liquefying several gases; he investigated the alloys of steel, and produced several new kinds of glass intended for optical purposes. A specimen of one of these heavy ‘ glasses afterwards became historically important as the substance in which Faraday detected the rotation of the plane of polarization of light when the glass was placed in the magnetic field, and also as the substance which was first repelled by, the poles of the magnet. He also endeavoured with some success to make the general methods of chemistry, as distinguished from its results, the subject of special study and of popular exposition. See his work on Chemical Manipulation.

• But Faraday’s chemical work, however important in itself, was soon completely overshadowed by his electrical discoveries. The first experiment which he has recorded was the construction of a voltaic

pile with seven halfpence, seven disks of sheet zinc, and six pieces of paper moistened with salt water. With this pile he decomposed sulphate of magnesia (first letter to Abbott, July 12, 181 2). Henceforward, whatever other subjects might from time to time claim his attention, it was from among electrical phenomena that he selected those problems to which he applied the full force of his mind, and which he kept persistently in view.

even when year after year his attempts to solve them had been baffled.

His first notable discovery was the production of the con- tinuous rotation of magnets and of wires conducting the electric current round each other. The consequences deducible from the great discovery of H. C. Oersted (21st July 1820) were still in 1821 apprehended in a somewhat confused manner even by the foremost men of science. Dr W. H. Wollaston indeed had formed the expectation that he could make the conducting wire rotate on its own axis, and in April 182 1 he came with Sir H. Davy to the laboratory of the Royal Institution to make an experiment. Faraday was not there at the time, but coming in afterwards he heard the conversation on the expected rotation of the wire.

In July, August and September of that year Faraday, at the request of R. Phillips, the editor of the Annals of Philosophy, wrote for that journal an historical sketch of electro-magnetism, and he repeated almost all the experiments he described. This led him in the beginning of September to discover the method of producing the continuous rotation of the wire round the magnet, and of the magnet round the wire. He did not succeed in making the wire or the magnet revolve on its own axis. This first success of Faraday in electro-magnetic research became the occasion of the most painful, though unfounded, imputations against his honour. Into these we shall not enter, referring the reader to the Life of Faraday, by Dr Bence Jones.

We may remark, however, that although the fact of the tan- gential force between an electric current and a magnetic pole was clearly stated by Oersted, and clearly apprehended by A. M. Ampere, Wollaston and others, the realization of the continuous rotation of the wire and the magnet round each other was a scientific puzzle requiring no mean ingenuity for its original solution. For on the one hand the electric current always form3 a closed circuit, and on the other the two poles of the magnet have equal but opposite properties, and are inseparably connected, so that whatever tendency there is for one pole to circulate round the current in one direction is opposed by

the equal tendency of the other pole to go round the other way, and thus the one pole can neither drag the other round and round the wire nor yet leave it behind. The thing cannot be done unless we adopt in some form Faraday's ingenious solution, by causing the current, in some part of its course, to divide into two channels, one on each side of the magnet, in such a way that during the revolution of the magnet the current is transferred from the channel in front of the magnet to the channel behind it, so that the middle of the magnet can pass across the current without stopping it, just as Cyrus caused his army to pass dryshod over the Gyndes by diverting the river into a channel cut for it in his rear.

We must now go on to the crowning discovery of the induction of electric currents.

In December 1824 he had attempted to obtain an electric current by means of a magnet, and on three occasions he had made elaborate but unsuccessful attempts to produce a current in one wire by means of a current in another wire or by a magnet. He still persevered, and on the 29th of August 183 1 he obtained the first evidence that an electric current can induce another in a different circuit. On the 23rd of September he writes to his friend R. Phillips: " I am busy just now again on electro- magnetism, and think I have got hold of a good thing, but can't say. It may be a weed instead of a fish that, after all my labour, I may at last pull up." This was his first successful experiment. In nine more days of experimenting he had arrived at the results described in his first series of "Experimental Researches" read to the Royal Society on the 24th of November 1841. By the intense application of his mind he had thus brought the new idea, in less than three months from its first development, to a state of perfect maturity.

During his first period of discovery, besides the induction of electric currents, Faraday established the identity of the electri- fication produced in different ways; the law of the definite electrolytic action of the current; and the fact, upon which he

laid great stress, that every unit of positive electrification is related in a definite manner to a unit of negative electrification, so that it is impossible to produce what Faraday called " an absolute charge of electricity " of one kind not related tc an equal charge of the opposite kind. He also discovered the difference of the capacities of different

substances for taking part in electric induction- Henry Cavendish had before 1773 discovered that glass, wax, rosin and shellac have higher specific inductive capacities than air, and had actually determined the numerical ratios of these capacities, but this was unknown both to Faraday and to all other electricians of his time, since Caven- dish's Electrical Researches remained unpublished till 1879.

The first period of Faraday's electrical discoveries lasted ten years. In 184 1 he found that he required rest, and it was not till 1845 that he entered on his second great period of research, in which he discovered the effect of magnetism on polarized light, and the phenomena of diamagnetism.

Faraday had for a long time kept in view the possibility of using a ray of polarized light as a means of investigating the condition of transparent bodies when acted on by electric and magnetic forces. Dr Bence Jones (Life of Faraday, vol. i. p. 362) gives the following note from his laboratory book on the 10th of September 1822: —

" Polarized a ray of lamplight by reflection, and endeavoured to ascertain whether any depolarizing action (was) exerted on it by water placed between the poles of a voltaic battery in a glass cistern ; one Wollaston's trough used; the fluids decomposed were pure water, weak solution of sulphate of soda, and strong sulphuric acid; none of them had any effect on the polarized light, either when out of or in the voltaic circuit, so that no particular arrangement of particles could be ascertained in this way."

Eleven years afterwards we find another entry in his notebook on the 2nd of May 1833 {Life, by Dr Bence Jones, vol. ii. p. 29). He then tried not only the effect of a steady current, but the effect on making and breaking contact.

" I do not think, therefore, that decomposing solutions or sub- stances will be found to have (as a consequence of decomposition or arrangement for the time) any effect on the polarized ray. Should now try non-decomposing bodies, as solid nitre, nitrate of silver, borax, glass, &c, whilst solid, to see if any internal state induced, which by decomposition is destroyed, i.e. whether, when they can- not decompose, any state of electrical tension is present. My borate of glass good, and common electricity better than voltaic."

On the 6th of May he makes further experiments, and con- cludes: " Hence I see no reason to expect that any kind of structure or tension can be rendered evident, either in decom- posing or non-decomposing

bodies, in insulating or conducting states."

At last, in 1845, Faraday attacked the old problem, but this time with complete success. Before we describe this result we may mention that in 1862 he made the relation between magnet- ism and light the subject of his very last experimental work. He endeavoured, but in vain, to detect any change in the lines of the spectrum of a flame when the flame was acted on by a powerful magnet.

This long series of researches is an instance of his persistence. His energy is shown in the way in which he followed up his discovery in the single instance in which he was successful. The first evidence which he obtained of the rotation of the plane of polarization of light under the action of magnetism was on the 13th of September 1845, the transparent substance being his own heavy glass. He began to work on the 30th of August 1845 on polarized light passing through electrolytes. After three days he worked with common electricity, trying glass, heavy optical glass, quartz, Iceland spar, all without effect, as on former trials. On the 13th of September he worked with lines of magnetic force. Air, flint, glass, rock-crystal, calcareous spar were examined, but without effect.

" Heavy glass was experimented with. It gave no effects when the same magnetic poles or the contrary poles were on opposite sides (as respects the course of the polarized ray), nor when the same poles were on the same side either with the constant or intermitting current. But when contrary magnetic poles were on the same side there was an effect produced on the polarized ray, and thus magnetic force and light were proved to have relations tc each other. This

fact will most likely prove exceedingly fertile, and of great value in the investigation of the conditions of natural force."

He immediately goes on to examine other substances, but with " no effect," and he ends by saying, " Have got enough for to-day." On the 18th of September he " does an excellent day's work." During September he had four days of work, and in October six, and on the 6th of November he sent in to. the Royal Society the nineteenth series of his " Experimental Researches," in which the whole conditions of the phenomena are fully speci- fied. The negative rotation in ferro-magnetic media is the only fact of importance which remained to be discovered afterwards (by M. E. Verdet in 1856).

But his work for the year was not yet over. On the 3rd of November a new horseshoe magnet came home, and Faraday immediately began

to experiment on the action in the polarized ray through gases, but with no effect. The following day he repeated an experiment which had given no result on the 6th of October. A bar of heavy glass was suspended by silk between the poles of the new magnet. ” When it was arranged, and had come to rest, I found I could affect it by the magnetic forces and give it position.” By the 6th of December he had sent in to the Royal Society the twentieth, and on the 24th of December the twenty-first, series of his ” Researches,” in which the properties of diamagnetic bodies are fully described. Thus these two great discoveries were elaborated, like his earlier one, in about three months.

The discovery of the magnetic rotation of the plane of polarized light, though it did not lead to such important practical applica- tions as some of Faraday’s earlier discoveries, has been of the highest value to science, as furnishing complete dynamical evidence that wherever magnetic force exists there is matter, small portions of which are rotating about axes parallel to the direction of that force.

We have given a few examples of the concentration of his efforts in seeking to identify the apparently different forces of nature, of his far-sightedness in selecting subjects for investiga- tion, of his persistence in the pursuit of what he set before him, of his energy in working out the results of his discoveries, and of the accuracy and completeness with which he made his final statement of the laws of the phenomenon.

These characteristics of his scientific spirit lie on the surface of his work, and are manifest to all who read his writings. But there was another side of his character, to the cultivation of which he paid at least as much attention, and which was reserved for his friends, his family and his church. His letters and his conversation were always full of whatever could awaken a healthy interest, and free from anything that might rouse ill- feeling. When, on rare occasions, he was forced out of the region of science into that of controversy, he stated the facts and let them make their own way. He was entirely free from pride and undue self-assertion. During the growth of his powers he always thankfully accepted a correction, and made use of every expedient, however humble, which would make his work more effective in every detail. When at length he found his memory failing and his mental powers declining, he gave up, without ostentation or complaint, whatever parts of his work he could no longer carry on according to his own standard of efficiency. When he was no longer able to apply his mind to science, he remained content and happy in the exercise of those kindly feelings and warm affections which he had

cultivated no less carefully than his scientific powers.

The parents of Faraday belonged to the very small and isolated Christian sect which is commonly called after Robert Sandeman. Faraday himself attended the meetings from childhood; at the age of thirty he made public profession of his faith, and during two different periods he discharged the office of elder. His opinion with respect to the relation between his science and his religion is expressed in a lecture on mental education delivered in 1854, an d printed at the end of his Researches in Chemistry and Physics.

” Before entering upon the subject, I must make one distinction which, however it may appear to others, is to me of the utmost importance. High as man is placed above the creatures around

him, there is a higher and far more exalted position within his view; and the ways are infinite in which he occupies his thoughts about the fears, or hopes, or expectations of a future life. I believe that the truth of that future cannot be brought to his knowledge by any exertion of his mental powers, however exalted they may be ; that it is made known to him by other teaching than his own, and is received through simple belief of the testimony given. Let no one suppose for an instant that the self-education I am about to commend, in respect of the things of this life, extends to any con- siderations of the hope set before us, as if man by reasoning could find out God. It would be improper here to enter upon this sub- ject further than to claim an absolute distinction between religious and ordinary belief. I shall be reproached with the weakness of refusing to apply those mental operations which I think good in respect of high things to the very highest. I am content to bear the reproach. Yet even in earthly matters I believe that ‘ the in- visible things of Him from the creation of the world are clearly seen, being understood by the things that are made, even His eternal power and Godhead ‘ ; and I have never seen anything incompatible between those things of man which can be known by the spirit of man which is within him and those higher things con- cerning his future, which he cannot know by that spirit.”

Faraday gives the following note as to this lecture : — ” These observations were delivered as a lecture before His Royal Highness the Prince Consort and the members of the Royal Insti- tution on the 6th of May 1854. They are so immediately connected in their nature and

origin with my own experimental life, considered either as cause or consequence, that I have thought the close of this volume not an unfit place for their reproduction.”

As Dr Bence Jones concludes —

” His standard of duty was supernatural. It was not founded on any intuitive ideas of right and wrong, nor was it fashioned upon any outward experiences of time and place, but it was formed entirely on what he held to be the revelation of the will of God in the written word, and throughout all his life his faith led him to act up to the very letter of it.”

Published Works. — Chemical Manipulation, being Instructions to Students in Chemistry (1 vol., John Murray, 1st ed. 1827, 2nd 1830, 3rd 1842); Experimental Researches in Electricity, vols. i. and ii., Richard and John Edward Taylor, vols. i. and ii. (1844 and 1847); vol. iii. (1844) ; vol. iii. Richard Taylor and William Francis (1855) ; Experimental Researches in Chemistry and Physics, Taylor and Francis (1859) ; Lectures on the Chemical History of a Candle (edited by W. Crookes) (Griffin, Bohn & Co., 1861); On the Various Forces in Nature (edited by W. Crookes) (Chatto & Windus, no date).

Biographies. — Faraday as a Discoverer , by John Tyndall (Longmans, 1st ed. 1868, 2nd ed. 1876); The Life and Letters of_ Faraday, by Dr Bence Jones, secretary of the Royal Institution, in 2 vols. (Longmans, 1870); Michael Faraday, by J. H. Gladstone, Ph.D., F.R.S. (Macmillan, 1872); Michael Faraday; his Life and Work, by S. P. Thompson (1898). (J. C. M.)

FARAH, a river of Afghanistan. It rises in the southern slopes of Siah-Koh, which forms the southern wall of the valley of Herat, and after a south-westerly course of about 200 m. falls into the Seistan Hamun. At the town of Farah it has a width of 150 yds. in the dry season with 2 ft. of water and a clear swift stream. It is liable to floods, when it becomes impassable for weeks. The lower valley of the Farah Rud is fertile and well cultivated.

FARAH, a town of Afghanistan. It is situated on the river that bears its name on the main road between Herat and Kandahar, 160 m. S. of Herat and 225 m. W. of Kandahar. It is a place of some strategical importance, as it commands the approaches to India and Seistan from Herat. The town (2460 ft. above sea-level) is a square walled enclosure standing in the middle of the plain, surrounded with a walled rampart. Owing to its unhealthiness it is now almost deserted,

being only occupied by the Afghan regiment quartered there. It is a place of great antiquity, being probably the Phra mentioned by Isidore of Charax in the 1st century a.d. It was sacked by the armies of Jenghiz Khan, and the survivors transported to a position farther north, where there are still great ruins. The population returned to the original site after the destruction of the medieval city by Shah Abbas, and the city prospered again until its bloody siege by Nadir Shah. Subsequently under constant attacks it declined, and in 1837 the population amounting to 6000 was carried off to Kandahar. The sole industry of the town at present is the manufacture of gunpowder. In the districts east of Farah are to be found the most fanatical of the Durani Afghan tribes.

FARAZDAQ [Hammam ibn Ghalib ibn Sa'sa', known as al-Farazdaq] (ca. 641-ea. 728), Arabian poet, was born at Basra. He was of the Darim, one of the most respected divisions of the bani Tamim, and his mother was of the tribe of Dabba. His grandfather Sa'sa' was a Bedouin of great repute, his father Ghalib followed the same manner of life until Basra was founded, and was famous for his generosity and hospitality. At the age of fifteen Farazdaq was known as a poet, and though checked for a short time by the advice of the caliph Ali to devote his attention to the study of the Koran, he soon returned to making verse. In the true Bedouin spirit he devoted his talent largely to satire and attacked the bani Nahshal and the bani Fuqaim. When Ziyad, a member of the latter tribe, became governor of Basra, the poet was compelled to flee, first to Kufa, and then, as he was still too near Ziyad, to Medina, where he was well received by Sa'Id ibn ul-AsI. Here he remained about ten years, writing satires on Bedouin tribes, but avoiding city politics. But he lived a prodigal life, and his amorous verses led to his expulsion by the caliph Merwan I. Just at that time he learned of the death of Ziyad and returned to Basra, where he secured the favour of Ziyad's successor 'Obaidallah ibn Ziyad. Much of his poetry was now devoted to his matrimonial affairs. He had taken advantage of his position as guardian and married his cousin Nawar against her will. She sought help in vain from the court of Basra and from various tribes. All feared the poet's satires. At last she fled to Mecca and appealed to the pretender 'Abdallah ibn Zobair, who, however, succeeded in inducing her to consent to a confirmation of the marriage. Quarrels soon arose again. Farazdaq took a second wife, and after her death a third, to annoy Nawar. Finally he consented to a divorce pronounced by Hasan al-Basri. Another subject occasioned a long series of verses, namely his feud with his rival Jarir (q.v.) and his tribe the bani Kulaib. These poems are published as the Naka'id of Jarir and al-Farazdaq (ed. A. A. Bevan, Leiden, 1906 ff.). In political

life Farazdaq was prevented by fear from taking a large part. He seems, however, to have been attached to the house of Ali. During the reign of Moawiya I. he avoided politics, but later gave his allegiance to ‘Abdallah ibn Zobair.

The fullest account of his life is contained in J. Hell’s Das Leben Farazdaq nach seinen Gedichten (Leipzig, 1903) ; Arabian stories of him in the Kitab ul-Aghdni and in Ibn Khallikan. A portion of his poems was edited with French translation by R. Boucher (Paris, 1870); the remainder have been published by J. Hell (Munich, 1900). (G. W. T.)

FARCE, a form of the comic in dramatic art, the object of which is to excite laughter by ridiculous situations and incidents rather than by imitation with intent to ridicule, which is the province of burlesque, or by the delineation of the play of character upon character, which is that of comedy. The history of the word is interesting. Its ultimate origin is the Latin/araV«, to stuff, and with the meaning of ” stuffing ” or forcemeat it appears m old cookery books in English. In medieval Latin farsa and farsia were applied to the expansion of the Kyrie eleison in litanies, &c, by interpolating words and phrases be- tween those two words; later, to words, phrases and rhymed verses, sometimes in the vernacular, also interpolated in various parts of the service. The French farce, the form to which we owe our word, was originally the ” gag ” that the actors in the medieval drama inserted into their parts, generally to meet the popular demand for a lightening of humour or buffoonery. It has thus been used for the lighter form of comic drama (see Drama), and also figuratively for a piece of idle buffoonery, sham, or mockery.

FAREHAM, a market town in the Fareham parliamentary division of Hampshire, England, 76 m. S.W. from London by the London & South Western railway. Pop. of urban district (iqoi) 8246. It lies at the head of a creek opening into the north- western corner of Portsmouth harbour. The principal industries are the manufacture of sackings, ropes, bricks, coarse earthen- ware, terra-cotta, tobacco-pipes and leather. Fareham has a considerable trade in corn, timber and coal; the creek being accessible to vessels of 300 tons. Three miles E. of Fareham, on Portsmouth harbour, are the interesting ruins of Po - Chester

Castle, an extensive walled enclosure retaining its Norman keep, and exhibiting in its outer walls considerable evidence of Roman workmanship; Professor Haverfield, however, denies that it occupies the site of the Roman Tortus Magnus. The church of St Mary has some fine Norman portions. It belonged to an Augustinian priory founded by Henry I. At Titchfield, 3 m. W. of Fareham, are ruins of the beautiful Tudor mansion, Place House, built on the site of a Premonstratensian abbey of the 13th century, of which there are also fragments.

The fact that Fareham (Fernham, Ferham) formed part of the original endowment of the see of Winchester fixes its existence certainly as early as the 9th century. It is mentioned in the Domesday Survey as subject to a reduced assessment on account of its exposed position and liability to Danish attacks. There is evidence to show that Fareham had become a borough before 1 264, but no charter can be found. It was a mesne borough held of the bishop of Winchester, but it is probable that during the 1 8th century the privileges of the burgesses were allowed to lapse, as by 1835 it had ceased to be a borough. Fareham returned two members to the parliament of 1306, but two years later it peti- tioned against representation on the ground of expense. A fair on the 31st of October and the two following days was held under grant of Henry III. The day appears to have been afterwards changed to the 29th of June, and in the 18th century was mainly important for the sale of toys. It was abolished in 187 i. Fare- ham owed its importance in medieval times to its facilities for commerce. It was a free port and had a considerable trade in wool and wine. Later its shipping declined and in the 16th century it was little more than a fishing village. Its commercial prosperity in modern times is due to its nearness to Portsmouth.

FAREL, GUILLAUME (1489-1565), French reformer, was born of a noble family near Gap in Dauphine in 1489. His parents meant him for the military profession, but his bent being for study he was allowed to enter the university of Paris. Here he came under the influence of Jacobus Faber (Stapulensis), on whose recommendation he was appointed professor in the college of Cardinal Lemoine. In 152 1, on the invitation of Bishop Brjconnet, he repaired to Meaux, and took part in efforts of reform within the Roman communion. The persecuting measures of 1523, from which Faber found a refuge at Meaux, determined Farel to leave France. Oecolampadius welcomed him to Basel, where in 1524 he put forth thirteen theses sharply antagonizing Roman doctrine. These he defended with great ability, but with so much heat that Erasmus joined in demanding his expulsion from the city. He thought of going to Wittenberg, but his

first halt was at Strassburg, where Bucer and Capito received him kindly. At the call of Duke Ulrich of Wiirttemberg he went as preacher to Montbeliard. Displaying the same qualities which had driven him from Basel, he was forced to leave Montbeliard in the spring of 1525.

He retraced his steps to Strassburg and Basel; and, at the end of 1526, obtained a preacher's post at Aigle, then a dependency of Bern. Deeming it wise to suppress his name, he adopted the pseudonym Ursinus, with reference to his protection by Bern. Despite strenuous opposition by the monastic orders, he obtained in 1528 a licence from the authorities to preach anywhere within the canton of Bern. He extended his labours to the cantons of Neuchatel and Vaud. His vehement missionary addresses were met by mob violence, but he persevered with undaunted zeal. In October 1530 he broke into the church of Neuchatel with an iconoclastic mob, thus planting the Reformation in that city. In 1532 he visited the Waldenses. On the return journey he halted at Geneva, then at a crisis of political and religious strife. On the 30th of June 1532 the council of two hundred had ordained that in every church and cloister of the city " the pure Gospel "should be preached; against this order the bishop's vicar led the opposition. Reaching Geneva in October 1532, Farel (described in a contemporary monastic chronicle as " un chetif malheureux predicant, nomme maistre Guillaume ") at once began to preach in a room of his lodging, and soon attracted " un grand nombre de gens qui estoient advertis de sa venue et deja infects de son heresie." Summoned before the bishop's

vicar, his trial was a scene of insult and clamour, ending in his being violently thrust from the court and bidden to leave the city within three hours. He escaped with difficulty to Orbe by boat. Through the intervention of the government of Bern, liberty of worship was granted on the 28th of March 1533 to the Reformation party in Geneva. Farel, returning, achieved in a couple of years a complete supremacy for his followers. On New Year's Day 1534 the bishop interdicted all preaching un- authorized by himself, and ordered the burning of all Protestant Bibles. This was the signal for public disputations in which Farel took the leading part on the Reformation side, with the result that. by decree of the 27th of August 1535 the mass was suppressed and the reformed religion established. Calvin, on his way to Basel for a life of study, touched at Geneva, and by the importunity of Farel was there detained to become the leader of the Genevan Reformation. " The severity of the discip- linary measures which followed procured a reaction under which Farel and Calvin were banished the city in 1538. Farel was called to Neuchatel in July 1538, but his position there was made untenable, though he remained

at his post during a visita- tion of the plague. When (1 541) Calvin was recalled to Geneva, Farel also returned; but in 1542 he went to Metz to support the Reformation there. It is said that when he preached in the Dominican church of Metz, the bells were rung to drown his voice, but his voice outdid the bells, and on the next occasion he had three thousand hearers. His work was checked by the active hostility of the duke of Lorraine, and in 1544 he returned to Neuchatel. No one was more frequently and confidentially consulted by Calvin. When the trial of Servetus was in progress (1 SS3)> Calvin was anxious for FarePs presence, but he did not arrive till sentence had been passed. H e accompanied Servetus to the stake, vainly urging .him to a recantation at the last moment. A coolness with Calvin was created by Farel's marriage , at the age of sixty-nine, with a refugee widow from Rouen, of unsuitable age. By her, six years later, he had one son, who died in infancy. The vigour and fervency of his preaching were unabated by length of years. Calvin's death, in 1564, affected him deeply. Yet in his last year he revisited Metz, preaching amid great enthusiasm, with all his wonted fire. The effort was too much for him; he left the church exhausted, took to his bed, and died at Metz on the 13th of September 1565.

Farel wrote much, but usually in haste, and for an immediate purpose. He takes no rank as a scientific theologian, being a man of activity rather than of speculation or of much insight. His Sommaire was re-edited from the edition of 1534 by J. G. Baum in 1867. Others of his works (all in French) were his treatise on purgatory (1534), on the Lord's Prayer (1543), on the Supper (1555). He " was remarkable for boldness and energy both in preaching and prayer " (M. Young, Life of Paleario). As an orator, he was denunciatory rather than suasive; thus while on the one hand he powerfully impressed, on the other hand he stimulated opposition. A monument to him vvas unveiled at Neuchatel on the 4th of May 1876.

Lives of Farel are numerous; it may suffice to mention C. Ancillon, Vie de G. Farel (1691); the article in Bayle.; M. Kirchhofer, Das Leben W. Farels (1831-1833) ; Ch. Schmidt, Etudes sur Farel (1834) '< F. Bevan, W. Farel (1893) ; J- J- Herzog, in Herzog-Hauck's Realency-klopddie (1898). (A. Go.*)

FAREY, JOHN (1766-1826), English geologist, was born at Woburn in Bedfordshire in 1766. He was educated at Halifax in Yorkshire, and showed such aptitude in mathematics, drawing and surveying, that he was brought under the notice of John Smeaton (1724-1792). In 1792 he was appointed agent to the duke of Bedford for his Woburn estates. After the decease of the duke, Farey in 1802 removed to London, and settled there as a consulting surveyor and geologist. That- he was enabled to take this step was due largely to his acquaintance with William Smith (q.v.), who in 1801 had been employed by the duke of Bedford in works of draining and irrigation. The duke, appreciating Smith's knowledge of the strata, commissioned him in 1802 to explore the margin of the chalk-hills south of Woburn in order to determine the true succession of the strata; and he instructed Farey to accompany him. Farcy has remarked

that Smith was his " Master and Instructor in Mineral Survey- ing," and his subsequent publications show how well he had profited by the teachings he received. Farey prepared the General View of the Agriculture and Minerals of Derbyshire in two vols. (1811-1813) for the Board of Agriculture. In the first of these volumes (181 1) he gave an able account of the upper part of the British series of strata, and a masterly exposition of the Carboniferous and other strata of Derbyshire. In this classic work, and in a paper published in the Phil. Mag. vol. li. 181 8, p. 173, on " Mr Smith's Geological Claims stated," he zealously called attention to the importance of the discoveries of William Smith. Farey died in London on the 6th of January 1826.

See Biographical Notice, by W. S. Mitchell, in Geol. Mag. 1873, P- 25-

FARGO, WILLIAM GEORGE (1818-1881), pioneer American expressman, was born in Pompey, New York, on the 20th of May 1818. From the age of thirteen he had to support himself, obtaining little schooling, and for several years he was a clerk in grocery stores in Syracuse. He became a freight agent for the Auburn & Syracuse railway company at Auburn in 1841, an express messenger between Albany and Buffalo a year later, and in 1843 a resident agent in Buffalo. In 1844 he organized, with Henry Wells (1805-1878) and Daniel Dunning, the first express company (Wells & Co.; after 1845 Livingston & Fargo) to engage in the carrying business west of Buffalo. The lines of this company (which first operated only to Detroit, via Cleveland) were rapidly extended to Chicago, St Louis, and other western points. In March 1850, when through a consolidation of

competing lines the American Express Company was organized, Wells became president and Fargo secretary. In 1851, with Wells and others, he organized the firm of Wells, Fargo & Company to conduct an express business between New York and San Francisco by way of the Isthmus of Panama and on the Pacific coast, where it long had a virtual monopoly. In 1861 Wells, Fargo & Co. bought and reorganized the Overland Mail Co., which had been formed in 1857 to carry the United States mails, and of which Fargo had been one of the original promoters. From 1862 to 1866 he was mayor of Buffalo, and from 1868 to his death, in Buffalo, on the 3rd of August 1881, he was president of the American Express Company, with which in 1868 the Mer- chants Union Express Co. was consolidated. He was a director of the New York Central and of the Northern Pacific railways.

FARGO, a city and the county-seat of Cass county, North Dakota, U.S.A., about 254 m. W. of Duluth, Minnesota. Pop. (1890) 5664; (1900) 9589, of whom 2564 were foreign-born; (1910 census) 14,331. It is served by the Northern Pacific, the Great Northern, and the Chicago, Milwaukee & St Paul railways. The city is situated on the W. bank of the Red river of the North, which in 1909 had a navigable depth of only about 2 ft. from Fargo to Grank Forks, and the navigation of which was obstructed at various places by fixed bridges. In the city are Island and Oakgrove parks, the former of which contains a statue (erected by Norwegians in 1908) of Henrik Arnold Wergeland, the Norwegian poet. Fargo is the seat of the North Dakota agricultural college (coeducational), founded in 1890 under the provisions of the Federal ” Morrill Act ” of 1862; it receives both Federal and state support (the former under the Morrill Act of 1890), and in connexion with it a United States Agricultural Experiment Station is main- tained. In 1907-1908 the college had 988 students in the regular courses (including the students in the Academy), 117 in the summer course in steam engineering, and 68 in corre- spondence courses. At Fargo, also, are Fargo College (non- sectarian, 1887; founded by Congregationalists) , which has a college department, a preparatory department, and a conserva- tory of music, and in 1908 had 310 students, of whom 211 were in the conservatory of music; the Oak Grove Lutheran ladies’ seminary (1906) and the Sacred Heart Academy (Roman Catholic). The city is the see of both a Roman Catholic bishop and a Protestant Episcopal bishop; and it is the centre of masonic interests in the state, having a fine masonic temple. There are a public library and a large Y.M.C.A. building. St

John’s hospital is controlled by Roman Catholic sisters, and St Luke’s

hospital by the. Lutheran Church. Fargo is in a rich agricultural (especially wheat) region, is a busy grain-trading and jobbing centre, is one of the most important wholesale distributing centres for agricultural implements and machinery in the United States, and has a number of manufactures, notably flour. The total value of the city's factory products in 1905 was $1,160,832. Fargo, named in honour of W. G. Fargo of the Wells Fargo Express Company, was first settled as a tent city in 1871, when the Red river was crossed by the Northern Pacific, but was not permanently settled until after the extinction in 1873 of the Indian title to the reservation on which it was situated. It was chartered as a city in 1875. The Milwaukee railway was completed to Fargo in 1884. In June 1893 a large part of the city was destroyed by fire, the loss being more than

$3,000,000.

FARIA Y SOUSA, MANUEL DE (1590-1649), Spanish and Portuguese historian and poet, was born of an ancient Portuguese family, probably at Pombeiro, on the 18th of March 1500, attended the university of Braga for some years, and when about fourteen entered the service of the bishop of Oporto. With the exception of about four years from 1631 to 1634, during which he was a member of the Portuguese embassy in Rome, the greater part of his later life was spent at Madrid, and there he died, after much suffering, on the 3rd of June 1649. He was a laborious, peaceful man; and a happy marriage with Catharina Machado, the Albania of his poems, enabled him to lead a studious domestic life, dividing his cares and affections between his children and his books. His first important work, an Epitome de las historias Portuguezas (Madrid, 1628), was favourably received; but some passages in his enormous commentary upon Os Lusiadas, the poem of Luis de Camoens, excited the suspicion of the inquisitors, caused his temporary incarceration, and led to the permanent loss of bis official salary. In spite of the enthusiasm which is said to have prescribed to him the daily task of twelve folio pages, death overtook him before he had completed his greatest enterprise, a history of the Portuguese in all parts of the world. Several portions of the work appeared at Lisbon after his death, under the editorship of Captain Faria y Sousa: — Europa Portu- gueza (1667, 3 vols.); Asia Portugueza (1666-1675, 3 vols.); Africa Portugueza (1681). As a poet Faria y Sousa was nearly as prolific; but his poems are vitiated by the prevailing Gon- gorism of his time. They were for the most part collected in the Noches claras (Madrid, 1624-1626), and the Fuente de Aganipe, of which four volumes were published at Madrid in 1644-1646. He also wrote, from information supplied by P. A. Semmedo, Imperio de China i cultura evangelica en el (Madrid, 1642);

and translated and completed the Nobiliario of the count of Barcellos.

There are English translations by J. Stevens of the History of Portugal (London, 1698), and of Portuguese Asia (London, 1695).

FARIBAULT, a city and the county-seat of Rice county, Minnesota, U.S.A., on the Cannon river, at the mouth of the Straight river, about 45 m. S. of St Paul. (Pop. 1890) 6520; (1900) 7868, of whom 1586 were foreign-born; (1905) 8279; (1910) 9001. Faribault is served by the Chicago Great Western, the Chicago, Milwaukee & St Paul, and the Chicago, Rock Island & Pacific railways. The city is attractively situated near a lake region widely known for its summer resorts. Faribault is the seat of the Minnesota institute for defectives, embracing the state school for the deaf (1863), the state school for the blind (1874), and the state school for the feeble-minded (1879); of three institutions under control of the Protestant Episcopal Church— the Seabury divinity school (incorporated i860), the Shattuck school (1867; incorporated in 1905), a military school for boys, and St Mary's hall (1866), a school for girls, founded by Bishop Whipple; and of the Roman Catholic (Dominican) Bethlehem Academy for girls. In the city are the cathedral of our Merciful Saviour (1868-1869), the first Protestant Episcopal church in the United States built and used as a cathedral from its opening; and the hospital and nurses' training school of the Minnesota District of the Evangelical

Synod. The city has a public library, and owns and operates its own water-supply system. There is a good water power, and among the city's manufactures are flour, beer, shoes, furniture, rattan-ware, warehouse trucks, canned goods, cane syrup, waggons and carriages, gasolene engines, wind-mills, pianos and woollen goods. Faribault, named in honour of Jean Baptiste Faribault, a French fur-trader and pioneer who made his headquarters in the region in the latter part of the 18th century, was permanently settled about 1848, and was chartered as a city in 1872. A French millwright, N. La Croix, introduced here, about i860, a new process of making flour, which revolu- tionized the industry in the United States, but his mill was soon destroyed by flood and he removed to Minneapolis, where the process was first successful on a large scale. Faribault was for many years the home of Bishop Henry Benjamin Whipple (1822-1901), the pioneer bishop (1850-1901) of the Protestant Episcopal Church in Minnesota, famous for his missionary work among the Indians.

FARIDKOT, a native state of India in the Punjab. It ranks as one of the Cis-Sutlej states, which came under British influence in 1809. Its area is 642 sq. m., and its population in 1901 was 1 24,91 2. It is bounded on the W. and N.E. by the British district of Ferozepore, and on the S. by Nabha state. During the Sikh wars in 1845 the chief, Raja Pahar Singh, exerted himself in the British cause, and was rewarded with an increase of territory. In the Mutiny of 1857, too, his son and successor, Wazir Singh, did good service by guarding the Sutlej ferries, and in attacking a notorious rebel, whose stronghold he destroyed. The estimated gross revenue is £28,300; there is no tribute. The territory is traversed by the Rewari-Ferozepore railway, and also crossed by the Fazilka line, which starts from Kotkapura, the old capital. It is irrigated by a branch of the Sirhind canal. The town of Faridkot has a railway station, 84 m. from Lahore.

FARIDPUR, or Furreedpore, a town and district of British India, in the Dacca division of eastern Bengal and Assam. The town, which has a railway station, stands on an old channel of the Ganges. Pop. (1901) 11,649. There are a Baptist mission and a government high school. The district comprises an area of 2281 sq. m. The general aspect is flat, tame “and uninteresting, although in the northern tract the land is comparatively high, with a light sandy soil, covered with water during the rainy season, but dry during the cold and hot weather. From the town of Faridpur the ground slopes, until in the south, on the confines of Backergunje, it becomes one immense swamp, never entirely dry. During the height of the inundations the whole district may be said to be under water. The villages are built on artificially raised sites, or the high banks of the deltaic streams. Along many of the larger rivers the line of hamlets is unbroken for miles together, so that it is difficult to say where one ends and another begins. The huts, however, except in markets and bazaars, are seldom close together, but are scattered amidst small garden plots, and groves of mango, date and betel-nut trees. The plains between the villages are almost invariably more or less depressed towards the centre, where usually a marsh, or lake, or deep lagoon is found. These marshes, however, are gradually filling up by the silt deposited from the rivers; in the north of the district there now only remain two or three large swamps, and in them the process may be seen going on. The climate of Faridpur is damp, like that of the other districts of eastern Bengal; the average annual rainfall is 66 in. and the average mean temperature 76-9° F.

The principal rivers of Faridpur are the Ganges, the Arial Khan and the Haringhata. The Ganges, or Padma as it is locally called, touches the extreme north-west corner of the district, flows along its northern boundary as far as Goalanda, where it receives the waters o£ the

Jamuna or main stream of the Brahmaputra, and whence the united stream turns southwards and forms the eastern boundary of the district. The river is navigable by large cargo boats throughout the year, and has an average breadth during the rainy season of 1600 yds. Rice is the great crop of the district. In 1901 the population was

1,937,646, showing an increase of 6% in the decade. The north of the district is crossed by the line of the Eastern Bengal railway to Goalanda, the port of the Brahmaputra steamers, and a branch runs to Faridpur town. But most of the trade is con- ducted by river.

FARiD UD-DlN ‘ATTAR, or Ferid Eddin-Athar (1119-. 1229), Persian poet and mystic, was born at Nishapur, 513 a.h. (1119 A.D.), and was put to death 627 a.h. (1229 a.d.), thus having reached the age of 1 10 years. The date of his death is, however, variously given between the years 11 93 and 1235, although the majority of authorities support 1229; it is also probable that he was born later than n 19, but before 1150. His real name was Abu Talib (or Abu Hamid) Mahommed ben Ibrahim, and Fand ud-din was simply an honourable title equivalent to Pearl of Religion. He followed for a time his father’s profession of druggist or perfumer, and hence the name ‘Attar (one who sold ‘itr, otto of roses; hence, simply, dealer in drugs), which he afterwards employed as his poetical designation. According to the account of Dawlatshah, his interest in the great mystery of the higher life of man was awakened in the following way. One day a wandering fakir gazed sadly into his shop, and, when ordered to be gone, replied: “It is nothing for me to go; but I grieve for thee, druggist, for how wilt thou be able to think of death, and leave all these goods of thine behind thee? ” The word was in season; and Mahommed ben Ibrahim the druggist soon gave up his shop and began to study the mystic theosophy of the Sufis under Sheik Rukneddin. So thoroughly did he enter into the spirit of that religion that he was before long recognized as one of its principal representatives. He travelled extensively, visited Mecca, Egypt, Damascus and India, and on his return was invested with the Sufi mantle by Sheik Majd-ud-dinof Bagdad. The greater portion of his life was spent in the town of Shadyakh, but he is not unfrequently named Nishapuri, after the city of his boyhood and youth. The story of his death is a strange one. Captured by a soldier of Jenghiz Khan, he was about to be sold for a thousand dirhems, when he advised his captor to keep him, as doubtless a larger offer would yet be made; but when the second bidder said he would give a bag of horse fodder for the old man, he asserted that he was worth no more, and had better be sold. The soldier, irritated at the loss of the first offer, immediately slew him. A noble tomb was erected over his grave, and the spot acquired a reputation for sanctity. Farld was a

voluminous writer, and left no fewer than 120,000 couplets of poetry, though in his later years he carried his asceticism so far as to deny himself the pleasures of poetical composition. His most famous work is the Mantty uttair, or language of birds, an allegorical poem containing a complete survey of the life and doctrine of the Sufis. It is ex- tremely popular among Mahommedans both of the Sunnite and Shiite sects, and the manuscript copies are consequently very numerous. The birds, according to the poet, were tired of a republican constitution, and longed for a king. As the lapwing, having guided Solomon through the desert, best knew what a king should be, he was asked whom they should choose. The Simorg in the Caucasus, was his reply. But the way to the Caucasus was long and dangerous, and most of the birds excused themselves from the enterprise. A few, however, set out; but by the time they reached the great king's court, their number was reduced to thirty. The thirty birds (si morg) , wing- weary and hunger-stricken, at length gained access to their chosen monarch the Simorg; but only to find that they strangely lost their identity in his presence — that they are he, and he is they. In such strange fashion does the poet image forth the search of the human soul after absorption into the divine.

The text of the Mantik utfair was published by Garcin de Tassy in 1857, a summary of its contents having already appeared as La Poesie philosophique et religieuse chez les Per sans in 1856; this was succeeded by a complete translation in 1863. Among Farid ud-din's other works may be mentioned his Pandnama (Book of Counsel), of which a translation by Silvestre de Sacy appeared in 1819; Bulbul Nama (Book of the Nightingale); Wasalet Nama (Book of Con- junctions); Khusru va Gul (The King and the Rose); and Tadh- kiratu 'l Avliya (Memoirs of the Saints) (ed. R. A. Nicholson in

i'ersian Historical Texts). See Sir Gore Ouseley, Biographical Notices of Persian Poets (1846), p. 236; Von Hammer Purgstall, Geschichte der schonen Redekiinste Persiens (Vienna, 1818), p. 140; the Oriental Collections, ii. (London, 1798), pp. 84, 124, containing translations of part of the Pandnama; E. H. Palmer, Oriental Mysticism (1867); E. G. Browne, Literary History of Persia (1906).

FARINA, SALVATORE (1846-), Italian novelist, was born in Sardinia, and after studying law at Turin and Pavia devoted himself to a literary life at Milan. Farina has often been compared as a sentimental

humorist with Dickens, and his style of writing has given him a special place in modern Italian fiction. His masterpiece is // Signor Io (1880), a delightful portrait of an egoist; Don Chisciottino, Amore bendato, Capelli biondi, Oro nascosto, II Tesoro di Donnina, Amore a cent' occhi, Mio figlio, II numero 13, are some of his other volumes.

FARINATO, PAOLO (1522-1606), Italian painter and archi- tect, was a native of Verona. He is sometimes named Farinato degli Uberti, as he came from the ancient Florentine stock to which the Ghibelline leader Farinata degli Uberti, celebrated in Dante's Corn-media, belonged. He flourished at the same time that the art of Verona obtained its greatest lustre in the works of -Paolo Cagliari (Paul Veronese) , succeeded by other members of the Cagliari family, of whom most or all were outlived by Farinato. He was instructed by Niccolo Giolfino, and probably by Antonio Badile and Domenico del Riccio (Brusasorci). Proceeding to Venice, he formed his style partly on Titian and Giorgione, though he was never conspicuous as a colourist, and in form he learned more from the works of Giulio Romano. His nude figures show knowledge of the antique; he affected a bronzed tone in the complexions, harmonizing with the general gravity of his colour, which is more laudable in fresco than in oil-painting. Vasari praised his thronged compositions and merit of draughtsmanship. His works are to be found not only in Venice and principally in Verona, but also in Mantua, Padua and other towns belonging or adjacent to the Venetian territory. He was a prosperous and light-hearted man, and continually progressed in his art, passing from a comparatively dry manner into a larger and bolder one, with much attraction of drapery and of landscape. The " Miracle of the Loaves and Fishes," painted in the church of S. Giorgio in Verona, is accounted his masterpiece; it was executed at the advanced age of seventy- nine, and is of course replete with figures, comprising those of the painter's own family. A saloon was painted by him in S. Maria in Organo, in the same city, with the subjects of " Michael expelling Lucifer " and the "Massacre of the Inno- cents "; in Piacenza is a " St Sixtus "; in Berlin a " Presenta- tion in the Temple "; and in the communal gallery of Verona one of his prime works, the " Marriage of St Catherine." Farinato executed some sculptures, and various etchings of sacred and mythologic subjects; his works of all kinds were much in request, including the wax models which he wrought as studies for his painted figures. He is said to have died at the same hour as his wife. His son Orazio was also a painter of merit.

FARINELLI (1705-1782), whose real name was Carlo Broschi, one of the most extraordinary singers that ever lived, was born on the 24th of January 1705, at Naples. He was the nephew of Cristiano Farinelli,

the composer and violinist, whose name he took. Having been prepared for the career of a soprano, he soon acquired, under the instruction of N. A. Porpora, a voice of marvellous beauty, and became famous throughout southern Italy as il ragazzo (the boy). In 1722 he made his first appearance at Rome in his master's Eumene, creating the greatest enthusiasm by surpassing a popular German trumpet- playeF, for whom Porpora had written an obligato to one of the boy's songs, in holding and swelling a note of prodigious length, purity and power, and in the variations, roulades and trills which he introduced into the air. In 1724 he appeared at Vienna, and at Venice in the following year, returning to Naples shortly afterwards. He sang at Milan in 1726, and at Bologna in 1727, where he first met and acknowledged himself vanquished by the singer Antonio Bernacchi (b. 1700), to whose instruction he was much indebted. With ever-increasing success and fame Farinelli appeared in nearly all the great cities of Italy; and

returned a third time to Vienna in 173 1. He now modified his style, it is said on the advice of Charles VI., from mere bravura of the Porpora school to one of pathos and simplicity. He visited London in 1734, arriving in time to lend his powerful support to the faction which in opposition to Handel had set up a rival opera with Porpora as composer and Senesino as principal singer. But not even his aid could make the under- taking successful. His first appearance at the Lincoln's Inn Fields theatre was in Arlaserse, much of the music of which was by his brother, Riccardo Broschi. His success was instantaneous, and the prince of Wales and the court loaded him with favours and presents. Having spent three years in England, Farinelli set out for Spain, staying a few months on the way in F ranee, where he .sang before Louis XV. In Spain, where he had only meant to stay a few months, he ended by passing nearly twenty- five years. His voice, employed by the queen to cure Philip V. of his melancholy madness, acquired for him an influence with that prince which gave him eventually the power, if not the name, of prime minister. This power he was wise and modest enough to use discreetly. For ten years, night after night, he had to sing to the king the same six songs, and never anything else. Under Ferdinand VI. he held a similar position, and was decorated (1750) with the cross of Calatrava. He utilized his ascendancy over this king by persuading him to establish an Italian opera. After the accession of Charles III. Farinelli retired with the fortune he had amassed to Bologna, and spent the remainder of his days there in melancholy splendour, dying on the 15th of July 1782. His voice was of large compass, possessing seven or eight notes more than those of ordinary singers, and was sonorous, equal and clear; he

also possessed a great knowledge of music.

FARIN6D0N, properly Great Faringdon, a market town in the Abingdon parliamentary division of Berkshire, England, 17 m. W.S.W. of Oxford by road. Pop. (1901) 2900. It lies on the slope of a low range of hills which borders the valley of the Thames on the south. It is the terminus of a branch of the Great Western railway from Uffington. The church of All Saints is a large cruciform building with low central tower. Its period is mainly Transitional Norman and Early English, and though considerably altered by restoration it contains some good details, with many monuments and brasses. Faringdon House, close to the church, was built by Henry James Pye (1745-1813), poet laureate from 1790 to 1813, who also caused to be planted the conspicuous group of fir-trees on the hill east of the town called Faringdon Clump, or locally (like other similar groups) the Folly. The trade of Faringdon is agricultural.

FARINI, LUIGI CARLO (1812-1866), Italian statesman and historian, was born at Russi, near Ravenna, on the 22 nd of October 18 12. After completing a brilliant university course at Bologna, which he interrupted to take part in the revolution of 1831 (see Carbonari), he practised as a physician at Russi and at Ravenna. He acquired a considerable reputation, but in 1843 hi s political opinions brought him under the suspicion of the police and caused his expulsion from the papal states. He resided successively in Florence and Paris, and travelled about Europe as private physician to Prince Jerome Bonaparte, but when Pius IX. was elected to the Holy See and began his reign with apparently Liberal and “nationalist tendencies, Farini returned to Italy and was appointed secretary-general to G. Recchi, the minister of the interior (March 1848). But he held office for little more than a month, since like all the other Italian Liberals he disapproved of the pope’s change of front in refusing to allow his troops to fight against Austria, and resigned with the rest of the ministry on the 29th of April. Pius, wishing to counteract the effect of this policy, sent Farini to Charles Albert, king of Sardinia, to hand over the command of the papal con- tingent to him. Elected member of parliament for Faenza, he was again appointed secretary to the ministry of the interior in the Mamiani cabinet, and later director-general of the public health department. He resigned office on the proclamation of the republic after the flight of the pope to Gaeta in 1849, resumed it for a while when Pius returned to Rome with the protection

of French arms, but when a reactionary and priestly policy was instituted, he went into exile and took up his residence at Turin. There he became convinced that it was only through the House of Savoy that Italy could be liberated, and he expounded his views in Cavour's paper II Risorgimento, in La Frusta and II Piemonte, of which latter he was at one time editor. He also wrote his chief historical work, Lo Stato Romano dal i8ij al 1850, in four volumes (Turin, 1850). In 1851 he was appointed minister of public instruction in the D'Azeglio cabinet, an office which he held till May 1852. As a member of the Sardinian parliament and as a journalist Farini was one of the staunchest supporters of Cavour (q.v.), and strongly favoured the proposal that Pied- mont should participate in the Cimean War, if indeed he was not actually the first to suggest that policy (see G. B. Ercolani's letter in E. Parri's memoir of Farini). In 1856 and 1857 he pub- lished two letters to Mr Gladstone on Italian affairs, which created a sensation, while he continued to propagate his views in the Italian press. When on the outbreak of the war of 1850 Francis V., duke of Modena, was expelled and a provisional government set up, Farini was sent as Piedmontese commissioner to that city; but although recalled after the peace of Villafranca he was determined on the annexation of central Italy to Pied- mont and remained behind, becoming a Modenese citizen and dictator of the state. He negotiated an alliance with Parma, Romagna and Tuscany, when other provisional governments had been established, and entrusted the task of organizing an army for this central Italian league to General Fanti (q.v.). Annexation to Piedmont having been voted by plebiscite and the opposition of Napoleon III. having been overcome, Farini returned to Turin, when the king conferred on him the order of the Annunziata and Cavour appointed him minister of the interior (June i860), and subsequently viceroy of Naples; but he soon resigned on the score of ill-health. Cavour died in 1861, and the following year Farini succeeded Rattazzi as premier, in which office he endeavoured to carry out Cavour's policy. Over-exertion, however, brought on softening of the brain, which compelled him to resign office on the 24th of March 1863, and ultimately resulted in his death on the 1st of August 1866. He was buried at Turin, but in 1878 his remains were removed to his native village of Russi.

His son Domenico Farini had a distinguished political career and was at one time president of the chamber.

Bibliography. — Several letters from Farini to Mr Gladstone and Lord John Russell were reprinted in a Memoire sur les affaires d'ltalie

(•859), and a collection of his political Correspondence was published under the title of Lettres sur les affaires d'ltalie (Paris, i860). His historical work was translated into English in part by Mr Gladstone and in part under his superintendence. See E. Parri, Luigi Carlo Farini (Rome, 1878) ; L. Carpi in II Risorgimento Italiano, vol. iv. (Milan, 1888); and G. Finali's article, " II 27 Aprile 1859," in the Nuova Antologia for the 16th of May 1903. (L. V.*)

FARM, in the most generally used sense, a portion of land leased or held for the purpose of agriculture; hence " farming " is equivalent to the pursuit of agriculture, and " farmer " to an agriculturist. This meaning is comparatively modern. The origin of the word has perhaps been complicated by an Anglo- Saxon feorm-, meaning provisions or food supply, and more particularly a payment of provisions for the sustenance of the king, the cyninges feorm. lit Domesday this appears as a food rent: firma unius noctis or diei. According to the New English Dictionary there is no satisfactory Teutonic origin for the word. It has, however, been sometimes connected with a word which appears in the older forms of some Teutonic languages, meaning " life." The present form " farm " certainly comes, through the French ferme, from the medieval Lat. firma {firmus, fixed), a fixed or certain payment in money or kind. The Anglo-Saxon feorm may be not an original Teutonic word but an early adapta- tion of the Latin. The feorm, originally a tax, seems, as the king " booked " his land, to have become a rent (see F. W. Maitland, Domesday Book and After, 1897, p. 236 ff., and J. H. Round, Feudal England, 1895, p. 109 ff.). The word firma is thus used of the composition paid by the sheriff in respect of the dues to be collected from the shire. From the use of the word for the

fixed sum paid as rent for a portion of land leased for cultivation, " farm "was applied to the land itself, whether held on lease or otherwise, and always with the meaning of agricultural land. The aspect of the fixity of the sum paid leads to a secondary meaning, that of a certain sum paid by a taxable person, com- munity, state, &c, in respect of the taxes or dues that will be imposed, or to such a sum paid as a rent by a contractor for the right of collecting such taxes. This method of indirect collection of the revenue by contractors instead of directly by the officials of the state is. that known as " farming the taxes." The system is best known through the publicani of Rome, who formed companies or syndicates to farm not only the indirect taxation of the state, but also other sources of the state revenues, such as mines, fisheries, &c. (see Publicani).

In monarchical Europe, which grew out of the ruins of the Roman

empire, the revenue was almost universally farmed, but the system was gradually narrowed down until only indirect taxes became the subject of farming. France from the 16th to the 18th centuries is the most interesting modern example. Owing to the hopeless condition of its revenues, the French government was continually in a state of anticipating its resources, and was thus entirely in the hands of financiers. In 1681 the indirect taxes were farmed collectively to a single company of forty capitalists {ferme ghiirale), increased to sixty in 1755, and reduced to the original number in 1780. These farmers-general were appointed by the king for six years, and paid an annual fixed sum every year in advance. The taxes which they collected were the customs (douanes or traites), the gabelle or salt tax, local taxes or octrois (entrees, &c), and various smaller taxes. They were under the management of a controller-general, who had a central office in Paris. The office of farmer-general was the object of keen competition, notwithstanding that the successful candidates had to share a considerable part of the profits of the post with ministers, courtiers, favourites, and even the sovereign, in the shape of gifts (croupes) and pensions. The rapacity of the farmers-general was proverbial, and the loss to the revenue by the system was great, while very considerable hardships were inflicted on the poorer contributors by the unscrupulous methods of collection practised by the underlings of the farmers. In addition, the unpopular nature of the taxes caused deep discontent, and the detestation in which the farmers- general were held culminated in the execution of thirty-two of them during the French Revolution and the sweeping away of the system.

See also Agriculture, Dairy and Dairy-Farming, Fruit and Flower Farming, &c.

FARM BUILDINGS. The best laying out of a farm, and the construction of its buildings, are matters which, from the variety of needs and circumstances, involve practical considerations and expert knowledge, too detailed in their nature for more than a brief reference in this work. It may be said generally that the best aspect for farm buildings is S. or S.S.E., and with a view to easy disposal of drainage they should be built on a slight slope. The supply of water, whether it be provided from wells by engine or windmill power, by hydraulic rams or other means, is a prime consideration, and it should if possible be laid on at different suitable points or at any rate the central source of supply should be in the most accessible and convenient place as regards stables and cow-sheds. The buildings should be constructed on or within easy distance of the public road, in order to save the upkeep of private roads, and should be as near as possible to the centre of the farm. On mixed farms of ordinary size (200 to 500 acres) the building

may be advantageously planned fn one rectangular block, the stock-yards being placed in the centre separated by the cow-sheds, and surrounded by the cart-sheds, stables, stores and barn, cattle-boxes, piggeries and minor buildings. On farms of larger size and on dairy farms special needs must be taken into account, while in all cases the local methods of farming must influence the grouping and arrangement of the steading.

For a more detailed treatment of the subject reference may be made to the following works: — S. Taylor, Modern Homesteads,

a Treatise on the Designing of Farm Buildings (London, 1905) ; A. D. Clarke, Modern Farm Buildings (London, 1899); P. Roberts, The Farmstead, in the " Rural Science Series " (New York, 1900), and articles in the Standard Cyclopaedia of Agriculture, vol. 3, and in the Cyclopaedia of American Agriculture, vol. I.

FARMER, RICHARD (i735-i797) > Shakespearian com- mentator, the son of a rich maltster, was born at Leicester on the 28th of August 1735. He was educated at the free grammar school of his native town, and at Emmanuel College, Cambridge. He graduated in 1757 a senior optime; three years later he proceeded M.A. and became classical tutor, and in 1775 master of his college, in succession to William Richardson, the bio- grapher of the English bishops. In the latter year also he was appointed vice-chancellor, and three years afterwards chief librarian of the university. In 1780 he was appointed to a prebendal stall in Lichfield, and two years later to one at Canter- bury; but the second office he exchanged in 1788 for that of a canon residentiary of St Paul's. Cambridge, where he usually resided, was indebted to him for improvements in lighting, paving and watching; but perhaps London and the nation have less reason to be grateful for his zealous advocacy of the custom of erecting monuments to departed worthies in St Paul's. In 1765 he issued a prospectus for a history of the town of Leicester; but this work, based on materials collected by Thomas Staveley, he never even began; it was carried out by the learned printer John Nichols. In 1766 he published his famous Essay on the Learning of Shakespeare, in which he proved that the poet's acquaintance with ancient and modern Continental literature was exclusively derived from translations, of which he copied even the blunders. " Shakespeare," he said, " wanted not the stilts of language to raise him above all other men." " He came out of nature's hand,

like Pallas out of Jove's head, at full growth and mature." " One might," he said — by way of ridicul- ing the Shakespearian criticism of the day — " with equal wisdom, ' study the Talmud for an exposition of Tristram Shandy." The essay fully justifies the author's description of himself in the preface to the second edition: " I may consider myself as the pioneer of the commentators; I have removed a deal of learned rubbish, and pointed out to them Shakespeare's track in the very pleasant paths of nature." Farmer died at Cambridge on the 8th of September 1797. He was, it appears, twice offered a bishopric by Pitt, but declined the preferment. Farmer was immensely popular in his own college, and loved, it was said, above all other things, old port, old clothes and old books.

FARMERS' MOVEMENT, in American political history, the general name for a movement between 1867 and 1896 remarkable for a radical socio-economic propaganda that came from what was considered the most conservative class of American society. In this movement there were three periods, popularly known as Granger, Alliance and Populist.

The Grange, or Order of the Patrons of Husbandry (the latter the official name of the national organization, while the former was the name of local chapters, including a supervisory National Grange at Washington), was a secret order founded in 1867 to advance the social needs and combat the economic backwardness of farm life. It grew remarkably in 1873-1874, and in the latter year attained a membership of perhaps 800,000. In the causes of its growth — much broader than those that issued in the financial crisis of 1873 — a high tariff, railway freight-rates and other grievances were mingled with agricultural troubles like the fall of wheat prices and the increase of mortgages. The condition of the farmer seemed desperate. The original objects of the Grange were primarily educational, but these were soon overborne by an anti-middleman, co-operative movement. Grange agents bought everything from farm machinery to women's dresses; hundreds of grain elevators and cotton and tobacco warehouses were bought, and even steamboat lines; mutual insurance companies were formed and joint-stock stores. Nor was co-operation limited to distributive processes; crop- reports were circulated, co-operative dairies multiplied, flour- mills were operated, and patents were purchased, that the Grange rhight manufacture farm machinery. The outcome in some

states was ruin, and the name Grange became a reproach. Nevertheless these efforts in co-operation were exceedingly important both for the results obtained and for their wider significance. Nor

could politics be excluded, though officially tatooed; for economics must be considered by social idealists, and economics everywhere ran into politics. Thus it was with the railway question. Railways had been extended into frontier states; there were heavy crops in sparsely settled regions where freight-rates were high, so that — given the existing distributive system — there were “over production” and waste; there was notorious stock manipulation and discrimination in rates; and the farmers regarded ” absentee ownership ” of railways by New York capitalists much as absentee ownership of land has been regarded in Ireland. The Grange officially disclaimed enmity to railways; but though the organization did not attack them, the Grangers — through political ” farmers’ clubs ” and the like — did. About 1867 began the efforts to establish regulation of the railways, as common-carriers, by the states. Such laws were known as ” Granger laws,” and their general principles, soon endorsed (1876) by the Supreme Court of the United States, have become an important chapter in the laws of the land. In a declaration of principles in 1874 Grangers were declared to be ” not enemies of railroads,” and their cause to stand for ” no communism, no agrarianism.” To conservatives, however, co-operation seemed communism, and ” Grange laws” agrarianism; and thus in 1873-1874 the growth of the movement aroused extraordinary interest and much uneasiness. In 1874 the order was reorganized, membership being limited to persons directly interested in the farmers’ cause (there had been a millionaire manufacturers’ Grange on Broadway), and after this there were constant quarrels in the order; moreover, in 1875 the National Grange largely lost control of the state Granges, which discredited the organization by their disastrous co-opera- tion ventures. Thus by 1876 it had already ceased to be of national political importance. About 1880 a renascence began, particularly in the Middle States and New England; this revival was marked by a recurrence to the original social and educational objects. The national Grange and state Granges (in all, or nearly all, of the states) were still active in 1909, especially in the old cultural movement and in such economic movements — notably the improvement of highways — as most directly concern the farmers. The initiative and referendum, and other proposals of reform politics in the direction of a democratic advance, also enter in a measure into their propaganda.

The Alliance carried the movement farther into economics. The ” National Farmers’ Alliance and Industrial Union,” formed in 1889, embraced several originally independent organizations formed from 1873 onwards; it was largely confined to the South and was secret. The ” National Farmers’ Alliance,” formed in 1880, went back

similarly to 1877, was much smaller. Northern and non-secret. The ” Colored Farmers’ National Alliance and Co-operative Union ” (formed 1888, merged in the above ” Southern ” Alliance in 1890) was the second greatest organiza- tion. With these three were associated many others, state and national, including an annual, non-partisan, deliberative and advisory Farmers’ National Congress. The Alliance movement reached its greatest power about 1890, in which year twelve national farmers’ organizations were represented in conventions in St Louis, and the six leading ones alone probably had a membership of 5, 000,000. J

As with the Grange, so in the ends and declarations of the whole later movement, concrete remedial legislation for agri- cultural or economic ills was mingled with principles of vague radical tendency and with lofty idealism. 2 Among the principles

1 Membership usually included males or females above 16 years of age.

2 Thus, the ” Southern ” Alliance in 1890 (the chief platforms were the one at Ocala, Florida, and that of 1889 at St Louis, in con- junction with the Knights of Labor) declared its principles to be: ” (1) To labour for the education of the agricultural classes in the science of economical government in a strictly non-partisan way, and to bring about a more perfect union of such classes. (2) To

advocated about 1890, practically all the great organizations demanded the abolition of national banks, the free coinage of silver, a ” sufficient ” issue of government paper money, tariff revision, and a secret ballot (the last was soon realized); only less commonly demanded were an income tax, taxation of evidence of debt, and government loans on lands. All of these were principles of the two great Alliances (the Northern and the Southern), as were also pure food legislation, abolition of land- holding by aliens, reclamation of unused or unearned land grants (to railways, e.g.), and either rigid federal regulation of railways and other means of communication or government ownership thereof. The ” Southern ” Alliance put in the forefront a ” sub- treasury ” scheme according to which cheap loans should be made by government from local sub-treasuries on non-perishable farm products (such as grain and cotton) stored in government warehouses; while the ” Northern ” Alliance demanded

restric- tion of the liquor traffic and (for a short time) woman suffrage. Still other issues were a modification of the patent laws (e.g. to prevent the purchase of patents to stifle competition), postal currency exchange,- the eight-hour day, inequitable taxation, the single-tax on land, ” trusts,” educational qualification for suffrage, direct popular election of federal judges, of senators, and of the president, special-interest lobbying, &c.

In 1889-1890 the political (non-partisan) movement developed astonishing strength; it captured the Republican stronghold of Kansas, brought the Democratic Party to vassalage in South Carolina, revolutionized legislatures even in conservative states like Massachusetts, and seemed likely completely to dominate the South and West. All its work in tlje South was accomplished within the old-party organizations, but in 1890 the demand became strong for an independent third party, for which various consolidations since 1887 had prepared the way, and by 1892 a large part of the strength of the farmers’ organizations, with that of various industrial and radical orders, was united in the People’s Party (perhaps more generally known as the Populist Party), which had its beginnings in Kansas in 1890, and received national organization in 1892. This party emphasized free silver, the income tax, eight-hour day, reclamation of land grants, government ownership of railways, telephones and telegraphs, popular election of federal senators, and the initiative and referendum. In the presidential election of 1892 it cast 1,041,021 votes (in a total of 12,036,089), and elected 22 presi- dential electors, the first chosen by any third party since 1856. In 1896 the People’s Party ” fused ” with the Democratic Party (q.v.) in the presidential campaign, and again in 1900; during this period, indeed, the greatest part of the People’s Party was reabsorbed into the two great parties from which its membership had originally been drawn; — in some northern states apparently largely into the Republican ranks, but mainly into the Democratic Party, to which it gave a powerful radical impulse.

The Farmers’ movement was much misunderstood, abused and ridiculed. It accomplished a vast amount of good. The movement — and especially the Grange, for on most important points the later movements only followed where it had led — contributed the initial impulse and prepared the way for the establishment of travelling and local rural libraries, reading courses, lyceums, farmers’ institutes (a steadily increasing in- fluence) and rural free mail delivery (inaugurated experimentally in 1896 and adopted as part of the permanent postal system of the country in 1902); for agricultural exhibits and an improved agricultural press; for encouragement to and

increased profit from the work of agricultural colleges, the establishment (1885) and great services of the United States Department of Agri- demand equal rights to all, and special privileges to none. (3) To endorse the motto: ‘In things essential, unity; in all things, charity.’ (4) To develop a better state, mentally, morally, socially and financially. ... (6) To suppress personal, local, sectional and national prejudices.” For the Southern farmer a chief concrete evil was the pre-crop mortgages by which cotton farmers remained in debt to country merchants; in the North the farmer attacked a wias range of ” capitalistic ” legislation that hurt him, he believed, for the benefit of other classes — notably legislation sought by railways.

culture, — in short, for an extraordinary lessening of rural isolation and betterment of the farmers’ opportunities; for the irrigation of the semi-arid West, adopted as a national policy in 1902, the pure-food laws of 1906, the interstate-commerce law of 1887, the railway-rate laws of 1903 and 1906, even the great Bureau of Commerce-and-Labor law of 1903, and the Anti-trust laws of 1903 and later. The Alliance and Populist movements were bottomed on the idea of ” ethical gains through legislation.” In its local manifestations the whole movement was often marked by eccentric ideas, narrow prejudices and weaknesses in economic reasoning. It is not to be forgotten that owing to the movement of the frontier the United States has always been ” at once a developed country and a primitive one. The same political questions have been put to a society advanced in some regions and undeveloped in others. ... On specific political questions each economic area has reflected its peculiar interests” (Prof. F. J. Turner). That this idea must not, however, be over-emphasized, is admirably enforced by observing the great mass of farmer radicalism that has, since about 1896, become an accepted Democratic and Republican principle over the whole country. The Farmers’ movement was the beginning of widespread, effective protest against ” the menace of privilege” in the United States.

American periodicals, especially in 1890-1892, are particularly informing on the growth of the movement; see F. M. Drew in Political Science Quarterly (1891), vi. p. 282; C. W. Pierson in Popular Science Monthly (1888), xxxii. pp. 199, 368; C. S. Walker and F. J. Foster in Annals of American Academy (1894); iv. p. 790; Senator W. A. Peffer in Cosmopolitan (1890), x. p. 694; and on agricultural discontent, Political Science Quarterly, iv. (1889), p. 433, by W. F. Mappin; v. (1890), p. 65, by J. P. Dunn; xi. (1896), pp. 433, 601, xii. (1897), p. 93, and xiv. (1899), p. 444, by C. F. Emerick; Prof. E. W. Bemis in Journal of Political Economy (1893), i. p. 193; A. H. Peters in Quarterly Journal of Economics (1890), iv. p. 18; C. W. Davis in

Forum (1890), ix. pp. 231, 291, 348. ‘ FARNABY (or Farnabie), THOMAS (c. 1575-1647), English grammarian, was the son of a London carpenter; his grandfather, it is said, had been mayor of Truro, his great-grandfather an Italian musician. Between 1590 and 1595 he appears succes- sively as a student of Merton College, Oxford, a pupil in a Jesuit college in Spain, and a follower of Drake and Hawkins. After some military service in the Low Countries ” he made shift,” says Wood, ” to be set on shore in the western part of England; where, after some wandering to and fro under the name of Tho. Bainrafe, the anagram of his sirname, he settled at Martock, in Somersetshire, and taught the grammar school there for some time with success. After he had gotten some feathers at Martock, he took his flight to London,” and opened a school in Goldsmiths’ Rents, Cripplegate. From this school, which had as many as 300 pupils, there issued, says Wood, ” more churchmen and statesmen than from any school taught by one man in England.” In the course of his London career ” he was made master of arts of Cambridge, and soon after incorporated at Oxon.” Such was his success that he was enabled to buy an estate at Otford near Sevenoaks, Kent, to which he retired from London in 1636, still, however, carrying on his profession of schoolmaster. In course of time he added to his Otford estate and bought another near Horsham in Sussex. In politics he was a royalist; and, suspected of participation in the rising near Tunbridge, 1643, he was imprisoned in Ely House, Holborn. He died at Sevenoaks on the 12th of June 1647.

The details of his life were derived by Anthony a Wood from Francis, Farnaby’s son by a second marriage (see Wood’s Athenac Oxonienses, ed. Bliss, iii. 213). His works chiefly consisted of anno- tated editions of Latin authors — Juvenal, Persius, Seneca, Martial, Lucan, Virgil, Ovid and Terence, which enjoyed extraordinary popularity. His Systema grammaticum was published in London in 1641. On the 6ch of April 1632, Farnaby was presented with a royal patent granting him, for the space of twenty-one years, the sole right of printing and publishing certain of his works.

FARNBOROUGH, THOMAS ERSKINE MAY, Baron (1815- 1886), English Constitutional historian, was born in London on the 8th of February 181 5 and educated at Bedford grammar school. In 183: he was nominated by Manners Sutton, speaker of the House of Commons, to the post of assistant librarian, so that his long connexion with parliament began in his youth.

He studied for the bar, and was called at the Middle Temple in 1838. In 1844 he published the first edition of his Treatise on the Law, Privilege, Proceedings and Usage of Parliament. This work, which has passed through many editions, is not only an invaluable mine of information for the historical student, but it is known as the text book of the law by which parliament governs 11s proceedings. In 1846 Erskine May was appointed examiner of petitions for private bills, and the following year taxing master of the House of Commons. He published his Remarks to Facilitate Public Business in Parliament in 1849; a work On the Consolidation of Election Laws in 1850; and his Rules, Orders and Forms of the House of Commons was printed by "command of the House in 1854. In 1856 he was appointed clerk assistant at the table of the House of Commons. He received the companionship of the Bath in i860 for his parliamentary services, and became a knight commander in 1866. His im- portant work, The Constitutional History of England since the Accession of George III. (1760-1860)., was published in 1861- 1863, and it received frequent additions in subsequent editions. In 1 87 1 Sir Erskine May was appointed clerk of the House of Commons. His Democracy in Europe: a History appeared in 1877, but it failed to take the same rank in critical esteem as his Constitutional History. He retired from the post of clerk to the House of Commons in April 1886, having for fifteen years discharged the onerous duties of the office with as much know- ledge and energy as unfailing tact and courtesy. Shortly after his retirement from office he was raised to the peerage under the title of Baron Farnborough of Farnborough, in the county of Southampton, but he only survived to enjoy the dignity for a few days. He died in London on the 1 7th of May 1886, and as he left no issue the title became extinct.

FARNBOROUGH, an urban district in the Basingstoke parliamentary division of Hampshire, England, 33 m. S.W. by W. from London, on the London & South Western and the South Eastern & Chatham railways. Pop. (1001) 11,500 (including 5070 military) . The church of St Peter ranges from Early English to Perpendicular in style. St Michael's Catholic memorial church, erected in 1887 by the ex- empress Eugenie, contains the remains of Napoleon III. and the prince imperial. An adjoining abbey is occupied by Benedictine fathers of the French congrega- tion; the convent is a ladies' boarding-school. Aldershot North Camp is within the parish.

FARNE ISLANDS [also Fearne, Fern, or The Staples], a group of rocky islands and reefs off the coast of Northumberland, England, included in that county. In 1901 they had only eleven inhabitants. They extend in a line of some 6 m. in a north- easterly direction from the coast, on

which the nearest villages are Bamborough and North Sunderland. The Fairway, 15 m. across, separates the largest island, Fame, or House, from the mainland. Fame is 16 acres in area, and has precipitous cliffs up to 80 ft. in height on the east, but the shore is otherwise low. The other principal islets are Staple, Brownsman, North and South Wamses, Longstone and Big; Harcar. On Fame is a small ancient chapel, with a square tower near it built for purposes of defence in the 15th century. The chapel is believed to occupy the site of St Cuthbert's hermitage, whither he retired from the priory on the neighbouring Holy Island or Lindisfarne. He was with difficulty persuaded to leave it on his elevation to the bishopric of Lindisfarne, and returned to it to die (687). Long- stone rock, with its lighthouse, is famous as the scene of the bravery of Grace Darling in rescuing some of the survivors of the wreck of the " Forfarshire " (1838). The rocks abound in sea-birds, including eider duck.

FARNESE, the name of one of the most illustrious and powerful Italian families, which besides including eminent prelates, statesmen and warriors among its members, ruled the duchy of Parma for two centuries. The early history of the family is involved in obscurity, but they are first heard of as lords of Farneto or Farnese, a castle near the lake of Bolsena, and they played an important part as consuls and signori of Orvieto. They seem to have always been Guelphs, and in the civil broils of Orvieto they sided with the Monaldeschi faction against

the Ghibelline Filippeschi. One Pietro Farnese commanded the papal armies under Paschal II. (1099-1118) ; another Pietro led the Florentines to victory against the Pisans in 1363. Ranuccio Farnese served Eugene IV. so well that the pope endowed him with large fiefs, and is reported to have said, " The Church is ours because Farnese has given it back to us."

The family derived further advantages at the time of Pope Alexander VI., who was the lover of the beautiful Giulia Farnese, known as Giulia Bella, and created her brother Alessandro a cardinal (1493). The latter was elected pope as Paul III. in 1534, and it is from that moment that the great importance of the family dates. An unblushing nepotist, he alienated immense fiefs belonging to the Holy See in favour of his natural children. Of these the most famous was Pierluigi Farnese (1503-1547), who served in the papal army in various compaigns, but also took part in the sack of Rome in 1527. On his father's elevation to the papacy he was made captain-general of the Church, and received the duchy of Castro in the Maremma, besides Frascati, Nepi, Montalto and other fiefs. A shameless rake and a man of uncontrollable temper, his massacre of the people of Perugia after a

rebellion in 1540 and the unspeakable outrage he com- mitted on the bishop of Fano are typical of his character. In 1545 his father conferred on him the duchy of Parma and Piacenza, which likewise belonged to the Holy See, and his rule proved cruel and tyrannical. He deprived the nobles of their privileges, and forced them to dwell in the towns, but to some extent he improved the conditions of the lower classes. Pierluigi being an uncompromising opponent of the emperor Charles V., Don Ferrante Gonzaga, the imperial governor of Milan, was ever on the watch for a pretext to deprive him of Piacenza, which the emperor greatly coveted. When the duke proceeded to build a castle in that town in order to overawe its inhabitants, the nobles were furiously indignant, and a plot to murder him was organized by the marquis Anguissola and others with the support both of Gonzaga and of Andrea Doria (q.v.), Charles's admiral, who wished to be revenged on Pierluigi for the part he had played in the Fiesco conspiracy (see Fiesco). The deed was done while the duke was superintending the building of the above-mentioned citadel, and his corpse was flung into the street (December 10th, 1 547) . Piacenza was thereupon occupied by the imperialists.

Pierluigi had several children, for all of whom Paul made generous provision. One of them, Alessandro (15 20-1 589), was created cardinal at the age of fourteen; he was a man of learning and artistic tastes, and lived with great splendour surrounded by scholars and artists, arnong whom were Annibal Caro, Paolo Giovio, Mons. Delia Casa, Bembo, Vasari, &c. It was he who completed the magnificent Farnese palace in Rome. He dis- played diplomatic ability on various missions to foreign courts, but failed to get elected to the papacy.

Orazio, Pierluigi's third son, was made duke of Castro when his father became duke of Parma, and married Diane, a natural daughter of Henry II. of France. Ottavio, the second son (1521- 1586), married Margaret, the natural daughter of Charles V. and widow of Alessandro de' Medici, at the age of fifteen, she being a year older; at first she disliked her youthful bridegroom, but when he returned wounded from the expedition to Algiers in 1 541 her aversion was turned to affection (see Margaret of Austria). Ottavio had been made lord of Camerino in 1540, but he gave up that fief when his father became duke of Parma. When, on the murder of the latter in 1547, Piacenza was occupied by the imperialists, Paul determined to make an effort to regain the city; he set aside Ottavio's claims to the succession of Parma, where he appointed a papal legate, giving him back Camerino in exchange, and then claimed Piacenza of the emperor, not for the Farnesi, but for the Church. But Ottavio would not be put 0$; he attempted to seize Parma by force, and having failed, entered into

negotiations with Gonzaga. This unnatural rebellion on the part of one grandson, combined with the fact that it was supported by the other grandson, Cardinal Alessandro, hastened the pope's death, which occurred on the 10th of November 1549- During the interregnum, that followed Ottavio

again tried to induce the governor of Parma to give up the city to him, but met with no better success; however, on the election of Giovan Maria Ciocchi (Julius III.) the duchy was conferred on him (1551). This did not end his quarrel with the emperor, for Gonzaga refused to give up Piacenza and even threatened to occupy Parma, so that Ottavio was driven into the arms of France. Julius, who was anxious to be on good terms with Charles on account of the council of Trent which was then sitting, ordered Farnese to hand Parma over to the papal authorities once more, and on his refusal hurled censures and admonitions at his head, and deprived him of his Roman fiefs, while Charles did the same with regard to those in Lombardy. A French army came to protect Parma, war broke out, and Gonzaga at once laid siege to the city. But the duke came to an arrangement with his father-in-law, by which he regained Piacenza and his other fiefs The rest of his life was spent quietly at home, where the modera- tion and wisdom of his rule won for him the affection of his people. At his death in 1586 he was succeeded by his son Alessandro Farnese (1545-1592), the famous general of Philip II. of Spain, who spent the whole of his reign in the Flemish wars.

The first years of the reign of his son and successor Ranuccio I. (1569-1622), who had shown much spirit in a controversy with Pope Sixtus V., were uneventful, but in 161 1 a conspiracy was formed against him by a group of discontented nobles supported by the dukes of Modena and Mantua. The plot was discovered and the conspirators were barbarously punished, many being tortured and put to death, and their estates confiscated. Ranuccio was a reserved and gloomy bigot; he instituted savage persecutions against supposed witches and heretics, and lived in perpetual terror of plots. His eldest son Alessandro being deaf and dumb, the succession devolved on his second son Odoardo (1612-1646), who fought on the French side in the war against Spain. His failure to pay the interest of the money borrowed in Rome, and the desire of Urban VIII. to obtain Castro for his relatives the Barberini (q.v.), resulted in a war between that pope and Odoardo. His son and successor Ra- nuccio II. (1630-1694) also

had a war with the Holy See about Castro, which was eventually razed to the ground. His son Francesco Maria (1678-1727) suffered from the wars between Spain and Austria, the latter's troops devastating his territory; but although this obliged him to levy some burdensome taxes, he was a good ruler and practised economy in his administration. Having no children, the succession devolved at his death oh his brother Antonio (1679-1731), who was also childless. The powers had agreed that at the death of the latter the duchy should pass to Don Carlos of Bourbon, son of King Philip V. of Spain by Elisabetta Farnese (1692-1766), granddaughter of Ranuccio II. Antonio died in 1731, and with him the line of Farnese came to an end.

The Palazzo Farnese in Rome, one of the finest specimens of Roman Renaissance architecture, was begun under Paul III., while he was cardinal, by Antonio da San Gallo, and completed by his nephew Cardinal Alessandro under the direction of Michelangelo (1326). It was inherited by Don Carlos, afterwards king of Naples and Spain, and most of the pictures were removed to Naples. It now contains the French embassy to the Italian court, as well as the French school of Rome.

Bibliography. — F. Odorici gives a detailed history of the family in P. Litta's Famiglie celebri italiane, vol. x. (Milan, 1868), to which an elaborate bibliography is appended, including manuscript , sources; a more recent bibliography is S. Lottici and G. Sitti, Bibliografia generate per la storia parmense (Parma, 1904) ; much information will be found in A. von Reumont's Geschichte der Siadt Rom, vol. iii. (Berlin, 1868), and in F. Gregorovius's Geschichte der Stadt Rom (Stuttgart, 1872). (L. V.*)

FARNESE, ALEXANDER (1545-1592), duke of Parma, general, statesman and diplomatist, governor-general of the Netherlands under Philip II. of Spain, was born at Rome on the 27th of August 1545, and died at the abbey of St Waast, near Arras, on the 3rd of December 1592. He was the son of Ottavio Farnese, duke of Parma, and Margaret of Austria, natural daughter of Charles V. He accompanied his mother to Brussels when she was appointed governor of the Netherlands, and in

1565 his marriage with the princess Maria of Portugal was celebrated in Brussels with great splendour. Alexander Farnese had been brought up in Spain with his cousin, the ill-fated Don Carlos, and his uncle Don John of Austria, both of whom were about the same age as himself, and after his marriage he took up his residence at once at the

court of Madrid. He fought with much personal distinction under the command of Don John in 1571 at the battle of Lepanto. It was seven years, however, before he had again an opportunity for the display of his great military talents. In the meantime the provinces of the Netherlands had revolted against the arbitrary and oppressive Spanish rule, and Don John of Austria, who had been sent as governor- general to restore order, had found himself helpless in face of" the superior talent and personal influence of the prince of Orange, who had succeeded in uniting all the provinces in common resistance to the civil and religious tyranny of Philip. In the autumn of 1577 Farnese was sent to join Don John at the head of reinforcements, and it .was mainly his prompt decision at a critical moment that won the battle of Gemblours (1578). Shortly afterwards Don John, whose health had broken down through disappointment and ill-health, died, and Farnese was appointed to take his place.

It is scarcely possible to exaggerate the difficulties with which he found himself confronted, but he proved himself more than equal to the task. In military ability the prince of Parma was inferior to none of his contemporaries, as a skilful diplomatist he was the match even of his great antagonist William the Silent, and, like most of the leading statesmen of his day, was un- scrupulous as to the means he employed so long as he achieved his ends. Perceiving that there were divisions and jealousies in the ranks of his opponents between Catholic and Protestant, Fleming and Walloon, he set to work by persuasion, address and bribery, to foment the growing discord, and bring back the Walloon provinces to the allegiance of the king. He was successful, and by the treaty of Arras, January 1579, he was able to secure the support of the " Malcontents," as the Catholic nobles of the south were styled, to the royal cause. The reply to the treaty of Arras was the Union of Utrecht, concluded a few weeks later between the seven northern provinces, who abjured the sovereignty of King Philip and bound themselves to use all their resources to maintain their independence of Spanish rule.

Farnese, as soon as he had obtained a secure basis of operations in Hainaut and Artois, set himself in earnest to the task of re- conquering Brabant and Flanders by force of arms. Town after town fell into his power. Tournai, Maastricht, Breda, Bruges and Ghent opened their gates, and finally he laid siege to the great seaport of Antwerp. The town was open to the sea, was strongly fortified, and was defended with resolute determination and courage by the citizens. They were led by the famous Philip de Marnix, lord of St Aldegonde, and had the assistance of an ingenious Italian engineer, by name Gianibelli. The siege began in 1584 and called forth all the resources of Farnese's

military genius. He cut off all access to Antwerp from the sea by constructing a bridge of boats across the Scheldt from Calloo to Oordam, in spite of the desperate efforts of the besieged to prevent its completion. At last, on the 15th of August 1585, Antwerp was compelled by famine to capitulate. Favourable conditions were granted, but all Protestants were required to leave the town within two years. With the fall of Antwerp, for Malines and Brussels were already in the hands of Farnese, the whole of the southern Netherlands was brought once more to recognize the authority of Philip. But Holland and Zeeland, whose geographical position made them unassailable except by water, were by the courage and skill of their hardy seafaring population, with the help of English auxiliaries sent by Queen Elizabeth, able to defy his further advance.

In 1586 Alexander Farnese became duke of Parma by the death of his father. He applied for leave to visit his paternal territory, but Philip would not permit him. He could not replace him in the Netherlands; but while retaining him in his command at the head of a formidable army, the king would not give his sanction to his great general's desire to use it for the reconquest

of the Northern Provinces. Never was there a better opportunity than the end of 1586 for an invading army to march through the country almost without opposition. The misgovernment and lack of high statesmanship of the earl of Leicester had caused faction to be rampant in the United Provinces; and on his return to England he left the country without organized forces or experienced generals to oppose an advance of a veteran army under the greatest commander of his time. But Philip's whole thoughts and energies were already directed to the prepara- tion of an Invincible Armada for the conquest of England, and Parma was ordered to collect an enormous flotilla of trans- ports and to keep his army concentrated and trained for the projected invasion of the island realm of Queen Elizabeth. Thus the critical period passed by unused, and when the tempests had finally dispersed the defeated remnants of the Great Armada the Dutch had found a general, in the youthful Maurice of Nassau, worthy to be the rival in military genius even of Alexander of Parma. Moreover, the accession to the throne of France of Henry of Navarre had altogether altered the situation of affairs, and relieved the pressure upon the Dutch. by creating a diversion, and placing Parma and his army between hostile forces. The ruinous expenditure upon the Great

Armada had also depleted the Spanish treasury and Philip found himself virtually bankrupt. In 1590 the condition of the Spanish troops had become intolerable. Farnese could get no regular supplies of money from the king for the payment of the soldiery, and he had to pledge his own jewels to meet the demand. A mutiny broke out, but was suppressed. In the midst of these difficulties Parma received orders to abandon the task on which he had spent himself for so many years, and to raise the siege of Paris, which was blockaded by Henry IV. He left the Nether- lands on the 3rd of August 1590 at the head of 15,000 troops. By brilliant generalship he outwitted Henry and succeeded in relieving Paris; but owing to lack of money and supplies he was compelled immediately to retreat to the Netherlands, abandoning on the march many stragglers and wounded, who were killed by the peasantry, and leaving all the positions he had taken to be recaptured by Henry.

Again in 1591, in the very midst of a campaign against Maurice of Nassau, sorely against his will, the duke of Parma was obliged to give up the engrossing struggle and march to relieve Rouen. He was again successful in his object, but was wounded in the arm before Caudebec, and was finally compelled to withdraw his army with considerable losses through the privations the troops had to undergo. He himself was shattered in health by so many years of continuous campaigning and exposure, and by the cares and disappointments which had befallen him. He died at Arras on the 3rd of December 1592, in the forty- seventh year of his age. The feeling that his immense services had not won for him either the gratitude or confidence of his sovereign hastened his end. He was honoured by a splendid funeral at Brussels, but his body was interred at his own capital city of Parma. He left two sons, Ranuce, who succeeded him, and Edward, who was created a cardinal in 1591 by Pope Gregory XIV. His daughter Margaret married Vincent, duke of Mantua.

See L. P. Gachard, Correspondance d' Alexandre Farnese, Prince de Parme, gouverneur general des Pays-Bas, avec Philippe II, 1578- 1579 (Brussels, 1850); Fra Pietro, AlessanaWo Farnese, duca di Parma (Rome, 1836).

FARNESE, ELIZABETH (1 692-1 766), queen of Spain, born on the 25th of October 1692, was the only daughter of Odoardo II., prince of Parma. Her mother educated her in strict seclusion, but seclusion altogether failed to tame her imperious and am- bitious temper. At the age of twenty-one (1 7 1 4) she was married by proxy at Parma to Philip V. of Spain. The marriage was arranged by Cardinal Alberoni (q.v.), with the concurrence of the Princess des Ursins, the Camerara

Mayor. On arriving at the borders of Spain, Elizabeth was met by the Princess des Ursins, but received her sternly, and, perhaps in accordance with a plan previously concerted with the king, at once ordered her to be removed from her presence and from Spain. Over the

weak king Elizabeth quickly obtained complete influence. This influence was exerted altogether in support of the policy of Alberoni, one chief aim of which was to recover the ancient Italian possessions of Spain, and which actually resulted in the seizure of Sardinia and Sicily. So vigorously did she enter into this policy that, when the French forces advanced to the Pyrenees, she placed herself at the head of one division of the Spanish army. But Elizabeth's ambition was grievously disappointed. The Triple Alliance thwarted her plans, and at length in 1720 the allies made the banishment of Alberoni a condition of peace. Sicily also had to be evacuated. And finally, all her entreaties failed to prevent the abdication of Philip, who in 1724 gave up the throne to his heir, and retired to the palace of La Granja. Seven months later, however, the death of the young king recalled him to the throne. During his later years, when he was nearly imbecile, she directed the whole policy of Spain so as to secure thrones in Italy for her sons. In 1736 she had the satisfaction of seeing her favourite scheme realized in the accession of her son Don Carlos (afterwards Charles III. of Spain) to the throne of the Two Sicilies and his recognition by the powers in the treaty of Vienna. Her second son, Philip, became duke of Parma. Elizabeth survived her husband twenty years, dying in 1 766.

See Memoires pour servir ct I'histoire d'Espagne sous le regne de, Philippe V, by the Marquis de St Philippe, translated by Maudave (Paris, 1756); Memoirs of Elizabeth Farnese (London, 1746); and E. Armstrong, Elizabeth Farnese, the Termagant of Spain (1892).

FARNHAM, a market town in the Guildford parliamentary division of Surrey, England, 37! m. S.W. by W. from Loridon by the London & South Western railway. Pop. of urban district (1901) 6124. It lies on the left bank of the river Wey, on the southern slope of a hill rising about 700 ft. above the sea-level. The church of St Andrew is a spacious transitional Norman and Early English building, with later additions, and was formerly a chapel of ease to Waverley Abbey, of which a crypt and fragmentary- remains, of Early English date, stand in the park attached to a modern residence of the same name. This was the earliest Cistercian house in England, founded in 1 1 28 by William Gifford, bishop of Winchester. The Annates' Waverlienses, published by Gale in his Scriptores and afterwards in the Record series

of Chronicles, are believed to have suggested to Sir Walter Scott the name of his first novel. Farnham Castle, on a hill north of the town, the seat of the bishops of Winchester, was first built by Henry de Blois, bishop of Winchester, and brother of King Stephen; but it was razed by Henry III. It was rebuilt and garrisoned for Charles I. by Denham, from whom it was taken in 1642 by Sir W. Waller; and having been dismantled, it was restored by George Morley, bishop of Win- chester (1662-1684). Farnham has a town hall and exchange in Italian style (1866), a grammar school of early foundation, and a school of science and art. It was formerly noted for its cloth manufacture. Hops of fine quality are grown in the vicinity. William Cobbett was born in the parish (1766), and is buried in the churchyard of St Andrew's. The neighbouring mansion of Moor Park was the residence of Sir William Temple (d. 1699), and Swift worked here as his secretary. Hester Johnson, Swift's " Stella," was the daughter of Temple's steward, whose cottage still stands. The town has grown in favour as a residential centre from the proximity of Aldershot Camp (3 m. N.E.).

Though there is evidence of an early settlement in the neigh- bourhood, the town of Farnham (Ferneham) seems to have grown up round the castle of the bishops of Winchester, who possessed the manor at the Domesday Survey. Its position at the junction of the Pilgrim's Way and the road from Southampton to London was important. In 1205 Farnham had bailiffs, and in 1207 it was definitely a mesne borough under the bishops of Winchester. In 1247 the bishop granted the first charter, giving, among other privileges, a fair on All Saints' Day. The burgesses surrendered the proceeds of the borough court and other rights in 1365 in returrt for respite of the fee farm rent; these were recovered in 1405 and rent again paid. Bishop Waynflete is said to have confirmed the original charter in 1452, and in 1566 Bishop Home

granted a new charter by which the burgesses elected 2 bailiffs and 12 burgesses annually and did service at their own courts every three weeks, the court leet being held twice a year. In resisting an attack made by the bishop in 1660 on their right of toll, the burgesses could only claim Farnham as a borough by prescription as their charters had been mislaid, but the charters were subsequently found, and after some litigation their rights were established. In the 18th century the corporation, a close body, declined, its duties being performed by the

vestry, and in 1789 the one survivor resigned and handed over the town papers to the bishop. Farnham sent representatives to parliament in 13 1 1 and 1460, on both occasions being practically the bishop's pocket borough. In accordance with the grant of 1247 a fair was held on All Saints' day and also on Holy Thursday; the former was afterwards held on All Souls' Day. Farnham was early a market of importance, and in 12 16 a royal grant changed the market day from Sunday to Thursday in each week. It was famous in the early 17th century for wheat and oats; hop- growing began in 1597.

FARNWORTH, an urban district in the Radcliffe-cum- Farnworth parliamentary division of Lancashire, England, on the Irwell, 3 m. S.E. of Bolton by the Lancashire & Yorkshire railway. Pop. (1901) 25,925. Cotton mills, iron foundries, brick and tile works, and collieries employ the large industrial population.

FARO, the capital of a district bearing the same name, in southern Portugal; at the terminus of the Lisbon-Faro railway, and on the Atlantic Ocean. Pop. (1900) 11,789. Faro is an episcopal see, with a Renaissance cathedral of great size, an ecclesiastical seminary, and a ruined castle surrounded by Moorish fortifications. Its broad but shallow harbour is pro- tected on the south by the long island of Caes, and a number of sandy islets, which, being constantly enlarged by silt from the small river Fermoso, render the entrance of large vessels im- possible. Fishing is an important industry, and fish, with wime s fruit, cork, baskets and sumach, are the principal articles of export. Little has been done to develop the mineral resources of the district, which include tin, lead, antimony auoid auriferous quartz. Faro was taken from the Mac** by Alphonso III. of Portugal (1248-12 79). It was sacked by the English in 1596, and nearly destroyed by an earthquake in 1755. –

The administrative district of. Faro coincides with the ancient kingdom and province of Algarve (q.v.); pop. (1900) 255,191; area, 1937 sq. m. •-**.-» <ˆ

FARO (from Pharaoh, a picture of the Egyptian king appearing on a card of the old French pack), a gam* of cards, played with a full pack. Originally the pack, was held in the dealer's left hand, but nowadays very elaborate and expensive implements are used. The dealer places the pack, after shuffling and cutting, in a dealing-box face upwards, and the cards are taken from the top of ,the box in couples through.a slit in the side. The exposed ' card on top is called soda, and the last card left in the box is in hoc. The implementˆ include counters of various colours and values, a deajingj-bex, a case or frame

manipulated by a ” case-keeper, V; upon which the cards already played are arranged in, sight, a shuffling-board, and score-sheets for the players. Upon the table is the ” lay-out,” a complete suit of spades, enamelled on green cloth, upon or near which to place the stakes. The dealer takes two cards from the box, placing the first one near it and the second close beside it. Each deal of two cards is called a turn, and there are twenty-five such, wda and hoe not counting. The players stake upon any caid they please, or in such manner as to take in several cards, reducing the amount, but increasing the chances, of winning, as at roulette. The dealer, having waved the hand, after which no more bets may be made, deals the turn, and then proceeds to gather in the stakes won by him, and to pay those he has lost. The chances as between dealer and punters, or players, are equal, except that the banker wins &alf the money staked on the cards

of Louis XIV. Owing to the dishonest methods of many gambling ” clubs ” the game is in disrepute.

FARQUHAR, GEORGE (1677-1707), British dramatist, son of William Farquhar, a clergyman, was born in Londonderry, Ireland, in 1677. When he was seventeen he was entered as a sizar at Trinity College, Dublin, under the patronage of Dr Wiseman, bishop of Dromore. He did not long continue his studies, being, according to one account, expelled for a profane joke. Thomas Wilkes, however, states that the abrupt termina- tion of his studies was due to the death of his patron. He became an actor on the Dublin stage, but in a fencing scene in Dryden’s Indian Emperor he forgot to exchange his sword for a foil, with results which narrowly escaped being fatal to a fellow-actor. After this accident he never appeared on the boards. He had met Robert Wilks, the famous comedian, in Dublin. Though he did not, as generally stated, go to London with Wilks, it was at his suggestion that he wrote his first play, Love and a Bottle, which was performed at Drury Lane, perhaps through Wilks’s interest, in 1698. He received from the earl of Orrery a lieuten- ancy in his regiment, then in Ireland, but in two letters of his dated from Holland in 1700 he says nothing of military service. His second comedy, The, Constant Couple: or a Trip to the Jubilee (1699), ridiculing the preparations for the pilgrimage to Rome in the Jubilee year, met with an enthusiastic reception. Wilks as Sir Harry Wildair contributed substantially to its success. In 1701 Farquhar wrote a sequel, Sir Harry Wildair. Leigh Hunt says that Mrs Qldfield, like Wilks, played admirably well in it, but the original Lady Lurewell was Mrs Verbruggen. Mrs Oldfield is said to have been the ” Penelope ” of Farquhar’s letters. In 1702 Farquhar published a slight volume of mis- cellanies — Love and Business; in a Collection of Occasionary Verse and Epistolary Prose — containing, among other

things, ” A Discourse on Comedy in reference to the English Stage,” in which he defends the English neglect of the dramatic unities. ” The rules of English comedy,” he says, ” don’t lie in the com- pass of Aristotle or his followers, but in the pit, box and galleries.” In 170a he borrowed from Fletcher’s Wild Goose Chase, The Inconstant, or the Way to win Hint, in which he followed his original fairly closely except in the last act. In 1703 he married, in the expectation of a fortune, hut found too late that he was deceived. It is said that, he never reproached his wife, although the marriage increased his liabilities and the rest of his life was a constant struggle against poverty. His other plays are : The Stage Coach (1704), a one-act farce adapted from the French of Jean de la Chapelle in. conjunction with Peter Motteux; The Twin Rivals (Drury Lane, 1702); The Recruiting Officer (Drury Lane, 1706); and The Beaux’ Stratagem (Haymarket, 1707). The Recruiting Officer was suggested to him by a recruiting expedition (1705) in Shropshire, and is dedicated to his ” friends round the Wrekin.” The Beaux’ Stratagem is the best of all his plays, and long kept the stage. Genest notes nineteen revivals up to 1828. Two embarrassed gentlemen travel in the country disguised as master and servant in the hope of mending their fortune. The play gives vivid pictures of the Lichfield inn with its rascally landlord, and of the domestic affairs of the Sullens. Archer, the supposed valet, whose adventurous spirit secures full play, was one of Garrick’s best parts,.

Meanwhile one. of his patrons, said to have been the duke of Ormond, had advised Farquhar to sell out of his regiment, and had promised to give him a captaincy in his own. Farquhar sold his commi.ssion, but the duke’s promise remained unfulfilled. Before lie had finished the second act of The Beaux’ Stratagem he knaw that he was stricken with a mortal illness, but it was necessary to persevere and to be ” consumedly lively to the end.” He, had received in advance £30 for the copyright from Lintot Cne bookseller. The play was staged on the 8th of March, and Farquhar lived to have his third night, and there was an extra benefit on the 29th of April, the day of his death. He left his two children to the care of his friend Wilks. Wilks obtained a benefit at the theatre for the dramatist’s widow, but he seems to have done little for the daughters. They were apprenticed to a mantua-maker, and one of them was, as late as 1/64, in

receipt of a pension of £20 solicited for her by Edmund Chaloner, a patron of Farquhar. She was then described as a maidservant and

possessed of sentiments ” fitted to her humble situation.”

The plots of Farquhar’s comedies are ingenious in conception and skilfully conducted. He has no pretensions to the brilliance of Congreve, but his amusing dialogue arises naturally out of the situation, and its wit is never strained. Sergeant Kite in the Recruiting Officer, Scrub, Archer and Boniface in The Beaux’ Stratagem are distinct, original characters which had a great success on the boards, and the unexpected incidents and adven- tures in which they are mixed up are represented in an irresistibly comic manner by a man who thoroughly understood the resources of the stage. The spontaneity and verve with which his ad- venturous heroes are drawn have suggested that in his favourite type he was describing himself. His own disposition seems to have been most lovable, and he was apparently a much gayer person than the reader might be led to suppose from the ” Portrait of Himself ” quoted by Leigh Hunt. The code of morals followed by these characters is open to criticism, but they are human and genial in their roguery, and compare far from unfavourably with the cynical creations of contemporary drama. The advance which he made on his immediate predecessors in dramatic con- struction and in general moral tone is more striking when it is remembered that he died before he was thirty.

Farquhar’s dramatic works were published in 1728, 1742 and 1772, and by Thomas Wilkes with a biography in 1775. They were included in the Dramatic Works of Wycherley, Congreve, Vanbrugh and Farquhar (1849), with biographical and critical notices, by Leigh Hunt. See also The Dramatic Works of George Farquhar, with Ltfe and Notes, by A. C. Ewald (2 vols., 1892) ; The Best Plays of George Farquhar (Mermaid series, 1906), with biographical and critical introductions, by William Archer; The Beaux’ Stratagem, edited (1898) by H. Macaulay Fitzgibbon for ” The Temple Dramatists “; and D. Schmid, ” George Farquhar, sein Leben und seine Original- Dramen ” (1904) in Wiener Beitrdge zur engl. Philol.

FARR, WILLIAM (1807-1883), English statistician, was born at Kenley, in Shropshire, on the 30th of November 1807. When nineteen he became the pupil of a doctor in Shrewsbury, also acting as dresser in the infirmary there. He then went to Paris to study medicine, but after two years returned to London, where, in 1832, he qualified as L.S.A. Next year he began to practise, but without very brilliant results, for five years later he definitely abandoned the exercise of his profession on accepting the post of compiler of abstracts in the registrar-general’s office. The commissioners for the 1841 census consulted him on several points, but did not in every case follow his advice. For the next

two decennial censuses he acted as assistant-commissioner; for that of 1871 he was a commissioner, and he wrote the greater part of the reports of all. He had an ambition to become registrar-general; and when that post became vacant in 1879, he was so disappointed at the selection of Sir Brydges Henniker instead of himself, that he refused to stay any longer in the registrar's office. He died of paralysis of the brain a year or two later, on the 14th of April 1883. A great part of Farr's literary production is to be found in the papers which, from 1839 to 1880, he wrote for each annual report of the registrar-general on the cause of the year's deaths in England. He was also the author of many papers on general statistics and on life-tables for insurance, some read before the Royal Statistical Society, of which he was president in 1871 and 1872, some contributed to the Lancet and other periodicals. A selection from his statistical writings was published in 1885 under the editorship of Mr Noel Humphreys.

FARRAGUT, DAVID GLASGOW (1801-1870), first admiral of the United States navy, was the son of Major George Farragut, a Catalan by descent, a Minorquin by birth, who had emigrated to America in 1776, and, after the peace, had married a lady of Scottish family and settled near Knoxville, in Tennessee; there Farragut was born on the 5th of July 1801. At the early age of nine he entered the navy, under the protection of his name-father, Captain David Porter, with whom he served in the " Essex "during her cruise in the A.ltantic in 181 2, and afterwards in the Pacific, until her capture by the " Phoebe," in Valparaiso

Bay, on the 28th of March 1814. He afterwards served on board the " Washington " (74) carrying the broad pennant of Com- modore Chauncey in the Mediterranean, and pursued his pro- fessional and other studies under the instruction of the chaplain, Charles Folsom, with whom he contracted a lifelong friendship. Folsom was appointed from the " Washington " as U.S. consul at Tunis, and obtained leave for his pupil to pay him a lengthened visit, during which he studied not only mathematics, but also French and Italian, and acquired a familiar knowledge of Arabic and Turkish. He is said to have had a great natural aptitude for languages and in after years to have spoken several fluently.

After more than four years in the Mediterranean, Farragut returned to the States in November 1820. He then passed his examination, and in 1822 was appointed for service in what was called the " mosquito " fleet, against the pirates, who then infested the Caribbean Sea. The service was one of great exposure and privation; for two years and a half, Farragut wrote, he never owned a bed, but lay down to rest

wherever he found the most comfortable berth. By the end of that time the joint action of the British and American navies had driven the pirates off the sea, and when they took to marauding on shore the Spanish governors did the rest. In 1825 he was promoted to the rank of lieutenant, whilst serving in the navy yard at Norfolk, where, with some breaks in sea-going ships, he continued till 1832; he then served for a commission on the coast of Brazil, and was again appointed to the yard at Norfolk.-

It is needless to trace the ordinary routine of his service step by step. The officers of the U.S. navy have one great advantage which British officers are without; when on shore they are not neces- sarily parted from the service, but are employed in their several ranks in the differentdockyards, escaping thus not only the private grievance and pecuniary difficulties of a very narrow half -pay, but also, what from a public point of view is much more important, the loss of professional aptitude, and of that skill which comes from unceasing practice. On the 8th of September 1841 Farragut was promoted to the rank of commander, and on the 14th of September 1855 to that of captain. At this time he was in charge of the navy yard, Mare Island, California, from which post he was recalled in 1858, and appointed to the " Brooklyn " frigate, the command of which he held for the next two years. When the war of secession broke out in 1861, he was " waiting orders " at Norfolk. By birth and marriage he was a Southerner, and the citizens of Norfolk counted on his throwing in his lot with them; but professional pride, and affection for the flag under which he had served for more than fifty years, held him true to his allegiance; he passionately rejected the proposals of his fellow-townsmen, and as it was more than hinted to him that his longer stay in Norfolk might be dangerous, he hastily quitted that place, and offered his services to the government at Washington. These were at once accepted; he was requested to sit on the Naval Retiring Board — a board then specially constituted for clearing the navy of unfit or disloyal officers — and a few months later was appointed to the command of the " Western Gulf Blockading Squadron," with the rank of flag-officer, and ordered to proceed forthwith, in the " Hartford," to the Gulf of Mexico, to collect such vessels as could be spared from the blockade, to proceed up the Mississippi, to reduce the defences which guarded the approaches to New Orleans, and to take and hold the city. All this Farragut executed to the letter, with a skill and caution that won for him the love of his followers, and with a dash and boldness that gained him the admiration of the public and the popular name of "Old Salamander." The passage of the Mississippi was forced on the 24th of April 1862, and New Orleans surrendered on the 26th; this was immediately

followed by the operations against Vicksburg, from which, however, Farragut was compelled to withdraw, having relearnt the old lesson that against heavy earthworks, crowning hills of sufficient height, a purely naval attack is unavailing; it was not till the following summer, and after a long siege, that Vicksburg surrendered to a land force under General Grant. During this time the service on the Mississippi continued both difficult and irksome; nor until the river was cleared could

Farragut seriously plan operations against Mobile, a port to which the fall of New Orleans had given increased importance. Even then he was long delayed by the want of monitors with which to oppose the ironclad vessels of the enemy. It was the end of July 1864 before he was joined by these monitors; and on the 5th of August, undismayed by the loss of his leading ship, the monitor ” Tecumseh,” sunk by a torpedo, he forced the passage into the bay, destroyed or captured the enemy’s ships, including the ram ” Tennessee ” bearing Admiral Buchanan’s flag, and took possession of the forts. The town was not occupied till the following April, but with the loss of its harbour it ceased to have any political or strategical importance.

With this Farragut’s active service came to an end; for though in September 1864 he was offered the command of the force intended for the reduction of Wilmington, the state of his health, after the labours and anxieties of the past three years, in a trying climate, compelled him to decline it and to ask to be recalled. He accordingly returned to New York in December, and was received with the wildest display of popular enthusiasm. It was then that the Government instituted the rank of vice- admiral, previously unknown in the American service. Farragut was promoted to it, and in July 1866 was further promoted to the rank of admiral. In 1867, with his flag flying in the ” Franklin,” he visited Europe. The appointment was an honourable distinction without political or naval import: the ” Franklin” was, to all intents, for the time being, a yacht at Farragut’s disposal; and her arrival in the different ports was the signal for international courtesies, entertainments and social gaiety. She returned to America in 1868, and Farragut retired into private life. Two years later, on the 14th of August 1870, he died at Portsmouth, New Hampshire..

Farragut was twice married, and left, by his second wife, a son, Loyall Farragut, who, in 1878, published a Life of his father ” em- bodying

his Journal and Letters.” Another Life (1892), by Captain A. T. Mahan, though shorter, has a greater_ value from the pro- fessional point of view, by reason of the critical appreciation of Farragut’s services. (J. K. L.)

FARRAKT, RICHARD, composer of English church music, flourished during the 16th century. Very little is known about him. Fetis gives 1530 as the date of his birth, but on what authority does not appear. He became a gentleman of the Chapel Royal in the reign of Edward VI., but resigned his post in 1564 on being appointed master of the children of St George’s chapel, Windsor. In this capacity he presented a play before the queen at Shrovetide 1568, and again at Christmas of the same year, receiving on each occasion the sum of £6: 13: 4d. In November 1569 he was reinstated as gentleman of the Chapel Royal. It is stated by Hawkins {History 0} Music, vol. iii. 279) that Farrant was also one of the clerks and organists of St George’s chapel, Windsor, and that he retained these posts till his death. Many of his compositions are printed in the collections of Barnard and Boyce. Among the most admired of them are a service in G minor, and’ the anthems ” Call to remembrance ” and ” Hide not thou thy face.” It is doubtful whether Farrant is entitled to the credit of the authorship of the beautiful anthem ” Lord, for thy tender mercies’ sake.” No copy of the music under his name appeared in print till 1 800, although it had been earlier attributed to him. Some writers have named John Hilton, and others Thomas Tallis, as the composer. From entries in the Old Check Book of the Chapel Royal (edited for the Camden Society by Dr Rimbault) it appears that Farrant died, not in 1585, as Hawkins states, but on the 30th of November 1580 or 1581.

FARRAR, FREDERIC WILLIAM (1831-1003), English divine, was born on the 7th of August 183 1, in the Fort of Bombay, where his father, afterwards vicar of Sidcup, Kent, was then a missionary. His early education was received in King William’s College, Castletown, Isle of Man, a school whose external sur- roundings are reproduced in his popular schoolboy tale, Eric; or, Little by Little. In 1847 he entered King’s College, London. Through the influence of F.D. Maurice he was led to the study of Coleridge, whose writings had a profound influence upon his faith and opinions. He proceeded to Trinity College, Cambridge,

in October 1851, and in the following year took the degree of B.A. at the university of London. In 1854 he took his degree as fourth junior optime, and fourth in the first class of the classical tripos. In addition to other college prizes he gained the chan- cellor’s medal for the English prize poem on the search for Sir John Franklin in 1852, the Le

Bas prize and the Norrisian prize. He was elected fellow of Trinity College in 1856.

On leaving the university Farrar became an assistant-master under G. E. L. Cotton at Marlborough College. In November 1855 he was appointed an assistant-master at Harrow, where he remained for fifteen years. He was elected a fellow of the Royal Society in 1864, university preacher in 1868, honorary chaplain to the queen in 1869 and Hulsean lecturer in 1870. In 1871 he was appointed headmaster of Marlborough College, and in the following year he became chaplain-in-ordinary to the queen. In 1876 he was appointed canon of Westminster and rector of St Margaret's, Westminster. He took his D.D. degree in 1874, the first under the new regulations at Cambridge. Farrar began his literary labours with the publication of his schoolboy story Eric in 1858, succeeded in the following year by Julian Home and Lyrics of Life, and in 1862 by St Winifred's; or the World of School. He had already published a work on The Origin of Language, and followed it up by a series of • works on grammar and scholastic philology, including Chapters on Language (1865) ; Greek Grammar Rules (1865); Greek Syntax (1866); and Families of Speech (1869). He edited Essays on a Liberal Education in 1868; and published Seekers after God in the Sunday Library (1869). It was by his theological works, how- ever, that Farrar attained his greatest popularity. His Hulsean lectures were published in 1870 under the title of The Witness of History to Christ. The Life of Christ, which was published in 1874, speedily passed through a great number of editions, and is still in much demand. It reveals considerable powers of imagination and eloquence, and was partly inspired by a personal knowledge of the sacred localities depicted. In 1877 appeared In the Days of My Youth, sermons preached in the chapel of Marlborough College; and during the same year his volume of sermons on Eternal Hope — in which he called in question the dogma of everlasting punishment — caused much controversy in religious circles and did much to mollify the harsh theology of an earlier age. There is little doubt that his boldness and liberality of thought barred his elevation to the episcopate. In 1879 appeared The Life and Works of St Paul, and this was succeededin 1882 by The Early Days of Christianity. Then came in order of publication the following works: Everyday Christian Life; or, Sermons by the Way (1887); Lives of the Fathers (1888); Sketches of Church History (1889); Darkness and Dawn, a story of the Neronic persecution (1891); The Voice from Sinai (1892); The Life of Christ as Represented in Art (1894); a work on Daniel (1893); Gathering Clouds, a tale of the days of Chrysostom (1896); and The Bible, its Meaning and Supremacy (1896). Farrar was a copious contributor of

articles to various magazines, encyclopaedias and theological commentaries. In 1883 he was made archdeacon of Westminster and rural dean; in 1885 he was appointed Bampton lecturer at Oxford, and took for his subject " The History of Interpretation." He was appointed dean of Canterbury in 1895. From 1890 to 1895 he was chaplain to the speaker of the House of Commons, and in 1894 he was appointed deputy-clerk of the closet to Queen Victoria. He died at Canterbury on the 22nd of March 1903.

As a theologian Farrar occupied a position midway between the Evangelical party and the Broad Church; while as a somewhat rhetorical preacher and writer he exerted a commanding influence over wide circles of. readers. He was an ardent temperance and social reformer, and was one of the founders of the institution known as the Anglican Brotherhood, a religious band with modern aims and objects.

See his Life, by his son R. Farrar (1904).

FARREN, ELIZABETH (c. 1759-1829), English actress, was the daughter of George Farren, an actor. Her first London appearance was in 1777 as Miss Hardcastle in She Stoops to Conquer. Subsequent successes established her reputation

and she became the natural successor to Mrs Abington when the latter left Drury Lane in 1782. The parts of Hermione, Olivia, Portia and Juliet were in her repertory, but her Lady Betty Modish, Lady Townly, Lady Fanciful, Lady Teazle and similar parts were her favourites. In 1797 she married Edward, 12th earl of Derby (1752-1834).

FARREN, WILLIAM (1 786-1861), English actor, was born on the 13th of May 1786, the son of an actor (b. 1725) of the same name, who played leading roles from 1784 to 1795 at Covent Garden. His first appearance on the stage was at Plymouth at the Theatre Royal, then under the management of his brother, in Love & la mode. His first London appearance was in 18 18 at Covent Garden as Sir Peter Teazle, a part with which his name is always associated. He played at Covent Garden every winter until 1828, and began in 1824 a series of summer engagements at the Haymarket which also lasted some years. At these two theatres he played an immense variety of comedy characters. From 1828 until 1837 he was at Drury Lane, where he essayed a wider range, including Polonius and Caesar. He was again at Covent

Garden for a few years, and next joined Benjamin Webster at the Haymarket, as stage-manager as well as actor. In 1843 at the close of his performance of the title-part in Mark Lemon's Old Parr, he was stricken with paralysis on the stage. He was, however, able to reappear the following year, and he remained at the Haymarket ten years more, though his acting never again reached its former level. For a time he managed the Strand, and, 1850-1853, was lessee of the Olympic. During his later years he confined himself to old men parts, in which he was unrivalled. In 1855 ne made his final appearance at the Haymarket, as Lord Ogleby in a scene from the Clandestine Marriage. He died in London on the 24th of September 1861. In 1825 he had married the actress Mrs Faucit, mother of Miss Helena Saville Faucit (Lady Martin), and he left two sons, Henry (1826-1860) and William (1825-1908), both actors. The former was the father of Ellen [Nellie] Farren (1848-1904), long famous for boy's parts in Gaiety musical burlesques, in the days of Edward Terry and Fred Leslie. As Jack Sheppard, and in similar roles, she had a unique position at the Gaiety, and was an unrivalled public favourite. From 1892 her health failed, and her retirement, coupled with Fred Leslie's death, brought to an end the type of Gaiety burlesque associated with them.

FARRER, THOMAS HENRY FARRER, ist Baron(i8i9-i8 9 9), English civil servant and statistician, was the son of Thomas Farrer, a solicitor in Lincoln's Inn Fields. Born in London on the 24th of June 1819, he was educated at Eton and Balliol College, Oxford, where he graduated in 1840. He was called to the bar at Lincoln's Inn in 1844, but retired from practice in the course of a few years. He entered the public service in 1850 as secretary to the naval (renamed in 1853 the marine) department of the Board of Trade. In 1865 he was-promoted to be one of the joint secretaries of the Board of Trade, and in 1867 became permanent secretary. His tenure of this office, which he held for upwards of twenty years, was marked by many reforms and an energetic administration. Not only was he an advanced Liberal in politics, but an uncompromising Free-trader of the strictest school. He was created a baronet for his services at the Board of Trade in 1883, and in 1886 he retired from office. During the same year he published a work entitled Free Trade versus Fair Trade, in which he dealt with an economic contro- versy then greatly agitating the public mind. He had already, in 1883, written a volume on Tlte Stale in its Relation to Trade. In 1889 he was co-opted by the Progressives an alderman of the London County Council, of which he became vice-chairman in 1890. His efficiency and ability in this capacity were warmly recognized; but in the course of time divergencies arose between his personal views and those of many of his colleagues. The tendency

towards socialistic legislation which became apparent was quite at variance with his principles of individual enterprise and responsibility. He consequently resigned his position. In 1893 he was raised to the peerage. From this time forward he devoted much of his energy and leisure to advocating his views at the Cobden Club, the Political Economy Club,

on the platform, and in the public press. Especially were his efforts directed against the opinions of the Fair Trade League, and upon this and other controversies on economic questions he wrote able, clear, and uncompromising letters, which left no doubt that he still adhered to the doctrines of free trade as advocated by its earliest exponents. In 1898 he published his Studies in Currency. He died at Abinger Hall, Dorking, on the 1 ith of October 1899. He was succeeded in the title by his eldest son Thomas Cecil (b. 1859).

FARRIER, and FARRIERY (from Lat. ferrarius, a black- smith, jerrum, iron). Farrier is the name given generally either to the professional shoer of horses or in a more extended sense to a practitioner of the veterinary art; and farriery is the term for his business. Primarily the art of farriery is identical with that of the blacksmith, in so far as he makes and fixes shoes on horses (see Horse-Shoes); he is liable in law for negligence, as one who holds himself out as skilled; and he has a lien on the animal for his expenses. William the Conqueror is supposed to have introduced horse-shoeing into England, and the art had an important place through the middle ages, the days of chivalry, and the later developments of equitation. In modern times it has been closely allied with the general progress in veterinary science, and in the knowledge of the anatomy and physiology of the horse's foot and hoof.

See Fisher, The Farrier (1893); Lungwitz, Text-Book of Horse- shoeing (Eng. trans., 1898).

FARS (the name Farsislan is not used), one of the five mam- likats (great provinces) of Persia, extending along the northern shore of the Persian Gulf and bounded on the west by Arabistan, on the north by Isfahan and on the east by Kerman. It lies between 49 30′ and 56 10′ E. and 26 20′ and 31° 45′ N. and has an area of nearly 60,000 sq. m. Fars is the same word as the Greek Persis, and, originally the name of only a part of the Persian empire (Iran), has become the name which Europeans have applied to the whole (see Persis). The province is popularly, but not for administrative purposes, divided according to climate into germslr and sardslr, or the warm and cold regions. The former extends from the sea to the central chain of hills and contains

all the lowlands and many mountainous districts, some of the latter rising to an elevation of between 3000 and 4000 ft. and the sardsir comprises the remaining and northern districts of the province.

In Arrian's relation of the voyage of Nearchus (Indica, 40), these two regions are well described. " The first part of Persis which lies along the Persian Gulf is hot, sandy and barren and only the date palm thrives there. The other part comprehends inner Persis lying northwards; it enjoys a pleasant climate and has fertile and well-watered plains, gardens with trees of all kinds, rich pasturages and forests abounding with game; with the exception of the olive all fruits are produced in profusion, particularly the vine. Horses and other draught animals are reared in the province, and there are several lakes frequented by water-fowl, and streams of clear water flow through it, as for instance the Kyros (Kur) formed by the junction of the Medos and Araxes."

The mountains of Fars may be considered as a continuation of the Zagros and run parallel to the shores of the Persian Gulf. They comprise several ranges which the roads from the sea to the interior have to cross at right angles, thereby rendering communication and transport very difficult. The highest of the mountains of Fars (14,000 ft.) is the Kuh Dina in the north- western part of the province. Of the rivers of Fars only three important ones flow into the sea: (1) the Mand (Arrian's Sitakos), Karaaghach in its upper course; (2) the Shapur or Khisht river (Granis); (3) the Tab (Oroatis). Some rivers, notably the Kur (Kyros, Araxes) which flows into the Bakhtegan lake east of Shiraz, drain into inland depressions or lakes.

The capital of the province is Shiraz, and the subdivision in districts, the chief places of the districts and their estimated population, and the number of inhabited villages in each as they appear in lists dated 1884 and 1905 are shewn en the following page.

FARS

Chief Place or Seat of

Number of

Numc of District

Government

inhabited

Name.

Popula- tion.

Villages in District.

I

Abadeh Iklid . . .

Abadeh

4,000

33

2

Abadeh-Tashk

Tashk

600

8

3

Abarj

Dashtek

2,000

6

4

Abbasi (1) Bander Abbasi ‘

and villages .

Bander Abbasi

10,000

H

(2) Issin and Tazian

Issin

6

(3) Shamil .

Shamil

1,000

18

(4) Moghistan .

Ziarat

10

(5) Minab . . .

Minab

4,000

23

5

Afzar

Nimdeh

12

6

‘Alemrud ….

Sabzpushan

1,000

16

7

Arb’ah (the four) (1) Deh Rod “1

(2) Deh Ram 1

Deh Ram

1,500

19

(3) Hengam [

(4) Rudbal J

8

Ardakan . .

Ardakan

5,000

10

9

Arsinjan ….

Arsinjan

5,000

25

10

Aslr

Aslr

500

10

11

Baiza

Baiza

2,000

55

12

Bidshahr and Juvim .

Bidshahr

3,000

23

13

Bovanat ….

Surian

500

23

H

Darab

Darab

5,000

62

15

Dashti

(1) Bardistan

Bander Dair

1,000

28

(2) Buluk . . .

Bushgan

18

(3) Mandistan .

Kaki

1,500

40

(4) Tassuj

Tang Bagh

500

11

(5) Shumbeh. .

Shumbeh

15

16

Dashtistan

(1) Angali

HaftjQsh

10

(2) Ahrom .

Ahrom

1,500

5

(3) Borazjan.

Borazjan

4,000

19

(4) Bushire 1 .

Bushire

25,000

20

(5) Daliki . . .

Daliki

1,500

7

(6) Gonavah.

Gonavah

1,000

12

(7) Hayat Daud

Bander Rig

1,000

6

(8) Khurmuj . .

Khurmuj

1,000

5

(9) Rud Hillah . .

Kelat Sukhteh

10

(10) Shaban Kareh.

Deh Kohneh

27

(11) Tangistan .

Tangistan

1,000

3i

(12) Zengeneh .

Samal

750

4

(13) Zirah . . .

Zirah

6

17

Dizkurd ….

Cherkes

500

6

18

Famur

Pagah

300

3

19

Ferrashband .

Ferrashband

1,000

M

20

Fessa

Fessa

5,000

40

21

Firuzabad ....

Firuzabad ■

4,000

20

22

Gillehdar ....

Gillehdar

1,000

43

2 3

Humeh of Shiraz .

Zerkan

1,000

89

24

Istahbanat

Istahbanat

.10,000

12

25

Jahrum ….

Jahrum

10,000

33

26

Jireh

Ishfayikan

23

27

Kamfiruz ….

Palangeri

34

28

Kamin

Kalilek

11

29

Kazerun ….

Kazerun

8,000

46

3°

Kavar

Kavar

26

3 1

Kir and Karzin

Kir

1,000

23

3 2

Khafr . . ... .

Khafr

I.OOO

41

33

Zanjiran

500

15

34

Khisht

Khisht

2,500

25

35

Khunj

Khunj

1,500

27

36

Kongan ….

Bander Kongan

12

37

Kuh Gilu and Beh-

bahan ….

Behbahan

10,000

182

38

Kurbal

Gavkan

600

67

39

Kuh i Marreh Shikeft

Shikeft

41

40

Kunkuri ….

Kazian

29

4 1

Laristan

(1) Lar . . . .

Lar

8,000

34

(2) Bikhah Ihsham.

Bairam

11

(3) Bikhah Fal . .

Ishkenan

10

(4) Jehangiriyeh

Bastak

4,000

30

(5) Shib Kuh . .

Bander Charak

36

(6) Fumistan or Gav-

bandi .

Gavbandi

13

(7) Kauristan

Kauristan

4

(8) Lingah] . . .

Bander Lingah

10,000

11

(9) Mazayijan .

Mazayijan

6

42

Mahiir Milati . .

Jemalgird

5

■Are forming separate administrative division of “Persian Gulf Ports.”

46

47 48

Name of District.

56

Maimand ….

Maliki

Mamasenni (Shulistan)

(1) Bekesh

(2) Javidior Javi

(3) Dushmanziaris

(4) Rustami

(5) Fahlian

(6) Kakan Mayin …. Mervast and Herat Mervdasht

(1) Upper Khafrek

(2) Lower Khafrek

(3) Mervdasht MeshhedMaderSuliman

Niriz

Ramjird …. Rudan and Ahmedi . Sab'ah (the seven)

(1) Bivunj (Bivanej)

(2) Hasanabad .

(3) Tarom . .. .

(4) Faraghan

(5) Forg ….

(6) Fin and Guhrah.

(7) Gileh Gah (aban-

doned) Sarchahan Sarhad Chahar Dungeh

(1) Dasht Ujan

(2) Dasht Khosro va

Shirin

(3) Dasht Khungasht

(4) Dasht KushkZard Sarhad Shesh Nahiyeh

(1) Padina (foot of

Mount Dina) .

(2) Henna

(3) Samiram

(4) Felard

(5) Vardasht (6)_Vank .

Sarvistan . Shiraz (town) Siyakh . Simkan

Chief Place or Seat of Government.

Name.

Maimand Bander Assalu

Kal’ah Sand

Mayin Mervast

Fathabad

Murghab Niriz Jashian Dehbariz

Durz

Hasanabad

Tarun

Faraghan

Forg

Fin

Ziaret

Kushk Zard

Khur

Henna

Samiram

Felard

Germabad

Vank

Sarvistan

Darinjan Duzeh

Popula tion.

5,000 1,000

1,250

800 9,000

2,000 1,500 3,000

1,000

4,500

53,6o7 !

Number of

inhabited

Villages in

District.

14

25

6 16 26

7 5 8

H

H

16

•22

6

24 36 21

H

7 15 13 18

13 11

31

24

23

1.3

28

The above sixty districts are grouped into eighteen sub- provinces under governors appointed by the governor-general of Fars, but the towns of Bushire, Lingah and Bander Abbasi, together with the villages in their immediate neighbourhood, form a separate government known as that of the ” Persian Gulf Ports ” (Benadir i Jihalij iFars),undera governor appointed from Teheran. The population of the province has been esti- mated at 750,000 and the yearly revenue it pays to the state amounts to about £150,000. Many districts are fertile, but some, particularly those in the south-eastern part of the province, do not produce sufficient grain for the requirements of the sparse population. In consequence of droughts, ravages of locusts and misgovernment by local governors the province has been much impoverished and hundreds of villages are in ruins and deserted. About a third of the population is composed of turbulent and lawless nomads who, when on the march between their winter and summer camping grounds, frequently render the roads insecure and occasionally plunder whole districts, leaving the inhabitants without means of subsistence.

The province produces much wheat, barley, rice, millet, cotton, but the authorities every now and then prohibiting the export of cereals, the people generally sow just as much as they think will suffice for their own wants. Much tobacco of excellent quality, principally for consumption in Persia, is also grown (especially in Fessa, Darab and Jahrom) and a considerable quantity of opium, much of it for export to China, is produced. Salt, lime and gypsum are abundant. There are also some oil

2 Persian census in 1884; 25,284 males, 28,323 females.

wells at Daliki, near Bushire, but several attempts to tap the oil have been unsuccessful. There are no valuable oyster-banks in Persian waters, and all the Persian Gulf pearls are obtained from banks on the coast of Arabia and near Bahrein. (A. H.-S.)

FARTHING (A.S. fedrtha, fourth, + ing, diminutive), the smallest English coin, equal to the fourth of a penny. It became a regular part of the coinage from the reign of Edward I., and was, up to the reign of Mary, a silver coin. No farthing was struck in the reign of Elizabeth, but a silver three-farthing piece was issued in that reign, with a profile bust of the queen crowned, with a rose behind her head, and inscribed ” E.D.G. Rosa sine spina.” The copper farthing was first introduced in the reign of James I., a patent being given to Lord Harington of Exton in 1613 for the issue of copper tokens of this denomination. It was nominally of six grains’ weight, but was usually heavier. Properly, however, the copper farthing dates from the reign of Charles II., in whose reign also was issued a tin farthing, with a small copper plug in the centre, and an inscription on the edge, ” Nummorum famulus 1684.” No farthings were actually issued in the reign of Queen Anne, though a number of patterns were prepared (see Numismatics: medieval section, England). In i860 the “copper farthing was superseded by one struck in bronze. In 1842 a proclamation was issued giving currency to half- farthings, and there were several issues, but they were de- monetized in 1869. In 1897 the practice was adopted of darken- ing farthings before issue, to prevent their being mistaken for half-sovereigns.

FARTHINGALE (from the O. Fr. verdagalle, or vertugalle, a corruption of the Spanish name of the article, verdagado, from verdago, a rod or stick), a case or hoop, originally of bent rods, but afterwards made of whalebone, upon which were hung the voluminous skirts of a woman’s dress. The fashion was intro- duced into England from Spain in the 16th century. In its most exaggerated shape, at the beginning of the 17th century, the top of the farthingale formed a flat circular surface projecting at right angles to the bodice (see Costume).

FARUKHABAD, Farrakhabad, or Furruckabad, a city and district of British India in the Agra division of the United Provinces. The city is near the right bank of the Ganges, 87 m. by rail from Cawnpore. It

forms a joint municipality with Fatehgarh, the civil headquarters of the district with a military cantonment. Pop. (1901) 67,338. At Fatehgarh is the govern- ment gun-carriage factory; and other industries include cotton- printing and the manufacture of gold lace, metal vessels and tents.

The District of Farukhabad has an area of 1685 sq. m. It is a flat alluvial plain in the middle Doab. The principal rivers are: the Ganges, which has a course of 87 m. either bordering on or passing through the district, but is not at all times navigable by large boats throughout its entire course; the Kali-nadi (84 m.) and the Isan-nadi (42 m.), both tributaries of the Ganges; and the Arind-nadi, which, after a course of 20 m. in the south of the district, passes into Cawnpore. The principal products are rice, wheat, barley, millets, pulses, cotton, sugar-cane, potatoes, &c. The grain crops, however, are insufficient for local wants, and grain is largely imported from Oudh and Rohilkhand. The district is, therefore, liable to famine, and it was severely visited by this calamity six times during the 19th century — in 1803- 1804, 1815-1816, 1825-1826, 1837-1838, 1868-1869 and 1899- 1900. Farukhabad is one of the healthiest districts in the Doab, but fevers are prevalent during August and September. The average annual mean temperature is almost 8o° F.; the average annual rainfall, 29-4 in.

In the early part of the i8lh century, when the Mogul empire was breaking up, Mahommed Khan, a Bangash Afghan from a village near Kaimganj, governor of Allahabad and later of Mahva, established a considerable state of which the present district of Farukhabad was the nucleus, founding the city of Farukhabad in 1714. After his death in 1743, his son and suc- cessor Kaim Khan was embroiled by Safdar Jang, the nawab wazir of Oudh, with the Rohillas, in battle with whom he lost his life in 1749. In 1 750 his brother, Ahmad Khan, recovered

the Farukhabad territories; but Safdar Jang called in the Mahrattas, and a struggle for the possession of the country began, which ended in 1771, on the death of Ahmad Khan, by its becoming tributary to Oudh. In 1801 the nawab wazir ceded to the British his lands in this district, with the tribute due from the nawab of Farukhabad, who gave up his sovereign rights in 1802. In 1804 the Mahrattas, under Holkar. ravaged this tract, but were utterly routed by Lord Lake at the town of Farukhabad. During the mutiny Farukhabad shared the fate of other districts, and passed entirely out of British hands for a time. The native troops, who had for some time previously evinced a seditious spirit, finally broke into rebellion on the 18th of June 1857, and placed the titular nawab of Farukhabad on the throne. The English

military residents took shelter in the fort, which they held until the 4th of July, when, the fort being undermined, they endeavoured to escape by the river. One boat succeeded in reaching Cawnpore, but only to fall into the hands of Nana. Its occupants were made prisoners, and perished in the massacre of the 10th of July. The other boat was stopped on its progress down the river, and all those in it were captured or killed, except four who escaped. The prisoners were conveyed back to Fateh- garh, and murdered there by the nawab on the 19th of July. The rebels were defeated in several engagements, and on the 3rd of January 1858 the English troops recaptured Fatehgarh fort; but it was not till May that order was thoroughly re-established. In 1901 the population was 925,812, showing an increase of 8% in one decade. Part of the district is watered by distributaries of the Ganges canal; it is traversed throughout its length by the Agra-Cawnpore line of the Rajputana railway, and is also served by a branch of the East Indian system. Tobacco, opium, potatoes and fruit, cotton-prints, scent and saltpetre are among the principal exports.

FASCES, in Roman antiquities, bundles of elm or birch rods from which the head of an axe projected, fastened together by a red strap. Nothing is known of their origin, the tradition that represents them as borrowed by one of the kings from Etruria resting on insufficient grounds. As the emblem of official authority, they were carried by the lictors, in the left hand and on the left shoulder, before the higher Roman magistrates; at the funeral of a deceased magistrate they were carried behind the bier. The lictors and the fasces were so inseparably connected that they came to be used as synonymous terms. The fasces originally represented the power over life and limb possessed by the kings, and after the abolition of the monarchy, the consuls, like the kings, were preceded by twelve fasces. Within the precincts of the city the axe was removed, in recognition of the right of appeal (provocatio) to the people in a matter of life and death; outside Rome, however, each consul retained the axe, and was preceded by his own lictors, not merely by a single accensus (supernumerary), as was originally the case within the city when he was not officiating. Later, the lictors preceded the officiating consul, and walked behind the other. Valerius Publicola, the champion of popular rights, further established the custom that the fasces should be lowered before the people, as the real representatives of sovereignty (Livy ii. 7; Florus i. 9; Plutarch, Publicola, 10); lowering the fasces was also the manner in which an inferior saluted a superior magistrate. A dictator, as taking the place of the two consuls, had 24 fasces (including the axe even within the city) ; most of the other magistrates had fasces varying in number, with the exception of the censors, who, as possessing no

executive authority, had none. Fasces were given to the Flamen Dialis and (after 42 B.C.) even to the Vestals. During the times of the republic, a victorious general, who had been saluted by the title of imperator by his soldiers, had his fasces crowned with laurel (Cicero, Pro Ligario, 3). Later, under the empire, when the emperor received the title for life on his accession, it became restricted to him, and the laurel was regarded as distinctive of the imperial fasces (see Mommsen, Roniisches Staatsrecht, i., 1887, p. 373). .

FASCIA (Latin for a bandage or fillet), a term used for many objects which resemble a band in shape; thus in anatomy it is applied to the layers of fibrous connective tissue which sheathe

the muscles or cover various parts or organs in the body, and in zoology, and particularly in ornithology, to bands or stripes of colour. In architecture the word is used of the bands into which the architrave of the Ionic and Corinthian orders is subdivided; their origin would seem to have been derived from the superimposing of two or more beams of timber to span the opening between columns and to support a superincumbent weight; the upper beam projected slightly in front of the lower, and similar projections were continued in the stone or marble beam though in one block. In the Roman Corinthian order the fasciae, still projecting one in front of the other, were subdivided by small mouldings sometimes carved. The several bands are known as the first or upper fascia, the second or middle fascia and the third or lower fascia. The term is sometimes applied to flat projecting bands in Renaissance architecture when em- ployed as string courses. It is also used, though more commonly in the form ” facia,” of the band or plate over a shop-front, on which the name and occupation of the tradesman is written.

FASCINATION (from Lat. fascinare, to bewitch, probably connected with the Gr. fiacnaiveiv, to speak ill of, to bewitch), the art of enchanting or bewitching, especially through the influence of the ” evil eye,” and so properly of the exercise of an evil influence over the reason or will. The word is thus used of the supposed paralysing attraction exercised by some reptiles on their victims. It is also applied to a particular hypnotic condition, marked by muscular contraction, but with conscious- ness and power of remembrance left. In a quite general sense, fascination means the exercise of any charm or strong attraction;

FASCINE (from the Lat. fascina, fastis, a bundle of sticks), a large faggot of brushwood used in the revetments of earthworks and for other purposes of military engineering. The British service pattern of fascine is 18 ft. long; it is tied as tightly as possible at short intervals, and the usual diameter is 9 in. Similar bundles of wood formed part of the foundations of the early lake-dwellings, and in modern engineering fascines are used in making rough roads over marshy ground and in building river and sea walls and breakwaters.

FASHION (adapted from Fr. facon, Lat. f actio, making, facere, to do or make), the action of making, hence the shape or form which anything takes in the process of making. It is thus used in the sense of the pattern, kind, sort, manner or mode in which a thing is done. It is particularly used of the common or customary way in which a thing is done, and so is applied to the manner or custom prevalent at or characteristic of a particular period, especially of the manner of dress, &c, current at a particular period in any rank of society, for which the French term is modes (see Costume).

FASHODA (renamed, 1904, Kodok), a post on the west bank of the Upper Nile, Anglo-Egyptian Sudan, in 9° 53′ N., 32 8′ E., 459 m. S., by river, of Khartum. It is the headquarters of the mudiria (province) of the Upper Nile. The station is built on a flat peninsula connected by a narrow strip of land with a ridge which runs parallel with the river. The surrounding country is mostly deep swamp and the station is most unhealthy; mosquitoes are present in millions. The climate is always damp and the temperature rarely below 98 in the shade. The government offices are well-built brick structures. In front of the station is a long low island, and when the Nile is at its lowest this channel becomes dry. Several roads from Kordofan converge on the Nile at this point, and near the station is the residence of the mek, or king, of the Shilluk tribe, whose designation of the post was adopted when it was decided to abandon the use of Fashoda. At Lul, 18 m. farther up stream, is an Austrian Roman Catholic mission station.

An Egyptian military post was established at Fashoda in 1865. It was then a trading station of some importance, slaves being the chief commodity dealt in. In 1883-1884 the place fell into the hands of the Mahdists. On the 10th of July 1898 it was occupied by a French force from the Congo under Commandant J. B. Marchand, a circumstance which gave rise to a state of great tension between Great Britain and France. On the nth of December following the French force withdrew, returning home

via Abyssinia (see Africa, § 5, and Egypt: History, and Military

Operations) .

FAST AND LOOSE, a cheating game played at fairs by sharpers. A strap, usually in the form of a belt, is rolled or doubled up with a loop in the centre, and laid edgewise on a table. The swindler then bets that the loop cannot be caught with a stick or skewer as he unrolls the belt. As this looks to be easy to do the bet is often taken, but the sharper unrolls the belt in such a manner as to make the catching of the loop practically impossible. Centuries ago it was much practised by gipsies, a circumstance alluded to by Shakespeare in Anthony and Cleopatra (iv. 1 2) :

” Like a right gipsy, hath, at fast and loose, Beguiled me to the very heart of loss.”

From this game is taken the colloquial expression ” to play fast and loose.” At the present day it is called ” prick the garter ” or ” prick the loop.”

FASTI, in Roman antiquities, plural of the Latin adjective fastus, but more commonly used as a substantive, derived from fas, meaning what is binding, or allowable, by divine law, as opposed to jus, or human law. Fasti dies thus came to mean the days on which law business might be transacted without impiety, corresponding to our own ” lawful days “; the opposite of the dies fasti were the dies nefasti, on which, on various religious grounds, the courts could not sit. The word fasti itself then came to be used to denote lists or registers of various kinds, which may be divided into two great classes.

1. Fasti Diurni, divided into urbani and rustici, a ldnd of official year-book, with dates and directions for religious cere- monies, court-days, market-days, divisions of the month, and the like. Until 304 B.C. the lore of the calendaria remained the exclusive and lucrative monopoly of the priesthood; but in that year Gnaeus Flavius, a pontifical secretary, introduced the custom of publishing in the forum tables containing the requisite information, besides brief references to victories, triumphs, prodigies, &c. This list was the origin of the public Roman calendar, in which the days were divided into weeks of eight days each, and indicated by the letters A-H. Each day was marked by a certain letter to show its nature; thus the letters F., N., N.P., F.P., Q. Rex C.F., C, EN., stood for fastus, nefastus, nefastus in some unexplained sense, fastus priore, quando rex (sacrorum) comitiavit fastus, comilialis and intercisus. The dies intercisi were partly fasti and partly nefasti. Ovid’s Fasti is a poetical description of the Roman

festivals of the first six months, written to illustrate the Fasti published by Julius Caesar after he remodelled the Roman year. Upon the cultivators fewer feasts, sacrifices, ceremonies and holidays were enjoined than on the inhabitants of cities; and the rustic fasti contained little more than the ceremonies of the calends, nones and ides, the fairs, signs of zodiac, increase and decrease of the days, the tutelary gods of each month, and certain direc- tions for rustic labours to be performed each month.

2. Fasti Magistrates, Annates or Historici, were concerned with the several feasts, and everything relating to the gods, religion and the magistrates; to the emperors, their birthdays, offices, days consecrated to them, with feasts and ceremonies established in their honour or for their prosperity. They came to be denominated magni, by way of distinction from the bare calendar, or fasti diurni. Of this class, the fasti consulares, for example, were a chronicle or register of time, in which the several years were denoted by the respective consuls, with the principal events which happened during their consulates. The fasti triumphales and sacerdotales contained a list in chronological order of persons who had obtained a triumph, together with the name of the conquered people, and of the priests. The word fasti thus came to be used in the general sense of ” annals ” or ” historical records.” A famous specimen of the same class are the fasti Capitolini, so called because they were deposited in the Capitol by Alexander Farnese, after their excavation from the Roman forum in 1547. They are chiefly a nominal list of statesmen, victories, triumphs, &c, from the expulsion of the kings to the death of Augustus. A considerable number of fasti

of the first class haye also been discovered; but none of them appear to be older than the time of Augustus. The Praenestine calendar, discovered in 1770, arranged by the famous gram- marian Verrius Flaccus, contains the months of January, March, April and December, and a portion of February. The tablets give an account of festivals, as also of the triumphs of Augustus and Tiberius. There are still two complete calendars in existence, an official list by Furius Dionysius Philocalus (a.d. 354), and a Christian version of the official calendar, made by Polemius Silvius (a.d. 448). But some kinds of fasti included under the second general head were, from the very beginning, written for publication. The Annales Pontificum — different from the calendaria properly so called — were ” annually exhibited in public on a white table, on which the memorable events of the year, with

special mention of the prodigies, were set down in the briefest possible manner." Any one was allowed to copy them. Like the pontifices, the augurs also had their books, libri augurales. In fact, all the state offices had their fasti corresponding in character to the consular fasti named above.

For the best text and account of the fragments of the Fasti see Corpus Inscriptionum Latinarum, i. (2nd ed.); on the subject gener- ally, Teuffel-Schwabe, Hist, of Roman Literature, §§ 74, 75, and article by Bouche-Leclercq in Daremberg and Saglio, Dictionnaire des antiquites.

FASTING (from " fast," derived from old Teutonic fastejan; synonyms being the Gr. vricreveip, late Lat. jejunare), an act which is most accurately defined as an abstention from meat, drink and all natural food for a determined period. So it is defined by the Church of England, in the 16th homily, on the authority of the Council of Chalcedon x and of the primitive church generally. In a looser sense the word is employed to denote abstinence from certain kinds of food merely; and this meaning, which in ordinary usage is probably the more prevalent, seems also to be at least tolerated by the Church of England when it speaks of " fast or abstinence days," as if fasting and abstinence were synonymous. 2 More vaguely still, the word is occasionally used as an equivalent for moral self-restraint generally. This secondary and metaphorical sense (vqartvuv KaK&rrjTos) occurs in one of the fragments of Empedocles. For the physiology of fasting, see Dietetics; Nutrition; also Corpulence.

Starvation itself (see also Hunger and Thirst) is of the nature of a disease which may be prevented by diet; nevertheless there are connected with it a few peculiarities of scientific and practical interest. "Inedia," as it is called in the nomenclature of diseases by the London College of Physicians, is of two kinds, arising from want of food and from want 'of water. When entirely deprived of nutriment the human body is ordinarily capable of supporting life under ordinary circumstances for little more than a week. In the spring of 1869 this was tried on the person of a " fasting girl " in South Wales. The parents made a show of their child, decking her out like a bride on a bed, and asserting that she had eaten no food for two years. Some reckless en- thusiasts for truth set four trustworthy hospital nurses to watch her; the Celtic obstinacy of the parents was roused, and in defence of their imposture they allowed death to take place in eight, days. Their trial and conviction for manslaughter may be found in the daily periodicals of the date; but, strange to say, the experimental physiologists and nurses escaped scot-free. There is no doubt that in this instance the unnatural quietude, the grave-like

silence, and the dim religious light in which the victim was kept contributed to deter death.

One thing which remarkably prolongs life is a supply of water.

1 ” The Fathers assembled there . . . decreed in that council that every person, as well in his private as public fast, should continue all the day without meat and drink, till after the evening prayer. And whosoever did eat or drink before the evening prayer was ended should be accounted and reputed not to consider the purity of his fast. This canon teacheth so evidently how fasting was used in the primitive church as by words it cannot be more plainly expressed ” (Of Good Works; and first, of Fasting.)

2 As indeed they are, etymologically ; but, prior to the Reforma- tion, a conventional distinction between abstinentia and jejunium naturale had long been recognized. ” Exceptio eduliorum quo- rundam portionale jejunium est ” (Tertullian).

x 7

Dogs furnished with as much as they wished to drink were found by M. Chossat (Sur I ‘inanition, Paris, 1843) to live three times as long as those who were deprived of solids and liquids at the same time. Even wetting the skin with sea-water has been found useful by shipwrecked sailors. Four men and a boy of fourteen who got shut in the Tynewydd mine near Porth, in South Wales, in the winter of 1876-1877 for ten days without food, were not only alive when released, but several of them were able to walk, and all subsequently recovered. The thorough saturation of the narrow space with aqueous vapour, and the presence of drain water in the cutting, were probably their chief preservatives- assisted by the high even temperature always found in the deeper headings of coal mines, and by the enormous compres- sion of the confined air. This doubtless prevented evaporation, and retarded vital processes dependent upon oxidation. The accumulation of carbonic acid in the breathed air would also have a similar arrestive power over destructive assimilation. These prisoners do not seem to have felt any of the severer pangs of hunger, for they were not tempted to eat their candles. With the instinctive feeling that darkness adds a horror to death, they preferred to use them for light. At the wreck of the ” Medusa ” frigate in 1816, fifteen people survived on a raft for thirteen days without food.

It is a paradoxical fact, that the supply of the stomach even from the substance of the starving individual’s body should tend to prolong life.

In April 1874 a case was recorded of exposure in an open boat for 32 days of three men and two boys, with only ten days' provisions, exclusive of old boots and jelly-fish. They had a fight in their delirium, and one was severely wounded. As the blood gushed out he lapped it up; and instead of suffering the fatal weakness which might have been expected from the haemorrhage, he seems to have done well. Experiments were performed by a French physiologist, M. Anselmier (Archives gen. de medecine, i860, vol. i. p. 169), with the object of trying to preserve the lives of dogs by what he calls " artificial auto-phagy." He fed them on the blood taken from their own veins daily, depriving them of all other food, and he found that the fatal cooling incident to starvation was 'thus postponed, and existence prolonged. Life lasted till the emaciation had pro- ceeded to six-tenths of the animal's weight, as in Chossat's experiments, extending to the fourteenth day, instead of ending on the tenth day, as was the case with other dogs which were not bled.

Various people have tried, generally for exhibition purposes, how long they could fast from food with the aid merely of water or some medicinal preparation; but these exhibitions cannot be held to have proved anything of importance. A man named Jacques in this way fasted at Edinburgh for thirty days in 1888, and in London for forty-two days in 1890, and for fifty days in 1891; and an Italian named Succi fasted for forty days in 1890.

Religious Fasts. — Fasting is of special interest when considered as a discipline voluntarily submitted to for moral and religious ends. As such it is very widely diffused. Its modes and motives vary considerably according to climate, race, civilization and other circumstances; but it would be difficult to name any religious system of any description in which it is wholly un- recognized. 3 The origin of the practice is very obscure. 4 In his Principles of Sociology Herbert Spencer collected, from the accounts we have of various savage tribes in widely separated

3 Confucianism ought perhaps to be named as one. Zoroastrian- ism is frequently given as another, but hardly corrrectly. In the Liber Sad-der, indeed (Porta xxv.), we read, " Cavendum est tibi a jejunio; nam a mane ad vesperam nihil comedere non est bonum in religione nostra "; but according to the Pere de Chinon (Lyons, 1671) the Parsee religion enjoins, upon the priesthood at least, no fewer than five yearly fasts. See Hyde, Veterum Persarum religio, pp. 449, 548 (ed. 1700).

4 During the middle ages the prevalent notion was that it had its

origin in paradise. The germ at least of this idea is to be found in Tertullian, who says: ” Acceperat Adam a Deo legem non gustandi de arbore agnitionis boni et mali, moriturus si gustasset; verum et ipse tunc in psychicum reversus . . . facilius ventri quam Deo cessit, pabiilo potius quam praecepto annuit, salutem gula vendidit, manducavit denique et periit, salvus alioquin si uni arbusculae jejunare maluisset ” (De jejuniis, c. 3).

parts of the globe, a considerable body of evidence, from which he suggested that it may have arisen out of the custom of providing refreshments for the dead, either by actually feeding the corpse, or by leaving eatables and drinkables for its use. It is suggested that the fasting which was at first the natural and inevitable result of such sacrifice on behalf of the dead may eventually have come to be regarded as an indispensable concomitant of all sacrifice, and so have survived as a well- established usage long after the original cause had ceased to operate. 1 But this theory is repudiated by the best authorities; indeed its extreme precariousness at once becomes evident when it is remembered that, now at least, it is usual for religious fasts to precede rather than to follow sacrificial and funeral feasts, if observed at all in connexion with these. Spencer himself (p. 284) admits that ” probably the practice arises in more ways than one,” and proceeds to supplement the theory already given by another — that adopted by E. B. Tylor — to the effect that it originated in the desire of the primitive man to bring on at will certain abnormal nervous conditions favourable to the seeing of those visions and the dreaming of those dreams which are supposed to give the soul direct access to the objective realities of the spiritual world. 2 Probably, if we leave out of sight the very numerous and obvious cases in which fasting, originally the natural reflex result of grief, fear or other strong emotion, has come to be the usual conventional symbol of these, we shall find that the practice is generally resorted to, either as a means of somehow exalting the higher faculties at the expense of the lower, or as an act of homage to some object of worship. The axiom of the Amazulu, that “the continually stuffed body cannot see secret things,” meets even now with pretty general acceptance; and if the notion that it is precisely the food which the worshipper foregoes that makes the deity more vigorous to do battle for his human friend be confined only to a few scattered tribes of savages, the general proposition that ”

fasting is a work of reverence toward God ” may be said to be an article of the Catholic faith. 3

Although fasting as a religious rite is to be met with almost everywhere, there areˆomparatively few religions, and those only of the more developed kind, which appoint definite public fasts, and make them binding at fixed seasons upon all the faithful. Brahmanism, for example, does not appear to enforce any stated fast upon the laity. 4 Among the ancient Egyptians fasting seems to have been associated with many religious festivals, notably with that of Isis (Herod, ii. 40), but it does not appear that, so far as the common people were concerned, the observance of thes» festivals (which were purely local) was compulsory. The vr\

Jewish Fasts. — While remarkable for the cheerful, non-ascetic character of their worship, the Jews were no less distinguished from all the nations of antiquity by their annual solemn fast appointed to be observed on the 10th day of the 7th month (Tisri), the penalty of disobedience being death. The rules, as laid down in.Lev. xvi. 29-34, xxiii. 27-32 and Numb. xxix. 7-11, include a special injunction of strict abstinence (” ye shall afflict your souls ‘ ‘ 5) from evening to evening. This fast was intimat ely associated with the chief feast of the year. Before that feast

1 Principles of Sociology, i. pp. 1 70, 284, 285. Compare the passage in the appendix from Hanusch, Slavischer Mythus, p. 408.

2 Spencer, Prin. of Sociology, i. 256, &c; E. B. Tylor, Primitive Culture, i. 277, 402 ; ii. 372, &c.

3 Hooker, E.P. v. 72. In the Westminster Assembly’s Larger Catechism fasting is mentioned among the duties required by the second commandment.

4 The Brahmans themselves on the eleventh day after the full moon and the eleventh day after the new ” abstain for sixty hours from every kind of sustenance ” ; and some have a special fast every Monday in November. See Picart, The Religion and Manners of the Brahmins.

5 i#pj is here to be taken as substantially equivalent to ” desire,” ” appetite.”

could be entered upon, the sins of the people had to be confessed and (sacramentally) expiated. The fast was a suitable con- comitant of that contrition which befitted the occasion. The practice of stated fasting

was not in any other case enjoined by the law; and it is generally understood to have been forbidden on Sabbath. 6 At the same time, private and occasional fasting, being regarded as a natural and legitimate instinct, was regulated rather than repressed. The only other provision about fasting in the Pentateuch is of a regulative nature, Numb. xxx. 14 (13), to the effect that a vow made by a woman ” to afflict the soul ” may in certain circumstances be cancelled by her husband.

The history of Israel from Moses to Ezra furnishes a large number of instances in which the fasting instinct was obeyed both publicly and privately, locally and nationally, under the influence of sorrow, or fear, or passionate desire. See, for example, Judg. xx. 26; 1 Sam. vii. 6 (where the national fast was conjoined with the ceremony of pouring out water before the Lord); Jer. xxxvi. 6, 9; and 2 Sam. xii. 16. 7 Sometimes the observance of such fasts extended over a considerable period of time, during which, of course, the stricter jejunium was conjoined with abstinentia (Dan. x. 2). Sometimes they lasted only for a day. In Jonah iii. 6, 7, we have an illustrative example of the rigour with which a strict fast might be observed; and such passages as Joel ii. and Isa. lviii. 5 enable us to picture with some vividness the outward accompaniments of a Jewish fast day before the exile.

During the exile many occasional fasts were doubtless observed by the scattered communities, in sorrowful commemoration of the various sad events which had issued in the downfall of the kingdom of Judah. Of these, four appear to have passed into general use — the fasts of the 10th, 4th, 5th and 7th months — commemorating the beginning of the siege of Jerusalem, the capture of the city, the destruction of the temple, the assassina- tion of Gedaliah. As time rolled on they became invested with increasing sanctity; and though the prophet Zechariah, when consulted about them at the close of the exile (Zech. viii. 19), had by no means encouraged the observance of them, the re-building of the temple does not appear to have been considered an achievement of sufficient importance to warrant their dis-continuance. It is worthy of remark that Ezekiel’s prophetic legislation contains no reference to any fast day; the book of Esther (ix. 31), on the other hand, records the institution of a new fast on the 13th of the 12th month.

In the post-exile period private fasting was much practised by the pious, and encouraged by the religious sentiment of the time (see Judith viii. 6; Tob. xii. 8, and context; Sirach xxxiv. 26, Luke ii. 37 and xviii. 12). The last reference contains an allusion to the weekly fasts which were observed on the 2nd and 5th days of each week, in

commemoration, it was said, of the ascent and descent of Moses at Sinai. The real origin of these fasts and the date of their introduction are alike uncertain; it is manifest, however, that the observance of them was volun- tary, and never made a matter of universal obligation. It is probable that the Sadducees, if not also the Essenes, wholly neglected them. The second book (Seder Moed) of the Mishna contains two tractates bearing upon the subject of fasting. One (Yoma, ” the day “) deals exclusively with the rites which were to be observed on the great day of expiation or atonement the other (Taanith, ” fast “) is devoted to the other fasts, and

6 See Judith viii. 6. ” And yet it may be a question whether they (the Jews) did not always fast upon Sabbath,” says Hooker (E.P v. 72, 7), who gives a curious array of evidence pointing in this direction. He even makes use of Neh. viii. 9-12, which might be thought to tell the other way. Justinian’s phrase, ” Sabbata Judaeorum a Mose in omne aevum jejunio dicata ” (1. xxxvi. c. 2; comp. Suetonius, Augustus, 76) may be accounted for by the fact that the day of atonement is called Sabbat Sabbaton (” a perfect Sabbath “).

7 There is, as Graf (Gesch. Bucher des A.T. p. 41) has pointed out, no direct evidence that the fast on the 10th of the 7th month was ever observed before the exile. But the inference which he draws from this silence of the historical books is manifestly a precarious one at best. Bleek calls Lev. xvi. ” ein deutliches Beispiel Mosaischer Abfassung ” (FJnleitung, p. 31, ed. 1878).

deals especially with the manner in which occasional fasting is to be gone about if no rain shall have fallen on or before the 17th day of Marcheschwan. It is enacted that in such a case the rabbis shall begin with a light fast of three days (Monday, Thursday, Monday), i.e. a fast during which it is lawful to work, and also to wash and anoint the person. Then, in the event of a continued drought, fasts of increasing intensity are ordered; and as a last resort the ark is to be brought into the street and sprinkled with ashes, the heads of the Nasi and Ab-beth-din being at the same time similarly sprinkled. 1 In no case was any fast to be allowed to interfere with new-moon or other fixed festival. Another institution treated with considerable fulness in the treatise Taanith is that of the s>ya ‘»:« (viri stationis), who are represented as having been laymen severally represent ing the twenty-four classes or families into which the whole commonwealth of the laity was divided.

They used to attend the temple in rotation, and be present at the sacrifices; and as this duty fell to each in his turn, the men of the class or family which he represented were expected in their several cities and places of abode to. engage themselves in religious exercises, and especially in fasting. The suggestion will readily occur that here may be the origin of the Christian staliones. But neither Tertullian nor any other of the fathers seems to have been aware of the existence of any such institution among the Jews; and very probably the story about it may have been a com- paratively late invention. It ought to be borne in mind that the Aramaic portion of the Megillath Taanith (a document consider- ably older than the treatises in the Mishna) gives a catalogue only of the days on which fasting was forbidden. The Hebrew part (commented on by Maimonides), in which numerous fasts are recommended, is of considerably later date. See Reland, Antiq. Hebr. p. iv. c. 10; Derenbourg, Hist, de Palestine, p. 439.

Practice of the Early Christian Church. — Jesus Himself did not inculcate asceticism in His teaching, and the absence of that distinctive element from His practice was sometimes a subject of hostile remark (Matt. xi. 19). We read, indeed, that on one occasion He fasted forty days and forty nights; but the ex- pression, which is an obscure one, possibly means nothing more than that He endured the privations ordinarily involved in a stay in the wilderness. While we have no reason to doubt that He observed the one great national fast prescribed in the written law of Moses, we have express notice that neither He nor His disciples were in the habit of observing the other fasts which custom and tradition had established. See Mark ii. 18, where the correct reading appears to be — ” The disciples of John, and the Pharisees, were fasting ” (some customary fast). He never formally forbade fasting, but neither did He ever enjoin it. He assumed that, in certain circumstances of sorrow and need, the fasting instinct would sometimes be felt by the community and the individual; what He was chiefly concerned about was to warn His followers against the mistaken aims which His contemporaries were so apt to contemplate in their fasting (Matt. vi. 16-18). In one passage, indeed, He has been understood as practically commanding resort to the practice in certain circumstances. It ought to be noted, however, that Matt, xvii. 21 is probably spurious; and that in Mark ix. 29 the words ” and fasting ” are omitted by Westcott and Hort as well as by Tischendorf on the evidence of the Cod. Sinaiticus (first hand) and Cod. Vaticanus. 2 The reference to ” the fast ” in Acts xxvii. 9 has generally been held to indicate that the apostles continued to observe the yearly Jewish fast. But this inference is by no means a necessary one. According to Acts xiii. 2, 3, xiv. 23, they conjoined fasting with

prayer at ordina- tions, and doubtless also on some other solemn occasions; but at the same time the liberty of the Christian ” in respect of an holiday, or of the new moon, or of the Sabbath ” was strongly insisted on, by one of them at least, who declared that meat whether taken or abstained from commendeth not to God (Col.

1 The allusion to the ark warns us to be cautious in assuming the laws of the Mishna to have been ever in force.

8 The idea, however, is found in the Clementine Homilies, ix. 9. Compare Tertullian De jejuniis, c. 8: ” Docait etiam adversus diriora daemonia jejuniis praeliandum.”

ii. 16-23; 1 Cor. viii. 8 ; Rom. xiv. 14-22 ; 1 Tim. iv. 3-5). The fastings to which the apostle Paul alludes in 2 Cor. vi. 5, xi. 27, were rather of the nature of inevitable hardships cheerfully endured in the discharge of his sacred calling. The words which appear to encourage fasting in 1 Cor. vii. 5 are absent from all the oldest manuscripts and are now omitted by all critics; 3 and on the whole the precept and practice of the New Testament, while recognizing the propriety of occasional and extraordinary fasts, seem to be decidedly hostile to the imposition of any of a stated, obligatory and general kind.

The usage of the Christian church during the earlier centuries was in this, as in so many other matters, influenced by traditional Jewish feeling, and by the force of old habit, quite as much as by any direct apostolic authority or supposed divine command. Habitual temperance was of course in all cases regarded as an absolute duty; and ” the bridegroom ” being absent, the present life was regarded as being in a sense one continual ” fast.” Fasting in the stricter sense was not unknown; but it is certain that it did not at first occupy nearly so prominent a place in Christian ritual as that to which it afterwards attained. There are early traces of the customary observance of the Wednesday and Friday fasts — the dies stationum (Clem. Alex. Strom, vii. 877), and also of a ” quadragesimal ” fast before Easter. But the very passage which proves the early origin of ” quadra- gesima,” conclusively shows how uncertain it was in its character, and how unlike the Catholic ” Lent.” Irenaeus, quoted by Eusebius (v. 24), informs us with reference to the customary yearly celebration of the mystery of the resurrection of our Lord, that disputes prevailed not only with respect to the day, but also with respect to the manner of fasting in connexion with it. ” For some think that they ought to fast only one day, some two, some more days ; some compute their day as consisting of forty hours night and day ; and this diversity existing among those that observe it is not a matter that has just sprung up in

our times, but long ago among those before us." It was not pretended that the apostles had legislated on the matter, but the general and natural feeling that the anniversaries of the crucifixion and the resurrection of Christ ought to be celebrated by Christians took expression in a variety of ways according to the differing tastes of individuals. No other stated fasts, besides ' those already mentioned, can be adduced from the time before Irenaeus ; but there was also a tendency — not unnatural in itself, and already sanctioned by Jewish practice — to fast by way of preparation for any season of peculiar privilege. Thus, according to Justin Martyr (Apol. ii. 93), catechumens were accustomed to fast before baptism, and the church fasted with them. To the same feeling the quadragesimal fast which (as already stated) preceded the joyful feast of the resurrection, is to be, in part at least, attributed. As early as the time of Tertullian it was also usual for communicants to prepare them- selves by fasting for receiving the eucharist. But that Christian fasts had not yet attained to the exaggerated importance which they afterwards assumed is strikingly shown in the well-known Shepherd of Hermas (lib. iii. sim. v.), where it is declared that " with merely outward fasting nothing is done for true virtue " ; the believer is exhorted chiefly to abstain from evil and seek to cleanse himself from feelings of covetousness, and impurity, and revenge : " on the day that thou fastest content thyself with bread, vegetables and water, and thank God for these. But reckon up on this day what thy meal would otherwise have cost thee, and give the amount that it comes to to some poor widow or orphan, or to the poor. " The right of bishops to ordain special fasts, "ex aliqua sollicitudinis ecclcsiasticae causa " (Tertullian), was also recognized.

Later Practice of the Church. — According to an expression preserved by Eusebius (H.E. v. 18), Montanus was the first to give laws (to the church) on fasting. Such language, though rhetorical in form, is substantially correct. The treatise of Ter- tullian, — Concerning Fasting : against the Carnal, — written as

3 On the manuscript evidence the words " 1 was fasting," in Acts x. 30, must also be regarded as doubtful. They are rejected by Lach- mann, Tregelles and Tischendorf.

it was under Montanistic influence, is doubly interesting, first as showing how free the practice of the church down to that time had been, and then as foreshadowing the burdensome legislation which

was destined to succeed. In that treatise (c. 15) he approves indeed of the church practice of not fasting on Saturdays and Sundays (as elsewhere, De corona, c. 3, he had expressed his concurrence in the other practice of observing the entire period between Easter and Pentecost as a season of joy) ; but otherwise he evinces great dissatisfaction with the indifference of the church as to the number, duration and severity of her fasts. 1 The church thus came to be more and more involved in discussions as to the number of days to be observed, especially in ” Lent,” as fast days, as to the hour at which a fast ought to terminate (whether at the 3rd or at the 9th hour), as to the rigour with which each fast ought to be observed (whether by abstinence from flesh merely, abstinentia, or by abstinence from lacticinia, xerophagia, or by literal jejunium), and as to the penalties by which the laws of fasting ought to be enforced. Almost a century, however, elapsed between the composition of the treatise of Tertullian (cir. 212) and the first recorded instances of ecclesiastical legislation on the subject. These, while far from indicating that the church had attained unanimity on the points at issue, show progress in the direction of the later practice of Catholicism. About the year 306 the synod of Illiberis in its 26th canon decided in favour of the observance of the Saturday fast. 2 The .council of Ancyra in 3.14, on the other hand, found it necessary to legislate in a somewhat different direction, — by its 14th canon enjoining its priests and clerks at least to taste meat at the love feasts. 3 The synod of Laodicea framed several rules with regard to the observance of ” Lent,” such as that ” during Lent the bread shall not be offered except on Saturday and Sunday ” (can. 49), that ” the fast shall not be relaxed on the Thursday of the last week of Lent, thus dishonour- ing the whole season; but the fast shall be kept throughout the whole period ” (can. 50), that ” during the fast no feasts of the martyrs shall be celebrated ” (can. 51), and that ” no wedding or birthday feasts shall be celebrated during Lent ” (can. 52). The synod of Hippo (393 a.d.) enacted that the sacrament of the altar should always be taken fasting, except on the Thursday before Easter. Protests in favour of freedom were occasionally raised, not always in a very wise manner, or on very wise grounds, by various individuals such as Eustathius of Sebaste (c. 350), Aerius of Pontus (c. 375), and Jovinian, a Roman monk (c. 388). Of the Eustathians, for example (whose connexion’ with Eusta- thius can hardly be doubted), the complaint was made that ” they fast on Sundays, but eat on the fast-days of the church.” They were condemned by the synod of Gangra in Paphlagonia in the following canons: — Can. 19, ” If any one fast on Sunday, let him be anathema.” * Can. 20, ” If any one do not keep the fasts universally commanded and observed by the whole church, let him be anathema.” Jovinian was very moderate. He ” did not allow

himself to be hurried on by an inconsiderate zeal to con- demn fasting, the life of celibacy, monachism, considered purely in themselves. ... He merely sought to show that men were

1 Quinam isti (adversarii) sint, semel nominabo : exteriores et interioresbotulipsychicorum . . . Arguuntnos quod jejunia propria custodiamus, quod stationes plerumque in vesperam producamus, quod etiam xerophagias observemus, siccantes cibum ab omni came et omni jurulentia et uvidioribus quibusque pomis, nee quid vinositatis vel edamus vel potemus; lavacri quoque abstinentiam congruentem arido victui.

2 The language of the canon is ambiguous; but this interpretation seems to be preferable, especially in view of canon 23, which enacts that jejunii superpositiones are to be observed in all months except July and August. See Hefele, Councils, i. 148 (Engl. trs.).

3 Compare the 52nd [51st] of the Apostolical canons. ” If any bishop or presbyter or deacon, or indeed any one of the sacerdotal catalogue, abstains from flesh and wine, not for his own exercise but out of hatred of the things, forgetting that all things were very good . . . either let him reform, or let him be deprived and be cast out of the church. So also a layman.” To this particular canon Hefele is disposed to assign a very early date.

4 Compare canon 64 of the (supposed) fourth synod of Carthage: ” He who fasts on Sunday is not accounted a Catholic ” (Hefele, ii.

415)-

wrong in recommending so highly and indiscriminately the life of celibacy and fasting, though he was ready to admit that both under certain circumstances might be good and useful ” (Neander). He was nevertheless condemned (390) both by Pope Siricius at a synod in Rome, and by Ambrose at another in Milan. The views of Aerius, according to the representations of his bitter opponent Epiphanius (Haer. 75, ” Adv. Aerium “), seem on this head at least, though unpopular, to have been character- ized by great wisdom and sobriety. He did not condemn fasting altogether, but thought that it ought to be resorted to in the spirit of gospel freedom according as each occasion should arise. He found fault with the church for having substituted for Christian liberty a yoke of Jewish bondage. 5

Towards the beginning of the 5th century we find Socrates (439) enumerating (H.E. v. 22) a long catalogue of the different fasting

practices of the church. The Romans fasted three weeks continuously before Easter (Saturdays and Sundays excepted). In Illyria, Achaia and Alexandria the quadragesimal fast lasted six weeks. Others (the Constantinopolitans) began their fasts seven weeks before Easter, but fasted only on alternate weeks, five days at a time. Corresponding differences as to the manner of abstinence occurred. Some abstained from all living creatures; others ate fish ; others fish and fowl. Some abstained from eggs and fruit; some confined themselves to bread; some would not take even that. Some fasted till three in the afternoon, and then took whatever they pleased. ” Other nations,” adds the historian, “observe other customs in their fasts, and that for various reasons. And since no one can show any written rule about this, it is plain the apostles left this matter free to every one’s liberty and choice, that no one should be compelled to do a good thing out of necessity and fear.”, When Leo the Great became pope in 440, a period of more rigid uniformity began. The imperial authority of Valentinian helped to bring the whole West at least into submission to the see of Rome ; and ecclesi- astical enactments had, more than formerly, the support of the civil power. Though the introduction of the four Ember seasons was not entirely due to him, as has sometimes been asserted, it is certain that their widespread observance was due to his influence, and to that of his successors, especially of Gregory the Great. The tendency to increased rigour may be discerned in the 2nd canon of the synod of Orleans (541), which declares that every Christian is bound to observe the fast of Lent, and, in case of failure to do so, is to be punished according to the laws of the church by his spiritual superior; in the 9th canon of the synod of Toledo (653), which declares the eating of flesh during Lent to be a mortal sin; in Charlemagne’s law for the newly con- quered Saxony, which attaches the penalty of death to wanton disregard of the holy season. 6 Baronius mentions that in the nth century those who ate flesh during Lent were liable to have their teeth knocked out. But it ought to be remembered that this severity of the law early began to be tempered by the power to grant dispensations. The so-called Butter Towers (Tours de beurre) of Rouen, 1485-1507, Bourges and other cities, are said to have been built with money raised by sale of dispensations to eat lacticinia on fast days.

It is probable that the apparent severity of the medieval Latin Church on this subject was largely due to the real strictness of the Greek Church, which, under the patriarch Photius in 864, had taken what was virtually a new departure in its fasting praxis. The rigour of the fasts of the modem Greek Church is well known; and it can on the whole be traced back to that comparatively early date. Of the nine

fundamental laws of that

5 Priscillian, whose widespread heresy evoked from the synod of Saragossa (418) the canon, ” No one shall fast on Sunday, nor may any one absent himself from church during Lent and hold a fes- tival of his own,” appears, on the question of fasting, not to have differed from the Encratites and various other sects of Manichean tendency (c. 406).

6 Cap. iii. pro partib. Saxoniae : ” Si quis sanctum quadragesimale jejunium pro despectu Christianitatis contempserit et carnem comederit, morte moriatur. Sed tamen consideretur a sacerdote ne forte causa necessitatis hoc cuilibet proveniat, ut carnem comedat.” See Augusti, Christliche Archdologie, x. p. 374.

church {kvvka. TrapayyiXnara tijs eKKhjaias) two are concerned with fasting. Besides fasts of an occasional and extraordinary nature, the following are recognized as of stated and universal obligation: — (1) The Wednesday and Friday fasts throughout the year (with the exception of the period between Christmas and Epiphany, the Easter week, the week after Whitsunday, the third week after Epiphany),; (2) The great yearly fasts, viz. that of Lent, testing 48 days, from the Monday of Sexagesima to Easter eve; that of Advent, 39 days, from November 15 to Christmas eve; that of the Theotokos (vriareia rrjs Qtorbnov), from August 1 to August 15; that of the Holy Apostles, last- ing a variable number of days from the Monday after Trinity; (3) The minor yearly fasts before Epiphany, before Whitsunday, before the feasts of the transfiguration, the invention of the cross, the beheading of John the Baptist. During even the least rigid of these the use of flesh and lacticinia is strictly forbidden; fish, oil and wine are occasionally conceded, but not before two o’clock in the afternoon. The practice of the Coptic church is almost identical with this. A week before the Great Fast (Lent), a fast of three days is observed in commemoration of that of the Ninevites, mentioned in the book of Jonah. Some of the Copts are said to observe it by total abstinence during the whole period. The Great Fast continues fifty-five days; nothing is eaten except bread and vegetables, and that only in the afternoon, when church prayers are over. The Fast of the Nativity lasts for twenty-eight days before Christmas; that of the Apostles for a variable number of days from the Feast of the Ascension; and that of the Virgin for fifteen days before the Assumption. All Wednesdays and

Fridays are also fast days except those that occur in the period between Easter and Whitsunday. The Armenians are equally strict; but (adds Rycaut) ” the times seem so confused and without rule that they can scarce be re- counted, unless by those who live amongst them, and strictly observe them, it being the chief care of the priest, whose learning principally consists in knowing the appointed times of fasting and feasting, the which they never omit on Sundays to publish unto the people.” 1

At the council of Trent no more than a passing allusion was made to the subject of fasting, The faithful were simply en- joined to submit themselves to church authority on the subject ; and the clergy were exhorted to urge their flocks to the observance of frequent jejunia, as conducive to the mortification of the flesh, and as assuredly securing the divitie favour. R. F. R. Bellarmine (De jejunio) distinguishes jejunium spiriluale {abstinentia a vitiis), jejunium morale {parsimonia et temperantia cibi et potus), jejunium naturale {abstinentia ab omni prorsus cibo et polu, quacunque ratione sumplo), and jejunium ecclesiasticum. The last he defines simply as an abstinence from food in conformity with the rule of the church. It may be either voluntary or compulsory; and compulsory either because of a vow or because of a command. But the definition given by Alexander Halensis, which is much fuller, still retains its authority: — ” Jejunium est abstinentia a cibo et potu secundum formam ecclesiae, intuitu satisfaciendi pro peccato et acquirendi vitam aeternam.” It was to this last clause that the Reformers most seriously objected. They did not deny that fasting might be a good thing, nor did they maintain that the church or the authority might not ordain fasts, though they deprecated the imposition of needless burdens on the conscience. What they protested against was the theory of the opus operatum et meritorium as applied to fasting. As matter of fact, . the Reformed churches in no case gave up the custom of observing fast days, though by some churches the number of such days was greatly reduced. In many parts of Germany the seasons of Lent and Advent are still marked by the use of emblems of mourning in the churches, by the frequency of certain phrases (Kyrie eleison, Agnus Dei) and the absence of others (Hallelujah, Gloria in excelsis) in the liturgical services, by abstinence from some of the usual social festivities, and by the non-celebration of marriages. And occasional fasts are more

1 See Fink’s article ” Fasten ” in Ersch and Gruber’s Encyclopddie ; Lane, Modern Egyptians; and Rycaut, Present State of the Armenian Church.

or less familiar. The Church of England has retained a con- siderable

list of fasts; though Hooker (E.P. v. 72) had to con- tend with some who, while approving of fastings undertaken ” of men’s own free and voluntary accord as their particular devotion doth move them thereunto,” yet “yearly or weekly fasts such as ours in the Church of England they allow no further than as the temporal state of the land doth require the same for the maintenance of seafaring men and preservation of cattle; because the decay of the one and the waste of the other could not well be prevented but by a politic order appointing some such usual change of diet as ours is.”

In the practice of modern Roman Catholicism the following are recognized as fasting days, that is to say, days on which one meal only, and that not of flesh, may be taken in the course of twenty-four hours: — The forty days of Lent (Sundays excepted), all the Ember days, the Wednesdays and Fridays in Advent, and the vigils of certain feasts, namely, those of Whitsuntide, of St Peter and St Paul, of the Assumption of the Blessed Virgin Mary, of All Saints and of Christmas day. The following are simply days of abstinence, that is to say, days on which flesh at all events must not be eaten: — The Sundays in Lent, the three Rogation days, the feast of St Mark (unless it falls in Easter week), and all Fridays which are not days of fasting. In the Anglican Church, the ” days of fasting or abstinence ” are the forty days of Lent, the Ember days, the Rogation days, and all the Fridays in the year, except Christmas day. The evens or vigils before Christmas, the Purification of the Blessed Virgin Mary, the Annunciation of the Blessed Virgin Mary, Easter day, Ascension day, Pentecost, St Matthias, the Nativity of St John Baptist, St Peter, St James, St Bartholomew, St Matthew, St Simon and St Jude, St Andrew, St Thomas, and All Saints are also recognized as ” fast days.” By the 64th canon it is enacted that ” every parson, vicar or curate, shall in his several charge declare to the people every Sunday at the time appointed in the communion-book [which is, after the Nicene creed has been repeated] whether there be any holy-days or fast-days the week following.”- The 72nd canon ordains that “no minister or ministers shall, without licence and direction of the bishop under hand and seal, appoint or keep any solemn fasts, either publicly or in any private houses, other than such as by law are or by public authority shall be appointed, nor shall be wittingly present at any of them under pain of suspension for the first fault, of excommunication for the second, and of deposition from the ministry for the third.” While strongly discouraging the arbitrary multiplication of public or private fasts, the English Church seems to leave to the discretion of the individual conscience every question as to the manner in which the fasts she formally enjoins are to be observed. In this connexion the

homily Of Fasting may be again referred to. By a statute of the reign of Queen Elizabeth it was enacted that none should eat flesh on ” fish days ” (the Wednesdays, Fridays and Saturdays throughout the year) without a licence, under a penalty. In the Scottish Presbyterian churches days of ” fast- ing, humiliation and prayer ” are observed by ecclesiastical appointment in each parish once or twice every year on some day of the week preceding the Sunday fixed for the administration of the sacrament of the Lord’s Supper. In some of the New England States, it has been usual for the governor to appoint by proclamation at some time in spring a day of fasting, when religious services are conducted in the churches. National fasts have more than once been observed on special occasions both in this country and in the United States of America.

On the subject of fasting the views of Aerius are to a large extent shared by modern Protestant moralists. R. Rothe, for example, who on this point may be regarded as a representative thinker, rejects the idea that fasting is a thing meritorious in itself, and is very doubtful of its value even as an aid to devotional feeling. Of course when bodily health and other circumstances require it, it becomes a duty; and as a means of self -discipline it may be used with due regard to the claims of other duties, and to the fitness of things. In this last aspect, however, habitual cemperance will generally be found to be much more

beneficial than occasional fasting. It is extremely questionable, in particular, whether fasting be so efficient as it is sometimes supposed to be in protecting against temptation to fleshly sin. The practice has a well-ascertained tendency t’o excite the imagination; and in so far as it disturbs that healthy and well- balanced interaction of body and mind which is the best or at least the normal condition for the practice of virtue, it is to be deprecated rather than encouraged {Theologische Ethik, sec.

873-875).

Mahommedan Fasts. — Among the Mahommedans, the month Ramadan, in which the first part of the Koran is said to have been received, is by command of the prophet observed as a fast with extraordinary rigour. No food or drink of any kind is permitted to be taken from daybreak until the appearance of the stars at nightfall.

Extending as it does over the w T hole ” month of raging heat,” such a fast manifestly involves con- siderable self-denial; and it is absolutely binding upon all the faithful whether at home or abroad. Should its observance at the appointed time be interfered with by sickness or any other cause, the fast must be kept as soon afterwards as possible for a like number of days. It is the only one which Mahommedanism enjoins; but the doctors of the law recommend a considerable number of voluntary fasts, as for example on the tenth day of the month Moharram. This day, called the ” Yom Ashoora,” is held sacred on many accounts: — ” because it is believed to be the day on which the first meeting of Adam and Eve took place after they were cast out of paradise; and that on which Noah went out from the ark; also because several other great events are said to have happened on this day; and because the ancient Arabs, before the time of the prophet, observed it by fasting. But what, in the opinion of most modern Moslems, and especially the Persians, confers the greatest sanctity on the day of Ashoora is the fact of its being that on which El-Hoseyn, the prophet’s grandson, was slain a martyr at the battle of the plain of Karbala.” It is the practice of many Moslems to fast on this day, and some do so on the preceding day also. Mahomet himself called fasting the ” gate of religion,” and forbade it only on the two great festivals, namely, on that which immediately follows Ramadan and on that which succeeds the pilgrimage. (See Lane, Modern Egyptians, chaps, iii., xxiv.)

FASTOLF, SIR JOHN (d. 1459), English soldier, has enjoyed a more lasting reputation as in some part the prototype of Shake- speare’s Falstaff. He was son of a Norfolk gentleman, John Fastolf of Caister, is said to have been squire to ThomasMowbray, duke of Norfolk, before 1398, served with Thomas of Lancaster in Ireland during 1405 and 1406, and in 1408 made a fortunate marriage with Millicent, widow of Sir Stephen Scrope of Castle Combe in Wiltshire. In 1413 he was serving in Gascony, and took part in all the subsequent campaigns of Henry V. in France. He must have earned a good repute as a soldier, for in 1423 he was made governor of Maine and Anjou, and in February 1426 created a knight of the Garter. But later in this year he was superseded in his command by John Talbot. After a visit to England in 1428, he returned to the war, and on the 12th of February 1429 when in charge of the convoy for the English army before Orleans defeated the French and Scots at the ” battle of herrings.” On the 18th of June of the same year an English force under the command of Fastolf and Talbot suffered a serious defeat at Patay. According to the French historian Waurin, who was present, the disaster was due to Talbot’s rashness, and Fastolf only fled when resistance was hopeless. Other accounts charge him with cowardice,

and it is true that John of Bedford at first deprived him of the Garter, though after inquiry he was honourably reinstated. This incident was made unfavourable use of by Shakespeare in Henry VI. (pt. i. act iv. sc. i.). Fastolf continued to serve with honour in France, and was trusted both by Bedford and by Richard of York. He only came home finally in 1440, when past sixty years of age. But the scandal against him continued, and during Cade's rebellion in 1451 he was charged with having been the cause of the English disasters through minishing the garrisons of Normandy. It is suggested that he had made much money

in the war by the hire of troops, and in his later days he showed himself a grasping man of business. A servant wrote of him : — " cruel and vengible he hath been ever, and for the most part without pity and mercy " (Paslon Letters, i. 389). Besides his share in his wife's property he had large estates in Norfolk and Suffolk, and a house at Southwark, where he also owned the Boar's Head Inn. He died at Caister on the 5th of November 1459. There is some reason to suppose that Fastolf favoured Lollardry, and this circumstance with the tradition of his braggart cowardice may have suggested the use of his name for the boon companion of Prince Hal, when Shakespeare found it expedient to drop that of Oldcastle. In the first two folios the name of the historical character in the first part of Henry VI. is given as " Falstaff e " not Fastolf. Other points of resemblance between the historic Fastolf and the Falstaff of the dramatist are to be found in their service under Thomas Mowbray, and association with a Boar's Head Inn. But Falstaff is in no true sense a dramatization of the real soldier.

The facts of Fastolf's early career are to be found chiefly in the chronicles of Monstrelet and Waurin. For his later life there is much material, including a number of his own letters, in the Paston Letters. There is a full life by W. Oldys in the Biographia Britannica (1st ed., enlarged by Gough in Kippis's edition). See also Dawson Turner's History of Caister Castle, Scrope's History of Castle Combe, J. Gairdner's essay On the Historical Element in Shakespeare' s Falstaff, ap. Studies in English History, Sidney Lee's article in the Dictionary of National Biography ', and D. W. Duthie, The Case of Sir John Fastolf and other Historical Studies (1907). (C. L. K.)

FAT (O.E. fdell; the word is common to Teutonic languages, cf. Dutch vet, Ger. Fett, &c, and may be ultimately related to Greek itUav and iriapos, and Sanskrit pivan), the name given to certain animal and vegetable products which are oily solids at ordinary temperatures, and are chemically distinguished as being the glyceryl esters of various

fatty acids, of which the most important are stearic, palmitic, and oleic; it is to be noticed that they are non-nitrogenous. Fat is a normal con- stituent of animal tissue, being found even before birth; it occurs especially in the intra-muscular, the abdominal and the subcutaneous connective tissues. In the vegetable kingdom fats especially occur in the seeds and fruits, and sometimes in the roots. Physiological subjects concerned with the part played by ‘fats in living animals are treated in the articles Connective Tissues,; Nutrition; Corpulence; Metabolic Diseases. The fats are chemically similar to the fixed oils, from which they are roughly distinguished by being solids and not liquids (see Oils). While all fats have received industrial applications, foremost importance must be accorded to the fats of the domestic animals — the sheep, cow, ox and calf. These, which are extracted from the bones and skins in the first operation in the manu- facture of glue, are the raw materials of the soap, candle and glycerin industries.

FATALISM (Lat. falum, that which is spoken, decreed), strictly the doctrine that all things happen according to a pre- arranged fate, necessity or inexorable decree. It has frequently been confused with determinism (

The doctrine of fate appears also in what are known as the higher religions, e.g. Christianity and Mahommedanism. In the

former the ideas of personality and infinite power have vanished, all power being conceived as inherent in God. It is recognized that the moral individual must have some kind of initiative, and yet since God is omnipotent and omniscient man must be conceived as in some sense foreordained to a certain moral, mental and physical development. In the history of theChristian church emphasis has from time to time been laid specially on the latter aspect of human life (cf. the doctrines of election, fore- ordination, determinism). Even those theologians, however, who have laid special stress on the limitations of the human will have repudiated the strictly fatalistic doctrine which is character- istic of Oriental thought and is the negation of all human initiative (see Predestination; Augustine, Saint; Will). In Islam fate is an absolute power, known as Kismet, or Nasib, which is conceived as inexorable and transcending all the physical laws of the universe. The most striking feature of the Oriental fatalism is its complete indifference to material circumstances: men accept prosperity and misfortune with calmness as the decree of fate.

FATE, in Roman mythology, the spoken word (fatum) of Jupiter, the unalterable will of heaven. The plural (Fata, the Fates) was used for the ” destinies ” of individuals or cities, and then for the three goddesses who controlled them. Thus, Fata Scribunda were the goddesses who wrote down a man’s destiny at his birth. In this connexion, however, Fata may be singular, the masculine and feminine Fatus, Fata, being the usual forms in popular and ceremonial language. The Fates were also called Parcae, the attributes of both being the same as those of the Greek Moerae.

FATEHPUR, Fathipur or Futtehpoor, a town and district of British India, in the Allahabad division of the United Provinces. The town is 73 m. by rail N.W. of Allahabad. Pop. (iqoi) 19,281. The district has an area of 1618 sq. m. It is situated in the extreme south-eastern corner of the Doab or tract of country between the Ganges and the Jumna, which respectively mark its northern and southern boundaries. The whole district consists – i an alluvial plain formed by the deposits of the two great rivers. The central part is almost perfectly level, and consists of highly cultivated land interspersed with jungle and with tracts im- pregnated with saltpetre (war). A ridge of higher land, forming the watershed of the district, runs along it from east to west at an average distance of about 5 m. from the Ganges. Fatehpur therefore consists of two inclined planes, the one 5 m. broad, sloping down rapidly to the Ganges, and the other from 15 to 20 m. broad, falling gradually to the Jumna. The country near the banks of the two rivers is cut up into ravines and nullahs running in all directions, and is almost entirely uncultivable. Besides the Ganges and Jumna the only rivers of importance are the Pandu, a tributary of the Ganges, and the Arind and Nun, which both fall into the Jumna. The climate is more humid than in the other districts of the Doab, and although fevers are common, it is not considered an unhealthy district. The average annual rainfall is 34 in.

The tract in which this district is comprised was conquered in 1 194 by the Pathans; but subsequently, after a desperate resistance, it was wrested from them by the Moguls. In the 18th century it formed a part of the subah of Korah, and was under the government of the wazir of Oudh. In 1736 it was overrun by the Mahraltas, who retained possession of it until, in 1750, they were ousted by the Pathans of Fatehpur. In 1753 it was reconquered by the nawab of Oudh. In 1 76 5 , by a treaty between the East India Company and the nawab, Korah was made over to the Delhi emperor, who retained it till 1774, when it was again restored to the nawab wazir’s dominions. Finally in 1801, the nawab, by treaty, reconveyed it to the Company in commutation of the amount which he had stipulated to pay in return for the defence

of his country. In June 1857 the district rose in rebellion, and the usual murders of Europeans took place. Order was established after the fall of Lucknow, on the return of Lord Clyde's army to Cawnpore. In 1901 the population was 686,391, «showing a decrease of 2 % in the decade. The district is traversed by the main line of the East Indian railway from

Allahabad to Cawnpore. Trade is mainly agricultural, but the town of Fatehpur is noted for the manufacture of ornamental whips, and Jafarganj for artistic curtains, &c.

FATEHPUR SIKRI, a town in the Agra district in the United Provinces of India, on the road from Agra to Jaipur. Pop. (1901) 7147. It is a ruined city, and is interesting only from an archaeo- logical point of view. It was founded by Akbar in 1569 as a thank-offering for the birth of a son, Selim, afterwards the emperor Jahangir, foretold by Selim Chisti, a famous Mahom- medan saint. The principal building is the great mosque, which is said by Fergusson to be hardly surpassed by any in India. " It measures 550 ft. east and west by 470 ft. north and south, over all. The mosque itself, 250 ft. by 80 ft., is crowned by three domes. In its courtyard, which measures 350 ft. by 440 ft., stand two tombs. One is that of Selim Chisti, built of white marble, and the windows with pierced tracery of the most exquisite geometrical patterns. It possesses besides a deep cornice of marble, supported by brackets of the most elaborate design. The other tomb, that of Nawab Islam Khan, is soberer and in excellent taste, but quite eclipsed by its surroundings. Even these parts, however, are surpassed in magnificence by the southern gateway. As it stands on a rising ground, when looked at from below its appearance is noble beyond that of any portal attached to any mosque in India, perhaps in the whole world." Among other more noteworthy buildings the following may be mentioned. The palace of Jodh Bai, the Rajput wife of Akbar, consists of a courtyard surrounded by a gallery, above which rise buildings roofed with blue enamel. A rich gateway gives access to a terrace on which are the " houses of Birbal and Miriam "; and beyond these is another courtyard, where are Akbar's private apartments and the exquisite palace of the Turkish sultana. Here are also the Panch Mahal or five-storeyed building, consisting of five galleries in tiers, and the audience chamber. The special feature in the architecture of the city is the softness of the red sandstone, which could be carved almost as easily as wood, and so lent itself readily to the elaborate Hindu embellishment. Fatehpur Sikri was a favourite residence of Akbar throughout his reign, and his establishment here was of great magnificence. After Akbar's death Fatehpur Sikri was deserted within 50 years of its foundation. The reason for this was that frequent cause

in the East, lack of water. The only water obtainable was so brackish and corroding as to cause great mortality among the inhabitants. The buildings are situated within an enclosure, walled on three sides and about 7 m. in circumference. They are all now more or less in ruins, and their elaborate painting and other decoration has largely perished, but some modern restoration has been effected.

See E. B. Havell, A Handbook to Agra and the Taj, Sikandra, Fatehpur Sikri, &c. (1904).

FATHER, the begetter of a child, the male parent. The word is common to Teutonic languages, and, like the other words for close family relationship, mother, brother, son, sister, daughter, appears in most Indo – European languages. The O. Eng. form is feeder, and it appears in Ger. Vater , Dutch vader, Gr. irarifp, Lat. pater, whence Romanic Fr. pere, Span, padre, &c. The word is used of male ancestors more remote than the actual male parent, and of ancestors in general. It is applied to God, as the Father of Jesus Christ, and as the Creator of the world, and is thus the orthodox term for the First Person of the Trinity. Of the transferred uses of the word many have religious reference; thus it is used of th*e Christian writers, usually confined to those of the first five centuries, the Fathers of the Church (see below), of whom those who flourished at the end of, or just after the age of, the apostles are known as the Apostolic Fathers. One who stands as a spiritual parent to another is his ” father,” e.g. god- father, or in the title of bishops or archbishops, Right or Most Reverend Father in God. The pope is, in the Roman Church, the Holy Father. In the Roman Church, father is strictly applied to a ” regular,” a member of one of the religious orders, and so always in Europe, in English usage, often applied to a confessor, whether regular or secular, and to any Roman pries! , ant) sometimes used of sub-members of a religious society or frateruity

in the English Church. Of transferred uses, other than religious, may be mentioned the application to the first founders of an institution, constitution, epoch, &c. Thus the earliest settlers of North America are the Pilgrim Fathers, and the framers of the United States constitution are the Fathers of the Constitution. In ancient Rome the members of the senate are the Patres conscripti, the ” Conscript fathers.” The senior member or doyen of a society is often called the father. Thus the member of the English House of Commons, and similarly, of the

House of Representatives in the United States, America, who has sat for the longest period uninterruptedly, is the Father of the House.

FATHERS OF THE CHURCH. The use of the word ” father ” as a title of respect is found in the Old Testament, where it is applied to patriarchs (Gen. 1. 24 (Septuagint) ; Exod. iii. 13, 15; Deut. i. 8), priests (Judg. xvii. 10, xviii. 19), prophets (2 Kings ii.

12, vi. 21, xiii. 14), and distinguished ancestors (Ecclus. xliv. 1). In the time of our Lord the scribes claimed the name with an arrogance which He disapproved (Matt, xxiii. 9) ; in the rabbinic literature ” the fathers ” are the more eminent of the earlier rabbis whose sayings were handed down for the guidance of posterity. 1 The Christian Church, warned perhaps by the words of Christ, appears at first to have avoided a similar use of the term, while St Paul, St Peter and St John speak of their converts as spiritual children (1 Cor. iv. 14 f., Gal. iv. 19, 1 Pet. v.

13, 1 John ii. 12); they did not assume, so far as we know, the official style of “fathers in God.” Nor is this title found in the age which succeeded to that of the apostles. When Polycarp, bishop of Smyrna, was martyred (a.d. 155), the crowd shouted, “This is the father of the Christians” 2 ; but the words were probably prompted by the Jews, who took a prominent part in the martyrdom, and who naturally viewed Polycarp in the light of a great Christian rabbi, and gave him the title which their own teachers bore. In the next century members of the episcopal order were sometimes addressed in this manner: thus Cyprian is styled papas or papa by his Roman correspondents. 3 The bishops who sat in the great councils of the 4th century were known as “the 318 fathers” of Nicaea, and “the 150 fathers” of Constantinople. Meanwhile the custom was growing up of appealing to eminent Church writers of a past generation under this name. Thus Athanasius writes (ad Afros vi.): ” We have the testimony of fathers (the two Dionysii, bishops of Alexandria and Rome, who wrote in the previous century) for the use of the word onoowios.” Such quotations were multiplied, as theologians learnt to depend increasingly upon their predecessors, until the testimony of ” our holy father ” Athanasius, or Gregory the Divine, or John the Golden-mouthed, came to be regarded as decisive in reference to controverted points of faith and practice.

In the narrower sense thus indicated the ” fathers ” of the Church are the great bishops and other eminent Christian teachers of the earlier centuries, who were conspicuous for soundness of judgment and sanctity of life, and whose writings remained as a court of appeal for

their successors. A list of fathers drawn up on this principle will begin with the Christian writers of the 1 st century whose writings are not included in the New Testament: where it ought to end is a more difficult point to determine. Perhaps the balance of opinion is in favour of regarding Gregory the Great (d. 604) as the last of the Latin fathers, and John of Damascus (d. c. 760) as the last of the fathers of the Greek Church. A more liberal estimate might include John Scotus Erigena or even Anselm or Bernard of Clairvaux in the West and Photius in the East. The abbe Migne carried his Latin patrology down to the time of Innocent III. (d. 1216), and his Greek patrology to the fall of Constantinople (1453); but, while this large extension of the field is much to the advan tage of his readers, it undoubtedly stretches the meaning of patrologia far beyond its natural limits. For ordinary purposes it is best to make the patristic period conterminous with the life

1 See Buxtorf, s.v. Abh, and cf. the title of the tract Pirke Aboth (ed. Taylor, p. 3). : Polyc. Mart. 8. 3 Stadia biblica, iv. p. 273.

of the ancient Catholic Church. In the West the Church enters the medieval stage of its history with the death of Gregory, while in the East even John of Damascus is rather a compiler of patristic teaching than a true “father.”

A further question arises. Are all the Christian writers of a given period to be included among the ” fathers,” or those only who wrote on religious subjects, and of whose orthodoxy there is no doubt ? Migne, following the example of the editors of bibliothecae patrum Who preceded him, swept into his great collection all the Christian writings which fell within his period; but he is careful to state upon his title-page that his patrologies include the ecclesiastical writers as well as the fathers and doctors of the Church. For a comprehensive use of the term ” ecclesi- astical writers ” he has the authority of Jerome, who enumerates among them 4 such heresiarchs or leaders of schism as Tatian, Bardaisan, Novatus, Donatus, Photinus and Eunomius. This may not be logical, but long usage has made it permissible or even necessary. It is often difficult, if not impracticable, to draw the line between orthodox writers and heterodox; on which side, it might be asked, is Origen to be placed ? and in the case of a writer like Tertullian who left the Church in middle life, are we to admit certain of his works into our patrology and refuse a place to others ? It is clear that in the circumstances the terms ” father,” ” patristic,” ■’ patrology ” must be used with much elasticity, since it is now too late to substitute for them any more comprehensive terms.

By the ” fathers,” then, we understand the whole of extant Christian literature from the time of the apostles to the rise of scholasticism or the beginning of the middle ages. However we may interpret the lower limit of this period, the literature which it embraces is immense. Some method of subdivision is necessary, and the simplest and most obvious is that which breaks the whole into two great parts, the ante-Nicene and the post-Nicene. This is not an arbitrary cleavage; the Council of Nicaea (a.d. 325) is the watershed which actually separates two great tracts of Christian literature. The ante-Nicene age yields priceless records of the early struggles of Christianity; from it we have received specimens of the early apologetic and the early polemic of the Church, the first essays of Christian philosophy, Christian correspondence, Christian biblical interpretation: we owe to it the works of Justin, Irenaeus, the Alexandrian Clement, Origen, Tertullian, Cyprian. In these products of the 2nd and 3rd centuries there is much which in its own way was not surpassed by any of the later patristic writings. Yet the post-Nicene literature, considered as literature, reaches a far higher level. Both in East and West, the 4th and 5th centuries form the golden age of dogmatic theology, of homiletic preaching, of exposition, of letter-writing, of Church history, of religious poetry. Two causes may be assigned for this fact. The conversion of the empire gave the members of the Church leisure and opportunities for the cultivation of literary taste, and gradually drew the educated classes within the pale of the Christian society. Moreover, the great Christological controversies of the age tended to encourage in Christian writers and preachers an intellectual acuteness and an accuracy of thought and expression of which the earlier centuries had not felt the need.

The ante-Nicene period of patristic literature opens with the “apostolic fathers,” 5 i.e. the Church writers who flourished toward the end of the apostolic age and during the half century that followed it, including Clement of Rome, Ignatius of Antioch, Polycarp of Smyrna and the author known as ” Barnabas.” Their writings, like those of the apostles, are epistolary; but editions of the apostolic fathers now usually admit also the early Church order known as the Didache, the allegory entitled the Shepherd, and a short anonymous apology addressed to one Diognetus. A second group, known as the ” Greek Apologists,” embraces Aristides, Justin, Tatian, Athenagoras and Theophilus; and a third consists of the early polemical writers, Irenaeus and

4 In his book De viris illustribus.

5 The term patres apostolici is due to the patristic scholars of the 17th

century: see Lightfoot, St Clement of Rome, i. p. 3. ” Sub- apostolic ” is perhaps a more accurate designation.

Hippolytus. Next come the great Alexandrians, Clement, Origen, Dionysius; the Carthaginians, Tertullian and Cyprian; the Romans, Minucius Felix and Novatian; the last four laid the foundations of a Latin Christian literature. Even the stormy days of the last persecution yielded seme considerable writers, such as Methodius in the East and Lactantius in the West. This list is far from complete; the principal collections of the ante- Nicene fathers include not a few minor and anonymous writers, and the fragments of many others whose works as a whole have perished.

In the post-Nicene period the literary output of the Church was greater. Only the more representative names can be men- tioned here. From Alexandria we get Athanasius, Didyrnus and Cyril; from Cyrene, Synesius; from Antioch, Theodore of Mopsuestia, John Chrysostom and Theodoret; from Palestine, Eusebius of Caesarea and Cyril of Jerusalem ; from Cappadocia, Basil, Gregory of ‘Nyssa and Gregory of Nazianzus. The Latin West was scarcely less productive; it is enough to mention Hilary of Poitiers, Ambrose of Milan, Augustine of Hippo, Leo of Rome, Jerome, Rufinus, and a father lately restored to his place in patristic literature, Niceta of Remesiana. 1 Gaul alone has a goodly list of Christian authors to show: John Cassian, Vincent of Lerins, Hilary of Aries, Prosper of Aquitaine, Salvian of Marseilles, Sidonius Apollinaris of Auvergne, Caesarius of Aries, Gregory of Tours. The period ends in the West with two great Italian names, Cassiodorus and Pope Gregory I., after Leo the greatest of papal theologians.

The reader to whom the study is new will gain some idea of the bulk of the extant patristic literature, if we add that in Migne’s collection ninety-six large volumes are occupied with the Greek fathers from Clement of Rome to John of Damascus, and seventy- six with the Latin fathers from Tertullian to Gregory the Great. 2

For a discussion of the more important fathers the student is referred to the articles which deal with them separately. In this place it is enough to consider the general influence of the patristic writings upon Christian doctrine and biblical interpretation, Can any authority be claimed for their teaching or their exegesis, other than that which belongs to the best writers of every age. The decree of the council of

Trent 3 (ut nemo . . . contra un- animum consensum patrum ipsam scripturam sacram interpreiari audeat) is studiously moderate, and yet it seems to rule that under certain circumstances it is not permitted to the Church of later times to carry the science of biblical interpretation beyond the point which it had reached at the end of the patristic period. Roman Catholic writers, 4 however, have explained the prohibition to apply to matters of faith only, and in that case the Tridentine decree is little else than another form of the Vincentian canon which has been widely accepted in the Anglican communion: curandum est ut id teneamus quod ubique, quod semper, quod ab omnibus creditum est. The fathers of the first six or seven centuries, so far as they agree, may be fairly taken to represent the main stream of Christian tradition and belief during the period when the apostolic teaching took shape in the great creeds and dogmatic decisions of Christendom. The English reformers realized this fact; and notwithstanding their insistence on the unique authority of the canon of Scripture, their appeal to the fathers as representatives of the teaching of the undivided Church was as wholehearted as that of the Tridentine divines. Thus the English canon of 1571 directs preachers " to take heed that they do not teach anything in their sermons as though they would have it completely held and believed by the people, save what is agreeable to the doctrine of the Old and New Testaments, and what the Catholic Fathers and ancient Bishops have gathered from that doctrine." Depreciation of the fathers was characteristic, not of the Anglican reformation, but of the

1 The editio princeps of Niceta's works was published by Dr A. E. Burn in 1905.

2 The Greek patrology contains, however, besides the text, a Latin translation, and in both patrologies there is much editorial matter.

8 Sess. iv.

4 E. G. Mohler, Symbolism (E. tr.) § 42.

revolt against some of its fundamental principles which was led by the Puritan reaction. 6

Now that the smoke of these controversies has passed away, it is possible to form a clearer judgment upon the merits of the patristic writings. They are no longer used as an armoury from which opposite sides may draw effective weapons, offensive or defensive; nor on the other hand are they cast aside as the rubbish of an ignorant and superstitious age. All patristic students now recognize the great

inequality of these authors, and admit that they are not free from the faults of their times; it is not denied that much of their exegesis is untenable, or that their logic is often feeble and their rhetoric offensive to modern taste. But against these disadvantages may be set the unique services which the fathers still render to Christian scholars. Their works comprise the whole literature of our faith during the decisive centuries which followed the apostolic age. They are important witnesses to the text of the New Testament, to the history of the canon, and to the history of interpretation. It is to their pages that we owe nearly all that we know of the life of ancient Christianity. We see in them the thought of the ancient Church taking shape in the minds of her bishops and doctors; and in many cases they express the results of the great doctrinal controversies of their age in language which leaves little to be desired. 6

Authorities.— The earliest writer on patristics was Terome. whose book De viris illustribus gives a brief account of one hundred and thirty-five Church writers, beginning with St Peter and ending with himself. Jerome's work was continued successively by Gennadius of Marseilles, Isidore of Seville, and Ildefonsus of Toledo; the last-named writer brings the list down to the middle of the 7th century. Since the revival of learning books on the fathers have been numerous; among the more recent and most accessible of these we may mention Smith and Wace's Dictionary of Christian Bio- graphy, Hauck-Herzog's Realencyklopadie, Bardenhewer's Patrologie and Gesckichte der altkirchlichen Litteratur, Harnack's Geschichte der altchristlichen Litteratur bei Eusebius and Ehrard's Die altchristliche Litteratur und ihre Erforschung. A record of patristic collections and editions down to 1839 may be found in Dowling's Notitia Scriptorum SS. Patrum. The contents of the volumes of Migne's patrologies are given in the Catalogue general des livres de I'abbe Migne, and a useful list in alphabetical order of the writers in the Greek Patrologia has been compiled by Dr J. B. Pearsdn (Cambridge, 1882). Migne's texts are not always satisfactory, but since the completion of his great undertaking two important collections have been begun on critical lines— the Vienna edition of the Latin Church writers, 7 and the Berlin edition of the Greek writers of the ante- Nicene period. 8

For English readers there are three series of translations from the fathers, which cover much of the ground; the Oxford Library of the Fathers, the Ante Nicene Christian Library and the Select Library of Nicene and Post-Nicene Fathers. Satisfactory lexicons of patristic Greek and Latin are still a desideratum: but assistance may be obtained in the study of the Greek fathers from Suicer's Thesaurus, the Lexicon of Byzantine Greek by E. A. Sophocles, and the Lexicon

Graecum suppletorium et dialecticum of Van Herwerden; whilst the new great Latin Lexicon, published by the Berlin Academy, is calculated to meet the needs of students of Latin patristic literature. For a fuller list of books useful to the reader of the Greek and Latin'fathers see H. B. Swete's Patristic Study (2nd ed., 1902). (H. B. S.)

FATHOM (a word common, in various forms, to Scandinavian and Teutonic languages; cf. Danish favn, Dutch mam and Ger. Faden, and meaning "the arms extended "; the ultimate origin is a root pet, seen in the Gr. ireravvvvai, to spread), a measure of length, being the distance from the tip of one middle finger to the tip of the other, when the arms are stretched out to their widest extent. This length has been standardized to a measure of 6 ft., and as such is used mainly in soundings as a unit for measuring the depth of the sea. " Fathom " is also used in the measurement of timber, when it is equivalent to 6 ft. sq.; similarly, in mining, a fathom is a portion of ground running the whole thickness of the vein of ore, and is 6 ft. in breadth and thickness. The verb " to fathom," i.e. to sound or measure with a fathom-line, is used figuratively, meaning to go into a subject deeply, to penetrate, or to explore thoroughly.

5 See J. J. Blunt, Right Use of the Fathers, p. 15 ff.

6 See Stanton, Place of Authority in Religion, p. 165 f.

7 Corpus scriptorum ecclesiasticorum Latinorum.

8 Griechischen christlichen Schriftstellern der ersten drei Jahrhunderte.

FATIMITES, or Fatimides, the name of a dynasty called after Fatima, daughter of the prophet Mahomet, from whom and her husband the caliph Ali, son of Abu Talib, they claimed descent. The dynasty is also called 'Obaidi (UbaidI) after 'Obaidallah, the first sovereign, and 'Alawl, a title which it shares with other dynasties claiming the same ancestry. For a list of sovereigns see Egypt, section History (Mahommedan period); three, however, must be prefixed who reigned in north-western Africa before the annexation of Egypt: al-Mahdl 'Obaidallah 297 (909); al-Qa'im Mahommed 322 (934); al-Manstir Isma'Il

334 (945)-

The dynasty owed its rise to the attachment to the family of the prophet which was widespread in the Moslem world, and the belief that the sovereignty was the right of one of its members. Owing, however, to the absence of the principle of primogeniture there was difference of opinion as to the person whose claim should be enforced, and a number of sects arose maintaining the rights of different branches of the family. The Fatimites were supported by those who regarded the sovereignty as vested in Isma'il, son of Ja'far al-Sadiq, great-great-grandson of All, through his second son Hosain (rjusain). Of this Isma'Il the first Fatimite caliph was supposed to be the great-grandson. The . line of ancestors between him and Isma'Il is, however, variously given, even his father's name being quite uncertain, and in some of the pedigrees even Isma'Il does not figure. Apparently when the family first became of political importance their Alid descent was not disputed at Bagdad, and the poet al-Sharif al-Radl (d. a.h. 406: a.d. 1015), in whose family the office of Naqib (registrar of the Alids) was hereditary, appears to have acknowledged it (Diwdn, ed. Beirut, p. 972). When their success became a menace to the caliphs of Bagdad, genealo- gists were employed to demonstrate the falsity of the claim, and a considerable literature, both official and unofficial, rose in consequence. The founder of the dynasty was made out to be a scion of a family of heretics from whom the terrible Carmathian sect had originated: later on (perhaps owing to the role played by Jacob, son of Killis, in bringing the Fatimites to Egypt), the founder was made out to have been a Jew, either as having been adopted by the heretic supposed to be his father, or as, having been made to personate the real 'Obaidallah, who had been killed in captivity. While the stories that make him of either Jewish or Carmathian origin may be neglected, as the product of malice, the uncertainty of the genealogies offered by their partisans renders any positive solution of the problem impossible. What seems to be clear is that secretly within the A.bbasid empire propaganda was carried on in favour of one or other Alid aspirant, and the danger which any such aspirant incurred by coming forward openly led to his whereabouts being concealed except from a very few adherents. What is known then is that towards the end of the 3rd Islamic century the leader of the sect of Isma'llites (Assassins, q.v.) who afterwards mounted a. throne, lived at Salamia, near Emesa (Horns), having agents spread over Arabia, Persia and Syria, and frequently receiving visits from pious adherents, who had been on pilgrimage to the grave of Hosain (Husain). Such visitors received directions and orders such as are usual in secret societies. One of these agents, Abu Abdallah al-Hosain called al-Shi'I, said to have filled the office of censor {muhtasib) at Basra, received orders to carry on a mission in Arabia, and at Mecca is said to have made the

acquaintance of some members of the Berber tribe Kutama, south of the bay of Bougie. These persons persuaded him to travel home with them in the character of teacher of the Koran, but according to some authorities the ground had already been prepared there for a political mission. He arrived in the Kutama country in June 893, and appears very soon to have been made chief, thereby exciting the suspicion of the Aghlabite ruler of Kairawan, Ibrahim b. Ahmad, which, however, was soon allayed. His success provoked a civil war among the Berbers, but he was protected by a chief named Hasan b. Harun, and displayed sufficient military ability to win respect. Nine years after his arrival he made use of the unrest following on the death of the Aghlabite Ibrahim to attack the town of Mila,

which he took by treachery, and turned into his capital; the son and successor of Ibrahim, Abu'l-' Abbas 'Abdallah, sent his son al-Ahwal to deal with the new power, and he defeated al-Shi'I in some battles, but in 903 al-Ahwal was recalled by his brother Ziyadatallah, who had usurped the throne, and put to death.

At some time after his first successes al-Shl'i sent a messenger (apparently his brother) to the head of his sect at Salamia, bidding him come to the Kutama country, and place himself at the head of affairs, since al-ShlTs followers had been taught to pay homage to a Mahdl who would at some time be shown them. It is said that 'Obaidallah, who now held this post, was known to the court at Bagdad, and that on the news of his departure orders were sent to the governor of Egypt to arrest him r but by skilful simulation 'Obaidallah succeeded in escaping this danger, and with his escort reached Tripoli safely. Instructions had by this time reached the Aghlabite Ziyadatallah to be on the watch for the Mahdl, who was finally arrested at Sijilmasa (Tafilalt) in the year a.h. 292 (a.d. 905) ; his companion, al-Shl'l's brother, had been arrested at an earlier point, and the Mahdl's journey to the south-west must have been to elude pursuit.

The invitation to the Mahdl turned out to have been prema- ture; for Ziyadatallah had sent a powerful army to oppose al-Shi'I, which, making Constantine its-headquarters, had driven al-Shi'I into the mountains: after six months al-Shi'I secured an opportunity for attacking it, and won a complete victory. Early in 906 another army was sent to deal with al-Shi'I, and an earnest appeal came from the caliph Muqtafl (Moktafi), addressed to all the Moslems of Africa, to aid Ziyadatallah against the usurper. The operations of the Aghlabite prince were unproductive of any decided result, and by September 906 al-Shi'I had got possession of the important fortress Tubna and

some others. Further forces were immediately sent to the front by Ziyadatallah, but these were defeated by al-Shi'I and his officers, to whom other towns capitulated, till Ziyadatallah found it prudent to retire from Al-Urbus or Laribus, which had been his headquarters, and entrench himself in Raqqada, one of the two capitals of his kingdom, Kairawan being the other. Ziyadatallah is charged by the chroniclers with dissoluteness and levity, and even cowardice: after his retreat the fortresses and towns in what now constitute the department of Constantine and in Tunisia fell fast into al-Shl'I's hands, and he was soon able to threaten Raqqada itself.

By March 909 Raqqada had become untenable, and Ziyadat- allah resolved to flee from his kingdom; taking with him his chief possessions, he made for Egypt, and thence to 'Irak: his final fate is uncertain. The cities Raqqada and Kairawan were immediately occupied by Al-Shi'I, who proceeded to send governors to the other places of importance in what had" been the Aghlabite kingdom, and to strike new coins, which, however, bore no sovereign's name. Orders were given that the Shi'ite peculiarities should be introduced into public worship.

In May 909 al-Shi'I led a tremendous army westwards to the kingdom of Tahert, where he put an end to the Rustamite dynasty, and appointed a governor of his own: he thence proceeded to Sijilmasa where 'Obaidallah lay imprisoned, with the intention of releasing him and placing him on the throne. After a brief attempt at resistance, the governor fled, and al-Shi'I entered the city, released 'Obaidallah and presented him to the army as the long-promised Imam. The day is given as the 26th of August 909. 'Obaidallah had been in prison more than three years. Whether his identity with the Mahdl for whom al-Shi'I had been fighting was known to the governor of Sijilmasa is uncertain. If it was, the governor and his master the Aghlabite sovereign might have been expected to make use of their knowledge and outwit al-Shi'I by putting his Mahdl to death. Opponents of the Fatimites assert that this was actually done, and that the Mahdl presented to the army was not the real 'Obaidallah, but (as usual) a Jewish captive, who had been su.borned to play the role.

The chief command was now assumed by 'Obaidallah, -who took the title " al-Mahdl, Commander of the Faithful," thereby claiming the headship of the whole Moslem world: Raqqada

was at the first made the seat of the court, and the Shl'Ite doctrines were enforced on the inhabitants, not without en- countering some opposition. Revolts which arose in different parts of the Aghlabite kingdom were, however, speedily quelled.

The course followed by 'Obaidallah in governing independently of al-Shi'I soon led to dissatisfaction on the part of the latter, who, urged on it is said by his brother, decided to dethrone their Mahdl, and on the occasion of an expedition to Tenes, which al-Shi'I commanded, organized a conspiracy with that end. The conspiracy was betrayed to 'Obaidallah, who took steps to defeat it, and on the last day of July 911 contrived to assassinate both al-Shi'I and his brother. Thus the procedure which had characterized the accession of the 'Abbasid dynasty was repeated. It has been conjectured that these assassinations lost the Fatimites the support of the organization that continued to exist in the East, whence the Carmathians figure as an independent and even hostile community, though they appear to have been amenable to the influence of the African caliph.

'Obaidallah had now to face the dissatisfaction of the tribes whose allegiance al-Shi'I had won, especially the Kutama, Zenata and Lawata: the uprising of the first assumed formidable proportions, and they even elected a Mahdl of their own, one Kadu b. Mu'arik al-Mawati, who promulgated a new revelation for their guidance. They were finally defeated by 'Obaidallah's son Abu'l-Qasim Mahommed, who took Constantine, and succeeded in capturing the new Mahdl, whom he brought to Raqqada. Other opponents were got rid of by 'Obaidallah by ruthless executions. By the middle of the year 913 by his own and his son's efforts he had brought his kingdom into order. After the style of most founders of dynasties he then selected a site for a new capital, to be called after his title Mahdia (q.v.), on a peninsula called rlamma (Cape Africa) S.S.E. of Kairawan. Eight years were spent in fortifying this place, which in 921 was made the capital of the empire.

After defeating internal enemies 'Obaidallah turned his attention to the remaining 'Abbasid possessions in Africa, and his general Habasah b. Yiisuf in the year 913 advanced along the northern coast, taking various places, including the important town of Barca, his progress, it is said, being marked by great cruelty. He then advanced towards Egypt, and towards the end of July 914, being reinforced by Abu'l-Qasim, afterwards al-Qa'im, entered Alexandria. The danger led to measures of unusual energy being taken by the Bagdad caliph Moqtadir, an army being sent to Egypt under Mu'nis, and a special post being organized between that country and Bagdad to convey

messages uninterruptedly. The Fatimite forces were defeated, partly owing to the insubordination of the general Habasah, in the winter of 914, and returned to Barca and Kairawan with great loss.

A second expedition was undertaken against Egypt in the year 919, and on the 10th of July Alexandria was entered by Abu'l-Qasim, who then advanced southward, seizing the Fayum and Ushmunain (Eshmunain). He was presently reinforced by a fleet, which, however, was defeated at Rosetta in March of the year 920 by a fleet despatched from Tarsus by the 'Abbasid caliph Moqtadir, most of the vessels being burned. Through the energetic measures of the caliph, who sent repeated rein- forcements to Fostat, Abu'l-Qasim was compelled in the spring of 921 to evacuate the places which he had seized, and return to the west with the remains of his army, which had suffered much from plague as well as defeat on the field. On his return he found that the court had migrated from Raqqada to the new capital Mahdia (q.v.). Meanwhile other expeditions had been despatched by 'Obaidallah towards the west, and Nekor (Nakur) and Fez had been forced to acknowledge his sovereignty.

The remaining years of 'Obaidallah's reign were largely spent in dealing with uprisings in various parts of his dominions, the success of which at times reduced the territory in which he was recognized to a small area.

'Obaidallah died on the 4th of March 933, and was succeeded by Abu'l-Qasim, who took the title al-Qa'im biamr allah. He immediately after his accession occupied himself with the

reconquest of Fez and Nekor, which had revolted during the last years of the former caliph. He also despatched a fleet under Ya'qiib b. Ishaq, which ravaged the coast of France, took Genoa, and plundered the coast of Calabria before returning to Africa. A third attempt made by him to take Egypt resulted in a disastrous defeat at Dhat al-Human, after which the remains of the expedition retreated in disorder to Barca.

The later years of the reign of Qa'im were troubled by the uprising of Abu Yazid Makhlad al-Zenati, a leader who during the former reign had acquired a following among the tribes inhabiting the Jebel Aures, including adherents of the TbadI sect. After having fled for a time to Mecca", this person returned in 937 to Tauzar (Touzer), the original seat of his operations, and was imprisoned by Qa'im's order. His sons, aided by the powerful tribe Zenata, succeeded in forcing the prison, and releasing their father, who continued to organize a conspiracy on

a vast scale, and by the end of 943 was strong enough to take the field against the Fatimite sovereign, whom he drove out of Kairawan. Abu Yazid proclaimed himself a champion of SunnI doctrine against the Shfis, and ordered the legal system of Malik to be restored in place of that introduced by the Fatimites. Apparently the doctrines of the latter has as yet won little popularity, and Abu Yazid won an enormous following, except among the Kutama, who remained faithful to Qa'im. On the last day of October 944, an engagement was fought between Kairawan and Mahdia at a place called al-Akhawan, which resulted in the rout of Qa'im's forces, and the caliph's being shortly after shut up in his capital, the suburbs of which he defended by a trench. Abu Yazld's forces were ill-suited to maintain a protracted siege, and since, owing to the former caliph's forethought, the capital was in a condition to hold out for a long time, many of them deserted and the besiegers gained no permanent advantage. After the siege had lasted some ten months Abu. Yazid was compelled to raise it (September 945) ; the struggle, however, did not end with that event, and for a time the caliph and Abu Yazid continued to fight with varying fortune, while anarchy prevailed over most of the caliph's dominions. On the 13th of January 946, Abu Yazid shut up Qa'im's forces in Susa which he began to besiege, and attempted to take by storm.

On the 1 8th of May 945, while Abu Yazid was besieging Susa, the caliph al-Qa'im died at Mahdia, and was succeeded by his son Isma'll, who took the title Mansur. He almost immediately relieved Susa by sending a fleet, which joining with the garrison inflicted a severe defeat on Abu Yazid, who had to evacuate Kairawan also; but though the cities were mainly in the hands of Fatimite prefects, Abu. Yazid was able to maintain the field for more than two years longer, while his followers were steadily decreasing in numbers, and he was repeatedly driven into fast- nesses of the Sahara. In August 947 his last stronghold was taken, and he died of wounds received in defending it. His sons carried on some desultory warfare against Mansur after their father's death. A town called Mansiira or Sabra was built adjoining Kairawan to celebrate the decisive victory over Abu Yazid, which, however, did not long preserve its name. The exhausted condition of north-west Africa due to the pro- tracted civil war required some years of peace for recuperation, and further exploits are not recorded for Mansur, who died on the 19th of March 952.

His son, Abu Tamim Ma'add, was twenty-two years of age at the time, and succeeded his father with the title Mo'izz lidin allah. His authority was acknowledged over the greater part of the region now constituting Morocco, Algeria and Tunisia, as well as Sicily, and he appears to have had serious thoughts of endeavouring to annex Spain.

At an early period in his reign he made Jauhar, who had been secretary under the former caliph, commander of the forces, and the services rendered by this person to the dynasty made him count as its second founder after al-Shi'I. In the years 958 and 959 he was sent westwards to reduce Fez and other places where the authority of the Fatimite caliph had been repudiated, and after a successful expedition advanced as far as the Atlantic. As early as 966 the plan of

attempting a fresh invasion of Egypt was conceived, and preparations made for its execution; but it was delayed, it is said at the request of the caliph's mother, who wished to make a pilgrimage to Mecca first; and her honourable treatment by Kafur when she passed through Egypt induced the caliph to postpone the invasion till that sovereign's death.

In August 972 Mo'izz resolved to follow Jauhar's pressing invitation to enter his new capital Cairo. With his arrival there the centre of the Fatimite power was transferred from Mahdia and Kairawan to Egypt, and their original dominion became a province called al-Maghrib, which immediately fell into the hands of a hereditary dynasty, the Zeirids, acknowledging Fatimite suzerainty. The first sovereign was Bulukkin, also called Abu'l-Futuh Yusuf, appointed by Mo'izz as his viceroy on the occasion of his departure for Egypt: separate prefects were appointed for Sicily and Tripoli; and at the first the minister of finance was to be an official independent of the governor of the Maghrib. On the death of Bulukkin in 984 he was succeeded by a son who took the royal title al-Mansur, under whose rule an attempt was made by the Kutama, instigated by the caliph, to shake off the yoke of the Zeirids, who originated from the Sanhaja tribe. This attempt was defeated by the energy of Mansiir in 988; and the sovereignty of the Fatimites in the Maghrib became more and more confined to recognition in public prayer and on coins, and the payment of tribute and the giving of presents to the viziers at Cairo. The fourth ruler of the Zeirid dynasty, called Mo'izz, endeavoured to substitute 'Abbasid suzerainty for Fatimite: his land was invaded by Arab colonies sent by the Fatimite caliph, with whom in 105 1 Mo'izz fought a decisive engagement, after which the dominion of the Zeirids was restricted to the territory adjoining Mahdia; a number of smaller kingdoms rising up around them. The Zeirids were finally overthrown by Roger II. of

Sicily in 1148.

After the death of al-Adid, the last Fatimite caliph in Egypt, some attempts were made to place on the throne a member of the family, and at one time there seemed a chance of the Assassins, who formed a branch of the Fatimite sect, assisting in this project. In 1 174 a conspiracy for the restoration of the dynasty was organized by ‘Umarah of Yemen, a court poet, with the aid of eight officials of the government: it was discovered and those who were implicated were executed. Two persons claiming Fatimite descent took the royal titles al-Mo’tasim billah and al-Hamid lillah in the years 1175 and 1176 respectively; and as late as 1192 we hear of pretenders in Egypt. Some members of the family are traceable till near the end of the 7 th century of Islam.

The doctrines of the Fatimites as a sect, apart from their claim to the sovereignty in Islam, are little known, and we are not justified in identifying them with those of the Assassins, the Carmathians or the Druses, though all these sects are connected with them in origin. A famous account is given by MaqrizI of a system of education by which the neophyte had doubts gently instilled into his mind till he was prepared to have the allegorical meaning of the Koran set before him, and to substitute some form of natural for revealed religion. In most accounts of the early days of the community it is stated that the permission of wine-drinking and licentiousness, and the com- munity of wives and property formed part of its tenets. There is little in the recorded practice of the Fatimite state to confirm or justify these assertions; and they appear to have differed from orthodox Moslems rather in small details of ritual and law than in deep matters of doctrine.

Authorities. — F. Wiistenfeld, Geschickte der Fatimiden Chalifen (Gottingen, 1881); E. Merrier, Histoire de V Ajryque Septentrionale (Paris, 1888) ; M. J. de Goeje, Memoire sur les Carmathes de Bahrain et les Fatimides (2nd ed., Leiden, 1886); P. Casanova, ” Memoire sur les derniers Fatimides,” Mem. Miss, archeologique au Caire, vol. vi. ; for the lives of ‘Obaidallah and Abu Yazld, Cherbonneau in the Journal Asiatique, ser. iv. vol. 20, and ser. v. vol. 5. See also Egypt: History, sect. Mahommedan. (D. S. M.*)

FAUBOURG, the French name for a portion of a town which lies outside the walls, hence properly a suburb. The name survives in certain parts of Paris, such as the Faubourg St

Antoine, and the Faubourg St Germain, &c, which have long since

ceased to be suburbs and have become portions of the town itself. The origin of the word is doubtful. The earlier spelling faux-bourg, and the occurrence in medieval Latin of falsus-burgus (see Ducange, Glossarium, s.v, ” Falsus-Burgus “), was taken as showing its obvious origin and meaning, the sham or quasi-borough. The generally accepted derivation is from fors, outside (Lat. forts, outside the gates), and bourg. It is suggested that the word is the French adaptation of the Ger. Pfahlbiirger, the burghers of the pale, i.e. outside the walls but within the pale.

FAUCES (a Latin plural word for ” throat “; the singular fd-ux is rarely found), in anatomy, the hinder part of the mouth, which leads into the pharynx; also an architectural term given by Vitruvius to narrow passages on either side of the tablinum, through which access could be obtained from the atrium to the peristylar court in the rear.

FAUCHER, LEONARD JOSEPH [Leon] (1803-1854), French politician and economist, was born at Limoges on the 8th of September 1803. When he was nine years old the family removed to Toulouse, where the boy was sent to school. His parents were separated in 1816, and Leon Faucher, who resisted his father’s attempts to put him to a trade, helped to support himself and his mother during the rest of his school career by designing embroidery and needlework. As a private tutor in Paris he continued his studies in the direction of archaeology and history, but with the revolution of 1830 he was drawn into active political journalism on the Liberal side. He was on the staff of the Temps from 1830 to 1833, when he became editor of the Constitutionnel for a short time. A Sunday journal of his own, Le Bien public, proved a disastrous financial failure; and his political independence having caused his retirement from the Constitutionnel, he joined in 1834 the Courrier franQais, of which he was editor from 1839 until 1842, when the paper changed hands. Faucher belonged in policy to the dynastic Left, and consistently preached moderation to the more ardent Liberals. On resigning his connexion with the Courrier franQais he gave his attention chiefly to economic questions. He advo- cated a customs union between the Latin countries to counter- balance the German Zollverein, and in view of the impractic- ability of such a measure narrowed his proposal in 1842 to a customs union between France and Belgium. In 1843 he visited England to study the English social system, publishing the results of his investigations in a famous series of £tudes sur V Angleterre (2 vols., 1845), published originally in the Revue des deux mondes. He helped to organize the Bordeaux associa- tion for free-trade propaganda, and it was as an advocate of free trade that he was elected in 1847 to the chamber of deputies for Reims. After the revolution of 1848 he

entered the Con- stituent Assembly for the department of Marne, where he opposed many Republican measures — the limitation of the hours of labour, the creation of the national relief works in Paris, the abolition of the death penalty and others. Under the presidency of Louis Napoleon he became minister of public works, arid then minister of the interior, but his action in seeking to influence the coming elections by a circular letter addressed to the prefects was censured by the Constituent Assembly, and he was compelled to resign office on the 14th of May 1849. In 1851 he was again minister of the interior until Napoleon declared his intention of resorting to universal suffrage. After the coup d'Mat of December he refused a seat in the consultative commission instituted by Napoleon. He had been elected a member of the Academy of Moral and Political Science in 1849, and his retirement from politics permitted a return to his writings on economics. He had been to Italy in search of health in 1854, and was returning to Paris on business when he was seized by typhoid at Marseilles, where he died on the 14th of December

1854-

His miscellaneous writings were collected (2 vols., 1856) as Melanges d'economie politique et de finance, and his speeches in the legislature are printed in vol. ii. of Leon Faucher, biographie et correspondance (2 vols., 2nd ed., Paris, 1875).

FAUCHET, CLAUDE (1530-1601), French historian and antiquary, was born at Paris on the 3rd of July 1530. Of his early life few particulars are known. He applied himself to the study of the early French chroniclers, and proposed to publish extracts which would throw light on the first periods of the monarchy. During the civil wars he lost a large part of his books and manuscripts in a riot, and was compelled to leave Paris. He then settled at Marseilles. Attaching himself after- wards to Cardinal de Tournon, he accompanied him in 1554 to Italy, whence he was several times sent on embassies to the king, with reports on the siege of Siena. His services at length procured him the post of president of the chambre des monnaies, and thus enabled him to resume his literary studies. Having become embarrassed with debt, he found it necessary, at the age of seventy, to sell his office; but the king, amused with an epigram, gave him a pension, with the title of historiographer of France. Fauchet has the reputation of an impartial and scrupulously accurate writer; and in his works are to be found

important facts not easily accessible elsewhere. He was, however, entirely uncritical, and his style is singularly inelegant. His principal works (1579, 1599) treat of Gaulish and French anti- quities, of the dignities and magistrates of France, of the origin of the French language and poetry, of the liberties of the Gallican church, &c. A collected edition was published in 1610. Fauchet took part in a translation of the Annals of Tacitus (1582). He died at Paris about the close of 1601.

FAUCHET, CLAUDE (1 744-1 793), French revolutionary bishop, was born at Domes (Nievre) on the 22nd of September 1744. He was a curate of the church of St Roch, Paris, when he was engaged as tutor to the children of the marquis of Choiseul, brother of Louis XV. ‘s minister, an appointment which proved to be the first step to fortune. He was successively grand vicar to the archbishop of Bourges, preacher to the king, and abbot of Montfort-Lacarre. The ” philosophic ” tone of his sermons caused his dismissal from court in 1788 before he became a popular speaker in the Parisian sections. He was one of the leaders of the attack on the Bastille, and on the 5th of August 1789 he delivered an eloquent discourse by way of funeral sermon for the citizens slain on the 14th of July, taking as his text the words of St Paul, ” Ye have been called to liberty.” He blessed the tricolour flag for the National Guard, and in September was elected to the Commune, from which he retired in October 1790. During the next winter he organized within the Palais Royal the ” Social Club of the Society of the Friends of Truth,” presiding over crowded meetings under the self assumed title of procureur general de la verite. Nevertheless, events were marching faster than his opinions, and the last occasion on which he carried his public with him was in a sermon preached at Notre Dame on the 14th of February 1791. In May he became constitutional bishop of Calvados, and was presently returned by the department to the Legislative Assembly, and afterwards to the Convention. At the king’s trial he voted for the appeal to the people and for the penalty of imprisonment. He protested against the execution of Louis XVI. in the Journal des amis (January 26, 1793), and next month was denounced to the Convention for prohibiting married priests from the exercise of the priesthood in his diocese. He remained secretary to the Convention until, the accusation of the Girondists in May 1793. In July he was imprisoned on the charge of supporting the federalist movement at Caen, and of complicity with Charlotte Corday, whom he had taken to see a sitting of the Convention on her arrival in Paris. Of the second of these charges he was certainly innocent. With the Girondist deputies he was brought before the revolutionary tribunal on the 30th of October, and was

guillotined on the following day.

See Memoires . . . ou Leilres de Claude Fauchet (5th ed., 1793); Notes sur Claude Fauchet (Caen, 1842).

FAUCIT, HELENA SAVILLE (1817-1898), English actress, the daughter of John Saville Faucit, an actor, was born in London. Her first London appearance was made on the 5th of January 1836 at Covent Garden as Julia in The Hunchback. Her success

in this was so definitely confirmed by her subsequent acting of Juliet, Lady Teazle, Beatrice, Imogen and Hermione, that within eighteen months she was engaged by Macready as leading lady at Covent Garden. There, besides appearing in several Shakespearian characters, she created the heroine's part in Lytton's Duchess de la Valliere (1836), Lady of Lyons (1838), Richelieu (1839), Tlie Sea Captain (1839), Money (1840), and Browning's Strafford (1837). After a visit to Paris and a short season at the Haymarket, she joined the Drury Lane company under Macready early in 1842. There she played Lady Macbeth, Constance in King John, Desdemona and Imogen, and took part in the first production of Westland Marston's Patrician's Daughter (1842) and Browning's Blot on the Scute/won (1843). Among her successful. tours was included a visit to Paris in 1844- 1845, where she acted with Macready in several Shakespearian plays. In 1851 she was married to Mr (afterwards Sir) Theodore Martin, but still acted occasionally for charity. One of her last appearances was as Beatrice, on the opening of the Shakespeare Memorial at Stratford-on-Avon on the 23rd of April 1879. In 1881 there appeared in Blackwood's Magazine the first of her Letters on some of Shakespeare's Heroines, which were published in book form as On Some of Shakespeare's Female Characters (1885). Lady Martin died at her home near Llangollen in Wales on the 31st of October 1898. There is a tablet to her in the Shakespeare Memorial with a portrait figure, and the marble pulpit in the Shakespeare church — with her portrait as Saint Helena — was given in her memory by her husband.

See Sir Theodore Martin's Helena Faucit (1900).

FAUJAS DE SAINT-FOND, BARTHˆLEMY (1741-1819), French geologist and traveller, was born at Montelimart on the 17th of May 1741. He was educated at the Jesuits' College at Lyons; afterwards he, went to Grenoble, applied himself to the study of law, and was admitted advocate to the parliament. He rose to be president of the seneschal's court (1765), a post which he honourably filled, but the duties of which became irksome, as he had early developed a love of

nature and his favourite relaxation was found in visits to the Alps. There he began to study the forms, structure, composition and superposition of rocks. In 1775 he discovered in the Velay a rich deposit of pozzuolana, which in due course was worked by the government. In 1776 he put himself in communication with Buffon, who was not slow to perceive the value of his labours. Invited by Buffon to Paris, he quitted the law, and was appointed by Louis XVI. assistant naturalist to the museum, to which office was added some years later (1785, 1788) that of royal commis- sioner for mines. One of the most important of his works was the Recherches sur les volcans eteints du Vivarais et du Velay, which appeared in 1778. In this work, rich in facts and observations, he developed his theory of the origin of volcanoes. In his capacity of commissioner for mines Faujas travelled in almost all the countries of Europe, everywhere devoting attention to the nature and constituents of the rocks. It was he who first recognized the volcanic nature of the basaltic columns of the cave of Fingal (Staffa), although the island was visited in 1772 by Sir Joseph Banks, who remarked that the stone ” is a coarse kind of Basaltes, very much resembling the Giante’ Causeway in Ireland ” (Pennant’s Tour in Scotland and Voyage to the Hebrides). Faujas’s Voyage en Angleterre, en Ecossc et aux lies Hebrides (1797) is full of interest — containing anecdotes of Sir Joseph Banks and Dr John Whitehurst, and an amusing account of ” The Dinner of an Academic Club ” (the Royal Society), and has been translated into English (2 vols., 1799). Having been nominated in 1 793 professor at the Jardin des Plantes, he held this post till he was nearly eighty years of age, retiring in 1818 to his estate of Saint- Fond in Dauphine. Faujas took a warm interest in the balloon experiments of the brothers Montgolfier, and published a very complete Description des experiences de la machine aerostatique de MM. Montgolfier, &c. (1783, 1784). He contributed many scientific memoirs to the Annates and the Memoires of the museum of natural history. Among his separate works, in addition to those already named are — Histoire nalurelle de la province de Dauphine (1781. 1782); Mineralogie des volcans

(1784); and Essai de geologie (1803-1809). Faujas died on the 18th of July 1819.

FAULT (Mid. Eng. faute, through the French, from the popular Latin use of fatter e, to fail; the original /of the Latin being replaced in English in the 15th century), a failing, mistake or defect.

In geologyˆ the term is given to a plane of dislocation in a portion of the earth's crust; synonyms used in mining are "trouble," "throw" and "heave"; the German equivalent is Vcrwerfung, and the French faille. Faults on a small scale are

sometimes sharply- defined planes, 1 as if the rocks had been sliced through and fitted together again after being shifted (fig. 1). In such cases, however, the harder portions of the dislocated rocks will usually be found " slickensided." More frequently some dis-

Crr , c . . c , . r ,. turbance has occurred

tic. 1. — Section of clean-cut fault. . . .,

on one or both sides

of the fault. Sometimes in a series of strata the beds on the side

which has been pushed up are bent down against the fault, while

those on the opposite side are bent up (fig. 2). Most commonly

fault (if the angle of inclination were measured from the horizon, as in determining the " dip " of strata, this would be expressed as the " dip of the fault "). In figs. 1 and 2 the faults are hading

Fig. 2. — Section of strata, bent at a line of fault.

the rocks on both sides are considerably broken, jumbled and crumpled, so that the line of fracture is marked by a belt or wall- like mass of fragmentary rock, fault-rock, which may be several yards in breadth. Faults are to be distinguished from joints and fissures by the fact that there must have been a movement of the rock on one side of the fault-plane relatively to that on the other side. The trace of a fault-plane at the surface of the earth is a line (or belt of fault-rock), which in geological mapping is often spoken of as a " fault-line " or " line of fault." Fig. 3

Fig. 3. — Plan of simple fault.

represents the plan of a simple fault; quite frequently, however, the main fault subdivides at the extremities into a number of minor faults (fig. 4), or the main fault may be accompanied by

Fig. 4. — Plan of a fault splitting into minor faults.

lateral subordinate faults (fig. 5), some varieties of which have been

termed flaws or Blatts.

” Fault- planes “are sometimes perpendicular to the horizon, but mors usually they are inclined at a greater or lesser angle. The angle made by the fault-plane with the vertical is the hade of the

‘ The fault-plane is not a plane surface in the mathematical sense; it may curve irregularly in more than one direction-

“1

y

Fig. 5. — Plan of main fault, with branches.

towards the right of the reader. The amount of dislocation as measured along a fault-plane is the displacement of the fault (for ah illustration of these terms see fig. 18, where they are applied to a thrust fault) ; the vertical displacement is the throw (Fr. rejet) ; the horizontal displacement, which even with vertical movement must arise in all cases where the faults are not per- pendicular to the horizon and the strata are not horizontal, is known as the heave. In fig. 6 the displacement is equal to the throw in the fault A; in the fault B the displacement is more than

Fig. 6. — Section of a vertical and inclined fault.

twice as great as in A, while the throw is the same in both; the fault A has no heave, in B it is considerable. The rock on that side of a fault which has dropped relatively to the rock on the other is said to be upon the downthrow side of the fault; con- versely, the relatively uplifted portion is the upthrow side. The two fault faces are known as the ” hanging-wall ” and the ” foot-wall.”

The relationship that exists between the hade and the direction of throw has led to the classification of faults into ” normal faults,” which hade under the downthrow side, or in other words, those in which the hanging- wall has dropped; and ” reversed faults,” which hade beneath the upthrow side, that is to say, the foot-wall exhibits a relative sinking. Normal faults are exemplified in figs. 1, 2, and 6; in the latter the masses A and B are on the downthrow sides, C is upthrown. Fig. 7 represents a small reversed fault. Normal faults are

Fig. 7. — Reversed fault, Liddcsdale.

so called because they are more generally prevalent than the other

type; they are sometimes designated “drop” or “gravity” faults, but these are misleading expressions and should be discountenanced. Normal faults are regarded as ihe result of stretching of the crust, hence they have been called “tension ” faults as distinguished from reversed faults, which are assumed to be due to pressure. It is needful, however, to exercise great caution in accepting this view except in a restricted and localized sense, for there are many instances in which the two forms are intimately associated (see fig. 8), and a whole complex system of faults may be the result of horizontal (tangential) pressure alone or even of direct vertical uplift. It is often tacitly assumed

that most normal and reversed faults are due to simple vertical movements of the fractured crust-blocks; but this is by no means the case. What is actually observed in examining a fault is the apparent direction of motion; but the present position of the dislocated masses is the result of real motion or series of

Fig. 8. — Diagram of gently undulating strata cut by a fault, with alternate throw in opposite directions.

motions, which have taken place along the fault-plane at various angles from horizontal to vertical; frequently it can be shown that these movements have been extremely complicated. The striations and ” slickensides ” on the faces of a fault indicate only the direction of the last movement.

Fig. 9. — Section of strata cut by step faults.

A broad monoclinal fold is sometimes observed to pass into a fault of gradually increasing throw; such a fault is occasionally regarded as pivoted at one end. Again, a faulted mass may be on the downthrow side towards one end, and on the upthrow side towards the other, the movement having taken place about

A single normal fault of large throw is sometimes replaced by a series of close parallel faults, each throwing a small amount in the same direction; if these subordinate faults occur within a narrow width of ground they are known as distribution faults; if they are more widely separated they are called step faults (fig. 9). Occasionally two normal faults hade towards one another and intersect, and the rock mass between them has ; been let down; this is”C;.’._ . .,_ described as a

trough \ˆ>S; :':■•": fault (fig. 10). A fault running parallel to the strike of bedded rocks is a strike fault; one which runs along the direction of the Fig. 12. — Sectionacrosstheplan.fig.il. dip is a dip fault; a

so-called diagonal fault takes a direction intermediate between these two directions. Although the effects of these types of fault upon the outcrops of strata differ, there are no .intrinsic differences between the faults themselves.

The effect of normal faults upon the outcrop may be thus briefly summarized: — a strike fault that hades with the direction of the dip may cause beds to be cut out at the surface on the

h

Fig. 10. — Trough faults.

an axis approximately normal to the fault-plane, the " pivot " in this case being near the centre. From an example of this kind it is evident that the same fault may at the same time be both " normal " and " reversed " (see fig. 8). When the principal movement along a highly inclined fault-plane has been approxi-

Sourh Fig. 11. — Plan of a strike fault.

mately horizontal, the fault has been variously styled a lateral- shift, transcurrent fault, transverse thrust or a heave fault. The horizontal component in faulting- movements is more common than is often supposed.

Fig. 13. — Plan of strata cut by a dip fault.

upthrow side; if it hades against the dip direction it may repeat some of the beds on the upthrow side (figs, n and 12). With dip faults the crop is carried forward (down the dip) on the upthrow side. The perpendicular distance between the crop of the bed (dike or vein) on opposite sides of the fault is the " offset." The offset decreases with increasing angle of dip and increases with increase in the throw of the fault (fig. 13).

Fig. 14. — Plan of strata traversed by a diminishing strike fault.

Faults which run obliquely across the direction of dip, if they hade with the dip of the strata, will produce offset with " gap " between the outcrops; if they hade in the opposite direction to the dip, offset with "

overlap ” is caused: in the latter case the crop moves forward (down dip) on the denuded upthrow side, in the former it moves backward. The effect of a strike fault of diminishing throw is seen in fig. 14. Faults crossing folded strata cause the outcrops to approach on the upthrow side of a syncline and tend to separate the outcrops of an anti- cline (figs. 15, 16, 17).

In the majority of cases the upthrown side of a fault has been so reduced by denudation as to leave no sharp upstandiiig ridge; but examples are known where the upthrown side still

u

a

-_ v

”

l

A eo

S

“~- -,

- _ ”

a

s

1

so- XI

\

-.^_

a

-

AbO’

1 //

A

«0*|

I

.— ‘,,”

a

H

r

loo-

A.

a

a

exists as a prominent cliff-like face of rock, a “fault-scarp”; familiar instances occur in the Basin ranges of Utah, Nevada, &c, and many smaller examples have been observed in the areas affected by recent earthquakes in Japan, San Francisco and other places. But although there may be no sharp cliff, the effect of faulting upon topographic forms is abundantly evident

wherever a harder T , series of strata has been

brought in juxtaposi- tion to softer rocks. By certain French writers, the upstanding side of a faulted piece of ground is said to have a regard, thus the faults of the Jura Mountains have a ” regard franc.ais,” and in the same region it has been observed that in curved faults the convexity is directed the same way as the regard. Occasionally one or more parallel faults have let down an intervening strip of rock, thereby form- ing ” fault valleys ” or Graben (Grabensenken) ; the Great Rift Valley is a striking example. On the other hand, a large area of rock is sometimes lifted up, or surrounded by a system of faults,

which have let down the /”-.“N encircling ground; such

a fault-block is known also as a horst; a con- siderable area of Greenland stands up in this manner.

Faults have often an

important influence upon

water-supply by bringing

impervious beds up

against pervious ones or

vice versa, thus forming underground dams or reservoirs, or

allowing water to flow away that would otherwise be conserved.

Springs often rise along the outcrop of a fault. In coal and metal

N.W,

>s'rA

Fig. 15. — Plan of an anticline (A) and syncline (S), dislocated by a fault.

.

Fig. 16. — Section along the upcast side of the fault in fig. 15.

mining it is evident from what has already been said that faults must act sometimes beneficially, sometimes the reverse. It is a common occurrence for fault-fissures and fault-rock to appear as valuable mineral lodes through the infilling or impregnation of the spaces and broken ground with mineral ores.

In certain regions which have been subjected to very great, crustal disturbance a type of fault is found which possesses a very low hade — sometimes only a few degrees from the horizontal — and, like a reversed fault, hades beneath the upthrown mass ; these are termed thrusts, overthrusts, or overthrusl faults (Fr. recouvrements, failles de chevauchemenl, charriages; Ger. Uberschiebungen, Uberspriinge, Wechsel, Fallen- verwerfungen) . Thrusts should not be confused with reversed faults, which have a strong hade. Thrusts play a very important

Fig. 17.-

-Section along the downcast side of same fault.

-Diagram to illustrate the terminology of faults and thrusts.

part in the N.W. highlands of Scotland, the Scandinavian high- lands, the western Alps, the Appalachians, the Belgian coal region, &c. By the action of thrusts enormous masses of rock have been pushed almost horizontally over underlying rocks, in some cases for several miles. One of the largest of the Scandinavian thrust

W&»

d down

Durnm

Kyte of Burnett

Meatl Meadhoncch

Scale, 1 inch = ijj miles F= Normal fault

•fter H.M. GtolotiaU Survey

Fig. 19. — Section of a very large thrust in the Durness Eriboll district, Scotland.

masses is 11 20 m. long, 80 m. broad, and 5000 ft. thick. In Scotland three grades of thrusts are recognized, maximum, major, and minor thrusts; the last have very generally been truncated by those of greater magnitude. Some of these great thrusts have received distinguishing names, e.g. the Moine thrust (fig. 19) and the Ben More thrust; similarly in the coal basin of Mons and Valenciennes we find the faille de Boussu and the Grande faille du midi. Overturned folds are frequently seen passing into thrusts. Bayley Willis has classified thrusts as (1) Shear thrusts, (2) Break thrusts, (3) Stretch thrusts, and (4) Erosion thrusts.

Dr J. E. Marr (" Notes on the Geology of the English Lake District," Proc. Geol. Assoc., 1900) has described a type of fault which may be regarded as the converse of a thrust fault. If we consider a series of rock masses A, B, C — of which A is the oldest and undermost — undergoing thrusting, say from south to north, should the mass C be

prevented from moving forward as rapidly as B, a low-hading fault may form between C and B and the mass C may lag behind; similarly the mass B may lag behind A. Such faults Dr Marr calls “lag faults.” A mass of rock suffering thrusting or lagging may yield unequally in its several parts, and those portions tending to travel more rapidly than the adjoining masses in the same sheet may be cut off by fractures. Thus the faster-moving blocks will be separated from the slower ones by faults approximately normal to the plane of movement: these are described as ” tear faults.”

Faults may occur in rocks of all ages; small local dislocations are observable even in glacial deposits, alluvium and loess, A region of faulting may continue to be so through more than one geological period. Little is known of the mechanism of faulting or of the causes that produce it; the majority of the text-book explanations will not bear scrutiny, and there is room for ex- tended observation and research. The sudden yielding of the strata along a plane of faulting is a familiar cause of earthquakes.

See E. de Margerie and A. Heim, Les Dislocations de I’ecorce terrestre (Zurich, 1888); A. Rothpletz, Geotektonische Probleme (Stuttgart, 1894); B. Willis, ” The Mechanics of Appalachian Structure,” 13th Ann. Rep. U.S. Geol. Survey (1891-1892, pub. 1893). A prolonged discussion of the subject is given in Economic Geology, Lancaster, Pa., U.S.A., vols. i. and ii. (1906, 1907). (A. Ge.; J. A. H.;

FAUNA, the name, in Roman mythology, of a country goddess of the fields and cattle, known sometimes as the sister, some- times as the wife of the god Faunus; hence the term is used collectively for all the animals in any given geographical area or geological period, or for an enumeration of the same. It thus corresponds to the term ” flora ” in respect to plant life.

FAUNTLEROY, HENRY (1785-1824), English banker and forger, was born in 1785. After seven years as a clerk in the London bank of Marsh, Sibbald & Co., of which his father was one of the founders, he was taken into partnership, and the whole business of the firm was left in his hands. In 1824 the bank suspended payment. Fauntleroy was arrested on the charge of appropriating trust funds by forging the trustees’ signatures, and was committed for trial, it being freely rumoured that he had appropriated £250,000, which he had squandered in de- bauchery. He was tried at the Old Bailey, and, the case against him having been proved, he admitted his guilt, but pleaded that he had used the misappropriated funds to pay his firm’s debts. He was found guilty ard sentenced to be hanged. Seventeen

merchants and bankers gave evidence as to his general integrity at the trial, and after his conviction powerful influence was brought to bear on his behalf, and his case was twice argued before judges on points of law. An Italian named Angelini even offered to take Fauntleroy's place on the scaffold. The efforts of his many friends were, however, unavailing, and he was executed on the 30th of November 1824. A wholly unfounded rumour was widely credited for some time subsequently to ˆthe effect that he had escaped strangulation by inserting a silver tube in his throat, and was living comfortably abroad.

' See*&. Griffith's Chronicles of Newgate, ii. 294-300, and Pierce Egan's Account of the Trial of Mr Fauntleroy.

FAUNUS {i.e. the " kindly," from Lat.favere, or the " speaker," from fart), an old Italian rural deity, the bestower of fruitfulness on fields and cattle. As such he fs akin to or identical with Inuus (" fructifier ") and Lupercus (see Lupercalia). Faunus also revealed the secrets of the future by strange sounds from the woods, or by visions communicated to those who slept within his precincts in the skin of sacrificed lambs; he was then called Fatuus, and with him was associated his wife or daughter Fatua. Under Greek influence he was identified with Pan, and just as there was supposed to be a number of Panisci, so the existence of many Fauni was assumed — misshapen and mischievous goblins of the forest, with pointed ears, tails and goat's feet, who loved to torment sleepers with hideous nightmares. In poetical tradition Faunus is an old king of Latium, the son of Picus (Mars) and father of Latinus, the teacher of agriculture and cattle-breeding, and the introducer of the religious system of the country, honoured after death as a tutelary divinity. Two festivals called Faunalia were celebrated in honour of Faunus, one on the 13th of February in his temple on the island in the Tiber, the other in the country on the 5th of December (Ovid, Fasti, ii. 193; Horace, Odes, iii. 18. 10). At these goats were sacrificed to him with libations of wine and milk, and he was im- plored tobepropitious to fields and flocks. The peasants and slaves at the same time amused themselves with dancing in the meadows.

FAURE, FRANQOIS FEUX (1841-1899), President of the French Republic, was born in Paris on the 30th of January 1841, being the son of a small furniture maker. Having started as a tanner and merchant at Havre, he acquired considerable wealth, was elected to the National Assembly on the 21st of August 1881, and took his seat as a member of the Left, interest- ing himself chiefly in matters concerning economics, railways and the navy. In November 1882 he became under-secretary for the colonies in M. Ferry's ministry, and

retained the post till 1885. He held the same post in M. Tirard's ministry in 1888, and in 1893 was made vice-president of the chamber. In 1894 he obtained cabinet rank as minister of marine in the administra- tion of M . Dupuy. In the January following he was unexpectedly elected president of the Republic upon the resignation of M. Casimir-Perier. The principal cause of his elevation was the determination of the various sections of the moderate republican party to exclude M. Brisson, who had had a majority of votes on the first ballot, but had failed to obtain an absolute majority. To accomplish this end it was necessary to unite among them- selves, and union could only be secured by the nomination of some one who offended nobody. M. Faure answered perfectly to this description. His fine presence and his tact on ceremonial occasions rendered the state some service when in 1896 he re- ceived the Tsar of Russia at Paris, and in 1897 returned his visit, after which meeting the momentous Franco-Russian alliance was publicly announced. The latter days of M. Faure's presidency were embittered by the Dreyfus affair, which he was determined to regard as chose jugSe. But at a critical moment in the proceedings his death occurred suddenly, from apoplexy, on the 1 6th of February 1899. With all his faults, and in spite of no slight amount of personal vanity, President Faure was a shrewd political observer and a good man of business. After his death, some alleged extracts from his private journals, dealing with French policy, were published in the Pans press.

See E. Maillard, Le President F. Faure (Paris, 1897) ; P. Bluysen, Felix Faure intime (1898) ; and F. Martin-Ginouvier, F. Faure devant I'histoire (1895).

FAURE, GABRIEL (1845-), French musical composer, was born at Pamiers on the 13th of May 1845. He studied at the school of sacred music directed by Niedermeyer, first under Dietsch, and subsequently under Saint-Saens. He became " maitre de chapelle " at the church of the Madeleine in 1877, and organist in 1896. His works include a symphony in D minor (Op. 40), two quartets for piano and strings (Opp. 15 and 45), a suite for orchestra (Op. 12), sonata for violin and piano (Op. 13), concerto for violin (Op. 14), berceuse for violin, elegie for violoncello, pavane for orchestra, incidental music for Alexandre Dumas' Caligula and De Haraucourt's Shylock,

a requiem, a cantata, The Birth of Venus, produced at the Leeds

festival in 1898, a quantity of piano music, and a large number of songs. Faure occupies a place by himself among modern French composers. He delights in the imprevu, and loves to wander through labyrinthine harmonies. There can be no denying the intense fascination and remarkable originality of his music. His muse is essentially aristocratic, and suggests the surroundings of the boudoir and the perfume of the hot- house.

FAURIEL, CLAUDE CHARLES (17 72-1844), French historian, philologist and critic, was born at St Etienne on the 21st of October 1772. Though the son of a poor joiner, he received a good education in the Oratorian colleges of Tournon and Lyons. He was twice in the army — at Perpignan in 1793, and in 1796- 1797 at Briancon, as private secretary to General J. Servan de Gerbey (1741-1808); but he preferred the civil service and the companionship of his friends and his books. In 1 794 he returned to St Etienne, where, but only for a short period, he filled a municipal office; and from 1797 to 1799 he devoted himself to strenuous study, more especially of the literature and history, both ancient and modern, of Greece and Italy. Having paid a visit to Paris in 1799, he was introduced to Fouche, minister of police, who induced him to become his private secretary. Though he discharged the duties of this office to Fouche's satisfaction, his strength was overtasked by his continued application to study, and he found it necessary in 1801 to recruit his health by a three months' trip in the south. In resigning his office in the following year he was actuated as much by these considerations as by the scruples he put forward in serving longer under Napoleon, when the latter, in violation of strict republican prin- ciples, became consul for life. This is clearly shown by the frag- ments of Memoirs discovered by Ludovic Lalanne and published in 1886.

Some articles which Fauriel published in the Decade philo- sophique (1800) on a work of Madame de StaePs — De la litterature considerie dans ses rapports avec les institutions sociales — led to an intimate friendship with her. About 1802 he contracted with Madame de Condorcet a liaison which lasted till her death (1822). It was said of him at the time that he gave up all his energies to love, friendship and learning. The salon of Mme de Condorcet was throughout the Consulate and the first Empire a rallying point for the dissentient republicans. Fauriel was introduced by Madame de Stael to the literary circle of Auteuil, which gathered round Destutt de Tracy. Those who enjoyed his closest intimacy were the physiologist Cabanis (Madame de Condorcet's brother-in-law), the poet Manzoni, the publicist Benjamin Constant, and Guizot. Later Tracy introduced to him Aug. Thierry (1821) and perhaps Thiers and Mignet. During his

connexion with Auteuil, Fauriel's attention was naturally turned to philosophy, and for some years he was engaged on a history of Stoicism, which was never completed, all the papers connected with it having accidentally perished in 1814. He also studied Arabic, Sanskrit and the old South French dialects. He published in 1810 a translation of the Parthenals of the Danish poet Baggesen, with a preface on the various kinds of poetry; in 1823 translations of two tragedies of Manzoni, with a preface " Sur la theorie de V art dramatique "; and in 1 824-1 825 his transla- tion of the popular songs of modern Greece, with a " Discours preliminaire " on popular poetry.

The Revolution of July, which put his friends in power, opened to him the career of higher education. In 1830 he became professor of foreign literature at the Sorbonne. The Histoire de la Gaule meridionale sous la domination des conquerants germains (4 vols., 1836) was the only completed section of a general history of southern Gaul which he had projected. In 1 836 he was elected a member of the Academy of Inscriptions, and in 1837 he pub- lished (with an introduction the conclusions of which would not now all be endorsed) a translation of a Provencal poem on the Albigensian war. He died on the 15th of July 1844. After his death his friend Mary Clarke (afterwards Madame J. Mohl) published his Histoire de la litterature provenqale (3 vols., 1846) — his lectures for 1831-1832. Fauriel was biased in this work by

his preconceived and somewhat fanciful theory that Provence was the cradle of the chansons de geste and even of the Round Table romances; but he gave a great stimulus to the scientific study of Old French and Provencal. Dante et les origines de la langue et de la UlliraXure ilaiiennes (2 vols.) was published in 1854.

Fauriel's Memoires, found with Condorcet's papers, are in the Institute library. They were written at latest in 1804, and include some interesting fragments on the close of the consulate, Moreau, &c. Though anonymous, Lalanne, who published them {Les Derniers Jours du Consulat, 1886), proved them to be in the same handwriting as a letter of Fauriel's in 1803. The same library has Fauriel's corre- spondence, catalogued by Ad. Regnier (1900). Benjamin Constant's letters (1802-1823) were published by Victor Glachant in 1906. For Fauriel's correspondence with Guizot see Nouvelle Rev. (Dec. I, 1901, by V. Glachant), and for his love-letters to Miss Clarke (1822- 1844) the Revue des deux mondes (1908-1909) by F. Rod.) See further Sainte-Beuve, Portraits contemporains , ii. ; Antoine Guillois, Le Salon de Mme Helvetius (1894) and La Marquise de Condorcet (1897); O'Meara, Un Salon & Paris: Mme Mohl (undated); and J. B. Galley,

Claude Fauriel (1909).

FAUST, or Faustus, the name of a magician and charlatan of the 16th century, famous in legend and in literature. The historical Faust forms little more than the nucleus round which a great mass of legendary and imaginative material gradually accumulated. That such a person existed there is, however, sufficient proof. 1 He is first mentioned in a letter, dated August 20, 1507, of the learned Benedictine Johann Tritheim or Trithe- mius (1462-1516), abbot of Spanheim, to the mathematician and astrologer Johann Windung, at Hasf urt, who had apparently written about him. Trithemius, himself reputed a magician, and the author of a mystical work (published at Darmstadt in 1621 under the title of Sleganographica and burnt by order of the Spanish Inquisition), speaks contemptuously of Faust, who called himself Magister Georgius Sabellicus Faustus Junior, as a fool rather than a philosopher (fatuum non philosophum) , a vain babbler, vagabond and mountebank who ought to be whipped, and who had fled from the city rather than confront him. The insane conceit of the man was proved by his boast that, were all the works of Aristotle and Plato blotted from the memory of men, he could restore them with greater elegance, and that Christ's miracles were nothing to marvel at, since he could do the like whenever and as often as he pleased; his debased character by the fact that he had been forced to flee from the school of which he had been appointed master by the discovery of his unnatural crimes. The same unflattering estimate is con- tained in the second extant notice of Faust, in a letter of the jurist and canon Konrad Mudt (Mutianus Rufus), of the 3rd of October 1513, to Heinrich Urbanus. Mudt, like Trithemius, simply regards Faust as a charlatan. Similar is the judgment of another contemporary, Philipp Begardi, who in the fourth chapter of his Index sanitalis (Worms, 1539) ranks Faust, with Theophrastus Paracelsus, among the " wicked, cheating, useless and unlearned doctors."

It was Johann Gast (d. 1572), a worthy Protestant pastor of Basel, who like Mudt claims to have come into personal contact with Faust, who in his Sermones convivales (Basel, 1543) first credited the magician with genuine supernatural qualities. Gast, a man of some learning and much superstition, believed Faust to be in league with the devil, by whom about 1525 he was ultimately carried off, and declared the performing horse and dog by which the necromancer was accompanied to be familiar and evil spirits. Further information was given to the world by Johann Mannel or Manlius (d. 1560), councillor and historian to the emperor Maximilian II., in his Locorum communium collectanea (Basel, undated). Manlius reports a conversation of Melanchthon, which there is no reason to suspect of

being other than genuine, in which the Reformer speaks of Faust as ” a disgraceful beast and sewer of many devils,” as having been born at Kundling (Kundlingen or Knittlingen), a little town near his own native town (of Bretten), and as having studied magic at Cracow. The rest of the information given can hardly be regarded as historical, though Melanchthon, who, like Luther,

‘The opinion, long maintained by some, that he was identical- with Johann Fust, the printer, is now universally rejected.

was no whit less superstitious than most people of his time, evidently believed it to be so. According to him, among other marvels, Faust was killed by the devil wringing his neck. While he lived he had taken about with him a dog, which was really a devil. A similar opinion would seem to have been held of Faust by Luther also, who in Widmann’s Faust-book is men- tioned as having declared that, by God’s help, he had been able to ward off the evils which Faust with his sorceries had sought to put upon him. The passage, with the omission of Faust’s name, occurs word for word in Luther’s Table-talk(ed.C.E.F6rstemann, vol. i. p. 50). It is not improbable, then, that Widmann, in supplying the name of the necromancer omitted in the Table- talk, may be giving a fuller account of the conversation. Bullinger also, in his Theatrum de beneficiis (Frankf., 1569) mentions Faust as one of those ” of whom the Scriptures speak, in various places, calling them magi.” Lastly Johann Weiher, Wierus or Piscinarius (1515-1588) — a pupil of Cornelius Agrippa, body physician to the duke of Cleves and a man of enlighten- ment, who opposed the persecution of witches — in his De prae- sligiis daemonum (Basel, 1563, &c), speaks of Faust as a drunken vagabond who had studied magic at Cracow, and before 1540 had practised ” this beautiful art shamelessly up and down Germany, with unspeakable deceit, many lies and great effect.” He goes on to tell how the magician had revenged himself on an unhappy parish priest, who had refused to supply him any longer with drink, by giving him a depilatory which removed not only the beard but the skin, and further, how he had insulted a poor wretch, for no better reason than that he had a black beard, by greeting him as his cousin the devil. Of his super- human powers Weiher evidently believes nothing, but he tells the tale of his being found dead with his neck wrung, after the whole house had been shaken by a terrific din.

The sources above mentioned, which were but the first of numerous works on Faust, of more or less value, appearing throughout the next two centuries, give a sufficient picture of the man as he appeared to his contemporaries: a wandering charlatan who lived by his wits, cheiromantist, astrologer, diviner, spiritualist medium, alchemist, or, to the more credulous, a necromancer whose supernatural gifts were the outcome of a foul pact with the enemy of mankind. Whatever his character, his efforts to secure a widespread notoriety had, by the time of his death, certainly succeeded. By the latter part of the 16th century he had become the necromancer par excellence, and all that legend had to tell about the great wizards of the middle ages, Virgil, Pope Silvester, Roger Bacon, Michael Scot, or the mythic Klingsor, had become for ever associated with his name. When in 1587, the oldest Faust-book was published, the Faust legend was, in all essential particulars, already complete.

The origin of the main elements of the legend must be sought far back in the middle ages and beyond. The idea of a compact with the devil, for the purpose of obtaining superhuman power or knowledge, is of Jewish origin, dating from the centuries immediately before and after the Christian era which produced the Talmud, the Kabbalah and such magical books as that of Enoch. In the mystical rites — in which blood, as the seat of life, played a great part — that accompanied the incantations with which the Jewish magicians evoked the Satanim — the lowest grade of those elemental spirits (shedim) who have their existence beyond the dimensions of time and space — we have the proto- types and originals of all the ceremonies which occupy the books of magic down to the various versions of the Hollenzwang ascribed to Faust. The other principle underlying the Faust legend, the belief in the essentially evil character of purely human learning, has existed ever since the triumph of Christianity set divine revelation above human science. The legend of Theo- philus — a Cilician archdeacon of the 6th century, who sold his soul to Satan for no better reason than to clear himself of a false charge brought against him by his bishop — was immensely popular throughout the middle ages, and in the 8th century formed the theme of a poem in Latin hexameters by the nun Hroswitha of Gandersheim, who, especially in her description of the ritual of Satan's court, displays a sufficiently lively and

original imagination. Equally widespread were the legends which gathered round the great name of Gerbert (Pope Silvestei II.). Gerbert's vast erudition, like Roger Bacon's so far in advance of his age, naturally cast upon him the suspicion of traffic with the infernal powers; and in due course the suspicion developed into the tale, embellished with circumstantial and harrowing details, of a compact

with the arch-fiend, by which the scholar had obtained the summit of earthly ambition at the cost of his immortal soul. These are but the two most notable of many similar stories, 1 and, in an age when the belief in witch- craft and the ubiquitous activity of devils was still universal, it is natural that they should have been retold in all good faith of a notorious wizard who was himself at no pains to deny their essential truth. The Faust legend, however, owes something of its peculiar significance also to the special conditions of the age which gave it birth: the age of the Renaissance and the Refor- mation. The opinion that the religious reformers were the champions of liberty of thought against the obscurantism of Rome is the outgrowth of later experience. To themselves they were the protagonists of ” the pure Word of God ” against the corruptions of a church defiled by the world and the devil, and the sceptical spirit of Italian humanism was as abhorrent to them as to the Catholic reactionaries by whom it was again trampled under foot. If then, in Goethe’s drama, Faust ultimately de- velops into the type of the unsatisfied yearning of the human intellect for ” more than earthly meat and drink,” this was because the great German humanist deliberately infused into the old story a spirit absolutely opposed to that by which it had originally been inspired. The Faust of the early Faust-books, of the ballads, the dramas and the puppet-plays innumerable which grew out of them, is irrevocably damned because he deliberately prefers human to ” divine ” knowledge; ” he laid the Holy Scriptures behind the door and under the bench, refused to be called doctor of Theology, but preferred to be styled doctor of Medicine.” The orthodox moral of the earliest versions is preserved to the last in the puppet-plays. The Voice to the right cries: ” Faust! Faust! desist from this proposal! Go on with the study of Theology, and you will be the happiest of mortals.” The Voice to the left answers: ” Faust! Faust! leave the study of Theology. Betake you to Necromancy, and you will be the happiest of mortals! ” The Faust legend was, in fact, the creation of orthodox Protestantism; its moral, the inevitable doom which follows the wilful revolt of the in- tellect against divine authority as represented by the Holy Scriptures and its accredited interpreters. Faust, the contemner of Holy Writ, is set up as a foil to Luther, the champion of the new orthodoxy, who with well-directed inkpot worsted the devil when he sought to interrupt the sacred work of rendering the Bible into the vulgar tongue.

It was doubtless this orthodox and Protestant character of the Faust story which contributed to its immense and immediate popularity in the Protestant countries. The first edition of the Historia von D. Johann Fausten, by an unknown compiler, published by Johann Spies at Frankfort in 1587, sold out at once. Though only placed on the

market in the autumn, before the year was out it had been reprinted in four pirated editions. In the following year a rhymed version was printed at Tubingen, a second edition was published by Spies at Frankfort and a version in low German by J. J. Balhorn at Liibeck. Reprints and amended versions continued to appear in Germany every year, till they culminated in the pedantic compilation of Georg Rudolf Widmann, who obscured the dramatic interest of the story by an excessive display of erudition and by his well-meant efforts to elaborate the orthodox moral. Widmann's version of 1599 formed the basis of that of Johann Nicholaus Pfitzer, published at Nuremberg in 1674, which passed through six editions, the last appearing in 1726. Like Widmann, Pfitzer was more zealous for imparting information than for perfecting a work of art, though he had the good taste to restore the episode of the evocation of Helen, which Widmann had expunged as unfit for Christian readers. Lastly there appeared, about 1 Many arc given in Kiesewetter's Faust, p. 112, &c

1712, what was to prove the most popular of all the Faust-books: The League with the Devil established by the world-famous Arch-necromancer and Wizard Dr Johann Faust. By a Christian Believer (Christlich Meynenden). This version, which bore the obviously false date of 1525, passed through many editions, and was circulated at all the fairs in Germany. Abroad the success of the story was scarcely less striking. A Danish version appeared in 1588; in England the History of the Damnable Life and Deserved Death of Dr John Fauslus was published some time between 1588 and 1594; in France the translation of Victor Palma Cayet was published at Paris in 1592 and, in the course of the next two hundred years, went through fifteen editions; the oldest Dutch and Flemish versions are dated 1592; and in 1612 a Czech translation was published at Prague.

Besides the popular histories of Faust, all more or less founded on the original edition of Spies, numerous ballads on the same subject were also soon in circulation. Of these the most interest- ing for the English reader is A Ballad of the life and death of Dr Fauslus the great congerer, published in 1588 with the imprimatur of the learned Aylmer, bishop of London. This ballad is supposed to have preceded the English version of Spies's Faust-book, mentioned above, on which Marlowe's drama was founded.

To Christopher Marlowe, it would appear, belongs the honour of first

realizing the great dramatic possibilities of the Faust legend. The Tragicall History of D. Fauslus as it hath bene acted by the Right Honourable the Earle of Nottingham his servants was first published by Thomas Bushall at London in 1604. As Marlowe died in 1593, the play must have been written shortly after the appearance of the English version of the Faust story on which it was based. The first recorded performance was on the 30th of September 1594.

As Marlowe's Fauslus is the first, so it is imcomparably the finest of the Faust dramas which preceded Goethe's masterpiece. Like most of Marlowe's work it is, indeed, very unequal. At certain moments the poet seems to realize the great possibilities of the story, only to sacrifice them to the necessity for humouring the prevailing public taste of the age. Faustus, who in one scene turns disillusioned from the ordinary fountains of know-: ledge, or flies in a dragon-drawn chariot through the Empyrean to search out the mysteries of the heavens, in another is made to use his superhuman powers to satisfy the taste of the ground- lings for senseless buffoonery, to swindle a horse-dealer, or cheat an ale-wife of her score; while Protestant orthodoxy is concili- ated by irrelevant insults to the Roman Church and by the final catastrophe, when Faustus pays for his revolt against the Word of God by the forfeit of his soul. This conception, which followed that of the popular Faust histories, underlay all further develop- ments of the Faust drama for nearly two hundred years. Of the serious stage plays founded on this theme, Marlowe's Faustus remains the sole authentic example until near the end of the 1 8th century; but there is plenty of evidence to prove that in Germany the Comedy of Dr Faust, in one form or another, was and continued to be a popular item in the repertories of theatrical companies until far into the 18th century. It is supposed, with good reason, that the German versions were based on those introduced kito the country by English strolling players early in the 17th century. However this may be, the dramatic versions of the Faust legend followed much the same course as the prose histories. Just as these gradually degener- ated into chap-books hawked at fairs, so the dramas were replaced by puppet-plays, handed down by tradition through genera- tions of showmen, retaining their original broad characteristics, but subject to infinite modification in detail. In this way, in the puppet-shows, the traditional Faust story retained its popu- larity until far into the 19th century, long after, in the sphere of literature, Goethe had for ever raised it to quite. another plane.

It was natural that during the literary revival in Germany in the 18th century, when German writers were eagerly on the look-out for subjects to form the material of a truly national literature, the Faust legend should have attracted their attention. Lessing was the first to

point out its great possibilities; 1 and 1 In the Liter aturbrief of Feb. 16, 1759.

he himself wrote a Faust drama, of which unfortunately only a fragment remains, the MS. of the completed work having been lost in the author's lifetime. None the less, to Lessing, not to Goethe, is due the new point of view from which the story Was approached by most of those who, after about the year 1770, attempted to tell it. The traditional Faust legend represented the sternly orthodox attitude of the Protestant reformers. Even the mitigating elements which the middle ages had per- mitted had been banished by the stern logic of the theologians of the New Religion. Theophilus had been saved in the end by the intervention of the Blessed Virgin; Pope Silvester, according to one version of the legend, had likewise been snatched from the jaws of hell at the last moment. Faust was irrevocably damned, since the attractions of the studium theologicum proved insufficient to counteract the fascinations of the classic Helen. But if he was to become, in the 18th century, the type of the human intellect face to face with the deep problems of human life, it was intolerable that his struggles should issue in eternal reprobation. Error and heresy had ceased to be regarded as crimes; and stereotyped orthodoxy, to the age of the Encyclopaedists, represented nothing more than the atrophy of the human intellect. Es irrt der Mensch so lang er strebt, which sums up in one pregnant line the spirit of Goethe's Faust, sums up also the spirit of the age which killed with ridicule the last efforts of persecuting piety, and saw the birth of modern science. Lessing, in short, proclaimed that the final end of Faust must be, not his damnation, but his salvation. This revolution- ary conception is the measure of Goethe's debt to Lessing. The essential change which Goethe himself introduced into the story is in the nature of the pact between Faust and Mephis- topheles, and in the character of Mephistopheles himself. The Mephistopheles of Marlowe, as of the old Faust-books, for all his brave buffoonery, is a melancholy devil, with a soul above the unsavoury hell in which he is forced to pass a hopeless existence. " Tell me," says Faust, in the puppet-play, to Mephistopheles, " what would you do if you could attain to everlasting salvation? " And the devil answers, " Hear and despair! Were I able to attain everlasting salvation, I would mount to heaven on a ladder, though every rung were a razor edge !" Goethe's Mephistopheles would have made no such reply. There is nothing of the fallen angel about him; he is perfectly content with his past, his present and his future; and he appears before the throne of God with the same easy insolence as he exhibits in Dame Martha's back-garden. He is, in fact, according to his own definition, the Spirit of Denial, the

impersonation of that utter scepticism which can see no distinction between high and low, between good and bad, and is therefore without aspiration because it knows no “divine discontent.” And the compact which Faust makes with this spirit is from the first doomed to be void. Faustus had bartered away his soul for a definite period of pleasure and power. The conception that underlies the compact of Faust with Mephis- topheles is far more subtle. He had sought happiness vainly in the higher intellectual and spiritual pursuits; he is content to seek it on a lower plane since Mephistopheles gives him the chance; but he is confident that nothing that “such a poor devil ” can offer him could give him that moment of supreme satisfaction for which he craves. He goes through the traditional mummery of signing the bond with scornful submission; for he knows that his damnation will not be the outcome of any formal compact, but will follow inevitably, and only then, when his soul has grown to be satisfied with what Mephistopheles can purvey him.

” Canst thou with lying flattery rule me Until self-pleased myself I see,

Canst thou with pleasure mock and fool me, Let that hour be the last for me!

When thus I hail the moment flying: ‘ Ah, still delay, thou art so fair!’

Then bind me in thy chains undying, My final ruin then declare!” 2

It is because Mephistopheles fails to give him this self -satisfaction 2 Bayard Taylor’s trans.

or to absorb his being in the pleasures he provides, that the compact comes to nothing. When, at last, Faust cries to the passing moment to remain, it is because he has forgotten self in enthusiasm for a great and beneficent work, in a state of mind the very antithesis of all that Mephistopheles represents. In the old Faust-books, Faust had been given plenty of opportunity for repentance, but the inducements had been no higher than the exhibition of a throne in heaven on the one hand and the tor- tures of hell on the other. Goethe’s Faust, for all its Christian setting, departs widely from this orthodox standpoint. Faust shows no signs of “repentance”; he simply emerges by the innate force of his character from a lower into a higher state. The triumph, foretold by ” the Lord ” in the opening scene, was inevitable from the first, since, though

” ‘ Man errs so long as he is striving, A good man through obscurest aspiration Is ever conscious of the one true way.’ ”

A man, in short, must be judged not by the sins and follies which may be but accidents of his career, but by the character which is its essential outcome.

This idea, which inspired also the kindred theme of Browning’s Paracelsus, is the main development introduced by Goethe into the Faust legend. The episode of Gretchen, for all its tragic interest, does not belong to the legend at all; and it is difficult to deny the pertinency of Charles Lamb’s criticism, ” What has Margaret to do with Faust?” Yet in spite of all that may be said of the irrelevancies, and of the discussions of themes of merely ephemeral interest, with which Goethe overloaded especially the second part of the poem, his Faust remains for the modern world the final form of the legend out of which it grew, the magnificent expression of the broad humanism which, even in spheres accounted orthodox, has tended to replace the peculiar studium theologicum which inspired the early Faust-books.

See Karl Engel, Zusammenstellung der Faust-Schriften vom 16. Jahrhundert bis Mitte 1884 — a second edition of the Bibliotheca Faustiana (1874) — (Oldenburg, 1885), a complete bibliography of all published matter concerned, even somewhat remotely, with Faust; Goethe’s Faust, with introduction and notes by K. J. Schroer (2nd ed., Heilbronn, 1886) ; Carl Kiesewetter, Faust in der Geschichte und Tradition (Leipzig, 1893). The last book, besides being a critical study of the material for the historical and legendary story of Faust, aims at estimating the relation of the Faust-legend to the whole subject of occultism, ancient and modern. It is a mine of information on necromancy and its kindred subjects, as well as on eminent theurgists, wizards, crystal-gazers and the like of all ages. (W. A. P.)

FAUSTINA, ANNIA GALERIA, the younger, daughter of Antoninus Pius, and wife of Marcus Aurelius Antoninus. She is accused by Dio Cassius and Capitolinus of gross profligacy, and was reputed to have instigated the revolt of Avidius Cassius against her husband. She died in 175 or 176 (so Clinton, Fasti rom.) at Halala, near Mount Taurus, in Cappadocia, whither she had accompanied Aurelius. Charitable schools for orphan girls (hence called Faustinianae) were founded in her honour, like those established by her father Antoninus in honour of his wife, the elder Faustina. Her statue was placed in the temple of Venus, and she was numbered among the tutelary deities of Rome. From the fact that Aurelius was always devoted to her and was heartbroken at her death, it has been inferred that the unfavour- able

estimate of the historians is prejudiced or at least mistaken.

See Capitolinus, Marcus Aurelius; Dio Cassius lxxi. 22, lxxiv. 3; E. Renan, in Melanges d'histoire et des voyages, 169-195.

FA VARA, a town of Sicily, in the province of Girgenti, 5 m. E. of Girgenti by road. Pop. (1001) 20,398. It possesses a fine castle of the Chiaramonte family, erected in 1280. The town has a considerable agricultural trade, and there are sulphur and other mines in the neighbourhood.

FAVART, CHARLES SIMON (1710-1792), French dramatist, was born in Paris on the 13th of November 1710, the son of a pastry-cook. He was educated at the college of Louis-le-Grand, and after his father's death carried on the business for a time. His first success in literature was La France delivree par la Pucelle d'Orlians, a poem which obtained a prize of the Academie des Jeux Flor ux. After the production of his first vaudeville, Les Deux Jumelles (1 734) , circumstances enabled him to relinquish

business and devote himself entirely to the drama. He provided many pieces anonymously for the lesser theatres, and first put his name to La Chercheuse d' esprit, which was produced in 1741. Among his most successful works were Annette et Lubin, Le Coq du village (1743), Ninette a la cour (1753), Les Trois Sultanes (1761) and L 'Anglais a Bordeaux (1763). Favart became director of the Op6ra Comique, and in 1745 married Marie Justine Benoite Duronceray (1727-1772), a beautiful young dancer, singer and actress, who as " Mile Chantilly " had made a success- ful d6but the year before. By their united talents and labours the Opera Comique rose to such a height of success that it aroused the jealousy of the rival Comedie Italienne and was suppressed. Favart, left thus without resources, accepted the proposal of Maurice de Saxe, and undertook the direction of a troupe of comedians which was to accompany his army into Flanders. It was part of his duty to compose from time to time impromptu verses on the events of the campaign, amusing and stimulating the spirits of the men. So popular were Favart and his troupe that the enemy became desirous of hearing his company and shar- ing his services, and permission was given to gratify them, battles and comedies thus curiously alternating with each other. But the marshal, who was an admirer of 'Mme Favart, began to perse- cute her with his attentions. To escape him she went to Paris, and the wrath of Saxe fell upon the husband. A lettre de cachet was issued against him, but he fled to Strassburg and found concealment in a cellar. Mme Favart meanwhile had been established by the marshal in a house at Vaugirard; but as

she proved a fickle mistress she was suddenly arrested and confined in a convent, where she was brought to unconditional surrender in the beginning of 1750. Before the year was out the marshal died, and Mme Favart reappeared at the Comedie Italienne, where for twenty years she was the favourite actress. To her is largely due the beginnings of the change in this theatre to perform- ances of a lyric type adapted from Italian models, which developed later into the genuine French comic opera. She was also a bold reformer in matters of stage costume, playing the peasant with bare arms, in wooden shoes and linen dress, and not, as heretofore, in court costume with enormous hoops, diamonds and long white kid gloves. With her husband, and other authors, she collabor- ated in a number of successful pieces, and one — La Fille mal garde" e —she produced alone.

Favart survived his wife twenty years. After the marshal's death in 1750 he had returned to Paris, and resumed his pursuits as a dramatist. It was at this time that the abbe de Voisenon became intimate with him and took part in his labours, to what extent is uncertain. He had grown nearly blind in his last days, and died in Paris on the 12th of May 1792. His plays have been several times republished in various editions and selections (1763-1772, 12 vols.; 1810, 3 vols.; 1813; 1853). His correspondence (1759-1763) with Count Durazzo, director of theatres at Vienna, was published in 1808 as Mtmoires et correspondance littiraire, dramatique el anecdotique de C. S. Favart. It furnishes valuable information on the state of the literary and theatrical worlds in the 18th century.

Favart's second son, Charles Nicolas Joseph Justin Favart (1 749-1 806), was an actor of moderate talent at the Comedie Francaise for fifteen years. He wrote a number of successful plays : — Le Diable boiteux (1782), Le Manage singulier (1 7 8 7) and , with his father, La Vieillesse d' Annette (1791). His son Antoine Pierre Charles Favart (1780-1867) was in the diplomatic service, and assisted in editing his grandfather's memoirs; he was a playwright and painter as well.

FA VERSHAM, a market town and river-port, member of the Cinque Port of Dover, and municipal borough in the Faversham parliamentary division of Kent, England, on a creek of the Swale, 9 m. W.N.W. of Canterbury on the South-Eastern & Chatham railway. Pop. (1901) 11,290. The church of St Maryof Charity, restored by Sir G. G. Scott in 1874, is of Early English archi- tecture, and has some remains on one of the columns of frescoes of the same period, while the 14th-century paintings in the chancel are in better preservation. Some of the brasses are very fine, and there is one commemorating King Stephen, as well

as

a tomb said to be his. He was buried at the abbey he founded here, of which only a wall and the foundations below ground remain. At Davington, close to Faversham, there are remains, incorporated in a residence, of the cloisters and other parts of a Benedictine priory founded in 1153. Faversham has a free grammar school founded in 1527 and removed to its present site in 1877. Faversham Creek is navigable up to the town for vessels of 200 tons. The shipping trade is considerable, chiefly in coal, timber and agricultural produce. The oyster fisheries are important, and are managed by a very ancient gild, the Com- pany of Free Dredgermen of the Hundred and Manor of Faver- sham. Brewing, brickmaking and the manufacture of cement are also carried on, and there are several large powder mills in the vicinity. The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 686 acres.

There was a Romano-British village on the site of Faversham. The town (Fauresfeld, Faveresham) owed its early importance to its situation as a port on the Swale, to the fertile country surrounding it, and to the neighbourhood of Watling Street. In 811 it was called the king's town, and a witenagemot was held here under iEthelstan. In 1086 it was assessed as royal demesne, and a market was "held here at this date. An abbey was built by Stephen in 1147, in which he and Matilda were buried. They had endowed it with the manor and hundred of Faversham ; this grant caused many disputes between the abbot and men of Faversham concerning the abbot's jurisdiction. Faversham was probably a member of Dover from the earliest association of the Cinque Ports, certainly as early as Henry III., who in 1252 granted among other liberties of the Cinque Ports that the barons of Faversham should plead only in Shepway Court, but ten years later transferred certain pleas to the abbot's court. In this reign also the abbot appointed the mayor, but from the reign of Edward I. he was elected by the freemen and then installed by the abbot. The corporation was prescriptive, and a hallmote held in 1293 was attended by a mayor and twelve jurats. All the liberties of the Cinque Ports were granted to the barons of Faversham by Edward I. in 1302, and confirmed by Edward III. in 1365, and by later monarchs. The governing charter till 1835 was that of Henry VIII., granted in 1545 and confirmed by Edward VI.

FAVORINUS (2nd century a.d.), Greek sophist and philosopher, flourished during the reign of Hadrian. A Gaul by birth, he was a native of Arelate (Aries) , but at an early age began his lifelong travels through Greece, Italy and the East. His extensive knowledge, combined with great oratorical powers, raised him to eminence both in Athens and in Rome. With Plutarch, who dedicated to him his treatise Yltpi tov irpwrov \f/vxpov, with Herodes Atticus, to whom he bequeathed his library at Rome, with Demetrius the Cynic, Cornelius Fronto, Aulus Gellius, and with Hadrian himself, he lived on intimate terms; his great rival, whom he violently attacked in his later years, was Polemon of Smyrna. It was Favorinus who, on being silenced by Hadrian in an argument in which the sophist might easily have refuted his adversary, subsequently explained that it was foolish to criticize the logic of the master of thirty legions. When the servile Athenians, feigning to share the emperor's displeasure with the sophist, pulled down a statue which they had erected to him, Favorinus remarked that if only Socrates also had had a statue at Athens, he might have been spared the hemlock. Of the very numerous works of Favorinus, we possess only a few fragments (unless the Kopivfliaicds X670S attributed to his tutor Dio Chrysostom is by him), preserved by Aulus Gellius, Diogenes Laertius, Philostratus, and Su'idas, the second of whom borrows from his Ha.vro8a.Tri urropia (miscellaneous history) and his 'kiroixvrnxovt\HJ.a.Ta (memoirs). As a philosopher, Favorinus belonged to the sceptical school ; his most important work in this connexion appears to have been Hvppwvtim rpcnroi (the Pyrrhonean Tropes) in ten books, in which he endeavours to show that the methods of Pyrrho were useful to those who intended to practise in the law courts.

See Philostratus, Vitae sophistarum, i. 8; Suidas, s.v. ; frags, in C. W. Muller, Frag. Hist. Graec. iii. 4; monographs by L. Legre (1900), T. Colardeau (1903),

FAVRAS, THOMAS DE MAHY, Marquis de (1744-1790), French royalist, was born on the 26th of March 1744, at Blois. He belonged to a poor family whose nobility dated from the 1 2th century. At seventeen he was a captain of dragoons, and saw some service in the closing campaign of the Seven Years' War. In 1772 he became first lieutenant of the Swiss guards of the count of Provence (afterwards Louis XVIII.) . Unable to meet the expenses of his rank, which was equivalent to the grade of colonel in the army, he retired in 1775. He married in 1776 Victoria Hedwig Caroline, princess of Anhalt-Bernburg-Schaumburg, whose mother, deserted by her husband Prince Carl Ludwig in 1 749, had found refuge with her daughter in the house of Marshal Soubise. After his marriage he went to Vienna to

press the restitution of his wife's rights, and spent some time in Warsaw. In 1787 he was authorized to raise a patriotic legion to help the Dutch against the stadtholder William IV. and his Prussian allies. Returning to Paris at the outbreak of the Revolution, he became implicated in schemes for the escape of Louis XVI. from Paris and the dominance of the National Assembly. He was commissioned by the count of Provence through one of his gentlemen, the comte de la Chatre, to negotiate a loan of two million francs from the bankers Schaumel and Sartorius. Favras took into his confidence certain officers by whom he was betrayed; and, with his wife, he was arrested on Christmas Eve 1789 and imprisoned in the Abbaye. A fortnight later they were separated, Favras being removed to the Chatelet. It was stated in a leaflet circulated throughout Paris that Favras had organized a plot of which the count of Provence was the moving spirit. A force of 30,000 was to be raised, La Fayette and Bailly, the mayor of Paris, were to be assassinated, and Paris was to be starved into sub- mission by cutting off supplies. The count hastened publicly to disavow Favras in a speech delivered before the commune of Paris and in a letter to the National Assembly, although there is no reasonable doubt of his complicity in the plot that did exist. In the course of a trial of nearly two months' duration the witnesses disagreed, and even the editor of the Revolutions de Paris (No. 30) admitted that the evidence was insufficient but an armed attempt of the Royalists on the Chatelet on the 26th of January, which was defeated by La Fayette, roused the suspicious temper of the Parisians to fury, and on the 18th of February 1 790, in spite of the courageous defence of his counsel, Favras was condemned to be hanged. He refused to give any information of the alleged plot, and the sentence was carried out on the Place de Greve the next day, to the delight of the populace, since it was the first instance when no distinction in the mode of execution was allowed between noble and commoner. Favras was generally regarded as a martyr to his refusal to implicate the count of Provence, and Madame de Favras was pensioned by Louis XVI. She left France, and her son Charles de Favras served in the Austrian and the Russian armies. He received an allowance from Louis XVIII. Her daughter Caroline married Riidiger, Freiherr von Stillfried Ratenic, in 1805.

The official dossier of Favras's trial for high treason against the nation disappeared from the Chatelet, but its substance is preserved in the papers of a clerk.

Bibliography. — For particulars see A. Tuetey, Repertoire general des sources manuscrites de Vhistoire de Paris pendant la Revolution Francaise (vol. i., 1890, pp. 175-177) ; M. Tourneux, Bibl. de Vhistoire

de Paris pendant la Revolution Francaise (vol. i. pp. 196-198, 1890). His brother, M. Mahy de Cormere, published a Memoire justificatif in 1790 and a Justification in 1791. See also a memoir by Eduard, Freiherr v. Stillfried Ratenic (Vienna, 188 1), and an article by Alexis de Valon in the Revue des deux mondes (15th June 1851).

FAVRE, JEAN ALPHONSE (1815-1890), Swiss geologist, was born at Geneva on the 31st of March 181 5. He was for many years professor of geology in the academy at Geneva, and afterwards president of the Federal Commission with charge of the geological map of Switzerland. One of his earliest papers was On the Anthracites of the Alps {1841), and later he gave special attention to the geology of Savoy and of Mont Blanc, and to the ancient glacial phenomena of those Alpine regions. His elucidation of the geological structure demonstrated that

certain anomalous occurrences of fossils were due to repeated interfoldings of the strata and to complicated overthrust faults. In 1867 he published Recherches geologiques dans les parties de la Savoie, du Piemont el de la Suisse voisines du Mont Blanc. He died at Geneva in June 1890.

His son Ernest Favre (b. 1845) has written on the palaeon- tology and geology of Galicia, Savoy and the Fribourg Alps, and of the Caucasus and Crimea.

FAVRE, JULES CLAUDE GABRIEL (1809-1880), French statesman, was born at Lyons on the 21st of March 1809, and began his career as an advocate. From the time of the revolu- tion of 1830 he openly declared himself a republican, and in political trials he seized the opportunity to express his opinions. After the revolution of 1848 he was elected deputy for Lyons to the Constituent Assembly, where he sat among the moderate republicans, voting against the socialists. When Louis Napoleon was elected President of France, Favre made himself conspicuous by his opposition, and on the 2nd of December 1851 he tried with Victor Hugo and others to organize an armed resistance in the streets of Paris. After the coup d’etat he withdrew from politics, resumed his profession, and distinguished himself by his defence of Felice Orsini, the perpetrator of the attack against the life of Napoleon III. In 1858 he was elected deputy for Paris, and was one of the ” Five ” who gave the signal for the republican opposition to the Empire. In 1863 he became the head of his party, and delivered a

number of addresses denouncing the Mexi- can expedition and the occupation of Rome. These addresses, eloquent, clear and incisive, won him a seat in the French Academy in 1867. With Thiers he opposed the declaration of war against Prussia in 1870, and at the news of the defeat of Napoleon III. at Sedan he demanded from the Legislative Assembly the deposition of the emperor. In the government of NationalDefencehebecame vice-president under General Trochu, and minister of foreign affairs, with the onerous task of negotiat- ing peace with victorious Germany. He proved to be less adroit as a diplomat than he had been as an orator, and committed several irreparable blunders. His famous statement on the 6th of September 1870 that he " would not yield to Germany an inch of territory nor a single stone of the fortresses " was a piece of oratory which Bismarck met on the 19th by his declara- tion to Favre that the cession of Alsace and of Lorraine was the indispensable condition of peace. He also made the mistake of not having an assembly elected which would have more regular powers than the government of National Defence, and of opposing the removal of the government from Paris during the siege. In the peace negotiations he allowed Bismarck to get the better of him, and arranged for the armistice of the 28th of June 1871 without knowing, the situation of the armies, and without consulting the government at Bordeaux. By a grave oversight he neglected to inform Gambetta that the army of the East (80,000 men) was not included in the armistice, and it was thus obliged to retreat to neutral territory. He gave no proof what- ever of diplomatic skill in the negotiations for the treaty of Frank- fort, and it was Bismarck who imposed all the conditions. He withdrew from the ministry, discredited, on the 2nd of August 187 1, but remained in the chamber of deputies. Elected senator on the 30th of January 1876, he continued to support the govern- ment of the republic against the reactionary opposition, until his death on the 20th of January 1880.

His works include many speeches and addresses, notably La Liberie de la Pressc (1849), Defense de F. Orsini (1866), Discours de reception & V Academie francaise (1868), Discours sur la liberie interieure (1869). In Le Gouvernement de la Defense Rationale, 3 vols., 1871-1875, he explained his role in 1870-1871. After his death his family published his speeches in 8 volumes.

See G. Hanotaux, Histoire de la France contemporaine (1903, &c.) ; also E. Benoit-Levy, Jules Favre (1884).

FAVUS (Lat. for honeycomb), a disease of the scalp, but occur- ring occasionally on any part of the skin, and even at times on mucous membranes. The uncomplicated appearance is that of a number of

yellowish, circular, cup-shaped crusts (scutula) grouped in patches like a oiecc of honeycomb, each about the

size of a split pea, with a hair projecting in the centre. These increase in size and become crusted over, so that the character- istic lesion can only be seen round the edge of the scab. Growth continues to take place for several months, when scab and scutulum come away, leaving a shining bare patch destitute of hair. The disease is essentially chronic, lasting from ten to twenty years. It is caused by the growth of a fungus, and pathologically is the reaction of the tissues to the growth. It was the first disease in which a fungus was discovered — by J. L. Schonlein in 1839; the discovery was published in a brief note of twenty lines in Milllers Archiv for that year (p. 82), the fungus having been subsequently named by R. Remak ■Achorion Schonleinii after its discoverer. The achorion consists of slender, mycelial threads matted together, bearing oval, nucleated gonidia either free or jointed. The spores would appear to enter through the unbroken cutaneous surface, and to germinate mostly in and around the hair- follicle and some- times in the shaft of the hair. In 1892 two other species of the fungus were described by P. G. Unna and Frank, the Favus griseus, giving rise to greyish-yellow scutula, and the Favus sulphureus celerior, causing sulphur-yellow scutula of a rapid growth. Favus is commonest among the poorer Jews of Russia, Poland, Hungary, Galicia and the East, and among the same class of Mahommedans in Turkey, Asia Minor, Syria, Persia, Egypt, Algiers, &c. It is not rare in the southern depart- ments of France, in some parts of Italy, and in Scotland. It is spread by contagion, usually from cats, often, however, from mice, fowls or dogs. Lack of personal cleanliness is an almost necessary factor in its development, but any one in delicate health, especially if suffering from phthisis, seems especially liable to contract it. Before treatment can be begun the scabs must be removed by means of carbolized oil, and the head thoroughly cleansed with soft soap. The cure is then brought about by the judicious use of parasiticides. If the nails are affected, avulsion will probably be needed before the disease can be reached.

FAWCETT, HENRY (1833-1884), English politician and economist, was born at Salisbury on the 25th of August 1833. His father, William Fawcett, a native of Kirkby Lonsdale, in Westmorland, started life as a draper’s assistant at Salisbury, opened a draper’s shop on his own account in the market-place there in 1825, married a solicitor’s daughter of the city, became a prominent local man, took a farm, developed his north-country sporting instincts, and displayed his shrewdness by successful speculations in Cornish mining. His second son, Henry, inherited a full measure of his shrewdness, along with his

masculine energy, his straightforwardness, his perseverance and his fondness for fishing. The father was active in electioneering matters, and his wife was an ardent reformer. Henry Fawcett was educated locally and at King's College school, London, and proceeded to Peterhouse, Cambridge, in October 1852, migrating in 1853 to Trinity Hall. He was seventh wrangler in 1856, and was elected to a fellowship at his college.

He had already attained some prominence as an orator at the Cambridge Union. Before he left school he had formed the ambition of entering parliament, and, being a poor man, he resolved to approach the House of Commons through a career at the bar. He had already entered Lincoln's Inn. Hisprospects, however, were shattered by a calamity which befell him in September 1858, when two stray pellets from his father's fowling- piece passed through the glasses he was wearing and blinded him for life. Within ten minutes after his accident he had made up his mind " to stick to his old pursuits as much as possible." He kept up all recreations contributing to the enjoyment of life; he fished, rowed, skated, took abundant walking and horse exercise, and learnt to play cards with marked pack?. Soon after his accident he established his headquarters at Trinity Hall, Cambridge, entered cordially into the social life of the college, and came to be regarded by many as a typical Cambridge man. He gave up mathematics (for which he had little aptitude) , and specialized in political economy. He paid comparatively little attention to economic history, but he. was in the main a

devout believer in economic theory, as represented by Ricardo and his school. The later philosophy of the subject he believed to be summed up in one book, Mill's Principles of Political Economy, which he regarded as the indispensable " vade mecum " of every politician. He was not a great reader, and Mill probably never had a serious rival in his regard, though he was much impressed by Buckle's History of Civilization and Darwin's Origin of Species when they severally appeared. He made a great impression in 1859 with a paper at the British Association, and he soon became a familiar figure there and at various lecture halls in the north as an exponent of orthodox economic theory. Of the sincerity of his faith he gave the strongest evidence by his desire at all times to give a practical application to his views and submit them to the test of experiment. Among Mill's disciples he was, no doubt, far inferior as an economic thinker to Cairnes, but as a

popularizer of the system and a demonstrator of its principles by concrete examples he had no rival. His power of exposition was illustrated in his Manual of Political Economy (1863), of which in twenty years as many as 20,000 copies were' sold. Alexander Macmillan had suggested the book, and it appeared just in time to serve as a credential, when, in the autumn of 1863, Fawcett stood and was elected for the Chair of Political Economy at Cambridge. The appoint- ment attached him permanently to Cambridge, gave him an income, and showed that he was competent to discharge duties from which a blind man is often considered to be debarred. He was already a member of the Political Economy Club, and was becoming well known in political circles as an advanced Radical. In January 1863, after a spirited though abortive attempt in Southwark, he was only narrowly beaten for the borough of Cambridge. Early in 1864 he was adopted as one of the Liberal candidates at Brighton, and at the general election of 1865 he was elected by a large majority. Shortly after his election he became engaged to Millicent, daughter of Mr Newson Garrett of Aldeburgh, Suffolk, and in 1867 he was married. Mrs Fawcett (b. 1847) became well known for her social and literary work, and especially as an advocate, in the press and on the platform, of women's suffrage and the higher education and independent employment of women. And after her husband's death, as well as during his lifetime, she was a prominent leader in these movements.

Fawcett entered parliament just in time to see the close of Palmerston's career and to hail the adoption by Gladstone of a programme of reform to which most of the laissez-faire economists gave assent. He was soon known as a forcible speaker, and quickly overcame the imputation that he was academic and doctrinaire, though it is true that a certain monotony in delivery often gave a slightly too didactic tone to his discourses. But it was as the uncompromising critic of the political shifts and expedients of his leaders that he attracted most attention. He constantly insisted upon the right of exercising private judgment, and he especially devoted himself to the defence of causes which, as he thought, were neglected both by his official leaders and by his Radical comrades. Re- elected for Brighton to the parliament of 1868-1874, he greatly hampered the government by his persistence in urging the abolition of clerical fellowships and the payment of election expenses out of the rates, and by opposing the " permissive compulsion " clauses of the Elementary Education Bill, and the exclusion of agricultural children from the scope of the act. His hatred of weak concessions made him the terror of parlia- mentary wirepullers, and in 1871 he was not undeservedly spoken of in The Times as the most "thorough Radical now in the

House.” His liberal ideals were further shocked by the methods by which Gladstone achieved the abolition of Army Purchase. His disgust at the supincness of the cabinet in dealing with the problems of Indian finance and the growing evil of Commons Enclosures were added to the catalogue of grievances which Fawcett drew up in a powerful, article, ” On the Present Position of the Government,” in the Fortnightly Review for November 1871. In 1867 he had opposed the expenses of a ball given to the sultan at the India office being charged upon the Indian

budget. In 1870 he similarly opposed the taxation of the Indian revenue with the cost of presents distributed by the duke of Edinburgh in India. In 1871 he went alone into the lobby to vote against the dowry granted to the princess Louise. The soundness of his principles was not impeached, but his leaders looked askance at him, and from 1871 he was severely shunned by the government whips. Their suspicion was justified when in 1873 Fawcett took a leading share in opposing Gladstone’s scheme for university education in Ireland as too denominational, and so contributed largely to a conclusive defeat of the Gladstone ministry.

From 1869 to 1880 Fawcett concentrated his energies upon two important subjects which had not hitherto been deemed worthy of serious parliamentary attention. The first of these was the preservation of commons, especially those near large towns; and the second was the responsibility of the British government for the amendment of. Indian finance. In both cases the success which he obtained exhibited the sterling sense and shrewdness which made up such a great part of Fawcett ‘s character. In the first case Fawcett’s great triumph was the enforcement of the general principle that each annual Enclosure Act must be scrutinized by parliament and judged in the light of its conformity to the interests of the community at large. Probably no one did more than he did to prevent the disafforesta- tion of Epping Forest and of the New Forest. From 1869 he regularly attended the meetings of the Commons Preservation Society, and he remained to the end one of its staunchest sup- porters. His intervention in the matter of Indian finance, which gained him the sobriquet of the ” member for India,” led to no definite legislative achievements, but it called forth the best energies of his mind and helped to rouse an apathetic and ignorant public to its duties and responsibilities. Fawcett was defeated at Brighton in February 1874. Two months later, however, he was elected for Hackney, and retained the seat during his life. He was promptly replaced on the Indian Finance Committee, and continued his searching inquiries with a view to promote a stricter economy in the Indian budget, and a more effective responsibility in the

management of Indian accounts.

As an opponent of the Disraeli government (1874-1880) Fawcett came more into line with the Liberal leaders. In foreign politics he gave a general adhesion to Gladstone's views, but he continued to devote much attention to Indian matters, and it was during this period that he produced two of his best publica- tions. His Free Trade and Protection (1878) illustrated his continued loyalty to Cobdenite ideas. At the same time his admiration for Palmerston and his repugnance to schemes of Home Rule show that he was not by any means a peace-at-any- price man. He thought that the Cobdenites had deserved well of their country, but he always maintained that their foreign politics were biased to excess by purely commercial considera- tions. As befitted a writer whose linguistic gifts were of the slenderest, Fawcett's English was a sound homespun, clear and unpretentious. In a vigorous employment of the vernacular he approached Cobbett, whose writing he justly admired. The second publication was his Indian Finance (1880), three essays reprinted from the Nineteenth Century, with an intro- duction and appendix. When the Liberal party returned to power in 1880 Gladstone offered Fawcett a place in the new government as postmaster-general (without a seat in the cabinet). On Egyptian and other questions of foreign policy Fawcett was often far from being in full harmony with his leaders, but his position in the government naturally enforced reserve. He was, moreover, fully absorbed by his new administrative functions. He gained the sympathy of a class which he had hitherto done little to conciliate, that of public officials, and he showed himself a most capable head of a public department. To his readiness in adopting suggestions, and his determination to push business through instead of allowing it to remain permanently in the stage of preparation and circumlocution, the public is mainly indebted for five substantial postal reforms: — (1) The parcels post, (2) postal orders, (3) sixpenny telegrams, (4) the banking

of small savings by means of stamps, (5) increased facilities for life insurance and annuities. In connexion with these last two improvements Fawcett, in 1880, with the assistance of Mr James Cardin, took great pains in drawing up a small pamphlet called Aids to Thrift, of which over a million copies were circulated gratis. A very

useful minor innovation of his provided for the announcement on every pillar-box of the time of the ” next collection.” In the post office, as elsewhere, he was a strong advocate of the employment of women. Proportional representa- tion and the extension of franchise to women were both political doctrines which he adopted very early in his career, and never abandoned. Honours were showered upon him during his later years. He was made an honorary D.C.L. of Oxford, a fellow of the Royal Society, and was in 1883 elected lord rector of Glasgow University. But the stress of departmental work soon began to tell upon his health. In the autumn of 1882 he had a sharp attack of diphtheria complicated by typhoid, from which he never properly recovered. He resumed his activities, but on the 6th of November 1884 he succumbed at Cambridge to an attack of congestion of the lungs. He was buried in Trump- ington churchyard, near Cambridge, and to his memory were erected a monument in Westminster Abbey, a statue in Salis- bury market-place, and a drinking fountain on the Thames em- bankment.

In economic matters Fawcett’s position can best be described as transitional. He believed in co-operation almost as a panacea. In other matters he clung to the old laissez-faire theorists, and was a strong anti-socialist, with serious doubts about free education, though he supported the Factory Acts and wished their extension to agriculture. Apparent inconsistencies were harmonized to a great extent by his dominating anxiety to increase the well-being of the poor. One of his noblest traits was his kindliness and genuine affection for the humble and oppressed, country labourers andthe like, for whom his sympathies seemed always on the increase. Another was his disposition to interest himself in and to befriend younger men. In the great affliction of his youth Fawcett bore himself with a fortitude which it would be difficult to parallel. The effect of his blindness was, as the event proved, the reverse of calamitous. It brought the great aim and purpose of his life to maturity at an earlier date than would otherwise have been possible, and it had a mellowing influence upon his character of an exceptional and beneficent kind. As a youth he was rough and canny, with a suspicion of harshness. The kindness evoked by his misfortune, a strongly reciprocated family affection, a growing capacity for making and keeping friends — these and other causes tended to ripen all that was best, and apparently that only, in a strong but somewhat stern character. His acerbity passed away, and in later life was reserved exclusively for official witnesses before parliamentary committees. Frank, helpful, conscientious to a fault, a shrewd gossip, and a staunch friend, he was a man whom no one could help liking. Several of his letters to his father and mother at

different periods of his career are preserved in Leslie Stephen's admirable Life (1885), and show a goodness of heart, together with a homely simplicity of nature, which is most touching. In appearance Fawcett was gaunt and tall, over 6 ft. 3 in. in height, large of bone, and massive in limb. (T. Se.)

FAWCETT, JOHN (1768-1837), English actor and playwright, was born on the 29th of August 1768, the son of an actor of the same name (d. 1793). At the age of eighteen he ran away from school and appeared at Margate as Courtall in The Belle's Stratagem; afterwards he joined Tate Wilkinson's company and turned from tragedy to low comedy parts. In 1791 he appeared at Covent Garden, and in 1794 at the Haymarket. Colman, then manager of that house, wrote a number of parts designed to suit his talents, and two of Fawcett's greatest successes were as Dr. Pangloss in The Heir at Law (1797) and as Dr Ollapod in The Poor Gentleman (1798). He retired from the Stage in 1830.

FAWKES, FRANCIS (1720-1777), English poet and divine, was born at Warmsworth, near Doncaster, Yorkshire, where

his father was rector, and was baptized on the 4th of April 1720. After studying at Jesus College, Cambridge, where he graduated M.A. in 1745, he took holy orders, and was successively curate of Bramham, curate of Croydon, vicar of Orpington, and rectoi of Hayes, and finally was made one of the chaplains to the princess of Wales. His first publication is said to have been Bramham Park, a Poem, in 1745; a volume of poems and translations appeared in 1761; and Partridge Shooting, an eclogue, in 1764. His translations of the minor Greek poets — Anacreon, Sappho, Bion and Moschus, Musaeus, Theocritus and Apollonius — ac- quired for him considerable fame, but they are less likely to be remembered than his fine song, " Dear Tom, this brown jug, that now foams with mild ale." Fawkes died on the 26th of August 1777.

FAWKES, GUY (1570-1606), English "gunpowder plot" conspirator, son of Edward Fawkes of York, a member of a good Yorkshire family and advocate of the archbishop of York's consistory court, was baptized at St Michael le Belfrey at York on the 16th of April 1570. His parents were Protestants, and he was educated at the free school at York, where, it is said, John and Christopher Wright and the Jesuit Tesimond alias Greenway, afterwards implicated in the conspiracy, were his schoolfellows. On his father's death in 1579 he inherited his property. Soon afterwards his mother married, as her second husband, Dionis Baynbrigge of Scotton in Yorkshire, to which place the family

removed. Fawkes's stepfather was connected w r ith many Roman Catholic families, and was probably a Roman Catholic himself, and Fawkes himself became a zealous adherent of the old faith. Soon after he had come of age he disposed of his property, and in 1593 went to Flanders and enlisted in the Spanish army, assisting at the capture of Calais by the Spanish in 1596 and gaining some military reputation. According to Father Greenway he was " a man of great piety, of exemplary temperance, of mild and cheerful demeanour, an ■ enemy of broils and disputes, a faithful friend and remarkable for his punctual attendance upon religious observances," while his society was " sought by all the most distinguished in the arch duke's camp for nobility and virtue." He is described as " tall, with brown hair and auburn beard."

In 1604 Thomas Winter, at the instance of Catesby, in whose mind the gunpowder plot had now taken definite shape, intro- duced himself to Fawkes in Flanders, and as " a confident gentleman," " best able for this business," brought him on to England as assistant in the conspiracy. Shortly afterwards he was initiated into the plot, after taking an oath of secrecy, meeting Catesby, Thomas Winter, Thomas Percy and John Wright at a house behind St Clement's (see Gunpowder Plot and Catesby, Robert). Owing to the fact of his being unknown in London, to his exceptional courage and coolness, and probably to his experience in the wars and at sieges, the actual accomplish- ment of the design was entrusted to Fawkes, and when the house adjoining the parliament house was hired in Percy's name, he took charge of it as Percy's servant, under the name of Johnson He acted as sentinel while the others worked at the mine in December 1604, probably directing their operations, and on the discovery of the adjoining cellar, situated immediately beneath the House of Lords, he arranged in it the barrels of gun- powder, which he covered over with firewood and coals and with iron bars to increase the force of the explosion. When all was ready in May 1605 Fawkes was despatched to Flanders to acquaint Sir William Stanley, the betrayer of Deventer, and the intriguer Owen with the plot. He returned in August and brought fresh gunpowder into the cellars to replace any which might be spoilt by damp. A slow match was prepared which would give him a quarter of an hour in which to escape from the ex- plosion. On Saturday, the 26th of October, Lord Monteagle (g.v.) received the mysterious letter which revealed the con- spiracy and of which the conspirators received information the following day. They, nevertheless, after some hesitation, hoping that the government would despise the warning, deter- mined to proceed with their plans, and were encouraged in their resolution by Fawkes, who visited the cellar

on the 30th and

reported that nothing had been moved or touched. He returned accordingly to his lonely and perilous vigil on the 4th of November. On that day the earl of Suffolk, as lord chamberlain, visited the vault, accompanied by Monteagle, remarked the quantity of faggots, and asked Fawkes, now described as ” a very tall and desperate fellow,” who it was that rented the cellar. Percy’s name, which Fawkes gave, aroused fresh suspicions and they retired to inform the king. At about ten o’ clock Robert Keyes brought Fawkes from Percy a watch, that he might know how the anxious hours were passing, and very shortly afterwards he was arrested, and the gunpowder discovered, by Thomas Knyvett, a Westminster magistrate. Fawkes was brought into the king’s bedchamber, where the ministers had hastily assembled, at one o’clock. He maintained an attitude of defiance and of ” Roman resolution,” smiled scornfully at his questioners, making no secret of his intentions, replied to the king, who asked why he would kill him, that the pope had excommunicated him, that ‘* dangerous diseases require a desperate remedy,” adding fiercely to the Scottish courtiers who surrounded him that ” one of his objects was to blow back the Scots into Scotland.” His only regret was the failure of the scheme. ” He carrieth himself,” writes Salisbury to Sir Charles Cornwallis, ambassador at Madrid, ” without any feare or perturbation . . . ; under all this action he is noe more dismayed, nay scarce any more troubled than if he was taken for a poor robbery upon the highway,” declaring ” that he is ready to die, and rather wisheth 10,000 deaths, than willingly to accuse his master or any other.” He refused stubbornly on the following days to give information concerning his accomplices; on the 8th he gave a narrative of the plot, but it was not till the 9th, when the fugitive conspirators had been taken at Holbeche, that torture could wring from him their names. His imperfect signature to his confession of this date, consisting only of his Christian name and written in a faint and trembling hand, is probably a ghastly testimony to the severity of the torture {“per gradus ad ima “) which James had ordered to be applied if he would not otherwise confess and the ” gentler tortures ” were unavailing, — a horrible practice unrecognized by the law of England, but usually employed and justified at this time in cases of treason to obtain information. He was tried, together with the two Winters, John Grant, Ambrose Rokewood, Robert Keyes and Thomas Bates, before a special commission in West- minster Hall on the 27th of January 1606. In this case there could be no defence and

he was found guilty. He suffered death in company with Thomas Winter, Rokewood and Keyes on the 31st, being drawn on a hurdle from the Tower to the Parliament House, opposite which he was executed. He made a short speech on the scaffold, expressing his repentance, and mounted the ladder last and with assistance, being weak from torture and illness. The usual barbarities practised upon him after he had been cut down from the gallows were inflicted on a body from which all life had already fled.

Bibliography. — Hist, of England, by S. R. Gardiner, vol. i. ; and the same author's What Gunpowder Plot was (1897) ; What was the Gunpowder Plots by J. Gerard (1897); The Gunpowder Plot, by D. Jardine (1857); Calendar of State Pap. Dom. 1603-1610; State Trials, vol. ii.; Archaeologia, xii. 200; R. Winwood's Memorials; Notes and Queries, vi. ser. vii. 233, viii. 136; The Fawkeses of York in the 16th Century, by R. Da vies (1850); Diet, of Nat. Biog. and authorities cited there. The official account (untrustworthy in details) is the True and Perfect Relation of the Whole Proceedings against the late most Barbarous Traitors (1606), reprinted by Bishop Barlow of Lincoln as The Gunpowder Treason (1679). See also Gunpowder Plot.

The lantern said to be Guy Fawkes's is in the Bodleian library at Oxford. (P. C. Y.)

FAY, ANDRAS (1786-1864), Hungarian poet and author, was born on the 30th of May 1786, at Kohany in the county of Zemplin, and was educated for the law at the Protestant college c-f Sarospatak. His Mesek (Fables), the first edition of which appeared at Vienna in 1820, evinced his powers of satire and invention, and won him the well-merited applause of his country- men. These fables, which, on account of their originality and simplicity, caused Fay to be regarded as the Hungarian Aesop,

were translated into German by Petz (Raab, 1825), and partly into English by E. D. Butler, Hungarian Poems and Fables (London, 1877). Fay wrote also numerous poems, the chief of which are to be found in the collections Bokreta (Nosegay) (Pest, 1807), and Fris Bokrtta (Fresh Nosegay) (Pest, 1818). He also composed plays and romances and tales. In 1835 Fay was elected to the Hungarian diet, and was for a time the leader of the opposition party. It is to him that the Pest Savings Bank owes its origin, and he was one of the chief founders of the Hungarian National theatre. He died on the 26th of July 1864. His earlier works were collected at Pest (1843- 1844, 8 vols.). The most noteworthy of his later works is a humorous novel entitled Jdvor orvos es Bakator Atnbrus szolgdia (Jdvor the Doctor and his servant

Ambrose Bakator), (Pest 1855, 2 vols.).

FAYAL (Faial), a Portuguese island in the Atlantic Ocean, forming part of the Azores archipelago. Pop. (1900) 22,262; area, 63 sq. m. Fayal, i.e. ” the beech wood,” was so called from the former abundance of the Myrica faya, which its dis- coverers mistook for beech trees. It is one of the most frequented of the Azores, for it lies directly in the track of vessels crossing the Atlantic, and has an excellent harbour at Horta (q.v.), a town of 6574 inhabitants. Cedros (3278) and Feteira (2002) are the other chief towns. The so-called ” Fayal wine,” which was largely exported from the Azores in the 19th century, was really the produce of Pico, a larger island lying to the east. The women of Fayal manufacture fine lace from the agave thread. They also execute carvings in snow-white fig-tree pith, and carry on the finer kinds of basket-making. A small valley, called Flemengos, perpetuates the name of the Flemish settlers, who have left their mark on the physical appearance of the inhabitants. (See Azores.)

FAYETTEVILLE, a city and the county-seat of Washington county, Arkansas, U.S.A., about 150 m. N.W. of Little Rock. Pop. (1890) 2942; (1900) 4061; (1910) 4471. It is served by the St Louis & San Francisco railway. The city lies about 1400 ft. above the sea, in the Ozark Mountain region. There is much fine scenery in the neighbourhood, there are mineral springs near by, and the place has become known as a summer resort. Fayetteville is the seat of the University of Arkansas (incor- porated 1871; opened 1872; co-educational), which includes the following departments: at Fayetteville, a college of liberal arts, science and engineering, a conservatory of music and art, a preparatory school, and an agricultural college and agricultural experiment station; at Little Rock, a medical school and a law school, and at Pine Bluff, the Branch Normal College for negroes. In 1908 the university had 122 instructors and a total enrolment of 1725 students. In Fayetteville there are a National cemetery with 1236 soldiers’ graves (782 ” unknown “) and a Confederate cemetery with 725 graves and a memorial monument. In the vicinity of Fayetteville there are deposits of coal; and the city is in a fine fruit-growing region, apples being the principal crop. Much of the surrounding country is still covered with timber. Among manufactures are lumber, spokes, handles, waggons, lime, evaporated fruit and flour.

The first settlement on the site of what is now Fayetteville was made between 1820 and 1825; when Washington county was created in 1828 the place became the county-seat, and it was called Washington Court-house until 1829, when it received its present name. The citizens of Fayetteville werevmainly Confederate sympathizers;

Fayetteville was raided by Federal cavalry on the 14th of July 1862, and was permanently occupied by Federal troops in the autumn of the same year. Con- federate cavalry under Brigadier- General William Lewis Cabell attacked the city on the 18th of April 1863, but were driven off. The town was burned in August 1863, and shelled on the 3rd of November 1864, after the battle of Pea Ridge, by a detachment of General Price's army. Fayetteville was incorporated as a town in 1841, and in 1859 received. a city charter, which was abolished by act of the Legislature in 1867; under a general law of 1869 the town was re-incorporated; and in 1906 it became a city of the first class.

FAYETTEVILLE, a city and the county-seat of Cumberland county, North Carolina, U.S.A., on the W. bank of the Cape Fear river (at the head of steamboat navigation), about 80 m. N.W. of Wilmington. Pop. (1890) 4222; (1900) 4670, including 2221 negroes; (1010) 7045. It is served by the Atlantic Coast Line railway and the short Raleigh & Southport railway, and by steamboat lines to Wilmington. A scheme was set on foot for the improvement by canalization of the Cape Fear river above Wilmington under a Federal project of 1902, which provided for a channel 8 ft. deep at low water from Wilmington to Fayetteville. Below Wilmington the improvement of the river channel, 270 ft. wide and 16 ft. deep, was completed in 1889, and the project of 1889 provided for an increase in depth to 20 ft. Pine forests surround the town, and oaks and elms of more than a century's growth shade its streets. Fayetteville has two hospitals (each with a training school for nurses) , and is the seat of a state coloured normal school and of the Donaldson military school. Several creeks and the upper Cape Fear river furnish considerable water- power, and in or near Fayetteville are manufactories of cotton goods, silk, lumber, wooden-ware, turpentine, carriages, wagons, ploughs, edge tools and flour. In the earlier half of the 19th century Fayetteville was a great inland market for the western part of the state, for eastern Tennessee and for south-western Virginia. There is a large vineyard in the vicinity; truck- gardening is an important industry in the surrounding country; and Fayetteville is a shipping centre for small fruits and vegetables, especially lettuce, melons and berries. The municipality owns its water- works and its electric-lighting plant. The vicinity was settled between 1729 and 1747 by Highlanders, the settle- ment called Cross Creek lying within the present limits of Fayette- ville. In 1762, by an act of the assembly, a town was laid out including Cross Creek, and was named Campbelltown (or ' Camp- beltown "); but in 1784, when Lafayette visited the town, its name was changed in his honour to Fayetteville, though the name Cross Creek continued to be used locally for many years. Flora McDonald, the famous Scottish heroine, came to Campbell- town in April 1775 with her husband and children, and here she seems to have lived during the remainder of that year. The general assembly of the state met at Fayetteville in 1787, 1788 and 1789 (Newbern, Tarboro, Hillsboro and Fayetteville all being rivals at this time for the honour of becoming the permanent capital); and in 1789 the Federal constitution was here ratified for North Carolina. In 1831 most of the town was burned. At the outbreak of the Civil War, the state authorities seized the United States Arsenal at Fayetteville,. which contained 37,000 muskets and a complete

equipment for a battery of light artillery. In March 1865 General W. T. Sherman and his army took possession of the town, destroyed the arsenal, and did consider- able damage to property. Fayetteville was chartered as a city in 1893. A serious flood occurred in August 1908.

FAYRER, SIR JOSEPH, Bart. (1824-1907), English physician, was born at Plymouth on the 6th of December 1824. After studying medicine at Charing Cross hospital, London, he was in 1847 appointed medical officer of H.M.S. ” Victory,” and soon afterwards accompanied the 3rd Lord Mount-Edgcumbe on a tour through Europe, in the course of which he saw fighting at Palmero and Rome. Appointed an assistant surgeon in Bengal in 1850, he went through the Burmese campaign of 1852 and was political assistant and Residency surgeon at Lucknow during the Mutiny. From 1859 to 1872 he was professor of surgery at the Medical College of Calcutta, and wjien the prince of Wales made his tour in India he was appointed to accompany him as physician. Returning from India, he acted as president of the Medical Board of the India office from 1874 to 1895, and in 1896 he was created a baronet. Sir Joseph Fayrer, who became a fellow of the Royal Society in 1877, wrote much on subjects connected with the practice of medicine in India, and was especially known for his studies on the poisonous snakes of that country and on the physiological effects produced by their virus (Thanatophidia of India, 1872). In 1900 appeared his Recollections of my Life. He died at Falmouth on the 21st of May 1907.

FAYUM, a mudiria (province) of Upper Egypt, having an area of 490 sq. m. and a population (1907) of 441,583. The capital, Medinet-el-Fayum, is 81 m. S.S. W. of Cairo by rail. The Fayum proper is an oasis in the Libyan Desert, its eastern border being about 15 m. west of the Nile. It is connected with that river by the Bahr Yusuf, which reaches the oasis through a gap in the hills separating the province from the Nile Valley. South- west of the Fayum, and forming part of the mudiria, is the Gharak depression. Another depression, entirely barren, the Wadi Rayan, covering 280 sq. m., lies west of the Gharak. The whole region is below sea-level, and save for the gap mentioned is encircled by the Libyan hills. The lowest part of the province, the north- west end, is occupied by the Birket el Rerun, or Lake of the Horns, whose surface level is 140 ft. below that of the sea. The lake covers about 78 sq. m.

Differing from the typical oasis, whose fertility depends on water obtained from springs, the cultivated land in the Fayum is formed of Nile mud brought down by the Bahr Yusuf. From this channel, 15 m. in length from Lahun, at the entrance of the gap in the hills, to

Medina, several canals branch off and by these the province is irrigated, the drainage water flowing into the Birket el Kerun. Over 400 sq. m. of the Fayum is cultivated, the chief crops being cereals and cotton. The completion of the Assuan dam by ensuring a fuller supply of water enabled 20,000 acres of land, previously unirrigated and untaxed, to be brought under cultivation in the three years 1903-1905. Three crops are obtained in twenty months. The province is noted for its figs and grapes, the figs being of exceptionally good quality. Olives are also cultivated. Rose trees are very numerous and most of the attar of roses of Egypt is manufactured in the province. The Fayum also possesses an excellent breed of sheep. Lake Kerun abounds in fish, notably the bulti (Nile carp), of which considerable quantities are sent to Cairo.

Medinet el-Fayum (or Medina), the capital of the province, is a great agricultural centre, with a population which increased from 26,000 in 1882 to 37,320 in 1907, and has several large bazaars, mosques, baths and a much-frequented weekly market. The Bahr Yusuf runs through the town, its banks lined with houses. There are two bridges over the stream: one of three arches, which carries the main street and bazaar, and one of two arches over which is built the Kait Bey mosque. Mounds north of the town mark the site of Arsinoe, earlier Crocodilopolis, where was worshipped the sacred crocodile kept in the Lake of Moeris. Besides Medina there are several other towns in the province, among them Senuris and Tomia to the north of Medina and Senaru and Abuksa on the road to the lake, all served by rail- ways. There are also, especially in the neighbourhood of the lake, many ruins of ancient villages and cities. The Fayurr is the site of the Lake of Moeris {q.v.) of the ancient Egyptians — a lake of which Birket el Kerun is the shrunken remnant.

See The Fayum and Lake Moeris, by Major (Sir) R. H. Brown, R.E. (London, 1892), a valuable contribution as to the condition of the province at that date, its connexion with Lake Moeris and its possi- bilities in the future ; The A ssudn Reservoir and Lake Moeris (London, 1904), by Sir William Willcocks — with text in English, French and Arabic — a consideration of irrigation possibilities; The Topography and Geology of the Fayum Province of Egypt, by H. J. L. Beadnell (Cairo, 1905).

FAZOGLI, or Fazokl, a district of the Anglo-Egyptian Sudan, cut by 1 1° N. and bounded E. and S. by Abyssinia. It forms part of the foot- hills of the Abyssinian plateau and is traversed by the Blue Nile and its affluent the Tumat. Immediately south is the auriferous Beni Shangul country. The chief gold-washings lie (in Abyssinian territory) on the

west slope of the hills draining to the White Nile. Here is the steep Jebel-Dul, which appears to contain rich gold-bearing reefs, as gold is found in all the ravines on its flanks. The auriferous region extends into Sudanese territory, gold dust being found in all the khors coming from Jebel Faronge on the S.E. frontier. The inhabitants of Fazogli, who are governed, under the Sudan administration, by theii own meks or kings, are Berta and other Shangalla tribes with an admixture of Funj blood, the country having been con- quered by the Funj rulers of Sennar at the close of the 15th

century. There are also Arab settlements. Fazogli, the" residence of the principal mek, is a straggling town built some 800 yds. from the left bank of the Blue Nile near the Tumat confluence, 434 m. by river above Khartum and opposite Famaka, the headquarters of the Egyptians in this region between 1839 and 1883. Above Famaka and near the Abyssinian frontier is the prosperous town of Kiri, while Abu Shaneina on the Nile below Fazogli is the spot where the trade route from Beni Shangul strikes the river. The chief imports from Abyssinia are coffee, cattle, transport animals andgold. Durra and tobacco are the principal crops. The local currency includes rings of gold, specially made as a circulating medium.

FEA, CARLO (1753-1836), Italian archaeologist, was born at Pigna in Piedmont on the 2nd of February 1753, and studied law in Rome. He received the degree of doctor of laws from the university of La Sapienza, but archaeology gradually ab- sorbed his attention, and with the view of obtaining better opportunities for his researches in 1798 he took orders. For political reasons he was obliged to take refuge in Florence; on his return in 1799 he was imprisoned by the Neapolitans, at that time in occupation of Rome, as a Jacobin, but shortly afterwards liberated and appointed Commissario delle Antichita. and librarian to Prince Chigi. He died at Rome on the 18th of March 1836.

Fea revised, with notes, an Italian translation of J. J. Winckel- mann's Gesckichte der Kunst, and also added notes to some of G. L. Rianconi's works. Among his original writings the principal are: — Miscellanea filologica, critica, e antiguaria ; L'Inlegrita del Panteone rivendicala a M. Agrippa; Frammenti di fasti consolari; Iscrizioni di monumenti pubblichi ; and Descrizione di Roma.

FEARNE, CHARLES (1742-1794), English jurist, son of Charles Fearne,

judge-advocate of the admiralty, was born in London in 1742, ‘and was educated at Westminster school. He adopted the legal profession, but, though well fitted by his talents~to succeed as a barrister, he neglected his profession and devoted most of his attention and his patrimony to the prosecu- tion of scientific experiments, with the vain hope of achieving discoveries which would reward him for his pains and expense. He died in 1794, leaving his widow and family in necessitous circumstances. His Essay on the Learning of Contingent Re- mainders and Executory Devises, the work which has made his reputation as a legal authority, and which has passed through numerous editions, was called forth by a decision of Lord Mans- field in the case of Perrin v. Blake, and had the effect of reversing that decision.

A volume entitled Fearne’ ‘s Posthumous Works was published by subscription in 1797 for the benefit of his widow.

FEASTS AND FESTIVALS. A festival or feast 1 is a day or series of days specially and publicly set apart for religious observ- ances. Whether its occurrence be casual or periodic, whether its ritual be grave or gay, carnal as the orgies of Baal and Astarte, or spiritual as the worship of a Puritan Sabbath, it is to be regarded as a festival or ” holy day” as long as it is professedly held in the name of religion.

To trace the festivals of the world through all their variations would be to trace the entire history of human religion and human civilization. Where no religion is, there can of course be no feasts; and without civilization any attempt at festival-keeping must necessarily be fitful and comparatively futile. But as religion develops, festivals develop with it, and assume their distinctive character; and an advancing civilization, at least in its earlier stages, will generally be found to increase their number, enrich their ritual, fix more precisely the time and order of their recurrence, and widen the area of their observance.

Some uncivilized tribes, such as the Juangs of Bengal, the Fuegians and the Andamanese, have been described as having no word for God, no idea of a future state, and consequently no religious ceremonies of any kind whatever. But such cases, doubtful at the best, are confessedly exceptional. In the vast majority of instances observed and recorded, the religiosity

1 ” To feast ” is simply to keep a festum or festival. The ety- mology of the word is uncertain; but probably it has no connexion with the Gr. icmav, ‘

of the savage is conspicuous. Even when incapable of higher manifestations, it can at least take the form of reverence for the dead; the grave-heap can become an altar on which offerings of food for the departed may be placed, and where in acts of public and private worship the gifts of survivors may be accom- panied with praises and with prayers. That the custom of ghost- propitiation by some sort of sacrifice is even now very widely diffused among the lower races at least, and that there are also many curious ” survivals ” of such a habit to be traced among highly civilized modern nations, has been abundantly shown of late by numerous collectors of folk-lore and students of sociology; and indications of the same phenomena can be readily pointed out in the Rig- Veda, the Zend-Avesta and the Pentateuch, as well as in the known usages of the ancient Egyptians, Greeks and Romans. 2 In many cases the ceremonial observed is of the simplest; but it ever tends to become more elaborate; and above all it calls for repetition, and repetition, too, at regular intervals. Whenever this last demand has made itself felt, a calendar begins to take shape. The simplest calendar is obviously the lunar. ” The Naga tribes of Assam celebrate their funeral feasts month by month, laying food and drink on the graves of the departed.” But it soon comes to be combined with the solar. Thus the Karens, ” while habitually making oblations, have also annual feasts for the dead, at which they ask the spirits to eat and drink.” The natives of the Mexican valley in November lay animals, edibles and flowers on the graves of their dead relatives and friends. The common people in China have a similar custom on the arrival of the winter solstice. The ancient Peruvians had the custom of periodically assembling the embalmed bodies of their dead emperors in the great square of the capital to be feasted in company with the people. The Athenians had their annual Nexucrta or Ntˆeireia and the Romans their Feralia and Lemuralia. The Egyptians observed their three ” festivals of the seasons,” twelve ” festivals of the month,” and twelve ” festivals of the half month,” in honour of their dead. The Parsees, too, were required to render their afringans (blessings which were to be recited over a meal to which an angel or the spirit of a deceased person was invited) at each of the six seasons of the year, and also on certain other days. 3

In the majority of recorded instances, the religious feeling of the savage has been found to express itself in other forms besides that of reverence towards the dead. The oldest litera- tures of the world, at all events, whether Aryan or Semitic, embody a religion of a much higher type than ancestor worship. The hymns of the Rig-Veda, for example, while not without traces of the other, yet indicate chiefly a worship of the powers of nature, connected with the regular recurrence of the

seasons. Thus in iv. 57 we have a hymn designed for use at the commence- ment of the ploughing time; 4 and in the Ailareya-Brdhmana, the earliest treatise on Hindu ceremonial, we already find a complete series of sattras or sacrificial sessions exactly following the course of the solar year. They are divided into two distinct sections, each consisting of six months of thirty days each. The sacrifices are allowed to commence only at certain lucky con- stellations and in certain months. So, for instance, as a rule, no great sacrifice can commence during the sun's southern progress. The great sacrifices generally take place in spring, in the months of April and May. 5 In the Parsee Scriptures 6 the year is divided into six seasons or gahanbars of two months each, concluding with February, the season at which " great expiatory sacrifices were offered for the growth of the whole creation in the last two months of the year." We have no means of knowing precisely what were the arrangements of the Phoenician calendar, but it

2 See Spencer, Principles of Sociology, i. 170, 280, 306.

3 Haug, Parsis, 224, 225.

4 " May the heavens, the waters, the firmament, be kind to us ; may the lord of the field be gracious to us … . May the oxen (draw) happily, the men labour happily ; may the traces bind happily, wield the goad happily " (Wilson's translation, iii. 224).

'See Haug's Aitareya-brdhmanam of the Rig- Veda; Max Miiller's Chips from a German Workshop, i. 115.

6 Visperad. See Haug, Parsis, 192 ; Richardson's Dissertation on the Language, &c, of Eastern Nations, p. 184; Morier's Journey I through Persia.

is generally admitted that the worship was solar, the principal festivals taking place in spring and in autumn. Among the most characteristic celebrations of the Egyptians were those which took place at the cupavurnos or disappearance of Osiris in October or November, at the search for- his remains, and their discovery about the winter solstice, and at the date of his sup- posed entrance into the moon at the beginning of spring. The Phrygian festivals were also arranged on the theory that the deity was asleep during the winter and awake during the summer; in the autumn they celebrated his

retiring to rest, and in spring with mirth and revelry they roused him from his slumbers. 1 The seasonal character of the Teutonic Ostern, the Celtic Beltein and the Scandinavian Yule is obvious. Nor was the habit of observing such festivals peculiar to the Aryan or the Semitic race. The Mexicans, who were remarkable for the perfection of their calendar, in addition to this had an elaborate system of movable and immovable feasts distributed over the entire year; the principal festivals, however, in honour of their chief gods, Tezcatlipoca, Huitzilopochtli and Tlaloc, were held in May, June and December. Still more plainly connected with the revolutions of the seasons was the public worship of the ancient Peruvians, who, besides the ordinary feast at each new moon, observed four solar festivals annually. Of these the most important was the Yntip-Raymi (Sun-feast), which, preceded by a three days' fast, began with the summer solstice, and lasted for nine days. Its ceremonies have been often described. A similar but less important festival was held at the winter solstice. The Cusqui-Raymi, held after seedtime, as the maize began to appear, was celebrated with sacrifices and banquets, music and dancing. A fourth great festival, called Citua, he'd on the first new moon after the autumnal equinox, was preceded by a strict fast and special observances intended for purposes of purification and expiation, after which the festivities lasted until the moon entered her second quarter.

Greek Festivals.— Perhaps the annual Attic festival in honour of Erechtheus alluded to in the Iliad (ii. 550) ought to be regarded as an instance of ancestor- worship ; but the seasonal character of the iofnri or new-moon feast in Od. xx. 156, and of the ddXvaia. or harvest-festival in //. ix. 533, is generally acknow- ledged. The older Homeric poems, however, give no such express indications of a fully-developed system of festivals as are to be met with in the so-called " Homeric " hymns, in the Works and Days of Hesiod, in the pages of Herodotus, and so abundantly in most authors of the subsequent period; and it is manifest that the calendar of Homer or even of Herodotus must have been a much simpler matter than that of the Taren- tines, for example, came to be, of whom we are told by Strabo that their holidays were in excess of their working days. Each demos of ancient Greece during the historical period had its own local festivals (hopral dyfioTiKal) , often largely attended and splendidly solemnized, the usages of which, though essentially alike, differed very considerably in details. These details have in many cases been wholly lost, and in others have reached us only in a very fragmentary state. But with regard to the Athenian calendar, the most interesting of all, our means of information are fortunately very copious. It included some 50 or 60 days on which all business, and especially the ad- ministration of

justice, was by order of the magistrates suspended. Among these Upoixrjvicu were included — in Gamelion (January), the Lenaea or festival of vats in honour of Dionysus; in Anthesterion (February), the Anthesteria, also in honour of Dionysus, lasting three days (Pithoigia, Choes and Chytri) ; the Diasia in honour of Zeus, and the lesser Eleusinia; in Elaphebolion (March), the Pandia (? of Zeus), the Elapkebolia of Artemis, and the greater Dionysia; in Munychion, the Munychia of Artemis as the moon goddess (Movvvxia) and the Delphinia of Apollo; in Thargelion (May), the Thargelia of Apollo and the Plynteria and Callynteria of Athena; in Sciro- phorion (June), the Diipolia of Zeus and the Scirophoria of Athena; in Hekatombaion, hecatombs were offered to Apollo the summer-god, and the Crania of Cronus and the Panalhenaea 1 Plutarch, De Isidc et Osiride; Mucrobius, Saturnalia, i. 21.

of Athena were held; in Metageitnion, the Metageitnia of Apollo; in Boedromion, the Boedromia of Apollo the helper, 2 the Nekusia or Nemeseia (the festival of the dead), and the greater Eleusinia;. in Pyanepsion, the Pyanepsia of Apollo, the Oschophoria of Dionysus (probably), the Chalkeia or Athenam of Athena, the Thesmophoria of Demeter, and the Apaturia; in Maimacterion, the Maimacteria of Zeus; and in Poseideon (December), the lesser Dionysia.

Of these some are commemorative of historical events, and one at least may perhaps be regarded as a relic of ancestor- worship; but the great majority are nature-festivals, associating themselves in the manner that has already been indicated with the phenomena of the seasons, the equinoxes and the solstices. 3 In addition to their numerous public festivals, the Greeks held various family celebrations, also called iopral, in connexion with weddings, births and similar domestic occurrences. For the great national irav.ryvpeis — Olympian, Pythian, Nemean and Isthmian— see the article Games, Classical.

Roman Festivals. — For the purpose of holding comitia and administering justice, the days of the Roman year were regarded as being either dies fasti or dies nefasti — the dies fasti being the days on which it was lawful for the praetors to administer justice in the public courts, while on the dies nefasti neither courts of justice nor meetings of comitia were allowed to be held. Some days were fasti during one portion and nefasti during another; these' were called dies inter cisi. For the purposes of religion a different division of the year was made; the days were treated asfesti or as profesti, — the former being consecrated to acts of public worship, such as sacrifices, banquets and games, while the latter (whether fasti or nefasti) were not specially claimed for religious purposes. The dies festi or feriae publicae 4 were

either stativae, conceptivae or imperativae. The stativae were such as were observed regularly, each on a definite day; the conceptivae were observed annually on days fixed by the authorities for the time being; the imperativae were publicly appointed as occasion called for them. In the Augustan age the feriae stativae were very numerous, as may be seen from what we possess of the Fasti of Ovid. The number was somewhat fluctuating. Festivals frequently fell into desuetude or were revived, were increased or diminished, were shortened or pro- longed at the will of the emperor, or under the caprice of the popular taste. Thus Augustus restored the Compitalia and Lupercalia; while Marcus Antoninus in his turn found it ex- pedient to diminish the number of holidays.

The following is an enumeration of the stated festivals as given by Ovid and contemporary writers. The first day of January was observed somewhat as is the modern New Year's day: clients sent presents to their patrons, slaves to their masters, friends and relatives to one another. On the 9th the Agonalia were held, apparently in honour of Janus. On the nth the Carmentalia were kept as a half -holiday, but principally by women; so also on the 15th. On the 13th of February were the Faunalia, on the 15th the Lupercalia, on the. 17th the Quirinalia, on the 18th the Feralia, on the 23rd (at one time the last day of the Roman year) the Terminalia, on the 24th the Regifugium or Fugalia, and on the 27th the Equiria (of Mars). On the 1st of March were the Malronalia, on the 14th a repetition of the Equiria, on the 15th the festival of Anna Perenna, on the 17th the Liberalia or Agonalia, and from the 19th to the 23rd the Quinquatria (of Minerva). On the 4th of April were the Megalesia (of Cybele), on the 12th the Cerealia, on the 21st the Palilia, on the 23rd the Vinalia, on the 25th the Robigalia, and on the 28th the Floralia. The 1st of May was the festival of the Lares Praestites; on the 9th, nth and 13th the Lemuria were celebrated; on the 12th the Ludi Martiales, and on the 15th those of Mercury. June 5 was sacred to Scmo Sancus; the Vestalia occurred on the 9th, the Matralia on the nth, and the

2 In this month the anniversaries of the battle of Marathon, and of the downfall of the thirty tyrants, were also publicly celebrated.

3 See Schoemann, Griechische Altertiimer, ii. 439 seq. ; Mommsen Heortologie.

4 Feriae privatae, such as anniversaries of births, deaths, and the like, were observed by separate clans, families or individuals.

Quinquatrus Minusculae on the 13th. The Ludi Apollmares were on the 5th, and the Neptunalia on the 23rd of July. On the 13th of August were the Nemoralia, in honour of Diana; on the 18th the Consualia, on the 19th the Vinalia Rustica, and on the 23rd the Vulcanalia. The Ludi Magni, in honour of Jupiter, Juno and Minerva, began on September 4. The Medi- trinalia (new wine) were on the nth of October, the' Faunalia on the 13th, and the Equina on the 15th. The Epulum Jovis was on 13th November. The December festivals were- ˆon the 5th Faunalia, and towards the close Opalia, Saturnalia, Larentalia.

The calendar as it stood' at the Augustan age was known to contain many comparatively recent accessions, brought in under the influence of two " closely allied powers, the foreign priest and the foreign cook " (Mommsen). The Megalesia, for example, had been introduced 204 B.C. The Ludi Apollinares could not be traced farther back than 208 B.C. The Floralia and Cerealia had not come in much earlier. Among the oldest feasts were undoubtedly the Lupercalia, in honour of Lupercus, the god of fertility; the Equiria, in honour of Mars; the Palilia; the great September festival; and the Saturnalia.

Among the feriae conceptivae were the very ancient feriae Ldtinae, held in honour of Jupiter on the Alban Mount, and attended by all the higher magistrates and the whole body of the senate. The time of their celebration greatly depended on the state of affairs at Rome, as the consuls were not allowed to take the field until they had held the Latin'ae, which were regarded as days of a sacred truce. The feriae semenlivae were held in the spring, and the Ambarvalia in autumn, both in honour of Ceres. The Paganalia of each pagus, and the Compitalia of each vicus were also conceptivae. Of feriae imperativae, — that is to say, festivals appointed by the senate, or magistrates, or higher priests to commemorate some great event or avert some threatened disaster,— the best known is the NSvendiale, which used to be celebrated as often as stones fell from heaven (Livy xxi. 62, xxv. 7, &c). In addition to all those already mentioned, there occasionally occurred ludi volivi, which were celebrated in fulfilment of a vow ; ludi funebres, sometimes given by private persons; and ludi secular es, to celebrate certain periods marked off in the Etrusco-Roman religion.

Feasts of the Jews. — By Old Testament writers a festival or feast is generally called either :n (compare the Arabic Had j), from jot to rejoice, or iy*a, from i$r, to appoint. The words n-ti and eh'P u-ib? are also occasionally used. In the Talmud the three principal feasts are

called crtri, after Exod. xxiii. 14. Of ‘ the Jewish feasts which are usually traced to a pre-Mosaic origin the most important and characteristic was the weekly Sabbath, but special importance was also attached from a very early date to the lunar periods. It is probable that other festivals also, of a seasonal character, were observed (see Exod. v. 1). In common with most others, the Mosaic system of annual feasts groups itself readily around the vernal and autumnal equinoxes. In Lev. xxiii., where the list is most fully given, they seem to be arranged with a conscious reference to the sacred number seven (compare Numb, xxviii.) . Those belonging to the vernal equinox are three in number ; a preparatory day, that of the Passover, leads up to the principal festival, that of unleavened bread, which again is followed by an after-feast, that of Pentecost (see Passover, Pentecost). Those of the autumnal equinox are four; a preparatory day on the new moon of the seventh month (the Feast of Trumpets) is followed by a great day of rest, the day of Atonement (which, however, was hardly a festival in the stricter sense of the word) , by the Feast of Tabernacles, and by a great concluding day (Lev. xxiii. 36; John vii. 37). If the feast of the Passover be excepted, it will be seen that all these celebrations or commemorations associate themselves more readily with natural than with historical events. 1 There was

1 In the ” parallel ” passages, there is considerable variety in the designation and arrangement of these feasts. While Ex. xii. approximates most closely to Lev. xxiii. and Num. xxviii., Ex. xxiii. has stronger affinities with Deut. xvi. The relations of these passages are largely discussed by Graf, Die geschichtlichen Biicher des A. T., pp. 34-41, and by other recent critics.

also a considerable number of post-Mosaic festivals, of which the principal were that of the Dedication (described in 1 Mace, iv. 52-59; comp. John x. 22) and that of Purim, the origin of which is given in the book of Esther (ix. 20 seq.) . It has probably no connexion with the Persian festival Furdigan (see Esther) . 2

Earlier Christian Festivals. — While making it abundantly manifest that Christ and his disciples observed the appointed Jewish feasts, the New Testament nowhere records the formal institution of any distinctively Christian festival. But we have unambiguous evidence of the actual observance, from a very early period, of the first day of the week as a holy day (John xx. 19, 26; 1 Cor. xvi. 2; Acts xx. 7; Rev. i. 10). Pliny in his letter to Trajan describes the Christians of Bithynia as meeting for religious purposes on a set day; that this day was Sunday is put beyond all reasonable doubt by such a passage as that in the Apology of Justin- Martyr, where he says that ” on Sunday (t§ tov

17X101; \tyofikvrj i]fxkpa) all the Christians living either in the city or the country met together." The Jewish element, in some churches at least, and especially in the East, was strong enough to secure that, along with the dies dominica, the seventh day should continue to be kept holy. Thus in the Apostolic Con- stitutions (ii. 59) we find the Saturday specially mentioned along with the Sunday as a day for the assembling of the church; in v. 15 it is ordained that there shall be no fasting on Saturday, while in viii. ˆ2> it is added that both on Saturday and Sunday slaves are to have rest from their labours. The 16th canon of the council of Laodicea almost certainly means that solemn public service was to be held on Saturday as well as on Sunday. In other quarters, however, the tendency to regard both days as equally sacred met with considerable resistance. The 36th canon of the council of Illiberis, for example, deciding that Saturday should be observed as a fast-day, was doubtless intended to enforce the distinction between Saturday and Sunday. At Milan in Ambrose's time Saturday was observed as a [festival; but Pope Innocent is found writing to the bishop of Eugubium to urge that it should be kept as a fast. Ultimately the Christian church came to recognize but one weekly festival.

The numerous yearly festivals of the later Christian church, when historically investigated, can be traced to very small beginnings. Indeed, while it appears to be tolerably certain that Jewish Christians for the most part retained all the festivals which had been instituted under the old dispensation, it is not at all probable that either they or their Gentile brethren recog- nized any yearly feasts as of distinctively Christian origin or obligation. It cannot be doubted, however, that gradually, in the course of the 2nd century, the universal church came to observe the anniversaries of the death and resurrection of Christ — the iraax a CTa.vp6xri.fiov and the iraaxo. avao-raoinov, as they were respectively called (see Easter and Good Friday). Not long afterwards Whitsunday also came to be fixed in the usage of Christendom as a great annual festival. Even Origen (in the 8th book Against Celsus) enumerates as Christian festivals the Sunday, the TtapaaKevrj, the Passover with the feast of the Resurrection, and Pentecost; under which latter term, however, he includes the whole period between Easter and Whitsuntide. About Cyprian's time we find individual Christians commemorat- ing their departed friends, and whole churches commemorating their martyrs; in particular, there are traces of a local and partial observance of the feast of the Innocents. Christmas day and Epiphany were among the later introductions, the feast of the Epiphany being somewhat the earlier of the two. Both are alluded to indeed by Clemens Alexandrinus (i. 340), but only in a way

which indicates that even in his time the precise date of Christ's birth was unknown, that its anniversary was not usually observed, and that the day of his baptism was kept as a festival only by the followers of Basilides (see Epiphany).

When we come down to the 4th century we find that, among the 50 days between Easter and Pentecost, Ascension Day has

2 On the whole subject of Jewish festivals see Reland, Antiq. Hebr. ; Knobel, Leviticus (c. 23); George, Die jildischen Fesie; Edersheim. The Temple; its Ministry and Services; Ewald, Altertiimer des Volkes Israel; articles in Bible dictionaries.

come into new prominence. Augustine, for example, enumerates as anniversaries celebrated by the whole church those of Christ's passion, resurrection and ascension, along with that of the out- pouring of the Holy Ghost, while he is silent with regard to Christmas and Epiphany. The general tendency of this and the following centuries was largely to increase the festivals of the Church, and by legislation to make them more fixed and uniform. Many passages, indeed, could be quoted from Chrysostom, Jerome and Augustine to show that these fathers had not by any means forgotten that comparative freedom with regard to outward observances was one of the distinctive excellences of Christianity as contrasted with Judaism and the various heathen systems (compare Socrates, H.E. v. 22). But there were many special circumstances which seemed to the leaders of the Church at that time to necessitate the permission and even legislative sanction of a large number of new feasts. The innova- tions of heretics sometimes seemed to call for rectification by the institution of more orthodox observances; in other instances the propensity of rude and uneducated converts from paganism to cling to the festal rites of their forefathers proved to be in- vincible, so that it was seen to be necessary to seek to adapt the old usages to the new worship rather than to abolish them altogether; 1 moreover, although the empire had become Christian, it was manifestly expedient that the old holidays should be recognized as much as possible in the new arrange- ments of the calendar. Constantine soon after his conversion enacted that on the dies dominica thjre should be no suits or trials in law; Theodosius the Great added a prohibition of all public shows on that day, and T. eodosius the younger extended the prohibition to Epiphany and the anniversaries of martyrdoms, which at that time included the festivals

of St Stephen, and of St Peter and St Paul, as also that of the Maccabees. In the 21st canon of the council of Agde (506), besides Easter, Christmas, Epiphany, Ascension and Pentecost, we find the Nativity of John the Baptist already mentioned as one of the more important festivals on which attendance at church was regarded as obli- gatory. To these were added, in the centuries immediately following, the feasts of the Annunciation, the Purification, and the Assumption of the Virgin ; as well as those of the Circum- cision, of St Michael and of All Saints.

Festivals were in practice distinguished from ordinary days in the following ways: all public and judicial business was suspended, 2 as well as every kind of game or amusement which might interfere with devotion; the churches were specially decorated; Christians were expected to attend public worship, attired in their best dress; love feasts were celebrated, and the rich were accustomed to show special kindness to the poor; fasting was strictly forbidden, and public prayers were said in a standing posture.

Later Practice. — In the present calendar of the Roman Catholic Church the number of feast days is very large. Each is cele- brated by an appropriate office, which, according to its character, is either duplex, semi-duplex or simplex. A duplex again may be either of the first class or of the second, or a major or a minor. The distinctions of ritual for each of these are given with great minuteness in the general rubrics of the breviary; they turn chiefly on the number of Psalms to be sung and of lessons to be read, on the manner in which the antiphons are to be given and on similar details. The duplicia of the first class are the Nativity, the Epiphany, Easter with the three preceding and two following days, the Ascension, Whitsunday and the two following days, Corpus Christi, the Nativity of John Baptist, Saints Peter and Paul, the Assumption of the Virgin, All Saints, and, for each church, the feast proper to its patron or title and the feast of its dedication. The duplicia of the second class are the Circum- cision, the feast of the Holy Name of Jesus, of the Holy Trinity, and of the Most Precious Blood of Christ, the feasts of the Purifica-

!As, at a later period (601), Gregory the Great instructed his Anglo-Saxon missionaries so to Christianize the temples, festivals, &c., of the heathen " ut durae mentes gradibus vel passibus, non autem saltibus, eleventur."

2 Manumission, however, was lawful on any day.

tion, Annunciation, Visitation, Nativity and Conception of the Virgin,

the Natalitia of the Twelve Apostles, the feasts of the Evangelists, of St Stephen, of the Holy Innocents, of St Joseph and of the Patrocinium of Joseph, of St Lawrence, of the Inven- tion of the Cross and of the Dedication of St Michael. The Dominicae majores of the first class are the first Sunday in Advent, the first in Lent, Passion Sunday, Palm Sunday, Easter Sunday, Dominica in Albis, Whitsunday and Trinity Sunday ; the Dominicae majores of the second class are the second, third and fourth in Advent, Septuagesima, Sexagesima and Quinqua- gesima Sundays, and the second, third and fourth Sundays in Lent.

In the canons and decrees of the council of Trent repeated allusions are made to the feast days, and their fitness, when properly observed, to promote piety. Those entrusted with the cure of souls are urged to see that the feasts of the Church be devoutly and religiously observed, the faithful are enjoined to attend public worship on Sundays and on the greater festivals at least, and parish priests are bidden to expound to the people on such days some of the things which have been read in the office for the day. Since the council of Trent the practice of the Church with respect to the prohibition of servile work on holidays has varied considerably in different Catholic countries, and even in the same country at different times. Thus in 1577, in the diocese of Lyons, there were almost forty annual festivals of a compulsory character. By the concordat of 1802 the number of such festivals was for France reduced to four, namely, Christmas day, Ascension day, the Assumption of the Virgin, and All Saints day.

The calendar of the Greek Church is even fuller than that of the Latin, especially as regards the iopral r&v ayiuv. Thus on the last Sunday in Advent the feast of All Saints of the Old Covenant is celebrated; while Adam and Eve, Job, Elijah, Isaiah, &c, have separate days. The distinctions of ritual are analogous to those in the Western Church . In the Coptic Church there are seven great festivals, Christmas, Epiphany, the Annunciation, Palm Sunday, Easter Sunday, Ascension and Whitsunday, on all of which the Copts ” wear new clothes (or the best they have), feast and give alms ” (Lane). They also observe, as minor festivals, Maundy Thursday, Holy Saturday, the feast of the Apostles (nth July), and that of the Discovery of the Cross.

In common with most of the churches of the Reformation, the Church of England retained a certain number of feasts besides all Sundays in the year. They are, besides Monday and Tuesday both in Easter-week and Whitsun-week, as follows : the Circumcision, the Epiphany, the Conversion of St Paul, the Purification of the Blessed Virgin, St Matthias the Apostle, the Annunciation of the Blessed Virgin, St Mark the Evangelist, St Philip and St James (Apostles), the Ascension, St

Barnabas, the Nativity of St John Baptist, St Peter the Apostle, St James the Apostle, St Bartholomew, St Matthew, St Michael and all Angels, St Luke the Evangelist, St Simon and St Jude, All Saints, St Andrew, St Thomas, Christmas, St Stephen, St John the Evangelist, the Holy Innocents. The 13th canon enjoins that all manner of persons within the Church of England shall from henceforth celebrate and keep the Lord's day, commonly called Sunday, and other holy days, according to God's holy will and pleasure, and the orders of the Church of England prescribed in that behalf, that is, in hearing the Word of God read and taught, in private and public prayers, in acknowledging their offences to God and amendment of the same, in reconciling them- selves charitably to their neighbours where displeasure hath been, in oftentimes receiving the communion of the body and blood of Christ, in visiting of the poor and sick, using all godly and sober conversation. (Compare Hooker, E. P. v. 70.) In the Directory for the Public Worship of God which was drawn up by the West- minster Assembly, and accepted by the Church of Scotland in 1645, there is an appendix which declares that there is no day commanded in Scripture to be kept holy under the gospel but the Lord's day, which is the Christian Sabbath; festival days, vulgarly called holy-days, having no warrant in the Word of God,

are not to be continued; nevertheless it is lawful and neces- sary, upon special emergent occasions, to separate a day or days for public fasting or thanksgiving, as the several eminent and extraordinary dispensations of God's providence shall administer cause and opportunity to his people.

Several attempts have been made at various times in western Europe to reorganize the festival system on some other scheme than the Christian. Thus at the time of the French Revolution, during the period of Robespierre's ascendancy, it was proposed to substitute a tenth day (Decadi) for the weekly rest, and to introduce the following new festivals: that of the Supreme Being and of Nature, of the Human Race, of the French people, of the Benefactors of Mankind, of Freedom and Equality, of the Martyrs of Freedom, of the Republic, of the Freedom of the World, of Patriotism, of Hatred of Tyrants and Traitors, of Truth, of Justice, of Modesty, of Fame and Immortality, of Friendship, of Temperance, of Heroism, of Fidelity, of Unselfishˆ ness, of Stoicism, of Love, of Conjugal Fidelity, of Filial Affection, of Childhood, of Youth, of Manhood, of Old Age, of Misfortune, of

Agriculture, of Industry, of our Forefathers, of Posterity and Felicity. The proposal, however, was never fully carried out, and soon fell into oblivion.

Mahommedan Festivals. — These are chiefly two — the ‘Eed es-Sagheer (or minor festival) and the ‘Eed el-Kebeer (or great festival), sometimes called ‘Eed el-Kurban. The former, which lasts for three days, immediately follows the month Ramadan, and is generally the more joyful of the two; the latter begins on the tenth of Zu-1-Heggeh (the last month of the Mahommedan year), and lasts for three or four days. Besides these festivals they usually keep holy the first ten days of Moharram (the first month of the year), especially the tenth day, called Yom Ashoora; the birthday of the prophet, on the twelfth day of the third month; the birthday of El-Hoseyn, in the fourth month; the anniversary of the prophet’s miraculous ascension into heaven, in the seventh month; and one or two other anniversaries. Friday, called the day of El-Gumah (the assembly), is a day of public worship; but it is not usual to abstain from public business on that day except during the time of prayer.

Hindu and Buddhist Festivals.— -In modern India the leading popular festivals are the Holi, which is held in March or April and lasts for five days, and the Dasahara, which occurs in October. Although in its origin Buddhism was a deliberate reaction against all ceremonial, it does not now refuse to observe festivals. By Buddhists in China, for example, three days in the year are especially observed in honour of the Buddha, — the eighth day of the second month, when he left his home; the eighth day of the fourth month, the anniversary of his birthday; and the eighth of the twelfth, when he attained to perfection and entered Nirvana. In Siam the eighth and fifteenth days of every month are considered holy, and are observed as days for rest and worship. At Trut, the festival of the close of the year, visiting and play-going are universal. The new year (January) is cele- brated for three days; in February is another holiday; in April is a sort of Lent, ushering in the rainy season; on the last day of June presents are made of cakes of the new rice ; in August is the festival of the angel of the river, ” whose forgiveness is then asked for every act by which the waters of the Meinam have been rendered impure.” See Bowring’s Siam and Carne’s Travels in Indo-China and the Chinese Empire. Copious details of the elaborate festival-system of the Chinese may be found in Doolittle’s Social Life of the Chinese.

Literature.— For Christian feasts see K. A, H. Kellner, Heorto- logie (Freiburg im Breisgau, 1906); Hippolyte Delehaye, Les LAgendes hagiographiques (Brussels, 1905) ; J. Rendel Harris, The Cult of the

Heavenly Twins (Cambridge, 1906); de Rossi-Duchesne, Martyrologium Hieronymianum.

FEATHER (0. Eng. fether, Ger. Feder, from an Indo- European root seen also in Gr. irrtpov, and wiTe

The most perfect form of feather is made up of a long, tapering

rod, fringed on either side, for the greater part of its length, by a secondary series of slender and tapering rods forming a more or less acute angle with the central axis. This fringe is known as the vexillum or ” vane ” (fig. 1 a). The central axis is divisible into two distinct parts, — a hollow, cylindrical, transparent calamus, or ” quill,” the base of which is inserted into the skin, and a solid, quadrangular rhachis or ” shaft ” which supports the vane. At the lower end of the quill is a small hole — the lower umbilicus-ˆ— through which the nutritive pulp passes during the growth of the feather: while at the upper end, where it passes into the shaft, a similar hole will be found, — the upper umbilicus — and from this the last remains of the capsules which contained the nutritive pulp may sometimes be seen protruding. If the quill is cut open a series of these capsules will be found fitting one into the other throughout the whole length of the tubular chamber.

Fig. 1. — Diagrams Outline of a feather showing the relation of the barbs and barbules to the central axis or shaft. Section across two of the barbs shown in a, highly magni- fied. Two barbules of the posterior series— seen only in cross- section in b.

of Feather-Barbs.

d, A barbule of the anterior

series.

e, Section across the base of three

anterior barbules showing attachment to barb. /, A portion of the hooklet of the anterior series showing the method of interlocking with the barbules of the posterior

The rods comprising the lateral fringe, or vane, are known as the rami or the ” barbs,” and will be found, on microscopic examination, to be lath-shaped and to taper to a point. Further, each barb supports a double series of smaller outgrowths known as the radii, or “barbules “; so that each barb may be likened to a feather in miniature. These ”

barbules," however, differ markedly in structure on the two sides of the barb, those pointing towards the tip of the feather — the " anterior barbules " — being ribbon-shaped from the base outwards for about half their length, when they become cut up to form a series of long and very delicate hooklets (fig. id). On the opposite side of the barb the barbules are also ribbon-shaped for about half their length, but the ribbon is curved trough-fashion, so that the whole series of posterior barbules forms a number of deep valleys, and into these the hooklets are thrust so as to catch hold of the upper edges of the troughs, which are set so that the

upper edge is towards the upper, and the lower edge towards the under surface of the feather. The manner in which this beautiful mechanism works may be seen in fig. 1 b.

In one of the primary or " quill " feathers of the wing of a crane, each barb of the inner side of the vane was found to bear about 600 pairs of barbules, which would make about 800,000 barbules for the inner web of the vane alone, or more than a million for the whole feather (H. F. Gadow). It is to the agency of these hooklets alone that the closely-knit, elastic vanes of the flight feathers and the body feathers are due. Where these hooklets are wanting the barbs do not adhere together, resulting in a loose " discontinuous " vane such as, for example, is found in the plumes of the ostrich.

Many feathers, in addition to the main axis, bear a second, generally much shorter axis, supporting a loose discontinuous vane; this shorter branch is known as the " aftershaft " and arises from the under surface of the feather. Only in the casso- wary and emu among adult birds is the aftershaft as large as the main shaft.

There are several different kinds of feathers — contour feathers, semiplumes, down-feathers, filoplumes and powder-down. Contour feathers, as their name implies, are those which form the contour or outline of the body, and are all that can generally be seen. Those which form the " flight feathers " of the wing, and the tail feathers, are the most perfectly developed. Semi- plumes are degenerate contour feathers. The down-feathers are generally completely hidden by the contour feathers: they form in many birds, such as gulls and ducks, a thick under- clothing comparable to the under-fur of mammals such as the seals. In all cases they are of a loose, soft, "

fluffy ” structure, the barbs being of great length and slenderness, while the barbules are often long and provided with knob-like thickenings answering to the hooklets of the more perfectly developed contour feathers; these thickenings help to ” felt ” the separate down-feathers together, the barbs of one down-feather inter- locking with those of its neighbour. Down-feathers differ from semiplumes both in their relation to contour feathers and in that they do not possess a main axis, all the barbs arising from a common centre.

Filoplumes are degenerate structures having a superficial resemblance to hairs, but they always bear a minute vane at the tip. They occur in all birds, in clusters of varying number, about the bases of contour feathers. In some birds they attain a great length, and may project beyond the contour feathers, sometimes forming conspicuous white patches, as for example in the necks of cormorants. In their early stages of development they often possess a large aftershaft made up of a number of barbs, but these quickly disappear, leaving only the degenerate main shaft. The eyelashes and bristles round the mouth found in many birds appear to be akin to filoplumes.

Powder-down feathers are degenerate down-feathers which appear to secrete a dry, waxy kind of powder. This powder rapidly disintegrates and becomes distributed over the plumage, adding thereto a quite peculiar bloom. In birds of the heron tribe powder-down feathers have reached a high degree of development, forming large patches in the breast and thighs, while in some hawks, and in the parrots, these mysterious feathers are scattered singly over the greater part of the body.

The nature of the covering of nestling birds is of a more complex character than has hitherto been suspected. The majority of young birds, as is well known, either down!* emerge from the egg clothed in down-feathers, or they develop these within a day or two afterwards. But this covering, though superficially similar in all, may, as a matter of fact, differ widely in its constitution, even in closely related forms, while only in a very few species can the complete history of these feathers be made out.

The brown or tawny owl {Syrnium aluco) is one of these. At hatching, the young of this species is thickly clad in white, woolly down-feathers, of the character known as umbelliform — that is to say, the central axis or main shaft is wanting, so that the barbs all start from a common centre. These feathers

occupy the. position of the ultimate contour feathers. They are shortly replaced by a second do wnrlike covering, superficially resembling, and generally regarded as, true down. But they differ in that their barbs spring from a central axis as in typical contour feathers. Feathers of this last description indeed have now made their appearance in the shape of the ” flight ” or quill feathers (remiges) and of the tail feathers. This plumage is worn until the autumn, when the downy feathers give place to the characteristic adult plumage. The down feathers which appear at hatching-time are known as pre-pennae, or pre-plumulae, as the case may be; the first generation of pre-pennae, in the case of the tawny owl for example, is made up of protoptyles, while the succeeding plumage is made up of mesoptyles, and these in turn give place to the teleoptyles or adult feathers. The two forms of nestling plumage — pre-pennae and pre-plumulae— may be collectively called ” neossoptyles,” a term coined by H. F. Gadow to distinguish the plumage of the nestling from that of the adult — the ” teleoptyle ” plumage.

As a rule the nestling develops but one of these generations of neossoptyles, and this generally answers to the mesoptyle plumage, though this is of a degenerate type. In some birds, as in the Megapodes, the ” protoptyle ” or first of these two generations of pre-pennae is developed and shed while the chick is yet in the shell, so that at hatching the mesoptyle plumage is well developed. But in the majority of birds, probably, the mesoptyle plumage only is developed, while the earlier, and apparently more degenerate, dress is suppressed. In the penguins both of these nestling plumages are developed, but the mesoptyle dress has degenerated so that umbelliform feathers now take the place of feathers having a central axis.

The Anatidae show traces of the earlier, first generation of feathers in one or two species only, e.g. Cloephaga mbidiceps. In all the remaining species mesoptyles only Occur. And this is true also of the game-birds. In both the Tinamous, the duck- tribe and the game-birds this mesoptyle plumage shows, in different species, every gradation between feathers having a well-developed main shaft and aftershaft, and those which are mere umbelliform tufts.

As development proceeds and the contour feathers make their appearance: they thrust the mesoptyle feathers out of their follicles — the pockets in the skin in which they were rooted — and these will often be found adhering to the tips of the contour feathers for many weeks after the bird has left the nest. This Occurs because the development of the contour feather begins before that of the

mesoptyles has completed.

The plumage in nestling birds is still futher complicated by the fact that it may be almost, or entirely, composed of pre-plumulae ; that is to say, of down-feathers which are later succeeded by adult down-feathers. This is the case among the accipitrine birds for example, and thereby it differs entirely from that of the owls, which develop neither pre-plumulae nor adult down. The cormorants are, so far as is known, the only birds which have a nestling plumage composed entirely of pre-plumulae.

In variety and brilliancy the colours of birds are not surpassed by those of any other group of animals. Yet the pigments to which these colours are due are but few in number, while a large number of the most resplendent hues Th f are produced by structural peculiarities of the feathers. colourless horny surface of the feathers, and hence are known as subjective or optical colours.

The principal colour pigments are (a) melanin pigments, derived possibly from the haemoglobin of the blood, but more probably from the blood plasma, and (b) lipochrome or ” fat ” pigments, which are regarded as reserve products; though in the case of birds it is exceedingly doubtful whether they have this significance.

The melanin pigments (zoomelanin) occur in the form of granules and give rise to the black, brown and grey tones; or they may combine with those of the lipochrome series.

The lipochrome pigments (zoonerythrin and zooxanthin) tend to be diffused throughout the substance of the feather, and give rise respectively to the red and yellow colours.

In addition to these must be reckoned turacin, a reddish- purple pigment consisting of the same elements as zoomelanin, but remarkable for the fact that it contains from 5 to 8% of copper, which can be extracted by a weak alkaline solution, such as ammonia, and with the addition of acetic acid it can be filtered off as a metallic red or blue powder. The presence of metallic copper is indicated by the green flame of these red feathers when burnt. Turacin was discovered by Sir A. H. Church in the quill-feathers of the wings of Touracoes or “plantain eaters.” These feathers, he showed, lose their colour after they have become wet, but regain it on drying. But turacin is not, as

was supposed, confined to the feathers of the plantain eaters, since it has been obtained from a cuckoo, Dasylophus superciliosus.

What effect food may have on colour in birds in a wild state we have no means of knowing, but it is significant that flamingoes and linnets in confinement never regain their bright hues after their first moult in captivity. If cayenne pepper be mixed with the food of certain strains of canaries, from the time the birds are hatched onwards, the yellow colour of the feathers becomes intensified, till it takes on a deep orange hue. Bullfinches, if fed on hemp-seed, turn black. According to Darwin, the natives of the Amazonian region feed the common green parrot on the fat of large Siluroid fishes, and as a result the feathers become beauti- fully variegated with red and yellow. Similarly, in the Malay Archipelago, the natives of Gilolo change the colours of another parrot.

With but rare exceptions bright colours are confined to the exposed portions of the plumage, but in some of the Bustards the down is of a bright pink colour.

Structural colours include all metallic or prismatic colours, blue, green, white, some yellows, and, in part, glossy black. In metallic feathers the radii (barbules) are modified co/bure™ 7 in various ways, frequently to form flattened, over- lapping plates or tiles, while the surfaces of the plates are either smooth, finely striated or pitted. But, save only in the case of white feathers, beneath this colourless, glazed outer coat there is always a layer of pigment.

The only green pigment known to occur in feathers is iura- coverdin, found in the feathers of the plantain eaters; it contains a relatively large amount of iron, but no copper. In all other cases the green colour of feathers is due to yellow, orange or greyish-brown pigment occurring with a special superstructure consisting of narrow ridges, as in some parrots and pittas (ant- thrushes), or the surface of the barbs and barbules is smooth and transparent, while between it and the pigment there exists a layer of small polygonal, colourless bodies having highly re- fractory, and often striated, surfaces.

Blue is unknown as a pigment in feathers. Blue feathers contain only orange or brownish pigment (Gadow), the blue colour being caused by the combination of pigment corpuscles and colourless striated polygonal bodies, as in green feathers.

While in many birds the coloration takes the form either of a uniform hue or of bands and patches of colour more or less brilliant, in others

the coloration is sombre, and made up of dark longitudinal stripes or transverse bars on a lighter ground. The latter is the more primitive, and there seems good reason to believe that longitudinal stripes preceded transverse bars. This is indicated by the fact that the nestlings of the more primitive groups are longitudinally striped, and that young hawks in their first plumage are so striped, while the adults are barred.

There is also evidence to show that the evolution of brilliant plumage began with the males, and has, in many cases, been more or less perfectly acquired by the females, and also by the young, as for example in the kingfishers, where parents and offspring wear the same livery. Often, where the parents are alike in plumage, the young wear a different and duller livery, as in the case of the common starling (Slurnus vulgaris). But where the female differs from the male in coloration the young resemble the female parent.

The physiological explanation of complete disappearance of pigment in adult life. e.g. gannet, is not yet apparent.

At least once annually birds renew their feathers completely by a process known as a moult. Until the new feathers have attained at least half their full length they are invested ˆ in a soft sheath, and, as development proceeds, the sheath breaks up from the tip of the feather downwards, so that for a time the new feathers have almost a brush-like appearance. Generally this replacement takes place gradually, new and old feathers occurring side by side, and on this account it is not always possible to see whether a moult is proceeding without raising the old feathers.

The ” quill ” feathers of the wing and tail are renewed in pairs, so that flight is little, if at all, impaired, the change taking place in the wing from the region of the wrist inwards, as to the primaries, and from the body outwards, towards the tip of the wing, as to the secondaries. In certain birds, however, as in the duck tribe and the rails, for example, all the quill-feathers of the wing are shed at once, so that for some time flight is impossible.

In the penguins this simultaneous method of moulting is carried still further. That is to say, the old feathers covering the body are not replaced gradually, but en masse. This method of ecdysis is, however, still further remarkable in that the old feathers do not drop out, to be succeeded by spine-like stumps which, later, split at the tip, liberating the barbs of the new feathers. They are, on the contrary, thrust out upon the tips of the new feathers, the barbs of which are never

enclosed within an envelope such as that just described. When their growth has practically completed, and not till then, the old feathers are removed in large patches by the aid of the bird's beak; ex- posing thereby a perfectly developed plumage. In the cassowary, and emeu, the old feathers similarly adhere for a time to the tips of the new; but in these birds the feathers are moulted singly as in other birds.

Some birds moult twice within the year, the additional moult taking place in the spring, as in the case of the "warblers" (Sylviidae) and Limicolae, for example. But when this is the case the spring moult is only partial, since the quill feathers of the wings and the tail feathers are not renewed.

At this spring moult a special " nuptial " plumage is often assumed, as for example in many of the Limicolae, e.g. godwits, knots, dunlin, ruff.

The sequel to this habit of assuming a nuptial dress is an interesting one. Briefly, this plumage, at first assumed at the mating period by the males only, and doffed soon after the young appear, has become retained for longer and longer periods, so that the succeeding plumage, often conspicuously dull com- pared with the nuptial dress, is worn only for a few weeks, instead of many months, as in the case of many of the ducks, for example; wherein the males, as soon as the young are hatched, assume what C. Waterton has aptly called an " eclipse " dress. This, instead of being worn till the following spring, as in the waders, is shed again in the autumn and replaced by what answers to the waders' " nuptial " dress. In the game-birds but a trace of this " eclipse " plumage remains; and this, apparently, only in jungle-fowl, the common grey partridge (Perdix citierea) and the blackcock (Lyrurus), in whose case the head and neck for a short period following the breeding season are clothed only by dull feathers. Further, this more highly developed plumage becomes transferred, first to the female, then to the young, so that, in many groups, the dull phase of plumage is entirely eliminated.

• But the assumption at the breeding season of a conspicuously brilliant plumage is not always due to a moult. In many birds, notably many Passerines, this change is brought about by shedding the tips of the feathers, which are of a duller hue than the rest of the feather. In this way the bright rose pink of the linnet's breast, the blue and black head of the chaffinch, and the black throat and chestnut-and-black markings of the back of the sparrow, are assumed — to mention but a few instances. These birds moult but once' a year, in the autumn, when the new feathers have broad brown fringes; as the spring advances these drop off, and with them the barbiccls from the

of the upper surface of the feather, thus revealing the hidden tints.

According to some authorities, however, some birdsˆ acquire a change of colour without a moult by the ascent of pigment from the base of the feather. The black head assumed by many gulls in the spring is, for example, said to be gained in this way. There is, however, not only no good evidence in support of the contention, but the whole structure of the feather is against the probability of any such change taking place.

Feathers correspond with the scales of reptiles rather than with

the hairs of mammals, as is shown by their development. They

make their first appearance in the developing chick at

Theae- about the sixth day of incubation, in the shape of small

h«. papillae. In section each papilla is found to be made up of feathers. q{ a c i uster f d erma l cells—that is to say, of cells of the deeper layer of the skin — capped by cells of the epidermis. These last form a single superficial layer of flattened cells — the epitrichium — overlaying the cells of the Malpighian layer, which are cylindrical in shape and rapidly increase to form several layers. As develop- ment proceeds the papillae assume a cone-shape with its apex directed backwards, while the base of this cone sinks down into the skin, or rather is carried. down by the growth of the Malpighian cells, so that the cone is now sunk in a deep pit. Thereby these Malpighian cells become divided into two portions: (1) those taking part in the formation of the walls of the pit or ” feather follicle,” and (2) those enclosed within the cone. These last surround the central mass or core formed by the dermis. This mass constitutes the nutritive pulp for the development of the growing feather, and is highly vascular. The cells of the Malpighian layer within the cone now become differentiated into three layers. (1) An inner, extremely thin, forming a delicate sheath for the pulp, and found in the fully developed feather in the form of a series of hollow, transparent caps enclosed within the calamus; (2) a thick layer which forms the feather itself; and (3) a thin layer which forms the investing sheath of the feather. It is this sheath which gives the curious spine- covered character to many nestling birds and birds in moult. As growth proceeds the cells of this middle

layer arrange themselves in longitudinal rows to form the barbs, while the barbules are formed by a secondary splitting. At their bases these rudimentary barbs meet to form the calamus. Finally the tips of the barbs break through the investing sheath and the fully formed down-feather emerges.

A part of the pulp and Malpighian cells remains over after the complete growth of the down-feather, and from this succeeding generations of feathers are developed. The process of this development differs from that just outlined chiefly in this: that of the longitudinal rows which in the down-feather form the barbs, two on the dorsal and two on the ventral aspect of the interior of the cylinder become stronger than the rest, combining to form the main- and after-shaft respectively. The remainder of the rods form the barbs and barbules as in the down-feather.

The reproductive power of the feather follicle appears to be almost inexhaustible, since it is not diminished appreciably by age, nor restricted to definite moulting periods, as is shown by the cruei and now obsolete custom of plucking geese alive, no less than three times annually, for the sake of their feathers. The growth of the feathers is, however, certainly affected by the general health of the bird, mal-nutrition causing the appearance of peculiar transverse V- shaped grooves, at more or less regular intervals, along the whole length of the feather. These are known as ” hunger-marks,” a name given by falconers, to whom this defect was well known.

It would seem that while the feather germ may be artificially stimulated to produce three successive generations of feathers within a year, it may, on the other hand, be induced artificially to maintain a continuous activity extending over long periods. That is to say, the normal quiescent period, and periodic moult, may be suspended, so that the feather maintains a steady and continuous growth till it attains a length of several feet. The only known instance of this kind is that furnished by a domesticated breed of jungle-fowl known as the ” Japanese long-tailed fowls ” or as ” Yokohamas.” In this breed the upper tail coverts are in some way, as yet unknown to Europeans, induced to go on growing until they have attained a length of from 12 to iS or even 20 ft. ! In this abnormal growth the ” hackles ” of the lower part of the back also share, though they do not attain a similar length.

The feathers of birds are not uniformly distributed over the body, but grow only along certain definite tracts known as pterylae, leaving bare spaces or apteria. These pterylae differ considerably in their

conformation in different groups of birds, and hence are of service in systematic ornithology.

The principal pterylae are as follows: —

(1) The head tract {pt. capitis), which embraces the head only.

(2) The spinal tract {pt. spinalis), which extends the whole length of the vertical column. It is one of the most variable in its modifications, especially in so far as the region from the base of the neck to the tail is concerned. In its simplest form it runs down the back in the form of a band of almost uniform width, but generally it

Fig

Ptcrylosis of the plover.

expands considerably in the lumbar region, as in Passeres. Frequently it is divided into two portions; an upper, terminating in the region of the middle of the back in a fork, and a lower, which commences either as a fork, e.g. plover, barbet, or as a median band, e.g. swallow. Very commonly the dorsal region of this tract encloses a more or less extensive featherless space (apterion), e.g. swift, auk. While, as a rule, the dorsal region of this tract is relatively narrow, it is in some of great breadth, e.g. grebe, pigeon, coly.

(3) The ventral tract (pt. ventralis), which presents almost as many variations as the spinal tract.

In its simplest form it runs from the throat backwards in the form of a median band as far as the base of the neck where it divides, sending a branch to each side of the breast. This branch commonly again divides into a short, broad outer branch which lodges the “flank” feathers, and a long, narrow, inner branch which runs backwards to join its fellow of the opposite side in front of the cloacal aperture. This branch lodges the abdominal feathers. The median space which divides the inner branches of the tract may be continued forwards as far as the middle of the neck, or even up to the throat, e.g. plover. Only in a few cases is the neck continuously covered by the fusion of the dorsal and ventral tracts, e.g. flamingo, Anseres, Ciconidae, Pygopodes.

For convenience sake the cervical portions of the spinal and ventral tracts are generally regarded as separate tracts, the pt. colli dorsalis and pt. colli ventralis respectively.

(4) The humeral tract [pt. humeralis), which gives rise to the ”

scapular ” feathers.

(5) The femoral tract {pt. femoralis), which forms an oblique band across the thigh.

(6) The crural tract (pt. cruralis), which clothes the rest of the leg.

(7) The tail tract (pt. caudalis), including the tail feathers and their coverts; and

(8) The wing tract (pt. alaris). The wing tract presents many peculiar features. Each segment — arm, forearm and hand — bears feathers essential to flight, and these are divided into remiges, or ” quill ” feathers, and tectrices, or ” coverts.”

The remiges of the arm, more commonly described as ” tertiaries,” are, technically, collectively known as the parapteron and hypopteron, and are composed respectively of long, quill-like feathers forming a double series, the former arranged along the upper, and the latter along the lower aspect of the humerus. They serve to fill up the gap which, in long-winged birds, would otherwise occur during flight between the quill-feathers of the forearm and the body, a gap which would make flight impossible. In short-winged birds these two series are extremely reduced.

The remiges range in number from 16, as in humming-birds, to 48 as in the albatross, according, in short, to the length of the wing. But these numerical differences depend, in flying birds, rather upon the length of the forearm, since the quills of the hand never exceed 12 and never fall below 10, though the tenth may be reduced to a mere vestige.

The quills of the forearm are known as ” secondaries,” those of the hand as ” primaries.” The former are attached by their bases at relatively wide distances apart to the ulna, while the primaries are crowded close together and attached to the skeleton of the hand. The six or seven which rest upon the fused metacarpals II.-III. are known as ” metacarpals.” The next succeeding feather is borne by the phalanx of digit III. and hence is known as the addigital. Phalanx i. of digit II. always supports two quills, the “middigitals,” while the remaining feathers — one or two — are borne by the last phalanx of digit II. and are known as pre-digitals, while the whole series of primaries are known as the metacarpo-digitals.

In their relation one to another the remiges, it must be noted, arc always so placed that they overlap one another, the free edge of each,

when the wing is seen from its upper surface, being turned towards the tip of the wing._ Thus, in flight, the air passes through the wing as it is raised, while in the downstroke the feathers are forced together to form a homogeneous surface.

_ Birds which fly much have the outer primaries of great length, giving the wing a pointed shape, as in swifts, while in species which fly but little, or frequent thickets, the outer primaries are very short, giving the wing a rounded appearance. This adaptation to environ- ment is commonly lost sight of by taxonomers, who not infrequently use the form of the wing as a factor in classification.

The tectrices, or covert feathers of the wing, are arranged in several series, decreasing in size from behind forwards. The number of rows on the dorsal aspect and the method of their overlap, afford characters of general importance in classification.

The first row of the series is formed by the major coverts; these, like the primaries, have their free-edges directed towards the tip of the wing, and hence are said to have a distal overlap. The next row is formed by the median coverts. These, on the forearm, commonly overlap as to the outer half of the row distally, and as to the inner half proximally. On the hand this series is incomplete. Beyond the median are four or five rows of coverts known as the minor coverts. These may have either a proximal or a distal overlap. The remaining rows of small feathers are known as the marginal coverts, and they always have a distal overlap.

The three or four large quill-like feathers borne by the thumb form what is known as the “bastard-wing,” ala spuria.

The coverts of the under follow an arrangement similar to that of the upper surface, but the minor coverts are commonly but feebly developed, leaving a more or less bare space which is covered by the great elongation of the marginal series.

One noteworthy fact about the coverts of the under side of the wing is that all save the major and median coverts have what answers to the dorsal surfaces of the feather turned towards the body, and what answers to the ventral surface of the feather turned towards the under surface of the wing. In the major and median coverts, however, the ventral surfaces of these feathers are turned ventral- wards, that is to

say, in the extended wing they, like the remiges, have the ventral surfaces turned downwards or towards the body in the closed wing.

But the most remarkable fact in connexion with the pterylosis of the wing is the fact that in all, save the Passerine and Galliform types, and some few other isolated exceptions, the secondary series of remiges appears always to lack the fifth remex, counting from the wrist inwards, inasmuch as, when such wings are examined, there is always found, in the place of the fifth remex, a pair of major coverts only, while throughout the rest of the series each such pair of coverts embraces a quill.

This extraordinary fact was first discovered by the French naturalist Z. Gerbe, and was later rediscovered by R. S. Wray: Neither of these, however, was able to offer any explanation thereof. This, however, has since been attempted, simultaneously, by P. C. Mitchell and W. P. Pycraft. The former has aptly coined the word diastataxic to denote the gap in the series, and eutaxic to denote such wings as have an uninterrupted series of quills. While both authors agree that there is no evidence of any loss in the number of the quills in diastataxic wings, they differ in the interpretation as to which of the two conditions is the more primitive and the means by which the gap has been brought about.

According to Mitchell the diastataxic is the more primitive condition, and he has conclusively shown a way in which diastataxic wings may become eutaxic. Pycraft on the other hand contends that the diastataxic wing has been derived from the eutaxic type, and has produced evidence showing, on the one hand, the method by which this transition is effected, and on the other that by which the diastataxic wing may again recover the eutaxic condition, though in this last particular the evidence adduced by Mitchell is much more complete. The matter is, however, one of considerable difficulty, but is well worth further investigation.

The wings of struthious birds differ from those of the Carinatae, just described, in many ways. -All are degenerate and quite useless as organs of flight. In some cases indeed they have become reduced to mere vestiges.

Those of the ostrich arid Rhea are the least degraded.

In the ostrich ankylosis has prevented the flexion of the hand at the wrist joint so that the quills — primaries and secondaries — form an unbroken series of about forty in number. Of these sixteen belong to

the primary or metacarpo-digital series, a number exceeding that of any other bird. What the significance of this may be with regard to the primitive wing it is impossible to say at present. The coverts, in their disposition, bear a general resemblance to those of Carinate wings; but they differ on account of the great length of the feathers and the absence of any definite overlap.

The wing of the South American Rhea more nearly resembles that of flying birds since the hand can be flexed at the wrist joint, and the primaries are twelve in number, as in grebes, and some storks, for example.

The coverts, as in the African ostrich, are remarkable for their great length, those representing the major series being as long as the remiges, a fact probably due to the shortening of the latter. They are not, however, arranged in quincunx, as is the rule among the Carinatae, but in parallel, transverse rows, in which respect they resemble the owls.

In both ostrich and Rhea, as well as in all the other struthious birds, the under surface of the wing is entirely bare.

The wing of the cassowary, emeu and apteryx has undergone complete degeneration ; so much so that only a vestige of the hand remains.

Remiges in the cassowary are represented by a few spine-like shafts — three primaries and two secondaries. These are really hypertrophied calami. This is shown by the fact that in the nestling these remiges have a normal calamus, rhachis and vane; but as development proceeds the rhachis with its vane sloughs off, while the calamus becomes enormously lengthened and solid.

In the emeu the wing is less atrophied than in the cassowary,

but is not yet completely degenerate. Altogether seventeen remiges are represented, of which seven correspond to primaries. Since, however, these feathers have each an aftershaft as long as the main shaft — like the rest of the body feathers — it may be that they answer not to remiges, but to major coverts.

The wing of apteryx, like that of the cassowary, has become extremely reduced. The remiges are thirteen in number, four of which answer to primaries. These feathers are specially interesting, inasmuch as they retain throughout life a stage corresponding to that seen in the very young cassowary, the calamus being greatly swollen, and supporting a very degenerate rhachis and vane.

_ The penguins afford another object-lesson in degeneration of this kind. Here the wing has become transformed into a paddle, clothed on both_ sides with a covering of small, close-set feathers. A pollex is wanting, as in the cassowary, emeu and apteryx, while it is impossible to say whether remiges are represented or not. , Authorities. — The following authors should be consulted for further details on this subject: —

For General Reference as to Structure, Colour, Development and Pterylosis. — H. Gadow, in Newton's Dictionary of Birds (1896); W. P. Pycraft, " The Interlocking of the Barbs of Feathers," Natural Science (1893).

On the Colours of Feathers. — J. L. Bonhote, " On Moult and Colour Change in Birds," Ibis (1900); A. H. Church, "Researches on Turacin, an Animal Pigment containing Copper," Phil. Trans. clix. (1870), pt. ii. ; H. Gadow, "The Coloration of Feathers as affected by Structure," Proc. Zool. Soc. (1882) ; Newbegin, Colour in Nature (1898) ; R. M. Strong, " The Development of Color in the Definitive Feather," hull. Mus. Zool. Harvard College, vol. xl.

On Moulting. — J. Dwight, " The Sequences of Plumage and Moults of the Passerine Birds of New York," Annals N. Y.Acad. Sci., vol. xiii. (1900); W. E. De Winton, " On the Moulting of the King Penguin," Proc. Zool. Soc. (1898-1899); W. P. Pycraft, " On some Points in the Anatomy of the Emperor and Adelie Penguins, "Report National Antarctic Expedition, vol. ii. (1907).

On Development of Embryonic, Nestling and Adult Feathers. — T. H. Studer, " Die Entwicklung der Federn," Inaug.-Diss. (Bern, 1873); " Beitrage zur Entwickl. der Feder," Zeitsch.f. wiss. Zool., Bd. xxx. ; J. T. Cunningham, " Observations and Experiments on Japanese Long-tailed Fowls," Proc. Zool. Soc. (1903) ; H. R. Davies, " Beitrag zur Entwicklung der Feder," MorpK. Jahrb. xiv. (1888), xv. (1889); W. P. Pycraft, " A Contribution towards our Knowledge of the Morphology of the Owls," Trans. Linn. Soc. (1898) ; W. P. Pycraft, " A Contribution towards our Knowledge of the Pterytography of the Megapodii," Report Willey's Zoological Results, pt. iv. (J900); W. P. Pycraft, " Nestling Birds and some of the Problems they Present," British Birds (1907).

On Pterylosis. — H. Gadow, " Remarks on the Numbers and on the Phylogenetic Development of the Remiges of Birds," Proc. Zool. Soc. (1888); Z. Gerbe, " Sur les plumes du vol et leur mue," Bull. Soc. Zool. France, vol. ii. (1877); J. G. Goodchild, " The Cubital Coverts of the

Euornithae in relation to Taxonomy," Proc. Roy. Phys. Edinb. vol. x. (1890-1891); Meijere, " Uber die Federn der Voge'l," Morphol. Jahrb. xxiii. (1895) ; P. C. Mitchell, " On so-called ' Quinto- cubitalism ' in the Wing of Birds," Journ. Linn. Soc. Zool. vol. xxvii. (1899); "On the Anatomy of the Kingfishers, with special reference to the Conditions known as Eutaxy and Diastataxy," Ibis (1901); C. L. Nitzsch, "Pterytography," Ray Soc. (1867); W. P. Pycraft, " Some Facts concerning the so-called ' Aquinto- cubitalism ' of the Bird's Wing," Journ. Linn. Soc. vol. xxvii ; C. J. Sundevall, " On the Wings of Birds," Ibis (1886) ; R. S. Wray, " On some Points in the Morphology of the Wings of Birds," Proc. Zool. Soc. (1887). (\V. P. P.)

Commercial Applications of Feathers. — The chief purposes for which feathers become commercially valuable may be compre- hended under four divisions: — (1) bed and upholstery feathers; (2) quills for writing; (3) ornamental feathers; and (4) mis- cellaneous uses of feathers.

Bed and Upholstery Feathers. — The qualities which render feathers available for stuffing beds, cushions, &c, are lightness; elasticity, freedom from matting and softness. These are combined in the most satisfactory degree in the feathers of the goose and of several other allied aquatic birds, whose bodies are protected with a warm downy covering. Goose feather* and down, when plucked in spring from the living bird, are most esteemed, being at once more elastic, cleaner and less liable tc- taint than those obtained from the bodies of killed geese. The down of the eider duck, Anas mollissima, is valued above aP other substances for lightness, softness and elasticity ; but it has some tendency to mat, and is consequently more used for quilts and in articles of clothing than unmixed for stuffing beds- The feathers of swans, ducks and of the common domestic fow\ are also largely employed for beds ; but in the case of the latter bird, which is of course non-aquatic, the feathers are harsher

and less downy than are those of the natatorial birds generally. Feathers which possess strong or stiff shafts cannot without some preliminary preparation be used for stuffing purposes, as the stiff points they present would not only be highly uncomfort- able, but would also pierce and cause the escape of the feathers from any covering in which they might be enclosed. The barbs are therefore stripped or cut from these feathers, and when so prepared they, in

common with soft feathers and downs, undergo a careful process of drying and cleaning, without which they would acquire an offensive smell, readily attract damp, and harbour vermin. The drying is generally done in highly heated apartments or stoves, and subsequently the feathers are smartly beaten with a stick, and shaken in a sieve to separate all dust and small debris.

Quills for Writing. — The earliest period at which the use of quill feathers for writing purposes is recorded is the 6th century; and from that time till the introduction of steel pens in the early part of the 19th century they formed the principal writing implements of civilized communities. It has always been from the goose that quills have been chiefly obtained, although the swan, crow, eagle, owl, hawk and turkey all have more or less been laid under contribution. Swan quills, indeed are better and more costly than are those from the goose, and for fine lines crow quills have been much employed. Only the five outer wing feathers of the goose are useful for writing, and of these the second and third are the best, while left-wing quills are also generally more esteemed than those of the right wing, from the fact that they curve outward and away from the writer using them. Quills obtained in spring, by plucking or otherwise, from living birds are by far the best, those taken from dead geese, more especially if fattened, being comparatively worthless. To take away the natural greasiness to remove the superficial and internal pellicles of skin, and to give the necessary qualities of hardness and elasticity, quills require to undergo some processes of preparation. The essential operation consists in heating them, generally in a fine sand-bath, to from 130 to 180° F. according to circumstances, and scraping them under pressure while still soft from heat, whereby the outer skin is removed and the inner shrivelled up. If the heating has been properly effected, the quills are found on cooling to have become hard, elastic and somewhat brittle. While the quills are soft and hot, lozenge-shaped patterns, ornamental designs, and names are easily and permanently impressed on them by pressure with suitable instruments or designs in metal stamps.

Ornamental Feathers. — Feathers do not appear to have been much used, in Europe at least, for ornamental purposes till the close of the 13th century. They are found in the conical caps worn in England during the reigns of Edward III. and Richard II.; but not till the period of Henry V. did they take their place as a part of military costume. Towards the close of the 15th century the fashion of wearing feathers in both civil and military life was carried to an almost ludicrous excess. In the time of Henry VIII. they first appeared in the bonnets of ladies; and during Elizabeth's reign feathers began to occupy an impor- tant place as head-dress ornaments of women. From that time

down to the present, feathers of endless variety have con- tinued to be leading articles of ornamentation in female head- attire; but, except for military plumes, they have long ceased to be worn in ordinary male costume. At the present day, the feathers of numerous birds are, in one way or another, turned to account by ladies for the purpose of personal ornament. Ostrich feathers, however, hold, as they have always held, a pre-eminent position among ornamental feathers; and the ostrich is the only bird which may be said to be reared exclusively for the sake of its feathers. Ostrich farming is one of the estab- lished industries of South Africa, and is also practised in Kordofan and other semi-desert regions of North Africa, in Argentina, and in Arizona and California in North America. The feathers are generally plucked from the living animal — a process which does not appear to cause any great inconvenience. In the male bird, the long feathers of the rump and wings are white, and the short feathers of the body are jet black; while the rump and

wing feathers of the female are white tinged with a dusky grey, the general body colour being the latter hue. The feathers of the male are consequently much more valuable than those of the female, and they are separately classified in commerce. The art of the plumassier embraces the cleaning, bleaching, dyeing, curling and making up of ostrich and other plumes and feathers. White feathers are simply washed in bundles in hot soapy water, run through pure warm water, exposed to sulphurous fumes for bleaching, thereafter blued with indigo solution, rinsed in pure cold water, and hung up to dry. When dry the shafts are pared or scraped down to give the feathers greater flexibility, and the barbs are curled by drawing them singly over the face of a blunt knife or by the cautious application of a heated iron. Dull-coloured feathers are usually dyed black. Feathers which are dyed light colours are first bleached by exposure in the open air. Much ingenuity is displayed in the making up of plumes, with the general result of producing the appearance of full, rich, and long feathers from inferior varieties and from scraps and fragments of ostrich feathers; and so dexterously can factitious plumes be prepared that only an experienced person is able to detect the fabrication.

In addition tc those of the ostrich, the feathers of certain other birds form articles of steady commercial demand. Among these are the feathers of the South American ostrich, Rhea americana, the marabout feathers of India obtained from Leptoptilos argala and L. javanica, the aigrettes of the heron, the feathers of the various species of birds of paradise, and of numerous species of humming-birds. Swan-down and the skins of various penguins and grebes and of the albatross are used, like fur, for muffs and collarettes.

The Chinese excel in the preparation of artificial flowers and other ornaments from bright natural-coloured or dyed feathers; and the French also skilfully work fragments of feathers into bouquets of artificial flowers, imitation butterflies, &c.

Miscellaneous Applications of Feathers. — Quills of various sizes are extensively employed as holders for the sable and camel hair brushes used by artists, &c. Feather brushes and dusters are made from the wing-feathers of the domestic fowl and other birds; those of a superior quality, under the name of vulture dusters, being really made of American ostrich feathers. A minor application of feathers is found in the dress- ing of artificial fly-hooks for fishing. As steel pens came into general use it became an object of considerable importance to find applications for the supplanted goose-quills, and a large field of employment for them was found in the preparation of toothpicks. (J. Pa; W. P. P.)

FEATHERSTONE, an urban district in the Osgoldcross parliamentary division of the West Riding of Yorkshire, England, 6 m. E. of Wakefield on the Lancashire & Yorkshire railway. Pop. (1901) 12,093. The industrial population is employed in large collieries in the vicinity; and here, on the 7th of September 1893, serious riots during a strike resulted in the destruction of some of the colliery works belonging to Lord Masham, and were not quelled without military intervention and some blood- shed.

FEATLEY (or Fairclough) DANIEL (1 582-1645), English divine, was born at Charlton, Oxfordshire, on the 15th of March 1582. He was a scholar of Corpus Christi College, Oxford, and probationer fellow in 1602, after which he went to France as chaplain to the English ambassador. For some years he was domestic chaplain to George Abbot, archbishop of Canterbury, and held also the rectories of Lambeth (1619), Allhallows, Bread Street (c. 1622), and Acton (1627), this last after leaving the archbishop's service in 1625. His varied activities included a " scholastick duel " with James I. in 1625, and the publication of (1) the report of a conference with some Jesuits in 1624, (2) a devotional manual entitled Ancilla Pietatis (1626), (3) Mystica Clavis, a Key opening divers Difficult Texts of Scripture in 70 Sermons (1636). He was appointed provost of Chelsea College in 1630, and in 1641 was one of the sub-committee " to settle religion." In the course of this work he had a disputation with four Baptists at Southwark which he commemorated in his book

KaTafiaimcrTai KaraiTTVCTol, The Dippers dipt or the Anabaptists duckl and plunged over head and ears (1645). He sat in the Westminster Assembly 1643. and was the last of the Episcopal members to remain. For revealing its proceedings he was expelled and imprisoned. He died at Chelsea on the 17th of April 1645.

FEBRONIANISM, the name given to a powerful movement within the Roman Catholic Church in Germany, in the latter part of the 18th century, directed towards the ” nationalizing ” of Catholicism, the restriction of the monarchical power usurped by the papacy at the expense of the episcopate, and the reunion of the dissident churches with Catholic Christendom. It was thus, in its main tendencies, the equivalent of what in France is known as Gallicanism (?.».)• The name is derived from the pseudonym of ” Justinus Febronius ” adopted by Johann Nikolaus von Hontheim (q.v.), coadjutor bishop of Treves (Trier), in publishing his work De statu ecclesiae et legitima potestate Romani pontificis. This book, which roused a vast amount of excitement and controversy at the time, exercised an immense influence on opinion within the Roman Catholic Church, and the principles it proclaimed were put into practice by the rulers of that Church in various countries during the latter part of the 1 8th and the beginning of the 19th century.

The main propositions defended by ” Febronius ” were as follows. The constitution of the Church is not, by Christ’s institution, monarchical, and the pope, though entitled to a certain primacy, is subordinate to the universal Church. Though as the ” centre of unity ” he may be regarded as the guardian and champion of the ecclesiastical law, and though he may propose laws, and send legates on the affairs of his primacy, his sovereignty {principatiis) over the Church is not one of jurisdic- tion, but of order and collaboration (ordinis et consociationis) . The Roman (ultramontane) doctrine of papal infallibility is not accepted ” by the other Catholic Churches ” and, moreover, ” has no practical utility.” The Church is based on the one episcopacy common to all bishops, the pope being only primus inter pares. It follows that the pope is subject to general councils, in which the bishops are his colleagues (conjudices), not merely his consultors; nor has he the exclusive right to summon such councils. The decrees of general councils need not be confirmed by the pope nor can they be altered by him; on the other hand, appeal may be made from papal decisions to a general council. As for the rights of the popes in such matters as appeals, reserva- tions, the confirmation, translation and deposition of bishops, these belong properly to the bishops in provincial synods, and

were usurped by the papacy gradually as the result of a variety of causes, notably of the False Decretals. For the health of the Church it is therefore necessary to restore matters to their condi- tion before the False Decretals, and to give to the episcopate its due authority. The main obstacle to this is not the pope himself, but the Curia, and this must be fought by all possible means, especially by thorough popular education (primum adversus abusum ecclesiasticaepotestalis remcdium), and by the assembling of national and provincial synods, the neglect of which is the main cause of the Church's woes. If the pope will not move in the matter, the princes, and notably the emperor, must act in co-operation with the bishops, summon national councils even against the pope's will, defy his excommunication, and in the last resort refuse obedience in those matters over which the papacy has usurped jurisdiction.

It will be seen that the views of Febronius had but little originality. In the main they were those that predominated in the great general councils of Constance and Basel in the 15th century; but they were backed by him with such a wealth of learning, and they fitted so well into the intellectual and political conditions of the time, that they found a widespread acceptance. The book, indeed, was at once condemned at Rome (February 1764), and by a brief of the 21st of May the pope commanded all the bishops of Germany to suppress it. The papal condemna- tion met with a very mixed reception ; in some dioceses the order 10 prohibit the book was ignored, in others action upon it was postponed pending an independent examination, in yet others

(nine in all) it was at once obeyed "for political reasons," though even in these the forbidden book became the " breviary of the governments." The Febronian doctrine, in fact, exactly fitted the views of the German bishops, which were by no means disinterested. It must be remembered that the bishops were at this time great secular princes rather than Catholic prelates; with rare exceptions, they made no pretence of carrying out their spiritual duties; they shared to the full in the somewhat shallow "enlightenment" of the age. As princes of the Empire they had asserted their practical independence of the emperor; they were irked by what they considered the unjustifiable interference of the Curia with their sovereign prerogatives, and wished to establish their independence of the pope also. In the ranks of the hierarchy, then, selfish motives combined with others more respectable to secure the acceptance of the Febronian position. Among secular rulers the welcome given to it was even less equivocal. Even so devout a sovereign as Maria Theresa refused to allow " Febronius " to be forbidden in the Habsburg dominions; her son, the emperor Joseph

II., applied the Febronian principles with remorseless thoroughness. In Venice, in Tuscany, in Naples, in Portugal, they inspired the vigorous efforts of ” enlightened despots ” to reform the Church from above; and they gave a fresh impetus to the move- ment against the Jesuits, which, under pressure of the secular governments, culminated in the suppression of the Society by Pope Clement XIV. in 1773. ” Febronius,” too, inspired the proceedings of two notable ecclesiastical assemblies, both held in the year 1786. The reforming synod which met at Pistoia under the presidency of the bishop, Scipione de’ Ricci, is dealt with elsewhere (see Pistoia). The other was the so- called congress of Ems, a meeting of the delegates of the four German archbishops, which resulted, on the 25th of August, in the celebrated “Punctation of Ems,” subsequently ratified and issued by the archbishops. This document was the outcome of several years of controversy between the archbishops and the papal nuncios, aroused by what was considered the un- justifiable interference of the latter in the affairs of the German dioceses. In 1769 the three archbishop-electors of Mainz, Cologne and Treves (Trier) had drawn up in thirty articles their complaints against the Curia, and after submitting them to the emperor Joseph II., had forwarded them to the new pope, Clement XIV. These articles, though ” Febronius ” was prohibited in the archdioceses, were wholly Febronian in tone; and, indeed, Bishop von Hontheim himself took an active part in the diplomatic negotiations which were their outcome. In drawing up the ” Punctation ” he took no active part, but it was wholly inspired by his principles. It consisted of XXIII. articles, which may be summarized as follows. Bishops have, in virtue of their God-given powers, full authority within their dioceses in all matters of dispensation, patronage and the like; papal bulls, briefs, &c, and the decrees of the Roman Congrega- tions are only of binding force in each diocese when sanctioned by the bishop; nunciatures, as hitherto conceived, are to cease; the oath of allegiance to the pope demanded of bishops since Gregory VII. ‘s time is to be altered so as to bring it into conformity with episcopal rights; annates and the fees payable for the pallium and confirmation are to be lowered and, in the event of the pallium or confirmation being refused, German archbishops and bishops are to be free to exercise their office under the protection of the emperor; with the Church tribunals of first and second instance (episcopal and metropolitan) the nuncios are not to interfere, and, though appeal to Rome is allowed under certain ” national ” safe-guards, the opinion is expressed that it would be better to set up in each archdiocese a final court of appeal representing the provincial synod; finally the emperor is prayed to use his influence with the pope to secure the assembly of a national council in order to remove the griev- ances left unredressed

by the council of Trent.

Whether this manifesto would have led to a reconstitution of the Roman Catholic Church on permanently Febronian lines must for ever remain doubtful. The French Revolution inter- vened; the German Church went down in the storm: and in

1803 the secularizations carried out by order of the First Consul put an end to the temporal ambitions of its prelates. Febronianism indeed, survived. Karl Theodor von Dalberg, prince primate of the Confederation of the Rhine, upheld its principles throughout the Napoleonic epoch and hoped to establish them in the new Germany to be created by the congress of Vienna. He sent to this assembly, as representative of the German Church, Bishop von Wessenberg, who in his diocese of Constance had not hesitated to apply Febronian principles in reforming, on his own authority, the services and discipline of the Church. But the times were not favourable for such experiments. The tide of reaction after the Revolutionary turmoil was setting strongly in the direction of traditional authority, in religion as in politics; and that ultramontane movement which, before the century was ended, was to dominate the Church, was already showing signs of vigorous life. Moreover, the great national German Church of which Dalberg had a vision — with himself as primate — did not appeal to the German princes, tenacious of their newly acquired status as European powers. One by one these entered into concordats with Rome, and Febronianism from an aggressive policy subsided into a speculative opinion. As such it survived strongly, especially in the universities (Bonn especially had been, from its foundation in 1774, very Febronian), and it reasserted itself vigorously in the attitude of many of the most learned German prelates and professors towards the question of the definition of the dogma of papal infallibility in 1870. It was, in fact, against the Febronian position that the decrees of the Vatican Council were deliberately directed, and their promulgation marked the triumph of the ultramontane view (see Vatican Council, Ultramontantsm, Papacy). In Germany, indeed, the struggle against the papal monarchy was carried on for a while by the governments on the so-called Kulturkampf, the Old Catholics representing militant Febronian- ism. The latter, however, since Bismarck ” went to Canossa,” have sunk into a respectable but comparatively obscure sect, and Febronianism, though it still has some hold on opinion within the Church in the chapters and universities of the Rhine

provinces, is practically extinct in Germany. Its revival under the guise of so- called Modernism drew from Pope Pius X. in 1908 the scathing condemnation embodied in the encyclical Pascendi gregis.

Authorities. — See Justinus Febronius, De statu ecclesiae et legilima potestae Romani pontificis (Bullioni, 1765), second and enlarged edition, with new prefaces addressed to Pope Clement XIII., to Christian kings and princes, to the bishops of the Catholic Church, and to doctors of theology and canon law; three additional volumes, published in 1770, 1772 and 1774 at Frankfort, are devoted to vindications of the original work against the critics. In the Revue des deux mondes for July 1903 (tome xvi. p. 266) is an interest- ing article under the title of " L'Allemagne Catholique," from the papal point of view, by Georges Goyau. For the congress of Ems see Herzog-Hauck, Realencyklopadie (Leipzig, 1898), s.v. " Emser Kongress." Further references are given in the article on Hontheim (q.v.). (W. A. P.)

FEBRUARY, the second month of the modern calendar. In ordinary years it contains 28 days; but in bissextile or leap year, by the addition of the intercalary day, it consists of 29 days. This month was not in the Romulian calendar. In the reign of Numa two months were added to the year, namely, January at the beginning, and February at the end; and this arrange- ment was continued until 452 B.C., when the decemvirs placed February after January. The ancient name of Februarius was derived from februare, to purify, or from Februa, the Roman festival of general expiation and lustration, which was celebrated during the latter part of this month. In February also the Lupercalia were held, and women were purified by the priests of Pan Lyceus at that festival. The Anglo-Saxons called this month Sprout-Kale from the sprouting of the cabbage at this season. Later it was known as Solmonath, because of the return of the sun from the low latitudes'. The most generally noted days of February are the following:— the 2nd, Candlemas day, one of the fixed quarter days used in Scotland; the 14th, St Valen- tine's day; and the 24th, St Matthias. The church festival of St Matthias was formerly observed on the 25th of February in bissextile years, but it is now invariably celebrated on the 24th.

FEBVRE, ALEXANDRE FREDERIC (1835-), French actor, was born in Paris, and after the usual apprenticeship in the provinces and in several Parisian theatres in small parts, was called to the Comedie Francaise in 1866, where he made his debut as Philip II. in Don Juan d'Autriche. He soon became the most popular leading man in Paris, not only in the classical repertoire, but in contemporary novelties. In

1894 he toured the principal cities of Europe, and, in 1895, of America. He was also a composer of light music for the piano, and published several books of varying merit. He married Mdlle Harville, daughter of one of his predecessors at the Comedie Francaise, herself a well-known actress.

FECAMP, a seaport and bathing resort of northern France, in the department of Seine-Inferieure, 28 m. N.N.E. of Havre on the Western railway. Pop. (1906) 15,872. The town, which is situated on the English Channel at the mouth of the small river Fecamp, consists almost entirely of one street upwards of 2 m. in length. It occupies the bottom and sides of a narrow valley opening out towards the sea between high cliffs. The most important building is the abbey church of La Trinite, dating for the most part from 1175 to 1225. The central tower and the south portal (13th century) are the chief features of its simple exterior; in the interior, the decorative work, notably the chapel-screens and some fine stained glass, is remarkable. The hotel-de-ville with a municipal museum and library occupy the remains of the abbey buildings (18th century). The church of St Etienne (16th century) and the Benedictine liqueur distillery, 1 a modern building which also contains a museum, are of some interest. A tribunal and chamber of commerce, a board of trade-arbitrators and a nautical school, are among the public institutions. The port consists of an entrance channel nearly 400 yds. long leading to a tidal harbour and docks capable of receiving ships drawing 26 ft. at spring-tide, 19 ft. at neap-tide. Fishing for herring and mackerel is carried on and the town equips a large fleet for the codbanks of Newfoundland and Iceland. The chief exports are oil-cake, flint, cod and Benedic- tine liqueur. Imports include coal,timber, tar and hemp. Steam sawing, metal-founding, fish-salting, shipbuilding and repairing, and the manufacture of ship's-biscuits and fishing-nets are among the industries.

The town of F6camp grew up round the nunnery founded in 658 to guard the relic of the True Blood which, according to the legend, was found in the trunk of a fig-tree drifted from Palestine to this spot, and which still remains the most precious treasure of the church. The original convent was destroyed by the North- men, but was re-established by Duke William Longsword as a house of canons regular, which shortly afterwards was converted into a Benedictine monastery. King Richard I. greatly enlarged this, and rebuilt the church. The town achieved some prosperity under the dukes of Normandy, who improved its harbour, but after the annexation of Normandy to France it was overshadowed by the rising port of Havre.

FECHNER, GUSTAV THEODOR (1801-1887), German experi- mental psychologist, was born on the 19th of April 1801 at Gross-Sarchen, near Muskau, in Lower Lusatia, where his father was pastor. He was educated at Sorau and Dresden and at the university of Leipzig, in which city he spent the rest of his life. In 1834 he was appointed professor of physics, but in 1839 contracted an affection of the eyes while studying the phenomena of colour and vision, and, after much suffering, resigned. Subse- quently recovering, he turned to the study of mind and the relations between body and mind, giving public lectures on the subjects of which his books treat. He died at Leipzig on the 18th of November 1887. Among his works may be mentioned: Das Buchlein vom Leben nach dem Tode (1836, 5th ed., 1903), which has been translated into English; Nanna, oder iiber das Seelenleben der Pflanzen (1848, 3rd ed., 1903); Zendavestaˆ oder

1 The liqueur is said to have been manufactured by the Benedictine monks of -the abbey as far back as 1510; since the Revolution it has been produced commercially by a secular company. The familiar legend D. O. M. (Deo Optimo Maximo) on the bottles preserves the memory of its original makers.

iiber die Binge des Himmels und des Jenseits (1851, 2nd ed. by Lasswitz, 1901); Uber die physikalische und philosophische Atomenlehre (1853, 2nd ed., 1864); Elemente der Psychophysik (i860, 2nd ed., 1889); Vorschule der Asthetik (1876, 2nd ed., 1898); Die Tagesansicht gegeniiber der Nachtansicht (1879). He also published chemical and physical papers, and translated chemical ‘works by J. B. Biot and L. J. Thenard from the French. A different but essential side’ of his character is seen in his poems and humorous pieces, such as the Vergleichende Anatomie der Engel (1825), written under the pseudonym of ” Dr Mises.” Fechner’s epoch-making work was his Elemente der Psychophysik (i860). He starts from the Spinozistic thought that bodily facts and conscious facts, though not reducible one to the other, are different sides of one reality. His originality lies in trying to discover an exact mathematical relation between them. The most famous outcome of his inquiries is the law known as Weber’s or Fechner’s law which may be expressed as follows: — ” In order that the intensity of a sensation may increase in arith- metical progression, the stimulus must increase in geometrical progression.” Though holding good within certain limits only, the law has been found immensely useful. Unfortunately, from the tenable theory that the

intensity of a sensation increases by definite additions of stimulus, Fechner was led on to postulate a unit of sensation, so that any sensation s might be regarded as composed of n units. Sensations, he argued, thus being representable by numbers, psychology may become an ” exact ” science, susceptible of mathematical treatment. His general formula for getting at the number of units in any sensation is s = C log R, where s stands for the sensation, r for the stimulus numerically estimated, and c for a constant that must be separ ately determined by experiment in each particular order of sensi- bility. This reasoning of Fechner’s has given rise to a great mass of controversy, but the fundamental mistake in it is simple. Though stimuli are composite, sensations are not. ” Every sensation,” says Professor James, ” presents itself as an indivisible unit; and it is quite impossible to read any clear meaning into the notion that they are masses of units combined.” Still, the idea of the exact measurement of sensation has been a fruitful one, and mainly through his influence on Wundt, Fechner was the father of that ” new ” psychology of laboratories which investigates human faculties with the aid of exact scientific apparatus. Though he has had a vast influence in this special department, the disciples of his general philosophy are few. His world-conception is highly animistic. He feels the thrill of life everywhere, in plants, earth, stars, the total universe. Man stands midway between the souls of plants and the souls of stars, who are angels. God, the soul of the universe, must be conceived as having an existence analogous to men. Natural laws are just the modes of the unfolding of God’s perfection. In his last work Fechner, aged but full of hope, contrasts this joyous ” daylight view ” of the world with the dead, dreary ” night view ” of materialism. Fechner’s work in aesthetics is also important. He conducted experiments to show that certain abstract forms and proportions are naturally pleasing to our senses, and gave some new illustrations of the working of aesthetic association. Fechner’s position in reference to predecessors and contemporaries is not very sharply defined. He was remotely a disciple of Schelling, learnt much from Herbart and Weisse, and decidedly rejected Hegel and the monadism of Lotze.

See W. Wundt, G. Th. Fechner (Leipzig, 1901); A. Elsas, ” Zum Andenken G. Th. Fechners,” in Grenzbote, 1888; J. E. Kuntze, G. Th. Fechner (Leipzig, 1892); Karl Lasswitz, G. Th. Fechner (Stuttgart, 1896 and 1902); E. B. Titchener, Experimental Psy- chology (New York, 1905) ; G. F. Stout, Manual of Psychology (1898), bk. ii. ch. vii. ; R. Falckenberg, Hist, of Mod. Phil. (Eng. trans., 1895), pp. 601 foil.; H. Hoffding, Hist, of Mod. Phil. (Eng. trans., 1900), vol. ii. pp. 524 foil.; Liebe, Fechners Metaphysik, im Umrlss dargestellt (1903). (H.

St.)

FECHTER, CHARLES ALBERT (1824-1879), Anglo-French actor, was born, probably in London, on the 23rd of October 1824, of French parents, although his mother was of Piedmontese and his father of German extraction. The boy would probably

have devoted himself to a sculptor's life but for the accident of a striking success made in some private theatricals. The result was an engagement in 184 1 to play in a travelling company that was going to Italy. The tour was a failure, and the com- pany broke up; whereupon Fechter returned home and worked assiduously at sculpture. At the same time he attended classes at the Conservatoire with the view of gaining admission to the Comedie Francaise. Late in 1844 he won the grand medal of the Academie des Beaux-Arts with a piece of sculpture, and was admitted to make his debut at the Comedie Francaise as Seide in Voltaire's Mahomet and Valere in Moliere's Tartuffe. He acquitted himself with credit; but, tired of the small parts he found himself condemned to play, returned again to his sculptor's studio in 1846. In that year he accepted an engagement to play with a French company in Berlin, where he made his first decisive success as an actor. On his return to Paris in the following year he married the actress Eleonore Rabut (d. 1895). Previously he had appeared for some months in London, in a season of French classical plays given at the St James's theatre. In Paris for the next ten years he fulfilled a series of successful engagements at various theatres, his chief triumph being his creation at the Vaudeville on the 2nd of February 1852 of the part of Armand Duval in La Dame aux camelias. For nearly two years (1857-1858) Fechter was manager of the Odeon, where he produced Tartuffe and other classical plays. Having received tempting offers to act in English at the Princess's theatre, London, he made a diligent study of the language, and appeared there on the 27th of October i860 in an English version of Victor Hugo's Ruy Bias. This was followed by The Corsican Brothers and Don Cesar de Bazan; and on the 20th of March 1861 he first attempted Hamlet. The result was an extraordinary triumph, the play running for 115 nights. This was followed by Othello, in which he played alternately the Moor and Iago. In 1863 he became lessee of the Lyceum theatre, which he opened with The Duke's Motto; this was followed by The King's Butterfly, The Mountebank (in which his son Paul, a boy of seven, appeared), The Roadside Inn, The Master of Ravenswood, The Corsican Brothers (in the original French version, in which he had created the parts of Louis and Fabian dei Franchi) and The Lady of Lyons. After this he appeared at the Adelphi (1868) as Obenreizer in No Thoroughfare, by Charles Dickens and Wilkie

Collins, as Edmond Dantes in Monte Cristo, and as Count de Leyrac in Black and White, a play in which the actor himself collaborated with Wilkie Collins. In 1870 he visited the United States, where (with the exception of a visit to London in 1872) he remained till his death. His first appear- ance in New York was at Niblo's Garden in the title role of Ruy Bias. He played in the United States between 1870 and 1876 in most of the parts in which he had won his chief triumphs in England, making at various times attempts at management, rarely successful, owing to his ungovernable temper. The last three years of his life were spent in seclusion on a farm which he had bought at Rockland Centre, near Quakertown, Pennsyl- vania, where he died on the 5th of August 1879. A bust of the actor by himself is in the Garrick Club, London.

FECKENHAM, JOHN (c. 1515-1584), English ecclesiastic, last abbot of Westminster, was born at Feckenham, Worcester- shire, of ancestors who, by their wills, seem to have been substantial yeomen. The family name was Howman, but, according to the English custom, Feckenham, on monastic profession, changed it for the territorial name by which he is always known. Learn- ing his letters first from the parish priest, he was sent at an early age to the claustral school at Evesham and thence, in his eighteenth year, to Gloucester Hall, Oxford, as a Benedictine student. After taking his degree in arts, he returned to the abbey, where he was professed; but he was at the university again in 1537 and took his B.D. on the nth of June 1539. Returning to Evesham he was there when the abbey was sur- rendered to the king (27th of January 1540) ; and then, with a pension of £10 a year, he once more went back to Oxford, but soon after became chaplain to Bishop Bell of Worcester and then served Bonner in that same capacity from 1543 to 1549.

In 1544 Bonner gave him the living of Solihull; and Feckenham established a reputation as a preacher and a disputant of keen intellect but unvarying charity. About 1549 Cranmer sent him to the Tower of London, and while there " he was borrowed out of prison " to take part in seven public disputations against Hooper, Jewel and others. Released by Queen Mary (5th of September 1553), he returned to Bonner and became prebendary of St Paul's, rector of Finchley, then of Greenford Magna, chaplain and confessor to the queen, and dean of St Paul's (10th of March 1554). He took part, with much charity and mildness, in the Oxford disputes against Cranmer, Latimer and Ridley; but he had no liking for the fierce bigotry and bloody measures then

in force against Protestants. Feckenham used all his influence with Mary ” to procure pardon of the faults or mitigation of the punishment for poor Protestants ” (Fuller), and he was sent by the queen to prepare Lady Jane Grey for death. When Elizabeth was sent to the Tower (18th of March 1554), Feckenham interceded for her life and liberty, even at the cost of displeasing the queen.

The royal abbey of Westminster having been restored to its primitive use, Feckenham was appointed abbot, and the old life began again within its hallowed walls on the 21st of November 1556. The abbey school was reopened and the shrine of St Edward restored. On the accession of Elizabeth Feckenham consistently opposed all the legislation for changes in religion, and, when the hour of trial came, he refused the oath of supremacy, rejecting also Elizabeth’s offer to remain with h’s monks at Westminster if he would conform to the new laws. The abbey was dissolved (12 th of July 1559), and within a year Feckenham was sent by Archbishop Parker to the Tower (20th of May 1 560) , according to Jewel, ” for having obstinately refused attendance on public worship and everywhere declaiming and railing against that religion which we now profess ” (Parker Society, first series, p. 79). Henceforth, except for some brief periods when he was a prisoner at large, Feckenham spent the rest of his life in confinement either in some recognized prison, or in the more distasteful and equally rigorous keeping of the bishops of Winchester and Ely. After fourteen years’ confine- ment, he was released on bail and lived in Holborn, where his benevolence was shown by all manner of works of charity. ” He relieved the poor wheresoever he came, so that flies flock not thicker to spilt honey than beggars constantly crowd about him ” (Fuller). He set up a public aqueduct in Holborn, and a hospice for the poor at Bath; he distributed every day to the sick the milk of twelve cows, took care of orphans, and encouraged manly sports on Sundays among the youth of London by giving prizes. In 1577 he was committed to the care of Cox of Ely with strict rules for his treatment; and the bishop (1578) could find no fault with him except that ” he was a gentle person but in the popish religion too, too obstinate.” In 1580 he was removed to Wisbeach Castle, and there exercised such an influence of charity and peace among his fellow-prisoners that was re- membered when, in after years, the notorious Wisbeach Stirs broke out under the Jesuit Weston. Even here Feckenham found a means of doing public good; at his own cost he repaired the road and set up a market cross in the town. After twenty- four years of suffering for his conscience he died in prison and was buried in an unknown grave in the parish church at Wis- beach on the 16th of October 1584.

The fullest account of Feckenham is to be found in E. Taunton’s

English Black Monks of St Benedict (London, 1897), vol. i. pp. 160-222. (E. Tn.)

FEDCHENKO, ALEXIS PAVLOVICH (1844-1873), Russian naturalist a'nd traveller, well known for his explorations in central Asia, was born at Irkutsk, in Siberia, on the 7th of February 1844; and, after attending the gymnasium of his native town, proceeded to the university of Moscow, for the study more especially of zoology and geology. In 1868 he travelled through Turkestan, the district of the lower Syr-Darya and Samarkand; and shortly after his return he set out for Khokand, where he visited a large portion of territory till then unknown. Soon after his return to Europe he perished on Mont

Blanc while engaged in an exploring tour in Switzerland, on the 15th of September 1873.

Accounts of the explorations and discoveries of Fcdchenko have been published by the Russian government, — his Journeys in Turkestan in 1874, In the Khanat of Khokand in 1875, and Botanical Discoveries in 1876. See Petermann's Mittheilungen (1872-1874).

FEDERAL GOVERNMENT (Lat. foedus, a league), a form of government of which the essential principle is that there is a union of two or more states under one central body for certain permanent common objects. In the most perfect form of federation the states agree to delegate to a supreme federal government certain powers or functions inherent in themselves in their sovereign or separate capacity, and the federal govern- ment, in turn, in the exercise of those specific powers acts directly, not only on the communities making up the federation, but on each individual citizen. So far as concerns the residue of powers unallotted to the central or federal authority, the separate states retain unimpaired their individual sovereignty, and the citizens of a federation consequently owe a double allegiance, one to the state, and the other to the federal government. They live under two sets of laws, the laws of the state and the laws of the federal government (J. Bryce, Studies in History and Juris- prudence, ii. 490). The word "confederation," as distinct from " federation " has been sometimes, though not universally, used to distinguish from such a federal state (Bundesstaat) a mere union of states (Staatenbund) for mutual aid, and the promotion of interests common to all (see Confederation).

The history of federal government practically begins with Greece. This, however, is due to the fact that the Greek federa- tions are the only ones of which we have any detailed information. The obvious

importance, especially to scattered villages or tribes, of systematic joint action in the face of a common danger makes it reasonable to infer that federation in its elementary forms was a widespread device. This view is strengthened by what we can gather of the conditions obtaining in such districts as Aetolia, Acarnania and Samnium, as in modern times among primitive peoples and tribes. The relatively detailed information which we possess concerning the federal governments of Greece makes it necessary to pay special attention to them.

In ancient Greece the most striking tendency of political development was the maintenance of separate city states, each striving for absolute autonomy, though all spoke practically the same language and shared to some extent in the same traditions, interests and dangers. This centrifugal tendency is most marked in the cases of the more important states, Athens, Sparta, Argos, Corinth, but Greek history is full of examples of small states deliberately sacrificing what must have been obvious commercial advantage for the sake of a precarious autonomy. Such examples as existed of even semi-federal union were very loose in structure, and the selfishness of the component units was the predominant feature. Thus the Spartan hegemony in the Peloponnese was not really a federation except in the broadest sense. The states did, it is true, meet occasionally for discussion, but their relation, which had no real existence save in cases of immediate common danger, was really that between a paramount leader and unwilling and suspicious allies. The Athenian empire again was a thinly disguised autocracy. The synod (see Delian League) of the " allies " soon degenerated into a mere form; of comprehensive united policy there was none, at all events after the League had achieved its original purpose of expelling the Persians from Europe.

None the less it is possible, even in the early days of political development in Greece, to find some traces of a tendency towards united action. Thus the unions of individual villages, known as synoecisms, such as took place in Attica and Elis in early times were partly of a federal character: they resulted in the establish- ment of a common administration, and no doubt in some degree of commercial and military unity. On the other hand, it is likely that these unions lacked the characteristic of federation in that the units could hardly be described as having any sovereign power: at the most they had some municipal autonomy as in the case of the Cleisthenic demes. The union was rather national than federal. Again the Amphictyonic unions had one of the

characteristic elements of federation, namely that they were free sovereign states combining for a particular purpose with an elaborate system of representation (see Amphictyony). But these unions, at all events in historic times, were mainly concerned with religion, and the authority of the councils did not seriously affect the autonomy of the individual states.

Thus among the city-states as well as among scattered villages the principle of cohesion was not unknown. On the other hand the golden mean between an easily dissoluble relationship, more like an alliance than a federation, and a national system resulting from synoecism was practically never, attained in early Greek history. There are, however, examples in Greece proper, and one, Lycia in Asia Minor, of real federal unions. The chief Greek federations were those of Thessaly, Boeotia, Acarnania, Olynthus, Arcadia, Aetolia, Achaea, the most important as well as the most complete in respect of organization being the Aetolian League and the Achaean League.

i. The Thessalian League originated in the deliberate choice by village aristocracies of a single monarch who belonged from time to time to several of the so-called Heracleid families. Soon after the Persian War this monarchy (dynasty of the Aleuadae, Herod, v. 63 and vii. 6) disappeared, and in 424 we find Athens in alliance with a sort of democratic federal council representing to koivov QerTa\S>u (cf. Thuc. i. 102, ii. 22, iv. 78), and probably composed of delegates from the towns. The local feudal nobles, however, seem to have put an end to this government by council, and a dictator (tagus) was appointed, with authority over the whole military force of the federation. Three such officers, Lycophron, Jason and Alexander, all of Pherae, endeavoured vainly to administer the collective affairs of the federation, the last by means of a revived republican council. The final failure of this scheme coincided with the disappearance of Thessaly as a sovereign state (see Thessaly).

2. The form and the history of the Boeotian federation are treated fully under Boeotia (q.v.). It may probably have originated in religious associations, but the guiding power throughout was the imperial policy of Thebes, especially during its short-lived supremacy after 379 B.C.

3. The federation of Acarnania is of peculiar interest as being formed by scattered villages or tribes, without settled, still less fortified, habitation. In the early part of the 4th century a koivov rwv ‘

K.Ko.pva.vwv met at Stratus (Xen. Hell. iv. 6. 4). Late in the same century towns began to form, without, however, disturbing the federation, which existed as late as the 2nd century B.C., governed by a representative council (fiovKa), and a common assembly (koivov) at which any citizen might be present.

4. The foundation of the Olynthian federation was due to the need of protection against the northern invaders (see Olyn- thus) . It was in many respects based on liberal principles, but Olynthus did not hesitate to exercise force against recalcitrants such as Acanthus.

5. The 4th century Arcadian league, which was no doubt a revival of an older federation, was the result of the struggle for supremacy between Thebes and Sparta. The defeat of Sparta at Leuctra removed the pressure which had kept separate the Arcadian tribes, and to koivov t&v 'kpKa&wv was established in the new city, Megalopolis (q.v., also Arcadia).

6 and 7. The Aetolian and Achaean leagues (see Aetolia, and Achaean League) were in all respects more important than the preceding and constitute a new epoch in European politics. Both belong to a period in Greek history when the great city states had exhausted themselves in the futile struggle against Macedon and Rome, and both represent a conscious popular determination in the direction of systematic government. This characteristic is curious in the Aetolian tribes which were famous in all time for habitual brigandage; there was, however, among them the strong link of a racial feeling. The governing council (to mivdv to>v AItooKccv) was the permanent representative body; there was also a popular assembly (iravaiTuKiKov) , partly of a primary, partly of a representative kind, any one being free to attend, but each state having only one official representative and one vote. Of all the federal governments of

Greece, this league was the most certainly democratic in constitu- tion. There was a complete system of federal officers, at the head of whom was a Strategus entrusted with powers both military and civil. This officer was annually elected, and, though the chief executive authority, was strictly limited in the federal delibera- tions to presidential functions (cf. Livy xxxv. 25, " ne praetor, quum de bello consuluisset, ipse sententiam diceret "). The Achaean League was likewise highly organized; joint action was strictly limited, and the individual cities had sovereign power over internal affairs. There were federal officers, all the military forces of the cities were controlled by the league, and federal finance was quite separate from city finance.

8. Of the Lycian federation, its origin and duration, practically nothing is known. We know of it in 188-168 B.C. as dependent on Rhodes, and, from 168 till the time when the emperor Claudius absorbed it in the provincial system, as an independent state under Roman protection. The federation was a remarkable example of a typical Hellenic development among a non-Hellenic people. Strabo (p. 665) informs us that the federation, composed of twenty-three cities, was governed by a council (noivdv crvvkSpiov) which assembled from time to time at that city which was most convenient for the purpose in hand. The cities were represented according to size by one, two or three delegates, and bore proportionate shares in financial responsibility. The Lycian league was, therefore, in this respect rather national than federal.

Of ancient federal government outside Greece we know very little. The history of Italy supplies a few examples, of which the chief is perhaps the league of the cities of Latium (q.v.; see also Etruria).

See E. A. Freeman, Federal Government in Greece and Rome (2nd ed., 1893, J. B. Bury), and works quoted in the special articles.

Among the later European confederations the Swiss republic is one of the most interesting. As now constituted it consists of twenty-two sovereign states or cantpns. The government is vested in two legislative chambers, a senate or council of state (Slander at), and a national council (Nationairat), consti- tuting unitedly the federal assembly. The executive council (Bundesrat) of seven members elects the president and vice- president for a term of three years (see Switzerland: Govern- ment). Before the French Revolution the German empire was a complex confederation, with the states divided into electoral colleges, consisting — (1) of the ecclesiastical electors and of the secular electors, including the king of Bohemia; (2) of the spiritual and temporal princes of the empire next in rank to the electors; and (3) of the free imperial cities. The emperor was elected by the first college alone. This imposing confederation came to an end by the conquests of Napoleon; and the Confedera- tion of the Rhine was established in 1806 with the French emperor as protector. But in 1815 the Germanic confederation (Deulscher Bund) was established by the congress of Vienna, which in its turn has been displaced by the present German empire. This, in its new organization, conferred on Germany the long-coveted unity and coherence the lack of which had been a source of weakness. The constitution dates, in its latest form, from the treaties entered into at Versailles in 1871. A federation was then organized with the king of Prussia as president, under the hereditary title of German emperor. Delegates of the various federated

governments form the Bundesrath; the Reichstag, or popular assembly, is directly chosen by the people by universal suffrage; and the two assemblies constitute the federal parlia- ment. This body has power to legislate for the whole empire in reference to all matters connected with the army, navy, postal service, customs, coinage, &c, all political laws affecting citizens, and all general questions of commerce, navigation, passports, &c. The emperor represents the federation in all international relations, with the chancellor as first minister of the empire, and has power, with consent of the Bundesrath, to declare war in name of the empire.

The United States of America more nearly resembles the Swiss confederacy, though retaining marks of its English origin. The original thirteen states were colonies wholly independent of each

other. By the Articles of Confederation and Perpetual Union adopted by the Continental Congress in 1777, and in effect in 1781-1789, the states bound themselves in a league of common defence. By the written Constitution, drafted in 1787 and in operation since 1789, a stronger and more centralized union was established — in theory a federal republic formed by the voluntary combination of sovereign states. A* common citizenship was recognized for the whole union; but the federal government was to exercise only such powers as were expressly delegated to it (Amendment of 1791). The powers of the central government are entrusted to three distinct authorities — executive, legislative and judicial. The president, elected for a term of four years by electors chosen for that purpose by each state, is the executive head of the republic. The vice-president, ex officio president of the Senate, assumes the presidency in case of resignation or death. Legislative power is vested in a Congress, consisting of two Houses: a Senate, composed of two members elected by each state for a term of six years; and a House of Representatives, consisting of representatives in numbers proportionate to the population of each state, holding their seats for two years. The supreme judicial authority is vested in a Supreme Court, which consists of a chief justice and eight associate justices, all appointed for life by the president, subject to confirmation by the Senate.

The extension of responsible constitutional government by Great Britain to her chief colonies, under a governor or viceregal representative of the crown, has been followed in British North

America by the union of th*e Canadian, maritime and Pacific provinces under a federal government — with a senate, the members of which are nominated by the crown, and a house of commons elected by the different provinces according to their relative population. The governor-general is appointed by the crown for a term of five years, and represents the sovereign in all matters of federal government. The lieutenant-governors of the provinces are nominated by him; and all local legislation is carried on by the provincial parliaments. The remarkable federation of the Dominion of Canada which was thus originated presented the unique feature of a federal union of provinces practically exercising sovereign rights in relation to all local self-government, and sustaining a constitutional autonomy, while cherishing the colonial relationship to Great Britain.

The Commonwealth of Australia (?.».), proclaimed in 1901, is another interesting example of self-governing states federating into a united whole. There is, however, a striking difference to be observed in the powers of the federal governments of Canada and Australia. The federal parliament of Canada has jurisdiction over all matters not specially assigned to the local legislatures, while the federal parliament of Australia has only such juris- diction as is expressly vested in it or is not expressly withdrawn from the local legislatures. This jurisdiction is undoubtedly extensive, comprising among others, power to legislate concerning trade and industry, criminal law, taxation, quarantine, marriage and divorce, weights and measures, legal tender, copyrights and patents, and naturalization and aliens. There was also an early attempt to federate the South African colonies, and an act was passed for that purpose (South African Act 1877), but it expired on the 1 8th of August 1882, without having been brought into effect by the sovereign in council; in 1908, however, the Closer Union movement (see South Africa) ripened, and in 1909 a federating Act was successfully passed.

See also Bluntschli, The Theory of the State ; W. Wilson, The Stale ; Wheaton, International Law.

FEDERALIST PARTY, in American politics, the party that organized the national government of the United States under the constitution of 1787. It may be regarded as, in various important respects, the lineal predecessor of the American Whig and Republican parties. The name Federalists (see Anti- Federalists) was first given to those who championed the adoption of the Constitution. They brought to the support of that instrument ” the areas of intercourse and wealth ” (Libby), the influence of the commercial towns, the greater planters, the army officers, creditors and property-holders’ generally, — in

short, of interests that had felt the evils of the weak government of the

Confederation, — and also of some few true nationalists (few, because there was as yet no general national feeling), actuated by political principles of centralization independently of motives of expediency and self-interest. Most of the Federalists of 1787- 1788 became members of the later Federalist Party.

The Federalist Party, which may be regarded as definitely organized practically from 1791, was led, leaving Washington aside, by Alexander Hamilton (q.v.) and John Adams. A nationalization of the new central government to the full extent warranted by a broad construction of the powers granted to it by the constitution, and a correspondingly strict construction of the powers reserved to the states and the citizens, were the basic principles of Hamilton's policy. The friends of individual liberty and local government naturally found in the assumption by the central government of even the minimum of its granted powers constant stimulus to their fears (see Democratic Party); while the financial measures of Hamilton — whose wish for extreme centralization was nowise satisfied by the government actually created in 1787 — were calculated to force an immediate and firm assumption by that government, to the limit, of every power it could be held to possess. To the Republicans (Demo- cratic Republicans) they seemed intended to cause a usurpation of powers ungranted. Hence these measures became the issues on which the first American parties were formed. Their effect was supplemented by the division into French and British sympathizers; the Republicans approving the aims and condon- ing the excesses of the French Revolution, the Federalists siding with British reaction against French democracy. The Federalists controlled the government until 1801. They, having the great opportunity of initiative, organized it in all its branches, giving it an administrative machinery that in the main endures to-day; established the doctrine of national neutrality toward European conflicts (although the variance of Federalist and Republican opinion on this point was largely factitious); and fixed the practice of a liberal construction of the Constitution, 1 — not only by Congress, but above all by the United States Supreme Court, which, under the lead of John Marshall (who had been appointed chief - justice by Pres. John Adams), impressed enduringly on the national system large portions of the Federalist doctrine. These are the great claims of the party to memory. After 1801 it never regained power. In attempts to do so, alike in national and in state politics, it impaired its morale by internal dissension, by intrigues,andby inconsistentfactious opposition to Democratic measures on grounds of ultra-strict construction. It took up, too, the Democratic weapon of states' rights,

and in New England carried sectionalism dangerously near secession in 1808, and in i8i2-i8i4,during the movement, in opposition to the war of 1812, which culminated in the Hartford Convention (see Hartford)! It lost, more and more, its influence and usefulness, and by 181 7 was practically dead as a national party, although in Massachusetts it lingered in power until 1823. It is sometimes said that Federalism died because the Republicans took over its principles of nationality. Rather it fell because its great leaders, John Adams and Alexander Hamilton, became bitter enemies; because neither was even distantly comparable to Jefferson as a party leader; because the party could not hold the support of its original commercial, manufacturing and general business elements; because the party opposed sectionalism to a growing nationalism on the issues that ended in the war of 181 2; and, above all, because the principles of the party's leaders (e.g. of Hamilton) were out of harmony, in various respects, with American ideals. Their conservatism became increasingly a reactionary fear of democracy; indeed, it is not a strained construction of the times to regard the entire Federalist period from the American point of view as reactionary — a reaction against the doctrines of natural rights, individualism, and states' rights, and the financial looseness of the period of the War of Independence and the succeeding years of the Confederation. The Federalists were charged by the Republicans with being aristocrats and monarchists, and it is certain that their leaders

1 Even the Democratic party has generally been liberal ; although less so in theory (hardly less so in practice) than its opponents.

(who were really a very remarkable body of men) distrusted democratic government ; that their Sedition Law was outrageous in itself, and (as well as the Alien Law) bad as a party measure; that in disputes with Great Britain they were true English Tories when contrasted with the friendly attitude toward America held by many English Liberals; and that they persisted in New England as a pro-British, aristocratic social-cult long after they lost effective political influence. In short, the country was already thoroughly democratic in spirit, while Federalism stood for obsolescent social ideas and was infected with political "Tory- ism " fatally against the times.

Besides the standard general histories see O. G. Libby, Geographical Distribution of the Vote of the Thirteen States on the Federal Constitu-

tion, 1787-1788 (Madison, Wis., 1894); the Memoirs of Oliver Wolcott (ed. by Gibbs) ; C. D. Hazen, Contemporary American Opinion of the French Revolution (" J.H.U. Studies," Baltimore, 1897) ; Henry Adams, Documents relating to New England Federalism, 1800- 1815 (Boston, 1878); A. E. Morse, The Federalist Party in Massa- chusetts (Princeton, N.J., 1909) ; and the biographies and writings of George Cabot, Fisher Ames, Gouverneur Morris, John Jay, Rufus King, Timothy Pickering, Theodore Sedgwick, C. C. Pinckney and J. A. Bayard.

FEDERICI, CAMILLO (1 749-1802), Italian dramatist and actor, was born at Garessio, a small town in Piedmont, on the 9th of April 1749. His real name was Giovanni Battista Viassolo, and that by which he is now known and which he transmitted to his children was taken from the title of one of his first pieces, Camillo e Federico. He was educated at Turin, and showed at an early age a great fondness for literature and especially for the theatre. The praises bestowed on his early attempts determined his choice of a career, and he obtained engagements with several companies both as writer and actor. He made a happy marriage in 1777, and soon after left the stage and devoted himself entirely to composition. He settled at Padua, and the reputation of his numerous comedies rapidly spread in Italy, and for a time seemed to eclipse that of his predecessors. Most of his pieces were of the melodramatic class, and he too often resorted to the same means of exciting interest and curiosity. He caught, however, something of the new spirit which was manifesting itself in German dramatic literature in the works of Schiller, IfBand and Kotzebue, and the moral tone of his plays is generally healthy. Fortune did not smile upon him; but he found a helpful friend in a wealthy merchant of Padua, Francis Barisan, for whose private theatre he wrote many pieces. He was attacked in 1791 with a dangerous malady which dis- abled him for several years; and he had the misfortune to see his works, in the absence of any copyright law, published by others without his permission. At length, in 1802, he undertook to prepare a collected edition; but of this four volumes only were completed when he was again attacked with illness, and died at Padua (December 23).

The publication of his works was completed in 14 volumes in 1816. Another edition in 26 volumes was published at Florence in 1826- 1827. A biographical memoir of Federici by Neymar appeared at Venice in 1838.

FEE, an estate in land held of a superior lord on condition of the performance of homage or service (see Feudalism). In English law " fee " signifies an estate of inheritance (i.e. an estate descendable to the

heirs of the grantee so long as there are any in existence) as opposed to an estate for life. It is divisible into three species: (1) fee simple; (2) conditional fee; (3) fee tail. (See Estate.) A fee farm rent is the rent reserved on granting a fee. farm, i.e. land in fee simple, to be held by the tenant and his heirs at a yearly rent. It is generally at least one-fourth of the value of the land at the time of its reservation. (See Rent.)

The word ” fee ” has also the sense of remuneration for services, especially the honorarium paid to a doctor, lawyer or member of any other profession. It is also used of a fixed sum paid for the right to enter for an examination, or on admission to member- ship of a university or other society. This sense of the word is taken by the New English Dictionary to be due to a use of ” fee ” in its feudal sense, and to represent a sum paid to the holder of an office ” in fee.”

The etymology of the Med. Lat. feudum, feodum or feum, of its French equivalent fief, and English ” fee,” in Scots law ” feu ” (q.v.), is extremely obscure. (See the New English Dictionary, s.v. ” Fee.”) There is a common Teutonic word represented in Old English as feoh or fto, in Old High German as fehu, meaning property in the shape of cattle (cf. modern Ger. Vieh, Dutch vee). The old Aryan peku gives Sanskrit pacu, Lat. pecus, cattle, whence petunia, money. The O. Eng. feoh, in the sense of money, possibly survives in ” fee,” honorarium, though this is not the view of the New English Dictionary. The common explanation of the Med. Lat. feudum or feodum, of which Ducange (Glossarium, s.v.) gives an example from a constitution of the emperor Charles the Fat of the year 884, is that it is formed from the Teutonic fehu, property, and 3d, wealth (cf. Allodium and Udal). This would apparently restrict the original meaning to movable property, while the early applications of feudum are to the enjoyment of something granted in return for service (beneficium) . Another theory takes the origin to be fehu alone, in a particular sense of wages, payment for services. This leaves the d- of feudum unexplained. Some have taken the origin to be a verbal form feudare = feum dare. Another theory finds the source in the O. High Ger. fehdn, to eat, feed upon, ” take for one’s enjoyment.”

FEHLING, HERMANN VON (1812-1885), German chemist, was born at Liibeck on the 9th of June 1 8 1 2 . With the intention of taking up pharmacy he entered Heidelberg University about 1835, and after graduating went to Giessen as prlparateur to Liebig, with whom he elucidated the composition of paraldehyde and metaldehyde. In 1839 on Liebig’s recommendation he was appointed to the chair of chemistry in the polytechnic at Stutt- gart, and held it till within three

years of his death, which happened at Stuttgart on the 1st of July 1885. His earlier work included an investigation of succinic acid, and the pre- paration of phenyl cyanide (benzonitrile), the simplest nitrile of the aromatic series; but later his time was mainly occupied with questions of technology and public health rather than with pure chemistry. Among the analytical methods worked up by him the best known is that for the estimation of sugars by " Fehling's solution," which consists of a solution of cupric sulphate mixed with alkali and potassium-sodium tartrate (Rochelle salt). He was a contributor to the Handworterbuch of Liebig, Wohler and Poggendorff, and to the Graham-Otto Textbook of Chemistry, and for many years was a member of the committee of revision of the Pharmacopoeia Germanica.

FEHMARN, an island of Germany, belonging to the Prussian province of Schleswig-Holstein, in the Baltic, separated from the north-east corner of Holstein by a strait known as the Fehmarn-Sund, less than a quarter of a mile in breadth. It is a gently undulating tract of country, about 120 sq. m. in area, bare of forest but containing excellent pasture-land, and rears cattle in considerable numbers. Pop. 10,000.

FEHMIC COURTS (Ger. Femgerichte, or Vehmgerichte, of disputed origin, but probably, according to J. Grimm, from O. High Ger. feme or feime, a court of justice), certain tribunals which, during the middle ages, exercised a powerful and some- times sinister jurisdiction in Germany, and more especially in Westphalia. Their origin is uncertain, but is traceable to the time of Charlemagne and in all probability to the old Teutonic free courts. They were, indeed, also known as free courts (Freigerichte), a name due to the fact that all free-born men were eligible for membership and also to the fact that they claimed certain exceptional liberties. Their jurisdiction they owed to the emperor, from whom they received the power of life and death (Blutbann) which they exercised in his name. The sessions were often held in secret, whence the names of secret court (heimliches Gericht, Stillgericht, &c); and these the uninitiated were forbidden to attend, on pain of death, which led to the designation forbidden courts (verbotene Gerichte). Legend and romance have combined to exaggerate the sinister reputation of the Fehmic courts; but modern historical research has largely discounted this, proving that they never employed torture, that their sittings were only sometimes secret, and that

their meeting-places were always well known. They were, in fact, a

survival of an ancient and venerable German institution; and if, during a certain period, they exercised something like a reign of terror over a great part of Germany, the cause of this lay in the sickness of the times, which called for some powerful organization to combat the growing feudal anarchy. Such an organization the Westphalian free courts, with their discipline of terror and elaborate system of secret service, were well cal- culated to supply. Everywhere else the power of life and death, originally reserved to the emperor alone, had been usurped by the territorial nobles; only in Westphalia, called ” the Red Earth ” because here the imperial blood-ban was still valid, were capital sentences passed and executed by the Fehmic courts in the emperor’s name alone.

The system, though ancient, began to become of importance only after the division of the duchy of Saxony on the fall of Henry the Lion, when the archbishop of Cologne, duke of West- phalia from 1 1 80 onwards, placed himself as representative of the emperor at the head of the Fehme. The organization now rapidly spread. Every free man, born in lawful wedlock, and neither excommunicate nor outlaw, was eligible for membership. Princes and nobles were initiated; and in 1429 even the emperor Sigismund himself became ” a true and proper Freischojfe of the Holy Roman Empire.” By the middle of the 14th century these Freischojfen (Latin scabini), sworn associates of the Fehme, were scattered in thousands throughout the length and breadth of Germany, known to each other by secret signs and pass- words, and all of them pledged to serve the summons of the secret courts and to execute their judgment.

The organization of the Fehme was elaborate. The head of each centre of jurisdiction (Freisluhl), often a secular or spiritual prince, sometimes a civic community, was known as the Stuhl- herr, the archbishop of Cologne being, as stated above, supreme over all (Oberststuhlherr) . The actual president of the court was the Freigraf (free count) chosen for life by the Stuhlherr from among the Freischojfen, who formed the great body of the initiated. Of these the lowest rank were the Fronboten or Frei- fronen, charged with the maintenance of order in the courts and the duty of carrying out the commands cf the Freigraf. The immense development of the Fehme is explained by the privileges of the Freischojfen; for they were subject to no jurisdiction but those of the Westphalian courts, whether as accused or accuser they had access to the secret sessions, and they shared in the discussions of the general chapter as to the policy of the society. At their initiation these swore to support the Fehme with all their powers, to guard its secrets, and to bring before its tribunal anything within its competence that they might discover. They were

then initiated into the secret signs by which members recognized each other, and were presented with a rope and with a knife on which were engraved the mystic letters S.S.G.G., supposed to mean Strick, Stein, Gras, Grun (rope, stone, grass, green).

The procedure of the Fehmic courts was practically that of the ancient German courts generally. The place of session, known as the Freisluhl (free seat), was usually a hillock, or some other well-known and accessible spot. The Freigraf and Schoffen occupied the bench, before which a table, with a sword and rope upon it, was placed. The court was held by day and, unless the session was declared secret, all freemen, whether initiated or not, were admitted. The accusation was in the old German form; but only a Freischofe could act as accuser. If the offence came under the competence of the court, i.e. was punishable by death, a summons to the accused was issued under the seal of the Freigraf. This was not usually served on him personally, but was nailed to his door, or to some convenient place where he was certain to pass. Six weeks and three days' grace were allowed, according to the old Saxon law, and the summons was thrice repeated. If the accused appeared, the accuser stated the case, and the investigation proceeded by the examination of witnesses as in an ordinary court of law. The judgment was put into execution on the spot if that was possible. The secret court, from whose procedure the whole institution

has acquired its evil reputation, was closed to all but the initiated, although these were so numerous as to secure quasi-publicity; any one not a member on being discovered was instantly put to death, and the members present were bound under the sarrie penalty not to disclose what took place. Crimes of a serious nature, and especially those that were deemed unfit for ordinary judicial investigation — such as heresy and witchcraft — fell within its jurisdiction, as also did appeals by persons condemned in the open courts, and likewise the cases before those tribunals in which the accused had not appeared. The accused if a member could clear himself by his own oath, unless he had re- vealed the secrets of the Fehme. If he were one of the uninitiated it was necessary for him to bring forward witnesses to his inno- cence from among the initiated, whose number varied according to the number on the side of the accuser, but twenty-one in favour of innocence necessarily secured an acquittal. The only punish- ment which the secret court could inflict was death. If the accused appeared, the sentence was carried into execution at once; if he did not appear, it was quickly made known to the whole body, and the Freischojfe who was the first to meet the condemned was bound to put him to death. This was usually done by hanging, the nearest tree

serving for gallows. A knife with the cabalistic letters was left beside the corpse to show that the deed was not a murder.

That an organization of this character should have outlived its usefulness and issued in intolerable abuses was inevitable. With the growing power of the territorial sovereigns and the gradual improvement of the ordinary process of justice, the functions of the Fehmic courts were superseded. By the action of the emperor Maximilian and of other German princes they were, in the 16th century, once more restricted to Westphalia, and here, too, they were brought under the jurisdiction of the ordinary courts, and finally confined to mere police duties. With these functions, however, but with the old forms long since robbed of their impressiveness, they survived into the 19th century. They were finally abolished by order of Jerome Bonaparte, king of Westphalia, in 1811. The last Freigraf died in 1835.

Authorities. — P. Wigand, Das Femgericht Westfalens (Hamm, 1825, 2nd ed., Halle, 1893) ; L. Tross, Sammlung merkwiirdiger Urkunden fur die Ceschichte der Femgerichte (Hanover, 1826); F. P. Usener, Die frei- und heimlichen Gerichte Westfalens (Frankfort, 1832) ; K. G. von Wachter, Beitrdge zur detitschen Gesch., insbesondere . . . des deutschen Strafrechts (Tubingen, 1845) ; O. Wachter, Femgerichte und Hexenprozesse in Deutschland (Stuttgart. 1882); T. Lindner, Die Feme (Munster and Paderborn, 1888) ; F. Thudi- chum, Femgericht und Inquisition (Giessen, 1889) whose theory concerning the origin of the Fehme is combated in T. Lindner's Der angebliche Ursprung der Femgerichte aus der Inquisition (Pader- born, 1890). For works on individual aspects see further Dahlmanri- Waitz, Quellenkunde (ed. Leipzig, 1906), p. 401 ; also ib. supple- mentary vol. (1907), p. 78. -x

FEHRBELLIN, a town of Germany, in the kingdom of Prussia, on the Rhine, 40 m. N.W. from Berlin on the railway to Neu,- Ruppin. Pop. (1905) 1602. It has a Protestant and a Roman Catholic church and some small industries, among them that of wooden shoes. Fehrbellin is memorable in history as the scene of the famous victory gained, on the 18th of June 1675, by the great elector, Frederick William of Prussia, over the Swedes under Field-Marshal Wrangel. A monument was erected in 1879 on the field of battle, near the village of Hakenberg, to commemorate this great feat of arms.

See A. von Witzleben and P. Hassel, Zum 200-jdhrigen Gedenktd'g von Fehrbellin (Berlin, 1875); G. Sello, "Fehrbellin," in Deutsche Zeitschrift fur Geschichtswissenschaften, vii.; M. Jahns, " Der Gross'e Kurfiirst bei Fehrbellin, &c," in Hohenzollern Jahrbuch, i.

FEIJ60 Y MONTENEGRO, BENITO JERONIMO (1676-1764), Spanish monk and scholar was born at Santa Maria de Melias, near Orense, on the 8th of October 1676. At the age of twelve he entered the Benedictine order, devoted himself to study, and waged war against the superstition and ignorance of his countrymen in the Teatro crltico (1726-1739) and the Cartas eruditas (1742-1760). These exposures of a retrograde system called forth embittered protests from narrow-minded patriots like Salvador Jose Maner, and others; but the opposition was

futile, and Feij6o's services to the cause of knowledge were universally recognized long before his death, which took place at Oviedo on the 26th of September 1764. He was not a great genius, nor a writer of transcendent merit; his name is con- nected with no important discovery, and his style is undis- tinguished. But he uprooted many popular errors, awakened an interest in scientific methods, and is justly regarded as the initiator of educational reform in Spain.

FEITH, RHIJNVIS (1753-1824), Dutch poet, was born of an aristocratic family at Zwolle, the capital of the province Over- ijssel, on the 7th of February 1753. He was educated at Harder- wijk and at the university of Leiden, where he took his degree in 1770. In 1772 he settled at his birthplace, and married. In 1 7 80, in his twenty-seventh year, he became burgomaster of Zwolle. He built a luxurious villa, which he named Boschwijk, in the out- skirts of the town, and there he lived in the greatest comfort. His first important production was Julia, in 1783, a novel written in emulation of Werther, and steeped in Weltschmerz and despair. This was followed by the tragedy of Thirsa (1784); Ferdinand and Constantia (1785), another Werther novel; and The Patriots (1784), a tragedy. • Bilderdijk and other writers attacked his morbid melancholy, and Johannes Kinker (1 764-1845) parodied his novels, but his vogue continued. In 1791 he published a tragedy of Lady Jane Grey; in 1792 a didactic poem, The Grave, in four cantos; in 1793 Inez de Castro; in 1796 to 1814 five volumes of Odes and Miscellaneous Poems; and in 1802 Old Age, in six cantos. He died at Zwolle on the 8th of February 1824.

His works were collected (Rotterdam, 11 vols.) in 1824, with a biographical notice by N. G. van Kampen.

FEj£R, GYORGY, Hungarian author, was born on the 23rd of April

1766, at Keszthely, in the county of Zala. He studied philosophy at Pest, and theology at Pressburg; eventu- ally, in 1808, he obtained a theological professorship at Pest University. Ten years later (1818) he became chief director of the educational circle of Raab, and in 1824 was appointed librarian to the university of Pest. Fejer's works, which are nearly all written either in Latin or Hungarian, exceed one hundred and eighty in number. His most important work, Codex diplomaticus Hungarian ecclesiasticus ac civilis, published from 1829 to 1844, in eleven so-called tomes, really exceeds forty volumes. It consists of old documents and charters from a.d. 104 to the end of 1439, and forms an extraordinary monument of patient in- dustry. This work and many others relating to Hungarian national history have placed Fejer in the foremost rank of Hun- garian historians. He died on the 2nd of July 1851. His latest works were A Kunok eredete (The Origin of the Huns), and A politikai forradaltnak okai (The Causes of Political Revolutions), both published in 1850. The latter production, on account of its liberal tendencies, was suppressed by the Austrian govern- ment. .

See Magyar IrSk: j£letrajz-gyiijtem6ny (Pest, 1856), and A Magyar nemzeti iroialomtdrte.net vdzlata (Pest, 1861).

FELANITX, or Felaniche, a town of Spain, in the south-east of the island of Majorca, Balearic Islands; about 5 m. inland from its harbour, Puerto Colon. Pop. (1900) 11,294. A range of low hills intervenes between Felanitx and the Mediterranean; upon one summit, the Puig de San Sebastian, stands a Moorish castle with a remarkable series of subterranean vaults. From the 3rd century B.C., and possibly for a longer period, earthenware water-coolers and other pottery have been manufactured in the town, and many of the vessels produced are noteworthy for their beauty of form and antiquity of design. There is a thriving trade in wine, fruit, wheat, cattle, brandy, chalk and soap.

FELDKIRCH, a small town in the Austrian province of the Vorarlberg, some 20 m. S. of the S. end of the Lake of Constance. It is situated in a green hollow, on the 111 river, between the two narrow rocky gorges through which it flows out into the broad valley of the Rhine. Hence, though containing only about 4000 inhabitants (German-speaking and Romanist), the town is of great military importance, since it commands the entrance into Tirol from the west, over the Arlberg Pass (5912 ft.), and has been the scene of many conflicts, the last in 1799, when the

French, under Oudinot and Massena, were driven back by the Austrians under Hotze and Jellachich. It is a picturesque little town,

overshadowed by the old castle of Schattenburg (now a poor-house), built about 1200 by the count of Montfort, whose descendant in 1375 sold it to the Habsburgs. The town contains many administrative offices, and is the residence of a suffragan bishop, who acts as vicar-general of the diocesan, the bishop of Brixen. Among the principal buildings are the parish church, dating from 1487, and possessing a " Descent from the Cross " (1521), which has been attributed to Holbein, the great Jesuit educational establishment called " Stella Matutina," and a Capuchin convent and church. There is a considerable amount of transit trade at Feldkirch, which by rail is n m. from Buchs (Switzerland), through the principality of Liechtenstein, 24 m. from Bregenz, and 995 m. from Innsbruck by tunnel beneath the Arlberg Pass. The town also possesses numerous industrial establishments, such as factories for cotton-spinning, weaving, bell-founding, dyeing, &c. (W. A. B. C.)

FELIBIEN, ANDRE (1619-1695), sieur des Avaux et de Javercy, French architect and historiographer, was born at Chartres in May 1619. At the age of fourteen he went to Paris to continue his studies; and in 1647 he was sent to Rome in the capacity of secretary of embassy to the Marquis de Marueil. His resi- dence at Rome he turned to good account by diligent study of its ancient monuments, by examination of the literary treasures of its libraries, and by cultivating the acquaintance of men eminent in literature and in art, with whom he was brought into contact through his translation of Cardinal Barberini's Life of Pius V. Among his friends was Nicholas Poussin, whose counsels were of great value to him. On his return to France he married, and was ultimately induced, in the hope of employment and honours, to settle in Paris. Both Fouquet and Colbert in their turn recog- nized his abilities; and he was one of the first members (1663) of the Academy of Inscriptions. Three years later Colbert procured him the appointment of historiographer to the king. In 167 1 he was named secretary to the newly-founded Academy Of Architecture, and in 1673 keeper of the cabinet of antiques in the palace of Brion. To these offices was afterwards added by Louvois that of deputy controller-general of roads and bridges. Felibien found time in the midst of his official duties for study and research, and produced many literary works. Among these the best and the most generally known is the Entretiens sur les vies et sur les ouvrages des plus excellents peintres anciens et modernes, which appeared in successive livraisons, the first in 1666, and the fifth in 1688. It was republished with several additions at Amsterdam in 1706, and again at Tr6voux in 1725. Felibien wrote also Origine de la peinture (1660), Principes de I' architecture, de la sculpture, de la peinture, &c. (1676-1690), and

descriptions of Versailles, of La Trappe, and of the pictures and statues of the royal residences. Among other literary works, he edited the Conferences of the Academy of Painting, and trans- lated the Castle of the Soul from the Spanish of St Theresa. His personal character commanded the highest esteem, agreeing with the motto which he adopted — Bene facere et vera dicere. He died in Paris on the nth of June 1695.

His son, Jean Francois Felibien (c. 1658-1733), was also an architect who left a number of works on his subject; and a younger son, Michel Felibien (c. 1666-1719), was a Benedictine of Saint Germain-des-Pres whose fame rests on his Histoire de I'abbaye royale de S. Denys en France, and also his L'Histoire de la ville de Paris in 5 vols., a work indispensable to the student of Paris.

FELIX, the name of five popes.

Felix I., pope from January 269 until his death in January 274. He has been claimed as a martyr, and as such his name is given in the Roman calendar and elsewhere, but his title to this honour is by no means proved, and he has been probably confused with another bishop of the same name. He appears in connexion with the dispute in the church of Antioch between Paul of Samosata, who had been deprived of his bishopric by a council of bishops for heresy, and his successor Domnus. Paul refused to give way, and in 272 the emperor Aurelian was asked to decide between the

rivals. He ordered the church building to be given to the bishop who was " recognized by the bishops of Italy and of the city of Rome " (Felix). See Eusebius, Hist. Ecc. vii. 30.

Felix II., antipope, was in 356 raised from the archdeaconate of Rome to the papal chair, when Liberius was banished by the emperor Constantius for refusing to subscribe the sentence of condemnation against Athanasius. His election was contrary to the wishes both of the clergy and of the people, and the consecra- tion ceremony was performed by certain prelates belonging to the court. In 357 Constantius, at the urgent request of an influential deputation of Roman ladies, agreed to the release of Liberius on condition that he signed the semi-Arian creed. Constantius also issued an edict to the effect that the two bishops should rule conjointly, but Liberius, on his

entrance into Rome in the follow- ing year, was received by all classes with so much enthusiasm that Felix found it necessary to retire at once from Rome. Regarding the remainder of his life little is known, and the accounts handed down are contradictory, but he appears to have spent the most of it in retirement at his estate near Porto. He died in 365.

Felix III., pope, was descended from one of the most in- fluential families of Rome, and was a direct ancestor of Gregory the Great. He succeeded Simplicius in the papal chair on the 2nd of March 483. His first act was to repudiate the Henoticon, a deed of union, originating, it is supposed, with Acacius, patriarch of Constantinople, and published by the emperor Zeno with the view of allaying the strife between the Monophysites and their opponents in the Eastern church. He also addressed a letter of remonstrance to Acacius; but the latter proved re- fractory, and sentence of deposition was passed against him. As Acacius, however, had the support of the emperor, a schism arose between the Eastern and Western churches, which lasted for 34 years. Felix died in 492.

Felix IV., pope, a native of Beneventum, was, on the death of John in 526, raised to the papal chair by the emperor Theodoric in opposition to the wishes of the clergy and people. His election was followed by serious riots. To prevent a recrudescence of these, Felix, on his death-bed, thought it advisable to nominate his own successor. His choice fell upon the archdeacon Boniface (pope as Boniface II.). But this proceeding was contrary to all tradition and roused very serious opposition. Out of two old buildings adapted by him to Christian worship, Felix made the church of SS. Cosimo and Damiano, near the Via Sacra. He died in September 530.

Felix V., the name taken by Amadeus (1383-1451), duke of Savoy, when he was elected pope in opposition to Eugenius IV. in 1439. Amadeus was born at Chambery on the 4th of December 1383, and succeeded his father, Amadeus VII., as count of Savoy in 1391. Having added largely to his patrimonial possessions he became very powerful, and in 1416 the German king Sigismund erected Savoy into a duchy; after this elevation Amadeus added Piedmont to his dominions. Then suddenly, in 1434, the duke retired to a hermitage at Ripaille, near Thonon, resigning his duchy to his son Louis (d. 1465), although he seems to have taken some part in its subsequent administration. It is said, but some historians doubt the story, that, instead of leading a life of asceticism, he spent his revenues in furthering his own luxury and enjoyment. In 1439, when Pope Eugenius IV. was deposed by the council of Basel, Amadeus, although not in orders, was chosen as his

successor, and was crowned in the following year as Felix V. In the stormy conflict between the rival popes which followed, the German king, Frederick IV., after some hesitation sided with Eugenius, and having steadily lost ground Felix renounced his claim to the pontificate in 1449 in favour of Nicholas V., who had been elected on the death of Eugenius. He induced Nicholas, however, to appoint him as apostolic vicar-general in Savoy, Piedmont and other parts of his own dominions, and to make him a cardinal. Amadeus died at Geneva on the 7th of January 1451.

FELIX, a missionary bishop from Burgundy, sent into East Anglia by Honorius of Canterbury (630-631). Under King Sigebert his mission was successful, and he became first bishop of

East Anglia, with a see at Dunwich, where he died and was buried, 647-648. It is noteworthy that the Irish monk Furseus preached in East Anglia at the same time, and Bede notices the admiration of Felix for Aidan.

See Bede, Hist. Eccl. (Plummer), ii. 15, iii. 18, 20, 25; Saxon Chronicle (Earle and. Plummer), s.a. 636.

FELIX, of Urgella (fl. 8th century), Spanish bishop, the friend of Elipandus and the propagator of his views in the great Adoptian Controversy (see Adoptianism).

FELIX, of Valois (1127-1212), one of the founders of the monastic order of Trinitarians or Redemptionists, was born in the district of Valois, France, on the 19th of April 1 1 27. In early manhood he became a hermit in the forest of Galeresse, where he remained till his sixty-first year, when his disciple Jean de Matha (1160-ˆ1213) suggested to him the idea of establishing an order of monks who should devote their lives to the redemption of Chris- tian captives from the Saracens. They journeyed to Rome about the end of 1197, obtained the sanction of the pope, and on their return to France founded the monastery of Cerfroi in Picardy. Felix remained to govern and propagate the order, while Jean de Matha superintended the foreign journeys. A subordinate establishment was also founded by Felix in Paris near a chapel dedicated to St Mathurin, on which account his monks were also called St Mathurins. He died at Cerfroi on the 4th of November 1 2 1 2 , and was canonized.

FELIX, ANTONIUS, Roman procurator of Judaea (a.d. 52-60), in succession to Ventidius Cumanus. He was a freedman either of the emperor Claudius — according to which theory Josephus (Anliq. xx.

7) calls him Claudius Felix — or more probably of the empress Antonia. On entering his province he induced Drusilla, wife of Azizus of Homs (Emesa), to leave her husband and live with him as his wife. His cruelty and licentiousness, coupled with his accessibility to bribes, led to a great increase of crime in Judaea. To put down the Zealots he favoured an even more violent sect, the Sicarii (" Dagger-men "), by whose aid he contrived the murder of the high-priest Jonathan. The period of his rule was marked by internal feuds and disturbances, which he put down with severity. The apostle Paul, after being apprehended in Jerusalem, was sent to be judged before Felix at Caesarea, and kept in custody for two years (Acts xxiv.). On returning to Rome, Felix was accused of having taken advantage of a dispute between the Jews and Syrians of Caesarea to slay and plunder the inhabitants, but through the intercession of his brother, the freedman Pallas, who had great influence with the emperor Nero, he escaped unpunished.

See Tacitus, Annals, xx. 54, Hist. v. 9; Suetonius, Claudius, 28; E. Schurer, History of the Jewish People (1890-1891); article in Hastings' Diet, of the Bible (A. Robertson) ; commentaries on the Acts of the Apostles; Sir W. M. Ramsay, St Paul the Traveller; Carl v. Weizsacker, Apostolic Age (Eng. trans., 1894) ; art. Jews.

FiLIX, LIA (1830-), French actress, was the third sister and the pupil of the great Rachel. She had hardly been given any trial when, by chance, she was called on to create the leading woman's part in Lamartine's Toussaint Louverture at the Porte St Martin on the 6th of April 1850. The play did not make a hit, but the young actress was favourably noticed, and several important parts were immediately entrusted to her. She soon came to be recognized as one of the best comediennes in Paris. Rachel took Lia to America with her to play second parts, and on returning to Paris she played at several of the principal theatres, although her health compelled her to retire for several years. When she reappeared at the Gaiete in the title-role of Jules Barbier's Jeanne d' Arc she had an enormous success.

FELIXSTOWE, a seaside resort of Suffolk, England; fronting both to the North Sea and to the estuary of the Orwell, where there are piers. Pop. of urban district of Felixstowe and Walton (1901), 5815. It is 85 m. N.E. by E. from London by a branch line from Ipswich of the Great Eastern railway; and is in the Woodbridge parliamentary division of the county. It has good golf links, and is much frequented by visitors for its bracing climate and sea-bathing. There is a small dock, and phosphate of lime is extensively dug in the neighbourhood and

exported for use as manure. The neighbouring village of Walton, a short distance inland, receives many visitors. The vicinity has yielded numerous Roman remains, and there was a Roman fort in the neighbourhood (now destroyed by the sea), forming part of the coast defence of the Litus Saxonicum in the 4th century. FELL, JOHN (1625-1686), English divine, son of Samuel Fell, dean of Christ Church, Oxford, was born at Longworth in Berk- shire and received his first education at the free school at Thame in Oxfordshire. In 1636 he obtained a studentship at Christ Church, and in 1640 he was specially allowed by Archbishop Laud on account of his ” known desert,” when wanting one term’s resi- dence, to proceed to his degree of B. A. He obtained his M.A. in 1643 and took holy orders (deacon 1647, priest 1649). During the Civil War he bore arms for the king and held a commission as ensign. In 1648 he was deprived of his studentship by the par- liamentary visitors, and during the next few years he resided chiefly at Oxford with his brother-in-law, Dr T. Willis, at whose house opposite Merton College he and his friends Allestree and Dolben kept up the service of the Church of England through the Commonwealth.

At the Restoration Fell was made prebendary of Chichester, canon of Christ Church (July 27, 1660), dean (Nov. 30), master of St Oswald’s hospital, Worcester, chaplain to the king, and D.D. He filled the office of vice-chancellor from 1666 to 1669, and was consecrated bishop of Oxford, in 1676, retaining his deanery in commendam. Some years later he declined the primacy of Ireland. Fell showed himself a most capable and vigorous administrator in his various high employments, and a worthy disciple of Archbishop Laud. He restored in the university the good order instituted by the archbishop, which in the Commonwealth had given place to anarchy and a general disregard of authority. He ejected the intruders from his college or else ” fixed them in loyal principles.” ” He was the most zealous man of his time for the Church of England,” says Wood, ” and none that I yet know of did go beyond him in the performance of the rules belonging thereunto.” He attended chapel four times a day, restored to the services, not without some opposition, the organ and surplice, and insisted on the proper academical dress which had fallen into disuse. He was active in recovering church property, and by his directions a children’s catechism was drawn up by Thomas Marshall for use in his diocese. ” As he was among the first of our clergy,” says Burnet, ” that apprehended the design of bringing in popery, so he was one of the most zealous against it.” He was forward in making converts from the Roman Catholics and Noncon- formists. On the other hand, it is recorded to his honour that he opposed successfully the incorporation

of Titus Oates as D.D. in the university in October 1679; and according to the testimony of William Nichols, his secretary, he disapproved of the Exclusion Bill. He excluded the undergraduates, whose presence had been irregularly permitted, from convocation. He obliged the students to attend lectures, instituted reforms in the performances of the public exercises in the schools, kept the examiners up to their duties, and himself attended the examinations. He encouraged the students to act plays. He entirely suppressed ” coursing,” i.e. disputations in which the rival parties ” ran down opponents in arguments,” and which commonly ended in blows and disturbances. He was an excellent disciplinarian and possessed a special talent for the education of young men, many of whom he received into his own family and watched over their progress with paternal care. Tom Browne, author of the Dialogues of the Dead, about to be expelled from Oxford for some offence, was pardoned by Fell on the condition of his translating extempore the 33rd epigram from Martial: — ■ ” Non amo te, Sabidi, nee possum dicere quare; Hoc tantum possum dicere, non amo te. ‘ To.whjch he immediately replied with the well-known lines: —

■-,..,..’ “I do not love you, Dr Fell,

” ‘”’ But why, I cannot tell,

-‘ – ; But this I know full well,

I do not love you, Dr Fell.” 1

‘ ‘).T. Browne, Works (9th ed. by J. Drake), iv. 99-100; T. Forde, Virtus rediviva (1661), 106.

Delinquents, however, were not always treated thus mildly by Fell, and Acton Cremer, for the crime of courting a wife while only a bachelor of arts, was set as an imposition the translation into English of the whole of Scheffer’s history of Lapland. As vice-chancellor, Fell himself visited the drinking taverns and ordered out the students. In the university elec- tions he showed great energy in suppressing corruption.

Fell’s building operations almost rivalled the plans of the great ecclesiastical architects of the middle ages. In his own college he completed in 1665 the north side of Wolsey’s great quadrangle, already begun by his father but abandoned during the Commonwealth; he rebuilt in 1672 the east side of the Chaplain’s quadrangle ” with a straight passage under it leading from the cloister

into the field," occupied now by the new Meadow Buildings; the lodgings of the canon of the 3rd stall in the passage uniting the Tom and Peckwater quadrangles (c. 1674); a long building joining the Chaplain's quadrangle on the east side in 1677-1678; and lastly the great tower gate, begun in June 1681 on the foundation laid by Wolsey and finished in November 1682, to which the bell " great Tom," after being recast, was transferred from the cathedral in 1683. In 1670 he planted and laid out the Broad Walk. He spent large sums of his own on these works, gave £500 for the restoration of Banbury church, erected a church at St Oswald's, Worcester, and the parsonage house at Woodstock at his own expense, and rebuilt Cuddesdon palace. Fell disapproved of the use of St Mary's church for secular purposes, and promoted the building of the Sheldonian theatre by Archbishop Sheldon. He was treasurer during its construction, presided at the formal opening on the 9th of July 1669, and was nominated with Wren curator in July 1670. In the theatre was placed the University Press, the establishment of which had been a favourite project of Laud, which now engaged a large share of Fell's energy and attention, and which as curator he practically controlled. " Were it not you ken Mr Dean extraordinarily well," writes Sir L. Jenkins to J. Williamson in 1672, " it were impossible to imagine how assiduous and drudging he is about his press." 2 He sent for type and printers from Holland, declaring that " the foundation of all success must be laid in doing things well, which I am sure will not be done with English letters." Many works, including a Bible, editions of the classics and of the early fathers, were produced under his direction and editing, and his press became noted not only in England but abroad. He published annually one work, generally a classical author annotated by himself, which he distributed to all the students of his college on New Year's day. On one occasion he surprised the Press in printing surreptitiously Aretino's Postures, when he seized and destroyed the plates and impressions. Ever " an eager defender and maintainer of the university and its privileges," he was hostile to the Royal Society, which he regarded as a possible rival, and in 1686 he gave an absolute refusal to Obadiah Walker, after- wards the Roman Catholic master of University College, though licensed by James II., to print books, declaring he would as soon " part with his bed from under him " as his press. He conducted it on strict business principles, and to the criticism that more great works were not produced replied that they would not sell. He was, however, not free from fads, and his new spelling (of which one feature was the substitution of i for y in such words as eies, daies, maiest) met with great disapproval.

Fell also did much to encourage learning in the university. While still

a young man at Christ Church he had shown both his zeal and his charity by reading gratuitously with the poor and neglected students of the college. He bore himself a high reputation as a Grecian, a Latinist and a philologist, and he found time, in spite of his great public employments, to bring out with the collaboration of others his great edition of St Cyprian in 1682, an English translation of The Unity of the Church in 1681, editions of Nemesius of Emesa (167 1), of Aratus and of Erato- sthenes (1672), Theocritus (1676), Alcinous on Plato (1677), St Clement's Epistles to the Corinthians (1677), Athenagoras (1682), Clemens Alexandrinus (1683), St Theophilus of Antioch (1684), 2 Cal. of State Pap. Dem., 1672, p. 478, and 1670, p. 26.

FELL, JOHN

24.1

Grammatica rationis sive institutiones logicae (1673 and 1685), and a critical edition of the New Testament in 1675. The first volumes of Rerum Anglicarum scriplores and of Historiae Britannicae, &c. were compiled under his patronage in 1684. He had the MSS. of St. Augustine in the Bodleian and other libraries at Oxford generously collated for the use of the Bene- dictines at Paris, then preparing a new edition of the father.

Fell spent such large sums in his building, in his noble patron- age of learning, and in charities, that sometimes there was little left for his private use. Occasionally in his schemes he showed greater zeal than prudence. He was the originator of a mission to India which was warmly taken up by the East India Company. He undertook himself to train as missionaries four scholars at Oxford, procured a set of Arabic types, and issued from these the Gospels and Acts in the Malay language in 1677. But this was scarcely the best method of communicating the gospel to the natives of India, and the mission collapsed. He affected to despise public opinion, and was masterful and despotic in his dealings with others, especially with those upon whom he was conferring favours. Having generously undertaken at his own charge to publish a Latin version of Wood's History and Antiquities of the University of Oxford, with the object of present- ing the history of the university in a manner worthy of the great subject to European readers, and of extending its fame abroad, he arrogated to himself the right of editing the work. " He would correct, alter, dash out what he pleased. . . .He was a great man and carried all things at his pleasure." In particular he struck out all the passages which Wood had inserted in praise of Hobbes, and substituted some disparaging

epithets. He called the philosopher's Leviathan " monstrosissimus " and " publico damno notissimus." To the printed remonstrance of Hobbes, Fell inserted an insulting reply in the History to " irri- tabile illud et vanissimum Malmesburiense animal," and to the complaint of Wood at this usage answered only that Hobbes " was an old man, had one foot in the grave; that he should mind his latter end, and not trouble the world any more with his papers." In small things as in great he loved to rule and direct. " Let not Fell," writes R. South to R. Bathurst, " have the fingering and altering of them (i.e. his Latin verses), for I think that, bating the want of siquidems and quinetiams, they are as good as his Worship can make." Wood styles him " a valde vult person." He was not content with ruling his own college, but desired to govern the whole university. He prevented Gilbert Ironside, who " was not pliable to his humour," from holding the office of vice-chancellor. He "endeavoured to carry all things by a high hand; scorn'd in the least to court the Masters when he had to have anything pass'd the convocation. Severe to other colleges, blind as to his own, very partiall and with good words, and flatterers and tell-tales could get anything out of him." According to Bishop Burnet, who praises his char- acter and his administration, Fell was " a little too much heated in the matter of our disputes with the dissenters." " He had much zeal for reforming abuses, and managed it perhaps with too much heat and in too peremptory a way." " But," he adds, " we have so little of that among us that no wonder if such men are censured by those who love not such patterns nor such severe task-masters." And Wood, whose adverse criticism must be discounted a little on account of the personal dispute, — after declaring that Fell " was exceeding partial in his government even to corruption; went thro' thick and thin; grasped at all yet did nothing perfect or effectually; cared not what people said of him, was in many things very rude and in most pedantic and pedagogical," — concludes with the acknowledgment, " yet still aimed at the public good." Roger North, who paid Fell a visit at Oxford, speaks of him in terms of enthusiasm: — " The great Dr Fell, who was truly great in all his circumstances, capacities, undertakings and learning, and above all for his superabundant public spirit and goodwill. . . .0 the felicity of that age and place when his authority swayed ! "

In November 1684, at the command of the king, Fell deprived Locke, who had incurred the royal displeasure by his friendship with Shaftesbury, and was suspected as the author of certain

seditious pamphlets, of his studentship at Christ Church, sum- marily and without hearing his defence. Fell had in former years cultivated Locke's friendship, had kept up a correspond- ence with him, and in 1663 had written a testimonial in his favour; and the ready compliance of one who could on occasion offer a stout resistance to any invasion of the privileges of the university has been severely criticised. It must, however, be remembered in extenuation that the legal status of a person on the foundation of a collegiate body had not then been decided in the law-courts. With regard to the justice of the proceeding P'ell had evidently some doubts, and he afterwards expressed his regret for the step which he was now compelled to take. But such scruples, however strong, would, with a man of Fell's political and religious opinions, yield immediately to an order from the sovereign, who possessed special authority in this case as a visitor to the college; and such subservience, however strange to modern notions, would probably only be considered natural and proper at that period.

Fell, who had never married, died on the 10th of July 1686, worn out, according to Wood, by his overwhelming public duties. He was buried in the divinity chapel in the cathedral, below the seat which he had so often occupied when living, where a monument and an epitaph, now moved elsewhere, were placed to his memory. "His death," writes John Evelyn, "was an extraordinary losse to the poore church at this time"; but for himself Fell was fortunate in the time of his departure; for a few months more of life would have necessitated a choice, most painful to a man of his character and creed, between fidelity to his sovereign and to his church. With all his faults, which were the defects which often attend eminent qualities such as his, Fell was a great man, " the greatest governor," according to Speaker Onslow, " that has ever been since his time in either of the universities," and of his own college, to which he left several exhibitions for the maintenance of poor scholars, he was a second founder. He was a worthy upholder of the Laudia n tradition at Oxford, an enlightened and untiring patron of learning, and a man of exemplary morals and great piety which remained unsullied in the midst of a busy life and much contact with the world. A sum of money was left by John Cross to perpetuate Fell's memory by an annual speech in his praise, but the Felii laudes have been discontinued since 1866. There are two interesting pictures of Fell at Christ Church, one where he is represented with his two friends Allestree and Dolben, and another by Vandyck. The statue placed on the N.E. angle of the Great Quadrangle bears no likeness to the bishop, who is described by Hearne as a " thin grave man."

Besides the learned works already mentioned Fell wrote the lives of his friends Dr Henry Hammond (1 66 1) , Richard Allestree, prefixed to his edition of the latter's sermons (1684), and Dr Thomas Willis, in Latin. His Seasonable advice to Protestants showing the necessity of maintaining the Established Religion in opposition to Popery was published in 1688. Some of his sermons, which Evelyn found dull, were printed, including Character of the Last Daies, preached before the king, 1675, and a Sermon preached before the House of Peers Dec. 22, 1680. The Interest of England stated (1659), advocating the restoration of the king, 1 and The Vanity of Scoffing (1674), are also attributed to him. Fell probably had some share in the composition of The Whole Duty of Man, and in the subsequent works published under the name of the author of The Whole Duty, which included Reasons of the Decay of Christian Piety, The Ladies Calling, The Gentle- man's Calling, The Government of the Tongue, The Art of Content- ment, and The Lively Oracles given us, all of which were published in one volume with notes and a preface by Fell in 1684.

Authorities.- — Wood's Athenae Oxonienses and Fasti (ed. Bliss) ; Wood's Life and Times, ed. by A. Clark ; Burnet's Hist, of His Own Time, ed. 1833; J. Welch, Alumni Westmonasterienses ; Thomas Hearne, Collections, ed. by C. E. Doble and others; History of the Univ. of Oxford (1814) ; Christ Church, by Rev. H. L. Thompson; Fortnightly Review, hx. 689 (May 1896); Macmillan's Magazine (Aug. 1875) ; A Specimen of the several sorts of Letter given to the

1 F. Maseres, Tracts of the Civil War, ii. 673.

University by Dr J. F(elt) (1695); Notes and Queries, ser. vi. 2, and ser. vii. 166; Calendars of State Papers, Dom. Series (1660-1675). Fell's books and papers were bequeathed by his nephew Henry Jones to the Bodleian library. A few of his letters are to be found in Add. MSS. Brit. Mus. 11046, and some are printed in Life of James II., by Ch. J. Fox, Appendix; Gent. Mag. 77, p. 633; Academy, 8, p. 141 ; Athenaeum for 1887 (2), p. 311 ; J. Gutch, Collectanea Curiosa, i. 269; and in Cat. of State Papers, Dom. Series. (P. C. Y.)

FELL. (1) (Through the O. Fr. fel, from Lo w Lat. fell o, felon) , savage, ruthless, deadly; only used now in poetry. (2) (Of Scandinavian origin, cf . Danish fjeld, probably connected with a Teutonic root appearing in German fels, rock), a hill, as in the names

of mountains in the Lake District in England, e.g. Scawfell; also a lofty moorland down. (3) (A word common to Teutonic languages, cf. Ger. fell, and Dutch vel, cognate with Lat. pellis, skin), the pelt or hide of an animal, with the hair or wool and skin; also used of any thick shaggy covering, like a matted fleece. (4) To cause to ” fall,” a word common to Teutonic languages and akin to the root of the Lat. fallere and Gr. o-4 > aWeiv, to cause to stumble, to deceive. As a substantive ” fell ” is used of a flat seam laid level with the surface of the fabric; also, in weaving, of the end of the web.

FELLAH (pi. Fellahin), Arabic for ” ploughman ” or ” tiller,” the word used in Arabic-speaking countries to designate peasantry. It is employed especially of the peasantry of Egypt, ” Fellahin ” in modern English usage being almost equivalent to ” Egyptians.” In Egypt the name is applied to the peasantry as opposed to the Arabs of the desert (and even those who have settled on the land), the Turks and the townsfolk. Fellah is used by the Arabs as a term of reproach, somewhat like the English ” boor,” but rather implying a slavish disposition; the fellahin, however, are not ashamed of the name and may pride themselves on being of good fellah descent, as a ” fellah of a fellah.” They may be classified as Hamito-Semites, and preserve to some extent the blood of the ancient Egyptians. They form the bulk of the population of Egypt and are mainly Mahommedan, though some villages in Upper Egypt are almost exclusively Copt (Christian) . Their hybridism is well shown by their great divergence of colour, fellahin in the Delta being sometimes lighter than Arabs, while in Upper Egypt the pre- vailing complexion is dark brown. The average fellah is some- what above medium height, big-boned, of clumsy but powerful build, with head and face of fine oval shape, cheek-bones high, forehead broad, short flattish nose with wide nostrils, and black but not woolly hair. The eyebrows are always straight and smooth, never bushy. The mouth is thick-lipped and large but well formed. The eyes are large and black, and are remarkable for the closeness of the eyelashes. The women and girls are particularly noted for their graceful and slender figures and their fine carriage, due to the custom of carrying burdens, especi- ally water-jars, on their heads. The men’s heads are usually shaved. The women are not as a rule closely veiled: they generally paint the lips a deep blue, and tattoo a floral device on the chin, sometimes on the forehead and other parts of the body. All but the poorest wear necklaces of cheap pearls, coins or gilt disks. The men wear a blue or brown cotton shirt, linen drawers and a plain skull-cap, or on occasion the tarbush or fez, round which sometimes a turban is wound; the women wear a single cotton smock. The common fellah’s home is a mere mud hut, roofed with durra straw. Inside are a few

mats, a sheepskin, baskets and some earthenware and wooden vessels. He lives almost entirely on vegetables, millet bread, beans, lentils, dates and onions. But some of the sheikhs are wealthy, and have large houses built of crude brick and whitewashed with lime, with courtyard, many apartments and good furniture. The fellah is laborious in the fields, and abominates absence from his occupations, which generally means loss of money to him. Military service on the old oriental plan was both ruinous and distasteful to him; hence voluntary mutilations to avoid con- scription were formerly common and the ingrained prejudice against military service remains. Trained by British officers the fellahin make, however, excellent soldiers, as was proved in

the Sudan campaigns of 1 896-98. The fellah is intelligent, cheer- ful and sober, and as hospitable as his poverty allows. (See Copts and Egypt.)

FELLENBERG, PHILIPP EMANUEL VON (1771-1844), Swiss educationist, was born on the 27th of June 1771 at Bern, in Switzerland. His father was of patrician family, and a man of importance in his canton, and his mother was a grand- daughter of the Dutch admiral Van Tromp. From his mother and from Pfeffel, the blind poet of Colmar, he received a better education than falls to the lot of most boys, while the intimacy of his father with Pestalozzi gave to his mind that bent which it afterwards followed. In 1790 he entered the university of Tubingen, where he distinguished himself by his rapid progress in legal studies. On account of his health he afterwards under- took a, walking tour in Switzerland and the adjoining portions of France, Swabia and Tirol, visiting the hamlets and farm- houses, mingling in the labours and occupations of the peasants and mechanics, and partaking of their rude fare and lodging. After the downfall of Robespierre, he went to Paris and remained there long enough to be assured of the storm impending over his native country. This he did his best to avert, but his warn- ings were disregarded, and Switzerland was lost before any efficient means could be taken for its safety. Fellenberg, who had hastily raised a levy en masse, was proscribed; a price was set upon his head, and he was compelled to fly into Germany. Shortly afterwards, however, he was recalled by his countrymen, and sent on a mission to Paris to remonstrate against the rapacity and cruelty of the agents of the French republic. But in this and other diplomatic offices which he held for a short time, he was witness to so much corruption and intrigue that his mind revolted from the idea of a political life, and he returned home with the intention of devoting himself wholly to the education of the young. With this resolution he purchased in 1799 the estate of Hofwyl, near

Bern, intending to make agriculture the basis of a new system which he had projected, for elevating the lower and rightly training the higher orders of the state, and welding them together in a closer union than had hitherto been deemed attainable. For some time he carried on his labours in conjunction with Pestalozzi, but incompatibility of disposition soon induced them to separate. The scheme of Fellenberg at first excited a large amount of ridicule, but gradually it began to attract the notice of foreign countries; and pupils, some of them of the highest rank, began to flock to him from every country in Europe, both for the purpose of studying agri- culture and to profit by the high moral training which he associated with his educational system. For forty-five years Fellenberg, assisted by his wife, continued his educational labours, and finally raised his institution to the highest point of prosperity and usefulness. He died on the 21st of November

1844.

See Hamm, Fellenberg's Leben und Wirken (Bern, 1845) ; and Schoni, Der Stifter von Hofwyl, Leben und Wirken Fellenberg' s.

FELLER, FRANCOIS XAVIER DE (1735-1802), Belgian author, was born at Brussels on the 18th of August 1735. In 1752 he entered a school of the Jesuits at Reims, where he manifested a great aptitude for mathematics and physical science. He commenced his novitiate two years afterwards, and in testimony of his admiration for the apostle of India added Xavier to his surname. On the expiry of his novitiate he became professor at Luxembourg, and afterwards at Liege. In 1764 he was appointed to the professorship of theology at Tyrnau in Hungary, but in 177 1 he returned to Belgium and continued to discharge his professorial duties at Liege till the suppression of the Jesuits in 1 7 7 3 . The remainder of his life he devoted to study, travel and literature. On the invasion of Belgium by the French in 1794 he went to Paderborn, and remained there two years, after which he took up his residence at Ratisbon, where he died on the 23rd of May 1802.

Feller's works exceed 120 volumes. In 1773 he published, under the assumed name Flexier de Reval (an anagram of Xavier d Feller), his Catechisme philosophique; and his principal worl Dictionnaire historique et litteraire (published in 1781 at Liege in volumes, and afterwards several times reprinted and continue'

down to 1848), appeared under the same name. Among his other works the most important are Cours de morale chretienne et de litterature religieuse and his Coup d'ceil sur congres d'Ems. The Journal historique et litteraire, published at Luxembourg and Liege from 1774 to 1794 in 70 volumes, was edited and in great part written by him.

FELLING, an urban district in the Jarrow parliamentary division of Durham, England, forming an eastern suburb of Gateshead. Pop. (1901) 22,467. Its large industrial population is employed in the neighbouring collieries and the various attendant manufactures.

FELLOE, the outer rim of a wheel, to which the spokes are attached. The word is sometimes spelled and usually pronounced " felly." It is a Teutonic word, in O. Eng. felg, cognate with Dutch velge, Ger. Felge; the original Teutonic root from which these are derived probably meant " to fit together."

FELLOW, properly and by origin a partner or associate, hence a companion, comrade or mate, as in " fellow-man," " fellow-countryman," &c. The word from the 15th century has also been applied, generally and colloquially, to any male person, often in a contemptuous or pitying sense. The Old English feolage meant a partner in a business, i.e. one who lays (lag) money or property (feoh, fee) together for a common purpose. The word was, therefore, the natural equivalent for socius, a member of the foundation of an incorporated college, as Eton, or a college at a university. In the earlier history of universities both the senior and junior members of a college were known as " scholars," but later, as now, " scholar " was restricted to those members of the foundation still in statu pupillari, and " fellow " to those senior graduate members who have been elected to the foundation by the corporate body, sharing in the government and receiving a fixed emolument out of the revenues of the college. It is in this sense that " fellow " is used at the universities of Oxford and Cambridge and Trinity, Dublin. At these universities the college teaching is performed by those fellows who are also " tutors." At other universities the term is applied to the members of the governing body or to the holders of certain sums of money for a fixed number of years to be devoted to special study or research. By analogy the word is also used of the members of various learned societies and institutions.

FELLOWS, SIR CHARLES (1799-1860), British archaeologist, was born in August 1799 at Nottingham, where his family had an estate. When fourteen he drew sketches to illustrate a trip to the ruins of Newstead Abbey, which afterwards appeared on the title-page of Moore's Life of

Lord Byron. In 1820 he settled in London, where he became an active member of the British Association. In 1827 he discovered the modern ascent of Mont Blanc. After the death of his mother in 1832 he passed the greater portion of his time in Italy, Greece and the Levant. The numerous sketches he executed were largely used in illustrat- ing Childe Harold. In 1838 he went to Asia Minor, making Smyrna his headquarters. His explorations in the interior and the south led him to districts practically unknown to Europeans, and he thus discovered ruins of a number of ancient cities. He entered Lycia and explored the Xanthus from the mouth at Patara upwards. Nine miles from Patara he discovered the ruins of Xanthus, the ancient capital of Lycia, finely situated on hills, and abounding in magnificent remains. About 15 m. farther up he came upon the ruins of Tlos. After taking sketches of the most interesting objects and copying a number of inscriptions, he returned to Smyrna through Caria and Lydia. The publication of A Journal written during an Excursion in Asia Minor (London, 1839) roused such interest that Lord Palmerston, at the request of the British Museum authorities, asked the British consul at Constantinople to get leave from the sultan to ship a number of the Lycian works of art. Late in 1839 Fellows, under the auspices of the British Museum, again set out for Lycia, accom- panied by George Scharf, who assisted him in sketching. This second visit resulted in the discovery of thirteen ancient cities, and in 1841 appeared An Account of Discoveries in Lycia, being a Journal kept during a Second Excursion in Asia Minor. A third visit was made late in 1841, after Fellows had obtained a. firman by personal application al Constantinople. He shipped

a number of works of art for England, and in the fourth and most famous expedition (1844) twenty-seven cases of marbles were despatched to the British Museum. His chief discoveries were at Xanthus, Pinara, Patara, Tlos, Myra and Olympus. In 1844 he presented to the British Museum his portfolios, accounts of his expeditions, and specimens of natural history illustrative of Lycia. In 1845 he was knighted ” as an acknowledgment of his services in the removal of the Xanthian antiquities to this country.” He paid his own expenses in all his journeys and received no public reward. Fellows was twice married. He died in London on the 8th of November i860.

In addition to the works above mentioned, Fellows published the following: The Xanthian Marbles; their Acquisition and Trans- mission to England (1843), a refutation of false statements that had been published ; An Account of the Ionic Trophy Monument excavated at Xanthus (1848); a cheap edition of his two Journals, entitled Travels and Researches in Asia Minor, particularly in the Province of Lycia (1852); and Coins of Ancient Lycia before the Reign of Alexander;

with an Essay on the Relative Dates of the Lycian Monu- ments in the British Museum (1855). See C. Brown's Lives of Notting- hamshire Worthies (1882), pp. 352-353, and Journ. of Roy. Geog. Soc, 1861. 1

FELO DE SE (M.L. a felon, i.e. murderer, of himself), one who commits murder upon himself. The technical conditions of murder apply to this crime; e.g., " if one commits any unlawful malicious act, the consequence of which is his own death, as if attempting to kill another he runs upon his antagonist's sword, or shooting at another the gun bursts and kills himself," he is a felo de se. The horror inspired by this crime led to the revolting punishment of an " ignominious burial on the highway, with a stake driven through the body." This was abolished by an act of 1823, which ordered the burial of the body of a person found to be felo de se within 24 hours after the coroner's inquest, between the hours of 9 and 1 2 at night, and without Christian rites of sepulture. This act was again superseded in 1882 by the Interments (Felo de se) Act, which permits the interment of any felo de se in the churchyard or other burial ground of the parish or place in which by the law or custom of England he might have been interred but for the verdict. The interment is carried out in accordance with the Burial Laws Amendment Act 1880 (see Burial and Burial Acts). The act does not authorize the performance of any of the rites of Christian burial, but a special form of service may be used. Formerly the goods and chattels, but not the land, of a felo de se were forfeited to the crown, but such forfeitures were abolished by the Forfeiture Act 1870. (See also Suicide.)

FELONY (O. Fr. felonie, homfelon, a word meaning " wicked," common to Romanic languages, cf. Italian fello, fellone, the ultimate origin of which is obscure, but is possibly connected either with Lat. fel, gall, or fallere, to deceive. The English " fell " cruel or fierce, is also connected; and the Greek <£tjXds, an impostor, has also been suggested) . Legal writers have sought to throw light on the nature of felony by examining the supposed etymology of the word. Coke says it is crimen animo felleo per- petratum [a crime committed with malicious or evil intent {fee lohn)\. Spelman connects it with the word fee, signifying fief or feud; and felony in this way would be equivalent to pretium feudi, an act for which a man lost or gave up his fee (see Stephen's Commentaries, vol. iv, p. 7). And acts involving forfeiture were styled felonies in feudal law, although they had nothing of a criminal character about them. A breach of duty on the part of the vassal, neglect of service, delay in seeking investiture, and the like were felonies: so were injuries by the lord against the vassal. Modern writers are now disposed to accept Coke's definition. In English law, crimes are usually classified as treason, felony,

misdemeanour and summary offence. Some writers— and with some justice — treat treason merely as a grave form of felony and it is so dealt with in the Juries Detention Act 1897. But owing to legislation in and since the time of William and Mary, the procedure for the trial of most forms of treason differs from that of felony. The expression summary offence is ambiguous. Many offences which are at common law or by statute felonies, or misdemeanours indictable at common law or by statute, may under certain conditions be tried by a court

of summary jurisdiction (q.v.), and many merely statutory offences which would ordinarily be punishable summarily may at the election of the accused be tried by a jury on indictment (Summary Jurisdiction Act 1879, s. 17).

The question whether a particular offence is felony or mis- demeanour can be answered only by reference to the history of the offence and not by any logical test. For instance, killing a horse in an unlicensed place is still felony under a statute of 1786. But most crimes described as felonies are or have been capital offences at common law or by statute, and have also entailed on the offender attaint and forfeiture of goods. A few felonies were not punishable by death, e.g. petty larceny and mayhem. Where an offence is declared a felony by statute, the common law punishments and incidents of trial attach, unless other statutory provision is made (Blackstone, Com- mentaries, iv. 94).

The chief common law felonies are: homicide, rape, larceny (i.e. inordinary language, theft), robbery (i.e. theft with violence), burglary and kindred offences. Counterfeiting the coin has been made a felony instead of being treason; and forgery of most documents has been made a felony instead of being, as it was at common law, a misdemeanour. At the beginning of the 19th century felony was almost equivalent to capital crime; but during that century capital punishment was abolished as to all felonies, except wilful murder, piracy with violence (7 W. IV. & 1 Vict. c. 88, s. 2) and offences against the Dockyards, &c, Protection Act 1772; and by the Forfeiture Act 1870, a felon no longer forfeits land or goods on conviction, though forfeiture on outlawry is not abolished. The usual punishment for felony under the present law is penal servitude or imprison- ment with or without hard labour. ” Every person cbnvicted of any felony for which no punishment is specially provided by the law in force for the time being is liable upon conviction thereof to be sentenced to

penal servitude for any period not exceeding seven years, or to be imprisoned with or without hard labour for any term not exceeding two years ” (Stephen, Dig. Cr. Law (6th ed.), art 18, Penal Servitude Act 1891). A felon may not be fined or whipped on conviction nor put under recognizance to keep the peace or be of good behaviour except under statutory provision. (See Offences against the Person Act 1861, ss. 5. 71.)

The result of legislative changes is that at the present time the only practical distinctions between felony and misdemeanour are : —

1. That a private person may arrest a felon without judicial authority and that bail on arrest is granted as a matter of discre- tion and not as of right. Any one who has obtained a drove of oxen or a flock of sheep by false pretences may go quietly on his way and no one, not even a peace officer, can apprehend him without a warrant, but if a man offers to sell another a bit of dead fence supposed to have been stolen, he not only may but is required to be apprehended by that person (Greaves, Criminal Law Consolidation Acts). (See Arrest, Bail.)

2. That on an indictment for felony counts may not be joined for different felonies unless they form part of the same transaction. (See Indictment.)

3. That on a trial for felony the accused has a right peremp- torily to challenge, or object to, the jurors called to try him, up to the number of twenty’. (See Jury.)

4. That a felon cannot be tried in absentia, and that the jury who try him may not separate during the trial without leave of the court, which may not be given in cases of murder.

5. That a special jury cannot be empanelled to try a felony.

6. That peers charged with felony are tried in a special manner. (See Peerage.)

7. That the costs of prosecuting all felonies (except treason felony) are paid out of public funds: and that a felon may be condemned to pay the costs of his prosecution and to compen- sate up to £100 for any loss of property suffered by any person through or by means of the felony. In the Criminal Code Bills of 18 78 1880 it was proposed to abolish the term felony alto gether: and in the Queensland Criminal Code 1899 the term

” crime ” is substituted, and within its connotation are included not

only treason and piracy but also perjury.

8. That a sentence of a felon to death, or to penal servitude or imprisonment with hard labour or for over twelve months, involves loss of and disqualification for certain offices until the sentence has been served or a free pardon obtained. (Forfeiture Act 1870.)

It is a misdemeanour (i.) to compound a felony or to agree for valuable consideration not to prosecute or to show favour in such prosecution; (ii.) to omit to inform the authorities of a felony known to have been committed (see Misprision), and, (iii.) not to assist in the arrest of a felon at the call of an officer of the law. (See Criminal law; Misdemeanour; Misprision.)

FELSITE, in petrology, a term which has long been generally used by geologists, especially in England, to designate fine- grained igneous rocks of acid (or subacid) composition. As a rule their ingredients are not determinable by the unaided eye, but they are principally felspar and quartz as very minute particles. The rocks are pale-coloured (yellowish or reddish as a rule), hard, splintery, much jointed and occasionally nodular. Many felsites contain porphyritic crystals of clear quartz in rounded blebs, more or less idiomorphic felspar, and occasionally biotite. Others are entirely fine-grained and micro- or crypto- crystalline. Occasionally they show a fiuxional banding; they may also be spherulitic or vesicular. Those which carry porphy- ritic quartz are known as quartz-felsites; the term soda-felsites has been applied to similar fine-grained rocks rich in soda-felspar.

Although there are few objections to the employment of felsite as a field designation for rocks having the above char- acters, it lacks definiteness, and has been discarded by many petrologists as unsuited for the exact description of rocks, especially when their microscopic characters are taken into con- sideration. The felsites accordingly are broken up into “granite- porphyries,” ” orthophyres ” and ” orthoclase-porphyries,” ” felsitic-rhyolites,” ” keratophyres,” ” granophyres,” ” micro- granites,” &c. But felsite or microfelsite is still the generally accepted designation for that very fine-grained, almost crypto- crystalline substance which forms the ground-mass of so many rhyolites, dacites and porphyries.

In the hand specimen it is a dull, lustreless, stony-looking aggregate. Under the microscope even with high powers and the very thinnest modern sections, it often cannot be resolved into its components. In places it may contain determinable minute crystals of quartz; less commonly it may show grains which can be proved to be felspar, but

usually it consists of an ultra-microscopic aggregate of fibres, threads and grains, which react to polarized light in a feeble and indefinite manner. Spherulitic, spotted, streaky and fluidal structures may appear in it, and many different varieties have been established on such characters as these but without much validity.

Its association with ‘he acid rocks, its hardness, method of weathering and chemical composition, indicate that it is an intermixture of quartz and acid felspar, and the occasional presence of these two minerals in well-defined grains confirms this. Moreover, in many dikes, while the ground-mass is microcrystalline and consists of quartz and felspar near the centre of the mass, towards the margins, where it has been rapidly chilled by contact with the cold surrounding rocks, it is felsitic. The very great viscosity of acid magmas prevents their molecules, especially when cooling takes place suddenly, from arranging themselves to form discrete crystals, and is the principal cause of the production of felsitic ground-masses. In extreme cases these conditions hinder crystallization altogether, and glassy rocks result. Some rocks are felsitic in parts but elsewhere glassy; and it is not always clear whether the felsite is an original substance or has arisen by the devitrification of primary glass. The presence of perlitic structure in some of these felsites points to the latter conclusion, and the results of an examination of ancient glasses and of artificial glass which has been slowly cooled are in accordance with this view. It has been argued that felsite is a eutectic mixture of quartz and felspar, such that when solidification takes place and the excess of felspar (or quartz) has

crystallized out it remains liquid till the temperature has fallen to its freezing point, and then consolidates simultaneously. This may be so, but analyses show that it has not always the same composition and consequently that the conditions which determine its formation are not quite simple. Felsitic rocks are sometimes silicified and have their matrix replaced by granular aggregates of cloudy quartz. (J. S. F.)

FELSPAR, or Feldspar, a name applied to a group of mineral silicates of much importance as rock-constituents. The name, taken from the Ger. Feldspath, was originally written with a ” d ” but in 1794 it was written ” felspar ” by R. Kirwan, on the assumption that it denoted a mineral of the ” fels ” rather than of the ” field,” and this corrupted form is now in common use in England. By some of the earlier

mineralogists it was written ” feltspar,” from the Swedish form faltspat.

The felspar – group is divided into two subgroups according to the symmetry of the crystals. Although the crystals of all felspars present a general resemblance in habit, they are usually regarded as belonging to two systems, some felspars being mono- clinic and others anorthic. Figures of the crystals are given in the articles on the different species. Two cleavages are gener- ally well marked. In the monoclinic or monosymmetric fel- spars these, being parallel to the basal pinacoid and clino- pinacoid, necessarily make an angle of 90 , whence the name orthoclase applied to these minerals; whilst in the anorthic or asymmetric felspars the corresponding angle is never exactly 90 , and from this obliquity of the principal cleavages they are termed plagioclase (see Orthoclase and Plagioclase). There are consequently two series of felspars, one termed orthoclastic or orthotomous, and the other plagioclastic or clinotomous. F. E. Mallard suggested that all felspars are really asymmetric, and that orthoclase presents only a pseudo-monosymmetric habit, due to twinning. Twin-crystals are very common in all the felspars, as explained under their respective headings.

The two divisions of the felspar-group founded on differences of crystalline symmetry are subdivided according to chemical composition. All the felspars are silicates containing aluminium with some other metallic base or bases, generally potassium, sodium or calcium, rarely barium, but never magnesium or iron. The monoclinic series includes common potash-felspar or ortho- clase (KAlSi 3 8) and hyalophane, a rare felspar containing barium (KoBaALSigOj,!). The anorthic series includes at one end the soda-felspar albite (NaAlSi 3 O s) and at the other ex- tremity the lime-felspar anorthite (CaAl 2 Si 2 8). It was sug- gested by G. Tschermak in 1864 that the other plagioclastic felspars are isomorphous mixtures in various proportion of albite (Ab) and anorthite (An). These intermediate members are the lime-soda felspars known as oligoclase, andesine, labradorite and bytownite. There are also placed in the anorthic class a potash- felspar called microcline, and a rare soda-potash-felspar known as anorthoclase.

The specific gravity of the felspars has been shown by G. Tschermak and V. Goldschmidt to vary according to their chemical composition, rising steadily from 2-57 in orthoclase to 2-75 in anorthite. All the felspars have a hardness of 6 to 6-5, being therefore rather less hard than quartz. Pure felspar is colourless, but the mineral is usually white, yellow, red or green. Certain felspars are used as ornamental

stones on account of their colour (see Amazon. Stone). Other felspars are prized for their pearly opalescence (see Moonstone), or for their play of iridescent colours (see Labradorite), or for their spangled appearance, like aventurine (see Sun-stone).

Felspar is much used in the manufacture of porcelain by reason of its fusibility. In England the material employed is mostly orthoclase from Scandinavia, often known as ” Swedish spar.” The high translucency of ” ivory porcelain ” depends on the large proportion of felspar in the body. The mineral is also an important constituent of most ceramic glazes. The melting points of felspars have been investigated by Prof. J. Joly, Prof. C. A. Doelter y Cisterich and especially by A. L. Day and E. T. Allen in the Geophysical Laboratory of the Carnegie Institute at Washington.

Among the applications of felspar is that of pure orthoclase in the manufacture of artificial teeth.

Felspar readily suffers chemical alteration, yielding kaolin (q.v.). The turbidity of orthoclase is usually due to partial kaolinization. Secondary mica is also a common result of alteration, and among other products are pinite, epidote, saussurite, chlorite, wollas- tonite and various zeolites.

See Albite, Amazon Stone, Andesine, Anorthite, Bytownite, Labradorite, Microcline, Moonstone,Oligoclase,Orthoclase, Plagioclase, Sun-stone.

FELSTED, or Felstead, a village of Essex, England, between Dunmow and Braintree, and 10 m. from Chelmsford; with a station on the Great Eastern railway. Felsted is only note- worthy by reason of its important public school, dating back to its foundation as a grammar school in 1564 by Richard 1st Baron Rich, who as lord chancellor and chancellor of the court of augmentations had enriched himself with the spoil of the adjoining abbey and priory of Little Leez at the dissolution of the monasteries. It became a notable educational centre for Puritan families in the 17 th century, numbering a hundred or more pupils, under Martin Holbeach (1600-1670), headmaster from 1627-1649, and his successors C. Glasscock (from 1650 to 1690), and Simon Lydiatt (1690 to 1702). John Wallis and Isaac Barrow were educated here, and also four sons of Oliver Cromwell, Robert, Oliver, Richard (the Protector), and Henry. Another era of prosperity set in under the headmastership of William Trivett (1745-1830) between 1778 and 1794; but under his successors W. J. Carless (from 1794 to 1813) and E. Squire (from 1813 to 1829) the numbers dwindled. As

the result of the discovery by T. Surridge (headmaster 1835-1850), from research among the records, that a larger income was really due to the foundation, a reorganization took place by act of parliament, and in 1851, under the headmastership of Rev. A. H. Wratislaw, the school was put under a new governing body (a revised scheme coming into operation in 1876). The result under Rev. W. S. Grignon (1823-1907), the headmaster from 1856 to 1875, who may be considered almost the second founder, was the rapid development of Felsted into one of the regular public schools of the modern English type. New buildings on an elaborate scale arose, the numbers increased to more than 200, and a complete transformation took place, which was carried on under his successors D. S. Ingram (from 1875 to 1890), H. A. Dalton (to 1906), and F. Stephenson, under whom large extensions to the buildings and playing-fields were made.

See John Sargeaunt, History of Felsted School (1889) ; and Alumni Felstedienses, by R. J. Beevor, E. T. Roberts and others (1903).

FELT (cognate with Ger. Filz, Du.wft, Swed. and Dan. Jilt; the root is unknown; the word has given Med. Lat. filtrum, ” filter “), a fabric produced by the ” matting ” or ” felting ” together of fibrous materials such as wools, hairs, furs, &c. Most textile fibres (see Fibres) possess the quality of matting to some extent, but wools, furs and some few hairs are the only fibres which can be felted satisfactorily. It is probable that the quality of felting must be attributed to the scale structure and waviness of the wools, furs and hairs referred to. When it is desired to incorporate non-felting fibres in felt cloths, wool must be employed to ” carry ” them.

There are two distinct classes of felts, viz. woven or ” thread- structure ” felts, and ” fibre ” or true felts. In the manufacture of thread-structure felts, wools possessing the quality of felting in a high degree are naturally selected, carefully scoured so that the felting quality is not seriously damaged, spun into woollen yarn possessing the necessary fibre arrangement and twist, woven into cloth of such a character that subsequently satis- factory shrinking or felting may be effected, and finally scoured, milled in the stocks of machine of both, dyed and finished on the lines of an ordinary woven fabric. The lighter styles of woven felts may be composed of a single cloth only, but for the heavier styles two or more cloths are woven, one on top of the other, at one and the same time, arrangements being made to stitch the cloths together during the weaving operation.

Fibre felts are exceedingly interesting from the historical point of view. It is now generally admitted that the art of

weaving preceded that of spinning, and it must further be con- ceded that the art of felting preceded that of weaving, so that the felt fabric is probably one of the oldest of the various styles of recognized fabrics. The inhabitants .of the middle and northern regions of Asia seem to have employed felt from time immemorial, as clothing and also as a covering for their habitations. Most of the classical writers refer to it and some of them actually describe its manufacture. Felt was also largely employed by the ancients for their hats, outer garments, and sometimes as a species of armour.

Fibre felts may be divided into three classes, viz. ordinary felts; hat felts; and impregnated felts. As all felts are based upon the ordinary felt, the process of manufacture of this will first be described. Of the wools employed the principal are: — East Indian, German or mid-European, New Zealand cross- breds, and Australian, Cape and Buenos Aires merinos. Vege- table fibres and silk are also employed, but wool must be used to ” carry ” them; thus a good felting wool may be made to carry its own weight of cotton, hemp, &c. Hairs and furs are princi- pally used in the hat felts. The average loss upon the wool from the raw state to the finished felt is 40 to 50%. The order of the manufacturing processes is as follows: — mixing, willowing, teasing, scribbling and carding. It is interesting to note that it is not usual to scour felting wools. This is not because they are really clean — some are dirty — but because the felting pro- perty is liable to be interfered with in the scouring operation. Some wools, however, must be scoured to ensure satisfactory working in the machines. From the card the wool is delivered as a gossamer-like film from 50 to 60 in. wide on to an endless sheet from 30 to 60 yds. long, upon which the felt is built up film upon film until the required thickness — perhaps 4 in. — is obtained. To harden this somewhat tender sheet of felt it is now passed through an ironing process, effected by either steam- heated” rollers — to which a rotatory and vibratory motion is given — playing upon the continually drawn- through cloth; or a huge vibrating fiat-iron, to which the cloth is automatically fed, held in position and then wound up while the following length to be treated is drawn under the iron. Soaping, fulling or ” felting ” and the ordinary finishing operations — including dyeing and printing if desirable — now follow, so that ultimately a strong firm fabric is turned out. It must be admitted, however, that the strength is much greater lengthwise than cross-wise, owing to the parallelization of the fibres induced in the scribbling and carding operations. Of course, the true felting or

contraction occurs in the fulling or felting stock, the fabric being perpetually ” hammered ” in the presence of fulling agents such as soap, fuller’s earth, &c, for a considerable time. The reduction in width, length and thickness is remarkable. This may be con- trolled within certain limits. The principal styles of ordinary fibre-felts are — linings for coats, furniture . and rubber shoes; saddlery; seatings for carriages and pews; carpets, surrounds and under-felts for carpets; mantles, dresses and table-cloths; felt-slippers; mattress felts; chest-preservers, and shoulder- pads; steam-engine packing, motor-car and anti- vibration felts, shipbuilding felts; drawing-roller felts and gun-wad felts.

Hat felts may be divided into two classes, viz. those made from wool and fur respectively. Wool “bodies” used for the lower quality hats are manufactured in the same way as ordinary felts, but the ” shape ” upon which the film issuing from the carder is built up takes the form of a double cone and thus approximates to the shape of the two hats ultimately formed. The shape is further controlled and developed in the fulling or felting opera- tion. In the fur hat felts an air-blast is employed to carry the finely separated fibres on to the shape required, upon which shape the fibres are held in position by suction until the required thickness is obtained. The structure is then further developed and ” stiffened,” i.e. impregnated with certain stiffening agents according to requirements. If desirable the exterior fibres blown on to any shape may be of a different material from the body fabric.

Impregnated felts are simply felts made in the ordinary way

but subsequently impregnated with certain agents which give a special quality to the fabric. Messrs McNeill & Co. , of London, were the originators of ” asphalted-felt ” for roofing and, among other styles, place on the market sheathing felt, inodorous felt, dry hair felt, foundation felt, &c, &c. A later development, however, is the impregnated iron-felt manufactured by Messrs Mitchells, Ashworth, Stansfield & Co., of Waterfoot, near Man- chester, who not only produce from 70 to 80 % of the ordinary felts manufactured in Great Britain, but also place on the market several specialties of which this ” iron-felt ” is largely used in the construction of bridges, &c, and as a substitute for rubber, it being apparently more durable. (A. F. B.)

FELTHAM, or Felltham, OWEN (d. 1668), English moralist, was the son of Thomas Feltham or Felltham of Mutford in Suffolk. The date of his birth is given variously as 1602 and 1609. Hs is famous chiefly as the author of a volume entitled Resolves, Divine, Moral and Political, containing one hundred short and pithy essays. To later issues of the

Resolves Feltham appended Lusoria, a collection of forty poems. Hardly anything is known of his life except that T. Randolph, the adopted ” son ” of Ben Jonson, addressed a poem of compliment to him, and became his friend, and that Feltham attacked Ben Jonson in an ode shortly before the aged poet’s death, but contributed a flattering elegy to the Jonsonus Virbius in 1638. Early in life Feltham visited Flanders, and published observations in 1652 under the title of A Brief Character of the Low Countries. He was a strict high-churchman and a royalist; he even described Charles I. as ” Christ the Second.” Hallam stigmatized Feltham as one of our worst writers. He has not, indeed, the elegance of Bacon, whom he emulated, and he is often obscure and affected; but his copious imagery and genuine penetration give his reflections a certain charm. To the middle classes of the 17th century he seemed a heaven-sent philosopher and guide, and was only less popular than Francis Quarles the poet.

Eleven editions of the Resolves appeared before 1700. Later editions by James Cumming (London, 1806; much garbled; has account of Feltham’s life and writings), and O. Smeaton in ” Temple Classics ” series (London, 1904).

FELTON, CORNELIUS CONWAY (1807-1862), American classical scholar, was born on the 6th of November 1807, in West Newbury, Massachusetts. He graduated at Harvard College in 1827, having taught school in the winter vacations of his sopho- more and junior years. After teaching in the Livingstone high school of Geneseo, New York, for two years, he became tutor at Harvard in 1829, university professor of Greek in 1832, and Eliot professor of Greek literature in 1834. In i860 he succeeded James Walker as president of Harvard, which position he held until his death, at Chester, Pennsylvania, on the 26th of February 1862. Dr Felton edited many classical texts. His annotations on Wolf’s text of the Iliad (1833) are especially valuable. Greece, Ancient and Modern (2 vols., 1867), forty-nine lectures before the Lowell Institute, is scholarly, able and suggestive of the author’s personality. Among his miscellaneous publications are the American edition of Sir William Smith’s History of Greece (1855) ; translations of Menzel’s German Literature (1840), of Munk’s Metres of the Greeks and Romans (1844), and of Guyot’s Earth and Man (1849) ; and Familiar Letters from Europe (1865).

FELTON, JOHN (c. 1595-1628), assassin of the 1st duke of Buckingham, was a member of an old Suffolk family established at Playford. The date of his birth and the name of his father are unknown, but his mother was Eleanor, daughter of William Wright, mayor of Durham. He entered the army, and served as lieutenant in

the expedition to Cadiz commanded by Sir Edward Cecil in 1625. His career seems to have been ill-starred and unfortunate from the beginning. His left hand was early disabled by a wound, and a morose temper rendered him un- popular and prevented his advancement. Every application made to Buckingham for his promotion was refused, on account of an enmity, according to Sir Simonds D'Ewes, which existed between Felton and Sir Henry Hungate, a favourite of Buckingham. To his personal application that he could not live without a captaincy Buckingham replied harshly " that he might hang." Whether he.

took part in the expedition to Rhe in 1627 is uncertain, but there is no doubt that he continued to be refused promotion, and that even his scanty pay earned during the Cadiz adventure was not received. Exasperated by his ill-treatment, his discontent sharpened by poverty, and his hatred of Buckingham intensified by a study of the Commons " Remonstrances " of the previous June, and by a work published by Eglesham, the physician of James I., in which Buckingham was accused of poisoning the king, Felton determined to effect his assassination. He bought a tenpenny knife on Tower Hill, and on his way through Fleet Street he left his name in a church to be prayed for as " a man much discontented in mind." He arrived at Portsmouth at 9 o'clock in the morning of the 23rd of August 1628, and immedi- ately proceeded to No. 10 High Street, where Buckingham was lodged. Here mingling with the crowd of applicants and un- noticed he stabbed the duke, who immediately fell dead. Though escape would have been easy he confessed the deed and was seized and conveyed to the Tower, his journey thither, such was the unpopularity of the duke, being accompanied by cries of " God bless thee " from the people. Charles and Laud desired he should be racked, but the illegal torture was prevented by the judges. He was tried before the king's bench on the 27th of November, pleaded guilty, and was hanged the next day, his body being exposed in chains subsequently at Portsmouth.

FELTRE, MORTO DA, Italian painter of the Venetian school, who worked at the close of the 1 5th century and beginning of the 1 6th. His real name appears to have been Pietro Luzzo; he is also known by the name Zarato or Zarotto, either from the place of his death or because his father, a surgeon, was in Zara during the son's childhood: whether he was termed Morto (dead) from his joyless temperament is a disputed point. He may probably have studied painting first in

Venice, but under what master is uncertain. At an early age he went to Rome, and investigated the ancient, especially the subterranean remains, and thence to Pozzuoli, where he painted from the decorations of antique crypts or ” grotte.” The style of fanciful arabesque which he formed for himself from these studies gained the name of ” grottesche,” whence comes the term “grotesque”; not, indeed, that Morto was the first painter of arabesque in the Italian Renaissance, for art of this kind had, apart from his influence, been fully developed, both in painting and in sculpture, towards 1480, but he may have powerfully aided its diffusion southwards. His works were received with much favour in Rome. He afterwards went to Florence, and painted some fine grotesques in the Palazzo Pubblico. Returning to Venice towards 1505, he assisted Giorgione in painting the Fondaco dei Tedeschi, and seems to have remained with him till 1511. If we may trust Ridolfi, Morto eloped with the mistress of Giorgione, whose grief at this transaction brought him to the grave; the allegation, however, is hardly reconcilable with other accounts. It may have been in 1515 that Morto returned to his native Feltre, then in a very ruinous condition from the ravages of war in 1509. There he executed various works, including some frescoes, still partly extant, and considered to be almost worthy of the hand of Raphael, in the loggia beside San Stefano. Towards the age of forty-five, Morto, unquiet and dissatisfied, abandoned painting and took to soldiering in the service of the Venetian republic. He was made captain of a troop of two hundred men; and fighting valorously, he is said to have died at Zara in Dalmatia, in 1519. This story, and especially the date of it, are questionable: there is some reason to think that Morto was painting as late as 1522. One of his pictures is in the Berlin museum, an allegorical subject of ” Peace and War.” Andrea Feltrini was his pupil and assistant as a decorative painter.

FELTRE (anc. Feltria), a town and episcopal see of Venetia, Italy, in the province of Belluno, 20 m. W.S.W. of it by rail, situated on an isolated hill, 885 ft. above sea-level. Pop. (1901) 5468 (town), 15,243 (commune). The cathedral has a fine poly- gonal apse of the 16th century. The Palazzo del Consiglio, now a theatre, is attributed to Palladio. At one end of the chief square of the town, the Piazza Maggiore, is the cistern by which the town is supplied with water, and a large fountain. There

are some remains of the medieval castle. The ancient Feltria, which lay on the road (Via Claudia) from Opitergium to Triden- turn, does not seem to have been a place of any importance under the Romans. Vittorino dei Rambaldoni da Feltre (1378-1446) was a famous educator and philosopher of his time.

FELUCCA (an Italian word; in forms like the Span, faluca, Fr. ielouque, it appears in other languages; it is probably of Arabic origin, cf. f-ulk, a ship, and falaka, to be round; the modern Arabic form is falukah), a type of vessel used in the Mediterranean for coasters or fishing- boats. It is a long, low and narrow undecked vessel, built for speed, and propelled by oars or sails. The sails are lateen-shaped and carried on one or two masts placed far forward (see Boat).

FEMALE, the correlative of ” male,” the sex which performs the function of conceiving and bearing as opposed to the beget- ting of young. The word in Middle English is femelle, adopted from the French from the Lat. feme.Ua, which is a diminutive, and in classical Latin used strictly as such, oifemina, a woman. The present termination in English is due to a connexion in ideas with ” male,” In various mechanical devices, where two corresponding parts work within the other, the receiving part is often known as the ” female,” as for example in the ” male ” and ” female screw.” The O. Fr. feme, modem femme, occurs in legal phraseology in feme covert, a married woman, i.e. one protected or covered by a husband, and in feme sole, one not so protected, a widow or spinster (see Women and Husband and Wife).

FEMERELL, properly Fumerell (from O. Fr. fumeraille, Lat, fumus, smoke), the old English term given to the lantern in the ridge of a hall roof for the purpose of letting out the smoke of the fire kindled on a central hearth.

FENCING. If by ” fencing “—the art of fence, i.e. of defence or offence — were meant generally the dexterous use of the sword, the subject would be wide indeed; as wide, in fact, as the history of the sword (q.v.) itself. But, in its modern acceptation, the meaning of the word has become considerably restricted. The scope of investigation must therefore be confined to one kind of swordsmanship only: to that which depends on the regulated, artificial conditions of ” single combat.” It is indeed this play, hemmed in by many restrictions, which we have come to mean more specially by “fencing.” It differs, of course, in many respects, from what may be called the art of fighting in the light of nature. But as its restrictions are among the very elements which work to the perfection of the play, it is undoubtedly in the history of swordsmanship as applied to duelling (see Duel) that we shall trace the higher development of the art.

It may be said that the history of fencing, therefore, would be tantamount to the history of private duelling. Now, this is an ethical subject; one, again, which would carry the investigation too far; and it

need not be taken up farther back than the middle of the 16th century, when, on the disuse of the medieval wager of battle, the practice of private duelling began to take an assured footing in a warlike society. It is curious to mark that the first cultivation of refined cunning in fence dates from that period, which corresponds chronologically with the general disuse of armour, both in battle and in more private encounters. It is still more curious to note that, in order to fit himself to meet what was an illegal but aristocratic obligation, the gallant of those days had to appeal to a class of men hitherto little considered: to those plebeian adepts, in fact, who for generations had cultivated skill in the use of hand weapons, on foot and without armour. Thus it came to pass that the earliest masters of fence in all countries, namely, the masters of the art of con- ducting skilfully what was essentially considered as an honourable encounter, were almost invariably to be found among a some- what dishonoured gentry — gladiators, free companions, pro- fessional champions, more or less openly recognized, or bravoes of the most uncompromising character.

In Germany, which may be considered the cradle of systematic swordsmanship, these teachers of the sword had, as early as the 15th century, formed themselves into gilds; among which the best known were the Marxbruder, or the Associates of St Marcus

of Lowenberg, who had their headquarters at Frankfort, and branches in all the more important towns. Similarly, in Spain and in northern Italy, professional swordsmen were at various times allowed to form themselves into recognized or at least tolerated associations.

In England ” swordmen ” had been looked upon with especial disfavour by the powers that were, until Henry VIII., who was a great lover of all manly exercises, found it likewise advisable to turn their obnoxious existence to a disciplined and profitable channel by regularizing their position. The most re- doubtable masters were allowed to form themselves into a company, with powers to increase their numbers with suitable and duly tried men, in imitation of the world-famed German Marxbriider or Marcusbrtider. Under these conditions they were granted the lucrative monopoly of teaching the art of fight in England. The enormous privileges that the king, in course of time, conferred on his Corporation of Masters of Defence very soon enabled it to put down or absorb all the more ferocious of

independent swashbucklers, and thereby to impart to the pro- fession a moderate degree of respectability under the coat of arms granted by the royal heralds: gules a sword pendant argent.

It was in the midst of such corporations and in the fighting dens of independent swordsmen, therefore, that sprouted the first buds of systematic swordsmanship. Among the pro- fessional fencers, curiously and happily for the historian, there seem to have been a few with a literary turn of mind.

The oldest manuscripts of fence belong to Italy and Germany. They deal with the methods of carrying out single combats on foot, with any of the most generally accepted weapons — long sword and short sword, dagger and every kind of knives, mace, long and short staff, axes, &c, — and with the tricks of wrestling recommendable therefor. Among the most comprehensive in their scope may be mentioned 77 Fior di battaglia di Maestro Fiore dei Liberi da Premariaco; a work which, although illustrated with truly Italian taste and grace, shows, as far as its fighting style is concerned, unmistakable marks of German influence. The text of the MS. bears the date 1410, but the writer was known to be flourishing as a master of fence as early as 1383. A reprint of this invaluable codex has been published, under the care of Francesco Donati, by the Istituto Italiano a" Arti Grafiche. Another is the better known Thalhofer's Fecht Buck, gerichtliche und andere Zweykampfe darstellend (1467), a reprint of which, with its 268 plates in facsimile, was brought out by Gustave Hergsell in Prague. The oldest printed book is likewise German : Ergrilndung der ritterlicher Kunst der Fechterei, von Andreas Paurnfeindt, Freifechter zu Wien (1516). This work, which is exceedingly rare, is a very complete exponent of the ways of wielding long and short blades to the utmost of their lethal capacity. It was reproduced (under various titles, very confus- ing to the bibliographer) in Frankfort, Augsburg, Strassburg, and finally done into French under the name of La Noble science des joueurs d'Spee, published in Paris and Antwerp, 1535.

Following the Germans, the oldest printed books of fence are Italian. The first French book on the sword is known to be a translation from the German. Curiously enough, the second, and one of the most notable, Le Traits de I'Spte settle, mire de toutes armes, of the Sieur de St Didier, published in Paris in 1573, can be shown to be a transparent adaptation of two Italian treatises, the Traltato di scienza d' arme of Camillo Agrippa, and Grassi's Ragione di adoperar sicuramente I'arme, &c.

It is about this time, namely, the latter half of the 1 6th century, that

swordsmanship pure and simple may be said to find its origin; for then a great change is perceptible in the nature and tendency of fence books: they dissociate themselves from indecorous wrestling tricks, and approximate more and more to the consideration of what we understand by swordsmanship. The older works expounded the art of fighting generally; taught the reader a number of valuable, if not ” gentlemanlike,” dodges for overcoming an adversary at all manner of weapons: now the lucubrations of fence-masters deal almost exclusively with the walking sword, that is, the duelling weapon — with the I

rapier in fact, both with and without its lieutenant, the dagger.

It must be remembered that at this period private duelling and cavalier quarrelsomeness amounted to a perfect mania. The fencing master was no longer merely a teacher of efficacious, if rascally, tricks; he was becoming a model of gallant deport- ment; in many cases he was even a recognized arbiter on matters of honour. He was often a gentleman himself: at all events he posed as such.

Although the Germans were always redoubtable adepts at the rougher games of swordsmanship, it is in Italy that is to be found development of that nimbler, more regulated, more cunning, better controlled, kind of play which we have learned to associate with the term ” fencing.” It was from Italy that the art of fence first spread over Europe: not from Spain, as it has been asserted by many writers. The Italians — if we take their early books as evidence, and the fact that their phraseology was adopted by all Europe — were the first to perceive (as soon as the problem of armour-breaking ceased to be the most im- portant one in fight) the superior efficiency of the point. They accordingly reduced fhe breadth of their sword, modified the hilt portion thereof to admit of readier thrust action, and relegated the cut to quite a secondary position in their system. With this lighter weapon they devised in course of time that brilliant cunning play known as rapier fence.

The rapier was ultimately adopted everywhere by men of courtly habit; but, in England at least, it was not accepted without murmur and vituperation from the older fighting class of swordsmen, especially from the members and admirers of the English Corporation of Defence Masters. As a body Englishmen were as conservative then as they are now. They knew the value of what they had as their own, and distrusted innovations, especially from foreign quarters. The old sword and the buckler were reckoned as your true English weapons: they always went together — in fact sword and buckler play in the 16th century was evidently held to be as national a game as boxing

came to be in a later age. Many are the allusions in contemporary dramatic literature to this characteristic national distrust of continental innovations. There is the well-known passage in Porter's play, The Two Angry Women of Abingdon, for instance: " Sword and buckler fight," says a sturdy Briton (in much the same tone of disgust as a British lover of fisticuffs might now assume when talking of a French " Mounseer's " foil play), " begins to grow out of use. I am sorry for it. I shall never see good manhood again. If it be once gone, this poking fight with rapier and dagger will come up. Then the tall man (that is, a courageous man and a good sword-and-buckler man) will be spitted like a cat or a rabbit!" The long-sword, that is, the two-hander, was also an essentially national weapon. It was a right-down pleasing and sturdy implement, recalling in good steel the vernacular quarter- staff of old. It required thews and sinews, and, incidentally, much beef and ale. The long-sword man looked perhaps with even greater disfavour than the smaller swashbuckler upon the new-fangled "bird-spit." "Tut, man," says Justice Shallow, typical laudator of the good bygone days, on hearing of the ridiculous Frenchman's skill with his rapier, " I could have told you more. In these times you stand on distance, your passes, stoccadoes, and I know not what; 'tis the heart, Master Page; 'tis here, 'tis here. I have seen the time, with my long-sword, I would have made you four tall fellows skip like rats."

Now, sword-and-buckler and long-sword play was no doubt a manly pursuit and a useful. But, as an every-day companion, the long-sword was incongruous to a fastidious cavalier; and, again, the buckler, indispensable adjunct to the broad swashing blade of home production, was hardly more suitable. In Elizabethan days it soon became obvious that the buckler was inadmissible as an item of gentlemanly attire. It was accordingly left to the body attendant; and the gallant took kindly to the fine rapier of Milanese or Toledan make. On the other hand, it is not difficult to understand the rapid popularity gained among the gentry by this nimble rapier, so much reviled by the older fighting men. The rapier, in fact, came in with the taste for " cavalfero "

style, and may be looked upon as its fit outward symbol already in the days of Queen Mary. In Elizabeth's reign it was firmly established as your only gentlemanlike weapon.

The rapier was decidedly a foreigner; yet it suited the Elizabethan age,

for it was decorative as well as practical. Its play was picturesque, fantastic — almost euphuistic, one might say — in comparison with the matter-of-fact hanger of older days. Its phraseology had a quaint, rich, southern smack, which connoted outlandish experience and gave those conversant with its intricate distinctions that marvellous character, at once precious and ruffling, which was so highly appreciated by the cavalier youth of the time. The rapier in its heyday was an admirable weapon to look at, a delicious one to wield. And, besides, in proper hands, it was undoubtedly one that was most conclusive. It was, in short, as elegant and deadly as its prede- cessors were sturdy and brutal.

By the time that the most perfect, namely, the Italian, rapier fence came to be generally taught in England — that is, during the last third of Elizabeth's reign — the theory of swordsmanship, as applied to a single combat, after having passed through many, phases of imperfection, was already tolerably simple and practical. (The exact story of its evolution may be found in a work now included in Bohn's Libraries, Schools and Masters of. Fence) What may be considered as one of the cardinal actions of regu- lated sword-play on foot, namely, the lunge, had already been discovered. Although a great many movements which, according to modern notions, would be considered not only unnecessary but actually pernicious, still formed part of the system, it may be doubted whether, considering the character of the weapon, anything very much better could be devised, even in our present state of knowledge.

For it must be remembered that the evolution of the forms of the sword and of the theories concerning its most efficient use are closely connected. It is, in fact, sometimes difficult to decide whether the change in the shape of the weapon was the result of a development of a theory; or whether new theories were elaborated to fit alterations in these shapes due to fashion or any other reason.

When systematic fence came over to England it was already much simplified (it should be noted that improvement in the art, from its earliest days down to the present time, seems always to have been in the direction of simplification) ; yet, for more than a century from the appearance of the first real treatise, simplification never reached that point which would render impossible a belief in the undoubted efficacy of those " secret thrusts," of that " universal parry," of those ineluctable passes, which every master professed to teach. These precious secrets remain long, among a certain shady class of swordsmen, an object of untiring study, carried on with much the same faith and zest as the quest of the alchemist for his powder of

projection, or of the Merchant Adventurer for El Dorado. There can, of course, be no such thing as an insuperable pass, a secret thrust or parry; every attack can be parried, every parry can be deceived by suitable movements. Yet there was some justification for the belief in the existence of secrets of swordsmanship in days when, as a rule, lessons of fence were given in jealous privacy; constant practice at one particular pass, especially with the long rapier, which required a great deal of muscular strength, might render any peculiarly fierce, sudden and audacious stroke excessively dangerous to one who did not happen to have opposed that stroke before. Undoubtedly there was little in Elizabethan fencing- schools of what we understand in modern days by loose-play between the pupils; practice was almost invariably conducted between scholar and teacher in private; and thus the opportunities for watching or testing any particular fencer's play were few. Such an opportunity would, as a rule, only occur on occasions of an earnest fight; and the possessor of a specially handy thrust (if it came off at all) would of course take good care that his opponent should not live to ponder over the secret. The secret, such as it was, remained. In this guise it was inevitable that an almost superstitious belief in " secret foynes," in the bolie secrete of certain practised duellists, should arise.

Be that as it may, there is no doubt that towards the end of the 1 6th century there were many free-lances in the field of arms who professed to teach, in exchange for much gold, strokes that were not to be parried. From one truculent personage, whom Brant6me mentions, Tappa the Milanese, you could learn how to cut (if it so took your fancy) both eyes out of your adversary's face with a rinverso tondo, or circular " reverse of the point." From Caizo, another Italian teacher, at one time much favoured by the French court, lessons were to be had in the special art of ham-stringing. Caizo's botte secrete seems to have been nothing more nor less than a /also manco, that is, a left-handed drawing cut, at the inside of the knee. But, as practised and taught by him, it was infallible. This stroke has come down to us as le coup de Jarnac — a stroke, be it said, which, notwithstanding its bad name, was quite as fair as any in rapier fence. One Le Flamand, a French master in Paris, was reputed the inventor of a jerky time-thrust at the adversary's brows, which was a certainty. This special foyne, which was merely an imbrocata at the head, has become legendary in the fencing world as la botte de Nevers. English fencers have their own legends about " the very butcher of a silk button," and this brings us to the first writer on the rapier in England, Vincenzio Saviolo, the great expounder of that Italianated fence which was so obnoxious to the old masters, withal so much admired of Elizabethan courtiers; the

man, in short, who — there seems to be much internal evidence to show it — was Shakespeare's fencing master.

Vincenzio was not the only foreign master of note established in London during the latter part of Elizabeth's reign. One, Signor Rocco, had, we hear, a very gorgeously appointed academy in Warwick Lane, near St Paul's, where he coined money rapidly at the expense of gulls and gallants alike. But this man came to grief ultimately in an encounter with the long- sword with an old-fashioned English master of defence. Another popular teacher was a certain " Geronimo " ; but he also met with a melancholy and premature end by the hands of one Cheef e, " a tall man in his fight and natural English," says George Silver, the champion of the Corporation of Masters of Defence. Saviolo, however, seems to have remained unconquered. In his work (Vincentio Saviolo, his practise, in two bookes, the first intr eating of the use of the Rapier and Dagger, the second of Honor and honorable quarrels. London. Printed by John Wolfe, 1595) are expounded in a most typical manner the principles of rapier play.

The fencing phraseology of Elizabethan times is highly picturesque, but with difficulty intelligible in the absence of practical demonstration. Without going into technical details it may be pointed out that the long Elizabethan rapier, however admirably balanced it might otherwise be, was still too heavy to admit of quick parries with the blade itself. Thrusts, as a rule, had to be avoided by body movements, by ducking, or by a vault aside (incartata), or beaten away with the left hand, the hand being protected with a gauntlet or armed with a dagger. In fact, one may say that the chief characteristic of Elizabethan sword-play was the concerted action of the left hand parrying while the right delivered the attack. Benvolio's description of Tybalt's fight is graphic: —

" With piercing steel he tilts at bold Mercutio's breast,

Who, ail as hot, turns deadly point to point,

And with a martial scorn, with one hand beats

Cold death aside, and with the other

Sends it back to Tybalt, whose dexterity

Retorts it . . ."

Of these body movements, in Saviolo 's days, the most approved were: the incartata, just mentioned; the pass (the " passado," in the ruffling

Anglo-Italian jargon), that is, passing of one foot in front of the other whilst delivering the attack; the bolta lunga, or lunge; and the caricado, which was a far-reaching combination of the two. Of systematic sword movements there were six: stocata, a thrust delivered with nails up wards; imbrocata, with nails down; punta-reversa, any thrust delivered from the left side of the body; mandritto, a cut from the right; rinverso, one from the left ; stramasone, a right-down blow with the point of the sword.

The new art of fence, as systematized by the principles of rapier play, was on the whole already accepted in England during the last decade of the 16th century, and was, as we know, destined to endure. Nevertheless, there were still many partisans of the older school: lovers of the national short-sword and the buckler. Their tenets are to be found embodied, in very strenu- ous language, by the George Silver mentioned above, a member, it would seem, of the now dwindling company of Masters of Defence, in his small work: Paradoxe of Defence, wherein is proved the true ground of fight to be in the short ancient weapons, etc. Printed in London, 1590. (The work has been reprinted by Messrs George Bell & Sons.)

The Italians were undoubtedly the leaders in sword-play; but, towards the beginning of the 17th century, the Spaniards developed a peculiar school of their own, which for a short while was all the mode in England as well as in France. The last trace, be it stated, of that school is now extinct. Yet the Spaniard of cavalier days was undoubtedly a formidable duellist; that was no doubt owing to the quality of the man, not of his art. The Italian's fence was artistic; the Spaniard's dexterity was essen- tially scientific. In Spain were to be found typically those " Captains of Complements," who not only understood in their most intricate mazes the proper " dependencies " for the cartel, but also the mathematical certainties for the " reason demon-strative." These Spanish books are marvellously pedantic; one may as well say it, frankly ridiculous. Spanish masters in- structed their scholars on mathematical lines, with the help of diagrams drawn on the floor within a circle, the radius of which bore certain cryptic proportions to length of human arms and Spanish swords. The circle was inscribed in squares and inter- sected by sundry chords bearing occult but, it was held, incon- trovertible relations to probabilities of strokes and parries. The scholar was to step from certain intersections to certain others. If this stepping was correctly done the result was a

fore- gone victory. ” A villain,” exclaims Mercutio, indignantly, ” who fights by the book of arithmetic.” Elizabethan comedies bring us many an echo of its great expounder of mathematical swordsmanship, the magnificent Carranza, the primer inventor de la Ciencia de las Armas, the writer of treatises so abstruse on ” the first and second cause,” in questions of honour and s word- ing, that they have never been quite understood to this day.

Perhaps the most curious matter in connexion with the Spanish fence is that the most splendid treatise of the sword published in the French language is in reality purely Spanish (we have seen that the first was German, and the second an adaptation of Italian treatises). This third work, Acade~mie de V epee de Girard Thibault, d’Anvers, etc., is indeed a monument; one of the biggest books ever printed, and beyond compare the biggest book of fence. It was issued in 1628 by the Leiden Elzevirs, and took fifteen years to complete. Nine reigning princes and a vast number of private gentlemen subscribed to meet its stupendous expenses.

This work was spoken of as a ” monument.” It may, in some respects, be looked upon as the funeral monument of the old rapier fence; for soon after that period rose an entirely new school, one adapted to the use of a less portentous weapon, the small-sword of French pattern; a school destined to endure, and to lead to the perfection of our modern escrime.

The evolution of this new school is an instance of the influence of fashion upon the shape of the sword, and hence upon theories concerning its use. The French school of fencing may be said to owe its origin to the adoption, under Louis XIV., of the short court-sword in place of the over-long wide-hilted rapier of the older style. With a weapon of such reduced dimensions, of such reduced weight, the advantage of the dagger as a fencing adjunct at once ceased to be felt. The dagger, last Gothic remnant, disappeared accordingly; and there arose rapidly a new system of play, in which most of the defensive actions were performed by the blade alone; in which, at the same time (the reduction in the size and weight of the weapon rendering the efficiency of the edge almost nugatory in comparison with that of the point), all cutting action was ultimately discarded.

It is from that date, namely, from the last third of the 17th century, that the sword, as a fighting implement, becomes differentiated into two very different directions. The military weapon becomes the back-sword or sabre; the walking com- panion and duelling weapon becomes what we now understand by the small-sword. Two utterly

different kinds of fence are practised: one, that of the back-sword; the other, what we would now call foil-play.

The magnificent old cut and thrust rapier still flourished, it is true, in parts of Italy and Spain; but by the end of the 17th century it had already become an object of ridicule in the eyes of all persons addicted to bon ton — and it must be remembered that bon ton, on the Continent everywhere and even in England, at that time, was French ton. The walking sword, fit for a gentleman's side, was therefore the small-sword of Versailles pattern. Its use had to be learnt from French masters of deportment; the old magniloquent Italo-Spanish rapier jargon was forgotten; French terms, barbarized into carte, tierce, sagoon, flanquonade, and so forth, were alone understood. In fact, French fencing became as indispensable an accomplishment to the Georgian gentlemen as the fine Italianated foyning had been to the Elizabethan.

The new French sword-play was, it must be owned, very neat, quiet, precise, and, if anything, even more deadly than the old fence. It was perfect as a decorous mode of fight, and as well suited to the lace ruffles, to the high perruque and the red heels of the " beau " as the long cup-hilted rapier had been to the booted and spurred " cavalier." The essence of its play was nimbleness of wrist; it required quickness of spirit rather than muscular vigour. It is to be noted, however, that the same sort of popular opposition met the invasion of French fencing, in post-Restoration days, that had been offered to the new-fangled Italian rapier a century earlier. During the Parliamentary period the rapier and its attendant dagger had practically disappeared; they were not true warlike weapons, their chief virtue was for duelling or sudden encounters. But the stout English back-sword survived; and with it a very definite school of back-sword play. Under Charles II., the amusement of stage or prize-fighting with swords had become a la mode. Courteous assaults at many weapons, of course rebated, had been frequent functions under the auspices of the Corporation of Masters of Defence during the second half of the 16th century; it is (be it remarked) in such sword-matches on the scaffold that we find the origin of our modern prize-fights at fisticuffs. The first instance known of a challenge at sharps on the fighting stage is seen in a cartel sent by George Silver and Toby his son, as champions of the Corporation of Masters of Defence, to the ob- noxious " Signors " Saviolo and Geronimo. As a matter of fact, the latter, having apparently no wish to improve their excellent social position or to risk forfeiting it, declined this invitation to a public trial of skill. But the idea was right martial and pleasing to the English mind, and the fashion of prize-fighting took the firm hold it retained on English

minds till stringent legislation, not so very long ago, was brought to bear upon it. Be it as it may, this prize-fighting with swords endured until middle Georgian days; when, under the impetus given to fistic displays then by the renowned Figg (who was at one and the same time the most formidable of English fencers and the first on the long list of English pugilistic champions), back-swording became relegated to the provinces, and ultimately dwindled into our bastard ” single-stick.”

Fencing, in its restricted sense of purely thrusting play, was always an ” academic ” art in England. The first great advocate and exponent of the new small-sword fence, as taught by the new French school, was Sir William Hope of Balcomy, at one time deputy governor of Edinburgh Castle, who wrote a great number of quaint treatises of great interest to the ” operative ” as well as to the ” speculative ” fencer. Yet, oddly enough, Sir William Hope was instrumental in endeavouring to push through parlia- ment a bill for the establishment of a court of honour, the office of which was to have been the deciding of honourable quarrels, whenever possible, without appeal to fencing skill. The House,

however, being at the time excited and busy on the question of the union of Scotland and England, the bill never became act.

To resume: since it began to be practised as a regulated art one may say broadly that sword play has already passed through four main phases. The first belongs to the early Tudor days of sword and buckler encounters, whereof, if the best theoretical treatises appeared in Italy, the sturdiest practical exponents were most probably found in the British Isles. Then came the age of the rapier, coeval with the general disuse of the buckler. There may be discerned the dawn of fencing proper, which will fully arise when, in Caroline times, the outrageous length of the tucke will at last be sufficiently reduced no longer to require the dagger as a helpmate. The third was the age of the small-sword. With its light, elegant and deadly practice we enter a new atmosphere, so to speak, on fencing ground. Suppleness of wrist and precision of fingering replace the ramping and traver- sing, the heavy forcing play, of the Elizabethan. If the rapier age was well exemplified by Vincent Saviolo, this one was typified, albeit perhaps at a time when it was already somewhat on the wane, by the admirable Angelo Tremamondo Malevolti.

In the early days of the small-sword age men still fenced in play as they fought in earnest. But presently there appeared on the scene (during the last years of the 18th century) an imple- ment destined to revolutionize the art and hopelessly to divide the practice of the school from that of the field: that was the fencing mask. Before this invention, small-sword play in the master's room was perforce comparatively cautious, correct, sure and above all deliberate. The long, excited, argumentative phrases of modern assaults were unknown; and so was the almost inevitably consequent scrimmage. But under the pro- tection of the fencing mask a»new school of foil-play was evolved, one in which swiftness and inveteracy of attack and parry, of riposte, remise, counter-riposte and reprise, assumed an all-im- portant character. With the new style began to assert itself that utter recklessness of " chance hits " which in our days so markedly differentiates foil-practice from actual duelling. And this brings us to the fourth phase, the fencing art, to what may be called the age of the foil.

If anything were required to demonstrate that foil-play has nowadays passed into the state of what may be called fine art in athleticism, it would be found in the rise of the method which French masters particularize as le jcu du terrain, as duelling play in fact; a play which differs as completely from academic foil- fencing as cross-country riding in an unknown district from the haute icole of horsemanship in the manege. By fencing, nowadays, that is by foil-play, we have come to mean not simply fighting for hits, but a strictly regulated game which, being quite conventional, does not take accidental hits into consideration at all. This game requires for its perfect display a combination of artificial circumstances, such as even floors, featherweight weapons, and an unconditional acceptance of a number of traditional conventions. Now, for the more utilitarian purposes of duelling, the major part of the foil fencer's special achievement and brilliancy has to be uncompromisingly sacrificed in the pres- ence of the brutal fact that thrusts in the face, or below the waist, do count, insomuch as they may kill; that accidental hits in the arm or the leg cannot be disregarded, for they may, and generally do, put a premature stop to the bout. The " rub on the green " must be accepted, perforce, and indeed often plays as important a part in the issue of the game as the player's skill. The fact, however, that in earnest encounters all conventionalities which determine the value of a hit vanish, does not in any way justify the notion, prevalent among many, that a successful hit justifies any method of planting the same ; and that the mere discarding of all convention in practical sword-play is sufficient to convert a bad fencer into a dangerous duellist.

It is the recognition of this fact (which, oddly enough, only came to be generally admitted, and not without reluctance, by the masters of the art during the last quarter of the 19th century) which has led to the elaboration of the modified system of small-sword fence now known as tpee play. The new system, after passing through various rather extravagant phases of its

own, gradually returned to the main principle of sound foil-play, but shorn of all futile conventions as to the relative values of hits. In epee play a hit is a hit, whether correctly delivered or reckless, whether intentional or the result of mere chance, and must, at the cost of much caution and patience, be guarded against.

Per contra the elaboration by the devotees of the epee of a really practical system of fence, that is, one applicable to trials in earnest, has reacted upon the teaching of foil-play by the best masters of the present day — a teaching which, without ceasing to be academical up to a certain point, takes now cognisance of the necessity of defending every part of the body as sedulously as the target of the breast, and, moreover, of warding the many possibilities of chance hits in contretemps.

In both plays — in the highly refined, complicated and brilliant fence of the first-class ” foil,” as well as in the simpler and more cautious operations of the practised duellist — the one golden rule remains, that one so quaintly expressed by M. Jourdain’s maitre d’armes in Moliere’s comedy: ” Tout le secret des armes ne consiste qu’en deux choses, a donner et a ne point recevoir.”

The point most usually lost sight of by sanguine and self- reliant scorners of conventionalities is that, although with the sword it may be comparatively easy at any time ” to give,” it is by no means easy to make sure of ” giving without receiving.” The mutual simultaneous hit — the coup-double — is, in fact, the dread pitfall of all sword-play. For this reason, in courteous bouts, a hit has no real value, not only when it is actually cancelled by a counter, but when it is delivered in such a way as to admit of a counter. In short, the experience of ages and the careful consideration of probabilities have given birth to the various make-believes and restrictions that go to make sound foil-play. These restrictions are destined to act in the same direction as the warning presence of a sharp point instead of a button; and thus, as far as possible, to prevent those mutual hits — the contretemps of the old masters — which mar the greater number of assaults. The proper observance of those conventions, other things being equal, distinguishes the good from the in- different swordsman, the man who

uses his head from him who rushes blindly where angels fear to tread. So much for foil- play.

In modern sword-play, on the other hand, is seen the usual tendency of arts which have reached their climax of complication to return to comparative simplicity. With reference to actual duelling, it is a recognized thing that it would be the height of folly to attempt, sword in hand, the complex attacks, the full- length lunges, the neat but somewhat weak parries of the foil; so much so, that many have been led to assert that, for its ultimate practical purpose (which logically is that of duelling), the refined art of the foil, requiring so many years of assiduous and methodical work, is next to useless. It is alleged, as a proof, that many successful duellists have happened to be indifferent performers on the fencing floor. Some even maintain that a few weeks' special work in that restricted — very restricted — play, which alone can be considered safe on the field of honour, will produce as good a practical swordsman as any who have walked the schools for years. Nothing can be further from the truth: were it but on the ground that the greater includes the less; that the foil-fencer of standing who can perform with ease and accuracy all the intricate movements of the assault, who has trained his hand and eye to the lightning speed of the well- handled foil, must logically prove more than a match for the more purely practical but less trained devotees of the Zpee de combat. The only difference for him in the two plays is that the latter is incomparably slower in action, simpler; that it demands above all things patience and caution; and especially that, instead of protecting his breast only, the epee fencer must beware of the wily attack, or the chance hit, at every part of his body, especially at his sword-hand.

The difference which still exists between the French and Italian schools of small-sword fence — by no means so wide, in point of theory, as popularly supposed — is mainly due to the dissimilarity of the weapons favoured by the two countries. The quillons, which are retained to this day in the Italian

fioretto and spada, conduce to a freer use of wrist-play and a straight arm. The French, on the other hand, having long ago adopted the plain grip both for fleuret and 6p6e, have come to rely more upon finger-play and a semi-bent arm. Both schools have long laid claims to an overwhelming superiority, on theo- retical ground, over their rivalsˆclaims which were unwarrant- able. Indeed, of later days,

especially since the evolution of a special ” duelling play,” the two schools show a decided tendency, notwithstanding the difference in the grip of the weapons, towards a mutual assimilation of principles.

As a duelling weapon — as one, that is to say, the practice of which under the restrictive influence of conventions could become elaborated into an art — the sabre (see Sabre-fencing) returned to favour in some countries at the close of the Napoleonic wars. Considered from the historical point of view, the modern sabre, albeit now a very distant cousin of the small- sword, is as direct a descendant as the latter itself of the old cut- and-thrust rapier. It is curious, therefore, to note that, just as the practice of the ” small ” or thrusting sword gave rise to two rival schools, the French and the Italian, that of the sabre or cutting sword (it can hardly be called the broadsword, the blade, for the purposes of duelling play, having been reduced to slenderest proportions) became split up into two main systems, Italian and German. And further it is remarkable that the leading characteristics of the latter should still be, in a manner, ” severity ” and steadfastness; and that the former, the Italian, should rely, as of yore, specially upon agility and insidious cunning.

Concerning the latter-day evolution of that special and still more conventional system of fence, the Schldger or Hau-rapier play favoured by the German student, from that of the ancestral rapier, the curious will find a critical account in an article entitled ” Schldger ei ” which appeared in the Saturday Review, 5th of December 1885.

See also the separate articles on Cane-Fencing (canne); Epee-de-Combat; Foil-Fencing; Sabre-Fencing; and Single-stick.

Authorities. — The bibliography of fencing is a copious subject; but it has been very completely dealt with in the following works: Bibliotheca dimicatoria, in the ” Fencing, Boxing and Wrestling ” volume of the Badminton library (Longmans) ; A Bibliography of Fencing and Duelling, by Carl A. Thimm (John Lane). For French works more especially: La Bibliographic de I’escrime, by Vigeant (Paris, Motteroz) ; and Ma Collection d’escrime, by the same (Paris, Quantin). For Italian books: Bibliografia generate della scherma, by Gelli (Firenza, Niccolai). For Spain and Portugal: Libros de esgrima espanoles y Portugueses, by Leguina (Madrid, Los Huerfanos). Both M. Vigeant’s and Cav. Gelli’s works deal with the subject generally; but their entries are only critical, or even tolerably accurate, in the case of books belonging to their own countries. Concerning the history of the art, Egerton Castle’s Schools and Masters of Fence (George Bell) ; Hutton’s The Sword and the Centuries (Grant Richards) ; and

Letainturier-Fradin's Les Joueurs d'ep'ee a travers les ages (Paris, Flammarion) cover the ground, technically and ethically. As typical exponents of the French and Italian schools respectively may be mentioned here: La Theorie de I'escrime, by Prevost (Paris, de Brunhof) (this is the work which was adopted in the Badminton volume on Fencing), and Trattato teorico- pratico della scherma, by Parise (Rome, Voghera). (E. Ca.)

FENDER, a metal guard or defence (whence the name) for a fire-place. When the open hearth with its logs burning upon dogs or andirons was replaced by the closed grate, the fender was devised as a finish to the smaller fire-places, and as a safeguard against the dropping of cinders upon the wooden floor, which was now much nearer to the fire. Fenders are usually of steel, brass or iron, solid or pierced. Those made of brass in the latter part of the 18th and the earlier part of the 19th centuries are by far the most elegant and artistic. They usually had three claw feet, and the pierced varieties were often cut into arabesques or con- ventional patterns. The lyre and other motives of the Empire style were much used during the prevalence of that fashion. The modern fender is much lower and is often little more than a kerb; it is now not infrequently of stone or marble, fixed to the floor.

FENELON, BERTRAND DE SALIGNAC, seigneur de la Mothe (1523-1589), French diplomatist, came of an old family of Perigord. After serving in the army he was sent ambassador to

England in 1568. At the request of Charles IX. he endeavoured to excuse to Elizabeth the massacre of St. Bartholomew as a necessity caused by a plot which had been laid against the life of the king of France. For some time after the death of Charles IX. Fenelon was continued in his office, but he was recalled in 1575 when Catherine de' Medici wished to bring about a marriage between Elizabeth and the duke of Alencon, and thought that another ambassador would have a better chance of success in the negotiation. In 1 582 Fenelon was charged with a new mission to England, then to Scotland, and returned to France in 1583. He opposed the Protestants until the end of the reign of Henry III., but espoused the cause of Henry IV. He died in 1589. His nephew in the sixth degree was the celebrated archbishop of Cambrai.

Fenelon is the author of a number of writings, among which those of general importance are Memoires touchant V Angleterre et la Suisse, ou Sommaire de la negotiation faite en Angleterre, Van 1571 (containing a number of the letters of Charles and his mother, relating

to Queen Elizabeth, Queen Mary and the Bartholomew massacre), published in the Memoires of Castelnau (Paris, 1659); Negotiations de la Mothe Fenelon et de Michel, sieur de Mauvissiere, en Angleterre ; and Depeches de M. de la Mothe Fenelon, Instructions au sieur de la Mauvissiere, both contained in the edition of Castelnau's Memoires, published at Brussels in 1 73 1. The correspondence of Fenelon was published at Paris in 1838-1841, in 7 vols. 8vo.

See " Lettres de Catherine de' Medicis," edited by Hector de la Ferriere (1880 seq.) in the Collection de documents inedits sur I'histoire de France.

FENELON, FRANCOIS DE SALIGNAC DE LA MOTHE (1651- 1715), French writer and archbishop of Cambrai, was born at the chateau of Fenelon in Perigord on the 6th of August 165 1. His father, Pons, comte de Fenelon, was a country gentleman of ancient lineage, large family and $mall estate. Owing to his delicate health the boy's early education was carried on at home; though he was able to spend some time at the neighbouring university of Cahors. In 1666 he came to Paris, undercharge of his father's brother, Antoine, marquis de Fenelon, a retired soldier of distinction, well known for his religious zeal. Three years later he entered the famous theological college of Saint Sulpice. Here, while imbibing the somewhat mystical piety of the house, he had an excellent chance of carrying on his beloved classical studies; indeed, at one time he proposed to couple sacred and profane together, and go on a missionary journey to the Levant. " There I shall once more make the Apostle's voice heard in the Church of Corinth. I shall stand on that Areopagus where St. Paul preached to the sages of this world an unknown God. But I do not scorn to descend thence to the Piraeus, where Socrates sketched the plan of his republic. I shall mount to the double summit of Parnassus; I shall revel in the joys of Tempe." Family opposition, however, put an end to this attractive prospect. Fenelon remained at Saint Sulpice till 1679, when he was made " superior " of a " New Catholic " sisterhood in Paris — an institution devoted to the conversion of Huguenot ladies. Of his work here nothing is known for certain. Presumably it was successful; since in the winter of 1685, just after the revocation of the edict of Nantes, F6nelon was put at the head of a number of priests, and sent on a mission to the Protestants of Saintonge, the district immediately around the famous Huguenot citadel of La Rochelle. To Fenelon such employment was clearly uncongenial; and if he was rather too ready to employ unsavoury methods — such as bribery and espionage — among his proselytes, his general conduct was kindly and statesmanlike in no slight degree. But neither in his actions nor in his writings is there the least trace of that belief in liberty of conscience

ascribed to him by 18th-century philosophers. Tender-hearted he might be in practice; but toleration he declares synonymous with ” cowardly indulgence and false compasssion.”

Meanwhile the marquis de F6nelon had introduced his nephew into the devout section of the court, dominated by Mme de Maintenon. He became a favourite disciple of Bossuet, and at the bishop’s instance undertook to refute certain metaphysical errors of Father Malebranche. Followed thereon an independent philsophical Treatise on the Existence of God, wherein Fenelon rewrote Descartes in the spirit of St Augustine. More important

were his Dialogues on Eloquence, wherein he entered an eloquent plea for greater simplicity and naturalness in the pulpit, and urged preachers to take the scriptural, natural style of Bossuet as their model, rather than the coldly analytic eloquence of his great rival, Bourdaloue. Still more important was his Treatise on the Education of Girls, being the first systematic attempt ever made to deal with that subject as a v/hole. Hence it was probably the most influential of all Fenelon’s books, and guided French ideas on the question all through the 18th century. It holds a most judicious balance between the two opposing parties of the time. On the one side were the precieuses, enthusiasts for the ” higher ” education of their sex; on the other were the heavy Philistines, so often portrayed by Moliere, who thought that the less girls knew the better they were likely to be. Fenelon sums up in favour of the cultivated house- wife; his first object was to persuade the mothers to take charge of their girls themselves, and fit them to become wives and mothers in their turn.

The book brought its author more than literary glory. In 1689 Fenelon was gazetted tutor to the duke of Burgundy, eldest son of the dauphin, and eventual heir to the crown. The character of this strange prince has been drawn once for all by Saint-Simon. Shortly it may be said that he was essentially a massof contradictions — brilliant, passionate to the point of mania, but utterly weak and unstable, capable of developing into a saint or a monster, but quite incapable of becoming an ordinary human being. FenJon assailed him on the religious side, and managed to transform him into a devotee, exceedingly affection-ate, earnest and religious, but woefully lacking in tact and common sense. In justice, however, it should be added that his health was being steadily undermined by a mysterious internal complaint, and

that Fenelon's tutorship came to an end on his disgrace in 1697, before the pupil was fifteen. The abiding result of his tutorship is a code of carefully graduated moral lessons — the Fables, the Dialogues of the Dead (a series of imagin- ary conversations between departed heroes), and finally TiU- maque, where the adventures of the son of Ulysses in search of a father are made into a political novel with a purpose. Not, indeed, that Fenelon meant his book to be the literal paper Constitution some of his contemporaries thought it. Like other Utopias, it is an easy-going compromise between dreams and possibilities. Its one object was to broaden Burgundy's mind, and ever keep before his eyes the " great and holy maxim that kings exist for the sake of their subjects, not subjects for the sake of kings." Here and there Fenelon carries his philanthropy to lengths curiously prophetic of the age of Rousseau — fervid denunciation of war, belief in nature and fraternity of nations. And he has a truly 18th-century belief in the all-efficiency of institutions. Mentor proposes to " change the tastes and habits of the whole people, and build up again from the very found- ations." Fenelon is on firmer ground when he leads a reaction against the " mercantile system " of Colbert, with its crushing restrictions on trade; or when he sings the praises of agriculture, in the hope of bringing back labour to the land, and thereby ensuring the physical efficiency of the race. Valuable and far- sighted as were these ideas, they fitted but ill into the scheme of a romance. Seldom was Voltaire wider of the mark than when he called Telemaque a Greek poem in French prose. It is too motive", too full of ingenious contrivances, to be really Greek. As, in Fenelon's own opinion, the great merit of Homer was his " amiable simplicity," so the great merit'of Telemaque is the art that gives to each adventure its hidden moral, to each scene some sly reflection on Versailles. Under stress of these pre- occupations, however, organic unity of structure went very much to the wall, and Telemaque is a grievous offender against its author's own canons of literary taste. Not that it altogether lost thereby. There is a curious richness in this prose, so full of rhythm and harmony, that breaks at every moment into verse, as it drags itself along its slow and weary way, half- fainting under an overload of epithets. And although no single feature of the book is Greek, there hangs round it p moral fragrance only to be called forth by one who had fulfilled the

vow of his youth, and learnt to breathe, as purely as on " the double summit of Parnassus," the very essence of the antique.

TeUmaque was published in 1699. Four years before, Fenelon had been appointed archbishop of Cambrai, one of the richest benefices in France. Very soon afterwards, however, came the great calamity of his

life. In the early days of his tutorship he had met the Quietist apostle, Mme Guyon (?.»•), and had been much struck by some of her ideas. These he developed along lines of his own, where Christian Neoplatomsm curiously mingles with theories of chivalry and disinterestedness, borrowed from the precieuses of his own time. His mystical principles are set out at length in his Maxims of the Saints, published in 1697 (see Quietism). Here he argues that the more love we have for ourselves, the less we can spare for our Maker. Perfection lies in getting rid of self-hood altogether — in never thinking of ourselves, or even of the relation in which God stands to us. The saint does not love Christ as his Redeemer, but only as the Redeemer of the human race. Bossuet (q.v.) attacked this position as inconsistent with Christianity. Fenelon promptly appealed to Rome, and after two years of bitter controversy his book was condemned by Innocent XII. in 1699. As to the merits of the controversy opinion will always be divided. On the point of doctrine all good judges agree that Fenelon was wrong; though many still welcome the obiter dictum of Pope Innocent, that Fenelon erred by loving God too much, and Bossuet by loving his neighbour too little. Of late years, however, Bossuet has found powerful defenders; and if they have not cleared his character from reproach, they have certainly managed to prove that Fenelon's methods of controversy were not much better than his. One of the results of the quarrel was Fenelon's banish- ment from court; for Louis XIV. had ardently taken Bossuet's side, and brought all the batteries of French influence to bear on the pope. Immediately on the outbreak of the controversy, Fenelon was exiled to his diocese, and during the last eighteen years of his life he was only once allowed to leave it.

To Cambrai, accordingly, all his energies were now directed. Even Saint-Simon allows that his episcopal duties were perfectly performed. Tours of inspection, repeated several times a year, brought him into touch with every corner of his diocese. It was administered with great strictness, and yet on broad and liberal lines. There was no bureaucratic fussiness, no seeking after popularity; but every man, whether great or small, was treated exactly as became his station in the world. And Saint-Simon bears the same witness to his government of his palace. There he lived with all the piety of a true pastor, yet with all the dignity of a great nobleman, who was still on excellent terms with the world. But his magnificence made no one angry, for it was kept up chiefly for the sake of others, and was exactly proportionate to his place. With all its luxuries and courtly ease, his house remained a true bishop's palace, breathing the strictest discipline and restraint. And of all this chastened dignity the archbishop was himself the ever-present, ever-inimitable model — in

all that he did the perfect churchman, in all the high-bred noble, in all things, also, the author of Telemaque.

The one great blot on this ideal existence was his persecution of the Jansenists (see Jansenism). His theories of life were very different from theirs: and they had taken a strong line against his Maxims of the Saints, holding that visionary theories of perfection were ill-fitted for a world where even the holiest could scarce be saved. To suppress them, and to gain a better market for his own ideas, he was even ready to strike up an alliance with the Jesuits, and force on a reluctant France the doctrine of papal infallibility. His time was much better employed in fitting his old pupil, Burgundy, for a kingship that never came. Louis XIV. seldom allowed them to meet, but for years they corresponded; and nothing is more admirable than the mingled tact and firmness with which Fenelon spoke his mind about the prince's faults. This exchange of letters became still more frequent in 171T, when the wretched dauphin died and left Burgundy heir- apparent to the throne. Fenelon now wrote a series of memorable criticisms on the government of Louis XIV., accompanied by projects of reform, not always quite so wise. For his practical

political service was to act as an- alarm-bell. Much more clearly than most men, he saw that the Bourbons were tottering to their fall, but how to prevent that fall he did not know.

Not that any amount of knowledge would have availed. In 171 2 Burgundy died, and with him died all his tutor's hopes of reform. From this moment his health began to fail, though he mustered strength enough to write a remarkable Letter to the French Academy in the autumn of 1714. This is really a series of general reflections on the literary movement of his time. As in his political theories, the critical element is much stronger than the constructive. Fenelon was feeling his way away from the rigid standards of Boileau to " a Sublime so simple and familiar that all may understand it." But some of his methods were remarkably erratic; he was anxious, for instance, to abolish verse, as unsuited to the genius of the French. In other respects, however, he was far before his age. The 17th century has treated literature as it treated politics and religion; each of the three was cooped up in a water-tight compartment by itself. Fenelon was one of the first to break down these partition-walls, and insist on viewing all three as products of a single spirit, seen at different angles.

A few weeks after the Letter was written, Fenelon met with a carriage-accident, and the shock proved too much for his en- feebled frame. On the 7th of January 1715 he died at the age of 63. Ever since, his character has been a much-discussed enigma. Bossuet can only bje thought of as the high-priest of authority and common-sense; but Fenelon has been made by turns into a sentimentalist, a mystical saint, an 18th-century philosophe, an ultramontane churchman and a hysterical hypocrite. And each of these views, except the last, contains an element of truth. More than most men, Fenelon ” wanders between two worlds — one dead, the other powerless to be born.” He came just at a time when the characteristic ideas of the 17th century — the ideas of Louis XIV., of Bossuet and Boileau — had lost their savour, and before another creed could arise to take their place. Hence, like most of those who break away from an established order, he seems by turns a revolutionist and a reactionary. Such a man expresses his ideas much better by word of mouth than in the cold formality of print; and Fenelon’ s contemporaries thought far more highly of his conversation than his books. That downright, gossiping German princess, the duchess of Orleans, cared little for the Maxims; but she was enraptured by their author, and his ” ugly face, all skin and bone, though he laughed and talked quite unaffectedly and easily.” An observer of very different mettle, the great lawyer d’Aguesseau, dwells on the “noble singularity, that gave him an almost prophetic air. Yet he was neither passionate nor masterful. Though in reality he governed others, it was always by seeming to give way; and he reigned in society as much by the attraction of his manners as by the superior virtue of his parts. Under his hand the most trifling subjects gained a new importance; yet he treated the gravest with a touch so light that he seemed to have invented the sciences rather than learnt them, for he was always a creator, always original, and himself was imitable of none.” Still better is Saint-Simon’s portrait of Fenelon as he appeared about the time of his appointment to Cambrai — tall, thin, well-built, exceedingly pale, with a great nose, eyes from which fire and genius poured in torrents, a face curious and unlike any other, yet so striking and attractive that, once seen, it could not be forgotten. There were to be found the most contradictory qualities in perfect agreement with each others-gravity and courtliness, earnestness and gaiety, the man of learning, the noble and the bishop. But all centred in an air of high-bred dignity, of graceful, polished seemliness and wit — it cost an effort to turn away one’s eyes.

Authorities. — The best complete edition of Fenelon was brought out by the abbe Gosselin of Saint Sulpice (10 vols., Paris, 1851). Gosselin also edited the Histoire de Fenelon, by Cardinal Bausset (4 vols., Paris,

1850). Modern authorities are Fenelon a Cambrai (Paris, 1885), by Emmanuel de Broglie; Fenelon, by Paul Janet (Paris, 1892) ; Bossuet et Fenelon, by L. Crousle (2 vols., Paris, 1894) ; J. Lemaitre, Fenelon(lQlo). In English there are: Fenelon, his Friends and Enemies, by E. K. Sanders (1901); and Francois de Fenelon, by Lord St Cyres (1906) ; see also the Quarterly Review for January 1902, and M. Masson, Fenelon et Madame Cuyon (1907). (St. C.)

FENESTELLA, Roman historian and encyclopaedic writer, flourished in the reign of Tiberius. If the notice in Jerome be correct, he lived from 52 B.C. toA.D. 19 (according to others 35 b.c- a.d. 36) . Taking Varro for his model, Fenestella was one of the chief representatives of the new style of historical writing which, in the place of the brilliant descriptive pictures of Livy, discussed curious and out-of-the-way incidents and customs of political and social life, including literary history. He was the author of an Annales, probably from the earliest times down to his own days. The fragments indicate the great variety of subjects discussed: the origin of the appeal to the people (provocatio) ; the use of elephants in the circus games; the wearing of gold rings; the introduction of the olive tree; the material for making the toga; the cultivation of the soil; certain details as to the lives of Cicero and Terence. The work was very much used (mention is made of an abridged edition) by Pliny the elder, Asconius Pedianus (the commentator on Cicero), Nonius, and the philologists.

Fragments in H. Peter, Historicorum Romanorum fragmenta (1883); see also monographs by L. Mercklin (1844) and J. Poeth (1849); M. Schanz, Geschichte der rom. Lift. ed. 2 (1901); Teuffel, Hist, of Roman Literature, p. 259. A work published under the name of L. Fenestella (De magistratibus et sacerdotiis Romanorum, 1 5 10) is really by A. D. Fiocchi, canon and papal secretary, and was subse- quently published as by him (under the latinized form of his name, Floccus), edited by Aegidius Witsius (1561).

FENESTRATION (from 0. Fr. fenestre, modern fenetre, Lat. fenestra, a window, connected with Gr. dtalveiv, to show), an architectural term applied to the arrangement of windows on the front of a building, more especially when, in the absence of columns or pilasters separating them, they constitute its chief architectural embellishment. The term ” f enestral ” is given to a frame or ” chassis ” on which oiled paper or thin cloth was strained to keep out wind and rain when the windows were not glazed.

FENIANS, or Fenian Brotherhood, the name of a modern Irish-American revolutionary secret society, founded in America by

JohnO'Mahony (1816-1877) ini858. The name was derived from an anglicized version of fiann, fiinne, the legendary band of warriors in Ireland led by the hero Find Mac Cumaill (see Finn Mac Cool; and Celt: Celtic Literature: Irish); and it was given to his organization of conspirators by O'Mahony, who was a Celtic scholar and had translated Keating's History of Ireland in 1857. After the collapse of William Smith O'Brien's attempted rising in 1848, O'Mahony, who was concerned in it, escaped abroad, and since 1852 had been living in New York. James Stephens, another of the "men of 1848," had established himself in Paris, and was in correspondence with O'Mahony and other disaffected Irishmen at home and abroad. A club called the Phoenix National and Literary Society, with Jeremiah Donovan (afterwards known as O'Donovan Rossa) among its more prominent members, had recently been formed at Skib- bereen; and under the influence of Stephens, who visited it in May 1858, it became the centre of preparations for armed re- bellion. About the same time O'Mahony in the United States established the " Fenian Brotherhood," whose members bound themselves by an oath of " allegiance to the Irish Republic, now virtually established," and swore to take up arms when called upon and to yield implicit obedience to the commands of their superior officers. The object of Stephens, O'Mahony and other leaders of the movement was to form a great league of Irishmen in all parts of the world against British rule in Ireland. The organization was modelled on that of the French Jacobins at the Revolution; there was a " Committee of Public Safety " in Paris, with a number of subsidiary committees, and affiliated clubs; its operations were conducted secretly by unknown and irresponsible leaders; and it had ramifications in every part of the world, the " Fenians," as they soon came to be generally called, being found in Australia, South America, Canada, and above all in the United States, as well as in the large centres of population in Great Britain such as London, Manchester and Glasgow. It is, however, noteworthy that Fenianism never gained much hold on the tenant-farmers or agricultural labourers in Ireland, although the scurrilous press by which it

was supported preached a savage vendetta against the land- owners, who were to be shot down " as we shoot robbers and rats." 1 The movement was denounced by the priests of the Catholic Church.

It was, however, some few years after the foundation of the Fenian

Brotherhood before it made much headway, or at all events before much was heard of it outside the organization itself, though it is probable that large numbers of recruits had enrolled themselves in its ” circles.” The Phoenix Club con- spiracy in Kerry was easily crushed by the government, who had accurate knowledge from an informer of what was going on. Some twenty ringleaders were put on trial, including Donovan, and when they pleaded guilty were, with a single exception, treated with conspicuous leniency. But after a convention held at Chicago under O’Mahony’s presidency in November 1863 the movement began to show signs of life. About the same time the Irish People, a revolutionary journal of extreme violence, was started in Dublin by Stephens, and for two years was allowed without molestation by the government to advocate armed rebellion, and to appeal for aid to Irishmen who had had military training in the American Civil War. At the close of that war in 1865 numbers of Irish who had borne arms flocked to Ireland, and the plans for a rising matured. The government, well served as usual by informers, now took action. In September 1865 the Irish People was suppressed, and several of the more prominent Fenians were sentenced to terms of penal servitude; Stephens, through the connivance of a prison warder, escaped to France. The Habeas Corpus Act was suspended in the beginning of 1866, and a considerable number of persons were arrested. Stephens issued a bombastic proclamation in America announcing an imminent general rising in Ireland; but he was himself soon afterwards deposed by his confederates, among whom dissension had broken out. A few Irish-American officers, who landed at Cork in the expectation of commanding an army against England, were locked up in gaol; some petty disturbances in Limerick and Kerry were easily suppressed by the police.

In the United States, however, the Fenian Brotherhood, now under the presidency of W. R. Roberts, continued plotting. They raised money by the issue of bonds in the name oi the ” Irish Republic,” which were bought by the credulous in the expectation of their being honoured when Ireland should be ” a nation once again. ” A large quantity of arms was purchased, and preparations were openly made for a raid into Canada, which the United States government took no steps to prevent. It was indeed believed that President Andrew Johnson was not indis- posed to turn the movement to account in the settlement of the Alabama claims. The Fenian ” secretary for war ” was General T. W. Sweeny (1820-1892), who temporarily (Jan. 1865-Nov. 1 ..166) was struck off the American army list. The command of the expedition was entrusted to John O’Neill, who crossed the Niagara river at the head of some 800 men on the 1st of June 1866, and captured Fort

Erie. But large numbers of his men deserted, and at Ridgeway the Fenians were routed by a battalion of Canadian volunteers. On the 3rd of June the remnant sur- rendered to the American warship ” Michigan “; and the tardy issue of President Johnson’s proclamation enforcing the laws of neutrality brought the raid to an ignominious end; the prisoners were released, and the arms taken from the raiders were, according to Henri Le Caron, ” returned to the Fenian organization, only to be used for the same purpose some four years later.” In December 1867, John O’Neill became president of the Brotherhood in America, which in the following year held a great convention in Philadelphia attended by over 400 properly accredited delegates, while 6000 Fenian soldiers, armed and in uniform, paraded the streets. At this convention a second in- vasion of Canada was determined upon; while the news of the Clerkenwell explosion in London (see below) was a strong in- centive to a vigorous policy. Le Caron (q.v.), who, while acting as a secret agent of the English government, held the position of ” inspector-general of the Irish Republican Army,” asserts that he ” distributed fifteen thousand stands of arms and almost 1 William O’Connor Morris, Ireland 1798-1898, p. 195.

three million rounds of ammunition in the care of the many trusted men stationed between Ogdensburg and St Albans,” in preparation for the intended raid. It took place in April 1870, and proved a failure not less rapid or complete than the attempt of 1866. The Fenians under O’Neill’s command crossed the Canadian frontier near Franklin, Vt., but were dispersed by a single volley from Canadian volunteers; while O’Neill himself was promptly arrested by the United States authorities acting under the orders of President Grant.

Meantime in Ireland, after the suppression of the Irish Feople, disaffection had continued to smoulder, and during the latter part of 1866 Stephens endeavoured to raise funds in America for a fresh rising planned for the following year. A bold move on the part of the Fenian ” circles ” in Lancashire had been concerted in co-operation with the movement in Ireland. An attack was to be made on Chester, the arms stored in the castle were to be seized, the telegraph wires cut, the rolling stock on the railway to be appropriated for transport to Holyhead, where shipping was to be seized and a descent made on Dublin before the authorities should have time to interfere. This scheme was frustrated by information given to the government by the in- former John Joseph Corydon, one of Stephens’s most trusted agents. Some insignificant outbreaks in the south and west of Ireland brought ” the rebellion of 1867 ” to an ignominious close. Most of the ringleaders were arrested, but although some of them were sentenced

to death none was executed. On the nth of September 1867, Colonel Thomas J. Kelly, ” deputy central organizer of the Irish Republic,” one of the most dangerous of the Fenian conspirators, was arrested in Manchester, whither he had gone from Dublin to attend a council of the English ” centres,” together with a companion, Captain Deasy. A plot to effect the rescue of these prisoners was hatched by Edward O’Meaher Condon with other Manchester Fenians; and on the 1 8th of September, while Kelly and Deasy were being conveyed through the city from the court-house, the prison van was attacked by Fenians armed with revolvers, and in the scuffle police-sergeant Brett, who was seated inside the van, was shot dead. Condon, Allen, Larkin, Maguire and O’Brien, who had taken a prominent part in the rescue, were arrested. All five were sentenced to death; but Condon, who was an American citizen, was respited at the request of the United States govern- ment, his sentence being commuted to penal servitude for life, and Maguire was granted a pardon. Allen, Larkin, and O’Brien were hanged on the 23rd of November for the murder of Brett. Attempts were made at the time, and have since been repeated, to show that these men were unjustly sentenced, the contention of their sympathizers being, first, that as ” political offenders ” they should not have been treated as -ordinary murderers; and, secondly, that as they had no deliberate intention to kill the police-sergeant, the shot that caused his death having been fired for the purpose of breaking open the lock of the van, the crime was at worst that of manslaughter. But even if these pleas rest on a correct statement of the facts they have no legal validity, and they afford no warrant for the title of the ” Manchester martyrs ” by which these criminals are remembered among the more extreme nationalists in Ireland and America. Kelly and Deasy escaped to the United States, where the former obtained employment in the New York custom-house.

In the same month, November 1867, one Richard Burke, who had been employed by the Fenians to purchase arms in Birming- ham, was arrested and lodged in Clerkenwell prison in London. While he was awaiting trial a wall of the prison was blown down by gunpowder, the explosion causing the death of twelve persons, and the maiming of some hundred and twenty others. This outrage, for which Michael Barrett suffered the death penalty, powerfully influenced W. E. Gladstone in deciding that the Protestant Church of Ireland should be disestablished as a con- cession to Irish disaffection. In 1870, Michael Davitt (q.v.) was sentenced to fifteen years’ penal servitude for participation in the Fenian conspiracy; and before he was released on ticket of leave the name Fenian had become practically obsolete, though the ” Irish Republican Brotherhood ” and other organizations

tn Ireland and abroad carried on the same tradition and pursued the same policy in later years. In 1879, John Devoy, a member of the Fenian Brotherhood, promoted a ” new departure ” in America, by which the ” physical force party ” allied itself with the ” constitutional movement ” under the leadership of C. S. Parnell (q.v.) ; and the political conspiracy of the Fenians was combined with the agrarian revolution inaugurated by the Land League.

See William O’Connor Morris, Ireland from 1798 to 1898 (London, 1898) ; Two Centuries of Irish History, 1691-1870, edited by R. Barry O’Brien (London, 1907); Henri Le Caron, Twenty-five Years in the Secret Service (London, 1892) ; Patrick J. P.Tynan, The Irish National Invincibles and their Times (London, 1896); Justin M’Carthy, A History of our own Times (4 vols., London, 1880). (R. J. M.)

FENNEL, Foeniculum vulgar e (also known as F. capillaceum) , a perennial plant of the natural order Umbelliferae, from 2 to 3 or (when cultivated) 4 ft. in height, having leaves three or four times pinnate, ‘with numerous linear or awl-shaped segments, and glaucous compound umbels of about 15 or 20 rays, with no involucres, and small yellow flowers, the petals incurved at the tip. The fruit is laterally compressed, five-ridged, and has a large single resin-canal or ” vitta ” under each furrow. The plant appears to be of south European origin, but is now met with in various parts of Britain and the rest of temperate Europe, and in the west of Asia. The dried fruits of cultivated plants from Malta have an aromatic taste, and odour, and are used for the preparation of fennel water, valued for its carminative properties. It is given in doses of 1 to 2 oz., the active principle being a volatile oil which is probably the same as oil of anise. The shoots of fennel are eaten blanched, and the seeds are used for flavouring. The fennel seeds of commerce are of several sorts. Sweet or Roman fennel seeds are the produce of a tall perennial plant, with umbels of 25-30 rays, which is cultivated near Nismes in the south of France; they are elliptical and arched in form, about f in. long and a quarter as broad, and are smooth exter- nally, and of a colour approaching a pale green. Shorter and straighter fruits are obtained from the annual variety of F. vulgare known as F. Panmorium (Panmuhuri) or Indian fennel, and are employed in India in curries, and for medicinal purposes. Other kinds are the German or Saxon fruits, brownish-green in colour, and between \ and \ in. in length, and the broader but smaller fruits of the wild or bitter fennel of the south of France. A variety of fennel, F.

duke, having the stem compressed at the base, and the umbel 6-8 rayed, is grown in kitchen-gardens for the sake of its leaves.

Giant fennel is the name applied to the plant Ferula communis, a member of the same natural order, and a fine herbaceous plant, native in the Mediterranean region, where the pith of the stem is used as tinder. Hog's or sow fennel is the species Peucedanum officinale, another member of the Umbelliferae.

FENNER, DUDLEY (c. 1558-1587), English puritan divine, was born in Kent and educated at- Cambridge University. There he became an adherent of Thomas Cartwright (153 5-1603), and publicly expounded his presbyterian views, with the result that he was obliged to leave Cambridge without taking his degree. For some months he seems to have assisted the vicar of Cran- brook, Kent, but it is doubtful whether he received ordination. He next followed Cartwright to Antwerp, and, having received ordination according to rite of the Reformed church, assisted Cartwright for several years in preaching to the English con- gregation there. The leniency shown by Archbishop Grindal to puritans encouraged him to return to England, and he became curate of Cranbrook in 1 583. fc the same year, however, he was one of seventeen Kentish ministers suspended for refusing to sign an acknowledgment of the queen's supremacy and of the authority of the Prayer Book and articles. He was imprisoned for a time, but eventually regained his liberty and spent the remainder of his life as chaplain in the Reformed church at Middleburgh.

A list of his authentic works is given in Cooper's Athenae Canta- brigienses (Cambridge, 1858-1861). They rank among the best expositions of the principles of puritanism.

FENNY STRATFORD, a market town in the Buckingham parliamentary division of Buckinghamshire, England, 48 m.

N.W. by N. of London on a branch of the London & North- Western railway. Pop. of urban district (1901), 4799. It lies in an open valley on the west (left) bank of the Ouzel, where the great north-western road from London, the Roman Watling Street, crosses the stream, and is 1 m. E. of Bletchley, an im- portant junction on the main line of the North-Western railway. The church of St Martin was built (c. 1730) on the site of an older church at the instance of Dr Browne Willis, an eminent antiquary (d. 1760), buried here; but the building has been greatly enlarged. A custom instituted by Willis on St Martin's Day (November nth) includes a service in the church, the firing of some small cannon called the " Fenny Poppers," and other celebrations. The

trade of the town is mainly agricultural.

FENRIR, or Fenris, in Scandinavian mythology, a water- demon in the shape of a huge wolf. He was the offspring of Loki and the giantess Angurboda, who bore two other children, Midgard the serpent, and Hel the goddess of death. Fenrir grew so large that the gods were afraid of him and had him chained up. But he broke the first two chains. The third, however, was made of the sound of a cat's footsteps, a man's beard, the roots of a mountain, a fish's breath and a bird's spittle. This magic bond was too strong for him until Ragnarok (Judgment Day), when he escaped and swallowed Odin and was in turn slain by Vidar, the latter's son.

FENS, 1 a district in the east of England, possessing a distinctive history and peculiar characteristics. It lies west and south of the Wash, in Lincolnshire, Huntingdonshire, Cambridgeshire and Norfolk, and extends over more than 70 m. in length (Lincoln to Cambridge) and some 35 m. in maximum breadth (Stamford to Brandon in Suffolk), its area being considerably over half a million acres. Although low and flat, and seamed by innumerable water-courses, the entire region is not, as the Roman name of Metaris Aestuarium would imply, a river estuary, but a bay of the North Sea, silted up, of which the Wash is the last remaining portion. Hydrographically, the Fens embrace the lower parts of the drainage-basins of the rivers Witham, Welland, Nene and Great Ouse; and against these streams, as against the ocean, they are protected by earthen embankments, 10 to 15 ft. high. As a rule the drainage water is lifted off the Fens into the rivers by means of steam-pumps, formerly by windmills.

General History.— According to fairly credible tradition, the first systematic attempt to drain the Fens was made by the Romans. They dug a catchwater drain (as the artificial fenland water-courses are called) , the Caer or Car Dyke, from Lincoln to Ramsey (or, according to Stukeley, as far as Cambridge), along the western edge of the Fens, to carry off the precipitation of the higher districts which border the fenland, and constructed alongside the Welland and on the seashore earthen embankments, of which some 150 m. survive. Mr S. H. Miller is disposed to credit the native British inhabitants of the Fens with having executed certain of these works. The Romans also carried causeways over the country. After their departure from Britain in the first half of the 5th century the Fens fell into neglect; and despite the preservation of the woodlands for the purposes of the chase by the Norman and early Plantagenet kings, and the unsuccessful attempt which Richard de Rulos, chamberlain of William the Conqueror, made to drain Deeping Fen, the fenland region became almost everywhere

waterlogged, and relapsed to a great extent into a state of nature. In addition to this it was ravaged by serious inundations of the sea, for example, in the years 1178, 1248 (or 1250), 1288, 1322, 1335, 1467, 1 57 1. Yet the fenland was not altogether a wilderness of reed-grown marsh and watery swamp. At various spots, more particularly in the north and in the south, there existed islands of firmer and higher ground, resting generally on the boulder clays of the Glacial epochs and on the inter- Glacial gravels of the Palaeo- lithic age. In these isolated localities members of the monastic 1 The word ” fen,” a general term for low marshy land or bog, is common to Teutonic languages, cf. Dutch ven or veen, Ger. Fenne, Fehn, Goth, fani, mud ; the Indo-European root is seen in Gr. tttjXos, mud, Lat. palus, marsh. The word ” bog ” is from the Irish or Gaelic bogach, formed from Celtic bog, soft, and meaning therefore soft, swampy ground.

.orders (especially at a later date the Cistercians) began to settle after about the middle of the 7th century. At Medeshampstead (i.e. Peterborough), Ely, Crowland, Ramsey, Thorney, Spald- ing, Peakirk, Swineshead, Tattershall, Kirkstead, Bardney, Sempringham, Bourne and numerous other places, they made settlements and built churches, monasteries and abbeys. In spite of the incursions of the predatory Northmen and Danes in the 9th and 10th centuries, and of the disturbances consequent upon the establishment of the Camp of Refuge by Hereward the Wake in the fens of the Isle of Ely in the nth century, these scattered outposts continued to shed rays of civilization across the lonely Fenland down to the dissolution of the monasteries in the reign of Henry VIII. Then they, too, were partly overtaken by the fate which befell the rest of the Fens; and it was only in the end of the 18th and the beginning of the 19th century that the complete drainage and reclamation of the Fen region was finally effected. Attempts on a considerable scale were indeed made to reclaim them in the 17th century, and the work as a whole forms one of the most remarkable chapters of the industrial history of England. Thus, the reclamation of the Witham Fens was taken up by Sir Anthony Thomas, the earl of Lindsey, Sir William Killigrew, King Charles I., and others in 1631 and succeeding years; and that of the Deeping or Welland Fens in 1638 by Sir W. Ayloff, Sir Anthony Thomas and other ” adventurers,” after one Thomas Lovell had ruined himself in a similar attempt in the reign of Queen Elizabeth. The earl of Lindsey received 24,000 acres for his work. Charles I., declaring himself the ” under- taker ” of the Holland Fen, claimed 8000 out of its 22,000 acres as his

share.

A larger work than these, however, was the drainage of the fens of the Nene and the Great Ouse, comprehending the wide tract known as the Bedford level. This district took name from the agreement of Francis, earl of Bedford, the principal land- holder, and thirteen other adventurers, with Charles I. in 1634, to drain the level, on condition of receiving 95,000 acres of the reclaimed land. A partial attempt at drainage had been made (1478-1490) by John Morton, when bishopof Ely, who constructed Morton's Leam, from Peterborough to the sea, to carry the waters of the Nene, but this also proved a failure. An act was passed, moreover, in 1602 for effecting its reclamation; and Lord Chief-Justice Popham (whose name is preserved in Popham's Eau, S.E. of Wisbech) and a company of Londoners began the work in 1605; but'the first effectual attempt was that of 1634. The work was largely directed by the Dutch engineer Cornelius Vermuyden, who had begun work in the Fens in 1621, and was knighted in 1628.

Three years after the agreement of the earl of Bedford and his partners with the king, after an outlay of £100,000 on the part of the company, the contract was annulled, on the fraudu- lent plea that the works were insufficient; and an offer was made by King Charles to undertake its completion on condition of receiving 57,000 acres in addition to the amount originally agreed on. This unjust attempt was frustrated by the breaking out of the civil war; and no further attempt at drainage was made until 1649, when the parliament reinstated the earl of Bedford's successor in his father's rights. After an additional outlay of £300,000, the adventurers received 05,000 acres of reclaimed land, according to the contract, which, however, fell far short of repaying the expense of the undertaking. In 1664 a royal charter was obtained- to incorporate the company, which still exists, and carries on the concern under a governor, 6 bailiffs, 20 conservators, and a commonalty, each of whom must possess 100 acres of land in the level, and has a voice in the election of officers. The conservators must each possess not less than 280 acres, the governor and bailiffs each 400 acres. The original adventurers had allotments of land according to their interest of the original 95,000 acres; but Charles II., on granting the charter, took care to secure to the crown a lot of 12,000 acres out of the 95,000, which, however, is held under the directors, whereas the allotments are not held in common, though subject to the laws of the corporation. The level was divided in 1697 into three parts, called the North, Middle, and South Levels— the x. 9

second being separated from the others by the Nene and Old Bedford

rivers.

These attempts failed owing to the determined opposition of the native fenmen (" stilt- walkers "), whom the drainage and appropriation of the unenclosed fenlands would deprive of valuable and long-enjoyed rights of commonage, turbary (turf- cutting), fishing, fowling, &c. Oliver Cromwell is said to have put himself at their head and succeeded in stopping all the operations. When he became Protector, however, he sanctioned Vermuyden's plans, and Scottish prisoners taken at Dunbar, and Dutch prisoners taken by Blake in his victory over Van Tromp, were employed as the workers. Vermuyden's system, however, was exclusively Dutch; and while perfectly suited to Holland it did not meet all the necessities of East Anglia. He confined his attention almost exclusively to the inland draining and embankments, and did not provide sufficient outlet for the waters themselves into the sea.

Holland and other Fens on the west side of the Witham were finally drained in 1767, although not without much rioting and lawlessness; and a striking account of the wonderful improve- ments effected by a generation later is recorded in Arthur Young's General View of the Agriculture of the County of Lincoln (London, 1799). The East, West and Wildmore Fens on the east side of the Witham were drained in 1801-1807 by John Rennie, who carried off the precipitation which fell on the higher grounds by catch- water drains, on the principle of the Roman Car Dyke, and improved the outfall of the river, so that it might the more easily discharge the Fen water which flowed or was pumped into it. The Welland or Deeping Fens were drained in 1794, 1801, 1824, 1837 and other years. Almost the only portion of the original wild Fens now remaining is Wicken Fen, which lies east of the river Cam and south-east of the Isle of Ely.

The Fen Rivers. — The preservation of the Fens depends in an intimate and essential manner upon the preservation of the rivers, and especially of their banks. The Witham, known originally as the Grant Avon, also called the Lindis by Leyland (Itinerary, vol. vii. p. 41), and in Jean Ingelow's High Tide on the Lincolnshire Coast, is some 80 m. long, and drains an area of 1079 sq. m. It owes its present condition to engineering works carried out in the years 1762-1764, 1865, 1881, and especially in 1880- 1884. In 1500 the river was dammed immediately above Boston by a large sluice, the effect of which was not only to hinder free navigation up to Lincoln (to which city sea-going vessels used to penetrate in the 14th and 15th centuries), but also to choke the channel below Boston with sedimentary matter. The sluice, or rather a new structure made in 1 764-1 766, remains; but

the river below Boston has been materially improved (1880-1884), first by the construction of a new outfall, 3 m. in length, whereby the channel was not only straightened, but its current carried directly into deep water, without having to battle against the often shifting sandbanks of the Wash; and secondly, by the deepening and regulation of the river-bed up to Boston. The Welland, which is about 70 m. long, and drains an area of 760 sq. m., was made to assume its present shape and direction in 1620, 1638, 1650, 1794, and 1835 and following years. The most radical alteration took place in 1794, when a new outfall was made from the confluence of the Glen (30 m. long) to the Wash, a distance of nearly 3 m. The Nene, 90 m. long, and draining an area of some 1077 sq. m., was first regulated by Bishop Morton, and it was further improved in 163 1, 17 21, and especially, under plans by Rennie and Telford, in 1827-1830 and 1832. The work done from 17 21 onward consisted in straightening the lower reaches of the stream and in directing and deepening the outfall. The Ouse (q.v.) or Great Ouse, the largest of the fenland rivers, seems to have been deflected, at some unknown period, from a former channel connecting via the Old Croft river with the Nene, into the Little Ouse below Littleport; and the courses of the two streams are now linked together by an elaborate network of artificial drains, the results of the great engineering works carried out in the Bedford Level in the 17th century. The old channel, starting from Earith, and known as the Old West river, carries only a small stream until, at a point above Ely, it joins the

Cam. The salient features of the plan executed by Vermuyden 1 for the earl of Bedford in the years 1632-1653 were as follows: taking the division of the area made in 1697-1698 into (i.) the North Level, between the river Welland and the river Nene; (ii.) the Middle Level, between the Nene and the Old Bedford river (which was made at this time, i.e. 1630); and (iii.) the South Level, from the Old Bedford river to the south-eastern border of the fenland. In the North Level the Welland was embanked, the New South Eau, Peakirk Drain, and Shire Drain made, and the existing main drains deepened and regulated. In the Middle Level the Nene was embanked from Peterborough to Guyhirn,

Map of the Fens.

also the Ouse from Earith to Over, both places at the south-west edge of the fenland; the New Bedford river was made from Earith to Denver, and the north side of the Old Bedford river and the south side of the New Bedford river were embanked, a long narrow ” wash,” or overflow basin, being left between them; several large feeding-drains were dug, including the Forty Foot or Vermuyden’s Drain, the Sixteen Foot river, Bevill’s river ; and the Twenty Foot river; and a new outfall was made for the Nene, and Denver sluice (to dam the old circuitous Ouse) constructed. In the South Level Sam’s Cut was dug and the rivers were embanked. Since that period the mouth of the Ouse has been straightened above and below King’s Lynn (1795-1821), a new straight cut made between Ely and Littleport, the North Level Main Drain and the Middle Level Drain constructed, and the

1 The principles upon which he proceeded are set forth in his Discourse touching the Draining of the Great Fennes (1642), reprinted in Fenland Notes and Queries (1898), pp. 26-38 and 81-87.

meres of Ramsey, Whittlesey (1851-1852), &c, drained and brought under cultivation. A considerable barge traffic is maintained on the Ouse below St Ives, on the Cam up to Cam- bridge, the Lark and Little Ouse, and the network of navigable cuts between the New Bedford river and Peterborough. The Nene, though locked up to Northampton, and connected from that point with the Grand Junction canal, is practically unused above Wansford, and traffic is small except below Wisbech.

The effect of the drainage schemes has been to lower the level of the fenlands generally by some 18 in., owing to the shrinkage of the peat consequent upon the extraction of so much of its contained water; and this again has tended, on the one hand, to diminish the speed and erosive power of the fenland rivers, and, on the other, to choke up their respective outfalls with the sedimentary matters which they themselves sluggishly roll seawards.

The Wash. — From this it will be plain that the Wash (q.v.) is being silted up by riverine detritus. The forma- tion of new dry land, known at first as ” marsh,” goes on, however, but slowly. During the centuries since the Romans are believed to have constructed the sea- banks which shut out the ocean, it is computed that an area of not more than 60,000 to 70,000 acres has been won from the Wash, embanked, drained and brought more or less under cultivation. The greatest gain has been at the direct head of the bay, between the Welland and the Great Ouse, where the average annual accretion is estimated at 10 to 11 lineal feet. On the Lincolnshire coast, farther north, the average

annual gain has been not quite 2 ft.; whilst on the opposite Norfolk coast it has been little more than 6 in. annually. On the whole, some 3 5 ,000 acres were enclosed in the 17th century, about 19,000 acres during the 18th, and about 10,000 acres during the 19th century.

The first comprehensive scheme for regulating the outfall channels and controlling the currents of the Fen rivers seems to be that proposed by Nathaniel Kinderley in 1751. His idea 2 was to link the Nene with the Ouse by means of a new cut to be made through the marshland, and guide the united stream through a further new cut " under Wotten and Wolverton through the Marshes till over against Inglesthorp or Snetsham, and there discharge itself immediately into the Deeps of Lyn Channel." In a similar way the Witham, " when it has received the Welland from Spalding," was to be carried " to some convenient place over against Wrangle or Friskney, where it may be dis- charged into Boston Deeps." This scheme was still further improved upon by Sir John Rennie, who, in a report which he drew up in 1839, recommended that the outfalls of all four rivers should be directed by means of fascined channels into one common outfall, and that the land lying between them should be enclosed as rapidly as it consolidated. By this means he esti- mated that 150,000 acres would be won to cultivation. But beyond one or two abortive or half-hearted attempts, e.g. by the Lincolnshire Estuary Company in 1851, and in 1876 and subsequent years by the Norfolk Estuary Company, no serious effort has ever been made to execute either of these schemes.

Climate. — The annual mean temperature, as observed at B oston, in the period 1864-1885, is 48-7° F.; January, 36-5°; July, 62-8°; and as observed at Wisbech, for the period 1861-1875, 49-1°. The average mean rainfall for the seventy-one years 1830-1900, at Boston, was 22-9 in.; at Wisbech for the fifteen years 1860-1875, 24-2 in., and for the fifteen years 1866-1880, 26-7 in.; and at Maxey near Peterborough, 21-7 for the nine- teen years 1882-1900. Previous to the drainage of the Fens, ague, rheumatism, and other ailments incidental to a damp

2 Set forth in The Present State of the Navigation of the Towns of Lyn, Wisbiach, Spalding and Boston (2nd ed., London, 1851), pp. 82 seq.

climate were widely prevalent, but at the present day the Fen country is as healthy as the rest of England; indeed, there is reason to believe that it is conducive to longevity.

Historical Notes. — The earliest inhabitants of this region of whom we have record were the British tribes of the Iceni con- federation; the Romans, who subdued them, called them Coriceni or Coritani. In Saxon times the inhabitants of the Fens were known (e.g. to Bede) as Gyrvii, and are described as traversing the country on stilts. Macaulay, writing of the year 1689, gives to them the name of Breedlings, and describes them as ” a half-savage population . . . who led an amphibious life, sometimes wading, sometimes rowing, from one islet of firm ground to another.” In the end of the 18th century those who dwelt in the remoter parts were scarcely more civilized, being known to their neighbours by the expressive term of ” Slodgers.” These rude fen-dwellers have in all ages been animated by a tenacious love of liberty. Boadicea, queen of the Iceni, the worthy foe of the Romans; Hereward the Saxon, who defied William the Conqueror; Cromwell and his Ironsides, are repre- sentative of the fenjnan’s spirit at its best. The fen peasantry showed a stubborn defence of their rights, not only when they resisted the encroachments and selfish appropriations of the “adventurers” in the 17th century, in the Bedford Level, in Deeping Fen, and in the Witham Fens, and again in the 18th century, when Holland Fen was finally enclosed, but also in the Peasants’ Rising of 1381, and in the Pilgrimage of Grace in the reign of Henry VIII. So long as the Fens were unenclosed and thickly studded with immense ” forests ” of reeds, and innumer- able marshy pools and ” rows ” (channels connecting the pools), they abounded in wild fowl, being regularly frequented by various species of wild duck and geese, garganies, polchards, shovelers, teals, widgeons, peewits, terns, grebes, coots, water-hens, water- rails, red-shanks, lapwings, god-wits, whimbrels, cranes, bitterns, herons, swans, ruffs and reeves. Vast numbers of these were taken in decoys 1 and sent to the London markets. At the same time equally vast quantities of tame geese were reared in the Fens, and driven by road 2 to London to be killed at Michaelmas. Their down, feathers and quills (for pens) were also a considerable source of profit. The Fen waters, too, abounded in fresh-water fish, especially pike, perch, bream, tench, rud, dace, roach, eels and sticklebacks. The Witham; on whose banks so many monasteries stoocl, was particularly famous for its pike; as were certain of the monastic waters in the southern part of the Fens for their eels. The soil of the reclaimed Fens is of excep- tional fertility, being almost everywhere rich in humus, which is capable not only of producing very heavy crops of wheat and other corn, but also of fattening live-stock with peculiar ease. Lincolnshire oxen were famous in Elizabeth’s time, and are specially singled out by Arthur Young, 3 the breed being the shorthorn. Of the crops peculiar to the region it must suffice to mention the old British dye-plant woad, which is still grown on a

small scale in two or three parishes immediately south of Boston; hemp, which was extensively grown in the 18th century, but is not now planted; and peppermint, which is occasionally grown, e.g. at Deeping and Wisbech. In the second half of the 19th century the Fen country acquired a certain celebrity in the world of sport from the encouragement it gave to speed skating. Whenever practicable, championship and other racing meetings are held, chiefly at Littleport and Spalding. The little village of Welney, between Ely and Wisbech, has produced some of the most notable of the typical Fen skaters, e.g. ” Turkey ” Smart and ” Fish ” Smart.

Apart from fragmentary ruins of the former monastic buildings of Crowland, Kirkstead and other places, the Fen country of Lincolnshire (division of Holland) is especially remarkable for the size and beauty of its parish churches, mostly built of Barnack rag from Northamptonshire. Moreover, in the posses-

1 For descriptions of these see Oldfield, Appendix, pp. 2-4, of A Topographical and Historical Account of Wainfleet (London, 1829) ; and Miller and Skertchly, The Fenland, pp. 369-375.

2 See De Foe’s account in A Tour through the Eastern Counties,

1722 (1724-1725).

3 General View, pp. 174-1294 and 288-304.

sion of such buildings as Ely cathedral and the parish church of King’s Lynn, other parts of the Fens must be considered only less rich in ecclesiastical Architecture. Using these fine opportunities, the Fen folk have long cultivated the science of campanology..

Dialect. — Owing to the comparative remoteness of their geographical situation, and the relatively late period at which the Fens were definitely enclosed, the Fenmen have preserved several dialectal features of a distinctive character, not the least interesting being their close kinship with the classical English of the present day. Professor E. E. Freeman {Longman’s Magazine, 1875) reminded modern Englishmen that it was a native of the Fens, ” a Bourne man, who gave the English language its present shape.” This was Robert Manning, or Robert of Brunne, who in or about 1303 wrote The Handlynge Synne. Tennyson’s dialect poems, The Northern Farmer, &c, do not reproduce the pure Fen dialect, but rather the dialect of the Wold district of mid Lincolnshire.

Authorities. — Sir William Dugdale, History of Imbanking and Draining (2nd ed., London, 1772) ; W. Elstobb, A Historical Account of the Great Level (Lynn, 1793); W. Chapman, Facts and Remarks relative to the Witham and the Wetland (Boston, 1800) ; S. Wells, History and Drainage of the Great Level of the Fens (2 vols., London, 1828 and 1830); P. Thompson, History of Boston (Boston, 1856); Baldwin Latham, Papers on the Drainage of the Fens, read before the Society of Engineers, 3rd November 1862; N. and A. Goodman, Handbook of Fen Skating (London, 1882); Moore, Associated Architectural Societies' Reports and Papers (1893); Fenland Notes and Queries, and Lincolnshire Notes and Queries, passim; W. H. Wheeler, A History of the Fens of South Lincolnshire, pp. 223 et seq. (2nd ed., Boston, 1897). Various phases of Fen life, mostly of the past, are described in Charles Kingsley's Hereward the Wake (Cam- bridge, 1866); Baring Gould's Cheap-Jack Zita (London, 1893); Manville Fenn's Dick 0′ the Fens (London, 1887) ; and J. T. Bealby's A Daughter of the Fen (London, 1896). (J. T. Be.)

FENTON, EDWARD (d. 1603), English navigator, son of Henry Fenton and brother of Sir Geoffrey Fenton (q.v.), was a native of Nottinghamshire. In 1577 he sailed, in command of the " Gabriel," with Sir Martin Frobisher's second expedition for the discovery of the north-west passage, and in the following year he took part as second in command in Frobisher's third expedition, his ship being the " Judith." He was then employed in Ireland for a time, but in 1582 he was put in charge of an expedition which was to sail round the Cape of Good Hope to the Moluccas and China, his instructions being to obtain any know- ledge of the north-west passage that was possible without hindrance to his trade. On this unsuccessful voyage he got no farther than Brazil, and throughout he was engaged in quarrelling with his officers, and especially with his lieutenant, William Hawkins, the nephew of Sir John Hawkins, whom he had in irons when he arrived back in the Thames. In 1588 he had command of the " Mary Rose," one of the ships of the fleet that was formed to oppose the Armada. He died fifteen years after- wards.

FENTON, ELIJAH (1683-1730), English poet, was born at Shelton near Newcastle-under-Lyme, of an old Staffordshire family, on the 25th of May 1683. He graduated from Jesus College, Cambridge, in 1704, but was prevented by religious scruples from taking orders. He accompanied the earl of Orrery to Flanders as private secretary, and on returning to England became assistant in a school at Headley, Surrey, being soon afterwards appointed master of the free grammar school at Sevenoaks in Kent. In 17 10 he resigned his appointment in the expectation of a place from Lord Bolingbroke, but was dis-

appointed. He then became tutor to Lord Broghill, son of his patron Orrery. Fenton is remembered as the coadjutor of Alexander Pope in his translation of the Odyssey. He was re- sponsible for the first, fourth, nineteenth and twentieth books, for which he received £300. He died at East Hampstead, Berkshire, on the 16th of July 1730. He was buried in the parish church, and his epitaph was written by Pope.

Fenton also published Oxford and Cambridge Miscellany Poems (1707) ;_ Miscellaneous Poems (1717) ; Mariamne, a tragedy (1723) ; an edition (1725) of Milton's poems, and one of Waller (1729) with elaborate notes. See W. W. Lloyd, Elijah Fenton, his Poetry and Friends (1894).

FENTON, SIR GEOFFREY (c. 1539-1608), English writer and politician, was the son of Henry Fenton, of Nottinghamshire. He was brother of Edward Fenton the navigator. He is said to have visited Spain and Italy in his youth; possibly he went to Paris in Sir Thomas Hoby's train in 1566, for he was living there in 1567, when he wrote Certaine tragicall discourses written oute of Frenche and Latin. This book is a free translation of Francois de Belleforest's French rendering of Matteo Bandello's Novelle. Till 1579 Fenton continued his literary labours, publishing Monophylo in 1572, Golden epistles gathered out of Guevarae's workes as other authors . . . 1575, and various re- ligious tracts of strong protestant tendencies. In 1579 appeared the Historic of Guicciardini, translated out of French by G. F. and dedicated to Elizabeth. Through Lord Burghley he ob- tained, in 1580, the post of secretary to the new lord deputy of Ireland, Lord Grey de Wilton, and thus became a fellow worker with the poet, Edmund Spenser. From this time Fenton abandoned literature and became a faithful if somewhat un- scrupulous servant of the crown. He was a bigoted protestant, longing to use the rack against " the diabolicall secte of Rome," and even advocating the assassination of the queen's most dangerous subjects. He won Elizabeth's confidence, and the hatred of all his fellow-workers, by keeping her informed of every one's doings in Ireland. In 1587 Sir John Perrot arrested Fenton, but the queen instantly ordered his release. Fenton was knighted in' 1589, and in 1590-1591 he was in London as commissioner on the impeachment of Perrot. Full of dislike of the Scots and of James VI. (which he did not scruple to utter), on the latter's accession Fenton's post of secretary was in danger, but Burghley exerted himself in his favour, and in 1604 it was confirmed to him for life, though he had to

share it with Sir Richard Coke. Fenton died in Dublin on the 19th of October t6o8, and was buried in St Patrick's cathedral. He married in June 1585, Alice, daughter of Dr Robert Weston, formerly lord chancellor of Ireland, and widow of Dr Hugh Brady, bishop of Meath, by whom he had two children, a son, Sir William Fenton, and a daughter, Catherine, who in 1603 married Richard Boyle, 1st earl of Cork.

Bibliography. — Harl. Soc. publications, vol. iv., Visitation of Nottinghamshire, 1871; Roy. Hist. MSS. Comm. (particularly Hatfield collection) ; Calendar of State papers, Ireland (very full), domestic, Carew papers; Lismore papers, ed. A. B. Grosart (1886- 1888); Certaine tragicall Discourses, ed. R. L. Douglas (2 vols., 1898), Tudor Translation series, vols, xix., xx. (introd.).

FENTON, LAVINIA (1708-1760), English actress, was prob- ably the daughter cf a naval lieutenant named Beswick, but she bore the name of her mother's husband. Her first appear- ance was as Monimia in Otway's Orphans, in 1726 at the Hay- market. She then joined the company of players at the theatre in Lincoln's Inn Fields, where her success and beauty made her the toast of the beaux. It was in Gay's Beggar's Opera, as Polly Peachum, that Miss Fenton made her greatest success. Her pictures were in great demand, verses were written to her and books published about her, and she was the most talked-of person in London. Hogarth's picture shows her in one of the scenes, with the duke of Bolton in a box. After appearing in several comedies, and then in numerous repetitions of the Beggar's Opera, she ran away with her lover Charles Paulet, 3rd duke of Bolton, a man much older than herself, who, after the death of his wife in 1 75 1, married her. Their three children all died young. The duchess survived her husband and died on the 24th of January

1760.

FENTON, a town of Staffordshire, England, on the North Staffordshire railway, adjoining the east side of Stoke-on-Trent, in which parliamentary and municipal borough it is included. Pop. (1891) 16,998; (1901) 22,742. The manufacture of earthen- ware common to the district (the Potteries) employs the bulk of the large industrial population.

FENUGREEK, in botany, Trigonella Foenum-graecum (so called from the name given to it by the ancients, who used it as fodder for cattle) , a member of a genus of leguminous herbs very similar in habit and in most of their characters to the species of the genus Medicago. The

leaves are formed of three obovate

leaflets, the middle one of which is stalked; the flowers are solitary, or in clusters of two or three, and have a campanulate, 5-cleft calyx; and the pods are many-seeded, cylindrical or flattened, and straight or only slightly curved. The genus is widely diffused over the south of Europe, West and Central Asia, and the north of Africa, and is represented by several species in Australia. Fenugreek is indigenous to south-eastern Europe and western Asia, and is cultivated in the Mediterranean region, parts of central Europe, and in Morocco, and largely in Egypt and in India. It bears a sickle-shaped pod, containing from 10 to 20 seeds, from which 6% of a fetid, fatty and bitter oil can be extracted by ether. In India the fresh plant is em- ployed as an esculent. The seed is an ingredient in curry powders, and is used for flavouring cattle foods. It was formerly much esteemed as a medicine, and is still in repute in veterinary practice.

FENWICK, SIR JOHN (c. 1645-1697), English conspirator, was the eldest son of Sir William Fenwick, or Fenwicke, a member of an old Northumberland family. He entered the army, becoming major-general in 1688, but before this date he had been returned in succession to his father as one of the members of parliament for Northumberland, which county he represented from 1677 to 1687. He was a strong partisan of King James II., and in 1685 was one of the principal supporters of the act of attainder against the duke of Monmouth; but he remained in England when William III. ascended the throne three years later. He began at once to plot against the new king, for which he underwent a short imprisonment in 1689. Renewing his plots on his release, he publicly insulted Queen Mary in 1691, and it is practically certain that he was implicated in the schemes for assassinating William which came to light in 1695 and 1696. After the seizure of his fellow-conspirators, Robert Charnock and others, he remained in hiding until the imprudent conduct of his friends in attempting to induce one of the witnesses against him to leave the country led to his arrest in June in 1696. To save himself he offered to reveal all he knew about the Jacobite conspiracies; but his confession was a farce, being confined to charges against some of the leading Whig noblemen, which were damaging, but not conclusive. By this time his friends had succeeded in removing one of the two witnesses, and in these circumstances it was thought that the charge, of treason must fail. The government, however, overcame this difficulty by introducing a bill of attainder, which after a long and acrimonious discussion passed through both Houses of Parliament. His wife persevered in her attempts to save his life, but her efforts were fruitless, and Fenwick was beheaded in London on the 28th of January

1697, with the same formalities as were usually observed at the execution of a peer. By his wife, Mary (d. 1708), daughter of Charles Howard, 1st earl of Carlisle, he had three sons and one daughter. Macaulay says that ” of all the Jacobites, the most desperate characters not excepted, he (Fenwick) was the only one for whom William felt an intense personal aversion “; and it is interesting to note that Fenwick’s hatred of the king is said to date from the time when he was serving in Holland, and was reprimanded by William, then prince of Orange.

FEOFFMENT, in English law, during the feudal period, the usual method of granting or conveying a freehold or fee. For the derivation of the word see Fief and Fee. The essential elements were livery of seisin (delivery of possession) , which consisted in formally giving to the feoffee on the land a clod or turf, or a growing twig, as a symbol of the transfer of the land, and words by the feoffor declaratory of his intent to deliver possession to the feoffee with a ” limitation ” of the estate intended to be trans- ferred. This was called livery in deed. Livery in law was made not on but in sight of this land, the feoffor saying to the feoffee, ” I give you that land; enter and take possession.” Livery in law, in order to pass the estate, had to be perfected by entry by the feoffee during the joint lives of himself and the feoffor. It was usual to evidence the feoffment by writing in a charter or deed of feoffment; but writing was not essential until the Statute of Frauds; now, by the Real Property Act 1845, a conveyance of real property is void unless evidenced by deed, and

thus feoffments have been rendered unnecessary and superfluous. All corporeal hereditaments were by that act declared to be in grant as well as livery, i.e. they could be granted by deed without livery. A feoffment might be a tortious conveyance, i.e. if a person attempted to give to the feoffee a greater estate than he himself had in the land, he forfeited the estate of which he was seised. (See Conveyancing; Real Property.)

FERDINAND (Span. Fernando or Hernando; Ital. Ferdi- nando or Ferrante; in O. H. Ger. Herinand, i.e. ” brave in the host,” from O. H. G. Heri, “army,” A. S. here, Mod. Ger. fleer, and the Goth. nan\jan, ” to dare “), a name borne at various times by many European sovereigns and princes, the more important of whom are noticed below in the following order: emperors, kings of Naples, Portugal,

Spain (Castile, Leon and Aragon) and the two Sicilies; then the grand duke of Tuscany, the prince of Bulgaria, the duke of Brunswick and the elector of Cologne.

FERDINAND I. (1 503-1 564), Roman emperor, was born at Alcala. de Henares on the 10th of March 1503, his father being Philip the Handsome, son of the emperor Maximilian L, and his mother Joanna, daughter of Ferdinand and Isabella, king and queen of Castile and Aragon. Philip died in 1506 and Ferdinand, educated in Spain, was regarded with especial favour by his maternal grandfather who wished to form a Spanish-Italian kingdom for his namesake. This plan came to nothing, and the same fate attended a suggestion made after the death of Maxi- milian in 1 5 19 that Ferdinand, and not his elder brother Charles, afterwards the emperor Charles V., should succeed to the imperial throne. Charles, however, secured the Empire and the whole of the lands of Maximilian and Ferdinand, while the younger brother was perforce content with a subordinate position. Yet some provision must be made for Ferdinand. In April 1521 the emperor granted to him the archduchies and duchies of upper and lower Austria, Carinthia, Styria and Carniola, adding soon afterwards the county of Tirol and the hereditary possessions of the Habsburgs in south-western Germany. About the same time the archduke was appointed to govern the duchy of Wiirttemberg, which had come into the possession of Charles V. ; and in May 1521 he was married at Linz to Anna (d. 1547), a daughter of Ladislaus, king of Hungary and Bohemia, a union which had been arranged some years before by the emperor Maximilian. In 1521 also he was made president of the council of regency (Reichs- regiment), appointed to govern Germany during the emperor's absence, and the next five years were occupied with imperial business, in which he acted as his brother's representative, and in the government of the Austrian lands.

In Austria and the neighbouring duchies Ferdinand sought at first to suppress the reformers and their teaching, and this was possibly one reason why he had some difficulty in quelling risings in the districts under his rule after the Peasants' War broke out in 1524. But a new field was soon opened for his ambition. In August 1526 his childless brother-in-law, Louis II., king of Hungary and Bohemia, was killed at the battle of Mohacs, and the archduke at once claimed both kingdoms, both by treaty and by right of his wife. Taking advantage of the divisions among his opponents, he was chosen king of Bohemia in October 1526, and crowned at Prague in the following February, but in Hungary he was less successful. John Zapolya, supported by the national party and soon afterwards by the Turks, offered a sturdy resistance, and although Ferdinand was chosen king at Pressburg in

December 1526, and after defeating Zapolya at Tokay was crowned at Stuhlweissenburg in November 1527, he was unable to take possession of the kingdom. ‘The Bavarian Wittelsbachs, incensed at not securing the Bohemian throne, were secretly intriguing with his foes; the French, after assisting spasmodically, made a formal alliance with Turkey in 1535; and Zapolya was a very useful centre round which the enemies of the Habsburgs were not slow to gather. A truce made in 1533 was soon broken, and the war dragged on until 1538, when by the treaty of Grosswardein, Hungary was divided between the claimants. The kingly title was given to Zapolya, but Ferdinand was to follow him on the throne. Before this, in January 1 531, he had been chosen king of the Romans, or German king, at Cologne,

and his coronation took place a few days later at Aix-la-Chapelle. He had thoroughly earned this honour by his loyalty to his brother, whom he had represented at several diets. In religious matters the king was now inclined, probably owing to the Turkish danger, to steer a middle course between the contending parties, and in 1532 he agreed to the religious peace of Nuremberg, receiving in return from the Protestants some assistance for the war against the Turks. In 1534, however, his prestige suffered a severe rebuff. Philip, landgrave of Hesse, and his associates had succeeded in conquering Wiirttemberg on behalf of its exiled duke, Ulrich (q.v.), and, otherwise engaged, neither Charles nor Ferdinand could send much help to their lieutenants. They were consequently obliged to consent to the treaty of Cadan, made in June 1534, by which the German king recognized Ulrich as duke of Wiirttemberg, on condition that he held his duchy under Austrian suzerainty.

In Hungary the peace of 1538 was not permanent. When Zapolya died in July 1540 a powerful faction refused to admit the right of Ferdinand to succeed him, and put forward his young son John Sigismund as a candidate for the throne. The cause of John Sigismund was espoused by the Turks and by Ferdinand’s other enemies, and, unable to get any serious assistance from the imperial diet, the king repeatedly sought to make peace with the sultan, but his envoys were haughtily repulsed. In 1544, however, a short truce was made. This was followed by others, and in 1547 one was concluded for five years, but only on con- dition that Ferdinand paid tribute for the small part of Hungary which remained in his hands. The struggle was renewed in 1551 and was continued in the same desultory fashion until 1562, when a truce was made which lasted during tberemainderof Ferdinand’s lifetime. During the war of the league of Schrrialkalden in 1546 and 1547 the king had taken the field primarily to protect Bohemia, and after the conclusion of the war he put down a rising in

this country with some rigour. He appears during these years to have governed his lands with vigour and success, but in imperial politics he was merely the representative and spokesman of the emperor. About 1546, however, he began to take up a more independent position. Although Charles had crushed the league of Schmalkalden he had refused to restore Wiirttemberg to Ferdinand; and he gave further offence by seeking to secure the succession of his son Philip, afterwards king of Spain, to the imperial throne. Ferdinand naturally objected, but in 1551 his reluctant consent was obtained to the plan that, on the proposed abdication of Charles, Philip should be chosen king of the Romans, and should succeed Ferdinand himself as emperor. Subsequent events caused the scheme to be dropped, but it had a somewhat unfortunate sequel for Charles, as during the short war between the emperor and Maurice, elector of Saxony, in 1552 Ferdinand's attitude was rather that of a spectator and mediator than of a partisan. There seems, however, to be no truth in the suggestion that he acted treacherously towards his brother, and was in alliance with his foes. On behalf of Charles he negotiated the treaty of Passau with Maurice in 1552, and in 1555 after the conduct of imperial business had virtually been made over to him, and harmony had been restored between the brothers, he was responsible for the religious peace of Augsburg. Early in 1558 Charles carried out his intention to abdicate the imperial throne, and on the 24th of March Ferdinand was crowned as his successor at Frankfort. Pope Paul IV. would not recognize the new emperor, but his successor Pius IV. did so in 1559 through the mediation of Philip of Spain. The emperor's short reign was mainly spent in seeking to settle the religious differences of Germany, and in efforts to prosecute the Turkish war more vigorously. His hopes at one time centred round the council of Trent which resumed its sittings in 1562, but he was unable to induce the Protestants to be represented. Although he held firmly to the Roman Catholic Church he sought to obtain tangible concessions to her opponents; but he refused to conciliate the Protestants by abrogating the clause concerning ecclesiastical reservation in the peace of Augsburg, and all his efforts to bring about reunion were futile. He did indeed secure the privilege of communion in both kinds from Pius IV. for the

laity in Bohemia and in various parts of Germany, but the hearty support which he gave the Jesuits shows that he had no sympathy with Protestantism, and was only anxious to restore union in the

Church. In November 1562 he obtained the election of his son Maximilian as king of the Romans, and having arranged a partition of his lands among his three surviving sons, died in Vienna on the 25th of July 1564. His family had consisted of six sons and nine daughters.

In spite of constant and harassing engagements Ferdinand was fairly successful both as king and emperor. He sought to consolidate his Austrian lands, reformed the monetary system in Germany, and reorganized the Aulic council (Reichskofrat) . Less masterful but more popular than his brother, whose character overshadows his own, he was just and tolerant, a good Catholic and a conscientious ruler.

See the article on Charles V. and the bibliography appended thereto. Also, A. Ulloa, Vita del potentissimo e christianissimo imperatore Ferdinando primo (Venice, 1565) ; S. Schard, Epitome rerum in variis orbis partibus a confirmatione Ferdinandi I. (Basel, ! 574); F. B. von Bucholtz, Geschichte der Regierung Ferdinands des Ersten (Vienna, 1831-1838) ; K. Oberleitner, Osterreichs Finanzen und Kriegswesen unter Ferdinand I. (Vienna, 1859); A. Rezek, Geschichte der Regierung Ferdinands I. in Bbhmen (Prague, 1878) ; E. Rosenthal, Die Behbrdenorganisation Kaiser Ferdinands I. (Vienna, 1887) ; and W. Bauer, Die Anfdnge Ferdinands I. (Vienna,

1507).

FERDINAND II. (1578-1637), Roman emperor, was the eldest son of Charles, archduke of Styria (d. 1590), and his wife Maria, daughter of Albert IV., duke of Bavaria and a grandson of the emperor Ferdinand I. Born at Gratz on the 9th of July 1578, he was trained by the Jesuits, finishing his education at the university of Ingolstadt, and became the pattern prince of the counter- reformation. In 1596 he undertook the government of Styria, Carinthia and Carniola, and after a visit to Italy began an organized attack on Protestantism which under his father's rule had made great progress in these archduchies; and although hampered by the inroads of the Turks, he showed his indifference to the material welfare of his dominions by compelling many of his Protestant subjects to choose between exile and conversion, and by entirely suppressing Protestant worship. He was not, however, unmindful of the larger interest of his family, or of the Empire which the Habsburgs regarded as belonging to them by hereditary right. In 1606 he joined his kinsmen in recognizing his cousin Matthias as the head of the family in place of the lethargic Rudolph II.; but he shrank from any proceedings which might lead to the deposition of the emperor, whom he represented at the diet of Regensburg in 1608; and his conduct was somewhat ambiguous during the subsequent quarrel

between Rudolph and Matthias.

In the first decade of the 17 th century the house of Habsburg seemed overtaken by senile decay, and the great inheritance of Charles V. and Ferdinand I. to be threatened with disintegration and collapse. The reigning emperor, Rudolph II., was inert and childless; his surviving brothers, the archduke Matthias (after- wards emperor), Maximilian (1 558-1618) and Albert (1550-162 1), all men of mature age, were also without direct heirs; the racial differences among its subjects were increased by their religious animosities; and it appeared probable that the numerous enemies of the Habsburgs had only to wait a few years and then to divide the spoil. In spite of the recent murder of Henry IV. of France, this issue seemed still more likely when Matthias suc- ceeded Rudolph as emperor in 161 2. The Habsburgs, however, were not indifferent to the danger, and about 161 5 it was agreed that Ferdinand, who already had two sons by his marriage with his cousin Maria Anna (d. 1616), daughter of William V., duke of Bavaria, should be the next emperor, and should succeed Matthias in the elective kingdoms of Hungary and Bohemia. The obstacles which impeded the progress of the scheme were gradually over- come by the energy of the archduke Maximilian. The elder archdukes renounced their rights in the succession; the claims of Philip III. and the Spanish Habsburgs were bought off by a promise of Alsace; and the emperor consented to his super- cession in Hungary and Bohemia. In 1617 Ferdinand, who was just concluding a war with Venice, was chosen king of Bohemia,

and in 16 18 king of Hungary; but his election as German king, or king of the Romans, delayed owing to the anxiety of Melchior Klesl {q.v.) to conciliate the protestant princes, had not been accomplished when Matthias died in March 1619. Before this event, however, an important movement had begun in Bohemia. Having been surprised into choosing a devoted Roman Catholic as their king, the Bohemian Protestants suddenly realized that their religious, and possibly their civil liberties, were seriously menaced, and deeds of aggression on the part of Ferdinand's representatives showed that this was no idle fear. Gaining the upper hand they declared Ferdinand deposed, and elected the elector palatine of the Rhine, Frederick V., in his stead; and the struggle between the rivals was the beginning of the Thirty Years' War. At the same time other difficulties confronted Ferdinand, who had not yet secured the imperial throne. Bethlen Gabor, prince of Transylvania, invaded Hungary, while the Austrians rose and joined the Bohemians; but having seen his foes retreat from Vienna, Ferdinand hurried to Frankfort, where he was chosen emperor on the 28th of August 1619.

To deal with the elector palatine and his allies the new emperor allied himself with Maximilian I., duke of Bavaria, and the Catholic League, who drove Frederick from Bohemia in 1620, while Ferdinand's Spanish allies devastated the Palatinate. Peace having been made with Bethlen Gabor in December 1621, the first period of the war ended in a satisfactory fashion for the emperor, and he could turn his attention to completing the work of crushing the Protestants, which had already begun in his archduchies and in Bohemia. In 1623 the Protestant clergy were expelled from Bohemia; in 1624 all worship save that of the Roman Catholic church was forbidden; and in 1627 an order of banishment against all Protestants was issued. A new con- stitution made the kingdom hereditary in the house of Habsburg, gave larger powers to the sovereign, and aimed at destroying the nationality of the Bohemians. Similar measures in Austria led to a fresh rising which was put down by the aid of the Bavarians in 1627, and Ferdinand could fairly claim that in his hereditary lands at least he had rendered Protestantism innocuous.

The renewal of the Thirty Years' War in 1625 was caused mainly by the emperor's vigorous championship of the cause of the counter-reformation in northern and north-eastern Germany. Again the imperial forces were victorious, chiefly owing to the genius of Wallenstein, who raised and led an army in this service, although the great scheme of securing the southern coast of the Baltic for the Habsburgs was foiled partly by the resistance of Stralsund. In March 1629 Ferdinand and his advisers felt themselves strong enough to take the important step towards which their policy in the Empire had been steadily tending. Issuing the famous edict of restitution, the emperor ordered that all lands which had been secularized since 1552, the date of the peace of Passau, should be restored to the church, and prompt measures were taken to enforce this decree. Many and powerful interests were vitally affected by this proceeding, and the result was the outbreak of the third period of the war, which was less favourable to the imperial arms than the preced- ing ones. This comparative failure was due, in the initial stages of the campaign, to Ferdinand's weakness in assenting in 1630 to the demand of Maximilian of Bavaria that Wallen- stein should be deprived of his command, and also to the genius of Gustavus Adolphus; and in its later stages to his insistence on the second removal of Wallenstein, and to his complicity in the assassination of the general. This deed was followed by the peace of Prague, concluded in 1635, primarily with John George I., elector of Saxony, but soon assented to by other princes; and this treaty, which made extensive concessions to the Protestants, marks the definite failure of Ferdinand to crush Protestantism in the Empire, as he had

already done in Austria and Bohemia. It is noteworthy, however, that the emperor refused to allow the inhabitants of his hereditary dominions to share in the benefits of the peace. During these years Ferdinand had also been menaced by the secret or open hostility of France. A dispute over the duchies of Mantua and Monferrato was

ended by the treaty of Cherasco in 1631, but the influence of France was employed at the imperial diets and elsewhere in thwarting the plans of Ferdinand and in weakening the power of the Habsburgs. The last important act of the emperor was to secure the election of his son Ferdinand as king of the Romans. An attempt in 1630 to attain this end had failed, but in December 1636 the princes, meeting at Regensburg, bestowed the coveted dignity upon the younger Ferdinand. A few weeks afterwards, on the 15th of February 1637, the emperor died at Vienna, leaving, in addition to. the king of the Romans, a son Leopold William (1614-1662), bishop of Passau and Strassburg. Fer- dinand's reign was so occupied with the Thirty Years' War and the struggle with the Protestants that he had little time or inclination for other business. It is interesting to note, however, that this orthodox and Catholic emperor was constantly at variance with Pope Urban VIII. The quarrel was due princi- pally, but not entirely, to events in Italy, where the pope sided with France in the dispute over the succession to Mantua and Monferrato. The succession question was settled, but the enmity remained; Urban showing his hostility by preventing the election of the younger Ferdinand as king of the Romans in 1630, and by turning a deaf ear to the emperor's repeated requests for assistance to prosecute the war against the heretics. Ferdinand's character has neither individuality nor interest, but he ruled the Empire during a critical and important period. Kind and generous to his dependents, his private life was simple and blameless, but he was to a great extent under the influence of his confessors.

Bibliography. — The chief authorities for Ferdinand's life and reign are F. C. Khevenhiller, Annates Ferdinandei (Regensburg, 1640-1646) ; F. van Hurter, Geschichte Kaiser Ferdinands II. (Schaffhausen, 1 850-1 855); Korrespondenz Kaiser Ferdinands II. mil P. Becanus und P. W. Lamormaini, edited by B. Dudik (Vienna, 1848 fol.) ; and F. Stieve, in the Allegmeine deutsche Biographie, Bandvi. (Leipzig, 1877). See also the elaborate bibliography in the Cambridge Modern History, vol. iv. (Cambridge, 1906).

FERDINAND III. (1608-1657), Roman emperor, was the elder son of the emperor Ferdinand II., and was born at Gratz on the 13th of July 1608. Educated by the Jesuits, he was crowned king of Hungary in December 1625, and king of Bohemia two years later, and soon began to take part in imperial business. Wallenstein, however, refused to allow him to hold a command in the imperial army; and henceforward reckoned among his enemies, the young king was appointed the successor of the famous general when he was deposed in 1634; and as commander- in-chief of the imperial troops he was nominally responsible for the capture of Regensburg and Donauworth, and the defeat of the Swedes at Nordlingen. Having been elected king of the Romans, or German king, at Regensburg in December 1636, Ferdinand became emperor on his father's death in the following February, and showed himself anxious to put an end to the Thirty Years' War. He persuaded one or two princes to assent to the terms of the treaty of Prague; but a general peace was delayed by his reluctance to grant religious liberty to the Protestants, and by his anxiety to act in unison with Spain. In 1640 he had refused to entertain the idea of a general amnesty suggested by the diet at Regensburg; but negotiations for peace were soon begun, and in 1648 the emperor assented to the treaty of Westphalia. This event belongs rather to the general history of Europe, but it is interesting to note that owing to Ferdinand's insistence the Protestants in his hereditary dominions did not obtain religious liberty at this settlement. After 1648 the emperor was engaged in carrying out the terms of the treaty and ridding Germany of the foreign soldiery. In 1656 he sent an army into Italy to assist Spain in her struggle with France, and he had just concluded an alliance with Poland to check the aggressions of Charles X. of Sweden when he died on the 2nd of April 1657. Ferdinand was a scholarly and cul- tured man, an excellent linguist and a composer of music. Industrious and popular in public life, his private life was blameless; and although a strong Roman Catholic he was less fanatical than his father. His first wife was Maria Anna (d. 1646), daughter of Philip III. of Spain, by whom he had three

sons: Ferdinand, who was chosen king of the Romans in 1653, and who died in the following year; Leopold, who succeeded his father on the imperial throne; and Charles Joseph (d. 1664), bishop of Passau and Breslau, and grand-master of the Teutonic order. The emperor's second wife was his cousin Maria (d. 1 649) , daughter of the archduke Leopold; and his third wife was Eleanora of Mantua (d, 1 686) . His musical works, together with those of the emperors Leopold I. and Joseph I., have been published by G. Adler (Vienna, 1802-1803).

See M. Koch, Geschichte des deutschen Reiches unter der Regierung Ferdinands III. (Vienna, 1865-1866).

FERDINAND I. (1703-1875), emperor of Austria, eldest son of Francis I. and of Maria Theresa of Naples, was born at Vienna on the 19th of April 1793. In his boyhood he suffered from epileptic fits, and could therefore not receive a regular education. As his health improved with his growth and with travel, he was not set aside from the succession. In 1830 his father caused him to be crowned king of Hungary, a pure formality, which gave him no power, and was designed to avoid possible trouble in the future. In 1831 he was married to Anna, daughter of Victor Emmanuel I. of Sardinia. The marriage was barren. When Francis I. died on the 2nd of March 1835, Ferdinand was recognized as his successor. But his incapacity was so notorious that the conduct of affairs was entrusted to a council of state, consist- ing of Prince Metternich (q.v.) with other ministers, and two archdukes, Louis and Francis Charles. They composed the Slaatsconferenz, the ill-constructed and informal regency which led the Austrian dominions to the revolutionary outbreaks of 1846-1849. (See Austria-Hungary.) The emperor, who was subject to fits of actual insanity, and in his lucid intervals was weak and confused in mind, was a political nullity. His personal amiability earned him the affectionate pity of his subjects, and he became the hero of popular stories which did not tend to maintain the dignity of the crown. It was commonly said that ‘having taken refuge on a rainy day in a farmhouse he was so tempted by the smell of the dumplings which the farmer and his family were eating for dinner, that he insisted on having one. His doctor, who knew them to be indigestible, objected, and there- upon Ferdinand, in an imperial rage, made the answer: — ” Kaiser bin i’, und Kniidel muss i’ haben ” (I am emperor, and will have the dumpling) — which has become a Viennese proverb. His popular name of Der G-iitige (the good sort of man) expressed as much derision as affection. Ferdinand had good taste for art and music. Some modification of the tight-handed rule of his father was made by the Slaatsconferenz during his reign. In the presence of the revolutionary troubles, which began with agrarian riots in Galicia in 1846, and then spread over the whole empire, he was personally helpless. He was compelled to escape from the disorders of Vienna to Innsbruck on the 17th of May 1848. He came back on the invitation of the diet on the 12th of August, but soon had to escape once more from the mob of students and workmen who were in possession of the city. On the 2nd of December he abdicated at Olmutz in favour of his nephew, Francis Joseph. He lived under supervision by doctors and guardians at Prague till his death on the 29th of June

See Krones von Marchland, Grundriss der osterreichischen Geschichte (Vienna, 1882), which gives an ample bibliography; Count F. Hartig, Genesis der Revolution in Osterreich (Leipzig, 1850), — an enlarged English translation will be found in the 4th volume of W. Coxe's House of Austria (London, 1862).

FERDINAND I. (1423-1494), also called Don Ferrante, king of Naples, the natural son of Alphonso V. of Aragon and I. of Sicily and Naples, was born in 1423. In accordance with his father's will, he succeeded him on the throne of Naples in 1458, but Pope Calixtus III. declared the line of Aragon extinct and the kingdom a fief of the church. But although he died before he could make good his claim (August 1458), and the new Pope Pius II. recognized Ferdinand, John of Anjou, profiting by the discontent of the Neapolitan barons, decided to try to regain the throne conquered by his ancestors, and invaded Naples. Ferdinand was severely defeated by the Angevins and the rebels at Sarno in July 1460, but with the help of Alessandro Sforza

and of the Albanian chief, Skanderbeg, who chivalrously came to the aid of the prince whose father had aided him, he triumphed over his enemies, and by 1464 had re-established his authority in the kingdom. In 1478 he allied himself with Pope Sixtus IV. against Lorenzo de' Medici, but the latter journeyed alone to Naples when he succeeded in negotiating an honourable peace with Ferdinand. In 1480 the Turks captured Otranto, and massacred the majority of the inhabitants, but in the following year it was retaken by his son Alphonso, duke of Calabria. His oppressive government led in 1485 to an attempt at revolt on the part of the nobles, led by Francesca Coppola and Antonello Sanseverino and supported by Pope Innocent VIII.; the rising having been crushed, many of the nobles, notwithstanding Ferdinand's promise of a general amnesty, were afterwards treacherously murdered at his express command. In 1493 Charles VIII. of France was preparing to invade Italy for the conquest of Naples, and Ferdinand realized that this was a greater danger than any he had yet faced. With almost prophetic instinct he warned the Italian princes of the calamities in store for them, but his negotiations with Pope Alexander VI. and Ludovico il Moro, lord of M Ian, having failed, he died in January 1494, worn out with anxiety. Ferdinand was gifted with great courage and real political ability, but his method of government was vicious and disastrous. His financial adminis- tration was based on oppressive and dishonest monopolies, and he was

mercilessly severe and utterly treacherous towards his enemies.

Authorities. — Codice Aragonese, edited by F. Trinchera (Naples, 1866-1874); P- Giannone, Istoria Civile del Regno di Napoli; J. Alvini, De gestis region Neapol. ab Aragonia (Naples, 1588); S. de Sismoijdi, Histoire des republiques italiennes, vols. v. and vi. (Brussels, 1838) ; P.Villari, Machiavelli, pp. 60-64 (Engl, transl., London, 1892) ; for the revolt of the nobles in 1485 see Camillo Porzio, La Congiura dei Baroni (first published Rome, 1565; many subsequent editions), written in the Royalist interest. (L. V.*)

FERDINAND II. (1469-1496), king of Naples, was the grand- son of the preceding, and son of Alphonso II. Alphonso finding his tenure of the throne uncertain on account of the approaching invasion of Charles VIII. of France and the general dissatis- faction of his subjects, abdicated in his son's favour in 1495, but notwithstanding this the treason of a party in Naples rendered it impossible to defend the city against the approach of Charles VIII. Ferdinand fled to Ischia; but when the French king left Naples with most of his army, in consequence of the formation of an Italian league against him, he returned, defeated the French garrisons, and the Neapolitans, irritated by the conduct of their conquerors during the occupation of the city, received him back with enthusiasm; with the aid of the great Spanish general Gonzalo de Cordova he was able completely to rid his state of its invaders shortly before his death, which occurred on the 7th of September 1496.

For authorities see under Ferdinand I. of Naples; for the exploits of Gonzalo de Cordova see H. P. del Pulgar, Cronica del gran capitano don Gonzalo de Cordoba (new ed., Madrid, 1834).

FERDINAND IV. (1751-1825), king of Naples (III. of Sicily, and I. of the Two Sicilies), third son of Don Carlos of Bourbon, king of Naples and Sicily (afterwards Charles III. of Spain), was born in Naples on the 12th of January 1751. When his father ascended the Spanish throne in 1759 Ferdinand, in accord- ance with the treaties forbidding the union of the two crowns, succeeded him as king of Naples, under a regency presided over by the Tuscan Bernardo Tanucci. The latter, an able, ambitious man, wishing to keep the government as much as possible in his own hands, purposely neglected the young king's education, and encouraged him in his love of pleasure, his idleness and his excessive devotion to outdoor sports. Ferdinand grew up athletic, but ignorant, ill-bred, addicted to the lowest amuse- ments; he delighted in the company of the lazzaroni (the most degraded class of the Neapolitan people), whose dialect and habits he affected, and he even sold fish in

the market, haggling over the price.

His minority ended in 1767, and his first act was the expulsion of the Jesuits. The following year he married Maria Carolina, daughterof the empress Maria Theresa. By the marriage con-

tract the queen was to have a voice in the council of state after the birth of her first son, and she was not slow to avail herself of this means of political influence. Beautiful, clever and proud, like her mother, but cruel and treacherous, her ambition was to raise the kingdom of Naples to the position of a great power; she soon came to exercise complete sway over her stupid and idle husband, and was the real ruler of the kingdom. Tanucci, who attempted to thwart her, was dismissed in 1777, and the Englishman Sir John Acton (1736), who in 1779 was appointed director of marine, succeeded in so completely winning the favour of Maria Carolina, by supporting her in her scheme to free Naples from Spanish influence and securing a rapprochement with Austria and England, that he became practically and after- wards actually prime minister. Although not a mere grasping adventurer, he was largely responsible for reducing the internal administration of the country to an abominable system of espionage, corruption and cruelty. On the outbreak of the French Revolution the Neapolitan court was not hostile to the movement, and the queen even sympathized with the revolu- tionary ideas of the day. But when the French monarchy was abolished and the royal pair beheaded, P'erdinand and Carolina were seized with a feeling of fear and horror and joined the first coalition against France in 1793. Although peace was made with France in 1796, the demands of the French Directory, whose troops occupied Rome, alarmed the king once more, and at his wife's instigation he took advantage of Napoleon's absence in Egypt and of Nelson's victories to go to war. He marched with his army against the French and entered Rome (29th of November), but on the defeat of some of his columns he hurried back to Naples, and on the approach of the French, fled on board Nelson's ship the " Vanguard " to Sicily, leaving his capital in a state of anarchy. The French entered the city in spite of the fierce resistance of the lazzaroni, who were devoted to the king, and with the aid of the nobles and bourgeois established the Parthenopaean Republic (January 1799). When a few weeks later the French troops were recalled to the north of Italy, Ferdinand sent an expedition composed of Calabrians, brigands and gaol-birds, under Cardinal Ruffo, a man of real ability, great devotion to the king, and by no means so bad as he has been painted, to reconquer the mainland kingdom. Ruffo was completely successful, and reached Naples in May. His army and the lazzaroni committed nameless atrocities, which he honestly tried to

prevent, and the Parthenopaean Republic collapsed.

The savage punishment of the Neapolitan Republicans is dealt with in more detail under Naples, Nelson and Caracciolo, but it is necessary to say here that the king, and above all the queen, were particularly arlxious that no mercy should be shown to the rebels, and Maria Carolina made use of Lady Hamilton, Nelson's mistress, to induce him to execute her own spiteful vengeance. Her only excuse is that as a sister of Marie Antoin- ette the very name of Republican or Jacobin filled her with loathing. The king returned to Naples soon afterwards, and ordered wholesale arrests and executions of supposed Liberals, which continued until the French successes forced him to agree to a treaty in which amnesty for members of the French party was included. When war broke out between France and Austria in 1805, Ferdinand signed a treaty of neutrality with the former, but a few days later he allied himself with Austria and allowed an Anglo-Russian force to land at Naples. The French victory at Austerlitz enabled Napoleon to despatch an army to southern Italy. Ferdinand with his usual precipitation fled to Palermo (23rd of January 1806), followed soon after by his wife and son, and on the 14th of February the French again entered Naples. Napoleon declared that the Bourbon dynasty had forfeited the crown, and proclaimed his brother Joseph king of Naples and Sicily. But Ferdinand continued to reign over the latter king- dom under British protection. Parliamentary institutions of a feudal type had long existed in the island, and Lord William Bentinck (q.v.), the British minister, insisted on a reform of the constitution on English and French lines. The king indeed practically abdicated his power, appointing his son Francis

regent, and the queen, at Bentinck's instance, was exiled to Austria, where she died in 1814.

After the fall of Napoleon, Joachim Murat, who had succeeded Joseph Bonaparte as king of Naples in 1808, was dethroned, and Ferdinand returned to Naples. By a secret treaty he had bound himself not to advance further in a constitutional direction than Austria should at any time approve; but, though on the whole he acted in accordance with Metternich's policy of preserving the status quo, and maintained with but slight change Murat's laws and administrative system, he took advantage of the situation to abolish the Sicilian constitution, in violation of his oath, and to proclaim the union of the two states into the king- dom of the Two Sicilies (December 12th, 1816). He was now completely subservient to Austria, an Austrian, Count Nugent, being

even made commander-in-chief of the army; and for four years he reigned as a despot, every tentative effort at the ex- pression of liberal opinion being ruthlessly suppressed. The result was an alarming spread of the influence and activity of the secret society of the Carbonari (g.v.), which in time affected a large part of the army. In July 1820 a military revolt broke out under General Pepe, and Ferdinand was terrorized into subscribing a constitution on the model of the impracticable Spanish constitution of 181 2. On the other hand, a revolt in Sicily, in favour of the recovery of its independence, was sup- pressed by Neapolitan troops.

The success of the military revolution at Naples seriously alarmed the powers of the Holy Alliance, who feared that it might spread to other Italian states and so lead to that general European conflagration which it was their main preoccupation to avoid (see Europe : History). After long diplomatic negotia- tions, it was decided to hold a congress ad hoc at Troppau (October 1820). The main results of this congress were the issue of the famous Troppau Protocol, signed by Austria, Prussia and Russia only, and an invitation to King Ferdinand to attend the adjourned congress at Laibach (1821), an invitation of which Great Britain approved " as implying negotiation " (see Troppau, Laibach, Congresses of). At Laibach Ferdinand played so sorry a part as to provoke the contempt of those whose policy it was to re-establish him in absolute power. He had twice sworn, with gratuitous solemnity, to maintain the new constitution; but he was hardly out of Naples before he re- pudiated his oaths and, in letters addressed to all the sovereigns of Europe, declared his acts to have been null and void. An attitude so indecent threatened to defeat the very objects of the reactionary powers, and Gentz congratulated the congress that these sorry protests would be buried in the archives, offering at the same time to write for the king a dignified letter in which he should express his reluctance at having to violate his oaths in the face of irresistible force ! But, under these circumstances, Metternich had no difficulty in persuading the king to allow an Austrian army to march into Naples " to restore order."

The campaign that followed did little credit either to the Austrians or the Neapolitans. The latter, commanded by General Pepe (g.v.), who made no attempt to defend the difficult defiles of the Abruzzi, were defeated, after a half-hearted struggle at Rieti (March 7th, 1821), and the Austrians entered Naples. The parliament was now dismissed, and Ferdinand inaugurated an era of savage persecution, supported by spies and informers, against the Liberals and Carbonari, the Austrian commandant in vain protesting against the savagery which his presence alone rendered possible.

Ferdinand died on the 4th of January 1825. Few sovereigns have left behind so odious a memory. His whole career is one long record of perjury, vengeance and meanness, unredeemed by a single generous act, and his wife was a worthy helpmeet and actively co-operated in his tyranny.

Bibliography. — The standard authority on Ferdinand's reign is Piet.ro Colletta's Storia del Reame di Napoli (2nd ed., Florence, 1848), which, although heavily written and not free from party passion, is reliable and accurate ; L. Conforti, Napoli nel if qq (Naples, 1886); G. Pepe, Memorie (Paris, 1847), a most valuable book; C. Auriol, La France, VAngleterre, el Naples (Paris, 1906) ; for the Sicilian period and the British occupation, G. Bianco, La Sicilia durante

Voccupazione Inglese (Palermo, 1902), which contains many new documents of importance ; Freiherr A. von Helfert has attempted the impossible task of whitewashing Queen Carolina in his Konigin Karolina von Neapel und Sicilien (Vienna, 1 878) , and Maria Karolina von Oesterreich (Vienna, 1884) ; he has also written a useful life of Fabrizio Ruffo (Italian edit., Florence, 1885); for the Sicilian revolution of 1820 see G. Bianco's La Rivoluzione in Sicilia del 182& (Florence, 1 905) , and M . Amai i's Carteggio (Turin, 1896), (L. V. *)

FERDINAND I., king of Portugal (1345-1383), sometimes referred to as el Gentil (the Gentleman), son of Pedro I. of Portugal (who is not to be confounded with his Spanish con- temporary Pedro the Cruel), succeeded his father in 1367. On the death of Pedro of Castile in 1369, Ferdinand, as great- grandson of Sancho IV. by the female line, laid claim to the vacant throne, for which the kings of Aragon and Navarre, and afterwards the duke of Lancaster (married in 1370 to Constance, the eldest daughter of Pedro), also became competitors. Mean- while Henry of Trastamara, the brother (illegitimate) and con- queror of Pedro, had assumed the crown and taken the field. After one or two indecisive campaigns, all parties were ready to accept the mediation of Pope Gregory XI. The conditions of the treaty, ratified in 13 71, included a marriage between Ferdinand and Leonora of Castile. But before the union could take place the former had become passionately attached to Leonora Tellez, the wife of one of his own courtiers, and having procured a dissolution of her previous marriage, he lost no time in making her his queen. This strange conduct, although it raised a serious insurrection in Portugal, did not at once result in a war with Henry; but the outward concord was soon disturbed by the intrigues o'f the duke of Lancaster, who prevailed on Ferdinand to enter into a secret treaty for the expulsion of Henry from his throne. The war which followed was unsuccessful; and peace was

again made in 1373.' On the death of Henry in 1379, the duke of Lancaster once more put forward his claims, and again found an ally in Portugal; but, according to the Continental annalists, the English proved as offensive to their companions in arms as to their enemies in the field; and Ferdinand made a peace for himself at Badajoz in 1382, it being stipulated that Beatrix, the heiress of Ferdinand, should marry King John of Castile, and thus secure the ultimate union of the crowns. Ferdinand left no male issue when he died on the 22nd of October 1383, and the direct Burgundian line, which had been in possession of the throne since the days of Count Henry (about 1 1 1 2) , became extinct. The stipulations of the treaty of Badajoz were set aside, and John, grand-master of the order of A viz, Ferdinand's illegitimate brother, was proclaimed. This led to a war which lasted for several years.

FERDINAND I., El Magno or " the Great," king of Castile (d. 1065), son of Sancho of Navarre, was put in possession of Castile in 1028, on the murder of the last count, as the heir of his mother Elvira, daughter of a previous count of Castile. He reigned with the title of king. He married Sancha, sister and heiress of Bermudo, king of Leon. In 1038 Bermudo was killed in battle with Ferdinand at Tamaron, and Ferdinand then took possession of Leon by right of his wife, and was recognized in Spain as emperor. The use of the title was resented by the emperor Henry IV. and by Pope Victor II. in 1055, as implying a claim to the headship of Christendom, and as a usurpation on the Holy Roman Empire. It did not, however, mean more than that Spain was independent of the Empire, and that the sovereign of Leon was the chief of the princes of the peninsula. Although Ferdinand had grown in power by a fratricidal strife with Bermudo of Leon, and though at a later date he defeated and killed his brother Garcia of Navarre, he ranks high among the kings of Spain who have been counted religious. To a large extent he may have owed his reputation to the victories over the Mahommedans, with which he began the period of the great reconquest. But there can be no doubt that Ferdinand was profoundly pious. Towards the close of his reign he sent a special embassy to Seville to bring back the body of Santa Justa. The then king of Seville, Motadhid, one of the small princes who had divided the caliphate of Cordova, was himself a sceptic and poisoner, but he stood in wholesome awe of the power of the

Christian king. He favoured the embassy in every way, and when the

body of Santa Justa could not be found, helped the envoys who were also aided by a vision seen by one of them in a dream, to discover the body of Saint Isidore, which was reverently carried away to Leon. Ferdinand died on the feast of Saint John the Evangelist, the 24th of June 1065, in Leon, with many manifestations of ardent piety — having laid aside his crown and royal mantle, dressed in the frock of a monk and lying on a bier, covered with ashes, which was placed before the altar of the church of Saint Isidore.

FERDINAND II., king of Leon only (d. 1188), was the son of Alphonso VII. and of Berenguela, of the house of the counts of Barcelona. On the division of the kingdoms which had obeyed his father, he received Leon. His reign of thirty years was one of strife marked by no signal success or reverse. He had to contend with his unruly nobles, several of whom he put to death. During the minority of his nephew Alphonso VIII. of Castile he endeavoured to impose himself on the kingdom as regent. On the west he was in more or less constant strife with Portugal, which was in process of becoming an independent kingdom. His relations to the Portuguese house must have suffered by his repudiation of his wife Urraca, daughter of Alphonso I. of Portugal. Though he took the king of Portugal prisoner in 1180, he made no political use of his success. He extended his dominions southward in Estremadura at the ex- pense of the Moors. Ferdinand, who died in n 88, left the reputation of a good knight and hard fighter, but did not display political or organizing faculty.

FERDINAND III., El Santo or ” the Saint,” king of Castile (1199-1252), son of Alphonso IX. of Leon, and of Berengaria, daughter of Alphonso VIII. of Castile, ranks among the greatest of the Spanish kings. The marriage of his parents, who were second cousins, was dissolved as unlawful by the pope, but the legitimacy of the children was recognized. Till 12 17 he lived with his father in Leon. In that year the young king of Castile, Henry, was killed by accident. Berengaria sent for her son with such speed that her messenger reached Leon before the news of the death of the king of Castile, and when he came to her she renounced the crown in his favour. Alphonso, of Leon considered himself tricked, and the young king had to begin his reign by a war against his father and a faction of the Castilian nobles. His own ability and the remarkable capacity of his mother proved too much for the king of Leon and his Castilian allies. Ferdinand, who showed himself docile to the influence of Beren- garia, so long as she lived, married the wife she found for him, Beatrice, daughter of the emperor Philip (of Hohenstaufen), and followed her advice both in prosecuting the war against the Moors and in the steps which she took to secure his peaceful succession to Leon on the death of his father in 1231. After

the union of Castile and Leon in that year he began the series of campaigns which ended by reducing the Mahommedan dominions in Spain to Granada. Cordova fell in 1236, and Seville in 1248. The king of Granada did homage to Ferdinand, and undertook to attend the cortes when summoned. The king was. a severe persecutor of the Albigenses, and his formal canonization was due as much to his orthodoxy as to his crusading by Pope Clement X. in 1671. He revived the university first founded by his grandfather Alphonso VIII., and placed it at Salamanca. By his second marriage with Joan (d. 1279), daughter of Simon, of Dammartin, count of Ponthieu, by right of his wife Marie, Ferdinand was the father of Eleanor, the wife of Edward I. of England.

FERDINAND IV., El Emplazado or ” the Summoned,” king of Castile (d. 1312), son of Sancho El Bravo, and his wife Maria de Molina, is a figure of small note in Spanish history. His strange title is given him in the chronicles on the strength of a story that he put two brothers of the name of Carvajal to death tyrannically, and was given a time, a plazo, by them in which to answer for his crime in the next world. But the tale is not contemporary, and is an obvious copy of the story told of Jacques de Molay, grand-master of the Temple, and Philippe Le Bel. Ferdinand TV. succeeded to the throne when a boy 1 of

six. His minority was a time of anarchy. He owed his escape from the violence of competitors and nobles, partly to the tact and undaunted bravery of his mother Maria de Molina, and partly to the loyalty of the citizens of Avila, who gave him refuge within their walls. As a king he proved ungrateful to his mother, and weak as a ruler. He died suddenly in his tent at Jaen when preparing for a raid into the Moorish territory of Granada, on the 7th of September 131 2.

FERDINAND I., king of Aragon (1373-1416), called ” of Antequera,” was the son of John I. of Castile by his wife Eleanor, daughter of the third marriage of Peter IV. of Aragon. His surname ” of Antequera ” was given him because he was besieg- ing that town, then in the hands of the Moors, when he was told that the cortes of Aragon had elected him king in succession to his uncle Martin, the last male of the old line of Wilfred the Hairy. As infante of Castile Ferdinand had played an honourable part. When his brother Henry III. died at Toledo, in 1406, the cortes was sitting, and the nobles offered to make him king in preference to his nephew John. Ferdinand refused to despoil his brother’s infant son, and even if he did not act on the moral ground he alleged, his sagacity must have shown him that he would be at the mercy of the men who had chosen him in such circumstances. As co-regent of the kingdom with Catherine, widow of

Henry III. and daughter of John of Gaunt by his marriage with Constance, daughter of Peter the Cruel and Maria de Padilla, Ferdinand proved a good ruler. He restrained the follies of his sister-in-law, and kept the realm quiet, by firm government, and by prosecuting the war with the Moors. As king of Aragon his short reign of two years left him little time to make his mark. Having been bred in Castile, where the royal authority was, at least in theory, absolute, he showed himself impatient under the checks imposed on him by the fueros, the chartered rights of Aragon and Cata- lonia. He particularly resented the obstinacy of the Barcelonese, who compelled the members of his household to pay municipal taxes. His most signal act as king was to aid in closing the Great Schism in the Church by agreeing to the deposition of the antipope Benedict XIV., an Aragonese. He died at Ygualada in Catalonia on the 2nd of April 1416.

FERDINAND V. of Castile and Leon, and II. of Aragon (1452-1516), was the son of John I. of Aragon by his second marriage with Joanna Henriquez, of the family of the hereditary grand admirals of Castile, and was born at Sos in Aragon on the 16th of March 1452. Under the name of “the Catholic” and as the husband of Isabella, queen of Castile, he played a great part in Europe. His share in establishing the royal authority in all parts of Spain, in expelling the Moors from Granada, in the conquest of Navarre, in forwarding the voyages of Columbus, and in contending with France for the supremacy in Italy, is dealt with elsewhere (see Spain: History). In personal char- acter he had none of the attractive qualities of his wife. It may fairly be said of him that he was purely a politician. His marri- age in 1469 to his cousin Isabella of Castile was dictated by the desire to unite his own claims to the crown, as the head of the younger branch of the same family, with hers, in case Henry IV. should die childless. When the king died in 1474 he made an ungenerous attempt to procure his own proclamation as king without recognition of the rights of his wife. Isabella asserted her claims firmly, and at all times insisted on a voice in the government of Castile. But though Ferdinand had sought a selfish political advantage at his wife’s expense, he was well aware of her ability and high character. Their married life was dignified and harmonious; for Ferdinand had no common vices, and their views in government were identical. The king cared for nothing but dominion and political power. His character explains the most ungracious acts of his life, such as his breach of his promises to Columbus, his distrust of Ximenez and of the Great Captain. He had given wide privileges to Columbus on the supposition that the discoverer would reach powerful king- doms. When islands inhabited by feeble savages were dis- covered, Ferdinand appreciated the risk that they might become

the seat of a power too strong to be controlled, and took measures to avert the danger. H'e feared that Ximinez and the

Great Captain would become too independent, and watched them in the interest of the royal authority. Whether he ever boasted, as he is said to have boasted, that he had deceived Louis XII. of France twelve times, is very doubtful; but it is certain that when Ferdinand made a treaty, or came to an understanding with any one, the contract was generally found to contain implied meanings favourable to himself which the other contracting party had not expected. The worst of his character was prominently shown after the death of Isabella in 1504. He endeavoured to lay hands on the regency of Castile in the name of his insane daughter Joanna, and without regard to the claims of her husband Philip of Habsburg. The hostility of the Castilian nobles, by whom he was disliked, baffled him for a time, but on Philip's early death he reasserted his authority. His second marriage with Germaine of Foix in 1505 was appar- ently contracted in the hope that by securing an heir male he might punish his Habsburg son-in-law. Aragon did not recog- nize the right of women to reign, and would have been detached together with Catalonia, Valencia and the Italian states if he had had a son. This- was the only occasion on which Ferdinand allowed passion to obscure his political sense, and lead him into acts which tended to undo his work of national unification. As king of Aragon he abstained from inroads on the liberties of his subjects which might have provoked rebellion. A few acts of illegal violence are recorded of him — as whenheinvitedanotorious demagogue of Saragossa to visit him in the palace, and caused the man to be executed without form of trial. Once when presid- ing over the Aragonese cortes he found himself sitting in a thorough draught and ordered the window to be shut, adding in a lower voice, " If it is not against the fueros." But his ill-will did not go beyond such sneers. He was too intent on building up a great state to complicate his difficulties by internal troubles. His arrangement of the convention of Guadalupe, which ended the fierce Agrarian conflicts of Catalonia, was wise and profitable to the country, though it was probably dictated mainly by a wish to weaken the landowners by taking away their feudal rights. Ferdinand died at Madrigalejo in Estremadura on the 23rd of February 15 16.

The lives of the kings of this name before Ferdinand V. are con- tained in the chronicles, and in the Amies de Aragon of Zurita, and the

History of Spain by Mariana. Both deal at length with the life of Ferdinand V. Prescott's History of the Reign of Ferdinand and Isabella, in any of its numerous editions, gives a full life of him with copious references to ?uthorities.

FERDINAND VI., king of Spain (1713-1759), second son of Philip V., founder of the Bourbon dynasty, by his first marriage with Maria Louisa of Savoy, was born at Madrid on the 23rd of September 17 13. His youth was depressed. His father's second wife, Elizabeth Farnese, was a managing woman, who had no affection except for her own children, and who looked upon her stepson as an obstacle to their fortunes. The hypo- chondria of his father left Elizabeth mistress of the palace. Ferdinand was married in 1729 to Maria Magdalena Barbara, daughter of John V. of Portugal. The very homely looks of his wife were thought by observers to cause the prince a visible shock when he was first presented to her. Yet he became deeply attached to his wife, and proved in fact nearly as uxorious as his father. Ferdinand was by temperament melancholy, shy and distrustful of his own abilities. When complimented on his shooting, he replied, " It would be hard if there were not some- thing I could do." As king he followed a steady policy of neu- trality between France and England, and refused to be tempted by the offers of either into declaring war on the other. In his life he was orderly and retiring, averse from taking decisions, though not incapable of acting firmly, as when he cut short the dangerous intrigues of his able minister Ensenada by dismiss- ing and imprisoning him. Shooting and music were his only pleasures, and he was the generous patron of the famous singer Farinelli (q.v.), whose voice soothed his melancholy. The death of his wife Barbara, who had been devoted to him, and who care- fully abstained from political intrigue, broke his heart. Between the date of her death in 1758 and his own on the 10th of August 1750 he fell into a state of prostration in which he would not

even dress, but wandered unshaven, unwashed and in a night- gown about his park. The memoirs of the count of Fernan Nunez give a shocking picture of his death-bed.

A good account of the reign and character of Ferdinand VI. will be found in vol. iv. of Coxe's Memoirs of the Kings of Spain of the House of Bourbon (London, 18 1 5). See also Vida de Carlos III., by the count of Fernan Nunez, ed. M. Morel Fatio and Don A. Paz v Melia (1898).

FERDINAND VII., king of Spain (1784-1833), the eldest son of Charles IV., king of Spain, and of his wife Maria Louisa of Parma, was born at the palace of San Ildefonso near Balsain in the Somosierra hills, on the

14th of October 1784. The events with which he was connected were many, tragic and of the widest European interest. In his youth he occupied the painful position of an heir apparent who was carefully excluded from all share in government by the jealousy of his parents, and the prevalence of a royal favourite. National discontent with a feeble govern- ment produced a revolution in 1808 by which he passed to the throne by the forced abdication of his father. Then he spent years as the prisoner of Napoleon, and returned in 1814 to find that while Spain was fighting for independence in his name a new world had been born of foreign invasion and domestic revolution. He came back to assert the ancient doctrine that the sovereign authority resided in his person only. Acting on this principle he ruled frivolously, and with a wanton indulgence of whims. In 1820 his misrule provoked a revolt, and he remained in the hands of insurgents till he was released by foreign intervention in 1823. When free, he revenged himself with a ferocity which disgusted his allies. In his last years he prepared a change in the order of succession established by his dynasty in Spain, which angered a large part of the nation, and made a civil war inevitable. We have to distinguish the part of Ferdinand VII. in all these transactions, in which other and better men were concerned. It can confidently be said to have been uniformly base. He had perhaps no right to complain that he was kept aloof from all share in government while only heir apparent, for this was the traditional practice of his family. But as heir to the throne he had a right to resent the degradation of the crown he was to inherit, and the power of a favourite who was his mother's lover. If he had put himself at the head of a popular rising he would have been followed, and would have had a good excuse. His course was to enter on dim intrigues at the instigation of his first wife, Maria Antonietta of Naples. After her death in 1806 he was drawn into other intrigues by flatterers, and, in October 1807, was arrested for the conspiracy of the Escorial. The conspiracy aimed at securing the help of the emperor Napoleon. When detected, Ferdinand betrayed his associates, and grovelled to his parents. When his father's abdication was extorted by a popular riot at Aranjuez in March 1808, he ascended the throne- not to lead his people manfully, but to throw himself into the hands of Napoleon, in the fatuous hope that the emperor would support him. He was in his turn forced to make an abdication and imprisoned in France, while Spain, with the help of England, fought for its life. At Valancay, where he was sent as a prisoner of state, he sank contentedly into vulgar vice, and did not scruple to applaud the French victories over the people who were suffer- ing unutterable misery in his cause. When restored in March 1814, on the fall of Napoleon, he had just cause to repudiate the impracticable

constitution made by the cortes without his consent. He did so, and then governed like an evil-disposed boy — indulging the merest animal passions, listening to a small camarilla of low-born favourites, changing his ministers every three months, and acting on the impulse of whims which were sometimes mere buffoonery, but were at times lubricous, or ferocious. The autocratic powers of the Grand Alliance, though forced to support him as the representative of legitimacy in Spain, watched his proceedings with disgust and alarm. ” The king,” wrote Gentz to the hospodar Caradja on the 1st of December 1814, ” himself enters the houses of his first ministers, arrests them, and hands them over to their cruel enemies “; and again, on the 14th of January 1815, ” The king has so debased himself that he has become no more than the leading police agent and gaoler of his country.” When at last the inevitable revolt came

in 1820 he grovelled to the insurgents as he had done to his parents, descending to the meanest submissions while fear was on him, then intriguing and, when detected, grovelling again. When at the beginning of 1823, as a result of the congress of Verona, the French invaded Spain, 1 ” invoking the God of St Louis, for the sake of preserving the throne of Spain to a descendant of Henry IV., and of reconciling that fine kingdom with Europe,” and in May the revolutionary party carried Ferdinand to Cadiz, he continued to make promises of amendment till he was free. Then, in violation of his oath to grant an amnesty, he revenged himself for three years of coercion by killing on a scale which revolted his ” rescuers,” and against which the duke of Angouleme, powerless to interfere, protested by refusing the Spanish decorations offered him for his services. During his last years Ferdinand’s energy was abated. He no longer changed ministers every few months as a sport, and he allowed some of them to conduct the current business of government. His habits of life were telling on him. He became torpid, bloated and horrible to look at. After his fourth marriage in 1829 with Maria Christina of Naples, he was persuaded by his wife to set aside the law of succession of Philip V., which gave a preference to all the males of the family in Spain over the females. His marriage had brought him only two daughters. When well, he consented to the change under the influence of his wife. When ill, he was terrified by priestly advisers, who were partisans of his brother Don Carlos. What his final decision was is perhaps doubtful. His wife was mistress by his death-bed, and she could put the words she chose into the mouth of a dead man — and could move the dead hand at her will. Ferdinand died on the 29th of Sep- tember 1 833 . It had been a frequent saying with the more zealous royalists

of Spain that a king must be wiser than his ministers, for he was placed on the throne and directed by God. Since the reign of Ferdinand VII. no one has maintained this un- qualified version of the great doctrine of divine right.

King Ferdinand VII. kept a diary during the troubled years 1 820-1 823, which has been published by the count de Casa Valencia.

FERDINAND II. (1810-1859), king of the Two Sicilies, son of Francis I., was born at Palermo on the 12th of January 1810. In his early years he was credited with Liberal ideas and he was fairly popular, his free and easy manners having endeared him to the lazzaroni. On succeeding his father in 1830, he published an edict in which he promised to ” give his most anxious atten- tion to the impartial administration of justice,” to reform the finances, and to ” use every effort to heal the wounds which had afflicted the kingdom for so many years “; but these promises seem to have been meant only to lull discontent to sleep, for although he did something for the economic development of the kingdom, the existing burden of taxation was only slightly lightened, corruption continued to flourish in all departments of the administration, and an absolutism was finally established harsher than that of all his predecessors, and supported by even more extensive and arbitrary arrests. Ferdinand was naturally shrewd, but badly educated, grossly superstitious and possessed of inordinate self-esteem. Though he kept the machinery of his kingdom fairly efficient, and was a patriot to the extent of brooking no foreign interference, he made little account of the wishes or welfare of his subjects. In 1832 he married Cristina, daughter of Victor Emmanuel I., king of Sardinia, and shortly after her death in 1836 he took for a second wife Maria Theresa, daughter of archduke Charles of Austria. After his Austrian alliance the bonds of despotism were more closely tightened, and the increasing discontent of his subjects was manifested by various abortive attempts at insurrection; in 1837 there was a rising in Sicily in consequence of the outbreak of cholera, and in 1843 the Young Italy Society tried to organize a general rising, which, however, only manifested itself in a series of isolated out- breaks. The expedition of the Bandiera brothers (q.v.) in 1844, although it had no practical result, aroused great ill-feeling owing to the cruel sentences passed on the rebels. In January 1848 a rising in Sicily was the signal for revolutions all over Italy and Europe; it was followed by a movement in Naples, and the king 1 Louis XVIII. ‘s speech from the throne, Jan. 28, 1823.

granted a constitution which he swore to observe. A dispute, however, arose as to the nature of the oath which should be taken by the

members of the chamber of deputies, and as neither the king nor the deputies would yield, serious disturbances broke out in the streets of Naples on the 15th of May; so the king, making these an excuse for withdrawing his promise, dissolved the national parliament on the 13th of March 1849. He retired to Gaeta to confer with various deposed despots, and when the news of the Austrian victory at Novara (March 1849) reached him, he determined to return to a reactionary policy. Sicily, whence the Royalists had been expelled, was subjugated by General Filangieri (q.v.), and the chief cities were bombarded, an expedient which won for Ferdinand the epithet of ” King Bomba.” During the last years of his reign espionage and arbitrary arrests prevented all serious manifestations of dis- content among his subjects. In 1851 the political prisoners of Naples were calculated by Mr Gladstone in his letters to Lord Aberdeen (1851) to number 15,000 (probably the real figure was nearer 40,000), and so great was the scandal created by the pre- vailing reign of terror, and the abominable treatment to which the prisoners were subjected, that in 1856 France and England made diplomatic representations to induce the king to mitigate his rigour and proclaim a general amnesty, but without success. An attempt was made by a soldier to assassinate Ferdinand in 1856. He died on the 22nd of May 1856, just after the declara- tion of war by France and Piedmont against Austria, which was to result in the collapse of his kingdom and his dynasty. He was bigoted, cruel, mean, treacherous, though not without a certain bonhomie; the only excuse that can be made for him is that with his heredity and education a different result could scarcely be expected.

See Correspondence respecting the Affairs of Naples and Sicily, 1848-1849, presented to both Houses of Parliament by Command of Her Majesty, 4th May 1849; Two Letters to the Earl of Aberdeen, by the Right Hon. W. E. Gladstone, 1st ed., 1 85 1 (an edition published in 1852 and the subsequent editions contain an Examination of the Official Reply of the Neapolitan Government) ; N. Nisco, Ferdinando II. il suo regno (Naples, 1884) ; H. Remsen Whitehouse, The Collapse of the Kingdom of Naples (New York, 1899) ; R. de Cesare, La Caduta d’ un Regno, vol. i. (Citta di Castello, 1900), which contains a great deal of fresh information, but is badly arranged and not always reliable. (L. V.*)

FERDINAND III. (1 769-1824), grand duke of Tuscany, and archduke of Austria, second son of the emperor Leopold II. , was born on the 6th of May 1769. On his father becoming emperor in 1790, he succeeded him as grand duke of Tuscany. Ferdinand was one of the first sovereigns to enter into diplomatic relations with the French republic (1793); and although, a few months later, he was compelled by

England and Russia to join the coalition against France, he concluded peace with that power in 1795, and by observing a strict neutrality saved his dominions from invasion by the French, except for a temporary occupation of Livorno, till 1799, when he was compelled to vacate his throne, and a provisional Republican government was estab- lished at Florence. Shortly afterwards the French arms suffered severe reverses in Italy, and Ferdinand was restored to his territories; but in 1801, by the peace of Luneville, Tuscany was converted into the kingdom of Etruria, and he was again compelled to return to Vienna. In lieu of the sovereignty of Tuscany, he obtained in 1802 the electorship of Salzburg, which he exchanged by the peace of Pressburg in 1805 for that of Wtirz- burg. In 1806 he was admitted as grand duke of Wurzburg to the confederation of the Rhine. He was restored to the throne of Tuscany after the abdication of Napoleon in 1814 and was re- ceived with enthusiasm by the people, but had again to vacate his capital for a short time in 181 5, when Murat proclaimed war against Austria. The final overthrow of the French supremacy at the battle of Waterloo secured him, however, in the un- disturbed possession of his grand duchy during the remainder of his life. The restoration in Tuscany was not accompanied by the reactionary excesses which characterized it elsewhere, and a large part of the French' legislation was retained. His prime minister was Count V. Fossombroni (q.v.). The mild rule of Ferdinand, his solicitude for the welfare of his subjects,

his enlightened patronage of art and science, his encouragement of commerce, and his toleration render him an honourable ex- ception to the generality of Italian princes. At the same time his paternal despotism tended to emasculate the Tuscan char- acter. He died in June 1824, and was succeeded by his son Leopold II. (q.v.).

Bibliography.— A. von Reumont, Geschichle Toscanas (Gotha, 1877) ; and " Federico Manfredini e la politica Toscana nei primi anm di Ferdinando III." (in the Archivio Storico Italiano, 1877); Emmer, Erzherzog Ferdinand III., Grossherzog von Toskana (Salz- burg, 1 871) ; C. Tivaroni, L' Italia durante il dominio francese, ii. 1-44 (Turin, 1889), and U Italia durante il dominio austriaco, ii. 1-18 (Turin, 1893). See also under Fossombroni; Vittorio; and Capponi, Gino.

FERDINAND, MAXIMILIAN KARL LEOPOLD MARIA,

king of Bulgaria (1861-), fifth and youngest son of Prince Augustus of Saxe-Coburg and Gotha, was born on the 26th of February 1861.

Great care was exercised in his education, and every encouragement given to the taste for natural history which he exhibited at an early age. In 1879 he travelled with his brother Augustus to Brazil, and the results of their botanical observations were published at Vienna, 1883-1888, under the title of Itinera Principum S. Coburgi. Having been appointed to a lieutenancy in the 2nd regiment of Austrian hussars, he was holding this rank when, by unanimous vote of the National Assembly, he was elected prince of Bulgaria, on the 7th of July 1887, in succession to Prince Alexander, who had abdicated on the 7th of September preceding. He assumed the government on the 14th of August 1887, for Russia for a long time refused to acknowledge the election, and he was accordingly exposed to frequent military conspiracies, due to the influence or attitude of that power. The firmness and vigour with which he met all attempts at revolution were at length rewarded, and his election was confirmed in March 1896 by the Porte and the great powers. On the 20th of April 1893 he married Marie Louise de Bourbon (d. 1899), eldest daughter of Duke Robert of Parma, and in May following the Grand Sobranye confirmed the title of Royal High- ness to the prince and his heir. The prince adhered to the Roman Catholic faith, but his son and heir, the young Prince Boris, was received into the Orthodox Greek Church on the 14th of February 1896. Prince Boris, to whom the tsar Nicholas III. became godfather, accompanied his father to Russia in 1898, when Prince Ferdinand visited St Petersburg and Moscow, and still further strengthened the bond already existing between Russia and Bulgaria. In 1908 Ferdinand married Eleanor (b. i860), a princess of the house of Reuss. Later in the year, in connexion with the Austrian annexation of Bosnia-Herzegovina and the crisis with Turkey, he proclaimed the independence of Bulgaria, and took the title of king or tsar. (See Bulgaria, and Europe: History.)

FERDINAND, duke of Brunswick (1721-1792), Prussian general field marshal, was the fourth son of Ferdinand Albert, duke of Brunswick, and was born at Wolfenbuttel on the 12th of January 1721. He was carefully educated with a view to a military career, and in his twentieth year he was made chief of a newly-raised Brunswick regiment in the Prussian service. He was present in the battles of Mollwitz and Chotusitz. In suc- cession to Margrave Wilhelm of Brandenburg, killed at Prague (I 744), Ferdinand received the command of Frederick the Great's Leibgarde battalion, and at Sohr (1745) he distinguished himself so greatly at the head of his brigade that Frederick wrote of him, " le Prince Ferdinand s'est surpasse." The height which he captured was defended by his brother Ludwig as an officer of the Austrian service, and another brother of Duke Ferdinand

was killed by his side in the charge. During the ten years' peace he was in the closest touch with the military work of Frederick the Great, who supervised the instruction of the guard battalion, and sought to make it a model of the whole Prussian army. Ferdinand was, moreover, one of the most intimate friends of the king, and thus he was peculiarly fitted for the tasks which afterwards fell to his lot. In this time he became successively major-general and lieutenant-general. In the first Rmpaign of the Seven Years' War Ferdinand com-

manded one of the Prussian columns which converged upon Dresden, and in the operations which led up to the surrender of the Saxon army at Pirna (1756), and at the battle of Lobositz, he led the right wing of the Prussian infantry. In 1757 he was present, and distinguished himself, at Prague, and he served also in the campaign of Rossbach. Shortly after this he was ap- pointed to command the allied forces which were being organized for the war in western Germany. He found this army dejected by a reverse and a capitulation, yet within a week of his taking up the command he assumed the offensive, and thus began the career of victory which made his European reputation as a soldier. His conduct of the five campaigns which followed (see Seven Years' War) was naturally influenced by the teachings of Frederick, whose pupil the duke had been for so many years. Ferdinand, indeed, approximated more closely to Frederick in his method of making war than any other general of the time. Yet his task was in many respects far more difficult than that of the king. Frederick was the absolute master of his own homo- geneous army, Ferdinand merely the commander of a group of contingents, and answerable to several princes for the troops placed under his control. The French were by no means despi- cable opponents in the field, and their leaders, if not of the first grade, were cool and experienced veterans. In 1758 he fought and won the battle of Crefeld, several marches beyond the Rhine, but so advanced a position he could not well maintain, and he fell back to the Lippe. He resumed a bold offensive in 1759, only to be repulsed at Bergen (near Frankfort-on-Main). On the 1st of August of this year Ferdinand won the brilliant victory of Minden (q.v.). Vellinghausen, Wilhelmsthal, War- burg and other victories attested the increasing power of Ferdi- nand in the following campaigns, and Frederick, hard pressed in the eastern theatre of war, owed much of his success in an almost hopeless task to the continued pressure exerted by Ferdinand in the west. In promoting him to be a field marshal (November 1758) Frederick acknowledged his debt in the words, " Je n'ai fait que ce que je dois, mon cher Ferdinand." After Minden, King George II. gave the duke the order of the Garter, and the thanks of the British parliament were voted on the same occasion to the " Victor of Minden." After the war he was honoured by other sovereigns, and he received the rank of field marshal and a regiment from the Austrians. During the War of American Independence there was a suggestion, which came to nothing, of offering him the command of the British forces. He exerted himself to compensate those who had suffered by the Seven Years' War, devoting to this purpose most of the small income he received from his various offices and the rewards given to him by the allied

princes. The estrangement of Frederick and Ferdinand in 1766 led to the duke's retirement from Prussian service, but there was no open breach between the old friends, and Ferdinand visited the king in 1772, 1777, 1779 and 1782. After 1766 he passed the remainder of his life at his castle of Veschelde, where he occupied himself in building and other im- provements, and became a patron of learning and art, and a great benefactor of the poor. He died on the 3rd of July 1792. The merits, civil and military, of the prince were recognized by memorials not only in Prussia and Hanover, but also in Denmark, the states of western Germany and England. The Prussian memorials include an equestrian statue at Berlin (1863). , . See , E – v – L \ Knesebeck, Ferdinand, Herzog von Braunschweig und Luneburg, wahrend des Siebenjahrigen Kriegs (2 vols., Hanover i 85 ?" 185 ?' 1 ' V(ˆ, n West Phalen, Geschichle der Feldziige des Herzogs terdinands von Braunschweig-Liineburg (5 vols., Berlin, 1859-1872)- v. d. Osten, Tagebuch des Herzogl. Gen. Adjutanten v. Reden (Hamburg' /?? 5 ˆL J" Schafer – Vte militaire du marechal Prince Ferdinand (Magdeburg, 1796; Nuremberg, 1798) ; also the CEuvres of Frederick the Great, passim, and authorities for the Seven Years' War.

FERDINAND (1577-1650), elector and archbishop of Cologne, son of William V., duke of Bavaria, was born on the 7th of October 1577. Intended for the church, he was educated by the Jesuits at the university of Ingolstadt, and in 1595 became coadjutor archbishop of Cologne. He became elector and arch- bishop in 161 2 on the death of his uncle Ernest, whom he also succeeded as bishop of Liege, Munster and Hildesheim. He

endeavoured resolutely to root out heresy in the lands under his rule, and favoured the teaching of the Jesuits in every possible way. He supported the league founded by his brother Maxi- milian I., duke of Bavaria, and wished to involve the leaguers in a general attack on the Protestants of north Germany. The cool political sagacity of the duke formed a sharp contrast to the impetuosity of the archbishop, and he refused to accede to his brother's wish; but, in spite of these temporary differences, Ferdinand sent troops and money to the assistance of the league when the Thirty Years' War broke out in 1619. The elector's alliance with the Spaniards secured his territories to a great extent from the depredations of the war until the arrival of the Swedes in Germany in 1630, when the extension of the area of the struggle to the neighbourhood of Cologne induced him to enter into

negotiations for peace. Nothing came of these attempts until 1647, when he joined his brother Maximilian in concluding an armistice with France and Sweden at Ulm. The elector's later years were marked by a conflict with the citizens of Liege; and when the peace of Westphalia freed him from his enemies, he was able to crush the citizens and deprive them of many privileges. Ferdinand, who had held the bishopric of Faderborn since 1618, died at Arnsberg on the 13th of September 1650, and was buried in the cathedral at Cologne.

See L. Ennen, Frankreich und der Niederrhein oder Geschichte von Stadt und Kurstadt Kbln seit dem 30jahrigen Kriege, Band i. (Cologne,

1855-1856).

FERENTINO (anc. Ferentinum, to be distinguished from Ferentum or Ferentinum in Etruria), a town and episcopal see of Italy, in the province of Rome, from which it is 48 m. E.S.E. by rail. Pop. (1901) 7957 (town), 12,279 (commune). !t is picturesquely situated on a hill 1290 ft. above sea-level, and still possesses considerable remains of ancient fortifications. The lower portion of the outer walls, which probably did not stand free, is built of roughly hewn blocks of a limestone which naturally splits into horizontal layers; above this in places is walling of rectangular blocks of tufa. Two gates, the Porta Sanguinaria (with an arch with tufa voussoirs), and the Porta S. Maria, a double gate constructed entirely of rectangular blocks of tufa, are preserved. Outside this gate is the tomb of A. Quinctilius Priscus, a citizen of Ferentinum, with a long inscrip- tion cut in the rock. See Th. Mommsen in Corp. Inscrip. Lat. x. (Berlin, 1883), No. 5853.

The highest part of the town, the acropolis, is fortified also; it has massive retaining walls similar to those of the lower town. At the eastern corner, under the present episcopal palace, the construction is somewhat more careful. A projecting rectan- gular terrace has been erected, supported by walls of quadri- lateral blocks of limestone arranged almost horizontally; while upon the level thus formed a building of rectangular blocks of local travertine was raised. The projecting cornice of this building bears two inscriptions of the period of Sulla, recording its construction by two censors (local officials) ; and in the in- terior, which contains several chambers, there is an inscription of the same censors over one of the doors,- and another over a smaller external side door. The windows lighting these chambers come immediately above the cornice, and the wall continues above them again. The whole of this construction probably belongs to one period (Mommsen, op. cit. No. 5837 seq.). The cathedral occupies a part of the level top of the ancient acropolis; it

was reconstructed on the site of an older church in 1099-1118; the interior was modernized in 1693, but was restored to its original form in 1902. It contains a fine canopy in the ” Cosma- tesque ” style (see Relatione dei lavori eseguiti dall’ officio tecnico per la conservazione dei monumenti di Rome a provincia, Rome, 1903, 175 seq.). The Gothic church of S. Maria Maggiore, in the lower town (13th- 14th century), has a very fine exterior; the interior, the plan of which is a perfect rectangle, has been spoilt by restoration. There are several other Gothic churches in the town.

Ferentinum was the chief town of the Hernici; it was captured from them by the Romans in 364 B.C. and took no part in the rising of 306 B.C. The inhabitants became Roman citizens after

195 B.C., and the place later became a municipium. It lay just above the Via Latina and, being a strong place, served for the detention of hostages. Horace praises its quietness, and it does not appear much in later history. (T. As.)

See further Ashby, Rom. Mitteil. xxiv. (1909). FERENTUM, or Ferentinum, an ancient town of Etruria, about 6 m. N. of Viterbo (the ancient name of which is unknown) and 34 m. E. of the Via Cassia. It was the birthplace (32 a.d.) of the emperor Otho, was destroyed in the nth century, and is now entirely deserted , though it retains its ancient name. It occupied a ridge running from east to west, with deep ravines on three sides. There are some remains of the city walls, and of various Roman structures, but the most important ruin is that of the theatre. The stage front is still standing; it is pierced by seven openings with flat arches, and shows traces of reconstruction. The- necropolis was on the hill called Talone on the north-east.

See G. Dennis, Cities and Cemeteries of Etruria (London, 1883), i. 156; Nolizie degli scavi, 1900, 401; 1902, 84; 1905, 3 1 –

FERETORY (from Lat. feretrum, a bier, from ferre, to bear), in architecture, the enclosure or chapel within which the ” fereter ” shrine, or tomb (as in Henry VII. ‘s chapel), was placed.

FERGHANA, or Fergana, a province of Russian Turkestan, formed in 1876 out of the former khanate of Khokand. It is bounded by the provinces of Syr-darya on the N. and N.W., Samarkand on the W., and Semiryechensk on the N.E., by Chinese Turkestan (Kashgaria) on the E., and by Bokhara and Afghanistan on the S. Its southern limits, on the Pamirs, were fixed by an Anglo-Russian commission in 1885, from Zor-kul (Victoria Lake) to the Chinese frontier; and Shignan, Roshan

and Wakhan were assigned to Bokhara in exchange for part of Darvaz (on the left bank of the Panj), which was given to Afghanistan. The area amounts to some 53> 000 S Q- m -> 0I which 17,600 sq. m. are on the Pamirs. The most important part of the province is a rich and fertile valley (1200-1500 ft.), opening towards the S.W. Thence the province stretches northwards across the mountains of the Tian-shan system and southwards across the Alai and Trans- Alai Mts., which reach their highest point in Peak Kaufmann (23,000 ft.), in the latter range. The valley owes its fertility to two rivers, the Naryn and the Kara- darya, which unite within its confines, near Namangan, to form the Syr-darya or Jaxartes. These streams, and their numerous mountain affluents, not only supply water for irrigation, but also bring down vast quantities of sand, which is deposited alongside their courses, more especially alongside the Syr-darya where it cuts its way through the Khojent-Ajar ridge, forming there the Karakchikum. This expanse of moving sands, cover- ing an area of 7S°sq. m., under the influence of south-west winds, encroaches upon the agricultural districts. The climate of this valley is dry and warm. In March the temperature reaches 68° F., and then rapidly rises to 95° in June, July and August. During the five months following April no rain falls, but it begins again in October. Snow and frost (down to — 4 F.) occur in December and January.

Out of some 3,000,000 acres of cultivated land, about two- thirds are under constant irrigation and the remaining third under partial irrigation. The soil is admirably cultivated, the principal crops being wheat, rice, barley, maize, millet, lucerne, tobacco, vegetables and fruit. Gardening is conducted with a high degree of skill and success. Large numbers of horses, cattle and sheep are kept, and a good many camels are bred. Over 17,000 acres are planted with vines, and some 350,000 acres are under cotton. , Nearly 1,000,000 acres are covered with forests. The government maintains a forestry farm atMarghelan, from which 120,000 to 200,000 young trees are distributed free every year amongst the inhabitants of the province.

Silkworm breeding, formerly a prosperous industry, has decayed, despite the encouragement of a state farm at New Marghelan. Coal, iron, sulphur, gypsum, rock-salt, lacustrine salt and naphtha are all known to exist, but only the last two are extracted. Some seventy or eighty factories are engaged in cotton cleaning; while leather, saddlery, paper and cutlery

are the principal products of the domestic industries. A con- siderable trade is carried on with Russia; raw cotton, raw silk, tobacco, hides, sheepskins, fruit and cotton and leather goods are exported, and manufactured wares, textiles, tea and sugar are imported and in part re-exported to Kashgaria and Bokhara. The total trade of Ferghana reaches an annual value of nearly {3,500,000. A new impulse was given to trade by the extension (1899) of the Transcaspian railway into Ferghana and by the opening of the Orenburg-Tashkent railway (1906). The routes to Kashgaria and the Pamirs are mere bridle-paths over the mountains, crossing them by lofty passes. For instance, the passes of Kara-kazyk (14,400 ft.) and Tenghiz-bai (11,200 ft.), both passable all the year round, lead from Marghelan to Kara- teghin and the Pamirs, while Kashgar is reached via Osh and Gulcha, and then over the passes of Terek-davan (12,205 ft.; open all the year round), Taldyk (11,500 ft.), Archat (11,600 ft.), and Shart-davan (14,000 ft.). Other passes leading out of the valley are the Jiptyk (12,460 ft.), S. of Khokand; the Isfairam (12,000 ft.), leading to the glen of the Surkhab, and the Kavuk (13,000 ft.), across the Alai Mts.

The population numbered 1,571,243 in 1897, and of that number 707,132 were women and 286,369 were urban. In 1906 it was estimated at 1,796,500. Two-thirds of the total are Sarts and Uzbegs (of Turkic origin). They live mostly in the valley; while the mountain slopes above it are occupied by Kirghiz, partly nomad and pastoral, partly agricultural and settled. The other races are Tajiks, Kashgarians, Kipchaks, Jews and Gypsies. The governing classes are of course Russians, who constitute also the merchant and artizan classes. But the merchants of West Turkestan are called all over central Asia Andijanis, from the town, of Andijan in Ferghana. The great mass of the population are Mussulmans (1,039,115 in 1897). The province is divided into five districts, the chief towns of which are New Marghelan, capital of the province (8977 in- habitants in 1897), Andijan (49,682 in 1900), Khokand (86,704 in 1900), Namangan (61,906 in 1897), and Osh (37,397 in 1900); but Old Marghelan (42,855 in 1900) and Chust (13,686 in 1897) are also towns of importance. For the history, see Khokand. (P.A.K.; J.T.Be.)

FERGUS FALLS, a city and the county-seat of Otter Tail county, Minnesota, U.S.A., on the Red river, 170 m. N.W. of Minneapolis. Pop. (1890) 3772; (1900) 6072, of whom 2131 were foreign-born; (1905) 6692; (1910) 6887. A large part of the population is of Scandinavian birth or descent. Fergus Falls is served by the Great Northern and the Northern Pacific railways. Situated in the celebrated ” park region ” of the state, the city possesses great natural beauty, which has been enhanced by a system of boulevards and well-kept private lawns. Lake

Alice, in the residential district, adds to the city's attractions. The city has a public library, a county court house, St Luke's hospital, the G. B. Wright memorial hospital, and a city hall. It is the seat of a state hospital for the insane (1887) with about 1600 patients, of a business college, of the Park Region Luther College (Norwegian Lutheran, 1892), and of the North-western College (Swedish Lutheran; opened in 1901). It has one of the finest water-powers in the state. Flour is the principal product; among others are woollen goods, foundry and machine- shop products, wooden ware, sash, doors and blinds, caskets, shirts, wagons and packed meats. The city owns and operates its water-works and its electric-lighting plant. Fergus Falls was settled about 1859 and was incorporated in 1863.

FERGUSON, ADAM (1723-1816), Scottish philosopher and historian, was born on the 20th of June 1723, at Logierait, Perthshire. He was educated at Perth grammar school and the university of St Andrews. In 1745, owing to his knowledge of Gaelic, he was appointed deputy chaplain of the 43 rd (afterwards the 42nd) regiment (the Black Watch), the licence to preach being granted him by special dispensation, although he had not completed the required six years of theological study. At the battle of Fontenoy (1745) Ferguson fought in the ranks through- out the day, and refused to leave the field, though ordered to do so by his colonel. He continued attached to the regiment till

1754, when, disappointed at, not obtaining a living, he abandoned the clerical profession and resolved to devote himself to literary pursuits. In January 1757 he succeeded David Hume as librarian to the faculty of advocates, but soon relinquished this office on becoming tutor in the family of Lord Bute.

In 1759 Ferguson was appointed professor of natural philoˆ sophy in the university of Edinburgh, and in 1764 was trans- ferred to the chair of " pneumatics " (mental philosophy) " and moral philosophy." In 1 767, against Hume's advice, he published his Essay on the History of Civil Society, which was well received and translated into several European languages. In 1776 appeared his (anonymous) pamphlet on the American revolution in opposition to Dr Price's Observations on the Nature. of Civil Liberty, in which he sympathized with the views of the British legislature. In 1778 Ferguson was appointed secretary to the commission which endeavoured, but without success, to negotiate an arrangement with the revolted colonies. In 1783 appeared his History of the Progress and Termination of the Roman Republic; it was very popular, and went through several editions. Ferguson was led to undertake this work from a con- viction that the history of the

Romans during the period of their greatness was a practical illustration of those ethical and political doctrines which were the object of his special study. The history is written in an agreeable style and a spirit of impartiality, and gives evidence of a conscientious use of authorities. The in- fluence of the author's military experience shows itself in certain portions of the narrative. Finding himself unequal to the labour of teaching, he resigned his professorship in 1785, and devoted himself to the revision of his lectures, which he published (1792) under the title of Principles of Moral and Political Science.

When in his seventieth year, Ferguson, intending to prepare a new edition of the history, visited Italy and some of the prin- cipal cities of Europe, where he was received with honour by learned societies. From 1795 he resided successively at the old castle of Neidpath near Peebles, at Hallyards on Manor Water and at St Andrews, where he died on the 22nd of February 1816.

In his ethical system Ferguson treats man throughout as a social being, and illustrates his doctrines by political examples. As a believer in the progression of the human race, he placed the principle of moral approbation in the attainment of perfection. His speculations were carefully criticized by Cousin " (see his Cours d'histoire de la philosophic morale au dix-huitieme siecle, pt. ii., 1830-1840): — " We find in his method the wisdom and circumspection of the Scottish school, with something more masculine and decisive in the results. The principle of perfection is a new one, at once more rational and comprehensive than benevolence and sympathy, which in our view places Ferguson as a moralist above all his predecessors." By this principle Ferguson endeavours to reconcile all moral systems. With Hobbes and Hume he admits the power of self-interest or utility, and makes it enter into morals as the law of self-preservation. Hutcheson's theory of universal benevolence and Smith's idea of sympathy he combines under the law of society. But, as these laws are the means rather than the end of human destiny, they are subordinate to a supreme end, and this supreme end is per- fection. In the political part of his system Ferguson follows Montesquieu, and pleads the cause of well-regulated liberty and free government. His contemporaries, with the exception of Hume, regarded his writings as of great importance; in point of fact they are superficial. The facility of their style and the frequent occurrence of would-be weighty epigrams blinded his critics to the fact that, in spite of his recognition of the import- ance of observation, he made no real contribution to political theory (see Sir Leslie Stephen, English Thought in the Eighteenth Century, x. 89-90).

The chief authority for Ferguson's life is the Biographical Sketch by John Small (1864); see also Public Characters (1799-1800); Gentleman's Magazine, i. (1816 supp.) ; W. R. Chambers's Biographical Dictionary of Eminent Scotsmen ; memoir by Principal Lee in early editions of the Encyclopaedia Britannica; J. McCosh, The Scottish Philosophy (1875) ; articles in Dictionary of National Biography and Edinburgh Review (January 1867) ; Lord Henry Cockburn, Memorials of his Time (1856).

FERGUSON, JAMES (1710-1776), Scottish mechanician and astronomer, was born near Rothiemay in Banffshire on the 25th of April 1 7 10, of parents in very humble circumstances. He first learned to read by overhearing his father teach his elder brother, and with the help of an old woman was " able," he says in his autobiography, " to read tolerably well before his father thought of teaching him." After receiving further instruction in reading from his father, who also taught him to write, he was sent at the age of seven for three months to the grammar school at Keith. His taste for mechanics was about this time accident ally awakened on seeing his father making use of a lever to raise a part of the roof of his house — an exhibition of seeming strength which at first " excited his terror as well as wonder." In 1720 he was sent to a neighbouring farm to keep sheep, where in the daytime he amused himself by making models of mills and other machines, and at night in studying the stars. After- wards, as a servant with a miller, and then with a doctor, he met with hardships which rendered his constitution feeble through life. Being compelled by his weak health to return home, he there amused himself with making a clock having wooden wheels and a whalebone spring. When slightly recovered he showed this and some other inventions to a neighbouring gentleman, who engaged him to clean his clocks, and also desired him to make his house his home. He there began to draw patterns for needlework, and his success in this art led him to think of becoming a painter. In 1734 he went to Edinburgh, where he began to take portraits in miniature, by which means, while engaged in his scientific studies, he supported himself and his family for many years. Subsequently he settled at Inverness, where he drew up his Astronomical Rottda for showing the motions of the planets, places of the sun and moon, &c, and in 1743 went to London, which was his home for the rest of his life. He wrote various papers for the Royal Society, of which he became a fellow in 1763, devised astronomical and mechanical models, and in 1748 began to give public lectures on

experimental philosophy. These he repeated in most of the principal towns in England. His deep interest in his subject, his clear explanations, his ingeniously constructed diagrams, and his mechanical apparatus rendered him one of the most successful of popular lecturers on scientific subjects. It is, however, as the inventor and improver of astronomical and other scientific apparatus, and as a striking instance of self-education, that he claims a place among the most remarkable men of science of his country. During the latter years of his life he was in receipt of a pension of £50 from the privy purse. He died in London on the 17th of November 1776.

Ferguson's principal publications are Astronomical Tables (1763); Lectures on Select Subjects (1st ed., 1761, edited by Sir David Brewster in 1805) ; Astronomy explained upon Sir Isaac Newton's Principles (1756, edited by Sir David Brewster in 181 1) ; and Select Mechanical Exercises, with a Short Account of the Life of the Author, written by himself (1773). This autobiography is included in a Life by E. Henderson, LL.D. (1st ed., 1867; 2nd, 1870), which also contains a full description of Ferguson's principal inventions, accompanied with illustrations. See also The Story of the Peasant-Boy Philosopher, by Henry Mayhew (1857).

FERGUSON, ROBERT (c. 1637-1714), British conspirator and pamphleteer, called the " Plotter," was a son of William Ferguson (d. 1699) of Badifurrow, Aberdeenshire, and after receiving a good education, probably at the university of Aber- deen, became a Presbyterian minister. According to Bishop Burnet he was tast out by the Presbyterians; but whether this be so or net, he soon made his way to England and became vicar of Godmersham, Kent, from which living he was expelled by the Act of Uniformity in 1662. Some years later, having gained meanwhile a reputation as a theological controversialist and become a person of importance among the Nonconformists, he attracted the notice of the earl of Shaftesbury and the party which favoured the exclusion of the duke of York (afterwards King James II.) from the throne, and he began to write political pamphlets just at the time when the feeling against the Roman Catholics was at its height. In 1680 he wrote " A Letter to a Person of Honour concerning the ' Black Box,' " in which he

supported the claim of the duke of Monmouth to the crown against that of the duke of York; returning to the subject after Charles II. had solemnly denied the existence of a marriage between himself and Lucy Waters. He took an active part in the controversy over the Exclusion Bill, and claimed to be the author of the whole of the pamphlet " No Protestant Plot " (1681), parts of which are usually ascribed to

Shaftesbury. Ferguson was deeply implicated in the Rye House Plot, although he asserted that he had frustrated both this and a subsequent attempt to assassinate the king, and he fled to Holland with Shaftesbury in 1682, returning to England early in 1683. For his share in another plot against Charles II. he was declared an outlaw, after which he entered into communication with Argyll, Monmou th and other malcontents. Ferguson then took a leading part in organizing the rising of 1685. Having overcome Mon- mouth's reluctance to take part in this movement, he accom- panied the duke to the west of England and drew up the manifesto against James II., escaping to Holland after the battle of Sedge- moor. He landed in England with William of Orange in 1688, and aided William's cause with his pen; but William and his advisers did not regard him as a person of importance, although his services were rewarded with a sinecure appointment in the Excise. Chagrined at this treatment, Ferguson was soon in correspondence with the exiled Jacobites. He shared in all the plots against the life of William, and after his removal from the Excise in 1692 wrote violent pamphlets against the govern- ment. Although he was several times arrested on suspicion, he was never brought to trial. He died in great poverty in 17 14, leaving behind him a great and deserved reputation for treachery. It has been thought by Macaulay and others that Ferguson led the English government to believe that he was a spy in their interests, and that his frequent escapes from justice were due to official connivance. In a proclamation issued for his arrest in 1683 he is described as " a tall lean man, dark brown hair, a great Roman nose, thin-jawed, heat in his face, speaks in the Scotch tone, a sharp piercing eye, stoops a little in the shoulders." Besides numerous pamphlets Ferguson wrote: History of the Revolution (1706); Qualifications requisite in a Minister of State (17 10); and part of the History of all the Mobs, Tumults and Insurrections in Great Britain (London, 1715).

See James Ferguson, Robert Ferguson, the Plotter (Edinburgh, 1887), which gives a favourable account of Ferguson.

FERGUSON, SIR SAMUEL (1810-1886), Irish poet and anti- quary, was born at Belfast, on the 10th of March 1810. He was educated at Trinity College, Dublin, was called to the Irish bar in 1838, and was made Q.C. in 1859, but in 1867 retired from practice upon his appointment as deputy-keeper of the Irish records, then in a much neglected condition. He was an excellent civil servant, and was knighted in 1878 for his services to the department. His spare time was given to general literature, and in particular to poetry. He had long been a leading contributor to the Dublin University Magazine and to Blackwood, where he had published his two literary master-

pieces, ” The Forging of the Anchor,” one of the finest of modern ballads, and the humorous prose extravaganza of ” Father Tom and the Pope.” He published Lays of the Western Gael in 1865, Poems in 1880, and in 1872 Congal, a metrical narrative of the heroic age of Ireland, and, though far from ideal perfection, perhaps the most successful attempt yet made by a modern Irish poet to revivify the spirit of the past in a poem of epic propor- tions. Lyrics have succeeded better in other hands; many of Ferguson’s pieces on modern themes, notably his ” Lament for Thomas Davis ” (1845), ar e, nevertheless, excellent. He was an extensive contributor on antiquarian subjects to the Transactions of the Royal Irish Academy, and was elected its president in 1882. His manners were delightful, and his hospitality was boundless. He died at Howth on the 9th of August 1886. His most important antiquarian work, Ogham Inscriptions in Ireland, Wales, Scotland, was published in the year after his death.

See Sir Samuel Ferguson in the Ireland of his Day (1896), by his wife, Mary C. Ferguson ; also an article by A. P. Graves in A Treasury of Irish Poetry in the English Tongue (1900), edited by Stopford Brooke and T. W. Rolleston.

FERGUSSON, JAMES (1808-1886), Scottish writer on archi- tecture, was born at Ayr on the 22nd of January 1808. His father was an army surgeon. After being educated first at the Edinburgh high school, and afterwards at a’ private school at Hounslow, James went to Calcutta as partner in a mercantile house. Here he was attracted by the remains of the ancient architecture of India, little known or understood at that time. The successful conduct of an indigo factory, as he states in his own account, enabled him in about ten years to retire from business and settle in London. The observations made on Indian architecture were first embodied in his book on The Rock-cut Temples of India, published in 1845. The task of analys- ing the historic and aesthetic relations of this type of ancient buildings led him further to undertake a historical and critical comparative survey of the whole subject of architecture in The Handbook of Architecture, a work which first appeared in 1855. This did not satisfy him, and the work was reissued ten years later in a much more extended form under the title of The History of Architecture. The chapters on Indian architecture, which had been considered at rather disproportionate length in the Hand- book, were removed from the general History, and the whole of this

subject treated more fully in a separate volume, The History of Indian and Eastern Architecture, which appeared in 1876, and, although complete in itself, formed a kind of appendix to The History of Architecture. Previously to this, in 1862, he issued his History of Modern Architecture, in which the subject was continued from the Renaissance to the present day, the period of ” modern architecture ” being distinguished as that of re- vivals and imitations of ancient styles, which began with the Renaissance. The essential difference between this and the spontaneously evolved architecture of preceding ages Fergusson was the first clearly to point out and characterize. His treatise on The True Principles of Beauty in Art, an early publication, is a most thoughtful metaphysical study. Some of his essays on special points in archaeology, such as the treatise on The Mode in which Light was introduced into Greek Temples, included theories which have not received genera] acceptance. His real monument is his History of Architecture (later edition revised by R. Phene Spiers), which, for grasp of the whole subject, compre- hensiveness of plan, and thoughtful critical analysis, stands quite alone in architectural literature. He received the gold medal of the Royal Institute of British Architects in 1871. Among his works, besides those already mentioned, are: A Proposed New System of Fortification (1849), Palaces of Nineveh and Persepolis restored (1851), Mausoleum at Halicarnassus restored (1862), Tree and Serpent Worship (1868), Rude Stone Monuments in all Countries (1872), and The Temples of the Jews and the other Buildings in the Haram Area at Jerusalem (1878). The sessional papers of the Institute of British Architects in- clude papers by him on The History of the Pointed Arch, Architecture of Southern India, Architectural Splendour of the City of Beejapore, On the Erechtheum and on the Temple of Diana at Ephesus.

Although Fergusson never practised architecture he took a keen interest in all the professional work of his time. He was adviser with Austen Layard in the scheme of decoration for the Assyrian court at the Crystal Palace, and indeed assumed in 1856 the duties of general manager to the Palace Company, a post which he held for two years. In 1847 Fergusson had pub- lished an ” Essay on the Ancient Topography of Jerusalem,” in which he had contended that the ” Mosque of Omar ” was the identical church built by Constantine the Great over the tomb of our Lord at Jerusalem, and that it, and not the present church of the Holy Sepulchre, was the genuine burial-place of Jesus. The burden of this contention was further explained by the publication in i860 of his Notes on the Site of the Holy Sepulchre at Jerusalem; and The Temples of the Jews and the other Buildings in the Haram Area at Jerusalem, published in 1878, was a still completer

elaboration of these theories, which are said to have been the origin of the establishment of the Palestine Exploration fund. His manifold activities continued till his death, which took place in London on the 9th of January 1886.

FERGUSSON, ROBERT (1750-1774), Scottish poet, son of Sir William Fergusson, a clerk in the British Linen Company, was born at Edinburgh on the 5th of September 1750. Robert was educated at the grammar school of Dundee, and at the university of St Andrews, where he matriculated in 1765. His father died while he was still at college; but a bursary enabled him to com- plete his four years of study. He refused to study for the church, and was too nervous to study medicine as his friends wished. He quarrelled with his uncle, John Forbes of Round Lichnot, Aberdeenshire, and went to Edinburgh, where he obtained employment as copying clerk in a lawyer's office. In this humble occupation he passed the remainder of his life. While at college he had written a clever elegy on Dr David Gregory, and in 1771 he began to contribute verses regularly to Ruddiman's Weekly Magazine. He was a member of the Cape Club, celebrated by him in his poem of " Auid Reekie." " The Knights of the Cape " assembled at a tavern in Craig's Close, in the vicinity of the Cross; each member had a name and character assigned to him, which he was required to maintain at all gatherings of the order. David Herd (1732-1810), the collector of the classic edition of Ancient and Modem Scottish Songs (1776), was sovereign of the Cape (in which he was known as " Sir Scrape ") when Fergusson was dubbed a knight of the order, with the title of " Sir Pre- centor," in allusion to his fine voice. Alexander Runciman, the historical painter, his pupil Jacob More, and Sir Henry Raeburn were all members. The old minute books of the club abound with pencilled sketches by them, one of the most interesting of which, ascribed to Runciman's pencil, is a sketch of Fergusson in his character of " Sir Precentor."

Fergusson's gaiety and wit made him an entertaining com- panion, and he indulged too freely in the convivial habits of the time. After a meeting with John Brown of Haddington he became, however, very serious, and would read nothing but his Bible. A fall by which his head was severely injured aggravated symptoms of mental aberration which had begun to show themselves; and after about two months' confinement in the old Darien House — then the only public asylum in Edinburgh — the poet died on the 16th of October 1774.

Fergussons' poems were collected in the year before his death. The influence of his writings on Robert Burns is undoubted. His " Leith Races " unquestionably supplied the model for the " Holy Fair." Not

only is the stanza the same, but the Mirth who plays the part of conductor to Fergusson, and the Fun who renders a. like service to Burns, are manifestly conceived on the same model. ” The Mutual Complaint of Plainstanes and Causey ” probably suggested ” The Brigs of Ayr “; ” On seeing a Butterfly in the Street ” has reflections in it which strikingly correspond with ” To a Mouse “; nor will a comparison of ” The Farmer’s Ingle ” of the elder poet with ” The Cottar’s Saturday Night ” admit of a doubt as to the influence of the city-bred poet’s muse on that exquisite picturing of homely peasant life. Burns was himself the first to render a generous tribute to the merits of Fergusson; on his visit to Edinburgh in 1787 he sought out the poet’s grave, and petitioned the authorities of the Canongate burying-ground for permission to erect the memorial stone which is preserved in the existing monument. The date there assigned for his birth differs from the one given above, which rests on the authority of his younger sister Margaret.

The first edition of Fergusson’s poems was published by Ruddiman at Edinburgh in 1 773 , and a supplement containing additional poems, in 1779. A second edition appeared in 1785. There are later editions, by Robert Chambers (1850) and Dr A. B. Grosart (1851). A life of Fergusson is included in Dr David Irving’s Lives of the Scottish Poets, and in Robert Chambers’s Lives of Illustrious and Distinguished Scotsmen.

FERGUSSON, SIR WILLIAM, Bart. (1808-1877), British surgeon, the son of James Fergusson of Lochmaben, Dumfries- shire, was born at Prestonpans, East Lothian, on the 20th of March 1808. After receiving his early education at Lochmaben and the high school of Edinburgh, he entered the university of Edinburgh with the view of studying law, but soon after- wards abandoned his intention and became a pupil of the anatomist Robert Knox (1791-1862) whose demonstrator he was

appointed at the age of twenty. In 1836 he succeeded Robert Liston as surgeon to the Edinburgh Royal Infirmary, and coming to London in 1840 as professor of surgery in King’s College, and surgeon to King’s College Hospital, he acquired a command- ing position among the surgeons of the metropolis. He revived the operation for cleft-palate, which for many years had fallen into disrepute, and invented a special mouth-gag for the same. He also devised many other surgical instruments, chief among which, and still in use to-day, are his bone

forceps, lion forceps and vaginal speculum. In 1866 he was created a baronet. He died in London on the 10th of February 1877. As a surgeon Fergusson's greatest merit is that of having introduced the practice of " conservative surgery," by which he meant the excision of a joint rather than- the amputation of a limb. He made his diagnosis with almost intuitive certainty; as an operator he was characterized by self-possession in the most critical circumstances, by minute attention to details and by great refinement of touch, and he relied more on his mechanical dexterity than on complicated instruments. He was the author of The Progress of A natomy and Surgery in the Nineteenth Century (1867), and of a System of Practical Surgery (1842), which went through several editions.

FERINGHI, or Feringhee, a Frank (Persian, Farangi). This term for a European is very old in Asia, and was originally used in a purely geographical sense, but now generally carries a hostile or contemptuous significance. The combatants on either side during the Indian Mutiny called each other Feringhies and Pandies.

FERISHTA, MAHOMMED KASIM (c. 1570-c. 1611), Persian historian, was born at Astrabad, on the shores of the Caspian Sea. While he was still a child his father was summoned away from his native country into Hindostan, where he held high office in the Deccan; and by his influence the young Ferishta received court promotion. In 1589 Ferishta removed to Bijapur, where he spent the remainder of his life under the immediate protection of the shah Ibrahim Adil II., who engaged him to write a history of India. At the court of this monarch he died about 161 1. In the introduction to his work a resume' is given of the history of Hindostan prior to the times of the Mahommedan conquest, and also of the victorious progress of the Arabs through the East. The first ten books are each occupied with a history of the kings of one of the provinces; the eleventh book gives an account of the Mussulmans of Malabar; the twelfth a history of the Mussul- man saints of India; and the conclusion treats of the geography and climate of India. Ferishta- is reputed one of the most trust- worthy of the Oriental historians, and his work still maintains a high place as an authority. Several portions of it have been translated into English; but the best as well as the most com- plete translation is that published by General J. Briggs under the title of The History of the Rise of the Mahometan Power in India (London, 1829, 4 vols. 8vo). Several additions were made by Briggs to the original work of Ferishta, but he omitted the whole of the twelfth book, and various other passages which had been omitted in the copy from which he translated.

FERMANAGH, a county of Ireland, in the province of Ulster, bounded

N.W. by Donegal, N.E. by Tyrone, E. by Monaghan and S.W. by Cavan and Leitrim. The area is 457,369 acres or about 715 sq. m. The county is situated mostly in the basin of the Erne, which divides the county into two nearly equal sections. Its surface is hilly, and its appearance (in many parts) somewhat sterile, though in the main, and especially in the neighbourhood of Lough Erne, it is picturesque and attractive. The climate, though moist, is healthy, and the people are gener- ally tall and robust. The chief mountains are Cuilcagh (2188 ft.), partly in Leitrim and Cavan, Belmore (1312), Glenkeel (r223), North Shean (1135), Tappahan (1110), Carnmore (1034). Tossett or Toppid and Turaw mountains command extensive prospects, and form striking features in the scenery of the county. But the most distinguishing features of Fermanagh are the Upper and Lower Loughs Erne, which occupy a great extent of its surface, stretching for about 45 m. from S.E. to N.W. These lakes are expansions of the river Erne, which enters the county

from Cavan at Wattle Bridge. It passes Belturbet, the Loughs Erne, Enniskillen and Belleek, on its way to the Atlantic, into which it descends at Ballyshannon. At Belleek it forms a con- siderable waterfall and is here well known to sportsmen for its good salmon fishing. Trout are taken in most of the loughs, and pike of great size in the Loughs Erne. There are several mineral springs in the county, some of them chalybeate, others sulphurous. At Belcoo, near Enniskillen, there is a famous well called Daragh Phadric, held in repute by the peasantry for its cure of paralytic and other diseases; and 4 m. N.W. of the same town, at a place called ” the Daughton,” are natural caves of considerable size.

This county includes in the north an area of the gneiss that is discussed under county Donegal, and, west of Omagh, a meta- morphic region that stretches in from the central axis of Tyrone. A fault divides the latter from the mass of red-brown Old Red Sandstone that spreads south nearly to Enniskillen. Lower Carboniferous sandstone and limestone occur on the north of Lower Lough Erne. The limestone forms fine scarps on the southern side of the lake, capped by beds regarded as the Yoredale series. The scenery about the two Loughs Macnean is carved out in similarly scarped hills, rising to 2188 ft. in Cuil- cagh on the south. The ” Marble Arch ” cave near Florence- court, with its emerging river, is a characteristic example of the subterranean waterways in the limestone. Upper Lough Erne is a typical meandering lake of the limestone lowland, with outliers of higher Carboniferous strata forming highlands north- east and south- west of it.

With the exception of the pottery works at Belleek, where iridescent ware of good quality is produced, Fermanagh has rio distinguishing manufactures. It is chiefly an agricultural county. The proportion of tillage to pasture is roughly as 1 to 2§. Cattle and poultry are the principal classes of live stock. Oats and potatoes are the crops most extensively cultivated. The north-western division of the Great Northern railway passes through the most populous portion of the county, one branch connecting Enniskillen with Clones, another connecting Ennis- killen with Londonderry via Omagh, and a third connecting Bundoran Junction with Bundoran, in county Donegal. The Sligo, Leitrim & Northern Counties railway connects with the Great Northern at Enniskillen, and the Clogher Valley light railway connects southern county Tyrone with the Great Northern at Maguiresbridge.

The population (74,17° in 1891; 65,430 in 1901; almost wholly rural) shows a decrease among the most serious of the county populations of Ireland. It includes 55% of Roman Catholics and about 35% of Protestant Episcopalians. Ennis- killen (the county town, pop. 5412) is the only town of import- ance, the rest being little more than villages. The principal are Lisnaskea,Irvinestown(formerlyLowtherstown), Maguiresbridge, Tempo, Newtownbutler, Belleek, Derrygonnelly and Kesh, at which fairs are held. Garrison, a fishing station on the wild Lough Melvin, and Pettigo, near to the lower Lough Erne, are market villages. Fermanagh returns two members to parlia- ment, one each for the north and south divisions. It comprises eight baronies and nineteen civil parishes. The assizes are held at Enniskillen, quarter sessions at Enniskillen and Newtown- butler. The headquarters of the constabulary are at Enniskillen. Ecclesiastically it belongs to the Protestant and Roman Catholic dioceses of Clogher and Kilmore.

By the ancient Irish the district was called Feor-magh-Eanagh, or the ” country of.the lakes ” (lit. ” the mountain- valley marsh district “); and also Magh-uire, or ” the country of the waters.” A large portion was occupied by the Guarii, the ancestors of the MacGuires or Maguires, a name still common in the district. This family was so influential that for centuries the county was called after it Maguire’s Country, and one of the towns still existing bears its name, Maguiresbridge. Fermanagh was formed into a county on the shiring of Ulster in 1585 by Sir John Perrot, and was included in the well-known scheme of colonization of James I., the Plantation of Ulster. In 1689 battles were fought between William III.‘s army and the Irish

under Macarthy (for James II.), Lisnaskea (26th July) and Newtownbutler (30th July). The chief place of interest to the antiquary is Devenish Island in Lough Erne, about 25 m. N.W. from Enniskillen (

FERMAT, PIERRE DE (1601-1665), French mathematician, was born on the 17th of August 1601, at Beaumont-de-Lomagne near Montauban. While still young, he, along with Blaise Pascal, made some discoveries in regard to the properties of numbers, on which he afterwards built his method of calculating probabilities. He discovered a simpler method of quadrating parabolas than that of Archimedes, and a method of finding the greatest and the smallest ordinates of curved lines analogous to that of the then unknown differential calculus. His great work De maximis et minimis brought him into conflict with Ren6 Descartes, but the dispute was chiefly due to a want of ex- plicitness in the statement of Fermat (see Infinitesimal Cal- culus). His brilliant researches in the theory of numbers entitle him to rank as the founder of the modern theory. They origin- ally took the form of marginal notes in a copy of Bachet's Diophantus, and were published in 1670 by his son Samuel, who incorporated them in a new edition of this Greek writer. Other theorems were published in his Opera Varia, and in John Wallis's Commercium epistolicum (1658) . He died in the belief that he had found a relation which every prime number must satisfy, namely 2 2n +i = a prime. This was afterwards disproved by Leonhard Euler for the case when n= 5. Fermat' s Theorem, if p is prime and a is prime to p then a v~ l -i is divisible by p, was first given in a letter of 1640. Fermat's Problem is that x n --y n =z n is im- possible for integral values of x, y and z when n is greater than 2.

Fermat was for some time councillor for the parliament of Toulouse, and in the discharge of the duties of that office he was distinguished both for legal knowledge and for strict integrity of conduct. Though the sciences were the principal objects of his private studies, he was also an accomplished general scholar and an excellent linguist. He died at Toulouse on the 12th of January 1665. He left a son, Samuel de Fermat (1630-1690) who published translations of several Greek authors and wrote certain books on law in addition to editing his father's works.

The Opera mathematica of Fermat were published at Toulouse, in 2 vols, folio, 1670 and 1679. The first contains the " Arithmetic of Diophantus," with notes and additions. The second includes a " Method for the Quadrature of Parabolas," and a treatise " on Maxima and Minima, on Tangents, and on Centres of Gravity," containing the

same solutions of a variety of problems as were after- wards incorporated into the more extensive method of fluxions by Newton and Leibnitz. In the same volume are treatises on “Geo- metric Loci, or Spherical Tangencies,” and on the ” Rectification of Curves,” besides a restoration of ” Apollonius’s Plane Loci,” together with the author’s correspondence addressed to Descartes, Pascal, Roberval, Huygens and others. The CEuvres of Fermat have been re-edited by P. Tannery and C. Henry (Paris, 1891-1894).

See Paul Tannery, ” Sur la date des principales decouvertes de Fermat,” in the Bulletin Darboux (1883); and ” Les Manuscrits de Fermat,” in the Annates de la faculte des lettres de Bordeaux.

FERMENTATION. The process of fermentation in the pre- paration of wine, vinegar, beer and bread was known and practised in prehistoric times. The alchemists used the terms fermentation, digestion and putrefaction indiscriminately; any reaction in which chemical energy was displayed in some form or other — such, for instance, as the effervescence occasioned by the addition of an acid to an alkaline solution — was described as a fermentation (Lat. fervere, to boil) ; and the idea of the ” Philosopher’s Stone ” setting up a fermentation in the common metals and developing the essence or germ, which should trans- mute them into silver or gold, further complicated the conceptions of fermentation. As an outcome of this alchemical doctrine the process of fermentation was supposed to have a purifying and elevating effect on the bodies which had been submitted to its influence. Basil Valentine wrote that when yeast was added to wort ” an internal inflammation is communicated to the liquid,

so that it raises in itself, and thus the segregation and separation of the feculent from the clear takes place.” Johann Becher, in 1669, first found that alcohol was formed during the fermenta- tion of solutions of sugar; he distinguished also between fermentation and putrefaction. In 1697 Georg Stahl admitted that fermentation and putrefaction were analogous processes, but that the former was a particular case of the latter.

The beginning of definite knowledge on the phenomenon of fermentation may be dated from the time of Antony Leeuwen- hoek, who in 1680 designed a microscope sufficiently powerful to render yeast cells and bacteria visible; and a description of these organisms, accompanied by diagrams, was sent to the Royal Society of London. This investigator just missed a great discovery, for he did not consider the spherical forms to be living organisms but compared them with starch granules. It was not until 1803 that L. J. Thenard stated that

yeast was the cause of fermentation, and held it to be of an animal nature, since it con- tained nitrogen and yielded ammonia on distillation, nor was it conclusively proved that the yeast cell was the originator of fermentation until the researches of C. Cagniard de la Tour, T. Schwann and F. Kiitzing from 1836 to 1839 settled the point. These investigators regarded yeast as a plant, and Meyer gave to the germs the systematic name of " Saccharomyces " (sugar fungus). In 1 83 9-1 840 J. von Liebig attacked the doctrine that fermentation was caused by micro-organisms, and enunciated his theory of mechanical decomposition. He held that every fermentation consisted of molecular motion which is transmitted from a substance in a state of chemical motion — that is, of de- composition — to other substances, the elements of which are loosely held together. It is clear from Liebig's publications that he first regarded yeast as a lifeless, albuminoid mass; but, although later he considered they were living cells, he would never admit that fermentation was a physiological process, the chemical aspect being paramount in the mind of this distinguished investigator.

In 1857 Pasteur decisively proved that fermentation was a phy- siological process, for he showed that the yeast which produced fermentation was no dead mass, as assumed by Liebig, but consisted of living organisms capable of growth and multiplica- tion. His own words are: " The chemical action of fermenta- tion is essentially a correlative phenomenon of a vital act, beginning and ending with it. I think that there is never any alcoholic fermentation without there being at the same time organization, development and multiplication of globules, or the continued consecutive life of globules already formed." Fermentation, according to Pasteur, was caused by the growth and multiplication of unicellular organisms out o-f contact with free oxygen, under which circumstance they acquire the power of taking oxygen from chemical compounds in the medium in which they are growing. In other words " fermentation is life without air, or life without oxygen." This theory of fermenta- tion was materially modified in 1892 and 1894 by A. J. Brown, who described experiments which were in disagreement with Pasteur's dictum. A. J. Brown writes: " If for the theory ' life without air ' is substituted the consideration that yeast cells can use oxygen in the manner of ordinary aerobic fungi, and probably do require it for the full completion of their life- history, but that the exhibition of their fermentative functions is independent of their environment with regard to free oxygen, it will be found that there is nothing contradictory in Pasteur's experiments to such a hypothesis."

Liebig and Pasteur were in agreement on the point that fer- mentation

is intimately connected with the presence of yeast in the fermenting liquid, but their explanations concerning the mechanism of fermentation were quite opposed. According to M. Traube (1858), the active cause of fermentation is due to the action of different enzymes contained in yeast and not to the yeast cell itself. As will be seen later this theory was confirmed by subsequent researches of E. Fischer and E. Buchner.

In 1879 C. Nageli formulated his – well-known molecular- physical theory, which supported Liebig's chemical theory on the one hand and Pasteur's physiological hypothesis on the

other: " Fermentation is the transference of the condition of motion of the molecules, atomic groups and atoms of the various compounds constituting the living plasma, to the fermenting material, in consequence of which equilibrium in the molecules of the latter is destroyed, the result being their disintegration." He agreed with Pasteur that the presence of living cells is essen- tial to the transformation of sugar into alcohol, but dissented from the view that the process occurs within the cell. This investigator held that the decomposition of the sugar molecules takes place outside the cell wall. In 1894 and 1895, Fischer, in a remarkable series of papers on the influence of molecular structure upon the action of the enzyme, showed that various species of yeast behave very differently towards solutions of sugars. For example, some species hydrolyse came sugar and maltose, and then carry on fermentation at the expense of the simple sugars (hexoses) so formed. Saccharomyces Marxianus will not hydro- lyse maltose, but it does attack cane sugar and ferment the pro- ducts of hydrolysis. Fischer next suggested that enzymes can only hydrolyse those sugars which possess a molecular structure in harmony with their own, or to use his ingenious analogy, " the one may be said to fit into the other as a key fits into a lock." The preference exhibited by yeast cells for sugar mole- cules is shared by mould fungi and soluble enzymes in their fermentative actions. Thus, Pasteur showed that Penicillium glaucum, when grown in an aqueous solution of ammonium racemate, decomposed the dextro-tartrate, leaving the laevo- tartrate, and the solution which was originally inactive to polarized light became dextro-rotatory. Fischer found that the enzyme " invertase," which is present in yeast, attacks methyl-d-glucoside but not methyl-Z-glucoside.

In 1897 Buchner submitted yeast to great pressure, and isolated a nitrogenous substance, enzymic in character, which he termed ” zymase.” This body is being continually formed in the yeast cell, and decomposes the sugar which has diffused into the cell. The freshly-expressed yeast juice causes concen- trated solutions of cane sugar, glucose, laevulose and maltose to ferment with the production of alcohol and carbon dioxide, but not milk-sugar and mannose. In this respect the plasma behaves in a similar manner towards the sugars as does the living yeast cell. Pasteur found that, when cane sugar was fermented by yeast, 49-4% of carbonic acid and 51-1% of alcohol were produced; with expressed yeast juice cane sugar yields 47 % of carbonic acid and 47-7% of alcohol. According to Buchner the fermentative activity of yeast-cell juice is not due to the presence of living yeast cells, or to the action of living yeast protoplasm, but it is caused by a soluble enzyme. A. Macfadyen, G. H. Morris and S. Rowland, in repeating Buchner’s experiments, found that zymase possessed properties differing from all other enzymes, thus: dilution with twice its volume of water practically destroys the fermentative power of the yeast juice. These investigators considered that differences of this nature cannot be explained by the theory that it is a soluble enzyme, which brings about the alcoholic fermentation of sugar. The remarkable discoveries of Fischer and Buchner to a great extent confirm Traube’s views, and reconcile Liebig’s and Pasteur’s theories. Although the action of zymase may be regarded as mechanical, the enzyme cannot be produced by any other than living protoplasm.

Pasteur’s important researches mark an epoch in the technical aspect of fermentation. His investigations on vinegar-making revolutionized that industry, and he showed how, instead of waiting two or three months for the elaboration of the process, the vinegar could be made in eight or ten days by exposing the vats containing the mixture of wine and vinegar to a tempera- ture of 20 to 25° C, and sowing with a small quantity of the acetic organism. To the study of the life-history of the butyric and acetic organisms we owe the terms ” anaerobic ” and ” aerobic.” His researches from i860 and onwards on the then vexed question of spontaneous generation proved that, in all cases where spontaneous generation appeared to have taken place, some defect or other was in the experiment. Al- though the direct object of Pasteur was to prove a negative,

yet it was on these experiments that sterilization as known to us was developed. It is only necessary to bear in mind the great part played by sterilization in the laboratory, and pasteuriza- tion on the fermentation industries and in the preservation of food materials.

Pasteur first formulated the idea that bacteria are responsible for the diseases of fermented liquids; the corol- lary of this was a demand for pure yeast. He recommended that yeast should be purified by cultivating it in a solution of sugar containing tartaric acid, or, in wort containing a small quantity of phenol. It was not recognized that many of the diseases of fermented liquids are occasioned by foreign yeasts; moreover, this process, as was shown later by Hansen, favours the develop- ment of foreign yeasts at the expense of the good yeast.

About this time Hansen, who had long been engaged in re- searches on the biology of the fungi of fermentation, demon- strated that yeast free from bacteria could nevertheless occasion diseases in beer. This discovery was of great importance to the zymo-technical industries, for it showed that bacteria are not the only undesirable organisms which may occur in yeast. Hansen set himself the task of studying the properties of the varieties of yeast, and to do this he had to cultivate each variety in a pure state. Having found that some of the commonest diseases of beer, such as yeast turbidity and the objectionable changes in flavour, were caused not by bacteria but by certain species of yeast, and, further, that different species of good brewery yeast would produce beers of different character, Hansen argued that the pitching yeast should consist only of a single species — namely, that best suited to the brewery in question. These views met with considerable opposition, but in 1890 Professor E. Duclaux stated that the yeast question as regards low fermentation has been solved by Hansen's investigations. He emphasized the opinion that yeast derived from one cell was of no good for top fermentation, and advocated Pasteur's method of purification. But in the course of time, notwith- standing many criticisms and objections, the reform spread from bottom fermentation to top fermentation breweries on the continent and in America. In the United Kingdom the employ- ment of brewery yeasts selected from a single cell has not come into general use; it may probably be accounted for in a great measure by conservatism and the wrong application of Hansen's theories.

Pure Cultivation of Yeasts. — The methods which were first adopted by Hansen for obtaining pure cultures of yeast were similar in principle to one devised by J. Lister for isolating a pure culture of lactic acid bacterium. Lister determined the number of bacteria present in a drop of the liquid under examina- tion by counting, and then diluted this with a sufficient quantity of sterilized water so that each drop of the mixture should con- tain, on an average, less than one bacterium. A number of flasks containing a nutrient medium were each inoculated with one drop of this mixture; it was found that some remained sterile, and Lister assumed that the remaining flasks each

contained a pure culture. This method did not give very certain results, for it could not be guaranteed that the growth in the inoculated flask was necessarily derived from a single bacterium. Hansen counted the number of yeast cells suspended in a drop of liquid diluted with sterilized water. A volume of the diluted yeast was introduced into flasks containing sterilized wort, the degree of dilution being such that only a small proportion of the flasks became infected. The flasks were then well shaken, and the yeast cell or cells settled to the bottom, and gave rise to a separate yeast speck. Only those cultures which contained a single yeast speck were assumed to be pure cultivations. By this method several races of Saccharomycetes and brewery yeasts were isolated and described.

The next important advance was the substitution of solid for liquid media; due originally to Schroter. R. Koch subsequently improved the method. He introduced bacteria into liquid sterile nutrient gelatin. After being well shaken, the liquid was poured into a sterile glass Petrie dish and covered with a moist and sterile bell-jar. It was assumed that each separate speck contained a pure culture. Hansen pointed out that this

was by no means the case, for it is more difficult to separate the cells from each other in the gelatin than in the liquid. To obtain an absolutely pure culture with certainty it is necessary, even when the gelatin method is employed, to start from a single cell. To effect this some of the nutrient gelatin containing yeast cells is placed on the under-surface of the cover-glass of the moist chamber. Those cells are accurately marked, the position of which is such that the colonies, to which they give rise, can grow to their full size without coming into contact with other colonies. The growth of the marked cells is kept under observation for three or four days, by which time the colonies will be large enough to be taken out of the chamber and placed in flasks. The contents of the flasks can then be introduced into larger flasks, and finally into an apparatus suitable for making enough yeast for technical purposes. Such, in brief, are the methods devised by that brilliant investigator Hansen; and these methods have not only been the basis on which our modern knowledge of the Saccharomycetes is founded, but are the only means of attack which the present-day observer has at his disposal.

From the foregoing it will be seen that the term fermentation has now

a much wider significance than when it was applied to such changes as the decomposition of must' or wort with the production of carbon dioxide and alcohol. Fermentation now includes all changes in organic compounds brought about by ferments elaborated in the living animal or vegetable cell. There are two distinct types of fermentation: (1) those brought about by living organisms (organized ferments), and (2) those brought about by non-living or unorganized ferments (enzymes). The first class include such changes as the alcoholic fermentation of sugar solutions, the acetic acid fermentation of alcohol, the lactic acid fermentation of milk sugar, and the putrefaction of animal and vegetable nitrogenous matter. The second class include all changes brought about by the agency of enzymes, such as the action of diastase on starch, invertase on cane sugar, glucase on maltose, &c. The actions are essentially hydrolytic.

Biological Aspect of Yeast. — The Saccharomycetes belong to that division of the Thallophyta called the Hyphomycetes or Fungi (q.v.). Two great divisions are recognized in the Fungi: (i.) the Phycomycetes or Algal Fungi, which retain a definitely sexual method of reproduction as well as asexual (vegetative) methods, and (ii.) the Mycomycetes, characterized by extremely reduced or very doubtful sexual reproduction. The Mycomy- cetes may be divided as follows: (A) forms bearing both sporangia and conidia (see Fungi), (B) forms bearing conidia only, e.g. the common mushroom. Division A comprises (a) the true Ascomycetes, of which the moulds Eurotium and Peni- cillium are examples, and (6) the Hemiasci, which includes the yeasts. The gradual disappearance of the sexual method of reproduction, as we pass upwards in the fungi from the points of their departure from the Algae, is an important fact, the last traces of sexuality apparently disappearing in the ascomycetes.

With certain rare exceptions the Saccharomycetes have three methods of asexual reproduction: —

1. The most common. — The formation of buds which separate to form new cells. A portion of the nucleus of the parent cell makes its way through the extremely narrow neck into the daughter cell. This method obtains when yeast is vigorously fermenting a saccharine solution.

2. A division by fission followed by Endogenous spore formation, characteristic of the Schizosaccharomycetes. Some species show fermentative power.

3. Endospore formation, the conditions for which are as follows: (1)

suitable temperature, (2) presence of air, (3) presence of moisture, (4) young and vigorous cells, (5) a food supply in the case of one species at least is necessary, and is in no case prejudicial. In some cases a sexual act would appear to precede*spore formation. In most cases four spores are formed within the cell by free formation. These may readily be seen after appropriate staining.

In some of the true Ascomycetes, such as Penicillium giaucum, the conidia if grown in saccharine solutions, which they have

the power of fermenting, develop single cell yeast-like forms, and do not — at any rate for a time — produce again the char- acteristic branching mycelium. This is known as the Torula condition. It is supposed by some that Saccharomyces is a very degraded Ascomycete, in which the Torula condition has become fixed.

The yeast plant and its allies are saprophytes and form no chlorophyll. Their extreme reduction in form and loss of sexuality may be correlated with the saprophytic habit, the proteids and other organic material required for the growth and reproduction being appropriated ready synthesized, the plant having entirely lost the power of forming them for itself, as evidenced by the absence of chlorophyll. The beer yeast S. cerevisiae, is never found wild, but the wine yeasts occur abundantly in the soil of vineyards, and so are always present on the fruit, ready to ferment the expressed juice.

Chemical Aspect of Alcoholic Fermentation. — Lavoisier was the first investigator to study fermentation from a quantitative standpoint. He determined the percentages of carbon, hydrogen and oxygen in the sugar and in the products of fermentation, and concluded that sugar in fermenting breaks up into alcohol, carbonic acid and acetic acid. The elementary composition of sugar and alcohol was fixed in 181 5 by analyses made by Gay- Lussac, Thenard and de Saussure. The first-mentioned chemist proposed the following formula to represent the change which takes place when sugar is fermented : —

C 6 H 12 6 = 2C0 2 + 2CH.O. Sugar. Carbon dioxide. Alcohol.

This formula substantially holds good to the present day, although a number of definite bodies other than carbon dioxide and alcohol occur in small and varying quantities, according to the conditions of the fermentation and the medium fermented. Prominent among these are glycerin and succinic acid. In this connexion Pasteur showed that 100 parts of cane sugar on in- version gave 105-4 parts of invert sugar, which, when fermented, yielded 51-1 parts alcohol, 49-4 carbonic

acid, 0-7 succinic acid, 3-2 glycerin and i-o unestimated. A. Bechamp and E. Duclaux found that acetic acid is formed in small quantities during fermentation; aldehyde has also been detected. The higher alcohols such as propyl, isobutyl, amyl, capryl, oenanthyl and caproyl, have been identified; and the amount of these vary according to the different conditions of the fermentation. A number of esters are also produced. The characteristic flavour and odour of wines and spirits is dependent on the proportion of higher alcohols, aldehydes and esters which may be produced.

Certain yeasts exercise a reducing action, forming sulphur- etted hydrogen, when sulphur is present. The ./' stinking fer- mentations " occasionally experienced in breweries probably arise from this, the free sulphur being derived from the hops. Other yeasts are stated to form sulphurous acid in must and wort. Another fact of considerable technical importance is, that the various races of yeast show considerable differences in the amount and proportion of fermentation products other than ethyl alcohol and carbonic acid which they produce. From these remarks it will be clear that to employ the most suitable kind of yeast for a given alcoholic fermentation is of funda- mental importance in certain industries. It is beyond the scope of the present article to attempt to describe the different forms of budding fungi (Saccharomyces), mould fungi and bacteria which are capable of fermenting sugar solutions. Thus, six species isolated by Hansen, Saccharomyces cerevisiae, S. Pas- teurianus I., 1 II., III., and S. ellipsoideus, contained invertase and maltase, and can invert and subsequently ferment cane sugar and maltose. 5. exiguus and S. Ludwigii contain only invertase and not maltase, and therefore ferment cane sugar but not maltose. S. apiculatus (a common wine yeast) contains neither of these enzymes, and only ferments solutions of glucose or laevulose.

Previously to Hansen's work the only way of differentiating

1 Hansen found there were three species of spore-bearing Saccharo- mycetes and that these could be subdivided into varieties. Thus, 5. cerevisiae I., 5. cerevisiae II., 5. Pasteurianus I., &c.

yeasts was by studying morphological differences with the aid of the

microscope. Max Reess distinguished the species accord- * ing to the appearance of the cells thus, the ellipsoidal cells were designated Saccharomyces ellipsoideus, the sausage-shaped Saccharomyces Pasteurianus, and so on. It was found by Hansen that the same species of yeast can assume different shapes; and it therefore became necessary to determine how the different varieties of yeast could be distinguished with certainty. The formation of spores in yeast (first discovered by T. Schwann in 1839) was studied by Hansen, who found that each species only developed spores between certain definite temperatures. The time taken for spore formation varies greatly ; thus, at 52 F., 5. cerevisiae takes 10, S. Pasteurianus I. and II. about 4, 5. Pasteurianus III. about 7, and S. ellipsoideus about 45 days. The formation of spores is used as an analytical method for determining whether a yeast is contaminated with another species, — for example: a sample of yeast is placed on a gypsum or porcelain block saturated with water; if in ten days at a temperature of 52° F. no spores make their appearance, the yeast in question may be regarded as S. cerevisiae, and not associated with 5. Pasteurianus or 5. ellipsoideus.

The formation of films on fermented liquids is a well-known phenomenon and common to all micro-organisms. A free still surface with a direct access of air are the necessary conditions. Hansen showed that the microscopic appearance of film cells of the same species of Saccharomycetes varies according to the temperature of growth; the limiting temperatures of film for- mation, as well as the time of its appearance for the different species, also vary.

In the zymo-technical industries the various species of yeast exhibit different actions during fermentations. A well-known instance of this is the ” top ” and ” bottom ” brewery fermen- tations (see Brewing). In a top fermentation — typical of English breweries — the yeast rises, in a bottom fermentation, as the phrase implies, it settles in the vessel. Sometimes a bottom yeast may for a time exhibit signs of a top fermentation. It has not, however, been possible to transform a typical top yeast into a permanent typical bottom yeast. There appear to be no true distinctive characteristics for these two types. Their selection for a particular purpose depends upon some special quality which they possess; thus for brewing certain essentials are demanded as regards stability, clarification, taste and smell; whereas, in distilleries, the production of alcohol and a high multiplying power in the yeast are required. Culture yeasts have also been successfully employed in the manufacture of wine and cider. By the judicious selection of a type of yeast it is possible to improve the bouquet, and from an inferior must obtain a better wine or cider than would otherwise be produced.

Certain acid fermentations are of common occurrence. The Bacterium acidi lacti described by Pasteur decomposes milk sugar into lactic acid. Bacillus amylobacter usually accom- panies the lactic acid organism, and decomposes lactic and other higher acids with formation of butyric acid. Moulds have been isolated which occasion the formation of citric acid from glucose. The production of acetic acid from alcohol has received much attention at the hands of investigators, and it has an important technical aspect in the manufacture of vinegar. The pheno- menon of nitrification (see Bacteriology, Agriculture and Manure), i.e. the formation of nitrites and nitrates from am- monia and its compounds in the soil, was formerly held to be a purely chemical process, until Schloesing and Muntz suggested in 1877 that it was biological. It is now known that the action takes place in two stages; the ammonium salt is first oxidized to the nitrite stage and subsequently to the nitrate. (J. L. B.)

FERMO (anc. “Firmum Picenum) , a town and archiepiscopal see of the Marches, Italy, in the province of Ascoli Piceno, ou a hill with a fine view, 1046 ft. above sea-level, on a branch from Porto S. Giorgio on the Adriatic coast railway. Pop. (1901) town, 16,577, commune 20,542. The summit of the hill was occupied by the citadel until 1446. It is crowned by the cathedral, reconstructed in 1227 by Giorgio da Como; the fine facade and campanile of this period still remain, and the side

portal is good; the beautiful rose- window over the main door dates from 1348. In the porch are several good tombs, including one of 1366 by Tura da Imola, and also the modern monument of Giuseppe Colucci, a famous writer on the antiquities of Picenum. The interior has been modernized. The building is now surrounded by a garden, with a splendid view. Against the side of the hill was built the Roman theatre; scanty traces of an amphitheatre also exist. Remains of the city wall, of rect- angular blocks of hard limestone, may be seen just outside the Porta S. Francesco; whether the walling under the Casa Porti belongs to them is doubtful. The medieval battlemented walls superposed on it are picturesque. The church of S. Francesco has a good tower and choir in brickwork of 1 240, the rest having been restored in the 17 th century. Under the Dominican monastery is a very large Roman reservoir in two storeys, belong- ing to the imperial period, divided into many chambers, at least 24 on each level, each 30 by 20 ft., for filtration (see G. de Minicis in Annali dell’ 1 stituto, 1846ˆ.46; 1858, p. 125). The piazza con- tains the Palazzo Comunale, restored in 1446, with a statue of Pope Sixtus V. in front of it. The Biblioteca Comunale contains a collection of inscriptions and antiquities. Porto S. Giorgio has a fine castle of 1269, blocking the

valley which leads to Fermo.

The ancient Firmum Picenum was founded as a Latin colony in 264 B.C., after the conquest of the Picentes, as the local head- quarters of the Roman power, to which it remained faithful. It was originally governed by five quaestors. It was made a colony with full rights after the battle of Philippi, the 4th legion being settled there. It lay at the junction of roads to Pausulae, Urbs Salvia and Asculum, being connected with the coast road by a shqrt branch road from Castellum Firmanum (Porto S. Giorgio). In the 10th century it became the capital of the Marchia Firmana. In 1 1 99 it became a free city, and remained independent until 1550, when it became subject to the papacy. . (T. As.)

FERMO Y, a market town in the east riding of Co. Cork, Ireland, in the north-east parliamentary division, 21 m. by road N.E. of Cork, and 14 m. E. of Mallow by a branch of the Great Southern & Western railway. Pop. of urban district (1901) 6126. It is situated on the river Blackwater, which divides the town into two parts, the larger of which is on the southern bank, and there the trade of the town, which is chiefly in flour and agricultural produce, is mainly carried on. The town has several good streets and some noteworthy buildings. Of the latter, the most prominent are the military barracks on the north bank of the river, the Protestant church, the Roman Catholic cathedral and St Colman's Roman Catholic college. Fermoy rose to importance only at the beginning of the 19th century, owing entirely to the devotion of John Anderson, a citizen, on becoming landlord. The town is a centre for salmon and trout fishing on the Blackwater and its tributary the Funshion. The neighbouring scenery is attractive, especially in the Glen of Araglin, once famed for its ironworks.

FERN (from O. Eng. fearn, a word common to Teutonic languages, cf. Dutch varen, and Ger. Farn; the Indo-European root, seen in the Sanskrit parna, a feather, shows the primary meaning; cf. Gr. Trepov, feather, xrepis, fern), a name often used to denote the whole botanical class of Pteridophytes, including both the true ferns, Filicales, by far the largest group of this class in the existing flora, and the fern-like plants, Equisetales, Sphenophyllales, Lycopodiales (see Pteridophyta) .

FERNANDEZ, ALVARO, one of the leading Portuguese ex- plorers of the earlier 15th century, the age of Henry the Navi- gator. He was brought up (as a page or esquire) in the household of Prince Henry, and while still " young and audacious " took an important part in the discovery of " Guinea." He was a nephew of Joao Goncalvez Zarco, who had rediscovered the Madeira group in Henry's service

(1418-1420), and had become part-governor of Madeira and commander of Funchal; when the great expedition of 1445 sailed for West Africa he was entrusted by his uncle with a specially fine caravel, under par- ticular injunctions to devote himself to discovery, the most cherished object of his princely master, so constantly thwarted.

Fernandez.as a pioneer, outstripped all otherservantsof theprince at this time. After visiting the mouth of the Senegal, rounding Cape Verde, and landing in Goree (?), he pushed on to the ” Cape of Masts ” (Cabo dos Matos, or Mastos, so called from its tall spindle-palms), probably between Cape Verde and the Gambia, the most southerly point till then attained. Next year (1446) he returned, and coasted on much farther, to a bay one hundred and ten leagues ” south ” (i.e. S.S.E.) of Cape Verde, perhaps in the neighbourhood of Konakry and the Los Islands, and but little short of Sierra Leone. This record was not broken till 1461, when Sierra Leone was sighted and named. A wound, received from a poisoned arrow in an encounter with natives, now compelled Fernandez to return to Portugal, where he was received with distinguished honour and reward by Prince Henry and the regent of the kingdom, Henry’s brother Pedro.

See Gomes Eannes de Azurara, Chronica de . . . Guine, chs. lxxv., lxxxvii.; Joao de Barros, Asia, Decade I., bk. i. chs. xiii., xiv.

FERNANDEZ, DIEGO, a Spanish adventurer and historian of the 1 6th century. Born at Palencia, he was educated for the church, but about 1545 he embarked for Peru, where he served in the royal army under Alonzo de Alvarado. Andres Hurtado de Mendoza, marquess of Canete, who became viceroy of Peru in 1655, bestowed on Fernandez the office of chronicler of Peru; and in this capacity he wrote a narrative of the insurrection of Francisco Hernandez Giron, of the rebellion of Gonzalo Pizarro, and of the administration of Pedro de la Gasca. The whole work, under the title Primera y segunda parte de la Hisloria del Piru, was published at Seville in 1571 and was dedicated to King Philip II. It is written in a clear and intelligible style, and with more art than is usual in the compositions of the time. It gives copious details, and, as he had access to the correspondence and official documents of the Spanish leaders, it is, although necessarily possessing bias, the fullest and most authentic record existing of the events it relates.

A notice of the work will be found in W. H. Prescott's History of the Conquest of Peru (new ed., London, 1902).

FERNANDEZ, JOHN (Joao, J cam), Portuguese traveller of the 15th century. He was perhaps the earliest of modern explorers in the upland of West Africa, and a pioneer of the European slave- and gold-trade of Guinea. We first hear of him (before 1445) as a captive of the Barbary Moors in the western Medi- terranean; while among these he-acquired a knowledge of Arabic, and probably conceived the design of exploration in the interior of the continent whose coasts the Portuguese were now unveiling. In 1445 he volunteered to stay in Guinea and gather what information he could for Prince Henry the Navigator; with this object he accompanied An tarn Goncalvez to the " River of Gold " (Rio d'Ouro, Rio de Oro) in 23 40′ N., where he landed and went inland with some native shepherds. He stayed seven months in the country, which lay just within Moslem Africa, slightly north of Pagan Negroland (W. Sudan) ; he was taken off again by Antam Goncalvez at a point farther down the coast, near the " Cape of Ransom " (Cape Mirik), in iq° 22′ 14"; and his account of his experiences proved of great interest and value, not only as to the natural features, climate, fauna and flora of the south-western Sahara, but also as to the racial affinities, language, script, religion, nomad habits, and trade of its inhabitants. These people— though Mahommedans, maintaining a certain trade in slaves, gold, &c, with the Bar- bary coast (especially with Tunis), and classed as " Arabs," " Berbers," and " Tawny Moors " — did not then write or speak Arabic. In 1446 and 1447 John Fernandez accompanied other expeditions to the Rio d'Ouro and other parts of West Africa in the service of Prince Henry. He was personally known to Gomes Eannes de Azurara, the historian of this early period of Portuguese expansion; and from Azurara's language it is clear that Fernandez' revelation of unknown lands and races was fully

appreciated at home.

See Azurara, Chronica de . . . Guine, chs. xxix., xxxii., xxxiv., xxxv., lxxvii., lxxviii., xc, xci., xciii.

FERNANDEZ, JUAN (fl. c. 1570), Spanish navigator and dis- coverer. While navigating the coasts of South America it occurred to him that the south winds constantly prevailing

near the shore, and retarding voyages between Peru and Chile, might not exist farther out at sea. His idea proved correct, and by the help of the trade winds and some currents at a distance from the coast he

sailed with such rapidity (thirty days) from Callao to Chile that he was apprehended on a charge of sorcery. His inquisitors, however, accepted his natural explanation of the marvel. During one of his voyages in 1563 (from Lima to Valdivia) Fernandez discovered the islands which now bear his name. He was so enchanted with their beauty and fertility that he solicited the concession of them from the Spanish government. It was granted in 1572, but a colony which he endeavoured to establish at the largest of them (Isla Mas-a-Tierra) soon broke up, leaving behind the goats, whose progeny were hunted by Alexander Selkirk. In 1574 Fernandez discovered St Felix and St Ambrose islands (in 27 S., 82° 7′ W.); and in 1576, while voyaging in the southern ocean, he is said to have sighted not only Easter Island, but also a continent, which was probably Australia or New Zealand if the story (rejected by most critics, but with reservations as to Easter Island) is to' be accepted.

See J. L. Arias, Memoir recommending to the king the conversion of the new discovered islands (in Spanish, 1609; Eng. trans., 1773); Ulloa, Relacion del Viaje, bk. ii. ch. iv. ; Alexander Dalrymple, An Historical Collection of the several Voyages and Discoveries in the South Pacific Ocean (London, 1769-1771); Freville, Voyages de la Mer du Stid par les Espagnols.

FERNANDEZ, LUCAS, Spanish dramatist, was born at Sala- manca about the middle of the 15th century. Nothing is known of his life, and he is represented by a single volume of plays, Farsas y Sglogas al modo y eslilo pastoril (1514). In his secular pieces — a comedia and two farsas — he introduces few personages, employs the simplest possible action, and burlesques the lan- guage of the uneducated class; the secular and devout elements are skilfully intermingled in his two Farsas del nascimiento de Nuestro Senor Jesucristo. But the best of his dramatic essays is the Auto de la Pasidn, a devout play intended to be given on Maundy Thursday. It is written in the manner of Encina, with less spontaneity, but with a sombre force to which Encina scarcely attained.

Fernandez' plays were reprinted by the Spanish Academy in 1867.

FERNANDINA, a city, a port of entry, and the county-seat of Nassau ccunty, Florida, U.S.A., a winter and summer resort, in the N.E. part of the state, 36 m. N.E. of Jacksonville, on Amelia Island (about 22 m. long and from § m. to if m. wide), which is separated from the mainland by an arm of the sea, known as Amelia river and bay. Pop. (1900) 3245; (1905, state census), 4959 (2957 negroes); (1910)348.2. Fernandina is served by the Seaboard Air Line railway, and by

steamship lines connecting with domestic and foreign ports; its harbour, which has the deepest water on the E. coast of Florida, opens on the N. to Cumberland Sound, which was improved by the Federal govern- ment, beginning in 1879, reducing freight rates at Fernandina by 25 to 40%. Under an act of 1907 the channel of Fernandina harbour, 1300 ft. wide at the entrance and about 2 m. long, was dredged to a depth of 20 to 24 ft. at mean low water with a width of 400 to 600 ft. The ” inside ” water-route between Savannah, Georgia and Fernandina is improved by the Federal government (1892 sqq.) and has a 7-ft. channel. The principal places of interest are ” Amelia Beach,” more than 20 m. long and 200 ft. wide, connected with the city by a compact shell road nearly 2 m. long and by electric line; the Amelia Island light- house, in the N. end of the island, established in 1836 and re- built in 1880; Fort Clinch, at the entrance to the harbour; Cumberland Island, in Georgia, N. of Amelia Island, where land was granted to General Nathanael Greene after the War of American Independence by the state of Georgia; and Dunge- ness, the estate of the Carnegie family. Ocean City, on Amelia Beach, is a popular pleasure resort. The principal industries are the manufacture of lumber, cotton, palmetto fibres, and cigars, the canning of oysters, and the building and repair of railway cars. The foreign exports, chiefly lumber, railway ties, cotton, phosphate rock, and naval stores, were valued at $9,346,704 in 1907; and the imports in 1907 at $116,514.

The harbour of Fernandina was known to the early explorers

of Florida, and it was here that Dominic de Gourgues landed when he made his expedition against the Spanish at San Mateo in 1568. An Indian mission was established by Spanish priests later in the same century, but it was not successful. When Georgia was founded, General James Oglethorpe placed a military guard on Amelia Island to prevent sudden attack upon his colony by the Spanish, and the first blood shed in the petty warfare between Georgia and Florida was the murder of two unarmed members of the guard by a troop of Spanish soldiers and Indians in 1739. The first permanent settlement was made by the Spanish in 1808, at what is now the village of Old Fernan- dina, about 1 m. from the city. The island was a centre for smuggling during the period of the embargo and non-importation acts preceding the war of 1812. This was the pretext for General George Matthews (1738-1812) to gather a band of adventurers at St Mary’s,

Georgia, invade the island, and capture Fernandina in 1812. In the following year the American forces were with- drawn. In 1817 Gregor MacGregor, a filibuster who had aided the Spanish provinces of South America in their revolt against Spain, fitted out an expedition in Baltimore and seized Fer- nandina, but departed soon after. Later in the same year Louis Aury, another adventurer, appeared with a small force from Texas, and took possession of the place in the name of the Republic of Mexico. In the following year Aury was expelled by United States troops, who held Fernandina in trust for Spain until Florida was finally ceded to the United States in 1821. Fernandina was first incorporated in 1859. In 1861 Fort Clinch was seized by the Confederates, and Fernandina harbour was a centre of blockade running in the first two years of the Civil War. In 1862 the place was captured by a Federal naval force from Port Royal, South Carolina, commanded by Commodore S. F. Du Pont.

FERNANDO DE NORONHA [Fernao de N.], an island in the South Atlantic, 125 m. from the coast of Brazil, to which country it belongs, in 3° 50′ S., 32 25′ W. It is about 7 m. long and if wide, and some other islets lie adjacent to it. Its surface is rugged, and it contains a number of rocky hills from 500 to 700 ft. high, and one peak towering to the height of 1089 ft. It is formed of basalt, trachyte and phonolite, and the soil is very fertile. The climate is healthy. It is defended by forts, and serves as a place of banishment for criminals from Brazil. The next largest island of the group is about a mile in circumference, and the others are small barren rocks. The population is about 2000, all males, including some 1400 criminals, and a garrison of 1 50. Communication is maintained by steamer with Pernam- buco. The island takes name from its Portuguese discoverer (1503), the count of Noronha.

FERNANDO PO, or Fernando Poo, a Spanish island on the west coast of Africa, in the Bight of Biafra, about 20 m. from the mainland, in 3 12′ N. and 8° 48′ E. It is of volcanic origin, related to the Cameroon system of the adjacent mainland, is the largest island in the Gulf of Guinea, is 44 m. long from N.N.E. to S.S.W., about 20 m. broad, and has an area of about 780 sq. m. Fernando Po is noted for its beautiful aspect, seeming from a short distance to be a single mountain rising from the sea, its sides covered with luxuriant vegetation. The shores are steep and rocky and the coast plain narrow. This plain is succeeded by the slopes of the mountains which occupy the rest of the island and culminate in the magnificent cone of Clarence Peak or Pico de Santa Isabel (native name Owassa). Clarence Peak, about 10,000 ft. high, 1 is in the north-central part of the island. In the south Musolo Mt. attains a height of 7400 ft. There are numerous other peaks

between 4000 and 6000 ft. high. The mountains contain craters and crater lakes, and are covered, most of them to their summits, with forests. Down the narrow inter- vening valleys rush torrential streams which have cut deep beds through the coast plains. The trees most characteristic of the forest are oil palms and tree ferns, but there are many varieties, including ebony, mahogany and the African oak. The under- growth is very dense; it includes the sugar-cane and cotton and indigo plants. The fauna includes antelopes, monkeys,

1 The heights given by explorers vary from 9200 to 10,800 ft.

lemurs, the civet cat, porcupine, pythons and green tree-snakes, crocodiles and turtles. The climate is very unhealthy in the lower districts, where malarial fever is common. The mean temperature on the coast is 7 8° Fahr. and varies little, but in the higher altitudes there is considerable daily variation. The rainfall is very heavy except during November-January, which is considered the dry season.

The inhabitants number about 25,000. In addition to about 500 Europeans, mostly Spaniards and Cubans, they are of two classes, the Bubis or Bube (formerly also called Ediya), who occupy the interior, and the coast dwellers, a mixed Negro race, largely descended from slave ancestors with an admixture of Portuguese and Spanish blood, and known to the Bubis as ” Portos ” — a corruption of Portuguese. The Bubis are of Bantu stock and early immigrants from the mainland. Physic- ally they are a finely developed race, extremely jealous of their independence and unwilling to take service of any kind with Europeans. They go unclothed, smearing their bodies with a kind of pomatum. They stick pieces of wood in the lobes of their ears, wear numerous armlets made of ivory, beads or grass, and always wear hats, generally made of palm leaves. Their weapons are mainly of wood; stone axes and knives were in use as late as 1858. They have no knowledge of working iron. Their villages are built in the densest parts of the forest, and care is taken to conceal the approach to them. The Bubis are sports- men and fishermen rather than agriculturists. The staple foods of the islanders generally are millet, rice, yams and bananas. Alcohol is distilled from the sugar-cane. The natives possess numbers of sheep, goats and fowls.

The principal settlement is Port Clarence (pop. 1500), called by the Spaniards Santa Isabel, a safe and commodious harbour on the north coast. In its graveyard are buried Richard Lander and several other explorers of West Africa. Port Clarence is unhealthy, and the seat of government has been removed to Basile, a small town 5 m. from- Port Clarence and over 1000 ft. above the sea. On the west coast are the

bay and port of San Carlos, on the east coast Concepcion Bay and town. The chief industry until the close of the 19th century was the collection of palm-oil, but the Spaniards have since developed plantations of cocoa, coffee, sugar, tobacco, vanilla and other tropical plants. The kola nut is also cultivated. The cocoa plantations are of most importance. The amount of cocoa exported in 1905 was 1800 tons, being 370 tons above the average export for the pre- ceding five years. The total value of the trade of the island (1900-1905) was about £250,000 a year.

History. — The island was discovered towards the close of the 1 5th century by a Portuguese navigator called Fernao do Po, who, struck by its beauty, named it Formosa, but it soon came to be called by the name of its discoverer. 2 A Portuguese colony was established in the island, which together with Annobon was ceded to Spain in 1778. The first attempts of Spain to develop the island ended disastrously, and in 1827, with the consent of Spain, the administration of the island was taken over by Great Britain, the British ” superintendent ” having a Spanish com- mission as governor. By the British Fernando Po was used as a naval station for the ships engaged in the suppression of the slave trade. The British headquarters were named Port Clarence and the adjacent promontory Cape William, in honour of the duke of Clarence (William IV.) . In 1 844 the Spaniards reclaimed the island, refusing to sell their rights to Great Britain. They did no more at that time, however, than hoist the Spanish flag, appointing a British resident, John Beecroft, governor. Beecroft, who was made British consul in 1849, died in 1854. During the British occupation a considerable number of Sierra Leonians, West Indians and freed slaves settled in the island, and English became and remains the common speech of the coast peoples. In 1858 a Spanish governor was sent out, and the Baptist missionaries who had laboured in the island since 1843 were compelled to withdraw. They settled in Ambas Bay on the

2 Some authorities maintain that another Portuguese seaman, Lopes Gonsalves, was the discoverer of the island. The years 1469, 1 47 1 and 1 486 are variously given as those of the date of the discovery.

neighbouring mainland (see Cameroon). The Jesuits who suc- ceeded the Baptists were also expelled, but mission and educa- tional work is now carried on by other Roman Catholic agencies, and (since 1870) by the Primitive Methodists. In 1879 the Spanish government recalled

its officials, but a few years later, when the partition of Africa was being effected, they were re- placed and a number of Cuban political prisoners were deported thither. Very little was done to develop the resources of the island until after the loss of the Spanish colonies in the West Indies and the Pacific, when Spain turned her attention to her African possessions. Stimulated by the success of the Portu- guese cocoa plantations in the neighbouring island of St Thomas, the Spaniards started similar plantations, with some measure of success. The strategical importance • and commercial possi- bilities of the island caused Germany and other powers to ap- proach Spain with a view to its acquisition, and in 1900 the Spaniards gave France, in return for territorial concessions on the mainland, the right of pre-emption over the island and her other West African possessions.

The administration of' the island is in the hands of a governor-general, assisted by a council, and responsible to the ministry of foreign affairs at Madrid. The governor-general has under his authority the sub-governors of the other Spanish possessions in the Gulf of Guinea, namely, the Muni River Settlement, Corisco and Annobon (see those articles). None of these possessions is self-supporting.

See E. dAlmonte, " Someras Notas . . . de la isla de Fernando Poo y de la Guinea continental espanola," in Bol. Real. Soc. Geog. of Madrid (1902) ; and a further article in the Riv. Geog. Col. of Madrid (1908); E. L. Vilches, "Fernando Poo y la Guinea espanola," in the Bol. Real. Soc. Geog. (1901); San Javier, Tres Anos en Fernando Poo (Madrid, 1875); O. Baumann, Eine africanische Tropeninstl: Fernando Poo und die Bube (Vienna, 1888); Sir H. H. Johnston, George Grenfell and the Congo . . . and Notes on Fernando Pd (London, 1908) ; Mary H. Kingsley, Travels in West Africa, ch. iii. (London, 1897); T. J. Hutchinson, sometime British Consul at Fernando Po, Impressions of Western Africa, chs. xii. and xiii. (London, 1858), and Ten Years' Wanderings among the Ethiopians, chs. xvii. and xviii. (London, 1861). For the Bubi language see J. Clarke, The Adeeyah Vocabulary (1841), and Introduction to the Fernandian Tongue (1848). Consult also Wanderings in West Africa (1863) and other books written by Sir Richard Burton as the result of his consulship at Fernando Po, 1861-1865, and the works cited under Muni River Settlemsnts.

FERNEL, JEAN FRANCOIS (1497-1558), French physician, was born at Clermont in 1497, and after receiving his early education at his native town, entered the college of Sainte-Barbe, Paris. At first he devoted himself to mathematical and astro- nomical studies; his Cosmothcoria (1528) records a determination of a degree of the

meridian, which he made by counting the re- volutions of his carriage wheels on a journey between Paris and Amiens. But from 1534 he gave himself up entirely to medicine, in which he graduated in 1530. His extraordinary general erudition, and the skill and success with which he sought to revive the study of the old Greek physicians, gained him a great ieputation, and ultimately the office of physician to the court. He practised with great success, and at his death in 1558 left behind him an immense fortune. He also wrote Monalo-spkaerium, sive astrolabii genus, generalis horarii structura et usus (1526); De proportionibus (1528); De evacuandi ratione (1545); De abditis rerum causis (1548); and Medicina ad Henricum II. (1554).

FERN1E, an important city in the east Kootenay district of British Columbia. Pop. about 4000. It is situated on the Crow's Nest branch of the Canadian Pacific railway, at the junction of Coal Creek with the Elk Tiver, and owes its importance to the extensive coal mines in its vicinity. There are about 500 coke ovens in operation at Fernie, which supply most of the smelting plants in southern British Columbia with fuel.

FERNOW, KARL LUDWIG (1763-1808), German art-critic and archaeologist, was born in Pomerania on the 19th of November 1763. His father was a servant in the household of the lord of Blumenhagen. At the age of twelve he became clerk to a notary, and was afterwards apprenticed to a druggist. While serving his time he had the misfortune accidentally to

shoot a young man who came to visit him; and although through the intercession of his master he escaped prosecution, the un- toward event weighed heavily on his mind, and led him at the close of his apprenticeship to quit his native place. He obtained a situation at Liibeck, where he had leisure to cultivate his natural taste for drawing and poetry. Having formed an acquaintance with the painter Carstens, whose influence was an important stimulus and help to him, he renounced his trade of druggist, and set up as a portrait-painter and drawing-master. At Ludwigslust he fell in love with a young girl, and followed her to Weimar; but failing in his suit, he went next to Jena. There he was introduced to Professor Reinhold, and in his house met the Danish poet Baggesen. The latter invited him to accom- pany him to Switzerland and Italy, a proposal which he eagerly accepted (1794) for the sake of the opportunity of furthering his studies in the fine arts. On Baggesen's return to Denmark, Fernow, assisted by some of his friends, visited Rome and made some stay there. He now renewed his intercourse with Carstens, who had settled at Rome, and applied himself to the study of the history and theory of the fine arts and of

the Italian language and literature. Making rapid progress, he was soon qualified to give a course of lectures on archaeology, which was attended by the principal artists then at Rome. Having married a Roman lady, he returned in 1802 to Germany, and was appointed in the following year professor extraordinary of Italian literature at Jena. In 1804 he accepted the post of librarian to Amelia, duchess-dowager of Weimar, which gave him the leisure he desired for the purpose of turning to account the literary and archaeological researches in which he had engaged at Rome. His most valuable work, the Romische Studien, appeared in 3 vols. (1806-1808). Among his other works are — Das Leben des Kunstlers Carstens (1806), Ariosto's Lebenslauf (1809), and Francesco Pelrarca (1818). Fernow diedat Weimar, December,

1808.

A memoir of his life by Johanna Schopenhauer, mother of the philosopher, Arthur Schopenhauer, appeared in 1810, and a complete edition of his works in 1829.

FEROZEPUR, or Firozpur, a town and district of British India, in the Jullundur division of the Punjab. The town is a railway junction connecting the North- Western and Rajputana railways, and is situated about 4 m. from the present south bank of the Sutlej. Pop. (1901) 49,341. The arsenal is the largest in India, and Ferozepur is the headquarters of a brigade in the 3rd division of the northern army corps. British rule was first established at Ferozepur in 1835, when, on the failure of heirs to the Sikh family who possessed it, a small territory 86 m. in extent became an escheat to the British government, and the present district has been gradually formed around this nucleus. The strategic importance of Ferozepur was at this time very great; and when, in 1839, Captain (afterwards Sir Henry) Lawrence took charge of the station as political officer, it was the outpost of British India in the direction of the Sikh power. Ferozepur accordingly became the scene of operations during the first Sikh War. The Sikhs crossed the Sutlej in December 1845, and were defeated successively at Mudki, Ferozepur, Aliwal and Sobraon; after which they withdrew into their own territory, and peace was concluded at Lahore. At the time of the mutiny Ferozepur cantonments contained two regiments of native infantry and a regiment of native cavalry, together with the 61st Foot and two companies of European artillery. One of the native regiments, the 57th, was disarmed; but the other, the 45th, broke into mutiny, and, after an unsuccessful attempt to seize the magazine, which was held by the Europeans, pro- ceeded to join the rebel forces in Delhi. Throughout the mutiny Ferozepur remained in the hands of

the English.

Ferozepur has rapidly advanced in material prosperity of late years, and is now a very important seat of commerce, trade being mainly in grain. The main streets of the city are wide and well paved, and the whole is enclosed by a low brick wall. Great im- provements have been made in the surroundings of the city. The cantonment lies 2 m. to the south of the city, and is con- nected with it by a good metalled road.

The District of Ferozeptjr comprises an area of 4302 sq. m. The surface is level, with the exception of a few sand-hills in the south and south-east. The country consists of two distinct tracts, that liable to annual fertilizing inundations from the Sutlej, known as the bhet, and the rohi or upland tract. The only river is the Sutlej, which runs along the north-western boundary. The principal crops are wheat, barley, millet, gram, pulses, oil- seeds, cotton, tobacco, &c. The manufactures are of the humblest kind, consisting chiefly of cotton and wool-weaving, and are confined entirely to the supply of local wants. The Lahore and Ludhiana road runs for 51 m. through the district, and forms an important trade route. The North-Western, the Southern Punjab, and a branch" of the Rajputana-Malwa rail- ways serve the district. The other important towns and seats of commerce are Fazilka (pop. 8505), Dharmkot (6731), Moga (6725), and Muktsar (6389). Owing principally to the dryness of its climate, Ferozepur has the reputation of being an excep- tionally healthy district. In September and October, however, after the annual rains, the people suffer a good deal from remit- tent fever. In 1901- the population was 958,072. Distributaries of the Sirhind canal water the whole district.

FEROZESHAH, a village in the Punjab, India, notable as the scene of one of the chief battles in the first Sikh War. The battle immediately succeeded that of Mudki, and was fought on the 21st and 22nd of December 1845. During its course Sir Hugh Gough, the British commander, was overruled by the governor- general, Lord Hardinge, who was acting as his second in com- mand (see Sikh Wars). At the end of the first day's fighting the British had occupied the Sikh position, but had not gained an undisputed victory. On the following morning the battle was resumed, and the Sikhs were reinforced by a second army under Tej Singh; but through cowardice or treachery Tej Singh withdrew at the critical moment, leaving the field to the British.

In the course of the fight the British lost 694 killed and 1721 wounded, the vast majority being British troops, while the Sikhs lost 100 guns and about 5000 killed and wounded.

FERRAND, ANTOINE FRANCOIS CLAUDE, Comte (1751- 1825), French statesman and political writer, was born in Paris on the 4th of July 1751, and became a member of the parlement of Paris at eighteen. He left France with the first party of emigrants, and attached himself to the prince of Conde; later he was a member of the council of regency formed by the cdmte de Provence after the death of Louis XVI. He lived at Regens- burg until 1801, when he returned to France, though he still sought to serve the royalist cause. In 1814 Ferrand was made minister of state and postmaster-general. He countersigned the act of sequestration of Napoleon's property, and introduced a bill for the restoration of the property of the emigrants, establishing a distinction, since become famous, between royalists of la ligne droite and those of la ligne courbe. At the second restoration Ferrand was again for a short time postmaster- general. He was also made a peer of France, member of the privy council, grand-officer and secretary of the orders of Saint Michel and the Saint Esprit, and in 1816 member of the Academy, He continued his active support of ultra-royalist views until his death, which took place in Paris on the 17th of January 1825.

Besides a large number of political pamphlets, Ferrand is the author of L'Esprit de I'histoire, ou Lettres d'un pere A son fits sur la maniere d'etudier I'histoire (4 vols., 1802), which reached seven > editions, the last number in 1826 having prefixed to it a biographical sketch of the author by his nephew Hericart de Thury; Eloge historique de Madame Elisabeth de France (1814); CEuvres drama-ˆ tiques (1817); Theorie des revolutions rapprochee des evenements qui en onl ete Vorigine, le developpement, ou la suite (4 vols., 1817); and Histoire des trois demembrements de la Pologne, pour faire suite a, VHistoire de I'anarchie de Pologne par Rulhiere (3 vols., 1820).

FERRAR, NICHOLAS (1592-1637), English theologian, was born in London in 1592 and educated at Clare Hall, Cambridge, graduating in 1610. He was obliged for some years to travel for his health, but on returning to England in 161 8 became actively connected with the Virginia Company. When this company was deprived of its patent in 1623 Ferrar turned his attention to politics, and was elected to parliament. But he soon decided

to devote himself to a religious life; he purchased the manor of Little Gidding in Huntingdonshire, where he organized a small religious

community. Here, in 1626, he was ordained a deacon by Laud, and declining preferment, he lived an austere, almost monastic life of study and good works. He died on the 4th of December 1637, and the house was despoiled and the community broken up ten years later. There are extant a number of ” harmonies ” of the Gospel, printed and bound by the community, two of them by Ferrar himself. One of the latter was made for Charles I. on his request, after a visit in 1633 to see the ” Arminian Nunnery at Little Gidding, ” which had been the subject of some scandalous — and undeserved— criticism.

FERRAR, ROBERT (d. 1555), bishop of St David’s and martyr, born about the end of the 15th century of a Yorkshire family, is said to have been educated at Cambridge, whence he proceeded to Oxford and became a canon regular of St Augustine. He came under the influence of Thomas Gerrard and Lutheran theology, and was compelled to bear a faggot with Anthony Dalaber and others in 1528. He graduated B.D. in 1533, accom- panied Bishop Barlow on his embassy to Scotland in 1535, and was made prior of St Oswald’s at Nostell near Pontefract. At the dissolution he surrendered his priory without compunction to the crown, and received a liberal pension. For the rest of Henry’s reign his career is obscure; perhaps he fled abroad on the enactment of the Six Articles. He certainly married, and is said to have been made Cranmer’s chaplain, and bishop of Sodor and Man; but he was never consecrated to that see.

After the accession of Edward VI., Ferrar was, probably through the influence of Bishop Barlow, appointed chaplain to Protector Somerset, a royal visitor, and bishop of St David’s on Barlow’s translation to Bath and Wells in 1548. He was the first bishop appointed by letters patent under the act passed in 1547 without the form of capitular election; and the service performed at his consecration was also novel, being in English; he also preached at St Paul’s on the nth of November clad only as a priest and not as a bishop, and inveighed against vest- ments and altars. At St David’s he had trouble at once with his singularly turbulent chapter, who, finding that he was out of favour at court since Somerset’s fall in 1549, brought a long list of fantastic charges against him. He had taught his child to whistle- dined with his servants, talked of ” worldly things such as bak- ing, brewing, enclosing, ploughing and mining,” preferred walking to riding, and denounced the debasement of the coinage. He seems to have been a kindly, homely, somewhat feckless person like many an excellent parish priest, who did not conceal his indignation at some of Northumberland’s deeds. He had voted against the act of November 1 549 for a reform of the canon law, and on a later occasion his nonconformity brought him into conflict with the Council; he was also

the only bishop who satisfied Hooper's test of sacramental orthodoxy. The Council accordingly listened to the accusations of Ferrar's chapter, and in 1552 he was summoned to London and imprisoned on a charge of praemunire incurred by omitting the king's authority in a commission which he issued for the visitation of his diocese.

Imprisonment on such a charge under Northumberland might have been expected to lead to liberation under Mary. But Ferrar had been a monk and was married. Even so, it is difficult to see on what legal ground he was kept in the queen's bench prison after July 1553; for Mary herself was repudiating the royal authority in religion. Ferrar's marriage accounts for the loss of his bishopric in March 1554, and his opinions for his further punishment. As soon as the heresy laws and ecclesiastical jurisdiction had been re-established, Ferrar was examined by Gardiner, and then with signal indecency sent down to berried by Morgan, his successor in the bishopric of St David's. He appealed from Morgan's sentence to Pole as papal legate, but in vain, and was burnt at Caermarthen on the 30th of March 1555. It was perhaps the most wanton of all Mary's acts of persecution; Ferrar had been no such protagonist of the Reformation as Cranmer, Ridley, Hooper and Latimer; he had had nothing to do with Northumberland's or Wyatt's conspiracy. He had

taken no part in politics, and, so far as is known, had not said a word or raised a hand against Mary. He was burnt simply because he could not change his religion with the law and would not pretend that he could; and his execution is a complete refutation of the idea that Mary only persecuted heretics because and when they were traitors.

See Dictionary of National Biography, xviii. 380-382, and authorities there cited. Also Acts of the Privy Council (1550-1554); H. A. L. Fisher, Political History of England, vol. vi. (A. F. P.)

FERRARA, a city and archiepiscopal see of Emilia, Italy, capital of the province of Ferrara, 30 m. N.N.E. of Bologna, situated 30 ft. above sea-level on the Po di Vomano, a branch channel of the main stream of the Po, which is 3J m. N. Pop. (1001) 32,968 (town), 86,392 (commune). The town has broad streets and numerous palaces, which date from the 16th century, when it was the seat of the court of the house of Este, and had, it is said, 100,000 inhabitants.

The most prominent building is the square castle of the house of Este, in the centre of the town, a brick building surrounded by a moat, with four towers. It was built after 1385 and partly restored in 1554; the pavilions on the top of the towers date from the latter year. Near it is the hospital of S. Anna, where Tasso was confined during his attack of insanity (1579-1586). The Palazzo del Municipio, rebuilt in the 18th century, was the earlier residence of the Este family. Close by is the cathedral of S. Giorgio, consecrated in 1135, when the Romanesque lower part of the main facade and the side facades were completed. It was built by Guglielmo degli Adelardi (d. 1146), who is buried in it. The upper part of the main facade, with arcades of pointed arches, dates from the 13th century, and the portal has recum- bent lions and elaborate sculptures above. The interior was restored in the baroque style in 171 2. The campanile, in the Renaissance style, dates from 1451-1493, but the last storey was added at the end of the 16th century. Opposite the cathedral is the Gothic Palazzo della Ragione, in brick (1315-1326), now the law-courts. A little way off is the university, which has faculties of law, medicine and natural science (hardly 100 students in all) ; the library has valuable MSS., including part of that of the Orlando Furioso and letters by Tasso. The other churches are of less interest than the cathedral, though S. Francesco, S. Benedetto, S. Maria in Vado and S. Cristoforo are all good early Renaissance buildings. The numerous early Re- naissance palaces, often with good terra-cotta decorations, form quite a feature of Ferrara; few towns of Italy have so many of them proportionately, though they are mostly comparatively small in size. Among them may be noted those in the N. quarter (especially the four at the intersection of its two main streets), which was added by Ercole (Hercules) I. in 1492-1505, from the plans of Biagio Rossetti, and hence called the ” Addizione Erculea.” The finest of these is the Palazzo de’ Diamanti, so called from the diamond points into which the blocks of stone with which it is faced are cut. It contains the municipal picture gallery, with a large number of pictures of artists of the school of Ferrara. This did not require prominence until the latter half of the 15th century, when its best masters were Cosimo Tura (1432-1495), Francesco Cossa (d. 1480) and Ercole dei Roberti (d. 1496). To this period are due famous frescoes in the Palazzo Schifanoia, which was built by the Este family; those of the lower row depict the life of Borso of Este, in the central row are the signs of the zodiac, and in the upper are allegorical representations of the months. The vestibule was decorated with stucco mouldings by Domenico di Paris of Padua. The building also contains fine choir-books with miniatures, and a collection of coins and Renaissance medals. The simple house of Ariosto, erected by himself after 1526, in which he died in 1532, lies farther west. The

best Ferrarese masters of the 16th century of the Ferrara school were Lorenzo Costa (1460-1535), and Dosso Dossi (1479-1542), the most eminent of all, while Benvenuto Tisi (Garofalo, J481-1559) is somewhat monotonous and insipid.

The origin of Ferrara is uncertain, and probabilities are against the supposition that it occupies the site

Alieni. It was probably a settlement formed by the inhabitants of the lagoons at the mouth of the Po. It appears first in a document of Aistulf of 753 or 754 as a city forming part of the exarchate of Ravenna. After 984 we find it a fief of Tedaldo, count of Modena and Canossa, nephew of the emperor Otho I. It afterwards made itself independent, and in 1101 was taken by siege by the countess Matilda. At this time it was mainly dominated by several great families, among them the Adelardi.

In 1 146 Guglielmo, the last of the Adelardi, died, and his property passed, as the dowry of his niece Marchesella, to Azzolino d' Este. There was considerable hostility between the newly entered family and the Salinguerra, but after considerable struggles Azzo Novello was nominated perpetual podesta in 1242; in 1259 he took Ezzelino of Verona prisoner in battle. His grandson, Obizzo II. (1264-1293), succeeded him, and the pope nominated him captain-general and defender of the states of the Church; and the house of Este was from henceforth settled in Ferrara. Niccolo III. (1393-1441) received several popes with great magnificence, especially Eugene IV., who held a council here in 1438. His son Borso received the fiefs of Modena and Reggio from the emperor Frederick III. as first duke in 1452 (in which year Girolamo Savonarola was born here), and in 1470 was made duke of Ferrara by Pope Paul II. Ercole I. (1471-1505) carried on a war with Venice and increased the magnificence of the city. His son Alphonso I. married Lucrezia Borgia, and continued the war with Venice with success. In 1509 he was excommunicated by Julius II., and attacked the pontifical army in 1 5 1 2 outside Ravenna, which he took. Gaston de Foix fell in the battle, in which he was supporting Alphonso. With the succeeding popes he was able to make peace. He was the patron of Ariosto from 1518 onwards. His son Ercole II. married Renata, daughter of Louis XII. of France; he too embellished Ferrara during his reign (1534-1559). His son Alphonso II. married Barbara, sister of the emperor Maxi- milian II. He raised the glory of Ferrara to its highest point, and was the patron of Tasso and Guarini, favouring, as the princes of his house had always done, the arts and sciences. He had no legitimate male heir, and in 1597 Ferrara was claimed as a vacant fief by Pope Clement VIII., as was also Comacchio.

A fortress was constructed by him on the site of the castle of Tedaldo, at the W. angle of the town. The town remained a part of the states of the Church, the fortress being occupied by an Austrian garrison from 1832 until 1859, when it became part of the kingdom of Italy.

A considerable area within the walls of Ferrara is unoccupied by buildings, especially on the north, where , the handsome Renaissance church of S. Cristoforo, with the cemetery, stands; but modern times have brought a renewal of industrial activity. Ferrara is on the main line from Bologna to Padua and Venice, and has branches to Ravenna and Poggio Rusco (for Suzzara).

See G. Agnelli, Ferrara e Pomposa (Bergamo, 1902) ; E. G. Gardner, Dukes and Poets of Ferrara (London, 1904).

FERRARA-FLORENCE, COUNCIL OF (1438 ff.). The council of Ferrara and Florence was the culmination of a series of futile medieval attempts to reunite the Greek and Roman churches. The emperor, John VI. Palaeologus, had been advised by his experienced father to avoid all serious negotiations, as they had invariably resulted in increased bitterness; but John, in view of the rapid dismemberment of his empire by the Turks, felt constrained to seek a union. The situation was, however, com- plicated by the strife which broke out between the pope (Eugenius IV.) and the oecumenical council of Basel. Both sides sent embassies to the emperor at Constantinople, as both saw the importance of gaining the recognition and support of the East, for on this practically depended the victory in the struggle between papacy and council for the supreme jurisdiction over the church (see Councils). The Greeks, fearing the domination of the papacy, were at first more favourably inclined toward the conciliar party; but the astute diplomacy of the Roman representatives, who have been charged by certain Greek writers with the skilful use of money and of lies, won over the emperor.

With a retinue of about 700 persons, entertained in Italy at the pope’s expense, he reached Ferrara early in March 1438. Here a council had been formally opened in January by the papal party, a bull of the previous year having promptly taken advan tage of the death of the Emperor Sigismund by ordering the removal of the council of Basel to Ferrara; and one of the first acts of the assemblage at Ferrara had been to excommunicate the remnant at Basel. A month after the coming of

the Greeks, the Union Synod was solemnly inaugurated on the 9th of April 1438. After six months of negotiation, the first formal session was held on the 8th of October, and on the 14th the real issues were reached. The time-honoured question of the filioque was still in the foreground when it seemed for several reasons advisable to transfer the council to Florence: Ferrara was threatened by condottieri, the pest was raging; Florence promised a welcome subvention, and a situation further inland would make it more difficult for uneasy Greek bishops to flee the synod.

The first session at Florence and the seventeenth of the union council took place on the 26th of February 1439; there ensued long debates and negotiations on the filioque, in which Markos Eugenikos, archbishop of Ephesus, spoke for the irreconcilables; but the Greeks under the leadership of Bessarion, archbishop of Nicaea, and Isidor, metropolitan of Kiev, at length made a declaration on the filioque (4th of June), to which all save Markos Eugenikos subscribed. On the next topic of importance, the primacy of the pope, the project of union nearly suffered ship- wreck; but here a vague formula was finally constructed which, while acknowledging the pope's right to govern the church, attempted to safeguard as well the rights of the patriarchs. On the basis of the above-mentioned agreements, as well as of minor discussions as to purgatory and the Eucharist, the decree of union was drawn up in Latin and in Greek, and signed on the 5th of July by the pope and the Greek emperor, and all the members of the synod save Eugenikos and one Greek bishop who had fled; and on the following day it was solemnly pub- lished in the cathedral of Florence. The decree explains the filioque in a manner acceptable to the Greeks, but does not require them to insert the term in their symbol; it demands that celebrants follow the custom of their own church as to the employment of leavened or unleavened bread in the Eucharist. It states essentially the Roman doctrine of purgatory, and asserts the world-wide primacy of the pope as the " true vicar of Christ and the head of the whole Church, the Father and teacher of all Christians "; but, to satisfy the Greeks, inconsistently adds that all the rights and privileges of the Oriental patriarchs are to be maintained unimpaired. After the consummation of the union the Greeks remained in Florence for several weeks, discussing matters such as the liturgy, the administration of the sacraments, and divorce; and they sailed from Venice to Constantinople in October.

The council, however, desirous of negotiating unions with the minor churches of the East, remained in session for several years, and seems never to have reached a formal adjournment. The decree for the Armenians was published on the 22nd of November 1439; they

accepted the filioque and the Athanasian creed, rejected Monophysitism and Monothelitism, agreed to the de- veloped scholastic doctrine concerning the seven sacraments, and conformed their calendar to the Western in certain points. On the 26th of April 1441 the pope announced that the synod would be transferred to the Lateran ; but before leaving Florence a union was negotiated with the Oriental Christians known as Jacobites, through a monk named Andreas, who, at least as regards Abyssinia, acted in excess of his powers. The Decretum pro Jacobitis, published on the 4th of February 1442, is, like that for the Armenians, of high dogmatic interest, as it summar- izes the doctrine of the great medieval scholastics on the points in controversy. The decree for the Syrians, published at the Lateran on the 30th of September 1444, and those for the Chaldeans (Nestorians) and the Maronites (Monothelites), pub- lished at the last known session of the council on the 7 th of August 144S1 added nothing of doctrinal importance. Though

the direct results of these unions were the restoration of prestige to the absolutist papacy and the bringing of Byzantine men of letters, like Bessarion, to the West, the outcome was on the whole disappointing. Of the complicated history of the ” United ” churches of the East it suffices to say that Rome succeeded in securing but fragments, though important frag- ments, of the greater organizations. As for the Greeks, the union met with much opposition, particularly from the monks, and was rejected by three Oriental patriarchs at a synod of Jerusalem in 1443; and after various ineffective attempts to enforce it, the fall of Constantinople in 1453 put an end to the endeavour. As Turkish interests demanded the isolation of the Oriental Christians from their western brethren, and as the orthodox Greek nationalists feared Latinization more than Mahommedan rule, a patriarch hostile to the union was chosen, and a synod of Constantinople in 1472 formally rejected the decisions of Florence.

Authorities. — Hardouin, vol. 9; Mansi, vols. 31 A, 31 B, 35; Sylvester Sguropulus (properly Syropulus), Vera historia Unionis, transl. R. Creyghton (Hague, 1660) ; Cecconi, Studi storici sul concilio di Firenze (Florence, 1869), (appendix); J. Zhishman, Die Unionsverhandlungen . . . bis zum Concil von Ferrara (Vienna, 1858); Gorski, of Moscow, 1847, The History of the Council of Florence, trans, from the Russian by Basil Popoff, ed. by J. M. Neale (London, 1861); C. J. von Hefele, Conciliengeschichte, vol. 7 (Freiburg i. B., 1874), 659-761, 793 ff., 814 ff . ; H. Vast, Le Cardinal Bessarion (Paris, 1878), 53-113; A. Warschauer, Uber die Quellen zur Geschichte des Florentiner Concils (Breslau, 1881), (Dissertation); M. Creighton, A History of the Papacy during the Period of the Refor- mation, vol. 2

(London, 1882), 173-194 (vivid); Knopfler, in Wetzer and Welte's Kirchenlexikon, vol. 4 (2nd ed., Freiburg i. B., 1885), 1363-1380 (instructive); L. Pastor, History of the Popes, vol. I (London, 1891), 315 ff. ; F. Kattenbusch, Lehrbuch der vergleichenden Confessionskunde, vol. 1 (Freiburg i. B., 1892), 128 ff. ; N. Kalogeras, archbishop of Patras, " Die Verhandlungen zwischen der orthodox-katholischen Kirche und dem Konzil von Basel uber die Wieder-vereinigung der Kirchen " (Internationale Theologische Zeitschrift), vol. I (Bern, 1893, 39-57); P. Tschackert, in Herzog-Hauck, Real-encyklopddie, vol. 6 (3rd ed., Leipzig, 1899), 45-48 (good biblio-graphy); Walter Norden, Das Papsttum und Byzanz: Die Trennung der beiden Mdchte und das Problem ihrer Wiedervereinigung bis 1453 (Berlin, 1903), 712 ff. (W. W. R.*)

FERRARI, GAUDENZIO (1484-1549), Italian painter and sculptor, of the Milanese, or more strictly the Piedmontese, school, was born at Valduggia, Piedmont, and is said (very dubiously) to have learned the elements of painting at Vercelli from Girolamo Giovenone. He next studied in Milan, in the school of Scotto, and some say of Luini; towards 1504 he proceeded to Florence, and afterwards (it used to be alleged) to Rome. His pictorial style may be considered as derived mainly from the old Milanese school, with a considerable tinge of the influence of Da Vinci, and later on of Raphael; in his personal manner there was something of the demonstrative and fantastic. The gentler qualities diminished, and the stronger intensified, as he progressed. By 1524 he was at Varallo in Piedmont, and here, in the chapel of the Sacro Monte, the sanctuary of the Piedmontese pilgrims, he executed his most memorable work. This is a fresco of the Crucifixion, with a multitude of figures, no less than twenty-six of them being modelled in actual relief, and coloured; on the vaulted ceiling are eighteen lamenting angels, powerful in expression. Other leading examples are the following. In the Royal Gallery, Turin, a " Pieta," an able early work. In the Brera Gallery, Milan, " St Katharine miraculously preserved from the Torture of the Wheel," a very characteristic example, hard and forcible in colour, thronged in composition, turbulent in emotion; also several frescoes, chiefly from the church of Santa Maria della Pace, three of them being from the history of Joachim and Anna. In the cathedral of Vercelli, the choir, the " Virgin with Angels and Saints under an Orange Tree." In the refectory of San Paolo, the " Last Supper." In the church of San Cristoforo, the transept (in 1532-1535), a series of paintings in which Ferrari's scholar Lanini assisted him; by Ferrari himself are the " Birth of the Virgin," the " Annun- ciation," the " Visitation," the " Adoration of the Shepherds and Kings," the " Crucifixion," the " Assumption of the Virgin," all full

of life and decided character, though somewhat mannered,

In tlie Louvre, ” St Paul Meditating.” In Varallo, convent of the Minorites (1507), a ” Presentation in the Temple,” and ” Christ ■among the Doctors,” and (after 1510) the ” History of Christ,” in twenty-one subjects; also an ancona in six compartments, named the ” Ancona di San Gaudenzio.” In Santa Maria di Loreto, near Varallo (after 1527), an “Adoration.” In the church of Saronno, near Milan, the cupola (1535). a ” Glory of Angels,” in which the beauty of the school of Da Vinci alternates with bravura of foreshortenings in the mode of Correggio. In Milan, Santa Maria delle Grazie (1 542) , the ” Scourging of Christ, ” an ” Ecce Homo ” and a ” Crucifixion.” The ” Scourging,” or else a ” Last Supper,” in the Passione of Milan (unfinished), is regarded as Ferrari’s latest work. He was a very prolific painter, distinguished by strong expression, animation and fulness of composition, and abundant invention; he was skilful in painting horses, and his decisive rather hard colour is marked by a partiality for shot tints in drapery. In general character, his work appertains more to the 15th than the 16th century. His subjects were always of the sacred order. Ferrari’s death took place in Milan. Besides Lanini, already mentioned, Andrea Solario, Giambattista della Cerva and Fermo Stella were three of his principal scholars. He is represented to us as a good man, attached to his country and his art, jovial and sometimes facetious, but an enemy of scandal. The reputation which he enjoyed soon after his death was very great, but it has not fully stood the test of time. Lomazzo went so far as to place him seventh among the seven prime painters of Italy.

See G. Bordiga, two works concerning Gaudenzio Ferrari (1821 and ! 835) ; G. Colombo, Vita ed opere di Gaudenzio Ferrari (1881); Ethel Halsey, Gaudenzio Ferrari (in the series Great Masters, 1904).

There was another painter nearly contemporary with Gaudenzio, Difendente Ferrari, also of the Lombard school. His celebrity is by no means equal to that of Gaudenzio; but Kugler (1887, as edited by Layard) pronounced him to be ” a good and original colourist, and the best artist that Piedmont has produced.” (W. M. R.)

FERRARI, GIUSEPPE (181 2-1876), Italian philosopher, historian and politician, was born at Milan on the 7 th of March 181 2, and died in Rome on the 2nd of July 1876. He studied law at Pa via, and took the

degree of doctor in 183 1. A follower of Romagnosi (d. 1835) and Giovan Battista Vico (

See Marro Macchi, Annuario istorico italiano (Milan, 1877); Mazzoleni, Giuseppe Ferrari; Werner, Die ital. Philosophie des iq. Jahrh. vol. 3 (Vienna, 1885); Uberweg, History of Philosophy (Eng. trans, ii. 461 foil.).

FERRARI, PAOLO (1822-1889), Italian dramatist, was born at Modena. After producing some minor pieces, in 1852 he made his reputation as a playwright with Goldoni e le sue sedici commedie. Among numerous later plays his comedy Parini e la satira (1857) had considerable success. Ferrari may be regarded as a follower of Goldoni, modelling himself on the French theatrical methods. His collected plays were published in 1877-1880.

FERREIRA, ANTONIO (1528-1569), Portuguese poet, was a native of Lisbon; his father held the post of escrivao de fazenda in the house of the duke of Coimbra at Setubal, so that he must there have met the great adventurer Mendes Pinto. In 1547- 1548 he went to the university of Coimbra, and on the 16th of July 1 55 1 took his bachelor's degree. The Sonnets forming the First Book in his collected works date from 1552 and contain the history of his early love for an unknown lady. They seem to have been written in Coimbra or during vacations in Lisbon; and if some are dry and stilted, others, like the admirable No. 45, are full of feeling and tears. The Sonnets in the Second Book were inspired by D. Maria Pimentel, whom he afterwards married, and they are marked by that chastity of sentiment, seriousness and ardent patriotism which characterized the man and the writer. Ferreira's ideal, as a poet, was to win " the applause of the good," and, in the preface to his poems, he says, " I am content with this glory, that I have loved my land and my people." He was intimate with princes, nobles and the most distinguished literary men of the time, such as the scholarly Diogo de Teive and the poets Bernardes, Caminha and Corte- Real, as well as with the aged Sa de Miranda, the founder of the classical school of which Ferreira became the foremost repre- sentative.

The death in 1554 of Prince John, the heir to the throne, drew from him, as from Camoens, Bernardes and Caminha, a poetical lament, which consisted of an elegy and two eclogues, imitative of Virgil and Horace, and devoid of interest. On the 14th of July 1555 he took his doctor's degree, an event which was cele- brated, according to custom, by a sort of Roman triumph, and he stayed on as a professor, finding Coimbra with its picturesque environs congenial to his poetical tastes

and love of a country life. The year 1557 produced his sixth elegy, addressed to the son of the great Albuquerque, a poem of noble patriotism expressed in eloquent and sonorous verse, and in the next year he married. After a short and happy married life, his wife died, and the ninth sonnet of Book 2 describes her end in moving words. This loss lent Ferreira's verse an added austerity, and the independence of his muse is remarkable when he addresses King Sebastian and reminds him of his duties as well as his rights. On the 14th of October 1567 he became Disembargador da Casa do Civel, and had to leave the quiet of Coimbra for Lisbon. His verses tell how he disliked the change, and how the bustle of the capital, then a great commercial emporium, made him sad and almost tongue-tied for poetry. The intrigues and moral twists of the courtiers and traders, among whom he was forced to live, hurt his fine sense of honour, and he felt his mental isolation the more, because his friends were few and scattered in that great city which the discoveries and conquests of the Portuguese had made the centre of a world empire. In 1569 a terrible epidemic of carbunculous fever broke out and carried off 50,000 inhabitants of Lisbon, and, on the 29th of November, Ferreira, who had stayed there doing his duty when others fled, fell a victim.

Horace was his favourite poet, erudition his muse, and his admiration of the classics made him disdain the popular poetry of the Old School (Escola Velha) represented by Gil Vicente. His national feeling would not allow him to write in Latin or Spanish, like most of his contemporaries, but his Portuguese is as Latinized as he could make it, and he even calls his poetical works Poemas Lusitanos. Sa de Miranda had philosophized in the familiar redondilha, introduced the epistle and founded the comedy of learning. It was the beginning of a revolution, which Ferreira completed by abandoning the hendecasyllable for the Italian decasyllable, and by composing the noble and austere

Roman poetry of his letters, odes and elegies. It was all done of set purpose, for he was a reformer conscious of his mission and resolved to carry it out. The gross realism of the popular poetry, its lack of culture and its carelessness of form, offended his educated taste, and its picturesqueness and ingenuity made no appeal to him. It is not surprising, however, that though he earned the applause of men of letters he failed to touch the hearts of his countrymen. Ferreira wrote the Terentian prose comedy Bristo, at the age of twenty-five (1553),

and dedicated it to Prince John in the name of the university. It is neither a comedy of character nor manners, but its vis comica lies in its plot and situations. The Cioso, a later product, may almost be called a comedy of character. Castro is Ferreira's most con- siderable work, and, in date, is the first tragedy in Portuguese, and the second in modern European literature. Though fashioned on the great models of the ancients, it has little plot or action, and the characters, except that of the prince, are ill- designed. It is really a splendid poem, with a chorus which sings the sad fate of Ignez in musical odes, rich in feeling and grandeur of expression. Her love is the chaste, timid affection of a wife and a vassal rather than the strong passion of a mistress, but Pedro is really the man history describes, the love-fettered prince whom the tragedy of Ignez's death converted into the cruel tyrant. King Alfonso is little more than a shadow, and only meets Ignez once, his son never; while, stranger still, Pedro and Ignez never come on the stage together, and their love is merely narrated. Nevertheless, Ferreira merits all praise for choosing one of the most dramatic episodes in Portuguese history for his subject, and though it has since been handled by poets of renown in many differenc languages, none has been able to surpass the old master.

The Castro was first printed in Lisbon in 1587, and it is included in Ferreira's Poentas, published in 1598 by his son. It has been trans- lated by Musgrave (London, 1825), and the chorus of Act I. appeared again in English in the Savoy for July 1896. It has also been done into French and German. The Bristo and Cioso first appeared with the comedies of Sa de Miranda in Lisbon in 1622. There is a good modern edition of the Complete Works of Ferreira (2 vols., Paris, 1865). See Castilho's Antonio Ferreira (3 vols., Rio, 1865), which contains a full biographical and critical study with extracts. • (E. Pr.)

FERREL'S LAW, in physical geography. " If a body moves in any direction on the earth's surface, there is a deflecting force arising from the earth's rotation, which deflects it to the right in the northern hemisphere and to the left in the southern hemi- sphere." This law applies to every body that is set in motion upon the surface of the rotating earth, but usually the duration of the motion of any body due to a single impulse is so brief, and there are so many frictional disturbances, that it is not easy to observe the results of this deflecting force. The movements of the atmosphere, however, are upon a scale large enough to make this observation easy, and the simplest evidence is obtained from a study of the direction of the air movements in the great wind systems of the globe. (See Meteorology.)

FERRERS, the name of a great Norman-English feudal house, derived

from Ferrieres-St-Hilaire, to the south of Bernay, in Normandy. Its ancestor Walkelin was slain in a feud during the Conqueror's minority, leaving a son Henry, who took part in the Conquest. At the time of the Domesday survey his fief extended into fourteen counties, but the great bulk of it was in Derbyshire and Leicestershire, especially the former. He him- self occurs in Worcestershire as one of the royal commissioners for the survey. He established his chief seat at Tutbury Castle, Staffordshire, on the Derbyshire border, and founded there a Cluniac priory. As was the usual practice with the great Norman houses, his eldest son succeeded to Ferrieres, and, according to Stapleton, he was ancestor of the Oakham house of Ferrers, whose memory is preserved by the horseshoes hanging in the hall of their castle. Robert, a younger son of Henry, inherited his vast English fief, and, for his services at the battle of the Standard (1138), was created earl of Derby by Stephen. He appears to have died a year after.

Both the title and the arms of the earls have been the subject

of much discussion, and they seem to have been styled indiffer- ently earls of Derby or Nottingham (both counties then forming one shrievalty) or of Tutbury, or simply (de) Ferrers. Robert, the 2nd earl, who founded Merevale Abbey, was father of William, the 3rd earl, who began the opposition of his house to the crown by joining in the great revolt of n 73, when he fortified his castles of Tutbury and DufKeld and plundered Nottingham, which was held for the king. On his subsequent submission his castles were razed. Dying at the siege of Acre, 1190, he was succeeded by his son William, who attacked Nottingham on Richard's behalf in 1194, but whom King John favoured and confirmed in the earldom of Derby, 1199. A claim that he was heir to the honour of Peveral of Nottingham, which has puzzled genealo- ' gists, was compromised with the king, whom the earl thenceforth stoutly supported, being with him at his death and witnessing his will, with his brother-in-law the earl of Chester, and with William Marshal, earl of Pembroke, whose daughter married his son. With them also he acted in securing the succession of the young Henry, joining in the siege of Mountsorrel and the battle of Lincoln. But he was one of those great nobles who looked with jealousy on the rising power of the king's favourites. In 1227 he was one of the earls who rose against him on behalf of his brother Richard and made him restore the forest charters, and in 1 237 he was one of the three counsellor* forced on the king by the barons. His influence had by this time been further increased by the death, in 1232, of the earl of Chester, whose sister, his wife, inherited a vast estate between the Ribble and the Mersey. On his death in 1247, his son William succeeded as 5th earl, and inherited through his wife her share of the

great possessions of the Marshals, earls of Pembroke. By his second wife, a daughter of the earl of Winchester, he was father of Robert, 6th and last earl. Succeeding as a minor in 1254, Robert had been secured by the king, as early as 1249, as a husband for his wife's niece, Marie, daughter of Hugh, count of Angouleme, but, in spite of this, he joined the opposition in 1263 and distinguished himself .by his violence. He was one of the five earls summoned to Simon de Montfort's parliament, though, on taking the earl of Gloucester's part, he was arrested by Simon. In spite of this he was compelled on the king's triumph to forfeit his castles and seven years' revenues. In 1266 he broke out again in revolt on his own estates in Derby- shire, but was utterly defeated at Chesterfield by Henry " of Almain," deprived of his earldom and lands and imprisoned. Eventually, in 1269, he agreed to pay £50,000 for restoration, and to pledge all his lands save Chartley and Holbrook for its payment. As he was not able to find the money, the lands passed to the king's son, Edmund, to whom they had been granted on his forfeiture. •

The earl's son John succeeded to Chartley, a Staffordshire estate long famous for the wild cattle in its chase, and was sum- moned as a baron in 1299, though he had joined the baronial opposition in 1297. On the death, in 1450, of the last Ferrers lord of Chartley, the barony passed with his daughter to the Devereux family and then to the Shirleys, one of whom was created Earl Ferrers in 171 1. The barony has been in abeyance since 1855.

The line of Ferrers of Groby was founded by William, younger brother of the last earl, who inherited from his mother Margaret de Quinci her estate of Groby in Leicestershire, and some Ferrers manors from his father. His son was summoned as a baron in 1300, but on the death of his descendant, William, Lord Ferrers of Groby, in 1445, the barony passed with his granddaughter to the Grey family and was forfeited with the dukedom of Suffolk in 1554- A younger son of William, the last lord, married the heiress of Tamworth Castle, and his line was seated at Tamworth till 1680, when an heiress carried it to a son of the first Earl Ferrers. From Sir Henry, a younger son of the first Ferrers of Tamworth, descended Ferrers of Baddesley Clinton, seated there in the male line till towards the end of the 19th century. The line of Ferrers of Wemme was founded by a younger son of Lord Ferrers of Chartley, who married the heiress of Wemme, Co. Salop, and was summoned as a baron in her right; but it

ended with their son. There are doubtless male descendants of this great Norman house still in existence.

Higham Ferrers, Northants, and Woodham Ferrers, Essex, take their names from this family. It has been alleged that they bore horseshoes for their arms in allusion to Ferrieres (i.e. iron- works); but when and why they were added to their coat is a moot point.

See Dugdale's Baronage; J. R. Planche's The Conqueror and his Companions; G. E. C(okayne)'s Complete Peerage; Chronicles and Memorials (Rolls Series) ; T. Stapleton's Rotuli Scaccarii Nor- mannie, (J. H. R.)

FERRERS, LAURENCE SHIRLEY, 4 th Earl (1720-1760), the last nobleman in England to suffer a felon's death, was born on the 18th of August 1720. There was insanity in his family, and from an early age his behaviour seems to have been eccentric, and his temper violent, though he was quite capable of manag- ing his business affairs. In 1758 his wife obtained a separation from him for cruelty. The Ferrers estates were then vested in trustees, the Earl Ferrers secured the appointment of an old family steward, Johnson, as receiver of rents. This man faith- fully performed his duty as a servant to the trustees, and did not prove amenable to Ferrer's personal wishes. On the 18th of January 1760, Johnson called at the earl's mansion at Staunton Harold, Leicestershire, by appointment, and was directed to his lordship's study. Here, after some business conversation, Lord Ferrers shot him. In the following April Ferrers was tried for murder by his peers in Westminster Hall. His defence, which he conducted in person with great ability/was a plea of insanity, and it was supported by considerable evidence, but he was found guilty. He subsequently said that he had only pleaded insanity to oblige his family, and that he had himself always been ashamed of such a defence. On the 5th of May 1760, dressed in a light- coloured suit, embroidered with silver, he was taken in his own carriage from the Tower of London to Tyburn and there hanged. It has been said that as a concession to his order the rope used was of silk.

See Peter Burke, Celebrated Trials connected with the Aristocracy in the Relations of Private Life (London, 1849); Edward Walford, Tales of our Great Families (London, 1877); Howell's State Trials (18 1 6), xix. 885-980.

FERRET, a domesticated, and frequently albino breed of quadruped, derived from the wild polecat (Putorius foetidus, or P. putorius), which it closely resembles in size, form, and habits, and with which it

interbreeds. It differs in the colour of its fur, which is usually yellowish-white, and of its eyes, which are pinky-red. The ” polecat-ferret ” is a brown breed, appar- ently the product of the above-mentioned cross. The ferret attains a length of about 14 in., exclusive of the tail, which measures 5 in. Although exhibiting considerable tameness, it seems incapable of attachment, and when not properly fed, or when irritated, is apt to give painful evidence of its ferocity. It is chiefly employed in destroying rats and other vermin, and in driving rabbits from their burrows. The ferret is remarkably prolific, the female bringing forth two broods annually, each numbering from six to nine young. It is said to occasionally devour its young immediately after birth, and in this case produces another brood soon after. The ferret was well known to the Romans, Strabo stating that it was brought from Africa into Spain, and Pliny that it was employed in his time in rabbit- hunting, under the name Viverra; the English name is not derived from this, but from Fr. juret, Late Lat. furo, robber. The date of its introduction into Great Britain is uncertain, but it has been known in England for at least 600 years.

The ferret should be kept in dry, clean, well-ventilated hutches, and fed twice daily on bread, milk, and meat, such as rabbits’ and fowls’ livers. When used to hunt rabbits it is provided with a muzzle, or, better and more usual, a cope, made by looping and knotting twine about the head and snout, in order to prevent it killing its quarry, in which case it would gorge itself and go to sleep in the hole. As the ferret enters the hole the rabbits flee before it, and are shot or caught by dogs as they break ground. A ferret’s hold on its quarry is as obstinate as that of a bulldog, but can easily be broken by a strong pressure of

the thumb just above the eyes. Only full-grown ferrets are ” worked to ” rats. Several are generally used at a time and without copes, as rats are fierce fighters.

See Ferrets, by Nicholas Everitt (London, 1897).

FERRI, CIRO (1634-1689), Roman painter, the chief disciple and successor of Pietro da Cortona. He was born in the Roman territory, studied under Pietro, to whom he became warmly attached, and, at an age a little past thirty, completed the paint- ing of the ceilings and other internal decorations begun by his instructor in the Pitti palace, Florence. He also co-operated in or finished several other works by Pietro, both in Florence and in Rome, approaching near to his style and his particular merits, but with less grace of design and native vigour, and in especial falling short of him in colour. Of his own

independent productions, the chief is an extensive series of scriptural frescoes in the church of S. Maria Maggiore in Bergamo; also a painting (rated as Ferri's best work) of St Ambrose healing a sick person, the principal altarpiece in thechurchof S. AmbrogiodellaMassima in Rome. The paintings of the cupola of S. Agnese in the same capital might rank even higher than these; but this labour remained uncompleted at the death of Ferri, and was marred by the performances of his successor Corbellini. He executed also a large amount of miscellaneous designs, such as etchings and frontispieces for books; and he was an architect besides. Ferri was appointed to direct the Florentine students in Rome, and Gabbiani was one of his leading pupils. As regards style, Ferri ranks as chief of the so-called Machinists, as opposed to the school founded by Sacchi, and continued by Carlo Maratta. He died in Rome — his end being hastened, as it is said, by mortification at his recognized inferiority to Bacciccia in colour.

FERRI, LUIGI (1826-1895), Italian philosopher, was born at Bologna on the 15th of June 1826. His education was obtained mainly at the Ecole Normale in Paris, where his father, a painter and architect, was engaged in the construction of the Theatre Italien. From his twenty-fifth year he began to lecture in the colleges of Evreux, Dieppe, Blois and Toulouse. Later, he was lecturer at Annecy and Casal-Montferrat, and became head of the education department under Mamiani in i860. Three years later hqpvas appointed to the chair of philosophy at the Istituto di Perfezionamento at Florence, and, in 187 1, was made professor of philosophy in the university of Rome. On the death of Mamiani in 1885 he became editor of the Filosofia delle scuole italiane, the title of which he changed to Rivista italiana di filosofia. He wrote both on psychology and on metaphysics, but is known especially as a historian of philosophy. His original work is eglectic, combining the psychology of his teachers, Jules Simon, Saisset and Mamiani, with the idealism of Rosmini and Gioberti. Among his works may be mentioned Studii sulla coscienza; II Fenomeno nelle sue relazioni con la sensazione; Delia idea del vero; Delia filosofia del diritto presso Aristotile (1885); II Genio di Aristotile; La Psicologia di Pietro Pomponazzi (1877), and, most important, Essai sur I'histoire de la philosophie en Italie au XIX" siecle (Paris, 1869), and La Psychologic de V association depuis Hobbes jusqu'a nos jours.

FERRIER, ARNAUD DU (c. 1508-1585), French jurisconsult and diplomatist, was born at Toulouse about 1 508, and practised as a lawyer first at Bourges, afterwards at Toulouse. Councillor to the parlement of the latter town, and then to that of Rennes, he later became president of the parlement of Paris. He repre- sented Charles

IX., king of France, at the council of Trent in 1562, but had to retire in consequence of the attitude he had adopted, and was sent as ambassador to Venice, where he remained till 1567, returning again in 1570. On his return to France he came into touch with the Calvinists whose tenets he probably embraced, and consequently lost his place in the privy council and part of his fortune. As compensation, Henry, king of Navarre, appointed him his chancellor. He died in the end of October 1585.

See also E. Fremy, Un Ambassadeur liberal sous Charles IX el Henri III, Arnaud du Ferrier (Paris, 1880).

FERRIER, JAMES FREDERICK (1808-1864), Scottish metaphysical writer, was born in Edinburgh on the 16th of

June 1808, the son of John Ferrier, writer to the signet. His mother was a sister of John Wilson (Christopher North) . He was educated at the university of Edinburgh and Magdalen College, Oxford, and subsequently, his metaphysical tastes having been fostered by his intimate friend, Sir William Hamilton, spent some time at Heidelberg studying German philosophy. In 1842 he was appointed professor of civil history in Edinburgh University, and in 1845 professorof moral philosophy and political economy at St Andrews. He was twice an unsuccessful candidate for chairs in Edinburgh, for that of moral philosophy on Wilson's resignation in 1852, and for that of logic and metaphysics in 1856, after Hamilton's death. He remained at St Andrews till his death on the nth of June 1864. He married his cousin, Margaret Anne, daughter of John Wilson. He had five children, one of whom became the wife of Sir Alexander Grant.

Ferrier's first contribution to metaphysics was a series of articles in Blackwood's Magazine (1838-1839), entitled An Introduction to the Philosophy of Consciousness. In these he condemns previous philosophers for ignoring in their psycho- logical investigations the fact of consciousness, which is the distinctive feature of man, and confining their observation to the so-called " states of the mind." Consciousness comes into manifestation only when the man has used the word " I " with full knowledge of what it means. This notion he must originate within himself. Consciousness cannot spring from the

states which are its object, for it is in antagonism to them. It originates in the will, which in the act of consciousness puts the ” I ” in the place of our sensations. Morality, conscience, and responsibility are necessary results of consciousness. These articles were succeeded by a number of others, of which the most important were The Crisis of Modern Speculation (1841), Berkeley and Idealism (1842), and an important examination of Hamilton’s edition of Reid (1847), which contains a vigorous attack on the philosophy of common sense. The perception of matter is pronounced to be the ne plus ultra of thought, and Reid, for presuming to analyse it, is declared to be a representationist in fact, although he professed to be an intuitionist. A distinction is made between the ” perception of matter ” and ” our apprehension of the perception of matter.” Psychology vainly tries to analyse the former. Metaphysic shows the latter alone to be analysable, and separates the subjective element, ” our apprehension,” from the objective element, ” the perception of matter,” — not matter per se, but the percep- tion of matter is the existence independent of the individual’s thought. It cannot, however, be independent of thought. It must belong to some mind, and is therefore the property of the Divine Mind. There, he thinks, is an indestructible foundation for the a priori argument for the existence of God.

Ferrier’s matured philosophical doctrines find expression in the Institutes of Metaphysics (1854), in which he claims to have met the twofold obligation resting on every system of philosophy, that it should be reasoned and true. His method is that of Spinoza, strict demonstration, or at least an attempt at it. All the errors of natural thinking and psychology must fall under one or other of three topics: — Knowing and the Known, Ignor- ance, and Being. These are all-comprehensive, and are therefore the departments into which philosophy is divided, for the sole end of philosophy is to correct the inadvertencies of ordinary thinking.

The problems of knowing and the known are treated in the ” Epistemology or Theory of Knowing.” The truth that ” along with whatever any intelligence knows it must, as the ground or condition of its knowledge, have some cognizance of itself,” is the basis of the whole philosophical system. Object + subject, thing + me, is the only possible knowable. This leads to the conclusion that the only independent universe which any mind can think of is the universe in synthesis with some other mind or ego.

The leading contradiction which is corrected in the ” Agnoi- ology or Theory of Ignorance ” is this: that there can be an ignorance of that of which there can be no knowledge. Ignorance is a defect. But there is

no defect in not knowing what cannot

be known by any intelligence {e.g. that two and two make five), and therefore there can be an ignorance only of that of which there can be a knowledge, i.e. of some-object-/>to-some-subject. The knowable alone is the ignorable. Ferrier lays special claim to originality for this division of the Institutes.

The " Ontology or Theory of Being " forms the third and final division. It contains a discussion of the origin of knowledge, in which Ferrier traces all the perplexities and errors of philo- sophers to the assumption of the absolute existence of matter. The conclusion arrived at is that the only true real and inde- pendent existences are minds-together-with-that-which-they- apprehend, and that the one strictly necessary absolute existence is a supreme and infinite and everlasting mind in synthesis with all things.

Ferrier's works are remarkable for an unusual charm and sim- plicity of style. These qualities are especially noticeable in the Lectures on Greek Philosophy, one of the best introductions on the subject in the English language. A complete edition of his philo- sophical writings was published in 1875, with a memoir by E. L. Lushington ; see also monograph by E. S. Haldane in the Famous Scots Series.

FERRIER, PAUL (1843-), French dramatist, was born at Montpellier on the 29th of March 1843. He had already produced several comedies when in 1873 he secured real success with two short pieces, Chez Vavocat and Les Incendies de Massou- lard. Others of his numerous plays are Les Compensations (1876); L' Art de tromper les femmes (1890), with M. Najac. One of Ferrier's greatest triumphs was the production with Fabrice Carre of Josephine vendue par ses sceurs (1886), an op&ra bouffe with music by Victor Roger. His opera libretti include La Marocaine (1879), music of J. Offenbach; Le Chevalier d'Har- menlal (1896) after the play of Dumas pere, for the music of A. Messager; La Fille de Tabarin (1901), with Victorien Sardou, music of Gabriel Pierne.

FERRIER, SUSAN EDMONSTONE (1782-1854), Scottish novelist, born in Edinburgh on the 7th of September 1782, was the daughter of James Ferrier, for some years factor to the duke of Argyll, and at one time one of the clerks of the court of session with Sir Walter. Scott. Her mother was a Miss Coutts, the beautiful daughter of a Forfarshire farmer. James Frederick Ferrier, noticed above, was Susan Ferrier's nephew.

Miss Ferrier's first novel, Marriage, was begun in concert with a friend, Miss Clavering, a niece of the duke of Argyll; but this lady only wrote a few pages, and Marriage, completed by Miss Ferrier as early as 18 10, appeared in 18 18. It was followed in 1824 by The Inheritance, a better constructed and more mature work; and the last and perhaps best of her novels, Destiny, dedicated to Sir Walter Scott (who himself undertook to strike the bargain with the publisher Cadell), appeared in 183 1. All these novels were published anonymously; but, with their clever portraiture of contemporary Scottish life and manners, and even recognizable caricatures of some social celebrities of the day, they could not fail to become popular north of the Tweed. " Lady MacLaughlan " represents Mrs Seymour Damer in dress and Lady Frederick Campbell, whose husband, Lord Ferrier, was executed in 1760, in manners. Mary, Lady Clark, well known in Edinburgh, figured as " Mrs Fox "and the three'maiden aunts were the Misses Edmonstone. Many were the conjectures as to the authorship of the novels. In the Nodes Ambrosianae (November 1826), James Hogg is made to mention The In- heritance, and adds, " which I aye thought was written by Sir Walter, as weel's Marriage, till it spunked out that it was written by a leddy." Scott himself gave Miss Ferrier a very high place indeed among the novelists of the day. In his diary (March 27, 1826), criticizing a new work which he had been reading, he says, " The women do this better. Edgeworth, Ferrier, Austen, have all given portraits of real society far superior to anything man, vain man, has produced of the like nature." Another friendly recognition of Miss Ferrier is to be found at the conclusion of his Tales of my Landlord, where Scott calls her his " sister shadow," the still anonymous author of " the very lively work entitled Marriage." Lively, indeed, all Miss Ferrier's works are, — written in clear, brisk English, and

with an inexhaustible fund of humour. It is true her books portray the eccentricities, the follies, and foibles of the society in which she lived, caricaturing with terrible exactness its hypocrisy, boastfulness, greed, affectation, and undue subservience to public opinion. Yet Miss Ferrier wrote less to reform than to amuse. In this she is less like Miss Edgeworth than Miss Austen. Miss Edge worth was more of a moralist; her wit is not so involuntary, her caricatures not always so good-natured. But Miss Austen and Miss Ferrier were genuine humorists, and with Miss Ferrier especially a keen sense of the ludicrous was always dominant. Her humorous characters are always her best. It was

no doubt because she felt this that in the last year of her life she regretted not having devoted her talents more exclusively to the service of religion. But if she was not a moralist, neither was she a cynic; and her wit, even where it is most caustic, is never uncharitable.

Miss Ferrier's mother died in 1797, and from that date she kept house for her father until his death in 1829. She lived quietly at Morningside House and in Edinburgh for more than twenty years after the publication of her last work. The pleasantest picture that we have of her is in Lockhart's de- scription of her visit to Scott in May 1831. She was asked there to help to amuse the dying master of Abbotsford, who, when he was not writing Count Robert of Paris, would talk as brilliantly as ever. Only sometimes, before he had reached the point in a narrative, " it would seem as if some internal spring had given way." He would pause, and gaze blankly and anxiously round him. " I noticed," says Lockhart, " the delicacy of Miss Ferrier on such occasions. Her sight was bad, and she took care not to use her glasses when he was speaking; and she affected to be also troubled with deafness, and would say, ' Well, I am getting as dull as a post; I have not heard a word since you said so-and- so,' — being sure to mention a circumstance behind that at which he had really halted. He then took up the thread with his habitual smile of courtesy — as if forgetting his case entirely in the consideration of the lady's infirmity."

Miss Ferrier died on the 5th of November 1854, at her brother's house in Edinburgh. She left among her papers a short un- published article, entitled " Recollections of Visits to Ashestiel and Abbotsford." This is her own very interesting account of her long friendship with Sir Walter Scott, from the date of her first visit to him and Lady Scott at Ashestiel, where she went with her father in the autumn of 181 1, to her last sad visit to Abbotsford in 183 1. It contains some impromptu verses written by Scott in her album at Ashestiel.

Miss Ferrier's letters to her sister, which contained much interesting biographical matter v were destroyed at her particular request, but a volume of her correspondence with a memoir by her grand-nephew, John Ferrier, was published in 1898.

FERROL [El FerroJ], a seaport of north-western Spain, in the province of Corunna; situated 12 m. N.E. of the city of Corunna, and on the Bay of Ferrol, an inlet of the Atlantic Ocean. Pop. (1900) 25,281. Together with San Fernando, near Cadiz, and Cartagena, Ferrol is governed by an admiral, with the special title of captain-general; and it ranks

beside these two ports as one of the principal naval stations of Spain. The town is beautifully situated on a headland overlooking the bay, and is surrounded by rocky hills which render it invisible from the sea. Its harbour, naturally one of the best in Europe, and the largest in Spain except those of Vigo and Corunna, is deep, capacious and secure; but the entrance is a narrow strait about 2 m. long, which admits only one vessel at a time, and is com- manded by modern and powerfully armed forts, while the neigh- bouring heights are also crowned by defensive works. Ferrol is provided with extensive dockyards, quays, warehouses and an arsenal; most of these, with the palace of the captain-general, the bull-ring, theatres, and other principal buildings, were built or modernized between 1875 and 1905. The local industries are mainly connected with the shipping trade, or the refitting of warships. Owing to the lack of railway communication, and the competition of Corunna at so short a distance, Ferrol is not a first-class commercial port; and in the early years of the 20th century its trade, already injured by the loss to Spain of Cuba

and Porto Rico in 1898, showed little prospect of improvement. The exports are insignificant, and consist chiefly of wooden staves and beams for use as pit-props; the chief imports are coal, cement, timber, iron and machinery. In 1904, 282 vessels of 155,881 tons entered the harbour. In the same year the con- struction of a railway to the neighbouring town of Betanzos was undertaken, and in 1909 important shipbuilding operations were begun.

Ferrol was a mere fishing village until 1752, when Ferdinand VI. began to fit it for becoming an arsenal. In 1799 the British made a fruitless attempt to capture it, but on the 4th of November 1805 they defeated the French fleet in front of the town, which they compelled to surrender. On the 27 th of January 1809 it was through treachery delivered over to the French, but it was vacated by them on the 22nd of July. On the 1 5th of July 1823 another blockade was begun by the French, and Ferrol surrendered to them on the 27th of August.

FERRUCCIO, or Ferrucci, FRANCESCO (1489-1530), Florentine captain. After spending a few years as a merchant’s clerk he took to soldiering at an early age, and served in the Bande Nere in various parts of Italy, earning a reputation as a daring fighter and somewhat of a swashbuckler. When Pope Clement VII. and the emperor Charles V. decided to reinstate the Medici in Florence, they made war on the Florentine republic, and Ferruccio was appointed Florentine military

commissioner at Empoli, where he showed great daring and resource by his rapid marches and sudden attacks on the Imperialists. Early in 1530 Volterra had thrown off Florentine allegiance and had been occupied by an Imperialist garrison, but Ferruccio surprised and recaptured the city. During his absence, however, the Imperialists captured Empoli by treachery, thus cutting off one of the chief avenues of approach to Florence. Ferruccio proposed to the government of the republic that he should march on Rome and terrorize the pope by the threat of a sack into making peace with Florence on favourable terms, but although the war committee appointed him commissioner- general for the operations outside the city, they rejected his scheme as too audacious. Ferruccio then decided to attempt a diversion by attacking the Imperialists in the rear and started from Volterra for the Apennines. But at Pisa he was laid up for a month with a fever— a misfortune which enabled the enemy to get wind of his plan and to prepare for his attack. At the end of July Ferruccio left Pisa at the head of about 4000 men, and although the besieged in Florence, knowing that a large part of the Imperialists under the prince of Orange had gone to meet Ferruccio, wished to co-operate with the latter by [means of a sortie, they were prevented from doing so by their own traitorous commander-in-chief, Malatesta Baglioni. Ferruccio encountered a much larger force of the enemy on the 3rd of August at Gavi- nana; a desperate battle ensued, and at first the Imperialists were driven back by Ferruccio ‘s fierce onslaught and the prince of Orange himself was killed, but reinforcements under Fabrizio Maramaldo having arrived, the Florentines were almost annihil- ated and Ferruccio was wounded and captured. Maramaldo out of personal spite despatched the wounded man with his own hand. This defeat sealed the fate of the republic, and nine days later Florence surrendered. Ferruccio was one of the great soldiers of the age, and his enterprise is the finest episode of the last days of the Florentine republic. See also under Florence and Medici.

Bibliography. — F. Sassetti, Vita di Francesco Ferrucci, written in the 16th century and published in the Archivio storico, vol. iv. pt. ii. (Florence, 1853), with an introduction by C. Monzani; E. Aloisi, La Battaglia di Gavinana (Bologna, 1881); cf. P. Villari’s criticism of .the latter work, ” Ferruccio e Maramaldo,” in his Arte, storia, e filosofia (Florence, 1884) ; Gino Capponi, Storia delta re- pubblica di Firenze, vol. ii. (Florence, 1875).

FERRULE, a small metal cap or ring used for holding parts of a rod, &c, together, and for giving strength to weakened materials, or especially, when attached to the end of a stick, umbrella, &c, for preventing wearing or splitting. The word is properly verrel or verril,

in which form it was used till the 1 8th century, and is derived through the O. Fr. virelle, modern

virole, from a diminutive Latin viriola of viriae, bracelets. The form in which the word is now known is due to the influence of Latin ferrum, iron. ” Ferrule ” must be distinguished from ” ferule ” or ” ferula,” properly the Latin name of the ” giant fennel.” From the use of the stalk of this plant as a cane or rod for punishment, comes the application of the word to many instruments used in chastisement, more particularly a short flat piece of wood or leather shaped somewhat like the sole of a boot, and applied to the palms of the hand. It is the common form of disciplinary instrument in Roman Catholic schools; the pain inflicted is exceedingly sharp and immediate, but the effects are momentary and leave no chance for any dangerous results. The word is sometimes applied to the ordinary cane as used by schoolmasters.

FERRY, JULES FRANCOIS CAMILLE (1832-1893), French statesman, was born at Saint Die (Vosges) on the 5th of April 1832. He studied law, and was called to the bar at Paris, but soon went into politics, contributing to various newspapers, particularly to the Temps. He attacked the Empire with great violence, directing his opposition especially against Baron Haussmann, prefect of the Seine. Elected republican deputy for Paris in 1869, he protested against the declaration of war with Germany, and on the 6th of September 1870 was appointed prefect of the Seine by the government of national defence. In this position he had the difficult task of administering Paris during the siege, and after the Commune was obliged to resign (5th of June 1871). From 1872-1873 he was sent by Thiers as minister to Athens, but returned to the chamber as deputy for the Vosges, and became one of the leaders of the republican party. When the first republican ministry was formed under W. H. Waddington on the 4th of February 1879, he was one of its members, and continued in the ministry until the 30th of March 1885, except for two short interruptions (from the 10th of November 1881 to the 30th of January 1882, and from the 29th of July 1882 to the 21st of February 1883), first as minister of education and then as minister of foreign affairs. He was twice premier (1880-1881 and 1883-1885). Two important works are associated with his administration, the non-clerical organization of public education, and the beginning of the colonial expansion of France. Following the republican programme he proposed to destroy the influence of the clergy in the university. He reorganized the committee of public education (law of the 27th of

February 1880), and proposed a regulation for the conferring of university degrees, which, though rejected, aroused violent polemics because the 7 th article took away from the unauthorized religious orders the right to teach. He finally succeeded in passing the great law of the 28th of March 1882, which made primary education in France free, non-clerical and obligatory. In higher education the number of professors doubled under his ministry. After the military defeat of France by Germany in 1870, he formed the idea of acquiring a great colonial empire, not to colonize it, but for the sake of economic exploitation. He directed the negotia- tions which led to the establishment of a French protectorate in Tunis (1881), prepared the treaty of the 17th of December 1885 for the occupation of Madagascar; directed the exploration of the Congo and of the Niger region; and above all he organized the conquest of Indo-China. The excitement caused at Paris by an unimportant reverse of the French troops at Lang-son caused his downfall (30th of March 1885), but the treaty of peace with China (9th of June 1885) was his work. He still remained an influential member of the moderate republican party, and directed the opposition to General Boulanger. ‘ After the resignation of President Grevy (2nd of December 1887), he was a candidate for the presidency of the republic, but the radicals refused to support him, and he withdrew in favour of Sadi Carnot. The violent polemics aroused against him at this time caused a madman to attack him with a revolver, and he died from the wound, on the 17th of March 1893. The chamber of deputies voted him a state funeral.

See Edg. Zevort, Sistoire de la troisieme Republigue ; A. Rambaud, Jules Ferry (Paris, 1903).

FERRY (from the same root as that of the verb ” to fare,” to journey or travel, common to Teutonic languages, cf. Ger. fahren; it is connected with the root of Gr. iropos, way, and Lat. portare, to carry), a place where boats ply regularly across a river or arm of the sea for the conveyance of goods and persons. The word is also applied to the boats employed (ferry boats). In a car-ferry or train-ferry railway cars or complete trains are conveyed across a piece of water in vessels which have railway lines laid on their decks, so that the vehicles run on and off them on their own wheels. In law the right of ferrying persons or goods across a particular river or strait, and of exacting a reason- able toll for the service, belongs, like the right of fair and market, to the class of rights known as franchises. Its origin must be by statute, royal grant, or prescription. It is wholly unconnected with the ownership or occupation of land, so that the owner of the ferry

need not be proprietor of the soil on either side of the water over which the right is exercised. He is bound to maintain safe and suitable boats ready for the use of the public, and to employ fit persons as ferrymen. As a correlative of this duty he has a right of action, not only against those who evade or refuse payment of toll when it is due, but also against those who disturb his franchise by setting up a new ferry, so as to diminish his custom, unless a change of circumstances, such as an increase of population near the ferry, justify other means of passage, whether of the same kind or not. See also Water Rights.

FERSEN, FREDRIK AXEL, Count von (1719-1794), Swedish politician, was a son of Lieutenant-General Hans Reinhold Fersen and entered the Swedish Life Guards in 1740, and from 1743 to 1748 was in the French service (Royal-Suidois), where he rose to the rank of brigadier. In the Seven Years' War Fersen distinguished himself during the operations round Use- dom and Wollin (1759), when he inflicted serious loss on the Prussians. But it is as a politician that he is best known. At the diet of 1755-1756 he was elected landtmarskalk, or marshal of the diet, and from henceforth, till the revolution of 1772, led the Hat party (see Sweden: History). In 1756 he defeated the projects of the court for increasing the royal power; but, after the disasters of the Seven Years' War, gravitated towards the court again and contributed, by his energy and eloquence, to uphold the tottering Hats for several years. On the accession of the Caps to power in 1766, Fersen assisted the court in its struggle with them by refusing to employ the Guards to keep order in the capital when King Adolphus Frederick, driven to desperation by the demands of the Caps, publicly abdicated, and a seven days' interregnum ensued. At the ensuing diet of 1769, when the Hats returned to power, Fersen was again elected marshal of the diet; but he made no attempt to redeem his pledges to the crown prince Gustavus, as to a very necessary reform of the constitution, which he had made before the elec- tions, and thus involuntarily contributed to the subsequent establishment of absolutism. When Gustavus III. ascended the throne in 1772, and attempted to reconcile the two factions by a composition which aimed at dividing all political power between them, Fersen said he despaired of bringing back, in a moment, to the path of virtue and patriotism a people who had been running riot for more than half a century in the wilder- ness of political licence and corruption. Nevertheless he con- sented to open negotiations with the Caps, and was the principal Hat representative on the abortive composition committee. During the revolution of August 1772, Fersen remained a passive spectator of the overthrow of the constitution, and was one of the first whom Gustavus summoned to his side after his triumph. Yeˆ his relations with the king

were never cordial. The old party-leader could never forget that he had once been a power in the state, and it is evident, from his Historiska Skrifter, how jealous he was of Gustavus's personal qualities. There was a slight collision between them as early as the diet of 1778; but at the diet of 1786 Fersen boldly led the opposition against the king's financial measures (see Gustavus III.) which were conse- quently rejected; while in private interviews, if his own account of them is to be trusted, he addressed his sovereign with

outrageous insolence. At the diet of i/8y Fersen marshalled the nobility around him for a combat a outrance against the throne and that, too, at a time when Sweden was involved in two dangerous foreign wars, and national unity was absolutely indispensable. This tactical blunder cost him his popularity and materially assisted the secret operations of the king. Ob- struction was Fersen's chief weapon, and he continued to post- pone the granting of subsidies by the house of nobles for some weeks. But after frequent stormy scenes in the diet, which were only prevented from becoming melees by Fersen's moderation, or hesitation, at the critical moment, he and twenty of his friends of the nobility were arrested (17th February 1789) and the opposition collapsed. Fersen was speedily released, but hence- forth kept aloof from politics, surviving the king two years. He was a man of great natural talent, with an imposing presence, and he always bore himself like the aristocrat he was. But his haughtiness and love of power are undeniable, and he was perhaps too great a party-leader to be a great statesman. Yet for seven- teen years, with very brief intervals, he controlled the destinies of Sweden, and his influence in France was for some time pretty considerable. His Historiska Skrifier, which are a record of ■ Swedish history, mainly autobiographical, during the greater part of the 18th century, is excellent as literature, but somewhat unreliable as an historical document, especially in the later parts.

See C. G. Malmstrom, Sveriges poliliska Historia (Stockholm, 1855-1865); R. N. Bain, Gustavus III. (London, 1895); C. T. Odhner, Sveriges politiska Historia under Gustaf III.'s Regering (Stockholm, 1885, &c.) ; F. A. Fersen, Historiska Skrifter (Stockholm, 1867-1872). (R.N.B.)

FERSEN, HANS AXEL, Count von (1755-1810), Swedish statesman, was carefully educated at home, at the Carolinum at Brunswick and at

Turin. In 1779 he entered the French military service (Royal-Baviere) , accompanied General Rocham- beau to America as his adjutant, distinguished himself during the war with England, notably at the siege of Yorktown, 1781, and in 1785 was promoted to be colonel proprietaire of the regiment Royal-Suedois. The young nobleman was, from the first, a prime favourite at the French court, owing, partly to the recollection of his father's devotion to France, but princi- pally because of his own amiable and brilliant qualities. The queen, Marie Antoinette, was especially attracted by the grace and- wit of le beau Fersen, who had inherited his full share of the striking handsomeness which was hereditary in the family.

It is possible that Fersen would have spent most of his life at Versailles, but for a hint from his own sovereign, then at Pisa, that he desired him to join his suite. He accompanied Gustavus III. in his Italian tour and returned home with him in 1784. When the war with Russia broke out, in 1788, Fersen accom- panied his. regiment to Finland, but in the autumn of the same year was sent to France, where the political horizon was already darkening. It was necessary for Gustavus to have an agent thoroughly in the confidence of the French royal family, and, at the same time, sufficiently able and audacious to help them in their desperate straits, especially as he had lost all confidence in his accredited minister, the baron de Stael. With his usual acumen, he fixed upon Fersen, who was at his post early in 1790. Before the end of the year he was forced to admit that the cause of the French monarchy was hopeless so long as the king and queen of France were nothing but captives in their own capital, at the mercy of an irresponsible mob. He took a leading part in the flight to Varennes. He found most of the requisite funds at the last moment. He ordered the construction of the famous carriage for six, in the name of the baroness von Korff, and kept it in his hotel grounds, rue Matignon, that all Paris might get accustomed to the sight of it. He was the coachman of the fiacre which drove the royal family from the Carrousel to the Porte Saint-Martin. He accompanied them to Bondy, the first stage of their journey.

In August 1 79 1, Fersen was sent to Vienna to induce the em- peror Leopold to accede to a new coalition against revolutionary

France, but he soon came to the conclusion that the Austrian court meant to do nothing at all. At his own request, therefore, he was transferred to Brussels, where he could be of more service to the queen of France. In February 1792, at his own mortal peril, he once more succeeded in reaching Paris with counterfeit credentials as minister plenipotentiary to Portugal. On the 13th he arrived, and the

same evening contrived to steal an interview with the queen unobserved. On the following day he was with the royal family from six o'clock in the evening till six o'clock the next morning, and convinced himself that a second flight was physically impossible. On the afternoon of the 21st he succeeded in paying a third visit to the Tuileries, stayed there till midnight and succeeded, with great difficulty, in regaining Brussels on the 27th. This perilous expedition, a monumental instance of courage and loyalty, had no substantial result. In 1797 Fersen was sent to the congress of Rastatt as the Swedish delegate, but in consequence of a protest from the French government, was not permitted to take part in it.

During the regency of the duke of Sudermania (1 792-1 796) Fersen, like all the other Gustavians, was in disgrace; but, on Gustavus IV. attaining his majority in 1796, he was welcomed back to court with open arms, and reinstated in all his offices and dignities. In 1801 he was appointed Riksmarskalk (= earl- marshal). On the outbreak of the war with Napoleon, Ferser. accompanied Gustavus IV. to Germany to assist him in gaining fresh allies. He prevented Gustavus from invading Prussia in revenge for the refusal of the king of Prussia to declare war against France, and during the rest of the reign was in semi- disgrace, though generally a member of the government when the king was abroad.

Fersen stood quite aloof from the revolution of 1809. (See Sweden: History.) His sympathies were entirely with Prince Gustavus, son of the unfortunate Gustavus IV., and he was generally credited with the desire to see him king. When the newly elected successor to the throne, the highly popular prince Christian Augustus of Augustenburg, died suddenly in Skane in May 1810, the report spread that he had been poisoned, and that Fersen and his sister, the countess Piper, were accessories. The source of this equally absurd and infamous libel has never been discovered. But it was eagerly taken up by the anti-Gustavian press, and popular suspicion was especially aroused by a fable called " The Foxes " directed against the Fersens, which appeared in Nya Posten. When, then, on the 20th of June 1810, the prince's body was conveyed to Stockholm, and Fersen, in his official capacity as Riksmarskalk, received it at the barrier and led the funeral cortege into the city, his fine carriage and his splendid robes seemed to the people an open derision of the general grief. The crowd began to murmur and presently to fling stones and cry " murderer ! " He sought refuge in a house in the Riddarhus Square, but the mob rushed after him, brutally maltreated him and tore his robes to pieces. To quiet the people and save the unhappy victim, two officers volunteered to conduct him to the senate house and there place him in

arrest. But he had no sooner mounted the steps leading to the entrance than the crowd, which had followed him all the way beating him with sticks and umbrellas, made a rush at him, knocked him down, and kicked and trampled him to death. This horrible outrage, which lasted more than an hour, happened, too, in the presence of numerous troops, drawn up in the Riddarhus Square, who made not the slightest effort to rescue the Riksmarskalk from his tormentors. In the circumstances, one must needs adopt the opinion of Fersen's contemporary, Baron Gustavus Armfelt, " One is almost tempted to say that the government wanted to give the people a victim to play with, just as when one throws something to an irritated wild beast to distract its attention. The more I consider it all, the more I am certain that the mob had the least to do with it. . . . But in God's name what were the troops about? How could such a thing happen in broad daylight during a procession, when troops and a military escort were actually present ? " The responsibility certainly rests with the government of Charles XIII., which apparently in- tended to intimidate the Gustavians by the removal of one of

their principal leaders. Armfelt escaped in time, so Fersen fell the victim.

See R. M. Klinckowstrom, Le Comte de Fersen et la cour de France (Paris, 1877; Eng. ed., London, 1902); Historia om Axel von Fersens mord (Stockholm, 1844); R. N. Bain, Gustavus III., vol. ii. (London, 1895) ; P. Gaulot, Un Ami de la reine (Paris, 1892) ; F. F. Flach, Grefve Hans Axel von Fersen (Stockholm, 1896) ; E. Tegner, Gustaj Mauritz Armfelt, vol. iii. (Stockholm, 1883-1887). (R. N. B.)

FESCA, FREDERIC ERNEST (1 789-1826), German violinist and composer of instrumental music, was born on the 15th of February 1789 at Magdeburg, where he received his early musical education. He completed his studies at Leipzig under Eberhard Mtiller, and at the early age of fifteen appeared before the public with several concerti for the violin, which were received with general applause, and resulted in his being appointed leading violinist of the Leipzig orchestra. This position he occupied till 1806, when he became concert-master to the duke of Oldenburg. In 1808 he was appointed solo- violinist by King Jerome of West- phalia at Cassel, and there he remained till the end of the French occupation (1814), when he went to Vienna, and soon afterwards to Carlsruhe, having been appointed

concert-master to the grand- duke of Baden. His failing health prevented him from enjoying the numerous and well-deserved triumphs he owed to his art, and in 1826 he died of consumption at the early age of thirty- seven. As a virtuoso Fesca ranks amongst the best masters of the German school of violinists, the school subsequently of Spohr and of Joachim. Especially as leader of a quartet he is said to have been unrivalled with regard to classic dignity and simplicity of style. Amongst his compositions, his quartets for stringed instruments and other pieces of chamber music are the most remarkable. His two operas, Canlemira and Omar and Leila, were less successful, lacking dramatic power and originality. He also wrote some sacred compositions, and numerous songs and vocal quartets.

FESCENNIA, an ancient city of Etruria, which is probably to be placed immediately to the N. of the modern Corchiano, 6 m. N.W. of Civita Castellana (see Falerii). The Via Amerina traverses it. G. Dennis (Cities and Cemeteries of Etruria, London, 1883, i. 115 proposed to place it at the Riserva S. Silvestro, 3 m. E. of Corchiano, nearer the Tiber, where remains of Etruscan walls exist. At Corchiano itself, however, similar walls may be traced, and the site is a strong and characteristic one — a triangle between two deep ravines, with the third (west) side cut off by a ditch. Here, too, remains of two bridges may be seen, and several rich tombs have been excavated.

See A. Buglione, ” Conte di Monale,” in Romische Mitteilungen (1887), p. 21 seq.

FESCENNINE VERSES (Fescennina carmina), one of the earliest kinds of Italian poetry, subsequently developed into the Satura and the Roman comic drama. Originally sung at village harvest-home rejoicings, they made their way into the towns, and became the fashion at religious festivals and private gatherings — especially weddings, to which in later times they were practically restricted. They were usually in the Saturnian metre and took the form of a dialogue, consisting of an inter- change of extemporaneous raillery. Those who took part in them wore masks made of the bark of trees. At first harmless and good-humoured, if somewhat coarse, these songs gradually out- stripped the bounds of decency; malicious attacks were made upon both gods and men, and the matter became so serious that the law intervened and scurrilous personalities were forbidden by the Twelve Tables (Cicero, De re publica, iv. 10). Specimens of the Fescennines used at weddings are the Epithalamium of Manlius (Catullus, lxi. 122) and the four poems of Claudian in honour of the marriage of Honorius and Maria; the first, how- ever, is distinguished

by a licentiousness which is absent in the latter. Ausonius in his Cento nuptialis mentions the Fescennines of Annianus Faliscus, who lived in the time of Hadrian. Various derivations have been proposed for Fescennine. According to Festus, they were introduced from Fescennia in Etruria, but there is no reason to assume that any particular town was specially devoted to the use of such songs. As an alternative Festus suggests a connexion with fascinum, either because the

Fescennina were regarded as a protection against evil influences (see Munro, Criticisms and Elucidations of Catullus, p. 76) or because fascinum (= phallus), as the symbol of fertility, would from early times have been naturally associated with harvest festivals. H. Nettleship, in an article on " The Earliest Italian Literature " (Journal of Philology, xi. 1882), in support of Munro's view, translates the expression " verses used by charmers," assuming a noun, fescennus, connected with fas fari.

The locus classicus in ancient literature is Horace, Epistles, ii. 1. 139; see also Virgil, Georgics, ii. 385; Tibullus ii. 1. 55; E. Hoffmann, " Die Fescenninen," in Rheinisches Museum, Ii. p. 320 (1896); art. Latin Literature.

FESCH, JOSEPH (1763-1839), cardinal, was born at Ajaccio on the 3rd of January 1763. His father, a Swiss officer in the service of the Genoese Republic, had married the mother of Laetitia Bonaparte, after the decease of her first husband. Fesch therefore stood almost in the relation of an uncle to the young Bonapartes, and after the death of Lucien Bonaparte, archdeacon of Ajaccio, he became for a time the protector and patron of the family. In the year 1789, when the French Revolution broke out, he was archdeacon of Ajaccio, and, like the majority of the Corsicans, he felt repugnance for many of the acts of the French government during that period ; in parti- cular he protested against the application to Corsica of the act known as the " Civil Constitution of the Clergy " (July 1790). As provost of the " chapter " in that city he directly felt the pressure of events; for on the suppression of religious orders and corporations, he was constrained to retire into private life.

Thereafter he shared the fortunes of the Bonaparte family in the intrigues and strifes which ensued. Drawn gradually by that family into espousing the French cause against Paoli and the Anglophiles, he was forced to leave Corsica and to proceed with Laetitia and her son to Toulon, in the early part of the autumn of 1793. Failing to find clerical duties at that time (the period of the Terror), he entered civil life, and served in various capacities, until on the appointment of

Napoleon Bonaparte to the command of the French ” Army of Italy ” he became a commissary attached to that army. This part of his career is obscure and without importance. His fortunes rose rapidly on the attainment of the dignity of First Consul by his former charge, Napoleon, after the coup d’etat of Brumaire (November 1799). Thereafter, when the restoration of the Roman Catholic religion was in the mind of the First Consul, Fesch resumed his clerical vocation and took an active part in the complex negotiations which led to the signing of the Concordat with the Holy See on the 15th of July 1801. His reward came in the prize of the archbishopric of Lyons, on the duties of which he entered in August 1802. Six months later he received a still more signal reward for his past services, being raised to the dignity of cardinal.

In 1804 on the retirement of Cacault from the position of French ambassador at Rome, Fesch received that important appointment. He was assisted by Chateaubriand, but soon sharply differed with him on many questions. Towards the close of the year 1804 Napoleon entrusted to Fesch the difficult task of securing the presence of Pope Pius VII. at the forth- coming coronation of the emperor at Notre Dame, Paris (Dec. 2nd, 1804). His tact in overcoming the reluctance of the pope to be present at the coronation (it was only eight months after the execution of the due d’Enghien) received further recognition. He received the grand cordon of the Legion of Honour, became grand-almoner of the empire and had a seat in the French senate. He was to receive further honours. In 1806 one of the most influential of the German clerics, Karl von Dalberg, then prince bishop of Regensburg, chose him to be his coadjutor and designated him as his successor.

Events, however, now occurred which overclouded his pros- pects. In the course of the years 1 806-1 807 Napoieon came into sharp collision with the pope on various matters both political and religious. Fesch sought in vain to reconcile the two potentates. Napoleon was inexorable in his demands, and Pius VII. refused to give way where the discipline and

vital interests of the church seemed to be threatened. The emperor on several occasions sharply rebuked Fesch for what he thought to be weakness and ingratitude. It is clear, however, that the cardinal went as far as possible in counselling the submission of the spiritual to the civil power. For a time he was not on speaking terms with the pope;

and Napoleon re- called him from Rome.

Affairs came to a crisis in the year 1809, when Napoleon issued at Vienna the decree of the 17th of May, ordering the annexation of the papal states to the French empire. In that year Napoleon conferred on Fesch the archbishopric of Paris, but he refused the honour. He, however, consented to take part in an ecclesiastical commission formed by the emperor from among the dignitaries of the Gallican Church, but in 1810 the commission was dissolved. The hopes of Fesch with respect to Regensburg were also damped by an arrangement of the year 1810 whereby Regensburg was absorbed in Bavaria.

In the year 181 1 the emperor convoked a national council of Gallican clerics for the discussion of church affairs, and Fesch was appointed to preside over their deliberations. Here again, however, he failed to satisfy the inflexible emperor and was dismissed to his diocese. The friction between uncle and nephew became more acute in the following year. In June 1812, Pius VII. was brought from his first place of detention, Savona, to Fontainebleau, where he was kept under surveillance in the hope that he would give way in certain matters relating to the Concordat and in other clerical affairs. Fesch ventured to write to the aged pontiff a letter which came into the hands of the emperor. His anger against Fesch was such that he stopped the sum of 150,000 florins which had been accorded to him. The disasters of the years 1812-1813 brought Napoleon to treat Pius VII. with more lenity and the position of Fesch thus became for a time less difficult. On the first abdication of Napoleon (April nth, 1814) and the restoration of the Bour- bons, he, however, retired to Rome where he received a welcome. The events of the Hundred Days (March- June, 181 5) brought him back to France; he resumed his archiepiscopal duties at Lyons and was further named a member of the senate. On the second abdication of the emperor (June 22nd, 181 5) Fesch retired to Rome, where he spent the rest of his days in dignified ease, surrounded by numerous masterpieces of art, many of which he bequeathed to the city of Lyons. He died at Rome on the 13th of May 1839.

See J. B. Monseigneur Lyonnet, Le Cardinal Fesch (2 vols., Lyons, 1841); Ricard, Le Cardinal Fesch (Paris, 1893); H. Welschinger, Le Pape et Vempereur (Paris, 1905) ; F. Masson, Napoleon et sa famille (4 vols., Paris, 1 897-1900).

FESSA, a town and district of Persia in the province of Fars. The town is situated in a fertile plain in 29 N. and 90 m. frpm Shiraz, and has a

population of about 5000. The district has forty villages and extends about 40 m. north-south from Runiz to Nasslrabad and 16 m. east-west from Vasilabad to Deh Dasteh (Dastajah); it produces much grain, dates, tobacco, opium and good fruit.

FESSENDEN, WILLIAM PITT (1806-1869), American states- man and financier, was born in Boscawen, New Hampshire, on the 1 6th of October 1806. After graduating at Bowdoin College in 1823, he studied law, and in 1827 was admitted to the bar, eventually settling in Portland, Maine, where for two years he was associated in practice with his father, Samuel Fessenden (1784-1869), a prominent lawyer and anti-slavery leader. In 1832 and in 1840 Fessenden was a representative in the Maine legislature, and in 1841-1843 was a Whig member of the national House of Representatives. When his term in this capacity was over, he devoted himself unremittingly and with great success to the law. He became well known, also, as an eloquent advocate of slavery restriction. In 1 845-1 846 and 1853-1854 he again served in the state House of Representatives, and in 1854 was chosen by the combined votes of Whigs and Anti-Slavery Democrats to the United States Senate. Within a fortnight after taking his seat he delivered a speech in opposition to the Kansas-Nebraska Bill, which at once

made him a force in the congressional anti-slavery contest. From then on he was one of the most eloquent and frequent debaters among his colleagues, and in 1859, almost without oppositiqp, he was re-elected to the Senate as a member of the Republican party, in the organization of which he had taken an influential part. He was a delegate in 1861 to the Peace Congress, but after the actual outbreak of hostilities he insisted that the war should be prosecuted vigorously. As chairman of the Senate Committee on Finance, his services were second in value only to those of President Lincoln and Secretary Salmon P. Chase in efforts to provide funds for the defence of the Union; and in July 1864 Fessenden succeeded Chase as secretary of the treasury. The finances of the country in the early summer of 1864 were in a critical condition; a few days before leaving office Secretary Chase had been compelled to withdraw from the market $32,000,000 of 6% bonds, on account of the lack of acceptable bids; gold had reached 285 and was fluctuating between 225 and 250, while the value of the paper dollar had sunk as low as 34 cents. It was Secretary Fessenden's policy to avoid a further increase of the circulating medium, and to redeem or consolidate the temporary obligations outstanding. In spite of powerful pressure the paper currency was not increased a dollar during his tenure of the office. As the sales of bonds and treasury notes were not sufficient for the needs of the Treasury, interest-

bearing certificates of indebtedness were issued to cover the deficits; but when these began to depreciate the secretary, following the example of his predecessors, engaged the services of the Philadelphia banker Jay Cooke (q.v.) and secured the consent of Congress to raise the balance of the $400,000,000 loan authorized on the 30th of June 1864 by the sale of the so-called ” seven-thirty ” treasury notes (i.e. notes bearing interest at 7-3% payable in currency in three years or convertible at the option of the holder into 6% 5-20 year gold bonds). Through Cooke’s activities the sales became enormous; the notes, issued in denominations as low as $50, appealed to the patriotic impulses of the people who could not subscribe for bonds of a higher denomination. In the spring of 1865 Congress authorized an additional loan of $600,000,000 to be raised in the same manner, and for the first time in four years the Treasury was able to meet all its obligations. After thus securing ample funds for the enormous expenditures of the war, Fessenden resigned the treasury portfolio in March 1865, and again took his seat in the Senate, serving till his death. In the Senate he again became chairman of the finance committee, and also of the joint committee on reconstruction. He was the author of the report of this last committee (1866), in which the Congressional plan of reconstruction was set forth and which has been considered a state paper of remarkable power and cogency. He was not, however, entirely in accord with the more radical members of his own party, and this difference was exemplified in his opposition to the impeachment of President Johnson and subsequently in his voting for Johnson’s acquittal. He bore with calmness the storm of reproach from his party associates which followed, and lived to regain the esteem of those who had attacked him. He died at Portland, Maine, on the 6th of September 1869.

See Francis Fessenden, Life and Public Services of William Pitt Fessenden (2 vols., Boston, 1907).

FESSLER, IGNAZ AURELIUS (1 756-1839), Hungarian ecclesiastic, historian and freemason, was born on the 18th of May 1756 at the village of Zurany in the county of Moson. In 1773 he joined the order of Capuchins, and in 1779 was ordained priest. He had meanwhile continued his classical and philological studies, and his liberal views brought him into frequent conflict with his superiors. In 1784, while at the monastery of Modling, near Vienna, he wrote to the emperor Joseph II., making suggestions for the better education of the clergy and drawing his attention to the irregularities of the monasteries. The searching investigation which followed raised up against him many implacable enemies. In 1784 he was appointed professor of Oriental languages and hermeneutics in the university of Lemberg, when he

took the degree of doctor’

of divinity; and shortly afterwards he was released from his monastic Vows on the intervention of the emperor. In 1788 he brought out his tragedy of Sidney, an exposi of the tyranny of James II. and of the fanaticism of the papists in England. This was attacked so violently as profane and revolutionary that he was compelled to resign his office and seek refuge in Silesia. In Breslau he met with a cordial reception from G. W. Korn the publisher, and was, moreover, subsequently employed by the prince of Carolath-Schonaich as tutor to his sons. In 1791 Fessler was converted to Lutheranism and next year contracted an unhappy marriage, which was dissolved in 1802, when he married again. In 1796 he went to Berlin, where he founded a humanitarian society, and was commissioned by the free- masons of that city to assist Fichte in reforming the statutes and ritual of their lodge. He soon after this obtained a govern- ment appointment in connexion with the newly-acquired Polish provinces, but in consequence of the battle of Jena (1806) he lost this office, and remained in very needy circumstances until 1809, when he was summoned to St Petersburg by Alexander I., to fill the post of court councillor, and the professorship of oriental languages and philosophy at the Alexander-Nevski Academy. This office, however, he was soon obliged to resign, owing to his alleged atheistic tendencies, but he was subsequently nominated a member of the legislative commission. In 1815 he went with his family to Sarepta, where he joined the Moravian community and again became strongly orthodox. This cost him the loss of his salary, but it was restored to him in 181 7. In November 1820 he was appointed consistorial president of the evangelical communities at Saratov and subsequently became chief superintendent of the Lutheran communities in St Petersburg. Fessler’s numerous works are all written in German. In recognition of his important services to Hungary as a historian, he was in 1831 elected a corresponding member of the Hungarian Academy of Sciences. He died at St Petersburg on the 15th of December 1839.

Fessler was a voluminous writer, and during his life exercised great influence; but, with the possible exception of the history of Hungary, none of his books has any value now. He did not pretend to any critical treatment of his materials, and most of his historical works are practically historical novels. He did much, however, to make the study of history popular. His most important works are — Die Geschichten

der Ungarn und ihrer Landsassen (10 vols. Leipzig, 1815-1825); Marcus Aureliusd vols., Breslau, 1790-1792; 3rd edition, 4 vols., 1799); Aristides und Themistokles (2 vols., Berlin, 1792; 3rd edition, 1818); Altila, Konig der Hunnen (Breslau, 1794); Malhias Corvinus (2 vols., Breslau, 1793-1794); and Die drei grossen Konige der Hungarn aus dem Arpadischen Stamme (Breslau,

1808).

See Fessler's Riickblicke auf seine siebzigjdhrige Pilgerschaft (Breslau, 1824; 2nd edition, Leipzig, 1851).

FESTA, CONSTANZO (c. 1495-1545), Italian singer and musical composer, became a member of the Pontifical choir in Rome in 1517, and soon afterwards maestro at the Vatican. His motets and madrigals (the first book of which appeared in 1537) excited Dr Burney's warm praise in his History of Music; and, among other church music, his Te Deum (published in 1 596) is still sung at important services in Rome. His madrigal, called in English " Down in a flow'ry vale," is well known.

FESTINIOG (or Ffestiniog), a town of Merionethshire, North Wales, at the head of the Festiniog valley, 600 ft. above the sea, in the midst of rugged scenery, near the stream Dwyryd, 31 m. from Conway. Pop. of urban district (1901), 11,435. There are many large slate quarries in this parish, especially at Blaenau Festiniog, the junction of three railways, London & North Western, Great Western and Festiniog, a narrow-gauge line between Portmadoc and Duffws. This light railway runs at a considerable elevation (some 700 ft.), commanding a view across the valley and lake of Tan y Bwlch, Lord Lyttelton's letter to Mr Bower is a well-known panegyric on Festiniog. Thousands of workmen are employed in the slate quarries. The Cynfael falls are famous. Near are Beddau gwyr Ardudwy

(the graves of the men of Ardudwy), memorials of a fight to recover women of the Clwyd valley from the men of Ardudwy. Near, too, is a rock named " Hugh Lloyd's pulpit " (Lloyd lived in the time of Charles I., Cromwell and Charles II.).

FESTOON (from Fr. feston, Ital. festone, from a Late Lat. festo, originally a " festal garland," Lat. festum, feast), a wreath or garland, and so in architecture a conventional arrangement of flowers, foliage or fruit bound together and suspended by ribbons, either from a decorated knot, or held in the mouths of lions, or suspended across the back of bulls' heads as in the Temple of Vesta at Tivoli. The "motif" is

sometimes known as a “swag.” It was largely employed both by the Greeks and Romans and formed the principal decoration of altars, friezes and panels. The ends of the ribbons are sometimes formed into bows or twisted curves; when in addition a group of foliage or flowers is suspended it is called a ” drop.” Its origin is probably due to the representation in stone of the garlands of natural flowers, &c, which were hung up over an entrance doorway on f£te days, or suspended round the altar.

FESTUS (? Ruftjs or Rufius), one of the Roman writers of breviaria (epitomes of Roman history). The reference to the defeat of the Goths at Noviodunum (a.d. 369) by the emperor Valens, and the fact that the author is unaware of the constitution of Valentia as a province (which took place in the same year) are sufficient indication to fix the date of composition. Mommsen identifies the author with Rufius Festus, proconsul of Achaea (366), and both with Rufius Festus Avienus (q.v.), the translator of Aratus. But the absence of the name Rufius in the best MSS. is against this. Others take him to be Festus of Tridentum, magister memoriae (secretary) to Valens and proconsul of Asia, where he was sent to punish those implicated in the conspiracy of Theodorus, a commission which he executed with such merciless severity that his name became a byword. The work itself (Breviarium rerum gestarum populi Romani) is divided into two parts — -one geographical, the other historical. The chief authorities used are Livy, Eutropius and Florus. It is extremely meagre, but the fact that the last part is based on the writer’s personal recollections makes it of some value for the history of the 4th century.

Editions by W. Forster (Vienna, 1873) and C. Wagener (Prague, 1886) ; see also R. Jacobi, De Festi breviarii fontibus (Bonn, 1874), and H. Peter, Die geschichtliche Litt. iiber die rbmische Kaiserzeit ii. p. 133 (1897), where the epitomes of Festus, Aurelius Victor and Eutropius are compared.

FESTUS, SEXTUS POMPEIUS, Roman grammarian, probably flourished in the 2nd century a.d. He made an epitome of the celebrated work De verborum sighificatu, a valuable treatise alphabetically arranged, written by M. Verrius Flaccus, a freedman and celebrated grammarian who flourished in the reign of Augustus. Festus gives the etymology as well as the meaning of every word; and his work throws considerable light on the language, mythology and antiquities of ancient Rome. He made a few alterations, and inserted some critical remarks of his own. He also omitted such ancient Latin words as had long been obsolete ; these he discussed in a separate work now lost, entitled Priscorum verborum cum exemplis. Of

Flaccus's work only a few fragments remain, and of Festus's epitome only one original copy is in existence. This MS., the Codex Festi Farnesianus at Naples, only contains the second half of the work (M- V) and that not in a perfect condition. It has been published in facsimile by Thewrewk de Ponor (1890). At the close of the 8th century Paulus Diaconus abridged the abridgment. From his work and the solitary copy of the original attempts have been made with the aid of conjecture to reconstruct the treatise of Festus.

Of the early editions the best are those of J. Scaliger (1565) and Fulvius Ursinus (1581) ; in modern times, those of C. O. Miiller (1839, reprinted 1880) and de Ponor (1889); see J. E. Sandys, History of Classical Scholarship, vol. i. (1906).

FETIS, FRANCOIS JOSEPH (1784-1871), Belgian composer and writer on music, was born at Mons in Belgium on the 25th of March 1784, and was trained as a musician by his father, who followed the same calling. His talent for composition manifested

itself at the age of seven, and at nine years old he was an organist at Sainte-Waudru. In 1800 he went to Paris and completed his studies at the conservatoire under such masters as Boieldieu, Rey and Pradher. In 1806 he undertook the revision of the Roman liturgical chants in the hope of discovering and estab- lishing their original form. In this year he married the grand- daughter of the Chevalier de Keralio, and also began his Biographie universelle des musiciens, the most important of his works, which did not appear until 1834. In 1821 he was appointed professor at the conservatoire. In 1827 he founded the Revae mtisicale, the first serious paper in France devoted exclusively to musical matters. Fetis remained in the French capital till in 1833, at the request of Leopold I., he became director of the conservatoire of Brussels and the king's chapel- master. He also was the founder, and, till his death, the con- ductor of the celebrated concerts attached to the conservatoire of Brussels, and he inaugurated a free series of lectures on musical history and philosophy. He produced a large quantity of original compositions, from the opera and the oratorio down to the simple chanson.- But all these are doomed to oblivion. Although not without traces of scholarship and technical ability, they show total absence of genius. More important are his writings on music. They are partly historical, such as the Curiosites historiques de la musique (Paris, 1850), and the Histoire universelle de musique

(Paris, 1869-1876); partly theoretical, such as the Mtthode des methodes de piano (Paris, 1837), written in conjunction with Moscheles. Fetis died at Brussels on the 26th of March 1871. His valuable library was purchased by the Belgian government and presented to the Brussels con- servatoire. His work as a musical historian was prodigious in quantity, and, in spite of many inaccuracies and some pre- judice revealed in it, there can be no question as to its value for the student.

FETISHISM, an ill-defined term, used in many different senses: (a) the worship of inanimate objects, often regarded as peculiarly African; (b) negro religion in general; (c) the worship of inanimate objects conceived as the residence of spirits not inseparably bound up with, nor originally connected with, such objects; (d) the doctrine of spirits embodied in, or attached to, or conveying influence through, certain material objects (Tylor); (e) the use of charms, which are not worshipped, but derive their magical power from a god or spirit; (/) the use as charms of objects regarded as magically potent in themselves. A further extension is given by some writers, who use the term as synonymous with the religions of primitive peoples, including under it not only the worship of inanimate objects, such as the sun, moon or stars, but even such phases of primitive philosophy as totemism. Comte applied the term to denominate the view of nature more commonly termed animism.

Derivation. — The word fetish (or fetich) was first used in connexion with Africa by the Portuguese discoverers of the last half of the 15th century; relics of saints, rosaries and images were then abundant all over Europe and were regarded as possessing magical virtue; they were termed by the Portuguese feiticos (i.e. charms). Early voyagers to West Africa applied this term to the wooden figures, stones, &c, regarded as the temporary residence of gods or spirits, and to charms. There is no reason to suppose that the word feitico was applied either to an animal or to the local spirit of a river, hill or forest. Feitico is sometimes interpreted to mean artificial, made by man, but the original sense is more probably ” magically active or artful.” The word was probably brought into general use by C. de Brosses, author of Du culte des dieux fetiches (1760), but it is frequently used by W. Bosman in his Description of Guinea (1705), in the sense of ” the false god, Bossum” or ” Bohsum,” properly a tutelary deity of an individual.

Definition. — The term fetish is commonly understood to mean the worship of or respect for material, inanimate objects, con- ceived as magically active from a virtue inherent in them, temporarily or permanently, which does not arise from the fact that a god or spirit is

believed to reside in them or communicate virtue to them. Taken in this sense fetishism is probably a

mark of decadence. There is no evidence of any such belief in Africa or elsewhere among primitive peoples. It is only after a certain grade of culture has been attained that the belief in luck appears; the fetish is essentially a mascot or object carried for luck.

Ordinary Usage. — In the sense in which Dr Tylor uses the term the fetish is (1) a ” god-house ” or (2) a charm derived from a tutelary deity or spirit, and magically active in virtue of its association with such deity or spirit. In the first of these senses the word is applied to objects ranging from the unworked stone to the pot or the wooden figure, and is thus hardly distinguishable from idolatry, (a) The bohsum or tutelary deity of a particular section of the community is derived from the local gods through the priests by the performance of a certain series of rites. The priest indicates into what object the bohsum will enter and proceeds to the abode of the local god to procure the object in question. After making an offering the object is carried to an appropriate spot and a ” fetish ” tree set up as a shade for it, which is sacred so long as the bohsum remains beneath it. The fall of the tree is believed to mark the departure of the spirit. A bohsum may also be procured through a dream; but in this case, too, it is necessary to apply to the priest to decide whether the dream was veridical, (ft) The suhman or tutelary deity of an individual is not an object selected at random to be the residence of the spirit. It is only procurable at the residence of a Sasabonsum, a malicious non-human being. Various ceremonies are performed, and a spirit connected with the •Sasabonsum is finally asked to enter an object. This is then kept for three days; if no good fortune results it is concluded either that the spirit did not enter the object selected, or that it is disinclined to extend its protection. In either case the ceremonies must be commenced afresh. Otherwise offerings and even human sacrifices in exceptional cases are made to the suhman. It is commonly believed that the negro claims the power of coercing his tutelary deity. This is denied by Colonel Ellis. It is certain that coercion of deities is not unknown, but further evidence is required that the negro uses it when his deity is refractory.

The suhman can, it is believed, communicate a part of his powers to various objects in which he does not dwell; these are also termed suhman by the natives and may have given rise to the belief that the practices commonly termed fetishism are not animistic. These charms are many in number; offerings of food and drink are made, i.e. to the portion of the power of the suhman which resides in them. These

charms can only be made by the possessor of the suhman.

On the Guinea Coast the spirit implanted in the object is usually, if not invariably, non-human. Farther south on the Congo the ” fetish ” is inhabited by human souls also. The priest goes into the forest and cuts an image; when a party enters a wood for this purpose they may not mention the name of any living being unless they wish him to die and his soul to enter the fetish. The right person having been selected, his name is mentioned; and he is believed to die within ten days, his soul passing into the nkissi. It is into these figures that the nails are driven, in order to procure the vengeance of the indwelling spirit on some enemy.

In many cases the fetish spirit is believed to leave the ” god. house ” and pass for the time being into the body of the priest, who manifests the phenomena of possession (q.v.). It is a common error to suppose that the whole of African religion is embraced in the practices connected with these tutelary deities; so far from this being the case, belief in higher gods, not neces- sarily accompanied with worship or propitiation, is common in many parts of Africa, and there is no reason to suppose that it had been derived in every case, perhaps not in any case, from Christian or Mahommedan missionaries.

See A. B. Ellis, Tshi-speaking Peoples, chs. vii., viii. and xii.; Waitz, Anthropologic der Naturvblker, ii. 174; R. E. Dennett in Folklore, vol. xvi. ; R. H. Nassau, Fetichism in West Africa (1904); also Tylor, Primitive Culture, ii. 143, and M. H. Kingsley, West African Studies (2nd ed., 1901), where the term is used in a more extended sense. (N. W. T.)

FETTERCAIRN, a burgh of barony of Kincardineshire, Scotland, \ m. N.W. of Laurencekirk. Pop. of parish (1901) 1390. The chief structures include a public hall, library and reading-room, and the arch built to commemorate the visit of Queen Victoria in 1861. The most interesting relic, however, is the market cross, which originally belonged to the extinct town of Kincardine. To the S.W. is Balbegno Castle, dating from 1509, and planned on a scale that threatened to ruin its projector. It contains a lofty hall of fine proportions. Two miles N. is Fasque, the estate of the Gladstones, which was acquired in 1831 by Sir John Gladstone (1764-1851), the father of W. E. Gladstone. The castle, which stands in beautiful grounds, was built in

1809. Sir John Gladstone's tomb is in the Episcopal church of St Andrew, which he erected and endowed. In the immediate vicinity are the ruins of the royal castle of Kincardine, where, according to tradition, Kenneth III. was assassinated in 1005, although he is more generally said to have been slain in battle at Monzievaird, near Crieff in Perthshire.

FETTERS AND HANDCUFFS, instruments for securing the feet and hands of prisoners under arrest, or as a means of punish- ment. The old names were manacles, shackbolts or shackles, gyves and swivels. Until within recent times handcuffs were of two kinds, the figure-8 ones which confined the hands close together either in front or behind the prisoner, or the rings from the wrists were connected by a short chain much on the model of the handcuffs in use by the police forces of to-day. Much improvement h as been made in handcuffs of late. They are much lighter and they are adjustable, fitting any wrist, and thus the one pair will serve a police officer for any prisoner. For the removal of gangs of convicts an arrangement of handcuffs con- nected by a light chain is used, the chain running through a ring on each fetter and made fast at both ends by what are known as end-locks. Several recently invented appliances are used as handcuffs, e.g. snaps, nippers, twisters. They differ from handcuffs in being intended for one wrist only, the other portion being held by the captor. In the snap the smaller circlet is snapped to on the prisoner's wrist. The nippers can be instantly fastened on the wrist. The twister, not now used in England as being liable to injure prisoners seriously, is a chain attached to two handles; the chain is put round the wrist and the two handles twisted till the chain is tight enough.

Leg-irons are anklets of steel connected by light chains long enough to permit of the wearer walking with short steps. An obsolete form was an anklet and chain to the end of which was attached a heavy weight, usually a round shot. The Spanish used to secure prisoners in bilboes, shackles round the ankles secured by a long bar of iron. This form of leg-iron was adopted in England, and was much employed in the services during the 17th and 18th centuries. An ancient example is preserved in the Tower of London. The French marine still use a kind of leg-iron of the bilbo type.

FEU, in Scotland, the commonest mode of land tenure. The word is the Scots variant of "fee" (q.v.). The relics of the feudal system still dominate Scots conveyancing. That system has recognized as many as seven forms of tenure— ward, socage, mortification, feu, blench, burgage, booking. Ward, the original military holding, was abolished in 1747 (20 G. II. c. 20), as an effect of the rising of 1745- Socage and

mortification have long since disappeared. Booking is a conveyance peculiar to the borough of Paisley, but does not differ essentially from feu. Burgage is the system by which land is held in royal boroughs. Blench holding is by a nominal payment, as of a penny Scots, or a red rose, often only to be rendered upon demand. In feu holding there is a substantial annual payment in money or in kind in return for the enjoyment of the land. The crown is the first overlord or superior, and land is held of it by crown vassals, but they in their turn may ” feu ” their land, as it is called, to others who become their vassals, whilst they themselves are mediate overlords or superiors; and this process of subinfeuda- tion may be repeated to an indefinite extent. The Conveyancing Act of 1874 renders any clause in a disposition against sub- infeudation null and void. In England on the other hand, since

1290, when the statute Quia Emptor es was passed, subinfeuda- tion is impossible, as the new holder simply effaces the grantor, holding by the same title as the grantor himself. Casualties, which are a feature of land held in feu, are certain payments made to the superior, contingent on the happening of certain events. The most important was the payment of an amount equal to one year’s feu-duty by a new holder, whether heir or purchaser of the feu. The Conveyancing Act of 1874 abolished casualties in all feus after that date, and power was given to redeem this burden on feus already existing. If the vassal does not pay the feu-duty for two years, the superior, among other remedies, may obtain by legal process a decree of irritancy, whereupon tinsel or forfeiture of the feu follows. Previously to 1832 only the vassals of the crown had votes in parliamentary elections for the Scots counties, and this made in favour of sub- infeudation as against sale outright. In Orkney and Shetland land is still largely possessed as udal property, a holding derived or handed down from the time when these islands belonged to Norway. Such lands may be converted into feus at the will of the proprietor and held from the crown or Lord Dundas. At one time the system of conveyancing by which the transfer of feus was effected was curious and complicated, requiring the presence of parties on the land itself and the symbolical handing over of the property, together with the registration of various documents. But legislation since the middle of the 19th century has changed all that. The system of feuing in Scotland, as contrasted with that of long leaseholds in England, has tended to secure greater solidity and firmness in the average buildings of the northern country.

See Erskine's Principles; Bell's Principles; Rankine, Law of Landowner ship in Scotland.

FEUCHERES, SOPHIE, Baronne de (1795-1840), Anglo- French adventuress, was born at St Helens, Isle of Wight, in 1795, the daughter of a drunken fisherman named Dawes. She grew up in the workhouse, went up to London as a servant, and became the mistress of the due de Bourbon, afterwards prince de Conde. She was ambitious, and he had her well educated not only in modern languages but, as her exercise books — still extant — show, in Greek and Latin. He took her to Paris and, to prevent scandal and to qualify her to be received at court, had her married in 1818 to Adrien Victor de Feucheres, a major in the Royal Guards. The prince provided her dowry, made her husband his aide-de-camp and a baron. The baroness, pretty and clever, became a person of consequence at the court of Louis XVIII. De Feucheres, however, finally discovered the relations between his wife and Conde, whom he had been assured was her father, left her — he obtained a legal separation in 1827 — and told the king, who thereupon forbade her appear- ance at court. Thanks to her influence, however, Conde was induced in 1829 to sign a will bequeathing about ten million francs to her, and the rest of his estate — more than sixty-six millions — to the due d'Aumale, fourth son of Louis Philippe. Again she was in high favour. Charles X. received her at court, Talleyrand visited her, her niece married a marquis and her nephew was made a baron. Conde, wearied by his mistress's importunities, and but half pleased by the advances made him by the government of July, had made up his mind to leave France secretly. When on the 27th of August 1830 he was found hanging dead from his window, the baroness was suspected and an inquiry was held, but the evidence of death being the result of any crime appearing insufficient, she was not prosecuted. Hated as she was alike by legitimatists and republicans, life in Paris was no longer agreeable for her, and she returned to London, where she died in December 1840.

FEUCHTERSLEBEN, ERNST, Freiherr von (1806-1849), Austrian physician, poet and philosopher, was born in Vienna on the 29th of April 1806; of an old Saxon noble family. He attended the " Theresian Academy " in his native city, and in 1825 entered its university as a student of medicine. In 1833 he obtained the degree of doctor of medicine, settled in Vienna as a practising surgeon, and in 1834 married. The young doctor kept up his connexion with the university, where he lectured, and

in 1844 was appointed dean of the faculty of medicine. He cultivated the acquaintance of Franz Grillparzer, Heinrich Laube, and other intellectual lights of the Viennese world, interested himself greatly in educational matters, and in 1848, while refusing the presidency of the ministry of education, accepted the appointment of under secretary of state in that department. His health, however, gave way, and he died at Vienna on the 3rd of September 1849. H e was n °t only a clever physician, but a poet of fine aesthetical taste and a philosopher. Among his medical works may be mentioned: Uber das Hippokratische erste Buck von der Diat (Vienna, 1835), Arzte und Publicum (Vienna, 1848) and Lehrbuch der arztlichen Seelenkunde (1845). His poetical works include Gedichte (Stutt. 1836), among which is the well-known beautiful hymn, which Mendelssohn set to music. ” Es ist bestimmt in Gottes Rat.” As a philosopher he is best known by his Zur Didtetik der Seele [Dietetics of the soul] (Vienna, 1838), which attained great popularity, and the tendency of which, in contrast to Hufeland’s Makrobiotik (On the Art of Prolonging Life), is to show the true way of rendering life harmonious and lovely. This work had by 1906 gone into fifty editions. Noteworthy also is his Beitrdge zur Litteratur-, Kunst- und Lebenstheorie (Vienna, 1837-1841), and an anthology, Geist der deutschen Klassiker (Vienna, 185 1; 3rd ed. 1865-1866).

His collected works (with the exception of the purely medical ones) were published in 7 vols, by Fr. Hebbel (Vienna, 1851-1853). See M. Necker, ” Ernst von Feuchtersleben, der Freund Grillparzers, ” in the Jahrbuch der Grillparzer Gesellschaft, vol. iii. (Vienna, 1893).

FEUD, animosity, hatred, especially a permanent condition of hostilities between persons, and hence applied to a state of private warfare between tribes, clans or families, a ” vendetta.” The word appears in Mid. Eng. as fede, which came through the O. Fr. from the O. High Ger. fehida, modern Fehde. The 0. Teutonic faiho, an adjective, the source of fehida, gives the O. Eng. fdh, foe. ” Fiend,” originally an enemy (cf. Ger. Feind), hence the enemy of mankind, the devil, and so any evil spirit, is probably connected with the same source. The word fede was of Scottish usage, but in the 16th century took the iormfoode,fewd in English. The New English Dictionary points out that ” feud, fee (Lat. feudum) could not have influenced the change, for it appears fifty years later than the first instances of foode, &c, and was only used by writers on feudalism.” For the etymology of

” feud ” (feudum) see Fee, and for its history see Feudalism.

FEUDALISM (from Late Lat. feodum or feudum, a fee or fiel; see Fee). In every case of institutional growth in history two things are to be clearly distinguished from the beginning for a correct understanding of the process and its results. One of these is the change of conditions in the political or social environment which made growth necessary. The other is the already existing institutions which began to be transformed to meet the new needs. In studying the origin and growth of political feudalism, the distinction is easy to make. The all-prevailing need of the later Roman and early medieval society was protection — protection against the sudden attacks of invading tribes or revolted peasants, against oppressive neigh- bours, against the unwarranted demands of government officers, or even against the legal but too heavy exactions of the govern- ment itself. In the days of the decaying empire and of the chaotic German settlement, the weak freeman, the small land- owner, was exposed to attack in almost every relation of life and on every side. The protection which normally it is the business of government to furnish he could no longer obtain. He must seek protection elsewhere wherever he could get it, and pay the price demanded for it. This is the great social fact — the failure of government to perform one of its most primary duties, the necessity of finding some substitute in private life — extending in greater or less degree through the whole formative period of feudalism, which explains the transformation of institutions that brought it into existence. Similar conditions have produced an organization which may be called feudal, in various countries, and in widely separated periods of history. While these different feudal systems have shown a general

similarity of organization, there has been also great variation in their details, because they have started from different institu- tions and developed in different ways. The feudal system with which history most concerns itself is that of medieval western Europe, and it is that which will be here described.

The institutions which the need of protection seized upon when it first began to turn away from the state were twofold. They had both long existed in the private, not public, relations of the Romans, and they had up to this time rMns shown no tendency to grow. One of them related to the person, to the man himself, without reference to property, the other related to land. There are thus distinguished at the beginning those two great sides of feudalism which remained to the end of its history more or less distinct, the personal relation and the land relation. The personal institution needs little description. It was

the Roman patron and client relationship which had remained in existence into the days of the empire, in later times less important perhaps legally than socially, and which had been reinforced in Gaul by very similar practices in use among the Celts before their conquest. The description of this institution which has come down to us from Roman sources of the days when feudalism was beginning is not so detailed as we could wish, but we can see plainly enough that it met a frequent need, that it was called by a new name, the patrocinium, and that it was firmly enough entrenched in usage to survive the German conquest, and to be taken up and continued by the conquerors. In its new use, alike in the later Roman and the early German state, the landless freeman who could not support himself went to some powerful man, stated his need, and offered his services, those proper to a freeman, in return for shelter and support. This transaction, which was called commendation, gave rise in the German state to a written contract which related the facts and provided a penalty for its violation. It created a relationship of protection and support on one side, and of free service on the other.

The other institution, relating to land, was that known to the Roman law as the precarium, a name derived from one of its essential features through all its history, the prayer of the suppliant by which the relationship was begun. The precarium was a form of renting land not intended primarily for income, but for use when the lease was made from friendship for example, or as a reward, or to secure a debt. Legally its characteristic feature was that the lessee had no right of any kind against the grantor. The owner could call in his land and terminate the relation at any time, for any reason, or for none at all. Even a definite understanding at the outset that the lease might be enjoyed to a specified date was no protection. 1 It followed of course that the heir had no right in the land which his father held in this way, nor was the heir of the donor bound by his father's act. The legal character of this transaction is summed up in a well-known passage in the Digest : — Interdictum de precariis merito introductum est, quia nulla eo nomine juris chilis actio esset, magis enim ad donationes et beneficii causam, quam ad negotii contracti special precarii conditio. 2 This may be para- phrased as follows:' — The precarium tenant may employ the interdict against a third party, because he cannot use the ordinary civil action, his holding being not a matter of business but rather of favour and kindness. It should be noted that from its very beginning the land relationship of feudalism was not created primarily for the grantor's income, but that it emphasized in the most striking way his continued ownership.

As used for protection in later Roman days the precarium gave rise to

what was called the commendation of lands, patro- cinium fundorum. The poor landowner, likely to lose all that he had from one kind of oppression or another, went to the great landowner, his neighbour, whose position gave him immunity from attack or the power to prevent official abuses, and begged to be protected. The rich man answered, I can only protect my own. Of necessity the poor man must surrender to his powerful neighbour the ownership of his lands, which he then received back as a precarium — gaining protection during his lifetime 1 Digest, xliii. 26. 12. 2 Ibid, xliii. 26. 14, and cf. 17.

at the cost of his children, who were left without legal claim and compelled to make the best terms they could. 1 Applied to this use the precarium found extensive employment in the last age of the empire. The government looked on the practice with great disfavour, because it transferred large areas from the easy access of the state to an ownership beyond its reach. The laws repeatedly forbade it under increasing penalties, but clearly it could not be stopped. The motive was too strong on both sides — the need of protection on one side, the natural desire to increase large possessions and means of self-defence on the other. These practices the Frankish conquerors of Gaul found in full possession of society when they entered into that province.

They seem to have understood them at once, and, like Frankish muc h e [se Roman, to have made them their own with- meat. ou t material change. The patrocinium they were made

ready to understand by the existence of a somewhat similar institution among themselves, the comitatus, described by Tacitus. In this institution the chief of the tribe, or of some plainly marked division of the tribe, gathered about himself a band of chosen warriors, who formed a kind of private military force and body-guard. The special features of the institution were the strong tie of faith and service which bound the man, the support and rewards given by the lord, and the pride of both in the relationship. The patrocinium might well seem to the German only a form of the comitatus, but it was a form which presented certain advantages in his actual situation. The chief of these was perhaps the fact that it was not confined to king or tribal chief, but that every noble was able in the Roman practice to surround himself with his organized private army. Probably this fact, together with the more general fact of the absorption in most things of the German in the Roman, accounts for the substitution of the

patrocinium for the comitatus which took place under the Merovingians.

This change did not occur, however, without some modification of the Roman customs. The comitatus made contributions of its own to future feudalism, to some extent to its institutional side, largely to the ideas and spirit which ruled in it. Probably the ceremony which grew into feudal homage, and the oath'of fealty, certainly the honourable position of the vassal and his pride in the relationship, the strong tie which bound lord and man together, and the idea that faith and service were due on both sides in equal measure, we may trace to German sources. But we must not forget that the origin of the vassal relationship, as an institution, is to be found on Roman and not on German soil. The comitatus developed and modified, it did not originate. Nor was the feudal system established in any sense by the settle- ment of the comitatus group on the conquered land. The uniting of the personal and the land sides of feudalism came long after the conquest, and in a different way.

To the precarium German institutions offered no close parallel. The advantages, however, which it afforded were obvious, and this side of feudalism developed as rapidly after the conquest as the personal. The new German noble was as eager to extend the size of his lands and to increase the numbers of his dependants as the Roman had been. The new German government furnished no better protection from local violence, nor was it able any more effectively to check the practices which were creating feudalism; indeed for a long time it made no attempt to do so. Precarium and patrocinium easily passed from the Roman empire to the Frankish kingdom, and became as firmly rooted in the new society as they had ever been in the old. Up to this point we have seen only the small landowner and the landless man enter- ing into these relations. Feudalism could not be established, however, until the great of the land had adopted them for themselves, and had begun to enter the clientage of others and to hold lands by the precarium tenure. The first step towards this result was easily and quickly taken. The same class con- tinued to furnish the king's men, and to form his household and body-guard whether the relation was that of the patrocinium or the comitatus, and to be made noble by entering into it. It was later that they became clients of one another, and in part at

] Salvian, Di g«6. Dei, v. 8, ed. Halm, p. 62.

least as a result of their adoption of the precarium tenure. In this latter step the influence of the Church rather than of the king seems to have

been effective. The large estates which pious intentions had bestowed on the Church it was not allowed to alienate. It could most easily make them useful to gain the influence and support which it needed, and to provide for the public functions which fell to its share, by employing the pre- carium tenure. On the other side, the great men coveted the wide estates of bishop and abbot, and were ready without persuasion to annex portions of them to their own on the easy terms of this tenure, not always indeed observed by the holder, or able to be enforced by the Church. The employment of the precarium by the Church seems to have been one of the surest means by which this form of landholding was carried over from the Romans to the Frankish period and developed into new forms. It came to be made by degrees the subject of written contract, by which the rights of the holder were more definitely defined and protected than had been the case in Roman law. The length of time for which the holding should last came to be specified, at first for a term of years and then for life, and some payment to the grantor was provided for, not pretending to represent the economic value of the land, but only to serve as a mark of his continued ownership.

These changes characterize the Merovingian age of Frankish history. That period had practically ended, however, before these two institutions showed any tendency to join together as they were joined in later feudalism. Nor had the king up to that time exerted any apparent influence on the processes that were going forward. Grants of land of the Merovingian kings had carried with them ownership and not a limited right, and the king's patrocinium had not widened in extent in the direction of the later vassal relation. It was the advent of the Carolingian princes and the difficulties which they had to over- come that carried these institutions a stage further forward. Making their way up from a position among the nobility to be the rulers of the land, and finally to supplant the kings, the Carolingians had especial need of resources from which to purchase and reward faithful support. This need was greatly in- creased when the Arab attack on southern Gaul forced them to transform a large part of the old Frankish foot army into cavalry. 2 The fundamental principle of the Frankish military system, that the man served at his own expense, was still unchanged. It had indeed begun to break down under the strain of frequent and distant campaigns, but it was long before it was changed as the recognized rule of medieval service. If now, in addition to his own expenses, the soldier must provide a horse and its keeping, the system was likely to break down altogether. It was this problem which led to the next step. To solve it the early Carolingian princes, especially Charles Martel, who found the royal domains exhausted and

their own inadequate, grasped at the land of the Church. Here was enough to endow an army, if some means could be devised to permit its use. This means was found in the precarium tenure. Keeping alive, as it did, the fact of the grantor's ownership, it did not in form deprive the Church of the land. Recognizing that ownership by a small payment only, not corresponding to the value of the land, it left the larger part of the income to meet the need which had arisen. At the same time undoubtedly the new holder of the land, if not already the vassal of the prince, was obliged to become so and to assume an obligation of service with a mounted force when called upon. 3 This expedient seems to have solved the problem. It gave rise to the numerous precariae verbo regis, of the Church records, and to the condemnation of Charles Martel in the visions of the clergy to worse difficulties in the future life than he had overcome in this. The most important consequences of the expedient, however, were not intended or perceived at the time. It brought together the two sides of feudalism, vassalage and benefice, as they were now commonly called, and from this age their union into what is really a single

2 H. Brunncr, Zeitschr. der sav. Stift. jiir RechtsgeschiclUe, Germ. Abth. viii. 1-38 (1887). Also in his Porschungcn, 39-74 (iSoi).

3 Sec F. Dahn, Kvnige der Cermanen, viii. 2, 00 ff

institution was rapid; 1 it emphasized military service as an essential obligation of the vassal; and it spread the vassal relation between individual proprietors and the sovereign widely- over the state.

In the period that followed, the reign of Charlemagne and the later Carolingian age, continued necessities, military and civil, forced the kings to recognize these new institutions more fully, even when standing in a position between the government and the subject, intercepting the public duties of the latter. The incipient feudal baron had not been slow to take advantage of the break-down of the old German military system. As in the last days of the Roman empire the poor landowner had found his only refuge from the exactions of the government in the protection of the senator, who could in some way obtain exemp- tions, so the poor Frank could escape the ruinous demands of military service only by submitting himself and his lands to the count, who did not hesitate on his side to force such submission. Charlemagne legislated with vigour against this tendency,

trying to make it easier for the poor freeman to fulfil his military duties directly to the state, and to forbid the misuse of power by the rich, but he was not more successful than the Roman government had been in a like attempt. Finally the king found himself compelled to recognize existing facts, to lay upon the lord the duty of producing his men in the field and to allow him to appear as their commander. This solved the difficulty of military service apparently, but with decisive consequences. Itcompleted the transformation of the army into a vassal army; it com- pleted the recognition of feudalism by the state, as a legitimate relation between different ranks of the people; and it recognized the transformation in a great number of cases of a public duty into a private obligation.

In the meantime another institution had grown up in this Franco-Roman society, which probably began and certainly assisted in another transformation of the same kind. This is the immunity. Suggested probably by Roman practices, possibly developed directly from them, it received a great extension in the Merovingian period, at first and especially in the interest of the Church, but soon of lay land-holders. By the grant of an immunity to a proprietor the royal officers, the count and his representatives, were forbidden to enter his lands to exercise any public function there. The duties which the count should perform passed to the proprietor, who now represented the government for all his tenants free and unfree. Apparently no modification of the royal rights was intended by this arrangement, but the beginning of a great change had really been made. The king might still receive the same revenues and the same services from the district held by the lord as formerly, but for their payment a private person in his capacity as overlord was now responsible. In the course of a long period characterized by a weak central government, it was not difficult to enlarge the rights which the lord thus obtained, to exclude even the king's personal authority from the immunity, and to translate the duties and payments which the tenant had once owed to the state into obligations which he owed to his lord, even finally into incidents of his tenure. The most important public function whose transformation into a private possession was assisted by the growth of the immunity was the judicial. This process had probably already begun in a small way in the growth of institutions which belong to the economic side of feudalism, the organization of agriculture on the great estates. Even in Roman days the proprietor had exercised a jurisdiction over the disputes of his unfree tenants. Whether this could by its own growth have been extended over his free tenants and carried so far as to absorb a local court, like that of the hundred, into private possession, is not certain. It seems probable that it could. But

in any case, the immunity easily carried the development of private jurisdiction through these stages. The lord's court took the place of the public court in civil, and even by degrees in criminal cases. The plaintiff, even if he were under another lord, was obliged to sue in the court of the defendant's lord, and the portion of the fine 1 F. Dahn, Konige der Germanen, viii. 2, 197. s

for a breach of the peace which should have gone to the state went in the end to the lord.

The transfer of the judicial process, and of the financial and administrative sides of the government as well, into private possession, was not, however, accomplished entirely by the road of the immunity. As government weakened after the strong days of Charlemagne, and disorder, invasion, and the difficulty of intercommunication tended to throw the locality more and more upon its own resources, the officer who had once been the means of centralization, the count, found success in the effort for independence which even Charlemagne had scarcely overcome. He was able to throw off responsibility to any central authority, and to exercise the powers which had been committed to him as an agent of the king, as if they were his own private possession. Nor was the king's aid lacking to this method of dividing up the royal authority, any more than to the immunity, for it became a frequent practice to make the administrative office into a fief, and to grant it to be held in that form of property by the count. In this way the feudal county, or duchy, formed itself, corresponding in most cases only roughly to the old administra- tive divisions of the state, for within the bounds of the county there had often formed private feudal possessions too powerful to be forced into dependence upon the count, sometimes the vice-comes had followed the count's example, and often, on the other hand, the count had attached to his county like private possessions of his own lying outside its boundaries. In time the private lord, who had never been an officer of the state, assumed the old administrative titles and called himself count or viscount, and perhaps with some sort of right, for his position in his territories, through the development of the immunity, did not differ from that now held by the man who had been originally a count.

In these two ways then the feudal system was formed, and took possession of the state territorially, and of its functions in government. Its earliest stage of growth was that of the private possession only. Under a government too weak to preserve order, the great landowner formed his estate into a little territory which could defend itself. His smaller neighbours who needed protection came to him for it. He

forced them to become his dependants in return under a great variety of forms, but especially developing thereby the precarium land tenure and the patrocinium personal service, and organizing a private jurisdiction over his tenants, and a private army for defence. Finally he secUred from the king an immunity which excluded the royal officers from his lands and made him a quasi-representative of the state. In the meantime his neighbour the count had been following a similar process, and in addition he had enjoyed considerable advantages of his own. His right to exact military, financial and judicial duties for the state he had used to force men to become his dependants, and then he had stood between them and the state, freeing them from burdens which he threw with increased weight upon those who still stood outside his personal protection. In ignorance of their danger, and later in despair of getting public services adequately performed in any other way, the kings first adopted for themselves some of the forms and practices which had thus grown up, and by degrees recog- nized them as legally proper for all classes. It proved to be easier to hold the lord responsible for the public duties of all his dependants because he was the king's vassal and by attaching them as conditions to the benefices which he held, than to enforce them directly upon every subject.

When this stage was reached the formative age of feudalism may be considered at an end. When the government of the state had entered into feudalism, and the king was as much senior as king; when the vassal relationship was recognized as a proper and legal foundation of public duties; when the two separate sides of early feudalism were united as the almost universal rule, so that a man received a fief because he owed a vassal's duties, or looked at in the other and finally prevailing way, that he owed a vassal's duties because he had received a fief; and finally, when the old idea of the temporary character of the precarium tenure was lost sight of, and the right of the

vassal's heir to receive his father's holding was recognized as the general rule — then the feudal system may be called full grown. Not that the age of growth was really over. Feudal history was always a becoming, always a gradual passing from one stage to another, so long as feudalism continued to form the main organization of society. But we may say that the formative age was over when these features of the system had combined to be its characteristic marks. What follows is rather a perfection of details in the direction of logical

completeness. To assign any specific date to the end of this formative age is of course impossible, but meaning by the end what has just been stated, we shall not be far wrong if we place it somewhere near the beginning of the ioth century.

Before we leave the history of feudal origins another word is necessary. We have traced a definite line of descent for feudal institutions from Roman days through the Merovingian and Carolingian ages to the ioth century. That line of descent can be made out with convincing clearness and with no particular difficulty from epoch to epoch, from the precarium and the patrocinium, through the benefice and commendation, to the fief and vassalage. But the definiteness of this line should not cause us to overlook the fact that there was during these centuries much confusion of custom and practice. All round and about this line of descent there was a crowd of varying forms branching off more or less widely from the main stem, different kinds of commendation, different forms of precarium, some of which varied greatly from that through which the fief descends, and some of which survived in much the old character and under the old name for a long time after later feudalism was definitely established. 1 The variety and seeming confusion which reign in feudal society, under uniform controlling principles, rule also in the ages of beginning. It is easy to lose one's bearings by over-emphasizing the importance of variation and exception. It is indeed true that what was the exception, the temporary offshoot, might have become the main line. It would then have produced a system which would have been feudal, in the wide sense of the term; but it would have been marked by different characteristics, it would have operated in a somewhat different way. The crowd of varying forms should not prevent us from seeing that we can trace through their confusion the line along which the characteristic traits and institutions of European feudalism, as it actually was, were growing constantly more distinct. 2 That is the line of the origin of the feudal system. (See also France: Law and Institutions.)

The growth which we have traced took place within the Frankish empire. When we turn to Anglo-Saxon England we

find a different situation and a different result. There England? precarium and patrocinium were lacking. Certain

forms of personal commendation did develop, certain forms of dependent land tenure came into use. These do not show, however, the characteristic marks of the actual line of feudal descent. They belong rather in the varying forms around that line. Scholars are not

yet agreed as to what would have been their result if their natural development had not been cut off by the violent introduction of Frankish feudalism with the Norman conquest, whether the historical feudal system, or a feudal system in the general sense. To the writer it seems clear that the latter is the most that can be asserted. They were forms which may rightly be called feudal, but only in the wider meaning in which we speak of the feudalism of Japan, or of Central Africa, not in the sense of 12th-century European feudalism; Saxon commendation may rightly be called vassalage, but only as looking back to the early Frankish use of the term for many varying forms of practice, not as looking forward to the later and more definite usage of completed feudalism; and such use of the terms feudal and vassalage is sure to be misleading. It is better to say that European feudalism is not to be found in England before the Conquest, not even in its beginnings. If

1 G. Waitz, Deutsche Verfassungsgeschichte, vi. 112 ff. (1896). Most fully described in G. Seeliger, Diesoziale u. politische Bedeutung d. Grundherrschaft im friiheren Mittelalter (1903).

4 F. Dahn, Konige, viii. 2, 89-90; 95.

these had really been in existence it would require no argument to show the fact. There is no trace of the distinctive marks of Frankish feudalism in Saxon England, not where military service may be thought to rest upon the land, nor even in the rare cases where the tenant seems to some to be made responsible for it, for between these cases as they are described in the original accounts, legally interpreted, and the feudal conception of the vassal's military service, there is a great gulf.

In turning from the origin of feudalism to a description of the completed system one is inevitably reminded of the words with which de Quincey opens the second part of his essay on style. He says: " It is a natural resource that Tne whatsoever we find it difficult to investigate as a C °^ em , result, we endeavour to follow as a growth. Failing analytically to probe its nature, historically we seek relief to our perplexities by tracing its origin. . . . Thus for instance when any feudal institution (be it Gothic, Norman, or Anglo-Saxon) eludes our deciphering faculty from the imperfect records of its use and operation, then we endeavour conjecturally to amend our knowledge by watching the circumstances in which that institution arose." The temptation to use the larger part of any space allotted to the history of feudalism for a discussion of origins does not arise alone from greater interest in that phase of the subject. It is almost impossible even with

the most dis- criminating care to give a brief account of completed feudalism and convey no wrong impression. We use the term ” feudal system ” for convenience sake, but with a degree of impropriety if it conveys the meaning ” systematic.” Feudalism in its most flourishing age was anything but systematic. It was contusion roughly organized. Great diversity prevailed everywhere, and we should not be surprised to find some different fact or custom in every lordship. Anglo-Norman feudalism attained a logical completeness and a uniformity of practice which, in the feudal age proper, can hardly be found elsewhere through so large a territory; but in Anglo-Norman feudalism the exception holds perhaps as large a place as the regular, and the uniformity itself was due to the most serious of exceptions from the feudal point of view — centralization under a powerful monarchy.

But too great emphasis upon variation conveys also a wrong impression. Underlying all the apparent confusion of fact and practice were certain fundamental principles and relationships, which were alike everywhere, and which really gave shape to everything that was feudal, no matter what its form might be. The chief of these are the following: the relation of vassal and lord; the principle that every holder of land is a tenant and not an owner, until the highest rank is reached, sometimes even the conception rules in that rank; that the tenure by which a thing of value is held is one of honourable service, not intended to be economic, but moral and political in character; the principle of mutual obligations of loyalty, protection and service binding together all the ranks of this society from the highest to the lowest; and the principle of contract between lord and tenant, as determining all rights, controlling their modification, and forming the foundation of all law. There was actually in fact and practice a larger uniformity than this short list implies, because these principles tended to express themselves in similar forms, and because historical derivation from a common source in Frankish feudalism tended to preserve some degree of uni- formity in the more important usages.

The foundation of the feudal relationship proper was the fief, v/hich was usually land, but might be any desirable thing, as an office, a revenue in money or kind, the right to collect a toll, or operate a mill. In return for the fief, the man became the vassal of his lord; he knelt before him, and, with his hands between his lord’s hands, promised him fealty and service; he rose to his feet and took the oath of fealty which bound him to the obligations he had assumed in homage; he received from his lord ceremonial investiture with the fief. The faithful performance of all the duties he had assumed in homage con- stituted the vassal’s right and title to his fief. So long as they were fulfilled, he, and his heir after him, held the fief as his property,

practically and in relation to all under tenants as if

he were the owner. In the ceremony of homage and investiture, which is the creative contract of feudalism, the obligations assumed by the two parties were, as a rule, not specified in exact terms. They were determined by local custom. What they were, however, was as well known, as capable of poof, and as adequate a check on innovation by either party, as if committed to writing. In many points of detail the vassal's services differed widely in different parts of the feudal world. We may say, however, that they fall into two classes, general and specific. The general included all that might come under the idea of loyalty, seeking the lord's interests, keeping his secrets, betraying the plans of his enemies, protecting his family, &c. The specific services are capable of more definite statement, and they usually received exact definition in custom and some- times in written documents. The most characteristic of these was the military service, which included appearance in the field on summons with a certain force, often armed in a specified way, and remaining a specified length of time. It often included also the duty of guarding the lord's castle, and of holding one's own castle subject to the plans of the lord for the defence of his fief. Hardly less characteristic was court service, which included the duty of helping to form the court on summons, of taking one's own cases to that court instead of to some other, and of submitting to its judgments. The duty of giving the lord advice was often demanded and fulfilled in sessions of the court, and in these feudal courts the obligations of lord and vassal were enforced, with an ultimate appeal to war. Under this head may be enumerated also the financial duties of the vassal, though these were not regarded by the feudal law as of the nature of the tenure, i.e. failure to pay them did not lead to confiscation, but they were collected by suit and distraint like any debt. They did not have their origin in economic considerations, but were either intended to mark the vassal's tenant relation, like the relief, or to be a part of his service, like the aid, that is, he was held to come to the aid of his lord in a case of financial as of military necessity. The relief was a sum paid by the heir for the lord's recognition of his succession. The aids were paid on a few occasions, determined by custom, where the lord was put to unusual expense, as for his ransom when captured by the enemy, or for the knighting of his eldest son. There was great variety regarding the occasion and amount of these payments, and in some parts of the feudal world they did not exist at all. The most lucrative of the lord's rights were

wardship and marriage, but the feudal theory of these also was non-economic. The fief fell into the hands of the lord, and he enjoyed its revenues during the minority of the heir, because the minor could not perform the duties by which it was held. The heiress must marry as the lord wished, because he had a right to know that the holder of the fief could meet the obligations resting upon it. Both wardship and marriage were, however, valuable rights which the lord could exercise himself or sell to others. These were by no means the only rights and duties which could be described as existing in feudalism, but they are the most char- acteristic, and on them, or some of them, as a foundation, the whole structure of feudal obligation was built, however detailed. Ideally regarded, feudalism covered Europe with a network of these fiefs, rising in graded ranks one above the other from the smallest, the knight's fee, at the bottom, to the king at the top, who was the supreme landowner, or who held the kingdom from God. Actually not even in the most regular of feudal countries, like England or Germany, was there any fixed grada- tion of rank, titles or size. A knight might hold directly of the king, a count of a viscount, a bishop of an abbot, or the king himself of one of his own vassals, or eveˆ of a vassal's vassal, and in return his vassal's vassal might hold another fief directly of him. The case of the count of Champagne, one of the peers of France, is a famous example. His great territory was held only in small part of the king of France. He held a portion of a foreign sovereign, the emperor, and other portions of the duke of Burgundy, of two archbishops, of four bishops, and of the abbot of St Denis. Frequently did great lay lords, as in this case, hold lands by feudal tenure of ecclesiastics.

It is now possible perhaps to get some idea of the way in which the government of a feudal country was operated. The early German governments whose chief functions, military, judicial, financial, legislative, were carried on by the freemen of the nation because they were members of the body politic, and were per- formed as duties owed to the community for its defence and sustenance, no longer existed. New forms of organization had arisen in which indeed these conceptions had not entirely disappeared, but in which the vast majority of cases a wholly different idea of the ground of service and obligation prevailed. Superficially, for example, the feudal court differed but little from its Teutonic predecessor. It was still an assembly court. Its procedure was almost the same as the earlier. It often included the same classes of men. Saxon Witenagemot and Norman Curia regis seem very much alike. But the members of the feudal court met, not to fulfil a duty owed to the com- munity, but a private obligation which they had assumed in return for the fiefs they

held, and in the history of institutions it is differences of this sort which are the determining principles. The feudal state was one in which, as it has been said, private law had usurped the place of public law. Public duty had become private obligation. To understand the feudal state it is essential to make clear to one's mind that all sorts of services, which men ordinarily owe to the public or to one another, were translated into a form of rent paid for the use of land, and defined and enforced by a private contract. In every feudal country, however, something of the earlier conception survived. A general military levy was occasionally made. Something like taxation occasionally occurred, though the government was usually sustained by the scanty feudal payments, by the proceeds of justice and by the income of domain manors. About the office of king more of this earlier conception gathered than elsewhere in the state, and gradually grew, aided not merely by traditional ideas, but by the active influence of the Bible, and soon of the Roman law. The kingship formed the nucleus of new governments as the feudal system passed away.

Actual government in the feudal age was primitive and un-differentiated. Its chief and almost only organ, for kingdom and barony alike, was the curia — a court formed of the vassals. This acted at once and without any consciousness of difference of function, as judiciary, as legislature, in so far as there was any in the feudal period, and as council, and it exercised final supervision and control over revenue and administration. Alrfiost all the institutions of modern states go back to the curia regis, branching off from it at different dates as the growing complexity of business forced differentiation of function and personnel. In action it was an assembly court, deciding all questions by discussion and the weight of opinion, though its decisions obtained their legal validity by the formal pronuncia- tion of the presiding member, i.e. of the lord whose court it was. It can readily be seen that in a government of this kind the essential operative element was the baron. So long as the government remained dependent on the baron, it remained feudal in its character. When conditions so changed that govern- ment could free itself from its dependence on the baron, feudalism disappeared as the organization of society; when a professional class arose to form the judiciary, when the increased circulation of money made regular taxation possible and enabled the govern- ment to buy military and other services, and when better means of intercommunication and the growth of common ideas made a wide centralization possible and likely to be permanent. Feudalism had performed a great service, during an age of disintegration, by maintaining a general framework

of govern- ment, while allowing the locality to protect and care for itself. When the function of protection and local supervision could be resumed by the general government the feudal age ended. In nearly all the states of Europe this end was reached during, or by the close of, the 13th century.

At the moment, however, when feudalism was disappearing as the organization of society, it gave rise to results which in a sense continued it into after ages and even to our own day. One of these results was the system of law which it created.

As feudalism passed from its age of supremacy into its age of decline, its customs tended to crystallize into fixed forms. At the same time a class of men arose interested in Decline these forms for their own sake, professional lawyers survivals. or Judges, who wrote down for their own and others' use the feudal usages with which they were familiar. The great age of these codes was the 13th century, and especially the second half of it. The codes in their turn tended still further to harden these usages into fixed forms, and we may date from the end of the 13th century an age of feudal law regulating especially the holding and transfer of land, and much more uniform in character than the law of the feudal age proper. This was particularly the case in parts of France and Germany where feudalism continued to regulate the property relations of lords and vassals longer than elsewhere, and where the under- lying economic feudalism remained in large part unchanged. In this later pseudo-feudalism, however, the political had given way to the economic, and customs which had once had no economic significance came to have that only.

Feudalism formed the starting-point also of the later social nobilities of Europe. They drew from it their titles and ranks and many of their regulative ideas, though these were formed into more definite and regular systems than ever existed in feudalism proper. It was often the policy of kings to increase the social privileges and legal exemptions of the nobility while taking away all political power, so that it is necessary in the history of institutions to distinguish sharply between these nobilities and the feudal baronage proper. It is only in certain backward parts of Europe that the terms feudal and baronage in any technical sense can be used of the nobility of the 15th century. (G. B. A.)

Bibliography. — For more detailed information the reader is referred to the articles English Law; France: French Law and Institutions, Villenage; Manor; Scutage; Knight Service; Hide. For a general sketch of Feudalism the chapters in tome ii. of the Histoire generate of Lavisse and Rambaud should be consulted. Other general works are J. T. Abdy, Feudalism (1890); Paul Roth, Feudalitdt und Unterlhanverband (Weimar, 1863)..; and Geschichte des Beneficialwesens (1850) ; M. M. Kovalevsky, Okono- mische Entwickelung Europas (1902); E. de Laveleye, De la pro- priety et de ses formes primitives (1891) ; and The Origin of Property in Land, a translation by M. Ashley from the works of N. D. Fustel de Coulanges, with an introductory chapter by Professor W. J. Ashley. Two other works of value are Sir H. S. Maine, Village Communities in the East and West (-1876) ; and Leon Gautier, La Chevalerie (Paris, 1884; Eng. trans, by Henry Frith, Chivalry, London, 1891).

For feudalism in England see the various constitutional histories, especially W. Stubbs, Constitutional History of England, vol. i. (ed. 1897). Very valuable also are the writings of Mr J. H. Round, of Professor F. W. Maitland and of Professor P. Vinogradoff. Among Round's works may be mentioned Feudal England (1895); Geoffrey de Mandeville (1892) ; and Studies on the Red Book of the Exchequer (1898). Maitland's Domesday Book and Beyond (Cambridge, 1897) is indispensable; and the same remark applies to his History of English Law before the time of Edward I. (Cambridge, 1895), written in conjunction with Sir Frederick Pollock. Vinogradoff has illumin- ated the subject in his Villainage inEngland (1892) and his English Society in the nth century (1908). See also J. F. Baldwin, The Scutage and Knight Service in England (Chicago, 1897) ; Rudolf Gneist, Adel und Ritterschaft in England (1853) ; and F. Seebohm, The English Village Community (1883).

For feudalism in France see N. D. Fustel de Coulanges, Histoire des institutions politiques de I'ancienne France (Les Origines du systeme feodal, 1890; Les Transformations de la royaute pendant Vepoque carolingienne, 1892) ; A. Luchaire, Histoire des institutions monar- chiques de la France sous les premiers Capetiens, 987-1180 (2nd ed., 1890) ; and Manuel des institutions francaises: periode des Capetiens directs (1892); J. Flach, Les Origines de I'ancienne France (1886-1893) ; Paul Viollet, Droit public: Histoires des institutions politiques et administrates de la France (1890-1898); and Henri See, Les classes r urates et le regime domanial (1901).

For Germany see G. Waitz, Deutsche Verfassungsgeschichte (Kiel and Berlin, 1844 foil.) ; H. Brunner, Grundziige der deutschen

Rechtsgeschichte (Leipzig, 1901) ; V. Menzel, Die Entstehung des Lebenswesens (Berlin, 1890) ; and G. L. von Maurer's works on the early institutions of the Germans.

FEUERBACH, ANSELM (1820-1880), German painter, born at Spires, the son of a well-known archaeologist, was the leading classicist painter of the German 19th-century school. He was the first to realize the danger arising from contempt of technique, that mastery of craftsmanship was needed to express even the

loftiest ideas, and that an ill-drawn coloured cartoon can never be the supreme achievement in art. After having passed through the art schools of Dusseldorf and Munich, he went to Antwerp and subsequently to Paris, where he benefited by the teaching of Couture, and produced his first masterpiece, " Hafiz at ths- Fountain " in 1852. He subsequently worked at Karlsruhe. Venice (where he fell under the spell of the greatest school of colourists), Rome and Vienna. He was steeped in classic knowledge, and his figure compositions have the statuesque dignity and simplicity of Greek art. Disappointed with the reception given in Vienna to his design of " The Fall of Uie Titans " for the ceiling of the Museum of Modelling, he went to live in Venice, where he died in 1880. His works are to be found at the leading public galleries of Germany; Stuttgart has his "Iphigenia"; Karlsruhe, the "Dante at Ravenna"; Munich, the " Medea "; and Berlin, " The Concert," his last important picture. Among his chief works are also " The Battle of the Amazons," " Pieta," " The Symposium of Plato," " Orpheus and Eurydice " and " Ariosto in the Park of Ferrara."

FEUERBACH, LUDWIG ANDREAS (1804-1872), German philosopher, fourth son of the eminent jurist (see below) , was born at Landshut in Bavaria on the 28th of July 1804. He matricu- lated at Heidelberg with the intention of pursuing an ecclesiastical career. Through the influence of Prof. Daub he was led to an interest in the then predominant philosophy of Hegel and, in spite of his father's opposition, went to Berlin to study under- the master himself. After two years' discipleship the Hegelian influence began to slacken. " Theology," he wrote to a friend, " I can bring myself to study no more. I long to take nature to my heart, that nature before whose depth the faint-hearted theologian shrinks back; and with nature man, man in his entire quality." These words are a key to Feuerbach's develop- ment. He completed his education at Erlangen with the study of natural science. His first book, published anonymously, Gedanken iiber Tod und Unsterblichkeit (1830, 3rd ed. 1876), contains an attack upon personal immortality and an advocacy of the Spinozistic immortality of reabsorption in nature. These principles, combined

with his embarrassed manner of public speaking, debarred him from academic advancement. After some years of struggling, during which he published his Geschichte der neueren Philosophie (2 vols., 1833-1837, 2nd ed. 1844), and Abalard und Heloise (1834, 3rd ed. 1877), he married in 1837 and lived a rural existence at Bruckberg near Nuremberg, supported by his wife's share in a small porcelain factory. In two works of this period, Pierre Bayle (1838) and Philosophie und Christentum (1839), which deal largely with theology, he held that he had proved " that Christianity has in fact long vanished not only from the reason but from the life of mankind, that it is nothing more than a fixed idea " in flagrant contra- diction to the distinctive features of contemporary civilization. This attack is followed up in his most important work, Das Wesen des Christentums (1841), which was translated intc English (The Essence of Religion, by George Eliot, 1853, 2nd ed. 1881), French and Russian. Its aim may be described shortly as an effort to humanize theology. He lays it down that man, so far as he is rational, is to himself his own object of thought. Religion is consciousness of the infinite. Religion therefore is " nothing else than the consciousness of the infinity of the consciousness; or, in the consciousness of the infinite, the conscious subject has for his object the infinity of his own nature." Thus God is nothing else than man: he is, so to speak, the outward projection of man's inward nature. In part 1 of his book he develops what he calls the " true or anthropological essence of religion." • Treating of God in his various aspects " as a being of the understanding," " as a moral being or law," " as love " and so on, Feuerbach shows that in every aspect God corresponds to some feature or need of human nature. " If man is to find contentment in God, he must find himself in God." In part 2 he discusses the " false or theological essence of religion," i.e. the view which regards God as having a separate existence over against man. Hence arise various mistaken beliefs, such as the belief in revelation which not only injures the moral

sence, but also " poisons, nay destroys, the divinest feeling in man, the sense of truth," and the belief in sacraments such as the Lord's Supper, a piece of religious materialism of which " the necessary consequences are superstition and immorality." In spite of many admirable qualities both of style and matter the Essence of Christianity has never made much impression upon British thought. To treat the actual forms of religion as expressions of our various human needs is a fruitful idea which deserves fuller development than it has yet received; but

Feuerbach's treatment of it is fatally vitiated by his sub- jectivism. Feuerbach denied that he was rightly called an atheist, but the denial is merely verbal: what he calls " theism " is atheism in the ordinary sense. Feuerbach labours under the same difficulty as Fichte; both thinkers strive in vain to re- concile the religious consciousness with subjectivism.

During the troubles of 1 848-1 849 Feuerbach's attack upon orthodoxy made him something of a hero with the revolutionary party; but he never threw himself into the political movement, and indeed had not the qualities of a popular leader. During the period of the diet of Frankfort he had given public lectures on religion at Heidelberg. When the diet closed he withdrew to Bruckberg and occupied himself partly with scientific study, partly with the composition of his Theogonie (1857). In i860 he was compelled by the failure of the porcelain factory to leave Bruckberg, and he would have suffered the extremity of want but for the assistance of friends supplemented by a public subscription. His last book, Gottheit, Freiheit und Unsterblichkeit, appeared in 1866 (2nd ed., 1890). After a long period of decay he died on the 13th of September 1872.

Feuerbach's influence has been greatest upon the anti- Christian theologians such as D. F. Strauss, the author of the Leben Jesu, and Bruno Bauer, who like Feuerbach himself had passed over from Hegelianism to a form of naturalism. But many of his ideas were taken up by those who, like Arnold Ruge, had entered into the struggle between church and state in Germany, and those who, like F. Engels and Karl Marx, were leaders in the revolt of labour against the power of capital. His work was too deliberately unsystematic ("keine Philosophie ist meine Philosophie ") ever to make him a power in philosophy. He expressed in an eager, disjointed, but condensed and laboured fashion, certain deep-lying convictions — that philosophy must come back from unsubstantial metaphysics to the solid facts of human nature and natural science, that the human body was no less important than the human spirit (" Der Mensch ist was er isst ") and that Christianity was utterly out of harmony with the age. His convictions gained weight from the simplicity, upright- ness and diligence of his character; but they need a more effective justification than he was able to give them.

His works appeared in 10 vols. (Leipzig, 1846-1866) ; his corre- spondence has been edited with an indifferent biography by Karl Grim (1874). See A. Levy, La Philosophie de Feuerbach (1904); M. Merer, L. Feuerbach's' ' Moralphilosophie (Berlin, 1899); E. v. Hartmann, Geschichte d. Metaphysik (Leipzig, 1899-1900), ii. 437- 444: F.

Engels, L. Feuerbach und d. Ausgangd. class, deutsch. Philos. (2nd ed., 1895). (H. St.)

FEUERBACH, PAUL JOHANN ANSELM, Ritter von (1775- 1833), German jurist and writer on criminal law, was born at Hainichen near Jena on the 14th of November 1775. He received his early education at Frankfort on Main, whither his family had removed soon after his birth. At the age of sixteen, however, he ran away from home, and, going to Jena, was helped by relations there to study at the university. In spite of poor health and the most desperate poverty, he made rapid progress. He attended the lectures of Karl Leonhard Reinhold and Gottlieb Hufeland, and soon published some literary essays of more than ordinary merit. In 1795 he took the degree of doctor in philosophy, and in the same year, though he only possessed 150 thalers (£22 : 10s.), he married. It was this step which led him to success and fame, by forcing him to turn from his favourite studies of philosophy and history to that of law, which was repugnant to him, but which offered a prospect of more rapid advancement. His success in this new and uncongenial sphere was soon assured. In 1796 he published Kritik des natfirlichcn

Rechts ah Propddeutik zu einer Wissenschaft der natiirlichen Reekie, which was followed, in 1 798, by Anti-Hobbes, oder iiber die Grenzen der biirgerlichen Gewalt, a dissertation on the limits of the civil power and the right of resistance on the part of subjects against their rulers, and by Philosophische, juristische Unter- suchungen iiber das Verbrechen des Hochverraths. In 1799 he obtained the degree of doctor of laws. Feuerbach, as the founder of a new theory of penal law, the so-called ” psychological- coercive or intimidation theory,” occupied a prominent place in the history of criminal science. His views, which he first made known in his Revision der GrundsStze und Grundbegriffe des posiliven peinlichen Rechts (1799), were further elucidated and expounded in the Bibliothek fur die peinliche Rechlswissenschaft (1800-1801), an encyclopaedic work produced in conjunction with Karl L. W. G. Grolmann andLudwigHarschervon Almendingen, and in his famous Lehrbuch des gemeinen in Deutschland gellenden peinlichen Rechts (1801). These works were a powerful protest against vindictive punishment, and did much towards the reformation of the German criminal law. The Carolina (the penal code of the emperor Charles V.) had long since ceased to be respected. What in 1532 was an inestimable blessing, as a check upon the arbitrariness and violence of the effete German pro- cedure, had in the course of time outlived its usefulness and become a source of evils similar to those it was enacted to combat. It availed nothing that, at the commencement of the 18th century, a freer and more scientific

spirit had been breathed into Roman law; it failed to reach the criminal law. The administration of justice was, before Feuerbach's time, especi- ally distinguished by two characteristics: the superiority of the judge to all law, and the blending of the judicial and executive offices, with the result that the individual was practically at the mercy of his prosecutors. This state of things Feuerbach set himself to reform, and using as his chief weapon the Revision der Grundbegriffe above referred to, was successful in his task. His achievement in the struggle may be summed up as: nullum crimen, nulla poena sine lege (no wrong and no punishment without a remedy). In 1801 Feuerbach was appointed extra- ordinary professor of law without salary, at the university of Jena, and in the following year accepted a chair at Kiel, where he remained two years. In 1804 he removed to the university of Landshut; but on being commanded by King- Maximilian Joseph to draft a penal code for Bavaria (Strafgesetzbuch fur das Kbnigreich Bayern), he removed in 1805 to Munich, where he was given a high appointment in the ministry of justice and was ennobled in 1808. Meanwhile the practical reform of penal legislation in Bavaria was begun under his influence in 1806 by the abolition of torture. In 1808 appeared the first volume of his Merkwiirdige Criminalfalle, completed in 181 1 — a work of deep interest for its application of psychological considerations to cases of crime, and intended to illustrate the inevitable imperfection of human laws in their application to individuals. In his Betrach- tungen iiber das Geschworenengericht (181 1) Feuerbach declared against trial by jury, maintaining that the verdict of a jury was not adequate legal proof of a crime. Much controversy was aroused on the subject, and the author's view was subsequently to some extent modified. The result of his labours was promul- gated in 1813 as the Bavarian penal code. The influence of this code, the embodiment of Feuerbach's enlightened views, was immense. It was at once made the basis for new codes in Wiirttemberg and Saxe- Weimar; it was adopted in its entirety in the grand-duchy of Oldenburg; and it was translated into Swedish by order of the king. Several of the Swiss cantons reformed their codes in conformity with it. Feuerbach had also undertaken ˆo prepare a civil code for Bavaria, to be founded on the Code ISiapoleon. This was afterwards set aside, and the Codex Maximilianus adopted as a basis. But the project did not become law. During the war of liberation (1813-1814) Feuerbach showed himself an ardent patriot, and published several political brochures which, from the writer's position, had almost the weight of state manifestoes. One of these is entitled Vber deutsche Freiheit und Vertretvng dcutsche Volker dutch Land- slandc (1814). In 1814 Feuerbach was appointed second presi-

dent of the court of appeal at Bamberg, and three years later he became first president of the court of appeal at Anspach. In 1 82 1 he was deputed by the government to visit France, Belgium, and the Rhine provinces for the purpose of investigat- ing their juridical institutions. As the fruit of this visit, he published his treatises Betrachtungen iiber OJfentlichkeit und Mundigkeit der Gerechtigkeitspflege (1821) and Uber die Gerichts- verfassung und das gerichtliche Verfahren Frankreichs (1825). In these he pleaded unconditionally for publicity in all legal pro- ceedings. In his later years he took a deep interest in the fate of the strange foundling Kaspar Hauser (q.v.), which had excited so much attention in Europe; and he was the first to publish a critical summary of the ascertained facts, under the title of Kaspar Hauser, ein Beispiel eines Verbrechens am Seelenleben (1832). Shortly before his death appeared a collection of his Kleine Schriften (1833). Feuerbach, still in the full enjoyment of his intellectual powers, died suddenly at Frankfort, while on his way to the baths of Schwalbach, on the 29th of May 1833. In 1853 was published the Leben und Wirken Ans. von Feuerbachs, 2 vols., consisting of a selection of his letters and journals, with occasional notes by his fourth son Ludwig, the distinguished philosopher.

See also, for an estimate of Feuerbach's life and work, Mar- quardtsen, in Allgemeine deutsche Biographic, vol. vi. ; and an " in memoriam " notice in Dis allgemeine Zeitung (Augsburg), 15th Nov. 1875, by Professor Dr Karl Binding of Leipzig University.

FEUILLANTS, CLUB OF THE, a political association which played a prominent part during the French Revolution. It was founded on the 16th of July 1791 by several members of the Jacobin Club, who refused to sign a petition presented by this body, demanding the deposition of Louis XVI. Among the dissident members were B. Barere and E. J. Sieves., who were later joined by other politicians, among them being Dupont de Nemours. The name of Feuillants was popularly given to this group of men, because they met in the fine buildings which had been occupied by the religious order bearing this name, in the rue Saint-Honore, near the Place Venddme, in Paris. The members of the club preserved the title of Amis de la Constitution, as being a sufficient indication of the line they intended to pursue. This con- sisted in opposing everything not contained in the Constitution; in their opinion, the latter was in need of no modification, and they hated alike all those who were opposed to it, whether emigres or

Jacobins; they affected to avoid all political discussion, and called themselves merely a ” conservative assembly.”

This attitude they maintained after the Constituent Assembly had been succeeded by the Legislative, but not many of the new deputies became members of the club. With the rapid growth of extreme democratic ideas the Feuillants soon began to be looked upon as reactionaries, and to be classed with ” aristocrats.” They did, indeed, represent the aristocracy of wealth, for they had to pay a subscription of four louis, a large sum at that time, besides six livres for attendance. Moreover, the luxury with which they surrounded themselves, and the restaurant which they had annexed to their club, seemed to mock the misery of the half-starved proletariat, and added to the suspicion with which they were viewed, especially after the popular triumphs of the 20th of June and the 10th of August 1792 (see French Revolution). A few days after the insurrection of the 10th of August, the papers of the Feuillants were seized, and a list was published containing the names of 841 members proclaimed as suspects. This was the death-blow of the club. It had made an attempt, though a weak one, to oppose the forward march of the Revolution, but, unlike the Jacobins, had never sent out branches into the provinces. The name of Feuillants, as a party designa- tion, survived the club. It was applied to those wl j advocated a policy of ” cowardly moderation,” and feuillantisme was associated with aristocratie in the mouths of the sansculottes.

The act of separation of the Feuillants from the Jacobins was published in a pamphlet dated the 16th of July 1791, beginning with the words, Les Membres de I’assemblee nationale . . . (Peris, 1791). The statutes of the club were also published in Paris. See also A. Aulard, Histoire politique de la Revolution francaise (Paris, 1903), 2nd ed., p. 153.

FEUILLET, OCTAVE (1821-1890), French novelist and dramatist, was born at Saint-L6, Manche, on the nth of August 1821. He was the son of a Norman gentleman of learning and distinction, who would have played a great part in politics ” sans ses diabies de nerfs,” as Guizot said. This nervous excitability was inherited, though not to the same excess, by Octave, whose mother died in his infancy and left him to the care of the hyper- sensitive invalid. The boy was sent to the lycee Louis-le Grand, in Paris, where he achieved high distinction, and was destined for the diplomatic service. In 1840 he appeared before his father at Saint-L6, and announced that he had determined to adopt the profession of literature. There was a stormy scene, and the elder Feuillet cut off his son, who returned to Paris and lived as best he

could by a scanty journalism. In company with Paul Bocage he began to write for the stage, and not without success; at all events, he continued to exist until, three years after the quarrel, his father consented to forgive him. Enjoying a liberal allowance, he now lived in Paris in comfort and independence, and he published his early novels, none of which is quite of sufficient value to retain the modern reader. The health and spirits of the elder M. Feuillet, however, having still further declined, he summoned his son to leave Paris and bury himself as his constant attendant in the melancholy chateau at Saint-L6. This was to demand a great sacrifice, but Octave Feuillet cheer- fully obeyed the summons. In 1851 he married his cousin, Mile Valerie Feuillet, who helped him to endure the mournful captivity to which his filial duty bound him. Strangely enough, in this exile — rendered still more irksome by his father's mania for solitude and by his tyrannical temper — the genius of Octave Feuillet developed. His first definite success was gained in the year 1852, when he published the novel Bellah and produced the comedy La Crise. Both were reprinted from the Revue des deux mondes, where many of his later novels also appeared. He wrote books which have long held their place,, La Petite Comiesse (1857), Dalila (1857), and in particular that universal favourite, Le Roman d'un jeune homme pauvre (1858). He himself fell into a nervous state in his " prison," but he was sustained by the devotion and intelligence of his wife and her mother. In 1857, having been persuaded to make a play of the novel of Dalila, he brought out this piece at the Vaudeville, and enjoyed a brilliant success; on this occasion he positively broke through the consigns and went up to Paris to see his play rehearsed. His father bore the shock of his temporary absence, and the following year Octave ventured to make the same experiment on occasion of the performance of Un Jeune Homme pauvre. To his infinite chagrin, during this brief absence his father died. Octave was now, however, free, and the family immediately moved to Paris, where they took part in the splendid social existence of the Second Empire. The elegant and distinguished young novelist became a favourite at court; his pieces were performed at Compiegne before they were given to the public, and on one occasion the empress Eugenie deigned to play the part of Mme de Pons in Les Portraits de la Marquise. Feuillet did not abandon the novel, and in 1862 he achieved a great success with Sibylle. His health, however, had by this time begun to decline, affected by the sad death of his eldest son. He determined to quit Paris, where the life was far too exciting for his nerves, and to regain the quietude of Normandy. The old chateau of the family had been sold, but he bought a house called "Les Paillers " in the suburbs of Saint-L6, and there he lived, buried in his roses, for fifteen years. He was elected to

the French Academy in 1862, and in 1868 he was made librarian of Fontainebleau palace, where he had to reside for a month or two in each year. In 1867 he produced his masterpiece of Monsieur de Camors, and in 1872 he wrote Julia de Trecceur, which is hardly less admirable. His last years, after the sale of ” Les Paillers,” were passed in a ceaseless wandering, the result of the agitation of his nerves. He was broken by sorrow and by ill-health, and when he passed away in Paris on the 29th of December 1890, his death was a release. His last book was Honneur d’ artiste (1890). Among the too-numerous writings of Feuillet, the novels have lasted longer than the dramas;

of the former three or four seem destined to retain their charm as classics. He holds a place midway between the romanticists and the realists, with a distinguished and lucid portraiture of life which is entirely his own. He drew the women of the world whom he saw around him with dignity, with indulgence, with extraordinary penetration and clairvoyance. There is little description in his novels, which sometimes seem to move on an almost bare and colourless stage, but, on the other hand, the analysis of motives, of emotions, and of ” the fine shades ” has rarely been carried further. Few have written French with greater purity than Feuillet, and his style, reserved in form and never excessive in ornament, but full of wit and delicate anima- tion, is in admirable uniformity with his subjects and his treat- ment. It is probably in Sibylle and in Julia de Tricasur that he can now be studied to most advantage, though Monsieur de Camors gives a greater sense of power, and though Le Roman d’un jeune homme pauvre still preserves its popularity.

See also Sainte-Beuve, Nouveaux Lundis, vol. v. ; F. Brunetiere, Nouveaux Essais sur la litterature contemporaine (1895). (E. G.)

FEUILLETON (a diminutive of the Fr. feuillet, the leaf of a book), originally a kind of supplement attached to the political portion of French newspapers. Its inventor was Bertin the elder, editor of the Debuts. It was not usually printed on a separate sheet, but merely separated from the political part of the newspaper by a line, and printed in smaller type. In French newspapers it consists chiefly of non-political news and gossip, literature and art criticism, a chronicle of the fashions, and epigrams, charades and other literary trifles; and its general characteristics are lightness, grace and sparkle. The feuilleton in its French sense has never been adopted by English

newspapers, though in various modern journals (in the United States especi- ally) the sort of matter represented by it is now included. But the term itself has come into English use to indicate the instal- ment of a serial story printed in one part of a newspaper.

FEUQUIERES, ISAAC MANASSES DE PAS, Marquis de (1590-1640), French soldier, came of a distinguished family of which many members held high command in the civil wars of the 16th century. He entered the Royal army at the age of thirty, and soon achieved distinction. In 1626 he served in the Valtelline, and in 1 6 28-1 6 29 at the celebrated siege of La Rochelle, where he was taken prisoner. In 1629 he was made Marichal de Camp, and served in the fighting on the southern frontiers of France. After occupying various military positions in Lorraine, he was sent as an ambassador into Germany, where he rendered important services in negotiations with Wallenstein. In 1636 he commanded the French corps operating with the duke of Weimar's forces (afterwards Turenne's " Army of Weimar "). With these troops he served in the campaigns of 1637 (in which he became lieutenant-general), 1638 and 1639. At the siege of Thionville (Diedenhofen) he received a mortal wound. His lettres inidites appeared (ed. Gallois) in Paris in

1845.

His son Antoine Manasses de Pas, Marquis de Feuquieres (1648-1711), was born at Paris in 1648, and entered the army at the age of eighteen. His conduct at the siege of Lille in 1667, where he was wounded, won him promotion to the rank of captain. In the campaigns of 1672 and 1673 he served on the staff of Marshal Luxemburg, and at the siege of Oudenarde in the following year the king gave him command of the Royal Marine regiment, which he held until he obtained a regiment of his own in 1676. In 1688 he served as a brigadier at the siege of Philipsburg, and afterwards led a ravaging expedition into south Germany, where he acquired much booty. Promoted Marichal de Camp, he served under Catinat against the Waldenses, and in the course of the war won the nickname of the " Wizard." In 1692 he made a brilliant defence of Speierbach against greatly superior forces, and was rewarded with the rank of lieutenant-general. He bore a distinguished part in Luxem- burg's great victory of Neerwinden or Landen in 1693. Marshal Villeroi impressed him less favourably than his old commander Luxemburg, and the resumption of war in 1701 found him in disfavour in consequence. The rest of his life, embittered by

the refusal of the marshal's baton, he spent in compiling his celebrated

memoirs, which, coloured as they were by the personal animosities of the writer, were yet considered by Frederick the Great and the soldiers of the 18th century as the standard work on the art of war as a whole. He died in 171 1. The Memoir es sur la guerre appeared in the same year and new editions were frequently published (Paris 1711, 1725, 1735, &c, London 1736, Amsterdam subsequently) . An English version appeared in London 1737, under the title Memoirs of the Marquis de Feu- quieres, and a German translation {Feuquieres geheime Nach- richten) at Leipzig 1732, 1738, and Berlin 1786. They deal in detail with every branch of the art of war and of military service.

FEVAL, PAUL HENRI CORENTIN (1817-1887), French novelist and dramatist, was born on the 27th of September 1817, at Rennes in Brittany, and much of his best work deals with the history of his native province. He was educated for the bar, but after his first brief he went to Paris, where he gained a footing by the publication of his ” Club des phoques ” (1841) in the Revue de Paris. The Mysteres de Lbndres (1844), in which an Irishman tries to avenge the wrongs of his countrymen by seeking the annihilation of England, was published under the ingenious pseudonym ” Sir Francis Trolopp.” Others of his novels are: Le Fils du diable (1846) ; Les Compagnons du silence (1857); Le Bossu (1858); Le Poisson d’or (1863); Les Habits noirs (1863); Jean le diable (1868), and Les Compagnons du trisor (1872). Some of his novels were dramatized, Le Bossu (1863), in which he had M. Victorien Sardou for a’ collaborator, being especially successful in dramatic form. His chronicles of crime exercised an evil influence, eventually recognized by the author himself. In his later years he became an ardent Catholic, and occupied himself in revising his earlier works from his new standpoint and in writing religious pamphlets. Reverses of fortune and consequent overwork undermined his mental and bodily health, and he died of paralysis in the monastery of the Brothers of Saint John in Paris on the 8th of March 1887.

His son, Paul Feval (i860-), became well known as a novelist and dramatist. Among his works are Nouvelles (1890), Maria Laura (1891), and Chantepie (1896).

FEVER (Lat. febris, connected with fervere, to burn), a term generally used to include all conditions in which the normal temperature of the animal body is markedly exceeded for any length of time. When the temperature reaches as high a point as 106° F. the term hyperpyrexia (excessive fever) is applied, and is regarded as indicating a condition of danger; while, if it exceeds 107 or 108° for any length of time,

death almost always results. The diseases which are called specific fevers, because of its being a predominant factor in them, are discussed separately under their ordinary names. Occasionally in certain specific fevers and febrile diseases the temperature may attain the elevation of iio -ii2° prior to the fatal issue. For the treatment of fever in general, see Therapeutics.

Pathology. — Every rise of temperature is due to a disturbance in the heat-regulating mechanism, the chief variable in which is the action of the skin in eliminating heat (see Animal Heat). Although for all practical purposes this mechanism works satis- factorily, it is not by any means perfect, and many physiological conditions cause a transient rise of temperature; e.g. severe muscular exercise, in which the cutaneous eliminating mechanism is unable at once to dispose of the increased amount of heat produced in the muscles. Pathologically, the heat-regulating mechanism may be disturbed in three different ways: 1st, by mechanical interference with the nervous system; 2nd, by interference with heat elimination; 3rd, by the action of various poisons.

1. In the human subject, fever the result of mechanical inter- ference with the nervous system rarely occurs, but it can readily be produced in the lower animals by stimulating certain parts of the great brain, e.g. the anterior portion of the corpus striatum. This leads to a rise of temperature with increased heat production. The high temperature seems to cause distintegration of cell protoplasm and increased excretion of nitrogen and of carbonic acid. Possibly some of the cases of high temperature recorded

after injuries to the nervous system may be caused in this way; but some may also be due to stimulation of vaso-constrictor fibres to the cutaneous vessels diminishing heat elimination. So far the pathology of this condition has not been studied with the same care that has been devoted to the investigation of the third type of fever.

2. Fever may readily be produced by interference with heat elimination. This has been done by submitting dogs to a temperature slightly below that of the rectum, and it is seen in man in Sunstroke. The typical nervous symptoms of fever are thus produced, and the rate of chemical change in the tissues is accelerated, as is shown by the increased excretion of carbonic acid. The protoplasm is also injured

and the proteids are broken down, and thus an increased excretion of nitrogen is produced and the cells undergo degenerative changes.

3. The products of various micro-organisms have a toxic action on the protoplasm of a large number of animals, and among the symptoms of this toxic action one of the most frequent is a rise in temperature. While this is by no means a necessary accompaniment, its occurrence is so general that the term Fever has been applied to the general reaction of the organism to the microbial poison. Toxins which cause a marked rise of tempera- ture in men may cause a fall in other animals. It is not the alteration of temperature which is the great index of the severity of the struggle between the host and the parasite, but the death and removal to a greater or lesser extent of the protoplasm of the host. In this respect fever resembles poisoning with phos- phorus and arsenic and other similar substances. The true measure of the intensity of a fever is the extent of disintegration of protoplasm, and this may be estimated by the amount of nitrogen excreted in the urine. The increased disintegration of protoplasm is also indicated by the rise in the excretion of sulphur and phosphorus and by the appearance in the urine of acetone, aceto-acetic and j3-oxybutyric acids (see Nutrition). Since the temperature is generally proportionate to the intensity of the toxic action, its height is usually proportionate to the excretion of nitrogen. But sometimes the rise of temperature is not marked, while the excretion of nitrogen is very decidedly increased. When the temperature is sufficiently elevated, the heat has of itself an injurious action on the protoplasm, and tends to increase disintegration just as when heat elimination is experimentally retarded. But the increase due to rise of temperature is small compared to that produced by the de- structive action of the microbial products. In the beginning of a fever the activity of the metabolism is not increased to any marked extent, and any increase is necessarily largely due to the greater activity of the muscles of the heart and respiratory mechanism, and to the muscular contractions which produce the initial rigors. Thus the excretion of carbon dioxide — the great measure of the activity of metabolism — is not usually increased, and there is no evidence of an increased combustion. In the later stages the increased temperature may bring about an acceleration in the rate of chemical change; but this is comparatively slight, less in fact than the increase observed on taking muscular exercise after rest. The rise of temperature is primarily due to diminished heat elimination. This diminished giving off of heat was demonstrated by means of the calorimeter by I. Rosenthal, while E. Maragliano showed that the cutaneous vessels are contracted. Even in the later stages, until defervescence occurs, heat elimination is

inadequate to get rid of the heat produced.

The toxic action is manifested not only by the increased disintegration of protoplasm, but also by disturbances in the functions of the various organs. The activity of the digestive glands is diminished and appetite is lost. Food is therefore not taken, although when taken it appears to be absorbed in un- diminished quantities. As a result of this the patient suffers from inanition, and lives largely on his own fats and proteids, and for this reason rapidly emaciates. The functions of the liver are also diminished in activity. Glycogen is not stored in the cells, and the bile secretion is modified, the essential constituents disappearing almost entirely in some cases. The

production of urea is also interfered with, and the proportion of nitrogen in the urine not in the urea increases. This is in part due to the increased disintegration of proteids setting free sulphur and phosphorus, which, oxidized into sulphuric and phosphoric acids, combine with the ammonia which would other- wise have been changed to urea. Thus the proportion of ammonia in the urine is increased. Concurrently with these alterations in the functions of the liver-cells, a condition of granular degenera- tion and probably a state of fatty degeneration makes its ap- pearance. That the functional activity of the kidneys is modified , is shown by the frequent appearance of proteoses or of albumen and globulin in the urine. Frequently the toxin acts very markedly on the protoplasm of the kidney epithelium, and causes a shedding of the cells and sometimes inflammatory reaction. The muscles are weakened, but so far no satisfactory study has been made of the influence of microbial poisons on muscular contraction. A granular and fatty degeneration super- venes, and the fibres waste. The nervous structures, especially the nerve-cells, are acted upon, and not only is their functional activity modified, but they also undergo structural changes of a chromatolytic nature. The blood shows two important changes — first, a fall in the alkalinity due to the products of disintegration of protoplasm; and, secondly, an increase in the number of leucocytes, and chiefly in the polymorpho-nuclear variety. This is best marked in pneumonia, where the normal number is often increased twofold and sometimes more than tenfold, while it is altogether absent in enteric fever.

An interesting general modification in the metabolism is the enormous fall in the excretion of chlorine, a fall far in excess of what could be accounted for by inanition, and out of all proportion to the fall in the sodium and potassium with which the chlorine is usually combined in the urine. The fevered animal in fact stores chlorine in its tissues, though in what manner and for what reason is not at present known.

Authorities.— Von Noorden, Lehrbuck der Pathologie des Stoff-wechsels (Berlin, 1893); Metabolism and Practical Medicine, vol. 11., article ” Fever” by F. Kraus (1907); Dr A. Rabe, Die modemen Fiebertheorien (Berlin, 1894); Dr G. B. Ughetti, Das Fieber, trans, by Dr R. Teuscher (jena, 1895); Dr M. Lovit, ” Die Lehre von Fieber,” Vorlesungen iiber allgemeine Pathologie, erstes Heft (Jena, 1897); Louis Guinon, ” De la fievre,” in Bouchard’s Traite de pathologie generate, t. iii. 2nd partie (Paris, 1899); Sir J. B. Sander- son, ” The Doctrine of Fever,” in Allbutt’s System of Medicine, vol. i. p. 139 (London, 1896). ‘ (D. N. P.)

FEYDEAU, ERNEST-AIMˆ (1821-1873), French author, was born in Paris, on the 16th of March 1821. He began his literary career in 1844, by the publication of a volume of poetry, Les Nationales. Either the partial failure of this literary effort, or his marriage soon afterwards to a daughter of the economist. Blanqui, caused him to devote himself to finance and to archaeology. He gained a great success with his novel Fanny (1858), a success due chiefly to the cleverness with which it depicted and excused the corrupt manners of a certain portion of French society. This was followed in rapid succession by a series of fictions, similar in character, but wanting the attraction of novelty; none of them enjoyed the same vogue as Fanny. Besides his novels Feydeau wrote several plays, and he is also the author of Histoire generate des usages fun’ebres et des sepultures des peuples anciens (3 vols., 1857-1861); Le Secret du bonheur. (sketches of Algerian life) (2 vols., 1864); and L’Allemagne en 1871 (1872), a clever caricature of German life and manners. He died in Paris on the 27th of October 1873.

See Sainte-Beuve, Causeries du lundi, vol. xiv., and Barbey d’Aurevilly, Les CEuvres et les hommes au XIX e siecle.

FEZ (Fas), the chief city of Morocco, into which empire it was incorporated in 1548. It lies in 34° 6′ 3″ N., 4° 38′ 15″ W., about 230 m. N.E. of Marrakesh, 100 m. E. from the Atlantic and 85 m. S. of the Mediterranean. It is beautifully situated in a deep valley on the Wad Fas, an affluent of the Wad Sebu, which divides the town into two parts — the ancient town, Fas el Bali, on the right bank, and the new, Fas el Jadid, on the left.

Like many other Oriental cities, Fez from a distance appears a very attractive place. It stretches out between low hills, crowned by the ruins of ancient fortresses, and though there

is nothing imposing, there is something particularly impressive in the sight of that white-roofed conglomeration of habitations, broken only by occasional mosque towers or, on the outskirts, by luxuriant foliage. Except on the south side the city is sur- rounded by hills, interspersed with groves of orange, pomegranate and other fruit trees, and large olive gardens.

From its peculiar situation Fez has a drainage superior to that of most Moorish towns. When the town becomes very dirty, the water is allowed to run down the streets by opening lids for the purpose in the conduits and closing the ordinary exits, so that

it overflows and cleanses the pavements. The Fasis as a rule prefer to drink the muddy river water rather than that of the pure springs which abound in certain quarters of the town. But the assertion that the supply and drainage system are one is a libel, since the drainage system lies below the level of the fresh river water, and was organized by a French renegade, under Mohammed XVI., about the close of the 18th century. The general dampness of the town renders it unhealthy, however, as the pallid faces of the inhabitants betoken, but this is con- sidered a mark of distinction and is jealously guarded.

Most of the streets are exceedingly narrow, and as the houses are high and built in many cases over the thoroughfares these are often very dark and gloomy, though, since wooden beams, rough stones and mortar are used in building, there is less of that ruined, half-decayed appearance so common in other Moorish towns where mud concrete is the material employed.

As a commercial town Fez is a great depot for the trade of Barbary and wares brought from the east and south by caravans. The manufactures still carried on are those of yellow slippers of the famous Morocco leather, fine white woollen and silk haiks, of which it is justly proud, women's embroidered sashes, various coarse woollen cloths and blankets, cotton and silk handkerchiefs, silk cords and braids, swords and guns, saddlery, brass trays, Moorish musical instruments, rude painted pottery and coloured tiles. Until recent times the city had a monopoly of the manu- facture of Fez caps, for it was supposed that the dye which imparts the dull crimson hue of these caps could not be procured elsewhere; they are now, however, made both in France and Turkey. The dye is obtained from the juice of a berry which grows in large quantities near the town, and is also used in the dyeing of leather. Some gold ornaments are made, the gold

being brought from the interior by caravans which trade regularly with Timbuktu.

As in other capitals each trade has a district or street devoted chiefly to its activities. Old Fez is the business portion of the town, new Fez being occupied principally by government quarters and the Jews' mellah. The tradesman usually sits cross-legged in a corner of his shop with his goods so arranged that he can reach most of them without moving.

In the early days of Mahommedan rule in Morocco, Fez was the seat of learning and the empire's pride. Its schools of religion, philosophy and astronomy enjoyed a great reputation in Africa and also in southern Europe, and were even attended by Christians. On the expulsion of the Moors from Spain, refugees of all kinds flocked to Fez, and brought with them some knowledge of arts, sciences and manufactures, and thither flocked students to make use of its extensive libraries. But its glories were brief, and though still " the university town " of Morocco, -it retains but a shadow of its greatness. Its library, estimated by Gerhard Rohlfs in 1861 to contain 5000 volumes, is open on Fridays, and any Moor of known respectability may borrow volumes on getting an order and signing a receipt for them. There are about 1 500 students who read at the Karueein. They pay no rents, but buy the keys of the rooms from the last occupants, selling them again on leaving.

The Karueein is celebrated as the largest mosque in Africa, but it is by no means the most magnificent. On account of the vast area covered, the roof, supported by three hundred and sixty-six pillars of stone, appears very low. The side chapel for services for the dead contains twenty-four pillars. All these columns support horse-shoe arches, on which the roof is built, long vistas of arches being seen from each of the eighteen

doors of the mosque. The large lamp is stated to weigh 1763 lb and to have 509 lights, but it is very seldom lit. The total number of lights in the Karueein is given as seventeen hundred, and they are said to require 3J cwt. of oil for one filling. The mosque of Mulai Idris, built by the founder of Fez about the year 810, is considered so sacred that the streets which approach its -entrance are forbidden to Jews, Christians or four-footed beasts. The sanctity of the shrine in particular is esteemed very great, and this accounts for the crowds which

daily flock to it. The Tumkt door leading to it was once very

fine, but is now much faded. Opposite to it is a refuge for friend- less sharifas — the female descendants of Mahomet — built by Mohammed XVII.

It is believed that the foundation stone of Fez was laid in 808 by Idris II. Since then its history has been chequered, as it was successfully besieged no fewer than eight times in the first five hundred years of its existence, yet only once knew foreign masters, when in 1554 the Turks took possession of it without a siege and held it for a short time. Fez became the chief residence of the Filali dynasty, who obtained possession of the town in 1649 (see further Morocco: History).

The population has been very varyingly estimated; probably the inhabitants number under one hundred thousand, even when the court is in residence.

See H. Gaillard, Une Ville de V Islam. Fes (Paris, 1905) ; C. Rene-Leclerc, ” Le commerce et l’industrie a Fez ” in Renseignements col. comite ajrique francaise (1905).

FEZZAN (the ancient Phazania, or country of the Gara- mantes), a region of the Sahara, forming a ” kaimakamlik ” of the Ottoman vilayet of Tripoli {q.v.). Its frontiers, ill-defined, run from Bonjem, within 50 m. of the Mediterranean on the north, south-westward to the Akakus range of hills, which separates Fezzan from Ghat, thence eastward for over 400 m., and then turn north and west to Bonjem again, embracing an area of about 156,000 sq. m.

Physical Features. — The general form of the country is determined by the ranges of hills, including the Jebel-es-Suda (highest peak about 4000 ft.), the Haruj-el-Aswad and the Haruj-el-Abiad, which between 14 and 19 E. and 27 and 29 N. form the northern edge of a broad desert plateau, and shut off the northern region draining to the Mediterranean from the depressions in which lie the oases of Fezzan proper in the south. The central depression of Hofra (” ditch “), as it is called, lies in about 26° N. It does not form a continuous fertile tract, but consists of a monotonous sandy expanse somewhat more thickly studded with oases than the surrounding wastes. The Hofra at its lowest part is not more than 600 ft. above the sea- level, and in this hollow is situated the capital Murzuk. It has a general east to west direction. North-west of the Hofra is a long narrow valley, the Wadi-el-Gharbi, which trends north- east and is the most fertile district of Fezzan. It contains several perennial springs and lake-like basins. One of these basins, the saline Bahr-el-Dud (” Sea of Worms “), has an extent of 600 sq. m., and is in places 26 ft. deep. Southwards the

Hofra rises to a height of 2000 ft., and in this direction lies the oasis of Gatron, followed by Tejerri on the verge of the desert, which marks the southern limit of the date and the northern of the dum palm. Beyond Tejerri the Saharan plateau rises continuously to the Tibesti highlands. (See further Tripoli.)

Climate. — The average temperature of Murzuk was found by Rohlfs to be 70 F. Frost is not uncommon in the winter months. The climate is a very regular one, and is in general healthy, the dryness of the air in summer making the heat more bearable than on the sea coast. An almost perpetual blue sky overhangs the desert, and the people of Fezzan are so unaccustomed to and so ill-prepared for wet weather that, as in Tuat and Tidikelt, they pray to be spared from rain. Water is found almost everywhere at small depths.

Flora and Fauna. — The date-palm is the characteristic tree of Fezzan, and constitutes the chief wealth of the land. Many different kinds of date-palms are found in the oases: in that of Murzuk alone more than 30 varieties are counted, the most

esteemed being named the Tillis, Tuati and Auregh. In all Fezzan the date is the staple food, not only for men, but for camels, horses and dogs. Even the stones of the fruit are softened and given to the cattle. The huts of the poorer classes are entirely made of date-palm leaves, and the more substantial habitations consist chiefly of the same material. The produce of the tree is small, ioo full-grown trees yielding only about 40 cwt. of dates. Besides the date there are numerous olive, fig and almond trees. Various grains are cultivated. Wheat and barley are sown in winter, and in spring, summer and autumn several kinds of durra, especially ksob and gafoli. Cotton flourishes, is perennial for six or seven years, and gives large pods of moderate length of staple.

There are no large carnivora in Fezzan. In the uninhabited oases gazelles and antelopes are occasionally found. The most important animal is the camel, of which there are two varieties, the Tebu or Sudan camel and the Arabian, differing very much in size, form and capabilities. Horses and cattle are not numerous. Among birds are ostriches, falcons, vultures, swallows and ravens; in summer wild pigeons and ducks are numerous, but in winter they seek a warmer climate. There are no remarkable insects or snakes. A species of

Artemia or brine shrimp, about a quarter of an inch in length, of a colour resembling the bright hue of the gold fish, is fished for with cotton nets in the ” Sea of Worms,” and mixed with dates and kneaded into a paste, which has the taste and smell of salt herring, is considered a luxury by the people of Fezzan.’

Inhabitants. — The total population is estimated at between 50,000 and 80,000. The inhabitants are a mixed people, derived from the surrounding Teda and Bornu on the south, Tuareg of the plateaus on the west, Berbers and Arabs from the north. The primitive inhabitants, called by their Arab conquerors Berauna, are believed to have been of Negro origin. They no longer persist as a distinct people. In colour the present inhabitants vary from black to white, but the prevailing hue of skin is a Malay-like yellow, the features and woolly hair being Negro. The chief languages are the Kanuri or Bornu language and Arabic. Many understand Targish, the Teda and the Hausa tongues. If among such a mixed people there can be said to be any national language, it is that of Bornu, which is most widely understood and spoken. The people of Sokna, north of the Jebel- es-Suda, have a peculiar Berber dialect which Rohlfs found to’ be very closely allied to that of Ghadames. The men*wear a haik or barakan like those of Tripoli, and a fez; short hose, and a large loose shirt called mansaria, with red or yellow slippers, complete their toilet. Yet one often sees the large blue or white tobe of Bornu, and the litham or shawl-muffler of the Tuareg, wound round the mouth to keep out the blown sand of the desert. The women, who so long as they are young have very plump forms, and who are generally small, are more simply dressed, as a rule, in the barakan, wound round their bodies; they seldom wear shoes, but generally have sandals made of palm leaf. Like the Arab women they load arms and legs with heavy metal rings, which are of silver among the more wealthy. The hair, thickly greased with butter, soon catching the dust which forms a crust over it, is done up in numberless little plaits round the head, in the same fashion as in Bornu and the Hausa countries. Children run about naked until they attain the age of puberty, which comes very early, for mothers of ten or twelve years of age are not uncommon. The Fezzani are of a gay disposition, much given to music and dancing.

Towns and Trade. — Murzuk, the present capital, which is in telegraphic communication with the town of Tripoli, lies in the western corner of the Hofra depression, in 25° 55′ N. and 14 10′ E. It was founded about 13 10, about which time the kasbak or citadel was built. The Turks repaired it, as well as the town- wall, which has, however, again fallen into a ruinous condition. Murzuk, which had in 1906 some 3000 inhabitants, is cut in two by a wide street, the

dendal. The citadel and most of the houses are built of salt-saturated dried mud. Sokna, about midway between Tripoli and Murzuk, situated on a great gravel plain north of the Suda range, has a population of about 2500.

Garama (Jerma-el-Kedima), the capital under the Garamantes and the Romans, was in the Wadi-el-Gharbi. It was a flourishing town at the time of the Arab conquest but is now deserted. Among the ruins is a well-preserved stone monument markixˆ the southern limit of the Roman dominions in this part of Africa. The modern Jerma is a small place a little north of the site of Garama. Zuila, the capital under the Arabs, lies in a depression called the Sherguia east of Murzuk on the most direct caravan route to Barca and Egypt. Of Traghen, the capital under the Nesur dynasty, which was on the same caravan route and between Zuila and Murzuk, little besides the ruined kasbah remains.

Placed roughly midway between the countries of the central Sudan and Tripoli, Fezzan serves as a depot for caravans crossing the Sahara; its commerce is unimportant. Its most important export is that of dates. Slave dealing, formerly the most lucrative occupation of the people, is moribund owing to the stoppage of slave raiding by the European governments in their Sudan territories.

History. — The country formed part of the territory of the Garamantes, described by Herodotus as a very powerful people. Attempts have been made to identify the Garamantes with the Berauna of the Arabs of the 7th century, and to the period of the Garamantes Duveyrier assigns the remains of remarkable hydraulic works, and certain tombs and rock sculptures- indications, it is held, of a Negro civilization of ancient date which existed in the northern Sahara. The Garamantes, whether of Libyan or Negro origin, had certainly a considerable degree of civilization when in the year 10 B.C. they were conquered by the proconsul L. Cornelius Balbus Minor and their country added to the Roman empire. By the Romans it was called Phazania, whence the present name Fezzan. After the Vandal invasion Phazania appears to have regained independence and to have been ruled by a Berauna dynasty. At this time the people were Christians, but in 666 the Arabs conquered the country and all traces of Christianity seem speedily to have disappeared. Subject at first to the caliphs, .an independent Arab dynasty, that of the Beni Khattab, obtained power early in the 10th century. In the 13th century the country came under the rule of the king of Kanem (Bornu), but soon afterwards the Nesur, said to have been a native or Berauna dynasty, were in power. More probably the Nesur were hereditary governors originally appointed by the rulers of Kanem. In the 14th century the

Nesur were conquered and dethroned by an Arab tribe, that of Khorman, who reduced the people of Fezzan to a state of slavery, a position from which they were rescued about the middle of the 16th century by a sherif of Morocco, Montasir-b.-Mahommed, who founded the dynasty of Beni Mahommed. This dynasty, which came into frequent conflict with the Turks, who had about the same time that Montasir secured Fezzan established themselves in Tripoli, gradually extended its borders as far as Sokna in the north. It was the Beni Mahommed who chose Murzuk as their capital. They became intermittently tributary to the pasha of Tripoli, but within Fezzan the power of the sultans was absolute. They maintained a bodyguard of mamelukes, mostly Europeans — Greeks, Genoese, or their immediate descendants. The annual tribute was paid to the pasha either in money or in gold, senna or slaves. The last of the Beni Mahommed sultans was killed in the vicinity of Traghen in 181 1 by El-Mukkeni, one of the lieutenants of Yusef Pasha, the last sovereign but one of the independent Karamanli dynasty of Tripoli. El-Mukkeni now made himself sultan of Fezzan, and became notorious by his slaving expeditions into the central Sudan, in which he advanced as far as Bagirmi. In 1831, Abd-el-Jelil, a chief of the Walid-Sliman Arabs, usurped the sovereign authority. After a troublous reign of ten years he was slain in battle by a Turkish force under Bakir Bey, and Fezzan was added to the Turkish empire. Towards the end of the 19th century the Turks, alarmed at the increase of French influence in the neighbouring countries, reinforced their garrison in Fezzan. The kaimakamlik is said to yield an annual revenue of £6000 only to the Tripolitaa treasury.

FIACRE, SAINTˆFIBRES

309

Authorities. — The most notable of the European travellers who nave visited Fezzan, and to whose works reference should be made for more detailed information regarding it, are, taking them in the order of date, as follows: F. Hornemann, 1798; G. F. Lyon, 1819; D. Denham, H. Clapperton and W. Oudney, 1822; J. Richardson, 1845; H. Barth, 1850-1855; E. Vogel, 1854; H. Duveyrier, 1859- 1861; M. von Beurmann, 1862; G. Rohlfs, 1865; G. Nachtigal, 1869; P. L. Monteil, 1892; H. Vischer, 1906. Nachtigal’ s Sahara and Sudan, vol. i. (Berlin, 1879), gathers up much of the information in earlier works, and a list of the Beni Mahommed sovereigns is given in A. M. H. J. Stokvis, Manuel d’kistoire, vol. i. (Leiden, 1888), p. 471. Miss Tinne (q.v.), who travelled with Nachtigal as far as Murzuk, was shortly afterwards murdered at the Sharaba wells on the road to Ghat.

FIACRE, SAINT (Celt. Fiachra) , an anchorite of the 7th century, of noble Irish descent. We have no information concerning his life in his native country. His Acta, which have scarcely any historical value, relate that he left Ireland, and came to France with his companions. He approached St Faro, the bishop of Meaux, to whom he made known his desire to live a life of solitude in the forest. St Faro assigned him a spot called Prodilus (Brodolium), the modern Breuil, in the province of Brie. There St Fiacre built a monastery in honour of the Holy Virgin, and to it added a small house for guests, to which he himself withdrew. Here he received St Chillen (? Killian), who was returning from a pilgrimage to Rome, and here he remained until his death, having acquired a great reputation for miracles. His remains rested for a long time in the place which he had sanctified. In 1568, at the time of the religious troubles, they were transferred to the cathedral of Meaux, where his shrine may still be seen in the sacristy. Various relics of St Fiacre were given to princes and great personages. His festival is celebrated on the 30th of August. He is the patron of Brie, and gardeners invoke him as their protector. French hackney-coaches received the name of fiacre from the Hotel St Fiacre, in the rue St Martin, Paris, where one Sauvage, who was the first to provide cabs for hire, kept his vehicles.

See Acta Sanctorum, Augusti vi. 598-620; J. O'Hanlon, Lives of the Irish Saints, viii. 421-447 (Dublin, 1875-1904); J. C. O'Meagher, " Saint Fiacre de la Brie," in Proceedings of the Royal Irish Academy, 3rd series, ii. I73-I7&- (H. De.)

FIARS PRICES, in the law of Scotland, the average prices of each of the different sorts of grain grown in each county, as fixed annually by the sheriff, usually after the verdict of a jury; they serve as a rule for ascertaining the value of the grain due to feudal superiors, to the clergy or to lay proprietors of teinds, to landlords as a part or the whole of their rents and in all cases where the price of grain has not been fixed by the parties. It is not known when or how the practice of " striking the fiars," as it is called, originated. It probably was first used to determine the value of the grain rents and duties payable to the crown. In confirmation of this view it seems that at first the duty of the sheriffs was merely to make a return to the court of exchequer of the prices of grain within their counties, the court itself striking the fiars; and from an old case it appears that the fiars were struck above the true prices, being regarded rather as punish- ments to force the king's tenants to pay their rents than as the proper equivalent of the grain they had to pay. Co-existent, however, with these fiars, which were termed sheriffs' fiars, there was at an early period another class called commissaries' fiars, by which the values of teinds were

regulated. They have been traced back to the Reformation, and were under the management of the commissary or consistorial courts, which then took the place of the bishops and their officials. They have now been long out of use, but they were perhaps of greater antiquity than the sheriffs' fiars, and the model upon which these were instituted. In 1723 the court of session passed an Act of Sederunt for the purpose of regulating the procedure in fiars courts. Down to that date the practice of striking the fiars was by no means universal over Scotland; and even in those counties into which it had been introduced, there was, as the preamble of the act puts it, " a general complaint that the said fiars are struck and given out by the sheriffs without due care and inquiry into the current and just prices." The act in consequence provided that all sheriffs should summon annually, between the 4th and the 20th

of February, a competent number of persons, living in the shire, of experience in the prices of grain within its bounds, and that from these they should choose a jury of fifteen, of whom at least eight were to be heritors; that witnesses and other evidence as to the price of grain grown in the county, especially since the 1st of November preceding until the day of inquiry, were to be brought before the jury, who might also proceed on " their own proper knowledge"; that the verdict was to be returned and the sentence of the sheriff pronounced by the 1st of March; and further, where custom or expediency recommended it, the sheriff was empowered to fix fiars of different values according to the different qualities of the grain. It cannot be said that this act has remedied all the evils of which it complained. The propriety of some of its provisions has been questioned, and the competency of the court to pass it has been doubted, even by the court itself. Its authority has been entirely disregarded in one county — – Haddingtonshire — where the fiars are struck by the sheriff alone, without a jury; and when this practice was called in question the court declined to interfere, observing that the fiars were better struck in Haddingtonshire than anywhere else. The other sheriffs have in the main followed the act, but with much variety of detail, and in many instances on principles the least calculated to reach the true average prices. Thus in some counties the averages are taken on the number of transactions, without regard to the quantities sold. In one case, in 1838, the evidence was so carelessly collected that the second or inferior barley fiars were 2s. 4d. higher than the first. Formerly the price was struck by the boll, commonly the Linlithgowshire boll; now the imperial quarter is always used.

The origin of the plural word fiars (feors, feers, fiers) is uncertain. Jamieson, in his Dictionary, says that it comes from the Icelandic fe,

wealth; Paterson derives it from an old French word feur, an average; others connect it with the Latin forum (i.e. market). The New English Dictionary accepts the two latter connexions. On the general subject of fiars prices see Paterson's Historical Account of the Fiars in Scotland (Edin., 1852); Connell, On Tithes; Hunter's Landlord and Tenant.

FIBRES (or Fibers, in American spelling; from Lat. fibra, apparently connected either with filum, thread, or findere, to split), the general term for certain structural components of animal and vegetable tissue utilized in manufactures, and in respect of such uses, divided for the sake of classification into textile, paper-making, brush and miscellaneous fibres. "

I. Textile Fibres are mostly products of the organic world, elaborated in their elongated form to subserve protective functions in animal life (as wool and epidermal hairs, &c.) or as structural components of vegetable tissues (flax, hemp and wood cells). It may be noted that the inorganic world provides an exception to this general statement in the fibrous mineral asbestos (?.».), which is spun or twisted into coarse textiles. Other silicates are also transformed by artificial processes into fibrous forms, such as " glass," which is fused and drawn or spun to a continuous fibre, and various " slags " which, in the fused state, are trans- formed into "slag wool." Lastly, we note that a number of metals are drawn down to the finest dimensions, in continuous lengths, and these are woven into cloth or gauze, such metallic cloths finding valuable applications in the arts. Certain metals in the form of fine wire are woven into textile fabrics used as dress materials. Such exceptional applications are of insignifi- cant importance, and will not be further considered in this article.

The common characteristics of the various forms of matter comprised in the widely diversified groups of textile fibres are those of the colloids. Colloidal matter is intrinsically devoid of structure, and in the mass may be regarded as homogeneous; whereas crystalline matter in its proximate forms assumes definite and specific shapes which express a complex of internal stresses. The properties of matter which condition its adaptation to structural functions, first as a constituent of a living individual, and afterwards as a textile fibre, are homogeneous continuity of substance, with a high degree of interior cohesion, and associated with an irreducible minimum of elasticity or extensibility. The colloids show an infinite diversity of variations in these essential properties: certain of them, and notably cellulose (q.v.), maintain

these characteristics throughout a cycle of transformations such as permit of their being brought into a soluble plastic form, in which condition they may be drawn into filaments in con- tinuous length. The artificial silks or lustra-celluloses are produced in this way, and have already taken an established position as staple textiles. For a more detailed account of these products see Cellulose.

The animal fibres are composed of nitrogenous colloids of which the typical representatives are the albumens, fibrines and gelatines. They are of highly complex constitution and their characteristics have only been generally investigated. The vegetable fibre substances are celluloses and derivatives of celluloses, also typically colloidal bodies. The broad distinction between the two groups is chiefly evident in their relationship to alkalis. The former group are attacked, resolved and finally dissolved, under conditions of action by no means severe. The celluloses, on the other hand, and therefore the vegetable fibres, are extraordinarily resistant to the action of alkalis.

The animal fibres are relatively few in number but of great industrial importance, They occur as detached units and are of varying dimensions; sheep's wool having lengths up to 36 in., the fleeces being shorn for textile uses at lengths of 2 to 16 in.; horse hair is used in lengths of 4 to 24 in., whereas the silks may be considered as being produced in continuous length, " reeled silks " having lengths measured in hundreds of yards, but " spun silks " are composed of silk fibres purposely broken up into short lengths.

The vegetable fibres are extremely numerous and of very diversified characteristics. They are individualized units only in the case of seed hairs, of which cotton is by far the most important ; with this exception they are elaborated as more or less complex aggregates. The bast tissues of dicotyledonous annuals furnish such staple materials as flax, hemp, rhea or ramie and jute. The bast occurs in a peripheral zone, external to the wood and beneath the cortex, and is mechanically separated from the stem, usually after steeping, followed by drying.

The commercial forms of these fibres are elongated filaments composed of the elementary bast cells (ultimate fibres) aggregated into bundles. The number of these as any part of the filament may vary from 3 to 20 (see figs.). In the processes of refinement preparatory to the spinning (hackling, scutching) and in the spinning process itself, the fibre-bundles are more or less sub- divided, and the

divisibility of the bundles is an element in the textile value of the raw material. But the value of the material is rather determined by the length of the ultimate fibres (for, although not the spinning unit, the tensile strength of the yarn is ultimately limited by the cohesion of these fibres), qualified by the important factor of uniformity.

Thus, the ultimate fibre of flax has a length of 2 5 to 3 5 mm. ; jute, on the other hand, 2 to 3 mm.; and this disparity is an essential condition of the difference of values of these fibres. Rhea or ramie, to cite another typical instance, has an ultimate fibre of extraordinary length, but of equally conspicuous variability, viz. from 50 to 200 mm. The variability is a serious impediment in the preparation of the material for spinning and this defect, together with low drawing or spinning quality, limits the applica- tions of this fibre to the lower counts or grades of yarn.

The monocotyledons yield still more complex fibre aggregates, which are the fibro-vascular bundles of leaves and stems. These complex structures as a class do not yield to the mechanical treatment by which the bast fibres are subdivided, nor is there any true spinning quality such as is conditioned by bringing the ultimate fibres into play under the drawing process, which immediately precedes the twisting into yarn. Such materials are therefore only used for the coarsest textiles, such as string or rope. An exception to be noted in passing is to be found in the pine apple (Ananassa Sativa) the fibres of which are worked into yarns and cloth of the finest quality. The more important fibres of this class are manila, sisal, phormium. A heterogeneous mass of still more complex fibre aggregates, in many cases the entire stem (cereal straws, esparto), in addition to being used in plaited form, e.g. in hats, chairs, mats, constitute the staple raw material

for paper manufacturers, requiring a severe chemical treatment for the separation of the ultimate fibres.

In this class we must include the woods which furnish wood pulps of various classes and grades. Chemical processes of two types, (a) aad and (b) alkaline, are also employed in resolving the wood, and the resolution not only effects a complete isolation of the wood cells, but, by attacking the hydrolysable constituents of the wood substance (lignocellulose) , the cells are obtained in the form of cellulose. These cellulose pulps are known in commerce as ” sulphite pulps ” and ” soda pulps ” respectively. In addition to these raw materials or ” half stuffs ” the paper- maker employs the rejecta of the vegetable and textile industries, scutching, spinning and cloth wastes of all kinds, which are treated by chemical (boiling) and mechanical means

(beating) to separate the ultimate fibres and reduce them to the suitable dimensions (0-5-2-0 mm.). These papermaking fibres have also to be reckoned with as textile raw materials, in view of a new and growing industry in ” pulp yarns ” (Papierstojfgarn), a coarse textile obtained by treating paper as delivered in narrow strips from the paper machine; the strips are reeled, dried to retain 30-40% moisture, and in this condition subjected to the twisting operation, which confers the cylindrical form and adds considerably to the strength of the fibrous strip. The following are the essential characteristics of the economically important fibres.

Animal. — A. Silk, (a) The true silks are produced by the Bombyx Mori, the worm feeding on the leaves of the mulberry. The fibre is extruded as a viscous liquid from the glands of the worm, and solidifies to a cylindrical thread. The cohesion of these threads in pairs gives to raw silk the form of a dual cylinder (Plate I. fig. 2). For textile purposes the thread is reeled from the cocoon, and several units, five and upwards, are brought together and suitably twisted, (b) The ” Wild ” silks are pro- duced by a large variety of insects, of which the most important are the various species of Antherea, which yield the Tussore silks. These silks differ in form and composition from the true silks. While they consist of a ” dual ” thread, each unit of these is complex, being made up of a number of fibrillae. This unit thread is quadrangular in section, and of larger diameter than the true silk, the mean breadth being 0-052 mm., as com- pared with 0-018, the mean diameter of the true silks. The variations in structure as well as in dimensions are, however, very considerable.

B. Epidermal hairs. Of these (a) wool, the epidermal protective covering of sheep, is the most important. The varying species of the animal produce wools of characteristic qualities, varying considerably in fineness, in length of staple, in composition and in spinning quality. Hence the classing of the fleeces or raw wool followed by the elaborate processes of selection, i.e. ” sorting ” and preparation, which precede the actual spinning or twisting of the yarn. These consist in entirely freeing the fibres and sorting them mechanically (combing, &c), thereafter forming them into continuous lengths of parallelized units. This is followed by the spinning process which consists in a simultaneous drawing and twisting, and a continuous produc- tion of the yarn with the structural characteristics of worsted yarns. The shorter staple — from 5 to 25% of average fleeces — is prepared by the ” carding ” process for the spinning opera- tion, in which drawing and twisting are simultaneous, the length spun being then wound up, and the process being conse- quently intermittent. This section of the industry is known as ” woollen spinning ” in contrast to the former or

” worsted spinning.”

(b) An important group of raw material closely allied to the wools are the epidermal hairs of the Angora goat (mohair), the llama, alpaca. Owing to their form and the nature of the substance of which they are composed, they possess more lustre than the wools. They present structural differences from sheep wools which influence the processes by which they are prepared or spun, and the character of the yarns; but the differences are only of subordinate moment.

(c) Various animal hairs, such as those of the cow, camel

FIBRES

Plate I

Fig. i. — RAW SILK. Bombyx mori. Filament of bave,

viewed in length. X no.

Fig. 2. — RAW SILK. Bombyx mori. Single fibres in transverse section showing each fibre or ” bave ” as dual cylinder. >’- 235.

FlG 3 — ARTIFICIAL “SILK” Lustra-cellulose viscose process, ,

single fibres in transverse section x 235 Normal tvpe— Fig. 4.— WOOL FIBRES. Australian merino viewed in length, polygon of 5 sides — with concave sides due to contact of the x 235. Surface imbrications — the structural cause of true

component units of textile filament felting properties.

Fig 5. — FLAX STEM Linum usitatissimum. tranverse section Fig. 6. — RAMIE. Section of bast region, x 235. Showing bast of stem, >’• 235, showing bast fibres occupying central zone. fibres bundles but only slightly occurring as individuals.

PlATE n.

FIBRES

Fig. 7— JT TK. Bast bundles. Section of bast reeion, x 2« showing agglomerated bundles of bast fibre, each bundle re- presenting a spinning unit or filament.

Fig. 8.— MAIZE STEM. Zea mats. Fibro-vascular bundle in section, x no, typical of monocotyledonous structure.

• J^

jute.

Flax.

Jute

Fig. io.— COTTON. FLAX. RAMIE. JUTE. Ultimate fibres —transverse section, x no. Note similarity of ramie to cotton Fig 9 -COTTON. FLAX. RAMIE. JUTE. Ultimate fibres in and jute to flax,

the length, x no. Portions selected to show typical structural characteristics.

Fig ii— ESPARTO Cellulose Ultimate fibres of paper making Fig. 12.— SECTION OF HAND-MADE PAPER, x no. Ultimate pulp lypical fus > form bast fibres, x 65. component fibres disposed in every plane.

FIBRES

3 11

and rabbit, are also employed; the latter is largely worked into the class of fabrics known as felts. In these the hairs are compacted together by taking advantage of the peculiarity of structure which causes the imbrications of the surface.

(d) Horse hair is employed in its natural form as an individual filament or inonofil. 1

Vegetable Fibres. — The subjoined scheme of classification sets out the morphological structural characteristics of the vegetable

fibres: —

Produced from Dicotyledons. Monocotyledons.

A. Seed hairs. D. Fibro-vascular bundles.

B. Bast fibres. E. Entire leaves and stems.

C. Bast aggregates.

In the list of the more important fibrous raw materials subjoined, the capital letter immediately following the name refers the individual to its position in this classification. In reference to the important

question of chemical composition and the actual nature of the fibre substance, it may be premised that the vegetable fibres are composed of cellulose, an important repre- sentative of the group of carbohydrates, of which the cotton fibre substance is the chemical prototype, mixed and combined with various derivatives belonging to the subgroups, (a) Carbohydrates, (b) Unsaturated compounds of benzenoid and furfuroid constitutions, (c) ” Fat and wax ” derivatives, i.e. groups belonging to the fatty series, and of higher molecular dimensions — of such compound celluloses the following are the prototypes : —

(a) Cellulose combined and mixed with ” pectic ” bodies (i.e. pecto-celluloses) , flax, rhea.

(b) Cellulose combined with unsaturated groups or ligno- celluloses, jute and the woods.

(c) Cellulose combined and mixed with higher fatty acids,

alcohols, ethers, cuto-celluloses, protective epidermal

covering of leaves. The letters a, b, c in the table below and following the capitals, which have reference to the structural basis of classification,

indicate the main characteristics of the fibre substances. (See also Cellulose.)

Miscellaneous.— Various species of the family Palmaceae yield fibrous products of value, of which mention must be made of the following. Raffia, epidermal strips of the leaves of Raphia ruffia (Madagascar), R. taedigera (Japan), largely em- ployed as binder twine in horticulture, replacing the ” bast ” (linden) formerly employed. Coir, the fibrous envelope of the fruit of the Cocos nucijera, extensively used for matting and other coarse textiles. Carludovica palmata (Central America) yields the raw material for Panama hats, the Corypha australis (Australia) yields a similar product. The leaves of the date palm, Phoenix dactylifera, are employed locally in making baskets and mats, and the fibro-vascular bundles are isolated for working up into coarse twine and rope; similarly, the leaves of the Elaeis guineensis, the fruit of which yields the ” palm oil ” of commerce, yield a fibre which finds employment locally (Africa) for special purposes. Chamaerops humilis, the dwarf palm, yields the well-known ” Crin d’Afrique.” Locally (Algiers) it is twisted into ropes, but its more general use, in Europe, is in upholstery as a stuffing material. The

cereal straws are used in the form of plait in the making of hats andlnats. Esparto grass is also used in the making of coarse mats.

The processes by which the fibres are transformed into textile fabrics are in the main determined by their structural features. The following are the distinctive types of treatment.

A. The fibre is in virtually continuous lengths. The textile yarn is produced by assembling together the unit threads, which are wound together aud suitably twisted (silk; artificial silk).

B. The fibres in the form of units of variable short dimensions are treated by more or less elaborate processes of scutching, hackling, combing, with the aim of producing a mass of free parallelized units of uniform dimensions; these are then laid together and drawn into continuous bands of sliver and roving, which are finally drawn and twisted into yarns. In this group are comprised the larger number of textile products, such as

Botanical Identity. Genus and Order.

Country of Origin.

Dimensions of Ultimate.

Textile Uses.

Cotton, A.a .

Gossypium

Tropical and subtropical

12-40 mm. 0-019-0-025.

Universal. Also as a raw material

Malvaceae

countries

Av. 28 mm.

in chemical industries, notably explosives, celluloid.

Flax, B.o . . .

Linum

Temperate (and subtropical)

6-60 mm. 0-011-0-025.

General. Special effects in lustre

Linaceae

countries, chiefly European

Av. 28 mm.

damasks. In India and America plants grown for seed (linseed) .

Hemp, B.a

Cannabis

Temperate countries, chiefly

5-55 mm. 0-016-0-050.

Coarser textiles, sail-cloth, rope and

Cannabineae

Europe

Av. 22. mm. Av. 0-022

twine.

Ramie, B.o .

Boehmeria

Tropical countries (some

60-200 mm. o-03-0’o8.

Coarse textiles. Cost of preparation

V

Urticaceae

temperate)

Av. 120 mm. Av. 0-050

for fine textiles prohibitive.

Jute, B.b . . .

Corchorus

Tropical countries, chiefly

1-5-5 mm. 0-020-0-025.

Coarse textiles, chiefly ” Hessians ”

Tiliaceae

India

Av.2-5mm. Av. 0-022

and sacking. ‘ ‘ Line ‘ ‘ spun yarns used in cretonne and furniture textiles.

B.b . .’ .

Crotalaria Leguminosae

India

4-0-12-0. 0-025-0-050.

Av. 7-5. Av. 0-O22

Twine and rope. Coarse textiles.

Hibiscus, B.b

Hibiscus

Tropical, chiefly India

2-6 mm. 0-014-0-033. Av. 4 mm. Av. 0-02 1

Coarse textiles. H. Elams has been extensively used in making mats.

Sida, B.Z> . . .

Sida

Tropical and subtropical

1-5-4 mm. 0-013-0-02.

Coarse textiles. Appears capable of

Malvaceae

Av. 2 mm. Av. 0-015

substituting jute.

Lime or Linden,

Tilia

European countries, chiefly

1-5 mm. 0-014-0-020.

Matting and binder twine.

C.b

Tiliaceae

Russia

Av. 2 mm. Av. 0-016

Mulberry, C .

Broussonetia Moraceae

Far East

5-31 mm. 0-02-0-04. Av. 15 mm. Av. 0-03

Paper and paper cloths.

Monocotyledons —

Manila, D .

Musa

Tropical countries, chiefly

3-12 mm. 0-016-0-032.

Twine and ropes. Produces papers

Musaceae

Philippine Islands

Av. 6 mm. Av. 0-024

of special quality.

Sisal, D . .

Agave

Tropical countries, chiefly

1-5-4 mm. 0-020-0-032.

Twine and ropes.

Amaryllideae

Central America

Av. 2-5. Av. 0-024

Yucca

do.

0-5-6 mm. 0-01-0-02.

do.

Liliaceae

Sansevieria

East Indies, Ceylon, East

1-5-6 mm. 0-015-0-026.

do.

Liliaceae

Africa

Av. 3 mm. Av. 0-020

Phormium, D .

Phormium tenax

New Zealand

5-0-15 mm. 0-010-0-020.

Twine and ropes. Distinguished by

Liliaceae

Av. 9 mm. Av. 0-016

high yield of fibre from green leaf.

Pine-apple, D .

Ananassa

Tropical East and West

3-0-9-0 mm.o-oo4-ooo8.

Textiles of remarkable fineness.

Bromeliaceae

Indies

Av. 5. Av. 0-006

Exceptional fineness of ultimate fibre.

‘ See also Alpaca, Feit, Mqiiair, Shqppy and Wqol,

used for dusting brushes, is obtained from various species of the Gramineae; the “Mexican Whisk” from Epicampeas macroura; and ” Italian Whisk ” from Andropogon. The coir fibre mentioned above in connexion with coarse textiles is also extensively used in brush-making. Aloe and Agave fibres in their softer forms are also used for plasterers’s brushes. Many of the whitewashes and cleansing solutions used in house decoration are alkaline in character, and for such uses advantage is taken of the specially resistant character of the cellulose group of materials.

Stuffing and Upholstery.— Another important use for fibrous materials is for filling or stuffing in connexion with the seats and cushions in upholstery. In the large range of effects required, a corresponding number and variety of products find employ- ment. One of the most important is the floss or seed-hair of the Eriodendron anfractuosum, known as Kapok, the use of which in Europe was created by the Dutch

merchants who drew their supplies from Java. The fibre is soft, silky and elastic, and maintains its elasticity in use. Many fibres when used in the mass show, on the other hand, a tendency to become matted and compressed in use, and to restore them to their original state the fibre requires to be removed and subjected to a teasing or carding process. This defect limits the use of other ” flosses ” or seed hairs in competition with Kapok. Horse hair is exten- sively used in this industry, as are also wool flocks and other short animal hairs and wastes.

Hats and Matting. — For these manufactures a large range of the fibrous products above described are employed, chiefly in their natural or raw state.

Bibliography.— The list of works appended comprises only a small fraction of the standard literature of the subject, but they are sufficiently representative to enable the specialist, by referring to them, to cover the subject-matter. F. H. Bowman, The Structure of the Wood Fibre (1885), The Structure of Cotton Fibre (1882) ; Cross, Sevan and King, Indian Fibres and Fibrous Substances (London, 1887) ; C. F. Cross, Report on Miscellaneous Fibres, Colonial Indian Exhibition, 1886 (London, 1887); Cross and Bevan, Cellulose, Researches on Cellulose, i. and ii. (London, 1895-1905) ; C. R. Dodge, A Descriptive Catalogue of Useful Fibre Plants of the World (Report No. 9, U.S. Dept. of Agriculture, Washington, 1897); von Hohmel, Die Mikroskopie der technisch verwendeten Faserstoffe (Leipzig, 1905) ; J. J. Hummel, The Dyeing of Textile Fabrics (London, 1885) ; J. M. Matthews, The Textile Fibres, their Physical, Microscopical and Chemical Properties (New York, 1904); H. Miiller, Die Pflanzenfaser (Braunschweig, 1877); H. Schlichter, ” The Examination of Textile Fibres and Fabrics” {Jour. Soc. Chem. Ind., 1890, 241) ; M. Vetillart, Etudes sur les fibres vegetates textiles (Paris, 1876); Sir T. H. Wardle, Silk and Wild Silks, original memoirs in connexion with Col. Ind. Ex., 1886, Jubilee Ex. Manchester, 1887; Sir G. Watt, Dictionary of Economic Products of India (London, 1891); Wiesner, Die Rohstoffe des Pflanzenreichs (Leipzig, 1873); O. N. Witt, Che- mische Technologic der Gespinnstfasern (Braunschweig, 1888); Kew Bulletin ; The Journal of the Imperial Institute ; The Journal of the Society of Arts; W. I. Hannam, The Textile Fibres of Commerce (London, 1902); J. Jackson, Commercial Botany; J. Zipser, Die Textilen Rohmaterialien (Wien, 1895) ; F. Zetzsche, Die wichtigsten Faserstoffe der europaischen Industrie (Leipzig, 1895). (C. F. C.)

FIBRIN, or Fibrine, a protein formed by the action of the so-called fibrin-ferment on fibrinogen, a constituent of the blood- plasma of all

vertebrates. This change takes place when blood leaves the arteries, and the fibrin thus formed occasions the clotting which ensues (see Blood). To obtain pure coagulated fibrin it is best to heat blood-plasma (preferably that of the horse) to 56 C. The usual method of beating a blood-clot with twigs and removing the filamentous fibrin which attaches itself to them yields a very impure product containing haemoglobin and much globulin; moreover, it is very difficult to purify. Fibrin is a very voluminous, tough, strongly elastic, jelly-like substance; when denaturalized by heat, alcohol or salts, it behaves as any other coagulated albumin.

FICHTE, IMMANUEL HERMANN (originally Hartmann) VON (1797-1879), German philosopher, son of J. G. Fichte, was born at Jena on the 18th of July 1797. Having held educa- tional posts at Saarbriicken and Dusseldorf, in 1836 he became extraordinary professor of philosophy at Bonn, and in 1840 full professor. In 1842 he received a call to Tubingen, retired in 1867, and died at Stuttgart on the 8th of August 1879. The

most important of his comprehensive writings are: System der Ethik (1850-1853), Anthropologic (1856, 3rded. 1876), Psychologit (1864-1873), Die theistische Weltansicht (1873). In 1837 he had founded the Zeitschrift fiir Philosophic as an organ of his views, more especially on the subject. of the philosophy of religion, where he was in alliance with C. H. Weisse; but; whereas Weisse thought that the Hegelian structure was sound in the main, and that its imperfections might be mended, Fichte held it to be incurably defective, and spoke of it as a “masterpiece of erroneous consistency or consistent error.” Fichte’s general views on philosophy seem to have changed considerably as he advanced in years, and his influence has been impaired by certain inconsistencies and an appearance of eclecticism, which is strengthened by his predominantly historical treatment of problems, his desire to include divergent systems within his own, and his conciliatory tone. His philosophy is an attempt to reconcile monism (Hegel) and individualism (Herbart) by means of theism (Leibnitz). He attacks Hegelianism for its pantheism, its lowering of human personality, and imperfect recognition of the demands of the moral consciousness. God, he says, is to be regarded not as an absolute but as an Infinite Person, whose nature it is that he should realize himself in finite persons. These persons are objects of God’s love, and he arranges the world for their good. The direct connecting link between God and man is the ” genius,” a higher spiritual individuality existing in man by the side of his lower, earthly individuality. Fichte,

in short, advocates an ethical theism, and his arguments might easily be turned to account by the apologist of Christianity. In his conception of finite personality he recurs to something like the monadism of Leibnitz. His insistence ori moral experience is connected with his insistence on personality. One of the tests by which Fichte discriminates the value of previous systems is the adequateness with which they interpret moral experience. The same reason that made him depreciate Hegel made him praise Krause (panentheism) and Schleiermacher, and speak respectfully of English philosophy. It is characteristic of Fichte's almost excessive receptiveness that in his latest published work, Der neuere Spiritualismus (1878), he supports his position by arguments of a somewhat occult or theosophical cast, not unlike those adopted by F. W. H. Myers. He also edited the complete works and literary correspondence of his father, including his life.

See R. Eucken, " Zur Erinnerung I. H. F." in Zeitschrift fiir Philosophicˆ ex. (1897); C. C. Scherer, Die Gotteslehre von I. H. F. (1902) ; article by Karl Hartmann in Allegemeine deutsche Biographii xlviii. (1904). Some of his works were translated by J. D. Morel! under the title of Contributions to Mental Philosophy (i860).

FICHTE, JOHANN GOTTLIEB (1762-1814), German philo- sopher, was born at Rammenau in Upper Lusatia on the 19th of May 1762. His father, a ribbon-weaver, was a descendant of a Swedish soldier who (in the service of Gustavus Adolphus) was left wounded at Rammenau and settled there. The family was distinguished for piety, uprightness, and solidity of character. With these qualities Fichte himself combined a certain im- petuosity and impatience probably derived from his mother, a woman of a somewhat querulous and jealous disposition.

At a very early age the boy showed remarkable mental vigour and moral independence. A fortunate accident which brought him under the notice of a neighbouring nobleman, Freiherr von Miltitz, was the means of procuring him a more excellent educa- tion than his father's circumstances would have allowed. He was placed under the care of Pastor Krebel at Niederau. After a short stay at Meissen he was entered at the celebrated school at Pforta, near Naumburg. In 1780 he entered the university of Jena as a student of theology. He supported himself mainly by private teaching, and during the years 1784- 1787 acted as tutor in various families of Saxony. In 1787, after an unsuccessful application to the consistory for pecuniary assist- ance, he seems to have been driven to miscellaneous literary work. A tutorship at Zurich was, however, obtained in the spring of 1788, and Fichte spent in Switzerland two of the happiest years of his life. He

made several valuable acquaintances,

cotton, wool, flax and jute, and it also includes at the other extreme the production of coarse textiles, such as twine and rope.

C. The fibres of still shorter dimensions are treated in various ways for the production' of a fabric in continuous length.

The distinction of type of manufacturing processes in which the relatively short fibres are utilized, either as disintegrated units or comminuted long fibres, follows the lines of division into long and short fibres; the long fibres are worked 'into yarns by various processes, whereas the shorter fibres are agglomerated by both dry and wet processes to felted tissues or felts. It is obvious, however, that these distinctions do not constitute rigid dividing lines. Thus the principles involved in felting are also applied in the manipulation of long fibre fabrics. For instance, woollen goods are closed or shrunk by milling, the web being subjected to a beating or hammering treatment in an apparatus known as " the Stocks," or is continuously run through squeezing rollers, in weak alkaline liquids. Flax goods are " closed " by the process of beetling, a long-continued process of hammering, under which the ultimate fibres are more or less subdivided, and at the same time welded or incorporated together. As already indicated, paper, which is a web composed of units of short dimensions produced by deposition from suspension in water and agglomerated by the interlacing of the component fibres in all planes within the mass, is a species of textile. Further, whereas the silks are mostly worked up in the extreme lengths of the cocoon, there are various systems of spinning silk wastes of variable short lengths, which are similar to those required fcr spinning the fibres which occur naturally in the shorter lengths.

The fibres thus enumerated as commercially and industrially important have established themselves as the result of a struggle for survival, and each embodies typical features of ultility. There are innumerable vegetable fibres, many of which are utilized in the locality or region of their production, but are not available for the highly specialized applications of modern competitive industry to qualify for which a very complex range of require- ments has to be met. These include primarily the factors of production and transport summed up in cost of production, together with the question of

regularity of supply; structural characteristics, form and dimensions, including uniformity of ultimate unit and adaptability to standard methods of preparing and spinning, together with tenacity and elasticity, lustre. Lastly, composition, which determines the degree of resistance to chemical disintegrating influences as well as subsidiary questions of colour and relationship to colouring matters. The quest for new fibres, as well as modified methods of production of those already known, require critical investigation from the point of view of established practice. The present perspective outline of the group will be found to contain the elements of a grammar of the subject. But those who wish to pursue the matter will require to amplify this outlined picture by a study of the special treatises which deal with general principles, as well as the separate articles on the various fibres.

Analysis and Identification. — For the analysis of textile fabrics and the ‘dentification of component fibre, a special treatise must be consulted. The following general facts are to be noted as of importance.

All animal fibres are effectively dissolved by 10% solution of caustic potash or soda. The fabric or material is boiled in this solution for 10 minutes and exhaustively washed. Any residue will be vegetable or cellulose fibre. It must not be for- gotten that the chemical properties of the fibre substances are modified more or less by association in combination with colour- ing matters and mordants. These may, in many cases, be removed by treatments which do not seriously modify the fibre substances. ‘ ■

Wool is distinguished from silk by its relative resistance to the action of sulphuric acid. The cold concentrated acid rapidly dissolves silk as well as the vegetable fibres. The attack on wool is slow, and the epidermal scales of wool make their appearance. The true silks are distinguished from the wild silks by the action of concentrated hydrochloric acid in the cold, which reagent dissolves the former, but has only a slight effect on Tussore

silk. After preliminary resolution by these group reagents, the fabric is subjected to microscopical analysis for the final identification of its component fibres (see H. Schlichter, Journal Soc. Chem. Ind., i&go, p. 241).

A scheme for the commercial analysis or assay of vegetable fibres, originally proposed by the author, 1 and now generally adopted, includes the following operations : —

1. Determination of moisture.

2. Determination of ash left after complete ignition.

3. Hydrolysis:

(a) loss of weight after boiling the raw fibre with a 1 % caustic soda solution for five minutes;

(b) loss after boiling for one hour.

4. Determination of cellulose: the white residue after

(a) boiling for five minutes with 1% caustic soda,

(b) exposure to chlorine gas for one hour,

(c) boiling with basic sodium sulphite solution.

5. Mercerizing: the loss of weight after digestion with a

20 % solution of sodium hydrate for one hour in the cold.

6. Nitration: the weight of the product obtained after

digestion with a mixture of equal volumes of sulphuric and nitric acids for one hour in the cold.

7. Acid purification: treatment of the raw fibre with 20%

acetic acid for one minute, the product being washed with water and alcohol, and then dried.

8. Determination of the total carbon by combustion.

II. Paper-making.- — The papermaking industry (see Paper) employs as raw materials a large proportion of the vegetable fibre products already enumerated, and, for the reasons incident- ally mentioned, they may be, and are, employed in a large variety of forms: in fact any fibrous material containing over 30% ” cellulose ” and yielding ultimate fibres of a length exceeding 1 mm. can be used in this industry. Most important staples are cotton and flax; these are known to the paper-maker as ” rag” fibres, rags, i.e. cuttings of textile fabrics, new and old, being their main source of supply. These are used for writing and drawing papers. In the class of ” printings ” two of the most important staples are wood pulp, prepared by chemical treatment from both pine and foliage woods, and in England esparto

cellu- lose, the cellulose obtained from esparto grass by alkali treat- ment; the cereal straws are also used and are resolved into cellulose by alkaline boiling followed by bleaching. In the class of “wrappings ” and miscellaneous papers a large number of other ma’terials find use, such as various residues of manufactur- ing and preparing processes, scutching wastes, ends of rovings and yarns, flax, hemp and manila rope waste, adansonia bast, and jute wastes, raw (cuttings) and manufactured (bagging). Other materials have been experimentally tried, and would no doubt come into use on their papermaking merits, but as a matter of fact the actually suitable raw materials are comprised in the list above enumerated, and are limited in number, through the influence of a number of factors of value or utility.

III. Brush Fibres, &c. — In addition to the textile industries there are manufactures which utilize fibres of both animal and vegetable character. The most important of these is brush- making. The familiar brushes of everyday use are extremely diversified in form and texture. The supplies of animal fibres are mainly drawn from the badger, hog, bear, sable, squirrel and horse. These fibres and bristles cover a large range of effects. Brushes required for cleansing purposes are composed of fibres of a more or less hard and resilient character, such as horse hairs, and other tail hairs and bristles. For painting work brushes of soft quality are employed, graduating for fine work into the extreme softness of the ” camel hair ” pencil. Of vegetable fibres the following are used in this industry. The Caryota urens furnishes the Kittul fibre, obtained from the base of the leaf stalks. Piassava is obtained from the Attalea funifera, also from the Leopoldina piassaba (Brazil). Palmyra fibre is obtained from the Borassus flabellifer. These are all members of the natural order of the Palmaceae. Mexican fibre, or Istle, is obtained from the agave. The fibre known as Whisk, largely

1 Col. Ind. Exhibition, 1886, Miscellaneous Reports.

among others Lavater and his brother-in-law Hartmann Rahn, to whose daughter, Johanna Maria, he became engaged.

Settling at Leipzig, still without any fixed means of livelihood, he was again reduced to literary drudgery. In the midst of this work occurred the most important event of his life, his introduction to the philosophy of Kant. At Schulpforta he had read with delight Lessing’s Anti-Goeze, and during his Jena days had studied the relation between philosophy

and religion. The outcome of his speculations, Aphorismen iiber Religion und Deismus (unpublished, date 1790; Werke, i. 1-8), was a species of Spinozistic determinism, regarded, however, as lying altogether outside the boundary of religion. It is remarkable that even for a time fatalism should have been predominant in his reasoning, for in character he was opposed to such a view, and, as he has said, " according to the man, so is the system of philosophy he adopts."

Fichte's Letters of this period attest the influence exercised on him by the study of Kant. It effected a revolution in his mode of thinking; so completely did the Kantian doctrine of the inherent moral worth of man harmonize with his own character, that his life becomes one effort to perfect a true philosophy, and to make its principles practical maxims. At first he seems to have thought that the best method for accom- plishing his object would be to expound Kantianism in a popular, intelligible form. He rightly felt that the reception of Kant's doctrines was impeded by their phraseology. An abridgment of the Kritik der Urtheilskraft was begun, but was left unfinished.

Fichte's circumstances had not improved. It had been arranged that he should return to Zurich and be married to Johanna Rahn, but the plan was overthrown by a commercial disaster which affected the fortunes of the Rahn family. Fichte accepted a post as private tutor in Warsaw, and proceeded on foot to that town. The situation proved unsuitable; the lady, as Kuno Fischer says, " required greater submission and better French " than Fichte could yield, and after a fortnight's stay Fichte set out for Konigsberg to see Kant. His first interview was disappointing; the coldness and formality of the aged philosopher checked 'Hie enthusiasm of the young disciple, though it did not diminish his reverence. He resolved to bring himself before Kant's notice by submitting to him a workin which the principles of the Kantian philosophy should be applied. Such was the origin of the work, written in four weeks, the Vcrsuch eitier Kritik oiler Ojfenbarung (Essay towards a Critique of all Revelation). The problem which Fichte dealt with in this essay was one not yet handled by Kant himself, the relations of which to the critical philosophy furnished matter for surmise. Indirectly, indeed, Kant had indicated a very definite opinion on theology: from the Critique of Pure Reason it was clear that for him speculative theology must be purely negative, while the Critique of Practical Reason as clearly indicated the view that the moral law is the absolute content or substance of any religion. A critical investigation of the conditions under which religious belief was possible was still wanting. Fichte sent his essay to Kant, who approved it highly, extended to the author a warm reception, and exerted his influence to procure a publisher. After some delay,

consequent on the scruples of the theological censor of Halle, who did not like to see miracles rejected, the book appeared (Easter, 1792). By an oversight Fichte's name did not appear on the title-page, nor was the preface given, in which the author spoke of himself as a beginner in philosophy. Outsiders, not unnaturally, ascribed the work to Kant. The Allgemeine Liter atur-Zeitung went so far as to say that no one who had read a line of Kant's writings could fail to recognize the eminent author of this new work. Kant himself corrected the mistake, at the same time highly commending the work. Fichte's reputation was thus secured at a stroke.

The Critique of Revelation marks the culminating point of Fichte's Kantian period. The exposition of the conditions under which revealed religion is possible turns upon the absolute requirements of the moral law in human nature. Religion itself is the belief in this moral law as divine, and such belief is a practical postulate, necessary in order to add force to the law.

It follows that no revealed religion, so far as matter or substance is concerned, can contain anything beyond this law; nor can any fact in the world of experience be recognized by us as super- natural. The supernatural element in religion can only be the divine character of the moral law. Now, the revelation of this divine character of morality is possible only to a being in whom the lower impulses have been, or are, successful in overcoming reverence for the law. In such a case it is conceivable that a revelation might be given in order to add strength to the moral law. Religion ultimately then rests upon the practical reason, and expresses some demand or want of the pure ego. In this conclusion we can trace the prominence assigned by Fichte to the practical element, and the tendency to make the requirements of the ego the ground for all judgment on reality. It was not possible that having reached this point he should not press forward and leave the Kantian position.

This success was coincident with an improvement in the fortunes of the Rahn family, and the marriage took place at Zurich in October 1793. The remainder of the year he spent at Zurich, slowly perfecting his thoughts on the fundamental problems left for solution in the Kantian philosophy. During this period he published anonymously two remarkable political works, Zuriickforderung der Denkfreiheit von den Fursten Europas and Beitrage zur Berichtigung der Urtheile des Publicums iiber die franzosische Revolution. Of these the latter is much the more important. The French Revolution seemed to many earnest thinkers the one great outcry of modern times for the liberty of thought and action which is the eternal heritage of every human

being. Unfortunately the political condition of Germany was unfavourable to the formation of an unbiassed opinion on the great movement. The principles involved in it were lost sight of under the mass of spurious maxims on social order which had slowly grown up and stiffened into system. To direct attention to the true nature of revolution, to demonstrate how inextricably the right of liberty is interwoven with the very existence of man as an intelligent agent, to point out the inherent progressiveness of state arrangements, and the consequent necessity of reform or amendment, such are the main objects of the Beitrage; and although, as is often the case with Fichte, the arguments are too formal and the distinctions too wire- drawn, yet the general idea is nobly conceived and carried out. As in the Critique cf Revelation so here the rational nature of man and the conditions necessary for its manifestation or realiza- tion become the standard for critical judgment.

Towards the close of 1793 Fichte received an invitation to succeed K. L. Reinhold as extraordinary professor of philosophy at Jena. This chair, not in the ordinary faculty, had become, through Reinhold, the most important in the university, and great deliberation was exercised in selecting his successor. It was desired to secure an exponent of Kantianism, and none seemed so highly qualified as the author of the Critique of Revela- tion. Fichte, while accepting the call, desired to spend a year in preparation; but as this was deemed inexpedient he rapidly drew out for his students an introductory outline of his system, and began his lectures in May 1 794. His success was instantaneous and complete. The fame of his predecessor was altogether eclipsed. Much of this success was due to Fichte's rare power as a lecturer. In oral exposition the vigour of thought and moral intensity of the man were most of all apparent, while his practical earnestness completely captivated his hearers. He lectured not only to his own class, but on general moral subjects to all students of the university. These general addresses, published under the title Bestimmung des Gelehrten (Vocation of the Scholar), were on a subject dear to Fichte's heart, the supreme importance of the highest intellectual culture and the duties incumbent on those who had received it. Their tone is stimulating and lofty.

The years spent at Jena were unusually productive; indeed, the completed Fichtean philosophy is contained in the writings of this period. A general introduction to the system is given in the tractate Uber den Begrijf der Wissenschaftslehre (On the Notion of the Theory of Science), 1794, and **h** theoretical

portion is worked out in the Grundlage der gesammten Wissenschaftslehre (Foundation of the whole Theory of Science, 1794) and Grundriss des Eigenihiimlichen d. Wissenschaftslehre (Outline of what is peculiar in the Theory of Science, 1794). To these were added in 1797 a First and a Second Introduction to the Theory of Science, and an Essay towards a new Exposition of the Theory of Science. The Introductions are masterly expositions. The practical philosophy was given in the Grundlage des Naturrechts (1796) and System der Sittenlehre (1798). The last is probably the most important of all Fichte's works; apart from it, his theoretical philosophy is unintelligible.

During this period Fichte's academic career had been troubled by various storms, the last so violent as to put a close to his professorate at Jena. The first of them, a complaint against the delivery of his general addresses on Sundays, was easily settled. The second, arising from Fichte's strong desire to suppress the Landsmannschafien (students' orders), which were productive of much harm, was more serious. Some misunderstanding caused an outburst of ignorant ill-feeling on the part of the students, who proceeded to such lengths that Fichte was com- pelled to reside out of Jena. The third storm, however, was the most violent. In 1798 Fichte, who, with F. I. Niethammer (1766-1848), had edited the Philosophical Journal since 1795, received from his friend F. K. Forberg (1770-1848) an essay on the " Development of the Idea of Religion." With much of the essay he entirely agreed, but he thought the exposition in so many ways defective and calculated to create an erroneous impression, that he prefaced it with a short paper On the Grounds of our Belief in a Divine Government of the Universe, in which God is defined as the moral order of the universe, the eternal law of right which is the foundation of all our being. The cry of atheism was raised, and the electoral government of Saxony, followed by all the German states except Prussia, suppressed the Journal and confiscated the copies found in their universities. Pressure was put by the German powers on Charles Augustus, grand-duke of Saxe- Weimar, in whose dominions Jena university was situated, to reprove and dismiss the offenders. Fichte's defences {Appellation an das Publicum gegen die Anklage des Alheismus, and Gerichtliche V erantwortung der Herausgeber der phil. Zeitschrift, 1799), though masterly, did not make it easier for the liberal-minded grand-duke to pass the matter over, and an unfortunate letter, in which he threatened to resign in case of reprimand, turned the scale against him. The grand-duke accepted his threat as a request to resign, passed censure, and extended to him permission to

withdraw from his chair at Jena; nor would he alter his decision, even though Fichte himself endeavoured to explain away the unfortunate letter.

Berlin was the only town in Germany open to him. His residence there from 1799 to r8o6 was unbroken save for a course of lectures during the summer of 1805 at Erlangen, where he had been named professor. Surrounded by friends, including Schlegel and Schleiermacher, he continued his literary work, perfecting the Wissenschaftslehre. The most remarkable of the works from this period are — (1) the Bestimmung des Menschen (Vocation of Man, 1800), a book which, for beauty of style, richness of content, and elevation of thought, may be ranked with the Meditations of Descartes; (2) Der geschlossene Handels- staot, 1800 (The Exclusive or Isolated Commercial State), a very remarkable treatise, intensely socialist in tone, and inculcating organized protection; (3) Sonnenklarer Bericht an das grosser e Publicum iiber die neueste Philosophic, 1801. In 1801 was also written the Darstellung der Wissenschaftslehre, which was not published till after his death. In 1804 a set of lectures on the W issenschaftslehre was given at Berlin, the notes of which were published in the Nachgelassene Werke, vol. ii. In 1804 were also delivered the noble lectures entitled Grundziige des gegen- w'drtigen Zeitallers (Characteristics of the Present Age, 1804), containing a most admirable analysis of the A nfklarung, tracing the position of such a movement of thought in the natural evolution of the general human consciousness, pointing out its inherent defects, and indicating as the ultimate goal of progress the life of reason in its highest aspect as a belief in the divine

order of the universe. The philosophy of history sketched in this work has something of value with much that is fantastic. In 1805 and 1806 appeared the Wesen des Gelehrten (Nature of the Scholar) and the Anweisung zum seligen Leben oder Religions- lehre (Way to a Blessed Life), the latter the most important work of this Berlin period. In it the union between the finite self-consciousness and the infinite ego or God is handled in an almost mystical manner. The knowledge and love of God is the end of life; by this means only can we attain blessedness (Seligkeit) , for in God alone have we a permanent, enduring object of desire. The infinite God is the all; the world of independent objects is the result of reflection or self-consciousness, by which the infinite unity is broken up. God is thus over and above the distinction of subject and object; our knowledge is but a reflex or picture of the infinite essence. Being is not thought.

The diasters of Prussia in 1806 drove Fichte from Berlin. He retired

first to Stargard, then to Konigsberg (where he lectured for a time), then to Copenhagen, whence he returned to the capital in August 1807. From this time his published writings are practical in character; not till after the appearance of the Nachgelassene Werke was it known in what shape his final speculations had been thrown out. We may here note the order of these posthumous writings as being of importance for tracing the development of Fichte's thought. From the year 1806 we have the remarkable Bericht iiber die Wissenschaftslehre (Werke, vol. viii.), with its sharp critique of Schelling; from 1810 we have the Thatsachen des Bewusstseyns, published in 181 7, of which another treatment is given in lectures of 1813 (Nachgel. Werke, vol. i.). Of the Wissenschaftslehre we have, in 1812-1813, four separate treatments contained in the Nachgel. Werke. As these consist mainly of notes for lectures, couched in uncouth phraseology, they cannot be held to throw much light on Fichte's views. Perhaps the most interesting are the lectures of 1812 on Transcendental Logic (Nach. Werke, i. 106-400).

From 1 8 1 2 we have notes of two courses on practical philosophy, Rechtslehre {Nach. Werke, vol. ii.) and Sittenlehre (ib. vol. Hi.) . A finished work in the same department is the Staatslehre, published in 1820. This gives the Fichtean Utopia organized on principles of pure reason; in too many cases the proposals are identical with principles of pure despotism.

During these years, however, Fichte was mainly occupied with public affairs. In 1807 he drew up an elaborate and minute plan for the proposed new university of Berlin. In 1807-1808 he delivered at Berlin, amidst danger and discourage- ment, his noble addresses to the German people (Reden an die deutsche Nation). Even if we think that in these pure reason is sometimes overshadowed by patriotism, we cannot but recog- nize the immense practical value of what he recommended as the only true foundation for national prosperity.

In 1810 he was elected rector of the new university founded in the previous year. This post he resigned in 181 2, mainly on account of the difficulties he experienced in his endeavour to reform the student life of the university.

In 1813 began the great effort of Germany for national in- dependence. Debarred from taking an active part, Fichte made his contribution by way of lectures. The addresses on the idea of a true war (Uber den Begriff eines wahrhaften Kriegs, forming part of the Staatslehre) contain a very subtle contrast between the positions of France and Germany in the war.

In the autumn of 1813 the hospitals of Berlin were “filled with sick and wounded from the campaign. Among the most devoted in her exertions was Fichte’s wife, who, in January 1814, was attacked with a virulent hospital fever. On the day after she was pronounced out of danger Fichte was struck down. He lingered for some days in an almost unconscious state, and died on the 27th of January 1814.

The philosophy of Fichte, worked out in a series of writings, and falling chronologically into two distinct periods, that of Jena and that of Berlin, seemed in the course of its development to undergo a change so fundamental that many critics have sharply separated and opposed to one another an earlier and a later phase. The ground of the modification, further, has been sought and apparently found in quite external influences, principally that of

Schelling’s Naturphilosophie, to some extent that of Schleiermacher. But as a rule most of those who have adopted this view have done so without the full and patient examination which the matter demands; they have been misled by the difference in tone and style between the earlier and later writings, and have concluded that underlying this was a fundamental difference of philosophic con- ception. One only, Erdmann, in his Entwicklung d. deut. Spek. sell Kant, § 29, seems to give full references to justify his opinion, and even he, in his later work, Grundriss der Gesch. der Philos. (ed. 3), § 311, admits that the difference is much less than he had at the- first imagined. He certainly retains his former opinion, but mainly on the ground, in itself intelligible and legitimate, that, so far as Fichte’s philosophical reputation and influence are concerned, attention may be limited to the earlier doctrines of the Wissen- schaftslehre. This may be so, but it can be admitted neither that Fichte’s views underwent radical change, nor that the Wissenschafts- lehre was ever regarded as in itself complete, nor that Fichte was unconscious of the apparent difference between his earlier and later utterances. It is demonstrable by various passages in the works and letters that he never looked upon the Wissenschaftslehre as con- taining the whole system; it is clear from the chronology of his writings that the modifications supposed to be due to other thinkers were from the first implicit in his theory; and if one fairly traces the course of thought in the early writings, one can see how he was inevitably led on to the statement of the later and, at first sight, divergent views. On only one point, the position assigned in the Wissenschaftslehre to the absolute ego, is there any obscurity; but

the relative passages are far from decisive, and from the early work, Neue Darstellung der Wissenchaftslehre, unquestionably to be in cluded in the Jena period, one can see that from the outset the doctrine of the absolute ego was held in a form differing only in statement from the later theory.

Fichte's system cannot be compressed with intelligibility. We shall here note only three points : — (a) the origin in Kant ; (6) the fundamental principle and method of the Wissenschaftslehre ; (c) the connexion with the later writings. The most important works for (a) are the " Review of Aenesidemus," and the Second Introduction to the Wissenschaftslehre; for (J) the great treatises of the Jena period; for (cˆthe Thatsachen des Bewusstseyns of 18 10.

(a) The Kantian system had for the first time opened up a truly fruitful line of philosophic speculation, the transcendental con- sideration of knowledge, or the analysis of the conditions under which cognition is possible. To Kant the fundamental condition was given in the synthetical unity of consciousness. The primitive fact under which might be gathered the special conditions of that synthesis which we call cognition was this unity. But by Kant there was no attempt made to show that the said special conditions were necessary from the very nature of consciousness itself. Their necessity was discovered and proved in a manner which might be called empirical. Moreover, while Kant in a quite similar manner pointed out that intuition had special conditions, space and time, he did not show any link of connexion between these and the primi- tive conditions of pure cognition. Closely connected with this remarkable defect in the Kantian view — lying, indeed, at the founda- tion of it — was the doctrine that the matter of cognition is altogether given, or thrown into the form of cognition from without. So strongly was this doctrine emphasized by Kant, that he seemed to refer the matter of knowledge to the action upon us of a non-ego or Ding-an-sich, absolutely beyond consciousness. While these hints towards a completely intelligible account of cognition were given by Kant, they were not reduced to system, and from the way in which the elements of cognition were related, could not be so reduced. Only in the sphere of practical reason, where the intelligible nature prescribed to itself its own laws, was there the possibility of systematic deduction from a single principle.

The peculiar position in which Kant had left the theory of cog- nition was assailed from many different sides and by many writers, specially by Schultze (Aenesidemus) and Maimon. To the criticisms of the latter, in particular, Fichte owed much, but his own activity went far

beyond what they supplied to him. To complete Kant's work, to demonstrate that all the necessary conditions of knowledge can be deduced from a single principle, and consequently to expound the complete system of reason, that is the business of the Wissen- schaftslehre. By it the theoretical and practical reason shall be shown to coincide; for while the categories of cognition and the whole system of pure thought can be expounded from one principle, the ground of this principle is scientifically, or to cognition, in- explicable, and is made conceivable only in the practical philosophy. The ultimate basis for the activity of cognition is given by the will. Even in the practical sphere, however, Fichte found that the contra- diction, insoluble to cognition, was not completely suppressed, and he was thus driven to the higher view, which is explicitly stated in the later writings though not, it must be confessed, with the precision and scientific clearness of the Wissenschaftslehre.

(b) What, then, is this single principle, and how does it work itself out into system? To answer this one must bear in mind what Fichte intended by designating all philosophy Wissenschafts- lehre, or theory of science. Philosophy is to him the rethinking of actual cognition, the theory of knowledge, the complete, systematic I exposition of the principles which lie at the basis of all reasoned '

cognition. It traces the necessary acts by which the cognitive consciousness comes to be what it is, both in form and in content. Not that it is a natural history, or even a phenomenology of con- sciousness; only in the later writings did Fichte adopt even the genetic method of exposition; it is the complete statement of the pure principles of the understanding in their rational or necessary order. But if complete, this Wissenschaftslehre must be able to deduce the whole organism of cognition from certain fundamental axioms, themselves unproved and incapable of proof; only thus can we have a system of reason. From these primary axioms the whole body of necessary thoughts must be developed, and, as Socrates would say, the argument itself will indicate the path of the development.

Of such primitive principles, the absolutely necessary conditions of possible cognition, only three are thinkable — one perfectly un- conditioned both in form and matter; a second, unconditioned in form but not in matter; a third, unconditioned in matter but not in form. Of these, evidently the first must be the fundamental ; to some extent it conditions the other two, though these cannot be deduced from it or proved by it. The statement of these principles forms the introduction to Wissenschaftslehre.

The method which Fichte first adopted for stating these axioms is not calculated to throw full light upon them, and tends to ex- aggerate the apparent airiness and unsubstantiality of his deduction. They may_ be explained thus. The primitive condition of all in- telligence is that the ego shall posit, affirm or be aware of itself. The ego is the ego; such is the first pure act of conscious intelligence, that by which alone consciousness can come to be what it is. It is what Fichte called a Deed-act (Thathandlung) ; we cannot be aware of the process, — the ego is not until it has affirmed itself,— but we are aware of the result, and can see the necessity of the act by which it is brought about. The ego then posits itself ,as real. What the ego posits is real. But in consciousness there is equally given a primitive act of op-positing, or contra-positing, formally distinct from the act of position, but materially determined, in so far as what is op-posited must be the negative of that which was posited. The non-ego — not, be it noticed, the world as we know it — is op-posed in consciousness to the ego. The ego is not the non-ego. How this act of op-positing is possible and necessary, only becomes clear in the practical philosophy, and even there the inherent difficulty leads to a higher view. But third, we have now an absolute antithesisto our original thesis. Only the ego is real, but the non-ego is posited in the ego. The contradiction is solved in a higher synthesis, which takes up into itself the two opposites. The ego and non-ego limit one another, or determine one another; and, as limitation is negation of part of a divisible quantum, in this third act, the divisible ego is op-posed to a divisible non-ego.

From this point onwards the course proceeds by the method already made clear. We progress by making explicit the oppositions contained in the fundamental synthesis, by uniting these opposites, analysing the new synthesis, and so on, until we reach an ultimate pair. Now, in the synthesis of the third act two principles may be distinguished: — (1) the non-ego determines the ego; (2) the ego determines the _ non-ego. As determined the ego is theoretical, as determining it is practical; ultimately the opposed principles must be united by showing how the ego is both determining and determined.

It is; impossible to enter here on the steps by which the theo- retical ego is shown to develop into the complete system of cognitive categories, or to trace the deduction of the processes (productive imagination, intuition, sensation, understanding, judgment, reason) by which the quite indefinite non-ego comes to assume the appear- ance of definite objects in the forms of time and space. All this evolution is the necessary consequence of the determination of the ego by the non-ego. But itis clear that the non-ego cannot really determine the ego. There is no reality beyond the ego itself. The contradiction can only

be suppressed if the ego itself opposes to itself the non-ego, places it as an Anstoss or plane on which its own activity breaks and from which it is reflected. Now, this op- positing of the Anstoss is the necessary condition of the practical ego, of the will. If the ego be a striving power, then of necessity a limit must be set by which its striving is manifest. But how can the infinitely active ego posit a limit to its own activity? Here we come to the crux of Fichte's system, which is only partly cleared up in the Rechtslehre and Siltenlehre. If the ego be pure Activity, free activity, it can only become aware of itself by positing some limit. We cannot possibly have any cognition of how such an act is possible. But as it is a free act, the ego cannot be determined to it by anything beyond itself; it cannot be aware of its own free- dom otherwise than as determined by other free egos. Thus in the Rechtslehre and Siltenlehre, the multiplicity of egos is deduced, and with this deduction the first form of the Wissenschaftslehre appeared to end.

(c) But in fact deeper questions remained. We have spoken of the ego as becoming aware of its own freedom, and have shown how the existence of other egos and of a world in which these egos may act are the necessary conditions of consciousness of freedom. But all this is the work of the ego. All that has been expounded follows if the ego comes to consciousness. We have therefore to consider that the absolute ego, from which spring all the individual egos, is not subject to these conditions, but freely determines itself to them.

How is this absolute ego to be conceived ? As early as 1 797 Fichte had begun to see that the ultimate basis of his system was the absolute ego, in which is no difference of subject and object; in 1800 the Bestimmung des Menschen defined this absolute ego as the infinite moral will of the universe, God, in whom are all the in- dividual egos, from whom they have sprung. It lay in the nature of the thing that more precise utterances should be given on this subject, and these we find in the Thatsachen des Bewusstseyns and in all the later lectures. God in them is the absolute Life, the absolute One, who becomes conscious of himself by self-diremption into the individual egos. The individual ego is only possible as opposed to a non-ego, to a world of the senses; thus God, the infinite will, mani- fests himself in the individual, and the individual has over against him the non-ego or thing. " The individuals do not make part of the being of the one life, but are a pure form of its absolute freedom." " The individual is not

conscious of himself, but the Life is conscious of itself in individual form and as an individual." In order that the Life may act, though it is not necessary that it should act, in- dividualization is necessary. " Thus," says Fichte, " we reach a final conclusion. Knowledge is not mere knowledge of itself, but of being, and of the one being that truly is, viz. God. . . . This one possible object of knowledge is never known in its purity, but ever broken into the various forms of knowledge which are and can be shown to be necessary. The demonstration of the necessity of these forms is philosophy or Wissenschaftslehre " {Thats. des Bewuss. Werke, ii. 685). This ultimate view is expressed throughout the lectures (in the Nachgel. Werke) in uncouth and mystical language.

It will escape no one (1) how the idea and method of the Wissen- schaftslehre prepare the way for the later Hegelian dialectic, and (2) how completely the whole philosophy of Schopenhauer is con- tained in the later writings of Fichte. It is not to the credit of historians that Schopenhauer's debt should have been allowed to pass with so little notice.

Bibliography. — Fichte's complete works were published by his son J. H. Fichte, Sammtliche Werke (8 vols., Berlin, 1845-1846), with Nachgelassene Werke (3 vols., Bonn, 1834-1835) ; also Leben und Briefwechsel (2 vols., 1830, ed. 1862). Among translations are those of William Smith, Popular Writings of Fichte, with Memoir (2 vols., London, 1848-1849, 4th ed. 1889) ; A. E. Kroeger, portions of the Wissenschaftslehre (Science of Knowledge, Philadelphia, 1868; ed. London, 1889), the Naturrecht (Science of Rights, 1870; ed, London, 1889); of the Vorlesungen ii. d. Bestimmung d. Gelehrten (the Vocation of the Scholar, by W. Smith, 1 847) ; Destination of Man, by Mrs P. Sinnett; Discours d la nation allemande, French by Leon Philippe (1895), with preface by F. Picavet, and a biographical memoir.

The number of critical works is very large. Besides the histories of post-Kantian philosophy by Erdmann, Fortlage (whose account is remarkably good), Michelet, Biedermann and others, see Wm. Busse, Fichte und seine Beziehung zur Gegenwart des deutschen Volkes (Halle, 1848-1849); J. H. Lowe, Die Philosophic Fichtes (Stuttgart, 1862); Kuno Fischer, Geschichte d. neueren Philosophic (1869, 1884, 1890) ; Ludwig Noack, Fichte nach seinem Leben, Lehren und Wirken (Leipzig, 1862); R. Adamson, Fichte (1881, in Knight's "Philo- sophical Classics ") ; Oscar Benzow, Zu Fichtes Lekre von Nicht-Ich (Bern, 1898); E. O. Burmann, Die Transcendentalphilosophie Fichtes und Schellings (Upsala, 1890-1892); M. Carriere, Fichtes

Geistesentwickelung in die Reden iiber d. Bestimmung des Gelehrten (1894) ; C. C. Everett, Fichte's Science of Knowledge (Chicago, 1884) ; O. Pfleiderer, /. G. Fichtes Lebensbild eines deutschen Denkers und Patrioten (Stuttgart, 1877); T. Wotschke, Fichte und Erigena (1896); W. Kabitz, Studien zur Entwickelungsgeschichte der Fichte- '•'hen Wissenschaftslehre aus der Kantischen Philosophic (1902); E. Lask, Fichtes Idealismus und die Geschichte (1902); X. Leon, La Philos. de Fichte (1902); M. Wiener, /. G. Fichtes Lehre vom Wesen und Inhalt der Geschichte (1906).

On Fichte's social philosophy see, e.g., F. Schmidt-Warneck, Die Sociologie Fichtes (Berlin, 1884); W. Windelband, Fichtes Idee des deutschen Staates (1890) ; M. Weber, Fichtes Sozialismus und sein Verhdltnis zur Marx' schen Doct/in (1900) ; S. H. Gutman, /. G. Fichtes Sozialpadogogik (1907) ; H. Lindau, Johann G. Fichte und der neuere Socialismus (1900). (R. Ad.; X.)

FICHTELGEBIRGE, a mountain group of Bavaria, forming the centre from which various mountain ranges proceed, — the Elstergebirge, linking it to the Erzgebirge, in a N.E., the Franken- wald in a N.W., and the Bohmerwald in a S.E. direction. The streams to which it gives rise flow towards the four cardinal points, — e.g. the Eger eastward and the Saale northward, both to the Elbe; the Weisser Main westward to the Rhine, and the Naab southward to the Danube. The chief points of the mass are the Schneeberg and the Ochsenkopf, the former having a height of 3A48, and the latter of 3356 ft. The whole district is pretty thickly populated, and there is great abundance of wood, as well as of iron, vitriol, sulphur, copper, lead and many kinds of marble. The inhabitants are employed chiefly in the

iron mines, at forges and blast furnaces, and in charcoal burning and the manufacture of blacking from firewood. Although surrounded by railways and crossed by the lines Nuremberg- Eger and Regensburg-Oberkotzau, the Fichtelgebirge, owing principally to its raw climate and bleakness, is not much visited by strangers, the only important points of interest being Alex- andersbad (a delightfully situated watering-place) and the granite labyrinth of Luisenburg.

See A. Schmidt, Fuhrer durch das Fichtelgebirge (1899); Daniel, Deutschland ; and Meyer, Conversations-Lexikon (1904).

FICINO, MARSILIO (1433-1499), Italian philosopher and writer, was born at Figline, in the upper Arno valley, in the year 1433. His father, a physician of some eminence, settled in Florence, and attached himself to the person of Cosimo de' Medici. Here the young Marsilio

received his elementary education in grammar and Latin literature at the high school or studio pubblico. While still a boy, he showed promise of rare literary gifts, and distinguished himself by his facility in the acquisition of knowledge. Not only literature, but the physical sciences, as then taught, had a charm for him; and he is said to have made considerable progress in medicine under the tuition of his father. He was of a tranquil temperament, sensitive to music and poetry, and debarred by weak health from joining in the more active pleasures of his fellow-students. When he had attained the age of eighteen or nineteen years, Cosimo received him into his household, and determined to make use of his rare disposition fpr scholarship in the development of a long-cherished project. During the session of the council for the union of the Greek and Latin churches at Florence in 1439, Cosimo had made acquaintance with Gemistos Plethon, the Neo-Platonic sage of Mistra, whose discourses upon Plato and the Alexandrian mystics so fascinated the learned society of Florence that they named him the second Plato. It had been the dream of this man's whole life to supersede both forms of Christianity by a semi-pagan theosophy deduced from the writings of the later Pythagoreans and Platonists. When, therefore, he perceived the impression he had made upon the first citizen of Florence, Gemistos suggested that the capital of modern culture would be a fit place for the resuscitation of the once so famous Academy of Athens. Cosimo took this hint. The second half of the 15th century was destined to be the age of academies in Italy, and the regnant passion for antiquity satisfied itself with any imitation, however grotesque, of Greek or Roman institutions. In order to found his new academy upon a firm basis Cosimo resolved not only to assemble men of letters for the purpose of Platonic disputation at certain regular intervals, but also to appoint a hierophant and official expositor of Platonic doctrine. He hoped by these means to give a certain stability to his projected institution, and to avoid the superficiality of mere enthusiasm. The plan was good; and with the rare instinct for character which distinguished him, he made choice of the right man for his purpose in the young Marsilio.

Before he had begun to learn Greek, Marsilio entered upon the task of studying and elucidating Plato. It is known that at this early period of his life, while he was yet a novice, he wrote voluminous treatises on the great philosopher, which he after- wards, however, gave to the flames. In the year 1459 John Argyropoulos was lecturing on the Greek language and literature at Florence, and Marsilio became his pupil. He was then about twenty-three years of age. Seven years later he felt himself a sufficiently ripe Greek scholar to begin the translation of Plato, by which his name is famous in the history of scholarship,

and which is still the best translation of that author Italy can boast. The MSS. on which he worked were supplied by his patron Cosimo de' Medici and by Amerigo Benci. While the translation was still in progress Ficino from time to time, submitted its pages to the scholars, Angelo Poliziano, Cristoforo Landino, Demetrios Chalchondylas and others; and since these men were all members of the Platonic Academy, there can be no doubt that the discussions raised upon the text and Latin version greatly served to promote the purpose of Cosimo's

foundation. At last the book appeared in 1482, the expenses of the press being defrayed by the noble Florentine, Filippo Valori. About the same time Marsilio completed and published his treatise on the Platonic doctrine of immortality {Theologia Platonica de immortalitate anitnae), the work by which his claims to take rank as a philosopher must be estimated. This was shortly followed by the translation of Plotinus into Latin, and by a voluminous commentary, the former finished in i486, the latter in 1491, and both published at the cost of Lorenzo de' Medici just one month after his death. As a supplement to these labours in the field of Platonic and Alexandrian philosophy, Marsilio next devoted his energies to the translation of Dionysius the Areopagite, whose work on the celestial hierarchy, though recognized as spurious by the Neapolitan humanist, Lorenzo Valla, had supreme attraction for the mystic and uncritical intellect of Ficino.

It is not easy to value the services of Marsilio Ficino at their proper worth. As a philosopher, he can advance no claim to originality, his laborious treatise on Platonic theology being little better than a mass of ill-digested erudition. As a scholar, he failed to recognize the distinctions between different periods of antiquity and various schools of thought. As an exponent of Plato he suffered from the fatal error of confounding Plato with the later Platonists. It is true that in this respect he did not differ widely from the mass of his contemporaries. Lorenzo Valla and Angelo Poliziano, almost alone among the scholars of that age, showed a true critical perception. For the rest, it was enough that an author should be ancient to secure their admira- tion. The whole of antiquity seemed precious in the eyes of its discoverers; and even a thinker so acute as Pico di Mirandola dreamed of the possibility of extracting the essence of philo- sophical truth by indiscriminate collation of the most divergent doctrines. Ficino was,

moreover, a firm believer in planetary influences. He could not separate his philosophical from his astrological studies, and caught eagerly at any fragment of antiquity which seemed to support his cherished delusions. It may here be incidentally mentioned that this superstition brought him into trouble with the Roman Church. In 1489 he was accused of magic before Pope Innocent VIII., and had to secure the good offices of Francesco Soderini, Ermolao Barbaro, and the archbishop Rinaldo Orsini, in order to purge himself of a most perilous imputation. What Ficino achieved of really solid, was his translation. The value of that work cannot be denied; the impulse which it gave to Platonic studies in Italy, and through them to the formation of the new philosophy in Europe, is indisputable. Ficino differed from the majority of his contempor- aries in this that, while he felt the influence of antiquity no less strongly than they did, he never lost his faith in Christianity, or contaminated his morals by contact with paganism. For him, as for Petrarch, St Augustine was the model of a Christian student. The cardinal point of his doctrine was the identity of religion and philosophy. He held that philosophy consists in the study of truth and wisdom, and that God alone is truth and wisdom, — so that philosophy is but religion, and true religion is genuine philosophy. Religion, indeed, is common to all men, but its pure form is that revealed through Christ; and the teaching of Christ is sufficient to a man in all circumstances of life. Yet it cannot be expected that every man should accept the faith without reasoning; and here Ficino found a place for Platonism. He maintained that the Platonic doctrine was providentially made to harmonize with Christianity, in order that by its means speculative intellects might be led to Christ. The transition from this point of view to an almost superstitious adoration of Plato was natural; and Ficino, we know, joined in the hymns and celebrations with which the Florentine Academy honoured their great master on the day of his birth and death. Those famous festivals in which Lorenzo de' Medici delighted had indeed a pagan tone appropriate to the sentiment of the Re- naissance; nor were all the worshippers of the Athenian sage so true to Christianity as his devoted student.

Of Ficino's personal life there is but little to be said. In order that he might have leisure for uninterrupted study, Cosimo de'

Medici gave him a house near S. Maria Nuova in Florence, and a little farm at Montevecchio, not far from the villa of Careggi. Ficino, like nearly all the scholars of that age in Italy, delighted in country lfe. At Montevecchio he lived contentedly among his books, in the neighbourhood of his two friends, Pico at Querceto, and Poliziano at Fiesole, cheering^, his solitude by playing on the lute, and

corresponding with the most illustrious men of Italy. His letters, extending over the years 1474-1494, have been published, both separately and in his collected works. From these it may be gathered that nearly every living scholar of note was included in the list of his friends, and that the subjects which interested him were by no means confined to his Platonic sudies. As instances of his close intimacy with illustrious Florentine families, it may be mentioned that he held the young Francesco Guicciardini at the font, and that he helped to cast the horoscope of the Casa Strozzi in the Via Tornabuoni.

At the age of forty Ficino took orders, and was honoured with a canonry of S. Lorenzo. He was henceforth assiduous in the performance of his duties, preaching in his cure of Novoli, and also in the cathedral and the church of the Angeli at Florence. He used to say that no man was better than a good priest, and none worse than a bad one. His life corresponded in all points to his principles. It was the life of a sincere Christian and a real sage, — of one who found the best fruits of philosophy in the practice of the Christian virtues. A more amiable and a more harmless man never lived; and this was much in that age of discordant passions and lawless licence. In spite of his weak health, he was indefatigably industrious. His tastes were of the simplest; and while scholars like Filelfo were intent on ex- tracting money from their patrons by flattery and threats, he remained so poor that he owed the publication of all his many works to private munificence. For his old patrons of the house of Medici Ficino always cherished sentiments of the liveliest gratitude. Cosimo he called his second father, saying that Ficino had given him life, but Cosimo new birth, — the one had devoted him to Galen, the other to the divine Plato, — the one was physician of the body, the other of the soul. With Lorenzo he lived on terms of familiar, affectionate, almost parental intimacy. He had seen the young prince grow up in the palace of the Via Larga, and had helped in the development of his rare intellect. In later years he did not shrink from uttering a word of warning and advice, when he thought that the master of the Florentine republic was too much inclined to yield to pleasure. A character- istic proof of his attachment to the house of Medici was furnished by a yearly custom which he practised at his farm at Monte-vecchio. He used to invite the contadini who had served Cosimo to a banquet on the day of Saints Cosimo and Damiano (the patron saints of the Medici), and entertained them with music and singing. This affection was amply returned. Cosimo employed almost the last hours of his life in listening to Ficino's reading of a treatise on the highest good; while Lorenzo, in a poem on true happiness, described him as the mirror of the world, the nursling of sacred muses, the harmonizer

of wisdom and beauty in complete accord. Ficino died at Florence in

1499.

Besides the works already noticed, Ficino composed a treatise on the Christian religion, which was first given to the world in 1476, a translation into Italian of Dante's De monarchia, a life of Plato, and numerous essays on ethical and semi-philosophical subjects. Vigour of reasoning and originality of view were not his characteristics as a writer; nor will the student who has raked these dust-heaps' of miscellaneous learning and old- fashioned mysticism discover more than a few sentences of genuine enthusiasm and simple-hearted aspiration to repay his trouble and reward his patience. Only in familiar letters, prolegomena, and prefaces do we find the man Ficino, and learn to know his thoughts and sentiments unclouded by a mist of citations; these minor compositions have therefore a certain permanent value, and will continually be studied for the light they throw upon the learned circle gathered round Lorenzo in the golden age of humanism.

The student may be referred for further information to the follow- ing works: — Marsilii Ficini opera (Basileae, 1576); Marsilii Ficini vita, auctore Corsio (ed. Bandini, Pisa, 1771); Roscoe's Life of Lorenzo de' Medici; Pasquale Villari, La Storia di Girolamo Savo- narola (Firenze, Le Monnier, 1859); Von Reumont, Lorenzo de' Medici (Leipzig, 1874). (J. A. S.)

FICKSBURG, a town of Orange Free State no m. by rail E. by N. of Bloemfontein. Pop. (1904) 1954, of whom 1021 were whites. The town is situated near the north bank of the Caledon river and is the capital of one of the finest agricultural and stock- raising regions of the province. It has direct railway communica- tion with Natal and an extensive trade. In the neighbourhood are petroleum wells and a diamond mine. In the fossilized ooze of the Wonderkop, a table mountain of the adjacent Wittebergen, are quantities of petrified fish.

FICTIONS, or legal fictions, in law, the term used for false averments, the truth of which is not permitted to be called in question. English law as well as Roman law abounds in fictions. Sometimes they are merely the condensed expression of a rule of law, — e.g., the fiction of English law that husband and wife were one person, and the fiction of

Roman law that the wife was the daughter of the husband. Sometimes they must be regarded as reasons invented in order to justify a rule of law according to an implied ethical standard. Of this sort seems to be the fiction or presumption that every one knows the law, which reconciles the rule that ignorance is no excuse for crime with the moral commonplace that it is unfair to punish a man for violating a law of whose existence he was unaware. Again, some fictions are deliberate falsehoods, adopted as true for the purpose of establishing a remedy not otherwise attainable. Of this sort are the numerous fictions of English law by which the different courts obtained jurisdiction in private business, removed inconvenient restrictions in the law relating to land, &c.

What to the scientific jurist is a stumbling-block is to the older writers on English law a beautiful device for reconciling the strict letter of the law with common sense and justice. Blackstone, in noticing the well-known fiction by which the court of king's bench established its jurisdiction in common pleas (viz. that the defendant was in custody of the marshal of the court), says, " These fictions of law, though at first they may startle the student, he will find upon further consideration to be highly beneficial and useful; especially as this maxim is ever invariably observed, that no fiction shall extend to work an injury; its proper operation being to prevent a miscMef or remedy an inconvenience that might result from the general rule of law. So true it is that in fictione juris semper subsistit aequitas." Austin, on the other hand, while correctly assigning as the cause of many fictions the desire to combine the necessary reform with some show of respect for the abrogated law, makes the following harsh criticism as to others: — " Why the plain meanings which I have now stated should be obscured by the fictions to which I have just adverted I cannot conjecture. A wish on the part of the authors of the fictions to render the law as uncognoscible as may be is probably the cause which Mr Bentham would assign. I judge not, I confess, so uncharitably; I rather impute such fictions to the sheer imbecility (or, if you will, to the active and sportive fancies) of their grave and venerable authors, than to any deliberate design, good or evil." Bentham, of course, saw in fictions the instrument by which the great object of his abhorrence, judiciary law, was produced. It was the means by which judges usurped the functions of legislators. " A fiction of law." he says, " may be defined as a wilful falsehood, having for its object the stealing legislative powers by and for hands which could not or durst not openly claim it, and but for the delusion thus produced could not exercise it." A partnership, he says, was formed between the kings and the judges against the interests of the people. " Monarchs

found force, lawyers fraud; thus was the capital found ” (Historical Preface to the second edition of the Fragment on Government) }

1 In the same essay Bentham notices the comparative rarity of fictions in Scots law. As to fiction in particular, compared with the

Sir H. Maine (Ancient Law) supplies the historical element which is always lacking in the explanations of Austin and Bentham. Fictions form one of the agencies by which, in pro- gressive societies, positive law is brought into harmony with public opinion. The others are equity and statutes. Fictions in this sense include, not merely the obvious falsities of the English and Roman systems, but any assumption which conceals a change of law by retaining the old formula after the change has been made. It thus includes both the case law of the English and the Responsa Prudentum of the Romans. ” At a particular stage of social progress they are invaluable expedients for overcom- ing the rigidity of law; and, indeed, without one of them, the fiction of adoption, which permits the family tie to be artificially created, it is difficult to understand how society would ever have escaped from its swaddling clothes, and taken its first steps towards civilization.”

The bolder remedial fictions of English law have been to a large extent removed by legislation, and one great obstacle to any reconstruction of the legal system has thus been partially removed. Where the real remedy stood in glaring contrast to the nominal rule, it has been openly ratified by statute. In ejectment cases the mysterious sham litigants have disappeared. The bond of entail can be broken without having recourse to the collusive proceedings of fine and recovery. Fictions have been almost entirely banished from the procedure of the courts. The action for damages on account of seduction, which is still nominally an action by the father for loss of his daughter’s services, is perhaps the only fictitious action now remaining.

Fictions which appear in the form of principles are not so easily dealt with by legislation. To expel them formally from the system would require the re-enactment of vast portions of law. A change in legal modes of speech aid thought would be more effective. The legal mind instinctively seizes upon concrete aids to abstract reasoning. Many hard and revolting fictions must have begun their career as metaphors. In some cases the history of the change may still almost be traced. The conception that a man-of-war is a floating island, or that an ambassador’s house is beyond the territorial limits of the country in which he resides, was originally a figure of speech designed to set a rule of law in a striking light. It is then gravely accepted as true in

fact, and other rules of law are deduced from it. Its beginning is to be compared with such phrases as ” an Englishman’s house is his castle,” which have had no legal offshoots and still remain mere figures of speech.

Constitutional law is of course honeycombed with fictions. Here there is hardly ever anything like direct legislative change, and yet real change is incessant. The rules defining the sovereign power and fixing the authority of its various members are in most points the same as they were at the last revolution, — in many points they have been the same since the beginning of parlia- mentary government. But they have long ceased to be true in fact; and it would hardly be too much to say that the entire series of formal propositions called the constitution is merely a series of fictions. The legal attributes of the king, and even of the House of Lords, are fictions. If we could suppose that the effects of the Reform Acts had been brought about, not by legisla- tion, but by the decisions of law courts and the practice of House of Commons committees — by such assumptions as that freeholder includes lease-holder and that ten means twenty — we should have in the legal constitution of the House of Commons the same kind of fictions that we find in the legal statement of the attributes of the crown and the House of Lords. Here, too, fictions have been largely resorted to for the purpose of supporting particular

work done by it in English law, the use made of it by the Scottish lawyers is next to nothing. No need have they had of any such clumsy instrument. They have two others ” of their own making, by which things of the same sort have been done with much less trouble. Nobile officium gives them the creative power of legislation ; this and the word desuetude together the annihilative.” And he notices aptly enough that, while the English lawyers declared that James II. had abdicated the throne (which everybody knew to be false), the Scottish lawyers boldly said he had forfeited it.

theories, — popular or monarchical, — and such have flourished even more vigorously than purely legal fictions.

FIDDES, RICHARD (1671-1725), English divine and historian, was born at Hunmanby and educated at Oxford. He took orders, and obtained the living of Halsham in Holderness in 1696. Owing to ill-health he applied for leave to reside at Wickham, and in 1712 he

removed to London on the plea of poverty, intending to pursue a literary career. In London he met Swift, who procured him a chaplaincy at Hull. He also became chaplain to the earl of Oxford. After losing the Hull chaplaincy through a change of ministry in 1714, he devoted himself to writing. His best book is a Life of Cardinal Wolsey (London, 1724), containing documents which are still valuable for reference; of his other writings the Prefatory Epistle contain-ingsome remarks to be published en Homer's Iliad (London, 17 14), was occasioned by Pope's proposed translation of the Iliad, and his Theologia speculativa (London, 1718), earned him the degree of D.D. at Oxford. In his own day he had a considerable reputation as an author and man of learning.

FIDDLE (O. Eng. fithele, fidel, &c, Fr. viele, mole, violon; M. H. Ger. videle, mod. Ger. Fiedel), a popular term for the violin, derived from the names of certain of its ancestors. The word fiddle antedates the appearance of the violin by several centuries., and in England did not always represent an instrument of the same type. The word has first been traced in 1205 in Layamon's Brut (7002), "of harpe, of salteriun, of fithele and of coriun." In Chaucer's time the fiddle was evidently a well-known instrument:

" For him was lever have at his beddes hed A twenty bokes, clothed in black or red, Of Aristotle and his Philosophie, Than robes riche or fidel or sautrie."

{Prologue, v. 298.)

The origin of the fiddle is of the greatest interest; it will be found inseparable from that of the violin both as regards the instruments and the etymology of the words; the remote common ancestor is the ketharah of the Assyrians, the parent of the Greek cithara. The Romans are responsible for the word fiddle, having bestowed upon a kind of cithara — probably then in its first transition — the name of fidiculae (more rarely fidicula) , a diminutive form of fides. In Alain de Lille's De planctu naturae against the word lira stands as equivalent vioel, with the definition " Lira est quoddam genue citharae vel fitola alioquin de reot. Hoc instrumentum est multum vulgare." This is a marginal note in writing of the 13th century. 1

Some of the transitions horn fidicula to fiddle are made evident in the accompanying table:

Latin ....

Medieval Latki

French . .

Provencal .

Spanish

Old High German .

Middle High German

German

Italian .,

Dutch

Danish

Anglo-Saxon

Old English

fidiculae

vitula, fitola.

viele, vielle, viole.

viula.

viguela, vihuela, vigolo.

fidula.

videle.

fiedel, violine.

viola, violino.

vedel.

fiddel.

fithele.

fithele, fythal, fithel,

fythylle, fidel,

fidylle, (south) vithele.

For the descent of the guitar-fiddle, the first bowed ancestor of the violin, through many transitions from the cithara, see Cithara, Guitar and Guitar-Fiddle.

In the minnesinger and troubadour fiddles, of which evidences abound during the 12th, 13th and 14th centuries, are to be observed the structural characteristics ‘ of the violin and its ancestors in the course of evolution. The principal of these are first of all the shallow sound-chest, composed of belly and back, almost flat, connected by ribs (also present in the cithara), with incurvations more or less pronounced, an arched bridge, a finger-board and strings (varying in number), vibrated by means

1 See C. E. H. de Coussemaker, Memoire sur Hucbald (Paris, 1841).

From Julius Ruhlmann’s Geschichte der Bogeninstrumente. < >‘ ;

Minnesinger Fiddle. Germany, 13th Century, from the Manesse MSS.

of a bow. The central rose sound-holes of stringed instruments whose strings are plucked by fingers, or plectrum have giysn place to smaller latpral sound- holes placed on each side of the strings. It is in Germany, 1 where contemporary drawings of fiddles of the 13 th and 14th centuries furnish an authorita- tive clue, and in France, that the development may best be followed. The German minne- singer fiddle with sloping shoulders was the prototype of the viols, whereas the guitar- fiddle produced the violin through the intermediary of the Italian bowed Lyra.

The fiddle of the Carolingian epoch, — such, for instance, as

that mentioned by Otfrid of Weissenburg 2 in his Harmony of the Gospels {c. 868),

” Sih thar ouch al ruarit

This organo fuarit

Lira joh fidula,” See,, —

was in all probability still an instrument whose strings were plucked

by the fingers, a cithara in transition. (K. S.)

FIDENAE, an ancient town of Latium, situated about 5 m. N. of Rome on the Via Salaria, which ran between it and the Tiber. It was for some while the frontier of the Roman territory and was often in the hands of Veii. It appears to have fallen under the Roman sway after the capture of this town, and is spoken of by classical authors as a place almost deserted in their time. It seems, however > to have had some importance as a post station. The site of the arx of the ancient town is probably to be sought on the hill on which lies the Villa Spada, though no traces of early buildings or defences are to be seen: pre- Roman tombs are to be found in the cliffs to the north. The later village lay at the foot of the hill on the eastern edge of the high-road, and its curia, with a dedicatory inscription to M. Aurelius by the Senatus Fidenatium, was excavated v in 1889. Remains of other buildings may also be seen.

See T. Ashby in Papers of the British School at Pome, iii. 17.

FIDUCIARY (Lat. fiduciaries, one in whom trust, fiducia, is reposed), of or belonging to a position of trust, especially of one who stands in a particular relationship of confidence to another. Such relationships are, in law, those of parent and child, guardian and ward, trustee and cestui que trust, legal adviser and client, spiritual adviser, doctor and patient, &c. In many of these the law has attached special obligations in the case of gifts made to the ” fiduciary,” on whom is laid the onus of proving that no ” undue influence” has been exercised. (See Contract; Children, Law Relating to; Infant; Trust.)

FIEF, a feudal estate in land, land held from a superior (see Feudalism). The word is the French form, which is represented in Medieval Latin a&feudum ox feodum, and in English as ” fee” or ” feu ” (see Fee). The A.Fr. f coffer, to invest with a fief or fee, has given the English law terms” feoffee “and “feoffment “{q.v.).

FIELD, CYRUS WEST (1819-1892), American capitalist, projector of the first Atlantic cable, was born at Stockbridge, Massachusetts, on the 30th of November 1819. He was a brother of David Dudley Field. At fifteen he became a clerk in the store of A. T. Stewart & Co., of New York, and stayed there three years; then worked for two years with his brother, Matthew Dickinson Field, in a paper-mill at Lee, Massachusetts; and in 1840 went into the paper business for himself at Westfield, Massachusetts, but almost immediately became a partner in E. Root & Co., wholesale paper dealers in New York City, who failed in the following year. Field soon afterwards formed with a

1 See the Manesse MSS. reproduced in part by F. H. von der Hagen, Heldenbilder (Leipzig and Berlin, 1855) and Bilaersaal. The fiddles are reproduced in J. Ruhlmann's Geschichte der Bogen- instrumente (Brunswick, 1882), plates.

2 See Schiller's Thesaurus antiq. Teut. vol. i. p. 379.

brother-in-law the firm of Cyrus W. Field & Co., and in 1853 had accumulated $250,000, paid off the debts of the Root company and retired from active business, leaving his name and $100,000 with the concern. In the same year he travelled with Frederick E. Church, the artist, through South America. In 1854 he became interested, through his brother Matthew, a civil engineer, in the project of Frederick Newton Gisborne (1824-1892) for a telegraph across Newfoundland; and he was attracted by the idea of a trans- Atlantic telegraphic cable, as to which he con- sulted S. F. B . Morse and Matthew F. Maury, head of the National Observatory at Washington. With Peter Cooper, Moses Taylor (1806-1882), Marshall Owen Roberts (1814-1880) and Chandler White, he formed the New York, Newfoundland & London Telegraph Company, which procured a more favourable charter than Gisborne's, and had a capital of $1,500,000. Having secured all the practicable landing rights on the American side of the ocean, be and John W. Brett, who was now his principal colleague, approached Sir Charles Bright (q.v.) in London, and in December 1856 the Atlantic Telegraph Company was organized by them in Great Britain, a government grant being secured of £14,000 annually for government messages, to be reduced to £10,000 annually when the cable should pay a 6% yearly dividend; similar grants were made by the United States government. Unsuccessful attempts to lay the cable were made in August 1857 and in June 1858, but the complete cable was laid between the 7th of July and the 5th of August 1858; for a time messages were transmitted, but in October the cable became useless, owing to the failure of its electrical insulation. Field, however, did not abandon the enterprise, and finally in July 1866, after a futile attempt in the previous year, a cable was laid and brought successfully into use. From the Congress of the United States he received a gold medal and a vote of thanks, and he received many other honoursbothathomeandabroad. In 1877 he bought a controlling interest in the New York Elevated Railroad Company, controlling the Third and Ninth Avenue lines, of which he was president in 1877-1880. He worked with Jay Gould for the completion of the

Wabash railway, and at the time of his greatest stock activity bought The New York Evening Express and The Mail and combined them as The Mail and Express, which he controlled for six years. In 1879 Field suffered financially by Samuel J. Tilden's heavy sales (during Field's absence in Europe) of " Elevated " stock, which forced the price down from 200 to 164; but Field lost much more in the great " Manhattan squeeze " of the 24th of June 1887, when Jay Gould and Russell Sage, who had been supposed to be his backers in an attempt to bring the Elevated stock to 200, forsook him, and the price fell from 1565 to 114 in half an hour. Field died in New York on the 12th of July 1892.

See the biography by his daughter, Isabella (Field) Judson, Cyrus W, Field, His Life and Work (New York, 1896) ; H. M. Field, History ef the Atlantic Telegraph (New York, 1866); and Charles Bright, The Story of the Atlantic Cable (New York, 1903).

FIELD, DAVID DUDLEY (1805-1894), American lawyer and law reformer, was born in Haddam, Connecticut, on the 13th of February 1805. He was the oldest of the four sons of the Rev. David Dudley Field (1781-1867), a well-known American clergyman and author. He graduated at Williams College in 1825, and settled in New York City, where he studied law, was admitted to the bar in 1828, and rapidly won a high position in his profession. Becoming convinced that the common law in America, and particularly in New York state, needed radical changes in respect to the unification and simplification of its procedure, he visited Europe in 1836 and thoroughly investigated the courts, procedure and codes of England, France and other countries, and then applied himself to the task of bringing about in the United States a codification of the common law procedure. For more than forty years every moment that he could spare from his extensive practice was devoted to this end. He entered upon his great work by a systematic publication of pamphlets and articles in journals and magazines in behalf of his reform, but for some years he met with a discouraging lack of interest. He appeared personally before successive legislative committees, and

in 1846 published a pamphlet, " The Reorganization of the Judiciary," which had its influence in persuading the New York State Constitutional Convention of that year to report in favour of a codification of the laws. Finally in 1847 he was appointed as the head of a state commission to revise the practice and procedure. The first part of the commission's work, consisting of a code of civil procedure, Was reported and enacted in 1848, and by the 1st of January 1850 the complete code of civil and criminal procedure was completed, and was subsequently enacted by the legislature. The basis of the new

system, which was almost entirely Field's work, was the abolition of the existing distinction informs of pro- cedure between suits in law and equity requiring separate actions, and their unification and simplification in a single action. Eventu- ally the civil code with some changes was adopted in twenty-four states, and the criminal code in eighteen, and the whole formed a basis of the reform in procedure in England and several of her colonies. In 1857 Field became chairman of a state commission for the reduction into a written and systematic code of tht whole body of law of the state, excepting those portions already reported upon by the Commissioners of Practice and Headings. In this work he personally prepared almost the whole of the political and civil codes. The codification, which was completed in February 1865, was adopted only in small part by the state, but it has served as a model after which most of the law codes of the United States have been constructed. In 1866 he proposed to the British National Association for the Promotion of Social Science a revision and codification of the laws of all nations. For an international commission of lawyers he prepared Draft Out- lines of an International Code (1872), the submission of which resulted in the organization of the international Association for the Reform and Codification of the Laws of Nations, of which he became president. In politics Field was originally an anti-slavery Democrat, and he supported Van Buren in the Free Soil campaign of 1848. He gave his support to the Republican party in 1856 and to the Lincoln administration throughout the Civil War. After 1876, however, he returned to the Democratic party, and from January to March 1877 served out in Congress the unexpired term of Smith Ely, elected mayor of New York City. During his brief Congressional career he delivered six speeches, all of which attracted attention, introduced a bill in regard to the presidential succession, and appeared before the Electoral Commission in Tilden's interest. He died in New York City on the 13th of April 1894.

Part of his numerous pamphlets and addresses were collected in his Speeches, Arguments and Miscellaneous Papers (3 vols., 1884- 1890). See also the Life of David Dudley Field (New York, 1898), by Rev. Henry Martyn Field.

FIELD, EUGENE (1850-1895), American poet, was born at St Louis, Missouri, on the 2nd of September 1850. He spent his boyhood in Vermont and Massachusetts; studied for short periods at Williams and Knox Colleges and the University of Missouri, but without taking a degree; and worked as a jour- nalist on various papers, finally becoming connected with the Chicago News. A Little Book of Profitable Tales appeared in Chicago in 1889 and in New York the next year; but Field's place in later American literature chiefly

depends upon his poems of Christmas-time and childhood (of which " Little Boy Blue " and " A Dutch Lullaby " are most widely known), because of their union of obvious sentiment with fluent lyrical form. His principal collections of poems are: A Little Book of Western Verse (1889); A Second Book of Verse (1892); With Trumpet and Drum (1892); and Love Songs of Childhood (1894). Field died at Chicago on the 4th of November 1895.

His works were collected in ten volumes (1896), at New York. His prose Love-affairs of a Bibliomaniac (1896) contains a Memoir by his brother Roswell Martin Field (b. 1851). See also Slason Thompson, Eugene Field: a study in heredity and contradictions (2 vols., New York, 1901).

FIELD, FREDERICK (1801-18,85), English divine and biblical scholar, was born in London and educated at Christ's hospital and Trinity College, Cambridge, where he obtained a fellowship in 1824. He took orders in 1828, and began a close study of patristic theology. Eventually he published an emended and

annotated text of Chrysostom's Homiliae in Matthaeum (Cam- bridge, 1839), and some years later he contributed to Pusey's Bibliotheca Patrum (Oxford, 1838-1870), a similarly treated text of Chrysostom's homilies on Paul's epistles. The scholarship displayed in both of these critical editions is of a very high order. In 1839 he had accepted the living of Great Saxham, in Suffolk, and in 1842 he was presented by his college to the rectory of Reepham in Norfolk. He resigned in 1863, and settled at Norwich, in order to devote his whole time to study. Twelve years later he completed the Origenis Hexaplorum quae supersunt (Oxford, 1867-1875), now well known as Field's Hexapla, a text reconstructed from the extant fragments of Origen's work of that name, together with materials drawn from the Syro-hexaplar version and the Septuagint of Holmes and Parsons (Oxford, 1798-1827). Field was appointed a member of the Old Testa- ment revision company in 1870.

FIELD, HENRY MARTYN (1822-1907), American author and clergyman, brother of Cyrus Field, was born at Stockbridge, Massachusetts, on the 3rd of April 1822; he graduated at Williams College in 1838, and was pastor of a Presbyterian church in St Louis, Missouri, from 1842 to 1847, an d of a Con- gregational church in

West Springfield, Massachusetts, from 1850 to 1854. The interval between his two pastorates he spent in Europe. From 1854 to 1898 he was editor and for many years he was also sole proprietor of The Evangelist, a New York periodical devoted to the interests of the Presbyterian church. He spent the last years of his life in retirement at Stock- bridge, Mass., where he died on the 26th of January 1907. He was the author of a series of books of travel, which achieved unusual popularity. His two volumes descriptive of a trip round the world in 1875-1876, entitled From the Lakes of Kil- larney to the Golden Horn (1876) and From Egypt to Japan (1877), are almost classic in their way, and have passed through more than twenty editions. Among his other publications are The Irish Confederates and the Rebellion of 1798 (1850), The History of the Atlantic Telegraph (1866), Faith or Agnosticism? the Field-Ingersoll Discussion (1888), Old Spain and New Spain (1888), and Life of David Dudley Field (1898).

He is not to be confused with another Henry Martyn Field, the gynaecologist, who was born in 1837 at Brighton, Mass., and graduated at Harvard in 1859 and at the College of Physicians and Surgeons in New York City in 1862; he was professor of Materia Medica and therapeutics at Dartmouth from 187 1 to 1887 and of therapeutics from 1887 to 1893.

FIELD, JOHN (1782-1837), English musical composer and pianist, was born at Dublin in 1782. He came of a musical family, his father being a violinist, and his grandfather the organist in one of the churches of Dublin. From the latter the boy received his first musical education. When a few years later the family settled in London, Field became the favourite pupil of the celebrated Clementi, whom he accompanied to Paris, and later, in 1802, on his great concert tour through France, Germany and Russia. Under the auspices of his master Field appeared in public in most of the great European capitals, especially in St Petersburg, and in that city he remained when Clementi returned to England. During his stay with the great pianist Field had to suffer many privations owing to dementi's all but unexampled parsimony; but when the latter left Russia his splendid connexion amongst the highest circles of the capital became Field's inheritance. His marriage with a French lady of the name of Charpentier was anything but happy, and had soon to be dissolved. Field made frequent concert tours to the chief cities of Russia, and in 1820 settled permanently in Moscow, [n 1 83 1 he came to England for a short time, and for the next four years led a migratory life in France, Germany and Italy, exciting the admiration of amateurs wherever he appeared in public. In Naples he fell seriously ill, and lay several months in the hospital, till a Russian family discovered him and brought him back to Moscow.

There he lingered for several years till his death on the nth of January 1837. Field's training and the cast of his genius were not of a kind to enable him to excel in the larger forms of instrumental music, and his seven concerti

for the pianoforte are now forgotten. Neither do his quartets for strings and pianoforte hold their own by the side of those of the great masters. But his " nocturnes," a form of music highly developed if not actually created by him, remain all but unrivalled for their tenderness and dreaminess of conception, combined with a continuous flow of beautiful melody. They were indeed Chopin's models. Field's execution on the pianoforte was nearly allied to the nature of his compositions, beauty and poetical charm of touch being one of the chief characteristics of his style. Moscheles, who heard Field in 1831, speaks of his " enchanting legato, his tenderness and elegance and his beautiful touch."

FIELD, MARSHALL (1835-1906), American merchant, was born at Conway, Massachusetts, on the 18th of August 1835. Reared on a farm, he obtained a common school and academy education, and at the age of seventeen became a clerk in a dry goods store at Pittsfield, Mass. In 1856 he removed to Chicago, where he became a clerk in the large mercantile establishment of Cooley, Wadsworth & Company. In i860 the firm was re- organized as Cooley, Farwell & Company, and he was admitted to a junior partnership. In 1865, with Potter Palmer (1826- 1902) and Levi Z. Leiter (1834-1904), he organized the firm of Field, Palmer & Leiter, which subsequently became Field, Leiter & Company, and in 1881 on the retirement of Leiter became Marshall Field & Company. Under Field's management the annual business of the firm increased from $12,000,000 in 1871 to more than $40,000,000 in 1895, when it ranked as one of the two or three largest mercantile establishments in the world. He died in New York city on the 16th of January 1906. He had married, for the second time, in the previous year. Field's public benefactions were numerous; notable among them being his gift of land valued at $300,000 and of $100,000 in cash to the University of Chicago, an endowment fund of $1,000,000 to support the Field Columbian Museum at Chicago, and a bequest of $8,000,000 to this museum.

FIELD, NATHAN (1587-1633), English dramatist and actor, was baptized on the 17th of October 1587. His father, the rector of Cripplegate, was a Puritan divine, author of a Godly Exhortation directed against play-acting, and his brother Theophilus became bishop of Hereford. Nat. Field early became one of the children of Queen Elizabeth's chapel, and in that capacity he played leading parts

in Ben Jonson's Cynthia's Revels (in 1600), in the Poetaster (in 1601), and in Epicoene (in 1608), and the title role in Chapman's Bussy d'Ambois (in 1606). Ben Jonson was his dramatic model, and may have helped his career. The two plays of which he was author were probably both written before 161 1. They are boisterous, but well-constructed comedies of contemporary London life ; the earlier one, A Woman is a Weathercock (printed 161 2), dealing with the inconstancy of woman, while the second, Amends for Ladies (printed 1618), was written with the intention, as the title indicates, of retracting the charge. From Henslowe's papers it appears that Field collaborated with Robert Daborne and with Philip Massinger, one letter from all three authors being a joint appeal for money to free them from prison. In 1614 Field received £10 for playing before the king in Bartholomew Fair, a play in which Jonson records his reputation as an actor in the words "which is your Burbadge now?. . . Your best actor, your Field?" He joined the King's Players some time before 16 19, and his name comes seventeenth on the list prefixed to the Shakespeare folio of 1623 of the " principal actors in all these plays." He retired from the stage before 1625, and died on the 20th of February 1633. Field was part author with Massinger in the Fatal Dowry (printed 1632), and he prefixed commendatory verses to Fletcher's Faithful Shepherdess.

His two plays were reprinted in J. P. Collier's Five Old Plays (1833), in Hazlitt's edition of Dodsley's Old Plays, and in Nero and other Plays (Mermaid series, 1888), with an introduction by Mr A. W. Verity. »

FIELD, STEPHEN JOHNSON (1816-1899), American jurist, was born at Haddam, Connecticut, on the 4th of November 1816. He was the brother of David Dudley Field, Cyrus W.

Field and Henry M. Field. At the age of thirteen he accom- panied his sister Emilia and her husband the Rev. Josiah Brewer (the parents of the distinguished judge of the Supreme Court, David J. Brewer) to Smyrna, Turkey, for the purpose of studying Oriental languages, but after three years he returned to the United States, and in 1837 graduated at Williams College at the head of his class. He then studied law in his elder brother's office, and in 1841 he was admitted to the New York bar. He was associated in practice there with his brother until 1848, and early in 1849 removed to California, settling soon afterward at Marysville, of which place, in 1850, he became the first

alcalde or mayor. In the same year he was chosen a member of the first state legislature of California, in which he drew up and secured the enactment of two bodies of law known as the Civil and Criminal Practices Acts, based on the similar codes prepared by his brother David Dudley for New York. In the former act he embodied a provision regulating and giving authority to the peculiar customs, usages, and regulations voluntarily adopted by the miners in various districts of the state for the adjudication of disputed mining claims. This, as Judge Field truly says, ” was the foundation of the jurisprudence respecting mines in the country,” having greatly influenced legislation upon this subject in other states and in the Congress of the United States. He was elected, in 1857, a justice of the California Supreme Court, of which he became chief justice in 1859, on the resignation of Judge David S. Terry to fight the duel with the United States senator David C. Broderick which ended fatally for the latter. Field held this position until 1863, when he was appointed by President Lincoln a justice of the United States Supreme Court. In this capacity he was conspicuous for fearless independence of thought and action in his opinion in the test oath case, and in his dissenting opinions in the legal tender, conscription and ” slaughter house ” cases, which displayed un- usual legal learning, and gave powerful expression to his strict constructionist theory of the implied powers of the Federal constitution. Originally a Democrat, and always a believer in states’ rights, his strong Union sentiments caused him never- theless to accept Lincoln’s doctrine of coercion, and that, together with his anti-slavery sympathies, led him to act with the Re- publican party during the period of the Civil War. He was a member of the commission which revised the California code in 1873 and of the Electoral Commission in 1877, voting in favour of Tilden. In 1880 he received sixty-five votes on the first ballot for the presidential nomination at the Democratic National Convention at Cincinnati. In August 1889, as a result of a ruling in the course of the Sharon-Hill litigation, a notorious conspiracy case, he was assaulted in a California railway station by Judge David S. Terry, who in turn was shot and killed by a United States deputy marshall appointed to defend Justice Field against the carrying out of Terry’s often-expressed threats. He retired from the Supreme Court on the 1st of December 1897 after a service of thirty-four years and six months, the longest in the court’s history, and died in Washington on the 9th of April 1899. His Personal Reminiscences of Early Days in California, originally privately printed in 1878, was republished in 1893 with George C. Gorham’s Slory of the Attempted Assassination of Justice Field.

FIELD, WILLIAM VENTRIS FIELD, Baron (1813-1907), English judge,

second son of Thomas Flint Field, of Fielden, Bedfordshire, was born on the 21st of August 1813. He was educated at King's school, Brutori, Somersetshire, and entered the legal profession as a solicitor. In 1843, however, he ceased to practise as such, and entered at the Inner Temple, being called to the bar in 1850, after having practised for some time as a special pleader. He joined the Western circuit, but soon ex- changed it for the Midland. He obtained a large business as a junior, and became a queen's counsel and bencher of his inn in 1864. As a Q.C. he had a very extensive common law practice, and had for some time been the leader of the Midland circuit, when in February 1875, on the retirement of Mr Justice Keating, he was raised to the bench as a justice of the queen's bench. Mr Justice Field was an excellent puisne judge of the type that attracts but little public attention. He was a first-rate lawyer,

had a good knowledge of commercial matters, great shrewdness and a quick intellect, while he was also painstaking and scrupu- lously fair. When the rules of the Supreme Court 1883 came into force in the autumn of that year, Mr Justice Field was so well recognized an authority upon all questions of practice that the lord chancellor selected him to sit continuously at Judges' Chambers, in order that a consistent practice under the new rules might as far as possible be established. This he did for nearly a year, and his name will always, to a large extent, be associated with the settling of the details of the new procedure, which finally did away with the former elaborate system of " special pleading." In 1890 he retired from the bench and was raised to the peerage as Baron Field of Bakeham, becoming at the same time a member of the privy council. In the House of Lords he at first took part, not infrequently, in the hearing of appeals, and notably delivered a carefully-reasoned judgment in the case of the Bank of England v. Vagliano Brothers (5 th of March 1891), in which, with Lord Bramwell, he differed from the majority of his brother peers. Before long, however, deafness and advancing years rendered his attendances less frequent. Lord Field died at Bognor on the 23rd of January 1907, and as he left no issue the peerage became extinct.

FIELD (a word common to many West German languages, cf. Ger. Feld, Dutch veld, possibly cognate with O.E.folde, the earth, and ultimately with root of the Gr. xXaros, broad), open country as opposed to woodland or to the town, and particularly land for cultivation divided up into separate portions by hedges, banks, stone walls, &c. ; also used in combination with words denoting the crop grown on such a portion of land, such as corn-field, turnip-field, &c. The word is similarly applied to a region with particular reference to its products, as oil-field, gold-field, &c. For the " open " or " common

field ” system of agriculture in village communities see Commons. Generally with a reference to their ” wild ” as opposed to their ” domestic ” nature ” field ” is applied to many animals, such as the ” field-mouse.” There are many applications of the word ; thus from the use of the term for the place where a battle is fought, and widely of the whole theatre of war, come such phrases as to ” take the field ” for the opening of a campaign, ” in the field ” of troops that are engaged in the operations of a campaign. It is frequently used figura- tively in this sense, of the subject matter of a controversy, and also appears in military usage, in field-fortification, field-day and the like, A “field-officer” is one who ranks above a captain and below a general (see Officers); a field marshal is the highest rank of general officer in the British and many European armies (see Marshal). ” Field ” is used in many games, partly with the idea of an enclosed space, partly with the idea of the ground of military operations, for the ground in which such games as cricket, football, baseball and the like are played. Hence it is applied to those players in cricket and baseball who are not ” in,” and ” to field ” is to perform the functions of such a player — to stop or catch the ball played by the ” in ” side. ” The field ” is used in hunting, &c, for those taking part in the sport, and in racing for all the horses entered for a race, and, in such ex- pressions as ” to back the field,” is confined to all the horses with the exception of the ” favourite.” A common application of the word is to a surface, more or less wide, as of the sky or sea, or of such physical phenomena as ice or snow, and particularly of the ground, of a special ” tincture,” on which armorial bearings are displayed (see Heraldry); it is thus used also of the ” ground ” of a flag, thus the white ensign of the British navy has a red St George’s cross on a white ” field.” In scientific usage the word is also used of the sphere of observation or of operations, and has come to be almost equivalent to a department of knowledge. In physics, a particular application is that to the area which is influenced by some agent, as in the magnetic or electric field. The field of observation or view is the area within which objects can be seen through any optical instrument at any one position. A ” field-glass ” is the name given to a binocular glass used in the field (see Binocular Instrument) ; the older form of field-glass was a small achromatic telescope with joints. This terms is also applied, in an astronomical telescope or compound microscope, to

that one of the two lenses of the ” eye-piece ” which is next to the object-glass; the other is called the “eye-glass.”

FIELDFARE (O.E. /«a/o-/or = fallow-farer), a large species of thrush, the Turdus pilaris of Linnaeus — well known as a regular and common autumnal visitor throughout the British Islands and a great part of Europe, besides western Asia, and even reaching northern Africa. It is the Veldjakker andVeld-lysler of the Dutch, the Wachholderdros'sel and Kramtsvogel of Germans, the Litorne of the French, and the Cesena of Italians. This bird is of all thrushes the most gregarious in. habit, not only migrating in large bands and keeping in flocks during the winter, but even commonly breeding in society — 200 nests or more having been seen within a very small space. The birch-forests of Norway, Sweden and Russia are its chief resorts in summer, but it is known also to breed sparingly in some districts of Germany. Though its nest has been many times reported to have been found in Scotland, there is perhaps no record of such an incident that is not open to doubt; and unquestionably the missel-thrush (T. viscivorus) has been often mistaken for the fieldfare by indifferent observers. The head, neck, upper part of the back and the rump are grey; the wings, wing-coverts and middle of the back are rich hazel-brown; the throat is ochraceous; and the breast reddish-brown— both being streaked or spotted with black, while the belly and lower wing-coverts are white, and the legs and toes very dark- brown. The nest and eggs resemble those of the blackbird (T. merula), but the former is usually built high up in a tree. The fieldfare's call-note is harsh and loud, sounding like t'chat- t'chat: its song is low, twittering and poor. It usually arrives in Britain about the middle or end of October, but sometimes earlier, and often remains till the middle of May before departing for its northern breeding-places. In hard weather it throngs to the berry-bearing bushes which then afford it sustenance, but in open winters the flocks spread over the fields in search of animal food- worms, slugs and the larvae of insects. In very severe seasons it will altogether leave the country, and then return for a shorter or longer time as spring approaches. From William of Palerne (translated from the French c. 1350) to thewriters of ourownday the fieldfare has occasionally been noticed by British poets with varying propriety. Thus Chaucer's association of its name with frost is as happy as true, while Scott was more than unlucky in his well-known reference to its " lowly nest " in the Highlands.

Structurally very like the fieldfare, but differing greatly in many other respects, is the bird known in North America as the " robin " — its ruddy breast and familiar habits reminding the early British settlers in the New World of the household favourite of their former homes. This bird, the Turdus migratorius of Linnaeus, has a wide geographical range, extending from the Atlantic to the Pacific, and from Greenland

to Guatemala, and, except at its extreme limits, is almost everywhere a very abundant species. As its scientific name imports, it is essentially a migrant, and gathers in flocks to pass the winter in the south, though a few remain in New England throughout the year. Yet its social instincts pbint rather in the direction of man than of its own kind, and it is not known to breed in companies, while it affects the homesteads, villages and even the parks and gardens of the large cities, where its fine song, its attractive plumage, and its great services as a destroyer of noxious insects, combine to make it justly popular. (A. N.)

FIELDING, ANTHONY VANDYKE COPLEY (1787-1855), commonly called Copley Fielding, English landscape painter (son of a portrait painter), became at an early age a pupil of John Varley. He took to water-colour painting, and to this he con- fined himself almost exclusively. In 1810 he became an associate exhibitor in the Water-colour Society, in 1813 a full member, and in 183 1 president of that body. He also engaged largely in teaching the art, and made ample profits. His death took place at Worthing in March 1855. Copley Fielding was a painter of much elegance, taste and accomplishment, and has always been highly popular with purchasers, without reaching very high in originality of purpose or of style: he painted in vast number all sorts of views (occasionally in oil-colour) including marine subjects in large proportion. Specimens of his work are to be seen in the

water-colour gallery of the Victoria and Albert Museum, of dates ranging from 1820 to 1850. Among the engraved specimens of his art is the Annual of British Landscape Scenery, published in 1830. (W. M.'R.)

FIELDING, HENRY (1707-17 54), English novelist and play- wright, was born at Sharpham Park, near Glastonbury, Somerset, on the 22nd of April 1707. His father was Lieutenant Edmund Fielding, third son of John Fielding, who was canon of Salisbury and fifth son of the earl of Desmond. The earl of Desmond belonged to the younger branch of the Denbigh family, who, until lately, were supposed to be connected with the Habsburgs. To this claim, now discredited by the researches of Mr J. Horace Round (Studies in Peerage, 1001, pp. 216-240), is to be attributed the famous passage in Gibbon's Autobiography which predicts for Tom Jones — " that exquisite picture of human manners " — a diuturnity exceeding that of the house of Austria. Henry Fielding's mother was Sarah Gould, daughter of Sir Henry Gould, a judge of the king's bench. It is probable that the marriage was not approved by her father, since, though she remained at Sharpham Park

for some time after that event, his will provided that her husband should have nothing to do with a legacy of £3000 left her in 17 10. About this date the Fieldings moved to East Stour in Dorset. Two girls, Catherine and Ursula, had apparently been born at Sharpham Park; and three more, together with a son, Edmund, followed at East Stour. Sarah, the third of the daughters, born November 1710, and afterwards the author of David Simple and other works, survived her brother.

Fielding's education up to his mother's death, which took place in April 17 18 at East Stour, seems to have been entrusted to a neighbouring clergyman, Mr Oliver of Motcombe, in whom tradition traces the uncouth lineaments of " Parson Trulliber " in Joseph Andrews* But he must have contrived, nevertheless, to prepare his pupil for Eton, to which place Fielding went about this date, probably as an oppidan. Little is known of his school- days. There is no record of his name in the college lists; but, if we may believe his first biographer, Arthur Murphy, by no means an unimpeachable authority, he left " uncommonly versed in the Greek authors, and an early master of the Latin classics," — a statement which should perhaps be qualified by his own words to Sir Robert Walpole in 1730 : —

" Tuscan and French are in my head ; ' ■'• ' Latin I write, and Greek— I read."

But he certainly made friends among his class-fellows — some of whom continued friends for life. Winnington and Hanbury- Williams were among these. The chief, however, and the most faithful, was George, afterwards Sir George, and later Baron Lyttelton of Frankley.

When Fielding left Eton is unknown. But in November 1725 we hear of him definitely in what seems like a characteristic escapade. He was staying at Lyme (in company with a trusty retainer, ready to " beat, maim or kill " in his young master's behalf), and apparently bent on carrying off, if necessary by force, a local heiress, Miss Sarah Andrew, whose fluttered guardians promptly hurried her away, and married her to some one else {Athenaeum, 2nd June 1883). Her baffled admirer consoled himself by translating part of Juvenal's sixth satire into verse as " all the Revenge taken by an injured Lover." After this he must have lived the usual life of a young man about town, and probably at this date improved the acquaintance of his second cousin, Lady Mary Wortley Montagu, to whom he in- scribed his first comedy, Love in Several Masques, produced at Drury Lane in February 1728. The moment was not particularly favourable, since it succeeded Cibber's Provok'd Husband, and was contemporary with Gay's popular

Beggar's Opera. Almost immediately afterwards (March 16th) Fielding entered himself as "Stud. Lit." at Leiden University. He was still there in February 1729. But he had apparently left before the annual registration of February 1730, when his name is absent from the books (Macmillan's Magazine, April 1907) ; and in January 1730 he brought out a second comedy at the newly-opened theatre in Goodman's Fields. Like its predecessor, the Templt

Bean, was an essay in the vein of Congreve and Wycherley, though, in a measure, an advance on Love in Several Masques.

With the Temple Beau Fielding's dramatic career definitely begins. His father had married again; and his Leiden career had been interrupted for lack of funds. Nominally, he was entitled to an allowance of £200 a year; but this (he was accustomed to say) "any body might pay that would." Young, handsome, ardent and fond of pleasure, he began that career as a hand-to-mouth playwright around which so much legend has gathered — and gathers. Having — in his own words — no choice but to be a hackney coachman or a hackney writer, he chose the pen; and his inclinations s as well as his opportunities, led him to the stage. From 1730 to 1736 he rapidly brought out a large number of pieces, most of which had merit enough to secure their being acted, but not sufficient to earn a lasting reputation for their author. His chief successes/from a critical point of view, the Author's Farce (1730) and Tom Thumb (1730, 1731), were burlesques; and he also was fortunate in two translations from Moliere, the Mock Doctor (1732) and the Miser (1733). Of the rest (with one or two exceptions, to be mentioned presently) the names need only be recorded. They are The Cojfee-House Politician, a comedy (1730); The Letter Writers, a farce (1731); The Grub-Street Opera, a burlesque (1731); The Lottery, a farce (1732); The Modern Husband, a comedy (1732); The Covent Garden Tragedy, a burlesque (1732); The Old Debauchees, a comedy (1732); Deborah; or, a Wife for you all, an after-piece (I 733); The Intriguing Chambermaid (from Regnard), a two-act comedy (1734); and Don Quixote in England, a comedy, which had been partly sketched at Leiden.

Don Quixote was produced in 1734, and the list of plays may be here interrupted by an event of which the date has only recently been ascertained, namely, Fielding's first marriage. This took place on the 28th of November 1734 at St Mary, Charlcombe, near Bath

(Macmillan's Magazine, April 1907), the lady being a Salisbury beauty, Miss Charlotte Cradock, of whom he had been an admirer, if not a suitor, as far back as 1730. This is a fact which should be taken into consideration in estimating the exact Bohemianism of his London life, for there is no doubt that he was devotedly attached to her. After a fresh farce entitled An Old Man taught Wisdom, and the comparative failure of a new comedy, The Universal Gallant, both produced early in 1735, he seems for a time to have retired with his bride, who came into £1500, to his old home at East Stour. Around this rural seclusion fiction has freely accreted. He is supposed to have lived for three years on the footing of a typical 18th-century country gentleman; to have kept a pack of hounds; to have put his servants into impossible yellow liveries; and generally, by profuse hospitality and reckless expenditure, to have made rapid duck and drake of Mrs Fielding's modest legacy. Something of this is demonstrably false; much, grossly exaggerated. In any case, he was in London as late as February 1735 (the date of the " Preface " to The Universal Gallant) ; and early in March 1 736 he was back again managing the Haymarket theatre with a so-called "Great Mogul's Company of English Comedians."

Upon this new enterprise fortune, at the outset, seemed to smile. The first piece (produced on the 5th of March) was Pasquin, a Dramatick Satire on the Times (a piece akin in its plan to Buckingham's Rehearsal), which contained, in addition to much admirable burlesque, a good deal of very direct Criticism of the shameless political corruption of the Walpole era. Its success was unmistakable; and when, after bringing out the remarkable Fatal Curiosity of George Lillo, its author followed up Pasquin by the Historical Register for the Year 1736, of which the effrontery was even more daring than that of its predecessor, the ministry began to bethink themselves that matters were going too far. How they actually effected their object is obscure: but grounds were speedily concocted for the Licensing Act of 1737, which restricted the number of theatres, rendered the lord chamberlain's licence an indispensable preliminary to stage representation, and — in a word — effectually put an end to Fielding's career as a dramatist.

Whether, had that career been prolonged to its maturity, the result would have enriched the theatrical repertoire with a new species of burlesque, or reinforced it with fresh variations on the " wit-traps " of Wycherley and Congreve, is one of those inquiries that are more academic than, profitable. What may be affirmed is, that Fielding's plays, as we have them, exhibit abundant invention and ingenuity; that they are full of humour and high spirits; that, though they may

have been hastily written, they were by no means thoughtlessly constructed; and that, in composing them, their author attentively considered either managerial hints, or the conditions of the market. Against this, one must set the fact that they are often immodest; and that, whatever their intrinsic merit, they have failed to rival in permanent popularity the work of inferior men. Fielding's own conclusion was, " that he left off writing for the stage, when he ought to have begun " — which can only mean that he himself regarded his plays as the outcome of imitation rather than experience. They probably taught him how to construct Tom Jones; but whether he could ever have written a comedy at the level of that novel, can only be established by a comparison which it is impossible to make, namely, a comparison with Tom Jones of a comedy written at the same age, and in similar circumstances.

Tumble-Down Dick; or, Phaeton in the Suds, Eurydice and Eurydice hissed are the names of three occasional pieces which belong to the last months of Fielding's career as a Haymarket manager. By this date he was thirty, with a wife and daughter. As a means of support, he reverted to the profession of his maternal grandfather; and, in November 1737, he entered the Middle Temple, being described in the books of the society as " of East Stour in Dorset." That he set himself strenuously to master his new profession, is admitted; though it is unlikely that he had entirely discarded the irregular habits Which had grown upon him in his irresponsible bachelorhood. He also did a good deal of literary work, the best known of which is contained in the Champion, a " News-Journal " of the Spectator type undertaken with James Ralph, whose poem of " Night " is made notorious in the Dunciad. That the Champion was not without merit is undoubted; but the essay- type was for the moment out-worn, and neither Fielding nor his coadjutor could lend it fresh vitality. Fielding contributed papers from the 15th of November 1739 to the 19th of June 1740. On the 20th of June he was called to the bar, and occupied chambers in Pump Court. It is further related that, in the diligent pursuit of his calling, he travelled the Western Circuit, and attended the Wiltshire sessions.

Although, with the Champion, he professed, for the time, to have relinquished periodical literature, he still wrote at intervals, a fact which, taken in connexion with his past reputa- tion as an effective satirist, probably led to his being " unjustly censured " for much that he never produced. But he certainly wrote a poem " Of True Greatness " (1741); a first book of a burlesque epic, the Vernoniad, prompted by Vernon's expedition of 1739; a vision called the Opposition, and, perhaps, a political sermon entitled the Crisis (1741). Another piece,

now known to have been attributed to him by his contemporaries {Hist, MSS. Comm., Rept. 12, App. Pt. ix., p. 204), is the pamphlet entitled An Apology for the Life of Mrs Shamela Andrews, a clever but coarse attack upon the prurient side of Richardson's Pamela, which had been issued in 1740, and was at the height of its popularity. Shamela followed early in 1741. Richardson, who was well acquainted with Fielding's four sisters, at that date his neighbours at Hammersmith, confidently attributed it to Fielding {Corr. 1804, iv. 286, and unpublished letter at South Kensington) ; and there are suggestive points of internal evidence (such as the transformation of Pamela's "MrB." into "Mr Booby ") which tend to connect it with the future Joseph Andrews. Fielding, however, never acknowledged it, or referred to it; and a great deal has been laid to his charge that he never deserved (" Preface " to Miscellanies, 1743).

But whatever may be decided in regard to the authorship of Shamela, it is quite possible that it prompted the more memorable

Joseph Andrews, which made its appearance in February 1742, and concerning which there is no question. Professing, on his title-page, to imitate Cervantes, Fielding set out to cover Pamela with Homeric ridicule by transferring the heroine's embarrass- ments to a hero, supposed to be her brother. Allied to this purpose was a collateral attack upon the slipshod Apology of the playwright Colley Cibber, with whom, for obscure reasons, Fielding had long been at war. But the avowed object of the book fell speedily into the background as its author warmed to his theme. His secondary speedily became his primary characters, and Lady Booby and Joseph Andrews do not interest us now as much as Mrs Slipslop and Parson Adams — the latter an invention that ranges in literature with Sterne's " Uncle Toby " and Goldsmith's " Vicar." Yet more than these and others equally admirable in their round veracity, is the writer's penetrating outlook upon the frailties and failures of human nature. By the time he had reached his second volume, he had convinced himself that he had inaugurated a new fashion of fiction; and in a " Preface " of exceptional ability, he announced his discovery. Postulating that the epic might be " comic " or " tragic," prose or verse, he claimed to have achieved what he termed the " Comic Epos in Prose," of which the action was " ludicrous " rather than " sublime," and the personages selected from society at large, rather than the restricted ranks of conventional high life. His plan, it will be observed, was

happily adapted to his gifts of humour, satire, and above all, irony. That it was matured when it began may perhaps be doubted, but it was certainly matured when it ended. Indeed, except for the plot, which, in his picaresque first idea, had not preceded the conception, Joseph Andrews has all the character- istics of Tom Jones, even (in part) to the initial chapters.

Joseph Andrews had considerable success, and the exact sum paid for it by Andrew Millar, the publisher, according to the assignment now at South Kensington, was £183 : 1 is., one of the witnesses being the author's friend, William Young, popularly supposed to be the original of Parson Adams. It was with Young that Fielding undertook what, with exception of " a very small share " in the farce of Miss Lucy in Town(\i\2), constituted his next work, a translation of the Plutus of Aristophanes, which never seems to have justified any similar experiments. Another of his minor works was a Vindication of the Dowager Duchess of Marlborough (1742), then much before the public by reason of the Account of her Life which she had recently put forth. Later in the same year, Garrick applied to Fielding for a play; and a very early effort, The Wedding Day, was hastily patched together, and produced at Drury Lane in February 1743 with no great success. It was, however, included in Fielding's next important publication, the three volumes of Miscellanies issued by subscription in the succeeding April. These also comprised some early poems, some essays, a Lucianic fragment entitled a Journey from this World to' the Next,- and, last but not least, occupying the entire final volume, the remark- able performance entitled the History of the Life of the late Mr Jonathan Wild the Great.

It is probable that, in its composition, Jonathan Wild preceded Joseph Andrews. At all events it seems unlikely that Fielding would have followed up a success in a new line by an effort so entirely different in character. Taking for his ostensible hero a well-known thief-taker, who had been hanged in 1725, he proceeds to illustrate, by a mock-heroic account of his progress to Tyburn, the general proposition that greatness without goodness is no better than badness. He will not go so far as to say that all " Human Nature is Newgate with the Mask on "; but he evidently regards the description as fairly applicable to a good many so-called great people. Irony (and especially Irony neat) is not a popular form of rhetoric; and the remorseless pertinacity with which Fielding pursues his demonstration is to many readers discomforting and even distasteful. Yet — in spite of Scott — Jonathan Wild has its softer pages; and as a purely intellectual conception it is not surpassed by any of the author's works.

His actual biography, both before and after Jonathan Wild,

is obscure. There are evidences that he laboured diligently at his profession; there are also evidences of sickness and embarrassment. He had become early a martyr to the malady of his century — gout, and the uncertainties of a precarious livelihood told grievously upon his beautiful wife, who eventually died of fever in his arms, leaving him for the time SO stunned and bewildered by grief that his friends feared for his reason. For some years his published productions were Unimportant. He wrote ” Prefaces ” to the David Simple of his sister Sarah in 1744 and 1747; and, in 1745-1746 and 1 747-1 748, produced two newspapers in the ministerial interest, the True Patriot and the Jacobite’s Journal, both of which are connected with, or derive from, the rebellion of 1745, and were doubtless, when they ceased, the pretext of a pension from the public service money {Journal of a Voyage to Lisbon, ” Introduction “). In November 1747 he married his wife’s maid, Mary Daniel, at St Bene’t’s, Paul’s Wharf; and in December 1748, by the interest of his old school-fellow, Lyttelton, he was made a principal justice of peace for Middlesex and Westminster, an office which put him in possession of a house in Bow Street, and £300 per annum ” of the dirtiest money upon earth ” (ibid.), which might have been more had he condescended to become what was known as a ” trading ” magistrate.

For some time previously, while at Bath, Salisbury, Twicken- ham and other temporary resting-places, he had intermittently occupied himself in composing his second great novel, Tom Jones; or, the History of a Foundling. For this, in June 1 748, Millar had paid him £600, to which he added £100 more in 1749. In the February of the latter year it was published with a dedication to Lyttelton, to whose pecuniary assistance to the author during the composition it plainly bears witness. In Tom Jones Fielding systematically developed the ” new Province of Writing ” he had discovered incidentally in Joseph Andrews. He paid closer attention to the construction and evolution of the plot; he elaborated the initial essays to each book which he had partly employed before, and he compressed into his work the flower and fruit of his forty years’ experience of life. He has, indeed, no character quite up to the level of Parson Adams, but his Westerns and Partridges, his Allworthys and Blifils, have the inestimable gift of life. He makes no pretence to produce ” models of perfection,” but pictures of ordinary humanity, rather perhaps in the rough than the polished, the natural than the artificial, and his desire is to do this with absolute truthfulness, neither extenuating nor disguising defects and shortcomings. One of the results of this unvarnished naturalism has been to attract more attention to certain of the episodes than their

inventor ever intended. But that, in the manners of his time, he had chapter and verse for everything he drew is clear. His sincere purpose was, he declared, ” to recommend goodness and innocence,” and his obvious aversions are vanity and hypocrisy. The methods of fiction have grown more sophisticated since his day, and other forms of literary egotism have taken the place of his once famous introductory essays, but the traces of Tom Jones are still discernible in most of our manlier modern fiction.

Meanwhile, its author was showing considerable activity in his magisterial duties. In May 1749, he was chosen chairman of quarter sessions for Westminster; and in June he delivered himself of a weighty charge to the grand jury. Besides other pamphlets, he produced a careful and still readable Enquiry into the Causes of the late Increase of Robbers, &c. (1751), which, among its other merits, was not ineffectual in helping on the famous Gin Act of that year, a practical result to which the ” Gin Lane ” and ” Beer Street ” of his friend Hogarth also materially con- tributed. These duties and preoccupations left their mark on his next fiction, Amelia (1752), which is rather more taken up with social problems and popular grievances than its forerunners. But the leading personage, in whom, as in the Sophia Western of Tom Jones, he reproduced the traits of his first wife, is certainly, as even Johnson admitted, ” the most pleasing heroine of all the romances.” The minor characters, too, especially Dr Harrison and -Colonel Bath, are equal to any in Tom Jones. The book nevertheless shows signs, not of failure but of fatigue, perhaps

of haste— a circumstance heightened by the absence of those ” prolegomenous ” chapters over which the author had lingered so lovingly in Tom Jones. In 1749 ne had been dangerously ill, and his health was visibly breaking. The £1000 which Millar is said to have given for Amelia must have been painfully earned.

Early in 1752 his still indomitable energy prompted him to start a third newspaper, the Covent Garden Journal, which ran from the 4th of January to the 25th of November. It is an in- teresting contemporary record, and throws a good deal of light on his Bow Street duties. But it has no great literary value, and it unhappily involved him in harassing’ and undignified hostilities with Smollett, Dr John Hill, Bonnell Thornton and other of his contemporaries. To the following year belong pamphlets on ” Provision for the Poor,” and

the case of the strange impostor, Elizabeth Canning (1734-1773). 1 By 1754 his own case, as regards health, had grown desperate; and he made matters worse by a gallant and successful attempt to break up a ” gang of villains and cut-throats,” who had become the terror of the metropolis. This accomplished, he resigned his office to his half-brother John (afterwards Sir John) Fielding. But it was now too late. After fruitless essay both of Dr Ward’s specifics and the tar-water of Bishop Berkeley, it was felt that his sole chance of prolonging life lay in removal to a warmer climate. On the 26th of June 1754 he accordingly left his little country house at Fordhook, Ealing, for Lisbon, in the ” Queen of Portugal,” Richard Veal master. The ship, as often, was tediously wind-bound, and the protracted discomforts of the sick man and his family are narrated at length in the touching posthumous tract entitled the Journal of a Voyage to Lisbon, which, with a fragment of a comment on Bolingbroke’s then recently issued essays, was published in February 1755 ” for the Benefit of his [Fielding’s] Wife and Children.” Reaching Lisbon at last in August 1754, he died there two months later (8th October), and was buried in the English cemetery, where a monument was erected to him in 1830. Luget Britannia gremio non darifovere natum is inscribed upon it.

His estate, including the proceeds of a fair library, only covered his just debts {Athenaeum, 25th Nov. 1905); but his family, a daughter by his first, and two boys and a girl by his second wife, were faithfully cared for by his brother John, and by his friend Ralph Allen of Prior Park, Bath, the Squire Allworthy of Tom Jones. His will (undated) was printed in the Athenaeum for the 1st of February 1890. There is but one absolutely authentic portrait of him, a familiar outline by Hogarth, executed from memory for Andrew Millar’s edition of his works in 1762. It is the likeness of a man broken by ill- health, and affords but faint indication of the handsome Harry Fielding who in his salad days ” warmed both hands before the fire of life.” Far too much stress, it is now held, has been laid by his first biographers upon the unworshipful side of his early career. That he was always profuse, sanguine and more or less improvident, is as probable as that he was always manly, generous and sympathetic. But it is also plain that, in his later years, he did much, as father, friend and magistrate, to redeem the errors, real and imputed, of a too-youthful youth.

As a playwright and essayist his rank is not elevated. But as a novelist his place is a definite one. If the Spectator is to be credited with foreshadowing the characters of the novel, Defoe with its earliest form, and Richardson with its first experiments in sentimental analysis, it is to Henry Fielding that we owe its first accurate delineation of contemporary manners. Neglecting, or practically

neglecting, sentiment as unmanly, and relying chiefly on humour and ridicule, he set out to draw life pre- cisely as he saw it around him, without blanks or dashes. He was, it may be, for a judicial moralist, too indulgent to some of its frailties, but he was merciless to its meaner vices. For reasons which have been already given, his high-water mark is Tom Jones, which has remained, and remains, a model in its way of the kind he inaugurated.

1 For a full account of this celebrated case see Howell, State Trials (1813), vol. xix.

An essay on Fielding's life and writings is prefixed to Arthur Murphy's edition of his works (1762), and short biographies have been written by Walter Scott and William Roscoe. There are also lives by Watson (1807), Lawrence (1855), Austin Dobson (" Men of Letters," 1883, 1907) and G. M. Godden (1909). An annotated edition of the Journal of a Voyage to Lisbon is included in the " World's Classics " (1907). (A. D.)

FIELDING, WILLIAM STEVENS (1848-), Canadian

journalist and statesman, was born in Halifax, Nova Scotia, on the 24th of November 1848. From 1864 to 1884 he was one of the staff of the Morning Chronicle, the chief Liberal paper of the province, and worked at all departments of newspaper life. In 1882 he entered the local legislature as Liberal member for Halifax, and from 1884 to 1896 was premier and provincial secretary of the province, but in the latter year became finance minister in the Dominion administration of Sir Wilfrid Laurier, and was elected to the House of Commons for Shelburne and Queen's county. He opposed Confederation in 1864-1867, and as late as 1886 won a provincial election on the promise to advocate the repeal of the British North America Act. His administration as finance minister of Canada was important, since in 1897 he introduced a new tariff, granting to the manufactures of Great Britain a preference, subsequently increased; and later he imposed a special surtax on German imports owing to unfriendly tariff legislation by that country. In 1902 he represented Canada at the Colonial Conference in London.

FIELD-MOUSE, the popular designation of such mouse-like British rodents as are not true or " house " mice. The term thus includes the long-tailed field mouse, Mus (Micromys) sylvaticus, easily recognized by its white belly, and sometimes called the wood-mouse; and the two species of short-tailed field-mice, Microtus agreslis and Evolomys glareolus, together with their representatives in Skomer island and the

Orkneys (see Mouse and Vole).

FIELD OF THE CLOTH OF GOLD, the French Camp du drap d'or, the name given to the place between Guines and Ardres where Henry VIII. of England met Francis I. of France in June 1520. The most elaborate arrangements were made for the accommodation of the two monarchs and their large retinues; and on Henry's part especially no efforts were spared to make a great impression in Europe by this meeting. Before the castle of Guines a temporary palace, covering an area of nearly 12,000 sq. yds., was erected for the reception of the English king. It was decorated in the most sumptuous fashion, and like the chapel, served by thirty-five priests, was furnished with a profusion of golden ornaments. Some idea of the size of Henry's following may be gathered from the fact that in one month 2 200 sheep and other viands in a similar proportion were con- sumed. In the fields beyond the castle, tents to the number of 2800 were erected for less distinguished visitors, and the whole scene was one of the greatest animation. Ladies gorgeously clad, and knights, showing by their dress and bearing their anxiety to revive the glories and the follies of the age of chivalry, jostled mountebanks, mendicants and vendors of all kinds.

Journeying from Calais Henry reached his headquarters at Guines on the 4th of June 1 520, and Francis took up his residence at Ardres. After Cardinal Wolsey, with a splendid train had visited the French king, the two monarchs met at the Val Dore, a spot midway between the two places, on the 7th. The following days were take up with tournaments, in which both kings took part, banquets and other entertainments, and after Wolsey had said mass the two sovereigns separated on the 24th. This meeting made a great impression on contemporaries, but its political results were very small.

The Ordonnance for the Field is printed by J. S. Brewer in the Calendar of Slate Papers, Henry VIII. vol. iii. (1867). See also J. S. Brewer, Reign of Henry VIII. (1884).

FIELDS, JAMES THOMAS (1817-1881), American publisher and author, was born in Portsmouth, New Hampshire, on the 31st of December 1817. At the age of seventeen he went to Boston as clerk in a bookseller's shop. Afterwards he wrote for the newspapers, and in 1835 he read an anniversary poem entitled " Commerce " before the Boston Mercantile Library

Association. In 1839 he became junior partner in the publishing and bookselling firm known after 1846 as Ticknor & Fields, and after 1868 as Fields, Osgood & Company. He was the publisher of the foremost contemporary American writers, with whom he was on terms of close personal friendship, and he was the American publisher of some of the best-known British writers of his time, some of whom, also, he knew intimately. The first collected edition of De Quincey's works (20 vols., 1850-1855) was published by his firm. As a publisher he was characterized by a somewhat rare combination of keen business acumen and sound, discriminating literary taste, and as a man he was known for his geniality and charm of manner. In 1862-1870, as the successor of James Russell Lowell, he edited the Atlantic Monthly. In 1871 Fields retired from business and from his editorial duties, and devoted himself to lecturing and to writing. Of his books the chief were the collection of sketches and essays entitled Under- brush (1877) and the chapters of reminiscence composing Yester- days with Authors (1871), in which he recorded his personal friendship with Wordsworth, Thackeray, Dickens, Hawthorne and others. He died in Boston on the 24th of April 1881.

His second wife, Annie Adams Fields (b. 1834), whom he married in 1854, published Under the Olive (1880), a book of verses; James T. Fields: Biographical Notes and Personal Sketches (1882); Authors and Friends (1896); The Life and Letters of Harriet Beecher Stowe (1897); and Orpheus (1900).

FIENNES, NATHANIEL (c. 1 608-1 669) English politician, second son of William, 1st Viscount Saye and Sele, by Elizabeth, daughter of John Temple, of Stow in Buckinghamshire, was born in 1607 or 1608, and educated at Winchester and at New College, Oxford, where as founder's kin he was admitted a perpetual fellow in 1624. After about five years' residence he left without taking a degree, travelled abroad, and in Switzerland imbibed or strengthened those religious principles and that hostility to the Laudian church which were to be the chief motive in his future political career. He returned to Scotland in 1639, and established communications with the Covenanters and the Opposition in England, and as member for Banbury in both the Short and Long Parliaments he took a prominent part in the attacks upon the church. He spoke against the illegal canons on the 14th of December 1640, and again on the 9th of February 1641 on the occasion of the reception of the London petition, when he argued against episcopacy as constituting a political as well as a religious danger and made a great impression on the House, his name being

added immediately to the committee appointed to deal with church affairs. He took a leading part in the examination into the army plot; was one of the commissioners appointed to attend the king to Scotland in August 1641; and was nominated one of the committee of safety in July 1642. On the outbreak of hostilities he took arms immediately, commanded a troop of horse in the army of Lord Essex, was present at the relief of Coventry in August, and at the fight at Worcester in September, where he distinguished himself, and subsequently at Edgehill. Of the last two engagements he wrote accounts, viz. True and Exact Relation of both the Battles fought by . . . Earl of Essex . . . against the Bloudy Cavaliers (1642). (See also A Narrative of the Late Battle before Worcester taken by a Gentleman of the Inns of Court from the mouth of Master Fiennes, 1642). In February 1643 Fiennes was sent down to Bristol, arrested Colonel Essex the governor, executed the two leaders of a plot to deliver up the city, and received a commission himself as governor on the 1st of May 1643. On the arrival, however, of Prince Rupert on the 22nd of July the place was in no condition to resist an attack, and Fiennes capitulated. He addressed to Essex a letter in his defence (Thomason Tracts E. 65, 26), drew up for the parliament a Relation concerning the Surrender . . . (1643), answered by Prynne and Clement Walker accusing him of treachery and cowardice, to which he opposed Col. Fiennes his Reply. . . . He was tried at St Albans by the council of war in December, was pronounced guilty of having surrendered the place improperly, and sentenced to death. He was, however, pardoned, and the facility with which Bristol subsequently capitulated to the parliamentary army induced Cromwell and the generals to

exonerate him completely. His military career nevertheless now came to an end. He went abroad, and it was some time before he reappeared on the political scene. In September 1647 h e w &s included in the army committee, and on the 3rd of January 1648 he became a member of the “committee of safety. He was, however, in favour of accepting the king’s terms at Newport in December, and in consequence was excluded from the House by Pride’s Purge. An opponent of church government in any form, he was no friend to the rigid and tyrannical Presbyterianism of the day, and inclined to Independency and Cromwell’s party. He was a member of the council of state in 1654, and in June 1655 he received the strange appointment of commissioner for the custody of the great seal, for which he was certainly in no way fitted. In the parliament of 1654 he was returned for Oxford county and in that of 1656 for the university, while in January 1658 he was included in Cromwell’s House of Lords. He was in favour of the Protector’s assumption of the royal title and

urged his acceptance of it on several occasions. His public career closes with addresses delivered in his capacity as chief com- missioner of the great seal at the beginning of the sessions of January 20, 1658, and January 2, 1659, in which the religious basis of Cromwell's government is especially insisted upon, the feature to which Fiennes throughout his career had attached most value. On the reassembling of the Long Parliament he was superseded; he took no part in the Restoration, and died at Newton Tony in Wiltshire on the 16th of December 1669. Fiennes married (1), Elizabeth, daughter of the famous parlia- mentarian Sir John Eliot, by whom he had one son, afterwards 3rd Viscount Saye and Sele; and (2), Frances, daughter of Richard Whitehead of Tuderley, Hants, by whom he had three daughters.

Besides the pamphlets already cited, a number of his speeches and other political tracts were published (see Gen. Catalogue, British Museum). Wood also attributed to him Monarchy Asserted (1666) (reprinted in Somers Tracts, vi. 346 [ed. Scott]), but there seems no reason to ascribe to him with Clement Walker the authorship of Sprigge's Anglia Rediviva.

FIERI FACIAS, usually abbreviated fi. fa. (Lat. " that you cause to be made "), in English law, a writ of execution after judgment obtained in action of debt or damages. It is addressed to the sheriff, and commands him to make good the amount out of the goods of the person against whom judgment has been obtained. (See Execution.)

FIESCHI, GIUSEPPE MARCO (1790-1836), the chief con- spirator in the attempt on the life of Louis Philippe in July 1835, was a native of Murato in Corsica. He served under Murat, then returned to Corsica, where he was condemned to ten years' imprisonment and perpetual surveillance by the police for theft and forgery. After a period of vagabondage he eluded the police and obtained a small post in Paris by means of forged papers; but losing it on account of his suspicious manner of living, he resolved to revenge himself on society. He took lodgings on the Boulevard du Temple, and there, with two members of the Societe des Droits de l'Homme, Morey and Pepin by name, contrived an " infernal machine," constructed with twenty gun barrels, to be fired simultaneously. On the 28th of July 1835, as Louis Philippe was passing along the boule- vard to the Bastille, accompanied by his three sons and a numerous staff, the machine was exploded. A ball grazed the king's forehead, and his horse, with those of the duke of Nemours and of the prince de Joinville, was shot; Marshal Mortier was killed, with seventeen other persons, and many were wounded; but the king and the princes escaped as if by miracle.

Fieschi himself was severely wounded by the discharge of his machine, and vainly attempted to escape. The attentions of the most skilful physicians were lavished upon him, and his life was saved for the stroke of justice. On his trial he named his accomplices, displayed much bravado, and expected or pretended to expect ultimate pardon. He was condemned tc death, and was guillo- tined on the 19th of February 1836. Morey and Pepin were also executed, another accomplice was sentenced to twenty years' imprisonment and one was acquitted. No less than seven plots against the life of Louis Philippe had been discovered

by the police within the year, and apologists were not wanting in the revolutionary press for the crime of Fieschi.

See Prods de Fieschi, precede de sa vie privee, sa condamnation par la Cour des Pairs et celles de ses complices (2 vols., 1836); also P. Thureau-Dangin, Hist, de la monarchic de Juillet (vol. iv. ch. xii.,

1884).

FIESCO (de' Fieschi), GIOVANNI LUIGI (c. 1523-1547), count of Lavagna, was descended from one of the greatest families of Liguria, first mentioned in the 10th century. Among his ancestors were two popes (Innocent IV. and Adrian V.), many cardinals, a king of Sicily, three saints, and many generals and admirals of Genoa and other states. Sinibaldo Fiesco, his father, had been a close friend of Andrea Doria (q.v.), and had rendered many important services to the Genoese republic. On his death in 1532 Giovanni found himself at the age of nine the head of the family and possessor of immense estates. He grew up to be a handsome, intelligent youth, of attrac- tive manners and very ambitious. He married Eleonora Cibo,' marchioness of Massa, in 1540, a woman of great beauty and family influence. There were many reasons which inspired his hatred of the Doria family; the almost absolute power wielded by the aged admiral and the insolence of his nephew and heir Giannettino Doria, the commander of the galleys, were galling to him as to many other Genoese, and it is said that Giannettino was the lover of Fiesco's wife. Moreover, the Fiesco belonged to the French or popular party, while the Doria were aristocrats and Imperialists. When Fiesco determined to conspire against Doria he found friends in many quarters. Pope Paul III. was the first to encourage him, while both Pier Luigi Farnese,

duke of Parma, and Francis I. of France gave him much assistance and promised him many advantages. Among his associates in Genoa were his brothers Girolamo and Ottobuono, Verrina and R. Sacco. A number of armed men from the Fiesco fiefs were secretly brought to Genoa, and it was agreed that on the 2nd of January 1 547, during the interregnum before the election of the new doge, the galleys in the port should be seized and the city gates held. The first part of the programme was easily carried out, and Giannettino Doria, aroused by the tumult, rushed down to the port and was killed, but Andrea escaped from the city in time. The conspirators attempted to gain possession of the government, but unfortunately for them Giovanni Luigi, while crossing a plank from the quay to one of the galleys, fell into the water and was drowned. The news spread consternation among the Fiesco faction, and Girolamo Fiesco found few adherents. They came to terms with the senate and were granted a general amnesty. Doria returned to Genoa on the 4th thirsting for revenge, and in spite of the amnesty he confiscated the Fiesco estates; Girolamo had shut himself up, with Verrina and Sacco and other conspirators, in his castle of Montobbia, which the Genoese at Doria's instiga- tion besieged and captured. Girolamo Fiesco and Verrina were tried, tortured and executed; all their estates were seized, some of which, including Torriglia, Doria obtained for himself. Otto- buono Fiesco, who had escaped, was captured eight years after- wards and put to death by Doria's orders.

There are many accounts of the conspiracy, of which perhaps the best is contained in E. Petit's Andre Doria (Paris, 1887), chs. xi. and xii., where all the chief authorities are quoted ; see also Calligari, La Congiura del Fiesco (Venice 1892), and Gavazzo, Nuovi documenti sulla congiura del conte Fiesco (Genoa, 1886) ; E. Bernabo-Brea, in his Sulla congiura di Giovanni Luigi Fieschi, publishes many important documents, while L. Capelloni's Congiura del Fiesco, edited by Olivieri, and A. Mascardi's Congiura del conte Giovanni Luigi de' Fieschi (Antwerp, 1629) may be commended among the earlier works. The Fiesco conspiracy has been the subject of many poems and dramas, of which the most famous is that by Schiller. See also under Doria, Andrea; Farnese. (L. V.*)

FIESOLE (anc. Faesulae, q.v.), a town and episcopal see of Tuscany, Italy, in the province of Florence, from which it is 3 m. N.E. by electric tramway. Pop. (1901) town 4951, commune 16,816. It is situated on a hill 970 ft. above sea-level, and commands a fine view. The cathedral of S. Romolo is an early and simple example of the Tuscan Romanesque style; it is a small basilica, begun in 1028 and restored in 1256. The picturesque battlemented campanile belongs to

tomb of the bishop Leonardo Salutati (d. 1466). with a beautiful portrait bust by the sculptor, Mino da Fiesole (1431-1484), is fine. The 13th-century Palazzo Pretorio contains a small museum of antiquities. The Franciscan monastery commands a fine view. The church of S. Maria Primerana has some works of art, and S. Alessandro, which is attributed to the 6th century, contains fifteen ancient columns of cipollino. The inhabitants of Fiesole are largely engaged in straw-plaiting.

Below Fiesole, between it and Florence, lies San Domenico di Fiesole (485 ft.); in the Dominican monastery the painter, Fra Giovanni Angelico da Fiesole (1387-1455), lived until he went to S. Marco at Florence. Here, too, is the Badia di Fiesole, founded in 1028 and re-erected about 1456-1466 by a follower of Brunelleschi. It is an irregular pile of buildings, in fine and simple early Renaissance style; a small part of the original facade of 1028 in black and white marble is preserved. The interior of the Church is decorated with sculptures by pupils of Desiderio da Settignano. The slopes of the hill on which Fiesole stands are covered with fine villas. To the S.E. of Fiesole lies Monte Ceceri (1453 ft.), with quarries of grey pietra serena, largely used in Florence for building. To the E. of this lies the 14th-century castle of Vincigliata restored and fitted up in the medieval style.

FIFE, an eastern county of Scotland, bounded N. by the Firth of Tay, E. by the Nor.th Sea, S. by the Firth of Forth, and W. by the shires of Perth, Kinross and Clackmannan. The Isle of May, Inchkeith, Inchcolm, Inchgarvie and the islet of Oxcar belong to the shire. It has an area of 322,844, acres or 504 sq. m. Its coast-line measure 108 m. The Lomond Hills to the S. and S.W. of Falkland, of which West Lomond is 1713 ft. high and East Lomond 1471 ft., Saline Hill (1178 ft.) to the N.W. of Dunfermline, and Benarty (1131 ft.) on the confines of Kinross are the chief heights. Of the rivers the Eden is the longest; formed on the borders of Kinross-shire by the confluence of Beattie Burn and Carmore Burn, it pursues a wandering course for 25 m. N.E., partly through the Howe, or Hollow of Fife, and empties into the North Sea. There is good trout fishing in its upper waters, but weirs prevent salmon from ascending it. The Leven drains the loch of that name and enters the Forth at the town of Leven after flowing eastward for 15 m. There are numerous factories at various points on its banks. The Ore, rising not far from Roscobie Hills to the north of Dunfermline, follows a mainly north-easterly course for 15 m. till it joins the Leven at Windygates. The old loch of Ore which was an expansion of its water was long ago reclaimed. Motray Water finds its source in the

parish of Kilmany, a few miles W. by N. of Cupar, makes a bold sweep towards the north-east, and then, taking a southerly turn, enters the head-waters of St Andrews Bay, after a course of 12 m. The principal lochs are Loch Fitty, Loch Gelly, Loch Glow and Loch Lindores; they are small but afford some sport for trout, perch and pike. ” Fresh-water mussels ” occur in Loch Fitty. There are no glens, and the only large valley is the fertile Stratheden, which supplies part of the title of the combined baronies of Stratheden (created 1836) and Campbell (created 1841).

Geology. — Between Damhead and Tayport on the northern side of the low-lying Howe of Fife the higher ground is formed of Lower Old Red Sandstone volcanic rocks, consisting of red and purple porphyrites and andesites and some coarse agglomerates, which, in the neighbourhood of Auchtermuchty, are rounded and conglomeratic. These rocks have a gentle dip towards the S.S.E. They are overlaid unconformably by the soft red sandstones of the Upper Old Red series which underlie the Howe of Fife from Loch Leven to the coast. The quarries in these rocks in Dura Den are famous for fossil fishes. Following the Old Red rocks conformably are the Carboniferous formations which occupy the remainder of the county, and are well exposed on the coast and in the numerous quarries. The Carboniferous rocks include, at the base, the Calciferous Sand- stone series of dark shales with thin limestones, sandstones and coals. They are best developed around Fife Ness, between St Andrews and Elie, and again around Burntisland between Kirkcaldy and Inver- keithing Bay. In the Carboniferous Limestone series, which comes next in upward succession, are the valuable gas-coals and ironstones worked in the coal-fields of Dunfermline, Saline, Oakley, Torryburn, Kirkcaldy and Markinch. The true Coal Measures lie in the district around Dysart and Leven, East Wemyss and Kinglassie, and they

are separated from the coal-bearing Carboniferous Limestone series by the sandstones and conglomerates of the Millstone Grit. Fourteen seams of coal are found in the Dysart Coal Measures, associated with sandstones, shales and clay ironstones. Fife is remarkably rich in evidences of former volcanic activity. Besides the Old Red Sandstone volcanic rocks previously mentioned, there are many beds of contemporaneous basaltic lavas and tuffs in the Carboniferous rocks; Saline Hill and Knock Hill were the sites of vents, which at that time threw out ashes ; these interbedded rocks are well exposed on the

shore between Burntisland and Seafield Tower. There were also many intrusive sheets of dolerite and basalt forced into tne lower Carboniferous rocks, and these now play an important part in the scenery of the county. They form the summits of the Lomond Hills and Benarty, and they may be followed from Cult Hill by the Cleish Hills to Blairadam ; and again near Dunfermline, Burntisland, Torryburn, Auchtertool and St Andrews. Later, in Permian times, eastern Fife was the seat of further volcanic action, and great numbers of ” necks ” or vents pierce the Carboniferous rocks; Largo Law is a striking example. In one of these necks on the shore at Kincraig Point is a fine example of columnar basalt ; the ” Rock and Spindle ” near St Andrews is another. Last of all in Tertiary times, east and west rifts in the Old Red Sandstone were filled by basalt dikes. Glacial deposits, ridges of gravel and sand, boulder clay, &c, brought from the N. W., cover much of the older rocks, and traces of old raised beaches are found round the coast and in the Howe of Fife. In the 25-ft. beach in the East Neuk of Fife is an island sea-cliff with small caves.

Climate and Agriculture.ˆ-Since the higher hills all lie in the west, most of the county is exposed to the full force of the east winds from the North Sea, which often, save in the more sheltered areas, check the progress of vegetation. At an elevation of 500 or 600 ft. above the sea harvests are three or four weeks later than in the valleys and low-lying coast-land. The climate, on the whole, is mild, proximity to the sea qualifying the heat in summer and the cold in winter. The average annual rainfall is 31 in., rather less in the East Neuk district and around St Andrews, somewhat more as the hills are approached, late summer and autumn being the wet season. The average temperature for January is 38 F., for July 59-5°, and for the year 47-6°. Four- fifths of the total area is under cultivation, and though the acreage under grain is smaller than it was, the yield of each crop is still extraordinarily good, oats, barley, wheat being the order of acreage. Of the green crops most attention is given to turnips. Potatoes also do well. The acreage under permanent pasture and wood is very considerable. Cattle are mainly kept for feed- ing purposes, and dairy farming, though attracting more notice, has never been followed more than to supply local markets. Sheep-farming, however, is on the increase, and the raising of horses, especially farm horses, is an important pursuit. They are strong, active and hardy, with a large admixture, or purely, of Clydesdale blood. The ponies, hunters and carriage horses so bred are highly esteemed. The strain of pigs has been improved by the introduction of Berkshires. North of the Eden the soil, though generally thin, is fertile, but the sandy waste of Tents Moor is beyond redemption. From St Andrews southwards all along

the coast the land is very productive. That adjacent to the East Neuk consists chiefly of clay and rich loam. From Leven to Inverkeithing it varies from a light sand to a rich clayey loam. Excepting Stratheden and Strathleven, which are mostly rich, fertile loam, the interior is principally cold and stiff clay or thin loam with strong clayey subsoil. Part of the Howe of Fife is light and shingly and covered with heather. Some small peat mosses still exist, and near Lochgelly there is a tract of waste, partly moss and partly heath. The character of the farm management may be judged by its results. The best methods are pursued, and houses, steadings and cottages are all in good order, commodious and comfortable. Rabbits, hares, pheasants and partridges are common in certain districts; roe deer are occasion- ally seen; wild geese, ducks and teal haunt the lochs; pigeon- houses are fairly numerous; and grouse and blackcock are plentiful on the Lomond moors. The shire is well suited for fox-hunting, and there are packs in both the eastern and the western division of Fife.

Mining. — Next to Lanarkshire, Fife is the largest coal- producing county in Scotland. The coal-field may roughly be divided into the Dunfermline basin (including Halbeath, Loch- gelly and Kelty), where the principal house coals are found, and

the Wemyss or Dysart basin (including Methil and the hinter- land) , where gas-coal of the best quality is obtained. Coal is also extensively worked at Culross, Carnock, Falfield, Donibristle, Ladybank, Kilconquhar and elsewhere. Beds of ironstone, limestone, sandstone and shale lie in many places contiguous to the coal. Blackband ironstone is worked at Lochgelly and Oakley, where there are large smelting furnaces. Oil shale is worked at Burntisland and Airdrie near Crail. Among the principal limestone quarries are those at Charlestown, Burnt- island and Cults. Freestone of superior quality is quarried at Strathmiglo, Burntisland and Dunfermline. Whinstone of unusual hardness and durability is obtained in nearly every district. Lead has been worked in the Lomond Hills and copper and zinc have been met with, though not in paying quantities. It is of interest to note that in the trap tufa at Elie there have been found pyropes (a variety of dark-red garnet), which are regarded as the most valuable of Scottish precious stones and are sold under the name of Elie rubies.

Other Industries. — The staple manufacture is linen, ranging from the finest damasks to the coarsest ducks and sackings. Its chief seats are at Kirkcaldyand Dunfermline, but it is carried on at many of the inland towns and villages, especially those situated near the Eden and Leven, on the banks of which rivers, as well as at Kirkcaldy, Dunfermline and Ceres, are fouricl the bleaching- greens. Kirkcaldy is famous for its oil-

cloth and linoleum. Most of the leading towns possess breweries and tanneries, and the largest distilleries are at Cameron Bridge and Burntisland. Woollen cloth is made to a small extent in several towns, and fishing-net at Kirkcaldy, Largo and West Wemyss. Paper is manufactured at Guardbridge, Markinch and Leslie; earthen- ware at Kirkcaldy; tobacco at Dunfermline and Kirkcaldy; engineering works and iron foundries are found at Kirkcaldy and Dunfermline; and shipbuilding is carried on at Kinghorn, Dysart, Burntisland, Inverkeithing and Tayport. From Inver- keithing all the way round the coast to Newburgh there are harbours at different points. They are mostly of moderate dimensions, the principal port being Kirkcaldy. The largest salmon fisheries are conducted at Newburgh and the chief seat of the herring fishery is Anstruther, but most of the coast towns take some part in the fishing either off the shore, or at stations farther north, or in the deep sea.

Communications. — The North British railway possesses a monopoly in the shire. From the Forth Bridge the main line follows the coast as far as Dysart and then turns northwards to Ladybank, where it diverges to the north-east for Cupar and the Tay Bridge, From Thornton Junction a branch runs to Dun- fermline and another to Methil, and here begins also the coast line for Leven, Crail and St Andrews which touches the main line again at Leuchars Junction; at Markinch a branch runs to Leslie; at Ladybank there are branches to Mawcarse Junction, and to Newburgh and Perth; and at Leuchars Junction a loop line runs to Tayport and Newport, joining the main at Wormit. From the Forth Bridge the system also connects, via Dunferm- line, with Alloa and Stirling in the W. and with Kinross and Perth in the N. From Dunfermline there is a branch to Charles- town, which on that account is sometimes called the port of Dunfermline.

Population and Government. — The population was 190,365 in 1891, and 218,840 in 1901, when 844 persons spoke Gaelic and English and 3 Gaelic only. The chief towns are the Anstruthers (pop. in 1901, 4233), Buckhaven (8828), Burntisland (4846), Cowdenbeath (7908), Cupar (4311), Dunfermline (25, 250), Dysart (3562), Kelty (3986), Kirkcaldy (34,079), Leslie (3587), Leven (5577), Lochgelly (5472), Lumphinnans (2071), Newport (2869), St Andrews (7621), Tayport (3325) and Wemyss (2522). For parliamentary purposes Fife is divided into an eastern and a western division, each returning one member. It also includes the Kirkcaldy district of parliamentary burghs (com- prising Burntisland, Dysart, Kinghorn and Kirkcaldy), and the St Andrews district (the two Anstruthers, Crail, Cupar, Kilrenny, Pittenweem and St Andrews); while Culross, Dunfermline and Inverkeithing are grouped with the Stirling district. As

regards education the county is under school-board jurisdiction, and in respect of higher education its equipment is effective. St Andrews contains several excellent schools; at Cupar there is the Bell-Baxter school; at Dunfermline and Kirkclady there are high schools and at Anstruther there is the Waid Academy.

History. — In remote times the term Fife was applied to the peninsula lying between the estuaries of the Tay and Forth and separated from the rest of the mainland by the Ochil Hills. Its earliest inhabitants were Picts of the northern branch and their country was long known as Pictavia. Doubtless it was owing to the fact that the territory was long subject to the rule of an independent king that Fife itself came to be called distinct- ively The Kingdom, a name of which the natives are still proud. The Romans effected no settlement in the province, though it is probable that they temporarily occupied points here and there. In any case the Romans left no impression on the civilization of the natives. With the arrival of the missionaries — especially St Serf, St Kenneth, St Rule, St Adrian, St Moran and St Fillan — and conversion of the Picts went on apace. Interesting memorials of these devout missionaries exist in the numerous coast caves between Dysart and St Andrews and in the crosses and sculptured stones, some doubtless of pre-Christian origin, to be seen at various places. The word Fife, according to Skene, seems to be identical with the Jutland Fibh (pronounced Fife) meaning ” forest,” and was probably first used by the Frisians to describe the country behind the coasts of the Forth and Tay, where Frisian tribes are supposed to have settled at the close of the 4th century. The next immigration was Danish, which left lasting traces in many place-names (such as the frequent use of law for hill). An ancient division of the Kingdom into Fife and Fothrif survived for a period for ecclesiastical purposes. The line of demarcation ran from Leven to the east of Cults, thence to the west of Collessie and thence to the east of Auchtermuchty. To the east of this line lay Fife proper. In 1426 the first shire of Kinross was formed, consisting of Kinross and Orwell, and was enlarged to its present dimensions by the transference from Fife of the parishes of Portmoak, Cleish and Tulliebole. Although the county has lain outside of the main stream of Scottish history, its records are far from dull or unimportant. During the reigns of the earlier Stuarts, Dunfermline, Falkland and St Andrews were often the scene of solemn pageantry and romantic episodes. Out of the seventy royal burghs in Scotland no fewer than eighteen are situated in the shire. However, notwithstanding the marked preference of the Stuarts,

the Kingdom did not hesitate to play the leading part in the momentous dramas of the Reformation and the Covenant, and by the 18th century the people had ceased to regard the old royal line with any but sentimental interest, and the Jacobite risings of 1715 and 1745 evoked only the most lukewarm support.

See Sir Robert Sibbald, History of the Sheriffdoms of Fife and Kinross; Rev. J. W. Taylor, Historical Antiquities of Fife (1875); A. H. Millar, Fife, Pictorial and Historical (Cupar, 1895) ; Sheriff Aeneas Mackay, sketch of the History of Fife (Edinburgh, 1890) ; History of Fife and Kinross (Scottish County History series) (Edin- burgh, 1896) ; John Geddie, The Fringe of Fife (Edinburgh, 1894).

FIFE (Fr. fifre; Med. Ger. Schweizerpfeijf, Feldpfeijf; Ital. ottavino), originally the small primitive cylindrical transverse flute, now the small Bb military flute, usually conoidal in bore, used in a drum and fife band. The pitch of the fife lies between that of the concert flute and piccolo. The fife, like the flute, is an open pipe, for although the upper end is stopped by means of a cork, an outlet is provided by the embouchure which is never entirely closed by the lips. The six finger-holes of the primitive flute, with the open end of the tube for a key-note, gave the diatonic scale of the fundamental octave; the second octave was produced by overblowing the notes of the funda- mental scale an octave higher; part of a third octave was obtained by means of the higher harmonics produced by using certain of the finger-holes as vent-holes. The modern fife has, in addition to the six finger-holes, 4, 5 or 6 keys. Mersenne describes and figures the fife, which had in his day the compass of a fifteenth. 1 The fife, which, he states, differed from the

1 Harmonie universelle (Paris, 1636), bk. v. prop. 9, pp. 241-244.

German flute only in having a louder and more brilliant tone and a shorter and narrower bore, was the instrument used by the Swiss with the drum. The sackbut, or serpent, was used as its bass, for, as Mersenne explains, the bass instrument could not be made long enough, nor could the. hands reach the holes, although some flutes were actually made with keys and had the tube doubled back as in the bassoon. 2

The words fife and the Fr. fifre were undoubtedly derived from the Ger. Pfeiff, the fife being called by Praetorius 3 Schweizerpfeijf and Feldpfeijf, while Martin Agricola, 4 writing a century earlier (1529), mentions the transverse flute by the names of Querchpfeijf or Schweizerpfeijf, which Sebastian Virdung 5 writes Zwerchpfeijf. The

Old English spelling was phife, phiphe or ffyjfe. The fife was in use in England in the middle of the 16th century, for at a muster of the citizens of London in 1540, droumes and ffyffes are mentioned. At the battle of St Quentin (1557) the list of the English army 6 employed states that one trumpet was allowed to each cavalry troop of 100 men, and a drum and fife to each hundred of foot. A drumme and phife were also employed at one shilling per diem for the ” Trayne of Artillery.” 7 This was the nucleus of the modern military band, and may be regarded as the first step in its formation. In England the adoption of the fife as a military instrument was due to the initiative of Henry VIII., who sent to Vienna for ten good drums and as many fifers. 8 Ralph Smith 9 gives rules for drummers and fifers who, in addition to the duty of giving signals in peace and war to the company, were expected to be brave, secret and ingenious, and masters of several languages, for they were oft sent to parley with the enemy and were entrusted with honourable but dangerous missions. In 1585 the drum and fife formed part of the furniture for war among the companies of the city of London. 10 Queen Elizabeth (according to Michaud, Biogr. universelle. tome xiii. p”. 60) had a peculiar taste for noisy music, and during meals had a concert of twelve trumpets, two kettledrums, with fifes and drums. The fife became such a favourite military instrument during the 16th and 17th centuries in England that it displaced the bagpipe; it was, however, in turn superseded early in the 1 8th century by the hautboy (see Oboe), introduced from France. In the middle of the 18th century the fife was reintroduced into the British army band by the duke of Cumberland ” in the Guards in 1745, commemorated by William Hogarth’s picture of the ” March of the Guards towards Scotland in 1745,” in which are seen a drummer and fifer; and by Colonel Bedford into the royal regiment of artillery in 1748, at the end of the war, when a Hanoverian fifer, John Ulrich, was brought over from Flanders as instructor. 12 In 1747 the 19th regiment, known as Green Howards, also had the advantage of a Hanoverian fifer as teacher, a youth presented by his colonel to Lieutenant- Colonel Williams commanding the regiment at Bois-le-Duc. Drum and fife bands in a short time became common in all infantry regi- ments, while among the cavalry the trumpet prevailed.

For the acoustics, construction and origin of the fife see Flute. Illustrations of the fife may be seen in Cowdray’s picture of an en- campment at Portsmouth in 1548; in Sandford’s “Coronation Procession of James II.,” and in C. R. Day’s Descriptive Catalogue, pi. i. (F) (description No. 42, p. 27). (K. S.)

FIFTH MONARCHY MEN, the name of a Puritan sect in England which for a time supported the government of Oliver Cromwell in the belief

that it was a preparation for the ” fifth monarchy,” that is for the monarchy which should succeed the Assyrian, the Persian, the Greek and the Roman, and during which Christ should reign on earth with His saints for a thousand years. These sectaries aimed at bringing about the entire aboli- tion of the existing laws and institutions, and the substitution of a simpler code based upon the law of Moses. Disappointed at the delay in the fulfilment of their hopes, they ‘soon began to agitate against the government and to vilify Cromwell; but the arrest of their leaders and preachers, Christopher Feake, John Rogers and others, cooled their ardour, and they were, perforce, content to cherish their hopes in secret until after the Restoration. Then, on the 6th of January 1661, a band of fifth monarchy men, headed by a cooper named Thomas Venner,

2 For an illustration of one of these bass flutes see article Flute, fig. 2.

3 Syntagma musicum (Wolfenbiittel, 1618), pp. 40-41 of Reprint.

4 Musica instrumenlalis (Wittenberg, 1529).

6 Musica getutscht und auszgezogen (Basel, 1511).

6 See Sir S. D. Scott, The British Army, vol. ii. p. 396.

7 See H. G. Farmer, Memoirs of the Royal Artillery Band (London,

1904).

8 Id. 9 Id. 10 Stowe’s Chronicles, p. 702.

11 Grose, Military Antiquities (London, 1801), vol. ii.

12 See Colonel P. Forbes Macbean, Memoirs of the Royal Regiment of A rtillery.

who was one of their preachers, made an attempt to obtain possession of London. Most of them were either killed or taken prisoners, and on the igth and 21st of January Venner and ten others were executed for high treason. From that time the special doctrines of the sect either died out, or became merged in a milder form of millenarianism, similar to that which exists at the present day.

For the proceedings of the sect see S. R. Gardiner, History of the

Commonwealth and Protectorate, passim (London, 1894-1901); and for an account of the rising of 1661 see Sir John Reresby, Memoirs, 1634-168Q, edited by J. J. Cartwright (London, 1875).

FIG, the popular name given to plants of the genus Ficus, an extensive group, included in the natural order Moraceae, and characterized by a remarkable development of the pear-shaped receptacle, the edge of which curves inwards, so as to form a nearly closed cavity, bearing the numerous fertile and sterile flowers mingled on its surface. The figs vary greatly in habit, — some being low trailing shrubs, others gigantic trees, among the

Figure i. — Fruiting Branch of Fig, Ficus Carica ; about § nat. size.

1. Unripe fruit cut lengthwise; about § nat. size. 2. Female flower taken from 1 ; enlarged. 3. Ripe fruit cut lengthwise ; about 3 nat. size.

most striking forms of those tropical forests to which they are chiefly indigenous. They have alternate leaves, and abound in a milky juice, usually acrid, though in a few instances sufficiently mild to be used for allaying thirst. This juice contains caout- chouc in large quantity.

Ficus Carica (figure 1), which yields the well-known figs of commerce, is a bush or small tree — rarely more than 18 or 20 ft. high, — with broad, rough, deciduous leaves, very deeply lobed in the cultivated varieties, but in the wild plant sometimes nearly entire. The green, rough branches bear the solitary, nearly sessile receptacles in the axils of the leaves. The male flowers are placed chiefly in the upper part of the cavity, and in most varieties are few in number. As it ripens, the receptacle enlarges greatly, and the numerous single-seeded pericarps or true fruits become imbedded in it. The fruit of the wild fig never acquires the succulence of the cultivated kinds. The fig seems to be indigenous to Asia Minor and Syria, but now occurs in a wild state in most of the countries around the Mediterranean. From the ease with which the nutritious fruit can be preserved, it was probably one of the earliest objects of cultivation, as may be inferred from the frequent allusions to it in the Hebrew

Scriptures. 1 From a passage in Herodotus the fig would seem to have been unknown to the Persians in the days of the first Cyrus; but it must have spread in remote ages over all the districts around the Aegean and Levant. The Greeks are said to have received it from Caria (hence the specific name) ; but the fruit so improved under Hellenic culture that Attic figs became celebrated throughout the East, and

special laws were made to regulate their exportation. From the contemptuous name given to in- formers against the violation of those enactments, aVKoip&vTCU {(jvkov, 4>alvoo), our word sycophant is usually derived. The fig was one of the principal articles of sustenance among the Greeks; the Spartans especially used it largely at their public tables, From Hellas, at some prehistoric period, it was trans- planted to Italy and the adjacent islands. Pliny enumerates many varieties, and alludes to those from Ebusus (the modern Iviza) as most esteemed by Roman epicures; while he describes those of home growth as furnishing a large portion of the food of the slaves, particularly those employed in agriculture, by whom great quantities were eaten in the fresh state at the periods of fig-harvest. In Latin myths the plant plays an important part. Held sacred to Bacchus, it was employed in religious ceremonies; and the fig-tree that overshadowed the twin founders of Rome in the wolf's cave, as an emblem of the future prosperity of the race, testified to the high value set upon the fruit by the nations of antiquity. The tree is now cultivated in all the Mediterranean countries, but the larger portion of our supply of figs comes from Asia Minor, the Spanish Peninsula and the south of France. Those of Asiatic Turkey are considered the best. The varieties are extremely numerous, and the fruit is of various colours, from deep purple to yellow, or nearly white. The trees usually bear two crops,— one in the early summer from the buds of the last year, the other in the autumn from those on the spring growth; the latter forms the chief harvest. Many of the immature receptacles drop off from imperfect fertilization, which circum- stance has led, from very ancient times, to the practice of caprification. 2 Branches of the wild fig in flower are placed over the cultivated bushes. Certain hymehopterous insects, of the genera Blastophaga and Sycophaga, which frequent the wild fig, enter the minute orifice of the receptacle, apparently to deposit their eggs; conveying thus the pollen more completely to the stigmas, they ensure the fertilization and consequent ripening of the fruit. By some the nature of the process has been questioned, and the better maturation of the fruit attributed merely to the stimulus given by the puncture of the insect, as in the case of the apple; but the arrangement of the unisexual flowers in the fig renders the first theory the more probable. In some districts a straw or small twig is thrust into the receptacle with a similar object. When ripe the figs are picked, and spread out to dry in the sun, — those of better quality being much pulled and extended by hand during the process. Thus prepared, the fruit is packed closely in barrels, rush baskets, or wooden boxes, for commerce. The best kind, known as elemi, are shipped at Smyrna, where the

1 Of these the case of the Barren Fig-tree (Mark. xi. 12-14, 20-21 : compare Matt. xxi. 18-20), which Jesus cursed and which then withered away, has been much discussed among theologians. The difficulty is in Mark xi. 13: ” And seeing a fig-tree afar off having leaves, he came, if haply he might find anything thereon ; and when he came to it he found nothing but leaves, for the time of figs was not yet.” These last words obviously raise the question whether the expectation of Jesus of finding figs, and his cursing of the tree on finding none, were not unreasonable. Many ingenious solutions have been propounded, by suggested emendations of the text and otherwise, for which consult M’Clintock and Strong’s Cyclopaedia of Biblical Literature {sub ” Fig “) and the Encyclopaedia Biblica (“Fig-tree”); the former demurs to the unreasonableness, and contends that the appearance of the leaves at this season (March) indicated a pretentious precocity in this particular fig-tree, so that Jesus was entitled to expect that it would also have fruit, even though the season had not arrived ; the Ency. Biblica, on the other hand, supposes that some ” early Christian,” confounding parable with history, has misunderstood the parable in Luke xiii. 6-9, and, forgetting that the season was not one for figs, has transformed it here into the narrative of an act of Jesus. The probability seems to be that the words ” for the time of figs was not yet ” are an un- intelligent gloss by an early reader, which has made its way into the text. For authorities see the works mentioned above.

2 From Lat. caprificus, a wild fig; O. Eng. caprijig

pulling and packing of figs form one of the most important industries of the people.

This fruit still constitutes a large part of the food of the natives of western Asia and southern Europe, both in the fresh and dried state. A sort of cake made by mashing up the inferior kinds serves in parts of the Archipelago as a substitute for bread. Alcohol is obtained from fermented figs in some southern countries; and a kind of wine, still made from the ripe fruit, was known to the ancients, and mentioned by Pliny under the name of sycites. Medicinally the fig is employed as a gentle laxative, when eaten abundantly often proving useful in chronic constipation; it forms a part of the well-known “con- fection of senna.” The milky juice of the stems and leaves is very acrid, and has been used in some countries for raising blisters. The wood is porous and of little value; though a piece, saturated with oil and spread with emery, is in France a common substitute for a hone.

The fig is grown for its fresh fruit (eaten as an article of dessert) in all the milder parts of Europe, and in the United States, with protection in winter, succeeds as far north as Pennsylvania. The fig was introduced into England by Cardinal Pole, from Italy, early in the 16th century. It lives to a great age, and along the’ southern coast of England bears fruit abundantly as a standard ; but in Scotland and in many parts of England a south wall is indispensable for its successful cultivation out of doors.

Fig trees are propagated by cuttings, which should be put into pots, and placed in a gentle hotbed. They may be obtained more speedily from layers, which should consist of two or three years old shoots, and these, when rooted, will form plants ready to bear fruit the first or second year after planting. The best soil for a fig border is a Friable loam, not too rich, but well drained; a chalky subsoil is congenial to the tree, and, to correct the tendency to over-luxuri- ance of growth, the roots should be confined within spaces surrounded by a wall enclosing an area of about a square yard. The sandy soil of Argenteuil, near Paris, suits the fig remarkably well ; but the best trees are those which grow in old qUarries, where their roots are free from stagnant water, and where they are sheltered from cold, while exposed to a very hot sun, which ripens the fruit perfectly. The fig succeeds well planted in a paved court against a building with a south aspect.

The fig tree naturally produces two sets of shoots and two crops of fruit in the season. The first shoots generally show young figs in July and August, but these in the climate of England very seldom ripen,

and should therefore be rubbed off. The late or midsummer shoots likewise put forth fruit-buds, which, however, do not develop themselves till the following spring; and these form the only crop of figs on which the British gardener can depend.

The fig tree grown as a standard should get very little pruning, the effect of cutting being to stimulate the buds to push shoots too vigorous for bearing. When grown against a wall, it has been recommended that a single stem should be trained to the height of a foot. Above this a shoot should be trained to the right, and another to the left; from these principals two other subdivisions should be encouraged, and trained 15 in. apart; and along these branches, at distances of about 8 in., shoots for bearing, as nearly as possible of equal vigour, should be encouraged. The bearing shoots produced along the leading branches should be trained in at full length, and in autumn every alternate one should be cut back to one eye. In the following summer the trained shoots should bear and ripen fruit, and then be cut back in autumn to one eye, while shoots from the bases of those cut back the previous autumn should be trained for succession. In this way every leading branch will be furnished alternately with bearing and successional shoots.

When protection is necessary, as it may be in severe winters, though it is too often provided in excess, spruce branches have been found to answer the purpose exceedingly well, owing to the fact that their leaves drop off gradually when the weather becomes milder in spring, and when the trees require less protection and more light and air. The principal part requiring protection is the main stem, which is more tender than the young wood.

In forcing, the fig requires more heat than the vine to bring it into leaf. It may be subjected to a temperature of 50° at night, and from 6o ° to 65° in the day, and this should afterwards be in- creased to 6o° and 65 by night, and 70 to 75° by day, or even higher by sun heat, giving plenty of air at the same time. In this temperature the evaporation from the leaves is very great, and this must be replaced and the wants of the swelling fruit supplied by daily watering, by syringing the foliage, and by moistening the floor, this atmospheric moisture being also necessary to keep down the red spider. When the crop begins to ripen, a moderately dry atmosphere should be maintained, with abundant ventilation when the weather permits.

The fig tree is easily cultivated in pots, and by introducing the

plants into heat in succession the fruiting season may be consider-

ably extended. The plants should be potted in turfy loam mixed with charcoal and old mortar rubbish, and in summer top-dressings of rotten manure, with manure water two or three times a week, will be beneficial. While the fruit is swelling, the pots should be plunged in a bed of fermenting leaves.

The following are a few of the best figs; those marked F. are good forcing sorts, and those marked W. suitable for walls : —

Agen: brownish-green, turbinate.

Brown Ischia, F. : chestnut-coloured, roundish-turbinate.

Brown Turkey (Lee's Perpetual), F., W. : purplish-brown, tur- binate.

Brunswick, W. : brownish-green, pyriform.

Col di Signora Bianca, F. : greenish-yellow, pyriform.

Col di Signora Nero: dark chocolate, pyriform.

Early Violet, F. : brownish-purple, roundish.

Grizzly Bourjassotte: chocolate, round.

Grosse Monstreuse de Lipari: pale chestnut, turbinate.

Negro Largo, F. : black, long pyriform.

White Ischia, F. : greenish-yellow, roundish-obovate.

White Marseilles, F., W. : pale green, roundish-obovate.

The sycamore fig, Ficus Sycomorus, is a tree of large size, with heart-shaped leaves, which, from their fancied resemblance to those of the mulberry, gave origin to the name SuKo/xopos. From the deep shade cast by its spreading branches, it is a favourite tree in Egypt and Syria, being often planted along roads and near houses. It bears a sweet edible fruit, somewhat like that of the common fig, but produced in racemes on the older boughs. The apex of the fruit is sometimes removed, or an incision made

3as£

Ssfe

Figure 2. — India-rubber Tree, Ficus elastica, showing spreading

woody roots.

in it, to induce earlier ripening. The ancients, after soaking it in water, preserved it like the common fig. The porous wood is only fit for fuel.

The sacred fig, peepul, or bo, Ficus religiosa, a large tree with heart-shaped, long-pointed leaves on slender footstalks, is much grown in southern Asia. The leaves are used for tanning, and afford lac, and a gum resembling caoutchouc is obtained from the juice; but in India it is chiefly planted with a religious object, being regarded as sacred by both Brahmans and Buddhists. The former believe that the last avatar of Vishnu took place beneath its shade. A gigantic bo, described by Sir J. Emerson Tennent as growing near Anarajapoora, in Ceylon, is, if tradition may be trusted, one of the oldest trees in the world. It is said to have been a branch of the tree under which Gautama Buddha became endued with his divine powers, and has always been held in the greatest veneration. The figs, however, hold as important a place in the religious fables of the East as the ash in the myths of Scandinavia.

Ficus elastica, the India-rubber tree (figure 2), the large, oblong, glossy leaves, and pink buds of which are so familiar in our greenhouses, furnishes most of the caoutchouc obtained from the East Indies. It grows to a large size, and is remarkable

for the snake-like roots that extend in contorted masses around the base of the trunk. The small fruit is unfit for food.

Ficus bengalensis, or the Banyan, wild in parts of northern India, but generally planted throughout the country, has a woody stem, branching to a height of 70 to 100 ft. and of vast extent with heart-shaped entire leaves terminating in acute points. Every branch from the main body throws out its own roots, at first in small tender fibres, several yards from the ground; but these continually grow thicker until they reach the surface, when they strike in, increase to large trunks, and become parent trees, shooting out new branches from the top, which again in time suspend their roots, and these, swelling into trunks, produce other branches, the growth continuing as long as the earth contributes her sustenance. On the bank’s of the Nerbudda stood a celebrated tree of this kind, which is supposed to be that described by Nearchus, the admiral of Alexander the Great. This tree once

covered an area so immense, that it was known to shelter no fewer than 7000 men, and though much reduced in size by the destructive power of the floods, the remainder was described by James Forbes (1749-1819), in his Oriental Memoirs (1813-1815) as nearly 2000 ft. in circumference, while the trunks large and small exceeded 3000 in number. The tree usually grows from seeds dropped by birds on other trees. The leaf -axil of a palm forms a frequent receptacle for their growth, the palm becoming ultimately strangled by the growth of the fig, which by this time has developed numerous daughter stems which continue to expand and cover ultimately a large area. The famous tree in the Royal Botanic Gardens, Calcutta, began its growth at the end of the 18th century on a sacred date-palm. In 1907 it had nearly 250 aerial roots, the parent trunk was 42 ft. in girth, and its leafy crown had a circumference of 857 ft.; and it was still growing vigorously. Both this tree and F. religiosa cause destruction to buildings, especially in Bengal, from seeds dropped by birds germinating on the walls. The tree yields an inferior rubber, and a coarse rope is prepared from the bark and from the aerial roots.

FIGARO, a famous dramatic character first introduced on the stage by Beaumarchais in the Barbier de Seville, the Mariage de Figaro, and the Folle Journee. The name is said to be an old Spanish and Italian word for a wigmaker, connected with the verb cigarrar, to roll in paper. Many of the traits of the character are to be found in earlier comic types of the Roman and Italian stage, but as a whole the conception was marked by great originality; and Figaro soon .seized the popular imagination, and became the recognized representative of daring, clever and nonchalant roguery and intrigue. Almost immediately after its appearance, Mozart chose the Marriage of Figaro as the subject of an opera, and the Barber of Seville was treated first by Paisiello, and afterwards in 1816 by Rossini. In 1826 the name of the witty rogue was taken by a journal which continued till 1833 to be one of the principal Parisian periodicals, numbering among its contributors such men as Jules Janin, Paul Lacroix, Leon Gozlan, Alphonse Karr, Dr Veron, Jules Sandeau and George Sand. Various abortive attempts were made to restore the Figaro during the next twenty years; and in 1854 the efforts of M. de Villemessant were crowned with success (see Newspapers: France).

See Marc Monnier, Les Aieux de Figaro (1868) ; H. de Villemessant, Memoires d’ un journaliste (1867).

FIGEAC, a town of south-western France, capital of an arrondissement in the department of Lot, 47 m. E. N. E. of Cahors on the Orleans railway. Pop. (1906) 4330. It is enclosed by an amphitheatre of

wooded and vine-clad hills, on the right bank of the Cele, which is here crossed by an old bridge. It is ill-built and the streets are narrow and dirty; on the outskirts shady boulevards have taken the place of the ramparts by which it was surrounded. The town is very rich in old houses of the 13th and 14th centuries; among them may be mentioned the Hotel de Balene, of the 14th century, used as a prison. Another house, dating from the 1 5th century, was the birthplace of the Egyptologist J. F. Champollion, in memory of whom the town has erected an obelisk. The principal church is that of

St Sauveur, which once belonged to the abbey of Figeac. It was built at the beginning of the 12 th century, but restored later; the facade in particular is modern. Notre-Dame du Puy, in the highest part of the town, belongs to the 12th and 13th centuries. It has no transept and its aisles extend completely round the interior. The altar-screen is a fine example of carved woodwork of the end of the 17 th century. Of the four obelisks which used to mark the limits of the authority of the abbots of Figeac, those to the south and the west of the town remain. Figeac is the seat of a subprefect and has a tribunal of first in- stance, and a communal college. Brewing, tanning, printing, cloth-weaving and the manufacture of agricultural implements are among the industries. Trade is in cattle, leather, wool, plums, walnuts and grain, and there are zinc mines in the neighbour- hood.

Figeac grew up round an abbey founded by Pippin the Short in the 8th century, and throughout the middle ages it was the property of the monks. At the end of the 1 6th century the lord- ship was acquired by King Henry IV.'s minister, the duke of Sully, who sold it to Louis XIII. in 1622.

FIGUEIRA DA FOZ, or Figueira, a seaport of central Portugal, in the district of Coimbra, formerly included in the province of Beira; on the north bank of the river Mondego, at its mouth, and at the terminus of the Lisbon-Figueira and Guarda-Figueira railways. Pop. (1900) 6221. Figueira da Foz is an important fishing-station, and one of the headquarters of the coasting trade in grain, fruit, wine, olive oil, cork and coal; but owing to the bar at the mouth of the Mondego large ships cannot enter. Glass is manufactured, and the city attracts many visitors by its excellent climate and sea-bathing. A residential suburb, the Bairro Novo, exists chiefly for their accommodation, to the north-west of the old town. Figueira is connected by a tramway running 4 m. N. W. with Buarcos (pop. 5033) and with the coal-mines of Cape Mondego. Lavos (pop. 7939), on the south bank of the Mondego, was the principal landing-place of the British troops which came, in 1808, to take part in the Peninsular War. Figueira da Foz received the title

and privileges of city by a decree dated the 20th of September 1882.

FIGUERAS, a town of north-eastern Spain, in the province of Gerona, 14 m. S. of the French frontier, on the Barcelona- Perpignan railway. Pop. (1900) 10,714. Figueras is built at the foot of the Pyrenees, and on the northern edge of El Ampurdan, a fertile and well-irrigated plain, which produces wine, olives and rice,and derives its name from the seaport of Ampurias, the ancient Emporiae. The castle of San Fernando, 1 m.N.W., is an irregular pentagonal structure, built by order of Ferdinand VI. (1746-1759), on the site of a Capuchin convent. Owing to its situation, and the rocky nature of the ground over which a besieger must advance, it is still serviceable as the key to the frontier. It affords accommodation for 16,000 men and is well provided with bomb-proof cover. In 1794 Figueras was sur- rendered to the French, but it was regained in 1795. During the Peninsular War it was taken by the French in 1808, re- captured by the Spaniards in 181 1, and retaken by the French in the same year. In 1823, after a long defence, it was once more captured by the French. An annual pilgrimage from Figueras to the chapel of Nuestra Senora de Requesens, 15 m. N., com- memorates the deliverance of the town from a severe epidemic of fever in 161 2.

FIGULUS, PUBLIUS NIGIDIUS (c. 98-45 B.C.), Roman savant, next to Varro the most learned Roman of the age-. He was a friend of Cicero, to whom he gave his support at the time of the Catilinarian conspiracy (Plutarch, Cicero, 20; Cicero, Pro Sulla, xiv. 42). In 58 he was praetor, sided with Pompey in the Civil War, and after his defeat was banished by Caesar, and died in exile. According to Cicero (Timaens, 1), Figulus endeavoured with some success to revive the doctrines of Pytha- goreanism. With this was included mathematics, astronomy and astrology, and even the magic arts. According to Suetonius (Augustus, 94) he foretold the greatness of tire future emperor on the day of liis birth, and Apuleius (Apologia, 42) records I that, by the employment of ” magic boys ” (magici pueri), he

helped to find a sum of money that had been lost. Jerome (the authority for the date of his death) calls him Pythagoricus et magus. The abstruse nature of his studies, the mystical character of his writings, and the general indifference of the Romans to such subjects, caused his works to be soon forgotten. Amongst his scientific, theological and grammatical works mention may be*made of De diis,

containing an examination of various cults and ceremonials; treatises on divination and the interpretation of dreams; on the sphere, the winds and animals. His Commen- tarii grammatici in at least 20 books was an ill-arranged collection of linguistic, grammatical and antiquarian notes. In these he expressed the opinion that the meaning of words was natural, not fixed by man. He paid especial attention to orthography, and sought to differentiate the meanings of cases of like ending by distinctive marks (the apex to indicate a long vowel is attributed to him). In etymology he endeavoured to find a Roman ex- planation of words where possible (according to him frater was =fere alter). Quintilian (Instit. oral. xi. 3. 143) speaks of a rhetorical treatise De gestu by him.

See Cicero, Ad Fam. iv. 13; scholiast on Lucan i. 639; several references in Aulus Gellius; Teuffel, Hist, of Roman Literature, 170; M. Hertz, De N. F. studiis atque operibus (1845); Quaestiones Nigidianae (1890), and edition of the fragments (1889) by A. Swoboda.

FIGURATE NUMBERS, in mathematics. If we take the sum of n terms of the series 1 + 1 + 1 + • • ., i-e. w,as the «th term of a new series, we obtain the series 1 + 2+3+ . . •, the sum of n terms of which is % n . n+i. Taking this sum as the «th term, we obtain the series 1+3+6+10+ . . ., which has for the sum of n terms n (w+i) (k-m)/ ^! 1 This sum is taken as the nth term of the next series, and proceeding in this way we obtain series having the following «th terms: — 1, n, «(»+i)/2', »(»+i) (»+2)/3!,...«(«+i)...(«+r-2)/(r-i) !. The numbers obtained by giving n any value in these expressions are of the first, second, third, ... or rth order of figurate numbers.

Pascal treated these numbers in his Traite du triangle arith- metique (1665), using them to develop a theory of combinations

and to solve problems in proba- bility. His table is here shown in its simplest form. It is to be noticed that each number is the sum of the numbers immediately above and to the left of it; and that the numbers along a line, termed a base, which cuts off an equal number of units along the top row and column are the co- efficients in the binomial ex- pansion of (i+x) r_1 , where r represents the number of units cut off.

FIJI (Viti), a British colony consisting of an archipelago in the Pacific Ocean, the most important in Polynesia, between 15° and 20 S., and on and about the meridian of 180 . The islands number about 250, of which some 80 are inhabited. The total land area is 7435 sq. m. (thus roughly equalling that of Wales), and the population is about 121,000. The principal island is Viti Levu, 98 m. in length (E. to W.) and 67 in

extreme breadth, with an area of 41 12 sq. m. Forty miles N.E. lies Vanua Levu, measuring 117 m. by 30, with an area of 2432 sq. m. Close off the south-eastern shore of Vanua Levu is Taviuni, 26 m. in length by 10 in breadth; Kandavu or Kadavu, 36 m. long and very narrow, is 41 m. S. of Viti Levu, and the three other main islands, lying east of Viti Levu in the Koro Sea, are Koro, Ngau or Gau, and Ovalau. South-east from Vanua Levu a loop of islets extends nearly to 20 S., enclosing the Koro Sea. North-west of Viti Levu lies another chain, the Yasawa or western group; and, finally, the colony includes the island of Rotumah (q.v.), 300 m. N.W. by N. of Vanua Levu.

The formation of the larger islands is volcanic, their surface rugged, their vegetation luxuriant, and their appearance very

1 The notation n! denotes the product 1 . 2 . 3. . . . n, and is termed ” factorial n.”

beautiful; their hills rise often above 3000, and, in the case of a few summits, above 4000 ft., and they contrast strongly with the low coral formation of the smaller members of the group. There is not much level country, except in the coral islets, and certain rich tracts along the coasts of the two large islands, especially near the mouths of the rivers. The large islands have a con- siderable extent of undulating country, dry and open on their lee sides. Streams and rivers are abundant, the latter very large in proportion to the size of the islands, affording a waterway to the rich districts along their banks. These and the extensive mud flats and deltas at their mouths are often flooded, by which their fertility is increased, though at a heavy cost to the culti- vator. The Rewa, debouching through a wide delta at the south-east of Viti Levu, is navigable for small vessels for 40 m. There are also in this island the Navua and Sigatoka (flowing S.), the Nandi (W.), and the Ba (N.W.). The Dreketi, flowing W.,

FIJI

English Mites o to 70 30 40 50 60

.oo*”

pi.

Ringgold

-l£

Vatu l£ili\

Ubulu Ltou, filt. Washington,

ˆmm?

QMakongat Nalngani [Aau

i5Uvuk4

‘;. Ubatihi Mbau I. if Bay

K

Vlta’ral

- •» Tnombia .

‘ *»»

Uvthala ,.** ., ,£jf q& iWailangifala

Ngenua » . lftl »iba

‘auiunl ˆ & ** Exploring

ˆ t ‘Group

Yethatpˆ <ˆ % "Viˆw Mbutvm

at u Vara > ..?_& n ˆ** unia

% , tKatafango ttvikTutMitha \f> •Yaraua

passage

yanua-kuta \ d/strvlabt Heef

“T..‘andaow

Mt.Chatleng t t “Ma’tattukfl 9, *liarb.

S

Hoi

r

mthiati

e a , \?

Vanua Vatu Uoala

Toto\ aft

Maluku

A Long. E.i 8 of Greenwich B

a* Lakemba

<""•««■ . WotM

KamoaraP * ^ej^roup

FulanpaG? £

Ongea Itou

Emery WiUcci te.

is the chief stream of Vanua Levu. It breaches the mountains in a fine valley; for this island consists practically of one long range, whereas the main valleys and ranges separating them in Viti Levu radiate for the most part from a common centre. With few exceptions the islands are surrounded by barriers of coral, broken by openings opposite the mouths of streams. Viti Levu is the most important island not only from its size, but from its fertility, variety of surface, and population, which is over one-third of that of the whole group. The town of Suva lies on an excellent harbour at the south-east of the island, and has been the capital of the colony since 1882, containing the government buildings and other offices. Vanua Levu is less fertile than Viti Levu; it has good anchorages along its entire southern coast. Of the other islands, Taviuni, remarkable for a lake (presumably a crater-lake) at the top of its lofty central ridge, is fertile, but exceptionally devoid of harbours; whereas the well-timbered island of Kandavu has an excellent one. On the eastern shore of Ovalau, an island which contains in a small area a remarkable series of gorge-like valleys between command- ing hills, is the town of Levuka, the capital until 1882. It stands partly upon the narrow shore, and partly climbs the rocky slope behind. The chief islands on the west of the chain enclosing the Koro Sea are Koro, Ngau, Moala and Totoya, all productive, affording good anchorage, elevated and picturesque. The eastern islands of the chain are smaller and more numerous, Vanua Batevu (one of the Exploring Group) being a centre of trade. Among

others, Mago is remarkable for a subterranean outlet of the waters of the fertile valley in its midst.

The land is of recent geological formation, the principal ranges being composed of igneous rock, and showing traces of much volcanic disturbance. There are boiling springs in Vanua

Levu and Ngau, and slight shocks of earthquake are occasionally felt. The tops of many of the mountains, from Kandavu in the S.W., through Nairai and Koro, to the Ringgold group in the N.E., have distinct craters, but their activity lias long ceased. The various decomposing volcanic rocks — tufas, conglomerates and basalts — mingled with decayed vegetable matter, and abundantly watered, form a very fertile soil. Most of the high peaks on the larger islands are basaltic, and the rocks generally are igneous, with occasional upheaved coral found sometimes over 1000 ft. above the sea; but certain sedimentary rocks observed on Viti Levu seem to imply a nucleus of land of con- siderable age. Volcanic activity in the neighbourhood is further shown by the quantities of pumice-stone drifted on to the south coasts of Kandavu and Viti Levu; malachite, antimony and graphite, gold in small quantities, and specular iron-sand occur.

Climate. — The colony is beyond the limits of the perpetual S.E. trades, while not within the range of the N.W. monsoons. From April to November the winds are steady between S.E. and E.N.E., and the climate is cool and dry, after which the weather becomes uncertain and the winds often northerly, this being the wet warm season. In February and March heavy gales are frequent, and hurricanes sometimes occur, causing scarcity by destroying the crops. The rainfall is much greater on the wind- ward than on the lee sides of the islands (about no in. at.Suva), but the mean temperature is much the same, viz., about 8o° F. In the hills the temperature sometimes falls below 50 . The climate, especially from November to April, is somewhat enervat- ing to the Englishman, but not unhealthy. Fevers are hardly known. Dysentery, which is common, and the most serious disease in the islands, is said to have been unknown before the advent of Europeans.

Fauna. — Besides the dog and the pig, which (with the domestic fowl) must have been introduced in early times, the only land mammals are

certain species of rats and bats. Insects are numerous, but the species few. Bees have been introduced. The avifauna is not remarkable. Birds of prey are few ; the parrot and pigeon tribes are better represented. Fishes, of an Indo-Malay type, are numerous and varied; Moliusca, especially marine, and Crustaceae are also very numerous. These three form an important element in the food supply.

• Flora. — The vegetation is mostly of a tropical Indo-Malayan character — thick jungle with great trees covered with creepers and epiphytes. The lee sides of the larger islands, however, have grassy plains suitable for grazing, with scattered trees, chiefly Pandanus, and ferns. The flora has also some Australian and New Zealand affinities (resembling in this respect the New Caledonia and New Hebrides groups), shown especially in these western districts by the Pandanus, by certain acacias and others. At an elevation of about 2000 ft. the vegetation assumes a more mountainous type. Among the many valuable timber trees are the vesi (Afzelia bijuga) ; the dilo (Calophyllum Inophyllum), the oil from its seeds being much used in the islands, as in India, in the treatment of rheumatism; the dakua (Dammara Vitiensis), allied to the New Zealand kauri, and others. The dakua or Fiji pine, however, has become scarce. Most of the fruit trees are also valuable as timber. The native cloth (masi) is beaten out from the bark of the paper mulberry cultivated for the purpose. Of the palms the cocoanut is by far the most important. The yasi or sandal-wood was formerly a valuable product, but is now rarely found. There are various useful drugs, spices and perfumes; and many plants are cultivated for their beauty, to which the natives are keenly alive. Among the plants used as pot-herbs are several ferns, and two or three Solanums, one of which, 5. anthropophagorum, was one of certain plants always cooked with human flesh, which was said to be otherwise difficult of digestion. The use of the kava root, here called yanggona, from which the well-known national beverage is made, is said to have been introduced from Tonga. Of fruit trees, besides the cocoanut, there may be mentioned the many varieties of the bread-fruit, of bananas and plantains, of sugar-cane and of lemon; the wi (Spondias dulcis), the kavika {Eugenia malaccensis) , the ivi or Tahitian chestnut (Inocarpus edulis), the pine-apple and others introduced in modern times. Edible roots are especially abundant. The chief staple of life is the yam, the names of several months in the calendar having reference to its cultivation and ripening. The natives use no grain or pulse, but make akind of bread (mandrai) from this, the taro, and other rootsf as well as from the banana (which is the best), the bread-fruit, the ivi, the kavika, the arrowroot, and in times of scarcity the mangrove. This bread is made by burying the materials

for months, till the mass is thoroughly fermented and homogeneous, when it is dug up and cooked by baking or steaming. This simple process, applicable to such a variety of substances, is a valuable security against famine.

People. — The Fijians are a people of Melanesian (Papuan) stock much crossed with Polynesians (Tongans and Samoans). They occupy the extreme east limits of Papuan territory and are usually classified as Melanesians; but they are physically superior to the pure examples of that race, combining their dark colour, harsh hirsute skin, crisp hair, which is bleached with lime and worn in an elaborately trained mop, and muscular limbs, with the handsome features and well proportioned bodies of the Polynesians. They are tall and well built. The features are strongly marked, but not unpleasant, the eyes deep set, the beard thick and bushy. The chiefs are fairer, much better-looking, and of a less negroid type of face than the people. This negroid type is especially marked on the west coasts, and still more in the interior of Viti Levu. The Fijians have other characteristics of both Pacific races, e.g. the quick intellect of the fairer, and the savagery and suspicion of the dark. They wear a minimum of covering, but, unlike the Melanesians, are strictly decent, while they are more moral than the Polynesians. They are cleanly and particular about their personal appearance, though, unlike other Melanesians, they care little for ornament, and only the women are tattooed. A partial circumcision is practised, which is exceptional with the Melanesians, nor have these usually an elaborate political and social system like that of Fiji. The status of the women is also somewhat better, those of the upper class having considerable freedom and influence. If less readily amenable to civilizing influences than their neighbours to the eastward, the Fijians show greater force of character and in- genuity. Possessing the arts of both races they practise them with greater skill than either. They understand the principle of division of labour and production, and thus of commerce. They are skilful cultivators and good boat-builders, the carpenters being an hereditary caste; there are also tribes of fishermen and sailors; their mats, baskets, nets, cordage and other fabrics are substantial and tasteful; their pottery, made, like many of the above articles, by women, is far superior to any other in the South Seas; but many native manufactures have been supplanted by European goods.

The Fijians were formerly notorious for cannibalism, which may have had its origin in religion, but long before the first contact with Europeans had degenerated into gluttony. The Fijian's chief table luxury was human flesh, euphemistically called by him " long pig," and to satisfy his appetite he would sacrifice even friends and

relatives. The Fijians combined with this greediness a savage and merciless natures. Human sacrifices were of daily occurrence. On a chief's death wives and slaves were buried alive with him. When building a chief's house a slave was buried alive in the hole dug for each foundation post. At the launching of a war-canoe living men were tied hand and foot between two plantain stems making a human ladder over which the vessel was pushed down into the water. The people acquiesced in these brutal customs, and willingly met their deaths. Affection and a firm belief in a future state, in which the exact , condition of the dying is continued, are the Fijians' own explanations of the custom, once universal, of killing sick or aged relatives. Yet in spite of this savagery the Fijians have always been remarkable for their hospitality, open-handedness and courtesy. They are a sensitive, proud, if vindictive, and boastful people, with good conversational and reasoning powers, much sense of humour, tact and perception of character. Their code of social etiquette is minute and elaborate, and the graduations of rank well marked. These are (1) chiefs, greater and lesser; (2) priests; (3) Mata ni Vanua (lit., eyes of the land), employes, messengers or counsellors; (4) distinguished warriors of low birth; (5) common people; (6) slaves.

The family is the unit of political society. The families are grouped in townships or otherwise (qali) under the lesser chiefs, who again owe allegiance to the supreme chief of the matanitu or tribe. The chiefs are a real aristocracy, excelling the people in physique, skill, intellect and acquirements of all sorts; and the reverence felt for them, now gradually diminishing, was very great, and had something of a religious character. All that aman had belonged to his chief. On the other hand, the chief's property

practically belonged to his people, and they were as ready to give as to take. In a time of famine, a chief would declare the contents of the plantations to be common property. A system of feudal service-tenures (lata) is the institution on which their social and political fabric mainly depended. It allowed the chief to call for the labour of any district, and to employ it in planting, house or canoe-building,supplying food on the occasion of another chief's visit, &c. This power was often used with much discern- ment; thus an unpopular chief would redeem his character by calling for some customary service and rewarding it liberally, or a district would be called on to supply labour or produce as a punishment. The privilege

might, of course, be abused by needy ormnscrupulous chiefs, though they generally deferred somewhat to public opinion; it has now, with similar customary exactions of cloth, mats, salt, pottery, &c. been reduced within definite limits. An allied custom, solevu, enabled a district in want of any particular article to call on its neighbours to supply it, giving labour or something else in exchange. Although, then, the chief is lord of the soil, the interior chiefs and individual families have equally distinct rights in it, subject to payment ®f certain dues; and the idea of permanent alienation of land by purchase was never perhaps clearly realized. Another curious custom was that of vasu (lit. nephew) . The son of a chief by a woman of rank had almost unlimited rights over the property of his mother's family, or of her people. In time of war the chief claimed absolute control over life and property. Warfare was carried on with many courteous formalities, and considerable skill was shown in the fortifications. There were well-defined degrees of dependence among the different tribes or districts: the first of these, bali, is an alliance between two nearly equal tribes, but implying a sort of inferiority on one side, acknowledged by military service; the second, qali, implies greater subjection, and payment of tribute. Thus A, being bati to B, might hold C in qali, in which case C was also reckoned subject to B, or might be protected by B for political purposes.

The former religion of the Fijians was a sort of ancestor- worship, had much in common with the creeds of Polynesia, and included a belief in a future existence. There were two classes of gods— the first immortal, of whom Ndengei is the greatest, said to exist eternally in the form of a serpent, but troubling himself little with human or other affairs, and the others had usually only a local recognition. The second rank (who, though far above mortals, are subject to their passions, and even to death) com- prised the spirits of chiefs, heroes and other ancestors. The gods entered and spoke through their priests, who thus pro- nounced on the issue of every enterprise, but they were not represented by idols; certain groves and trees were held sacred, and stones which suggest phallic associations. The priesthood usually was hereditary, and their influence great, and they had generally a good understanding with the chief. The institution of Taboo existed in full force. The mburi or temple was also the council chamber and place of assemblage for various purposes.

The weapons of the Fijians are spears, slings, throwing clubs and bows and arrows. Their houses, of which the framework is timber and the rest lattice and thatch, are ingeniously con- structed, with great taste in ornamentation, and are well furnished with mats, mosquito-curtains, baskets, fans', nets and cooking and other utensils. Their

canoes, sometimes more than ioo ft. long, are well built. Ever excellent agriculturists, their implements were formerly digging sticks and hoes of turtlebone or flat oyster-shells. In irrigation they showed skill, draining their fields with built watercourses and bamboo pipes. Tobacco, maize, sweet potatoes, yams, kava, taro, beans and pumpkins, are the principal crops.

Fijians are fond of amusements. They have various games, and dancing, story-telling and songs are especially popular. Their poetry has well-defined metres, and a sort of rhyme. Their music is rude, and is said to be always in the major key. They are clever cooks, and for their feasts preparations are some- times made months in advance, and enormous waste results from them. Mourning is expressed by fasting, by shaving the head and face, or by cutting off the little finger. This last is

sometimes done at the death of a rich man in the hope that his family will reward the compliment; sometimes it is done vicari- ously, as when one chief cuts off the little finger of his dependent in regret or in atonement for the death of another.

A steady, if not a very rapid, decrease in the native population set in after 1875. A terrible epidemic of measles in that year swept away 40,000, or about one-third of the Fijians. Sub- sequent epidemics have not been attended by anything like this mortality, but there has, however, been a steady decrease, principally among young children, owing to whooping-cough, tuberculosis and croup. Every Fijian child seems to contract yaws at some time in its life, a mistaken notion existing on the part of the parents that it strengthens the child's physique. Elephantiasis, influenza, rheumatism, and a skin disease, thoko, also occur. One per cent of the natives are lepers. A commission appointed in 1891 to inquire into the causes of the native de- crease collected much interesting anthropological information regarding native customs, and provincial inspectors and medical officers were specially appointed to compel the natives to carry out the sanitary reforms recommended by the commission. A considerable sum was also spent in laying on good water to the native villages. The Fijians show no disposition to intermarry with the Indian coolies. The European half-castes are not prolific inter se, and they are subject to a scrofulous taint. The most robust cross in the islands is the offspring of the African negro and the Fijian. Miscegenation with the Micronesians, the only race in the Pacific which is rapidly increasing, is regarded as the most hopeful manner of preserving the native Fijian population. There is a large Indian immigrant population.

Trade, Administration, &c. — The principal industries are the cultivation of sugar and fruits and the manufacture of sugar and copra, and these three are the chief articles of export trade, which is carried on almost entirely with Australia and New Zealand. The fruits chiefly exported are bananas and pine- apples. There are also exported maize, vanilla and a variety of fruits in small quantities; pearl and other shells and beche- de-mer. There is a manufacture of soap from coconut oil; a fair quantity of tobacco is grown, and among other industries may- be included boat-building and saw-milling. Regular steamship communications are maintained with Sydney, Auckland and Vancouver. Good bridle-tracks exist in all the larger islands, and there are some macadamized roads, principally in Viti Levu. There is an overland mail service by native runners. The export trade is valued at nearly £600,000 annually, and the imports at £500,000. The annual revenue of the colony is about £140,000 and the expenditure about £125,000. The currency and weights and measures are British. Besides the customs and stamp duties, some £18,000 of the annual revenue is raised from native taxation. The seventeen provinces of the colony (at the head of which is either a European or a roko tui or native official) are assessed annually by the legislative council for a fixed tax in kind. The tax on each province is distributed among districts under officials called bulls, and further among villages within these districts. Any surplus of produce over the assessment is sold to contractors, and the money received is returned to the natives.

Under a reconstruction made in 1904 there is an executive council consisting of the governor and four official members. The legislative council consists of the governor, ten official, six elected and two native members. The native chiefs and pro- vincial representatives meet annually under the presidency of the governor, and their recommendations are submitted for sanction to the legislative council. Suva and Levuka have each a municipal government, and there are native district and village councils. There is an armed native constabulary; and a volunteer and cadet corps in Suva and Levuka.

The majority of the natives are Wesleyan Methodists. The Roman Catholic missionaries have about 3000 adherents; the Church of England is confined to the Europeans and kanakas in the towns; the Indian coolies are divided between Mahom- medans and Hindus. There are public schools for Europeans and half-castes in the towns, but there is no provision for the education of the children of settlers in the out-districts. By an

ordinance of 1890 provision was made for the constitution of school boards, and the principle was first applied in Suva and Levuka. The missions have established schools in every native village, and most natives are able to read and write their own language. The government has established a native technical school for the teaching of useful handicrafts. The natives show themselves very slow in adopting European habits in food, clothing and house-building.

History. — A few islands in the north-east of the group were first seen by Abel Tasman in 1643. The southernmost of the group, Turtle Island, was discovered by Cook in 1 7 73 . Lieutenant Bligh, approaching them in the launch of the “Bounty,” 1789, had a hostile encounter with natives. In 1827 Dumont d’Urville in the ” Astrolabe ” surveyed them much more accurately, but the first thorough survey was that of the United States exploring expedition in 1840. Up to this time, owing to the evil reputation of the islanders, European intercourse was very limited. The labours of the Wesleyan missionaries, however, must always have a prominent place in any history of Fiji. They came from Tonga in 1835 and naturally settled first in the eastern islands, where the Tongan element, already familiar to them, preponderated. They perhaps identified themselves too closely with their Tongan friends, whose dissolute, lawless, tyrannical conduct led to much mischief; but it should not be forgotten that their position was difficult, and it was mainly through their efforts that many terrible heathen practices were stamped out.

About 1804 some escaped convicts from Australia and runaway sailors established themselves around the east part of Viti Levu, and by lending their services to the neighbouring chiefs probably led to their preponderance over the rest of the group. Na Ulivau, chief of the small island of .Mbau, established before his death in 1829 a sort of supremacy, which was extended by his brother Tanoa, and by Tanoa’s son Thakombau, a ruler of considerable capacity. In his time, however, difficulties thickened. The Tongans, who had long frequented Fiji (especi- ally for canoe-building, their own islands being deficient in timber), now came in larger numbers, led by an able and am- .bitious chief, Maafu, who, by adroitly taking part in Fijian quarrels, made himself chief in the Windward group, threatening Thakombau’s supremacy. He was harassed, too, by an arbitrary demand for £9000 from the American government, for alleged injuries to their consul. Several chiefs who disputed his authority were crushed by the aid of King George of Tonga, who (1855) had opportunely arrived on a visit; but he afterwards, taking some offence,

demanded £12,000 for his services. At last Thakombau, disappointed in the hope that his acceptance of Christianity (1854) would improve his position, offered the sovereignty to Great Britain (1859) with the fee simple of 100,000 acres, on condition of her paying the American claims. Colonel Smythe, R.A., was sent out to report on the question, and decided against annexation, but advised that the British consul should be invested with full magisterial powers over his country- men, a step which would have averted much subsequent difficulty. Meanwhile Dr B. Seemann's favourable report on the capabilities of the islands, followed by a time of depression in Australia and New Zealand, led to a rapid increase of settlers — from 200 in i860 to 1800 in 1869. This produced fresh complica- tions, and an increasing desire among the respectable settlers for a competent civil and criminal jurisdiction. Attempts were made at self-government, and the sovereignty was again offered, conditionally, to England, and to the United States. Finally, in 1871, a " constitutional government " was formed by certain Englishmen under King Thakombau; but this, after incurring heavy debt, and promoting the welfare of neither whites nor natives, came after three years to a deadlock, and the British government felt obliged, in the interest of all parties, to accept the unconditional cession now offered (1874). It had besides long been thought desirable to possess a station on the route between Australia and Panama; it was also felt that the Polynesian labour traffic, the abuses in which had caused much indignation, could only be effectually regulated from a point contiguous to the recruiting field, and the locality where that

labour was extensively employed. To this end the governor of Fiji was also created " high commissioner for the western Pacific." Rotumah (q.v.) was annexed in 1881.

At the time of the British annexation the islands were suffering from commercial depression, following a fall in the price of cotton after the American Civil War. Coffee, tea, cinchona and sugar were tried in turn, with limited success. The coffee was attacked by the leaf disease; the tea could not compete with that grown by the cheap labour of the East; the sugar machinery was too antiquated to withstand the fall in prices consequent on the European sugar bounties. In 1878 the first coolies were im- ported from India and the cultivation of sugar began to pass into the hands of large companies working with modern machinery. With the introduction of coolies the Fijians began to fall behind in the development of their country. Many of the coolies chose to remain in the colony after the termination of their indentures, and began to displace the European country traders. With a regular and plentiful supply of Indian coolies, the recruiting of kanaka labourers

practically ceased. The settlement of European land claims, and the measures taken for the protection of native institutions, caused lively dissatisfac- tion among the colonists, who laid the blame of the commercial depression at the door of the government; but with returning prosperity this feeling began to disappear. In 1900 the govern- ment of New Zealand made overtures to absorb Fiji. The Aborigines Society protested to the colonial office, and the imperial government refused to sanction the proposal.

See Smyth, Ten Months in the Fiji Islands (London, 1864) ; B. Seemann, Flora Viliensis (London, 1865); and Viti: Account of a Government Mission in the Vilian or Fijian Islands (1860-1861); W. T. Pritchard, Polynesian Reminiscences (London, 1866); H. Forbes, Two Years in Fiji (London, 1875); Commodore Goodenough, Journal (London, 1876) ; H. N. Moseley, Notes of a Naturalist in the " Challenger " (London, 1879); Sir A. H. Gordon, Story of a Little War (Edinburgh, privately printed, 1879); J. W. Anderson, Fiji and New Caledonia (London, 1880); C. F. Gordon-Cumming, At Home in Fiji (Edinburgh, 1881); John Home, A Year in Fiji (London, 1881); H. S. Cooper, Our New Colony, Fiji (London, 1882); S. E. Scholes, Fiji and the Friendly Islands (London, 1882) : Princes Albert Victor and George of Wales, Cruise of H. M. S. " Bac- chante " (London, 1886) ; A. Agassiz, The Islands and Coral Reefs of Fiji (Cambridge, Mass., U.S., 1899); H. B. Guppy, Observations of a Naturalist in the Pacific (1896-1899), vol. i. ; Vanua Levu, Fiji (Phys. Geog. and Geology) (London, 1903) ; Lorimer Fison, Tales from Old Fiji (folk-lore, &c.) (London, 1904); B. Thomson, The Fijians (London, 1908).

FILANDER, the name by which the Aru Island wallaby (Macropus brunii) was first described. It occurs in a translation of C. de Bruyn's Travels (ii. 101) published in 1737.

FILANGIERI, CARLO (1 784-1867), prince of Satriano, Neapolitan soldier and statesman, was the son of Gaetano Filangieri (1752-1788), a celebrated philosopher and jurist. At the age of fifteen he decided on a military career, and having obtained an introduction to Napoleon Bonaparte, then first consul, was admitted to the Military Academy at Paris. In 1803 he received a commission in an infantry regiment, and took part in the campaign of 1805 under General Davoust, first in the Low Countries, and later at Ulm, Maria Zell and Austerlitz, where he fought with distinction, was wounded several times and promoted. He returned to Naples as captain on Massena's staff to fight the Bourbons and the Austrians in 1806, and subsequently went to Spain, where he followed Jerome Bona- parte in his retreat from Madrid. In consequence of a fatal duel he was sent back to Naples; there he

served under Joachim Murat with the rank of general, and fought against the Anglo- Sicilian forces in Calabria and at Messina. On the fall of Napoleon he took part in Murat's campaign against Eugene Beauharnais, and later in that against Austria, and was severely wounded at the battle of the Panaro (1815). On the restoration of the Bourbon king Ferdinand IV. (I.), Filangieri retained his rank and command, but found the army utterly disorganized and impregnated with Carbonarism. In the disturbances of 1820 he adhered to the Constitutionalist party, and fought under General Pepe (q.v.) against the Austrians. On the re- establishment of the autocracy he was dismissed from the

service, and retired to Calabria where he had inherited the princely title and estates of Satriano. In 183 1 he was recalled by Ferdinand II. and entrusted with various military reforms. On the outbreak of the troubles of 1848 Filangieri advised the king to grant the constitution, which he did in February 1848, but when the Sicilians formally seceded from the Neapolitan kingdom Filangieri was given the command of an armed force with which to reduce the island to obedience. On the 3rd of September he landed near Messina, and after very severe fighting captured the city. He then advanced southwards, besieged and took Catania, where his troops committed many atrocities, and by May 1849 he had conquered the whole of Sicily, though not without much bloodshed. He remained in Sicily as governor until 1855, when he retired into private life, as he could not carry out the reforms he desired owing to the hostility of Giovanni Cassisi, the minister for Sicily. On the death of Ferdinand II. (22nd of May 1859) the new king Francis II. appointed Filangieri premier and minister of war. He promoted good relations with France, then fighting with Piedmont against the Austrians in Lombardy, and strongly urged on the king the necessity of an alliance with Piedmont and a constitution as the only means whereby the dynasty might be saved. These proposals being rejected, Filangieri resigned office. In May i860, Francis at last promulgated the constitution, but it was too late, for Gari- baldi was in Sicily and Naples was seething with rebellion. On the advice of Liborio Romano, the new prefect of police, Filangieri was ordered to leave Naples. He went to Marseilles with his wife and subsequently to Florence, where at the instance of General La Marmora he undertook to write an account of the Italian army. Although he adhered to the new government he refused to accept any dignity at its hands, and died at his villa of San Giorgio a Cremano

near Naples on the 9th of October

1867.

Filangieri was a very distinguished soldier, and a man of great ability; although he changed sides several times he became really attached to the Bourbon dynasty, which he hoped to save by freeing it from its reactionary tendencies and infusing a new spirit into it. His conduct in Sicily was severe and harsh, but he was not without feelings of humanity, and he was an honest man and a good administrator.

His biography has been written by his daughter Teresa Filangieri Fieschi-Ravaschieri, // Generate Carlo Filangieri (Milan, 1902), an interesting, although somewhat too laudatory volume based on the general's own unpublished memoirs; for the Sicilian expedition see V. Finocchiaro, La Rivoluzione siciliana del 1848-49 (Catania, 1906, with bibliography), in which Filangieri is bitterly attacked; see also under Naples; Ferdinand IV.; Francis I.; Ferdinand II.; Francis II. (L. V.*)

FILANGIERI, GAETANO (175 2-1 788), Italian publicist, was born at Naples on the 18th of August 1752. His father, Caesar, prince of Arianiello, intended him for a military career, which he commenced at the early age of seven, but soon abandoned for the study of the law. At the bar his knowledge and eloquence early secured his success, while his defence of a royal decree reforming abuses in the administration of justice gained him the favour of the king, Charles, afterwards Charles III. of Spain, and led to several honourable appointments at court. The first two books of his great work, La Scienza della legislazione, appeared in 1780. The first book contained an exposition of the rules on which legislation in general ought to proceed, while the second was devoted to economic questions. These two books showed him an ardent -reformer, and vehement in denouncing the abuses of his time. He insisted on unlimited free trade, and the abolition of the medieval institutions which impeded production and national well-being. Its success was great and immediate not only in Italy, but throughout Europe at large. In 1783 he married, re- signed his appointments at court, and retiring to Cava, devoted himself steadily to the completion of his work. In the same year appeared the third book, relating entirely to the principles of criminal jurisprudence. The suggestion which he made in it as to the need for reform in the Roman Catholic church brought upon him the censure of the ecclesiastical authorities, and it was condemned by the congregation ot the Index in 1784. In 1785 he

published three additional volumes, making the fourth book of the

projected work, and dealing with education and morals. -In 1787 he was appointed a member of the supreme treasury council by Ferdinand IV., but his health, impaired by close study and over-work in his new office, compelled his withdrawal to the country at Vico Equense. He died somewhat suddenly on the 2 1 st of July 1788, having just completed the first part of the fifth book of his Scienza. He left an outline of the remainder of the work, which was to have been completed in six books.

La Scienza della legislazione has gone through many editions, and has been translated into most of the languages of Europe. The best Italian edition is in 5 vols. 8vo. (1807). The Milan edition (1822) contains the Opusculi scelti and a life by Donato Tommasi. A French translation appeared in Paris in 7 vols. 8vo (1786-1798); it was republished in 1 822-1 824, with the addition of the Opuscles and notes by Benjamin Constant. The Science of Legislation was trans- lated into English by Sir R. Clayton (London, 1806).

FILARIASIS, the name of a disease due to the nematode Filaria sanguinis hominis. A milky appeara.nce of the urine, due to the presence of a substance like chyle, which forms a clot, had been observed from time to time, especially in tropical and subtropical countries; and it was proved by Dr Wucherer of Bahia, and by Dr Timothy Lewis, that this peculiar condition is uniformly associated with the presence in the blood of minute eel-like worms, visible only under the microscope, being the embryo forms of a Filaria (see Nematoda). Sometimes the discharge of lymph takes place at one or more points of the surface of the body, and there is in other cases a condition of naevoid elephantiasis of the scrotum, or lymph-scrotum. More or less of blood may occur along with the chylous fluid in the urine. Both the chyluria and the presence of filariae in the blood are curiously intermittent; it may happen that not a single filaria is to be seen during the daytime, while they swarm in the blood at night, and it has been ingeniously shown by Dr S. Mackenzie that they may be made to disappear if the patient sits up all night, reappearing while he sleeps through the day.

Sir P. Manson proved that mosquitoes imbibe the embryo filariae from the blood of man; and that many of these reach full development within the mosquito, acquiring their freedom when the latter resorts to water, where it dies after depositing its eggs. Mosquitoes would thus be the intermediate host of the filariae, and their introduction into the human body would be through the medium of water (see Parasitic Diseases).

FILDES, SIR LUKE (1844-), English painter, was born at Liverpool, and trained in the South Kensington and Royal Academy schools. At first a highly successful illustrator, he took rank later among the ablest English painters, with ” The Casual Ward ” (1874), ” The Widower ” (1876), ” The Village Wedding ” (1883), “An Al-fresco Toilette” (1889); and “The Doctor” (1891), now in the National Gallery of British Art. He also painted a number of pictures of Venetian life and many notable portraits, among them the coronation portraits of King Edward VII. and Queen Alexandra. He was elected an associate of the Royal Academy in 1879, and academician in 1887; and was knighted in 1906.

See David Croal Thomson, The Life and Work of Luke Fildes, R.A*

(1895)-

FILE. 1. A bar of steel having sharp teeth on its surface, and used for abrading orsmoothing hard surfaces. (The O. Eng. word is jtol, and cognate forms appear in Dutch vijl, Ger. Feile, &c. ; the ultimate source is usually taken to be an Indo-European root meaning to mark or scratch, and seen in the Lat. pingere, to paint.) Some uncivilized tribes polish their weapons with such things as rough stones, pieces of shark skin or fishes’ teeth. The operation of filing is recorded in 1 Sam. xiii. 21; and, among other facts, the similarity of the name for the filing instrument among various European peoples points to an early practice of the art. A file differs from a rasp (which is chiefly used for working wood, horn and the like) in having its teeth cut with a chisel whose straight edge extends across its surface, while the teeth of the rasp are formed by solitary indentations of a pointed chisel. According to the form of their teeth, files may be single- cut or double-cut; the former have only one set of parallel ridges

(either at right angles or at some other angle with the length); the latter (and more common) have a second set cut at an angle with the first. The double-cut file presents sharp angles to the filed surface, and is better suited for hard metals. Files are classed according to the fineness of their teeth (see Tool), and their shapes present almost endless varieties. Common forms are — the flat file, of parallelogram section, with uniform breadth and thickness, or tapering, or ” bellied “; the four-square file, of square section, sometimes with one side ” safe,” or left smooth; and the so-called three-square file, having its

cross section an equilateral triangle, the half-round file, a segment of a circle, the round or rat-tail file, a circle, which are generally tapered. The float file is like the flat, but single-cut. There are many others. Files vary in length from three-quarters of an inch (watchmakers ‘) to 2 or 3 ft. and upwards (engineers’). The length is reckoned exclusively of the spike or tang which enters the handle. Most files are tapered; the blunt are nearly parallel, with larger section near the middle; a few are parallel. The rifflers of sculptors and a few other files are curvilinear in their central line.

In manufacturing files, steel blanks are forged from bars which have been sheared or rolled as nearly as possible to the sections required, and after being carefully annealed are straightened, if necessary, and then rendered clean and accurate by grinding or filing. The process of cutting them used to be largely performed by hand, but machines are now widely employed. The hand- cutter, holding in his left hand a short chisel (the edge 1 of which is wider than the width of the file), places it on the blank with an inclination from the perpendicular of 12 or 14°, and beginning near the farther end (the blank is placed With the tartg or handle end towards him) strikes it sharply with a hammer. An indenta- tion is thus made, and the steel, slightly thrown up on the side next the tang, forms a ridge. The chisel is then transferred to the uncut surface and slid away from the operator till it encounters the ridge just made; the position of the next cut being thus determined, the chisel is again struck, and so on. The workman seeks to strike the blows as uniformly as possible, and he will make 60 or 80 cuts a minute. If the file is to be single-cut, it is now ready to be hardened, but if it is to be double-cut he pro- ceeds to make the second series or course of cuts, which are generally somewhat finer than the first. Thus the surface is covered with teeth inclined towards the point of the file. If the file is flat and is to be cut on the other side, it is turned over, and a thin plate of pewter placed below it to protect the teeth. Tri- angular and other files are supported in grooves in lead. In cutting round and half-round files, a straight chisel is applied as tangent to the curve. The round face of a half-round file requires eight, ten or more courses to complete it. Numerous attempts were made, even so far back as the 18th century, to invent machinery for cutting files, but little success was attained till the latter part of the 19th century. In most of the machines the idea was to arrange a metal arm and hand to hold the chisel with a hammer to strike the blow, and so to imitate the manual process as closely as possible. The general principle on which the successful forms are constructed is that the blanks, laid on a moving table, are slowly traversed forward under a rapidly reciprocating chisel or knife.

The filing of a flat surface perfectly true is the test of a good filer; and this 1 is no easy matter to the beginner. The piece to be operated upon is generally fixed about the level of the elbow, the operator standing, and, except in the case of small files, grasping the file with both hands, the handle with the right, the farther end with the left. The great point is to be able to move the file forward with pressure in horizontal straight lines; from the tendency of the hands to move in arcs of circles, the heel and point of the file are apt to be alternately raised. This is partially compensated by the bellied form given to many files (which also counteracts the frequent warping effect of the harden- ing process, by which one side of a flat file may be rendered concave and useless). In bringing back the file for the next thrust it is nearly lifted off the work. Further, much delicacy and skill are required in adapting the pressure and velocity, ascertaining if foreign matters or filings remain interposed

between the file and the work, &c- Files can be cleaned with a piece of the so-called cotton-card (used in combing cotton wool) nailed to a piece of wood. In draw-filing, which is sometimes resorted to to give a neat finish, the file is drawn sideways to and fro over the work. New files are generally used for a time on brass or cast-iron, and when partially worn they are still available for filing wrought iron and steel.

2. A string or thread (through the Fr. fil and file, from Lat. filum, a thread) ; hence used of a device, originally a cord, wire or spike on which letters, receipts, papers, &c, may be strung for convenient reference. The term has been extended to embrace various methods for the preservation of papers in a particular order, such as expanding books, cabinets, and in- genious improvements on the simple wire file which enable any single document to be readily found and withdrawn without removing the whole series. From the devices used for filing the word is transferred to the documents filed, and thus is used of a catalogue, list, or collection of papers, &c. File is also employed to denote a row of persons or objects arranged one behind the other. In military usage a ” file ” is the opposite of a ” rank,” that is, it is composed of a (variable) number of men aligned from front to rear one behind the other, while a rank contains a number of men aligned from right to left abreast. Thus a British infantry company, in line two deep, one hundred strong, has two ranks of fifty men each, and fifty ” files ” of two men each. Up to about 1600 infantry companies or battalions were often sixteen deep, one front rank man and the fifteen ” eoverers ” forming a file. The number of ranks and, therefore, of men in the file diminished first to ten (1600), then to six (1630), then to three (1700), and finally to two (about 1808 in the British army, 1888 in the German) . Denser formations when employed have been

formed, not by altering the order of men within the unit, but by placing several units, one closely behind the other (" doubling " and " trebling " the line of battle, as it used to be called). In the 17 th century a file formed a small command under the " file leader," the whole of the front rank consisting therefore of old soldiers or non-commissioned officers. This use of the word to express a unit of command gave rise to the old-fashioned term " file firing," to imply a species of fire (equivalent to the modern " independent ") in which each man in the file fired in succession after the file leader, and to-day a corporal or sergeant is still ordered to take one or more files under his charge for independent work. In the above it is to be understood that the men are facing to the front or rear. If they are turned to the right or left so that the company now stands two men broad and fifty deep, it is spoken of as being " in file." From this come such phrases as " single file " or " Indian file " (one man leading and the rest following singly behind him). 1 The use of verbs " to file " and " to defile," implying the passage from fighting to marching formation, is to be derived from this rather than from the re- semblance of a marching column to a long flexible thread, for in the days when the word was first used the infantry company whether in battle or on the march was a solid rectangle of men, a file often containing even more men than a rank.

FILE-FISH, or Trigger-fish, the names given to fishes of the genus Batistes (and Monacanthus) inhabiting all tropical and subtropical seas. Their body is compressed and not covered with ordinary scales, but with small juxtaposed scutes. Their other principal characteristics consist in the structure of their first dorsal fin (which consists of three spines) and in their peculiar dentition. The first of the three dorsal spines is very strong, roughened in front like a file, and hollowed out behind to receive the second much smaller spine, which, besides, has a projection in front, at its base, fitting into a notch of the first. Thus these two spines can only be raised or depressed simultaneously, in such a manner that the first cannot be forced down unless the second has been previously depressed. The latter has been com- pared to a trigger, hence the name of Trigger-fish. Also the

1 This may also be understood as meaning simply " a single file," but the explanation given above is more probable, as it is essentially a marching and not a fighting formation that is expressed by the phrase.

generic name Batistes and the Italian name of ” Pesce balistra” refer to this structure. Both jaws are armed with eight strong incisor- like and sometimes pointed teeth, by which these fishes are enabled, not only to break off pieces of madrepores and other corals on which they feed, but also to chisel a hole into the hard shells of Mollusca, in order to extract the soft parts. In this way they destroy an immense number of molluscs, and become most injurious to the pearl-fisheries. The gradual failure of those

Balistes vidua.

fisheries in Ceylon has been ascribed to this cause, although evidently other agencies must have been at work at the same time. The Monaeanthi are distinguished from the Balistes in having only one dorsal spine and a velvety covering of the skin. Some 30 different species are known of Balistes and about 50 of Monacanthus. Two species (B. macidatus and capriscus), common in the Atlantic, sometimes wander to the British coasts.

FILELFO, FRANCESCO (1398-1481), Italian humanist, was born in 1398 at Tolentino, in the March of Ancona. When he appeared upon the scene of human life, Petrarch and the students of Florence had already brought the first act in the recovery of classic culture to conclusion. They had created an eager appetite for the antique, had disinterred many important Roman authors, and had freed Latin scholarship to some extent from the barbarism of the middle ages. Filelfo was destined to carry on their work in the field of Latin literature, and to be an im- portant agent in the still unaccomplished recovery of Greek culture. His earliest studies in grammar, rhetoric and the Latin language were conducted at Padua, where he acquired so great a reputation for learning that in 141 7 he was invited to teach eloquence and moral philosophy at Venice. According to the custom of that age in Italy, it now became his duty to explain the language, and to illustrate the beauties of the principal Latin authors, Cicero and Virgil being considered the chief masters of moral science and of elegant diction. Filelfo made his mark at once in Venice. He was admitted to the society of the first scholars and the most eminent nobles of that city; and in 141 9 he received an appointment from the state, which enabled him to reside as secretary to the consul-general(6a;yfo) of the Venetians in Constantinople. This appointment was not only honourable to Filelfo as a man of trust and general ability, but it also gave him the opportunity of acquiring the most coveted of all posses- sions at that moment for a scholar — a knowledge of the Greek language. Immediately after his arrival in Constantinople, Filelfo placed himself under the tuition of John

Chrysoloras, whose name was already well known in Italy as relative of Manuel, the first Greek to profess the literature of his ancestors in Florence. At the recommendation of Chrysoloras he was employed in several diplomatic missions by the emperor John Palaeologus. Before very long the friendship between Filelfo and his tutor was cemented by the marriage of the former to Theodora, the daughter of John Chrysoloras. He had now acquired a thorough knowledge of the Greek language, and had formed a large collection of Greek manuscripts. There was no reason why he should not return to his native country. Accordingly, in 1427 he accepted an invitation from the republic of Venice, and set sail for Italy, intending to resume his professorial career. From this

time forward until the date of his death, Filelfo's history consists of a record of the various towns in which he lectured, the masters whom he served, the books he wrote, the authors he illustrated, the friendships he contracted, and the wars he waged with rival scholars. He was a man of vast physical energy, of inexhaustible mental activity, of quick passions and violent appetites; vain, restless, greedy of gold and pleasure and fame; unable to stay quiet in one place, and perpetually engaged in quarrels with his compeers.

When Filelfo arrived at Venice with his family in 1427, he found that the city had almost been emptied by the plague, and that his scholars would be few. He therefore removed to Bologna; but here also he was met with drawbacks. The city was too much disturbed with political dissensions to attend to him; so Filelfo crossed the Apennines and settled in Florence. At Florence began one of the most brilliant and eventful periods of his life. During the week he lectured to large audiences of young and old on the principal Greek and Latin authors, and on Sundays he explained Dante to the people in the Duomo. In addition to these labours of the chair, he found time to translate portions of Aristotle* Plutarch, Xenophon and Lysias from the Greek. Nor was he dead to the claims of society. At first he seems to have lived with the Florentine scholars on tolerably good terms; but his temper was so arrogant that Cosimo de' Medici's friends were not long able to put up with him. Filelfo hereupon broke out into open and violent animosity; and when Cosimo was exiled by the Albizzi party in 1433, he urged the signoria of Florence to pronounce upon him the sentence of death. On the return of Cosimo to Florence, Filelfo's position in that city was no longer tenable. His life, he asserted, had been already once attempted by a cut-throat in the pay of the Medici; and now he readily accepted an invitation from the state of Siena. In Siena, however, he was not destined to remain more than four years. His fame as a professor had grown great in Italy, and he daily received

tempting offers from princes and republics. The most alluring of these, made him by the duke of Milan, Filippo Maria Visconti, he decided on accepting; and in 1440 he was received with honour by his new master in the capital of Lombardy.

Filelfo's life at Milan curiously illustrates the multifarious importance of the scholars of that age in Italy. It was his duty to celebrate his princely patrons in panegyrics and epics, to abuse their enemies in libels and invectives, to salute them with encomiastic odes on their birthdays, and to compose poems on their favourite themes. For their courtiers he wrote epithalamial and funeral orations; ambassadors and visitors from foreign states he greeted with the rhetorical lucubrations then so much in vogue. The students of the university he taught in daily lectures, passing in review the weightiest and lightest authors of antiquity, and pouring forth a flood of miscellaneous erudition. No satisfied with these outlets for his mental energy, Filelfo went on translating from the Greek, and prosecuted a paper warfare with his enemies in Florence. He wrote, moreover, political pamphlets on the great events of Italian history; and when Constantinople was taken by the Turks, he procured the liberation of his wife's mother by a message addressed in his own name to the sultan. In addition to a fixed stipend of some 700 golden florins yearly, he was continually in receipt of special payments for the orations and poems he produced; so that, had he been a man of frugal habits or of moderate economy, he might have amassed a considerable fortune. As it was, he spent his money as fast as he received it, living in a style of splendour ill befitting a simple scholar, and indulging his taste for pleasure in more than questionable amusements. In con- sequence of this prodigality, he was always poor. His letters and his poems abound in impudent demands for money from patrons, some of them couched in language of the lowest adula- tion, and others savouring of literary brigandage.

During the second year of his Milanese residence Filelfo lost his first wife, Theodora. He soon married again; and this time he chose for his bride a young lady of good Lombard family, called Orsina Osnaga. When she died he took in wedlock for

the third time a woman, of Lombard birth, Laura Magiolini. To all his three wives, in spite of numerous infidelities, he seems to have been warmly attached; and this is perhaps the best trait in a character otherwise more remarkable for arrogance and heat than for any

amiable qualities.

On the death of Filippo Maria Visconti, Filelfo, after a short hesitation, transferred his allegiance to Francesco Sforza, the new duke of Milan; and in order to curry favour with this parvenu, he began his ponderous epic, the Sforziad, of which 1 2,800 lines were written, but which was never published. When Francesco Sforza died, Filelfo turned his thoughts towards Rome. He was now an old man of seventy-seven years, honoured with the friendship of princes, recognized as the most distin- guished of Italian humanists, courted by pontiffs, and decorated with the laurel wreath and the order of knighthood by kings. Crossing the Apennines and passing through Florence, he reached Rome in the second week of 1475. The terrible Sixtus IV. now ruled in the Vatican; and from this pope Filelfo had received an invitation to occupy the chair of rhetoric with good emolu- ments. At first he “was vastly pleased with the city and court of Rome; but his satisfaction ere long turned to discontent, and he gave vent to his ill-humour in a venomous satire on the pope’s treasurer, Milliardo Cicala. Sixtus himself soon fell under the ban of his displeasure; and when a year had passed he left Rome never to return. Filelfo reached Milan to find that his wife had died of the plague in his absence, and was already buried. His own death followed speedily. For some time past he had been desirous of displaying his abilities and adding to his fame in Florence. Years had healed the breach between him and the Medicean family; and on the occasion of the Pazzi conspiracy against the life of Lorenzo de’ Medici, he had sent violent letters of abuse to his papal patron Sixtus, denouncing his participation in a plot so dangerous to the security of Italy. Lorenzo now invited him to profess Greek at Florence, and thither Filelfo journeyed in 148 1. But two weeks after his arrival he succumbed to dysentery, and was buried at the age of eighty-three in the church of the Annunziata.

Filelfo deserves commemoration among the greatest humanists of the Italian Renaissance, not for the beauty of his style, not for the elevation of his genius, not for the accuracy of his learning, but for his energy, and for his complete adaptation to the times in which he lived. His erudition was large but ill-digested; his knowledge of the ancient authors, if extensive, was superficial ; his style was vulgar; he had no brilliancy of imagination, no pungency of epigram, no grandeur of rhetoric. Therefore he has left nothing to posterity which the world would not very willingly let die. But in his own days he did excellent service to learning by his untiring activity, and by the facility with which he used his stores of knowledge. It was an age of accumula- tion and preparation, when the world was still amassing

and cataloguing the fragments rescued from the wrecks of Greece and Rome. Men had to receive the very rudiments of culture before they could appreciate its niceties. And in this work of collection and instruction Filelfo excelled, passing rapidly from place to place, stirring up the zeal for learning by the passion of his own enthusiastic temperament, and acting as a pioneer for men like Poliziano and Erasmus.

All that is worth knowing about Filelfo is contained in Carlo de' Rosmini's admirable Vita di Filelfo (Milan, 1808) ; see also W. Roscoe's Life of Lorenzo de' Medici, Vespasiano's Vile di uomini illustri, and I. A. Symonds's Renaissance in Italy (1877).

"a. a. so

A complete edition of Filelfo's Greek letters (based on the Codex I Trevulzianus) was published for the first time, with French translation, notes and commentaries, by E. Legrand in 1892 at Paris (C. xii. of Publications de I'ecole des lang. orient.). For further references, especially to monographs, &c, on Filelfo's life and work, see Ulysse Chevalier, Repertoire des sources hist., bio-bibliographie (Paris, 1905), s. v. Philelphe, Francois.

FILEY, a seaside resort in the Buckrose parliamentary division' of the East Riding of Yorkshire, England, g| m. S.E. of Scarborough by a branch of the North Eastern railway. Pop. of urban district (1001) 3003. It stands upon the slope and summit of the cliffs above Filey Bay, which is fringed by a fine

sandy beach. The northern horn of the bay is formed by Filey Brigg, a narrow and abrupt promontory, continued seaward by dangerous reefs. The coast-line sweeps hence south-eastward to the finer promontory of Flamborough Head, beyond which is the watering-place of Bridlington. The church of St Oswald at Filey is a fine cruciform building with central tower, Transitional Norman and Early English in date. There are pleasant promenades and good golf links, also a small spa which has fallen into disuse. Filey is in favour with visitors who desire a quiet resort without the accompaniment of entertainment common to the larger watering-places. Roman remains have been dis- covered on the cliff north of the town; the site was probably important, but nothing is certainly known about it.

FILIBUSTER, a name originally given to the buccaneers (q.v.). The term is derived most probably from the Dutch vry buiter, Ger. Freibeuter, Eng. freebooter, the word changing first into fribustier,

and then into Fr. flibustier, Span. filibus[ero. Fli- bustier has passed into the French language, and filibustero into the Spanish language, as a general name for a pirate. The term ” filibuster ” was revived in America to designate those adventurers who, after the termination of the war between Mexico and the United States, organized expeditions within the United States to take part in West Indian and Central American revolutions. From this has sprung the modern use of the word to imply one who engages in private, unauthorized and irregular warfare against any state. In the United States it is colloquially applied to legislators who practise obstruction.

FILICAJA, VINCENZO DA (1642-1707), Italian poet, sprung from an ancient and noble family of Florence, was born in that city on the 30th of December 1642. From an incidental notice in one of his letters, stating the amount of house rent paid during his childhood, his parents must have been in easy circumstances, and the supposition is confirmed by the fact that he enjoyed all the advantages of a liberal education, first under the Jesuits of Florence, and then in the university of Pisa.

At Pisa his mind became stored, not only with the results of patient study in various branches of letters, but with the great historical associations linked with the former glory of the Pisan republic, and with one remarkable institution of which Pisa was the seat. To the tourist who now visits Pisa the banners and emblems of the order of St Stephen are mere matter of curiosity, but they had a serious significance two hundred years ago to the young Tuscan, who knew that these naval crusaders formed the main defence of his country and commerce against the Turkish, Algerine and Tunisian corsairs. After a five years’ residence in Pisa he returned to Florence, where he married Anna, daughter of the senator and marquis Scipione Capponi, and withdrew to a small villa at Figline, not far from the city. Abjuring the thought of writing amatory poetry in consequence of the premature death of a young lady to whom he had been attached, he occupied himself chiefly with literary pursuits, above all the composition of Italian and Latin poetry. His own literary eminence, the opportunities enjoyed by him as a member of the celebrated Academy Delia Crusca for making known his critical taste and classical knowledge, and the social relations within the reach of a noble Florentine so closely allied with the great house of Capponi, sufficiently explain the intimate terms on which he stood with such eminent men of letters as Magalotti, Menzini, Gori and Redi. The last-named, the author of Bacchus in Tuscany, was not only one of the most brilliant poets of his time, and a safe literary adviser; he was the court physician, and his court influence was employed with zeal and effect in his friend’s

favour. Filicaja's rural seclusion was owing even more to his straitened means than to his rural tastes. If he ceased at length to pine in obscurity, the change was owing not merely to the fact that his poetical genius, fired by the deliverance of Vienna from the Turks in 1683, poured forth the right strains at the right time, but also to the influence of Redi, who not only laid Filicaja's verses before his own sovereign, but had them transmitted with the least possible delay to the foreign princes whose noble deeds they sung. The first recompense carne, however, not from those princes, but from Christina, the ex-queen of Sweden, who, from her circle of savants and

courtiers at Rome, spontaneously and generously announced to Filicaja her wish to bear the expense of educating his two sons, enhancing her kindness by the delicate request that it should remain a secret.

The tide of Filicaja's fortunes now turned. The grand-duke of Tuscany, Cosmo III., conferred on him an important office, the commissionership of official balloting. He was named governor of Volterra in 1696, where he strenuously exerted himself to raise the tone of public morality. Both there and at Pisa, where he was subsequently governor in 1700, his popularity was so great that on his removal the inhabitants of both cities petitioned for his recall. He passed the close of his life at Florence; the grand- duke raised him to the rank of senator, and he died in that city on the 24th of September 1707. He was buried in the family vault in the church of St Peter, and a monument was erected to his memory by his sole surviving son Scipione Filicaja. In the six celebrated odes inspired by the great victory of Sobieski, Filicaja took a lyrical flight which has placed him at moments on a level with the greatest Italian poets. They are, however, unequal, like all his poetry, reflecting in some passages the native vigour of his genius and purest inspirations of his tastes, whilst in others they are deformed by the affectations of the Seicenlisti. When thoroughly natural and spontaneous — as in the two sonnets " Italia, Italia, o tu cui feo la sorte " and " Dov' e, Italia, il tuo braccio ? e a che ti serve;" in the verses " Alia beata Vergine," "Al divino amore;" in the sonnet "Sulla fede nelle disgrazie " — the truth and beauty of thought and language recall the verse of Petrarch.

Besides the poems published in the complete Venice edition of 1762, several other pieces appeared for the first time in the small Florence

edition brought out by Barbera in 1864.

FILIGREE (formerly written filigrain or filigrane; the Ital. filigrana, Fr. filigrane, Span, filigrana, Ger. Drahtgeflecht) , jewel work of a delicate kind made with twisted threads usually of gold and silver. The word, which is usually derived from the Lat. filum, thread, and granum, grain, is not found in Ducange, and is indeed of modern origin. According to Prof. Skeat it is derived from the Span, filigrana, from “filar, to spin, and grano, the grain or principal fibre of the material.” Though filigree has become a special branch of jewel work in modern times it was anciently part of the ordinary work of the jeweller. Signor A. Castellani states, in his Memoir bn the Jewellery of the Ancients (1861), that all the jewelry of the Etruscans and Greeks (other than that intended for the grave, and therefore of an unsub- stantial character) was made by soldering together and so building up the gold rather than by chiselling or engraving the material.

The art may be said to consist in curling, twisting and plaiting fine pliable threads of metal, and uniting them at their points of contact with each other, and with the ground, by means of gold or silver solder and borax, by the help of the blowpipe. Small grains or beads of the same metals are often set in the eyes of volutes, on the junctions, or at intervals at which they will set off the wire-work effectively. The more delicate work is generally protected by framework of stouter wire. Brooches, crosses, earrings and other personal ornaments of modern filigree are generally surrounded and subdivided by bands of square or flat metal, giving consistency to the filling up, which would not other- wise keep its proper shape. Some writers of repute have laid equal stress on the filum and the granum, and have extended the use of the term filigree to include the granulated work of the ancients, even where the twisted wire-work is entirely wanting. Such a wide application of the term is not approved by current usage, according to which the presence of the twisted threads is the predominant fact. ‘

The Egyptian jewellers employed wire, both tP lay down on a background and to plait or otherwise arrange a jour. But, with the exception of chains, it cannot be said that filigree work was much practised by them. Their strength lay rather in their cloisonne work and their moulded ornaments. Many examples, however, remain of round plaited gold chains of fine wire, such as are still made by the filigree workers of India, and known as Trichinopoly chains From some of these are hung smaller

chains of finer wire with minute fishes and other pendants fastened to

them. In ornaments derived from Phoenician sites, such as Cyprus and Sardinia, patterns of gold wire are laid down with great delicacy on a gold ground, but the art was advanced to its highest perfection in the Greek and Etruscan filigree of the 6th to the 3rd centuries b.c. A number of earrings and other personal ornaments found in central Italy are pre- served in the Louvre and in the British Museum. Almost all of them are made of filigree work. Some earrings are in the form of flowers of geometric design, bordered by one or more rims each made up of minute volutes of gold wire, and this kind of ornament is varied by slight differences in the way of disposing the number or arrangement of the volutes. But the feathers and petals of modern Italian filigree are not seen in these ancient designs. Instances occur, but only rarely, in which filigree devices in wire are self-supporting and not applied to metal plates. The museum of the Hermitage at St Petersburg contains an amazingly rich collection of jewelry from the tombs of the Crimea. Many bracelets and necklaces in that collection are made of twisted wire, some in as many as seven rows of plaiting, with clasps in the shape of heads of animals of beaten work. Others are strings of large beads of gold, decorated with volutes, knots and other patterns of wire soldered over the surfaces. (See the Antiquites du Bosphore Cimmerien, by Gille, 1854; reissued by S. Reinach, 1892, in which will be found careful engravings of these objects.) In the British Museum a sceptre, probably that of a Greek priestess, is covered with plaited and netted gold wiie, finished with a sort of Corinthian capital and a boss of green glass.

It is probable that in India and various parts of central Asia filigree has been worked from the most remote period without any change in the designs. Whether the Asiatic jewellers were influenced by the Greeks settled on that continent, or merely trained under traditions held in common with them, it is certain that the Indian filigree workers retain the same patterns as those of the ancient Greeks, and work them in the same way, down to the present day. Wandering workmen are given so much gold, coined or rough, which is weighed, heated in a pan' of charcoal, beaten into wire, and then worked in the courtyard or verandah of the employer's house according to the designs of the artist, who weighs the complete work on restoring it and is paid at a specified rate for his labour. Very fine grains or beads and spines of gold, scarcely thicker than coarse hair, projecting from plates of gold are methods of ornamentation still used.

Passing to later times we may notice in many collections of medieval jewel work (such as that in the South Kensington Museum) reliquaries, covers for the gospels, &c, made either in Constantinople from the 6th to the 12th centuries, or in monasteries in Europe, in which Byzantine

goldsmiths' work was studied and imitated. These objects, besides being enriched with precious stones, polished, but not cut into facets, and with enamel, are often decorated with filigree. Large surfaces of gold are sometimes covered with scrolls of filigree soldered on; and corner pieces of the borders of book covers, or the panels of reliquaries, are not unfrequently made up of complicated pieces of plaited work alternating with spaces encrusted with enamel. Byzantine filigree work occasionally has small stones set amongst the curves or knots. Examples of such decoration can be seen in the South Kensington and British Museums.

In the north of Europe the Saxons, Britons and Celts were from an early period skilful in several kinds of goldsmiths' work. Admirable examples of filigree patterns laid down in wire on gold, from Anglo-Saxon tombs, may be seen in the British Museum — notably a brooch from Dover, and a sword-hilt from Cumberland.

The Irish filigree work is more thoughtful in design and more varied in pattern than that of any period or country that could be named. Its highest perfection must be placed in the 10th and nth centuries. The Royal Irish Academy in Dublin contains a number of reliquaries and personal jewels, of which filigree is the general and most remarkable ornament. The " Tara " brooch has been copied and imitated, and the shape and

decoration of it are well known. Instead of fine curls or volutes of gold thread, the Irish filigree is varied by numerous designs in which one thread 'can be traced through curious knots and complications, which, disposed over large surfaces, balance one another, but always with special varieties and arrangements difficult to trace with the eye. The long thread appears and disappears without breach of continuity, the two ends generally worked into the head and the tail of a serpent or a monster. The reliquary containing the " Bell of St Patrick " is covered with knotted work in many varieties. A two-handled chalice, called the " Ardagh cup," found near Limerick in 1868, is ornamented with work of this kind of extraordinary fineness. Twelve plaques on a band round the body of the vase, plaques on each handle and round the foot of the vase have a series of different designs of characteristic patterns, in fine filigree wire work wrought on the front of the repousse ground. (See a paper by the 3rd earl of Dunraven in Transactions of Royal Irish Academy, xxiv. pt. hi. 1873.)

Much of the medieval jewel work all over Europe down to the 15th

century, on reliquaries, crosses, croziers and other ecclesiastical goldsmiths' work, is set off with bosses and borders of filigree. Filigree work in silver was practised by the Moors of Spain during the middle ages with great skill, and was intro- duced by them and established all over the Peninsula, whence it was carried to the Spanish colonies in America. The Spanish filigree work of the 17 th and 18th centuries is of extraordinary complexity (examples in the Victoria and Albert Museum), and silver filigree jewelry of delicate and artistic design is still made in considerable quantities throughout the country. The manu- facture spread over the Balearic Islands, and among the popula- tions that border the Mediterranean. It is still made all over Italy, and in Malta, Albania, the Ionian Islands and many other parts of Greece. That of the Greeks is sometimes on a large scale, with several thicknesses of wires alternating with larger and smaller bosses and beads, sometimes set with turquoises, &c, and mounted on convex plates, making rich ornamental headpieces, belts and breast ornaments. Filigree silver buttons of wire-work and small bosses are worn by the peasants in most of the countries that produce this kind of jewelry. Silver filigree brooches and buttons are also made in Denmark, Norway and Sweden. Little chains and pendants are added to much of this northern work.

Some very curious filigree work was brought from Abyssinia after the capture of Magdala — arm-guards, slippers, cups, &c, some of which are now in the South Kensington Museum. They are made of thin plates of silver, over which the wire-work is soldered. The filigree is subdivided by narrow borders of simple pattern, and the intervening spaces are made up of many patterns, some with grains set at intervals.

A few words must be added as to the granulated work which, as stated above, some writers have classed under the term of filigree, although the twisted wires may be altogether wanting. Such decoration consists of minute globules of gold, soldered to form patterns on a metal surface. Its use is rare in Egypt, (See J. de Morgan, Fouilles a Dahchour, 1894-1895, pi. xii.) It occurs in Cyprus at an early period, as for instance on a gold pendant in the British Museum from Enkomi in Cyprus (10th century B.C.). The pendant is in the form of a pomegranate, and has upon it a pattern of triangles, formed by more than 3000 minute globules separately soldered on. It also occurs on ornaments of the 7th century B.C. from Camirus in Rhodes. But these globules are large, compared with those which are found on Etruscan jewelry. Signor Castellani, who had made the antique jewelry of the Etruscans and Greeks his special study, with the intention of reproducing the ancient models, found it for a long time impossible to

revive this particular process of delicate soldering. He overcame the difficulty at last, by the discovery of a traditional school of craftsmen at St Angelo in Vado, by whose help his well-known reproductions were executed.

For examples of antique work the student should examine the gold ornament rooms of the British Museum, the Louvre and the

collection in the Victoria and Albert Museum. The last contains a large and very varied assortment of modern Italian, Spanish, Greek and other jewelry made for the peasants of various countries. It also possesses interesting examples of the modern work in granulated gold by Castellani and Giuliano. The Celtic work is well represented in the Royal Irish Academy in Dublin.

FILLAN, SAINT, or Faelan, the name of the two Scottish saints, of Irish origin, whose lives are of a purely legendary character. The St Fillan whose feast is kept on the 20th of June had churches dedicated to his honour at Ballyheyland, Queen's county, Ireland, and at Loch Earn, Perthshire. The other, who is commemorated on the 9th of January, was specially venerated at Cluain Mavscua, Co. Westmeath, Ireland, and so early as the 8th or 9th century at Strathfillan, Perthshire, Scotland, where there was an ancient monastery dedicated to him, which, like most of the religious houses of early times, was afterwards secularized. The lay-abbot, who was its superior in the reign of William the Lion, held high rank in the Scottish kingdom. This monastery was restored in the reign of Robert Bruce, and became a cell of the abbey of canons regular at Inchaffray. The new foundation received a grant from King Robert, in grati- tude for the aid which he was supposed to have obtained from a relic of the saint on the eve of the great victory of Bannockburn. Another relic was the saint's staff or crozier, which became known as the coygerach or quigrich, and was long in the posses- sion of a family of the name of Jore or Dewar, who were its hereditary guardians. They certainly had it in their custody in the year 1428, and their right was formally recognized by King James III. in 1487. The head of the crozier, which is of silver-gilt with a smaller crozier of bronze inclosed within it, is now deposited in the National Museum of the Society of Anti- quaries of Scotland.

The legend of the second of these saints is given in the Bollandist Acta SS. (1643), 9th of January, i. 594-595; A. P. Forbes, Kalendars of Scottish Saints (Edinburgh, 1872), pp. 341-346; D. O'Hanlon's Lives of Irish Saints (Dublin), n.d. pp. 134-144. See also Historical Notices of

St Fillan' s Crozier, by Dr John Stuart (Aberdeen, 1877).

FILLET (through Fr. filet, from the med. La.t. filettum, diminu- tive oifilum, a thread), a band or ribbon used for tying the hair, the Lat. vitta, which was used as a sacrificial emblem, and also worn by vestal virgins, brides and poets. The word is thus applied to anything in the shape of a band or strip, as, in coining, to the metal ribbon from which the blanks are punched. In architecture, a " fillet " is a narrow flat band, sometimes called a " listel," which is used to separate mouldings one from the other, or to terminate a suite of mouldings as at the top of a cornice. In the fluted column of the Ionic and Corinthian Orders the fillet is employed between the flutes. It is a very important feature in Gothic work, being frequently worked on large mouldings; when placed on the front and sides of the moulding of a rib it has been termed the " keel and wings " of the rib.

In cooking, " fillet " is used of the " undercut " of a sirloin of beef, or of a thick slice of fish or meat; more particularly of a boned and rolled piece of veal or other meat, tied by a " fillet " or string.

FILLMORE, MILLARD (1800-1874), thirteenth president of the United States of America, came of a family of English stock, which had early settled in New England. His father, Nathaniel, in 1795, made a clearing within the limits of what is now the town of Summerhill, Cayuga county, New York, and there Millard Fillmore was born, on the 7th of January 1800. Until he was fifteen he could have acquired only the simplest rudiments of education, and those chiefly from his parents. At that age he was apprenticed to a fuller and clothier, to card wool, and to dye and dress the cloth. Two years before the close of his term, with a promissory note for thirty dollars, he bought ihe remainder of his time from his master, and at the age of nineteen began to study law. In 1820 he made his way to Buffalo, then only a village, and supported himself by teaching school and aiding the postmaster while continuing his studies.

In 1823 he was admitted to the bar, and began practice at Aurora, New York, to which place his father had removed. Hard study, temperance and integrity gave him a good reputa- tion and moderate success, and in 1827 he was made an attorney

and, in 1829, counsellor of the supreme court of the state. Returning

to Buffalo in 1830 he formed, in 1832, a partnership with Nathan K. Hall (1810-1874), later a member of Congress and postmaster-general in his cabinet. Solomon G. Haven (1810- 1861), member of Congress from 1851 to 1857, joined them in 1836. The firm met with great success. From 1829 to 1832 Fillmore served in the state assembly, and, in the single term of 1833-1835, in the national House of Representatives, coming in as anti-Jackson, or in opposition to the administration. From 1837 to 1843, when he declined further service, he again repre- sented his district in the House, this time as a member of the Whig party. In Congress he opposed the annexation of Texas as slave territory, was an advocate of internal improvements and a protective tariff, supported J. Q. Adams in maintaining the right of offering anti-slavery petitions, advocated'the prohibition by Congress of the slave trade between the states, and favoured the exclusion of slavery from the District of Columbia. His speech and tone, however, were moderate on these exciting subjects, and he claimed the right to stand free of pledges, and to adjust his opinions and his course by the development of circumstances. The Whigs having the ascendancy in the Twenty- Seventh Congress, he was made chairman of the House Com- mittee of Ways and Means. Against a strong opposition he carried an appropriation of $30,000 to Morse's telegraph, and reported from his committee the Tariff Bill of 1842. In 1844 he was the Whig candidate for the governorship of New York, but was defeated. In November 1847 he was elected comptroller of the state of New York, and in 1848 he was elected vice-president of the United States on the ticket with Zachary Taylor as president. Fillmore presided over the senate during the exciting debates on the " Compromise Measures of i8 S o."_

President Taylor died on the 9th of July 1850, and on the next day Fillmore took the oath of office as his successor. The cabinet which he called around him contained Daniel Webster, Thomas Corwin and John J. Crittenden. On the death of Webster in 1852, Edward Everett became secretary of state. Unlike Taylor, Fillmore favoured the " Compromise Measures," and his signing one of them, the Fugitive Slave Law, in spite of the vigorous protests of anti-slavery men, lost him much of his popularity in the North. Few of his opponents, however, questioned his own full persuasion that the Compromise Measures were vitally necessary to pacify the nation. In 1851 he interposed promptly but ineffectively in thwarting the projects of the " filibusters," under Narciso Lopez for the invasion of Cuba. Commodore Matthew Calbraith Perry's expedition, which opened up diplo- matic relations with Japan, and the exploration of the valley of the Amazon by Lieutenants William L. Herndon (1813-1857) and Lardner Gibbon

also occurred during his term. In the autumn of 1852 he was an unsuccessful candidate for nomination for the presidency by the Whig National Convention, and he went out of office on the 4th of March 1853. In February 1856, while he was travelling abroad, he was nominated for the presidency by the American or Know Nothing party, and later this nomina- tion was also accepted by the Whigs; but in the ensuing pre- sidential election, the last in which the Know Nothings and the Whigs as such took any part, he received the electoral votes of only one state, Maryland. Thereafter he took no public share in political affairs. Fillmore was twice married: in 1826 to Abigail Powers (who died in 1853, leaving him with a son and daughter), and in 1858 to Mrs. Caroline C. Mcintosh. He died at Buffalo on the 8th of March 1874.

In 1907 the Buffalo Historical Society, of which Fillmore was one of the founders and the first president, published the Millard Fillmore Papers (2 vols., vol. x. and xi. of the Society's publications; edited by F. H. Severance), containing miscellaneous writings and speeches, and official and private correspondence. Most of his correspondence, however, was destroyed in pursuance of a direction in his son's will.

FILMER, SIR ROBERT (d. 1653), English political writer, was the son of Sir Edward Filmer of East Sutton in Kent. He studied at Trinity College, Cambridge, where he matriculated in 1604. Knighted by Charles I. at the beginning of his reign, he

was an ardent supporter of the king's cause, and his house is said to have been plundered by the parliamentarians ten times. He died on the 26th of May 1653.

Filmer was already a middle-aged man when the great contro- versy between the king and the Commons roused him into literary activity. His writings afford an exceedingly curious example of the doctrines held by the most extreme section of the Divine Right party. Filmer's theory is founded upon the statement that the government of a family by the father is the true original and model of all government. In the beginning of the world God gave authority to Adam, who had complete control over his descend- ants, even as to life and death. From Adam this authority was inherited by Noah; and Filmer quotes as not unlikely the tradition that Noah sailed up the Mediterranean and allotted the three continents of the Old World to the rule of his three sons. From Shem, Ham and Japheth the patriarchs inherited the absolute power which they exercised over their families and servants; and from the patriarchs all kings and governors (whether a single monarch or a governing assembly) derive their authority, which is

therefore absolute, and founded upon divine right. The difficulty that a man ” by the secret will of God may unjustly ” attain to power which he has not inherited appeared to Filmer in no way to alter the nature of the power so obtained, for ” there is, and always shall be continued to the end of the world, a natural right of a supreme father over every multitude.” The king is perfectly free from all human control. He cannot be bound by the acts of his predecessors, for which he is not re sponsible; nor by his own, for ” impossible it is in nature that a man should give a law unto himself “—a law must be imposed by another than the person bound by it. With regard to the English constitution, he asserted, in his Freeholder’s Grand Inquest touching our Sovereign Lord the King and his Parliament (1648), that the Lords only give counsel to the king, the Commons only ” perform and consent to the ordinances of parliament,” and the king alone is the maker of laws, which proceed purely from his will. It is monstrous that the people should judge or depose their king, for they would then be judges in their own cause.

The most complete expression of Filmer’s opinions is given in the Patriarcha, which was published in 1680, many years after his death. His position, however, was sufficiently indicated by the works which he published during his lifetime: the Anarchy of a Limited and Mixed Monarchy (1648), an attack upon a treatise on monarchy by Philip Hunton (1604 ?-i682), who maintained that the king’s prerogative is not superior to the authority of the houses of parliament; the pamphlet entitled The Power of Kings, and in particular of the King of England (1648), first published in 1680; and his Observations upon Mr Hobbes’s Leviathan, Mr Milton against Salmasius, and H. Grotius De jure belli et pads, concerning the Original! of Government (1652). Filmer’s theory, owing to the circumstances of the time, obtained a recognition which it is now difficult to understand. Nine years after the publication of the Patriarcha, at the time of the Revolution which banished the Stuarts from the throne, Locke singled out Filmer as the most remarkable of the advocates of Divine Right, and thought it worth while to attack him expressly in the first part of the Treatise on Government, going into all his arguments seriatim, and especially pointing out that even if the first steps of his argument be granted, the rights of the eldest born have been so often set aside that modern kings can claim no such inheritance of authority as he asserted.

FILMY FERNS, a general name for a group of ferns with delicate much-divided leaves and often moss-like growth, belonging to the genera Hymenophyllum, Todea and Trichomanes. They require to be kept in close cases in a cool fernery, and the stones and moss amongst which they are grown must be kept continually moist so that the

evaporated water condenses on the very numerous divisions of the leaves.

FILON, PIERRE MARIE AUGUSTIN (1841-), French man of letters, son of the historian Charles Auguste Desire Filon (1800-1875), was born in Paris in 1841. His father became professor of history at Douai, and eventually ” inspecteur d’academie “in Paris; his principal works were Histoire comparte

de France et de I’Angleterre (1832), Histoire de V Europe au XVI’ siede (1838), La Diplomatic franqaise sous Louis XV (1843), Histoire de I’ltalie miridionale (1849), Histoire du sinat romain (1850), Histoire de la democratic athinienne (1854). Educated at the Fxole normale, Augustin Filon was appointed tutor to the prince imperial and accompanied him to England, where he remained for some years. He is the author of Guy Palin, sa vie, sa correspondence (1862); Nos grands-peres (1887); Prosper Mirimie (1894); Sous la tyrannie (1900). On English subjects he has written chiefly under the pseudonym of Pierre Sandrie, Les Manages de Londres (1875) ; Histoire de la littSrature anglaise (1883); Le Theatre anglais (1896), and La Caricature en Angleterre (1902).

FILOSA (A. Lang), one of the two divisions of Rhizopoda, characterized by protoplasm granular at the surface, and fine pseudopodia branching and usually acutely pointed at the tips. FILTER (a word common in various forms to most European languages, adapted from the medieval Lat. filtrum, felt, a material used as a filtering agent), an arrangement for separating solid matter from liquids. In some cases the operation of filtration is performed for the sake of removing impurities from the filtrate or liquid filtered, as in the purification of water for drinking purposes; in others the aim is to recover and collect the solid matter, as when the chemist filters off a precipitate from the liquid in which it is suspended.

In regard to the purification of water, filtration was long looked upon as merely a mechanical process of straining out the solid particles, whereby a turbid water could be rendered clear. In the course of time it was noticed that certain materials, such as charcoal, had the power to some extent also of softening hard water and of removing organic matter, and at the beginning of the 19th century charcoal, both animal and vegetable, came into use for filtering purposes. Porous

carbon blocks, made by strongly heating a mixture of powdered charcoal with oil, resin, &c, were introduced about a generation later, and subsequently various preparations of iron (spongy iron, magnetic oxide) found favour. Innumerable forms of filters made with these and other materials were put on the market, and were extolled as removing impurities of every kind from water, and as affording complete protection against the communication of disease. But whatever merits they had as clarifiers of turbid water, the advent of bacteriology, and the recognition of the fact that the bacteria of certain diseases may be water-borne, introduced a new criterion of effectiveness, and it was perceived that the removal of solid particles, or even of organic impurities (which were realized to be important not so much because they are dangerous to health per se as because their presence affords grounds for suspecting that the water in which they occur has been exposed to circum- stances permitting contamination with infective disease), was not sufficient ; the filter must also prevent the passage of pathogenic organisms, and so render the water sterile bacteriologically. Examined from this point of view the majority of domestic filters were found to be gravely defective, and even to be worse than useless, since unless they were frequently and thoroughly cleansed , they were liable to become favourable breeding-places for microbes. The first filter which was more or less completely impermeable to bacteria was the Pasteur-Chamberland, which was devised in Pasteur's laboratory, and is made of dense biscuit porcelain. The filtering medium in this, as in other filters of the same kind, takes the form of a hollow cylinder or "candle," through the walls of which the water has to pass from the outside to the inside, the candles often being arranged so that they may be directly attached to a tap, whereby the rate of flow, which is apt to be slow, is accelerated by the pressure of the main. But even filters of this type, if they are to be fully relied upon, must be frequently cleaned and sterilized, and great care must be taken that the joints and connexions are watertight, and that the candles are without cracks or flaws. In cases where the water supply is known to be infected, or even where it is merely doubtful, it is wise to have recourse to sterilization by boiling, rather than trust to any filter. Various machines have been constructed to perform this operation, some of them specially

designed for the use of troops in the field; those in which economy of fuel is studied have an exchange-heater, by means of which the incoming cold water receives heat from the outgoing hot water, which thus arrives at the point of outflow at a temperature nearly as low as that of the supply. Chemical methods of sterilization have also been suggested, depending on the use of iodine, chlorine, bromine, ozone,

potassium per- manganate, copper sulphate or chloride and other substances. For the sand-filtration of water on a large scale, in which the presence of a surface film containing zooglaea of bacteria is an essential feature, see Water Supply.

Filtration in the chemical laboratory is commonly effected by the aid of a special kind of unsized paper, which in the more expensive varieties is practically pure cellulose, impurities like feric oxide, alumina, lime, magnesia and silica having been re- moved by treatment with hydrochloric and hydrofluoric acids. A circular piece of this paper is folded twice upon itself so as to form a quadrant, one of the folds is pulled Out, and the cone thus obtained is supported in a glass or porcelain funnel having an apical angle of 6o°. The liquid to be filtered is poured into the cone, preferably down a glass rod upon the sides of the funnel to prevent splashing and to preserve the apex of the filter-paper, and passes through the paper, upon which the solid matter is retained. In the case of liquids containing strong acids or alkalis, which the paper cannot withstand, a plug of carefully purified asbestos or glass-wool (spun glass) is often employed, contained in a bulb blown as an enlargement on a narrow ” filter- tube.” To accelerate the rate of filtration various devices are resorted to, such as lengthening the tube below the filtering material, increasing the pressure on the liquid being filtered, or decreasing it in the receiver of the filtrate. R. W. Bunsen may be regarded as the originator of the second method, and it was he who devised the small cone of platinum foil, sometimes replaced by a cone of parchment perforated with pinholes, arranged at the apex of the funnel to serve as a support for the paper, which is apt to burst under the pressure differences. In the so-called ” Buchner funnel,” the filtering vessel is cylindrical, and the paper receives support by being laid upon its flat perforated bottom. In filtering into a vacuum the flask receiving the filtrate should be connected to the exhaust through a second flask. The suction may be derived from any form of air-pump; a form often employed where water at fair pressure is available is the jet-pump, which in consequence is known as a filter-pump. Another method of filtering into a vacuum is to immerse a porous jar (” Pukall cell “) in the liquid to be filtered, and attach a suction-pipe to its interior. A filtering arrangement devised by F. C. Gooch, which has come into common use in quantitative analysis where the solid matter has to be submitted to heating or ignition, consists of a crucible having a perforated bottom. By means of a piece of stretched rubber tubing, this crucible is supported in the mouth of an ordinary funnel which is con- nected with an exhausting apparatus; and water holding in suspension fine scrapings of asbestos, purified by boiling with strong hydrochloric

acid and washing with water, is run through it, so that the perforated bottom is covered with a layer of felted asbestos. The crucible is then removed from the rubber support, weighed and replaced; the liquid is filtered through in the ordinary way; and the crucible with its contents is again removed, dried, ignited and weighed. A perforated cone, similarly coated with asbestos and fitted into a conical funnel, is sometimes employed.

In many processes of chemical technology filtration plays an important part. A crude method consists of straining the liquid through cotton or other cloth, either stretched on wooden frames or formed into long narrow bags (" bag-filters "). Occasionally filtration into a vacuum is practised, but more often, as in filter- presses, the liquid is forced under pressure, either hydrostatic or obtained from a force-pump or compressed air, into a series of chambers partitioned off by cloth, which arrests the solids, but permits the passage of the liquid portions. For separating liquids from solids of a fibrous or crystalline character " hydro- extractors " or " centrifugals " are frequently employed. The

material is placed in a perforated cage or " basket," which is enclosed in an outer casing,, and when the cage is rapidly rotated by suitable gearing, the liquid portions are forced out into the external casing.

FIMBRIA, GAIUS FLAVIUS (d. 84 B.C.), Roman soldier and a violent partisan of Marius. He was sent to Asia in 86 B.C. as legate to L. Valerius Flaccus, but quarrelled with him and was dismissed. Taking advantage of the absence of Flaccus at Chalcedon and the discontent aroused by his avarice and severity, Fimbria stirred up a revolt and slew Flaccus at Nicomedia. He then assumed the command of the army and obtained several successes against Mithradates, whom he shut up in Pitane on the coast of Aeolis, and would undoubtedly have captured him had Lucullus co-operated with the fleet. Fimbria treated most cruelly all the people of Asia who had revolted from Rome or sided with Sulla. Having gained admission to Ilium by declaring that, as a Roman, he was friendly, he massacred the inhabitants and burnt the place to the ground. But in 84 Sulla crossed over from Greece to Asia, made peace with Mithradates, and turned his arms against Fimbria, who, seeing that there was no chance of escape, committed suicide. His troops were made to serve in Asia till the end of the third Mithradatic War.

See Rome: History; and arts, on Sulla and Marius.

FIMBRIATE (from Lat. fimbriae, fringe), a zoological and botanical term, meaning fringed. In heraldry, ” fimbriate ” or ” fimbriated ” refers to a narrow edge or border running round a bearing.

FINALE (Ital. for ” end “), a term in music for the concluding movement in an instrumental composition, whether symphony, concerto or sonata, and, in dramatic music, the concerted piece which ends each act. Of instrumental finales, the great choral finale to Beethoven’s oth symphony, and of operatic finales, that of Mozast’s Nozze di Figaro, to the second act, and to the last act of Verdi’s Falstaff may be mentioned. In the Wagnerian opera the finale has no place.

FINANCE. The term ” finance,” which comes into English through French, in its original meaning denoted a payment (finatio). In the later middle ages, especially in Germany, it acquired the sense of usurious or oppressive dealing with money and capital. The specialized use of the word as equivalent to the management of the public expenditure and receipts first became prominent in France during the 16th century and quickly spread to other countries. The plural form (Les Finances) was particularly reserved for this application, while the singular came to denote business activity in respect to monetary dealings (as in the expression la haute finance). For the Germans the phrase ” science of finance ” (Finanzwissenschaft) refers ex- clusively to the economy of the state. English and American writers are less definite in their employment of the term, which varies with the convenience of the author.

A work on ” finance ” may deal with the Money Market or the Stock Exchange; it may treat of banking and credit organiza- tion, or it may be devoted to state revenue and expenditure, which is on the whole the prevailing sense. The expressions ” science of finance ” and ” public finance ” have been suggested as suitable to delimit the last mentioned application. At all events, the broad sense is quite intelligible. ” Financial ” means what is concerned with business, and the idea of a balance between effort and return is also prominent. In the present article attention will be directed to “public finance”; for the other aspects of the subject reference may be made (inter alia) to the following: — Banks and Banking; Company; Exchange; Market; Stock Exchange. See also English Finance, and the sections on finance under headings of countries.

Finance, regarded as state house-keeping, or ” political economy ” (see

Economics) in the older sense of the term, deals with (1) the expenditure of the state; (2) state revenues; (3) the balance between expenditure and receipts; (4) the organiza- tion which collects and applies the public funds. Each of these large divisions presents a series of problems of which the practical treatment is illustrated in the financial history of the great nations of the world. Thus the amount and character of public ex-

penditure necessarily depends on the functions that the state undertakes to perform — national defence, the maintenance of internal order, and the efficient equipment of the state organiza- tion; such are the tasks that all governments have to discharge, and for their cost due provision has to be made. The widening sphere of state activity, so marked a characteristic of modern civilization, involves outlay for what may be best described as ” developmental ” services. Education, relief of distress, regulation of labour and trade, are duties now in great part performed by public agencies, and their increasing prominence involves augmented expense. The first problem on this side of expenditure is the due balancing of outlay by income. The financier has to ” cover ” his outlay. There is, further, the duty of establishing a proper proportion between the several forms of expenditure. Not only has there to be a strict control over the total national expense; supervision has to be carried into each .department of the state. No one branch of public activity is entitled to make unlimited calls on the state’s revenue. The claims of the ” expert ” require to be carefully scrutinized. The great financiers have made their reputation quite as much by rigorous control over extravagance in expenditure as by dexterity in devising new forms of revenue. Unfortunately they have not been able to reduce their methods to rule. As yet no more definite principle has been discovered than the somewhat obvious one of measuring the proposed items of outlay (1) against each other, (2) against the sacrifice that additional taxation involves. Of almost equal importance is the rule that the utmost return is to be obtained for the given outlay. The canon of economy is as fundamental in regard to public expenditure as it will appear, later, to be in respect to revenue. Just application of the outlay of the state, so that no class receives undue advantage, and the use of public funds for ” reproductive,” in preference to ” un- productive ” objects, are evident general principles whose difficulty lies in their application to the circumstances of each particular case.

Far greater progress has been made in the formulation of general canons as to the nature, growth and treatment of the public revenues. Historically, there is, first, the tendency towards increase in state income to balance the advance in outlay. A second general feature is

the relative decline of the receipts from state property and industries in contrast to the expansion of taxation. Regarded as an organized system, the body of receipts has to be made conformable to certain general conditions. Thus there should be revenue sufficient to meet the public re- quirements. Otherwise the financial organization has failed in one of its essential purposes. In order continuously to attain this end, the revenue must be flexible, or, as is often said, elastic enough to vary in response to pressure. Frequently recurring deficits are, in themselves, a condemnation of the methods under which they are found. Again, the rule of ” economy ” in raising revenue, or, in other words, taking as little as possible from the contributors over and above what the state receives, holds good for the whole and for each part of public revenue. In like manner the principle of formal justice has the same claim in respect to revenue as to expenditure. No class of person should bear more than his or its proper share. In fact the special maxims usually placed under the head of taxation have really a wider scope as governing the whole financial system. The recognition of even the most elementary rules has been a very slow process, as the course of financial history abundantly proves. Until the 1 8th century no scientific treatment of financial problems was attained, though there had been great advances on the admini- strative side. ‘

A brief description of the historical evolution of the earlier financial forms will be the most effective illustration of this statement. The theory of well-organized public finance is also discussed under Taxation and National Debt.

The earliest forms of public revenue are those obtained from the property of the chief or ruler. Land, cattle and slaves are the principal kinds of wealth, and they are all constituents of the king’s revenue; enforced work contributed by members of the community, and the furnishing commodities on requisition,

further aid in the maintenance of the primitive state. Financial organization makes its earliest appearance in the great Eastern monarchies, in which tribute was regularly collected and the oldest and most general form of taxation — that levied on the produce of land — was established. In its normal shape this impost consisted in a given proportion of the yield, or of certain portions of the yield, of the soil; one-fourth as in India, one- fifth as in Egypt, or two separate

levies of a tenth as in Palestine, are examples of what may from the last instance be called the ” tithe ” system. Dues of various kinds were gradually added to the land revenue, until, as in the later Egyptian monarchy, the forms of revenue reached a bewildering complexity. But no Eastern state advanced beyond the condition generally characterized as the ” patrimonial,” i.e. an organization on the model of the household. The part played by money economy was small, and it is noticeable that the revenues were collected by the monarch’s servants, the farming out of taxes being completely unknown. Tribute, however, was paid by subject communities as a whole, and was collected by them for trans- mission to the conquerors.

A much higher stage was reached in the financial methods of the Greek states, or more correctly speaking of Athens, the best-known specimen of the class. Instead of the Oreei”’ comparatively simple expedients of the barbarian monarchies, as indicated above, the Athenian city state by degrees developed a rather complex revenue system. Some of the older forms are retained. The city owned public land which was let on lease and the rents were farmed out by auction. A specially valuable property of Athens was the possession of the silver mines at Laurium, which were worked on lease by slave labour. The produce, at first distributed amongst the citizens, was later a part of the state income, and forms the subject of some of the suggestions respecting the revenue in the treatise formerly ascribed to Xenophon. The reverence that attached to the precious metals caused undue exaltation of the services rendered by this property.

One of the characteristics of the ancient state was its extensive control over the persons and property of its citizens. In respect to finance this authority was strikingly manifested in the burdens imposed on wealthy citizens by the requirements of the ” liturgies ” (\eiTOvpyLat)j which consisted in the provision of a chorus for theatrical performances, or defraying the expenses of the public games, or, finally, the equipment of a ship, ” the trierarchy,” which was economically and politically the most important. Athenian statesmanship in the time of Demosthenes was gravely exercised to make this form of contribution more effective. The grouping into classes and the privilege of exchang- ing property, granted to the contributor against any one whom he believed entitled to take his place, are marks of the defective economic and financial organization of the age.

Amongst taxes strictly so called were the market dues or tolls, which in some cases approximated to excise duties, though in their actual mode of levy they were closely similar to the octrois of modern times.

Of greater importance were the customs duties on imports and exports. These at the great period of Athenian history were only 2%. The prohibition of export of corn was an economic rather than a financial provision. In the treatment of her subject allies Athens was more rigorous, general import and export duties of 5 % being imposed on their trade. The high cost of carriage, and the need of encouraging commerce in a community relying on external sources for its food supply, help to explain the comparatively low rates adopted. Neither as financial nor as protective expedients were the custom duties of classical societies of much importance.

Direct taxation received much greater expansion. A special levy on the class of resident aliens (peroiiaov), probably paralleled by a duty on slaves, was in force. A far more important source of revenue was the general tax on property {dafyopk), which according to one view existed as early as the time of Solon, who made it a part of his constitutional system. Modern inquiry, however, tends towards the conclusion that it was under the stress of the Peloponnesian War that this impost was intro-

duced (428 B.C.). At first it was only levied at irregular intervals; afterwards, in 378 B.C., it became a permanent tax based on elaborate valuation under which the richer members paid on a larger quota of their capital; in the case of the wealthiest class the taxable quota was taken as one-fifth, smaller fractions being adopted for those belonging to the other divisions. The assess- ment (Tifirnxa) included all the property of the contributor, whose accuracy in making full returns was safeguarded by the right given to other citizens to proceed against him for fraudulent under-valuation. A further support was provided in the reform of 378 B.C. by the establishment of the symmories, or groups of tax-paying citizens; the wealthier members of each group being responsible for the tax payments of all the members.

The scanty and obscure references to finance, and to economic matters generally, in classical literature do not elucidate all the details of the system; but the analogies of other countries, e.g. the mode of levying the faille in 18th century France and the ” tenth and fifteenth ” in medieval England, make it tolerably plain that in the 4th century B.C. the Athenian state had developed a mode of taxation on property which raised those questions of just distribution and effective valuation that present themselves in the latest tax systems of the modern world. Taken together with the liturgies, the ” eisphora ” placed a very heavy burden on the wealthier citizens, and this financial pressure accounts in great part for the hostility of the rich towards the democratic constitution that facilitated the imposition of

graduated taxation and super-taxes — to use modern terms — on the larger incomes. The normal yield of the property tax is reported as 60 talents (£14,400); but on special occasions it reached 200 talents (£48,000), or about one-sixth of the total receipts.

On the administrative side also remarkable advances were made by the entrusting of military expenditure to the ” generals,’ 1 and in the 4th century B.C. by the appointment of an admini- strator whose duty it was to distribute the revenue of the state under the directions of the assembly. The absence of settled public law and the influence of direct democracy made a complete ministry of finance impossible.

The Athenian ” hegemony ” in its earlier and later phases had an important financial side. The confederacy of Delos made provision for the collection of a revenue (6pos) from the members of the league, which was employed at first for defence against Persian aggression, but afterwards was at the disposal of Athens as the ruling state. The annual collection of 460 talents (£11 0,400) shows sufficiently the magnitude of the league.

Too little is known of the financial methods of the other Greek states and of the Macedonian kingdoms to allow of any definite account of their position. In the latter, particularly in Egypt, the methods of the earlier rulers probably survived. Their finance, like their social life generally, exhibited a blending of Hellenic and barbarian ‘elements. The older land-taxes were probably accompanied by import dues and taxes on property.

In the infancy of the Roman republic its revenues were of the kind usual in such communities. The public land yielded receipts which may indifferently be regarded as rents „ or taxes; the citizens contributed their services or commodities, and dues were raised on certain articles coming to market. With the progress of the Roman dominion the financial organization grew in extent. In order to meet the cost of the early wars a special contribution from property (tributum ex censu) was levied at times of emergency, though it was in some cases regarded as an advance to be repaid when the occasion of expense was over. Owing to the great military successes, and the consequent increase of the other sources of revenue, it became feasible to suspend the tributum in 167 B.C., and it was not again levied till after the death of Julius Caesar. From this date the expenses of the Roman state ” were un- disguisedly supported by the taxation of the provinces.” Neither the state monopolies nor the public land in Italy afforded any appreciable revenue. The other charges that affected Italy were the 5% duty on manumissions, and customs dues on sea-

borne imports. But with the acquisition of the important provinces of Sicily, Spain and Africa, the formation of a tax

system based on the tributes of the dependencies became possible. To a great extent the pre-existing forms of revenue were retained, but were gradually systematized. In legal theory the land of conquered communities passed into the ownership of the Roman state; in practice a revenue was obtained through land taxes in the form of either tithes (decumae) or money payments (stipendia) . To the latter were adjoined capitation and trade taxes (the tributum capitis). For pasture land a special rent was paid. In some provinces {e.g. Sicily) payment in produce was preferred, as affording the supply needed for the free distribution of corn at Rome.

The great form of indirect taxation consisted in the customs dues {portoria), which were collected at the provincial boundaries and varied in amount, though the maximum did not exceed 5 %. Under the same head were included the town dues (or octrois). Further, the local administration was charged on the district concerned, and requisitions for the public service were frequently made on the provincial communities. Supplies of grain, ships and timber for military use were often demanded.

The methods of levy may be regarded as an additional tax. ‘ Vexation,” as Adam Smith remarks, ” though not strictly speaking expense, is certainly equivalent to the expense at which every man would be willing to redeem himself from it “; and the Roman system was extraordinarily vexatious. From an early date the collection of the taxes had been farmed out to companies of contractors (societates vectigales), who became a by-word for rapacity. Being bound to pay a stated sum to the public authorities these publicani naturally aimed at extracting the largest possible amount from the unfortunate provincials, and, as they belonged to the Roman capitalist class, they were able to influence the provincial governors. Undue claims on the part of the tax collectors were aggravated by the extortion of the public officials. The defects of the financial organization were a serious influence in the complex of causes that brought about the fall of the Republic.

One of the reasons that induced the subject populations to accept with pleasure the establishment of the Empire was the improvement in

financial treatment that it secured. The corrupt and uneconomical method of farming out the collection of the revenue was, to a great extent, replaced by collection through the officials of the imperial household. The earlier Roman treasury (aerarium) was formally retained for the receipt of revenue from the senatorial provinces, but the officials were appointed by the Princeps and became gradually mere municipal officers. The real centre of finance was the fiscus or imperial treasury, which was under the exclusive control of the ruler (" res fiscales," says Ulpian, " quasi propriae et privatae principis sunt "), and was administered by officials of his household. Under the Republic the Senate had been the financial authority, with the Censors as finance ministers and the Quaestors as secretaries of the treasury. Never very precise, this system in the 1st century B.C. fell into extreme decay. By means of his freedmen the emperor introduced the more rigorous economy of the Roman household into public finance. The census as a method of valuation was revived; the important and productive land taxes were placed on a more definite footing; while, above all, the substitution of direct collection by state officials for the letting out by auction of the tax-collection to the companies of publicani was made general. Thus some of the most valuable lessons as to the normal evolution of a system of finance are to be learned in this connexion. Of equal, or even greater moment is the failure of the administrative reforms of the Empire to secure lasting improvement, a result due to the absence of constitutional guarantees. The close relation between finance and general policy is most impressively illustrated in this failure of benevolent autocracy.

Viewed broadly, the financial resources of the earlier Empire were obtained from (1) the public land alike of the state and the Princeps; (2) the monopolies, principally of minerals; (3) the land tax; (4) the customs; (5) the taxes on inheritances, on sales and on the purchase of slaves (vectigalia). One result of the establishment of the Principate was the consolidation of

the public domain. The old " public land " in Italy had nearly disappeared; but the royal possessions in the conquered provinces and the private properties of the emperor became ultimately a part of the property of the Fiscus. Such land was let either on five-year leases or in perpetuity to coloni. Mines were also taken over for public use and worked by slaves or, in later times, by convict labour. The tendency towards state monopoly became more marked in the closing days of the Empire, the 4th and 5th centuries a.d. Perhaps the most comprehensive of the fiscal reforms of the Empire was the reconstruction of the land tax, based on a census or (to use the French term) cadastre, in which the area, the modes of cultivation and the

estimated productiveness of each holding were stated, the average of ten preceding years being taken as the standard. After the reconstruction under Diocletian at the end of the 3rd century a.d., fifteen years (the indictio) — though probably used as early as the time of Hadrian — was recognized as the period for revalua- tion. With the growing needs of the state this taxation became more rigorous and was one of the great grievances of the popula- tion, especially of the sections that were declining in status and passing into the condition of villenage. The portoria, or customs, received a better organization, though the varying rates for different provinces continued. By degrees the older maximum of 5% was exceeded, until in the 4th century 125% was in some cases levied. Even at this higher rate the facilities for trade were greater than in medieval or (until the revolution in transport) modern times. In spite of certain prejudices against the import of luxuries and the export of gold, there is little indication of the influence of mercantilist or protectionist ideas. The nearest approach to excise was the duty of 1 % on all sales, a tax that in Gibbon's words " has ever been the occasion of clamour and discontent." The higher charge of 4% on the purchase of slaves, and the still heavier 5 % on successions after death, were likewise established at the beginning of the Empire and specially applied to the full citizens. Escheats and lapsed legacies (caduca) were further miscellaneous sources of gain to the state.

Taken as a whole, the financial system of Imperial Rome shows a very high elaboration in form. The patrimonium, the tributa and the vectigalia are divisions parallel to the domaine, the contributions directes and the contributions indirectes of modern French administration; or the English "non-tax" revenue, inland revenue and " customs and excise." The careful regulations given in the Codes and the Digest show the observance of technical conditions as to assessment and account- ing. In substance and spirit, however, Romar finance was essentially backward. Without altogether accepting Merivale's judgment that " their principles of finance were to the last rude and unphilosophical," it may be granted that Roman states- men never seriously faced the questions of just distribution and maximum productiveness in the tax system. Still less did they perceive the connexion between these two aspects of finance." Mechanical uniformity and minute regulation are inadequate substitutes for observance of the canons of equality, certainty and economy in the operation of the tax system. Whether (as has been suggested) an Adam Smith in power could have saved the Empire is doubtful; but he would certainly have remodelled its finance. The most glaring fault was plainly the undue and increasing pressure on the productive classes.

Each century saw heavier burdens imposed on the actual workers and on their employers, while expenditure was chiefly devoted to unproductive purposes. The distribution was also unfair as between the different territorial divisions. The capital and certain provincial towns were favoured at the expense of the provinces and the country districts. Again, the cost of collection, though less than under the farming-out system, was far too great. Some alleviation was indeed obtained by the apportion- ment of contributions amongst the districts liable, leaving to the community to decide as it thought best between its members. The allotment of the land-tax to units ijuga) of equal value whatever might be the area, was a contrivance similar in character.

35°

FINANCE

The gradual way in which the several provinces were brought under the general tax system, and the equally gradual extension of Roman citizenship, account further for the irregularity and increased weight of the taxes; as the absence of publicity and the growth of autocracy explain the sense of oppression and the hopelessness of resistance so vividly indicated in the literature of the later Empire. Exemptions at first granted to the citizens were removed, while the cost of local government which continually increased was placed on the middle-class of the towns as represented by the decuriones, or members of the municipalities.

The fact that no ingenuity of modern research has been able to construct a real budget of expenditure and receipt for any part of the long centuries of the Empire is significant as to the secrecy that surrounded the finances, especially in the later period. For at the beginning of the principate Augustus seems to have aimed at a complete estimate of the financial situation, though this may be regarded as due to the influence of the freer republican traditions which the reverence that soon attached to the emperor's dignity completely extinguished.

In addition to its value as illustrating the difficulties and defects that beset the development of a complex financial organization from the simpler forms of the city and the province, Roman finance is of special importance in consequence of its place as supplying a model or rather a guide for the administra- tion of the states that arose on its ruins. The barbarian invaders, though they were accustomed to contributions to their chiefs and to the payment of commodities as

tributes or as penalties, had no acquaintance with the working of a regular system of taxation. The more astute rulers utilized the machinery that they inherited from the Roman government. Under the Franks the land tax and the provincial customs continued as forms of revenue, while beside them the gifts and court fees of Teutonic origin took their place. Similar conditions appear in Theodoric's administration of Italy. The maintenance of Roman forms and terms is prominent in fiscal administration. But institutions that have lost their life and animating spirit can hardly be preserved for any length of time. All over western Europe the elaborate devices of the census and the stations for the collection of customs crumbled away; taxation as such disappeared, through the hostility of the clergy and the exemptions accorded to powerful subjects. This process of disintegration spread out over centuries. The efforts made from time to time by vigorous rulers to enforce the charges that remained legally due, proved quite ineffectual to restore the older fiscal system. The final result was a complete transformation of the ingredients of revenue. The character of the change may be best indicated as a substitution of private claims for public rights. Thus, the land-tax disappears in the 7 th century and only comes into notice in the 9th century in the shape of private customary dues. The customs duties become the tolls and transit charges levied by local potentates on the diminishing trade of the earlier middle ages. This revolution is in accordance with — indeed it is one side of — the movement towards feudalism which was the great feature of this period. Finance is essentially a part of public law and administration. It could, therefore, hold no prominent place in a condition of society which hardly recognized the state, as distinct from the members of the community, united by feudal ties. The same conception may be expressed in another way, viz. by the statement that the kingdoms which succeeded the Roman Empire were organized on the patrimonial basis (i.e. the revenues passed into the hands of the king or, rather, his domestic officials), and thus in fact returned to the condition of pre-classical times. Notwithstanding the differing features in the several countries, retrogression is the common characteristic of European history from the 5th to the 10th century, and it was from the ruder state that this decline created that the re- building of social and political organization had to be accom- plished. On the financial side the work, as already suggested, was aided by the ideas and institutions inherited from the Roman Empire. This influence was common to all the continental states and indirectly was felt even in England. Each of the great realms

has, however, worked out its financial system on lines suitable to its

own particular conditions, which are best considered in connexion with the separate national histories.

Running through the different national systems there are some common elements the result not of inheritance merely but still more of necessity, or at the lowest of similarity in environ- ment. Over and above the details of financial development there is a thread of connexion which requires treatment under Finance taken as a whole. As the great aim of this side of public activity is to secure funds for the maintenance of the state's life and working, the administration which operates for this end is the true nucleus of all national finance. The first sign of revival from the catastrophe of the invasions is the reorganization of the Imperial household under Charlemagne with the intention of establishing a more exact collection of revenue. The later German empire of Otto and the Frederics; the French Capetian monarchy and, in a somewhat different sphere, the medieval Italian and German cities show the same movement. The treasury is the centre towards which the special receipts of the ruler or rulers should be brought, and from it the public wants should be supplied. P'eudalism, as the antithesis of this orderly treatment, had to be overthrown before national finance could become established. The development can be traced in the financial history of England, France and the German states; but the advance in the French financial organization of the 15th and 1 6th centuries affords the best illustration. The gradual unification operates on all the branches of finance, — expenditure, revenue, debt and methods of control. In respect to the first head there is a well-marked " integration " of the modes for meeting the cost of the public services. What were semi-private duties become public tasks, which, with the growing importance of " money-economy," have to be defrayed by state payments. Thus, the creation of the standing army in France by Charles VII. marks a financial change of the first order. The English navy, though more gradually developed, is an equally good illustration of the movement. All outlay by the state is brought into due co-ordination, and it becomes possible for constitutional govern- ment to supervise and direct it. This improvement, due to English initiative, has been adopted amongst the essential forms of financial administration on the continent. The immense im- portance of this view of public expenditure as representing the consumption of the state in its unified condition is obvious; it has affected, for the most part unconsciously, the conception of all modern peoples as to the functions of the state and the right of the people to direct them.

On the side of receipts a similar unifying process has been accomplished. The almost universal separation between " ordinary "

and ” extraordinary ” receipts, taxation being put under the latter head, has completely ceased. It was, how- ever, the fundamental division for the early French writers on finance, and it survives for England as late as Blackstone’s Com- mentaries. The idea that the ruler possessed a normal income in certain rents and dues of a quasi-private character, which on emergency he might supplement by calls on the revenues of his subjects, was a bequest of feudalism which gave way before the increasing power of the state. In order to meet the unified public wants, an equally unified public fund was requisite. The great economic changes which depreciated the value of the king’s domain contributed towards the result. Only by well- adjusted taxation was it possible to meet the public necessities. In respect to taxation also there has been a like course of re- adjustment. Separate charges, assigned for distinct purposes, have been taken into the national exchequer and come to form a part of the general revenue. There has been — taking long periods — a steady absorption of special taxes into more general categories. The replacement of the four direct taxes by the income tax in France, as proposed in 1909, is a very recent example. Equally important is the growth of ” direct ” taxa- tion. As tax contributions have taken the places of the revenue from land and fees, so, it would seem, are the taxes on com- modities likely to be replaced or at least exceeded by the imposts levied on income as such, in the shape either of income taxes

proper or of charges on accumulated wealth. The recent history of the several financial systems of the world is decisive on this point. A clearer perception of the conditions under which the effective attainment of revenue is possible is another outcome of financial development. Security, and in particular the absence of arbitrary impositions, combined with convenient modes of collection, have come to be recognized as indispensable auxiliaries in financial administration which further aims at the selection of really productive forms of charge. Unproductiveness is, accord- ing to modern standard, the cardinal fault of any particular tax. How great has been the progress in these aspects is best illustrated in the case of English finance, but both French and German fiscal history can supply many instructive examples.

In a third direction the co-ordination of finance has been just as remarkable. Financial adjustment implies the conception of a balance, and this should be found in the relation of outlay and income. Under

the pressure of war and other emergencies it has been found impossible to maintain this desirable equilibrium. But the use of the system of credit, and the general establishment of constitutional government, have enabled the difficulty to be surmounted by the creation on a vast scale of national debts. Apart from the special problems that this system of borrowing raises, there is the general one of its aid in making national finance continuous and orderly. Deficits can be transferred to the capital account, and the country's resources employed most usefully by repaying liabilities contracted in times of extreme need. The growth of this department, parallel with the general progress of finance, is significant of its function.

Finally, in all countries though with diversities due to national peculiarities, the modes of account and control have been brought into a more effective condition. Previous legislative sanction for both expenditure and receipts in all their particular forms is absolutely necessary; so is thorough scrutiny of the actual application of the funds provided. Either by administrative survey or by judicial examination care is taken to see that there has been no improper diversion from the designed purposes. It is only when the varied systems of financial organization are studied in their general bearing, and with regard to what may be called their frame-work, that their essential resemblance is thoroughly realized. Such a real underlying unity is the reason and justification for regarding " public finance " as a distinct subject of study and as an independent division of political science.

Local Finance. — One of the most remarkable features of modern financial development has been the growth of the com- plementary system of local finance, which in extent and complica- tion bids to rival that of the central authority. Under the constraining power of the Roman Empire the older city states were reduced to the position of municipalities, and their financial administration became dependent on the control of the Emperor — as is abundantly illustrated in the correspondence of Pliny and Trajan. After the fall of the Western Empire, a partial revival of city life, particularly in Italy and Germany, gave some scope for a return to the type of finance presented by the Athenian state. Florence affords an instructive specimen; but the passage from feudalism to the national state under the authority of monarchy made the cities and country districts parts of a larger whole. It is in this condition of subordination that the finance of localities has been framed and effectively organized. Though each great state has adopted its own methods, influenced by historical circumstances and by ideas of policy, there are general resemblances that furnish material for scientific treat- ment and allow of important

generalizations being made.

Amongst these the first to be noticed is the essential subordina- tion of local finance. Alike in expenditure, in forms of receipt, and in methods of administration the central government has the right of directing and supervising the work of municipal and provincial agencies. The modes employed are various, but they all rest on the sovereignty of the state, whether exercised by the central officials or by the courts. A second characteristic is the predominance of the economic element in the several tasks that local administrations have to perform, and the consequent

tendency to treat the charges of local finance as payments for services rendered, or, in the usual phrase, to apply the ” benefits ” principle, in contrast to that of ” ability,” which rightly prevails in national finance. Over a great part of municipal administra- tion—particularly that engaged in supplying the needs of the individual citizens — the finance may be assimilated to that of the joint-stock company, with of course the necessary differences, viz. that the association is compulsory; and that dividends are paid, not in money, but in social advantage. The great expansion in recent years of what is known as Municipal Trading has brought this aspect of local finance into prominence. Water supply, transport and lighting have become public services, requiring careful financial management, and still retaining traces of their earlier private character.

Corresponding to the mainly economic nature of local ex- penditure there is the further limitation imposed on the side of revenue. Unlike the state in this, localities are limited in respect to the amount and form of their taxation. Several distinct influences combine to produce this result. The needs of the central government lead to its retention of the more profitable modes of procuring revenue. No modern country can surrender the chief direct and indirect taxes to the local administrations. Another limiting condition is found in the practical impossibility of levying by local agencies such imposts as the customs and the income-tax in their modern forms. The elaborate machinery that is requisite for covering the national area and securing the revenue against loss can only be provided by an authority that can deal with the whole territory. Hence the very general limitation of local revenues to certain typical forms. Though in some cases municipal taxation is imposed on commodities in the form of octrois or entry duties — as is notably the case in France — yet the prevailing tendency is towards the levy of direct charges on immovable property, which cannot escape by removal outside the tax jurisdiction. In addition to these ” land ” and ” house ” taxes, the employment of

licence duties on trades, particularly those that are in special need of supervision, is a favourite method. Closely akin are the payments demanded for privileges to industrial undertakings given as ” franchises,” very often in connexion with monopolies, e.g. gas-works and tramways. Over and above the peculiar revenues of local bodies there is the further resource — which emphasizes the subordinate position of local finance — of obtaining supplemental revenue from the central treasury, either by taxes additional to the charges of the state, and collected at the same time; or by donations from its funds, in the shape of grants for special services, or assignments of certain parts of the state’s receipts. Great Britain, France and Prussia furnish good examples of these different modes of preserving local administration from financial collapse.

The broad resemblance between the two parts of the entire system of public finance is seen in another direction. To national debts there has been added a great mass of municipal and local indebtedness, which seems likely to equal, or even exceed in magnitude the liabilities of the central governments. But here also the essential limitations of the newer form are easily per- ceptible. The sovereignty of the state enables it to deal as it thinks best with the public creditor. In its methods of borrowing, in its plans for repayment, or, in extremity, in its power of repudiation it is independent of external control. Local debt on the other hand can only be contracted under the sanction of the appropriate administrative organ of the state. The creditor has the right of claiming the aid of the law against the defaulting municipality; and the amounts, the terms, and the time of duration of local debt are supervised in order to prevent injustice to particular persons or improvidence with regard to the revenue and property of the local units. The chief reason for contracting local debt being the establishment of works that are, directly or indirectly, reproductive, the governing conditions are evidently to be found in the character and probable yield of those businesses. The principles of company investments are fully applicable: the creation of sinking-funds, the fixing the term of each loan to the time at which the return from its employment ceases, and the avoidance of the formation of fictitious capital, become guiding

rules from this part of finance, and indicate the connexion with what the commercial world calls ” financial operations.”

Finally, there is the same set of problems in respect to account- ing and control in local as in central finance. Though the materials are simpler, the need for a well-prepared budget is existent in the case of the city, county or department, if there is to be clear and accurate financial management. Perhaps the greatest weakness of local finance lies in this direction. The public opinion that affects the national budget is unfortunately too often lacking in the most important towns, not excluding those in which political life is highly developed.

Bibliography. — The English literature on finance is rather un-satisfactory; for public finance the available text-books are: Adams, Science of Finance (New York, 1898) ; Bastable, Public Finance (London, 1892 ; 3rd ed., 1903) ; Daniels, Public Finance (New York, 1899), and Plehn, Public Finance (3rd ed., New York, 1909). In French, Leroy-Beaulieu, Traite de la science des finances .('877 ; 3rd ed., 1908), is the standard work. The German literature is abundant. Roscher, 5th ed. (edited by Gerlach), 1901; Wagner (4 vols.), incomplete; Cohn (1889) and Eheberg (9th ed., 1908) have published works entitled Finanzwissenschaft, dealing with all the aspects of state finance. For Greek financial history Boekh, Staalshaushaltung der Athenen (ed. Frankel, 1887), is still a standard work. For Rome, Marquardt, Romische Staatsverwaltung, vol. ii., and Humbert, Les Finances el la comptabilile publique chez les Romains, are valuable. Clamageran, Histoire de I'impot en France (1876), gives the earlier development of French finance. R. H. Patterson, Science of Finance (London, 1868), C. S. Meade, Trust Finance (1903), and E. Carroll, Principles and Practice of Finance, deal with finance in the wider sense of business transactions. (C. F. B.)

FINCH, FINCH-HATTON. This old English family has had many notable members, and has contributed in no small degree to the peerage. Sir Thomas Finch (d. 1563), who was knighted for his share in suppressing Sir T. Wyatt's insurrection against Queen Mary, was a soldier of note, and was the son and heir of Sir William Finch, who was knighted in 1 513. He was the father of Sir Moyle Finch (d. 1614), who was created a baronet in 161 1, and whose widow Elizabeth (daughter of Sir Thomas Heneage) was created a peeress as countess of Maidstone in 1623 and countess of Winchilsea in 1628; and also of Sir Henry Finch (1558-1625), whose son John, Baron Finch of Fordwich (1584-1660), is separately noticed. Thomas, eldest son of Sir Moyle, succeeded his mother as first earl of Winchilsea; and Sir Heneage, the fourth son (d. 1631), was the speaker of the House of Commons, whose son Heneage (1621-1682), lord chancellor, was created earl of Nottingham in 1675. The latter's second son Heneage (1649-17 19) was created earl of Aylesford in 1 714. The earldoms of

Winchilsea and Nottingham became united in 1729, when the fifth earl of Winchilsea died, leaving no son, and the title passed to his cousin the second earl of Nottingham, the earldom of Nottingham having since then been held by the earl of Winchilsea. In 1826, on the death of the ninth earl of Winchilsea and fifth of Nottingham, his cousin George William Finch-Hatton succeeded to the titles, the additional surname of Hatton (since held in this line) having been assumed in 1764 by his father under the will of an aunt, a daughter of Christopher, Viscount Hatton (1632-1706), whose father was related to the famous Sir Christopher Hatton.

FINCH OF FORDWICH, JOHN FINCH, Baron (1584-1660), generally known as Sir John Finch, English judge, a member of the old family of Finch, was born on the 17th of September 1584, and was called to the bar in 1611. He was returned to parliament for Canterbury in 1614, and became recorder of the same place in 161 7. Having attracted the notice of Charles I., who visited Canterbury in 1625, and was received with an address by Finch in his capacity as recorder, he was the following year appointed king's counsel and attorney-general to the queen and was knighted. In 1628 he was elected speaker of the House of Commons, a post which he retained till its dissolution in 1629. He was the speaker who was held down in his chair by Holies and others on the occasion of Sir John Eliot's resolution on tonnage and poundage. In 1634 he was appointed chief justice of the court of common pleas, and distinguished himself by the active zeal with which he upheld the king's prerogative. Notable also was the brutality which characterized his conduct as chief

justice, particularly in the cases of William Prynne and John Langton. He presided over the trial of John Hampden, who resisted the payment of ship-money, and be was chiefly re- sponsible for the decision of the judges that ship-money was constitutional. As a reward for his services he was, in 1640, appointed lord keeper, and was also created Baron Finch of Fordwich. He had, however, become so unpopular that one of the first acts of the Long Parliament, which met in the same year was his impeachment. He took refuge in Holland, but had to suffer the sequestration of his estates. When he was allowed to return to England is uncertain, but in 1660 he was one of the commissioners for the trial of the regicides, though he does not appear to have taken much part in the proceedings. He died on the 27th of November 1660 and was buried in St Martin's church near Canterbury, his peerage becoming extinct.

See Foss, Lives of the Judges ; Campbell, Lives of the Chief Justices.

FINCH (Ger. Fink, Lat. Fringilla), a name applied (but almost always in composition — as bullfinch, chaffinch, goldfinch, hawfinch, &c.) to a great many small birds of the order Passeres, and now pretty generally accepted as that of a group or family — the Fringillidae of most ornithologists. Yet it is one the extent of which must be regarded as being uncertain. Many writers have included in it the buntings (Emberizidae) , though these seem to be quite distinct, as well as the larks (Alaudidae), the tanagers (Tanagridae) , and the weaver-birds (Ploceidae). Others have separated from it the crossbills, under the title of Loxiidae, but without due cause. The difficulty which at this time presents itself in regard to the limits of the Fringillidae arises from our ignorance of the anatomical features, especially those of the head, possessed by many exotic forms.

Taken as a whole, the finches, concerning which no reasonable doubt can exist, are not only little birds with a hard bill, adapted in most cases for shelling and eating the various seeds that form the chief portion of their diet when adult, but they appear to be mainly forms which predominate in and are highly characteristic of the Palaearctic Region; moreover, though some are found elsewhere on the globe, the existence of but very few in the Notogaean hemisphere can as yet be regarded as certain.

But even with this limitation, the separation of the undoubted Fringillidae 1 into groups is a difficult task. Were we merely to consider the superficial character of the form of the bill, the genus Loxia (in its modern sense) would be easily divided not only from the other finches, but from all other birds. The birds of this genus — the crossbills — when their other characters are taken into account, prove to be intimately allied on the one hand to the grosbeaks (Pinicola) and on the other through the redpolls (Aegiothus) to the linnets (Linota) — if indeed these two can be properly separated. The linnets, through the genus Leucosticte, lead to the mountain-finches (Montifringilla), and the redpolls through the siskins (Chrysomitris) to the goldfinches (Carduelis) ; and these last again to the hawfinches, one group of which (Coccothraustes) is apparently not far distant from the chaffinches (Fringilla proper), and the other (Hesperiphona) seems to be allied to the greenfinches (Ligurinus). Then there is the group of serins (Serinus), to which the canary belongs, that one is in doubt whether to refer to the vicinity of the greenfinches or that of the redpolls. The mountain-finches may be regarded as pointing first to the rock-sparrows (Petronia) and then to the true sparrows (Passer) ; while the grosbeaks pass into many varied forms and throw out a very well marked form — the bullfinches (Pyrrhula) . Some of the modifications of the family are very gradual, and therefore

conclusions founded on them are likely to be correct; others are further apart, and the links which connect them, if not altogether missing, can but be surmised. To avoid as much as possible prejudicing the case, we shall therefore take the different groups of Fringillidae which it is convenient to consider in this article in an alphabetical arrangement.

Of the Bullfinches the best known is the familiar bird (Pyrrhula

1 About 200 species of these have been described, and perhaps 150 may really exist.

europaea). The varied plumage of the cock — his bright red breast and his grey back, set off by his coal-black head and quills —is naturally attractive; while the facility with which he is tamed, with his engaging disposition in confinement, makes him a popular cage-bird, — to say nothing of the fact (which in the opinion of so many adds to his charms) of his readily learning to ” pipe ” a tune, or some bars of one. By gardeners the bullfinch has long been regarded as a deadly enemy, from its undoubted destruction of the buds of fruit-trees in spring-time, though whether the destruction is really so much of a detriment is by no means so undoubted. Northern and eastern Europe is inhabited by a larger form (P. major), which differs in nothing but size and more vivid tints from that which is common in the British Isles and western Europe. A very distinct species (P. murina), remarkable for its’ dull coloration, is peculiar to the Azores, and several others are found in Asia from the Himalayas to Japan. A bullfinch (P. cassini) has been discovered in Alaska, being the first recognition of this genus in the New World.

The Canary (Serinus canarius) is indigenous to the islands whence it takes its name, as well, apparently, as to the neighbour- ing groups of the Madeiras and Azores, in all of which it abounds. It seems to have been imported into Europe at least as early as the first half of the 16th century, 1 and has since become the commonest of cage-birds. The wild stock is of an olive-green, mottled with dark brown above, and greenish-yellow beneath. All the bright-hued examples we now see in captivity have been induced by carefully breeding from any chance varieties that have shown themselves; and not only the colour, but the build and stature of the bird have in this manner been greatly modified. The ingenuity ef ” the fancy,” which might seem to have ex-

hausted itself in the production of topknots, feathered feet, and so forth, has brought about a still further change from the original type. It has been found that by a particular treatment, in which the mixing of large quantities of vegetable colouring agents with the food plays an important part, the ordinary ” canary yellow ” may be intensified so as to verge upon a more or less brilliant flame colour. 2

Very nearly resembling the canary, but smaller in size, is the Serin {Serinus hortulanus), a species which not long since was very local in Europe, and chiefly known to inhabit the countries bordering on the Mediterranean. It has pushed its way towards the north, and has even been several times taken in England (Yarrell’s Brit. Birds, ed. 4, ii. pp. 111-116). A closely allied species (5. canonicus) is peculiar to Palestine.

The Chaffinches are regarded as the type-form of Fringillidae . The handsome and sprightly Fringilla coelebs 3 is common throughout the whole of Europe. Conspicuous by his variegated plumage, his peculiar call note 4 and his glad song, the cock is almost everywhere a favourite. In Algeria the British chaffinch is replaced by a closely-allied species (F. spodogenia) , while in the Atlantic Islands it is represented by two others (F. tinlillon and F. teydea) — all of which, while possessing the general appear- ance of the European bird, are clothed in soberer tints. 5 Another

1 The earliest published description seems to be that of Gesner in 1555 (Orn. p. 234), but he had nbt seen the bird, an account of which was communicated to him by Raphael Seiler of Augsburg, under the name of Suckeruogele.

2 See also The Canary Book, by Robert L. Wallace; Canaries and Cage Birds, by W. A. Blackston; and Darwin’s Animals and Plants under Domestication, vol. i. p. 295. An excellent monograph on the wild bird is that by Dr Carl Bolle (Journ.fiir Orn., 1858, pp. 125-151).

3 This fanciful trivial name was given by Linnaeus on the sup- position (which later observations do not entirely confirm) that in Sweden the hens of the species migrated southward in autumn, leaving the cocks to lead a celibate life till spring. It is certain, however, that in some localities the sexes live apart during the winter. ,,

4 This call-note, which to many ears sounds like pink or ” spink,” not only gives the bird a name in many parts of Britain, but is also obviously the origin of the German Fink and the English .Finch. The similar Celtic form Pine is said to have given rise to the Low Latin

Pincio, and thence come the Italian Pincione, the Spanish Pinzon, and the French Pinson.

6 This is especially the case with F. teydea of the Canary Islands, which from its dark colouring and large size forms a kind of parallel to the Azcrean Pyrrhula murina.

species of true Fringilla is the brambling (F. montifringilla) , which has its home in the birch forests of northern Europe and Asia, whence it yearly proceeds, often in flocks of thousands, to pass the winter in more southern countries. This bird is still more beautifully coloured than the chaffinch — especially in summer, when, the brown edges of the feathers being shed, it presents a rich combination of black, white and orange. Even in winter, however, its diversified plumage is sufficiently striking. With the exception of the single species of bullfinch already noticed as occurring in Alaska, all the above forms of finches are peculiar to the Palaearctic Region. (A. N.)

FINCHLEY, an urban district in the Hornsey parliamentary division of Middlesex, England, 7 m. N. W. of St Paul's cathedral, London, on a branch of the Great Northern railway. Pop. (1801) 16,647; (iQ°i) 22,126. A part, adjoining Highgate on the north, lies at an elevation between 300 and 400 ft., while a portion in the Church End district lies lower, in the valley of the Dollis Brook. The pleasant, healthy situation has caused Finchley to become a populous residential district. Finchley Common was formerly one of the most notorious resorts of high- waymen near London; the Great North Road crossed it, and it was a haunt of Dick Turpin and Jack Sheppard, and was still dangerous to cross at night at the close of the 18th century. Sheppard was captured in this neighbourhood in 1724. The Common has not been preserved from the builder. In 1660 George Monk, marching on London immediately before the Restoration, made his camp on the Common, and in 1745 a regular and volunteer force encamped here, prepared to resist the Pretender, who was at Derby. The gathering of this force inspired Hogarth's famous picture, the " March of the Guards to Finchley."

FINCK, FRIEDRICH AUGUST VON (17 18-1766), Prussian soldier, was born at Strelitz in 1718. He first saw active service in 1734 on the Rhine, as a member of the suite of Duke Anton Ulrich of Brunswick-Wolfenbuttel. Soon after this he trans- ferred to the Austrian service, and thence went to Russia, where he served until the fall of his patron Marshal Munnich put an end to his prospects of advancement. In 1 742 he went to Berlin, and Frederick the Great made him his aide-de-camp, with the rank of major. Good service brought him rapid

promotion in the Seven Years' War. After the battle of Kolin (June 18th, 1757) he was made colonel, and at the end of 1757 major-general. At the beginning of 1759 Finck became lieutenant-general, and in this rank commanded a corps at the disastrous battle of Kunersdorf , where he did good service both on the field of battle and (Frederick having in despair handed over to him the command) in the rallying of the beaten Prussians. Later in the year he fought in concert with General Wunsch a widespread combat, called the action of Korbitz (Sept. 2 1st) in which the Austrians and the contingents of the minor states of the Empire were sharply defeated. For this action Frederick gave Finck the Black Eagle (Seyfarth, Beilagen, ii. 621-630). But the subsequent catastrophe of Maxen (see Seven Years' War) abruptly put an end to Finck's active career. Dangerously exposed, and with inadequate forces, Finck received the king's positive order to march upon Maxen (a village in the Pirna region of Saxony). Unfortunately for himself the general dared not disobey his master, and, cut off by greatly superior numbers, was forced to surrender with some 11,000 men (21st Nov. 1759). After the peace, Frederick sent him before a court-martial, which sentenced him to be cashiered and to suffer a term of imprisonment in a fortress. At the expiry of this term Finck entered the Danish service as general of infantry. He died at Copenhagen in 1766.

He left a work called Gedanken iiber militdrische Gegenstdnde (Berlin, 1788). See Denkwiirdigkeiten der militdrischen Gesellschaft, vol. ii. (Berlin, 1802-1805), and the report of the Finck court-martial in Zeitschrift fur Kunst, Wissenschaft und Geschichte des Krieges, pt. 81 (Berlin, 1851). There is a life of Finck in MS. in the library of the Great General Staff.

FINCK, HEINRICH (d. c. 1519), German musical composer, was probably born at Bamberg, but nothing is certainly known either of the place or date of his birth. Between 1492 and 1506 he was a musician in, and later possibly conductor of the court

orchestra of successive kings of Poland at Warsaw. He held the post of conductor at Stuttgart from 1510 till about 1510, in which year he probably died. His works, mostly part songs and other vocal compositions, show great musical knowledge, and amongst the early masters of the German school he holds a high position. They are found scattered amongst ancient and modern collections of songs and other

musical pieces (see R. Eitner, Bibl. der Musiksammelwerke des 16. und 17. Jahrh., Berlin, 1877). The library of Zwickau possesses a work containing a collection of fifty-five songs by Finck, printed about the middle of the 16th century.

FINCK, HERMANN (1527-1558), German composer, the great-nephew of Heinrich Finck, was born on the 21st of March 1527 in Pirna, and died at Wittenberg on the 28th of December 1558. After 1553 he lived at Wittenberg, where he was organist, and there, in 1555, was published his collection of " wedding songs." Few details of his life have been preserved. His theoretical writing was good, particularly his observations on the art of singing and of making ornamentations in song. His most celebrated work is entitled Practica musica, exempla" variorum signorum, proportionum, et canonum, judicium dc tonis ac quaedam de arte suaviter et artificiose cantandi continens (Wittenberg, 1556). It is of great historic value, but very rare.

FINDEN, WILLIAM (1787-1852), English line engraver, was born in 1787. He served his apprenticeship to one James Mitan, but appears to have owed far more to the influence of James Heath, whose works he privately and earnestly studied. His first employment on his own account was engraving illustrations for books, and among the most noteworthy of these early plates were Smirke's illustrations to Don Quixote. His neat style and smooth finish made his pictures very attractive and popular, and although he executed several large plates, his chief work through- out his life was book illustration. His younger brother, Edward Finden, worked in conjunction with him, and so much demand arose for their productions that ultimately a company of assistants was engaged, and plates were produced in increasing numbers, their quality as works of art declining as their quantity rose. The largest plate executed by William Finden was the portrait of King George IV. seated on a sofa, after the painting by Sir Thomas Lawrence. For this work he received two thousand guineas, a sum larger than had ever before been paid for an engraved portrait. Finden's next and happiest works on a large scale were the " Highlander's Return " and the "Village Festival," after Wilkie. Later in life he undertook, in co-operation with his brother, aided by their numerous staff, the publication as well as the production of various galleries of engravings. The first of these, a series of landscape and portrait illustrations to the life and works of Byron, appeared in 1833 and following years, and was very successful. But by his Gallery of British Art (in fifteen parts, 1 838-1 840), the most costly and best of these ventures, he lost the fruits of all his former success. Finden's last undertaking was an engraving on a large scale of Hilton's " Crucifixion." The plate was bought by the Art Union for £1470. He

died in London on the 20th of September 1852.

FINDLATER, ANDREW (1810-1885), Scottish editor, was born in 1810 near Aberdour, Aberdeenshire, the son of a small farmer. By hard study in the evening, after his day's work on the farm was finished, he qualified himself for entrance at Aberdeen University, and after graduating as M.A. he attended the Divinity classes with the idea of entering the ministry. In 1853 he began that connexion with the firm of W. & R. Chambers which gave direction to his subsequent activity. His first engagement was the editing of a revised edition of their Informa- tion for the People (1857). In this capacity he gave evidence of qualities and acquirements that marked him as a suitable editor for Chambers's Encyclopaedia, then projected, and his was the directing mind that gave it its character. Many of the more important articles were written by him. This work occupied him till 1868, and he afterwards edited a revised edition (1874). He also had charge of other publications for the same firm, and wrote regularly for the Scotsman. In 1864 he was made LL.D. of Aberdeen University. In 1877 nc g ave U P active work for

Chambers, but his services were retained as consulting editor. He died in Edinburgh on the 1st of January 1885.

FINDLAY, SIR GEORGE (1829-1893), English railway manager, was of pure Scottish descent, and was born at Rainhill, in Lancashire, on the 18th of May 1820. For some time he attended Halifax grammar school, but left at the age of fourteen, and began to learn practical masonry on the Halifax railway, upon which his father was then employed. Two years later he obtained a situation on the Trent Valley railway works, and when that line was finished in 1847 went up to London. There he was for a short time among the men employed in building locomotive sheds for the London & North-Western railway at Camden Town, and years afterwards, when he had become general manager of that railway, he was able to point out stones which he had dressed with his own hands. For the next two or three years he was engaged in a higher capacity as supervisor of the mining and brickwork of the Harecastle tunnel on the North Staffordshire line, and of the Walton tunnel on the Birkenhead, Lancashire & Cheshire Junction railway. In 1850 the charge of the construction of a section of the Shrewsbury & Hereford line was entrusted to him, and when the line was opened for traffic T. Brassey, the contractor, having determined to work it himself, installed him as manager. In the course of his duties he was brought for the first time into official relations with the London & North-Western railway, which had under- taken to work the Newport, Abergavenny & Hereford line, and he ultimately

passed into the service of that company, when in 1862, jointly with the Great Western, it leased the railway of which he was manager. In 1864 he was moved to Euston as general goods manager, in 1872 he became chief traffic manager, and in 1880 he was appointed full general manager; this last post he retained until his death, which occurred on the 26th of March 1893 at Edgware, Middlesex. He was knighted in 1892. Sir George Findlay was the author of a book on the Working and Management of an English Railway (London, 1889), which contains a great deal of information, some of it not easily accessible to the general public, as to English railway practice about the year 1890.

FINDLAY, JOHN RITCHIE (1824-1898), Scottish newspaper owner and philanthropist, was born at Arbroath on the 21st of October 1824, and was educated at Edinburgh University. He entered first the publishing office and then the editorial department of the Scotsman, became a partner in the paper in 1868, and in 1870 inherited the greater part of the property from his great uncle, John Ritchie, the founder. The large increase in the influence and circulation of the paper was in a great measure due to his activity and direction, and it brought him a fortune, which he spent during his lifetime in public benefaction. He presented to the nation the Scottish National Portrait Gallery, opened in Edinburgh in 1889, and costing over £70,000; and he contributed largely to the collections of the Scottish National Gallery. He held numerous offices in antiquarian, educational and charitable societies, showing his keen interest in these matters, but he avoided political office and refused the offer of a baronetcy. The freedom of Edinburgh was given him in 1896. He died at Aberlour, Banffshire, on the 1 6th of October 1898.

FINDLAY, a city and the county-seat of Hancock county, Ohio, U.S.A., on Blanchard's Fork of the Auglaize river, about 42 m. S. by W. of Toledo. -Pop. (1890) 18,553; (19°°) 17,613, (1051 foreign-born); (1910) 14,858. Itisservedby the Cleveland, Cincinnati, Chicago & St Louis, the Cincinnati, Hamilton & Dayton, the Lake Erie & Western, and the Ohio Central railways, and by three interurban electric railways. Findlay lies about 780 ft. above sea-level on gently rolling ground. The city is the seat of Findlay College (co-educational), an institution of the Church of God, chartered in 1882 and opened in 1886; it has collegiate, preparatory, normal, commercial and theological departments, a school of expression, and a conservatory of music, and in 1907 had 588 students, the majority of whom were in the conservatory of music. Findlay is the centre of the Ohio natural gas and oil region, and lime and building stone

abound in the vicinity. Among manufactures are refined petroleum, flour and grist-mill products, glass, boilers, bricks, tile, pottery, bridges, ditching machines, carriages and furniture. The total value of the factory product in 1905 was $2,925,309, an increase of 73-6 % since 1900. The municipality owns and operates the water-works. Findlay was laid out as a town in 1821, was incorporated as a village in 1838, and was chartered as a city in 1890. The city was named in honour of Colonel James Findlay (c. 1775-1835), who built a fort here during the war of 181 2; he served in this war under General William Hull, and from 1825 to 1833 was a Democratic representative in Congress.

FINE, a word which in all its senses goes back to the Lat. finire, to bring to an end [finis). Thus in the common adjectival meanings of elegant, thin, subtle, excellent, reduced in size, &c, it is in origin equivalent to ” finished.” In the various substantival meanings in law, with which this article deals, the common idea underlying them is an end or final settlement of a matter.

A fine, in the ordinary sense, is a pecuniary penalty inflicted for the less serious offences. Fines are necessarily discretionary as to amount; but a maximum is generally fixed when the penalty is imposed by statute. And it is an old constitutional maxim that fines must not be unreasonable. In Magna Carta, c. in, it is ordained “Liber homo non amercietur pro parvo delicto nisi secundum modum ipsius delicti, et pro magno delicto secundum magnitudinem delicti.”

The term is also applied to payments made to the lord of a manor on the alienation of land held according to the custom of the manor, to payments made by a lessee on a renewal of a lease, and to other similar payments.

Fine also denotes a fictitious suit at law, which played the part of a conveyance of landed property. ” A fine,” says Blackstone, ” may be described to be an amicable composition or agreement of a suit, either actual or fictitious, by leave of the king or his justices, whereby the lands in question become or are acknowledged to be the right of one of the parties. In its original it was founded on an actual suit commenced at law for the recovery of the possession of land or other hereditaments; and the possession thus gained by such composition was found to be so sure and effectual that fictitious actions were and

continue to be every day commenced for the sake of obtaining the same security.” Freehold estates could thus be transferred from one person to another without the formal delivery of possession which was generally necessary to a feoffment. This is one of the oldest devices of the law. A statute of 18 Edward I. describes it as the most solemn and satisfactory of securities, and gives a reason for its name — ” Qui quidem finis sic vocatur, eo quod finis et consummatio omnium placitorum esse debet, ct hac de causa providebatur.” The action was supposed to be founded on a breach of covenant: the defendant, owning himself in the wrong, 1 makes overtures of compromise, which are authorized by the licentia concordandi; then followed the concord, or the compromise itself. These, then were the essential parts of the performance, which became efficient as soon as they were complete; the formal parts were the notes, or abstract of the proceedings, and the foot of the fine, which recited the final agreement. Fines were said to be of four kinds, according to the purpose they had in view, as, for instance, to convey lands in pursuance of a covenant, to grant revisionary interest only, &c. In addition to the formal record of the proceedings, various statutes required other solemnities to be observed, the great object of which was to give publicity to the transaction. Thus by statutes of Richard III. and Henry VII. the fine had to be openly read and proclaimed in court no less than sixteen times. A statute of Elizabeth required a list of fines to be exposed in the court of common pleas and at assizes. The reason for these formalities was the high and important nature of the conveyance, which, according to the act of Edward I. above mentioned, ” precludes not only those which are parties and privies to the

1 Hence called cognizor; the other party, the purchaser, is the cognizee.

fine and their heirs, but all other persons in the world who are of full age, out of prison, of sound memory, and within the four seas, the day of the fine levied, unless they put in their claim on the foot of the fine within a year and a day." This barring by non-claim was abolished in the reign of Edward III., but restored with an extension of the time to five years in the reign of Henry VII. The effect of this statute, intentional according to Blackstone, unintended and brought about by judicial construction according to others, was that a tenant-in-tail could bar his issue by a fine. A statute of Henry VIII. expressly declares this to be the law. Fines, along with the kindred fiction of recoveries, were abolished by the Fines and Recoveries Act 1833, which substituted a deed enrolled in the court of chancery.

Fines are so generally associated in legal phraseology with recoveries that it may not be inconvenient to describe the latter in the present place. A recovery was employed as a means for evading the strict law of entail. The purchaser or alienee brought an action against the tenant-in-tail, alleging that he had no legal title to the land. The tenant-in-tail brought a third person into court, declaring that he had warranted his title, and praying that he might be ordered to defend the action. This person was called the vouchee, and he, after having appeared to defend the action, takes himself out of the way. Judgment for the lands is given in favour of the plaintiff; and judgment to recover lands of equal value from the vouchee was given to the defendant, the tenant-in-tail. In real action, such lands when recovered would have fallen under the settlement of entail; but in the fictitious recovery the vouchee was a man of straw, and nothing was really recovered from him, while the lands of the tenant-in-tail were effectually conveyed to the successful plaintiff. A recovery differed from a fine, as to form, in being an action carried through to the end, while a fine was settled by compromise, and as to effect, by barring all reversions and remainders in estates tail, while a fine barred the issue only of the tenant. (See also Ejectment; Proclamation.)

FINE ARTS, the name given to a whole group of human activities, which have for their result what is collectively known as Fine Art. The arts which constitute the group are the five greater arts of architecture, sculpture, painting, music and poetry, with a number of minor or subsidiary arts, of which dancing and the drama are among the most ancient and universal. In antiquity the fine arts were not explicitly named, nor even distinctly recognized, as a separate class. In

other modern languages besides English they are called by the equivalent name of the beautiful arts {belle arti, beaux arts, schone Kiinsle). The fine or beautiful arts then, it is usually said, are those among the arts of man which minister, not primarily to his material necessities or conveniences, but to his love of beauty; and if any art fulfils both these purposes at once, still as fulfilling the latter only is it called a fine art. Thus architecture, in so far as it provides shelter and accommodation, is one of the useful or mechanical arts, and one of the fine arts only in so far as its structures impress or give pleasure by the aspect of strength, fitness, harmony and proportion of parts, by disposition and contrast of light and shade, by colour and enrichment, by variety and relation of contours, surfaces and intervals. But this, the commonly accepted account of the matter, does not really cover the ground. The idea conveyed by the words ” love of beauty,” even stretched to its widest, can hardly be made to include the love of caricature and the grotesque; and these are admittedly modes of fine art. Even the terrible, the painful, the squalid, the degraded, in a word every variety of the signifi- cant, can be so handled and interpreted as to be brought within the province of fine art. A juster and more inclusive, although clumsier, account of the matter might put it that the fine arts are those among the arts of man which spring from his impulse to do or make certain things in certain ways for the sake, first, of a special kind of pleasure, independent of direct utility, which it gives him so to do or make them, and next for the sake of the kindred pleasure which he derives from witnessing or contem- plating them when they arc so done or made by others.

The nature of this impulse, and the several grounds of these pleasures, are subjects which have given rise to a formidable body of speculation and discussion, the chief phases of which will be found summarized under the heading Aesthetics. In the present article we have only to attend to the concrete processes and results of the artistic activities of man; in other words, we shall submit (i) a definition of fine art in general, (2) a definition and classification of the principal fine arts severally, (3) some observations on their historical development.

I. Of Fine Art in General.

According to the popular and established distinction between art and

nature, the idea of Art (q.v.) only includes phenomena Premedl- °^ which, man is deliberately the cause; while the tation idea of Nature includes all phenomena, both in man essential an d in the world outside him, which take place without to art. forethought or studied initiative of his own. Art, accordingly, means every regulated operation or dexterity where- by we pursue ends which we know beforehand; and it means nothing but such operations and dexterities. What is true of art generally is of course also true of the special group of the fine aitSi One of the essential qualities of all art is premedita- tion; and when Shelley talks of the skylark's profuse strains of " unpremeditated art," he in effect lays emphasis on the fact that it is only by a metaphor that he uses the word art in* this case at all; he calls attention to that which (if the songs of* birds are as instinctive as we suppose) precisely makes the difference between the skylark's outpourings and his own. We are slow to allow the title of fine art to natural eloquence, to charm or dignity of manner, to delicacy and tact in social intercourse, and other such graces of life and conduct, since, although in any given case they may have been deliberately cultivated in early life, or even through ancestral generations, they do not produce their full effect until they are so ingrained as to have become unreflecting and spontaneous. When the exigencies of a philo- sophic scheme lead some writers on aesthetics to include such acts or traits of beautiful and expressive behaviour among the deliberate artistic activities of mankind, we feel that an essential distinction is being sacrificed to the exigencies of a system. That distinction common parlance very justly observes, with its opposition of " art " to " nature " and its phrase of " second nature " for those graces which have become so habitual as to seem instinctive, whether originally the result of discipline or not. When we see a person in all whose ordinary movements there are freedom and beauty, we put down the charm of these with good reason to inherited and inbred aptitudes of which the person has never thought or long since ceased to think, and could not still be thinking without spoiling the charm by self- consciousness; and we call the result a gift of nature. But when we go on to notice that the same person is beautifully and appropriately dressed, since we know that it is impossible to dress without thinking of it, we put down the charm of this to judicious forethought and calculation and call the result a work of art.

The processes then of fine art, like those of all arts properly so called, are premeditated, and the property of every fine art The active * s to 2′ ve to t ˆ e P erson exercising it a special kind of and the active pleasure, and a special kind of passive or passive receptive pleasure to the person witnessing the results

pleasures £ jj exercise. This latter statement seems to imply of floe art. , ... ,

that there exist in human societies a separate class

producing works of fine art and another class enjoying them.

Such an implication, in regard to advanced societies, is near

enough the truth to be theoretically admitted (like the analogous i

assumption in political economy that there exist separate |

classes of producers and consumers). In developed communities j

the gifts and calling of the artist constitute in fact a separate I

profession of the creators or purveyors of fine art, while the rest |

of the community are its enjoyers or recipients. In the most

primitive societies, apparently, this cannot have been so, and we

can go back to an original or rudimentary stage of almost every

fine art at which the separation between a class of producers I

or performers and a class of recipients hardly exists. Such an original or rudimentary stage of the dramatic art is presented by children, who will occupy themselves for ever with mimicry and make-believe for their own satisfaction, with small regard or none to the presence or absence of witnesses. The original or rudimentary type of the profession of imitative sculptors or painters is the cave-dweller of prehistoric ages, who, when he rested from his day's hunting, first took up the bone handle of his weapon, and with a flint either carved it into the shape, or on its surface scratched the outlines, of the animals of the chase. The original or rudimentary type of the architect, con- sidered not as a mere builder but as an artist, is the savage who, when his tribe had taken to live in tents or huts instead of caves, first arranged the skins and timbers of his tent or hut in one way because it pleased his eye, rather than in some other way which was as good for shelter. The original type of the artificer or adorner of implements, considered in the same light, was the other savage who first took it into his head to fashion his club or spear in one way rather than another for the pleasure of the eye only and not for any practical reason, and to ornament it with tufts or markings. In none of

these cases, it would seem, can the primitive artist have had much reason for pleas- ing anybody but himself. Again, the original or rudimentary type of lyric song and dancing arose when the first reveller clapped hands and stamped or shouted in time, in honour of his god, in commemoration of a victory, or in mere obedience to the blind stirring of a rhythmic impulse within him. To some very remote and solitary ancestral savage the presence or absence of witnesses at such a display may in like manner have been indifferent ; but very early in the history of the race the primitive dancer and singer joined hands and voices with others of his tribe, while others again sat apart and looked on at the perform- ance, and the rite thus became both choral and social. A primitive type of the instrumental musician is the shepherd who first notched a reed and drew sounds from it while his sheep were cropping. The father of all artists in dress and personal adornment was the first wild man who tattooed himself or be- decked himself with shells and plumes. In both of these latter instances, it may be taken as certain, the primitive artist had the motive of pleasing not himself only, but his mate, or the female whom he desired to be his mate, and in the last instance of all the further motive of impressing his fellow- tribesmen and striking awe or envy into his enemies. The tendency of recent specula- tion and research concerning the origins of art has been to ascribe the primitive artistic activities of man less and less to individual and solitary impulse, and more and more to social impulse and the desire of sharing and communicating pleasure. (The writer who has gone furthest in developing this view, and on grounds of the most careful study of evidence, has been Dr Yrjo Hirn of Helsingfors.) Whatever relative parts the individual and the social impulses may have in fact played at the outset, it is clear that what any one can enjoy or admire by himself, whether in the way of mimicry, of rhythmical movements or utterances, of imitative or ornamental carving and drawing, of the disposition and adornment of dwelling-places and utensils — the same things, it is clear, others are able also to enjoy or admire with him. And so, with the growth of societies, it came about that one class of persons separated themselves and became the ministers or producers of this kind of pleasures, while the rest became the persons ministered to, the participators in or recipi- ents of the pleasures. Artists are those members of a society who are so constituted as to feel more acutely than the rest certain classes of pleasures which all can feel in their degree. By this fact of their constitution they are impelled to devote their active powers to the production of such pleasures, to the making or doing of some of those things which they enjoy so keenly when they are made and done by others. At the same time the artist does not, by assuming these ministering or creative functions, surrender his

enjoying or receptive functions. He continues to participate in the pleasures of which he is himself the cause, and remains a conscious member of his own public. The architect, sculptor, painter, are able respectively

to stand off from and appreciate the results of their own labours; the singer enjoys the sound of his own voice, and the musician of his own instrument; the poet, according to his temperament, furnishes the most enthusiastic or the most fastidious reader for his own stanzas. Neither, on the other hand, does the person who is a habitual recipient from others of the pleasures of fine art forfeit the privilege of producing them according to his capabilities, and of becoming, if he has the power, an amateur or occasional artist.

Most of the common properties which have been recognized by consent as peculiar to the group of fine arts will be found on Pleasures examination to be implied in, or deducible from,' of flue art the one fundamental character generally claimed for *■■ them, namely, that they exist independently of direct

Interested. p ract ; ca i necessity or utility. Let us take, first, a point relating to the frame of mind of the recipient, as distin- guished from the producer, of the pleasures of fine art. It is an observation as old as Aristotle that such pleasures differ from most other pleasures of experience in that they are dis- interested, in the sense that they are not such as nourish a man's body nor add to his riches; they are not such as can gratify him, when he receives them, by the sense of advantage or superiority over his fellow-creatures; they are not such as one human being can in any sense receive exclusively from the object which bestows them. Thus it is evidently characteristic of a beautiful building that its beauty cannot be monopolized, but can be seen and admired by the inhabitants of a whole city and by all visitors for all generations. The same thing is true of a picture or a statue, except in so far as an individual possessor may choose to keep such a possession to himself, in which case his pride in exclusive ownership is a sentiment wholly independent of his pleasure in artistic contemplation. Similarly, music is composed to be sung or played for the enjoyment of many at a time, and for such enjoyment a hundred years hence as much as to-day. Poetry is written to be read by all

readers for ever who care for the ideas and feelings of the poet, and can apprehend the meaning and melody of his language. Hence, though we can speak of a class of the producers of fine art, we cannot speak of a class of its consumers, only of its recipients or enjoyers. If we consider other pleasures which might seem to be analogous to those of fine art, but to which common consent yet declines to allow that character, we shall see that one reason is that such pleasures are not in their nature thus disinterested. Thus the sense of smell and taste have pleasures of their own like the senses of sight and hearing, and pleasures neither less poignant nor very much less capable of fine graduation and discrimination than those. Why, then, is the title of fine art not claimed for any skill in arranging and combining them ? Why are there no recognized arts of savours and scents corresponding in rank to the arts of forms, colours and sounds — or at least none among Western nations, for in Japan, it seems, there is a recognized and finely regulated social art of the combination and succession of perfumes? An answer commonly given is that sight and hearing are intellectual and therefore higher senses, that through them we have our avenues to all knowledge and all ideas of things outside us; while taste and smell are unintellectual and therefore lower senses, through which few such impressions find their way to us as help to build up our knowledge and our ideas. Perhaps a more satisfactory reason why there are no fine arts of taste and smell — or let us in deference to Japanese modes leave out smell, and say of taste only — is this, that savours yield only private pleasures, which it is not possible to build up into separate and durable schemes such that every one may have the benefit of them, and such as cannot be mono- polized or used up. If against this it is contended that what the programme of a performance is in the musical art, the same is a menu in the culinary, and that practically it is no less possible to serve up a thousand times and to a thousand different com- panies the same dinner than the same symphony, we must fall back upon that still more fundamental form of the distinction between the aesthetic and non-aesthetic bodily senses, upon which the physiological psychologists of the English school lay

stress. We must say that the pleasures of taste cannot be pleasures of fine art, because their enjoyment is too closely associated with the most indispensable and the most strictly personal of utilities, eating and drinking. To pass from these lower pleasures to the highest ; consider the nature of the delight derived from the contemplation, by the person who is their object, of the signs and manifestations of love. That at least is a beautiful experience; why is the pleasure which it affords not an artistic pleasure either? Why, in order to receive an

artistic pleasure from human signs and manifestations of this kind, are we compelled to go to the theatre and see them exhibited in favour of a third person who is not really their object any more than ourselves? This is so, for one reason, evidently, because of the difference between art and nature. Not to art, but to nature and life, belongs love where it is really felt, with its attendant train of vivid hopes, fears, passions and contingencies. To art belongs love displayed where it is not really felt; and in this sphere, along with reality and spontaneousness of the display, and along with its momentous bearings, there disappear all those elements of pleasure in its contemplation which are not disinterested — the elements of personal exultation and self-congratulation, the pride of exclusive possession or accept- ance, all these emotions, in short, which are summed up in the lover's triumphant monosyllable, " Mine." Thus, from the lowest point of the scale to the highest, we may observe that the element of personal advantage or monopoly in human grati- fications seems to exclude-them from the kingdom of fine art. The pleasures of fine art, so far as concerns their passive or receptive part, seem to define themselves as pleasures of gratified contemplation, but of such contemplation only when it is disinterested — which is simply another way of saying, when it is unconcerned with ideas of utility.

Modern speculation has tended in some degree to modify and obscure this old and established view of the pleasures of fine art by urging that the hearer or spectator is not after An all so free from self-interest as he seems; that in the objection act of artistic contemplation he experiences an enhance- aod lts ment or expansion of his being which is in truth a aBSWer – gain of the egoistic kind; that in witnessing a play, for instance, a large part of his enjoyment consists in sympathetically identify- ing himself with the successful lover or the virtuous hero. All this may be true, but does not really affect the argument, since at the same time he is well aware that every other spectator or auditor present may be similarly engaged with himself. At most the objection only requires us to define a little more closely, and to say that the satisfactions of the ego excluded from among the pleasures of fine art are not these ideal, sym- pathetic, indirect satisfactions, which every one can share together, but only those which arise from direct, private and incommunicable advantage to the individual.

Next, let us consider another generally accepted observation concerning the nature of the fine arts, and one, this time, relating to the disposition and state of mind of the practising artist himself. While for success in other arts it is only ca ° n e n a ot De necessary to learn their rules and to apply them until practised practice gives facility, in

the fine arts, it is commonly by rule and justly said, rules and their application will carry a ” a but a little way towards success. All that can depend on rules, on knowledge, and On the application of knowledge by practice, the artist must indeed acquire, and the acquisition is often very complicated and laborious. But outside of and beyond such acquisitions he must trust to what is called genius or imagination, that is, to the spontaneous working together of an incalculably complex group of faculties, reminiscences, preferences, emotions, instincts in his constitution. This char- acteristic of the activities of the artist is a direct consequence or corollary of the fundamental fact that the art he practices is independent of utility. A utilitarian end is necessarily a determinate and prescribed end, and to every end which is determinate and prescribed there must be one road which is the best. Skill in any useful art means knowing practically, by rules and the application of rules, the best road to the particular

ends of that art. Thus the farmer, the engineer, the carpenter, the builder so far as he is not concerned with the look of his buildings, the weaver so far as he is not concerned with the designing of the patterns which he weaves, possesses each his peculiar skill, but a skill to which fixed problems are set, and which, if it indulges in new inventions and combinations at all, can indulge them only for the sake of an improved solution of those particular problems. The solution once found, the inven- tion once made, its rules can be written down, or at any rate its practice can be imparted to others who will apply it in their turn. Whereas no man can write down, in a way that others can act upon, how Beethoven conquered unknown kingdoms in the world of harmony, or how Rembrandt turned the aspects of gloom, squalor and affliction into pictures as worthy of con- templation as those into which the Italians before him had turned the aspects of spiritual exaltation and shadowless day. The reason why the operations of the artist thus differ from the operations of the ordinary craftsman or artificer is that his ends, being ends other than useful, are not determinate nor fixed as theirs are. He has large liberty to choose his own problems, and may solve each of them in a thousand different ways according to the prompting of his own ordering or creating instincts. The musical composer has the largest liberty of all. Having learned what is learnable in his art, having mastered the compli- cated and laborious rules of musical form, having next deter- mined the

particular class of the work which he is about to compose, he has then before him the. whole inexhaustible world of appropriate successions and combinations of emotional sound. He is merely directed and not fettered, in the case of song, cantata, oratorio or opera, by the sense of the words which he has to set. The value of the result depends absolutely on his possessing or failing to possess powers which can neither be trained in nor communicated to any man. And this double freedom, alike from practical service and from the representation of definite objects, is what makes music in a certain sense the typical fine art, or art of arts. Architecture shares one-half of this freedom. It has not to copy or represent natural objects; for this service it calls in sculpture to its aid; but architecture is without the other half of freedom altogether. The architect has a sphere of liberty in the disposition of his masses, lines, colours, alternations of light and shadow, of plain and orna- mented surface, and the rest; but upon this sphere he can only enter on condition that he at the same time fulfils the strict practical task of supplying the required accommodation, and obeys the strict mechanical necessities imposed by the laws of weight, thrust, support, resistance and other properties of solid matter. The sculptor again, the painter, the poet, has each in like manner his sphere of necessary facts, rules and conditions corresponding to the nature of his task. The sculptor must be intimately versed both in the surface aspects and the inner mechanism of the human frame alike in rest and motion, and in the rules and conditions for its representation in solid form; the painter in a much more extended range of natural facts and appearances, and the rules and conditions for repre- senting them on a plane surface; the poet's art of words has its own not inconsiderable basis of positive and disciplined acquisi- tion. So far as rules, precepts, formulas and other communicable laws or secrets can carry the artist, so far also the spectator can account for, analyse, and, so to speak, tabulate the effects of his art. But the essential character of the artist's operation, its very bloom and virtue, lies in those parts of it which fall outside this range of regulation on the one hand and analysis on the other. His merit varies according to the felicity with which he is able, in that region, to exercise his free choice and frame his individual ideal, and according to the tenacity with which he strives to grasp and realize his choice, or to attain perfection according to that ideal.

In this connexion the question naturally arises, In what way do the progress and expansion of mechanical art affect the power and province of fine art? The great practical movement of the world in our age is a movement for the development of mechanical inventions and multiplication of mechanical pro-

ducts. So far as these inventions are applied to purposes purely useful, and so far as their products to not profess to offer any- thing delightful to contemplation, this movement in _. _

, V> ˆ .1 . Fine arts

no way concerns our argument. But there is a vast aad

multitude of products which do profess qualities of machln- pleasantness, and upon which the ornaments intended ery: ” art to make them pleasurable are bestowed by machinery; ˆctures.” and in speaking of these we are accustomed to the phrases art-industry, industrial art, art manufactures and the like. In these cases the industry or ingenuity which directs the machine is not fine art at all, since the object of the machine Is simply to multiply as easily and as perfectly as possible a definite and prescribed impress or pattern. This is equally true whether the machine is a simple one, like the engraver’s press, for producing and multiplying impressions from an engraved plate, or a highly complex one, like the loom, in which elaborate patterns of carpet or curtain are set for weaving. In both cases there exists behind the mechanical industry an industry which is one of fine art in its degree. In the case of the engraver’s press, there exists behind the industry of the printer the art of the engraver, which, if the engraver is also the free inventor of the design, is then a fine art, or, if he is but the interpreter of the invention of another, is then in its turn a semi-mechanical skill applied in aid of the fine art of the first inventor. In the case of the weaver’s loom there is, behind the mechanical industry which directs the loom at its given task, the fine art, or what ought to be the fine art, of the designer who has contrived the pattern. In the case of the engraving, the mechani- cal industry of printing only exists for the sake of bringing out and disseminating abroad the fine art employed upon the design. In the case of the carpet or curtain, the fine art is often only called in to make the product of the useful or mechanical industry of the loom acceptable, since the eye of man is so constituted as to receive pleasure or the reverse of pleasure from whatever it rests upon, and it is to the interest of the manufacturer to have his product so made as to give pleasure if it can. Whether the machine is thus a humble servant to the artist, or the artist a kind of humble purveyor to the machine, the fine art in the result is due to the former alone; and in any case it reaches the recipient at second-hand, having been put in circulation by a medium not artistic but mechanical.

Again, with reference not to the application of mechanical contrivances but to their invention; is not, it may be inquired, the title

of artist due to the inventor of some of the – . . . astonishingly complex and astonishingly efficient machines: machines of modern - times? Does he not spend as are they much thought, labour, genius as any sculptor or J orkso * musician in perfecting his construction according to his ideal, and is not the construction when it is done — so finished, so responsive in all its parts, so almost human — is not that worthy to be called a work of fine art? The answer is that the inventor has a definite and practical end before him; his ideal is not free; he deserves all credit as the perfect or of a particular instrument for a prescribed function, but an artist, a free follower of the fine arts, he is not; although we may perhaps have to concede him a narrow sphere for the play of something like an artistic sense when he contrives the proportion, arrangement, form or finish of the several parts of his machine in one way rather than another, not because they work better so but simply because their look pleases him better.

Returning from this digression, let us consider one common observation more on the nature of the fine arts. They are activities, it is said, which were put forth not because Plne arts they need but because they like. They have the called a activity to spare, and to put it forth in this way pleases kind ot them. Fine art is to mankind what play is to the play ‘ individual, a free and arbitrary vent for energy which is not needed to be spent upon tasks concerned with the conservation, perpetuation or protection of life. To insist on the superfluous or optional character of the fine arts, to call them the play or pastime of the human race as distinguished from its inevitable and sterner tasks, is obviously only to reiterate our fundamental

distinction between the fine arts and the useful or necessary. But the distinction, as expressed in this particular form, has been interpreted in a great variety of ways and followed out to an infinity of conclusions, conclusions regarding both the nature of the activities themselves and the character and value of their results.

For instance, starting from this saying that the aesthetic activities are a kind of play, the English psychology of association goes back to the spontaneous cries and movements The play f c j,ildren, in which their superfluous energies find a worked out vent. It then enumerates pleasures of which the by the human constitution is capable apart

from direct English advantage or utility. Such are the primitive or tloalsts. organic pleasures of sight and hearing, and the second- ary orderi vative pleasures of association or unconscious reminiscence and inference that soon become mixed up with these. Such are also the pleasures derived from following any kind of mimicry, or representation of things real or like reality. The association psychology describes the grouping within the mind of predilections based upon these pleasures; it shows how the growing organism learns to govern its play, or direct its superfluous energies, in obedience to such predilections, till in mature individuals, and still more in mature societies, a highly regulated and accomplished group of leisure activities are habitually employed in supplying to a not less highly cultivated group of disinterested sensibilities their appropriate artistic pleasures. It is by Herbert Spencer that this view has been most fully and systematically worked out.

Again, in the views of an ancient philosopher, Plato, and a modern poet, Schiller, the consideration that the artistic activities are in the nature of play, and the manifestations in which they result independent of realities and utilities, has led to judgments so differing as the following. Plato held that the daily realities of things in experience are not realities, indeed, but only far-off shows or reflections of the true realities, that is, of certain ideal or essential forms which can be appre- hended as existing by the mind. Holding this, Plato saw in the works of fine art but the reflections of reflections, the shows of shows, and depreciated them according to their degree of remoteness from the ideal, typical or sense-transcending exist- ences. He sets the arts of medicine, agriculture, shoemaking and the rest above the fine arts, inasmuch as they produce something serious or useful {cnrovbalov tl) . Fine art, he says, pro- duces nothing useful, and makes only semblances (elSuSoroiiicq) , whereas what mechanical art produces are utilities, and even in the ordinary sense realities {avTOiroiriTiKri) .

In another age, and thinking according to another system, Schiller, so far from holding thus cheap the kingdom of play and show, regarded his sovereignty over that kingdom as the noblest prerogative of man. Schiller wrote his famous Letters on the Aesthetic Education of Man in order to throw into popular currency, and at the same time to modify and follow up in a particular direction, certain meta- physical doctrines which had lately been launched upon the schools by Kant. The spirit of man, said Schiller after Kant, is placed between two worlds, the physical world or world of sense, and the moral world or world of will. Both of these are worlds of constraint or necessity. In the sensible world, the spirit of man submits to constraint from

without; in the moral world, it imposes constraint from within. So far as man yields to the importunities of sense, in so far he is bound and passive, the subject of outward shocks and victim of irrational forces. So far as he asserts himself by the exercise of will, imposing upon sense and outward things the dominion of the moral law within him, in so far he is free and active, the rational lord of nature and not her slave. Corresponding to these two worlds, he has within him two conflicting impulses or impulsions of his nature, ihe one driving him towards one way of living, the other towards another. The one, or sense-impulsion (Stoffirieb), Schiller thinks of as that which enslaves the spirit of man as the victim of matter, the other or moral impulsion (Formtrieb) as that which enthrones it as the dictator of form. Between the two

By Schiller.

the conflict at first seems inveterate. The kingdom of brute nature and sense, the sphere of man's subjection and passivity, wages war against the kingdom of will and moral law, the sphere of his activity and control, and every conquest of the one is an encroachment upon the other. Is there, then, no hope of truce between the two kingdoms, no ground where the two contending impulses can be reconciled ? Nay, the answer comes, there is such a hope; such a neutral territory there exists. Between the passive kingdom of matter and sense, where man is compelled blindly to feel and be, and the active kingdom of law and reason, where he is compelled sternly to will and act, there is a kingdom where both sense and will may have their way, and where man may give the rein to all his powers. But this middle kingdom does not lie in the sphere of practical life and conduct. It lies in the sphere of those activities which neither subserve any necessity of nature nor fulfil any moral duty. Towards activities of this kind we are driven by a third impulsion of our nature not less essential to it than the other two, the impulsion, as Schiller calls it, of Play (Spieltrieb). Relatively to real life and conduct, play is a kind of harmless show; it is that which we are free to do or leave undone as we please, and which lies alike outside the sphere of needs and duties. In play we may do as we like, and no mischief will come of it. In this sphere man may put forth all his powers without risk of conflict, and may invent activities which will give a complete ideal satisfaction to the contending faculties of sense and will at once, to the impulses which bid him feel and enjoy the shocks of physical and outward things, and the impulse which bids him master such things, control and regulate them. In play you may impose upon Matter what Form you choose, and the two will not interfere with one another or clash. The kingdom of Matter and the kingdom of Form thus harmonized, thus reconciled by the activities of

play and show, will in other words be the kingdom of the Beautiful. Follow the impulsion of play, and to the beautiful you will find your road; the activities you will find yourself putting forth will be the activities of aesthetic creation — you will have dis- covered or invented the fine arts. ” Midway “—these are Schiller’s own words — “midway between the formidable kingdom of natural forces and the hallowed kingdom of moral laws, the impulse of aesthetic creation builds up a third kingdom un- perceived, the gladsome kingdom of play and show, wherein it emancipates man from all compulsion alike of physical and of moral forces.” Schiller, the poet and enthusiast, thus making his own application of the Kantian metaphysics, goes on to set forth how the fine arts, or activities of play and show, are for him the typical, the ideal activities of the race, since in them alone is it possible for man to put forth his whole, that is his ideal self. ” Only when he plays is man really and truly man.” ” Man ought only to play with the beautiful, and he ought to play with the beautiful only.” ” Education in taste and beauty has for its object to train up in the utmost attainable harmony the whole sum of the powers both of sense and spirit.” And the rest of Schiller’s argument is addressed to show how the activities of artistic creation, once invented, react upon other departments of human life, how the exercise of the play impulse prepares men for an existence in which the inevitable collision of the two other impulses shall be softened or averted more and more. That harmony of the powers which clash so violently in man’s primitive nature, having first been found possible in the sphere of the fine arts, reflects itself, in his judgment, upon the whole composition of man, and attunes him, as an aesthetic being, into new capabilities for the conduct of his social existence.

Our reasons for dwelling on this wide and enthusiastic formula of Schiller’s are both its importance in the history of reflection — it remained, indeed, for nearly a century a formula _. almost classical — and the measure of positive value strong which it still retains. The notion of a sphere of points of

voluntary activity for the human spirit, in which, SchUkr’s

, i • r •■ • theory.

under no compulsion of necessity or conscience, we

order matters as we like them apart from any practical end,

seems coextensive with the widest conception of fine art and the

fine arts as they exist in civilized and developed communities.

10

3 6 °

FINE ARTS

[GENERAL DEFINITION

Its weak points.

It insists on and brings into the light the free or optional character of these activities) as distinguished from others to which we are compelled by necessity or duty, as well as the fact that these activities, superfluous as they may be from the points of view of necessity and of duty, spring nevertheless from an imperious and a saving instinct of our nature. It does justice to the part which is, or at any rate may be, filled in the world by pleasures which are apart from profit, and by delights for the enjoyment of which men cannot quarrel. It claims the dignity they deserve for those shows and pastimes in which we have found a way to make permanent all the transitory delights of life and nature, to turn even our griefs and yearnings, by their artistic utterance, into sources of appeasing joy, to make amends to ourselves for the confusion and imperfection of reality by conceiving and imaging forth the semblances of things clearer and more complete, since in contriving them we incorporate with the experiences we have had the better experiences we have dreamed of and longed for.

One manifestly weak point of Schiller's theory is that though it asserts that man ought only to play with the beautiful, and that he is his best or ideal self only when he does so, yet it does not sufficiently indicate what kinds of play are beautiful nor why we .are moved to adopt them. It does not show how the delights of the eye and spirit in contemplating forms, colours and movements, of the ear and spirit in apprehending musical and verbal sounds, or of the whole mind at once in following the comprehensive current of images called up by poetry — it does not clearly show how delights like these differ from those yielded by other kinds of play or pastime, which are by common consent excluded from the sphere of fine art.

The chase, for instance, is a play or pastime which gives scope for any amount of premeditated skill; it has pleasures, for lands 6t tri ose who take part in it, which are in some degree play analogous to the pleasures of the artist ; we all know

which the claims made on behalf of the noble art of venerie are not (following true medieval precedent) by the knights and woodmen of Sir Walter Scott's romances. It is an obvious reply to say that though the chase is play to us, who in civilized communities follow it on no plea of necessity, yet to a not remote ancestry it was earnest; in primitive societies hunting does not belong to the class of optional activities at all, but is among the most pressing of utilitarian needs. But this reply loses much of its force since we have learnt how many of the fine arts, however emancipated from direct utility now, have as a matter of history been evolved out of activities primarily utilitarian. It would be more to the point to remark that the pleasures of the sportsman are the only pleasures arising from the chase; his exertions afford pain to the victim, and no satisfaction to any class of recipients but himself; or at least the sympathetic pleasures of the lookers-on at a hunt or at a battle are hardly to be counted as pleasures of artistic contemplation. The issue which they witness is a real issue; the skilled endeavours with which they sympathize are put forth for a definite practical result, and a result disastrous to one ■of the parties concerned.

What then, it may be asked, about athletic games and sports, which hurt nobody, have no connexion with the chase, and give pleasure to thousands of spectators? Here the difference is, that the event which excites the spectator's interest and pleasure at a race or match or athletic contest is not a wholly unreal or simulated event; it is less real than life, but it is more real than art. The contest has no momentous practical conse- quences, but it is a contest, an aflXos, all the same, in which competitors put forth real strength, and one really wins and others are defeated. Such a struggle, in which the exertions are real and the issue uncertain, we follow with an excitement and a suspense different in kind from the feelings with which we contemplate a fictitious representation. For example, let the reader recall the feelings with which he may have watched a real fencing bout, and compare them with those with which he watches the simulated fencing bout in Shakespeare's Hamlet.

The instance is a crucial one, because in the fictitious case the excitement is heightened by the introduction of the poisoned foil, and by the tremendous consequences which we are aware will turn, in the representation, on the issue. Yet because the fencing scene in Hamlet is a representation, and not real, we find ourselves watching it in a mood quite different from that in which we watch the most ordinary real fencing-match with vizors and blunt foils; a mood more exalted, if the representa- tion is good, but amid the aesthetic emotions of which the fluctuations of strained, if trivial, suspense and the eagerness of

sympathetic participation find no place. ” The delight of tragedy,” says Johnson, “proceeds from our consciousness ‘ of fiction; if we thought murders and treasons real, they would please no more.” So does the peculiar quality of our pleasure in watching the fencing-match in Hamlet, or the wrestling-match in As You Like It, depend on our consciousness of fiction: if we thought the matches real they might please us still, but please us in a different way. Again, of athletics in general, they are pursuits to 1 a considerable degree definitely utilitarian, having for their specific end the training and strengthening of individual human bodies. Nevertheless, in some systems the title of fine arts has been consistently claimed, if not for athletics technically so called, and involving the idea of competition and defeat, at any rate for gymnastics, regarded simply as a display of the physical frame of man cultivated by exercise — as, for instance, it was cultivated by the ancient Greeks— to an ideal perfection of beauty and strength.

But apart from criticisms like these on the theory of Schiller, the Kantian doctrine of a metaphysical opposition between the senses and the reason has for most minds of to-day lost its validity, and with it falls away Schiller’s theory”?,, derivative theory of a Stojftrieb and a Formtrieb the light contending like enemies for dominion over the human ofanthro- spirit, with a neutral or reconciling Spiellrieb standing J^f—^ between them. Even taking the existence of the Spieltrieb, or play-impulse, by itself as a plain and in- dubitable fact in human nature, the theory that this impulse is the general or universal source of the artistic activities of the race, which seemed adequate to thinkers so far apart as Schiller and Herbert Spencer, is found no longer to hold water. The tendency of recent thought and study on these subjects has been to abandon the abstract or dialectical method in favour of the methods of historical and anthropological inquiry. In the light of these methods it is claimed that the artistic activities of the race spring in point of fact from no single source but from a number of different sources. It is admitted that the play- impulse is one of these, and the allied and overlapping, but not identical, impulse of mimicry or imitation another. But it is urged at the same time that these twin impulses, rooted as they both are among the primordial faculties both of men and animals, are far from existing merely to provide a vent whereby the superfluous energies of sentient beings may discharge themselves at pleasure, but are indispensable utilitarian instincts, by which the young are led to practise and rehearse in sport those activities the exercise of which in earnest will be necessary to their pre- servation in the adult state. (The researches of Professor Karl Groos in this field seem to be conclusive.) A third impulse innate in man, though scarcely so primordial as the other

two, and one which the animals cannot share with him, is the impulse of record or commemoration. Man instinctively desires, alike for safety, use and pleasure, to perpetuate and hand on the memory of his deeds and experiences whether by words or by works of his hands contrived for permanence. This impulse of, record is the most stimulating ally of the impulse of mimicry or imitation, and perhaps a large part of the arts usually put down as springing from the love of imitation ought rather to be put down as springing from the commemorative or recording impulse, using imitation as its necessary means; Granting the existence in primitive man of these three allied impulses of play, of mimicry, and of record, it is urged that they are so many distinct though contiguous sources from which whole groups of the fine arts have sprung, and that all three in their origin

served ends primarily or in great part utilitarian. Examining any of the rudimentary artistic activities of primitive man already mentioned: the decoration of the person with tattooings or strings of shells or teeth or feathers had primarily the object of attracting or impressing the opposite sex, or terrifying an enemy, or indicating the tribal relations of the person so adorned; some of the same purposes were served by the scratches and tufts and markings on weapons or utensils; the graffiti or outline drawings of animals incised by cave-dwellers on bones are surmised to have sprung in like manner from the desire of con- veying information, combined, probably, sometimes with that of obtaining magic power over the things represented; the erection of memorial shrines and images of all kinds, from the rudest upwards, had among other purposes the highly practical one of propitiating the spirits of the departed; and so on through the whole range of kindred activities. It is contended, next, that such activities only take on the character of rudimentary fine arts at a certain stage of their evolution. Before they can assume that character, they must come under the influence and control of yet another rooted and imperious impulse in mankind. That is the impulse of emotional self-expression, the instinct which compels us to seek relief under the stimulus of pent-up feeling; an instinct, it is added, second only in power to those which drive us to seek food, shelterˆ protection from enemies, and satisfaction for- sexual desires. According to a law of our constitution, the argument goes on, this need for emotional self-expression finds itself fully satisfied only by certain modes of activity; those, namely, which either

have in themselves, or impress on their products, the property of rhythm, that is, of regular interval and recurrence, flow, order and proportion. Leaping, shouting, and clapping hands is the human animal's most primitive way of seeking relief under the pressure of emotion; so soon as one such animal found out that he both expressed and relieved his emotions best, and communicated them best to his fellows, when he moved in regular rhythm and shouted in regular time and with regular changes of pitch, he ceased to be a mere excited savage and became a primitive dancer, singer, musician — in a word, artist. So soon as another found himself taking pleasure in certain qualities of regular interval, pattern and arrangement of lines, shapes and colours, apart from all questions of purpose or utility, in his tattooings and self-adornments, his decoration of tools Or weapons or structures for shelter or commemoration, he in like manner became a primitive artist in ornamental and imitative design.

The special qualities of pleasure felt and communicated by doing things in one way rather than another, independently of direct utility, which we indicated at the outset as characteristic of the whole range of the fine arts, appear on this showing to be dependent primarily on the response of our organic sensibilities of nerve and muscle, eye, ear and brain to the stimulus of rhythm , (using the word in its widest sense) imparted either to our own actions and utterances or to the works of our hands. Such pleasures would seem to have been first experienced by man directly, in the endeavour to find relief with limbs and voice from states of emotional tension, and then incidentally, as a kind of by-product arising and affording similar relief in the development of a wide range of Utilitarian activities. Into the nature of those organic sensibilities, and the grounds of the relief they afford us when gratified, it is the province of physio- logical and psychological aesthetics to inquire: our business here is only with the activities directed towards their satisfaction and the results of those activ ties in the works of fine art. On the whole the account of the matter yielded by the method of anthropological research, and here very briefly summarized, may be accepted as answering more closely to the complex nature of the facts than any of the accounts hitherto current; and so we may expand our first tentative suggestion of a defini- tion into one more complete, which from the nature of the case cannot be very brief or simple and must run somehow thus: Fine art is everything which man does or makes in one way rather than another, freely and with premeditation, in order to express

and arouse emotion, in obedience to laws of rhythmic movement or utterance or regulated design, and with results independent of direct utility and capable of affording to many permanent and disinterested

delight.

II. Of the Fine Arts severally. Architecture, sculpture, painting, music and poetry are by common consent, as has been said at the outset, the five principal or greater fine arts practised among developed communities of men. It is possible in thought to group M °h£lf!! these five arts in as many different orders as there are // ve among them different kinds of relation or affinity, greater One thinker fixes his attention upon one kind of rela- * rts * ave tions as the most important, and arranges his group classified. accordingly; another upon another; and each, when he has done so, is very prone to claim for his arrangement the virtue of being the sole essentially and fundamentally true. For example, we may ascertain one kind of relations between the arts by inquiring which is the simplest or most limited in its effects, which next simplest, which another degree less simple, which least simple or most complex of them all. This, the relation of progressive complexity or comprehensiveness between the fine arts, is the relation upon which Auguste Comte fixed his attention, and it yields in his judgment the following order: — Architecture lowest in complexity, because both of the kinds of effects which it produces and of the material conditions and limitations under which it works; sculpture next; painting third; then music; and poetry highest, as the most complex or comprehensive art of all, both in its own special effects and in its resources for ideally calling up the effects of all the other arts as well as all the phenomena of nature and experiences of life. A somewhat similar grouping was adopted, though from the consideration of a wholly different set of relations, by Hegel. Hegel fixed his attention on the varying relations borne by the idea, or spiritual element, to the embodiment of the idea, or material element, in each art. Leaving aside that part of his doctrine which concerns, not the phenomena of the arts them- selves, but their place in the dialectical world-plan or scheme of the universe, Hegel said in effect something like this. In certain ages and among certain races, as in Egypt and Assyria, and again in the Gothic age of Europe, mankind has only dim ideas for art to express, ideas insufficiently disengaged and realized, of which the expression cannot be complete or lucid, but only adumbrated and imperfect; the characteristic art of those ages is a symbolic art, with its material element predominating over and keeping down its spiritual; and such a symbolic art is architecture. In other ages, as in the Greek age, the ideas of men have come to be definite, disengaged, and clear; the characteristic art of such an age will be one in which the spiritual and material elements are in equilibrium, and neither predomi- nates over nor keeps down the other, but a thoroughly realized idea is expressed in a thoroughly

adequate and lucid form; this is the mode of expression called classic, and the classic art is sculpture. In other ages, again, and such are the modern ages of Europe, the idea grows in power and becomes importunate ; the spiritual and material elements are no longer in equilibrium, but the spiritual element predominates; the characteristic arts of such an age will be those in which thought, passion, sentiment, aspiration, emotion, emerge in freedom, dealing with material form as masters or declining its shackles altogether; this is the romantic mode of expression, and the romantic arts are painting, music and poetry. A later systematizer, Lotze, fixed his attention on the relative degrees of freedom or independ- ence which the several arts enjoy — their freedom, that is, from the necessity of either imitating given facts of nature or minister- ing, as part of their task, to given practical uses. In his grouping, instead of the order architecture, sculpture, painting, music, poetry, music comes first, because it has neither to imitate any natural facts nor to serve any practical end; architecture next, because, though it is tied to useful ends and material conditions, yet it is free from the task of imitation, and pleases the eye in its degree, by pure form, light and shade, and the rest, as music

pleases the ear by pure sound; then, as arts all tied to the task of imitation, sculpture, painting and poetry, taken in progressive order according to the progressing comprehensiveness of their several resources.

The thinker on these subjects has, moreover, to consider the enumeration and classification of the lesser or subordinate fine Place of artS- Whole clusters or families of these occur to the the minor mind at once; such as dancing, an art subordinate or sub- to music, but quite different in kind; acting, an art aa'ar? auxiliary to poetry, from which in kind it differs no less; eloquence in all kinds, so far as it is studied and not merely spontaneous; and among the arts which fashion or dispose material objects, embroidery and the weaving of patterns, pottery, glassmaking, goldsmith's work and jewelry, joiner's work, gardening (according to the claim of some), and a score of other dexterities and industries which are more than mere dexterities and industries because they add elements of beauty and pleasure to elements of serviceableness and use. To decide whether any given one of these has a right to the title of fine art, and, if so, to which of the

greater fine arts it should be thought of as appended and subordinate, or between which two of them intermediate, is often no easy task.

The weak point of all classifications of the kind of which we have above given examples is that each is intended to be No one nna lj an d to serve instead of any other. The truth classifies- is, that the relations between the several fine arts are Hon anal much too complex for any single classification to bear or this character. Every classification of the fine arts

must necessarily be provisional, according to the particular class of relations which it keeps in view. And for practical purposes it is requisite to bear in mind not one classifica- tion but several. Fixing our attention, not upon complicated or problematical relations between the various arts, but only upon their simple and undisputed relations, and giving the first place in our consideration to the five greater arts of architecture, sculpture, painting, music and poetry, we shall find at least three principal modes in which every fine art either resembles or differs from the rest.

1. The Shaping and the Speaking Arts (or Arts of Form and Arts of Utterance, or Arts of Space and Arts of Time). — Each of the greater

arts either makes something or not which can be seen and 1 .„ handled. The arts which make something which can be tin •, th" ‘ seen an d nan dled are architecture, sculpture and painting. sh°‘olnt ˆ n t ˆ le P r °ducts or results of all these arts external matter and the x5 ‘ n some wav or another manually put together, fashioned speaking or disposed*. But music and poetry do not produce any arts. results of this kind. What music produces is something

that can be heard, and what poetry produces is something that can be either heard or read — which last is a kind of ideal hearing, having for its avenue the eye instead of the ear, and for its material, written signs for words instead of the spoken words themselves. Now what the eye sees from any one point of view, it sees all at once ; in other words, the parts of anything we see fill or occupy not time but space, and reach us from various points in space at a single simultaneous perception. If we are at the proper distance we see at one glance a house from the ground to the chimneys, a statue from head to foot, and in a picture at once the foreground and background, and everything that is within the four corners of the frame. There is, indeed, this distinction to be drawn, that in walking round or through a temple, church, house or any other building, new parts and proportions of the building unfold themselves to view; and the same

thing happens in walking round a statue or turning it on a turn- table: so that the spectator, by his own motions and the time it takes to effect them, can impart to architecture and sculpture something of the character of time arts. But their products, as contemplated from any one point of view, are in themselves solid, stationary and permanent in space. Whereas the parts of anything we hear, or, reading, can imagine that we hear, fill or occupy not spaee at all but time, and can only reach us from various points in time through a continuous series of perceptions, or, in the case of reading, of images raised by words in the mind. We have to wait, in music, while one note follows another in a theme, and one theme another in a movement; and in poetry, while one line with its images follows another in a stanza, and one stanza another in a canto, and so on. It is a convenient form of expressing both aspects of this difference between the two groups of arts, to say that archi- tecture, sculpture and painting are arts which give shape to things in space, or, more briefly, shaping arts; and music and poetry arts which give utterance to things in time, or, more briefly, speaking arts. These simple terms of the shaping and the speaking arts (the

equivalent of the Ger. bildende und redende Kiinste) axe not usual in English; but they seem appropriate and clear; the simplest alternatives for their use is to speak of the manual and the voral arts, or the arts of space and the arts of time. This is practically, if not logically, the most substantial and vital distinction upon which a classification of the fine arts can be based. The arts which surround us in space with stationary effects for the eye, as the house we live in, the pictures on the walls, the marble figure in the vestibule, are stationary, hold a different kind of place in our experience — not a greater or a higher place, but essentially a different place — from the arts which provide us with transitory effects in time, effects capable of being awakened for the ear or mind at any moment, as a symphony is awakened by playing and an ode by reading, but lying in abeyance until we bid that moment come, and passing away when the perform- ance or the reading is over. Such, indeed, is the practical force of the distinction that in modern usage the expression fine art, or even art, is often used by itself in a sense which tacitly excludes music and poetry, and signifies the group of manual or shaping arts alone.

As between three of the five greater arts and the other two, the distinction on which we are now dwelling is complete. Buildings, statues, pictures, belong strictly to sight and space; to . time and to hearing, real through the ear, or ideal through m t

the mind in reading, belong music and poetry. Among ™ eaiate the

lesser or subordinate arts, however, there are several ~f s °. in which this distinction finds no place, and which produce, m «°» in space and time at once, effects midway between the ° ° ‘

stationary or stable, and the transitory or fleeting. Such is the dramatic art, in which the actor makes with his actions and gestures, or several actors make with the combination of their different actions and gestures, a kind of shifting picture, which appeals to the eyes of the witnesses while the sung or spoken words of the drama appeal to their ears; thus making of them spectators and auditors at once, and associating with the pure time art of words the mixed time-and-space art of bodily movements. As all movement whatso- ever is necessarily movement through space, and takes time to happen, so every other fine art which is wholly or in part an act of movement partakes in like manner of this double character. Along with acting thus comes dancing. Dancing, when it is of the mimic character, may itself be a kind of acting; historically, indeed, the dancer’s art was the parent of the actor’s ; whether apart from or in conjunction with the mimic element, dancing is an art in which bodily movements obey, accompany, and, as it were, express or accentuate in space the time effects of music. Eloquence or oratory in like manner, so far as its power depends on studied and pre- meditated gesture, is also an art which to some extent enforces its primary appeal through the ear in time by a secondary appeal through the eye in space. So much for the first distinction, that between the shaping or space arts and the speaking or time arts, with the intermediate and subordinate class of arts which, like acting, dancing, oratory, add to the pure time element a mixed time-and-space element. These last can hardly be called shaping arts, because it is his own person, and not anything outside himself, which the actor, the dancer, the orator disposes or adjusts; they may perhaps best be called arts of motion, or moving arts.

2. The Imitative and the Non-Imitative Arts. — Each art either does or does not represent or imitate something which exists already in nature. Of the five greater fine arts, those which thus represent objects existing in nature are sculpture, painting ˆ coa .„ and poetry. Those which do not represent anything so ™ s *’™ s * existing are music and architecture. On this principle we /Z’Jjy? get a new grouping. Two shaping or space arts and one ™ a dnon- speaking or time art now form the imitative group of imitative sculpture, painting and poetry; while one space art and artSn one time art form the non-imitative group of music and architecture. The mixed space-and-time arts of the actor, and of the dancer, so far as he or she is also a mimic, belong, of course, by their very name and nature, to the imitative class.

It was the imitative character of the fine arts which chiefly occupied the attention of Aristotle. But in order to understand the art theories of Aristotle it is necessary to bear in mind the very different meanings which the idea of imitation bore to his mind and bears to ours. For Aristotle the . idea of imitation or representation (mimesis) was extended “““ctions so as to denote the expressing, evoking or making manifest JeconBiw of anything whatever, whether material objects or ideas to Arts- or feelings. Music and dancing, by which utterance or totle. expression is given to emotions that may be quite detached from all definite ideas or images, are thus for him varieties of imita- tion. He says, indeed, most music and dancing, as if he was aware that there were exceptions, but he does not indicate what the ex- ceptions are; and under the head of imitative music, he distinctly reckons some kinds of instrumental music without words. But in our own more restricted usage, to imitate means to copy, mimic or represent some existing phenomenon, some definite reality of experience; and we can only call those imitative arts which bring before us such things, either directly by showing us their actual likeness, as sculpture does in solid form, and as painting does by means of lines and colours on a plane surface, or else indirectly, by calling up ideas or images of them in the mind, as poetry and litera- ture do by means of words. It is by a stretch of ordinary usage

that we apply the word imitation even to this last Way of representing things; since words are no true likeness of, but only customary signs for, the thing they represent. And those arts we cannot call imitative at all, which by combinations of abstract sound or form express and arouse emotions unattended by the recognizable likeness, idea or image of any definite thing.

Now the emotions of music when music goes along with words, whether in the shape of actual song or even of the instrumental accompaniment of song, are no doubt in a certain sense attended with definite ideas; those, namely, which are expressed by the words

themselves. But the same ideas would be conveyed to the mind equally well by the same words if they were simply spoken. What the music contributes is a special element of its own, an element of pure emotion, aroused through the sense of hearing, which heightens the effect of the words upon the feelings without helping to elucidate them for the understanding. Nay, it is well known that a song well sung produces its intended effect upon the feelings almost as fully though we fail to catch the words or are ignorant of the language to which they belong. Thus the view of Aristotle cannot be defended on the ground that he was familiar with music only in an elementary form, and principally as the direct accompaniment of words, and that in his day the modern development of the art, as an art for building up constructions of independent sound, vast and intricate fabrics of melody and harmony detached from words, was a thing not yet imagined. That is perfectly true; the immense technical and intellectual development of music, both in its resources and its capacities, is an achievement of the modern world; but the essential character of musical sound is the same in its most elementary as in its most complicated stage. Its privilege is to give delight, not by communicating definite ideas, or calling up particular images, but by appealing to certain organic sensibilities in our nerves of hearing, and through such appeal expressing on the one part and arousing on the other a unique kind of emotion. The emotion caused by music may be altogether independent of any ideas conveyable by words. Or it may serve to intensify and enforce other emotions arising at the same time in connexion with the ideas conveyed by words; and it was one of the contentions of Richard Wagner that in the former phase the art is now exhausted, and that only in the latter are new conquests in store for it. But in either case the music is the music, and is like nothing else; it is no representation or similitude of anything whatsoever.

But does not instrumental music, it will be said, sometimes really imitate the sounds of nature, as the piping of birds, the whispering of woods, the moaning of storms or explosion of thunder; An objec- Qr c j oes ; t not > at any ratej SU gg e st these things by resem- on an blances so close that they almost amount in the strict sense to imitation? Occasionally, it is true, music does allow itself these playful excursions into a region of quasi-imitation or mimicry. It modifies the character of its abstract sounds into something, so to speak, more concrete, and, instead of sensations which are like nothing else, affords us sensations which recognizably resemble those we receive from some of the sounds of nature. But such excursions are hazardous, and to make them often is the surest proof of vulgarity in a musician. Neither are the successful effects of the great composers in evoking

ideas of particular natural pheno- mena generally in the nature of real imitations or representations; although passages such as the notes of the dove and nightingale in Haydn s Creation, and of the cuckoo in Beethoven's Pastoral Sym- phony, the bleating of the sheep in the Don Quixote symphony of Richard Strauss, must be acknowledged to be exceptions. Again, it is a recognized fact concerning the effect of instrumental music on those of its hearers who try to translate such effect into words, that they will all find themselves in tolerable agreement as to the meaning of any passage so long as they only attempt to describe it in terms of vague emotion, and to say such and such a passage expresses, as the case may be, dejection or triumph, effort or the relaxation of effort, eagerness or languor, suspense or fruition, anguish or glee. But their agreement comes to an end the moment they begin to associate, in their interpretation, definite ideas with these vague emotions; then we find that what suggests in idea to one hearer the vicissitudes of war will suggest to another, or to the same at another time, the vicissitudes of love, to another those of spiritual yearning and aspiration, to another, it may be, those of changeful travel by forest, field and ocean, to another those of life's practical struggle and ambition. The infinite variety of ideas which may thus be called up in different minds by the same strain of music is proof enough that the music is not like any particular thing. The torrent of varied and entrancing emotion which it pours along the heart, emotion latent and undivined until the spell of sound begins, that is music's achievement and its secret. It is this effect, whether coupled or not with a trained intellectual recognition of the highly abstract and elaborate nature of the laws of the relation, succession and combinations of sounds on which the effect depends, that has caused some thinkers, with Schopenhauer at their head, to find in music the nearest approach we have to a voice from behind the veil, a universal voice expressing the central purpose and deepest essence of things, uncpnfused by fleeting actualities or by the distracting duty of calling up images of particular and perishable phenomena. " Music," in Schopenhauer's own words, " reveals the

innermost essential being of the world, and expresses the highest wisdom in a language the reason does not understand."

Aristotle endeavoured to frame a classification of the arts, in their several applications and developments, on two grounds — the nature of the objects imitated by each, and the means or instru- ments employed in the imitation. But in the case of

music, as it exists in the modern world, the first part of this endeavour falls to the ground, because the object imitated has, in the sense in which we now use the word imitation, no existence. The means employed by music are successions and combinations of vocal or instrumental sounds regulated according to the three conditions of time and pitch (which together make up melody) and harmony, or the relations of different strains of time and tone co- operant but not parallel. With these means, music either creates her independent constructions, or else accompanies, adorns, enforces the imitative art of speech — but herself imitates not; and may be best defined simply as a speaking or time art, oj 'which the business is to express and arouse emotion by successions and combinations of regulated sound.

That which music is thus among the speaking or time-arts, architecture is among the shaping or space-arts. As music appeals to our faculties for taking pleasure in non-imitative N combinations of transitory sound, so architecture appeals JT. to our faculties for taking pleasure in non-imitative ˆ."ˆL. combinations of stationary mass. Corresponding to the / are /,/„ system of ear-effects or combinations of time, tone and f ec f«re " harmony with which music works, architecture works with a system of eye-effects or combinations of mass, contour, light and shade,- colour, proportion, interval, alternation of plain and decorated parts, regularity and variety in regularity, apparent stability, vastness, appropriateness and the rest. Only the materials of architecture are not volatile and intangible like sound, but solid timber, brick, stone, metal and mortar, and the laws of weight and force according to which these materials have to be combined are much more severe and cramping than the laws of melody and harmony which regulate the combinations of music. The architect is further subject, unlike the musician, to the dictates and precise prescriptions of utility. Even in structures raised for purposes not of everyday use and necessity, but of commemoration or worship, the rules for such commemoration and such worship have prescribed a more or less fixed arrangement and proportion of the parts or members, whether in the Egyptian temple or temple-tomb, the Greek temple or herSon, or in the churches of the middle ages and Renaissance in the West.

Hence the effects of architecture are necessarily less full of various, rapturous and unforeseen enchantment than the effects of music. Yet for those who possess sensibility to the pleasures of the A ag j ojl i es eye and the perfections of shaping art, the architecture / arc j,/„ of the great ages has yielded combinations which, so far t ec t are and as comparison is permissible between things unlike in their mus ic materials, fall little short of the achievements of music in those kinds

of excellence which are common to them both. In the virtues of lucidity, of just proportion and organic interdependence of the several parts or members, in the mathematic subtlety of their mutual relations, and of the transitions from one part or member to another, in purity and finish of individual forms, in the character of one thing growing naturally out of another and everything serving to complete the whole — in these qualities, no musical combination can well surpass a typical Doric temple such as the Parthenon at Athens. _ None, again, can well surpass some of the great cathedrals of the middle ages in the qualities of sublimity, of complexity, in the power both of expressing and suggesting spiritual aspiration, in the invention of intricate developments and ramifications about a central plan, in the union of majesty in the main conception with fertility of adornment in detail. In fancifulness, in the unexpected, in capricious and far-sought opulence, in filling the mind with mingled enchantments Of east and west and south and north, music can hardly do more than a building like St Mark's at Venice does with its blending of Byzantine elements, Italian elements, Gothic elements, each carried to the utmost pitch of elaboration and each enriched with a hundred caprices of ornament, but all working together, all in obedience to a law, and " all beginning and ending with the Cross."

In the case of architecture, however, as in the case of music, the non-imitative character must not be stated quite without exception or reserve. There have been styles of architecture in which forms suggesting or imitating natural or other Bxcep- phenomena have held a place among the abstract forms Jf"Jf ? proper to the art. Often the mode of such suggestions ™ " is rather symbolical to the mind than really imitative to J? Z!™' the eye ; as when the number and relations of the heavenly «„//„—. planets were imaged by that race of astronomers, the Baby- y arehl- lonians, in the seven concentric walls of their great temple, tecture. and in many other architectural constructions ; or as when the shape of the cross was adopted, with innumerable slight varieties and modifications, for the ground plan of the churches of Christen- dom. Passing to examples of imitation more properly so called, it may be true, and was, at any rate, long believed, that the aisles of Gothic churches, when once the use of the pointed arch had been evolved as a principle of construction, were partly designed to evoke the idea of the natural aisles of the forest, and that the upsoaring

as their means.

forest trunks and meeting branches were more or less consciously imaged in their piers and vaultings. In the templeˆpalaces of Egypt, one of the regular architectural members, the sustaining pier, is often systematically wrought in the actual likeness of a con- ventionalized cluster of lotus stems, with lotus flowers for the capital; When we come to the fashion, not rare in Greek architecture, of carving this same sustaining member, the column, in complete human likeness, and employing caryatids, canephori, atlases or the like, to support the entablature of a building, it then becomes difficult to say whether we have to do with a work of architecture or of sculpture. The case, at any rate, is different from that in which the sculptor is called in to supply surface decoration to the various members of a building, or to fill with the products of his own art spaces in the building specially contrived and left vacant for that purpose. When the imitative feature is in itself an indispensable member of the architectural construction, to architecture rather than sculpture we shall probably do best to assign it.

Defining architecture, then (apart from its utility, which for the present we leave out of consideration), as a shaping art, of which the function is to express and arouse emotion by combinations Definition fl j or(i er ed an g decorated mass, we pass from the character- ofarchi- j st ; cs f t h e non-imitative to those of the imitative group tecture. Q f artSj name]y sculpture, painting and poetry.

If We keep in mind the source and origin of these arts, we must remember what has already been observed, that they spring by no means from man's love of imitation alone, but from his The ImHa- (j es j re to record and commemorate experience, using the tivearts faculty of imitation as his means. Mnemosyne (Memory) are arts of was m Greek tradition the mother of the M uses ; imitation, record jn the sense above defined, is but their instrument. Hence

T'uˆti we m 'S nt think " arts of record " a better name for this imitation grou p t h an arts f imitation. The answer is — but a large part of pure architecture is also commemorative; from the pyramids and obelisks of Egypt down there are many monuments in which the impulse of men to perpetuate their own or others' memories has worked without any aid of imitation; Hence as the definition of a class of arts contrasted with architecture and music the name " arts of record " would fail; and we have to fall back on the current and

established name of the ” imitative arts.” In considering them we cannot do better than follow that Aristotelian division which describes each art according, first, to the objects which it imitates, and, secondly, to the means it employs.

Taking sculpture first, as imitating a smaller range of objects than the other two, and imitating them more completely : sculpture may have for the objects of its imitation the shapes of whatever Sculpture t jj; n g S p 0gses s length, breadth and magnitude. For its fif ” rt means or instruments it has solid form, which the sculptor tative an. e ; tner carves ou t f a hard substance, as in the case of wood and stone, or models in a yielding substance, as in th« case of clay and wax, or casts in a dissolved or molten substance, as in the case of plaster and of metal in certain uses, or beats, draws or chases in a malleable and ductile substance, as in the case of metal in other uses, or stamps from dies or moulds, a method sometimes used in all soft or fusible materials. Thus a statue or statuette may either be carved straight out of a bjpck of stone or wood, or first modelled in clay or wax, then moulded in plaster or some equivalent material, and then carved in stone or cast in bronze. A gem is wrought in stone by cutting and grinding. Figures in jeweller’s work are wrought by beating and chasing; a medallion by beating and chasing or else by stamping from a die; a coin by stamping from a die; and so forth. The process of modelling (Gr. xX arret*) in a soft substance being regarded as the typical process of the sculptor, the name plastic art has been given to his operations in general.

In general terms, the task of sculpture is to imitate solid form with solid form. But sculptured form may be either completely or in- <- .. completely solid. Sculpture in completely solid form

Ithe™ exact ‘y reproduces, whether on the original or on a different round scale, the relations or proportions of the object imitated

and lit ln t ‘ le three dimensions of length, breadth and depth or relief. thickness. Sculpture in incompletely solid form re-

produces the proportions of the objects with exactness only so far as concerns two of its dimensions, namely, those of length and breadth; while the third dimension, that of depth or thickness, it reproduces in a diminished proportion, leaving it. to the eye to infer, from the partial degree of projection given to the work, the full projection of the object imitated. The former, or Completely solid kind of sculpture, is called sculpture in the round; its works stand free, and can be walked round and seen from all points. The latter, or incompletely

solid kind of sculpture, is caHed sculpture in relief; its works do not stand free, but are engaged in or attached to a background, and can only be seen from in front. According, in the latter kind of sculpture, to its degree of projection from the background, a work is said to be in high or in low relief . Sculpture in the round and sculpture in relief are alike in this, that the properties of objects which they imitate are their external forms as defined by their outlines — that is, by the boundaries and circum- scriptions of their masses — and their light and shade — the lights and shadows, that is, which diversify the curved surfaces of the masses in consequence of their alternations and gradations of projection and recession. But the two kinds of sculpture differ in this. A work

of sculpture in the round' imitates the whole of the" outlines by which the object imitated is circumscribed in the three dimensions of spacer and presents to the eye, as the object; itself would do, a new outline succeeding the last every moment as you walk round it. Whereas a work of sculpture in relief imitates only one outline of any object; it takes, so to speak, a section of the object as seen from a particular point, and traces on the background the boundary- line of that particular section ; merely suggesting, by modelling the surface within such boundary according to a regular, but a dimin- ished, ratio of projection, the other outlines which 1 the object would present if seen from all sides" successively.

As sculpture in the round reproduces the real relations of a solid object in space, it follows that the only kind of object which it can reproduce with pleasurable effect according to the laws .

of regulated or rhythmical design must be one not too Sub l* c t* vast or complicated, one that can afford to be detached P r "pert9r and isolated from its surroundings, and of which all the ^"•P tun parts can easily be perceived and apprehended in their '"J organic relations: Further; it will need to be an object "

interesting enough to mankind in general to make them take delight in seeing it reproduced with all its parts in complete imitation. And again, it must be such that some considerable part of the interest lies in those particular properties of outline, play of surface, and light and shade which it is the special function of sculpture to reproduce. Thus a sculptured representation in the round, say, of a' mountain with cities on it, would hardly be a sculpture at all; it:could only be a model, and as a model might have value; but value as a work of fine art it could not'have, because the object imitated would lack organic definiteness and complete- ness; it would lack universality of interest, and of the

interest which it did possess, a very inconsiderable part would depend upon its properties of outline, surface, and light and shade. Obviously there is no kind of object in the world that so well unites the required conditions for pleasurable imitation in sculpture as the human body. It is at once the most complete of organisms, and the shape of all others the most subtle as well as the most intelligible in its outlines; the most habitually detached in active or stationary freedom ; the most interesting to mankind, because its own; the richest in those particular' effects, contours and modulations, contrasts, harmonies and transitions of modelled surface and circumscribing line, which it is the- prerogative of sculpture to imitate. Accordingly the object of imitation for this art is pre-eminently the body of man or woman. That it has not been for the sake of representing men and women as such, but for the sake Of representing gods in the likeness of men and women, that the human form has been most enthusiastic- ally studied, does not affect this fact in the theory of the art, though it is a consideration of great importance in its history. Besides the human form, sculpture may imitate the forms of those of the lower animals whose physical -endowments have something of a kindred perfection, with other natural or artificial objects as may be needed merely by way of accessory or symbol. The body must for the purposes of this art be divested of covering, or covered only with such tissues as reveal, translate or play ab6ut Without concealing it. Chiefly in lands and ages where climate and social use have given the sculptor the opportunity of studying human forms so draped or undraped has this art attained perfection, and become examplary and enviable to that of other races.

Relief sculpture: is more closely connected with architecture than the other kind, and indeed is commonly used in subordination to it. But if its task is thus somewhat different from that of sculpture in the round, its principal objects of imitation So **M*** are the same. The human 'body remains the principal P ro P er for theme of the sculptor in relief ; but the nature of his art f"*?2? allows, and sometimes compels, him to include other latt ' lef ' objects in the range of his imitation. As he has not to represent the real depth or projection of things, but only to suggest them according to a ratio which he may fix himself, so he can introduce into the third- or depth dimension, thus arbitrarily reduced, a multitude of objects for which the sculptor in the round, having to observe the real ratio Of the three dimensions, has no room. He cam place one figure in slightly raised outline emerging from behind the more fully raised outline of another, and by the same systemcan add _ to his representation rocks, trees, nay mountains and cities and birds on the wing. But the more he uses this liberty the less will he be truly

a sculptor. Solid modelling, and real light and shade, are the special means or instruments of effect which the sculptor alone among imitative artists enjoys. Single outlines' arid cohtours, the choice of one particular section and the tracing of its circumscription, are means which the sculptor enjoys in common with the painter or draughtsman. And indeed, when we consider works executed wholly or in part in very low relief, whether Assyrian battle-pieces and hunting-pieces in alabaster or bronze, or the backgrounds carved in bronze, marble or wood by the 'Italian' sculptors who followed the example set by Ghiberti at the Renais- sance, we shall see that the principle of such work is not the principle Of sculpture at all. Its effect depends little on qualities of surface- light and shadow, and mainly on qualities of contour, as traced by a slight line of shadow on the side away from the light, and a slight line of light on the side next to it. And we may fairly hesitate whether we shall rank the artist who works on this' principle, which

is properly a graphic rather than a plastic principle, among sculptors or among draughtsmen. The above are cases in which the relief sculptor exercises his liberty in the introduction of other objects besides human figures into his sculptured compositions. But there is another kind of relief sculpture in which the artist has less choice. That is, the kind in which the sculptor is called in to decorate with carved work parts of an architectural construction which are not adapted for the introduction of figure subjects, or for their introduction only as features in a scheme of ornament that comprises many other elements. To this head belongs most of the carving of capitals, mouldings, friezes (except the friezes of Greek temples), bands, cornices, and, in the Gothic style, of doorway arches, niches, canopies, pinnacles, brackets, spandrels and the thousand members and parts of members which that style so exquisitely adorned with true or conventionalized imitations of natu r al forms. This is no doubt a subordinate function of the art ; and it is impossible, as we have seen already, to find a precise line of demarcation between carving, in this decorative use, which is properly sculpture, and that which belongs properly to architecture.

Leaving such discussions, we may content ourselves with the definition of sculpture as a shaping art, of which the business is to n n

m express and arouse emotion by the imitation of natural De oa objects, and principally the human body, in solid form, sculoture reproducing either their true proportions in three dimensions, ‘ or their proportions in the two dimensions of length and breadth only, with a diminished proportion in the third dimension of depth or thickness.

In considering bas-relief as a form of sculpture, we have found ourselves approaching the confines of the second of the shaping „ . imitative arts, the graphic art or art of painting. Painting,

fainting as t0 j tg means or instruments of imitation, dispenses “imitative w ‘ t ‘ 1 tn€ third dimension altogether. It imitates natural art objects by representing them as they are represented on

the retina of the eye itself, simply as an assemblage of variously shaped and variously shaded patches of colour on a flat surface. Painting does not reproduce the third dimension of reality by any third dimension of its own whatever; but leaves the eye to infer the solidity of objects, their recession and projection, their nearness and remoteness, by the same perspective signs by which it also infers those facts in nature, namely, by the direction of their several boundary lines, the incidence and distribution of their lights and shadows, the strength or faintness of their tones of colour.

Hence this art has an infinitely greater range and freedom than any form of sculpture. Near and far is all the same to it, and _ . whatever comes into the field of vision can come also

oblects” ‘ nto t ‘ ie ˆ e ‘^ °^ a Pi cture ! trees as well as persons, and Imltableb c l° u ds as well as trees, and stars as well as clouds; the palntlnz. * remotest mountain snows, as well as the violet of the foreground, and far-off multitudes of people as well as one or two near the eye. Whatever any man has seen, or can imagine himself as seeing, that he can also fix by painting, subject only to one great limitation, — that of the range of brightness which he is able to attain in imitating natural colour illuminated by light. In this particular his art can but correspond according to a greatly diminished ratio with the effects of nature. But excepting this it can do for the eye almost all that nature herself does; or at least all that nature would do if man had only one eye since the three dimensions of space produce upon our binocular machinery of vision a particular stereoscopic effect of which a picture, with its two dimensions only, is incapable. The range of the art being thus almost unbounded, its selections have naturally been dictated by the varying interest felt in this or that subject of

representation by the societies among whom the art has at various times been practised. As in sculpture, so in painting, the human form has always held the first place. For the painter, the intervention of costume between man and his environment is not a misfortune in the same degree as it is for the sculptor. For him, clothes of whatever fashion or amplitude have their own charm; they serve to diversify the aspect of the world, and to express the characters and stations, if not the physical frames, of his personages; and he is as happy or happier among the brocades of Venice as among the bare limbs of the Spartan palaestra. Along with man, there come into painting all animals and vegetation, all man's furniture and belongings, his dwelling-places, fields and landscape; and in modern times also landscape and nature for their own sakes, skies, seas, mountains and wildernesses apart from man.

Besides the two questions about any art, what objects does it imitate, and by the use of what means or instruments, Aristotle The chief P ro P oses (i n * ne case of poetry) the further question, forms or wmc h °f several possible forms does the imitation in any modes 0/ S' ven case assume? We may transfer very nearly the painting: sanie inquiry to painting, and may ask, concerning any Hue, light- P am ter, according to which of three possible systems he and- shade works. The three possible systems. are (j) that which and colour, attends principally to the configuration and relations of natural objects as indicated by the direction of their boundaries, for defining which there is a convention in universal use, the convention, that is, of line; this may be called for short the system of line; (2) that which attends chiefly to their configura- tion and relations as indicated by the incidence and distribution * > f their lights and shadows— this is the system of light-and-shade or

Technical varieties of the painter's craft.

chiaroscuro; and (3) that which attends chiefly, not to their con-figuration at all, but to the distribution, qualities and relations ot local colours upon their surface — this is the system of colour. It is not possible for a painter to imitate natural objects to the eye at all without eitheT denning their boundaries by outlines, or suggesting the shape of their masses by juxtapositions of light and dark or of local colours. In the complete art of painting, of course, all three methods are employed at once. But in what is known as outline drawing and outline engraving, one of the three methods only is employed, line; in monochrome pictures, and in shaded drawings and engravings, two only, line with light-and-shade; and in the various shadeless forms of decorative painting and colour-printing, two only, line with colour.

Even in the most accomplished examples of the complete art of painting, as was pointed out by Ruskin, we find that there almost always prevails a predilection for some one of these three parts of painting over the other two. Thus among the mature Italians of the Renaissance, Titian is above all things a painter in colour, Michelangelo in line, Leonardo in light-and-shade. Many academic painters in their day tried to combine the three methods in equal balance; to the impetuous spirit of the great Venetian, Tintoretto, it was alone given to make the attempt with a great measure of success. A great part of the effort of modern painting; has been to get rid of the linear convention altogether, to banish line and develop the resources of the oil medium in imitating on canvas, more strictly than the early masters attempted, the actual appearance of things on the retina as an assemblage of coloured streaks and patches modified and toned in the play of light-and-shade and atmosphere.

It remains to consider, for the purpose of our classification, what are the technical varieties of the painter's craft. Since we gave the generic name of painting to all imitation of natural objects by the assemblage of lines, colours and lights and darks on a single plane, we must logically include as varieties of painting not only the ordinary crafts of spreading or laying pictures on an opaque surface in fresco, oil, distemper or water-colour, but also the craft of arranging a picture to be seen by the transmission of light through a transparent substance, in glass painting ; the craft of fitting together a multitude of solid cubes or cylinders so that their united surface forms a picture to the eye, as in mosaic; the craft of spreading vitreous colours in a state of fusion so that they form a picture when hardened, as in enamel ; and even, it would seem, the crafts of weaving, tapestry, and embroidery, since these also yield to the eye a plane surface figured in imitation of nature. As drawing we must also count incised or engraved work of all kinds representing merely the out lines cf objects and not their modellings, as for instance the graffiti on Greek and Etruscan mirror-backs and dressing-cases; while raised work in low relief, in which outlines are plainly marked and modellings neglected, furnishes, as we have seen, a doubtful class between sculpture and painting. In all figures that are first modelled in the solid and then variously coloured, sculpture and painting bear a common share; and by far the greater part both of ancient and medieval statuary was in fact tinted so as to imitate or at least suggest the colours of life. But as the special characteristic of sculpture, solidity in the third dimension, is in these cases present, it is to that art and not to painting that we shall still ascribe the resulting work.

With these indications we may leave the art of painting defined in

general terms as a shaping or space art, of which the business is to express and arouse emotion by the imitation of all kinds of netinttlon natural objects, reproducing on a plane surface the relations . of their boundary lines, lights and shadows, or colours, or „/„

The next and last of the imitative arts is the speak'ng art of poetry. The transition from sculpture and painting to poetry is, from the point of view not of our present but of our first division _ . among the fine arts, abrupt and absolute. It is a transition ™ '££ from space into time, from the sphere of material forms ~ a . ' to the sphere of immaterial images. Following Aristotle's method, we may define the objects of poetry's imitation or evocation, as everything of which the idea or image can be called up by words, that is, every force and phenomenon of nature, every operation and result of art, every fact of life and history, or every imagination of such a fact, every thought and feeling of the human spirit, for which mankind in the course of its long evolution has been able to create in speech an explicit and appropriate sign. The means or instru- ments of poetry's imitation are these verbal signs or words, arranged in lines, strophes or stanzas, so that their sounds have some of the regulated qualities and direct emotional effect of music.

The three chief modes or forms of the imitation may still be defined as they were defined by Aristotle himself. First comes the epic or narrative form, in which the poet speaks alternately _. . , . for himself and his characters, now describing their t,J m . „f situations and feelings in his own words, and anon making mo des ot each of them speak in the first person for himself. Second ooe t rr comes the lyric form, in which the poet speaks in his own name exclusively, and gives expression to sentiments which are purely personal. Third comes the dramatic form, in which the poet does not speak for himself at all, but only puts into the mouths of each of his personages successively such discourse as he thinks

as an i tatlve art to paint- ing and sculpture.

appropriate to the part. The last of these three forms of poetry, the dramatic, calls, if it is merely read, on the imagination of the reader to fill up those circumstances of situation, action and the rest, which in

the first or epic form are supplied by the narrative between the speeches, and for which in the lyric or personal form there is no occasion. To avoid making this call upon the imagination, to bring home its effects with full vividness, dramatic poetry has to call in the aid of several subordinate arts, the shaping or space art of the scene-painter, the mixed time and space arts of the actor and the dancer. Occasionally also, or in the case of opera throughout, dramatic poetry heightens the emotional effect of its words with music. A play or drama is thus, as performed upon the theatre, not a poem merely, but a poem accompanied, interpreted, completed and brought several degrees nearer to reality by a combination of auxiliary effects of the other arts. Besides the narrative, the lyric and dramatic forms of poetry, the didactic, that is the teaching or expository form, has usually been recognized as a fourth. Aristotle refused so to recognize it, regarding a didactic poem in the light not so much of a poem as of a useful treatise. But from the Works and Days down to the Loves of the Plants there has been too much literature produced in this form for us to follow Aristotle here. We shall do better to regard didactic poetry as a variety corresponding, among the speaking arts, to architecture and the other manual arts of which the first purpose is use, but which are capable of accompanying and adorning use by a pleasurable appeal to the emotions.

We shall hardly make our definition of poetry, considered as an imitative art, too extended if we say that it is a speaking or time art, of which the business is to express and arouse emotion by Definition imitating or evoking all or any of the phenomena of life and of poetry. na t ure fry means f words arranged with musical regularity. Neither the varieties of poetical form, however, nor the modes in which the several forms have been mixed up and interchanged — as such mixture and interchange are implied, for instance, Relation ˆ ˆ ver y t ; t j e Q f a group of Robert Browning's poems, ofpoery t £ e J) rama i{ c Lyrics, — the observation of neither of these ' m ' things concerns us here so much as the observation of the relations of poetry in general, as an art of representation or imitation, to the other arts of imitation, painting and sculpture. Verbal signs have been invented for in numerable things which cannot be imitated or represented at all either in solid form or upon a coloured surface. You cannot carve or paint a sigh, or the feeling which finds utterance in a sigh ; you can only suggest the idea of the feeling, and that in a somewhat imperfect and uncertain way, by representing the physical aspect of a person in the act of breathing the sigh. Similarly you cannot carve or paint any movement, but only figures or groups in which the movement is represented as arrested in some particular point of time ; nor any

abstract idea, but only figures or groups in which the abstract idea, as for example release, captivity, mercy, is symbolized in the concrete shape of allegorical or illustrative figures. The whole field of thought, of propositions, arguments, injunctions and ex- hortations is open to poetry but closed to sculpture and painting. Poetry, by its command over the regions of the understanding," of abstraction, of the movement and succession of things in time, by its power of instantaneously associating one image with another from the remotest regions of the mind, by its names for every shade of feeling and experience, exercises a sovereignty a hundred times more extended than that of either of the two arts of manual imitation. But, on the other hand, words do not as a rule bear any sensible resemblance to the things of which they are the signs. There are few things that words do not stand for or cannot call up; but they stand for things symbolically and alˆsecond hand, and call them up only in idea, and not In actual presentment to the senses. In strictness, the business of poetry should not be called imitation at all, but rather evocation. Tne strength of painting and sculpture lies in this, that though there are countless phenomena which they cannot represent at all, and countless more which they can only represent by symbolism and suggestion more or less ambiguous, yet there are a few which each can represent more fully and directly than poetry can represent any thing at all. These are, for sculpture, the forms or configurations of things, which that art represents directly to the senses both of sight and touch; and for painting the forms and colours of things and their relations to each other in space, air and light, which the art represents to the sense of sight, directly so far as regards surface appearance, and indirectly so far as regards solidity. For many delicate qualities and differences in these visible relations of things there are no words at all — the vocabulary of colours, for instance, is in all languages surprisingly scanty and primitive. And those visible qualities .for which words exist, the words still call up in- distinctly and at second hand. Poetry is almost as powerless to bring before the mind's eye with precision a particular shade of red or blue, a particular linear arrangement or harmony of colour-tones, as sculpture is to relate a continuous experience, or painting to en- force an exhortation or embellish an abstract proposition. The wise poet, as has been justly remarked, when he wants to produce a vivid impression of a visible thing, does not attempt to catalogue or describe its stationary beauties. Shakespeare, when he wants to make us realize the perfections of Perdita, puts into the mouth of Florizel, not, as a bad poet would have done, a description of her

lilies and carnations, and the other charms which a painter could

make us realize better, but the praises of her ways and movements ; and with the final touch,

” When you do dance, I wish you A wave o’ the sea, that you might ever do Nothing but that,” he evokes a twofold image of beauty in motion, of which one half might be the despair of those painters who designed the dancing maidens of the walls of Herculaneum, and the other half the despair of all artists who in modern times have tried to fix upon their canvas the buoyancy and grace of dancing waves. In representing the perfections of form in a bride’s slender foot, the speaking art, poetry, would find itself distanced by either of the shaping arts, painting or sculpture. Suckling calls up the charm of such a foot by describing it not at rest but in motion, and in the feet which ” Beneath the petticoat, Like little mice, went in and out,” leaves us an image which baffles the power of the other arts. Keats, when he tells of Madeline unclasping her jewels on St Agnes’s Eve, does not attempt to conjure up their lustre to the eye, as a painter would have done, and a less poetical poet might have tried to do, but in the words “her warmed jewels ” evoked instead a quality^ breathing of the very life of the wearer, which painting could aot even have remotely suggested.

The differences between the means and capacities of representation proper to the shaping arts of sculpture and painting and those proper to the speaking art of poetry were for a long while overlooked or misunderstood. The maxim of Simonides, General that poetry is a kind of articulate painting, and painting law of the a kind of mute poetry, was vaguely accepted until the re,atlve days of Lessing, and first overthrown by the famous meaasa ” a treatise of that writer on the Laocoon. Following in the ca P acltles main the lines laid down by Lessing, other writers have ,

worked out the conditions of representation or imitation f^‘fJi. proper not only to sculpture and painting as distinguished !■!*,. from poetry, but to sculpture as distinguished from sc „/o/„ re painting. The chief points established may really all be condensed under one simple law, that the more direct and complete the imitation effected by any art, the less is the range and number of phenomena which that art can imitate. Thus sculpture in the round imitates its objects much more completely and directly than any other single art, reproducing one whole set of their relations which no other art attempts to reproduce at all, namely, their solid relations in space. Precisely for this reason, such sculpture is limited to a narrow class of objects. As we have seen, it must represent human or animal figures; nothing else has enough either of universal interest or of organic beauty and perfection.

Sculpture in the round must represent such figures standing free in full clearness and detachment, in combinations and with accessories comparatively simple, on pain of teasing the eye with a complexity and entanglement of masses and lights and shadows; and in attitudes comparatively quiet, on pain of violating, or appearing to violate, the conditions of mechanical stability. _ Being a stationary or space-art, it can only represent a single action, which it fixes and perpetuates for ever; and it must therefore choose for that action one as significant and full of interest as is consistent with due observation of the above laws of simplicity and stability. Such actions, and the facial expressions accompanying them, should not be those of sharp crisis or transition, because sudden movement or flitting expression, thus arrested and perpetuated in full and solid imitation by bronze or marble, would be displeasing and not pleasing to the spectator. They must be actions and ex- pressions in some degree settled, collectedand capable of continuance, and in their collectedness must at the same time suggest to the spectator as much as possible of the circumstances which have led up to them and those which will next ensue. These conditions evi- dently bring within a very narrow range the phenomena with which this art can deal, and explain why, as a matter of fact, the greater number of statues represent simply a single figure in repose, with the addition of one or two symbolic Or customary attributes. Paint a statue (as the greater part both of Greek and Gothic statuary was in fact painted), and you bring it to a still further point of imitative completeness to the eye ; but you do not thereby lighten the restric- tions laid upon the art by its material, so long as it undertakes to reproduce in full the third or solid dimension of bodies. You only begin to lighten its restrictions when you begin to relieve it of that duty. We have traced how sculpture in relief, which is satisfied with only a partial reproduction of the third dimension, is free to introduce a larger range of objects, bringing forward secondary figures and accessories, indicating distant planes, indulging even in considerable violence and complexity of motion, since limbs attached to a background do not alarm the spectator by any idea of danger of fragility. But sculpture in the round has not this licence. It is true that the art has at various periods made efforts to escape from its natural limitations. Several of the later schools of antiquity, especially that of Pergamus in the 3rd and and centuries B.C., strove hard both for violence of expression and complexity of design, not only in relief ‘sculptures, like the great altar-friezes now at Berlin, but in detached groups, such as {pace Lessing) the Laocoon itself. Many modern virtuosi of sculpture since Bernini have misspent their

skill in trying to fix in marble both the restlessness of momentary actions and the flimsiness of fluttering tissues. In latter days Auguste Rodin, an innovating master with a real genius for his art, has attacked many problems of complicated grouping, more or less in the nature of the Greek symplegmata, but keeps these interlocked or contorted actions circumscribed within strict limiting lines, so that they do not by jutting or straggling suggest a kind of acrobatic challenge to the laws of gravity. The same artist and others inspired by him have further sought to emancipate sculpture from the necessity of rendering form in clear and complete definition, and to enrich it with a new power of mysterious suggestion, by leaving his figures wrought in part to the highest finish and vitality of surface, while other parts (according to a precedent set in some unfinished works of Michelangelo) remain scarcely emergent from the rough- hewn or unhewn block. But it may be doubted whether such ex- periments and expedients can permanently do much to enlarge the scope of the art.

Next we arrive at painting, in which the third dimension is dis- missed altogether, and nothing is actually reproduced, in full or partially, except the effect made by the appearance of cJ aa t? natural objects upon the retina of the eye. The conse- otnalnt* Q 1161106 i s tnat tn i s art can ran ge over distance and , j! ‘ multitude, can represent complicated relations between its *’ various figures and groups of figures, extensive back-

grounds, and all those infinite subtleties of appearance in natural things which depend upon local colours and their modification in the play of light and shade and enveloping atmosphere. These last phenomena of natural things are in our experience subject to change in a sense in which the substantial or solid properties of things are not so subject. Colours, shadows and atmospheric effects are naturally associated with ideas of transition, mystery and evanes- cence. Hence painting is able to extend its range to another kind of facts over which sculpture has no power. It can suggest and perpetuate in its imitation, without breach of its true laws, many classes of facts which are themselves fugitive and transitory, as a smile, the glance of an eye, a gesture of horror or of passion, the waving of hair in the wind, the rush of horses, the strife of mobs, the whole drama of the clouds, the toss and gathering of ocean waves, even the flashing of lightning

across the sky. Still, any long or continuous series of changes, actions or movements is quite beyond the means of this art to represent. Painting remains, in spite of its comparative width of range, tied down to the inevitable conditions of a space-art: that is to say, it has to delight the mind by a har- monious variety in its effects, but by a variety apprehended not through various points of time successively, but from various points in space at the same moment. The old convention which allowed painters to indicate sequence in time by means of distribution in space, dispersing the successive episodes of a story about the different parts of a single picture, has been abandoned since the early Renais- sance ; and Wordsworth sums up our modern view of the matter when he says that it is the business of painting

" to give To one blest moment snatched from fleeting time The appropriate calm of blest eternity."

Lastly, a really unfettered range is only attained by the art which does not give a full and complete reproduction of any natural fact „ at all, but evokes or brings natural facts before the mind

ww* mere ly by the images which words convey. The whole capacities wor j(j f moV ement, of continuity, of cause and effect, of poetry. q j ˆ success ; onSi alternations and interaction of events, characters and passions of everything that takes time to happen and time to declare, is open to poetry as it is open to no other art. As an imitative or, more properly speaking, an evocative art, then, poetry is subject to no limitations except those which spring from the poverty of human language, and from the fact that its means of imitation are indirect. Poetry's account of the visible properties of things is from these causes much less full, accurate and efficient than the reproduction or delineation of the same properties by sculpture and painting. And this is the sum of the conditions concerning the respective functions of the three arts of imitation which had been overlooked, in theory at least, until the time of Lessing.

To the above law, in the form in which we have expressed it, it may perhaps be objected that the acted drama is at once the most full and complete reproduction of nature which we owe The acted t0 t jj e g ne arts> anc j t jj at at t jj e same time the number of drama no f acts over which its imitation ranges is the greatest. real -j-jˆ answer j s that our law applies to the several arts

e t xc f? only in that which we may call their pure or unmixed

reaeral state. Dramatic poetry is in that state only when it js j- w read

or spoken like any other kind of verse. When it is

witnessed on the stage, it is in a mixed or impure state ; the art of the actor has been called in to give actual reproduction to the gestures and utterances of the personages, that of the costumier to their appearances and attire, that of the stage-decorator to their furniture and surroundings, that of the scene-painter to imitate to the eye the dwelling-places and landscapes among which they move; and only by the combination of all these subordinate arts does the drama gain its character of imitative completeness or reality.

Throughout the above account of the imitative and non-imitative groups of fine arts, we have so far followed Aristotle as to allow the name of imitation to all recognizable representation or evocation of realities,-— using the word ” realities ” in no . I ™W B metaphysical sense, but to signify the myriad phenomena ”” j OWn . of life and experience, whether as they actually and f * hit literally exist to-day, or as they may have existed in the Jˆ/ˆ/„ a past, or may be conceived to exist in some other world otthines not too unlike our own for us to conceive and realize in kaown. thought. When we find among the ruins of a Greek temple the statue of a beautiful young man at rest, or above the altar of a Christian church the painting of one transfixed with arrows, we know that the statue is intended to bring to our minds no mortal youth, but the god Hermes or Apollo, the trans- fixed victim no simple captive, but Sebastian the holy saint. At the same time we none the less know that the figures in either case have been studied by the artist from living models before his eyes. In like manner, in all the representations alike of sculpture, painting and poetry the things and persons represented may bear symbolic meanings and imaginary names and characters ; they may be set in a land of dreams, and grouped in relations and circumstances upon which the sun of this world never shone; in point of fact, through many ages of history they have been chiefly used to embody human ideas of supernatural powers; but it is from real things and persons that their lineaments and characters have been taken in the first instance, in order to be attributed by the imagination to another and more exalted order of existences.

The law which we have last laid down is a law defining the relations of sculpture, painting and poetry, considered simply as arts having their foundations at any rate in reality, and drawing from the imitation of reality their indispensable elements and { m/ ‘*™ J ‘ materials. It is a law defining the range and character y of those elements or materials in nature which each art is fffˆf” best fitted, by its special means and resources, to imitate. Meallzed But we must

remember that, even in this fundamental imitation part of its operations, none of these arts proceeds by imitation or evocation pure and simple. None of them con- tents itself with seeking to represent realities, however literally taken, exactly as those realities are. A portrait in sculpture or painting, a landscape in painting, a passage of local description in poetry, may be representations of known things taken literally or for their own sakes, and not for the sake of carrying out thoughts to the unknown ; but none of them ought to be, or indeed can possibly be, a representation of all the observed parts and details of such a reality on equal terms and without omissions. Such a representation, were it possible, would be a mechanical inventory and not a work of fine art.

Hence the value of a pictorial imitation is by no means necessarily in proportion to the number of facts which it records. Many accom- plished pictures, in which all the resources of line, colour and light-and-shade have been used to the utmost of Com P te te- the artist's power for the imitatioi! of all that he could see nessnot in nature, are dead and worthless in comparison with a f . st few faintly touched outlines or lightly laid shadows or olvalae tints of another artist who could see nature more vitally ". f . . and better. Unless the painter knows how to choose and P i' m uati combine the elements of his finished work so that it ""

shall contain in every part suggestions, and delights over and above the mere imitation, it will fall short, in that which is the essential charm of fine art, not only of any scrap of a great master's handiwork, such as an outline sketch of a child by Raphael or a colour sketch of a boat or a mackerel by Turner, but even of any scrap of the merest journeyman's handiwork produced by an artistic race, such as the first Japanese drawing in which a water-flag and kingfisher, or a spray of peach or almond blossom across the sky, is dashed in with a mere hint of colour, but a hint that tells a whole tale to the imagination. That only, we know, is fine art which affords keen and permanent delight to con- templation. Such delight the artist can never communicate by the display of a callous and pedantic impartiality in presence of the facts of life and nature. His representation of realities will only strike or impress others in so far as it concentrates their attention on things by which he has been struck and impressed himself. To arouse emotion, he must have felt emotion; and emotion is impos- sible without partiality. The artist is one who instinctively tends to modify and work upon every reality before him in conformity with some poignant and sensitive principle of preference or selection in his mind. He instinctively adds something to nature in one direction and takes away something in another, overlooking this kind of fact and insisting

on that, suppressing many particulars which he holds irrelevant in order to insist on and bring into prominence others by which he is attracted and arrested.

The instinct by which an artist thus prefers, selects and brings into light one order of facts or aspects in the thing before him rather than the rest, is part of what is called the idealizing or ideal faculty. Interminable discussion has been spent on the Native questions, — What is the ideal, and how do we idealize? Jj~? The answer has been given in one form by those thinkers idealizing (e.g. Vischer and Lotze) who have pointed out that the P rocess ‘ process of aesthetic idealization carried on by the artist is only the

higher development of a process carried on in an elementary fashion by all men, from the very nature of their constitution. The physical organs of sense themselves do not retain or put on record all the impressions made upon them. When the nerves of the eye receive a multitude of different stimulations at once from different points in space, the sense of eyesight, instead of being aware of all these stimulations singly, only abstracts and retains a total impression of them together. In like manner we are not made aware by the sense of hearing of all the several waves of sound that strike in a momentary succession upon the nerves of the ear; that sense only abstracts and retains a total impression from the combined effect of a number of such waves. And the office which each sense thus performs singly for its own impressions, the mind performs in a higher degree for the impressions of all the senses equally, and for all the other parts of our experience. We are always dismissing or neglecting a great part of our impressions, and abstracting and combining among those which we retain. The ordinary human consciousness works like an artist up to this point; and when we speak of the ordinary or inartistic man as being impartial in the retention or registry of his daily impressions, we mean, of course, in the retention or registry of his impressions as already thus far abstracted and assorted in consciousness. The artistic man, whose impressions affect him much more strongly, has the faculty of carrying much farther these same processes of abstraction, com- bination and selection among his impressions.

The possession of this faculty is the artist's most essential gift. To attempt to carry farther the psychological analysis of the gift is

outside our present object ; but it is worth while to con- Subjec- s ider somewhat closely its modes of practical operation, Ihl-rjl One mode is this: the artist grows up with certain innate abjective Qr aC q U ; rec j predilections which become a part of his

constitution whether he will or no,— predilections, say, if he is a dramatic poet, for certain types of plot, character and situation; if he is a sculptor, for certain proportions and a certain habitual carriage and disposition of the limbs; if he is a figure painter, for certain schemes of composition and moulds of figure and airs and expressions of countenance; if a landscape painter, for a certain class of local character, sentiment and pictorial effect in natural scenery. To such predilections he cannot choose but make his representations of reality in large measure conform. This is one part of the transmuting process which the data of life and experience have to undergo at the hands of artists, and may be called the subjective or purely personal mode of idealization. But there is another part of that work which springs from an impulse in the artistic constitution not less imperious than the last named, and in a certain sense contrary to it. As an imitator or evoker of the facts of life and nature, the artist must recognize and accept the character of those facts with which he has in any given case to deal. All facts cannot be of the cast he prefers, and in so far as he undertakes to deal with those of an opposite cast he must submit to them; he must study them as they actually are, must apprehend, enforce and bring into prominence their own dominant tendencies. If he cannot find in them what is most pleasing to himself, he will still be led by the abstracting and discriminating powers of his observation to discern what is most expressive and significant in them, he will emphasize and put on record this, idealizing the facts before him not in his direction but in their own. This is the second or objective half of the artist's task of idealization. It is this half upon which Taine dwelt almost exclusively, and on the whole with a just insight into the principles of the operation, in his well-known treatise On the Ideal in Art. Both these modes of idealization are legitimate; that which springs from inborn and overmastering 1 personal preference in the artist for particular aspects of life and nature, and that which springs from his insight into the dominant and significant character of the phenomena actually before him, and his desire to emphasize and disengage them. But there is a third mode of idealizing which is less vital and genuine than either of these, and therefore less legitimate, though unfortunately far more common. This mode consists in making things conform to a borrowed and conventional standard of beauty

and taste, which corresponds neither to any strong inward predilection of the artist nor to any vital characteristic in the objects of his representation. Since the rediscovery of Greek and Roman sculpture in the Renaissance, a great part of the efforts of artists have been spent in falsifying their natural instincts and misrepresenting the facts of nature in pursuit of a conventional ideal of abstract and generalized beauty framed on a false conception and a shallow knowledge of the antique. School after school from the l6th century downwards has been confirmed in this practice by academic criticism and theory, with resulting insipidities and in- sincerities of performance which have commonly been acclaimed in their day, but from which later generations have sooner or later turned away with a wholesome reaction of distaste.

The two genuine modes of idealization, the subjective and the objective, are not always easy to be reconciled. The greatest artist is no doubt he who can combine the strongest personal instincts of preference with the keenest power of observing characteristics as they are, yet in fact we find few in whom both these elements of the ideal faculty have been equally developed. To take an example among Florentine painters, Sandro Botticelli is usually thought of as one who could never escape from the dictation of his own personal

ideals, in obedience to which he is. supposed to have invested all the creations of his art with nearly the same conformation of brows, lips, cheeks and chin, nearly the same looks of wistful yearning and dejection. There is some truth in this Exa j”P les impression, though it is largely based on the works not of ofthe the master himself, but of pupils who exaggerated his °. mannerisms. Leonardo da Vinci was strong in both “‘Jy**, directions; haunted in much of his work by a particular JJLJf !™ . human ideal of intellectual sweetness and alluring tl0n ” a ‘ mystery, he has yet left us a vast number of exercises which show him as an indefatigable student of objective character- istics and psychological expressions of an order the most opposed to this. And in this case again followers have over-emphasized the master’s predilections, Luini, Sodoma and the rest borrowing and repeating the mysterious smile of Leonardo till it becomes in their work an affectatiofi cloying however lovely. Among latter-day painters, Burne-Jones will occur to every reader as the type of an artist always haunted and dominated by ideals of an intensely personal cast partly engendered in his imagination by sympathy with the early Florentines. If we se»k for examples of the opposite principle, of that idealism which idealizes aboveall things objectively, and seeks to disengage the very inmost and individual characters of the thing or person before it, we think naturally of certain great masters of the northern schools, as

Diirer, Holbein and Rembrandt. Durer's endeavour to express such characters by the most searching intensity of linear definition was, however, hampered and conditioned by his inherited national and Gothic predilection for the strained in gesture and the knotted and the gnarled in structure, against which his deliberate scholarly ambition to establish a canon of ideal proportion contended for the most part in vain. And Rembrandt's profound spiritual insight into human character and personality did not prevent him from plunging his subjects, ever deeper and deeper as his life advanced, into a mysterious shadow-world of his own imagination, whereall local colours were brokenupand crumbled, and where amid the struggle of gloom and gleam he could make his intensely individualized men and women breathe more livingly than in plain human daylight.

It is by the second mode of operation chiefly, that is by imagina- tively discerning, disengaging and forcing into prominence their inherent significance, that the idealizing faculty brings into the sphere of fine art deformities and degeneracies Car lcatun to which the name beautiful or sublime can by no stretch and ttle of usage be applied. Hence arise creations like the Stryge « rotes 9»e of Notre-Darne and a thousand other grotesques of Gothic as , mo

Sculpture! painting and poetry, then, are among the greater fine arts those which express and arouse emotion by imitating or evoking real and known things, either for their own sakes literally, or for the sake of shadowing forth things not known but ˆ aideal – imagined. In either case they represent their originals, ?*? iml ~ not indiscriminately as they are, but sifted, simplified, tatma " at enforced and enhanced to our apprehensions partly by meart – the artist's power of making things conform to his own in- stincts and preferences, partly by his other power of interpreting and emphasizing the significant characters of the facts before him. Any imitation that does not do one or other or both of these things in full measure fails in the quality of emotional expression and emotional appeal, and in so failing falls short, taken merely as imitation, of the standard of fine art.

But we must remember that idealized imitation, as such, is not the whole task of these arts nor their only meuns of appeal. There is another part of their task, logically though not practically independent of the relations borne by their imitations , f h a ˆ pe f to the original phenomena of nature, and dependent on ofthe '"> ' m the appeal made through the eye and ear to our primal

tative arts depends

organic sensibilities by the properties of rhythm, pattern v*f and regulated design in the arrangement of sounds, lines, (!f „. °” masses, colours and light-and-shade. That appeal we j m it a ti ve noted as lying at the root of the art impulse in its most e i emeB t s , elementary stage. In its most developed stage every fine art is bound still to play upon the same sensibilities. In a work of sculpture the contours and interchanges of light and shadow are bound to be such as would, please the eye, whether the statue or relief represented the figure of anything real in the world or not. The flow and balance of line, and the distribution of colours and light-and-shade, in a picture are bound to be such as would make an agreeable pattern although they bore no resemblance to natural fact (as, indeed, many subordinate applications of this art, in decorative painting and geometrical and other ornaments, do- we know, srive pleasure though they represent nothing). The

Necessity of due balance between conception and tech- nique: the non» imitative arts and their , technique.

sound of a line or verse in poetry is bound to be such as would thrill the physical ear in hearing, or the mental ear in reading, with a delightful excitement even though the meaning went for nothing. If the imitative arts are to touch and elevate the emotions, if they are to afford permanent delight of the due pitch and volume, it is not a more essential law that their imitation, merely as such, should be of the order which we have defined as ideal, than that they should at the same time exhibit these independent effects which they share with the non-imitative group.

So far we have assumed, without asserting,’ the necessity that the artist in, whatever kind should possess a power of execution, or technique as it is called in modern phrase, adequate to the task of embodying and giving shape to his ideals. In thought it is possible to separate the conception of a work of art from its execution; in practice it is not possible, and half the errors in criticism and speculation about the fine arts spring from failing to realize that an artistic conception can only be brought home to us through and by its appropriate embodiment. Whatever the artist’s cast of imagination or degree of sensibility may be in presence of the materials of life, it is essential

that he should be able to express himself appropriately in the material of his particular art. To quote the writer (R. A. Mi Stevenson) who has enforced this point most clearly and vividly, perhaps with some pardonable measure of over-statement : “It is a sensitiveness to the special qualities of some visible or audible medium of art which distinguishes . the species artist from’ the genus man.” And again : ” There are as many separate faculties of imagination as thereare separate mediums in which to conceive an image — clay, words, paint, notes of music.” . . . ” Technique differs as the material of each art differs — differs as marble, pigments, musical notes and words differ.” The artist who does not enjoy and has not with delighted labour mastered the effects of his own chosen medium will never be a master; the hearer, reader or spectator who cannot appreciate the qualities of skill, vitality and charm in the handling of the given material, or who fails to feel their absence when they aTe lacking, or who looks in one material primarily for the qualities appropriate to another, will never make a critic. The technique of the space-arts differs radically from that of the time-arts. So again do those of the imita- tive and the non-imitative arts differ among themselves. The non- imitative arts of music and architecture are in a certain degree alike in this, that the artist is in neither case his own executant (this at least is true of music so far as concerns its modern con- certed and orchestral developments) ; the musical composer and the architect each imagines and composes a design in the medium of his own art which it is left for others to carry out under his direction. The technique in each case consists not in mastery of an instrument (though the musical composer may be, and often is, a master of some one of the instruments whose effects he in his mind’s ear co-ordinates and combines) ; it lies in the power of knowing and conjuring up all the emotional resources and effects of the various materials at his command, and of conceiving a’rid designing to their last detail vast and ordered structures, to be raised by subordinate executants- from those materials, which shall adequately express his temperament and embody his ideals.

In the imitative arts, on the other hand, the sculptor, unless he is a fraud, must be wholly his own executant in the original task of modelling his design in the soft material of clay or wax, though he must accept the aid of assistants whether in the casting of his work in bronze or in first roughing it out from the block in marble. Too many sculptors have been inclined further to trust to trained mechanical help in finishing their work with the chisel; with the result that the surface loses the touch r which is the ex- pression of personal temperament and, personal feeling for the relations of his material to

nature. The artist in love with the vital qualities of form, or those, of his own handiwork in expressing such qualities in modelling-clay, will never stop until he learns how to translate them for himself in marble. Proceeding to that imitative art which leaves out the third dimension of nature, and by so doing enormously increases the range of objects and effects which come within its power — proceeding to the art of painting, the painter is in theory exclusively his own executant, and in practice mainly so, though in certain schools and periods the great artists have been accustomed to surround themselves with pupils to whom they have imparted their methods and who have helped them in the subordinate and preparatory parts of their work. But the painter fit to teach and lead can by no means escape the necessity of being himself a master of his material, and his handling of it must needs bear the immediate impress of his tempera- ment. His emotional preferences among the visible facts of nature, his feeling for the relative importance and charm of line, colour, light and shade, used whether for the interpretation and heightening of natural fact or for producing a pattern in itself harmonious and suggestive to the eye, his sense of the special modes of handling most effective for communicating the impression he desires, all these together inevitably appear in, and constitute, his style and technique. If he is careless or inexpert or conventional, or cold or without delight, in technique, though he may be animated by the noblest purposes

The imita- tive arts and their technique: painting and sculp- ture.

and the loftiest ideas, he is a failure as a painter. At certain periods in the history of painting, as in the 13th and 14th centuries in Italy, the technique seems indeed to modern eyes wholly immature; but that was because there were many aspects of visible things which the art had not yet attempted or desired to portray, not because it did not put forth with delight its best traditional or newly acquired skill in portraying the special aspects with which it had so far attempted to grapple. At certain other periods, as in the later 16th arid 17th centuries in the same country, the elements of inherited technical facility and academic pride of skill outweigh the sincerity and freshness of interest taken in the aspects of things to be portrayed, and the true balance is lost. At other times, as in much of the work of the 19th century, especially in England, painters have been diverted from their true task, and lost hold of intelligent and living technique altogether, in trying to please a public blind to the special qualities of their art, and prone to seek in it the effects, frivolous or serious, which are appropriate not to paint and canvas but to literature.

Lastly, the poet and literary artist must obviously be the exclusive

master of his own technique. No one can help him : all depends on the keenness of his double sensibility to the thrill of life _ and to that of words, and to his power of maintaining a J ecanl Q

” Twice five years Or less I might have seen, when first my mind With conscious pleasure opened to the charm Of words in tuneful order, found them sweet For their own sakes, a passion, and a power ; And phrases pleased me chosen for delight, For pomp, or love.” And again, expressing betterthan any one else the relation which words in true poetry hold to things, he writes :

” Visionary power Attends the motions of the viewless winds, Embodied in the mystery of words ; There darkness makes abode, and all the host Of shadowy things work endless changes, — there, As in a mansion like their proper home, Even forms and substances are circumfused By that transparent veil with light divine, And, through the turnings intricate of verse, Present themselves as objects recognized, In flashes, and with glory not their own.”

3. The Serviceable and the Non-Serviceable Arts. — It has been

established from the outset that, though the essential distinction of

fine art as such is to minister not to material necessity or

practical use, but to delight, yet there are some among the , ,

arts of men which do both these things at once and are f.*™ 8 ”” — ,.. „r a: i 1 _r i ˆ _ .” _ .• , , tmn: the

arts of direct use and of beauty or emotional appeal together. Under this classification a survey of the field of art at different periods of history would yield different

results. In ruder times, we have seen, the utilitarian aim ser ˆ lceable was still the predominant aim of art, and most of what art5 we now call fine arts served in the beginning to fulfil the practical needs of individual and social life ; and this not only among primitive or savage races. In ancient Egypt and Assyria the primary purpose of the relief-sculptures on palace and temple walls was the practical one of historical record and commemoration. Even as late as the middle ages and early Renaissance the primary business of the painter was to give instruction to the unlearned in Bible history and in the lives of the saints, and to rouse him to moods of religious and ethical exaltation. The pleasures of fine art proper among the manual-imitative group — the pleasures, namely, of producing and contemplating certain

arrangements rather than others of design, proportion, pattern, colour and light and shade, and of putting forth and appreciating certain qualities of skill, truth and significance in idealized imitation, — these were, historically speaking, by-products that arose gradually in the course of practice and development. As time went on, the conscious aim of ministering to such pleasures displaced and threw into the background the utilitarian ends for which the arts had originally been practised, and the pleasures became ends in themselves.

But even in advanced societies the double qualities of use and

architec- ture alone exists

beauty still remain inseparable, among the five greater arts, in

architecture. We build in the first instance for the sake of

Among the necessar y shelter and accommodation, or for the com-

X”> a ter memoration, propitiation or worship of spiritual powers on

a ‘ whom we believe our welfare to depend. By and by we

find out that the aspect of our constructions is pleasurable

or the reverse. Architecture is the art of building at once

orlmarihr as we neec ‘ ana – as we ^’ ce » an d a practical treatise on f or architecture must treat the beauty and the utility of

sen-ice. buildings as bound up together. But for our present purpose it has been proper to take into account one half only of the vocation of architecture, the half by which it im- presses, gives delight and belongs to that which is the subject of our study, to fine art ; and to neglect the other half of its vocation, by which it belongs to what is not the subject of our study, to useful or mechanical art. It is plain, however, that the presence or absence of this foreign element, the element of practical utility, constitutes a fair ground for a new and separate classification of the fine arts. Jf we took the five greater arts as they exist in modern times by themselves, architecture would on this ground stand alone in one division, as the directly useful or

serviceable fine art ; with sculpture, painting, music and poetry together in the other division, as fine arts unassociated with such use or service. Not that the divi- sions would, even thus, be quite sharply and absolutely separated. Didactic poetry, we have already acknowledged, is a branch of the poetic art which aims at practice and utility. Again, the hortatory and patriotic kinds of lyric poetry, from the strains of Tyrtaeus to those of Arndt or Rouget de Lisle or Wordsworth's sonnets written in war-time, may fairly be said to belong to a phase of fine art which aims directly at one of the highest utilities, the stimulation of patriotic feeling and self-devotion. So may the strains of music which accompany such poetry. The same practical character, as stimulating and attuning the mind to definite ends and actions, might indeed have been claimed for the greater part of the whole art of music as that art was practised in antiquity, when each of several prescribed and highly elaborated moods, or modes, of melody was supposed to have a known effect upon the courage and moral temper of the hearer. Compare Milton, when he tells of the Dorian mood of flutes and soft recorders which assuaged the sufferings and renewed the courage of Satan and his legions as they marched through hell. In modern music, of which the elements, much more complex in themselves than those of ancient music, have the effect of stirring our fibres to moods of rapturous contemplation rather than of action, military strains in march time are in truth the only purely instrumental variety of the art which may still be said to retain this character.

To reinforce, however, the serviceable or useful division of fine

arts in our present classification, it is not among the greater arts

that we must look. We must look among the lesser or

Other and aux ;i; ar y ar f- s f f^e manual or shaping group. The

minor arts W eaver, t h e joiner, the potter, the smith, the goldsmith,

h- e tne glass-maker, these and a hundred artificers who pro- S "rdi ate duce wares primarily for use, produce them in a form or 'toarchl- w ' t ' 1 embellishments that have the secondary virtue of tecture ' gi vm £ pleasure both to the producer and the user. Much ingenuity has been spent to little purpose in attempting to group and classify these lesser shaping arts under one or other of the greater shaping arts, according to the nature of the means employed in each. Thus the potter's art has been classed under sculpture, because he moulds in solid form the shapes of his cups,

Elates and ewers; the art of the joiner under that of the architect, ecause his tables, seats and cupboards are fitted and framed together, like the houses they furnish, out of solid materials previously prepared and cut ; and the weaver and embroiderer, from the point of view of the effects produced by their art, among painters. But the truth is, that each one of these auxiliary handicrafts has its own materials and technical procedure, which cannot, without forcing and confusion, be described by the name proper to the materials and technical procedure of any of the greater arts. The only satis- factory classification of these handicrafts is that now before us, according to which we think of them all together in the same group with architecture, not because any one or more of them may be technically allied to that art, but because, like it, they all yield products capable of being practically useful and beautiful at the same time. Architecture is the art which fits and frames together, of stone, brick, mortar, timber or iron, the abiding and assembling places of man, all his houses, palaces, temples, monuments, museums, workshops, roofed places of meeting and exchange, theatres for spectacle, fortresses of defence, bridges, aqueducts, and ships for seafaring. The wise architect having fashioned any one of these great constructions at once for service and beauty in the highest degree, the lesser or auxiliary manual arts (commonly called ” in- dustrial ” or ” applied ” arts) come in to fill, furnish and adorn it with things of service and beauty in a lower degree, each according to its own technical laws and capabilities; some, like pottery, delighting the user at once by beauty of form, delicacy of substance, and pleasantness of imitative or non-imitative ornament ; some, like embroidery, by richness of tissue, and by the same twofold pleasant- ness of ornament; some, like goldsmith’s work, by exquisiteness of fancy and workmanship proportionate to the exquisiteness of the

material. To this vast group of workmen, whose work is at the same time useful and fine in its degree, the ancient Greek gave the place which is most just and convenient for thought, when he classed them all together under the name of tcktoj>«s, or artificers, and called the builder by the name of 6.pxirkicTa>v, arch-artificer or artificer-in-chief . Modern usage has adopted the phrase ” arts and crafts ” as a convenient general name for their pursuits.

III. Of the History of the Fine, Arts.

Students of human culture have concentrated a great deal of attentive thought upon the history of fine art, and have put forth various comprehensive generalizations intended at once to sum up and to account for the phases and „”^.”;. vicissitudes of that history. The most

famous formulae izations are those of Hegel, who regarded particular arts as being on the characteristic of and appropriate to particular forms h , i . stor ˆ t ! >t of civilization and particular ages of history. For him, n e gei.' architecture was the symbolic art appropriate to ages of obscure and struggling ideas, and characteristic of the Egyptian and the Asiatic races of old and of the medieval age in Europe. Sculpture was the classical art appropriate to ages of lucid and self-possessed ideas, and characteristic of the Greek and Roman period. Painting, music and poetry were the romantic arts, appropriate to the ages of complicated and overmastering ideas, and characteristic of modern humanity in general. In the working out of these generalizations Hegel brought together a mass of judicious and striking observations; and that they contain on the whole a preponderance of truth may be admitted. It has been objected against them, from the philosophical point of view, that they too much mix up the definition of what the several arts theoretically are with considerations of what in various historical circumstances they have practically been. From the historical point of view there can be taken what seems a more valid objection, that these formulae of Hegel tend too much to fix the attention of the student upon the one dominant art chosen as characteristic of any period, and to give him false ideas of the proportions and relations of the several arts at the same period — of the proportions and relations which poetry, say, really bore to sculpture among the Greeks and Romans, or sculpture to architecture among the Christian nations of the middle age. The truth is, that the historic survey gained over any field of human activity from the height of generaliza- tions so vast in scope as these are must needs, in the complexity of earthly affairs, be a survey too distant to give much guidance until its omissions are filled up by a great deal of nearer study; and such nearer study is apt to compel the student in the long run to qualify the theories with which he has started until they are in danger of disappearing altogether.

Another systematic exponent of the universe, whose system is very different from that of Hegel, Herbert Spencer, brought the doctrine of evolution to bear, not without interest- u er hert ing results, upon the history of the fine arts and their Spencer development. Herbert Spencer set forth how the and the manual group of fine arts, architecture, sculpture *?oiutioa and painting, were in their first rudiments bound up together, and how each of them in the course of history has liberated itself from the rest by a gradual process of separation. These arts did not at first exist in the distinct and developed forms in which we have above described them. There were no statues in the round, and no painted panels or canvases hung upon

the wall. Only the rudiments of sculpture and painting existed, and that only as ornaments applied to architecture, in the shape of tiers of tinted reliefs, representing in a kind of picture-writing the exploits of kings upon the walls of their temple-palaces. Gradually sculpture took greater salience and roundness, and tended to disengage itself from the wall, while painting found out how to represent solidity by means of its own, and dispensed with the raised surface upon which it was first applied. But the old mixture and union of the three arts, with an undeveloped art of painting and an undeveloped art of sculpture still engaged in or applied to the works of archi- tecture, continued on the whole to prevail through the long cycles of Egyptian and Assyrian history. In the Egyptian

palace-temple we find a monument at once political and religious, upon the production of which were concentrated all the energies and faculties of all the artificers of the race. With its incised and pictured walls, its half-detached colossi, its open and its colonnaded chambers, the forms of the columns and their capitals recalling the stems and blossoms of the lotus and papyrus, with its architecture everywhere taking on the characters and covering itself with the adornments of immature sculpture and painting — this structure exhibits within its single fabric the origins of the whole subsequent group of shaping arts. From hence it is a long way to the innumerable artistic surroundings of later Greek and Roman life, the many temples with their detached and their engaged statues, the theatres, the porticoes, the baths, the training-schools, the stadiums, with free and separate statues both of gods and men adorning every building and public place, the frescoes upon the walls, the panel pictures hung in temples and public and private galleries. In the terms of the Spencerian theory of evolution, the advance from the early Egyptian to the later Greek stage is an advance from the one to the manifold, from the simple to the complex, from the homogeneous to the heterogeneous, and affords a striking instance of that vast and ceaseless process of differentiation and integration which it is the law of all things to undergo. In the Christian monuments of the early middle age, again, the arts, owing to the political and social cataclysm in which Roman civilization went down, have gone back to the rudimentary stage, and are once more

attached to and combined with each other. The single monument, the one great birth of art, in that age, is the Gothic church. In this we find the art of applied sculpture exercised in fashions infinitely rich and various, but entirely in the service and for the adornment of the architecture ; we find painting exercised in fashions more rudimentary still, principally in the forms of translucent imagery in the chancel windows and tinted decorations on the walls and vaultings. From this stage again the process of the differentiation of the arts is repeated. It is by a new evolution or unfolding, and by one carried to much further and more complicated stages than the last had reached, that the arts since the middle age have come to the point where we find them to-day; when architecture is applied to a hundred secular and civil uses with not less magnificence, or at least not less desire of magnificence, than that with which it fulfilled its two only uses in the middle age, the uses of worship and of defence; when detached sculptures adorn, or are intended to adorn, all our streets and commemorate all our likenesses; when the subjects of painting have been extended from religion to all life and nature, until this one art has been divided into the dozen branches of history, landscape, still life, genre, anecdote and the rest. Such being in brief the successive stages, and such the reiterated processes, of evolution among the shaping or space arts, the action of the same law can be traced, it is urged, in the growth of the speaking or time arts also. Originally poetry and music, the two great speaking arts, were not separated from each other and from the art of bodily motion, dancing. The father of song, music and dancing, all three, was that primitive man of whom so much has already been said, he who first clapped hands and leapt and shouted in time at some festival of his tribe. From the clapping, or rudi- mentary rhythmical noise, has been evolved the whole art of instrumental music, down to the entrancing complexity of the modern symphony. From the shout, or rudimentary emotional utterance, has proceeded by a kindred evolution the whole art of vocal music down to the modern opera or oratorio. From the leap, or rudimentary expression of emotion by rhythmical movements of the body, has descended every variety of dancing, from the stately figures of the tragic chorus of the Greeks to the kordax of their comedy or the complexities of the modern ballet.

That the theory of evolution serves usefully to group and to interpret many facts in the history of art we shall not deny, though it would be easy to show that Herbert Spencer's instances and applications are not sufficient to sustain all the conclusions that he seems to draw from them. Thus, it is perfectly true

that the Egyptian or Assyrian palace wall is an instance of

rudimentary painting and rudimentary sculpture in subser- vience to architecture. But it is not less true that races who had no architecture at all, but lived in caverns of ^^f" rf the earth, exhibit, as we have already had occasion to points of notice, excellent rudiments of the other two shaping arts Spencer's in a different form, in the carved or incised handles of j e "%) al ~ their weapons. And it is almost certain that, among the nations of oriental antiquity themselves, the art of decorating solid walls so as to please the eye with patterns and presentations of natural objects was borrowed from the precedent of an older art which works in easier materials, namely, the art of the weaver. It would be in the perished textile fabrics of the earliest dwellers in the valleys of the Euphrates and the Nile that we should find, if anywhere, the origins of the systems of surface design, whether conventional or imitative, which those races afterwards applied to the decoration of their solid construc- tions. Not, therefore, in any one exclusive type of primitive artistic activity, but in a score of such types equally, varying according to race, region and circumstances, shall we find so many germs or nuclei from which whole families of fine arts have in the course of the world's history differentiated and unfolded themselves. And more than once during that history, a cataclysm of political and social forces has not only checked the process of the evolution of the fine arts, but from an advanced stage of development has thrown them back again to a primitive stage. Recent research has shown how the Minoan and Mycenaean civilizations in the Mediterranean basin, with their developed fine arts, must have perished and been effaced before the second growth of art from new rudiments took place in Greece. The great instance of the downfall of the Roman civilization need not be requoted. By Spencer's application of the theory of evolution, not less than by Hegel's theory of the historic periods, attention is called to the fact that Christian Europe, during several centuries of the middle age, presents to our study a civilization analogous to the civilization of the old oriental empires in this respect, that its ruling and characteristic manual art is architecture, to which sculpture and painting are, as in the oriental empires, once more subjugated and attached. It does not of course follow that such periods of fusion or mutual dependence among the arts are periods of bad art. On the contrary, each stage of the evolution of any art has its own characteristic excellence. The arts can be employed in combina- tion, and yet be all severally excellent. When music, dancing, acting and singing were combined in the performance of the Greek chorus, the combination no doubt presented a relative perfection of each of the four elements analogous to the combined perfection, in the contemporary Doric temple, of pure architec- tural form, sculptured enrichment of spaces specially

contrived for sculpture in the pediments and frieze, and coloured decoration over all. The extreme differentiation of any art from every other art, and of the several branches of one art among themselves, does not by any means tend to the perfection of that art. The process of evolution among the fine arts may go, and indeed in the course of history has gone, much too far for the health of the arts severally. Thus an artist of our own day is usually either a painter only or a sculptor only; but yet it is acknow- ledged that the painter who can model a statue, or the sculptor who can paint a picture, is likely to be the more efficient master of both arts; and in the best days of Florentine art the greatest men were generally painters, sculptors, architects and goldsmiths all at once. In like manner a landscape painter who paints landscape only is apt not to paint it so well as one who paints the figure too; and in recent times the craft of engraving had almost ceased to be an art from the habit of allotting one part of the work, as skies, to one hand, another part, as figures, to a second, and another part, as landscape, to a third. This kind of continually progressing subdivision of labour, which seems to be the necessary law of industrial processes, is fatal to any skill which demands, as skill in the fine arts, we have seen, demands, the free exercise and direction of a highly complex cluster both of faculties and sensibilities.

[HISTORICAL DEVELOPMENT

In the second half of the 19th century a reaction set in against such over-differentiation of the several manual arts and crafts.

This reaction is chiefly identified in England with the

1

against

Reaction name j William Morris, who insisted by precept and

over . example that one form of artistic activity was as

evolution worthy as another, and himself both practised and th”ti’ St trame(J others in the practice of glass-painting, weaving, arts- embroidery, furniture and wall-paper designing, and

book decoration alike. His example has been to some extent followed in most European countries, and efforts have been made to reunite the functions of artist and craftsman, and to set a limit to the process of differentiation among the various manual arts. In the vocal or time arts also, a reformer of high genius and force of character, Richard Wagner, rose to contend that in music the process of evolution and differentiation had gone much too far. Music, he urged, as separated from words and actions, independent orchestral and instrumental music, had reached its utmost development, and its further advance could only be an advance into the inane; while operatic music had broken itself up into a number of set and separate forms, as aria, scena, recitative, which corresponded to no real varieties of instinctive emotional utterance, and in the aimless production of which the art was in danger of paralysing and stultifying itself. This process, he declared, must be checked; music and words must be brought back again into close connexion and mutual dependence; the artificial opera forms must be abolished, and a new and homogeneous music-drama be created, of which the author must combine in himself the functions of poet, composer, inventor, and director of scenery and stage appliances, so that the entire creation should bear the impress of a single mind; to the creation of such a music-drama he accordingly devoted all the energies of his being.

It is thus evident that the evolution theory, though it furnishes us with some instructive points of view for the history of the fine t arts as for other things, is far from being the whole philosophy k e y to that history. Another key, employed with or natural results perhaps less really luminous than they are history of certainly showy and attractive, is that supplied by arts ”’ Taine. Taine’s philosophy, which might perhaps be better called a natural history, of fine art consists in regarding the fine arts as the necessary result of the general conditions under which they are at any time produced — conditions of race and climate, of religion, civilization and manners. Acquaint yourself with these conditions as they existed in any given people at any given period, and you will be able to account for the characters assumed by the arts of that people at that period, and to reason from one to the other, as a botanist can account for the flora of any given locality, and can reason from its soil, exposure and temperature, to the orders of vegetation which it will produce. This method of treating the history of the fine arts, again, is one which can be pursued with profit in so far as it makes the student realize the connexion of fine arts with human culture in general, and teaches him how the arts of any age and country are not an independent or arbitrary phenomenon, but are essentially an outcome, or efflorescence, to use a phrase of Ruskin’s, of

deep-seated elements in the civilization which produces them. But it is a method which, rashly used, is very apt to lead to a hasty and one-sided handling both of history and of art. It is easy to fasten on certain obvious relations of fine art to general civilization when you know a few of the facts of both, and to say, the cloudy skies and mongrel industrial population of Protestant Amsterdam at such and such a date had their inevitable reflection in the art of Rembrandt; the wealth and pomp of the full-fleshed burghers and burgesses of Catholic Antwerp had theirs in the art of Rubens. But to do this in the precise and conclusive manner of Taine's treatises on the philosophy of art always means to ignore a large range of conditions or causes for which no corre- sponding effect is on the surface apparent, and generally also a large number of effects for which appropriate causes cannot easily be discovered at all.

These considerations have resulted in a reaction against

Taine's theories which goes probably too far. It is no complete

confutation of his philosophy of art-history to contend,

as has been done somewhat contemptuously by ˆ sms

Professor Ernst Grosse and others, that the great counter-

artist, so far from representing the general tendencies criticisms

of his time and environment, is commonly a solitary "" Zt ia f s . , ,..',, , J methods,

innovator and revolutionist, and has to educate and

create his own public, often through years of obloquy or neglect. This is sometimes true when the traditions and ideals of art are undergoing revolution or swift experimental change, but hardly ever true in times of stable tradition and accepted ideals; and when true it only shows that the tendencies, the innovating genius represents are tendencies which have till his time been working underground, and which he is born to bring into light and evidence. A new and revolutionary impulse in art, as in thought or politics, is like a yeast or ferment working at first secretly, affecting for a while only a few spirits, as a new epidemic may for a while only affect a few constitutions, and then gradually ripening and strengthening till it communicates itself to thousands. In its inception such a ferment is not, indeed, one of the obvious phenomena of the society in which it takes root, but it is none the less one of the most vital and significant phenomena. The truth is,

that this particular efflorescence of human culture depends for its character at any given time upon combinations of causes which are by no means simple, but generally highly complex, obscure and nicely balanced. For instance, the student who should try to reason back from the holy and beatified character which prevails in. much of the devotional painting of the Italian schools down to the Renaissance would be much mistaken were he to conclude!- “like art, like life, / houghts and manners.” He would not understand the relation of the art to the general civilization of those days unless he were to remember that one of the chief functions of the imagination is to make up for the shortcomings of reality, and to supply to contemplation images of that which is most lacking in actual life; so that the visions at once peaceful and ardent embodied by the religious schools of art in the Italian cities are to be. explained, not by the peace, but rather in great part by the dispeace, of contemporary existence, and by the longing of the human spirit to escape into happier and more calm conditions.

Any one of the three modes of generalization to which we have referred might no doubt yield, however, supposing in the student the due gifts of patience and of caution, a working clue to guide him through that immense region of j%£? r , research, the history of the fine arts. But it is hardly biaiug’the possible to pursue to any purpose the history of the study ot two great groups, the shaping group and the speaking ˆ nua/ ■ group, together. At some stages of the world’s Zkh”that history the manual and the monumental arts have ofihe flourished, as in Egypt and Assyria, when there was vocal no fine art of words at all, and the only literature was ^^3ˆ. that of records cut in hieroglyph or cuneiform on palace walls and temples, and on tablets, seals and cylinders. At other times and in other communities there has existed a great tradition and inheritance of poetry and song when the manual arts were only beginning to emerge again from the wreck of an old civilization, as in the Homeric age of Greece, or where they had never flourished at all except by imitation and importation, as in Palestine. In historic Greece aU three divisions of the art of poetry, the epic, lyric, and the dramatic, had been perfected, and two of them had again declined, before sculpture had reached maturity or painting had passed beyond the stage of its early severity. The European poetry of the middle ages, abundant and rich as it was alike in France and Provence, in Germany and Scandinavia, can yet not take rank, among the creations of human genius, beside the great master- pieces of Romanesque and Gothic architecture; it was in Italy only that Dante, before the end of that age, carried poetry to a place of equality if not of primacy among the arts. Taking the England of the Elizabethan age,

we find the great outburst of our national genius in poetry contemporary with nothing more

interesting in the manual arts than the gradual and only half-intelligent transformation of late Gothic architecture by the adoption of Italian Jlenaissance forms imported principally by way of Flanders or France, together with a fine native skill shown in the art of miniature portrait-painting, and none at all worth mentioning in other branches of painting or in sculpture. If the course of poetry and that of the manual arts have thus run independently throughout almost the whole field of history, those of music and the manual arts have been more widely separated still. In ancient Greece music and poetry were, we know, most intimately connected, but of the true nature of Greek music we know but little, of that of the earlier middle ages less still, and throughout the later middle ages and the earlier Renaissance the art remained undeveloped, whether in the service of the church or in secular and popular use, and in both cases in strict subservience to words. The growth of independent music is entirely the work of the modern world, and will probably rank in the esteem of posterity as its highest spiritual achievement and claim to gratitude, when the mechanical inventions and applications of applied science, which now occupy so dispropor- tionate a part of the attention of humanity, have become a normal and unregarded part of its existence.

Moments in history there have no doubt been when literature and the manual arts, and even music, have been swept simul- taneously along a single stream of ideas and feelings. Such a moment was experienced in France in 183c and the following years, when (to choose only a few of the greatest names) Hugo in poetry, Delacroix in painting, and Berlioz in music were roused to a high pitch of consentaneous inspiration by the new ideas and feelings of romanticism. But such moments are rare and exceptional. On the other hand, it is very possible to take the whole of the shaping or manual group of fine arts-together and to pursue their history connectedly throughout the course of civilization. By the history of art what is usually meant is indeed the history of these three arts with that of some of their subordinate and connected crafts. Leaving aside the arts of the races of the farther East, which, profoundly interesting as they are, have but gradually and late become known to us, and the relations of which

with the arts of the nearer East and the Mediterranean are still quite obscure — leaving these aside, the history of the manual arts of architecture, painting and sculpture falls naturally into several great periods or divisions to some extent overlapping each other but in the main consecutive. These periods are roughly as follows:—

1. The period of the great civilizations of Mesopotamia and the Nile, beginning approximately about 5000 B.C. Mala divt' an d ending, roughly speaking (but some of them sioas of much earlier), with the spread of Greek power and the history Greek ideas under Alexander. On the main char- a * acteristics of the art of these empires we have already had occasion to touch.

2. The Minoan and Mycenaean period, partly contemporary with the above and dating probably from about 2500 to about 1000 B.C.; our knowledge of this is due entirely to quite recent researches, confined at present to certain points in Greece and Asia Minor, in Crete and other islands in the Mediterranean basin; enough has already been revealed to prove the existence' of an original and highly developed palace-architecture and of forms of relief-painting and of all the minor and decorative arts more free and animated than anything known to Egypt or Assyria. (See Crete and Aegean Civilization.)

3. The Greek and Roman period, from about 700 B.C. to the final triumph of Christianity, say a.d. 400. During the first two or three centuries of this period the Hellenic race, beginning again after the cataclysm which had swallowed up the earlier Mediterranean civilizations, carried to perfection its most characteristic art, that of sculpture, in the endeavour to embody worthily its ideas of the supernatural powers governing the world. Putting aside the monstrous gods of Egypt and the East, it found its ideals in varieties of the human form as presented by the most harmoniously developed specimens of the race under co nditions of the greatest health, activity and grace. In the figures

of Greek sculpture, both decorative and independent, and no doubt in Greek painting also (but of that we can only judge from such specimens of the minor handicrafts, chiefly vase-paintings, as have come down to us) — in these were set for the whole Western world the types and standards of human beauty, and in their grouping and arrangement the types and standards of rhythmical composition and design. Gradually human por- traiture and themes of everyday life took their place beside representations of the gods and heroes. New schools struck out new tendencies within certain limits. But in the general standards of form and design there was in the imitative arts

relatively little change, though towards the end there was much failure of skill, throughout the whole period. The one great change was in architecture. Greece had been content with the constructive system of columns and horizontal entablature, and under that system had invented and perfected her three successive modes or orders of architecture — the Doric, Ionic and Corinthian. The genius of Rome invented the round arch, and by help of that system erected throughout her subject world a thousand vast constructions — temple, palace, bath, amphitheatre, forum, aqueduct, triumphal gate and the rest — on a scale of monumental grandeur such as Greece had never known.

4. The Christian period, from about 400 to about 1400. The decay or petrifaction of the imitative arts which had set in . during the latter days of Rome continued during all the earlier centuries of the Christian period, while the Western world was in process of remaking. Free painting and free sculpture practically ceased to exist. Roman architecture underwent modifications under the influence of the church and of the new conditions of life; the Byzantine form, touched at certain times and places with oriental influences, developed itself wherever the Eastern Empire still stood erect in decay; the Romanesque form, as it is called, in the barbarian-conquered regions of the west and north. Sculpture existed for centuries only in rudimentary and subordinate forms as applied to archi- tecture; painting only in forms of rigid though sometimes impressive hieratic imagery, whether as mosaic in the apses and vaults of churches, as rude illumination in MSS. and service- books, or as still ruder altar-painting carried on according to a frozen mechanical tradition. As time went on and medieval institutions developed themselves, a gradual vitality dawned in all these arts. In architecture the introduction of the pointed or Gothic arch at the beginning of the 13th century led to almost as great a revolution as that brought about by the use of the round or vaulted arch among the Romans. The same vital impulse that informed the new Gothic architecture breathed into the still quite subordinate arts of sculpture and painting (the latter now including the craft of glass-painting for church windows) a new spirit whether of devotional intensity or sweet- ness, or of human pathos or rugged humour, with a new technical skill for its embodiment. We have not set down, as is usually done, a specifically Gothic period in art, for this reason. The characteristic of the whole Christian period is that its dominant art is architecture, chiefly employed in the service of the church, with painting and sculpture only subordinateˆ introduced for its enrichment. It makes no essential difference that from the 5th to the 1 2th century the forms of this art

were derived with various modifications from the round-arched architecture of the Empire, and that by the 13th century new forms both of con- struction and decoration, in which the round arch was replaced by the pointed, had been invented in France, and from thence spread abroad to Germany and Scandinavia, Great Britain, Spain, and last and most superficially to Italy. The essential difference only begins when the imitative arts, sculpture and painting, begin to emancipate and detach themselves, to exist and strive after perfection on their own account. This happened first and very partially in Italy with the artificers of the 13th «md 14th centuries — with the sculptors Nicola, Giovanni, and Andrea Pisano; the Sienese group of painters, Duccio, Simone Martini, and the Lorenzetti; and the Florentine group, Cimabue (if Cimabue is not a myth), Giotto and the Giotteschi. The

development of the rapid and flowing craft of fresco in place of the laborious and piecemeal craft of mosaic (henceforth for several centuries almost lost) was a great aid to this movement. After a period of something like stagnation, the movement received a vigorous fresh impulse soon after 1400, at about which date in Italy (not till near a century later in northern Europe) the beginning of the Renaissance is usually fixed.

5. The Renaissance period, from about 1400 to about 1600. The passion for classic literature, stimulated by the influence of Greek scholars into Italy after the fall of Constantinople; the enthusiastic revival of classic forms of architecture by architects like Brunelleschi and Alberti; the achievements in sculpture and painting of masters like Donatello and Masaccio, based on a new and impassioned study of nature and the antique together; these are the outstanding and universally known symptoms of the Italian Renaissance in the second and third quarters of the 15th century. Promptly and contemptuously in Italy, much more gradually and incompletely in, the north, Gothic principles of construction and decoration were cast aside for classical principles, as reformulated by eager spirits from a combined study of Roman remains and of the text of Vitruvius. To the ideal types of devout and prayer-worn, ascetic and spiritualized humanity (tempered in certain subjects with elements of the homely and the grotesque), which the spirit of the middle ages had dictated to the sculptor and the painter, succeeded ideals of physical power, beauty and grace

rivalling the Hellenic. The personages of the Christian faith and story were brought into visible kindred with those of ancient paganism. In the hands of certain artists a fortunate blending of the two ideals yielded results of a poignant and unique charm, which for us, who are the heirs both of antiquity and the middle ages, is far from being yet exhausted. At the same time, the love alike of republics, great princes, churchmen, nobles and merchants for works of art gave employment to sculptors and painters on themes other than ecclesiastical. The taste for civic or personal commemoration, for portraiture, for illustrations of allegory, romance and classic fable, covered with pictures the walls of council halls, of public and private palaces, and of villas. The invention of the oil medium by the painters of Flanders, and its gradual adoption by the Venetians and other schools of Italy for all purposes except the external decorations of buildings, added enormously to the resources of the art in rivalry with nature, and to the splendour of its results as objects of pride and luxury. The glories of matured Italian art reacted, not always favourably, on the north. The great days of Flemish painting had been from about 1430 to 1500, before any appreci- able influence of the Renaissance had touched the schools of Brussels, of Bruges or of Antwerp. By about 1520 the artists of those schools had begun, except in portraiture, to lose their native vigour and originality by contact with the alien south. Among the great artists of Germany in the first half of the 16th century the work of one or two, like Burgkmair and Holbein, shows Italian influence reconciled not unsuccessfully with native instinct; but Diirer, the greatest of them, remained in all essentials Gothic and German to the end. During the last half of the century, the Netherlands and Germany alike yielded little but work of mongrel Teutonized Italian or Italianized Teutonic type, until towards its close Rubens accomplished, in the fire of his prodigious temperament, a true fusion of Flemish and Venetian qualities, at the same time closing gloriously the Renaissance period properly so called, and handing on an example which irresistibly affected a great part of modern painting.

6. Modern period, from about 1600 to the present time. During this period architecture remained in all European countries, until the 19th century, more or less completely under the influence of the Italian Renaissance. The principles of the classical revival had during a century or more of transition been gradually absorbed, first by France, then by Germany, the Low Countries, and Spain, and last by England, each country modify- ing the style according to its degree of knowledge or ignorance, its needs, instincts and traditions. Sculpture, which in the

hands of the great masters of the earlier and later Renaissance in Italy

had almost equalled its ancient glories, nay, in those of Michelangelo had actually surpassed, them in the qualities at least of superhuman energy and intellectual expression — sculpture lost the sense of its true limitations, and entered, with the work of Bernini and even earlier, into an extravagant or ” baroque ” period of relaxed and bulging line, of exaggerated and ostentatious virtuosity. In this it followed the lead given by Italian architecture, by Jesuit church architecture especially, at and after the height of the Catholic reaction. From the monumental and memorial purposes which sculpture principally serves, it remained still, except in purely iconic uses, attached to or dependent on architecture. Not so painting, which asserted its independence more and more. In Protestant countries the old ecclesiastical patronage of the art had quite died out; in those that remained Catholic it continued, and even received a new stimulus from the anti-Protestant reaction. The demand for religious art was supplied with abundance of traditional facility, of technical accomplishment and devotional display, but with a loss of the old sincerity and inspiration. Almost all painting, even for the most extensive and monumental phases of decoration in church or palace or civic hall, was on canvas stretched over or fitted into its allotted space in the architecture, and the art of fresco, even in Venice, its last stronghold, was for a time neglected or forgotten. Portable paintings for princely or private galleries and cabinets became the chief and most characteristic products of the art. The subjects of painting multiplied themselves. All manner of new aspects of life and nature were brought within the technical compass of the painter. Besides devotional and classical subjects and portraiture, daily life in all its phases, down to the homeliest and grossest, the life of the parlour and the tavern, of field and shore and sea, with landscape in all its varieties, took their place as material for the painter. The truths of indoor and outdoor atmosphere were translated on canvas for the first time. The Dutchmen from about 1620 to 1670 were the most active innovators and path-breakers of modern art along all these fines. The greatest of them, Rembrandt, dealt, as has been said, like a master and a magician with the problems of human individuality as revealed in a mysterious colour and shadow world of his own invention. At the same time a painter of no less power in Spain, Velazquez, viewing the world in the natural light of every day, showed for the first time how vitally and subtly paint could render the relief and mutual values of figures and objects in space, the essential truth of their visible relations and reactions in the enveloping atmosphere. The achievement of these two victorious innovators has only come to be fully understood in our own day. The simultaneous conquest of Claude le Lorrain, on the other hand, over the atmospheric glow of summer

and sunset on the Roman Campagna and the adjacent hills and coasts, found acceptance instantly, less perhaps for its own sake than because of the classical associations of the scenery which he depicted. The vast widening of the field of the painter's art and multiplica- tion of its subjects, which thus took place at the dawn of the modern period, were gains attended by one drawback, the loss, namely, of the sense of high seriousness and universal appeal which belonged to the art while its themes had been those of religion and classic story almost exclusively.

During the three hundred or so years of the modern period, academical schools attempting, more or less unsuccessfully, to carry on the great Italian and classical traditions classical of the Renaissance have not ceased to exist side by and side with those which have striven to express new ™"» an " c ways of seeing and feeling. Sometimes, as in France first under Louis XIV., and again for forty years from the beginning of the Revolution to the dawn of romanticism, such schools have succeeded in crushing out and discrediting all efforts in other directions. Between these two epochs, say from 1710 to 1780, French 18th-century ideals of social elegance and brilliant frivolity expressed themselves in forms of great accomplishment and vivacity both in poetry and sculpture, from the days of Watteau to those of Fragonard and Clodion.

jo

At the same time England produced one of the finest and at the same time most national and downright masters of the brush in Hogarth; two of the greatest aristocratic portrait-painters of the world in Reynolds and Gainsborough, each of whom modified according to his own instincts the tradition imported in the previous century by Van Dyck, the greatest pupil of Rubens (Reynolds fusing with this influence those of Rembrandt and the Venetians in almost equal shares). Pastoral landscape in the hands of Gainsborough, classical, following Claude, in those of Wilson — these together with the humble but wholesome discipline of topographical illustration led on to the ambitious, wide-ranging and often inspired experiments of Turner, and to the narrower but more secure achievements of Constable in the same field, and made this country the acknowledged pioneer of modern landscape art. In the meantime the wave of classical enthusiasm which passed over Europe in the later years of

the 18th century had produced in architecture generally a return to severer principles and purer lines, in reaction from the baroque and the rococo Renaissance styles of the preceding century and a half. In Italian sculpture, the same movement inspired during the Napoleonic period the over-honeyed accomplishment of Canova and his school; in northern sculpture, the more truly antique but almost wholly imitative work of Thorwaldsen, and the pure and rhythmic grace of the English Flaxman, a true master of design though scarcely of sculpture strictly so called. The same movement again was partly responsible in English painting and illustration from about 1770 to 1820 for much pastoral and idyllic work of agreeable but shallow elegance. In French painting the classic movement struck deeper. Along with much would-be Roman attitudinizing there was much real, if rigid, power in the work of David, much accomplished purity and sweetness in that of Prud'hon. The last and truest classic of France, and at the same time in portraiture the greatest realist, Ingres, held high the standard of his cause even through and past the great romantic revival which began with Gericault and culminated in Delacroix and the school of landscape painters who had received their inspiration from Constable. The main instincts embodied in the Romantic movement were the awaken- ing of the human spirit to an eager retrospective love of the past, and especially of the medieval past, and simultaneously to a new passion for the beauties of nature, and especially of wild nature. Germany and England preceded France in this double awakening; in both countries the movement inspired a fine literature, but in neither did it express itself so fully and self- consciously through literature and the other arts together as it did in France when the hour struck. The revival of medieval sentiment in Germany had inspired comparatively early in the century the learned but somewhat aridly ascetic and essentially unpainterlike work of the group of artists who styled themselves Nazarener. In England the same revival expressed itself during a great part of the Victorian age in an enthusiastic return to the early Gothic ecclesiastical styles of architecture, a return unsuccessful upon the whole, because in pursuit of archaeological and grammatical detail the root qualities of right proportion and organic design were too often neglected. Allied with this Gothic revival, and stimulated like it by the persuasive conviction and brilliant resource of Ruskin in criticism was the pre-Raphaelite movement in painting. Among The pre- t h e artists identified with this movement there was uts hae " little reauv m common except in impatience of the prevailing modes of empty academic convention or anecdotic frivolity. The name covered for a while the essentially divergent aims of a vigorous unintellectual craftsman like Millais, fired for a few years in youth by contact with more imaginative temperaments, of a strenuous

imitator of unharmon- ized local colours and unsubordinated natural facts like Holman Hunt, and of born poets and impassioned medievalists like Rossetti and after him Burne-Jones. Meantime in France, putting aside the work of the great Delacroix, the impulse of 1830 expressed itself best and most lastingly in the monumental work of Daumier both in caricature and romance, the impressive and significant treatment of peasant life and labour by J. F.

Millet, the vitally truthful pastoral and landscape work of Troyon, Corot, Daubigny and the rest.

Since the exhaustion of the Romantic movement, the other movements that have been taking place in European art have been too numerous and too rapid to be touched on contem- here to any purpose. Both in sculpture and painting porary France has taken and held the lead. Mention has tenden- already been made of the special tendency in recent sculpture identified with the name and influence of Rodin. In painting there has been the fertilizing and transforming influence of Japan on the decorative ideals of the West; there have been successively the Realist movement, the movements of the Impressionists, the Luminists, the Neo-impressionists, the Independents, movements initiated almost always in Paris, and in other countries eagerly adopted and absorbed, or angrily controverted and denounced, or simply neglected and ignored according to the predilection of this or that group of artists and critics; there has been a vast amount of heterogeneous, hurried, confident and clamant innovating activity in this direction and in that, much of it perhaps doomed to futility in the eyes of posterity, but at any rate there has not been stag- nation.

Bibliography. — To attempt in this place anything like a full bibliography covering so vast a field would be idle. Many of the books necessary to a first-hand study of the subject are cited in the article Aesthetics. The following are some of the most important writings actually referred to in the text, English translations being mentioned where they exist: Aristotle, Poetics, edited with critical notes and a translation by S. H. Butcher (1898); S. H. Butcher, Aristotle's Theory of Poetry and Fine Art, with a critical text and a translation of the Poetics (1902); Plato, Republic, bk. x. 596 fT., 600 ff. (Grote, iii. 117 ff.; Jowctt, iii. 489 ff.); B. Bosanquet, Introduction to Hegel's Philosophy of Fine Art (Asthetik), translation with notes and prefatory essay (1896); The Philosophy of Art, an Introduction to the Science of Aesthetics, by Hegel and C. L. Michelet, trans. Hastie (1886); Schiller, Brief e uber die asthetische Erziehung des Menschen (trans, by G. J. Weiss, with preface by J. Chapman, 1845; also in Bohn's Standard

Library, 1846); Herbert Spencer, First Principles, ch. xxii.; Gottfried Semper, Der Stil (1860-1863); Hippolyte Taine, De I'ideal dans I'art (1867), Philosophic de Vart en Grece (1869), Philosophic de I'art en Italie, Philosophic de I'art dans les Pays-Bas (translations in 5 vols, by J. Durand, New York, 1889) ; Karl Groos, Die Spiele der Menschen (1899 ; trans, by E. L. Baldwin, 1901), and Die Spiele der Tiere (2nd ed., 1907; trans, by E. L. Baldwin, 1898) ; Ernst Grosse, Die Anfdnge der Kunst (1894; trans, in the Anthropological Series, 1894) ; Yrjo Hirn, The Origins of Art (1900); G. Baldwin Brown, The Fine Arts (2nd ed., 1902); Felix Clay, Tlie Origins of the Sense of Beauty (1908). For a general history of the manual or shaping group of arts, C. J. F. Schnasse, Geschichie derbildenden Kiinste (2nd ed., 1866-1879), though in parts obsolete, is still unsuperseded. A very summary general view is given in Salomon Reinach, The Story of Art through the Ages (trans, by Florence Simmonds, 1904) ; a general history of the same group was undertaken by Giulio Carotti (English translation by Alice Todd, 1909). (S. C.)

FINGER, one of the five members with which the hand is terminated, a digit; sometimes the word is restricted to the four digits other than the thumb. The word is common to Teutonic languages, cf. Dutch vinger and Ger. Finger; probably the ultimate origin is to be found in the root of the words ap- pearing in Greek ■Ktvre, Lat. quinque, five. (See Skeleton: Appendicular.)

FINGER-AND-TOE, Club Root or Anbury, a destructive plant-disease known botanically as Plasmodiophora Brassicae, which attacks cabbages, turnips, radishes and other cultivated and wild members of the order Cruciferae. It is one of the so-called Slime-fungi or Myxogastres. The presence of the disease is indicated by nodules or warty outgrowths on the root, which sometimes becomes much swollen and ultimately rots, emitting an unpleasant smell. The disease is contracted from spores present in the soil, which enter the root. The parasite develops within the living cells of the plant, forming a glairy mass of protoplasm known as the Plasmodium, the form of which alters from time to time. The cells which have been attacked increase enormously in size and the disease spreads from cell to cell. Ultimately the plasmodium becomes resolved into numerous minute round spores which, on the decay of the root, are set free in the soil. A preventive is quicklime, the

application of which destroys the spores in the soil. It is impor- tant that diseased plants should be burned, also that cruciferous

Finger-and-Toe {Plasmodiophora Brassicae).

1, Turnip attacked by the disease, reduced.

2, A cell of the tissue containing the Plasmodium ; the smaller cells

at the sides are unaffected.

3, Infected cell, showing spore formation. 2, 3, highly magnified.

weeds, such as shepherd's purse, charlock, &c, should not be allowed to grow in places where plants of the same order are in cultivation.

FINGER-PRINTS. . The use of finger-prints as a system of identification (g.v.) is of very ancient origin, and was known from the earliest days in the East when the impression of his thumb was the monarch's sign-manual. A relic Of this practice is still preserved in the formal confirmation of a legal document by " delivering " it as one's " act and deed." The permanent character of the finger-print was first put forward scientifically in 1823 by J. E. Purkinje, an eminent professor of physiology, who read a paper before the university of Breslau, adducing nine standard types of impressions and advocating a system of classi- fication which attracted no great attention. Bewick, the English draughtsman, struck with the delicate qualities of the lineation, made engravings of the impression of two of his finger- tips and used them as signatures for his work. Sir Francis Galton, who laboured to introduce finger-prints, points out that they were proposed for the identification of Chinese immigrants when registering their arrival in the United States. In India, Sir William Herschel desired to use finger-prints in the courts of the Hugli district to prevent false personation and fix the identity upon the executants of documents. The Bengal police under the wise administration of Sir E. R. Henry, after- wards chief commissioner of the London metropolitan police, usefully adopted finger-prints for the detection of crime, an example followed in many public departments in India. A transfer of property is attested by the thumb-mark, so are documents when registered, and advances made to opium- growers or to labourers on account of wages, or to contracts signed under the emigration law, or medical certificates to vouch for the persons examined, all tending to check the frauds and impostures constantly attempted.

The prints depend upon a peculiarity seen in the human hand and to some extent in the human foot. The skin is traversed in all directions by creases and ridges, which are ineradicable and show no change from childhood to extreme old age. The persistence of the markings of the finger-tips has been proved beyond all question, and this universally accepted quality has been the basis of the present system of identification. The impressions, when examined, show that the ridges appear in certain fixed patterns, from which an alphabet of signs or a

system of notation has been arrived at for convenience of record. As the result of much experiment a fourfold scheme of classifi- cation has been evolved, and the various types employed are styled “arches,” “loops,” “whorls” and “composites.” There are seven subclasses, and all are perfectly, distinguishable by an expert, who can describe each by its particular symbol in the code arranged, so that the whole ” print ” can be read as a distinct and separate expression. Very few, and the simplest, appliances are required for taking the print—a sheet of white paper, a tin slab, and some printer’s ink. Scars or malformations do not interfere with the result.

The unchanging character of the finger-prints has repeatedly helped in the detection of crime. We may quote the case of the thief who broke into a residence and among other things helped himself to a glass of wine, leaving two finger-prints upon the tumbler which were subsequently found to be identical with those of a notorious criminal who was arrested, pleaded guilty and was convicted. Another burglar effected entrance by re- moving a pane of glass from a basement window, but, unhappily for hiih, left his imprints, which were referred to the registry and found to agree exactly with those of a convict at large; his address was known, and when visited some of the stolen property was found in his possession. In India a murderer was identified by the brown mark of a blood-stained thumb he had left when rummaging amongst the papers of the deceased. This man was convicted of theft but not of the murder.

The keystone to the whole system is the central office where the register or index of all criminals is kept for ready reference. The operators need no special gifts or lengthy training; method ard accuracy suffice, and abundant checks exist to obviate incorrect classification arid reduce the liability to error.

Authorities. — F. Galton, Finger Prints (1892), Fingerprint Directories (1895); E. R. Henry, Classification and Uses of Finger Prints; A. Yvert, L’ Identification par les empreintes digiiales pal- maires (1905) ; K.

Windt, R. S. Kodicek, Daktyloskopie. Verwertung von Fingerabdriicken zu Identifizierungszwecken (Vienna, 1904) ; E. Loeard, La Dactyloscopie. Identification ■ des r&cidivistes par les empreintes digitales (1904); H. Faulds, Guide to Finger-Print Identification (1905); H. Gross, Criminal Investigation (trans. J. and J. C. Adam, 1907). s (A. G.)

FINGO, or Fengu (Ama-Fengu, ” wanderers “), a Bantu- Negro people, allied to the Zulu family, who have given their name to the district of Fingoland, the S.W. portion of the Transkei division of the Cape province. The Fingo tribes were formed from the nations broken up by Chaka and his Zulu; after some years of oppression by the Xosa they appealed to the Cape government in 1835, and were permitted by Sir Benjamin D’ Urban to settle on the banks of the Great Fish river. They have been always loyal to the British, and have steadily advanced in social respects. They have largely adapted themselves to western culture, wearing European clothes, supporting their schools by voluntary contributions, editing newspapers, translat- ing English poetry, and setting their national songs to correct music. The majority call themselves Christians and many of them have intermarried with Europeans. (See Kaffirs.)

FINIAL (a variant of ” final “; Lat. finis, end), an archi- tectural term for the termination of a pinnacle, gable end, buttress, or canopy, consisting of a bunch of foliage, which bears a close affinity to the crockets (q.v.) running up the gables, turrets or spires, and in some cases may be formed by uniting four or more crockets together. Sometimes the term is in- correctly applied to a small pinnacle of which it is only the termination (see Epi).

FINIGUERRA, MASO [i.e. Tommaso] (1426-1464), Florentine goldsmith, draughtsman, and engraver, whose name is distin- guished in the history of art and craftsmanship for reasons which are partly mythical. Vasari represents him as having been the first inventor pf the art of engraving (using that word in its popular sense of taking impressions on paper from designs engraved on metal plates), and Vasari’s account was universally accepted and repeated until recent research proved it erroneous. What we actually know from contemporary documents of Finiguerra, his origin, his life, and his work, is as follows. He

was the son of Aiitonio, and grandson of Tommaso Finiguerra or Finiguerri, both goldsmiths of Florence, and was born in Sta Lucia d'Ognissanti in 1426. He was brought up to the hereditary- profession of goldsmith and was early distinguished for his work in niello. In his twenty-third year (1449) we find note of a sulphur cast from a niello of his workmanship being handed over by the painter Alessio Baldovinetti to a customer in pay- ment or exchange for a dagger received. In 1452 Maso delivered and was paid for a niellated silver pax commissioned for the baptistery of St John by the consuls of the gild of merchants or Calimara. By this time he seems to have left his father's workshop: and we know that he was in partnership with Piero di Bartolorrimeo di Sali and the great Antonio Pollaiuolo in 1457, when the firm had an order for a pair of fine silver candlesticks for the church of San Jacopo at Pistoia. In 1459 we find Fini- guerra noted in the house-book of Giovanni Rucellai as one of several distinguished artists with whose works the Casa Rucellai was adorned. In 1462 he is recorded as having supplied another wealthy Florentine, Cino di Filippo Rinuccini, with waist- buckles, and in the years next following with forks and spoons for christening presents. In 1463 he drew cartoons, the heads of which were coloured by Alessio Baldovinetti, for five or more figures for the sacristy of the duomo, which was being decorated in wood inlay by a group of artists with Giuliano da Maiano at their head. On the 14th of December 1464 Maso Finiguerra made his will, and died shortly afterwards.

These documentary facts are supplemented by several writers of the next generation with statements more or less authoritative. Thus Baccio Bandinelli says that Maso was among the young artists who worked under Ghiberti on the famous gates of the baptistery; Benvenuto Cellini that he was the finest master of his day in the art of niello engraving, and that his masterpiece was a pax of the Crucifixion in the baptistery of St John; that being no great draughtsman, he in most cases, including that of the above-mentioned pax, worked from drawings by Antonio Pollaiuolo. Vasari, on the other hand, allowing that Maso was a much inferior draughtsman to Pollaiuolo, mentions nevertheless a number of original drawings by him as existing in his own collection, " with figures both draped and nude, and histories drawn in water-colour." Vasari's account was confirmed and amplified in the next century by Baldinucci, who says that he has seen many drawings by Finiguerra much in the manner of Masaccio; adding that Maso was beaten by Pollaiuolo in com- petition for the reliefs of the great silver altar-table commission by the merchants' gild for the baptistery of St John (this famous work is now preserved in the Opera del Duomo). But the para- graph of Vasari which has chiefly held the

attention of posterity is that in which he gives this craftsman the credit of having been the first to print off impressions from niello plates on sulphur casts and afterwards on sheets of paper, and of having followed up this invention by engraving copper-plates for the express purpose of printing impressions from them, and thus became the inventor and father of the art of engraving in general. Finiguerra, adds Vasari, was succeeded in the practice of engrav- ing at Florence by a goldsmith called Baccio Baldini, who, not having much invention of his own, borrowed his designs from other artists and especially from Botticelli. In the last years of the 18th century Vasari's account of Finiguerra's invention was held to have received a decisive and startling confirmation under the following circumstances. There was in the baptistery at Florence (now in the Bargello) a beautiful 15th-century niello pax of the Coronation of the Virgin. The Abate Gori, a savant and connoisseur of the mid-century, had claimed this conjectur- ally for the work of Finiguerra; a later and still more enthusi- astic virtuoso, the Abate Zani, discovered first, in the collection of Count Seratti at Leghorn, a sulphur cast from the very same niello (this cast is now in the British Museum), and then, in the National library at Paris, a paper impression corresponding to both. Here, then, he proclaimed, was the actual material first- fruit of Finiguerra's invention and proof positive of Vasari's accuracy.

Zani's famous discovery, though still accepted in popular

art histories and museum guides, is now discredited among serious students. • For one thing, it has been proved that the art of printing from engraved copper-plates had been known in Germany, and probably in Italy also, for years before the date of Finiguerra's alleged invention. For another, Maso's pax for the baptistery, if Cellini is to be trusted, represented not a Coronation of the Virgin but a Crucifixion. In the next place, its recorded weight does not at all agree with that of the pax claimed by Gori and Zani to be his. Again, and perhaps this is the strongest argument of any, all authentic records agree in repre- senting Finiguerra as a close associate in art and business of Antonio Pollaiuolo. Now nothing is more marked than the special style of Pollaiuolo and his group; and nothing is more unlike it than the style of the Coronation pax, the designer of which must obviously have been trained in quite a different school, namely that of Filippo Lippi. So this seductive identifica- tion has to be abandoned, and we have to look elsewhere for traces of the real work of Finiguerra. The only fully authenti- cated specimens which exist are the above-mentioned tarsia figures, over half life-size, executed from his cartoons for the sacristy of the duomo. But his hand has lately been conjectur- ally recognized in a number of other things : first in a set of drawings of the school of

Pollaiuolo at the Uffizi, some of which are actually inscribed “Maso Finiguerra” in a 17th-century writing, probably that of Baldinucci himself; and secondly in a very curious and important book of nearly a hundred drawings by the same hand, acquired in 1888 for the British Museum. The Florence series depicts for the most part figures of the studio and the street, to all appearance members of the artist’s own family and workshop, drawn direct from life. The museum volume, on the other hand, is a picture-chronicle, drawn from imagination, and representing parallel figures of sacred and profane history, in a chronological series from the Creation to Julius Caesar, dressed and accoutred with inordinate richness according to the quaint pictures which Tuscan popular fancy in the mid-i5th century conjured up to itself of the ancient world. Except for the differences naturally resulting from the difference of subject, and that the one series are done from life and the other from imagination, the technical style and handling of the two are identical and betray unmistakably a common origin. Both can be dated with certainty, from their style, costumes, &c, within a few years of 1460. Both agree strictly with the accounts of Finiguerra’s drawings left us by Vasari and Baldinucci, and disagree in no respect with the character of the inlaid figures of the sacristy. That the draughtsman was a goldsmith is proved on every page of the picture-chronicle by his skill and extravagant delight in the ornamental parts of design — chased and jewelled cups, helmets, shields, breastplates, scabbards and the like, — as well as by the symmetrical metallic forms into which he instinctively conventionalizes plants and flowers. That he was probably also an engraver in niello appears from the fact that figures from the Uffizi series of drawings are repeated among the rare anonymous Florentine niello prints of the time (the chief collection of which, formerly belonging to the marquis of Salamanca, is now in the cabinet of M.Edmondde Rothschild in Paris). That he was furthermore an engraver on copper seems certain from the fact that the general style and many particular figures and features of the British Museum chronicle drawings are exactly repeated in some of those primitive 15th-century Florentine prints which used to be catalogued loosely under the names of Baldini or Botticelli, but have of late years been classed more cautiously as anonymous prints in the ” fine manner ” (in contradistinction to another contem porary group of prints in the “broad manner”). The fine- manner group of primitive Florentine engravings itself falls into two divisions, one more archaic, more vigorous and original than the other, and consisting for the most part of larger and more important prints. It is this division which the drawings of the Chronicle series most closely resemble; so closely as almost to compel the conclusion that drawings and engravings are by

the same hand. The later division of fine-manner prints represent a certain degree of technical advance from the earlier, and are

softer in style, with elements of more classic grace and playful- ness; their motives moreover are seldom original, but are borrowed from various sources, some from German engravings, some from Botticelli or a designer closely akin to him, some from the pages of the British Museum Chronicle-book itself, with a certain softening and attenuating of their rugged spirit; as though the book, after the death of the original draughtsman- engraver, had remained in his workshop and continued to be used by his successors. We thus find ourselves in presence of a draughtsman of the school of Pollaiuolo, some of whose drawings bear an ancient attribution to Finiguerra, while all agree with what is otherwise known of him, and one or two are exactly repeated in extant works of niello, the craft which was peculiarly his own; others being intimately related to the earliest or all but the earliest works of Florentine engraving, the kindred craft which tradition avers him to have practised, and which Vasari erroneously believed him to have invented. Surely, it has been confidently argued, this draughtsman must be no other than the true Finiguerra himself. The argument has not yet been universally accepted, but neither has any competent criticism appeared to shake it; so that it may be regarded for the present as holding the field.

Bibliography. — See Bandinelli in Bottari, Raccolta di lettere (1754), i. p. 75; Vasari (ed. Milanesi), i. p. 209, iii. p. 206; Ben- venuto Cellini, / Trattati dell' orificeria, &c. (ed. Lemonnier), pp. 7, 12, 13, 14; Baldinucci, Notizie dei projessori di disegno (1845), i. pp. 518, 519, 533 ; Zani, Materiali per servire, &c. (1802) ; Duchesne, Essai sur les nielles (1824) ; Dutuit, Manuel.de /' amateur d'eslampes, vol. i. pref. and vol. ii. ; and for a full discussion of the whole ques- tion, with quotations from earlier authorities and reproductions of the works discussed, Sidney Colvin, A Florentine Picture Chronicle (1898). . (S. C.)

FINISHING. The term finishing, as specially applied in the textile industries, embraces the process or processes to which bleached, dyed or printed fabrics of any description are subjected, with the object of imparting a characteristic appearance to the surface of the fabric, or of influencing its handle or feel. Strictly speaking, certain operations might be classed under this heading which are conducted previous to bleaching, dyeing, &c; e.g. mercerizing (q.v.), stretching and crabbing, singeing (see Bleach- ing); but as these are not undertaken by the finisher, only those will be dealt with here which are not mentioned under other headings. By the various treatments to which the fabric is subjected in finishing, it is often so altered in appearance that it is impossible to recognize in it the same material that came from the loom or from the bleacher or dyer. On the other hand, one and the same fabric, subjected to different processes of finishing, may be made to represent totally different classes of material. In other cases, however, the appearance of the finished article, differs but slightly from that of the piece on leaving the loom.

All processes of finishing are purely mechanical in character, and the most important of them depend upon the fact that in their ordinary condition (i.e. containing their normal amount of moisture), or better still in a damp state, the textile fibres are plastic, and consequently yield to pressure or tension, ultimately assuming the shape imparted to them. The old-fashioned box press, formerly largely used for household linen, owed its efficacy to this principle. At elevated temperatures the damp fibres become very much more plastic than at the ordinary temperature, the simplest form of finishing appliance based on this fact being the ordinary flat iron. Indeed it may safely be stated that most of the modern finishing processes have been evolved from the household operations of washing (milling), brushing, starching, mangling, ironing and pressing.

Cotton Pieces. — In the ordinary process of bleaching, cotton goods are subjected during the various operations to more or less continual longitudinal tension, and while becoming elongated, shrink more or less considerably in width. In order to bring them back to their original width, they are stretched or ” stentered ” by means of specially constructed machines. The most effective of these is the so-called stentering frame, which consists essentially of two slightly diverging endless chains carrying clips or pins which hold the piece in position as it

traverses the machine. The length of a frame may vary from 20 to 30 yds. On the upper part of the frame the chains run in slots, and by

means of set screws the distance between the two chains can be set within the required limits. The pieces are fed on to One end of the machine in the damp state by hand and are then naturally slack. But before they have travelled many yards they become taut,, the stretching increasing as they travel along. Simultaneously with the stretching, the pieces are dried by a current of hot air which is blown through from below, so that on arriving at the end of the machine they are not only stretched to the required degree but are also dry. The machine used for stentering is more fully described under Mercerizing (q.v.). In case the goods come straight from the loom to be finished, stentering is not necessary.

Pieces intended to receive a ” pure ” finish pass on without further treatment to the ordinary finishing processes such as calendering, hot pressing, raising, &c. But in the majority of cases they are previously impregnated, according to the finish desired, with stiffening or softening agents, weighting materials, &c. Usually, starch constitutes the main stiffening agent, with additions of china clay, barium compounds, &c, for weighting purposes, and Turkey red oil, with or without the addition of some vegetable oil or fat, as the softening agent. Magnesium sulphate is also largely used in order to give ” body ” to the cloth, which it does by virtue of its property of crystallizing in fine felted needle-shaped crystals throughout the mass of the fabric. When starch is used in filling, it is advisable to add some anti- septic, such as zinc chloride, sodium silicofluoride, phenol or salicylic acid, in order to prevent or retard subsequent develop- ment of mildew. The impregnation of the pieces with the filling is effected in two ways, viz. either throughout the thickness of the cloth or on one surface only (back starching). When the whole piece is to be impregnated the operation is conducted in a starching mangle, which is similar in construction to an ordinary household mangle, though naturally larger and more elaborate in construction. The pieces run at full width through a trough situated immediately below the bowls and containing the filling (starch paste, &c), then between the bowls, the pressure (” nip “) of which regulates the amount of filling taken up, and thence over a range of steam-heated drying cylinders (see Bleaching). In case one side only of the goods is to be stiffened — and this is usually necessary in the case of printed goods, — a so-called back-starching mangle is employed.

The construction of the machine varies, but the simplest form consists essentially of a wooden bowl a (fie;. 1) which runs in the starch paste con- tained in trough /. The pieces pass from the batch- roller B, _ through scrimp rails S and over the bowl under tension, touching the sur- face from which they gather the starch paste. By means of the

fixed ” doctor ” blade d, which extends across the piece, the paste is levelled on the surface of the fabric and excess scraped off, falling back into the trough. The goods are then dried with the face side to the cylinders.

Some goods come into the market with no further treatment after starching other than running through a mangle with a little softening and then drying, but in the great majority of cases they are subjected to further operations.

Damping. — When deprived of their natural moisture by drying on the cylinder drying machine, cotton goods are not in a fit condition to undergo the subsequent operations of calendering, beetling, &c, since the fibres in the dry state have lost theii plasticity. The pieces are consequently damped to the desired degree, and this is usually effected in a damping machine in passing through which they meet with a fine spray of water.

A simple and effective device for this purpose is shown in section in fig. 2. It consists essentially of a brass roller r running in water

Fig. i. — Principle of Back-Starching Machine.

_: f Or J

F

}/6ˆ-v

Fig. 2. — Principle of Damping Machine.

contained in a trough or box t. Touching the brass roller is a brush

roller b which revolves at a high speed, thus spraying the water,

which it takes up continuously from the wet revolving brass roller in all directions, and consequently also against the piece which passes in a stretched condi- tion over the top of the box, being drawn from the batch roller B,

over scrimp rails S, and batched again on the other side on roller R.

The level of the water in the trough is kept constant.

Calendering. — The calender may be regarded as an elaboration of the ordinary mangle, from which, however, it differs essentiahV inasmuch as one or more of the rollers or bowls are made of steel or iron and can be treated either by gas or steam; the other bowls are made of compressed cotton or paper. Three distinct forms of calender are in use, viz. the ordinary calender, the friction calender and the embossing calender.

The number of bowls in an ordinary calender varies between two and six according to the character of the finish for which it is intended. In a modern five-bowl calender the bottom bowl is made of cast iron, the second of compressed cotton or paper, the third of iron being hollow and fitted with steam heating apparatus. The fourth bowl is made of compressed cotton, and the fifth of cast iron. The pieces are simply passed through for " swissing," i.e. for the production of an ordinary plain finish. The same calender may also be used for " chasing," in which two pieces are passed through, face to face, in order to produce an imitation linen finish. Moire or " watered " effects are produced in a similar way, but these effects are frequently imitated in the embossing calender.

The friction calender, the object of which is to produce a high gloss on the fabric, differs from the ordinary calender inasmuch as one of the bowls is caused to revolve at a greater speed than the others. In an ordinary three-bowl friction calender the bottom bowl is made of cast iron, the middle one of compressed cotton or paper, and the top one (the friction bowl) of highly polished chilled iron. The last-named bowl, which has a greater peripheral speed than the others, is hollow and can be heated either by steam or gas.

The embossing calender is usually constructed of two bowls, one of which is of steel and the other of compressed cotton or paper. The steel roller, which is hollow and can be heated either by steam or gas, is engraved with the pattern which it is desired to impart to the piece. If the pattern is deep, as is the case in the production of book cloths, it is necessary to run the machine empty under pressure until the pattern of the steel bowl has impressed itself into the cotton or paper bowls, but if the effect desired only consists of very fine lines, this is not necessary; for instance, in the production of the Schreiner finish, which is intended to give the pieces (especially after mercerizing) the appearance of silk, the steel roller is engraved with fine diagonal lines which are so close together (about 250 to the in.) as to be undistinguishable by the naked eye.

Beetling is a process by which a peculiar linen-like appearance and a leathery feel or handle are imparted to cotton fabrics, the process being also employed for improving the appearance of linen goods. For the best class of beetle finish, the pieces are first impregnated with sago starch and the other necessary ingredients (softening, &c.) and are dried on cylinders. They are then damped on a water mangle, and beamed on to the heavy iron bowl of the beetling machine.

A beetling machine of the kind, with four sets of ” fallers,” is shown in fig. 3. The fallers are made of beech wood, are about 8 ft. long, 5 j in. deep and 4 in. wide, and are kept in their vertical position by two pairs of guide rails. Each faller is provided with a tappet or wooden peg driven in at one side, which engages with the teeth or ” wipers ” of the revolving shaft in the front of the machine. The effect of this mechanism is to lift the faller a distance of about 13 in. and then let it drop on to the cloth wound on the beam. This

lifting and dropping of the fallers on to the beam takes place in rhythmical and rapid succession. To ensure even treatment the beam turns slowly round and also has a to-and-fro movement im- parted to it. The treatment may last, according to the finish which it is desired to obtain, from one to sixty hours.

Fig. 3. — Beetling Machine (Edmeston & Sons).

Beetling was originally used for linen goods, but to-day is almost entirely applied to cotton for the production of so-called linenettes. ‘

Hot-pressing is used to a limited extent in order to obtain a soft finish on cotton goods, but as this operation is more used for wool, it will be described below.

Raising. — This operation, which was formerly only used for woollen goods (teasing), has come largely into use for cotton pieces, partly in consequence of the introduction of the direct cotton colours by which the cotton is dyed evenly throughout (see Dyeing), and partly in consequence of new and improved machinery having been devised for the purpose. Starting with a plain bleached, dyed or printed fabric, the process consists in principle in raising or drawing out the ends of individual fibres from the body of the cloth, so as to produce a nap or soft woolly surface on the face.

This is effected by passing the fabric slowly round a large drum D, which is surrounded, as shown in the diagram, (fig- 4)! by a number of

Fig. 4. — Raising.

small cylinders or rollers, r, covered with steel wire brushes or ” carding,” such as is used in carding engines (see Cotton-Spinning Machinery).

The rollers r, which are all driven by one and the same belt (not shown in the figure), revolve at a high rate of speed, and can be made to do so either in the same direction as that followed by the piece as it travels through the machine or in the opposite one. In addition to their revolving round their own axes, the raising rollers may be either kept stationary or may be moved round the drum D in either direction.

In the more modern machines there are two sets of raising rollers, of which each alternate one is caused to revolve in the direction followed by the piece, while the other is made to revolve in the opposite direction. By passing through an arrangement of this kind several times, or through several such machines in succession, the ends of the fibres are gradually drawn out to the desired extent,

FINISHING

After raising, the pieces are sheared (for better class work) in order to produce greater regularity in the length of the nap. The raised style of finishing is used chiefly for the production of uniformly white or coloured flannelettes but is also used for such as are dyed in the yarn, and to a limited extent for printed fabrics.

Woollen and Worsted Pieces. — Although both of these classes of material are made from wool, their treatment in finishing differs so materially that it is necessary to deal with them separately. Unions or fabrics consisting of a cotton warp with a worsted weft are in general treated like worsteds.

In the finishing of woollen pieces the most important operation is that of milling, which consists in subjecting the pieces to mechanical friction, usually in an alkaline medium (soap or soap and soda) but sometimes in an acid (sulphuric acid) medium, in order to bring about felting and consequent ” fulling ” of the fabric. This felting of the wool is due to the peculiar structure of the fibre, the scales of which all protrude in one direction, so that the individual fibres can slip past

each other in one direction more readily than in the opposite one and thus become more and more interlocked as the milling proceeds. If the pieces contain burrs these are usually removed by a process known as ” carbon- izing,” which generally, but not necessarily, precedes the milling. Their removal depends upon the fact that the burrs, which consist in the main of cellulose, are disintegrated at elevated temperatures by dilute mineral acids. The pieces are run through sulphuric acid of from 4° to 6° Tw., squeezed or hydro- extracted, and dried over cylinders and then in stoves. The acid is thus concentrated and attacks the burrs, which fall to dust, while leaving the wool intact. For the removal of the acid the fabric is first washed in water and then in weak soda. Carbon- izing is also sometimes used for worsteds.

Milling was formerly all done in milling or fulling stocks (see fig. 5), in which the cloth saturated with a strong solution of soap

Fig. 5. — Milling Stocks,

(with or without other additions such as stale urine, potash, fuller’s earth, &c.) is subjected to the action of heavy wooden hammers, which are raised by the cams attached to the wheel (E) on the revolving shaft, and fall with their own weight on to the bundles of cloth. The shape of the hammer-head causes the cloth to turn slowly in the cavity in which the milling takes place. Occasionally, the cloth is taken out, straightened, washed if necessary, and then returned to the stocks to undergo further treatment, the process being continued until the material is uniformly shrunk or milled to the desired degree.

In the more modern forms of milling machines the principle adopted is to draw the pieces in rope form, saturated with soap solution and sewn together end to end so as to form an endless band, between two or more rollers, on leaving which they are forced down a closed trough ending in an aperture the size of which can be varied, but which in any case is sufficiently small to cause a certain amount of force to be necessary to push the pieces through. A machine of this kind is shown in fig. 6. It is evident that for coloured goods which have to be milled only

such colouring matters must be chosen for dyeing that are absolutely fast to soap.

After the pieces have been milled down to the desired degree, they present an uneven and ; undesirable appearance on the surface, the ends of many of the fibres which pre- viously projected having been turned and thus become embedded in the body of the cloth. In order to bring these hairs to the surface again, the fabric is subjected to teas-

ing or raising, an operation iden- tical in principle

with one which F ronl Ganswindt, rec/ireofcˆfc der ˆ4 has already been Fig. 6.-Roller Milling Machine,

noticed under the finishing of cotton. In place of the steel wire brushes it is the usual practice to employ teasels for the treat- ment of woollen goods.

The teasel (see fig. 7) is the dried head (fruit) of a kind of thistle (Dipsacusfullorum), the horny sharp spikes of which turn downwards at their extremity, and, while possessing the necessary sharpness and strength for raising the fibres, are not sufficiently rigid to cause any material damage to the cloth. For raising, the teasels are fixed in rows on a large revolving drum, and the piece to be treated is drawn lengthways underneath the drum, being guided by rollers or rods so as to just touch the teasels as they sweep past. In the raising of woollen goods it is necessary that the pieces should be damp or moist while undergoing this treatment.

After teasing, the pieces are stretched and dried. At this stage they still have an irregular appearance, for although the raising has brought all the loose ends of the fibres to the surface, these vary considerably in length and thus give rise to an uneven nap.

By the next operation of shearing or cropping, the long hairs are cut off arid a uniform surface is thus obtained. Shearing was in former times done by hand, by means of shears, but is to-day universally effected by riieans of a cut- ting device which works on the same principle as an ordinary lawn-mower, in which a number of spiral blades set on the surface of a rapidly revolving roller pass continuously over a straight fixed blade under- neath, the roller being set So that the spiral blades just touch the fixed blade. Before the piece comes to the shearing device the nap is raised by means of a rotary brush. Shearing may be effected either trans- versely, in which case the fixed blade is parallel to the warp, or longitudinally with the fixed blade parallel

to the weft. In the first case,

From Ganswindt, Technologie d&r Appretur.

, , ... , , Fig. 7. — Teasel used for Raising,

the piece being stretched on

a table, over which the cutter, carried on rails, travels from selv- edge to selvedge. The length of the piece that can be shorn in one operation will naturally depend upon the length of the blade, but in any case the process is necessarily intermittent, many operations being required before the whole piece is shorn. In

the longitudinal shearing machines the process is continuous, the pieces passing from the beam in the stretched condition over the rotary brush, under the fixed blade, and then being again brushed before being beamed on the other side of the machine. Shearing once is generally insufficient, and for this reason many of the modern machines are constructed with duplicate arrangements so as to effect the shearing twice in the same operation. In the finishing of certain woollen goods the pieces, after having been milled, raised and sheared, go through these operations again in the same sequence.

After these operations the goods are pressed either in the hydraulic press or in the continuous press, and according to the character of the material and the finish desired may or may not be steamed under pressure, all of which operations are described below.

New cloth, as it comes into the hands of the tailor, frequently shows an undesirable gloss or sheen, which is removed before making up by a process known as.shrinking, in which the material is simply damped or steamed.

Worsteds and Unions. — The pieces are first singed by gas or hot plate (see Bleaching), and are then usually subjected to a process known as ” crabbing,” the object of which is to ” set ” the wool fibres. If this operation is omitted, especially in the case of unions, the fabric will ” cockle,” or assume an uneven surface on being wetted. In crabbing the pieces are drawn at full breadth and under as much tension as they will stand through boiling water, and are wound or beamed on to a roller under the pressure of a superposed heavy iron roller, the operation being conducted two or three times as required. From the crabbing machine the pieces are wound on to a perforated shell or steel cylinder which is closed at one end. The open end is then attached to a steam pipe, and steam, at a pressure of 30 to 45 lb, is allowed to enter until it makes its way through all the layers of cloth to the outside, when the steam is turned off and the whole allowed to cool. Since those layers of the cloth which are nearest the shell are

acted upon for a longer period than those at the outside, it is necessary to re-wind and repeat the operation, the outside portions coming this time nearest to the shell. The principle of the process depends upon the fact that at elevated temperatures moist wool becomes plastic, and then easily assumes the shape imparted to it by the great tension under which the pieces are wound. On cooling the shape is retained, and since the temperature at which the pieces were steamed under tension exceeds any to which they are submitted in the subsequent processes, the ” setting ” of the fibres is permanent. After crabbing, the pieces are washed or ” scoured ” in soap either on the winch or at full width. In some cases the crabbing precedes the scouring. The goods are then dyed and finished.

The nature of the finishing process will vary considerably according to the special character of the goods under treatment. Thus, for certain classes of goods cold pressing is sufficient, while in other cases the pieces are steamed under pressure in a manner analogous to the treatment after crabbing (” decatiz- ing “). The treatment in most common use for worsteds and unions is hot pressing, which may be effected either in the hydraulic press or in the continuous press, but in most cases in the former.

In pressing in the hydraulic press the pieces are folded down by hand on a table, a piece of press paper (thin hand-made cardboard with a glossed and extremely hard surface) being inserted between each lap. After a certain number of laps, a steel or iron press plate is inserted, and the folding proceeds in this way until the pile is sufficiently high, when it is placed in the press. The press being filled, the hydraulic ram is set in motion until the reading on the gauge shows that the desired amount of pressure has been obtained. The heating of the press plates was formerly done in ovens, previous to their insertion in the piece, but although this practice is still in vogue in rare instances, the heating is now effected either by means’of steam which is caused to circulate through the hollow steel plates, or in the more modern forms of presses by means of an electric I

current. After the pieces have thus been subjected to the combined effects of heat and pressure for the desired length of time, they are allowed to cool in the press. It is evident that portions of the pieces, viz. the folds, thus escape the finishing process, and for this reason it is necessary to repeat the process, the folds now being made to lie in the middle of the press papers.

The continuous press, which is used for certain classes of worsteds, but more especially for woollen goods, consists in principle of a

polished steam-heated steel cylinder against which either one or two steam-heated chilled iron cheeks are set by means of levers and adjust- ing screws. The pieces to be'pressed are drawn slowly between the

From Ganswindt,' Techndogie der Appretur.

Fig. 8. — -Continuous Press.

cheeks and the bowl. A machine of the kind is shown in section in fig. 8. In working, the cheeks C, d are pressed against the bowl B. The course followed by the cloth to be finished is shown by the dotted line, the finished material being mechanically folded down on the left-hand side of the machine. The pieces thus acquire a certain amount of finish which is, however, not comparable with that produced in the hydraulic press.

Pile Fabrics, such as velvets, velveteens, corduroys, plushes, sealskins, &c, require a special treatment in finishing, and great care must be taken in all operations to prevent the pile being crushed or otherwise damaged. Velveteens and corduroys are singed before boiling or bleaching. Velveteens dyed in black or in dark shades are brushed with an oil colour (e.g. Prussian blue for blacks), and dried over-night in a hot stove in order to give them a characteristic bloom. Regularity in the pile and gloss are obtained by shearing and brushing. Corduroys are stiffened at the back by the application of " bone-size " (practi- cally an impure form of glue) in a machine similar to that used for back-starching. The face of the fabric is waxed with beeswax by passing the piece under a revolving drum, on the surface of which bars of this material are fixed parallel to the axis. The bars just touch the surface of the fabric as it passes through the machine. The gloss is then obtained by brushing with circular brushes which run partly in the direction of the piece and partly diagonally. In the finishing of velvets, shearing and brushing are the most important operations. The same applies to sealskins and other long pile fabrics, but with these an additional operation, viz. that of " batting," is employed after dyeing and before shearing and brushing, which consists in beating the back of the stretched fabric with sticks in order to shake out the pile and cause it to stand erect.

For the finishing of silk pieces the operations and machinery employed are similar in character to some of those used for cotton and worsteds. Most high-class silks require no further treatment other than simple damping and pressing after they leave the loom. Inferior qualities are frequently filled or back- filled with glue, sugar, gum

tragacanth, dextrin, &c, after which they are dried, damped and given a light calender finish. Moiifi

or watered effects are produced by running two pieces face to face through a calender or by means of an embossing calender. In the latter case the pattern repeats itself. For the production of silk crape the dyed (generally black) piece is impregnated with a solution of shellac in methylated spirit and dried. It is then ” goffered,” an operation which is practically identical with embossing (see above), and may either be done on an embossing calender or by means of heated brass plates in which the design is engraved to the desired depth and pattern.

The measuring, wrapping, doubling, folding, &c, of piece goods previous to making up are done in the works by specially constructed machinery.

Finishing of Yarn. — The finishing of yarn is not nearly so important as the finishing of textiles in the piece, and it will suffice to draw attention to the main operations. Cotton yarns are frequently ” gassed,” i.e. drawn through a gas flame, in order to burn or singe off the projecting fibres and thus to produce a clean thread which is required for the manufacture of certain classes of fabrics. The most important finishing process for cotton yarn is ” mercerizing ” (q.v.), by means of which a per- manent silk-like gloss is obtained. The ” polishing ” of cotton yarn, by means of which a highly glazed product, similar in appearance to horsehair, is obtained, is effected by impregnating the yarn with a paste consisting essentially of starch, beeswax or paraffin wax and soap, and then subjecting the damp material to the action of revolving brushes until dry. Woollen yarn is not subjected to any treatment, but worsted yarns (especially twofold) have to be ” set ” before scouring and dyeing in order to prevent curling. This is effected by stretching the yarn tight on a frame, which is immersed in boiling water and then allowing it to cool in this condition.

A peculiar silk-like gloss and feel is sometimes imparted to yarns made from lustre wool by a treatment with a weak solution of chlorine (bleaching powder and hydrochloric acid) followed by a treatment with soap.

Worsted and mohair yarns intended for the manufacture of braids are singed by gas, a process technically known as ” Genapping.”

Silk yarn is subjected to various mechanical processes before weaving. The most important of these are stretching, shaking, lustreing jind glossing. Stretching and shaking are simple operations the nature of which is sufficiently indicated by their names, and by these means the hanks are stretched to their original length and straightened out by hand or on a specially devised machine. In lustreing, the yarn is stretched slightly beyond its original length between two polished revolving cylinders (one of which is steam heated) contained in a box or chest into which steam is admitted. In glossing, the yarn is twisted tight, first in one direction and then in the other, on a machine, this alternating action being continued until the maximum gloss is obtained.

The so-called ” scrooping ” process, which gives to silk a peculiar feel and causes it to crackle or crunch when compressed by the hand, is a very simple operation, and consists in treating the yarn after dyeing in a bath of dilute acid (acetic, tartaric or sulphuric) and then drying without washing. Heavily weighted black silks are passed after dyeing through an emulsion of olive oil in soap and dried without washing, in order to give additional lustre to the material or rather to restore some of the lustre which has been lost in weighting. (E. K.)

FINIST&RE, or Finisterre, the most western department of France, formed from part of the old province of Brittany. Pop. (1906) 795,103. Area, 2713 sq. m. It is bounded W. and S. by the Atlantic Ocean, E. by the departments of C6tes-du-Nord and Morbihan, and N. by the English Channel. Two converging chains of hills run from the west towards the east of the depart- ment and divide it into three zones conveying the waters in three different directions. North of the Arree, or more northern of the two chains, the waters of the Douron, Penz6 and Fleche flow northward to the sea. The Elorn, however, after a short northerly course, turns westward and empties into the Brest roads. South of the Montagnes Noires, the Odet, Aven, Isole

and Elle flow southward; while the waters of the Aulne, flowing ‘ through a region enclosed by the two chains with a westward declination, discharge into the Brest roads. The rivers are all small, and none of the hills attain a height of 1300 ft. The coast is generally steep and rocky and at some points dangerous, notably off Cape Raz and the lie de Sein; it is indented with numerous bays and inlets, the chief of which — the roadstead of Brest and the Bays of Douarnenez and Audierne — are on che west. The principal harbours are those of

Brest, Concarneau, Morlaix, Landerneau, Quimper and Douarnenez. Off the coast lie a number of islands and rocks, the principal of which are Ushant (g.D.)N.W. of Cape St Mathieu, and Batz off Roscoff. The climate is temperate and equable, but humid; the prevailing winds are the W., S.W. and N.W. Though more than a third of the department is covered by heath, waste land and forest, it produces oats, wheat, buckwheat, rye and barley in quantities more than sufficient for its population. In the extreme north the neighbourhood of Roscoff, and farther south the borders of the Brest roadstead, are extremely fertile and yield large quantities of asparagus, artichokes and onions, besides melons and other fruits. The cider apple is abundant and furnishes the chief drink of the inhabitants. Hemp and flax are also grown. The farm and dairy produce is plentiful, and great attention is paid to the breeding and feeding of cattle and horses. The pro- duction of honey and wax is considerable. The fisheries of the coast, particularly the pilchard fishery, employ a great many hands and render this department an excellent nursery of seamen for the French navy. Coal, though found in Finistere, is not mined; there are quarries of granite, slate, potter's clay, &c. The lead mines of Poullaouen and Huelgoat, which for several centuries yielded a considerable quantity of silver, are no longer worked. The preparation of sardines is carried on on a large scale at several of the coast-towns. The manufactures include linens, woollens, sail-cloth, ropes, agricultural implements, paper, leather, earthenware, soda, soap, candles, and fertilizers and chemicals derived from seaweed. Brest has important foundries and engineering works; and shipbuilding is carried on there and at other seaports. Brest and Morlaix are the most important commercial ports. Trade is in fish, vegetables and fruit. Coal is the chief import. The department is served by the Orleans and Western railways. The canal from Nantes to Brest has 51 rn. of its length in the department. The Aulne is navigable for 17 m., and many of the smaller rivers for short distances.

Finistere is divided into the arrondissements of Quimperle, Brest, Chateaulin, Morlaix and Quimper (43 cantons, 294 com- munes) , the town of Quimper being the capital of the department and the seat of a bishopric. The department belongs to the region of the XI. army corps and to the archiepiscopal province and academie (educational division) of Rennes, where its court of appeal is also situated.

The more important places are Quimper, Brest, Morlaix, Quimperl6, St Pol-de-Leon, Douarnenez, Concarneau, Roscoff, Penmarc'h and Pont-1'Abbe. Finistere abounds in menhirs and other megalithic monuments, of which those of Penmarc'h, Plouarzal and Crozon are noted. The two religious structures characteristic of Brittany —

calvaries and charnel-houses — are frequently met with. The calvaries of Plougastel-Daoulas, Pleyben, St Thegonnec, Lampaul-Guimiliau, which date from the 17th century, and that of Guimiliau (16th century), and the charnel-houses of Sizun and St Th6gonnec (16th century) and of Guimiliau (17th century) may be instanced as the most remarkable. Daoulas has the remains of a fine church and cloister in the Romanesque style. The chapel of St Herbot (16th century) near Loqueffret, the churches of St Jean-du-Doigt and Locronan, which belong to the 15th and 16th centuries, those of Ploare, Roscoff, Penmarc'h and Pleyben of the 16th century, that of Le Folgoet (14th and 16th centuries), and the huge chateau of Kerjean (16th century) are of architectural in- terest. Religious festivals, and processions known as " pardons," are held in many places, notably at Locronan, St Jean-du-Doigt, St Herbot and Le Faou.

10

FINLAND

383

FINLAND (Finnish, Suomi or Suomenmaa), a grand-duchy governed subject to its own constitution by the emperor of Russia as grand-duke of Finland. It is situated between the gulfs of Bothnia and Finland, and includes, moreover, a large territory in Lapland. It touches at its south-eastern extremity the government of St Petersburg, includes the northern half of Lake Ladoga, and is separated from the Russian governments of Arkhangelsk and Olonets by a sinuous line which follows, roughly speaking, the water-parting between the rivers flowing into the Baltic Sea and the White Sea. In the north of the Gulf of Bothnia it is separated from Sweden and Norway by a broken line which takes the course of the valley of the Tornea river up to its sources, thus falling only 21m. short of reaching the head of Norwegian Lynr-en-f jord ; then it runs south-east and north-east down the Tana and Pasis-joki, but does not reach the Artie Ocean, and 13 m. from the Varanger-fjord it turns southwards. Finland includes in the south-west the Aland archipelago — its frontier approaching within 8 m. from the Swedish coast — as well as the islands of the Gulf of Finland, Hogland, Tytars, &c. Its utmost limits are: 59° 48'— 70 6′ N., and 19° 2'— 32° 50′ E. The area of Finland, in square miles, is as follows (Altas de Finlande, 1899): — •

Government.

Continent.

Islands in Lakes.

Islands in Seas.

Lakes.

Total.

Nyland

Abo- Bj orneborg

Tavastehus

Viborg

St Michel .

Kuopio

Vasa ….

Uleaborg .

4,062

7,594

6,837

11,630

5,652 13,160

H,527

60,348

24 8

97

362

1018

643

62

171

210 1331

130

203 94

286 400 1,400 4,502 2,149 2,696

I-3I3

3,344

4,582

9,333

8,334

16,624

8,819

16,499

16,105

63,957

Total

123,810

2385

1968

16,090

144,253

Orography. — A line drawn from the head of the Gulf of Bothnia to the eastern coast of Lake Ladoga divides Finland into two distinct parts, the lake region and the nearly uninhabited hilly tracts belonging to the Kjolen mountains, to the plateau of the Kola peninsula, and

to the slopes of the plateau which separates Finland proper from the White Sea. At the head-waters of the Tornea, Finland penetrates as a narrow strip into the heart of the highlands of Kjolen (the Keel), where the Haldef jail (Lappish, Halditjokko) reaches 41 15 ft. above the sea, and is surrounded by other Jjalls, or hat-topped summits, of from 3300 to 3750 ft. of altitude. Extensive plateaus (1500-1750 ft.), into which Lake Enare, or Inari, and the valleys of its' tributaries are deeply sunk, and which take the character of a mountain region in the Saariselka (highest summit, 2360 ft.), occupy the remainder of Lapland. Along the eastern border the dreary plateaus of Olonets reach on Finnish territory altitudes of from 700 to 1000 ft. Quite different is the character of the pentagonal space comprised between the Gulfs of Bothnia and Finland, Lake Ladoga, and the above-mentioned line traced through the lakes Ulea and Piellis. The meridional ridges which formerly used to be traced here along the main water-partings do not exist in reality, and the country appears on the hypsometrical map in the Atlas de Finlande as a plateau of 350 ft. of average altitude, covered with countless lakes, lying at altitudes of from 250 to 300 ft. The three main lake-basins of Nasi-jarvi, Pajane and Saima are separated by low and flat hills only; but one sees distinctly appearing on the map a line of flat elevations running south-west to north-east along the north-west border of the lake regions from Lauhanvuori to Kajana, and reaching from 650 to 825 ft. of altitude. A regular gentle slope leads from these hills to the Gulf of Bothnia (Osterbotten), forming vast prairie tracts in its lower parts.

A notable feature of Finland are the dsar or narrow ridges of morainic deposits, more or less reassorted on their surfaces. Some of them are relics of the longitudinal moraines of the ice-sheet, and they run north-west to south-east, parallel to the striation of the rocks and to the countless parallel troughs excavated by the ice in the hard rocks in the same direction; while the Lojo as, which runs from Hangoudd to Vesi-jiirvi, and is continued farther east under the name of Salpausellia, parallel to the shore of the Gulf of Finland, are remainders of the frontal moraines, formed at a period when the ice-sheet remained for some time stationary during its retreat. As a rule these forest-clothed dsar rise from 30 to 60 and occasionally 120 ft. above the level of the surrounding country, largely adding to the already great picturesqueness of the lake region; railways are traced in preference along them.

Lakes and Rivers. — A labyrinth of lakes, covering 11% of the aggregate territory, and connected by short and rapid streams (fjdrdfit), covers the surface of South Finland, offering great facilities

for internal navigation, while the connecting streams supply an enormous amount of motive-power. The chief lakes are: Lake Ladoga, of which the northern half belongs to Finland; Saima (three and a half times larger than Lake Leman), whose outlet, the Vuoksen, flows into Lake Ladoga, forming the mighty Imatra rapids, while the lake itself is connected by means of a sluiced canal with the Gulf of Finland; the basins of Pyha-selka, Ori-vesi and Piellis-jarvi; Pajane, surrounded by hundreds of smaller lakes, and the waters of which are discharged into the lower gulf through the Kymmene river ; Nasi-jarvi and Pyha-jarvi, whose outflow is the Kumo-elf, flowing into the Gulf of Bothnia; Ulea-trask, discharged by the Ulea into the same gulf; and Enare, belonging to the basin of the Arctic Ocean. Two large rivers, Kemi and Tornea, enter the head of the Gulf of Bothnia, while the Ulea is now navigable throughout, owing to improvements in its channel.

Geology. — Cambrian, Silurian, Devonian and Carboniferous deposits are found on the coasts of the Gulf of Finland and Lake Ladoga, and also along the coasts of the Arctic Ocean (probably Devonian), and in the Kjolen. Eruptive rocks of Palaeozoic age are met with in the Kola peninsula (nepheline-syenites) and at Kuusamo (syenite). The remainder of Finland is built up of the oldest known crystalline rocks belonging to the Archaeozoic or Algonkian period. The most ancient of these seem to be the granites of East Finland. The denudation and destruction of the granites gave rise to the Ladoga schists and various deposits of the same period, which were subsequently strongly folded. Then the country came once more under the sea, and the debris of the previous formations, mixed with fragments from the vol- canoes then situated in West Finland, formed the so-called Bothnian series. New masses of granites protruded next from underneath, and the Bothnian deposits underwent foldings in their turn, while denudation was again at work on a grand scale. A new series of Jalulian deposits was formed and a new system of foldings followed; but these were the last in this part of the globe. The Jotnian series, which were formed next, remain still undisturbed. It is to this series that the well-known Rapakivi granite of Aland, Nystad and Viborg belongs. No marine deposits younger than those just mentioned — all belonging to a pre-Cambrian epoch — are found in the central portion of Finland; and the greater part of the country has probably been dry land since Palaeozoic times. The whole of Finland is covered with Glacial and post-Glacial deposits. The former of these, representing the bottom- moraine of the ice-sheet, are covered with Glacial and post-Glacial clays (partly of lacustrine and partly of marine origin) only in the peripheral coast-region — or in separate areas in the interior depressions. Some Finnish geologists — Sederholm for one — con- sider it probable that

during the Glacial period an Arctic sea (Yoldia sea) covered alVsouthern Finland and also Scania (Skane) in Sweden, thus connecting the Atlantic Ocean with the Baltic and the White Sea by a broad channel; but no fossils from that sea have been found anywhere in Finland. Conclusive proofs, however, of a later submergence under a post-Glacial Littorina sea (containing shells now living in the Baltic) are found up to 150 ft. along the Gulf of Finland, and up to 260, or perhaps 330 ft., in Osterbotten. Traces of a large inner post-Glacial lake, similar to Lake Agassiz of North America, have been discovered. The country is still continuing to rise, but at an unequal rate; of nearly 3-3 ft. in a century in the Gulf of Bothnia (Kvarken), from 1-4 to 2 ft. in the south, and nearly zero in the Baltic provinces.

Climate. — Owing to the prevalence of moist west and south-west winds the climate of Finland is less severe than it is farther east in corresponding latitudes. The country lies thus between the annual isotherms of 41° and 28° Fahr., which run in a W.N.W.-E.S.E. direction. In January the average monthly temperature varies from 9° Fahr. about Lake Enare to 30 along the south coast; while in July the difference between the monthly averages is only eight degrees, being 53 in the north and 61° in the south-east. Everywhere, and especially in the interior, the winter lasts very long, and early frosts (June 12-14 in 1892) often destroy the crops. The amount of rain and snow is from 25! in. along the south coast to 13,8 in. in the interior of southern Finland.

Flora, Forests, Fauna. — The flora of Finland has been most minutely explored, especially in the south, and the Finnish botanists were enabled to divide the country into twenty-eight different provinces, giving the numbers of phanerogam species for each prov- ince. These numbers vary from 318 to 400 species in Lapland, from 508 to 651 in Karelia, and attain 752 species for Finland proper; while the total for all Finland attains 1132 species. Alpine plants are not met with in Finland proper, but are represented by from 32 to 64 species in the Kola peninsula. The chief forest trees of Finland are the Scotch fir (Pinus sylvestris, L.), the fir [Picea excelsa, Link.); two species of birch (B. verrucosa, Ehrh., and B. odorata, Bechst.), as well as the birch-bush (B. nana) ; two species of Alnus {glutinosa and incana); the oak (Q. pedunculata, Ehrh.), which grows only on the south coast; the poplar (Pobiilus tremula); and the Siberian larch, introduced in culture in the 18th century. Over 6,000,000 trees are cut every year to he floated to thirty large saw-mills, and

about 1 ,000,000 to be transformed into paper pulp. The total export of timber was valued in 1897 at 82,160,000 marks It is estimated, however, that the domestic use of wood (especially for fuel) represents nearly five times as many cubic feet as the wood used lor export in different shapes. The total area under forests is estimated at 63,050,000 acres, of which 34,662,000 acres belong to the state. The fauna has been explored in great detail both as regards the vertebrates and the invertebrates, and specialists will find the necessary bibliographical indications in Travaux geographtques en FinlandL published for the London Geographical Congress of 1895. Population. — The population of Finland, which was 429,912 in 17 = 51, 832,659 in 1800, 1,636,915 in 1850, and 2,520,437 m 1895, was 2,712,562 in 1904, of whom 1,370,480 were women and 1,342,083 men. Of these only 341.602 lived in towns the remainder in the country districts. The distribution of population in various prov- inces was as follows : —

1904.

Abo-Bjomeborg. Kuopio . . • Nyland . St Michel . Tavastehus. Uleaborg . Viborg Vasa

•Total

Population.

447,098 313.951 297.813 189,360 301,272 280,899 421,610 460,460

2,712,562

Density per sq. kilometre.

20-3

8-9

293

ri-i

177

i-9

14-6 12-5

8-6

lakes and lake-basins for inland navigation, a sum of £1,000,000 having been spent for that purpose.

The telegraphs chiefly belong to Russia. Telephones have an enormous extension both in the towns and between the different towns of southern Finland; the cost of the yearly subscription varies from 40 to 60 marks, 1 and is only 10 marks in the smaller towns.

Commerce. — The foreign trade of Finland increases steadily, and reached in 1904 the following values: —

From or to Russia.

From or to other Countries.

Totals.

Imports' Exports

£4,036,000

2,332,000

£6,488,000

6,292,000

£10,524,000

8,624,006

The number, of births in 1904 was 90,253 and the deaths 50,227, showing an excess of births over deaths of 40,026 Emigration was estimated at about three thousand every year before l8 9 8 V,P" t . o £ lareelv increased then owing to Russian encroachments on rinmsn autonomy. In 1899 the emigrants numbered 12,357; l°.64 2 "» iqoo; I2.6S9 in 1901; and 10,952 in 1904. .

The bulk of the population are Finns (2,352,990 m .1904) and Swedes (349,733). Of Russians there were only 5939. ch « :tt >', in , the provinces of Viborg and Nyland. Both Finns and Swedes belong to the Lutheran faith, there being only 46,466 members of the Greek Orthodox Church and 755 Roman Catholics.

The leading cities of Finland are : Helsingfors, capita ot the erand-duchy Ind of the province (Ian) of Nyland, principal seaport (1 1 1 654 inhabitants) ; Abo, capital of the Abo-Bjorneborg province and ancient capital of Finland (42,639); Tammerfors tne leading manufacturing town of the grand-duchy (40,261) ! Viborg, chief town of province of same name, important seaport (34.672) , Ulea boTg capital of province (i 7 ,737); Vasa or Nikolaistad capital of Vasa Ian (18,028); Bjorneborg (16,053); Kuopio, capital of pro- vince (13,519); and Tavastehus, capital of province of the same

“ˆSi-Agriculture gives occupation to the large majority of the population, but of late the increase of manufactures has been marked. Dairy-farming is also on the increase, and the foreign exports of butter rose from 1930 cwt. in 1900 to 3130 cwt. in 1905. Measures have been taken since 1892 for the improvement o agri- culture, and the state keeps twenty-six agronomists and instructors for that purpose. There are two high schoo s , one expenmenta station twenty-two middle schools and forty-eight lower schools of agriculture, besides ten horticultural schools. Agricultural societies

eXi FLLgis h a P n important item of income. The value of exports of fish &c ; was £140,000 in 1904, but fish was a so imported to the value of £61,300 The manufacturing industries (wood-products, metallurgy, machinery, textiles, paper and leather) are of modern development, but the aggregate production approaches one and a

““goM fsˆbtKIn Lapland on the Ivalajoki but the output, which amounted in i8 7 l to 56,692 grammes, had fallen in 1 1904 to iosi grammes. There is also, a small output of silver, copper and iron. The last is obtained partly from mines , but chiefly from he lakes In 1904 22,050 tons of cast iron were obtained, lhe textile ndustries are making rapid progress, and their produce no tw.th- standin°- the high duties, is exported to Russ ia . The fabrication of paper out of wood is also rapidly growing. . As to the timber trade, there are upwards of 500 saw-mills, employing 21,000 men, and with an output valued at over £3,000,000 annually. ,

Communications. -The roads, attaining an aggregate length of 27,500 m., are kept as a rule in very good order. The first .railway walopened in 18&, and the next, from HeWon to St Pˆbuiˆ in 1870 (cost only £4520 per mile . Railways of a lighter type begLn to be bnilt sm« 1877. and *™ ™l nA has * bout 2I f °? m ‘ t £ railway, mostly belonging to the state. The gross ™ e f™™^* state railways is 26,607,622, and the net income 4.684,856 marks Finland has an extensive and well-kept system of canals, of which the sluiced canal

connecting Lake Saima with the Gulf of Finland is the chief one. It permits ships navigating the Baltic to penetrate 270 m inland, and is passed every year by from 4 ‘)8o to 5200 vessels Considerable works have also been made to connect the different

The chief trade of Finland is with Russia, and next with Great Britain, Germany, Denmark, France and Sweden. The main im- ports are: cereals and flour (to an annual value exceeding £3,000,000), metals, machinery, textile materials and textile products. The chief articles of export are; timber and wood articles (£5,250,000), paper and paper pulp, some tissues, metallic goods, leather, &c. The chief ports are Helsingfors, Abo, Viborg, Hango and Vasa.

Education.— Great strides have been made since 1866, when a new education law was passed. Rudimentary teaching in reading, occasionally writing, and the first principles of Lutheran faith are given in the maternal house, or in ” maternal schools,” or by ambu- latory schools under the control of the clergy, who make the necessary examination in the houses of every parish. All education above that level is in the hands of the educational department and school boards elected in each parish, each rural parish being bound (since 1898) to be divided into a proper number of school districts and to have a school in each of them, the state contributing to these ex- penses 800 marks a year for each male and 600 marks for each female teacher, or 25% of the total cost in urban communes. Secondary education, formerly instituted on two separate lines, classical and scientific, has been reformed so as to give more prom- inence to scientific education, eyen in the classical (linguistic) lyceums or gymnasia. For higher education there is the university of Helsingfors (formerly the Abo Academy), which in 1906 had 1921 students (328 women) and 141 professors and docents. Besides the Helsingfors polytechnic there are a number of higher and lower technical, commercial and navigation schools. Finland has several scientific societies enjoying a world-wide reputation, as the Finnish Scientific Society, the Society for the Flora and Fauna of Finland, several medical societies, two societies of literature, the Fmno- Ugrian Society, the Historical and Archaeological Societies, one juridical, one technical and two geographical societies. All of these, as also the Finnish Geological Survey, the Forestry Administration, &c issue publications well known to the scientific world, lhe numerous local branches of the Friends of the Folk-School and the Society for Popular Education display great activity, the former by aiding the smaller communes in establishing schools, and the latter in publishing popular works, starting their own schools as well as free libraries (in nearly every commune), and organizing lectures for the people. The university students take a lively part in

this work.

Government and Administration.— -From the time of its union with Russia at the Diet of Borga in 1809 till the events of 1899 (see History) Finland was practically a separate state, the emperor of Russia as grand-duke governing by means of a nomin- ated senate and a diet elected on a very narrow franchise, and meeting at distant and irregular intervals. This diet was on the old Swedish model, consisting of representatives of the four estates— nobility, clergy, burghers and peasants— sitting and voting in separate ” Houses.” The government of the country was practically carried on by the senate, which communicated with St Petersburg through a Finnish secretary attached to the Russian government. War and foreign affairs were entirely in the hands of Russia, and a Russian governor had his residence in Helsingfors. The senate also controlled the administration of the law. The constitutional conflict of 1899-1905 brought about something like a revolution in Finland. For some years the country was subject to a practically arbitrary form of govern- ment, but the disasters of the Russo-Japanese War and the growing anarchy in Russia resulted in 1905 in a complete and peaceful victory. for the defenders of the Finnish constitution. As a Finnish writer puts it: ” just as the calamities which had befallen Finland came from Russia, so Was her deliverance to come from Russia.” The status quo ante was restored, the diet met in extraordinary session, and proceeded to the entire re- casting of the Finnish government. Freedom of the press was voted, and the diet next proceeded to reform its own constitution. 1 The Finnish mark, markka, of 100 penni, equals about 9ˆd

Far-reaching changes were voted. The new diet, instead of being composed of four estates sitting separately, consists of a single chamber of 200 members elected directly by universal suffrage, women being eligible. By the new constitution the grand-duchy was to be divided into not less than twelve and not more than eighteen ‘constituencies, electing members in propor- tion to population. A scheme of ” proportional representation,” the votes being counted in accordance with the system invented by G. M. d’Hondt, a Belgian, was also adopted. The executive was to consist of a minister-secretary of state and of the members of the senate, who were entitled to attend and address the diet and who might be the subject of interpellations. The members of the senate were made responsible to the diet as well as to the emperor-grand-duke for their acts. The diet has power to

consider and decide upon measures proposed by the government. After a measure has been approved by the diet it is the duty of the senate to report upon it to the sovereign. But the senate is not obliged to accept the decision of the majority of the diet, nor, apparently, is the sovereign bound to accept the advice of the senate. The first elections, April 1907, resulted in the election to the diet of about 40 % representatives of the Social Democratic party, and nineteen women members. The budget of Finland in 1905 was £4,273,970 of "ordinary" revenue. The " ordinary " expenditure was £3,595,300. The public debt amounted at the end of 1905 to £5,611,170.

History.— It was probably at the end of the 7 th or the begin- ning of the 8th century that the Finns took possession of what is now Finland, though it was only when Christianity was in- troduced, about 1157, that they were brought into contact with civilized Europe. They probably found the Lapps in possession of the country. The early Finlanders do not seem to have had any governmental organization, but to have lived in separate communities and villages independent of each other. Their mythology consisted in the deification of the forces of nature, as " Ukko," the god of the air, " Tapio," god of the forests, " Ahti," the god of water, &c. These early Finlanders seem to have been both brave and troublesome to their neighbours, and their repeated attacks on the coast of Sweden drew the attention of the kings of that country. King Eric IX. (St Eric), accom- panied by the bishop of Upsala, Henry (an Englishman, it is said), and at the head of a considerable army, invaded the country in 1157, when the people were conquered and baptized. King Eric left Bishop Henry with his priests and some soldiers behind to confirm the conquest and complete the conversion. After a time he was killed, canonized, and as St Henry became the patron saint of Finland. As Sweden had to attend to her own affairs, Finland was gradually reverting to independence and paganism, when in 1209 another bishop and missionary, Thomas (also an Englishman), arrived and recommenced the work of St Henry. Bishop Thomas nearly succeeded in detaching Finland from Sweden, and forming it into a province subject only to the pope. The famous Birger Jarl undertook a crusade in Finland in 1249, compelling the Tavastians, one of the sub- divisions of the Finlanders proper, to accept Christianity, and building a castle at Tavestehus. It was Torkel Knutson who conquered and connected the Karelian Finlanders in 1293, and built the strong castle of Viborg. Almost continuous wars between Russia and Sweden were the result of the conquest of Finland by the latter. In 1323 it was settled that the river Rajajoki should be the boundary between Russia and the Swedish province. After the final conquest of the country by the Swedes, they spread among the

Finlanders their civilization, gave them laws, accorded them the same civil rights as belonged to themselves, and introduced agriculture and other beneficial arts. The Reformed religion was introduced into Finland by Gustavus Vasa about 1528, and King John III. raised the country to the dignity of a grand-duchy. It continued to suffer, sometimes deplorably, in most of the wars waged by Sweden, especially with Russia and Denmark. His predecessor having created an order of nobility,— counts, barons and nobles, Gustavus Adolphus in the beginning of the 17th century established the diet of Finland, composed of the four orders of

the nobility, clergy, burghers and peasants. Gustavus and his successor did much for Finland by founding schools and gymnasia, building churches, encouraging learning and intro- ducing printing. During the reign of Charles XL (1692-1696) the country suffered terribly from famine and pestilence; in the diocese of Abo alone 60,000 persons died in less than nine months; Finland' has been visited a| different periods since by these scourges; so late as 1848 whole' villages were starved during a dreadful famine. Peter the Great cast an envious eye on Finland and tried to wrest it from Sweden; in 1710 he managed to obtain possession of the towns of Kexholm and Villmanstrand; and by 17 16 all the country was in his power. Meantime the sufferings of the people had been great; thousands perished in the wars of Charles XII. By the peace of Nystad in 1721 the province of Viborg, the eastern division of Finland, was finally ceded to Russia. But the country had been laid very low by war, pestilence and famine, though it recovered itself with wonderful rapidity. In 1741 the Swedes made an effort to recover the ceded province, but through wretched management suffered disaster, and were compelled to capitulate in August 1742, ceding by the peace of Abo, next year, the towns of Villman- strand and Fredrikshamn. Nothing remarkable seems to have occurred till 1788, under Gustavus III., who began to reign in 1 77 1, and who confirmed to Finland those "fundamental laws " which they have succeeded in maintaining against kings and tsars for over two centuries. The country was divided into six governments, a second superior court of justice was founded at Vasa, many new towns were built, commerce flourished, and science and art were encouraged. Latin disappeared as the academic language, and Swedish was adopted. In 1788 war again broke out between Sweden and Russia, and was carried on for two years without much glory or gain to either party, the main aim of Gustavus being to recover the lost Finnish province. In 1808, under Gustavus IV., peace was again broken between the two countries, and the war ended by the cession in 1809

of the whole of Finland and the Aland Islands to Russia. Finland, however, did not enter Russia as a conquered province, but, thanks to the bravery of her people after they had been abandoned by an incompetent monarch and treacherous generals, and not less to the wisdom and generosity of the emperor Alexander I. of Russia, she maintained her free constitu- tion and fundamental laws, and became a semi-independent grand-duchy with the emperor as grand-duke. The estates were summoned to a free diet at Borga and accepted Alexander as grand-duke of Finland, he on his part solemnly recognizing the Finnish constitution and undertaking to preserve the religion, laws and liberties of the country. A senate was created and a governor-general named. The province of Viborg was reunited to Finland in 181 1, and Abo remained the capital of the country till 182 1, when the civil and military authorities were removed to Helsingfors, and the university in 1827. The diet, which had not met for 56 years, was convoked by Alexander II. at Helsingfors in 1863. Under Alexander II. Finland was on the whole pros- perous and progressive, and his statue in the great square in front of the cathedral and the senate house in Helsingfors testifies to the regard in which his memory is cherished by his Finnish subjects. Unfortunately his successor soon fell under the influence of the reactionary party which had begun to assert itself in Russia even before the assassination of Alexander II. One of Alexander III.'s first acts was to confirm " the constitu- tion which was granted to the grand-duchy of Finland by His Majesty the emperor Alexander Pavlovich of most glorious memory, and developed with the consent of the estates of Finland by our dearly beloved father of blessed memory the emperor Alexander Nicolaievich." But the Slavophil movement, with its motto, " one law, one church, one tongue," acquired great influence in official circles, and its aim was, in defiance of the pledges of successive tsars, to subject Finland to Orthodoxy and autocracy. It is unnecessary to follow in detail the seven years' struggle between the Russian bureaucracy and the defenders of the Finnish constitution. Politics in Finland were complicated by the rivalry between the Swedish party, which

had hitherto been dominant in Finland, and the Finnish " nation- alist " party which, during the latter half of the 19th century, had been determinedly asserting itself linguistically and politi- cally. With some exceptions, however, the whole country united in defence of its

constitution; ” Fennoman ” and ” Svecoman,” recognizing that their common liberties were at stake, suspended their feud for a season. With the accession of Nicholas II. (see Russia) the constitutional conflict became acute, and the ” February manifesto ” (February 15th, 1809) virtually abro- gated the legislative power of the’Finnish diet. A new military law, practically amalgamating the Finnish with the Russian forces, followed in July 1901 ; Russian officials and the Russian language were forced on Finland wherever possible, and in April 1903 the Russian governor, General Bobrikov, was invested with practically dictatorial powers. The country was flooded with spies, and a special Russian police force was created, the expenses being charged to the Finnish treasury. The Russian system was now in full swing; domiciliary visits, illegal arrests and banishments, and the suppression of newspapers, were the order of the day. To all this the people of Finland opposed a dogged and determined resistance, which culminated in November 1905 in a ” national strike.” The strike was universal, all classes joining in the movement, and it spread to all the industrial centres and even to the rural districts. The railway, steamship, telephone and postal services were practically suspended. Helsingfors was without tramcars, cabs, gas and electricity; no shops except provision shops were open; public departments, schools and restaurants were closed. After six days the unconstitutional government — already much shaken by events in Russia and Manchuria — capitulated. In an imperial manifesto dated the 7th of November 1905 the demands of Finland were granted, and the status quo ante 1899 was restored.

But the reform did not rest here. The old Finnish constitution, although precious to those whose only protection it was, was an antiquated and not very efficient instrument of government. Popular feeling had been excited by the political conflict, ad- vanced tendencies had declared themselves, and when the new diet met it proceeded as explained above to remodel the con- stitution, on the basis of universal suffrage, with freedom of the press, speech, meeting and association.

In 1908-10 friction with Russia was again renewed. The Imperial government insisted that the decision in all Finnish questions affecting the Empire must rest with them; and a re- newed attempt was made to curtail the powers of the Finnish Diet.

Ethnology. — The term Finn has a wider application than Finland, being, with its adjective Finnic or Finno-Ugric (q.v.) or Ugro-Finnic, the collective name of the westernmost branch of the Ural-Altaic family, dispersed throughout Finland, Lapland, the Baltic provinces

(Esthonia, Livonia, Curland), parts of Russia proper (south of Lake Onega), both banks of middle Volga, Perm, Vologda, West Siberia (between the Ural Mountains and the Yenissei) and Hungary.

Originally nomads (hunters and fishers), all the Finnic people except the Lapps and Ostyaks have long yielded to the influence of civilization, and now everywhere lead settled lives as herdsmen, agriculturists, traders, &c. Physically the Finns (here to be distinguished from the Swedish-speaking population, who retain their Scandinavian qualities) are a strong, hardy race, of low stature, with almost round head, low forehead, flat features, prominent cheek bones, eyes mostly grey and oblique (inclining inwards), short and flat nose, protruding mouth, thick lips, neck very full and strong, so that the occiput seems flat and almost in a straight line with the nape; beard weak and sparse, hair no doubt originally black, but, owing to mixture with other races, now brown, red and even fair; complexion also somewhat brown. The Finns are morally upright, hospitable, faithful and submissive, with a keen sense of personal freedom and independence, but also somewhat stolid, revengeful and indolent. Many of these physical and moral characteristics they have in common with the so-called ” Mongolian ” race, to which they are no doubt ethnically, if not also linguistically, related.

Considerable researches have been accomplished since about 1850 in the ethnology and archaeology of Finland, on a scale which has no parallel in any other country. The study of the prehistoric population of Finland— Neolithic (no Palaeolithic finds have yet been made) — of the Age of Bronze and the Iron Age has been carried on with great zeal. At the same time the folklore, Finnish and partly Swedish, has been worked out with wonderful completeness (see L’CEuvre demi-se’culaire de la Sociite de Literature finnoise et le mouvement national finnois, by Dr E. G. Palmen, Helsingfors, 1882, and K. Krohn’s report to the London Folklore Congress of 1891). The work that was begun by Porthan, Z. Topelius, and especially E. Lonnrot (1802-1884), for collecting the popular poetry of the Finns, was continued by Castren (1813-1852), Europaeus (1820-1884), and V. Porkka (1854-1889), who extended their researches to the Finns settled in other parts of the Russian empire, and collected a considerable number of variants of the Kalewala and other popular poetry and songs. In order to study the different eastern kinsfolk of the Finns, Sjogren (1 792-1855) extended his journeys to North Russia, and Castren to West and East Siberia (Nordische Reisen und Forschungen), and collected the materials which permitted himself and Schiefner to publish grammatical works relative to the Finnish, Lappish, Zyrian, Tcheremiss, Ostiak, Samoyede, Tungus, Buryat, Karagas, Yenisei-

Ostiak and Kott languages. Ahlqvist (1826-1889), and a phalanx of linguists, continued their work among the Vogules, the Mordves and the Obi-Ugrians. And finally, the researches of Aspelin {Foundations ofFinno- Ugrian Archaeology ‘, in Finnish, and Atlas of Antiquities) led the Finnish ethnologists to direct more and more their attention to the basin of the Yenisei and the Upper Selenga. A series of expeditions (of Aspelin, Snellman and Heikel) were consequently directed to those regions, especially since the discovery by Yadrintseff of the remarkable Orkhon inscriptions (see Turks, p. 473), which finally enabled the Danish linguist, V. Thomsen, to decipher these inscriptions, and to discover that they belonged to the Turkish Iron Age. (See Inscriptions de I’linissei recueillies et publics par la Societe Finl. d’ A rcMologie, 1889, and Inscriptions de I’Orkhon, 1892.)

Authorities. — The general history of Finland is fully treated by Yrjo Koskinen (1869-1873) and M. G. Schybergson (1887-1889). Both works have been translated into German. The constitutional conflict gave ri6e to a host of books and pamphlets in various languages. Mechelin, Danielson and Hermanson were the leading writers on the Finnish side, and M.Ordin on the Russian. Most of the political documents have been published and translated. A finely illustrated book, Finland in the Nineteenth Century, by various Finnish writers, gives an excellent account of the country; also Reuter’s Finlandia, a very complete work with an exhaustive bibliography. The constitutional question was fully discussed in English in Fin- land and the Tsars, by J. R. Fisher (2nd ed., 1900). The Atlas de Finlande, published in 1899 by the Geographical Society of Fin- land, is a remarkably well executed and complete work. The Statistical Annual for Finland— Slatistisk Arsbok for Finland — pub- lished annually by the Central Statistical Bureau in Helsingfors, gives the necessary figures. (P. A. K.; J. S. K.; J. R. F.*)

Finnish Literature. The earliest writer in the Finnish vernacular was Michael Agricola (1506-1552), who published an A B C Book in 1544, and, as bishop of Abo, a number of religious and educational works. A version of the New Testament in Finnish was printed by Agricola in 1548, and some books of the Old Testament in 1552. A complete Finnish Bible was published at Stockholm in 1642. The dominion of the Swedes was very unfavourable to the development of anything like a Finnish literature, the poets of Finland preferring to write in Swedish and so secure a wider audience. It was not until, in 1835, the national epos of Finland, the Kalewala (q.v.), was introduced to readers by the exertions of Elias Lonnrot (q.v.), that the Finnish language was used for literary composition. Lonnrot also collected and edited the works of the peasant-poets P. Korhonen (1775-1840) and

Pentti Lyytinen, with an anthology containing the improvisa- tions of eighteen other rustic bards. During the last quarter of the 19th century there was an ever-increasing literary activity in Finland, and it took the form less and less of the publication

of Swedish works, but more and more that of examples of the aboriginal vernacular. At the present time, in spite of the political troubles, books in almost every branch of research are found in the language, mainly translations or adaptations. We meet with, during the present century, a considerable number of names of poets and dramatists, no doubt very minor, as also painters, sculptors and musical composers. At the Paris International Exhibition of 1878 several native Finnish painters and sculptors exhibited works which would do credit to any country; and both in the fine and applied arts Finland occupied a position thoroughly creditable. An important contribution to a history of Finnish literature is Krohn's Suomenkielinen runollisuns ruotsinvallan aikana (1862). Finland is wonderfully rich in periodicals of all kinds, the publications of the Finnish Societies of Literature and of Sciences and other learned bodies being specially valuable. A great work in the revival of an interest in the Finnish language was done by the Suomalaisen Kirjallisuuden Seura (the Finnish Literary Society), which from the year 1841 has published a valuable annual, Suomi. The Finnish Literary Society has also published a new edition of the works of the father of Finnish history, Henry Gabriel Porthan (died 1804). A valuable handbook of Finnish history was pub- lished at Helsingfors in i860- 1873, by Yrjo Koskinen, and has been translated into both Swedish and German. The author was a Swede, Georg Forsman, the above form being a Finnish translation. Other works on Finnish history and some inportant works in Finnish geography have also appeared. In language we have Lonnrot's great Finnish-Swedish dictionary, published by the Finnish Literary Society. Dr Otto Donner's Comparative Dictionary of the Finno-Ugric Languages (Helsingfors and Leipzig) is in German. In imaginative literature Finland has produced several important writers of the vernacular. Alexis Stenwall (" Kiwi ") (1834-187 2), the son of a village tailor, was the best poet of his time ; he wrote popular dramas and an historical romance, The Seven Brothers (1870). Among recent playwrights Mrs Minna Canth (1844-1897) has been the most successful. Other dramatists are E. F. Johnsson (1844-1895), P. Cajander (b. 1846), who translated Shakespeare into Finnish, and Karl Bergbom (b. 1843). Among lyric

poets are J. H. Erkko (b. 1840), Arwi Jannes (b. 1848) and Yrjo Weijola (b. 1875). The earliest novelist of Finland, Pietari Paivarinta (b. 1827), was the son of a labourer; he is the author of a grimly realistic story, His Life. Many of the popular Finnish authors of our day are peasants. Kauppis Heikki was a wagoner; Alkio Filander a farmer; Heikki Mavilainen a smith; Tunana Kokko (Kyosti) a gamekeeper. The most gifted of the writers of Finland, however, is certainly Juhani Alio (b. 1861), the son of a country clergyman. His earliest writings were studies of modern life, very realistically treated. Aho then went to reside in France, where he made a close study of the methods of the leading French novelists of the newer school. About the year 1893 he began to publish short stories, some of which, such as Enris, The Fortress of Matthias, The Old Man of Korpela and Finland's Flag, are delicate works of art, while they reveal to a very interesting degree the temper and ambitions of the contem- porary Finnish population. It has been well said that in the writings of Juhani Aho can be traced all the idiosyncrasies which have formed the curious and pathetic history of Finland in recent years. A village priest, Juho Reijonen (b. 1857), in tales of somewhat artless form, has depicted the hardships which poverty too often entails upon the Finn in his country life. Tolstoy has found an imitator in Arwid Jarnefelt (b. 1861). Santeri Ingman (b. 1866) somewhat naively, but not without skill, has followed in the steps of Aho. It would be an error to exaggerate either the force or the originality of these early developments of a national Finnish literature, which, moreover, are mostly brief and unambitious in character. But they are eminently sincere, and they have the great merit of illustrating the local aspects of landscape and temperament and manners.

Authorities. — E. G. Palmen, L'CEuvre demi-skulaire de la Suomalaisen Kirjallisuuden Seura, 1831-81 (Helsingfors, 1882) ; J. Krohn, Suomalaisen Kirjallisuuden waiheet (Helsingfors, 1897);

F. W. Pipping, Forteckning ofver backer pdfinska spraket (Helsingfors, 1856-1857); E. Brausewetter, Finland im Bilde seiner Dichtung und seiner Dichier (Berlin, 1899); C. J. Billson, Popular Poetry of the Finns (London, 1900) ; V. Vasenius, Ofversigt af Finlands Litteratur-historiafbr skolor (Helsingfors, 1893). For writers using the Swedish language, see Sweden: Literature. (E. G.)

FINLAY, GEORGE (1799-1875), British historian, was born of Scottish parents at Faversham, Kent, on the 21st of December 1799. He studied for the law in Glasgow, and about 1821 went to Gottingen. He had already begun to feel a deep interest in the Greek struggle for independence, and in 1823 he resolved to visit the country. In

November he arrived in Cephalonia, where he was kindly received by Lord Byron. Shortly afterwards he landed at Pyrgos, and during the next fourteen months he improved his knowledge of the language, history and antiquities of the country. Though he formed an unfavourable opinion of the Greek leaders, both civil and military, he by no means lost his enthusiasm for their cause. A severe attack of fever, however, combined with other circumstances, induced him to spend the winter of 1824-1825 and the spring of 1825 in Rome, Naples and Sicily. He then returned to Scotland, and, after spending a summer at Castle Toward, Argyllshire, went to Edinburgh, where he passed his examination in civil law at the university, with a view to being called to the Scottish bar. His enthusiasm, however, carried him back to Greece, where he resided almost uninterruptedly till his death. He took part in the unsuccessful operations of Lord Cochrane and Sir Richard Church for the relief of Athens in 1827. When independence had been secured in 1829 he bought a landed estate in Attica, but all his efforts for the introduction of a better system of agriculture ended in failure, and he devoted himself to the literary work which occupied the rest of his life. His first publications were The Hellenic Kingdom and the Greek Nation (1836); Essai sur les principes de banque applique's a I'itat actuel de la Grece (Athens, 1836); and Remarks on the Topography of Oropia and Diacria, with a map (Athens, 1838). The first instalment of his great historical work appeared in 1844 (2nd ed., 1857) under the title Greece under the Romans; a Historical View of the Condition of the Greek Nation from the time of its Conquest by the Romans until the Extinction of the Roman Empire in the East. Meanwhile he had been qualifying himself still further by travel as well as by reading; he undertook several tours to various quarters of the Levant; and as the result of one of them he published a volume On the Site of the Holy Sepulchre; with a plan of Jerusalem (1847). The History of the Byzantine and Greek Empires from 716-1453 was completed in 1854. It was speedily followed by the History of Greece under the Ottoman and Venetian Domination (1856), and by the History of the Greek Revolution (1861). In weak health, and conscious of failing energy, he spent his last years in revising his history. From 1864 to 1870 he was also correspondent of The Times newspaper, his letters to which attracted considerable attention, and, appearing in the Greek newspapers, exercised a distinct influence on Greek politics. He was a member of several learned societies; and in 1854 he received from the university of Edin- burgh the honorary degree of LL.D. He died at Athens on the 26th of January 1875. A new edition of his History, edited by the Rev. H. F. Tozer, was issued by the Oxford Clarendon press in 1877. It includes a brief but extremely interesting fragment of an autobiography of the author, almost the only authority

for his life.

As an historian, Finlay had the merit of entering upon a field of research that had been neglected by English writers, Gibbon alone being a partial exception. As a student, he was laborious; as a scholar he was accurate; as a thinker, he was both acute and profound; and in all that he wrote he was unswerving in his loyalty to the principles of constitutional government and to the cause of liberty and justice.

FINN MAC COOL (in Irish Find Mac Ctjmaiix), the central figure of the later heroic cycle of Ireland, commonly called Ossianic or Fenian. In Scotland Find usually goes by the name of Fingal. This appears to be due to a misunderstanding of the title assumed by the Lord of the Isles, Ri Fionnghall, i.e. king of theNorse. Find'sfather, CumallmacTrenrn6ir, was uncle toConn

C6tchathach, High King of Ireland, who died in a.d. 157. Cuiriall carried off Murna Munchaem, the daughter of a Druid named Tadg mac Nuadat, and this led to the battle of Cnucha, in which Cumall was slain by Goll mac Morna (a.d. 174). Find was born after his father's death and was at first called Demni. He is leader of the fiann or ferine (English " Fenians "), a kind of militia or standing army which was drawn from all quarters of Ireland. His father had held the same office before him, but after his death it passed to his enemy Goll mac Morna, who retained it until Find came to man's estate. Find usually resided at Almu (Allen) in Co. Kildare, where he was surrounded by some of the contingents of the fiann, the rest being scattered throughout Ireland to ward off enemies, particularly those coming from over the sea. In times of invasion Find collected his forces, overcame the foe, and pursued him to Scotland or Lochlann (Scandinavia) as the case might be. When not engaged in war the fiann gave themselves up to the chase or love-adventures. We are informed in great detail as to the conditions of admission to this privileged bahd, which were at once singular and exacting. The foremost heroes in Find's train were his son Ossian, his grandson Oscar, Cailte mac Ronain, and Diarmait O'Duibne, whose elopement with Find's destined bride Grainne, daughter of the High-King Cormac mac Airt (a.d. 227-266), forms the subject of a celebrated story. These, like Find, were all of the Ua Baisgne branch, with which was allied the Ua Morna, with whom they were generally at variance. The latter hailed from Connaught, chief among them being Goll and Conan. By the annalists Find is

represented as having met with death by treachery either in 252 Or 283. Under Coirpre Lifeochair, successor to Cormac mac Airt, the power of the fiann became intolerable. The monarch accordingly took up arms against them and utterly crushed them at the battle of Gabra (a.d. 283). Very few survived the defeat, but the story makes Ossian and Cailte live on until after the arrival of St Patrick in 432.

It is incredible that such a band as the fiann should have existed in the 2nd and 3rd centuries. A number of sagas older in date than the Ossianic stories have been preserved, which deal with events happening in the reigns of Art son of Conn (166-196), Lugaid mac Con (196-227), and Cormac mac Airt (227-266), but none of these in their oldest shape contain any allusion whatsoever to Find and his warriors. In the history of the Boroma, contained in the book of Leinster, Find is merely a Leinster chieftain who assists Bressal the king of Leinster against Coirpre Lifeochair. It can be shown that Find was originally a figure in Leinster-Munster tradition previous to the Viking age, but we have no documentary evidence concerning him at this time. He seems primarily to have been regarded as a poet and magician. Later he appears to have been trans- formed into a petty chief, and Zimmer even tried to show that his personality was developed in Leinster and Munster local tradition out of stories clustering round the figure of the Viking leader Ketill Hviti (Caittil Find), who was slain in 857. By the year 1000 Find was certainly connected in the minds of the people with the reign of Cormac mac Airt, but the process is obscure. Recently John MacNeill has pointed out that in the oldest genealogies Find is always connected with the Ui Tairrsigh of Failge (Offaley, a district comprising the present county of Kildare and parts of King's and Queen's counties). The Ui Tairrsigh were undoubtedly of Firbolg origin, and MacNeill would account in this manner for the slow acceptance of the stories by the conquering Milesians. Whilst the Ulster epic was fashionable at court, the subject races clung to the Fenian cycle. For the last 800 years Find has been the national hero of the Gaelic-speaking populations of Ireland, the Scottish Highlands and the Isle of Man. See also Celt (subsection Irish Literature).

Authorities. — A. Nutt, Ossian and the Ossianic Literature (London, 1899) ; H. Zimmer, " Keltische Beitfage Hi.," Zeitschriftfiir deulsches Altertum (1891), vol. xxxv. pp. 1-172; L. C Stern, " Die Ossianischen Heldenlieder," Zeitschrift fur vergleichende Litleratw- eeschichte (1895: trans, by J. L. Robertson \n Transactions of the Gaelic Society of Inverness, 1897-1898, vol. xxii. pp. 257-325); J.

MacNeill, Duanaire Finn (London, 1908).

(E. C. Q.)

FINNO-UGRIAN, or Finno-Ugric, the designation of a division of the Ural-Altaic family of languages and their speakers. The first part is the name given by their neighbours, though not used by themselves, to the inhabitants of the eastern shores of the Baltic. It is probably the same word as the Fenni of Tacitus and $iwot of Ptolemy, though it is not certain that those races were Finns in the modern sense. It possibly means people of the fens or marshes, and corresponds to the native word Suomi, which appears to be derived from suo, a marsh. Finn and Finnish are used not only of the inhabitants of Finland but also in a more extended sense of similar tribes found in Russia and sometimes called Baltic Finns and Volga Finns. In this sense the Esthonian tribes (Baltic), the Laps, the Cheremis and Mordvins (Volga), and the Permian tribes are all Finns. The name is not, however, extended to the Ostiaks, Voguls and Magyars, who, though allied, form a separate subdivision called Ugrian, a name derived from Yura or Ugra, the country on either side of the Ural Mountains, and first used by Castren in a scientific sense.

The name Finno-Ugric is primarily linguistic and must not be pressed as indicating a community of physical features and customs. But making allowance for the change of language by some tribes, the Finno*Ugrians form, with the striking ex- ception of the Hungarians, a moderately homogeneous whole. They are nomads, but, unlike the Turks, Mongols and Manchus, have hardly ever shown themselves warlike and have no power of political organization. Those of them who have not come under European influence live under the simplest form of patriarchal government, and states, kings or even great chiefs are almost unknown among them.

Their headquarters are in Russia. From the Baltic to south Siberia extends a vast plain broken only by the Urals. Large parts of it are still wooded, and the proportion of forest land and marsh was no doubt much greater formerly. The Finno-Ugric tribes seem to shun the open steppes but are widely spread in the wooded country, especially on the banks of lakes and rivers. Their want of political influence renders them obscure, but they form a considerable element in the population of the northern, middle and eastern provinces of Russia, but are not found much to the south of Moscow (except in the east) or in the west (except in the Baltic provinces) . The difference of temperament between the Great Russians and the purer Slavs such as the Little Russians is partly due to an infusion of Finnish blood.

Physically the Finno-Ugric races are as a rule solidly built and, though

there is considerable variation in height and the cephalic index, are mostly of small or medium stature, somewhat squat, and brachy- or mesocephalic. As a rule the skin is greyish or olive coloured, the eyes grey or blue, the hair light, the beard scanty. Most of them seem deficient in energy and liveliness, both mental and physical; they are slow, heavy, conservative, somewhat suspicious and vindictive, inclined to be taciturn and melancholy. On the other hand they are patient, persevering, industrious, faithful and honest. When their natural mistrust of strangers is overcome they are kindly and hospitable.

I. Tribes and Nations. — The Ugrian subdivision, which seems to be in many respects the more primitive, consists of three peoples standing on very different levels of civilization, the Ostiaks and Voguls and the Hungarians.

The Ostiaks (Ostyaks or Ostjaks) are a tribe of nomadic fishermen and hunters inhabiting at present the government of Tobolsk and the banks of the Obi. They formerly extended into the government of Perm on' the European side of the Ural Mountains. The so-called Ostiaks of the Yenisei appear to be a different race and not to belong to the Finno- Ugrian group. The Ostiaks are still partially pagan and worship the River Obi. Allied to them are the Voguls, a similar nomadic tribe found on both sides of the Urals, and formerly extending at least as far as the government of Vologda. *"

The languages of the Ostiaks and Voguls are allied, though not mere dialects of one another, and form a small group separated from the languages of the Finns both Western and Easterm

For further details of these and other tribes see under the separate headings.

According to the legend, Nimrod had two sons, Hunyor and Magyor. They married daughters of the prince of the Alans and became the ancestors of the two kindred nations, Magyars jj uns anc i Magyars or Hungarians. This story corre- rarians. sponds with what can be ascertained scientifically about the origin of these peoples. It is probable that the Huns and Magyars were allied tribes of mixed descent comprising both Turkish and Finno-Ugrian elements. The language is indisputably Finno-Ugrian, but the name Hungarian seems

to lead back to the form Un-ugur, and to suggest Turkish connexions which are confirmed by the warlike habits of the Huns and Magyars. The same name possibly occurs in the form Hiung-nu as far east as the frontiers of China, but recent authorities are of opinion that the tribes from whom the present Hungarians are descended were formed originally in the Terek-Kuban country to the north of the Caucasus, where a mixture of Turkish and Ugrian blood took place, a Ugrian language but Turkish mode of life predominating. They were also influenced by Iranians and the various tribes of the Caucasus. Both Huns and Magyars moved westwards, but the Huns invaded Europe in the 5th century and made no permanent settlement in spite of the devastation they caused, whereas the Magyars remained for some centuries near the banks of the Don. According to tradition they were compelled to leave a country called Lebedia under the pressure of nomadic tribes, and moved westward under the leadership of seven dukes. They conquered Hungary in the years 884-895, and the first king of their new dominions was called Arpad. For the chequered and often tragic history of the country see Hungary. The Magyars were converted to Christianity in the nth century and adhered to the Roman not the Eastern Church. They have in all probability entirely lost their ancient physique, but have retained their language, and traces of their older life may be seen in their fondness for horses and flocks.

The following are the principal Finnish peoples. The Permians and Syryenians may be treated as one tribe. The latter name is very variously spelt asSyrjenian, Sirianian,Zyrjenian, Permians zirian, &c. They both call themselves Komi and yeniaas'. speak a mutually intelligible language, allied to Votiak. The name Bjarmisch is sometimes applied to this sub-group. Both Permians and Syryenians are found chiefly in the governments of Perm, Vologda and Archangel, but there are a few Syryenians on the Siberian side of the Urals. The Syryenian headquarters are at the town of Ishma on the Pechora, whereas the name Permian is more correctly restricted to the inhabitants of the right bank of the upper Kama. Both probably extended much farther to the west in former times. The Syryenians are said to be more intelligent and active than most Finnish tribes and to make considerable journeys for trading purposes. They are possibly a mixed race.

The Votiaks are a tribe of about a quarter of a million persons dwelling chiefly in the south-eastern part of the government of Viatka. Their language indicates that they have borrowed a good deal from the Tatars and Chuvashes, and they seem to have little individuality, being described as weak both mentally and physically. They call themselves Ud-murt or Urt-murt. About the 16th century some of

them migrated, doubtless under the pressure of Russian advance, into the government of Ufa and, the country being more fertile, are said to have improved in physique.

The Cheremissians, or Tcheremissians or Cheremis, who call themselves Man, inhabit the banks of the Volga, chiefly in the neighbourhood of Kazan. Those inhabiting the right bank of the Volga are physically stronger and are known as Hill Cheremiss. The evidence of place names makes it probable that their present position is the result of their being driven northwards by the Mordvins and then southwards by the Russians. There is some discrepancy between their language and their physical characteristics. The former shows affinities to both Mordvinian and the Permian group, but

Votiaks.

Chere- mlssians

Lapps.

their crania are said to be mainly dolichocephalic, and it has been suggested that they are connected with the neolithic dolichocephalic population of Lake Ladoga. They are gentle and honest, but neither active nor intelligent.

The Mordvinians, also called Mordva, Mordvins and Mordvs, are scattered over the provinces near the middle Volga, especially Nizhniy Novgorod, Kazan, Penza, Tambov, Simbirsk, Ufa and even Orenburg. Though not continuous, yMans their settlements are considerable both in extent and population. They are the most important of the Eastern Finns, and their traditions speak of a capital and of a king who fought with the Tatars. They are mentioned as Moydens as early as the 6th century, but do not now use the name, calling themselves after one of their two divisions, Moksha or Erza. Their country is still covered with forest to a large extent. Their language is on the one side allied to Cheremissian. On the other it shows a nearer approach to Finnish (Suomi) than the other Eastern languages of the family, but it has also constructions peculiar to itself.

The Lapps are found in Norway, Sweden and Finland. They call themselves Sabme, but are called Finns by the Norwegians. They are the shortest and most brachycephalic race in Europe. The majority are nomads who live by pasturing reindeer, and are known as Mountain Lapps, but others have become more or less settled and live by hunting or fishing. From ancient times the Lapps have had a great

reputa- tion among the Finns and other neighbouring nations for skill in sorcery.

The Esthonians are the peasantry of the Russian province Esthonia and the neighbouring districts. They were serfs until 1817 when they were liberated, but their condition remained unsatisfactory and led to a serious rebellion in nians” 1859. They are practically a branch of the Finns, and are hardly separable from the other Finnish tribes inhabiting the Baltic provinces. The name Est or Ehst, by which they are known to foreigners, appears to be the same as the Aestii of Tacitus, and to have properly belonged to quite a different tribe. They call themselves Ma mes, or country people, and their land Rahwama or Wiroma (cf. Finnish, Virolaiset, Esthon- ians.) Though not superior to other tribes in general intelligence, they have become more civilized owing to their more intimate connexion with the Russian and German population around them.

Livs, Livlanders or Livonians is the name given to the old Finnish-speaking population of west Livland or Livonia and north Kurland. We hear of them as a warlike and predatory pagan tribe in the middle ages, and it is n iaa” s . possible that they were a mixed Letto-Finnish race from the beginning. In modern times they have become almost completely absorbed by Letts, and their language is only spoken in a few places on the coast of Kurland. It has indeed been disputed if it still exists. It is known as Livish or Livonian and is allied to Esthonian.

The Votes (not to be confounded with the Votiaks), also called southern Chudes and Vatjalaiset, apparently represent the original inhabitants of Ingria, the district round St Petersburg, but have decreased before the advance of the Russians and also of Karelians from the north. They are heard of in the nth century, but now occupy only about thirty parishes in north-west Ingria.

The Vepsas or Vepses, also called Northern Chudes, are another tribe allied to the Esthonians, but are more numerous than the Votes. They are found in the district of Tikhvinsk and other parts of the government of Old Novgorod, and apparently extended farther east into the government of Vologda in former times. Linguistically both the Votes and Vepsas are closely related to the Esthonians.

The Finns proper or Suomi, as they call themselves, are the most important and civilized division of the group. They inhabit at present the grand duchy of Finland and the plans adjacent governments, especially Olonetz, Tver and St Petersburg. Formerly a tribe of them called Kainulaiset was also found in Sweden, whence the Swedes call

the Finns

Votes,

Vepsas.

Qven. At present there are two principal subdivisions of Finns, the Tavastlanders or Hamalaiset, who occupy the southern and western parts of the grand duchy, and the Karelians orKarjalaiset found in the east and north, as far as Lake Onega and towards the White Sea.

The former, and generally speaking, all the inhabitants of the grand duchy have undergone a strong Swedish influence. There is a considerable admixture of Swedish blood; the language is full of Swedish words; Christianity is universal; and the upper classes and townspeople are mainly Swedish in their habits and speech, though of late a persistent attempt has been made to Russify the country. The Finns have much the same mental and moral characteristics as the other allied tribes, but have reached a far higher intellectual and literary stage. Several collections of their popular and mythological poetry have been made, the most celebrated of which is the Kalcwala, compiled by Lonnrot about 1835, and there is a copious modern literature. The study of the national languages and antiquities is prosecuted in Helsingfors and other towns with much energy: several learned societies have been formed and considerable results published, partly in Finnish. It is clear that this scientific activity, though animated by a patriotic Finnish spirit, owes much to Swedish training in the past. Besides the literary language there are several dialects, the most important of which is that of Savolaks.

The Karelians are not usually regarded as separate from the Finns, though they are a distinct tribe as much as the Vepsas Karelians. an ˆ V°t es – Living farther east they have come less under Swedish and more under Russian influence than the inhabitants of West Finland; but, since many of the districts which they inhabit are out of the way and neglected, this influence has not been strong, so that they have adopted less of European civilization, and in places preserved their own customs more than the Westerners. They are of a slighter and better pro-, portioned build than the Finns, more enterprising, lively and friendly, but less persevering and tenacious. They number about 260,000, of whom about 63,000 live in Olonetz and 195,000 in Tver

and Novgorod, but in the southern districts are less distinguished from the Russian population. They belong to the Russian Church, whereas the Finns of the grand duchy are Protestants. There also appear to be authentic traces of a Karelian population in Kaluga, Yaroslavl, Vladimir, Vologda and Tambov. It was among them that the Kalewala was collected, chiefly in East Finland and Olonetz.

There is some difference of opinion as to whether the Samoyedes should be included among the Finno-Ugrian tribes or be given the rank of a separate division equivalent to Finno- yedes" Ugrian and Turkish. The linguistic question is discussed below. The Samoyedes are a nomad tribe who wander with their reindeer over the treeless plains which border on the White and Kara seas on either side of the Urals. In culture and habits they resemble the Finno-Ugrian tribes, and there seems to be no adequate reason for separating them.

Various other peoples have been referred to the Finno-Ugrian

group, but some doubt must remain as to the propriety

inclusions. °^ the classification, either because they are now

extinct, or because they are suspected of having

changed their language.

The original Bulgarians, who had their home on the Volga before they invaded the country which now bears their name, were probably a tribe similar to the Magyars, though all record of their language is lost. It has been disputed whether the Khazars, who in the middle ages occupied parts of south Russia and the shores of the Caspian, were Finno-Ugrians or Turks, and there is the same doubt about the Avars and Pechenegs, which without linguistic evidence remains insoluble. Nor is the differ- ence ethnographically important. The formation of hordes of warlike bodies, half tribes, half armies, composed of different races, was a characteristic of Central Asia, and it was probably often a, matter of chance what language was adopted as the common speech.

At the present day the Bashkirs, Meshchers and Tepters, who

speak Tatar languages, are thought to be Finnish in origin, as are also the Chuvashes, whose language is Tatar strongly modified by Finnish influence. The little known Soyots of the headwaters of the Yenisei are also said to be Finno-Ugrians.

The name Chude appears to be properly applied to the Vepsas and Votes but is extended by popular usage in Russia to all Finno-Ugrian tribes, and to all extinct tribes of whatever race who have left tombs, monuments or relics of mining operations in European Russia or Siberia. Some Russian archaeologists use it specifically of the Permian group. But its extension is so vague that it is better to discard it as a scientific term.

II. Languages. — The Finno-Ugric languages are generally considered as a division of the Ural-Altaic group, which consists of four families: Turkish, Mongol, Manchu and Finno-Ugric, including Samoyede unless it is reckoned separately as a fifth. The chief character of the group is that agglutination, or the addition of suffixes, is the only method of word-formation, prefixes and significant change of vowels being unknown, as is also gender. This suggests an affinity with many other languages, such as the ancient Accadian or Sumerian, and Japanese. A connexion between the Finno-Ugric and Dravidian languages has also been suggested. On the other hand, the more highly developed agglutinative languages, such as Finnish, approach the inflected Aryan type, so that the Aryan languages may have been developed from an ancestor not unlike the Ural-Altaic group.

The Finno-Ugrian languages are distinguished from the other divisions of the Ural-Altaic group both in grammar and vocabu- lary. Compared with Mongol and Manchu they have a much greater wealth of forms, both in declension and conjugation; the suffixes form one word with the root and are not wholly or partially detachable postpositions; the pronominal element is freely represented in the suffixes added to both verbs and nouns. These features are also found in the Turkish languages, but Finno-Ugrian has a much greater variety of cases denoting position or motion, and the union of the case termination with the noun is more complete; in some languages the object can be incorporated in the verb, which does not occur in Turkish, but the negative is rarely (Cheremissian) thus incorporated after the Turkish fashion (e.g. yazmak, ” to write “; yazmamak, ” not to write “), and in some languages takes pronominal suffixes (Finnish en title, et tide, eivtil tule, ” I, you, they do not come “)• Vowel-harmony is completely observed in Finnish and Magyar, but in the other languages is imperfectly developed, or has been lost under Russian influence. Relative pronouns and particles exist and are fully developed in some languages. The tendency to form compounds, which is not characteristic of Turkish, is very marked in Finnish and Hungarian, and is said also to be found in Samoyede, Cheremissian and Syryenian. The original order in the sentence seems to be that the governing word follows the word governed, but there are many

exceptions to this, particularly in Hungarian where the arrangement is very free.

In vocabulary the pronouns agree fairly well with those of Turkish, Mongol and Manchu, but there is little resemblance between the numbers. Many of the languages contain numerous Tatar and Turkish loan-words, but with this exception the resemblance of vocabulary is not striking and indicates an ancient separation. But the similarity in the process of word- building and of the elements used, even if they have not the same sense, as well as analogies in the general construction of sentences and in some details (e.g. the use of the infinitive or verbal substantive), seem to justify the hypothesis of an original relationship with the Turkish languages, which in their turn have -connexions with the other groups.

Samoyede is classed by some as a separate group and by some among the Finno-Ugrian languages, but it at any rate displays a far closer resemblance to them in both grammar and vocabulary than do any of the Turkish languages. The numerals are different, but the personal and interrogative pronouns and many common words (e.g. joha, ” river,” Finn. joki; sava, ” good,” Finn, hywil; hole, ” fish,” Finn, kala)

show a considerable resemblance. The inflection of nouns is very like that found in Finno-Ugrian but that of the verb differs, verb and noun being imperfectly differentiated. In detail, however, the verbal suffixes show analogies to those of Finno-Ugrian. Vowel – harmony and weakening of consonants occur as in Finnish.

Excluding Samoyede, the Finno-Ugrian languages may be divided into two sections: (i) Ugrian, comprising Ostiak, Vogul and Magyar; and (2) Finnish. The Permian languages (Syryenian, Permian and Votiak) form a distinct group within this latter section, and the remainder may be divided into the Volga group (Cheremissian and Mordvinian) and the West Finnish (Lappish, Esthonian and Finnish proper).

The Ugrian languages appear to have separated from the Finnish branch before the systems of declension or conjugation were developed. Their case suffixes seem to be later formations, though we find, t, tl or k for the plural and traces of / as a local suffix. Ostiak and Vogul, like Samoyede, have a dual. Moods and tenses are less numerous but the number of verbal forms is increased by those in

which the pronominal object is incorporated. Hungarian has naturally advanced enormously beyond the stage reached by Ostiak and Vogul, and shows marks of strong European influence, but also retains primitive features. Vowel- harmony is observed (vdrok, ” I await,” but verek, ” I strike “). The verb has two sets of terminations, according as it is transitive or intransitive, and the pronominal object is sometimes in- corporated. Alone among FinnorUgrian languages it has developed an article, and the adjective is inflected when used as a predicate though not as an attribute (Jo ember -ek, ” good men,” but Az emberek jok, ” the men are good “). There is great freedom in the order of words and, as in Finnish, a tendency to form long compounds.

The Finnish languages are not divided from the Ugrian by any striking differences, but show greater resemblances to one another in details. None of them have a dual and only Mord- vinian an objective conjugation. The case system is elaborate and generally comprises twelve or fifteen forms. The negative conjugation is peculiar; there are negative adjectives ending in tern or lorn and abessive cases {e.g. Finnish syytla, without a cause, tiedotta, without knowledge).

Permian, Syryenian and Votiak exhibit this common develop- ment less fully than the more western languages. They are less completely inflected than the Finnish languages and more thoroughly agglutinative in the strict sense. In vocabulary, e.g. the numerals, they show resemblances to the Ugrian division. Syryenian has older literary remains than any Finno-Ugrian language except Hungarian. In the latter part of the 14th century Russian missionaries composed in it various manuals and translations, using a special alphabet for the purpose.

Unlike the Finnish and Esthonian branch, the languages of the Volga Finns (Mordvinian and Cheremissian) have been influenced by Russian and Tatar rather than by Scandinavian, and hence show apparent differences. But Mordvinian has points of detailed resemblance to Finnish which seem to point to a comparatively late separation, e.g. the use of kemen for ten, -nza as the possessive suffix of the third personal pronoun, the regular formation of the imperfect with i, the infinitive with ma, and the participle with/ (Finnish va). On the other hand it has many peculiarities. It retains an objective conjugation like the Ugrian languages, and has developed two forms of declension, the definite and indefinite.

Cheremissian has affinities to both the Permian languages and Mordvinian. It resembles Syryenian in its case terminations and also in

marking the plural by interposing a distinct syllable (Syry. yas, Cher, vlya) between the singular and the case suffixes. Most of the numerals are like Syryenian but kandekhsye,indekhsye, for eight and nine, recall Finnish forms (kahdeksan, yhdeksdn), as do also the pronouns.

The connexion between the various West Finnish languages is more obvious than between those already discussed. Lappish (or Lapponic) forms a link between them and Mordvinian. Its pronouns are remarkably like the Mordvinian equivalents, but

the general system of declension and conjugation, both positive and negative, is much as in Finnish. Superficially, however, the resemblance is somewhat obscured by the difference in phonetics, for Lappish has an extraordinary fondness for diph- thongs and also an unusually ample provision of consonants.

The affinity of Esthonian (together with Votish, Vepsish and Livish) to Finnish is obvious not only to the philologist but to the casual learner. In a few cases it shows older forms than Finnish, but on the whole is less primitive and has assumed under foreign influence the features of a European language even more thoroughly. The vowel-harmony is found only in the Dorpat dialect and there imperfectly, the pronominal affixes are not used, and the negative has become an unvarying particle, though in Vepsish and Votish it takes suffixes as in Finnish. On the other hand, the laws for the change of consonants, the general system of phonetics, the declension, the pronouns and the positive conjugation of the verb all closely resemble Finnish. Esthonian has two chief dialects, those of Reval and Dorpat, and a certain amount of literary culture, the best-known work being the national epic or Kalewi-poeg.

Finnish proper is divided into two chief dialects, the Karelian or Eastern, and the Tavastland or Western. The spoken language of the Karelians is corrupt and mixed with Russian, but the Kalewala and their other old songs are written in a pure Finnish dialect, which has come to be accepted as the ordinary language of poetry throughout modern Finland, just as the Homeric dialect was used by the Greeks for epic poetry. It is more archaic than the Tavastland dialect and preserves many old forms which have been lost elsewhere, but its utterance is softer and it sometimes rejects consonants which are retained in ordinary speech, e.g. saa'a, kosen for saada, kosken.

The affinity of Finnish to the more eastern languages of the group is clear, but it has been profoundly influenced by Scandi- navian and in its present form consists of non- Aryan material recast in an Aryan and

European mould. Not only are some of the simplest words borrowed from Scandinavian, but the grammar has been radically modified. Un-Aryan peculiarities have been rejected, though perhaps less than in Esthonian. The various forms of nouns and verbs are not merely roots with a string of obvious suffixes attached, but the termination forms a whole with the root as in Greek and Latin inflections; the adjective is declined and compared and agrees with its sub- stantive; compound tenses are formed with the aid of the auxiliary verb, and there is a full supply of relative pronouns and particles.

Finnish and Hungarian together with Turkish are interesting examples of non-Aryan languages trying to participate, by both translation and imitation, in the literary life of Europe, but it may be doubted if the experiment is successful. The sense of effort is felt less in Hungarian than in the other languages; though they are admirable instruments for terse conversation or popular poetry, there appears to be some deep-seated difference in the force of the verb and the structure of phrases which renders them clumsy and complicated when they attempt to express sentences of the type common in European literature.

III. Civilization and Religion. — The Finno-Ugric tribes have not been equally progressive; some, such as the Finns and Magyars, have adopted, at least in towns, the ordinary civiliza- tion of Europe; others are agriculturists; others still nomadic. The wilder tribes, such as the Ostiaks, Voguls and Lapps, mostly consist of one section which is nomadic and another which is settling down. The following notes apply to traces of ancient conditions which survive sporadically but are nowhere universal. Few except the Hungarians have shown themselves warlike, though we read of conflicts with the Russians in the middle ages as they advanced among this older population. But most Finno-Ugrians are astute and persevering hunters, and the Ostiaks still shoot game with a bow. The tribes are divided into numerous small clans which are exogamous. Marriage by capture is said to survive among the Cheremiss, who are still polygamous in some districts, but purchase of the bride is the more general form. Women are treated as servants and often

excluded from pagan religious ceremonies. The most primitive form of house consists of poles inclined towards one another and covered with skins or sods, so as to form a circular screen round a fire; winter

houses are partly underground. Long snow-shoes are used in winter and boats are largely employed in summer. The Finns in particular are very good seamen. The Ostiaks and Samoyedes still cast tin ornaments in wooden moulds. The variation of the higher numerals in the different languages, which are sometimes obvious loan words, shows that the original system did not extend beyond seven, and the aptitude for calculating and trading is not great. Several thousands of the Ostiaks, Voguls and Cheremiss are still unbaptized, and much paganism lingers among the nominal Christians, and in poetry such as the Kalewala. The deities are chiefly nature spirits and the importance of the several gods varies as the tribes aire hunters, fishermen, &c. Sun or sky worship is found among the Samoyedes and Jumala, the Finnish word for god, seems originally to mean sky. The Ostiaks worship a water-spirit of the river Obi and also a thunder-god. We hear of a forest-god among the Finns, Lapps and Cheremiss.- There are also clan gods worshipped by each clan with special ceremonies. Traces of ancestor-worship are also found. The Samoyedes and Ostiaks are said to sacrifice to ghosts, and the Ostiaks to make images of the more important dead, which are tended and honoured, as if alive, for some years. Images are found in the tombs and barrows of most tribes, and the Samoyedes, Ostiaks and Voguls still use idols, generally of wood. Animal sacrifices are offered, and the lips of the idol sometimes smeared with blood. Quaint combinations of Christianity and paganism occur; thus the Cheremiss are said to sacrifice to the Virgin Mary. The idea that disease is due to possession by an evil spirit, and can be both caused and cured by spells, seems to prevail among all tribes, and in general extraordinary power is supposed to reside in incantations and magical formulae. This belief is conspicuous in the Kalewala, and almost every tribe has its own collection of prayers, healing charms and spells to be used on the most varied occasions. A knowledge of these formulae is possessed by wizards (Finnish noita) corresponding to the Shamans of the Altaic peoples. They are exorcists and also mediums who can ascertain the will of the gods; a magic drum plays a great part in their invocations, and their office is generally hereditary. The non- Buddhist elements of Chinese and Japanese religion present the same features as are found among the Finno-Ugrians — nature- worship, ancestor-worship and exorcism — but in a much more elaborate and developed form.

IV. History. — Most of the Finno-Ugrian tribes have no history or written records, and little in the way of traditions of their past. In their later period the Hungarians and Finns enter to some extent the course of ordinary European history. For the earlier period we have no positive information, but the labours of investigators, especially in

Finland, have collected a great number of archaeological and philological data from which an account of the ancient wanderings of these tribes may be con- structed. Barrows containing skulls and ornaments may mark the advance of a special form of culture, and language may be of assistance; if we find, for instance, a language with loan words of an archaic type, we may conclude that it was in contact with the other language from which it borrowed at the time when such forms were current. But clearly all such deductions contain a large element of theory, and the following sketch is given with all reserve.

The Finno-Ugrian tribes originally lived together east of the Urals and spoke a common language. It is not certain if they were all of the same physical type, for the association of different races speaking one language is common in central Asia. They were hunters and fishermen, not agriculturists. At an unknown period the Finns, still undivided, moved into Europe -and perhaps settled on the Volga and Oka. They had perhaps arrived there before 1500 B.C., learned some rudiments of agriculture, and developed their system of numbers up to ten. They were still in the neolithic stage. About 600 B.C. they came in contact with an Iranian people, from whom they learned the use of

metals, and borrowed numerals for a hundred (Finnish sata, Ostiak sat, Magyar szaz; cf. Zend sata) and a thousand (Magyar ezer; cf. hazanra and hazar). Magyar and some other languages also borrowed a word for ten (tiz, cf. das). This Iranian race may perhaps have been the Scythians, who are believed by many authorities to have been Iranians and to be represented by the Osetians of the Caucasus. There was probably a trade route up the Volga in the 4th century B.C. About that time the Western Finns must have broken away from the Mordvinians and wandered north-westwards. At a period not much later than the Christian era, they must have come in contact with Letto-Lithuanian peoples in the Baltic provinces, and also with Scandinavians. Whether they came in contact with the latter first in the Baltic provinces or in Finland itself is disputed, as there may have been Scandinavians in the Baltic provinces. But the distribution of tombs and barrows seems to indicate that they entered Finland not from the east through Karelia but from the Baltic provinces by sea to Satakunta and the south-east coast, whence they extended eastwards. From both Lithuanians and' Scandinavians they borrowed an enormous quantity of culture-words and probably the ideas and materials they indicate. Thus the Finnish words for gold, king and everything concerned with government are of Scandinavian origin. Their migration to Finland was probably complete about a.d. 800. Meanwhile the Slav tribes known later as Russians were coming up

from the south and pressed the Finns northwards, overwhelming but not annihilating them in the country between St Petersburg and Moscow. The same movement tended to drive the Eastern Finns and Ugrians backwards towards the east. The Finns know the Russians by the name of Venaja, or Wends, and as this name is not used by Slavs themselves but by Scandi- navians and Teutons, it seems clear that they arrived among the Finns as greater strangers than the Scandinavians and known by a foreign name. Christianity was perhaps first preached to the Finns as early as a.d. iooo, but there was a long political and religious struggle with the Swedes. At the end of the 13th century Finland was definitely converted and annexed to Sweden, remaining a dependency of that country until 1809, when it was ceded to Russia.

The Ugrians and Eastern Finns took no part in the westward movement and did not fall under western influences but came into contact with Tatar tribes and were more or less Tatarized. In some cases this took the form of the adoption of a Tatar language, in others (Mordvin, Cheremis and Votiak) a large number of Tatar words were borrowed. We also know that there were considerable settlements of these tribes, perhaps amounting to states, on the Volga and in south-eastern Russia. Such was Great Bulgaria, which continued until destroyed by the Mongols in 12ˆ38. The pressure of tribes farther east acting on these settlements dislodged sections of them from time to time and created the series of invasions which devastated the East Roman empire from the 5th century onwards. But we do not know what were the languages spoken by the Huns, Bulgarians, Pechenegs and Avars, so that we cannot say whether they were Turks, Finns or Ugrians, nor does it follow that a horde speaking aUgrian language were necessarily Ugrians by race. An inspec- tion of the performances of the various tribes, as far as we can distinguish them, suggests that the Turks or Tatars were the warlike element. The names Hun and Hungarian may possibly be the same as Hiung-nu, but we cannot assume that this tribe passed across Asia unchanged in language and physique. The Hungarians entered on their present phase at the end of the oth century of this era, when they crossed the Carpathians and conquered the old Pannonia and Dacia. For half a century or so before this invasion they are said to have inhabited Atelkuzu, probably a district between the Dnieper and the Danube. The isolated groups of Hungarians now found in Transylvania and called Szeklers are considered the purest descendants of the invading Magyars. Those who settled in the plains of Hungary probably mingled there with remnants of Huns, Avars and earlier invaders, and also with subsequent invaders, such as Pechenegs and Kumans.

Bibliography. — ‘Among the older writers may be mentioned Strahlenberg (Das nord- und ostliche Theil von Europa und Asia, !73°). Johann Gottlieb Georgi (Description de toutes les nations de I’empire de la Russie, French tr., St Petersburg, 1777); but especially the various works of Matthias A. Castren (1852-1853) and W. Schott (1858). Modern scientific knowledge of the Finno-Ugrians and their languages was founded by these two authors. Among newer works some of the most important separate publications are : J. R. Aspelin, Antiquites du nord finno-ougrien (1877-1884); J. Abercromby, Pre- and Proto-historic Finns (1898) ; and A. Hackmann, Die filtere Eisenzeit in Finnland (1905).

The recent literature on the origin, customs, antiquities and languages of these races is voluminous, but is contained chiefly not in separate books but in special learned periodicals. Of these there are several: Journal de la Societe Finno-ougrienne (Helsinerfors) (Suomalais-Uerilaisen Seuran Aikakauskirja); Finnisch-Ugrische Forschungen (Helsingfors and Leipzig) ; Milteilungen der archao- loeischen, historischen und ethnographischen Cesellschaft der Kais. ifniversitat zu Kasan; Keleti Szemle or Revue orientate pour les etudes ouralo-altaiques (Budapest) . In all of these will be found numerous valuable articles by such authors as Ahlqvist, Halevy, Heikel, Krohn, Muncacsi, Paasonen, Setala, Smurnow, Thomsen and Vambery.

The titles of grammars and dictionaries will be found under the headings of the different languages. For general linguistic questions may be consulted the works of Castren, Schotf and Otto Donner, also such parts of the following as treat of Fiimo-Ugric languages: Byrne, Principles of the Structure of Languagp?Vo\A. (1892) ; Friedrich Miiller, Grundriss der Sprachwissenschafi II.; Band ii., Abth. 1882; Steinthal and Misleli, Abriss der Sprachwissenschaft (1893). (C. El.)

FINSBURY, a central metropolitan borough of London, England, bounded N. by Islington, E. by Shoreditch, S. by the city of London and W. by Kolborn and St Pancras. Pop. (1901) 101,463. The principal thoroughfares are Pentonville Road, from King’s Cross east to the Angel, Islington, continuing E. and S. in City Road and S. again to the City in Moorgate Street; Clerkenwell Road and Old Street, crossing the centre from W. to E., King’s Cross Road running S.E. into Farringdon Road, and so to the City; St John Street and Road and Goswell Road (the residence of Dickens’ Pickwick) running S. from the Angel

towards the City; and Rosebery Avenue running S.W. from St John Street into Holborn. The commercial character of the City extends into the southern part of thi borough; the residential houses are mostly those of artisans. Local industries include working in precious metals, watch-making, printing and paper-making.

An early form of the name is Vynesbury, but the derivation is not known. The place was supposed by some! to take name from an extensive fen, a part of which, commonly known as Moorfields (cf. Moorgate Street), was drained in the 16th century and subsequently laid out as public grounds. It was a frequent resort of Pepys, who mentions its houses of entertainment and the wrestling and other pastimes carried on, also that it furnished a refuge for many of those whose houses were destroyed in the fire of London in 1666. Bookstalls and other booths were numerous at a somewhat later date. The borough includes the parish of Clerkenwell (q.v.), a locality of considerable historic interest, including the former priory of St John, Clerkenwell, of which the gateway and other traces remain. Among several other sites and buildings of historical interest the Charterhouse (q.v.) west of Aldersgate Street, stands first, originally a Carthusian monastery, subsequently a hospital and a school out of which grew the famous public school at Godalming. Bunhill Fields, City Road, was used by the Dissenters as a burial-place from the middle of the 17th century until 1832. Among eminent persons interred here are John Bunyan, Daniel Defoe, Susanna, mother of John and Charles Wesley, and George Fox, founder of the Society of Friends. A neighbouring chapel is intimately associ- ated with the Wesleys, and the house of John Wesley is opened as a museum bearing his name. Many victims of the plague were buried in a pit neighbouring to these fields, near the junction of Goswell Road and Old Street. To the south of the fields lies the Artillery Ground, the training ground of the Honourable Artillery Company, so occupied since 1641, with barracks and armoury. Sadler's Wells theatre, Rosebery Avenue, dating as a place of entertainment from 1683, preserves the name of a fashionable medicinal spring, music room and theatre, the last

most notable in its connexion with the names of Joseph Grirrialdi the clown and Samuel Phelps. Other institutions are the tech- nical college, Leonard Street, and St Mark's, St Luke's and the Royal chest hospitals. At Mount Pleasant is the parcels department of the general post office, and at Clerkenwell Green the sessions house for the county of London (north side of the Thames). Adjacent to Rosebery Avenue are reservoirs of the New River Head. The municipal borough coincides with the east and central divisions of the parliamentary borough of Finsbury, each returning one member. The borough

council consists of a mayor, 9 aldermen and 54 councillors. Area, 589-1 acres.

FINSTERWALDE, a town of Germany, in the kingdom of Prussia, on the Schackebach. a tributary of the Little Elster, 28 m. W.S.W. of Cottbus by rail. Pop. (1905) 10,726. The town has a Gothic church (1581), a chateau, schools, cloth and cigar factories, iron-foundries, flour and saw mills and factories for machine building. The town, which is first mentioned in 1288, came into the possession of electoral Saxony in 1635 and of Prussia in 1815.

FIORENZO DI LORENZO (c. 1440-1522), Italian painter, of the Umbrian school, lived and worked at Perugia, where most of his authentic works are still preserved in the Pinacoteca. There is probably no other Italian master of importance of whose life and work so little is known. In fact the whole edifice that modern scientific criticism has built around his name is based on a single signed and dated picture (1487) in the Pinacoteca of Perugia— a niche with lunette, two wings and predella— and on the documentary evidence that he was decemvir of that city in 1472, in which year he entered into a contract to paint an altarpiece for Santa Maria Nuova— the pentatych of the ” Madonna and Saints ” now in the Pinacoteca. Of his birth and death and pupilage nothing is known, and Vasari does not even mention Fiorenzo’s name, though he probably refers to him when he says that Cristofano, Perugino’s father, sent his son to be the shop drudge of a painter in Perugia, ” who was not particularly distinguished in his calling, but held the art in great veneration and highly honoured the men who excelled therein.” Certain it is that the early works both of Perugino and of Pintu- ricchio show certain mannerisms which point towards Fiorenzo’s influence, if not to his direct teaching. The list of some fifty pictures which modern critics have ascribed to Fiorenzo includes works of such widely varied character that one can hardly be surprised to find great divergence of opinion as regards the masters under whom Fiorenzo is supposed to have studied. Pisanello, Verrocchio, Benozzo Gozzoli, Antonio Pollaiuolo, Benedetto Bonfigli, Mantegna, Squarcione, Filippo Lippi, Signorelli and Ghirlandajo have all been credited with this distinguished pupil, who was the most typical Umbrian painter that stands between the primitives and Perugino; but the probability is that he studied under Bonfigli and was indirectly influenced by Gozzoli. Fiorenzo’s authentic works are remarkable for their sense of space and for the expression of that peculiar clear, soft atmosphere which is so marked a feature in the work of Perugino. But Fiorenzo has an intensity of feeling and a power of expressing character which are far removed from the somewhat affected grace of Perugino. Of the forty-

five pictures bearing Fiorenzo's name in the Pinacoteca of Perugia, the eight charming St Bernardino panels are so different from his well-authenticated works, so Florentine in conception and movement, that the Perugian's authorship is very questionable. On the other hand the beautiful " Nativity," the " Adoration of the Magi," and the " Adoration of the Shepherds" in the same gallery, may be accepted as the work of his hand, as also the fresco of SS. Romano and Rocco at the church of S. Francesco at Deruta. The London National Gallery, the Berlin and the Frankfort museums contain each a ■" Madonna and Child " ascribed to the master, but the attribution is in each case open to doubt.

See Jean Carlyle Graham, The Problem of Fiorenzo di horen'zo (Perugia, 1903) ; Edward Hutton. The Cities of Umbria (London).

(P.G.K.) .

FIORENZUOLA D'ARDA, a town of Emilia, Italy, in the province of Piacenza, from which it is 14 m. S.E. by rail, 270 ft. above sea-level. Pop. (1001) 7792. It is traversed by the Via Aemilia, and has a picturesque piazza with an old tower in the centre. The Palazzo Grossi also is a fine building. Alseno lies 4 m. to the S.E., and near it is the Cistercian abbey of Chiara- valle della Colomba, with a fine Gothic church and a large and beautiful cloister (in brick and Verona marble), of the i2th-i4th century.

FIORILLO, JOHANN DOMINICUS (1748-1821), German painter and historian of art, was born at Hamburg on the 13th of October 1748. He received his first instructions in art at an academy of painting at Bayreuth; and in 1761, to continue his studies, he went first to Rome, and next to Bologna, where he distinguished himself sufficiently to attain in 1769 admission to the academy. Returning soon after to Germany, he obtained the appointment of historical painter to the court of Brunswick. In 1781 he removed to Gottingen, occupied himself as a drawing- master, and was named in 1784 keeper of the collection of prints at the university library. He was appointed professor extra- ordinary in the philosophical faculty in 1799, and ordinary professor in 18 13. During this period he had made himself known as a writer by the publication of his Geschichte der zeich-nenden Ktinste, in 5 vols. (1798-1808). This was followed in 1815 to 1820 by the Geschichte der zeichnenden Ktinste in Deutsch- land und

den vereinigten Niederlanden, in 4 vols. These works, though not attaining to any high mark of literary excellence, are esteemed for the information collected in them, especially on the subject of art in the later middle ages. Fiorillo practised his art almost till his death, but has left no memorable master- piece. The most noticeable of his painting is perhaps the ” Surrender of Briseis.” He died at Gottingen on the 10th of September 1821.

FIR, the Scandinavian name originally given to the Scotch pine (Pinus sylvestris), but at present not infrequently employed as a general term for the whole of the true conifers (Abielineae) ; in a more exact sense, it has been transferred to the ” spruce ” and ” silver firs,” the genera Picea and Abies of most modern botanists.

The firs are distinguished from the pines and larches by having their needle-like leaves placed singly on the shoots, instead of growing in clusters from a sheath on a dwarf branch. Their cones are composed of thin, rounded, closely imbricated scales, each with a more or less conspicuous bract springing from the base. The trees have usually a straight trunk, and a tendency to a conical or pyramidal growth, throwing out each year a more or less regular whorl of branches from the foot of the leading shoot, while the buds of the lateral boughs extend horizontally.

In the spruce firs (Picea), the cones are pendent when mature and their scales persistent ; the leaves are arranged all round the shoots, though the lower ones are sometimes directed laterally. In the genus Abies, the silver firs, the cones are erect, and their scales drop off when the seed ripens; the leaves spread in distinct rows on each side of the shoot.

The most important of the firs, in an economic sense, is the Norway spruce (Picea excelsa), so well known in British planta- tions, though rarely attaining there the gigantic height and grandeur of form it often displays in its native woods. Under favourable conditions of growth it is a lofty tree, with a nearly straight, tapering trunk, throwing out in somewhat irregular whorls its widespreading branches, densely clothed with dark, clear green foliage. The boughs and their side-branches, as they increase in length, have a tendency to droop, the tower tier, even in large trees, often sweeping the ground — a habit that, with the jagged sprays, and broad, shadowy, wave-like foliage-masses, gives a peculiarly graceful and picturesque aspect to the Norway spruce. The slender, sharp, slightly curved leaves are scattered thickly around the shoots; the upper one pressed towards the stem, and the lower directed sideways, so as to give a somewhat

flattened appearance to the individual sprays. The elongated cylindrical cones grow chiefly at the ends of the upper branches ; they are purplish at first, but become afterwards green, and

eventually light brown; their scales are slightly toothed at the extremity; they ripen in the autumn, but seldom discharge their seeds until the following spring.

The tree is very widely distributed, growing abundantly on most of the mountain ranges of northern and central Europe; while in Asia it occurs at least as far east as the Lena, and in latitude extends from the Altaic ranges to beyond the Arctic circle. On the Swiss Alps it is one of the most prevalent and striking of the forest trees, its dark evergreen foliage often standing out in strong contrast to the snowy ridges and glaciers beyond. In the lower districts of Sweden it is the predominant tree in most of the great forests that spread over so large a portion of that country. In Norway it constitutes a considerable part of the dense woods of the southern dales, flourishing, according to Franz Christian Schiibeler, on the mountain slopes up to an altitude of from 2800 to 3100 ft., and clothing the shores of some of the fjords to the water's edge; in the higher regions it is generally mingled with the pine. Less abundant on the western side of the fjelds, it again forms woods in Nordland, extending

Fig. I. — Norway Spruce (Picea excelsa). Male Flowers. A, branch bearing male cones, reduced ; B, single male cone, enlarged; C, single stamen, enlarged.

in the neighbourhood of the coast nearly to the 67th parallel; but it is, in that arctic climate, rarely met with at a greater elevation than 800 ft. above the sea, though in Swedish Lapland it is found on the slope of the Sulitelma as high as 1200 ft., its upper limit being everywhere lower than that of the pine. In all the Scandinavian countries it is known as the Gran or Grann. Great tracts of low country along the southern shores of the Baltic and in northern Russia are covered with forests of spruce. It everywhere shows a preference for a moist but well-drained soil, and never attains its full stature or luxuriance of growth upon arid ground, whether on plain or mountain — a peculiarity that should be remembered by the planter. In a favourable soil and open situation it becomes the tallest and one of the stateliest of European trees, rising sometimes to a height of from 150 to 170 ft., the trunk attaining a diameter of from 5 to 6 ft. at the base. But when it grows in dense woods, where the lower branches decay and drop off early, only a small head of foliage remaining at the tapering summit, its stem, though frequently of great height, is rarely more than i§ or 2

ft. in thickness. Its growth is rapid, the straight leading shoot, in the vigorous period of the tree, often extending 2J or even 3 ft. in a single season. In its native habitats it is said to endure for several centuries; but in those countries from which the com- mercial supply of its timber is chiefly drawn, it attains perfection in from 70 to 90 years, according to soil and situation.

FIR

Plate I,

B

SILVER FIR (Abies pedinata). A, Cone and foliage.

SPRUCE FIR (Picea excelsa). B, Cone and foliage.

HEMLOCK SPRUCE (Tsuga canadensis). C, Cone, seed and foliage.

DOUGLAS FIR (Pseudotsuga Dor.glasii). D, Cone, seed and foliage.

Photos by Henry Irving.

Plate II.

FIR

CYPRESS (Cupressus sempervirens). A, Cone and branchlets.

JUNIPER (Juniperus communis). 2-;, Fruit and foliage.

■ray* !’< •"!*' ' i ■' *

■

•-‘% ‘ ‘

ARAL CARIA (.4. imbricata, Chile pine or monkey-puzzle). C, Seed-bearing cone and a single scale with seed.

YEW (Taxus baccata). D t Seed and foliage.

Photos by Henry Irving.

FIR

395

In the most prevalent variety of the Norway spruce the wood is white, apt to be very knotty when the tree has grown in an open place, but, as produced in the close northern forests, often of fine and even grain. Immense quantities are imported into Britain from Norway, Sweden and Prussia, under the names of ” white Norway,” ” Christiania ” and ” Danzig deal.” The larger trees are sawn up into planks and battens, much used for the purposes of the builder, especially for flooring, joists and rafters. Where not exposed to the weather the wood is probably as lasting as that of the pine, but, not being so resinous, appears less adapted for out-door uses. Great quantities are sent from Sweden in a manufactured state, in the form of door and window-frames and ready-prepared flooring, and much of the cheap ” white deal ” furniture is made of this wood. The younger and smaller trees are remarkably durable, especially when the bark is allowed to remain on them; and most of the poles imported into Britain for scaffolding, ladders, mining-timber and similar uses are furnished by this fir. Small masts and spars are often

made of it, and are said to be lighter than those of pine. The best poles

are obtained in Norway from small, slender, drawn-up trees, growing under the shade of the larger ones in the thick woods, these being freer from knots, and tougher from their slower growth. A variety of the spruce, abounding in some parts of Nor- way, produces a red heartwood, not easy to distinguish from that of the Norway pine (Scotch fir), and imported with it into England as ” red deal ” or ” pine.” This kind is some- times seen in planta- tions, where it may be recognized by its shorter, darker leaves and longer cones. The smaller branches and the waste portion of the trunks, left in cutting up the timber, are exported as fire-wood, or used for splitting into matches. The wood of the spruce is also employed in the manufacture of wood-pulp for paper.

The resinous products of the Norway spruce, though yielded by the tree in less abundance than those furnished by the pine, are of considerable economic value. In Scandinavia a thick turpentine oozes from cracks or fissures in the bark, forming by its congelation a fine yellow resin, known commercially as ” spruce rosin,” or ” frankincense “; it is also procured artifici- ally by cutting off the ends of the lower branches, when it slowly exudes from the extremities. In Switzerland and parts of Germany, where it is collected in some quantity for commerce, a long strip of bark is cut out of the tree near the root; the resin that slowly accumulates during the summer is scraped out in the latter part of the season, and the slit enlarged slightly the following spring to ensure a continuance of the supply. The process is repeated every alternate year, until the tree no longer yields the resin in abundance, which under favourable circum- stances it will do for twenty years or more. The quantity obtained from each fir is very variable, depending on the vigour of the tree, and greatly lessens after it has been subjected to the operation for some years. Eventually the tree is destroyed,

Fig. 2. — Norway Spruce (Picea excelsa). Cones; scale with seeds. A, Branch bear- ing (a) young female cones, (6) ripe cones, reduced. B, Ripe cone scale with seeds, enlarged.

and the wood rendered worthless for timber, and of little value even for fuel. From the product so obtained most of the better sort of ” Burgundy pitch ” of the druggists is prepared. By the peasantry t>f its native countries the Norway spruce is applied to innumerable purposes of daily life. The bark and young cones afford a tanning material, inferior indeed to oak- bark, and hardly equal to that of the larch, but of value in countries where substances more rich in tannin are not abundant. In Norway the sprays, like those of the juniper, are scattered over the floors of churches and the sitting-rooms of

dwelling-houses, as a fragrant and healthful substitute for carpet or matting. The young shoots are also given to oxen in the long winters of those northern latitudes, when other green fodder is hard to obtain. In times of scarcity the Norse peasant-farnier uses the sweetish inner bark, beaten in a mortar and ground in his primitive mill with oats or barley, to eke out a scanty supply of meal, the mixture yielding a tolerably palatable though some- what resinous substitute for his ordinary flad-brod. A decoction of the buds in milk or whey is a common household remedy for scurvy; and the young shoots or green cones form an essential ingredient in the spruce-beer drank with a s'milar object, or as an occasional beverage. The well-known " Danzig-spruce " is prepared by adding a decoction of the buds or cones to the wort or saccharine liquor before fermentation. Similar prepara- tions are in use wherever the spruce fir abounds. The wood is burned for fuel, its heat-giving power being reckoned in Germany about one-fourth less than that of beech. From the wide- spreading roots string and ropes are manufactured in Lapland and Bothnia: the longer ones which run near the surface are selected, split through, and then boiled for some hours in a ley of wood-ashes and salt, which, dissolving out the resin, loosens the fibres and renders them easi'y separable, and ready for twist- ing into cordage. Light portable boats are sometimes made of very thin boards of fir, sewn together with cord thus manufac- tured from the roots of the tree.

The Norway spruce seems to have been the " Picea " of Pliny, but is evidently often confused by the Latin writers with their "Abies," the Abies pectinata of modern botanists. From an equally loose application of the word " fir " by our older herbalists, it is difficult to decide upon the date of intro- duction of this tree into Britain; but it was commonly planted for ornamental purposes in the beginning of the 17th century. In places suited to its growth it seems to flourish nearly as well as in the woods of Norway or Switzerland; but as it needs for its successful cultivation as a timber tree soils that might be turned to agricultural account, it is not so well adapted for economic planting in Britain as the Scotch fir or larch, which come to perfection in more bleak and elevated regions, and on comparatively barren ground, though it may perhaps be grown to advantage on some moist hill-sides and mountain hollows. Its great value to the English forester is as a " nurse " for other trees, for which its dense eafage and tapering form render it admirably fitted, as it protects, without overshading, the young saplings, and yie'ds saleable stakes and small poles when cut out. For hop-poles it is not so well adapted as the larch. As a pictur- esque tree, for park and ornamental plantation, it is among the best of the conifers, its colour and form contrasting yet

harmonizing with the olive green and rounded outline of oaks and beeches, or with the red trunk and glaucous foliage of the pine. When ycung its spreading boughs form good cover for game. The fresh branches, with their thick mat of foliage, are useful to the gardener for sheltering wall-fruit in the spring. In a good soil and position the tree sometimes attains an enormous size: one in Studley Park, Yorkshire, attained nearly 140 ft. in height, and the trunk more than 6 ft. in thickness near the ground. The spruce bears the smoke of great cities better than most of the Abietineae; but in suburban localities after a certain age it soon loses its healthy appearance, and is apt to be affected with blight (Eriosoma), though not so much as the Scotch fir and most of the pines.

The black spruce (Picea nigra) is a tree of more formal growth than the preceding. The branches grow at a more acute angle

and in more regular whorls than those of the Norway spruce; and, though the lower ones become bent to a horizontal position, they do not droop, so that the tree has a much less elegant appearance. The leaves, which grow very thickly all round the stem, are short, nearly quadrangular, and of a dark greyish- green. The cones, produced in great abundance, are short and oval in shape, the scales with rugged indented edges; they are deep purple when young, but become brown as they ripen. The tree also occurs in the New England states and extends over nearly the whole of British North America, its northern limit occurring at about 67 N. lat., often forming a large part of the dense forests, mostly in the swampy districts. A variety with lighter foliage and reddish bark is common in Newfoundland and some districts on the mainland adjacent. The trees usually grow very close together, the slender trunks rising to a great height bare of branches; but they do not attain the size of the Norway spruce, being seldom taller than 60 or 70 ft., with a diameter of 15 or 2 ft. at the base. This species prefers a peaty soil, and often grows luxuriantly in very moist situations. The wood is strong, light and very elastic, forming an excellent material for small masts and spars, for which purpose the trunks are used in America, and exported largely to England. The sawn timber is inferior to that of P. excelsa, besides being of a smaller size. In the countries in which it abounds, the log-houses of the settlers are often built of the long straight trunks. The spruce-beer of America is generally made from the young shoots of this tree. The small twigs, tied in bundles, are boiled for some time in water with

broken biscuit or roasted grain; the resulting decoction is then poured into a cask with molasses or maple sugar and a little yeast, and left to ferment. It is often made by the settlers and fishermen of the St Lawrence region, being esteemed as a preventive of scurvy. The American ” essence of spruce,” occasionally used in England for making spruce-beer, is obtained by boiling the shoots and buds and concentrating the decoction. The resinous products of the tree are of no great value. It was introduced into Britain at the end of the 1 7th century.

The white spruce {Picea alba), sometimes met with in English plantations, is a tree of lighter growth than the black spruce, the branches being more widely apart; the foliage is of a light glaucous green; the small light-brown cones are more slender and tapering than in P. nigra, and the scales have even edges. It is of comparatively small size, but is of some importance in the wilds of the Canadian dominion, where it is found to the northern limit of tree- vegetation growing up to at least 6o°; the slender trunks yield the only useful timber of some of the more desolate northern regions. In the woods of Canada it occurs frequently mingled with the black spruce and other trees. The fibrous tough roots, softened by soaking in water, and split, are used by the Indians and voyageurs to sew together the birch-bark covering of their canoes; and a resin that exudes from the bark is employed to varnish over the seams. It was introduced to Great Britain at the end of the 17th century and was formerly more extensively planted than at present.

The hemlock spruce (Tsuga canadensis) is a large tree, abound- ing in most of the north-eastern parts of America up to Labrador; in lower Canada, New Brunswick and Nova Scotia it is often the prevailing tree. The short leaves are flat, those above pressed close to the stem, and the others forming two rows; they are of a rather light green tint above, whitish beneath. The cones are very small, ovate and pointed. The large branches droop, like those of the Norway spruce, but the sprays are much lighter and more slender, rendering the tree one of the most elegant of the conifers, especially when young. When old, the branches, broken and bent down by the winter snows, give it a ragged but very picturesque aspect. The trunk is frequently 3 ft. thick near the base. The hemlock prefers rather dry and elevated situations, often forming woods on the declivities of mountains. The timber is very much twisted in grain, and liable to warp and split, but is used for making plasterers’ laths and for fencing; ” shingles ” for roofing are sometimes made of it. The bark, split off in May or June, forms one of the most

valuable tanning substances in Canada. The sprays are > some- times used for making spruce-beer and essence of spruce. It was introduced into Great Britain in about the year 1736.

The Douglas spruce (Pseudo-tsuga Douglasii), one of the finest conifers, often rises to a height of 200 ft. and sometimes considerably more, while the gigantic trunk frequently measures 8 or 10 ft. across. The yew-like leaves spread laterally, and are of a deep green tint; the cones are furnished with tridentate bracts that project far beyond the scales. It forms extensive forests in Vancouver Island, British Columbia and Oregon, whence the timber is exported, being highly prized for its strength, durability and even grain, though very heavy; it is of a deep yellow colour, abounding in resin, which oozes from the thick bark. It was introduced into Britain soon after its rediscovery by David Douglas in 1827, and has been widely planted, but does not flourish well where exposed to high winds or in too shallow soil.

Of the Abies group, the silver fir {A. pectinata), may be taken as the type, — a lofty tree, rivalling the Norway spruce in size, with large spreading horizontal boughs curving upward toward the extremities. The flat leaves are arranged in two regular, distinct rows; they are deep green above, but beneath have two broad white lines, which, as the foliage in large trees has a tendency to curl upwards, give it a silvery appearance from below. The large cones stand erect on the branches, are cylindrical in shape, and have long bracts, the curved points of which project beyond the scales. When the tree is young the bark is of a silvery grey, but gets rough with age. This tree appears to have been the true ” Abies ” of the Latin writers — the ” pul- cherrima abies ” of Virgil. From early historic times it has been held in high estimation in the south of Europe, being used by the Romans for masts and all purposes for which timber of great length was required. It is abundant in most of the mountain ranges of southern and central Europe, but is not found in the northern parts of that continent. In Asia it occurs on the Caucasus and Ural, and in some parts of the Altaic chain. Exten- sive woods of this fir exist on the southern Alps, where the tree grows up to nearly 4000 ft.; in the Rhine countries it forms great part of the extensive forest of the Hochwald, and occurs in the Black Forest and in the Vosges; it is plentiful likewise on the Pyrenees and Apennines. The wood is inferior to that of Picea excelsa, but, being soft and easily worked, is largely employed in the countries to which it is indigenous for all the purposes of carpentry. Articles of furniture are frequently made of it, and it is in great esteem for carving and for the construction of stringed instruments. Deficient in resin, the wood is more perishable than that of the spruce fir when exposed to the air, though it is said to stand well under water. The

bark contains a large amount of a fine, highly-resinous turpentine, which collects in tumours on the trunk during the heat of summer. In the Alps and Vosges this resinous semi-fluid is collected by climbing the trees and pressing out the contents of the natural receptacles of the bark into horn or tin vessels held beneath them. After purification by straining, it is sold as ” Strasburg turpentine,” much used in the preparation of some of the finer varnishes. Burgundy pitch is also prepared from it by a similar process as that from Picea excelsa. A fine oil of turpentine is distilled from the crude material; the residue forms a coarse resin. Introduced into Britain at the beginning of the 17th century, the silver fir has become common there as a planted tree, though, like the Norway spruce, it rarely comes up from seed scattered naturally. There are many fine trees in Scotland; one near Roseneath, figured by Strutt in his Sylva Britannica, then measured more than 22 ft. round the trunk. In the more southern parts of the island it often reaches a height of 90 ft., and specimens exist considerably above that size; but the young shoots are apt to be injured in severe winters, and the tree on light soils is also hurt by long droughts, so that it usually presents a ragged appearance; though, in the distance, the lofty top and horizontal boughs sometimes stand out in most picturesque relief above the rounded summits of the neighbouring trees. The silver fir flourishes in a deep loamy soil, and will grow even

upon stiff clay, when well drained — a situation in which few conifers will succeed. On such lands, where otherwise desirable, it may sometimes be planted with profit. The cones do not ripen till the second year.

The silver fir of Canada (A. bahamea), a small tree resembling the last species in foliage, furnishes the ” Canada balsam ” ; it abounds in Quebec and the adjacent provinces.

Numerous other firs are common in gardens and shrubberies, and some furnish valuable products in their native countries; but they are not yet of sufficient economic or general interest to demand mention here.

For further information see Veitch’s Manual of Coniferae (2nd ed.,

1900).

FIRDOUSl, Firdausi or FirdtjsI, Persian poet. Abu ‘1 Kasim Mansur (or Hasan), who took the nomde plume of FirdousI, author of the epic poem the Shahnama, or ” Book of Kings,” a complete history of Persia in nearly 60,000 verses, was born at Shadab, a suburb of Tus, about the year 329 of the Hegira (941 A.D.), or earlier. His father belonged to the class of Dihkans (the old native country families and landed proprietors of Persia, who had preserved their influence and status under the Arab rule), and possessed an estate in the neighbourhood of Tus (in Khorasan). Firdousi’s own education eminently qualified him for the gigantic task which he subsequently undertook, for he was profoundly versed in the Arabic language and literature and had also studied deeply the Pahlavi or Old Persian, and was conversant with the ancient historical records which existed in that tongue.

The Shahnama of FirdousI (see also Persia: Literature) is perhaps the only example of a poem produced by a single author which at once took its place as the national epic of the people. The nature of the work, the materials from which it was composed, and the circumstances under which it was written are, however, in themselves exceptional, and necessarily tended to this result. The grandeur and antiquity of the empire and the vicissitudes through which it passed, their long series of wars and the magnificent monuments erected by their ancient sovereigns, could not fail to leave numerous traces in the memory of so imaginative a people as the Persians. As early as the 5th century of the Christian era we find mention made of these historical traditions in the work of an Armenian author, Moses of Chorene (according to others, he lived in the 7th or 8th century). During “the reign of Chosroes I. (Anushirvan) the contemporary of Mahomet, and by order of that monarch, an attempt had been made to collect, from various parts of the kingdom, all the popular tales and legends relating to the ancient kings, and the results were deposited in the royal library. During the last years of the Sassanid dynasty the work was resumed, the former collection being revised and greatly added to by the Dihkan Danishwer, assisted by several learned mobeds. His work was entitled the Khoda’indma, which in the old dialect also meant the ” Book of Kings.” On the Arab invasion this work was in great danger of perishing at the hands of the icono- clastic caliph Omar and his generals, but it was fortunately preserved; and we find it in the 2nd century of the Hegira being paraphrased in Arabic by Abdallah ibn el Mokaffa, a learned Persian who had embraced Islam. Other Guebres occupied themselves privately with the collection of these tradi- tions; and, when a prince of Persian origin, YakUb ibn Laith, founder of the Saffarid dynasty, succeeded in throwing off his allegiance to the caliphate, he at once set about continuing the work

of his illustrious predecessors. His ” Book of Kings ” was completed in the year 260 of the Hegira, and was freely circulated in Khorasan and Irak. Yakub’s family did not continue long in power; but the Samapid princes who succeeded applied themselves zealously to the same work, and Prince Nuh II., who came to the throne in 365 a.h. (a.d. 976), entrusted it to the court poet Dakiki, a Guebre by religion. Dakiki’s labours were brought to a sudden stop by his own assassination, and the fall of the Samanian house happened not long after, and their kingdom passed into the hands of the Ghaznevids. Mahmud ibn Sabuktagin, the second of the dynasty (998-1030), continued

to make himself still more independent of the caliphate than his predecessors, and, though a warrior and a fanatical Moslem, extended a generous patronage to Persian literature and learning, and even developed it at the expense of the Arabic institutions. The task of continuing and completing the collection of the , ancient historical traditions of the empire especially attracted him. With the assistance of neighbouring princes and of many of the influential Dihkans, Mahmud collected a vast amount of materials for the work, and after having searched in vain for a man of sufficient learning and ability to edit them faithfully, and having entrusted various episodes for versification to the numerous poets whom he had gathered round him, he at length made choice of FirdousI. FirdousI had been always strongly attracted by the ancient Pahlavi records, and had begun at an early age to turn them into Persian epic verse. On hearing of the death of the poet Dakiki, he conceived the ambitious design of himself carrying out the work which the latter had only just commenced; and, although he had not then any introduction to the court, he contrived, thanks to one of his friends, Mahommed Lashkari, to procure a copy of the Dihkan Danishwer’s collection, and at the age of thirty-six commenced his great undertaking. Abu Mansur, the governor of Tus, patronized him and encour- aged him by substantial pecuniary support. When Mahmud succeeded to the throne, and evinced such aetkt r e interest in the work, FirdousI was naturally attracted to the court of Ghazni. At first court jealousies and intrigues prevented FirdousI from being noticed by the sultan; but at length one of his friends, Mahek, undertook to present to Mahmud his poetic version of one of the well-known episodes of the legendary history. Hearing that the poet was born at Tus, the sultan made him explain the origin of his native town, and was much struck with the intimate knowledge of ancient history which he displayed. Being pre- sented to the seven poets who were then engaged on the projected epic, Abu ‘1 Kasim was admitted to their meetings, and on one occasion improvised a verse, at

Mahmud's request, in praise of his favourite Ayaz, with such success that the sultan bestowed upon him the name of FirdousI, saying that he had converted his assemblies into paradise (Firdous). During the early days of his sojourn at court an incident happened which contributed in no small measure to the realization of his ambition. Three of the seven poets were drinking in a garden when FirdousI approached, and wishing to get rid of him without rudeness, they informed him who they were, and told him that it was their custom to admit none to their society but such as could give proof of poetical talent. To test his acquirements they proposed that each should furnish an extemporary line of verse, his own to be the last, and all four ending in the same rhyme. FirdousI accepted the challenge, and the three poets having previously agreed upon three rhyming words to which a fourth could not be found in the Persian language, 'Ansari began —

" Thy beauty eclipses the light of the sun " ; Farrakhi added —

" The rose with thy cheek would comparison shun " ; 'Asjadi continued —

" Thy glances pierce through the mailed warrior's johsun "; l and FirdousI, without a moment's hesitation, completed the quatrain — t

" Like the lance of fierce Giv in his fight with Poshun." The poets asked for an explanation of this allusion, and FirdousI recited to them the battle as described in the Shahnama, and delighted and astonished them with his learning and eloquence. Mahmud now definitely selected him for the work of compiling and versifying the ancient legends, and bestowed upon him such marks of his favour and munificence as to elicit from the poet an enthusiastic panegyric, which is inserted in the preface of the Shahnama, and forms a curious contrast to the bitter satire which he subsequently prefixed to the book. The sultan ordered his treasurer, Khojah Hasan Maimandi, to pay to FirdousI a thousand gold pieces for every thousand verses; but the poet preferred allowing the sum to accumulate till the whole was

1 A sort of cuirass.

finished, with the object of amassing sufficient capital to construct a dike for his native town of Tus, ;which suffered greatly from defective irrigation, a project which had been the chief dream of his childhood.

Owing to this resolution, and to the jealousy of Hasan Maimandi, who often refused to advance him sufficient for the necessaries of life, FirdousI passed the later portion of, his life in great privation, though enjoying the royal favour and widely extended fame. Amongst other princes whose liberal presents enabled him to combat his pecuniary difficulties, was one Rustam, son of Fakhr Addaula, the Dailamite, who sent him a thousand gold pieces in acknowledgment of a copy of the episode of Rustam and Isfendiar which FirdousI had sent him, and promised him a gracious reception if he should ever come to his court. As this prince belonged, like FirdousI, to the Shiah sect, while Mahmud and Maimandi were Sunnites, and as he was also politically opposed to the sultan, Hasan Maimandi did not fail to make the most of this incident, and accused the poet of disloyalty to his sovereign and patron, as well as of heresy. Other enemies and rivals also joined in the attack, and for some time Firdousl's position was very precarious, though his pre-eminent talents and obvious fitness for the work prevented him from losing his post.- To add to his troubles he had the misfortune to lose his only son at the age of 37.

At length, afterfibirty-five years' work, the book was completed (ion), and FirdousI entrusted it to Ayaz, the sultan's favourite, for presentation to him. Mahmud ordered Hasan Maimandi to take the poet as much gold as an elephant could carry, but the jealous treasurer persuaded the monarch that it was too generous a reward, and that an elephant's load of silver would be sufficient. 60,000 silver dirhems were accordingly placed in sacks, and taken to FirdousI by Ayaz at the sultan's command, instead of the 60,000 gold pieces, one for each verse, which had been promised. The poet was at that moment in the bath, and seeing the sacks, and believing that they contained the expected gold, received them with great satisfaction, but finding only silver he complained to Ayaz that he had not executed the sultan's order. Ayaz related what had taken place between Mahmud and Hasan Maimandi, and FirdousI in a rage gave 20 thousand pieces to Ayaz himself, the same amount to the bath-keeper, and paid the rest to a beer seller for a glass of beer (Jouka), sending word back to the sultan that it was not to gain money that he had taken so much trouble. On hearing this message, Mahmud at first reproached Hasan with having caused him to break his word, but the wily treasurer succeeded in turning his master's anger upon FirdousI to such an extent that he threatened that on the morrow he would " cast that Carmathian (heretic) under the feet of his elephants." Being apprised by one of the nobles of the court of what had taken place, FirdousI passed the night in great anxiety; but passing in the morning by the gate that led from his own apartments into the palace, he met

the sultan in his private garden, and succeeded by humble apologies in appeasing his wrath. He was, however, far from being appeased himself, and determined at once upon quitting Ghazni. Return- ing home he tore up the draughts of some thousands of verses which he had composed and threw them in the fire, and repairing to the grand mosque of Ghazni he wrote upon the walls, at the place where the sultan was in the habit of praying, the following lines: —

” Theauspicious court of Mahmud, king of Zabulistan.is like a sea. What a sea! One cannot see its shore. If I have dived therein without finding any pearls it is the fault of my star and not of the sea.”

He then gave a sealed paper to Ayaz, begging him to hand it to the sultan in a leisure moment after 20 days had elapsed, and set off on his travels with no better equipment than his staff and a dervish’s cloak. At the expiration of the 20 days Ayaz gave the paper to the sultan, who on opening it found the celebrated satire which is now always prefixed to copies of the Shahnama, and which is perhaps one of the bitterest and severest pieces of reproach ever penned. Mahmud, in a violent rage, sent after the poet and promised a large reward for his capture, but he was already in comparative safety. FirdousI directed his

steps to Mazandaran, and took refuge with Kabus, prince of Jorjah, who at first received him with great favour, and promised him his continued protection and patronage; learning, however, the circumstances under which he had left Ghazni, he feared the resentment of so powerful a sovereign as Mahmud, who he knew already coveted his kingdom, and dismissed the poet with a magnificent present. FirdousI next repaired to Bagdad, where he made the acquaintance of a merchant, who introduced him to the vizier of the caliph, al-Qadir, by presenting an Arabic poem which the poet had composed in his honour. The vizier gave FirdousI an apartment near himself, and related to the caliph the manner in which he had been treated at Ghazni. The caliph summoned him into his presence, and was so much pleased with a poem of a thousand couplets, which FirdousI composed in his honour, that he at once received him into favour. The fact of his having devoted his fife and talents to chronicling the renown of fire- worshipping Persians was, however, somewhat of a crime in the orthodox caliph’s eyes; in order therefore to recover his prestige, FirdousI composed another poem of 9000 couplets on the theme borrowed from the Koran of the loves of Joseph and Potiphar’s wife — Yusuf and Ztdeikha (edited by H. Ethe, Oxford, 1902; complete metrical transla- tion by Schlechta-Wssehrd, Vienna, 1889). This poem, though rare and little known, is still in existence —

the Royal Asiatic Society possessing a copy. But Mahmud had by this time heard of his asylum at the court of the caliph, and wrote a letter menacing his liege lord, and demanding the surrender of the poet. FirdousI, to avoid further troubles, departed for: Ahwaz, a province of the Persian Irak, and dedicated his Yusuf and Zuleikha to the governor of that district. Thence he went to Kohistan, where the governor, Nasir Lek, was his intimate and devoted friend, and received him with great ceremony upon the frontier. FirdousI confided to him that he contemplated writing a bitter exposition of his shameful treatment at the hands of the sultan of Ghazni; but Nasir Lek, who was a personal friend of the latter, dissuaded him from his purpose, but himself wrote and remonstrated with Mahmud. Nasir Lek's message and the urgent representations of Firdousl's friends had the desired effect; and Mahmud not only expressed his intention of offering full reparation to the poet, but put his enemy Maimandi to death. The change, however, came too late; FirdousI, now a broken and decrepit old man, had in the meanwhile returned to Tus, and, while wandering through the streets of his native town, heard a child lisping a verse from his own satire in which he taunts Mahmud with his slavish birth: —

" Had Mahmud 's father been what he is now A crown of gold had decked this aged brow; Had Mahmud's mother been of gentle blood, In heaps of silver knee-deep had I stood."

He was so affected by this proof of universal sympathy with his misfortunes that he went home, fell sick and died. He was buried in a garden, but Abu'l Kasim Jurjani, chief sheikh of Tus, refused to read the usual prayers over his tomb, alleging that he was an infidel, and had devoted his life to the glorification of fire-worshippers and misbelievers. The next night, however, having dreamt that he beheld FirdousI in paradise dressed in the sacred colour, green, and wearing an emerald crown, he recon- sidered his determination; and the poet was henceforth held to be perfectly orthodox. He died in the year 411 of the Hegira (1020 A.D.), aged about eighty, eleven years after the completion of his great work. The legend goes that Mahmud had in the meanwhile despatched the promised hundred thousand pieces of gold to FirdousI, with a robe of honour and ample apologies for the past. But as the camels bearing the treasure reached one of the gates of the city, Firdousl's funeral was leaving it by another. His daughter, to whom they brought the sultan's present, refused to receive it; but his aged sister remembering his anxiety for the construction of the stone embankment for the river of Tus, this work was completed in honour of the poet's memory, and a large caravanserai built with the surplus.

Much of the traditional life, as given above, which is based upon that prefixed to the revised edition of the poem, undertaken by

order of Baisingar Khan, grandson of Timur-i-Leng (Tiraur), is rejected by modern scholars (see T. Noldeke, ” Das iranische Nationalepos,” in W. Geiger s Grundriss der iranischen Philologie, ii. pp. 150-158).

The Shahnama is based, as we have seen, upon the ancient legends current among the populace of Persia, and collected by the Dihkans, a class of men who had the greatest facilities for this purpose. There is every reason therefore to believe that Firdousi adhered faithfully to these records of antiquity, and that the poem is a perfect store- house of the genuine traditions of the country.

The entire poem (which only existed in MS. up to the beginning of the 19th century) was published (1831-1868) with a French transla- tion in a magnificent folio edition, at the expense of the French government, by the learned and indefatigable Julius von Mohl. The size and number of the volumes, however, and their great expense, made them difficult of access, and Frau von Mohl published the French translation (1876-1878) with her illustrious husband’s critical notes and introduction in a more convenient and cheaper form. Other editions are by Turner Macan (Calcutta, 1829), J. A. Vullers and S. Landauer (unfinished; Leiden, 1877-1883). There is an English abridgment by J. Atkinson (London, 1832; reprinted 1886, 1892) ; there is a verse-translation, partly rhymed and partly unrhymed, by A. G. and E. Warner (1905 foil.), with an introduction containing an account of Firdousi and the Shahnama; the version by A. Rogers (1907) contains the greater part of the work. The episode of Sohrab and Rustam is well known to English readers from Matthew Arnold’s poem. The only complete translation is // Libro dei Rei, by I. Pizzi (8 vols., Turin, 1886-1888), also the author of a history of Persian poetry.

See also E. G. Browne’s Literary History of Persia, i., ii. (1902- 1906) ; T. Noldeke (as above) for a full account of the Shahnama, editions, &c. ; and H. Ethe, ” Neupersische Litteratur,” in the same work. (E. H. P. ; X.)

FIRE (in 0. Eng. fyr; the word is common to West German languages, cf. Dutch vunr, Ger. Feuer; the pre- Teutonic form is seen in Sanskrit

pu, pdvaka, and Gr. xvp; the ultimate origin is usually taken to be a root meaning to purify, cf. Lat. purus), the term commonly used for the visible effect of combustion (see Flame) , operating as a heating or lighting agency.

So general is the knowledge of fire and its uses that it is a question whether we have any authentic instance on record of a tribe altogether ignorant of them. A few notices indeed are to be found in the voluminous literature of travel which would decide the question in the affirmative; but when they are carefully investigated, their evidence is found to be far from conclusive. The missionary Krapf was told by a slave of a tribe in the southern part of Shoa who lived like monkeys in the bamboo jungles, and were totally ignorant of fire; but no better authority has been found for the statement, and the story, which seems to be current in eastern Africa, may be nothing else than the propagation of fables about the Pygmies whom the ancients located around the sources of the Nile. Lieut. Charles Wilkes, commander of the United States exploring expedition of 1838-42, says that in Fakaafo or Bowditch Island ” there was no sign of places for cooking nor any appearance of fire,” and that the natives felt evident alarm at the sparks pro- duced by flint and steel and the smoke emitted by those with cigars in their mouths. The presence of the word afi, fire, in the Fakaafo vocabulary supplied by Hale the ethnographer of the expedition, though it might perhaps be explained as equivalent only to solar light and heat, undoubtedly invalidates the supposi- tion of Wilkes; and the Rev. George Turner, in an account of a missionary voyage in 1859, not only repeats the word afi in his list for Fakaafo, but relates the native legend about the origin of fire, and describes some peculiar customs connected with its use. Alvaro de Saavedra, an old Spanish traveller, informs us that the inhabitants of Los Jardines, an island of the Pacific, showed great fear when they saw fire— which they did not know before. But that island has not been identified with certainty by modern explorers. It belongs, perhaps, to the Ladrones or Marianas Archipelago, where fire was unknown, says Padre Gobien, ” till Magellan, wroth at the pilferings of the inhabitants, burnt one of their villages. When they saw their wooden huts ablaze, their first thought was that fire was a beast which eats up wood. Some of them having approached the fire too near were burnt, and the others kept aloof, fearing to be torn or poisoned by the powerful breath of that terrible animal.” To this Freycinet objects that these Ladrone islanders made pottery

before the arrival of Europeans, that they had words expressing the ideas of flame, fire, oven, coals, roasting and cooking. Let us add that in their country numerous graves and ruins have been found, which

seem to be remnants of a former culture. Thus the question remains in uncertainty: though there is nothing impossible in the supposition of the existence of a tireless tribe, it cannot be said that such a tribe has been discovered.

It is useless to inquire in what way man first discovered that fire was subject to his control, and could even be called into being by appropriate means. With the natural phenomenon and its various aspects he must soon have become familiar. The volcano lit up the darkness of night and sent its ashes or its lava down into the plains; the lightning or the meteor struck the tree, and the forest was ablaze; or some less obvious cause produced some less extensive ignition. For a time it is possible that the grand manifestations of nature aroused no feelings save awe and terror; but man is quite as much endowed with curiosity as with reverence or caution, and familiarity must ere long have bred confidence if not contempt. It is by no means necessary to suppose that the practical discovery of fire was made only at one given spot and in one given way; it is much more probable indeed that different tribes and races obtained the knowledge in a variety of ways.

It has been asserted of many tribes that they would be unable to rekindle their fires if they were allowed to die out. Travellers in Australia and Tasmania depict the typical native woman bearing always about with her a burning brand, which it is one of her principal duties to protect and foster; and it has been supposed that it was only ignorance which imposed on her the endless task. This is absurd. The Australian methods of producing fire by the friction of two pieces of wood are perfectly well known, and are illustrated in Howitt's Native Tribes of South-East Australia, pp. 771-773. To carry a brand saves a little trouble to the men.

The methods employed for producing fire vary considerably in detail, but are for the most part merely modified applications of concussion or friction. Lord Avebury has remarked that the working up of stone into implements must have been followed sooner or later by the discovery of fire; for in the process of chipping sparks were elicited, and in the process of polishing heat was generated. The first or concussion method is still familiar in the flint and steel, which has hardly passed out of use even in the most civilized countries. Its modifications are comparatively few and unimportant. The Alaskans and Aleutians take two pieces of quartz, rub them well with native sulphur, strike them together till the sulphur catches fire, and then transfer the flame to a heap of dry grass over which a few feathers have been scattered. Instead of two pieces of quartz the Eskimos use a piece of quartz and a piece of iron pyrites. Mr Frederick Boyle saw fire

produced by striking broken china violently against a bamboo, and Bastian observed the same process in Burma, and Wallace in Ternate. In Cochin China two pieces of bamboo are considered sufficient, the silicious character of the outside layer rendering it as good as native flint. The friction methods are more various. One of the simplest is what E. B. Tylor calls the stick and groove—" a blunt pointed stick being run along a groove of its own making in a piece of wood lying on the ground." Much, of course, depends on the quality of the woods and the expertness of the manipulator. In Tahiti Charles Darwin saw a native produce fire in a few seconds, but only succeeded himself after much labour. The same device was employed in New Zealand, the Sandwich Islands, Tonga, Samoa and the Radak Islands. Instead of rubbing the movable stick backwards and forwards other tribes make it rotate rapidly in a round hole in the station- ary piece of wood—thus making what Tylor has happily desig- nated a fire-drill. This device has been observed in Australia, Kamchatka, Sumatra and the Carolines, among the Veddahs of Ceylon, throughout a great part of southern Africa, among the Eskimo and Indian tribes of North America, in the West Indies, in Central America, and as far south as the Straits of Magellan. It was also employed by the ancient Mexicans, and

Tylor gives a quaint picture of the operation from a Mexican MS.— a man half kneeling on the ground is causing the stick to rotate between the palms of his hands. This simple method of rotation seems to be very generally in use; but various devices have been resorted to for the purpose of diminishing the labour and hastening the result. The Gaucho of the Pampas takes " an elastic stick about 18 in. long, presses one end to his breast and the other in a hole in a piece of wood, and then rapidly turns the curved part like a carpenter's centre-bit." In other cases the rotation is effected by means of a cord or thong wound round the drill and pulled alternately by this end and that. In order to steady the drill the Eskimo and others put the upper end in a socket of ivory or bone which they hold firmly in their mouth. A further advance was made by the Eskimo and neighbouring tribes, who applied the principle of the bow-drill; and the still more ingenious pump-drill was used by the Onondaga Indians. For full descriptions of these instruments and a rich variety of details connected with fire-making we must refer the reader to Tylor's valuable chapter in his Researches. These methods of producing fire are but rarely used in Europe, and only in connexion with supers

stitious observances. We read in Wuttke that some time ago the authorities of a Mecklenburg village ordered a ” wild fire ” to be lit against a murrain amongst the cattle. For two hours the men strove vainly to obtain a spark, but the fault was not to be ascribed to the quality of the wood, or to the dampness of the atmosphere, but to the stubbornness of an old lady, who, object- ing to the superstition, would not put out her night lamp; such a fire, to be efficient, must burn alone. At last the strong-minded female was compelled to give in; fire was obtained’ — -but of bad quality, for it did not stop the murrain.

It has long been known that the rays of the sun might be concentrated by a lens or concave mirror. Aristophanes men- tions the burning-lens in The Clouds, and the story of Archimedes using a mirror to fire the ships at Syracuse is familiar to every schoolboy. If Garcilasso de la Vega can be trusted as an authority the Virgins of the Sun in Peru kindled the sacred fire with a concave cup set in a great bracelet. In China the burning-glass is in common use.

To the inquiry how mankind became possessed of fire, the cosmogonies, those records of pristine speculative thought, do not give any reply which would not be found in the relations of travellers and historians.

They Say in the Tonga Islands that the god of the earthquakes is likewise the god of fire. At Manga’ia it is told that the great Maui went down to hell, where he surprised the secret of making fire by rubbing two pieces of wood together. The Maoris tell the tale differently. Maui had the fire given to him by his old blind grandmother, Mahuika, who drew it from the nails of her hands. Wishing to have a stronger one, he pretended that it had gone out, and so he obtained fire from her great toe. It was so fierce that every thing melted before the glow; even Maui and the grandmother herself were already burning when a deluge, sent from heaven, saved the hero and the perishing world; but before the waters extinguished all the blaze, Mahuika shut a few sparks into some trees, and thence men draw it now. The Maoris have also the legend that thunder is the noise of Tawhaki’s footsteps, and that lightnings flash from his armpits. At Western Point, Victoria, the Australians say the good old man Pundyil opened the door of the sun, whose light poured then on earth, and that Karakorok, the good man’s good daughter, seeing the earth to be full of serpents, went everywhere destroying serpents; but before she 1 had killed them all, her staff snapped in two, and while it broke, a flame burst out of it. Here the serpent-killer is a fire-bringer. In the Persian Shahnama also fire was discovered by a dragon-fighter. Hushenk, the powerful hero,

hurled at the monster a prodigious stone, which, evaded by the snake, struck a rock and was splintered by it. ” Light shone from the dark pebble, the heart of the rock flashed out in glory, and fire was seen for the first time in the world.” The snake escaped, but the mystery of fire had been revealed.

North American legends narrate how the great buffalo, careering through the plains, makes sparks flit in the night, and sets the prairie ablaze by his hoofs hitting the rocks. We meet the same idea in the Hindu mythology, which conceives thunder to have been, among many other things, the clatter of the solar horses on the Akmon or hard pavement of the sky. The Dakotas claim that their ancestor obtained fire from the sparks which a friendly panther struck with its claws, as it scampered upon a stony hill.

Tohil, who gave the Quiches fire by shaking his sandals, was,

like the Mexican Quetzelcoatl, represented by a flint stone. Guamansuri, the father of the Peruvians, produced the thunder and the lightning by hurling stones with his sling. The thunderbolts, are his children. Kudai, the great god of the Altaian Tartars, disclosed “the secret of the stone’s edge and the iron’s hardness.” The Slavonian god of thunder was depicted with a silex in his hand, or even protruding from his head. The Lapp Tiermes struck with his hammer upon his own head ; the Scandinavian Thor held a mallet in one hand, a flint in the other. Taranis, the Gaul, had upon his head a huge mace surrounded by six little ones. Finnish poems describe how ” fire, the child of the sun, came down from heaven, where it was rocked in a tub of yellow copper, in a large pail of gold.” Ukko, theEsthonian god, sends forth lightnings, as he strikes his stone with his steel. According to the Kalewala, the same mighty Ukko struck his sword against his nail, and from the nail issued the ” fiery babe.” He gave it to the Wind’s daughter to rock it, but the unwary maiden let it fall in the sea, where it was swallowed by the great pike, and fire would have been lost for ever if the child of the sun had not come to the rescue. He dragged the great pike from the water, drew out his entrails, and found there the heavenly spark still alive. Prometheus brought to earth the torch he had lighted at the sun’s chariot.

Human culture may be said to have begun with fire, of which the uses increased in the same ratio as culture itself. To save the labour expended on the initial process of procuring light, or on carrying it about constantly, primitive men hit on the expedient of a fire which should burn night and day in a public building. The Egyptians had one in every temple, the Greeks, Latins and Persians in all towns and

villages. The Natchez, the Aztecs, the Mayas, the Peruvians had their ” national fires ” burning upon large pyramids. Of these fires the ” eternal lamps” in the synagogues, in the Byzantine and Catholic churches, may be a survival. The ” Regia,” Rome’s sacred centre, supposed to be the abode of Vesta, stood close to a fountain; it was convenient to draw from the same spot the two great requisites, fire and water. All civil and political interests grouped themselves around the prytaneum which was at once a temple, a tribunal, a town-hall, and a gossiping resort: all public business and most private affairs were transacted by the light and in the warmth of the common fire. No wonder that its flagstones should become sacred. Primitive communities consider as holy everything that ensures their existence and promotes their welfare, material things such as fire and water not less than others. Thus the prytaneum grew into a religious institution. And if we hear a little more of fire worship than of water worship, it is because fire, being on the whole more difficult to obtain, was esteemed more precious. The prytaneum and the state were convertible terms. If by chance the fire in the Roman temple of Vesta was extinguished, all tribunals, all authority, all public or private business had to stop immediately. The connexion between heaven and earth had been broken, and it had to be restored in some way or other — either by Jove sending down divine lightning on his altars, or by the priests making a new fire by the old sacred method of rubbing two pieces of wood together, or by catching the rays of the sun in a concave mirror. No Greek or Roman army crossed the frontier without carrying an altar where the fire taken from the prytaneum burned night and day. When the Greeks sent out colonies the emigrants took with them living coals from the altar of Hestia, and had in their new country a fire lit as a representative of that burning in the mother country. 1 Not before the three curiae united their fires into one could Rome become powerful; and

1 Curiously enough we see the same institution obtaining among the Damaras of South Africa, where the chiefs, who sway their people with a sort of priestly authority, commit to their daughters the care of a so-called eternal fire. From its hearth younger scions separating from the parent stock take away a burning brand to their new home. The use of a common prytaneum, of circular form, like the Roman temple of Vesta, testified to the common origin of the North American Assinais and Maichas. The Mobiles, the Chippewas, the Natche2, had each a corporation of Vestals. If the Natchez let their fire die out, they were bound to renew it from the Mobiles. The Moquis, Pueblos and Comanches had also their perpetual fires. The Red- skins discussed important affairs of state at the ” council fires,” around which each

sachem marched three times, turning to it all the sides of his person. ” It was a saying among our ancestors,” said an Iroquois chief in 1753, ” that when the fire goes out at Onondaga ” — the Delphi of the league — ” we shall no longer be a people.”

Athens became a shining light to the world only, we are told, when the twelve tribes of Attica, led by Theseus, brought each its brand to the altar of Athene Polias. All Greece confederated, making Delphi its central hearth; and the islands congregated around Delos, whence the new fire was fetched every year.

Periodic Fires. — Because the sun loses its force after noon, and after midsummer daily shortens the length of its circuit, the ancients inferred, and primitive populations still believe, that, as time goes on, the energies of fire must necessarily decline. Therefore men set about renewing the fires in the temples and on the hearth on the longest day of summer or at the beginning of the agricultural year. The ceremony was attended with much rejoicing, banqueting and many religious rites. Houses were thoroughly cleansed; people bathed, and underwent lustrations and purifications; new clothes were put on; quarrels were made up; debts were paid by the debtor or remitted by the creditor; criminals were released by the civil authorities in imitation of the heavenly judges, who were believed to grant on the same day a general remission of sins. All things were made new; each man turned over a new page in the book of his existence. Some nations, like the Etruscans in the Old World and the Peruvians and Mexicans in the New, carried these ideas to a high degree of development, and celebrated with magnificent ceremonies the renewal of the saecula, or astronomic periods, which might be shorter or longer than a century. Some details of the festival among the Aztecs have been preserved. On the last night of every period (52 years) every fire was extinguished, and men proceeded in solemn procession to some sacred spot, where, with awe and trembling, the priests strove to kindle a new fire by friction. It was as if they had a vague idea that the cosmos, with its sun, moon and Stars, had been wound up like a clock for a definite period of time. And had they failed to raise the vital spark, they would have believed that it was because the great fire was being extinguished at the central hearth of the world. The Stoics and many other ancient philosophers thought that the world was doomed to final extinction by fire. The Scandinavian bards sung the end of the world, how at last the wolf Fenrir would get loose, how the cruel fire of Loki

would destroy itself by destroying everything. The Essenes enlarged upon this doctrine, which is also found in the Sibylline books and appears in the Apocrypha (2 Esdras xvi. 15).

See Dupuis, Origine de tous les cultes (1794); Burnout, Science des religions) Grimm, Deutsche Mythologie, cap. xx. (1835); Adal- bert Kuhn. Die Herabkunft des Feuers und des Gbttertranks (1859) ; Steinthal, Uber die urspriingliche Form dtr Sage von Prometheus (1861) ; Albert Reville, ” Le Mythe de Promethee,” in Revue des deux mondes (August 1862); Michel Breal, Hercule et Cacus (1863) ; Tylor, Researches into the Early History of Mankind, ch.ix. (1865); Bachofen, Die Sage von Tanaquil (1870) ; Lord Avebury, Prehistoric Times (6th ed., 1900) ; Haug, Religion of the Parsis (1878). (E. Re.)

FIRE AND FIRE EXTINCTION. Fire is considered in this article, primarily, from the point of view of the protection against fire that can be accorded by preventive measures and by the organization of fire extinguishing establishments.

History is full of accounts of devastation caused by fires in towns and cities of nearly every country in the civilized world. The following is a list of notable fires of early days: —

Great Britain and Ireland 798. London, nearly destroyed. 982. ,, greater part of the city burned. 1086. ,, all houses and churches from the east to the west

gate burned. 1212. ,, greater part of the city burned. 1666. ,, ” The Great Fire,” September 2-6.

It began in a wooden house in Pudding Lane, and burned for three days, consuming the buildings on 436 acres, 400 streets, lanes, &c, 13,200 houses, with St Paul’s church, 86 parish churches, 6 chapels, the guild-hall, the royal ex- change, the custom-house, many hospitals and libraries, 52 companies’ halls, and a vast number of other stately edifices, together with three of the city gates, four stone bridges, and the prisons of Newgate, the Fleet, and the Poultry and Wood Street Compters. The fire swept from the Tower to Tample church, and from the N.E. gate to Holborn bridge. * Six persons were killed. The total loss of property was estimated at the time to be £10,730,500.

1794. London, 630 houses destroyed at Wapping. Loss above

£1,000,000. 834. „ Houses of Parliament burned. 861. „ Tooley Street wharves, &c, burned. Loss estimated

at £2,000,000. 873. „ Alexandra palace destroyed. 137. York, totally destroyed. 184. Glastonbury, town and abbey burned. 292. Carlisle, destroyed.

507. Norwich, nearly destroyed; 718 houses burned. 544. Leith, burned. 598. Tiverton, 400 houses and a large number of horses burned;

33 persons killed. Loss, £150,000. 612. „ 600 houses burned. Loss over £200,000. 731. „ 300 houses burned. 700. Edinburgh, ” the Great Fire.”

612. Cork, greater part burned, and again in 1622.

613. Dorchester, nearly destroyed. Loss, £200,000.

614. Stfatford-on-Avon, burned.

644. Beaminster, burned. Again in 1684 and 1781. 675. Northampton, almost totally destroyed. 683. Newmarket, large part of the town burned. 694. Warwick, more than half burned; rebuilt by national con- tribution. 707. Lisburn, burned. 727. Gravesend, destroyed. 738. Wellingborough, 800 houses burned. 743. Crediton, 450 houses destroyed. 760. Portsmouth, dockyard burned. Loss, £400,000. 770. . ■ ■ „ „ „ Loss, £100,000.

802. Liverpool, destructive fire. Loss, £1,000,000. 827. Sheerness, 50 houses and much property destroyed. 854. Gateshead, 50 persons killed. Loss, £1,000,000. 875. Glasgow. Great fire. Loss, £300,000.

France 59. Lyons, burned to ashes. Nero offers to rebuild it. 1 1 18. Nantes, greater part of the city destroyed. 1 137. Dijon, burned. 1524. Troyes, nearly destroyed.

1720. Rennes, on fire from December 22 to 29. 850 houses burned. 1784. Brest. Fire and explosion in dockyard. Loss, £1,000,000. 1862. Marseilles, destructive fire.

1 87 1. Paris. Communist devastations. Property destroyed, £32,000,000.

Central and Southern Europe 64. Rome burned during 8 days. 10 of the 14 wards of the city were destroyed.

1 106. Venice, greater part of the city was burned.

1577- » ure at the arsenal, greater part of the city ruined by an explosion.

1299. Weimar, destructive fire; also in 1424 and 1618.

1379. Memel was in large part destroyed, and again in 1457, 1540,

1678, 1854.

1405. Bern was destroyed.

1420. Leipzig lost 400 houses.

1457. Dort, cathedral and large part of the town burned.

1491. Dresden was destroyed.

1 52 1. Oviedo, large part of the city destroyed.

1543. Komorn was burned.

1634. Fiirth was burned by Austrian Croats.

I680. Fiirth was again destroyed.

1686. Landau was almost destroyed.

1758. Pima was burned by Prussians. 260 houses destroyed.

1762. Munich lost 200 houses.

1764. KUnigsberg, public buildings, &c, burned. Loss, £600,000.

1769. „ almost destroyed.

1784. Rokitzan (Bohemia) was totally destroyed. Loss, £300,000.

1801. Brody, 1500 houses destroyed.

1859. „ 1000 houses destroyed.

1803. Posen, large part of older portion of city burned.

181 1. Forest fires in Tyrol destroyed 64 villages and hamlets.

1818. Salzburg was partly destroyed.

1842. Hamburg. A fire raged for 100 hours, May 5-7.

During the fire the city was in a state of anarchy. 4219 buildings, including 2000 dwellings, were destroyed. One- fifth of the population was made homeless, and 100 persons lost their lives'. The total loss amounted to £7,000,000. After the fire, contributions from all Germany came in to help to rebuild the city.

1 861. Glarus (Switzerland) ,500 houses burned.

Northern Europe 1530. Aalborg, almost entirely destroyed. 1 541. Aarhuus, almost entirely destroyed, and again in 1556. 1624. Opslo, nearly destroyed. Christiania was built on the site. 1702. Bergen, greater part of the town destroyed. 1728. Copenhagen, nearly destroyed. i65ohousesburned, 77 streets,

1794. ,, royal palace with contents burned.

1795. „ 50 streets, 1563 houses burned.

4° 2

FIRE AND FIRE EXTINCTION

[STATISTICS

1751. Stockholm, 1000 houses destroyed.

1759. ,, 250 houses burned. Loss, 2,000,000 crowns.

1775- Abo, 200 houses and 15 mills burned. 1827. ,, 780 houses burned, with the university. 1790. Carlsc ona, 1087 houses, churches, warehouses, &c, destroyed. 1802. Gothenburg, 178 houses burned. 1858. Christiania. Loss estimated at £250,000. 1865. Carhtadt (Sweden), everything burned except the bishop's residence, hospital and jail. 10 lives lost.

Russia 1736. St Petersburg, 2000 houses burned. 1862. „ great fire. Loss, £1,000,000.

1752. Moscow, 18,000 houses burned.

1812. „ The Russians fired the city on September 14 to drive out the army of Napoleon. The fire con- tinued five days. Nine-tenths of the city was destroyed. Number of houses burned, 30,800. Loss, £30,000,000.

1753. Archangel, 900 houses burned.

1793. „ 3000 buildings and the cathedral burned.

1786. Tobolsk, nearly destroyed.

1788. Mitau, nearly destroyed.

1812. Riga, partly destroyed.

1834. Tula, destructive fire.

1848. Orel, large part of the town destroyed.

1850. Cracow, large part of the town burned.

1864. Novgorod, large amount of property destroyed.

Turkey The following fires have occurred at Constantinople: — 1729. A great fire destroyed 12,000 houses and 7000 people. 1745. A fire lasted five days.

1750. In January, 10,000 houses burned; in April, property destroyed

estimated from £1,000,000 to £3,000,000. Later in the year 10,000 houses were destroyed.

1 75 1. 4000 houses were burned.

1756. 15,000 houses and 100 people destroyed. During the years

1 76 1, 1765 and 1767 great havoc was made by fire. 1769. July 17. A fire raged for twelve hours, extending nearly I m.

in length. Many of the palaces, some small mosques and

nearly 650 houses were destroyed. 1 77 1. A fire lasting 15 hours consumed 2500 houses and shops. 1778. 2000 houses were burned. 1782. August 12. A fire burned three days: 10,000 houses, 50

mosques and 100 corn mills destroyed; 100 lives lost.

In February, 600 houses burned; in June, 7000 more. 1784. August 5. A fire burned for 26 hours and destroyed 10,000

houses, most of which had been rebuilt since the fires of

1782. In the same year, March 13, a fire in the suburb of

Pera destroyed two-thirds of that quarter. Loss estimated

at 2,000,000 florins. 1791. Between March and July 32,000 houses are said to have been

burned, and as many in 1795. 1799. In the suburb of Pera 13,000 houses were burned and many

magnificent buildings. 1816. August 16. 12,000 houses and 3000 shops in the finest quarter

were destroyed. 1818. August 13. A fire destroyed several thousand houses. 1826. A fire destroyed 6000 houses. 1848. 500 houses and 2000 shops destroyed. Loss estimated at

£3,000,000.

1865. A great fire destroyed 2800 houses, public buildings, &c.

Over 22,000 people were left homeless.

1870. June 5. The suburb of Pera, occupied by the foreign population and native Christians, was swept by a fire which destroyed over 7000 buildings, many of them among the best in the city, including the residence of the foreign legations. Loss estimated at nearly £5,000,000.

1797. Scutari, the town of 3000 houses totally destroyed.

1763. Smyrna, 2600 houses consumed. Loss, £200,000.

J77 2 – >» 3000 dwellings burned. 3000 to 4000 shops, &c. consumed. Loss, £4,000,000.

1796., ,, 4000 shops, mosques, magazines, &c, burned.

1841. ,, 12,000 houses were burned.

India

163 1. Rajmahal. Palace and great part of the town burned.

1799. Manilla, vast storehouses were burned.

1833. ,, 10,000 huts were burned, March 26. 30,000 people

rendered homeless, and 50 lives lost.

1803. Madras, more than 1000 houses burned.

1803. Bombay. Loss by fire of £600,000.

China and Japan

1822. Canton was nearly destroyed by fire.

1866. Yokohama, two-thirds of the native town and one-sixth of the

foreign settlement destroyed.

1872. Yeddo. A fire occurred in April during a gale of wind, destroy-

ing buildings covering a space of 6 sq. m. 20,000 persons were made homeless.

1873. •> A fire destroyed 16,000 houses.

United States 1679. Boston. All the warehouses, 80 dwellings, and the vessels in the dockyards were consumed. Loss, £200,000. 1760. „ A fire caused a loss estimated at £100,000.

1787. ,, A fire consumed 100 buildings, February 20. 1794. ,, 96 buildings were burned. Loss, £42,000.

1872. ,, Great fire, November 9-10. By this fire the richest

quarter of Boston was destroyed. The fire commenced at the corner of Summer and Kingston streets. The area burned over was 65 acres. 776 buildings, comprising the largest granite and brick warehouses of the city, filled with merchandise, were burned. The loss was about £15,000,000. Before the end of the year 1876 the burned district had been rebuilt more substantially than ever. 1778. Charleston (S.C.). A fire caused the loss of £100,000. 1796. ,, 300 houses were burned.

1838. „ One-half the city was burned on April 27. 1158

buildings destroyed. Loss, £600,000. 1802. Portsmouth (N.H.), 102 buildings destroyed. 1813. ,, 397 buildings destroyed.

1820. Savannah, 463 buildings were burned. Loss, £800,000. 1835. New York. The great fire of New York began in Merchant Street, December 16, and burned 530 buildings in the business part of the city. 1000 mercantile firms lost their places of business. The area burned over was 52 acres. The loss was £3,000,000. 1845. „ A fire in the b.usiness part of the city, July 20,

destroyed 300 buildings. The loss was £1,500,000. 35 persons were

killed.

1845. Pittsburg. A large part of the city burned, April 11. 20

squares, 1 100 buildings destroyed. Loss, £2,000,000.

1846. Nantucket was almost destroyed.

1848. Albany. 600 houses burned, August 17. Area burned over

37 acres, one-third of the city. Loss, £600,000.

1849. St Louis. 23 steamboats at the wharves, and the whole or

part of 15 blocks of the city burned, May 17.

Loss, £600,000. 1851. ,, More than three-quarters of the city was burned,

May 4. 2500 buildings. Loss, £2,200,000. 1851. ,, 500 buildings burned. Loss, £600,000.

1850. Philadelphia. 400 buildings burned, July 9. 30 lives lost.

Loss, £200,000.

1865. ,, 50 buildings burned, February 8. 20 persons

killed. Loss, £100,000.

1 85 1. Washington. Part of the Capitol and the whole of the Con-

gressional Library were burned.

1851. San Francisco. On May 4-5 a fire destroyed 2500 buildings. A number of lives lost. More than three-fourths of the city destroyed. Loss, upwards of £2 ,000,000. In June another fire burned 500 buildings. Loss estimated at £600,000.

1857. Chicago. A fire destroyed over £100,000. 14 lives lost.

1859. ,, Property destroyed worth £100,000, Sept. 15.

1866. „ Two fires on August 10 and November 18. Loss,

£100,000 each. 1871. „ The greatest fire of modern times.

It began in a barn on the night of the 8th of October and raged until

the loth. The area burned over was 2124 acres, or 3a sq. m., of “the very heart of the city. 250 lives were lost, 98,500 persons were made homeless, and 17,430 buildings were consumed. The buildings were one-third in number and one-half in value of the buildings of the city. Before the end of 1875 the whole burned district had been rebuilt. The loss was estimated at £39,000,000. 1862. Troy (N.Y.) was nearly destroyed by fire. 1866. Portland (Maine). Great fire on July 4. One-half of the city was burned ; 200 acres were ravaged ; 50 buildings were blown up to stop the progress of the fire. Loss, £2,000,000 to £2,250,000. 1 87 1. October. Forest and prairie fires in Wisconsin and Michigan. 15,000 persons were made homeless; 1000 lives lost. Loss estimated at £600,000.

British North America 1815. Quebec was injured to the extent of £260,000. 1845. „ 1650 houses were burned, May 28. One-third of the population made homeless. Loss from £400,000 to £750,000. Another fire, on June 28, consumed 1300 dwellings. 6000 persons were made homeless. 30 streets destroyed. Insurance losses, £60,770. 1866. „ 2500 houses and 17 churches in French quarter burned , 1825. New Brunswick. A tract of 4,006,000 acres, more than 100 m. in length, was burned over; it included many towns. 160 persons killed, and 875 head of cattle. 590 buildings burned. Loss, about £60,000. Towns of New- castle, Chatham and Douglastown destroyed. 1837. St John (New Brunswick). 115 houses burned, January 13, and nearly all the business part of the city. Loss, £1,000,000.

FIRE PROTECTION]

FIRE AND FIRE EXTINCTION

4°3

1877. St. John. Great fire on June 21. The area burned over was 200 acres. 37 streets and squares totally or in part de- stroyed; io m. of streets; 1650 dwellings. 18 lives lost. Total loss, £2,500,000. Two-fifths of the city burned. 1846. St John’s (Newfoundland) was nearly destroyed, June 9. Two whole streets burned upwards of 1 m. long. Loss estimated at £1,000,000. 1850. Montreal. A fire destroyed the finest part of the city on

June 7. 200 houses were burned. 1852. „ A fire on July 9 rendered 10,000 people destitute.

The space burned was 1 m. in length by \ m. in width, including 1200 houses. Loss, £1,000,000.

South America 1536. Cuzco was nearly consumed.

1861. Mendoza. A great fire followed an earthquake which had destroyed 10,000 people.

1862. Valparaiso was devastated by fire.

1863. Santiago. Fire in the Jesuit church; 2000 persons, mostly women and children, perished.

West Indies

1752. Pierre (Martinique) had 700 houses burned.

1782. Kingston (Jamaica) had 80 houses burned. Loss, £500,000.

1795. Montego Bay (Jamaica). Loss by fire of £400,000.

1805. St Thomas. 900 warehouses consumed. Loss, £6,000,000.

1808. Spanish Town (Trinidad) was totally destroyed. Loss esti- mated at £1 ,500,000.

1828. Havana lost 350 houses; 2000 persons reduced to poverty.

1843. Port Republicain (Haiti). Nearly one-third of the town was burned.

Since this list was compiled, there have been further notable fires, more particularly in North America, the great conflagra- tions at Chicago, Baltimore and San Francisco being terrible examples. But speaking generally, these conflagrations, exten- sive as they were, only repeated the earlier lessons as to the necessity of combating the general negligence of the public by attaching far greater importance to the development of fire- preventive measures even than to the better organization of the fire-fighting establishments.

It may be of interest to mention notable fires in the British empire, and London in particular, during the decade 1890 to 1899:— Port of Spain (Trinidad) March 4, 1895

New Westminster (British Columbia) Toronto (Ontario) ....

Windsor (Nova Scotia) St John's (Newfoundland) London — Charterhouse Square St Mary Axe ,, Old Bailey and Fleet Street

,, Tabernacle Street, Finsbury

,, Bermondsey Leather Market

„ Minories ….

,, South-West India Docks .

,, Charlotte and Leonard Streets,

,, Cripplegate

Nottingham Sheffield Bradford Sunderland . Dublin Glasgow—Anderston Quay

„ Dunlop Street

Finsbury

July Dec. July Nov. June

Sept. 10, 1898 Jan. 6, 10, and March ,3, 1895 Oct. 17, 1897

8, 1892 25, 1889

18, 1893

15. 1893

21, 1894

Sept. 13, 1894 May 17, 1895

10, 1894 8, 1895

10, 1896

19, 1897

17, 1894 21, 1893 30, 1896

18, 1898 4, 1894

16, 1897

Nov. Feb. June Nov. Nov. Dec. Nov. July May Jan.

April 25, li

As to fires in any one specific class of building, the extra- ordinary number of fires that occurred in theatres and similar places of public entertainment up to the close of the 19th century calls for mention. Since that time, however, there has been a considerable abatement in this respect, owing to the adoption of successful measures of fire prevention. A list of some 1100 fires was published by Edwin O. Sachs in 1897 (Fires at Public Entertainments), and the results of these fires analysed. They involved a recorded loss of life to the extent of 93 50 souls. About half of them (584) occurred in Europe, and the remainder in other parts of the world. Since the publication of that list extraordinary efforts have been made in all countries to reduce the risk of fires in public entertainments. The only notable disaster that has occurred since was that at the Iroquois Theatre at Chicago.

The annual drain in loss of life and in property through fires is far greater than is generally realized, and although the loss of life and property is being materially reduced from year to year, mainly by the fire-preventive measures that are now making themselves felt, the annual fire wastage of the world still averages quite £50,000,000 sterling. It is extremely difficult to obtain precise data as to the fire loss, insured and uninsured, but it may be assumed that in Great Britain the annual average loss by fire, towards the end of the 19th century (say 1897), was about £17,000,000 sterling, and that this had been materially reduced by 1909 to probably somewhere about £12,000,000 sterling. This extraordinary diminution in the fire waste of Great Britain, — in spite of the daily increasing number of houses, and the increasing amount of property in buildings — is in the main owing to the fire-preventive measures, which have led to a better class of new building and a great improvement in existing structures, and further, to a greater display of intelligence and interest in general fire precautionary measures by the public.

Notable improvements in the fire service have been effected, more particularly in London and in the country towns of the south of England since 1903. The International Fire Exhibition held in 1903 at Earl's Court, and the Fire Prevention Congress of the same year, may be said to have revolutionized thought on the subject of fire brigade organization and equipment in the British empire; but, for all that, the advance made by the fire service has not been so rapid as the development of the fire- preventive side of fire protection.

Fire Protection. — The term " Fire Protection " is often mis-understood. Fire-extinguishing — in other words, fire brigade work — is what the majority understand by it, and many towns consider themselves well protected if they can boast of an efficiently manned

fire-engine establishment. The fire brigade as such, however, has but a minor role in a rational system of protection. Really well-protected towns owe their condition in the first place to properly applied preventive legislation, based on the practical experience and research of architects, engineers, fire experts and insurance and municipal officials. Fire protec- tion is a combination of fire prevention, fire combating and fire research.

Under the heading of ” Fire Prevention” should be classed all preventive measures, including the education of the public; and under the heading ” Fire Combating ” should be classed both self-help and outside help.

Preventive measures may be the result of private initiative, but as a rule they are defined by the local authority, and con- tained partly in Building Acts, and partly in separate codes of fire-survey regulations — supplemented, if necessary, by special rules as to the treatment of extraordinary risks, such as the storage of petroleum, the manufacture of explosives, and theatri- cal performances. The education of the public may be simply such as can be begun informally at school. and continued by official or semi-official warnings, and a judicious arrangement with the newspapers as to the tendency of their fire reports.

Such forms of training have already been successfully introduced. There are English towns where the authorities have, for instance, had some of the meaningless fables of the old elementary school Standard Reader replaced by more instructive ones, which warn children- not to play with matches, and teach them to run for help in case of an emergency. Instructive copy-book headings have been arranged in place of the meaningless sentences so often used in elementary schools. There are a number of municipalities where regular warnings are issued every December as to the dangerous Christmas-tree. In such places every inhabitant has at least an opportunity of learning how to throw a bucket of water properly, and how to trip up a burning woman and roll her up without fanning the flames. The householder is officially informed where the nearest fire-call point is, and how long he must expect to wait till the first engine can reach his house. If he is a newspaper reader, he will also have ample opportunity of knowing the resources of his town, and the local reporter’s fire report will give him much useful infor- mation based on facts or hints supplied by the authorities.

Both self-help- and outside help must be classed under the heading of ” Fire Combating.” Self-help mainly deals with the protection of large

risks, such as factories, stores and public places of amusement, which lend themselves to regulation.

4-04

FIRE AND MRE EiXˆINCTIjON

[FIRE PROTECTION

The requirements of the fire survey code may allow for hydrants or sprinklers in certain risks, and also for their regular inspection, and the means for self-help may thus be given. These means will, however, probably not be properly employed unless some df the employes engaged on the risk are instructed as to their purpose, and have confidence in the apparatus at their disposal. The possibility of proper self-help in dangerous risks may be encouraged by enforcing regular drills for the employ6s, and regular inspections to test their efficiency. There are towns where great reliance is placed on the efforts of such amateur firemen. In some cities they even receive extra pay and are formed into units, properly uniformed and equipped, and retained by the fire brigade as a reserve force for emergencies.

Self-help for the shopkeeper, the lodger or the householder can scarcely be regulated. The opportunities already mentioned for the education of the public, if properly utilized, would assure intelligent behaviour on the part of a large percentage of the community. There are places where, without any regulation being attempted, and thanks entirely to the influence referred to, most residences pan boast of a hand-pump, a bucket, and a crowbar, the proper use of which is known to most of the house- hold. Self-help in small risks may, however, be distinctly encouraged by the authorities, without any irksome interference with personal liberty, simply by the provision of street pillar- boxes, with the necessaries of first aid, including perhaps a couple of scaling ladders, and, further, by opportunities being given to householders to learn how to handle them. If a street pillar- box of this kind be put in a fire-station, and certain afternoons in the year be reserved on which this elementary instruction will be given, and the students afterwards shown over the fire-station or treated to a ” turn-out,” a considerable number will be found to take advantage of the opportunity. No matter whether curiosity or real interest brings them, the object in view will be attained.

Under ” outside ” help should be understood what is organized, and not simply such as is tendered by the casual passer-by or by a neighbour. The link between self-help and outside help is the fire-call.

The Fire-Call. — The efficiency of the fire-call depends not only on the instrument employed and its position, but also on its conspicuous appearance, and the indications by which its situation may be discovered. These indications are quite as important as the instruments themselves. The conspicuous- ness of the instrument alone does not suffice. Of the official notifications given in the press, those in regard to the position of the call-points are among the most useful. An indication at every street corner as to the direction to take to reach the point—- or perhaps better, the conspicuous advertisement of the nearest call-point over every post pillar-box and inside every front door — may enable the veriest stranger to call assistance, and minimize the chances of time being lost in search of the instrument. It is immaterial for the moment whether the helpers are called by bell outside a fire-station, by a messenger from some special messenger service, by a call through a telephone, or by an electric or automatic appliance. Any instrument will do that ensures the call being transmitted with maximum speed and certainty and in full accord with the requirements of the locality.

Outside Help. — Organized outside help may not be limited simply to the attendance of the fire brigade. Special arrange- ments can be made for the attendance of the local police force, a public or private salvage corps, an ambulance, or, in some cases, a military guard. Then in some instances arrangements are made for the attendance of the water and gas companies' servants, and even officials from the public works office, insur- ance surveyors, and the Press. There are places where the salvage corps arrives on the scene almost simultaneously with the fire brigade, and others where the police are generally on the spot in good force five minutes after the arrival of the first engines. There are several cities where the ambulance' wagon and the steamers arrive together, and another city where the military authorities always send a fire piquet which can be turned out in a few minutes.

If all these helpers c6me together, no matter how high the rank of the. individual commanders, the senior officer of the fire brigade, . even if he holds only non-commissioned officer's rank, should have control, and his authority be fully recognized. Unfortunately, there are not many countries where this is the case. The efficiency of outside help depends in the first instance on the clear definition of the duties and powers of all concerned— on the legal foundation, in fact; then on the organization, the theoretically as well as practically correct executive; and, last, but by no means least, on the prestige, the social standing, the education of commanders and their ability to handle men. Among the rank and file of the brigade, clear-headedness, pluck, smartness and agility will be as invaluable as reckless dare- devilry; showy

acrobatism, or an unhealthy ambition for public applause, will be dangerous.

Research— XJnder the heading ” Fire Research ” should be included theoretical and experimental investigation as to materials and construction, combined with the chronicling of practical experience in fires, then the careful investigation and chronicling of the causes of fires, assisted where necessary by a power for holding fire inquests in interesting, suspicious or fatal cases. Experimental investigation as to natural and accidental causes as distinct from criminal causes can be included. Re- search in criminal cases may be assisted not only by a fire inquest, but also by immediate formal inquiries held on the spot, by the senior fire brigade and police officers present, or by immediate government investigations held on the same lines as inquiries into explosions and railway accidents. 1 As to general research work, there are several cities which contribute sub- stantially towards the costs of fire tests at independent testing stations. Some towns also have special commissions of experts who visit all big fires occurring within easy travelling distance, take photographs and sketches, and issue reports as to how the materials were affected. Then there are the usual statistics as to outbreaks, their recurrence and causes, and in some places such tables are supplemented by reports on experiments with oil lamps, their burners and wicks, electric wiring, and the like.

The British Fire Prevention Committee. — The British Fire Preven- tion Committee is an organization founded a few days after the great Cripplegate (London) fire in 1897, and incorporated in February 1899. It comprises some 500 members and subscribers. The members include civil engineers, public officials holding government appointments, fire chiefs, insurance surveyors and architects, whilst the subscribers in the main include the great public departments, such as the admiralty and war office, arid municipalities, such as the important corporations of Glasgow, Liverpool and the like. Colonial government departments and municipalities are also on the roll, together with a certain number of colonial members. New Zealand has formed a special section having its own local honorary secretary. The ordinary .work of the committee is carried out by a council and an executive, and the necessary funds are provided by the sub- scription of members and subscribers. The services of the members of council and executive are given gratuitously, no out-of-pocket expenses of any kind being refunded. Whilst the routine Work deals mainly with questions of regulations, rules and publications \ of general technical interest, the tests are probably what have brought the committee into prominence and given it an international’ re- putation. They are not only the recognized fire tests of Great Britain, but they rank as

universal standard tests for the whole of the civilized world, and Americans, just as much as Danes, Germans or Austrians, pride themselves when some product of their country has passed the official procedure of a test by the committee. The reports of the tests, which state facts only without giving criticisms or recommendations, are much appreciated by all who have the control of public works or the specification of appliances. The committee does not limit itself solely to testing proprietary forms of. construction or appliances, but has a number of tests — -quite equal to the proprietary tests — of articles in general use. The ordinary concrete floor or the ordinary wooden joist floor protected by asbestos boards or slag wool receives as much attention as a patent floor;

1 In the United States a special officer called a ” fire-marshal ” has for some time been allocated to this work in many cities, and in 1894 state fire-marshals were authorized in Massachusetts and in Maryland, this example being followed by Ohio (1900), Connecticut (1901), and Washington (1902) ; and in other states laws have been passed making official inquiry compulsory. In England the question has been mooted whether coroners, even where no death has occurred, should hold similar inquiries, but though this has been done in recent years in the City of London no regular system exists.

and similarly the ordinary everyday hydrant receives equal attention with the patent hydrant, or ordinary bucket of water with the special fire extinguisher. The door tests of the committee, Which cover some thirty different types of doors, deal with no less than twenty ordinary wooden doors that can be made by any ordinary builder or cabinet-maker. These so-called non-proprietary tests are made at the expense of the general funds of the committee, whilst for the proprietary tests the owners have to pay about two-thirds of the expenses incurred in the form of a testing fee. The expenses incurred in a test, of course, not only comprise the actual testing operation of testing, but also the expense of producing the report, which is always a very highly finished publication with excellent blocks. The ex- pense incurred also includes the establishment expenses of the testing station at Regent’s Park.

The British Fire Prevention Committee organized the great Fire

Exhibition and International Fire Congress of London in 1903, in both of which it enjoyed the support and assistance of the National Fire Brigades Union and the Association of Professional Fire Chiefs. It from time to time despatches special commissions to the continent of Europe, and these visits are followed by the issue of official reports, well illustrated, presenting the appliances, rules and methods of the countries visited, and serving as most useful reference publications.

Taken generally, the whole of the work of the committee, both in respect of scientific investigations and propagandism, has been most beneficial. Fire waste has been materially reduced, regardless of the fact of the greater fire hazards and the ever-growing amount of property. In Great Britain alone the sum saved in fire wastage annually is about £5,000,000. This great annual saving has been obtained at an expenditure in research work, as far as the British Fire Prevention Committee is concerned, of about £23,000, of which more than half was provided by the membership in voluntary contributions or subscriptions.

There is no similar institution anywhere in the world, although several government laboratories occasionally undertake fire tests, notably the Gross Lichterfelde laboratory near Berlin, and several insurance corporations have testing plants, notably the American Underwriters at Chicago. The efforts at research work outside Great Britain have, however, been spasmodic and in no way compare with the systematic series of inquiries conducted without any substantial state aid in London.

Distribution of Losses. — Property destroyed by fire is practi- cally an absolute loss. This loss may actually only affect the owner, or it may be distributed among a number of people, who are taxed for it in the form of a. contribution to their national or local fire fund, a share in some mutual insurance ” ring,” or the more usual insurance companies’ premium. In the first two cases some expenses have also to be met in connexion with the management of the fund, ” tariff ” organization, or ” ring.” In the last case, not only the expenses of management have to bfe covered, but also the costs incurred in running the insurance enterprise as such, and then a further amount for division amongst those who share the risk of the venture— ˆnamely, the insurance company’s shareholders.

It is well to distinguish between loss and mere expenditure. The sinking fund of the large property owner should cover a loss with a minimum extra expense; insurance in an extravagantly managed company paying large dividends will cover a loss, but with an

unnecessarily large extra outlay. In every case the loss remains; and as property may always be considered part of the community, the province or nation, as the case may be, suffers. It is always in the interest of a nation to minimize its national losses, no matter whether they fall on one individual's shoulders or on many, and whether such losses are good for certain trades or not. With a suitable system of fire protection it is possible to bring these losses to a minimum, but this minimum would probably only be reached by an extra expense, which would fall heavier on the insurers' pockets in the form of municipal rates than the higher premium for the greater risk. A practical minimum is all that can be attempted, and that practical minimum varies according to circumstances.

Practical protection must mean smaller annual insurance dues, and the actual extra cost of this protection should be something less than the saving off these dues. Then not only has the nation a smaller dead loss, but the owner also has a smaller annual ex- penditure for his combined contributions toward the losses, the management of his insurance, and the protective measures. Where there is mutual insurance or municipal insurance in its best sense, the losses by fire and the costs of the protection are often booked in one account, and the better protection up to a certain point should mean a smaller individual annual share. Where there is company insurance the municipal rates are increased to cover the cost of extra protection, while a proportionate decrease is expected in the insurance premiums. Competition and public opinion generally impose this decrease of the insurance rates as soon as there is a greater immunity from fire. Where the insurance companies are well managed and the shareholders are satisfied with reasonable dividends, practical protection can be said to find favour with all

concerned, but if the protection is arranged for and the companies dp not moderate their charges accordingly, the reverse is the case.

The position of insurance companies subscribing towards the maintenance of a fire brigade should here be referred to, as there is considerable misunderstanding on the subject. The argument which municipalities or fire brigade organizations often use is to the effect that the insurance companies derive all the profit from a good fire service, and should contribute towards its cost. Where properly managed companies have the business, a better fire service, however, means a smaller premium to the ratepayer. If the ratepayer has to pay for extra protection in the form of an increased municipal rate, or in the form of an increased premium raised to meet the contribution levied, this is simply juggling with figures.

Cost. — As to the cost of a practical system of fire protection, better and safer building from the fire point of view means better and more valuable structures of longer life from the economic aspect. Such better and safer constructional work pays for itself and cannot be considered in the light of an extra tax on the building owner. The compilation and administration of the fire protective clauses in a Building Act would be attended to by the; same executive authorities as would in any case superintend general structural matters, and the additional work would at the most require some increased clerical aid. If the execution of the fire survey regulations were delegated to the same authority there would again simply be some extra clerical aid to pay for, and the salaries of perhaps a few extra surveyors. To make the inspections thoroughly efficient, it has been found advisable in several instances to form parties of three for the rounds. The second man would, in this case, be a fire brigade officer, and the third probably a master chimney-sweep, who would have to receive a special retaining fee.

The cost of the public training referred to would be small, as the elementary part would simply be included in the school- master's work, and the Press matters could be easily managed in the fire brigade office. Payments would have only to be made for advertisements, such as the official warnings, lists for fire- call points, &c, and perhaps for the publication of semi-official hints. Self-help', as far as inspection and drills for amateurs are concerned would be under the control of the fire brigade. There would, however, be an extra expense for the purchase and maintenance of the street first-aid appliances referred to.

The most expensive items in the system of fire protection undoubtedly come under the headings " Fire-Call " and " Fire Brigade." As to the former, there are a number of cities where the cost is modified by having the whole of the electrical service for the police force, the ambulance and fire brigade, managed by a separate department. The same wires call up each of these services, and, as the same staff attend to their maintenance, the fire protection of a city need only be debited with perhaps a third of the outlay it would occasion if managed independently. The combined system has also the great advantage of facilitating the mutual working of the different services in case of an emer- gency. The indicators which have been referred to involve an outlay; but here again, if the three services work together, the expenses on the count of fire protection can be lessened. The money rewards given in some cities to the individuals who first call the fire-engines may become a heavy item. Their utility is doubtful, and they have formed an inducement for arson.

As to the outlay on fire brigade establishment, a strong active force should be provided, supported by efficient reserves. The latter should be as inexpensive as possible, but should at least constitute a part-paid and disciplined body which could be easily called in for emergencies. Fire brigade budgets cannot allow for an active force being ready for such coincidences as an unusual number of large fires starting simultaneously, but they must allow for an ample strength always being forthcoming for the ordinary emergencies, and this with all due consideration for men's rest and possible sickness. An undermanned fire brigade is an anomaly which is generally fatal, not only to the property owner, but also to the whole efficiency and esprit of the force. The budget roust also allow for an attractive rate of pay, as the profession is one which requires men who have a maximum of the; sterling qualities which we look for in the pick

of a nation. It must also not be forgotten that the fire service is one of the few where a system of pensions is the only fair way of recognizing the risks of limb and health, and at the same time securing that stability in which practical experience from long service is so essential a factor. The budget must allow for an ample reserve of appliances.

Whether or not a fire brigade should be so strong as to permit of its having a separate section for salvage corps purposes depends on circumstances. Economically a salvage corps is required, and should be part and parcel of the municipal brigade and organized on the same lines with a reserve, no matter whether the insurance of the locality be managed by the authori- ties or by companies. If a corps is necessary, it matters little whether it be paid for out of premiums or out of rates.

Of further expenses which have to be considered, there are items for fire research and fire inquest. If managed economically, due confidence being placed in the opinions of the fire officers and surveyors, there is no reason why the outlay should be great. The statistical work would only require some clerical aid. Where special coroners are retained for criminal cases some extra money will of course be required; but even here the costs need not be excessive, as there are many retired fire brigade officers and fire surveyors who are well suited for the work, and would be satisfied with a small

emolument.

As to the cost of the water supply, there are but few places where special fire high-pressure mains are laid on in the interests of fire protection. As a rule the costs which are debited to the heading ” Fire Protection ” have simply to cover the maintenance of hydrants and tablets, or at the most the cost of the water actually used for fire-extinguishing purposes. Sometimes the cost of hydrants is shared with the scavenging department or the commission of sewers, which also have the use of them. Where the provision of water and hydrants falls to a private water company, the property owners will be paying their share for them, indirectly, in the form of water rates.

The protective measures referred to will serve both for life- saving and for the protection of property. It should be re- membered that a good staircase and a ladder are often as useful for the manoeuvring of the firemen as for life-saving purposes, and that they are practically as essential for the saving of pro- perty as for saving life. No distinction need be made between the two risks when speaking of fire protection in general; but as the safety of the most valueless life is generally classed higher than that of the most valuable property, it may be well to give life-saving the first place when alluding to the two separately.

Criminal fire-raising only prevails where the fire-protective system is defective. With good construction and a fire survey, the quick arrival of the firemen, and careful inquests, the risks of detection are as a rule far too great to encourage its growth.

Saving of Life. — Under ” Fire Prevention ” special require- ments in the Building Act can greatly influence the safety of life by requiring practical exits and sufficient staircase accommoda- tion. The risks in theatres and assembly halls require separate legislation. In ordinary structures no inmate of a building should be more than sixty feet away from a staircase, and preferably there should be two staircases at his disposal in the event of one being blocked. Generally, attention is only given to the construction of staircases; but it must be pointed out that their ventilation is equally important. Smoke is even a greater danger than fire, and may hamper the helpers terribly. The possibility of opening a window has saved many a life.

Safety of Property. — As far as the protection of property is concerned, the prevention of outbreaks can be influenced by the careful construction of flues, hearths, stoves, and in certain classes of buildings by the construction of floors and ceilings, the arrangement of skylights, shutters and lightning conductors. Then comes the

prevention of the fire spreading, first, by the division of risks, and secondly, by the materials used in con- struction.

The legislator's first ambition must be to prevent a fire in one house from spreading to another, and a stranger's property, so to say, from being endangered. This is quite possible, given

good party walls carried well over the roof to a height regulated by the nature of the risk, the provision of the shutters to windows where necessary, and the use of fire-resisting glass. Again, a thoroughly good roof — or still better, a fire-resisting attic floor — can do much. If the locality has a fire brigade and the force is efficiently handled, " spreads " from one house to another should never occur. Narrow thoroughfares and courts are, however, a source of danger which may baffle all efforts to localize a fire. This should be remembered by those responsible for street improvements.

The division of a building or large " risk " into a number of minor ones is only possible to a certain extent. There is no need to spend enormous sums to make each of the minor " risks " impregnable. The desire should be simply to try to retard the spread for a certain limited time after the flames have really taken hold of the contents. In those minutes most fires will have been discovered, and, where there is an efficient fire- extinguishing establishment, a sufficient number of firemen can be on the spot to localize the outbreak and prevent the con- flagration from becoming a big one. In the drawing-room of an ordinary well-built house, for example, if the joists are strong and the boards grooved, if some light pugging be used and the plastering properly done, if the doors are made well-fitting and fairly strong, a very considerable amount of furniture and fittings can remain well alight for half an hour before there is a spread. In a warehouse or factory " risk " the same holds good. With well-built wooden floors, thickly pugged, and the ceilings perhaps run on wire netting or on metal instead of on laths, with ordinary double ledged doors safely hung, at the most perhaps lined with sheet iron or asbestos cloth, a very stiff blaze can be imprisoned for a considerable time. Many of the recent forms of " patent " flooring are exceedingly useful for the division of "risks," and with their aid a fire can be limited to an individual storey of a building, but it should not be forgotten that even the best of flooring is useless if carried by unprotected iron girders supported, say, by some light framing or weak partition. The general mistake made in using expensive iron and concrete construction is the tendency to allow some breach to be made (for lifts, shafting, &c), through which the fire spreads, or to forget that the protection of the supports and girder-work requires most careful

attention.

Of the various systems of “patent” flooring, as a rule the simpler forms are the more satisfactory. It should, however, always be remembered that any specific form of flooring alone does not prevent a fire breaking from one ” risk ” to another. They should go hand in hand with general good construction, and naked ironwork must be non-existent. Some of the modern fire-resisting floors are too expensive to permit their introduction for fire protection alone. In considering their introduction, the general advantages which they afford as to spans, thickness, general stability, &c, should be taken into account. A practical installation of floors, partitions, doors, &c, should, first, not increase the cost of a building more than 5%, and secondly should add to the general value of the structure by giving it a more substantial character.

The danger of lift wells, skylights and shaft openings should not be forgotten. The last should be as small as possible, well armed with shutters, the skylights should have fire-resisting glass, and the lifts not only vertical doors, but also horizontal flaps, cutting up the well into sections. The question of light partitions must also not be neglected.

Division of ” risks,” common-sense construction, and proper staircase accommodation are really all that fire protection requires, and where the special Building Act clauses have been kept within the lines indicated, there has been little friction and discontent. It is only as a rule when the authorities are eccentric in their demands that the building owner considers himself harassed by protective measures.

Fire survey regulations should mainly aim at preventing the actual outbreak of fire. In certain classes of risks fire survey can also increase the personal safety of the inmates and lessen the possibility of a fire spreading. The provision of fire-escape;:

or ladders, and a regular inspection of their efficiency, will do much. The examination of a rusty door-catch may save a building. The actual preventive work of the surveyor will, however, mostly consist in warning property owners against temporary stoves standing on ordinary floor boards, sooty chimneys, badly hung lamps, dangerous burners and gas brackets fixed in risky positions. Self-help will be

greatly facilitated ‘ by the judicious arrangement of fire-extinguishing gear, and a like inspection of its efficiency. Hydrants and cocks must not rust, nor must the hose get so stiff that the water cannot pass through it, or sprinklers choked. Hand pumps and pails must always stand ready filled. One of the greatest errors generally made in distributing such apparatus is disregard of the fact that the amateur likes to have an easy retreat if his efforts are unsuccessful, and if this is not the case, he may not, perhaps, use the gear at all.

With regard to regulations governing ” special risks,” so far as the safety of the public in theatres and public assembly halls is concerned, attention should be chie.ly given to the exits. Spread of fire, and even its outbreak, are secondary considera- tions. A panic caused by the suspicion of a fire can be quite as fatal as that caused by the actual start of a conflagration. In the storage of petroleum in shops, direct communication should be prevented between the shop or cellar and the mair staircase or the living rooms. The sale of dangerous lamps and burners should be prohibited.

Fire – resisting Materials. — One of the greatest misnomers in connexion with fire prevention was originally the description of certain materials and systems of construction as being ” fire- proof.” This has seriously affected the development of the

” fire-proof,” now indiscriminately and often most unsuitably applied to many building materials and svstems of building con- struction in use in Great Britain, have come to the conclusion that the avoidance of this term in general business, technical, and legis- lative vocabulary is essential.

The executive consider the term ” fire-resisting ” more applicable for general use, and that it more correctly describes the varying qualities of different materials and systems of construction intended to resist the effect of fire for shorter or longer periods, at high or low temperatures, as the case may be, and they advocate the general adoption of this term in place of ” fire-proof.”

Further, the executive, fully realizing the great variations in the fire-resisting qualities of materials and systems of construction, consider that the public, the professions concerned, and likewise the authorities controlling building operations, should clearly dis- criminate between the amount of protection obtainable or, in fact, requisite for different classes of property. For instance, the city warehouse filled with highly inflammable goods of great weight requires very different protection from the tenement house of the suburbs.

The executive are desirous of discriminating between fire-resisting materials and systems of construction affording temporary protection, partial protection, and full protection against fire, and to classify all building materials and systems of construction under these three headings. The exact and definite limit of these three classes is based on the experience obtained from numerous investigations and tests, combined with the experience obtained from actual fires, and after due consideration of the limitations of building practice and the question of cost.

The executive's minimum requirements of fire-resistance for building materials or systems of construction will be seen from the standard tables appended for — •

I. Fire-resisting floors and ceilings,

II. Fire-resisting partitions,

III. Fire-resisting doors,

but they could be popularly summarized as follows: —

(a) That temporary protection implies resistance against fire

movement towards fire prevention, for, having regard to the fact | .for at least three-quarters of an hour.

that nothing described as " fire-proof " could be fire-proof in the true sense, confidence was lost in everything so described, and in fact everything described as " fire-proof " came to be looked on with suspicion. In order to decrease this suspicion and obtain a better understanding on the subject, the Inter- national Fire Prevention Congress of London in 1903, at which some 800 representatives of government departments and municipalities were present, discussed this matter at considerable length, and they arrived at conclusions which, in consideration of their importance in affecting the whole development of fire- resisting construction, are published below. It is the classifica- tion of fire resistance adopted by this congress in 1903 that has been utilized by all concerned throughout the British empire, and in numerous other countries, since that date.

The resolutions adopted by the congress embodied the re- commendations contained in the following statement issued by the British Fire Prevention Committee: —

The executive of the British Fire Prevention Committee having given

their careful consideration to the common misuse of the term

(b) That partial protection implies resistance against a fierce fire for at least one hour and a half.

(c) That full protection implies resistance against a fierce fire for at least two hours and a half.

The conditions under this resistance should be obtainable, the actual minimum temperatures, thickness, questions of load, and the application of water can be aporeciated from the annexed tables by all technically interested, but for the popular discrimination — ■ which the executive are desirous of encouraging — the time standard alone should suffice.

It is desirable that these standards become the universal standards in this country, on the continent and in the United States, so that the same standardization may in future be common to all countries, and the preliminary arrangements for this universal standardization are already in hand.

Fire Combating. — As to self-help, complication must always be avoided. The amateur fireman must be drilled on the simplest lines. One thing which must be instilled into him is not to waste water — a sure sign of lack of training. Of course the drills must be on the same lines as those of the local brigade, and on no account should other gear be used for self-help than is generally

Standard Table for Fire-resisting Floors and Ceilings.

Classification.

Sub-Class.

Duration

of Test.

At Least

Minimum Temperature.

Load per Superficial

Foot

Distributed

(per Sq. Metre).

Minimum Superficial

Area under Test.

Minimum Time for

Application of. Water

under Press.

Temporary Protection

Class A

45 mins.

1500° F.

(8i5-5° c.)

Optional

100 sq. ft. (9-290 sq. m.)

2 mins.

Class B

60 mins.

1500° F. (815-5° C.)

Optional

200 sq. ft. (18-580 sq. m.)

2 mins.

Partial Protection –

Class A

90 mins.

1800° F. (982-2° C.)

H2 lb (546-852 kg.)

IOO sq. ft. (9-290 sq. m.)

2 mins.

Class B

120 mins.

1800° F. (982-2° C.)

168 ft (820-278 kg.)

200 sq. ft. (18-580 sq. m.)

2 mins.

Full Protection

Class A

150 mins.

1800° F. (982-2° C.)

224 lb (1093-706 kg.)

IOO sq. ft. (9-290 sq. m.)

2 mins.

Class B

240 mins.

1800° F. (982-2° C.)

280 lb (1367-130 kg.)

300 sq. ft. (18-580 sq. m.)

5 mins.

kg. —‘kilogramme.

4-o8

FIRE AND FIRE EXTINCTION

[FIRE-CALLS

Standard Table for Fire

-resisting Partitions.

Classification.

Sub-class.

Duration of Test. At Least

Minimum Temperature.

Thickness of Material.

Minimum Superficial

Area under Test.

Minimum

Time for

Application

of Water under Press.

Temporary Protection . . . -i

Class A

45 mins.

1500° F. (8i5-5° C.)

2 in. and under (•051 m.)

80 sq. ft. (7-432 sq. m.)

2 mins.

Class B

60 mins.

1500° F. (8i5-5° C.)

Optional

80 sq. ft. (7-432 sq. m.)

2 mins.

Partial Protection J.

Class A

90 mins.

1800° F. (982-2° C.)

2\ in. and under (•063 m.)

80 sq. ft. (7-432 sq. m.)

2 mins.

Class B

120 mins.

1800° F. (982-2° C.)

Optional

80 sq. ft. (7-432 sq. m.)

2 mins.

Full Protection -1

Class A

150 mins.

1 8oo° F. (982-2° C.)

2\ in. and under (•063 m.)

80 sq. ft. (7-432 sq. m.)

2 mins.

Class B

240 mins.

1800° F. (982-2° C.)

Optional

80 sq. ft. (7-432 sq. m.)

5 mins.

Standard Table for Fire-resisting Single Doors, with

or without Frames

Classification.

Sub-class.

1

Duration of Test. At Least

Minimum Temperature.

Thickness of Material.

Minimum Superficial

Area under Test.

Minimum Time for

Application of Water

under Press.

Temporary Protection . . . . -j

Class A

45 mins.

1500° F. (8i5-5° C.)

2 in. and under (•051 m.)

. 20 sq. ft. (1-858 sq. m.)

2 mins.

Class B

60 mins.

1500° F. (8i5-5° C.)

Optional

20 sq. ft. (1-858 sq. m.)

2 mins.

Partial Protection <

Class A

90 mins.

1800° F. (982-2° C.)

2 J in. and under (■063 m.).

20 sq. ft. (1-858 sq. m.)

2 mins.

Class B

120 mins.

1800° F. (982-2° C.)

Optional

20 sq. ft. (1-858 sq. m.)

2 mins.

Full Protection . . . . . -1

Class A

150 mins.

1800° F. (982-2°C.)

| in. and under (•018 m.)

25 sq. ft. (2-322 sq. m.)

2 mins.

Class B

240 mins.

1800° F. (982-2° C.)

Optional

25 sq. ft. (2-322 sq. m.)

5 mins.

customary in that force. When volunteers and regulars work together, the former should always remember that the paid force are experts, though the regulars must never have that contempt for volunteer work so often noticeable. Volunteers are often men who are probably experts in some other vocation outside fire-fighting, and have not had the opportunities which a professional fire-fighter has had.

Transmission of Fire-Calls. — There are several methods of transmitting the message of a fire-call. The simplest is, of course, to run direct to the nearest fire-station; but this is only possible where the distance is short. In one or two cities, how- ever, the r.un.l.er of fire-stations is so great that they are very close to one another, and hence ” direct ” calls are generally recorded.

Then comes the system of special messengers. The fire is reported at some public office, police-station or guard-room, where there are always runners ready to start off to the nearest fire-station. The special runner is here practically a makeshift for the more modern telegraph or telephone line, and it is believed that the only city in which this system is employed is one where the unsettled political atmosphere has compelled the authorities to prohibit the construction of any telegraph lines other than those for the use of the general postal service. Similar messenger services have, however, also been introduced in connexion with the telegraphic signalling system. Private enterprises known as ” general messenger ” or ” call-boy ” services, which are organized for business purposes, have the

advantage of including the fire-call and the police-call. In the same way that a cab can be signalled, a call ma}' come for a fire-engine, and the ever-ready

runner makes off to the fire-station instead of to the cab rank. As a rule, these messenger offices are near the fire-station. The combination is rather a curious one, as it embraces the most advanced notions of giving every " risk " its own fire-call, and the somewhat ancient one of the special runner.

Another system for facilitating the fire-call relies entirely on the public telephone system, the terms of subscription to which may compel holders to forward fire messages if required to do so. This system allows for such development as the payment of retaining fees to porters in public and other buildings which have a night service, on condition that the fire-call shall be promptly despatched. The telephones are, perhaps, even provided free, if they are not forthcoming; but it should be remembered that the service always goes through a general telephone exchange, which is, of course, open day and night.

In the special telephone line system special wires are laid from buildings which are practically open all the year round direct to their nearest fire-stations, and some payment is again made for prompt attention. Sometimes the telegraph takes the place of the telephone, but this requires the porter or attend- ant to be specially trained to the work. To simplify matters, the buildings are sometimes provided -with automatic fire-calls instead of telephones; but the principle of the system remains the same. In districts where there are few public offices, the list of buildings at which messages can be handed in has been frequently augmented by a set of bakeries or apothecaries' shops, where night service is not unusual.

What may be termed semi-public street alarms come next. Automatic fire-calls are put up in the street, but their handles

are under lock and key, and the keys are distributed only among policemen, watchmen or householders, and the messages can, therefore, only be given by persons known to the authorities.

The public automatic street-call is the simplest system next to the direct message. Private automatic fire-calls or telephones can be laid on from dangerous risks, and there has even been an instance where an attempt was made to give every householder a private fire-call. This system is, however, unfortunately too extreme for the municipal purse. If in connexion with some other paying enterprise, as in the case of the messenger services referred to, it would be a different matter, though it should also not be forgotten that too great a number of call points means a probable repetition of signals of the same fire, and a risk of too many sections of the fire brigade being on the road to it.

Besides these forms of ” call,” there is also the private alarm. Dangerous buildings are frequently provided with telephones, alarm-posts, or even automatic temperature indicators, by which a call can be given direct from the ” risk ” involved.

Call points should be not only conspicuous, but also in most frequented positions. Possibly, in some towns, a point in front of a church would be the best; in others, the front of a public- house. It should always be remembered that every facility should be given to enable as many people as possible to know the whereabouts of the call points without any distinct effort on their part. Red paint may make a call pillar conspicuous by day, and a coloured lamp by night.

As to the indication of call points, a plate on every letter-box stating the position of the nearest call-point is perhaps one of the best methods. The letter-box is one of the instruments most in use in a modern city, and hence the plate is read by many. In an oriental town the public fountain would, however, take the place of the letter-box. Plates put up inside every front door are somewhat extreme measures. In one city red darts are painted on the glass of every street lamp, indicating the direction to be taken to find a street alarm. This sign, however, has the disadvantage of requiring a previous knowledge of its meaning, and is generally useless to a stranger in the town.

Rewards paid to messengers vary from one shilling to half a sovereign. In some places every call is rewarded — even those to chimney fires — and this often results in an abuse of the privilege. Rogues light fires on the top of a chimney and then run to call the engines. If a reward be given, a limitation should be made. In one town no relation or employe of the owner receives a reward. In other cities no rewards are given for calls to a fire in a dust-bin or a chimney.

No true fireman would be annoyed at a false alarm given by mistake.

The possibility of a fire, or the suspicion of one, is a bona fide reason for a call which should not be discouraged. Malicious alarms should, however, be treated with the utmost rigour, as the absence of firemen from their stations always means an extra risk to life and property. Combined ” lynch law ” and imprisonment has generally been adopted with good effect. The rascal should first be put when caught over the pole of the engine and thrashed with a broad fireman’s belt, and after that handed to the police.

The fire-call should, if possible, also be so constructed as to facilitate intercommunication between the scene of a fire and the headquarters of the fire brigade. Where the runner is employed or the telephone is used no special arrangements are required, but where the telegraph or automatic call point has been intro- duced, the apparatus must be adapted for this contingency. At some automatic fire-call points a few signals can be given, at others, a telegraphic or telephonic transmitter can be applied. • Much valuable time may be saved in this way when more assist- ance is required.

Fire Brigades .—The organization of fire brigades varies greatly, There are brigades where officers and men are practi- cally constantly ready to attend a fire, and others where they are ready on alternate days, two days out of every three, or three days out of every four, and the off day is entirely their own, or at the most, only partially used by the authorities for some

light work. The men off duty are only expected to attend a fire if there is a great emergency, the brigade being strong enough without them for ordinary eventualities. Both systems can be worked with or without part-paid or volunteer service, which would be only called out for great calamities. They could be organized as a practically independent reserve force, or the reserve men might be attached to sections of the regulars and mixed with them when the occasion arises. The reserves can consist either of retired firemen who have a few regular drills, or of amateurs who go through a special course of training, and have some series of drills at intervals, with preferably a short spell of service every year with the regulars. For the regulars, forty-eight hours on duty to every twenty-four off has given the most satisfactory results.

The division of the active force may be on a system of a number of small parties of twos and threes backed by one or more strong bodies. Another system allows for subdivision into sections of equal strength, ranging from parties of, say, five men with a non-commissioned officer to thirty non-commissioned officers and men with an officer.

The force can, of course, also simply be divided up into parties or sections of different strengths not governed by a system of military units. The sections either can work independently, as units, simply governed by one central authority, or there can be a grouping of the units into minor or major bodies or districts, each duly officered, and as a whole individually responsible to headquarters.

The officers may be all taken from the ranks, or they may be ” officers and gentlemen ” in the military sense, or have only temporarily done work with the rank and file when in training. There could also be a combination of these two systems. Only the captain and deputy-captain might be officers in the military sense, the sections or divisions being officered by ” non-coms.” Some cities have an officer to every thirty ” non-coms ” and men, whilst others put a division of as many as two hundred under a fireman who has risen from the ranks. Where protection is treated as a science, and where those in charge of a brigade have really to act as advisers to their employers, officers in the military sense have been found essential. They have also been found advantageous where their scope is limited to fire extinguishing. The prestige of the fire service has been raised everywhere where the officers, besides being fire experts, are educated men of social standing. There are cities where the officers of the fire brigade are in every way recognized as equal to army or navy men, their social position is the same, and their mess fulfils the same functions as a regimental mess. The fire brigade officer is recognized at court, and there is no ceremonial without him. On the other hand, there are also cities with brigades several hundred strong where the captain’s social standing is beneath that of a petty officer -or colour-sergeant. As to the primary training of a fire brigade officer, the best men have generally had some experience in another profession, such as the army, the navy, or the architectural and engineering professions, previous to their entering the fire service. Some brigades recruit from army officers only, and preferably from the engineers or artillery regiments; others recruit from among architects and engineers, subject to their having at least had some military experience in the reserve forces or the volunteers. Some cities only take engineers or architects, and make a point of it that they should have no previous military experience. Some previous experience in the handling of men is essential.

As to the men, there are cities where only trained soldiers are taken as firemen; others where the engines are manned by sailors. In some towns the building trades supply the recruits; in others, all trades are either discriminately or indiscriminately represented. A combination from the army or navy on the one side and the building trades on the

other is most satisfactory. The knowledge of building construction in the ranks stands the force in good stead, and has often saved both lives and property. Where a brigade can boast of a few men of each important trade, much money has been saved the ratepayers by the men doing their own repairs and refitting, but the number of men from sedentary trades should not be excessive. Where there are only

men of one trade or calling, there is often too great a tendency to one-sidedness, and a great amount of prejudice.

Physical strength and perfect constitution are requisite for both officers and men. As to the height of the men, small, wiry men are very useful. First-class eyes, ears and nose are neces- sary, also a good memory. Fat men are entirely out of place in a brigade, and should be transferred to some other service if the fatness be developed during their engagement with a brigade. Many brigades take only single men, ” non-coms ” and officers only being allowed to marry. There are many brigades where twenty-two and forty are the limits of age for the privates, fifty for the ” non-coms,” and sixty for the officers.

As to the equipment, there are brigades which have all their sections or units provided with practically the same gear; others where each unit has a double or treble set, one of which is used according to circumstances. The section may have a manual engine, a steamer and a ladder truck at its disposal, and may turn out with either. There are towns where the units are differently equipped, and steamer or manual sections called out, as the case may be. In a few extreme cases, where the sections are very strong, they may be equipped with a set of engines and trucks, and the unit, in every case, turns out complete with (say) a chemical engine, a steamer and a horsed escape. The contrast to this will be found in the small parties of twos or threes, whose turn-out would only consist of a small hose trolley or an escape. Of course, there are all kinds of combina- tions, the most important of which allows a section to have one or more independent subsections. Though practically belonging to the ” unit,” the subsections work independently in charge of a certain gear. This may be a hose-reel, a long ladder, or a smoke helmet, according to circumstances. The subsections may act as outposts or simply as specialist parties, which are only called out for particular work.

As for the housing of the units or sections, simple street stations are provided for the small parties referred to. In a few cases two small parties are housed under the same roof. The large bodies that back them are generally quartered together in extensive barracks, from which any number of engines and men can be turned out according to the nature of the call. Then there are cities where every section has its own well-built station ; others where one or two sections are housed together, according to circumstances, and perhaps as many as half a dozen located at headquarters. If groups are formed, the headquarters of the group or district has, perhaps, two sections, while each of the other stations has only one. The general headquarters may be the central station of a district at the same time. The actual working of the district headquarters would, however, then be kept separate from the working of the headquarters staff. The latter would, perhaps, have some sections ready to send any- where besides the trucks, &c, necessary for the officers, the general extra gear, &c, that might be required. It is usual to combine workshops, stores, hose-drying towers, &c, with the headquarters station, and, in some cases, also with the district centres.

In the distribution of the stations, the formation of districts, &c, various systems have been adopted. The most satisfactory results have been obtained where a fully-equipped section (not simply a hose-car or escape-party) can reach any building in the city within six minutes from the time of the call reaching the station, the six minutes including both turn-out and run. Where there are exceptionally large or dangerous risks, this time has had to be shortened to four minutes, and the possibility of an attend- ance from a second station assured within six minutes. In dividing up districts, the most satisfactory results have been obtained where every house can be reached from the district centre within fifteen minutes from the call. Headquarters would naturally have a central position in the city. In one or two instances the headquarters offices are located in a separate building, which in no way serves as a fire-station, but simply as a centre through which all orders and business pass.

The different stations must be in connexion with each other. The special runner or rider is practically disappearing. The

telegraph and telephone have taken his place. Some cities favour Morse telegraphy, which certainly had great advantages over the telephone at one time, as messages could be easily transmitted to several stations with the same effort, but telephone distributors have now been successfully introduced. Errors are less frequent by telegraph than by telephone, and there is always a record of every

message. The most modern forms of telephone communication are, however, more suitable for the fire service than the telegraph. Headquarters should be in direct communication with every station, but every station should be able to communicate with its neighbour directly, as well as through the headquarters office, and there should be a direct wire to its district station if it has one. There should be three routes of communication, so that two should be always ready for use in case of one breaking down. Either headquarters or the district centres would be in touch with the various auxiliaries referred to, as well as the general telegraph office and the telephone exchange.

As to the attendance at fires, some cities turn out but one unit to answer the first call if they have no particulars, others always turn out two or three sections, and there are several cities where the district centre would at least send an officer and a few men as well. In one brigade, headquarters is always represented by either the chief or the second officer in the case of a call of this kind. The idea is that it is always better to have too strong a force quickly in attendance than too small a number of men, and that it is most important that the first arrival should be well handled. Further, if two sections answer a call and one breaks down on the road, there is no chance of there being too great a delay in the arrival of organized help. It should, however, not be forgotten that further calls in the same district to other fires are not unusual, and that the absence of too many engines, on account of a first call, is dangerous. In some cities, when a call reaches the firemen one or two of the nearest stations turn out, and if more help is required other sections will be called up individually. In others the reinforcements are not called up separately, but the fires are divided into three classes — small, medium and large; and on the message arriving of a more extensive conflagration at a certain point, the section already know beforehand whether they must attend or not. First calls to certain classes of risks, e.g. to theatres or public offices, may always be considered to be for medium or large fires; and the same message will then simultaneously turn out the stronger body without any further detailed instructions being necessary. In some towns the fire-call automata are so arranged that the messenger can at once call for the different classes of fire. This, however, is not to be recommended, as a messenger will probably consider the smallest fire to be a gigantic blaze, and will bring out too many engines.

Equipment. — The following are characteristic features in the equipment of brigades. First, where there is a high-pressure water supply, some brigades simply attend with hose-cars, life-saving gear and ladders; or, instead of the hose-cars, take their manuals, which they practically never use and which serve only as vehicles to carry

men and hose. Others take, and make a point of using, the manuals, and have a barrel with them ready to supply the first gallons of water necessary. No time is thus lost in connecting with the nearest hydrant or plug; and in case of a hydrant being out of order, there is always sufficient water at hand until the second hydrant has been found. Many cities have introduced chemical engines to take the place of this combination of water barrel and manual engine. A supply of water is carried on the chemical engine. Some cities always have an attendance of steamers, which are, however, only used in urgent cases. In other instances the steamer is at once used in the same way as the manual, and this quite inde- pendently of the pressure there is in the water service. Where there is no good water service, manuals or steamers have, of course, to be sent out, and are supplied either from the low- pressure service or from the natural waterways or wells. There are still a large number of cities where the suburbs have no proper water service, and the water barrel is then very handy

for water porterage. Attempts have also been made at the chemical treatment of water which is to be thrown on to a fire, with the view of increasing its effect, or at the use of chemicals instead of water. In certain localities fire appliances are still run out to fires by hand, especially where there is a high pressure water system and hose carts only are required. Generally the appliances are horsed. Motor traction is, however, now rapidly superseding horse traction for reasons of economy and the wider and more rapid range of efficiency.

As to life saving and manoeuvring gear, some brigades rely almost entirely on hook ladders, others almost entirely depend on scaling ladders or telescopic escapes. In some great con- fidence is placed in the jumping-sheet ; in another, chutes are much used; and there are a few where wonderful work is done with life-lines. To indicate the diversity with which any one appliance can be treated, made or handled, in the fire service, it may be mentioned that there are quite ten different ways in which a jumping-sheet can be held. Then there is the material of the jumping-sheet to be considered; the size and the shape — whether round, oblong, square or rectangular; then the means of holding it, the way to fold it, how and where to stow it, and at what distance from the endangered building the sheet is to be held. Last, but not least, come the words of command.

Working of Brigades— In some forces all possible attention is given to the rapidity of the actual turn out, while in others the speed at which engines run to the fire is considered to be of primary importance. Other brigades, again, give equal attention to both. There are brigades which work entirely on military lines, each man having certain duties marked out for him beforehand for every possible occasion, and there are others where happy-go-lucky working is preferred. Of course there are combinations in the same way as regards command. Some chief officers arrive at a fire with a staff of adjutants and orderlies, and control the working of the brigade from a position of vantage at a distance. Other chiefs delight to be in the thick of a fire, perhaps at the branch itself, or on some gallant life-saving exploit where they no doubt do good work as a fireman, but in no way fulfil the office of commanders. Officers must remember that they are officers, and not rank and file; and this is generally very difficult to those who have advanced from the ranks. Superintendents, however smart, must leave acts of bravery to their men, and chief officers, without going to extremes, must always be in a good position where they can superintend every thing pertaining to the outbreak in question. Some brigades seem to make a point of working quietly, and shouting is absolutely forbidden, all commands being given by shrill whistles. In some brigades all commands are given by word of mouth, and there is much bawling. In others commands, besides being bawled, are even repeated on horns, and the noise becomes trying. As a rule, quiet working is a sign of efficiency.

Some brigades work as close as possible to the fire, others are satisfied with putting water on or about the fire from a distance. Some attack the fire direct, others only try to protect what surrounds the seat of the flames. Several brigades are ordered always to try to attack by the natural routes of the front door and the staircases. In others, the men always have to attempt some more unnatural entrance, with the aid of ladders — through windows, for instance. Some brigades care- fully extinguish a fire, some simply swamp it. Seme brigades boast of never having damaged property unnecessarily. They have, for instance, had the patience to suffocate a cellar fire, instead of putting the whole cellar under water. In certain classes of property the bucket, the mop, and the hand-pump have been far more effective in minimizing actual destruction than the branch and hose. It is one of the easiest signs by which to judge the training and handling of a fire brigade — to see what damage they do. Even an inconsiderate smashing of doors and windows, when there is absolutely no need for it, can be avoided, where every man in the force feels that his first duty is to prevent damage and loss and his second to extinguish the fire.

Where the brigade includes a salvage division, it is generally stationed at headquarters; where this division is split up into

sections, there would also be a distribution among the district centres; the salvage men are simply part of the force, told off on special duty. Where there are private salvage corps, their stations are generally near the headquarters or district centres of the brigade, from which they receive notice of the fire. In some cities the salvage corps work quite independently; in others, they work under the chief of the brigade directly they arrive at the fire.

As to the working of allied civilian forces in conjunction with the fire service, the advantages of firemen having plenty of room to work in is now fully recognized, and the police are at once called out and often brought on to the scene in an incredibly short time. The value of these measures should not be under- rated, especially in cities where rowdyism exists. In many cities the ambulance service is also turned out to fires. Where no independent ambulance corps exists, some of the firemen should be trained to work as ambulance men. Turncocks and gasmen are also frequently brought to all fires. Lastly, in many garrison towns the military turn out to assist the fire brigade.

National Fire Brigades' Union.— The National Fire Brigades' Union, which is the representative Fire Service Society for Great Britain, originated in a national demonstration of volunteer fire brigades held at Oxford in celebration of Queen Victoria's jubilee on the 30th of May 1887, when 82 fire brigades with 916 fireman were present. Next day a meeting of the officers was held at the Guildhall, Oxford, and it was then resolved to form the National Fire Brigades Union. Alderman Green, the chief officer of the Oxford fire brigade, was appointed the first chairman. Sir Eyre Massey Shaw was ap pointed first president in 1888, and on his retirement in 1896 through ill-health he was succeeded by the duke of Marlborough. When the union offered to provide ambulance firemen and stretcher bearers for his regiment the duke accepted the offer, and two fully equipped corps were sent out to the Imperial Yeomanry hospital at Deel- fontein, South Africa, under Colonel Sloggett, who specially men- tioned the services rendered by the firemen in his despatches.

The union is divided into seventeen districts, each having its own council, and sending one delegate for every ten brigades to the central council. The districts are :— Eastern, Midlands, South Coast, South-Eastern, West Midland, North-Eastern, North- Western, South Western, Surrey, South Midlands, Southern, South Wales, North Wales, Cornish, Yorkshire, Central and South Africa (formed in 1902). There are also

seventy-five foreign members and corre- spondents in America, Australia, Austria, Belgium, Canada, Denmark, France, Germany, Holland, Italy, New Zealand, Russia, South Africa, India and the Federated Malay Straits. The total strength of the union is 667 fire brigades and members with nearly 12,000 firemen. Every member of the union gives his time and services for the benefit of the country ; all appointments are honorary, with the exception that a small allowance is made for clerical assistance. A drill book is issued by the union, and the fourth edition was published in 1902. Over 60,000 of these books have been issued to brigades all over the world.

The ambulance department is under the charge of medical officers. All members have to come up for re-examination every three years, else they are not entitled to wear the red cross, and the examination is more stringent than that held by the St John Ambulance Associa- tion. This department has proved to be a great benefit to provincial fire brigades, who are often called upon to undertake ambulance work. A very useful and instructive manual has been issued by the union entitled First Aid in the Fire Service, by Chief Officer William Ettles, M.D.

The union organized and took part in the International Fire Exhibitions, at the Royal Agricultural Hall, London, in 1893 and 1896, and it was represented at the International Fire Congresses at Antwerp, Brussels, Ghent, Paris, Lyons, Havre and Berlin. It has also held a review before the German emperor at the Crystal Palace, and before Queen Victoria in Windsor Park.

Fire Brigade Organization.

Below are given examples of the organization of different fire brigades. The brigades so described have been selected not so much on account of their intrinsic importance, as because they represent classes or types of brigades and fire brigade organization which it may be useful to refer to. In respect of the London fire brigade, however, historical data are also presented, as it is only with the aid of these that the extraordinary development of that force can be properly realized.

With regard to modern views as to the functions of the fire brigade, the resolutions of the Fire Prevention Congress of 1903 are reprinted below. As they indicate, the general feeling amongst all interested in fire protection from an economic point

of view is that fire brigades should not be merely fire extinguish- ing organizations but should utilize their influence in a much wider sense. ■.'.:,

The Congress considered:—

i. That public authorities should encourage fire brigade officers to take an active interest in the preventive aspect of fire projection, inasmuch as the result of the fire brigade officers' experience in actual fire practice, if suitably applied in conjunction with the work of architects, engineers and public officials, would be most useful for the organization and development of precautionary measures.

2. That fire brigade societies, associations and unions should encourage amongst the brigades affiliated to these bodies the study of questions of fire prevent/on.

3. That fire brigades should be placed on a sound legal bilsis, and that it is advisable that their efficiency be supervised by a govern- ment department.

4. That an official investigation should be made of all fires. That on the occurrence of every fire an investigation should be immedi- ately made by an official, duly qualified and empowered to ascertain the cause and circumstances connected therewith, reporting the result of such investigation to a public department for tabulation and publication.

5. That the whole or part of the cost of such inquiry should be charged to the occupier of the premises where the fire occurred, as may appear desirable in the circumstances of each case.

6. That the press should from time to time publish technical reports on fires so that the public may benefit from the knowledge and experience gained.

London.-^-In the early part of the 19th century the methods in vogue for the suppression of outbreaks of fire in the metropolis were of the most crude and disjointed character, in striking contrast with the highly elaborated system now put into practice by the London County Council through its fire brigade; and it was not until the second half of the 19th century was well advanced that anything approaching an

adequate and satis- factory organization was brought into existence. Until the passing of the Metropolitan Fire Brigade Act 1865, the only acts relating to the suppression of outbreaks of fire in London were the Lighting and Watching Act (3 & 4 William IV., c. go), and “an act’ (14 Geo.’ III., c. 78) for the further and better Regulation of Buildings and Party Walls, and for the more effectually preventing Mischiefs by Fire within the Cities of London and Westminster, and the Liberties thereof, and other the Parishes, Precincts and Places within the Weekly Bills of Mortality, the Parishes of Marylebone, Paddington, St Pancras, and St Luke’s at Chelsea, in the County of Middlesex.” The clauses in the latter act relating to protection against fire re- mained in force till the passing of the act of 1865. They provided that every parish should keep ” one large engine and one. small, called a hand engine, a leathern pipe, and a certain number of ladders.” The Lighting and Watching Act contained a clause which extended to England and Wales and so covered the area “without the bills of mortality,” enabling the inspectors ap- pointed under that act to provide and keep up two fire-engines; and certain of the parishes in the metropolitan district, without the bills of mortality, availed themselves of this provision.

The select committee of fires in the metropolis, which sat in 1862, reported that it was difficult to ascertain how far the act of George III. was attended to, or when it ceased to be considered practically of importance, but that, at the time of the report, the arrangements generally made by the parishes under the act were not only entirely useless, but in many cases produced injurious results, as the system under the act frequently con- ferred a reward for the first useless parochial engine, whereas the efficient engine which might be on the spot a few minutes later derived no pecuniary advantages. There were, however,, exceptions to the general rule. At Hackney, for example, a ” very efficient ” fire brigade was maintained at an expense of about £500 a year, or about one halfpenny in the pound on the rating of the parish. The select committee were unable to ascertain with any accuracy the total amount paid by the metropolitan parishes for the maintenance, “however in- efficient,” of their fire-engines, but it was estimated to be about £10,000.

For many years previous to 1832, the principal fire insurance offices in London kept fire brigades at their individual expense;

to these. brigades were attached a considerable number of men usually occupied as Thames watermen, retained in the service of the different Fire Offices, who received payment only on the occurrence of fires, and who wore the livery and badge of the respective companies.

These fire brigades were, to quote the report of the select committee of 1862, considered as giving notoriety to the different insurance companies, and a considerable rivalry was maintained, which was productive naturally of good as well as of some considerable evil on occasions of fires.

The large expenses thus incurred by the companies induced an attempt to be made, which was effectually carried out in the year 1832, by R. Bell Forde, a leading director of the Sun Fire Office, to form one brigade for the purpose of promoting economy as well as greater efficiency. Thus the first organized fire brigade for London began its operations under the united sanction of, and from funds contributed by, most of the leading insurance offices in London. The force thus formed was known as the London Fire Engine Establishment. The annual expense was at first £8000, the number of stations 19, the number of men employed 80. By 1862 the annual cost had grown to £25,000, the number of stations had become 20, and the number of men 127.

It is interesting to note that the chief station of the Fire Engine Establishment was the Watling-Street station, in sub- stitution for which the new Cannon-Street station has been built. The following is a list of the other stations of the establish- ment:—

School House-lane, Shadwell Crown Street, Soho

.-, Wellclose Square Wells Street

Jeffrey's Square Baker Street

Whitecross Street King Street, Golden Square

Farringdon Street Horseferry Road

Holborn Waterloo Road

Chandos Street Southwark Bridge Road

Tooley Street Southwark Bridge (floating)

Lucas Street, Rotherhithe Rotherhithe (floating)

The work of this force was carried out in an efficient manner as far as its limited equipment and strength would permit, but it was universally admitted that the staff, engines and stations were totally inadequate for the general protection of London from fire. The

directors of the insurance offices themselves admitted this, but they considered their brigade sufficient for the protection of that part of London in which the largest amount of insured property was located, and contended that it was not their business to provide fire stations in the more outlying districts where, if a fire occurred, it was not likely to involve their offices in serious loss.

From 1836. the work of the brigade maintained by the fire offices was supplemented by the ” Society for the Protection of Life from Fire.” This society was managed by a committee of which the lord mayor was president. It was supported entirely by voluntary contributions, and, at a cost of about £7000 a year, maintained fire-escapes at from 80 to 90 stations in different parts of the most central districts in London. Its most outlying station was only 4 m. from the Royal Exchange, and it main- tained no stations in such localities as Greenwich, Peckham, Deptford and New Cross. It did much useful work, though its equipment was quite inadequate to cope with the needs of the metropolis.

In 1S34, two years after the institution of the London Fire Engine Establishment, the Houses of Parliament were destroyed by fire, and the attention of the government was consequently directed to the inadequacy of the existing conditions for fire extinction. It was suggested, at the time, that the parochial engines should be placed under the inspection of the commis- sioners of police, but this proposal was not adopted, and the existing state of matters was allowed ;to continue for another thirty years. The select committee of 1862 recommended that a fire brigade should be created under the superintendence of the commissioners of police, and should form part of the general establishment of the metropolitan police. In 1865, however, the Metropolitan Fire Brigade Act was passed, under which the responsibility for the provision and mauitenance of an efficient

fire brigade was laid upon the Metropolitan Board of Works. Under the provisions of the act, the board took over the staff, stations and equipment of the Fire Engine Establishment; the engines maintained by the various parochial authorities, and the men in charge of them were also absorbed by the new organization, as were the fire-escapes and staff of the Society for the Protection of Life from Fire.

The funds provided by the Fire Brigade Act for the main- tenance of the brigade were: (i) the produce of a halfpenny rate on all the rateable property in London; (2) contributions by the fire insurance companies at the rate of £35 per million of the gross amount insured by them in respect of property in London; and (3) a contribution of £10,000 a year by the govern- ment. Although the revenue allotted increased year by year, its increase was far from keeping pace with the constant calls from all parts of London for protection from fire. Some tem- porary financial relief was afforded by the Metropolitan Board of Works (Loans) Act 1869, which (1) authorized the interest on borrowed money to be paid, and the principal to be redeemed out of the proceeds of the Metropolitan Consolidated rate, apart from the halfpenny allocated for fire brigade purposes; and (2) provided that the amount to be raised for the annual working expenditure on the brigade should be equal to what would be produced by a halfpenny in the pound on the gross annual value of property, instead of, as before, on the rateable value. One result of the passing of the Local Government Act 1888 (by which the London County Council was constituted), under which a county rate for all purposes is levied, was virtually to repeal the limitation of the amount which might be raised from the ratepayers for fire brigade purposes. Since: that time the expenditure on the brigade has therefore, like that of other departments of the council's service, been determined solely by what the council has judged to be the requirements Of the case.

When the council came into existence early in 1889 the fire brigade was admittedly not large enough properly to protect the whole of London, the provision in various suburban districts being notoriously inadequate to the requirements. A plan for enlarging and improving old stations, and for carrying out a scheme of additional protection laid down after careful considera- tion of the needs of London as a whole, was approved on the 8th of February 1898 (and somewhat enlarged in 1901); it provided for the placing of horsed escapes at existing fire stations, for the establishment of some 22 additional stations provided with horsed escapes, and for the discontinuance of nearly all the fire- escape and hose-cart stations in the public thoroughfares.

Since it came into existence the London County Council has estab- lished additional fire stations at Dulwich. New Cross, Kingsland, Whitefriars, Lewisham, Shepherd's Bush, West Hampstead, East Greenwich, Perivale, Homerton, Highbury, Vauxhall, Pageant's Wharf (Rotherhithe), Streatham, Kilburn, Bayswater, Eltham, Burdett Road (Mile End), Wapping, Northcote Road (Battersea), Heme Hill, Lee Green and North End (Fulham). Of these, Vaux- hall, Kilburn,

Bayswater, Eitham, Burdett Road, Heme Hill and North End stations are sub-stations. New stations have been erected, in substitution for small and inconvenient buildings, at Wandsworth, Shoreditch, Fulham, Brompton, Islington, Padding- ton, Redcross Street (City), Euston Road, Clapham, Mile End, Deptford, Old Kent Road, Millwall, Kensington, Westminster, Brixton and Cannon Street (City), and the existing stations at Kennington, Rotherhithe, Clerkenwell, Hampstead, Battersea, Whitechapel, Greenwich and Stoke Newington have been consider- ably enlarged. Two small stations without horses have been estab- lished in Battersea Park Road and North Woolwich respectively. A building has been erected at Rotherhithe for the accommodation of the staff of the Cherry-garden river station ; and another building has been erected at Battersea for the accommodation of the staff of a river station which has been established there.

In 1909 new stations in substitution for existing stations were in course of erection at Knightsbridge and Tooting, and additional sub-stations were being erected at Plumstead and Hornsey Rise. The Bethnal Green station was being considerably altered and en- larged. The council had also determined to erect new stations in substitution for existing inconvenient buildings at Holloway, Waterloo Road, Shooter's Hill and North End, Fulham; and to build additional sub-stations at Charlton, Caledonian Road, Brixton Hill, Camberwell New Ro;\d, Roehampton, Balham, Brockley and Earlsficld.

Budapest. — There is a combination of a professional force and a vplunteer force at Budapest, and in addition an auxiliary service of factory fire brigades. The professional fire brigade possesses a central station and eight sub-stations, two minor stations, and permanent theatre- watchrooms at the royal theatres. The staff (in 1901) of the professional brigade con- sisted of a chief officer, an inspector, a senior adjutant and two junior adjutants, a clerk, and further 23 warrant officers, 3 engineers, 15 foremen, 154 firemen and 36 coachmen with 62 horses. There have been some slight increases since. The apparatus, at their disposal consists of 6 steam fire-engines, 22 manual engines, 27 small manual engines, n water carts, 13 traps, 4 tenders, 26 hose reels and hose carts, 5 long ladders, 9 ordinary extension ladders, 34 hook ladders, 12 smoke helmets and 2 2, 000 metres of hose. The various stations are connected with the central station by private telephone lines. There are 149 telephonic fire alarms ' distributed throughout the city. They are on radial lines connected up with their respective nearest stations, and on a single radial line there are from three to seventeen call-points.

The volunteer brigade has an independent constitution and comprises

some eighty members. Its equipment is housed with that of the professional brigade, and is bought and maintained by the municipality. This volunteer brigade is a comparatively wealthy institution, having a capital of 100,000 crowns, whilst receiving a special subsidy annually from the municipality. Though legally an entirely independent institution, the brigade voluntarily puts itself under the command of the chief officer of the professional brigade. It further puts daily at the disposal of the professional fire chief ten men who do duty every night and “turn out” when called upon to render service. This volunteer brigade stands as a kind of model to the other volunteer brigades, and it is in connexion with this volunteer brigade that the educational classes referred to above are held and facilities accorded to the officers undergoing instruction to gain experience at the Budapest fires.

The Budapest professional fire brigade, even if assisted by the volunteer force, would scarcely be of adequate strength to deal with the great factory risks of that city were it not that the Budapest factories and mills have a splendidly organized service of factory fire brigades. These brigades— forty-four in number— are essentially private institutions, intended to render self-help in the factories to which they belong, but they are well organized, and have a mutual understanding whereby the neighbouring brigades of any one factory immediately turn out and assist in case of need. These factory brigades have a total staff of 1600 men. They are equipped with

1 steam fire-engine, 57 large manuals, 136 small manuals, and have a very considerable amount of small gear, including 15 smoke helmets,

Cologne.-ˆ-The Cologne professional fire brigade is 153 strong (1906), with a chief officer, a second officer, and two divisional officers, a warrant officer, a telegraph superintendent and 16 foremen. The brigade has 26 horses, of which 2, however, are used for ambulance purposes. The brigade has three large stations and a minor station, and has a permanent fire-watch at the two municipal theatres. Men are told off for duty as coachmen among the firemen. The staff do forty-eight hours of duty to twenty-four hours of rest.

A peculiarity of the Cologne organization is its auxiliary retained fire brigade in two sections, comprising a superintendent,

2 deputy superintendents, 5 foremen, and 51 men, with 2 horses, who are retained men housed in municipal buildings (tenements), and available as an immediate reserve force. The first section of the reserve force are housed centrally.

There is a further system of suburban volunteer fire brigades manned by volunteers but equipped by the municipality, and horsed from the municipal stables or municipal tramways. Three of these volunteer brigades, which have large suburban districts, comprise each a superintendent, 2 senior foremen and

3 junior foremen, with 50 firemen and 3 coachmen. The minor outlying suburbs have several such brigades, each having one senior foreman, 3 junior foremen, 20 firemen and 2 coachmen. The combined force of the suburban volunteer brigades is 295. all ranks.

The Cologne fire service thus comprises a combination of professional brigade with a retained auxiliary brigade and a system of suburban volunteer brigades. Of the three stations, the central one is still an old building, and the other two are in modern buildings ; the extra sub-station (near the river stores) is also a modern building. The brigade has about 150 fires to attend per annum. Its printed matter, in the form of an annual detailed report, is exceptionally well prepared. The brigade does permanent ” fire-watch ‘ duty at the municipal theatres which are strengthened of an evening. It provides additional watches during performances at all other theatres and public entertainments. Such duties are provided in part by an auxiliary brigade and partly by the professional brigade. A number of the professional brigade are always utilized for doing general work in the workshops of the brigade. The first: or central section of the auxiliary brigade drills eleven times per annum, and is additionally turned out eleven times per annum (without drill). Men newly attached to the auxiliary force have to go through a four weeks’ recruit drill.

Nuremberg. — The Nuremberg fire service stands as the most economically organized efficient fire service in Central Europe, and its form of organization is peculiar and exceptional. In 1902 the entire fire-service cost the city 126,000 marks (£6300). The total of inhabitants in 1900 was 261,000. For this small amount of money the city gets a highly-trained retained fire brigade of 156 men (1907), and two volunteer fire brigades of 130 and 224 men respectively. Further, it has an auxiliary of eighteen suburban volunteer fire brigades (1080 men) and two private factory fire brigades (71 men) . The whole service stands under a professional chief officer and professional

second officer. There are 8 telegraph clerks, 6 watchmen and 17 coachmen attached to the retained brigade. The service has been in existence for fifty years. It has gradually developed and has worked remarkably well, and may, in fact, be taken as a model institution for municipal economy, with due regard to up-to- dateness and efficiency. The retained fire brigade comprises entirely municipal employes, regularly engaged in the municipal workshops, scavenging and works department. The municipal workshops are located alongside the fire-brigade stations. There Is a headquarters station for the retained brigade and volunteer brigade in the centre of the town, a modern district station in the western district, and a third district station is in course of erection for the eastern district, which is at present only served by a small branch station.

At headquarters station there are on immediate duty by day 14 firemen (chiefly smiths and carpenters) of the retained brigade. Nine men of the retained brigade are on duty at headquarters at night, together with 8 men of the volunteer fire brigade. At the west district station, 14 men of the retained brigade are on duty by day, and the same number at night.

The headquarters can turn out in succession four complete units of the following strength, namely: — ■

First unit, a large chemical engine, and a mechanical long ladder.

Second unit, a trap with hose reel, a special gear-cart and a long ladder.

Third unit, a trap with hose-cart and manual, and a long ladder.

Fourth unit, a steam fire-engine, and hose-and coal-tender trap.

From the west district station three units can be turned out in rotation, namely: — ■

First unit, large chemical engine, large trap and a long ladder.

Second unit, a trap with hose-reel and manual engine.

Third unit, a steam fire-engine and a hose-tender and coal-tender trap.

The equipment of the eastern sub-station at present comprises a turn-out of a trap and a long ladder.

The brigade can thus turn out immediately, in rapid succession, these

horsed appliances, well organized and fully manned. It further has a reserve of 4 manual engines and 2 long ladders.

The suburban volunteer brigades have besides at their disposal 25 manual engines, 9 fire-escapes and 18 hose-reels. The whole of the hose for all brigades is of uniform pattern and make, with bayonet pattern standard couplings. The brigade posts an evening ” fire watch ” at the theatres. The men of the retained brigade get modest extra pay for fire brigade duty, but this pay is intended rather to cover disbursements or expenses than to be considered as wages. The brigade uses the municipal horses, all of which are stabled in proximity to the fire stations, and a number of which are kept on duty for fire brigade purposes in the actual stations. For all practical purposes the retained brigade is the professional brigade in which the men do municipal work in the municipal workshops, and else- where, i.e. in training, drill and general efficiency they are quite up to the best professional standard. The volunteer brigade is well drilled and includes the best of the younger townsmen, who do duty at night by rotation. The brigade’s responsibilities arc clearly

defined, and the position of the professional chief and second officer clearly laid down by by-laws. There are 1 29 fire-call points. During the fifty years’ existence of the service, 85 firemen received the twenty-five years’ long-service medal, of whom 32 belonged to the suburban volunteer brigades.

Venice. — The Venice fire brigade is a section of the force of ” Vigili ” or municipal watchmen, which body does general duty in preserving order and rendering assistance to the com- munity. In other words, this force performs the duties of the civil police (rather than governmental or criminal police), fire, patrol watch service, and public control in a general sense. The force, which in all its sections made a most excellent impres- sion, has a commandant, under whom the two primary sections work, namely (a) the civil police section and the (b) fire brigade section; each section in turn having its own principal officers. The police section comprises some 108 of all ranks, and the fire brigade section some 73 of all ranks (1908). The commandant of the whole force is a retired military officer, and the chief of the fire service section is a civil engineer, and these two officers, together with the chief of the civil police section, are the three superior officers of the force. The police section serve as auxili- aries to the fire brigade section in case of any great fire, and, of course, generally work very much hand in hand on all occa- sions. The fire brigade section has 3 superintendents, 6 foremen, 6 sub-foremen, 6 corporals and 40 file. The section is well equipped with appliances,

both hand and steam, having a large modern petrol-propelled float, constructed in London, a large old type steam-float, two 35-ft. old steam-floats, and several small petrol motor-floats or first turnout appliances. The manual- engines, ladders, &c, which are in considerable number, are carried in a large fleet of swift gondolas. Fire-escape work is done with Roman ladders, which are usually planted on two gondolas flung together barge-form, or, if the depth of the canal permits, the lower length is buried in the canal bottom. Hook ladders are also used.

Men are distributed in six companies of varying strength, the headquarters company being stationed at the town hall, with a strength of 22, and most of the steam and petrol floats lie opposite the station. The fire brigade does theatre watch duty. As a fire station of considerable interest, should be mentioned the one at the Doge's palace; the 1 large vaults occupying a portion of the ground floor facing St Mark's Square have been adapted for fire station purposes in a very simple yet artistic manner, and the old gear of the brigade has been used to form emblems, &c.

Vienna.— In 1892 the Vienna fire service was reconstituted on modern lines owing to the area of the Vienna municipality having been greatly extended. The professional brigade was somewhat strengthened and entirely re-equipped, and the various existing volunteer brigades of the outlying districts were transformed into suburban volunteer fire brigades, equipped and controlled by the municipality and standing under the general command of the fire brigade headquarters. The principle involved was the utilization of the splendid volunteer force around Vienna for the purpose of strengthening the municipal brigade, a principle of great economic advantage, as the pro- fessional brigade would otherwise have had to be materially strengthened, probably trebled. These suburban volunteer fire brigades number no fewer than 34, and have 1200 firemen of all ranks. They are practically independent institutions as far as the election of officers and administration is concerned, but their equipment and uniforms and their fire stations are provided by the municipality, and in certain districts a staff of professional firemen detached from headquarters are attached to their stations as telegraph clerks and drill-instructors.

The suburban volunteer brigades turn out to fires in their own districts, and further, assist in other districts when so ordered by headquarters. They form a strong reserve for great fires in the city proper. Headquarters, of course, renders assistance at large suburban fires. These suburban volunteer fire brigades are very perfectly

equipped with appliances, gener- ally of the same type as those used in the central professional brigade. Some of these brigades are equipped with combined chemical engines with 15-metres long ladders attached. They have smoke helmets, and everything that may be termed modern.

The men are volunteers in the truest sense of the word, i.e. do not take pay of any description or make any charges for attend- ance at fires or refreshments at fires.

The Vienna ” professional brigade,” as it is generally called, has a personnel (1906) consisting of 8 officers, 5 officials and 475 men. Of stations there is the headquarters, a district station, 4 branch stations with steam fire engines, 9 small branch stations, and 2 ” watches ” in public buildings. The officers of the brigade consist of the commandant, chief inspector and six inspectors. The officers, of whom four are on duty daily, are all quartered at headquarters. There are three telegraph superintendents. The rank and file is composed of 8 drill-sergeants, 40 telegraph clerks (three classes), 53 foremen (two classes), 22 engineers and stokers, 248 men (three classes). Twenty-four telegraph clerks and engineers are detailed for duty with the suburban volunteer brigades. There are 78 coachmen.

The following are the fire-extinguishing and life-saving apparatus and service vehicles of all kinds standing ready to ” turn out ” : — 2 open and 2 officers’ service carriages (at headquarters), 6 ” traps ” for the first ” turn-out ” (5 at headquarters and I at the district fire station), each manned by one officer in charge and nine men, and equipped with 3 hook-ladders, a portable extension ladder and jumping sheet, a life-saving chute, an ambulance chest, 3 tool- boxes, a jack, tools, torches, 2 smoke-helmets, with hand-pump and a hose-reel attached ; five special gear-carts (4 at headquarters and I at the district station), each manned by seven firemen and equipped like the ” traps ” with the exception that, instead of the life-saving chute, the carts carry with them a sliding-sheet, two petroleum torches each, an extension ladder (15 metres long) and some spare coal for the steam fire-engines; 4 pneumatic extension ladders each 25 metres long, and 3 extension turn-table ladders each 25 metres long (at headquarters and at two of the substations) ; each of the pneumatic ladders has three

men, and each turn-table ladder five men; 18 chemical engines (3 at headquarters and I each in the other stations), each having five men with 3 hook-ladders, a jointed ladder (in four sections), a hose-reel, a hand-engine, a smoke helmet, a jumping sheet, an ambulance chest, a tool box, torches, &c. ; 8 steam fire-engines (3 at headquarters and one each in the district fire station and the 4 steam-engine stations), each with an engineer and stoker.

The reserve of appliances includes 12 manual engines, 15 large chemical engines, 17 steel water-carts (with 1000 litre reservoirs). The total number of oxygen smoke helmets in the brigade is 68, and there are 15 ordinary smoke helmets with hand-pumps. The total number of horses is 132. One electrically-driven trap and two electrically-driven chemical engines are being tried. The fire tele- graphic and telephonic installation, including the lines in the volun- teer brigades' districts kept up by the prof essional brigade, comprises 47 telegraph stations, 249 telephone stations, with altogether 161 Morse instruments and 536 semi-public fire-call points.

Zurich. — Zurich covers about 12,000 English acres, 1500 of which are built over with some 15,000 houses, the whole of the buildings being subject to the local building regulations and the State Insurance Association's rules, in which they are com- pulsorily insured. The brigade is a compulsory militia brigade, placed under the control of the head of the department of police under a law of 1898. The same municipal officer is head of a special municipal committee of nine, entrusted with the safety of the town from fire. The executive officer of the committee is known as the inspector, and acts as captain of the fire brigade. His office is at the fire-brigade headquarters, where he has a small permanent staff both for brigade work and correspondence. Every male inhabitant of Zurich is compelled to do some service for the prevention of, or protection against, fire, from the age of twenty to fifty years. The duty may be fulfilled (1) by active service, or (2) in the case of an able-bodied citizen, who for some reason is not found suited to be a member of the brigade, or has been dismissed from the brigade, by the payment of a tax, which tax is fixed on the basis of his income. Certain citizens, however, are ipso facto exempt from active service, namely members of parliament, members of council of the Polytechnic school, of the Cantonal government, of the High Court of Justice, and of the Town Council; also clergymen and schoolmasters, the officials of railways, tramway and steamboat companies, of the post-office and telephone department, students of the Poly- technic school and other educational institutions and municipal officials, with whose duties fire brigade service is incompatible. Exemption from active service can also be

accorded on a testi-

monial of a medical board. Exemption from active service, however, in no case exempts from the tax, the total of which amounts to between £4000 and £5000. In making the selection of men for active service only, men particularly fitted for the work are taken, namely, men who are personally keen, who have a good physique, and who are preferably of the building or allied trades. The officers of the brigade are appointed by the municipal committee. The men's drills are by the chief officer, and the men are liable to fines and to imprisonment (up to four days) for not attending their drills. The whole of the brigade is insured against accidents and illness with the Swiss Fire Brigade Union at the expense of the city, and the city in addition provides a fund for families in cases of death of firemen on duty. There is also a sick fund provided for the brigade by the municipality, which also accords a scale of compensation.

The fire brigade comprises the very large complement of fifteen companies with 120 men each. Each company has three sections, namely, a fire service section, a life-saving section, and a police section, the last being utilized for keeping the ground and attending to salvage. Each company is supposed to be able, as a rule, to deal with the fire in its own district without calling upon the company of an adjoining district, and it is only in the case of a very serious fire that additional companies are turned out. There is thus a system of decentralization and independence of companies in this brigade not often met with elsewhere. Firemen are paid one franc for each drill of two hours. For fires, two francs for two hours, and fifty centimes per hour afterwards. Refreshments are provided. Any telephone can be used free by law for an alarm. The brigade has at its disposal an extension telephone service, but the men are not all connected up with the telephone of their respective districts, and thus the alarm is given mainly with horns sounded by men who are on the telephone. No section of the brigade has less than ten men on the telephone.

The water-supply is of a most excellent character. The appliances in the main comprise hydrants and hose-reels with ladder trucks, and each section has not less than 3000 ft. of hose. They are mainly housed in small temporary corrugated iron sheds with roller shutter doors, to which all the firemen have keys. There are some sixty of these hydrant houses distributed round the city, the larger appli- ances being at headquarters and at some depots.

Apart from the fact of there being the inspector or chief officer for the whole district, with a certain permanent staff, each company might be considered as a separate brigade, having its own chief officer and staff, and independent organization, the organization of the companies, however, being identical. A company comprises I chief officer, 1 second officer, 1 doctor, 2 ambulance men and 6 orderlies, a staff in charge, and the three sections have respectively I lieutenant, I deputy-lieutenant and 40 men for the fire service section; I lieutenant, 1 deputy-lieutenant and 40 men for the life- saving section, and 1 lieutenant, 1 deputy-lieutenant and 20 men for the police section. Only in the case of sections I and 2 is there some slight variation in the organization, namely, I and 2 sections have been combined as a joint section, with an additional senior officer. At Zurich, as in all Swiss fire brigades, there is an extra- ordinary uniformity of drills, rules, regulations and instructions in all its sections. In 1908 the brigade comprised 2268 in all ranks. There were about 70 fires in that year. (E. O. S.)

United Stales.

Fire service in the United States has developed on so large a scale that in 1902 it was estimated by P. G. Hubert (" Fire Fighting To-Day and To-Morrow," Scribner's Magazine, 1902, 32, pp 448 sqq.) that in proportion to population the fire force of America was nearly four times that of Germany or France and about three times that of England. The many fires consequent on wooden construction even in the large cities; the bad effect of sudden climatic changes — drying, parching heat being followed by weather so cold as to require artificial heating; the less safe character of heating appliances; and, especially in tenements, the more inflammable character of furniture, are some of the reasons assigned for greater fire frequency in America. Fire- fighting service in the United States is in no way connected with the military as it is on the continent of Europe; the association of volunteer with paid firemen is uncommon except in the suburban parts of the large cities, and in the smaller cities and towns, where volunteers serving for a certain term are, during that term and thereafter, exempt from jury duty.

New York. — The fire department of New York City is the result of gradual development. The first record of municipal action in regard to fire prevention dates from 1659, when 250

leather buckets and a supply of fire-ladders and hooks were purchased, and a tax of one guilder for fire apparatus was imposed on every chimney; in 1676 fire-wells were ordered to be dug; in 1686 every dwelling-house with two chimneys was required to provide one bucket (if with more than two hearths, two), and bakers and brewers had to provide three and six buckets re- spectively; in 1689 ” brent-masters ” or fire-marshals were appointed; in 1695 every dwelling-house had to provide one fire-bucket at least; in 1730 two Richard Newsham hand- engines were ordered from England, and soon afterwards a superintendent of fire-engines was appointed on a small salary; in 1736 an engine-house was built near the watch-house in Broad Street, and an act of the provincial legislature authorized the appointment of twenty-four firemen exempt from constable or militia duty. Early in the igth century volunteer fire com- panies increased rapidly in numbers and in importance, especially political; and success in a fire company was a sure path to success in politics, the best-known case being that of Richard Croker, a member of ” Americus 6,” commonly called ” Big Six,” of which William M. Tweed was organizer and foreman. Parades of fire companies, chowder parties and picnics (pre- decessors of the present “ward leader’s outing “) under the auspices of the volunteer organizations, annual balls after 1829, water-throwing contests, often over liberty poles, and bitter fights between different companies (sometimes settled by fist duels between selected champions), improved the organization of these companies as political factors if not as fire-fighters. So devoted were the volunteers to their leaders that in 1836, when James Gulick, chief engineer since 1831, was removed from office for political reasons, the news of his removal coming when the volunteers were fighting a fire caused them all to stop their work, and they began agajn only when Gulick assured them that the news was false ; almost all the firemen resigned until Gulick was reinstated. The type of the noisy, rowdy New York volunteer fire hero was made famous in 1848-1849 by Frank S. Chanfrau’s playing of the part Mose in Benjamin Baker’s play, A Glance at New York. The Ellsworth Zouaves of New York were raised entirely from volunteer firemen of the city.

In 1865, when the volunteer service was abolished, it consisted of 163 companies (52 engines, 54 hose; 57 hook and ladder) manned by 3521 men (engines averaging 40 to 60 men, hose-carts about 25, and hook and ladder companies about 40); the chief engineer, elected/ with assistants for terms of five or three years by ballots of the

firemen, received a salary of $3000 a year; and three bell-ringers in each of eight district watch-towers, who watched for smoke and gave alarms, received $600 a year. The legislature in March 1865 created a Metropolitan Fire District and established therein a Fire Department, headed by four commissioners, who with the mayor and comptroller con- stituted a board of estimate.

This organization was practically unchanged until 1898, when the Greater New York was chartered and the present system was introduced. At its head is a commissioner who receives $7500 a year. The more immediate head of the firemen is a chief /annual salary $10,000), the only member of the force not appointed on the basis of a civil service examination; the chief has a deputy in Manhattan (for Manhattan, Bronx and Rich- mond boroughs) and another for Brooklyn and Queens, each receiving an annual salary of $5000.

In December 1908 there were: 14 deputy chiefs (eight in Man- hattan, Bronx and Richmond, and six in Brooklyn and Queens) ; 59 chiefs of battalion (31 in Manhattan, Bronx and Richmond, and 28 in Brooklyn and Queens); 248 foremen or captains (137 in Manhattan, Bronx and Richmond, and 1 1 1 in Brooklyn and Queens), 365 assistant foremen (221 in Manhattan, Bronx and Richmond; and 144 in Brooklyn and Queens); 431 engineers of steamers (247 in Manhattan, Bronx and Richmond, and 184 in Brooklyn and Queens) and 2933 firemen (1772 in Manhattan, Bronx and Rich- mond, and 1 161 in Brooklyn and Queens); and the total uniformed force was 4107. At the close of 1908 there were 88 engine com- panies in Manhattan and the Bronx, including 6 fire-boat companies — at East 99th St., Battery Park, Grand St. (East River), West 35th St., Gansevoort St. and West 132nd St.; and in Manhattan and the Bronx there were 38 hook and ladder companies; in Brooklyn nd Queens there were 70 engine companies, including

two fire-boat companies; — at 42nd St. and at North 8th St. The appropriations for the year 1906 were $4, 777, 687 for Manhattan, Bronx and Richmond, and $3,147,033 for Brooklyn and Queens; and the department expenses were $3,980,535 for Manhattan, Bronx and Richmond, and $2,565,849 for Brooklyn and Queens.

The first high-pressure main system in the city was installed at Coney Island in 1905, gas-engines working the pumps. Electrically driven centrifugal pumps are used in Brooklyn (protected area, 1360 acres) and in Manhattan, where the system was introduced in 1908, and where the protected district (1454 acres) reaches from the City Hall to 25th St. and from the Hudson east to Second Avenue and East

Broadway, being the ” Dry Goods District “; water is pumped either from city mains or from the river, and the change may be made instantaneously. The fire watch-tower system was abolished in 1869; the present system is that of red box electric telegraph alarms, which register at headquarters (East 67th St.), where an operator sends out the alarm to that engine-house nearest to the fire which is ready to respond, and a chart informing him of the absence from the engine-house of apparatus. There are volunteer forces (about 2700 men) in Queens and Richmond boroughs and in other outlying districts.

Boston. — The Boston fire department (reorganized after the great fire of 1872) is officered by a commissioner (annual salary, $5000), ˆ chief (annual salary, $4000), a senior deputy ($2400), and a junior oeputy ($2200), twelve district chiefs ($2000 each), a superintendent and an assistant superintendent of fire-alarms, and a superintendent and an assistant superintendent of the repair shop. In 1909 the force numbered 877 regulars and 8 call men. There were 53 steam fire-engines, 14 chemical engines, 3 water-towers, 3 combination chemical engines and hose- wagons (one being motor-driven), 3 fire- boats (built in 1889, 1895 and 1909 respectively), 29 ladder-trucks and 49 hOse-wagons. The auxiliary salt-water main service was established in 1893. The earliest suggestion of the application of the electric telegraph to a fire-alarm system was made in Boston in 1845 by Dr Wm. F. Channing; in 1 847-1848 Moses G. Farmer, then a telegraph operator at Framingham, made a practicable electric telegraph alarm ; and in 1851-1855 Farmer became superintendent of the Boston fire-alarm system, a plant being installed in 1852. 1

Chicago. — The Chicago organization practically dates from the fire of_ 1871, though there was a paid department as early as 1858. Its principal officers are a fire-marshal and chief of brigade (salary $8000), four assistant fire-marshals, a department inspector, eighteen battalion chiefs, a superintendent of machinery, a veterinary and assistant, and about one hundred each of captains, lieutenants, engineers and assistant engineers; the total regular force in 1908 was 1799 men with an auxiliary volunteer force of 71 in Riverdale, Norwood Park, Hansen Park and Ashburn Park. In the business part of the city there is a patrol of seven companies employed by the Board of Fire Underwriters. Since 1895 all men in the uniformed force (except the chief of brigade) are under civil service rules. In 1908 the equipment included 117 engine companies, 34 hook and ladder companies, including one water-tower, 15 chemical engines and one hose company ; and there were 5 fire-boats (4 active and 1 reserve). _ The first fire-boat was built in 1883. The initial installa- tion of high-pressure mains was completed in 1902, and was greatly enlarged in

Fire Appliances.

Fire-Alarms. — Most large cities possess a system of electrical fire-alarms, consisting of call boxes placed at frequent intervals along the streets. Any one wishing to give notice of a fire either opens the door of one of these boxes or breaks the glass window with which it is fitted, and then pulls the handle inside, thus causing the particular number allocated to the box, which of course indicates its position, to be electrically telegraphed to the nearest fire station, or elsewhere as thought advisable. Sometimes a telephone is fixed in each call-box. Automatic fire-alarms consist of arrangements whereby an electric circuit is closed when the surrounding air reaches a certain temperature. The electric circuit may be used to start an alarm bell or to give warning to a watchman or central office, and the devices for closing it are of the most varied kinds — the expansion of mercury in a thermometer tube, the sagging of a long wire suspended between horizontal supports, the unequal expansion of the brass in a curved strip of brass and steel welded together, &c.

Fire- Engines. — The earliest method of applying water to the extinction of fires was by means of buckets, and these long remained the chief instruments employed for the purpose, though Hero of Alexandria about 150 B.C. described a fire-

1 See Thomas C. Martin, Municipal Electric Fire Alarm and Police Patrol Systents (Washington, 1904), Bulletin 11 of the Bureau of the Census, Department of Commerce and Labour. The next plant was installed in Philadelphia in 1855; one in St Louis was completed in 1858; and work was begun in New Orleans and Baltimore in 1 86a

engine with” two cylinders and pistons worked by a reciprocating lever, and Pliny refers to the use of fire-engines in Rome. In the 1 6th century (as at Augsburg in 1518) we hear of fire squirts or syringes worked by hand, and towards the end of the same century Cyprien Lucar described a very large one operated by a screw handle. The fire squirts used in London about the time of the Great Fire were 3 or 4 ft. long by 25 or 3 in. in diameter, and three men were required to manipulate them. The next stage of development was to mount a

cistern or reservoir on wheels so that it was portable, and to provide it with pumps which forced out the water contained in it through a fixed delivery pipe in the middle of the machine. An important advance was made in 1672 when two Dutchmen, Jan van der Heyde, senior and junior, made flexible hose by sewing together the edges of a strip of leather, and applied it for both suction and delivery, so that the engines could be continuously supplied with water and the stream could be more readily directed on the seat of the fire. For many years manual engines were the only ones employed, and they came to be made of great size, requiring as many as 40 or 50 men to work them; but now they are super- seded by power-driven engines, at least for all important services. The first practical steam fire-engine was made by John Braith- waite about 1829, but though it proved useful in various fires in London for several years after that date, it was objected to by the men of the fire brigade and its use was abandoned. A generation later, however, steam fire-engines began to come into vogue. At first they were usually drawn by horses to the scene of the fire, though exceptionally their engines could be geared to the wheels so that they became self-propelled; and it was not till the beginning of the 20th century that motor fire-engines were employed to any extent. Steam, petrol and electricity have all been used. Such engines have the advantage that they can reach a fire much more rapidly than a horse-drawn vehicle) especially in hilly districts, and they can if necessary be made of greater power, since their size need not be limited by considera- tions of the weight that can be drawn by horses. Petrol-propelled engines can be started off from a station within a few seconds of the receipt of an alarm, and their pumps are ready to work immediately the fire is reached; steam-propelled engines possess the same advantage, if they are kept always standing under steam, though this involves expense that is avoided with petrol engines, which cost nothing for maintenance except while they are actually working. Motor engines are made with a capacity to deliver 1000 gallons of water a minute or even more, but the sizes than can deal with 400 or 500 gallons a minute are probably those most commonly used.

In towns standing on a navigable water-way fire-boats are often provided for extinguishing fires in buildings, in docks and along the waterside. The capacity of these may rise to 6000 gallons a minute. Steam is the power most commonly used in them, both for propulsion and for pumping, but in one built for Spezia by Messrs Merryweather & Sons of London in 1900, an 80 H. P. petrol engine was fitted for propulsion, while a steam engine was employed for pumping. The boiler was fired with oil-fuel, and steam could be raised in a few minutes while the boat was on its way to a fire. The pumps could

throw a i|-in. jet to a height of nearly 200 ft. In some places, as at Boston, Mass., the fire-boats are utilized for service at some distance from the water. Fire-mains laid through the streets terminate in deep water at points accessible to the boats, the pumps of which can be connected to them and made to fill them with water at high pressure. In cities where a high-pressure hydraulic supply system is available, a relatively small quantity of the pressure water can be used, by means of Greathead hydrants or similar devices, to draw a much larger quantity from the ordinary mains and force it in jets to considerable heights and distances, without the intervention of any engine.

The water is conducted from the engines or hydrants in hoseˆ pipes, which are made either of leather fastened with brass or copper rivets, or of canvas (woven from flax) which has the merit of lightness but is liable to rot, or of rubber jacketed with canvas (or in America with cotton). For directing the water on x. 14

the fife, nozzles of various forms are employed, some throwing a plain solid jet, others producing spray, and others again com- bining jet and spray, the spray being useful to drive away smoke and protect the firemen. Various devices are employed to enable the upper storeys of buildings to be effectively reached. A line of hose may be attached to a telescopic ladder, the exten- sions of which are pulled out by a wire rope until the top rests on the wall of the building at the required height. Water-towers enable the jet to be delivered at a considerable height inde- pendently of any support from the building. A light, stiff, lattice steel frame is mounted on a truck, on which it lies horizontally while being drawn to a fire, but when it has to be used it is turned to an upright position, often by the aid of compressed gas, and then an extensible tube is drawn out to a still greater height. The direction of the stream delivered at the top may be controlled from below by means of gearing which enables the nozzle to be moved both horizontally and vertically. The pipe up the tower may be of large diameter, so that it can carry a huge volume of water, and at the bottom it may terminate in a reservoir into which several fire-engines may pump simultane- ously.

Another class of fire-engines, known in the smaller portable sizes as fire-extinguishers or ” extincteurs,” and in the larger ones as ” chemical engines,” throw a jet of water charged with gas, commonly carbon dioxide, which does not support com- bustion. Essentially they consist of a closed metal tank, filled with a solution of some carbonate and also containing a small vessel of sulphuric acid. Under normal conditions the acid is kept separate from the solution, but when the machine has to be used they are mixed together; in some cases there is

a plunger projecting externally, which when struck a sharp blow breaks the bottle of acid, while in others the act of inverting the apparatus breaks the bottle or causes it to fall against a sharp pricker which pierces the metallic capsule that closes it.; As soon as the acid comes into contact with the carbonate solution carbon dioxide is formed, and a stream of gas and liquid mixed issues under considerable pressure from the attached nozzle or hose- pipe. Hand appliances of this kind, holding a few gallons, are often placed in the corridors of hotels, public buildings, &c.j and if they are well-constructed, so that they do not fail to act when they are wanted, they are useful in the early stages of a fire, because they enable a powerful jet to be quickly brought to bear: but it is doubtful whether the stream of mixed gas and liquid they emit is much more efficacious than plain water, and too much importance can easily be attached to spectacular displays of their power to extinguish artificial blazes of wood soused with petrol, which have been burning only a few seconds. Chemical engines, up to 60 or 70 gallons capacity, are used by fire brigades as first-aid appliances, being mounted on a horsed or motor vehicle and often combined with a fire-escape, a reel of hose, and other appliances needed by the firemen, and even with pumps for throwing powerful jets of ordinary water. Large buildings, such as hotels and warehouses, where a competent watchman is assumed to be always on duty, may be protected by a large chemical engine placed in the basement and connected by pipes to hydrants placed at convenient points on the various floors. At each hose-station a handle is provided which when pulled actuates a device that effects the mixing of the acid and carbonate solution in the machine, so that in a minute or so a stream is available at the hydrants.

Automatic 5/>wt£fe™.— Factories, warehouses and other buildings in which the fire risks are great, are sometimes fitted with automatic sprinklers which discharge water from the ceiling of a room as soon as the temperature rises to a certain point. Lines of pipes containing water under pressure are carried through the building near the ceilings at distances of 8 cr 10 ft. apart, and to these pipes are attached sprinkler heads at intervals such that the water from them is distributed all over the room. The valves of the sprinklers are normally kept closed by a device the essential feature of which is a piece of fusible metal; this as soon as it is softened (at a temperature of about 160° F.) by the heat from an incipient fire, gives way and releases the water (

which striking against a deflecting plate is spread in a shower. In situations where the water is liable to freeze, the ceiling pipes are filled only with air at a pressure of say 10 lb per sq. in. When the sprinkler head opens under the influence of the heat from a fire, the compressed air escapes, and the consequent loss of pressure in the pipes is arranged to operate a system of levers that opens the water-valve of the main-feed pipe. The idea of automatic sprinklers is an old one, and a system was patented by Sir William Congreve in 1812; but in their present develop- ment they are specially associated with the name of Frederick Grinnell, of Providence, Rhode Island.

Fire -Escapes. — The best kind of fire-escape, because it is always in place, and always ready for use, is an external iron staircase, reaching from the top of a building to the ground, and connected with balconies accessible from the windows on tach floor. In many towns the building by-laws require such staircases to be provided on buildings exceeding a certain height and containing more than a certain number of persons. Of non-fixed escapes, designed to enable the inmates of an upper room to reach the ground through the window, numberless forms have been invented, from simple knotted ropes and folding ladders to slings and baskets suspended by a rope over sheaves fixed permanently outside the windows, and provided with brakes by which the occupant can regulate the speed of his descent, and to ” chutes ” or canvas tubes down which he slides. Fire brigades are provided with telescopic ladders, mounted on a wheeled carriage, up which the firemen climb; sometimes the persons rescued are sent down a chute attached to the apparatus, but many fire brigades think it preferable to rely on carrying down those who are unable to descend the ladder unaided. Jumping sheets or nets, held by a number of men, are provided to catch those whose only chance of escape is by jumping from an upper window. (X.)

FIREBACK, the name given to the ornamented slab of cast iron protecting the back of a fireplace. The date at which firebacks became common probably synchronizes with the removal of the fire from the centre to the side or end of a room. They never became universal, since the proximity of deposits of iron ore was essential to their use. In England they were confined chiefly to the iron districts of Sussex and Surrey, and appear to have ceased being made when the ore in those counties was exhausted. They are, however, occasionally found in other parts of the country, and it is reasonable to suppose that there was a certain commerce in an appliance which gradually assumed an interesting and even artistic form. The earlier examples were

commonly rectangular, but a shaped or gabled top eventu- ally became common. English firebacks may roughly be separ- ated into four chronological divisions — those moulded from more than one movable stamp; armorial backs; allegorical, mytho- logical and biblical slabs with an occasional portrait; and copies of 17th and 18th century continental designs, chiefly Nether- landish. The fleur-de-lys, the rosette, and other motives of detached ornament were much used before attempts were made to elaborate a homogeneous design, but by the middle of the 1 7 th £entury firebacks of a very elaborate type were being produced. Thus we have representations of the Crucifixion, the death of Tacob, Hercules slaying the hydra, and the plague of serpents. Coats of arms were very frequent, the royal achievement being used extensively — many existing firebacks bear the arms of the Stuarts. About the time of Elizabeth the coats of private families began to be used, the earliest instances remaining bearing those of the Sackvilles, who were lords of a large portion of the forest of Anderida, which furnished the charcoal for the smelting operations in our ancient iron-fields. To the armorial shields the date was often added, together with the initials of the owner. The method of casting firebacks was to cut the design upon a thick slab of oak which was impressed face down- wards upon a bed of sand, the molten metal being ladled into the impression. Firebacks were also common in the Netherlands and in parts of France, notably in Alsace. At Strassburg and Metz there are several private collections, and there are also many examples in public museums. The museum of the Porte de

Hal at Brussels contains one of the finest examples in existence with an equestrian portrait of the- emperor Charles V., accom- panied by his arms and motto. When monarchy was first destroyed in France the possession of a plaque de cheminee bearing heraldic insignia was regarded as a mark of disaffection to the republic, and on the 13th of October 1793 the National Convention issued a decree giving the owners and tenants of houses a month in which to turn such firebacks with their face to the wall, pending the manufacture by the iron foundries of a sufficient number of backs less offensive to the instinct of equality. Very few of the old plaques were however removed, and to this day the old chateaux of France contain many with their backs outward. Reproductions of ancient chimney backs are now not infrequently made, and the old examples are much prized and collected.

FIRE BRAT, a small insect {Thermobia or Thermophila furnorum) related to the silverfish, and found in bakehouses, where it feeds upon bread and flour.

FIREBRICK. — Under this term are included all bricks, blocks and slabs used for lining furnaces, fire-mouths, flues, &c, where the brickwork has to withstand high temperature (see Brick).

The conditions to which firebricks are subjected in use vary very greatly as regards changes of temperature, crushing strain, corrosive action of gases, scouring action of fuel or furnace charge, chemical action of furnace charge and products of com- bustion, &c, and in order to meet these different conditions many varieties of firebricks are manufactured.

Ordinary firebricks are made from fireclays, i.e. from clays which withstand a high temperature without fusion, excessive shrinkage or warping. Many clays fulfil these conditions although the term "fireclay" is generally restricted in use to certain shales from the Coal Measures, which contain only a small percentage of soda, potash and lime, and are consequently highly refractory. There is no fixed standard of refractoriness for these clays, but no clay should be classed as a fireclay which has a fusion point below 1600 C.

Fireclays vary considerably in chemical composition, but gener- ally the percentage of alumina and silica (taken together) is high, and the percentage of oxide of iron, magnesia, lime, soda and potash (taken together) is low. Other materials, such as lime, bauxite, &c, are also used for the manufacture of firebricks where special chemical or other properties are necessary.

The suitability of a fireclay for the manufacture of the various fireclay goods depends upon its physical character as well as upon its refractoriness, and it is often necessary to mix with the clay a certain proportion of ground firebrick, ganister, sand or some similar refractory material in order to obtain a suitable brick. Speaking generally, fireclay goods used for lining furnaces where the firing is continuous, or where the lining is in contact with molten metal or other flux, are best made from fine-grained plastic clays; whereas firebricks used in fire-mouths and other places which are subjected to rapid changes of temperature must be made from coarser-grained and consequently less plastic clays. In all cases care should be taken to obtain a texture and also, as far as possible, by selection and mixing, to obtain a chemical composition suitable for the purpose to which the goods are to be applied. The Coal Measure clays often contain nodules of siderite in addition to the carbonate of iron disseminated in fine particles throughout the mass, and these nodules are carefully picked out as far as practicable before the clay is used.

A firebrick suitable for ordinary purposes should be even and rather open in texture, fairly coarse in grain, free from cracks or warping, strong enough to withstand the pressure to which it may be subjected when in use, and sufficiently fired to ensure practically the full contraction of the material. Very few fireclays meet all these requirements, and it is usual to mix a certain prqportion of ground firebrick, ganister, sand or clay with the fireclay before making up. The fireclay or shale or other materials are ground either between rollers or on perforated pans, and then passed through sieves to ensure a certain size and evenness of grain, after which the clay and other materials are mixed in suitable proportion in the dry state, water being generally added in the mixing mill, and the bricks made up from plastic or semi-plastic clay in the ordinary way.

The proportion of ground firebrick, &c, used depends on the nature of the clay and the purpose for which the material is required, but generally speaking the more plastic clays require a higher percentage of a plastic materialthan the less plastic clays, the object being to produce a clay mixture which shall dry and fire without cracking, warping or excessive shrinkage, and which shall retain after firing a sufficiently open and even texture to withstand alternate heatings and coolings without cracking or flaking. For special purposes

special mixtures are required and many expedients are used to obtain fireclay goods having certain specific qualities. In preparing clay for the manufacture of ordinary fire-grate backs, &c, where the temperature is very variable but never very high, a certain percentage of sawdust is often mixed with the fireclay, which burns out on firing and ensures a very open or porous texture. Such material is much less liable to splitting or flaking in use than one having a closer texture, but it is useless for furnace lining and similar work, where strength and resistance to wear and tear are essential. For the construction of furnaces, fire-mouths, &c, the firebrick used must be sufficiently strong and rigid to withstand the crushing strain of the superimposed brickwork, &c, at the highest temperature to which they are subjected.

The wearing out of a firebrick used in the construction of furnaces, &c, takes place in various ways according to the character of the brick and the particular conditions to which it is subjected. The firebrick may waste by crumbling — due to excessive porosity or openness of

texture; it may waste by shattering, due to the presence of large pebbles, pieces of limestone, &c. ; it may gradually wear away by the friction of the descending charge in the furnace, of the solid particles carried by the flue gases and of the flue gases them- selves ; it may waste by the gradual vitrification of the surface through contact with fluxing materials: in cases where it is sub- jected to very high temperature it will gradually vitrify and contract and so split and fall away from the setting. It is a well-recognized fact that successive firings to a temperature approaching the fusion point, or long continued heating near that temperature, will gradually produce vitrification, which brings about a very dense mass and close texture, and entirely alters the properties of the brick.

Where firebricks are in contact with the furnace charge it is necessary that the texture shall be fairly close, and that the chemical composition of the brick shall be such as to retard the formation of fusible double silicates as much as possible. Where the furnace charge is basic the firebrick should, generally speaking, be basic or aluminous and not siliceous, i.e. it should be made from a fireclay- containing little free silica, or from such a fireclay to which a high percentage of alumina, lime, magnesia, or iron oxide has been added. For such purposes firebricks are often made from materials con- taining little or no clay, as for example mixtures of calcined and uncalcined magnesite; mixtures of lime and magnesia and their carbonates; mixtures of bauxite and clay; mixtures of bauxite, clay and plumbago; bauxite and oxide of iron, &c.

In certain cases it is necessary to use an acid brick, and for the manufacture of these a highly siliceous mineral, such as chert or canister, is used, mixed if necessary with sufficient clay to bind the material together. Dinas fireclay, so-called, and the ganisters of the south Yorkshire coal-fields are largely used for making these siliceous firebricks, which may be also used where the brickwork does not come in contact with basic material, as in the arches, &c, of many furnaces. It is evident that no particular kind of firebrick can be suitable for all purposes, and the manufacturer should en- deavour to make his bricks of a definite composition, texture, &c, to meet certain definite requirements, recognizing that the materials at his disposal may be ill-adapted or entirely unsuitable for making firebricks for other purposes. In setting firebricks in position, a thin paste of fireclay and water or of material similar to that of which the brick is composed, must be used in place of ordinary mortar, and the joints should be as close as possible, only just sufficient of the paste being used to enable the bricks to ” bed on one another.

It has long been the practice on certain works to wash the face of firebrick work with a thin paste of some very refractory material — such as kaolin — in order to protect the firebricks from the direct action of the flue gases, &c, and quite recently a thin paste of carborundum and clay, or carborundum and silicate of soda has been more extensively used for the same purpose. So-called carbor- undum bricks have been put on the market, which have a coating of carborundum and clay fired on to the firebrick, and which are said to have a greatly extended life for certain purposes. It is probable that the carborundum gradually decomposes in the firing, leaving a thin coating of practically pure silica which forms a smooth, impervious and highly-refractory facing. (J. B.**; W. B.**)

FIREFLY, a term popularly used for certain tropical American click-beetles (Pyrophorus) , on account of their power of emitting light. The insects belong to the family Elateridae, whose char- acters are described under Coleoptera (q.v.). The genus Pyro- phorus contains about ninety species, and is entirely confined to America and the West Indies, ranging from the southern United States to Argentina and Chile. Its species are locally known as cucujos. Except for a few species in the New Hebrides, New Caledonia and Fiji, the luminous Elateridae are unknown in the eastern hemisphere. The light proceeds from a pair of con- spicuous smooth ovoid spots on the pronotum and from an area beneath the base of the abdomen. Beneath the cuticle of these regions are situated the luminous organs, consisting of layers of cells which may be regarded as a specialized portion of the

fat-body. Both the male and female fireflies emit light, as well as their larvae and eggs, the egg being luminous even while still in the ovary. The inhabitants of tropical America some- times keep fireflies in small cages for purposes of illumination, or make use of the insects for personal adornment.

The name ” firefly ” is often applied also to luminous beetles of the family Lampyridae, to which the well-known glow-worm belongs.

FIRE-IRONS, the implements for tending a fire. Usually they consist of poker, tongs and shovel, and they are most frequently of iron, steel, or brass, or partly of one and partly of another. The more elegant brass examples of the early part of the 19th century are much sought after for use with the brass fenders of that date. They were sometimes hung from an ornamental brass stand. The fire-irons of our own times are smaller in size and lighter in make than those of the best period.

FIRENZUOLA, AGNOLO (1493-c. 1545), Italian poet and litterateur,

was born at Florence on the 28th of September 1493. The family name was taken from the town of Firenzuola, situated at the foot of the Apennines, its original home. The grandfather of Agnolo had obtained the citizenship of Florence and trans- mitted it to his family. Agnolo was destined for the profession of the law, and pursued his studies first at Siena and afterwards at Perugia. There he became the associate of the notorious Pietro Aretino, whose foul life he was not ashamed to make the model of his own. They met again at Rome, where Firenzuola practised for a time the profession of an advocate, but with little success. It is asserted by all his biographers that while still a young man he assumed the monastic dress at Vallombrosa, and that he afterwards held successively two abbacies. Tira- boschi alone ventures to doubt this account, partly on the ground of Firenzuola's licentiousness, and partly on the ground of absence of evidence; but his arguments are not held to be conclusive. Firenzuola left Rome after the death of Pope Clement VII., and after spending some time at Florence, settled at Prato as abbot of San Salvatore. His writings, of which a collected edition was published in 1548, are partly in prose and partly in verse, and belong to the lighter classes of literature. Among the prose works are — Discorsi degli animali, imitations of Oriental and Aesopian fables, of which there are two French translations; Dialogo delle bellezze delle donne, also translated into French; Ragionamenti amorosi, a series of short tales in the manner of Boccaccio, rivalling him in elegance and in licen- tiousness; Discacciamento delle nuove letlere, a controversial piece against Trissino's proposal to introduce new letters into the Italian alphabet; a free version or adaptation of The Golden Ass of Apuleius, which became a favourite book and passed through many editions; and two comedies, / Lucidi, an imitation of the Menaechmi of Plautus, and La Trinuzia, which in some points resembles the Calandria of Cardinal Bibbiena. His poems are chiefly satirical and burlesque. All his works are esteemed as models of literary excellence, and are cited as authori- ties in the vocabulary of the Accademia della Crusca. The date of Firenzuola's death is only approximately ascertained. He had been dead several years when the first edition of his writings appeared (1548).

His works have been very frequently republished, separately and in collected editions. A convenient reprint of the whole was issued at Florence in 2 vols, in 1848.

FIRESHIP, a vessel laden with combustibles, floated down on an enemy to set him on fire. Fireships were used in antiquity, and in the middle ages. The highly successful employment of one by the defenders of Antwerp when besieged by the prince of Parma in 1585

brought them into prominent notice, and they were used to drive the Armada from its anchorage at Gravelines in 1588. They continued to be used, sometimes with great effect, as late as the first quarter of the 19th century. Thus in 1809 fireships designed by Lord Cochrane (earl of Dundonald) were employed against the French ships at anchor in the Basque Roads; and in the War of Greek Independence the successes of the Greek fireships against the Ottoman navy, and the conse- quent demoralization of the ill-disciplined Turkish crews, largely

contributed to secure for the insurgents the command of the sea. In general, however, it was found that fireships hampered the movements of a fleet, were easily sunk by an enemy's fire, or towed-aside by his boats, while a prem'ature explosion was frequently fatal to the men who had to place them in position. They were made by building " a fire chamber " between the decks from the forecastle to a bulkhead constructed abaft the main- mast. This space was filled with resin, pitch, tallow and tar, together with gunpowder in iron vessels. The guhpowder and combustibles were connected by trains of powder, and by bundles of brushwood called "bavins." When a fireship was to be used, a body of picked men steered her down on the enemy, and when close enough set her alight, and escaped in a boat which was towed astern. As the service was peculiarly dangerous a reward of £ ioo, or in lieu of it a gold chain with a medal to be worn as a mark of honour, was granted in the British navy to the successful captain of a fireship. A rank of capitwine de br&lot existed in the French navy of Louis XIV., and was next to the full captain — or capitaine de vaisseau.

FIRE-WALKING-, a religious ceremony common to many races. The origin and meaning of the custom is very obscure, but it is shown to have been widespread in all ages. It still survives in Bulgaria, Trinidad, Fiji Islands, Tahiti, India, the Straits Settlements, Mauritius, and it is said Japan. The details of its ritual and its objects vary in different lands, but the essential feature of the rite, the passing of priests, fakirs, and devotees barefoot over heated stones or smouldering ashes is always the same. Fire-walking was usually associated with the spring festivals and was believed to ensure a bountiful harvest. Such was the Chinese vernal festival of fire. In the time of Kublai Khan the TaoiSt Buddhists held great festivals to the " High Emperor of the Sombre Heavens " and walked through a great

fire barefoot, preceded by their priests bearing images of their gods in their arms. Though they were severely burned, these devotees held that they would pass unscathed if they had faith. J. G. Frazer (Golden Bough, vol. iii. p. 307) describes the ceremony in the Chinese province of Fo-kien. The chief performers are labourers who must fast for three days and observe chastity for a week. During this time they are taught in the temple how they are to perform their task. On the eve of the festival a huge brazier of charcoal, often twenty feet wide, is prepared in front of the temple of the great god. At sunrise the next morning the brazier is lighted. A Taoist priest throws a mixture of salt and rice into the flames. The two exorcists, barefooted and followed by two peasants, traverse the fire again and again till it is somewhat beaten down. The trained performers then pass through with the image of the god. Frazer suggests that, as the essential feature of the rite is the carrying of the deity through the flames, the whole thing is sympathetic magic designed to give to the coming spring sun- shine (the supposed divine emanation), that degree of heat which the image experiences. Frazer quotes Indian fire-walks, notably that of the Dosadhs, a low Indian caste in Behar and Chota Nagpur. On the fifth, tenth, and full moon days of three months in the year, the priest walks over a narrow trench filled with smouldering wood ashes. The Bhuiyas, a Dravidian tribe of Mirzapur, worship their tribal hero Bir by a like per- formance, and they declare that the walker who is really ” pos- sessed ” by the hero feels no pain. For fire-walking as observed in the Madras presidency see Indian Antiquary, vii. (1878) p. 126; iii. (1874) pp. 6-8; ii. (1873) p. 190 seq. In Fiji the ceremony is called vilavilarevo, and according to an eyewitness a number of natives walk unharmed across and among white- hot stones which form the pavement of a huge native oven. In Tahiti priests perform the rite. In April 1890 an Englishman saw a fire-walk in Tokio (see The Field, May 20th, 1899). The fire was six yards long by six wide. The rite Was in honour of a mountain god. The fire-walkers in Bulgaria are called Nistinares and the faculty is regarded as hereditary. They -dance in the fire on the 21st of May, the feast of SS. Helena and Constantine. Huge fires of faggots are made, and when these burn down the Nistinares (who turn blue in the face) dance on the red-hot

embers and utter prophecies, afterwards placing their feet in the muddy ground where libations of water have been poured.

The interesting part of firerwalking is the alleged immunity of the performers from burns. On this point authorities and eyewitnesses differ greatly. In a case in Fiji a handkerchief was thrown on to the stones when the first man leapt into the oven, and what remained of it snatched up as the last left the stones. Every fold that touched the

stone was charred! In some countries a thick ointment is rubbed on the feet, but this is not usual, and the bulk of the reports certainly leave an im- pression that there is something still to be explained in the escape of the performers from shocking injuries. S. P. Langley, who witnessed a fire-walk in Tahiti, declares, however, that the whole rite as there practised is a mere symbolic farce (Nature for August 22nd, 1901).

For a full discussion of the subject with many eyewitnesses' reports in extenso, see A. Lang, Magic and Religion (1901). See also Dr Gustav Oppert, Original Inhabitants of India, p. 480; W. Crooke, Introd. to Popular Religion and Folklore of Northern India, p. 10 (1896) ; Folklore Journal for September 1895 and for 1903, vol. xiv. p. 87.

FIREWORKS. In modern times this term is principally associated with the art of " pyrotechny " (Gr. xOp, fire, and rexvri, art), and confined to the production of pleasing scenic effects by means of fire and inflammable and explosive substances. But the history of the evolution of such displays is bound up with that of the use of such substances not only for scenic display but for exciting fear and for military purposes; and it is consequently complicated by our lack of exact knowledge as to the materials at the disposal of the ancients prior to the invention of gunpowder (see also the article Greek Fire). For the following historical account the term " fireworks " is therefore used in a rather general sense.

History. — It is usually stated that from very ancient times fireworks were known in China; it is, however, difficult to assign dates or quote trustworthy authorities. Pyrotechnic displays were certainly given in the Roman circus. While a passage in Manilius, 1 who lived in the days of Augustus, seems to bear this interpretation, there is the definite evidence of Vopiscus 2 that fireworks were performed for the emperor Carinus and later for the emperor Diocletian; and Claudian, 3 writing in the 4th century, gives a poetical description of a set piece, where whirling wheels and dropping fountains of fire were displayed upon the pegma, a species of movable framework employed in the various spectacles presented in the circus. After the fall of the Western empire no mention of fireworks can be traced until the Crusaders carried back with them to Europe a knowledge of the incendiary compounds of the East, and gunpowder had made its appearance. Biringuccio, 4 writing in 1540, says that at an anterior period it had been customary at Florence and Siena to represent a fable or story at the Feast of St John or at the Assumption, and that on these occasions stage properties, including effigies with wooden bodies and plaster limbs, were grouped upon lofty pedestals, and that these figures gave

forth flames, whilst round about tubes or pipes were erected for projecting fire-balls into the air: but he adds that these shows were never heard of in his time except at Rome when a pope was elected or crowned. But if relinquished in Italy, fire festivals on the eve of St John were observed both in England and France; the custom was a very old one in the days of Queen Elizabeth, 5 while De Frezier, 6 writing in 1707, says it was com- monly adhered to in his time, and that on one occasion the king of France himself set a light to the great Paris bonfire. Survivals of these curious rites have been noted quite recently in Scotland and Ireland. 7 Early use also of fireworks was made in plays and pageants. Hell or hell's mouth was represented by a

1 Manilius, Astronomica, lib. v., 438-443.

2 Vopiscus, Cams, Numerianus et Carinus, ch. xix.

3 Claudianus, De consulatu Manlii Theodori, 325-330.

4 Vanuzzio Biringuccio, Pyrolechnia.

6 Strutts, Sports and Pastimes of the English People.

6 De Frezier, Traite des feux d 'artifice (1707 and 1747).

7 Notes and Queries, series 5, vol. ix. p. 140, and series 8, vol. ii. pp. 145 and 254.

gigantic head out of -which flames were made to issue: 1 in the river procession on the occasion of the marriage of Henry VII. and Elizabeth (1487) the " Bachelors' Barge " carried a dragon spouting flames, and Hall relates that at the marriage of Anne Boleyn (1538) " there went before the lord mayor's barge a foyst or waf ter full of ordnance, which foyst also carried a great red dragon that spouted out wild fyre and round about were terrible monstrous and wild men casting lire and making a hideous noise." s These individuals were known as " green men." Their clothing was green, they wore fantastic masks, and carried " fire clubs." They were sometimes employed to clear the way at processions. 3

Soon after the introduction of gunpowder the gunner and fireworker

came into existence; at first they were not soldiers, but civilians who sometimes exercised military functions, and part of their duties was intimately connected with the preparation of fireworks both for peace and war. The emperor Charles V. brought his fireworks under definite regulations in 1535, 4 and eventually other countries did the same. The ignes triumphales were an early form of- public fireworks. Scaffold poles were erected with trophies at their summits, while fixed around them were tiers of casks filled with combustibles, so that they presented the appearance of huge flaming trees; at their bases crouched dragons or other mythical beasts. With such a display Antwerp welcomed the archduke of Austria in 1550. 6 Then the ” fire combat ” came into fashion. Helmets from which flames would issue were provided for the performers; there were also swords and clubs that would give out sparks at every stroke, lances with fiery points, and bucklers that when struck gave forth a detonation and a flame. A picture of a combat with weapons such as these will be found in Hanzelet’s Rccueil de machines militaires (1620). In addition, the fireworker grew to be some- what of a scenic artist who could devise a romantic background and fill it with shapes bizarre, beautiful or terrific; he had to make his castle, his cave or his rocky ravine, and people his stage with distressed damsel, errant knight or devouring dragon. Furthermore he had to give motion to the inanimate persons of the drama; thus his dragon would run down an incline on hidden wheels, be actuated by a rope, or be propelled by a rocket. 6 In 1613 at the marriage of the prince palatine to the daughter of James, the pyrotechnic display was confided to four of the king’s gunners, who provided a fiery drama which included a giant, a dragon, a lady, St George, a conjurer, and an enchanted castle, jumbled up together after the approved fashion of the Spenserian legends. 7 As time went on a more refined taste rejected the bizarre features of the old displays, artistic merit began to creep into the designs, and an effort was made to introduce something appropriate to the occasion. Thus Clarmer of Nuremberg, a well-known fire-worker, celebrated the capture of Rochelle (1613) by an adaptation of the Andromeda legend, where Rochelle was the rock, Andromeda the Catholic religion, the monster Heresy, and Perseus on his Pegasus the all-conquer- ing Louis XIII. 8 In the first half of the 1 7th century many books 9 on fireworks appeared, which avoided the old grotesque ideas and advocated skill and finesse. ” It is a rare thing,” says. Nye

1 T. B. Nichols & Sons, London Pageants.

2 Hall’s Chronicles.

3 J. Bate. Mysteries of Nature and Art (1635). This contains a picture

of a green man.

1 Geschichle des Feuerwerkswesen (Berlin, 1887). The Jubilee pamphlet of the Brandenburg Artillery.

6 See ” Fairholts’ Collection ” bequeathed to the Royal Society of Antiquaries.

8 Journal of the Royal Artillery, vol. xxxii. No. n.

7 Somers’ Tracts, vol. iii. 8 De Frezier.

9 Diego Ufano, Artillery, in Spanish (1614) ; Master Gunner Norton, The Gunner and The Gunner’s Dialogue (1628) ; F. de Malthe (Malthus), Artificial Fireworks, in French and English (1628); ” Hanzelet,” Recueil de plusieurs machines militaires et feux artificiels pour la guerre et recreation (1620 and 1630); Furttenback, master gunner of Bavaria, Halinitro PyroioWo.inGerman (1 627) ; (John Babington Matross, Pyrotechnia, 1635) ; Nye, master gunner of Worcester, Art of Gunnery (Worcester, 1648) ; Casimir Siemienowitz, lieut. -general of the Ordnance to the king of Poland, The Great Art of Artillery, in French (1650).

(1648), ” to represent a tree or fountain in the air.” The most celebrated work of them all was the Great Art of Artillery by Siemienowitz, which was. considered important, enough to be translated into English by order of the Board of Ordnance, nearly eighty years after it had appeared. 10 .The classic facade now came into fashion; on it and about it were placed emblematic figures, and disposed around were groups of rockets, Roman candles, &c, musket barrels for projecting stars, and mortars from which were fired shells called balloons, which were full of combustibles. The figures were carved out of wood which was soaped or waxed over and covered with papier mache so that a skin was formed: this was cut vertically into two parts, removed from the wood, formed into a hollow figure, and filled with fireworks.

National fireworks now assumed a stately and dignified appear- ance, and for two centuries played a conspicuous part all over Europe in the public expression of thanksgiving or of triumph. Representations and sometimes accounts will be found in the British Museum u of the more important English displays, from the coronation of James II. down to the peace rejoicings of 1856, during which period national fireworks were provided by the officials of the Ordnance. But since the days of Ranelagh and Vauxhall fireworks have become a subject of private

enter- prise, and the triumphs of such firms as Messrs Brock or Messrs Pain at the Crystal Palace and elsewhere have been without an official rival. (J. R. J. J.)

Modern Fireworks. — In modern times the art of pyrotechny has been gradually improved by the work of specialists, who have had the advantage of being guided by the progress of scientificchemistryandmechanics. As in all such cases, however, science is useless without the aid of practical experience and acquired manual dexterity.

Many substances have a strong tendency to combine with oxygen, and will do so, in certain circumstances, so energetically as to render the products of the combination (which may be solid matter or gas) intensely hot and luminous. This is the general cause of the phenomenon known as fire. Its special character depends chiefly on the nature of the substances burned and on the manner in which the oxygen is supplied to them. As is well known, our atmosphere contains oxygen gas diluted with about four times its volume of nitrogen; and it is this oxygen which supports the combustion of our coal and candles. But it is not often that the pyrotechnist depends wholly upon atmospheric oxygen for his purposes; for the phenomena of combustion in it are too familiar, and toe little capable of varia- tion, to strike with wonder. Two cases, however, where he does so may be instanced, viz. the burning of magnesium powder and of lycopodium, both of which are used for the imitation of lightning in theatres. Nor does the pyrotechnist resort much to the use of pure oxygen, although very brilliant effects may be produced by burning various substances in glass jars filled with the gas. Indeed, the art could never have existed in any- thing like its present form had not certain solid substances become known which, containing oxygen in combination with other elements, are capable of being made to evolve large volumes of it at the moment it is required. The best examples of these solid oxidizing agents are potassium nitrate (nitre or saltpetre) and chlorate; and these are of the first importance in the manufacture of fireworks. If a portion of one of these salts be thoroughly powdered and mixed with the correct quantity of some suitable combustible body, also reduced to powder, the resulting mixture is capable of burning with more or less energy without any aid from atmospheric oxygen, since each small piece of fuel is in close juxtaposition to an available and sufficient store of the gas. All that is required is that the libera- tion of the oxygen from the solid particles which contain it shall be started by the application of heat from without, and the

10 Translated by George Shelvocke, 1727, by order of the surveyor-

general of the Ordnance.

11 ” Grace Collection ” in the print-room; the King’s Prints and Drawings in the library. See also ” The Connection of the Ordnance Department with National and Royal Fireworks,” R. A. Journal, vol. xxii. No. 11.

action then goes on unaided. This, then, is the fundamental fact of pyrotechny — that, with proper attention to the chemical nature of the substances employed, solid mixtures (compositions or fuses) may be prepared which contain within themselves all that is essential for the production of fire.

If nitre and potassium chlorate, with other salts of nitric and chloric acids and a few similar compounds, be grouped together as oxidizing agents, most of the other materials used in making firework compositions may be classed as oxidizable substances. Every composition must contain at least one sample of each class: usually there are present more than one oxidizable substance, and very often more than one oxidizing agent. In all cases the proportions by weight which the in- gredients of a mixture bear to one another is a matter of much importance, for it greatly affects the manner and rate of com- bustion. The most important oxidizable substances employed are charcoal and sulphur. These two, it is well known, when properly mixed in certain proportions with the oxidizing agent nitre, constitute gunpowder; and gunpowder plays an important part in the construction of most fireworks. It is sometimes employed alone, when a strong explosion is required; but more commonly it is mixed with one or more of its own ingredients and with other matters. In addition to charcoal and sulphur, the following oxidizable substances are more or less employed: — many compounds of carbon, such as sugar, starch, resins, &c; certain metallic compounds of sulphur, such as the sulphides of arsenic and antimony; a few of the metals themselves, such as iron, zinc, magnesium, antimony, copper. Of these metals iron (cast-iron and steel) is more used than any of the others. They are all employed in the form of powder or small filings. They do not contribute much to the burning power of the composition; but when it is ignited they become intensely heated and are discharged into the air, where they oxidize more or less completely and cause brilliant sparks and scintillations.

Sand, potassium sulphate, calomel and some other substances, which neither combine with oxygen nor supply it, are sometimes employed as ingredients of the compositions in order to influence the character of the fire. This may be modified in many ways. Thus the rate of combustion may be altered so as to give anything from an instantaneous explosion to a slow fire lasting many minutes. The flame may be clear, smoky, or charged with glow- ing sparks. But the most important characteristic of a fire — one to which great attention is paid by pyrotechnists — is its colour, which may be varied through the different shades and combinations of yellow, red, green and blue. These colours are imparted to the flame by the presence in it of the heated vapours of certain metals, of which the following are the most important :— sodium, which gives a yellow colour; calcium, red; strontium, crimson; barium, green; copper, green or blue, according to circumstances. Suitable salts of these metals are much used as ingredients of fire mixtures; and they are decomposed and volatilized during the process of combustion. Very often the chlorates and nitrates are employed, as they serve the double purpose of supplying oxygen and of imparting colour to the flame.

The number of fire mixtures actually employed is very great, for the requirements of each variety of firework, and of almost each size of each variety, are different. Moreover, every pyro- technist has his own taste in the matter of compositions. They are capable, however, of being classified according to the nature of the work to which they are suited. Thus there are rocket- fuses, gerbe-fuses, squib-fuses, star-compositions, &c. ; and, in addition, there are a few which are essential in the construction of most fireworks, whatever the main composition may be. Such are the starting-powder, which first catches the fire, the bursting- powder, which causes the final explosion, and the quick- match (cotton-wick, dried after being saturated with a paste of gunpowder and starch), employed for connecting parts of themore complicated works and carrying the fire from one to another. Of the general nature of fuses an idea may be had from the following two examples, which are selected at hazard from

among the numerous recipes for making, respectively, tourbillion fire and green stars: —

Tourbillion.

Green Stars.

Meal gunpowder .

24 parts.

Potassium chlorate .

16 par

Nitre

10

>i

Barium nitrate .

48 ,

Sulphur ....

7

,,

Sulphur ....

12 ,

Charcoal ....

4

»»

Charcoal ....

1 ,

Steel filings

8

Shellac ....

Calomel

Copper sulphide .

5 , 8 , 2 ,

Although the making of compositions is of the first importance, it is not the only operation with which the pyrotechnist has to do; for the construction of the cases in which they are to be packed, and the actual processes of packing and finishing, require much care and dexterity. These cases are made of paper or pasteboard, and are generally of a cylindrical shape. In size they vary greatly, according to the effect which it is desired to produce. The relations of length to thickness, of internal to external diameter, and of these to the size of the openings for discharge, are matters of extreme importance, and must always be attended to with almost mathematical exactness and considered in connexion with the nature of the composition which is to be used.

There is one very important property of fireworks that is due more to the mechanical structure of the cases and the manner in which they are filled than to the precise chemical character of the composition, i.e. their power of motion. Some are so constructed that the piece is kept at rest and the only motion possible is that of the flame and sparks which escape during combustion from the mouth of the case. Others, also fixed, contain, alternately with layers of some more ordinary com- positions, balls or blocks of a special mixture cemented by some kind of varnish; and these stars, as they are called, shot into the air, one by one, like bullets from a gun, blaze and burst there with striking effect. But in many instances motion is imparted to the firework as a whole — to the case as well as to its contents. This motion, various as it is in detail, is almost entirely one of two kinds— rotatory motion round a fixed point, which may be in the centre of gravity of a single piece or that of a whole system of pieces, and free ascending motion through the air. In all cases the cause of motion is the same, viz. that large quantities of gaseous matter are formed by the combustion, that these can escape only at certain apertures, and that a backward pressure is neces- sarily exerted at the point opposite to them. When a large gun is discharged, it recoils a few feet. Movable fireworks may be regarded as very light guns loaded with heavy charges; and in them the recoil is therefore so much greater as to be the most noticeable feature of the discharge; and it only requires proper contrivances to make the piece fly through the air like a sky-rocket or revolve round a central axis like a Catherine wheel. Beauty of motion is hardly less important in pyro- techny than brilliancy of fire and variety of colour.

The following is a brief description of some of the forms of fire- work most employed : —

Fixed Fires. — Theatre fires consist of a slow composition which may

be heaped in a conical pile on a tile or a flagstone and lit at the apex. They require no cases. Usually the fire is coloured — green, red or blue ; > and beautiful effects are obtained by illuminating buildings with it. It is also used on the stage; but, in that case, the composition must be such as to give no suffocating or poisonous fumes. Bengal lights are very similar, but are piled in saucers, covered with gummed paper, and lit by means of pieces of match. Marroons are small boxes wrapped round several times with lind cord and filled with a strong composition which explodes with a loud report. They are generally used in batteries, or in combination with some other form of firework. Squibs are straight cylindrical cases about 6 in. long, firmly closed at one end, tightly packed with a strong composition, and capped with touch-paper. Usually a little bursting-powder is put in before the ordinary composition, so that the fire is finished by an explosion. The character of the fire is, of course, susceptible of great variation in colour, &c. Crackers are characterized by the cases being doubled backwards and forwards several times, the folds being pressed close and secured by twine. One end is primed; and when this is lit the cracker burns with a hissing noise, and a loud report occurs every time the fire reaches a bend. If the cracker is placed on the ground, it will give a jump at each report; so that it cannot quite fairly be classed among the fixed fireworks. Roman, candles are straight cylindrical cases filled

with layers of composition and stars alternately. These stars are simply balls of some special composition, usually containing metallic filings, made up with gum and spirits of wine, cut to the required size and shape, dusted with gunpowder and dried. They are dis- charged like blazing bullets several feet into the air, and produce a beautiful effect, which may be enhanced by packing stars of differ- ently coloured fire in one case. Gerbes are choked cases, not unlike Roman candles, but often of much larger size. Their fire spreads like a sheaf of wheat. They may be packed with variously coloured stars, which will rise 30 ft. or more. Lances are small straight cases charged with compositions like those used for making stars. They are mostly used in complex devices, for which purpose they are fixed with wires on suitable wooden frames. They are connected by leaders, i.e. by quick-match enclosed in paper tubes, so that they can be regulated to take fire all at the same time, singly, or in detach- ments, as may be desired. The devices and ” set pieces ” constructed in this way are often of an extremely elaborate character ; and they include all the

varieties of lettered designs, of fixed suns, fountains, palm-trees, waterfalls, mosaic work, Highland tartan, portraits, ships, &c. Rotating Fireworks. — Pin or Catherine wheels are long paper cases filled with a composition by means of a funnel and packing- wire and afterwards wound round a disk of wood. This is fixed by a pin, sometimes vertically and sometimes horizontally; and the outer primed end of the spiral is lit. As the fire escapes the recoil causes the wheel to revolve in an opposite direction and often with considerable velocity. Pastiles are very similar in principle and construction. Instead of the case being wound in a spiral and made to revolve round its own centre point, it may be used as the engine to drive a wheel or other form of framework round in a circle. Many varied effects are thus produced, of which the fire- wheel is the simplest. Straight cases, filled with some fire-com- position, are attached to the end of the spokes of a wheel or other mechanism capable of being rotated. They are all pointed in the same direction at an angle to the spokes, and they ate connected together by leaders, so that each, as it burns out, fires the one next it. The pieces may be so chosen that brilliant effects of changing colour are produced ; or various fire-wheels of different colours may be combined, revolving in different planes and different directions — some fast and some slowly. Bisecting wheels, plural wheels, caprice wheels, spiral wheels, are all more or less complicated forms; and it is possible to produce, by mechanism of this nature, a model in ■ire of the solar system.

Ascending Fireworks. — Tourbillions are fireworks so constructed as to ascend in the air and rotate at the same time, forming beautiful spiral curves of fire. The straight cylindrical case is closed at the centre and at the two ends with plugs of plaster of Paris, the com- position occupying the intermediate parts. The fire finds vent by six holes pierced in the case. Two of these are placed close to the end , but at opposite sides, so that one end discharges to the right and the other to the left ; and it is this which imparts the rotatory motion. The other holes are placed along the middle line of what is the under- surface of the case when it is laid horizontally on the ground; and these, discharging downwards, impart an upward motion to the whole. A cross piece of wood balances the tourbillion ; and the quick- match and touch-paper are so arranged that com- bustion begins at the two ends simultaneously and does not reach the holes of ascension till after the rotation is fairly begun. The sky-rocket is generally considered -the most beautiful of all fireworks; and it certainly is the one that requires most skill and science in its construction. It consists essentially of two parts, — the body and the head. The body is a straight cylinder of strong pasted paper and is choked at the lower

end, so as to present only a narrow opening for the escape of the fire. The composition does not fill up the case entirely, for a central hollow conical bore extends from the choked mouth up the body for three-quarters of its length. This is an essential feature of the rocket. It allows of nearly the whole com- position being fired at once ; the result of which is that an enormous quantity of heated gases collects in the hollow bore, and the gases, forcing their way downwards through the narrow opening, urge the rocket up through the air. The top of the case is closed by a plaster- of-Paris plug. A hole passes through this and is filled with a fuse, which serves to communicate the fire to the head after the body is burned out. This head, which is made separately and fastened on after the body is packed, consists of a short cylindrical paper chamber with a conical top. It serves the double purpose of cutting a way through the air and of holding the garniture of stars, sparks, crackers, serpents, gold and silver rain, &c, which are scattered by bursting fire as soon as the rocket reaches the highest point of its path. A great variety of beautiful effects may be obtained by the exercise of ingenuity in the choice and construction of this garniture. Many of the best results have been obtained by unpublished methods which must be regarded as the secrets of the trade. The stick of the sky- rocket serves the purpose of guiding and balancing it in its flight ; and its size must be accurately adapted to the dimensions of the case. In winged rockets the stick is replaced by cardboard wings, which act like the feathers of an arrow. A girandole is the simultaneous dis- charge of a large number of rockets (often from one hundred to two hundred), which either spread like a peacock's tail or pierce the sky in all directions with rushing lines of fire. This is usually the final feat of a great pyrotechnic display.

See Chertier, Sur les feux d' artifice (Paris, 1841 ; 2nd ed., 1854); Mortimer, Manual of Pyrotechny (London, 1856); Tessier, Chimie pyrotechnique, ou traite pratique des feux colores (Paris, 1858); Richardson and Watts, Chemical Technology, s.v. " Pyrotechny " (London, 1863-1867); Thomas Kentish, The Pyrotechnist's Treasury (London, 1878); Websky, Luflfeuerwerkkunst (Leipzig, 1878).

(O. M.) FIRM, an adjective originally indicating a dense or close consistency, hence steady, unshaken, unchanging or fixed. This word, in M. Eng. ferme, is derived through the French, from Lat. firmus. The medieval Latin substantive Jirma meant a fixed payment, either in the way of rent, composition for periodic payments, &c; and this word, often represented by "firm" in translations of medieval documents, has produced the English " farm " (q.v.). From a late Latin use of firmare, to confirm by signature, jirma occurs in many Romanic languages for a signature, and the English " firm " was thus used till the 18th

century. From a transferred use came the meaning of a business house. In the Partnership Act 1890, persons who have entered into partnership with one another are called collectively a firm, and the name under which their business is carried on is called the firm-name.

FIRMAMENT, the sky, the heavens. In the Vulgate the word firmamenlum, which means in classical Latin a strengthen- ing or support {firmare, to make firm or strong) was used as the equivalent of orepew/xa {(ntptbtiv, to make firm or solid) in the LXX., which translates the Heb. rdqiya'. The Hebrew probably signifies literally " expanse," and is thus used of the expanse or vault of the sky, the verb from which it is derived meaning " to beat out." In Syriac the verb means " to make firm," and is the direct source of the Gr. arepeoiixa and the Lat. firmamenlum. In ancient astronomy the firmament was the eighth sphere containing the fixed stars surrounding the seven spheres of the planets.

FIRMAN (an adaptation of the Per. fermdn, a mandate or patent, cognate with the Sanskrit pramdna, a measure, authority), an edict of an oriental sovereign, used specially to designate decrees, grants, passports, &c, issued by the sultan of Turkey and signed by one of his .ministers. A decree bearing the sultan's sign-manual and drawn up with special formalities is termed a hatti-sherif, Arabic words meaning a line, writing or command, and lofty, noble. A written decree of an Ottoman sultan is also termed an trade, the word being taken from the Arab, irddd, will, volition, order.

FIRMICUS, MATERNUS JULIUS, a Latin writer, who lived in the reign of Constantine and his successors. About the year 346 he composed a work entitled De erroribus profanarum religionum, which he inscribed to Constantius and Constans, the sons of Constantine, and which is still extant. In the first part (chs. 1-17) he attacks the false objects of worship among the Oriental cults; in the second (chs. 18-29) he discusses a number of formulae and rites connected with the mysteries. The whole tone of the work is fanatical and declamatory rather than argumentative, and is thus in such sharp contrast with the eight books on astronomy (Libri VIII. Matheseos) bearing the same author's name, that the two works have usually been attributed to different writers. Mommsen {Hermes vol. 29, pp. 468-472) has, however, shown that the astronomy — a work interfused with an urbane Neoplatonic spirit — was composed about 336 and not in 354 as was formerly held. When we add to this the similarity of style, and the fact that each betrays a connexion with Sicily, there is the strongest reason for claiming the same author for the two books, though it shows that in the 4th century acceptance of Christianity did

not always mean an advance in ethical standpoint.

The Christian work is preserved in a Palatine MS. in the Vatican library. It was first printed at Strassburg in 1562, and has been reprinted several times, both separately and along with the writings of Minucius Felix, Cyprian or Arnobius. The most correct editions are those by Conr. Bursian (Leipzig, 1856), and by C. Halm, in his Minucius Felix {Corp. Scr. Eccl. Lat. ii.), (Vienna, 1867). The Neo-platonist work was first printed by Aldus Manutius in 1 501, and has often been reprinted. For full discussions see G. Ebert, Gesch. der chr. lat. Litt., ed. 1889, p. 129 ff. ; O. Bardenhewer, Patrologie, ed. 1901, p. 354.

4-ˆ4

FIRMINY, a town of central France in the department of Loire, 8 m. S.W. of St Etienne by rail. Pop. (1906) 15,778. It has important coal mines known since the 14th century and extensive manufactures of iron and steel goods, including railway material, machinery and cannon. Fancy woollen hosiery is also manufactured.

FIRST-FOOT, in British folklore, especially that of the north and Scotland, the first person who crosses the threshold on Christmas or New Year's Eve. Good or ill luck is believed to be brought the house by First-Foot, and a female First-Foot is regarded with dread. In Lancashire a light-haired man is as unlucky as a woman, and it became a custom for dark-haired males to hire themselves out to " take the New Year in." In Worcestershire luck is ensured by stopping the first carol-singer who appears and leading him through the house. In Yorkshire it must always be a male who enters the house first, but his fairness is no objection. In Scotland first-footing was always more elaborate than in England, involving a subsequent enter- tainment.

FIRST OF JUNE, Battle or the. By this name we call the great naval victory won by Lord Howe over the French fleet of Admiral Villaret-Joyeuse, on the 1st of June 1794. No place name can be given to it, because the battle was fought 429 m. to the west of Ushant.

The French people were suffering much distress from the bad harvest of the previous year, and a great convoy of merchant ships laden with corn was expected from America. Admiral Vanstabel of the French navy had been sent to escort it with two ships of the line in December of 1793. He sailed with his charge from the Chesapeake on the nth of

April 1794. On the previous day six French ships of the line left Brest to meet Vanstabel in mid ocean. The British force designed to intercept the convoy was under LordHowe,then in command of the channel fleet. He sailed from Spithead on the 2nd of May with 34 sail of the line and 15 smaller vessels, having under his charge nearly a hundred merchant ships which were to be seen clear of the Channel. On the 4th, when off the Lizard, the convoy was sent on its way protected by 8 line of battle ships and 6 or 7 frigates. Two of the line of battle ships were to accompany them throughout the voyage. The other six under Rear-admiral Montagu were to go as far as Cape Finisterre, and were then to cruise on the look-out for the French convoy between Cape Ortegal and Belle Isle. These detachments reduced the force under Lord Howe's immediate command to 26 of the line and 7 frigates. On the 5th of May he was off Ushant, and sent frigates to reconnoitre the harbour of Brest. They reported to him that the main French fleet, which was under the command of Villaret-Joyeuse, and was of 25 sail of the line, was lying at anchor in the roads. Howe then sailed to the latitude on which the convoy was likely to be met with, knowing that if the French admiral came out it would be to meet the ships with the food and cover them from attack. To seek the convoy was therefore the most sure way of forcing Villaret-Joyeuse to action. Till the 18th the British fleet continued cruising in the Bay of Biscay. On the 19th Lord Howe returned to Ushant and again recon- noitred Brest. It was then seen that Villaret-Joyeuse had gone to sea. He had sailed with his whole force on the 16th and had passed close to the British fleet on the 17th, unseen in a fog. On the 19th the French admiral was informed by the " Patriote " (74) that Nielly had fallen in with, and had captured, the British frigate " Castor " (32), under Captain Thomas Troubridge, to- gether with a convoy from Newfoundland. On the same day Villaret-Joyeuse captured part of a Dutch convoy of 53 sail from Lisbon. On the 19th a frigate detached by Admiral Montagu joined Howe. It brought information that Montagu had re- captured part of the Newfoundland convoy, and had learnt that Nielly was to join Vanstabel at sea, and that their combined force would be 9 sail of the line. Montagu himself had steered to cruise on the route of the convoy between the 45th and 47th degrees of north latitude. Howe now steered to meet his sub-ordinate who, he considered, would be in danger from the main French fleet. On the 21st he recaptured some of the Dutch

ships taken by Villaret-Joyeuse. From them he learnt that on the 19th the French fleet had been in latitude 47 46′ N. and in longitude 11° 22′ N. and was steering westward. Judging that Montagu was too far to the south to be in peril from Villaret- Joyeuse, and considering him

strong enough to perform the duty of intercepting the convoy, Lord Howe decided to pursue the main French ‘ fleet. The wind was changeable and the weather hazy. It was not till the 28th of May at 6.30 a.m. that the British fleet caught sight of the enemy in 47° 34′ N. and 13° 39′ W.

The wind was from the south-east, and the French were to windward. Villaret-Joyeuse bore down to a distance of 10 m. from the British, and then hauled to the wind on the port tack. It was difficult for the British fleet to force an action from leeward if the French were unwilling to engage. Lord Howe detached a light squadron of four ships, the ” Bellerophon ” (74), ” Russel ” (74), “Marlborough” (74), and “Thunderer” (74) under Rear-admiral Thomas Pasley, to attack the rear of the French line. Villaret-Joyeuse stood on and endeavoured to work to windward. In the course of the afternoon Rear-admiral Pasley’s ships began to come up with the last of the French line, the ” Revolutionnaire ” (no). A partial action took place which went on till after dark; other British vessels joined. The ” Revolutionnaire ” was so damaged that she was compelled to leave her fleet, and the British ” Audacious ” (74) was also crippled and compelled to return to port. The ” Revolution- naire ” was accompanied by another liner. During the night the two fleets continued on the same course, and next day Howe renewed his attempts to force an action from leeward. He tacked his fleet in succession — his first ship tacking first and the rest in order — in the hope that he would be able to cut through the French rear and gain the weather-gage. Villaret-Joyeuse then turned all his ships together and again headed in the same direction as the British. This movement brought him nearer the British fleet, and another partial action took place between the van of each force. Seeing that the French admiral was not disposed to charge home, Howe at noon once more ordered his fleet to tack in succession. His signal was poorly obeyed by the van, and his object, which was to cut through the French line, was not at once achieved. But the admiral himself finally set an example by tacking his flagship, the ” Queen Charlotte ” (100), and passing through the French, two ships from the end of their line. He was followed by his fleet, and Villaret-Joyeuse, seeing the peril of the ships in his rear, wore all his ships together to help them. Both forces had been thrown into considerable confusion by these movements, but the British had gained the weather-gage. Villaret-Joyeuse was able to save the two ships cut off, but he had fallen to leeward and the power to force on a battle had passed to Lord Howe. During the 30th the fleets lost sight of one another for a time. The French, who had four ships crippled, had been joined by four others, and were again 26 in number, including the ” Patriote.”

The 31st of May passed without a hostile meeting and in thick weather, but by the evening the British were close to windward of the French. As Howe, who had not full confidence in all his captains, did not wish for a night battle, he waited till the follow- ing morning, keeping the French under observation by frigates. On the 1st of June they were in the same relative positions, and at about a quarter past eight Howe bore down on the French, throwing his whole line on them at once from end to end, with orders to pass through from windward to leeward, and so to place the British ships on the enemy's line of retreat. It was a very bold departure from the then established methods of fighting, and most honourable in a man of sixty-eight, who had been trained in the old school. Its essential merit was that it produced a close melee, in which the better average gunnery and seamanship of the British fleet would tell. Lord Howe's orders were not fully obeyed by all his captains, but a signal victory was won, — six of the French line of battle ships were taken, and one, the " Vengeur," sunk. The convoy escaped capture, having passed over the spot on which the action of the 29th May was fought on the following day, and it anchored at

Brest on the 3rd of June. Its safe arrival went far to console the French for their defeat. The failure to stop it was forgotten in England in the pleasure given by the victory.

See James's Naval History, vol. i. (1837); and Tronde, Batailles navales de la France (1867). (D. H.)

FIRTH, CHARLES HARDING (1857-), British historian, was born at Sheffield on the 16th of March 1857, and was educated at Clifton College and at Balliol College, Oxford. At his univer- sity he took the Stanhope prize for an essay on the marquess Wellesley in 1877, became lecturer at Pembroke College in 1887, and fellow of All Souls College in iqoi. He was Ford's lecturer in English history in 1900, and became regius professor of modern history at Oxford in succession to F. York Powell in 1904. Firth's historical work was almost entirely confined to English history during the time of the Great Civil War and the Commonwealth; and although he is somewhat overshadowed by S. R. Gardiner, a worker in the same field, his books are of great value to students of this period. The chief of them are: Life of the Duke of Newcastle (1886) ; Scotland and the Common- wealth (1895); Scotland and the Protectorate (1899); Narrative of General V enables

(iqoo); Oliver Cromwell (1900); Cromwell's Army (1902); and the standard edition of Ludlow's Memoirs (1894). He also edited the Clarke Papers (1891-1901), and Mrs Hutchinson's Memoirs of Colonel Hutchinson (1885), and wrote an introduction to the Stuart Tracts (1903), besides contributions to the Dictionary of National Biography. In 1909 he published The Last Years of the Protectorate.

FIRTH, MARK (1819-1880), English steel manufacturer and philanthropist, was born at Sheffield on the 25th of April 1819, the son of a steel smelter. At the age of fourteen Mark, with his brother, left school to join their father in the foundry where he was employed, and ten years later the three together started a six-hole furnace of their own. The venture proved successful, and besides an extensive home business, they soon established a large American connexion. Their huge Norfolk works were erected at Sheffield in 1849, and still greater were afterwards acquired at Whittington in Derbyshire and others at Clay Wheels near Wadsley. The manufacture of steel blocks for ordnance was the principal feature of their business, and they produced also shot and heavy forgings. They also installed a plant for the production of steel cores for heavy guns, and for some time they supplied nearly all the metal used for gun making by the British government and a large proportion of that used by the French. On the death of his father in 1848 Mark Firth became the head of the firm. In 1869 he built and endowed " Mark Firth's Almshouses " at Ranmoor near Sheffield, and in 1875, when mayor, he presented to his native place a freehold park of thirty-six acres. He founded and endowed Firth.College, for lectures and classes in connexion with the extension of university education, which was opened in 1879. He died on the 28th of November 1880, and was accorded a public funeral.

FIRUZABAD, a town of Persia, in the province of Fars, 72 m. S. of Shiraz, in 28° 51′ N. Pop. about 3000. It is situated in a fertile plain, 15 m. long and 7 m. broad, well watered by the river Khoja which flows through it from north to south. The town is surrounded by a mud wall and ditch. Three or four miles north-west of the town are the ruins of the ancient city and of a large building popularly known as the fire-temple of Ardashir, and beyond them on the face of the rock in the gorge through which the river enters the plain are two Sassanian bas-reliefs.

The river leaves the plain by a narrow gorge at the southern end, and according to Persian history it was there that Alex- ander the Great, when unable to capture the ancient city, built a dike across the gorge, thus damming up the water of the river and turning the plain into a lake and submerging the city and villages. The lake remained until the

beginning of the 3rd century, when Ardashir, the first Sassanian monarch, drained it by destroying the dike. He built a new city, called it Gur, and made it the capital of one of the five great provinces or divisions of Fars. Firuz (or Peroz, q.v.), one of Ardashir's successors, called the district after his name Firuzabad (" the

abode of Firuz "), but the name of the city remained Gur until Azud ed Dowleh (Adod addaula) (949-982) changed it to its present name. He did this because he frequently resided at Gur, and the name meaning also " a grave " gave rise to unpleasant allusions, for instance, " People who go to Gur (grave) never return alive; our king goes to Gur (the town) several times a year and is not dead yet."

The district has twenty villages and produces much wheat and rice. It is said that the rice of Firuzabad bears sixty- fold. _ _ (A. H.-S.)

FIRtJZKUH, a small province of Persia, with a population of about 5000, paying a yearly revenue of about £500. Its chief place is a village of the same name picturesquely situated in a valley of the Elburz, about 90 m. east of Teheran, at an elevation of 6700 ft. and in 35° 46′ N. and 52° 48′ E. It has post and telegraph offices and' a population of 2500. A precipitous cliff on the eastern side of the valley is surmounted by the ruins of an ancient fort popularly ascribed to Alexander the Great.

FISCHART, JOHANN (c. 1545-1591), German satirist and publicist, was born, probably at Strassburg (but according to some accounts at Mainz), in or about the year 1545, and was educated at Worms in the house of Kaspar Scheid, whom in the preface to his Eulenspiegel he mentions as his " cousin and preceptor." He appears to have travelled in Italy, the Nether- lands, France and England, and on his return to have taken the degree of doctor juris at Basel. From 1575 to 1581, within which period most of his works were written, he lived with, and was probably associated in the business of, his sister's husband, Bernhard Jobin, a printer at Strassburg, who published many of his books. In 1581 Fischart was attached, as advocate to the Reichskammergericht (imperial court of appeal) at Spires, and in 1583, when he married, was appointed Amtmann (magis- trate) at Forbach near Saarbriicken. Here he died in the winter of i590-i59r. Fischart wrote under various feigned names, such as Mentzer, Menzer, Reznem, Huldrich Elloposkleros, Jesuwalt Pickhart, Winhold Alkofribas Wiistblutus, Ulrich Mansehr von Treubach, and Im Fischen Gilt's Mischen; and it is partly owing to this fact that there is doubt whether some of the works attributed to him are really his. More than 50 satirical works, however, both in prose and verse, remain

authentic, among which are — Nachtrab oder Nebelkrdh (1570), a satire against one Jakob Rabe, who had become a convert to the Roman Catholic Church; Von St Dominici des Predigermdnchs und St Francisci Barfiissers artlichem Leben (1571), a poem with the expressive motto ” Sie haben Nasen vnd riechen’s nit ” (Ye have noses and smell it not) , written to defend the Protestants against certain wicked accusations, one of which was that Luther held communion with the devil; Eulenspiegel Reimensweis (written 1571, published 1572); Alter Praktik Grossmutter (1572), after Rabelais’s Prognostication Pantagrueline; Flbh Haz, Weiber Traz (1573), in which he describes a battle be- tween fleas and women; Affentheuerliche und ungeheuerliche Ge- schichtschrift vom Leben, Rhaten und Thaten der . . . Helden und Herren Grandgusier Gargantoa und Pantagruel, also after Rabelais (1575, and again under the modified title, Naupen- geheurliche Geschichtklitterung, 1577); Neue kunstliche Figuren biblischer Historien (1576) ; Anmahnung zur christlichen Kinder- zucht (1576); Das gliickhafft Schiff von Zurich (1576, repub- lished 1828, with an introduction by the poet Ludwig Uhland), a poem commemorating the adventure of a company of Zurich arquebusiers, who sailed from their native town to Strassburg in one day, and brought, as a proof of this feat, a kettleful of Hirscbrei (millet), which had been cooked in Zurich, still warm into Strassburg, and intended to illustrate the pro- verb ” perseverance overcomes ail difficulties “; Podagrammisch Trostbilchlein (1577); Philosophisch Ehzuchtbiichlein (1578); the celebrated Bienenkorb des heiligen romischen Immenschwarms, &c, a modification of the Dutch De roomscha Byen-Korf, by Philipp Marnix of St Aldegonde, published in 1579 and reprinted in 1847; Der heilig Brotkorb (1580), after Calvin’s Traiti des reliques; Das vierhornige Jesuiterhutlein, a rhymed satire against the Jesuits (1580); and a number of smaller poems.

To Fischart also have been attributed some ” Psalmen und geistliche Lieder ” which appeared in a Strassburg hymn-book of 1576.

Fischart had studied not only the ancient literatures, but also those of Italy, France, the Netherlands and England. He was a lawyer, a theologian, a satirist’ and the most powerful Protestant publicist .of the counter-reformation period; in politics he was a republican. Above all, he is a master of language, and was indefatigable with his pen. His satire was levelled mercilessly at all perversities in the public and private life of his time— at astrological superstition, scholastic

pedantry, ancestral pride, but especially at the papal dignity and the lives of the priesthood and the Jesuits. He indulged in the wildest witticisms, the most abandoned caricature; but all this he did with a serious purpose. As a poet, he is characterized by the eloquence and picturesqueness of his style and the symboli- cal language he employed. Thirty years after Fischart's death his writings, once so popular, were almost entirely forgotten. Recalled to the public attention by Johann Jakob Bodmer and Gotthold Ephraim Lessing, it is only recently that his works have come to be a subject of investigation, and his position in German literature to be fully understood. ,

Freiherr von Meusebach, whose valuable collection of Fischart's works has passed into the possession of the royal library in Berlin, deals in his Fischartsludien (Halle, 1879) with the great satirist. Fischart's poetical works were published by Hermann Kurz in three volumes (Leipzig, 1866-1868); and selections by K. Goedeke (Leipzig, 1800) and by A. Hauffen in Kiirschner's Deutsche Nahonal- lileratur (Stuttgart, 1893); Die Geschichtklitterung and some minor writings appeared in Scheible's Kloster, vols. 7 and 10 (Stuttgart, 1847-1848). Das gliickhajft Schiff has been frequently reprinted, critical edition by J. Baechtold (1880). See for further biographical details, Erich Schmidt in the Allgemeine deutsche Biographie, vol. 7; A. F. C. Vilmar in Ersch and Gruber's Encyclopaedie; W. Wacker- nagei johann Fischart von Strassburg und Basels Anteil an ihm (2nd ed Basel 1875); P. Besson, Etude sur Jean Fischart (Pans, 1889); and A. Hauffen, " Fischart-Studien " (in Euphorion, 1896-1909).

FISCHER, EMIL (1852-), German chemist, was born at Euskirchen, in Rhenish Prussia, on the oth of October 1852, his father being a merchant and manufacturer. After studying chemistry at Bonn, he migrated to Strassburg, where he graduated as Ph.D. in 1874. He then acted as assistant to Adolf von Baeyer at Munich for eight years, after which he was appointed to the chair of chemistry successively at Erlangen (1882) and Wurzburg (1885). In 1892 he succeeded A. W. von Hofmann as professor of chemistry at Berlin. Emil Fischer devoted himself entirely to organic chemistry, and his investigations are characterized by an originality of idea and readiness of resource which make him the master of this branch of experi- mental chemistry. In his hands no substance seemed too complex to admit of analysis or of synthesis; and the more intricate and involved the subjects of his investigations the more strongly shown is the conspicuous skill in pulling, as it were, atom from atom, until the molecule stood revealed, and, this accomplished, the same skill combined atom with atom until the molecule was regenerated. His forte was to enter fields where

others had done little except break the ground; and his researches in many cases completely elucidated the problem in hand, and where the solution was not entire, his methods and results almost always contained the key to the situation.

In 1875, the year following his engagement with von Baeyer, he published his discovery of the organic derivatives of a new compound of hydrogen and nitrogen, which he named hydrazine (q.v.). He investigated both the aromatic and aliphatic derivatives, establishing their relation to the diazo compounds, and he perceived the readiness with which they entered into combination with other substances, giving origin to a wealth of hitherto unknown compounds. Of such condensation products undoubtedly the most important are the hydrazones, which result from the interaction with aldehydes and ketones. His observations, published in 1886, that such hydra- zones, by treatment with hydrochloric acid or zinc chloride, yielded derivatives of inclol, the pyrrol of the benzene series and the parent substance of indigo, were a valuable confirmation of the views advanced by his master, von Baeyer, on the subject of indigo and the many substances related to it. Of greater moment was his discovery that phenyl hydrazine reacted with the sugars to form

substances which he named osazones, and which, being highly crystalline and readily formed, served to identify such carbohydrates more definitely than had been previously possible. He next turned to the rosaniline dyestuffs (the magenta of Sir W. H. Perkin), and in collaboration with his cousin Otto Fischer (b. 1852), then at Munich and afterwards professor at Erlangen, who has since identified himself mainly with the compounds of this and related groups, he published papers in 1878 and 1879 which indubitably established that these dyestuffs were derivatives of triphenyl methane. Fischer's next research was concerned with compounds related to uric acid. Here the ground had been broken more especially by von Baeyer, but practically all our knowledge of the so-called purin group (the word purin appears to have been suggested by the phrase purum uricum) is due to Fischer. In 1881-1882 he published papers which established the formulae of uric acid, xanthine, caffeine, theobromine and some other compounds of this group. But his greatest work in this field was instituted in 1894, when he commenced his great series of papers, wherein the compounds above mentioned were all referred to a nitrogenous base, purin (q.v.). The base itself was obtained, but only after much difficulty; and an immense series of derivatives were prepared, some of which were patented in view of possible therapeutical applications. 1 These researches were pub- lished in a collected form in 1907 with the title Vntersuchungen in der

Puringruppe (1882-1906). The first stage of his purin work successfully accomplished, he next attacked the sugar group. Here the pioneer work was again of little moment, and Fischer may be regarded as the prime investigator in this field. His researches may be taken as commencing in 1883; and the results are unparalleled in importance in the history of organic chemistry. The chemical complexity of these carbohydrates, and the difficulty with which they could be got into a manageable form — they generally appeared as syrups — occasioned much experimental difficulty; but these troubles were little in comparison with the complications due to stereochemical relations. However, Fischer synthesized fructose, glucose and a great number of other sugars, and having showed how to deduce, for instance, the formulae of the 16 stereoisomerˆ glucoses, he prepared several stereoisomerides, thereby completing a most brilliant experimental research, and simultaneously confirm- ing the van't Hoff theory of the asymmetric carbon atom (see Stereoisomerism). The study of the sugars brought in its train the necessity for examining the nature, properties and reactions of substances which bring about the decomposition known as fermenta- tion (q.v.). Fischer attacked the problem presented by ferments and enzymes, and although we as yet know little of this complex subject, to Fischer is due at least one very important discovery, viz. that there exists some relation between the chemical constitution of a sugar and the ferment and enzyme which breaks it down. The magnitude of his researches in this field may be gauged by his collected papers, Vntersuchungen uber Kohlenhydrate und Fermente (1884-1908), pp. viii.-t~9i2 (Berlin, 1909).

From the sugars and ferments it is but a short step to the subject of the proteins, substances which are more directly connected with life processes than any others. The chemistry of the proteins, a subject which bids fair to be Fischer's great lifework, presents difficulties which are probably without equal in the whole field of chemistry, partly on account of the extraordinary chemical com- plexity of the substances involved, and partly upon the peculiar manner in which chemical reactions are brought about in the living organism. But by the introduction of new methods, Fischer suc- ceeded irj breaking down the complex albuminoid substances into amino acids and other nitrogenous compounds, the constitutions of most of which have been solved ; and by bringing about the re- combination of these units, appropriately chosen, he prepared synthetic peptides which approximate to the natural products. His methods led to the preparation of an octadeca-peptide of the molecular weight 1213, exceeding that of any other synthetic compound; cut even this compound falls far short of the simplest natural peptide, which has a

molecular weight of from 2000 to 3000, He considers, however, that the synthesis of more complex products is only a matter of trouble and cost. His researches made from 1899 to 1906 have been published with the title Vntersuchungen uber Aminosauren, Polypeptides und Prcteine (Berlin, 1907). The extra- ordinary merit of his many researches has been recognized by all the important scientific societies in the world, and he was awarded the Nobel prize for chemistry in 1902- Under his control the laboratory at Berlin became one of the most important in existence, and has attracted to it a constant stream of brilliant pupils, many of whom are to be associated with much of the experimental work indis- solubly connected with Fischer.

FISCHER, ERNST KUNO BERTHOLD (1824-1907), German philosopher, was born at Sandewalde in Silesia, on the 23rd of July 1824. After studying philosophy at Leipzig and Halle, he became a privat-docent at Heidelberg in 1850. The Baden government in 1853 laid an embargo on his teaching owing to

1 For a brief review of the pharmacology of purin derivatives see F. Francis and J. M. Fortescue-Brinkdale, The Chemical Basis of Pharmacology (1908).

his Liberal ideas, but the effect of this was to rouse considerable sympathy for his views, and in 1856 he obtained a professorship at Jena, where he soon acquired great influence by the dignity of his personal character. In 1872, on Zeller's removal to Berlin, Fischer succeeded him as professor of philosophy and the history of modern German literature at Heidelberg, where he died on the4thof July 1907. His part in philosophy was that of historian and commentator, for which he was especially qualified by his remarkable clearness of exposition; his point of view is in the main Hegelian. His Geschichte der neuern Philosophic (1852- 1893, new ed. 1897) is perhaps the most accredited modern book of its kind, and he made valuable contributions to the study of Kant, Bacon, Shakespeare, Goethe, Spinoza, Lessing, Schiller and Schopenhauer.

Some of his numerous works have been translated into English: Francis Bacon of Verulam, by J. Oxenford (1857); The Life and Character of Benedict Spinoza, by Frida Schmidt (1882) ; A Commentary on Kant's Kritik of Pure Reason, by J. P. Mahaffy (1866) ; Descartes and his School, by J. P. Gordy (1887) ; A Critique of Kant,

by W. S. Hough (1888) ; see also H. Falkenheim, Kuno Fischer und die litterar-historische . Methode (1892); and bibliography in J. M. Baldwin's Dictionary of Philosophy and Psychology (1905).

FISH, HAMILTON (1808-1893), American statesman, was born in New York City on the 3rd of August 1808. His father, Nicholas Fish (1758-1833), served in the American army during the War of American Independence, rising to the rank of lieutenant-colonel. The son graduated at Columbia College in 1827, and in 1830 was admitted to the bar, but practised only a short time. In 1843-1845 he was a Whig representative in Congress. He was the Whig candidate for lieutenant-governor of New York in 1846, and was defeated by Addison Gardner (Democrat); but when in 1847 Gardner was appointed a judge of the state court of appeals, Fish was elected (November 1847) to complete the term (to January 1849). He was governor of New York state from 1849 to 185 1, and was United States senator in 1851-1857, acting with the Republicans during the last part of his term. In 1 861- 186 2 he was associated with John A. Dix, William M. Evarts, William E. Dodge, A. T. Stewart, John Jacob Astor, and other New York men, on the Union Defence Committee, which (from April 22, 1861, to April 30, 1862) co-operated with the municipal government in the raising and equipping of troops, and disbursed more than a million dollars for the relief of New York volunteers and their families. Fish was secretary of state during President Grant's two ad- ministrations (1869-1877). He conducted the negotiations with Great Britain which resulted in the treaty of the 8th of May 1871, under which (Article 1) the "Alabama claims" were referred to arbitration, and the same disposition (Article 34) was made of the " San Juan Boundary Dispute," concerning the Oregon boundary line. In 187 1 Fish presided at the Peace Conference at Washington between Spain and the allied republics of Peru, Chile, Ecuador and Bolivia, which resulted in the formulation (April 12) of a general truce between those countries, to last indefinitely and not to be broken by any one of them without three years' notice given through the United States; and it was chiefly due to his restraint and moderation that a satisfactory settlement of the " Virginius Affair " was reached by the United States and Spain (1873). Fish was vice-president- general of the Society of the Cincinnati from 1848 to 1854, and president-general from 1854 until his death. He died in Garrison, New York, on the 7th of September 1893.

His son, Nicholas Fish (1846-1902), was appointed second secretary of legation at Berlin in 1871, became secretary in 1874, and was chargf d'affaires at Berne in 1877-1881, and minister to Belgium in 1882-1886, after which he engaged in banking in New York City.

FISH (O. Eng. fisc, a word common to Teutonic languages, cf. Dutch visch, Ger. Fisch, Goth, fisks, cognate with the Lat. piscis), the common name of that class of vertebrate animals which lives exclusively in water, breathes through gills, and whose limbs take the form of fins (see Ichthyology). The article Fisheries deals with the subject from the economic and commercial point of view, and Angling with the catching of

fish as a sport. The constellation and sign of the zodiac known as ” the fishes ” is treated under Pisces.

The fish was an early symbol of Christ in primitive and medieval Christian art. The origin is to be found in the initial letters of the names and titles of Jesus in Greek, viz. Tijo-oDs Xpioros, GeoO ‘Tws, Swrtjp, Jesus Christ, Son of God, Saviour, which together spell the Greek word for ” fish,” Ixdvs- The fish is also said to be represented in the oval-shaped figure, pointed at both ends, and formed by the intersection of two circles. This figure, also known as the vesica piscis, is common in ecclesiastical seals and as a glory or aureole m paintings of sculpture, surround- ing figures of the Trinity, saints, &c. The figure is, however, sometimes referred to the almond, as typifying virginity; the French name for the symbol is Amande mystique.

The word ” fish ” is used in many technical senses. Thus it is used of the purchase used in raising the flukes of an” anchor to the bill-board; of a piece of wood or metal used to strengthen a sprung mast or yard; and of a plate of metal used, as in railway construction, for the strengthening of the meeting-place of two rails. This word is of doubtful origin, but it is probably an adaptation of the Fr. fiche, that which ” fixes,” a peg. This word also appears in the English form ” fish,” in the metal, pearl or bone counters, sometimes made in the form of fish, used for scoring points, &c, in many games.

FISHER, ALVAN (1792-1863), American portrait-painter, was born at Needham, Massachusetts, on the 9th of August 1792. At the age of eighteen he was a clerk in a country shop, and subsequently was employed by the village house painter, but at the age of twenty-two he began to paint portrait heads, alternat- ing with rural scenes and animals, for which he found patrons at modest prices. In ten years he had saved enough to go to Europe, studying at the Paris schools and copying in the galleries of the Louvre. Upon his return he became one of the recognized group of Massachusetts portrait-painters. Along with Doughty, Harding and Alexander, in 1831, he held an exhibition of his work in Boston — perhaps the first joint display by painters ever held in that city. Though he had considerable talent for landscape, a lack of

patronage for such work caused him to confine himself to portraiture, in which he was moderately successful. He died at Dedham, Mass., on the 16th of February

1863.

FISHER, GEORGE PARK (1827-1909), American theologian, was born at Wrentham, Massachusetts, on the 10th of August 1827. He graduated at Brown University in 1847, and at the Andover Theological Seminary in 185 1, spent three years in study in Germany, was college preacher and professor of divinity at Yale College in 1854-1861, and was Titus Street professor of ecclesiastical history in the Yale Divinity School in 1861-1901, when he was made professor emeritus. He was president of the American Historical Association in 1897-1898. His writings have given him high rank as an authority on ecclesiastical history. They include Essays on the Supernatural Origin of Christianity (1865); History of the Reformation (1873), republished in several revisions; The Beginnings of Christianity (1877); Discussions in History and Theology (1880); Outlines of Universal History (1886); History of the Christian Church (1887); The Nature and Method of Revelation (1890); Manual of Natural Theology (1893); A History of Christian Doctrine, in the “Interna- tional Theological Library ” (1896) ; and A Brief History of Nations (1896). He died on the 20th of December 1909.

FISHER, JOHN (c. 1460-1535), English cardinal and bishop of Rochester, born at Beverly, received his first education at the collegiate church there. In 1484 he went to Michael House, Cambridge, where he took his degrees in arts in 1487 and 1491, and, after filling several offices in the university, became master of his college in 1499. He took orders; and his reputation for learning and piety attracted the notice of Margaret Beaufort, mother of Henry VII., who made him her confessor and chaplain. In 1 501 he became vice-chancellor; and later on, when chancellor, he was able to forward, if not to initiate entirely, the beneficent schemes of his patroness in the foundations of St. John’s and Christ’s colleges, in addition to two lectureships, in Greek

and Hebrew. His love for Cambridge never waned, and his own benefactions took the form of scholarships, fellowships and lectures. In 1503 he was the first Margaret professor at Cam- bridge; and the

following year was raised to the see of Rochester, to which he remained faithful, although the richer sees of Ely and Lincoln were offered to him. He was nominated as one of the English prelates for the Lateran council (151 2), but did not attend. A man of strict and simple life, he did not hesitate at the legatine synod of 1517 to censure the clergy, in the presence of the brilliant Wolsey himself, for their greed of gain and love of display; and in the convocation of 1523 he freely opposed the cardinal's demand for a subsidy for the war in Flanders. A great friend of Erasmus, whom he invited to Cambridge, whilst earnestly working for a reformation of abuses, he had no sympathy with those who attacked doctrine; and he preached at Paul's Cross (12th of May 1521) at the burning of Luther's books. Although he was not the author of Henry's book against Luther, he joined with his friend, Sir Thomas More, in writing a reply to the scurrilous rejoinder made by the reformer. He retained the esteem of the king until the divorce proceedings began in 1527; and then he set himself sternly in favour of the validity of the marriage. He was Queen Catherine's confessor and her only champion and advocate. He appeared on her behalf before the legates at Blackfriars; and wrote a treatise against the divorce that was widely read.

Recognizing that the true aim of the scheme of church reform brought forward in parliament in 1529 was to put down the only moral force that could withstand the royal will, he energetic- ally opposed the reformation of abuses, which doubtless under other circumstances he would have been the first to accept. In convocation, when the supremacy was discussed (nth of February 1531), he declared that acceptance would cause the clergy " to be hissed out of the society of God's holy Catholic Church "; and it was his influence that brought in the saving clause, quantum per legem Dei licet. By listening to the revela- tions of the " Holy Maid of Kent," the nun Elizabeth Barton (q.v.), he was charged with misprision of treason, and was condemned to the loss of his goods and to imprisonment at the king's will, penalties he was allowed to compound by a fine of £300 (25th of March 1534). Fisher was summoned (13th of April) to take the oath prescribed by the Act of Succession, which he was ready to do, were it not that the preamble stated that the offspring of Catherine were illegitimate, and prohibited all faith, trust and obedience to any foreign authority or potentate. Refusing to take the oath, he was committed (15th of April) to the Tower, where he suffered greatly from the rigours of a long confinement. Onthepassing of the Actof Supremacy (November 1534), in which the saving clause of convocation was omitted, he was attainted and deprived of his see. The council, with Thomas Cromwell at their head, visited him on the

7th of May 1535, and his refusal to acknowledge Henry as supreme head of the church was the ground of his trial. The constancy of Fisher, while driving Henry to a fury that knew no bounds, won the admiration of the whole Christain world, where he had been long known as one of the most learned and pious bishops of the time. Paul III., who had begun his pontificate with the intention of purifying the curia, was unaware of the grave danger in which Fisher lay; and in the hope of reconciling the king with the bishop, created him (20th of May 1535) cardinal priest of St Vitalis. When the news arrived in England it sealed his fate. Henry, in a rage, declared that if the pope sent Fisher a hat there should be no head for it. The cardinal was brought to trial at Westminster (17th of June 1535) on the charge that he did " openly declare in English that the king, our sovereign lord, is not supreme head on earth of the Church of England," and was condemned to a traitor's death at Tyburn, a sentence afterwards changed. He was beheaded on Tower Hill on the 2 2nd of June 1535, after saying the Te Deum and the psalm In te Domine speravi. His body was buried first at All Hallows, Barking, and then removed to St. Peter's ad vinculo, in the Tower, where it lies beside that of Sir Thomas More. His head was exposed on London Bridge and then thrown into the river. As

a champion of the rights of conscience, and as the only one of the English bishops that dared to resist the king's will, Fisher commends himself to all. On the 9th of December 1886 he was beatified by Pope Leo XIII.

Fisher's Latin works are to be found in the Opera J. Fisheri quae hactenus inveniri potuerunt omnia (Wiirzburg, 1595), and some of his published English works in the Early English Text Society (Extra series, No. 27, part i. 1876). There are others in manuscript at the P.R.O. (27, Henry VIII., No. 887). Besides the State papers, the main sources for his biography are The Life and Death of that renowned John Fisher, Bishop of Rochester (London, 1655), by an anonymous writer, the best edition being that of Van Ortroy (Brussels, 1893) ; Bridgett's Life of Blessed John Fisher, Bishop of Rochester (London, 1880 and 1890) ; and Thureau, Le bienheureux Jean Fisher (Paris, 1907). (E. Tn.)

FISHER, JOHN ARBUTHNOT FISHER, ist Baron (1841-), British admiral, was born on the 25th of January 1841, and entered the navy in June 1854. He served in the Baltic during the Crimean War, and was engaged as midshipman on the " Highflyer," " Chesapeake " and " Furious," in the Chinese War, in the operations required by the occupations of Canton, and of the Peiho forts in 1859. He became sub-

lieutenant on the 25th of January i860, and lieutenant on the 4th of November of the same year. The cessation of naval wars, at least of wars at sea in which the British navy had to take a part, after i860, allowed few officers to gain distinction by actual services against the enemy. But they were provided with other ways of proving their ability by the sweeping revolution which transformed the construction, the armament, and the methods of propulsion of all the navies of the world, and with them the once accepted methods of combat. Lieutenant Fisher began his career as a commissioned officer in the year after the launching of the French " Gloire " had set going the long duel in construction between guns and armour. He early made his mark as a student of gunnery, and was promoted commander on the 2nd of August 1869, and post-captain on the 30th of October 1874. In this rank he was chosen to serve as president of the committee appointed to revise " The Gunnery Manual of the Fleet." It was his already established reputation which pointed Captain Fisher out for the command of H.M.S. " Inflexible," a vessel which, as the representative of a type, had supplied matter for much discussion. As captain of the " Inflexible " he took part in the bombardment of Alexandria (nth July 1882). The engagement was not arduous in itself, having been carried out against forts of inferior construction, indifferently armed, and worse garrisoned, but it supplied an opportunity for a display of gunnery, and it was conspicuous in the midst of a long naval peace. The " Inflexible " took a prominent part in the action, and her captain had the command of the naval brigade landed in Alexandria, where he adapted the ironclad train and com- manded it in various skirmishes with the enemy. After the Egyptian campaign, he was, in succession, director of Naval Ordnance and Torpedoes (from October 1886 to May 1891); A.D.C. to Queen Victoria (18th June, 1887, to 2nd August 1890, at which date he became rear-admiral) ; admiral superintendent of Portsmouth dockyard (1891 to 1892); a lord commissioner of the navy and comptroller of the navy (1892 to 1897), an d vice-admiral (8th May 1896); commander-in-chief on the North American and West Indian station (1897). In 1899 he acted as naval expert at the Hague Peace Conference, and on the ist of July 1809 was appointed commander-in-chief in the Mediterranean. From the Mediterranean command, Admiral Fisher passed again to the admiralty as second sea lord in 1902, and became commander-in-chief at Portsmouth on the 31st of August 1903, from which post he passed to that of first sea lord. Besides holding the foreign Khedivial and Osmanieh orders, he was created K.C.B. in 1894 and G.C.B. in 1902. As first sea lord, during the years 1903-1909, Sir John Fisher had a predominant influence in all the far-reaching new measures of naval development and internal

reform; and he was also one of the committee, known as Lord Esher's committee, appointed in 1904 to report on the measures necessary to be taken to put the administration and organization of the British army on a sound footing. The changes in naval administration made

under him were hotly canvassed among critics, who charged him with autocratic methods, and in 1906-1909 with undue sub- servience to the government's desire for economy; and whatever the efficiency of his own methods at the admiralty, the fact was undeniable that for the first time for very many years the navy suffered, as a service, from the party-spirit which was aroused. It was notorious that Admiral Lord Charles Beresford in particular was acutely hostile to Sir John Fisher's administra- tion; and on his retirement in the spring of 1909 from the position of commander-in-chief of the Channel fleet, he put his charges and complaints before the government, and an inquiry was held by a small committee under the Prime Minister. Its report, published in August, was in favour of the Admiralty, though it encouraged the belief that some important suggestions as to the organization of a naval " general staff " would take effect. On the 9th of November Sir John Fisher was created a peer as Baron Fisher of Kilverstone, Norfolk. He retired from the Admiralty in January 19 10.

FISHERIES, 1 a general term for the various operations engaged in for the capture of such aquatic creatures as are useful to man. From time immemorial fish have been captured by various forms of spears, nets, hooks and more elaborate apparatus, and a historical description of the methods and appliances that have been used would comprise a considerable portion of a treatise on the history of man. For the most part the operations of fishing have been comparable with those of primitive hunting rather than with agriculture; they have taken the least possible account of considerations affecting the supply; when one locality has been fished out, another has been resorted to. The increasing pressure on every source of food, and the enormous improvements in the catching power of the engines involved, has made some kind of regulation and control inevitable, with the result that in practically every civilized country there exists some authority for the investigation and regulation of fisheries.

The annexed table shows the department of state and the

The early years of the 20th century witnessed another great expansion

of the sea fisheries of the United Kingdom. The herring' fishery has been revolutionized partly by the successful introduction of steam drifters, which have markedly increased the aggregate catching power, and partly by the prosecution oi) the fishery on one part or other of the British coasts during the greater part of the year. The crews of many Scottish vessels which formerly worked at the herring and line fisheries in alternate seasons of the year now devote their energies almost entirely to the herring fishery, which they pursue in nomad fleets around all the coasts of Great Britain. The East Anglian drifters carry on their operations at different seasons of the year from Shetland in the north (for herrings) to Newlyn in the west (for mackerel). In Scotland the value of the nets employed on steam drifters has increased from £3000 in 1899 to £61,000 in 1906, and the average annual catch of herrings has increased from about four to about five million cwts. during the past ten years. In England also the annual catch of herrings, which reached a total of two million cwts. for the first time in 1899, has exceeded three millions in each year from 1902 tq

In steam trawling also great enterprise has been shown. In 1906 Messrs Hellyer of Hull launched a new steam trawling fleet of 50 vessels for working the North Sea grounds, and the delivery of new steam trawlers at Grimsby was greater than at any previous period, these vessels being designed more especi- ally to exploit the distant fishing grounds, the range of whicL has been extended from Morocco to the White Sea. About 100 vessels were added to the Grimsby fleet in the course of twelve months. These new vessels measure about 140 ft. in length and over 20 ft. in beam, and exceed 250 tons gross tonnage, the accommodation both for fish and crews being considerably in excess of that provided in vessels of this class hitherto.

Returns of the steam trawlers registered in 1907 in the chief European countries show the expanse of this industry, and the

Administration of Fisheries.

Norway.

Sweden.

Denmark.

Germany.

Holland.

Belgium.

Department of State

Approximate Annual Expenditure —

1. Administration

2. Scientific Fishery Research .

Trade and In- dustry and Agriculture.

£15,000 5,ooo

Agriculture.

£5,500

4,500

Agriculture.

£10,200

6,300

Imperial De- partment of Interior.

Conducted by M aritime States £27,750

Agriculture.

£12,500

2,500

Agriculture and Woods and Forests.

£1,000

Canada.

U.S. America.

England and Wales.

Scotland.

Ireland.

Department of State

Approximate Annual Expenditure —

1. Administration

2. Scientific Fishery Research

Marine and Fish- eries.

£159,000

48,000

Bureau of Fisheries under Commerce and Labour.

Conducted by

Coastal States

£141,000

Agriculture and Fisheries.

£8,000

14,000

(expended through

agents)

Fishery Board.

£13,000

800

Agriculture and Technical In- struction.

£10,000

approximate expenditure on fisheries in some of the chief countries oi the world. The figures are only approximate and are based on the expenditure for 1907. In the case of England and Wales the expenditure is not complete, as under the Sea Fisheries Regulation Act

of 1888 the whole of the coast of England and Wales could be placed under local fisheries committees with power to levy rates for fishery purposes, and in a certain number of districts advantage has been taken of this act. But even with this addition, British expenditure on fisheries is less than that undertaken by most of the countries of northern Europe, although British fisheries are much more valuable than those of all the rest of Europe together.

1 For fisheries in the cases of Coral, Oyster, Pearl, Salmon, Sponges and Whale, see these articles; for fishing as a sport see Angling.

enormous preponderance of Great Britain. The numbers are as

follows : —

Belgium 23

Denmark 5

France 22ˆ4.

Germany 239

Netherlands 81

Norway 20

Portugal 13

Spain 12-18

Sweden n

Scotland 292

Ireland 6

England and Wales 1317

A simultaneous development of the sea fisheries has been manifested in other maritime countries of Europe, particularly in Germany and Holland, but the total number of steam trawlers

belonging to those countries in 1905 scarcely exceeded the mere additions to the British fishing fleet in 1906.

The relative magnitude of British fisheries may best be gauged by a comparison with the proceeds of the chief fisheries of other European countries. The following table is based upon official returns and mainly derived from the Bulletin Statislique of the International Council for the Study of the Sea. It re- presents in pounds sterling the value of the produce of the various national fisheries during the year 1904, except in the case of France, for which country the latest available figures are those for 1902.

Values in Thousands of £.

The total value of the sea fisheries in the three chief sub- divisions of the British Isles in the year 1905, according to the official returns, was as follows:

These figures show an increase of £1,000,000 as compared with the total value in 1900, and of more than £3,000,000 as compared with 1895 (cf. Table I. at end).

In England and Wales the trawl fisheries for cod, haddock, and flat fish yielded about three-quarters of the total, and the drift fisheries for herring and mackerel nearly the whole of the remaining quarter. The line fisheries in England and Wales are now relatively insignificant and yield only about one-fortieth of the total (cf. Table VIII. at end).

In Scotland, on the other hand, there is not so much difference in the relative importance of the three chief fisheries. In 1905 herrings and other net-caught fish yielded rather more than one-

east coasts. The remaining quarter is mainly derived from the trawl fisheries, the headquarters of which are at Dublin, Howth and Balbriggan on the east, and at Galway and Dingle on the west coast.

The value of the fishing boats and gear employed in the Scottish fisheries during 1905 is returned as nearly £4,120,000. Upon a moderate estimate, the total value of the boats and gear employed in the fisheries of Great Britain and Ireland cannot be less than £12,000,000.

The relative yield and value of the various fisheries on the separate coasts of the British Isles is illustrated in the table of landings from the latest data available.

From these figures it is manifest that the yield and value of the east coast fisheries of England and Scotland preponderate enormously over those of the western coasts, whether attention be paid to the drift-net fisheries for surface fish or to the fisheries for bottom fish with trawls and lines.

The preceding statistics and remarks, as well as the supple- mentary tables at the end of this article, indicate that the British fishing industry has enjoyed a period of unexampled prosperity. The community at large has benefited by the more plentiful supply, and the merchant by the general lowering of prices at the ports of landing (see Tables I.-IV. at end). But it is to be noted that this wave of prosperity, as on previous occasions, has been attained by the application of increased and more powerful means of capture and by the exploitation of new fishing grounds in distant waters, and not by any, increase, natural or artificial, in the productivity of the home waters, — unless perhaps the abundance of herrings is to be ascribed to the destruction of their enemies by trawling. British fisheries are still pursued as a form of hunting rather than of husbandry. In 1892 the Iceland and Bay of Biscay trawling banks were discovered, in 1898 the Faroe banks, in 1905 rich plaice grounds in the White Sea. In 1905 one-half of the cod and a quarter of the haddock and plaice landed at east coast ports of England were caught in waters beyond the North Sea.

Table showing, in Thousands of Cwt., the Quantity of Fish landed by Steam Trawlers on the East Coast of England from Fishing Grounds within and beyond the North Sea respectively.

Herring.

Cod.

Plaice.

Other Fish.

Total.

British Isles Norway . Denmark Germany Holland . . . France (1902) .

1870 352 117 220

575 635

1015

834 60

64 1

53

851 »

IIOO

40 1 58

5496 443 223

512 1

311 3562

9,481,000

1,629,000

571,000

836,000

997,000

5,048,000

Fish landed in

Excluding Shellfish.

Including Shellfish.

England and Wales …. Total

£7,200,644

2,649,148

360,577

£7,502,768

2,719,810

4H.364

£10,210,369

£10,636,942

Year.

Within the North Sea.

Beyond the North Sea.

Cod.

Haddock.

Plaice.

All Kinds.

Cod.

Haddock.

Plaice.

All Kinds.

1903 1904 1905

729

637 640

2301 2032 1560

812 658 621

4776 4228 3739

470

447 603

389 429

5i8

114

284 244

1 189

1389 1682

Fishery.

Trawl and Line.

Drift and Stake-nets.

Shellfish.

Thousands

Thousands

Thousands

Thousands

Thousands

of cwt.

of £.

of cwt.

off.

off.

England and Wales, 1905 —

East Coast

6017

4713

3042

1 145

202

- South Coast .

303

245

728

268

64

West Coast

1002

720

219

III

36

Scotland, 1906 —

East Coast

2296

1202

2709

819

25

Orkney and Shetland

114

42

1735

642

10

West Coast

148

62

591

210

38

Ireland, 1905 — North Coast .

9

5

177

70

. 7

East Coast

79

70

no

32

18

South and West Coast .

46

35

577

half of the total, the trawl fisheries nearly three-eighths, and the line fisheries one-eighth (cf. Table X.).

In Ireland the mackerel and herring fisheries provide nearly three-quarters of the total yield, the mackerel forming the chief item in the south and west, and the herring on the north and

1 Estimated as regards about one-third of the total. 2 Including the Newfoundland fishery.

The statistics of the English Board of Agriculture and Fisheries have distinguished since 1903 between the catch of fish within and beyond the North Sea, and between the catch of trawlers and liners. Neglecting the catch of the liners as relatively insignificant, and of the sailing trawlers as relatively small and practically con- stant during the three years in question, we see from the board's figures (see table above) that the total catch of English steam trawlers within the North Sea during 1904 and 1905 was in each year 500,000 cwt. less than in the year before, amounting to a gross decrease of more than 25% in 1905 as com- pared with 1903, and, in relation to the catching power employed, to an average decrease of 2\ cwt. per boat per diem. This decrease may be largely explained by the occurrence in 1903 of one of those periodic " floods " of small cod and haddock which take place in the North Sea from time to time; but the steady decline in the number of North Sea voyages by English steam trawlers — from 29,300 in 1003 to 26,700 in 1905 — affords a clear indication of the fact that many of our trawling skippers are deserting the North Sea for more profitable fishing grounds. The number of Scottish steam trawlers " employed " at Scottish North Sea ports has

also declined during the same period from 240 in 1903 to 228 in 1905.

The following table shows the number of British and foreign steam trawlers registered at North Sea ports, and for English vessels the number of fishing voyages made within and beyond the North Sea respectively: —

Year.

Boats Registered.

English Steam Trawlers. Voyages. 1

Scottish. Employed.

German, Dutch and

Belgian. Registered.

Within North Sea.

Beyond

North Sea.

1903 1904

1 9°S

1060 1049 1064

29,328 28,589 26,670

1822 2120 2671

240

233

228

181 199 228

Unfortunately the North Sea gains no rest from this with- drawal of British trawlers, since the place of the latter is filled year after year by increasing numbers of continental fishing boats. The number of fishing steamers (practically all trawlers) registered at North Sea ports in Germany and Holland was 1 59 in 1903, 177 in 1904, 205 in 1905, and 330 in 1907.

It is satisfactory under these circumstances to note the in- creased attention which has been paid in recent years to the acquisition of more exact knowledge upon the actual state of the fisheries and upon the biological and other factors which influence the supply.

A comprehensive programme of co-operative investigations, both scientific and statistical, was put into execution in the course of 1902 under the International Council for the Study of the Sea (see below). The Fishery Board for Scotland and the Marine Biological Association for England were commissioned to carry out the work at sea allotted to Great Britain, and the English fishery department was equipped soon afterwards with the means for collecting more adequate statistics.

Trawling investigations and the quantitative collection of fish eggs have located important spawning grounds of cod, haddock, plaice, sole, eel, &c; marking experiments with cod, plaice and eel have thrown much light upon the migrations of these fishes; and the rate of growth of plaice, cod and herring has been elucidated in different localities. The percentage of marked plaice annually recaptured in the North Sea has been found to be remarkably high (from 25 to 50 %), and throws a significant light on the intensity of fishing under modern con- ditions. It seems probable that the impoverishment of the stock of plaice on the central grounds of the North Sea is mainly attributable to the excessive rate of capture of plaice during their annual off-shore migrations from the coast. On the other hand, it has been shown that the growth-rate of plaice on the Dogger Bank is constantly and markedly greater (five- or six-fold in weight) than on the coastal grounds where these fish are reared, — facts which open up the possibility of increasing the permanent supply of plaice from the North Sea by the adoption of some plan of commercial transplantation (see Pisciculture).

History. — A brief review may now be given of the history of the administration of British sea-fisheries since i860, and of the steps which have been taken for the attainment of scientific and statistical information in relation thereto.

In i860 a royal commission, consisting of Professor Huxley, Mr (afterwards Sir) John Caird, and Mr G. Shaw-Lefevre (after- wards Lord Eversley), was appointed to inquire into the con- dition of the British sea-fisheries, the harmfulness or otherwise of existing methods of fishing, and the necessity or otherwise of the existing legislation. The important report of this com- mission, issued in 1866, embodied the following main conclusions and recommendations: — (1) the total supply of fish obtained upon the British coasts is increasing and admits of further augmentation; (2) beam-trawling in the open sea is not a waste- fully destructive mode of fishing; (3) all acts of parliament which profess to regulate or restrict the modes of fishing pursued in the open sea should be repealed and ” unrestricted freedom

1 Excluding the voyages of the fleeting trawlers which supply London by means of carriers.

of fishing be permitted hereafter “; (4) all fishing boats should be lettered and numbered as a condition of registration and licence.

In 1868 full effect was given to these recommendations by the passing of the Sea Fisheries Act. Regulations for the registration of fishing boats were issued by order in council in the following year. (New regulations were intro- duced in 1902.)

In 1878 a commission was given to Messrs Buck- land and Walpole to inquire into the alleged destruction of the spawn and fry of sea fish, especially by the use of the beam-trawl and ground seine. Their report is an excellent sum- mary of the condition of the sea fisheries at the time, and shows how little was then known with regard to the eggs and spawning habits of our marine food fishes.

In 1882 the former Board of British White Herring was dis- solved and the Fishery Board for Scotland instituted, the latter being empowered to take such measures for the improvement of the fisheries as the funds under their administration might admit of. Arrangements were made in the following year with Professor M’lntosh of St Andrews which enabled the latter to fit up a small marine laboratory and to begin a series of studies on the eggs and larvae of sea fishes, which have contributed greatly to the development of more exact knowledge concerning the reproduction of fishes. Under the Sea Fisheries (Scotland) Amendment Act of 1885 the board closed the Firth of Forth and St Andrews Bay against trawlers as an experiment for the purpose of ascertaining the result of such prohibition on the supply of fish on the grounds so protected. The treasury also, by a further grant of £3000, enabled the board to purchase the steam-yacht ” Garland” as a meansof carryingout regular experi- mental trawlings over the protected grounds. Reports on the results of these experiments have been annually published, and were summarized at the end of ten years’ closure in the board’s report for 1895. Dr Fulton’s summary showed that ” no very marked change took place in the abundance of food-fishes generally, either in the closed or open waters of the Firth of Forth or St Andrews Bay,” as a consequence of the prohibition of trawl- ing. Nevertheless, among fiat fishes, plaice and lemon soles, which spawn off-shore, were reported to have decreased in numbers in all the areas investigated, whether closed or open, while dabs and long rough dabs showed a preponderating, if not quite universal, increase.

The results of this classical experiment point strongly to the presumptions (1) that trawling operations in the open sea have now exceeded the point at which their effect on the supply of eggs and fry for the upkeep of the fiat fisheries is inappreciable; and (2) that protection of in-shore areas alone is insufficient to check the impoverishment caused by over-fishing off-shore. (For critical examinations of Dr Fulton's account see M'lntosh, Resources of the Sea, London, 1889; Garstang, " The Impoverish- ment of the Sea," Journ. Mar. Biol. Ass. vol. vi., 1900; and Archer, Report 0} Ichthyological Committee, Cd. 1312, 1902.)

A laboratory and sea-fish hatchery were subsequently estab- lished by the board at Dunbar in 1893, but removed to Aberdeen in 1900.

In 1883 a royal commission, under the chairmanship of, the late earl of Dalhousie, was appointed to inquire into complaints against the practice of beam-trawling on the part of line and drift-net fishermen. A small sum of money (£200) was granted to the commission for the purpose of scientific trawling experi- ments, which were carried out by Professor M'lntosh.

The report of this commission was an important one, and its recommendations resulted in the institution of fishery statistics for England, Scotland and Ireland (1885-1887).

In 1884 the Marine Biological Association of the United Kingdom was founded for the scientific study of marine zoology and botany, especially as bearing upon the food, habits and life-conditions of British food-fishes, Crustacea and molluscs. Professor Huxley was its first president, and Professor Ray

Lankester, who initiated the movement, succeeded him. A large and well-equipped laboratory was erected at Plymouth, and formally opened for work in 1888. The work of the association has been maintained by annual grants of £400 from the Fish- mongers' Company and £1000 from H. M. treasury, and by the subscriptions of the members. The association publishes a half-yearly journal recording the results of its investigations.

In 1886 a fishery department of the Board of Trade was organized under the Salmon and Freshwater Fisheries Act of that year. The department publishes annually a return of statistics of sea-fish landed,

a report on salmon fisheries (trans- ferred from the home office), and a report on sea fisheries. It consists of several inspectors under an assistant secretary of the board; it has no power to make scientific investigations or bye-laws and regulations affecting the sea-fisheries. In 1894 the administration of the acts relating to the registration of fishing vessels, &c, was transferred to the fisheries department.

In 1888 the Sea Fisheries Regulation Act provided for the constitution (by provisional order of the Board of Trade) of local fisheries committees having, within defined limits, powers for the regulation of coast fisheries in England and Wales. The powers of district committees were extended under Part II. of the Fisheries Act 1801, and again under the Fisheries (Shell Fish) Regulation Act 1894. Sea-fisheries districts have now been created round nearly the whole coast of England and Wales. Under bye-laws of these committees steam-trawling has been prohibited in nearly all the territorial waters of England and Wales, and trawling by smaller boats has been placed under a variety of restrictions. Local scientific investigations have been initiated under several of the committees, especially in Lancashire by Professor Herdman of Liverpool and his assistants.

In 1890 an important survey of the fishing grounds off the west coast of Ireland was undertaken by the Royal Dublin Society, with assistance from the government, and in the hands of Mr E. W. L. Holt led to the acquisition of much valuable information concerning the spawning habits of fishes and the distribution' of fish en the Atlantic seaboard.

In 1892, under powers conferred by the Herring Fishery (Scot- land) Act of 1889, the Fishery Board for Scotland closed the whole of the Moray Firth — including a large tract of extra-territorial waters — against trawling, in order to test experimentally the effect of protecting certain spawning grounds in the outer parts of the firth. The closure has given rise to a succession of protests from the leaders of the trawling industry in Aberdeen and England. It seems that the difficulty of policing so large an area, as well as the absence of any power to enforce the restriction on foreign vessels, have defeated the original intention; and the bye-law appears to be now retained mainly in deference to the wishes of the local line-fishermen, the decadence of whose irfdustry — from economic causes which have been alluded to above — is manifest from the figures in Table X. below. The controversy has had the effect of causing the transference of a number of English trawlers to foreign flags, especially the Norwegian.

Statistics. — The following tables summarize the official statistics of

fish landed on the coasts of England and Wales, Scotland and Ireland, and give some information relative to the numbers of fishing-boats and fishermen in the three countries.

Table I. — Summary of Statistics of Fish landed, imported and exported for the United Kingdom.

Year.

Fish landed

Net

Exports of

(excluding Shell-fish).

Imports.

British Fish.

Cwt.

1890

12,774,010

£6,361,487

£2,315,572

£1,795,267

1895

14,068,641

7,168,025

2, 453, 676

2,282,406

1900

14,671,070

9,242,491

2,937,486

3,000,852

‘ 1905

20,164,276

10,210,369

2,250,259

4,164,869

Note.— Imported fish afterwards re-exported (consisting chiefly of salted or cured fish to the value of over £900,000 in 1905) are not included in the above values of imports and exports. The exports consist mainly of herrings.

Table II. — Quantity and Average Landing Value of Flat Fishes landed on the Coasts of England and Wales {all caught with Trawl-nets, except Halibut in part).

c

rt

Quantity (in Thousands of Cwt.).

Average Price (per Cwt.).

+j

«

+j

>

• m

u

3

.0

i >

£3

3

.a

u

3

H

PQ

E

X

H

3

CQ

E

“3

X

i 8.

£ s.

£ s.

£ s.

£ s.

1890

72-1

51-9

15 ‘4

623

95

6 7

3 13

2 8

19

1 10

1895

82-8

77-9

19-0

789

114

6 16

3 17

2 11

1 1

1 15

1900

75″ 3

60-7

20-7

752

1.56

7 11

4 3

2 14

1 4

1 14

1905

8o-i

«9-5

22-4

1074

120

5 18

3 11

2 11

19

1 17

Table III. — Quantity and Average Landing Vawe of Round Fishes, caught with Trawls and Lines, landed on the Coasts of England and Wales.

Quantity (in Thousands of Cwt.).

Average Price (per Cwt.)

M

i

M

tO

>

•a

8

J4

bo

a

13

O

•0.

M

cj-j C

U

-a

U-

•a X

X

►J

c

3

CO

U

•a X

X

J

a

3

1/5

s. d.

s. d.

s. d.

s. d.

s. d.

1890

363

1585

96

1151

13 10

9 7

14 3

14

1 «9.s

496

2433

132

114

1013

12 5

9 9

16 2

11 8

13 7

1900

589

2487

233

100

1 190

14 8

13 8

15 10

12 10

14 10

1905

1423

2148

4«4

i< >5

1425

12 4

12 5

13 4

11 3

9 8

Table IV.— Quantity and Average Landing Value of Surface Fishes landed on the Coasts of England and Wales {caught with Drift-, Seine-, and Stow-nets).

u

: OJ >

Quantity (in Thousands of Cwt.).

Average Price (per Cwt.).

u

M

u cti

‘ s

bb

.5

“C u

X

■0

u

E

C/5

0)

J*

ttf

c ‘C u

X

■6

u

E

a

u

a.

I89O

1895

I9O0

1905

509

375 321

682

1332 1437 2425

3062

61

65 106 169

99 91

73 75

s. d.

15 5

16 3 15 9

8 11

s. d.

7 2 5 10 7 8 7 7

s. d.

5 10 5 3

4 6

5

s. d.

3

3 1

4 1,1 3 6

Table V. — Quantity and Average L’anding Value of Shell-fish landed on the Coasts of England and Wales.

8

>

Number.

Average Price.

Thousands.

Mills.

Thou- sands of Cwt.

Per Hundred.

Per Cwt.

to XI a

u

u

to

u

Hi tsi

J3 O ►J

10

u

V -M X > > O

to

-

‘C -a c

3

in

to

CS u

O

u5 u

O

to

u

4)

to

>,

w

*C

T3

a

3

1890

1895 1900

1905

4808 4501 5177 5106

922 677 654 503

47-6 25-3 37-8 35-4

505

59o

539 423

£• s.

1 4 1 4 1 2

1 3

£ s.

4 18

4 8 4 7 4 15

S. d.

6 1

6 2

7 5 9

s. d. 5 P

4 11

5 8 5 6

Table VI. — Total Quantity of the more important Fishes and Shell-fish landed in Scotland.

Year.

In Thousands erf Cwt.

Cwt.

Number (Thousands).

c

‘E

X

c .

4J

u ft >

a.ya; or 1 ‘

3

to a

1

f

IS

1

6

in

O

t

1890

189s

1900

19ˆ5

3980 4077

352°

5343

17 19

21 31

8t

80

102

561

20

2g

26 36

440 459 434 677

170 165 157

LSI

754 1001 761 932

75 43 75 184

54 59 72 100

181

j 94

143 103

2882 2548 3128

I990

643

6lO

680 760

3S»-

239 796 218

1 Plaice only.

FISHERIES

433

Table VII. — Total Quantity of the more important Fishes and Shell-fish returned as landed on the Irish Coasts.

>

In Thousands of Cwt.

Number (Thousands).

u

J*

C3

3

c ‘C u

~o

3

■a

U

ti

c

A

8

■0

-0

IS

o3

to

t*

> >

O

2

u

en

U,

CO

O

1890

1895 1900

1905

502

339

278

505

85 171 284 354

4‘5

1-8

3-1

3-5

1-4

1-0

i-5 o-8

39-6

43-6 33-6 18-6

14-8

29-7

n-9

9-1

ib-4

30-9

12-4

n-3

13-5

n-9 u-9

18-3

25-3

187

16-3

7-1

576 563

236 348

228 24.0 202 175

238 276 286 236

Note. — The Irish statistics of shell-fish are very incomplete, owing to the inadequate means at the disposal of the authorities for collect- ing statistics over large sections of the coast.

divergencies of opinion on the question whether the low size- limits proposed would be effectual in keeping the trawlers from working on the grounds where small fish congregated, the committee reported against the bill, and urged the immediate equipment of the government departments with means for undertaking the necessary scientific investigations.

In 1901 an international conference of representatives of all the

countries bordering upon the North and Baltic Seas met at Christiania to revise proposals which had been drafted at Stock- holm in 1899 for a scientific exploration of these waters in the interest of the fisheries, to be undertaken concurrently by all the participating countries. The British government was represented by Sir Colin Scott-Moncrieff, K.C.M G., with Pro- fessor D'Arcy W. Thompson, Mr (afterwards Professor) W. Garstang and Dr H. R. Mill as advisers. The proposals were subsequently accepted, with some restrictions, and an interna-

Table VIII.— Classified List of British Fishing Boats on the Register for 1905, omitting 2nd Class Steamers tl0nal council of manage-

and Vessels under 18 Ft. Keel or Navigated by Oars only and Vessels unemployed.

Mode of Fishing.

England and Wales.

Scotland.

Ireland. 1

Steamers. 1st CI.

Sailing. 1st CI. 2nd CI.

Steamers. 1st CI.

Sailing. 1st CI. 2nd CI.

Steamers. 1st CL-

Sailing. 1st CI. 2nd CI.

Trawling . Drift-nets Lines Various .

1 173 263

56 21

904

562

29

215

586

539 685

2277

244 209

3403

68 2910

IO

142 229

283 2776

Total .

1513

1710

4087

453

3403

2978

10

371

3059

Note-

meat was appointed by the participating govern- ments. The Fishery Board for Scotland and the Marine Biological Association from England were commissioned in 1902 to carry out the work at sea allotted to Great Britain, and a special grant of £5500 per annum was made to

1st class = steamers of at least 15 tons gross tonnage, and other boats of at least 15 tons registered eacn body by the Trea tonnage (in Scotland exceeding 30 ft. keel). . y ,.

‘ ‘ less than 15 tons tonnage, or from 18 to 30 ft. keel. surv 10r tnls purpose.

Two steamers, the

2nd class =

Table IX. — Number (A) of Men and Boys constantly employed and (B) of other Persons occasionally employed in Fishing.

Year.

England and Wales.

Scotland.

Ireland.

United Kingdom.

A.

B.

A.

B.

A.

B.

A.

B.

1890

189s

1900

I9°5

32,503 32,229 31,589 34,318

93″ 8995 7994 8132

34,3 > 9 3i,°44

27,288 29,064

20,829 12,329 10,288 10,487

10,121 8,692 8,677 8,744

13,981 18,218 18,982 17,079

78,450 73,090 68,708 73,293

46,i37

41,230

37,8l4

Table X.-

-Catch and Value of Line-caught and Trawled Fish landed in Scotland.

Year.

Line-caught Fish.

Trawled Fish.

Cwt.

Cwt.

1890

1-577.299

£59i.o59

291,812

£203,620

1895

1,479.654

548,629

531.695

291,165

1900

757.416

37LI73

1,077,082

703.427

1905

735.654

348,610

1. 745.431

948,117

In 1893 a select committee of the House of Commons took evidence as to the expediency of adopting measures for the preservation of the sea-fisheries in the seas around the British Islands, with especial reference to the alleged wasteful destruction of under-sized fish. They recommended the adoption of a size- limit of 8 in. for soles and plaice, and 10 in. for turbot and brill, below which the sale of these fishes should be prohibited, on the ground that these limits would approximate to those already adopted by foreign countries.

In 1899 the Agriculture and Technical Instruction (Ireland) Act transferred the powers and duties of the inspectors of Irish fisheries to the Department of Agriculture and Technical Instruc- tion for Ireland. The department is provided with a steam cruiser, the “Helga,” 375 tons, fully equipped for fishery research, as well as with a floating marine laboratory. Mr Holt, formerly of the Marine Biological Association, was appointed to take charge of the scientific work.

In 1900 another select committee of the House of Commons was appointed to consider and take evidence on the proposals of the Sea

Fisheries Bill, which had been framed in accordance with the recommendations of the select committee of 1893, but had failed to pass in several sessions of parliament. Owing to marked

" Huxley " and the " Goldseeker," were chartered for the investi gations and began work in 1902 and 1903 from Lowestoft and Aberdeen respectively. Reports on the work of the first five years were published in 1909.

In 1901 the Board of Trade appointed a committee (the Committee on Ichthyological Research) to inquire and report as to the best means by which scientific fishery research could be organized and assisted in relation to the state or local authori- ties. The committee consisted of Sir Herbert Maxwell, M.P. (chairman), Mr W. F. Archer, Mr Donald Crawford, Rev. W. S. Green, Professor W. A. Herdman, Hon. T. H. W. Pelham, Mr S. E. Spring Rice and Professor J. A. Thomson. Sir Herbert Maxwell resigned his chairmanship before the report was drawn up (September 1902), and was succeeded by Sir Colin Scott- Moncrieff. The committee recommended the provision of more complete statistics; the provision and maintenance of five special steamers (where not already existing) to work in connexion with as many marine laboratories, viz. one for each of the three coasts of England and Wales, and one each for Scotland and Ireland; the provision of three biological assistants at each laboratory; the grant of statutory powers to local sea-fisheries committees to expend money on fishery research; the constitution of a fishery council for England and Wales, and of a conference of represent- atives of the central authorities in England, Scotland and Ireland. In 1903 the fishery department of the Board of Trade was transferred to the Board of Agriculture, Mr W. E. Archer, chief inspector of fisheries, becoming an assistant secretary of the new Board of Agriculture and Fisheries.

In 1907 a departmental treasury committee was appointed to inquire into the scientific and statistical investigations carried on in relation to the fishing industry of the United Kingdom. The committee consisted of Mr H. J. Tennant, M.P. (chairman), Lord Nunburnholme, Sir Reginald MacLeod, Mr N. W. Helms, M.P., Mr A. Williamson, M.P*., Dr P. Chalmers Mitchell, F.R.S., Mr J. S. Gardiner, F.R.S., the Rev. W. S. Green, Mr R. H. Rew and Mr L. S. Hewby. This committee revie'wed the work that had already been done and urged its continuation and extension under the direction of a central council composed of represent- atives of the government departments concerned with fishery matters in England, Scotland and Ireland, with a scientific

chairman and director, and further insisted on the need of international co-operation in the investigations.

United Slates Fisheries. — The administration of the fisheries of the United States of America is under the control of the several coastal states, but the Bureau of Fisheries at Washing- ton, which reports to the secretary of commerce and labour, conducts a vast amount of scientific fishery investigation, issues admirable statistical and biological reports, and conducts on a very large scale work on the replenishment of the fishing stations by artificial means (see Pisciculture). Although in recent years Canada has given an increasing amount of state support to the investigation, control and assistance of her fisheries, an amount actually and relatively far exceeding that given in Great Britain, the fishing industry of the United States still far exceeds that of Canada. A considerable bulk of fish, taken by American ships from the Newfoundland coasts and from those of other British provinces, is landed at American ports, but as the follow- ing recent table shows, it is much less than that taken from American waters.

Quantities and Values of Fish landed by American Vessels at Boston and Gloucester, Mass., in 1905.

Quantities.

Value.

(a) From fishing grounds off U.S.

coasts

(b) From fishing grounds off New-

foundland

(c) From fishing grounds off other

British provinces

152,241,139 17,165,083 32,608,343

£669,640 I03.H5

192.517

The fisheries of the United States show a substantial increase from year to year. There has been a decline in some important branches owing to indiscreet fishing and to the inevitable effects of civilization on certain kinds of animal life and in certain restricted areas. Such diminution has been more than com- pensated for by growth resulting from the invasion of new fishing grounds made possible by increase in the sea-going capacity of the vessels employed, by improvement in the preservation and handling of the catch, and by the greater utilization of products which until comparatively recently were disregarded or considered without economic value. The annual value of the water products taken and sold by the United States fishermen now amounts to over £11,000,000, and this sum does not include the very large quantities taken by the fishermen for home consumption or captured by sportsmen and amateurs. Between two and three hundred thousand persons make a livelihood by the industry, and the capital involved exceeds £16,000,000.

The oyster is the most valuable single product, and the output of the United States industry exceeds the combined output of all other countries in the world. The most notable feature of this fishery is that nearly half the total yield now comes from cultivated grounds, so that the business is being placed on a secure basis. Virginia has now taken the first rank as an oyster- producing state, oyster" farming being now highly developed with an annual yield of nearly nine million bushels.

The high-sea fisheries for cod, haddock, hake, halibut, mackerel, herring, and so forth are on the whole not increasing in prosperity, the annual value being between one and two million pounds. The lobster, fishery shows a markedly diminishing yield, the diminution having been progressive since about 1890, and being attributed to over-fishing and violation of the restrictive regulations. At present a large part of the lobsters consumed in the United States comes from Nova Scotia, but there is evidence of useful results coming from the extensive cultural operations now being carried out.

The whale fishery, at one time the leading fishing industry of the country, is now conducted chiefly in the North Pacific and Arctic oceans, but is decaying, being now expensive, un- certain and often unremunerative. The annual value of the take is now under £200,000.

The important group of anadromous fishes (those like salmon, shad, alewife, striped bass and sea perches, which ascend the rivers from the ocean) has continued to provide an increasing

source of income to fishermen, the combined value 01 me catch on

the Atlantic and Pacific seaboards now amounting to over £3,000,000 annually. The fisheries of the Great Lakes yield about £600,000 annually. (W. Ga.; P. C. M.)

FISHERY (Law or). This subject has (1) its international aspect; (2) its municipal aspect. On the high seas outside territorial waters the right of fishery is now recognized as common to all nations. Claims were made in former times by single nations to the exclusive right of fishing in tracts of open sea; such as that set up by Denmark in respect of the North Sea, as lying between its possessions of Norway and Iceland, against England in the 17th century, and against England and Holland in the 18th century, when she prohibited any foreigners fishing within 15 German miles of the shores of Greenland and Iceland. This claim, however, was always effectively resisted on the ground stated in Queen Elizabeth's remonstrance to Denmark on the subject in 1602, that " the law of nations alloweth of fishing in the sea everywhere, even in seas where a nation hath propertie of command." The enunciation of this principle is to be found, also, in the award of the arbitration court which decided the question of the fur-seal fishery in Bering Sea in 1894. (See Bering Sea Arbitration; Arbitration, International.) The right of nations to take fish in the sea may, however, be restrained or regulated by treaty or custom; and Great Britain has entered into conventions with other nations with regard to fishing in certain parts of the sea. The provisions of such conventions are made binding on British subjects by statutes.

Instances of these are the conventions of 181 8 and 1872 between Great Britain and the United States as to the fisheries on the eastern coasts of British North America and the United States within certain limits, and the award of the Bering Sea arbitration tribunal under the treaty of 1892; the conventions between Great Britain and France in 1839 and 1867 as regards fishing in the seas adjoining these countries, the latter of which will come into force on the repeal of the former; the agreement of 1904 with respect to the New- foundland fisheries (see Newfoundland); the convention of 1882 between Belgium, Denmark, France, Germany, Great Britain and Holland, regarding the North Sea fisheries; that of 1887 between the same parties concerning the liquor traffic in the North Sea; and the declaration regarding the same waters made between Great Britain and Belgium for the settlement of differences between their fishermen subjects in such extra-territorial waters. At the instance of the Swedish government the British parliament also passed an act in 1875 to establish a close time for the seal fishery in the seas adjacent to the eastern coasts of Greenland.

Cases have come before British courts with regard to the whale fishery in northern and southern seas; and the customs proved to exist among the whaling ships of the nations engaged in a particular trade have been upheld if known to the parties to the action. In territorial waters, on the other hand, fishery is a right exclusively belonging to the subjects of the country owning such waters, and no foreigners can fish there except by convention.

(a) Tidal Waters.- — In British territorial waters, it may be stated, as the general rule, that fishery is a right incidental to the soil covered by the waters in which that right is exercised.

The bed of all navigable rivers where the tide flows and reflows, and of all estuaries or arms of the sea, is vested in the crown ; and therefore, in Lord Chief Justice Hale's words, " the right of the fishery in the sea and the creeks and arms thereof is originally lodged in the crown, as the right of depasturing is originally lodged in the owner of the waste whereof he is lord, or as the right of fishing belongs to him that is the owner of a private or inland river. " But," he continues, " though the king is the owner of this great waste, and as a consequent of his propriety hath the primary right of fishing in the sea and the creeks and arms thereof, yet the common people of England have regularly a liberty of fishing therein as a

Cublic common of piscary, and may not without injury to their right e restrained of it unless in such places or creeks or navigable rivers where either the king or some particular subject hath gained a propriety exclusive of that common liberty " (De Jure Maris, ch. iv.)_

This right extends to all fish floating in the sea or left on the seashore, except certain fish known as royal fish, which, when taken in territorial waters, belong to the crown or its grantee, though caught by another person. These are whales, sturgeons and porpoises; and grampuses are also sometimes added (whales, porpoises and grampuses being " fishes " only in a legal sense). In Scotland only whales which are of large size can be so claimed;

but the rights of salmon fishing in the sea and in public and private rivers, and those of mussel and oyster fishing, except in private rivers, are inter regalia, and are only enjoyable by the crown or persons deriving title under it. As salmon fishery was formerly practised by

nets and engines on the shore, and the mussel and oyster fisheries were necessarily carried on on the shore, the opinion was held at one time that angling for salmon was a public right, but the later decisions have established that the right of salmon fishing by whatever means is a jus regale in Scotland. In England the crown in early times made frequent grants of fisheries to subjects in tidal waters, and instances of such fisheries belonging to persons and corporations are very common at the present day: but by Magna Carta the crown declared that ” no rivers shall be defended from henceforth, but such as were in defence in the time of King Henry, our grandfather, by the same places and the same bounds as they were wont to be in his time”; and thus bound itself not to create a private fishery in any navigable tidal river. Judicial decision and commentators having interpreted this statute according to the spirit and not the letter, at the present day the right of fishery in tidal waters prima facie belongs to the public, and they can only be excluded by a particular person or corpora- tion on proof of an exclusive right to fish there not later in its origin than Magna Carta; and for this it is necessary either to prove an actual grant from the crown of that date to the claimant’s predecessor in title, or a later grant or immemorial custom or prescription to that effect, from which such an original grant may be presumed. This exclusive right of fishing may be either a franchise derived from the crown, or may arise by virtue of ownership of the soil covered by the waters.

In Lord Hale’s words: ” Fishing may be of two kinds ordinarily, viz. fishing with a net, which may be either as a liberty without the soil, or as a liberty arising by reason of and in concomitance with the soil or an interest or propriety of it ; or otherwise it is a local fishing that ariseth by or from the propriety of the soil, — such are gurgites, wears, fishing-places, borachiae, stachiae, which are the very soil itself, and so frequently agreed by our books. And such as these a subject may have by usage; either in gross, as many religious houses had, or as parcel of or appurtenant to their manors, as both corporations and others have had ; and this not only in navigable rivers and arms of the sea but in creeks and ports and havens, yea, and in certain known limits in the open sea contiguous to the shore. And these kinds of fishings are not only for small sea-fish, such as herrings, &c, but for great fish, as salmons, and not only for them but for royal fish. . . . Most of the precedents touching such rights of fishing in the sea, and the arms and creeks thereof belonging by usage to subjects, appear to be by reason of the propriety 01 the very water and soil wherein the fishing is, and some of them even within parts of the seas ” (De Jure Maris, ch. v.)

An instance of the former kind of fishery is to be found in the old case

of Royal Fishery of the River Bann (temp. James I., Davis 655), and the modern one of Wilson v. Crossfield, 1885, 1 T.L.R. 601, where a right of fishery in gross was established; but the latter kind, as Hale says, is much more common, and the presumption is always in its favour; A fortiori where the fishing is proved to have been carried on by means of engines or struc- tures fixed in the soil. In England the public have not at com- mon law, as incidental to their right of fishing in tidal waters, the right to make use of the banks or shores for purposes in- cidental to the fishery, such as beaching their boats upon them, landing there, or drying their nets there (though they can do so by proving a custom from which such a grant may be presumed) ; but statutes relating to particular parts of the realm, such as Cornwall for the pilchard fishery, give them such rights. In Scotland a right of salmon fishing separate from land implies the right of access to and use of the banks, foreshores or beach for the purposes of the fishing; and so does white fishing by statute. But otherwise there is no right to do so, e.g. in a public river for trout fishing. A similar privilege is given to Irish fishermen for the purpose of sea fishery by special statute. There is no property in fish in the sea, and they belong to the first taker; and the custom of the trade decides when a fish is taken or not, e.g. in the whale fishery the question whether a fish is ” loose ” or not has come before English courts.

(b) Fresh Waters. — In non-tidal waters in England and

Ireland, for the reason given above, the presumption is in favour of the fishery in such waters belonging to the owners of the ad- jacent lands; ” fresh waters of what kind soever do of common right belong to the owners of the soil adjacent, so that the owners of the one side have of common right the property of the soil, and consequently the right of fishing usque ad filum aquae, and the owners of the other side the right of soil or ownership and fishing unto the filum aquae on their side ; and if a man be owner of the land on both sides, in common presumption he is owner of the whole river, and hath the right of fishing according to the extent of his land in length ” (Hale, ch. L). There is a similar presumption that the owner of the bed of a river has the exclusive right of fishery there, and this is so even though he does not own the banks; but these presumptions may be displaced by proof of a different state of things, e.g. where the banks of a stream are separately owned the owner of one bank may show by acts of ownership exercised over the whole stream that he has the fishery over it all. The crown prerogative of fishery, never it seems, extended to non-tidal waters flowing over the land of a subject, and it could not therefore grant such a franchise to a subject, nor has it any right de jure to the soil or fisheries of an inland lake such as Lough

Neagh {Bristow v. Cormican, 1878, 3 App. Cas. 641). The public cannot acquire the right to fish in fresh waters by prescription or otherwise although they are navigable; such a right is unknown to law, because a profit a prendre in alieno solo is neither to be acquired by custom nor by prescription under the Prescription Act. It has been decided that the ” dwellers ” in a parish cannot acquire such a right, being of too vague a class; but the commoners in a manor may have it by custom; and the ” free inhabitants of ancient tene- ments ” in a borough have been held capable of acquiring a right to dredge for oysters in a fishery belonging to the corpora- tion of the borough on certain days in each year by giving proof of uninterrupted enjoyment of it from time immemorial, on the presumption that this was a condition to which the grant made to the corporation was subject.

In Scotland the law is similar. The right to fish for trout in private streams is a pertinent of the land adjacent, and owners of opposite banks may fish usque ad medium filum aquae; and where two owners own land round a private loch, both have a common of fishing over it. The public cannot prescribe for it, for a written title either to adjacent lands or to the fishery is necessary. A right of way along the bank of a river or loch does not give it, nor does the right of the public to be on or at a navigable but non-tidal river. The right of salmon fishing carries with it the right of trout fishing: and eel fishing passes in the same way.

In England and Ireland private fisheries have been divided into (a) several (separalis), (b) free (libera), (c) common of piscary (communis) , whether in tidal or non-tidal waters. The distinction between several and free fisheries has always been uncertain. Blackstone’s opinion was that several fishery implied a fishery in right of the soil under the water, while free fishery was confined to a public river and did not necessarily comprehend the soil. He is supported by later writers, such as Woolrych and Paterson. On the other hand, the opinions of Coke and Hale are opposed to this view. ” A man may prescribe to have a several fishery in such a water, and the owner shall not fish there; but if he claim to have common of fishery or free fishery the owner of the soil shall fish there” (Co Littl. 122 A); “one man may have the river and others the soil adjacent: or one man may have the river and soil thereof, and another the free or several fishing in that river ” (De Jure Maris, ch. i.). Lord Holt, though in one instance he distinguished them, in a later case thought that they were ” all one.” Later decisions have established the latter view, and it is now settled that although the owner of the several fishery is prima facie owner of the soil of the waters, this presump- tion may be displaced by showing that the terms of the grant only convey an

incorporeal hereditament, and that the words ” sole and exclusive fishery ” give a several fishery in alieno solo. In the words of Mr Justice Willes, ” the only substantial distinc- tion is between an exclusive right of_fishery, usually called

‘ several,’ and sometimes ‘ free,’ as in ‘ free warren,’ and a right in common with others, usually called ‘ common of fishery,’ and sometimes ‘ free,’ as in ‘ free port.’ A several fishery means an exclusive right to fish in a given place, either with or without the property in the soil ” {Malcolmson v. O’Dea, 1863, 10 H.L.). A common of piscary, or ” a right to fish in common with certain other persons in a particular stream,” is usually found in manors, the commoners of which may have the right to enjoy it to an extent sufficient for the sustenance of their tenements; but they cannot, except by immemorial special prescription, exclude the lord of the manor therefrom, and have no rights over the soil itself. Decisions also establish that a grant of ” fishery ” will prima facie pass an exclusive fishery; a grant of soil covered by water or a lease of lands including water will pass the fishery therein; a several fishery will not merge on being resumed by the crown; and a fishery situate within a manor is presumed to belong to the owners of adjacent land, and not to the lord. A several fishery, as already seen, being an incorporeal heredita- ment, can only be transferred by deed, and therefore cannot be abandoned, and so acquired by the public, even on proof that the public have, as far back as living memory, exercised the right of fishing in the locus in quo to the knowledge of and without interruption from the claimant of the fishery. But to establish a title to a several fishery, a ” paper title,” i.e. one founded on documentary evidence only, is not sufficient; it must be sup- ported by evidence of acts of ownership in recent times, for otherwise it will be presumed that a person other than the alleged owner is the real owner. If the waters of a tidal river leave their old channel and flow into another, the owner of a several fishery in the old channel cannot claim to have it in the new one; but, on the other hand, the owner of a several fishery can take advantage of a gradual encroachment by the river upon and into the land of a riparian owner, the limits of whose land are ascertained. The owner of an exclusive fishery, whether in tidal or fresh waters, has the right to take as many fish as he can, and may do so by means of fixed engines or dredging, provided that in navigable waters he does not interfere with the right of navigation, and that in navigable and other waters he does not interfere with the fishing

rights of his neighbours or infringe the provisions made by old or modern statutes as to the methods of taking the fish, e.g. by weirs. These were forbidden in rivers by Magna Carta and later statutes, and on the seashore by a statute of James I.; but all weirs in navigable fresh waters traceable to a date not later than 25 Edward III. are lawful, for the statutes forbidding weirs do not apply to navigable waters. It seems, however, that at common law any fixed structures put up by the owner of a fishery in his part of a river, which at all prevent the free passage of fish to the waters above or below, give the owners of fisheries therein a right of action against him. So the grantee of an exclusive fishery with rod and line in an unnavigable river can prevent any person from polluting the river higher up and so damaging the fishery. At common law there is no property in fish when enjoying their natural liberty; the taker is entitled to keep them unless they are caught from a tank or small pond; or except in the case of salmon by statute.

Modern statutes now regulate all fisheries, sea or fresh, in territorial or inland waters. As regards sea fishery in England, the Board of Agriculture and Fisheries has (since 1903, when it took it over from the Board of Trade) power by order to create sea fisheries districts, comprising any part of the sea within which British subjects have, by international law, the exclusive right of fishing, and to provide for the constitution of a local fisheries committee to regulate the sea fisheries in such district, which can make by-laws for that purpose. It appoints fishery officers to enforce them, prescribes a close time for sea fish (which does not include salmon as defined in the Salmon Act), has summary jurisdiction over offences committed on the sea coast or at sea beyond the ordinary jurisdiction of a court of summary jurisdiction, can enforce the Sea Fisheries Acts, or regulate, protect and develop fisheries for all or any kind of shell fish. Special provision is also made by statute for the oyster

fishery and herring fishery (applicable also to Scotland), and that of mussels, cockles, lobsters and crabs (applicable to all the United Kingdom) . In Scotland the Fishery Board .can constitute sea fishery districts, and boards with like powers to those in England, and has general control over the coast and deep-sea fisheries of Scotland; and there are acts relative to herring, mussel and oyster fisheries, and allowing the appropriation of money intended to relieve local distress and taxation towards the encouragement of sea fisheries, and marine superintendence and enforcement of Scottish sea. fisheries laws. In Ireland the sea fisheries are under the direction of the inspectors of Irish fisheries, who have replaced the former fishery commissioners and special commissioners for Irish fisheries; special statutes, besides

the general ones applying to all the United Kingdom, deal with oyster fisheries and mussel fisheries; and money is also appropriated for sea fisheries under the head of technical instruction. In all three component parts of the United Kingdom there are also special statutes relative to salmon and freshwater fish: for England, the Salmon and Freshwater Fisheries Acts 1861-1007, and the Freshwater Fisheries Acts 1878-1886; for Scotland the chief Salmon Acts are those of 1862-1868, and for trout and freshwater fish those of 184 5-1902; for Ireland, the Fisheries (Ireland) Acts 1842-1901. A similar scheme is adopted in each case, namely, fishery districts and district boards are set up which regulate the fishing by by-laws and protect the fish by fixing a close time, and prescribing passes, licences, inspection and the like, breaches of which are punishable by courts of summary jurisdiction. The supreme authorities in each case are — for England the Board of Agriculture and Fisheries, for Scotland the Fishery Board, and for Ireland the inspectors of fisheries, and in England a certain official number of conservators on such boards are appointed by the county councils. The Salmon and Freshwater fisheries Act 1907 gives the Board of Agriculture and Fisheries power to make provisional orders for the regulation of salmon fisheries or freshwater fisheries within any area on the application of any board of conservators, or of a county council, or of the owners of one-fourth in value of private fisheries. There are also special acts dealing with the fishing in certain rivers, such as the Thames, Medway, Severn, Tweed and Esk. (The act of 1907 applies, however, to the Esk, but not otherwise to Scotland nor to Ireland.) Throughout the United Kingdom the use of dynamite or other explosive substance to catch or destroy fish in any public fishery is prohibited, as it is also in England in any private waters subject to the Salmon and Freshwater Fisheries Acts 1878, in which it is also forbidden to use poison or other noxious substance for destroying fish. Officers in the army or marines are forbidden (under penalty) to kill fish without written leave from the person entitled to grant it. There are also provisions of the criminal law dealing with the protection of fisheries generally, as well as the provisions of the acts already mentioned dealing with special kinds of fish.

Special provision is made by the Merchant Shipping Acts 1 894- 1 906 for sea-fishing boats (except in Scotland and the colonies), relating to their registration, carrying official papers, carrying boats in proportion to their tonnage, the punishment of offences on board, the wages of their crews, and keeping record of all casualties, punishments and the like on board. As regards trawlers, especially in the case of those of 25 tons and upwards, a statutory form of agreement with the crew is prescribed, as well as accounts of wages and discharges; and skippers

and second hands must have certificates of competency, which are granted under similar conditions to those required in the case of seagoing ships and are registered with the Board of Trade. Scottish fishing boats are regulated by a special statute of 1886 (except as regards agreements to pay crew by share of profits, dealt with by the above act) and by the Sea Fisheries Act of 1868, which applies to all British fishing boats. Particular lights must be carried by fishing boats in navigation. An act of 1908 (The Cran Measures Act) legalized the use of cran measures in connexion with trading in fresh herrings in England and Wales, the Board of Agriculture and Fisheries being empowered to make regula- tions under the act.

Authorities. — Green, Encyclopaedia of Scots Law (Edinburgh, 1896); Stewart, Law of Fishing in Scotland (Edinburgh, 1869); Woolrych, Waters (London, 1851); Paterson, Fishery Laws of the United Kingdom (London and Cambridge, 1863); Stuart Moore, Foreshore (London, 1888); Phillimore, International Law (3rd ed., London, 1879) ; Martens, Causes celebres du droit des gens (Leipzig, 1827); Selwyn, Nisi Prius, Fishery (London, 1869). (G. G. P.*)

FISHGUARD (Abergwaun), a market town, urban district, contributory parliamentary borough and seaport of Pembroke- shire, Wales, near the mouth of the river Gwaun, which here flows into Fishguard Bay of St George's Channel. Pop. (1901) 2002. Its railway station, which is the chief terminus of the South Wales system of the Great Western railway, is at the hamlet of Goodwick across the bay, a mile distant to the south-west. Fishguard Bay is deep and well sheltered from all winds save those of the N. and N.E., and its immense commercial value has long been recognized. After many years of labour and at a great expenditure of money the Great Western railway has constructed a fine breakwater and railway pier at Goodwick across the lower end of the bay, and an important passenger and goods traffic with Rosslare on the opposite Irish coast was inaugurated in 1906.

The importance of Fishguard is due to the local fisheries and the excellence of its harbour, and its early history is obscure. The chief historical interest of the town centres round the so- called "Fishguard Invasion" of 1797, in which year on the 22nd of February three French men-of-war with troops on board, under the command of General Tate, an Irish-American adven- turer, appeared off Carreg Gwastad Point in the adjoining parish of Llanwnda. To the great alarm

of the inhabitants a body of about 1400 men disembarked, but it quickly capitulated, practically without striking a blow, to a combined force of the local militias under Sir Richard Philipps, Lord Milford and John Campbell, Lord Cawdor; the French frigates meanwhile sailing away towards Ireland. For many years the castles and prisons of Haverfordwest and Pembroke were filled to over- flowing with French prisoners of war. Close to the banks of the Gwaun is the pretty estate of Glyn-y-mel, for many years the residence of Richard Fenton (1746-1821), the celebrated anti- quary and historian of Pembrokeshire.

FISHKILL LANDING, or Fishkill-on-the-Hudson, a village of Fishkill township, Dutchess county, New York, U.S.A., about 58 m. N. of New York City, on the E. bank of the Hudson river, opposite Newburgh. Pop. (1890) 3617; (1900) 3673, of whom 540 were foreign-born; (1905) 3939; (1910) 3902, of Fishkill township (1890) 11,840; (1900) 13,016; (1905) 13,183; (1910) 13,858. In the township are also the villages of Matteawan (q.v.), Fishkill and Glenham. Fishkill Landing is served by the New York Central & Hudson River and the New York, New Haven & Hartford railways; by railway ferry and passenger ferries to Newburgh, connecting with the West Shore railway; by river steamboats and by electric railway to Matteawan. Four miles farther N. on Fishkill Creek is the village of Fishkill (incorporated in 1899), pop. (1905) 579. In this village are two notable old churches, Trinity (1769), and the First Dutch Reformed (1731), in which the New York Provinical Congress met in August and September 1776. At the old Verplanck mansion in Fishkill Landing the Society of the Cincinnati was organized in 1783. Among the manu- factures of Fishkill Landing are rubber-goods, engines (Corliss) and other machinery, hats, silks, woollens, and brick and tile. The village of Fishkill Landing was incorporated in 1864. The first settlement in the township was made about 1690. The township of Fishkill was, like Newburgh, an important military post during the War of Independence, and was a supply depot for the northern Continental Army.

FISK, JAMES (1834-1872), American financier, was born at Bennington, Vermont, on the 1st of April 1834. After a brief period in school he ran away and joined a circus. Later he became a hotel waiter, and finally adopted the business of his father, a pedlar. He then became a salesman for a Boston dry goods firm, his aptitude and energy eventually winning for him a share in the business. By his shrewd dealing in army contracts during the Civil War. and it is said by engaging in cotton smuggling,

he accumulated a considerable capital which he soon lost in

speculation. In 1864 he became a stockbroker in New York and was employed by Daniel Drew as a buyer. He aided Drew in his war against Vanderbilt for the control of the Erie railway, and as a result of the compromise that was reached he and Jay Gould became members of the Erie directorate. The association with Gould thus began continued until his death. Subsequently by a well-planned " raid," Fisk and Gould obtained control of the road. They carried financial " buccaneering " to extremes, their programme including open alliance with the Tweed " ring," the wholesale bribery of legislatures and the buying of judges. Their attempt to t corner the gold market culminated in the fateful Black Friday of the 24th of September 1869. Fisk was shot and killed in New York City by E. S. Stokes, a former business associate, on the 6th of January 1872.

FISK, WILBUR (1792-1839), American educationist, was born in Brattleboro, Vermont, on the 31st of August 1792. He studied at the university of Vermont in 1812-1814, and then entered Brown University, where he graduated in 1815. He studied law, and in 181 7 came under the influence of a religious revival in Vermont, where at Lyndon in the following year he was licensed as a local preacher and was admitted to the New England conference. His influence with the conference turned that body from its opposition to higher education as immoral in tendency to the establishment of secondary schools and colleges. Upon the removal in 1824 of the conference's academy at New Market, New Hampshire, to Wilbraham, Massachusetts, Fisk became one of its agents and trustees, and in 1826 its principal. He drafted the report of the committee on education to the general conference in 1828, at which time he declined the bishopric of the Canada conference. He was first president of Wesleyan University from the opening of the university in 1 83 1 until his death on the 22nd of February 1839 in Middle- town, Connecticut. His successful administration of the Wesleyan Academy at Wilbraham and of Wesleyan University were remark- able. He was an able controversialist, and in the interests of Arminianism attacked both New England Calvinism and Unitarianism; he published in 1837 The Calvinistic Controversy. He also wrote Travels on the Continent of Europe (1838).

See Life and Writings of Wilbur Fisk (New York, 1842), edited by Joseph Holdich, and the biography by George Prentice (Boston, 1890), in the American Religious Leaders Series; also a sketch in Memoirs of Teachers and Educators (New, York, 1861), edited by Henry Barnard.

FISKE, JOHN (1842-1901), American historical, philosophical and scientific writer, was born in Hartford, Connecticut, on the 30th of

March 1842, and died at Gloucester, Massachusetts, on the 4th of July 1901. His name was originally Edmund Fiske Green, but in 1855 he took the name of a great-grandfather, John Fiske. His boyhood was spent with a grandmother in Middletown, Connecticut; and prior to his entering college he had read widely in English literature and history, had surpassed most boys in the extent of his Greek and Latin work, and had studied several modern languages. He graduated at Harvard in 1863, continuing to study languages and philosophy with zeal; spent two years in the Harvard law school, and opened an office in Boston; but soon devoted the greater portion of his time to writing for periodicals. With the exception of one year, he resided at Cambridge, Massachusetts, from the time of his graduation until his death. In 1869 he gave a course of lectures at Harvard on the Positive Philosophy; next year he was history tutor; in 1871 he delivered thirty-five lectures on the Doctrine of Evolution, afterwards revised and expanded as Outlines of Cosmic Philosophy (1874); and between 1872 and 1879 he was assistant-librarian. After that time he devoted himself to literary work and lecturing on history. Nearly all of his books were first given to the public in the form of lectures or magazine articles, revised and collected under a general title, such as Myths and Myth-Makers (1872), Darwinism and Other Essays (1879), Excursions of an Evolutionist (1883), and A Century of Science (1899). He did much, by the thoroughness of his learning and the lucidity of his style, to spread a knowledge of Darwin and Spencer in America. His Outlines of Cosmic

Philosophy, while Setting forth the Spencerian system, made psychological and sociological additions of original matter, in some respects anticipating Spencer's later conclusions. Of one part of the argument of this work Fiske wrote in the preface of one of his later books {Through Nature to God, 1899): " The detection of the part played by the lengthening of infancy in the genesis of the human race is my own especial contribution to the Doctrine of Evolution." In The Idea of God as affected by Modem Knowledge (1885) Fiske discusses the theistic problem, and declares that the mind of man, as developed, becomes an illuminating indication of the mind of God, which as a great immanent cause includes and controls both physical and moral forces. More original, perhaps, is the argument in the immedi- ately preceding work, The Destiny of Man, viewed in the Light of his Origin (1884), which is, in substance, that physical evolution is a demonstrated fact; that intellectual force is a later, higher and more

potent thing than bodily strength; and that, finally, in most men and some ” lower animals ” there is developed a new idea of the advantageous, a moral and non-selfish line of thought and procedure, which in itself so transcends the physical that it cannot be identified with it or be measured by its standards, and may or must be enduring, or at its best immortal.

It is principally, however, through his work as a historian that Fiske’s reputation will live. His historical writings, with the exception of a small volume on American Political Ideas (1885), an account of the system of Civil Government in the United States (1890), The Mississippi Valley in the Civil War (1900), a school history of the United States, and an elementary story of the American Revolution, are devoted to studies, in a unified general manner, of separate yet related episodes in American history. The volumes have not appeared in chrono- logical order of subject, but form a nearly complete colonial history, as follows: The Discovery of America, with some Account of Ancient America, and the Spanish Conquest (1892, 2 vols.); Old Virginia and her Neighbours (1897, 2 vols.) ; The Beginnings of New England; or, The Puritan Theocracy in its Relations to Civil and Religious Liberty (1889); Dutch and Quaker Colonies in America (1899); The American Revolution (1891, 2 vols.); and The Critical Period of American History, 1783-1789 (1888). Of these the most original and valuable is the Critical Period volume, a history of the consolidation of the states into a govern- ment, and of the formation of the constitution. (C. F. R.)

FISKE, MINNIE MADDERN (1865-), American actress, was born in New Orleans, the daughter of Thomas Davey. As a child she played, under her mother’s name of Maddern, with several well-known actors. In 1882 she first appeared as a ” star,” but in 1890 she married Harrison Grey Fiske and was absent from the stage for several years. In 1893 she reappeared in Hester Crewe, a play written by her husband, and afterwards acted a number of Ibsen’s heroines, and in Becky Sharp, a dramatization of Thackeray’s Vanity Fair. In 1901 she opened, in opposition to the American theatrical ” trust,” an independent theatre in New York, the Manhattan. She won a considerable reputation in the United States as an emotional actress.

FISTULA (Lat. for a pipe or tube), a term in surgery used to designate an abnormal communication leading either from the surface of the body to a normal cavity or canal, or from one normal cavity or canal to another. These communications are the result of disease or injury. They receive different names according to their situation: lachrymal fistula is the small opening left after the bursting of an abscess in the

upper part of the tear-duct, near the root of the nose; salivary fistula is an opening into the salivary duct on the cheek; anal fistula, or fistula in ano, is a suppurating track near the outlet of the bowel; urethral fistula is the result of a giving way of the tissues behind a stricture. These are examples of the variety of the first kind of fistula; while recto-vesical fistula, a communication between the rectum and bladder, and vesico-vaginal fistula, a communication between the bladder and vagina, are examples of the second. The abnormal passage may be straight or tortuous, of considerable diameter or of narrow calibre. Fistulae may be caused by an obstruction of the normal channel, the result

of disease or injury, which prevents, for example, the tears, saliva or urine, as the case may be, from escaping; their reten- tion gives rise to inflammation and ulceration in order that an exit may be obtained by the formation of an abscess, which bursts, for example, into the gut or through the skin; the cavity does not close, and a fistula is the result. The fistulous channel remains open as long as the contents of the cavity or canal with which it is connected can pass through it. To obliter- ate the fistula one must remove the obstruction and encourage the flow along the natural channel; for example, one must open up the nasal duct so as to allow the tears to reach the nasal cavity, and the lachrymal fistula will close; and so also in the salivary and urethral fistulae. Sometimes it may be necessary to lay the channel freely open, to scrape out the unhealthy material which lines the track, and to encourage it to fill up from its deepest part, as in anal fistula; in other cases it may be necessary to pare the edges of the abnormal opening and stitch them together. (E. O.*)

FIT, a word with several meanings. (1) A portion or division of a poem, a canto, in this sense often spelled ” fytte.” (2) A sudden but temporary seizure or attack of illness, particularly one with convulsive paroxysms accompanied by unconsciousness, especially an attack of apoplexy or epilepsy, but also applied to a transitory attack of gout, of coughing, fainting, &c, also of an outburst of tears, of merriment or of temper. In a transferred sense, the word is also used of any temporary or irregular periods of action or inaction, and hence in such expressions as ” by fits and starts.” (3) As an adjective, meaning suitable, proper, becoming, often with the idea of having necessary qualifications for a specific purpose, “a fit and proper person”; and also as prepared for, or in a good condition for, any enterprise. The verb ” to fit ” is thus used intransitively and transitively, to be adapted for, to suit, particularly to be of the right measurement or shape, of a dress, of parts of a mechanism, &c, and to make or render a thing in such a condition. Hence the word is used as a substantive.

The etymology of the word is difficult; the word may be one in origin, or may be a homonymous term, one in sound and spelling but with different origin in each different meaning. In Skeat's Etymological Dictionary (ed. 1898) (1) and (2) are connected and derived from the root of " foot," which appears in Lat. pes, pedis. The evolution of the word is: step, a part of a poem, a struggle, a seizure. (3) A word of Scandinavian origin, with the idea of " knitted together " (cf. Ice. fitja, to knit together, Goth, feljan, to adorn) ; the ultimate origin is a Teutonic root meaning to seize (cf. " fetch "). The New English Dictionary suggests that this last root may be the origin of all the words, and that the underlying meaning is junction, meeting; the early use of " fit " (2) is that of conflict. It is also pointed out that the meanings of " fit," suitable, proper, have been modified by " feat," which comes through P'r. fait, from Lat. factum, facere, to do, make.

FITCH, JOHN (1 743-1 798), American pioneer of steam naviga- tion, was born at Windsor, Connecticut, on the 21st of January 1743. He was the son of a farmer, and received the usual common school education. At the age of seventeen he went to sea, but he discontinued his sailor life after a few voyages and became successively a clockmaker, a brassfounder and a silver- smith. During the War of Independence he was a sutler to the American troops, and amassed in that way a considerable sum of money, with which he bought land in Virginia. He was appointed deputy-surveyor for Kentucky in 1780, and when returning to Philadelphia in the following year he was captured by the Indians, but shortly afterwards regained his liberty. About this time he began an exploration of the north-western regions, with the view of preparing a map of the district; and while sailing on the great western rivers, the idea occurred to him that they might be navigated by steam. He endeavoured by the sale of his map to find money for the carrying out of his projects, but was unsuccessful. He next applied for assistance to the legislatures of different states, but though each reported in favourable terms of his invention, none of them would agree

to grant him any pecuniary assistance. He was successful, however, in 1786, in forming a company for the prosecution of his enterprise, and shortly afterwards a steam-packet of his invention was launched on the Delaware. His claim to be the inventor of steam-navigation was disputed by James Rumsey of Virginia, but Fitch obtained exclusive rights in steam-naviga- tion in New Jersey, Pennsylvania and

Delaware, while a similar privilege was granted to Rumsey in Virginia, Maryland and New York. A steam-boat built by Fitch conveyed passengers for hire on the Delaware in the summer of 1790, but the under- taking was a losing one, and led to the dissolution of the company. In 1793 he endeavoured to introduce his invention into France, but met with no success. On his return to America he found his property overrun by squatters, and reaping from his invention nothing but disappointment and poverty, he committed suicide at Bardstown, Kentucky, on the 2nd of July 1798.

He left behind him a record of his adventures and misfortunes, ” inscribed to his children and future posterity “; and from this a biography was compiled by Thompson Westcott (Philadelphia,

I857-)

FITCH, SIR JOSHUA GIRLING (1824-1903), English educa- tionist, second son of Thomas Fitch, of a Colchester family, was born in Southwark, London, in 1824. His parents were poor but intellectually inclined, and at an early age Fitch started work as an assistant master in the British and Foreign School Society’s elementary school in the Borough Road, founded by Thomas Lancaster. But he continued to educate himself by assiduous reading and attending classes at University College; he was made headmaster of another school at Kingsland; and in 1850 he took his B.A. degree at London University, proceeding M.A. two years later. In 1852 he was appointed by the British and Foreign School Society to a tutorship at their Training College in the Borough Road, soon becoming vice-principal and in 1856 principal. He had previously done some occasional teaching there, and he was thoroughly imbued with the Lancasterian system. In 1863 he was appointed a government inspector of schools for the York district, from which, after intervals in which he was detached for work as an assistant commissioner (1865- 1867) on the Schools Inquiry Commission, as special commis- sioner (1869), and as an assistant commissioner under the Endowed Schools Act (1870-1877), he was transferred in 1877 to East Lambeth. In 1883 he was made a chief inspector, to superintend the eastern counties, and in 1885 chief inspector of training colleges, a post he held till he retired in 1894. In the course of an extraordinarily active career, he acquired a unique acquaintance with all branches of education, and became a recognized authority on the subject, his official reports, lectures and books having a great influence on the development of education in England. He was a strong advocate and supporter of the movement for the higher education of women, and he was constantly looked to for counsel and direction on every sort of educational subject; his wide knowledge,

safe judgment and amiable character made his co-operation of exceptional value, and after he retired from official life his services were in active request in inquiries and on boards and committees. In 1896 he was knighted; and besides receiving such academic distinctions as the LL.D. degree from St Andrews University, he was made a chevalier of the French Legion of Honour in 1889. He was a constant contributor to the leading reviews; he published an important series of Lectures on Teaching (1881), Educational Aims and Methods, Notes on American Schools and Colleges (1887), and an authoritative criticism of Thomas and Matthew Arnold, and their Influence on English Education (see also the article on Arnold, Matthew) in 1901 ; and he wrote the article on Education in the supplementary volumes (10th edition) of this encyclopaedia (1902). He died on the 14th of July 1903 in London. A civil list pension was given to his widow, whom, as Miss Emma Wilks, he had married in 1856.

See also Sir Joshua Fitch, by the Rev. A. L. Lilley (1906).

FITCH, RALPH (fl. 1 583-1606), London merchant, one of the earliest English travellers and traders in Mesopotamia, the Persian Gulf and Indian Ocean, India proper and Indo-China.

In January 1 583 he embarked in the ” Tiger ” for Tripoli and Aleppo in Syria (see Shakespeare, Macbeth, Act I. sc. 3), together with J. Newberie, J. Eldred and two other merchants or em- ployees of the Levant Company. From Aleppo he reached the Euphrates, descended the river from Bir to Fallujah, crossed southern Mesopotamia to Bagdad, and dropped down the Tigris to Basra (May to July 1583). Here Eldred stayed behind to trade, while Fitch and the rest sailed down the Persian Gulf to Ormuz, where they were arrested as spies (at Venetian instiga- tion, as they believed) and sent prisoners to the Portuguese viceroy at Goa (September to October). Through the sureties procured by two Jesuits (one being Thomas Stevens, formerly of New College, Oxford, the first Englishman known to have reached India by the Cape route in 1579) Fitch and his friends regained their liberty, and escaping from Goa (April 1584) travelled through the heart of India to the court of the Great Mogul Akbar, then probably at Agra. In September 1585 Newberie left on his return journey overland via Lahore (he disappeared, being presumably murdered, in the Punjab), while Fitch descended the Jumna and the Ganges, visiting Benares, Patna, Kuch Behar, Hugh, Chittagong, &c. (1585-1586), and pushed on by sea to Pegu and Burma. Here he visited the Rangoon region, ascended the Irawadi some distance, acquired a remarkable acquaintance with inland Pegu, and even pene- trated to the Siamese Shan states (1586-1587). Early in 1588 he visited Malacca; in the

autumn of this year he began his homeward travels, first to Bengal; then round the Indian coast, touching at Cochin and Goa, to Ormuz; next up the Persian Gulf to Basra and up the Tigris to Mosul (Nineveh); finally via Urfa, Bir on the Euphrates, Aleppo and Tripoli, to the Mediterranean. He reappeared in London on the 29th of April 1 59 1. His experience was greatly valued by the founders of the East India Company, who specially consulted him on Indian affairs (e.g. 2nd of October 1600; 29th of January 1601; 31st of December 1606).

See Hakluyt, Principal Navigations (1599), vol. ii. part i. pp. 245-271, esp. 250-268; Linschoten, Voyages (Ilineraris), part i. ch. xcii. (vol. ii. pp. 158-169, &c, Hakluyt Soc. edition) ; Stevens and Birdwood, Court Records of the East India Company 1599-1603 (1886), esp. pp. 26, 123; State Papers, East Indies, &c, 1313-1616 (1862), No. 36; Pinkerton, Voyages and Travels (1808-1814), ix. 406-425.

FITCHBURG, a city and one of the county-seats of Worcester county, Massachusetts, U.S.A., situated, at an altitude varying from about 433 ft. to about 550 ft., about 23 m. N. of Worcester and about 45 m. W.N.W. of Boston. Pop. (1880) 12,429; (1890) 22,037; (1900) 31, S3 T > °f whom 10,917 were foreign-born, including 4063 French Canadians, 836 English Canadians, 2306 Irish and 963 Finns; (1910 census) 37,826. Fitchburg is traversed by the N. branch of the Nashua river, and is served by the Boston & Maine, and the New York, New Haven & Hartford railways, and by three interurban electric lines. The city area (27-7 sq.m.) is well watered, and is very uneven, with hill spurs running in all directions, affording picturesque scenery. The court house and the post office (in a park presented by the citizens) are the principal public buildings. Fitchburg is the seat of a state normal school (1895), vvith model and training schools; has a free public library (1859; in the Wallace library and art building), the Burbank hospital, the Fitchburg home for old ladies, and an extensive system of parks, in one of which is a fine fountain, designed by Herbert Adams. Fitchburg has large mercantile and financial interests, but manufacturing is the principal industry. The principal manufactures are paper and wood pulp, cotton and woollen goods, yarn and silk, machinery, saws, horn goods, and bicycles and firearms (the Iver Johnson Arms and Cycle Works being located here). In 1905 the city's total factory product was valued at $15,390,507, of which $3,019,118 was the value of the paper and wood pulp product, $2,910,572 was the value of the cotton goods, and $1,202,421 was the value of the foundry and machine shop products. The municipality owns and operates its (gravity) water works system. Fitchburg was included in Lunenburg until 1 764, when it was incorporated as a township and was

named in honour of John Fitch, a citizen who did much to secure incorporation; it was chartered as a city in 1872.

See W. A. Emerson, Fitchburg, Massachusetts, Past and Present (Fitchburg, 1887).

FITTIG, RUDOLF (1835-), German chemist, was born at Hamburg on - the 6th of December 1835. He studied chemistry at Gottingen, graduating as Ph.D. with a dissertation on acetone in 1858. He subsequently held several appointments at Gottingen, being privat docent (i860), and extraordinary professor (1870). In 1870 he obtained the chair at Tubingen, and in 1876 that at Strassburg, where the laboratories were erected from his designs. Fittig's researches are entirely in organic chemistry, and cover an exceptionally wide field. The aldehydes and ketones provided material for his earlier work. He observed that aldehydes and ketones may suffer reduction in neutral, alkaline, and sometimes acid solution to secondary and tertiary glycols, substances which he named pinacones; and also that certain pinacones when distilled with dilute sulphuric acid gave compounds, which he named pinacolines. The unsaturated acids, also received much attention, and he discovered the internal anhydrides of oxyacids, termed lactones. In 1863 he introduced the reaction known by his name. In 1855 Adolph Wurtz had shown that when sodium acted upon alkyl iodides, the alkyl residues combined to form more complex hydrocarbons; Fittig developed this method by showing that a mixture of an aromatic and alkyl haloid, under similar treatment, yielded homologues of benzene. His investigations on Perkin's reaction led him to an explanation of its mechanism which appeared to be more in accordance with the facts. The question, however, is one of much difficulty, and the exact course of the reaction appears to await solution. These researches incidentally solved the constitution of coumarin, the odoriferous principle of woodruff. Fittig and Erdmann's observation that phenyl isocrotonic acid readily yielded a-naphthol by loss of water was of much importance, since it afforded valuable evidence as to the constitution of naphthalene. They also investigated certain hydrocarbons occurring in the high boiling point fraction of the coal tar distillate and solved the constitution of phenanthrene. We also owe much of our knowledge of the alkaloid piperine to Fittig, who in collaboration with Ira Remsen established its constitution in 187 1. Fittig has published two widely used text-books; be edited several editions of Wohler's Grundriss der organischen Chemie (1 ith

ed., i887)and wrote an Unorganische Chemie (1st ed., 1872; 3rd, 1882). His researches have been recognized by many scientific societies and institutions, the Royal Society awarding him the Davy medal in 1906.

FITTON, MARY (c. 1578-1647), identified by some writers with the ” dark lady ” of Shakespeare’s sonnets, was the daughter of Sir Edward Fitton of Gawsworth, Cheshire, and was baptized on the 24th of June 1578. Her elder sister, Anne, married John Newdigate in 1587, in her fourteenth year. About 1595 Mary Fitton became maid of honour to Queen Elizabeth. Her father recommended her to the care of Sir William Knollys, comptroller of the queen’s household, who promised to defend the ” innocent lamb ” from the ” wolfish cruelty and fox-like subtlety of the tame beasts of this place.” Sir William was fifty and already married, but he soon became suitor to Mary Fitton, in hope of the speedy death of the actual Lady Knollys, and appears to have received considerable encouragement. There is no hint in her authenticated biography that she was acquainted with Shake- speare. William Kemp, who was a clown in Shakespeare’s company, dedicated his Nine Dates Wonder to Mistress Anne (perhaps an error for Mary) Fitton, ” Maid of Honour to Eliza- beth”; and there is a sonnet addressed to her in an anonymous volume, A Woman’s Woorth defended against all the Men in the World (1599). In 1600 Mary Fitton led a dance in court festivi- ties at which William Herbert, later earl of Pembroke, is known to have been present; and shortly afterwards she became his mistress. In February 1601 Pembroke was sent to the Fleet in connexion with this affair, but Mary Fitton, whose child died soon after its birth, appears to have simply been dismissed from court. Mary Fitton seems to have gone to her sister; Lady

Newdigate, at Arbury. A second scandal has been fixed on Mary Fitton by George Ormerod, author of History of Cheshire, in a MS. quoted by Mr. T. Tyler {Academy, 27th Sept. 1884). Ormerod asserted, on the strength of the MSS. of Sir Peter Leycester, that she had two illegitimate daughters by Sir Richard Leveson, the friend and correspondent of her sister Anne. He also gives the name of her first husband as Captain Logher, and her second as Captain Polwhele, by whom she had a son and daughter. Polwhele died in 1609 or 16 10, about three years after his marriage. But Ormerod was mistaken in the order of Mary Fitton’s husbands, for her second husband, Logher, died in 1636. Her own will, which was proved in 1647, gives her name as ” Mary Lougher.” In Gawsworth church there is a painted monument of the Fittons, in which Anne and Mary are represented kneeling behind their mother . It is stated that from what remains of the colouring Mary was a dark woman, which is of course essential to her

identification with the lady of the sonnets, but in the portraits at Arbury described by Lady Newdigate-Newdegate in her Gossip from a Muniment Room (1897) she has brown hair and grey eyes.

The identity of the Arbury portrait with Mary Fitton was chal- lenged by Mr Tyler and by Dr Furnivall. For an answer to their remarks see an appendix by C. G. O. Bridgeman in the 2nd edition of Lady Newdigate- Newdegate's book.

The suggestion that Mary Fitton should be regarded as the false mistress of Shakespeare's sonnets rests on a very thin chain of reasoning, and by no means follows on the acceptance of the theory that William Herbert was the addressee of the sonnets, though it of course fails with the rejection of that supposition. Mr William Archer {Fortnightlyˆ Review, December 1897) found some support for Mary Fitton's identification with the " dark lady " in the fact that Sir William Knollys was also her suitor, thus numbering three "Wills " among her admirers. This supplies a definite interpreta- tion, whether right or wrong, to the initial lines of Sonnet 135 : — " Whoever hath her wish, thou hast thy ' Will,' And ' Will ' to boot, and ' Will ' in overplus." Arguments in favour of her adoption into the Shakespeare circle will be found in Mr Thomas Tyler's Shakespeare's Sonnets (1890, pp. 73-92), and in the same writer's Herbert- Fitton Theory of Shake- speare's Sonnets (1898).

FITTON, WILLIAM HENRY (1780-1861), British geologist was born in Dublin in January 1780. Educated at Trinity College, in that city, he gained the senior scholarship in 1798, and graduated in the following year. At this time he began to take interest in geology and to form a collection of fossils. Having adopted the medical profession he proceeded in 1808 to Edin- burgh, where he attended the lectures of Robert Jameson, and thenceforth his interest in natural history and especially in geology steadily increased. He removed to London in 1809, where he further studied medicine and chemistry. In 181 1 he brought before the Geological Society of London a description of the geological structure of the vicinity of Dublin, with an account of some rare minerals found in Ireland. He took a medical practice at Northampton in 181 2, and for some years the duties of his profession engrossed his time. He was admitted M.D. at Cambridge in 1816. In 1820, having mairied a lady of means, he settled in London, and devoted himself to the science of geology with such assiduity and thoroughness that he soon became a leading authority, and in the end, as Murchison said, " one of the British worthies who have raised modern geology to its present advanced position." His " Observations on some of the Strata between the Chalk and the Oxford Oolite, in the

South-east of England ” {Trans. Geol. Soc. ser. 2, vol. iv.) embodied a series of researches extending from 1824 to 1836, and form the classic memoir familiarly known as Fitton’s ” Strata below the Chalk.” In this great work he established the true succession and relations of the Upper and Lower Greensand, and of the Wealden and Purbeck formations, and elaborated their detailed structure. ‘ He had been elected F.R.S. in 1815, and he was president of the Geological Society of London 1827-1829. His house then became a meeting place for scientific workers, and during his presidency he held a conversazione open on Sunday evenings to all fellows of the Geological Society. From 1817 to 1841 he contributed to the Edinburgh Review many admirable essays on the progress of geological science; he also wrote ” Notes on the

Progress of Geology in England ” for the Philosophical Magazine (1832-1833). Hisonly independent publication was A Geological Sketch of the Vicinity of Hastings (1833). He was awarded the Wollaston medal by the Geological Society in 1852. He died in London on the 13th of May 1861.

Obituary by R. I. Murchison in Quart. Journ. Geol. Soc, vol. xviii., 1862, p. xxx.

FITZBALL, EDWARD (1792-1873), English dramatist, whose real patronymic was Ball, was born at Burwell, Cambridge- shire, in 1792. His father was a well-to-do farmer, and Fitzball, after receiving his schooling at Newmarket, was apprenticed to a Norwich printer in 1809. He produced some dramatic pieces at the local theatre, and eventually the marked success of his Innkeeper of Abbeville, or The Ostler and the Robber (1820), together with the friendly acceptance of one of his pieces at the Surrey theatre by Thomas Dibdin, induced him to settle in London. During the next twenty-five years he produced a great number of plays, most of which were highly successful. He had a special talent for nautical drama. His Floating Beacon (Surrey theatre, 19th of April 1824) ran for 140 nights, and his Pilot (Adelphi, 1825) for 200 nights. His greatest triumph in melodrama was perhaps Jonathan Bradford, or the Murder at the, Roadside Inn (Surrey theatre, 12th of June 1833). He was at one time stock dramatist and reader of plays at Covent Garden, and afterwards at Drury Lane. He had a considerable reputation as a song-writer and as a librettist in opera. The last years of his life were spent in retirement at Chatham,

where he died on the 27th of October 1873.

His autobiography, Thirty- Five Years of a Dramatic Author's Life (2 vols., 1859), is a naive record of his career. Numbers of his plays are printed in Cumberland's Minor British Theatre, Dick's Standard Plays and Lacy's Acting Edition of Plays.

FITZGERALD, the name of an historic Irish house, which descends from Walter, son of Other, who at the time of the Domesday Survey (1086) was castellan of Windsor and a tenant- in-chief in five counties. From his eldest son William, known as " de Windsor," descended the Windsors of Stanwell, of whom Andrew Windsor was created Lord Windsor of Stanwell (a Domesday possession of the house) by Henry VIII., which barony is now vested in the earl of Plymouth, his descendant in the female line. Of Walter's younger sons, Robert was given by Henry I. the barony of Little Easton, Essex; Maurice obtained the stewardship (dapiferatus) of the great Suffolk abbey of Bury St Edmunds; Reinald the stewardship to Henry I.'s queen, Adeliza; and Gerald (also a dapifer) became the ancestor of the FitzGeralds. As constable and captain of the castle that Arnulf de Montgomery raised at Pembroke, Gerald strengthened his position in Wales by marrying Nesta, sister of Griffith, prince of South Wales, who bore to him famous children, " by whom the southern coast of Wales was saved for the English and the bulwarks of Ireland stormed." Of these sons William, the eldest, was succeeded by his son Odo, who was known as " de Carew," from the fortress of that name at the neck of the Pembroke peninsula, the eldest son Gerald having been slain by the Welsh. The descendants of Odo held Carew and the manor of Moulsford, Berks, and some of them acquired lands in Ireland. But the wild claims of Sir Peter Carew, under Queen Elizabeth, to vast Irish estates, including half of " the kingdom of Cork," were based on a fictitious pedigree. Odo de Carew's brothers, Reimund " Fitz William " (known as " Le Gros ") and Griffin " Fitz William," took an active part in the conquest of Ireland.

Returning to Gerald and Nesta, their son David " Fitz Gerald " became bishop of St David's (1147-1176), and their daughter Angharat mother of Gerald de Barri (Giraldus Cambrensis, q.i).), the well-known historian and the eulogist of his mother's family. A third son, Maurice, obtained from his brother the stewardship (dapiferatus) of St David's, c. 11 74, and having landed in Ireland in 1 169, on the invitation of King Dermod, founded the fortunes of his house there, receiving lands at Wexford, where he died and was buried in 11 76. His eventual territory, however, was the great barony of the Naas in Ophaley (now in Kildare), which Strongbow granted him with Wicklow Castle; but

his sons were

forced to give up the latter. His eldest son William succeeded him as baron of the Naas and steward of St David's, but William's granddaughter carried the Naas to the Butlers and so to the Loundreses. Gerald, a younger son of Maurice, who obtained lands in Ophaley, was father of Maurice " Fitz Gerald," who held the great office of justiciar of Ireland from 1232 to 1245. In 1234 he fought and defeated his overlord, the earl marshal, Richard, earl of Pembroke, and he also fought for his king against the Irish, the Welsh, and in Gascony, dying in 1257. He held Maynooth Castle, the seat of his descendants.

Much confusion follows in the family history, owing to the justiciar leaving a grandson Maurice (son of his eldest son Gerald) and a younger son Maurice, of whom the latter was justiciar for a year in 1272, while the former, as heir male and head of the race, inherited the Ophaley lands, which he is said to have bequeathed at his death (1287) to John " Fitz Thomas," whose fighting life was crowned by a grant of the castle and town of Kildare, and of the earldom of Kildare to him and the heirs male of his body (May 14th, 1316), Dying shortly after, he was succeeded by his son Thomas, son-in-law of Richard (de Burgh) the " red earl " of Ulster, who received the hereditary shrievalty of Kildare in 1317, and was twice (1320, 1327) justiciar of Ireland for a year. His younger son Maurice " Fitz Thomas," 4th earl (1331-1390), was frequently appointed justiciar, and was great-grandfather of Thomas, the 7th earl (1427-1477), who between 1455 and 1475 was repeatedly in charge of the govern- ment of Ireland as " deputy," and who founded the " brotherhood of St George " for the defence of the English Pale. He was also made lord chancellor of Ireland in 1463. His son Gerald, the 8th earl (1477-1513), called " More" (the Great), was deputy governor of Ireland from 1481 for most of the rest of his life, though imprisoned in the Tower two years (1494-1496) on suspicion as a Yorkist. He was mortally wounded while fighting the Irish as "deputy." Gerald, .the 9th earl (1513-1534), followed in his father's steps as deputy, fighting the Irish, till the enmity of the earl of Ormonde, the hereditary rival of his house, brought about his deposition in 1520. In spite of tem- porary restorations he finally died a prisoner in the Tower.

In his anger at his rival's successes the 9th earl had been led, it was suspected, into treason, and while he was a prisoner in England his son Lord Thomas Fitzgerald, " Silken Thomas," broke out into open revolt (1534), and declared war on the government; his followers slew the archbishop of Dublin and laid siege to Dublin Castle. Meanwhile

he made overtures to the native Irish, to the pope and to the emperor; but the Butlers took up arms against him, an English army laid siege to his castle of Maynooth, and, though its fall was followed by a long struggle in the field, the earl, deserted by O'Conor, had eventually to surrender himself to the king's deputy. He was sent to the Tower, where he was subsequently joined by his five uncles, arrested as his accomplices. They were all six executed as traitors in February 1537, and acts of attainder completed the ruin of the family.

But the earl's half-brother, Gerald (whose sister Elizabeth was the earl of Surrey's " fair Geraldine "), a mere boy, had been carried off, and, after many adventures at home and abroad, returned to England after Henry VIII. 's death, and to propitiate the Irish was restored to his estates by Edward VI. (1352). Having served Mary in Wyat's rebellion, he was created by her earl of Kildare and Lord Offaley, on the 13th of May 1554, but the old earldom (though the contrary is alleged) remained under attainder. Although he conformed to the Protestant religion under Elizabeth and served against the Munster rebels and their Spanish allies, he was imprisoned in the Tower on suspicion of treason in 1583. But the acts attainting his family had been repealed in 1569, and the old earldom was thus regained. In 1585 he was succeeded by his son Henry (" of the Battleaxee "), who was mortally wounded when fighting the Tyrone rebels in IS97- On the death of his brother in 1599 the earldom passed to their cousin Gerald, whose claim to the estates was opposed by Lettice, Lady Digby, the heir-general. She obtained the ancestral castle of Geashill with its territory and was recognized

in 1620 as Lady Offaley for life. George, the 16th earl (1620- 1 660) , had his castle of Maynooth pillaged by the Roman Catholics in 1642, and after its subsequent occupation by them in 1646 it was finally abandoned by the family.

The history of the earls after the Restoration was uneventful, save for the re-acquisition in 1739 of Carton, which thenceforth became the seat of the family, until James the 20th earl (1722- ˆlli), wn < > obtained a viscounty of Great Britain in 1747, built Leinster House in Dublin, and formed a powerful party in the Irish parliament. In 1756 he was made lord deputy; in 1760 he raised the royal Irish regiment of artillery; and in 1766 he received the dukedom of Leinster, which remained the only Irish dukedom till that of Abercorn was created in

1868. His wealth and connexions secured him a commanding position. Of his younger children one son was created Lord Lecale; another was the well-known rebel, Lord Edward Fitzgerald; another was the ancestor of Lord De Ros; and a daughter was created Baroness Rayleigh. William Robert, the 2nd duke (1740- 1 804), was a cordial supporter of the Union, and received nearly £30,000 for the loss of his borough influence. In 1883 the family was still holding over 70,000 acres in Co. Kildare; but, after a tenure of nearly 750 years, arrangements were made to sell them to the tenants under the recent Land Purchase Acts. In 1893 Maurice Fitzgerald (b. 1887) succeeded his father Gerald, the 5th duke (1851-1893), as 6th duke of Leinster.

The other great Fitzgerald line was that of the earlsof Desmond, who were undoubtedly of the same stock and claimed descent from Maurice, the founder of the family in Ireland, through a younger son Thomas. It would seem that Maurice, grandson of Thomas, was father of Thomas ” Fitz Maurice ” Nappagh (” of the ape “), justice of Ireland in 1295, who obtained a grant of the territory of ” Decies and Desmond ” in 1292, and died in 1298. His son Maurice Fitz Thomas or Fitzgerald, inheriting vast estates in Munster, and strengthening his position by marry- ing a daughter of Richard de Burgii, earl of Ulster, was created earl of Desmond {i.e. south Munster) on the 22nd of August 1329, and Kerry was made a palatine liberty for him. The greatest Irish noble of his day, he led the Anglo-Irish party against the English representatives of the king, and was attacked as the king’s enemy by the viceroy in 1345. He surrendered in England to the king and was imprisoned, but eventually regained favour, and was even made viceroy himself in 135s. He died, however, the following year. Two of his sons succeeded in turn, Gerald, the 3rd earl (1359-1398), being appointed justiciar (i.e. viceroy) in 1367, despite his adopting his father’s policy which the crown still wished to thwart. But he was superseded two years later, and defeated and captured by the native king of Thomond shortly after. Yet his sympathies were distinctly Irish. The remote position of Desmond in the south-west of Ireland tended to make the succession irregular on native lines, and a younger son succeeded as 6th or 7th earl about 1422. His son Thomas, the next earl (1462-1467), governed Ireland as deputy from 1463 to 1467, and upheld the endangered English rule by stubborn conflict with the Irish. Yet Tiptoft, who super- seded him, procured his attainder with that of the earl of Kildare, on the charge of alliance with the Irish, and he was beheaded on the 14th of February 1468, his followers in Munster avenging his death by invading the Pale. His younger son Maurice, earl from 1487 to 1520, was one of Perkin Warbeck’s Irish supporters, and besieged Waterford on his behalf. His son James

(1520- 1529) was proclaimed a rebel and traitor for conspiring with the French king and with the emperor. At his death the succession reverted to his uncle Thomas (1 529-1 534), then an old man, at whose death there was a contest between his younger brother Sir John " of Desmond " and his grandson James, a court page of Henry VIII. Old Sir John secured possession till his death (1536), when his son James succeeded de facto, and dejure on the rightful earl being murdered by the usurper's younger brother in 1540. Intermarriage with Irish chieftains had by this time classed the earls among them, but although this James looked to their support before 1540, he thenceforth played so prudent a part that in spite of the efforts of the Butlers, the hereditary

foes of his race, he escaped the fate of the Kildare branch and kept Munster quiet and in order for the English till his death in 1558. His four marriages produced a disputed succession and a break-up of the family. His eldest son Thomas " Roe " (the Red) was disinherited, and failed to obtain the earldom, which was confirmed by Elizabeth to his half-brother Gerald " the rebel earl " (1558-1582), but Gerald had other enemies in his uncle Maurice (the murderer of 1 540) and his son especially, the famous James " Fitz Maurice " Fitz Gerald. Gerald's turbulence and his strife with the Butlers led to his detention in England (1562-1564) and again in 1565-1566. In 1567 Sidney imprisoned him in Dublin Castle, whence, with his brother, Sir John " of Desmond," he was sent to England and the Tower, and not allowed to return to Ireland till 1573. Meanwhile the above James, in spite of the protests of Thomas " Roe," had usurped his position in his absence and induced the natives to choose him as " captain " or chieftain of Desmond. He formed a strong Irish Catholic party and broke into revolt in 1569. Suppressed by Sidney, he rebelled again, till crushed by Perrot in 1573. As Earl Gerald on his return would not join James in revolt, the latter withdrew to France. But Gerald himself, after some trimming, rose in rebellion (July 1574), though he soon submitted to the queen's forces. On the continent James Fitz Maurice offered the crown of Ireland in succession to France and to Spain, and finally to the nephew of Pope Gregory XIII. With the papal nuncio and a few troops he landed at Dingle in Kerry (June 1579) and called on the earls of Kildare and Desmond to join him, but the latter assured the English government of his loyalty, and James was killed in a skirmish. Yet Desmond was viewed with suspicion and finally forced, by being proclaimed as a traitor (Nov. 1st, 1579), into a miserable rebellion. His castles were soon captured, and he was hunted as a fugitive, till surprised and beheaded on the nth of November 1583, after long wanderings, his head being fixed on London Bridge. His ruin is

attributable to his restless turbulence and lack of settled policy. The vast estates of the earls, estimated at 600,000 acres, were forfeited by act of parliament.

But the influence of his mighty house was still great among the Irish. The disinherited Thomas ” Roe ” left a son James ” Fitz Thomas,” who, succeeding him in 1595 and finding that the territory of the earls would never be restored, assumed the earldom and joined O’Neill’s rebellion in 1598, at the head of 8000 of his men. Long sheltered from capture by the fidelity of the peasantry, he was eventually seized (1601) by his kinsman the White Knight, Edmund Fitz Gibbon, whose sister-in-law he had married, and sent to the Tower. The ” sugan ” (sham) earl lingered there obscurely as ” James M’Thomas ” till his death. In consequence of his rebellion and the devotion of the Irish to his race, James, son of Gerald ” the rebel earl,” who had remained in the Tower since his father’s death (1583), was restored as earl of Desmond and sent over to Munster in 1600, but he, known as ” the queen’s earl,” could, as a Protestant, do nothing, and he died unmarried in 1601. The ” sugan ” earl’s brother John, who had joined in his rebellion, escaped into Spain, and left a son Gerald, who appears to have assumed the title and was known as the Conde de Desmond. He was killed in the service of the emperor Ferdinand in 1632. The common origin of the earls of Desmond and of Kildare had never been forgotten, and intermarriage had cemented the bond. Just before his death the exile wrote as ” Desmond alias Gerratt Fitz Gerald ” to his ” Most Noble Cosen ” the earl of Kildare, that ” wee must not be oblivious of the true amity and love that was inviolably observed betweene our antenates and elders.”

There can be no doubt that the house of Fitzmaurice was also of this stock, although their actual origin, in the 12th century, is doubtful. From a very early date they were feudal lords of Kerry, and their dignity was recognized as a peerage by Henry VII. in 1489. The isolated position of their territory (” Clan- maurice “) threw them even more among the Irish than the earls of Desmond, and they often adopted the native form of their name, ” MacMorrish.” Under Elizabeth the lords of Kerry narrowly escaped sharing the ruin of the earls. The conduct

of Thomas in the rebellion of James ” Fitz Maurice ” was suspicious, and his sons joined in that of the earl of Desmond, while he himself was a rebel in 1582. Patrick, his successor (1590-1600), was captured in rebellion (1587), and when free, joined the revolt of 1598, as did

his son and heir Thomas, who continued in the field till he obtained pardon and restoration in 1603, though suspect till his death in 1630. His grandson with- drew to France with James II., but the next peer became a supporter of the Whig cause, married the eventual heiress of Sir William Petty, and was created earl of Kerry in 1723. From him descend the family of Petty-Fitzmaurice, who obtained the marquessate of Lansdowne (q.v.) in 1818, and still hold among their titles the feudal barony of Kerry together with vast estates in that county.

From the three sons by a second wife of one of the earls of Desmond's ancestors, descended the hereditary White Knights, Knights of Glin and Knights of Kerry, these feudal dignities having, it is said, been bestowed upon them by their father, as Lord of Decies and Desmond. Glin Castle, county Limerick, is still the seat of the (Fitzgerald) Knight of Glin. Valencia Island is now the seat of the Knights of Kerry, who received a baronetcy in 1880.

Authorities. — Calendars of Irish documents and state papers and Carew papers; Gilbert's Viceroys of Ireland; Lord Kildare's Earls of Kildare; G. E. C[okayne]'s Complete Peerage; Haymond Graves, Unpublished Geraldine Documents; Annals of the Four Masters; Calendar of the duke of Leinster's MSS. in 9th Report on Historical MSS., part ii. ; Ware's Annals; J. H. Round's 'Origin of the Fitzgeralds" and "Origin of the Carews " in the Ancestor; his " Earldom of Kildare and Barony of Offaley " in Genealogist, ix., and " Barons of the Naas " in Genealogist, xv. ; and his " Decies and Desmond " in Eng. Hist. Rev. xviii. (J. H. R.)

FITZGERALD, EDWARD (1809-1883), English writer, the poet of Omar Khayyam, was born as Edward Purcell, at Bredfield House, in Suffolk, on the 31st of March 1809. His father, John Purcell, who had married a Miss FitzGerald, assumed in 1818 the name and arms of his wife's family. From 1816 to 1821 the FitzGeralds lived at St Germain and at Paris, but in the latter year Edward was sent to school at Bury St Edmunds. In 1826 he proceeded to Trinity College, Cambridge, where, some two years later, he became acquainted with Thackeray and W. H. Thompson. With Tennyson, " a sort of Hyperion," his intimacy began about 1835. In 1830 he went to live in Paris, but in 1831 was in a farm-house on the battlefield of Naseby. He adopted no profession, and lived a perfectly stationary and rustic life, presently moving into his native county of Suffolk, and never again leaving it for more than a week or two. Until 1835 the FitzGeralds lived at Wherstead; from that year until 1853 the poet resided at Boulge, near Woodbridge; until i860 at Farlingay Hall; until 1873 in the town of

Woodbridge; and then until his death at his own house hard by, ealled Little Grange.

During most of this time FitzGerald gave his thoughts almost without interruption to his flowers, to music and to literature. He allowed friends like Tennyson and Thackeray, however, to push on far before him, and long showed no disposition to emulate their activity. In 1851 he published his first book, Euphranor, a Platonic dialogue, born of memories of the old happy life at Cambridge. In 1 8 5 2 appeared Polonius, a collection of " saws and modern instances," some of them his own, the rest borrowed from the less familiar English classics. FitzGerald began the study of Spanish poetry in 1850, when he was with Professor E. B. Cowell at Elmsett and that of Persian in Oxford in 1853. In the latter year he issued Six Dramas of Calderon, freely translated. He now turned to Oriental studies, and in 1856 he anonymously published a version of the. Saiaman and Absdl of Jami in Miltonic verse. In March 1857 the name with which he has been so closely identified first occurs in FitzGerald's correspondence — " Hafiz and Omar Khayydm ring like true metal." On the 15th of January 1859 a little anonymous pamphlet was published as The Rubdiydt of Omar Khayydm. In the world at large, and in the circle of FitzGerald's particular friends, the poem seems at first to have attracted no attention. The publisher allowed it to gravitate to the fourpenny or even

(as he afterwards boasted) to the penny box on the bookstalls. But in i860 Rossetti discovered it, and Swinburne and Lord Houghton quickly followed. The Rubdiydt became slowly famous, but it was not until 1868 that FitzGerald was eacouraged to print a second and greatly revised edition. Meanwhile he had produced in 1865 a version of the Agamemnon, and two more plays from Calderon. In 1880-1881 he issued privately transla- tions of the two Oedipus tragedies; his last publication was Readings in Crabbe, 1882. He left in manuscript a version of Attar's M antic- Uttair under the title of The Bird Parliament.

From 1861 onwards FitzGerald's greatest interest had centred in the sea. In June 1863 he bought a yacht, " The Scandal," and in 1867 he became part-owner of a herring-lugger, the " Meum and Tuum." For some years, till 1871, he spent the months from June to October mainly in " knocking about somewhere outside of Lowestoft." In this way, and among his books and flowers, FitzGerald gradually became an old man. On the 14th of June 1883 he passed away painlessly in his sleep. He was " an idle fellow, but one whose friendships were more like loves." In 1885 a stimulus was given to the steady advance

of his fame by the fact that Tennyson dedicated his Tiresias to FitzGerald's memory, in some touching reminiscent verses to " Old Fitz." This was but the signal for that universal appreciation of Omar Khayyam in his English dress, which has been one of the curious literary phenomena of recent years. The melody of FitzGerald's verse is so exquisite, the thoughts he rearranges and strings together are so profound, and the general atmosphere of poetry in which he steeps his version is so pure, that no surprise need be expressed at the universal favour which the poem has met with among critical readers. But its popularity has gone much deeper than this; it is now probably better known to the general public than any single poem of its class published since the year i860, and its admirers have almost transcended common sense in the extravagance of their laudation. FitzGerald married, in middle life, Lucy, the daughter of Bernard Barton, the Quaker poet. Of FitzGerald as a man practically nothing was known until, in 1889, Mr W. Aldis Wright, his intimate friend and literary executor, published his Letters and Literary Remains in three volumes. This was followed in 1895 by the Letters to Fanny Kemble. These letters constitute a fresh bid for immortality, since they discovered that FitzGerald was a witty, picturesque and sympathetic letter- writer. One of the most unobtrusive authors who ever lived, FitzGerald has, nevertheless, by the force of his extraordinary individuality, gradually influenced the whole face of English belles-lettres, in particular as it was manifested between 1890 and

1900.

The Works of Edward FitzGerald appeared in 1887. See also a chronological list of FitzGerald's works (Caxton Club, Chicago, 1899); notes for a bibliography by Col. W. F. Prideaux, in Notes and Queries (9th series, vol. vi.), published separately in 1901 ; Letters and Literary Remains (ed. W. Aldis Wright, 1902-1903); and the Life of Edward FitzGerald, by Thomas Wright (1904), which contains a bibliography (vol. ii. pp. 241-243) and a list of sources (vol. i. pp. xvi.xvii.). The volume on FitzGerald in the " English Men of Letters " series is by A. C. Benson. The Fitz Gerald centenary was celebrated in March 1909. See the Centenary Celebrations Souvenir (Ipswich, 1909) and The Times for March 25, 1909- (E. G.)

FITZGERALD, LORD EDWARD (1 763-1 798), Irish con- spirator, fifth son of James, 1st duke of Leinster, by his wife Emilia Mary, daughter of Charles Lennox, 2nd duke of Richmond, was born at Carton House, near Dublin, on the 15th of October 1763. In 1773 the duke of Leinster died, and his widow soon afterwards married William Ogilvie, who superintended Lord Edward's early education. Joining the army

in 1779, Lord Edward served with credit in America on the staff of Lord Rawdon (afterwards marquess of Hastings), and at the battle of Eutaw Springs (8th of September 1781) he was severely wounded, his life being saved by a negro named Tony, whom Lord Edward retained in his service till the end of his life. In 1783 Fitzgerald returned to Ireland, where his brother, the duke of Leinster, had procured his election to the Irish parliament as member for Athy. In parliament he acted with the small

4 + 4

Opposition group led by Grattan (q.v.), but took no prominent part in debate. After spending a short time at Woolwich to complete his military education, he made a tour through Spain in 1787; and then, dejected by unrequited love for his cousin Georgina Lennox (afterwards Lady Bathurst), he sailed for New Brunswick to join the 54th regiment with the rank of major. The love-sick mood and romantic temperament of the young Irishman found congenial soil in the wild surroundings of un- explored Canadian forests, and the enthusiasm thus engendered for the ” natural ” life of savagery may have been already fortified by study of Rousseau’s writings, for which at a later period Lord Edward expressed his admiration. In February 1789, guided by compass, he traversed the country, practically unknown to white men, from Frederickstown to Quebec, falling in with Indians by the way, with whom he fraternized; and in a subsequent expedition he was formally adopted at Detroit by the Bear tribe of Hurons as one of their chiefs, and made his way down the Mississippi to New Orleans, whence he returned to England.

Finding that his brother had procured his election for the county of Kildare, and desiring to maintain political independ- ence, Lord Edward refused the command of an expedition against Cadiz offered him by Pitt, and devoted himself for the next few years to the pleasures of society and his parliamentary duties. He was on terms of intimacy with his relative C. J. Fox, with R. B. Sheridan and other leading Whigs. According to Thomas Moore, Lord Edward Fitzgerald was the only one of the numerous suitors of Sheridan’s first wife whose attentions were received with favour; and it is certain that, whatever may have been its limits, a warm mutual affection subsisted between the two. His Whig connexions combined with his transatlantic experiences to predispose Lord Edward to sympathize with the doctrines of the French Revolution, which he embraced with ardour when he visited Paris in October 1 792. He lodged with Thomas Paine, and listened to the debates in the Convention. At a convivial gathering on the 18th of November he supported a toast to ”

the speedy abolition of all hereditary titles and feudal distinctions," and gave proof of his zeal by expressly repudiating his own title — a performance for which he was dismissed from the army. While in Paris Fitzgerald became enamoured of a young girl whom he chanced to see at the theatre, and who is said to have had a striking likeness to Mrs Sheridan. Procuring an intro- duction he discovered her to be a protegee of Madame de Sillery, comtesse de Genlis. The parentage of the girl, whose name was Pamela (?i776-i83i), is uncertain; but although there is some evidence to support the story of Madame de Genlis that Pamela was born in Newfoundland of parents called Seymour or Sims, the common belief that she was the daughter of Madame de Genlis herself by Philippe (figalitd), duke of Orleans, was prob- ably well founded. On the 27th of December 1792 Fitzgerald and Pamela were married at Tournay, one of the witnesses being Louis Philippe, afterwards king of the French; and in January 1793 the couple reached Dublin.

Discontent in Ireland was now rapidly becoming dangerous, and was finding a focus in the Society of the United Irishmen, and in the Catholic Committee, an organization formed a few years previously, chiefly under the direction of Lord Kenmare, to watch the interests of the Catholics. French revolutionary doctrines had become ominously popular, and no one sympa- thized with them more warmly than Lord Edward Fitzgerald, who, fresh from the gallery of the Convention in Paris, returned to his seat in the Irish parliament and threw himself actively into the work of opposition. Within a week of his arrival he denounced in the House of Commons a government proclamation, which Grattan had approved, in language so violent that he was ordered into custody and required to apologize at the bar of the House. As early as 1794 the government had information that placed Lord Edward under suspicion; but it was not till 1796 that he joined the United Irishmen, whose aim after the recall of Lord Fitzwilliam in 1795 was avowedly the establish- ment of an independent Irish republic. In May 1796 Theobald Wolfe Tone was in Paris endeavouring to obtain French assist-

ance for an insurrection in Ireland. In the same month Fitz- gerald and his friend Arthur O'Connor proceeded to Hamburg, where they opened negotiations with the Directory through Reinhard, French minister to the Hanseatic towns. The duke of York, meeting Pamela at Devonshire House on her way through London with her husband, had told her that " all was known " about his plans, and advised her to persuade him not to go abroad. The proceedings of the conspirators at Hamburg

were made known to the government in London by an informer, Samuel Turner. Pamela was entrusted with all her husband's secrets and took an active part in furthering his designs; and she appears to have fully deserved the confidence placed in her, though there is reason to suppose that at times she counselled prudence. The result of the Hamburg negotiations was Hoche's abortive expedition to Bantry Bay in December 1796. In September 1797 the government learnt from the informer MacNally that Lord Edward was among those directing the conspiracy of the United Irishmen, which was now quickly maturing. He was specially concerned with the military organization, in which he held the post of colonel of the Kildare regiment and head of the military committee. He had papers showing that 280,000 men were ready to rise. They possessed some arms, but the supply was insufficient, and the leaders were hoping for a French invasion to make good the deficiency and to give support to a popular uprising. But French help proving dilatory and uncertain, the rebel leaders in Ireland were divided in opinion as to the expediency of taking the field without waiting for foreign aid. Lord Edward was among the advocates of the bolder course. His opinions and his proposals for action were alike violent. He was on intimate terms with apologists for assassination; there is some evidence that he favoured a project for the massacre of the Irish peers while in procession to the House of Lords for the trial of Lord Kingston in May 1798. It was probably abhorrence of such measures that converted Thomas Reynolds from a conspirator to an informer; at all events, by him and several others the authorities were kept posted in what was going on, though lack of evidence producible in court delayed the arrest of the ringleaders. But on the 1 2th of March 1798 Reynolds' information led to the seizure of a number of conspirators at the house of Oliver Bond. Lord Edward Fitzgerald, warned by Reynolds, was not among them. The government were anxious to save him from the consequences of his own folly, and Lord Clare said to a member of his family, " for God's sake get this young man out of the country; the ports shall be thrown open, and no hindrance whatever offered." Fitzgerald with chivalrous recklessness refused to desert others who could not escape, and whom he had himself led into danger. On the 30th of March a proclamation establishing martial law and authorizing the military to act without orders from the civil magistrate, which was acted upon with revolting cruelty in several parts of the country, precipitated the crisis.

The government had now no choice but to secure if possible the person of Lord Edward Fitzgerald, whose social position more than his abilities made him the most important factor in the conspiracy. On the

nth of May a reward of £1000 was offered for his apprehension. The 23rd of May was the date fixed for the general rising. Since the arrest at Bond's, Fitzgerald had been in hiding, latterly at the house of one Murphy, a feather dealer, in Thomas Street, Dublin. He twice visited his wife in disguise; was himself visited by his stepfather, Ogilvie, and generally observed less caution than his situation required. The conspiracy was honeycombed with treachery, and it was long a matter of dispute to whose information the government were indebted for Fitzgerald's arrest; but it is no longer open to doubt that the secret of his hiding place was disclosed by a Catholic barrister named Magan, to whom the stipulated reward was ultimately paid through Francis Higgins, another informer. On the rgth of May Major Swan and a Mr. Ryan proceeded to Murphy's house with Major H. C. Sirr and a few soldiers. Lord Edward was discovered in bed. A desperate scuffle took place, Ryan being mortally wounded by Fitzgerald with a dagger, while Lord Edward himself was onlv secured after Sirr had

disabled him with a pistol bullet in the shoulder. He was conveyed to Newgate gaol, where by the kindness of Lord Clare he was visited by two of his relatives, and where he died of his wound on the 4th of June 1798. An Act of Attainder (repealed in 1810) was passed, confiscating his property; and his wife — against whom the government probably possessed sufficient evidence to secure a conviction for treason — was compelled to leave the country before her husband had actually expired.

Pamela, who was scarcely less celebrated than Lord Edward himself, and whose remarkable beauty made a lasting impression on Robert Southey, repaired to Hamburg, where in 1800 she married J. Pitcairn, the American consul. Since her marriage with Lord Edward she had been greatly beloved and esteemed by the whole Fitzgerald family; and although after her second marriage her intimacy with them ceased, there is no sufficient evidence for the tales that represented her subsequent conduct as open to grave censure. She remained to the last passionately devoted to the memory of her first husband; and she died in Paris in November 183 r. A portrait of Pamela is in the Louvre. She had three children by Lord Edward Fitzgerald: Edward Fox (1 794-1863); Pamela, afterwards wife of General Sir Guy Campbell; and Lucy Louisa, who married Captain Lyon, R.N.

Lord Edward Fitzgerald was of small stature and handsome features.

His character and career have been made the subject of eulogies much beyond their merits. He had, indeed, a winning personality, and a warm, affectionate and generous nature, which made him greatly beloved by his family and friends; he was humorous, light-hearted, sympathetic, adventurous. But he was entirely without the weightier qualities requisite for such a part as he undertook to play in public affairs. Hot- headed and impulsive, he lacked judgment. He was as con- spicuously deficient in the statesmanship as he was in the oratori- cal genius of such men as Flood, Plunket or Grattan. One of his associates in conspiracy described him as ” weak and not fit to command a sergeant’s guard, but very zealous.” Reinhard, who considered Arthur O’Connor ” a far abler man,” accurately read the character of Lord Edward Fitzgerald as that of a young man ” incapable of falsehood or perfidy, frank, energetic, and likely to be a useful and devoted instrument; but with no experience or extraordinary talent, and entirely unfit to be chief of a great party or leader in a difficult enterprise.”

See Thomas Moore, Life and Death of Lord Edward Fitzgerald (2 vols., London, 1832), also a revised edition entitled The Memoirs of Lord Edward Fitzgerald, edited with supplementary particulars by Martin MacDermott (London, 1897); R. R. Madden, The United Irishmen (7 vols., Dublin, 1842-1846); C. H. Teeling, Personal Narrative of the Irish Rebellion of 1798 (Belfast, 1832); W. J. Fitzpatrick, The Sham Squire, The Rebellion of Ireland and the Informers of 1798 (Dublin, 1866), and Secret Service under Pitt (London, 1892) ; J. A. Froude, TheEnglish inlreland in the Eighteenth Century (3 vols., London, 1872-1874); W. E. H. Lecky, History of England in the Eighteenth Century, vols. vii. and viii. (London, 1896) ; Thomas Reynolds the younger, The Life of Thomas Reynolds (London, 1839); “The Life and Letters of Lady Sarah Lennox, edited by the countess of Ilchester and Lord Stavordale (London, 1901); Ida A. Taylor, The Life of Lord Edward Fitzgerald (London, 1903), which gives a prejudiced and distorted picture of Pamela. For particulars of Pamela, and especially as to the question of her parentage, see Gerald Campbell, Edward and Pamela Fitz- gerald (London, 1904) ; Memoirs of Madame de Genlis (London, 1825); Georgette Ducrest, Chroniques populaires (Paris, 1855); Thomas Moore, Memoirs of the Life of R. B. Sheridan (London, 1825). (R. J. M.)

FITZGERALD, RAYMOND, or Redmond (d. ca. 1182), surnamed Le Gros, was the son of William Fitzgerald and brother of Odo de Carew. He was sent by Strongbow to Ireland in 1 170, and landed at Dundunnolf , near Waterford, where he was besieged in his entrenchments by the combined Irish and Ostmen, whom he repulsed.

He was Strongbow's second in command, and had the chief share in the capture of Waterford and in the successful assault on Dublin. He was sent to Aquitaine to hand over Strongbow's conquests to Henry II., but was back in Dublin in July 1171, when he led one of the sallies from the town. Strongbow offended him later by refusing him the marriage of his sister Basilea, widow of Robert de Quenci, con-

stable of Leinster. Raymond then retired to Wales, and Hervey de Mountmaurice became constable in his place. At the outbreak of a general rebellion against the earl in 1 1 74 Raymond returned with his uncle Meiler Fitz Henry, after receiving a promise of marriage with Basilea. Reinstated as constable he secured a series of successes, and with the fall of Limerick in October 1 1 75 order was restored. Mountmaurice meanwhile obtained Raymond's recall on the ground that his power threatened the royal authority, but the constable was delayed by a fresh out- break at Limerick, the earl's troops refusing to march without him. On the death of Strongbow he was acting governor until the arrival of William Fitz Aldhelm, to whom he handed over the royal fortresses. He was deprived of his estates near Dublin and Wexford, but the Geraldines secured the recall of Fitz Aldhelm early in n 83, and regained their power and influence. In 1 182 he relieved his uncle Robert Fitzstephen, who was besieged in Cork. The date of his death, sometimes stated to be 1 182, is not known.

FITZGERALD, LORD THOMAS (10th earl of Kildare), (1513-1537), the eldest son of Gerald Fitzgerald, 9th earl of Kildare, was born in London in 1513. He spent much of his youth in England, but in 1534 when his father was for the third time summoned to England to answer for his maladministra- tion as lord deputy of Ireland, Thomas, at the council held at Drogheda, in February was made vice-deputy. In June the Ormond faction spread a report in Ireland that the earl had been executed in the Tower, and that his son's life was to be attempted. Inflamed with rage at this apparent treachery, Thomas rode at the head of his retainers 1 into Dublin, and before the council for Ireland (the nth of June 1534) formally renounced his allegiance to the king and proclaimed a rebellion. His enemies, including Archbishop John Allen (of Dublin), who had been set by Henry VIII. to watch Fitzgerald, took refuge in Dublin Castle. In attempting to escape to England, Allen was taken by the rebels, and on the 28th of July 1534, was murdered by Fitzgerald's servants in his presence, but whether actually by his orders is uncertain. In any case he sent to the pope for absolution, but was solemnly excommunicated by the Irish Church. Leaving part of his army (with the consent of the citizens) to besiege Dublin Castle, Fitzgerald himself went against Piers Butler,

earl of Ossory, and succeeded at first in making a truce with him. But the citizens of Dublin now rose against him, Ossory invaded Kildare, and the approach of an English army forced Fitzgerald to raise the siege. Part of the English army landed on the 17th of October, the rest a week later, but taking advantage of the inactivity of the new lord deputy, Sir William Skeffington, Fitzgerald from his stronghold at Maynooth ravaged Kildare and Meath throughout the winter. He had now succeeded to the earldom of Kildare, his father having died in the Tower on the 13th of December 1534, but he does not seem to have been known by that title. In March Skeffington stormed the castle, the stronghold of the Geraldines, which was defended, and some said betrayed, by Christopher Parese, Fitzgerald's foster-brother. It fell on the 23rd of March 1535, and most of the garrison were put to the sword. This proved the final blow to the rebellion. The news of what is known as the " pardon of Maynooth " reached Fitzgerald as he was returning from levying fresh troops in Offaley; his men fell away from him, and he retreated to Thomond, intending to sail for Spain. Changing his mind he spent the next few months in raids against the English and their allies, but his party gradu- ally deserting him, on the 18th of August 1535 he surrendered himself to Lord Leonard Grey (d. 1541). It seems likely that he made some conditions, but what they were is very uncertain. He was taken to England and placed in the Tower. In February 1536 his five uncles were also, some of them with great injustice, seized and brought to England. The six Geraldines were hanged at Tyburn on the 3rd of February 1537. Acts of attainder against them and Gerald the 9th earl were passed by both the

1 Fitzgerald was known by the sobriquet of " Silken Thomas," either from the silken fringes on his helmet, or from his distinguished

Irish and English parliaments; but the family estates were restored by Edward VI. to Gerald, nth earl of Kildare (step- brother of Thomas), and the attainder was repealed by Queen Elizabeth. Lord Thomas Fitzgerald married Frances, youngest daughter of Sir Adrian Fortescue, but had no children.

Bibliography. — Richard Stanihurst, Chronicles of Ireland (vol. ii. of Holinshed's Chronicles); Sir James Ware, Rerum Hibernicarum annales (Dublin, 1664) ; The Earls of Kildare, by C. W. Fitzgerald, duke of Leinster (3rd ed., 1858); Richard Bagwell, Ireland under the Tudors (3 vols., 1885, vol. i. passim); Calendar State Papers, Hen.

VIII., Irish; G. E. C.'s Peerage; John Lodge, Peerage of Ireland, ed. M. Archdall (1789), vol. i.

FITZHERBERT, SIR ANTHONY (1470-1538), English jurist, was born at Norbury, Derbyshire. After studying at Oxford, he was called to the English bar, and in 1523 became justice of the Court of Common Pleas, the duties of which office he con- tinued to discharge till within a short time of his death in 1538. As a judge he left behind him a high reputation for fairness and integrity, and his legal learning is sufficiently attested by his

published works.

He is the author of La Graunde A bridgement, a digest of important legal cases written in Old French, first printed in 15 14; The Office and Authority of Justices of the Peace, first printed in 1538 (last ed. 1794); the New Natura Brevium (1534, last ed. 1794), with a commentary ascribed to Sir Matthew Hale. To Fitzherbert are sometimes attributed the Book of Husbandry (1523), the first published work on agriculture in the English language, and the Book of Surveying and, Improvements (1523) (see Agriculture).

FITZHERBERT, THOMAS (1552-1640), English Jesuit, was the eldest son and heir of William Fitzherbert of Swynnetton in Staffordshire, and grandson of Sir Anthony Fitzherbert, judge of the common pleas. He was educated at Oxford, where, at the age of twenty, he was imprisoned for recusancy. On his release he went to London, where he was a member of the association of young men founded in 1580 to assist the Jesuits Edmund Campion and Robert Parsons. In 1582 he withdrew to the continent, where he was active in the cause of Mary, queen of Scots. He married in this year Dorothy, daughter of Edward East of Bledlow in Buckinghamshire. After the death of his wife (1588) he went to Spain, where on the recommendation of the duke of Feria he received a pension from the king. He continued his intrigues against the English government, and in 1598 he was charged with complicity in a plot to poison Queen Elizabeth. After this he was for a short while in the service of the duke of Feria at Milan, then went to Rome, where he was ordained priest (1601-1602) and became agent for the English clergy. He was unpopular with them, however, owing to his subserviency to the Jesuits, and resigned the agency in 1607 owing to the remonstrances of the English arch-priest George Birkhead. In 1613 he joined the Society of Jesus, and was appointed superior of the English mission at Brussels in 1616, and in 1618 rector of the English college at Rome. He held this post to within a year of his death, which occurred at Rome on the 7th of August (O.S.) 1640.

I Father Fitzherbert, who is described as ” a person of excellent parts, a notable politician, and of graceful behaviour and generous spirit,” wrote many controversial works, a list of which is given in the article on him by Mr Thompson Cooper in the Dictionary of National Biography, together with authorities for his life.

FITZ NEAL or (Fitz Nigll), RICHARD (d. 1198), treasurer of Henry II. and Richard I. of England, and bishop of London, belonged to a great administrative family whose fortunes were closely linked with those of Henry I., Henry II. and Richard I. The founder of the family was Roger, bishop of Salisbury, the great minister of Henry I. Before the death of that sovereign (1135) the care of the treasury passed from Roger to his nephew, Nigel, bishop of Ely (d. n 69), who held that office until the whole family were disgraced by Stephen (1139). Becoming a partisan of the empress, Nigel reaped his reward at the accession of her son, Henry II., who made him at first chancellor and then treasurer. Nigel’s son, Richard, who was born before his father’s elevation to the episcopate (1133), succeeded to the office of treasurer in 11 58, and held it continuously for forty years. His name appears in the lists of itinerant justices for 1179 and 1194, but these are the only occasions on which he

exercised that office. Before 1184 he became dean of Lincoln, and was in that year presented by the chapter of Lincoln among three select candidates for the vacant see. The king passed him over in favour of Hugh of Avalon, having resolved on this occasion to make a disinterested appointment. Richard I., however, rewarded the treasurer’s services with the see of London

(1189).

Richard Fitz Neal is best remembered as an author. He lacked the broad statesmanship of his father and great-uncle; he avoided any connexion with political parties; he is only once mentioned as taking part in a debate of the Great Council (1193), and then spoke, in his character as a bishop, to support a royal demand for a special aid. But his work De necessariis observantiis Scaccarii dialogus, commonly called the Dialogus de Scaccario, is of unique interest to the historian. It is an account, in two books, of the procedure followed by the exchequer in the author’s time. Richard handles his subject with the more enthusiasm because, as he explains, the ” course ” of the exchequer was largely the creation of his own family. When read in connexion with the Pipe Rolls the Dialogus furnishes a most faithful and detailed picture of English fiscal arrangements under Henry II. The speakers in the dialogue are Richard himself and an anonymous

pupil. The latter puts leading questions which Richard answers in elaborate fashion. The date of the conversation is given in the prologue as 1176-1177. This probably marks the date at which the book was begun; it was not completed before n 78 or 1 1 79. Soon after the author's death we find it already recog- nized as the standard manual for exchequer officials. It was frequently transcribed and has been used by English antiquarians of every period. Hence it is the more necessary to insist that the historical statements which the treatise contains are some- times demonstrably erroneous; the author appears to have relied excessively upon oral tradition. But, as the work is only known to us through transcripts, it is possible that some of the blunders which it now contains are due to the misdirected zeal of editors. Richard Fitz Neal also compiled in his earlier years a register or chronicle of contemporary affairs, arranged in three parallel columns. This was preserved in the exchequer at the time when he wrote the Dialogus, but has since disappeared. Stubbs' conjectural identification of this Liber tricolumnis with the first part of the Gesta Henrici (formerly attributed to Benedictus Abbas) is now abandoned as untenable.

See Madox's edition in his History of the Exchequer (1769); and that of A. Hughes, C. G. Crump and C. Johnson (Oxford, 1902). F. Liebermann's Einleitung in den Dialogus de Scaccario (Gottingen, 1875) contains the fullest account of the author. (H. W. C. D.)

FITZ-OSBERN, ROGER (fl. 1070), succeeded to the earldom of Hereford and the English estate of William Fitz-Osbern in 1071. He did not keep on good terms with William the Con- queror, and in 1075, disregarding the king's prohibition, married his sister Emma to Ralph Guader, earl of Norfolk, at the famous bridal of Norwich. Immediately afterwards the two earls rebelled. But Roger, who was to bring his force from the west to join the earl of Norfolk, was held in check at the Severn by the Worcestershire fyrd which the English bishop Wulfstan brought into the field against him. Oh the collapse of his confederate's rising, Roger was tried before the Great Council, deprived of his lands and earldom, and sentenced to perpetual imprisonment; but he was released, with other political prisoners, at the death of William I. in 1087.

FITZ-OSBERN, WILLIAM, Earl of Hereford (d. 1071), was an intimate friend of William the Conqueror, and the principal agent in preparing for the invasion of England. He received the earldom of Hereford with the special duty of pushing into Wales. During William's absence in 1067, Fitz-Osbern was left as his deputy in central England, to guard it from the Welsh on one side, and the Danes on the other. He also acted

as William's lieutenant during the rebellions of 1069. In 1070 William sent him to assist Queen Matilda in the govern- ment of Normandy. But Richilde, widow of Baldwin VI. of Flanders, having offered to marry him if he would protect her son Arnulf against Robert the Frisian, Fitz-Osbern accepted

the proposal and joined Richilde in Flanders. He was killed, fighting against Robert, at Cassel in io7i._

See Freeman, Norman Conquest, vols. iii. and iv. ; Sir James Ramsay, Foundations of England, vol. ii.

FITZ OSBERT, WILLIAM (d. 1196), was a Londoner of good position who had served in the Third Crusade, and on his return took up the cause of the poorer citizens against the magnates who monopolized the government of London and assessed the taxes, as he alleged, with gross partiality. It is affirmed that he entered on this course of action through a quarrel with his elder brother who had refused him money. But this appears to be mere scandal; the chronicler Roger of Hoveden gives Fitz Osbert a high character, and he was implicitly trusted by the poorer citizens. He attempted to procure redress for them from the king; but the city magistrates persuaded the justiciar Hubert Walter that Fitz Osbert and his followers meditated plundering the houses of the rich. Troops were sent to seize the demagogue. He was smoked out of the sanctuary of St Mary le Bow, in which he had taken refuge, and summarily dragged to execution at Tyburn.

FITZ PETER, GEOFFREY (d. 12 13), earl of Essex and chief justiciar of England, began his official career in the later years of Henry II., whom he served as a sheriff, a justice itinerant and a justice of the forest. During Richard's absence on Crusade he was one of the five justices of the king's court who stood next in authority to the regent, Longchamp. It was at this time (1190) that Fitz Peter succeeded to the earldom of Essex, in the right of his wife, who was descended from the famous Geoffrey de Mandeville. In attempting to assert his hereditary rights over Walden priory Fitz Peter came into conflict with Long- champ, and revenged himself by taking an active part in the baronial agitation through which the regent was expelled from his office. The king, however, forgave Fitz Peter for his share in these proceedings; and, though refusing to give him formal investiture of the Essex earldom, appointed him justiciar in succession to Hubert Walter (1198). In this

capacity Fitz Peter continued his predecessor's policy of encouraging foreign trade and the development of the towns; many of the latter received, during his administration, charters of self-government. He was continued in his office by John, who found him a useful instrument and described him in an official letter as " indispens- able to the king and kingdom." He proved himself an able instrument of extortion, and profited to no small extent by the spoliation of church lands in the period of the interdict. But he was too closely counected with the baronage to be altogether trusted by the king. The contemporary Histoire des dues describes Fitz Peter as living in constant dread of disgrace and confiscation. In the last years of his life he endeavoured to act as a mediator between the king and the opposition. It was by his mouth that the king promised to the nation the laws of Henry I. (at the council of St Albans, August 4th, 1213). But Fitz Peter died a few weeks later (Oct. 2), and his great office passed to Peter des Roches, one of the unpopular foreign favourites. Fitz Peter was neither a far-sighted nor a disinterested statesman ; but he was the ablest pupil of Hubert Walter, and maintained the traditions of the great bureaucracy which the first and second Henries had founded.

See the original authorities specified for the reigns of Richard I. and John. Also Miss K. Norgate's Angevin England, vol. ii. (1887), and John Lackland (1902); A. Ballard in English Historical Review, xiv. p. 93 ; H. W. C. Davis' England under the Normans and Angevins (1905). (H. W. C. D.)

FITZROY, ROBERT (1805-1865), English, vice-admiral, distinguished as a hydrographer and meteorologist, was born at Ampton Hall, Suffolk, on the 5th of July 1805, being a grand- son, on the father's side, of the third duke of Grafton, and on the mother's, of the first marquis of Londonderry. He entered the navy from the Royal Naval College, then a school for cadets, on the 19th of October 1819, and on the 7th of September 1824 was promoted to the rank of lieutenant. After serving in the " Thetis " frigate in the Mediterranean and on the coast of South America, under the command of Sir John Phillimore and Captain Bingham, he was in August 1828 appointed to the " Ganges,"

as flag-lieutenant to Rear-Admiral Sir Robert Otway, the commander-in-chief on the South American station; and on the death of Commander Stokes of the " Beagle," on the 13th of November 1828, was promoted to the vacant command. The " Beagle," a small brig of about 240 tons, was then, and had been for the two previous years, employed on the survey of the coasts of Patagonia and Tierra del

Fuego, under the orders of Commander King in the ” Adventure,” and, together with the ” Adventure,” returned to England in the autumn of 1830. Fitzroy had brought home with him four Fuegians, one of whom died of smallpox a few weeks after arriving in England; to the others he endeavoured, with but slight success, to impart a rudimentary knowledge of religion and of some useful handi- crafts; and, as he had pledged himself to restore them to their native country, he was making preparations in the summer of the following year to carry them back in a merchant ship bound to Valparaiso, when he received his reappointment to the ” Beagle,” to continue the survey of the same wild coasts. The ” Beagle ” sailed from Plymouth on the 27th of December 1831, carrying as a supernumerary Charles Darwin, the afterwards famous naturalist. After an absence of nearly five years, and having, in addition to the survey of the Straits of Magellan and a great part of the coast of South America, run a chronometric line round the world, thus fixing the longitude of many secondary meridians with sufficient exactness for all the purposes of ordinary naviga- tion, the ” Beagle ” anchored at Falmouth on the 2nd of October 1836. In 1835 Fitzroy had been advanced to the rank of captain and was now for the next few years principally employed in reducing and discussing his numerous observations. In 1837 he was awarded the gold medal of the Royal Geographical Society ; and in 1839 he published, in two thick 8vo volumes, the narrative of the voyage of the ” Adventure ” and ” Beagle,” 1826-1830, and of the ” Beagle,” 1831-1836, with a third volume by Darwin — a book familiarly known as a record of scientific travel. Of Fitzroy’s work as a surveyor, carried on under circumstances of great difficulty, with scanty means, and with an outfit that was semi-officially denounced as ” shabby,” Sir Francis Beaufort, the Hydrographer to the Admiralty, wrote, in a report to the House of Commons, 10th of February 1848, that ” from the equator to Cape Horn, and from thence round to the river Plata on the eastern side of America, all that is immediately wanted has been already achieved by the splendid survey of Captain Robert Fitzroy.” This was written before steamships made the Straits of Magellan a high-road to the Pacific. The survey that was sufficient then became afterwards very far from sufficient.

In 1 84 1 Fitzroy unsuccessfully contested the borough of Ipswich, and in the following year was returned to parliament as member for Durham. About the same time he accepted the post of conservator of the Mersey, and in his double capacity obtained leave to bring in a bill for improving the condition and efficiency of officers in the mercantile marine. This was not proceeded with at the time, but gave rise to the ” voluntary certificate ” instituted by the Board of Trade in 1845, and

furnished some important clauses to the Mercantile Marine Act of 1850.

Early in 1843 Fitzroy was appointed governor and commander- in-chief of New Zealand, then recently established as a colony. He arrived in his government in December, whilst the excitement about the Wairau massacre was still fresh, and the questions relating to the purchase of land from the natives were in a very unsatisfactory state. The early settlers were greedy and un- scrupulous; Fitzroy, on the other hand, had made no secret of his partiality for the aborigines. Between such discordant elements agreement was impossible: the settlers insulted the governor; the governor did not conciliate the settlers, who denounced his policy as adverse to their interests, as unjust and illegal; colonial feeling against him ran very high; petition after petition for his recall was sent home, and the government was compelled to yield to the pressure brought to bear on it. Fitzroy was relieved by Sir George Grey in November 1845.

In September 1848 he was appointed acting superintendent

of the dockyard at Woolwich, and in the following March to the command of the ” Arrogant,” one of the early screw frigates which had been fitted out under his supervision, and with which it was desired to carry out a series of experiments and trials. When these were finished he applied to be superseded, on account at once of his health and of his private affairs. In February 1850 he was accordingly placed on half pay; nor did he ever serve again, although advanced in due course by seniority to the ranks of rear and vice-admiral on the retired list (1857, 1863). In 1851 he was elected a fellow of the Royal Society, and in 1854, after serving for a few months as private secretary to his uncle, Lord Hardinge, then commander-in-chief of the army, he was appointed to the meteorological department of the Board of Trade, with, in the first instance, the peculiar title of ” Meteorological Statist.”

From the date of his joining the ” Beagle ” in 1828 he had paid very great attention to the different phenomena foreboding or accompanying change of weather, and his narratives of the voyages of the ” Adventure ” and ” Beagle ” are full of interest- ing and valuable details concerning these. Accordingly, when in 1854 Lord Wrottesley, the president of the Royal Society, was asked by the Board of Trade to

recommend a chief for its newly forming meteorological department, he, almost without hesitation, nominated Fitzroy, whose name and career became from that time identified with the progress of practical meteor- ology. His Weather Book, published in 1863, embodies in broad outline his views, far in advance of those then generally held; and in spite of the rapid march of modern science, it is still worthy of careful attention and exact study. His storm warnings, in their origin, indeed, liable to a charge of empiricism, were gradually developed on a more scientific basis, and gave a high percentage of correct results. They were continued for eighteen months after his death by the assistants he had trained, and though stopped when the department was transferred to the management of a committee of the Royal Society, they were resumed a few months afterwards; and under the successive direction of Dr R. H. Scott and Dr W. N. Shaw, have been developed into what we now know them. But though it is perhaps by these storm warnings that Fitzroy's name has been most generally known, seafaring men owe him a deeper debt of gratitude, not only for his labours in reducing to a more practical form the somewhat complicated wind qharts of Captain Maury, but also for his great exertions in connexion with the life-boat association. Into this work, in its many ramifications, he threw himself with the energy of an excitable temperament, already strained by his long and anxious service in the Straits of Magellan. His last years were fully and to an excessive degree occupied by it; his health, both of body and mind, threatened to give way; but he refused to take the rest that was prescribed. In a fit of mental aberration he put an end to his existence on the 30th of April 1865.

Besides his works already named mention may be made of Remarks on New Zealand (1846) ; Sailing Directions for South America (1848) ; his official reports to the Board of Trade (1857-1865) ; and occasional papers in the journal of the Royal Geographical Society and of the Royal United Service Institution. (J. K. L.)

FITZROY, a city of Bourke county, Victoria, Australia, 2 m. by rail N.E. of and suburban to Melbourne. Pop. (1901) 31,610. It is a prosperous manufacturing town, well served with tramways and containing manv fine residences.

FITZ STEPHEN, ROBERT "(fl. 1150), son of Nesta, a Welsh princess and former mistress of Henry I., by Stephen, constable of Cardigan, whom Robert succeeded in that office, took service with Dermot of Leinster when that king visited England (1167), In 1 1 60 Robert led the vanguard of Dermot's Anglo- Welsh auxiliaries to Ireland, and captured Wexford, which he was then allowed to hold jointly with

Maurice Fitz Gerald. Taken prisoner by the Irish in 11 71, he was by them surrendered to Henry II., who appointed him lieutenant of the justiciar of Ireland, Hugh de Lacy. Robert rendered good service in the troubles of n 73, and was rewarded by receiving, jointly with Miles Cogan, a grant of Cork (1177). He had difficulty in main-

taining his position and was nearly overwhelmed by a rising of Desmond in 1 182. The date of his death is uncertain.

FITZ STEPHEN, WILLIAM (d. c. 1190), biographer of Thomas Becket and royal justice, was a Londoner by origin. He entered Becket's service at some date between 11 54 and 1162. The chancellor employed Fitz Stephen in legal work, made him sub-deacon of his chapel and treated him as a confidant. Fitz Stephen appeared with Becket at the council of Northampton (1164) when the disgrace of the archbishop was published to the world; but he did not follow Becket into exile. He joined Becket's household again in n 70, and was a spectator of the tragedy in Canterbury cathedral. To his pen we owe the most valuable among the extant biographies of his patron. Though he writes as a partisan he gives a precise account of the differ- ences between Becket and the king. This biography contains' a description of London which is our chief authority for the social life of the city in the 1 2th century. Despite his connexion with Becket, William subsequently obtained substantial prefer- ment from the king. He was sheriff of Gloucestershire from n 71 to 1 190, and a royal justice in the years 11 76-1 180 and 1189-

1190.

See his " Vita S. Thomae " in J. C. Robertson's Materials for the History of Thomas Becket, vol. iii. (Rolls series, 1877). Sir T. D. Hardy, in his Catalogue of Materials, ii. 330 (Rolls series, 1865), discusses the manuscripts of this biography and its value. W. H. Hutton, St Thomas of Canterbury, pp. 272-274 (1889), gives an account of the author. (H. W. C. D.)

FITZ THEDMAR, ARNOLD (d. 1274), London chronicler and merchant, was born in London on the 9th of August 1201. Both his parents were of German extraction. The family of his mother migrated to England from Cologne in the reign of Henry II.; his father, Thedmar by name, was a citizen of Bremen who had been attracted to London by the privileges which the Plantagenets conferred upon the Teutonic Hanse. Arnold succeeded in time to his father's wealth and position. He held an honourable position among the Hanse traders, and became their " alderman." He was also, as he tells us himself, alderman of a

London ward and an active partisan in municipal politics. In the Barons' War he took the royal side against the populace and the mayor Thomas Fitz Thomas. The popular party planned, in 1265, to try him for his life before the folk-moot, but he was saved by the news of the battle of Evesham which arrived on the very day appointed for the trial. Even after the king's triumph Arnold suffered from the malice of his enemies, who contrived that he should be unfairly assessed for the tallages imposed upon the city. He appealed for help to Henry III., and again to Edward I., with the result that his liability was diminished. In 1270 he was one of the four citizens to whose keeping the muniments of the city were entrusted. To this circumstance we probably owe the compilation of his chronicle. Chronica Maiorum et Vicecomitum, which begins at the year 1188 and is continued to 1274. From 1239 onwards this work is a mine of curious information. Though municipal in its outlook, it is valuable for the general history of the kingdom, owing to the important part which London played in the agitation against the misrule of Henry III. We have the king's word for the fact that Arnold was a consistent royalist; but this is apparent from the whole tenor of the chronicle. Arnold was by no means blind to the faults of Henry's government, but preferred an autocracy to the mob-rule which Simon de Montfortcountenanced in London. Arnold died in 1274; the last fact recorded of him is that, in this year, he joined in a successful appeal to the king against the illegal grants which had been made by the mayor, Walter Hervey.

The Chronica Maiorum et Vicecomitum, with the other contents of Arnold's common-place book, were edited for the Camden Society by T. Stapleton (1846), under the title Liber de Antiquis Legibus. Our knowledge of Arnold's life comes from the Chronica and his own biographical notes. Extracts, with valuable notes, are edited in G. H. Pertz's Mon. Germaniae historica, Scriptores, vol. xxviii. See also J. M. Lappenberg's Urkundliche Geschichte des Hansischen Stahlhofes zu London (Hamburg, 1851). (H. W C. D)

FITZWALTER, ROBERT (d. 1235), leader of the baronial opposition against King John of England, belonged to the

official aristocracy created by Henry I. and Henry II. He served John in the Norman wars, and was taken prisoner by Philip of France, and forced to pay a heavy ransom. He was implicated in the baronial conspiracy of 121 2. According to his own statement the king had

attempted to seduce his eldest daughter; but Robert's account of his grievances varied from time to time. The truth seems to be that he was irritated by the suspicion with which John regarded the new baronage. Fitzwalter escaped a trial by flying to France. He was outlawed, but returned under a special amnesty after John's reconciliation with the pope. He continued, however, to take the lead in the baronial agitation against the king, and upon the outbreak of hostilities was elected " marshal of the army of God and Holy Church " (1215). To his influence in London it was due that his party obtained the support of the city and used it as their base of operations. The famous clause of Magna Carta (§ 39) pro- hibiting sentences of exile, except as the result of a lawful trial, refers more particularly to his case. He was one of the twenty- five appointed to enforce the promises of Magna Carta,; and his aggressive attitude was one of the causes which contributed to the recrudescence of civil war (1 2 1 5) . His incompetent leadership made it necessary for the rebels to invoke the help of France. He was one of the envoys who invited Louis to England, and was the first of the barons to do homage when the prince entered London. Though slighted by the French as a traitor to his natural lord, he served Louis with fidelity until captured at the battle of Lincoln (May 1217). Released on the conclusion of peace he joined the Damietta crusade of 12 19, but returned at an early date to make his peace with the regency. The remainder of his career was uneventful; he died peacefully in 1235.

See the list of chronicles for the reign of John. The Histoire des dues de Normandie el des rois d' ' Angleterre (ed. F. Michel, Paris, 1840) gives the fullest account of his quarrel with the king. Miss K. Norgate's John Lackland (1902), W. McKechnie's Magna Carta (1905), and Stubbs's Constitutional History, vol. i. ch. xii. (1897), should also be consulted.

FITZWILLIAM, SIR WILLIAM (1526-1599), lord deputy of Ireland, was the eldest son of Sir William Fitzwiliiam (d. 1576) of Milton, Northamptonshire, where he was born, and grandson of another Sir William Fitzwiliiam (d. 1534), alderman and sheriff of London, who was also treasurer and chamberlain to Cardinal Wolsey, and who purchased Milton in 1506. On his mother's side Fitzwiliiam was related to John Russell, 1st earl of Bedford, a circumstance to which he owed his introduction to Edward VI. In 1559 he became vice-treasurer of Ireland and a member of the Irish House of Commons; and between this date and 157 1 he was (during the absences of Thomas Radclyffe, earl of Sussex, and of his successor, Sir Henry Sidney) five times lord justice of Ireland. In 1 5 7 1 Fitzwiliiam himself was appointed lord deputy, but like Elizabeth's other servants

he received little or no money, and his period of government was marked by continuous penury and its attendant evils, inefficiency, mutiny and general lawlessness. Moreover, the deputy quarrelled with the lord president of Connaught, Sir Edward Fitton (1527-1579)1 but he compelled the earl of Desmond to submit in 1574. He disliked the expedition of Walter Devereux, earl of Essex; he had a further quarrel with Fitton, and after a serious illness he was allowed to resign his office. Returning to England in 1575 he was governor of Fotheringhay Castle at the time of Mary Stuart's execution. In 1588 Fitzwiliiam was again in Ireland as lord deputy, and although old and ill he displayed great activity in leading expeditions, and found time to quarrel with Sir Richard Bingham (1 528-1599), the new president of Connaught. In 1594 he finally left Ireland, and five years later he died at Milton. From Fitzwiliiam, whose wife was Anne, daughter of Sir William Sidney, were descended the barons and earls Fitzwiliiam.

See R. Bagwell, Ireland under the Tudors, vol. ii. (1885).

FITZWILLIAM, WILLIAM WENTWORTH FITZWILLIAM, 2nd earl (1748-1833), English statesman, was the son of the 1 st earl (peerage of the United Kingdom), who died in 1756. The English family of Fitzwiliiam claimed descent from a natural son of William the Conqueror, and among its earlier members

were a Sir William Fitzwiliiam (1460-1534), sheriff of London, who in 1506 acquired the family seat of Milton Manor in North- amptonshire, and his grandson Sir William Fitzwiliiam (see above). The latter's grandson was made an Irish baron in 1620; and in later generations the Irish titles of Viscount Milton and Earl Fitzwiliiam (17 16) and the English titles of Baron Milton (1742) and Viscount Milton and Earl Fitzwiliiam (1746), were added. These were all in the English house of the Fitzwilliams of Milton Manor. They were distinct from the Irish Fitzwilliams of Meryon, who descended from a member of the English family who went to Ireland with Prince John at the end of the 12th century, and whose titles of Baron and Viscount Fitzwiliiam died out with the 8th viscount in 1833; the best known of these was Richard, 7th viscount (1745-1816), who left the Fitzwiliiam library and a fund for creating the Fitzwiliiam Museum to Cambridge University.

The 2nd earl inherited not only the Fitzwiliiam estates in Northamptonshire, but also, on the death of his uncle the marquess of Rockingham in 1782, the valuable Went worth estates in Yorkshire, and thus became one of the wealthiest noblemen of the day. He had

been at Eton with C. J. Fox, and became an active supporter of the Whig party; and in 1794, with the duke of Portland, Windham and other " old Whigs " he joined Pitt's cabinet, becoming president of the council. At the end of the year, however, he was sent to Ireland as viceroy. Fitzwiliiam, however, had set his face against the jobbery of the Protestant leaders, and threw himself warmly into Grattan's scheme for admitting the Catholics to political power; and in March 1795 he was recalled, his action being disavowed by Pitt, the result of a series of misunderstandings which appeared to Fitzwiliiam to give him just cause of complaint. The quarrel was, however, made up, and in 1798 Fitzwiliiam was appointed lord-lieutenant of the West Riding of Yorkshire. He continued to take an active part in politics, and in 1806 was president of the council, but his Whig opinions kept him mainly in opposition. He died in February 1833, his son, Charles William Wentworth, the 3rd earl (1786-1857), and later earls, being notable figures in the politics and social life of the north of England.

FIUME (Slav. Rjeka, Rieka or Reka, Ger. St Veil am Flaum), a royal free town and port of Hungary; situated at the northern extremity of the Gulf of Quarnero, an inlet of the Adriatic, and on a small stream called the Rjeka, Recina or Fiumara, 70 m. by rail S.E. of Trieste. Pop. (1900) 38,955; including 17,354 Italians, 14,885 Slavs (Croats, Serbs and Slovenes), 2482 Hun- garians and 1945 Germans. Geographically, Fiume belongs to Croatia; politically the town, with its territory of some 7 sq. m., became a part of Hungary in August 1870. The picturesque old town occupies an outlying ridge of the Croatian Karst; while the modern town, with its wharves, warehouses, electric light and electric trams, is crowded into the amphitheatre left between the hills and the shore. On the north-west there is a fine public garden. The most interesting buildings are the cathedral church of the Assumption, founded in 1377, and com- pleted with a modern facade copied from that of the Pantheon in Rome; the church of St Veit, on the model of Santa Maria della Salute in Venice; and the Pilgrimage church, hung with offerings from shipwrecked sailors, and approached by a stairway of 400 steps. In the old town is a Roman triumphal arch, said to have been erected during the 3rd century a.d. in honour of the emperor Claudius II. Fiume also possesses a theatre and a music-hall; palaces for the governor and the Austrian emperor; a high court of justice for commerce and marine; a chamber of commerce; an asylum for lunatics and the aged poor; an industrial home for boys; and several large schools, including the marine academy (1856) and the school of seamanship (1903). Municipal affairs are principally managed by the Italians, who sympathize with the Hungarians against the Slavs.

Fiume is the only seaport of Hungary, with which country it was connected, in 1809, by the Maria Louisa road, through Karlstadt. It has two railways, opened in 1873; one a branch of the southern railway from Vienna to Trieste, the other of the

Hungarian state railway from Karlstadt. There are several harbours, including the Porto Canale, for coasting vessels ; the Porto Baross, for timber; and the Porto Grande, sheltered by the Maria Theresia mole and breakwater, besides four lesser moles, and flanked by the quays, with their grain-elevators. The development of the Porto Grande, originally named the Porto Nuovo, was undertaken in 1847, and carried on at intervals as trade increased. In 1902, arrangements were made for the construction of a new mole and an enlargement of the quays and breakwater; these works to be completed within 5 years, at a cost of £420,000. The exports, worth £6,460,000 in 1902, chiefly consisted of grain, flour, sugar, timber and horses; the imports, worth £3,678,000 in the same year, of coal, wine, rice, fruit, jute and various minerals, chemicals and oils. A large share in the carrying trade belongs to the Cunard, Adria, Ungaro- Croat and Austrian Lloyd Steamship Companies, subsidized by the state. A steady stream of Croatian and Hungarian emigrants, officially numbered in 1902 at 7500, passes through Fiume. Altogether 11,550 vessels, of 1,963,000 tons, entered at Fiume in 1902; and 11,535, of 1,956,000, cleared. Foremost among the industrial establishments are Whitehead's torpedo factory, Messrs Smith & Meynie's paper-mill, the royal tobacco factory, a chemical factory, and several flour-mills, tanneries and rope manufactories. In 1902 the last shipbuilding yard was closed. The soil of the surrounding country is stony, but the climate is warm, and wine is extensively produced. The Gulf of Quarnero yields a plentiful supply of fish, and the tunny trade with Trieste and Venice is of considerable importance. Steamboats ply daily from Fiume to the Istrian health-resort of Abbazia, the Croatian port of Buccari, and the islands of Veglia and Cherso.

Fiume is supposed to occupy the site of the ancient Liburnian town Tersatica; later it received the name of Vitopolis, and eventually that of Fanum Sancti Viti ad Flumen, from which its present name is derived. It was destroyed by Charlemagne in 799, from which time it probably long remained under the dominion of the Franks. It was held

in feudal tenure from the patriarch of Aquileia by the bishop of Pola, and afterwards, in 1 139, by the counts of Duino, who retained it till the end of the 14th century. It next passed into the hands of the counts of Wallsee, by whom it was surrendered in 147 1 to the emperor Frederick III., who incorporated it with the dominions of the house of Austria. From this date till 1776 Fiume was ruled by imperial governors. In 1723 it was declared a free port by Charles VI., in 1776 united to Croatia by the empress Maria Theresa, and in 1779 declared a corpus separatum of the Hungarian crown. In 1809 Fiume was occupied by the French; but it was retaken by the British in 1813, and restored to Austria in the following year. It was ceded to Hungary in 1822, but after the revolution of 1 848- 1 849 was annexed to the crown lands of Croatia, under the government of which it remained till it came under Hungarian control in 1870.

FIVES, a ball-game played by two or four players in a court enclosed on three or four sides, the ball being struck with the hand, usually protected by a glove, whence the game is known in America as " handball." The origin of the game is probably the French jeu de paume, tennis played with the hand, the hand in that case being eventually superseded by the racquet. Fives and racquets are probably both descended from the jeu de paume, of which they are simplified forms. The name fives may be derived from la tongue paume, in which five on a side played, or from the five fingers, or from the fact that five points had to be made by the winners (in modern times the game consists of fifteen points). Fives is played in Great Britain principally at the schools and universities, although its encouragement is included in the functions of the Tennis Racquets and Fives Association, founded in 1908. In America it is much affected for training purposes by professional athletes and boxers. There are two forms of fives — the Eton game and the Rugby game — which require separate notice, though the main features of the two games are the serving of the ball to the taker of the service, the necessity of hitting the ball before the second

bounce, and of hitting it above a line and within the limits of the court.

Eton Fives. — The peculiar features of the Eton court arose from the fact that in early times the game was played against the chapel-wall, so that buttresses formed side walls and the balustrade of the chapel-steps projected into the court, while a step divided the court latitudinally. These were reproduced in the regular courts, the buttress being known as the " pepper- box " and the space between it and the step as the " hole." The riser of the step is about 5 in. The floor of the

court is paved ; there is no back wall. On the front wall is a ledge, known as the ” line,” 4 ft. 6 in. from the floor, and a vertical line, painted; 3 ft. 8 in. from the right-hand wall. Four people usually play, two against two; one of each pair plays in the forward court, the other in the back court. The server stands on the left of the forward court, his partner in the right-hand corner of the back court; the taker of the service by the right wall of the forward court, his partner at the left-hand corner of the back court. The forward court is known as ” on-wall,” the other as ” off-wall.” The server must toss the ball gently against the front wall, above the line, so that it afterwards hits the right wall and falls on the ” off-wall,” but the server’s object is not, as at tennis and racquets, to send a service that cannot be returned. At fives he must send a service that hand-out can take easily; indeed hand-out can refuse to take any service that he does not like, and if he fails to return the ball above the line no stroke is counted. After the service has been returned either of the opponents returns the ball if he can, and so on, each side and either member of it returning the ball above the line alternately till one side or the other hits it below the line or out of court. Only hand-in can score. If hand-in wins a stroke, his side scores a point; if he misses a stroke he loses his innings and his partner becomes server, unless he has already served in this round, in which case the opponents become hand-in. The game is fifteen points. If the score is ” 13 all,” the out side may ” set ” the game to 5 or 3; i.e. the game becomes one of 5 or 3 points; at ” 14 all ” it may be set to three. The game and its terminology being somewhat intricate, can best be learnt in the court. No apparatus is required except padded gloves and fives-balls, which are covered with white leather tightly stretched over a hard founda- tion of cork, strips of leather and twine. The Eton balls are 1 1 in. in diameter and weigh about ij oz. apiece.

Rugby Fives is much less complicated owing to the simpler form of the court. The rules as to service, taking the balls, &c, are the same as in Eton Fives. The balls are rather smaller. The courts are larger, measuring about 34 ft. by 19 ft. 6 in. and may be roofed or open. The side walls slope from 20 ft. to 12 ft. Some courts have a dwarf back wall, some have none. The back wall, when there is one, is 5 ft. 8 in. in height. In some courts the side walls are plain; in others, where there is no back wall, a projection about 3 in. deep is built at right angles to the two side walls; in others a buttress, similar to the tambour of the tennis-court, is built out from the left-hand wall about 10 ft. from the front wall, and continued to the end of the court. The line is generally a board fixed across the front wall, its upper edge 34 in. from the ground, but the height varies slightly.

Handball, of ancient popularity in Ireland and much played in the United States, is practically identical with fives, though there are minor differences. The usual American court is about 60 ft. long, 24! ft. wide and 35 ft. high at the front, tapering to 33 ft. at the back wall. The front wall is of brick faced with marble, the sides of cement and the floor of white pine laid on beams 10 in. apart. These are the dimensions of the Brooklyn court of the former American champion, Phil Casey (d. 1904), which has been extensively copied. Twenty-one aces constitute a game and gloves are not usually worn. The American ball is a trifle larger and softer than the Irish, which is called a ” red ace ” when made of solid red rubber, and ” black ace ” when made of black rubber. Baggs of Tipperary, who was in his prime about 1855, was the most celebrated Irish handball player. In his day nearly every village tavern in Ireland had a court. Browning and Lawlor, who won the Irish championship in 1885,

were his most prominent successors. In America Phil Casey and Michael Egan are the best-known names.

See A. Tait’s Fives in the All England Series: ” Fives ” in the Encyclopaedia of Sport; and Official Handball Guide in Spalding’s Athletic Library.

FIX, THEODORE (1800-1846), French journalist and econo- mist, was born at Soleure in Switzerland in 1800. His father was a French physician whose ancestors had been ex- patriated by the revocation of the edict of Nantes. At first a land surveyor, he in 1830 became connected with the Bulletin universal des sciences, to which he contributed most of the geographical articles. In 1833 he founded the Revue mensuelle a” iconomie politique, which he edited during the three years of its existence. He then became engaged in journalistic work, till his essay on L’ Association des douanes allemandes won him a prize from the Academie des Sciences Morales et Politiques in 1840, and also procured him work on the report on the progress of sciences since the Revolution, which the Institute was prepar- ing. A few months before his death he published Observations sur les classes ouvrieres, in which he argued against all attempts to regulate artificially the rate of wages, and attributed the condition of the working classes to their own thriftlessness and intemperance. He died suddenly at Paris on the 31st of July

1846.

FIXTURES (Lat. figere, to fix), in law, chattels which have been so fixed or attached to land (as it is expressed in English law, ” so annexed to the freehold “), as to become, in contemplation of law, a part of it. All systems of law make a marked distinction for certain purposes, between immovables and movables, between real and personal property, between land and all other things. In the case of fixtures the question arises under which set of rights they are to fall — under those of real or of personal property. The general rule of English law is that everything attached to the land goes with the land — quicquid plantatur solo, solo cedit. This, like many other rules of English law, is all in favour of the freeholder; but its hardship has been modified by a large number of exceptions formulated from time to time by the courts as occasion arose.

In order to constitute a fixture there must be some degree of annexation to the land, or to a building which forms part of it. Thus it has been held that a barn laid on blocks of timber, but not fixed to the ground itself, is not a fixture; and the onus of showing that articles not otherwise attached to the land than by their own weight have ceased to be chattels, rests with those who assert the fact. On the other hand, an article, even slightly affixed to the land, is to be considered part of it, unless the circumstances show that it was intended to remain a chattel. The question is one of fact in each case — depending mainly on the mode, degree and object of the annexation, and the possi- bility of the removal of the article without injury to itself or the freehold. In certain cases the courts have recognized a construc- tive annexation, when the articles, though not fixed to the soil, pass with the freehold as if they were, e.g. the keys of a house, the stones of a dry wall, and the detached or duplicate portions of machines.

Questions as to the property in fixtures principally arise — (1) between landlord and tenant, (2) between heir and executor, (3) between executor and remainder-man or reversioner, (4) between seller and buyer.

I. At common law, if the tenant has affixed anything to the freehold during his occupation, he cannot remove it without the permission of his landlord. But an exception was established in favour of trade fixtures. In a case before Lord Holt it was held that a soap-boiler might, during his term, remove the vats he had set up for trade purposes, and that not by virtue of any special custom, but ” by the common law in favour of trade, and to encourage industry,” and it may be stated as a general rule that things which a tenant has fixed to

the freehold for the purpose of trade or manu- facture may be taken away by him, whenever the removal is not contrary to any prevailing practice, or the particular terms of the contract of tenancy, and can be effected without causing material injury to the estate or destroying the essential character of the articles themselves (Lambourn v. M'Lellan, 1903, 2 Ch. 269). Agri- cultural tenants are not entitled, at common law, to remove trade fixtures. But the Landlord and Tenant Act 1851 granted such a right of removal in the case of buildings or machinery erected by a

tenant at his own expense, and with his landlord's consent in writing, provided that the freehold was not injured or that any injury was made good, and that before removal a month's written notice was given to the landlord, who had an option of purchase. Under the Agricultural Holdings Act 1883 the tenant might, under similar conditions, remove fixtures, although the landlord had not consented to their erection. The Agricultural Holdings Act 1900 extended this provision to fixtures or buildings acquired, although not annexed or erected, by the tenant. Similar rights were created by the Allot- ments Compensation Act 1887, and by the Market Gardeners' Compensation Act 1895. All these provisions were re-enacted by the Agricultural Holdings Act 1908.

Again, ornamental fixtures, set up by the tenant for ornament and convenience, such as hangings and looking-glasses, tapestry, iron-backs to chimneys, wainscot fixed by screws, marble chimney-pieces, are held to belong to the tenant, and to be removable without the landlord's consent. Here again the extent of the privilege has been a matter of some uncertainty.

In all these cases the fixtures must be remo\ed during the term. If the tenant gives up possession of the premises without removing the fixtures, it will be presumed, it appears, that he has made a gift of them to the landlord, and that presumption probably could not be rebutted by positive evidence of a contrary intention. His right to the fixtures is not, however, destroyed by the mere expiry of the term, if he still remains in possession; but if he has once left the premises he cannot come back and claim his fixtures. In one case where the fixtures had actually been severed from the free- hold after the end of the term, it was held that the tenant had no right to recover them.

2. As between heir and executor or administrator. The question of fixtures arises between these parties on the death of a person owning land. The executor has no right to remove trade fixtures, set up tor the benefit of the inheritance. As regards ornamental objects, the rule

quicquid plantatur solo, solo cedit was in early times somewhat relaxed in favour of the executor. As far back as 1 701, it was held that hangings fixed to a wall for ornament passed to the executor; and, although the effect of this relaxation was subsequently cut down, it is supported by the decisions of the courts affirming the executor's right to valuable tapestries affixed by a tenant for life to the walls of a house for ornament and their better enjoyment as chattels {Leigh v. Taylor, 1902, App. Cas. 157); and the same has been held as to statues and bronze groups set on pedestals in the grounds of a mansion house.

3. When a tenant for life of land dies, the question of fixtures arises between his representatives and the persons next entitled to the estate (the remainder- man or reversioner). The remainder- man is not so great a favourite of the law as the heir, and the right to fixtures is construed more favourably for executors than in the preceding cases between heir and executor. Whatever are executor's fixtures against the heir would therefore be executor's fixtures against the remainder-man. And the result of the cases seems to be that, as against the remainder, the executor of the tenant for life would be certainly entitled to trade fixtures. Agricultural fixtures are not removable by the executor of a tenant for life.

4. As between seller and buyer, a purchase of the lands includes a purchase of all the fixtures. But here the intention of the parties is of great importance. Similar questions may arise in other cases, e.g. as between mortgagor and mortgagee. When land is mortgaged the fixtures pass with it, unless a contrary intention is expressed in the conveyance; and this even where the chattels affixed are the subject of a hire purchase agreement {Reynolds v. Ashby, 1903, I K.B. 87). Again, in reference to bills of sale the question arises. Bills of sale are dispositions of personal property similar to mort- gages, the possession remaining with the person selling them. To make them valid they must be registered, and so the question has arisen whether deeds conveying fixtures ought not to have been registered as bills of sale. Unless it was the intention of the parties to make the fixtures a distinct security, it seems that a deed of mortgage embracing them does not require to be registered as a bill of sale. The question of what is or is not a fixture must also often be considered in questions of rating or assessment.

The law of Scotland as to fixtures is the same as that of England. The Agricultural Holdings (Scotland) Acts 1883 (ss. 35, 42) and 1900 (as to market gardens) give a similar statutory right of removal. The law of Ireland has been the subject of the special legislation sketched in the article Landlord and Tenant. The French Code Civil recognizes the

right of the usufructuary to remove articles attached by him to the subject of his estate on the expiry of his term, on making good the place from which they were taken (Art. 599) ; and there are similar provisions in the Civil Codes of Italy (Art. 495), Spain (Arts. 487, 489), Portugal (Art. 2217) and Germany (Arts. 1037, 1049).

The law of the United States as to fixtures is substantially identical with English common law. Constructive, as well as actual, annexation is recognized. The same relaxations (from the common law ■ rule quicquid plantatur solo, solo cedit) as regards trade fixtures, and ornamental fixtures, such as tapestry, have been recognized.

In Mauritius the provisions of the Code Civil are in force without modification. In Quebec (Civil Code, Arts. 374 et seq.) and St Lucia (Civil Code, Arts. 368 et seq.) they have been re-enacted in

substance. Some of the British colonies have conferred a statutory right to remove fixtures on tenants (cf. Tasmania, Landlord and Tenant Act 1874). I n certain of the colonies acquired by cession, or settlement (e.g. New Zealand) the English Landlord and Tenant Act 1851 is in force.

Authorities. — English law: Amos and Ferard, Law of Fixtures (3rd ed., London, 1883); Brown, Law of Fixtures (3rd ed., London, 1875); Ryde, on Rating (2nd ed., London, 1905). Scots Law: Hunter, Landlord and Tenant; Erskine's Principles (20th ed., Edin., 1903). American Law: Bronson, Law of Fixtures (St Paul, 1904) ; Reeves, Real Property (Boston, 1904) ; Ruling Cases (London and Boston, 1894-1901), Tit. " Fixtures " (American Notes).

(A. W. R.)

FIZEAU, ARMAND HIPPOLYTE LOUIS (1819-1896), French physicist, was born at Paris on the 23rd of September 1819. His earliest work was concerned with improvements in photo- graphic processes; and then, in association with J. B. L. Foucault, he engaged in a series of investigations on the interference of light and heat. In 1849 he published the first results obtained by his method for determining the speed of propagation of light (see Light), and in 1850 with E. Gounelle measured the velocity of electricity. In 1853 he described the employment of the con- denser as a means for increasing the efficiency of the induction- coil. Subsequently he studied the

expansion of solids by heat, and applied the phenomena of interference of light to the measure- ment of the dilatations of crystals. He died at Venteuil on the 1 8th of September 1896. He became a member of the French Academy in i860 and of the Bureau des Longitudes in 1878.

FJORD, or Fiord, the anglicized Norwegian word for a long narrow arm of the sea running far inland, with more or less precipitous diffs on each side. These ” sea-lochs,” as they are sometimes called, present many peculiar features. They differ entirely from an estuary in the fact that they are bounded sea- wards by a rocky sill, covered by shallow water, and they deepen inland for some distance before the bottom again curves up to the surface. They are thus true rock basins drowned in sea- water. It is pointed out by Dr H. R. Mill that Loch Morar on the west coast of Scotland, a fresh- water basin 178 fathoms deep, with its surface 30 ft. above sea-level, which is connected with the sea by a short river, is exactly similar in configuration to Loch Etive, 80 fathoms deep, filled with sea-water which pours over the seaward sill in a waterfall with the retreating tide; that Loch Nevis with a depth of 70 fathoms has its sill 8 fathoms below the surface, while the gigantic Sogne Fjord in Norway, more than 100 m. in length, is a rock basin with a maximum depth of 700 fathoms. Any inland rock basin such as Loch Morar would become a fjord if the seaward portion sank below sea-level. The origin of these rock basins has not yet been satisfactorily determined. Recent work upon somewhat similar basins in the high Alps has suggested local weathering of surface rock in fracture belts or faulted areas, or dikes, where material is easily eroded, thus producing a trough bounded by high walls in which a lake forms under favourable conditions. But in- vestigations in such regions as the Rocky Mountains and the Yosemite Valley, where there is frequently a ” reversed grade ” similar to that near the seaward end of rock basins and fjords, seem to show, in some cases at least, that such a formation may be due to the ” gouging ” effect of a glacier coming down the valley which it constantly deepens where the ice pressure and the supply of eroding material are greatest. There may be several causes, but the results are the same in all these drowned valleys. The mass of sea-water in the depth of the basin is either un- affected by the seasonal changes in surface temperature, which in Norway penetrate no deeper than 200 fathoms, or else, as in Loch Goil, the fresher film of surface water responds quickly to seasonal changes, while the heat of advancing summer penetrates so slowly to the depth of the basin that it takes six months to reach the bottom, arriving there in winter. It has been found that where the fresher surface water has been frozen over, the temperature may be as much

as 45 F. at a few fathoms from the surface. When the surface is warmest, on the other hand, the depths are coldest.

FLACCUS, a cognomen in the plebeian gens Fulvia, one of the most illustrious in ancient Rome. Cicero and Pliny state that

the family came from Tusculum, where some were still living in the middle of the 1st century B.C. Of the Fulvii Flacci the most important were the following:

Quintus Fulvius Flaccus, son of the first of the family, Marcus, who was consul with Appius Claudius Caudex in 264. He especially distinguished himself during the second Punic War. He was consul four times (237, 224, 212, 209), censor (231) pontifex maximus (216), praetor urbanus (215). During his first consulships he did good service against the Ligurians, Gauls and Insubrians. In 212 he defeated Hanno near Beneventum, and with his colleague Appius Claudius Pulcher began the siege of Capua. The capture of this place was considered so important that their imperium was prolonged, but on condition that they should not leave Capua until it had been taken. Hannibal's unexpected diversion against Rome interfered with the operations for the moment, but his equally unexpected retirement enabled Flaccus, who had been summoned to Rome to protect the city, to return, and bring the siege to a successful conclusion. He punished the inhabitants with great severity, alleging in excuse that they had shown themselves bitterly hostile to Rome. He was nominated dictator to hold the consular elections at which he was himself elected (209). He was appointed to the command of the army in Lucania and Bruttium, where he crushed all further attempts at rebellion. Nothing further is known of him. The chief authority for his life is the part of Livy dealing with the period (see Punic Wars).

His brother Gnaeus was convicted of gross cowardice against Hannibal near Herdoniae in 210, and went into voluntary exile at Tarquinii. His son, Quintus, waged war with signal success against the Celtiberians in 182-181, and the Ligurians in 179. Having vowed to build a temple to Fortuna Equestris, he dismantled the temple of Juno Lacinia in Bruttium of its marble slabs. This theft became known and he was compelled to restore them, though they were never put back in their places. Subsequently he lost his reason and hanged himself.

Marcus Fulvius Flaccus, grandnephew of the first Quintus, lived in the times of the Gracchi, of whom he was a strong supporter. After the death of Tiberius Gracchus (133 B.C.) he was appointed in his place one of the commission of three for the distribution of the land. He was

suspected of having had a hand in the sudden death of the younger Scipio (129), but there was no direct evidence against him. When consul in 125, he proposed to confer the Roman citizenship on all the allies, and to allow even those who had not acquired it the right of appeal to the popular assembly against penal judgments. This proposal, though for the time successfully opposed by the senate, eventually led to the Social War. The attack made upon the Massilians (who were allies of Rome) by the Salluvii (Salyes) afforded a convenient excuse for sending Flaccus out of Rome. After his return in triumph, he was again sent away (122), this time with Gaius Gracchus to Carthage to found a colony, but did not remain absent long. In 121 the disputes between the optimates and the party of Gracchus culminated in open hostilities, during which Flaccus was killed, together with Gracchus and a number of his supporters. It is generally agreed that Flaccus was perfectly honest in his support of the Gracchan reforms, but his hot-headedness did more harm than good to the cause. Cicero (Brulus, 28) speaks of him as an orator of moderate powers, but a diligent student.

See Livy, Epit. 59-61; Val. Max. ix. 5. 1; Veil. Pat. ii. 6; Appian, Bell. Civ. i. 18, 21, 24-26; Plutarch, C. Gracchus, 10. 13; also A. H. j. Greenidge, Hist, of Rome (1904), and authorities quoted under Gracchus.

FLACH, GEOFROI JACQUES (1846-), French jurist and historian, was born at Strassbuig, Alsace, on the 16th of February 1846, of a family known at least as early as the 16th century, when Sigismond Flach was the first professor of law at Strassburg University. G. J. Flach studied classics and law at Strassburg, and in 1869 took his degree of doctor of law. In his theses as well as in his early writings — such as De la subrogation reelle, La Bonorum possessio, and Sur la durSe des efets de la minoriti (1870) — he endeavoured to explain the problems of laws by

means of history, an idea which was new to France at that time. The Franco-German War engaged Flach's activities in other directions, and he spent two years (described in his Strasbourg apres le bombardement, 1873) at work on the rebuilding of the library and the museum, which had been destroyed by Prussian shells. When the time came for him to choose between Germany and France, he settled definitely in Paris, where he completed his scientific training at the

Ecole des Chartes and the Ecole des Hautes Etudes. Having acted for some time as secretary to Jules Senard, ex-president of the Constituent Assembly, he published an original paper on artistic copyright, but as soon as possible resumed the history of law. In 1879 he became assistant to the jurist Edouard Laboulaye at the College de France, and succeeded him in 1884 in the chair of comparative legislation. Since 1877 he had been professor of comparative law at the free school of the political sciences. To qualify himself for these two positions he had to study the most diverse civilizations, including those of the East and Far East {e.g. Hungary, Russia and Japan) and even the antiquities of Babylonia and other Asiatic countries. Some of his lectures have been published, particularly those concerning Ireland: Histoire du regime agraire de I'Irlande (1883); Considerations sur I' histoire politique de I'Irlande (1885); and Jonathan Swift, son action politique en Irlande (1886).

His chief efforts, however, were concentrated on the history of ancient French law. A celebrated lawsuit in Alsace, pleaded by his friend and compatriot Ignace Chauffour, aroused his interest by reviving the question of the origin of the feudal laws, and gradually led him to study the formation of those laws and the early growth of the feudal system. His great work, Les OHgines de I'ancienne France, was produced slowly. In the first volume, Le Regime seigneurial (1886), he depicts the triumph of individualism and anarchy, showing how, after Charlemagne's great but sterile efforts to restore the Roman principle of sovereignty, the great landowners gradually monopolized the various functions in the state; how society modelled on antiquity disappeared; and how the only living organisms were vassalage and clientship. The second volume, Les Origines communales, la jiodaliti et la chevalerie (1893), deals with the reconstruction of society on new bases which took place in the 10th and nth centuries. It explains how the Gallo-Roman villa gave place to the village, with its fortified castle, the residence of the lord; how new towns were formed by the side of old, some of which disappeared; bow the townspeople united in corporations; and how the communal bond proved to be a powerful instrument of cohesion. At the same time it traces the birth of feudalism from the germs of the Gallo-Roman personal comitatus; and shows how the bond that united the different parties was the contract of the fief; and how, after a slow growth of three centuries, feudalism was definitely organized in the 12th century. In 1904 appeared the third volume, La Renaissance de I'Uat, in which the author describes the efforts of the Capetian kings to reconstruct the power of the Frankish kings over the whole of Gaul; and goes on to show how the clergy, the heirs of the imperial tradition, encouraged this ambition;

how the great lords of the kingdom (the ” princes,” as Fiach calls them), whether as allies or foes, pursued the same end; and how, before the close of the 1 2th century, the Capetian kings were in possession of the organs and the means of action which were to render them so powerful and bring about the early downfall of feudalism.

In these three volumes, which appeared at long intervals, the author’s theories are not always in complete harmony, nor are they always presented in a very luminous or coherent manner, but they are marked by originality and vigour. Flach gave them a solid basis by the wide range of his researches, utilizing charters and cartularies (published and unpublished) , chronicles, lives of saints, and even those dangerous guides, the chansons de geste. He owed little to the historians of feudalism who knew what feudalism was, but not how it came about. He pursued the same method in his L’Origine de I’ habitation et des lieux habilSs en France (1899), in which he discusses some of the theories circulated by A. Meitzen in Germany and by Arbois de Jubain-

ville in France. Following in the footsteps of the jurist F. C. von Savigny, Flach studied the teaching of law in the middle ages and the Renaissance, and produced Cujas, les glossateurs et les Bartolistes (1883), and Jitudes critiques sur I’histoire du droit romain au moyen dge, avec textes inedits (1890).

FLACIUS (Ger. Flach; Slav. Vlakich), MATTHIAS (1520- 1575), surnamed Illyricus, Lutheran reformer, was born at Albona, in Illyria, on the 3rd of March 1520. Losing his father in childhood, he was in early years self-educated, and made himself able to profit by the instructions of the humanist, Baptista Egnatius in Venice. At the age of seventeen he decided to join a monastic order, with a view to sacred learning. His intention was diverted by his uncle, Baldo Lupetino, provincial of the Franciscans, in sympathy with the Reformation, who induced him to enter on a university career, from 1539, at Basel, Tubingen and Wittenberg. Here he was welcomed (1541) by Melanchthon, being well introduced from Tubingen, and here he came under the decisive influence of Luther. In 1544 he was appointed professor of Hebrew at Wittenberg. He married in the autumn of 1545, Luther taking part in the festivities. He took his master’s degree on the 24th of February 1 546, ranking first among the graduates. Soon he was prominent in the theological discussions of the time, opposing strenuously the “Augsburg Interim,” and the compromise of Melanchthon known as the ” Leipzig Interim ” (see Adiaphorists). Melan- chthon wrote of him with venom as a renegade (” aluimus in sinu serpentem “), and Wittenberg became too hot for him. He

removed to Magdeburg (Nov. 9, 1551), where his feud with Melanchthon was patched up. On the 17th of May 1557 he was appointed professor of New Testament theology at Jena; but was soon involved in controversy with Strigel, his colleague, on the synergistic question (relating to the function of the will in conversion). Affirming the natural inability of man, he un- wittingly fell into expressions consonant with the Manichaean view of sin, as not an accident of human nature, but involved in its substance, since the Fall. Resisting ecclesiastical censure, he left Jena (Feb. 1562) to found an academy at Regensburg. The project was not successful, and in October 1 566 he accepted a call from the Lutheran community at Antwerp. Thence he was driven (Feb. 1567) by the exigencies of war, and betook himself to Frankfort, where the authorities set their faces against him. He proceeded to Strassburg, was well received by the superintendent Marbach, and hoped he had found an asylum. But here also his religious views stood in his way; the authorities eventually ordering him to leave the city by May- day 1573. Again betaking himself to Frankfort, the prioress, Catharina von Meerfeld, of the convent of White Ladies, harboured him and his family in despite of the authorities. He fell ill at the end of 1574; the city council ordered him to leave by Mayday 1575; but death released him on the nth of March 1575. His first wife, by whom he had twelve children, died in 1564; in the same year he remarried and had further issue. His son Matthias was professor of philosophy and medicine at Rostock. Of a life so tossed about the literary fruit was indeed remarkable. His polemics we may pass over; he stands at the fountain-head of the scientific study of church history, and — if we except, a great exception, the work of Laurentius Valla — of hermeneutics also. No doubt his impelling motive was to prove popery to be built on bad history and bad exegesis. Whether that be so or not, the extirpation of bad history and bad exegesis is now felt to be of equal interest to all religionists. Hence the permanent and continuous value of the principles embodied in Flacius' Catalogus lestium veritatis (1556; revised edition by J. C. Dietericus, 1672) and his Clavis scripturae sacrae (1567), followed by his Glossa compendiaria in N. Testamentum (1570). His characteristic formula, ' ' historia est fundamentum doctrinae," is better understood now than in his own day.

See J. B. Ritter, Flacius' s Leben u. Tod (1725); M. Twesten, M. Flacius Illyricus (1844); W. Preger, M. Flacius Illyricus u. seine Zeit (1859-1861) ; G. Kawerau, in Herzog-Hauck's Realencyklopadie (1899). (A. Go.*)

FLACOURT, ETIENNE DE (1607-1660), French governor of Madagascar, was born at Orleans in 1607. He was named governor of Madagascar by the French East India Company in 1648. Flacourt restored order among the French soldiers, who had mutinied, but in his dealings with the natives he was less successful, and their intrigues and attacks kept him in continual harassment during all his term of office. In 1655 he returned to France. Not long after he was appointed director general of the company; but having again returned to Madagascar, he was drowned on his voyage home on the 10th of June 1660. He is the author of a Histoire de la grande isle Madagascar (1st edition 1658, 2nd edition 1661).

See A. Malotet, fct. de Flacourt, on les origines de la colonisation jrancaise a Madagascar (1648-1661), (Paris, 1898).

FLAG (or ” Flagge,” a common Teutonic word in this sense, but apparently first recorded in English), a piece of bunting or similar material, admitting of various shapes and colours, and waved in the wind from a staff or cord for use ‘in display as a standard, ensign or signal. The word may simply be derived onomatopoeically, or transferred from the botanical ” flag “; or an original meaning of ” a piece of cloth ” may be connected • with the 12th-century English “flage,” meaning a baby’s garment; the verb ” to flag,” i.e. droop, may have originated in the idea of a pendulous piece of bunting, or may be connected with the O. Fr. flaguir, to become flaccid. It is probable that almost as soon as men began to collect together for common purposes some kij-‘d of conspicuous object was used, as the symbol of the common sentiment, for the rallying point of the common force. In military expeditions, where any degree of organization and discipline prevailed, objects of such a kind would be necessary to mark out the lines and stations of encampment, and to keep in order the different bands when marching or in battle. In addition, it cannot be doubted that flags or their equivalents have often served, by reminding men of past resolves, past deeds and past heroes, to arouse to enthusiasm those sentiments of esprit de corps, of family pride and honour, of personal devotion, patriotism or religion, upon which, as well as upon good leader- ship, discipline and numerical force, success in warfare depends.

History. — Among the remains of the people which has left the earliest traces of civilization, the records of the forms of objects used as ensigns are frequently to be found. From their carvings and paintings, supplemented by ancient writers, it appears that several

companies of the Egyptian army had their own particular standards. These were formed of such objects as, there is reason to believe, were associated in the minds of the men with feelings of awe and devotion. Sacred animals, boats, emblems or figures, a tablet bearing a king's name, fan and feather-shaped symbols, were raised on the end of a staff as standards, and the office of bearing them was looked upon as one of peculiar privilege and honour (fig. 1). Somewhat similar seem to have been the customs of the Assyrians and Jews. Among the sculptures unearthed by Layard and others at Nineveh, only two different designs have been noticed for standards: one is of a figure drawing a bow and standing on a running bull, the other of two bulls running in opposite direc- tions (fig. 2). These may resemble the emblems of war and peace which were attached to the yoke of Darius's chariot. They are borne upon and attached to chariots; and this method of bearing such objects was the custom also of the Persians, and prevailed during the middle ages. That the custom survived to a comparatively modern period is proved from the fact that the " Guns," which are the " standards " of the artillery, have from time immemorial been entitled to all the parade honours prescribed by the usages of war for the flag, that is, the symbol of authority. In days comparatively recent there was a " flag gun," usually the heaviest piece, which emblemized authority and served also as the " gun of direction " in the few concerted movements then attempted. No representations of Egyptian or Assyrian naval standards have been found, but the sails of ships were embroidered and ornamented with devices, another custom which survived into the middle ages.

In both Egyptian and Assyrian examples, the staff bearing the

emblem is frequently ornamented immediately below with flag-like streamers. Rabbinical writers have assigned the different devices of the different. Jewish tribes, but the authen- ticity of their testimony is extremely doubtful. Banners, standards and ensigns are frequently mentioned in the Bible. " Every man of the children of Israel shall pitch by his standard,

BSmmk

Fig. 1. — Egyptian Standards.

with the ensign of their father's house " (Num. ii. 2). " Who is she that looketh forth as the morning, fair as the moon, clear as the sun, terrible as an army with banners?" (Cant. vi. 10. See also Num. ii. 10, x. 14; Ps. xx. 5, lx. 4; Cant. ii. 4; Is. v. 26, x. 18, lix. 19; Jer. iv. 21).

The Persians bore an eagle fixed to the end of a lance, and the sun, as their divinity, was also represented upon their standards, which appear to have been formed of some kind of textile, and were guarded with the greatest jealousy by the bravest men of

Fig. 2. — Assyrian Standards.

the army. The Carian soldier who slew Cyrus, the brother of Artaxerxes, wˆs allowed the honour of carrying a golden cock at the head of the army, it being the custom of the Carians to wear that bird as a crest on their helmets. The North American Indians carried poles fledged with feathers from the wings of eagles, and similar customs seem to have prevailed among other semi-savage peoples.

The Greeks bore a piece of armour upon a spear in early times; afterwards the several cities bore sacred emblems or

letters chosen for their particular associations — the Athenians the olive and the owl, the Corinthians a pegasus, the Thebans a sphinx, in memory of Oedipus, the Messenians their initial M, and the Lacedaemonians A. A purple dress was placed on the end of a spear as the signal to advance. The Dacians carried a standard representing a contorted serpent, while the dragon was the military sign of many peoples — of the Chinese, Dacians and Parthians among others — and was probably first used by the Romans as the ensign of barbarian auxiliaries (see fig. 3).

Fig. 3. — Roman Standards.

The question of the signa militaria of the Romans is a wide and very important one, having direct bearing on the history of heraldry, and on the origin of national, family and personal devices. With them the custom was reduced to system. “Each century, or at least each maniple,” says Meyrick, ” had its proper standard and standard-bearer.” In the early days of the republic a handful of hay was borne on a pole, whence probably came the name manipulus (Lat. manus, a hand). The forms of standards in later times were very various; sometimes a cross piece of wood was placed at the end of a spear and sur- mounted by the figure of a hand in silver, below round or oval discs, with figures of Mars or Minerva, or in later times portraits of emperors or eminent generals (fig. 3). Figures of animals, as the wolf, horse, bear and x>thers, were borne, and it was not till a later period

that the eagle became the special standard of the legion. According to Pliny, it was Gaius Marius who, in his second consulship, ordained that the Roman legions should only have the eagle for their standard; ” for before that time the eagle marched foremost with four others — wolves, minotaurs, horses and bears — each one in its proper order. Not many years passed before the eagle alone began to be advanced in battle, and the rest were left behind in the camp. But Marius rejected them altogether, and since this it is observed that scarcely is there a camp of a legion wintered at any time without having a pair of eagles.”

The vexillum, which was the cavalry flag, is described by Livy as a square piece of cloth fastened to a piece of wood fixed crosswise to the end of a spear, somewhat resembling the medieval gonfalon. Examples of these vexilla are to be seen on various Roman coins and medals, on the sculptured columns of Trajan and Antoninus, and on the arch of Titus. The labarum, which was the imperial standard of later emperors, resembled in shape and fixing the vexillum. It was of purple silk richly embroidered with gold, and sometimes was not suspended as the vexillum from a horizontal crossbar, but displayed as our modern flags, that is to say, by the attachment of one of its sides to a staff. After Constantine, the labarum bore the monogram of Christ (fig. 5, A) . It is supposed that the small scarf, which in medieval

days was often attached to the pastoral staff or crook of a bishop, was derived from the labarum of the first Christian emperor, Constantine the Great. The Roman standards were guarded with religious veneration in the temples at Rome; and the reverence of this people for their ensigns was in proportion to their superiority to other nations in all that tends to success in war. It was not unusual for a general to order a standard to be cast into the ranks of the enemy, to add zeal to the onset of his soldiers by exciting them to recover what to them was perhaps the most sacred thing the earth possessed. The Roman soldier swore by his ensign.

Although in earlier times drapery was occasionally used for standards, and was often appended as ornament to those of other material, it was probably not until the middle ages that it became the special material of military and other ensigns; and perhaps not until the practice of heraldry had attained to definite nomenclature and laws does anything appear which is in the modern sense a flag.

Early flags were almost purely of a religious character. In Bede’s description of the interview between the heathen king iEthelberht and the Roman missionary Augustine, the followers of the latter are said to

have borne banners on which silver crosses were displayed. The national banner of England for centuries — the red cross of St George — was a religious one; in fact the aid of religion seems ever to have been sought to give sanctity to national flags, and the origin of many can be traced to a sacred banner, as is notably the case with the oriflamme of France and the Dannebrog of Denmark. Of the latter the legend runs that King Waldemar of Denmark, leading his troops to battle against the enemy in 1210, saw at a critical moment a cross in the sky. This was at once taken as an answer to his prayers, and an assurance of celestial aid. It was forthwith adopted as the Danish flag and called the ” Dannebrog,” i.e. the strength of Denmark. Apart from all legend, this flag un- doubtedly dates from the 13th century, and the Danish flag is therefore the oldest now in existence.

The ancient kings of France bore the blue hood of St Martin upon their standards. The Chape de St Martin was originally in the keeping of the monks of the abbey of Marmoutier, and the right to take this blue flag into battle with them was claimed by the counts of Anjou. Clovis bore this banner against Alaric in 507, for victory was promised him by a verse of the Psalms which the choir were chanting when his envoy entered the church of St Martin at Tours. Charlemagne fought under it at the battle of Narbonne, and it frequently led the French to victory. At what precise period the oriflamme, which was originally simply the banner of the abbey of St Denis, supplanted the Chape de St Martin as the sacred banner of all France is not known. Probably, however, it gradually became the national flag after the kings of France had transferred the seat of government to Paris, where the great local saint, St Denis, was held in high honour, and the banner hung over the tomb of the saint in the abbey church. The king of France himself was one of the vassals of the abbey of St Denis for the fief of the Vexin, and it was in his quality of count of Vexin that Louis VI., le Gros, bore this banner from the abbey to battle, in n 24. He is credited with having been the first French king to have taken the banner to war, and it appeared for the last time on the field of fight at Agincourt in 1415. The accounts also of its appearance vary considerably. Guillaume Guiart, in his Chronicle says: — ” Oriflambe est une banniere

De cendal voujoiant et simple Sans portraiture d’autre affaire.”

It would, therefore, seem to have been a plain scarlet flag; whilst an English authority states ” the celestial auriflamb, so by the French admired, was but of one colour, a square redde banner.” The Chronique de Flandres describes it as having three points with tassels of green silk attached. The banner of William the Conqueror was sent to him by the pope, and the early English kings fought under the

banners of Edward the Confessor and St Edmund; while the blended crosses of St George, St Andrew and St Patrick still form the national ensign of the united

kingdoms of England, Scotland and Ireland, whose patron saints they severally were.

The Bayeux tapestry, commemorating the Norman conquest of England, contains abundant representations of the flags of the period borne upon the lances of the knights of William's army. They appear small in size, and pointed, frequently indented into three points and bearing pales,crosses and roundels. One, a Saxon pennon, is triangular, and roundly indented into four points; one banner is of segmental shape and rayed, and

Fig. 4. — Pennons and Standards from the Bayeux Tapestry.

bears the figure of a bird, which has been supposed to represent the raven of the war-flag of the Scandinavian Vikings (fig. 4). In all, thirty-seven pennons borne on lances by various knights are represented in the Bayeux tapestry, and of these twenty-eight have triple points, whilst others have two, four or five. The devices on these pennons are very varied and distinctive, although the date is prior to the period in which heraldry became definitely established. In fact, the flags and their charges are probably not really significant of the people bearing them; for, even admitting that personal devices were used at the time, the figures may have been placed without studied intention, and so give the general figure only of such flags as happened to have come under the observation of the artists. The figures are probably rather ornamental and symbolic than strictly heraldic, — that is, personal devices, for the same insignia do not appear on the shields of the several bearers. The dragon standard which he is known to have borne is placed near Harold; but similar figures appear on the shields of Norman warriors, which fact has induced a writer in the Journal of the Archaeological Association (vol. xiii. p. 113) to suppose that on the spears of the Saxons they represent only trophies torn from the shields of the Normans, and that they are not ensigns at all. Standards in form much resembling these dragons appear on the Arch of Titus and the Trajan column as the standards of barbarians.

At the battle of the Standard in 1138 the English standard was formed of the mast of a ship, having a silver pyx at the top and bearing three sacred banners, dedicated severally to St Peter, St John of Beverley and St Wilfrid of Ripon, the whole being fastened to a wheeled vehicle. Representations of three-pointed, cross-bearing pennons are found on seals of as early date as the No man era, and the warriors in the first crusade bore three-pointed pennons. It is possible that the three points with the three roundels and cross, which so often appear on these banners, have some reference to the faith of the bearers in the Trinity and in the Crucifixion, for in con- temporary representations of Christ's resurrection and descent into hell he bears a three-pointed banner with cross above. The triple indentation so common on the flags of this period has been supposed to be the origin of one of the honourable ordinaries

—the pile. The ” pile,” it may be explained, is in the form of a wedge, and unless otherwise specified in the blazon, occupies the central portion of the escutcheon, issuing from the middle chief. It may, however, issue from any other extremity of the shield, and there may be more than one. More secular characters were, however, not uncommon. In 1 244 Henry III. gave order for a ” dragon to be made in fashion of a standard of red silk sparkling all over with fine gold, the tongue of which should be made to resemble burning fire and appear to be continually moving, and the eyes of sapphires or other suitable stones.” The Siege of Carlaverock, an Anglo-Norman poem of the 14th century, describes the heraldic bearings on the banners of the knights at the siege of that fortress. Of the king himself the writer says: —

” En sa banniere trois luparte

De or fin estoient mis en rouge;”

and he goes on to describe the kingly characteristics these may be supposed to symbolize. A MS. in the British Museum (one of Sir Christopher Barker’s heraldic collection, Harl. 4632) gives drawings of the standards of English kings from Edward III. to Henry VIII., which are roughly but artistically coloured. v

The principal varieties of flags borne during the middle ages were the pennon, the banner and the standard. The ” guydhommes ” or ” guidons,” ” banderolls,” ” pennoncells,” ” streamers ” or pendants, may be considered as minor varieties. The pennon (fig. 5, B) was a purely personal ensign, sometimes pointed, but more generally forked or swallow-tailed at the end. It was essentially the flag of the knight simple, as apart from the knight banneret, borne by him on his lance, charged with his personal armorial bearings so displayed that they stood in true position when he couched his lance for action. A MS. of the 16th century (Harl. 2358) in the British Museum, which gives minute particulars as to the size, shape and bearings of the standards, banners, pennons, guydhommes, pennoncells, &c, says ” a pennon must be two yards and a half long, made round at the end, and conteyneth the armes of the owner,” and warns that ” from a standard or streamer a man may flee but not from his banner or pennon bearing his arms.”

A pennoncell (or penselle) was a diminutive pennon carried by the esquires. Flags of this character were largely used on

Fig. 5. — A, Labarum from medallion of Constantine ; B, Medieval Pennon ; C, Medieval Banner; D, Standard of Henry V.

any special occasion of ceremony, and more particularly at state funerals. For instance, we find ” XII. doz. penselles ” amongst the items that figured at the funeral of the duke of Norfolk in 1554, and in the description of the lord mayor’s procession in the following year we read of ” ij goodly pennes (state barges) deckt with flages and stremers, and a m (1000) penselles.” Amongst

the items that ran the total cost of the funeral of Oliver Cromwell up to an enormous sum of money, we find mention of thirty dozen of pennoncells a foot long and costing twenty shillings a dozen, and twenty dozen of the same kind of flags at twelve shillings a dozen.

The banner was, in the earlier days of chivalry, a square flag, though at a later date it is often found greater in length than in depth, precisely as is the case in the ordinary national flags of to-day. In some very early examples it is found considerably longer in the depth on the staff than in its outward projection from the staff. The banner was charged in a manner exactly similar to the shield of the owner, and it was borne by knights banneret and all above them in rank. As a rough guide it may be taken that the banner of an emperor was 6 ft. square; of a king, 5 ft.; of a prince or duke, 4 ft.; of a marquis, earl, viscount or baron, 3 ft. square. As the function of the banner was to display the armorial bearings of the dignitary who had the right to carry it, it is evident that the square form was the most convenient and akin to the shield of primal heraldry. In fact, flags were originally heraldic emblems, though in modern devices the strict laws of heraldry have often been departed from.

The rank of knights bannerets was higher than that of ordinary knights, and they could he created on the field of battle only. To create a knight banneret, the king or commander-in-chief in person tore off the fly of the pennon on the lance of the knight, thus turning it roughly into the square flag or banner, and so making the knight a banneret. The date in which this dignity originated is uncertain, but it was probably about the period of Edward I. John Chandos is said to have been made a banneret by the Black Prince and the king of Castile at Najara on the 3rd of April 1367; John of Copeland was made a banneret in the reign of Edward III., he having taken prisoner David

Bruce, the Scottish king, at the battle of Durham. In more modern times Captain John Smith, of Lord Bernard Stuart's troop of the King's Guards, who saved the royal banner from the parlia- mentary troops at Edgehill, was made a knight banneret by Charles I. From this time the custom of creating knights banneret ceased until it was revived by George II. after Dettingen in 1 743, when the dignity was again conferred. It is true, however, that, when in 1763 Sir William Erskine presented to George III. sixteen stands of colours captured by his regiment [now the 15th (king's) Hussars] at Emsdorf, he was raised to the dignity of knight banneret, but as the ceremony was not performed on the field of battle, the creation was considered irregular, and his possession of the rank was not generally recognized.

The banner was therefore not only a personal ensign, but it also denoted that he who bore it was the leader of a military force, large or small according to his degree or estate. It was, in fact, the battle flag of the leader who controlled the particular force that followed it into the fight. Every baron who in time of war had furnished the proper number of men to his liege was entitled to charge with his arms the banner which they followed. There could indeed be at present found no better representative of the medieval " banner " than what we now term the " royal standard "; it is essentially the personal battle flag of the king of the United Kingdom of Great Britain and Ireland. It and other royal and imperial standards have now become " standards," inasmuch as they are to-day used for display in the same fashion, and for the same purposes as was the " standard " of old. The " gonfalon " or " gonfannon " was a battle flag differing from the ordinary banner in that it was not attached to the pole but hung from it crosswise, and was not always square in shape but serrated, so that the lower edge formed streamers. The gonfalon was in action borne close to the person of the commander- in-chief and denoted his position. In certain of the Italian cities chief magistrates had the privilege of bearing a gonfalon, and for this reason were known as " gonfaloniere."

The standard (fig. 5, D) was a flag of noble size, long, tapering towards the fly (the " fly " is that portion of the flag farther from the pole, the " hoist " the portion of the flag attached to the pole), the edges of the flag fringed or bordered, and with the ends split and rounded off, The shape was not, however, by

any means uniform during the middle ages nor were there any definite rules as to its charges. It varied in size according to tne rank of the owner. The Tudor MS. mentioned above says of the royal standard of that time — " the Standard to be sett before the king's pavilion or tente, and not to be borne in battayle; to be in length eleven yards." A

MS. of the time of Henry VII. gives the following dimensions for standards: ” The King’s had a length of eight yards; that of a duke, seven; a marquis, six and a half; an earl, six; a viscount, five and a half; a baron, five; a knight banneret, four and a half; and a knight four yards.” The standard was, in fact, from its size, and as its very name implies, not meant to be carried into action, as was the banner, but to denote the actual position of its pos- sessor on occasions of state ceremonial, or on the tilting ground, and to denote the actual place occupied by him and his following when the hosts were assembled in camp preparatory for battle. It was essentially a flag denoting position, whereas the banner was the rallying point of its followers in the actual field. Its uses are now fulfilled, as far as royalties are concerned, by the ” banner ” which has now become the ” royal standard,” and which floats over the palace where the king is in residence, is hoisted at the saluting point when he reviews his troops, and is broken from the mainmast of any ship in his navy the moment that his foot treads its deck. The essential condition of the standard was that it should always have the cross of St. George conspicuous in the innermost part of the hoist immediately con- tiguous to the staff; the remainder of the flag was then divided fesse-wise by two or more stripes of colours exactly as the heraldic ” ordinary ” termed ” fesse ” crosses the shield horizon- tally. The colours used as stripes, as also those used in the fringe or bordering of the standard, were those which prevailed in the arms of the bearer or were those of his livery. The standard here depicted (fig. 5, D) is that of Henry V.; the colours white and blue, a white antelope standing between two red roses, and in the interspaces more red roses. To quote again from the Harleian MS. above mentioned: ” Every standard and guidon to have in the chief the cross of St George, the beast or crest with his devyce and word, and to be slitt at the end.” The motto indeed usually figured on most standards, though occasionally it was missing. An excellent type of the old standard is that of the earls of Percy, which bore the blue lion, the crescent, and the fetterlock — all badges of the family — whilst, as tokens of matrimonial alliances with the families of Poynings, Bryan and Fitzpayne, a silver key, a bugle-horn and a falchion were respectively displayed. There was also the historic Percy motto, Esperance en Dieu. No one, whatsoever his rank, could possess more than one banner, since it displayed his heraldic arms, which were unchangeable. A single individual, however, might possess two or three standards since this flag displayed badges that he could multiply at discretion, and a motto that he could at any time change. For example, the standards of Henry VII., mostly green and white — the colours of the Tudor livery — had in one ” a red firye dragon,” in another ” a donne kowe,” in a third ” a silver greyhound and two red

roses.” The standard was always borne by an eminent person, and that of Henry V. at Agincourt is supposed to have been carried upon a car that preceded the king. At Nelson’s funeral his banner and standard were borne in the procession, and around his coffin were the banderolls — square, bannerlike flags bearing the various arms of his family lineage. Nelson’s standard bore his motto, Palmam qui meruit ferat, but, in lieu of the cross of St George, it bore th« union of the crosses of St George, St Andrew and St Patrick, the medieval England having expanded into the United Kingdom of Great Britain and Ireland. Again, at the funeral of the duke of Wellington we find amongst the flags his personal banner and standard, and ten banderolls of the duke’s pedigree and descent.

The guidon, a name derived from the Fr. Guyd-homme, was somewhat similar to the standard, but without the cross of St George, rounded at the end, less elongated and altogether less ornate. It was borne by a leader of horse, and according to a medieval writer ” must be two and a half yards or three yards

long, and therein shall no armes be put, but only the man’s crest, cognisance, and devyce.”

The streamer, so called in Tudor days but now better known as the pennant or pendant, was a long, tapering flag, which it was directed ” shall stand in the top of a ship or in the forecastle, and therein be put no armes, but the man’s cognisance or devyce, and may be of length twenty, thirty, forty or sixty yards, and is slitt as well as a guidon or standard.” Amongst the fittings of the ship that took Beauchamp, earl of Warwick, to France in the reign of Henry VII. was a ” grete stremour for the shippe xl yardes in length viij yardes in brede.” In the hoist was ” a grete bere holding a raggid staffe,” and the rest of the fly ” powdrid full of raggid staves.”

National Flags. — British. The royal standard of England was, when it was hoisted on the Tower on the ist of January 1 80 1, thus heraldically described: — ” Quarterly; first and fourth, gules, three lions passant gardant, in pale, or, for England; second, or, a lion rampant, gules, within a double tressure flory counter flory of the last, for Scotland; third, azure, a harp or, stringed argent, for Ireland.” The present standard connects in direct descent from the arms of the Conqueror. These were two leopards passant on a red field, and

remained the same until the reign of Henry II., when lions were substituted for leopards, and a third added. The next change that took place was in the reign of Edward III. when the royal arms were for the first time quartered; fleurs-de-lis in the first and fourth quarters, and the three lions of England in the second and third. The fleurs-de-lis were assumed in token of the monarch's claim to the throne of France. In the " coats " of Edward III. and the two monarchs that succeeded him, the fleurs-de-lis were powdered over a blue ground, but under Henry V. the fleurs-de-lis were reduced in number to three, and the " coat " so devised remained the same until the death of Queen Elizabeth. The lion of Scotland and the Irish harp were added to the flag on the accession of James I., and the flag then had the French and English arms quartered in the first and fourth quarters, the lion of Scotland, red on a yellow ground, in the second quarter, and the harp of Ireland, gold on a blue ground, in the third quarter. With the exception of the period of the Commonwealth, to which reference will be made later, the flag remained thus until the accession of William III., who imposed upon the Stuart standard a central shield carrying the arms of Nassau. Queen Anne made further alterations ; the first and fourth quarters were subdivided, the three lions of England being in one half, the lion of Scotland in the other. The fleurs-de-lis were in the second quarter; the Irish harp in the third. Under George I. and George II. the first, second and third quarters remained the same, the arms of Hanover being placed in the fourth quarter, and this continued to be the royal standard until 1801, when the standard was re- arranged as first described with the addition of the Hanoverian arms displayed on a shield in the centre. On the accession of Queen Victoria, the Hanoverian arms were removed, and the flag remained as it to-day exists. It is worthy of note, however, that in the royal standard of King Edward VII. which hangs in the chapel of St George at Windsor, the ordinary " winged woman " form of the harp in the Irish third quartering is altered to a harp of the old Irish pattern. At King Edward's accession this banner replaced that of Queen Victoria which for sixty-two years had hung in this, the chapel of the order of the Garter.

Up to the time of the Stuarts it had been the custom of the lord high admiral or person in command of the fleet to fly the royal standard as deputy of the sovereign. When royalty ceased to be, a new flag was devised by the council of state for the Commonwealth, which comprised the "arms of England and Ireland in two several escutcheons in a red flag within a compartment." In other words, it was a red flag containing two shields, the one bearing the cross of St George, red on a white ground, the other the harp, gold on a blue

ground, and round the shields was a wreath of palm and shamrock leaves. One of these flags is still in existence at Chatham dockyard, where it is kept in a wooden chest which was taken out of a Spanish galleon at Vigo by Admiral Sir George Rooke in 1704. When Cromwell

became protector of the commonwealth of England, Scotland and Ireland, he devised for himself a personal standard. This had the cross of St George in the first and fourth quarters, the cross of St Andrew, a white saltire on a blue ground, in the second, and the Irish harp in the third. His own arms — a lion on a black shield — were imposed on the centre of the flag. No one but royalty has a right to fly the royal standard, and though it is constantly seen flying for purposes of decoration its use is irregular. There has, however, always been one exception, namely, that the lord high admiral when in executive command of a fleet has always been entitled to fly the royal standard. For example, Lord Howard flew it from the mainmast of the ” Ark Royal ” when he defeated the Spanish Armada; the duke of Buckingham flew it as lord high admiral in the reign of Charles I., and the duke of York fought under it when he commanded during the Dutch Wars.

The national flag of the British empire is the Union Jack, in which are combined in union the crosses of St George, St Andrew and St Patrick. St George had long been a patron saint of England, and his banner, argent, a cross gules, its national ensign. St Andrew in the same way was the patron saint of Scotland, and his banner, azure, a saltire argent, the national ensign of Scotland. On the union of the two crowns James I. issued a proclamation ordaining that ” henceforth all our subjects of this Isle and Kingdom of Greater Britain and the members thereof, shall bear in their main-top the red cross commonly called St George’s cross, and the white cross commonly called St Andrew’s cross, joined together according to a form made by our heralds, and sent by us to our admiral to be pub- lished to our said subjects; and in their fore-top our subjects of south Britain shall wear the red cross only, as they were wont, and our subjects of north Britain in their fore-top, the white cross only as they were accustomed.” This was the first Union Jack, as it is generally termed, though strictly the name of the flag is the ” Great Union,” and it is only a “Jack” when flown on the jackstaff of a ship of war. Probably the name of the Stuart king ” Jacques,” which James I. always signed, gave the name to the flag, and then to the staff at which it was hoisted. At the death of Charles I. , the union with Scotland being dissolved, the ships of the parliament reverted to the simple cross of St George, but the union flag was restored when Cromwell became protector, with the Irish harp imposed upon its centre. On the

Restoration, Charles II. removed the harp and so the original union flag was restored, and continued as described until the year 1801, when, on the legislative union with Ireland, the cross of St Patrick, a saltire gules, on a field argent, was incorporated in the union flag. To so combine these three crosses without losing the distinctive features of each was not easy; each cross must be distinct, and retain equally distinct its fimbriation, or bordering, which denotes the original ground. In the first union flag, the red cross of St George with the white fimbriation that represented the original white field was simply imposed upon the white saltire of St Andrew with its blue field. To place the red saltire of St Patrick on the white saltire of St Andrew would have been to obliterate the latter, nor would the red saltire have its proper bordering denoting its original white field; even were the red saltire narrowed in width the portion of the white saltire that would appear would not be the St Andrew saltire, but only the fimbriation appertaining to the saltire of St Patrick. The difficulty has been got over by making the white broader on one side of the red than the other. In fact, the continuity of direction of the arms of the St Patrick red saltire has been broken by its portions being removed from the centre of the oblique points that form the St Andrew's saltire Thus both the Irish and Scottish saltires can be easily distin- guished from one another, whilst the red saltire has its due white fimbriation.

The Union Jack is the most important of all British ensigns, and is flown by representatives of the empire all the world over. It flies from the jackstaff of every man-of-war in the navy. With the Irish harp on a blue shield displayed in the centre, it is flown by the lord-lieutenant of Ireland. When flown by the

FLAGS

Plate I.

GREAT BRITAIN.

Roys] Standard.

JAPAN. Imperial Navy.

J

i

GERMANY. Imperial Navy.

GERMANY. Mercantile Marine.

FRANCE. National Flag.

PORTUGAL. National Flag.

GREAT BRITAIN.

White Ensign

(Royal Navy).

lS5l

mrˆ

CANADA.

Red Ensign

(Mercantile Marine).

NEW ZEALAND.

Bine Ensign

(Government).

JAPAN. Mercantile Marine.

ir

AUSTRIA-HUNGARY. Imperial Navy.

Ill

GRBAT BRITAIN. Union Jack.

r

AUSTRIA-HUNGARY. Mercantile Marine.

SPAIN. Royal Navy.

3

ITALY. Mercantile Marine.

SPAIN. Mercantile Marine.

RUMANIA. National Flag.

FLAGS

Plate I.

GREAT BRITAIN, RoyaJ Standard,

JAPAN. Imperial Navy.

GERMANY. Imperial Navy.

GERMANY. Mercantile Marine.

FRANCE. Notional Flag.

©TO

|

PORTUGAL. National Flag.

GREAT BklTAIN, » – White Ensign

(Royal Navy).

NEW ZEALAND.

Bine Ensign

(Government).

GREAT BRITAIN. Union Jack.

SPAIN. Royal Navy.

u

SPAIN. Mercantile Marine.

CANADA.

Red Ensign

(Mercantile Marine).

JAPAN. Mercantile Marine.

AUSTRIA-HUNGARY. Imperial Navy.

AUSTRIA-HUNGARY. Mercantile Marine.

ITALY. Mercantile Marine.

RUMANIA. National Flag.

governor-general of India the star and device of the order of the Star of India are borne in the centre. Colonial governors fly it with the badge of their colony displayed in the centre. Diplo- matic representatives use it with the royal arms in the centre. As a military flag, it is flown over fortresses and headquarters, and on all occasions of military ceremonial. Hoisted at the mainmast of a man-of-war it is the flag of an admiral of the fleet.

Military flags in the shape of regimental standards and colours, and flags used for signalling, are described elsewhere, and it will here be only necessary to deal with the navy and admiralty flags.

The origin of the three ensigns — the red, white, and blue — had its genesis in the navy. In the days of huge fleets, such as prevailed in the Tudor and Stuart navies, there were, besides the admiral in supreme command, a vice-admiral as second in command, and a rear-admiral as third in command, each con- trolling his own particular group or squadron. These were designated centre, van, and rear, the centre almost invariably being commanded by the admiral, the vice-admiral taking the van and the rear-admiral the rear squadron. In order that any vessel in any group could distinguish its own admiral's ship, the flagships of centre, van, and rear flew respectively a plain red, white, or blue flag, and so came into being those naval ranks of admiral, vice-admiral, and rear-admiral of the red, white, and blue which continued down to as late as 1864. As the admiral in supreme command flew the union at the main, there was no rank of admiral of the red, and it was not until November 1805 that the rank of admiral of the red was added to the navy as a special compliment to reward Trafalgar. About 1652, so that each individual ship in the squadron should be distinguish- able as well as the flagships, each vessel carried a large red, white, or blue flag according as to whether she belonged to the centre, van, or rear, each flag having in the left-hand upper corner a canton, as it is termed, of white bearing the St George's cross. These flags were called ensigns, and it is, of course, due to the fact

that the union with Scotland was for the time dissolved that they bore only the St George's cross. Even when the restoration of the Stuarts restored the status quo the cross of St George still remained alone on the ensign, and it was not altered until 1707 when the bill for the Union of England and Scotland passed the English parliament. In 1801, when Ireland joined the Union, the flag, of course, became as we know it to-day. All these three ensigns belonged to the royal navy, and continued to do so until 1864, but as far back as 1707 ships of the mercantile marine were instructed to fly the red ensign. As ironclads replaced the wooden vessels and fleets became smaller the inconvenience of three naval ensigns was manifest, and in 1864 the grades of flag officer were reduced again to admiral, vice- admiral, and rear-admiral, and the navy abandoned the use of the red and blue ensigns, retaining only the white ensign as its distinctive flag. The mercantile marine retained the red ensign which they were already using, whilst the blue ensign was allotted to vessels employed on the public service whether home or colonial.

The white ensign is therefore essentially the flag of the royal navy. It should not be flown anywhere or on any occasion except by a ship (or shore establishment) of the royal navy, with but one exception. By a grant of William IV. dating from 1829 vessels belonging to the Royal Yacht Squadron, the chief of all yacht clubs, are allowed to fly the white ensign. From 1821 to 1829 ships of the squadron flew the red ensign, as that of highest dignity, but as it was also used by merchant ships, they then obtained the grant of the white ensign as being more distinctive. Some few other yacht clubs flew it until 1842, when the privilege was withdrawn by an admiralty minute. By some oversight the order was not conveyed to the Royal Western of Ireland, whose ships flew the white ensign until in 1857 the usage was stopped. Since that date the Royal Yacht Squadron has alone had the privilege. Any vessel of any sort flying the white ensign, or pennant, of the navy is committing a grave offence, and the ship can be boarded by any officer of His

Majesty's service, the colours seized, the vessel reported to the authorities, and a penalty inflicted on the owners or captain or both. The penalty incurred is £500 fine for each offence, as laid down in the 73rd section of the Merchant Shipping Act 1894. In 1883 Lord Annesley's yacht, belonging to the Royal Yacht Squadron, was detained at the Dardanelles in consequence of her flying the white ensign of the royal navy which brought her under the category of a man-of-war, and no foreign man-of-war is allowed to pass the Dardanelles without first obtaining an imperial trade. Since then owners belonging to the squadron have been warned that they must

either sail their ships through the straits under the red ensign common to all ships British owned, or obtain imperial permission if they wish to display the white ensign.

Besides the white ensign the ship of war flies a long streamer from the maintopgallant masthead. This, which is called a pennant, is flown only by ships in commission; it is, in fact, the sign of command, and is first hoisted when a captain com- missions his ship. The pennant, which was really the old " pennoncell," was of three colours for the whole of its length, and towards the end left separate in two or three tails, and so continued till the end of the great wars in 1816. Now, however, the pennant is a long white streamer with the St George's cross in the inner portion close to the mast. Pennants have been carried by men-of-war from the earliest times, prior to 1653 at the yard-arm, but since that date at the maintopgallant mast- head.

The blue ensign is exclusively the flag of the public service other than the royal navy, and is as well the flag of the royal naval reserve. It is flown also by certain authorized vessels of the British mercantile marine, the conditions governing this privilege being that the captain and a certain specified portion of the officers and crew shall belong to the ranks of the royal naval reserve. When flown by ships belonging to British government offices the seal or badge of the office is displayed in the fly. For example, hired transports fly it with the yellow anchor in the fly; the marine department of the Board of Trade has in the fly the device of a ship under sail; the telegraph branch of the post-office shows in the fly a device representing Father Time with his hour-glass shattered by lightning; the ordnance department displays upon the fly a shield with a cannon and cannon balls upon it. Certain yacht clubs are also authorized by special admiralty warrant to fly the blue ensign. Some of these display it plain; others show in the fly the distinc- tive badge of the club. Consuls-general, consuls and consular agents also have a right to fly the blue ensign, the distinguishing badge in their case being the royal arms.

The red ensign is the distinguishing flag of the British merchant service, and special orders to this effect were issued by Queen Anne in 1707, and again by Queen Victoria in 1864. The order of Queen Anne directed that merchant vessels should fly a red flag " with a Union Jack described in a canton at the upper corner thereof next the staff," and this is probably the first time that the term " Union Jack " was officially used. In some cases those yacht clubs which fly the red ensign change it slightly from that flown by the merchant service, for they are allowed to display the badge of the club in the fly. Colonial merchant- men usually display the ordinary red ensign, but, provided

they have a warrant of authorization from the admiralty, they can use the ensign with the badge of the colony in the fly.

In regard to ensigns it is important to remember that they are purely maritime flags, and though the rule is more honoured in the breach than in the observance, the only flag that a private individual or a corporation has a right to display on shore is the national flag, the Union Jack, in its plain condition and without any emblazonment.

There are two other British sea flags which are worthy of brief notice. These are the admiralty flag and the flag of the master of Trinity House. The admiralty flag is a plain red flag with a clear anchor in the centre in yellow. In a sense it is a national flag, for the sovereign hoists it when afloat in conjunc- tion with the royal standard and the Union Jack. It would

appear to have been first used by the duke of York as lord high admiral, who flew it when the sovereign was afloat and had the royal standard flying in another ship. When a board of com- missioners was appointed to execute the office of lord high admiral this was the flag adopted, and in 1691 we find the admiralty, minuting the navy board, then a subordinate depart- ment, ” requiring and directing it to cause a fitting red silk flag, with the anchor and cable therein, to be provided against Tuesday morning next, for the barge belonging to this board.” In 1725, presumably as being more pretty and artistic, the cable in the device was twisted round the stock of the anchor. It was thus made into a ” foul anchor,” the thing of all others that a sailor most hates, and this despite the fact that the first lord at the time, the earl of Berkeley, was himself a sailor. The anchor retained its unseamanlike appearance, and was not ” cleared ” till 1815, and even to this day the buttons of the naval uniform bear a ” foul anchor.” The ” anchor ” flag is solely the emblem of an administrative board; it does not carry the executive or combatant functions which are vested in the royal standard, the union or an admiral’s flag, but on two occasions it has been made use of as an executive flag. In 1710 the earl of Berkeley, who at the time was not only first lord of the admiralty, but vice-admiral of England, obtained the special permission of George I. to hoist it at the main instead of the union flag. Again in 1869, when Mr Childers, then first lord, accompanied by some members of his board, went on board the ” Agincourt ” he hoisted the admiralty flag and took command of the combined Mediterranean and Channel

squadrons, thus superseding the flags of the two distinguished officers who at the time were in command of these squadrons. It is hardly necessary to add that throughout the navy there was a very distinct feeling of dissatisfaction at the innovation. When the admiralty flag is flown by the sovereign it is hoisted at the fore, his own standard being of course at the main, and the union at the mizzen.

The flag of the master of the Trinity House is the red cross of St George on its white ground, but with an ancient ship on the waves in each quarter; in the centre is a shield with a precisely similar device and surmounted by a lion.

The sign of a British admiral's command afloat is always the same. It is the St George's cross. Of old it was borne on the main, the fore, or the mizzen, according as to whether the officer to whom it pertained was admiral, vice-admiral, or rear-admiral, but, as ironclads superseded wooden ships, and a single pole mast took the place of the old three masts, a different method of indicating rank was necessitated. To-day the flag of an admiral is a square one, the plain St George's cross. When flown by a vice-admiral it bears a red ball on the white ground in the upper canton next to the staff; if flown by a rear-admiral there is a red ball in both the upper and lower cantons. As nowadays most battleships have two masts, the admiral's flag is hoisted at the one which has no masthead semaphore. The admiral's flag is always a square one, but that of a commodore is a broad white pennant with the St George's cross. If the commodore be first class the flag is plain; if of the second class the flag has a red ball in the upper canton next to the staff. The same system of differentiating rank prevails in most navies, though very often a star takes the place of the ball. In some cases, however, the indications of rank are differently shown. For instance, both in the Russian and Japanese navies the distinction is made by a line of colour on the upper or lower edges of the flag.

The flags of the British colonies are the same as those of the mother country, but differentiated by the badge of the colony being placed in the centre of the flag if it is the Union Jack, or in the fly if it be the blue or red ensign. Examples of these are shown in the Plate, where the blue ensign illustrated is that of New Zealand, the device of the colony being the southern cross in the fly. Precisely the same flag, with a large six-pointed star, emblematic of the six states immediately under the union, forms the flag of the federated commonwealth of Australia. The red ensign shown is that of the Dominion of Canada, the

device in the fly being the armorial bearings of the Dominion. As the lord-lieutenant of Ireland, as the representative of royalty, flies the Union Jack with a harp in the centre, or the viceroy of India flies the same flag with, in the centre, the badge of the order of the Star of India, so too colonial governors or high commissioners fly the union flag with the arms of the colony they preside over on a white shield in the centre and surrounded by a laurel wreath. In the case of Canada the wreath, however, is not of laurel but of maple, which is the special emblem of the Dominion.

French, — To come to flags of other countries, nowhere have historical events caused so much change in the standards and national ensigns of a country as in the case of France. The oriflamme and the Chape de St Martin were succeeded at the end of the 16th century, when Henry III., the last of the house of Valois, came to the throne, by the white standard powdered with fleurs-de-lis. This in turn gave place to the famous tricolour. The tricolour was introduced at the time of the Revolution, but the origin of this flag and its colours is a disputed question. Some maintain that the intention was to combine in the flag the blue of the Chape de St Martin, the red of the oriflamme, and the white flag of the Bourbons. By others the colours are said to be those of the city of Paris. Yet again, other authorities assert that the flag is copied from the shield of the Orleans family as it appeared after Philippe Egalite had knocked off the fleurs- de-lis. The tricolour is divided vertically into three parts of equal width — blue, white and red, the red forming the fly, the white the middle, and the blue the hoist of the flag. During the first and second empires the tricolour became the imperial, standard, but in the centre of the white stripe was placed the eagle, whilst all three stripes were richly powdered over with the golden bees of the Napoleons. The tricolour is now the sole flag of France.

American. — Before the Declaration of Independence the flags of those colonies which now form the United States of America were very various. In the early days of New England the Puritans objected to the red cross of St George, not from any disloyalty to the mother country, but from a conscientious objection to what they deemed an idolatrous symbol. By the year 1700 most of the colonies had devised badges to distinguish their vessels from those of England and of each other. In the early stages of the revolution each state adopted a flag of its own; thus, that of Massachusetts bore a pine tree, South Carolina displayed a rattlesnake, New York had a white flag with a black beaver, and Rhode Island a white flag with a blue anchor upon it. Even after the Declaration of Independence, and the introduction of the stars and stripes, the latter under- went many changes in the

manner of their arrangement before taking the position at present established. In 1775 a committee was appointed to consider the question of a single flag for the thirteen states. It recommended that the union be retained in the upper corner next to the staff, the remainder of the field of the flag to be of thirteen horizontally disposed stripes, alter- nately red and white. This flag, curiously enough, was precisely the same as the flag of the old Honourable East India Company. On the 14th of June 1777 congress resolved “that the flag of the United States be thirteen stripes, alternate red and white; that the Union be thirteen stars, white in a blue field, representing a new constellation.” This was the origin of the national flag, but at first, as the number of the stripes were unequal, the flag very often varied, sometimes having seven white and six red stripes, and at other times seven red and six white, and it was not for some considerable time that it was authoritatively laid down that the latter arrangement was the one to be adopted. It has also been held that the stars and stripes of the American national flag, as well as the eagle, were suggested by the crest and arms of the Washingon family. The latter supposition is absurd, for the Washington crest was a raven. The Washington arms were a white shield having two horizontal red bars, and above these a row of three red stars. This might, by a stretch of imagination, be supposed to have inspired the original idea of the flag which was that each state in the Union should be represented in the national flag by a star

FLAGS

Plate II.

RUSSIA. Mercantile Marlnt

DENMARK. Royal Navy.

NETHERLANDS.. National Flag.

SWITZERLAND. Notional Flag.

CHINA. Imperial Navy.

Imperial Navy.

SWEDEN. Royal Navy.

UNITED STATES National Flag.

ARGENTWA. Naval.

BELGIUM. National Flag.

NORWAY.

Mercantile Marine.

GREECE. Mercantile Marine.

TURKEY. National Flag.

PERU. Naval.

VENEZUELA. Naval.

FLAGS

Plate II.

RUSSIA. Mercantile MartaC

EX

H DENMARK.

Royal Navy. ~

NETHERLANDS.. National Flag.

SWITZERLAND. National Flag.

|3fe<

| CHINA.

Imperial Navy

Ill

■fflr

*3|

l^^^

ARGENTINA. -Naval.

RUSSIA. Imperial Navy.

Royal Navy,

PERU. Naval.

BELGIUM. National Flag.

Jl SWEDEN. pUJ |

■ NORWAY.

Mercantile Marine.

1 E5 =

GREECE. Mercantile Marine.

TURKEY. National Flag.

BRAZIL. National Flag.

75

VENEZUELA. Naval.

FLAG

461

and stripe. Naturally other states coming into the Union expected the same privilege. After Vermont in 1790 and Kentucky in 1792 had entered the Union, the stars and stripes were changed in number from thirteen to fifteen. Later on other states joined, and soon the flag came to consist of twenty stars and stripes. It was, however, found objectionable to be con- stantly altering the national flag, and in the year 1818 it was determined to go back to the original thirteen stripes, but to place a star for each state in the blue union canton in the top corner of the flag next the staff. Thus the stars always show the exact number of states that are in the Union, whilst the stripes denote the original number of the states that formed the union. 1 The presidential flag of the president of the United States is an eagle on a blue field, bearing on its breast a shield displaying stripes, and above the national motto E pluribus unum, and a design of the stars of the original thirteen states of the union.

Other Countries. — The most general and important of the various national flags are figured in the Plate. In the top line representing Great Britain are shown the royal standard, the Union Jack (the

national flag), the white ensign of the royal navy, the blue ensign of government service, and the red ensign of the commercial marine, colonial flags being shown in the case of the two latter ensigns. The two Japanese flags shown are the man-of-war ensign — a rising sun, generally known as the sun- burst — and the flag of the mercantile marine, in which the red ball is used without the rays and placed in the centre of the white field. The imperial standard of Japan is a golden chrysanthemum on a red field. It is essential that the chrysanthemum should invariably have sixteen petals. Heraldry in Japan is of a simpler character than that of Europe, and is practically limited to the employment of " Mon," which correspond very nearly to the " crests " of European heraldry. The great families of Japan possess at least one, and in many cases even three, " Mon." The imperial family use two, the one Kiku no go Mon (the august chrysanthemum crest) and Kiri no go Mon (the august Kiri crest) . The first represents the sixteen-petalled chrysanthemum, and, although the use of the chrysanthemum flower as a badge is not necessarily confined to the imperial family, they alone have the right to use the sixteen-petalled form. If used by any other family, or society or corporation, it must be with a number of petals less or more than sixteen. The second imperial " Mon " is composed of three leaves and three flower spikes of the Kiri (Paulownia imperialis). This, however, is not displayed as an official emblem, that being reserved for the chrysanthemum. The Kiri is used for more private purposes. For example, the chrysanthemum figures in the imperial standard, and the Kiri " Mon " adorns the harness of the emperor's horses. It is very probable that the chrysanthemum crest did not originally repre- sent the chrysanthemum flower at all but the sun with sixteen rays, and it will be noticed that in the " sun-burst " flag the sun's rays are sixteen in number. The use of the number sixteen is probably traceable to Chinese geomantic ideas.

The German imperial navy and mercantile marine flags are next depicted. The " iron cross " in the navy flag is that of the Teutonic Order, and dates from the close of the 12th century. For five centuries black and white have been the Hohenzollern colours, and the first verse of the German war song, Ich bin ein Preusse, runs : —

" I am a Prussian ! Know ye not my banner ? Before me floats my flag of black and white ! My fathers died for freedom, 'twas their manner, So say these colours floating in your sight."

The mercantile marine tricolour of black, white and red is em- blematic of the joining of the Hohenzollern black and white with the red and white, which was the ensign of the Hanseatic League. This

flag came into being when the North German Confederacy was established (November 25th, 1867) at the close of the Austro- Prussian War.

The German imperial standard has the iron cross with its white border displayed on a yellow field, diapered over in each of the four quarters with three black eagles and a crown. In the centre of the cross is a shield bearing the arms of Prussia surmounted by a crown,

1 By the admission of Oklahoma as a state in 1907 the number of stars became 46, arranged from the top in horizontal rows thus:

8, 7, 8, 7, 8, 8 = 46.

and surrounded by a collar of the Order of the Black Eagle. In the four arms of the crown are the legend Cott mit uns 1870. The United States flag and the tricolour of France have already been fully dealt with, and in both countries the one flag is common to both men-of- war and ships of the mercantile marine.

The next depicted are the imperial navy and the mercantile marine flags of the Austro-Hungarian empire. In the latter the introduction of the green half stripe denotes the combination of the Austrian red, white and red with the Hungarian red, white and green. The shields with which the flag is charged contain respectively the arms of Austria and of Hungary. The former shield only is borne on the man-of-war ensign, and displays the heraldic device of the ancient dukes of Austria, which dates back to the year 1 191. The Austrian imperial standard has, on a yellow ground, the black double-headed eagle, on the breast and wings of which are imposed shields bearing the arms of the provinces of the empire. The flag is bordered all round, the border being composed of equal-sided triangles with their apices alternately inwards and outwards, those with their apices pointing inwards being alternately yellow and white, the others alternately scarlet and black.

The green, white and red Italian tricolour was adopted in 1805, when Napoleon I. formed Italy into one kingdom. It was adopted again in 1848 by the Nationalists of the peninsula, accepted by the king of Sardinia, and, charged by him with the arms of Savoy, it became the flag of a united Italy. The man-of-war flag is precisely similar to that of the mercantile marine, except that in the case of the former the shield of Savoy is surmounted by a crown. The royal standard is a blue flag. In the centre is a black eagle crowned and displaying on its breast the arms of Savoy, the whole surrounded by the collar of the Most Sacred Annunziata, the third in rank of all European orders. In

each corner of the flag is the royal crown.

For Portugal the flag is one of the few national flags that are parti-coloured. It is half blue, half white, with, in the centre, the arms of Portugal surmounted by the royal crown, and it is the same both in the mercantile marine and in the Portuguese navy. The royal standard of Portugal is an all-red flag charged in the centre with the royal arms, as shown in the national flag.

In the Spanish ensigns red and yellow are the prevailing colours, and here again the arrangement differs from that generally used. The navy flag has a yellow central stripe, with red above and below. To be correct the yellow should be half the width of the flag, and each of the red stripes a quarter of the width of the flag. The central yellow stripe is charged in the hoist with an escutcheon containing the arms of Castile and Leon, and surmounted by the royal crown. In the mercantile flag the yellow centre is without the escutcheon, and is one-third of the entire depth of the flag, the remaining thirds being divided into equal stripes of red and yellow, the yellow above in the upper part of the flag, the red in the lower. Of all royal standards that of Spain is the most elaborate, for it contains quarter- ings of the Spanish royal escutcheon, many of the bearings being as much an anachronism as if the royal arms of England were to-day to be quartered with the fleur-de-lis. In all, the quarterings displayed are those of Leon, Castile, Aragon, Sicily, Austria, Burgundy, Flanders, Antwerp, Brabant, Portugal and France. The flag is usually depicted as composed entirely of the quarterings. We believe, however, that it is more correctly a purple flag in the centre of which the quarterings are displayed on an oval shield surmounted by a crown and encircled by the collar of the order of the Golden Fleece.

The flag of the Russian mercantile marine is a horizontal tricolour of white, blue and red. Originally, it was a tricolour of blue, white and red, and it is said that the idea of its colouring was taken by Peter the Great when learning shipbuilding in Holland, for as the flag then stood it was simply the Dutch ensign reversed. Later, to make it more distinctive, the blue and white stripes changed places, leaving the tricolour as it stands to-day. The flag of the Russian navy is the blue saltire of St Andrew on a white ground. St Andrew is the patron saint of Russia, from whence the emblem. The imperial standard is of a character akin to that of Austria; the ground is yellow, and the centre bears the imperial double-headed eagle, a badge that dates back to 1472, when Ivan the Great married a niece of Constantine Palaeologus and assumed the arms of the Greek empire. On the breast of the eagle is an escutcheon charged with the emblem of St George and the

Dragon on a red ground, and this is surrounded by the collar of the order of St Andrew. On the splayed wings of the eagle are small shields bearing the arms of the various provinces of the empire.

The Rumanian flag is a blue, yellow and red tricolour, the stripes vertical, with the blue stripe forming the fly. The Servian flag is a horizontal tricolour, the top stripe red, the middle blue and the lower white. When these tricolours are flown as royal standards the royal arms are displayed on the central stripe. The flag of Montenegro is a horizontal tricolour, the top stripe red, the centre blue, the lower-most white. The Bulgarian flag is a similar tricolour, white, green and red, the white stripe uppermost, but when flown as a war ensign there is a canton in the upper corner of the hoist in which is a golden lion on a red ground.

The flags of all the three Scandinavian kingdoms are somewhat similar in design. That of Denmark, the Dannebrog, has been already alluded to, and it is shown in our illustration as flown bv the Danish

navy. The mercantile marine flag is precisely similar, but rectangular instead of being swallow- tailed. The Swedish flag is a yellow cross on a blue ground. When flown from a man-of-war it is forked as in the Danish, but the longer arm of the cross is not cut off but pointed, thus making it a three-pointed flag as illustrated. For the mercantile marine the flag is rectangular. When Norway separated from Denmark in 1814, the first flag was red with a white cross on it, and the arms of Norway in the upper corner of the hoist, but as this was found to resemble too closely the Danish flag, a blue cross with a white border was substituted for the white cross. This, it will be seen, is the Danish flag with a blue cross imposed upon the white one. For a man-of-war the flag is precisely similar to that of Sweden in shape; that is to say, converted from the rectangular into the three-pointed design. While Sweden and Norway remained united the flag of each remained distinct, but each bore in the top canton of the hoist a union device, being the combination of the Norwegian and Swedish national colours and crosses. In each of the three above nationalities the flag used for a royal standard is the man-of-war flag with the royal arms imposed on the centre of the cross.

The Belgian tricolour is vertical, the stripes being black next the hoist, yellow in the centre and red in the fly. That of the Nether- lands is a

horizontal tricolour, red above, white in the centre and blue below. In both countries the same flag is common to both navy and mercantile marine, but when the flag is used as a royal standard the royal arms are displayed in the central stripe. The black, yellow and red of the Belgian flag are the colours of the duchy of Brabant, and were adopted in 1831 when the monarchy was founded. The original Dutch colours adopted when Holland declared its independence were orange, white and blue, the colours of the house of Orange, and when and how the orange became red is not quite clear, though it was certainly prior to 1643.

The blue and white which form the colouring of the Greek flag shown in our illustration are the colours of the house of Bavaria, and were adopted in 1832, when Prince Otho of Bavaria was elected to the throne of Greece. The stripes are nine in number — five blue and four white — with, in the upper corner of the hoist, a canton bearing a white cross on a blue ground. The flag for the royal navy is similar to that flown by the mercantile marine, with the exception that it has the addition of a golden crown in the centre of the cross. The royal standard is a blue flag with a white cross, on the centre of which the royal arms are imposed. The cross is exactly similar to that in the Danish flag, that is to say, the arms of the cross are not of equal length, the shorter end being in the hoist of the flag.

The very simple flag of Switzerland is one of great antiquity, for it was the emblem of the nation as far back as 1339, and probably considerably earlier. In addition to the national flag of the Swiss confederation, each canton has its own cantonal colours. In each case the flag has its stripes disposed horizontally. Basel, for instance, is half black, half white; Berne, half black, haif red; Glarus, red, black and white, &c, &c.

The Turkish crescent moon and star were the device adopted by Mahomet II. when he captured Constantinople in 1453. Originally they were the symbol of Diana, the patroness of Byzantium, and were adopted by the Ottomans as a triumph, for they had always been the special emblem of Constantinople, and even now in Moscow and elsewhere the crescent emblem and the cross may be seen combined in Russian churches, the crescent badge, of course, indicat- ing the Byzantine origin of the Russian church. The symbol origin- ated at the time of the siege of Constantinople by Philip the father of Alexander the Great, when a night attempt of the besiegers to undermine the walls was betrayed by the light of a crescent moon, and in acknowledgment of their escape the Byzantines raised a statue to Diana, and made her badge the symbol of the city. Both the man-of-

war and mercantile marine flags are the same, but the imperial standard of the sultan is scarlet, and bears in its centre the device of the reigning sovereign. This device is known as the ” Tughra,” and consists of the name of the sultan, the title of khan, and the epithet al-Muzaffar Daima, which means ” the ever vic- torious.” The origin of the ” Tughra ” is that the sultan Murad I., who was not of scholarly parts, signed a treaty by wetting his open hand with ink, and pressing it on the paper, the first, second and third fingers making smears close together, the thumb and fourth finger leaving marks apart. Within the marks thus made the scribes wrote in the name of Murad, his title, and the epithet above quoted. The ” Tughra ” dates from the latter part of the 14th century. The smaller characters in the ” Tughra ” change, of course, on the accession of every fresh sovereign, but the leading form of the device always remains the same, namely, rounded lines to the left denoting the thumb, lines to the right denoting where the little finger made impression, and three upright lines indicating the other fingers.

The Mahommedan states tributary to Turkey also display the crescent and star. Morocco, Muscat and other Arab states where they use an ensign display a red flag, that of the Zanzibar protectorate having the British union in the centre of the red field.

The Persian flag is white with a border, green on the upper edge of the flag and in the fly, and red in the hoist and on the lower edge. On the white ground are the lion and sun.

The flag of Siam is a white elephant on a red ground. That of

Korea, a white flag with, in the centre, a ball, half red, half blue, the colours being curiously intermixed, the whole being precisely as if two large commas of equal size, one red and the other blue, were united to form a complete circle.

The Chinese flag is a yellow one, bearing on it the emblem of the dragon devouring the sun. As at present used, it is a square flag, but an earlier version was a triangular right-angled flag, hoisted with the right-angle in the base of the hoist. The merchant flag is red with a yellow ball in the centre.

Among the South American republics the Brazilian flag is peculiar inasmuch as it is the only national flag which carries a motto.

Mexico flies precisely the same tricolour as Italy, but plain in the case of the merchant ensign, and charged on the central stripe with the

Mexican arms (as illustrated) when flown as a man-of-war ensign.

The Argentine flag is as illustrated flown by the navy, but, when used by the mercantile marine, the sun emblazoned on the central white stripe is omitted, the flag otherwise being precisely the same.

The Venezuelan flag shown is also that of the navy. The flag of the mercantile marine is the same, but the shield bearing the arms of the state is not introduced into the yellow top stripe in the corner near the hoist, as in the naval flag.

The Chilean ensign illustrated is used alike by men-of-war and vessels in the mercantile marine, but, when flown as the standard of the president, the Chilean arms and supporters are placed in the centre of the flag.

The plain red, white, red in vertical stripes, is the flag of the mercantile marine of Peru, and becomes the naval ensign when charged on the central stripe with the Peruvian arms as shown in our illustration. In fact, in nearly every case with the South American republics, the ordinary mercantile marine flag becomes that of the war navy by the addition of the national arms, and in some cases is used in the same way as a presidential flag.

In nearly every case the flags of the lesser American republics are tricolours, and in a very great many of them the flags are by no means such combinations as would meet with the approval of Euro-

Eean heralds. All flag devising should be in accordance with eraldic laws, and one of the most important of these is that colour should not be placed on colour, nor metal on metal, yellow in blazonry being the equivalent of gold and white of silver. Hence, properly devised tricolours are such as, for example, those of France, where the red and blue are divided by white, or Belgium, where the black and red are divided by yellow. On the other hand, the yellow, blue, red of Venezuela is heraldically an abomination.

Manufacture and Miscellaneous Uses. — Flags, the manufacture, of which is quite a large industry, are almost invariably made from bunting, a very light, tough and durable woollen material. The regulation bunting as used in the navy is made in in. widths, and the flag classes in size according to the number of breadths of bunting of which it is composed. The great centre of the manufacture of flags, as far as the royal navy is concerned, is the dockyard at Chatham. Ensigns and Jacks are made in different sizes; the largest ensign made

is 33 ft. long by 163 ft. in width; the largest Jack issued is 24 ft. long and 12 ft. wide.

The dimensions of a flag according to heraldry should be either square or in the proportion of two to one, and it is this latter dimension that is used in the navy and generally.

Signalling flags are dealt with elsewhere (see Signal), and here it will only be necessary to make brief allusion to some inter- national customs with regard to the use of flags to indicate certain purposes. For long a blood-red flag has always been used as a symbol of mutiny or of revolution. The black flag was in days gone by the symbol of the pirate; to-day, in the only case in which it survives, it is flown after an execution to indicate that the requirements of the law have been duly carried out. All over the world a yellow flag is the signal of infectious illness. A ship hoists it to denote that there are some on board suffering from yellow fever, cholera or some such infectious malady, and it remains hoisted until she has received quarantine. This flag is also hoisted on quarantine stations. The white flag is univers- ally used as a flag of truce.

At the sea striking of the flag denotes surrender. When the flag of one country is placed over that of another the victory of the former is denoted, hence in time of peace it would be an insult to hoist the flag of one friendly nation above that of another. If such were done by mistake, say in ” dressing ship ” for instance, an apology would have to be made. This custom of hoisting the flag of the vanquished beneath that of the victor is of com- paratively modern date, as up to about a century ago the sign of victory was to trail the enemy’s flag over the taffrail in the water.

Each national flag must be flown from its own flagstaff, and this is often seen when the allied forces of two or more powers are in joint occupation of a town or territory. To denote honour and respect a flag is ” dipped.” Ships at sea salute each other by ” dipping ” the flag, that is to say, by running it smartly down from the masthead, and then as quickly replacing it. When troops parade before the sovereign the regimental flags are lowered as they salute him. A flag flying half-mast high is the universal symbol of mourning. When a ship has to make the signal of distress, this is done by hoisting the” national ensign reversed, that is to say, upside do wn . If it is wished to accentuate the

imminence of the danger it is done by making the flag into a ” weft,” that is, by knotting it in the middle. This means of showing distress at sea is of very ancient usage, for in naval works written as far back as the reign of James I. we find the ” weft ” mentioned as a method of showing distress.

We have already alluded to the Union Jack as used for denoting nationality, and as a flag of command, but it also serves many other purposes. For instance, if a court-martial is being held on board any ship the Union Jack is displayed while the court is sitting, its hoisting being accompanied by the firing of a gun. In a fleet in company the ship that has the guard for the day flies it. With a white border it forms the signal for a pilot, and in this case is known as a Pilot Jack. In all combinations of signalling flags which denote a ship’s name the Union Jack forms a unit. Lastly, it figures as the pall of every sailor or soldier of the empire who receives naval or military honours at his funeral.

Bibliography. — See Flags: Some Account of their History and Uses, by A. MacGeorge (1881); National Banners: Their History and Construction, by W. Bland (1892) (one of a series of Heraldic Tracts, 1850-1892, Br. Museum Library, No. 9906, b. 9; this pamphlet gives the design of the national banners of St George, St Andrew and St Patrick, and illustrates and tells the story of the composition of the three flags into the great union flag, commonly knownasthe Union Jack) ; Our Flags: TheirOrigin, Use and Traditions, by Rear-Admiral S. Eardley-Wilmot (1901), an excellent treatise, historical and narrative, on all the flags of the British empire; A History of the Flag of the United States (Boston, 1872), by G. H. Preble ; Flags of the World: Their History, Blazonry and Associations, by Edward Hulme, F.L.S., F.S.A. (1897), a most complete mono- graph on the subject, illustrated with a very complete series of plates ; Admiralty Book of Flags of all Nations, printed for H.M. Stationery office, 1889, kept up to date by the publication periodically of Errata, officially issued under an admiralty covering letter; Flags of Mari- time Nations, prepared by the Bureau of Equipment department of the navy, printed by authority (Washington, 1899). The last two works have no letterpress beyond titles, but contain, to scale, delineations of all the flags at present used officially by all nations. Between the two there are no discrepancies, and the delineation of a flag taken from either may be assumed as absolutely correct. Both are respectively the guides for flag construction in the royal navy and the United States navy. (H. L. S.)

FLAGELLANTS (from Lat. flagellate, to whip), in religion, the name given to those who scourge themselves, or are scourged, by way of

discipline or penance. Voluntary flagellation, as a form of exalted devotion, occurs in almost all religions. Accord- ing to Herodotus (ii. 40. 61), it was the custom of the ancient Egyptians to beat themselves during the annual festival in honour of their goddess Isis. In Sparta children were flogged before the altar of Artemis Orthia till the blood flowed (Plutarch, Instil. Laced. 40). At Alea, in the Peloponnese, women were flogged in the temple of Dionysus (Pausanias, Arcad. 23). The priests of Cybele, or archigalli, submitted to the discipline in the temple of the goddess (Plutarch, Adv. Colot. p. 1127; Apul., Metam. viii. 173). At the Roman Lupercalia women were flogged by the celebrants to avert sterility or as a purificatory ceremony (W. Mannhardt, Mythol. Forsch., Strassburg, 1884, p. 72 seq.).

Ritual flagellation existed among the Jews, and, according to Buxtorf {Synagoga judaica, Basel, 1603), was one of the ceremonies of the day of the Great Pardon. In the Christian church flagellation was originally a punishment, and was practised not only by parents and schoolmasters, but also by bishops, who thus corrected offending priests and monks (St Augustine, Ep. isg ad Marcell.; cf. Cone. Agd. 506, can. ii.).

Gradually, however, voluntary flagellation appeared in the libri poenitentiales as a very efficacious means of penance. In the nth century this new form of devotion was extolled by some of the most ardent reformers in the monastic houses of the west, such as Abbot Popon of Stavelot, St Dominic Loricatus (so called from his practice of wearing next his skin an iron lorica, or cuirass of thongs), and especially Cardinal Pietro Damiani. Damiani advocated the substitution of flagellation for the recita- tion of the penitential psalms, and drew up a scale according to which 1000 strokes were equivalent to ten psalms, and 15,000 to the whole psalter. The majority of these reformers exemplified their preaching in their own persons, and St Dominic gained great renown by inflicting upon himself 300,000 strokes in six days. The custom of collective flagellation was introduced into the monastic houses, the ceremony taking place every Friday after confession.

The early Franciscans flagellated themselves with character- istic rigour, and it is no matter of surprise to find the Franciscan, St Anthony of Padua, preaching the praises of this means of penance. It is incorrect, however, to suppose that St Anthony took any part in the creation of the flagellant fraternities, which were the result of spontaneous popular movements, and later than the great Franciscan preacher; while Ranieri, a monk of Perugia, to whom the foundation of these strange communities has been attributed, was merely the

leader of the flagellant brotherhood in that region. About 1259 these fraternities were distributed over the greater part of northern Italy. The con- tagion spread very rapidly, extending as far as the Rhine pro- vinces, and, across Germany, into Bohemia. Day and night, long processions of all classes and ages, headed by priests carrying crosses and banners, perambulated the streets in double file, reciting prayers and drawing the blood from their bodies with leathern thongs. The magistrates in some of the Italian towns, and especially Uberto Pallavicino at Milan, expelled theflagellants with threats, and for a time the sect disappeared. The disorders of the 14th century, however, the numerous earthquakes, and the Black Death, which had spread over the greater part of Europe, produced a condition of ferment and mystic fever which was very favourable to a recrudescence of morbid forms of devotion. The flagellants reappeared, and made the state of religious trouble in Germany, provoked by the struggle between the papacy and Louis of Bavaria, subserve their cause. In the spring of 1349 bands of flagellants, perhaps from Hungary, began their propaganda in the south of Germany. Each band was under the command of a leader, who was assisted by two lieutenants; and obedience to the leader was enjoined upon every member on entering the brotherhood. The flagellants paid for their own personal maintenance, but were allowed to accept board and lodging, if offered. The penance lasted 33% days, during which they flogged themselves with thongs fitted with four iron points. They read letters which they said had fallen from heaven, and which threatened the earth with terrible punishments if men refused to adopt the mode of penance taught by the flagellants. On several occasions they incited the populations of the towns through which they passed against the Jews, and also against the monks who opposed their propa- ganda. Many towns shut their gates upon them; but, in spite of discouragement, they spread from Poland to the Rhine, and penetrated as far as Holland and Flanders. Finally, a band of 100 marched from Basel to Avignon to the court of Pope Clement VI., who, in spite of the sympathy shown them by several of his cardinals, condemned the sect as constituting a menace to the priesthood. On the 20th of October 1349 Clement published a bull commanding the bishops and inquisitors to stamp out the growing heresy, and in pursuance of the pope’s orders numbers of the sectaries perished at the stake or in the cells of the inquisitors and the episcopal justices. In 1389 the leader of a flagellant band in Italy called the bianchi was burned by order of the pope, and his following dispersed. In 1417, however, the Spanish Dominican St Vincent Ferrer pleaded the cause of the flagellants with great warmth at the council of Constance, and elicited a severe reply from John Gerson

(Epistola ad Vincentium), who declared that the flagellants were showing a tendency to slight the sacramental confession and penance, were refusing to perform the cultus of the martyrs venerated by the church, and were even alleging their own superiority to the martyrs.

The justice of Gerson's protest was borne out by' events. In Germany, in 1414, there was a recrudescence of the epidemic of flagellation, which then became a clearly-formulated heresy. A certain Conrad Schmidt placed himself at the head of a com- munity of Thuringian flagellants, who took the nameof Brethren of the Cross. Schmidt gave himself out as the incarnation of Enoch, and prophesied the approaching fall of the Church of Rome, the overthrow of the ancient sacraments, and the triumph of flagellation as the only road to salvation. Numbers of Beghards joined the Brethren of the Cross, and the two sects were confounded in the rigorous persecution conducted in Germany by the inquisitor Eylard Schoneveld, who almost annihilated the flagellants. This mode of devotion, however, held its ground among the lower ranks of Catholic piety. In the 16th century it subsisted in Italy, Spain and southern France. Henry III. of France met with it in Provence, and attempted to acclimatize it at Paris, where he formed bands divided into various orders, each distinguished by a different colour. The king and his courtiers joined in the processions in the garb of penitents, and scourged themselves with ostentation. The king's encouragement seemed at first to point to a successful revival of flagellation; but the practice disappeared along with the other forms of devotion that had sprung up at the time of the league, and Henry III.'s successor suppressed the Paris brotherhood. Flagellation was occasionally practised as a means of salvation by certain Jansenist convulsionaries in the 18th century, and also, towards the end of the 18th century, by a little Jansenist sect known as the Fareinists, founded by the brothers Bonjour, cure's of Fareins, near Trevoux (Ain). In 1820 a band of flagellants appeared during a procession at Lisbon; and in the Latin countries, at the season of great festivals, one may still see brotherhoods of penitents flagellating themselves before the assembled faithful.

For an account of flagellation in antiquity see S. Reinach, Cultes, mythes et religions (vol. i. pp. 173-183, 1906), which contains a biblio- graphy of the subject. For a bibliography of the practice in medieval times, see M. Rohricht, " Bibliograpnische Beitrage zur Gesch. der Geissler" in Briegers Zeitschrift fur Kirchengeschichte, i.

313. (P. A.)

FLAGELLATA, the name given to the Protozoa whose dominant phase is a ” flagellula,” or cell-body provided with one, few or rarely many long actively vibratile, cytoplasmic processes. Nutrition is variable: — (1) “Holozoic”; food taken in by ingestion, by amoeboid action either unspeciaiized or at one or more well-defined oral spots, or through an aperture (mouth); (2) ” Saprophytic ” ; food taken in in solution through the general surface of the body; (3) ” Holophytic ” ; food-material formed in the coloured plasm by fixation of carbon from the medium, with liberation of oxygen, in presence of light, as in green plants. Fission in the ” active ” state occurs and is usually longitudinal. Multiple fission rarely occurs save in a sporocyst, and produces microzoospores, which in some cases may conjugate with others as isogametes or with larger forms (megagametes). ” Hypnocysts ” to tide over unfavourable conditions are not infrequent, but have no necessary relation to reproduction. Many have a firm pellicle which may form a hard shell: again a distinct cell-wall of chitin or cellulose may be formed: finally, an open cup, ” theca,” of firm or gelatinous material may be present, with or without a stalk: such a cup and stalk are often found in colonial species, and are subject to much the same conditions as in Infusoria. The nucleus is simple in most cases; but in Haemoflagellates it is connected with a second nucleus, which again is in immediate relation with the motile apparatus; the former is termed the ” tropho- nucleus,” the latter the ” kineto-nucleus.”

As reserves the protoplasm may contain oil, starch, paramylum, leucosin (a substance soluble in water, and of doubtful com- position), proteid granules. In the holophytic forms the cyto- plasm contains specialized parts of more or less definite form,

1. Chlamydomonas pulvisculus, Ehr. (Chlamydomonadidae) free-swimming individual.

a = nucleus. — contractile vacuole. c\ = starch corpuscle. d = cellulose investment. e = stigma (eye-spot).

2. Resting stage of the same, with fourfold division of the cell-contents. Letters as before.

3. Breaking up of the cell- contents into minute biflagellate swarm-spores, which escape, and whose history is not further known.

4. Syncrypta volvox, Ehr. (Chrysomonadidae). A colony enclosed by a common gelatinous test c.

a «■ stigma.

b = vacuole(non-contractile).

5. Uroglena volvox, Ehr.

Fig. 1 .— Flagellata.

(Chrysomonadidae). Half of a large colony, the flagellates em- bedded in a common jelly.

6. Chlorogonium euchlorum, Ehr. (Chlamydomonadidae).

a = nucleus.

b = contractile vacuole.

c — starch grain.

d = eye-spot.

7. Chlorogonium euchlorum, Ehr. (Chlamydomonadidae). Copu- lation of two liberated micro- gonidia.

a = nucleus.

b = con tractile vacuole.

d = eye-spot (so-called).

8. Colony of Dinobryon sertu- laria, Ehr. (Chrysomona- didae).

9. Haematococcus palustris, Girod (= Chlamydococcus, Braun, Prolococcus, Cohn), one of the

Ehr.

(Volvocidae), showing the inter- cellular connective fibrils.

= nucleus.

b — contractile vacuole.

c = starch granule.

19. Two microgametes (sper- matozoa) of Volvox globator, L.

= nucleus.

b = contractile vacuole.

20. Ripe asexually produced daughter-individual of Volvox minor, Stein, still enclosed in the cyst of the partheno-gonidium.

= young, partheno-gonidia.

21. 22. Trypanosoma sanguinis, Gruby (Haematoflagellales) , from the blood of Rana esculenta.

a = nucleus; X 500. 23-26. Reproduction of Bodo caudatus,T)u]. (Bodonidae), after Dallinger and Drysdale : — 23, fusion of several individuals (Plas- modium) ; 24, encysted fusion- product dividing into four; 25, later into eight; 26, cyst filled with swarm-spores.

27. Distigma proteus, Ehbg., O. F. Miiller (Euglenidae) ; X440. Individual with the two flagella, and strongly contracting hinder region of the body.

28. The same devoid of flagella. c, c = the two dark pigment spots (so-called eyes) near the mouth,

29. Oicomonas termo (Monas termo) Ehr. (one of the Oicomona- didae).

c = food-ingesting vacuole. d — food-particle ; X440.

30. The food-particle d has now been ingested by the vacuole.

31. Oicomonas mutabilis, Kent {Oicomonadidae), with adherent stalk.

a = nucleus.

b = contractile vacuole.

c = food-particle in food vacuole. 3 2 i33- Cercomonas crassicauda, Duj. {Oicomonadidae), showing two conditions of the pseudo- podium-protruding tail.

a = nucleus.

b = contractile vacuoles.

c — mouth.

known generally as ” plastids ” or ” chromatophores ” impreg- nated with a lipochrome pigment, whether green (chlorophyll), yellow or brown (diatomin or some allied pigment), or again red (chlorophyll with phycoerythrin). In the active condition of such coloured holophytic forms there is usually at least one anterior ” eye-spot,” of a refractive globule embedded behind in a collection of red pigment granules. The single anterior ” flagellum tractellum ” of so many of the larger forms acts by the bending over of its free end in consecutive meridians, so as to describe a hollow cone with its apex backwards: we may imitate this by bending the head of a slender sapling round and round while it is implanted in the soil; and the result is to push the water backwards, or in other words to pull the body forwards, the whole rotating on its longitudinal axis as it moves on (Y. Delage). An anterior lateral trailing flagellum may modify this axial rotation, and help in steering. When the animal is at rest — attached by its base or with its body so curved as to resist onward motion — the current produced by the tractellum will bring suspended particles up against the protoplasm at its base of insertion. As noted by E. R. Lankester, the posterior flagellum of many Haemoflagellates, like that of the spermato- zoon of Metazoa, propels the cell by a sculling motion behind; he terms it a ” pulsellum.” Such flagellar motion is distinct from that of cilia, which always move backwards and forwards, with a swift downstroke and a slower recovery in the same plane; though where the flagella are numerous they may behave in this

Chrysomonadidae ; ordinary in- dividual with widely separated test.

a = nucleus.

b = contractile vacuole.

c = amylon nucleus (pyre- noid).

10. Dividing resting stage of the same, with eight fission pro- ducts in the common test e.

1 1 . A microgonidium of the same.

12. Phaiansterium consociatum, Cienk. (Choanoflagellata) ; X325. Disk-like colony.

13. Euglena viridis, Ehr.; X 300 (Euglenidae).

a = pigment spot (stigma). b = clear space. c =paramylum granules.

d = chromatophor (endo- chrome plate).

14. Gonium pectorale, O. F. Miiller (Volvocineae) . Colony seen from the flat side ; X 300.

a = nucleus.

6= contractile vacuole.

c =amylon nucleus.

15. Dinobryon sertularia, (Chrysomonadidae) .

a = nucleus.

b = contractile vacuole.

c =amylon nucleus.

<2 = free colourless flagellates,

probably not belonging

to Dinobryon. e = stigma (eye-spot). / = chromatophors.

16. Peranema trichophorum, Ehr. (Peranemidae), creeping in- dividual seen from the back; X 140.

c = pharynx. d = mouth.

17. Anterior end of Euglena acus, Ehr., in profile.

= mouth.

b = vacuoles.

c — pharynx.

d = stigma (eye-spot).

e =paramylum-body.

/= chlorophyll corpuscles.

18. Part of the surface of a colony of Volvox globator, L.

way, and indeed flagella agree with cilia in being mere vibratory extensions of cytoplasm. Symmetrically placed flagella may have a

symmetrical reciprocating motion like that of cilia.

Many of the Flagellata are parasitic (some haematozoic) ; the majority live in the midst of putrefying organic matter in sea and fresh waters, but are not known to be active as agents of putrefaction. Dallinger and Drysdale have shown that the spores of Bodo and others will survive an exposure to a higher temperature than do any known Schizomycetes (Bacteria), viz. 250 to 300° Fahr., for ten minutes, although the adults are killed at 180°.

The Flagellata are for the most part very minute; the Proto-mastigopoda rarely exceeding 20 n in length. The Euglenaceae contain the largest species, up to 130 y. in length, exclusive of the flagellum.

Our classification is modified from those of Senn (in Engler and Prantl, Pflanzenfamilien) and Hartog (in Cambridge Natural History).

I. RHIZOFLAGELLATA (PANTOSTOMATA) Food taken in by pseudopodia at any part of the body. Order 1.— HOLOMASTIGACEAE. Body homaxial with uniform flagella. Multicilia (Cienkowski) ; Grassia (Fisch, in frog's blood and gastric mucus). Order 2.— RHIZOMASTIGACEAE. Flagellum 1, 2 or few, diverg- ing from anterior end. Mastigamoeba (F. E. Schulze).

II. EUFLAGELLATA Food taken in at one or more definite mouth-spots, or by a true mouth, or by absorption; or nutrition holophytic. Order 1— PROTOMASTIGACEAE. Contractilevacuolesimple, one or more, or absent; either holozoic, ingesting food by a mouth- spot (or 2 or more), saprophytic, or parasitic.

Family 1. — Oicomonadidae. Flagellum 1, sometimes with a tail-like posterior prominence passing into a temporary flagellum, but without other cytoplasmic processes. Oicomonas (Kent); Cercomonas (Dujardin) (fig. 1,32,33); Codonoeca (James-Clark), with a gelatinous theca. Family 2. — Bicoecidae. Differs from Oicomonadidae in a uni-lateral proboscidiform process next the flagellum; often thecate and stalked, forming branched colonies, like Choanoflagellates in habit. Bicoeca (J. -CI.), Poteriodendron. Family 3. — Choanoflagellidae (Choanoflagellata, Kent; Craspedomonadina, Stein). As in previous families, but with flagellum surrounded by an obconical or cylindrical rim of cytoplasm, at the base of which is the ingestive area. The cells of this group have the morphology of the flagellate cells (choanocytes) of sponges. They are often colonial, and in the gelatinous colony of Proterospongia, the more internal cells (fig. 2, 15) pass into a definite " reproductive state." Many stalked forms are epizoic on

Entomostracan Crustacea.

(a) Naked forms often stalked: Monosiga (Kent), stalked

solitary; Codosiga (Kent) (fig. 2, 3), stalked social; Desmarella (Kent), unstalked, and Astrosiga (Kent), stalked, form floating colonies.

(b) Forms enclosed in a vase-like shell: Salpingoeca (J.-

Cl.) ; (fig. 2, 1, 6, 7) recalling the habit of Monosiga and Cod siga; Polyoeca forming a branched free swimming colony.

(c) Forms surrounded by a gelatinous sheath : Protero-

spongia (Kent) (fig. 2, is)', Phaiansterium (Cienk.) (fig. I, 12), has a slender cylindrical collar, and a branching tubular stalk. Family 4. — Haemoflagellidae. Formswithacomplexnuclear apparatus, and a muscular undulating membrane with , which one or two flagella are connected, parasitic in Metazoa (often in the blood). Trypanosoma (Gruby) (fig. 1, 21, 22), Herpetomonas(Kent) , Treponema (Vuillemin) (= Spirochaele, auctt., nee. Ehrbg.). Family 5. — Amphimonadidae. Flagella 2 anterior, both directed forward, equal and similar; in stalk sheath, &c, often recalling Choanoflagellata, Amphimqnsis (Kent) , Diplomitus (Kent) ; Spongomonas (St.) , with thick branching gelatinous sheath. Family 6. — Monadidae. Flagella 2 (3), anterior all directed forwards, one long the other (or 2) accessory, short.

Monas (St.); Anthophysa (Bory) (fig. 2, 12, 13), with the stalk composed of the accumulation of faeces at the hinder end of the cells of the colony. Family 7. — Bodonidae. Flagella 2 (or 3) 1 anterior, the other (1 or 2) antero-lateral and trailing or becoming fixed at the end to form a temporary anchor.

Bodo (Ehrb.) (figs. 1, 23-26 and 2, to). B. lens is the " hooked " and B. saltans the " springing monad " of Dallinger and Drysdale ; Dallingeria (Kent) with a pair of

?-°\

Fig. 2. — Flagellata.

1. Salpingoeca fusiformis, S. Kent (Choanoflagellata). The

protoplasmic body is drawn to- gether within the goblet-shaped shell, and divided into numerous spores.

2. Escape of the spores of the same as monoflagellate and swarm-spores.

3. Codosiga umbellala, Tatem (Choanoflagellata) ; adult colony formed by dichotomous growth .

4. A single zooid of the same.

a = nucleus.

6 = contractile vacuole.

c = the characteristic “col- lar ” of naked stream- ing protoplasm.

5. Hexamitainflata,T)u). (Dis- tomatidae) ; normal adult.

6, 7. Salpingoeca urceolata, S. Kent (Choanoflagellata) : — 6, with collar extended; 7, with collar retracted within the stalked cup.

8. Polytoma uvella, Mull. sp. (Chlamydomonadidae) .

9. Lophomonas blattarum, Stein (Trichonymphidae) from the intestine of Blatta orientalis.

10. Bodolens, Mull. (Bodo- nidae), the wavy filament is a tractellum, the straight one is a trailing thread.

11. Tetramitus sulcatus, Stein (Tetramitidae) .

12. Anthophysa vegetans, O. F. Miiller (Monadidae). A typi- cal, erect, shortly-branching col- ony stock with four terminal monad-clusters.

13. Monad cluster of the same in optical section, show-

ing the relation of the individual monads or flagellate zooids to the

stem d.

14. Tetramitus rostratus, Perty (Tetramitidae).

= nucleus.

b = contractile vacuole.

15. Preterospongia Haeckeli, Saville Kent (Choanoflagellata); A social colony of about forty flagellate zooids.

a • = nucleus.

b= contractile vacuole.

c=amoebiform cell sunk

within the colonial gela- tinous test compared by S. Kent to a mesoderm cell of the sponges.

d = similar cell reproducing by transverse fission.

e = normal cells, with their collars contracted.

/ = substance of test.

g = individual reproducing by multiple fission, pro- ducing microzoospores, comparable to the sper- matozoa of sponges.

antero-lateral flagella; Costia necatrix (Leclerq) is also 3- flagellate ; causes destructive epidemics in fish-hatcheries.

Family 8. — Tetramitidae. Body pyriform, the pointed end posterior ; flagella 4 anterior.

Tetramitus (Perty) {T. calycinus of Kent, fig. 2,- II, 14), is the ” calycine monad” of Dallinger and Drysdale; Trichomonas, Donne, possesses a longitudinal undulating membrane, and is an innocuous human parasite; it is possibly related to Hae mo flagellates on one hand and to Trichonymphi- dae on the other.

Family 9. — Distoma- tidae. Mouth- spots two, or one, with a distinct construction ; fla- gella symmetri- cally , arranged; nucleus bilobed or geminate. Hex- amitus (Duj.) (fig. 2, 5), saprophytic and parasitic ; Tre- pomonas (Duj.), freshwater; Mega- stoma (Grassi) (= Lamblia of Blan- chard), with con- stricted mouth- spot and blepha- roplast (kineto- nucleus) parasitic in the small intes- tine of Mammals, including Man.

Family 10. — Tricho- nymphidae. Fla- gella numerous, sometimes accom- panied by one or Fig. 3. more undulating 1. Trichonympha agilis, Leidy, from membranes; cyto- gut of White Ant (Termite), plasm highly 2. Opalina ranarum, Purkinje para- differentiated; sitic in frog rectum multinucleate contractile vac- adult.

uole absent; all 3,4. Binary fissionsof same, i-nucleat parasitic in in- individual at final stage of fission, sects (all except 5. Same encysted dejected from Lophomonas in rectum to be swallowed by tadpole. Termites — the so- 6. Young i-nucleate individual called White emerged from cyst, destined to grow, Ants.) proliferating its nuclei to adult form.

Lophomonas(St.) o = nucleus.

(fig. 2, p); para- 6 = food (?) particles in fig. I.

sitic in the cock- roach ; Dinenympha (Leidy), Pyrsonympha (Leidy) ; Triche- nympha (Leidy) (fig. 3, j).

Family 11. — Opalinidae. Flagella short, numerous, ciliform, uniformly distributed over the flat oval body ; nuclei small, numerous, uniform.

Only genus, Opalina (Purkinje and Valentin) (fig. 3, 2-6),

in bladder and cloaca of the frog (usually regarded as an

aberrant ciliate, but E. R. Lankester expressed doubts as

to its position in the 9th edition of this encyclopaedia).

Order 2.— CHRYSOMONADACEAE. Contractile vacuole simple (in

fresh-water forms) or absent ; plastids yellow or brown always

present ; reserves fat.

Family 1. — Chrysomonadidae. Body naked, often amoeboid in active state, or sometimes with a cup-like theca, a gela- tinous investment, a firm cuticle, or silicified shell ; reserves fat or leucosin (starch in Zooxanthella) ; eye-spot present. Chromulina (Cienk.) often forms a golden scum on tanks; Chrysamoeba (Klebs) ; Hydrurus (Agardh), theca of colony

forming branching tubes, simulating a yellow Conferva in mountain torrents; Dinobryon (Ehrb.) (fig. 1, 8, 15); Stylochrysalis (St.); Uroglena (Ehrb.); Syncrypta (Ehrb.), and Synura (Ehrb.) (fig. I, 5) f° rm floating spherical colonies; Zooxanthella (Brandt), symbiotic as “yellow cells ” in Radiolaria Foraminifera, Millepora, and many Actinozoa. .

Family 2. — Coccolithophoridae. Body invested in a spheri- cal test strengthened by calcareous elements, tangential circular plates, ” coccoliths,” ” discoliths,” ” cyatholiths,” or radiating rods ” rhabdoliths. ” These are often found in Foraminiferal ooze and its fossil condition, chalk; when coherent as in the complete test, they are known as ” onco- spheres ” and ” rhabdospheres.” Coccolithophora (Loh- mann), Rhabdosphaera (Haeckel), Order 3.— CRYPTOMONADACEAE. Contractile vacuole (infresh- water forms) simple; plastids green, more rarely red, brown or absent; reserves starch; holophytic or saprophytic. Crypto- monas (Ehrb.); Paramoeba (Greeff) has yellow plastids and shows two cycles, in the one amoeboid, finally encysting to pro- duce a brood of flagellulae; in the other flagellate, and multiply- ing by longitudinal fission (it differs from MasHgamoeba in possess- ing no fiagellum in the amoeboid state, though it takes in food amoeba-fashion); Chilomonas (Ehrb.). Order 4.— CHLOROMONADACEAE. Contractile vacuoles 1-3, a complex of variable arrangement; pellicle delicate; plastids dis- coid chlorophyll-bodies; reserves oil; eye-spot absent even in active state ; holophytic or saprophytic, though with an anterior blind tubular depression simulating a pharynx. Coelomonas (St.), Vacuolaria

(Cienk.). Order 5.— EUGLENACEAE. Vacuole large, a reservoir for one or more accessory vacuoles, contractile and opening to the surface by a canal (" pharynx ") in which are planted one or two strong flagella; pellicle strong often striated; nucleus large, chromato- phores green, complex or absent; reserves paramylum granules of definite shape, and oil; nutrition variable; body stiff or " metabolic," never amoeboid. Among the true Flagellates these are the largest, few being below 40 11 and several attaining 130 /j. in length of cell-body (excluding fiagellum). Encysted condition common; the green forms sometimes multiply in this state and simulate unicellular Algae.

Family 1.— Euglenidae. Radial (monaxial) forms; nutrition saprophytic or holophytic, mostly one flagellate. (1) Chromatophore large; eye-spot conspicuous. Euglena (Ehrb.) (fig. I, 13, 17), with flexible cuticle and metabolic movements (this is probably Priestley's " green matter " through which he obtained oxygen gas) — a very common genus; Colacium (Ehbg.), in its resting state epizoic on Copepoda, which it colours green; Eutreptia (Perty), bi- flagellate; Ascoglena (St.); Trachelomonas (Ehrb.), with a hard brown cuticle; Phacus (Nitszche), with a firm rigid pellicle, often symmetrically flattened; Cryptoglena (Ehbg.). (2) Chromatophores absent. Astasia (Duj.), body meta- bolic; Menoidium (Perty), body not metabolic, somewhat inflected and crescentic; Sphenomonas (Stein), with a short accessory trailing fiagellum in front peeled; Distigma (Ehbg.) (fig. I, 27, 28), very metabolic, with two unequal flagella and two dark pigment spots. Family 2. — Peranemidae. Bilaterally symmetrical, often creeping, pharynx highly developed, with a firm rod-like skeleton, sometimes protrusible; nutrition saprophytic and holozoic. Peranema (Ehbg.) and Urceolus (Mere- schowsky), uni-flagellate creeping, very metabolic. Peta- lomonas (St.), uni-flagellate flattened with a deep ventral groove, not metabolic; Heteronema (Duj.) and Tropido- scyphus (St.), with a small accessory anterior trailing flagellum; Anisonema (Duj.) and Entosiphon (St.), with the trailing flagellum as long as the tractellum or even much longer. , , . ,

Order 6. — VOLVOCACEAE. Contractile vacuole simple anterior ; cell always enclosed in a cellulose wall (sometimes gelatinous) perforated by the two (more rarely four, five) diverging anterior flagella; reserves starch; chlorophyll almost always present, except in Polytoma, sometimes masked by a red pigment ; nutri- tion usually holophytic, rarely saprophytic, never holozoic. Brood-division in active state common, radial.

Family 1. — Chlamydomonadidae. Cell- wall firm not gelatinous, rarely forming colonies. Fore-end of the body with two or four

(seldom five) flagella. Almost always green in consequence of the presence of a very large single chromatophore. Generally a delicate shell-hke envelope of membranous consistence. I to 2 simple contractile vacuoles at the base of the flagella. Usually one eye- speck. Division of the protoplasm within the envelope may produce four, eight or more new individuals. This may occur in the swimming or in a resting stage. Also by more continuous fission microgametes of various sizes are formed. Conjugation is frequent. Genera.— Chlorangium (Stein), lacking green chlorophyll; Chlorogonium (Ehr.) (fig. 1, 6, 7); Polytoma (Ehr.) (fig. 2, 8);

Chlantydomonas (Ehr.) (fig. 1, I, 2, 3); Haematococcus (Agardh) (= Chlamydococcus, A. Braun, Stein); Prolococcus (Cohn, Huxley and Martin); Chlamydomonas (Cienkowski), causes red snow and “bloody rain”; Carteria (Diesing), quadri-flagellate ; Spondyto- morum (Ehrb.), forming floating colonies; Coccomonas (St.); Phacotus (Perty); Zoochlorella (Brandt), is the name given to un- determined Chlamydomonads found multiplying in the resting state within and in symbiotic relation to other Protozoa, to the fresh- water sponge, Ephydatia, Hydra viridis, and to the Turbellarian, Convoluta viridis (in which last species the active form has been recognized as a Carteria).

Family 2. — Volvocidae. Cell-wall gelatinous; always as- sociated in colonies; cells, as in Family I. The number of individuals united to form a colony varies very much, as does the shape of the colony. Reproduction by the continuous division of all or of only certain individuals of the colony, resulting in the production of a daughter colony (from each such individual). In some, probably in all, at certain times copulation of the individuals of distinct sexual colonies takes place, without or with a differentiation of the colonies and of the copulating cells as male and female. The result of the copulation is a resting zygospore (also called zygote or oospermo or fertilized egg), which after a time develops itself into one or more new colonies. Genera.— Gonium (O. F. M tiller) (fig. I, 14); Stephanosphaera (Cohn); Pandorina (Bory de Vine); Eudorina (Ehr.); Volvox (Ehr.) (fig. 1, 18, 20).

The sexual reproduction of the colonies of the Volvocaceae is one of the most important phenomena presented by the Protozoa. In some families of Flagellata full-grown individuals become amoeboid, fuse, encyst, and then break up into flagellate spores which develop simply to the parental form (fig. I, 23 to 26). In the Chlamydomona- didae a single adult individual by division produces small individuals, so-called ” microgametes.” These conjugate with one another or with similar microgametes formed by other adults (as in Chloro- gonium,

fig. 1, 7); or more rarely in certain genera a microgamete conjugates with an ordinary individual megagamete. The result in either case is a ” zygote,” a cell formed by fusion of two which divides in the usual way to produce new individuals. The micro- gamete in this case is the male element and equivalent to a sperma- tozoon; the megagamete is the female and equivalent to an egg- cell. The zygote is a ” fertilized egg,” or oosperm. In some colony- building forms we find that only certain cells produce by division microgametes; and, regarding the colony as a multicellular in- dividual, we may consider these cells as testis-cells and their micro- gametes as spermatozoa.

CYSTOFLAGELLATAand

Dinoflagellata are scarcely more than subdivisions of Flagellata; but, following 0. Butschli, we describe them separately; the three groups being united into his Mastigophora.

Further Remarks on the Flagellates. — Besides the work of special Protozoologists, such as F. Cienkowski, O. Butschli, F. v. Stein, F. Schaudinn, W. Saville Kent, &c, the Flagellates have been a favourite study with botanists, especially algologists: we may cite N. Pringsheim, F. Cohn, W. C. Williamson, W. Zopf, P. A. Dangeard, G. Klebs, G. Senn, F. Schutt; the reason for this is obvious. They present a wide range of structure, from the simple amoeboid genera to the highly differentiated cells of Euglenaceae, and the complex colonies of Proterospongia and Volvox. By some they are regarded as the parent-group of the whole of the Protozoa — a position which may perhaps better be assigned to the Proteomyxa ; but they seem undoubtedly ancestral to Dinoflagellates and to Cystoflagellates, as well as to Sporozoa, and presumably to Infusoria. Moreover, the only distinction between the Chlamydomonadidae and the true green Algae or Chlorophyceae is that when the former divide in the resting condition, or are held together by gelatinization of the older cell- walls (Palmella state), they round off and separate, while the latter divide by a ” party wall so as to give rise either to a cylindrical filament when the partitions are parallel and the axis of growth constant (Conferva type), or to a plate of tissue when the directions alternate in a plane. The same holds good for the Chrysomonadaceae and Cryptomonadaceae, so that these little groups are included in all text-books of botany. Again among Fungi, the zoospores of the Zoosporous Phycomycetes (Chytrydiaceae, Peronosporaceae, Saprolegniaceae) have the characters of the Bodonidae. Thus in two directions the Flagellates lead up to undoubted Plants. Prob- ably also the Chlamydomonads have an ancestral relation to the Conjugatae in the widest sense, and the Chrysomonadaceae to the Diatomaceae; both groups of obscure

affinity, since even the repro- ductive bodies have no special organs of locomotion. For these reasons the Volvocaceae, Chloromonadaceae, Chrysomonadaceae and Cryptomonadaceae have been united as Phytoflagellates ; and the Euglenaceae might well be added to these. It is easy to under- stand the relation of the saprophytic and the holophytic Flagellates to true plants. The capacity to absorb nutritive matter in solution (as contrasted with the ingestion of solid matter) renders the encysted condition compatible with active growth, and what in holozoic forms is a true hypnocyst, a state in which all functions are put to sleep, is here only a rest from active locomotion, nutrition being only limited by the supply of nutritive matter from without, and — in the

case of holophytic species— by the illumination: this latter con- dition naturally limits the possible growth in thickness in holophytes with undifferentiated tissues. The same considerations apply indeed to the larger parasitic organisms among Sporozoa, such as Gregarines and Myxosporidia and Dolichosporidia, which are giants among Protozoa.

Literature. — W. S. Kent, Manual of the” Infusoria, vol. i. Protozoa (1880-1882) ; O. Biitschli, Die Flagellaten (in Bronn’s Thierreich, vol. i. Protozoa, 1885) ; these two works contain full bibliographies of the antecedent authors. See also J. Goroschankin (on Chlamydomonads) in Bull. Soc. Nat. (Moscow, iv. v., 1890-1891); G. Klebs, ” Flagel- latenstudien ” in Zeitsch. Wiss. Zool. Iv. (1892); Doflein, Protozoen als Krankheitserreger (1900); Senn, “Flagellaten,” in Engler and Prantl’s Pflanzenfamilien, 1 Teil, Abt. ia (1900); R. France, Der Organismus der Craspedomonaden (1897) ; Grassi and Sandias, ” Tri- chonymphidae,” in Quart. J. Micr. Sci. xxxix.xl. (1897) ; Bezzen berger, ” Opa inidae ” in Arch. Protist, iii. (1903); Marcus Hartog, ” Protozoa,” in Cambridge Nat. Hist. vol. i. (1906). (M. Ha.)

FLAGEOLET, in music, a kind of flfite-A-bec with a new fingering, invented in France at the end of the 16th century, and in vogue in England from the end of the 17 th to the beginning of the 19th century. The instrument is described and illustrated by Mersenne, 1 who states that the most famous maker and player in his day was Le Vacher. The flageolet differed from the recorder in that it had four finger-holes in front and two thumb-holes at the back instead of seven finger-holes in front and one thumb-hole at the back. This fingering has survived in the French flageolet still used in the provinces of

France in small orchestras and for dance music. The arrangement of the holes was as follows: 1, left thumb-hole at the back near mouthpiece; 2 and 3, finger-holes stopped by the left hand; 4, finger-hole stopped by right hand; 5, thumb-hole at the back; 6, hoh; near the open end. According to Dr Burney (History of Music) the flageolet was invented by the Sieur Juvigny, who played it in the Ballet comique de la Royne, 1581. Dr Edward Browne, 2 writing to his father from Cologne on the 20th of June 1673, relates, ” We have with us here one . . . and Mr Hadly upon the flagelet, which instrument he hath so improved as to invent large ones and outgoe in sweetnesse all the basses whatso- ever upon any other instrument.” About the same time was published Thomas Greeting’s Pleasant Companion; or New Lessons and Instructions for the Flagelet (London, 1675 or 1682), a rare book of which the British Museum does not possess a copy. The instrument retained its popularity until the beginning of the 19th century, when Bainbridge constructed double and triple flageolets. 3 The three tubes were bored parallel through one piece of wood communicating near the mouthpiece which was common to all three. The lowest notes of the respective

tubes were

P

The word flageolet was undoubtedly derived from the medieval Fr. flajol, the primitive whistle-pipe. (K. S.)

FLAGSHIP, the vessel in a fleet which carries the flag, the symbol of authority of an admiral.

FLAHAUT DE LA BILLARDERIE, AUGUSTE CHARLES JOSEPH, Comte de (1785-1870), French general and statesman, son of Alexandre Sebastien de Flahaut de la Billarderie, comte de Flahaut, beheaded at Arras in February 1793, and his wife Adelaide Filleul, afterwards Mme de Souza (q.v.), was born in Paris on the 21st of April 1785. Charles de Flahaut was generally recognized to be the offspring of his mother’s liaison with Talley- rand, with whom he was closely connected throughout his life. His mother took him with her into exile in 1792, and they remained abroad until 1798. He entered the army as a volunteer in 1800, and received his commission after the battle of Marengo. He became aide-de-camp to Murat, and was wounded at the battle of Landbach in 1805. At Warsaw he met Anne Ponia- towski, Countess Potocka, with whom he rapidly became inti- mate. After the battle of Friedland he received the Legion of

1 Harmonie universelle (Paris, 1636), bk. v. pp. 232-237.

2 See Sir Thomas Browne's Works, vol. i. p. 206.

3 See Capt. C. R. Day, Descriptive Catalogue of Musical Instruments (London, 1891), pp. 18-22 and pi. 4; also Complete Instructions for the Double Flageolet (London, 1825); and The Preceptor, or a Key to the Double Flageolet (London, 1815).

Honour, and returned to Paris in 1807. He served in Spain in 1808, and then in Germany. Meanwhile the Countess Potocka had established herself in Paris, but Charles de Flahaut had by this time entered on his liaison with Hortense de Beauharnais, queen of Holland. The birth of their son was registered in Paris on the 2 1 st of October 181 1 as Charles Auguste Louis Joseph Demorny, known later as the due de Morny. Flahaut fought with distinction in the Russian campaign of 181 2, and in 1813 became general of brigade, aide-de-camp to the emperor, and, after the battle of Leipzig, general of division. After Napoleon's abdication in 1814 he submitted to the new government, but was placed on the retired list in September. He was assiduous in his attendance on Queen Hortense until the Hundred Days brought him into active service again. A mission to Vienna to secure the return of Marie Louise resulted in failure. He was present at Waterloo, and afterwards sought to place Napoleon II. on the throne. He was saved from exile by Talleyrand's influence, but was placed under police surveillance. Presently he elected to retire to Germany, and thence to England, where he married Margaret, daughter of Admiral George Keith Elphinstone, Lord Keith, and after the latter's death Baroness Keith in her own right. The French ambassador opposed the marriage, and Flahaut resigned his commission. His eldest daughter, Emily Jane, married Henry, 4th marquess of Lansdowne. The Flahauts returned to France in 1827, and in 1830 Louis Philippe gave the count the grade of lieutenant-general and made him a peer of France. He remained intimately associated with Talleyrand's policy, and was, for a short. time in 1831, ambassador at Berlin. He was afterwards attached to the household of the duke of Orleans, and in 1841 was sent as ambassador to Vienna, where he remained until 1848, when he was dismissed and retired from the army. After the coup d'etat of 1851 he was again actively employed, and from i860 to 1862 was ambassador at the court of St James's. He died on the 1st of September 1870. The comte de Flahaut is perhaps better remembered for his exploits in gallantry, and the elegant manners in which he had been carefully trained by his mother, than for his public services, which were not, however, so inconsiderable as they have some- times been represented to be.

See A. de Haricourt, Madame de Souza et safamille (1907).

FLAIL (from Lat. flagellum, a whip or scourge, but used in the Vulgate in the sense of ” flail “; the word appears in Dutch vlegel, Ger. Flegel, and Yx.fleau), a farm hand-implement formerly used for threshing corn. It consists of a short thick club called a ” swingle ” or ” swipple ” attached by a rope or leather thong to a wooden handle in such a manner as to enable it to swing freely. The ” flail ” was a weapon used for military purposes in the middle ages. It was made in the same way as a threshing- flail but much stronger and furnished with iron spikes. It also took the form of a chain with a spiked iron ball at one end swinging free on a wooden or iron handle. This weapon was known as the ” morning star ” or ” holy water sprinkler.” During the panic over the Popish plot in England from 1678 to 1681, clubs, known as ” Protestant flails,” were carried by alarmed Protestants (see Green Ribbon Club).

FLAMBARD, RANULF, or Ralph (d. 11 28), bishop of Durham and chief minister of William Rufus, was the son of a Norman parish priest who belonged to the diocese of Bayeux. Migrating at an early age to England, the young Ranulf entered the chancery of William I. and became conspicuous as a courtier. He was disliked by the barons, who nicknamed him Flambard in reference to his talents as a mischief-maker; but he acquired the reputation of an acute financier and appears to have played an important part in the compilation of the Domesday survey. In that record he is mentioned as a clerk by profession, and as holding land both in Hants and Oxfordshire. Before the death of the old king he became chaplain to Maurice, bishop of London, under whom he had formerly served in the chancery. But early in the next reign Ranulf returned to the royal service. He is usually described as the chaplain of Rufus; he seems in that capacity to have been the head of the chancery and the custodian of the great seal. But he is also called treasurer;

and there can be no doubt that his services were chiefly of a fiscal character. His name is regularly connected by the Chroniclers with the ingenious methods of extortion from which all classes suffered between 1087 and 1100. He profited largely by the tyranny of Rufus, farming for the king a large proportion of the ecclesiastical preferments which were illegaly kept vacant, and obtaining for himself the wealthy see of Durham (1099). His fortunes suffered an

eclipse upon the accession of Henry I., by whom he was imprisoned in deference to the popular outcry. A bishop, however, was an inconvenient prisoner, and Flambard soon succeded in effecting his escape from the Tower of London. A popular legend represents the bishop as descending from the window of his cell by a rope which friends had conveyed to him in a cask of wine. He took refuge with Robert Curthose in Normandy and became one of the advisers who pressed the duke to dispute the crown of England with his younger brother; Robert rewarded the bishop by entrusting him with the administration of the see of Lisieux. After the victory of Tinchebrai (1106) the bishop was among the first to make his peace with Henry, and was allowed to return to his English see. At Durham he passed the remainder of his life. His private life was lax; he had at least two sons, for whom he purchased benefices before they had entered on their teens; and scandalous tales are told of the entertainments with which he enlivened his seclusion. But he distinguished himself, even among the bishops of that age, as a builder and a pious founder. He all but completed the cathedral which his predecessor, William of St Carilef, had begun; fortified Durham; built Norham Castle; founded the priory of Mottisfout and endowed the college of Christchurch, Hampshire. As a politician he ended his career with his sub- mission to Henry, who found in Roger of Salisbury a financier not less able and infinitely more acceptable to the nation. Ranulf died on the 5th of September n 28.

See Orderic Vitalis, Historia ecclesiastica, vols. iii. and iv. (ed. le Prevost, Paris, 1845) ; the first continuation of Symeon's Historia Ecclesiae Dunelmensis (Rolls ed., 1882) ; William of Malmesbury in the Gesta pontificum (Rolls ed., 1870); and the Peterborough Chronicle (Rolls ed., 1861). Of modern writers E. A. Freeman in his William Rufus (Oxford, 1882) gives the fullest account. See also T. A. Archer in the English Historical Review, ii. p. 103; W. Stubbs's Constitutional History of England, vol. i. (Oxford, 1897); J. H. Round's Feudal England (London, 1895). (H. W. C. D.)

FLAMBOROUGH HEAD, a promontory on the Yorkshire coast of England, between the Filey and Bridlington bays of the North Sea. It is a lofty chalk headland, and the resistance it offers to the action of the waves may be well judged by contrast with the low coast of Holderness to the south. The cliffs of the Head, however, are pierced with caverns and fringed with rocks of fantastic outline. Remarkable contortion of strata is seen at various points in the chalk. Sea-birds breed abundantly on the cliffs. A lighthouse marks the point, in 54° 7′ N., o° 5′ W.

FLAMBOYANT STYLE, the term given to the phase of Gothic architecture in France which corresponds in period to the Perpendicular style. The word literally means ” flowing ” or ” flaming,” in consequence of the resemblance to the curved lines of flame in window tracery. The earliest examples of flowing tracery are found in England in the later phases of the Decorated style, where, in consequence of the omission of the enclosing circles of the tracery, the carrying through of the foliations resulted in a curve of contrary flexure of ogee form and hence the term flowing tracery. In the minster and the church of St Mary at Beverley, dating from 1320 and 1330, are the earliest examples in England; in France its first employment dates from about 1460, and it is now generally agreed that the flamboyant style was introduced from English sources. One of the chief characteristics of the flamboyant style in France is that known as ” interpenetration,” in which the base mouldings of one shaft are penetrated by those of a second shaft of which the faces are set diagonally. This interpenetration, which was in a sense a tour de force of French masons, was carried to such an extent that in a lofty rood-screen the mouldings penetrating the base-mould would be found to be those of a diagonal buttress situated 20 to 30 ft. above it. It was not limited, however, to

internal work; in late 15th and early 16th century ecclesiastical architecture it is found on the facades of some French cathedrals, and often on the outside of chapels added in later times.

FLAME (Lat. flamma; the root flag- appears in flagrare, to burn, blaze, and Gr. (frXkyeiv). There is no strict scientific definition of flame, but for the purpose of this article it will be regarded as a name for gas which is temporarily luminous in consequence of chemical action. It is well known that the luminosity of gases can be induced by the electrical discharge, and with rapidly alternating high-tension discharges in air an oxygen-nitrogen flame is produced which is long and flickering, can be blown out, yields nitrogen peroxide, and is in fact in- distinguishable from an ordinary flame except by its electrical mode of maintenance. The term ” flame ” is also applied to solar protuberances, which, according to the common view, consist of gases whose glow is of a purely thermal origin. Even with the restricted definition given above, difficulties present themselves. It is found, for example, with a hydrogen flame that the luminosity diminishes as the purity of the hydrogen is increased and as the air is freed from dust, and J. S. Stas declared that under the most favourable conditions he was only able, even in a dark room, to localize the flame by feeling for it, an observation consistent with the fact that the line spectrum of the flame lies wholly in the ultra-violet. On the other hand, there are

many examples of chemical combination between gases where the attendant radiation is below the pitch of visibility, as in the case of ethylene and chlorine. It will be obvious from these facts that a strict definition of flame is hardly possible. The common distinction between luminous and non-luminous flames is, of course, quite arbitrary, and only corresponds to a rough estimate of the degree of luminosity.

The chemical energy necessary for the production of flame may be liberated during combination or decomposition. A single substance like gun-cotton, which is highly endothermic and gives gaseous products, will produce a bright flame of decom- position if a single piece be heated in an evacuated flask. Com- bination is the more common case, and this means that we have two separate substances involved. If they be not mixed en masse before combination, the one which flows as a current into the other is called conventionally the " combustible," but the simple experiment of burning air in coal gas suffices to show the unreality of this distinction between combustible and sup- porter of combustion, which, in fact, is only one of the many partial views that are explained and perhaps justified by the dominance of oxygen in terrestrial chemistry.

Although hydrocarbon flames are the commonest and most interesting, it will be well to consider simpler flames first in order to discuss some fundamental problems. In hydrocarbon flames the complexity of the combustible, its susceptibility to change by heating, and the possibilities of fractional oxidation, create special difficulties. In the flame of hydrogen and oxygen or carbon monoxide and oxygen we have simpler conditions, though here, too, things may be by no means so simple as they seem from the equations $2H2 + 2 = 2H2O$ and $2CO + 2 = 2C0\ 2$ – The influence of water vapour on both these actions is well known, and the molecular transactions may in reality be com- plicated. We shall, however, assume for the sake of clearness that in these cases we have a simple reaction taking place through- out the mass of flame. There are various ways in which a pair of gases may be burned, and these we shall consider separately. Let us first suppose the two gases to have been mixed en masse and a light to be applied to the stationary mixture. If the mixture be made within certain limiting proportions, which vary for each case, a flame spreads from the point where the light is applied, and the flame traverses the mixture. This flame may be very slow in its progress or it may attain a velocity of the order of one or two thousand metres per second. Until comparatively recent times great misunderstanding prevailed on this subject. The slow rate of movement of flame in short lengths of gaseous mixtures was taken to be the velocity of explosion, but more

recent researches by M. P. E. Berthelot,

E. Mallard and H. L. le Chatelier and H. B. Dixon have shown that a distinction must be made between the slow initial rale of inflammation of gaseous mixtures and the rapid rate of detona- tion, or rate of the explosive wave, which in many cases is subse- quently set up. We shall here deal only with the slow movements of flame. The development of a flame in such a gaseous mixture requires that a small portion of it should be raised to a tempera- ture called the temperature of ignition. Here again considerable misunderstanding has prevailed. The temperature of ignition has often been regarded as the temperature at which chemical combination begins, whereas it is really the temperature at which combination has reached a certain rate. The combination of hydrogen and oxygen begins at temperatures far below that of ignition. It may indeed be supposed that the combination occurs with extreme slowness even at ordinary temperatures, and that as the temperature is raised the velocity of the reaction increases in accordance with the general expression according to which an increase of io° C. will approximately double the rate. However that may be, it has been proved experimentally by J. H. van't Hoff, Victor Meyer and others that the combination of hydrogen and oxygen proceeds at perceptible rates far below the temperature of ignition. The phenomenon appears to be greatly influenced by the solid surfaces which are present; thus in a plain glass vessel the combination only began to be per- ceptible at 448 , whilst in a silvered glass vessel it would be detected at 182 C.

The same kind of thing is true for most oxidizable substances, including ordinary combustibles. We must look upon the application of heat to a combustible mixture as resulting in an increase of the rate of combination locally. Let us suppose that we are dealing with a stratum of the mixture in small contiguous sections. If we raise the temperature of the first section a° C, an increased rate of combination is set up. The heat produced by this combination will be dissipated by conduc- tion and radiation, and we will suppose that it does not quite suffice to raise the adjacent section of the mixture to a° C. The combination in that section, therefore, will not be as rapid as in the first one, and so evidently the impulse to combination will go on abating as we pass along the stratum. Suppose now we start again and heat the first section of the mixture to a tempera- ture c° C, such that the rate of combination is very rapid and the heat developed by

combination suffices to raise the adjacent section of the mixture to a temperature higher than c° C. The rate of combination will then be greater than in the first section, and the impulse to combination will be intensified in the same way from section to section along the stratum until a maximum temperature is reached. It is obvious that there must be a temperature of b° C. between a° and c° which will satisfy this condition, that the heat which results from the combination stimulated in the first section just suffices to raise the temperature of the second section to 6°. This temperature b° is the tempera- ture of ignition of the mixture; so soon as it is attained by a portion of the mixture the combustion becomes self-sustaining and flame spreads through the mixture. Ignition temperature may be defined briefly as the temperature at which the initial loss of heat due to conduction, &c, is equal to the heat evolved in the same time by the chemical reaction (van't Hoff). From the above considerations we see that the temperature of ignition will vary not only when the gases are varied, but when the proportions of the same gases are varied, and also when the pressure is varied. We can see also that outside certain limiting proportions a mixture of gases will have no practicable ignition temperature, that is to say, the cooling effect of the gas which is in excess will carry off so much heat that no attainable initial heating will suffice to set up the transmission of a constant temperature. Thus in the case of hydrogen and air, mixtures containing less than 5 and more than 72% of hydrogen are not inflammable. The theory of ignition temperature enables us to understand why in an explosive mixture a very small electric spark may not suffice to induce explosion. Combination will indeed take place in the path of the spark, but the amount of it is n&t sufficient to meet the loss of heat by conduction, &c. It

must be added that the theory of ignition temperatures given above does not explain all the observed facts. F. Emich states that the inflammability of gaseous mixtures is not necessarily greatest when the gases are mixed in the proportions theoretically required for complete combination, and the influence of foreign gases does not appear to follow any simple law. The presence of a small quantity of a gas may exercise a profound influence on the ignition temperature as in the case of the addition of ethylene to hydrogen (Sir Edward Frankland), and again when a mixture of methane and air is raised to its ignition temperature a sensible interval (about 10 seconds) elapses before inflammation occurs.

The rate at which a flame will traverse a mixture of two gases which has been ignited depends on the proportions in which the gases are mixed. Fig. 1 (Bunte) represents this relationship for several common

gases.

1

n

e

s

J3

E E

\

/

\

\

■

•

• ■

V

\

A

■»

\

X V

\

1

/J

\

Acetif

ene

-ˆi.

O 10 20 30 40 SO SO 70 80

Percentage of combustible gas in mixture

Fig. i . — Rates of inflammation of combustible gases with air.

If a ready-made gaseous mixture is to be used for the produc- tion of a steady flame, it may be forced through a tube and ignited at the end; it is obvious that the velocity of efflux must be greater than the initial rate of inflammation of the mixture, for otherwise the mixture would fire back down the tube. If the velocity of efflux be considerably greater than the rate of inflammation, the flame will be separated from the end of the tube, and only appear as a flickering crown where the velocity and inflammability of the issuing gas have been diminished by admixture with air. With much increased velocity of efflux the flame will be blown out. J. B. A. Dumas used to show the experiment of blowing out a candle with electrolytic gas. A steady flame formed by burning a ready-made gaseous mixture at the end of a tube of circular section has the form shown in fig. 2. The small internal cone marks the lower limiting surface of the flame; it is the locus of all points where the velocity of efflux is just equal to the velocity of inflammation, and its conical form is explained by the fact that the rate of efflux of gas is greatest in the vertical axis of the tube where the flow is not retarded by friction with the walls, as well as by the further fact that the gas issuing from such an orifice spreads outwards, the inflammation proceeding directly against it. The flame, it will be seen, is of considerable thickness. If the gaseous mixture be hydrogen and oxygen, or carbon monoxide and oxygen, it will have no obvious features of structure beyond those shown in the figure; that is to say, the shaded region of burning gas has the appearance of homogeneity and uniform colour which might be expected to accompany a uniform chemical condition. Some admixture of the external Fig. 2. air will, of course, take place, especially in the upper parts of the flame, and detectable quantities of oxides of nitrogen may be found in the products of combustion, but this is an inconsiderable feature. The flame just described is essentially that of a blowpipe. .

A second way of producing a flame is the more common one of allowing one gas to stream into the other. Using the same gases as

before, hydrogen or carbon monoxide with oxygen, we find

again that the flame is conical in form and uniform in colour, but in this case, if the velocity of efflux be not immoderate, the burning gas only extends over a comparatively thin shell, limited on the inside by the pure combustible and on the outside by a-mixture of the products of combustion with oxygen. The combustible gas has to make its own inflammable mixture with the circumambient oxygen, and we may suppose the column of gas to be burned through as it ascends. The core of unburned gas thus becomes thinner as it ascends and the flame tapers to a point. The external surface of a flame of this kind will for the same consumption of gas be larger than that of a flame where the ready-made mixture of gases is used. If a jet of one gas be sent with a sufficient velocity into another, turbulent admixture takes place and an unsteady sheet of flame of uniform colour is obtained.

A third way of forming a flame is to allow the whole of one gas, mixed with a less quantity of the second than is sufficient for complete combustion, to issue into an atmosphere of the second. This is the case with what are generally known as atmospheric burners, of which the Bunsen burner is the prototype. The development of a flame of this kind can be well studied in the case of carbon monoxide and air. The carbon monoxide is fed into a Bunsen burner with closed air-valve, the burner-tube being prolonged by affixing a glass tube to it by means of a cork. The flame consists of a single conical blue sheet. If now the air-valve be opened very slightly, an internal cone of the same blue colour makes its appearance. The air which has entered through the air-valve (” primary ” air) has become mixed with the carbon monoxide and so oxidizes its quota in an internal cone, the rest of the carbon monoxide (diluted now, of course, with carbon dioxide and nitrogen) wandering into the external atmosphere to burn (with ” secondary ” air) in a second cone. The existence of the internal cone and the subsequent thermal effect lead to slight convexity of surface in the outer cone. If the quantity of primary air be increased more internal combustion can take place. This, however, does not lead to an enlargement of the inner cone, for the increase of air increases the rate of inflammation of the mixture, and the inner cone (which only maintains its stability because the rate of efflux of the mixture is greater than the velocity of inflammation) contracts, and will, as the proportion of primary air is increased, soon evince a tendency to enter the burner-tube. At this stage an interesting pheno- menon is to be

noticed. When we have reached the point of aeration where the velocity of inflammation of the mixture just surpasses the velocity of efflux, the inner cone enters the burner-tube as a disk and descends, but this downward motion checks the suction flow of air through the valve at the base of the burner, whilst it does not appreciably check the pressure flow of the carbon monoxide through the gas nozzle. The result is that a stratum of gas-mixture poor in air, and therefore of low rate of inflammation, is formed, and when the descending disk of flame meets it, the descent is arrested and the disk returns to the top of the tube, reproducing the inner cone. The full air suction is now restored and the course of events is repeated. This oscillatory action can be maintained almost indefinitely long if the pressure and other conditions be maintained constant. With still more primary air the inner cone of flame simply fires back to the burner nozzle, or, in the last stage, we may have enough air entering to produce a flame of the blast blowpipe type, namely, one where the carbon monoxide mixed with an excess of primary air burns with a single cone in a steady flame.

By means of a simple contrivance devised by A. Smithells a two-coned flame of the kind described may be resolved into its components. The apparatus is like a half-extended telescope made of two glass tubes, and it is evident that the velocity of a mixture of gases flowing through it must be greater in the narrow tube than in the wider one. If the end of the narrower tube be fixed to a Bunsen burner and the flame be formed at the end of the wider one, then when the air-supply is increased to a certain point the inner cone will descend into the wide tube and attach itself to the upper end of the narrower one. This occurs

when the velocity of inflammation is just greater than the upward velocity of the gaseous stream in the wide tube and less than the upward velocity in the narrow tube. If the outer tube be now drawn down, a two-coned flame burns at the end of the inner tube; if the outer tube he slid up again, it detaches the outer cone and carries it upward. This apparatus has been of use in investigating the progress of combustion in various flames.

Temperature of Flames. — The term ” flame- temperature ” is used very vaguely and has no clear meaning unless qualified by some description. It it least ambiguous when used in reference to flames where the combining gases are mixed in theoretical proportions before issuing from the burner. The flame in such a case has considerable thickness and uniformity, and, though the temperature is not constant throughout, flames of this type given by different combustibles admit

of comparison. In other flames where the shells of combustion are thin and envelop large regions of unburned or partly-burned gas, it is not clear how temperature should be specified. An ordinary gas-flame will not, from the point of view of the practical arts, give a sufficient temperature for melting platinum, yet a very thin platinum wire may be melted at the edge of the lower part of such a flame. The maximum temperature of the flame is therefore not in any serious sense an available temperature. It will suffice to point out here that in order to burn a gas so that it may have the highest available temperature, we must burn it with the smallest external flame-surface obtainable. This is done when the com- bining gases are completely mixed before issuing from the burner. Where this is impracticable we may employ a burner of the Bunsen type, and arrange matters so that a large amount of primary air is supplied. It is in this direction that modern improvements have been made with a view to obtaining hot flames for heating the Welsbach mantle. The Kern burner, for example, employs the principle of the Venturi tube. Where much primary air is drawn in it is usual to provide for it being well mixed with the gas, otherwise an unsteady flame may be produced with a great tendency to light back. The burner head is therefore usually provided with a mixing chamber and the mixture issues through a slit or a mesh. A great many modified Bunsen burners have been produced, the aim in all of them being to produce a flame which shall combine steadiness with the smallest attainable external surface.

To estimate the temperature of flames several methods have been employed. The method of calculation, based on the supposition that the whole heat of combustion is localized in the product (or products) of combustion and heats it to a tem- perature depending on its specific heat, cannot be applied in a simple way. Apart from the assumption (which there is reason to suppose incorrect) that none of the chemical energy assumes the radiant form directly, we have to regard the possible change of specific heat at high temperatures, the likelihood of dissociation and the time of reaction. Any practical consideration of tem- perature must have regard to a large assemblage of molecules and not to a single one, and therefore any” influence which means delay in combination will result in reduction of temperature by radiation and conduction. It can hardly be maintained that in the present state of knowledge we have the requisite data for the calculation of flame temperature, though good approxima- tions may be made. Many attempts have been made to deter- mine flame temperatures by means of thermo-electric couples and by radiation pyrometers. The couple most employed is that known as H. L. le Chatelier’s, consisting of two wires, one of platinum and the other an

alloy of 90% platinum and 10% of rhodium. When all possible precautions are taken it is possible by means of such thermo-couples to measure local flame tempera- tures with a considerable degree of accuracy. Subjoined are some results obtained at different times and by different observers with regard to the maximum temperatures of flames: —

Coal gas in Bunsen burner (Waggener, 1896) . . . 1770 8 C.

,, ,, ,, „ (Berkenbusch, 1899). . 1830°

„ ,, (White & Traver, 1902) . 1780°

(Fery, 1905). . . . 1871°

The following are given by Fery: —

Acetylene 2548° C.

Alcohol 1705

Hydrogen (in air) 1900

Oxy-hydrogen 2420°

Oxy-coal gas blowpipe 2200°

Source of Light in Flames. — We may consider first those flames where solid particles are out of the question; for example, the flame of carbon monoxide in air. The old idea that the luminosity was due to the thermal glow of the highly heated product of combustion has been challenged independently by a number of observers, and the view has been advanced that the emission of light is due to radiation attendant upon a kind of discharge of chemical energy between the reacting molecules. E. Wiedemann proposed the name ” chemi-luminescence ” for radiation of this kind. The fact is that colourless gases cannot be made to glow by any purely thermal heating at present available, and products of combustion heated to the average temperature of the flames in which they are produced are non- luminous. On the other hand, it must be remembered that in a mass of burning gas only a certain proportion of the molecules are engaged at one instant in the act of chemical combination, and that the energy liberated in such individual transactions, if localized momentarily as heat, would give individual molecules a unique condition of temperature far

transcending that of the average, and the distribution of heat in a flame would be very different from that existing in the same mixture of gases heated from an external source to the same average temperature. The view advocated by Smithells is that in the chemical combination of gases the initial phase of the formation of the new molecule is a vibratory one, which directly furnishes light, and that the damping down of this vibration by colliding molecules is the source of that translatory motion which is evinced as heat. This, it will be seen, is an exact reversal of the older view.

The view of Sir H. Davy that ” whenever a flame is remarkably brilliant and dense it may always be concluded that some solid matter is produced in it ” can be no longer entertained. The flames of phosphorus in oxygen and of carbon disulphide in nitric oxide contain only gaseous products, and Frankland showed that the flames of hydrogen and carbon monoxide became highly luminous under pressure. From his experiments Frank- land was led to the generalization that high luminosity of flames is associated with high density of the gases, and he does not draw a distinction in this respect between high density due to high molecular weight and high density due to the close packing of lighter molecules. The increased luminosity of a compressed flame is not difficult to understand from the kinetic theory of gases, but no explanation has appeared of the luminosity considered by Frankland to be due merely to high molecular weight. It is possible that the electron theory may ultimately afford a better understanding of these phenomena.

Structure of Flame. — The vagueness of the term structure, as applied to flames, is to be seen from the very conflicting accounts which are current as to the number of differentiated parts in different flames. Unless this term’ is restricted to sharp differences in appearance, there is no limit to the number of parts which may be selected for mention. The flame of carbon monoxide, when the gas is not mixed with air before it issues from the burner, shows no clearly differentiated structure, but is a shell of blue luminosity of shaded intensity — a hollow cone if the orifice of the burner be circular and the velocity of the gas not immoderate, or a double sheet of fan shape if the burner have a slit or two inclined pores which cause the jets of issuing gas to spread each other out. Such a flame has but one single distinct feature, and this is not surprising, as there is no reason to suppose that there is any difference in the chemical process or processes that are occurring in different quarters of the flame. The amount of materials undergoing this transformation in different parts of the flame may and does vary; the gases become diluted with products of combustion, and the molecular vibrations gradually die down. These things may cause a

variation in the intensity of the light in different quarters, but

the differences induced are not sharp or in any proper sense structural. A flame of this kind may develop a secondary feature of structure. If carbon monoxide be burnt in oxygen which is mixed or combined with another element there may be an additional chemical process that will give light; flames in air are sometimes surrounded by a faintly luminous fringe of a greenish cast, apparently associated with the combination of nitrogen with oxygen (H. B. Dixon). Carbon monoxide on being strongly heated begins to dissociate into carbon and carbon dioxide; if the unburnt carbon monoxide within a flame of that gas were so highly heated by its own burning walls as to reach the temperature of dissociation, we might expect to see a special feature of structure due to the separated carbon. Such a temperature does not, however, appear to be reached.

Apart from hydrocarbon flames not much has been published in reference to the structure of flames. The case of cyanogen is of peculiar interest. The beautiful flame of this gas consists of an almost crimson shell surrounded by a margin of bright blue. Investigations have shown that these two colours correspond to two steps in the progress of the combustion, in the first of which the carbon of the cyanogen is oxidized to carbon monoxide and in the second the carbon monoxide oxidized to carbon dioxide.

The inversion of combustion may bring new features of structure into existence; thus when a jet of cyanogen is burnt in oxygen no solid carbon can be found in the flame, but when a jet of oxygen is burnt in cyanogen solid carbon separates on the edge of the flame.

Hydrocarbon Flames. — As already stated the flames of carbon compounds and especially of hydrocarbons have been much more studied than any other kind, as is natural from their common use and practical importance. The earliest investigations were made with coal gas, vegetable oils and tallow, and the composite and complex nature of these substances led to difficulties and confusion in the interpretation of results. One such difficulty may be illustrated by the fact, often overlooked, that when a mixed gaseous combustible issues into air the individual com- ponent gases will separate spontaneously in accordance with their diffusibilities: hydrogen will thus tend to get to the outer edge of a flame and heavy hydrocarbons to lag behind.

The features of structure in a hydrocarbon flame depend of course on the manner in which the air is supplied. The extreme cases are (i.) when the issuing gas is supplied before it leaves the burner with

sufficient air for complete combustion, as in the blast blowpipe, in which case we have a sheet of blue undiffer- entiated flame; and (ii.) when the gas has to find all the air it requires after leaving the burner. The intermediate stage is when the issuing gas is supplied before leaving the burner with a part of the air that is required. In this case a two-coned flame is produced. The general theory of such phenomena has already been discussed. It must be remarked that the transition of one kind of flame into the others can be effected gradually, and this is seen with particular ease and distinctness by burning benzene vapour admixed with gradually increasing quantities of air. The key to the explanation of the structure of an ordinary luminous flame, such as that of a candle, is to be found, according to Smithells, by observing the changes undergone by a well-aerated Bunsen flame as the " primary " air is gradually cut off by closing the air-ports at the base of the burner. It is then seen that the two cones of flame evolve or degenerate into the two recognizable blue parts of an ordinary luminous flame, whilst the appearance of the bright yellow luminous patch becomes increasingly emphasized as a hollow dome lying within the upper part of the blue sheath. There are thus three recognizable features of structure in an ordinary luminous flame, each region being as it were a mere shell and the interior of the flame filled with gas which has not yet entered into active combustion. If, as is suggested, the blue parts of an ordinary luminous flame are the relics of the two cones of a Bunsen flame, the chemistry of a Bunsen flame may be appropriately considered first. What happens chemically when a hydrocarbon is burned in a Bunsen burner ? The air sent in with the gas is insufficient for complete

combustion so that the inner cone of the flame may be considered as air burning in an excess of coal gas. What will be the products of this combustion? This question has been answered at different times in very different ways. There are many conceiv- able answers: part of the hydrocarbon might be wholly oxidized and the rest left unaltered to mix with the outside air and burn as the outer cone; on the other hand, there might be (as has been so commonly assumed) a selective oxidation in the inner cone whereby the hydrogen was fully oxidized and the carbon set free or oxidized to carbon monoxide; or again the carbon might be oxidized to carbon dioxide or monoxide and the hydrogen set free. There might of course be other intermediate kinds of action. Now it is important at this point to insist upon a distinction between what can be found by direct analysis as to the products of

partial combustion, and what can be imagined or inferred as the transitory existence of substances of which the products actually found in analysis are the outcome. We shall consider only in the first instance what substances are found by analysis. Earlier experiments on the Bunsen burner in which coal gas was used, and the gases withdrawn directly from the flame by aspiration, gave no very clear results, but the introduction of the cone-separating apparatus and the use of single hydrocarbons led to more definite conclusions. The analysis of the inter-conal gases from an ethylene flame gave the following numbers: — carbon dioxide = 3-6; water = 9-5; carbon monoxide = 15-6; hydrocarbons = 1-3; hydrogen = 9ˆ4; nitrogen = 6o-6.

It appears therefore, and it may be stated as a fact, that a considerable amount of hydrogen is left unoxidized, whilst practically all the carbon is converted into monoxide or dioxide. As the gases have cooled down before analysis and as the reaction CO + H 2 OˆC0 2 + H2 is reversible, it may be objected that the inter-conal gases may have a composition when they are hot very different from what they show when cold. Experiments made to test this question have not sustained the objection. Subsequent experiments on the oxidation of hydrocarbons have made it appear undesirable to use the expression ” pre- ferential combustion ” or ” selective combustion ” in connexion with the facts just stated; but for the purpose of describing in brief the chemistry of a hydrocarbon flame it is necessary to say that in the inner cone of a Bunsen flame hydrogen and carbon monoxide are the result of the limited oxidation, and that the combustion of these gases with the external air generates the outer cone of the flame. As to the actual stages in the limited oxidation of a hydrocarbon a large amount of very valuable work has been carried out by W. A. Bone and his collaborators. Different hydrocarbons mixed with oxygen have been circulated continuously through a vessel heated to various temperatures, beginning with that (about 250 C.) at which the rate of oxidation is easily appreciable. Proceeding in this way, Bone, without effecting a complete transformation of the hydrocarbon into partially oxidized substances, has isolated large quantities of such products, and concludes that the oxidation of a hydrocarbon involves nothing in the nature of a selective or preferential oxidation of either the hydrogen or the carbon. He maintains that it occurs in several well-defined stages during which oxygen enters into and is incorporated with the hydrocarbon molecule, forming oxygenated intermediate products among which are alcohols and aldehydes. The reactions between ethane and ethylene with an equal volume of oxygen would be represented as follows : —

Stage 1. Stage 2.

CH 3 -CH 3 -^ CH 3 CH 2 OH — ? CH 3 -CH(OH) 2

Ethane. Ethyl alcohol. . * ,

1 — • , CH 3 -CHO + H 2

Acetaldehyde.

CH4 + CO I

C + 2H2 + CO \

HOCH : CH-OH

C 2 H 4 + H 2 > 2C + 2H2 + H2O \

CH 2 : CH 2

Ethylene.

-» CH 2 : CHOH

- >

< C 2 H 2 + H 2) 2CH 2 0 = 2CO + 2H 2

I 2C + H 2 + H 2 \ Formaldehyde.

The affinity between the hydrocarbon and oxygen at a high

temperature is so great that, when the supply of oxygen is sufficient to carry the oxidation as far as the second stage, practically no decomposition of the monohydroxy molecule formed in the first stage occurs. This is especially the case with unsaturated hydrocarbons.

As a crucial test decisive against the hypothesis of preferential carbon oxidation, Bone cites the experiment of firing a mixture of equal volumes of ethane and oxygen sealed up in a glass bulb. In such a case a lurid flame fills the vessel, accompanied by a black cloud of carbon particles and considerable condensation of water. About 10 % of methane is also found. It is impossible within the limits of this article to give a more extended account of these later researches on the oxidation of hydrocarbons. They make it evident that the relative oxidizability of carbon and hydrogen cannot form the basis of a general theory of the combustion of hydrocarbons, and that both the a

priori view that hydrogen is the more oxidizable element, and the inference from the behaviour of ethylene when exploded with its own volume of oxygen, viz. that carbon is the more oxidizable element in hydrocarbons, are not in harmony with experimental facts.

The view that the bright luminosity of hydrocarbon flames is due ” to the deposition of solid charcoal ” was first put forward by Sir Humphry Davy in 1816. In explaining the origin of this charcoal, Davy used somewhat ambiguous language, stating that it ” might be owing to a decomposition of a part of the gas towards the interior of the flame where the air was in smallest quantity.” This statement was interpreted commonly as implying that the charcoal became free by the preferential combustion of the hydrogen, and such an interpretation was given explicitly by Faraday. Whatever may have been Davy’s view with regard to this part of the;theory, his conclusion that finely divided carbon was the cause of luminosity in hydrocarbon flames was not questioned until 1867, when E. Frankland, in connexion with researches already alluded to, maintained that the luminosity of such flames was not due in any important degree to solid particles of carbon, but to the incandescence of dense hydrocarbon vapours. Among the arguments adduced against this view the most decisive is furnished by the optical test first used by J. L. Soret. If the image of the sun be focussed upon the glowing part of a hydrocarbon flame the scattered light is found to be polarized, and it is indisputable that the luminous region is pervaded by a cloud of finely divided solid matter. The quantity of this solid (estimated by H. H. C. Bunte to be o- 1 milligram in a coal-gas flame burning 5 cub. ft. per hour) is sufficient to account for the luminosity, so that Davy’s original view may be said to be now universally accepted.

The remaining question with regard to the luminosity of a hydrocarbon flame relates to the manner in which the carbon is set free. The fact- that hydrocarbons when strongly heated in absence of air will deposit carbon has long been known and is daily evident in the operation of coal-gas making, when gas carbon accumulates as a hard deposit in the highly-heated crown of the retorts. There is no difficulty in supposing therefore that the carbon in a flame is separated from the hydrocarbon within it by the purely thermal action of the blue burning walls of the flame. Many experiments might be adduced to confirm this view. It is sufficient to name two. If a ring of metal wire be so disposed in a small flame as to make a girdle within the blue walls towards the base, the withdrawal of heat is rapid enough to prevent the maintenance of a temperature sufficient to cause a separation of carbon, and the bright luminosity disappears. Again, if the flame of a Bunsen burner be fed through the air-ports not

with air but with some neutral gas such as nitrogen, carbon dioxide or steam, the dilution of the burning gas and the hydrocarbon within it becomes so great that the temperature of separation is not attained, no carbon is separated and the flame consists of a single blue shell.

Whilst it is thus easy to understand generally why carbon becomes separated as a solid within a flame, it is not easy to trace the processes by which the carbon becomes separated in the case of a given hydrocarbon. According to M. P. E. Berthelot, who made prolonged and elaborate researches on the

pyrogenetic relationships of hydrocarbons, these compounds only liberate carbon by a process of the continual coalescence of hydrocarbon molecules with the elimination of hydrogen, until there is left the limiting solid hydrocarbon hardly distin- guishable from carbon itself and constituting the glowing soot of flames.

V. B. Lewes, on the other hand, basing his conclusions on a study of the thermal decomposition of hydrocarbons, on tempera- ture measurements of flames and analysis of their gases, has more recently developed a theory of flame luminosity in which the formation and sudden exothermic decomposition of acetylene are regarded as the essential incidents productive of carbon separation and luminosity. Smithells has disputed the evidence on which this theory is based and it appears to have gained no adherence from those who have worked in the same field; but as it has not been formally disavowed by the author and has found its way into some text-books, it is mentioned here.

W. A. Bone and H. F. Coward (Journ. Chem. Soc, 1908) published the results of a very careful study of the decomposition of hydrocarbons when heated in a stationary condition and when continually circulated through hot vessels. Their results disclose once more the great difficulty of tracing the processes of decom- position and of arriving at a generalization of wide applicability, but they appear to be conclusive against the views both of Berthelot and of Lewes.

They do not think that the decomposition of hydrocarbons can be adequately represented by ordinary chemical equations owing to the complexity of the changes which really take place. Methane, which is the most stable of the hydrocarbons, appears to be resolved at high

temperatures directly into carbon and hydrogen, hut the phenomenon is dependent mainly on surface action; ethane, ethylene and acetylene undergo decomposition throughout the body of the gas (loc. til. p. 1197 et seq.).

” In the cases of ethane and ethylene it may be supposed that the primary effect of high temperature is to cause an elimination of hydrogen with a simultaneous loosening or dissolution of the bond between the carbon atoms, giving rise to (in the event of dissolution) residues such as : CH2 and • CH. These residues, which can only have a very fugitive separate existence, may either (a) form H 2 C : CH 2 and HC ; CH, as the result of encounters with other similar residues, or {b) break down directly into carbon and hydrogen, or © be directly hydrogenized to methane in an atmosphere rich in hydrogen. These three possibilities may all be realized simul- taneously in the same decomposing gas in proportions dependent on the temperature, pressure and amount of hydrogen present. The whole process may be represented by the following scheme, the dotted line indicating the tendency to dissolve a bond between the carbon atoms which becomes actually effective at higher tem- peratures : —

HiH ((a)C 2 H 4 + H 2

H-C : C-H = [20CH 2)+H 2]=] (6) 2C+2H 2 + H 2 H;H ((c) plus Ui = 2CH t

H H (W C 2 H 2 +H 2

“;” =-[2(;CH)+H 2] =) (b) 2C+H 2 +H 2 H-C:C-H ((c) plus 2H 2 = CH t .

” In the case of acetylene, the main primary change may be either one of polymerization or of dissolution according to the temperature, and if the latter, it may be supposed that the molecule breaks down across the triple bond between the carbon atoms, giving rise to 2(; CH), and that these residues are subsequently either resolved into carbon and hydrogen or ” hydrogenized ” according to circumstances, thus: —

H-OC-H =[2(:CH)] – j jg g+ 3 ˆ, = 2C H 4 . Polymerization.

” Acetylene is, moreover, distinguished by its power of poly- merization at moderate temperatures so that whether it is the gas initially heated or whether it is a prominent product of the decom- position of another hydrocarbon polymerization will occur to an extent dependent on temperature.”

We may describe briefly the view to which we are led as to the genesis of an ordinary luminous hydrocarbon flame: —

The gaseous hydrocarbon issues from the burner or wick, let us suppose, in a cylindrical column. This column is not sharply marked off from the air but is so penetrated by it that we must suppose a gradual transition from the pure hydrocarbon in the centre of column to the pure air on the outside. Let us

take a thin transverse slice of the flame, near the lower part of the wick or close to the burner tube. At what lateral distance from the centre will combustion begin ? Clearly, where enough oxygen has penetrated the column to give such partial combus- tion as takes place in the inner cone of a Bunsen burner. This then defines the blue region. Outside this the combustion of the carbon monoxide, hydrogen and any hydrocarbons which pass from the blue region takes place in a faintly luminous fringe. These two layers form a sheath of active combustion, surrounding and intensely heating the enclosed hydrocarbons in the middle of the column. These heated hydrocarbons rise and are heated to a higher temperature as they ascend. They are accordingly decomposed with separation of carbon in the higher parts of the flame, giving the region of bright yellow luminosity. There remains a central core in which neither is there any oxygen for combustion nor a sufficiently high tempera- ture to cause carbon separation. This constitutes the dark interior region of the flame. We thus account for the different parts of the flame. It is to be noted, however, that the bright blue layer only surrounds the lower part of the flame, whilst the pale, faintly-luminous fringe surrounds the whole flame. The flame also is conical and not cylindrical. The foregoing explanation is therefore not quite complete. Let us suppose that the changes have gone on in the small section of the flame exactly as described and consider how the processes will differ in parts above this section. The central core of unburned gases will pass upwards and we may treat it as a new cylindrical column which will undergo changes just as the original one, leaving, however, a smaller core of unburned gases, or, in other words, each succeeding section of the flame will be of smaller diameter. This gives us the conical form of the flame. Again, the higher we ascend the flame the greater proportionally is the amount of separated carbon, for we have not only the heat of laterally outlying combustion to effect decomposition, but also that of the lower parts of the flame. The lower part of a luminous flame accordingly contains less separated carbon than the upper. Where the hydrocarbon is largely decomposed before combustion we have no longer the conditions of the Bunsen flame, and so in the upper parts of a luminous flame the bright blue part

fades away. The luminous fringe would, however, be continued, for the separated hydrogen has still to burn. In this way then we may reasonably account for the existence, position and relative sizes of the four regions of an ordinary luminous flame. (A. S.)

FLAMEL, NICOLAS (c. 1330-1418), reputed French alchemist and scrivener to the university of Paris, was born in Paris or Pontoise about 1330, and died in Paris in 1418, bequeathing the bulk of his property to the church of Saint-Jacques-la-Boucherie, j where he was buried. During his life he contributed freely to charitable and religious purposes from the considerable wealth he amassed either by the practice of his craft, or, as some surmise without definite proof, by fortunate speculation or money lending, or, as legend has it, by alchemy. According to a docu- ment purporting to be written by himself in 1413 (printed in Waite's Lives of the Alchemystical Philosophers, London, 1888), there fell into his hands in 1357, at the cost of two florins, a book on alchemy by Abraham the Jew, which taught in plain words the transmutation of metals. It did not, however, explain the materia prima, but merely figured or depicted it, and for more than 20 years Flamel strove in vain to find out the secret. Then, returning from a journey to Spain, he fell in with a Christian Jew, named Canches, who gave him the explanationˆ and after three more years' work he succeeded in preparing the materia prima, thus being enabled in 1382 to transmute mercury into both silver and gold. But this fantastic story was disposed of by the facts, derived from parish records, set forth in Vilain's Essai sur I'histoire de Saint-J acques-la-Boucherie, 1758, and his Histoire critique de Nicolas Flamel et de Pernelle sa femme, recueillie d'actes anciens qui justifient I'origine et la midiocriti de leur fortune contre les imputations des alchimistes, 1761.

A book on alchemy in the ParisBibliotheque, Le Tresor de philo- sophie, professing to be written and illuminated by Flamel with his

own hand, is ui very doubtful authenticity, and other treatises bear- ing his name, such as the Sommaire philosophigue de Nicolas Flamel, published in 1561 in a collection of alchemist treatises entitled Trans- formation mitallique, are certainly spurious.

FLAMEN (from ./fare, " to blow up " the altar fire), a Roman sacrificial priest. The flamens were subject to the pontifex (q.v.)

maximus, and were consecrated to the service of some particular deity. The highest in rank were the flamen Dialis, flamen Martiaiis and flamen Quirinalis, who were always selected from among the patricians. Their institution is generally ascribed to Numa. When the number of flamens was raised from three to fifteen, those already mentioned were entitled tnajores, in contradistinction to the other twelve, who were called minores, as connected with less important deities, and were chosen from the plebs. Towards the end of the republic the number of the lesser flamens seems to have diminished. The flamens were held to be elected for life, but they might be compelled to resign office for neglect of duty, or on the occurrence of some ill-omened event (such as the cap falling off the head) during the performance of their rites. The characteristic dress of the flamens in general was the apex, a white conical cap, the laena or mantle, and a laurel wreath. The official insignia of the flamen Dialis (of Jupiter), the highest of these priests, were the white cap (pileus, albogalerus), at the top of which was an olive branch and a woollen thread; tne laena, a thick woollen toga praetexta woven by his wife; the sacrificial knife; and a rod to keep the people from him when on his way to offer sacrifice. He was never allowed to appear without these emblems of office, every day being considered a holy day for him. By virtue of his office he was entitled to a seat in the senate and a curule chair. The sight of fetters being forbidden him, his toga was not allowed to be tied in a knot but was fastened by means of clasps, and the only kind of ring permitted to be worn on his finger was a broken one. If a person in fetters took refuge in his house he was immediately loosed from his bonds; and if a criminal on his way to the scene of his punishment met him and threw himself at his feet he was respited for that day. The flamen Dialis was not allowed to leave the city for a single night, to ride or. even touch a horse (a restriction which incapacitated him for the consulship), to swear an oath, to look at an army, to touch any- thing unclean, or to look upon people working. His marriage, which was obliged to be performed with the ceremonies of confarreatio (q.v.), was dissoluble only by death, and on the death of his wife (called flaminica Dialis) he was obliged to resign his office. The flaminica Dialis assisted her husband at the sacrifices and other religious duties which he performed. She wore long woollen robes; a veil and a kerchief for the head, her hair being plaited up with a purple band in a conical form (tutulus); and shoes made of the leather of sacrificed animals; like her husband, she carried the sacrificial knife. The main duty of the flamens was the offering of daily sacrifices; on the 1st of October the three major flamens drove to the Capitol and sacrificed to Fides Publica (the Honour of the People). Some of the municipal towns in Italy had flamens as well as Rome.

We may mention, as distinct from the above, the flamen curialis, who assisted the curio, the priest who attended to the religious affairs of each curia (q.v.); the flamens of various sacerdotal corporations, such as the Arval Brothers; the. flamen Augustalis, who superintended the worship of the emperor in the provinces.

See Marquardt, Romiscke Staatsverwaltung, iii. (1885), PP- 3 2 ˆ- 33 6 > 473J H. Dessau, in Ephemeris epigraphica, iii. (1877); and the exhaustive article by C.Jullian in Daremberg and Saglio, Dictionnaire des antiquites.

FLAMINGO (Port. Flamingo, Span. Flamenco), one of the tallest and most beautiful birds, conspicuous for the bright flame-coloured or scarlet patch upon its wings, and long known by its classical name Phoenicopterus, as an inhabitant of most of the countries bordering the Mediterranean Sea. Flamingos have a very wide distribution, and the sole genus comprises only a few species. Ph. roseus or antiquorum, white, with a rosy tinge above, and with scarlet wing-coverts, while the remiges are black (as in all species), ranges from the Cape Verde Islands

to India and Ceylon, north as far as Lake Baikal; southwards through Africa and Madagascar, eventually as P. minor. P. ruber, entirely light vermilion, extends from Florida to Para and the Galapagos; P. chilensis s. ignipalliatus, from Peru to Patagonia, more resembles the classical species; while P. andinus, the tallest of all, which lacks the hallux, inhabits the salt lakes of the elevated desert of Atacama, whence it extends into Chile and Argentina. Fossil remains of flamingos have been described from the Lower Miocene of France as P. croizeti, and from the Pliocene of Oregon. From the Mid-Miocene to the Oligocene of France are known several species of Palaelodus, Elomis and Agnopterus, which have relatively shorter legs, longer toes and a complicated hypotarsus, and represent an earlier family, less specialized although not directly ancestral to the flamingos. Palaelodidae and Phoenicopteridae together form the larger group Phoenicopteri. These are in many respects exactly intermediate between Anserine and stork -like birds, so much so in fact that

The Flamingo.

T. H. Huxley preferred to keep them separate as Amphimorphae. However, if we carefully sift their characters, the flamingos obviously reveal themselves as much nearer related to the Ciconiae, especially to Platalea and Ibis, than to the Anseres. This is the opinion arrived at by W. F. R. Weldon, M. Fuerbringer and Gadow, while others prefer the

goose-like voice and the webbed toes as reliable characters. (For a detailed analysis of this instructive question see Bronn's Thierreich, Aves Syst. p. 146.)

The food of the flamingo seems to consist chiefly of small aquatic invertebrate animals which live in the mud of lagoons, for instance Mollusca, but also of Confervae and other low salt-water algae. Whilst feeding, the bird wades about, stirs up the mud with its feet, and, reversing the ordinary position of its head so as to hold the crown downwards and to look backwards, sifts the mud through its bill. This is abruptly bent down in the middle, as if broken; the upper jaw is rather flat and narrow, while the lower jaw is very roomy and furnished with numerous lamellae, which, together wi'h the thick and

large tongue, act like a sieve, an arrangement enhanced by the considerable movability of the upper jaw. Then the bird erects its long neck to swallow the selected food. When flying, flamingos present a striking and beautiful sight, with legs and neck stretched out straight, looking like white and rosy or scarlet crosses with black arms. Not less fascinating is a flock of these sociable birds when at rest, standing on one or both legs, with their long necks twisted or coiled upon the body in any conceiv- able position.

The nest is likewise peculiar. It is built of mud, a somewhat conical structure rising above the water according to the depth, of which the cone is from a few inches to 2 ft. in height. If, as often happens, the water-level sinks, the nests stand out higher. On the top is a shallow cup for the reception of the one or two eggs, which have a bluish-white shell with chalky incrustation. Of course the hen sits with her legs doubled up under her, as does any other long-legged bird. It seems strange that many ornithologists should have given credence to W. Dampier's statement of the mode of incubation (New Voyage round the World, ed. 2, i. p. 71, London, 1699): " And when they lay their eggs, or hatch them, they stand all the while, not on the hillock, but close by it with their legs on the ground and in the water, resting themselves against the hillock, and covering the hollow nest upon it with their rumps," &c. P. S. Pallas (Zoograph. Rosso- Asiatica, ii. p. 208) tried to improve upon this by stating that the standing bird leans upon the nest with its breast ! The young, which are hatched after about four weeks' incubation, look very different from the adult. The small bill is still quite straight and the legs are short. The whole body

is covered with a thick coat of short nestling feathers, pure white in colour. These neossoptiles or first feathers bear no resemblance to those of the Anseriform birds, but agree in detail with those of spoonbills, the young of which the little flamingos resemble to a striking extent, but they leave the nest soon after their birth to shift for themselves like ducks and geese. (H. F. G.)

FLAMINIA, VIA, an ancient high road of Italy, constructed by C. Flaminius during his censorship (220 B.C.). It led from Rome to Ariminum, and was the most important route to the north. We hear of frequent improvements being made in it during the imperial period. Augustus, when he instituted a general restoration of the roads of Italy, which he assigned for the purpose among various senators, reserved the Flaminia for himself, and rebuilt all the bridges except the Pons Mulvius, by which it crosses the Tiber, 2 m. N. of Rome (built by M. Scaurus in 109 B.C.), and an unknown Pons Minucius. Triumphal arches were erected in his honour on the former bridge and at Ariminum, the latter of which is still preserved. Vespasian constructed a new tunnel through the pass of Intercisa, modern Furlo, in a.d. 77 (see Cales), and Trajan, as inscriptions show, repaired several bridges along the road.

The Via Flaminia runs due N. from Rome, considerable remains of its pavement being extant in the modern high road, passing slightly E. of the site of the Etruscan Falerii, through Ocriculi and Narnia. Here it crossed the Nar by a splendid four-arched bridge to which Martial alludes (Epigr. vii. 93, 8), one arch of which and all the piers are still standing; and went on, followed at first by the modern road to Sangemini which passes over two finely preserved ancient bridges, past Carsulae to Mevania, and thence to Forum Flaminii. Later on a more circuitous route from Narnia to Forum Flaminii was adopted, passing by Interamna, Spoletium and Fulginium (from which a branch diverged to Perusia), and increasing the distance by 12 m. The road thence went on to Nuceria (whence a branch road ran to Septempeda and thence either to Ancona or to Tolentinum and Urbs Salvia) and Helvillum, and then crossed the main ridge of the Apennines, a temple of Jupiter Apenninus standing at the summit of the pass. Thence it descended to Cales (where it turned N.E.), and through the pass of Intercisa to Forum Sempronii (Fossombrone) and Forum Fortunae, where it reached the coast of the Adriatic. Thence it ran N.W. through Pisaurum to Ariminum. The total distance from Rome was 210 m. by the older road and 222 by the newer. The road

gave its name to a juridical district of Italy from the 2nd century a.d. onwards, the former territory of the Senones, which was at first

associated with Umbria (with which indeed under Augustus it had formed the sixth region of Italy), but which after Constantine was always administered with Picenum. (T. As.)

FLAMININUS, TITUS QUINCTIUS (c. 228-174 B.C.), Roman general and statesman. He began his public life as a military tribune under M. Claudius Marcellus, the conqueror of Syracuse. In 199 he was quaestor, and the next year, passing over the regular stages of aedile and praetor, he obtained the consulship.

Flamininus was one of the first and most successful of the rising school of Roman statesmen, the opponents of the narrow patriotism of which Cato was the type, the disciples of Greek culture, and the advocates of a wide imperial policy. His winning manners, his polished address, his knowledge of men, his personal fascination, and his intimate knowledge of Greek, all marked him out as the fittest representative of Rome in the East. Accordingly, the province of Macedonia, and the conduct of the war with Philip V. of Macedon, in which, after two years, Rome had as yˆt gained little advantage, were assigned to him. Flamininus modified both the policy and tactics of his pre- decessors. After an unsuccessful attempt to come to terms, he drove the Macedonians from the valley of the Aous by skilfully turning an impregnable' position. Having thus practically made himself master of Macedonia, he proceeded to Greece, where Philip still had allies and supporters. The Achaean League (q.v.) at once deserted the cause of Macedonia, and Nabis, the tyrant of Sparta, entered into an alliance with Rome; Acarnania and Boeotia submitted in less than a year, and, with the exception of the great fortresses, Flamininus had the whole of Greece under his control. The demand of the Greeks for the expulsion of Macedonian garrisons from Demetrias, Chalcis and Corinth, as the only guarantee for the freedom of Greece, was refused, and negotiations were broken off. Hostilities were renewed in the spring of 197, and Flamininus took the field supported by nearly the whole of Greece. At Cynoscephalae the Macedonian phalanx and the Roman legion for the first time met in open fight, and the day decided which nation was to be master of Greece and perhaps of the world. It was a victory of superior tactics. The left wing of the Roman army was retiring in confusion before the Macedonian right led by Philip in person, when Flamininus, leaving them to their fate, boldly charged the left wing under Nicanor, which was forming on the heights. Before the left wing had time to form, Flamininus was upon them, and a massacre rather than a fight ensued. This defeat was turned into a general rout by a nameless tribune, who collected twenty companies and charged in the rear the victorious Macedonian phalanx, which in its pursuit had left the Roman right far behind.

Macedonia was now at the mercy of Rome, but Flamininus contented himself with his previous demands. Philip lost all his foreign possessions, but retained his Macedonian kingdom almost entire. He was required to reduce his army, to give up all his decked ships except five, and to pay an indemnity of 1000 talents (£244,000). Ten commissioners arrived from Rome to regulate the final terms of peace, and at the Isthmian games a herald proclaimed to the assembled crowds that " the Roman people, and T. Quinctius their general, having conquered King Philip and the Macedonians, declare all the Greek states which had been subject to the king henceforward free and independent." Flamininus's last act before returning home was characteristic. Of the Achaeans, who vied with one another in showering upon him honours and rewards, he asked but one personal favour, the redemption of the Italian captives who had been sold as slaves in Greece during the Hannibalic War. These, to the number of 1200, were presented to him on the eve of his departure (spring, 194), and formed the chief ornament of his triumph.

In 192, on the rupture between the Romans and Antiochus III. the Great, Flamininus returned to Greece, this time as the civil representative of Rome. His personal influence and skilful diplomacy secured the wavering Achaean states, cemented the alliance with Philip, and contributed mainly to the Roman

victory at Thermopylae (191). In 183 he undertook an embassy to Prusias, king of Bithynia, to induce him to deliver up Hannibal, who forestalled his fate by taking poison. Nothing more is known of Flamininus, except that, according to Plutarch, his end was peaceful andjiappy.

There seems no doubt that Flamininus was actuated by a genuine love of Greece and its people. To attribute to him a Machiavellian policy, which foresaw the overthrow of Corinth fifty years later and the conversion of Achaea into a Roman province, is absurd and disingenuous. There is more force in the charge that his Hellenic sympathies prevented him from seeing the innate weakness and mutual jealousies of the Greek states of that period, whose only hope of peace and safety lay in submitting to the protectorate of the Roman republic. But if the event proved that the liberation of Greece was a political mistake, it was a noble and generous mistake, and reflects nothing but honour on the name of Flamininus, " the liberator of the Greeks."

His life has been written by Plutarch, and in modern times by F. D. Gerlach (1871) ; see also Mommsen, Hist, of Rome (Eng. tr.), bk. Hi. chs. 8, 9.

FLAMINIUS, GAIUS, Roman statesman and general, of plebeian family. During his tribuneship (232 B.C.), in spite of the determined opposition of the senate and his own father, he carried a measure for distributing among the plebeians the ager Gallicus Picenus, an extensive tract of newly-acquired territory to the south of Ariminum (Cicero, De senectute, 4, Brutus, 14). As praetor in 227, he gained the lasting gratitude of the people of his province (Sicily) by his excellent administration. In 223, when consul with P. Furius Philus, he took the field against the Gauls, who were said to have been roused to war by his agrarian law. Having crossed the Po to punish the Insubrians, he at first met with a severe check and was forced to capitulate. Reinforced by the Cenomani, he gained a decisive victory on the banks of the Addua. He had previously been recalled by the optimates, but ignored the order. The victory seems to have been due mainly to the admirable discipline and fighting qualities of the soldiers, and he obtained the honour of a triumph only after the decree of the senate against it had been overborne by popular clamour. During his censorship (220) he strictly limited the freedmen to the four city tribes (see Comitia). His name is further associated with two great works. He erected the Circus Flaminius on the Campus Martius, for the accommoda- tion of the plebeians, and continued the military road from Rome to Ariminum, which had hitherto only reached as far as Spoletium (see Flaminia, Via). He probably also instituted the ” plebeian ” games. In 218, as a leader of the democratic opposition, Flaminius was one of the chief promoters of the measure brought in by the tribune Quintus Claudius, which prohibited senators and senators’ sons from possessing sea-going vessels, except for the transport of the produce of their own estates, and generally debarred them from all commercial speculation (Livy xxi. 63). His effective support of this measure vastly increased the popularity of Flaminius with his own order, and secured his second election as consul in the following year (217), shortly after the defeat of T. Sempronius Longus at the Trebia. He hastened at once to Arretium, the termination of the western high road to the north, to protect the passes of the Apennines, but was defeated and killed at the battle of the Trasimene lake (see Punic Wars).

The testimony of Livy (xxi., xxii.) and Polybius (ii., iii.)— no friendly critics — shows that Flaminius was a man of ability, energy and probity. A popular and successful democratic leader, he cannot, however, be ranked among the great statesmen of the republic. As a

general he was headstrong and self- sufficient and seems to have owed his victories chiefly to personal boldness favoured by good fortune.

His son, Gaius Flaminius, was quaestor under P. Scipio Africanus the elder in Spain in 210, and took part in the capture of New Carthage. Fourteen years later, when curule aedile, he distributed large quantities of grain among the citizens at a very low price. In 193, as praetor, he carried on a successful war

against the insubordinate populations of his recently constituted province of Hispania Citerior. In 187 he was consul with M. Aemilius Lepidus, and subjugated the warlike Ligurian tribes. In the same year the branch of the Via Aemilia connecting Bononia with Arretium was constructed by him. In 181 he founded the colony of Aquileia. The chief authority for his life is the portion of Livy dealing with the history of the period.

FLAMSTEED, JOHN (1646-1719), English astronomer, was born at Denby, near Derby, on the 19th of August 1646. The only son of Stephen Flamsteed, a maltster, he was educated at the free school of Derby, but quitted it finally in May 1662, in consequence of a rheumatic affection of the joints, due to a chill caught while bathing. Medical aid having proved of no avail, he went to Ireland in 1665 to be ” stroked ” by Valentine Greatrakes, but ” found not his disease to stir.” Meanwhile, he solaced his enforced leisure with astronomical studies. Begin- ning with J. Sacrobosco’s De sphaera, he read all the books on the subject that he could buy or borrow; observed a partial solar eclipse on the 12th of September 1662; and attempted the construction of measuring instruments. A tract on the equation of time, written by him in 1667, was published by Dr John Wallis with the Posthumous Works of J. Horrocks (1673); and a paper embodying his calculations of appulses to stars by the moon, which appeared in the Philosophical Transactions (iv. 1099), signed In Mathesi a sole fundes, an anagram of ” Johannes Flamsteedius,” secured for him, from 1670, general scientific recognition.

On his return from a visit to London in 1670 he became acquainted with Isaac Newton at Cambridge, entered his name at Jesus college, and took, four years later, a degree of M.A. by letters-patent. An essay composed by him in 1673 on the true and apparent diameters of the planets furnished Newton with data for the third book of the Principia, and he fitted numerical elements to J. Horrocks’s theory of the moon. In 1674, and again in 1675, he was invited to London by

Sir Jonas Moore, governor of the Tower, who proposed to establish him in a private observatory at Chelsea, but the plan was anticipated by the determination of Charles II. to have the tables of the heavenly bodies corrected, and the places of the fixed stars rectified ” for the use of his seamen,” and Flamsteed was ap- pointed ” astronomical observator ” by a royal warrant dated 4th of March 1675. His salary of £100 a year was cut down by taxation to £90; he had to provide his own instruments, and to instruct, into the bargain, two boys from Christ’s hospital. Sheer necessity drove him, in addition, to take many private pupils; but having been ordained in 1675, he was presented by Lord North in 1684 to the living of Burstow in Surrey; and his financial position was further improved by a small inheritance on his father’s death in 1688. He now ordered, at an expense of £120, a mural arc from Abraham Sharp, with which he began to observe systematically on the 12th of September 1689 (see Astronomy: History). The latter part of Flamsteed’s life passed in a turmoil of controversy regarding the publication of his results. He struggled to withhold them until they could be presented in a complete form; but they were urgently needed for the progress of science, and the astronomer-royal was a public servant. Sir Isaac Newton, who depended for the perfecting of his lunar theory upon ” places of the moon ” reluctantly doled out from Greenwich, led the movement for immediate communication; whence arose much ill-feeling between him and Flamsteed. At last, in 1704, Prince George of Denmark undertook the cost of printing; a committee of the Royal Society was appointed to arrange preliminaries, and Flamsteed, protesting and exasperated, had to submit. The work was only partially through the press when the prince died, on the 28th of October 1708, and its completion devolved upon a board of visitors to the observatory endowed with ample powers by a royal order of the 12th of December 1712. As the upshot, the Historia coelestis, embodying the first Greenwich star-catalogue, together with the mural arc observations made 1689-1705, was issued under Edmund Halley’s editorship in 171 2. Flamsteed denounced the production as surreptitious; he committed to

the flames three hundred copies, of which he obtained possession through the favour of Sir Robert Walpole; and, in defiance of bodily infirmities, vigorously prosecuted his designs for the entire and adequate publication of the materials he continued to accumulate. They were but partially executed when he died on the 31st of

December 17 19. The preparation of his monu- mental work, Hisioria coeleslis Britannica (3 vols, folio, 1725), was finished by his assistant, Joseph Crosthwait, aided by Abraham Sharp. The first two volumes included the whole of Flamsteed's observations at Derby and Greenwich; the third contained the British Catalogue of nearly 3000 stars. Numerous errors in this valuable record having been detected by Sir William Herschel, Caroline Herschel drew up a list of 560 stars observed, but not catalogued, while in of those catalogued proved to have never been observed {Phil. Trans, lxxxvii. 293; see also F. Baily, Memoirs Roy. A sir. Society, iv. 129). The appearance of the Atlas coeleslis, corresponding to the British Catalogue, was delayed until 1729. A portrait of Flamsteed, painted by Thomas Gibson in 1712, hangs in the rooms of the Royal Society. The extent and quality of his performance were the more remark- able considering his severe physical sufferings, his straitened means, and the antagonism to which he was exposed. Estimable in private life, he was highly susceptible in professional matters, and hence failed to keep on terms with his contemporaries.

Francis Baily 's Account of the Rev. John Flamsteed (1835) is the leading authority for his life. It comprises an autobiographical narrative pieced together from various sources, a large collection of Flamsteed's letters, a revised and enlarged edition of the British Catalogue, besides authoritative and detailed introductory dis- cussions. Some clamour was raised by a publication in which blame for harsh dealings was freely imputed to Newton, but W. Whewell vindicated his character in Flamsteed and Newton (1836).

See also General Dictionary, vol. v. (1737), from materials supplied by James Hodgson, Flamsteed's nephew-in-law ; Biographia Britan- nica, iii. 1943 (1750); S. Rigaud's Correspondence of Scientific Men; Cunningham's Lives of Eminent Englishmen, iv. 366 (1835); Mark Noble's Continuation of James Granger's Biog. Hist, of England, ii. 132; R. Grant's Hist, of Phys. Astronomy, p. 467; W. Whewell's Hist, of the Inductive Sciences, ii. 162; J. S. Bailly's Hist, de I'astronomie moderne, ii. 423, 589, 650; J. Delambre's Hist, de Vastronomie au XV IIP siecle, p. 93; Observatory, xv. 355, 379, 382. (A. M. C.)

FLANDERS (Flem. Vlaanderen), a territorial name for part of the Netherlands, Europe. Originally it applied only to Bruges and the immediate neighbourhood. In the 8th and 9th centuries it was gradually extended to the whole of the coast region from Calais to the Scheldt. In the middle ages this was divided into two parts, one looking to Bruges as its capital, and the other to Ghent. The name is retained in the two Belgian provinces of West and East Flanders.

1. West Flanders is the portion bordering the North Sea, and its coast-line extends from the French to the Dutch frontier for a little over 40 m. Its capital is Bruges, and the principal towns of the province are Ostend, Courtrai, Ypres and Roulers. Agri- culture is the chief occupation of the population, and the country is under the most careful and skilful cultivation. The admiration of the foreign observer for the Belgian system of market gardening is not diminished on learning that the subsoil of most of this tract is the sand of the " dunes." Fishing employs a large proportion of the coast population. The area of West Flanders is officially computed at 808,667 acres or 1 263 sq. m. In 1904 the population was 845,732, giving an average of 669 to the sq. m.

2. East Flanders lies east and north-east of the western province, and extends northwards to the neighbourhood of Antwerp. It is still more productive and richer than Western Flanders, and is well watered by the Scheldt. The district of Waes, land entirely reclaimed within the memory of man, is supposed to be the most productive district of its size in Europe. The principal towns are Ghent (capital of the province), St Nicolas, Alost, Termonde, Eecloo and Oudenarde. The area is given at 749,987 acres or 1172 sq. m. In 1904 the population was 1,073,507, showing an average of 916 per sq. m.

History. — The ancient territory of Flanders comprised not only the modern provinces known as East and West Flanders, but the southernmost portion of the Dutch province of Zeeland

and a considerable district in north-western France. In the time of Caesar it was inhabited by the Morini, Atrebates and other Celtic tribes, but in the centuries that followed the land was repeatedly overrun by German invaders, and finally became a part of the dominion of the Franks. On the break-up of the Carolingian empire the river Scheldt was by the treaty of Verdun (843) made the line of division between the kingdom of East Francia (Austrasia) under the emperor Lothaire, and the kingdom of West Francia (Neustria) under Charles the Bald. In virtue of this compact Flanders was henceforth attached to the West Frankish monarchy (France) . It thus acquired a position unique among the provinces of the territory known in later times as the Netherlands, all of which were included in that northern part of Austrasia assigned on the death of the emperor Lothaire (855) to King Lothaire II., and from his name called Lotharingia or Lorraine.

The first ruler of Flanders of whom history has left any record is Baldwin, surnamed Bras-de-fer (Iron-arm). This man, a brave and daring warrior under Charles the Bald, fell in love with the king's

daughter Judith, the youthful widow of two English kings, married her, and fled with his bride to Lorraine. Charles, though at first very angry, was at last conciliated, and made his son-in-law margrave {Marchio Flandriae) of Flanders, which he held as an hereditary fief. The Northmen were at this time continually devastating the coast lands, and Baldwin was entrusted with the possession of this outlying borderland of the west Frankish dominion in order to defend it against the invaders. He was the first of a line of strong rulers, who at some date early in the 10th century exchanged the title of margrave for that of count. His son, Baldwin II. — the Bald — from his strong- hold at Bruges maintained, as did his father before him, a vigorous defence of his lands against the incursions of the North- men. On his mother's side a descendant of Charlemagne, he strengthened the dynastic importance of his family by marrying Aelfthryth, daughter of Alfred the Great. On his death in 918 his possessions were divided between his two sons Arnulf the Elder and Adolphus, but the latter survived only a short time and Arnulf succeeded to the whole inheritance. His reign was filled with warfare against the Northmen, and he took an active part in the struggles in Lorraine between the emperor Otto I. and Hugh Capet. In his old age he placed the government in the hands of Baldwin, his son by Adela, daughter of the count of Vermandois, and the young man, though his reign was a very short one, did a great deal for the commercial and industrial progress of the country, establishing the first weavers and fullers at Ghent, and instituting yearly fairs at Ypres, Bruges and other places.

On Baldwin III.'s death in 961 the old count resumed the control, and spent the few remaining years of his life in securing the succession of his grandson Arnulf II. — the Younger. The reign of Arnulf was terminated by his death in 989, and he was followed by his son Baldwin IV., named Barbatus or the Bearded. This Baldwin fought successfully both against the Capetian king of France and the emperor Henry II. Henry found himself obliged to grant to Baldwin IV. in fief Valenciennes, the bur- graveship of Ghent, the land of Waes, and Zeeland. The count of Flanders thus became a feudatory of the empire as well as of the French crown. The French fiefs are known in Flemish history as Crown Flanders (Kroon- Vlaanderen), the German fiefs as Imperial Flanders (Rijks-Vlaanderen). Baldwin's son — afterwards Baldwin V.— rebelled in 1028 against his father at the instigation of his wife Adela, daughter of Robert II. of France; but two years later peace was sworn at Oudenaarde, and the old count continued to reign till his death in 1036. Baldwin V. proved a worthy successor, and acquired from the people the surname of Dtbonnaire. He was an active enter- prising man, and greatly extended his power by wars and

alliances. He obtained from the emperor Henry IV. the territory between the Scheldt and the Dender as an imperial fief, and the margraviate of Antwerp. So powerful had he become that the Flemish count on the decease of Henry I. of France in 1060 was appointed regent during the minority of Philip I. (see

France). Before his death he saw his eldest daughter Matilda (d. 1083) sharing the English throne with William the Conqueror, his eldest son Baldwin of Mons in possession of Hainaut in right of his wife Richilde, heiress of Regnier V. (d. 1036) and widow of Hermann of Saxony (d. 1050/1) (see Hainaut), and his second son Robert the Frisian regent (voogd) of the county of Holland during the minority of Dirk V., whose mother, Gertrude of Saxony, widow of Floris I. of Holland (d. 1061), Robert had married (see Holland). On his death in 1067 his son Baldwin of Mons, already count of Hainaut, succeeded to the countship of Flanders. Baldwin V. had granted to Robert the Frisian on his marriage in 1063 his imperial fiefs. His right to these was disputed by Baldwin VI., and war broke out between the two brothers. Baldwin was killed in battle in 1070. Robert now claimed the tutelage of Baldwin's children and obtained the support of the emperor Henry IV., while Richilde, Baldwin's widow, appealed to Philip I. of France. The contest was decided at Ravenshoven, near Cassel, on the 22nd of February 1071, where Robert was victorious. Richilde was taken prisoner and her eldest son Arnulf III. was slain. Robert obtained from Philip I. the investiture of Crown Flanders, and from Henry IV. the fiefs which formed Imperial Flanders.

The second son of Richilde was recognized as count of Hainaut (see Hainaut), which was thus after a brief union separated from Flanders. Robert died in 1093, and was succeeded by his son Robert II., who acquired great renown by his exploits in the first crusade, and won the name of the Lance and Sword of Christendom. His fame was second only to that of Godfrey of Bouillon. Robert returned to Flanders in n 00. He fought with his suzerain Louis the Fat of France against the English, and was drowned in 1 1 1 1 by the breaking of a bridge. His son and successor, Baldwin VII., or Baldwin with the Axe, also fought against the English in France. He died at the age of twenty-seven from the wound of an arrow, in 11 19, leaving no heir. He nominated as his successor his cousin Charles, son of Knut IV. of Denmark and of Adela, daughter of Robert the Frisian. Charles tried his utmost to put down oppression and to promote the welfare of his subjects, and obtained

the surname of ” the Good.” His determination to enforce the right made him many enemies, and he was foully murdered on Ash Wednesday, 11 27, at Bruges. He died childless, and there were no less than six candidates to the countship. The contest lay between two of these, William Clito, son of Robert of Normandy and grandson of William the Cnqueror and Matilda of Flanders, and Thierry or Dirk of Aisace, whose mother Gertrude was a daughter of Robert the Frisian. William Clito, through the support of Louis of France, was at first accepted by the Flemish nobles as count, but he gave offence to the com- munes, who supported Thierry. A struggle ensued and William was killed before Alost. Thierry then became count without further opposition. He married the widow of Charles the Good, Marguerite of Clermont, and proved himself at home a wise and prudent prince, encouraging the growth of popular liberty and of commerce. In 1146 he took part in the second crusade and distinguished himself by his exploits. In n 57 he resigned the countship to his son Philip of Alsace and betook himself once more to Jerusalem. On his return from the East twenty years later Thierry retired to a monastery to die in his own land.

Count Philip of Alsace was a strong and able man. He did much to promote the growth of the municipalities for which Flanders was already becoming famous. Ghent, Bruges, Ypres, Lille and Douai under him made much progress as nourishing industrial towns. He also conferred rights and privileges on a number of ports, Hulst, Nieuwport, Sluis, Dunkirk, Axel, Damme, Gravelines and others. But while encouraging the development of the communes and ” free towns,” Philip sternly repressed any spirit of independence or attempted uprisings against his authority. This count was a powerful prince. He acted for a time as regent in France during the minority of his godson Philip Augustus, and married his ward to his niece Isabella of Hainaut (1180). Philip took part in the third

crusade, and died in the camp before Acre of the pestilence in 1191.

As he had no children, the succession passed to Baldwin of Hainaut, who had married Philip’s sister Margaret. The count- ships of Flanders and Hainaut were thus united under the same ruler. Baldwin did not obtain possession of Flanders without strong opposition on the part of the French king, and he was obliged to cede Artois, St Omer, Lens, Hesdin and a great part of southern Flanders to France, and to allow Matilda of Portugal, the widow of Philip of Alsace, to retain certain towns in right of her dowry. Margaret died in 1194 and Baldwin the following year, and their eldest son Baldwin IX. succeeded to both count- ships. Baldwin IX. is famous in history as the founder of the

Latin empire at Constantinople. He perished in Bulgaria in 1206. The emperor's two daughters were both under age, and the government was carried on by their uncle Philip, marquess of Namur, whom Baldwin had appointed regent on his departure to Constantinople. Philip proved faithless to his charge, and he allowed his nieces to fall into the hands of Philip Augustus, who married the elder sister Johanna of Constantinople to his nephew Ferdinand of Portugal. The Flemings were averse to the French king's supremacy, and Ferdinand, who acted as governor in the name of his wife, joined himself to the confederacy formed by Germany, England, and the leading states of the Netherlands against Philip Augustus. Ferdinand was, however, taken prisoner at the disastrous battle of Bouvines (1214) and was kept for twelve years a prisoner in the Louvre. The countess Johanna ruled the united countships with prudence and courage. On Ferdinand's death she married Thomas of Savoy, but died in 1244, leaving no heirs. She was succeeded in her dignities by her younger sister Margaret of Constantinople, commonly known amongst her contemporaries as " Black Meg " (Zwarte Griet). Margaret had been twice married. Her first husband was (1212) Buchard of Avesnes, one of the first of Hainaut's nobles and a man of knightly prowess, but originally destined for the church. On this ground he was excommunicated by Innocent III. and imprisoned by the countess Johanna, with the result that Margaret at last was driven to repudiate him. She married in second wedlock (1225) William of Dampierre. Two sons were the issue of the first marriage, three sons and three daughters of the second.

When Margaret in 1244 became countess of Flanders and Hainaut, she wished her son William of Dampierre to be acknow- ledged as her successor. John of Avesnes, her eldest son, strongly protested against this and was supported by the French king. A civil war ensued, which ended in a compromise (1246), the succession to Flanders being granted to William of Dampierre, that of Hainaut to John of Avesnes. Margaret, however, ruled with a strong hand for many years and survived both her sons, dying at the age of eighty in 1280. On her death her grandson, John II. of Avesnes, became count of Hainaut : Guy of Dampierre, her second son by her second marriage, count of Flanders.

The two counties were once more under separate dynasties. The government of Guy of Dampierre was unfortunate. It was the interest of the Flemish weavers to be on good terms with England, the wool-producing country, and Guy entered into an alliance with Edward I. against France. This led to an invasion and conquest of Flanders by Philip the Fair. Guy with his sons and the leading Flemish nobles were

taken prisoners to Paris, and Flanders was ruled as a French dependency. But though in the principal towns, Ghent, Bruges and Ypres, there was a powerful French faction — known as Leliaerts (adherents of the lily) — the arbitrary rule of the French governor and officials stirred up the mass of the Flemish people to rebellion. The anti-French partisans (known as Clauwaerts) were strongest at Bruges under the leadership of Peter de Conync, master of the cloth-weavers, and John Breydel, master of the butchers. The French garrison at Bruges were massacred (May 19th, 1302), and on the following nth of July a splendid French army of invasion was utterly defeated near Courtray. Peace was con- cluded in 1305, but owing to Guy of Dampierre, and the leading Flemish nobles being in the hands of the French king, on terms

very disadvantageous to Flanders. Very shortly afterwards the aged count Guy died, as did also Philip the Fair. Robert of Bethune, his son and successor, had continual difficulties with France during the whole of his reign, the Flemings offering a stubborn resistance to all attempts to destroy their independence. Robert was succeeded in 1322 by his grandson Louis of Nevers. Louis had been brought up at the French court, and had married Margaret of France. His sympathies were entirely French, and he made use of French help in his contests with the communes.

Under Louis of Nevers Flanders was practically reduced to the status of a French province. In his time the long contest between Flanders and Holland for the possession of the island of Zeeland was brought to an end by a treaty signed on the 6th of March 13 2 3 > by which West Zeeland was assigned to the count of Holland, the rest to the count of Flanders. The latter part of the reign of Louis of Nevers was remarkable for the successful revolt of the Flemish communes, now rapidly advancing to great material prosperity under Jacob van Artevelde (see Artevelde, Jacob van). Artevelde allied himself with Edward III. of England in his contest with Philip of Valois for the French crown, while Louis of Nevers espoused the cause of Philip. He fell at the battle of Crecy (1346). He was followed in the countship by his son Louis II. of Male. The reign of this count was one long struggle with the communes, headed by the town of Ghent, for political supremacy. Louis was as strong in his French sympathies as his father, and relied upon French help in enforcing his will upon his refractory subjects, who resented his arbitrary methods of government, and the

heavy taxation imposed upon them by his extravagance and love of display. Had the great towns with their organized gilds and great wealth held together in their opposition to the count's despotism, they would have proved successful, but Ghent and Bruges, always keen rivals, broke out into open feud. The power of Ghent reached its height under Philip van Artevelde (see Artevelde, Philip van) in 1382. He defeated Louis, took Bruges and was made ruward of Flanders. But the triumph of the White Hoods, as the popular party was called, was of short duration. On the 27th of November 1382 Artevelde suffered a crushing defeat from a large French army at Roosebeke and was himself slain. Louis of Male died two years later, leaving an only daughter Margaret, who had married in 1369 Philip the Bold, duke of Burgundy.

Flanders now became a portion of the great Burgundian domain, which in the reign of Philip the Good, Margaret's grandson, had absorbed almost the whole of the Netherlands (see Burgundy; Netherlands). The history of Flanders as a separate state ceases from the time of the acquisition of the countship by the Burgundian dynasty. There were revolts from time to time of great towns against the exactions even of these powerful princes, but they wers in vain. The conquest and humiliation of Bruges by Philip the Good in 1440, and the even more relentless punishment inflicted on rebellious Ghent by the emperor Charles V. exactly a century later are the most remarkable incidents in the long-continued but vain struggle of the Flemish communes to maintain and assert their privileges. The Burgundian dukes and their successors of the house of Habsburg were fully alive to the value to them of Flanders and its rich commercial cities. It was Flanders that furnished to them no small part of their resources, but for this very reason, while fostering the development of Flemish industry and trade, they were the more determined to brook no opposition which sought to place restrictions upon their authority.

The effect of the revolt of the Netherlands and the War of Dutch Independence which followed was ruinous to Flanders. Albert and Isabel on their accession to the sovereignty of the southern Netherlands in 1599 found " the great cities of Flanders and Brabant had been abandoned by a large part of their in- habitants; agriculture hardly in a less degree than commerce and industry had been ruined." In 1633 with the death of Isabel, Flanders reverted to Spanish rule (1633). By the treaty of Munster the north-western portion of Flanders, since known as States (or Dutch) Flanders, was ceded by Philip IV. to the United Provinces (1648). By a succession of later treaties — of

the Pyrenees (1659), Aix-la-Chapelle (1668), Nijmwegen (1679) and others— a large slice of the southern portion of the old county of Flanders became French territory and was known as French Flanders.

From 1795 to 1814 Flanders, with the rest of the Belgic provinces, was incorporated in France, and was divided into two departments — departement de I'Escaut and departement de la Lys. This division has since been retained, and is represented by the two provinces of East Flanders and West Flanders in the modern kingdom of Belgium. The title of count of Flanders was revived by Leopold I. in 1840 in favour of his second son, Philip Eugene Ferdinand (d. 1905). (G. E.)

FLANDRIN, JEAN HIPPOLYTE (1809-1864), French painter, was born at Lyons in 1809. His father, though brought up to business, had great fondness for art, and sought himself to follow an artist's career. Lack of early training, however, disabled him for success, and he was obliged to take up the precarious occupation of a miniature painter. Hippolyte was the second of three sons, all painters, and two of them eminent, the third son Paul (b. 181 1) ranking as one of the leaders of the modern landscape school of France. August© (1804-1842), the eldest, passed the greater part of his life as professor at Lyons, where he died. After studying for some time at Lyons, Hippolyte and Paul, who had long determined on the step and economized for it, set out to walk to Paris in 1829, to place themselves under the tuition of Hersent. They chose finally to enter the atelier. of Ingres, who became not only their instructor but their friend for life. At first considerably hampered by poverty, Hippolyte's difficulties were for ever removed by his taking, in 1832, the Grand Prix de Rome, awarded for his picture of the " Recognition of Theseus by his Father." This allowed him to study five years at Rome, whence he sent home several pictures which consider- , ably raised his fame. " St Clair healing the Blind " was done' for the cathedral of Nantes, and years after, at the exhibition of 1855, brought him a medal of the first class. " Jesus and the Little Children " was given by the government to the town of Lisieux. " Dante and Virgil visiting the Envious Men struck with Blindness," and " Euripides writing his Tragedies," belong to the museum at Lyons. Returning to Paris through Lyons in 1838 he soon received a commission to ornament the chapel of St John in the church of St Severin at Paris, and reputation increased and employment continued abundant for the rest of his life. Besides the pictures mentioned above, and others of a similar kind, he painted a great number of portraits. The works, however, upon wbi:n his fame most surely rests are his monu- mental decorative paintings. Of these the principal are those executed in the following churches: — in the sanctuary of St Germain des Pres at Paris (1842-1844), in the choir of

the same church (1846-1848), in the church of St Paul at Nismes (1848- 1849), of St Vincent de Paul at Paris (1850-1854), in the church of Ainay at Lyons (1855), in the nave of St Germain des Pres (1855-1861). In 1856 Hippolyte Flandrin was elected to the Academie des Beaux- Arts. In 1863 his failing health, rendered worse by incessant toil and exposure to the damp and draughts of churches, induced him again to visit Italy. He died of small- pox at Rome on the 21st of March 1864. As might naturally be expected in one who looked upon painting as but the vehicle for the expression of spiritual sentiment, he had perhaps too little pride in the technical qualities of his art. There is shown in his works much of that austerity and coldness, expressed in form and colour, which springs from a faith which feels itself in opposition to the tendencies of surrounding life. He has been compared to Fra Angelico; but the faces of his long processions of saints and martyrs seem to express rather the austerity of souls convicted of sin than the joy and purity of never-corrupted life which shines from the work of the early master.

See Delaborde, Lettres et pensees de H. Flandrin (Paris, 1865); Beule, Notice historique sur H. F. (1869).

FLANNEL, a woollen stuff of various degrees of weight and fineness, made usually from loosely spun yarn. The origin of the word is uncertain, but in the 16th century flannel was a well-known production of Wales, and a Welsh origin has been

suggested. The French form flanelle was used late in the 17 th century, and the Ger. Flanell early in the i&th century. Baize, a kind of coarse flannel with a long nap, is said to have been first introduced to England about the middle of the 16th century by refugees from France and the Netherlands. The manufacture of flannel has naturally undergone changes, and, in some cases, deteriorations. Flannels are frequently made with an admixture of silk or cotton, and in low varieties cotton has tended to become the predominant factor. Formerly a short staple wool of fine quality from a Southdown variety of the Sussex breed was principally in favour with the flannel manufacturers of Rochdale, who also used largely the wool from the Norfolk breed, a cross between the Southdown and Norfolk sheep. In Wales the short staple wool of the mountain sheep was used, and in Ireland that of the Wicklow variety of the Cottagh breed, but now the New Zealand, Cape and South American wools are extensively

employed, and English wools are not commonly used alone. Over 2000 persons are employed in flannel manufacture in Rochdale alone, which is the historic seat of the industry, and a good deal of flannel is now made in the Spen Valley district, Yorkshire. Blankets, which constitute a special branch of the flannel trade, are largely made at Bury in Lancashire and Dewsbury in Yorkshire. Welsh flannels have a high reputation, and make an important industry in Montgomeryshire. There are also flannel manufactories in Ireland.

A moderate export trade in flannel is done by Great Britain. The following table gives the quantities exported during three years: —

	1904.	1905.	1906.
Yards . .	9,758,300	9,220,500	8,762,200

In 1877 the export was 9,273,429 yds., so it appears that this tracje has varied comparatively little. The imports of flannel are not very large.

Many so-called flannels have been made with a large admixture of cotton, but the Merchandise Marks Act has done something to limit the indiscriminate use of names. Unquestionably the development of the flannel trade has been checked by the great increase in the production of flannelettes, the better qualities of which have become, formidable competitors with flannel. There must, however, be a regular and large demand for flannel while theory and experience confirm its value as a clothing particularly suitable for immediate contact with the body.

FLANNELETTE, a cotton cloth made to imitate flannel. The word seems to have been first used in the early ‘eighties, and there is a reference in the Daily News of 1887 to ” a poverty- stricken article called flannelette.” Now it is used very exten- sively for underclothing, night gear, dresses, dressing-gowns, shirts, &c. It is usually made with a much coarser weft than warp, and its flannel-like appearance is obtained by the raising or scratching up of this weft, and by various finishing processes. Some kinds are raised equally on both sides, and the nap may be long or short according to the purpose for which the cloth is required. A considerable trade is done in plain cloths dyed, and also in woven coloured stripes and checks, but almost any heavy or coarse cotton cloth can be made into flannelette. It is now largely used by the poorer classes of the community, and the flimsier kinds have been a frequent source of accident by fire. It is, however, when used discreetly and in a fair quality, a cheap and useful article. A

flannelette, patented under the title of ” Non-flam,” has been made with fire-resisting properties, but its sale has been more in the better qualities than in the lower and more dangerous ones. Flannelette is made largely on the continent of Europe, and in the United States as well as in Great Britain.

FLASK, in its earliest meaning in Old English a vessel for carrying liquor, made of wood or leather. The principal applica- tions in current usage are (1) to a vessel of metal or wood, formerly of horn, used for carrying gunpowder; (2) to a long- necked, round-bodied glass vessel, usually covered with plaited straw or maize leaves, containing olive or other oil or Italian wines — it is often known as a “Florence flask”: similarly shaped vessels are used for experiments, &c, in a laboratory;

x. 16

(3) to a small metal or glass receptacle for spirits, wine or other liquor, of a size and shape to fit into a pocket or holster, usually covered with leather, basket-work or other protecting substance, and with a detachable portion of the case shaped to form a cup. ” Flask ” is also used in metal-founding of a wooden frame or case to contain part of the mould. The word ” flagon,” which is by derivation a doublet of ” flask,” is usually applied to a larger type of vessel for holding liquor, more particularly to a type of wine-bottle with a short neck and circular body with flattened sides. The word is also used of a jug-shaped vessel with a handle, spout and lid, into which wine may be decanted from the bottle for use at table, and of a similarly shaped vessel to contain the Eucharistic wine till it is poured into the chalice. “Flask” (inO. Eng. flasce or flaxe) is represented both in Teutonic and Romanic languages. The earliest examples are found in Med. Lat. fiasco, flasconis, whence come Ital. fiascone, 0. Fr. flascon(moA.. flacon), adapted in the Eng. “flagon – .” Another Lat. form is fiasco, this gave a Fr. flasque, which in the sense of ” powder flask ” remained in use till later than the 16th century. In Teutonic languages the word, in its various forms, is the common one for ” bottle,” so in Ger. Flasche, Dutch fiesch, &c. If the word is of Romanic origin it is probably a metathesized form of the Lat. vasculum, diminutive of vas, vessel. There is no very satisfactory etymology if the word is of Teutonic origin; the New English Dictionary considers a connexion with ” flat ” probable phonetically, but finds no evidence that the word was used originally for a flat-shaped vessel.

FLAT (a modification of O. Eng. flet, an obsolete word of Teutonic origin, meaning the ground beneath the feet), a term- commonly used

as an adjective, signifying level in surface, level with the ground, and so, figuratively, fallen, dead, inanimate, tasteless, dull; or, by another transference, downright; or, in music, below the true pitch. In a substantival form, the term is used in physical geography for a level tract.

The word is also generally applied by modern usage to a self-contained residence or separate dwelling (in Scots law, the terra flatted house is still used) , consisting of a suite of rooms which form a portion, usually on a single floor, of a larger building, called the tenement house, the remainder being similarly divided. The approach to it is over a hall, passage and stairway, which are common to all residents in the building, but from which each private flat is divided off by its own outer door (Clode, Tenement Houses and Flats, pp. 1, 2).

There is in England a considerable body of special law applic- able to flats. The following points deserve notice: — (i.) The occupants of distinct suites of rooms in a building divided into flats are generally, and subject, of course, to any special terms in their agreements, not lodgers but tenants with exclusive possession of separate dwelling-houses placed one above the other. They are, therefore, liable to distress by the immediate landlord, and each flat is separately rateable, though as a general rule by the contract of tenancy the rates are payable by the landlord. Flats used solely for business purposes are exempt from house tax, by the Customs and Inland Revenue Act 1878 (see Grant, v. Langston, 1900, A.C. 383); and, by the Revenue Act 1903 (s. n), provision is made for excluding from assessment or for assessing at a low rate buildings used for providing separate dwellings at rents not exceeding £60 a year. It appears that tenants of a flat would not come within the meaning of ” lodger ” for the purposes of the Lodgers’ Goods Protection Act 187 1. (ii.) The owner of an upper storey, without any express grant or enjoyment for any given time, has a right to the support of the lower storey (Daltonv. Angus, 1881, 6 A.C. 740, 793). Theowner of the lower storey, however, so long as he does nothing actively in the way of withdrawing its support, is not bound to repair, in the absence of a special covenant imposing that obligation upon him. The right of support being an easement in favour of the owner of the upper storey, it is for him to repair. He is in law entitled to enter on the lower storey for the purpose of doing the necessary repairs. It appears, however, that there is an implied obligation by the landlord to the tenants to keep the common stair and the lift or elevator in repair, and, for breach

of this duty, he will be liable to a third party who, while visiting a tenant in the course of business, is injured by its defective condition (Miller v. Hancock, 1893, 2 Q.B. 177). No such liability would be involved in a mere licence to the tenants to use a part of the building not essential to the enjoyment of their flats, (iii.) In case of the destruction of the flat by fire, the rent abates pro tanto and an apportionment is made; pari ratione, where a flat is totally destroyed, the rent abates altogether (Clode, p. 14); unless the tenant has entered into an express and unqualified agreement to pay rent, when he will remain liable till the expiration of his tenancy, (iv.) Where the agreements for letting the flats in a single building are in common form, an agreement by the lessor not to depart from the kind of building there indicated may be held to be implied. Thus an injunction has been granted to restrain the conversion into a club of a large part of a building, adapted to occupation in residential flats, at the instance of a tenant who held under an agreement in a common form binding the tenants to rules suitable only for residential purposes (Hudson v. Cripps,iSg6, 1 Ch. 265). (v.) The porter is usually appointed and paid by the landlord, who is liable for his acts while engaged on his general duties; while engaged on any special duty for any tenant the porter is the servant of the latter, who is liable for his conduct within the scope of his employment.

In Scots law the rights and obligations of the lessors and lessees of flats, or — as they are called — ” flatted houses,” spring partly from the exclusive possession by each lessee of his own flat, partly from the common interest of all in the tenement as a whole. The ” law of the tenement ” may be thus summed up. The solum on which the flatted house stands, the area in front and the back ground are presumed to belong to the owner of the lowest floor or the owners of each floor severally, subject to the common right of the other proprietors to prevent injury to their flats, especially by depriving them of light. The external walls belong to each owner in so far as they enclose his flat; but the other owners can prevent operations on them which would endanger the security of the building. The roof and uppermost storey belong to the highest owner or owners, but he or they may be compelled to keep them in repair and to refrain from injuring them. The gables are common to the owner of each flat, so far as they bound his property, and to the owner of the adjoining house; but he and the other owners in the building have cross rights of common interest to prevent injury to the stability of the building. The floor and ceiling of

each flat are divided in ownership by an ideal line drawn through the middle of the joists; they may be used for ordinary purposes, but may not be weakened or exposed to unusual risk from fire. The common passages and stairs are the common property of all to whose premises they form an access, and the walls which bound them are the common property of those persons and of the owners on their farther side.

In the United States the term ” apartment-house ” is applied to what in England are called flats. The general law is the same as in England. The French Code Civil provides (Art. 664) that where the different storeys of a house belong to different owners the main walls and roof are at the charge of all the owners, each one in proportion to the value of the storey belonging to him. The proprietor of each storey is responsible for his own flooring. The proprietor of the first storey makes the staircase which leads to it, the proprietor of the second, beginning from where the former ended, makes the staircase leading to his and so on. There are similar provisions in the Civil Codes of Belgium (Art. 664), Quebec (Art. 521), St Lucia (Art. 471).

Authorities. — English Law: Clode, Law of Tenement-Houses and Flats (London, 1889); Daniels, Manual of the Law of Flats (London, 1905). Scots Law: Erskine, Principles of the Law of Scotland (20th ed., Edinburgh, 1903) ; Bell, Principles of the Law of Scotland (10th ed., Edinburgh, 1899). American Law: Bouvier, Law Dicty. (Boston and London, 1897). Foreign Laws: Burge, Foreign and Colonial Laws (2nd ed., London, 1906). (A. W. R.)

FLATBUSH, formerly a township of Kings county, Long Island, New York, U.S.A., annexed to Brooklyn in 1894, and after the 1st of January 1898 a part of the borough of Brooklyn,

New York City. The first settlement was made here by the Dutch about 1651, and was variously called ” Midwout,” ” Mid- woud” and “Medwoud” (from the Dutch words, med, “middle” and woud, ” wood “) for about twenty years, when it became more commonly known as Vlachte Bos (vlachte, “wooded”; bos, ” plain “) or Flackebos, whence, by further corruption, the present name. Farming was the chief occupation of the early settlers. On the 23rd of August 1776 the village was occupied by General Cornwallis’s division of the invading force under Lord Howe, and on the 27th, at the disastrous battle of Long Island (or ” battle of Flatbush,” as it is sometimes called), ” Flatbush Pass,” an important strategic point, was vigorously defended by General Sullivan’s roops.

FLAT-FISH (Pleuronectidae) , the name common to all those fishes

which swim on their side, as the halibut, turbot, brill, plaice, flounder, sole, &c. The side which is turned towards the bottom, and in some kinds is the right, in others the left, is generally colourless, and called ” blind,” from the absence of an eye on this side. The opposite side, which is turned upwards and towards the light, is variously, and in some tropical species even vividly, coloured, both eyes being placed on this side of the head. All the bones and muscles of the upper side are more strongly developed than on the lower; but it is noteworthy that these fishes when hatched, and for a short time afterwards, are sym- metrical like other fishes.

Assuming that they are the descendants of symmetrical fishes, the question has been to determine which group of Teleosteans may be regarded as the ancestors of the flat-fishes. The old notion that they are only modified Gadids (Anacanthini) was the result of the artificial classification of the past and is now generally abandoned. The condition of the caudal fin, which in the cod tribe departs so markedly from that of ordinary Teleosteans, is in itself a sufficient reason for dismissing the idea of the homocercal flat-fishes being derived from the Anacanthini, and the whole structure of the two types of fishes speaks against such an assumption. On the other hand it has been shown, as noticed in the article Dory, that considerable, deep-seated resemblances exist between the Zeidae or John Dories and the more generalized of the Pleuronectidae; and that a fossil fish from the Upper Eocene, Amphistium paradoxum, evidently allied to the Zeidae, appears to realize in every respect the prototype of the Pleuronectidae before they had assumed the asymmetry which characterizes them as a group. In accordance with these views the flat-fishes are placed by G. A. Boulenger in the suborder Acanthopterygii, in a division called Zeorhombi. The three families included in that division can be traced back to the Upper Eocene, and their common ancestors will probably be found in the Upper Cretaceous associated with the Berycidae, to which they will no doubt prove to be related. The very young are transparent and symmetrical, with an eye on each side, and swim in a vertical position. As they grow, the eye of one side moves by degrees to the other side, where it becomes the upper eye. If at that age the dorsal fin does not extend to the frontal region, the migrating eye simply moves over the line of the profile, temporarily assuming the position which it preserves in some of the less modified genera, such as Psettodes; in other genera, the dorsal fin has already extended to the snout before the migration takes place, and the eye, passing between the frontal bone and the tissues supporting the fin, appears to make its way from side to side through the head, as was believed by some of the earlier observers.

About 500 species of flat-fish are known, mostly marine, a few species allied to the sole being confined to the fresh waters of South America, West Africa, and the Malay Archipelago, whilst a few others, such as the English flounder, ascend streams, though still breeding in the sea. They range from the Arctic Circle to the southern coasts of the southern hemisphere and may occur at great depths. (G. A. B.)

FLATHEADS, a tribe of North American Indians of Salishan stock. They formerly occupied the mountains of north-western Montana and the country around. They have always been friendly to the whites. Curiously enough they have not the

custom, so general among American tribes, of flattening the heads of their infants. Father P. J. de Smet in 1841 founded among them a mission which proved the most successful in the north-west. With the Pend d'Oreille tribe and some Kutenais they are on a reservation in Montana, and number a few hundreds.

FLAUBERT, GUSTAVE (1821-1880), French novelist, was born at Rouen on the 12th of December 1821. His father, of whom many traits are reproduced in Flaubert's character of Charles Bovary, was a surgeon in practice at Rouen; his mother was connected with some of the oldest Norman families. He was educated in his native city, and did not leave it until 1840, when he came up to Paris to study law. He is said to have been idle at school, but to have been occupied with literature from the age of eleven. Flaubert in his youth " was like a young Greek," full of vigour of body and a certain shy grace, enthusiastic, intensely individual, and apparently without any species of ambition. He loved the country, and Paris was extremely distasteful to him. He made the acquaintance of Victor Hugo, and towards the close of 1840 he travelled in the Pyrenees and Corsica. Returning to Paris, he wasted his time in sombre dreams, living on his patrimony. In 1846, his mother being left quite alone through the deaths of his father and his sister Caroline, Flaubert gladly abandoned Paris and the study of the law together, to make a home for her at Croisset, close to Rouen. This estate, a house in a pleasant piece of ground which ran down to the Seine, became Flaubert's home for the remainder of his life. From 1846 to 1854 he carried on relations with the poetess, Mile Louise Colet; their letters have been preserved, and accord- ing to M. Emile Faguet, this was the only sentimental episode of any importance in the life of Flaubert, who never married. His principal friend at this

time was Maxime du Camp, with whom he travelled in Brittany in 1846, and through the East in 1849. Greece and Egypt made a profound impression upon the imagination of Flaubert. From this time forth, save for occa- sional visits to Paris, he did not stir from Croisset.

On returning from the East, in 1850, he set about the com- position of Madame Bovary. He had hitherto scarcely written anything, and had published nothing. The famous novel took him six years to prepare, but was at length submitted to the Revue de Paris, where it appeared in serial form in 1857. The government brought an action against the publisher and against the author, on the charge of immorality, but both were acquitted; and when Madame Bovary appeared in book-form it met with a very warm reception. Flaubert paid a visit to Carthage in 1858, and now settled down to the archaeological studies which were required to equip him for Salammho, which, however, in spite of the author's ceaseless labours, was not finished until 1862. He then took up again the study of contemporary manners, and, making use of many recollections of his youth and childhood, wrote U Education sentimentale, the composition of which occupied him seven years; it was published in 1869. Up to this time the sequestered and laborious life of Flaubert had been comparatively happy, but misfortunes began to gather around him. He felt the anguish of the war of 1870 so keenly that the break-up of his health has been attributed to it; he began to suffer greatly from a distressing nervous malady. His best friends were taken from him by death or by fatal misunder- standing; in 1872 he lost his mother, and his circumstances became greatly reduced. He was very tenderly guarded by his niece, Mme Commonville; he enjoyed a rare intimacy of friendship with George Sand, with whom he carried on a corre- spondence of immense artistic interest, and occasionally he saw his Parisian acquaintances, Zola, A. Daudet, Tourgenieff, the Goncourts; but nothing prevented the close of Flaubert's life from being desolate and melancholy. He did not cease, however, to work with the same intensity and thoroughness. La Tentation de Saint- Antoine, of which fragments had been published as early as 1857, was at length completed and sent to press in 1874. In that year he was subjected to a disappointment by the failure of his drama Le Candidal. In 1877 Flaubert published, in one volume, entitled Trois conies, Un Cceur simple, La Legende de

Saint- J ulien-V Hospitaller and Hirodias. After this something of his judgment certainly deserted him; he spent the remainder of his life in the toil of building up a vast satire on the futility of human knowledge and the omnipresence of mediocrity, which he left a fragment. This is the depressing and bewildering Bouvard el Pecuchet (posthumously printed, 1881), which, by a curious irony ; he believed to be his

masterpiece. Flaubert had rapidly and prematurely aged since 1870, and he was quite an old man when he was carried off by a stroke of apoplexy at the age of only 58, on the 8th of May 1880. He died at Croisset, but was buried in the family vault in the cemetery of Rouen. A beautiful monument to him by Chapu was unveiled at the museum of Rouen in 1890.

The personal character of Flaubert offered various peculiarities. He was shy, and yet extremely sensitive and arrogant; he passed from silence to an indignant and noisy flow of language. The same inconsistencies marked his physical nature; he had the build of a guardsman, with a magnificent Viking head, but his health was uncertain from childhood, and he was neurotic to the last degree. This ruddy giant was secretly gnawn by mis- anthropy and disgust of life. His hatred of the ” bourgeois ” began in his childhood, and developed into a kind of monomania. He despised his fellow-men, their habits, their lack of intelligence, their contempt for beauty, with a passionate scorn which has been compared to that of an ascetic monk. Flaubert’s curious modes of composition favoured and were emphasized by these peculiarities. He worked in sullen solitude, sometimes occupying a week in the completion of one page, never satisfied with what he had composed, violently tormenting his brain for the best turn of a phrase, the most absolutely final adjective. It cannot be said that his incessant labours were not rewarded. His private letters show that he was not one of those to whom easy and correct language is naturally given; he gained his extraordinary perfection with the unceasing sweat of his brow. One of the most severe of academic critics admits that ” in all his works, and in every page of his works, Flaubert may be considered a model of style. ” That he was one of the greatest writers who ever lived in France is now commonly admitted, and his greatness principally depends upon the extraordinary vigour and exactitude of his style. Less perhaps than any other writer, not of France, but of modern Europe, Flaubert yields admission to the inexact, the abstract, the vaguely inapt ex- pression which is the bane of ordinary methods of composition. He never allowed a cliche to pass him, never indulgently or wearily went on, leaving behind him a phrase which ” almost ” expressed his meaning. Being, as he is, a mixture in almost equal parts of the romanticist and the realist, the marvellous propriety of his style has been helpful to later writers of both schools, of every school. The absolute exactitude with which he adapts his expression to his purpose is seen in all parts of his work, but particularly in the portraits he draws of the figures in his principal romances. The degree and manner in which, since his death, the fame of Flaubert has extended, form an interesting chapter of literary history. The

publication of Madame Bovary in 1857 had been followed by more scandal than admiration; it was not understood at first that this novel was the beginning of a new thing, the scrupulously truthful portraiture of life. Gradually this aspect of his genius was accepted, and began to crowd out all others. At the time of his death he was famous as a realist, pure and simple. Under this aspect Flaubert exercised an extraordinary influence over E. de Goncourt, Alphonse Daudet and M. Zola. But even since the decline of the realistic school Flaubert has not lost prestige; other facets of his genius have caught the light. It has been perceived that he was not merely realistic, but real; that his clairvoyance was almost boundless; that he saw certain phenomena more clearly than the best of observers had done. Flaubert is a writer who must always appeal more to other authors than to the world at large, because the art of writing, the indefatigable pursuit of perfect expression, were always before him, and because he hated the lax felicities of improvization as a disloyalty to the most sacred procedures of the literary artist.

His CEuvres completes (8 vols., 1885) were printed from the original manuscripts, and included, besides the works mentioned already, the two plays, Le Candidal and Le Chdteau des cozurs. Another edition (10 vols.) appeared in 1873-1885. Flaubert's correspondence with George Sand was published in 1884 with an introduction by Guy de Maupassant. Other posthumous works are Par les champs et par les grives (1885), 'the result of a tour in Brittany; and four volumes of Correspondan.ee (1887-1893). See also Paul Bourget, Essais de psychologie contemporaine (1883); Emile Faguet, Flaubert (1899) ; Henry James, French Poets and Novelists (1878) ; Emile Zola, Les Romanciers naturalistes (1881); C. A. Sainte-Beuve, Causeries du lundi, vol. xiii., Nouveaux lundis, vol. iv. ; and the Souvenirs lUtiraires (2 vols., 1882-1883) of Maxime du Camp. (E. G.)

FLAVEL, JOHN (c. 1627-1691), English Presbyterian divine, was born at Bromsgrove in Worcestershire, probably in 1627. He was the elder son of Richard Flavel, described in con- temporary records as " a painful and eminent minister." After receiving his early education, partly at home and partly at the grammar-schools of Bromsgrove and Haslar, he entered Uni- versity College, Oxford. Soon after taking orders in 1650 he obtained a curacy at Diptford, Devon, and on the death of the vicar he was appointed to succeed him. From Diptford he re- moved in 1656 to Dartmouth. He was ejected from his living by

the passing of the Act of Uniformity in 1662, but continued to preach and administer the sacraments privately till the Five Mile Act of 1665, when he retired to Slapton, 5 m. away. He then lived for a time in London, but returned to Dartmouth, where he laboured till his death in 160 1. He was married four times. He was a vigorous and voluminous writer, and not without a play of fine fancy.

His principal works are his Navigation Spiritualized (1671); The Fountain of Life, in forty-two Sermons (1672); The Method of Grace (1680); Pneumatologia,' a Treatise on the Soul of Man (1698); A Token for Mourners; Husbandry Spiritualized (1699). Collected editions appeared throughout the 18th century, and in 1823 Charles Bradley edited a 2 vol. selection.

FLAVIAN I. (d. 404), bishop or patriarch of Antioch, was born about 320, most probably in Antioch. He inherited great wealth, but resolved to devote his riches and his talents to the service of the church. In association with Diodorus, afterwards bishop of Tarsus, he supported the Catholic faith against the Arian Leontius, who had succeeded Eustathius as bishop of Antioch. The two friends assembled their adherents outside the city walls for the observance of the exercises of religion; and, according to Theodoret, it was in these meetings that the practice of antiphonal singing was first introduced in the services of the church. When Meletius was appointed bishop of Antioch in 361 he raised Flavian to the priesthood, and on the death of Meletius in 381 Flavian was chosen to succeed him. The schism between the two parties was, however, far from being healed; the bishop of Rome and the bishops of Egypt refused to acknowledge Flavian, and Paulinus, who by the extreme Eus- tathians had been elected bishop in opposition to Meletius, still exercised authority over a portion of the church. On the death of Paulinus in 383, Ev.agrius was chosen as his successor, but after the death of Evagrius (c. 393) Flavian succeeded in preventing his receiving a successor, though the Eustathians still continued to hold separate meetings. Through the intervention of Chrysostom, soon after his elevation to the patriarchate of Constantinople (398) ,and the influence of the empcrorTheodosius, Flavian was acknowledged in 399 as legitimate bishop of Antioch by the Church of Rome; but the Eustathian schism was not finally healed till 415. Flavian, who died in February 404, is venerated in both the Western and Eastern churches as a saint.

See also the article Meletius of Antioch, and the article " Flavianus von Antiochien " by Loofs in Herzog-Hauck's Real- encyklop. (ed. 3). For the Meletian schism see also A. Harnack's, Hist, of Dogma, iv. 95.

FLAVIAN II. (d. 518), bishop or patriarch of Antioch, was chosen by the emperor Anastasius I. to succeed Palladius, most probably in 498. He endeavoured to please both parties by steering a middle course in reference to the Chalcedon (q.v.) decrees, but was induced after great hesitation to agree to the request of Anastasius that he should accept the Henoticon, or decree of union, issued by the emperor Zeno. His doing so, while it brought upon him the anathema of the patriarch of

Constantinople, failed to secure the favour of Anastasius, wha in 511 found in the riots which were occurring between the rival parties in the streets of Antioch a pretext for deposing Flavian, and banishing him to Petra, where he died in 518. Flavian was soon after his death enrolled among the saints of the Greek Church, and after some opposition he was also canonized by the Latin Church.

FLAVIAN (d. 449) , bishop of Constantinople, and an adherent of the Antiochene school, succeeded Proclus in 447. He presided at the council which deposed Eutyches (q.v.) in 448, but in the following year he was deposed by the council of Ephesus (the ” robber synod “), which reinstated Eutyches in his office. Flavian’s death shortly afterwards was attributed, by a pious fiction, to ill treatment at the hands of his theological opponents. The council of Chalcedon canonized him as a martyr, and in the Latin Church he is commemorated on the 18th of February.

FLAVIGNY, a town of eastern France, in the department of Cote-d’Or, situated on a promontory overlooking the river Ozerain, ˆs m – W.N.W. of Dijon by road. Pop. (1906) 725. Among its antiquities are the remains of an abbey of the 8th century, which has been rebuilt as a factory for the manufacture of anise, an industry connected with the town as early as the 17th century. There is also a church of the 13th and 15th centuries, containing carved stalls (15th century) and a fine rood-screen (early 16th century). A Dominican convent, some old houses and ancient gateways are also of interest. About 3 m. north-west of Flavigny rises Mont Auxois, the probable site of the ancient Alesia, where Caesar in a.d. 52 defeated the Gallic chieftain Vercingetorix, to whom a statue has been erected on the summit of the height. Numerous remains of the Gallo- Roman period have been discovered on the hill.

FLAVIN (Lat. flavus, yellow), the commercial name for an extract or preparation of quercitron bark (Quercus tinctoria), which is used as a yellow dye in place of the ground and powdered bark (see Quercitron).

FLAX. The terms flax or lint (Ger. Flachs, Fr. lin, Lat. linum) are employed at once to denote the fibre so called, and the plant from which it is prepared. The flax plant (Linum usitatissimum) belongs to the natural order Linaceae, and, like most plants which have been long under cultivation, it possesses numerous varieties, while its origin is doubtful. As cultivated it is an annual with an erect stalk rising to a height of from 20 to 40 in., with alternate, sessile, narrowly lance-shaped leaves, branching only at the top, each branch or branchlet ending in a bright blue flower. The flowers are regular and symmetrical, having five sepals, tapering to a point and hairy on the margin, five petals which speedily fall, ten stamens, and a pistil bearing five distinct styles. The fruit or boll is round, containing five cells, each of which is again divided into two, thus forming ten divisions, each of which contains a single seed. The seeds of the flax plant, well known as linseed, are heavy, smooth, glossy and of a bright greenish-brown colour. They are oval in section, but their maximum contour represents closely that of a pear with the stalk removed. The contents are of an oily nature, and when liquefied are of great commercial value.

The earliest cultivated flax was Linum angustifolium, a smaller plant with fewer and narrower leaves than L. usitatissimum, and usually perennial. This is known to have been cultivated by the inhabitants of the Swiss lake-dwellings, and is found wild in south and west Europe (including England), North Africa, and western Asia. The annual flax (L. usitatissimum) has been cultivated for at least four or five thousand years in Mesopotamia, Assyria and Egypt, and is wild in the districts included between the Persian Gulf, the Caspian Sea and the Black Sea. This annual flax appears to have been introduced into the north of Europe by the Finns, afterwards into the west of Europe by the western Aryans, and perhaps here and there by the Phoe- nicians; lastly, into Hindustan by the eastern Aryans after their separation from the European Aryans. (De Candolle, Origin of Cultivated Plants.)

The cultivation and preparation of flax are among the most ancient of all textile industries, very distinct traces of their

existence during the stone age being preserved to the present day. ” The use of flax,” says Ferdinand Keller (Lake Dwellings of Switzerland, translated by J. E. Lee), ” reaches back to the very earliest periods of civilization, and it was most extensively and variously applied in the

lake-dwellings, even in those of the stone period. But of the mode in which it was planted, steeped, heckled, cleansed and generally prepared for use, we can form no idea any more than we can of the mode or tools employed by the settlers in its cultivation. . . . Rough or unworked flax is found in the lake-dwellings made into bundles, or what are technically called heads, and, as much attention was given to this last operation, it was perfectly clean and ready for use." As to its applications at this early period, Keller remarks: " Flax was the material for making lines and nets for fishing and catching wild animals, cords for carrying the earthenware vessels and other heavy objects; in fact, one can hardly imagine how

Fig. 1. — Flax Plant (Linuni usitatissimum).

navigation could be carried on, or the lake-dwellings themselves be erected, without the use of ropes and cords; and the erection of memorial stones (menhirs, dolmens), at whichever era, and to whatever people these monuments may belong, would be alto- gether impracticable without the use of strong ropes."

Manufacture. — That flax was extensively cultivated and was regarded as of much importance at a very early period in the world's history there is abundant testimony. Especially in ancient Egypt the fibre occupied a most important place, linen having been there not only generally worn by all classes, but it was the only material the priestly order was permitted to wear, while it was most extensively used as wrappings for embalmed bodies and for general purposes. In the Old Testament we are told that Pharaoh arrayed Joseph " in vestures of fine linen " (Gen. xlii. 42), and among the plagues of Egypt that of hail destroyed the flax and barley crops, " for the barley was in the ear, and the flax was boiled " (Exod. ix. 31). Further, numerous pictorial representations of flax culture and preparation exist to the present day on the walls of tombs and in Egypt. Sir J. G. Wilkinson in his description of ancient Egypt shows clearly the great antiquity of the ordinary processes of preparing flax. " At Beni Hassan," he says, " the mode of cultivating the plant, in the same square beds now met with throughout Egypt (much resembling our salt pans), the process of beating the stalks and making them into ropes, and the manufacture of a piece of cloth are distinctly pointed out." The preparation of the fibre as conducted in Egypt is illustrated by Pliny, who says: " The stalks themselves are immersed in water, warmed by the heat of the sun, and are kept down by weights placed upon

them, for nothing is lighter than flax. The membrane, or rind, becoming loose is a sign of their being sufficiently macerated. They

are then taken out and repeatedly turned over in the sun until perfectly dried, and afterwards beaten by mallets on stone slabs. That which is nearest the rind is called stupa [‘ tow ‘], inferior to the inner fibres, and fit only for the wicks of lamps. It is combed out with iron hooks until the rind is all removed. The inner part is of a whiter and finer quality. Men are not ashamed to prepare it ” (Pliny, N.H. xix. 1). For many ages, even down to the early part of the 14th century, Egyptian flax occupied the foremost place in the commercial world, being sent into all regions with which open intercourse was maintained. Among Western nations it was, without any competitor, the most important of all vegetable fibres till towards the close of the 1 8th century, when, after a brief struggle, cotton took its place as the supreme vegetable fibre of commerce.

Flax prospers most when grown upon land of firm texture resting upon a moist subsoil. It does well to succeed oats or potatoes, as it requires the soil to be in fresh condition without being too rich. Lands newly broken up from pasture suit it well, as these are generally freer from weeds than those that have been long under tillage. It is usually inexpedient to apply manure directly to the flax crop, as the tendency of this is to produce over-luxuriance, and thereby to mar the quality of the fibre, on which its value chiefly depends. For the same reason it must be thickly seeded, the effect of this being to produce tall, slender stems, free from branches. The land, having been ploughed in autumn, is prepared for sowing by working it with the grubber, harrow and roller, until a fine tilth is obtained. On the smooth surface the seed is sown broadcast by hand or machine, at the rate of 3 bushels per acre, and covered in the same manner as clover seeds. It is advisable immediately to hand-rake it with common hay-rakes, and thus to remove all stones and clods, and to secure a uniform close cover of plants. When these are about 2 to 3 in. long the crop must be carefully hand-weeded. This is a tedious and expensive process, and hence the importance of sowing the crop on land as free as possible from weeds of all kinds. The weeders, faces to the wind, move slowly on hands and knees, and should remove every vestige of weed in order that the flax plants may receive the full benefit of the land. When flax is cultivated primarily on account of the fibre, the crop ought to be pulled before the capsules are quite ripe, when they are just beginning to change from a green to a pale-brown colour, and when the stalks of the plant have become yellow throughout about two-thirds of their height.

The various operations through which the crop passes from this point till flax ready for the market is produced are — (1) Pulling, (2) Rippling, (3) Retting, (4) Drying, (5) Rolling, (6) Scutching.

Pulling and rippling may be dismissed very briefly. Flax is always pulled up by the root, and under no circumstances is it cut or shorn like cereal crops. The pulling ought to be done in dry clear weather; and care is to be taken in this, as in all the subsequent operations, to keep the root-ends even and the stalks parallel. At the same time it is desirable to have, as far as possible, stalks of equal length together, — all these conditions having considerable influence on the quality and appearance of the finished sample. As a general rule the removal of the ” bolls ” or capsules by the process of rippling immediately follows the pulling, the operation being performed in the field; but under some systems of cultivation, as, for example, the Courtrai method, alluded to below, the crop is made up into sheaves, dried and stacked, and is only boiled and retted in the early part of the next ensuing season. The best rippler, or apparatus for separating the seed capsules from the branches, consists of a kind of comb having, set in a wooden frame, iron teeth made of round-rod iron ˆ-ths of an inch asunder at the bottom, and half an inch at the top, and 18 in. long, to allow a sufficient spring, and save much breaking of flax. The points should begin to taper 3 in, from the top. A sheet or other cover being spread on the field, the apparatus is placed in the middle of it, and two ripplers sitting opposite each other, with

the machine between them, work at the same time. It is un- advisable to ripple the flax so severely as to break or tear the delicate fibres at the upper part of the stem. The two valuable commercial products of the flax plant, the seeds and the stalk, are separated at this point. We have here to do with the latter only.

Retting or rotting is an operation of the greatest importance, and one in connexion with which in recent years numerous experiments have been made, and many projects and processes put forth, with the view of remedying the defects of the primi- tive system or altogether supplanting it. From the earliest times two leading processes of retting have been practised, termed re- spectively water-retting and dew-retting; and as no method has yet been introduced which satisfactorily supersedes these operations, they will first be described.

Water-retting. — For this — the process by which flax is generally prepared — pure soft water, free from iron and other materials which might colour the fibre, is essential. Any water much impregnated with lime is also specially objectionable. The dams or ponds in which the

operation is conducted are of variable size, and usually between 4 and 5 ft. in depth. The rippled stalks are tied in small bundles and packed, roots downwards, in the dams till they are quite full; over the top of the upper layer is placed a stratum of rushes and straw, or sods with the grassy side downwards, and above all stones of sufficient weight to keep the flax submerged. Under favourable circumstances a process of fermentation should immediately be set up, which soon makes itself manifest by the evolution of gaseous bubbles. After a few days the fermentation subsides; and generally in from ten days to two weeks the process ought to be complete. The exact time, however, depends upon the weather and upon the particular kind of water in which the flax is immersed. The immersion itself is a simple matter; the difficulty lies in deciding when the process is complete. If allowed to remain under water too long, the fibre is weakened by what is termed ” over-retting,” a condition which increases the amount of codilla in the scutching process; whilst ” under-retting ” leaves part of the gummy or resinous matter in the material, which hinders the subsequent process of manufacture. As the steeping is such a critical operation, it is essential that the stalks be frequently examined and tested as the process nears completion. When it is found that the fibre separates readily from the woody ” shove ” or core, the beets or small bundles are ready for remov- ing from the dams. It is drained, and then spread, evenly and equally, over a grassy meadow to dry. The drying, which takes from a week to a fortnight, must be uniform, so that all the fibres may spin equally well. To secure this uniformity, it is necessary to turn the material over several times during the process. It is ready for gathering when the core cracks and separates easily from the fibre. At this point advantage is taken of fine dry weather to gather up the flax, which is now ready for scutching, but the fibre is improved by stooking and stacking it for some time before it is taken to the scutching mill.

Dew-retting is the process by which all the Archangel flax and a large portion of that sent out from St Petersburg are pre- pared. By this method the operation of steeping is entirely dispensed with, and the flax is, immediately after pulling, spread on the grass where it is under the influence of air, sunlight, night-dews and rain. The process is tedious, the resulting fibre is brown in colour, and it is said to be peculiarly liable to undergo heating (probably owing to the soft heavy quality of the flax) if exposed to moisture and kept close packed with little access of air. Archangel flax is, however, peculiarly soft and silky in structure, although in all probability water-retting would result in a fibre as good or even better in quality.

The theory of retting, according to the investigations of J. Kolb, is that

a peculiar fermentation is set up under the influence of heat and moisture, resulting in a change of the intercellular substance — pectose or an analogue of that body — into pectin and pectic acid. The former, being soluble, is left in the water; but the latter, an insoluble body, is in part attached to the

fibres, from which it is only separated by changing into soluble metapectic acid under the action of hot alkaline ley in the subsequent process of bleaching.

To a large extent retting continues to be conducted in the primitive fashions above described, although numerous and persistent attempts have been made to improve upon it, or to avoid the process altogether. The uniform result of all ex- periments has only been to demonstrate the scientific soundness of the ordinary process of water-retting, and all the proposed improvements of recent times seek to obviate the tediousness, difficulties and uncertainties of the process as carried on in the open air. In the early part of the 19th century much attention was bestowed, especially in Ireland, on a process invented by Mr James Lee. He proposed to separate the fibre by purely mechanical means without any retting whatever; but after the Irish Linen Board had expended many thousands of pounds and much time in making experiments and in erecting his machinery, his entire scheme ended in complete failure. About the year 1851 Chevalier Claussen sought to revive a process of ” cottonizing ” flax — a method of proceeding which had been suggested three-quarters of a century earlier. Claussen’s process consisted in steeping flax fibre or tow for twenty-four hours in a weak solution of caustic soda, next boiling it for about two hours in a similar solution, and then saturating it in a solution containing 5 % of carbonate of soda, after which it was immersed in a vat containing water acidulated with \% of sulphuric acid. The action of the acid on the carbonate of soda with which the fibre was impregnated caused the fibre to split up into a fine cotton-like mass, which it was intended to manufacture in the same manner as cotton. A process to turn good flax into bad cotton had, however, on the face of it, not much to recom- mend it to public acceptance; and Claussen’s process therefore remains only as an interesting and suggestive experiment.

The only modification of water-retting which has hitherto endured the test of prolonged experiment, and taken a firm position as a distinct improvement, is the warm-water retting patented in England in 1846 by an American, Robert B. Schenck. For open pools and dams Schenck substitutes large wooden vats under cover, into which the flax is tightly packed in an upright position. The water admitted into the

tanks is raised to and maintained at a temperature of from 75° to 95° F. during the whole time the flax is in steep. In a short time a brisk fermenta- tion is set up, gases at first of pleasant odour, but subsequently becoming very repulsive, being evolved, and producing a frothy scum over the surface of the water. The whole process occupies only from 50 to 60 hours. A still further improvement, due to Mr Pownall, comes into operation at this point, which consists of immediately passing the stalks as they are taken out of the vats between heavy rollers over which a stream of pure water is kept flowing. By this means, not only is all the slimy glutinous adherent matter thoroughly separated, but the subsequent processes of breaking and scutching are much facilitated.

A process of retting by steam was introduced by W. Watt of Glasgow in 1852, and subsequently modified and improved by J. Buchanan. The system possessed the advantages of rapidity, being completed in about ten hours, and freedom from any noxious odour; but it yielded only a harsh, ill-spinning fibre, and consequently failed to meet the sanguine expectations of its promoters.

In connexion with improvements in retting, Mr Michael Andrews, secretary of the Belfast Flax Supply Association, made some suggestions and experiments which deserve close attention. In a paper contributed to the International Flax Congress at Vienna in 1873 he entered into details regarding an experimental rettery he had formed, with the view of imitating by artificial means the best results obtained by the ordinary methods. In brief, Mr Andrews' method consists in introducing water at the proper temperature into the retting vat, and main- taining that temperature by keeping the air of the chamber at a proper degree of heat. By this means the flax is kept at a uniform temperature with great certainty, since even should the

heat of the air vary considerably through neglect, the water in the vat only by slow degrees follows such fluctuations. ” It may be remarked,” says Mr Andrews, ” that the superiority claimed for this method of retting flax over what is known as the ‘hot- water steeping’ is uniformity of temperature; in fact the experiments have demonstrated that an absolute control can be exercised over the means adopted to produce the artificial climate in which the vats containing the flax are situated.”

Several other attempts have been made with a view of obtain- ing a quick and practical method of retting flax. The one by Messrs Doumer and Deswarte appears to have been well received in France, but in Ireland the invention of Messrs Loppens and Deswarte has recently received the most attention. The apparatus consists of a tank with two chambers, the partition being perforated. The flax is placed in the upper chamber and covered by two sets of rods or beams at right angles to each other. Fresh water is allowed to enter the lower chamber immediately under the perforated partition. As the tank fills, the water enters the upper chamber and carries with it the flax and the beams, the latter being prevented from rising too high. The soluble substances are dissolved by the water, and the liquid thus formed being heavier than water, sinks to the bottom of the tank where it is allowed to escape through an outlet. By this arrange- ment the flax is almost continually immersed in fresh water, a condition which hastens the retting. The flow of the liquids, in and out, can be so arranged that the motion is very slow, and hence the liquids of different densities do not mix. When the operation is completed, the whole of the water is run off, and the flax remains on the perforated floor, where it drains thoroughly before being removed to dry.

The Department of Agriculture and Technical Instruction for Ireland, and the Belfast Flax Supply Association, have jointly made some experiments with this method, and the following extract from the Association’s report for 1905 shows the success which attended their efforts: —

” By desire of the department (which has taken up the position of an impartial critic of the experiment) a quantity of flax straw was divided into two equal lots. One part was retted at Millisle by the patent-system of Loppens and Deswarte; the other was sent to Courtrai and steeped in the Lys. Both lots when retted and scutched were examined by an inspector of the department and by several flax spinners. That

which was retted at Millisle was pronounced , superior to the other "...

" To summarise results up to date —

1. It has been proved that flax can be thoroughly dried in

the field in Ireland.

2. That the seed can be saved, and is of first quality.

3. That the system of retting (Loppens and Deswarte's

patent) is at least equal to the Lys, as to quality and yield of fibre produced."

Since these results appear to be satisfactory, it is natural to expect further attempts with the same object of supplanting the ordinary steeping. A really good chemical, mechanical or other method would probably be the means of reviving the flax industry in the remote parts of the British Isles.

Scutching is the process by which the fibre is freed from its woody core and rendered fit for the market. For ordinary water- retted flax two operations are required, first breaking and then scutching, and these are done either by hand labour or by means of small scutching or lint mills, driven either by water or steam power. Hand labour, aided by simple implements, is still much used in continental countries; also in some parts of Ireland where labour is cheap or when very fine material is desired; but the use of scutching mills is now very general, these being more economical. The breaking is done by passing the stalks between grooved or fluted rollers of different pitches; these rollers, of which there may be from 5 to 7 pairs, are sometimes arranged to work alternately forwards and backwards in order to thoroughly break the woody material or " boon " of the straw, while the broken " shoves " are beaten out by suspending the fibre in a machine fitted with a series of revolving blades, which, striking violently against the flax, shake out the bruised and broken woody cores. A great many modified scutching machines

and processes have been proposed and introduced with the view of promoting economy of labour and improving the turn-out of fibre, both in respect of cleanness and in producing the least proportion of codilla or scutching tow.

The celebrated Courtrai flax of Belgium is the most valuable staple in the market, on account of its fineness, strength and particularly bright

colour. There the flax is dried in the field, and housed or stacked during the winter succeeding its growth, and in the spring of the following year it is retted in crates sunk in the sluggish waters of the river Lys. After the process has proceeded a certain length, the crates are withdrawn, and the sheaves taken out and stooked. It is thereafter once more tied up, placed in the crates, and sunk in the river to complete the retting process; but this double steeping is not invariably practised. When finally taken out, it is unloosed and put up in cones, instead of being grassed, and when quite dry it is stored for some time previous to undergoing the operation of scutching. In all operations the greatest care is taken, and the cultivators being peculiarly favoured as to soil, climate and water, Courtrai flax is a staple of unapproached excellence.

An experiment made by Professor Hodges of Belfast on 7770 ft of air-dried flax yielded the following results. By rippling he separated 1946 lb of bolls which yielded 910 lb of seed. The 5824 lb (52 cwt.) of flax straw remaining lost in steeping 13 cwt., leaving 39 cwt. of retted stalks, and from that 6 cwt. 1 qr. 2 lb (702 . lb) of finished flax was procured. Thus the weight of the fibre was equal to about 9 % of the dried flax with the bolls, 12 % of the boiled straw, and over 16% of the retted straw. One hundred tons treated by Schenck's method gave 33 tons bolls, with 27-50 tons of loss in steep- ing; 32-13 tons were separated in scutching, leaving 5-90 tons of finished fibre, with 1-47 tons of tow and pluckings. The following analysis of two varieties of heckled Belgian flax is by Dr Hugo Miiller (Hoffmann's Berichte iiber die Entwickelung der chemischen Industrie) : —

Ash 0-70 1-32

Water 8-65 10-70

Extractive matter 3-65 6-02

Fat and wax 2-39 2-37

Cellulose 82-57 71-50

Intercellular substance and pectose bodies 2-74 9-41

According to the determinations of Julius Wiesner (Die Rohstoffe des Pflanzenreiches) , the fibre ranges in length from 20 to 140 centi-metres, the length of the individual cells being from 2-0 to 4-0 millimetres, and the limits of breadth between 0-012 and 0-025 mm., the average being 0-016 mm.

Among the circumstances which have retarded improvement both in the growing and preparing of flax, the fact that, till comparatively recent times, the whole industry was conducted only on a domestic scale has had much influence. At no very remote date it was the practice in Scotland for every small farmer and cotter not only to grow “lint” or flax in small patches, but to have it retted, scutched, cleaned, spun, woven, bleached and finished entirely within the limits of his own premises, and all by members or dependents of the family. The same practice obtained and still largely prevails in other countries. Thus the flax industry was long kept away from the most powerful motives to apply to it labour-saving devices, and apart from the influence of scientific inquiry for the improve- ment of methods and processes. As cotton came to the front, just at the time when machine-spinning and power-loom weaving were being introduced, the result was that in many localities where flax crops had been grown for ages, the culture gradually drooped and ultimately ceased. The linen manufacture by degrees ceased to be a domestic industry, and began to centre in and become the characteristic factory employment of special localities, which depended, however, for their supply of raw material primarily on the operations of small growers, working, for the most part, on the poorer districts of remote thinly populated countries. The cultivation of the plant and the preparation of the fibre have therefore, even at the present day, not come under the influence (except in certain favoured localities) of scientific knowledge and experience.

Cultivation. — The approximate number of acres (1905) under cultivation in the principal flax-growing countries is as follows : —

+ 8 ?

FhAM

Russia

. ‘

. 3,500,000

Caucasia

,

450,000

Austria

Italy

120,000

Poland

95,000

Rumania

. . .

80,000

Germany

75.ooo

France

65,000

Belgium

Hungary

Ireland

46,000

Holland

38,000

Although the amount grown in Russia exceeds considerably the combined quantity grown in the rest of the above-mentioned countries, the quality of the fibre is inferior. The fibre is culti- vated in the Russian provinces of Archangel, Courland, Esthonia, Kostroma, Livonia, Novgorod, Pskov, Smolensk, Tver, Vyatka, Vitebsk, Vologda and Yaroslav or Jaroslav, while the bulk of the material is exported through the Baltic ports. Riga and St Petersburg (including Cronstadt) are the principal ports, but flax is also exported from Revel, Windau, Pernau, Libau, Narva and Konigsberg. Sometimes it is exported from Archangel, but this port is frost-bound for a great period of the year; moreover, most of the districts are nearer to the Baltic.

The raw flax is almost invariably known by the same name as (he

district in which it is grown, and it is further classified by

The marks in the Crown flaxes have the following signification ;-ˆ K means Crown and is usually the base mark;

H P G

S W

z

Light and represents a rise of about £1 Picked ‘ „ ‘ ,, ‘„ £3

Grey „ „ ,, £3

Superior „. ,, „ £4

White „ ,, ,, £4

Zins ,, ,, ,, £10

Each additional mark means a rise in the price, but it must be understood that it is quite possible for a quality denoted by two letters to be more valuable than one indicated by three or more, since every mark has not the same value.

If we take £25 as the value of the base mark, the value per ton for the different groups would be : —

K . . . £25 HSPK . . . £33

GSPK . . . £35

WSPK . . . £36

■ ZK £35

HZK . . . £36

GZK . . . £38, &c.

The Hoffs flaxes are reckoned in a similar way. Here H is for Hoffs, D for Drieband, P for picked, F for fine, S for superior, and R for Risten. In addition to these marks, an X may appear before, after or in both places. With £20 as base mark we have : — HD . . . £20 per ton.

HK . .

■ £26

PK. .

• £28

HPK . .

- £29

GPK . .

. £31

SPK . :

• £32

PHD

FPHD

SFPHD

XHDX

XRX

£23 £26

£29 £32 £35

The following Prices, taken from the Dundee Year Books, show the Change in Price of a few

well-known Varieties.

1 — .

Riga—

Dec. 1897.

Dec. 1898.

Dec. 1899.

Dec. 1900.

Dec. 1901.

Dec. 1902.

Dec. 1903.

Dec. 1904.

Dec. 1905.

Dec. 1906.

£

£

£

£

£

£

£

£

£

£

8 SPK . .

23i

21 to 22

28 to 32

42

28 to 32

32

39

33

35

32

XHDX . .

27

26!

32* to 33

43i

34

35

42

34

36

33

W . .

16 to l6J

15J to 16

22 § to 24

31

18 to 19

22

29

23

24

24

St Petersburg—

38

Bajetsky .

28 to 29

26 to 27

32 to 324

46

37

33

, 49

36

42

Jaropol

24 to 25

23 to 234

30

42

32

30

42

33

35

33

Tows—

Mologin .

24 to 24J

23 to 23!

24* to 25

31*

32

32

42

£1

34

32I 34i

Novgorod

1 23$ to 24i

123

l 26 to 26*

33

31*

32*

41

3ii

37

Archangel —

i and f tow .

25

24 to 24I

26 to 27

32

3i

32

41

315

3 2 i

31

2nd Codilla .

25 .

24 to 24J

25J to 26

32

31

32

41

32

33

31

special marks. The following names amongst others are given to the fibre:— Archangel, Bajetsky, Courish, Dorpat, Drogobusher, Dunaberg, Fabrichnoi, Fellin, Gjatsk, Glazoff, Qriazourtz, Iwashkower, Jaransk, Janowitz, Jajropol, Jaroslav, Kama, Kashin, Konigsberg, Kostroma, Kotekiitch, Kowns, Krasno- holm, Kurland (Courland), Latischki, Livonian Crowns, Mal- muish, Marienberg, Mochenetz, Mologin,

Newel, Nikolsky, Nolinsk, Novgorod, Opotchka, Ostroff, Ostrow, Otbornoy, Ouglitch, Pernau, Pskofl, Revel, Riga, Rjeff, St Petersburg, Seretz, Slanitz, Slobodskoi, Smolensk, Sytcheffka, Taroslav, Tchesna, Totma, Twer, Ustjuga, Viatka, Vishni, Vologda, Werro, Wiasma, Witebsk.

These names indicate the particular district in which the flax has been grown, but it is more general to group the material into classes such as Livonian Crowns, Rija Crowns, Hoffs, Wracks, Drieband, Zins, Ristens, Pernau, Archangel, &c.

The quotations for the various kinds of flaxes are made with one or other special mark termed a base mark; this usually, but not necessarily, indicates the lowest quality. The September-October 1906 quotations appeared as under :—

Livonian. . . basis K £26 to £37 per ton,

Hoffs . . . „ HD £21 to £22 Pernau „ D £28 to £28 : 10 „

Dorpat . „ D £32 to £32 : 10

cleaned:

It will, of course, be understood that the base mark is subject to variation, the ruling factors being the amount of crop, quality and demand.

■ >8 and 2, which means 80 % of one quality and 20 / of another. Sometimes other proportions obtain, while it is not unusual to have quotations for flaxes containing four different kinds.

Of the lower qualities of Riga flax the following may be named ;

W, Wrack flax. WPW, White picked wrack. D, Dreiband (Threeband). LD, Livonian Dreiband. SD, Slanitz Dreiband.

PW, Picked wrack flax. GPW, Grey picked wrack flax.

PD, Picked Dreiband flax. PLD, Picked Livonian Dreiband. PSD, Picked Slanitz Dreiband.

The last-named (SD and PSD) are dew-retted qualities shipped from Riga either as Lithuanian Slanitz, Wellish Slanitz or Wiasma Slanitz, showing from what district they come, as there are differences in the quality of the produce of each district. The lowest quality of Riga flax

is marked DW, meaning Dreiband Wrack.

Another Russian port from which a large quantity of flax is im- ported is Pernau, where the marks in use are comparatively few. The leading marks are : —

. LOD, indicating Low Ordinary Dreiband (Threeband). OD, ,, Ordinary Dreiband.

D, ,, Dreiband.

HD, ,, Light Dreiband.

R, ,, Risten.

G, „ Cut.

M, ,, Marienburg.

Pernau flax is shipped as Livonian and Fellin sorts, the latter being the best.

Both dew-retted and water-retted flax are exported from St Peters- burg, the dew-retted or Slanitz flax being marked 1st, 2nd, 3rd and 4th Crown, also Zebrack No. 1 and Zebrack No. 2, while all the Archangel flax is dew-retted.

Some idea of the extent of the Russian flax trade may be gathered from the fact that 233,000 tons were exported in 1905. Out of this quantity a little over 53,000 tons came to the United Kingdom. The Chief British ports for the landing of flax are :— Belfast, Dundee, Leith, Montrose, London and Arbroath, the two former being the chief centres of the flax industry.

The following table, taken from the annual report of the Belfast Flax Supply Association, shows the quantities received from all sources into the different parts of the United Kingdom : —

Year.

Imports to the United

Imports to Trpla nH

Imports to England and

Kingdom.

1. 1 Clttllu .

Scotland.

Tons.

Tons.

Tons.

1895

102,622

33,506

67,116

1896

95,199

36,650

58,549

1897

98,802

37,715

61,087

1898

97,253

34,440

62,813

1899

99.052

40,H5

58,907

1900

7L586

31,563

40,023

1901

75,565

28,785

46,780

1902

73.61 1

29,727

43.884

1903

94,701

38,168

56,533

1904

74,917

33. 02 4

41,893

1905

90,098

40,063

50,035

The extent of flax cultivation in Ireland is considerable, but the acreage has been gradually diminishing during late years. In 1864 it reached the maximum, 301,693 acres; next year it fell to 251,433. After 1869 it declined, there being 229,252 acres in flax crop that year, and only 122,003 in 1872. From this year to 1889 it fluctuated considerably, reaching 157,534 acres in 1880 and dropping to 89,225 acres in 1884. Then for five successive years the acreage was above 108,000. From 1890 to 1905 it only once reached 100,000, while the average in 1903, 1904 and 1905 was a little over 45,000 acres. (T. Wo.)

FLAXMAN, JOHN (1755-1826), English sculptor and draughts- man, was born on the 6th of July 1755, during a temporary residence of his parents at York. The name John was hereditary in the family, having been borne by his father after a forefather who, according to tjie family tradition, had fought on the side of parliament at Naseby, and afterwards settled as a carrier or farmer, or both, in Buckinghamshire. John Flaxman, the father of the sculptor, carried on with repute the trade of a moulder and seller of plaster casts at the sign of the Golden Head, New Street, Covent Garden, London. His wife's maiden name was See, and John was their second son. Within six months of his birth the family returned to London, and in his father's back shop he spent an ailing childhood. His figure was high-shouldered and weakly, the head very large for the body. His mother having died about his tenth year, his father took a second wife, of whom all we know is that her maiden name was Gordon, and that she proved a thrifty housekeeper and kind stepmother. Of regular schooling the boy must have had some, since he is reputed as having remembered in after life the tyranny of some pedagogue of his youth; but his principal education he picked up for himself at home. He early took delight in drawing and modelling from his father's stock-in-trade, and early endeavoured to understand those counterfeits of classic art by the light of translations from classic literature.

Customers of his father took a fancy to the child, and helped him with books, advice, and presently with commissions. The two special encouragers of his youth were the painter Romney, and a cultivated clergyman, Mr Mathew, with his wife, in whose house in Rathbone Place the young Flaxman used to meet the best " blue-stocking "

society of those days, and, among associates of his own age, the artists Blake and Stothard, who became his closest friends. Before this he had begun to work with precocious success in clay as well as in pencil. At twelve years old he won the first prize of the Society of Arts for a medal, and became a public exhibitor in the gallery of the Free Society of Artists; at fifteen he won a second prize from the Society of Arts and began to exhibit in the Royal Academy, then in the second year of its existence. In the same year, 1770, he entered as an Academy student and won the silver medal. But all these successes were followed by a discomfiture. In the competition for the gold medal of the Academy in 1772, Flaxman, who had made sure of victory, was defeated, the prize being adjudged by the president, Sir Joshua Reynolds, to another competitor named Engleheart. But this reverse proved no discouragement, and indeed seemed to have had a wholesome effect in curing the successful lad of a tendency to conceit and self-sufficiency which made Thomas Wedgwood say of him in 1775: “It is but a few years since he was a most supreme coxcomb.”

He continued to ply his art diligently, both as a student in the schools and as an exhibitor in the galleries of the Academy,

occasionally also attempting diversions into the sister art of painting. To the Academy he contributed a wax model of Neptune (1770); four portrait models in wax (1771); a terra- cotta bust, a wax figure of a child, a figure of History (1772); a figure of Comedy, and a relief of a Vestal (1773). During these years he received a commission from a friend of the Mathew family, for a statue of Alexander. But by heroic and ideal work of this class he could, of course, make no regular livelihood. The means of such a livelihood, however, presented themselves in his twentieth year, when he first received employment from Josiah Wedgwood and his partner Bentley, as a modeller of classic and domestic ffiezes, plaques, ornamental vessels and medallion portraits, in those varieties of “jasper” and “basalt ” ware which earned in their day so great a reputation for the manufacturers who had conceived and perfected the invention. In the same year, 1775, John Flaxman the elder moved from New Street, Covent Garden, to a more commodious house in the Strand (No. 420). For twelve years, from his twentieth to his thirty-second (1775-1787), Flaxman subsisted chiefly by his work for the firm of Wedgwood. It may be urged, of the minute refinements of figure outline and modelling which these manu- facturers aimed at in their ware, that they were not the qualities best suited to such a material; or it may be regretted that the gifts of an artist like Flaxman should have been spent so long upon such a minor and half-mechanical art of household decora- tion; but the beauty of the product it would be idle to deny, or

the value of the training which the sculptor by this practice acquired in the delicacies and severities of modelling in low relief and on a minute scale;

By 1780 Flaxman had begun to earn something in another branch of his profession, which was in the future to furnish his chief source of livelihood, viz. the sculpture of monuments for the dead. Three of the earliest of such monuments by his hand are those of Chatterton in the church of St Mary Redcliffe at Bristol (1780), of Mrs Morley in Gloucester cathedral (1784), and of the Rev. 1*. and Mrs Margaret Ball in the cathedral at Chichester (1785). During the rest of Flagman's career memorial bas-reliefs of the same class occupied a principal part of his industry; they are to be found scattered in many cbtirches throughout the length and breadth of England, and in them the finest qualities of his art are represented. The best are admirable for pathos and simplicity, and for the alliance of a truly Greek instinct for rhythmical design and composition with that spirit of domestic tenderness and innocence which is one of the secrets of the modern soul.

In 1782, being twenty-seven years old, Flaxman was married' to Anne Denman, and had in her the best of helpmates until almost his life's end. She was a woman of attainments in letters and to some extent in art, and the devoted companion of her' husband's fortunes and of his travels. They set up house at first in Wardour Street, and lived an industrious life, spending their summer holidays once and again in the house of the hospitable poet Hayley, at Eartham in Sussex. After five years, in 1787, they found themselves with means enough to travel, and set out for Rome, where they took up their quarters in the Via Felice. Records more numerous and more consecutive of Flaxmair's residence in Italy exist in the shape of drawings and studies than in the shape of correspondence. He soon ceased modelling himself for Wedgwood, but continued to direct the work of other modellers employed for the manufacture at Rome. He had intended to return after a stay of a little more than two years, but was detained by a commission for a marble group of a Fury of Athamas, a commission attended in the sequel with circum- stances of infinite trouble and annoyance, from the notorious Comte-Eveque, Frederick Hervey, earl of Bristol and bishop of Derry. He did not, as things fell out, return until the summer' of 1 794, after an absence of seven years,— having in the meantime executed another ideal commission {a " Cephalus and Aurora ") for Mr Hope, and having sent home models for several sepulchral monuments, including one in relief for the poet Collins in Chichester cathedral, and one in the round for Lord Mansfield in Westminster Abbey.

But what gained for Flaxman in this interval a general and European fame was not his work in sculpture proper, but those outline designs to the poets, in which he showed not only to what purpose he had made his own the principles of ancient design in vase-paintings and bas-reliefs, but also by what a natural affinity, better than all mere learning, he was bound to the ancients and belonged to them. The designs for the Iliad and Odyssey were commissioned by Mrs Hare Naylor; those for Dante by Mr Hope; those for Aeschylus by Lady Spencer; they were all engraved by Piroli, not without considerable loss of the finer and more sensitive qualities of Flaxman's own lines.

During their homeward journey the Flaxmans travelled through central and northern Italy. On their return they took a house, which they never afterwards left, in Buckingham Street, Fitzroy Square. Immediately afterwards we find the sculptor publishing a spirited protest against the scheme already enter- tained by the Directory, and carried out five years later by Napoleon, of equipping at Paris a vast central museum of art with the spoils of conquered Europe.

The record of Flaxman's life is henceforth an uneventful record of private affection and contentment, and of happy and tenacious industry, with reward not brilliant but sufficient, and repute not loud but loudest in the mouths of those whose praise was best worth having — Canova, Schlegel, Fuseli. He took for pupil a son of Hayley's, who presently afterwards sickened and died. In 1797 he was made an associate of the Royal Academy. Every year he exhibited work of one class or another: occasionally a public monument in the round, like those of Paoli (1798), or Captain Montague (1802) for Westminster Abbey, of Sir William Jones for St Mary's, Oxford (1797-1801), of Nelson or Howe for St Paul's; more constantly memorials for churches, with symbolic Acts of Mercy or illustrations of Scripture texts, both commonly in low relief [Miss Morley, Chertsey (1797), Miss Cromwell, Chichester (1800), Mrs Knight, Milton, Cambridge (1802), and many more]; and these pious labours he would vary from time to time with a classical piece like those of his earliest predilection. Soon after his election as associate, he published a scheme, half grandiose, half childish, for a monument to be erected on Green- wich Hill, in the shape of a Britannia 200 ft. high, in honour of the naval victories of his country. In 1800 he was elected full Academician. During the peace of Amiens he went to Paris to see the despoiled treasures collected there, but bore himself according to the

spirit of protest that was in him. The next event which makes any mark in his life is his appointment to a chair specially created for him by the Royal Academy — the chair of Sculpture: this took place in 1810. We have ample evidence of his thoroughness and judiciousness as a teacher in the Academy schools, and his professorial lectures have been often reprinted. With many excellent observations, and with one singular merit — that of doing justice, as in those days justice was hardly ever done, to the sculpture of the medieval schools — these lectures lack point and felicity of expression, just as they are reported to have lacked fire in delivery, and are somewhat heavy reading. The most important works that occupied Flaxman in the years next following this appointment were the monument to Mrs Baring in Micheldever church, the richest of all his monuments in relief (1805-1811); that for the Worsley family at Campsall church, Yorkshire, which is the next richest; those to Sir Joshua Reynolds for St Paul's (t8o7), to Captain Webbe for India (1810); to Captains Walker and Beckett for Leeds (181 1); to Lord Cornwallis for Prince of Wales's Island (1812); and to Sir John Moore for Glasgow (1813). At this time the antiquarian world was much occupied with the vexed question of the merits of the Elgin marbles, and Flaxman was one of those whose evidence before the parliamentary commission had most weight in favour of the purchase which was ultimately effected in 1816.

After his Roman period he produced for a good many years no outline designs for the engraver except three for Cowper's translations of the Latin poems of Milton (1810). Other sets of outline illustrations drawn about the same time, but not published, were one to the Pilgrim's Progress, and one to a

Chinese tale in verse, called " The Casket," which he wrote to amuse his womenkind. In 181 7 we find him returning to his old practice of classical outline illustrations and publishing the happiest of all his series in that kind, the designs to Hesiod, excellently engraved by the sympathetic hand of Blake. Im- mediately afterwards he was much engaged designing for the goldsmiths — a testimonial cup in honour of John Kemble, and following that, the great labour of the famous and beautiful (though quite un-Homeric) " Shield of Achilles!" Almost at the same time he undertook a frieze of " Peace, Liberty and Plenty," for the duke of Bedford's sculpture gallery at Woburn, and an heroic group of Michael overthrowing Satan, for Lord Egremont's house at Petworth. Flis literary industry at the same time is shown by several articles on art and archaeology contributed to Rees's Encyclopaedia (1819-1820).

In 1820 Mrs Flaxman died, after a first warning from paralysis six years earlier. Her younger sister, Maria Denman, and the sculptor's own sister, .Maria Flaxman, remained in his house, and his industry was scarcely at all relaxed. In 1822 he delivered at the Academy a lecture in memory of his old friend and generous fellow-craftsman, Canova, then lately dead; in 1823 he received from A. W. von Schlegel a visit of which that writer has left us the record. From an illness occurring soon after this he recovered sufficiently to resume both work and exhibition, but on the 3rd of December 1826 he caught cold in church, and died four days later, in his seventy-second year. Among a few intimate associates, he left a memory singularly dear; having been in companionship, although susceptible and obstinate when his religious creed — a devout Christianity with Swedenborgian admixtures — was crossed or slighted, yet in other things genial and sweet-tempered beyond most men, full of modesty and playfulness and withal of a homely dignity, a true friend and a kind master, a pure and blameless spirit.

Posterity will doubt whether it was the fault of Flaxman or of his age, which in England offered neither training nor much encouragement to a sculptor, that he is weakest when he is most ambitious, and most inspired when he makes the least effort; but so it is. Not merely does he fail when he seeks to illustrate the intensity of Dante, or to rival the tumultuousness of Michelangelo — to be intense or tumultuous he was never made; but he fails, it may almost be said, in proportion as his work is elaborate and far carried, and succeeds in proportion as it is partial and suggestive. Of his completed ideal sculptures, the " St Michael " at Petworth is the best, and is indeed admirably composed from all points of view; but it lacks fire and force, and it lacks the finer touches of the chisel; a little bas-relief like the diploma piece of the " Apollo " and " Marpessa " in the Royal Academy compares with it favourably. This is one of the very few things which he is recorded to have executed in the marble entirely with his own hand; ordinarily he entrusted the finishing work of the chisel to the Italian workmen in his employ, and was content with the smooth mechanical finish which they imitated from the Roman imitations (themselves often reworked at the Renaissance) of Greek originals. Of Flaxman's com- plicated monuments in the round, such as the three in West- minster Abbey and the four in St Paul's, there is scarcely one which has not something heavy and infelicitous in the arrange- ment, and something empty and unsatisfactory in the surface execution. But when we come to his simple monuments in relief, in these we find almost always a far finer quality. The truth is that he did not thoroughly understand composition on the great scale and in the round, but he thoroughly

understood relief, and found scope in it for his remarkable gifts of harmonious design, and tender, grave and penetrating feeling. But if we would see even the happiest of his conceptions at their best, we must study them, not in the finished marble but rather in the casts from his studio sketches (marred though they have been by successive coats of paint intended for their protection) of which a comprehensive collection is preserved in the Flaxman gallery at University College And the same is true of his happiest efforts in the classical and poetical vein, like the well- known rcl'cf of " Pandora conveyed to Earth by Mercury." Nay,

going farther back still among the rudiments and first concep- tions of his art, we can realize the most essential charm of his genius in the study, not of his modelled work at all, but of his sketches in pen and wash on paper. Of these the principal public collections are at University College, in the British Museum, and the Victoria & Albert Museum; many others are dispersed in public and private cabinets. Every one knows the excellence of the engraved designs to Homer, Dante, Aeschylus and Hesiod, in all cases save when the designer aims at that which he cannot hit, the terrible or the grotesque. To know Flaxman at his best it is necessary to be acquainted not only with the original studies for such designs as these (which, with the excep- tion of the Hesiod series, are far finer than the engravings), but still more with those almost innumerable studies from real life which he was continually producing with pen, tint or pencil. These are the most delightful and suggestive sculptor's notes in existence; in them it was his habit to set down the leading and expressive lines, and generally no more, of every group that struck his fancy. There are groups of Italy and London, groups of the parlour and the nursery, of the street, the garden and the gutter; and of each group the artist knows how to seize at once the structural and the spiritual secret, expressing happily the value and suggestiveness, for his art of sculpture, of the contacts, intervals, interlacements and balancings of the various figures in any given group, and not less happily the charm of the affections which link the figures together and inspire their gestures.

The materials for the life of Flaxman are scattered m various bio- graphical and other publications ; the principal are the following : — ■ An anonymous sketch in the European Magazine for 1823 ; an anony- mous " Brief Memoir," prefixed to Flaxman s Lectures (ed. 1829, and reprinted in subsequent editions) ; the chapter in Allan

Cunningham's Lives of the Most Eminent British Painters, &c, vol. iii.; notices in the Life of Nollekens, by John Thomas Smith ; in the Life of Josiah Wedgwood, by Miss G. Meteyard (London, 1865) ; in the Diaries and Reminiscences of H. Crabbe Robinson (London, 1869), the latter an authority of great importance ; in the Lives of Stothard.by Mrs Bray, of Constable, by Leslie, of Watson, by Dr Lonsdale, and of Blake, by Messrs Gilchrist and Rossetti ; a series of illustrated essays, princi- pally on the monumental sculpture of Flaxman, in the Art. Journal for 1867 and 1868, by Mr G. F. Teniswood; Essays in English Art, by Frederick Wedmore; The Drawings of Flaxman, in 32 plates, with Descriptions, and an Introductory Essay on the Life and Genius of Flaxman, by Sidney Colvin (London, 1876); and the article " Flaxman " in the Dictionary of National Biography. (S. C.)

FLEA (0. Eng. fleah, or JlSa, cognate with flee, to run away from, to take flight), a name typically applied to Pulex irritans, a well-known blood-sucking insect-parasite of man and other mammals, remarkable for its powers of leaping, and nearly cosmopolitan. In ordinary language the name is used for any species of Siphonaptera (otherwise known as Aphaniptera), which, though formerly regarded as a suborder of Diptera (q.v.), are now considered to be a separate order of insects. All Siphonaptera, of which more than 100 species are known, are parasitic on mammals or birds. The majority of the species belong to the family Pulicidae, of which P. irritans may be taken as the type; but the order also includes the Sarcopsyllidae, the females of which fix themselves firmly to their host, and the Ceratopsyllidae, or bat-fleas.

Fleas are wingless insects, with a laterally compressed body, small and indistinctly separated head, and short thick antennae situated in cavities somewhat behind and above the simple eyes, which are always minute and sometimes absent. The structure of the mouth-parts is different from that seen in any other insects. The actual piercing organs are the mandibles, while the upper lip or labrum forms a sucking tube. The maxillae are not pierc- ing organs, and their function is to protect the mandibles and labrum and separate the hairs or feathers of the host. Maxillary and labial palpi are also present, and the latter, together with the labrum or lower lip, form the rostrum.

Fleas are oviparous, and undergo a very complete metamor- phosis. The footless larvae are elongate, worm-like and very active; they feed upon almost any kind of waste animal matter, and when full-grown form a silken cocoon. The human flea is considerably exceeded in size by certain other species found

upon much smaller hosts; thus the European Hystrichopsylla talpae, a parasite of the mole, shrew and other small mammals, attains a length of 5ˆ millimetres; another large species infests the Indian porcupine. Of the Sarcopsyllidae the best known species is the ” jigger ” or ” chigoe ” {Dermatophilus penetrans), indigenous in tropical South America and introduced into West Africa during the second half of last century. Since then this pest has spread across the African continent and even reached Madagascar. The impregnated female jigger burrows into the feet of men and dogs, and becomes distended with eggs until its abdomen attains the size and appearance of a small pea. If in extracting the insect the abdomen be ruptured, serious trouble may ensue from the resulting inflammation. At least four species of fleas (including Pulex irritans) which infest the common rat are known to bite man, and are believed to be thf active agents in the transmission of plague from Tats to human beings. (E. E. A.)

FLECHE (French for ” arrow “), the term generally used in French architecture for a spire, but more especially employed to designate the timber spire covered with lead, which was erected over the intersection of the roofs over nave and transepts; sometimes these were small and unimportant, but in cathedrals they were occasionally of large dimensions, as in the fleche of Notre-Dame, Paris, where it is nearly 100 ft. high; this/however, is exceeded by the example of Amiens cathedral, which measures 148 ft. from its base on the cresting to its finial.

FLECHIER, ESPRIT (1632-1710), French preacher and author, bishop of Nimes, was born at Pernes, department of Vaucluse, on the 10th of June 1632. He was brought up at Tarascon by his uncle, Hercule Audiffret, superior of the Congregation des Doctrinaires, and afterwards entered the order. On the death of his uncle, however, he left it, owing to the strictness of its rules, and went to Paris, where he devoted himself to writing poetry. His French poems met with little success, but a description in Latin verse of a tournament {carrousel, circus regius), given by Louis XIV. in 1662, brought him a great reputation. He subsequently became tutor to Louis Urbain Lefevre de Cau- martin, afterwards intendant of finances and counsellor of state, whom he accompanied to Clermont-Ferrard (q.v.), where the king had ordered the Grands Jours to be held (1665), and where Caumartin was sent as representative of the sovereign. There Flechier wrote his . curious Memoir es sur les Grand Jours tenus a Clermont, in which he relates, in a half romantic, half historical form, the proceedings of this extraordinary court of justice. In 1668 the duke of Montausisr procured for him the post of lecteur to the dauphin. The sermons of Flechier increased his. reputation, which was afterwards raised to the

highest pitch by his funeral orations. The most important are those on Madame de Montausier (1672), which gained him the membership of the Academy, the duchesse d'Aiguillon (1675), and, above all, Marshal Turenne (1676). He was now firmly established in the favour of the king, who gave him successively the abbacy of St Severin, in the diocese of Poitiers, the office of almoner to the dauphiness, and in 1685 the bishopric of Lavaur, from which he was in .1687 promoted to that of Nimes. The edict of Nantes had been repealed two years before; but the Calvinists were still very numerous at Nimes. Flechier, by his leniency and tact, succeeded in bringing over some of them to his views, and even gained the esteem of those who declined to change their faith. During the troubles in the Cevennes (see Huguenots) he softened i to' the utmost of his power the rigour of the edicts, and showed himself so indulgent even to what he regarded as error, that his memory was long held in veneration amongst the Protestants of that district. It is right to add, however, that some authorities consider the accounts of his leniency to have been greatly exaggerated, and even charge him with going beyond what the edicts permitted. He died at Montpellier on the 16th of February 1 7 10. Pulpit eloquence is the branch of belles-lettres in which Flechier excelled. He is indeed far below Bossuet, whose robust and sublime genius had no rival in that age; he does not equal Bourdaloue in earnestness of thought and vigour of expression; nor can he rival the philosophical depth or the insinuating and

impressive eloquence of Massillon. But he is always ingenious, often witty, and nobody has carried farther than he the harmony of diction, sometimes marred by an affectation of symmetry and an excessive use of antithesis. His two historical works, the histories of Theodosius and of Ximenes, are more remarkable for elegance Of style than for accuracy and comprehensive insight.

The last complete edition of Flechier's works is by J. P. Migne (Paris, 1856) ; the Memoires sur les Grands Jours was first published in 1844 by B. Gonod (2nd ed. as Mem. sur les Gr. J.d'Auvergne, with notice by Sainte-Beuve and an appendix by M. Cheruel, 1862). His chief works are : Histoire de Theodose le Grand, Oraisons funebres, Histoire du Cardinal Ximenes, Sermons de morale, Panegyriques des saints. He left a portrait or caractere of himself, addressed to one of his friends. The Life of Theodosius has been translated into English by F. Manning (1693), and the "Funeral Oration of Marshal Turenne " in H. C. Fish's

History and Repository of Pulpit Eloquence (ii., 1857). On Flechier generally see Antonin V, D. Fabre, La Jeunesse de Flechier (1882), and Adolphe Fabre, Flechier, orateur (1886) ; A. Delacroix, Hist, de Flechier (i86£),

FLECKEISEN, CARL FRIEDRICH WILHELM ALFRED

(1820-1899), German philologist and critic, was born at Wolfen-biittel on the 23rd of September 1820. He was educated at the Helmstedt gymnasium and the university of Gottingen. After holding several educational posts, he was appointed in 1861 to the vice-principalship of the Vitzthum 'sch.es Gymnasium at Dresden, which he held till his retirement in 1889. He died on the 7th of August 1899. Fleckeisen is chiefly known for his labours on Plautus and Terence; in the knowledge of these authors he was unrivalled, except perhaps by Ritschi, his life- long friend and a worker in the same field. His chief works are: Exercitationes Plautinae (1842), one of the most masterly pro- ductions on the language of Plautus; " Analecta Plautina," printed in Philologus, ii. (1847); Plauti Comoediae, i., ii. (1850- 185 1, unfinished), introduced by an Epiptula critica ad F. Ritschelium; P. Terenti Afri Comoediae (new ed., 1898). In bis editions he endeavoured to restore the text in accordance with the results of his researches on the usages of the Latin language and metre. He attached great importance to the ques- tion of orthography, and his short treatise Fiinfzig Artikel (1861) is considered most valuable. Fleckeisen also contributed, largely to the Jahrbucher fiir Philologie, of which he was for many years editor.

See obituary notice by G. Gotz in C. Bursian's Biographisches Jahrbuchfiir Altertumskunde (xxiii., 1901), and article by H. Usener in Ailgemeine deutsche Biographic (where the date of birth is given as the 20th of September).

FLECKNOE, RICHARD (c. 1600-1678?), English dramatist and poet, the object of Dryden's satire, was probably of English birth, although there is no corroboration of the suggestion of J. Gillow (Bibliog. Diet, of the Eng. Catholics, vol. ii., 1885), that he was a nephew of a Jesuit priest, William Flecknoe, or more properly Flexney, of Oxford. The few known facts of his life are chiefly derived from his Relation of Ten Years' Travels in Europe, Asia, Ajfrique and America (1655?), consisting of letters written to friends and patrons during his travels. The first of these is dated from Ghent (1640), whither he had fled to escape the troubles of the Civil War. In Brussels he met Beatrix de Cosenza, wife of Charles IV., duke of Lorraine, who sent him to Rome to secure the legalization of her marriage. There in 1645 Andrew

Marvell met him, and described his leanness and his rage for versifying in a witty satire, ” Flecknoe, an English Priest at Rome.” He was probably, however, not in priest’s orders. He then travelled in the Levant, and in 1648 crossed the Atlantic to Brazil, of which country he gives a detailed description. On his return to Europe he entered the household of the duchess of Lorraine in Brussels. In 1645 he went back to England. His royalist and Catholic convictions did not prevent him from writing a book in praise of Oliver Cromwell, The Idea of His Highness Oliver . . . (1659), dedicated to Richard Cromwell. This publication was discounted at the restoration by the Heroick Portraits (1660) of Charles IL and others of the Stuart family. John Dryden used his name as a stalking horse from behind which to assail Thomas Shadwell in Mac Flecknoe (1682). The opening lines run: —

” All human things are subject to decay, And,, when fate summons, monarchs must obey. This Flecknoe found, who, like Augustus, young Was called to empire, and had governed long ; In prose and verse was owned, without dispute, Throughout the realms of nonsense, absolute.”

Dryden’s aversion seems to have been caused by Flecknoe’s affectation of contempt for the players and his attacks on the. immorality of the English stage. His verse, which hardly deserved his critic’s sweeping condemnation, was much of it religious, and was chiefly printed for private circulation. None of his plays was acted except Love’s Dominion, announced as a I’ pattern for the reformed stage ” (1654), that title being altered in 1664 to Love’s Kingdom, with a Discourse of the English Stage. He amused himself, however, by adding lists of the actors whom he would have selected for the parts, had the plays been staged. Flecknoe had many connexions among English Catholics, and is said by Gerard Langbaine, to have been better acquainted with the nobility than with the muses. He died probably about

1678.

A Discpurse of the English Stage, was reprinted in W. C. Hazlitt’s English Drama and Stage (Roxburghe Library, 1869); Robert Southey, in his Omniana (1812), protested against the wholesale depreciation of Flecknoe’s works. See also ” Richard Flecknoe ” (Leipzig, 1905, in Miinchener Beitrdge zur . . . Philologie), by A. Lohr, who has given minute attention to his life and works. i

FLEET, a word in all its significances, derived from the root of the verb ” to fleet,” from O. Eng. fleotan, to float or flow, ‘ which ultimately derives from an Indo-European root seen in Gr. irXfeiv, to

sail, and Lat. pluere, to rain; cf . Dutch vliessen, and Ger.ftiessen. In English usage it survives in the name of many places, such as By fleet and Northfleet, and in the Fleet, a stream in London that formerly ran into the Thames between the bottom of Ludgate Hill and the present Fleet Street. From the idea of ” float ” comes the application of the word to ships, when in company, and particularly to a large number of warships under the supreme command of a single officer, with the individual ships, or groups of ships, under individual and sub-ordinate command. The distinction between a fleet and a squadron is often one of name only. In the British navy the various main divisions are or have been called fleets and squadrons indifferently. The word is also frequently used of a company of fishing vessels, and in fishing is also applied to a row of drift-nets fastened together. From the original meaning of the word ’” flowing ” comes the adjectival use of the word, swift, or speedy; so also ” fleeting,” of something evanescent or fading away, with the idea of the fast-flowing lapse of time.

FLEET PRISON, an historic London prison, formerly situated on the east side of Farringdon Street, and deriving its name from the Fleet stream, which flowed into the Thames. Concerning its early history little is known, but it certainly dated back to Norman times. It came into particular prominence from being used as a place of reception for persons committed by the Star Chamber, and, afterwards, for debtors, and persons imprisoned for contempt of court by the court of chancery. It was burnt down in the great fire of 1666; it was rebuilt, but was destroyed in the Gordon riots of 1780 and again rebuilt in 1781-1782. In pursuance of an act of parliament (5 & 6 Vict. c. 22, 1842), by which the Marshalsea, Fleet, and Queen’s Bench prisons were consolidated into one under the name of Queen’s prison, it was finally closed, and in 1844 sold to the corporation of the city of London, by whom it was pulled down. The head of the prison was termed ” the warden,” who was appointed by patent. It became a frequent practice of the holder of the patent to ” farm out ” the prison to the highest bidder. It was this custom which made the Fleet prison long notorious for the cruelties inflicted on prisoners. One purchaser of the office was of particularly evil repute, by name Thomas Bambridge, who in 1728 paid, with another, the sum of £5000 to John Huggins for the warden- ship. He was guilty of the greatest extortions upon prisoners, and, in the words of a committee of the House of Commons appointed to inquire into the state of the gaols of the kingdom, ” arbitrarily and unlawfully loaded with irons, put into dungeons,

and destroyed prisoners for debt, treating them in the most barbarous and cruel manner, in high violation and contempt of the laws of this kingdom.” He was committed to Newgate, and an act was passed to prevent his enjoying the office of warden or any other office whatsoever. The liberties or rules of the Fleet were the limits within which particular prisoners were allowed to reside outside the prison walls on ohserying certain conditions.

Fleet Marriages.— By the law of England a marriage was recognized as valid, so long as the ceremony was conducted by a person in holy orders, even if those orders were not of the Church of England. Neither banns nor > licence were necessary, and the time and place were alike immaterial. Out of this state of the marriage law, in the period of laxness which succeeded the Commonwealth, resulted innumerable clandestine marriages. They were contracted at first to avoid the expenses attendant on the public ceremony, but an act of 1696, which imposed a penalty of £100 on any clergyman who celebrated, or permitted another to celebrate, a marriage otherwise than by banns or licence, acted as a considerable check. To clergymen imprisoned for debt in the Fleet, however, such a penalty had no terrors, for they had ” neither liberty, money nor credit to lose by any proceedings the bishop might institute against them.” The earliest recorded date of a Fleet marriage is 1613, while the earliest recorded in a Fleet register took place in 1674, but it was only on the prohibition of marriage without banns or licence that they began to be clandestine. Then arose keen competition, and ” many of the Fleet parsons and tavern-keepers in the neighbourhood fitted up a room in their respective lodgings or houses as a chapel,” and employed touts to solicit custom for them. The scandal and abuses brought about by these clan- destine marriages became so great that they became the object of special legislation. In 1753 Lord Hardwicke’s Act (26 Geo. ii. c. 33) was passed, which required, under pain of nullity, that banns should be published according to the rubric, or a licence obtained, and that, in either case, the marriage should be solemnized in church; and that in the case of minors, marriage by licence must be by the consent of parent or guardian. This act had the effect of putting a stop to these clandestine marriages, so far as England was concerned, and henceforth couples had to fare to Gretna Green (q.v.).

The Fleet Registers, consisting of ” about two or three hundred large registers ” and about a thousand rough or ” pocket ” books, eventually came into private hands, but were purchased by the government in 1821, and are now deposited in the office of the registrar-general,’

Somerset House. Their dates range from 1686 to 1754. In 1840 they were declared not admissible as evidence to prove a marriage.

Authorities. — J. S. Burn, The Fleet Registers; comprising the History of Fleet Marriages, and some Account of the Parsons and Marriage-house Keepers, &c. (London, 1833); J. Ashton, The Fleet: its River, Prison and Marriages (London, 1

FLEETWOOD, CHARLES (d. 1692), English soldier and politician, third son of Sir Miles Fleetwood of Aldwinkle, Northamptonshire, and of Anne, daughter of Nicholas Luke of Woodend, Bedfordshire, was admitted into Gray's Inn on the 30th of November 1638. At the beginning of the Great Rebellion, like many other young lawyers who afterwards distinguished themselves in the field, he joined Essex's life-guard, was wounded at the first battle of Newbury, obtained a regiment in 1644 and fought at Naseby. He had already been appointed receiver of the court of wards, and in 1646 became member of parliament for Marlborough. In the dispute between the army and parlia- ment he played a chief part, and was said to have been the principal author of the plot to seize King Charles at Holmby, but he did not participate in the king's trial. In 1649 he was appointed a governor of the Isle of Wight, and in 1650, as lieutenant-general of the horse , took part in Cromwell's campaign in Scotland and assisted in the victory of Dunbar. The next year he was elected a member of the council of state, and being recalled from Scotland was entrusted with the command of the forces in England, and played a principal part in gaining the

final triumph at Worcester. In 1652 he married 1 Cromwell's daughter, Bridget, widow of Ireton, and was made commander- in-chief in Ireland, to which title that of lord deputy was added. The chief feature of his administration, which lasted from September 1652 till September 1655, was the settlement of r the soldiers on the confiscated estates and the transplantation of the original owners, which he carried out ruthlessly. He showed also great severity in the prosecution of the Roman Catholic priests, and favoured the Anabaptists and the extreme Puritan sects to the disadvantage of the moderate Presbyterians, exciting great and general discontent, a petition being finally sent in for. his recall.

Fleetwood was a strong and unswerving follower of Cromwell's policy. He supported his assumption of the protectorate and his dismissal of the parliaments. In December 1654 he became a member of the council, and after his return to England in 1655 was appointed one of the major-generals. He approved of the " Petition and Advice," only

objecting to the conferring of the title of king on Cromwell; became a member of the new House of Lords; and supported ardently Cromwell's foreign policy in Europe, based on religious divisions, and his defence of the Protestants persecuted abroad. He was therefore, on Cromwell's death, naturally regarded as a likely successor, and it is said that Cromwell had in fact so nominated him. He, however, gave his support to Richard's assumption of office, but allowed subsequently, if he did not instigate, petitions from the army demanding its independence, and finally compelled Richard by force to dissolve parliament. His project of re-establishing Richard in close dependence upon the army met with failure, and he was obliged to recall the Long Parliament on the 6th of May 1659. He was appointed immediately a member of the committee of safety and of the council of state, and one of the seven commissioners for the army, while on the 9th of June he was nominated commander-in-chief. In reality, however, his power was undermined and was attacked by parliament, which on the nth of October declared his commission void. The next day he assisted Lambert in his expulsion of the parliament and was reappointed commander-in-chief. On Monk's approach from the North, he stayed in London and maintained order. While hesitating with which party to ally his forces, and while on the point of making terms with the king, the army on the 24th of December restored the Rump, when he was deprived of his command and ordered to appear before parliament to answer for his conduct. The Restoration therefore took place without him. He was included among the twenty liable to penalties other than capital, and was finally incapacitated from holding any office of trust. His public career then closed, though he survived till the 4th of October 1692.

FLEETWOOD, WILLIAM (1656-1723), English divine, was descended of an ancient Lancashire family, and was born in the Tower of London on New Year's Day 1656. He received his education at Eton and at King's College, Cambridge. About the time of the Revolution he took orders, and was shortly afterwards made rector of St Austin's, London, and lecturer of St Dunstan's in the West. He became a canon of Windsor in 1702, and in 1708 he was nominated to the see of St Asaph, from which he was translated in 17 14 to that of Ely. He died at Tottenham, Middlesex, on the 4th of August 1723. Fleetwood was regarded as the best preacher of his time. He was accurate in learning, and effective in delivery, and his character stood deservedly high in general estimation. In episcopal administra- tion he far excelled most of his contemporaries. He was a zealous Hanoverian, and a favourite with Queen Anne in spite of his Whiggism. His opposition to the doctrine of non-resistance brought him into conflict with the tory

ministry of 17 12 and with Swift, but he never entered into personal controversy.

His principal writings are — An Essay on Miracles (1701) ; Chroni cum preciosum (an account of the English coinage, 1707); and Free Sermons (1712), containing discourses on the death of Queen Mary,

1 He had lost his first wife, Frances Smith; and later he had a third wife, Mary, daughter of Sir John Coke and widow of Sir Edward Hartopp.

the duke of Gloucester and King William. The preface to this last was condemned to public burning by parliament, but, as No. 384 of The Spectator, circulated more widely than ever. A collected edition of his works, with a biographical preface, was published in

1737-

FLEETWOOD, a seaport and watering-place in the Blackpool parliamentary division of Lancashire, England, at the mouth of the Wyre; 230 m. N.W. by N. from London, the terminus of a joint branch of the London & North- Western and Lancashire & Yorkshire railways. Pop. (1891) 9274; (1901) 12,082. It dates its rise from 1836, and takes its name from Sir Peter Hesketh Fleetwood, by whom it was laid out. The seaward views, especially northward over Morecambe Bay, are fine, but the neighbouring country is flat and of little interest. The two railways jointly are the harbour authority. The dock is provided with railways and machinery for facilitating traffic, including a large grain elevator. The shipping traffic is chiefly in the coasting and Irish trade. Passenger steamers serve Belfast and Londonderry regularly, and the Isle of Man and other ports during the season. The fisheries are important, and there are salt-works in the neighbourhood. There is a pleasant promenade, with other appointments of a watering-plice. There are also barracks with a military hospital and a rifle range. Rossall school, to the S.W., is one of the principal public schools in the north of England. Rossall Hall was the seat of Sir Peter Fleetwood, but was converted to the uses of the school on its foundation in 1844. The school is primarily divided into classical and modern sides, with a special department for preparation for army, navy or professional examinations. A number of entrance scholarships and leaving scholarships tenable at the universities are offered annually. The

number of boys is about 350.

FLEGEL, EDWARD ROBERT (1855-1886), German traveller in West Africa, was born on the 1st of October 1855 at Wilna, Russia. After receiving a commercial education he obtained in 1875 a position in Lagos, West Africa. In 1879 he ascended the Benue river some 125 m. above the farthest point hitherto reached. His careful survey of the channel secured him a commission from the German African Society to explore the whole Benue district. In 1880 he went up the Niger to Gorriba, and then visited Sokoto, where he obtained a safe-Conduct from the sultan for his intended expedition to Adamawa. This expedition was undertaken in 1882, and on the iSth of August in that year Flegel discovered the source of the Benue at Ngaundere. In 1883-1884 he made another journey up the Benue, crossing for the second time the Benue-Congo watershed. After a short absence in Europe Flegel returned to Africa in April 1885 with a commission from the German African Company and the Colonial Society to open up the Niger-Benue district to German trade. This expedition had the support of Prince Bismarck, whp endeavoured, unsuccessfully, to obtain for Germany this region, already secured as a British sphere cf influence by the National African Company (the Royal Niger Company). Flegel, despite a severe illness, ascended the Benue to Yola, but was unable to accomplish his mission. He returned to the coast and died at Brass, at the mouth of the Niger, on the nth of September 1886. (See further Goldie, Sir George.)

Flegel wrote Lose Blatter aus dem Tagebuche meiner Hattssaajreunde (Hamburg, 1885), and Vom Niger-Benue. Briefe aus Afrika (edited by K. Flegel, Leipzig, 1890).

FLEISCHER, HEINRICH LEBERECHT (1801-1888), German Orientalist, was born at Schandau, Saxony, on the 21st of February 1801. From 1819 to 1824 he studied theology and oriental languages at Leipzig, subsequently continuing his studies in Paris. In 1836 he was appointed professor of oriental languages at Leipzig University, and retained this post till his death. His most important works wete editions of Abulfeda's Historia ante-Islamica (1831-1834), and of Beidhawi's Com- mentary on the Koran (1846- 1848). He compiled a catalogue of the oriental MSS. in the royal library at Dresden (1831); published an edition and German translation of Ali's Hundred Sayings (1837); the continuation of Babicht's edition of The Thousand and One Nights (vols, ix.-xii., 1842-1843); and an

edition of Mahommed Ibrihim's Persian Grammar (1847). He also wrote an account of the Arabic, Turkish and Persian MSS. at the town

library in Leipzig. He died there on the 10th of February 1888. Fleischer was one of the eight foreign members of the French Academy of Inscriptions and a knight of the German Ordre pour le merite.

FLEMING, PAUL (1609- 1 640), German poet, was born at Hartenstein in the Saxon Erzgebirge, on the 5th of October 1609, the son of the village pastor. At the age of fourteen he was sent to school at Leipzig and subsequently studied medicine at the university. Driven away by the troubles of the Thirty Years' War, he was fortunate enough to become attached to an embassy despatched in 1634 by Duke Frederick of Holstein- Gottorp to Russia and Persia, and to which the famous traveller Adam Olearius was secretary. In 1639 the mission returned, to Reval, and here Fleming, having become betrothed, determined to settle as a physician. He proceeded to Leiden to procure a doctor's diploma, but died suddenly at Hamburg on his way home on the 2nd of April 1640.

Though belonging to the school of Martin Qpitz, Fleming is distinguished from most of his contemporaries by the ring of genuine feeling and religious fervour that pervades his lyric poems, even his occasional pieces. In the sonnet, his favourite form of verse, he was particularly happy. Among his religious poems the hymn beginning " In alien meinen Taten lass ich den Hochsten raten " is well known and widely sung.

Fleming's Teutsche Poemata appeared posthumously in 1642'; they are edited by J. M. Lappenberg, in the Bibliothek des littera- rischen Vereins (2 vols., 1863; a third volume, 1866, contains Fleming's Latin poems) . Selections have been edited by J . Tittmann in the second volume of the series entitled Deutsche Dichter des sieb- zehnten Jahrhunderti r (Leipzig, 1870), and by H. Osterley (Stuttgart, 1885). A life of the poet will be found in Varnhagen von Ense's Biographische Denkmale, Bd. iv. (Berlin, 1 826) . See also J . Straumer, Paid Flemings Leben und Orientreise (1892); L. G. Wysocky, De Pauli Flemingi Germanice scriplis et ingenio (Paris, 1892).

FLEMING, RICHARD (d. 1431), bishop of. Lincoln, and founder of Lincoln College, Oxford, was born at Crofton in Yorkshire. He was descended from a good family, and was educated at University College, Oxford. Having taken his degrees, he was made prebendary of York in 1406, and the next year was junior proctor of the university. About this time he became an ardent Wycliffite, winning over many persons, some of high rank, to the side of the reformer, and incurring the censure of Archbishop Arundel. He afterwards became one of

Wycliffe's most determined opponents. Before 141 5 he was instituted to the rectory of Boston in Lincolnshire, and in 1420 he was consecrated bishop of Lincoln. In 1428-1429 he attended the councils of Pavia and Siena, and in the presence of the pope, Martin V., made an eloquent speech in vindication of his native country, and in eulogy of the papacy. It was probably on this occasion that he was named chamberlain to the pope. To Bishop Fleming was entrusted the execution of the decree of the council for the exhumation and. burning of Wycliffe's remains. The see of York being vacant, the pope conferred it on Fleming; but the king (Henry V.) refused to confirm the appointment. In 1427 Fleming obtained the royal licence empowering him to found a college at Oxford for the special purpose of training up disputants against Wycliffe's heresy. He died at Sleaford, on the 26th of January 1431. Lincoln College was, however, completed by his trustees, and its endow- ments were afterwards augmented by various benefactors.

FLEMING, SIR SANDFORD (1827-), Canadian engineer and publicist, was born at Kirkcaldy, Scotland, on the 7th of January 1827, but emigrated to Canada in 1845. Great powers of Work and thoroughness in detail brought him to the front, and he was from 1867 to 1880 chief engineer of the Dominion government. Under his control was constructed the Inter- colonial railway, and much of the Canadian Pacific. After his retirement in 1880 he devoted himself to the study of Canadian and Imperial problems, such as the unification of time reckoning throughout the world, and the construction of a state-owned system of telegraphs throughout the British empire. After

years of labour he saw the first link forged in the chain, in the opening in 1002 of the Pacific Cable between Canada and Australia. Though not a party man he strongly advocated Federation in 1864-1867, and in 1891 vehemently attacked the Liberal policy of unrestricted reciprocity with the United States. He took the deepest interest in education, and in 1880 became chancellor of Queen's University, Kingston.

He published The Intercolonial: a History (Montreal and London, 1876) ; England and Canada (London, 1884) ; and numerous brochures and magazine articles on scientific, social and political subjects.

FLEMING, SIR THOMAS (1544-1613), English judge, was born at Newport, Isle of Wight, in April 1544, and was called to the bar at Lincoln's Inn in 1574. He represented Winchester in parliament from 1584 to 1601, when he was returned for Southampton. In 1 594 he was appointed recorder of London, and in 1595 was chosen solicitor-general in preference to Bacon. This office he retained under James I. and was knighted in 1603. In 1604 he was created chief baron of the exchequer and presided over many important state trials. In 1607 he was promoted to the chief justiceship of the king's bench, and was one of the judges at the trial of the post-nati in 1608, siding with the majority of the judges in declaring that persons born in Scotland after the accession of James I. were entitled to the privileges of natural-born subjects in England. He was praised by his contemporaries, more particularly Coke, for his " great judg- ments, integrity and discretion." He died on the 7th of August 1613 at his seat, Stoneham Park, Hampshire.

See Foss, Lives of the Judges.

FLEMISH LITERATURE. The older Flemish writers are dealt with in the article on Dutch Literature; after the separation of Belgium, however, from the Netherlands in 1830 there was a great revival of Flemish literature. The immediate result of the revolution was a reaction against everything associated with Dutch, and a disposition to regard the French language as the speech of liberty and independence. The provisional government of 1830 suppressed the official use of the Flemish language, which was relegated to the rank of a patois. For some years before 1830 Jan Frans Willems ' (1793-1846) had been advocating the claims of the Flemish language. He had done his best to allay the irritation between Holland and Belgium and to prevent a separation. As archivist of Antwerp he made use of his opportunities by writing a history of Flemish letters. After the revolution his Dutch sympathies had made it necessary for him to live in seclusion, but in 1835 he settled at Ghent, and devoted himself to the cultivation of Flemish. He edited old Flemish classics, Reinaert de Vos (1836), the rhyming Chronicles of Jan van Heelu and Jan le Clerc, &c, and gathered round him a band of Flemish enthusiasts, the chevalier Philipp Blommaert (1809-1871), Karel Lodewijk Ledeganck (1805-1847), Fr, Rens (1805-1874), F. A. Snellaert (1809-1872), Prudens van Duyse (1804-1859), and others. Blommaert, who was born at Ghent on the 27th of August 1809, founded in 1834 in his native town the Nederduitsche letter •oefen- ingen, a review for the new writers, and it was speedily followed by other Flemish organs, and by literary societies for the promo- tion of Flemish. In 1851 a central organization for the Flemish propaganda was provided by a

society, named after the father of the movement, the ” Willemsfonds.” The Catholic Flemings founded in 1874 a rival ” Davidsfonds,” called after the energetic J. B. David (1801-1866), professor at the university of Louvain, and the author of a Flemish history of Belgium (V aderlandsche historie, Louvain, 1842-1866). As a result of this propaganda the Flemish language was placed on an equality with French in law, and in administration, in 1873 and 1878, and in the schools in 1883. Finally in 1886 a Flemish Academy was established by royal authority at Ghent, where a course in Flemish literature had been established as early as 1854.

The claims put forward by the Flemish school were justified by the appearance (1837) of In’ tW ‘onderjaar 1 566 (In the Wonder-

1 See Max Rooses, Reus van Dicht- en Prozawerken van J. F. Willems, and his Brirccn in the publications of the Willemsfonds (Ghent, 1872-1874’!

ful year) of Hendrik Conscience (q.v.), who roused national enthusiasm by describing the heroic struggles of the Flemings against the Spaniards. Conscience was eventually to make his greatest successes in the description of contemporary Flemish life, but his historical romances and his popular history of Flanders helped to give a popular basis to a movement which had been started by professors and scholars.

The first poet of the new school was Ledeganck, the best known of whose poems are those on the ” three- sister cities ” of Bruges, Ghent and Antwerp (Die drie zustersteden, vader- landsche trilogie, Ghent, 1846), in which he makes an im- passioned protest against the adoption of French ideas, manners and language, and the neglect of Flemish tradition. The book speedily took its place as a Flemish classic. Ledeganck, who was a magistrate, also translated the French code into Flemish. Jan Theodoor van Rijswijck (1811-1849), after serving as a volunteer in the campaign of 1830, settled down as a clerk in Antwerp, and became one of the hottest champions of the Flemish movement. He wrote a series of political and satirical songs, admirably suited to his public. The romantic and sentimental poet, Jan van Beers (q.v.), was typically Flemish in his sincere and moral outlook on life. Prudens van Duyse, whose most ambitious work was the epic Arlavelde (1859), is perhaps best remembered by a collection (1844) of poems for children. Peter Frans Van Kerckhoven (1818-1857), a native of Antwerp, wrote novels, poems, dramas, and a work on the Flemish revival {De Vlaemsche Beweging, 1847).

Antwerp produced a realistic novelist in Jan Lambrecht Damien Sleeckx (1818-1901). An inspector of schools by profession, he was an indefatigable journalist and literary critic. He was one of the founders in 1844 of the Vlaemsch Belgie, the first daily paper in the Flemish interest. His works include a long list of plays, among them Jan Steen (1852), a comedy; Gretry, which gained a national prize in 1861; De Visschers van Blankenberg (1863); and the patriotic drama of Zannekin (1865). His talent as a novelist was diametrically opposed to the idealism of Conscience. He was precise, sober and concrete in his methods, relying for his effect on the accumulation of carefully observed detail. He was particularly successful in describing the life of the shipping quarter of his native town. Among his novels are: In' i Schipperskwartkr (1856), Dirk Meyer (r86o), Tybaerts en K u (1867) , Kunsl en Liejde (" Art and Love," 1870), and Vesaiius in Spanje (1895). His complete works were collected in 17 vols. (187 7-1884).

Jan Renier Snieders '(-1812-1888) wrote novels dealing with North Brabant; his brother, August Snieders (b. 1825), began by writing historical novels in the manner of Conscience, but his later novels are satires on contemporary society. A more original talent was displayed by Anton Bergmann (1835-1874), who, under the pseudonym of " Tony," wrote Ernest Staas, Advocat, which gained the quinquennial prize of literature in 1874. In t"he same year appeared the Novellen of the sisters Rosalie (1834- 1875) and Virginie Loveling (b. 1836). These simple and touching stories were followed by a second collection in 1876. The sisters had published a volume of poems in 1870. Virginie Loveling's gifts of fine and exact observation soon placed her in the front rank of Flemish novelists. Her political sketches, In onze Vlaamsche gewesten (1877), were published under the name of "W. G. E. Walter." Sophie (1885), Een dure Red (1892), and Het Land der Verbeelding (1896) are among the more famous of her later works. Reimond Styns (b. 1850) and Isidoor Teirlinck (b. 1851) produced in collaboration one very popular novel, Arm Vlaanderen (1884), and some others, and have since written separately. Cyril Buysse, a nephew of Mme Loveling, is a disciple of Zola. Het Recht van den Slerkste (" The Right of the Strongest," 1893) is a picture of vagabond life in Flanders; Schoppenboer (" The Knave of Spades," 1898) deals with brutalized peasant life; and Sursum corda (1895) describes the narrowness and religiosity of village life.

In poetry Julius de Geyter (b. 1830), author of a rhymed translation of Reinaert (1874), an epic poem on Charles V. (1888), &c. produced a social epic in three parts, Drie menschen van in

de wieg tot in het graf (” Three Men from the Cradle to the Grave,” 1861), in which he propounded radical and humanitarian views. The songs of Julius Vuylsteke (1836-1903) are full of liberal and patriotic ardour; but his later life was devoted to politics rather than literature. He had been the leading spirit of a students’ association at Ghent for the propagation of ” flammgant ” views, and the ” Willemsfonds ” owed much of its success to his energetic co-operation. His Uit het studenten leven appeared in 1868, and his poems were collected in 1881. The poems of Mme van Ackere (1803-1884), nie’ Maria Doolaeghe, were modelled on Dutch originals. Joanna Courtmans (1811-1890), nie Berchmans, owed her fame rather to her tales than her poems; she was above all a moralist, and her fifty tales are sermons on economy and the practical virtues. Other poets were Emmanuel Hiel (q.v.), author of comedies, opera libretti and some admirable songs; the abbe Guido Gezelle (1830-1899), who wrote religious and patriotic poems in the dialect of West Flanders; Lodewijk de Koninck (b. 1838), who attempted a great epic subject in Menschdon Verlosi (1872); J. M. Dautzen- berg (1808-1869), author of a volume of charming V.olksliederen. The best of Dautzenberg’s Work is icontained in the posthumous volume of 1869, published by his son-in-law, Frans de Cort (1834-1878), who was himself a song-writer, and translated songs from Burns, from Jasmin and from the German. The Makamen en Ghazelen (1866), adapted from Riiekert’s version of Hariri, and other volumes by “Jan Ferguut ” (J. A. van Droogen- broeck, b. 1835) show a growing preoccupation with form, and with the work of Theodoor Antheunis (b. 1840), they prepare the way for the ingenious and careful workmanship of the younger school of poets, of whom Charles Polydore de Mont is the leader. He was born at Wambeke in Brabant in 1857, and became professor in the academy of the fine arts at Antwerp. He introduced something of the ideas and methods of con- temporary French writers into Flemish verse; and explained his theories in 1898 in an Inleiding tot de Po’ezie. Among Pol de Mont’s numerous volumes of verse dating from 1877 onwards are Claribella (1893), and Iris (1894), which contains amongst other things a curious ” Uitde Legende van Jeschoea-benr-Josief,” a version of the gospel story from a Jewish peasant.

Mention should also be made of the history of ‘Ghent (Gent nan den vroegsten Tijd tot heden, 1882-1889) of Frans de Potter (b. 1834), and of the art criticisms of Max Rooses (b. 1839), curator of the Plantin museum at Antwerp, and of Julius Sabbe (b. 1846).

See Ida van Diiringsfeld, Von der Scheldt bis zur Maas; Das

feistige Leben der Vlatningen (Leipzig, 3 vols., 1 861); J. Stecher, listoire de la litterature neerlandaise en Belgique (1886) ; Geschiedenis der Vlaamsche Letterkunde van het jaar 1830 tot heden (1899), by Theodoor Coopman and L. Scharpe; A. de Koninck, Bibliographie nationale (3 vols., 1 886-1 897); and Histoire politique et littiraire du mouvement flamand (1894), by Paul Hamelius. The Vlaamsche Bibliographie, issued by the Flemish Academy of Ghent, by Frans de Potter, contains a list of publications between 1830 and 1890; and there is a good deal of information in the excellent Biographisch woordenboeck der Noord- en Zuii- Nederlandsche Letterkunde (1878) of Dr W. J. A. Huberts and others. (E. G.)

FLENSBURG (Danish, Flensborg), a seaport of Germany, in the Prussian province of Schleswig-Holstein, at the head of the Flensburg Fjord, 20 m. N.W. from Schleswig, at the junction of the main line Altona-Vamdrup (Denmark), with branches to Kiel and Glucksburg. Pop. (1905) 48,922. The principal public buildings are the Nikolai Kirche (built 1390, restored 1894), with a spire 295 ft. high; the Marienkirche, also a medieval church, with a lofty tower; the law courts; the theatre and the exchange. There are two gymnasia, schools of marine engineer- ing, navigation, wood-carving and agriculture. The cemetery contains the remains of the Danish soldiers who fell at the battle of Idstedt (25th of July 1850), but the colossal Lion monument, erected by the Danes to commemorate their victory, was removed to Berlin in 1864. Flensburg is a busy centre of trade and industry, and is the most important town in what was formerly the duchy of Schleswig. It possesses excellent wharves, does a large import trade in coal, and has shipbuilding yards, breweries, distilleries, cloth and paper factories, glass-works, copper-works, :

soap-works and rice mills. Its former extensive trade with the West Indies has lately suffered owing to the enormous develops ment of the North Sea ports, but it is still largely engaged in the Greenland whale and the oyster fisheries. ■ .■ •

Flensburg was probably founded in the 12th century. It attained municipal privileges in 1284, was frequently pillaged by the Swedes after 1643, and in 1848 became the capital, under Danish rule, of Schleswig.

SeeHoldt, Flensburg jriihe’r und jetzt (1884).

FLERS, a manufacturing town of north-western France, in the arrondissement of Domfront, and department of Orne, on the Vere, 41 m. S. of Caen on the railway to Laval. Pop. (1906) 11,188. A modern

church in the Romanesque style and a restored chateau of the 15th century are its principal buildings. There is a tribunal of commerce, a board of trade-arbitrators, a Communal college arid a branch of the Bank of France. Flers is the Centre of a cotton and linen-manufacturing region which includes the towns of Cond6-sur-Noireau and La Ferte-Mac6. Manufactures are very important, and include, besides cotton and linen fabrics, of which the annual value is about £1,500,000, dirugs and chemicals'; there are large brick and tile works, flour mills and dye works. 1

FLETA, a treatise, with the sub-title seu Commentarius juris Anglicani, on the common law of England. It appears, from internal evidence, to have been written in the reign of Edward I., about the year 1290. It is for the most part a poor imitation of Bracton. The author is supposed to have written it during his confinement in the Fleet prison, hence the name. It has been conjectured that he was one of those judges who were im- prisoned for malpractices by Edward I. Fleta was first printed by J. Selden in 1647, with a dissertation (2nd edition, 1685).

FLETCHER, ALICE .CUNNINGHAM (1845-), American ethnologist, was born in Boston, Massachusetts, in 1845. She studied the remains of Indian civilization in the Ohio and Mississippi valleys, became a member of the Archaeological Institute of America in 1879, and worked and lived with the Omahas as a representative of the Peabody Museum of American Archaeology and Ethnology, Harvard University. In 1883 she was appointed special agent to allot lands to the Omaha tribes, in 1884 prepared and sent to the New Orleans Exposition an exhibit showing the progress of civilization among the Indians of North America in the quarter-century previous, in 1886 visited the natives of Alaska and the Aleutian Islands on a mission from the commissioner of education, and in 1887 was United States special agent in the distribution of lands among the Winnebagoes and Nez Perces. She was made assistant in ethnology at the Peabody Museum in 1882, and received the Thaw fellowship in 189 1; was president of the Anthropological Society of Washington and of the American Folk-Lore Society, and vice-president of the American Association for the Advance- ment of Science; 'and, working through the Woman's National Indian Association, introduced a system of making small loans to Indians, wherewith they might buy land and houses. In 1888 she published Indian Education and Civilization, a special report of the Bureau of Education. In 1898 at the Congress of Musicians held at Omaha during the Trans-Mississippi Ex- position she read " several essays upon the songs of the North American Indians … in illustration of which a number of Omaha Indians . . . sang their native melodies." Out of this grew her Indian Story and Song from North America

(1900), illustrating ” a stage of development antecedent to that in which culture music appeared.”

FLETCHER, ANDREW, of Saltoun (1655-1716), Scottish politician, was the son and heir of Sir Robert Fletcher (1625- 1664), and was born at Saltoun, the modern Salton, in East Lothian, Educated by Gilbert Burnet, afterwards bishop of Salisbury, who was then the parish minister of Saltoun, he completed his education by spending some years in travel and study, entering public life as member of the Scottish parliament which met in 1681. Possessing advanced political ideas, Fletcher was a fearless and active opponent of the measures introduced by John Maitland, duke of Lauderdale, the representative of

Charles II. in Scotland, and his successor, the duke ;vi Mark, afterwards King James II,; but he left Scotland about 1682, subsequently spending some time in Holland as an associate of the duke of Monmouth and other malcontents.

Although on grounds of prudence Fletcher objected to the rising of 1685, he accompanied Monmouth to the west of England, but left the army after killing one of the duke’s trusted advisers. This incident is thus told by Sir John Dalrymple:

” Being sent upon an expedition, and not esteeming times of, danger to be times of ceremony, he had seized for his own riding the horse of a country gentleman (the mayor of Lynne) Which stood ready equipt for its master. The master hearing this ran in a passion to Fletcher, gave him opprobrious language, shook his cane and attempted to strike. Fletcher, though rigid in the duties of morality, yet having been accustomed to foreign services both by sea and land in which he had acquired high ideas of the honour of a soldier and a gentleman and of the affront of a cane, pulled out his pistol and shot him dead on the spot. The action was unpopular in countries where such refinements were not understood. A clamour was raised against it among the people of the country: in a body they waited upon the duke with their complaints ; and he was forced to desire the only soldier and almost the only man of parts in his army, to abandon him.”

Another, but less probable account, represents Fletcher as quitting the rebel army because he disapproved of the action of Monmouth in

proclaiming himself king.

His history during the next few years is' rather obscure. He probably travelled in Spain, and fought against the Turks in Hungary; and having in his absence lost his estates and been sentenced to death, he joined William of Qrange at the Hague, and returned to Scotland in 1689 in consequence of the success of the Revolution of 1688. His estates were restored to him; and he soon became a leading member of the ' ' club, ' ' an organiza- tion which aimed at reducing the power of the crown in Scotland, and in general an active opponent of the English government. In 1703, at a critical stage in the history of Scotland, Fletcher again became a member of the Scottish parliament. The failure of the Darien expedition had aroused a strong feeling of resent- ment against England, and Fletcher and the national party seized the opportunity to obtain a greater degree of independence for their country. : ,.*;

His attitude in this matter, and also to the proposal for the union of the two crowns, is thus described by a writer in the third edition of the Encyclopaedia Brilannica:—

" The thought of England's domineering over Scotland was what his generous soul could not endure. The indignities and oppression which Scotland lay under galled him to the heart, so that in his learned and elaborate discourses he exposed, them with undaunted courage and pathetical eloquence. In that great event, the Union, he performed essential service. He got the act of security passed, which declared that the two crowns should not pass to the same head till Scotland was secured in her liberties civil and religious. There- fore Lord Godolphin was forced into the Union, to avoid a civil war after the queen's demise. Although Mr Fletcher disapproved of some of the articles, and indeed of the whole frame of the Union, yet, as the act of security was his own work, he had all the merit of that important transaction."

Soon after the passing of the Act of Union' Fletcher retired from public life. Employing his abilities in another direction, he did a real, if homely, service to his country by introducing from Holland machinery for sifting grain. He died unmarried in London in September 17 16.

Contemporaries speak very highly of Fletcher's integrity, but he was also choleric and impetuous. Burnet describes him as "a Scotch gentleman of great parts and many virtues, but a most violent republican and extremely passionate." In appear- ance he was " a low, thin man, of a brown complexion; full of fire; with a stern, sour look."

Fletcher was a fine scholar and a graceful writer, and both his writings and speeches afford bright glimpses of the manners and state of the country in his time. His chief works are: A Discourse of Government relating to Militias (1698); Two Discourses concerning the Affairs of Scotland (1698); and An Account of a Conversation concerning a right regulation of Governments for the common good of Mankind (1 704) . In Two Discourses he suggests that the numerous vagrants who infested Scotland should be brought into com- pulsory and hereditary servitude; and in An Account of a

Conversation occurs his well-known remark, ” I knew a very wise man so much of Sir Christopher’s (Sir C. Musgraye) senti- ment, that he believed if a man were permitted to make all the ballads, he need not care who should make the laws of a nation.”

The Political Works of Andrew Fletcher were published in London in I737- See D. S; Erskine, nth earl of Buchan, Essay an the Lives of Fletcher of Saltoun and.ihe Poet Thomson (1792); J. H. Burton, History of Scotland, vol, viii, (Edinburgh, 1905).; and A. Lang, History of Scotland, vol. iv. (Edinburgh, 1907).

FLETCHER, GILES (c. 1548-1611), English author, son of Richard Fletcher, vicar of Cranbrook, Kent, and father of the poets Phineas and Giles Fletcher, was horn in 1548 or 1549. He was educated at Eton and at King’s College, Cambridge, takinghisB.A. degreein 1569. He was a fellow of his college, and was made LL.D. in 1581. In 1580 he had married Joan Sheafe of Cranbrook. In that year he was commissary to Dr Bridg- water, chancellor of Ely, arid in 1585 he sat in parliament for Winchelsea. He was employed on diplomatic service in Scotland, Gerrnany ai *d Holland, and in 1588 was sent to Russia to the court of the czar Theodore with instructions to conclude as alliance between England and Russia, to restore English trade, and to obtain better conditions for the English Russia Company. The factor of the company, Jerome Horsey, had already obtained large concessions through the favour of the protector, Boris Godnnov, but when Dr Fletcher reached Moscow in 1588 he found that Godunov’sinterest was alienated, and that the Russian government was contemplating an alliance with Spain. The envoy was badly lodged, and treated with obvious contempt, and was not allowed to forward letters to England, but the English victory over the Armada and his own indomitable patience secured: among other advantages for English traders exclusive rights of trading on the Volga and their security from the infliction of torture. Fletcher’s treatment at Moscow was later made the subject of formal complaint by Queen Elizabeth. He returned to, England in 1589 in company with Jerome Horsey, and in 1591 he

published Of the Russe Commonwealth, Or Maner of Government by the Russe Emperour {commonly called The Emperour of Moskovia) with the manners and fashions of the people of that. Countrey. In this comprehensive account of Russian geography, government, law, methods of warfare, church and manners, Fletcher, who states that he began to arrange his material during the return journey, doubtless received some assistance from the longer experience of his travelling companion, who also wrote a narrative of his travels, published in Purchas his Pilgrimes (1626). The Russia Company feared that the freedom of Fletcher's criticisms would give offence to the Muscovite authorities, and accordingly damage their trade. The book was consequently suppressed, and was not reprinted in its entirety until 1856, when it was edited from a copy of the original edition for the Hakluyt Society, with an introduction by Mr Edward A. Bond.

Fletcher was appointed "Remembrancer" to the city of London, and an extraordinary master of requests in 1596, and became treasurer of St Paul's in 1597. He contemplated a history of the reign of Queen Elizabeth, and in a letter to Lord Burghley he suggested that it might be well to begin with an account from the Protestant side of the marriage of Henry VIII. and Ann Boleyn. But personal difficulties prevented the execu- tion of this plan. He had become security to the exchequer for the debts of his brother, Richard Fletcher, bishop of London, who died in 1596, and was only then saved from imprison- ment by the protection of the earl of Essex. He was actually in prison in 1601, when he addressed a somewhat ambiguous letter to Burghley from which it may be gathered that his prime offence had been an allusion to Essex's disgrace as being the work of Sir Walter Raleigh. Fletcher was employed in i6ro to negotiate with Denmark on behalf of the " Eastland Merchants," and he died next year, and was buried on the nth of March in the parish of St Catherine Colman, London

The Russe Commonwealth was issued in an abridged form in Hakluyt's Principal Navigations, Voyages, &c. (vol. i. p. 473, ed. of 1598).., a somewhat completer version in Purchas his Pilgrimes (pt. iii. ed. 1625), also as History of Russia in T643 and 1657.

Fletcher also wrote De Uteris antigude Britanniae (ed. by Phineas Fletcher, 1633), a treatise on " TheTartars," printed in Israel Redux (ed. by S(amuel) L(ee), 1677), to prove that they were the ten lost tribes of Israel, Latin poems published in various miscellanies, and

Licia or Poemes of Love in Honour of the admirable and singular vertues of his Lady, to the imitation of the best Latin Poets. . .whereunto is added the Rising to the Crowne of Richard the third (1593)- This series of love sonnets, followed by some other poems, was published anonymously. Most critics, with the notable exception of Alexander Dyce (Beaumont and Fletcher, Works, 1. p. xvi., 1843) have accepted it as the work of Dr Giles Fletcher on the evidence afforded in the first of the Piscatory Eclogues of his son Phineas, who represents his father (Thelgon), as having ” raised his rime to sing of Richard’s climbing.” . ,

See E. A. Bond’s Introduction to the Hakluyt Society s edition ; also Dr A. B. Grosart’s prefatory matter to Licia (Fuller Worthies Library, Miscellanies, vol. Hi., 1871), and to the works (1869) of Phineas Fletcher in the same series. Fletcher s letters relative to the college dispute with the provost, Dr Roger Goad, are preserved in the Lansdowne MSS. (xxiii. art. 18 et seq.), and ate translated in Grosart’s edition.

FLETCHER, GILES (c. 1 584-1623), English poet, younger son of the preceding, was born about 1 584. Fuller in his Worthies of England says that he was a native Of London, and was educated at Westminster school. From there he went to Trinity College, Cambridge, where he took his B.A. degree in 1606, and became a minor fellow of his college in 1608. He was reader in Greek grammar (1615) and in Greek language (1618). In 1603 he con- tributed a poem on the death of Queen Elizabeth to Sorrow’s Joy. His great poem of Christ’s Victory appeared in 1610, and in 1 61 2 he edited the Remains of his cousin Nathaniel Pownall. It is not known in what year he was ordained, but his sermons at St Mary’s were famous. Fuller tells us that the prayer before the sermon was a continuous allegory. He left Cambridge about 1618, and soon after received, it is supposed from Francis Bacon, the rectory of Alderton, on the Suffolk coast, where ” his clownish and low-parted parishioners . . . valued not their pastor according to his worth; which disposed him to melancholy and hastened his dissolution.” (Fuller, Worthies of England, ed. 1811, vol. ii. p. 82). His last work, The Reward of the Faithful, appeared in the year of his death (1623).

The principal work by which Giles Fletcher is known is Christ’s Victorie and Triumph, in Heaven, in Earth, over and after Death (1610). An edition in 1640 contains seven full-page illustrative engravings by George Tate. It is in four cantos and is epic in design. The first canto, ” Christ’s Victory in Heaven,” represents a dispute in heaven between Justice and Mercy, assuming the facts of Christ’s life

on earth; the second, ” Christ’s Victory on Earth,” deals with an allegorical account of the Temptation; the third, ” Christ’s Triumph over Death,” treats of the Passion; and the fourth, ” Christ’s Triumph after Death,” treating of the Resurrection and Ascension, concludes with an affectionate eulogy of his brother Phineas Fletcher (q.v.) as ” Thyrsilis.” The metre is an eight-line stanza owing something to Spenser. The first five lines rhyme ababb, and the stanza concludes with a rhyming triplet, resuming the conceit which nearly every verse embodies. Giles Fletcher, like his brother Phineas, to whom he was deeply attached, was a close follower of Spenser. In his very best passages Giles Fletcher attains to a rich melody which charmed the ear of Milton, who did not hesitate to borrow very considerably from the Christ’s Victory and Triumph in his Paradise Regained. Fletcher lived in an age which regarded as models the poems of Marini and Gongora, and his conceits are sometimes grotesque in connexion with the sacredness of his subject. But when he is carried away by his theme and forgets to be ingenious, he attains great solemnity and harmony of style. His descriptions of the Lady of Vain Delight, in the second canto, and of Justice and of Mercy in the first, are workedout with much beauty of detail into separate pictures, in the maitner of the Faerie Queene.

Giles Fletcher’s poem was edited (1868) for _ the Fuller Worthies Library, and (1876) for the Early English Poets hy Dr A. B. Grosart. It is also reprinted for The Ancient and Modern Library of Theo- logical Literature (1888), and in R. Cattermole s and H. Stebbing s Slcred Classics (1834, &c) vol. 20 In the library of King s College, Cambridge, is a MS. Aegidii Fletchem versio poetica Lamentattonum Jeremiae.

FLETCHER, JOHN WILLIAM (1729-1785), English divine, was born at Nyon in Switzerland on the i<2th of September 1729, his original name being de la Flechiere. He was educated at Geneva, but, preferring an army career to a clerical one, went to Lisbon and enlisted. An accident prevented his sailing with his regiment to Brazil, and after a visit to Flanders, where an uncle offered to secure a commission for him, he went to England, picked up the language, and in 1752 became tutor in a Shropshire family. Here he came under the influence of the new Methodist preachers, and in 1757 took orders, being ordained by the bishop of Bangor. He often preached with John Wesley and for him, and became known as a fervent supporter of the revival. Refusing the wealthy living of Dunham, he accepted the humble one of Madeley, where for twenty-five years (1760-1785) he lived and worked with unique devotion and zeal. Fletcher was one of the few parish clergy who understood Wesley and his work, yet he never wrote or said anything inconsistent with his own Anglican

position. In theology he, upheld the Arminian against the Calvinist position, but always with courtesy and fairness; his resignation on doctrinal grounds of the superintendency (1768-1771) of the countess of Hunting- don's college at Trevecca left no unpleasantness. The outstanding feature of his life was a transparent simplicity and saintliness of spirit, and the testimony of his contemporaries to his godliness is unanimous. Wesley preached his funeral sermon from the words " Mark the perfect man." Southey said that " no age ever provided a man of more fervent piety or more perfect charity, and no church ever possessed a more apostolic minister." His fame was not confined to his own country, for it is said that Voltaire, when challenged to produce a character as perfect as that of Christ, at once mentioned Fletcher of Madeley. He died on the 14th of August 1785.

Complete editions of his works were published in 1803 and 1836. The chief of them, written against Calvinism, are Five Checks to Antinomianism, Scripture Scales to weigh the Gold of Gospel Truth, and the Portrait of St Paul. See lives by J. Wesley (1786); L. Tyerman (1882); F. W. Macdonald (1885); J. Maratt (1902); also C. J. Ryle, Christian Leaders of the i&th Century, pp. 384-423 (1869).

FLETCHER, PHINEAS (1582-1650), English poet, elder son of Dr Giles Fletcher, and brother of Giles the younger, noticed above, was born at Cranbrook, Kent, and was baptized on the 8th of April 1582. He was admitted a scholar of Eton, and in 1600 entered King’s College, Cambridge. He graduated B.A. in 1604, and M.A. in 1608, and was one of the contributors to Sorrow’s Joy (1603). His pastoral drama, Sicelides or Piscatory (pr. 1631) was written (1614) for performance before James I., but only produced after the king’s departure at King’s College. He had been ordained priest and before 161 1 became a fellow of his college, but he left Cambridge before 1616, apparently because certain emoluments were refused him. He became chaplain to Sir Henry Willoughby, who presented him in 1621 to the rectory of Hilgay, Norfolk, where he married and spent the rest of his life. In 1627 he published Locustae, vel Pietas Jesuitica. The Locusts or Apollyonists, two parallel poems in Latin and English furiously attacking the Jesuits. Dr Grosart saw in this work one of the sources of Milton’s conception of Satan. Next year appeared an erotic poem, Brittains Ida, with Edmund Spenser’s name on the title-page. It is certainly not by Spenser, and is printed by Dr Grosart with the works of Phineas Fletcher. Sicelides, a play acted at King’s College in 1614, was printed in 1631. In 1632 appeared two theological prose treatises, The Way to Blessedness and Joy in Tribulation, and in 1633 his magnum opus, The Purple Island. The book was dedicated to his friend Edward Benlowes, and included his Piscatorie Eclogs and other

Poetical Miscellanies. He died in 1650, his will being proved by his widow on the 13th of December of that year. The Purple Island, or the Isle of Man, is a poem in twelve cantos describing in cumbrous allegory the physiological structure of the human body and the mind of man. The in- tellectual qualities are personified, while the veins are rivers, the bones the mountains of the island, the whole analogy being worked out with great ingenuity. The manner of Spenser is preserved throughout, but Fletcher never lost sight of his moral

aim to lose himself in digressions like those of the Faerie Queene. What he gains in unity of design, however, he more than loses in human interest and action. The chief charm of the poem lies in its descriptions of rural scenery. The Piscatory Eclogues are pastorals the characters of which are represented as fisher boys on the banks of the Cam, and are interesting for the light they cast on the biography of the poet himself (Thyrsil) and his father (Thelgon). The poetry of Phineas Fletcher has not the sublimity sometimes reached by his brother Giles. The mannerisms are more pronounced and the conceits more far-fetched, but the verse is fluent, and lacks neither colour nor music.

A complete edition of his works (4 vols.) was privately printed by Dr A. B. Grosart (Fuller Worthies Library, 1869).

FLEURANGES, ROBERT (III.) DE LA MARCK, Seigneur de (1491-1537), marshal of France and historian, was the son of Robert II. de la Marck; duke of Bouillon, seigneur of Sedan and Fleuranges, whose uncle was the celebrated William de la Marck, ” The Wild Boar of the Ardennes.” A fondness for military exercises displayed itself in his earliest years, and at the age of ten he was sent to the court of Louis XII., and placed in charge of the count of Angouleme, afterwards King Francis I. In his twentieth year he married a niece of the cardinal d’Amboise, but after three months he quitted his home to join the French army in the Milanese. With a handful of troops he threw himself into Verona, then besieged by the Venetians; but the siege was protracted, and being impatient for more active service, he rejoined the army. He then took part in the relief of Mirandola, besieged by the troops of Pope Julius II., and in other actions of the campaign. In 151 2 the French being driven from Italy, Fleuranges was sent into Flanders to levy a body of 10,000 men, in command of which, under his father, he returned to Italy in 1513, seized Alessandria, and vigorously assailed Novara. But the French were defeated, and

Fleuranges narrowly escaped with his life, having received more than forty wounds. He was rescued by his father and sent to Vercellae, and thence to Lyons. Returning to Italy with Francis I. in 1515, he distinguished himself in various affairs, and especially at Marignano, where he had a horse shot under him, and contributed so powerfully to the victory of the French that the king knighted him with his own hand. He next took Cremona, and was there called home by the news of his father's illness. In 1519 he was sent into Germany on the difficult errand of inducing the electors to give their votes in favour of Francis I. ; but in this he failed. The war in Italy being rekindled, Fleuranges accompanied the king thither, fought at Pavia (1525), and was taken prisoner with his royal master. The emperor, irritated by the defection of his father, Robert II. de la Marck, sent him into confinement in Flanders, where he remained for some years. During this imprisonment he was created marshal of France. He employed his enforced leisure in writing his Histoire des choses mimorables advenues du regne de Louis XII et de Francois I, depuis 14Q9 jusqu'en Van 1521. In this work he designates himself Jeune Adventureux. Within a small compass he gives many curious and interesting details of the time, writing only of what he had seen, and in a very simple but vivid style. The book was first published in 1735, by Abbe Lambert, who added historical and critical notes; and it has been reprinted in several collections. The last occasion on which Fleuranges was engaged in active service was at the defence of Peronne, besieged by the count of Nassau in 1536. In the following year he heard of his father's death, and set out from Amboise for his estate of La Marck; but he was seized with illness at Longjumeau, and died there in December 1537-

See his own book in the Nouvelle Collection des memoires pour servir a I'histoire de France (edited by J. F. Michaud and J. J. F. Poujoulat, series i. vol. v. Paris, 1836 seq.).

FLEUR-DE-LIS (Fr. " lily flower "), an heraldic device, very widespread in the armorial bearings of all countries, but more particularly associated with the royal house of France. The conventional fleur-de-lis, as Littre says, represents very im- perfectly three flowers of the white lily (Lilium) joined together,

the central one erect, and each of the other two curving outwards. The fleur-de-lis is a common device in ancient decoration, notably in India and in Egypt,where it was the symbol of life and resur- rection, the attribute of the god Horus. It is common also in Etruscan bronzes. It is uncertain whether the conventional fleur-de-lis was originally meant to represent the lily or white iris — the flower-de-luce of Shakespeare

— or an arrow-head, a spear-head, an amulet fastened on date-palms to ward off the evil eye, &c. In Roman and early Gothic architecture the fleur-de-lis is a frequent sculptured ornament. As early as 1 1 20 three fleurs-de-lis were sculptured on the capitals of the Chapelle Saint-Aignan at Paris. The fleur-de-lis was first definitely connected with the French monarchy in an ordonnance of Louis le Jeune (c. 1147), and was first figured on a seal of Philip Augustus in 11 80. The use of the fleur-de-lis in heraldry dates from the 12th century, soon after which period it became a very common charge in France, England and Germany, where every gentleman of coat-armour desired to adorn his shield

Middle Ages. 17th century. 18th and 19th centuries.

with a loan from the shield of France, which was at first d'asur, seme defleurs de lis d'or. In February 1376 Charles V. of France reduced the number of fleurs-de-lis to three — in honour of the Trinity — and the kings of France thereafter bore d'azur, d, trois flews de lis d'or. Tradition soon attributed the origin of the fleur-de-lis to Clovis, the founder of the Frankish monarchy, and explained that it represented the lily given to him by an angel at his baptism. Probably there was as much foundation for this legend as for the more rationalistic explanation of William Newton (Display of Heraldry, p. 145), that the fleur-de-lis was the figure of a reed or flag in blossom, used instead of a sceptre at the proclamation of the Frankish kings. Whatever be the true origin of the fleur-de-lis as a conventional decoration, it is demonstrably far older than the Frankish monarchy, and history does not record the reason of its adoption by the royal house of France, from which it passed into common use as an heraldic charge in most European countries. An order of the •Lily, with a fleur-de-lis for badge, was established in the Roman states by Pope Paul III. in 1546; its members were pledged to defend the patrimony of St Peter against the enemies of the church. Another order of the Lily was founded by Louis XVIII. in 181 6, in memory of the silver fleurs-de-lis which the comte d'Artois had given to the troops in 1814 as decorations; it was abolished by the revolution of 1830.

FLEURUS, a village of Belgium, in the province of Hennegau, S m. N.E. of Charleroi, famous as the scene of several battles. The first of these was fought on August 19/29, 1622, between the forces of Count Mansfeld and Christian of Brunswick and the Spaniards under Cordovas, the latter being defeated. The second is described below, and the third and fourth, incidents of Jourdan's campaign of 1794, under French Revolutionary Wars. The ground immediately north-east of Fleurus forms the battlefield of Ligny (June 16, 1815), for which

see Waterloo Campaign.

The second battle was fought on the 1st of July 1690 between 45,000 French under Francois-Henri de Montgomery-Bouteville, duke of Luxemburg, and 37,000 allied Dutch, Spaniards and Imperialists under George Frederick, prince of Waldeck. The latter had formed up his army between Heppignies and St Amand in what was then considered an ideal position; a double barrier of marshy brooks was in front, each flank rested on a village, and the space between, open upland, fitted his army exactly. But Luxemburg, riding up with his advanced guard from Velaine, decided, after a cursory survey of the ground, to

attack the front and both flanks; of the Allies' position at onceˆr- a decision- which fqw, if any, generalsthen living would have dared to make, and which of itself places Luxemburg in the same rank as a tactician as his old friend and commander Conde. The left wing of cavalry was to move under cover of woods, houses and hollows to gain Wangenies, where it was to connect with the frontal attack of the French, centre from Eleurus and to envelop Waldeck's right. Luxemburg himself with the right wing of cavalry and some infantry and artillery made a wide sweep round the enemy's left by way of Ligny and Les Trois Burettes, concealed by the high-standing corn. At 8 o'clock the frontal attack began by a vigorous artillery engagement, in which the French, though greatly outnumbered in guns, held their Own, and three hours later Waldeck, whose attention had been, absorbed by events oil the front, found a long line of the enemy

?■"■"■» """" F Mii «

Contour* at interval* of 1Q metres -32 , 8 '

ˆrwoh Cam/) „_…, ,.,...,..

frt noh poeitloM in the battfe..ˆ..,- ,.,.n

already formed up in his rear. , He at once brought his second line back to oppose them, but while he "was doing so the French leader filled up the gap between himself and the frontal assailants by posting infantry around Wagnelee, and also guns on the neighbouring hill whence their fire enfiladed both halves of the enemy's army up to the

limit of their ranging power. At 1 p.m. Luxemburg ordered a general attack of his whole line. He him- self scattered the cavalry opposed to him and hustled the Dutch infantry into St Amand, where they were promptly surrounded. The left and centre of the French army were less fortunate, and in their first charge lost their leader, Lieutenant-GeneratJaan Christophe, comte de Gournay, one of the best cavalry officers in the service. But Waldeck, hoping to profit by this momentary success, sent a portion of his right wing towards St Amand, where it merely shared the fate of his left, and the day was decided. Only a quarter of the cavalry and 14 battalions of infantry (English and Dutch) remained intact, and Wakieek could do no more, but with these he emulated the last stand of the Spaniards at Rocroi fifty years before. A great square was formed of the infantry, and a handful of cavalry joined them — the French cavalry, eager to; avenge Gournay, had swept away the rest. Then slowly and in perfect Order, they retired into the broken ground above Mellet, where they were in safety. The French slept on the battlefield, and then returned >to camp with their trophies and 8000 prisoners. They had lost some 2500 killed, amongst them Gournay and Berbier du Metz, the chief of artillery, the Allies twice as many, as well as 48 guns, and Luxemburg was able to send 150 colours and standards ;to decorate Notre- Dame. But the victory was not followed up, for Louis XIV. ordered Luxemburg to keep in line with other French armies

which were carrying on more or less desultory wars of manoeuvre on the Meuse and Moselle. ...

FLEURY [Abraham Joseph Benard] (1750ˆ-1822), French actor, was born at Chartres on the 26th of October 1750, and began his stage apprenticeship at Nancy, where his father was at the head of a company of actors attached to the court of King Stanislaus. After four years in the provinces, he came to Paris in 1778, and almost immediately was made socictaire at the Comedie Francaise, although the public was slow to recognize him as the greatest comedian of his time. In 1793 Fleury, like the rest of his fellow-players, was arrested in consequence of the presentation of Laya's V Ami des lots, and, when liberated, appeared at various theatres until, in 1799, he rejoined the rehabilitated Comedie Francaise. After forty years of service he retired in 18 18, and died on the 3rd of March 1822. He. was notoriously illiterate, a'nd it is probable that the interesting M'imtiire de Fleury owes more to its author, Lafitte, than to the subject whose " notes and papers " it is said to contain.

FLEURY, ANDRE HERCULE DE (1653-1743), French cardinal and statesman, was born at Lodeve (Herault) on the 22nd, of June 1653,

the son of a collector of taxes. Educated by the Jesuits in Paris, he entered the priesthood, and became in 1679, through the influence of Cardinal Bonzi, almoner to Maria Theresa, queen of Louis XIV., and in 1698, bishop of Frejus. Seventeen years of a country bishopric determined him to seek a position at court. He became tutor to the king's great-grandson and heir, and in spite of an apparent lack of ambition, he acquired over the child's mind an influence which proved to be indestructible. On the death of the regent Orleans in 1723 Fleury, although already seventy years of age, deferred his own supremacy by suggesting the appointment of Louis Henri, duke of Bourbon, as first minister. Fleury was present at all interviews between Louis XV. and his first minister, and on Bourbon's attempt to break through this rule Fleury retired from court. Lbuis made Bourbon recall the tutor, who on the nth of July 1726, took affairs into his own hands, and secured the exile from court of Bourbon and of his mistress Madame de Prie. He refused the title of first minister, but his elevation to the cardinalate in that year secured his precedence over the other ministers. He was naturally frugal and prudent, and carried these qualities into the administration, with the result that in 1738-1739 there was a surplus of 15,000,000 livres instead of the usual deficit. In 1 7 26 he fixed the standard of the currency and secured the credit of the government by the regular payment thenceforward of the interest on the debt. By exacting forced labour from the peasants he gave France admirable roads, though at the cost of rousing angry discontent. During the seventeen years of his orderly government the country found time to recuperate its forces after the exhaustion caused by the extra- vagances of Louis XIV. and of the regent, and the general prosperity rapidy increased. Internal peace was only seriously disturbed by the severities which Fleury saw fit to exercise against the Jansenists. He imprisoned priests who refused to accept the bull Unigenitus, and he met the opposition of the parlement of Paris by exiling forty of its members.

In foreign affairs his chief preoccupation was the maintenance of peace, which was shared by Sir Robert Walpole, and therefore led to a continuance of the good understanding between France and England. It was only with reluctance that he supported the ambitious projects of Elizabeth Farnese, queen of Spain, in Italy by guaranteeing iri 1729 the succession of Don Carlos to the duchies of Parma and Tuscany. Fleury had economized in the army and navy, as elsewhere, and when in 1733 war was forced upon him he was hardly prepared. He was compelled by public opinion to support the claims of Louis XV.'s father-in- law Stanislaus Leszczynski, ex-king of Poland, to the Polish crown on the death of Frederick Augustus I., against the Russo-

Austrian candidate; but the despatch of a French expedition of 1500 men to Danzig only served to humiliate France. Fleury was driven by Chauvelin to more energetic measures; he con- cluded a close alliance with the Spanish Bourbons and sent two armies against the Austrians. Military successes on,, the

Rhine and in Italy secured the favourable terms of the treaty of Vienna (1735-1738). France had joined with the other powers in guaranteeing the succession of Maria Theresa under the Pragmatic sanction, but on the death of Charles VI. in 1740 Fleury by a diplomatic quibble found an excuse for repudiating his engagements, when he found the party of war supreme in the king's counsels. After the disasters of the Bohemian campaign he wrote in confidence a humble letter to the Austrian general Konigsegg, who immediately published it. Fleury dis- avowed his own letter, and died a few days after the French evacuation of Prague on the 29th of January 1743. He had enriched the royal library by many valuable oriental MSS., and was a member of the French Academy, of the Academy of Science, and the Academy of Inscriptions. _

Bibliography. — F. J. Bataille, Eloge historique de M. le Cardinal A. H. de fleury (Strassburg, 1737); C. Frey de Neuville, Oraison funibre de S.E. Mgr. le Cardinal A. H. Fleury (Paris, 1743); P. Vicaire, Oraison funibre du Cardinal A. H. de Fleury (Caen, 1743); M. van Hoey, Lettres et negotiations pour servir d I'histoire de la vie du Cardinal de Fleury (London, 1743); Leben des Cardinals A. H. Fleury (Freiburg, 1743); F. Morenas, Parallele du \ninistlre du Cardinal Richelieu et du Cardinal de Fleury (Avignon, 1743) ; Nach- richten von dem Leben und der Verwaltung des Cardinals Fleury (Hamburg, 1744).

FLEURY, CLAUDE (1640-1723), French ecclesiastical historian, was born at Paris on the 6th of December 1640. Destined for the bar, he was educated at the aristocratic college of Clermont (now that of Louis-le-Grand). In 1658 he was nominated an advocate to the parlement of Paris, and for nine years followed the legal profession. But he had long been of a religious disposi- tion, and in 1667 turned from lav/ to theology. He had been some time in orders when Louis XIV., in 1672, selected him as tutor of the princes of Conti, with such success that the king next entrusted to him the education of the count of Vermandois, one of his natural sons, on whose death in 1683 Fleury received for his services the Cistercian abbey of Loc-Dieu, in the

diocese of Rhodez. In 1689 he was appointed sub-preceptor of the dukes of Burgundy, of Anjou, and of Beny, and thus became intimately associated with Fenelon, their chief tutor. In 1696 he was elected to fill the place of La Bruyere in the French Academy; and on the completion of the education of the young princes the king bestowed upon him the rich priory of Argenteuil, in the diocese of Paris (1706). On assuming this benefice he resigned, with rare disinterestedness, that of the abbey of Loc-Dieu. About this time he began his great work, the first of the kind in France, and one for which he had been collecting materials for thirty years — the Histoire ecclesiastique. Fleury's evident intention was to write a history of the church for all classes of society; but at the time in which his great work appeared it was less religion than theology that absorbed the attention of the clergy and the educated public; and his work accordingly appealed to the student rather than to the popular reader, dwelling as it does very particularly on questions of doctrine, of discipline, of supremacy, and of rivalry between the priest- hood and the imperial power. Nevertheless it had a great success. The first edition, printed at Paris in 20 volumes 4to, 1691, was followed by many others, among which may be mentioned that of Brussels, in 32 vols. 8vo, 1692, and that of Nismes, in 25 vols. 8vo, 1778 to 1780. The work of Fleury only comes down to the year 1414. It was continued by J. Claude Fabre and Goujet down to 1595, in 16 vols. 4to. In consulting the work of Fleury and its supplement, the general table of contents, published by Rondel, Paris, 1758, 1 vol. 4to will be found very useful. Translations have been made of the entire work into Latin, German and Italian. The Latin translation, published at Augsburg. 1758-1759, 85 vols. 8vo, carries the work down to 1684. Fleury, who had been appointed confessor to the young ' king Louis XV. in 1716, because, as the duke of Orleans said, he was neither Jansenist nor Molinist, nor Ultramontanist, but Catholic, died on the 14th of July 1723. His great learning was equalled by the modest simplicity of his life and the uprightness of his conduct.

Fleury left many works besides his Histoire ecclesiastique. The following deserve special mention: — Histoire du droit Jrancois (1674,

iamo); Moeurs des Israelites (1681 , i2md); Mmurs des ChrStiens (1682, i2mo); Traite du choix et de la metkode des itudes (1686, 2 vols. i2mo) ; Les Devoirs des maitres et des domestiques (1688, l2mo) .A number of the smaller works were published in one volume at Paris in 1807. The Roman Congregation of the Index condemned his Catechisme historique (1679) and the Institution du droit ecclesi-astique (1687).

See C. Ernst Simonetti, Der Character .eines Geschichtsschreibers in dem Leben und aus den Schriften des Abts C. Fleury (Gottingen.' 1746, 4to) ; C. F. P. Jaeger, Notice sur C. Fleury, consider e cqmnu' historien de I'eglise (Strassburg, 1847, 8vo) ; Reichlin-Meldegg, Geschichte des Christentums, i.

FLIEDNER, THEODOR (1800-1864), German Protestant divine, was born on the 21st of January 1800 at Epstein (near Wiesbaden), the small village in which his father was paston. He studied theology at the universities of Giessen and Gottingen, and at the theological seminary of Herborn, and at the age of twenty he passed his final examination. After a year spent in teaching and preaching, in 182 1 he accepted a call from the Protestant church at Kaiserswerth, a little town on the Rhine, a few miles below Diisseldorf. To help his people and to provide an endowment for his church, he undertook "journeys'; in 1822 through part of Germany, and then in 1823 to Holland and England. He met with considerable success, and had oppor- tunities of observing what was being done towards prison reform; in England he made the acquaintance of the philanthropist Elizabeth Fry, The German prisons were then in a very bad state. The prisoners were huddled together in dirty rooms, badly fed, and left in complete idleness. No one dreamed of instructing them, or of collecting statistics to form the basis of' useful legislation on the subject. Fliedner, at first singly, undertook the work. He applied for permission to be imprisoned for some time, in order that he might look at prison life from the inside. This petition was refused, but he was allowed to hold fortnightly services in the Diisseldorf prison, and to visit the inmates individually. Those interested in the subject banded themselves together, and on the 18th of June 1826 the first Prison Society of Germany (Rheinisch-Westfaiischer Gejdngnis- Herein) was founded: In 1833 Fliedner opened in his own parsonage garden at Kaiserswerth a refuge for discharged female convicts. His circle of practical philanthropy rapidly increased. The state of the sick poor had for some time ex- cited his interest, and it seemed to him that hospitals might be best served by an organized body of specially trained women. Accordingly in 1836 he began the first deaconess house, and the hospital at Kaiserswerth. By their ordination vows the deaconesses devoted themselves to the care of the poor, the sick and the young; but their engagements were not final— they might leave their work and return to ordinary life if they chose. In addition to these institutions Fliedner founded in 1835 an infant school, then a normal school for infant school mistresses (1836), an orphanage for orphan girls of the middle class (1842), and an asylum for female lunatics (1847). Moreover, he assisted at the foundation and in the

management of similar institutions, not only in Germany, but in various parts of Europe.

In 1849 he resigned his pastoral charge, and from 1849 to 1851 he travelled over a large part of Europe, America and the East — the object of his journeys being to found ” mother houses,” which were to be not merely training schools for deaconesses, but also centres whence other training establishments might arise. He established a deaconess house in Jerusalem, and after his return assisted by counsel and money in the erection of establish- ments at Constantinople, Smyrna, Alexandria and Bucharest. Among his later efforts may be mentioned the Christian house of refuge for female servants in Berlin (connected with which other institutions soon arose) and the ” house of evening rest ” for retired deaconesses at Kaiserswerth. In 1855 Fliedner received the degree of doctor in theology from the university of Bonn, in recognition rather of his practical activity than of his theological attainments. He died on the 4th of October 1864, leaving behind him over 100 ˆstations attended by 430 deaconesses; and these by 1876 had increased to 150 with an attendance of 600.

Fliedner’s son Fritz Fliedner (1845-1901), after studying in Halle and Tubingen, became in 1870 chaplain to the embassy in

Madrid. He followed in his father’s footsteps by founding several philanthropic institutions in Spain. He was also the author of a number of books, amongst which was an auto- biography, Aus meinem Leben. Erinnerungen und Erfahrungen (iooi).

Theodor Fliedner’s writings are almost entirely of a practical character. He edited a periodical, Der Armen und Kranken Freund, which contained information regarding the various institutions, and also the yearly almanac of the Kaiserswerth institution. Besides purely educational and devotional works, he wrote Buch der Martyrer (1852) ; Kurze Geschichte der Enlstehung der ersten evang. Liebesaristalten zu Kaiserswerth (1856) ; Nachricht iiber das Diakonissen-Werk in der Christ. Kirche (5th ed., 1867); Die evangel. Martyrer Ungarns und SiebenbUrgens ; and Beschreibung der Reise nach Jerusalem und Constantinopel. All were published at Kaiserswerth. There is a translation of the German life by C. Winkworth (London, 1867). See also G. Fliedner, Theodor Fliedner, kurzer Abriss seines Lebens und Wirkens (3rd ed., 1892). See also on Fliedner and his work

Kaiserswerth Deaconesses (London, 1857); Dean John S. Howson's Deaconesses (London, 1862); The Service of the Poor, by E. C. Stephen (London, 1871); W. F. Stevenson's Praying and Working (London, 1865).

FLIGHT and FLYING. Of the many scientific problems of modern times, there are few possessing a wider or more enduring interest than that of aerial navigation (see also Aeronautics). To fly has always been an object of ambition with man; nor will this occasion surprise when we remember the marvellous freedom enjoyed by volant as compared with non-volant animals. The subject of aviation is admittedly one of extreme difficulty. To tread upon the air (and this is what is really meant) is, at first sight, in the highest degree Utopian; and yet there are thousands of living creatures which actually accomplish this feat. These creatures, however varied inform and structure, all fly according to one and the same principle; and this is a significant fact, as it tends to show that the air must be attacked in a particular way to ensure flight. It behoves us then at the outset to scrutinize very carefully the general configuration of flying animals, and in particular the size, shape and movements of their flying organs.

S lying animals differ entirely from sailing ships and from oons, with which they are not unfrequently though errone- ously compared; and a flying machine constructed upon proper principles can have nothing in common with either of those creations. The ship floats upon water and the balloon upon air; but the ship differs from the balloon, and the ship and the balloon differ from the flying creature and flying machine. The water and air ; moreover, have characteristics of their own. The analogies which connect the water with the air, the ship with the balloon, and the ship and the balloon with the flying creature and flying machine are false analogies. A sailing ship is sup- ported by the water and requires merely to be propelled; a flying creature and a flying machine constructed on the living type require to be both supported and propelled. This arises from the fact that water is much denser than air, and because water supports on its surface substances which fall through air. While water and air are both fluid media, they are to be dis- tinguished from each other in the following particulars. Water is comparatively very heavy, inelastic and incompressible; air, on the other hand, is comparatively very light, elastic and compressible. If water be struck with violence, the recoil obtained is great when compared with the recoil obtained from air similarly treated. In water we get a maximum recoil with a minimum of displacement; in air, on the contrary, we obtain a minimum recoil with a maximum of displacement. Water and air when unconfined yield readily to pressure. They thus form movable fulcra to bodies

acting upon them. In order to meet these peculiarities the travelling organs of aquatic and flying animals (whether they be feet, fins, flippers or wings) are made not of rigid but of elastic materials. The travelling organs, moreover, increase in size in proportion to the tenuity of the fluid to be acted upon. The difference in size of the travelling organs of animals becomes very marked when the land animals are contrasted with the aquatic, and the aquatic with the aerial, as in figs. 1, 2 and 3.

The peculiarities of water and air as supporting media arc well

illustrated by a reference to swimming, diving and flying birds. A bird when swimming extends its feet simultaneously or alter- nately in a backward direction, and so obtains a forward recoil. The water supports the bird, and the feet simply propel. In this case the bird is lighter than the water, and the long axis of the body is horizontal (a of fig. 4). When the bird dives, or flies under water, the long axis of the body is inclined obliquely down- wards and forwards, and the bird forces itself into and beneath the water by the action of its feet, or wings, or both. In divingorsub- aquatic flight the feet strike upwards and backwards, the wings downwards and backwards (b of fig. 4) . In aerial flying everything

X3i

Fig. 1. — ChilHngham Bull (Bos Scoticus). Small travelling extremities adapted for land, r, s, t, u, figure-of-8 described by the feet in walking.

Fig. 2. — The Turtle (Chelonia imbricata). Enlarged travelling extremities (flippers) adapted for water.

Fig. 3. — The Bat (Phyllocina gracilis). Greatly expanded travelling extremities adapted for air.

is reversed. The long axis of the bird is inclined obliquely upwards and forwards, and the wings strike, not downwards and backwards, but downwards und forwards (c of fig. 4). These changes in the direction of the long axis of the bird in swimming, diving and flying, and in the direction of the stroke of the wings in sub-aquatic and aerial flight, are due to the fact that the bird is heavier than the air and lighter than the water.

The physical properties of water and air explain in a great measure how the sailing ship differs from the balloon, and how the latter differs from the flying creature and flying machine constructed on the

natural type. The sailing ship is, as it were, immersed in two oceans, viz. an ocean of water and an ocean of air — the former being greatly heavier and denser than the latter. The ocean of water buoys or floats the ship, and the ocean of air, or part of it in motion, swells the sails which propel the ship. The moving air, which strikes .the sails directly, strikes the hull of the vessel indirectly and forces it through the water, which, as explained, is a comparatively dense fluid. When the

ship is in motion it can be steered either by the sails alone, or by the rudder alone, or by both combined. A balloon differs from a sailing ship in being immersed in only one ocean, viz. the ocean of air. It resembles the ship in floating upon the air, as the ship

Fig. 4. — The King Penguin in the positions assumed by a bird in (a)

(6) diving, and © flying.

floats upon the water; in other words, the balloon is lighter than the air, as the ship is lighter than the water. But here all analogy ceases. The ship, in virtue of its being immersed in two fluids having different densities, can be steered and made to tack about in a horizontal plane in any given direction. This in the case of the balloon, immersed in one fluid, is impossible. The balloon in a calm can only rise and fall in a vertical line. Its horizontal movements, which ought to be the more important, are accidental movements due to air currents, and cannot be controlled; the balloon, in short, cannot be guided. One might as well attempt to steer a boat carried along by currents of water in the absence of oars, sails and wind, as to steer a balloon carried along by currents of air. The balloon has no hold upon the air, and this consequently cannot be employed as a fulcrum for regulating its course. The balloon, because of its vast size and from its being lighter than the air, is completely at the mercy of the wind. It forms an integral part, so to speak, of the wind for the time being, and the direction of the wind in every instance determines the horizontal motion of the balloon. The force required to propel a balloon against even a moderate breeze would result in its destruction. The balloon cannot be transferred with any degree of certainty from one point of the earth's surface to another, and hence the chief danger in its employment. It may, quite as likely as not, carry its occupants out to sea. The balloon is a mere lifting machine and is in no sense to be

regarded as a flying machine. It resembles the flying creature only in this, that it is immersed in the ocean of air in which it sustains itself. The mode of suspension is wholly different. The balloon floats because it is lighter than the air; the flying creature floats because it extracts from the air, by the vigorous downward action of its wings, a certain amount of upward recoil. The balloon is passive; the flying creature is active. The balloon is controlled by the wind; the flying creature controls the wind. The balloon in the absence of wind can only rise and fall in a vertical line ; the flying creature can fly in a horizontal plane in any given direction. The balloon is inefficient because of its levity; the flying creature is efficient because of its weight.

Weight, however paradoxical it may appear, is necessary to flight. Everything which flies is vastly heavier than the air. The inertia of the mass of the flying creature enables it to control and direct its movements in the air. Many are of opinion that flight is a mere matter of levity and power. This is quite a mis-

take. No machine, however light and powerful, will ever fly whose travelling surfaces are not properly fashioned and properly applied to the air.

It was supposed at one time that the air sacs of birds contributed in some mysterious way to flight, but this is now known to be erroneous. The bats and some of the best-flying birds have no air sacs. Similar remarks are to be made of the heated ; air imprisoned within the bones of certain birds. 1 Feathers even are not necessary to flight. Insects and bats have no feathers, and yet fly well. The only facts in natural history which appear even indirectly to countenance the flotation theory are the presence of a swimming bladder in some fishes, and the existence of membranous expansions or pseudo- wings in certain animals, such as the flying fish, flying dragon and flying squirrel. As, however, the animals referred to do not actually fly, but merely dart into the air and there sustain themselves for brief intervals, they afford no real support to the theory. The so-called floating animals are depicted at figs. 5, 6 and 7. It has been asserted, and with some degree of plausibility, that a fish might swim, and that a bird lighter

swimming,

lighter than the water

than the air might fly: it ought, however, to be borne in mind

Fig. 5.— The Red-throated Dragon Fig. 6.— The Flying Colugo {Draco

haematopogon). (Galeopithecus volans) ; also called

flying lemur and flying squirrel.

Fig. 7. — The Flying Fish (Exocoetus exiliens).

that, in point of fact, a fish lighter than the water could not hold its own if the water were in the least perturbed, and that a bird lighter than the air would be swept into space by even a moderate

1 According to Dr Crisp, the swallow, martin, snipe and many birds of passage have no air in their bones. — Proc. Zool. Soc. Lond. part xxv., 1857, p. 13.

breeze without hope of return. Weight and power are always associated in living animals, and the fact that living animals are made heavier than the medium they are to navigate may be regarded as a conclusive argument in favour of weight being necessary alike to the swimming of the fish and the flying of the bird. It may be stated once for all that flying creatures are for the most part as heavy, bulk for bulk, as other animals, and that flight in every instance is the product, not of superior levity, but of weight and power directed upon properly constructed flying organs.

This fact is important as bearing on the construction of flying machines. It shows that a flying machine need not necessarily be a light, airy structure exposing an immoderate amount of surface. On the contrary, it favours the belief that it should be a compact and moderately heavy and powerful structure, which trusts for elevation and propulsion/entirely to its flying appliances— whether actively moving wings, or screws, or aero- planes wedged forward by screws. It should attack and subdue the air, and never give the air an opportunity of attacking or subduing it. It should smite the air intelligently and as a master, and its vigorous well-directed thrusts should in every instance elicit an upward and forward recoil. The flying machine must be mult urn in parvo. It must launch itself in the ocean of air, and must extract from that air, by means of its travelling surfaces — however fashioned and however applied — the recoil or resistance necessary to elevate and carry it forward. Extensive inert surfaces indeed are contra-indicated in a flying machine, as they approximate it to the balloon, which, as has been shown, cannot maintain its position in the air if there are air currents. A flying

machine which could not face air currents would necessarily be a failure. To obviate this difficulty we are forced to fall back upon weight, or rather the structures and appliances which weight represents. These appliances as indicated should not be un- necessarily expanded, but when expanded they should, wherever practicable, be converted into actively moving flying, surfaces, injwefeiJence to fixed or inert dead surfaces.

The question of surface is a very important one in aviation: # it nafcarally resolves itself into one of active and passive Surf ace. As there are active and passive surfaces in the flying animal, so theri ftrVoHhould be, active and passive surfaces in the flying machine. Art' should follow nature in. this matter. The active surfaceS,,i$ flying creatures are always greatly in excess of the passive oriesˆirom the fact that the former virtually increase in proportion to the spaces through which they are made to travel. Nature not-only distinguishes between actiy« and passiyesurf aces in flying anfˆajs, but she strikes a just balance between them, and utilizes both. She regulates the surfaces to the strength and weight of the flyirg creature and the air .currents to which the surfaces are to be exposed and upon which they are to operate. In her calculations she never forgets that her flying subjects are to Control and not to be controlled by the air. As a rule she reduces the passive surfaces of the body to a minimum; she likewise reduces as far as possible the actively moving or flying surfaces. While, however, diminishing the surfaces of the flying animal as a whole, she increases as occasion demands the active or wing surfaces by wing movements, and the passive or dead surfaces by the forward motion of the body in progressive flight. She knows that if the wings are driven with sufficient rapidity- they practically convert the spaces through which they move into solid bases of support; she also knows that the body in rapid flight derives support from all the air over which it passes. The manner in which the wing surfaces are increased by the wing movements will be readily understood from the accompany- ing illustrations of the blow-fly with its wings at rest and in motion (figs. 8 and 9). In fig. 8 the surfaces exposed by the body of the insect and the wings are, as compared with those of fig. 9, trifling. The wing would have much less purchase on fig. 8 than on fig. 9, provided the surfaces exposed by the latter were passive or dead surfaces. But they are not dead surfaces: they represent the spaces occupied by the rapidly vibrating wings, which are actively moving flying organs. As, moreover, the wings travel at a much higher speed than any wind that blows, they are superior

to and control the wind; they enable the insect to dart through the wind in whatever direction it pleases.

The reader has only to imagine figs, 8 and 9 cut out in paper to realize that extensive, inert, horizontal aeroplanes 1 in a flying machine would be a mistake. It is found to be so practically, as will be shown by and by. Fig. 9 so cut out would be heavier than fig. 8, and if both were exposed to a current of air, fig. 9 would be more blown about than fig. 8.

It is true that in beetles and certain other insects there are the elytra or wing cases — thin, light, horny structures inclined

Fig. 8. — Blow-fly {Musca vomitoria) Fig. 9. — Blow-fly with its wings with its wings at rest. iri motion as in flight.

slightly upwards — which in .the act of flight are spread out and act as sustainers or gliders. The elytra, however, are com- paratively long narrow structures which occupy a position in front of the wings, of which they may be regarded as forming the anterior parts. The elytra are to the delicate wings of some insects what the thick anterior margins are to stronger wings. The elytra, moreover, are not wholly passive structures. They can be moved, and the angles made by their under surfaces with the horizon adjusted. Finally, they are not essential to flight, as flight in the great majority of instances is performed without them. The elytra serve as protectors to the wings when the wings are folded upon the back of the insect, and as they are extended on either side of the body more or less horizontally when the insect is flying they contribute to flight indirectly, in virtue of their being carried forward by the body in motion.

Natural Flight.— The manner in which the wings of the insect traverse the air, so as practically to increase the basis of support, raises the whole subject of natural flight. It is necessary, there- fore, at this stage to direct the attention of the reader somewhat fully to the subject of flight, as witnessed in the insect, bird and bat, a knowledge of natural flight preceding, and being in some sense indispensable to, a knowledge of artificial flight. The bodies of flying creatures are, as a rule, very strong, compara- tively light and of an elongated form, — the bodies of birds being specially adapted for cleaving the air. Flying creatures, however, are less remarkable for their strength, shape and comparative levity than for the size and extraordinarily rapid and complicated movements of their wings. Prof. J. Bell Pettigrew first satis- factorily analysed those movements, and reproduced them by the aid of artificial wings. This physiologist in 1867 2 showed that all natural wings, whether of the insect, bird or bat, are screws structurally, and that they act as screws when they are made to vibrate, from the fact that they twist in opposite directions during the

down and up strokes. He also explained that all wings act upon a common principle, and that they present oblique, kite-like surfaces to the air, through which they pass much in the same way that an oar passes through water in sculling. He further pointed out that the wings of flying creatures (contrary to received opinions, and as has been already indicated) strike downwards and forwards during the down strokes, and upwards and forwards during the up strokes. Lastly he demonstrated that the wings of flying creatures, when the

1 By the term aeroplane is meant a thin, light, expanded structure inclined at a slight upward angle to the horizon intended to float or rest upon the air, and calculated to afford a certain amount of support to any body attached to it.

2 ” On the Various Modes of Flight in relation to Aeronautics,” by J. Bell Pettigrew, Proc. Roy. Inst., 1867; ” On the Mechanical Appliances by which Flight is attained in the Animal Kingdom,” by the same author, Trans. Linn. Soc, 1867,

bodies of said creatures are fixed, describe Jigure-of-8 tracks in space — the figure-of-8 tracks, when the bodies are released and advancing as in rapid, flight, being opened out and converted into waved (racks.

It may be well to explain here that a claim has been set up by his admirers for the celebrated artist, architect and engineer, Leonardo da Vinci, to be regarded as the discoverer of the principles and practice of flight (see Theodore Andrea Cook, Spirals in Nature and Art, 1,903). The claim is, however, unwarranted ; Leonardo’s chief work on flight, bearing the title Codice sul Volo degli Uccelli e Varie Altre Materie, written in 1505, consists of a short manuscript of twenty-seven small quarto pages, with simple sketch illustrations interspersed in the text. In addition he makes occasional references to flight in his - other manuscripts, which are also illustrated. In hone of Leonardo’s manuscripts, however, and in none of his figures, is the slightest hint given of his having any knowledge of the spiral movements made by the wing in flight or of the spiral structure of the wing itself. It is claimed that Leonardo knew the direction of the stroke of the wing, as revealed by recent researches and proved by modern instantaneous photography. As a matter of fact, Leonardo gives a wholly inaccurate account of the direction of the stroke of the wing. He states that the wing during the down stroke strikes downwards and backwards,

whereas in reality it strikes downwards and forwards. In speaking of artificial flight Leonardo says: “The wings have to row downwards and backwards to support the machine on high, so that it moves forward.” In speaking of natural flight he remarks: ” If in its descent the bird rows backwards with its wings the bird will move rapidly; this happens because the wings strike the air which successively runs behind the bird to fill the void whence it comes.” There is nothing in Leonardo’s writings to show that he knew either the anatomy or physiology of the wing in the modern sense.

Pettigrew’s discovery of the figure-of-8 and waved movements made by the wing in stationary and progressive flight was con- firmed some two years after it was made by Prof. E. J. Marey of Paris 1 by the aid of the “sphygmograph.” 2 The movements in question are now regarded as fundamental, from the fact that they are alike essential to natural and artificial flight.

The following is Pettigrew’s description of wings and wing movements published in 1867: —

” The wings of insects and birds are, as a rule, more or less tri- angular in shape, the base of the triangle being directed towards the body, its sides anteriorly and posteriorly. They are also conical on section from within outwards and from before backwards, this shape converting the pinionsiinto delicately graduated instruments balanced with the utmost nicety to satisfy the requirements of the muscular system on the one hand and the resistance and resiliency of the air on the other. While all wings are graduated as explained, innumer- able varieties occur as to their general contour, some being falcated or scythe-like, others oblong, others rounded or circular, some lanceo- late and some linear. The wings of insects may consist either of one or two pairs — the anterior or upper pair, when two are present, being in some instances greatly modified and presenting a corneous condition. They are then known as elytra, from the Gr. iXvrpov, a sheath. Both pairs are composed of a duplicature of the integu- ment, or investing membrane, and are strengthened in various direc- tions by a system of hollow, horny tubes, known to entomologists as the neurae or nervures. These nervures taper towards the extremity of the wing, and are strongest towards its root and anterior margin, where they supply the place of the arm in birds and bats. The neurae are arranged at the axis of the wing after the manner of a fan or spiral stair — the anterior one occupying a higher position than that farther back, and so of the others. As this arrangement extends also to the margins, the wings are more or less twisted upon themselves and present a certain degree of convexity on their superior or upper surface, and a

corresponding concavity on their inferior or under surface,— their free edges supplying those fine curves which act with such efficacy upon the air in obtaining the maximum of resistance and the minimum of displacement. As illustrative examples of the form of wings alluded to, those of the beetle, bee and fly may be cited — the pinions in those insects acting as helices, or twisted levers, and

1 Revue des cours scientifiques de la France et de V Stranger, 1869.

2 The sphygmograph, as its name indicates, is a recording instrument. It consists of a smoked cylinder revolving by means of clockwork at a known speed, and a style or pen which inscribes its surface by scratching or brushing away the lampblack. The movements to be registered are transferred to the style or pen by one or more levers, and the pen in turn transfers them to the cylinder, where they appear as legible tracings. In registering the movements of the wings the tips and margins of the pinions were, by an ingenious modification, employed as the styles or pens. By this arrangement the different parts of the wings were made actually to record their own movements. As will be seen from this account, the figure-of-8 or wave theory of stationary and progressive flight has been made the subject of a rigorous experimentum crucis.

elevating weights much greater than the area of the wings would seem to warrant ” (figs. 10 and 11). ... ” To confer on the wings the multiplicity of movements which they require, they are supplied with double hinge or compound joints, which enable them to move not only in an upward, downward, forward and backward direction, but also at various intermediate degrees of obliquity. An’insect with wings thus hinged may, as far as steadiness of body is concerned, be not inaptly compared to a compass set upon gimbals, where the universality of motion in one direction ensures comparative fixedness in another.” ...” All wings obtain their leverage by presenting oblique surfaces to the air, the degree of obliquity gradu- ally increasing in a direction from be- hind, forwards and downwards, during extension when the sudden or effective stroke is being given, Fig. 10.— Right Wing of the Beetle (Goliathus

micans) when at rest ; seen from above.

and gradually de- Creasing in an oppo- site direction during flexion, or when the wing is being more

oaratorTrrnlkTnt FlG ‘ “—Right Wing of the Beetle {Goli- , r- nn A
+™ir tu athus micans) when in motion; seen from efflcdve stroke in

behind ‘ This figure shows how the wing twists ;’”.” ,„a \u- and untwists when in action, and how it forms hdds f*W * also of a true screw.

birds, is therefore delivered downwards and forwards, and not, as the majority of writers believe, vertically, or even slightly backwards . . . The wing in the insect is more flattened than in the bird ; and advantage is taken on some occasions of this circumstance, particularly in heavy-bodied, small-winged, quick-flying insects, to reverse the pinion more or less completely during the down and up strokes.” ...” This is effected in the following manner. The posterior margin of the wing is made to rotate, during the down stroke, in a direction from above downwards and from behind forwards — the anterior margin travelling in an opposite direction and reciprocating. The wing may thus be said to attack the air by a screwing movement from above. During the up or return stroke, on the other hand, the posterior margin rotates in a direction from below upwards and from before backv/ards, so that by a similar but reverse screwing motion the pinion attacks the air from beneath.” . . . ” A figure-of-8, compressed laterally and placed obliquely with its long axis running from left to right of the spectator, represents the movements in question. The down and up strokes, as will be seen from this account, cross each other, the wing smiting the air during its descent from above, as in the bird and bat, and during its ascent from below as in the flying fish and boy’s kite ” (fig. 12).

Fig. 12 shows the figure-of-8 made by the margins of the wing in extension (continuous line), and flexion (dotted line). As the tip of the wing is mid-way between its margins, a line between the continu- ous and dotted lines gives the figure-of-8 made by the tip. The arrows indicate the reversal of the planes of the wing, and show how the down and up strokes cross each other.

...” The figure-of-8 action of the wing explains how an insect or bird may fix itself in the air, the backward and forward recipro- cating action of the pinion affording support, but no propulsion. In these instances the backward and forward strokes are made to counterbalance each other. Although the figure-of-8 represents with considerable fidelity the twisting of the wing upon its axis during extension and flexion, when the insect is playing its wings before an object, or still better when it is artificially fixed, it is otherwise when the down stroke is added and the insect is fairly on the wing and progressing rapidly. In this case the wing, in virtue of its being carried forward by the body in motion, describes an undulating or spiral course, as shown in ng. 13.”

...” The down and up strokes are compound movements— the termination of the down stroke embracing the beginning of the up stroke, and the termination of the up stroke including the begin- ning of the down stroke. This is necessary in order that the down and up strokes may glide into each other in such a manner as to prevent jerking and unnecessary retardation.” 3 . . .

3 This continuity of the down into the up stroke and the converse is greatly facilitated by the elastic ligaments at the root and in the

” The wing of the bird, like that of the insect, is concavo-convex, and more or less twisted upon itself when extended, so that the anterior or thick margin of the pinion presents a different degree of curvature to that of the posterior or thin margin. This twisting is in a great measure owing to the manner in which the bones of the wing are twisted upon themselves, and the spiral nature of their articular surfaces — the long axes of the joints always intersecting each other

■—/:

FlG. 13.— Wave track made by the wing in progressive flight, a, b, Cfests of the wave; c, d, e, up strokes; x, x, down strokes; /, point corresponding to the anterior margin of the wing, and forming a centre for the downward rotation of the wing (a, g) ; g, point corresponding to the posterior margin of the wing, and forming a centre for the upward rotation of the wing (d, f).

at right angles, and the bones of the elbow and wrist making a quarter of a turn or so during extension and the same amount during flexion. As a result of this disposition of the articular surfaces, the wing may be shot out or extended, and retracted or flexed in nearly the same plane, the bones composing the wing rotating on their axes during either movement (fig. 14). The secondary action, or the revolving of

Extension (elbow). Flexion (wrist).

Flexion (elbow).

Extension (wrist).

Fig. 15. — Right Wing of the Red- logged Partridge (Perdix rubra). Dorsal aspect as seen from above.

Fig. 14. — a, b, line along which the wing travels during extension and flexion. The arrows indicate the direction in which the wing is spread out in extension and closed or folded in flexion.

the component bones on their own axes, is of the greatest importance in the movements of the wing, as it communicates to the hand and forearm, and consequently to the primary and secondary feathers which they bear, the precise angles necessary for flight. It in fact ensures that the wing, and the curtain or fringe of the wing which the primary and secondary feathers form, shall be screwed into and down upon the wind in extension, and unscrewed or withdrawn from the wind during flexion. The wing of the bird may therefore be compared to a huge gimlet or auger, the axis of the gimlet repre- senting the bones of the wing, the flanges or spiral thread of the gimlet

the primary and secondary feathers ” (figs. 15 and 16). ...” From this descrip- tion it will be evident that by the mere rotation of the bones of the forearm and hand the maximum and minimum of resistance is secured much in the same way that this object is attained by the alternate dipping and feathering of an oar.” ...” The wing, both when at rest and when in motion, may not inaptly be compared to the blade of an ordinary screw propeller as employed in navigation. Thus the general outline of

the wing corresponds closely with the outline of the propeller (figs, n, 16 and 18), and the track described by the wing in space is twisted upon itself propeller fashion 1 (figs. 12, 20, 21, 22, 23). The great velocity with which the wing is driven converts the impres- sion or blur made by it into what is equivalent to a solid for the time being, in the same way that the spokes of a wheel in violent motion, as is well understood, more or less completely

substance of the wing. These assist in elevating, and, when necessary, in flexing and elevating it. They counteract in some measure what may be regarded as the dead weight of the wing, and are especially useful in giving it continuous play.

1 ” The importance of the twisted configuration or screw-like form cannot be over-estimated. That this shape is intimately associated with flight is apparent from the fact that the rowing feathers of the wing of the bird are every one of them distinctly spiral in their nature; in fact, one entire rowing feather is equivalent — morpho- logically and physiologically — to one entire insect wing. In the

Fig. 16.— Right Wing of the Red- legged Partridge {Perdix rubra).

Dorsal and ventral aspects as seen from be- hind ; showing auger-like conformation of wing. Compare with figs. 11 and 18.

occupy the space contained within the rim or circumference of the wheel ” (figs. 9, 20 and 21).

...” The wing of the bat bears a considerable resemblance to that of the insect, inasmuch as it consists of a delicate, semi-trans- parent, continuous membrane, supported in divers directions, par- ticularly towards its anterior margin, by a system of osseous stays cr stretchers which con- fer upon it the degree of rigidity requisite for flight. It is, as a rule, deeply concave on its under or ventral surface, and in this respect re- sembles the wing of the

heavy-bodied birds. The movement of the bat’s wing in extension is a spiral one, the spiral running alternately from below upwards and forwards and from above downwards and backwards. The action of the wing of the bat, and the movements of its component bones, are essentially the same as in the bird ” (figs. 17 and 18).

. . . “The wing strikes the air . precisely as a boy’s kite would if it

were jerked by its string, FlG l8 ._Ri g ht Wing of the Bat (P/n>/- the on ly difference being locina gracilis) . Dorsal and ventral aspects, that the kite is pulled as s fron ˆ behind ™.

Fig. 17.— Right Wing of the Bat (Phyl- locina gracilis). Dorsal aspect as seen from above.

These show the screw-like configuration of the wing, and also how the wing twists and untwists during its action.

forwards upon the wind

by the string and the

hand, whereas in the

insect, bird and bat

the wing is pushed forwards on the wind by the weight of the body

and the power residing in the pinion itself ” (fig. 19). 2

Fig. 19. — The Cape Barn-owl (Strix capensis), showing the kite- like surfaces presented by the ventral aspect of the wings and body in flight.

The figure-of-8 and kite-like action of the wing referred to lead us to explain how it happens that the wing, which in many instances is a comparatively small and delicate organ, can yet attack the air with such vigour as to extract from it the recoil necessary to elevate and propel the flying creature. The accom- panying figures from one of Pettigrew's later memoirs 3 will serve to explain the rationale (figs. 20, 21, 22 and 23).

As will be seen from these figures, the wing during its vibration sweeps through a comparatively very large space. This space, as already explained, is practically a solid basis of support for the wing and for the flying animal. The wing attacks the air in such a manner as virtually to have no slip — this for two reasons. The wing reverses instantly and acts as a kite during nearly the entire down and up strokes. The angles, moreover, made by the wing with the horizon during the down and up strokes are at no two intervals the same, but (and this is a

wing of the martin, where the bones of the pinion are short, and in some respects rudimentary, the primary and secondary feathers are greatly developed, and banked up in such a manner that the wing as a whole presents the same curves as those displayed by the insect's wing, or by the wing of the eagle, where the bones, muscles and feathers have attained a maximum development. The con- formation of the wing is such that it presents a waved appearance in every direction — the waves running longitudinally, transversely and obliquely. The greater portion of the wing may consequently be removed without essentially altering either its form or its func- tions. This is proved by making sections in various directions, and by finding that in some instances as much as two-thirds of the wing may be lopped off without materially impairing the power of flight." — Trans. Roy. Soc. Edin. vol. xxvi. pp. 325, 326.

2 " On the Various Modes of Flight in relation to Aeronautics," Proc. Roy. Inst., 1867; " On the Mechanical Appliances by which Flight is attained in the Animal Kingdom," Trans. Linn. Soc,

1867, 26.

■ , " On the Physiology of Wings ; being an analysis of the move- ments by which flight is produced in the Insect, Bat and Bird," Trans. Roy. Soc. Edin. vol. 26.

remarkable circumstance) they are always adapted to the speed at which the wing is travelling for the time being. The increase and decrease in the angles made by the wing as it hastens to and fro are due partly to the resistance offered by the air, and partly to the mechanism and mode of application of the wing to the air. The wing, during its vibrations, rotates upon two separate centres, the tip rotating round the root of the wing as an axis (short axis of wing), the posterior margin rotating around

h 6

Fig. 20.

Fig. 21.

Fig. 22.

Fig. 23.

Figs. 20, 21, 22 and 23 show the area mapped out by the left wing of the Wasp when the insect is fixed and the wing made to vibrate. These figures illustrate the various angles made by the wing with the horizon as it hastens to and fro, and show how the wing reverses and reciprocates, and how it twists upon itself in opposite directions, and describes a figure-of-8 track in space. Figs. 20 and 22 represent the forward or down stroke (a b c d e f g), figs. 21 and 23 the backward or up stroke (gkijkla). The terms forward and back strokes are here employed with reference to the head of the insect, x, x', line to represent the horizon. If fig. 22, representing the down or forward stroke, be placed upon fig. 23, representing the up or backward stroke, it will be seen that the wing crosses its own track more or less completely at every stage of the down and up strokes.

the anterior margin (long axis of wing). The wing is really eccentric in its nature, a remark which applies also to the rowing feathers of the bird's wing. The compound rotation goes on throughout the entire down and up strokes, and is intimately associated with the power which the wing enjoys of alternately seizing and evading the air.

The compound rotation of the wing is greatly facilitated by the wing being elastic and flexible. It is this which causes the wing to twist and untwist diagonally on its long axis when it is made to vibrate. The twisting referred to is partly a vital and partly a mechanical act; — that is, it is occasioned in part by the action of the muscles and in part

by the greater resistance experienced from the air by the tip and posterior margin of the wing as compared with the root and anterior margin, — the reˆ sistance experienced by the tip and posterior margin causing them to reverse always subsequently to the root and anterior margin, which has the effect of throwing the anterior and posterior margins of the wing into figure-of-8 curves, as shown at figs. 9, 11, 12, 16, 18, 20, 21, 22 and 23.

The compound rotation of the wing, as seen in the bird, is represented in fig. 24.

Not the least curious feature of the wing movements is the remarkable power which the wing possesses of making and utilizing its own currents. Thus, when the wing descends it draws after it a strong current, which, being met by the wing during its ascent, greatly increases the efficacy of the up stroke. Similarly and conversely, when the wing ascends, it creates an upward current, which, being met by the wing when it descends, powerfully contributes to the efficiency of the down stroke. This statement can be readily verified by experiment both with natural and artificial wings. Neither the up nor the down strokes are complete in themselves.

The wing to act efficiently must be driven at a certain speed, and in such a manner that the down and up strokes shall glide into each other. It is only in this way that the air can be made to pulsate, and that the rhythm of the wing and the air waves carl be made to correspond. The air must be seized and let go in a certain order and at a certain speed to extract a maximum

recoil. The rapidity of the wing movements is regulated by the size of the wing, small wings being driven at a very much higher speed than larger ones. The different parts of the wing, more- over, travel at different degrees of velocity— the tip and posterior margin of the wing always rushing through a much greater space, in a given time, than the root and anterior margin.

J

I – “pi k

Fig. 24. — Wing of the Bird with its root (a, b) cranked forwards. a, b, Short axis of the wing (axis

for tip of wing, h). c, d, Long axis (axis for posterior

margin of wing, h, i,j, k, I). m, n, Short axis of rowing

feathers of wing. r, s, Long axis of rowing feathers e f,

of wing. The rotation of

the rowing feathers on

their long axis (they are eccentrics) enables them to open or separate during the up, and close or come together during the down strokes. g p, concave shape presented by the under surface of the wing.

Fig. 25 shows how different portions of the wing travel at

. The rapidity of travel of the insect wing is in some cases

enormous. The wasp, for instance, is said to ply its wings at

the rate of no, and the common house-fly at the rate of 330

beats per second. Quick as are the vibrations of natural wings,

the speed of certain parts of the wing is amazingly increased.

Wings as a rule are long and narrow. As a consequence, a

comparatively slow and very

limited movement at the root

confers great range and im- mense speed at the tip, the

speed of each portion of the

wing increasing as the root pf

the wing is receded from. This

is explained on a principle well

understood in mechanics, viz.

that when a wing or rod

hinged at one end is made to

move in a circle, the tip or

free end of the wing or rod

describes a much wider circle

in a given time than a portion

of the wing or rod nearer the different degrees of speed. In this

hinge (fig. 25). figure the rod a, b, hinged at *,

One naturally inquires why represents the wing. When the

wing is made to vibrate, its several portions travel through the spaces d b f, j k I, g h i, and e a c in exactly the same interval of time. The part of the wing marked b, which corresponds with the tip, consequently travels very much

the wings were not driven at mo re rapidly than the part marked

a high speed, and if they were a, which corresponds with the root.

not eccentrics made to revolve m “• ° P< c " rves ™ ade b y the wing . ., at the end of the up and down

upon two separate axes, they strokes . r , position G f the wing at would of necessity be large the middle of the stroke. cumbrous structures; but

large heavy wings would be difficult to work, and what is worse, they would (if too large), instead of controlling the air, be controlled by it, and so cease to be flying organs.

There is, however, another reason why wings should be made to vibrate at high speeds. The air, as explained, is a very light, thin, elastic medium, which yields on the slightest pressure, and unless the wings attacked it with great violence the necessary recoil or resistance could not be obtained. The atmosphere, because of its great tenuity, mobility and comparative imponder- ability, presents little resistance to bodies passing through it at low velocities. If, however, the speed be greatly accelerated,

the high speed of wings, and why the progressive increase of speed at their tips and posterior margins? The answer is not far to seek. If

the action of even an ordinary cane is sufficient to elicit a recoil. This

comes of the action arid reaction of matter, the resistance experienced varying according to the density of the atmosphere and the shape, extent and velocity of the body acting upon it; While, therefore, scarcely any impediment is offered to the pro- gress of an animal in motion in the air, it is often exceedingly difficult to compress the air with sufficient rapidity and energy to convert it into a suitable fulcrum for securing the necessary support and forward impetus. This arises from the fact that bodies moving in air experience a minimum of resistance and occasion a maximum of displacement. Another and very obvious difficulty is traceable to the great disparity in the weight of air as compared with any known solid, and the consequent want of buoying or sustaining power which that disparity involves. If we compare air with water we find it is nearly iooo times lighter. To meet these peculiarities the insect, bird and bat are furnished with extensive flying surfaces in the Shape of wings, which they apply with singular velocity and power to the air, as levers of the third order. In this form of lever the power is applied between the fulcrum and the weight to be raised. The power is represented by the wing, the fulcrum by the air, and the weight by the body of the flying animal. Although the third order of lever is particularly inefficient when the fulcrum is rigid and immobile, it possesses singular advantages when these conditions are reversed, that is, when the fulcrum, as happens with the air, is elastic and yielding. In this instance a very slight movement at the root of the pinion, or that end of the lever

directed towards the body, is followed by an immense sweep of the extremity of the wing, where its elevat- ing and propelling power is greatest — this arrange- ment ensuring that the

large quantity of air

\ ^^&f&^ X ”””* necessary for support and

\ fli^^’^ *’^ propulsion shall be com-

-*^ K ”’~^ P : i pressed under the most

favourable conditions.

In this process the weight of the body per- forms an important part, by acting upon the in- clined planes formed by the wings in the plane of progression. The power and the weight may thus be said to reciprocate, the two sitting as it were side by side and blending their peculiar influences to pro- duce a common result, as indicated at fig, 26.

When the wings descend they elevate the body, the wings being active and the body passive; when the body descends it con- tributes to the elevation of the wings, 1 the body being active and the wings more or less passive. It is in this way that weight forms a factor in flight, the wings and the weight of the body reciprocating and mutually assisting and relieving each other. This is an argument for employing four wings in artificial flight,— the wings being so arranged that the two which are up shall always* by their fall mechanically elevate the two which are down. Such an arrangement is calculated greatly to conserve the driving power, and as a consequence, to reduce the weight.

1 The other forces which assist in elevating the wings are — (o) the elevator muscles of the wings, (6) the elastic properties of the wings, and © the reaction of the compressed air on the under surfaces of the wings.

Fig. 26. — Inthis figure/,/' represent the movable fulcra furnished by the air, p p' the power residing in the wing, and b the body to be moved. In order to make the problem of flight more in- telligible, the lever formed by the wing is prolonged beyond the body (b), and to the root of the wing so extended the weight (u>, w') is attached ; x represents the universal joint by which the wing is attached to the body. When the wing ascends as shown at p, the air (fulcrum /) resists its upward passage, and forces the body (b) or its repre- sentative (w) slightly downwards. When the wing descends as shown at p', the air (fulcrum/') resists its down- ward passage, and forces the body (b) or its representative (w') slightly up- wards. From this it follows that when the wing rises the body falls, and vice versa — the wing describing the arc of a large circle (//'), the body (b), or the weights (w, w'j representing it, describ ing the arc of a small circle.

— j , _ _~ —

>y

That the weight of the body plays an important part in the production of flight may be proved by a very simple experiment. If two quill feathers are fixed in an ordinary cork, and so arranged that they expand and arch above it (fig. 27), it is found that if the apparatus be

dropped from a vertical \£

height of 3 yds. it does \J C

not fall vertically down- j

wards > but downwards and i

forwards in a curve, the i

forward travel amounting •■, /

in some instances to a yard f e

and a Half. 1 Here the cork, in falling; acts upon the

feathers (which are to all A /

intents and purposes wings) , g

and these in turn act upon Fig. 27.-^-0, b, quill feathers; c,

the air, in such a manner as cork • : <* > *•_/> «>. downward and for-

„ „^i„„„ „ t,™- „.„! ward curved trajectory made by the

to produce a horizontal fea t h ers and cork before reaching the transference. ground (h, i).

In order to utilize the air as a means of transit, the body in motion, whether it moves in virtue of the life it possesses, or because of a force super- added, must be heavier than air. It must tread with its wings and rise upon the air as a swimmer upon the water, or as a kite upon the wind. This is necessary for the simple reason that the body must be active, the air passive. The flying body must act against gravitation, and elevate and carry itself forward at the expense of the air and of the force which resides in it, whatever that may be. If it were other-wise—if it were rescued from the law of gravitation on the one hand, and bereft of independent movement on the other, it would float about uncontrolled and uncontrollable like an ordinary balloon.

In flight one of two things is necessary. Either the wings must attack the air with great violence, or the air in rapid motion must attack the wings: either suffices. If a bird attempts to fly in a calm, the wings must be made to smite the air after the manner of a boy's kite with great vigour and at a high speed. In this case the wings fly the bird. If, however, the bird is fairly launched in space and a stiff breeze is blowing, all that is required in many instances is to extend the wings at a slight upward angle to the horizon so that the under parts of the wings present kite-like surfaces. In these circumstances the rapidly moving air flies the bird. The flight of the albatross supplies the

necessary illustration. If by any chance this magnificent bird alights upon the sea he must flap and beat the water and air with his wings with tremendous energy until he gets fairly launched. This done he extends his enormous pinions 2 and sails majestically along, seldom deigning to flap his wings, the breeze doing the work for him. A familiar illustration of the same principle may be witnessed any day when children are engaged in the pastime of kite-flying. If two boys attempt to fly a kite in a calm, the one must hold up the kite and let go when the other runs. In this case the under surface of the kite is made to strike the Still ait. If, however, a stiff autumn breeze be blowing, it suffices if the boy who formerly ran when the kite was let go stands still. In this case the air in rapid motion strikes the under surface of the kite and forces it up. The string and the hand are to the kite what the weight of the flying creature is to the inclined planes formed by its wings.

The area of the insect, bird and bat, when the wings are fully expanded, is greater than that of any other class of animal, their weight being proportionally less. As already stated, however, it ought never to be forgotten that even the lightest insect, bird or bat is vastly heavier than the air, and that no fixed relation exists between the weight of body and expanse of wing in any of the orders. We have thus light-bodied and

5 The wings of the albatross, when fully extended, measure across the back some 14 ft. They are exceedingly narrow, being sometimes under a foot in width.

Insects.

large-winged insects and birds, as the butterfly and heron; and others with heavy bodies and small wings, as the beetle and partridge. Similar remarks are to be made of bats. Those apparent inconsistencies in the dimensions of the body and wings are readily explained by the greater muscular development of the heavy-bodied, small- winged insects, birds and bats, and the increased power and rapidity with which the wings in them are made to oscillate. This is of the utmost importance in the science of aviation, as showing that flight may be attained by a heavy powerful animal with comparatively small wings, as well as by a lighter one with greatly enlarged wings. While, therefore, there is apparently no correspondence between the area of the wing and the animal to be raised, there is, except in the case of sailing insects, birds and bats, an unvarying relation as to the weight and number of oscillations; so that the problem of flight would seem to resolve itself into one of weight, power, velocity and small surfaces, versus buoyancy, debility, diminished speed and extensive surfaces — weight in either case being a sine qua

That no fixed relation exists between the area of the wings and the size and weight of the body to be elevated is evident on comparing the dimensions of the wings and bodies of the several orders of insects, bats and birds. If such comparison be made, it will be found that the pinions in some instances diminish while the bodies increase, and the converse. No practical good can therefore accrue to aviation from elaborate measurements of the wings and body of any flying thing; neither can any rule be laid down as to the extent of surface required for sus- taining a given weight in the air. The statements here advanced are borne out by the fact that the wings of insects, bats and birds may be materially reduced without impair- ing their powers of flight. In such cases the speed with which the wings are driven is increased in the direct ratio of the mutilation. The inference to be deduced from the foregoing is plainly this, that even in large-bodied, small-winged insects and birds the

this we have a partial explanation of the buoyancy of insects, and the great lifting power possessed by birds and bats,— the bats carrying their young without inconvenience, the birds elevat- ing surprising quantities of fish, game, carrion, &c. (fig. 28).

While as explained, no definite relation exists between 1 the weight of

a flying animal and the size of its flying surfaces, there being, as stated, heavy-bodied and small-wiiiged insects, birds and bats, and the converse, and while, as has been shown, flight is possible within a wide range, the wings being, as a rule, in excess of what are required for the purposes of flight, — still it appears from the researches of L. de Lucy that there is a general law, to the effect that the larger the volant animal, the smaller, by comparison, are its flying surfaces. The existence of such a law is very encouraging so far as artificial flight is concerned, for it shows that the,flying surfaces of a large, heavy, powerful flying machine will be comparatively small, and consequently comparatively compact and strong. This is a point of very considerable importance, as the object desiderated in a flying machine is elevating capacity.

De Lucy tabulated his results as under: —

Names.

Gnat . . . .

Dragon-fly (small) Coccinella (Lady-bird) Dragon-fly (common) Tipula, or Daddy-long-legs Bee ….

Meat-fly … Drone (blue) Cockchafer

(Stag-beetle 1 (female) S Stag-beetle / (male) \ Rhinoceros-beetle

Flying Surface

referred to the

Kilogramme

= 2 lb8oz. 3 dwt.

v 2 gr. avoird. = 2 1B30Z. 4-428 dr. troy.

sq. yds. ft.

II

7 5 5 3 1 1

I

1

8 2

13 2

5 2

3 2

2

92 56

»7

89 11

74i 54i

20

50

39i

Birds.

Names.

Swallow

Sparrow

Turtle-dove

Pigeon . .

Stork .

Vulture

Crane of Australia

o 8 33 o 6 122ˆ

Flying Surface

referred to the

Kilogramme.

sq.

yds. ft. 1 I

in. 104I 142I

1 00 i

“3

20

116

130

wing-surface is greatly in excess, the surplus wing area supplying

Fig. 28.— Hawk and Pigeon.

that degree of elevating and sustaining power which is necessary to prevent undue exertion on the part of the volant animal. In

“It is easy, by the aid of this table, to follow the order, always decreasing, of the surfaces, in proportion as the winged animal increases in size and weight. Thus, in comparing the insects with one another, we find that the gnat, which weighs 460 times less than the stag-beetle, has 14 times more of surface. The lady-bird weighs 150 times less than the stag-beetle, and possesses 5 times more of surface, &c. It is the same with the birds. The sparrow weighs about 10 times less than the pigeon, and has twice as much surface. The pigeon weighs about 8 times less than the stork, and has twice as much surface. The sparrow weighs 339 times less than the Australian crane, and possesses 7 times more surface, &c. If now we compare the insects and the birds, the gradation will become even much more striking. The gnat, for example, weighs 97,000 times less than the pigeon, and has 40 times more surface ; it weighs three millions of times less than the crane of Australia, and possesses 140 times more of surface than this latter, the weight of which is about 9 kilogrammes 500 grammes (25 lb 5 oz. 9 dwt. troy, 20 lb 15 oz. 2! dr. avoirdupois).

The Australian crane, the heaviest bird weighed, is that which has the smallest amount of surface, for, referred to the kilogramme, it does not give us a surface of more than 899 square centimetres (139 sq.

in.), that is to say, about an eleventh part of a square metre. But every one knows that these grallatorial animals are excellent birds of night. Of all travelling birds they Undertake the longest and most remote journeys. They are, in addition, the eagle excepted, the birds which elevate themselves the highest, and the flight of which is the longest maintained.” 1

The way in which the natural wing rises and falls on the air, and reciprocates with the body of the flying creature, has a very obvious bearing upon artificial flight. In natural flight the body of the flying creature falls slightly forward in a curve when the

1 On the Flight of Birds, of Bats and of Insects, in reference to the subject of Aerial Locomotion, by L. de Lucy (Paris).

wing ascends, and is slightly elevated in a curve when the wing descends. The wing and body are consequently always playing at cross purposes, the wing rising when the body is falling and vice versa. The alternate rise and fall of the body and wing of the bird are well seen when contemplating the flight of the gull

Fig. 29 shows how in progressive flight the wing and the body describe waved tracks, — the crests of the waves made by the wing (a, c, e, g, i) being placed opposite the crests of the waves made by the body 1, 2, 3, 4, 5).

from the stern of a steamboat, as the bird is following in the wake of the vessel. The complementary movements referred to are indicated at fig. 29, where the continuous waved line represents the trajectory made by the wing, and the dotted waved line that made by the body. As will be seen from this figure, the wing advances both when it rises and when it falls. It is a peculiarity of natural wings, and of artificial wings constructed on the principle of living wings, that when forcibly elevated or depressed, even in a strictly vertical direction, they inevitably dart forward. If, for instance, the wing is suddenly depressed in a vertical direction, as at a b of fig. 29, it at once darts downwards and forwards in a double curve (see continuous line of figure) to c, thus converting the vertical down stroke into a down, oblique, forward stroke. If, again, the wing be suddenly elevated in a strictly vertical direction, as at c d, the wing as certainly darts upwards and forwards in a double curve to e, thus converting the

vertical up strokes into an upward, oblique, forward stroke. The same thing happens when the wing is depressed from e to / and elevated from g to h, the wing describing a waved track as at

e g,gi-

There are good reasons why the wings should always be in advance of the body. A bird when flying is a body in motion; but a body in motion tends to fall not vertically downwards, but downwards and forwards. The wings consequently must be made to strike forwards and kept in advance of the body of the bird if they are to prevent the bird from falling downwards and forwards. If the wings were to strike backwards in aerial flight, the bird would turn a forward somersault.

That the wings invariably strike forwards during the down and up strokes in aerial flight is proved alike by observation and experiment. If any one watches a bird rising from the ground or the water, he cannot fail to perceive that the head and body are slightly tilted upwards, and that the wings are made to descend with great vigour in a downward and forward direction. The dead natural wing and a properly constructed artificial wing act in precisely the same way. If the wing of a gannet, just shot, be removed and made to flap in what the operator believes to be a strictly vertical downward direction, the tip of the wing, in spite of him, will dart forwards between 2 and 3 ft. — the amount of forward movement being regulated by the rapidity of the down stroke. This is a very striking experiment. The same thing happens with a properly constructed artificial wing. The down stroke with the artificial as with the natural wing is invariably converted into an oblique, downward and forward stroke. No one ever saw a bird in the air flapping its wings towards its tail. The old idea was that the wings during the down stroke pushed the body of the bird in an upward and forward direction; in reality the wings do not push but pull, and in order to pull they must always be in advance of the body to be flown. If the wings did not themselves fly forward, they could not possibly cause the body of the bird to fly forward. It is the wings which cause the bird to fly.

It only remains to be stated that the wing acts as a true kite, during both the down and the up strokes, its under concave or biting surface, in virtue of the forward travel communicated to it by the body of the flying creature, being closely applied to the air, during both its ascent and its descent. This explains

how the wing furnishes a persistent buoyancy alike when it rises and when it falls (fig. 30).

The natural kite formed by the wing differs from the artificial kite only in this, that the former is capable of being moved in all its parts ; and is more or less flexible and elastic, whereas the latter is comparatively rigid. The flexibility and elasticity of the kite formed by the natural wing are rendered necessary by the fact that the wing, as already stated, is practically hinged at its root and along its anterior margin, an arrangement which necessitates its several parts travelling at different degrees of speed, in proportion as they are removed from the axes of rotation. Thus the tip travels at a higher speed than the root, and the posterior margin than the anterior margin. This begets a twisting diagonal movement of the wing on its long axis, which, but for the elasticity referred to, would break the wing into fragments. The elasticity contributes also to the continuous play of the wing, and ensures that no two parts of it shall reverse at exactly the same instant. If the wing was inelastic, every part of it would reverse at precisely the same moment, and its vibration would be characterized by pauses or dead points at the end of the down and up strokes which would be fatal to it as a flying organ.

Fig. 30 shows the kite-like action of the wing during the down and up strokes, how the angles made by the wing with the horizon (a, b) vary at every stage of these strokes, and how the wing evades the superimposed air during the up stroke, and seizes the nether air during the down stroke. In this figure the spaces between the double dotted lines (c g, i b) represent the down strokes, the single dotted line (h, i) representing the up stroke. The kite-like surfaces and angles made by the wing with the horizon (a, b) during the down strokes are indicated at c d e f g, j k I m, — those made during the up strokes being indicated at g h i. As the down and up strokes run into each other, and the convex surface of the wing is always directed upwards and the concave surface downwards, it follows that the upper surface of the wing evades in a great measure the upper air, while the under surface seizes the nether air. It is easy to understand from this figure how the wing always flying forwards furnishes a persistent buoyancy.

The elastic properties of the wing are absolutely essential, when the mechanism and movements of the pinion are taken into account. A rigid wing can never be an effective flying instru- ment.

The kite-Jike surfaces referred to in natural flight are those upon which the constructors of flying machines very properly ground their hopes of ultimate success. These surfaces may be conferred on artificial wings, aeroplanes, aerial screws or similar structures; and these structures, if we may judge from what we find in nature, should be of moderate size and elastic. The power of the flying organs will be

increased if they are driven at a com- paratively high speed, and particularly if they are made to reverse and reciprocate, as in this case they will practically create the currents upon which they are destined to rise and advance. The angles made by the kite-like surfaces with the horizon should vary according to circumstances. They should be small when the speed is high, and vice versa. This, as stated, is true of natural wings. It should also be true of artificial wings and their analogues.

Artificial Flight. — We are now in a position to enter upon a consideration of artificial wings and wing movements, and of artificial flight and flying machines.

We begin with artificial wings. The first properly authenti- cated account of an artificial wing was given by G. A. Borelli in 1670. This author, distinguished alike as a physiologist, mathematician and mechanician, describes and figures a bird with artificial wings, each of which consists of a rigid rod in front and flexible feathers behind. The wings are represented as striking vertically downwards, as the annexed duplicate of Borelli's figure shows (fig. 31).

Borelli wasof opinion that flight resulted from the application of an inclined plane, which beats the air, and which has a wedge

action. He, in fact, endeavours to prove that a bird wedges itself forward upon the air by the perpendicular vibration of its wings, the wings during their action, forming a wedge, the base of

which (c b e) is directed to- wards the head of the bird, the apex (a f) being directed towards the tail (d). In the 196th proposition of his work (De motu animalium, Leiden, 1685) he states that —

" If the expanded wings of a bird suspended in the air shall strike the undisturbed air be- neath it with a motion perpen- dicular to the horizon, the bird will fly with a transverse motion in a plane parallel with the horizon." " If," he adds, " the wings of the bird be expanded,

r e, a,

be, f,

d, r 2:

% ■ >

Fig. 31.

Borelli's bird with artificial wings. Anterior margin of the right

wing.consistingofarigidrod. ~ .

Posterior margin of the right and the under surfaces of the

wing, consisting of flexible wings be struck by the air

feathers. ascending perpendicularly to the

Anterior – and horizon with such a force as

Posterior margins of the left shall prevent the bird gliding

wing same as the right. downwards (i.e. with a tend-

Tail of the bird. ency to glide downwards) trom

d h, Vertical direction of the falling, it will be urged in a

down stroke of the wing. horizontal direction.

The same argument is re- stated in different words as under:—" If the air under the wings be struck by the flexible portions of the wings (flabella, literally fly flaps or small fans) with a motion perpendicular to the horizon, the sails (vela) and flexible portions of the wings (flabella) will yield in an upward direction and form a wedge, the point of which is directed towards the tail. Whether, therefore, the air strikes the wings from below, or the wings strike the air from above, the result is the same, — the posterior or flexible margins of the wings yield in an upward direction, and in so doing urge the bird in a horizontal direction."

There are three points in Borelli's argument to which it is necessary to draw attention: (1) the direction of the down stroke: it is stated to be vertically downwards; (2) the construc- tion of the anterior margin of the wing: it is stated to consist of a rigid rod; (3) the function delegated to the posterior margin of the wing: it is said to yield in an upward direction during the down stroke.

With regard to the first point. It is incorrect to say the wing strikes vertically downwards, for, as already explained, the body of a flying bird is a body in motion; but as a body in motion tends to fall

downwards and forwards, the wing must strike downwards and forwards in order effectually to prevent its fall. Moreover, in point of fact, all natural wings, and all artificial wings constructed on the natural type, invariably strike down- wards and forwards.

With regard to the second point, viz. the supposed rigidity of the anterior margin of the wing, it is only necessary to examine the anterior margins of natural wings to be convinced that they are in every case flexible and elastic. Similar remarks apply to properly constructed artificial wings. If the anterior margins of natural and artificial wings were rigid, it would be impossible to make them vibrate smoothly and continuously. This is a matter of experiment. If a rigid rod, or a wing with a rigid anterior margin, be made to vibrate, the vibration is characterized by an unequal jerky motion, at the end of the down and up strokes, which contrasts strangely with the smooth, steady fanning movement peculiar to natural wings.

As to the third point, viz. the upward bending of the posterior margin of the wing during the down stroke, it is necessary to remark that the statement is true if it means a slight upward bending, but that it is untrue if it means an extensive upward bending.

Borelli does not state the amount of upward bending, but one of his followers, E. J. Marey, maintains that during the down stroke the wing yields until its under surface makes a backward angle with the horizon of 45°. Marey further states that during the up stroke the wing yields to a corresponding extent in an opposite direction— the posterior margin < >f the wing, according

1

to him, passing through an angle of oo°, plus or minus according to circumstances, every time, the wing rises and falls.

That the posterior margin of the wing yields to a slight extent during both the down and up strokes will readily be admitted, alike because of the very delicate and highly elastic properties' of the posterior margins of the wing, and because of the com' paratively great force employed in its propulsion; but that it does not yield to the extent stated by Marey is a matter of absolute certainty. This admits of direct proof. If any one watches the horizontal or upward flight of a large bird he will observe that the posterior or flexible margin of the wing never rises during the down stroke to a perceptible extent, so that the under surface of the wing, as a whole, never looks backwards. On the contrary, he will perceive that the under surface of the wing (during

the down stroke) invariably looks forwards and forms a true kite with the horizon, the angles made by the kite varying at every part of the down stroke, as shown more particularly atcdefg, ijklm of fig. 30.

The authors who have adopted Borelli's plan of artificial wing, and who have endorsed his mechanical views of the wing's action most fully, are J. Chabrier, H. E. G. Strauss-Diirckheim and Marey. Borelli's artificial wing, it will be remembered, consists of a rigid rod in front and a flexible sail behind. It is also made to strike vertically downwards. According to Chabrier, the wing has only one period of activity. He believes that if the wing be suddenly lowered by the depressor muscles, it is elevated solely by the reaction of the air. There is one unanswerable objection to this theory: the birds and bats, and some if not all the insects, have distinct elevator muscles, and can elevate their wings at pleasure when not flying and when, consequently, the reaction of the air is not elicited. Strauss-Diirckheim agrees with Borelli both as to the natural and the artificial wing. He is of opinion that the. insect abstracts from the air by means of the inclined plane a component force (composant) which it employs to support and direct itself. In his theology of nature he describes a schematic wing as consisting of a rigid ribbing in front, and a flexible sail behind. A membrane so constructed will, according to him, be fit for flight. It will suffice if such a sail elevates and lowers itself successively. It will of its own accord dispose itself as an inclined plane, and receiving obliquely the reaction of the air, it transfers into tractile force a part of the vertical impulsion it has received. These two parts of the wing, moreover, are equally indispensable to each other.

Marey repeats Borelli and Diirckheim with, very trifling modifications, so late as 1869. He describes two artificial wings, the one composed of a rigid rod and sail — the rod representing the stiff anterior margin of the wing; the sail, which is made of paper bordered with cardboard, the flexible posterior margin. The other wing consists of a rigid nervure in front and behind of thin parchment which supports fine rods of steel. He states that if the wing only elevates and depresses itself, " the resistance of the air is sufficient to produce all the other movements. In effect (according to Marey) the wing of an insect has not the power of equal resistance in every part. On the anterior margin the extended nervures make it rigid, while behind it is fine and flexible. During the vigorous depression of the wing, the nervu re has the power of remaining rigid, whereas the flexible portion, being pushed in an upward direction on account of the resistance it experiences from the air, assumes an oblique position which causes the upper surface of the wing to look forwards." The reverse of this, in

Marey's opinion, takes place during the eleva- tion of the wing — the resistance of the air from above causing the upper surface of the wing to look backwards. ..." At first," he says, " the plane of the wing is parallel with the body of the animal. It lowers itself — the front part of the wing strongly resists, the sail which follows it being flexible yields. Carried by the ribbing (the anterior margin of the wing) which lowers itself, the sail or posterior margin of the wing being raised meanwhile by the air, which sets it straight again, the sail will take an inter- mediate position and incline itself about 45° plus or minus accord- ing to circumstances. . . . The wing continues its movements of depression inclined to the horizon; but the impulse of the air,

which continues its effect, and naturally acts Upon the surface which it strikes, has the power of resolving itself into two forces, a vertical and a horizontal force ; the first suffices to raise the animal, the second to move it along." 1 Marey, it will be observed, reproduces Borelli's artificial wine, and even his text, at a distance of nearly two centuries.

The artificial wing recommended by Pettigrew is a more exact imitation of nature than either of the foregoing. It is of a more or less triangular form, thick at the root and anterior margin, and thin at the tip and posterior margin. No part of it is rigid. It is, on the contrary, highly elastic and flexible throughout. It is furnished with springs at its root to contribute to its con- tinued play, and is applied to the air by a direct piston action in such a way that it descends in a downward and forward direction during the down stroke, and ascends in an upward and forward direction during the up stroke. It elevates and propels both when it rises and falls. It, moreover, twists and untwists during its action and describes figure-of-8 and waved tracks in space, precisely as the natural wing does. The twisting is most marked at the tip andposterior margin, particularly that half of the posterior margin next the tip. The wing when in action may be divided into two portions by a line running diagonally between the tip of the wing anteriorly and the root of the wing posteriorly. The tip and posterior parts of the wing are more active than the root and anterior parts, from the fact that the tip and posterior parts (the wing is an eccentric) always travel through greater spaces, in a given time, than the root and anterior parts.

Fig. 32.- — Elastic Spiral Wing, which twists and untwists during its

action, to form a mobile helix or screw. This wirig is made to vibrate by; a direct piston action, and by a slight adjustment can be propelled vertically, horizontally or at any degree of obliquity.

c d,

x,

a b. Anterior margin of wing, to which the neurae or ribs are affixed. Posterior margin of wing

crossing anterior one. Ball-and-socket joint at root of wing, the wing being attached to the side of the cylinder by the socket.

/, Cylinder.

r r, Piston, with cross heads (w, w) and piston head (s).

o o, Stuffing boxes.

e, f. Driving chains.

m, Superior elastic band, which

assists in elevating the wing. Inferior elastic band, which antagonizes m, The alter- nate stretching of the superior and inferior elastic bands , contributes to the continuous play of the wing, by preventing dead points at the end of the down and up strokes. The wing is free to move in a vertical and horizontal direction and at any degree of obliquity.

The wing is so constructed that the posterior margin yields freely in a downward direction during the up stroke, while it yields comparatively little in an upward direction during the down stroke; and this is a distinguishing feature, as the wing is thus made to fold and elude the air more or less completely during the up stroke, whereas it is made to expand and seize the air with avidity during the down stroke. The oblique line referred to as running diagonally across the wing virtually divides the wing into an active and a passive part, the former elevating and propelling, the latter sustaining.

It is not possible to determine with exactitude the precise function discharged by each part of the wing, but experiment tends to show that the tip of the wing elevates, the posterior margin propels, and the root sustains.

The wing — and this is important — is driven by a direct piston

1 E. J. Marey, Revue dcs cours scientifiques dc la France ci de i'elranger (1869).

action with an irregular hammer-like movement, the pinion having communicated to it a smart click at the beginning of every down stroke — the up stroke being more uniform. The following is the arrangement (fig. 32). If the artificial wing here represented (fig. 32) be compared with the natural wing as depicted at fig. 33, it will be seen that there is nothing in the one which 1 is not virtually reproduced' in the other. In addition to the foregoing, Pettigrew recommended a double elastic wing to be applied to the air like a steam-hammer, by being fixed to the

Fig. 33 shows the Spiral Elastic Wings of the Gull, wing forms a mobile helix or screw.

Each

a b, Anterior margin of left wing. c d, Posterior margin of ditto. d g, Primary or rowing feathers

of left wing. g a, Secondary feathers ditto.

x, Root of right wing with ball- and-socket joint. I, Elbow joint. m. Wrist joint. n,o, Hand and finger joints.

head of the piston. This wing, like the single wing described, twists and untwists as it rises and falls, and possesses all the characteristics of the natural wing (fig. 34).

He also recommends an elastic aerial screw consisting of two blades, which taper and become thinner towards the tips and

i'

Fig. 34. — Double Elastic Wing driven by direct piston action, During the up stroke of the piston the wing is very decidedly convex on its upper surface (ab c d, A A') ; its under surface (e f g h, A A') being deeply concave and inclined obliquely upwards and forwards. It thus evades, to a considerable extent, the air during the up stroke. During the down stroke of the piston the wing is flattened out in every direction, and its extremities twisted in such a manner as to form two screws, as seen at a' V c' d' . e* f g' h', B, B'. The active area of the wing is by this arrangement considerably diminished during the up stroke, and considerably augmented during the down stroke ; the wing seizing the air with greater avidity during the down than during the

up stroke, i, j, k, elastic band to regulate the expansion of the wing; /.piston; m, piston head ; n, cylinder.

posterior margins. When the screw is made to rotate, the blades, because of their elasticity, assume a great variety of angles, the angles being least where the speed of the blades is greatest and vice versa. The pitch of the blades is thus regulated by the speed attained (fig. 35).

The peculiarity of Pettigrew's wings and screws consists in their elasticity, their twisting action, and their great comparative length and narrowness. They offer little resistance to the air when they are at rest, and when in motion the speed with which they are driven is such as to ensure that the comparatively large spaces through which they travel shall practically be converted into solid bases of support.

After Pettigrew enunciated his views (1867) as to the screw configuration and elastic properties of natural wings, and more especially after his introduction of spiral, elastic artificial wings, and elastic screws, a great revolution took place in the construc- tion of flying models. Elastic aeroplanes were advocated by

D. S. Brown, 1 elastic aerial screws by J. Armour, 2 and elastic aeroplanes, wings and screws by Alphonse Penaud. 3

Penaud's experiments are alike interesting and instructive. He constructed models to fly by three different methods:— (a) by means of screws acting vertically upwards; (b) by aero- planes propelled horizontally by screws; and © by wings which

Fig. 35. — Elastic Aerial Screw with twisted blades-resembling wings (a b c d, efg h).

x, End of driving shaft.

v, w, Sockets in which the roots

of the blades of the screw d c, h rotate, the degree of rota- tion being limited by steel springs (z, s).

a b, ef, tapering elastic rods form-

ing anterior or • thick margins of blades of screw, g, Posterior or thin elastic margins of blades of screw. The arrows m, n, 0, p, q, r indicate the direction of travel.

flapped in an upward and downward direction. An account of his helicoptere or screw model appeared in the Aeronaut for January 1872, but before giving a description of it, it may be well to state very briefly what is known regarding the history of the screw as applied to the air.

The first suggestion on this subject was given by A. J. P. Paucton in 1768. This author, in his treatise on the Tkiorie de la vis d' Archimede, describes a machine provided with two screws which he calls a " pterophores." In 1796 Sir George

Fig. 36.— Cayley's Flying Model.

Cayley gave a practical illustration of the efficacy of the screw as applied to the air by constructing a small machine, consisting of two screws made of quill feathers, a representation of which we annex (fig. 36). Sir George writes as under: —

"As it may be an amusement to some of your readers to see a machine rise in the air by mechanical means, I will conclude my present communication by describing an instrument of this kind, which any one can construct at the expense of ten minutes' labour.

'"The Aero-bi-plane, or First Steps to FUght," Ninth Annual Report of the Aeronautical Society of Great Britain, 1874.

2 " Resistance to Falling Planes on a Path of Translation," Ninth Annual Report of the Aeronautical Society of Great Britain, 1874. . , 3 The Aeronaut for January 1872 and February 1875.

" a and b, fig. 36, are two corks, into each of which are inserted four wing feathers from any bird, so as to be slightly inclined like the sails of a windmill, but in opposite directions in each set. A round shaft is fixed in the cork a, which ends in a sharp point. At the upper part of the cork b is fixed a whalebone bow, having a small pivot hole in its centre to receive the point of the shaft. The bow is then to be strung equally on each side to the upper portion of the shaft, and the little machine is completed. Wind up the string by turning the flyers different ways, so that the spring of the bow may unwind them with their anterior edges ascending; then place the cork with the bow attached to it upon a table, and with a finger on the upper cork press strong enough to prevent the string from un- winding, and, taking it

away suddenly, the instrument will rise to the ceiling.”

Cayley’s screws were peculiar, inasmuch as they were super- imposed and rotated in opposite directions. He estimated that if the area of the screws was increased to 200 sq. ft., and moved by a man, they would elevate him. His interesting experiment is described at length, and the apparatus figured in Nicolson’s Journal, 1800, p. 172.

Other experimenters, such as J. Degen in 1816 and Ottoris Sarti in 1823, followed Cayley at moderate intervals, constructing flying models on the vertical screw principle. In 1842 W. H. Phillips succeeded, it is stated,: in elevating. a steam model by the aid of jgsfolving fans, which according to his account flew across two fields after having attained a great altitude; and in 1859 H. Bright took out a patent for a machine to be sustained by vertical screws. In 1863 the subject of aviation by vertical screws received a fresh impulse from the experiments of Gustave de Ponton d’Amecourt, G. de la Landelle, and A. Nadar, who exhibited models driven by clock-work springs, which ascended with graduated weights a distance of from 10 to 12 ft. These models were so fragile that they usually broke in eomingin contact with the ground in their descent. Their flight, moreover, was unsatisfactory, from the fact that it only lasted a few seconds.

Fig. 37. — De la Landelle’s Flying-machine, m, n, o, p; q, r, s, t, Screws arranged on vertical axes to act vertically upwards. The vertical axes are surmounted by two parachutes, and the body of the machine is furnished with an engine, propeller, rudders and an exten- sive aeroplane.

Stimulated by the success of his spring models, Ponton d’Amecourt had a small steam model constructed. This model, which was shown at the exhibition of the Aeronautical Society of Great Britain at the Crystal Palace in 1868, consisted of two superposed screws propelled by an engine, the steam for which was generated (for lightness) in an aluminium boiler. This steam model proved a failure, inasmuch as it only lifted a third of its own weight. Fig. 37 embodies de la Landelle’s ideas.

All the models referred to (Cayley’s excepted 1) were provided with rigid screws. In 1872 P6naud discarded the rigid screws in favour of elastic ones, as Pettigrew had done some years before.

Penaud also substituted india-rubber under torsion for the whalebone and clock springs of the smaller models, and the steam of the larger ones. His helicoptere or screw-model is remarkable for its lightness, simplicity and power. The accompanying sketch will serve to illustrate its construction (fig. 38). It con-

Fig. 38.— Helicoptere or Screw-Model, by P6naud.

sists of two superposed elastic screws (a a, b b), the upper of which (a a) is fixed in a vertical frame © , which is pivoted in the central part (d) of the under screw. From the centre of the under screw an axle provided with a hook ‘(e), which performs the part of a crank, projects in an upward direction. Between the hook or crank (e) and the centre of the upper screw (a a), the india- rubber in a state of torsion (/) extends. By fixing the lower screw and turning the upper one a sufficient number of times the requisite degree of torsion and power is obtained. The apparatus when liberated flies into the air sometimes to a height of 50 ft., and gyrates in large circles for a period varying from 15 to 30 seconds.

Penaud next directed his attention to the construction of a model, to be propelled by a screw and sustained by an elastic aeroplane extending horizontally. Sir George Cayley proposed such a machine in 1810, and W. S. Henson constructed and patented a similar machine in 1 842. Several inventors succeeded in making models fly by the aid of aeroplanes and screws, as, e.g. J. Stringfellow in 1847, 2 and F. du Temple in 1857. These models flew in a haphazard sort of a way, it being found exceed- ingly difficult to confer on them the necessary degree of stability fore and aft and laterally. Penaud succeeded in overcoming the difficulty in question by the invention of what he designated an automatic rudder. This consisted of a small elastic aeroplane placed aft or behind the principal aeroplane which is also elastic. The two elastic aeroplanes extended horizontally and made a slight upward angle with the horizon, the angle made by the smaller aeroplane (the rudder) being slightly in excess of that made by the larger. The motive power was india-rubber in the condition of torsion; the propeller, a screw. The reader will understand the arrangement by a reference to the accompanying drawing (fig. 30)-

Models on the aeroplane screw type may be propelled by two screws, one fore and one aft, rotating in opposite directions; and in the event of only one screw being employed it may be placed in front of or behind the aeroplane.

When such a model is wound up and let go it descends about 2 ft.,

after which, having acquired initial velocity, it rises and flies in a forward direction at a height of from 8 to 10 ft. from

1 Cayley's screws, as explained, were made of feathers, and consequently elastic. As, however, no allusion is made in his writings to the superior advantages possessed by elastic over rigid screws, it is to be presumed that feathers were employed simply for convenience and lightness. Pettigrew, there is reason to believe, was the first to advocate the employment of elastic screws for aerial purposes.

- Stringfellow constructed a second model, which is described and figured further on (fig. 44).

the ground for a distance of from 120 to 130 ft. It flies this distance in from io to 1 1 seconds, its mean speed being something like 12 ft. per second. From experiments made with this model, Penaud calculates that one horse-power would elevate and support 85 lb.

D. S. Brown also \vrote (1874) in support of elastic aero- biplanes. His experiments proved that two elastic aeroplanes united by a central shaft or shafts, and separated by a wide

a a, bb, c c, d,

Fig. 39. — Aeroplane Model with Automatic Rudder.

Elastic aeroplane. torsion, attached to hook

Automatic rudder. or crank at /. By holding

Aerial screw centred at /. the aeroplane (o o) and

Frame supporting aeroplane, turning the screw (c c) the

rudder and screw. necessary power is obtained

e, India-rubber, in a state of by torsion. (Penaud.) .

interval, always produce increased stability. The production of flight by the vertical flapping of wings is in some respects the most difficult, but this also has been attempted and achieved. Penaud and A. H. de Villeneuve each constructed winged models. Marey was not so fortunate. He endeavoured to construct an artificial insect on the plan advocated by Borelli, Strauss-Dtirckheim and Chabrier, but signally failed, his insect never having been able to lift more than a third of its own weight.

De Villeneuve and P6naud constructed their winged models on different types, the former selecting the bat, the latter the bird.

V

Fig. 40. — Penaud's Artificial Flying Bird.

abed, a' b' c' d', Elastic wings, which twist and untwist when made to vibrate.

a b, a' V , Anterior margins of wings.

c d, c' d' ', Posterior margins of wings.

C, c'. Inner portions of wings attached to central shaft of model by elastic bands at e.

f, India-rubber in a state of

h,

torsion, which provides the motive power, by causing the crank situated between the vertical wing supports (g) to rotate ; as the crank revolves the wings are made to vibrate by means of two rods which extend between the crank and the roots of the wings. Tail of artificial bird.

De Villeneuve made the wings of his artificial bat conical in shape and comparatively rigid. He controlled the movements of the wings, and made them strike downwards and forwards in imitation of natural wings. His model possessed great power of rising. It elevated itself from the ground with ease, and flew in a horizontal direction for a distance of 24 ft., and at a velocity of 20 m. an hour. Penaud's model differed from de Villeneuve's in being provided with elastic wings, the posterior margins of which in addition to being elastic were free to move round the

anterior margins as round axes (see fig. 24). India-rubber springs were made to extend between the inner posterior parts of the wings and the frame, corresponding to the backbone of the bird.

A vertical movement having been communicated by means of india-rubber in a state of torsion to the roots of the wings, the wings

themselves, in virtue of their elasticity, and because of the resistance experienced from the air, twisted and untwisted and formed reciprocating screws, precisely analogous to those originally described and figured by Pettigrew in 1867. Penaud's arrangement is shown in fig. 40.

If the left wing of Penaud's model {ah, c d of fig. 40) be com- pared with the wing of the bat (fig. 18), or with Pettigrew's artificial wing (fig. 32), the identity of principle and application is at once apparent.

In Penaud's artificial bird the equilibrium is secured by the addition of a tail. The model cannot raise itself from the ground, but on being liberated from the hand it descends 2 ft. or so, when, having acquired initial velocity, it flies horizontally for a distance of 50 or more feet, and rises as it flies from 7tooTt. Thefollowing are the measurements of the model in question: — length of wing from tip to tip, 32 in.; weight of wing, tail, frame, india-rubber, &c, 73 grammes (about 2j ounces). (J. B. P.)

Flying Machines. — Henson's flying machine, designed in 1843, was the earliest attempt at aviation on a great scale. Henson was one of the first to combine aerial screws with exten- sive supporting structures occupying a nearly horizontal position. The accompanying illustration explains the combination (fig. 41).

Fig. 41. — Henson's Aerostat.

" The chief feature of the invention was the very great expanse of its sustaining planes, which were larger in proportion to the weight it had to carry than those of many birds. The machine advanced with its front edge a little raised, the effect of which was to present its under surface to the air over which it passed, the resistance of which, acting upon it like a strong wind on the sails of a windmill, prevented the descent of the machine and its burden. The sustaining of the whole, therefore, depended upon the speed at which it travelled through the air, and the angle at which its under surface impinged on the air in its front. . . . The machine, fully prepared for flight, was started from the top of an inclined plane, in descending which it attained a velocity necessary to sustain it in its further progress. That velocity would be gradually destroyed by the resistance of the air to the forward flight ; it was, therefore, the office of the steam- engine and the vanes it actuated simply to repair the loss of velocity ; it was made, therefore, only of the power and weight necessary for that small effect." The editor of Newton's Journal of Arts .and Sciences speaks of it thus: — " The apparatus consists of a car con taining the goods, passengers,

engines, fuel, &c, to which a rectr angular frame, made of wood or bamboo cane, and covered with canvas or oiled silk, is attached. This frame extends on either side of the car in a similar manner to the outstretched wings of a bird ; but with this difference, that the frame is immovable. Behind the wings are two vertical fan wheels, furnished with oblique vanes, which are intended to propel the apparatus through the air. The rainbow-like circular wheels are the propellers, answering to the wheels of a steam-boat, and acting upon the air after the manner of a windmill. These wheels receive motions from bands and pulleys from a steam or other engine contained in the car. To an axis at the stern of the car a triangular frame is attached, resembling the tail of a bird, which is also covered with canvas or oiled silk. This may be expanded or contracted at pleasure, and is moved up and down for the purpose of causing the machine to ascend or descend. Beneath the tail is a rudder for direct- ing the course of the machine to the right or to the left ; and to facilitate the steering a sail is stretched between two masts which rise from the car. The amount of canvas or oiled silk necessary for buoy- ing up the machine is stated to be equal to one square foot for each half pound of weight."

F. H. Wenham, thinking to improve upon Henson, invented in 1866 what he designated his aeroplanes. 1 These were thin, light, long, narrow structures, arranged above each other in tiers like so many shelves. They were tied together at a slight upward angle, and combined strength and lightness. The idea was to obtain great sustaining area in comparatively small space with comparative ease of control. It was hoped that when the aeroplanes were wedged forward in the air by vertical screws, or by the body to be flown, each aeroplane would rest or float upon a stratum of undisturbed air, and that practically the aeroplanes would give the same support as if spread out horizon- tally. The accompanying figures illustrate Wenham 's views (figs. 42 and 43).

Stringfellow, who was originally associated with Henson, and built a successful flying model in 1847, made a second model

Fig. 42. — Wenham's system of Aeroplanes designed to carryaman

a, a, Thin planks, tapering at each

end, and attached to a triangle.

b, Similar plank for supporting

the aeronaut.

c, c, Thin bands of iron with truss

planks a, a, and

d, d, Vertical rods. Between

these are stretched five bands of holland 15 in.broad and 16 ft. long, the total length of the web being 80 ft. This apparatus when caught by a gust of wind, actually lifted the aeronaut.

in 1868, in which Wenham's aeroplanes were combined with aerial screws. This model was on view at the exhibition of the Aeronautical Society of Great Britain, held at the Crystal Palace,

Fig. 43. — A similar system,

a, a, Main spar 16 ft. long;

b, b, Panels, with base board for

aeronaut attached to main spar. e, e, Thin tie-band of steel with struts starting from main spar. This forms a strong c, light framework for the

planned by Wenham.

aeroplanes, consisting of six webs of thin holland 15 in. broad. The aeroplanes are kept in parallel plane by vertical divisions of holland 2 ft. wide.

c', Wing propellers driven by the feet.

London, in 1868. It was remarkably compact, elegant and light, and obtained the £100 prize of the exhibition for its engine, which was the lightest and most powerful so far constructed. The illustration below (fig. 44), drawn from a photograph, gives a

Fig. 44. — Stringfellow's Flying Machine.

very good idea of the arrangement — a, b, c representing the superimposed aeroplanes, d the tail, e, f the screw propellers. The superimposed aeroplanes (a, b, c) in this machine contained a sustaining area of 28sq.ft.,inadditiontotlietail(

propellers) was under 12ft, Its sustaining area, if that of the tail (d) be included, was something like 36 sq. ft., i.e. 3 sq. ft. for every pound. The model was forced by its propellers along a wire at a great speed, but so far as an observer could determine, failed to lift itself, notwithstanding its extreme lightness and the comparatively very great power employed. Stringfellow, however* stated that it occasionally left the wire and was sus- tained by its aeroplanes alone.

The aerial steamer of Thomas Moy (fig. 45), designed in 1874, consisted of a light, powerful, skeleton frame resting on three wheels; a very effective light engine constructed on a new principle, which dispensed with the old-fashioned, cumbrous boiler; two long, narrow, horizontal aeroplanes; and two comparatively very large aerial screws. The idea was to get up the initial velocity by a preliminary run on the ground. This accomplished it was hoped that the weight of the machine would gradually be thrown upon the aeroplanes in the same, way that the : “weight of certain birds— the ea.gle i e.*g.*—is thrown upon

Fig. 45.— Moy’s Aerial Steamer.

the wings after a few hops and leaps. Once in the air the aero- planes, it was believed, would become effective in proportion to the speed attained. The machine, however, did not realize the high expectations formed of it, and like all its predecessors it was doomed to failure.

Two of the most famous of the next attempts to solve the problem of artificial flight, by means of aeroplanes, were those of Prof. S. P. Langley and Sir Hiram S. Maxim, who began their aerial experiments about the same time (1889-1890). By 1893-1894 both had embodied their views in models and large flying machines.

Langley, who occupied the position of secretary to the Smithsonian Institution, Washington, U.S.A., made many small flying models and one large one. These he designated ” aero- dromes.” They were all constructed on a common principle, and were provided with extensive flying surfaces in the shape of rigid aeroplanes inclined at an upward angle to the horizon, and more or less fixed on the plan advocated by Henson. The cardinal idea was to force the aeroplanes (slightly elevated at their anterior margins) forwards, kite-fashion, by means of power- ful vertical screw propellers driven at high speed — the greater the horizontal speed provided by the propellers, the greater, by implication, the lifting, capacity of the aerodrome. The bodies, frames and aeroplanes of the aerodromes were strengthened by vertical and other supportsˆ to which were attached aluminium wires

to ensure absolute .rigidity so far as that was possible. Langley aimed at great lightness of construction, and in this he succeeded to a remarkable extent. His aeroplanes were variously shaped, and were, as a rule, concavo-convex, the convex surface being directed upwards. He employed a competent staff of highly trained mechanics at the Smithsonian Institution, and great secrecy was observed as to his operations. He flew his smallest models in the great lecture room of the National Museum, and his larger ones on the Potomac river about 40 m. below Washington.

While Langley conducted his preliminary experiments in 1889, . he i did not construct and test his steam-driven flying

models until 1893. These were made largely of steel and aluminium, and one of them in 1896 made the longest flight then recorded for a flying machine, namely, fully half a mile on the Potomac river. The largest aerodrome, intended to carry passengers and to be available for war purposes, was built to the order and at the expense of the American government, which granted a sum of fifty thousand dollars for its construction. Langley's machine shown in fig. 46 was a working model, not intended to carry passengers. In configuration the body-portion

Fig. 46. — Langley's Flying Machine, a, Large aeroplane; 6, Small aeroplane ; c, Propelling screws.

closely resembled a mackerel. The backbone was a light but very rigid tube of aluminium steel, 15 ft. in length, and a. little more, than 2 in. in diameter. The engines were located in the portion of the framework corresponding to the head of the fish; they weighed 60 oz. and developed one horse-power. There were four boilers made of thin hammered copper and weighing a little more than 7 lb each ; these occupied the middle portion of the fish. The fuel used was refined gasoline, and the extreme end of the tail of the fish was utilized for a storage tank with a capacity Of one quart. There were twin screw propellers, which could' be adjusted to different angles in practice, to provide for steering, and made 1700 revolutions a minute. The wings, or aeroplanes, four in number, consisted of light frames of tubular aluminium steel covered with china silk. The pair in front were 42 in. wide and 40 ft. from tip to tip. They could be adjusted at different angles. The machine required to be dropped from a height, or a preliminary forward impetus had to be given to it, before it could be started. Fixity of all the parts was secured by a tubular mast extending upwards and downwards through about the middle of the craft, and from its extremities ran stays of aluminium wire to the tips of the

aeroplanes and the end of the tubular backbone. By this trussing arrangement the whole structure was rendered exceedingly stiff. ,

In the larger aerodrome (fig. 47) the aeroplanes were concavo-convex, narrow, greatly elongated and square at their free extremities,

Fig. 47. — Langley's Aerodrome in flight.

the two propellers, which were comparatively very large, being placed amidships, so to speak. At the first trial of this machine, on the 7th of October 1903, just as it left the launching track it was jerked violently down at the front (being caught, as subsequently appeared, by the falling ways), and under the full power of its engine was pulled into the water, carrying with it its engineer. When the aerodrome rose to the surface, it was found that while the front sustaining surfaces had been broken by their impact with the water, yet the rear ones were comparatively uninjured. At the second and last attempt, on the 8th of December 1903, another disaster, again due to the launching ways, occurred as the machine was leaving the track. This time the back part of the machine, in some way still unexplainedt was caught by a portion of the launching car, which caused the rear sustaining surface to break, leaving the rear entirely without support

and it came down almost vertically into the water. Darkness had come before the engineer, who had been in extreme danger, could aid in the recovery of the aerodrome. The boat and machine had drifted apart, and one of the tugs in its zeal to render assistance had fastened a rope to the frame of the machine in the reverse position from what it should have been attached, and had broken the frame entirely in two. Owing to lack of funds further trials were abandoned (see Annual Report of the Smithsonian Institution, 1904, p. 122).

Sir Hiram S. Maxim, like Langley, employed a staff of highly skilled workmen. His machine (fig. 48) consisted of a platform, on which stood a large water-tube boibr, a number of concavo-convex aeroplanes arranged in tiers like shelves, each making a slight upward angle with the horizon, two very large vertical screws placed aft and propelled by steam engines, tanks for the storage of water, naphtha, &c. The boiler was especially noteworthy. The water was contained in about 2000 bent copper tubes, only f in. in external diameter, heated by over 7000 gas jets arranged in rows. The fuel was naphtha or

gasoline. Steam could be got up in the short space of half a minute. The steam-generating appliances, which weighed only 1000 lb in all, were placed in the front of the machine. The motive power was

Fig. 48. — Sir H. Maxim's Flying Machine.

provided by a pair of two-cylinder, compound engines, poised abtmt 8 ft. from the ground, and about 6 ft. apart. Each of them was independently governed, and furnished together 363 horse-power in actual effect, an amount which, considering that their total weight was only 600 lb, gave the extraordinary efficiency of over I horse-power for every 2 lb weight. The high and the low pressure cylinders were 5 and 8 in.' in diameter respectively, and the stroke was 12 in. When going at full speed these engines conferred 425 revolutions per minute on the two gigantic propellers that drove the machine along. These were in appearance like two-bladed marine propellers except that they were square instead of rounded at the ends, and were broad and thin. They were built from overlapping strips of American pine, planed smooth and covered with glued canvas. They weighed 135 lb each, the length of each blade being close upon 9 ft. and the width at the ends 5! ft. The pitch was 16 ft. They were carefully stayed by steel wires to their shafts, or the first revolution would have snapped them off short. The material of which the framework was built was thin steel tubing, exceedingly light. All the wires and ties were of the best steel, capable of standing a strain of 100 tons to the square inch. The body of the machine was oblong in shape, with the fore-part cut away like a water-chute boat, and a long counter at the stern over which the propellers revolved. It had canvas stretched all over it. High overhead, like a gigantic awning, was the slightly concavo-convex main aeroplane, tilted towards the front at an imperceptible angle, and stretched taut. Its area was 1400 sq. ft., increased by side wings to 2700 sq. ft. There were also side aeroplanes arranged in tiers, and large aeroplanes in front, which were pivoted and served for vertical steering. The machine was strengthened in every direction by vertical and other supports and securely wired together at all points. It was furnished with four strong flanged wheels and ran along a light broad-gauge (9 ft.) railway track, 1800 ft. long, in the hope that when the speed reached a certain point it would leave the rails, but it was prevented from rising more than an inch or so by four arms, or outriggers, furnished with wheels, which projected from its sides and ran under an inverted wooden upper or safety track outside the railway track proper.

At a trial carried out in 1894 at Bexley, Kent, only the main aeroplane, the fore and aft rudders, and the top and bottom side planes

were in position. After everything had been got in readiness, careful observers were stationed along the track, and the machine was connected to a dynamometer. The engines were then started and the pump set so as to deliver over 5000 lb of water per hour into the boiler. The gas was then carefully turned on until the pressure amounted to 310 lb per sq. in., and the dynamometer showed a thrust of more than 2100 lb. A small safety-valve placed in the steam pipe had been adjusted so as to blow off slightly at 310 lb and with a strong blast at 320 lb. The signal being given to let go, the machine darted forward at a terrific pace, and the safety-valve ceased to blow. More gas was instantly turned on, and before the machine had advanced 300 ft., the steam had mounted to 320 lb per sq. in., and the safety- valve was blowing off a steady blast. When the machine had travelled only a few hundred feet, all four of the small outrigger wheels were fully engaged, which showed that the machine was lifting at least 8000 lb. The speed rapidly increased until when the

machine had run about 900 ft. one of the rear axletrees, which were of 2 in. steel tubing, doubled up and set the rear end of the machine completely free. When the machine had travelled about 1000 ft., the left-hand forward wheel became disengaged from the safety track, and shortly after this the right-hand wheel broke the upper track — 3 in. by 9 in. Georgia pine— -and a plank became entangled in the framework of the machine. Steam had already been shut off, and the machine coming to rest fell directly to the ground, all four of its wheels sinking deeply into the turf without leaving other marks. Before making this run the wheels which were to engage the upper track were painted, and the paint left by them on the upper track indicated the exact point where the machine lifted. The area of the aeroplanes was very nearly 4000 sq. ft. and the total lifting effect was fully 10,000 lb. The planes therefore lifted 2-5 lb per sq. ft., and 5 lb for each pound thrust. Nearly half of the power of the engines was lost in the screw slip. This showed that the diameter of the screws was not great enough ; it should have been at least 22 ft.

In 1897 M. C. Ader, who had already tested, with indifferent results, two full-sized flying machines, built a third apparatus with funds furnished by the French government. This repro- duced the structure of a bird with almost servile imitation, save that traction was obtained by two screw-propellers. The steam engine weighed about 7 lb per horse-power, but the equilibrium of the apparatus was defective.

Largely with the view of studying the problem of maintaining equilibrium, several experimenters, including Otto Lilienthal, Percy Pilcher and Octave Chanute, cultivated gliding flight by means of

aeroplanes capable of sustaining a man. They depended mainly on the utilization of natural air currents, trust- ing for stability and balance to movements in their own bodies, or in portions of their machines which they could control. They threw themselves from natural or artificial elevations, or, facing the wind, they ran or were dragged forwards against it until they got under way and the wind caught hold of their aeroplanes. To Lilienthal in Germany belongs the double credit of demon- strating the superiority of arched over flat surfaces, and of reducing gliding flight to regular practice. He made over 2000 glides safely, using gravity as his motive power, with concave, batlike wings, in some cases with superposed surfaces (fig. 49).

^^^^BgBBB

^

—■r 1 – _Lj — ■ ; .. -.1 H^

jBjjjJIlljjJIjpl

vBHKsBemsk

fipllp^^~\

jffjlii^

^Sf&BJEEvgST

-«***^^*-j.-s

Fig. 49. — Lilienthal's Gliding Machine.

It was with a machine of the latter type that he was upset by a sudden gust of wind and killed in 1896. Pilcher in England improved somewhat on Lilienthal's apparatus, but used the same general method of restoring the balance, when endangered, by shifting the weight of the operator's body. He too made several hundred glides in safety, but finally was thrown over by a gust of wind and killed in 1899. Chanute in America confined his endeavours to the production of automatic stability, and made the surfaces movable instead of the man. He used several different forms of apparatus, including one with five superposed pairs of wings and a tail (fig. 50) and another with two continuous aeroplanes, one above the other (fig. 51). He made over 1000 glides without accident.

Similaf experiments , were meanwhile conducted by Wilbur and

Orville Wright of Dayton, Ohio, in whose hands the glider developed into a successful flying machine. These investigators began their work in 1900, and at an early stage introduced two characteristic features — a horizontal rudder in front for steering in the vertical plane, and the flexing or bending of the ends of

the main supporting aeroplanes as a means of maintaining the structure in proper balance. Their machines to begin with were merely gliders, the operator lying upon them in a horizontal, position, but in 1903 a petsol motor was added, and a flight lasting 59 seconds was performed. In 1905 they made forty-five flights, in the longest of which they remained in the air for half

Fig. 50. — Chanute's Multiple Gliding Machine.

an hour and covered a distance of 243 m. The utmost secrecy, however, was maintained concerning their experiments, and in consequence their achievements were regarded at the time with doubt and suspicion, and it was hardly realized that their suc- cess would reach the point later achieved.

Thanks, however, to the efforts of automobile engineers, great improvements were now being effected in the petrol engine, and, although the certainty and trustworthiness of its action still left something to be desired, it provided the designers of flying machines with what they had long been looking for — a motor

Fig. 51. — Chanute's Biplane Gliding Machine.

very powerful in proportion to its weight. Largely in consequence of this progress, and partly no doubt owing to the stimulus given by the activity of builders of dirigible balloons, the con- struction of motor-driven aeroplanes began to attract a number of workers, especially in France. In 1906 A. Santos Dumont, after a number of successful experiments with dirigible cigar- shaped gas balloons, completed an aeroplane flying machine. It consisted of the following parts: — (a) A system of aeroplanes arranged like the capital letter T at a certain upward angle to the horizon and bearing a general resemblance to box kites;

(b) a pair of very light propellers driven at a high speed ;■ and

(c) an exceedingly light and powerful petrol engine. The driver occupied a position in the centre of the arrangement, which is shown in fig. 52. The machine was furnished with two wheels and vertical supports which depended from the anterior parts of the aeroplanes and supported it when it touched the ground

1 *”««4iSˆggˆ

Fig. 52. — Santos Dumont’s Flying Machine.

on either side. With this apparatus he traversed on the 12th of November 1906 a distance of 220 metres in 21 seconds.

About a year later Henry Farman made several short flights on a machine of the biplane type, consisting of two main sup- porting surfaces one above the other, with a box-shaped vertical rudder behind and two small balancing aeroplanes in front. The engine was an eight-cylinder Antoinette petrol motor, developing 49 horse-power at 1 100 revolutions a minute, and driving directly a single metal screw propeller. On the 27 th of October 1906 he flew a distance of nearly half a mile at Issy-les- Molineaux, and on the 13th of January 1908 he made a circular flight of one kilometre, thereby winning the Deutsch- Archdeacon prize of £2000. In March he remained in the air for 33 minutes, covering a distance of i\ m.; but in the following month a rival, Leon Delagrange, using a machine of the same type and con- structed by the same makers, Messrs Voisin, surpassed this performance by flying nearly 23 m. in 63 minutes. In July Farman remained in the air for over 20 minutes; on the 6th of September Delagrange increased the time to nearly 30 minutes, and on the 29th of the same month Farman again came in front with a flight lasting 42 minutes and extending over nearly 245 m.

But the best results were obtained by the Wright brothers — ■ Orville Wright in America and Wilbur Wright in France. On the 9th of September 1908 the former, at Fort Myer, Virginia, made three notable flights; in the first he remained in the air 573 minutes and in the second 1 hour 3 minutes, while in the third he took with him a passenger and covered nearly 4 m. in 6 minutes. Three days later he made a flight of 45 m. in 1 hour 14! minutes, but on the 17th he had an accident, explained as being due to one of his propellers coming into contact with a stay, by which his machine was wrecked, he himself seriously injured, and Lieu- tenant Selfridge, who was with him, killed. Four days afterwards Wilbur Wright at Le Mans in France beat all previous records with a flight lasting 1 hour 31 minutes 25ˆ- seconds, in which he covered about 56 m.; and subsequently, on the

nth of October, he made a flight of 1 hour 9 minutes accompanied by a passenger. On the 31st of December he succeeded in remaining in the air for 2 hours 20 minutes 23 seconds.

Wilbur Wright's machine (fig. 53), that used by his brother being essentially the same, consisted of two slightly arched supporting surfaces, each 123 metres long, arranged parallel one above the other at a distance of if metres apart. As they were each about 2 metres wide their total area was about 50 sq. metres. About 3 metres in front of them was arranged a pair of smaller horizontal aeroplanes, shaped like a long narrow ellipse, which formed the rudder that effected changes of eleva- tion, the driver being able by means of a lever to incline them up or down according as he desired to ascend or descend. The rudder for lateral steering was placed about 23 metres behind the main surfaces and was formed of two vertical pivoted aeroplanes. The lever by which they were turned was connected with the device by which the ends of the main aeroplanes could be flexed simultaneously though in opposite directions; i.e.. if the ends of the aeroplanes on one side were bent downwards, those on the

FLIGHT AND FLYING

Plate I.

J

Fig. i.— PAULHAN FLYING ON FARMAN BIPLANE.

Thoto, Topical Press.

Fig. 2— WRIGHT BIPLANE.

Photo, Topical Press.

Plate II.

FLIGHT AND FLYING

feˆ

Fig. 4— A. V. ROE'S TRIPLANE.

■, Toptcal Press.

FLINCK

5*9

other were bent upwards. By the aid of this arrangement the natural cant of the machine when making a turn could be checked, if it became excessive. The four-cylinder petrol engine was placed on the lower aeroplane a little to the right of the central line, being counterbalanced by the driver (and passenger

Fig. 53. — Wright Flying Machine; diagrammatic sketch. A, B, Main supporting surfaces. F, Vertical rudder.

C, D, Aeroplanes of horizontal rudder G, Motor,

with fixed semilunar fin E. H, Screws.

if one was carried), who sat a little to the left of the same line. Making about 1 200 revolutions a minute, it developed about 24 horse-power, and was connected by chain gearing to two wooden propellers, 25 metres in diameter and 35 metres apart, the speed of which was about 450 revolutions a minute. The whole machine, with aeronaut, weighed about 1100 lb, the Weight of the motor being reputed to be 200 lb.

A feature of the year 1909 was the success obtained with monoplanes having only a single supporting surface, and it was on a machine of this type that the Frenchman Bleriot on July 25th flew across the English Channel from Calais to Dover in 31 minutes. Hubert Latham all but performed the same feat on an Antoinette monoplane. The year saw considerable increases in the periods for which aviators were able to remain in the air, and Roger Sommer's flight of nearly i\ hours on August 7th was surpassed by Henry Farman on November 3rd, when he covered a distance estimated at 1371 m. in 4 hr. 17 min. 53 sec. In both these cases biplanes were employed. Successful aviation meetings were held, among other places, at Reims, Juvisy, Doncaster and Blackpool; and at Blackpool a daring flight was made in a wind of 40 m. an hour by Latham. This aviator also proved the possibility of flying at considerable altitudes by attaining on December 1st a height of over 1500 ft., but this record was far surpassed in the following January by L. Paulhan, who on a biplane rose to a height of 1383 yds. at Los Angeles. In the course of the year three aviators were killed — Lefevbre and Ferber in September and Fernandez in December; and four men perished in September by the destruction of the French airship " Republique," the gas-bag of which was ripped open by a broken propeller. In January 1910 Delagrange was killed by the fracture of one of the wings of a monoplane on which he was flying. On April 27th-28th, 1910, Paulhan successfully flew from London to Manchester, with only one stop, within 24 hours, for the Daily Mail's

£10,000 prize.

The progress made by all these experiments at aviation had naturally created widespread interest, both as a matter of

sport and also as indicating a new departure in the possibilities of machines of war. And in 1909 the British government appointed a scientific committee, with Lord Rayleigh as chairman, as a consultative body for furthering the development of the science in England.

The table below gives some details, approximately correct, of the principal experiments made with flying machines up to

1908.

References. — Some of the books mentioned under Aeronautics contain details of flying machines ; see H. W. L. Moedebeck, A Pocket-book of Aeronautics, trans, by W. Mansergh Varley (London, 1907); Sir Hiram S. Maxim, Artificial and Natural Flight (London, 1908) ; F. W. Lanchester, Aerodynamics and Aerodonetics (London, 1907 and 1908); C. C. Turner, A erial Navigation of To-day (London, 1909); also two papers on “Aerial Navigation” read by Colonel G. O. Fullerton before the Royal United Service Institution in 1892 and 1906; papers read by Major B. F. S. Baden- Powell and E. S. Bruce before the Society of Arts, London, in April 1907 and December 1908 respectively; Cantor Lectures by F. W. Lanchester (Society of Arts, 1909); and the Proceedings of the Aeronautical Society (founded 1865), &c.

FLINCK, GOVERT (1615-1660), Dutch painter, born at Cleves in 161 5, Was apprenticed by his father to a silk mercer, but having secretly acquired a passion for drawing, was sent to Leuwarden, where he boarded in the house of Lambert Jacobszon, a Mennonite, better known as an itinerant preacher than as a painter. Here Flinck was joined by Jacob Backer, and the companionship of a youth determined like himself to be an artist only confirmed his passion for painting. Amongst the neighbours of Jacobszon at Leuwarden were the sons and relations of Rombert Ulenburg, whose daughter Saske married Rembrandt in 1634. Other members of the same family lived at Amsterdam, cultivating the arts either professionally or as amateurs. The pupils of Lambert probably gained some knowledge of Rembrandt by intercourse with the Ulenburgs. Certainly J. von Sandrart, who visited Holland in 1637, found Flinck acknowledged as one of Rembrandt’s best pupils, and living habitually in the house of the

dealer Hendrik Ulenburg at Amsterdam. For many years Flinck laboured on the lines of Rembrandt, following that master's style in all the works which he executed between 1636 and 1648; then he fell into peculiar mannerisms by imitating the swelling forms and grand action of Rubens's creations. Finally he sailed with unfortunate complacency into the Dead Sea of official and diplomatic painting. Flinck's relations with Cleves became in time very important. He was introduced to the court of the Great Elector, Frederick William of Brandenburg, who married in 1646 Louisa of Orange. He obtained the patronage of John Maurice of Orange, who was made stadtholder of'Cleves in 1649. In 1652 a citizen of Amsterdam, Flinck married in 1656 an heiress, daughter of Ver Hoeven, a director of the Dutch East India Company. Hewas already well known even then in the patrician circles over which the burgomasters De Graef and the Echevin Six presided; he was on terms of intimacy with the poet Vondel and the treasurer Uitenbogaard. In his house, adorned with antique casts, costumes, and a noble collection of prints, he often

Tip

Pounds

Speed

Maximum Flight.

Pounds

Year.

Experimenter.

to

Surface.

Weight.

per

per

Motor.

Horse-

sustained

rip.

sq. ft.

hour.

power.

per h.p.

Ft.

Sq. ft.

lb.

Mis.

Ft.

1879

Tatin

6-2

7-5

3-85

0-51

18

100?

Compressed

0-03

no?

1889 \

Hargrave (No. 16)

5-5

26-0

5 -bo

0-19.

10

343

0-06

79

•893

Phillips . .

22-0

136-0

402-00

3-00

28

500?

Steam

5-6

72?

1894

Maxim *

50-0

4000-0

8000-00

2-5

36

300?

,,

363-00

28

1896

Langley

12-0

70-0

30-00

o-43

24

4,000

,,

I-OO

3°

1897

Tatin and Richet

21-0

86-0

72-00

0-83

40

460

”

1-33

55

1897

Ader* .

49-0

270-0

IIOO-OO

4-00

50?

100?

”

40-00

27

1895

Lilienthal*

230

151-0

220-00

1-46

23

1,200

Gravity

2-00

no

1896

Pilcher*

23-0

170-0

200-00

1-17

25

900

,,

2-00

100

1896

Chanute*

I60

i35-o

178-0O

131

22

360

2-00

89

1906

S. Dumont* .

39

560

550 –

0-98

22-26

2,900

Petrol

50

23

L_ I9 ° 8

W. Wright* .

4i

650

1 IOO

1-7

37

295,000

Petrol

24

46

*The apparatus marked thus * carried a man or men.

received the stadtholder John Maurice, whose portrait is still preserved in the work of the learned Barleius.

The earliest of Flinck's authentic pieces is a likeness of a lady, dated 1636, in the gallery of Brunswick. His first subject picture is the " Blessing of Jacob," in the Amsterdam museum (1638); Both are thoroughly Rembrandtesque in effect as well as in vigour of touch and warmth of flesh tints. The four " civic guards " of 1642, and " the twelve musketeers " with their president in an arm-chair (1648), in the town-hall at Amsterdam, are fine specimens of composed portrait groups. But the best of Flinck's productions in this style is the peace of Mtinstef in the museum of Amsterdam, a canvas with 19 life-size figures full of animation in the faces, " radiant with Rembrandtesque colour," and admirably distributed. Flinck here painted his own likeness to the left in a doorway. The mannered period of Flinck is amply illustrated in the " Marcus Curius eating Turnips before the Samnite Envoys," and " Solomon receiving Wisdom," in the palace on the Dam at Amsterdam. Here it is that Flinck shows most defects, being faulty in arrangement, gaudy in tint, flat and shallow in execution, and partial to whitened flesh that looks as if it had been smeared with violet powder and rouge. The chronology of Flinck's works, so far as they are seen in public galleries, comprises, in addition to the foregoing, the " Grey Beard " of 1639 at Dresden, the " Girl " of 1641 at the Louvre, a portrait group of a male and female (1646) at Rotter- dam, a lady (1651) at Berlin. In November 1659 thebur'go- master of Amsterdam contracted with Flinck for 12 canvases to represent four heroic figures of David and Samson and Marcus Curius and Horatius Codes, and scenes from the wars of the Batavians and Romans. Flinck was unable to finish more than the sketches. In the same year he received a flattering acknow- ledgment from the town council of Cleveson the completion of a picture of Solomon which was a counterpart of the composition at Amsterdam. This and other pictures and portraits, such as the likenesses of Frederick William of Brandenburg and John Mauriceof Nassau, and the allegoryof " Louisaof Orange attended by Victory and Fame " and other figures at the cradle of the first-born son of the elector, have disappeared. Of several pictures which were painted for the Great Elector, none are preserved except the " Expulsion of Hagar " in the Berlin museum. Flinck died at Amsterdam on the 22nd of February

1660.

FLINDERS, MATTHEW (1774-1814), English navigator, explorer, and man of science, was born at Donington, near Boston, in Lincolnshire, on the 16th of March 1774. Matthew was at first designed to follow his father's profession of surgeon, but his enthusiasm in favour of a life of adventure impelled him to enter the royal navy, which he did on the 23rd of October 1789. After a voyage to the Friendly Islands

and West Indies, and after serving in the ” Bellerophon ” during Lord Howe’s “glorious first of June ” (1794) off Ushant, Flinders went out in 1795 as midshipman in the ” Reliance ” to New South Wales. For the next few years he devoted himself to the task of accurately laying down the outline and bearings of the Australian coast, and he did his work so thoroughly that he left comparatively little for his successors to do. With his friend George Bass, the surgeon of the ” Reliance,” in the year of his arrival he explored George’s river; and, after a voyage to Norfolk Island, again in March 1796 the two friends in the same boat, the “Tom Thumb,” only 8 ft. long, and with only a boy to help them, explored a Btretch of coast to the south of Port Jackson. After a voyage to the Cape of Good Hope, when he was promoted to a lieutenancy, Flinders was engaged during February 1798 in a survey of the Furneaux Islands, lying to the north of Tasmania. His delight was great when, in September of the same year, he was commissioned along with Bass, who had already explored the sea between Tasmania and the south coast to some extent and inferred that it was a strait, to proceed in the sloop ” Norfolk ” (25 tons) to prove conclusively that Van Diemen’s Land was an island by circumnavigating it. In the same sloop, in the summer of next year. Flinders made an exploration lo the north of Port Jackson, the object being mainly to survey Glasshouse Bay

(Moreton Bay) and Hervey’s Bay. Returning to England he was appointed to the command of an expedition for the thorough exploration of the coasts of Terra Australis, as the southern continent was still called, though Flinders is said to have been the first to suggest for it the name Australia. On the 1 8th of July 1801 the sloop ” Investigator ” (334 tons), in which the expedition sailed, left Spithead, Flinders being furnished with instructions and with a passport from the French government to all i heir officials in the Eastern seas. Among the scientific staff ■was’ Robert Brown, one of the most eminent English botanists; and among the midshipmen was Flinders’s relative, John Franklin, of Arctic fame. Cape Leeuwin, on the south- west coast of Australia, was reached on November 6, and King George’s sound on the 9th of December. Flinders sailed round the Great Bight,, examining the islands and indentations on the east side, noting the nature of the country, the people, products, &c, and paying special attention to the subject of the variation of the compass. Spenser and St Vincent Gulfs were discovered and explored. On the 8th of April 1802, shortly after leaving Kangaroo Islands, at the mouth of St Vincent Gulf, Flinders fell in with the French exploring ship, ” Le Geographe,” under Captain Nicolas Baudin, in the bay now known as Encounter Bay. In the narrative of the French expedition published in

1807 (when Flinders was a prisoner in the Mauritius) by M. Peron, the naturalist to the expedition, much of the land west of, the point of meeting was claimed as having been discovered by Baudin, and French names were extensively substituted for the English ones given by Flinders. It was only in 1814, when Flinders published his own narrative, that the real state of the case was fully exposed. Flinders continued his examination of: the coast along Bass's Strait, carefully surveying Port Phillip. Port Jackson was reached on the 9th of May 1802.

After staying at Port Jackson for about a couple of months, Flinders set out again on the 22nd of July to complete his circumnavigation of Australia. The Great Barrier Reef was examined with the. greatest care in several places. The north east entrance of the Gulf of Carpentaria was reached early, in November; and the next three months were spent in an examina- tion of the shores of the gulf, and of the islands that skirt them. An inspection of the " Investigator " showed that she was in so leaky a condition that, only with the greatest precaution could the voyage be completed in her. Flinders completed the survey of the Gulf of; Carpentaria, and aftfir touching at the island of Timor, the " Investigator " sailed round the west and south of Australia, and Port Jackson was reached on the 9th of June 1803. Much suffering was endured by nearly all the members of the expedition: a considerable proportion of the men suc- cumbed to disease, and their leader was so reduced by scurvy that his health was greatly impaired.

: Flinders determined to proceed home in H.M.S. " Porpoise " as a passenger, submit the results of his work to the Admiralty, and obtain, if possible, another vessel to complete his exploration of the Australian coast. The " Porpoise " left Port Jackson on the 10th of August, accompanied by the H.E.I.C.'s ship " Bridge- water " (750 tons) and the " Cato " (450 tons) of London. On the night of the 17th the " Porpoise " and " Cato " suddenly struck on a coral reef and were rapidly reduced to wrecks. The officers and men encamped on a small sandbank near, 3 or 4 ft. above high- water, a considerable quantity of provisions, with many of the papers and charts, having been saved from the wrecks. The reef was in about 22° 11′ S. and 155° E., and about 800 m. from Port Jackson. Flinders returned to Port Jackson in a six-oared cutter in order to obtain a vessel to rescue the party. The reef was again reached on the 8th of October, and all the officers and men having been satisfactorily disposed of, Flinders on the nth left for Jones Strait in an unsound schooner of 29 tons, the " Cumberland," with ten companions, and a valuable collection of papers, charts, geological specimens, &c. On the 15th of December he put in at Mauritius, when he discovered that France and England were at war.

The passport he possessed from the French government was for the "Investigator"; still, though he was now on board another ship, his mission was

essentially the same, and the work he was; on was simply a continuation of that commenced in the unfortunate vessel. Never- theless, on. her arrival at Port Louis the " Cumberland" was seized by order of the governor-general de Caen. Flinders's papers were taken possession of , and he found himself virtually a prisoner. We need not dwell on the sad details of this un- justifiable captivity, which lasted to June 1810. But there can be no doubt that the hardships and inactivity Flinders was com- pelled to endure for upwards of six years told seriously on his health, and brought his life to a premature end. He reached England in October 1810, after an absence of upwards of nine years. The official red-tapeism of the day barred all promotion to the unfortunate explorer, who set himself to prepare an account of his explorations, though unfortunately an important part of his record had been retained by de Caen. The results of his labours were published in two large quarto volumes, entitled A Voyage to Terra Australis, with a folio volume of maps. The very day (July 19, 1814) on which his work was. published Flinders died, at the early age of forty. The great work is a model of its kind, containing as it does not only a narrative of his own and of previous voyages, but masterly statements of the scientific results, especially with regard to magnetism, meteorology, hydrography and navigation. Flinders paid great attention to the errors of the compass, especially to those caused by the presence of iron in ships. He is understood to have been the first to discover the source of such errors (which had scarcely been noticed before), and after investigating the laws of the variations, he suggested counter-attractions, an invention for which Professor Barlow got much credit many years afterwards. Numerous experiments on ships' magnetism were conducted at Portsmouth by Flinders, by order of the admiralty, in 18 12. Besides the Voyage, Flinders wrote Observations on the Coast of Van Diemen's Land, Bass's Strait, &c, and two papers in the Phil. Trans.— one on the "Magnetic Needle" (1805), and the other, " Observations on the Marine Barometer " (1806). (J. S. K.)

FLINSBERG, a village and watering-place of Germany, in the Prussian province of Silesia, on the Queis, at the foot of the Iserkamm, 1450 ft. above the sea, 5 m. W. of Friedeberg, the terminus station of the railway from Greiffenberg. Pop. (1906) 1957. It contains an

Evangelical and a Roman Catholic church, and has some manufactures of wooden wares. Flinsberg is celebrated for its chalybeate waters, specific in cases of feminine disorders, and used both for bathing and drinking. It is also a climatic health resort of some reputation, and the visitors number about 8500 annually.

See Adam, Bad Flinsberg als klimatischer Kurort (Gorlitz, 1891).

FLINT, AUSTIN (1812-1886), American physician, was born at Petersham, Massachusetts, on the 20th of October 1812, and graduated at the medical department of Harvard University in 1833. From 1847 to 1852 he was professor of the theory and practice of medicine in Buffalo Medical College, of which he was one of the founders, and from 1852 to 1856 he filled the same chair in the university of Louisville. From 1861 to 1886 he was professor of the principles and practice of medicine arid clinical medicine in Bellevue Hospital Medical College, New York. He wrote many text-books on medical subjects, among these being Diseases of the Heart (1859-1870); Principles and Practice of Medicine (1866); Clinical Medicine (1879); and Physical Exploration of the Lungs by means of Auscultation and Percussion (1882). He died in New York on the 13th of March 1886.

His son, Austin Flint, junr., who was born at Northampton, Massachusetts, on the 28th of March 1836, after studying at Harvard and at the university of Louisville, graduated at the Jefferson Medical College, Philadelphia, in 1857. He then became professor of physiology at the university of Buffalo (1858) and subsequently at other centres, his last connexion being with the Cornell University Medical College (1898-1906). He was better known as a teacher and writer on physiology than as a practi- tioner, and his Text-book of Human Physiology (1876) was for many years a standard book in American medical colleges. He also published an extensive Physiology of Man (5 vols., 1866-

1874), Chemical Examination of the Urine in Disease (1870), Effects of Severe and Protracted Muscular Exercise (1871), Source of Muscular. Power (1878), and Handbook of Physiology (1905). In 1896, he became a consulting physician to the New York State Hospital for the Insane.

FLINT, ROBERT (1838-), Scottish divine and philosopher, was born near Dumfries and educated: at the university of Glasgow. After a few years of pastoral service, first in Aberdeen and then at Kilconquhar, Fife, he was appointed professor of moral philosophy and political

economy at St Andrews in 1864. From 1876 to 1903 he was professor of divinity at Edinburgh. He contributed a number of articles to. the 9th edition of the Encyclopaedia Britannica. His chief works are Christ's Kingdom upon Earth (Sermons, 1865); Philosophy of History m Europe (1874; partly rewritten with reference to France and Switzerland, 1894); Theism and Anti-theistic Theories (2 vols., being the Baird Lectures for, 1876ˆ1877; often reprinted); Socialism (1894); Sermons and Addresses (1899); Agnosticism (1903).

FLINT, TIMOTHY (1780-1840), American clergyman and writer, was born in Reading, Massachusetts, on the nth of July 1780. He graduated at Harvard in 1800, and in 1802 settled as a Congregational minister in Lunenburg, Mass. , where he pursue d scientific studies with' interest; and his labours in his chemical laboratory seemed so strange to the people of that retired region, that some persons supposed and asserted that he was engaged in counterfeiting. This, together with political differences, led to disagreeable complications, which resulted in his resigning his charge (1814) and becoming a missionary (181 5) in the valley of the Mississippi. He was also for a short period a teacher and a farmer. His observations on the manners and character of the settlers of the Ohio and Mississippi valleys were recorded in a picturesque work called Recollections of the Last Ten Years passed in the Valley of the Mississippi (1826; reprinted in England and translated into French), the first account of the western states which brought to light the real life and character of the people. The success which this work met with, together with the failing health of the writer, led him to relinquish his more active labours for' literary pursuits, and, besides editing the Western Review in Cincinnati from 1825 to 1828 and Knickerbocker's Magazine (New York) in 1833, he published a number of books, including Francis Berrian, or the Mexican Patriot (1826), his best novel; A Condensed Geography and History of the Western States, or the Mississippi Valley (2 vols., 1828); Arthur Clenning (1828), a novel; and Indian Wars in the West (1833). His style is vivid; plain and forcible, and his matter interesting; and his works on the western states are of great value. He died in Salem, Mass., on the 16th of August 1840.

FLINT, a city and the county-seat of Genesee county, Michigan, U.S.A., on Flint river, 68 m. (by rail) N.W. of Detroit. Pop. (1890) 9803; (1900) 13,103, of whom 2165 were foreign-born; (1910J census) 38,55°- It is served by the Grand Trunk and the Pere Marquette railways, and by an electric line, the Detroit United railway, connecting with Detroit. The city has a fine court-house (1904), a federal building (1908), a city hall (1908) and a public library. The Michigan school for the deaf, established in 1854, and the Oak Grove

hospital (private) for the treatment of mental and nervous diseases, are here. Flint has important manufacturing interests, its chief manufactures being automobiles, wagons, carriages— Flint is called " the vehicle city," — flour, woollen goods, iron goods, cigars, beer, and bricks and tiles; and its grain trade is of considerable importance. In 1904 the total value of the city's factory product was $6,177,170, an increase of 31-1 % over that of 1900. The settle- ment of the place, then called the Grand Traverse of the Flint, began in 1820, but Flint's growth was Very slow until 1831, when it was platted as a village; it was chartered as a city in

i8SS-

FLINT, or Flintshire (str Gallestr), a county of North Wales, the smallest in the country, bounded N. by the Irish Sea and the Dee estuary, N.E. by the Dee, E. by Cheshire, and S.W. by Denbighshire. Area, 2 5 7 sq. m. Included in Flint is the detached hundred of Maelor, lying 8 m. S.E. of the main part of the county,

and shut in by Cheshire on the N. and N.E., by Shropshire on the S., and by Denbighshire on the W. and N.W. The Clwyd valley is common to Flint and Denbigh. Those of the Alyn and Wepre (from Ewloe Castle to the Dee) are fine. The Dee, entering the county near Overton, divides Maelor from Denbigh on the W., passes Chester and bounds most of the county on the N. The Clwyd enters Flint near Bodfary, and joining the Elwy near Rhuddlan, reaches the Irish Sea near Rhyl. The Alyn enters the county under Moel Fammau, passes Cilcen and Mold (y Wydd- grug), runs underground near Hesb-Alyn (Alyn J s drying-up), bends south to Caergwrle, re-enters Denbighshire and joins the Dee. Llyn Helyg (willow-pool), near Whitford, is the chief lake.

Both for their influence- upon the physical features and for their economic value the carboniferous rocks of Flintshire are the most important. From Prestatyn on the coast a band of carboniferous limestone passes close by Holywell and through Caerwen ; it forms the Halkin Mountain east of Halkin, whence it Continues past Mold to beyond the county boundary. The upper portion of this series is cherty in the north— the chert is quarried for use in the potteries of Staffordshire — but traced southward it passes into sandstones and grits; above these beds come the Holywell shales, possibly the equivalent of the Pendleside series of Lancashire and Derbyshire,

while upon them lies the Gwespyr sandstone, which has been thought to correspond to the Gannister coal measures of Lancashire, but may be a representative of the Millstone Grit. Farther to the east, the coal measures, with valuable coals, some oil shale, and with fireclays and marls which are used for brick and tile-making, extend front Talacre through Flint, Northop, Ha warden and Broughton to Hopeˆ The carboniferous rocks appear again through the intervention of a fault, in the neighbourhood of St Asaph. Silurian strata, mostly of Wenlock age, lie below the carboniferous limestone on the western border of the county. Triassic red beds of the Bunter fill the ClWyd valley and appear again on the coal measures S.E. of Chester. Lead and zinc ores have been worked in the lower carboniferous rocks in the north of the county, and caves in the same formation, at Caer Gwyn and Ffynnon Beuno, have yielded the remains of Pleistocene mammals along with palaeolithic implements. Much glacial drift obscures the older rocks on the east and north and in the vale of Clwyd. Short stretches of blown sand occur on the coast near Rhyl and Talacre.

The London & North-Western railway follows the coast-line. Other railways which cross the county are the Great Western, and the Wrexham, Mold & Connah's Quay, acquired by the Great Central company. For pasture the vale of Clwyd is well known. Oats, turnips and swedes are the chief crops. Stock and dairy farming prospers, native cattle being crossed with Herefords and Downs, native sheep with Leicesters and South- downs, while in the thick mining population a ready market is found for meat, cheese, butter, &c. The population (81,700 in 1 901) nearly doubled in the 19th century, and Flintshire to-day is one of the most densely populated counties in North Wales. The area of the ancient county is 164,744 acres, and that of the administrative county 163,025 acres. The collieries begin at Llanasa, run through Whitford, Holywell, Flint, Halkin (Halcyn), Northop, Buckley, Mold and Hawarden (Penarlag). At Halkin, Mold, Holywell, Prestatyn and Talacre lead is raised, and is sometimes sent to Bagillt, Flint or Chester to be smelted. Zinc, formerly only worked at Dyserth, has increased in output, and copper mines also exist, as at Talargoch, together with smelting works, oil, vitriol, potash and alkali manufactories. Potteries around Buckley send their produce chiefly to Connah's Quay, whence a railway crosses the Dee to the Birkenhead (Cheshire) district. Iron seams are now thin, t>ut limestone quarries yield building stone, lime for burning and small stone for chemical works. Fisheries are unproductive and textile manufactures small.

The county returns one member to parliament. The parlia- mentary borough district (returning one member), consists of Caergwrle, Caerwys, Flint, Holywell, Mold, Overton, St Asaph and Rhuddlan. In

addition, there is a small part of the Chester parliamentary borough. There is one municipal borough, Flint (pop. 4625). The other urban districts are: Buckley (5780), Connah's Quay (3369), Holywell (2652), Mold (4263), Prestatyn (1261) and Rhyl (8473). Flint is in the North Wales and Chester circuit, assizes being held at Mold. The Flint borough has a separate commission of the peace, but no separate court of quarter sessions. The ancient county,, which is in the

dioceses of Chester, Lichfield and St Asaph, contains forty-six entire ecclesiastical parishes and districts, with parts of eleven others.

Among sites of antiquarian or historical interest, besides the fragmentary ruin of Flint Castle, the following may be mentioned: — Caerwys, near Flint, still shows traces of Roman occupation. Bodfary (Bodfari) was traditionally occupied by the Romans. Moel y gaer (bald hill of the fortress), near Northop, is a re- markably perfect old British post. Maes y Garmon (perhaps for Meusydd Garmon, as y, the article, has no significance before a proper name, and so to be translated, battlefields of Germanus). A mile from Mold is the reputed scene of une victoire sans larmes, gagnie non par les armes, mats par la foi (E. H. Vollet). The Britons, says the legend, were threatened by the Picts and Saxons, at whose approach the Alleluia of that Easter (a.d. 430) was sung. Panic duly seized the invaders, but the victor, St Germanus, confessor and bishop of Auxerre (a.d. 380-448), had to return to the charge in 446. He has, under the name Garmon, a great titular share in British topography. At Bangor Iscoed, " the great high choir in Maelor," was the monastery, destroyed with over 2000 monks, by ˆEthelfred of Northumberland in 607, as (by a curious coincidence) its namesake Bangor in Ireland was sacked by the Danes in the 9th century. Bede says (ii. 2) that Bangor monastery was in seven sections, with three hundred (working) monks. The supposed lines of direction of Watt's and Offa's dykes were: Basingwerk, Halkin, Hope, Alyn valley, Oswestry (Croes Oswallt, " Oswald's cross"), for Watt's, and Prestatyn, Mold, Minera, across the Severn (Hafren, or Sabrina) for Offa's. Owain Gwynedd (Gwynedd or Venedocia, is North Wales) defeated Henry II. at Coed Ewloe (where is a tower) and at Coleshill (Cynsyllt). Near Pant Asa (pant is a bottom) is the medieval Maen Achwynfan (achwyn, to complain, maen, stone), and tumuli, menhirs (meini hirion) and inscribed stones are frequent throughout the county. There is a 14th-century cross in Newmarket churchyard. Caergwrle Castle seems early Roman, or even British; but most of the castles in the county date from the early Edwards.

See H. Taylor, Flint (London, 1883).

FLINT, a municipal borough and the county town of the above; a seaport and contributory parliamentary borough, on the south of the Dee estuary, 192 m. from London by the London & North-Western railway. Pop. (1901) 4265. The seat of great alkali manufactures, it imports chiefly sulphur and other chemicals, exporting coal, soda, potash, copper, &c. The county gaol here, as at Haverfordwest, occupied an angle of the castle, was removed to Mold, and is now Chester Castle (jointly with Cheshire.)

Flint Castle was built on a lonely rock by the riverside by Edward I. Here met Edward II. and Piers Gaveston. Edward III. bestowed its constableship upon the earls of Chester, and here Richard II. surrendered to Bolingbroke. It was twice taken, after siege, by the parliamentarians, and finally dismantled in 1647. There remain a square court (with angle towers), round tower and drawbridge, all three entrusted to a constable, appointed by the crown under the Municipal Corporations Reforms Act. Made a borough by Edward I., Flint was chartered by Edward III., and by Edward the Black Prince, as earl of Chester.

FLINT (a word common in Teutonic and Scandinavian languages, possibly cognate with the Gr. -rXivdos, a tile), in petrology, a dark grey or dark brown crypto-crystalline substance which has an almost vitreous lustre, and when pure appears structureless to the unaided eye. In the mass it is dark and opaque, but thin plates or the edges of splinters are pale yellow and translucent. Its hardness is greater than that of steel, so that a knife blade leaves a grey metallic streak when drawn across its surface. Its specific gravity is 2-6 or only a litlje less than that of crystalline quartz. It is brittle, and when hammered readily breaks up into a powder of angular grains. The fracture is perfectly conchoidal, so that blows with a hammer detach flakes which have convex, slightly undulating surfaces. At the point of impact a bulb of percussion, which is a somewhat

elevated conical mark, is produced. This serves to distinguish flints which have been fashioned by human agencies from those which have been split merely by the action of frost and the weather. The bulb is evidence of a direct blow, probably intentionally made, and is a point of some importance to archaeologists investigating Palaeolithic implements. With skill and experience a mass of flint can be worked to any simple shape by well directed strokes, and further trimming

can be effected with pressure by a pointed stone in a direction slightly across the edge of the weapon. The purest flints have the most perfect conchoidal fracture, and prehistoric man is known to have quarried or mined certain bands of flint which were specially suitable for his purposes.

Silica forms nearly the whole substance of flint; calcite and dolomite may occur in it in small amounts, and analysis has also detected minute quantities of volatile ingredients, organic com- pounds, &c, to which the dark colour is ascribed by some authorities. These are dispelled by heat and the flint becomes white and duller in lustre. Microscopic sections show that flint is very finely crystal- line and consists of quartz or chalcedonic silica ; colloidal or amorph- ous silica may also be present but cannot form- any considerable part of the rock. Spicules of sponges and fragments of other organisms, such as molluscs, polyzoa, foraminifera and brachiopods, often occur in flint, and may be partly or wholly silicified with retention of their original structure. Nodules of flint when removed from the chalk (vhich encloses them have a white dull rough surface, and .exposure to the weather produces much the same appearance on broken flints. At first they acquire a bright and very smooth surface, but this is subsequently replaced by a dull crust, resembling white or yellowish porcelain. It has been suggested that this change is due to the re- moval of the colloidal silica in solution, leaving behind the fibres and grains of more crystalline structure. This process must be a very slow one as, from its chemical composition, flint is a material of great durability. Its great hardness also enables it to resist attrition. Hence on beaches and in rivers, such as those of the south- east of England, flint pebbles exist in vast numbers. Their surfaces often show minute crescentic or rounded cracks which are the edges of small conchoidal fractures produced by the impact of one pebble on another during storms or floods.

Flint occurs primarily as concretions, veins and tabular masses in the white chalk of such localities as the south of England (see Chalk) . It is generally nodular, and forms rounded or highly irregular masses which may be several feet in diameter. Although the flint nodules often lie in bands which closely follow the bedding; they were not deposited simultaneously with the chalk; very often the flint bands cut across the beds of the limestone and may traverse them at right angles. Evidently the flint has accumulated along fissures, such as bedding planes, joints and other cracks, after the chalk had to some extent consolidated. The silica was derived from the tests of radiolaria and the spicular skeletons of sponges. It has passed into solution, filtered through the porous matrix, and has been again precipitated

when the conditions were suitable. Its formation is consequestly the result of ” concretionary action.” Where the flints lie the chalk must have been dissolved away ; we have in fact a kind of metasomatic replacement in which a siliceous rock has slowly replaced a calcareous one. The process has been very gradual and the organisms of the original chalk often have their outlines preserved in the flint. Shells may become completely silicified, or may have their cavities occupied by flint with every detail of the interior of the shell preserved in the outer surface of the cast. Objects of this kind are familiar to all collectors of fossils in chalk districts.

Chert is’ a coarser and less perfectly homogeneous substance of the same nature and composition as flint. It is grey, black or brown, and commonly occurs in limestone (e.g. the Carboniferous Limestone) in the same way as flint occurs in chalk. Some cherts contain tests of radiolaria, and correspond fairly closely to the siliceous radiolarian oozes which are gathering at the present day at the bottom of some of the deepest parts of the oceans. Brownish cherts are found in the English Greensand ; these often contain remains of sponges.

The principal uses to which flint has been put are the fabrica- tion of weapons in Palaeolithic and Neolithic times. Other materials have been employed where flint was not available, e.g. obsidian, chert, chalcedony, agate and. quartzite, but to prehistoric man (see Flint Implements below) flint must have been of great value and served many of the uses to which steel is put at the present day. Flint gravels are widely employed for dressing walks and roads, and for rough-cast work in archi- tecture. For road-mending flint, though very hard, is not regarded with favour, as it is brittle and pulverizes readily; binds badly, yielding a surface which breaks up with heavy traffic and in bad weather; and its fine sharp-edged chips do much damage to tires of motors and cycles. Seasoned flints

from the land, having been long exposed to the atmosphere, are preferred to flints freshly dug from the chalk pits. Formerly flint and steel were everywhere employed for striking a light; and gun flints were required for fire-arms. A special industry in the shaping of gun flints long existed at Brandon in Suffolk. In 1870 about thirty men were employed. Since then the trade has become almost extinct as gun flints are in demand only in semi-savage countries where modern fire-arms are not obtainable. Powdered flint was formerly used in the manufacture of glass, and is still one of the ingredients of many of the finer varieties of pottery. (J. S. F.)

FLINT IMPLEMENTS AND WEAPONS. The excavation of these

renTains of the prehistoric races of the globe in river-drift gravel-beds has marked a revolution in the study of Man's history (see Archaeology). Until almost the middle of the 19th century no suspicion had arisen in the minds of British and European archaeologists that the momentous results of the excavations then proceeding in Egypt and Assyria would be dwarfed by discoveries at home which revolutionized all previous ideas of Man's antiquity. It was in 1841 that Boucher de Perthes observed in some sand containing mammalian remains, at Menchecourt near Abbeville, a flint, roughly worked into a cutting implement. This " find " was rapidly followed by others, and Boucher de Perthes published his first work on the subject, Antiquitis celtiques et antediluviennes: m&moire sur Vindustrie primitive et les arts a leur origin (1847), in which he proclaimed his discovery of human weapons in beds unmistakably belonging to the age of the Drift. It was not until 1859 that the French archaeologist convinced the scientific world. An English mission then visited his collection and testified to the great importance of his discoveries. The " finds " at Abbeville were followed by others in many places in England, and in fact in every country where siliceous stones which are capable of being flaked and fashioned into implements are to be found. The implements occurred in beds of rivers and lakes, in the tumuli and ancient burial-mounds; on the sites of settlements of prehistoric man in nearly every land, such as the shell-heaps and lake-dwellings; but especially embedded in the high-level gravels of England and France which have been deposited by river-floods and long left high and dry above the present course of the stream. These gravels represent the Drift or Palaeolithic period when man shared Europe with the mammoth and woolly-haired rhinoceros. The worked flints of this age are, however, unevenly distributed; for while the river-gravels of south-eastern England yield them abundantly, none has been found in Scotland or the northern English counties. On the continent the same partial distribution is observable: while they occur plentifully in the north-western area of France, they are not discovered in Sweden, Norway or Denmark. The association of these flints, fashioned for use by chipping only, with' the bones of animals either extinct or no longer indigenous, has justified their reference to the earlier period of the Stone Age, generally called Palaeolithic. Those flint implements, which show signs of polishing and in many cases remarkably fine workmanship, and are found in tumuli, peat-bogs and lake-dwellings mixed with the bones of common domestic animals, are assigned to the Neolithic or later Stone Age. The Palaeolithic flints are hammers, flakes, scrapers, implements worked to a cutting edge at one side, implements which resemble rude axes, flat ovoid implements worked to an edge all round, and: a great

quantity of spear and arrow heads. None of these is ground or polished. The Neolithic flints, on the other hand, exhibit more variety of design, are carefully finished, and the particular use of each weapon can be easily detected. Man has reached the stage of culture when he could socket a stone into a wooden handle, and fix a flaked flint as a handled dagger or knife. The workmanship is superior to that shown in any of the stone utensils made by savage tribes of historic times. The manner of making flint implements appears to have been in all ages much the same. Flint from its mode of fracture is the only kind of stone which can be chipped or flaked into almost any shape, and thus forms the principal material of these earliest weapons. The blows must be carefully aimed or the flakes

dislodged will be shattered: a gun-flint maker at Brandon, Suffolk, stated that it took him two years to acquire the art. ,

For accounts of the gun-flint manufacture at Brandon, and detailed descriptions of ancient flint-working, see Sir John Evans, Ancient Stone Implements (1897), Lord Avebiiry's Prehistoric Times (1865, 1900); also Thomas Wilson, "Arrow-heads, Spear-heads arid Knives of Prehistoric Times," in Smithsonian Report for 1897; and W. K. Moorehead, Prehistoric Implements (1900).

FLOAT (in Q. Eng. flot and fiota, in the verbal iotmfliptan; the Teutonic root is flut-, another form of flu-, seen in " flow," cf, " fleet "; the root is seen in Gr. irXkiv, to sail, Lat. pluere, to rain; the Lat, fluere and fluctus, wave, is not connected), the action of moving on the surface of water, or through the air. The word is used also of a wave, or the flood of the tide, river, backwater or stream, and of any object floating in water, as a mass of ice or weeds ; a movable landing-stage, a flat-bottomed boat, or a raft, or, in fishing, of the cork or quill used to support a baited line or fishing-net. It is also applied to the hollow or inflated organ by means of which certain animals, such as the " Portuguese man-of-war," swim, to a hollow metal ball or piece of whinstone, &c, used to regulate the level of water in a tank of boiler, and to a piece of ivory in the cistern of a barometer. " Float " is also the name of one of the boards of a paddle-wheel or water-wheel. In a theatrical sense, it is used to denote the footlights. The word is also applied to something broad, level and shallow, as a wooden frame attached to a cart or wagon for the purpose of increasing the carrying capacity; and to a special kind of low, broad cart for carrying heavy

weights, and to a platform on wheels used for shows in a procession. The term is applied also to various tools, especially to many kinds of trowels used in plastering. It is also used of a dock where vessels may float, as at Bristol, and of the trenches used in ” floating ” land. In geology and mining, loose rock or ore brought down by water is known as ” float,” and in tin-mining it is applied to a large trough used for the smelted tin. In weaving the word is used of the passing of weft threads over part of the warp without being woven in with it, also of the threads so passed. In the United States a voter not attached to any particular party and open to bribery is called a ” float “or ” floater.”

FLOCK. 1. (A word found in Old English *md Old Norwegian, from which come the Danish and Swedish words, and not in other Teutonic languages), originally a company of people, now mainly, except in figurative usages, of certain animals when gathered together for feeding or moving from place to place. For birds it is chiefly used of geese; and for other animals most generally of sheep and goats. It is from the particular applica- tion of the word to sheep that ‘ : flock ” is used of the Christian Church in its relation to the ” Good Shepherd,” and also of a congregation of worshippers in its relation to its spiritual head.

2. (Probably from the Lat. floccus, but many Teutonic languages have the same word in various forms), a tuft of wool, cotton or similar substance. The name ” flock ” is given to a material formed of wool or cotton refuse, or of shreds of old woollen or cotton rags, torn by a machine known as a ” devil.” This material is used for stuffing mattresses or pillows, and also in upholstery. The name is also applied to a special kind of wall-paper, which has an appearance almost like cloth, or, in the more expensive kinds, of velvet. It is made by dusting on a specially prepared adhesive surface finely powdered fibres of cotton or silk. The word ” flocculent ” is used of many substances which have a fleecy or ” flock “-like appearance, such as a precipitate of ferric hydrate.

FLODDEN, or Flodden Field, near the village of Branxton, in Northumberland, England (10 m. N.W. of Wooler), the scene of a famous battle fought on the 9th of September 1513 between the English and the Scots. On the 22nd of August a great Scottish army under King James IV. had crossed the border. For the moment the earl of Surrey (who in King Henry VIII. ‘s absence was charged with the defence: of the realm) had no organized force in the north of England, but James wasted much precious time among the border castles, and when Surrey appeared at Wooler, with an army equal in strength to

his own,

which was now greatly weakened by privations and desertion, he had not advanced beyond Ford Castle. The English com- mander promptly sent in a challenge to a pitched battle, which the king, in spite of the advice of his most trusted counsellors, accepted. On the 6th of September, however, he left Ford and took up a strong position facing south, on Flodden Edge. Surrey's reproaches for the alleged breach of faith, and a second challenge to fight on Millfield Plain were this time disregarded. The English commander, thus foiled, executed a daring and skilful march round the enemy's flank, and on the 9th drew up for battle in rear of the hostile army. It is evident that Surrey was con- fident of victory, for he placed his own army, not less than the enemy, in a position where defeat would involve utter ruin. On his appearance the Scots hastily changed front and took post on Branxton Hill, facing north. The battle began at 4 p.m. Surrey's archers and cannon soon gained the upper hand, and the Scots, unable quietly to endure their losses, rushed to close quarters. Their left wing drove the English back, but Lord Dacre's reserve corps restored the fight on this side. In all other parts of the field, save where James and Surrey were personally Opposed, the English . gradually gained ground. The king's corps was then attacked by Surrey in front, and by Sir Edward Stanley in flank. As the Scots were forced back, a part of Dacre's force closed upon the other flank, and finally Dacre himself, boldly neglecting an almost intact Scottish division in front of him, charged in upon the rear of King James's corps. Sur- rounded and attacked on all sides, this, the remnant of the invading army, was doomed. The circle of spearmen around the king grew less and less, and in the end James and a few of his nobles were alone left standing. Soon they too died, fighting to the last man. Among the ten thousand Scottish dead were all the leading men in the kingdom of Scotland, and there was no family of importance that had not lost a member in this great disaster. The " King's Stone," said to mark the spot where James was killed, is at some distance from the actual battlefield. " Sybil's Well," in Scott's Marmion, is imaginary.

FLODOARD (894-966), French chronicler, was born at Epernay, and educated at Reims in the cathedral school which had been established by Archbishop Fulcon (822-900). As canon of Reims, and favourite of the archbishops Herivaeus (d. 922) and Seulfus (d. 925), he occupied while still young an important position at the archiepiscopal court, but was twice deprived of his benefices by Heribert, count of Vermandois, on account of his steady opposition to the election of the count's infant son to the archbishopric. Upon the final triumph of Archbishop Artold in 947, Flodoard became for a time his chief

adviser, but withdrew to a monastery in 952, and spent the remaining years of his life in literary and devotional work. His history of the cathedral church at Reims (Hisloria Remensis Ecclesiae) is one of the most remarkable productions of the 10th century. Flodoard had been given charge of the episcopal archives, and constructed his history out of the original texts, which he generally reproduces in full; the documents for the period of Hincmar being especially valuable. The Annates which Flodoard wrote year by year from 919 to 966 are doubly important, by reason of the author's honesty and the central position of Reims in European affairs in his time. Flodoard's poetical works are of hardly less historical interest. The long poem celebrating the triumph of Christ and His saints was called forth by the favour shown him by Pope Leo VII., during whose pontificate he visited Rome, and he devotes fourteen books to the history of the popes.

Flodoard's works -were published in full by J. P. Migne (Patrologia Latina, vol. 135) ; a modern edition of the Annates is the one edited by P. Lauer (Paris, 1906). For bibliography see A. Molinier, Sources de I'histoire de France (No. 932).

FLOE (of uncertain derivation; cf. Norse flo, layer, level plain), a sheet of floating ice detached from the main body of polar ice. It is of less extent than the field of " pack " ice, which is a compacted mass of greater depth drifting frequently under the influence of deep currents, while the floating floe is driven bv the wind.

FLOOE), H;

525

FLOOD, HENRY (1732-1791), Irish statesman, son of Warden Flood, ehief justice of the king's bench in Ireland, was born in 1732, and was educated at Trinity College, Dublin, and after- wards at Christ Church, Oxford, where he became proficient in the classics. His father was a man of good birth and; fortune, and he himself married a member of the influential Beresford family, who brought him a large fortune. In his early years he was handsome, witty, good-tempered, and a brilliant con- versationalist. His judgment was sound, and he had a natural gift of eloquence which had been cultivated and developed by study of classical oratory and the practice of elocution. Flood therefore possessed every personal advantage when, in 1759, he entered the Irish parliament as member for Kilkenny in his twenty-seventh year. There was at that time no party in the Irish House of Commons that could truly be called national, and until a few years before there had been none that deserved even the name of an

opposition. The Irish parliament was still constitutionally subordinate to the English privy council; it had practically no powers of independent legislation, and none of controlling the policy, of the executive, which was nominated by the ministers in London (see Grattan, Henry). Though the great majority of the people were Roman Catholics, no person of that faith could either enter parliament or exercise the franchise; the penal code, which made it almost impossible for a Roman Catholic to hold property, to follow a learned profession, or even to educate his children, and which in numerous particulars pressed severely on the Roman Catholics and subjected them to degrading conditions, was as yet unrepealed, though in practice largely obsolete; the industry and commerce of Ireland were throttled by restrictions imposed, in accordance with the economic theories of the period, in the interest of the rival trade of Great Britain. Men like Anthony Malone and Hely-Hutchison fully realized the necessity for far-reaching reforms,' and it only needed the ability and eloquence of Flood in the Irish House of Commons to raise up an independent party in parliament, and to create in the country a public opinion with definite intelligible aims.

The chief objects for which Flood strove were the shortening of the duration of parliament — which had then no legal limit in Ireland except that of the reigning sovereign's life, — the. reduction of the scandalously heavy pension list, the establish- ment of a national militia, and, above all, the complete legislative independence of the Irish parliament. For some years little was accomplished; but in 1768 the English ministry, which had special reasons at the moment for avoiding unpopularity in Ireland, allowed an octennial bill to pass, which was the first step towards making the Irish House of Commons in some measure representative of public opinion. It had become the practice to allow crown patronage in Ireland to be exercised by the owners of parliamentary boroughs in return for their under- taking to manage the House in the government interest. But during the viceroyalty of Lord Townsend the aristocracy, and more particularly these " undertakers " as they were called, were made to understand that for the future their privileges in this respect would be curtailed. When, therefore, an opportunity was taken by the government in 1768 for reasserting the con-; stitutional subordination of the Irish parliament, these powerful classes were thrown into temporary alliance with Flood. In the following year, in accordance with the established procedure, a money bill was sent over by the privy council in London for acceptance by the Irish House of Commons. Not only was it rejected, but contrary to custom a reason for this course was assigned, namely, that the bill had not originated in the Irish House.

In consequence parliament was peremptorily prorogued, and a recess of fourteen months was employed by the government in securing a majority by the most extensive corruption. 1 Never- theless when parliament met in February 1771 another money bill was thrown out on the motion of Flood; and the next year Lord Townsend, the lord lieutenant whose policy had provoked this conflict, was recalled. The struggle was the occasion of a publication, famous in its day, called Baratariaw, to which 1 Walpole's George III., iv. 348.

Flood contributed a series of powerful letters after the manner of Junius, one of his collaborators being Henry Grattan.

The success which had thus far attended Flood's efforts had placed him in a position such as no Irish politician had previously attained. He had, as an eminent historian of Ireland observes, " proved himself beyond all comparison the greatest popular orator that his country had yet produced, and also a consummate master of parliamentary tactics. Under parliamentary conditions that were exceedingly unfavourable, and in an atmosphere charged with corruption, venality and subserviency, he had created a party before which ministers had begun to quail, and had inoculated the Protestant constituencies with a genuine spirit • of liberty and self-reliance. " 2 Lord Harcourt, who succeeded Townsend as viceroy, saw that Flood must be con- ciliated at any price " rather than risk the opposition of so formidable a leader." Accordingly, in 1775, Flood was offered and accepted a seat in the privy council and the office of vice- treasurer with a salary of £3500 a year. For this step he has been severely criticized. The suggestion that he acted corruptly in the matter is groundless; and although it is true that he lost influence from the moment he became a minister of the crown, Flood may reasonably have held that he had a better prospect of advancing his policy by the leverage of a ministerial position than by means of any opposition party he could hope to muster in an unreformed House of Commons. 3 The result, however, Was that the leadership of the national party passed from Flood to Grattan, who entered the Irish parliament in the same session that Flood became a minister.

Flood continued in office for nearly seven years. During this long period he necessarily remained silent on the subject of the independence of the Irish parliament, and had to be content with advocating minor reforms as occasion offered. He was thus instrumental in obtaining bounties on the export of Irish corn to foreign countries and some other trifling commercial concessions. On the other hand he failed to procure the passing of a Habeas Corpus bill and a bill for making the judges irre- movable, while his support of

Lord North's American policy still more gravely injured his popularity and reputation. But an important event in 1778 led indirectly to his recovering to some extent his former position in the country; this event was the alliance of France with the revolted American colonies. Ireland was thereby placed in peril of a French invasion, while the English government could provide no troops to defend the island. The celebrated volunteer movement was then set on foot to meet the. emergency; in a few weeks more than 40,000 men, disciplined and equipped, were under arms, officered by the country gentry, and controlled by the wisdom and patriotism of Lord Charlemont. This volunteer force, in which Flood was a colonel, while vigilant for the defence of the island, soon made itself felt in politics. A Volunteer Convention, formed with all the regular organization of a representative assembly, but wielding the power of an army, began menacingly to demand the removal of the commercial restrictions which were destroying Irish prosperity. Under this pressure the government gave way; the whole colonial trade was in 1779 thrown open to Ireland for the first time, and other concessions were also extorted. Plood, who had taken an active though not a leading part in this move- ment, now at last resigned his office to rejoin his old party. He found to his chagrin that his former services had been to a great extent: forgotten, and that he was eclipsed by Grattan. When in a debate on the constitutional question in 1779 Flood com- plained of the small consideration shown him in relation to a subject which he had been the first to agitate, he was reminded that by the civil law " if a man should separate from his wife, and abandon her for seven years, another might then take her and . give her his protection." But though Flood had lost control of the movement for independence of the Irish parliament, the agitation, backed as it now was by the Volunteer Convention

2 W. E. H. Lecky, Leaders of Public Opinion in Ireland (enlarged edition, 2 vols., 1903), i. 48.

? See Hardy's Life af Charlemont, i. 356.

and by increasing signs of popular disaffection, led at last in 1782 to the concession of the demand, together with a number of other important reforms (see Grattan, Henry).

No sooner, however, was this great success gained than a question

arose— known as the Simple Repeal controversy— as to whether England, in addition to the repeal of the Acts on which the subordination of the Irish parliament had been based, should not be required expressly to renounce for the future ■all- claim to control Irish legislation. The chief historical importance of this dispute is that it led to the memorable rupture of friendship between Flood and Grattan, each of whom assailed the other with unmeasured but magnificently eloquent invective in the House of Commons. Flood's view prevailed — for a Renunciation Act such as he advocated was ungrudgingly passed by the English parlia- ment in 1783 — and for a time he regained popularity at the expense of his rival. Flood next (28th of November 1783) introduced a reform bill, after first submitting it to the Volunteer Convention. The bill, which contained no provision for giving the franchise to Roman Catholics — a proposal which Flood always opposed — was rejected, ostensibly on the ground that the attitude of the volunteers threatened the freedom of parliament. The volunteers were perfectly loyal to the crown and the connexion with England. They carried an address to the king, moved by Flood, expressing the hope that their support of parliamentary reform might be imputed to nothing but " a sober and laudable desire to uphold the constitution . . . and to perpetuate the cordial union of both kingdoms." The convention then dissolved, though Flood had desired, in opposition to Grattan, to continue it as a means of putting pressure on parliament for the purpose of obtaining reform.

In 1776 Flood had made an attempt to enter the English House of Commons. In 1783 he tried again, this time with success. • He purchased a seat for Winchester from the duke of Chandos, and for the next seven years he was a member at the same time of both the English and Irish parliaments. He reintroduced, but without success, his reform bill in the Irish House in 1784; supported the movement for protecting Irish industries; but short-sightedly opposed Pitt's commercial propositions in 1785. He remained a firm opponent of Roman Catholic emancipation, even defending the penal laws on the ground that after the Revolution they " were not laws of persecution but of political necessity "; but after 1786 he does not appear to have attended the parliament in Dublin. In the House at Westminster, where he refused to enrol himself as a member of either political party, he was not successful. His first speech, in opposition to Fox's India Bill on the 3rd of December 1783, disappointed the ex- pectations aroused by his celebrity. His speech in opposition to the commercial treaty with France in 1787 was, however, most able; and in 1790 he introduced a reform bill which Fox declared to be the best scheme of reform that had yet been proposed, and which in Burke's

opinion retrieved Flood's reputa- tion. But at the dissolution in the same year he lost his seat in both parliaments, and he then retired to Farmley, his residence in county Kilkenny, where he died on the 2nd of December 1701.

When Peter Burrowes, notwithstanding his close personal friendship with Grattan, declared that Flood was " perhaps the ablest man Ireland ever produced, indisputably the ablest man of his own times," he expressed what was probably the general opinion of Flood's contemporaries. Lord Charlemont, who knew him intimately though not always in agreement with his policy, pronounced him to be " a man of consummate ability." He also declared that avarice made no part of Flood's character. Lord Mountmorres, a critic by no means partial to Flood, described him as a pre-eminently truthful man, and one who detested flattery. Grattan, who even after the famous quarrel never lost his respect for Flood, said of him that he was the best tempered and the most sensible man in the world. In his youth he was genial, frank, sociable and witty; but in later years disappointment made him gloomy and taciturn. As an orator he was less polished, less epigrammatic than Grattan; but a closer reasoner and a greater master of sarcasm and invective. Personal ambition often governed his actions, but his political judgment was usually

sound; and it was the opinion of Bentham that Flood would have succeeded in carrying a reform bill which might have preserved Irish parliamentary independence, if he had been supported by Grattan and the rest of his party in keeping alive the Volunteer Convention in 1 783. Though he never wavered in loyalty to the British crown and empire, Ireland never produced a more sincere patriot than Henry Flood.

See Warden Flood, Memoirs of Henry Flood (London, 1838) ; Henry Grattan, Memoirs of the Life and Times of the Right Hon. H. Grattan (5 vojs., London, 1839-1846) ; Charles Phillips, Recollections of Curran and some of his Contemporaries (London, 1822) ; The Irish Parliament 1775, from an official and contemporary manuscript, edited by William Hunt (London, 1907); W. J. O'Neill Daunt, Ireland dnd Her Agitators; Lord Mountmorres, History of the Irish Parliament ' (2 vols., London, 1792); W. E. H. Lecky, History of England in the Eighteenth Century (8 vols., London, 1878-1890); and Leaders of Public Opinion in Ireland (enlarged edition, 2 vols., London, 1903) ; J. A. Froude, The English in Ireland, vols. ii. and iii. (London, 1881); Horace Walpole, Memoirs of the Reign of George III. (4 vols., London, 1845, 1894); Sir Jonah Barrington, Rise and Fall of the Irish Nation (London, 1833) ; Francis Plowden, Historical Review of the State of

Ireland (London, 1803) ; Alfred Webb, Com- pendium of Irish Biography (Dublin, 1878); F. Hardy, Memoirs of Lord Charlemont (London, 1812), especially for the volunteer move- ment, on which see also Proceedings of the Volunteer Delegates of Ireland 1784 (Anon. Pamphlet, Brit. Mus.) ; also The Charlemont Papers, and Irish Pari. Debates, vols, i.-iv.). (R. J. M.)

FLOOD (in 0. Eng. fldd, a word common to Teutonic languages, cf . Ger. Flut, Dutch vloed, from the same root as is seen in ” flow,” ” float “), an overflow of water, an expanse of water submerging land, a deluge, hence ” the flood,” specifically, the Noachian deluge of Genesis, but also any other catastrophic submersion recorded in the mythology of other nations than the Hebrew (see Deluge, The). In the sense of ” flowing water,” the word is applied to the inflow of the tide, as opposed to ” ebb.”

FLOOD PLAIN, the term in physical geography for a plain formed of sediment dropped by a river. When the slope down which a river runs has become very slight, it is unable to carry the sediment brought from higher regions nearer its source, and consequently the lower portion of the river valley becomes filled with alluvial deposits; and since in times of flood the rush of water in the high regions tears off and carries down a greater quantity of sediment than usual, the river spreads this also over the lower valley where the plain is flooded, because the rush of water is checked, and the stream in consequence drops its extra load. These flood plains are sometimes of great extent. That of the Mississippi below Ohio has a width of from 20 to 80 m., and its whole extent has been estimated at 50,000 sq. m. Flood plains may be the result of planation, with aggradation, that is, they may be due to a graded river working in meanders from side to side, widening its valley by this process and covering the widened valley with sediment. Or the stream by cutting into another stream (piracy), by cutting through a barrier near its head waters, by entering a region of looser or softer rock, and by glacial drainage, may form a flood plain simply by filling up its valley (alluviation only). Any obstruction across a river’s course, such as a band of hard rock, may form a flood plain behind it, and indeed anything which checks a river’s course and causes it to drop its load will tend to form a flood plain; but it is most commonly found near the mouth of a large river, such as the Rhine, the Nile, or the Mississippi, where there are occasional floods and the river usually carries a large amount of sediment. ” Levees ” are formed, inside which the river usually flows, gradually raising its bed above the surrounding plain. Occasional breaches during floods cause the overloaded stream to spread in a great lake over the surrounding country, where the silt covers the ground in consequence. Sections of

the Missouri flood plain made by the United States geological survey show a great variety of material of varying coarseness, the stream bed being scoured at one place, and filled at another by currents and floods of varying swiftness, so that sometimes the deposits are of coarse gravel, sometimes of fine sand, or of fine silt, and it is probable that any section of such an alluvial plain would show deposits of a similar character. The flood plain during its formation is marked by meandering, or anastomosing streams, ox-bow lakes and bayous,

marshes or stagnant pools, and is occasionally completely covered with water. When the drainage system has ceased to act or is entirely diverted owing to any cause, the flood plain may become a level area of great fertility, similar in appearance to the floor of an old lake. The flood plain differs, however, inasmuch as it is not altogether flat. It has a gentle slope down-stream, and often for a distance from the sides towards the centre.

FLOOR (from O. Eng. flor, a word common to many Teutonic languages, cf. Dutch vloer, and Ger. Flur, a field, in the feminine, and a floor, masculine), generally the lower horizontal surface of a room, but specially employed for one covered with boarding or parquetry. The various levels of rooms in a house are desig- nated as ” ground-floor,” ” first-floor,” ” mezzanine-floor,” &c. The principal floor is the storey which contains the chief apart- ments whether on the ground- or first-floor; in Italy they are always on the latter and known as the ” piano nobile.” The storey below the ground-floor is called the ” basement-floor,” even if only a little below the level of the pavement outside; the storey in a roof is known as the ” attic-floor.” The expressions one pair, two pair, &c, apply to the storeys above the first flight of stairs from the ground (see also Carpentry).

FLOORCLOTH, a rough flannel cloth used for domestic cleaning; also a generic term applied to a variety of materials used in place of carpets for covering floors, and known by such trade names as kamptulicon, oil-cloth, linoleum, corticine, cork- carpet, &c. Kamptulicon (Kaixirros, flexible, ov\os, thick) was patented in 1844 by E. Galloway, but did not attract much attention till about 1862. It was essentially a preparation of indiarubber masticated up with ground cork, and. rolled out into sheets between heavy steam-heated rollers, sometimes over a backing of canvas. Owing to its expensiveness, it has given place to cheaper materials serving the

same purpose. Oil-cloth is a coarse canvas which has received a number of coats of thick oil paint, each coat being rubbed smooth with pumice stone before the application of the next. Its surface is ornamented with patterns printed in oil colours by means of wooden blocks. Linoleum (linum, flax, oleum, oil), patented by F. Walton in i860 and 1863, consists of oxidized linseed oil and ground cork. These ingredients, thoroughly incorporated with the addition of certain gummy and resinous matters, and of pigments such as ochre and oxide of iron as required, are pressed on to a rough canvas backing between steam-heated rollers. Patterns may be printed on its surface with oil paint, or by an improved method may be inlaid with coloured composition so that the colours are continuous through the thickness of the linoleum, instead of being on the surface only, and thus do not dis- appear with wear. Lincrusta- Walton is a similar material to lino- leum, also having oxidized linseed oil as its base, which is stamped out in embossed patterns and used as a covering for walls.

FLOQUET, CHARLES THOMAS (1828-1896), French states- man, was born at St Jean-Pied-de-Port (Basses-Pyrenees) on the 2nd of October 1828. He studied law in Paris, and was called to the bar in 1851. The coup d'etat of that year aroused the strenuous opposition of Floquet, who had, while yet a student, given proof of his republican sympathies by taking part in the fighting of 1848. He made his name by his brilliant and fearless attacks on the government in a series of political trials, and at the same time contributed to the Temps and other influential journals. When the tsar Alexander II. visited the Palais de Justice in 1867, Floquet was said to have confronted him with the cry " Vive la Pologne, monsieur! " He delivered a scathing indictment of the Empire at the trial of Pierre Bonaparte for killing Victor Noir in 1870, and took a part in the revolution of the 4th of September, as well as in the subsequent defence of Paris. In 1871 he was elected to the National Assembly by the department of the Seine. During the Commune he formed the Ligue d'union ripublicaine des droits de Paris to attempt a reconciliation with the government of Versailles. When his efforts failed, he left Paris, and was imprisoned by order of Thiers, but soon released. He became editor of the Ripublique Francaise, was chosen president of the municipal council, and in 1876 was elected deputy for the eleventh arrondissement. He took a

prominent place among the extreme radicals, and became president of the group of the " Union republicaine." In 1882 he held for a short time the post of prefect of the Seine. In 1885 he succeeded M. Brisson as president of the chamber. This difficult position he filled with such tact and impartiality that he was re-elected the two following years.

Having approached the Russian ambassador in such a way as to remove the prejudice existing against him in Russia since the incident of 1867, he rendered himself eligible for office; and on the fall of the Tirard cabinet in 1888 he became president of the council and minister of the interior in a radical ministry, which pledged itself to the revision of the constitution, but was forced to combat the proposals of General Boulanger. Heated debates in the chamber culminated on the 13th of July in a duel between Floquet and Boulanger in which the latter was wounded. In the following February the government fell on the question of revision, and in the new chamber of November Floquet was re-elected to the presidential chair. The Panama scandals, in which he was compelled to admit his implication, dealt a fatal blow to his career: he lost the presidency of the chamber in 1892, and his seat in the house in 1893, but in 1894 was elected to the senate. He died in Paris on the 18th of January 1896.

See Discours et opinions de M. Charles Floquet, edited by Albert Faivre (1885).

FLOR, ROGER DI, a military adventurer of the I3th-i4th century, was the second son of a falconer in the service of the emperor Frederick II., who fell at Tagliacozzo (1268), and when eight years old was sent to sea in a galley belonging to the Knights Templars. He entered the order and became com- mander of a galley. At the siege of Acre by the Saracens in 1291 he was accused and denounced to the pope as a thief and an apostate, was degraded from his rank, and fled to Genoa, where he began to play the pirate. The struggle between the kings of Aragon and the French kings of Naples for the possession of Sicily was at this time going on; and Roger entered the service of Frederick, king of Sicily, who gave him the rank of vice-admiral. At the close of the war, in 1302, as Frederick was anxious to free the island from his mercenary troops (called Almugavares), whom he had no longer the means of paying, Roger induced them under his leadership to seek new adventures in the East, in fighting against the Turks, who were ravaging the empire. The emperor Andronicus II. accepted his offer of service; and in September 1303 Roger with his fleet and army arrived at Constantinople. He was adopted into the imperial family, was married to a grand-daughter of the emperor, and was made grand duke and commander-in-chief of the army and the fleet. After some weeks lost in dissipation, intrigues and bloody quarrels, Roger and his men were sent into Asia, and after some successful encounters with the Turks they went into winter quarters at Cyzicus. In May 1304 they again took the field, and rendered the important service of relieving Philadelphia, then invested and reduced to extremities by the Turks.

But Roger, bent on advancing his own interests rather than those of the emperor, determined to found in the East a principality for himself. He sent his treasures to Magnesia, but the people slew his Catalans and seized the treasures. He then formed the siege of the town, but his attacks were repulsed, and he was compelled to retire. Being recalled to Europe, he settled his troops in Gallipoli and other towns, and visited Constantinople to demand pay for the Almugavares. Dissatisfied with the small sum granted by the emperor, he plundered the country and carried on intrigues both with and against the emperor, receiving reinforcements all the while from all parts of southern Europe. Roger was now created Caesar, but shortly afterwards the young emperor Michael Palaeologus, not daring to attack the fierce and now augmented bands of adventurers, invited Roger to Adrianople, and there contrived his assassination and the massacre of his Catalan cavalry (April 4, 1306). His death was avenged by his men in a fierce and prolonged war against the Greeks.

See Moncada, Expedition de los Catalanes Turcos y Griegos (Paris, 1840).

y Aragoneses contre

FLORA, in Roman mythology, goddess, of spring-time and flowers, later identified with the Greek Chloris. Her festival at Rome, the Floralia, instituted 238 B.C. by order of the Sibylline books and at first held irregularly, became annual afteri73. It lasted six days (April 28-May 3), the first day being the anniversary of the foundation of her temple. It included theatrical performances and animal hunts in the circus, and vegetables were distributed to the people. The proceedings were characterized by excessive merriment and licentiousness. According to the legend, her worship was instituted by Titus Tatius, and her priest, the flamen Floralis, by Numa. In art Flora was represented as a beautiful maiden, bedecked with flowers (Ovid, Fasti, v. 183 ff.; Tacitus, Annals, ii. 49).

The term ” flora ” is used in botany collectively for the plant- growth of a district; similarly ” fauna ” is used collectively for the animals.

FLORE AND BLANCHEFLEUR, a 13th-century romance. This tale, generally supposed to be of oriental origin, relates the passionate devotion of two children, and their success in over- coming all the

obstacles put in the way of their love. The romance appears in differing versions in French, English, German, Swedish, Icelandic, Italian, Spanish, Greek and Hungarian. The various forms of the tale receive a detailed notice in E. Hausknecht's version of the 13th-century Middle English poem of " Floris and Blauncheflur " (Samml. eng. BenkmQler, vol.; v. Berlin, 1885). Nothing definite can be stated of the origin of the story, but France was in the 12 th and 13-th centuries the chief market of romance, and the French version of the tale, Floire et Blanchefleur, is the most widespread. Floire, the son of a Saracen king of Spain, is brought up in constant companion- ship with Blanchefleur, the daughter of a Christian slave of noble birth. Floire 's parents, hoping to destroy this attachment, send the boy away at fifteen and sell Blanchefleur to foreign slave-merchants. When Floire returns a few days later he is told that his companion is dead, but when he threatens to kill himself, his parents tell him the truth. He traces her to the tower of the maidens destined for the harem of the emir of Babylon, into which he penetrates concealed in a basket of flowers. The lovers are discovered, but their constancy touches the hearts of their judges. They are married, and Floire returns to his kingdom, when he and all his people adopt Christianity. Of the two 12th-century French poems (ed. Edelestand du Meril, Paris, 1856), the one contains the love story with few additions, the other is a romance of chivalry, containing the usual battles, single combats, &c. Two lyrics based on episodes of the story are printed by Paulin Paris in his Romancer francais (Paris, 1883). The English poem renders the French version without amplifications, such as are found in other adaptations. Its author has less sentiment than his original, and less taste for detailed description. Among the other forms of the story must be noted the prose romance (c. 1340) of Boccaccio, II Filocolo, and the 14th-century Leggenda delta reina Rosana edi Rosana sua figliuola (pr. Leghorn, 1871). The similarity between the story of Floire and Blanchefleur and Chanle-fable of Aucassm et Nicolete l has been repeatedly pointed out, and they have even been credited with a common source. . .

See also editions by I. Bekker (Berlin, 1844) and E. Hausknecht (Berlin, 1885) ; also H. Sundraacher, Die altfr. und mittelhochdeutsche Bearbeitung der Sage von Flore et Blanschefiur (Gottingen, 1872); H. Herzog, Die beiden Sagenkreise von Flore und Blanschefiur (Vienna, 1884) ; Zeitschrift filr dent. Altertum (vol. xxi.) contains a Rhenish version; the Scandinavian Flores Saga ok BlankiflUr, ed. E. Kolbing (Halle, 1896) ; the 13th-century version of Konrad Fleck, Flore und Blanschefiur, ed. E. Sommer (Leipzig, 1846) ; the Swedish by G. E. Klemming (Stockholm, 1844). The English poem

was also edited

by Hartschorne (.English Metrical Tales, 1829), by Laing (Abbotsford Club, 1829), and by Lumly (Early Eng. Text Soc., 1866, re-edited G. H. McKmght, 1901). J. Reinhold {Floire et Blanchefleur, Paris, 1906) suggests a parallelism with the story of Cupid and Psyche as

1 Ed. H. Suchier (Paderborn, 1878, 5th ed. 1903) ; modern French by G. Michaut, with preface by J. Bedier (Tours, 1901); English by Andrew Lang (1887), by F. W. Bourdillon (Oxford, 1896), and by Laurence Housman (1902).

told by Apuleius ; also that the oriental setting does not necessarily imply a connexion with Arab tales, as the circumstances might with small alteration have been taken from the Vulgate version of the book of Esther.

FLORENCE, WILLIAM JERMYN (1831-1891), American actor, of Irish descent, whose real name was Bernard Conlin, was born on the 26th of July 1831 at Albany, N.Y., and first attracted attention as an actor at Brougham's Lyceum in 1851. Two years later he married Mrs Malvina Pray Littell (d. 1906), in association with whom, until her retirement in 1889, he won all his successes, notably in Benjamin Woolf's The Mighty Dollar, said to have been presented more than 2500 times. In 1856 they had a successful London season, Mrs Florence being one of the first American actresses to appear on the English stage. In 1889 Florence entered into partnership with Joseph Jefferson, playing Sir Lucius O'Trigger to his Bob Acres and Mrs John Drew's Mrs Malaprop on a very successful tour. His last appearance was with Jefferson on the 14th of November 1891, as Ezekiel Homespun in The Heir-at-law, and he died on the 18th of November in Philadelphia.

FLORENCE OF WORCESTER (d. n 18), English chronicler, was a monk of Worcester, who died, as we learn from his con- tinuator, on the 7th of July 11 18. Beyond this fact nothing is known of his life. He compiled a chronicle called Chronicon ex chronicis which begins with the creation and ends in n 17. The basis of his work was a chronicle compiled by Marianus Scotus, an Irish recluse, who lived first at Fulda, afterwards at Mainz. Marianus, who began his work after 1069, carried it up to 1082. Florence supplements Marianus from a lost version of the English Chronicle, and from Asser. He is always worth comparing with the extant English Chronicles; and from 1106 he is an independent annalist, dry but accurate. Either Florence or a later editor of his work made considerable borrowings from the first four

books of Eadiiier's Historia novorum. Florence's work is continued, up to 1141, by a certain John of Worcester, who wrote about ir5o. John is valuable for the latter years of Henry I. and the early years of Stephen. He is friendly to Stephen, but not an indiscriminate partisan.

The first edition of these two writers is that of 1592 (by William Howard). The most accessible is that of B. Thorpe (Eng. Hist. Soc, 2 vols., 1848-1849) ; but Thorpe's text of John's continuation needs revision. Thorpe gives, without explanations, the insertions of an ill-informed Gloucester monk who has obscured the accurate chronology of the original. Thorpe also prints a continuation by John Taxter (died c. 1295), a 13th-century writer and a monk of Bury St Edmunds. Florence and John of Worcester are translated by J. Stevenson in his Church Historians of England, vol. ii. pt. i. (London, 1853); T. Forester's translation in Bohn's Antiquarian Library (London, 1854) gives the work of Taxter also. (H. W. C. D.)

FLORENCE, the. county-seat of Lauderdale county, Alabama, U.S.A., on the N. bank of the Tennessee river, at the foot of Muscle Shoals Canal, and about 560 ft- above sea-level. Pop. (1880) 1359; (1890) 6012; (1900) 6478 (1952 negroes); (1910) 6689. It is served by the Southern, the Northern Alabama (controlled by the Southern), and the Louisville & Nashville railways, and by electric railway to Sheffield and Tuscumbia, and the Tennessee river is here navigable. Florence is situated in the fertile agricultural lands of the Tennessee river valley on the edge of the coal and iron districts of Alabama, and has various manufactures, including pig-iron, cotton goods, wagons, stoves, fertilizers, staves and mercantile supplies. At Florence are the state Normal College, the Florence University for Women, and the Burrell Normal School (for negroes; founded in 1903 by the American Missionary Association). Florence was founded in 1818, Andrew Jackson, afterwards president of the United States, and ex-president James Madison being among the early property holders. For several years Florence and Nashville, Tennessee, were commercial rivals, being situated respectively at the head of navigation on the Tennessee and Cumberland rivers. The first invasion of Alabama by Federal troops in the Civil War was by a gunboat raid up the Tennessee to Florence on the 8th of February 1862. On the nth of April 1863 another Federal gunboat raid was attempted, but the vessels were repulsed by a force under Gen. S. A. Wood. On the 26th

of May following, Federal troops entered Florence, and destroyed cotton mills and public and private property; but they were driven back by Gen. Philip D. Roddy (1820-1897). On the nth of December 1863 the town was again raided, but the Federals did not secure permanent possession. Florence was chartered as a city in 1889.

FLORENCE (Ital. Firenze, Lat. Florentia), formerly the capital of Tuscany, now the capital of a province of the kingdom of Italy, and the sixth largest city in the country. It is situated 43 46′ N., n° 14′ E., on both banks of the river Arno, which at this point flows through a broad fertile valley enclosed between spurs of the Apennines. The city is 165 ft. above sea-level, and occupies an area of 3 sq. m. (area of the commune, i6| sq. m.). The geological formation of the soil belongs to the Quaternary and Pliocene period in its upper strata, and to the Eocene and Cretaceous in the lower. Pietra forte of the Cretaceous period is quarried north and south of the city, and has been used for centuries as paving stone and for the buildings. Pietra serena or macigno, a stone of a firm texture also used for building purposes, is quarried at Monte Ceceri below Fiesole. The soil is very fertile; wheat, Indian corn, olives, vines, fruit trees of many kinds cover both the plain and the surrounding hills; the chief non-fruit-bearing trees are the stone pine, the cypress, the ilex and the poplar, while many other varieties are repre- sented. The gardens and fields produce an abundance of flowers, which justify the city's title of la citta dei fiori.

Climate and Sanitary Conditions. — The climate of Florence is very variable, ranging from severe cold accompanied by high winds from the north in winter to great heat in the summer, while in spring-time sudden and rapid changes of temperature are frequent. At the same time the climate is usually very agreeable from the end of February to the beginning of July, and from the end of September to the middle of November. The average temperature throughout the year is about 57° Fahr.; the maximum heat is about 96-8°, and the minimum 36-5°, sometimes sinking to 21 . The longest day is 15 hours and 33 minutes, the shortest 8 hours and 50 minutes. The average rainfall is about 375 inches. Epidemic diseases are rare and children's diseases mild; cholera has visited Florence several times, but the city has been free from it for many years. Diphtheria first appeared in 1868 and continued as a severe epidemic until 1872, since when it has only occurred at rare inter- vals and in isolated cases. Typhoid, pneumonia, tuberculosis, measles and scarlatina, and influenza are the commonest illnesses. The drainage system is still somewhat imperfect, but the water brought from the hills or from the Arno in pipes is fairly good, and the general sanitary conditions are satisfactory.

Public Buildings.— Of the very numerous Florentine churches the Duomo (Santa Maria del Fiore) is the largest and most Churches, important, founded in 1298 on the plans of Arnolfo di Cambio, completed by Brunelleschi, and consecrated in 1436; the facade, however, was not finished until the 19th century — it was begun in 1875 on the designs of de Fabris and unveiled in 1888. Close by the Duomo is the no less famous Campanile built by Giotto, begun in 1332, and adorned with exquisite bas-reliefs. Opposite is the Baptistery built by Arnolfo di Cambio in the 13th century on the site of an earlier church, and adorned with beautiful bronze doors by Ghiberti in the 15th century. The Badia, Santo Spirito, Santa Maria Novella, are a few among the many famous and beautiful churches of Florence. The existence of these works of art attracts students from all countries, and a German art school subsidized by the imperial government has been instituted.

The streets and piazze of the city are celebrated for their splendid palaces, formerly, and in many cases even to-day the residences of the noble families of Florence. Among others we may mention the Palazzo Vecchio, formerly the seat of the govern- ment of the Republic and now the town hall, the Palazzo Riccardi, the residence of the Medici and now the prefecture, the palaces of the Strozzi, Antinori (one of the most perfect specimens of Florentine quattrocento architecture), Corsini, Davanzati, Pitti (the royal palace), &c. The palace of the Arte della Lana or

gild of wool merchants, tastefully and intelligently restored, is the headquarters of the Dante Society. The centre of Florence, which was becoming a danger from a hygienic point of view, was pulled down in 1880-1890, but, unfortunately, sufficient care was not taken to avoid destroying certain buildings of historic arid artistic value which might have been spared without im- pairing the work of sanitation, while the new structures erected in their place, especially those in the Piaza Vittorio Emanuele, are almost uniformly ugly and quite out of keeping with Florentine architecture. The question aroused many polemics at the time both in Italy and abroad. After the new centre was built, a society called the Societa per la difesa di Firenze antica was formed by many prominent citizens to safeguard the ancient buildings and prevent them from destruction, and a spirit of intelligent conservatism seems now to prevail in this connexion. The city is growing in all directions, and a number of new quarters have sprung up where the houses are more sanitary than in the older parts; but unfortunately few of them evince much aesthetic feeling. The viali or boulevards form pleasant residential streets with gardens, and the system of building separate houses for each family (villini) instead of large

blocks of flats is becoming more and more general.

Florence possesses four important libraries besides a number of smaller collections. The Biblioteca Nazionale, originally founded by Antonio Magliabecchi in 1747, enjoys the £_ /ftrariea< right, shared by the Vittorio Emanuele library of Rome, of receiving a copy of every work printed in Italy, since 1870 (since 1848 it had enjoyed a similar privilege with regard to works printed in Tuscany) . It contains some 5oo,< >oo printed volumes, 700,000 pamphlets, over 9000 prints and drawings (including 284 by Albert Diirer), nearly 20,000 MSS., and 40,000 letters. The number of readers in 1904 was over 50,000. Un fortunately, however^ the confusion engendered by a defective organization has long been a byword among the people; there is no printed catalogue, quantities of books are buried in packing- cases and unavailable, the collection of foreign books is very poor, hardly any new works being purchased, and the building itself is quite inadequate and far from safe; but the site of a new one has now been purchased and the plans are agreed upon, so that eventually the whole collection will be transferred to more suitable quarters. The Biblioteca Marucelliana, founded in 1752, contains 150,000 books, including 620 incunabula, 17,000 engravings and 1500 MSS.; it is well managed and chiefly remarkable for its collection of illustrated works and art publica- tions. The Biblioteca Mediceo-Laurenziana, founded in 1571, has its origin in the library of Cosimo de' Medici the Elder, and was. enlarged by Piero, Giovanni and above all by Lorenzo the Magnificent. Various princes and private persons presented it with valuable gifts and legacies, among the most important of which was thtcoWectionoieditionesprincipes given by Count d'Elci, in 1841, and the Ashburnham collection of MSS. purchased by the Italian Government in 1885. It contains nearly 10,000 MSS., including many magnificent illuminated missals and Bibles and a number of valuable Greek and Latin texts, 242 incunabula and 11,000 printed books, chiefly dealing with palaeography; it is in some ways the most important of the Florentine libraries. The Biblioteca Riccardiana, founded in the 16th century by Romolo Riccardi, contains nearW 4000 MSS., over 32,000 books and 650 incunabula, chiefly relating to Florentine history. The state archives are among the most complete in Italy, and contain over 450,000 filze and registri and 126,000 charters, covering the period from 726 to 1856.

Few cities are as rich as Florence in collections of works of artistic and historic interest, although the great majority of them belong to a comparatively limited period— from aallerles the 13th to the 16th century. The chief art galleries of Pine are the Uffizi, the Pitti and Accademia. The two *** aod former are among the finest in the world,

and are use >” ns – filled with masterpieces by Raphael, Andrea del Sarto, Perugino, Ghrrlandaio, Botticelli, the Lippi, and many other Florentine, Umbrian, Venetian, Dutch and Flemish artists, as well as numer- ous admirable examples of antique, medieval and Renaissance

sculpture. The Pitti collection is in the royal palace (formerly the residence of the grand dukes), and a fine new stairway and vestibule have been constructed by royal munificence. In the Uffizi the pictures are arranged in strict chronological order. In the Accademia, which is rich in early Tuscan masters, the Botticelli and Perugino rooms deserve special mention. Other pictures are scattered about in the churches, monasteries and private palaces. Of the monasteries, that of St Mark should be mentioned, as containing many works of Fra Angelico, besides relics of Savonarola, while of the private collections the only one of importance is that of Prince Corsini. There is a splendid museum of medieval and Renaissance antiquities in the Bargello, the ancient palace of the Podesta, itself one of the finest buildings in the city; among its many treasures are works of Donatello, Ghiberti, Verrochio and other sculptors, and large collections of ivory, enamel and bronze ware. The Opera del Duomo contains models and pieces of sculpture connected with the cathedral; the Etruscan and Egyptian museum, the gallery of tapestries, the Michelangelo museum, the museum of natural history and other collections are all important in different ways.

The total population of Florence in 1005, comprising foreigners and a garrison of 5500 men, was 220,879. I n !86i it was 114,363; it increased largely when the capital of Italy was in tkuH”” Florence (1865-1872), but decreased or increased very slightly after the removal of the capital to Rome, and increased at a greater rate from 1881 onwards. At present the rate of increase is about 22 per 1000, but it is due to immigration, as the birth rate was actually below the death rate down to 1903; since when there has been a slight increase of the former and a decrease of the latter.

Florence is the capital of a province of the same name, and the central government is represented by a prefect (prefetto), while local government is carried on by a mayor (sindaco) teflon*’ an(* an Active town council (consiglio comunale). The city is the seat of a court of cassation (for civil cases only), of a court of appeal, besides minor tribunals. It is the headquarters of an army corps, and an

archiepiscopal see.

There are 22 public elementary schools for boys and 18 for girls (education being compulsory and gratuitous), with about 20,000 pupils, and 56 private schools with 5700 pupils. Secondary Education. ec j ucat ; Qn ; s provided by one higher and four lower technical schools with 1375 pupils, three ginnasii or lower classical schools, and three licei or higher classical schools, with 1000 pupils, , and three training colleges with over 700 pupils. Higher education is imparted at the university (Istituto di studii superiors e di perfezionamento) , with 600 to 650 students; although only comprising the faculties of literature, medicine and natural science, it is, as regards the first-named faculty, one of the most important institutions in Italy. The original Studio Fiorentino was founded in the 14th century, and acquired considerable fame as a centre of learning under the Medici, enhanced by the presence in Florence of many learned Greeks who had fled from Constantinople after its capture by the Turks (1453). Although in 1472 some of the faculties and several of the professors were transferred to Pisa, it still retained importance, and in the 17th and 18th centuries it originated a number of learned academies. In 1859 after the annexa- tion of Tuscany to the Italian kingdomitwasrevivedandreorganized; since then it has become to some extent a national centre of learning and culture, attracting students from other parts of Italy, partly on account of the fact that it is in Florence that the purest Italian is spoken. The revival of classical studies on scientific principles in modern Italy may be said to have begun in Florence, and great activity has also been displayed in reviving the study of Dante; Dante lectures being given regularly by scholars and men of letters from all parts of the country, above the church of Or San Michele as in the middle ages, under the auspices of the Societa Dantesca. Palaeography, history and Romance languages are among the other subjects to which especial importance is given. Besides the Istituto di studii superiori there is the Istituto di scienze sociali ” Cesare Alfieri,” founded by the marchese Alfieri di Sostegno for the education of aspirants to the diplomatic and consular services, and for students of economics ana social sciences (about 50 students) ; an academy of fine arts, a conservatoire of music, a higher female training-college with 150 students, a number oi professional and trade schools, and an academy of recitation. There are also many academies and learned societies of different kinds, of which one of the most important is the Accademia delta Crusca for the study of the Italian language, which undertook the publication of a monumental dictionary.

Several of the Florence hospitals are of great antiquity, the most

important being that of SantaMaria Nuova, which, founded by Folco Portinari, the father of Dante's Beatrice, has been thoroughly renovated according to modern scientific c « ar l"es, principles. There are numerous other hospitals both ' general and special, a foundling hospital dating from the 13th century (Santa Maria degli Innocenti), an institute for the blind, one for the deaf and dumb, &c. Most of the hospitals and other charitable institutions are endowed, but the endowments are supplemented by private contributions.

Florence is the centre of a large and fertile agricultural district, and does considerable business in wine, oil and grain, and supplies the neighbouring peasantry with goods of all kinds. There c are no important industries, except a few flour-mills, some . glass works, iron foundries, a motor car factory, straw / n< / us

lighting and for the numerous tramcars. There are, however, some artistic industries in and around the city, of which the most important is the Ginori-Richard porcelain works, and the Cantagalli majolica works. There are many other smaller establishments, and the Florentine artificer seems to possess an exceptional skill in all kinds of work in which art is combined with technical ability. Another very important source of revenue is the so-called " tourist industry," which in late years has assumed immense proportions; the city contains a large number of hotels and boarding-houses which every year are filled to overflowing with strangers from all parts of the world. (L. V.*)

History

Florentia was founded considerably later than Faesulae (Fiesole), which lies on the hill above it; indeed, as its name indicates, it was built only in Roman times and probably in connexion with the construction by C. Flaminius in 187 B.C. of a road from Bononia to Arretium (which later on formed part of the Via Cassia) at the point where this road crossed the river Arnus. We hear very little of it in ancient times; it appears to have suffered at the end of the war between Marius and Sulla, and in a.d. 15 (by which period it seems to have been already a colony) it successfully opposed the project of diverting part of the waters of the Clanis into the Arno (see Chiana). Tacitus mentions it, and Florus describes it as one of the municipia splendidissim-a. A bishop of Florence is mentioned in a.d. 313. A group of Italic cremation tombs a pozzo of the Villanova period were found under the pavement of the medieval Vicolo del Campidoglio. This took its name from the Capitolium of Roman times, the remains of which were found under the Piazza Luna; the three cellae were

clearly traceable. The capitals of the columns were Corinthian, about 4 ft. in diameter, and it became clear that this temple had supplied building materials for S. Giovanni and S. Miniato. Fragments of a fine octagonal altar, probably belonging to the temple, were found. Remains of baths have been found close by, while the ancient amphitheatre has been found near S. Croce outside the Roman town, which formed a rectangle of about 400 by 600 yds., with four gates, the Decumanus being represented by the Via Strozzi and Via del Corso, and the Cardo by the Via Calcinara, while the Mercato Vecchio occupied the site of the Forum.

See L. A. Milani, ” Reliquie di Firenze antica,” in Monumenti dei Lincei, vi. (1896), 5 seq. (T. As.)

The first event of importance recorded is the siege of the city by the Goths, a.d. 405, and its deliverance by the Roman general Stilicho. Totila besieged Florence in 542, but was repulsed by the imperial garrison under Justin, and later it was occupied by the Goths. We find the Longobards in Tuscany in 570, and mention is made of one Gudibrandus Dux civitalis Florentinorum, which suggests that Florence was the capital of a duchy (one of the regular divisions of the Longobard empire). Charlemagne was in Florence in 786 and conferred many favours on the city, which continued to grow in importance owing to its situation on the road from northern Italy to Rome. At the time of the agitation against simony and the corruption of the clergy, the head of the movement in Florence was San Giovanni Gualberto, of the monastery of San Salvi. The simoniacal election of Pietro Mezzabarba as bishop of Florence (1068) caused serious disturbances and a long controversy with Rome, which ended in the triumph, after a trial by fire, of the monk Petrus Igneus, champion of the popular reform movement; this event indicates the beginnings of a popular conscience among the Florentines.

FLORENCE

Guelphs and Qhlbel- llnes.

Under the Carolingian emperors Tuscany was a March or margraviate, and the marquises became so powerful as to be even a danger to the Empire. Under the emperor Otto I. one Ugo (d, iooi) was marquis, and the emperor Conrad II. (elected in 1024) appointed Boniface of Canossa marquis of Tuscany, a territory then extending from the Po to the borders of the Roman state. Boniface died in 1052, and in the following year the margraviate passed to his daughter, the famous countess coun tess Matilda, who ruled for forty years and played

Matilda. a prominent part in the history of Italy in that period. In the Wars of the Investitures Matilda was ever on the papal (afterwards called Guelph) side against the emperor and the faction afterwards known as Ghibelline, and she herself often led armies to battle. It is at this time that the people of Florence first began to acquire influence, and while the countess presided at the courts of justice in the name of the Empire, she was assisted by a group of great feudal nobles, judges, lawyers, &c, who formed, as elsewhere in Tuscany, the boni homines or sapientes. As the countess was frequently absent these, boni homines gave judgment without her, thus paving the way for a free commune. The citizens found themselves in opposition to the nobility of the hills around the city, Teutonic feudatories < of Ghibelline sympathies, who interfered with their commerce. Florence frequently waged war with these nobles and with other cities on its own account, although in the name of the countess, and the citizens began to form themselves into groups and associations which were the germs of the arti or gilds. After the death of Begin' Countess Matilda in 1115 the grandi or boni homines a lags of continued to rule and administer justice, but in the tae name of the people — a change hardly noticed at first,

commune, jˆ wn j cn marks the foundation of the commune. After 1 138 the boni homines began to be called comities, while the population was divided into the grandi or delle torri, i.e. the noble families who had towers, and the art i or trade and merchant gilds. At first the consules, of whom there seem to have been twelve, two for each sestiere or ward, were chosen by the men of the towers, and assisted by a council of 100 boni homines, in which the arti were predominant; the government thus came to be in the hands of a few powerful families. The republic now proceeded to extend its power. In 11 25 Fiesole was sacked and destroyed, but the feudal nobles of the contado (surrounding country) , protected by the imperial margraves, were still power- ful. The early margraves had permitted the Florentines to wage war against the Alberti family, whose castles they destroyed. The emperor Lothair when in Italy forced Florence to submit to his authority, but at his death in 1137 things returned to their former state and the Florentines fought successfully against the powerful counts Guidi. Frederick Barbarossa, however, elected emperor in n 52, made his authority felt in Tuscany, and ap- pointed one Welf of Bavaria as margrave. Florence and other cities were forced to supply troops to the emperor for his Lombard campaigns, and he began to establish a centralized imperial bureaucracy in Tuscany, appointing a potestas, who resided at San Miniato (whence the name of ” San Miniato al Tedesco “), to represent him and exercise

authority in the contado; this double authority of the consoli in the town and the potestas or podesta outside generated confusion. By n 76 the Florentines were masters of all the territory comprised in the dioceses of Florence and Fiesole; but civil commotion within ˆth" nobles tne c ˆ broke out between the consoli and the greater ‘ nobles, headed by the Alberti and strengthened by the many feudal families who had been forced to leave their castles and dwell in the city (1177-1180). Intheendthe Alberti, though not victorious, succeeded in getting occasionally admitted to the consulship. Florence now formed a league with the chief cities of Tuscany, made peace with the Guidi, and humbled the Alberti whose castle of Semifonte was destroyed (1202); Later we find a potestas within the city, elected for a year potestas. an d assisted by seven councillors and seven rectores super capitibus artium. This represented the triumph of the feudal party, which had gained the support of the arti

minori or minor gilds. The potestates subsequently were foreigners, and in 1207 the dignity was conferred on Gualfredotto of Milan; a new council was formed, the consiglio del comune, while the older senate still survived. The Florentines now undertook to open the highways of commerce towards Rome, for their city was already an important industrial and banking centre.

Discord among the great families broke out again, and the attempt to put an end to it by a marriage between Buondelmonte de' Buondelmonti and a daughter of the Amidei, only led to further strife (1215), although the causes of these broils were deeper and wider, being derived from the general division between Guelphs and Ghibellines all over Italy. But the work of crush- ing the nobles of the contado and of asserting the city's position among rival communes continued. In 1222 Florence waged war successfully on Pisa, Lucca and Pistoia, and during the next few years against the Sienese with varying results; although the emperor supported the latter as Ghibellines, on his departure for Germany in 1235 they were forced to accept peace on onerous terms. During the interregnum (1241-1243) following on the death of Pope Gregory IX. the Ghibelline cause revived in Tuscany and imperial authority was re-established. The tumults against the Paterine heretics (1244-1245), among whom were many Ghibelline nobles favoured by the podesta Pace di Pesamigola, indicate a successful Guelphic reaction; but Frederick II., having defeated his enemies both in Lombardy and in the Two Sicilies, appointed his natural son, Frederick of Antioch, imperial vicar in Tuscany, who, when civil war broke out, entered the city with i6co German knights. The Ghibellines now triumphed completely, and in 1249 the Guelph leaders were driven into exile — the first of many

instances in Florentine history of exile en masse of a defeated party. The attempt to seize Montevarchi and other castles where the Guelph exiles were congregated failed, and in 1250 the burghers elected thirty-six caporali di popolo, who formed the basis of the primo popolo or body of citizens independent of the nobles, headed by the capitano del popolo. The Ghibellines being unable to maintain their supremacy, the city came to be divided into two almost autonomous republics, the comune headed by Comune the podesta, and the popolo headed by the capitano and popolo. militarily organized into twenty companies; the central power was represented by twelve anziani or elders. The podesta, who was always a foreigner, usually commanded the army, repre- sented the city before foreign powers, and signed treaties. He was assisted by the consiglio speciale of 90 and the consiglio generate e speciale of 300, composed of nobles, while the capitano del popolo had also two councils composed of burghers, heads of the gilds, gonfalonieri of the companies, &c. The anziani had a council of 36 burghers, and then there was the parlamento or general assembly of the people, which met only on great occasions. At this time the podesta's palace (the Bargello) was built, and the gold florin was first coined and soon came to be accepted as the standard gold piece throughout Europe. But, although greatly strengthened, the Guelphs, who now may be called the democrats as opposed to the Ghibelline aristocrats, were by no means wholly victorious, and in 1251 they had to defend themselves against a league of Ghibelline cities (Siena, Pisa and Pistoia) assisted by Florentine Ghibellines; the Florentine Uberti, who had been driven into exile after their plot of 1258, took refuge in Siena and encouraged that city in its hostility to Florence. Fresh disputes about the possession of Montepulciano and other places having arisen, the Florentines declared war once more. A Florentine army assisted by Guelphs of other towns was cunningly induced to believe that Siena would surrender at the first summons; but it was met by a Sienese army reinforced by Florentine exiles, including Farinata degli Uberti and other Ghibellines, and by the cavalry of Manfred (q.v.) of Sicily, led by Count Giordano and the count Battle ot of Arras, with the result that the Florentines were Monta- totally routed at Montaperti on the 4th of September Bertl 1260. Count Giordano entered Florence, appointed {,260) – Count Guido Novello podesta, and began a series of persecutions

FD0REMK3E

against the Guelphs. The Ghibellines even proposed to raze the walls of the city, but Farinata degli Uberti strongly opposed the idea, saying

that ” hehad fought to regain and not to ruin his fatherland.” ■

During this new Ghibelline predominance (1260-1266) the old-liberties were abolished; and the popdlo was deprived of all

share in the administration. But when Charles I. stuutioa. (?•*•) °* Anjou descended into Italy as champion of

the papacy, and Manfred was defeated and killed (1 266), the popolo, who had acquired wealth in trade and industry, was ready to rise. After some disturbances Guido Novello and the Ghibellines were expelled, but it was not the popolo who triumphed; the pope and Charles were the real masters of the situation, and the Florentines found they had exchanged a foreign and Ghibelline protector for one who was foreign and Guelph. Nevertheless much of the old order was restored; the podesta who represented King Charles was assisted by 12 buoni uomini, and by the council of the 100 buoni uomini del popolo, ” without the deliberation of whom,” says Villani, ” no great matter nOr expenditure could be undertaken.” Other bodies and magistrates were maintained, and the capitano del popolo, now called capitano delta massa di parte Guelfa, tended to become a very important person. The property of the Ghibellines was confiscated, and a commission of six capitani di parte Guelfa appointed to administer it and in general td expend it for the persecution of the Ghibellines. The whole constitution of the republic, although of very democratic tendencies, seemed designed to promote civil strife and weaken the central power.

While the constitution was evolving in a manner which seemed to argue small p6litical ability and no stability in the Florentines,

the people had built up a wonderful commercial

organization. Each of the seVen arti maggiori or

Florentine

the gilds, greater gilds was organized like a small state with its councils, statutes, assemblies, magistrates, &c, and in times of trouble constituted a citizen militia. Florentine cloth especially was known and sold all over Europe, and the Florentines were regarded as the first merchants of the age. If the life of the city went on uninterruptedly even during the many changes of government and the almost endemic civil war, it was owing to the solidity of the gilds, who could carry on the administration without a government.

After Charles's victory over Conradin in 1 268 the Florentines defeated the Sienese (1260) and made frequent raids into Pisan territory. As Charles perpetually interfered in their Latiao. affairs, always favouring the grandi or Guelph nobles, some cif the Ghibellines were recalled as a counterpoise, which, however, only led to further civil strife. Rudolph of Habsburg, elected king of the Romans in 1273, having come to terms with Pope Nicholas III., Charles was obliged in 1278 to give up his title of imperial vicar in Tuscany, which he had held during the interregnum following on the death of Frederick II. In 1279 Pope Nicholas sent his nephew, the friar preacher Latino Frangipani Malabranca, whom he had created cardinal bishop of Ostia the saihe year, to reconcile the parties in Florence once more. Cardinal Latino to some extent succeeded, arid was granted a kind of temporary dictatorship. He raised the 1 2 buoni uomini to 14 (8 Guelphs and 6 Ghibellines), to be changed every two months; and they were assisted by a council of too: A force of 1000 men was placed at the disposal of the podesta and capitano (now both elected by the people) to keep order and oblige the grandi to respect the law. The Sicilian Vespers (q.v.) by weakening Charles strengthened the commune, which aimed at complete independence of emperors, kings and popes. After 1282 the signoria was composed of the 3 (afterwards 6) priori of the gilds, who ended by ousting the buoni uomini, while a defensor artificum et artium takes the place of the capitano; thus the republic became an essentially trading community, governed by the popolani grassi or rich merchants.

The republic now turned to the task of breaking the power of the Ghibelline cities of Pisa and Arezzo. In 1 280 the Aretini were completely defeated by the Florentines at Campaldino, a

battle made famous by the fact that Dante took part in It- War against the Pisans; who had been defeated by the Genoese in the naval battle of La Meloria in '■ 1284, was g^^g o(carried on in a desultory fashion, and in 1 293 peace was campaU made. But the grandi, who had largely contributed <«"* to the Victory of Campaldino, especially men like Corso (~ asr >- Donati and' Vieri de' Cerchi, were becoming more powerful, and Charles had increased their number by creating a great many knights,- but their attempts to interfere with the administration of justice were severely repressed, and new laws were passed- to reduce their influence. Among Other internal reforms the aboli- tion of the last traces of servitude in 1289, and the increase it the number of arti, first to 12 and then to 21 (7 maggiori and 14. minori) must be Mentioned. This, however, was not enough for- the Florentine democracy, who viewed with alarm the increasing power and arrogance of the grandi, who in spite of their exclusion frOm

many offices were still influential and constituted inde- pendent clans within the state. The law obliged each member of the clan (consorteria) to sodare for all the other members, i.e. to give a pecuniary guarantee to ensure payment of fines for offences committed by any one of their number, a provision made necessary by the fact that the whole clan acted collectively. But as the laws, were not always enforced new and severe ones were enacted. These were the famous Ordinamenti 0rdlaa . deild'Giustizia of 1293, by which all who were not of mentliella the arti were definitely excluded from the signory. aimmta > The priori were to remain in office two months and *- 1293 ^' elected the gonfaloniere, also for two months; there were the iapitudini or councils of the gilds, and two savi for each sestiere, with 1 000 soldiers at their disposal; the number of the grandi families was fixed at 38 (later 72). Judgment in matters con- cerning the Ordinamenti was delivered in a summary fashion without appeal. The. leading spirit of this reform was Giano della Bella, a noble who by engaging in trade had become a popolano; the grandi now tried to make him unpopular with the popdlani grassi, hoping that without him the Ordinamenti would not be executed, and opened negotiations with Pope Boniface VIII. (elected 1294), who aimed at extending his authority in Tuscany. ' A signory adverse to Giano having been elected, he was driven into exile in 1295. The grandi regained some of their power by corrupting the podesta and by the favour of the popolo minutb or unorganized populace; but their quarrels among themselves prevented them from/completely succeeding, while the arti were solid.

In 1295 a signory favourable to the grandi enacted a law attenuating the Ordinamenti, but now the grandi split into two factions, one headed by the Donati, which hoped to The abolish the Ordinamenti, and the other by the Cerchi, Biancht which had given up all hope of their abolition; after- ??''.'** wards these parties came to be called Neri (Blacks) and Bianchi (Whites). A plot of the Donati to establish their influence' over Florence with the help of Boniface VIII. having been discovered 5 (May 1300), serious riots broke out between the Neri arid the Bianchi. The pope's attempt to : unite the grandi having failed, he summoned Charles of Valois to come to his assistance, promising him the imperial crown; in 1301 Charles entered Italy, and was created by the pope paciaro or peace- maker 'Of Tuscany, with instructions to crush the Bianchi and the popolo and exalt the Neri. On the 1st of November Charles reached Florence, promising to respect its laws; but he permitted Corso Donati and his friends to attack the Bianchi, and the new podest&,Cs.nte dei Gabrielli of Gubbio, who had come with Charles, punished many of that faction;

among those whom he exiled was- the poet Dante (1302). Corso Donati, who for some time was the most powerful man in Florence, made himself many enemies by his af f ogance, and was obliged to rely on the popolo grasso, the irritation against him resulting in a rising in which he was killed (1308). In this same year Henry of Luxemburg was elected king of the Romans and with the pope's favour he came to Italy in 1310; the Florentine exiles and all the Ghibel- lines of Italy regarded him as a saviour and regenerator of the country, while the Guelphs of Florence on the contrary opposed

both him and the pope as dangerous to their own liberties and accepted the protection of King Robert of Naples, disregarding Henry's summons to submission. In 131 2 Henry was crowned emperor as Henry VII. in Rome, but instead of the universal ruler and pacifier which he tried to be, he was forced by circum- stances into being merely a German kaiser who tried to subjugate free Italian communes. He besieged Florence without success, and died of disease in 13 13.

The Pisans, fearing the vengeance of the Guelphs now that Henry was dead, had accepted the lordship of Uguccione della

Fagginola, imperial vicar in Genoa. A brave general Uguccione an(j an am ' D itious man, he captured Lucca and defeated Fagginola the Florentines and their allies from Naples at Monte- and catini in 13 15, but the following year he lost both Pisa

Castruccto anc j L ucca aru] had to fly from Tuscany. A new danger can/.™" now threatened Florence in the person of Castruccio

Castracani degli Antelminelli (q.v.), who made himself lord of Lucca and secured help from Matteo Visconti, lord of Milan, and other Ghibellines of northern Italy. Between 1320 and 1323 he harried the Florentines and defeated them several times, captured Pistoia, devastated their territory up to the walls of the city in spite of assistance from Naples under Raymundo de Cardona and the duke of Calabria (King Robert's son); never before had Florence been so humiliated, but while Castruccio was preparing to attack Florence he died in 1328. Two months later the duke of Calabria, who had been appointed protector of the city in 1325, died, and further constitutional reforms were made. The former councils were replaced by the consiglio del popolo, consisting of 300 popolani and presided

over by the capitano, and the consiglio del cotnune of 250 members, half of them nobles and half popolani, presided over by the podestd. The priori and other officers were drawn by lot from among the Guelphs over thirty years old who were declared fit for public office by a special board of 98 citizens (1329). The system worked well at first, but abuses soon crept in, and many persons were unjustly excluded from office; trouble being expected in 1335 a captain of the guard was created. But the first one appointed, Jacopo dei Gabrielli of Gubbio, used his dictatorial powers so ruthlessly that at the end of his year of office no successor was chosen.

The Florentines now turned their eyes towards Lucca; they might have acquired the city immediately after Castruccio's

death for 80,000 florins, but failed to do so owing to Attempt to differences of opinion in the signory; Martino della toces?* Scala, lord of Verona, promised it to them in 1335, but

broke his word, and although their finances were not then very flourishing they allied themselves with Venice to make war on him. They were successful at first, but Venice made a truce with the Scala independently of the Florentines, and by the peace of 1339 they only obtained a part of Lucchese territory. At the same time they purchased from the Tarlati the protectorate over Arezzo for ten years. But misfortunes fell on the city: Edward III. of England repudiated the heavy debts contracted for his wars in France with the Florentine banking houses of Bardi and Peruzzi (1339), which eventually led to their failure and to that of many smaller firms, and shook Florentine credit all over the world; Philip VI. of France extorted large sums from the Florentine merchants and bankers in his dominions by accusing them of usury; in 1340 plague and famine wrought terrible havoc in Florence, and riots again broke out between the grandi and the popolo, partly on account of the late unsuccessful wars and the unsatisfactory state of the finances. To put an

end to these disorders, Walter of Brienne, duke of T ˆAth ke -Athens, was elected " conservator " and captain of {1342-43). the guard in 1342. An astute, dissolute and ambitious

man, half French and half Levantine, he began his government by a policy of conciliation and impartial justice which won him great popularity. But as soon as he thought the ground was secure he succeeded in getting himself acclaimed by the populace lord of Florence for life, and on the 8th of September was carried in triumph to the Palazzo della Signoria. The fodestd. and the capitano assenting

to this treachery, he

dismissed the gonfaloniere, reduced the priori to a position of impotence, disarmed the citizens, and soon afterwards accepted the lordship of Arezzo, Volterra, Colle, San Gimignano and Pistoia. He increased his bodyguard to 800 men, all FrerichmeijL, who behaved with the greatest licence and brutality; by his oppressive taxes, and his ferocious cruelty towards all who opposed him, and the unsatisfactory treaties he concluded with Pisa, he accumulated bitter hatred against his rule. The grandi were disappointed because he had not crushed the popolo, and the latter because he had destroyed their liberties and interfered with the organization of the arti. Many unsuccess- ful plots against him were hatched, and having discovered one that was conducted by Antonio degli Adimari, the duke summoned the latter to the palace and detained him a prisoner. He also summoned 300 leading citizens on the pretext of wishing to consult them, but fearing treachery they refused to come. On the 26th of July 1343, the citizens rose in arms, demanded the duke's abdication, and besieged him in the palace. Help came to the Florentines from neighbouring cities, the podestd was ex- pelled, and a balia or provisional government of 14 was elected. The duke was forced to set Adimari and his other prisoners free, and several of his men-at-arms were killed by the populace; three of his chief henchmen, whom he was obliged to surrender, were literally torn to pieces, and finally on the 1st of August he had to resign his lordship. He departed from Florence under a strong guard a few days later, and the Fourteen cancelled all his enactments.

The expulsion of the duke of Athens was followed by several measures to humble the grandi still further, while the popolo minuto or artisans began to show signs of discontent • at the rule of the merchants, andthepopulacedestroyed 'gtuuttoa' the houses of many nobles. As soon as order was restored a balia" was appointed to reform the government, jn which task it was assisted by the Sienese and Perugian ambassadors and by Simone da Battifolle. The priori were reduced to 8 (2 popolani grassi, 3 mediani and 3 artifici minttti), while the gonfaloniere was to be chosen in turn from each of those classes; the grandi were excluded from the administration, but they were still admitted to the consiglio del cotnune, the cinque di mercanzia, and other offices pertaining to the commune; the Ordinamenli were maintained but in a somewhat attenuated form, and certain grandi as a favour were declared to be of the popolo. Florence was now a thoroughly democratic and com- mercial republic, and its whole policy was mainly dominated by commercial considerations: its rivalry with Pisa was due to an ambition to gain secure access to the sea; its

strong Guelphism was the outcome of its determination to secure the bank-business of the papacy; and its desire to extend its territory in Tuscany to the necessity for keeping open the land trade routes. Florentine democracy, however, was limited to the walls of the city, for no one of the contado nor any citizen of the subject towns enjoyed political rights, which were reserved for the in- habitants of Florence alone and not by any means for all of them. Florence was in the 14th century a city of about 100,000 inhabitants, of whom 25,000 could bear arms; there were no churches, 39 religious houses; the shops of the arte ~, .. ,. della lana numbered over 200, producing cloth worth 1,200,000 florins; Florentine bankers and merchants were found all over the world, often occupying responsible positions in the service Of foreign governments; the revenues of the republic, derived chiefly from the city customs, amounted to some. 300,000 florins, whereas its ordinary expenses, exclusive of military matters and public buildings, were barely 40,000. It was already a centre of art and letters and full of fine buildings, pictures and libraries. But now that the grandi were suppressed politically, the lowest classes came into prominence, ” adventurers without sense or virtue and of no authority for the most part, who had usurped public offices by illicit and dishonest practices ” (Matteo Villani, iv. 69); this paved the way for tyranny.

In 1347 Florence was again stricken with famine, followed the next year by the most terrible plague it had ever experienced, which carried off three-fifths of the population (according to

Villani). Yet in spite of these disasters the republic was by no means crushed; it soon regained the suzerainty of

many cities which had broken off all connexion Piazue*” w ‘ tn ˆ a ˆ ter tne expulsion of the duke of Athens, (1348). and purchased the overlordship of Prato from Queen

Joanna of Naples, who had inherited it from the duke of Calabria. In 1351 Giovanni Visconti, lord and archbishop of Milan, having purchased Bologna and allied himself with

sundry Ghibelline houses of Tuscany with a view to War with dominating Florence, the city made war on him , and in (1351). violation of its Guelph traditions placed itself under the

protection of the emperor Charles IV. (1355) for his life- time. This

move, however, was not popular, and it enabled the grandi, who, although excluded from the chief offices, still dominated the parte Guelja, to reassert themselves. They had in 1347 succeeded in enacting a very stringent law against all who were in any way tainted with Ghibellinism, which, they themselves being above suspicion in that connexion, enabled them to drive from office many members of the popolo minuto. In 1358 the parte Guelja made these enactments still more stringent, punish- ing with death or heavy fines all who being Ghibellines held office, and provided that if trustworthy witnesses were forth- coming condemnations might be passed for this offence without hearing the accused; even a non-proved charge or an ammonizione (warning not to accept office) might entail disfranchisement. Thus the parte, represented by its 6 (afterwards 9) captains, came to exercise a veritable reign of terror, and no one knew when an accusation might fall on him. The leader of the parte was Piero degli Albizzi, whose chief rivals were the Ricci family. Italy at this time began to be overrun by bands of soldiers of fortune. The first of these bands with whom Florence came

into contact was the Great Company, commanded by dottier!.' ˆhe coun t of Lando, which twice entered Tuscany

but was expelled both times by the Florentine troops

(1358-1350)-

In 1362 we find Florence at war with Pisa on account of commercial differences, and because the former had acquired the lordship of Volterra. The Florentines were successful until Pisa enlisted Sir John Hawkwood's English company; the latter won several battles, but were at last defeated at Cascina, and peace was made in 1364, neither side having gained much advantage. A fresh danger threatened the republic in 1367 when Charles IV., who had allied himself with Pope Urban V., Queen Joanna of Naples, and various north Italian despots to humble the Visconti, demanded that the Florentines should join the league. This they refused to do and armed themselves for defence, but eventually satisfied the emperor with a money payment.

The tyranny of the parte Guelja still continued unabated, and the capitani carried an enactment by which no measure

affecting the parte should be even discussed by the Ouelfa. e signory unless previously approved of by them. This

infamous law, however, aroused so much opposition that some of the

very men who had proposed it assembled in secret to discuss its abolition, and a quarrel between the Albizzi and the Ricci having weakened the parte, a balia of 56 was agreed upon. Several of the Albizzi and the Ricci were excluded from office for five years, and a council called the Ten of Liberty was created to defend the laws and protect the weak against the strong. The parte Guelja and the Albizzi still remained very influential and the attempts to abolish admonitions failed.

In 1375 Florence became involved in a war which showed how the old party divisions of Italy had been obliterated. The

papal legate at Bologna, Cardinal Guillaume de Noellet War with (J 1394), although the church was then allied to (1375-78). Florence, was meditating the annexation of the city to

the Holy See; he refused a request of the Florentines for grain from Romagna, and authorized Hawkwood to devastate their territory. Although a large part of the people disliked (he idea of a conflict with the church, an alliance with Florence's old enemy Bernabd Visconti was made, war declared, and a balia of 8, the Otto delta giterra (afterwards called the " Eight

Saints " on account of their good management) was created to carry on the campaign. Treaties with Pisa, Siena, Arezzo and Cortona were concluded, and soon no less than 80 towns, including Bologna, had thrown off the papal yoke. Pope Gregory XI. placed Florence under an interdict, ordered the expulsion of all Florentines from foreign countries, and engaged a ferocious company of Bretons to invade the republic's territory. The Eight levied heavy toll on church property and ordered the priests to disregard the interdict. They turned the tables on the pope by engaging Hawkwood, and although the Bretons by order of Cardinal Robert of Geneva (afterwards the anti-pope Clement VII.) committed frightful atrocities in Romagna, their captains were bribed by the republic not to molest its territory. By 1378 peace was made, partly through the media- tion of St Catherine of Siena, and the interdict was removed in consideration of the republic's paying a fine of 200,000 florins to the pope.

During the war the Eight had been practically rulers of the city, but now the parte Guelja, led by Lapo da Castiglionchio and Piero degli Albizzi, attempted to reassert itself by illicit interference in the elections and by a liberal Saivestro use of " admonitions "(ammonizioni). Saivestro de' Medici. Medici, who had always opposed the parte, having been elected gonjaloniere in spite of its

intrigues, proposed a law for the abolition of the admonitions, which was eventually passed (June 18, 1378), but the people had been aroused, and desired to break the power of the parte for good. Rioting occurred on the 2 1 st of June, and the houses of the Albizzi and other nobles were burnt. The signory meanwhile created a balia of 80 which repealed some of the laws promoted by the parte, and partly enfranchised the ammoniti. The people were still unsatisfied, the arti minori demanded further privileges, and the workmen insisted that their grievances against the arti maggiori, especially the wool trade by whom they were employed, be redressed. A large body of ciompi (wool carders) gathered outside the city and conspired to subvert The rio< °j the signory and establish a popular government. ,jj/g? Although the plot, in which Saivestro does not seem to have played a part, was revealed, a good deal of mob violence occurred, and on the 21st of July the populace seized the podestd's palace, which they made their headquarters. They demanded a share in the government for the popolo minuto, but as soon as this was granted Tommaso Strozzi, as spokesman of the ciompi, obliged the signory to resign their powers to the Eight. Once the people were in possession of the palace, a ciompo named Michele di Lando took the lead and put a stop to disorder and pillage. He re- mained master of Florence for one day, during which he reformed the constitution, probably with the help of Saivestro de' Medici. Three new gilds were created, and nine priors appointed, three from the arti maggiori, three from the minori, and three from the new ones, while each of these classes in turn was to choose the gonjaloniere of justice; the first to hold the office was Michele di Lando. This did not satisfy the ciompi, and the disorders provoked by them resulted in a new government which reformed the two councils so as to exclude the lower orders. But to satisfy the people several of the grandi, including Piero degli Albizzi, were put to death, on charges of conspiracy, and many others were exiled. There was perpetual rioting and anarchy, and interference in the affairs of the government by the working men, while at the same time poverty and unemployment increased owing to the timidity of capital and the disorders, until at last in 1382 a reaction set in, and order was restored by the gild companies. Again a new constitution was decreed by which the gonjaloniere and half the priori were to be chosen from the arti maggiori and the other half from the minori; on several other boards the former were to be in the majority, and the three new gilds were abolished. The demagogues were executed or forced to fly, and Michele di Lando with great ingratitude was exiled. Several subsequent risings of the ciompi, largely of an economic character, were put down, and the Guelph families gradually regained much of their lost power, of which

FLORENCE

they availed themselves to exile their opponents and revive the odious system of ammonizioni.

Meanwhile in foreign affairs the republic maintained its position, and in 1383 it regained Arezzo by purchase from the lieutenant of Charles of Durazzo. In' 1390 Gian Galeazzo Visconti, having made himself master of a large part of northern Italy, intrigued to gain possession of Pisa and Siena. Florence, alone in resisting him, engaged Hawkwood, who with an army of 7000 men more than held his own against the powerful lord of Milan, and in 1392 a peace was concluded which the republic strengthened by an alliance with Pisa and several north Italian states. In 1393 Maso degli Albizzi was made gonfaloniere, and for many years remained almost master of Florence owing to his influential position in the Arte della Lana. A severe persecution was initiated against the Alberti and other families, who were disfranchised and exiled. Disorders and conspiracies against the merchant oligarchy continued, and although they were unsuc- cessful party passion was incredibly bitter, and the exiles caused the republic much trouble by intriguing against it in foreign states. In 1397ˆ139*8 Florence had two more wars with Gian Galeazzo Visconti, who, aspiring to the conquest of Tuscany, acquired the lordship of Pisa, Siena and Perugia;. Hawkwood being dead, Florence purchased aid from the emperor Rupert. The Imperialists were beaten; but just as the Milanese were about to march on Florence, Visconti died. His territories were then divided between his sons and his condottieri, and Florence, ever keeping her eye on Pisa, now ruled by Gabriele Maria Visconti, made an alliance with Pope Boniface IX., who wished to regain Perugia and Bologna. War broke out once more, and the allies were successful, but as soon as Boniface had gained his ends he made peace, leaving the Florentines unsatisfied. In Attempts I 4°4 their attempt to capture Pisa single-handed to acquire failed, and Gabriele Maria placed himself under the Pisa protection of the French king. The Florentines then

K " '" made overtures to France, who had supported the anti-popes all through the great schism, and suggested that they too would support the then anti-pope, Benedict XIII., in ex- change for the sale of Pisa. This was agreed to, and in 1405 the city was sold to Florence for 260,000 florins; and Gino Capponi, 1 the Florentine commissioner, took possession of the citadel, but a few days later the citizens arose in arms and recaptured it from the mercenaries. There was great consternation in Florence at the news, and every man in the city "

determined that he would go naked rather than not conquer Pisa ” (G. Capponi). The next year that city, then ruled by Giovanni Gambacorti, was besieged by the Florentines, who blockaded the mouth of the Arno. After a six months’ siege Pisa surrendered on terms (9th October 1406), and, although it was not sacked, many of the citizens were exiled and others forced to live in Florence, a depopulation from which it never recovered. Florence now acquired a great seaport and was at last able to develop a direct maritime trade.

Except in connexion with the Pisan question the republic had taken no definite side in the great schism which had divided The the church since 1378, but in 1408 she appealed both

council to Pope Gregory XII. and the anti-pope Benedict of Pisa XIII. as well as to various foreign governments in 1 favour of a settlement, and suggested a council within

her own territory. Gregory refused, but after consulting a com- mittee of theologians who declared him to be a heretic, the council promoted by Cardinal Cossa and other independent prelates met at Pisa. This nearly led to war with King Ladislas of Naples, because he had seized Rome, which he could only hold so long as the church was divided. The council deposed both popes and elected Pietro Filargi as Alexander V. (26th of June). But Ladislas still occupied the papal states, and Florence, alarmed at his growing power and ambition, formed a league with Siena, Bologna and Louis of Anjou who laid claim to the Nea- politan throne, to drive Ladislas from Rome. Cortona, Orvieto, Viterbo and other cities were recovered for Alexander, and in

■ The historian, not to be confounded with the modern historian

and statesman of the same name iqv.).

January 1410 Rome itself was captured by the Florentines under Malatesta dei Malatesti. Alexander having died in May before entering the Eternal City, Cardinal Cossa was elected as John XXIII.; Florence without offending him made peace with Ladislas, who had ceased to be dangerous, and purchased Cortona of the pope. In 1413 Ladislas attacked the papal states once more, driving John from Rome, and threatened Florence; but like Henry VII., Gian Galeazzo Visconti, and other enemies of the republic, he too died most opportunely (6th of August 1414). John having lost all authority after leaving Rome, a new council was held at Constance, which put an end to the schism in 141 7 with the election of Martin V. The new pope came to Florence

in 14 19 as he had not yet re- gained Rome, which was held by Francesco Sforza for Queen Joanna II. of Naples, and remained there until the following year.

No important changes in the constitution took place during this period except the appointment of two new councils in 141 1 to decide on questions of peace and war. The aristocratic faction headed by Maso degli Albizzi, a wise and popular statesman, had remained predominant, and at Maso's death in 1417 he was succeeded in the leadership of the party by Niccold da Uzzano. In 1421 Giovanni de' Medici was elected gonfaloniere of justice, an event which marks the beginning of that wealthy family's power. The same year the republic purchased Leghorn from the Genoese for 100,000 florins, and established a body of " Con- suls of the Sea " to superintend maritime trade. Although 11,000,000 florins had been spent on recent wars Florence con- tinued prosperous and its trade increased.

In 142 1 Filippo Maria Visconti, who had succeeded in recon- quering most of Lombardy, seized Forli; this induced the Florentines to declare war on him, as they regarded his New war approach as a menace to their territory in spite of the with the Opposition of the peace party led by Giovanni de' Visconti Medici. The campaign was anything but successful, <. 142lm2r >- and the Florentines were defeated several times, with the result that their credit was shaken and several important firms failed. The pope too was against them, but when they induced the Venetians to intervene the tide of fortune changed, and Visconti was finally defeated and forced to accept peace on onerous terms (1427).

The old systems of raising revenue no longer corresponded to the needs of the republic, and as early as 1336 the various loans made to the state were consolidated into one national debt {monte) . Subsequently all extraordinary Fls "> ! expenditure was met by forced loans (prestanze) , but the (14° n. method of distribution aroused discontent among the lower classes, and in 1427 a general catasto or assessment of all the wealth of the citizens was formed, and measures were devised to distribute the obligations according to each man's capacity, so as to avoid pressing too hardly on the poor. The catasto was largely the work of Giovanni de' Medici, who greatly increased his popularity thereby. He died in 1429.

An attempt to capture Lucca led Florence, in alliance with Venice, into another costly war with Milan (1432-1433). The mismanagement of the campaign brought about a Bxj/e gad quarrel between the aristocratic party, led by Rinaldo return of degli Albizzi, and the

popular party, led by Giovanni Cosimo de' Medici's son Cosimo (1389-1464), although both ?/^f/Jf' had agreed to the war before it began. Rinaldo was determined to break the Medici party, and succeeded in getting Cosimo exiled. The Albizzi tried to strengthen their position by conferring exceptional powers on the capilano del popolo ant) by juggling with the election bags, but the Medici still had a great hold on the populace. Rinaldo's proposal for a coup d'etat met with no response from his own party, and he failed to prevent the election of a pro-Medici signory in 1434. He and other leaders of the party were summoned to the palace to answer a charge of plotting against the state, to which he replied by collecting 800 armed followers. A revolution was only averted through the intervention of Pope Eugenius IV., who was then in Florence. A parlamcnlo was summoned, and the balia appointed decreed

the return of Cosimo and the exile of Rinaldo degli Albizzi, Rodolfo Peruzzi, Niccolo Barbadori, and others, in spite of the feeble attempt of Eugenius to protect them. On the 6th of October 1434 Cosimo returned to Florence, and for the next three centuries the history of the city is identified with that ' of the house of Medici. 1

Cosimo succeeded in dominating the republic -while remaining nominally a private citizen. He exiled those who opposed him,

and governed by means of the batle, which, re-elected Cosimo s ever y g ve y earS; appointed all the magistrates and

acted according to his orders. In 1437 Florence and Venice were again at war with the Visconti, whose chief captain, Niccolo Piccinino (q.v.), on entering Tuscany with many Floren- tine exiles in his train, was signally defeated at Anghiari by the Florentines under Francesco Sforza (1440); peace was made the following year. The system of the catasto, which led to abuses, was abolished, and a progressive income-tax (decima scalata) was introduced with the object of lightening the burdens of the poor, who were as a rule Medicean, at the expense of the rich; but as it was frequently increased the whole community came to be oppressed by it in the end. Cosimo increased his own authority and that of the republic by aiding Francesco Sforza to become duke of Milan (1450), and he sided with him in the war against Venice (1452-1454). In 1452 the emperor Frederick III. passed through Florence on his way to be crowned in Rome; and was

received as a friend. During the last years of Cosimo's life, affairs were less under his control, and the gonfaloniereLuca. Pitti, a vain and ambitious man, introduced many changes, such as the abasement of the authority of the podesti and of the capitano, which Cosimo desired but was glad to attribute 1 to others.

In 1464 Cosimo died and was succeeded, not without some opposition, by his son Piero, who was very infirm and gouty. _. ., Various plots against him were hatched, the anti- Medicl Medicean faction being called the Del Poggio party Uhe because the house of its leader Luca Pitti was on a hill,

Goaty). w hile the Mediceans were called the Del Piano party because Piero's house was in the town below; the other opposi- tion leaders were Dietisalvi Neroni and Agnolo Acciaiuoli. But Piero's unexpected energy upset the schemes of his enemies. The death of Sforza led to a war for the succession of Milan, and the Venetians, instigated by Florentine exiles, invaded Tuscany. The war ended, after many indecisive engagements, in 1468, through the intervention of Pope Paul II. Piero died Lorenzo * n x 4 6 °' ' eavm S two sons, Lorenzo (1449-1492) and the Giuliano (1453-1478). The former at once assumed

Magaifl- the reins of government and became ruler of Florence ceat ' in a way neither Cosimo nor Piero had ever attempted;

he established his domination by means of balie consisting of the signory, the accoppialori, and 240 other members, all Mediceans, to be renewed every five years (1471). In 1472 a quarrel having arisen with Volterra on account of a dispute concerning the alum mines, Lorenzo sent an expedition against the city, which was sacked and many of the inhabitants massacred. Owing to a variety of causes an enmity arose between Lorenzo and Pope Sixtus IV., and the latter, if not an accomplice, at all events had knowledge of the Pazzi conspiracy against the Medici (1478). The result of the plot was that, although Giuliano was murdered, Lorenzo strengthened his position, and put to death or exiled numbers of his enemies. He was excommunicated by Sixtus, who, together with King Ferdinand of Naples, waged war against him; no great successes were registered on either side at first, but eventually the Florentines were defeated at Poggio Imperiale (near Poggibonsi) and the city itself was in danger. Lorenzo's position was critical, but by his boldness in going to Naples he succeeded in concluding a peace with the king, which led to a reconciliation with the pope (1479-1480). He was received with enthusiasm on returning to Florence and became absolute master

1 The history of Florence from 1434 to 1 737 witl be found in greater detail in the article Medici, save for the periods from 1494 to 1512 and from 1527 to .1530, during which the republic was restored. For the period from 1530 to i860 see also under Tuscany.

of the situation. Iji April 1480 a balia was formed, and its most important act was the creation at Lorenzo's instance of the Council of Seventy; it was constituted for five years, but it be- came permanent, : and all its members were Lorenzo's friends. From that time until his death the city was free fro in party strife under a de facto despotism, but after the Rinuccini Conspiracy of that year the Council of Seventy passed a. law declaring attempts on Lorenzo's life to >be high treason. Owing to his political activity Lorenzo had neglected the business interests of his firm, and in order to make good certain heavy losses he seems to have appropriated public funds. His foreign policy, which was magnificent but expensive, rendered further forced loans necessary, and he also laid hands on the Monte delle Doti, an insurance institution to provide dowries for girls.

An attempt by the Venetians to seize Ferrara led to a general Italian war, in which Florence also took part on the side hostile to Venice, and when peace was made in 1484 the republic gained some advantages. The following year a revolt of the Neapolitan barons against King Ferdinand broke out, actively supported by Pope Innocent VIII. ; Lorenzo regained neutral at first, but true to his policy of maintaining the balance of power and not wishing to see Ferdinand completely crushed, he ended by giving him assistance in spite of the king's unpopularity in Florence. Peace was made when the pope agreed to come to terms in i486, and in 1487 Lorenzo regained Sarzana, which Genoa had taken from Florence nine years previously. The general dis- orders and ceaseless intrigues all over Italy required Lorenzo's constant attention, and he succeeded in making Florence " the needle of the balance of power in Italy." At this time the Dominican Fra Girolamo Savonarola (q.v.) an™.' was in Florence and aroused the -whole city by his denunciations of ecclesiastical corruption and also of that of the Florentines. He opposed Lorenzo's government as the source of the immorality of the people, and to some extent influenced public opinion against him. Ill-health now gained on Lorenzo, and Savonarola, whom he had summoned to his bedside, refused to give absolution to- the destroyer of Florentine liberties. Lorenzo, during whose rule Florence had become one of the greatest centres of art and literature in Europe; died in 1492.

He was succeeded by his 'son Piero, who had none of his father's capacity and made a number of political blunders. When Charles VIII.

of France came to Italy to conquer Naples t

Piero decided to assist the latter kingdom, although the Medki.* traditional sympathies of the people were for the French king, and when Charles entered Florentine territory and captured Sarzana, Piero went to his camp and asked pardon for oppos- ing him. The king demanded the cession of Pisa, Leghorn and other towns, which Piero granted, but on returning to Florence on the 8th of November 1494 he found the opposition greatly strengthened and his popularity forfeited, especially when the news of his disgraceful cessions to Charles became known. He was refused admittance to the palace, and the people began to shout ” Popolo e liberta I ” in opposition to the Medicean cry of “Palle, Palle!” (from the Medici arms). With a small escort he fled from the city, followed soon after by his brother Giovanni. That same day Pisa rose in revolt against the Floren- Expulsion tines, and was occupied by Charles. The expulsion of of the the Medici produced some disorder but Piero Capponi Medici (q.v.) and other prominent citizens succeeded in (U94U keeping the peace. Ambassadors, one of whom was Savonarola, were sent to treat with the French king, but no agreement was arrived at until Charles entered Florence on the 17th of November at the head of 12,000 men. In Spite of Stf”?* their French sympathies the citizens were indignant at Florence. the seizure of Sarzana, and while they gave the king a splendid welcome, they did not like his attitude of conqueror. Charles was impressed with the wealth and refinement of the citizens, and above all with the solid fortress-like appearance of their palaces. The signory appointed Piero Capponi, a man of great ability arid patriotism, and experienced in diplomacy, the gonjaloniere Francesco Valori, the Dominican Giorgio Vespucci, and the jurisconsult and diplomatist Domenico Bonsi,

syndics to conduct the negotiations with the French king. Charles’s demands by no means pleased the citizens, and the arrogance and violence of his soldiers led to riots in which they were assailed with stones in the narrow streets. When the king began to hint at the recall of Piero de’ Medici, whose envoys had gained his ear, the signory ordered the citizens to be ready to fly to arms. The proposal was dropped, but Charles demanded an immense sum of money before he would leave the city; long discussions followed, and when at last he presented an insolent ultimatum the syndics refused to accept it. The king said in

a threatening tone, ” Then we shall sound our Capponi trumpets,” whereupon Capponi tore up the document

in his face and replied, ” And we shall ring Our bells.” The king, realizing what street fighting in Florence would mean, at once came to terms; he contented himself with 120,000 florins, agreeing to assume the title of ” Protector and Restorer of the liberty of Florence,” and to give, up the fortresses he had taken within two years, unless his expedition to Naples should be concluded sooner; the Medici were to remain banished, but the price on their heads was withdrawn. But Charles would not depart, a fact which caused perpetual disturbance in the city, and it was not until the 28th of November, after an exhortation by Savonarola whom he greatly respected, that he left Florence. It was now intended to re-establish the government on the basis of the old republican institutions, but it was found that

sixty years of Medici rule had reduced them to mere T -vlved shadows, and the condition of the government, largely republic controlled by a balia of 20 accoppiatori and frequently

disturbed by the summoning of the parlamenlo, was utterly chaotic. Consequently men talked of nothing save of changing the constitution, but unfortunately there was no longer an upper class accustomed to public affairs, while the lower class was thoroughly demoralized. Many proposals were made, none Savoa- of them of practical value, until Savonarola, who had arola as a already made a reputation as a moral reformer, began states- his famous series of political sermons. In the prevailing maa ‘ confusion the people turned to him as their only hope,

and gradually a new government was evolved, each law being enacted as the result of his exhortations. A Greater Council empowered to appoint magistrates and pass laws was formed, to which all citizens netti di specchio (who had paid their taxes) and beneficiati {i.e. who had sat in one of the higher magistracies or whose fathers, grandfathers, or great-grandfathers had done so) were eligible together with certain others. There were 3200 such citizens, and they sat one-third at a time for six months. The Greater Council was to elect another council of 80 citizens over forty years old, also to be changed every six months; this body, which the signory must consult once a week, together with the colleges and the signory itself, was to appoint ambassadors and commissaries of war, and deal with other confidential matters. The system of forced loans was abolished and a 10% tax on real property introduced in its stead, and a law of amnesty for political offenders enacted. Savonarola also proposed a court of

appeal for criminal and political crimes tried by the Otto di guardia e. balia; this too was agreed to, but the right of appeal was to be, not to a court as Savonarola suggested, but to the Greater Council, a fact which led to grave abuses, as judicial appeals became subject to party passions. The parlamenti were abolished and a monk di pieta to advance money at reasonable interest was created. But in spite of Savonarola's popularity there was a party called the Bigi (greys) who intrigued secretly in favour of the return of the Medici, while the men of wealth, called the Arrabbiati, although they hated the Medici, were even more openly opposed to the aetual regime and desired to set up an aristocratic oligarchy. The adherents of Savonarola were called the Piagnoni, or snivellers, while the Neutrali changed sides frequently.

A league between the pope, the emperor, Venice and Spain having been made against Charles VIII., the latter was forced to return to France. On his way back he passed through Florence, and; although the republic had refused to join the gue, it believed itself in danger, as Piero de' Medici was in;the

king's train. Savonarola was again sent to the French camp, and his eloquence turned the king from any idea he may have had of reinstating the Medici. At the same time League Charles violated his promise by giving aid to the Pisans against in their revolt against Florence, and did not restore the Charles other fortresses. After the French had abandoned Italy, Piero de' Medici, encouraged by the league, enlisted a number of mercenaries and marched on Florence, but the citizens, fired by Savonarola's enthusiasm, flew to arms and prepared for an energetic resistance; owing to Piero's incapacity and the exhaustion of his funds the expedition came to nothing. At the same time the conditions of the city were not prosperous; its resources were strained by the sums paid to Charles and by the war; its credit was shaken, its trade paralysed, famine and plague visited the city, and the war to subjugate Pisa was pro- ceeding unsatisfactorily. Worse still was the death in 1496 of one of its ablest and most disinterested statesmen, Piero Capponi. The league now attacked Florence, for Pope Alexander VI. hated Savonarola and was determined to destroy Alexander the republic, so as to reinstate the Medici temporarily vi. and prepare the way for his own sons; the Venetians against and Imperialists besieged Leghorn, and there was F orence – great misery in Florence. All this decreased Savonarola's popularity to some extent, but the enemy having been beaten at Leghorn and the league being apparently on the point of breaking up, the Florentines took courage and the friar's party was once more in the ascendant. Numerous processions were held, Savonarola's sermons against corruption and vice seemed to have temporarily transformed the citizens, and the

carnival of 1497 remained famous for the burning of the ” vanities ” (i.e. indecent books and pictures and carnival masks and costumes). The friar’s sermons against ecclesiastical corruption, and especi- ally against the pope, resulted in his excommunication by the latter, in consequence of which he lost much of his influence and immorality spread once more. That same year Piero made another unsuccessful attempt on Florence. New Medici plots having been discovered, Bernardo del Nero and other prominent citizens were tried and put to death; but the party hostile to Savonarola gained ground and had the support of the Franciscans, who were hostile to the Dominican order. Pulpit warfare was waged between Savonarola and his opponents, and the matter ended in his being forbidden to preach and in a pro- posed ordeal by fire, which, however, never came off. The pope again and again demanded that the friar be surrendered to him, but without success, in spite of his threats of an interdict against the city. The Piagnoni were out of power, and a signory of Arrabbiati having been elected in 1498, a mob of Savonarola’s opponents attacked the convent of St Mark where he resided, and he himself was arrested and imprisoned. The commission appointed to try him on charges of heresy and treason was com- posed of his enemies, including Doffo Spini, who had jˆˆf aad previously attempted to murder him; many irregu- execution larities were committed during the three trials, and ofSavon- the prisoner was repeatedly tortured. The outgoing JJˆjw* signory secured the election of another which was of their way of thinking, and on the 22nd of May 1498 Savonarola was condemned to death and executed the following day.

The pope having been satisfied, the situation in Florence was less critical for the moment. The war against Pisa was renewed, and in 1499 the city might have been taken but for the dilatory tactics of the Florentine commander Paolo Vitelli, who was consequently arrested on a charge of treason and put to death. Louis XII. of France, who now sent an army into Italy to conquer the Milanese, obtained the support of the Florentines. Cesare Borgia, who had seized many cities in Romagna, suddenly demanded the reinstatement of the Medici in Florence, and the danger was only warded off by appointing him captain-general of the Florentine forces at a large salary (1501). The weakness of the government becoming every day more apparent, several constitutional changes were made, and many old institutions, such as that of the podestd and cqpitano del popolo, were abolished; finally in 1502, in order

Schis- matic council ot Pisa

(.1510).

to give more stability to the government, the office of gonfaloniere, with the right of proposing laws to the signory, was made a life appointment. The election fell on Piero Soderini (1448-1522), an honest public-spirited man of no particular party, Soderini. DUt lacking in strength of character. One useful measure which he took was the institution of a national militia at the suggestion of Niccolo Machiavelli (1505). In the meanwhile the Pisan war dragged on without much headway being made. In 1503 both Piero de' Medici and Alexander VI. had died, eliminating two dangers to the republic. Spain, who was at war with France over the partition of Naples, helped the Pisans as the enemies of Florence, France's ally (1 501-1504), but when the war was over the Florentines were able to lay siege to Pisa (1507), and in 1509 the city was driven by famine to surrender and became a dependency of Florence once more.

Pope Julius II., after having formed the league of Cambrai with France and Spain against Venice, retired from it in 1510, and raised the cry of " Fuori i Barbari " (out with the barbarians) , with a view to expelling the French from Italy. King Louis thereupon proposed an oecumenical council so as to create a schism in the Church, and demanded that it be held in Florentine territory. After some hesitation the republic agreed to the demand,and the council was opened at Pisa, whereupon the pope immediately placed Florence under an interdict. At the request of the Florentines the council removed to Milan, but this did not save them from the pope's wrath. A Spanish army under Raymundo de Cardona and accompanied by Cardinal Giovanni de' Medici and his brother Giuliano entered the republic's territory and demanded 100,000 florins, the dismissal of Soderini, and the readmission of the Medici. Soderini offered to resign, but the Greater Council supported him and preparations for defence were made. In August the Spaniards took Prato by storm and committed hideous atrocities on the inhabitants; Florence was in a panic, a group of the Ottimati, or nobles, forced Soderini to resign and leave the city, and Cardona's new terms were accepted, viz. the readmission of the Medici, a fine of 150,000 florins, and an alliance with Spain. On the 1st of September 1512 the Medici Giuliano and Giovanni de' Medici, and their nephew (1512). Lorenzo, entered Florence with the Spanish troops; a parlamento was summoned, and a packed balia formed which abolished the Greater Council and created a con- stitution similar to that of Lorenzo the Magnificent. Giuliano became de facto head of the government, but he did not pursue the usual vindictive

policy of his house, although he resorted to the Laurentian method of amusing the citizens with splendid festivities. In 1513, on the death of Julius II., Giovanni de' Medici was elected pope as Leo X., an event which greatly en- hanced the importance of the house. In March 15 14 Giuliano died, and was succeeded by Lorenzo, who was also created duke of Urbino. At his death in 15 19 Cardinal Giulio de' Medici (son of the Giuliano murdered in the Pazzi conspiracy) took charge of the government; he met with some opposition and had to play off the Ottimati against the Piagnoni, but he did not rule badly and maintained at all events the outward forms of freedom. In 1 5 23 he was created pope as Clement VII. and sent his relatives Ippolito and Alessandro, both minors and bastards, to Florence under the tutorship of Cardinal Silvio Passerini. Ippolito was styled the Magnifico and destined to be ruler of the republic, but Cardinal Passerini's regency proved most unpopular, and the city was soon seething with discontent. Revolts broke out and Passerini showed himself quite unequal to coping with the situation. The Ottimati were mostly anti-Medicean, and by 1527 the position was untenable. When Filippo Strozzi, and above all his wife, threw their influence in the scales against the Medici, and the magistrates declared for their ex- pulsion from power, Passerini, Ippolito and Alessandro left Florence (17th of May 1527). A Consiglio degli Scelti was summoned, and a constitution similar to that of Savonarola's time was established. The Greater Council was revived and Niccold Capponi created gonfalonier e for a year. But Florence was torn by factions— -the Ottimati

Second expulsion of the Medici

(1527).

who desired an oligarchy, the Palleschi or Mediceans who gener- ally supported them, the Adirati who opposed Capponi for his moderation, the Arrabbiati who were strongly anti-Medicean, and the Popolani who opposed the Ottimati. " It is almost impossible that a state so disorganized and corrupt as Florence then was should produce men of parts and character, but if by chance any such should arise they would be hated and perse- cuted, their dispositions would be soured by indignation, or they would be hunted from their country or die of grief " (Benedette Varchi). Capponi did his best to reform the city and save the situation, and while adopting Savonarola's tone in internal affairs, he saw the dangers in the foreign situation, realizing that a reconciliation between the pope and the emperor Charles V. would prove disastrous for Florence, for Clement would certainly seize the opportunity to reinstate his family in power. Having been re-elected gonfaloniere in spite of much opposition in 15 28, Capponi tried to

make peace with the pope, but his correspond- ence with the Vatican resulted in a quite unjustified charge of high treason, and although acquitted he had to resign office and leave the city for six months. Francesco Carducci was elected gon- faloniere in his place, and on the 29th of June 1529 the pope and the emperor concluded a treaty by which the latter agreed to re-establish the Medici in Florence. Carducci made preparations for a siege, but a large part of the people were against him, either from Medicean sympathies or fear, although the Frateschi, as the believers in Savonarola's views were called, supported him strongly. A body called the Nove della Milisia, of whom Michelangelo Buonarroti was a member, was charged with the defence of the city, and Michelangelo (q.v.) himself superintended the strengthening of the fortifications. A most unfortunate Choice for the chief command of the army was the appointment of Malatesta Baglioni. In August an imperial army under Philibert, prince of Orange, advanced on the city. In September Malatesta surrendered Perugia, and other cities fell before the Imperialists. All attempts to come to terms with the pope were unsuccessful, and by October the siege had begun. Although alone against papacy and empire, the citizens sl ' of showed the greatest spirit and devotion, and were Florence. successful in many sorties. The finest figure produced by these events was that of Francesco Ferruccio {q.v.) ; by his defence of Empoli he showed himself a first-class soldier, and was appointed commissioner-general. He executed many rapid marches and counter-marches, assaulting isolated bodies of the enemy unexpectedly, and harassing them continually. But Malatesta was a traitor at heart and hindered the defence of the city in every way. Ferruccio, who had recaptured Volterra, marched to Gavinana above Pistoia to attack the Imperialists in the rear. A battle took place at that spot on the 3rd of August, but in spite of Ferruccio's heroism he was defeated and killed; the prince of Orange also fell in that desperate engagement. Malatesta contributed to the defeat by preventing a simultaneous attack by the besieged. The sufferings from famine within the city were now very great, and an increasingly large part of the people favoured surrender. The signory, at last realizing that Malatesta was a traitor, dismissed him; but it was too late, and he now behaved as though he were governor of Florence; when the troops attempted to enforce the dismissal he turned his guns on them. On the gth of August the signory saw that all hope was lost and entered into negotiations with Don Surrender Ferrante Gonzaga, the new imperial commander, of On the 12th the capitulation was signed: Florence f/|2j?*^ was to pay an indemnity of 80,000 florins, the Medici were to be recalled, the emperor was to establish the new govern- ment, " it being understood that liberty is to be preserved." Baccio Valori, a Medicean who had

been in the imperialist camp, now took charge, and the city was occupied by foreign troops. A parlamento was summoned, the usual packed balia created, and all opposition silenced. The city was given over to Pope Clement, who, disregarding the terms of the capitulation, had Carducci and Girolami (the last gonfaloniere) hanged, and established Alessandro de' Medici, the natural son of Lorenzo, duke of Urbino, as head of the republic on the 5th of July 153 1. The next year

a boisterous behaviour quite incongruous with the gentle, meditative character of his works. On the outbreak of the French Revolution he retired to Sceaux, but he was soon dis- covered and imprisoned; and though his imprisonment was short he survived his release only a few months, dying on the 13 th of September 1794.

Florian's first literary efforts were comedies; his verse epistle Voltaire et le serf du Mont Jura and an eclogue Ruth were crowned by the French Academy in 1782 and 1784 respectively. In 1782 also he produced a one-act prose comedy, Le Bon Menage, and in the next year Galatee, a romantic tale in imitation of the Galatea of Cervantes. Other short tales and comedies followed, and in 1 786 appeared Numa Pompilius, an undisguised imitation of Fenelon's TiUmaque. In 1788 he became a member of the French Academy, and published Estelle, a pastoral of the same class as Galatee. Another romance, Gonzalve de Cordoue, pre- ceded by an historical notice of the Moors, appeared in 1791, and his famous collection of Fables in 1 792. Among his posthum- ous works are La Jeunesse de Florian, ou Memoires d'un jeune Espagnol (1807), and an abridgment (1790) of Don Quixote, which, though far from being a correct representation of the original, had great and merited success.

Florian imitated Salomon Gessner, the Swiss idyllist, and his style has all the artificial delicacy and sentimentality of the Gessnerian school. Perhaps the nearest example of the class in English literature is afforded by John Wilson's (Christopher North's) Lights and Shadcnvs of Scottish Life. Among the best of his fables are reckoned " The Monkey showing the Magic Lantern," " The Blind Man and the Paralytic," and " The Monkeys and the Leopard."

The best edition of Florian's CEuvres completes appeared in Paris in 16 volumes, 1820; his CEuvres inedites in 4 volumes, 1824.

See ” Vie de Florian,” by L. F. Jauffret, prefixed to his CEuvres posthumes (1802) ; A. J. N. de Rosny, Vie de Florian (Paris, An V.) ; Sainte-Beuve, Caaseries du lundi, t. iii. ; A. de Montvaillant, Florian, sa vie, ses ceuvres (1879) ; and Lettres de Florian & Mme de la Briche, published, with a notice by the baron de Barante in Melanges published (1903) by the Societe des bibliophiles franjais.

FLORIANOPOLIS (formerly Desterro, Nossa Senhora do Desterro and Santa Catharina, and still popularly known under the last designation), a city and port of Brazil and the capital of the state of Santa Catharina, on the western or inside shore of alarge island of the same name, 485 m. S.S.W. of Rio de Janeiro, in 27 30′ S., 48 30′ W. Pop. (1890) 11,400, including, many Germans; (1902, estimate) 16,000; of the municipality, includ- ing a large rural district and several villages (1890), 30,687. The harbour is formed by the widening of the strait separating the island from the mainland, which is nearly 2 m. wide at this point. It is approached by narrow entrances from the N. and S., which are defended by small forts. The island is mountainous and wooded, and completely shelters the harbour from easterly storms. The surroundings are highly picturesque and tropical in character, but the town itself is poorly built and unattractive. Its public buildings include the president’s official residence, arsenal, lyceum, hospital and some old churches. The climate is warm for the latitude, but the higher elevations of the vicinity are noted for their mild climate and healthfulness. There are some German colonies farther up the coast whose products find a market here, and a number of small settlements along the mainland coast add something to the trade of the town. The more distant inland towns are partly supplied from this point, but difficult mountain roads tend to restrict the trade greatly. There is a considerable trade in market produce with Rio de Janeiro, but the exports are inconsiderable. Santa Catharina was formerly one of the well-known whaling stations of the South Atlantic, and is now a secondary military and naval station.

The island of Santa Catharina was originally settled by the Spanish; Cabeza de Vaca landed here in 1542 and marched hence across country to Asuncion, Paraguay. The Spanish failed to establish a permanent colony, however, and the Portu- guese took possession. The island was captured by a Spanish expedition under Viceroy Zeballos in 1777. A boundary treaty

of that same year restored it to Portugal. In 1894 Santa Catharina fell into the possession of revolutionists against the government of President Floriano Peixoto. With the collapse of the revolution the city was occupied by the government forces, and its name was then

changed to Florianopolis in honour of the president of the republic.

FLORIDA, the most southern of the United States of America, situated between 24 30′ and 31° N. lat. and 79° 48′ and 87 38′ W. long. It is bounded N. by Georgia and Alabama, E. by the Atlantic Ocean, S. by the Strait of Florida, which separates it from Cuba, and by the Gulf of Mexico, and W. by Alabama and the Gulf. The Florida Keys, a chain of islands extending in a general south-westerly direction from Biscayne Bay, are included in the state boundaries, and the city of Key West, on an island of the same name, is the seat of justice of Monroe county. The total area of the state is 58,666 sq. m., of which 3805 sq. m. are water surface. The coast line is greater than that of any other state, extending. 47 2 m. on the Atlantic and 674 m. on the Gulf Coast.

The peculiar outline of Florida gives it the name of ” Peninsula State.” The average elevation of the surface of the state above the sea-level is less than that of any other state except Louisiana, but there is not the monotony of unbroken level which descrip- tions and maps often suggest. The N.W. portion of the state is, topographically, similar to south-eastern Alabama, being a rolling, hilly country; the eastern section is a part of the Atlantic coastal plain; the western coast line is less regular than the eastern, being indented by a number of bays and harbours, the largest of which are Charlotte Harbour, Tampa Bay and Pensacola Bay. Along much of the western coast and along nearly the whole of the eastern coast extends a line of sand reefs and narrow islands, enclosing shallow and narrow bodies of water, such as Indian river and Lake Worth — called rivers, lakes, lagoons, bays and harbours. In the central part of the state there is a ridge, extending N. and S. and forming a divide, separating the streams of the east coast from those of the west. Its highest elevation above sea-level is about 300 ft. The central region is remarkable for its large number of lakes, approximately 30,000 between Gainesville in Alachua county, and Lake Okee- chobee. They are due largely to sinkholes or depressions caused by solution of the limestone of the region. Many of the lakes are connected by subterranean channels, and a change in the surface of one lake is often accompanied by a change in the surface of another. By far the largest of these lakes, nearly all of them shallow, is Lake Okeechobee, a body of water about 1250 sq. m. in area and almost uniformly shallow, its depth seldom being greater than 15 ft. Caloosahatchee river, flowing into the Gulf of Mexico near Charlotte Harbour, is its principal outlet. Among the other lakes are Orange, Crescent, George, Weir, Harris, Eustis, Apopka, Tohopekaliga, Kissimmee and Istokpoga. The chief feature of the southern portionof thestate is the Everglades (.), the term “Everglade State” being popularly applied to Florida. Within the state there are many swamps,

the largest of which are the Big Cypress Swamp in the S. adjoining the Everglades on the W., and Okefinokee Swamp, extending from Georgia into the N.E. part of the state.

A peculiar feature of the drainage of the state is the large number of subterranean streams and of springs, always found to a greater or less extent in limestone regions. Some of them are of great size. Silver Spring and Blue Spring in Marion county, Blue Spring and Orange City Mineral Spring in Volusia county, Chipola Spring near Marianna in Jackson county, Espiritu Santo Spring near Tampa in Hillsboro county, Magnolia Springs in Clay county, Suwanee Springs in Suwanee county, White Sulphur Springs in Hamilton county, the Wekiva Springs in Orange county, and Wakulla Spring, Newport Sulphur Spring and Panacea Mineral Spring in Wakulla county are the most noteworthy. Many of the springs have curative properties, one of them, the Green Cove Spring in Clay county, discharging about 3000 gallons of sulphuretted water per minute. Not far from St Augustine a spring bursts through the sea itself with such force that the ocean breakers roll back from it as from a sunken reef. The springs often merge into lakes, and lake systems are usually the sources of the rivers, Lake George being the principal source of the St Johns, and Lake Kissimmee of the Kissimmee, while a number of smaller lakes are the source of the Oklawaha, one of the most beautiful of the Floridian rivers.

the signdry was abolished, Alessandro created gonfaloniere for life, and his lordship made hereditary in his family by imperial patent. Thus Florence lost her liberty, and came to be the capital of the duchy (afterwards grand-duchy) of Tuscany (see Tuscany) . The Medici dynasty ruled in Tuscany until the death of Gian Gastone in 1737, when the grand-duchy was assigned to Francis, The duke of Lorraine. But it was governed by a regency

arnnd- until 1753, when it was conferred by the empress Duchy of Maria Theresa on his son Peter Leopold. During the uscany.]\j a p i eon j c wars t }j e grand-duke Ferdinand III. of Habsburg-Lorraine was driven from the throne, and Tuscany was annexed to the French empire in 1808. In 1809 Florence was made capital of the kingdom of Etruria, but after the fall of Napoleon in 1814 Ferdinand was reinstated. He died in 1833, and was succeeded by Leopold II. In 1848 there was a liberal revolutionary movement in Florence, and Leopold granted a constitution. But civil disorders followed, and in 1840 the

grand- duke returned under an Austrian escort. In 1859, after the Franco-Italian victories over the Austrians in Lombardy, by a bloodless revolution in Florence Leopold was expelled and Tuscany annexed to the Sardinian kingdom.

In 1865 Florence became the capital of the kingdom of Italy, but after the occupation of Rome in 1870 during the Franco- Prussian war, the capital was transferred to the Eternal City

(1871).

Bibliography. — The best complete history of Florence is Gino Capponi's Storia delta Repubblica di Firenze (2 vols., Florence, 1875), which although defective as regards the earliest times is a standard work based on original authorities; also F. T. Perrens, Histoire de Florence (9 vols., Paris, 1877-1890). For the early period see Pasquale Villari's / Pritni Due Secoli delta storia di Firenze (Eng. ed., London, 1894), and R. Davidsohn's Geschichte der Stadt Florenz (Berlin, 1896) ; P. Villari's Savonarola (English ed., London, 1896) is invaluable for the period during which the friar's personality domin- ated Florence, and his Machiavelli (English ed., London, 1892) must be also consulted, especially for the development of political theories. Among the English histories of Florence, Napier's Florentine History (6 vols., London,l846-i847) and A.Trollope's History of the Common- wealth of Florence (4 vols., London, 1865) are not without value although out of date. Francis Hyett's Florence (London, 1903) is more recent and compendious; the author is somewhat Medicean in his views, and frequently inaccurate. For the later history, A. von Reumont's Geschichte von Toscana (Gotha, 1 876-1 877) is one of the best works. There is a large number of small treatises and compendia of Florentine history of the guide-book description. See also the bibliographies in Medici, Machiavelli, Savonarola, Tuscany, &c. (L. V.*)

FLORES, an island in the Atlantic Ocean, belonging to Portugal, and forming part of the Azores archipelago. Pop. (1900) 8137; area, 57 sq. m. Flores and the adjacent island of Corvo (pop. 806; area, 7 sq. m.) constitute the westernmost group of the Azores, and seem but imperfectly to belong to the archipelago, from the rest of which they are widely severed. They lie also out of the usual track of navigators; but to those who, missing their course, are led thither, Flores affords good shelter in its numerous bays. Its poultry is excellent; and the cattle are numerous, but small. It derives its name from the abundance of the flowers that find shelter in its deep ravines. Its capital is Santa Cruz das Flores (2247). In 1591 Flores was the station of the English fleet before the famous sea fight between Sir R. Grenville's ship "

Revenge ” and a Spanish fleet of 53 vessels. See Azores.

FLORES, an island of the Dutch East Indies, a member of the chain extending east of Java. Its length is 224 m., its greatest breadth 37 m., and its area 5850 sq. m. The existence of slate, chalk, and sandstone, eruptive rock, volcanoes and heights stretching west and east, indicates a similar structure to that of the other islands of the chain. Several volcanoes are active. Among the loftier summits are, on the south coast, Gunong Rokka (7940ft.) and Keo (6560 ft.); with the lesser but con- stantly active Gunong Api, forming a peninsula; and at the south-east, Lobetobi (7120 ft.). The thickly wooded interior is little explored. The coasts have deep bays and extensive rounded gulfs, where are situated the principal villages {kamˆ pongs). On the north coast are Bari, Reo, Maumer and Geliting; on the east, Larantuka; and on the south, Sikka and Endeh.

The rivers, known only at their mouths, seem to be unnavigable. The mean temperature is 77 to 8o° F., and the yearly rainfall 43 to 47 in. For administrative purposes the island is divided into West Flores (Mangerai), attached to the government of Celebes, and Middle and East Flores (Larantuka and depend- encies), attached to the residency of Timor. The population is estimated at 250,000. The people live by trade, fishing, salt-making, shipbuilding, and the cultivation of rice, maize, and palms in the plain, but there is little industry or commerce. Some edible birds’ nests, rice, sandalwood and cinnamon are exported to Celebes and elsewhere. The inhabitants of the coast-districts are mainly of Malay origin. The aborigines, who occupy the interior, are of Papuan stock. They are tall and well-built, with dark or black skins. The hair is frizzly. They are pure savages; their only religion is a kind of nature- worship. They consider the earth holy and inviolable; thus in severe droughts they only dig the river-beds for water as a last resource. Portugal claimed certain portions of the island until 1859.

FLOREZ, ENRIQUE (1701-1773), Spanish historian, was born at Valladolid on the 14th of February 1 701 . In his fifteenth year he entered the order of St Augustine, was afterwards professor of theology at the university of Alcala, and published a Cursus theologiae in five volumes (1732-1738). He afterwards devoted himself to historical studies. Of these the first-fruit was his Clave Historial, a work of the same class as the French Art de verifier les dates, and preceding it by several years. It appeared in 1743, and passed through many editions. In 1747 was published the first volume of EspanaSagrada, teatrogeografico- historico de la Iglesia de Espana, a vast compilation of Spanish ecclesiastical history which obtained a European reputation, and of which twenty-nine volumes appeared in

the author's lifetime. It was continued after his death by Manuel Risco and others, and further additions have been made at the expense of the Spanish government. The whole work in fifty-one volumes was published at Madrid (1747-1886). Its value is considerably increased by the insertion of ancient chronicles and documents not easily accessible elsewhere. Florez was a good numismatist, and published Medallas de las Colonias in 2 vols. (1757-1758), of which a third volume appeared in 1773. His last work was the Memorias de las reynas Catolicas, 2 vols. (1770). Florez led a retired, studious and unambitious life, and died at Madrid on the 20th of August 1773.

See F. Mendez, Noticia de la vida y escritos de Henrique Florez (Madrid, 1 780).

FLORIAN, SAINT, a martyr honoured in Upper Austria. In the 8th century Puoche was mentioned as the place of his tomb, and on the site was built the celebrated monastery of canons regular, St Florian, which still exists. His Acta are of consider- able antiquity, but devoid of historical value. Their substance is borrowed from the Acta of St Irenaeus of Sirmium. The cult of St Florian was introduced into Poland, together with the relics of the saint, which were brought thither in 11 83 by Giles, bishop of Modena. Casimir, duke of Poland, dedicated a church at Cracow to him. He is represented in various ways, especially as a warrior holding in his hand a vessel from which he pours out flames. His protection is often sought against fire. His day in the calendar is the 4th of May.

See Acta Sanctorum, May, i. 461-467; B. Krusch, Scriplores rerum Merovingicarum, iii. 65-68; C. Cahier, Caracteristiques des saints, p. 490 (Paris, 1867). (H. De.)

FLORIAN, JEAN PIERRE CLARIS DE (1755-1794), French poet and romance writer, was born on the 6th of March 1755 at the chateau of Florian, near Sauve, in the department of Gard. His mother, a Spanish lady named Gilette de Salgues, died when he was quite a child. His uncle and guardian, the marquis of Florian, who had married a niece of Voltaire, introduced him at Ferney and in 1768 he became page at Anet in the household of the duke of Penthievre, who remained his friend throughout his life. Having studied for some time at the artillery school at Bapaume he obtained from his patron a captain's commission in a dragoon regiment, and in this capacity it is said he displayed

Of the rivers the most important are the St Johns* which flows N. from about the middle of the peninsula, empties into the Atlantic a short distance below Jacksonville, and is navigable for about 250 m. from; its mouth, the Withlacoochee, flowing in a general north-westerly direction from its source in the N.E. part of Polk county, and forming near its entrance into the Gulf of Mexico the boundary between Levy and Citrus counties, and four rivers, the Escambia, the Choctawatchee, the Apalachicola, and the Suwanee, having their sources in other states and traversing the north-western part of Florida. On account of its sand reefs, the east coast has not so many harbours as the west coast. The most important harbours are at Fernandina, St Augustine, and Miami on the E. coast, and at Tampa, Key West and Pensacola on the W. coast.

The soils of Florida have sand as a common ingredient. 1 They may be divided into three classes: the pine lands, which often have a surface of dark vegetable mould, under which is a sandy loam resting on a substratum of clay, marl or limestone— areas of such soil are found throughout the state; the ” hammocks,” which have soil of similar ingredients and are interspersed with the pine lands- large areas of this soil, occur in Levy, Alachua, Citrus, Hernando, Pasco, Gadsden, Leon, Madison, Jefferson and Jackson counties; and the alluvial swamp lands, chiefly in E. and S. Florida, the richest class, which require drainage to fit them for cultivation.

As regards climate Florida may be divided into three moire or less distinct zones. North and west of a line passing through Cedar Keys and Fernandina the climate is distinctly ” southern,” similar to that of the Gulf states; from this line to another extending from the mouth of the Caloosaha tehee to Indian river inlet the climate is semi-tropical, and is well suited to the cultivation of oranges; S. of this the climate is sub-tropical, well adapted to the cultivation of pineapples. “.’ Since , the semi- tropical and sub-tropical zones are nearer the course of the Gulf Stream, and are swept by the trade winds, their tempera- tures are more uniform than those of the zones of southern climate; indeed, the extremes of heat (103 F.) and cold (13 F.) are felt in the region of southern climate. The mean annual temperature of the state is 70-8° F., greater in the sub-tropical than in the other climate zones, and the Atlantic coast is in general warmer than the Gulf Coast. The rainfall

averages 52-09 in. per annum. On account of its warm climate, Florida has many resorts for health and pleasure, which are especially popular in the season from January to April; the more important are St Augustine, Ormond, Daytona, Palm Beach, Miami, Tampa, White Springs, Hampton Springs, Worthington Springs and Orange Springs.

No metals have ever been discovered in Florida. The principal minerals are rock phosphate and (recently more important) land and river pebble phosphate, found in scattered deposits in a belt on the ” west coast about 30 m. wide and extending from Tallahassee to Lake Okeechobee. The centre of the quarries is .Dunnellon in Marion county, and pebble phosphate is found in Hillsboro, Polk, De Soto, Osceola, Citrus and Hernando counties. Although the economic value of the phosphate deposits was first realized about 1889, between 1894 and 1907 Florida produced, each year, more than half of all the phosphate rock produced in the whole United States, the yield of Florida (i,357 > 3 6 5 long tons) in 1907 being valued at $6,577,757; that of the whole country at $10,653,558. Florida is also the principal source in the United States for fuller’s earth, a deposit of which, near Quincy, was first discovered in 1893; and clay (including kaolin) is also mined to some extent. Other minerals that have been discovered but have not been industrially developed are gypsum, lignite and cement rock. The lack of a thorough geological survey has perhaps prevented the discovery of other minerals — certainly it is responsible for a late recognition of the economic value of the known mineral resources.

The flora of N. Florida is similar to that of south-eastern North America ; that of S. Florida seems to be a link between the vegetation of North America and that of South America and the West Indies, for out of 247 species of S. Florida that have been examined, 187 are common to the West Indies, Mexico and South America. The forests cover approximately 37,790 sq. m., chiefly in the northern part of the state, including about half of the peninsula, yellow pine being predominant, except in the coastal marsh lands, where cypress, found throughout the state, particularly abounds. About half of the varieties of forest trees in the United States are found, and

1 Almost everywhere limestone is the underlying rock, but siliceous sands, brought out by the Atlantic rivers to the N.E., are carried the whole length of the Florida coast by marine action.

among the peculiar species are the red bay or ” Florida Mahogany,” satinwood and cachibou, and the Florida yew and savin, both almost extinct. The lumber industry is important: in 1905 the total factory

product of lumber and timber was valued at $10,901,650, and lumber and planing mill products were valued at $1,690,455. In 1900 this was the most valuable industry in the state; in 1905 it was second to the manufacture of tobacco. The fauna is similar in general to that of the southern United States. Among the animals are the puma, manatee (sea cow), alligator and crocodile, but the number of these has been greatly diminished by hunting. Ducks, wild turkeys, bears and wild cats (lynx) are found, but in decreasing numbers.

The fisheries are very valuable; the total number of species of fish in Florida waters is about 600, and many species found on one coast are not found on the other. The king fish and tarpon are hunted for sport, while mullet, shad, redsnappers, pompano, trout, sheepshead and Spanish mackerel are of great economic value. The sponge and oyster fisheries are also important. The total product of the fisheries in 1902 was valued at about $2,000,000.

Industry and Commerce. — The principal occupation is agri- culture, in which 44% of the labouring population was engaged in 1900, but only 12-6% of the total land surface was enclosed in farms, of which only 34-6% was improved, and the total agricultural product for 1899 was valued at $18,309,104. As the number of farms increased faster than the cultivated area from 1850 to 1900, the average size of farms declined from 444 acres in i860 to 140 in 1880 and to 106-9 i n 1900, the largest class of farms being those with an acreage varying from 20 to 50 acres. Nearly three-fourths of the farms, in 1900, were cultivated by their owners, but the cash tenantry system showed an increase of 100% since 1890, being most extensively used in the cotton counties. One-third of the farms were operated by negroes, but one-half of these farms were rented, and the value of negro farm property was only one-eighth that of the entire farm property of the state. According to the state census of 1905 only 1,621,362 acres were improved; of 45,984 farms, 31,233 were worked by whites.

Fruits normally form the principal crop; the total value for 1907-8 of the fruit crops of the state (including oranges, lemons, limes, grape-fruit, bananas, guavas, pears, peaches, grapes, figs, pecans, &c.) was $6,160,299, according to the report of the State Department of Agriculture, The discovery of Florida's adaptability to the culture of oranges about 1875 may be taken as the beginning of the state's modern industrial development. But the unusual severity of the winters of 1887, 1894 and 1899 (the report of the Twelfth Census which gives the figures for this year being therefore misleading) destroyed three-fourths of the orange trees, and caused an increased attention to stock- raising, and to various agricultural products.

Orange culture has recovered much of its importance, but it is carried on in the more southern counties of the state. The cultivation of pineapples, in sub-tropical Florida, is proving successful, the product far surpassing that of California, the only other state in the Union in which pineapples are grown. Grape-fruit, guavas and lemons are also successfully produced in this part of the state. The cultivation of strawberries and vegetables (cabbage, cauliflower, beets, beans, tomatoes, egg-plant, cucumbers, water-melons, celery, &c.) for northern markets, and of orchard fruits, especially plums, pears and prunes, has likewise proved successful. In 1907-8, according to the State Department of Agriculture, the total value of vegetable and garden products was $3,928,657. In 1903, according to the statistics of the United States Department of Agriculture, Indian corn ranked next to fruits (as given in the state reports), but its product as compared with that of various other states is unimportant — in 1907 it amounted to 7,017,000 bushels only; rice is the only other cereal whose yield in 1899 was greater than that of 1889, but the Florida product was surpassed (in 1899) by that of the Carolinas, Georgia, Louisiana and Texas; in 1907 the product of rice in Florida (69,000 bushels) was less than that of Texas, Louisiana, South Carolina, Arkansas and Georgia severally. Tobacco culture, which declined after i860 on account of the competition of Cuba and Sumatra, has revived since 1885 through the introduction of Cuban and Sumatran seed; the product of 1907 (6,937,500 lb) was more than six times that of

1899, the product in 1899 (1,125,600 lb) being more than twice that of 1889 (470,443 lb), which in turn was more than twenty times that for 1880 (21,182 lb) — the smallest production recorded for many decades. In 1907 the average farm price of tobacco was 45 cents per lb higher than that of any other state. In 1899, 84% of the product was raised in Gadsden county. The sweet potato and pea-nut crops have also become very valuable; on the other hand the Census of 1900 showed a decline in acreage and production of cotton. In 1907 the acreage (265,000 acres) was less than in any cotton-growing state except Missouri and Virginia; the crop for 1907-1908 was 49,794 bales. Sea-island cotton of very high grade is grown in Alachua county. The production of sugar, begun by the early Spanish settlers, declined, but that of syrup increased. Pecan nuts are a promising crop, and many groves were planted after 1905. In 1900 there were more than 1,900,000 acres of land in the state unoccupied. The low lands of the South are being drained partly by the state and partly by private

companies. Irrigation, introduced in 1888 by the orange growers, has been adopted by other farmers, especially the tobacco-growers of Gadsden county, and so the evil effects of the droughts, so com- mon from February to June, are avoided. The value of farm pro- perty in the southern counties, which have been developed very recently, shows a steady increase, that of Hillsboro county surpassing the other counties of the state. In 1907-8, according to the state Department of Agriculture, the total value of all field crops (cotton, cereals, sugar-cane, hay and forage, sweet potatoes, &c.) was $11,856,340, and the total value of all farm products (including live stock, $20,81 7,804, poultry and products, $1,688,433, and dairy products, $1,728,642) was $46,371,320.

The manufactures of Florida, as compared with those of other states, are unimportant. Their product in 1900 was more than twice the product in 1890, and the product in 1905 (from establishments under the factory system only) was $50,298,290, i.e.. tf-l% greater than in 1900. The most important industries were those that depended upon the forests, their product amounting to nearly 45 % of the entire manufactured product of the state. The lumber and timber products were valued in 1905 at $10,901,650, almost twice their valuation in 1890, and an increase of 1-2% over the product of 1900. The manufacture of turpentine and rosin, material for which is obtained from the pine forests, had increased greatly in importance between 1890 and 1900, the product in 1890 being valued at only $191,859, that of 1900 at $6,469,605, and from the latter sum it increased in 1905 to $9,901,905, an increase of more than one-half. In 1900 the state ranked second and in 1905 first of all the states of the country in the value of this product ; in 1905 the state's product amounted to 41 -4 % of that of the entire country. The manufacture of cigars and cigarettes (almost entirely of cigars, few cigarettes being manufactured), carried on chiefly by Cubans at Key West and Tampa, also increased in importance between 1890 and 1900, the products in the latter year being valued at $10,735,826, or more than one-quarter more than in 1890, and in 1905 there was a further increase of 56-2 %, the gross value being $16,764,276, or nearly one-third of the total factory product of the state. In 1900 Florida ranked fourth in the manufacture of tobacco among the states of the Union, being surpassed by New York, Pennsylvania and Ohio; in 1905 it ranked third (after New York and Pennsylvania). Most of the tobacco used is imported from Cuba, though, as has been indicated, the production of the state has greatly increased since 1880. In the manufacture of fertilizers, the raw material for which is derived from the phosphate beds, Florida's aggregate product in 1900 was valued at $500,239,

and in 1905 at $1,590,371, an increase of 217-9 % in five years.

Florida's industrial progress has been mainly since the Civil War, for before that conflict a large part of the state was practi- cally undeveloped. An important influence has been the railways. In 1880 the total railway mileage was 518 m.; in 1890 it was 2489 m.;in 1900, 3255 m., and in January 1909, 4,004-92 m. The largest system is the Atlantic Coast Line, the lines of which in Florida were built or consolidated by H. B. Plant (1 819-1899) and once formed a part of the so-called " Plant System " of railways. The Florida East Coast Railway is also the product of one man's faith in the country, that of Henry M. Flagler (b. 1830). The Seaboard Air Line, the Louisville & Nashville, and the Georgia Southern & Florida are the other important railways. The Southern railway penetrates the state as far as Jacksonville, over the tracks of the Atlantic Coast Line. A state railway commission, whose members are elected by the people, has power

to enforce its schedule of freight rates except when such rates would not pay the operating expenses of the railway. In 188-! the Florida East Coast Line Canal and Transportation Co. Wis organized to develop a waterway from Jacksonville to Biscayne Bay by connecting with canals the St Johns, Matanzas, and Halifax rivers, Mosquito Lagoon, Indian river, Lake Worth. Hillsboro river, New river, and Snake Creek; in 1908 this vast undertaking was completed. The development of marine commerce has been retarded by unimproved harbours, but Fernandina and Pensacola harbours have always been good. Since 1890 much has been done by the national Government, aided in many cases by the local authorities and by private enterprise, to improve the harbours and to extend the limits of river navigation. With the increase of trade between the United States and the West Indies following the Spanish- American War (1898), the business of the principal ports, notably of Fernandina, Tampa and Pensacola, greatly increased.

Population. — The population of Florida in 1880 was 269,493; in 1890, 391,422, an increase of 45-2%; and in 1900, 528,542, or a further increase of 35% ; and in 1905, by a state census, 614,845; and in 1910, 752,619. In 1900, 95-5 % were native born, 43"7% were coloured (including 479 Chinese, Japanese and Indians), and in 1905 the percentages were little altered. The Seminole Indians, whose number is not definitely known, live in and near the Everglades. The urban population on the basis of places having a population of 4000 or more was 166% of the total in 1900 and 22-7% in 1905, the percentage for Florida, as for other Southern States ; being small as compared with the percentage for most of the other states of the

Union. In 1900 there were 92, and, in 1905, 125 incorporated cities, towns and villages; but only 14 (in 1905, 22) of these had a population of over 2000, and only 4 (in 1905, 8) a population of more than 5000. The four in 1900 were: Jacksonville (28,429); Pensacola (17,747); Key West (17,114); and Tampa (15,839). The eight in 1905 were Jacksonville (35,301), Tampa (22,823), Pensacola (21,505), Key West (20,498), Live Oak (7200), Lake City (6409), Gainesville (5413), and St Augustine(5i2i). Tallahassee is the capital of the state. In 1906 the Baptists were the strongest religious denomination; the Methodists ranked second, while the Roman Catholic, Presbyterian and Protestant Episcopal churches were of relatively minor importance.

Government. — The present constitution was framed in 1885 and was ratified by the people in 1886. Its most important feature, when compared with the previous constitution of 1868, is its provision for the choice of state officials other than the governor (who was previously chosen by election) by elections instead of by the governor's appointment, but the governor, who serves for four years and is not eligible for the next succeed- ing term, still appoints the circuit judges, the state attorneys for each judicial circuit and the county commissioners; he may fill certain vacaricies and may suspend, and with the Senate remove officers not liable to impeachment. The governor is a member of the Board of Pardons, the other members being the attorney-general, the secretary of state, the comptroller and the commissioner of agriculture; he and the secretary of state, attorney-general, comptroller, treasurer, superintendent of public instruction, and commissioner of agriculture comprise a Board of Commissioners of State Institutions; he is also a member of the Board of Education. The office of lieutenant- governor was abolished by the present constitution. The legisla- ture meets biennially, the senators being chosen for four, the representatives for two years. By an amendment of 1896 the Senate consists of not more than 32, and the House of Representa- tives of not more than 68 members; by a two-thirds vote of members present the legislature maypassa bill over thegovernor's veto. The three judges of the Supreme Court and the seven of the circuit court serve for six years, those of the county courts for four years, and justices of the peace (one for each justice district, of which the county commissioners must form at least two in each county) hold office for four years. The constitutional qualifications for suffrage are: the age of twenty-one years, citizenship in the United States or presentation of naturalization

certificates at registration centres, residence in the state one year and in the county six months, and registration. To these requirements the payment of a poll-tax has been added by legislative enactment, such an enactment having been authorized by the constitution. Insane persons and persons under guardian- ship are excluded by the constitution, and ” all persons convicted of bribery, perjury, larceny or of infamous crime, or who shall make or become directly or indirectly interested in any bet or wager the result of which shall depend upon any election,” or who shall participate as principal, second or challenger in any duel, are excluded by legislative enactment.

Amendments to the constitution may be made by a three-fifths vote of each house of the legislature, ratified by a majority vote of the people. A revision of the Constitution may be made upon a two-thirds vote of all members of both Houses of the legislature, if ratified by a majority vote of the people; a Constitutional Convention is then to be provided for by the legislature, such convention to meet within six months of he passage of the law therefor, and to consist of a number equal to the membership of the House of Representatives, apportioned among the counties, as are the members of this House.

A homestead of 160 acres, or of one-half of an acre in an in-corporated town or city, owned by the head of a family residing in the state, with personal property to the value of $1000 and the improvements on the real estate, is exempt from enforced sale except for delinquent taxes, purchase money, mortgage or improvements on the property. The wife holds in her own name property acquired before or after marriage; the inter- marriage of whites and negroes (or persons of negro descent to the fourth generation) is prohibited. All these are constitutional provisions. By legislative enactment whites and blacks living in adultery are to be punished by imprisonment or fine; divorces may be secured, only after two years’ residence in the state and on the ground of physical incapacity, adultery, extreme cruelty, habitual indulgence in violent temper, habitual drunkenness, desertion for one year, previous marriage still existing, or such relationship of the parties as is within the degrees for which marriage is prohibited by law. Legitimacy of natural children can be established by subsequent marriage of the parents, and the age of consent is sixteen years.

The bonded debt was incurred during, the Reconstruction Period (1865-1875). In 1871 7 % 30 year bonds to the extent of $350,000 were issued and in 1873 another issue of 6% 30 year bonds to the value of $925,000 was made. Most of these were held by the Educational Fund at the time of their maturity. By 1901 all but

$267,700 of the issue of 1871 had been retired and this amount was then refunded with 3 % 50 year bonds which were taken by the Educational Fund. In 1903 $616,800 of the 1873 issue was held by the Educational Fund and $148,000 by individuals. The first part of this claim was refunded by a new bond issue, also taken by the Educational Fund, the second was paid from an Indian war claim of $692,946, received from the United States government in 1902, when $132,000 bonds of 1857, held by the United States government, were also extinguished. The bonded debt was thus reduced to $884,500; and on the 1st of January 1909 the debt, consisting of refunding bonds held as educational funds, amounted to $601,567.

Penal System. — There is no penitentiary; the convicts are hired to the one highest bidder who contracts for their labour, and who undertakes, moreover, to lease all other persons convicted during the term of the lease, and sub-leases the prisoners. In 1889 the convicts were placed under the care of a supervisor of convicts, and in 1905 the law was amended so that one or more supervisors could be appointed at the will of the governors. In 1908 there were four supervisors and one state prison physician, and there are special laws designed to prevent abuses in the system. In 1908 the state received $208,148 from the lease of convicts. Decrepit prisoners were formerly leased, but in 1906 the lease excluded such as were thought unfit by the state prison physician. Women convicts were still leased with the men in 1908; of the 446 convicts committed in that year, there were 15 negro females, 356 negro males and 75 white males. In the same year 54 escaped, and 27 were recaptured. The leased convicts are employed in the turpentine and lumber industries and in the phosphate works.

The 1232 convicts ” on hand” at the close of 1908 were held in 38 camps, 4 being the minimum, and 160 the maximum number, at a camp. In 1908 two central hospitals for the prisoners were maintained by the lessee company. County prison camps are under the supervision of the governor and the supervisors of convicts. The state supervisors must inspect each state prison camp and each county prison camp every thirty days.

Education. — As early as 183 1 an unsuccessful attempt was made to form an adequate public school fund; the first real effort to establish a common school system for the territory was made after 1835; in 1840 there were altogether 18 academies and 51 common schools, and in 1849 the state legislature made an appropriation in the interest of the public instruction of white pupils, and this was supplemented by the proceeds of land granted by the United States government for the

same purpose. In 1852 Tallahassee established a public school; and in i860 there were, according to a report of the United States census, 2032 pupils in the public schools of the state, and 4486 in ” academies and other schools.” The Civil War, however, in- terrupted the early progress, and the present system of common schools dates from the constitution of 1868 and the school law of 1869. The school revenue derived from the interest of a permanent school fund, special state and county taxes, and a poll-tax, in 1907-1908 amounted to $1,716,161; the per capita cost for each child of school age was $6- 11 (white, $9-08; negro, $2-24), and the average school term was 108 days (112 for whites, 99 for negroes). The state constitution prescribes that ” white and colored children shall not be taught in the same school, but impartial provision shall be made for both.” The percentage of enrolment in 1907-1908 was 60 (whites, 66; negroes, 52). The percentage of attendance to enrolment was 70%, — 68% for white and 74% for negro schools. Before 1905 the state provided for higher education by the Florida State College, at Tallahassee, formerly the West Florida Seminary (founded in 1857) ; the University of Florida, at Lake City, which was organized in 1903 by enlarging the work of the Florida Agricultural College (founded in 1884); the East Florida Seminary, at Gainesville (founded 1848 at Ocala) ; the normal school (for whites) at De Funiak Springs; and the South Florida Military Institute at Bartow; but in 1905 the legislature passed the Buckman bill abolishing all these state institutions for higher education and establishing in their place the university of the state of Florida and a state Agricultural Experiment Station,; both now at Gainesville, and the Florida Female College at Tallahassee, which has the same standards for entrance and for graduation as the state university for men. Private educational institutions in Florida are John B. Stetson University at De Land (Baptist) ; Rollins College (1885) at Winter Park (non-sectarian), with a collegiate department, an academy, a school of music, a school of expression, a school of fine arts, a school of domestic and industrial arts, and a business school; Southern College (1901), at Sutherland (Methodist Episcopal, South); the Presbyterian College of Florida (1905), at Eustis; Jasper Normal Institute (1890), at Jasper, and the Florida Normal Institute at Madison. The negroes have facilities for advanced instruction in the Florida Baptist Academy, and Cookman Institute (Methodist Episcopal, South), both at Jacksonville, and in the Normal and Manual Training School (Congregational), at Orange Park. There are a school for the Blind, Deaf, and Dumb (1885) at St. Augustine, a hospital for the insane at Chattahoochee and a reform school at Marianna, all wholly supported by the state, and a Confederate soldiers’ and sailors’ home at Tallahassee, which is partially supported by the state.

History. — The earliest explorations and attempts at coloniza- tion of Florida by Europeans were made by the Spanish. The Council of the Indies claimed that since 1510 fleets and ships had gone to Florida, and Florida is shown on the Cantino map of 1502. In 1513 Juan Ponce de Leon (c. 1460-1521), who had been with Christopher Columbus on his second voyage and had later been governor of Porto Rico, obtained a royal grant authorizing him to discover and settle ” Bimini,” — a fabulous island believed to contain a marvellous fountain or spring

whose waters would restore to old men their youth or at least had wonderful curative powers. Soon after Easter Day he came in sight of the coast of Florida, probably near the mouth of the St Johns river. From the name of the day in the calendar, Pascua Florida, or from the fact that many flowers were found on the coast, the country was named Florida. De Leon seems to have explored the coast, to some degree, on both sides of the peninsula, and to have turned homeward fully convinced that he had discovered an immense island. He returned to Spain in 1514, and obtained from the king a grant to colonize ” the island of Bimini and the island of Florida,” of which he was appointed adelantado, and in 1521 he made another expedition, this one for colonization as well as for discovery. He seems to have touched at the island of Tortugas, so named on aceount of the large number of turtles found there, and to have landed at several places, but many of his men succumbed to disease and he himself was wounded in an Indian attack, dying soon afterward in Cuba. Meanwhile, in 1516, another Spaniard, Diego Miruelo, seems to have sailed for some distance along the west coast of the peninsula. The next important exploration of Florida was that of Panfilo de Narvaez. In 1527 he sailed from Cuba with about 600 men (soon reduced to less than 400), landed (early in 1528) probably at the present site of Pensacola, and for six months remained in the country, he and his men suffering terribly from exposure, hunger and fierce Indian attacks. In September, his ships being lost and his force greatly reduced in number, he hastily constructed a crazy fleet, re- embarked probably at Apalachee Bay, and lost his life in a storm probably near Pensacola Bay. Only four of his men, including Nunez Cabeza de Vaca, succeeded after eight years of Indian captivity and of long and weary wanderings, in finding their way to Spanish settlements in Mexico. Florida was also partially explored by Ferdinando de Soto (q.v.) in 1 539-1540. In the summer of 1559 another attempt at colonization was made by Tristan de Luna, who sailed from Vera Cruz, landed at

Pensacola Bay, and explored a part of Florida and (possibly) Southern Alabama. Somewhere in that region he desired to make a permanent settlement, but he was abandoned by most of his followers and gave up his attempt in 1 561.

In the following year, Jean Ribaut (1520-1565), with a band of French Huguenots, landed first near St Augustine and then at the mouth of the St Johns river, which he called the river of May, and on behalf of France claimed the country, which he described as ” the fairest, fruitfullest and pleasantest of all the world “; but he made his settlement on an island near what is now Beaufort, South Carolina. In 1564 Rene de Laudonniere (? ~c. 1586), with another party of Huguenots, established Fort Caroline at the mouth of the St Johns, but the colony did not prosper, and in 1565 Laudonniere was about to return to France when (on the 28th of August) he was reinforced by Ribaut and about 300 men from France. On the same day that Ribaut landed, a Spanish expedition arrived in the bay of St Augustine. It was commanded by Pedro Menendez de Aviles (1523-1574), one of whose aims was to destroy the Huguenot settlement. This he did, putting to death almost the entire garrison at Fort Caroline ” not as Frenchmen, but as Lutherans,” on the 20th of September 1565. The ships of Ribaut were soon afterwards wrecked near Matanzas Inlet; he and most of his followers surrendered to Menendez and were executed. Menendez then turned his attention to the founding of a settlement which he named St Augustine (q.v.); he also explored the Atlantic coast from Cape Florida to St Helena, and established forts at San Mateo (Fort Caroline), Avista, Guale and St Helena. In 1567 he returned to Spain in the interest of his colony.

The news of the destruction of Fort Caroline, and the execution of Ribaut and his followers, was received with indifference at the French court; but Dominique de Gourgues (c. i53°-i593), a friend of Ribaut but probably a Catholic, organized an expedi- tion of vengeance, not informing his men of his destination until his three ships were near the Florida coast. With the co-operation of the Indians under their chief Saturiba he captured Fort San Mateo in the spring of 1568, and on the spot where

the garrison of Fort Caroline had been executed, he hanged his Spanish prisoners, inscribing on a tablet of pine the words, ” I do this not as unto Spaniards but as to traitors, robbers and murderers.” Feeling unable to attack St Augustine, . de Gourgues returned to France.

The Spanish settlements experienced many vicissitudes. The Indians

were hostile and the missionary efforts among them failed. In 1586 St Augustine was almost destroyed by Sir Francis Drake and it also suffered severely by an attack of Captain John Davis in 1665. No until the last decade of the 17 th century did the Spanish authorities attempt to extend the settlements beyond the east coast. Then, jealous of the French explorations along the Gulf of Mexico, they turned their atten- tion to the west coast, and in 1696 founded Pensacola. When the English colonies of the Carolinas and Georgia were founded, there was constant friction with Florida. The Spanish were accused of inciting the Indians to make depredations on the English settlements and of interfering with English commerce and the Spanish were in constant fear of the encroachments of the British. In 1702, when Great Britain and Spain were con- tending in Europe, on opposite sides, in the war of the Spanish Succession, a force from South Carolina captured St Augustine and laid siege to the fort, but being unable to reduce it for lack of necessary artillery, burned the town and withdrew at the approach of Spanish reinforcements. In 1706 a Spanish and French expedition against Charleston, South Carolina, failed, and the Carolinians retaliated by invading middle Florida in 1708 and again in 1722. In 1740 General James Edward Ogle- thorpe, governor of Georgia, supported by a naval force, made an unsuccessful attack upon St Augustine; two years later a Spanish expedition against Savannah by way of St Simon's Island failed, and in 1745 Oglethorpe again appeared before the walls of St Augustine, but. the treaty of Aix-la-Chapelle in 1748 prevented further hostilities. Pensacola, the other centre of Spanish settlement, though captured and occupied (17 19-17 23) by the French from Louisiana, had a more peaceful history.

By the treaty of Paris in 1763 Florida was ceded to England in return for Havana. The provinces of East Florida and West Florida were now formed, the boundaries of West Florida being 3 1° N. lat. (when ciyil government was organized in 1767, the N. line was made 32° 28'), the Chattahoochee, and the Apalachicola rivers, the Gulf of Mexico, Mississippi Sound, Lakes Borgne, Pontchartrain and Maurepas, and the Mississippi river. A period of prosperity now set in. Civil in place of military government was instituted; immigration began; and Andrew Turnbull, an Englishman, brought over a band of about 1500 Minorcans (1769), whom he engaged in the cultivation of indigo at New Smyrna. Roads were laid out, some of which yet remain; and in the last three years of English occupation the government spent $580,000 on the two provinces. Conse- quently, the people of Florida were for the most part loyal to Great Britain during the War of American Independence. In 1776, the Minorcans of New Smyrna refused to work longer on the indigo plantations; and many of them

removed to St Augustine, where they were protected by the authorities. Several plans were made to invade South Carolina and Georgia, but none matured until 1778, when an expedition was organized which co-operated with British forces from New York in the siege of Savannah, Georgia. In the following year, Spain having declared war against Great Britain, Don Bernardo de Galvez (1756-1794), the Spanish governor at New Orleans, seized most of the English forts in West Florida, and in 1781 captured Pensacola.

By the treaty of Paris (1783) Florida reverted to Spain, and, no religious liberty being promised, many of the English in- habitants left East and West Florida. A dispute with the United States concerning the northern boundary was settled by the treaty of 1795, the line 31 N. lat. being established.

The westward expansion of the United States made necessary American ports on the Gulf of Mexico; consequently the acquisi- tion of West Florida as well as of New Orleans was one of the

aims of the negotiations which resulted in the Louisiana Purchase of 1803. After the cession of Louisiana to the United States, the people of West Florida feared that that province would be seized by Bonaparte. They, therefore, through a convention at Buhler's Plains (July 17, 1810), formulated plans for a more effective government. When it was found that the Spanish governor did not accept these plans in good faith, another con- vention was held on the 26th of September which declared West Florida to be an independent state, Organized a government and petitioned for admission to the American Union. On the 27th of October President James Madison, acting on a theory of Robert R. Livingston that West Florida was ceded by Spain to France in 1800 along with Louisiana, and was therefore included by France in the sale of Louisiana to the United States in 1803, declared West Florida to be under the jurisdiction of the United States. Two years later the American Congress annexed the portion of West Florida between the Pearl and the Mississippi rivers to Louisiana (hence the so-called Florida parishes of Louisiana), and that between the Pearl and the Perdido to the Mississippi Territory. .

In the meantime war between Great Britain and the United States was imminent. The American government asked the Spanish authorities of East Florida to permit an American occupation of the country in order

that it might not be seized by Great Britain and made a base of military operations. When the request was refused, American forces seized Fernandina in the spring of 181 2, an action that was repudiated by the American government after protest from Spain, although it was authorized in official instructions. About the same time an attempt to organize a government at St Mary's was made by American sympathizers, and a petty civil war began between the Americans, who called themselves " Patriots," and the Indians, who were encouraged by the Spanish. In 1814 British troops landed at Pensacola to begin operations against the United States. In retaliation General Andrew Jackson captured the place, but in a few days withdrew to New Orleans. The British then built a fort on the Apalachicola river, and there directed expedi- tions of Indians and runaway negroes against the American settlements, which continued long after peace was concluded in 1814. In 1818 General Jackson, believing that the Spanish were aiding the Seminole Indians and inciting them to attack the Americans, again captured Pensacola. By the treaty of 1819 Spain formally ceded East and West Florida to the United States; the treaty was ratified in 1821, when the United States took formal possession, but civil government was not established until 1822.

Indian affairs furnished the most serious problems of the new Territory of Florida. The aborigines, who seemed to have reached a stage of civilization somewhat similar to that of the Aztecs, were conquered and exterminated or absorbed by Creeks about the middle of the 18th century. There was a strong demand for the removal of these Creek Indians, known as Seminoles, and by treaties at Payne's Landing in 1832 and Fort Gibson in 1833 the Indian chiefs agreed to exchange their Florida lands for equal territory in the western part of the United States. But a strong sentiment against removal suddenly developed, and the efforts of the United States to enforce the treaty brought on the Seminole War (1836-42), which resulted in the removal of all but a few hundred Seminoles whose descendants still live in southern Florida.

In 1845 Florida became a state of the American Union. On the 10th of January 1861 an ordinance of secession, which declared Florida to be a " sovereign and independent nation," was adopted by a state convention, and Florida became one of the Confederate States of America. The important coast towns were readily captured by Union forces; Fernandina, Pensacola and St Augustine in 1862, and Jacksonville in 1863; but an invasion of the interior in 1864 failed, the Union forces being repulsed in a battle at Olustee (on the 20th of February 1864). In 1865 a provisional governor was appointed by

President Andrew Johnson, and a new state government was organized. The legislature of 1866 rejected the Fourteenth Amendment

to the Federal Constitution, and soon afterwards Florida was made a part of the Third Military District, according to the Reconstruction Act of 1867. Negroes were now registered as voters by the military authorities, and another Constitutional Convention met in January and February 1868. A factional strife in the dominant party, the Republican, now began; fifteen delegates withdrew from the convention; the others framed a constitution, and then resolved themselves into a political convention. The seceding members with nine others then returned and organized; but the factions were reconciled by General George M. Meade. A new constitution was framed and was ratified by the electors, and Florida passed from under a quasi-military to a full civil government on the 4th of July 1868. The factional strife in the Republican party continued, a number of efforts being made to impeach Governor Harrison Reed (1813-1899). The decisive year of the Reconstruction Period was 1876. The Canvassing Board, which published the election returns, cast out some votes, did not wait for the returns from Dade county, and declared the Republican ticket elected. George F. Drew (1827-1900), the Democratic candidate for governor, then secured a mandamus from the circuit court restraining the board from going behind the face of the election returns; this was not obeyed and a similar mandamus was therefore obtained from the supreme court of Florida, which declared that the board had no right to determine the legality of a particular vote. According to the new count thus ordered, the Democratic state ticket was elected. By a similar process the board's decision in favour of the election of Republican presidential electors was nullified, and the Democratic electors were declared the successful candidates; but the electoral commission, appointed by Congress, reversed this decision. (See Electoral Commission.)

Since 1876 Florida has been uniformly Democratic in politics. American Governors of Florida.

Territorial Governors. Andrew Jackson . . . 1821-1822 William P. Duval . . 1822-1834 John H. Eaton . . 1834—1835

Richard K. Call . . . 1 835-1 840 Robert R. Reid . . . 1840-1841 Richard K. Call . 1 841-1844

John Branch . . . 1 844-1 845 State Governors. William D. Moseley . 1845-1849 Democrat

Thomas Brown .... 1849-1853 Whig- James E. Broome .... 1853-1857 Democrat Madison S. Perry .... 1 857-1 861 „

John Milton 1861-1865

William Marvin .... 1865 Provisional

David S. Walker . . . 1 865-1 868 Democrat

Harrison Reed .... 1 868-1 872 Republican Ossian B. Hart .... 1873-1874 „ Marcellus L. Stearns . . . 1 874-1 877 „ George F. Drew .... 1877-1881 Democrat William D. Bloxham . . 1881-1885

Edward A. Perry . . . . 1885-1889 „ Francis P. Fleming . . . 1 889-1 893 „ Henry L. Mitchell . . . 1893-1897 „

William D. Bloxham . . . 1897-1901 „ William S. Jennings . . . 1901-1905 ,, Napoleon B. Broward . . . 1905-1909 ,, Albert W. Gilchrist . . 1909- „

Bibliography. — Physical and economic conditions are discussed in a pamphlet (591 pp.) published by the State Department of Agriculture, Florida, a Pamphlet Descriptive of its History, Topo- graphy, Climate, Soil, &c. (Tallahassee, 1904) ; in Climate, Soil and Resources of Florida (United States Department of Agriculture, Washington, 1882); A Preliminary Report on the Soils of Florida (United States Department of Agriculture, Division of Soils, Bulletin 13, 1898); C L. Norton's Handbook of Florida (2nd edition, New York, 1892); the volumes of the Twelfth Census of the United States (for 1900) which treat of Agriculture and Manufactures, and the Special Report on Mines and Quarries for 1902. J. N. Mac- Gonigle's " Geography of Florida " {National Geographic Magazine, vol. 7), T. D. A. Cockerell's " West Indian Fauna in Florida " {Nature, vol. 46), L. F. Pourtales's " Flora and Fauna of the Florida Keys " {American Naturalist, vol. 11), and C F. Millspaugh's Flora of the Sand Keys of Florida (Chicago, 1907), a Field Columbian Museum publication, are of value. To sportsmen, C B. Cory's Hunting and Fishing in Florida (Boston, 1896) and A. W. an<*

J. A. Dimock's Florida Enchantments (New York, 1308) are of interest. For administration, see Wilbur F. Yocum's Civil Government of Florida (De Land, Florida, 1904) ; and the Revised Statutes of Florida (1892).

The standard history is that by G. R. Fairbanks, History of Florida (Philadelphia, 1871). This should be supple- mented by D. G. Brinton's Notes on the Floridian Peninsula, its Literary History, Indian Tribes and Antiquities (Philadelphia, 1859), which has an excellent descriptive bibliography of the early ex- plorations ; Woodbury Lowery, The Spanish Settlements within the Present Limits of tlte United States (New York, vol. i., 1901 ; vol. ii., sub-title Florida, 1905) ; R. L. Campbell's Historical Sketches of Colonial Florida (Cleveland, 1892), which treats at length of the history of Pensacola; H. E. Chambers's West Florida and its Relation to the Historical Cartography of the United States (Johns Hopkins Studies in Historical and Political Science, Series 16, No. 5) ; and Herbert B. Fuller's Th-e Purchase of Florida; its History and Diplomacy (Cleveland, O., 1906). The only published collections of documents relating to the state are Buckingham Smith's Colleccion de varios documentos para la historia de la Florida y HerraS adyacentes (London, 1857), and Benjamin F. French's Historical Collections of Louisiana (New York, 1846-1875).

FLORIDABLANCA, DON JOSE MONINO Y REDONDO,

Count or (1728-1808), Spanish statesman, was born at Murcia in 1728. He was the son of a retired army officer, and received a good education, which he completed at the university of Salamanca, especially applying himself to the study of law. For a time he followed the profession of an advocate, and acquired a high reputation. A more public career was opened to him by the marquis of Esquilache, then chief minister of state, who sent him ambassador to Pope Clement XIV. Successful in his mission, he was soon after appointed by Charles III. successor to his patron, and his administration was one of the most brilliant Spain had ever seen. He regulated the police of Madrid, reformed many abuses, projected canals, established many societies of agriculture and economy and many philanthropical institutions, and gave encouragement to learning, science and the fine arts. Commerce flourished anew under his rule, and the long-standing disputes with Portugal about the South American colonies were settled. He sought to strengthen the alliance of Spain with Portugal by a double marriage between the members of the royal houses, designing by this arrangement to place ultimately a Spanish prince on the throne of Portugal. But in this he failed. Floridablanca was the right-hand man of King Charles III. in his policy of domestic reform, and was much under the influence of French philosophes and economic writers. Like other re- formers of that school he was a strong supporter of the royal authority and a convinced partisan of benevolent despotism. The French Revolution frightened him into reaction, and he advocated the support of the first coalition against France. He retained his office for

three years under Charles IV.; but in 1792, through the influence of the favourite Godoy, he was dismissed and imprisoned in the castle of Pampeluna. Here he was saved from starvation only by the intervention of his brother. He was afterwards allowed to retire to his estates, and remained in seclusion till the French invasion of 1808. He was then called by his countrymen to take the presidency of the central junta. But his strength failed him, and he died at Seville on the 20th of November of the same yea . He left several short treatises on jurisprudence.

See Obras originates del Conde de Floridablanca, edited, with biographical introduction, by A. Ferrer del Rio; in the BiiMcteca de Rivadeneyra, vol. lix.

FLORIDOR [Josi\s de Soulas, Sieur de Prinefosse] (d. c. 1671), French actor, was born in Brie early in the 17th century, the son of a gentleman of German family who had moved to France, married there, and become a Roman Catholic. The son entered the French army, but after being promoted ensign, quitted the army for the theatre, where he took the name of Floridor. His first Paris appearance was in 1640. Three years later he was called to the company at the Hdtel de Bour- gogne, where he played all the leading parts in tragedy and comedy and became the head of his profession. He was a man of superb physique and excellent carriage, with a flexible and sonorous voice, and manners of rare distinction and elegance, He was much liked at court , and Louis XIV. held him in particular esteem. He died in 1671 or 1672.

FLORIN, the name applied to several coins of the continent of Europe and to two coins struck in England at different times. The word comes through the Fr. florin horn the Ital. fiorino, flower, La,t.flos,florem. Fiorino was the Italian name of a gold coin issued at Florence in 1252, weighing about fifty-four grains. This coin bore on the obverse a lily, from which it took its name of ” the flower,” on the reverse the Latin name of the city Florentia, from which it was also known as a ” floience.” ” Florin ” and ” florence ” seem to have been used in English indiscriminately as the name of this coin. The Florentine florin was held in great commercial repute throughout Europe, and similar coins were struck in Germany, other parts of Italy, France, &c. The English gold florin was introduced by Edward III. in 1343, half and quarter florins being struck at the same time. This gold florin weighed 108 grains and was to be current for six shillings. It was found, however, to be overvalued in proportion to the silver currency and was demonetized the following year. The florin did not again appear in the English coinage until 1849, when silver coins with this name, having a

nominal value of two shillings (one- tenth of a pound), were struck. When first issued the ” Dei gratia ” was omitted from the inscription, and they were frequently referred to as the ” Godless ” or ” graceless ” florins. The D.G. was added in 1852. In 1887 a double florin or four shilling piece was issued, but its coinage was discontinued in 1890. The total value of double florins issued during these years amounted to £533,125. (See also Numismatics.)

FLORIO, GIOVANNI (i553?i < 525), English writer, was born in London about 1553. He was of Tuscan origin, his parents being Waldenses who had fled from persecution in the Valtelline and taken refuge in England. His father, Michael Angelo Florio, was pastor of an Italian Protestant congregation in London in 1550. He was attached to the household of Sir William Cecil, but dismissed on a charge of immorality. He dedicated a book on the Italian language to Henry Herbert, and may have been a tutor in the family of William Herbert, earl of Pembroke. Anthony a Wood says that the Florios left England on the accession of Queen Mary, but returned after her death. The son resided for a time at Oxford, and was appointed, about 1576 tutor to the son of Richard Barnes, bishopof Durham, then studying at Magdalen College. In 1578 Florio published a work entitled First Fruits, which yield Familiar Speech, Merry Proverbs, Willy Sentences, and Golden Sayings (4to). This was accompanied by A Perfect Induction to the Italian and English Tongues. The work was dedicated to the earl of Leicester. Three years later Florio was admitted a member of Magdalen College, and became a teacher of French and Italian in the univer sity. In 1 591 appeared his Second Fruits, to be gathered of Twelve Trees, of divers but delightsome Tastes to the Tongues of Italian and English men; to which was annexed the Garden of Recreation, yielding six thousand Italian Proverbs (4to). These manuals contained an outline of the grammar, a selection of dialogues in parallel columns of Italian and English, and longer extracts from classical Italian writers in prose and verse. Florio had many patrons; he says that he ” lived some years ” with the earl of Southampton, and the earl of Pembroke also be- friended him. His Italian and English dictionary, entitled A World of Words, was published in folio in 1598. After the accession of James I., Florio was named French and Italian tutor to Prince Henry, and afterwards became a gentleman of the privy chamber and clerk of the closet to the queen, whom he also instructed in languages. His magnum opus is the admirable translation of the Essayes on M or all, Politike, and Millitarie Discourses of Lo. Michaell de Montaigne, published in folio in 1603 in three books, each dedicated to two noble ladies. A second edition in 1613 was dedicated to the queen. Special interest attaches to the first edition

from the circumstance that of the several copies in the British Museum library one bears the autograph of Shakespeare — long received as genuine but now supposed to be by an 18th-century hand — and another that of Ben Jonson. It was suggested by Warburton that Florio is satirized by Shakespeare under the character of Holofernes, the

pompous pedant of Love's Labour's Losl,but it is much more likely, especially as he was one of the earl of Southampton's proteges, that he was among the personal friends of the dramatist, who may well have gained his knowledge of Italian and French from him. He had married the sister of the poet Daniel, and had friendly relations with many writers of his day. Ben Jonson sent him a copy of Volpone with the inscription, " To his loving father and worthy friend Master John Florio, Ben Jonson seals this testimony of his friendship and love." He is character- ized by Wood, in Athenae Oxonienses, as a very useful man in his profession, zealous for his religion, and deeply attached to his adopted country. He died at Fulham, London, in the autumn of 1625.

FLORIS, FRANS, or more correctly Frans de Vriendt, called Floris (1520-1570), Flemish painter, was one of a large family trained to the study of art in Flanders. Son of a stone- cutter, Cornelis de Vriendt, who died at Antwerp in 1538, he began life as a student of sculpture, but afterwards gave up carving for painting. At the age of twenty he went to Liege and took lessons from Lambert Lombard, a pupil of Mabuse, whose travels in Italy had transformed a style truly Flemish into that of a mongrel Leonardesque. Following in the footsteps if Mabuse, Lambert Lombard had visited Florence, and caught Ihe manner of Salviati and other pupils of Michelangelo and Del Sarto. It was about the time when Schoreel, Coxcie and Heemskerk, after migrating to Rome and imitating the master pieces of Raphael and Buonarroti, came home to execute Dutch- Italian works beneath the level of those produced in the peninsula itself by Leonardo da Pistoia, Nanaccio and Rinaldo of Mantua. Fired by these examples, Floris in his turn wandered across the Alps, and appropriated without assimilation the various mannerisms of the schools of Lombardy, Florence and Rome. Bold, quick and resolute, he saw how easy it would be to earn a livelihood and acquire a name by drawing for engravers and painting on a large scale after the fashion of Vasari. He came home, joined the gild of Antwerp in 1 540, and quickly opened a school from which 1 20 disciples are stated to have issued. Floris

painted strings of large pictures for the country houses of Spanish nobles and the villas of Antwerp patricians He is known to have illustrated the fable of Hercules in ten compositions, and the liberal arts in seven, for Claes Jongeling, a merchant of Antwerp, and adorned the duke of Arschot's palace of Beaumont with fourteen colossal panels. Comparatively few of his works have descended to us, partly because they came to be contemned for their inherent defects, and so were suffered to perish, partly because they were soon judged by a different standard from that of the Flemings of the 16th century. The earliest extant canvas by Floris is the " Mars and Venus ensnared by Vulcan " in the Berlin Museum (1547), the latest a " Last Judgment " (1566) in the Brussels gallery. Neither these nor any of the intermediate works at Alost, Antwerp, Copenhagen, Dresden, Florence, Leau, Madrid, St Petersburg and Vienna display any charm of originality in composition or in form. Whatever boldness and force they may possess, or whatever principles they may embody, they are mere appropriations of Italian models spoiled in translation or adaptation. Their technical execution reveals a rapid hand, but none of the lustre of bright colouring; and Moris owed much of his repute to the cleverness with which his works were transferred to copper by Jerome Cock and Theodore de Galle. Whilst Floris was engaged on a Crucifixion of 27 ft., and a Resurrection of equal size, for the grand prior of Spain, he was seized with illness, and died on the 1st of October 1 5 70 at Antwerp.

FLORUS, Roman historian, flourished in the time of Trajan and Hadrian. He compiled, chiefly from Livy, a brief sketch of the history of Rome from the foundation of the city to the closing of the temple of Janus by Augustus (25 B.C.). The work, which is called Epitome de T. Livio Bellorum omnium annorum DCC Libri duo, is written in a bombastic and rhetorical style, and is rather a panegyric of the greatness of Rome, whose life is divided into the four periods of infancy, youth, manhood and old age. It is often wrong in geographical and chronological

details; but, in spite of its faults, the book was much used in the middle ages. In the MSS. the' writer is variously given as Julius Florus, Lucius Anneus Florus, or simply Annaeus Floras. From certain similarities of style he has been identified with Publius Annius Florus, poet, rhetorician and friend of Hadrian, author of a dialogue on the question whether Virgil was an orator or poet, of which the introduction has been preserved.

The best editions are by O. Jahn {1852), C. Halm (1854), which contain the fragments of the Virgilian dialogue. There is an English

translation in Bohn's Classical Library.

FLORUS, JULIUS, poet, orator, and jurist of the Augustan age. His name has been immortalized by Horace, who dedicated to him two of his Epistles (i. 3; ii. 2), from which it would appear that he composed lyrics of a light, agreeable kind. The statement of Porphyrion, the old commentator on Horace, that Florus himself wrote satires, is probably erroneous, but he may have edited selections from the earlier satirists (Ennius, Lucilius, Varro). Nothing is definitely known of his personality, except that he was one of the young men who accompanied Tiberius on his mission to settle the affairs of Armenia. He has been variously identified with Julius Florus, a distinguished orator and uncle of Julius Secundus, an intimate friend of Quintilian (Instit. x. 3,13); with the leader of an insurrection of the Treviri (Tacitus, Ann. iii. 40); with the Postumus of Horace (Odes, ii. 14) and even with the historian Florus.

FLORUS, PUBLIUS ANNIUS, Roman poet and 'rhetorician, identified by some authorities with the historian Florus (q.v.). The introduction to a dialogue called Virgilius orator an poeta is extant, in which the author (whose name is given as Publius Annius Florus) states that he was born in Africa, and at an early age took part in the literary contests on the Capitol insti- tuted by Domitian. Having been refused a prize owing to the prejudice against African provincials, he left Rome in disgust, and after travelling for some time set up at Tarraco as a teacher of rhetoric. Here he was persuaded by an acquaintance to return to Rome, for it is generally agreed that he is the Florus who wrote the well-known lines quoted together with Hadrian's answer by Aelius Spartianus (Hadrian 1 6) . Twenty-six trochaic tetrameters, De qualitate vitae, and five graceful hexameters, De rosis, are also attributed to him. Florus is important as being the first in order of a number of 2nd-century African writers who exercised a considerable influence on Latin literature, and also the first of the poetae neoterici or novelli (new-fashioned poets) of Hadrian's reign, whose special characteristic was the use of lighter and graceful metres (anapaestic and iambic dimeters), which had hitherto found little favour.

The little poems will be found in E. Bahrens, Poetae Latini minores (1879-1883) ; for an unlikely identification of Florus with the author of the Pervigilium Veneris (q.v.) see E. H. O. Miiller, De P. Annio Floro poeta et de Pervigilio Veneris (1855), and, for the poet's re- lations with Hadrian, F. Eyssenhardt, Hadrian und Florus (1882) ; see also F. Marx in Pauly-Wissowa's Realencyclopddie, i. pt. 2 (1894).

FLOTOW, FRIEDRICH FERDINAND ADOLF VON, Freiherr

(1812-1883), German composer, was born on his father's estate at Teutendorf, in Mecklenburg, on the 27th of April 1812. Destined originally for the diplomatic profession, his passion for music induced his father to send him to Paris to study under Reicha. But the outbreak of the revolution in 1830 caused his return home, where he busied himself writing chamber- music and operetta until he was able to return to Paris. There he produced Pierre et Catherine, Rob Roy, La Duchesse de Guise, but made his first real success with Le Naufrage de la Miduse at the Renaissance Theatre in 1838. Greater, however, was the success which attended Stradella (1844) and Martha (1847), which made the tour of the world. In 1848 Flotow was again driven home by the Revolution, and in the course of a few years he produced Die Grossfurstin (1850), Indra (1853), Rubezahl (1854), Hilda (1855) and Albin (1856). From 1856 to 1863 he was director (Intendant) of the Schwerin opera, but in the latter year he returned to Paris, where in 1869 he produced V Ombre. From that time to the date of his death he lived in Paris or on his estate near Vienna. He died on trie 24th of

January 1883. Of his concert-music only the Jubelouvertiire is now ever heard. His strength lay in the facility of his melodies.

FLOTSAM, JETSAM and LIGAN, in English law, goods lost at sea, as distinguished from goods which come to land, which are technically designated wreck. Jetsam (the same word as jettison, from Lat. jactare, to throw) is when goods are cast into the sea, and there sink and remain under water; flotsam (floatsbn, from float, Lat. flottare) is where they continue floating on the surface of the waves; ligan (or lagan, from lay or lie) is where they are sunk in the sea, but tied to a cork or buoy in order to be found again. Flotsam, jetsam and ligan belong to the sovereign in the absence only of the true ownerj Wreck, on the other hand {i.e. goods cast on shore), was by the common law adjudged to the sovereign in any case, because it was said by the loss of the ship all property was gone out of the original owner. This singular distinction which treated goods washed ashore as lost, and goods on and in the sea as not lost, is no doubt to be explained by the primitive practice of plundering wrecked ships. (See Wrecjc.)

FLOUNDER, a common term for flat-fish. The name is also more specially given to certain varieties, according to local usage. Thus the Pleuronectes flesus is the common flounder of English terminology, found along the coasts of northern Europe from the Bristol Channel to

Iceland. It is particularly partial to fresh water, ascending the Rhine as: far as Cologne. It rarely exceeds a length of 12 in. or a weight of.ij lb. In American terminology the principal fish of the name are the ” summer flounders ” or ” deep-sea flounders,” also known in America as ” plaice ” {Paralichthys dentatus), as long as 3 ft. and as heavy as 15 lb; the “four-Spotted flounders” (Para- lichthys oblongus); the “common” or “winter” flounder {Pseudo pleuronectes americanus) ; the “diamond flounder” (Hysopsetta guttulata) ; and the ” pole flounder ” {Glyptocephalus cynoglossus).

FLOUR and FLOUR MANUFACTURE. The term ” flour ” (Fr. flew, flower, i.e. the best part) is usually applied to the triturated farinaceous constituents of the wheat berry (see Wheat) ; it is, however, also used of other cereals and even of leguminoids when ground into a fine powder, and of many other substances in a pulverulent state, though in these cases it is usual to speak of rye flour, bean flour, &c. The flour obtained from oats is generally termed oatmeal. In Great Britain wheaten flour was commonly known in the 1 6th and 17th centuries as meal, and up to the beginning of the 19th century, or perhaps later, the term mealing trade was not infrequently used of the milling trade.

The ancestor of the millstone was apparently a rounded stone about the size of a man’s fist, with which grain or nuts were pounded and crushed into a rude meal. These stones grinding. are generally of hard sandstohe and were evidently used against another stone, which by dint of continual hammering was broken into hollows. Sometimes theˆ crusher was used on the surface of rocks. St Bridget’s stone, on the shore of Lough Macnean, is supposed to have been a primitive Irish mill; there are many depressions in the face of the table L like rock, and it is probable that round this stone several women (for in early civilization the preparation of flour was peculiarly the duty of the women) would stand and grind, or rather pound, meal. Many such stones, known as Bullan stones, still exist in Ireland. Similar remains are found in the Orkneys and Shetlands, and it is on record that some of these stones have been used for flour-making within historic times. Richard Bennett in his History of Corn Milling remarks that the Seneca Indians to this day boil maize and crush it into a paste between loose stones. In the same way the Omahas pound this cereal in holes in the rocks, while the Oregon Indians parch and pound the capsules of the yellow lily, much after the fashion described by Herodotus in his account of the ancient Egyptians. In California the Indian squaws make a sort of paste by crushing acorns between a round stone or ” muller,” and a cuplike hollow in the surface of a rock. Crushing stones are of different shapes, ranging

Saddle- stone.

Quern.

from the primitive ball-like implement to an elongated shape resembling the pestle of a mortar. Mullers of the latter type are not infrequent among prehistoric remains in America, ‘while Dr Schliemann discovered several ■ specimens of the globular form on the reputed site of the city of Troy, and also among the ruins of Mycenae. As ‘a matter of fact stone mullers survived in highly civilized countries into modern days, if indeed they are now altogether ‘extinct. ‘

The saddle-stone is the connecting link between the primitive pounder, or muller, and the qitern, which was itself the direct ancestor of the millstones still used to some extent in the manufacture’ of fldur. ■ The saddle-stone, the first true grinding implement, consisted of a stone with a more or less concave face on which the grain was spread, and in and along this hollow surface it was rubbed and ground into coarse meal. Saddle-stories have been discovered in the sand caves of Italy, among the lake dwellings of Switzerland, in the dolmens of France, in the pit dwellings of the British Isles, and among the remains of primitive folk all the world over. The Romans of the classical period seem to have distinguished the saddle-stone from the quern. We find illusions to the mola trusatilis, which may be translated ” the thrusting mill “; this would fairly describe a backwards and forwards motion. The mola versatilis evidently referred to the revolving millstone or quern. In primitive parts of the world the saddle-stone is not yet extinct, as for instance in Mexico. It is known as the metaia, and is used both for grinding maize and for making the maize cakes known as tortillas. The same implement is apparently still in use in some parts of South America, notably in Chile.

According to Richard Bennett, the quern, the first complete milling machine, originated in Italy and is in all probability not older than the 2nd century B.C. This is, however, a controverted point. Querns are still used in most primitive countries, nor is it certain that they have altogether disappeared from remoter districts of Scotland and Ireland. Whatever was their origin, they revolutionized flour milling. The rotary motion of millstones became the essential principle of the trituration of grain, and exists to-day in the rolls of the roller mill. The early quern appears to have differed from its descendants in that it was somewhat globular in shape, the lower stone being made conical, possibly with the idea that the ground flour should be provided with a

downward flow to enable it to fall from the stones. This type did not* however, persist. Gradually the convexity disappeared and the surface of the two stones became flat or very nearly so. In the upper stone was a species of funnel, through which the grain passed as through a hopper, making its way thence, as the stone revolved, into the space between the running and the ; bed stone. The ground meal was discharged at the periphery. The runner, or upper stone, was provided with a wooden handle by which the 1 stone was revolved: The typical Roman mill of the Augustan age may' be seen at Pompeii. Here, in what is believed to have been a public pisirinum or mill, were found four pairs of mill- stones. The circular base of these mills is 5 ft. in diameter and

1 ft. highland upon it was fastened the meta, a blunt cone abbut

2 ft. high, on which fitted the upper millstone or catillus, also conical. These mills were evidently rotated by slave labour, as there was no room for the perambulation of a horse or donkey, while the sideˆlugs in which the handle-bars were inserted are plainly visible. Slave labour was generally used up to the introduction of Christianity, but was finally abolished by the emperor Constahtine, though even after his edict mills continued to be driven by criminals.

The Romans are credited by some authorities with- having first applied power to the driving of millstones, which ! they connected with water-wheels by a horizontal spindle through the intervention of bevel gearing. • But long P Mrer. after millstones had been- harnessed to water power slave labour was largely employed as a motive force. The water- mill of the. Romans was introduced at a relatively early period into Britain. Domesday Book shows that England was covered by mills of a kind at the time of the Norman conquest, and

mentions some 500 mills in the counties of Norfolk and Suffolk alone. No doubt the mala of Domesday Book consisted of one pair of stones connected by rude gearing with a water-wheel. Windmills are said to have been introduced by the Crusaders, who brought them from the East. Steam power is believed to have been first used in a British flour mill towards the close of the 1 8th century, when Boulton & Watt installed a steam engine in the Albion Flour Mills in London,, erected under the care of John Rennie. Another great engineer, Sir William Fairbairn, in the early days of the 19th century, left the impress of his

genius on the mill and all its accessories. He was followed by other clever engineers, and in the days immediately preceding the roller period many improvements were introduced as regards the balancing and driving of millstones. The introduction of the blast and exhaust to keep the stones cool was a great step in advance, while the substitution of silk gauze for woollen or linen bolting cloth, about the middle of the 19th century, marked another era in British milling. Millstones, as used just before the introduction of roller milling, were from 4 to 45 ft. in diameter by some 1 2 in. in thickness, and were usually made of a siliceous stone, known as buhr-stone, much of which came from the quarry of La Fert6-sous-Jouarre, in France.

Nine-tenths, or perhaps ninety-nine hundredths, of all the flour consumed in Great Britain is made in roller mills, that is,

mills in which the wheat is broken and floured by mining. means of rollers, some grooved in varying degrees

of fineness, some smooth, their work being preceded and supplemented by a wide range of other machinery. All roller mills worthy of the name are completely automatic, that is to say, from the time the raw material enters the mill warehouse till it is sacked, either in the shape of finished flour or of offals, it is touched by no human hand.

The history of roller milling extends back to the first half of the 19th century. Roller mills, that is to say, machines fitted with rolls set either horizontally, or vertically, or obliquely, for the grinding of corn, are said to have been used as far back as the 17th century, but if this be so it is certain that they Were only used in a tentative manner. Towards the middle of the roth century the firm of E. R. & F. Turner, of Ipswich, began to build roller mills for breaking wheat as a preliminary to the conversion of the resultant middlings on millstones. The rolls were made of chilled iron and were provided with serrated edges, which must have exercised a tearing action on. the integuments of the berry. These mills were built to the design of a German engineer, of the name of G. A. Buchholz, and were exhibited at the London exhibition of r862, but they never came into general use. It has also been stated that as early as 1823 a French engineer, named Collier, of Paris, patented a roller mill, while five years later a certain Malar took out another French patent, the specification of which speaks of grooves and differential Speeds. But the direct ancestors of the roller mills of the present day were brought out some time in the third decade of the 19th century by a Swiss engineer named Sulzberger. His apparatus was rather cumbrous, and the chilled iron

rolls with which it was fitted consumed a large amount of power relatively to the work effected. But the Pester Walz-Muhle, founded in 1839 by Count Szechenyi, a Hungarian nobleman, which took its name from the roller mills with which it was equipped by Sulz-berger, was for many years a great success; some of its roller mills are said to have been kept at work for upwards of forty years, and one at least is preserved in the museum at Budapest. It may be noted that Hungarian wheat is hard and flinty and well adapted for treatment by rolls. Moreover, gradual reduction,

as now understood, was more or less practised in practice.*" Hungary, even before the introduction of roller

milling. Though millstones, and not rolls, were used, yet the, wheat was not floured at one operation, as in typical low or flat grinding, but Was reduced to flour in several successive operations. In the first break the stones would be placed just wide enough apart to "end " the wheat, and in each succeeding operation the stones were brought closer together. But Hun- garian milling was not then automatic in the sense in which

British millers understand the word. For a long time a great deal of hand labour was employed in the merchant mills of Budapest in carrying about products from one machine to another for further treatment. This practice may have been partly due to the cheap labour available, but it was also the deliberate policy of Hungarian millers to handle in this way the middlings and fine " dunst," because it was maintained that only thus could certain products be delivered to the machine by which they were to be treated in the perfection of cdndition. The results were good so far as the finished products were con- cerned, but in the light of modern automatic milling the system appears uneconomical. Not only did it postulate an inordinately large staff, but it further increased the labour bill by the demand it made on the number of sub-foremen who were occupied in classifying, largely by touch, the various products, and directing the labourers under them. Hungarian milling still differs widely from milling as practised in Great Britain in being a longer system. This is due to the more minute subdivision of products, a necessary consequence of the large number of grades of flour and offals made in Hungary, where there are many intermediate varieties of middlings and " dunst " for which no corresponding terms are available in an English miller's vocabulary.

It will be convenient here to explain the meaning of three terms constantly used by millers, namely, semolina, middlings and dunst.

These three products of roller mills are practically identical in composition, but represent f£Jj}2Jj”£ different stages in the process of reducing the endo- dunst. sperm of the wheat to flour. A wheat berry is covered by several layers of skin, while under these layers is the floury kernel or endosperm. This the break or grooved rolls tend to tear and break up. The largest of these more or less cubical particles are known as semolina, whilst the medium-sized are called middlings and the smallest sized termed dunst. The last is a German word, with several meanings, but is used in this particular sense by German and Austrian millers, from whom it was doubtless borrowed by the pioneers of roller milling in England. If we were to lay a sample of fairly granular flour beside a sample of small dunst the two would be easy to dis- tinguish, but place a magnifying glass over the flour and it would look very like the dunst. If we were to repeat this experi- ment on dunst and fine middlings, the former would under the glass present a strong resemblance to the middlings. The same effect would be produced by the putting side by side of large middlings and small semolina. This is a broad description of semolina, middlings and dunst. Semolina and middlings are more apt to vary in appearance than dunst, because the latter is the product of the later stages of the milling process and represents small particles of the floury kernel tolerably free from such impurities as bran or fluff. The flour producing middlings must not be confounded with the variety of wheat offal which is also known to many English millers as middlings. This consists of husk or bran, more or less comminuted, and with a certain proportion of floury particles adherent. It is only fit for feeding beasts.

The spread of roller milling on the continent of Europe was undoubtedly accelerated by the invention of porcelain rolls, by Friedrich Wegmann, a Swiss miller, which were brought into general use in the seventh decade of the ro J£* ” ” 1 9th century, and are still widely employed. They are admirably fitted for the reduction of semolina, middlings and dunst into flour; and for reducing pure middlings, that is, middlings containing no bran or wheat husk, there is perhaps nothing that quite equals them. They were introduced into Great Britain in 1877, or thereabouts, and were used for several years, but ultimately they almost disappeared from British mills. This was partly due to the fact that as made at that date they were rather difficult to work, as it was not easy to keep the rolls perfectly parallel. Another drawback was their in- adaptability to over-heavy feeds, to which the British, and perhaps still more the American, miller is frequently obliged to resort. However, since the beginning of the 20th century some of the most advanced flour mills in England have again

la England.

taken to using porcelain rolls for some part of their reduction process.

The birth of roller milling in Great Britain may be said to date from 1872, when Oscar Oexle, a German milling engineer, Roller erected a set of roller mills in the Tradeston Mills, milling in Glasgow. This was long before the introduction of automatic roller mills. But the foundations of the millstone system were not seriously disturbed till 1877, when a party of leading British and Irish millers visited Vienna and Budapest with the object of studying roller milling in its native home. In 1878 J. H. Carter installed in the mill of J. Boland, of Dublin, what was probably the first complete automatic roller plant erected in the United Kingdom, and in i88r a milling exhibition held at the Royal Agricultural Hall, London, showed the automatic roller system in complete opera- tion. From that time the roller system made great progress. By 1885 many of the leading British millers had installed full roller plants, and in the succeeding ten years small roller plants were installed in many country mills. For a time there was a transition stage in which there was in operation a number of so- called ” combined ” plants, that is to say, mills in which the wheat was broken on millstones or disk mills, while the middlings were reduced by smooth rolls; but these gradually dropped out of being.

Well-found British flour mills at the present time are probably the best fitted in the world, and as a whole have nothing to fear from comparison with their American competitors. It is true that American millers were rather quicker to copy Hungarian milling methods so far as gradual reduction was concerned. But from about 1880 the British miller was quite awake to his position and was straining every nerve to provide himself with a plant capable of dealing with every kind of wheat. It has often been said that he commands the wheat of the whole world. This is true in a sense, but it is not true that he can always command the exact kind of wheat he requires at the price required to meet foreign competition. Therein he is at a dis- advantage. But engineers have done their best to meet this weak point, and by their assistance he is able to compete under almost all conditions with the millers of the whole world.

Processes of Milling. — Fully to appreciate the various processes of modern milling, it must be remembered not only that the wheat as

delivered at the mill is dusty and mixed with sand and even more objectionable refuse, but also that it contains many light grains and seeds of other plants. It is not therefore sufficient for the miller to be able to reduce the grain to flour on the most approved principles; he must also have at command the means of freeing it from foreign substances, and further of ” condition- ing ” it, should it be damp or over dry and harsh. Again, his operations must be conducted with reference to the structure of the wheat grain. The wheat berry is a fruit, not a seed, the actual seed being the germ or embryo, a kidney-shaped body which is found at the base of the berry and is connected with the plumule or root. The germ is tough in texture and is in roller milling easily separated from the rest of the berry, being flattened instead of crushed by the rolls and thus readily sifted from the stock. The germ contains a good deal of fatty matter, which, if allowed to remain, would not increase the keeping qualities of the flour. Botanists distinguish five skins on the berry — epidermis, epicarp, endicarp, episperm and embryous membrane — but for practical purposes the number of integuments may be taken as three. The inner skin is often as thick as the outer and second skins together, which are largely composed of woody fibre; it contains the cerealin or aleurone cells, but although these are made up of a certain proportion of proteids, on account of the discolouring and diastasic action of the cerealin in flour they are best eliminated. The endosperm, or floury kernel, coming next to the inner skin, consists of starch granules which are caught as it were in the minute meshes of a net. This network is the gluten, and it may be noted that these meshes are not of equal consistency throughout the berry, but are usually finer and more dense near the husk than in the interior of the kernel. This glutinous portion is of great importance

to the baker because on its quantity and quality depends the ” strength ” or rising power of the flour, and the aim of modern roller milling is to retain it as completely as possible, a matter of some difficulty owing to its close adherence to the husk, especially in the richest wheats. Another organ of the wheat berry which has a most important bearing on the work of the miller is the placenta, which is in effect a cord connecting the berry with its stalk or straw. The placenta serves to filter the food which the plant sucks up from the ground; it passes up the crease of the berry, and is enfolded in the middle skin, being protected on the outer side by the first and having the third or inner skin on its other side. A good deal of the matters filtered by the placenta are mineral in their nature, and such portions as are not digested remain in the crease. This is the matter which millers call ” crease dirt.” It is highly discolouring to flour, and must

be carefully eliminated. The fuzzy end of the berry known as the beard also has a distinct function; its hairs are in reality tubes which serve to carry off superfluous moisture. They have, in common with the bran, no nutritive value. (See also Wheat.)

In the old ” flat ” or ” low ” milling the object was to grind as perfectly as possible, at one operation, the central substance of the grain, constituting the flour, and to separate it from the embryo and outer skins constituting the bran. In ” high ” milling, on the other hand, the grinding is effected in a series of operations, the aim being to get a» much semolina and middlings as possible from the wheat, and to make as. little flour as possible during the earlier or ” breaking ” part of the process. It is impossible altogether to avoid the production of flour at this stage, but properly set and worked break-rolls will make as little as 15% of “break-flour,” which is of less value, being contaminated with crease dirt, arid also because it is weak owing to the absence of the gluten cells which adhere more readily to the middlings. Whole wheaten flour, some- times called Graham flour, consists of the entire grain ground up to a uniform mass.

Wheat cleaning has been well called the foundation of all good milling. In the screen house, as the wheat-cleaning department of the mill is termed, will be found an array of machinery almost equal in range and varietv to that in the mill “j 7 itself. The wheat, drawn by an elevator from the barge, cfcaflil W- or hoisted in sacks, is first treated by a machine known as a ware- house separator. This apparatus accomplishes its work by means of flat sieves, some of which will be of much coarser mesh than others, and of air currents, the adjustment of which is a more delicate task than might appear. The warehouse separator serves to free dirty wheat of such impurities as lumps of earth, stones, straws and sand, not to mention small seeds, also some maize, oats and barley. Great care has to be exercised in all operations of the screen house lest wheat should pass away with the screenings. Besides the warehouse separator, which is made in different types’ and sizes, grading and sorting cylinders, and what are known as cockle and barley cylinders, are much used in the screen house. These cylinders are provided with indents so shaped and of such size as to catch seeds which are smaller than wheat, and reject grains, as of barley or oats, which are longer than wheat. Sorting cylinders should be followed by machines known as scourers, the function of which is to free the wheat from adherent impurities. These machines are of different types, but all depend on percussive action. A vertical scourer consists of a number of steel or iron beaters attached to a vertical spindle which revolves inside a metallic woven or perforated casing, the whole being fitted with an effectual exhaust.

Scourers with horizontal spindles are also in great favour. Not every wheat is suitable for scouring, but some wheats are so mingled with im- purities that a severe action between the beaters and the perforated case is absolutely necessary. The most efficient scourer is that which frees the wheat from the greatest amount of impurity with a mini- mum of abrasion. The beaters should be adjustable to suit different kinds of wheat. Scourers are followed by brush machines which are similar to the last arid are of three distinct types: solid, divided and cone brushes. In the solid variety the brush surface is continu- ous around the circumference of a revolving cylinder; in divided brushes there is often a set of beaters or bars covered with brush but leaving intermediate spaces; while the cone brush "consists of beaters covered with fibre arranged like cones around a vertical spindle. The object of all these brushes, the cylinder containing them being fitted with an exhaust fan, is to polish the. wheat and remove adhering impurities which the percussive action of the scourer may have failed to eliminate, also to remove the beard or fuzzy end and any loose portions of the outer husk. But the miller must be careful not to overdo the scouring action and unnecessarily abrade the berry, else he will have trouble with his flour, the tritu- rated bran breaking under the rolls and producing powder which will discolour the break flour. To remove such metallic fragments as nails, pieces of wire, &c, magnets are used. These may either

be of horseshoe shape, in which case they are usually set at the head of the wheat spouts, or they may consist of magnetized plates set at angles over which the wheat will slide. It is not a bad plan to place the magnets just before the first set of break-rolls, where they should ensure the arrest of steel and iron particles, which might otherwise get between the rolls and spoil the edges of their grooves, and also do damage to the sifting machines. Mention must also be made of the automatic scales which are used to check the milling value of the wheat. In principle these machines are all the same, though details of construction may vary. Each weigher is set for a given weight of grain. As soon as the receiving chopper has poured through a valve into the recipient or skip, which is hung at one end of a beam scale, a load of grain sufficient to overcome the weight hung at the other end of the beam, the inlet of grain is auto- matically cut off and the skip is discharged, automatically returning to take another charge. Each weighing is automatically recorded on a dial. In this way a record can be kept of the gross weight of the uncleaned wheat entering the

warehouse and of the net weight of the cleaned wheat. The difference between the two weighings will, of course, represent the loss by cleaning. The percentage of flour obtained from a given wheat can be ascertained in the mill itself. In practice the second weigher is placed just before the first break.

The cleansing of wheat by washing only became a fine art at the close of the 19th century, though it was practised in the north of England some twenty years earlier. Briefly it may be said *Y et that certain wheats are washed to free them from extrane-

cleanlag QUS matters gˆb as adherent earth and similar impurities «#«/ C °l”’ w hi cn could not be removed by dry cleaning without

°” “Z- unc j ue abrasion. Such wheats are Indians, Persians and hard Russians, and these require not only washing but also condition- ing, by which is meant mellowing, before going to the rolls. With another class of wheats, such as the softer Russians and Indians, spring Americans and Canadians, hard American winters, Cali- fornians and the harder River Plates, washing and conditioning by heat is also desirable, though care must be exercised not to let the moisture penetrate into the endosperm or floury portion of the kernel. In a third and distinct class fall soft wheats, such as many kinds of Plates, soft Russians and English wheat. It is generally admitted that while wheat of the first two divisions will benefit from the application of both moisture and heat, wheat of the third class must be washed with great circumspection. The object of washing machines is to agitate the wheat in water till the adherent foreign matters are washed off and any dirt balls broken up and drained off in the waste water. To this end some washers are fitted with Archi- medean worm conveyors set either at an inclined angle or horizon- tally or vertically; or the washer may consist of a barrel revolving in a tank partly filled with water. Another function of washing machines is to separate stones of the same size which are found in several varieties of wheat. This separation is effected by utilizing a current of water as a balance strong enough to carry wheat but not strong enough to carry stones or bodies of greater specific gravity than wheat. This current may be led up an inclined worm or may flow horizontally over a revolving tray. The washer is followed by a whizzer, which is an apparatus intended to free the berry by purely mechanical means from superfluous moisture. The typical whizzer is a vertical column fed at the bottom and delivering at the top. The wet wheat ascends by centrifugal force in a spiral direction round the column to the top, and by the time it is discharged from the spout at the top it has thrown off from its outer skin almost all its moisture, the water escaping through the perforated

cover of the machine. But there still remains a certain amount of water which has penetrated the integuments more or less deeply, and to condition the berry it is treated by a combination of hot and cold air. The wheat is passed between perforated metal plates and subjected to a draught first of hot and then of cold air. The perforated plates are usually built in the shape of a column, or leg as it is often called, and this is provided with two air chambers, an upper one serving as a reservoir for hot, and the lower for cold air. The air from both chambers is discharged by pressure through the descending layers of wheat, which should not be more than an inch thick; the air is drawn in by a steel-plate fan, which is often provided with a divided casing, one side being used for cold, andtheotherforhotair. Coupled with the hot air side is a heater consisting of a series of circulating steam-heated pipes. The temperature of the heated air can be regulated by the supply of steam to the heater. This process of washing and conditioning, one of the most important in a flour mill, is characteristically British; millers have to deal with wheats of the most varied nature, and one object of conditioning is to bring hard and harsh, soft and weak wheats as nearly as possible to a common standard of condition before being milled. Wheat is some- times washed to toughen the bran, an end which can also be attained by damping it from a spraying pipe as it passes along an inclined worm. Another way of toughening bran is to pass wheat through a heated cylinder, while again another process known as steaming consists of injecting steam into wheat as it passes through a metal hopper. Here the object is to cleanse to some extent, and to warm and soften (by the condensation of moisture on the grain), but these processes are imperfect substitutes for a full washing and condition- ing plant. Hard wheats will not be injured by a fairly long im-

mersion in water, always provided the subsequent whizzing and dry- ing are efficiently carried out. The second class of semi-hard wheats already mentioned must be run more quickly through the washer and treed from the water as rapidly as possible. Still more is this necessary with really soft wheats, such as soft River Plates and the softer English varieties. Here an immersion of only a few seconds is desirable, while the moisture left by the water must be immediately and energetically thrown off by the whizzer before the grain enters the drier. Treated thus, soft wheats may be improved by washing. It is claimed that hard wheats, like some varieties of Indians, are positively improved in flavour by conditioning, and this is probably true; certain it is that English country millers, in seasons when native wheat was scarce and dear, and Indian wheat was abundant and cheap, have found the latter, mellowed by conditioning, to be an excellent substitute.

Wheats which have been exposed to the action of water during harvest do not necessarily yield unsound flour; the matter is a question of the amount of moisture absorbed. But it must be remembered that it is not so much the water Effect 0/ itself which degrades the constituents of the wheat ” am P- (starch and gluten) as the chemical changes which the dampness produces. Hence perhaps the best remedy which can be found for damp wheat is to dry it as soon as it has been harvested, either by kiln or steam drier at a heat not exceeding 120° F., until the moisture has been reduced to 10 % of the whole grain. The flour made from wheat so treated may be weak, but will not usually be unsound. The practice of drying damp flour has also good results. Long before the roller milling period it was found that only flour which had been dried (in a kiln) could safely be taken on long sea voyages, especially when the vessel had to navigate warm latitudes. It may be noted that in the days of millstone milling it was far more difficult to produce good keeping flour. The wheat berry being broken up and triturated in one operation, the flour necessarily contained a large proportion of branny particles in which cerealin, an active diastasic constituent, was present in very sensible proportions. Again, the elimination of the germ by the roller process is favourable to the production of a sounder flour, because the germ contains a large amount of oleaginous matter and has a strong diastasic action on imperfectly matured starches. The tendency of flours containing germ to become rancid is well marked. During the South African War of 1899-1902 the British army supply department had a practical proof of the diastasic action of branny particles in flour. Soldiers’ bread is not usually of white colour, and the military authorities not unnaturally believed that comparatively low-grade flour, if sound, was eminently suitable for use in the field bakeries. But in the climate of South Africa flour of this description soon developed considerable acidity. Ultimately the supply department gave up buying any but the driest patent flours, and it is understood that the most suitable flour proved to be certain patents milled in Minneapolis, U.S.A., from hard spring wheat. Not only did they contain a minimum of branny and fibrous matters, but they were also the driest that could be found.

After being cleaned the wheat berry is split and broken up into increasingly fine pieces by fluted rolls or ” breaks.” In the earlier years of roller milling it was usual to employ more breaks than is now the case. The first pair of break-rolls used Break- to be called the splitting rolls, because their function was rolls. supposed to be to split the berry longitudinally down its crease, so as to give the miller an opportunity of removing the dirt between the two lobes of the berry by means of a brush machine. The dirt was in many cases no more than the placenta

already described, which shrivelling up took, like all vegetable fibre, a dark tint. The neat split along the crease was not, however, achieved in more than 10% of the berries so treated. Where such rolls are still in use they are really serving as a sort of adjunct to the wheat-cleaning system. Four or five breaks are now thought sufficient, but three breaks are not recommended, except in very short systems for small country mills. Rolls are now used up to 60 in. in length, though in one of the most approved systems they never exceed 40 in. ; they are made of chilled iron, and for the breaking of wheat are provided with grooving cut at a slight twist, the spiral averaging J in. to the foot length, though for the last set of break-rolls, which clean up the bran, the spiral is sometimes increased to 5 in. per foot. The grooves should have sharp edges because they do better work than when blunt, giving larger semolina and middlings, with bran adherent in big flakes; small middlings, that is, little pieces of the endosperm torn away by blunt grooves, and comminuted bran, make the pro- duction of good class flour almost impossible; cut bran, moreover, brings less money. The break-rolls should never work by pressure, but nip the material fed between them at a given point ; to cut or shear, not to flatten and crush, is their function. Rolls may be set either horizontally or vertically; an oblique setting has also come into favour. The feed is of the utmost importance to the correct working of a roller mill. The material should be fed in an even stream, not too thick, and leaving no part of the roll uncovered. The two rolls of each pair are run at unequal speeds, 2§ to 1 being the usual ratio on the three first breaks, while the last break is often speeded at 3 to I or 3! to I ; in one of the oblique mills the difference is obtained by making the diameter of one roll 13 and of the other 10 in. and running them at equal speed. For break-rolls up to 36 in. in

length 9 in. is the usual diameter; for longer rolls 10 in. is the standard. To do good work rolls must run in perfect parallelism; otherwise some parts of the material will pass untouched, while others will be treated too severely.

The products of the break-rolls are treated by what are known as scalpers, which are simply machines for sorting out these products Scaloers ˆ or Iurt; her treatment. Scalpers may either be revolving ‘ reels or flat sieves. The sieve is the favourite form of scalper on account of its gentle action. Scalping requires a separat- ing and sifting, not a scouring action. The break products are usually

separated on a sieve covered with wire or perforated zinc plates. Generally speaking, two sieves are in one frame and are run at a slight incline. The throughs of the top sieve fall on the sieve below, while the rejections or overtails of the first sieve are fed to the next break. The ” throughs,” or what has passed this sieve, are graded by the next sieve, the tailings going to a purifier, while the throughs may be freed from what flour adheres to them by a centri- fugal dressing machine and then treated by another purifier. A form of scalper which has come into general use on the continent of Europe, and to a lesser extent in Great Britain and America, is known as the plansifter. This machine, of Hungarian origin, is simply a collection of superimposed flat sieves in one box, and will bcalp or sort out any kind of break stock very efficiently. A system of grading the tailings, that is, the rejections of the scalpers, intro- duced by James Harrison Carter (Carter-Zimmer patent), was known as pneumatic sorting. Its object was to supplement the work of the scalpers by classifying the tailings by means of air-currents. To this end each scalper was followed by a machine arranged some- what like a gravity purifier; that is to say, a current of air drawn through the casing of the sorter allowed the heaviest and best material to drop down straight, while the lighter stuff was deposited in one or other of further compartments formed by obliquely placed adjustable cant boards. So searching was this grading, that from the first sorter of a four-break plant four separations would be obtained, the first going to the second break, the second joining the first separation from the second sorter and being fed to the third break, while the third went with the best separation of the third sorter to the fourth break, and the last separation from all the sorters went straight into the bran sack. The work of the break-rolls was greatly simplified and reduced by this sorting process, as each particle of broken wheat went exactly to that pair of break-rollers for which it was suitable, instead of all the material being run indiscriminately through all the break-rollers and thereby being cut up with the necessary result of increasing the production of small bran.

The object of the purifier, a machine on which milling engineers have lavished much thought and labour, is to get away from the _ .„ semolina and middlings as much impure matteras possible,

n ‘ that those products may be pure, as millers say, for reduction to flour by the smooth rolls. The purifiers used in British mills take advantage of the fact that the more valuable portions of the wheat berry are heavier than the less valuable particles, such as bran and fibrous bodies, and a current of air is employed to weigh these fragments of the wheat berry as in a balance and to separate them while they pass over a silk-covered sieve. To this end the semolina or

middlings are fed on a sieve vibrated by an eccentric and set at a slight downward angle. This sieve is installed in an air-tight longitudinal wooden chamber with glass windows on either side, through which the process of purifying can be watched. Up- wards through this sieve a fan constantly draws a current of air, which, raising the stock upwards, allows the heavier and better material to remain below while the lighter particles are lifted off and fall on side platforms or channels, whence they are carried forward and delivered separately. The good material drops through the meshes of the silk, and is collected by a worm. It is usual to clothe the sieve in sections with several different meshes of silk so that stock of almost identical value, but differing size, may be treated with uniform accuracy. In good purifiers the strength of the current can be regulated at will in each section. The tailings of a purifier do not usually exceed 10 to 15 % of the feed. The clothing of purifier sheets must be nicely graduated to the clothing of the preceding machines. Repurification and even tertiary purification may be necessary under certain conditions. In Hungary and other parts of Europe, gravity purifiers are much in use. Here the material is guided along an open sieve set at a slight angle, while an air- current is drawn up at an acute angle. Under the sieve may be ar- ranged a series of inclined boards, the position of which can be varied as required. The heaviest and most valuable products resist the current and drop straight down, while lighter material is carried off to further divisions.

From the purifier all the stock except the tailings, which may require other treatment, should go to the smooth rollers to be made into flour, but here the rollerman will have to exercise great care and discretion. Many of the remarks already made in regard to break-rolls apply to smooth rolls, notably in respect of parallelism. But instead of a cutting action, the smooth rolls press the material fed to them into flour. This pressure, however, must be applied with great discrimination, large semolina with impurities attached requiring quite different treat- ment from that called for by small pure middlings. The pressure on

Smooth rolls.

the stock must be just sufficient and no more. Reduction rolls are usually run at a differential speed of about 2 to ,3. The feed must be carefully graded, because to pass stock of varying size through a pair of smooth rolls would be fatal to good work. Scratch rolls very finely grooved are used for cracking impure semolina or for reducing the tailings of purifiers. The latter often hold fragments of bran, which are best detached by rolls grooved about 36 to the inch and run at a differential of 3 to 1. The reduction requires even more roll surface

than the break system. To do first-class work a mill should have at least 35 to 40 in. on the breaks and 50 in. on the reduction for each sack of 280 lb of flour per hour. Many engineers consider 100 to no in. on the break, scratch and smooth rolls not too much.

The dressing out of the flour from the stock reduced on smooth rolls is generally effected by centrifugal machines, which consist of a slowly revolving cylinder provided with an internal „ shaft on which are keyed a number of iron beaters that ressmg. run at a speed of about 200 revolutions a minute, and fling the feed against the silk clothing of the cylinder. What goes through the silk is collected by a worm conveyor at the bottom of the machine. Most centrifugals have so-called ” cut-off ” sheets, with internal divisions in the tail end; these are intended to separate some intermediate products, which, having been freed fromfloury particles, are treated on some other machine, such as a pair of rolls either direct or after a purifier. The centrifugal is undoubtedly an efficient flour separator, but the plansifters already mentioned are also good flour-dressers, especially in dry climates. A plansifter mill will have no centrifugals, except one or two at the tail end where the material gets more sticky and requires more severe treatment.

The yield of flour obtained in a British roller mill averages 70 to 73 % of the wheat berry. The residue, with the exception of a very small proportion of waste, is offal, which is divided into various grades and sold. Profitable markets for British-made bran have been found in Scandinavia, and especially in Denmark. In mill- stone milling the yield of flour probably averaged 75 to 80%, but a certain proportion of this was little more than offal. The length of the flour yield taken by British millers varies in different parts of the kingdom, because demand varies. In one locality high-class patents may be at a premium ; in another the call is for a straight grade, i.e. a flour containing as much of the farinaceous substance as can be won from the wheat berry. In one district there is a sale for rich offals, that is, offals with plenty of flour adhering; in another there may be no demand for such offals. Hence, though the general principles of roller milling as given above hold good all over the country, yet in practice the work of each mill is varied more or less to suit the peculiarities of the local trade.

Early in the 19th century a French chemist, J. J. E. Poutet, discovered that nitrous acid and oxides of nitrogen act on some fluid and semi-fluid vegetable oils, removing their yellow „. tinge and converting a considerable portion of their sub- //f C , ° g stance into a white solid. The importance of this dis- ° our ‘ covery, when the physical constitution of wheat is considered, is obvious, but it was years before

any attempt was made to bleach flour. The first attempts at bleaching seem to have been made on the wheat itself rather than on the flour. In 1879 a process was patented for bleaching grain by means of chlorine gas, and about 1 89 1 a suggestion was made for bleaching grain by means of electro- lysed sea- water. In 1895 a scheme was put forward for treating grain with sulphurous acid, and about two years later it was pro- posed to subject both grain and flour to the influence of electric currents. In 1893 a patent was granted for the purification of flour by means of fresh air or oxygen, and three years later another in- ventor proposed to employ the Rontgen rays for the same purpose. In 1898 Emile Frichot took out a patent for using ozone and ozonized air for flour-bleaching. The patent (No. 1661 of 1901) taken out by J. & S. Andrews of Belfast recited that flour is known to improve greatly if kept for some time after grinding, and the purpose of the invention it covered was to bring about this improvement or con- ditioning not only immediately after grinding, but also to a greater extent than can be effected by keeping. The process consisted in subjecting the flour to the action of a suitable gaseous oxidizing medium; the inventors preferred air carrying a minute quantity of nitric acid or peroxide of nitrogen, but they did not confine them- selves to those compounds, having found that chlorine, bromine and other substances capable of liberating oxygen were also more or less efficacious. They claimed that while exercising no deleterious action their treatment made the flour whiter, improved its baking qualities, and rendered it less liable to be attacked by mites or other organisms. Under the* patent, No. 14006 of 1903, granted to J. N. Alsop of Kentucky the flour was treated with atmospheric air which had been subjected to the action of an arc or flaming dis- charge of electricity, with the purpose of purifying it and improv- ing its nutritious properties. The Andrews and Alsop patents became the objects of extended litigation in the English courts, and it was held that the gaseous medium employed by Alsop was substantially the same as that employed by Andrews, though produced electrically instead of chemically, and therefore that the Alsop process was an infringement of the Andrews patent. Various other patents for more or less similar processes have also been taken out. (G.F.Z.)

FLOURENS, GUSTAVE (1838-1871), French revolutionist and writer, a son of J. P. Flourens (1794-1867), the physiologist, was born at Paris on the 4th of August 1838. In 1863 he under- took for his father a course of lectures at the College de France, the subject of which was

the history of mankind. His theories as to the manifold origin of the human race, however, gave offence to the clergy, and he was precluded from delivering a second course. He then went to Brussels, where he published his lectures under the title of Histoire de I'homme (1863); he next visited Constantinople and Athens, took part in the Cretan insurrection of 1866, spent some time in Italy, where an article of his in the Popolo d' Italia caused his arrest and imprisonment, and finally, having returned to France, nearly lost his life in a duel with Paul de Cassagnac, editor of the Pays. In Paris he devoted his pen to the cause of republicanism, and at length, having failed in an attempt to organize a revolution at Belleville on the 7th of February 1870, found himself compelled to flee from France. Returning to Paris on the downfall of Napoleon, he soon placed himself at the head of a body of 500 tirailleurs. On account of his insurrectionary proceedings he was taken prisoner at Creteil, near Vincennes, by the provisional government, and confined at Mazas on the 7th of December 1870, but was released by his men on the night of January 21-22. On the 18th of March he joined the Communists. He was elected a member of the commune by the 20th arrondissement, and was named colonel. He was one of the most active leaders of the insurrection, and in a sortie against the Versailles troops in the morning of the 3rd of April was killed in a hand-to-hand conflict at Rueil, near Malmaison. Besides his Science de I'homme (Paris, 1869) , Gustave Flourens was the author of numerous fugitive pamphlets.

See C. Proles, Les Homines de la revolution de 187 1 (Paris, 1898).

FLOURENS, MARIE JEAN PIERRE (1794-1867), French physiologist, was born at Maureilhan, near Beziers, in the depart- ment of Herault, on the 15th of April 1794. At the age of fifteen he began the study of medicine at Montpellier, where in 1823 he received the degree of doctor. In the following year he repaired to Paris, provided with an introduction from A. P. de Candolle, the botanist, to Baron Cuvier, who received him kindly, and interested himself in his welfare. At Paris Flourens engaged in physiological research, occasionally contributing to literary publications; and in 1821, at the Athenee there, he gave a course of lectures on the physiological theory of the sensations, which attracted much attention amongst men of science. His paper entitled Recherches expirimentales sur les proprietes et les fonctions du systeme nerveux dans les animaux vertebres, in which he, from experimental evidence, sought to assign their special functions to the cerebrum, corpora quadri- gemina and cerebellum, was the subject of a highly commendatory report by Cuvier, adopted by the French Academy of Sciences in 1822. He was chosen by Cuvier in 1828 to deliver for him a course of lectures on natural history at

the College de France, and in the same year became, in succession to L. A. G. Bosc, a member of the Institute, in the division ” Economie rurale.” In 1830 he became Cuvier’s substitute as lecturer on human anatomy at the Jardin du Roi, and in 1832 was elected to the post of titular professor, which he vacated for the professorship of comparative anatomy created for him at the museum of the Jardin the same year. In 1833 Flourens, in accordance with the dying request of Cuvier, was appointed a perpetual secretary of the Academy of Sciences; and in 1838 he was returned as a deputy for thejarrondissement of Beziers. In 1 840 he was elected, in preference to Victor Hugo, to succeed J. F. Michaud at the French Academy; and in 1845 he was created a commander of the legion of honour, and in the next year a peer of France. In March 1847 Flourens directed the attention of the Academy of Sciences to the anaesthetic effect of chloroform on animals. On the revolution of 1848 he withdrew completely from political life; and in 1855 he accepted the professorship of natural history at the College de France. He died at Montgeron, near Paris, on the 6th of December 1867.

Besides numerous shorter scientific memoirs, Flourens published — Sssai sur quelques points de la doctrine de la revulsion et de la deri-

vation (Montpellier, 1813) ; Experiences sur le systeme nerveux (Paris, 1825); Cours sur la generation, I’ovologie, et I ‘ embryologie (1836); Analyse raisonnee des travaux de G. Cuvier (1841) ; Recherches sur le developpement des os et des dents (1842) ; Anatomic generate de la peau et des membranes muqueuses (1843) ; Buff on, histoire de ses travaux et de ses idees (1844) ; Fontenelle, ou de la philosophic moderne rela- tivement aux sciences physiques (1847); Theorie experimentale de la formation des os (1847); CEuvres completes de Buff on (1853); De la longevite humaine et de la quantite de vie sur le globe (1854), numerous editions; Histoire de la decouverte de la circulation du sang (1854); Cours de physiologic comparee (1856); Recueil des eloges historiques (1856); De la vie et de V intelligence (1858); De la raison, du genie, et de la folie (1861); Ontologie naturelle (1861); Examen du livre de M. Darwin sur I’Origine des Especes (1864). For a list of his papers see the Royal Society’s Catalogue of Scientific Papers.

FLOWER, SIP WILLIAM HENRY (1831-1899), English biologist, was born at Stratford-on-Avon on the 30th of November 1 83 1. Choosing medicine as his profession, he began his studies at University College, London, where he showed special aptitude for physiology and comparative anatomy and took his M.B. degree in 1851. He then joined the Army Medical Service, and went out to the Crimea as

assistant-surgeon, receiving the medal with four clasps. On his return to England he became a member of the surgical staff of the Middlesex hospital, London, and in 1861 succeeded J. T. Quekett as curator of the Hunterian Museum of the Royal College of Surgeons of England. In 1870 he also became Hunterian professor, and in 1884, on the death of Sir Richard Owen, was appointed to the directorship of the Natural History Museum at South Kensington. He died in London on the 1st of July 1 899. He made valuable contributions to structural anthropology, publishing, for example, complete and accurate measurements of no less than 1300 human skulls, and as a comparative anatomist he ranked high, devoting himself especially to the study of the mammalia. He was also a leading authority on the arrangement of museums. The greater part of his life was spent in their administration, and in conse- quence he held very decided views as to the principles upon which their specimens should be set out. He insisted on the importance of distinguishing between collections intended for the use of specialists and those designed for the instruction of the general public, pointing out that it was as futile to present to the former a number of merely typical forms as to provide the latter with a long series of specimens differing only in the most minute details. His ideas, which were largely and success- fully applied to the museums of which he had charge, gained wide approval, and their influence entitles him to be looked upon as a reformer who did much to improve the methods of museum arrangement and management. In addition to numerous original papers, he was the author of An Introduction to the Osteology of the Mammalia (1870); Fashion in Deformity (1881); The Horse: a Study in Natural History (1890); Introduction to the Study of Mammals, Living and Extinct (1891); Essays on Museums and other Subjects (1898). He also wrote many articles for the ninth edition of the Encyclopaedia Britannica.

FLOWER (Lat. flos, floris; Fr. fleur), a term popularly used for the bloom or blossom of a plant, and so by analogy for the fairest, choicest or finest part or aspect af anything, and in various technical senses. Here we shall deal only with its botanical interest. It is impossible to give a rigid botanical definition of the term ” flower.” The flower is a characteristic feature of the highest group of the plant kingdom — the flowering plants (Phanerogams) — and is the name given to the association of organs, more or less leaf-like in form, which are concerned with the production of the fruit or seed. In modern Dotanical works the group is often known as the seed-plants (Spermatophyta). As the seed develops from the ovule which has been fertilized by the pollen, the essential structures for seed-production are

two, viz. the pollen-bearer or stamen and the ovule-bearer or carpel. These are with few exceptions foliar structures, known in comparative morphology as sporophylls, because they bear the spores, namely, the microspores or pollen-grains which are developed in the microsporangia or pollen-sacs, and the mega- spore, which is contained in the ovule or megasporangium.

In Gymnosperms (q.v.), which represent the more primitive

Bracts.

type of seed-plants, the micro- or macro-sporophylls are generally associated, often in large numbers, in separate cones, to which the term ” flower ” has been applied. But there is considerable difference of opinion as to the relation between these cones and the more definite and elaborate structure known as the flower in the higher group of seed-plants — the Angiosperms (q.v.) — and it is to this more definite structure that we generally refer in using the term ” flower.”

Flowers are produced from flower-buds, just as leaf-shoots arise from leaf -buds. These two kinds of buds have a resemblance to each other as regards the arrangement and the development of their parts; and it sometimes happens, from injury and other causes, that the part of the axis which, in ordinary cases, would produce a leaf-bud, gives origin to a flower-bud. A flower-bud has not in ordinary circumstances any power of

extension by the continuous de- velopment of its apex. In this respect it differs from a leaf-bud. In some cases, however, of mons- trosity, especially seen in the rose (fig. i), the central part is pro- longed, and bears leaves or flowers. In such cases the flowers, so far as their functional capabilities are concerned, are usually abortive. This phenomenon is known as pro- liferation of the floral axis.

Flower-buds, like leaf-buds, are produced in the axil of leaves, which are called bracts.

The term bract is properly applied

to the leaf from which the primary

floral axis, whether

simple or branched,

arises, while the leaves which arise

on the axis between the bract and

the outer envelope of the flower

are bracteoles or bractlets. Bracts

sometimes do not differ from

Fig. i. — Proliferous Rose, the ordinary leaves, as in Veronica

s, Sepals transformed into hederifolia, Vinca, Anagallis and

leaves. Ajuga. In general as regards their

p, Petals multiplied at the f orm anc i appearance they differ

expense ot the stamens, c ■ ,. , ., ,.~

which are reduced in from ordm ary leaves, the difference

number. ” being greater in the upper than

c, Coloured leaves represent- in the lower branches of an inflor-

ing abortive carpels, escence. They are distinguished

Axis prolongˆ Jbˆrmg an by thdr position at the base of

the flower or flower-stalk. Their arrangement is similar to that of the leaves. When the flower is sessile the bracts are often applied closely to the calyx, and may thus be confounded with it, as in the order Malvaceae and species of Dianthus and winter aconite (Eranthis), where they have received the name of epicalyx or calyculus. In some Rosaceous plants an epicalyx is present, due to the formation of stipulary structures by the sepals. In many cases bracts act as protective organs, within or beneath which the young flowers are concealed in their earliest stage of growth.

When bracts become coloured, as in Amherstia nobilis, Euphorbia splendens, Erica elegans and Salvia splendens, they may be mistaken for parts of the corolla. They are sometimes mere scales or threads, and at other times are undeveloped, giving rise to the ebracteate inflorescence of Cruciferae and some Boraginaceae. Sometimes they

are empty, no flower-buds being produced in their axil. A series of empty coloured bracts terminates the inflorescence of Salvia Horminum. The smaller bracts or bracteoles, which occur among the subdivisions of a branching inflorescence, often produce no, flower-buds, and thus anomalies occur in the floral arrangements. Bracts are occasion- ally persistent, remaining long attached to the base of the peduncles, but more usually they are deciduous, falling off early

imperfect apex.

by an articulation. In some instances they form part of the fruit, becoming incorporated with other organs. Thus, the cones of firs and the stroboli of the hop are composed of a series of spirally arranged bracts covering fertile flowers; and the scales on the fruit of th i pine-apple are of the same nature. At the base of the general umbel in umbelliferous plants a whorl of bracts often exists, called a general involucre, and at the base of the smaller umbels or umbellules there is a similar leafy whorl called an involucel or partial involucre. In some instances, as in fool's-parsley, there is no general involucre, but simply an involucel; while in other cases, as in fennel or dill (fig. 15), neither involucre nor involucel is developed. In Compositae the name involucre is applied to the bracts surrounding the head

FlG. 2. — Head (capitulum)of From Strasburger's Lehrbuch dcr Botanik,

•Marigold {Calendula), showing h V permission of Gustav Fischer, a congeries of flowers, enclosed Fig. 3. — Cupule of Quercus Aegi-

by rows of bracts, i, at the base, lops, cp, Cupule; gl, fruit. (After

which are collectively called an Duchartre.) involucre.

of flowers (fig. 2, i), as in marigold, dandelion, daisy, artichoke. This involucre is frequently composed of several rows of leaflets, which are either of the same or of different forms and lengths, and often lie over each other in an imbricated manner. The leaves of the involucre are spiny in thistles and in teazel (Dip- sacus), and hooked in burdock. Such whorled or verticillate bracts generally remain separate (polyphyllous) , but may be united by cohesion (gamophyllous) , as in many species of Bu- pleurum and in Lavatera. In Compositae besides the involucre there are frequently chaffy and setose bracts at the base of each flower, and in Dipsacaceae a membranous tube surrounds each flower. These structures are- of the nature of an epicalyx. In the acorn the cupule or cup (fig. 3) is formed by a growing upwards of the

flower-stalk immediately beneath the flower, upon which scaly or spiny protuberances appear; it is of the nature of bracts. Bracts also compose the husky covering of the hazel-nut. – j

When bracts become united, and overlie each other in several rows, it often happens that the outer ones do not produce flowers, that is, are empty or sterile. In the artichoke the outer imbri- cated scales or bracts are in this condition, and it is from the membranous white scales or bracts (paleae) forming the choke attached to the edible receptacle that the flowers are produced. The sterile bracts of the daisy occasionally produce capitula, and give rise to the hen-and-chickens daisy. In place of develop- ing flower-buds, bracts may, in certain circumstances, as in proliferous or viviparous plants, produce leaf-buds.

A sheathing bract enclosing one or several flowers is called a spathe. It is common among Monocotyledons, as Narcissus (fig. 4), snow-flake, Arum and palms. In some palms it is 20 ft. long, and encloses 200,000 flowers. It is often associated with that form of inflorescence termed the spadix, and may be coloured, as in Anthurium, or white, as in arum lily (Richardia aethiopica) . When the spadix is compound or branching, as in palms, there are smaller spathes, surrounding separate parts of the inflorescence. The spathe protects the flowers in their young state, and often falls off after they are developed, or hangs down

FlG. 4. — Flowers of Narcissus (Narcissus Tazetta) bursting from a sheathing bract b.

in a withered form, as in some palms, Typha and Pothos. In grasses the outer scales or glumes of the spikelets are sterile bracts (fig. 5, gl); and in Cyperaceae bracts enclose the organs

of reproduction. Bracts are frequently changed into com- plete leaves. This change is called phyllody of bracts, and is seen in species of Plantago, especially in the variety of Plantago media, called the rose-plantain in gardens, where the bracts become leafy and form a rosette round the flowering axis. Similar changes occur in Plantago major, P. lanceolate, Ajuga reptans, dandelion, daisy, dahlia and in umbelliferous plants. The conversion of bracts into stamens (staminody of bracts) has been observed in the case of Abies excelsa.

A lengthen- ing of the axis of the female strobilus of Coniferae is not of infrequent occurrence in Cryplomeria japonica, larch (Larix europaea), &c, and this is usually associated with a leaf-like condition of the bracts, and

sometimes even with the development of leaf-bearing shoots in place of the scales.

The arrangement of the flowers on the axis, or the ramification of the floral axis, is called the inflorescence. The primary axis of the inflorescence is some- times called the rachis; its branches, whether terminal or lateral, which form the stalks supporting flowers or clusters of flowers, are peduncles, and if small branches are given off by it, they are called pedicels. A flower having a stalk is called pedunculate or pedicel- late; one having no stalk is sessile. In describing a branching inflorescence, it is common to speak of the rachis as the primary floral axis, its branches as the secondary floral axes, their divi- sions as the tertiary floral axes, and so on; thus avoiding any confusion that might arise from the use of the terms rachis, ped- uncle and pedicel.

The peduncle is simple, bearing a single flower, as in primrose; or branched, as in London-pride. It is sometimes succulent, as in the cashew, in which it forms the large coloured expansion sup- porting the nut; spiral, as in Cyclamen and Vallisneria; or spiny, as in Alyssum spinosum. When the peduncle proceeds from radical leaves, that is, from an axis which is so shortened as to bring the leaves close together in the form of a cluster, as in the primrose, auricula or hyacinth, it is termed a scape. The floral axis may be shortened, assuming a flattened, convex or concave torm, and bearing numerous flowers, as in the arti-

Fig. 5. — Spikelet of Oat (Avena sativa) laid open, showing the sterile bracts gl, gl, or empty glumes; g, the fertile or floral glume, with a dorsal awn a; p, the pale; fs, an abortive flower.

Fig.

(Ficus hollow

numerous flowers.

6. — Peduncle of Fig Carica), ending in a receptacle, enclosing male and female

choke, daisy and fig (fig. 6). The floral axis sometimes appears as if

formed by several peduncles united together, constituting a fasciated axis, as in the cocks- comb, in which the flowers form a peculiar crest at the apex of the flattened peduncles. Adhe- sions occasionally take place l” 1 between the peduncle and the bracts or leaves of the plant, as in the lime-tree (fig. 7). The” adhesion of the peduncles to the stem accounts for the extra- axillary position of flowers, as in many Solanaceae. When this union extends for a considerable length along the stem, several leaves may be interposed be- tween the part where the ped- uncle becomes free and the leaf whence it originated, and it may be difficult to trace the con- nexion. The peduncle occasion- ally becomes abortive, and in place of bearing a flower, is trans- formed into a tendril; at other times it is hollowed at the apex, so as apparently to form the lower part of the outer whorl of floral leaves as in Eschscholtzia.

The termination of the peduncle, . .

or the part on which the whorls ˆ™ e { – Tdm pMypkyllos) (nat. of the flower are arranged, is –

called the thalamus, torus or re- ceptacle.

There are two distinct types of , inflorescence — one in which the c flowers arise as lateral shoots s, from a primarv axis, which goes /> on elongating,” and the lateral kn ‘ Flower-bud. shoots never exceed in their development the length of the

primary axis beyond their point of origin. The flowers esceaee. are thus always axillary. Exceptions, such as in cruciferous plants, are due to the non-appear- ance of the bracts. In the other type the primary axis terminates

(From Vines’ Students’ Text-Book of Botany, by per- mission of Swan Sormenschein & Co,)

Fig. 7. — Inflorescence of the

a,

Branch.

Petiole with axillary bud.

Attached to the peduncle

is the bract (h). Calyx. Corolla. Stamens. Ovary.

Fig. 9. — Head of flowers(capitulum) of Scabiosa atropurpurea. The inflor- escence is simple and indeterminate, and the expansion of the flowers cen- tripetal, those at the circumference opening first.

in a single flower, but lateral axes are given off from the axils of the bracts, which again repeat the primary axis; the development of each lateral axis is stronger than that of the primary (From strasburger's Lehrbuch ax j s beyond its point of origin. The

der Botanik, by permission or Gustav n . ,.,..-

Fischer.) flowers produced in this inflorescence

Fig. 8— Raceme of Lt'nano a re thus terminal. The first kind

striata, d, bract.

of inflorescence is indeterminate,

indefinite or axillary. Here the axis is either elongated,

$st >

FLOWER

producing flower-buds as it grows, the lower expanding first (fig. 8), or it is shortened and depressed, and the outer flowers expand first (fig. 9). The expansion of the flowers is thus centripetal, that is, from base to apex, or from circumference to centre.

The second kind of inflorescence is determinate, definite or terminal. In this the axis is either elongated and ends in a solitary flower, which thus terminates the axis, and if other flowers are produced, they belong to secondary axes farther from the centre;

or the axis is shortened and flat- tened, producing a number of separate floral axes, the central one expanding first, while the others are developed in succession farther from the centre. The ex- pansion of the flowers is in this case centrifugal, that is, from apex to base, or from centre to circum- ference. It is illustrated in fig. 10, Ranunculus bulbosus ; a' is the primary axis swollen at the base in a bulb-like manner 6, and with roots proceeding from it. From the leaves which are radical pro- ceeds the axis ending in a solitary terminal flower /'. About the middle of this axis there is a leaf or bract, from which a secondary floral axis a" is produced, ending in a single flower/", less advanced than the flower/'. This secondary axis bears a leaf also, from

which

Fig. 10. — Plant of Ranun- culus bulbosus, showing deter- minate inflorescence.

a tertiary floral axis a’” is pro-

duced, bearing an unexpanded solitary flower /’”. From this tertiary axis a fourth is in progress of formation. Here /’ is the termination of the primary axis, and this flower expands first, while the other flowers are developed centrifugally on separate axes.

A third series of inflorescences, termed mixed, may be recog- nized. In them the primary axis has an arrangement belonging to the opposite type from that of the branches, or vice versa. According to the mode and degree of development of the lateral shoots and also of the bracts, various forms of both inflorescences result.

Amongst indefinite forms the simplest occurs when a lateral shoot produced in the axil of a large single foliage leaf of the plant ends in a single flower, the axis of the plant elongating beyond, as in Veronica hederifolia, Vinca minor and Lysimachia nemorum. The flower in this case is solitary, and the ordinary leaves become bracts by producing flower-buds in place of leaf buds; their number, like that of the leaves of this main axis, is indefinite, varying with the vigour of the plant. Usually, however, the floral axis, arising from a more or less altered leaf or bract, instead of ending in a solitary flower, is prolonged, and bears numerous bracteoles, from which smaller peduncles are produced, and those again in their turn may be branched in a similar way. Thus the flowers are arranged in groups, and frequently very complicated forms of inflorescence result. When the primary peduncle or floral axis, as in fig. 8, is elongated, and gives off pedicels, ending in single flowers, a raceme is produced, as in currant, hyacinth and barberry. If the secondary floral axes give rise to tertiary ones, the raceme is branching, and forms a panicle, as in Yucca gloriosa. If in a raceme the lower flower stalks are developed more strongly than the upper, and thus all the flowers are nearly on a level, a corymb is formed,whichmaybe simple, as in fig. n, where the primary axis a’ gives off secondary axes a”, a”, which end in single flowers; or branching, where the secondary axes again subdivide. If the pedicels are very short or wanting, so that the flowers are sessile, a spike is produced, as in Plantago and vervain (Verbena officinalis) (fig. 12). If the spike bears unisexual flowers, as in willow or hazel (fig. 13), it is an amentum or catkin, hence such trees are called amentiferous; at

other times it becomes succulent, bearing numerous flowers, surrounded by a sheathing bract or spathe, and then it constitutes a spadix, which may be simple, as in Arum maculatum (fig. 14), or branching as in palms. A spike bearing female flowers only, and covered with scales, is a strobilus, as in the hop. In grasses

Fig. 11.

Fig. 12.

Fig. 13.

Fig. II.— Corymb of Cerasus Mahaleb, terminating an abortive branch, at the base of which are modified leaves in the form of scales, e. a', Primary axis ; a", secondary axes bearing flowers; b, bract in the axils of which the secondary axes arise.

Fig. 12. — Spike of Vervain (Verbena officinalis), showing sessile flowers on a common rachis. The flowers at the lower part of the spike have passed into fruit, those towards the middle are in full bloom, and those at the top are only in bud.

Fig. 13. — Amentum or catkin of Hazel (Corylus A vellana), consisting of an axis or rachis covered with bracts in the form of scales, each of which covers a male flower, the stamens of which are seen projecting beyond the scale. The catkin falls off in a mass, separating from the branch by an articulation.

there are usually numerous sessile flowers arranged in small spikes, called locustae or spikelets, which are either set closely along a central axis, or produced on secondary axes formed by the branching of the central one; to the latter form the term panicle is applied.

If the primary axis, in place of being elongated, is contracted, it gives rise to other forms of indefinite inflorescence. When the axis is so shortened that the secondary axes arise from a common point, and spread out as radii of nearly equal length, each ending in a single flower or dividing again in a similar radiating manner,

r2 A

(From Slrasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.)

Fig. 14. — Spadix of Arum maculatum. (After Wossidlo.) a, Female flowers; b, male flowers; c, hairs representing sterile flowers.

Fig. 15. — Compound umbel of Com- mon Dill (Anethum graveolens), having a primary umbel a, and secondary umbels b, without either involucre or involucel.

an umbel is produced, as in fig. 15. From the primary floral axis a the secondary axes come off in a radiating or umbrella-like manner, and end in small umbels 6, which are called partial umbels or umbellules. This inflorescence is seen in hemlock and other allied plants, which are hence called umbelliferous. If there are numerous flowers on a flattened, convex or slightly concave receptacle, having either very short pedicels or none, a

capitulum (head) is formed, as in dandelion, daisy and other composite plants (fig. 2), also in scabious (fig. 9) and teazel. In the American button-bush the heads are globular, in some species of teazel elliptical, while in scabious and in composite plants, as sunflower, dandelion, thistle, centaury and marigold, they are somewhat hemispherical, with a flattened, slightly hollowed, or convex disk. If the margins of such a receptacle be developed upwards, the centre not developing, a concave receptacle is formed, which may partially or completely enclose a number of flowers that are generally unisexual. This gives rise to the peculiar inflorescence of Dorstenia, or to that of the fig (fig. 6), where the flowers are placed on the inner surface of the hollow receptacle, and are provided with bracteoles. This in- florescence has been called a hypanthodium.

Lastly, we have what are called compound indefinite inflores- cences. In these forms the lateral shoots, developed centripetally upon the primary axis, bear numerous bracteoles, from which floral shoots arise which may have a centripetal arrangement similar to that on the mother shoot, or it may be different. Thus we may have a group of racemes, arranged in a racemose manner on a common axis, forming a raceme of racemes or compound raceme, as in Astilbe. In the same way we may have compound umbels, as in hemlock and most Umbelliferae (fig. 15), a com- pound spike, as in rye-grass, a compound spadix, as in some palms, and a compound capitulum, as in the hen-and-chickens daisy. Again, there may be a raceme of capituia, that is, a group of capituia disposed in a racemose manner, as in Petasites, a raceme of umbels, as in ivy, and so on, all the forms of inflores- cence being indefinite in disposition. In Eryngium the shortening of the pedicels changes an umbel into a capitulum.

The simplest form of the definite type of the inflorescence is seen in Anemone nemorosa and in gentianella (Gentiana acaulis), where the

axis terminates in a single flower, no other flowers being produced upon the plant. This is a solitary terminal inflorescence. If other flowers were produced, they would arise as lateral shoots from the bracts below the first-formed flower. The general name of cyme is applied to the arrangement of a group of flowers in a definite inflorescence. A cymose inflores- cence is an inflorescence where the primary floral axis before terminating in a flower gives off one or more lateral unifloral axes which repeat the process — the development being only limited by the vigour of the plant. The floral axes are thus centrifugally developed. The cyme, according to its develop- ment, has been characterized as biparous or uniparous. In fig. 16 the biparous cyme is represented in the flowering branch of Ceraslium. Here the primary axis I ends in a flower, which has passed into the state of fruit. At its base two leaves are produced, in each of which arise secondary axes /' t', ending in single flowers, and at the base of these axes a pair of opposite leaves is produced, giving rise to tertiary axes t" t", ending in single flowers, and so on. The term dichasium has also been applied to this form of cyme.

In the natural order Carophyllaceae (pink family) the dichasial form of inflorescence is very general. In some members of the order, as Dianthus barbatus, D. carthusianorum, &c, in which the peduncles are short, and the flowers closely approximated, with a centrifugal expansion, the inflorescence has the form of a contracted dichasium, and receives the name of fascicle. When the axes become very much shortened, the arrangement is more complicated in appearance, and the nature of the inflorescence can only be recognized by the order of opening of the flowers. In Labiate plants, as the dead-nettle (Lamium), the flowers are produced in the axil of each of the foliage leaves of the plant, and they appear as if arranged in a simple whorl of flowers. But on examination it is found that there is a central flower expanding first, and from its axis two secondary axes spring bearing solitary flowers; the expansion is thus centrifugal. The inflorescence is therefore a contracted dichasium, the flowers being sessile, or nearly so, and the clusters are called verticillasters (fig. 17). Sometimes, especially towards the summit of a di- chasium, owing to the exhaustion of the growing power of the plant, only one of the bracts gives origin to a new axis, the other

remaining empty; thus the inflorescence becomes unilateral, and further development is arrested. In addition to the dichasial form there are others where more than two lateral axes are produced from the primary floral axis, each of which in turn

(From Strasburger's Lehrbuch der Boianik, by permission of Gustav

Fischer.) Fig. 16. — Cymose inflorescence (dichasium) of Ceraslium collinum; t-t"", successive axes. (After Duchartre.)

produces numerous axes. To this form the terms trichasial and polychasial cyme have been applied; but these are now usually designated cymose umbels. They are well seen in some species of Euphorbia. Another term, anthela, has been used to dis- tinguish such forms as occur in several species of Luzula and

Fig. 17. — Flowering stalk of the White Dead-nettle {Lamium album). The bracts are like the ordinary leaves of the plant, and produce clusters of flowers in their axil. The clusters are called verticillasters, and consist of flowers which are produced in a centri- fugal manner.

Juncus, where numerous lateral axes arising from the primary axis grow very strongly and develop in an irregular manner.

In the uniparous cyme a number of floral axes are successively developed one from the other, but the axis of each successive generation, instead of producing a pair of bracts, produces only one. The basal portion of the consecutive axes may become much thickened and arranged more or less in a straight line,

and thus collectively form an apparent or false axis or sympodium, and the inflorescence thus simulates a raceme. In the true raceme, however, we find only a single axis, producing in succes- sion a series of bracts, from which the flora) peduncles arise as lateral shoots, and thus each flower is on the same side of the floral axis as the bract in the axil of which it is developed ; but in the uniparous cyme the flower of each of these axes, the basal portions of which unite to form the false axis, is situated on the opposite side of the axis to the bract from which it apparently arises (fig. 18). The bract is not, however, the one from which the axis terminating in the flower arises, but is a bract produced upon it, and gives origin in its axil to a new axis, the basal portion

Fig. 20.

Fig. 19.

Fig. 21.

Fig. 18. — Helicoid cyme of a species of Alstroemeria. 01, a it a 3 , a t , &c, separate axes successively developed in the axils of the corresponding bracts b%, b 3 , i 4 , &c, and ending in a flower/2,/3,/4, &c. The whole appears to form a simple raceme of which the axes form the internodes.

Fig. 19. — Scorpioidal or cicinal cyme of Forget-me-not (Myosotis palustris).

Fig. 20. — Diagram of definite floral axes a, b, c, d, e, &c.

Fig. 21. — Flowering stalk of Ragwort (Senecio). The flowers are in heads (capitula), and open from the circumference inwards in an indefinite centripetal manner. The heads of flowers, on the other hand, taken collectively, expand centrifugally — the central one a first.

of which, constituting the next part of the false axis, occupies the angle between this bract and its parent axis — the bract from which the axis really does arise being situated lower down upon the same side of the axis with itself. The uniparous cyme presents two forms, the scorpioid or cicinal and the helicoid or bostrychoid.

In the scorpioid cyme the flowers are arranged alternately in a double row along one side of the false axis (fig. 19), the bracts when developed forming a second double row on the opposite side; the whole inflorescence usually curves on itself like a scorpion's tail, hence its name. In fig. 20 is shown a diagram- matic sketch of this arrangement. The false axis, a b c d, is formed by successive generations of unifloral axes, the flowers being arranged along one side alternately and in a double row; had the bracts been developed they would have formed a similar double row on the opposite side of the false axis; the whole

inflorescence is represented as curved on itself. The inflorescence in the family Boraginaceae are usually regarded as true scorpioid cymes.

In the helicoid cyme there is also a false axis formed by the basal portion of the separate axes, but the flowers are not placed in a double row, but in a single row, and form a spiral or helix round the false axis. In Alstroemeria, as represented in fig. 18, the axis

Compound definite inflorescences are by no means common, but in Streptocarpus polyanthus and in several calceolarias we probably have examples. Here there are scorpioid cymes of pairs of flowers, each pair consisting of an older and a younger flower.

Forms of inflorescence occur, in which both the definite and indefinite types are represented — mixed inflorescences. Thus in Composite plants,such as hawk weeds (Hieracia) and ragworts (Senecio, fig. 21), the heads of flowers, ˆ ‘* erf _ taken as a whole, are developed centrifugally, the cence. terminal head first, while the florets, or small flowers on the receptacle, open centripetally, those at the circumference first. So also in Labiatae, such as dead-nettle (Lamium), the different whorls of inflorescence are developed centripetally, while the florets of the verticillaster are centrifugal. This mixed character presents difficulties in such cases as Labiatae, where the leaves, in place of retaining their ordinary form, become bracts, and thus might lead to the supposition of the whole series of flowers being one inflorescence. In such cases the cymes are described as spiked, racemose, or panicled, according to circumstances. In Saxifraga umbrosa (London-pride) and in the horse-chestnut we meet with a raceme of scorpioid cymes; in sea-pink, a capitulum of contracted scorpioid cymes (often called a glomerulus); in laurustinus, a compound umbel of dichasial cymes; a scorpioid cyme of capitula in Vernonia scorpioides. The so-called catkins of the birch are, in reality, spikes of contracted dichasial cymes. In the bell-flower (Cam- panula) there is a racemose uniparous cyme. In the privet (Liguslrum vulgare) there are numerous racemes of dichasia arranged in a racemose manner along an axis; the whole inflores- cence thus has an appearance not unlike a bunch of grapes, and has been called a thyrsus.

Tabular View of Inflorescences

A. Indefinite Centripetal Inflorescence.

I. Flowers solitary, axillary. Vinca, Veronica hederifolia. II. Flowers in groups, pedicellate.

1 . Elongated f orm(Raceme), Hyacinth, Laburnum, Currant.

(Corymb), Ornithogalum.

2. Contracted or shortened form (Umbel), Cowslip,

Astrantia. III. Flowers in groups, sessile.

1. Elongated form (Spike), Plantago.

(Spikelet), Grasses. (Amentum, Catkin), Willow, Hazel. (Spadix) Arum, some Palms. (Strobilus), Hop.

2. Contracted orshortenedfcrm(Capitulum), Daisy, Dande-

lion, Scabious. IV. Compound Indefinite Inflorescence.

a. Compound Spike, Rye-grass.

b. Compound Spadix, Palms.

c. Compound Raceme, Astilbe.

d. Compound Umbel, Hemlock and most Umbelliferae.

e. Raceme of Capitula, Petasites.

f. Raceme of Umbels, Ivy.

B. Definite Centrifugal Inflorescence.

I. Flowers solitary, terminal. Gentianella, Tulip. II. Flowers in Cymes.

1. Uniparous Cyme.

a. Helicoid Cyme (axes forming a spiral). Elongated form,
Alstroemeria. Contracted form, Witsenia corymbosa.

The flower.

-/

Fig. 22.

Fig.

b. Scorpioid Cyme (axes unilateral, two rows).

Elongated form, Forget-me-not, Symphytum,

Henbane. Contracted form, Erodium, AlchemiUa amends.

2. Biparous Cyme (Dichotomous), including 3-5-chotomous

Cymes (Dichasium, Cymose Umbel, Anthela).

a. Elongated form, Cerastium, Stellaria.

b. Contracted form (Verticillaster) , Dead-nettle, Pelar-

gonium.

3. Compound Definite Inflorescence. Streptocarpus poly-

anthus, many Calceolarias. C. Mixed Inflorescence.

Raceme of Scorpioid Cymes, Horse-chestnut. Scorpioid Cyme of Capitula, Vernonia scorpioides. Compound Umbel Of Dichotomous Cymes,Laurustinus. Capitulum of contracted Scorpioid Cymes (Glomerulus), Sea-pink.

The flower consists of the floral axis bearing the sporophylls (stamens and carpels), usually with certain protective envelopes.

The axis is usually very much contracted, no inter- nodes being developed, and the portion bearing the floral leaves, termed the thalamus or torus, frequently expands into a conical, flattened or hollowed expansion; at other times, though rarely, the inter- nodes are developed and it is elongated. Upon this torus the parts of the flower are arranged in a crowded manner, usually forming a series of verticils, the parts of which alternate; but they are sometimes arranged spirally especially if the floral axis be elongated. In a typical flower, as in fig. 22, we recognize four distinct whorls of leaves: an outer whorl, the calyx of sipals; within it, another whorl, the parts alternating with those of the outer whorl, the corolla of petals; next a whorl of parts alternating with the parts of the corolla, the androecium of stamens; and in the centre the gynoecium of carpels. Fig. 23 is a diagrammatic representation of the arrangement of the parts of such a flower; it is known as a floral diagram. The flower is supposed to be cut transversely, and the parts of each whorl are distinguished by a different symbol. Of these whorls the two internal, forming the sporo- phylls, constitute the essential

Fig. 23.

Fig. 24.

Fig.

26.

Fig. 22. — Flower of Sedum rubens. s, Sepals; p, petals; a, stamens; c, carpels.

Fig. 23. — Diagram of a com- pletely symmetrical flower, con- sisting of four whorls, each of five parts, s, Sepals; p, petals; a, stamens; c, carpels.

Fig. 24. — Monochlamydeous (apetalous) flower of Goose- foot (Chenopodium), consisting organs of re p ro duction ; the two of a single perianth (calyx) of five , , , .

parts, enclosing five stamens, which are opposite the divisions of the perianth, owing to the absence of the petals.

Fig. 25. — Stamen, consisting of a filament (stalk) / and an anther a, containing the pollen p, which is discharged through slits in the two lobes of the anther.

Fig. 26. — The pistil of Tobacco (Nicotiana Tabacum), consisting of the ovary 0, containing ovules, the style s, and the capitate stigma g. The pistil is placed on the receptacle r, at the extremity of the peduncle.

outer whorls are the protective coverings or floral envelopes. The sepals are generally of a greenish colour; their function is mamly protective, shielding the more delicate internal organs before the flower opens. The petals a~e usually showy, and normally alternate with the sepals. Some- times, as usually in monocoty- ledons, the calyx and corolla are similar; in such cases the term perianth, or perigone, is applied.

Thus, in the tulip, crocus, lily, hyacinth, we speak of the parts of the perianth, in place of calyx and corolla, although in these plants there is an outer

whorl (calyx), of three parts, and an inner (corolla), of a similar number, alternating with them. When the parts of the calyx are in appearance like petals they are said to be petaloid, as in Liliaceae. In some cases the petals have the appearance of sepals, then they are sepaloid, as in Juncaceae. In plants, as Nymphaea alba, where a spiral arrangement of the floral leaves occurs, it is not easy to say where the calyx ends and the corolla begins, as these two whorls pass insensibly into each other. When both calyx and corolla are present, the plants are dichlamydeous; when one only is present, the flower is termed monochlamydeous or apetalous, having no petals (fig. 24). Sometimes both are absent, when the flower is achlamydeous, or naked, as in willow. The outermost series of the essential organs, collectively termed the androecium, is composed of the microsporophylls known

as the staminal leaves or stamens. In their most differentiated form each consists of a stalk, the filament (fig. 25, /), supporting at its summit the anther (a), consisting of the pollen-sacs which contain the powdery pollen (p), the microspores, which is ultimately discharged therefrom. The gynoecium or pistil is the central portion of the flower, terminating the floral axis. It consists of one or more carpels (megasporophylls), either separate (fig. 22, c) or combined (fig. 24). The parts distinguished in the pistil are the ovary (fig. 26, o), which is the lower portion enclosing the ovules destined to become seeds, and the stigma (g), a portion of loose cellular tissue, the receptive surface on which the pollen is deposited, which is either sessile on the apex of the ovary, as in the poppy, or is separated from it by a prolonged portion called the style (s). The androecium and gynoecium are not present in all flowers. When both are present the flower is hermaphrodite; and in descriptive botany such a flower is indicated by the symbol g . When only one of those organs is present the flower is unisexual or diclinous, and is either male (staminate),$, or female (pistillate), ?. A flower then normally consists of the four series of leaves — calyx, corolla, androecium and gynoecium — and when these are all present the flower is complete. These are Hsually densely crowded upon the thalamus, but in some instances, after apical growth has ceased in the axis, an elongation of portions of the receptacle by intercalary growth occurs, by which changes in the position of the parts may be brought about. Thus in Lychnis an elonga- tion of the axis betwixt the calyx and the corolla takes place, and in this way they are separated by an interval. Again, in the passion-flower (Passiflora) the stamens are separated from the corolla by an elongated portion of the axis, which has consequently been termed the androphore, and in Passi- flora also, fraxinella (fig. 27), Cappari- daceae, and some other plants, the ovary is raised upon a distinct stalk termed the gynophore; it is thus separated from the

Fig. 27. — Calyx and pistil of Frax- inella (Dictamnus Fraxinella). The pistil consists of several carpels, vhich are elevated

stamens, and is said to be stipitate. Usually on a stalk or gyno- the successive whorls of the flower, disposed P hore prolonged c _ u 1 j r - \. . ■ from the receptacle,

from below upwards or from without in- wards upon the floral axis, are of the same number of parts, or are a multiple of the same number of parts, those of one whorl alternating with those of the whorls next it.

In the more primitive types of flowers the torus is more or less convex,

and the series of organs follow in regular succession, culminating in the carpels, in the formation of which the growth of the axis is closed (fig. 28). This arrangement is known as hypogynous, the other series (calyx, corolla and stamens) beirg beneath (hypo-) the gynoecium. In other cases, the apex of the growing point ceases to develop, and the parts below form a cup around it, from the rim of which the outer members of the flower are developed around (peri-) the carpels, which are formed from the apex of the growing-point at the bottom of the cup. This arrangement is known as perigynous (fig. 29). In many cases this is carried farther and a cavity is formed which is roofed over

by the carpels, so that the outer members of the flower spring from the edge of the receptacle which is immediately above the ovary (epigynous), hence the term epigyny (fig. 30).

Fig. 28. Fig. 29. Fig. 30.

Figs. 28, 29 and 30. — Diagrams illustrating hypogyny, perigyny and epigyny of the flower, a, Stamens; c, carpels; p, petals; s, sepals.

When a flower consists of parts arranged in whorls it is said to be cyclic, and if all the whorls have an equal number of parts

and are' alternate it is encyclic (figs. 22, 23). In Symmetry con trast to the cyclic flowers are those, as in Magnoli- ttower. aceae, where the parts are in spirals (acyclic). Flowers

which are cyclic at one portion and spiral at another, as in many Ranunculaceae, are termed hemicyclic. In spiral flowers the distinction into series is by no means easy, and usually there is a gradual passage from sepaloid through petaloid to staminal parts, as in the water-lily family, Nymphaeaceae (figs. 31, 32), although in some plants there is no such distinction, the

Fig. 3 Fig. 31.

Fram Strasburger's Text-Book o] Botany, by permission of Macmiilan & Co., Ltd.

Figs. 31 and 32. — White Water Lily. Fig. 31, flower; fig. 32, successive stages, a-f, in the transition from petals to stamens. (After Wossidlo.)

parts being all petaloid, as in Trollius. Normally, the parts of successive whorls alternate; but in some cases we find the parts of one whorl opposite or superposed to those of the next whorl. In some cases, as in the vine-family Ampelidaceae, this seems to be the ordinary mode of development, but the superposition of the stamens on the sepals in many plants, as in the pink family, Caryophyllaceae, is due to the suppression or abortion of the whorl of petals, and this idea is borne out by the development, in some plants of the order, of the suppressed whorl. As a rule, whenever we find the parts of one whorl superposed on those of another we may suspect some abnormality.

A flower is said to be symmetrical when each of its whorls consists of an equal number of parts, or when the parts of any one whorl are multiples of that preceding it. Thus, a sym- metrical flower may have five sepals, five petals, five stamens and five carpels, or the number of any of these parts may be ten, twenty or some multiple of five. Fig. 23 is a diagram of a symmetrical flower, with five parts in each whorl, alternating with each other. Fig. 33 is a diagram of a symmetrical flower of stone-crop, with five sepals, five alternating petals, ten

stamens and five carpels. Here the number of parts in the staminal whorl is double that in the others, and in such a case the additional five parts form a second row alternating with the others. In the staminal whorl especially it is common to find additional rows. Fig. 34 shows a symmetrical flower, with five parts in the three outer rows, and ten divisions in the inner. In this case it is the gynoecium which has an additional number of parts. Fig. 35 shows a flower of heath, with four divisions of the calyx and corolla, eight stamens in two rows, and four divisions of the pistil. In fig. 36 there are three parts in each whorl; and in fig. 37 there are three divisions of the calyx, corolla and pistil, and six stamens in two rows. In all these cases the flower is symmetrical. In Mono- cotyledons it is usual for the staminal whorl to be double, it rarely having more than two rows, whilst amongst dicotyledons there are often very numerous rows of stamens. The floral envelopes are rarely multiplied. Flowers in which the number of parts in each whorl is the same, are isomerous (of equal number); when the number in some of the whorls is different, the flower is anisomerous (of un- equal number). The pistil- late whorl is very liable to

Fig. 33.

Fig. 34.

Fig. 37.

Fig. 38.

changes. It frequently Fig. 33.— Diagrammatic section happens that when it is fully ˆer oTsTneˆp (fefuˆlZ-

sisting of five sepals (s), five petals (p) alternating with the sepals, ten stamens (a) in two rows, and five carpels © containing ovules. The dark lines (d) on the outside of the carpels are glands.

Fig. 34. — Diagram of the flower of Flax (Linum), consisting of five sepals (s), five petals (p), five stamens (a), and five carpels ©.

formed, the number of its parts is not in conformity with that of the other whorls. In such circumstances, how- ever, a flower has been called symmetrical, provided the parts of the other whorls are normal, — the permanent state

relation of parts. A flower in which the parts are arranged in twos is called dimerous; when the parts of

of the pistil not being taken each of which is partially' divided into account in determining into two. The dots represent a symmetry. Thus fig. 38 shows whorl of , stamens which has dis- a nentampT-ons wmmptr.'ral appeared. It is pentamerous, com- a pentamerous symmetrical p i e te, symmetrical and regular, flower, with dimerous pistil. Fig. 35— Diagram of the flower Symmetry, then, in botanical of Heath (Erica), a regular tetra- language, has reference to a merous flower, certain definite numerical Fic.36.Diagrainof thetnmer

ous symmetrical flower of Ins.

Fig. 37. — Diagram of the sym- metrical trimerous flower of Fritil- lary (Fritillaria) .

Fig. 38. — Diagram of the flower ,, , , , , of Saxifrage (Saxifragatridactylites).

the whorls are three, four or The calyx and corolla consist of five, the flower is trimerous, five parts, the stamens are ten in tetramerous or pentamerous, tw ° rows – while th e pistil has only respectively. The symmetry tw0 P arts developed, which is most commonly met with is trimerous and pentamerous — the former occurring generally among monocotyledons, the latter among dicotyledons. Dimerous and tetramerous sym- metry occur also among dicotyledons.

The various parts of the flower have a certain definite relation to the axis. Thus, in axillary tetramerous flowers (fig. 35), one sepal is next the axis, and is called superior or posterior; another is next the bract, and is inferior or anterior, and the other two are lateral; and certain terms are used to indicate that position. A plane passing through the anterior and posterior sepal and through the floral axis is termed the median plane of the flower; a plane cutting it at right angles, and passing through the lateral sepals, is the lateral plane; whilst the planes which bisect the

angles formed by the lateral and median planes are the diagonal planes, and in these flowers the petals which alternate with the sepals are cut by the diagonal planes.

In a pentamerous flower one sepal may be superior, as in the calyx of Rosaceae and Labiatae; or it may be inferior, as in the calyx of Leguminosae (fig. 39) — the reverse, by the law of alternation, being the case with the petals. Thus, in the blossom of the pea (figs. 39, 40), the odd petal (vexillum) st is superior,

Fig. 39. — Diagram of flower of Sweet-pea (Latkyrus), showing five sepals (s), two superior, one inferior, and two lateral; five petals (p), one superior, two in- ferior, and two lateral; ten stamens in two rows (a) ; and one carpel ©.

Fig. 40. — Flower of Pea (Pisum sativum) , showing a papi- lionaceous corolla, with one petal superior (st) called the standard (vexillum), two inferior (car) called the keel (carina), and two lateral (a) called wings (alae). The calyx is marked c.

while the odd sepal is inferior. In the order Scrophulariaceae one of the two carpels is posterior and the other anterior, whilst in Convolvulaceaethe carpels are arranged laterally. Sometimes the twisting of a part makes a change in the position of other parts, as in Orchids, where the twisting of the ovary changes the position of the labellum.

When the different members of each whorl are like in size and shape, the flower is said to be regular; while differences in the size and shape of the parts of a whorl make the flower irregular, as in the papilionaceous flower, represented in fig. 39. When a flower can be divided by a single plane into two exactly similar parts; then it is said

to be zygomorphic. Such flowers as Papilio- naceae, Labiatae, are examples. In contrast with this are polysymmetrical or actinomorphic flowers, which have a radial symmetry and can be divided by several planes into several exactly similar portions; such are all regular, symmetrical flowers. When the parts of any whorl are not equal to or some multiple of the others, then the flower is asymmetrical. This want of symmetry may be brought about in various ways. Alteration in the symmetrical arrangement as well as in the completeness and regularity of flowers has been traced to sup- pression or the non-development of parts, degeneration or imperfect formation, cohesion or union of parts of the same whorl, adhesion or union of the parts of different whorls, multiplication of parts, and deduplication (sometimes called chorisis) or splitting of parts.

By suppression or non-appearance of a part at the place where it ought to appear if the structure was normal, the symmetry or completeness of the flower is disturbed. This suppression when confined to the parts of certain verticils makes the flower asymmetrical. Thus, in many Caryophyllaceae, as Polycarpon and Holosteum, while the calyx and corolla are pentamerous, there are only three or four stamens and three carpels; in Impatiens N oli-me-tangere the calyx is composed of three parts, while the other verticils have five; in labiate flowers there are five parts of the calyx and corolla, and only four stamens; and in Tropaeolum pentaphyllum there are five sepals, two petals, eight stamens and three carpels. In all these cases the want of symmetry is traced to the suppression of certain parts. In the last-mentioned plant the normal number is five, hence it is said that there are three petals suppressed, as shown by the position of the two remaining ones; there are two rows of stamens, in each of which one is wanting; and there are two carpels suppressed. In many instances the parts which are afterwards suppressed can be seen in the early stages of growth, and occasion- ally some vestiges of them remain in the fully developed flower. By the suppression of the verticil of the stamens, or of the carpels, flowers become unisexual or diclinous, and by the suppression of one or both of the floral envelopes, monochlamy- deous and achlamydeous flowers are produced. The suppression

of parts of the flower may be carried so far that at last a flower consists of only one part of one whorl. In the Euphorbiaceae we have an excellent example of the gradual suppression of parts, where from an apetalous, trimerous, staminal flower we pass to one where one of the stamens is suppressed, and then to forms where two of them are wanting. We next have flowers in which the calyx is suppressed, and its place occupied by one, two or three bracts (so that the flower is,

properly speaking, achlamy- deous), and only one or two stamens are produced. And finally, we find flowers consisting of a single stamen with a bract. There is thus traced a degradation, as it is called, from a flower with three stamens and three divisions of the calyx, to one with a single bract and a single stamen.

Degeneration, or the transformation of parts, often gives rise either to an apparent want of symmetry or to irregularity in form. In unisexual flowers it is not uncommon to find vestiges of the undeveloped stamens in the form of filiform bodies or scales. In double flowers transformations of the stamens and pistils take place, so that they appear as petals. In Canna, what are called petals are in reality metamorphosed stamens. In the capitula of Compositae we sometimes find the florets converted into green leaves. The limb of the calyx may appear as a rim, as in some Umbelliferae; or as pappus, in Compositae and Valeriana. In Scrophularia the fifth stamen appears as a scale-like body; in other Scrophulariaceae, as in Pentstemon, it assumes the form of a filament, with hairs at its apex in place of an anther.

Cohesion, or the union of parts of the same whorl, and adhesion, or the growing together of parts of different whorls, are causes of change both as regards form and symmetry. Thus in Cucurbita the stamens are originally five in number, but subsequently some cohere, so that three stamens only are seen in the mature flower. Adhesion is well seen in the gynostemium of orchids, where the stamens and stigmas adhere. In Capparidaceae the calyx and petals occupy their usual position, but the axis is prolonged in the form of a gynophore, to which the stamens are united.

Multiplication, or an increase of the number of parts, gives rise to changes. We have already alluded to the interposition of new members in a whorl. This takes place chiefly in the staminal whorl, but usually the additional parts produced form a symmetrical whorl with the others. In some instances, however, this is not the case. Thus in the horse-chestnut there is an interposition of two stamens, and thus seven stamens are formed in the flower, which is asymmetrical.

Parts of the flower are often increased by a process of deduplica- tion, or chorisis, i.e. the splitting of a part so that two or more parts are formed out of what was originally one. Thus in Cruci- ferous plants the staminal whorl consists of four long stamens and two short ones (tetradynamous) . The symmetry in the flower is evidently dimerous, and the abnormality in the androecium, where the four long stamens are opposite the posterior sepals, takes place by a splitting, at a very early stage of development, of a single outgrowth into two. Many

cases of what was con- sidered chorisis are in reality due to the development of stipules from the staminal leaf. Thus in Dicentra and Corydalis there are six stamens in two bundles; the central one of each bundle alone is perfect, the lateral ones have each only half an anther, and are really stipules formed from the staminal leaf. Branching 01 stamens also produces apparent want of symmetry; thus, in the so-called polyadelphous stamens of Hypericaceae there are really only five stamens which give off numerous branches, but the basal portion remaining short, the branches have the appearance of separate stamens, and the flower thus seems asymmetrical.

Cultivation has a great effect in causing changes in the various parts of plants. Many alterations in form, size, number and adhesion of parts are due to the art of the horticulturist. The changes in the colour and forms of flowers thus produced are endless. In the dahlia the florets are rendered quilled, and are made to assume many glowing colours. In pelargonium the flowers have been rendered larger and more showy; and such is

also the case with the Ranunculus, the auricula and the carna- tion. Some flowers, with spurred petals in their usual state, as columbine, are changed so that the spurs disappear; and others, as Linaria, in which one petal only is usually spurred, are altered so as to have all the petals spurred, and to present what are called pelorian varieties.

As a convenient method of expressing the arrangement of the parts of the flower, floral formulae have been devised. Several modes of expression are employed. The following is a very simple mode which has been proposed: — The several whorls are represented by the letters S (sepals), P (petals), St (stamens), C (carpels), and a figure marked after each indicates the number of parts in that whorl. Thus the formula SsPsStsCs means that

Fig. 41. Fig. 42. Fig. 43.

Fig. 41. — Tetramerous monochlamydeous male flower of the Nettle {Urtica).

Fig. 42. — Diagram to illustrate valvular or valvate aestivation, in which the parts are placed in a circle, without overlapping or folding.

Fig. 43.— Diagram to illustrate induplicative or induplicate

aestivation, in which the parts of the verticil are slightly turned inwards at the edges.

the flower is perfect, and has pentamerous symmetry, the whorls being isomerous. Such a flower as that of Sedum (fig. 33) would be represented by the formula SsPsSts + sCs, where St 6 + 5 indicates that the staminal whorl consists of two rows of five parts each. A flower such as the male flower of the nettle (fig. 41) would be expressed S 4 PoSt 4 Co. When no other mark is appended the whorls are supposed to be alternate; but if it is desired to mark the position of the whorls special symbols are employed. Thus, to express the superposition of one whorl upon another, a line is drawn between them, e.g. the symbol S5P5 | St 5 C 5 is the formula of the flower of Primulaceae.

The manner in which the parts are arranged in the flower-bud with respect to each other before opening is the aestivation or praefloration. The latter terms are applied to the flower-bud in the same way as vernation is to the leaf-bud, and distinctive names have been given to the different arrangements exhibited, both by the leaves individually and in their relations to each other. As regards each leaf of the flower, it is either spread out, as the sepals in the bud of the lime-tree, or folded upon itself (conduplicate), as in the petals of some species of Lysimachia, or slightly folded inwards or outwards at the edges, as in the

Fig. 45.

Fig. 46.

Fig. 44.

Fig. 44. — Diagram to illustrate reduplicative or reduplicate aestivation, in which the parts of the whorl are slightly turned outwards at the edges.

Fig. 45. — Diagram to illustrate contorted or twisted aestivation, in which the parts of the whorl are overlapped by each other in turn, and are twisted on their axis.

Fig. 46. — Diagram to illustrate the quincuncial aestivation, in which the parts of the flower are arranged in a spiral cycle, so that 1 and 2 are wholly external, A and 5 are internal, and 3 is partly external and partly overlapped by 1 .

calyx of some species of clematis and of some herbaceous plants, or rolled up at the edges (involute or revolute), or folded trans- versely,

becoming crumpled or corrugated, as in the poppy. When the parts of a whorl are placed in an exact circle, and are

applied to each other by their edges only, without overlapping or being folded, thus resembling the valves of a seed-vessel, the aestivation is valvate (fig. 42). The edges of each of the parts may be turned either inwards or outwards; in the former case the aestivation is induplicate (fig. 43), in the latter case reduplicate (fig. 44) . When the parts of a single whorl are placed in a circle, each of them exhibiting a torsion of its axis, so that by one of its sides it overlaps its neighbour, whilst its side is overlapped in like manner by that standing next to it, the aestivation is twisted or contorted (fig. 45). This arrangement is characteristic of the flower-buds of Malvaceae and Apocynaceae, and it is also seen in Convolvulaceae and Caryophyllaceae. When the flower expands, the traces of twisting often disappear, but sometimes, as in Apocynaceae, they remain. Those forms of aestivation are such as occur in cyclic flowers, and they are included under circular aestivation. But in spiral flowers we have a different arrangement; thus the leaves of the calyx of Camellia japonica cover each other partially like tiles on a house. This aestivation is imbricate. At other times, as in the petals of Camellia, the parts envelop each other completely, so as to become convolute. This is also seen in a transverse section of the calyx of Magnolia grandiflora, where each of the three leaves embraces that within it. When the parts of a whorl are five, as occurs in many dicotyledons, and the imbrication is such that there are two parts external, two internal, and a fifth which partially covers one of the internal parts by its margin, and is in its turn partially covered by one of the external parts, the aestivation is quin- cuncial (fig. 46) . This quin- cunx is common in the corolla of Rosaceae. In fig. 47 a section is given of the bud of Antirrhinum majus, showing the imbri- cate spiral arrangement. In this case it will be seen that the part marked 5 has, by a slight change in posi- tion, become overlapped by 1. This variety of imbri- cate aestivation has been termed cochlear. In flowers such as those of the pea (fig. 40), one of the parts, the vexillum, is often large and folded over the others, giving rise to vexillary

Fig. 47. Fig. 48.

Fig. 47. — Diagram to illustrate im- bricated aestivation, in which the parts are arranged in a spiral cycle, following the order indicated by the figures I, 2, 3, 4, 5.

Fig. 48. — Diagram of a papilio- naceous flower, showing vexillary aestivation. 1 and 2, The alae or wings.

3, A part of the carina or keel.

4, The vexillum or standard, which, in place of being internal, as marked by the dotted line, be- comes external.

5, The remaining part of the keel. The order of the cycle is indicated

restrvatio7(fig7 4 8)7o7the by the figures, carina may perform a similar office, and then the aestivation is carinal, as in the Judas-tree (Cercis Siliquastrum) . The parts of the several verticils often differ in their mode of aestivation. Thus, in Malvaceae the corolla is contorted and the calyx valvate, or reduplicate; in St John's- wort the calyx is imbricate, and the corolla contorted. In Convolvulaceae, while the corolla is twisted, and has its parts arranged in a circle, the calyx is imbri- cate, and exhibits a spiral arrangement. In Guazuma the calyx is valvate, and the corolla induplicate. The circular aestivation is generally associated with a regular calyx and corolla, while the spiral aestivations are connected with irregular as well as with regular forms.

The sepals are sometimes free or separate from each other, at other times they are united to a greater or less extent ; in the former case, the calyx is polysepalous, in the latter gamosepalous or monosepalous. The divisions of the calyx present usually the characters of leaves, and in some cases of monstrosity they are converted into leaf-like organs, as not infrequently happens in primulas. They are usually entire, but occasionally they are cut in various ways, as in the rose; they are rarely stalked. Sepals are generally of a more or less oval, elliptical or oblong form, with their apices either blunt or

Calyx.

acute. In their direction they are erect or reflexed (with their apices downwards), spreading outwards (divergent or patulous), or arched inwards (connivent). They are usually of a greenish colour (herbaceous); but sometimes they are coloured or petaloid, as in the fuchsia, tropaeolum, globe-flower and pomegranate. Whatever be its colour, the external envelope of the flower is considered as the calyx. The vascular bundles sometimes form a prominent rib, which indicates the middle of the sepal; at other times they form several ribs. The venation is useful as pointing out the number of leaves which constitute a gamosepalous calyx. In a polysepalous calyx the number

of the parts is indicated by Greek numerals prefixed; thus, a calyx which has three sepals is trisepalous; one with five sepals is pentasepalous. The sepals occasionally are of different forms and sizes. In Aconite one of them is shaped like a helmet (galeate). In a gamosepalous calyx the sepals are united in various ways, sometimes very slightly, and their number is marked by the divisions at the apex. These divisions either are simple projections in the form of acute or obtuse teeth (fig. 49) ; or they extend down the calyx as fissures about halfway,

Fig. 51.

Fig. 52.

From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 53.

Fig. 49. — Gamosepalous five-toothed calyx of Campion (Lychnis).

Fig. 50. — Obsolete calyx (e) of Madder (Rubia) adherent to the pistil, in the form of a rim.

Fig. 51. — Feathery pappus attached to the fruit of Groundsel (Senecio vulgaris).

Fig. 52. — Caducous .calyx © of Poppy. There are two sepals which fall off before the petals expand.

Fig. 53. — Fruit of Physalis Alkekengi, consisting of the persistent calyx (s), surrounding the berry (fr), derived from the ovary. (After Duchartre.)

. the calyx being trifid (three-cleft), quinquefid (five-cleft), &c, according to their number; or they reach to near the base in the form of partitions, the calyx being tripartite, quadripartite, quinquepartite, &c. The union of the parts may be complete, and the calyx may be quite entire or truncate, as in some Correas, the venation being the chief indication of the different parts. The cohesion is sometimes irregular, some parts uniting to a greater extent than others; thus a two-lipped or labiate calyx is formed. The upper lip is often composed of three parts, which are thus posterior or next the axis, while the lower has two, which are anterior. The part formed by the union of the sepals is called the tube of the calyx; the portion where the sepals are free is the limb.

Occasionally, certain parts of the sepals undergo marked enlargement. In the violet the calycine segments are prolonged downwards beyond their insertions, and in the Indian cress (Tropaeolum) this prolongation is in the form of a spur (calcar), formed by three sepals; in Delphinium it is formed by one. In Pelargonium the spur from one of the sepals is adherent to the fiower-stalk. In Potenlilla and allied genera an epicalyx is formed by the development of stipules from the sepals, which form an apparent outer calyx, the parts of which alternate with

Corolla.

the true sepals. In Malvaceae an epicalyx is formed by the bracteoles. Degenerations take place in the calyx, so that it becomes dry, scaly and glumaceous (like the glumes of grasses), as in the rushes (Juncaceae); hairy, as in Compositae; or a mere rim, as in some Umbelliferae and Acanthaceae, and in Madder (Rubia tinctorum, fig. 50), when it is called obsolete or marginate. In Compositae, Dipsacaceae and Valerianaceae the calyx is attached to the pistil, and its limb is developed in the form of hairs called pappus (fig. 51). This pappus is either simple (pilose) or feathery (plumose). In Valeriana the superior calyx is at first an obsolete rim, but as the fruit ripens it is shown to consist of hairs rolled inwards, which expand so as to waft the fruit. The calyx sometimes falls off before the flower expands, as in poppies, and is caducous (fig. 52); or along with the corolla, as in Ranunculus, and is deciduous; or it remains after flowering (persistent) as in Labiatae, Scrophulariaceae, and Boraginaceae; or its base only is persistent, as in Datura Stramonium. In Eschscholtzia and Eucalyptus the sepals remain united at the upper part, and become disarticulated at the base or middle, so as to come off in the form of a lid or funnel. Such a calyx is operculate or calyptrate. The existence or non-existence of an articulation determines the deciduous or persistent nature of the calyx.

The receptacle bearing the calyx is sometimes united to the pistil, and enlarges so as to form a part, of the fruit, as in the apple, pear, &c. In these fruits the withered calyx is seen at the apex. Sometimes a persistent calyx increases' much after flowering, and encloses the fruit without being incorporated with it, becoming accrescent, as in various species of Physalis (fig- 53)', at other times it remains in a withered or marcescent form, as in Erica; sometimes it becomes inflated or vesicular, as in sea campion (Silene marilima).

The corolla is the more or less coloured attractive inner floral envelope; generally the most conspicuous whorl. It is present in the

greater number of Dicotyledons. Petals differ more from ordinary leaves than sepals do, and are much more nearly allied to the staminal whorl. In some cases, however, they are transformed into leaves, like the calyx, and occasionally leaf-buds are developed in their axil. They are seldom green, although occasionally that colour is met with, as in some species of Cobaea, Hoya viridiflora, Gonolobus viridiflorus and Pentalropis spiralis. As a rule they are highly coloured, the colouring matter being contained in the cell-sap, as in blue or red flowers, or in plastids (chromoplasts) , as generally in yellow flowers, or in both forms, as in many orange-coloured or reddish flowers. The attractiveness of the petal is often due wholly or in part to surface markings; thus the cuticle of the petal of a pelargonium, when viewed with a J or |-in. object-glass, shows beautiful hexagons, the boundaries of which are ornamented with several inflected loops in the sides of the cells.

Petals are generally glabrous or smooth; but, in some instances, hairs are produced on their surface. Petaline hairs, though sparse and scattered, present occasionally the same arrangement as those which occur on the leaves; thus, in Bombaceae they are stellate. Coloured hairs are seen on the petals of Menyanthes, and on the segments of the perianth of Iris. They serve various purposes in the economy of the flower, often closing the way to the honey-secreting part of the flower to small insects, whose visits would be useless for purposes of pollination. Although petals are usually very thin and delicate in their texture, they occasionally become thick and fleshy, as in Stapelia and Rafflesia; or dry, as in heaths; or hard and stiff, as in Xylopia. A petal often consists of two portions — the lower narrow, resembling the petiole of a leaf, and called the unguis or claw; the upper broader, like the blade of a leaf, and called the lamina or limb. These parts are seen in the petals of the wallflower (fig. 54). The claw is often wanting, as in the crowfoot (fig. 55) and the poppy, and the petals are then sessile. According to the development of veins and the growth of cellular tissue, petals present varieties similar to those of leaves. Thus the margin is either entire or divided into lobes or teeth. These teeth sometimes form a regular fringe round the margin, and the

petal becomes fimbriated, as in the pink; or laciniated, as in Lychnis Flos-cuculi; or crested, as in Poly gala. Sometimes the petal becomes pinnatifid, as in Schizopetalum. The median vein is occasionally prolonged beyond the summit of the petals in the form of a long

process, as in Strophanthus hispidus, where it extends for 7 in. ; or the prolonged extremity is folded down- wards or inflexed, as in Umbelliferae, so that the apex approaches the base. The limb of the petal may be flat or concave, or hollowed like a boat. In Hellebore the petals become folded

Fig. 54.

Fig. 55.

Fig. 56.

Fig. 57.

Fig. 58.

Fig. 54. — Unguiculate or clawed petal of Wallflower (Cheiranthus Cheiri). c, The claw or unguis ; /, the blade or lamina.

Fig. 55. — Petal of Crowfoot (Ranunculus), without a claw, and thus resembling a sessile leaf. At the base of the petal a nectariferous scale is seen.

Fig. 56. — Tubular petal of Hellebore (Hellcborus) .

Fig. 57. — Pansy (Viola tricolor). Longitudinal section of flower; v, bracteole on the peduncle; /, sepals; Is, appendage of sepal; c, petals ; cs, spur of the lower petals ; fs, glandular appendage of the lower stamens; a, anthers. (After Sachs.)

(From Vines' Students' Text-Book o\ Botany, by permission of Swan Sonnenschein &Co.)

Fig. 58. — Part of the flower of Aconite (Aconitum Napettus), show- ing two irregular horn-like petals (p) supported on grooved stalks (0). These serve as nectaries. 5, the whorl of stamens inserted on the thalamus and surrounding the pistil.

in a tubular form, resembling a horn (fig. 56) ; in aconite (fig. 58) some of the petals resemble a hollow-curved horn, supported on a grooved stalk; while in columbine, violet (fig. 57), snapdragon and Centranthus, one or all of them are prolonged in the form of a spur, and are calcarate. In Valeriana, Antir- rhinum and Corydalis, the spur is very short, and the corolla or petal is said to be gibbous, or saccate, at the base. These spurs, tubes and sacs serve as receptacles for the secretion or containing of nectar.

A corolla is dipetalous, tripetalous, tetrapetalous or pentapetalous according as it has two, three, four or five separate petals. The general name of polypetalous is given to corollas having separate petals, while monopetalous, gamopetalous or sympetalous is applied to those in which the petals are united. This union generally takes place at the base, and extends more or less towards the apex; in Phyteuma the petals are united at their apices also. In some polypetalous corollas, as that of the vine, the petals are separate at the base and adhere by the apices. When the petals are equal as regards their development and size, the corolla is regular; when unequal, it is irregular. When a corolla is gamo- petalous it usually happens that the lower portion forms a tube, while the upper parts are either free or partially united, so as to form a common limb, the point of union of the two portions being the throat, which often exhibits a distinct constric- tion or dilatation. The number of parts forming such a corolla can be determined by the divisions, whether existing as teeth, crenations, fissures or partitions, or if, as rarely happens, the corolla is entire, by the venation. The union may be equal among the parts, or some may unite more than others.

Amongst regular polypetalous corollas may be noticed the rosaceous corolla (fig. 59), in which there are five spreading petals, having no claws, and arranged as in the rose, strawberry and Polentilla; the caryophyllaceous corolla, in which there are five petals with long, narrow, tapering claws, as in many of the pink tribe; the cruciform, having four petals, often unguiculate, placed opposite in the form of a cross, ‘as seen in wall- flower, and in other plants called cruci- ferous. Of irregular polypetalous corollas the most marked is the papilionaceous (fig. 40), in which there are five petals:

— one superior (posterior), st, placed p IG , 59. Rosaceous

next to the axis, usually larger than the corolla © of the Straw- rest, called the vexillum or standard; berr Y (Fmgaria vesca) two lateral, a, the alae or ˆ wings; two ˆFcW* *** inferior (anterior), partially or com- pletely covered by the alae, and often united slightly by their lower margins, so as to form a single keel-like piece, car, called carina, or keel, which embraces the essential organs. This form of corolla is characteristic of British leguminous plants.

Regular gamopetalous corollas are sometimes campanulate or bell-shaped, as in (Campanula) (fig. 60) ; infundibuliform or funnel-shaped, when the tube is like an inverted cone, and the limb becomes more expanded at the apex, as in tobacco; hypo- crateriform or salver-shaped, when there is a, straight tube sur- mounted by a flat spreading

limb, as in primula (fig. 61) ; tubular, having a long cylindrical tube, appearing continuous with the limb, as in Spigelia and comfrey; rotate or wheel-shaped, when the tube is very short, and the limb flat and spreading, as in forget-me-not, Myosotis (when the divisions of the rotate corolla are very acute, as in Galium, it is sometimes called stellate or star-like); urceolale or urn-shaped, when there is scarcely any limb, and the tube is narrow at both ends, and expanded in the middle, as in bell-heath (Erica cinerea). Some of these forms may become irregular in consequence of certain parts being mora developed than others. Thus, in Veronica, the rotate corolla has one division much smaller than the rest, and in foxglove (Digitalis) there is a slightly irregular companulate cor- olla. Of irregular gamopetalous cor- ollas there may be mentioned thelabiale or lipped (fig. 62), having two divisions of the limb in the form of lips (the upper one, u, com- posed usually of two united petals, and the lower, I, of three), separated by a gap. In such cases the tube varies in length, and the parts in their union follow the reverse order of what occurs in the calyx, where two sepals are united in the lower lip and three in the upper. When the upper lip of a labiate corolla is much arched, and the lips separated by a distinct gap, it is called ringent (fig. 62). The labiate corolla characterizes the natural order Labiatae. When the lower lip is pressed against the upper, so as to leave only a chink between them, the corolla is said to be personate, as in snapdragon, and some other Scrophulariaceae. In some corollas the two lips become hollowed out in a remarkable manner, as in calceolaria, assuming a slipper-like appearance, similar to what occurs in the labellurn of some orchids, as Cypripedium. When a tubular corolla is split in such a way as to form a strap-like process on one side with several tooth-like projections at its apex, it becomes ligulate or strap-shaped (fig. 63). This corolla occurs in many composite plants, as in the florets of dandelion, daisy and chicory. The number of divisions at the apex indicates the number of united petals, some of which, however, may be

From Strasburger's Lehrbuch der Botanik, by permis- sion of Gustav Fischer.

Fig.

60. — Flower of Campanula medium; d, bract ; v, bracteoles.

abortive. Occasionally some of the petals become more united than others, and then the corolla assumes a bilabiate or two-lipped form, as seen in the division of Compositae called Labiatiflorae.

Petals are sometimes suppressed, and sometimes the whole corolla is absent. In A morpka and Afzelia the corolla is reduced to a single petal, and in some other Leguminous plants it is entirely wanting. In the natural order Ranunculaceae, some genera, such as Ranunculus, globe-flower and paeony, have both calyx and corolla, while others, such as clematis, anemone and Caltha, have only a coloured calyx. Flowers become double by the multiplica- tion of the parts of the corolline whorl; this arises in general from a metamorphosis of the stamens.

Certain structures occur on the petals of some flowers, which received in former days the name of nectaries. The term nectary

was very vaguely applied by Linnaeus to any part of the flower which pre- sented an unusual aspect, as the crown {corona) of narcissus, the fringes of the Passion-flower, &c. If the name is retained it ought properly to include only those parts which secrete a honey-like sub- stance, as the glandular depression at the base of the perianth of the fritil- lary, or on the petal of Ranunculus (fig. 55), or on the stamens of Rutaceae. The honey secreted by

Fig. 61. Fig. 62. Fig. 63.

Fig. 61. — Flower of cowslip {Pri- mula veris) cut vertically. 5, Sepals joined to form a gamosepalous calyx; c, corolla consisting of tube and spread- ing limb; a, stamens springing from flowers attracts insects, the mouth of the tube; £, pistil. which by con veying the

IHG. 62. — Irregular gamopetalous labiate corolla of the Dead-nettle {Lamium album). The upper lip u is composed of two petals united, the horn-like nectaries under lower Hp (0 of three. Between the the galea te sepal of two lips there is a gap. The throat is ■? ,c o\ j-

the part where the tube and the labiate aconite (fig. 58) are modi- limb join. From the arching of the upper lip this corolla is called ringent.

conveying pollen to the stigma, effect fertilization. The

fied petals, so also are the tubular nectaries of hel-

i- F . IG ; 6 S’~ Irre ? u ‘ ar gamopetalous lebore (fig _ .5). 0ther

ligulate flower of Ragwort (Senecio). ,, .. /

It is a tubular floret, split down on one modifications of some part side, with the united petals forming a ˚f tne flower, especially straplike projection. The lines on the of the corolla and stamens, flat portion indicate the divisions of the are produced either by five petals. I-rom the tuoular portion j . ■ .

below, the bifid style projects slightly, degeneration or out- growth, or by chorisis, or deduplication. Of this nature are the scales on the petals in Lychnisˆ Silene and Cynoglossum, which are formed in the same way as the ligules of grasses. In other cases, as in Samolus, the scales are alternate with the petals, and may represent altered stamens. In Narcissus the appendages are united to form a crown, consisting of a membrane similar to that which unites the stamens in Pancratium. It is sometimes difficult to say whether these structures are to be referred to the corolline or to the staminal row.

Petals are attached to the axis usually by a narrow base. When this attachment takes place by an articulation, the petals fall off either immediately after expansion {caducous) or after fertilization {deciduous). A corolla which is continuous with the axis and not articulated to it, as in campanula and heaths, may be persistent, and remain in a withered or marcescent state while the fruit is ripening. A gamopetalous corolla falls off in one piece; but sometimes the base of the corolla remains per- sistent, as in Rhinanthus and Orobanche.

The stamens and the pistil are sometimes spoken of as the essential organs of the flower, as the presence of both is required in order that perfect seed may be produced. As with few excep- tions the stamen represents a leaf which has been specially developed to bear the pollen or microspores, it is spoken of in comparative morphology as a microsporophyll ; similarly the

carpels which make up the pistil are the megasporophylls (see Angiosperms). Hermaphrodite or bisexual flowers are those in which both these organs are found; unisexual or diclinous are those in which only one of these organs appears, — those bearing stamens only, being staminiferous or ” male “; those having the pistil only, pistilliferous or ” female.” But even in plants with hermaphrodite flowers self-fertilization is often pro- vided against by the structure of the parts or by the period of ripening of the organs. For instance, in Primula and Linum some flowers have long stamens and a pistil with a short style, the others having short stamens and a pistil with a long style. The former occur in the so-called thrum-eyed primroses (fig. 61), the latter

in the ” pin-eyed.” Such plants are called dimorphic. Other plants are Irimorphic, as species of Lythrum, and proper fertilization is only effected by combination of parts of equal length. In some plants the stamens are perfected before the pistil; these are called prolerandrous, as in Ranunculus repens, Silene maritima, Zea Mays. In other plants, but more rarely, the pistil is perfected before the stamens, as in Potentilla argentea, Plantago major, Coix Lachryma, and they are termed pro- terogynous. Plants in which proterandry or proterogyny occurs are called dichogamous. When in the same plant there are unisexual flowers, both male and female, the plant is said to be monoecious, as in the hazel and castor-oil plant. When the male and female flowers of a species are found on separate plants, the term dioecious is applied, as in Mercurialis and hemp; and when a species has male, female and hermaphrodite flowers on the same or different plants, as in Parietaria, it is polygamous. The stamens arise from the thalamus or torus within the petals, with which they generally alternate, forming one or more whorls, which collectively constitute the androecium. _. Their normal position is below the pistil, and when they are so placed (fig.64, a) upon the thalamus they are hypo- gynous. Sometimes they become adherent to the petals, or are epipetalous, and the insertion of both is looked upon as similar, so that they are still hypogynous, provided they are independent of the calyx and the pistil. In other cases they are perigynous or epigynous (fig. 65). Numerous intermediate forms occur, especially amongst Saxifragaceae, where the parts are half superior or half inferior. Where the stamens become adherent to the pistil so as to form a column, the flowers are said to be gynandrous, as in Aristolochia (fig. 66). These arrange- ments of parts are of great importance in classification. The stamens vary in num- ber from one to many hundreds. In acyclic flowers there is often a gradual transition from petals to stamens, as in the white water-lily (fig. 31). When flowers be- come double by cul- tivation, the stamens are converted into petals, as in the paeony, camellia, rose, &c. When there is only one whorl the stamens are usually equal in number to the sepals or petals, and are arranged opposite to the former, and alternate with the latter. The flower is then isostemonous. When the stamens are not equal in number to the sepals or petals, the flower is anisoste- monous. When there is more than one whorl of stamens, then the parts of each successive whorl alternate with those of the whorl preceding it. The staminal row is more liable to multiplication of parts than the outer whorls. A flower with a single row of stamens is haplostemonous. If the stamens are double the sepals or petals as regards number, the flower is diplostemonoUs; if more than double, polystemonous. The additional rows of

From S tras burger's Lehrbtich der Bolanik, by per- mission of Gustav Fischer.

Fig. 64. — Flower of Paeonia peregrina,ia longitudinal section, k, Sepal ; c, petal ; a, stamens; g, pistil, (j nat. size.)

stamens may be developed in the usual centripetal (acropetal) order, as in Rhamnaceae; or they may be interposed between the pre-existing ones or be placed outside them, i.e. develop centrifugally (basipetally), as in geranium and oxalis, when the flower is said to be obdiplostemonous . When the stamens are fewer than twenty they are said to be definite; when above twenty they are indefinite, and are represented by the symbol '». The number of stamens is indicated by the Greek numerals prefixed to the term androus; thus a flower with one stamen is monandrous, with two, three, four, five, six or many stamens, di-, tri-, tetr-, pent-, hex- or polyandrous, respectively.

The function of the stamen is the development and distribution of the pollen. The stamen usually consists of two parts, a con- tracted portion, often thread-like, termed the filament (fig. 25/), and a broader portion, usually of two lobes, termed the anther (a) , containing the powdery pollen (p), and supported upon the end of the filament. That portion of the filament in contact with the anther-lobes is termed the connective. If the

Fig. 65. — Flower of Aralia in vertical sec- tion, c, Calyx; p, petal; e, stamen; s, stigmas. The calyx, petals and stamens spring from above the ovary (0) in which two chambers are shown each with a pendulous ovule; d, disc between the stamens and stigmas.

From Strasburger's Lehrbuch der Boianik, by perr mission of Gustav Fischer.

Fig. 66. — Flowers of Aristolochia Clem- atitis cut through longitudinally. I. Young flower in which the stigma (N) is receptive and the stamens (S) have not yet opened ; II. Older flower with the stamens (S) opened, the stigma withered, and the hairs on the corolla dried up.

anther is absent the

stamen is abortive,

and cannot perform

its functions . The

anther is developed

before the filament,

and when the latter is not produced, the anther is sessile, as in

the mistletoe.

The filament is usually, as its name imports, filiform or thread- like, and cylindrical, or slightly tapering towards its summit. It is often, however, thickened , compressed and flattened in various ways, becoming peialoid in Carina, Marania, water-lily (fig. 32); subulate or slightly broadened at the base and drawn out into a point like an awl, as in Butomus umbellatus; or clavate, that is, narrow below and broad above, as in Thalictrum. In some instances, as in Tamarix gallica, Pcganum Harmala, and Campanula, the base of the filament is much dilated, and ends suddenly in a narrow thread-like portion. In these cases the base may give off lateral stipulary processes, as in Allium and Alyssum calycinum. The filament varies much in length and in firmness. The length sometimes bears a relation to that of the pistil, and to the position of the flower, whether erect or drooping. The filament is usually of sufficient solidity to support the anther in an erect position; but sometimes, as in grasses, and other wind-pollinated flowers, it is very delicate and hair-like, so that the anther is pendulous (fig. 105). The filament is generally continuous from one end to the other, but in some cases it is bent or jointed, becoming geniculate; at other times, n.s in the pellitory, it is spiral. It is colourless, or of different colours. Thus in fuchsia and Poinciana, it is red; in Adamia fvl Tradescantia virginica, blue; in Oenothera and Ranunculus ac'is, yellow.

Hairs, scales, teeth or processes of different kinds are some-

times developed on the filament. In spiderwort (Tradescantia virginica) the hairs are beautifully coloured, moniliform or necklace-like, and afford good objects for studying rotation of the protoplasm. Filaments are usually articulated to the thalamus or torus, and the stamens fall off after fertilization; but in Campanula and some other plants they are continuous with the torus, and the stamens remain persistent, although in a withered state. Changes are produced in the whorl of stamens by cohesion of the filaments to a greater or less extent, while the anthers remain free; thus, all the filaments of the

androecium may unite, forming a tube round the pistil, or a central bundle when the pistil is abor- tive, the stamens becoming monadelphous, as occurs in plants of the Mallow tribe; or they may be arranged in two bundles, the stamens being diadelphous, as in Polygala, Fumaria and Pea; in this case the bundles may be equal or unequal. It frequently happens, especially in Papilionaceous flowers, that out of ten stamens nine are united by their fila- ments, while one (the postericr one) is free (fig. 68). When there are three or more bundles the stamens are Iriadelphous, as in Hypericum aegypliacum, or polyadelphous, as in Ricinus communis (castor-oil). In some cases, as in papilionaceous flowers, the stamens cohere, having been originally separate, but in most cases each bundle is pro- duced by the branching of a single stamen. When there are three stamens in a bundle we may conceive the lateral ones as of a stipulary nature. In Lauraceae there are perfect stamens, each having at the base of the filament two abortive stamens or staminodes, which may be analogous to stipules. Filaments sometimes are adherent to the pistil, forming a column (gynostemium) , as in Stylidium, Asclepiadaceae, Rafflesia, and Aristolochiaceae (fig. 66) ; the flowers are then termed gynandrous.

Fig. 67. — Spikelet of Reed (Phragmites communis) opened out. a, b, Barren glumes; c, fertile glumes, each enclosing one flower with its pale, d; the zig- zag axis (rhachilla) bears long silky hairs.

Fig. 69.

Fig. 70.

Fig. 68. — Stamens and pistil of Sweet Pea (Lathyrus). The stamens are diadelphous, nine of them being united by their filaments (/), while one of them (e) is free; st, stigma; c, calyx.

Fig. 69. — Portion of wall of anther of Wallflower (Cheiranthus) . ce, Exothecium ; cf, endothecium ; highly magnified.

Fig. 70. — Quadrilocular or tetrathecal anther of the flowering Rush (Butomus umbellatus). The anther entire (a) with its filament; section of anther (b) showing the four loculi.

The anther consists of lobes containing the minute powdery pollen grains, which, when mature, are discharged by a fissure or opening of some sort. There is a double covering of the anther — the outer, or exothecium, resembles the epidermis, and often presents stomata and projections of different kinds (fig. 69) ; the inner, or endothecium, is

formed by a layer or layers of cellular tissue (fig. 69, cf), the cells of which

The anther.

have a spiral, annular, or reticulated thickening of the wall. The endothecium varies in thickness, generally becoming thinner towards the part where the anther opens, and there disappears entirely. The walls of the cells are frequently absorbed, so that when the anther attains maturity the fibres are alone left, and these by their elasticity assist in discharging the pollen. The anther is developed before the filament, and is always sessile in the first instance, and sometimes continues so. It appears at first as a simple cellular papilla of meristem, upon which an indication of two lobes soon appears. Upon these projections the rudiments of the pollen-sacs are then seen, usually four in number, two on each lobe. In each a differentiation takes place in the layers beneath the epidermis, by which an outer layer of small-celled tissue surrounds an inner portion of large cells. Those central cells are the mother-cells of the pollen, whilst the small-celled layer of tissue external to them becomes the endo- thecium, the exothecium being formed from the epidermal layer. In the young state there are usually four pollen-sacs, two for each anther-lobe, and when these remain permanently complete it is a quadrilocular or telratkecal anther (fig. 70). Sometimes, however, only two cavities remain in the anther, by union of the sacs in each lobe, in which case the anther is said to be bilocular or dilhecal. Sometimes the anther has a single cavity, and becomes unilocular, or monothecal, or dimidiate, either by the disappearance of, the partition between the two lobes, or by the abortion of one of its lobes, as in Slyphelia laeta and Alihaea officinalis (hollyhock). Occasionally there are numerous cavities in the anther, as in Viscum and Rafflesia. The form of the anther-lobes varies. They are generally of a more or less oval or elliptical form, or they may be globular, as in Mercurialis annua; at other times linear or clavate : curved, flexuose, or sinuose, as in bryony and gourd. According to the amount of union of the lobes and the unequal development of different parts of their surface an infinite variety of forms is produced. That part of the anther to which the filament is attached is the back, the opposite being the face. The division between the lobes is marked on the face of the anther by a groove or furrow, and there is usually on the face a suture, indicating the line of de-hiscence. The suture is often towards one side in consequence of the valves being unequal. The stamens may cohere by their anthers, and become syngenesious, as in composite flowers, and in lobelia, jasione,

&c.

The anther-lobes are united to the connective, which is either continuous with the filament or articulated with it. When the filament is continuous with the connective, and is prolonged so that the anther-lobes appear to be united to it throughout their whole length, and lie in apposition to it and on both sides of it, the anther is said to be adnate or adherent; when the filament ends at the base of the anther, then the fatter is innate or erect. In these cases the anther is to a greater or less degree fixed. When, however, the attachment is very narrow, and an articulation exists, the anthers are movable {versatile) and are easily turned by the wind, as in Tritonia, grasses (fig. 105), &c, where the filament is attached only to the middle of the connective. The connective may unite the anther- lobes completely or only partially. It is sometimes very short and is reduced to a mere point, so that the lobes are separate or free. At other times it is prolonged upwards beyond the lobes, assuming various forms, as in Acalypha and oleander; or it is extended backwards and downwards, as in violet (fig. 71), forming a nectar-secreting spur. In Salvia officinalis the connec- tive is attached to the filament in a horizontal manner, so as to separate the two anther-lobes (fig. 72), one only of which contains pollen, the other being imperfectly developed and sterile. The connective is joined to the filament by a movable joint forming a lever which plays an important part in the pollination-mechanism. In Stachys the connective is expanded laterally, so as to unite the bases of the anther-lobes and bring them into a horizontal line.

The opening or dehiscence of the anthers to discharge their contents takes place either by clefts, by valves, or by pores. When the anther-lobes are erect, the cleft is lengthwise along the

The coil' aecttve.

567

At other

Anther-

line of the suture— longitudinal dehiscence (fig. 25). times the slit is horizontal, from the connective to the side, as in Alchemilla arvensis (fig. 73) and in Lemna;' delllsceace the dehiscence is then transverse. When the anther- lobes are rendered horizontal by the enlargement of the connec- tive, then what is really longitudinal dehiscence may

appear to be transverse. The cleft does not always proceed the whole length of the anther-lobe at once, but often for a time it extends only partially. In other in- stances the opening is confined to the base or apex, each locula- ment opening by a single pore, as in Pyrola, Tetratheca juncea, Rhododendron, Vaccinium and Solanum (fig. 74) , where there are two, and Poranthera, where there are four; whilst in the mistletoe the anther has numerous pores for the discharge of the pollen. Another mode of dehiscence is the valvular, as in the barberry (fig- 7S) > where each lobe opens by a valve on the outer side of the suture, separately rolling up from base to apex; in some of the laurel tribe there are two such valves for each lobe, or four in all. In some Guttiferae, as Hebradendron cambogioides (the Ceylon gamboge plant), the anther opens by a lid separating from the apex (circumscissile dehiscence) .

The anthers dehisce at different' periods during the process of flowering; sometimes in the bud, but more commonly when the pistil is fully developed and the flower is expanded. They either dehisce simultaneously or in suc- cession. In the latter case in- dividual stamens may move in succession towards the pistil and discharge their contents, as in Parnassia palustris, or the outer or the inner stamens may first dehisce, following thus a centri- petal or centrifugal order. These variations are intimately con- nected with the arrangements for transference of pollen. The anthers are called introrse when they dehisce by the surface next to the centre of the flower; they are extrorse when they dehisce by the outer surface; when they dehisce by the sides, as in Iris and some grasses, they are laterally dehiscent. Sometimes, from their versatile nature, anthers originally introrse become extrorse, as in the Passion- flower and Oxalis.

The usual colour of anthers is yellow, but they present a great variety in this respect. They are red in the peach, dark purple in the poppy and tulip, orange in Eschscholtzia, &c. The colour and appearance of the anthers often change after they have discharged their functions.

Stamens occasionally become sterile by the degeneration or non-development of the anthers, when they are known as staminodia, or rudimentary stamens. In Scrophularia the fifth stamen appears in the form of a scale; and in many Pentstemons it is reduced to a filament wifh hairs or a shrivelled membrane at the apex. In other cases, as in double flowers, the stamens are converted into petals; this is also probably the case with such

Fig. 72. Fig. 75.

Fig. 71. — Two stamens of Pansy (Viola tricolor), with their two anther-lobes and the connectives (p) extending be- yond them. One of the stamens has been deprived of its spur, the other shows its spur c.

Fig. 72. — Anther of Salvia officinalis. If, fertile lobe full of pollen ; Is, barren lobe with- out pollen; e, connective; /, filament.

Fig. 73. — Stamen of Lady's Mantle (Alchemilla), with the anther opening transversely.

Fig. 74. — Stamen of a species of Nightshade (Solanum), showing the divergence of the anther-lobes at the base, and the dehiscence by pores at the apex.

Fig. 75. — The stamen of the Barberry (Berberis vulgaris), showing one of the valves of the anther (v) curved upwards, bearing the pollen on its inner surface.

plants as Mesembryanthemum, where there is a multiplication of petals in several rows. Sometimes, as in Canna, one of the anther-lobes becomes abortive, and a petaloid appendage is produced. Stamens vary in length as regards the corolla. Some are enclosed within the tube of the flower, as in Cinchona (included); others are exserted, or extend beyond the flower, as in Littorella or Plantago. Sometimes the stamens in the early state of the flower project beyond the petals, and in the progress of growth become included, as in Geranium striatum. Stamens also vary in their relative lengths. When there is more than one row or whorl in a flower, those on the outside are sometimes longest, as in many Rosaceae; at other times those in the interior are longest, as in Luhea. When the stamens are in two rows, those opposite the petals are usually shorter than those which alternate with the petals. It sometimes happens that a single

stamen is longer than all the rest. A definite relation, as regards number, sometimes exists between the long and the short stamens. Thus, in some flowers the stamens are didy- namous, having only four out of five stamens developed, and the two corresponding to the upper part of the flower longer than the two lateral ones. This occurs in Labiatae and Scrophulariaceae (fig. 76). Again, in other cases there are six stamens, whereof four long ones are arranged in pairs opposite to each other, and alternate with two isolated short ones (fig. 77), giving rise to tetradynamous flowers, as in Cruciferae. Stamens, as

regards their direction, may be erect, turned inwards, outwards, or to one side. In the last-mentioned case they are called declinate, as in amaryllis, horse-chestnut and fraxinella.

The pollen-grains or microspores contained in the anther con- sist of small cells, which are developed in the large thick-walled mother-cells formed in the interior of the pollen-sacs (micro- sporangia) of the young anther. These mother-cells are either separated from one another and float in the granular fluid which fills up the cavity of the pollen-sac, or are not so isolated. A division takes place, by which four cells are formed in each, the exact mode of division differing in dicotyledons and mono- cotyledons. These cells are the pollen-grains. They increase in size and acquire a cell-wall, which becomes differentiated into an outer cuticular layer, or extine, and an inner layer, Or intine. Then the walls of the mother-cells are absorbed, and the pollen- grains float freely in the fluid of the pollen-sacs, which gradually disappears, and the mature grains form a powdery mass within the anther. They then either remain united in fours, or multiples of four, as in some acacias, Periploca graeca and Inga anomala, or separate into individual grains, which by degrees become mature pollen. Occasionally the membrane of the mother-cell is not completely absorbed, and traces of it are detected in a viscid matter surrounding the pollen-grains, as in Onagraceae. In orchidaceous plants the pollen-grains are united into masses, or pollinia (fig. 78), by means of viscid matter. In orchids each of the pollen-masses has a prolongation or stalk (caudicle) which adheres to a prolongation at the base of the anther (rostellum) by means of a viscid gland (retinaculum) which is either naked or covered. The term clinandrium is sometimes applied to the part of the column in orchids where the stamens are situated. In some orchids, as Cypripedium, the pollen has its ordinary character of separate grains. The number of pollinia varies;

Fig. 76. — Corolla of foxglove (Digi- talis purpurea), cut in order to show the didynamous stamens (two long and two short) which are attached to it.

From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 77. — Tetra- dynamous stamens (four long and two short) of wallflower (CheiranthusCheiri) .

thus, in Orchis there are usually two, in Cattleya four, and in Laelia eight. The two pollinia in Orchis Morio contain each about 200

secondary smaller masses. These small masses, when bruised, divide into grains which are united in fours. In Asclepia- daceae the pollinia are usually united in pairs (fig. 79), belonging to two contiguous anther-lobes — each pollen-mass having a

s

Fig. 78. Fig. 79. Fig. 80.

FlG. 78. — Pollinia, or pollen-masses, with their retinacula (g) or viscid matter attaching them at the base. The pollen masses (p) are supported on stalks or caudicles ©. These masses are easily detached by the agency of insects. Much enlarged.

Fig. 79. — Pistil of Asclepias (a) with pollen-masses (p) adhering to the stigma (s). b, pollen-masses, removed from tie stigma, united by a gland-like body. Enlarged.

Fig. 80. — Stamen of Asclepias, showing filament/, anther a, and appendages p. Enlarged.

caudicular appendage, ending in a common gland, by means of which they are attached to a process of the stigma. The pollinia are also provided with an appendicular staminal covering (fig. 80). The extine is a firm membrane, which defines the figure of the pollen-grain, and gives colour to it. It is either smooth, or covered with numerous projections (fig. 81), granules, points or crested reticulations. The colour is generally yellow, and the sur- face is often covered with a viscid or oily H F * G : 8l ;~ matter. The intine is uniform in different ˆ « u ■ magni . kinds of pollen, thin and transparent, ne d. and possesses great power of extension. In some aquatics, as Zostera, Zannichellia, Naias, &c, only one covering exists.

Pollen-grains vary from -gfrg to yJtt of an inch or less in diameter. Their forms are various. The most common form of grain is ellipsoidal, more or less narrow at the extremities, which are called its poles, in contradistinction to a line equidistant from the extremities, which is its equator. Pollen-grains are also spherical; cylindrical and curved, as in Tradescantia virginica;

-Pollen of

(Althaea

Fig. 83. — Male flower of Peilitory (Parietaria officinalis), having four stamens with in- curved elastic filaments, and an abortive pistil in the

centre. When the perianth (p) ex- pands, the filaments are thrown out with force as at a, so as to scatter the pollen.

From Vines' Students' Text-Book cj Botany, by permission of Swan Sonnen- schein & Co.

Fig. 82. — Germinating pollen- grain of Epilobium (highly mag.) bearing a pollen-tube s; e, exine ; i, intine; abc,_ the three spots where the exine is thicker in anticipation of the formation of the pollen-tube developed in this case at a.

polyhedral in Dipsacaceae and Compositae; nearly triangular in section in Proteaceae and Onagraceae (fig. 8ˆ). The surface of the pollen-grain is either uniform and homogeneous, or it is marked by folds formed by thinnings of the membrane. There are also rounded portions of the membrane or pores visible in the pollen- grain; these vary in number from one to fifty, and through one

Disk.

or more of them the pollen-tube is extended in germination of the spore. In Monocotyledons, as in grasses, there is often only one, while in Dicotyledons they number from three upwards; when numerous, the pores are either scattered irregularly, or in a regular order, frequently forming a circle round the equatorial surface. Sometimes at the place where they exist, the outer membrane, in place of being thin and transparent, is separated in the form of a lid, thus becoming operculale,as in the passion- flower and gourd. Within the pollen-grain is the granular protoplasm with some oily particles, and occasionally starch. Before leaving the pollen-sac a division takes place in the pollen- grain into a vegetative cell or cells, from which the tube is developed, and a generative cell, which ultimately divides to form the male cells (see Angiosperms and Gymnosperms) .

When the pollen-grains are ripe, the anther dehisces and the pollen is shed. In order that fertilization may be effected the pollen must be conveyed to the stigma of the pistil. Po/ffna- This procesSj termed pollination (see Pollination), is promoted in various ways, — the whole form and structure of the flower having relation to the process. In some plants, as Kalmia and Pellitory (fig. 83), the mere elasticity of the filaments is sufficient to effect this; in other plants pollination is effected by the wind, as in most of our forest trees, grasses, &c, and in

such cases enormous quantities of pollen are produced. These plants are anemophilous . But the common agents for pollination are insects. To allure and attract them to visit the flower the odoriferous secretions and gay colours are developed, and the position and complicated structure of the parts of the flower are adapted to the perfect performance of the process. It is comparatively rare in hermaphrodite flowers for self-fertilization to occur, and the various forms of dicho- gamy, dimorphism and trimorphism are fitted to prevent this.

Under the term disk is included every structure intervening between the stamens and the pistil. It was to such structures that the name of nectary was applied by old authors. It presents great varieties of form, such as a ring, scales, glands, hairs, petaloid appendages, &c, and in the progress of growth it often contains saccharine matter, thus becoming truly nectariferous . The disk is frequently formed by degeneration or transformation of the staminal row. It may consist of processes rising from the torus, alternating with the stamens, and thus representing an abortive whorl; or its parts may be opposite to the stamens. In some flowers, as Jatropha Curcas, in which the stamens are not developed, their place is occupied by glandular bodies forming the disk. In Gesner- 1 aceae and Cruciferae the disk con- sists of tooth-like scales at the base of the stamens. The parts compos- ing the disk sometimes unite and form a glandular ring, as in the orange; or they form a dark -red lamina covering the pistil, as in Paeonia Moutan (fig. 84); or a Fig. 84.— Flower of Tree wax ˆ linin S of the hollow receptacle, Paeony {Paeonia Moutan), as in the rose; or a swelling at the deprived of its corolla, and top of the ovary, as in Umbelliferae, showingthediskin the form m whic h the disk is said to be cIverinTt/ eovaTˆˆepigynou, The enlarged torus covering the ovary in Nymphaea (Castalia) and Nelumbium may be regarded as a form of disk.

The pistil or gynoecium occupies the centre or apex of the flower, and is surrounded by the stamens and floral envelopes The pistil. wnen these are present. It constitutes the innermost whorl, which after flowering is changed into the fruit and contains the seeds. It consists essentially of two parts, a basal portion forming a chamber, the ovary, containing the ovules attached to a part called the placenta, and an upper receptive portion, the stigma, which is either seated on the ovary (sessile) , as in the tulip and poppy, or is elevated on a stalk called the style, interposed between the ovary and stigma. The pistil

consists of one or more modified leaves, the carpels (or megasporo- phylls). When a pistil consists of a single carpel it is simple 01 monocarpellary (fig. 85). When it is composed of several carpels, more

or less united, it is compound or polycarpellary (fig. 86). In the first-mentioned case the terms carpel and pistil are synonymous-. Each carpel has its own ovary, style (when present), and stigma, and may be regarded as formed by a folded leaf, the upper surface of which is turned inwards towards the axis, and the lower outwards, while from its margins are developed one or more ovules. This comparison is borne out by an examina- tion of the flower of the double-flowering cherry. In it no fruit is produced, and the pistil consists merely of sessile leaves, the limb of each being green and folded, with a narrow prolonga- tion upwards, as if from the midrib, and ending in a thickened portion. In Cycas the carpels are ordinary leaves, with ovules upon their margin.

A pistil is usually formed by more than one carpel. The carpels may be arranged either at the same or nearly the same height

Fig. 85.

From Strasburger's Lenrbuch der Botanik, by permission of Gustuy Fischer.

Fig.

Fig. 86. Fig. 89. Fig. 88. fig. 90.

Fig. 85. — Pistil of Broom {Cytisus). consisting of ovary style s and stigma /. It is formed by a single carpel. ' !

Fig. 86— Vertical section of the flower of Black Hellebore (Helle-borus niger). The pistil is apocarpous, consisting of several distinct carpels, each with ovary, style and stigma. The stamens are in-definite, and are inserted below the pistil (hypogynous) .

Fig. 87.— Fruit of the Strawberry {Fragaria vesca), ronsisting of an enlarged succulent receptacle, bearing on its surface the small dry seed-like fruits (achenes).

Fig. 88.— Fruit of Rosa alba, consisting of the fleshy hollowed axis .? , the persistent sepals s, and the carpels jr. The stamens © have withered. (After Duchartre.)

_ Fig. 89.— Pistil of Ranunculus, x, Receptacle with the points of insertion of the stamens a, most of which have been removed

Fig. 90— Syncarpous Pistil of Flax (Linum), consisting of five carpels, united by their ovaries, while their styles and stigmas are separate.

in a verticil, or at different heights in a spiral cycle. When they remain separate and distinct, thus showing at once the composi- tion of the pistil, as in Caltha, Ranunculus, hellebore (fig. 86), and Spiraea, the term apocarpous is applied. Thus, in Sedum (fig. 22) the pistil consists of five vertieillate carpels 0, alternating with the stamens e. In magnolia and Ranunculus (fig. 89) the separate carpels are numerous and are arranged in a spiral cycle upon an elongated* axis or receptacle. In the raspberry the carpels are on a conical receptacle; in the strawberry, on a swollen succulent one (fig. 87); and in the rose (fig. 88), on a hollow one. When the carpels are united, as in the pear, arbutus and chickweed, the pistil becomes syncarpous. The number of carpels in a pistil is indicated by the Greek numeral. A flower with a simple pistil is monogynous; with two carpels, digynous; with three carpels, trigynous, &c.

The union in a syncarpous pistil is not always complete; it may take place by the ovaries alone, while the styles and stigmas remain free (fig. 90), and in this case, when the ovaries form apparently a single body, the organ receives the name of compound ovary; or the union may take place by the ovaries and styles while the stigmas are disunited; or by the stigmas

and the summit of the style only. Various intermediate states exist, such as partial union of the ovaries, as in the rue, where they coalesce at their base; and partial union of the styles, as in Malvaceae. The union is usually most complete at the base ; but in Labiatae the styles are united throughout their length, and in Apocynaceae and Asclepiadaceae the stigmas only. When the union is incomplete, the number of the parts of a com- pound pistil may be determined by the number of styles and stigmas; when complete, the external venation, the grooves on the surface, and the internal divisions of the ovary indicate the number.

The ovules are attached to the placenta, which consists of a mass of cellular tissue, through which the nourishing vessels Th pass to the ovule. The placenta is usually formed on

placenta. tne edges of the carpellary leaf (fig. 91)— marginal. In many cases, however, the placentas are formations from the axis (axile), and are not connected with the carpellary leaves. In marginal placentation the part of the carpel bearing the placenta is the inner or ventral

suture, corresponding to the margin of the folded carpellary leaf, while the outer or dorsal suture corresponds to the midrib of the carpellary leaf. As the placenta is formed on each margin of the carpel it is essentially double. This is seen in cases where the margins of the carpel do not unite, but remain separate, and con- sequently two placentas are formed in place of one. When the pistil is formed by one carpel the inner margins unite and form usually a common marginal placenta, which may extend after fertilization of 'the al ° n S the whole margin of the ovary ovules, developing to form as far as the base of the stvIe (%• 9i) > the fruit. /, Funicle or or may be confined to the base or stalk of ovuie (ov) ; pi, pla- apex only. When the pistil consists centa ; s.withered style and f d separate carpels, or is

stigma ; c, persistent calyx. J , ,,

apocarpous, there are generally separ- ate placentas at each of their margins. In a syncarpous pistil, on the other hand, the carpels are so united that the edges of each of the contiguous ones, by their union, form a septum or dissepiment, and the number of these septa consequently indicates the number of carpels in the compound pistil (fig. 92). When the

Fig. 92. Fig. 93. Fig. 94.

Fig. 92. — -Trilocular ovary of the Lily (Lilium), cut transversely. s, Septum ; 0, ovules, which form a double row in the inner angle of each chamber. Enlarged.

Fig. 93. — Diagrammatic section of a quinquelocular ovary, com- posed of five carpels, the edges of which are folded inwards, and meet in the centre forming the septa, 5. The ovules (0) are attached to a central placenta, formed by the union of the five ventral sutures. Dorsal suture, I.

Fig. 94. — Diagrammatic section of a five-carpel lary ovary, in which the edges of the carpels, bearing the placentas and ovules 0, are not folded inwards. The placentas are parietal, and the ovules appear sessile on the walls of the ovary. The ovary is unilocular.

dissepiments extend to the centre or axis, the ovary is divided into cavities or cells, and it may be bilocular, trilocular (fig. 92), quadrilocular, quinquelocular, or multilocular , according as it is formed by two, three, four, five or many carpels, each carpel corresponding to a single cell. In these cases the marginal placentas meet in the axis, and unite so as to form a single central one (figs. 92,

93), and the ovules appear in the central angle of the loculi. When the carpels in a syncarpous pistil do not fold inwards so that the placentas appear as projections on the walls

of the ovary, then the ovary is unilocular (fig. 95) and the placentas are parietal, as in Viola (fig. 96). In these instances the placentas may be formed at the margin of the united con- tiguous leaves, so as to appear single, or the margins may not be united, each developing a placenta. Frequently the margins of the carpels, which fold in to the centre, split there into two lamellae, each of which is curved outwards and projects into the

Fig. 95.

m

Fig. 96.

©

Fig. 97. Fig. 98.

Fig. 95. — Diagrammatic section of a five-carpellary ovary, in which the septa (s) proceed inwards for a certain length, bearing the placentas and ovules (0). In this case the ovary is unilocular, and the placentas are parietal. Dorsal suture, L

Fig. 96. — Pistil of Pansy (Viola tricolor), enlarged. 1, Vertical; 2, horizontal section; c, calyx; d, wall of ovary; o, ovules; p, placenta; s, stigma.

Fig. 97. — Transverse section of the fruit of the Melon (Cucumis Melo), showing the placentas with the seeds attached to them. The three carpels forming the pepo are separated by partitions. From the centre, processes go to circumference, ending in curved placentas bearing the ovules.

Fig. 98. — Diagrammatic section of a compound unilocular ovary, in which there are no indications of partitions. The ovules (0) are attached to a free central placenta, which has no connexion with the walls of the ovary.

loculament, dilating at the end into a placenta. This is well seeninCucurbitaceae(fig.97), Pyrola,&c. The carpellary leaves may fold inwards very slightly, or. they may be applied in a valvate manner, merely touching at their margins, the placentas then being parietal (fig. 94), and appearing as lines or thickenings along the walls. Cases occur, however, in which the placentas are not connected with the walls of the ovary, and form what is called a free central placenta (fig. 98). This is seen in many of the Caryophyl- laceae and Primulaceae (figs. 99,100). In Caryophyllaceae, however, while the placenta is free in the centre, there are often traces found at the base of the ovary of the remains of septa, as if rupture had taken place, and, in rare instances, ovules are found on the margins of the carpels. But in Primulaceae no vestiges of septa or marginal ovules can be perceived at any period of growth; the placenta is always free, and rises in the centre of the ovary. Free central placentation, there- fore, has been accounted for in two ways: either by supposing that the placentas in the early state were formed on the margins of

Fig. 99. Fig. 100.

Fig. 99. — Pistil of Cerastium hirsutum cut vertically. 0, Ovary ; p, free central placenta; g, ovules; s, styles.

Fig. 100. — The same cut hori- zontally, and the halves separated so as to show the interior of the cavity of the ovary 0, with the free central placenta p, covered with ovules g.

carpellary leaves, and that in the progress of development these leaves separated from them, leaving the placentas and ovules free in the centre; or by supposing that the placentas are not marginal but axile formations, produced by an elongation of the axis, and the carpels verticillate leaves, united together around the axis. The first of these views applies to Caryophyllaceae, the second to Primulaceae.

Occasionally, divisions take place in ovaries which are not formed by the edges of contiguous carpels. These are called spurious dissepiments. They are often horizontal, as in Cathar- tocarpus Fistula, where they consist of transverse cellular pro- longations from the walls of the ovary, only developed after fertilization, and therefore more properly noticed under fruit. At other times they are vertical, as in Datura, where the ovary, in place of being two-celled, becomes four-celled; in Cruciferae, where the prolongation of the placentas forms a vertical partition ; in Astragalus and Thespesia, where the dorsal suture is folded inwards; and in Oxytropis, where the ventral suture is folded inwards.

The ovary is usually of a more or less spherical or curved form, sometimes smooth and uniform on its surface, at other times hairy and grooved. The grooves usually indicate the divisions between the carpels and correspond to the dissepiments. The dorsal suture may be marked by a slight projection or by a superficial groove. When the ovary is situated on the centre of the receptacle, free from the other whorls, so that its base is above the insertion of the stamens, it is termed superior, as in Lychnis, Primula (fig. 61) and Peony (fig. 64) (see also fig. 28). When the margin of the receptacle is prolonged upwards, carrying with it the floral envelopes and staminal leaves, the basal portion of the ovary being formed by the receptacle, and the carpellary leaves alone closing in the apex, the ovary is inferior, as in pomegranate, aralia (fig. 65), gooseberry and fuchsia (see

fig. 30). In some plants, as many Saxifragaceae, there are intermediate forms, in which the term half-inferior is applied to the ovary, whilst the floral whorls are half- superior.

The style proceeds from the summit of the

,,, , , carpel (fig.

The style. . ˆ , ?

102), and is

traversed by a narrow canal, in which there are some loose projecting cells, a continuation of the placenta, constituting what is called conduct- ing tissue, which ends in the stigma. This is par- ticularly abundant when the pistil is ready for fertilization. In some cases, owing to more rapid growth of the dorsal side of the ovary, the style becomes lateral (fig. 101); this may so increase that the style appears to arise from

Fig. 103.

Fig. ioi. — Carpel of Lady's-mantle (Alchemilla) with lateral style s; 0, ovary, st, stigma. Enlarged.

Fig. 1 02. — Pistil of Primrosc(Primula) composed of five carpels which are com- pletely united; 0, ovary; s, style; st, stigma. Enlarged.

Fig. 1 03 . — Gy noeciu m of the Flower- de-Luce (Iris), consisting of an inferior ovary (0) and a style which divides into three petaloid segments (s), each bearing a stigma (st).

Fig. 104. — Capsule of Poppy, opening by pores (p), under the radiating peltate stigma (i).

near the base, as in the strawberry, or from the base, as in Chrysobalanus Icaco, when it is called basilar. In all these cases the style still indicates the organic apex of the ovary, although it may not be the apparent apex. When in a compound pistil the style of each carpel is thus displaced, it appears as if the ovary were depressed in the centre, and the style rising from the depres- sion in the midst of the carpels seems to come from the torus. Such a style is gynobasic, and is well seen in Boraginaceae.

The stigma.

The form of the style is usually cylindrical, more or less filiform and simple; sometimes it is grooved on one side, at other times it is flat, thick, angular, compressed and even petaloid, as in Iris (fig. 103) and Canna. In Goodeniaceae it ends in a cup-like expansion, enclosing the stigma. It sometimes bears hairs, which aid in the application of the pollen to the stigma, and are called collecting hairs, as in Campanula, and also in Aster and other Compositae. These hairs, during the upward growth of the style, come into contact with the already ripened pollen, and carry it up along with them, ready to be applied by insects to the mature stigma of other flowers. In Vicia and Lobelia the hairs frequently form a tuft below the stigma. The styles of a syncarpous pistil are either separate or united; when separate, they alternate with the septa; when united completely, the style is said to be simple (fig. 102). The style of a single carpel, or of each carpel of a compound pistil, may also be divided. Each division of the tricarpeilary ovary of Jatropha Curcas has a bifurcate or forked style, and the ovary of Emblica officinalis has three styles, each of which is twice forked. The length of the style is determined by the relation which should subsist between the position of the stigma and that of the anthers, so as to allow the proper application of the pollen. The style is deciduous or persists after fertilization.

The stigma is the termination of the conducting tissue of the style, and is usually in direct communication with the placenta. It consists of loose cellular tissue, and secretes a viscid matter which detains the pollen, and causes it to germinate. This secreting portion is, strictly speaking, the true stigma, but the name is generally applied to all the divisions of the style on which the stigmatic apparatus is situated. The stigma alternates with the dissepiments of a syncarpous pistil, or, in other words, corresponds with the back of the loculaments; but in some cases it would appear that half the stigma of one carpel unites with half that of the contiguous carpel, and thus the stigma is opposite the dissepiments, that is, alternates with the loculaments, as in the poppy.

The divisions of the stigma mark the number of carpels which compose the pistil. Thus in Campanula a five-cleft stigma indicates five carpels; in Bignoniaceae, Scrophulariaceae and Acanthaceae, the two-lobed or bilamellar stigma indicates a bilocular ovary. Sometimes, however, as in Gramineae, the stigma of a single carpel divides. Its position may be terminal or lateral. In Iris it is situated on a cleft on the back of the petaloid divisions of the style (fig. 103). Some stigmas, as those of Mimulus, present sensitive flattened laminae, which close when touched. The stigma presents various forms. It may be globular, as in Mirabilis Jalapa; orbicular, as in Arbutus Andrachne; umbrella-

like, as in Sarracenia, where, however, the proper stigmatic surface is beneath the angles of the large expansion of the apex of the style; ovoid, as in fuchsia; hemispherical; poly- hedral; radiating, as in the poppy (fig. 104), where the true stigmatic rays are attached to a sort of peltate or shield-like body, which may represent depressed or flattened styles; cucullate, i.e. covered by a hood, in calabar bean. The lobes of a stigma are flat and pointed as in Mimulus and Bignonia, fleshy and blunt, smooth or granular, or they are feathery, as in many grasses (fig. 105) and other wind- pollinated flowers. In Orchidaceae the stigma is situated on the anteiior surface of the column beneath the anther. In Asclepiadaceae the stigmas are united to the face of the anthers, and along with them form a solid mass.

The ovule is attached to the placenta, and destined to become the seed. Ovules are most usually produced on the margins of

Fig. 105. — Flower of a grass with glumes removed, show- ing three stamens and two feathery styles, p. Pale; /, lodicules. Enlarged.

the carpellary leaves, but are also formed over the whole surface of the leaf, as in Butomus. In other instances they rise from the floral axis itself, either terminal, as in Poly- The ovu e. gonaceae and pjp er aceae, or lateral, as in Primulaceae and Compositae. The ovule is usually contained in an ovary, and all plants in which the ovule is so enclosed are termed angiospermous; but in Coniferae and Cycadaceae it has no proper ovarian covering, and is called naked, these orders being denominated gymnospermous. In Cycas the altered leaf, upon the margin of which the ovule is produced, and the peltate scales, from which they are pendulous in Zamia, are regarded by all botanists as carpellary leaves. As for the Coniferae great dis- cussion has arisen regarding the morphology of parts in many genera. The carpellary leaves are sometimes united in such a way as to leave an opening at the apex of the pistil, so that the ovules are exposed, as in mignonette. In Leontice thalictroides (Blue Cohosh), species of Ophiopogon, Peliosanthes and Stateria, the ovary ruptures immediately after flowering, and the ovules are exposed; and in species of Cuphea the placenta ultimately bursts through the ovary and corolla, and becomes erect, bearing the exposed ovules. The ovule is attached to the placenta either directly, when it is sessile, or by means of a prolongation funicle (fig. 1 10, /) . This cord sometimes becomes much elongated after fertilization. The part by which the ovule is

attached to the placenta or cord is its base or hilum, the opposite extremity being its apex. The latter is frequently turned round in such a way as to approach the base. The ovule is sometimes embedded in the placenta, as in Hydnora.

Fig. 106.

Fig. 107.

Fig. 108.

Fig. 109.

Figs. 106 and 107. — Successive stages in the development of an ovule, n, Nucellus; i, inner; 0, outer integument in section; m, micropyle.

Fig. 108. — Orthotropous ovule of Polygonum in section, showing the embryo-sac s, in the nucellus n, the different ovular coverings, the base of the nucellus or chalaza ch, and the apex of the ovule with its micropyle m. ,

Fig. 109.— Vertical section of the ovule of the Austrian Pine (Pinus austriaca), showing the nucellus a, consisting of delicate cellular tissue containing deep in its substance an embryo-sac b. The micropyle m is very wide.

The ovule appears at first as a small cellular projection from the placenta. The cells multiply until they assume a more or less enlarged ovate form constituting what has been called the nucellus (fig. 106, n), or central cellular mass of the ovule. This nucellus may remain naked, and alone form the ovule, as in some orders of parasitic plants such as Balanophoraceae, Santa- laceae, &c. ; but in most plants it becomes surrounded by certain coverings or integuments during its development. These appear first in the form of cellular rings at the base of the nucellus, which gradually spread over its surf ace (figs. 106, 107). Insome cases only one covering is formed, especially amongst gamo- petalous dicotyledons, as in Compositae, Campanulaceae, also in walnut, &c. But usually besides the single covering another is developed subsequently (fig. 106, 0), which gradually extends over that first formed, and ultimately covers it completely, except at the apex. There are thus two integuments to the nucellus, an outer and an inner. The integuments do not completely invest the apex of the nucellus, but an opening termed the micropyle is left. The micropyle indicates the organic apex of the ovule. A single cell of the nucellus enlarges greatly to form the embryo-sac or

megaspore (fig. 108, s). This embryo-sac increases in size, gradually supplanting the cellular tissue of the nucellus until it is surrounded only by a thin layer of it; or it

may actually extend at the apex beyond it, as in Phaseolus and Alsine media; or it may pass into the micropyle, as in Santalum. In Gymnosperms it usually remains deep in the nucellus and surrounded by a thick mass of cellular tissue (fig. 109). For an account of the further development of the mega- spore, and the formation of the egg-cell, from which after fertiliza- tion is formed the embryo, see Gymnosperms and Angio- sperms.

The point where the integuments are united to the base of the nucellus is called the chalaza (figs. 111, 112). This is often coloured, is of a denser texture than the sur- rounding tissue, and is traversed by fibro- vascular bundles, which pass from the placenta to nourish the ovule.

When the ovule is so developed that the chalaza is at the hilum (next the pla- centa), and the micro

Fig. hi.

Fig. no. Fig. no. — Campylotropous ovule of

, . . ., .. wall-flower (Cheiranthus), showing the

pyle is at the opposite {lmicle ˆ wh ; c h attaches the ovule to the extremity, there being placenta; p, the outer, s, the inner coat, a short funicle, the n, the nucellus, ch, the chalaza. The ovule is orthotropous. °Y ule is curved upon itself, so that the „, . , . 11 • micropvle is near the funicle.

This form is well seen in Fig.iii.— Anatropous ovule of Dande- Polygonaceae (fig. 112), ii on (Taraxacum), n, nucellus, which is Cistaceae, and most inverted, so that the chalaza ch, is re- gymnosperms. In such moved from the base or hilum h, while bJ , , . , , ,. the micropyle / is near the base, the

an ovule a straight ine connexion between the base of the ovule drawn from the hilum anc j the base of the nucellus is kept up to the micropyle passes by means of the raphe r. along the axis of the

ovule. Where, by more rapid growth on one side than on the other, the nucellus, together with the integuments, is curved upon itself, so that the micropyle approaches the hilum,and ultimately is placed

close to it, while the chalaza is at the hilum, the ovule is campylotropous (fig. 1 1 o) . Curved ovules are found in Crucif erae, and Caryophyllaceae. The inverted or anatropous ovule (fig. in) is the commonest form amongst angiosperms. In this ovule the apex with the micropyle is turned towards the point of attach- ment of the funicle to the placenta, the chalaza being situated at the opposite extremity; and the funicle, which runs along the side usually next the placenta, coalesces with the ovule and constitutes the raphe ®, which often forms a ridge. The anatropous ovule arises from the placenta as a straight or only slightly curved cellular process, and as it grows, gradually becomes inverted, curving from the point of origin of the integu- ments (cf. figs. 106, 107). As the first integument grows round it, the amount of inversion increases, and the funicle becomes adherent to the side of the nucellus. Then if a second integument be formed it covers all the free part of the ovule, but does not form on the side to which the raphe is adherent. These may be taken as the three types of ovule; but there are various inter- mediate forms, such as semi-anatropous and others.

The position of the ovule relative to the ovary varies. When there is a single ovule, with its axis vertical, it may be attached to the placenta at the base of the ovary {basal placenta), and is then erect, as in Polygonaceae and Compositae; or it may be inserted a little above the base, on a parietal placenta, with its apex upwards, and then is ascending, as in Parietaria. It may hang from an apicilar placenta at the summit of the ovary, its apex being directed downwards, and is inverted or pendulous, as in Hippuris vulgaris; or from a parietal placenta near the summit, and then is suspended, as in Daphne Mezereum, Poly- galaceae and Euphorbiaceae. Sometimes a long funicle arises from a basal placenta, reaches the summit of the ovary, and there bending over suspends the ovule, as in Armeria (sea-pink); at other times the hilum appears to be in the middle, and the ovule becomes horizontal. When there are two ovules in the same cell, they may be either collateral, that is, placed side by

side (fig. 92), or the one may be erect and the other inverted, as in some species of Spiraea and Aesculus; or they may be placed one above another, each directed similarly, as is the case in ovaries containing a moderate or definite number of ovules. Thus, in the ovary of Leguminous plants (fig. 91), the ovules, 0, are attached to the extended marginal placenta, one above the other, forming usually two

parallel rows corresponding to each margin of the carpel. When the ovules are definite {i.e. are uniform, and can be counted), it is usual to find their attachment so constant as to afford good characters for classification. When the ovules are very numerous {indefinite), while at the same time the placenta is not much developed, their position exhibits great variation, some being directed upwards, others downwards, others transversely; and their form is altered by pressure into various polyhedral shapes. In such cases it frequently happens that some of the ovules are arrested in their development and become abortive.

When the pistil has reached a certain stage in growth it becomes ready for fertilization. Pollination having been effected, and the pollen-grain having reached the stigma in angio- sperms,or the summit of the nucellusin gymnosperms, it is detained there, and the viscid secretion from the glands of the stigma in the former case, or from the nucellus in the latter, induce the protrusion of the intine as a pollen-tube

through the pores of the grain.

Fertiliza- tion.

msrˆ

The pollen-tube or tubes pass down the canal (fig. 112), through the conducting tissue of the style when present, and reach the interior of the ovary in angiosperms, and then pass to the micropyle of the ovule, one pollen-tube going to each

From Strasburger's Lehrbuck der Botanik, by permission of Gustav Fischer.

Fig. 112. — Ovary of Poly- gonum Convolvulus in longitu- dinal section during fertilization. (X 48.)

fs, Stalk-like base of ovary. fu, Funicle. cha, Chalaza. nu, Nucellus. mi, Micropyle.

it, inner, ie, outer integument. e, Embryo-sac. ek, Nucleus of embryo-sac. ei, Egg-apparatus. an, Antipodal cells, g, Style. n, Stigma. p, Pollen-grains. ps, Pollen-tubes.

Fig. 113. — Vertical section of the ovule of the Scotch Fir {Pinus syhestris) in May of the second year, showing the enlarged em- bryo-sac b, full of endosperm cells, and pollen-tubes c, pene- trating the summit of the nucellus after the pollen has entered the large

micropyle.

ovule. Sometimes the micro- pyle lies close to the base of the style, and then the pollen- tube enters it at once, but frequently it has to pass some distance into the ovary, being guided in its direction by vari- ous contrivances, as hairs, grooves, &c. In gymnosperms the pollen-grain resting on the apex of the nucellus sends out its pollen-tubes, which at once penetrate the nucellus (fig. 113). In angiosperms when the pollen-

tube reaches the micropyle it passes down into the canal, and this portion of it increases considerably in size. Ultimately the apex of the tube comes in contact with the tip of the embryo-sac and perforates it. The male cells in the end of the pollen-tube are then transmitted to the embryo-sac and fertilization is effected. Consequent upon this, after a longer or shorter period, those changes commence in the embryo-sac which result in the formation of the embryo

plant, the ovule also undergoing changes which convert it into the seed, and fit it for a protective covering, and a store of nutriment for the embryo. Nor are the effects of fertilization confined to the ovule; they extend to other parts of the plant. The ovary enlarges, and, with the seeds enclosed, constitutes the fruit, frequently incorporated with which are other parts of the flower, as receptacle, calyx, &c. In gymnosperms the pollen-tubes, having penetrated a certain distance down the tissue of the nucellus, are usually arrested in growth for a longer or shorter period, sometimes nearly a year. Fruit and seed are discussed in a separate article — Fruit. (A. B. R.)

FLOWERS, ARTIFICIAL. Imitations of natural flowers are sometimes made for scientific purposes (as the collection of glass flowers at Harvard University, which illustrates the flora of the United States), but more often as articles of decoration and ornament. A large variety of materials have been used in their manufacture by different peoples at different times — painted linen and shavings of stained horn by the Egyptians, gold and silver by the Romans, rice-paper by the Chinese, silkworm cocoons in Italy, the plumage of highly coloured birds in South America, wax, small tinted shells, &c. At the beginning of the 1 8th century the French, who originally learnt the art from the Italians, made great advances in the accuracy of their repro- ductions, and towards the end of that century the Paris manu- facturers enjoyed a world-wide reputation. About the same time the art was introduced into England by French refugees, and soon afterwards it spread also to America. The industry is now a highly specialized one and comprises a large number of operations performed by separate hands. Four main

processes may be distinguished. The first consists of cutting up the various fabrics and materials employed into shapes suitable for forming the leaves, petals, &c. ; this may be done by Scissors, but more often stamps are employed which will cut through a dozen or more thicknesses at one blow. The veins of the leaves are next impressed by means of a die, and the petals are given their natural rounded forms by goffering irons of various shapes. The next step is to assemble the petals and other parts of the flower, which is built up from the centre outwards; and the fourth is to mount the flower on a stalk formed of brass or iron wire wrapped round with suitably coloured material, and to fasten on the leaves required to complete the spray.

FLOYD, JOHN (1572-1649), English Jesuit, was born in Cambridgeshire in 1572. He entered the Society of Jesus when at Rome in 1592 and is also known as Daniel a Jesu, Hermannus Loemelius, and George White, the names under which he pub- lished a score of controversial treatises. He had considerable fame both as a preacher and teacher, and was frequently arrested in England. His last years were spent at Louvain and he died at St Omer on the 1 5th of September 1649. His brother Edward Floyd was impeached and sentenced by the Commons in 1621 for speaking disparagingly of the elector palatine.

FLOYD, JOHN BUCHANAN (1807-1863), American politician, was born at Blacksburg, Virginia, on the 1st of June 1807. He was the son of John Floyd (1770-1837), a representative in Congress from 1817 to 1829 and governor of Virginia from 1830 to 1834. After graduating at South Carolina College in 1826, the son practised law in his native state and at Helena, Arkansas, and in 1839 settled in Washington county, Virginia, which in 1847-1849 and again in 1853 he represented in the state legisla- ture. Meanwhile, from 1849 to 1852, he was governor of Virginia, in which position he recommended to the legislature the enact- ment of a law laying an import tax on the products of such states as refused to surrender fugitive slaves owned by Virginia masters. In March 1857 he became secretary of war in President Buchanan's cabinet, where his lack of administrative ability was soon apparent. In December i860, on ascertaining that Floyd had honoured heavy drafts made by government con- tractors in anticipation of their earnings, the president requested his resignation. Several days later Floyd was indicted for malversation in office, but the indictment was overruled on technical grounds. There is no proof that he profited by these irregular transactions; in fact he went out of the office

financially embarrassed. Though he had openly opposed seces- sion before the election of Lincoln, his conduct after that event, especially after his breach with Buchanan, fell under suspicion, and he was accused of having sent large stores of government arms to Southern arsenals in anticipation of the Civil War. In the last days of his term he apparently had such an intention, but during the year i860 the Southern States actually received less than their full quota of arms. After the secession of Virginia he was commissioned a brigadier-general in the Confederate service. He was first employed in some unsuccessful operations in western Virginia, and in February 1862 became commander of the Confederate forces at Fort Donelson, from which he fled with his second in command, General Gideon J. Pillow, on the night of February 18, leaving General Simon B. Buckner to surrender to General Grant. A fortnight later President Davis relieved him of his command. He died at Abingdon, Virginia, on the 26th of August 1863.

FLOYER, SIR JOHK (1640-1734), English physician and author, was born at Hinters in Staffordshire, and was educated at Oxford. He practised in Lichfield, and it was by his advice that Dr Johnson, when a child, was taken by his mother to be touched by Queen Anne for the king's evil on the 30th of March 1714. He died on the 1st of February 1734. Floyer was an advocate of cold bathing, introduced the practice of counting the rate of the pulse-beats, and gave an early account of the patho- logical changes in the lungs associated with emphysema.

His writings include: — Qap/iaKo-HoKravos : or the Touchstone of Medicines, discovering the virtues of Vegetables, Minerals and Animals, by their Tastes and Smells (2 vols., 1687) ; The praeternatural State of animal Humours described by their sensible Qualities (1696); An Enquiry into the right Use and Abuses of the hot, cold and temperate Baths in England (1697); A Treatise of the Asthma (1st ed., 1698); The ancient •irvxpoXovaia revived, or an Essay to prove cold Bathing both safe and useful (London, 1702; several editions 8vo; abridged, Manchester, 1844, i2mo) ; The Physician's Pulse-watch (1707-1710); The Sibylline Oracles, translated from the best Greek copies, and com- pared with the sacred Prophecies (1st ed., 1713); Two Essays: the first Essay concerning the Creation, Aetherial Bodies, and Offices of good and bad Angels; the second Essay concerning the Mosaic System of the World (Nottingham, 1717); An Exposition of the Revelations (1719) ; An Essay to restore the Dipping

of Infants in their Baptism (1722); Medicina Gerocomica, or the Galenic Art of preserving old Men's Healths (1st ed., 1724); A Comment on forty-two Histories described by Hippocrates (1726).

FLUDD, or Flud, ROBERT [Robertus de Fluctibus] (1574- 1637), English physician and mystical philosopher, the son of Sir Thomas Fludd, treasurer of war to Queen Elizabeth in France and the Low Countries, was born at Milgate, Kent. After studying at St John's College, Oxford, he travelled in Europe for six years, and became acquainted with the writings of Paracelsus. He subsequently returned to Oxford, became a member of Christ Church, took his medical degrees, and ulti- mately became a fellow of the College of Physicians. He practised in London with success, though it is said that he combined with purely medical treatment a good deal of faith-healing. Following Paracelsus, he endeavoured to form a system of philosophy founded on the identity of physical and spiritual truth. The universe and all created things proceed from God, who is the beginning, the end and the sum of all things, and to him they will return. The act of creation is the separation of the active principle (light) from the passive (darkness) in the bosom of the divine unity (God). The universe consists of three worlds; the archetypal (God), the macrocosm (the world), the microcosm (man). Man is the world in miniature, all the parts of both sympathetically correspond and act upon each other. It is possible for man (and even for the mineral and the plant) to undergo transformation and to win immortality. Fludd's system may be described as a materialistic pantheism, which, allegorically interpreted, he put forward as containing the real meaning of Christianity, revealed to Adam by God himself, handed down by tradition to Moses and the patriarchs, and re- vealed a second time by Christ. The opinions of Fludd had the honour of being refuted by Kepler, Gassendi and Mersenne. Though rapt in mystical speculation, Fludd was a man of varied attainments. He did not disdain scientific experiments, and is

thought by some to be the original inventor of the barometer. He was an ardent defender of the Rosicrucians, and De Quincey considers him to have been the immediate, as J. V. Andrea. was the remote, father of freemasonry. Fludd died on the 8th of September 1637.

See J. B. Craven, Robert Fludd, the English Rosicrucian (1902), where a list of his works is given; A. E. Waite, The Real History of the Rosicrucians (1887) ; De Quincey, The Rosicrucians and Free- masons; J. Hunt, Religious Thought in England (1870), i. 240 seq. His works were published in 6 vols., Oppenheim and Gouda, 1638.

FLtJGEL, GUSTAV LEBERECHT (1802-1870), German orientalist, was born at Bautzen on the 18th of February 1802. He received his early education at the gymnasium of his native town, and studied theology and philology at Leipzig. Gradually he devoted his attention chiefly to Oriental languages, which he studied in Vienna and Paris. -In 1832 he became professor at the Filrstenschule of St Afra in Meissen, but ill-health compelled him to resign that office in 1850, and in 1851 he went to Vienna, where he was employed in cataloguing the Arabic, Turkish and Persian manuscripts of the court library. He died at Dresden on the 5th of July 1870.

Flugel's chief work is an edition of the bibliographical and encyclopaedic lexicon of Haji Khalfa, with Latin translation (7 vols., London and Leipzig, 1835-1858). He also brought out an edition of the Koran (Leipzig, 1834 and again 1893); then followed Concordantiae Corani arabicae (Leipzig, 1842 and again 1898); Mani, seine Lehren und seine Schriften (Leipzig, 1862) ; Die grammatischen Schulen der Araber (Leipzig, 1862) ; and Ibn KutMbugas Krone der Lebensbeschreibungen (Leipzig, 1862). An edition of Kitdb-al-Fihrist, prepared by him, was published after his death.

FLUGEL, JOHANN GOTTFRIED (1788-1855), German lexico- grapher, was born at Barby near Magdeburg, on the 22nd of November 1788. He was originally a merchant's clerk, but emigrating to the United States in 1810, he made a special study of the English language, and returning to Germany in 1819, was in 1824 appointed lector of the English language in the uni- versity of Leipzig. In 1838 he became American consul, and subsequently representative and correspondent of the Smith- sonian Institution at Washington and several other leading American literary and scientific institutions. He died at Leipzig on the 24th of June 1855.

The fame of Fliigel rests chiefly on the Vollstdndige englisch- deutsche und deutsch-englische Worterbuch, first published in 2 vols. (Leipzig) in 1830, which has had an extensive circulation not only in Germany but in England and America. In this work he was assisted by J. Sporschil, and a new and enlarged edition, edited by his son Felix Fliigel (1820-1904), was published at Brunswick (1890- 1892). Another edition, in two volumes, edited by Prof. Immanuel Schmidt and S. Tanger appeared (Brunswick, London & New York) in 1906. Among his other works are — Vollstdndige engl. Sprachlehre (1 824-1 826); Triglotte, oder kaufmannisches Worterbuch in drei Sprachen, Deutsch, Englisch und Franzbsisch (1836-1840); Kleines Kaufmannisches Handwbrterbuch in drei Sprachen (1840); and Praktisches Handbuch der engl. Handelscorrespondenz (1827, 9th ed.

1873). All these have passed through several editions. In addition, Fliigel also published in the English language: A series of Commercial Letters (Leipzig, 1822), a 9th edition of which appeared in 1874 under the title Practical Mercantile Correspondence and a Practical Dictionary of the English and German Languages (2 vols., Hamburg and Leipzig, 1847-1852; 15th ed., Leipzig, 1891). The last was continued and re-edited by his son Felix.

FLUKE (probably connected with the Ger. flack, flat), a name given to several kinds of fish, flat in shape, especially to the common flounder; also the name of a trematoid worm, resem- bling a flounder in shape, which as a parasite infects the liver and neighbouring organs of certain animals, especially sheep, and causes liver-rot. The most common is the Fasciola hepatica (see Trematodes). It is also the name of a species of kidney potato. Probably from a resemblance to the shape of the fish, ” fluke ” is the name given to the holding-plates, triangular in shape, at the end of the arms of an anchor, and to the triangular extremities of the tail of a whale. The use of the word as a slang expression for a lucky accident appears to have been first applied in billiards to an unintentional scoring shot.

FLUME (through an 0. Fr. word flum, from the Lat. flumen, a river), a word formerly used for a stream, and particularly for the tail of a mill-race. It is used in America for a very narrow gorge running between precipitous rocks, with a stream

at the bottom, but more frequently is applied to an artificial channel of wood or other material for the diversion of a stream of water from a river for purposes of irrigation, for running a saw- mill, or for various processes in the hydraulic method of gold- mining (see Aqueduct).

FLUMINI MAGGIORE, a town of the province of Cagliari, Sardinia, 10 m. by road N. of Iglesias, and 5 m. from the W. coast. Pop. (1001) town 3908; commune 9647. It is the centre of a. considerable lead and zinc mining district. Three miles to the S. are the ruins of a temple erected probably in the time of Commodus (Corpus inscr. Lat. x., Berlin, 1883, No. 7539). They seem to mark the site of Metalla (mines), a station on the coast road from Sulci to Tharros, and the centre of the mining district in Roman times. At Flumini Maggiore itself were found two ingots of lead, one bearing a stamp with

Hadrian's name.

FLUORANTHENE, C15H10, also known as idryl, a hydrocarbon occurring with phenanthrene, pyrene, diphenyl, and other substances in " Stupp " fat (the fat obtained in working up the mercury ores in Idria) , and. also in the higher boiling fractions of the coal tar distillate. It was discovered by R. Fittigin 1878, who, with Gebhard and H. Liepmann, elucidated its constitution (see Ann., 1879, 200, p. 1). The hydrocarbons are separated from the " Stupp " by means of alcohol, the soluble portion on distillation giving first phenanthrene and then a mixture of pyrene and fluoranthene. From the tar distillate, the chrysene can be fractionally precipitated, and the fluoranthene can be separated from most of the pyrene by fractional distillation in a partial vacuum. In either case the two hydrocarbons are finally separated by fractional crystallization of their picrates, which are then decomposed by ammonia. Fluoranthene crystallizes in large slender needles or monoclinic tables, melting at 109-110° C. and boiling at 250-251 C. (60 mm.). It is easily soluble in hot alcohol, ether and carbon bisulphide. On oxidation with chromic acid it forms a quinone, Ci 5 H 8 02, and an a-diphenylene keto-

carboxylic acid /ˆt/ˆˆS h – The picrate melts at 182-183 C.

FLUORENE (a-diphenylene methane), C 13 Hi or .(C 6 H 4) 2 CH2, a hydrocarbon found in coal-tar. It is obtained from the higher boiling fractions, after separation of naphthalene and anthracene, by fractional distillation, the portion boiling between 290-340° C. being taken. The fluorene is separated from this by placing it in a freezing mixture, and is then redistilled or crystallized from glacial acetic acid, or purified by means of its picrate. It may be prepared by distilling diphenylene ketone over zinc dust, or by heating it with hydriodic acid and phosphorus to 1 50-160° C. ; and also by passing the vapour of diphenyl methane through a red hot tube. It crystallizes in colourless plates, possessing a violet fluorescence, melting at n 2-1 13° and boiling at 293-295° C. By oxidation with chromic acid in glacial acetic acid solution, it is converted into diphenylene ketone (C 6 H 4)2-CO; whilst on heating with hydriodic acid and phosphorus to 250-260° C. it gives a hydro derivative of composition C13H22.

FLUORESCEIN, or Resorcin-Phthalein, C20H12O5, in chemistry, a compound discovered in 1876 by A. v. Baeyer by the condensation of phthalic anhydride with resorcin at 195-200° C. (Ann., 1876, 183, p. 1). The two reacting substances are either heated alone or with zinc chloride for some hours, and the melt obtained is boiled out with water, washed by dilute alcohol, extracted by means of sodium

hydrate, and the solution so obtained is precipitated by an acid. The precipitate is well washed with water and then dried. By repeating this process two or three times, the fluorescein may be obtained in a very pure condition. It forms a yellow amorphous powder, insoluble in water but soluble in alcohol, and crystallizing from the alcoholic solution in small dark red nodules. It is readily soluble in solu- tions of the caustic alkalis, the solution being of a dark red colour and showing (especially when largely diluted with water) a brilliant green fluorescence. It was so named on account of this last character. By brominating fluorescein in glacial acetic. acid solution, eosin (tetrabromfluorescein) is obtained, the same compound being formed by heating 3-5-dibrom-2-4-dioxy- benzoylbenzoic acid above its melting point (R. Meyer, Ber.,

1895, 28, p. 1576). It crystallizes from alcohol in yellowish red needles, and dyes silk, wool, and mordanted cotton a fine pink colour. When heated with caustic alkalis it yields dibrom- resorcin and dibrommonoresorcin-phthalein. The corresponding iodo compound is known as erylhrosin. Fluorescein is readily nitrated, yielding a di- or tetra-nitro compound according to conditions. The entrance of the negative nitro group into the molecule weakens the central pyrone ring in the fluorescein nucleus and the di- and tetra-nitro compounds readily yield hydrates (see J. T. Hewitt and B. W. Perkins, Jour. Cheni. Soc, 1900, p. 1326). By the action of ammonia or amines the di-nitro fluoresceins are converted into yellow dyestuffs (F. Reverdin, Ber., 1897, 30, p. 332). Other dyestuffs obtained from fluorescein are safrosine or eosin scarlet (dibromdinitrofiuorescein) and rose Bengal (tetraiodotetrachlorfluorescein) .

On fusion with caustic alkali, fluorescein yields resorcin, C 6 H4(OH) 2 , and monoresorcin phthalein (dioxybenzoylbenzoic acid), (HO) 2 CeH 3 -CO-C H 4 COOH. _ With zinc dust and caustic soda it yields fluorescin. By warming fluorescein with excess of phosphorus pentachloride it yields fluorescein chloride, C20H10O3CI2 (A. Baeyer), which crystallizes from alcohol in small prisms, melting at 252 ° C. When heated with aniline and aniline hydrochloride, fluorescein yields a colourless anilide (O. Fischer and E. Hepp, Ber., 1893, 26, p. 2236), which is readily methylated by methyl iodide and potash to a fluoresceinanilidedimethyl ether, which when heated for six hours to 150 C. with acetic and hydrochloric acids, is hydro lysed and yields a colourless fluoresceindimethyl ether, which melts at 198 C. On the other hand, by heating fluorescein with caustic potash, methyl iodide and methyl alcohol, a coloured (yellow) dimethyl ether, melting at 208 C. is obtained (Fischer and Hepp). By heating the coloured dimethyl ether with caustic soda, the monomethyl ether is

obtained (O. Fischer and E. Hepp, Ber., 1895, 28, p. 397) ; this crystallizes in triclinic tables, and melts at 262° C. It is to be noted that the colourless monomethyl ether fluoresces strongly in alkaline solution, the dimethyl ether of melting point 208 fluoresces only in neutral solution (e.g., in alcoholic solution), and the dimethyl ether of melting point 198 C. only in concentrated hydrochloric or sulphuric acid solution (Fischer and Hepp). Con- siderable discussion has taken place as to the position held by the hydroxyl groups in the fluorescein molecule, C. Graebe (Ber., 1895, 28, p. 28) asserting that they were in the ortho position to the linking carbon atom of the phthalic anhydride residue. G. Heller (Ber., 1895, 28, p. 312), however, showed that monoresorcin-phthalein when brominated in glacial acetic acid gives a dibrom derivative which, with fuming sulphuric acid, yields dibromxanthopurpurin (l-3-dioxy-2-4-dibromanthraquinone), a reaction which is only possible if the fluorescein (from which the monoresorcin-phthalein is derived) contains free hydroxyl groups in the para position to the linking carbon atom of the phthalic anhydride residue.

FLUORESCENCE. In a paper read before the Royal Society of Edinburgh in 1833, Sir David Brewster described a remarkable phenomenon he had discovered to which he gave the name of ” internal dispersion.” On admitting a beam of sunlight, con- densed by a lens, into a solution of chlorophyll, the green colour- ing matter of leaves (see fig. 1), he was surprised to find that the path of the rays within the fluid ˆ

was marked by a bright light of a blood-red colour, strangely contrast- ing with the beautiful green of the fluid when seen in moderate thick- ness. Brewster afterwards observed the same phenomenon in various vegetable solutions and essential oils, and in some solids, amongst which was fluor-spar. He believed this effect to be due to coloured particles held in suspension. A few years later, Sir John Herschel in- dependently discovered that if a IC ‘ I-

solution of quinine sulphate, which, viewed by transmitted light, appears colourless and transparent like water, were illuminated by a beam of ordinary daylight, a peculiar blue colour was seen in a thin stratum of the fluid adjacent to the surface by which the light entered. The blue light was unpolarized and passed freely through many inches of the fluid. The incident beam, after having passed through the stratum from which the blue light came, was not sensibly enfeebled or coloured, but yet it had lost the power of

producing the characteristic blue colour when admitted into a second solution of quinine sulphate. A beam of light modified in this mysterious manner was called by Herschel ” epipolized. ” Brewster showed that epipolic was merely a particular case of internal dispersion, peculiar only in this respect, that the rays capable of dispersion were dispersed with unusual rapidity. The investigation of this phenomenon was afterwards taken up by Sir G. G. Stokes, to whom the greater part of our present knowledge of the subject is due. Stokes’s first paper ” On the Change of the Refrangibility of Light ” appeared in 1852. He repeated the experiments of Brewster and Herschel, and con- siderably extended them. These experiments soon led him to the conclusion that the effect could not be due, as Brewster had imagined, to the scattering of light by suspended particles, but that the dispersed beam actually differed in refrangibility from the light which excited it. He therefore termed it ” true internal dispersion ” to distinguish it from the scattering of light, which he called ” false internal dispersion.” As this name, however, is apt to suggest Brewster’s view of the phenomenon, he after- wards abandoned it as’ unsatisfactory, and substituted the word ” fluorescence.” This term, derived from fluor-spar after the analogy of opalescence from opal, does not presuppose any theory. To examine the nature of the fluorescence produced by quinine, Stokes formed a pure spectrum of the sun’s rays in the usual manner. A test-tube, filled with a dilute solution of quinine sulphate, was placed just outside the red end of the spectrum and then gradually moved along the spectrum to the other extremity. No fluorescence was observed as long as the tube remained in the more luminous portion, but as soon as the violet was reached, a ghost-like gleam of blue light shot right across the tube. On continuing to move the tube, the blue light at first increased in intensity and afterwards died away, but not until the tube had been moved a considerable distance into the ultra-violet part of the spectrum. When the blue gleam first appeared it extended right across the tube, but just before disappearing it was confined to a very thin stratum on the side at which the exciting rays entered. Stokes varied this experi- ment by placing a vessel filled with the dilute solution in a spectrum formed by a train of prisms. The appearance is illustrated diagrammatically in fig. 2. The greater part of the light passed freely as if through water, but from about half-way between the Fraunhofer lines G and H to far beyond the extreme violet, the incident rays “_v gave rise to light of a sky-blue colour, — which emanated in all directions from “■* the portion of the fluid (represented white in fig. 2) which was under the influence of the incident rays. The anterior surface of the blue space

coin cided, of course, with the inner surface of the glass vessel. The posterior sur- face marked the distance to which the incident rays were able to penetrate before they were absorbed. This distance was at first considerable, greater than the diameter of the vessel, but decreased with great rapidity as the refrangibility of the incident light increased, so that from a little beyond the extreme violet to the end, the blue space was reduced to an excessively thin stratum. This shows that the fluid is very opaque to the ultra- violet rays. The fixed lines in the violet and invisible part of the solar spectrum were represented by dark lines, or rather planes, intersecting the blue region. Stokes found that the fluorescent light is not homogeneous, for on reducing the incident rays to a narrow band of homogeneous light, and examining the dispersed beam through a prism, he found that the blue light consisted of rays extending over a wide range of refrangibility, but not into the ultra-violet.

Another method, which Stokes found especially useful in examining different substances for fluorescence, was as follows. Two coloured media were prepared, one of which transmitted the upper portion of the spectrum and was opaque to the lower portion, while the second was opaque to the upper and trans-

Fig. 2.

parent to the lower part of the spectrum. These were called by Stokes ” complementary absorbents.” No pair could be found which were exactly complementary, of course, but the condition was approximately fulfilled by several sets of coloured glasses or solutions. One such combination consisted of a deep-blue solution of ammoniacal copper sulphate and a yellow glass coloured with silver. The two media together were almost opaque. The light of the sun being admitted through a hole in the window-shutter, a white porcelain tablet was laid on a shelf fastened in front of the hole. If the vessel containing the blue solution was placed so as to cover the hole, and the tablet was viewed through the yellow glass, scarcely any light entered the eye, but if a paper washed with some fluorescent liquid were laid on the tablet it appeared brilliantly luminous. Different pairs of complementary absorbents were required according to the colour of the fluorescent light. This experiment shows clearly that the light which passed through the first absorbent and which would have been stopped by the second gave rise in the fluorescent substance to rays of a different wave-length which were transmitted by the second absorbent. Scattered light, with which the true fluorescent light was often associated, was eliminated by this method, being stopped by the second absorbent.

Stokes also used a method, analogous to Newton's method of crossed prisms, for the purpose of analysing the fluorescent light. A spectrum was produced by means of a slit and a prism, the slit being horizontal instead of vertical. The resulting very narrow spectrum was projected on a white paper moistened with a fluorescent solution, and viewed through a second prism with its refracting edge per- pendicular to that of the first prism. In addition to the slop- ing spectrum seen under ordinary cir- cumstances, another spectrum due to the fluorescent light alone, made its appearance, as seen in figs. 3 and 4. In this spectrum the colours do not run from left to right, but in horizontal lines. Thus the dark lines of the solar spectrum lie across the colours. The spectra in figs. 3 and 4 were obtained by V. Pierre with an improved arrange- ment of Stokes's method. It will be seen that, in the case of chlorophyll, the whole spectrum, far into the ultra-violet, gives rise to a short range of red fluorescent light, while the effective part of the exciting light in the case of aesculin (a glucoside occurring in horse-chestnut bark) begins a little above the fixed line G and the fluorescent light covers a wide range extending from orange to blue.

Besides the substances already mentioned, a large number of vegetable extracts and some inorganic bodies are strongly fluorescent. Stokes found that most organic substances show signs of fluorescence. Green fluor-spar from Alston Moor exhibits a violet, uranium glass a yellowish-green fluorescence. Tincture of turmeric gives rise to a greenish light, and the extract of seeds of Datura stramonium a pale green light. Ordinary paraffin oil fluoresces blue. Barium platinocyanide, which is much used in the fluorescent screens employed in work with the Rontgen rays, shows a brilliant green fluorescence with ordinary light. Crystals of magnesium platinocyanide possess the remarkable property of emitting a polarized fluorescent light,

Spectrum of Aesculin.

the colour and plane of polarization depending on the position of the crystal with respect to the incident beam, and, if polarized light is used, on the plane of polarization of the latter.

Stokes's Law. — In all the substances examined by Stokes, the fluorescent light appeared to be of lower refrangibility than the light which excited it. Stokes considered it probable that this lowering of

the refrangibility of the light was a general law which held for all substances. This is known as Stokes's law. It has been shown, however, by E. Lommel and others, that this law does not hold generally. Lommel distinguishes two kinds of fluorescence. The bodies which exhibit the first kind are those which possess strong absorption bands, of which only one re- mains appreciable after great dilution. These bodies are always strongly coloured and show anomalous dispersion and (in solids) surface colour. In such cases, the maximum of intensity in the fluorescent spectrum corresponds to the maximum of absorption. Stokes's law is not obeyed, for a fluorescent spectrum can be pro- duced by means of homogeneous light of lower refrangibility than a great part of the fluorescent light. The second kind of fluorescence is the most common, and is exhibited by bodies which show absorption only in the upper part of the spectrum, i.e. they are usually yellow or brown or (if the absorption is in the ultra-violet) colourless. The absorption bands also are different from those of substances of the first kind, for they readily dis- appear on dilution. A third class of bodies is formed by those substances which exhibit both kinds of fluorescence.

Nature of Fluorescence. — No complete theory of fluorescence has yet been given, though various attempts have been made to explain the phenomenon. Fluorescence is closely allied to phosphorescence (?.».), the difference consisting in the duration of the effect after the exciting cause is removed. Liquids which fluoresce only do so while the exciting light is falling on them, ceasing immediately the exciting light is cut off. In the case of solids, on the other hand, such as fluor-spar or uranium glass, the effect, though very brief, does not die away quite instantane- ously, so that it is really a very brief phosphorescence. The property of phosphorescence has been generally attributed to some molecular change taking place in the bodies possessing it. That some such change takes place during fluorescence is rendered probable by the fact that the property depends upon the state of the sensitive substance; somebodies, such as barium pla'tino- cyanide, fluorescing in the solid state but not in solution, while others, such as fluorescein, only fluoresce in solution. Fluores- cence is always associated with absorption, but many bodies are absorbent without showing fluorescence. A satisfactory theory would have to account for these facts as well as for the production of waves of one period by those of another, and the non-homo- geneous character of the fluorescent light. Quite recently W. Voigt has sought to give a theory of fluorescence depending on the theory of electrons. Briefly, this theory assumes that the electrons which constitute the molecule of the sensitive body can exist in two or more different configurations simultaneously, and that

these are in dynamical equilibrium, like the molecule in a partially dissociated gas. If the electrons have different periods of vibration in the different configurations, then it would happen that the electrons whose period nearly corresponded with that of the incident light would absorb the energy of the latter, and if they then underwent a transformation into a different configuration with a different period, this absorbed energy would be given out in waves of a period corresponding to that of the new configuration.

Applications of Fluorescence. — The phenomenon of fluorescence can be utilized for the purpose of illustrating the laws of re- flection and refraction in lecture experiments since the path of a ray of light through a very dilute solution of a sensitive sub- stance is rendered visible. The existence of the dark lines in the ultra-violet portion of the solar spectrum can also be demon- strated in a simple manner. In addition to the foregoing applications, Stokes made use of this property for studying the character of the ultra-violet spectrum of different sources of illumination and flames. He suggested also that the property would in some cases furnish a simple test for the presence of a

small quantity of a sensitive substance in an organic mixture. Fluorescent screens are largely used in work with Rontgen rays. There appears to be some prospect of light being thrown on the question of molecular structure by experiments on the fluores- cence of vapours. Some very interesting experiments in this direction have been performed by R. W. Wood on the fluorescence of sodium vapour.

References. — Sir G. G. Stokes, Mathematical and Physical Papers, vols. iii. and iv. ; Miiller-Pouillet, Lehrbuch der Physik, Bd. ii. (1897) ; A. Wullner, Lehrbuch der Experimentalphysik, Bd. iv. (1899); A. A. Winkelmann, Handbuch der Physik, Bd. vi. (1906); R. W. Wood, Physical Optics (1905). (J. R. C.)

FLUORINE (symbol F, atomic weight 19), a chemical element of the halogen group. It is never found in the uncombined condition, but in combination with calcium as fluor-spar CaF_2 it is widely distributed; it is also found in cryolite Na_3AlF_6, in fluor-apatite, $CaF_2 3Ca_3P_2 0_8$, and in minute traces in sea water, in some mineral springs, and as a constituent of the enamel of the teeth. It was first isolated by H. Moissan in 1886 by the electrolysis of pure anhydrous hydrofluoric acid containing dissolved potassium fluoride. The U-shaped electrolytic vessel and the electrodes are made of an alloy of platinum-iridium, the limbs of the tube being closed by stoppers made of fluor-spar, and fitted with two lateral exit tubes for carrying off the gases

evolved. Whilst the electrolysis is proceeding, the apparatus is kept at a constant temperature of- 23° C. by means of liquid methyl chloride. The fluorine, which is liberated as a gas at the anode, is passed through a well cooled platinum vessel, in order to free it from any acid fumes that may be carried over, and finally through two platinum tubes containing sodium fluoride to remove the last traces of hydrofluoric acid; it is then collected in a platinum tube closed with fluor-spar plates. B. Brauner {Jour. Chem. Soc, 1894, 65, p. 393) obtained fluorine by heating potassium fluorplumbate3KF-HF-PbF 4 . At 20o°C. this salt decomposes, giving off hydrofluoric acid, and between 230-2 50° C. fluorine is liberated.

Fluorine is a pale greenish-yellow gas with a very sharp smell; its specific gravity is 1-265 (H- Moissan); it has been liquefied, the liquid also being of a yellow colour and boiling at – 187 C. It is the most active of all the chemical elements; in contact with hydrogen combination takes place between the two gases with explosive violence, even in the dark, and at as low a tempera- ture as -210 C; finely divided carbon burns in the gas, forming carbon tetrafluoride; water is decomposed even at ordinary temperatures, with the formation of hydrofluoric acid and ” ozonised ” oxygen; iodine, sulphur and phosphorus melt and then inflame in the gas; it liberates chlorine from chlorides, and combines with most metals instantaneously to form fluorides; it does not, however, combine with oxygen. Organic compounds are rapidly attacked by the gas.

Only one compound of hydrogen and fluorine is known, namely hydrofluoric acid, HF or H 2 F 2 , which was first obtained by C . Scheele in 1 7 7 1 by decomposing fluor-spar with concentrated sulphuric acid, a method still used for the commercial preparation of the aqueous solution of the acid, the mixture being distilled from leaden retorts and the acid stored in leaden or gutta-percha bottles. The perfectly anhydrous acid is a very volatile colour- less liquid and is best obtained, according to G. Gore {Phil. Trans., 1869, p. 173) by decomposing the double fluoride of hydrogen and potassium, at a red heat in a platinum retort fitted with a platinum condenser surrounded by a freezing mixture, and having a platinum receiver luted on. It can also be prepared in the anhydrous condition by passing a current of hydrogen over dry silver fluoride. The pure acid thus obtained is a most dangerous substance to handle, its vapour even when highly diluted with air having an exceedingly injurious action on the respiratory organs, whilst inhalation of the pure vapour is followed by death. The anhydrous acid boils at 19°- 5 C. (H. Moissan), and on cooling, sets to a solid mass at -io2°-5 C, which melts at-92°-3 C. (K. Olszewski, Monats. fiir Chemie, 1886, 7, p. 371). Potassium and

sodium readily dissolve in the anhydrous acid with evolution of hydrogen and formation of

fluorides. The aqueous solution is strongly acid to litmus and dissolves most metals directly. Its most important property is that it rapidly attacks glass, reacting with the silica of the glass to form gaseous silicon fluoride, and consequently it is used for etching. T. E. Thorpe {Jour. Chem. Soc, 1889, 55, p. 163) determined the vapour density of hydrofluoric acid at different temperatures, and showed that there is no approach to a definite value below about 88° C. where it reaches the value 10-29 corresponding to the molecular formula HF; at temperatures below 88° C. the value increases rapidly, showing that the molecule is more complex in its structure. (For references see J. N. Friend, The Theory of Valency (1909), p. in.) The aqueous solution behaves on concentration similarly to the other halogen ‘acids; E. Deussen (Zeit. anorg. Chem., 1905, 44, pp. 300, 408; 1906, 49, p. 297) found the solution of constant boiling point to contain 43-2% HF and to boil at no° (750 mm.).

The salts of hydrofluoric acid are known as fluorides and are easily obtained by the action of the acid on metals or their oxides, hydroxides or carbonates. The fluorides of the alkali metals, of silver, and of most of the heavy metals are soluble in water; those of the alkaline earths are insoluble. A characteristic property of the alkaline fluorides is their power of combining with a molecule of hydrofluoric acid and with the fluorides of the more electro-negative elements to form double fluorides, a behaviour not shown by other metallic halides. Fluorides can be readily detected by their power of etching glass when warmed with sulphuric acid ; or by warming them in a glass tube with concentrated sulphuric acid and holding a moistened glass rod in the mouth of the tube, the water apparently gelatinizes owing to the decomposition of the silicon fluoride formed. The atomic weight of fluorine has been determined by the con- version of calcium, sodium and potassium fluorides into the corres- ponding sulphates. J. Berzelius, by converting silver fluoride into silver chloride, obtained the value 19-44, an d by analysing calcium fluoride the value 19-16; the more recent work of H. Moissan gives the value 19-05.

See H. Moissan, Le Fluor et ses composes (Paris, 1900).

FLUOR-SPAR, native calcium fluoride (CaF 2), known also as Fltjorite

or simply Fluor. In France it is called fluorine, whilst the term fluor is applied to the element (F). All these terms, from the Lat. fluere, ” to flow,” recall the fact that the spar is useful as a flux in certain metallurgical operations. (Cf. its Ger. name Flussspat or Fluss.)

Fluor-spar crystallizes in the cubic system, commonly in cubes, either alone or combined with the octahedron, rhombic dodecahedron, four-faced cube, &c. The four-faced cube has been called_the fluoroid. In fig. 1, a is the cube (100), d the

Fig. 1.

Fig. 2.

rhombic dodecahedron (no), and/ the four-faced cube (310). Fig. 2 shows a characteristic twin of interpenetrant cubes. The crystals are sometimes polysynthetic, a large octahedron, e.g., being built up of small cubes. The faces are often etched or corroded. Cleavage is nearly always perfect, parallel to the octahedron.

Fluor-spar has a hardness of 4, so that it is scratched by a knife, though not so readily as calcite. Its specific gravity is about 3-2. The colour is very variable, and often beautiful, but the mineral is too soft for personal decoration, though it forms a handsome material for vases, &c. In some fluor-spar the colour is disposed in bands, regularly following the contour of the crystal. As the colour is usually expelled, or much altered, by heat, it is believed to be due to an organic pigment, and the presence of hydrocarbons has been detected in many specimens by G. Wyrouboff, and other observers. H. W. Morse (Proc. Amer. Acad., 1906, p. 587)

obtained carbon monoxide and dioxide, hydrogen and nitrogen and small quantities of oxygen from Weardale specimens by heating. He concluded that the gases are due to the decom- position of an organic colouring matter, which has, however, no connexion with the fluorescence or thermo-luminescence of the mineral. Certain crystals from Cumberland are beautifully fluorescent, appearing purple with a bluish internal haziness by reflected light, and greenish by transmitted light. Fluor-spar, though cubic, sometimes exhibits weak double refraction, probably due to internal tension. Many kinds of fluor-spar are thermo-luminescent, i.e. they glow on exposure to a moderate heat, and the name of chlorophane has been given to a variety which exhibits a green glow. The mineral also phosphoresces under the Rontgen rays. Cavities containing liquid occasionally occur in crystals of fluor-spar, notably in the greasy green cubes of Weardale in

Durham. A dark violet fluor-spar from Wolsen- dorf in Bavaria, evolves an odour of ozone when struck, and has been called antozonite. Ozone is also emitted by a violet fluor- spar from Quincie, dep. Rhone, France. In both cases the spar evolves free fluorine, which ozonizes the air.

Fluor-spar is largely employed by the metallurgist, especially in lead-smelting, and in the production of ferro-silicon and ferro-manganese. It is also used in iron and brass foundries, and has been found useful as a flux for certain gold-ores and in the reduction of aluminium. It is used as a source of hydrofluoric acid, which it evolves when heated with sulphuric acid. The mineral is also used in the production of opal glass and enamel ware. In consequence of its low refractive and dispersive power, colourless pellucid fluor-spar is valuable in the construction of apochromatic lenses, but this variety is rare. The dark violet fluor-spar of Derbyshire, known locally as ” Blue John,” is prized for ornamental purposes. It occurs almost exclusively at Tray Cliff, near Castleton. The dark purple spar, called by the workmen ” bull beef,” may be changed, by heat, to a rich amethystine tint. Being very brittle, the spar is rather difficult to work on the lathe, and is often toughened by means of resin. F. Corsi, the eminent Italian antiquary, held that fluor-spar was the material of the famous murrhine vases.

Fluor-spar is a mineral of very wide distribution. Some of the finest crystals occur in the lead-veins of the Carboniferous Limestone series in the north of England, especially at Weardale, Allendale and Alston Moor. It is also found in the lead and copper-mines Of Cornwall and S. Devon, notably near Liskeard, where fine crystals have been found, with faces of the six-faced octahedron replacing the corners of the cube. In Cornwall fluor- spar is known to the miners as ” cann.” Fine yellow fluor-spar occurs in some of the Saxon mines, and beautiful rose-red octahedra are found in the Alps, near Goschenen. Many localities in the United States yield fluor-spar, and it is worked commercially in a few places, notably at Rosiclare in southern Illinois.

FLUSHING, formerly a township and a village of Queens county, New York, U.S.A., on Long Island, at the head of Flushing Bay, since the 1st of January 1898 a part of the borough of Queens, New York City. Flushing is served by the Long Island railroad and by electric lines. It was settled in 1644 by a company of English non-conformists who had probably been residents of Flushing in Holland, from which the new place took its name. Subsequently a large number of Quakers settled here, and in 1672 George Fox spent some time in the township. Before the War of Independence Flushing was the country-seat of many rich

New Yorkers and colonial officials.

FLUSHING (Dutch Vlissingen), a fortified seaport in the province of Zeeland, Holland, on the south side of the island of Walcheren, at the mouth of the estuary of the western Scheldt, 4 m. by rail S. by W. of Middelburg, with which it is also con- nected by steam tramway and by a ship canal. There is a steam ferry to Breskens and Ter Neuzen on the coast of Zeeland- Flandres. Pop. (1900) 18,893. An important naval station and fortress up to 1867, Flushing has since aspired, under the care of the Dutch government, to become a great commercial port. In 1872 the railway was opened which, in conjunction

with the regular day and night service of steamers to Queen- borough in the county of Kent, forms one of the main routes between England and the east of Europe. In 1873 the great harbour, docks and canal works were completed. Yet the navigation of the port remains far behind that of Rotterdam or Antwerp, the tonnage being in 1899 about 7-9% of that of the kingdom. As a summer resort, however, Flushing has acquired considerable popularity, sea-baths and a large modern hotel being situated on the fine beach about three-quarters of a mile north-west of the town. It possesses a town hall, containing a collection of local antiquities, a theatre, an exchange, an academy of sciences and a school of navigation. The Jakobskerk, or Jacob's church, founded in 1328, contains monuments to Admiral de Ruyter (1607-1676) and the poet Jacob Bellamy (1757-1786), who were natives of Flushing. The chief industries of the town are connected with the considerable manufacture of machinery, the state railway-workshops, shipbuilding yards, Krupp iron and steel works' depot, brewing, and oil and soap manufacture. The chief imports are colonial produce and wine, wood and coal. The exports include agricultural produce (wheat and beans), shrimps and meat.

FLUTE, a word adapted from O. Fr. fleUte, modern flute; from O. Fr. have come the Span, flauta, Ital. flauto and Ger. Flote. The New English Dictionary dismisses the derivations suggested from Lat. flatuare or flavitare; ultimately the word must be referred to the root seen in " blow," Lat. flare, Ger. blasen, &c. 1. In music " flute " is a general term applied to wood-wind instruments consisting of a pipe pierced with lateral holes and blown directly through the mouthpiece without the intervention of a reed. The flute family is classified

according to the mouth- piece used to set in vibration the column of air within the tube: i.e. (1) the simple lateral mouth-hole or embouchure which necessitates holding the instrument in a transverse position; (2) the whistle or fipple mouthpiece which allows the performer to hold the instrument vertically in front of him. There is a third class of pipes included among the flutes, having no mouth- piece of any sort, in which the column of air is set in vibration by blowing obliquely across the open end of the pipe, as in the ancient Egyptian nay, and the pan-pipe or syrinx (q.v.). The transverse flute has entirely superseded the whistle flute, which has survived only in the so-called penny whistle, in the ” flute- work ” of the organ (q.v.), and in the French flageolet.

The Transverse Flute or German Flute (Fr. flute traversiere, flute allemande: Ger. Flote, Quer flote, Zwerchpfeiff, Schweitzer- pfeiff; Ital. flauto traverso) includes the concert flute known both as flute in C and as flute in D, the piccolo (q.v.) or octave flute, and the fife (q.v.). The modern flute consists of a tube open at one end and nominally closed at the other by means of a plug or cork stopper: virtually, however, the tube is an open one giving the consecutive harmonic series of the open pipe or of a stretched string. The primitive flute was made in one piece, but the modern instrument is composed of three adjustable joints. (1) The head-joint, plugged at the upper end and contain- ing at about one-third of the length the mouth-hole or em- bouchure. This embouchure, always open when the instrument is being played, converts the closed tube into an open one, in an acoustical sense. (2) The body, containing the holes and keys necessary to produce the scale which gave the flute its original designation of D flute, the head and body together, when the holes are closed, giving the fundamental note D. Before the invention of keys, this fundamental note and the notes obtained by the successive opening of the six holes produced the diatonic scale of D major. All other semitones were obtained by what is known as cross fingering (Fr. doigU fourchu; Ger. Gabelgriffe). It became usual to consider this the typical fingering nomen- clature, whatever the fundamental note given out by the flute, and to indicate the tonality by the note given out when the six lateral holes are covered by the fingers. The result is that the tonality is always a tone lower than the name of the instrument indicates. Thus the D flute is really in C, the F flute is Eb, &c. (3) The foot-joint or tail-joint con- taining the two additional keys for C# and C which extend the

compass downwards, completing the chromatic scale of C in the fundamental octave. The compass of the modern flute is three octaves with

chromatic semitones from

The sound is pro-

duced by holding the flute transversely with the embouchure turned slightly outwards, the lower lip resting on the nearer edge of the embouchure, and blowing obliquely across, not into, the orifice. The flat stream of air from the lips, known as the air-reed, breaks against the sharp outer edge of the embouchure. The current of air, thus set in a flutter, produces in the stationary column of air within the tube a series of pulsa- tions or vibrations caused by the alternate compression and rare- faction of the air and generating sounds of a pitch proportional to the length of the stationary column, which is practically somewhat longer than the length of the tube. 1 The length of this column is varied by opening the lateral finger-holes. The current or air-reed thus acts upon the air column within the flute, without passing through the tube, as a plectrum upon a string, setting it in vibration. The air column of the flute is the sound-producer, whereas in instruments with reed mouthpieces the vibrating reed is more properly the sound-producer, while the air column, acting as a resonating medium, reinforces the note of the reed by vibrating synchronously with it. If the angle 2 at which the current of air is directed against the outer edge of the embouchure be made less acute and the pressure of the breath be at the same time increased, the frequency of the alternate pulses of com- pression and rarefaction within the tube will be increased two, three or fourfold, forming a corresponding number of nodes and loops which results in harmonics or upper partials, respectively the octave, the twelfth, the double octave. By this means sounds of higher pitch are produced without actually shortening the length of the column of air by means ©f lateral holes. The acoustic theory of sound-production in the flute is one on which there is great diversity of opinion. The subject is too vast to be treated here, but readers who wish to pursue it may consult the works of Rockstro, 3 Helmholtz, 4 and others. 5 The effect of boring lateral holes in pipes is to shorten the vibrating length of the air column, which may be regarded as being effective only between the hole in question and the mouthpiece. In order to obtain this result the diameter of the hole should be equal to that of the bore; as long as the holes were covered by the fingers, this was obviously impossible. The holes, therefore, being smaller than the laws of acoustics demand, have to be placed proportion- ally nearer the mouthpiece in order to avoid deepening the pitch and deadening the tone. This principle was understood by wind- instrument makers of classic Greece (see Aulos and Clarinet), and has been explained by Chladni 6 and Gottfried Weber. 7

The bore of the early flute with six finger-holes was invariably cylindrical throughout, but towards the end of the 17th century a modification took place, the head joint alone remaining cylindrical while the rest of the bore assumed the form of a cone having its smallest diameter at the open end of the tube. The

1 See E. F. F. Chladni, Die Akustik (Leipzig, 1802), p. 87.

2 See Sonreck, ” fiber die Schwingungserregung und die Bewegung der Luftsaule in offenen und gedeckten Rohren,” Pogg. Ann., 1876, vol. 158.

3 The Flute (London, 1890), § 90-105, pp. 34-40.

4 Theorie der Luftschwingungen in Rohren mil offenen Enden (Berlin, 1896). Ostwald’s Klassiker der exacten Wissenschaften, No. 80.

6 V. C. Mahillon, Experimental Studies on the Resonance of Trunco-Conical and Cylindrical Air Columns, translated by F. A. Mahan (London, 1901); D. J. Blaikley, Acoustics in Relation to Wind Instruments (London, 1890); Friedrich Zamminer, Die Musik und die musikalischen Instrumente, &c. (Giessen, 1855); idem. ” Sur le mouvement vibratoire de 1’air dans Ies tuyaux,” Comptes rendus, 1855, vol. 41, &c.

6 Op. cit., § 73, pp. 87-88, note 1.

7 ” Akustik der Blasinstrumente,” Allgem. musikal. Zeit. (Leipzig, 1816), Bd. xviii. No. 5, p. 65 et seq. See also Ernst Euting, Zur Geschichte der Blasinstrumente. im 16. und 17. Jahrhundert. Inaugural Dissertation, Friedrich-Wilhelms Universitat. (Berlin, 15th of March 1899), p. 9.

conoidal bore greatly improved the quality of tone and the production of the higher harmonics of the third octave. Once the conical bore had been adopted, the term flute was exclu- sively applied to the new instruments, the smaller flutes, then cylindrical, used in the army being designated fife (q.v.). At

From Captain Day’s Catalogue, &> <;., by permission of Messrs. Eyre & Spottiswoode.

Fig. i. — Eight-keyed Cone Flute by Richard Potter. 1 8th century.

Messrs. Rudall, Carte & Co.

Fig. 2. — Boehm Cylinder Flute. Rockstro Model.

the present day in England, France and America, the favourite mode of construction is that introduced by Theobald Boehm, and known as the ” cylinder flute with the parabolic head,” of which more will be said further on. The successive opening of the holes and keys on the flute produces the chromatic scale of the first or fundamental octave. By increasing the pressure of the breath and slightly altering the position of the lips over the mouth-hole, the same fingering produces the notes of the fundamental octave in the next octave higher. The third octave of the compass is obtained by the production of the higher harmonics (Fr. sons harmoniques; Ger. Flageolettbne) , of the fundamental scale, facilitated by the opening of certain of the finger-holes as ” vent holes.” The quality of tone depends somewhat on the material of which the flute is made; silver and gold produce a liquid tone of exquisite delicacy suitable for solo music, cocus-wood and ebonite a rich mellow tone of considerable power suitable for orchestral music. The tone differs further in the three registers, the lowest being slightly rough, the medium sweet and elegiac, and the third bird-like and brilliant. The proportions, position and form of the stopper and of the air chamber situated between it and the embouchure are mainly influential in giving the flute its peculiar slightly hollow timbre, due to the paucity of the upper partials of which according to Helmholtz 1 only the octave and twelfth are heard. Mr Blaikley 2 states, however, that when the fundamental D is played, he can discern the seventh partial. The technical capabilities of the flute are practically unlimited to a good player who can obtain sustained notes diminuendo and crescendo, diatonic and chro- matic scales and arpeggios both legato and staccato, leaps, turns, shakes, &c. By the articulation with the tongue of the syllables te-ke or ti-ke repeated quickly for groups of double notes, or of te-ke-ti for triplets, an easy effective staccato is produced, known respectively as double ox triple tonguing, a device under- stood early in the 16th century and mentioned by Martin Agricola, 3 who gives the syllables as de for sustained notes, di-ri for shorter notes, and tel-lel-lel for staccato passages in quick tempo. 4

Musical instruments, such as flutes, in which a column of air is set in vibration by regular pulsations derived from a current of air directed by the lips of the executant against the side of the orifice serving as embouchure, appear to be of very ancient origin. The Hindus, Chinese

and Japanese claim to have used these modes of blowing from time immemorial. The ancient Egyptians had a long pipe held obliquely and blown across the end of the pipe itself at its upper extremity ; it was known as Saib-it s and was frequently figured on the monuments. The same instrument, called ” nay,” is still used in Mahommedan countries. The oblique aulos of the

1 Lehre von der Tonempfindung (Braunschweig, 1877).

2 See additions by D. J. B. to article ” Flute ” in Grove’s Diction- ary of Music and Musicians (London, 1904).

3 Musica instrumentalis deutsch (Wittenberg, 1528).

4 See also LArtusi, Delle imperfettioni della musica moderna (Venice, 1600), p. 4; Gottfried Weber in Cdcilia, Bd. ix. p. 99.

5 See ” Les Anciennes Flutes 6gyptiennes,” by Victor Loret in Journal asiatique (Paris, 1889), vol. xiv. p. 133 et seq., two careful articles based on the ancient Egyptian instruments still extant. See also Lauth, ” Uber die agyptische Instrumente,” Sitzungs. der philos., philolog. und histor. Klasse. der Kgl. bayer. Akad. zu Milnchen (1873).

Greeks, plagiaulos, 6 was of Egyptian origin and was perhaps at first blown from the end as described above,’ since we know that the Greeks were familiar with that method of blowing in the syrinx or pan-pipe. The instruments preserved at the British Museum 8 having lateral embouchures show, however, that they were also acquainted — probably through the Hindus — with the transverse flute, although in the case of these specimens a reed must have been inserted into the mouth-hole or no sound would have been obtained.

The high antiquity of a lateral embouchure in Europe is generally admitted; the flute evidently penetrated from the East at some period not yet determined. A transverse flute is seen on Indian ˆvgagSfflM M — I K ,..„ sculptures of the Gandhara school showing Greek influence, and dating from the beginning of our era (fig. 3). But although the transverse flute was evi- dently known to the Greeks and Romans, it did not find the same the reed instruments known as auloi. We have no

favour as

evidence of the survival of the transverse flute after the fall of the

Roman empire until it filtered through from Byzantine sources

Fig. 3. — Transverse Flute. 1st or 2nd century a.d. From the Tope at Amarabati, British Museum.

during the early middle ages. Instances of the flute occur on a group of caskets 9 of Italo-Byzantine work of the 9th or loth century, while of purely Byzantine origin we find examples of flutes in Greek

6 See Albert A. Howard, ” The Aulos or Tibia,” Harvard Studies, iv. (Boston, 1893), pp. 16-17.

7 Representations of flutes blown as here described have been found in Europe. See Comptes rendus de la commission impiriale archeologique (St Petersburg, 1867), p. 45, and atlas for the same date, pi. vi. Pompeian painting given by Helbig, Wandgemdlde, No. 7607; Zahn, vol. hi. pi. 31 ; Museo Borbonnico, pi. xv. No. 18; Clarac, pi. 130, 131, 139; Heuzey, Les Figurines, p. 136.

8 There are two flutes at the British Museum (Catal. No. 84, 4-9 and 5 and 6), belonging to the Castellani collection, made of wood encased in bronze in which the mouthpiece, consisting of the head of a maenad, has a lateral hole bored obliquely into the main tube. This hole was probably intended for the reception of a reed. The pipe is stopped at the end beyond the mouthpiece as in the modern flute. There are six holes. See also the plagiaulos from Halicar- nassus in the British Museum described by C. T. Newton in History of Discoveries at Halicarnassus (London), vol. ii. p. 339. The Louvre has two ancient statues (from the villa Borghese) representing satyrs playing upon transverse flutes. Unfortunately these marbles have been restored, especially in the details affecting our present subject, and are therefore examples of no value to us. Another statue representing a flute-player occurs in the British Museum. The instrument has been supposed to be a transverse flute, but erroneously, for the insufflation of the lateral tube against which the instrumentalist presses his lips, could not, without the inter- vention of a reed, excite the vibratory movement of the column of air.

‘ Florence, Carrand Collection. See Museo Nazionale Firenze, Catalogo (1898), p. 205, No. 26 (description only). Illustration in Gallerie nazionali italiane, A. Venturi, vol. iii. (1897), p. 263, L Arte (Rome, 1894), vol. i. p. 24, Hans Graeven, ” Antike Vorlagen byzantinischer Elfenbeinreliefs,” in Jahrb. d. K. Preuss. Kunst- Sammlungen (Berlin, 1897), Bd. xviii. p. 11; Hans Graeven, ” Ein Reliquienkastchen aus Pirano,” id., 1899, Bd. xx. fig. 2 and pi. iii.

MSS, 1 preserved in Paris, at the British Museum and elsewhere. There is moreover in the cathedral of St Sophia at Kiev 2 an orchestra depicted on frescoes said to date from the nth century; among the musicians is a flautist.

The first essentially western European trace of the transverse flute occurs in a German MS. of the I2tb century, the celebrated Hortus deliciarum of the abbess Herrad von Landsperg. 3 Fol. 221 shows a syren playing upon the transverse flute, which Herrad explains in a legend as tibia; in the vocabulary the latter is trans- lated swegel. In the 13th century it occurs among the miniatures of the fifty-one musicians in the beautiful MS. Las Cantigas de Santa Maria in the Escorial, Madrid. 4 Eustache Deschamps, a French poet of the 14th century, in one of his ballads, makes mention of the ” flute fcraversaine,” and we are justified in supposing that he refers to the transverse flute. It had certainly acquired some vogue in the 15th century, being figured in an engraving in Sebastian Vird- ung’s celebrated work 5 , where it is called ” Zwerchpfeiff,” and, with the drums, it already constituted the principal element of the military music. Agricola (op. cit.) alludes to it as the ‘_’ Querch- pfeiff ” or ” Schweizerpfeiff,” the latter designation dating, it is said, from the battle of Marignan (1515), when the Swiss troops used it for the first time in war.

From Agricola onwards transverse flutes formed a complete family, said to comprise the discant, the alto and tenor, and the bass —

n ˆ v respectively. Praetorius 6 desig-

ft — gff— -n iˆ nates the transverse flute as

— c?— \f — ” Flauta traversa’ Querpfeiff ”

“ˆ and ” Querflot,” and gives the

pitch of the bass I

. the tenor ; and alto 1

: and the : discant

3

in flute

w

concert at that tenors, and two basses. ” Traversa ” and* the

j = = = as varie-

‘ ties then

in use. A four altos or

in

time included two discants,

The same author distinguishes between the

Schweizerpfeiff ” or fife (which he also calls

‘ Feldpfeiff,” i.e. military flute), although the construction was the

same. There were -9 = -y respectively ; they were

two kinds of &=5= <*nd fe— rj:zzz employed _ exclusively "Feldpfeiff," in tf **T** = with the military drum.

Mersenne’s 7 account of the transverse flute, then designated ” flute d’Allemagne “or ” flute allemande ” in France, and an ” Air de Cour ” for four flutes in his work lead us to believe that there were then in

use in France 9 = = the tenor #EE=zz ar >d the bass .

alto ffi- — 1 — flute descend-£|ˆ;j= =.

the soprano j flute in The museum specimens of

: or flute in Conservatoire

■at mg to of the Conservatoire Royal of Brussels possesses all these varieties except the last. All of them are laterally pierced with six finger-holes; they have a cylindrical bore, and are fashioned out of a single piece of wood. Their compass con- sists of two octaves and a fifth. Mersenne’s tablature for fingering the flute differs but little from those of Hotteterre-le-Romain 8 and Eisel 9 for the diatonic scale ; he does not give the chromatic semi- tones and the flute had as yet no keys. _ _

The largest bass flute in the Brussels museum is in {jˆdpsnrˆ

at the French normal pitch A 435 double vibrations per — “—-

second. It measures 0-95 m. from the centre of the blow orifice to

1 Greek MS. 510, Gregoir de Nazance 10th century, Bibliotheque Nationale, Paris; illustration in Gustave L. Schlumberger, L ‘Epopee byzantine ct la fin du dizieme siecle (Paris, 1896 and 1900), vol. i. p. 503. British Museum, Greek Psalter, add. MS. 19352, fol. 189b. written and illuminated cir. 1066 by Theodorus of Caesarea. _ A cylindrical flute is shown turned to the right, the left hand being uppermost. Smyrna, Library of the Evaggelike Schole B. 18, fol. 72a, a.d. 1 100, illustration by Strzygowski, ” Der Bilderkreis des griechischen Physiologus,” in Byzantinisches Archiv (Leipzig, 1899), Heft 2, Taf. xi. ; N. P. Kondakoff, Histoire de I’art byzantin (Paris, 1886 and 1891), pi. xii. 5; ” Kuseyr’ Amra,” issued by K. Akad. d. Wissenschaften (Vienna, 1907), vol. ii. pi. xxxiv.

2 A fine volume containing coloured drawings of these frescoes has been published in St Petersburg (British Museum library cata- logue, sect. ” Academies,” St Petersburg, 1874-1887, vol. iv. Tab. 1325a).

3 This manuscript, written towards the end of the 12th century, was preserved in the Strassburg library until 1870, when it was burnt during the bombardment of the city. See the fine reproduction in facsimile published by the Soc. pour la conservation des monuments hisloriques d’ Alsace. Texte explicatif de A. Straub and G. Keller (Strassburg, 1901), pi. lvii., also C. M. Engelhardt, Herrad von Landsperg und ihr Werk (Stuttgart and Tubingen, 1 818), twelve plates.

4 MS. j. b. 2. Illustrated in Critical and Bibliographical Notes on Early Spanish Music (London, 1887), p. 119.

6 Musica getutscht und auszgezogen (Basel, 151 1).

6 Organographia (Wolfcnbuttel. 1618), pp. 24, 25, 40.

7 Harmonie universelle (Paris, 1636), Livre v. p. 241.

8 Principes de la flute traversiere ou flute d’Allemagne, de la flute ii bee el du haulbois (Paris, 1722), p. 38.

9 Musicus avro&iSaKTos oder der sich selbst informirende Musicus (Erfurt, 1738), p. 85.

Fig. 4. Fig. 5. Fig. 4. — Bass Flute.

the lower extremity of the tube. The disposition of the lateral holes is such that it is impossible to cover them with the fingers if the flute is held in the ordinary way. The in- strument must be placed against the mouth in an almost vertical direction, inclining the extremity of the tube either to the right or the left. This inconvenient position makes it necessary that the instrument should be divided into two parts, enabling the player to turn the head joint that the embouchure may be most commodiously approached by the lips, which is not at all easy. The first and fourth of the six lateral holes are double in order to accommodate both right- and left-handed players, the holes not in use being stopped up with wax. The bass flute shown in fig. 4 is the facsimile of an instrument in the Museo Civico of Verona. The original, unfortunately no longer fit for use, is nevertheless sufficiently well pre- served to allow of all its proportionate measurements being given. The lowest note, Eb, is obtained with a remarkable amplitude of sound, thus upsetting a very prevalent opinion that it is impossible to produce by lateral insufflation sounds which go a little lower than the ordinary limit downwards of the modern orchestral flute. 10 The bass flute cited by Mersenne should not differ much from that of the Museo Civico at Verona. We suppose it to have

been in &—-<& — , and that it was furnished

with an open key like that which was applied to the recorders (flutes douces) of the same epoch, the function of the key being to augment by another note the com- pass of the instrument in the lower part. A bass flute in G similar to the one in fig. 5 is figured and described in Diderot and D'Alembert's encyclopaedia u (1751). Ac- cording to Quantz, 12 it was in France and . . about the middle of the 17th century that F rom Museo Civico, the first modifications were introduced in Verona (facsimile), the manufacture of the flute. The improve- Fig. 5.— Bass Flute, ments at this period consisted of the Brussels Museum, abandonment of the cylindrical bore in

favour of a conical one, with the base of the cone forming the head of the instrument. At the same time the flute was made of three separate pieces called head, body, and tail or foot, which were ultimately further subdivided. The body or middle joint was divided into two pieces, so that the instrument could be tuned to the different pitches then in use by a replacement with longer or shorter pieces. It was probably about 1677, when Lully introduced the German flute into the opera, that recourse was had for the first time to keys, and that the key of D# was applied to the lower part of the instrument. 13 The engraving of B. Picart, dated 1707, given in Hotteterre's book, represents the flute as having reached the stage of improvement of

which we have just spoken. In 1726 Quantz, 14 finding himself in Paris, had a second key applied to the flute, placed nearly at the same height as the first, that of the – & , intended to differentiate the D# and the Eb. 16 This

jffi- J = innovation was generally well received in Germany, but ~*j ~t s ‘ does not appear to have met with corresponding success in other countries. In France and England manufacturers adopted it but rarely; in Italy it was declared useless. 16 About the same

10 Fetis, Rapport sur la fabrication des instruments de musique d, V Exposition Universelle de Paris, en 1855.

11 See Recueil de planches, vol. iv., and article ” Basse de flute traversiere,” vol. ii. (Paris, 1751). See also The Flute, by R. S. Rockstro (London, 1890), p. 238, where the wood cut is reproduced together with a translation of the article. The Museum of the Conservatoire in Paris also possesses a bass flute by the noted French maker Delusse.

12 Versuch einer Anweisung die Flote traversiere zu spielen (Berlin, I752)- . ,

13 Unless the contrary is stated, we have always in view, in describing the successive improvements of the flute, the treble flute in D, which is considered to be typical of the family.

14 ” Herrn Johann Joachim Quantzens-Lebenslauf, von ihm selbst entworfen,” in the Historisch-Kritische Beytrage zur Aufnahme des Musik, by Marpurg (Berlin, 1754), p. 239. Quantz was professor of the flute to Frederick the Great.

16 See Johann Georg Tromlitz, Ausfuhrlicher und griindlicher Unterricht die Flote zu spielen (Leipzig, 1791), I, § 7, and tlber Floten mit mehrern Klappen (Leipzig, 1800), cap. vii. § 21.

16 Antonio Lorenzoni, Saggio per ben sonare il flauto traverso (Vicenza, 1779).

time flutes were constructed with the lower extremity lengthened sufficiently to produce the fundamental C, and furnished with a supplementary key to produce the C#. This innovation, spoken of by Quantz l did not meet with a«very favourable reception, and was

shortly afterwards abandoned. Passing mention may be made of the drawing of a flute with a C key in the Music-Saal of J. F. B. Majer (Nuremberg, 1741), p. 45.

The tuning of the instrument to different pitches was effected by changes in the length, and notably by substituting a longer or shorter upper piece in the middle joint. So wide were the differences in the pitches then in use that seven such pieces for the upper portion of it were deemed necessary. The relative proportions between the different parts of the instrument being altered by these modifications in the length, it was conceived that the just relation could be re-established by dividing the foot into two pieces, below the key. These two pieces were adjusted by means of a tenon, and it was asserted that, in this way, the foot could be lengthened proportion- ately to the length of the middle joint. Flutes thus improved took the name of ” flutes a registre.” The register system was, about 1752, applied by Quantz to the head joint 2 and, the embouchure section being thus capable of elongation, it was allowable to the per- former, according to the opinion of this professor, to lower the pitch of the flute a semitone, without having recourse to other lengthening pieces, and without disturbing the accuracy of intonation.

The upper extremity of the flute, beyond the embouchure orifice, is closed by means of a cork stopper. On the position of this cork depends, in a great measure, the accurate tuning of the flute. It is in its right place when the accompanying octaves are ˆa.

true. Quantz, in speaking of this accessory, mentions -9 G ~ˆ-zi

the use of a nut-screw to give the required position to Sj— =)=p=~:z the cork. 3 He does not name the inventor of this ap- tf – *” pliance, but, according to Tromlitz, 4 the improvement was due to Quantz himself. The invention goes back to 1726.

When the Method of Quantz appeared there were still in use, besides the orchestral flute in D, the little fourth flute in G, the low fourth flute in A, and the flute d’amour a note higher; in France they had, moreover, the little octave flute in D (octave). A bass flute in D had also been attempted (see fig. 5). When Ribock published his Bemerkungen iiber die Flote 5 the flute had already the five keys here shown. — – ■ ■[

This author states that the inventor of these ˆz;~— Fg-grg jEJtg— new keys is not known to him, but that » % =) either Kusder, a musical instrument-maker in London, or Johann Georg Tromlitz of Leipzig was the

originator, since he has not been able to trace those keys on the flutes of any other maker. Although Tromlitz does not claim for himself the invention of the keys for F, G# and Bt>, he states that " he had occupied himself for several years in applying these keys so as not to augment the difficulty of playing, but on the contrary to render the handling of them as easy as possible." 6 In the later work published in 1800, 7 however, he seems to attribute the invention of these keys to Richard Potter of London; he says that he has never yet been fortunate enough to come across a good flute by that maker — " the flute has certainly gained by the addition of the keys for F, Gi- and Bb, but this is not everything, for on such a flute much must perforce be left unattempted. . . . Only a flute with eight keys according to my invention is capable of everything." It would seem, moreover, from circumstantial evidence stated clearly and on good authority by Rockstro 8 that the keys for F, G# and Bb must have been used first in England and made by Richard Potter before 1774. The higher key of C adopted from 1786 by Tromlitz, we believe to have been first recommended by Ribock (1782). 9 Tromlitz in Uber Flblen describes at length what may be termed the first systematic effort to overcome the difficulties created by the combination of open holes and closed keys. He attempted to solve the question by determining the positions of the holes according to the exigencies of fingering instead of subordinating them to the more arbitrary theories connected with the musical scale.

In 1785 Richard Potter improved Quantz's slide applied to the head joint as well as to the register of the foot by a double system of tubes forming double sliding air-tight joints. In the document 10 describing this improvement Potter patented the idea of lining the holes with silver tubes and of adapting metal conical valves to the keys. Potter's patent conical valves were an adaptation of the contrivance first invented by J. F. Boie or Boye of Gottingen, 11

1 See Anweisung, i. § 15.

2 See Lebenslauf, he. eit. p. 248, where Quantz states that he invented the adjustable head for the flute.

3 See Anweisung, i. §§ 10-13 an d iv. § 26.

4 A usfiihrlicher und griindlicher Unterricht die Flote zu spielen (Leipzig, 1791), i. cap. § 20. Compare Schilling, Univ.-Lexikon (Leipzig, 1835).

5 Stendal, 1782 (published under his initials only, J. J. H. R., see p.

2).

6 Kurze Abhandlung von Flotenspielen (Leipzig, 1786), p. 27.

7 Uber Flbten, &c, pp. 133 and 134.

8 See The Flu'e, pp. 242-244 and 561 and 562.

9 See op. eit. po. 51 and 62.

10 English patent, No. 1499. " See Rockstro, op. eit. p. 197.

who used pewter for the plugs, and silver for lining the holes. The keys mentioned in the patent were four — D#, F, G#, A#. The idea of extending the compass of the flute downwards was taken up again about the same time by two players of the flute in London named Tacet and Florio. They devised a new disposition of the keys C and C#, and confided the execution of their invention to Potter. In Dr Arnold's New Instructions for the German Flute occurs a tablature, the engraving of which goes back to the end of the 18th century, and bears the following title, " A Complete Drawing and Concise Scale and Description of Tacet and Florio's new invented German Flute, with all the additional keys explained." It explains the use of six keys — C, C#, D#, F, G#, A# — that are not always figured, because the employment of so many keys was at once admitted. Tromlitz himself, who, however, made flutes with nine keys — adding Eb, another F, and Cq, declared that he was not in favour of so great a complication, and that he preferred the flute with only two keys, D# and Eb, with a register foot joint and a cork nut-screw at the head joint. This instrument met all requirements. He was always much opposed to the use of the old keys for Co and C#, because they altered the recognised quality of tone of the instrument. When Tromlitz published his method, the family of flutes had become modified. It comprehended only the typical flute in D, the flute d'amour a minor third lower, a " third " flute a minor third higher, and, finally, the little octave flute.

While Tromlitz was struggling in Germany with the idea of augmenting the compass of the flute downwards by employing open keys for Cq and C#, an Italian, Giovanni Batista Orazi, 12 increased the scale of the instrument downwards by the application of five new keys, viz. B, Bb, A, Ab, and G. At the same time that he produced this invention 13 he conceived the plugging of the lateral holes by the valve keys then recently invented by Potter. But it was hardly possible to obtain a perfect plugging of seven lateral holes with the aid of as many keys, for the control of which there were only the two little

fingers, and therefore this invention of Orazi proved a failure.

In 1808 the Rev. Frederick Nolan, 14 of Stratford, near London, conceived an open key, the lever of which, terminating by a ring, permitted the closing of a lateral hole at the same time the key was being acted upon. The combination in this double action is the embryo of the mechanism that a little later was to transform the system of the flute. Two years later Macgregor, 15 a musical-instrument maker in London, constructed a bass flute an octave lower than the ordinary flute. The idea was not new, as is proved by the existence of the bass flute mentioned above. The difference between the two instruments lies in the mechanism of the keys. That em- ployed by Macgregor consisted of a double lever, a contrivance dating from before the middle of the 18th century, of which the application is seen in an oboe of large dimensions preserved in the National Museum at Munich. 16

In 181 1 Johann Nepomuk Capeller invented the extra Do, hole and key, which is still in constant use on every flute of modern construction. 17

About 1830 the celebrated French flautist Tulou added two more keys, those of F# and C#, and a key, called

” de cadence,” to facilitate the accompany- ■ f-v f>-^ J*”^

ing shakes. ** Jfc Iz: .£ ‘

To increase the number of keys, to improve jft ~ t= I

their system of plugging, and to extend the w

scale of the instrument in the lower region,

— these had hitherto been the principal problems dealt with in the improvement of the flute. No maker, no inventor to whose labours we have called attention, had as yet devoted his atten- tion to the rational division of the column of air by means of the lateral holes. In 1831 Theobald Boehm, a Bavarian, happening to be in London, was struck with the power of tone the celebrated English performer Charles Nicholson drew from his instrument. Boehm learned, and not without astonishment, that his English colleague obtained this result by giving the lateral holes a much greater diameter than was then usually admitted. About the same time Boehm made the acquaintance of an amateur player named Gordon, who had effected certain improvements; he had bored the lateral hole for the lower E, and had

covered it with a key, while he had replaced the key for F with a ring. These innova- tions set Boehm about attempting a complete reform of the

12 Saggio per costruire e suonare un flauto traverso enarmonico che ha i suoni bassi del violino (Rome, 1797).

13 The idea of this large flute was taken up again in 1819 by Trexler of Vienna, who called it the ” panaulon.”

14 Patent, No. 3183. Part of the specification together with a diagram is reproduced by Rockstro, op. eit. pp. 273-274.

16 Patent, No. 3349. Part of the specification together with a diagram is reproduced by Rockstro, op. eit. pp. 273-274.

16 Another specimen, almost the same, constructed about 1775, and called ” Basse de Musette,” may be seen in the Museum of the Paris Conservatoire.

17 See account of Capeller’s inventions by Carl Maria von Weber in Allgem. musikal. Zeit. (Leipzig, 1811), pp. 377-379, a translation of which is given by Rockstro, op. eit. pp. 279 and 280.

instrument. 1 He went resolutely to work, and during the year 1832 he produced the new flute which bears his name. This instrument is distinguished by a new mechanism of keys, as well as by larger holes disposed along the tube in geometrical progression.

Boehm’s system had preserved the key of G# open; Coche, 2 a professor in the Paris Conservatoire, assisted by Auguste Buffet the younger, a musical-instrument maker in that city, modified Boehm’s flute by closing the G# with a key, wishing thus to render the new fingering more conformable to the old. He thus added a key, facilitating the shake upon C# with D#, and brought about some other changes in the instrument of less importance.

Boehm had not, however, altered the bore of the flute, which had been conical from the end of the 17th century. In 1846, however, he made further experiments, and the results obtained were put in practice by the construction of a new instrument, of which the body was given a cylindrical bore, while the diameter of the head was

modified at the embouchure, the head-joint becoming parabolic (see fig. 2). The inventor thus obtained a remarkable equality in the tones of the lower octave, a greater sonorousness, and a perfect accuracy of intonation, by establishing the more exact proportions which a column of air of cylindrical form permitted.

The priority of Boehm's invention was long contested, his de- tractors maintaining that the honour of having reconstructed the flute was due to Gordon. But an impartial investigation vindi- cates the claim of the former to the invention of the large lateral holes. 3 His greatest title to fame is the invention of the mechanism which allows the production of the eleven chromatic semitones intermediate between the fundamental note and its first harmonic by means of eleven holes so disposed that in opening them suc- cessively they shorten the column of air in exact proportional quantities. 4 Boehm (Essays, &c.) published a diagram or scheme to be adopted in determining the position of the note-holes of wind instruments for every given pitch. This diagram gives the posi- tion of the intermediate holes which he had been enabled to establish by a rule of proportion based on the law of the lengths of strings.

The Boehm flute, notwithstanding the high degree of perfection it has reached, has not secured unanimous favour; even now there are players who prefer the ordinary flute. The change of fingering required for some notes, the great delicacy and liability to derange- ment of the mechanism, have something to do with this. In England especially, the ordinary flute retains many partisans, thanks to the improvements introduced by a clever player, Abel Siccama, in 1845 (Patent No. 10,553). He bored the lateral holes of E and A lower, and covered them with open keys. He added some keys, and made a better disposition of the other lateral holes, of which he increased the diameter, producing thus a sonorousness almost equal to that of the Boehm flute, while yet preserving the old fingering for the notes of the first two octaves. But in spite of these improve- ments the old flute will not bear an impartial comparison with that of Boehm.

A flute constructed on a radically new system by Signor Carlo Tommaso Georgi and introduced in 1896 places the technique of the instrument on an entirely new and simple basis. • The principal features of this flute consist in an embouchure placed at the upper extremity of the tube instead of at the side, which allows the instru- ment to be held in a perpendicular position; no tuning cork is re- quired. There are eleven holes mathematically placed in the tube which give the semitones of the scale; there are no keys. The eleven holes are fingered by the fingers and thumbs, the C# hole being closed

by the side of the left fore-finger. All the notes are obtained by means of simple fingering as far as G# of the third octave, the remaining notes of which are produced by cross-fingering. For the convenience of players with short fingers keys can be added, and the head of the Georgi flute can be used with any cylinder flute. The compass of the Georgi flute £ is almost the same as that of the concert flute; viz. fc; If the lower C and C# are

required, extra holes -6 ı~ ar *d keys can De added.

Everything that is fa..=r| to= ˆ= possible on the Boehm flute is possible on the Georgi v ” and more, owing to the sim

plicity of the fingering; each finger having but one duty to perform, all trills are equally easy. The tone is the true flute tone, brilliant and sympathetic. 5

1 See Uber den Flbienbau und die neuesten Verbesserungen desselben (Mainz, 1847) ; and W. S. Broadwood, An Essay on the Construction of Flutes originally written by Theobald Boehm, published with the addition of Correspondence and other Documents (London, 1882).

2 Examen critique de la flute ordinaire comparee d, la flute Boehm (Paris, 1838).

3 They existed long before, however, in the Chinese Ty and the Japanese Fuye.

4 The reader may consult with advantage Mr C. Welch’s History of the Boehm Flute (London, 1883), wherein all the documents relat- ing to this interesting discussion have been collected with great impartiality.

5 For further details see Kathleen Schlesinger, The Instruments of the Orchestra, part i. pp. 192-194, where an illustration is given, and Paul Wetzger, Die Flbte (Heilbronn, 1906), pp. 23-24, and Tafel iv. No. 20.

The old English fipple flute, or flute a bee, is described under the headings Recorder and Flageolet. (V. M.; K. S.)

2. In architecture the name ” flute ” is given to the vertical channels (segmental, semicircular or elliptical in horizontal section) employed on the shafts of columns in the classic styles. The flutes are separated one from the other by an ” arris ” in the Doric order and by a ” fillet ” in the Ionic and Corinthian orders. The earliest fluted columns are those in Egypt, at first with plain faces without any sinking, subsequently at Karnac (1400 B.C.) with a segmental sinking equal in

depth to about one-seventh of the width of the flute. The columns flanking one of the ” beehive ” tombs at Mycenae have segmental flutes and are the earliest Greek examples. In two of the earliest Doric temples at Metapontum and Syracuse (temple of Apollo) the flutes are also segmental, but in later examples in order to emphasize the arris they were formed of three arcs and are known as ” false ellipses,” and this applies to nearly all the fluting in Greek examples whether belonging to the Doric, Ionic or Corinthian orders. The number of flutes varies, there being 52 in the archaic temple of Diana at Ephesus and from 30 to 52 flutes in the Persian columns according to the diameter of the column. In the Greek Doric column 20 is the usual number, but there are 16 only in the temples of Sunium, Assos, Segesta and the temple of Apollo at Syracuse; 18 in one of the temples of Selinus and the temple of Diana at Syracuse, and 24 in the temple of Neptune at Paestum. The depth of the flute also varies; in the Propylaea at Athens the radius is equal to the width of the flute and the flute is segmental. In the Parthenon the radius of the central part of the flute is greater than the width, but the smaller arcs on either side accentuate better the arris. A similar accentuation is found in the Ionic and Corinthian orders, where the flutes are separated by fillets, and their section is always elliptical in Greek work, the depth of the flute, however, being always greater than in the Doric order. Thus, in the temple of Ilissus and the Ionic column in the cella of the temple at Bassae, the depth is about one-quarter of the width, in the Propylaea at Priene it is about one-third, and in the Erechtheum and other examples of the Greek Ionic order it is little more than one-half. The width of the fillet also varies, being as a rule one quarter of the width of the flute; and the same applies to the Greek Corinthian order. In the Roman Doric, Ionic and Corinthian orders, the flute is either segmental or semicircular, its depth being about one third of the width in the Doric column, and in all Ionic, Corinthian and Composite columns half the width of the flute. The fillet also is much broader in Roman examples, being about one-third of the width of the flute. In Roman columns sometime ; the flutes of the lower part of the shaft, about one third of the height, are partly filled with a convex moulding, ” cabling ” being the usual term applied to this treatment. The French architects of the 16th and 17th centuries carried this decorative feature much farther, and in the Tuileries and the Louvre carved a series of leaves in the flutes. In a few Italian buildings, instead of the fluting of the column being vertical, it twines round the column and is known as spiral fluting; a fine example is found in the Bevilacqua palace at Verona by San Michele. Fluting is sometimes introduced into capitals, as in the tomb of Mylasa, and in friezes, as in the theatre at Cnidos, the Incantada at Salonica, and a doorway at

Patara. In one of the museums at Rome is a fine sarcophagus, the sides of which are sculptured with flutes in waved lines. The coronas of many of the Roman temples were carved with flutes. In medieval buildings, fluting was occasionally introduced in imitation of Roman work, as in the churches of central Syria and of Autun and Langres in France, but in the south of Italy and Sicily it would seem to have been brought in as a variety of treatment in the decoration of the shafts carrying the arches of cloisters, as at Monreale in Sicily and in those of St John Lateran and St Paul- outside-the-Walls at Rome. (R. p. s.)

FLUX (Lat. fluxus, a flowing; this being also the meaning of the English term in medicine, &c.),in metallurgy, a substance introduced in the smelting of ores to promote fluidity, and to remove objectionable impurities in the form of a slag. The

substances in commonest use are: — lime or limestone, to slag off silica and silicates, fluor-spar for lead, calcium and barium sulphates and calcium phosphate, and silica for removing basic substances such as limestone. Other substances are also used, but more commonly in assaying than in metallurgy. Sodium and potassium carbonates are valuable for fluxing off silica; mixed with potassium nitrate sodium carbonate forms a valuable oxidizing fusion mixture; ” black flux ” is a reducing flux composed of finely divided carbon and potassium carbonate, and formed by deflagrating a mixture of argol with J to | its weight of nitre. Borax is very frequently employed; it melts to a clear liquid and dissolves silica and many metallic oxides. Potassium bisulphate is useful in the preliminary treatment of refractory aluminous ores. Litharge and red lead are used in silver and gold assays, acting as solvents for silica and any metallic oxides present.

FLY (formed on the root of the supposed original Teut. fleugan, to fly), a designation applied to the winged or perfect state of many insects belonging to various orders, as in butterfly (see Lepidoptera), dragon-fly (q.v.), may-fly (q.v.), caddis-fly (q.v.), &c; also specially employed by entomologists to mean any species of the two- winged flies, or Diptera {q.v.). In ordinary parlance fly is often used in the sense of the common house-fly (Musca domeslica); and by English colonists and sportsmen in South Africa in that of a species of tsetse-fly (Glossina), or a tract of country (” belt “) in which these insects abound (see Tsetse-Fly).

Apart from the house-fly proper (Musca domeslica), which in England is the usual one, several species of flies are commonly found in houses; e.g. the Stomoxys calcitrans, or stable-fly; Pollenia rudis, or cluster-fly; Muscina stabulans, another stable- fly; Calliphora erythrocephala, blue-bottle fly, blow-fly or meat- fly, with smaller sorts of blue-bottle, Phormia terraenovae and Lucilia caesar; Homalomyia canicularis and brevis, the small house-fly; Scenopinus fenestralis, the black window-fly, &c. But Musca domeslica is far the most numerous, and in many places, especially in hot weather and in hot climates, is a regular pest. Mr L. O. Howard (Circular 71 of the Bureau of Entomology U.S. Dept. of Agriculture, Washington, 1906) says that in 1900 he made a collection of the flies in dining-rooms in different parts of the United States, and out of a total of 23,087 flies, 22,808 were the common house-fly. Its geographical distribution is of the widest, and its rapidity of breeding, in manure and door- yard filth, so great that, as a carrier of germs of disease, especially cholera and typhoid, the house-fly is now recognized as a potent source of danger; and various sanitary regulations have been made, or precautions suggested, for getting rid of it. These are discussed by Mr Howard in the paper referred to, but in brief they all amount to measures of general hygiene, and the isolation, prompt removal, or proper sterilization of the animal or human excrement in which these flies breed.

FLYCATCHER, a name introduced in ornithology by Ray, being a translation of the Muscicapa of older authors, and applied by Pennant to an extremely common English bird, the M. grisola of Linnaeus. It has since been used in a general and very vague way for a great many small birds from all parts of the world, which have the habit of catching flies on the wing. Orni- thologists who have trusted too much to this characteristic and to certain merely superficial correlations of structure, especially those exhibited by a broad and rather flat bill and a gape beset by strong hairs or bristles, have associated under the title of Muscicapidae an exceedingly heterogeneous assemblage of forms much reduced in number by later systematists. Great advance has been made in establishing as independent families the Todidae and Enrylaemidae, as well as in excluding from it various members of the Ampelidae, Cotingidae, Tyrannidae, Vireonidae, Mniotiltidae, and perhaps others, which had been placed within its limits. These steps have left the Muscicapidae a purely Old- World family of the order Passeres, and the chief difficulty now seems to lie in separating it from the Campephagidae and the Laniidae. Only a very few of the forms of flycatchers (which, after all the deductions above mentioned, may be

reckoned to include some 60 genera or subgenera, and perhaps 250

species) can here be even named. 1

The best-known bird of this family is that which also happens to be the type of the Linnaean genus Muscicapa — the spotted or grey flycatcher (M. grisola). It is a common summer visitant to nearly the whole of Europe, and is found throughout Great Britain, though less abundant in Scotland than in England, as well as in many parts of Ireland, where, however, it seems to be but locally and sparingly distributed. It is one of the latest migrants to arrive, and seldom reaches the British Islands till the latter part of May, when it may be seen, a small dust-coloured bird, sitting on the posts or railings of gardens and fields, ever and anon springing into the air, seizing with an audible snap of its bill some passing insect as it flies, and returning to the spot it has quitted, or taking up some similar station to keep watch as before. It has no song, but merely a plaintive or peevish call-note, uttered from time to time with a jerking gesture of the wings and tail. It makes a neat nest, built among the small twigs which sprout from the bole of a large tree, fixed in the branches of some plant trained against a wall, or placed in any hole of the wall itself that may be left by the falling of a brick or stone. The eggs are from four to six in number, of a pale greenish-blue, closely blotched or freckled with rust-colour. Silent and incon- spicuous as is this bird, its constant pursuit of flies in the closest vicinity of houses makes it a familiar object to almost everybody. A second British species is the pied flycatcher (M. atricapilla) , a much rarer bird, and in England not often seen except in the hilly country extending from the Peak of Derbyshire to Cumber- land, and more numerous in the Lake District than elsewhere. It is not common in Scotland, and has only once been observed in Ireland. More of a woodland bird than the fo/mer, the brightly-contrasted black and white plumage of the cock, together with his agreeable song, readily attracts attention where it occurs. It is a summer visitant to all western Europe, but farther eastward its place is taken by a nearly allied species (M. collaris) in which the white of the throat and breast extends like a collar round the neck. A fourth European species (M. parva), distinguished by its very small size and red breast, has also strayed some three or four times to the extreme south-west of England. This last belongs to a group of more eastern range, which has received generic recognition under the name of Erythro- sterna, and it has several relations in Asia and particularly in India, while the allies of the pied flycatchers (Ficedula of Brisson) are chiefly of African origin, and those of the grey or spotted flycatcher (Muscicapa proper 2) are common to the two con- tinents.

One of the most remarkable groups of Muscicapidae is that known as the paradise flycatchers, forming the genus Tchitrea of Lesson. In

nearly all the species the males are distinguished by the growth of exceedingly long feathers in their tail, and by their putting on, for some part of the year at least, a plumage generally white, but almost always quite different from that worn by the females, which is of a more or less deep chestnut or bay colour, though in both sexes the crown is of a glossy steel-blue. They are found pretty well throughout Africa and tropical Asia to Japan, and seem to affect the deep shade of forests rather than the open country. The best-known species is perhaps the Indian T. paradisi; but the Chinese T. incii, and the Japanese T. princeps, from being very commonly represented by the artists of those nations on screens, fans and the like, are hardly less so; and the cock of the last named, with his bill of a pale greenish-blue and

1 Of the 30 genera or subgenera which Swainson included in his Natural Arrangement and Relations of the Family of Flycatchers (published in 1838), at least 19 do not belong to the Muscicapidae at all, and one of them, Todus, not even to the order Passeres. It is perhaps impossible to name any ornithological work whose substance so fully belies its title as does this treatise. Swainson wrote it filled with faith in the so-called ” Quinary System ” — that fanciful theory, invented by W. S. Macleay, which misled and kept back so many of the best English zoologists of his generation from the truth, — and, unconsciously swayed by his bias, his judgment was warped to fit his hypothesis.

2 By some writers this section is distinguished as Butalis of Boie, but to do so seems contrary to rule.

eyes surrounded by bare skin of the same colour — though these are characters possessed in some degree by all the species — seems to be the most beautiful of the genus. T. bourbonnensis, which is peculiar to the islands of Mauritius and Reunion, appears to be the only species in which the outward difference of the sexes is but slight. In T. corvina of the Seychelles, the adult male is wholly black, and his middle tail-feathers are not only very long but very broad. In T. mutata of Madagascar, some of the males are found in a blackish plumage, though with the elongated median rectrices white, while in others white pre- dominates over the whole body; but whether this sex is here actually dimorphic, or whether the one dress is a passing phase of the other, is at present undetermined. Some of the African species,

of which many have been described, seem always to retain the rufous plumage, but the long tail-feathers serve to mark the males.

A few other groups are distinguished by the brilliant blue they exhibit, as Myiagra azurea, and others as Monarcha (or Arses) chrysomela by their golden yellow. The Australian forms assigned to the Muscicapidae are very varied. Sisura inquieta has some of the habits of a water- wagtail (Motacilla), and hence has re- ceived the name of " dishwasher," bestowed in many parts of England on its analogue; and the many species of Khipidura or fantailed flycatchers, which occur in various parts of the Australian Region, have manners still more singular — turning over in the air, it is said, like a tumbler pigeon, as they catch their prey; but concerning the mode of life of the majority of the Muscicapidae, and especially of the numerous African forms, hardly anything is known. (A. N.)

FLYGARE-CARLEN, EMILIE (1807-1892), Swedish novelist, was born in Stromstad on the 8th of August 1807. Her father, Rutger Smith, was a retired sea-captain who had settled down as a small merchant, and she often accompanied him on the voyages he made along the coast. She married in 1827 a doctor named Axel Fiygare, and went with him to live in the province of Smaland. After his death in 1833 she returned to her old home and published in 1838 her first novel, Waldemar Klein. In the next year she removed to Stockholm, and married, in 1841, the jurist and poet, Johan Gabriel Carlen (1814-1875). Her house became a meeting-place for Stockholm men of letters, and for the next twelve years she produced one or two novels annually. The premature death of her son Edvard Fiygare (1829-1853), who had already published three books, showing great promise, was followed by six years of silence, after which she resumed her writing until 1884. The most famous of her tales are Rosen pa Tistelon (1842; Eng. trans. The Rose of Tistelon, 1842); Enslingen pa Johannesskaret (1846; Eng. trans. The Hermit, 4 vols., 1853); and Ell Kopemanshus i skargarden (1859; The Merchant's House on the Cliffs). Fru Carlen published ia 1878 Minnen af svenskt forfaltarlif 1 840-1860, and in 1 887-1 888 three volumes of Efterskord fran en 80-arings forfaltarbana, containing her last tales. She died at Stockholm on the 5th of February 1892. Her daughter, Rosa Carlen (1836-1883), was also a popular novelist.

Emilie Flygare-Carlen's novels were collected in thirty-one volumes (Stockholm, 1 869-1 875).

FLYING BUTTRESS, in architecture, the term given to a structural feature employed to transmit the thrust of a vault across an

intervening space, such as an aisle, chapel or cloister, to a buttress built outside the latter. This was done by throwing a semi-arch across to the vertical buttress. Though employed by the Romans and in early Romanesque work, it was generally masked by other constructions or hidden under a roof, but in the 1 2 th century it was recognized as rational construction and emphasized by the decorative accentuation of its features, as in the cathedrals of Chartres, Le Mans, Paris, Beauvais, Reims, &c. Sometimes, owing to the great height of the vaults, two semi-arches were thrown one above the other, and there are cases where the thrust was transmitted to two or even three buttresses across intervening spaces. As a vertical buttress, placed at a distance, possesses greater power of resistance to thrust than if attached to the wall carrying the vault, vertical

buttresses as at Lincoln and Westminster Abbey were built outside the chapterhouse to receive the thrust. All vertical buttresses are, as a rule, in addition weighted with pinnacles to give them greater power of resistance.

FLYING COLUMN, in military organization, an independent corps of troops usually composed of all arms, to which a particular task is assigned. It is almost always composed in the course of operations, out of the troops immediately available. Mobility being its raison d'itre, a flying column is when possible composed of picked men and horses accompanied with the barest minimum of baggage. The term is usually, though not necessarily, applied to forces under the strength of a brigade. The " mobile columns " employed by the British in the South African War of 1899-1902, were usually of the strength of two battalions of infantry, a battery of artillery, and a squadron of cavalry — almost exactly half that of a mixed brigade. Flying columns are mostly used in savage or guerrilla warfare.

" FLYING DUTCHMAN," a spectre-ship popularly believed to haunt the waters around the Cape of Good Hope. The legend has several variants, but the commonest is that which declares that the captain of the vessel, Vanderdecken, was condemned for his blasphemy to sail round the cape for ever, unable to " make " a port. In the Dutch version the skipper is the ghost of the Dutch seaman Van Straaten. The appearance of the " Flying Dutch- man " is considered by sailors as ominous of disaster. The German legend makes one Herr Von Falkenberg the hero, and alleges that he is condemned to sail for ever around the North Sea, on a ship without helm or steersman, playing at dice for his soul with the devil. Sir Walter Scott says the " Flying Dutchman " was originally a vessel laden with bullion. A murder was committed on board, and thereafter the plague broke out among the

crew, which closed all ports to the ill-fated craft. The legend has been used by Wagner in his opera Der fliegende Hollander.

FLYING-FISH, the name given to two different kinds of fish. The one (Dactylopterus) belongs to the gurnard family (Triglidae), and is more properly called flying gurnard; the other (Exocoetus) has been called flying herring, though more nearly allied to the gar-pike than to the herring. Some other fishes with long pectoral fins (Pterois) have been stated to be able to fly, but this has been proved to be incorrect.

The flying gurnards are much less numerous than the Exocoeli with regard to individuals as well as species, there being only three or four species known of the former, whilst more than fifty have been described of the latter, which, besides, are found in numerous shoals of thousands. The Dactylopteri may be readily

Fig

Dactylopterus volitans.

distinguished by a large bony head armed with spines, hard keeled scales, two dorsal fins, &c. The Exocoeli have thin, deciduous scales, only one dorsal fin, and the ventrals placed far backwards, below the mifldle of the body; some have long barbels at the chin. In both kinds the pectoral fins are greatly prolonged and enlarged, modified into an organ of flight, and in many species of Exocoetus the ventral fins are similarly enlarged, and evidently assist in the aerial evolutions of these fishes. Flying-fishes are found in the tropical and subtropical seas only, and it is a singular fact that the geographical distribution of the two kinds is nearly identical. Flying-fish are more frequently

observed in rough weather and in a disturbed sea than during calms; they dart out of the water when pursued by their enemies or frightened by an approaching vessel, but frequently also without any apparent cause, as is also observed in many other fishes; and they rise without regard to the direction of the wind or waves. The fins are kept quietly distended, without any motion, except an occasional vibration caused by the air whenever the surface of the wing is parallel with the current of the wind. Their flight is rapid, greatly exceeding that of a ship going 10 m. an hour, but gradually decreasing in velocity and not extending beyond a distance of 500 ft. Generally it is longer when the fishes fly against, than with or at an angle to, the wind. Any vertical

or horizontal deviation from a straight line is not caused at the will of the fish, but by currents of the air; thus they

Fig. 2. — Exocoetus callopterus.

retain a horizontally straight course when flying with or against the wind, but are carried towards the right or left whenever the direction of the wind is at an angle with that of their flight. However, it sometimes happens, that the fish during its flight immerses its caudal fin in the water, and by a stroke of its tail turns towards the right or left. In a calm the line of their flight is always also vertically straight or rather parabolic, like the course of a projectile, but it may become undulated in a rough sea, when they are flying against the course of the waves; they then frequently overtop each wave, being carried over it by the pressure of the disturbed air. Flying-fish often fall on board of vessels, but this never happens during a calm or from the lee side, but during a breeze only and from the weather side. In day time they avoid a ship, flying away from it, but during the night when they are unable to see, they frequently fly against the weather board, where they are caught by the current of the air, and carried upwards to a height of 20 ft. above the surface of the water, whilst under ordinary circumstances they keep close to it. All these observations point clearly to the fact that any deflection from a straight course is due to external circumstances, and not to voluntary action on the part of the fish.

A little Malacopterygian fish about 4 in. long has recently been discovered in West Africa which has the habits of a fresh-water flying-fish. It has been named Pantodon buchholzi. It has very large pectoral fins with a remarkable muscular process attached to the inner ray. It lives in fresh-water lakes and rivers in the Congo region, and has been caught in its flight above the water in a butterfly-net.

FLYING-FOX, or, more correctly, Fox-Bat. The first name is applied by Europeans in India to the fruit-eating bats of the genus Pteropus, which contains more than half the family (Pteropidae) . This genus is confined to the tropical regions of the Eastern hemisphere and Australia. It comprises numerous species, a considerable proportion of which occur in the islands of the Malay Archipelago. The flying-foxes are the largest of the bats, the kalong of Java {Pteropus edulis) measuring about a foot in length, and having an expanse of wing-membrane measuring 5 ft. across. Flying-foxes are gregarious, nocturnal bats, suspending themselves during the day head-downwards by thousands from the branches of trees, where with their wings gathered about them, they bear some resemblance to huge

shrivelled-up leaves or to clusters of some peculiar fruit. In Batchian, according to Wallace, they suspend themselves chiefly from the branches of dead trees, where they are easily caught or knocked down by sticks, the natives carrying them home in basketfuls. They are then cooked with abundance of spices, and ” are really very good eating, something like hare.” Towards

evening these bats bestir themselves, and fly off in companies to the village plantations, where they feed on all kinds of fruit, and so numerous and voracious are they that no garden crop has much chance of being gathered which is not specially pro- tected from their attacks. The flying-fox of India {Pteropus medius) is a smaller species, but is found in great numbers wherever fruit is to be had in the Indian peninsula.

FLYING-SQUIRREL, properly the name of such members of the squirrel-group of rodent mammals as have a parachute-like expansion of the skin of the flanks, with attachments to the limbs, by means of which they are able to take long flying-leaps from tree to tree. The parachute is supported by a cartilage attached to the wrist or carpus; in addition to the lateral membrane, there is a narrow one from the cheek along the front of each shoulder to the wrist, and in the larger species a third (interfemoral) connecting the hind-limbs with the base of the long tail. Of the two widely distributed genera, Pteromys includes the larger and Sciuro- pterus the smaller species. The two differ in certain details of dentition, and in the greater develop- ment in the former of the parachute, especially the interfemoral portion, which in the latter is almost absent. In Ptero- mys the tail is cylindrical and comparatively thin, while in Sciuropterus it is broad, flat and laterally expanded, so as to com- pensate for the absence of the interfemoral mem- brane by acting as a supplementary para- chute.

In general appearance flying-squirrels resemble ordinary squirrels, although they are even more beautifully col- oured. Their habits, food, &c, are also very similar to those of the true squirrels, except that they are more nocturnal, and are therefore less

often seen. The Indian flying-squirrel {P. oral) leaps with its parachute extended from the higher branches of a tree, and descends first directly and then more and more obliquely, until the flight, gradually becoming slower, assumes a horizontal direction, and finally terminates in an ascent to the branch or trunk of the tree to which it was directed. The presence of these rodents at night is made known by their screaming cries. Sciuro- pterus is represented by 5. vclucella in

eastern Europe and northern Asia, and by a second species in North America, but the other species of this genus and all those of Pteromys are Indo- Malayan. A third genus, Eupetaurus, typified by a very large, long-haired, dark-grey species from the mountains to the north- west of Kashmir (Eu. cinereus), differs from all other members of the squirrel-family by its tall-crowned molar teeth. It has a total length of 37 in., of which 22 are taken up by the tail.

In Africa the name of flying-squirrel is applied to the members of a very different family of rodents, the Anomaluridae, which are provided with a parachute. Since, however, this parachute is absent in some members of the family, the most distinctive character is the presence of a double row of spiny scales on the under surface of the tail, which apparently aid in climbing. The flying species are also distinguished from ordinary flying- squirrels by the circumstance that the additional bone serving for the support of the fore part of the flying-membrane rises

Pigmy African Flying-Squirrel

(Idiurus zenkeri) .

from the elbow-joint instead of from the wrist. The family is represented by two flying genera, Anomalurus and Idiurus; the latter containing only one very minute species (shown in the cut) characterized by its small ears and elongated tail. Most of the species are West African. In habits these rodents appear to be very similar to the true flying-squirrels. The species without a parachute constitutes the genus Zenkerella, and looks very like an ordinary squirrel (see Rodentia).

In Australia and Papua the name flying-squirrel is applied to such marsupials as are provided with parachutes; animals which naturalists prefer to designate flying-phalangers (see Marsupialia) (R.L.*)

FLYSCH, in geology, a remarkable formation, composed mainly of sandstones, soft marls and sandy shales found extending from S.W. Switzerland eastward along the northern Alpine zone to the Vienna basin, whence it may be followed round the northern flanks of the Carpathians into the Balkan peninsula. It is represented in the Pyrenees, the Apennines, the Caucasus and extends into Asia; similar flysch-like deposits are related to the Himalayas as the European

formations are to the Alps. The Flysch is not of the same age in every place; thus in the western parts of Switzerland the oldest portions probably belong to the Eocene period, but the principal development is of Oligocene age; as it is traced eastward we find in the east Alps that it descends into the upper Cretaceous, and in the Vienna region and the Carpathians it contains intercalations which clearly indicate a lower Cretaceous horizon for the lower parts. It appears indeed that this type of formation was in progress of deposition at one point or another in the regions enumerated above from Jurassic to late Tertiary times. The absence of fossils from enormous thicknesses of Flysch makes the correlation with other formations difficult; often the only indications of organisms are the abundant markings supposed to represent Algae (Chondrites, &c), which have given rise to the term " Hieroglyphic-sandstone." The most noteworthy exceptions are perhaps the Oligocene fish-bed of Glarus, the Eocene nummu- litic beds in Calabria, and the Aptychus beds of Waidhofen. Local phases of the Flysch have received special names; it is the " Vienna " or " Carpathian " sandstone of those regions; the " macigno " (a soft sandstone with calcareous cement) of the Maritime Alps and Apennines; the " scagliose " (scaly clays) and " alberese " (limestones) of the same places are portions of this formation. The gris de Menton, the gris d'Annot of the Basses Alps, and the gris d'Embrun of Chaillot appear in Switzer- land as the gris de Taveyannaz. At several places the upper layers of the Flysch are iron-stained, as in the region of Leman and at the foot of the Dent du Midi; it is then styled the " Red-Flysch." Lenticular intercalations of gabbro, diabase, &c, occur in the Flysch in Calabria on the Pyrenees. Large exotic blocks of granite, gneiss and other crystalline rocks in coarse conglomerates are found near Vienna, near Sonthofen in Bavaria,nearLakeThun (Wild Flysch) and at other points, which have been variously regarded as indications of glaciation or of coastal conditions.

FOCA (pronounced Fawtcha), a town of Bosnia, situated at the confluence of the Drina and Cehotina rivers, and encircled by wooded mountains. Pop. (1895) 4217. The town is the head- quarters of a thriving industry in silver filigree-work and inlaid weapons, for which it was famous. With its territories enclosed by the frontiers of Montenegro and Novi Bazar, Foca, then known as Chocha, was the scene of almost incessant border warfare during the middle ages. No monuments of this period are left except the Bogomil cemeteries, and the beautiful mosques, which are the most ancient in Bosnia. The three adjoining towns of Foca, Gorazda and Ustikolina were trading-stations of the Ragusans in the 14th century, if not earlier. In the 16th century, Benedetto Ramberti, ambassador from Venice to the Porte,

described the town, in his Libri Tre delle Cose dei Turchi, as Cozza, ” a large settlement, with good houses in Turkish style, and many shops and merchants. Here dwells the governor of Herzegovina, whose authority extends over the whole of Servia. Through this place all goods must pass, both going and returning, between Ragusa and Constantinople.”

FOCHABERS, a burgh of barony and village of Elginshire, Scotland. Pop. (1901) 981. It is delightfully situated on the Spey, about 9 m. E. by S. of Elgin, the terminus of a branch of the Highland railway connecting at Orbliston Junction with the main line from Elgin to Keith. The town was rebuilt in its present situation at the end of the 18th century, when its earlier site was required for alterations in the grounds of Gordon Castle, in which the old town cross still stands. The streets all lead at right angles to the central square, where fairs and markets are held. The public buildings include a library and reading-room, the court-house and the Milne school, named after Alexander Milne, who endowed it with a legacy of £20,000. Adjoining the town, surrounded by a park containing many magnificent old trees, stands Gordon Castle, the chief seat of the duke oi Richmond and Gordon, erected in the 18th century. The anti- quary George Chalmers (1742-1825) and the composer William Marshall (1 748-1833) were natives of the burgh.

FOCSHANI (Rumanian Focsani, sometimes incorrectly written Fokshani or Fokshan), the capital of the department of Putna, Rumania; on the river Milcov, which formed the ancient frontier of the former principalities of Moldavia and Walachia. Pop. (1900) 23,783; of whom 6000 were Jews. The chief buildings are the prefecture, schools, synagogues, and many churches, including those of the Armenians and Protestants. Focshani is a commercial centre of some importance, the chief industries being oil and soap manufacture and tannery. A large wine trade is also carried on, and corn is shipped in lighters to Galatz. The annual fair is held on the 29th of April. Government explora- tions in the vicinity of this town show it to be rich in minerals, such as iron, copper, coal and petroleum. The line Focshani- Galatz is covered by a very strong line of fortifications, known as the Sereth Line. A congress between Russian and Turkish diplomatists was held near the town in 1772. In the neighbour- hood the Turks suffered a severe defeat from the-Austrians and Russians in 1789.

FOCUS (Latin for ” hearth ” or ” fireplace “), a point at which converging rays meet, toward which they are directed, or from which diverging rays are directed; in the latter case called the virtual focus

(see Microscope; Telescope; Lens). In geometry the word is used to denote certain points (see Geometry; Conic Section; and Perspective).

FOG, the name given to any distribution of solid or liquid particles in the surface layers of the atmosphere which renders surrounding objects notably indistinct or altogether invisible according to their distance. In its more intense forms it hinders and delays travellers of all kinds, by sea or land, by railway, road or river, or by the mountain path. It is sometimes so thick as to paralyse traffic altogether. According to the New English Dictionary the word ” appears to be ” a back formation from the adjective ” foggy,” a derivative of ” fog ” used with its old meaning of aftermath or coarse grass, or, in the north of Britain, of ” moss.” Such a formation would be reasonable, because wreaths of fog in the atmospheric sense are specially character- istic of meadows and marshes where fog, in the more ancient sense, grows.

Two other words, mist and haze, are also in common use with reference to the deterioration of transparency of the surface layers of the atmosphere caused by solid or liquid particles, and in ordinary literature the three words are used almost according to the fancy of the writer. It seems possible to draw a distinction between mist and haze that would be fairly well supported by usage. Mist may be defined as a cloud of water particles at the surface of land or sea, and would only occur when the air is nearly or actually saturated, that is, when there is little or no difference between the readings of the dry and wet bulbs; the word haze, on the other hand, may be reserved for the obscuration of the surface layers of the atmosphere when the air is dry.

It would not be difficult to quote instances in which even this distinction is disregarded in practice. Indeed, the telegraphic code of the British Meteorological Office uses the same figure for mist and haze, and formerly the Beaufort weather notation had no separate letter for haze (now indicated by z), though it

distinguished between /,fog, and m, mist. It is possible, however, that these practices may arise, not from confu- sion of idea, but from economy of symbols, when the meaning can be made out from a knowledge of the asso- ciated observations.

As regards the dis- tinction between mist and fog, careful con-

sideration of a number

Description

of Effects.

Name.

No.

On Land.

On Sea.

On River.

Slight Fog or Mist

Moderate Fog Thick Fog

i

Objects indistinct, but traffic by rail or road unimpeded

Traffic by rail requires additional caution

Traffic by rail or road impeded

Traffic by rail or road

impeded Traffic by rail or road

totally disorganized

-

Horizon invisible, but lights and landmarks visible at working distances Lights, passing vessels and landmarks gener- ally indistinct under a mile. Fog signals are sounded

Ships' lights and vessels invisible at \ mile or less

Objects indistinct, but navigation unimpeded

Navigation impeded, ad- ditional caution re- quired

Navigation suspended

of examples leads to the conclusion that the word ” fog ” is used to indicate not so much the origin or meteorological nature of the obscurity as its effect upon traffic and travellers whether on land or sea. It is, generally speaking, “in a fog ” that a traveller loses himself, and indeed the phrase has become proverbial in that sense. A ” fog-bell ” or ” fog- horn ” is sounded when the atmosphere is so thick that the aid of sound is required for navigation. A vessel is ” fog-logged ” or ” fog-bound ” when it is stopped or detained on account of thick atmosphere. A ” fog-signal ” is employed on railways when the ordinary signals are obliterated within working distances. A ” fog-bow ” is the accompaniment of conditions when a mountain traveller is apt to lose his way.

These words are used quite irrespective of the nature of the cloud which interferes with effective vision and necessitates the special provision; the word ” mist ” is seldom used in similar connexion. We may thus define a fog as a surface cloud suffi- ciently thick to cause hindrance to traffic. It will be a thick mist if the cloud consists of water particles, a thick haze if it consists of smoke or dust particles which would be persistent even in a dry atmosphere.

It is probable that sailors would be inclined to restrict the use of the word to the surface clouds met with in comparatively calm weather, and that the obscurity of the atmosphere when it is blowing hard and perhaps raining hard as well should be indicated by the terms ” thick weather ” or ” very thick weather ” and not by ” fog ” ; but the term ” fog ” would be quite correctly used on such occasions from the point of view of cautious navigation. If cloud, drizzling rain, or heavy rain cause such obscurity that passing ships are not visible within working distances the sound- ing of a fog-horn becomes a duty.

The number of occasions upon which fog and mist may be noted as occurring with winds of different strengths may be exemplified by the following results of thirty years for St Mary’s, Stilly Isles, where the observations have always been made by men of nautical experience.

a cloud of minute water globules, of no great vertical thickness, which disperses the sunlight by repeated reflection but is fully translucent. In dust-storms and sand-storms dark or coloured fog clouds are produced such as those which are met with in the Harmattan winds off the west coast of Africa. In large towns the fog cloud is darkened and intensified by smoke, and in some cases may be regarded as due entirely to the smoke.

The physical processes which produce fogs of water particles are

complicated and difficult to unravel. We have to account for the formation and maintenance of a cloud at the earth's surface; and the process of cloud-formation which is probably most usual in nature, namely, the cooling of air by rarefraction due to the reduction of pressure on ascent, cannot be invoked, except in the case of the fogs forming the cloud-caps of hills, which are perhaps not fairly included. We have to fall back upon the only other process hitherto recognized as causing cloudy condensation in the atmosphere, that is to say, the mixing of masses of mist air of different temperatures. The mixing is brought about by the slow motion of air masses, and this slow motion is probably essential to the phenomenon.

Over the sea fog is most frequently due to the cooling of a surface layer of warm air by the underlying cold water. The amount of motion of the air must be sufficient to prevent the

Table I. — Air travelling from Northern Africa to Northern Russia, round by the Azores.

Successive Temperatures of sea „ „ „ air ,, States of the atmosphere .

68°

68°

clear

68°

70°

clear

67°

67°

clear

59° 60°

shower

54°F. 56°F. mist

Table II. — Air travelling from N.W. Africa to Scotland.

Successive Temperatures of sea. ,, ,, ,, air .

„ State of atmosphere

67° 66° fair

63°

64°

shower

54° F.

53° F.

mist with shower

Wind Force.

O&I

2

3

4

5

6

7

8-12

All Winds.

Number of occasions of fog

per 1000 observations .

• Number of occasions of mist

per 1000 observations .

8 5

7 6

9 11

14 22

6 20

3 12

6

2

47 84

The use of the word ” fog ” in the connexion ” high fog,” to describe the almost total darkness in the daytime occasionally noted in London and other large cities due to the persistent opaque cloud in the upper air without serious obscuration of the surface layers, is convenient but incorrect.

Regarding ” fog ” as a word used to indicate the state of the atmosphere as regards transparency considered with reference to its effect upon traffic, a scale of fog intensity has been introduced for use on land or at sea, whereby the intensity of obscurity is indicated by the numbers 1 to 5 in the table following. At sea or in the country a fog, as a rule, is white and consists of

condensation taking place at the sea surface without showing itself as a cloud. In a research on the Life History of Surface Air Currents the changes incidental to the movement of the air over the north Atlantic Ocean were traced with great care, and the above examples (Tables I, II) taken from page 72 of the work referred to are typical of the forma- tion of sea fog by the cooling of a relatively warm current passing over cold water.

In conformity with this suggestion we find that fog is most liable to occur over the open ocean in those regions where, as off the Newfound- land banks, cold-water currents underlie warm air, and that it is most frequent at the season of the year when the air temperature is increasing faster than the water temperature. But it is difficult to bring this hypothesis always to bear upon actual practice, because the fog is representative of a tempera- ture difference which has ceased to exist. One cannot therefore observe under ordinary circumstances both the temperature difference and the fog. Doubtless one requires not only the initial temperature difference but also

the slow drift of air which favours cooling of the lower layers without too much mixing and consequently a layer of fog close to the surface. Such a fog, the characteristic sea fog, may be called a cold surface fog. From

the conditions of its formation it is likely to be less dense at the mast-head than it is on deck.

One would expect that a cold-air current passing over a warm sea surface would give rise to an ascending current of warmed air and hence cause cumulus cloud and possibly thunder showers rather than surface fog, but one cannot resist the conclusion that sea fog is sometimes formed by slow transference of cold air over relatively warm water, giving rise to what may be called a " steaming-pot " fog. In such a case the actual surface layer in contact with the warm water would be clear, and the fog would be thicker aloft where the mixing of cold air and water vapour is more complete. Such fogs are, however, probably rare in comparison with the cold-water fogs. If the existence of a cold current over warm water were a sufficient cause of fog, as a current of warm air over cold water appears to be, the geographical distribution of notable fog would be much more widespread than it actually is, and the seasonal distribution of fog would also be other than it is.

The formation of fog over land seems to be an even more complicated process than over the sea. Certainly in some cases mistiness amounting to fog arises from the replacement of cold surface air which has chilled the earth and the objects thereon by a warm current. But this process can hardly give rise to detached masses or banks of fog. The ordinary land or valley fog of the autumn evening or winter morning is due to the combination of three causes, first the cooling of the surface layer of air at or after sunset by the radiation of the earth, or more particularly of blades of grass, secondly the slow downward flow (in the absence of wind) of the air thus cooled towards lower levels following roughly the course of the natural water drainage of the land, and thirdly the supply of moisture by evaporation from warm moist soil or from the relatively warm water surface of river or lake. In this way steaming-pot fog gradually forms and is carried downward by the natural though slow descent of the cooled air. It thus forms in wreaths and banks in the lowest parts, until perhaps the whole valley becomes filled v/ith a cloud of mist or fog. A case of this kind in the Lake District is minutely described by J. B. Cohen {Q.J. Roy. Met. Soc. vol. 30, p. 211,

1904).

It will be noticed that upon this hypothesis the circumstances favourable for fog formation are (1) a site near the bottom level of the drainage area, (2) cold surface air and no wind, (3) an even- ing or night of vigorous radiation, (4) warm soil, and (5) abundant moisture in the surface-soil. These conditions define with reasonable accuracy the circumstances in which fog is actually observed.

The persistence of these fog wreaths is always remarkable when one considers that the particles of a fog cloud, however small they may be, must be continually sinking through the air which holds them, and that unless some upward motion of the air keeps at least a balance against this downward fall, the particles of the cloud must reach the earth or water and to that extent the cloud must disappear. In sheltered valleys it is easy to suppose that the constant downward drainage of fresh and colder fog-laden material at the surface supplies to the layers dis- placed from the bottom the necessary upward motion, and the result of the gradual falling of drops is only that the surface cloud gets thicker; but there are occasions when the extent and persistence of land fog seems too great to be accounted for by persistent radiation cooling. For example, in the week before Christmas of 1904 the whole of England south of the Humber was covered with fog for several days. It is of course possible that so much fog-laden air was poured down from the sides of mountains and hills that did project above the surface of the fog, as to keep the lower reaches supplied for the whole time, but without more particulars such a statement seems almost incred- ible. Moreover, the drifting of fog banks over the sea seems capricious and unrelated to any known circumstances of fog- formation, so that one is tempted to invoke the aid of electrifica- tion of the particles or some other abnormal condition to account for the persistence of fog. The observations at Kew observatory show that the electrical potential is abnormally high during fog,

but whether that is the cause or the result of the presence of the water particles, we are not yet in a position to say. It must be remembered that a fog cloud ought to be regarded as being, generally speaking, in process of formation by mixing. Observa- tions upon clouds formed experimentally in globes tend to show that if a mass of fog-bearing air could be enclosed and kept still for only a short while the fog would settle and leave the air clear. The apparently capricious behaviour of fog banks may be due to the fact that mixing is still going on in the persistent ones, but is completed in the disappearing ones.

One remarkable characteristic of a persistent fog is the coldness of the foggy air at the surface in spite of the heat of the sun's rays falling upon

the upper surface of the fog. A remarkable example may be quoted from the case of London, which was under fog all day on 28th January 1909. The maximum temperature only reached 3 1° F., whereas at Warlingham in Surrey from which the fog lifted it was as high as 46 F.

A priori we might suppose that the formation of fog would arrest cooling by radiation, and that fog would thus act as a protection of plants against frost. The condensation of water evaporated from wet ground, which affords the material for making fog, does apparently act as a protection, and heavy watering is sometimes used to protect plants from frost, but the same cannot be said of fog itself — cooling appears to go on in spite of the forma- tion of fog.

A third process of fog-formation, namely, the descent of a cloud from above in the form of light drizzling rain, hardly calls for remark. In so far as it is subject to rules, they are the rules of clouds and rain and are therefore independent of surface conditions.

These various causes of fog-formation maybe considered with advantage in relation to the geographical distribution of fog. Statistics on this subject are not very satisfactory on account of the uncertainty of the distinction between fog and mist, but a good deal may be learned from the distribution of fog over the north Altantic Ocean and its various coasts as shown in the Monthly Meteorological Charts of the north Atlantic issued by the Meteorological Office, and the Pilot charts of the North Atlantic of the United States Hydrographic Office. Coast fog, which is probably of the same nature as land fog, is most frequent in the winter months, whereas sea fog and ocean fog is most extensive and frequent in the spring and summer. By June the fog area has extended from the Great Banks over the ocean to the British Isles, in July it is most intense, and by August it has notably diminished, while in November, which is proverbially a foggy month on land, there is hardly any fog shown over the ocean.

The various meteorological aspects of fog and its incidence in London were the subject of reports to the Meteorological Council by Captain A. Carpenter and Mr R. G. K. Lempfert, based upon special observations made in the winters of 1901-1902 and 1902- 1903 in order to examine the possibility of more precise forecasts of fog.

The study of the properties and behaviour of fog is especially important for large towns in consequence of the economic and hygienic results which follow the incidence of dense fogs. The fogs of London in particular have long been a subject of inquiry. It is difficult to get trustworthy statistics on the subject in con- sequence of the vagueness of the practice as regards the classifica- tion of fog. For large towns there is great advantage in using a

fog scale such as that given above, in which one deals only with the practical range of vision irrespective of the meteorological cause.

Accepting the classification which distinguishes between fog and haze or mist, but not between the two latter terms, as equivalent to specifying fog when the thickness amounts to the figure 2 or more on the fog scale, we are enabled to compare the frequency of fog in London by the comparison of the results at the London observing stations. The comparison was made by Mr Brodie in a paper read before the Royal Meteorological Society {Quarterly Journal, vol. 31, p. 15), and it appears therefrom that in recent years there has been a notable diminution of fog

frequency, as indicated in the following table of the total number of days of fog in the years from 187 1 : — –

1871.

1872.

1873-

1874-

1875-

1876.

1877-

1878.

1879.

1880.

1881.

1882.

1883.

1884.

1885.

1886.

1887.

1888.

1889.

42

35

75

53

49

40

46

63

69

- *74*

59

69

6!

53

69

86

83

62

75

1890.

1891.

1892.

1893-

1894.

1895-

1896.

1897.

1898.

1899.

1900.

1901.

1902.

1903.

1904.

1905-

1906.

1907.

1908.

65

69

68

31

51

48

43

48

47

56

13

45

42

26

44

19

16

37

19

But from any statistics of the frequency occurrence of fog it must not be understood that the atmosphere of London is approaching that of the surrounding districts as regards trans- parency. Judged by the autographic records it is still almost opaque to sunshine strong enough to burn the card of the recorder during the winter months.

The bibliography of fog is very extensive. The titles referring to fog, mist and haze in the Bibliography of Meteorology (part ii.) of the U. S. Signal Office, published in 1889, number 306. Among more recent authors on the subject, besides those referred to in the text, may be mentioned: — Koppen, " Bodennebel," Met.Zeit. (1885); Trabert, Met. Zeit. (1901), p. 522; Elias in Ergebnisse des a'eronautischen Observatoriums bei Berlin, ii. (Berlin, 1904) ; Scott, Q.J.R. Met. Soc. xix. p. 229; A. G. McAdie, " Fog Studies," Amer. Inv. ix. (Washington, D.C., 1902), p. 209; Buchan, " Fogs on the Coasts of Scotland," Journ. Scot. Met. Soc. xii. p. 3. (W. N. S.)

FOGAZZARO, ANTONIO (1842-), Italian novelist and poet, was born at Vicenza in 1842. He was a pupil of the Abate Zanella, one of the best of the modern Italian poets, whose tender, thoughtful and deeply religious

spirit continued to animate his literary productions. He began his literary career with Miranda, a poetical romance (1874), followed in 1876 by Valsolda, which, republished in 1886 with considerable addi- tions, constitutes perhaps his principal claim as a poet, which is not inconsiderable. Tc the classic grandeur of Carducci and D'Annunzio's impetuous torrent of melody Fogazzaro opposes a Wordsworthian simplicity and pathos, contributing to modern Italian literature wholesome elements of which it would other- wise be nearly destitute. His novels, Malombra (1882), Daniele Cortis (1887), Misterio del Poela (1888), obtained considerable literary success upon their first publication, but did not gain universal popularity until they were discovered and taken up by French critics in 1896. The demand then became prodigious, and a new work, Piccolo Mondo antico (1896), which critics far from friendly to Fogazzaro's religious and philosophical ideas pronounced the best Italian novel since I Promessi Sposi, went through numerous editions. Even greater sensation was caused by his novel II Santo {The Saint, 1906), on account of its being treated as unorthodox by the Vatican; and Fogazzaro's sympathy with the Liberal Catholic movement — his own Catholicism being well known — made this novel a centre of discussion in the Roman Catholic world.

See the biography by Molmenti (1900).

FOGELBERG, BENEDICT (or Bengt) ERLAND (1786-1854), Swedish sculptor, was born at Gothenburg on the 8th of August 1786. His father, a copper-founder, encouraging an early- exhibited taste for design, sent him in 1801 to Stockholm, where he studied at the school of art. There he came much under the influence of the sculptor Sergell, who communicated to him his own enthusiasm for antique art and natural grace. Fogelberg worked hard at Stockholm for many years, although his instinct for severe beauty rebelled against the somewhat rococo quality of the art then prevalent in the city. In 1818 the grant of a government pension enabled him to travel. He studied from one to two years in Paris, first under Pierre Guerin, and after- wards under the sculptor Bosio, for the technical practice of sculpture. In 1820 Fogelberg realized a dream of his life in visiting Rome, where the greater part of his remaining years were spent in the assiduous practice of his art, and the careful study and analysis of the works of the past. Visiting his native country by royal command in 1854, he was received with great enthusiasm, but nothing could compensate him for the absence of those • remains of antiquity and surroundings of free natural beauty to which he had been so long accustomed Returning

to Italy, he died suddenly of apoplexy at Trieste on the 22nd of December 1854. The subjects of Fogelberg's earlier works

are mostly taken from classic myth- ology. Of these, "Cupid and Psyche," " Venus entering the B a t h," " A

Bather" (1838), " Apollo Citharede," " Venus and Cupid " (1839) and " Psyche " (1854) may be mentioned. In his representations of Scandinavian mythology Fogelberg showed, perhaps for the first time, that he had powers above those of intelligent assimilation and imitation. His "Odin"(i83i),"Thor" (1842), and"Balder"(i8 4 2), though in- fluenced by Greek art, display considerable power of independent imagination. His portraits and historical figures, as those of Gustavus Adolphus (1 849) , of Charles XII. (1 8 5 1) , of Charles XIII. (1852), and of Birger Jarl, the founder of Stockholm (1853), are faithful and dignified works. See Casimir Leconte, L'CEuvre de Fogelberg (Paris, 1856). FOGGIA, a town and episcopal see (since 1855) of Apulia, Italy, the capital of the province of Foggia, situated 243 ft. above sea- level, in the centre of the great Apulian plain, 201 m. by rail S.E. of Ancona and 123 m. N.E. by E. of Naples. Pop. (1901) town, 49,031; commune, 53,134. The name is probably derived from the pits or cellars (foveae) in which the inhabitants store their grain. The town is the medieval successor of the ancient Arpi, 3 m. to the N. ; the Normans, after conquering the district from the Eastern empire, gave it its first importance. The date of the erection of the cathedral is probably about n 79; it retains some traces of Norman architecture, and the facade has a fine figured cornice by Bartolommeo da Foggia; the crypt has capitals of the nth (?) century. The whole church was, however, much altered after the earthquake of 173 1. A gateway of the palace of the emperor Frederick II. (1223, by Bartolommeo da Foggia) is also preserved. Here died his third wife, Isabella, daughter of King John of England. Charles of Anjou died here in 1 284. After his son's death, it was a prey to internal dissensions and finally came under Alphonso I. of Aragon, who converted the pastures of the Apulian plain into a royal domain in 1445, and made Foggia the place at which the tax on the sheep was to be paid and the wool to be sold. The other buildings of the town are modern. Foggia is a commercial centre of some importance for the produce of the surrounding country, and is also a con- siderable railway centre, being situated on the main line from Bologna to Brindisi, at the point where this is joined by the line from Benevento and Caserta. There are also branches to Rocchetta S. Antonio (and thence to either Avellino, Potenza, or Gioia del Colle), to Manfredonia, and to Lucera.

FOHN (Ger., probably derived through Romansch favongn, favoign, from Lat. favbnius), a warm dry wind blowing down the valleys of the Alps from high central regions, most frequently in winter. The Fohn wind often blows with great violence. It is caused by the indraft of air from the elevated region to areas of low barometric pressure in the neighbourhood, and the warmth and dryness are due to dynamical compression of the air as it

descends to lower levels. Similar local winds occur in many parts of the world, as Greenland, and on the slopes of the Rocky Mountains. In the southern Alpine valleys the Fohn wind is often called sirocco, but its nature and cause are different from the true sirocco. The belief that the warm dry wind comes from the Sahara dies hard; and still finds expression in some textbooks.

For a full account of these winds see Hann, Lehrbuch der Meteoro- logie, p. 594.

FOHR, a German island in the North Sea, belonging to the province of Schleswig-Holstein, and situated off its coast. Pop. 4500. It comprises an area of 32 sq. m., and is reached by a regular steamboat service from Husum and Dagebull on the mainland to Wyk, the principal bathing resort on the E. coast of the island. The chief attraction of Wyk is the SandwaJQ, a

promenade which is shaded by trees and skirts the beach. Fbhr, the most fertile of the North Frisian islands, is principally marshland, and comparatively well wooded. There are numerous pleasantly-situated villages and hamlets scattered over it, of which the most frequented are Boldixum, Nieblum and Al- kersum. The inhabitants are mainly engaged in the fishing industry, and are known as excellent sailors.

FOIL. i. (Through O. Fr. from Lat. folium, a leaf, modern Fr. feuille) , a leaf, and so used in heraldry and in plant names, such as the " trefoil " clover; and hence applied to anything re- sembling a leaf. In architecture, the word appears for the small leaf-like spaces formed by the cusps of tracery in windows or panels, and known, according to the number of such spaces, as " quatrefoil," " cinquefoil," &c. The word is also found in " counterfoil," a leaf of a receipt or cheque book, containing memoranda or a duplicate of the receipt or draft, kept by the receiver or drawer as a " counter " or check. " Foil " is particu- larly used of thin plates of metal, resembling a leaf, not in shape as much as in thinness. In thickness foil comes between " leaf " and " sheet " metal. In jewelry, a foil of silvered sheet copper, sometimes known as Dutch foil, is used as a backing for paste gems, or stones of inferior lustre or colour. This is coated with a mixture of isinglass and translucent colour, varying with the stones to be backed, or, if only brilliancy is required, left un- coloured, but highly polished. From this use of " foil," the word comes to mean, in a figurative sense, something which by contrast, or by its own brightness, serves to heighten the attrac-

tive qualities of something else placed in juxtaposition. The commonest " foil " is that generally known as " tinfoil." The ordinary commercial " tinfoil " usually consists chiefly of lead, and is used for the wrapping of chocolate or other sweetmeats, tobacco or cigarettes. A Japanese variegated foil gives the effect of " damaskeening." A large number of thin plates of various metals, gold, silver, copper, together with alloys of different metals are soldered together in a particular order, a pattern is hammered into the soldered edges, and the whole is hammered or rolled into a single thin plate, the pattern then appearing in the order in which the various metals were placed.

2. (From an O. Fr. fuler or foler, modern fouler, to tread or trample, to " full " cloth, Lat. fullo, a fuller), an old hunting term, used of the running back of an animal over its own tracks, to confuse the scent and baffle the hounds. It is also used in wrestling, of a " throw." Thus comes the common use of the word, in a figurative sense, with reference to both these meanings, of baffling or defeating an adversary, or of parrying an attack.

3. As the name of the weapon used in fencing (see Foil- Fencing) the word is of doubtful origin. One suggestion, based on a supposed similar use of Yr.fleuret, literally a " little flower," for the weapon, is that foil means a leaf, and must be referred in origin to Lat. folium. A second suggestion is that it means " blunted," and is the same as (2). A third is that it is an adaptation of an expression " at foils," i.e. " parrying." Of these suggestions, according to the New English Dictionary, the first has nothing to support it, the second is not supported by any evidence that in sense (2) the word ever meant to blunt. The third has some support. Finally a suggestion is made that the word is an alteration of an old word " foin," meaning a thrust with a pointed weapon. The origin of this word is probably an O. Fr. foisne, from the Lat. fuscina, a three-pronged fork.

FOIL-FENCING, the art of attack and defence with the fencing- foil. The word is used in several spellings (foyle, file, &c.) by the English writers of the last half of the 16th century, but less in the sense of a weapon of defence than merely as an imitation of a real weapon. Blunt swords for practice in fencing have been used in all ages. For the most part these were of wood and flat in general form, but when, towards the close of the 17th century, all cutting action with the small-sword was discarded (see Fencing), foil-blades were usually made of steel, and either round, three-cornered or four-cornered in form, with a button covering the point. The foil is called in French fleuret, and in Italian fioretto (literally " bud ") from this button. The classic small-

sword play of the 17th and 18th centuries is represented at the present time by fencing with the epie de combat (fighting-rapier), which is merely the

modern duelling-sword furnished with a button (see Epee-de-Combat), and by foil-fencing. Foil-fencing is a conventional art, its characteristic limitation lying in the rule that no hits except those on the body shall be considered good, and not even those unless they be given in strict accordance with' certain standard precepts. In epee-fencing on the contrary, a touch on any part of the person, however given, is valid. Foil-fencing is considered the basis, so far as practice is con- cerned, of all sword-play, whether with foil, epee or sabre.

There are two recognized schools of foil-fencing, the French and the Italian. The French method, which is now generally adopted everywhere except in Italy, is described in this article, reference being made to the important differences between the two schools.

The Foil. — The foil consists of the " blade " and the " handle." The blade, which is of steel and has a quadrangular section, consists of two parts: the blade proper, extending from the guard 1 to the button, and the "tongue," which runs through the handle and is joined to the pommel. The blade proper is divided into the " forte," or thicker half (next the handle), and the " foible " or thinner half. Some authorities divide the blade proper into three parts, the " forte," " middle " and " foible." The handle is comprised of the " guard," the " grip " and the " pommel." The guard is a light piece of metal shaped like the figure 8 (Fr. lunettes, spectacles) and backed with a piece of stiff leather of the same shape. The grip, which is grasped by the hand, is a hollow piece of wood, usually wound with twine, through which the tongue of the blade passes. The pommel is a piece of metal, usually pear-shaped, to which the end of the tongue is joined and which forms the extremity of the handle. The blade from guard to button is' about 33 in. long (No. 5), though a somewhat shorter' and lighter blade is generally used by ladies. The handle is about 8 in. long and slightly curved downwards.

The genuine Italian foil differs from the French in having the blade a trifle longer and more whippy, and in the form of the handle, which consists of a thin, solid, bell-shaped guard from 4 to 5 in. in diameter, a straight grip and a light metal bar joining the grip with the guard, beyond the edge of which it extends slightly on each side. Of late years many Italian masters use French blades and even discard the cross-bar, retaining, however, the bell-guard.

In holding the foil, the thumb is placed on the top or convex surface of the grip (the sides of which are a trifle narrower than the top and bottom), while the palm and fingers grasp the other three sides. This is the position of " supination/' or thumb-up. " Pronation " is the reverse position, with the knuckles up. The French lay stress upon holding the foil lightly, the

necessary' pressure being exerted mostly by the thumb and forefinger, the other fingers being used more to guide the direction of the exe- cuted movements. This is in order to give free scope to the doigte (fingering), or the faculty of directing the point of the foil by the action of the fingers alone, and includes the possibility of changing the position of the hand on the grip. Thus, in parry- ing, the end of the thumb is placed within half an inch, or even less, of the guard, while in making a lunge, the foil is held as near the pommel as possible, in order to gain additional length. It will be seen that doigte is impossible with the Italian foil, in holding which the forefinger is firmly interlaced with the cross- bar, preventing any movement of the hand. The lightness of grasp inculcated by the French is illustrated by the rule of the celebrated master Lafaugere: " Hold your sword as if you had a little bird in your hand, firmly enough to prevent fts escape, yet not so firmly as to crush it." This lightness has for a consequence that a disarmament is not considered of any value in the French school.

To Come on Guard. — The position of " on guard " is that in which the fencer is best prepared both for attack and defence. It is taken from the position of " attention "; the feet together and at right angles with each other, head and body erect, facing forward in the same direction as the right foot, left arm and hand hanging in touch with the body, and the right arm and foil

forming a straight line so that the button is about i yd. in front of the feet and 4 in. from the floor. From this position the movements to come " on guard " are seven in number: —

1. Raise the arm and foil and extend them towards the adversary (or master) in a straight line, the hand being opposite the eye.

2. Drop the arm and foil again until the point is about 4 in. from the floor.

3. Swing the button round so that it shall point horizontally backwards, and hold the hilt against the left thigh, the open fingers of the left hand being held, knuckles down, against the guard and along the blade.

4. Carry the foil, without altering the position of the hands, above the head until the arms are fully extended, the foil being kept horizontal and close to the body as it is lifted.

5. Let the left arm fall back behind the head to a curved position, the hand being opposite the top of the head ; at the same time bring the right hand

down opposite the right breast and about 8 in. from it; keeping the elbow well in and the point of the foil directed towards the opponent's eye.

6. Bend the legs by separating them at the knees but without moving the feet.

7. Shift the weight of the body on to the left leg and advance the right foot a short distance (from 14 to 18 in., according to the height of the fencer).

In the Italian school the fencer stands on guard with the right arm fully extended, the body more effaced, i.e. the left shoulder thrown farther back, and the feet somewhat farther apart. At the present time, however, many of the best Italian fencers have adopted the guard with crooked sword-arm, owing to their abandonment of the old long-foil blade.

The Recover (at the close of the lesson or assault). — To recover " in advance ": extend the right arm at right angles with the body, drop the left arm and straighten the legs by drawing the rear foot up to the one in advance. To recover " to the rear ": extend the right arm and drop the left as before, and- straighten the legs by drawing the forward foot back to that in the rear.

The Salute always follows the recover, the two really forming one manoeuvre. Having recovered, carry the right hand to a position just in front of the throat, knuckles out, foil vertical with point upwards; then lower and extend the arm with nails up until the point is 4 in. from the floor and slightly to the right.

To Advance. — Being on guard, take a short step forward with the right foot and let the left foot follow immediately the same distance, the position of the body not being changed. However the step, or series of steps, is made, the right foot should always move first.

To Retreat. — This is the reverse of the advance, the left foot always moving first.

The Calls (deux appels).— Being on guard, tap the floor twice with the right foot without altering the position of any other part of the person. The object of the calls is to test the equilibrium of the body, and they are usually executed as a pre- liminary to the recover.

The Lunge is the chief means of attack. It is immediately preceded by the movement of " extension," in fact the two really form one combined movement. Extension is executed by quickly extending the right arm, so that point, hand and shoulder shall have the same elevation; no other part of the person is moved. The " lunge " is then carried out by straightening

the left leg and throwing forward the right foot, so that it shall be planted as far forward as possible without losing the equili- brium or preventing a quick recovery to the position of guard. The left foot remains firmly in its position, the right shoulder is advanced, and the left arm is thrown down and back (with hand open and thumb up), to balance the body. The recovery to the position of guard is accomplished by smartly throwing the body back by the exertion of the right leg, until its weight rests again on the left leg, the right foot and arms resuming their on-guard positions. The point upon which the French school lays most stress is, that the movement of extension shall, if only by a fraction of a second, actually precede the advance of the right foot. The object of this is to ensure the accuracy of the lunge, i.e. the direction of the point.

The Gain. — This consists in bringing up the left foot towards the right (the balance being shifted), keeping the knees bent. In

this manner a step is gained and an exceptionally long lunge can be made without the knowledge of the adversary. It is a common stratagem of fencers whose reach is short.

Defence. — For the purpose of nomenclature the space on the fencer's jacket within which hits count is divided into quarters, the two upper ones being called the " high lines," and the two lower ones the " low lines." Thus a thrust directed at the upper part of the breast is called an attack in the high lines. In like manner the parries are named from the different quarters they are designed to protect. There are four traditional parries executed with the hand in supination, and four others, practically identical in execution, made with the hand held in pronation. Thus the p'arries defending the upper right-hand quarter of the jacket are " sixte " (sixth; with the hand in supination) and " tierce " (third; hand in pronation). Those defending the upper left-hand quarter are " quarte " (fourth; in supination) and " quinte " (fifth; in pronation). Those defending the lower right-hand quarter are " octave " (eighth; in supination) and " seconde " (second; in pronation). Those defending the lower left-hand quarter are " septime " (seventh; in supination), more generally called " demicircle," or " half-circle " ; and " prime " (first; in pronation).

The Parries. — The tendency of the French school has always been towards simplicity, especially of defence, and at the present day the parries made with the knuckles up (pronation), although recognized and taught, are seldom if ever used against a strong adversary in foil-fencing, owing principally to the time lost in turning the hand. The theory of parrying is to turn aside the opponent's foil with the least possible expenditure of time and exertion, using the arm as little as possible while letting the hand and wrist do the work, and opposing the " forte " of the foil to the " foible " of

*the adversary's. The foil is kept pointed as directly as possible towards the adversary, and the parries are made rather with the corners than the sides of the blade. *The slightest movement that will turn aside the opponent's blade is the most perfect parry. There are two kinds of parries, " simple," in which the attack is warded off by a single movement, and " counter," in which a narrow circle is described by the point of the foil round that of the opponent, which is thus enveloped and thrown aside. There are also complex parries, composed of combinations of two or more parries, which are used to meet complicated attacks, but they are all resolvable into simple parries. In parrying, the arm is bent about at right angles.*

Simple Parries. — The origin of the numerical nomenclature of the parries is a matter of dispute, but it is generally believed that they received their names from the positions assumed in the pro- cess of drawing the sword and falling on guard. Thus the position of the hand and blade, the moment it is drawn from the scabbard on the left side, is practically that of the first, or " prime," parry. To go from " prime " to " seconde " it is only necessary to drop the hand and carry it across the body to the left side; thence to " tierce " is only a matter of raising the point of the sword, &c.

Parry of Prime (to ward off attacks on the — usually lower — left-hand side of the body). Hold the hand, knuckles up, opposite the left eye and the point directed towards the opponent's knee. This parry is now regarded more as an elegant evolution than a sound means of defence, and is little employed.

Parry of Seconde (against thrusts at the lower right-hand side). This is executed by a quick, not too wide movement of the hand downwards and slightly to the right, knuckles up.

Parry of Tierce (against thrusts at the upper right-hand side). A quick, dry beat on the adversary's " foible " is given, forcing it to the right, the hand, in pronation, being held opposite the middle of the right breast. This parry has been practically discarded in favour of " sixte."

Parry of Quarte (against thrusts at the upper left-hand side). This parry, perhaps the most used of all, is executed by forcing the adversary's blade to the left by a dry beat, the hand being in supination, opposite the left breast.

Parry of Quinte (against thrusts at the left-hand side, like " quarte "). This is practically a low " quarte," and is little used.

Parry of Sixte (against thrusts at the upper right-hand side) . This parry is, together with " quarte," the most important of all. It is executed with the hand held in supination opposite the right breast, a quick, narrow movement throwing the adversary's blade to the right.

Parry of Septime or Half-Circle (against thrusts at the lower left-hand side) is executed by describing with the point of the foil a small semicircle downward and towards the left, the hand moving a few inches in the same direction, but kept thumb up.

Parry of Octave (against thrusts at the lower right-hand side) is executed by describing with the point of the foil a small semi- circle downward and towards the right, the hand moving a few inches in the same direction, but kept thumb up.

Counter Parries (Fr. contre). — Although the simple parries are theoretically sufficient for defence, they are so easily deceived by feints that they are supplemented by counter parries, in which the blade describes narrow circles, following that of the adversary and meeting and • turning it aside ; thus the point describes a complete circle while the hand remains practically stationary. Each simple parry has its counter, made with the hand in the same position and on the same side as in the simple parry. The two most important are the " counter of quarte " and the " counter of sixte," while the counters of " septime " and " octave " are less used, and the other four at the present time practically never.

Counter of Quarte. — Being on guard in quarte (with your adversary's blade on the left of yours) , if he drops his point under and thrusts in sixte, in other words at your right breast, describe a narrow circle with your point round his blade, downward to the right and then up over to the left, bringing hand and foil back to their previous positions and catching and turning aside his blade on the way. The " Counter of Sixte " is executed in a similar manner, but the circle is described in the opposite direction, throwing off the adverse blade to the right. The " Counters of Septime and Octave " are similar to the other two but are executed in the low lines.

Complex or Combined Parries are such as are composed of two or more parries executed in immediate succession, and are made in answer to feint attacks by the adversary (see below); e.g. being on guard in quarte, should the adversary drop his point under and feint at the right breast but deflect the point again and really thrust on the left, it is evident that the simple parry of sixte would cover the right breast but would leave the real point of attack, the left, entirely uncovered. The sixte parry is therefore followed, as a continuation of the movement, by the parry of quarte, or a counter parry. The complex parries are numerous and depend upon the attack to be

met.

Engagement is the junction of the blades, the different engage- ments being named from the parries. Thus, if both fencers are in the position of quarte, they are said to be engaged in quarte. To engage in another line (Change of Engagement) e.g. from quarte to sixte, the point is lowered and passed under the adversary's blade, which is pressed slightly outward, so as to be well covered (called "opposition"). "Double Engagement" is composed of two engagements executed rapidly in succession in the high lines, the last with opposition.

Attack. — The attack in fencing comprises all movements the object of which is to place the point of the foil upon the adversary's breast, body, sides or back, between collar and belt. The space upon which hits count is called the " target " and differs accord- ing to the rules prevailing in the several countries, but is usually as above stated. In Great Britain no hits above the collar-bones count, while in America the target is only the left breast between the median line and a line running from the armpit to the belt. The reason for this limitation is to encourage accuracy.

Attacks are either "primary" or "secondary." Primary Attacks are those initiated by a fencer before his adversary has made any offensive movement, and are divided into " Simple," " Feint " and " Force " attacks.

Simple Attacks, the characteristic of which is pace, are those made with one simple movement only and are four in number, viz. the "Straight Lunge," the "Disengagement," the

" Counter-disengagement " and the " Cut-over." The Straight- Lunge (coup droit), used when the adversary is not properly covered when on guard, is described above under " Lunge." The Disengagement is made by dropping the point of the foil under the opponent's blade and executing a straight lunge on the other side. It is often used to take an opponent unawares or when he presses unduly hard on your blade. The Counter- disengagement is used when the adversary moves his blade, i.e. changes the line of engagement, upon which you execute a narrow circle, avoiding his blade, and thrust in your original line. The Cut-over (coupe) is a disengagement executed by passing the point of the foil over that of the adversary and lunging in the opposite line. The preliminary movement of raising the point is made by the action of the hand only, the arm not being drawn back.

Feint Attacks, deceptive in character, are those which are pre- ceded by one or more feints, or false thrusts made to lure the adversary into thinking them real ones. A feint is a simple extension, often with a slight movement of the body, threatening the adversary in a certain line, for the purpose of

inducing him to parry on that side and thus leave the other open for the real thrust. At the same time any movement of the blade or any part of the body tending to deceive the adversary in regard to the nature of the attack about to follow, must also be considered a species of feint. The principal feint attacks are the " One-Two," the " One-Two-Three " and the " Double."

The " One-Two " is a feint in one line, followed (as the adversary parries) by a thrust in the original line of engagement. Thus, being engaged in quarte, you drop your point under the adversary's blade and extend your arm as if to thrust at his left breast, but instead of doing this, the instant he parries you move your point back again and lunge in quarte, i.e. on the side on which you were originally engaged. In feinting it is necessary that the extension of the arm and blade be so complete as really to compel the adversary to believe it a part of a real thrust in that line.

The " One-Two-Three " consists of two feints, one at each side, followed by a thrust in the line opposite to that of the original engagement. Thrusts preceded by three feints are also sometimes used. It is evident that the above attacks are useless if the adversary parries by a counter (circular parry) , which must be met by a " Double." This is executed by feinting and, upon perceiving that the adversary opposes with a circular parry, by following the circle described by his point with a similar circle, deceiving (i.e. avoiding contact with) his blade and thrusting home.

The " Double," which is a favourite manoeuvre in fencing, is a combination of a disengagement and a counter-disengagement.

Force- A Hacks, the object of which is to disconcert the opponent by assaulting his blade, are various in character, the principal ones being the " Beat," the " Press," the " Glide " and the " Bind." The " Beat " is a quick, sharp blow of the forte of the foil upon the foible of the adversary's, for the purpose of opening a way for a straight lunge which follows instantly. The blow is made with the hand only. A " false beat " is a lighter blow made for the purpose of drawing out or disconcerting the opponent, and is often followed by a disengagement. The " Press " is similar in character to the beat, but, instead of striking the adverse blade, a sudden pressure is brought to bear upon it, sufficiently heavy to force it aside and allow one's own blade to be thrust home. A " false press " may be used to entice the adversary into a too heavy responsive pressure, which may then be taken advantage of by a disengagement. The " Traverse " (Fr. froissi, Ital. striscio) is a prolonged press carried sharply down the adverse blade towards the handle. The " Glide " (" Graze," Fr. coult) is a stealthy sliding of one's blade down that of the adversary, without his notice, until a straight thrust can be made inside his guard. It is also used as a feint before

a disengage. The " Bind " (liement) consists in gaining possession of the adver- sary's foible with one's forte, and pressing it down and across into the opposite low line, when one's own point is thrust home, the adversary's blade being still held by one's hilt. It may be

also carried out from a low line into a high one. The bind is less used in the French school than in the Italian. The " Flan- connade " is a bind made by capturing the adversary's blade in high quarte, carrying it down and thrusting in the outside line with strong opposition. Another attack carried out by means of a twist and thrust is the " Cross " (croise), which is executed when the adversary's blade is held low by passing one's point over his wrist and forcing down both blades into seconde with a full extension of the arm. The result is to create a sudden and wide opening, and often disarms the adversary.

Secondary Attacks are those made (i) just as your adversary himself starts to attack; (2) during his attack; and (3) on the completion of his attack if it fails.

1. " Attacks on the Preparation " are a matter of judgment and quickness. They are usually attempted when the adversary is evidently preparing a complicated attack, such as the " one- two-three " or some other manoeuvre, involving one or more preliminary movements. At such a time a quick thrust will often catch him unawares and score. Opportunities for pre- paration attacks are often given when the adversary attempts a beat preliminary to his thrust; the beat is frustrated by an " absence of the blade," i.e. your blade is made to avoid contact with his by a narrow movement, and your point thrust home into the space left unguarded by the force of his unresisted beat. Or the adversary himself may create an " absence " by suddenly interrupting the contact of the blades, in the hope that, by the removal of the pressure, your blade will fly off to one side, leaving an opening; if, however, you are pre- pared for his " absence " a straight thrust will score.

2. The chief " Attacks on the Development," or " Counter Attacks," are the " Stop Thrust " and the " Time Thrust," both made while the adversary is carrying out his own attack. The " Stop Thrust " (coup d'arrtt) is one made after the adver- sary has actually begun an attack involving two or more move- ments, and is only justified when it can be brought off without your being hit by the attacking adversary's point on any part of the person. The reason for this is, that the rules of fencing decree that the fencer attacked

must parry, and that, if he disregards this and attempts a simultaneous counter attack, he must touch his opponent while totally avoiding the latter's point. Should he, however, be touched, even on the foot or mask, by the adversary, his touch, however good, is invalid. If both touches are good, that of the original attacker only counts. Stop thrusts are employed mostly against fencers who attack wildly or without being properly covered. The " Time Thrust " is delivered with opposition upon the adversary's composite attack (one involving several movements), and, if successful, generally parries the original attack at the same time. It is not valid if the fencer employing it is touched on any part of the person.

3. " Attacks on the Completion " {i.e. of the adversary's attack) are " Ripostes," " Counter-ripostes," " Remises " and " Renewals of Attack."

The Riposte (literally, response) is an attack made, immediately after parrying successfully, by merely straightening the arm, the body remaining immovable. The " counter-riposte " is a riposte made after parrying the adversary's riposte, and gener- ally from the position of the lunge, or while recovering from it, since one must have attacked with a full lunge if the adversary has had an opportunity to deliver a riposte. There are three kinds of ripostes: direct/with feints and after a pause.

The " direct riposte " may be made instantly after parrying the adversary's thrust by quitting his blade and straightening the arm, so that the point will touch his body on the nearest and most exposed part; or by not quitting his blade but running yours quickly down his and at the same time keeping a strong opposition (" riposte d'opposition "). The quickest direct riposte is that delivered after parrying quarte (for a right-hand fencer), and is called by the French the riposte of " tac-au-tac," imitative of the sudden succession of the click of the parry and the tap of the riposting fencer's point on his adversary's breast. In making " ripostes with a feint " the point is not jabbed on to the op- ponent's breast immediately after the parry, but one or more

preliminary movements precede the actual riposte, such as a disengagement, a cut-over or a double.

Ripostes with a pause (a temps perdu, with lost time) are made after a second's hesitation, and are resorted to when the fencers are too near for an accurate direct riposte, or to give the adversary time to make a quick parry, which is then deceived.

The remise is a thrust made after one's first thrust has been parried and in the same line; it must be made in such a way that the adversary's justified riposte is at the same time parried by opposition or completely avoided. It is

really a renewal of the attack in the original line, while the so-called " renewal of attack " ("• redoublement d'attaque ") is a second thrust which ignores the adversary's riposte, but made in a different line. Both the remise and the renewal are valid only when the adversary's riposte does not hit.

" False Attacks " are broad movements made for the purpose of drawing the adversary out or of disconcerting him. They may consist of an advance, an extension, a change of engage- ment, an intentional uncovering by taking a wide guard (called " invitation guard "), or any movement or combination of movements tending to make the adversary believe that a real attack is under way.

" The Assault " is a formal fencing bout or series of bouts in public, while formal fencing in private is called " loose play " or a " friendly bout." Bouts between fencers take place on a platform about 24 ft. long and 6 ft. wide (in the United States 20 X 3 ft.). Formal bouts are usually for a number of touches, or for a certain number of minutes, the fencer who touches oftenest winning. The judges (usually three or five) are some- times empowered to score one or more points against a com- petitor for breaches of good form, or for overstepping the space limits. In the United States bouts are for four minutes, with a change of places after two minutes, and the competitors are not interrupted, the winner being indicated by a vote of the judges, who take into account touches and style. In all countries contestants are required to wear jackets of a light colour, so that hits may be easily seen. Audible acknowledgment of all touches, whether on the target or not, is universally considered to be a fencer's duty. Fencing competitions are held in Great Britain under the rules of the Amateur Fencing Association, and in the United States under those of the Amateur Fencers' League of America.

Fencing Terms (not mentioned above) : " Cavazione" Ital. for disengagement. " Contraction, Parries of," those which do not parry in the simplest manner, but drag the adverse blade into another line, e.g. to parry a thrust in high sixte by counter of quarte. " Con- trotempo," Ital. for time-thrust. " Coronation," an attack preceded by a circular movement from high sixte to high quarte (and vice versa) made famous by Lafaugere. " Corps-a-corps " (body to body), the position of two fencers who are at such close quarters that their persons touch ; when this occurs the fencers must again come on guard. " Coule," Fr. for glide. " Disarm," to knock the foil out of the adversary's hand; it is of no value in the French school. " Double Hit," when both fencers attack and hit at the same time; neither hit counts. " Filo," Ital. for glide (graze). " Flying Cut-over," a cut-over executed as a continuation of a parry, the hand being drawn back towards the body. " Incontro," Ital. for double attack. " Give the blade," to allow the adversary easy contact with the foil ; it is often resorted to in order to tempt the

adversary into a beat or bind. " Menace," to threaten the adversary by an extension and forward movement of the trunk. " Mur," see " Salute." " Passage of arms," a series of attacks and parries, ending in a successful hit. " Phrase of arms," a series of attacks and parries ending in a hit or invalidation. " Invalidation," a hit on some part of the person outside the target, made by the fencer whose right it is at that moment to attack or riposte; such a hit invalidates one made simultaneously or subsequently by hisopponent, however good. " Rebeat," two beats, executed as quickly as possible together, one on each side of the adversary's blade. " Reprises d'attaque," Fr. for renewed attacks. "Salute," the courteous salutation of the public and the adversary before and after a bout. A more elaborate salute, called by the French the Mur, consists of a series of parries, lunges and other evolutions carried out by both fencers at the same time. Important exhibition assaults are usually preceded by the Mur, which is called in English the Grand Salute. " Septime enveloppee," a riposte by means of a twist and thrust after a parry in septime. It envelops and masters the adverse blade, whence the name. ." Secret thrusts," the French " holies secretes," pretended infallible attacks of which the user is supposed alone to

know the method of execution; they have no real existence. " Sforza," Ital. for disarmament. " Scandaglio," Ital for examina- tion, studying the form of an opponent at the beginning of a bout. " Toccato!" Ital. for "Touched!"; Fr. " Touche."

Bibliography. — The literature of foil-fencing is practically identical with that of the art in general (see Fencing). The follow- ing modern works are among the best. French School: Fencing, in the Badminton library (1897); Foil and Sabre, by L. Rondelle (Boston, 1892); "Fencing," by C. Prevost in the Encyclopaedia of Sport (1901); Fencing, by Edward Breck (New York, 1906). Italian school: Istruzione per la scherma, &c, by S. de Frae (Milan, 1885); La Scherma italiana di spada e di sciabola, by F. Masiello (Florence, 1887). (E. B.)

FOIX, PAUL DE (1528-1584), French prelate and diplomatist. He studied' Greek and Roman literature at Paris, and juris- prudence at Toulouse, where shortly after finishing his curri- culum he delivered a course of lectures on civil law, which gained him great reputation. At the age of nineteen he was named councillor of the parlement of Paris. Having in this capacity expressed himself favourable to the adoption of mild measures in regard to certain persons accused of Lutheranism, he was arrested, but

escaped punishment, and subsequently regained the favour of the French court. At the end of 1561 he was sent ambassador to England, where he remained four years. He was then sent to Venice, and returned a short time afterwards to England to negotiate a marriage between Queen Elizabeth and the duke of Anjou. He again fulfilled several important missions during the reign of Henry III. of France. In 1577 he was made archbishop of Toulouse, and in 1579 was appointed ambassador to Rome, where he remained till his death in 1584.

Les Lettres de Messire de Paul de Foix, archevesque de Toloze et ambassadeur pour le roy aupres du pape Gregoire XIII, au roi Henry III, were published in 1628, but there are some doubts as to their authenticity. See Gallia Christiana (1715 seq.) ; M. A. Muret, Oraisonfunebre de Paul de Foix (Paris, 1584) ; " Lettres de Catherine de Medicis," edited by Hector de la Ferriere (Paris, 1880 seq.) in the Collection de documents inedits sur I'histoire de France.

FOIX, a town of south-western France, in the middle ages capital of the counts of Foix, and now capital of the department of Ariege, 51 m. S. of Toulouse, on the Southern railway from that city to Ax. Pop. (1906) town, 4498; commune, 6750. It is situated between the Ariege and the Arget at their confluence. The old part of the town, with its ill-paved winding streets and old houses, is dominated on the west by an isolated rock crowned by the three towers of the castle (12th, 14th and 15th centuries), while to the south it is limited by the shady Promenade de Villotte. The chief church is that of St Volusien, a Gothic building of the 14th century. The town is the seat of a prefecture, a court of assizes and a tribunal of first instance, and has a lycee, training colleges, a chamber of commerce and a branch of the Bank of France. Flour-milling and iron-wcrking are carried on. Foix probably owes its origin to an oratory founded by Charle- magne. This afterwards became an abbey, in which were laid the remains of St Volusien, archbishop of Tours in the 5th century.

The county of Foix included roughly the eastern part of the modern department of Ariege, a region watered chiefly by the Ariege and its affluents. During the later middle ages it consisted of an agglomeration of small holdings ruled by lords, who, though subordinate to the counts of Foix, had some voice in the govern- ment of the district. Protestantism obtained an early entrance into the county, and the 'religious struggles of the 16th and 17th centuries were carried on with much implacability therein. The estates of the county, which can be traced back to the 14th century, consisted of three orders and possessed considerable power and virility. In the 17th and 18th centuries Foix formed one of the thirty-three governments of France, and in 1790 it was incorporated in the department of Ariege.

Counts of Foix. — The counts of Foix were an old and dis- tinguished French family which flourished from the nth to the 15th century. They were at first feudatories of the counts of Toulouse, but chafing under this yoke they soon succeeded in throwing it off, and during the 13th and 14th centuries were among the most powerful of the French feudal nobles. Living on the borders of France, having constant intercourse with

Navarre, and in frequent communication with England, they were in a position peculiarly favourable to an assertion of independence, and acted rather as the equals than as the dependents of the kings of France.

The title of count of Foix was first assumed by Roger, son of Bernard Roger, who was a younger son of Roger I., count of Carcassonne (d. 1012), when he inherited the town of Foix and the adjoining lands, which had hitherto formed part of the county of Carcassonne. Dying about 1064, Roger was succeeded by his brother Peter, who died six years later, and was succeeded in turn by his son, Roger II. This count took part in the crusade of 1095, and was afterwards excommunicated by Pope Paschal II. for seizing ecclesiastical property; but subsequently he appeased the anger of the church by rich donations, and when he died in 1 1 25 he was succeeded by his son, Roger III. The death of Roger III. about 1149, and of his son, Roger Bernard I., in 1188, brought the county to Roger Bernard's only son, Raymond Roger, who, in n 90, accompanied the French king, Philip Augustus, to Palestine and distinguished himself at the capture of Acre. He was afterwards engaged in the wars of the Albi- genses, and on being accused of heresy his lands were given to Simon IV, count of Montfort. Raymond Roger, who came to terms with the church and recovered his estates before his death in 1223, was a patron of the Provencal poets, and counted himself among their number. He was succeeded by his son, Roger Bernard II., called the Great, who assisted Raymond VII., count of Toulouse, and the Albigenses in their resistance to the French kings, Louis VIII. and Louis IX., was excommunicated on two occasions and died in 1241. His son, Roger IV., who followed, died in 1265, and was succeeded by his son, Roger Bernard III., who, more famous as a poet than as a warrior, was taken prisoner both by Philip III. of France and by Peter III. of Aragon. This count married Marguerite, daughter and heiress of Gaston VII., viscount of Beam (d. 1 290), and this union led to the outbreak of a long feud between the houses of Foix and Armagnac; a quarrel which was continued by Roger Bernard's son and successor, Gaston I., who became count in 1302, inheriting both Foix and Beam. Becoming embroiled with the French king, Philip IV., in consequence of the struggle with the count of Armagnac, Gaston was imprisoned in Paris; but quickly regaining his freedom he accompanied King Louis X. on an expedition into Flanders in 131 5, and died on his return to France in the same year. His eldest son, Gaston II., was the next count. Having

become reconciled with the house of Armagnac, Gaston took part in various wars both in France and Spain, dying at Seville in 1343, when he was succeeded by his son, Gaston III. (1331-1391). Gaston III., who was sumamed Phoebus on account of his beauty, was the most famous member of the old Foix family. Like his father he assisted France in her struggle against England, being entrusted with the defence of the frontiers of Gascony; but when the French king, John II., showed a marked preference for the count of Armagnac, Gaston left his service and went to fight against the heathen in Prussia. Returning to France about 1357 he delivered some noble ladies from the attacks of the adherents of the Jacquerie at Meaux, and was soon at war with the count of Armagnac. During this struggle he also attacked the count of Poitiers, the royal representative in Languedoc, but owing to the intervention of Pope Innocent VI. he made peace with the count in 1360. Gaston, however, con- tinued to fight against the count of Armagnac, who, in 1362, was defeated and compelled to pay a ransom; and this war lasted until 1377, when peace was made. Early in 1380 the count was appointed governor of Languedoc, but when Charles VI. succeeded Charles V. as king later in the same year, this appointment was cancelled. Refusing, however, to heed the royal command, and supported by the communes of Languedoc, Gaston fought for about two years against John, duke of Berry, who had been chosen as his successor, until, worsted in the combat, he abandoned the struggle and retired to his estates, remaining neutral and independent. In 1348 the count had married Agnes, daughter of Philip, count of Evreux (d. 1343), by his wife Jeanne II., queen of Navarre. By Agnes, whom he

divorced in 1373, he had an only son, Gaston, who is said to have been incited by his uncle, Charles II., king of Navarre, to poison his father, and who met his death in 1381. It is probable, as Froissart says, that he was killed by his father. Left without legitimate sons, Gaston was easily persuaded to bequeath his lands to King Charles VI., who thus obtained Foix and Beam when the count died at Orthes in 1391. Gaston was very fond of hunting, but was not without a taste for art and literature. Several beautiful manuscripts are in existence which were exe- cuted by his orders, and he himself wrote DUduits de la chasse des besles sauvaiges et des oiseaulx de proye. Froissart, who gives a graphic description of his court and his manner of life, speaks enthusiastically of Gaston, saying: " I never saw none like him of personage, nor of so fair form, nor so well made," and again, u in everything he was so perfect that he cannot be praised too much."

Almost immediately after Gaston's death King Charles VI. granted the county of Foix to Matthew, viscount of Castelbon, a descendant of Count Gaston I. Dying without issue in 1398, Matthew's lands were seized by Archambault, count of Grailly and captal de Buch, the husband of his sister Isabella (d.1426), who became count of Foix in 1401. Archambault's eldest son, John (c. 1382-1436), who succeeded to his father's lands and titles in 141 2, had married in 1402 Jeanne, daughter of Charles III., king of Navarre. Having served the king of France in Guienne and the king of Aragon in Sardinia, John became the royal representative in Languedoc, when the old quarrel between Foix and Armagnac broke out again. During the struggle between the Burgundians and the Armagnacs, he intrigued with both parties, and consequently was distrusted by the dauphin, afterwards King Charles VII. Deserting the cause of France, he then allied himself with Henry V. of England; but when Charles VII. became king in 1422, he returned to his former allegiance and became the king's representative in Languedoc and Guienne. He then assisted to suppress the marauding bands which were devastating France; fought for Aragon against Castile; and aided his brother, the cardinal of Foix, to crush some insurgents in Aragon. Peter, cardinal of Foix (1386-1464), was the fifth son of Archambault of Grailly, and was made archbishop of Aries in 1450. He took a prominent part in the struggle between the rival popes, and founded and endowed the College de Foix at Toulouse. The next count was John's son, Gaston IV., who married Leonora (d. 1479), a daughter of John, king of Aragon and Navarre. In 1447 he bought the vis- county of Narbonne, and having assisted King Charles VII. in Guienne, he was made a peer of France in 1458. In 1455 hi s father-in-law designated him as his successor in Navarre, and Louis XL of France gave him the counties of Rousillon and Cerdagne, and made him his representative in Languedoc and Guienne; but these marks of favour did not prevent him from joining a league against Louis in 1471. His eldest son, Gaston, the husband of Madeleine, a daughter of Charles VII. of France, died in 1470, and when Gaston IV. died two years later, his lands descended to his grandson, Francis Phoebus (d. 1483), who became king of Navarre in 1479, and was succeeded by his sister Catherine (d. 1517), the wife of Jean d'Albret (d. 1516). Thus the house of Foix-Grailly was merged in that of Albret and subsequently in that of Bourbon; and when Henry of Navarre became king of France in 1 589 the lands of the counts of Foix-Grailly became part of the French royal domain. A younger son of Count Gaston IV. was John (d. 1500), who received the viscounty of Narbonne from his father and married Marie, a sister of the French king Louis XII. He was on good terms both with Louis XL and Louis XII., and on the death of his nephew Francis Phoebus, in 1483, he claimed the kingdom of Navarre against Jean d'Albret and his wife, Catherine de Foix. The ensuing struggle lasted until 1497, when John renounced his claim. He left

a son, Gaston de Foix (1489-15 12), the distinguished French general, and a daughter, Germaine, who became the second wife of Ferdinand I., king of Spain. In 1507 Gaston exchanged his viscounty of Narbonne with King Louis XII. for the duchy of Nemours, and as duke of

Nemours he took command of the French troops in Italy. Having delivered Bologna and taken Brescia, Gaston encountered the troops of the Holy League at Ravenna in April 1512, and after putting the enemy to flight was killed during the pursuit. From the younger branch of the house of Foix-Grailly have also sprung the viscounts of Lautrec and of Meilles, the counts of Benanges and Candale, and of Gurson and Fleix.

See D. J. Vaissete, Histoire generate de Languedoc, tome iv. (Paris, 1876); L. Flourac, Jean I", comte de Foix, vicomte souverain de Beam (Paris, 1884); Le Pere Anselme, Histoire genealogique, tome iii. (Paris, 1 726-1 733) ; Castillon, Histoire du comte de Foix (Toulouse, 1852); Madaune, Gaston Phabus, comte de Foix et souverain de Beam (Pau, 1865); and Froissart's Chroniques, edited by S. Luce and G. Raynaud (Paris, 1869-1897).

FOLARD, JEAN CHARLES, Chevalier de (1669-1752), French soldier and military author, was born at Avignon on the 13th of February 1669. His military ardour was first awakened by reading Caesar's Commentaries, and he ran away from home and joined the army. He soon saw active service, and, young as he was, wrote a manual on partisan warfare, the manuscript of which passed with Folard's other papers to Marshal Belleisle on the author's death. In 1702 he became a captain, and aide-de- camp to the duke of Vendome, then in command of the P'rench forces in Italy. In 1705, while serving under Vendome's brother, the Grand Prior, Folard won the cross of St Louis for a gallant feat of arms, and in the same year he distinguished himself at the battle of Cassano, where he was severely wounded. It was during his tedious recovery from his wounds that he conceived the tactical theories to the elucidation of which he devoted most of his life. In 1706 he again rendered good service in Italy, and in 1708 distinguished himself greatly in the operations attempted by Vendome and the duke of Burgundy for the relief of Lille, the failure of which was due in part to the disagreement of the French commanders; and it is no small testimony to the ability and tact of Folard that he retained the friendship of both. Folard was wounded at Malplaquet in 1709, and in 171 1 his services were rewarded with the governorship of Bourbourg. He saw further active service in 17 14 in Malta, under Charles XII. of Sweden in the north, and under the duke of Berwick in the short Spanish War of 1719. Charles XII. he regarded as the first captain of all time, and it was at Stockholm that Folard began to formulate his tactical ideas in a commentary on Polybius. On his way back to France he was shipwrecked and lost all his

papers, but he set to work at once to write his essays afresh, and in 1724 appeared his Nouvelles Dicouvertes sur la guerre dans une dissertation de Polybe, followed (1 727-1 730) by Histoire de Polybe traduite par . . . de Thuillier avec un commentaire . . . de M. de Folard, Chevalier de I'Ordre de St Louis. Folard spent the remainder of his life in answering the criticisms provoked by the novelty of his theories. He died friendless and in obscurity at Avignon in 1752.

An analysis of Folard's military writings brings to light not a connected theory of war as a whole, but a great number of independent ideas, sometimes valuable and suggestive, but far more often extravagant. The central point of his tactics was his proposed column formation for infantry. Struck by the apparent weakness of the thin line of battle of the time, and arguing from the efifioKov or cuneus of ancient warfare, he desired to substitute the shock of a deep mass of troops for former methods of attack, and further considered that in defence a solid column gave an unshakable stability to the line of battle. Controversy at once centred itself upon the column. Whilst some famous commanders, such as Marshal Saxe and Guido Starhemberg, approved it and put it in practice, the weight of military opinion throughout Europe was opposed to it, and eventually history justified this opposition. Amongst the most discriminating of his critics was Frederick the Great, who is said to have invited Folard to Berlin. The Prussian king certainly caused a precis to be made by Colonel von Seers, and wrote a preface thereto expressing his views. The work (like others by Frederick) fell into unauthorized hands, and, on its publication (Paris, 1760) under the title Esprit du Chev. Folard, created a great impression. " Thus kept within bounds," said

the prince de Ligne, " Folard was the best author of the time." Frederick himself said tersely that " Folard had buried diamonds in a rubbish-heap." Thus began the controversy between line and column formations, which long continued and influenced the development of tactics up to the most modern times. Folard's principal adherents in the 18th century were Joly de Maizeroy and Menil Durand.

See Memoires pour servir a I'histoire de M. le Chevalier de Folard (Paris and Regensburg, 1753), an d for a detailed account of Folard's works and those of his critics and supporters, Max Jahns, Geschichte der Kriegswissenschaften, vol. ii. pp. 1478-1493 (Munich and Leipzig,

1890).

FOLD, a pleat or bend in a flexible material, or a curve in any surface, whence its particular application in geology with which this article deals. The verb " to fold " (0. Eng. fealdan) meant originally to double back a piece of cloth or other material do as to form a pleat, whence has evolved its various senses of to roll up, to enclose, enfold or embrace as with the arms, to clasp the hands or arms together, &c. The word is common to Teutonic languages, cf. Ger. fatten, Dutch vouwen (for vouden), &c, and the ultimate Indo-European root is found in Gr. 7rXexe(j', Lat. plicare, plectere, to plait, pleat, weave, and in the suffixes of such words as StirXatnos, duplex, double, simplex, &c. Similarly the termination " -fold " is added to numbers implying " so many," e.g. twofold, hundredfold, cf. " manifold." The similar word for an enclosure or pen for animals, especially for sheep, and hence applied in a spiritual sense to a community of worshippers, or to the whole body of Christians regarded as Christ's flock, must be distinguished. In O. Eng. it is falad, and cognate forms are found in Dutch vaalt, &c. It apparently meant a planked or boarded enclosure, cf. Dan. fjael, Swed. fjol, plank.

In geology, a fold is a bend or curvature in the stratified rocks of the earth's crust, whereby they have been made to take up less horizontal space. The French equivalents are pit, plissement, ridement; in Germany, Falte, Faltung, Saltelung are the terms usually employed. It is comparatively rarely that bedded rocks are observed in the position in which they were first deposited, a certain amount of buckling up or sagging down of the crust being continually in progress in one region or another. In every instance therefore where, in walking over the surface, we traverse a series of strata which gradually, and without dis- locations, increase or diminish in inclination, we cross part of a great curvature in the strata of the earth's crust.

Such foldings, however, can often be distinctly seen, either on some cliff or coast-line, or in the traverse of a piece of hilly or mountainous ground. The observer cannot long continue his researches in the field without discovering that the rocks of the earth's crust have been almost everywhere thrown into curves, usually so broad and gentle as to escape observation except when specially looked for. The outcrop of beds at the surface is commonly the truncation of these curves. The strata must once have risen above the present surface, and in many cases may be found descending to the surface again with a contrary dip, the intervening portion of the undulation having been worn away.

The curvature occasionally shows itself among horizontal or gently inclined strata in the form of an abrupt inclination, and then an immediate resumption of the previous flat or sloping character. The strata are thus bent up and continue on the other side of the tilt at a higher level. Such

bends are called mono-

Fig. I. — Section of the Isle of Wight — a Monoclinal Curve, a, Chalk; b, Woolwich and Reading beds; c, London clay; d, Bagshot series; e, Headon series; /, g, Osborne and Bembridge series.

dines, monoclinal folds or flexures, because they present only one fold, or one half of a fold, instead of the two which we see in an arch or trough. The most notable instance of this structure in Britain is that of the Isle of Wight, of which a section is given in fig. 1. The Cretaceous rocks on the south side of the island rapidly rise in inclination till they become nearly vertical.

The Lower Tertiary strata follow with a similar steep dip, but rapidly flatten down towards the north coast. Some remarkable cases of the same structure have been brought to light by J. W. Powell in his survey of the Colorado region.

It much more frequently happens that the strata have been bent into arches and troughs, so that they can be seen dipping under the surface on one side of the axis of a fold, and rising up again on the other side. Where they dip away from the axis of movement the structure is termed an anticline or anticlinal fold; where they dip towards the axis, it is a syncline or synclinal fold. The diagram in fig. 2 may be taken to represent a series of strata

Fig. 2. — Plan of Anticlinal and Synclinal Folds.

(1-17) thrown into an anticline (AA') and syncline (BB'). A section drawn across these folds in the line CD would show the structure given in fig. 3. Here we see that, at the part of the

Section on line C D.

».-'

Fig. 3.-

-Section of Anticlinal and Synclinal Folds on the line CD (fig. 2).

anticlinal axis (A) where the section crosses, bed No. 4 forms the crown of the arch, Nos. 1, 2 and 3 being concealed beneath it. On the east side of the axis the strata follow each other in regulai succession as far as No. 13, which, instead of passing here under the next in order, turns up with a contrary dip and forms the centre of a trough or syncline (B). From underneath No. 13 on the east side the same beds rise to the surface which passed beneath it on the west side. The particular bed marked EF has been entirely removed by denudation from the top of the anti- cline, and is buried deep beneath the centre of the syncline.

Such foldings of strata must always die out unless they are abruptly terminated by dislocations. In the cases given in fig. 2, both the arch and trough are represented as diminishing, the former towards the north, the latter towards the south. The observer in passing northwards along the axis of that anticline finds himself getting into progressively higher strata as the fold sinks down. On the other hand, in advancing southwards along the synclinal axis, he loses stratum after stratum and gets into lower portions of the series. When a fold diminishes in this way it is said to " nose out." In fig. 2 there is obviously a general inclination of the beds towards the north,

besides the outward dip from the anticline and the inward dip from the syncline. Hence the anticline noses out to the north and the syncline to the south.

Simple Folds. — In describing rock-folds special terms have been assigned to certain portions of the fold; thus, the sloping

Fig. 4.

sides of an anticline or syncline are known as the " limbs," " slopes," " flanks " or " members " of the fold; in an anticline, the part X, fig. 3, the angle of the bend, is the " crest " or "crown" (Ger. Gewolbebiegung, Fr. charniere anticlinale) , the corresponding part of a syncline being the " trough-core " or " base," Y, fig. 3 (Ger. Muldenbiegung, Fr. charniere synclinale). The portion of an anticline which has been removed by denuda- tion is the " aerial arch," dotted in fig. 3. The innermost strata in a fold constitute the " core," arch-core A, fig. 3, or trough- core B, in the same figure. In the majority of folds the bending of the strata has taken place about an "axial plane" (often called the " axis "), which in the examples illustrated in fig. 3 would pass through the points A and B, perpendicularly to the horizontal line CD. In powerfully folded regions the axial planes of the folds are no longer upright; they may be moder- ately inclined, producing an " inversion," " inverted fold " or " overfold." When the inclination of the axial plane is great a " recumbent overfold " is produced (Fr. pli coucM, Ger, liegende Falte). In a fold of this kind (fig. 4) we have an " arch limb "

(a), a middle limb {b) and a floor or " trough limb " (c). X and Y are the upper and lower bends respectively. One of the important func- tions of a fold is its direc- tion; this of course depends upon the orientation of the axial plane. The crest-line of an anticline or trough-line of a syncline is rarely horizontal for any great distance; its departure from horizontality is designated the " pitch," and the fold is said to pitch (or dip) towards the north, &c. Most simple folds — with the exception of very shallow curvatures of wide area, — when considered in their entirety, are seen to be somewhat canoe-shaped in form. There are three variations of the simple fold dependent upon the position of the limbs, (1) the limbs may tend to diverge as they recede from the crest (fig. 3), sometimes styled an "open anticline"; (2) the limbs may be parallel in " closed " folds (commonly known as isoclinal folding) ; (3) the limbs may make an open angle or widen out towards the crest (fig. 4). This is known as a fan-

shaped fold (Fr. pli en eventail, Ger. F ticker falte); another variant of the same form is the mushroom fold (Fr. pli en cham- pignon). The axial plane is not always extended: it may be so abbreviated that the folding appears to have taken place about a point; anticlines of this type are variously designated " short-anticlines," " brachyanticlinaux " or " domes "; similarly, there are " short-synclines," " brachysynclinaux " or " cuvettes." The dip in cases of this kind has been described as " qua-qua versal " or " periclinal."

Complex Folding. — Sometimes a simple fold has been itself subjected to further folding repeated more than once, it is then termed a " refolded fold " (Fr. pli replie); fine examples may be observed in the Alps and in other mountain chains. A great regional major fold containing within itself a number of minor " special " or subsidiary folds is described as a " geanticline " (Fr. structure en eventail compose), or as a " geosyncline " (Fr. structure en iventail renverse). Even folds of lesser magnitude may be highly complex in regions of extreme crustal movement, and may contain smaller folds of the first, second, third or higher order (Fr. couches gaufrees [fig. 5]). In its smaller manifestation, this class of folding passes into " crumpling " or " puckering," wh^ere quite a large number of folds may be crowded into a single hand specimen. In " frilling " or " frilled structure " the folds have still smaller amplitude, and in many highly corrugated rocks minute folds are observable with the microscope that do not appear to the unaided eye. When a series of adjacent iso- clinal overfolds has passed into a series of thrusts (see Fault), the so-called " imbricated " structure (Fr. structure imbriquee, Ger. Sckuppenstruktur) is generated. Occasionally crust-blocks resembling " graben " and " horsts " are circumscribed by folds instead of faults; when this is so they have been called respec- tively " infolded graben " or " overfolded horsts."

The heterogeneous character of great masses of strata has always had a marked influence on the nature of the folding; some beds have yielded much more readily than others, certain beds will be found to be faulted, while those above and below have folded without fracture. In many examples of apparent plasticity it can be shown that this effect has been produced by an infinite number of minute slippings within the rock substance.

The larger rock folds have produced important economic

Fig. 5.— Curved and Contorted Rocks, near Old Head of Kinsale.

(Du Noyer.)

results. For example, in many coal regions the deposits have been

conserved in some districts in the synclines or " basins," while they have been removed by denudation from the Uplifted anticlines in others. Near the crest of anticlines is commonly an enriched portion of the ground in mineralized districts; and, in the case of water supply, the tilt of the strata determines the direction of the underground flowage. Again, the most convenient site for oil wells is the crest of an anticline or " dome," where an impervious stratum imprisons the gas and oil in a subjacent saturated layer under pressure.

For a discussion of the question of the distribution and arrange- ment of the great folded regions of the earth's crust, see E. Suess, Das Antlitz der Erde, English translation, The Face of the Earth, vols, i., ii., iii., iv. (Oxford). See also E. de Margerie and A. Heim, Les Dislocations de I'ecorce terrestre (Zurich, 1888); A. Rothpletz, Geotektonische Probleme (Stuttgart, 1894).

FOLENGO, TEOFILO (1491-1544), otherwise known as Merlino Coccajo or Cocajo, one of the principal Italian macaronic poets, was born of noble parentage at Cipada near Mantua on the 8th of November 1491, From his infancy he showed great vivacity of mind, and a remarkable cleverness in making verses. At the age of sixteen he entered the monastery of Monte Casino near Brescia, and eighteen months afterwards he became a professed member of the Benedictine order. For a few years his life as a monk seems to have been tolerably regular, and he is said to have produced a considerable quantity of Latin verse, written, not unsuccessfully, in the Virgilian style. About the year 1516 he forsook the monastic life for the society of a well-born young woman named Girolama Dieda, with whom he wandered about the country for several years, often suffering great poverty, having no other means of support than his talent for versification. His first publication was the Merlini Cocaii macaronicon, which relates the adventures of a fictitious hero named Baldus. The coarse buffoonery of this work is often relieved by touches of genuine poetry, as well as by graphic descriptions and acute criticisms of men and manners. Its macaronic style is rendered peculiarly perplexing to the foreigner by the frequent introduction of words and phrases from the Mantuan patois. Though frequently censured for its occasional grossness of idea and ex- pression, it soon attained a wide popularity, and within a very few years passed through several editions. Folengo's next production was the Orlandino, an Italian poem of eight cantos, written in rhymed octaves. It appeared in 1526, and bore on the title-page the new pseudonym of Limerno Pitocco (Merlin the Beggar) da Mantova. In the same year, wearied with a life of dissipation, Folengo returned to his ecclesiastical obedience; and shortly afterwards wrote his Chaos del tri per uno, in which, partly in prose, partly in verse, sometimes in Latin, sometimes in Italian, and sometimes in macaronic, he gives a veiled account of the vicissitudes of the life he had lived under his various names,

We next find him about the year 1533 writing in rhymed octaves a life of Christ entitled L' Umanitd del Figliuolo di Dlo ; and he is known to have composed, still later, another religious poem upon the creation, fall and restoration of man, besides a few tragedies. These, however, have never been published. Some of his later years were spent in Sicily under the patronage of Don Fernando de Gonzaga, the viceroy; he even appears for a short time to have had charge of a monastery there. In 1543 he retired to Santa Croce de Campesio, near Bassano; and there he died on the 9th of December 1544.

Folengo is frequently quoted and still more frequently copied by Rabelais. The earlier editions of his Opus macaronicum are. now extremely rare. The often reprinted edition of 1530 exhibits the text as revised by the author after he had begun to amend his life.

FOLEY, JOHN HENRY (1818-1874), Irish sculptor, was born at Dublin on the 24th of May 1818. At thirteen he began to study drawing and modelling at the schools of the Royal Dublin Society, where he took several first-class prizes. In 1835 he was admitted a student in the schools of the Royal Academy, London. He first appeared as an exhibitor in 1839 with his " Death of Abel and Innocence." " Ino and Bacchus," exhibited in 1840, gave him immediate reputation, and the work itself was after- wards commissioned to be done in marble for the earl of Elles- mere. " Lear and Cordelia " and " Death of Lear " were exhibited in 1 84 1. " Venus rescuing Aeneas "and" The Houseless Wanderer " in 1842, " Prospero and Miranda " in 1843. In 1844 Foley sent to the exhibition at Westminster Hall his " Youth at a Stream," and was, with Calder Marshall and John Bell, chosen by the commissioners to do work in sculpture for the decoration of the Houses of Parliament. Statues of John Hampden and Selden were executed for this purpose, and received liberal praise for the propriety, dignity and proportion of their treatment. Commissions of all kinds now began to come rapidly. Fanciful works, busts, bas-reliefs, tablets and monumental statues were in great numbers undertaken and executed by him with a steady equality of worthy treatment. In 1849 he was made an associate and in 1858 a member of the Royal Academy. Among his numerous works the following may be noticed, besides those mentioned above: — " The Mother "; " Egeria," for the Mansion House; " The Elder Brother in Comus," his diploma work; " The Muse of Painting," the monument of James Ward, R.A.; " Caractacus," for the Mansion House; "Helen Faucit"; "Goldsmith" and "Burke," for Trinity College, Dublin; "Faraday"; "Reynolds"; "Barry," for Westminster Palace Yard; " John

Stuart Mill," for the Thames embankment; " O'Connell ." and " Gough," for Dublin ; " Clyde," for Glasgow; " Clive," for Shrewsbury; " Hardinge," " Canning " and " Outram," for Calcutta; " Hon. James Stewart," for Ceylon; the symbolical group " Asia," as well as the statue of the prince himself, for the Albert Memorial in Hyde Park; and " Stonewall Jackson," in Richmond, Va. The statue of Sir James Outram is probably his masterpiece. Foley's early fanciful works have some charming qualities; but he will probably always be best remembered for the workmanlike and manly style of his monumental portraits. He died at Hampstead on the 27th of August 1874, and on the 4th of September was buried in St Paul's cathedral. He left his models to the Royal Dublin Society, his early school, and a great part of his property to the Artists' Benevolent Fund.

See W. Cosmo Monkhouse, The Works of 7. H. Foley (1875).

FOLEY, SIR THOMAS (1757-1833), British admiral, entered the navy in 1770, and, during his time as midshipman, saw a good deal of active service in the West Indies against American privateers. Promoted lieutenant in 1778, he served under Admiral (afterwards Viscount) Keppel and Sir Charles Hardy in the Channel, and with Rodney's squadron was present at the defeat of De Langara off Cape St Vincent in 1780, and at the relief of Gibraltar. Still under Rodney's command, he went out to the West Indies, and took his part in the operations which culminated in the victory of the 12th of April 1782. In the Revolutionary War he was engaged from the first. As flag- captain to Admiral John Gell, and afterwards to Sir Hyde

Parker, Foley took part in the siege of Toulon in 1793, the action of Golfe Jouan in 1794, and the two fights off Toulon on the 13th of April and the 13th of July 1795. At St Vincent he was flag- captain to the second in command, and in the following year was sent out in command of the " Goliath " (74), to reinforce Nelson's fleet in the Mediterranean. The part played by the " Goliath " in the battle of the Nile was brilliant. She led the squadron round the French van, and this manoeuvre contributed not a little to the result of the day. Whether this was done by Foley's own initiative, or intended by Nelson, has been a matter of controversy (see Journal of the Royal United Service Institution, 1885, p. 916). His next important service was with Nelson in the Baltic. The " Elephant " carried Nelson's flag at the battle of Copenhagen, and her captain acted as his chief-of-staff. Ill- health obliged Foley to decline Nelson's offer (made when on the point of starting for the battle of Trafalgar) of the post of Captain of the Fleet. From 1808 to 1815 he commanded in the Downs and at the peace was made K.C.B. Sir Thomas Foley rose to be full admiral and G. C. B. He died while commanding in chief at Portsmouth in 1833.

See J. B. Herbert, Life and Services of Sir Thomas Foley (Cardiff,

1884).

FOLI (Foley), ALLAN JAMES (1837-1899), Irish bass singer, was born at Cahir, Tipperary, on the 7 th of August 1837 ; originally a carpenter, he studied under Bisaccia at Naples, and made his first appearance at Catania in 1862. From the opera in Paris he was engaged by Mapleson for the season of 1865, and appeared with much success in various parts. He sang in the first performance, of The Flying Dutchman (Daland) in England in 1870, and in the first performance of Gounod's Redemption in 1882. He was distinguished in opera and oratorio alike for his vigorous, straightforward way of singing, and was in great request at ballad concerts. He died on the 20th of October 1899.

FOLIGNO (anc. Fulginiae, q.v.), a town and episcopal see of Umbria, Italy, 771 ft. above se"a-level, in the province of Perugia, from which it is 25 m. S.E. by rail. Pop. (1901) 9532 (town), 26,278 (commune). It lies in a fertile plain, on the Topino, a tributary of the Tiber; it is almost square in shape and is sur- rounded by walls. It is a picturesque and interesting town; several of its churches contain paintings by Umbrian masters, notably works by Niccolo di Liberatore (or Niccolo Alunno, 1430-1502), and among them his chief work, a large altar-piece (the predella of which is in the Louvre) in S. Niccolo. The cathedral has a romanesque S. facade of 1133, restored in 1903; the interior was modernized in the 18th century. To the left of the choir is an octagonal chapel by Antonio da Sangallo the younger (1527). In the same piazza as the S. facade is the Palazzo del GoVerno, erected in 1350, which has a chapel with frescoes by Ottaviano Nelli of Gubbio (1424). S. Maria infra Portas is said to date from the 7th century, but from this period only the columns of the portico remain. Raphael's " Madonna di Foligno," now in the Vatican, was originally painted for the church of S. Anna. The Palazzo Orfini and the Palazzo Deli are two good Renaissance buildings.

Foligno seems to have been founded about the middle of the 8th century a.d. It changed hands often during the wars of the 13th century, and was ' destroyed by Perugia in 1281. From 1305 to 1439 it was governed by the family of the Trinci as deputies of the Holy See, until in the latter year one of its members went against the church. Pope Eugene IV. sent a force against Foligno, to which the inhabitants opened their gates, and the last of the Trinci, Corrado II., was beheaded. Henceforth Foligno belonged to the states of the church until i860. It suffered from a severe earthquake in 1832. Foligno is a station on the main line from Rome (via Orte) to Ancona, and is the junction for Perugia. Three miles to the E. is the abbey of Sassovivo with cloisters of 1229, very like those of S. Paolo fuori le Mura at Rome, with pairs of small columns supporting arches, and decorations in coloured mosaic (" Cosmatesque " work). The church has

been modernized.

FOLIO (properly the ablative case of the Lat. folium, leaf, but also frequently an adaptation of the Ital. foglio), a term in

bibliography and printing, with reference either to the size of paper employed, or of the book, or to the pagination. In the phrase " in folio " it means a sheet of paper folded once, and thus a book bound up in sheets thus folded is a book of the largest size and is known as a " folio " (see Bibliography). Similarly, " folio " is one of the sizes of paper adapted to be thus folded (see Paper). In book-keeping the word is used for a page in a ledger on which the credit and debtor account is written; in law-writing, for a fixed number of words in a legal document, used for measurement of the length and for the addition of costs. In Great Britain, a " folio " is taken to contain 72 words, except in parliamentary and chancery documents, when the number is 90. In the U.S.A. 100 words form a " folio."

FOLIUM, in mathematics, a curve invented and discussed by Rene Descartes. Its cartesian equation is x 3 +y i = $axy. The curve is symmetrical about the line x = y, and consists of two infinite branches asymptotic to the line x+y+a = o and a loop in the first quadrant. It may be traced by giving m various values in the equations x = ˆam\ (1+m 3), y = sam 2 (1+m 3), since by eliminating m between these relations the equation to the curve is obtained. Hence it is unicursal (see Curve). The area of the loop, which equals the area between the curve and its asymptote, is 30/2.

FOLKES, MARTIN (1690-1754), English antiquary, was born in London on the 29th of October 1690. He was educated at Saumur University and Clare College, Cambridge, where he so distinguished himself in mathematics that when only twenty- three years of age he was chosen a fellow of the Royal Society. He was elected one of the council in 1716, and in 1723 Sir Isaac Newton, president of the society, appointed him one of the vice- presidents. On the death of NSwton he became a candidate for the presidency, but was defeated by Sir Hans Sloane, whom, however, he succeeded in 1741; in 1742 he was made a member of the French Academy; in 1746 he received honorary degrees from Oxford and Cambridge. In 1733 he set out on a tour through Italy, in the course of which he composed his Disserta- tions on the Weights and Values of Ancient Coins. Before the Society of Antiquaries, of which he was president from 1749 to 1754, he read in 1736 his Observations on the Trajan and

Antonine Pillars at Rome and his Table of English Gold Coins from the i8lh Year of King Edward III. In 1745 he printed the latter with another on the history of silver coinage. He also contributed both to the Society of Antiquaries and to the Royal Society other papers, chiefly on Roman antiquities. He mafried in 1 7 14 Lucretia Bradshaw, an actress who had appeared at the Haymarket and Drury Lane (see Nichols's Lit. Anecdot. ii.

578-598).

For Sir John Hill's attack on Folkes (Review of the Works of the Royal Soc, 1751), see D'Israeli, Calamities and Quarrels of Authors (i860), pp. 364-366.

FOLKESTONE, a municipal borough, seaport and watering- place of Kent, England, within the parliamentary borough of Hythe, 71 m. S.E. by E. of London by the South-Eastern & Chatham railway. Pop. (1891) 23,905; (1901) 30,650. This is one of the principal ports in cross-Channel communications, the steamers serving Boulogne, 30 m. distant. The older part of Folkestone lies in a small valley which here opens upon the shore between steep hills. The more modern portions extend up the hills on either hand. To the north the town is sheltered by hills rising sharply to heights of 400 to 500 ft., on several of which, such as Sugarloaf and Castle Hills, are ancient earth- works. Above the cliff west of the old town is a broad promenade called the Lees, commanding a notable view of the channel and connected by lifts with the shore below. On this cliff also stands the parish church of St Mary and St Eanswith, a cruciform building of much interest, with central tower. It is mainly Early English, but the original church, attached to a Benedictine priory, was founded in 1095 on the site of a convent established

by Eanswith, daughter of Eadbald, king of Kent in 630. The site of this foundation, however, became endangered by en- croachments of the sea. The monastery was destroyed at the dissolution of religious houses by Henry VIII. Folkestone inner harbour is dry at low water, but there is a deep water pier for use at low tide by the Channel steamers, by which not only the passenger traffic, but also a large general trade are carried on. The fisheries are important. Among institutions may be mentioned the grammar school, founded in 1674, the public library and museum, and a number of hospitals and sanatoria. The discontinued Harveian Institution for young men was named after William Harvey, discoverer of the circulation of the blood, a native of Folkestone (1578), who is also commemorated by a tercentenary memorial on the Lees. Folkestone is a member of the Cinque Port of Dover. It is governed by a mayor, 7 aldermen and 21 councillors. Area, 2522 acres. To the west of Folkestone, close to Shorncliffe camp, is the populous suburb of Cheriton (an urban

district, pop. 7091).

Folkestone (Folcestan) was among the possessions of Earl Godwine and was called upon to supply him with ships when he was exiled from England; at the time of the Domesday Survey it belonged to Odo, bishop of Bayeux. From early times it was a member of the Cinque Port of Dover, and had to find one out of the twenty-one ships furnished by that port for the royal service. It shared the privileges of the Cinque Ports, whose liberties were exemplified at the request of the barons of Folke- stone by Edward III. in 1330. The corporation, which was prescriptive, was entitled the mayor, jurats and commonalty of Folkestone. The history of Folkestone is a record of its struggle against the sea, which was constantly encroaching upon the town. In 1629 the inhabitants, impoverished by their losses, obtained licence to erect a port. By the end of the 18th century the town had become prosperous by the increase of its fishing and shipping trades, and by the middle of the 19th century one of the chief health and pleasure resorts of the south coast.

FOLKLAND (folcland). This term occurs three times in Anglo- Saxon documents. In a law of Edward the Elder (c. i. 2) it is contrasted with bookland in a way which shows that these two kinds of tenure formed the two main subdivisions of landowner- ship : no one is to deny right to another in respect of f olkland or bookland. By a charter of 863 (Cod. Dipl. 281), King ˆEthelberht exchanges five hides of folkland for five hides of bookland which had formerly belonged to a thane, granting the latter for the newly-acquired estates exemption from all fiscal exactions except the threefold public obligation of attending the fyrd and joining in the repair of fortresses and bridges. Evidently folkland was not free from the payment of gafdl (land tax) and providing quarters for the king's men. In ealdorman Alfred's will the testator disposes freely of his bookland estates in favour of his sons and his daughter, but to a son who is not considered as rightful offspring five hides of folkland are left, provided the king consents. It is probable that folkland is meant in two or three cases when Latin documents speak of terra rei publicae jure possessa.

Two principal explanations have been given to this term. Allen thought that folkland was similar to the Roman ager publicus: it was the common property of the nation (folc), and the king had to dispose of it by carving out dependent tenures for his followers more or less after the fashion of conti- nental beneficia. These estates remained subject to the superior ownership of the folk and of the king: they could eventually be taken back by the latter and, in any case, the heir of a holder of folkland had to be confirmed in possession by the king. A letter of Bede to the archbisho'p Ecgbert of York may be inter- preted to apply to this kind of tenure. Kemble, K. Maurer, H. C. Lodge, Stubbs and others followed Allen's lead.

Another theory was started by Professor Vinogradoff in an article on folkland in the English Hist. Review for 1893. It considers folkland as landownership by folkright — at common law, as might be said in modern legal speech. In opposition to it bookland appears as landownership derived from royal privilege. The incidents recorded in the charters characterize folkland as

subject to ordinary fiscal burdens and to limitations in respect of testamentary succession. Thane Wallaf has to be relieved from fiscal exactions when his estate is converted from folkland into bookland (c.d. 281). Ealdorman Alfred's son, not being recog- nized as legitimate, has to claim fplkland not by direct succession or devise, but by the consent of the king. These incidents and limitations are thrown into relief by copious illustrations as to the fundamental features of bookland contained in the number- less "books." These are exemptions from fiscal dues and freedom of disposition of the owner. This view of the matter has been accepted by the chief modern authorities.

Bibliography. — J. Allen, Inquiry into the Rise and Growth of Royal Prerogative in England (London, 1849) ; K. Maurer, Kritische Uberschau (1853), Band i. 102 ff. ; F. W. Maitland, Domesday Book and Beyond, 244 ff. (Cambridge, 1897) ; P. Vinogradoff, " Folcland," in the Eng. Hist. Rev. (1893), p. 1 ff. ; Sir F. Pollock, Land Laws (London, 1896); H. Brunner, Deutsche Rechtsgeschichte, Band i. (2nd ed., 293, Leipzig, 1887-1892). (P. Vl.)

FOLKLORE, a term invented in 1846 by Mr W. J. Thorns as a designation for the traditional learning of the uncultured classes of civilized nations. The word has been adopted in this sense into many foreign languages; it is sometimes regarded as the equivalent of the Ger. Volkskunde. But folklore is, properly speaking, the " lore of the folk," while Volkskunde is lore or learning about the folk, and includes not only the mental life of a people, but also their arts and crafts. The term folklore is also used to designate the science which deals with folklore; the study of survivals involves the investigation of the similar customs, beliefs, &c, of races on lower planes of culture; conse- quently folklore, as interpreted by the English and American societies, concerns itself as much or more with savage races as with the popular superstitions of the white races.

History. — The scientific study of folklore dates back to the first quarter of the 19th century, but folklore was collected long before that date. The

organized study of folklore is a thing of recent growth. The first Folklore Society was founded in London in 1878; similar bodies now exist in the United States, France, Italy, Switzerland and especially in Germany and Austria. The folk-tale makes its appearance in literature at a very early period; Egyptian examples have come down to us from the 28th century B.C. In Greece the Homeric poems contain many folk-tale incidents; for India we have the Jatakas and Pancha- tantra; and for the Arabs the great collection of the Thousand and One Nights. Another type of folk-narrative is represented by Aesop's Fables. Not unnaturally beliefs and customs received less attention; our knowledge of them among the ancients is as a rule pieced together. Among the oldest professed collections are J. B. Thiers (1606-1703), Traite des superstitions (1679), Aubrey's Miscellanies (1686) and H. Bourne's (1696-1733) Antiquitates vulgares (1725); but they belong to the antiquarian, non-scientific period.

The pioneers of the modern scientific treatment of folklore were the brothers Grimm, by the publication of their Kinder-und Hausmdrchen (1812-1815) and Deutsche Mythologie (1835). They were the first to present the folk-tale in its genuine un- adulterated form. They differed from their predecessors in regarding the myth, not as the result of conscious speculation, but of a mythopoeic impulse. They were, however, disposed to press modern linguistic evidence too far and make the figures of the folk-tale the lineal representatives of ancient gods, as the folk-tales themselves were of the myths. This tendency was exaggerated by their successors, J. W. Wolf, W. Rochholz and others. At the outset of his career, W. Mannhardt (1831-1880), the forerunner of the anthropological school of folklore, shared in this mistake. Breaking away eventually from the philological schools, which interpreted myths and their supposed descendants, the folk-tales, as relating to the storm, the sun, the dawn, &c. (see Mythology), Mannhardt made folk-custom and belief his basis. To this end he set. himself to collect and compare the superstitions of the peasantry; but his health was always feeble and he never completed his scheme. For a time Mann- hardt's researches bore fruit neither in his own country nor abroad. In 1878 the foundation of the Folklore Societv marked

a new era in England, where the philological school had had few adherents; and the anthropological school soon produced evidence of its vitality in the works of Mr Andrew Lang, Dr J. G. Frazer and Professor Robertson Smith.

With the growth of our knowledge of European folk-custom and belief on the one hand, and of rites and religions of people in the lower stages of culture on the other hand, it has become abundantly clear that there is no line of demarcation between the two. Each throws light upon the other, and the super- stitions of Europe are the lineal descendants of savage creeds

which have their parallels all over the world in the culture of primitive peoples.

Subdivisions. — The folklore of civilized peoples may be conveniently classified under three main heads: (1) belief and custom; (2) narratives and sayings; (3) art. These again may be subdivided. The first division, Belief and Custom, includes (A) Superstitious beliefs and practices, including (a) those connected with natural phenomena or inanimate nature, (b) tree and plant superstitions, (c) animal superstitions, (d) ghosts and goblins, (e) witchcraft, '(f) leechcraft, (g) magic in general and divination, (k) eschatology, and (i) miscellaneous super- stitions and practices; and (B) Traditional customs, including (a) festival customs for which are set aside certain days and seasons, (b) ceremonial customs on the occasion of events such as birth, death or marriage, (c) games, (d) miscellaneous local customs, such as agricultural rites connected with the corn-spirit (see Demonology), and (e) dances. The second head of Narra- tives and Sayings may be subdivided (A) into (a) sagas or tales told as true, (b) Marchen or nursery tales, (c) fables, (d) drolls, apologues, cumulative tales, &c, (e) myths (see Mythology), and (J) place legends; (B) into ballads and songs (in so far as they do not come under art); and © into nursery rhymes, riddles, jingles, proverbs, nicknames, place rhymes, &c. The third head, Art, subdivides into (a) folk music with ballads and songs, (b) folk drama. Any classification, however, labours under the disadvantage of separating items which properly belong together. Thus, myths are obviously the form in which some superstitions are expressed. They may also be aetiological in their nature and form an elaborate record of a custom. Eschatological beliefs naturally take the form of myths. Traditional narratives can also be classified under art, and so on.

Literature. — The literature of the subject falls into two sharply defined classes — synthetic works and collections of folklore — of which the latter are immensely more numerous. Of the former class the most important is Dr J. G. Frazer's Golden Bough, which sets out from the study of a survival in Roman religion and covers a wide field of savage and civilized beliefs and customs. Especially important are the chapters on agricultural rites, in which are set forth the results of Mannhardt's researches. Other important lines of folklore research in the Golden Bough are those dealing with spring ceremonies, with the primitive view of the soul, with animal cults, and with sun and rain charms. Mr E. S. Hartland's Legend of Perseus is primarily concerned with the origin of a folk-tale, and this problem in the end is dismissed as insoluble. A large part of the book is taken up with a discussion of sympathetic magic, and especially with the " life index," an object so bound up with the life of a human being that it acts as an indication of his well-being or otherwise. The importance of children's games in the study of folklore has been recognized of recent years. An

admirable collection of the games of England has been published by Mrs G. L. Gomme. With the more minute study of uncivilized peoples the problem of the diffusion of games has also come to the fore. In particular it is found that the string-game called " cat's cradle " in various forms is of very wide diffusion, being found even in Australia. The question of folk-music has recently received much attention (see Song).

Bibliography. — Introductory works: M. R. Cox, Introduction to Folklore; Kaindl, Die Volkskunde; Marillier in Revue de I'histoire des religions, xliii. 166, and other works mentioned by Kaindl.

General works: J. G. Frazer, The Golden Bough; E. S. Hartland, The Legend of Perseus; A. Lang, Custom and Myth, Myth, Ritual and Religion; Tylor, Primitive Culture; Liebrecht, Zur Volkskunde.

British Isles. England: Burne, Shropshire Folklore; Denham Tracts (F. L. S.) ; Harland and Wilkinson, Lancashire Folklore ; Henderson, Folklore of Northern Counties; County Folklore Series (Printed Extracts) of the F.L.S. Wales: Elias Owen, Welsh Folklore; Rhys, Celtic Folklore. Scotland: Dalyell, Darker Superstitions; Gregor, Folklore of N.E. of Scotland; the works of J. G. Campbell, &c.

Germany: Grimm, Deutsche Myfhologie, English translation by Stallybrass; Wuttke, Der deutsche Volksaberglaube; Meyer, Deutsche Volkskunde; Tetzner, Die Slaven in Deutschland; Mogk in Paul's Grundriss der germanischen Philologie, and the works cited by Kaindl (see above).

France: Sebillot's works; Rolland, Faune populaire; Laisnel de la Salle, Croyances et legendes.

On the Slavs see the works of Krauss and v. Wlislochi; for Bohemia, Grohmann, Aberglaube; for Greece, Abbott, Macedonian Folklore, and Rennell Rodd, Folklore of Greece; for Italy, Pitre's bibliography; for India, Crooke's works, and the Indian Antiquary. For questionnaires see Handbook of Folklore (Folklore Soc.) ; Sebillot, Essai de questionnaires; Journal of American Folklore (1890, &c.) ; and Kaindl's Volkskunde. For a bibliography of folk-tales see Hartland, Mythology and Folk-tales; to his list may be added Petitot's Legendes indiennes; Rand, Legends of the Micmacs; Lummis, The Man who Married the Moon; and the publications of the American Folklore Society. For other works see biblio- graphies in Folklore and other periodicals. On special points may be mentioned Miss Cox's Cinderella (Folklore Society); Kohler's works, &c. (see also

bibliography to the article Tale). For games see Gomme, English Games; Culin, Korean Games; Rochholz, Alemannisches Kinderlied; Bohme, Deutsches Kinderlied; Handel- mann, Volks- und Kinderspiele; Jayne, String Figures, &c; and the bibliography to Doll. See also Sonnenschein's Best Books.

The following is a list of the more important Societies and publi- cations: —
.

England: Folklore Society; Folksong Society; Gipsy-lore Society.

U.S.A. : American Folklore Society.

France : Societe des traditions populaires.

Germany: Verein filr Volkskunde; Hessische Vereinigung fur Volkskunde; and minor societies in Saxony, Silesia and other provinces.

Austria: Verein fitr osterreichische Volkskunde.

Switzerland : Schweizerische Gesellschaft fur Volkskunde.

Italy : Societi per lo studio delle tradizioni popolari.

In addition to these, the anthropological societies devote more or less attention to folklore. Besides the publications of the societies mentioned above, minor societies or individuals are responsible for the following among others: Belgium, Wallonia; Poland, Wisla; France, Melusine (1878, 1883-1901); Bohemia, Cesky Lid; Den- mark, Dania, &c. ; Germany, Zcitschrift filr Volkerpsychologie (1859-1890); Am Urguell (1890-1898). (N. W. T.)

FOLLEN, AUGUST (or, as he afterwards called himself, Adolf) LUDWIG (1794-1855), German poet, was born at Giessen on the 21st of January 1794, the son of a district judge. He studied theology at Giessen and law at Heidelberg, and after leaving the university edited the Elberfeld Allgemeim Zeitung. Suspected of being connected with some radical plots, he was imprisoned for two years in Berlin. When released in 1821 he went to Switzerland, where he taught in the canton school at Aarau, farmed from 1847-1854 the estate of Liebenfels in Thurgau, and then retired to Bern, where he lived till his death on the 26th of December 1855. Besides a number of minor poems he wrote Harfengrusse aus Deutschland und der Schweiz (1823) and Malegys und Vivian (1829), a knightly romance after the fashion of the romantic school. Of his many translations, mention may be made of the Homeric Hymns in collaboration with R. Schwenck (1814), Tasso's Jerusalem Delivered (1818) and Siegfrieds Tod from the

Nibelungenlied (1842); he also collected and translated Latin hymns and sacred poetry (1819). In 1846 he published a brief collection of sonnets entitled An die gottlosen Nichtswiiteriche. This was aimed at the liberal philosopher Arnold Ruge, and was the occasion of a literary duel between the two authors. Follen's posthumous poem Tristans Eltern (1857) may also be mentioned, but his best-known work is a collection of German poetry entitled Bildersaal deutscher Dichtung (1827).

FOLLEN, KARL (1 795-1840) , German poet and patriot, brother of A. L. Follen, was born at Romrod in Hesse-Darmstadt, on the 5th of September 1795. He first studied theology at Giessen, but after the campaign of 1814, in which, like his brother August, he took part as a Hessian volunteer, began the study of jurisprudence, and in 1818 established himself as Privatdocent

of civil law at Giessen. Owing to being suspected of political intrigues, he removed to Jena, and thence, after the assassination of Kotzebue, fled to France. Here again the political murder of the due de Berry, on the 14th of January 1820, led to Follen being regarded as a suspect, and he accordingly took refuge in Switzerland, where he taught for a while at the cantonal school at Coire and at the university of Basel; but the Prussian authorities imperatively demanding his surrender, he sought in 1824 the hospitality of the United States of America. Here he became an instructor in German at Harvard in 1825, and in 1830 obtained an appointment as professor of German language and literature there; but his anti-slavery agitation having given umbrage to the authorities, he forfeited his post in 1.835, and was ordained Unitarian minister of a chapel at Lexington in Massachusetts in 1836. He perished at sea on board a steamboat which was totally consumed by fire while on a voyage from New York to Boston, on the night of the i3th-i4th of January 1840. Follen was the author of several celebrated patriotic songs written in the interests of liberty. The best is perhaps Horch auf, ihr Fiirsten I Du Volk, horch auf! of which Johannes Wit, called von Dorring (1800-1863), was long, though errone- ously, considered the author. It was published in A. L. Follen's collection of patriotic songs, Freie Slimmen frischer Jugend.

His wife Elisa Lee (1787-1860), an American authoress of some reputation, published after his death his lectures and sermons, with a biography written by herself (5 vols., Boston, 1846).

FOLLETT, SIR WILLIAM WEBB (1798-1845), English lawyer, was born at Topsham in Devonshire on the 2nd of December 1798. He was the son of Captain Benjamin Follett, who had retired from the army in 1790, and engaged in business at Topsham. He received his education at Exeter grammar school and Trinity College, Cambridge, graduating in 18 18. He

had entered the Inner Temple in 1816 and began to practise as a pleader below the bar in 1821, but was called to the bar in 1824, and joined the western circuit in 1825. At the very outset his great qualifications were universally recognized. He was thoroughly master of his profession, and his rapid rise in it was due not only to his quick perception and sound judgment, but to his singular courtesy, kindness and sweetness of temper. In 1830 he married the eldest daughter of Sir Ambrose Harding Gifford, chief justice of Ceylon. In 1835 he was returned to parliament for Exeter. In parliament he early distinguished himself, and under the first administration of Sir Robert Peel was appointed solicitor-general (November 1834) ; but resigned with the ministry in April 1835. In the course of this year he was knighted. On the return of Peel to power in 1841 Sir William was again appointed solicitor-general, and in April 1844 he suc- ceeded Sir Frederick Pollock as attorney-general. But his health, which had begun to fail him in 1838, and had been permanently injured by a severe illness in 1841, now broke down, and he was compelled to relinquish practice and to visit the south of Europe. He returned to England in March 1845; but the disease, consumption, reasserted itself, and he died in London on the 28th of June following. A statue of Follett, executed by Behnes, was erected by subscription in West- minster Abbey.

FONBLANQUE, ALBANY WILLIAM (1793-1872), English journalist, descended from a noble French Huguenot family, the Greniers of Languedoc, was born in London in 1793. John Grenier, a banker, became naturalized in England under the name of Fonblanque; and his son John Samuel Martin Fon- blanque (1760-1838), a distinguished equity lawyer, and the author of a standard legal work, a Treatise on Equity, was the father of Albany Fonblanque; he represented the borough of Camelford in parliament; and was one of the Whig friends of George IV. when prince of Wales. At fourteen young Fonblanque was sent to Woolwich to prepare for the Royal Engineers. His health, however, failed, and for two years his studies had to be suspended. Upon his recovery he studied for some time with a view to being called to the bar. At the age of nineteen (181 2) he commenced writing forthe newspapers, and very soon attracted notice both by the boldness and liberality of his opinions, and by

the superiority of his style to what Macaulay, when speaking of him, justly called the " rant and twaddle of the daily and weekly press " of the time. While he was eagerly taking his share in all the political struggles of this eventful period, he was also con- tinuing his studies, devoting no less than six hours a day to the study of classics and political philosophy. Under this

severe mental training his health once more broke down. His energy, however, was not impaired. He became a regular contributor to the newspapers and reviews, realizing a fair income which, as his habits were simple and temperate, secured him against pecuniary anxieties.

From 1820 to 1830 Albany Fonblanque was successively employed upon the staff of The Times and the Morning Chronicle, whilst he contributed to the Examiner, to the London Magazine and to theWestminster Review. In 1828 theExaminer newspaper, which had been purchased by ihe Rev. Dr Fellowes, author of the Religion of the Universe, &c, was given over to Fonblanque's complete control; and for a period of seventeen years (1830 to 1847) he not only sustained the high character for political in- dependence and literary ability which the Examiner had gained under the direction of Leigh Hunt and his brother, John Hunt, but even compelled his political opponents to acknowledge a certain delight in the boldness and brightness of the wit directed against themselves. When it was proposed that the admirers and supporters of the paper should facilitate a reduction in its price by the payment of their subscription ten years in advance, not only did Mr Edward Bulwer (Lord Lytton) volunteer his aid, but also Mr Disraeli, who was then coquetting with radical- ism. During his connexion with the Examiner, Fonblanque had many advantageous offers of further literary employment; but he devoted his energies and talents almost exclusively to the service of the paper he had resolved to make a standard of literary excellence in the world of journalism. Fonblanque was offered the governorship of Nova Scotia; but although he took great interest in colonial matters, and had used every effort to advocate the more generous political system which had colonial self-government for its goal, he decided not to abandon his beloved Examiner even for so sympathetic an employment. In 1847, however, domestic reasons induced him to accept the post of statistical secretary of the Board of Trade. This of course compelled him to resign the editorship of the Examiner, but he still continued to contribute largely to the paper, which, under the control of John Forster, continued to sustain its influential position. During the later years of his life Fonblanque took no prominent part in public affairs; and when he died at the age of seventy-nine(187 2)he seemed, as his nephew, EdwardFonblanque, rightly observes, " a man who had lived and toiled in an age gone by and in a cause long since established."

The character of Albany Fonblanque's political activity may be judged of by a study of his England under Seven Administra- tions (1837), in comparison with the course of social and political events in England fcom 1826 to 1837. As a journalist, he must be regarded in the light of a reformer. Journalism before his day was regarded as a somewhat discreditable profession; men of true culture were shy of entering the hot and dusty arena lest they should be confounded with the ruder combatants

who fought there before the public for hire. But the fact that Fonblanque, a man not only of strong and earnest political convictions but also of exceptional literary ability, did not hesitate to choose this field as a worthy one in which both a politician and a man of letters might usefully as well as honourably put forth his best gifts, must have helped, in no small degree, to correct the old prejudice.

See the Life and Labours of Albany Fonblanque, edited by his nephew, Edward Barrington de Fonblanque (London, 1874); a collection of his articles with a brief biographical notice.

FOND DU LAC, a city and the county-seat of Fond du Lac county, Wisconsin, U.S.A., about 60 m. N. of Milwaukee, at the S. end of Lake Winnebago, and at the mouth of the Fond du Lac river, which is navigable for only a short distance. Pop. (1890) 12,024; (1900) iS,no, of whom 2952 were foreign-born; (1910) 18,797. The city is a railway centre of some importance,

and is served by the Chicago, Milwaukee & St Paul, the Minneapolis, St Paul & Sault St Marie, and the Chicago & North- western railways, by interurban electric lines, and by steamboat 1 lines connecting through the Fox river with vessels on the Great Lakes. At North Fond du Lac, just beyond the city limits, are car-shops of the two last-mentioned railways, and in the city are manufactories of machinery, automobiles, wagons and carriages, awnings, leather, beer, flour, refrigerators, agri- cultural implements, toys' and furniture. The total value of the city's factory products in 1905 was $5,599,606, an increase of 95′ 7% since 1900. The city has a Protestant Episcopal cathedral, the Grafton Hall school for girls, and St Agnes hospital and convent, and a public library with about 25,000 volumes in 1908. The first settlers on the site of Fond du Lac arrived about 1835. Subsequently a village was laid out which was incorpor- ated in 1847; a city charter was secured in 1852.

FONDI (anc. Fundi), a town of Campania, Italy, in the province of Caserta, 12 m. N.W. of Formia, and n m. E.N.E. of Terracina by road. Pop. (1901) 9930. It lies 25 ft. above sea-level, at the N. end of a plain surrounded by mountains, which extend to the sea. It occupies the site of the ancient Fundi, a Volscian town, belonging later to Latium adjeclum, on the Via Appia, still represented by the modern high-road which passes through the centre of the town. It is rectangular in plan, and portions of its walls, partly in fine polygonal work and partly in opus incertum, are preserved. Both plan and walls date, no doubt, from the Roman period. The gate on the north-east still exists, and bears the inscription of three aediles who erected the gate, the towers and the wall. A similar inscription of three different aediles from the N.W. gate still exists, but not in situ. In

the neighbourhood are the remains of several ancient villas, and along the Via Appia still stands an ancient wall of opus reticidatum, with an inscription, in large letters, of one Varroni- anus, the letters being at intervals of 25 ft. The engineering of the ancient Via Appia between Fdndi and Formia, where it passes through the mountains near Itri, is remarkable.

The modern town is still enclosed by the ancient walls. The castle on the S.E. side has some 15th-century windows with beautiful tracery. Close by is the Gothic church of S. Pietro (formerly S. Maria), which was the cathedral until the see was suppressed in 1818 and united with that of Gaeta; it contains a fine pulpit with " cosmatesque " work and the fine tomb of Cristoforo Caetani (1439), two interesting 15th-century triptychs and an episcopal throne, whicn served for the coronation of the antipope Clement VII. in 1378. In the Dominican monastery the cell which St Thomas Aquinas sometimes occupied is shown.

The ancient city of Fundi in 338 B.C. (or 332) received (with Formiae) the civitas sine sufragio, because it had always secured the Romans safe passage through its territory; the people as a whole did not join Privernum in its war against Rome three years later, though Vitruvius Vacca, the leader, was a native of Fundi. It acquired the full citizenship in 188 B.C., and was partly under the control of a praefectus. The inscription upon some waterpipes which have been discovered shows that later it became a municipium. It was governed by three aediles: Horace's jest against the officious praetor (sic) is due to the exigencies of metre (Th. Mommsen in Hermes, xiii. p. 113). The family of Livia, the consort of Augustus, belonged to Fundi. During the Lombard invasions in 592 Fundi was temporarily abandoned, but it seems to have come under the rule of the papacy by a.d. 754 at any rate. Pope John VIII. ceded it with its territory to Docibile, duke of Gaeta, but its history is some- what intricate after this period. Sometimes it appears as an independent countship, though held by members of the Caetani family, who about 1297 returned to it. In 1504 it was given to Prospero Colonna. In 1534 Khair-ed-Din Barbarossa tried to carry off Giulia Gonzaga, countess of Fondi, and sacked the city. After this Fondi was much neglected; in 1721 it was sold to the Di Sangro family, in which it still remains. Its position as a frontier town between the papal states and the kingdom of Naples, just in the territory of the latter — the Via Appia can easily be blocked either N.W. at the actual frontier called

Portella 1 or S.E. of it — affected it a good deal during the French Revolution and the events which led up to the unification of Italy.

The Lago di Fondi, which lies in the middle of the plain, and the partially drained marshes surrounding it, compelled the ancient Via Appia, followed by the modern road, to make a considerable detour. The lake was also known in classical times as lacus Amyclanus, from the town of Amyclae or Amunclae, which was founded, according to legend, by Spartan colonists, and probably destroyed by the Oscans in the 5th century B.C. (E. Pais in Rendiconti dei Lincei, 1906, 611 seq.); the bay was also known as mare Amunclanum.

The ancient Speluncae (mod. Sperlonga) on the coast also belonged to the territory of Fundi. Here was the imperial villa in which Sejanus saved the life of Tiberius, who was almost crushed by a fall of rock. Considerable remains of it, and of the caves from which it took its name, still exist 1 m. S.E. of the modern village. For modern discoveries see P. di Tucci in Notizie degli scavi (1880), 480; G. Patroni, ibid. (1898), 493. The wine of Fundi is spoken of by ancient writers, though the ager Caecubus, the coast plain round the Lago di Fundi, was even more renowned, and Horace frequently praises its wine; and though Pliny the Elder speaks as if its production had almost entirely ceased in his day (attributing this to neglect, but even more to the excavation works of Nero's projected canal from the lacus Avernus to Ostia), Martial mentions it often, and it is spoken of in the inscription of a wine-dealer of the time of Hadrian, together with Falernian and Setian wines (Corpus inscripl. Lat. vi. Berlin, 1882, 9797). The plain of Fondi is the northernmost point in Italy where the cultivation of oranges and lemons is regularly carried on in modern times.

See G. Conte Colino, Storia di Fondi (Naples, 1902) ; B. Amante and R. Bianchi, Memorie storiche e statutarie di Fondi in Campania, (Rome, 1903) ; T. Ashby, in English Historical Review, xix. (1904) 557 seq. (T. As.)

FONNI, a town of Sardinia, in the province of Sassari, 3280 ft. above sea-level, to the N.W. of Monte Gennargentu, 21 m. S. of Nuoro by road. Pop. (1901) 4323. It is the highest village in Sardinia, and situated among fine scenery with some chestnut woods. The church of the Franciscans, built in 1708, contains some curious paintings by local artists. The costumes are ex- tremely picturesque, and are well seen on the day of St John the Baptist, the patron saint. The men's costume is similar to that worn in the district generally; the linen trousers are long and black gaiters are worn. The women wear a white chemise; over that a very small corselet, and over that a red jacket with blue and black velvet facings. The skirt is brown above and red below, with a blue band between the two colours; it is accordion-pleated. Two identical skirts are often worn, one above the other. The unmarried girls wear white kerchiefs, the married women black. A little to the N. of Fonni, by the high-road, stood the Roman station of

Sorabile, mentioned in the Antonine Itinerary as situated 87 m. from Carales on the road to Olbia. Excavations made in 1879 and 1880 led to the discovery of the remains of this station, arranged round three sides of a courtyard some 100 ft. square, including traces of baths and other buildings, and a massive embanking wall above them, some 150 ft. in length, to protect them from landslips (F. Vivanet, in Notizie degli scavi, 1879, 350; 1881, 31), while a discharge certificate {tabula honeslae missionis) of sailors who had served in the classis Ravennas was found in some ruins here or hereabouts (id. ib., 1882, 440; T. Mommsen, Corp. inscr. Lat. x. 8325). Near Fonni, too, are several " menhirs " (called pietre celtiche in the district) and other prehistoric remains. (T. As.)

FONSAGRADA, a town of north-western Spain, in the province of Lugo; 25 m. E.N.E. of Lugo by road. Pop. (1900) 17,302. Fonsagrada is situated 3166 ft. above the sea, on the watershed between the rivers Rodil and Suarna. It is an important market for all kinds of agricultural produce, and manufactures linen and frieze; but its trade is mainly local, owing to the mountainous

1 For the pass of Ad Lautulas see Terracina.

character of the neighbourhood, and the lack of a railway or navigable waterway, which prevent the development of any considerable export trade.

FONSECA, MANOEL DEODORO DA (182 7-1 89 2), first president of the united states of Brazil, was born at Alagoas on the 5th of August 1827, being the third son of Lieut. Colonel Manoel Mendes da Fonseca (d. 1859). He was educated at the military school of Rio de Janeiro, and had attained the rank of captain in the Brazilian army when war broke out in 1864 against Montevideo, and afterwards against Solano Lopez, dictator of Paraguay. His courage gained him distinction, and before the close of the war in 1870 he reached the rank of colonel, and some years later that of general of division. After holding several military commands, he was appointed in 1886 governor of the province of Rio Grande do Sul. In this position he threw himself heartily into politics, espoused the republican opinions then becoming prevalent, and sheltered their exponents with his authority. After a fruitless remonstrance, the government at the close of the year removed him from his post, and recalled him to the capital as director of the service of army material. Finding that even in that post he still continued to encourage insubordination, the minister of war, Alfredo Chaves, dismissed him from office. On 14th of May 1887, in conjunction with the viscount de Pelotas, Fonseca issued a manifesto in defence of the military officers' political rights. From that time his influence was supreme in the army. In December 1888, when the Con servative Correa d'Oliveira

became prime minister, Fonseca was appointed to command an army corps on the frontier of Matto Grosso. In June 1889 the ministry was overthrown, and on a dissolution an overwhelming Liberal majority was returned to the chamber of deputies. Fonseca returned to the capital in September. Divisions of opinion soon arose within the Liberal party on the question of provincial autonomy. The more extreme desired the inauguration of a complete federal system. Amongst the most vehement was Ruy Barbosa, the journalist and orator, and after some difficulty he persuaded Fonseca to head an armed movement against the government. The insur- rection broke out on the 15th of November 1889. The govern- ment commander, Almeida Barreto, hastened to place himself under Fonseca's orders, and the soldiers and sailors made common cause with the insurgents. The affair was almost bloodless, the minister of marine, baron de Ladario, being the only person wounded. Fonseca had only intended to overturn the ministry, but he yielded to the insistency of the republican, leaders and proclaimed a republic. A provisional government was constituted by the army and navy in the name of the nation, with Fonseca at its head. The council was abolished, and both the senate and the chamber of deputies were dissolved. The emperor was requested to leave the territory of Brazil within twenty-four hours, and on the 17 th of November was embarked on a cruiser for Lisbon. On the 20th of December a decree oi banishment was pronounced against the imperial family. So universal was the republican sentiment that there was no attempt at armed resistance. The provisional government exercised dictatorial powers for a year, and on the 25th of February 1891 Fonseca was elected president of the republic. He was, however, no politician, and possessed indeed little ability beyond the art of acquiring popularity. His tenure of office was short. In May be became involved in an altercation with congress, and in November pronounced its dissolution, a measure beyond his constitutional power. After a few days of arbitrary rule insur- rection broke out in Rio Grande do Sul, and before the close of November Fonseca, finding himself forsaken, resigned his office. From that time he lived in retirement. He died at Rio de Janeiro on the 23rd of August 1892.

FONSECA, Amapala or Conchagua, BAY OF, an inlet of the Pacific Ocean in the volcanic region between the Central American republics of Honduras, Salvador and Nicaragua. The bay is unsurpassed in extent and security by any other harbour on the Pacific. It is upwards of 50 m. in greatest length, by about 30 m. in average width, with an entrance from the sea about 18 m. wide, between the great volcanoes of Gonchagua (3800 ft.)

and Coseguina (3000 ft.). The lofty islands of Conchaguita and Mianguiri, with a collection of rocks called " Los Farellones," divide the entrance into four distinct channels, each of sufficient depth for the largest vessels. A channel called " El Estero Real " extends from the extreme southern point of the bay into Nicaragua for about 50 m., reaching within 20 or 25 m. of Lake Managua. The principal islands in the bay are Sacate Grande, Tigre, Gueguensi and Esposescion belonging to Honduras, and Martin Perez, Punta Sacate, Conchaguita and Mianguiri belonging to Salvador. Of these Sacate Grande is the largest, being about 7 m. long by 4 broad. The island of Tigre from its position is the most important in the bay, being about 20 m. in circumference, and rising in a cone to the height of 2500 ft. On the southern and eastern shores of the island the lava forms black rocky barriers to the waves, varying in height from 10 to 80 ft.; but on the northward and eastward are a number of playas or smooth, sandy beaches. Facing one of the most considerable of these is the port of Amapala (g.v.). Fonseca Bay was discovered in 1522 by Gil Gonzalez de Avila, and named by him after his patron, Archbishop Juan Fonseca, the implacable enemy of Columbus.

FONT (Lat. fans, " fountain " or " spring," Ital. fonte, Fr. les fonts), the vessel used in churches to hold the water for Christian baptism. In the apostolic period baptism was ad- ministered at rivers or natural springs (cf. Acts viii. 36), and no doubt the primitive form of the rite was by immersion in the water. Infusion — pouring water on the head of the neophyte — was early introduced into the west and north of Europe on account of the inconvenience of immersion, as well as its occasional danger; this form has never been countenanced in the Oriental churches. Aspersion, or sprinkling, was also admitted as valid, but recorded early examples of its use are rare (see Baptism). These different modes of administering baptism have caused corresponding changes in the receptacles for the water. After the cessation of persecution, when ritual and ornament began to develop openly, special buildings were erected for administering the rite of baptism. This was obviously necessary, for a large piscina (basin or tank) in which candidates could be immersed would occupy too much space of the church floor itself. These baptisteries consisted of tanks entered by steps (an ascent of three, and descent of four, to the water was the normal but not the invariable number) and covered with a domed chamber (see Baptistery).

By the 9th century, however, the use of separate baptisteries had generally given place to that of fonts. The material of which these were made was stone, often decorative marble; as early as 524, however, the council of Lerida enacted that if a stone font were not procurable the presbyter was to provide a suitable vessel, to be used for the sacrament exclusively, which might be of any material. In the Eastern Church the font never became an important decorative article of church furniture : "The font, KoXvfxpifipa

(says Neale, Eastern Church, i. 214), in the Eastern Church is a far less conspicuous object than it is in the West. Baptism by immersion has been retained; but the font seldom or never possesses any beauty. The material is usually either metal or wood. In Russia the columbethra is movable and only brought out when wanted."

One of the most elaborate of early fonts is that described by Anastasius in the Lateran church at Rome, and said to have been presented thereto by Constantine the Great. It was of porphyry, overlaid with silver inside and out. In the middle were two porphyry pillars carrying a golden dish, on which burnt the Paschal lamp (having an asbestos wick and fed with balsam). On the rim of the bowl was a golden lamb, with silver statues of Christ and St. John the Baptist. Seven silver stags poured out water. This elaborate vessel was of course exceptional; the majority of early fonts were certainly much simpler. A fine early Byzantine stone example exists, or till recently existed, at Beer-Sheba.

Few if any fonts survive older than the nth century. These are all of stone, except a few of lead; much less common are fonts of cast bronze (a fine example, dated 1112, exists at the

Church of St Barthelemy, Liege). The most ancient are plain cylindrical bowls, with a circular — sometimes cruciform or quatrefoil — outline to the basin, either without support or with a single central pillar; occasionally there is more than one pillar. The basins are usually lined with lead to prevent absorption by the stone. The church of Efenechtyd, Denbigh, possesses an ancient font made of a single block of oak. Though the circular form is the commonest, early Romanesque fonts are not infrequently square; and sometimes an inverted truncated cone is found. Octagonal fonts are also known, though uncommon; hexagons are even less common, and pentagons very rare. There is a pentagonal font of this period at Cabourg, dept. Calvados, N. France.

Fonts early began to be decorated with sculpture and relief. Arcading and interlacing work are common; so are symbol and pictorial representation. A very remarkable leaden font is preserved at Strassburg, bearing reliefs representing scenes in the life of Christ. At Pont-a-Mousson on the Moselle are bas- reliefs of St John the Baptist preaching, and baptizing Christ. Caryatides sometimes take the place of the pillars, and sculp- tured animals and grotesques of strange design not infrequently form the base. More remarkable is the occasional persistence of pagan symbolism; an interesting example is the very ancient font from Ottrava, Sweden, which, among a series of Christian symbols and figures on its panels, bears a representation of Thor (see G. Stephens' brochure, Thunor the Thunderer).

In the 13th century octagonal fonts became commoner. A very remarkable example exists at the cathedral of Hildesheim in Hanover, resting on four kneeling figures, each bearing a vase from which water is running (typical of the rivers of Paradise). Above is an inscription explaining the connexion of these rivers with the virtues of temperance, courage, justice and prudence. On the sides of the cup are representations of the passage of the Jordan, of the Red Sea, the Baptism of Christ, and the Virgin and Child. The font has a conical lid, also ornamented with bas-reliefs. A cast of this font is to be seen in the Victoria and Albert Museum at South Kensington. A leaden font, with figures of Our Lord, the Virgin Mary, St Martin, and the twelve Apostles, exists at Mainz; it is dated 1328 by a set of four leonine hexa- meters inscribed upon it. In the 14th and succeeding centuries octagonal fonts became the rule. They are delicately ornamented with mouldings and similar decorations, in the contemporary style of Gothic architectural art. Though the basin is usually circular in 15th-century fonts, examples are not infrequently found in which the outline of the basin follows the octagonal shape of the outer surface of the vessel. Examples of this type are to be found at Strassburg, Freiburg and Basel.

In England no fonts can certainly be said to date before the Norman conquest, although it is possible that a few very rude examples, such as those of Washaway, Cornwall, and Denton, Sussex, are actually of Saxon times; of course we cannot count as " Saxon fonts " those adapted from pre-Norman sculptured stones originally designed for other purposes, such as that at Dolton, Devonshire. On the other hand, Norman fonts are very common, and are often the sole surviving relics of the Norman parish church. They are circular or square, sometimes plain, but generally covered with carving of arcades, figures, foliage, &c. Among good examples that might be instanced of this period are Alphington, Devon (inverted cone, without foot); Stoke Cannon, Devon (supported on caryatides); Ham, Staffs (cup-shaped); Fincham, Burnham Deepdale, Sculthorpe, Toftrees, and Shernborne in Norfolk (all, especially the last, remarkable for elaborate carving); Youlgrave, Derby (with a projecting stoup in the side for the chrism — a unique detail); besides others in Lincoln cathedral; Iffley, Oxon; Newenden, Kent; Coleshill, Warwick; East Meon, Hants; Castle Frome, Herefordshire. Some of the best examples of " Norman " fonts in England (such as the notable specimen in Winchester cathedral) were probably imported from Belgium. In the Transitional period we may mention a remarkable octagonal font at Belton, Lincolnshire; in this period fall most of the leaden fonts that remain in England, of which thirty are known (7 in

Gloucestershire, 4 in Berkshire and Kent, 3 in Norfolk, Oxford and Sussex, 1 in Derby, Dorset, Lincoln, Somerset, Surrey and Wiltshire) ; perhaps the finest examples are at Ashover, Derby- shire, and Walton, Surrey. Early English fonts are com- paratively rare. They bear the moulding, foliage and tooth ornament in the usual style of the period. A good example of an Early English font is at All Saints, Leicester; others may be seen at St Giles', Oxford, and at Lackford, Suffolk. Fonts of the Decorated period are commoner, but not so frequent as those of the preceding Norman or subsequent Perpendicular periods. Fonts of the Perpendicular period are very common, and are generally raised upon steps and a lofty stem, which, together with the body of the font, are frequently richly ornamented with panelling. It was also the custom during this period to ornament the font with shields and coats of arms and other heraldic insignia, as at Heme, Kent. The fonts of this period, however, are as a rule devoid of interest, and, like most Perpendicular work, are stiff and monotonous. There is, however, a remarkable font, with sculptured figures, belonging to the late 14th century, at West Drayton in Middlesex.

In Holyrood chapel there was a brazen font in which the royal children of Scotland were baptized. It was carried off in 1544 by Sir R. Lea, and given by him to the church at St Albans, but was afterwards destroyed by the Puritans. A silver font existed at Canterbury, which was sometimes brought to West- minster on the occasion of a royal baptism. At Chobham, Surrey, there is a leaden font covered with oaken panels of the 16th century. The only existing structure at all recalling the ancient baptisteries in English churches is found at Luton in Bedfordshire. The font at Luton belongs to the Decorated style, and is enclosed in an octagonal structure of freestone, consisting of eight pillars about 25 ft. in height, supporting a canopy. The space around the font is large enough to hold twelve adults comfortably. At the top of the canopy is a vessel for containing the consecrated water, which when required was let down into the font by means of a pipe.

In 1236 it was ordered by Edmund, archbishop of Canterbury, that baptismal fonts should be kept under lock and key, as a precaution against sorcery: — " Fontes baptismales sub sera clausi teneantur propter sortilegia." The lids appear at first to have been quite simple and flat. They gradually, however, partook of the ornamentation of the font itself, and are often of pyramidal and conical forms, highly decorated with finials, crockets, mouldings and grotesques. Sometimes these covers are very heavy and are suspended by chains to enable them to be raised at will. Very rich font covers may be seen at Ewelme, Oxon; St Gregory, Sudbury; North Walsingham, Norfolk; Worlingworth, Suffolk. The ordinary position of the font in the church was and is near the entrance, usually to the left of the south door.

See Arcisse de Caumont, Cours a" antiquites monumenlales (Paris, 1830-1843); Francis Simpson, A Serins of Antient Baptismal Fonts (London, 1828); Paley, Ancient Fonts; fi. E. Viollet-le-Duc, Diet, raisonne de V architecture (1858-1868), vol. v. ; J. H. Parker's Glossary of Architecture; Francis Bond, Fonts and Font-Covers (London, 1908). A large number of fine illustrations of fonts, principally of the earlier periods, will be found in the volumes of the Reliquary and Illustrated Archaeologist. (R. A. S. M.)

FONTAINE, PIERRE FRANCOIS LEONARD (1762-1853), French architect, was born at Pontoise on the 20th of September 1762. He came of a family several of whose members had dis- tinguished themselves as architects. Leaving the college of Pontoise at the age of sixteen he was sent to LTsle-Adam to assist in hydraulic works undertaken by the architect Andre. To facilitate his improvement Andre allowed him to have access to his plans and to copy his designs. In October 1779 he was sent to Paris to study in the school of Peyre the younger, and there began his acquaintance with Percier, which ripened into a life-long friendship. After six years of study he competed for a prize at the Academy, and, winning the second for the plan of an underground chapel, he received a pension and was sent to Rome (1785). Percier accompanied him. The Revolution breaking out soon after his return to France, he took refuge in

England; but after the establishment of the consulate he was employed by Bonaparte, to whom he had been introduced by the painter, David, to restore the palace of Malmaison. Hence- forth he was fully engaged in the principal architectural works executed in Paris as architect successively to Napoleon I., Louis XVIII. and Louis Philippe. In conjunction with Percier (till his death) he was employed on the arch of the Carrousel, the restoration of the Palais-Royal, the grand staircase of the Louvre, and the works projected for the union of the Louvre and the Tuileries. In 18 12 he was admitted a member of the Academy of Fine Arts, and in 18 13 was named first architect to the emperor. With Percier he published the following works — Palais, maisons, et autres edifices de Rome moderne (1802); Descriptions de cire'monies et de fetes (1807 and 18 10); Recueil de decorations interieures (181 2); Choix des plus celcbres maisons de plaisance de Rome et des environs (1809-1813); Residences des souverains, Par allele (1833). L'histoire du Palais- Royal was published by Fontaine alone, who lost Percier, his friend and associate, in 1838, and himself died in Paris on the 10th of October 1853.

FONTAINEBLEAU, a town of northern France, capital of an arrondissement in the department of Seine-et-Marne, 37 m. S.E. of Paris on the railway to Lyons. Pop. (1906) 11,108. Fontaine- bleau, a town of clean, wide and well-built streets, stands in the midst of the forest of

Fontainebleau, nearly 2 m. from the left bank of the Seine. Of its old houses, the Tambour mansion, and a portion of that which belonged to the cardinal of Ferrara, both of the 16th century, are still preserved; apart from the palace, the public buildings are without interest. A statue of General Damesme (d. 1848) stands in the principal square, and a monument to President Carnot was erected in 1895. Fontaine- bleau is the seat of a subprefect and has a tribunal of first instance and a communal college. The school of practical artillery and engineering was transferred to Fontainebleau from Metz by a decree of 187 1, and now occupies the part of the palace surrounding the cour des offices.

Fontainebleau has quarries of sand and sandstone, saw-mills, and manufactories of porcelain and gloves. Fine grapes are grown in the vicinity. The town is a fashionable summer resort, and during the season the president of the Republic frequently resides in the palace. This famous building, one of the largest, and in the interior one of the most sumptuous, of the royal residences of France, lies immediately to the south-east of the town. It consists of a series of courts surrounded by buildings, extending from W. to E.N.E.; they comprise the Cour du Cheval Blanc or des Adieux (thus named in memory of the parting scene between Napoleon and the Old Guard in 18 14), the Cour de la Fontaine, the Cour Ovale, built on the site of a more ancient chateau, and the Cour d' Henri IV.: the smaller Cour des Princes adjoins the northern wing of the Cour Ovale. The exact origin of the palace and of its name (Lat. Fons Bleaudi) are equally unknown, but the older chateau was used in the latter part of the 12th century by Louis VII., who caused Thomas Becket to consecrate the Chapelle St Saturnin, and it continued a favourite residence of Philip Augustus and Louis IX. The creator of the present edifice was Francis I., under whom the architect Gilles le Breton erected most of the buildings of the Cour Ovale, including the Porte Doree, its southern entrance, and the Salle des Fetes, which, in the reign of Henry II., was decorated by the Italians, Francesco Primaticcio and Nicolo dell' Abbate, and is perhaps the finest Renaissance chamber in France. The Galerie de Francois I. and the lower storey of the left wing of the Cour de la Fontaine are the work of the same architect, who also rebuilt the two-storeyed Chapelle St Saturnin. In the same reign the Cour du Cheval Blanc, including the Chapelle de la Ste Trinite and the Galerie d'Ulysse, destroyed and rebuilt under Louis XV., was constructed by Pierre Chambiges. After Francis I., Fontainebleau owes most to Henry IV., to whom are due the Cour d' Henri IV., the Cour des Princes, with the adjoining Galerie de Diane, and Galerie des Cerfs, used as a library. Louis XIII. built the graceful horseshoe staircase in the Cour du Cheval Blanc; Napoleon I. spent 12,000,000 francs

FONTAN, L. M.— FONTANA, P.

on works of restoration, and Louis XVIII., Louis Philippe and Napoleon III. devoted considerable sums to the same end. The palace is surrounded by gardens and ornamental waters — to the north the Jardin de l'Orangerie, to the south the Jardin Anglais and the Parterre, between which extends the lake known as the Bassin des Carpes, containing carp in large numbers. A space of over 200 acres to the east of the palace is covered by the park, which is traversed by a canal dating from the reign of Henry IV. On the north the park is bordered by a vinery producing fine white grapes.

Forest of Fontainebleau. — The forest of Fontainebleau is one of the most beautiful wooded tracts in France, and for generations it has been the chosen haunt of French landscape painters. Among the most celebrated spots are the Vallee de la Solle, the Gorge aux Loups, the Gorges de Franchard and d'Apremont, and the Fort l'Empereur. The whole area extends to 42,200 acres, with a circumference of 56 m. Nearly a quarter of this area is of a rocky nature, and the quarries of sandstone supplied a large part of the paving of Paris. The oak, pine, beech, horn- beam and birch are the chief varieties of trees.

It is impossible to do more than mention a few of the historical events which have taken place at Fontainebleau. Philip the Fair, Henry III. and Louis XIII. were all born in the palace, and the first of these kings died there. James V. of Scotland was there received by his intended bride; and Charles V. of Germany was entertained there in 1539. Christina of Sweden lived there for years, and the gallery is still to be seen where in 1657 she caused her secretary Monaldeschi to be put to death. In 1685 Fontainebleau saw the signing of the revocation of the edict of Nantes, and in the following year the death of the great Conde. In the 18th century it had two illustrious guests in Peter the Great of Russia and Christian VII. of Denmark; and in the early part of the 19th century it was twice the residence of Pius VII., — in 1804 when he came to consecrate the emperor Napoleon, and in 1812-1814, when he was his prisoner.

See Pfnor, Monographic de Fontainebleau, with text by Cham- pollion Figeac (Paris, 1 866) ; Guide artistique et historique au palais de Fontainebleau (Paris, 1889); E. Bourges, Recherches sur Fontaine- bleau (Fontainebleau, 1896).

FONTAN, LOUIS MARIE (1801-1839), French man of letters, was born at Lorient on the 4th of November 1801. He began his career as a clerk in a government office, but was dismissed for taking part in a political banquet. At the age of nineteen he went to Paris and began to contribute to the Tablettes and the Album. He was brought to trial for political articles

written for the latter paper, but defended himself so energetically that he secured the indefinite postponement of his case. The offending paper was suppressed for a time, and Fontan produced a collection of political poems, Odes et ipitres, and a number of plays, of which Perkins Warbec (1828), written in collaboration with MM. Halevy and Drouineau, was the most successful. In 1828 the Album was revived, and in it Fontan published a virulent but witty attack on Charles X., entitled Le Mouton enrage (20th June 1829). To escape the inevitable prosecution Fontan fled over the frontier, but, finding no safe asylum, he returned to Paris to give himself up to the authorities, and was sentenced to five years' imprisonment and a heavy fine. He was liberated by the revolution of 1830, and his Jeanne lafolle, performed in the same year, gained a success due perhaps more to sympathy with the author's political principles than to the merits of the piece itself, a somewhat crude and violent picture of Breton history. A drama representing the trial of Marshal Ney, which he wrote in collaboration with Charles Dupenty, Le Proces d'un marechal de France (printed 183 1), was suppressed on the night of its production. Fontan died in Paris on the 10th of October 1839.

A sympathetic portrait of Fontan as a prisoner, and an analysis of his principal works, are to be found in Jules Janin's Histoire de la Utterature dramatique, vol. i.

FONTANA, DOMENICO (1543-1607), Italian architect and mechanician, was born at Mili, a village on the Lake of Como, in 1543. After a good training in mathematics, he went in 1563 to join his elder brother, then studying architecture at Rome.

He made rapid progress, and was taken into the service of Cardinal Montalto, for whom he erected a chapel in the church of Santa Maria Maggiore and the villa Negroni. When the cardinal's pension was stopped by the pope, Gregory XIII., Fontana volunteered to complete the works in hand at his own expense. The cardinal being soon after elected pope, under the name of Sixtus V., he immediately appointed Fontana his chief architect. Amongst the works executed by him were the Lateran palace, the palace of Monte Cavallo (the Quirinal), the Vatican library, &c. But the undertaking which brought Fontana the highest repute was the removal of the great Egyptian obelisk, which had been brought to Rome in the reign of Caligula, from the place where it lay in the circus of the Vatican. Its erection in front of St Peter's he accomplished in 1 586. After the death of Sixtus V., charges were brought against Fontana of misappropriation of public moneys, and Clement VIII. dismissed him from his post (1592). This appears to have been just in time to save the Colosseum from being converted by Fontana into a huge cloth factory, according to a project of Sixtus V. Fontana was then called to Naples, and accepted the appointment

of architect to the viceroy, the count of Miranda. At Naples he built the royal palace, constructed several canals and projected a new harbour and bridge, which he did not live to execute. The only literary work left by him is his account of the removal of the obelisk (Rome, 1590). He died at Naples in 1607, and was honoured with a public funeral in the church of Santa Anna. His plan for a new harbour at Naples was carried out only after his death. His son Giulio Cesare succeeded him as royal architect in Naples, the university of that town being his best-known building.

FONTANA, LAVINIA (1552-1614), Italian portrait-painter, was the daughter of Prospero Fontana (q.v.). She was greatly employed by the ladies of Bologna, and, going thence to Rome, painted the likenesses of many illustrious personages, being under the particular patronage of the family (Buoncampagni) of Pope Gregory XIII., who died in 1585. The r oman ladies, from the days of this pontiff to those of Paul V., elected in 1605, showed no less favour to Lavinia than their Bolognese sisters had done; and Paul V. was himself among her sitters. Some of her portraits, often lavishly paid for, have been attributed to Guido. – In works of a different kind also she united care and delicacy with boldness. Among the chief of these are a Venus in the Berlin museum; the " Virgin lifting a veil from the sleeping infant Christ," in the Escorial; and the " Queen of Sheba visiting Solomon." Her own portrait in youth — she was accounted very beautiful — was perhaps her masterpiece; it belongs to the counts Zappi of Imola, the family into which Lavinia married. Her husband, whose name is given as Paolo Zappi or Paolo Foppa, painted the draperies in many of Lavinia 's pictures. She is deemed on the whole a better painter than her father; from him naturally came her first instruction, but she gradually adopted the Carac- cesque style, with strong quasi-Venetian colouring. She was elected into the Academy of Rome, and died in that city in 1614.

FONTANA, PROSPERO (1512-1597), Italian painter, was born in Bologna, and became a pupil of Innocenzo da Imola. He afterwards worked for Vasari and Perino del Vaga. It was probably from Vasari that Fontana acquired a practice of off- hand, self-displaying work. He undertook a multitude of com- missions, and was so rapid, that he painted, it is said, in a few weeks an entire hall in the Vitelli palace at Citta di Castello. Along with daring, he had fertility of combination, and in works of parade he attained a certain measure of success, although his drawing was incorrect and his mannerism palpable. He belongs to the degenerate period of the Bolognese school, under the influence chiefly of the imitators of Raphael — Sabbatini, Sam- machini and Passerotti being three of his principal colleagues. His soundest successes were in portraiture, in which branch of art he stood so high that towards 1550 Michelangelo introduced him to Pope Julius III. as a portrait-painter; and he was pensioned by this pope, and remained at the pontifical court with the three successors of

Julius. Here he lived on a grand scale, and figured as a sort of arbiter and oracle among his

professional brethren. Returning to Bologna, after doing some work in Fontainebleau and in Genoa, he opened a school of art, in which he became the preceptor of Lodovico and Agostino Caracci; but these pupils, standing forth as reformers and innovators, finally extinguished the academy and the vogue of Fontana. His subjects were in the way of sacred and profane history and of fable. He has left a large quantity of work in Bologna, — the picture of the " Adoration of the Magi," in the church of S. Maria delle Grazie, being considered his masterpiece — not unlike the style of Paul Veronese. He died in Rome in

1597-

FONTANE, THEODOR (1819-1898), German poet and novelist, was born at Neu-Ruppin on the 30th of December 18 19. At the age of sixteen he was apprenticed to a chemist, and after qualifying as an apothecary, he found employment in Leipzig and Dresden. In 1844 he travelled in England, and settling in Berlin devoted himself from 1849 to literature. He made repeated journeys to England, interesting himself in old English ballads, and as the firstfruits of his tours published Ein Sommer in London (1854); Aus England, Studien und Briefe (i860) and Jenseit des Tweed, Bilder und Briefe aus Schottland (i860). Fontane was particularly attached to the Mark of Brandenburg, in which his home lay; he was proud of its past achievements, and delighted in the growth of the capital city, Berlin. The fascination which the country of his birth had for him may be seen in his delightfully picturesque Wanderungen durch die Mark Brandenburg (1862-1882, 4 vols.). He also described the wars of Prussia in Der schleswig-holsteinische Krieg im Jahre 1864 (1866) and Der deutsche Krieg von 1866 (1869). He proceeded to the theatre of war in 1870, and, being taken prisoner at Vaucouleurs, remained three months in captivity. His experiences he narrates in Kriegsgefangen. Erlebtes 1870 (1871), and he published the result of his observations of the campaign in Der Krieg gegen Frankreich 1870-71 (1874-1876). Like most of his contemporaries, he at first sought inspiration for his poetry in the heroes of other countries. His Gedichte (1851) and ballads Manner und Helden (1 860) tell of England's glories in bygone days. Then the achievements of his own countrymen entered into rivalry, and these, as an ardent patriot, he immortalized in poem and narra- tive. It is, however, as a novelist that Fontane is best known. His fine historical romance Vor dem Sturm (1878)

was followed by a series of novels of modern life: V Adulter a (1882); Schach von Wuthenow (1883); Irrungen, Wirrungen (1888); Stine (1890); Unwiederbringlich (1891); Effi Briest (1895); Der Stechlin (1899), in which with fine literary tact Fontane adapted the realistic methods and social criticism of contemporary French fiction to the conditions of Prussian life. He died on the 20th of September 1898 at Berlin.

Fontane's Gesammelte Romane und Erzahlungen were published in 12 vols. (1890-1891; 2nd ed., 1905). For his life see the auto- biographical works Meine Kinderjahre (1894) and Von zwanzig bis dreissig (1898), also Briefe an seine Familie (1905) ; also F. Servaes, Theodor Fontane (1900).

FONTANES, LOUIS, Marquis de (1757-1821), French poet and politician, was born at Niort (Deux Sevres) on the 6th of March 1757. He belonged to a noble Protestant family of Languedoc which had been reduced to poverty by the revocation of the edict of Nantes. His father and grandfather remained Protestant, but he was himself brought up as a Catholic. His parents died in 1774-1775, and in 1777 Fontanes went to Paris, where he found a friend in the dramatist J. F. Ducis. His first published poems, some of which were inspired by English models, appeared in the Almanack des Muses; " Le Cri de mon cceur," describing his own sad childhood, in 1778; and " La Foret de Navarre " in 1780. His translation from Alexander Pope, L'Essai sur I'homme, was published with an elaborate preface in 1783, and La Chartreuse and Le Jour des morts in the same year, Le Verger in 1788 and his Epltre sur 1'edit en faveur des non-catholiques, and the Essai sur I'astronomie in 1789. Fontanes was a moderate reformer, and in 1790 he became joint-editor of the Moderateur. He married at Lyons in 1792, and his wife's first child was born during their flight from the

siege of that town. Fontanes was in hiding in Paris when the four citizens of Lyons were sent to the Convention to protest against the cruelties of Collot d'Herbois. The petition was drawn up by Fontanes, and the authorship being discovered, he fled from Paris and found shelter at Sevran, near Livry, and afterwards at Andelys. On the fall of Robespierre he was made professor of literature in the Ecole Centrale des Quatre-Nations, and he was one of the original members of the Institute. In the Memorial, a journal edited by La Harpe, he discreetly advocated reaction to the monarchical principle. He was exiled by the Directory and made his way to London, where he was closely associated with Chateaubriand. He soon returned to France, and his admiration for Napoleon, who commissioned him to write an eloge on Washington, secured his return to the Institute and his political promotion. In 1802 he was elected to the legis- lative chamber, of which he was president from 1804 to 1810. Other honours and titles followed. He

has been accused of servility to Napoleon, but he had the courage to remonstrate with him on the judicial murder of the due d'Enghien, and as grand master of the university of Paris (1808-18 15) he con- sistently supported religious and monarchical principles. He acquiesced in the Bourbon restoration, and was made a marquis in 18 1 7. He died on the 17th of March 182 1 in Paris, leaving eight cantos of an unfinished epic poem entitled La Grece sauvSe.

The verse of Fontanes is polished and musical in the style of the 18th century. It was not collected until 1839, when Sainte- Beuve edited the CEuvres (2 vols.) of Fontanes, with a sym- pathetic critical study of the author and his career. But by that time the Romantic movement was in the ascendant and Fontanes met with small appreciation.

FONTENAY-LE-COMTE, a town of western France, capital of an arrondissement in the department of Vendee 30 m. N.E. of La Rochelle on the State railway between that town and Saumur. Pop. (1906) town, 7639; commune, 10,326. Fontenay, an ancient and straggling town, is situated a few miles south of the forest of Vouvant and on both banks of the Vendee, at the point where it becomes navigable. The church of Notre-Dame (15th to 18th centuries), which has a fine spire and a richly sculptured western entrance, and the church of St Jean (16th and 17th centuries) are the chief religious buildings. The town has several houses of the 16th and 17th centuries. The most remarkable of these is the Hotel de Terre Neuve (1 595-1600), which contains much rich decoration together with collections of furniture and tapestry. Fontenay was the birthplace of many prominent men during the 15th and 16th centuries, and the Fontaine des Quatre-Tias, a fountain in the Renaissance style, given to the town by King Francis I., commemorates the fact. The chief square is named after Francois Viete, the great mathematician, who was born at Fontenay in 1540. The public institutions of the town include a tribunal of first instance and a communal college. Among its industries are the manufacture of felt hats, oil and soap and timber-sawing, flour-milling and tanning. There is trade in horses, mules, timber, grain, fruit, &c.

Fontenay was in existence as early as the time of the Gauls. The affix of " comte " is said to have been applied to it when it was taken by King Louis IX. from the family of Lusignan and given to his brother Alphonse, count of Poitou, under whom it became capital of Bas-Poitou. Ceded to the English by the treaty of Bretigny in 1360 it was retaken in 1372 by Duguesclin. It suffered repeated capture during the Religious Wars of the 1 6th century, was dismantled in 162 1 and was occupied both by the republicans and the Vendeans in the war of 1793. From 1790 to 1806 it was capital of the department of Vendee.

FONTENELLE, BERNARD LE BOVIER DE (1657-1757), French author, was born at Rouen, on the nth of February 1657. He died in Paris, on the 9th of January 1757, having thus very nearly attained the age of 100 years. His father was an advocate settled in Rouen, his mother a sister of the two Corneille. He was educated at the college of the Jesuits-in his native city, and distinguished himself by the extraordinary precocity and versatility of his talents. His teachers, who readily appreciated these, were anxious for him to join their

order, but his father had designed him for the bar, and an advocate accordingly he became; but, having lost the first cause which was entrusted to him, he soon abandoned law and gave himself wholly to literary pursuits. His attention was first directed to poetry; and more than once he competed for prizes of the French Academy, but never with success. He visited Paris from time to time and established intimate relations with the abbe de Saint Pierre, the abbe Vertot and the mathe- matician Pierre Varignon. He witnessed, in 1680, the total failure of his tragedy A spar. Fontenelle afterwards acknowledged the justice of the public verdict by burning his unfortunate drama. His opera of Thetis et Pelie, 1689, though highly praised by Voltaire, cannot be said to rise much above the others; and it may be regarded as significant that of all his dramatic works not one has kept the stage. His Poesies pastorales (1688) have no greater claim to permanent repute, being char- acterized by stiffness and affectation; and the utmost that can be said for his poetry in general is that it displays much of the limae labor, great purity of diction and occasional felicity of expression.

His Lellres galantes du chevalier d'Her . . ., published anonymously in 1685, was an amusing collection of stories that immediately made its mark. In 1686 his famous allegory of Rome and Geneva, slightly disguised as the rival princesses Mreo and Eenegu, in the Relation de I'tte de Borneo, gave proof of his daring in religious matters. But it was by his Nouveaux Dialogues des morts (1683) that Fontenelle established a genuine claim to high literary rank; and that claim was enhanced three years later by the appearance of the Entreliens sur la pluralitS des mondes (1686), a work which was among the very first to illustrate the possibility of being scientific without being either uninteresting or unintelligible to the ordinary reader. His object was to popularize among his countrymen the astro- nomical theories of Descartes; and it may well be doubted if that philosopher ever ranked a more ingenious or successful expositor among his disciples.

Hitherto Fontenelle had made his home in Rouen, but in 1687 he removed to Paris; and in the same year he published his Histoire des oracles, a book which made a considerable stir in theological and philosophical circles. It consisted of two essays, the first of which was designed to prove that oracles were not given by the supernatural agency of demons, and the second that they did not cease with the birth of Christ. It excited the suspicion of the Church, and a Jesuit, by name Baltus, published a ponderous refutation of it; but the peace-loving disposition of its author impelled him to leave his opponent unanswered. To the following year (1688) belongs his Digression sur les anciens et les modernes, in which he took the modern side in the controversy then raging; his Doutes sur le sysleme physique des causes occasionnelles (against Malebranche) appeared shortly afterwards.

In 1 69 1 he was received into the French Academy in spite of the determined efforts of the partisans of the ancients in this quarrel, especially of Racine and Boileau, who on four previous occasions had secured his rejection. He consequently was admitted a member both of the Academy of Inscriptions and of the Academy of Sciences; and in 1697 he became perpetual secretary to the latter body. This office he actually held for the long period of forty-two years; and it was in this official capacity that he wrote the Histoire du renouvellement del' A cademie des Sciences (Paris, 3 vols., 1708, 1717, 1722) containing extracts and analyses of the proceedings, and also the eloges of themembers, written with great simplicity and delicacy. Perhaps the best known of his ttoges, of which there are sixty-nine in all, is that of his uncle Pierre Corneille. This was first printed in the Nouvelles de la republique des lettres (January 1685) and, as Vie de Corneille, was included in all the editions of Fontenelle's CEuvres. The other important works of Fontenelle are his ilimtnts de la geomelrie de I'infini (1727) and his Apologie des tourbillons (1752). Fontenelle forms a link between two very widely different periods of French literature, that of Corneille, Racine and Boileau on the one hand, and that of Voltaire,

D'Alembert and Diderot on the other. It is not in virtue of his great age alone that this can be said of him; he actually had much in common with the beaux esprils of the 17 th century, as well as with the philosophes of the 18th. But it is to the latter rather than to the former period that he properly belongs.

He has no claim to be regarded as a genius; but, as Sainte- Beuve has said, he well deserves a place " dans la classe des esprits infiniment distinguis " — distinguished, however, it ought to be added by intelligence rather than by intellect, and less by the power of saying much than by the power of saying a little well. In personal character he has sometimes been described

as having been revoltingly heartless; and it is abundantly plain that he was singularly incapable of feeling strongly the more generous emotions — a misfortune, or a fault, which revealed itself in many ways. " Ilfaut avoir de I'dme pour avoir du godl." But the cynical expressions of such a man are not to be taken too literally; and the mere fact that he lived and died in the esteem of many friends suffices to show that the theoretical selfishness which he sometimes professed cannot have been consistently and at all times carried into practice.

There have been several collective editions of Fontenelle's works, the first being printed in 3 vols, at the Hague in 1 728-1 729. The best is that of Paris, in 8 vols. 8vo, 1790. Some of his separate works have been very frequently reprinted and also translated. The Pluralitc des mondes was translated into modern Greek in 1 794. Sainte-Beuve has an interesting essay on Fontenelle, with several useful references, in the Causeries du lundi, vol. iii. See also Ville- main, Tableau de la litterature francaise au XVIII' siecle; the abb6 Trublet, Memoires pour servir d V histoire de la vie et des ouvrages de M. de Fontenelle (1759); A. Laborde-Milaa, Fontenelle (1905), in the "Grands ecrivains franjais " series; and L. Maigron, Fontenelle, I'homme, I'cetivre, I'influence (Paris, 1906).

FONTENOY, a village of Belgium, in the province of Hennegau, about 4 m. S.E. of Tournai, famous as the scene of the battle of Fontenoy, in which on the nth of May 1745 the French army under Marshal Saxe defeated the Anglo-Allied army under the duke of Cumberland. The object of the French (see also Austrian Succession, War or the) was to cover the siege of the then important fortress of Tournai, that of the Allies, who slowly advanced from the east, to relieve it. Informed of the impending attack, Louis XV., with the dauphin, came with all speed to witness the operations, and by his presence to give Saxe, who was in bad health and beset with private enemies, the support necessary to enable him to command effectively. Under Cumberland served the Austrian field-marshal Konigsegg, and, at the head of the Dutch contingent, the prince of Waldeck.

The right of the French position (see map) rested on the river at Antoing, which village was fortified and garrisoned, between Antoing and Fontenoy three square redoubts were constructed, and Fontenoy itself was put in a complete state of defence. On the left rear of this line, and separated from Fontenoy by some furlongs of open ground, another redoubt was made at the corner of the wood of Barry and a fifth towards Gavrain. The infantry was arrayed in deployed lines behind the Antoing-Fontenoy redoubts and the low ridge between Fontenoy and the wood; behind them was the cavalry. The approaches to Gavrain were guarded by a mounted volunteer corps called Grassins. At Calonne the marshal had constructed three military bridges against the contingency of a forced retreat. The force of the

French was about 60,000 of all arms, not including 22,000 left in the lines before Tournai. Marshal Saxe himself, who was suffering from dropsy to such an extent that he was unable t^« moun.t his horse, slept in a wicker chariot in the midst of the troops. At early dawn of the 1 ith of May, the Anglo-Hanoverian army with the Austrian contingent formed up in front of Vezon, facing towards Fontenoy and the wood, while the Dutch on their left extended the general line to Peronne. The total force was 46,000, against about 52,000 whom Saxe could actually put into the line of battle.

The plan of attack arranged by Cumberland, Konigsegg and Waldeck on the 10th grew out of circumstances. A preliminary skirmish had cleared the broken ground immediately about Vezon and revealed a part of the defender's dispositions. It was resolved that the Dutch should attack the front Antoing-

Fontenoy, while Cumberland should deliver a flank attack against Fontenoy and all in rear of it, by way of the open ground between Fontenoy and the wood. A great cavalry attack round the wood was projected but had to be given up, as in the late evening of the ioth the Allies' light cavalry drew fire from its southern edge. Cumberland then ordered his cavalry commander to form a screen facing Fontenoy, so as to cover the formation of the infantry. On the morning of the nth another and most important modification had to be made. The advance was beginning when the redoubt at the corner of the wood became visible. Cumberland hastily told off Brigadier James Ingoldsby (major and brevet-colonel ist Guards), with four regiments and an artillery detachment, to storm this redoubt which, crossing its fire with that of Fontenoy, seemed absolutely to inhibit the development of the flank attack. At 6 a.m. the brigade moved off, but it was irresolutely handled and halted time after time; and after waiting as long as possible, the British and Hanoverian cavalry under Sir James Campbell rode forward and extended

Emery Walker sc

in the plain, becoming at once the target for a furious cannonade which killed their leader and drove them back. Thereupon Sir John (Lord) Ligonier, whose deployment the squadrons were to have covered, let them pass to the rear, and, hearing the guns of the Dutch towards Antoing, pushed the British infantry for- ward through the lanes, each unit on

reaching open ground covering the exit and deployment of the one in rear, all under the French cannonade. This went on for two hours, and save that it showed the magnificent discipline of the British and Hano- verian regiments, was a bad prelude to the real attack. Cumber- land's own exertions brought a few small guns to the front of the Guards' Brigade, and one of the first shots from these killed Antoine Louis, due de Gramont, colonel of the Gardes Francaises, and another Henri du Baraillon du Brocard, Saxe's artillery commander.

It was now 9 a.m., and while the guns from the wood redoubt battered the upright ranks of the Allies, Ingoldsby's brigade was huddled together, motionless, on the right. Cumberland himself galloped thither, and under his reproaches Ingoldsby lost the last remnants of self-possession. To Sir John Ligonier's aide- de-camp, who delivered soon afterwards a bitterly formal order to advance, Ingoldsby sullenly replied that the duke's orders were for him to advance in line with Ligonier's main body.

By now, too, the Dutch advance against Antoing-Fontenoy had collapsed.

But on the right the cannonade and the blunders together had roused a stern and almost blind anger in the leaders and the men they led. Ingoldsby was wounded, and his successor, the Hanoverian general Zastrow, gave up the right attack and brought his battalions into the main body. A second half- hearted attack on Fontenoy itself, delivered by some Dutch troops, was almost made successful by the valour of two of these battalions (one of them being the then newly raised Highland regiment, the Black Watch) which came thither of their own accord. Meantime the young duke and the old Austrian field- marshal had agreed to take all risks and to storm through between Fontenoy and the wood redoubt, and had launched the great attack, one of the most celebrated in the history of war. The English infantry was in two lines. The Hanoverians on their left, owing to want of space, were compelled to file into third line behind the redcoats, and on their outer flanks were the battalions that had been with Ingoldsby. A few guns, man- drawn, accompanied the assaulting mass, and the cavalry followed. The column may have numbered 14,000 infantry. All the infantry battalions closed on their centre, the normal three ranks becoming six. If the proper distances between lines were preserved, the mass must have formed an oblong about 500 yds X 600 yds (excluding the cavalry).

The duke of Cumberland placed himself at the head of the front line and gave the signal to advance. Slowly and in parade order, drums beating and colours flying, the mass advanced, straight up the gentle slope, which was swept everywhere by the flanking artillery of the defence. Then, when the first line reached the low crest on the ends of which stood the French artillery, the fire, hitherto convergent, became a full enfilade from both

sides, and at the same moment the enemy's horse and foot became visible beyond. A brief pause ensued, and the front gradually contracted as regiments shouldered inwards to avoid the fire. Then the French advanced, and the Guards Brigade and the Gardes Francaises met face to face. Captain Lord Charles Flay (d. 1760), lieutenant of the First (Grenadier) Guards, suddenly ran in front of the line, took off his hat to the enemy and drank to them from a pocket flask, shouting a taunt, " We hope you will stand till we come up to you, and not swim the river as you did at Dettingen," then, turning to his own men, he called for three cheers. The astonished French officers returned the salute and gave a ragged counter-cheer. Whether or not the French, as legend states, were asked and refused to fire first, the whole British line fired one tremendous series of volleys by companies. 50 officers and 760 men of the three foremost French regiments fell at once, and at so appalling a loss the remnant broke and fled. Three hundred paces farther on stood the second line of the French, and slowly the mass advanced, firing regular volleys. It was now well inside the French position, and no longer felt the enfilade fire that swept the crest it had passed over. By now, as the rear lines closed up, the assailants were practically in square and repelled various partial attacks coming from all sides. The Regiment du Roi lost 33 officers and 345 men at the hands of the Second (Cold- stream) Guards. But these counter-attacks gained a few precious minutes for the French. It was the crisis of the battle. The king, though the court meditated flight, stood steady with the dauphin at his side, — Fontenoy was the one great day of Louis XV.'s life, — and Saxe, ill as he was, mounted his horse to collect his cavalry for a charge. The British and Hanoverians were now at a standstill. More and heavier counter-strokes were repulsed, but no progress was made; their cavalry was un-able to get to the front, and Saxe was by now thinking of victory. Captain Isnard of the Touraine regiment suggested artillery to batter the face of the square, preparatory to a final charge. General Lowendahl galloped up to Saxe, crying, " This is a great day for the king; they will never escape! " The nearest guns were planted in front of the assailants, and used with effect. The infantry, led by Lowendahl, fastened itself on the sides of the square, the regiments of Normandy and Vaisseaux and the

Irish Brigade conspicuous above the rest. On the front, waiting for the cannon to do its work, were the Maison du Roi, the Gendar- merie and all the light cavalry, under Saxe himself, the duke of Richelieu and count d'Estrees. The left wing of the Allies was si ill inactive, and troops were brought up from Antoing and Fontenoy to support the final blow. About 2 p.m. it was de- livered, and in eight minutes the square was broken. As the

infantry retired across the plain in small stubborn groups the French fire still made havoc in their ranks, but all attempts to close with them were repulsed by the terrible volleys, and they regained the broken ground about Vezon, whence they had come. Cumberland himself and all the senior generals remained with the rearguard.

The losses at Fontenoy were, as might be expected, somewhat less than normally heavy when distributed over the whole of both armies, but exceedingly severe in the units really engaged. Eight out of nineteen regiments of British infantry lost over 200 men, two of these more than 300. A tribute to the loyalty and discipline of the British, as compared with the generality of armies in those days, may be found in the fact that the three Guards' regiments had no " missing " men whatever. The 23rd (Royal Welsh Fusiliers) had 322 casualties. Boschlanger's Hanoverian regiment suffered even more heavily, and four others of that nation had 200 or more casualties. The total loss was about 7500, that of the French 7200. The French " Royal " regiment lost 30 officers and 645 men; some other regimental casualties have been mentioned above. The Dutch lost a bare 7 % of their strength.

Fontenoy was in the 18th century what the attack of the Prussian Guards at St Privat is to-day, a locus classicus for military theorists. But the technical features of the battle are completely overshadowed by its epic interest, and above all it illustrates the permanent and unchangeable military characteristics of the British and French nations.

' FONTEVRAULT, or Fontevraud (Lat. Fons Ebraldi), a town of western France, in the department of Maine-et-Loire, 10 m. S.E. of Saumur by road and 25 m. from the confluence of the Loire and Vienne. Pop. (1906) 1279. It is situated in the midst of the forest of Fontevrault. The interest of the place centres in its abbey, which since 1804 has been utilized and abused as a central house of detention for convicts. The church (12th century), of which only the choir and apse are appropriated to divine service, has a beautiful nave formerly covered by four cupolas destroyed in 1816. There is a fifth cupola above the crossing. In a chapel in the south transept are the effigies of Henry II. of England, of his wife Eleanor of Guienne, of Richard I. of England and of Isabella of Angouieme, wife of John of England — Eleanor's being of oak and the rest of stone. The cloister, refectory and chapter-house date from the 16th century. The second court of the abbey contains a remarkable building, the Tour d'Evrault (12th century), which long went under the misnomer of chapelle funeraire, but was in reality the old kitchen. Details and diagrams will be found in Viollet-le-Duc's Dictionnaire de V architecture. There are three stories, the whole being surmounted by a pyramidal structure.

The Order of Fontevrault was founded about 1 100 by Robert of Arbrissel, who was born in the village of Arbrissel or Arbresec, in the diocese of Rennes, and attained great fame as a preacher and ascetic. The establishment was a double monastery, containing a nunnery of 300 nuns and a monastery of 200 monks, separated completely so that no communication was allowed except in the church, where the services were carried on in common; there were, moreover, a hospital for 120 lepers and other sick, and a penitentiary for fallen women, both worked by the nuns. The basis of the life was the Benedictine rule, but the observance of abstinence and silence went beyond it in stringency. The special feature of the institute was that the abbess ruled the monks as well as the nuns. At the beginning the order had a great vogue, and at the time of Robert's death, 1117, there were several monasteries and 3000 nuns; afterwards the number of monasteries reached 57, all organized on the same plan. The institute never throve out of France; there were attempts to

introduce it into Spain and England: in England there were three houses — at Ambresbury (Amesbury in Wiltshire) , Nuneaton, and Westwood in Worcestershire. The nuns in England as in France were recruited from the highest families, and the abbess of Fontevrault, who was the superior-general of the whole order, was usually of the royal family of France.

See P. Helyot, Hist, des ordres religieuses (1718), vi. cc. 12, 13; Max Heimbucher, Orden und Kongregationen (1907), i. 46; the arts. " Fontevrauld " in Wetzer and Welte, Kirchenlexicon (ed. 2), and in Herzog-Hauck, Realencyklopadie (ed. 3), supply full references to the literature. The most recent monograph is Edouard, Font- evrault et ses monuments (1875); for the later history see art. by Edmund Bishop in Downside Review (1886). (E. C. B.)

FOOD (like the verb " to feed," from a Teutonic root, whence O. Eng. foda; cf. "fodder"; connected with Gr. irareiodai, to feed), the general term for what- is eaten by man and other creatures for the sustenance of life. The scientific aspect of human food is dealt with under Nutrition and Dietetics.

Infancy. — The influence of a normal diet upon the health of man (we exclude here the question of diet in illness, which must depend on the abnormal conditions existing) begins at the earliest stage of his life. No food has as yet been found so suitable for the young of all animals as their mother's milk. This, however, has not been from want of seeking. Dr Brouzet (Sur F education medicinale des enfants, i. p. 165) had such a bad opinion of human mothers, that he expressed a wish for the state to interfere and prevent them from suckling their children, lest they should communicate immorality and disease! A still more determined pessimist was the famous chemist Van Helmont, who thought life had been reduced

to its present shortness by our inborn propensities, and proposed to substitute bread boiled in beer and honey for milk, which latter he calls " brute's food," Baron Justus von Liebig, as the result of his chemical researches, introduced a " food for infants," which in more modern days has been followed by a multiplication of patent foods. A close imitation of human milk may also be made by the addition to fresh cow's milk of half its bulk of soft water, in each pint of which has been mixed a heaped-up teaspoonful of powdered " sugar of milk " and a pinch of phosphate of lime. These artificial substitutes for the natural nutriment have their value where for any reason it is not available. The wholesomest food, however, for the first six months is certainly mother's milk alone. A vigorous baby can indeed bear with impunity much rough usage, and often appears none the worse for a certain quantity of farinaceous food; but the majority do not get habituated to it without an exhibition of dislike which indicates rebellion of the bowels. It is only when the teeth are on their way to the front, as shown by dribbling, that the parotid glands secrete an active saliva capable of digesting bread stuffs. Till then anything but milk must be given tentatively, and considered in the light of a means of education for its future mode of nutrition.

The time for weaning should be fixed partly by the child's age, partly by the growth of the teeth. The first group of teeth nine times out of ten consists of the lower central front teeth, which may appear any time during the sixth and seventh month. The mother may then begin to diminish the number of suckling times; and by a month she can have reduced them to twice a day, so as to be ready when the second group makes its way through the upper front gums to cut off the supply altogether. The third group, the lateral incisors and first grinders, usually after the first anniversary of birth, give notice that solid food can be chewed. But it is prudent to let dairy milk form a con- siderable portion of the fare till the eye-teeth are cut, which seldom happens till the eighteenth or twentieth month.

Childhood and Youth. — At this stage of life the diet must obviously be the best which is a transition from that of infancy to that of adult age. Growth is not completed, but yet entire surrender of every consideration to the claim of growth is not possible, nor indeed desirable. Moreover, that abundance of adipose tissue, or reserve new growth, which a baby can bear is an impediment to the due education of the muscles of the boy or girl. The supply of nutriment need not be so continuous as before, but at the same time should be more frequent than for

the adult. Up to at least fourteen or fifteen years of age the rule should be four meals a day, varied indeed, but nearly equal in nutritive power and in quantity, that is to say, all moderate, all sufficient. The maturity the body then reaches involves a hardening and enlargement of the bones and cartilages, and a strengthening of the digestive organs, which in healthy young persons enables us to dispense with some of the watchful care bestowed upon their diet. Three full meals a day are generally sufficient, and the requirements of mental training may be allowed to a certain extent to modify the attention to nutrition which has hitherto been paramount.

Adults. — It is only necessary here to refer to the article on Dietetics (see also Vegetarianism) for a discussion of the food of normal adults; and to such headings as Dietary (for fixed allowances) or Cookery. Different staple articles of food are dealt with under their own headings. For animals other than man see the respective articles on them.

Among numerous books on the subject, in addition to those enumerated under Dietetics, see Sir Henry Thompson's Foods and Feeding (1894) ; Hart's Diet in Sickness and Health (1896) ; Knight, Food and its Functions (1895).

FOOD PRESERVATION. The preservation of food material beyond the short term during which it naturally keeps sound and eatable has engaged human thought from the earliest dawn of civilization. Necessity compelled man to store the plenitude of one season or place against the need of another. The hunter dried, smoked and salted meat and fish, pastoral man preserved milk in the form of cheese and butter, or fermented grape-juice into wine. With the separation of country from town, the development of manufacturing nation as distinct from agricul- tural and food-producing people, the spreading of civilized man from torrid to arctic zones, the needs of travellers on land and sea and of armies on the march, the problem of the prevention of the natural decomposition to which nearly all food substances are liable became increasingly urgent, and forms to-day, next to the production of food, the most important problem in con- nexion with the feeding and the trade of nations. As long as the reasons of decomposition were unknown, all attempts at preser- vation were necessarily empirical, and of the numberless processes which have during modern times been proposed and attempted comparatively few have stood the test of experience. In the light of modern knowledge, however, the guiding principles appear to be very simple.

Very few organic materials undergo decomposition, as it were, of their own accord. They may lose water by evaporation, and fatty substances may alter by the absorption of oxygen from the air. They are otherwise quite stable and unchangeable while not attacked and eaten up by living

organisms, or while the life with which they may be endowed is in a state of suspense. An apple is alive and in breathing undergoes its ripening change ; a grain of wheat is dormant and does not alter. A substance, in order to be a food material, must be decomposable under the attack of a living organism; the energy stored in it must be available to that stream of energy which we call life, whether the life be in the form of the human consumer or of any lower organism. All decomposition of food is due to the development within the food of living organisms. Under conditions under which living organisms cannot enter or cannot develop food keeps undecomposed for an indefinite length of time. The problem of food preservation resolves itself, therefore, into that of keeping out or killing off all living things that might feed upon and thus alter the food, and as these organisms mainly belong to the family of moulds, yeasts and bacteria, modern food preservation is strictly a subject for the bacteriologist.

The changes which food undergoes on keeping are easily intelligible when once their biological origin is recognized. Yeasts cause the decomposition of saccharine substances into alcohol and carbon dioxide, acetic and lactic ferments produce from sugar or from alcohol the organic acids causing the souring of food, moulds as a rule cause oxidation and complete destruction of organic matter, nitrogenous or saccharine, while most bacteria act mainly upon the nitrogenous constituents, producing

albumoses and peptones and breaking up the complex albumen- molecule into numerous smaller molecules often allied to alka- loids, generally with the production of evil-smelling gases. These processes may go on simultaneously, but more frequently take place successively in the decomposition of food, one set of organisms taking up the work of destruction as the conditions become favourable to its development and unfavourable to its predecessor. The organisms may come from the air, the soil or from animal sources. The air teems with organisms which settle and may develop when brought upon a favourable nidus; the organic matter of the soil largely consists of fungoid life; while the intestinal canal and other mucous membranes of all animals harbour bacteria, sarcinae and other organisms in countless millions. Whenever, therefore, food material is exposed to the air, or touched by the soil or by animals or man, it becomes infected with living cells, which by their development lead to its decomposition and destruction.

Fungoid organisms may be killed by heat or by chemicals; or their development may be arrested by cold, removal of water, or by the presence of agents inhibiting their growth though not destroying their life. All successful processes of food preser vation depend upon one or other of these circumstances.

Preservation by Heat. — At the boiling-point of water all living cells perish, but some spores of bacteria may survive for about three hours. Few adult bacteria can live beyond 75 C. (167° F.) in the presence of water, though dry heat only kills with certainty at 140 C. (284 F.). Destruction of life takes place more rapidly in solutions showing an acid than a feebly alkaline reaction; hence acid fruit is more easily preserved than milk, which, when quite fresh, is alkaline. By cooking, therefore, food becomes temporarily sterile, until a fresh crop of organisms finds access from the air. By repeated cooking all food can be in- definitely preserved. One of the most important functions of cookery is sterilization. Civilized man unwittingly revolts against the consumption of non-sterile food, and the use of certain fungus-infected material is an inheritance from barbarous ages: few materials of animal origin are eaten raw, and in vegetables some sort of sterilizing process is attempted by washing (of salads) or removal of the outer skin (of fruits). All preparation of food for the table, cooking being the most important, tends towards preservation, but is effectual only for a few hours or days at most, unless special means are adopted to prevent reinfection. The housewife covering the jam with a thin paper soaked in brandy, or the potted meat with a thin layer of lard, attempts unconsciously to bar the road to bacteria and other minute organisms. To preserve food in a permanent manner and on a commercial scale it has to be cooked in a receptacle which must be sufficiently strong for transport, cheap, light and unattacked by the material in contact with it. None of the receptacles at present in use quite fulfils the whole of these conditions: glass and china are heavy and fragile, and their carriage is expensive; tinned iron, so-called tin-plate, is rarely quite unaffected by food materials, but owing to its strength, tenacity and cheapness, it is used on an ever-increasing scale. The sheet iron, which formerly was made of soft wrought iron, now generally consists of steel containing but very little carbon; it is cleaned by immersion in acid and covered with a very thin layer of pure tin, all excess of tin being removed by hot rollers and brushes. The layer of tin, which formerly con- stituted from 3 to 5% of the total weight of the plate, has, owing to the increased price of tin and the improvement in machinery, gradually become so thin that its weight is only from 1 to 3%. Not rarely, therefore, the tin-surface is imperfect, perforated or pin-holed. Tin itself is slightly attacked by all acid juices of vegetable or animal substances. With the exception of milk, all human food is slightly acid, and consequently all food that has been preserved in tin canisters contains variable traces of dissolved tin. Happily, salts of tin have but little physiological action. Nevertheless, the employment cf tin- plate for very acid materials, like tomatoes, peaches, &c, is very objectionable.

The process of preservation in canisters is carried out as

follows: — The canister, which has been made either by the use of solder or by folding machinery only, is packed with the material to be preserved, and a little water having been added to fill the interstices the lid is secured by soldering or folding, generally the former. Sterilization is effected by placing the tins in pressure chamhers, which are heated by steam to 120 C. or more. The tins are exposed to that temperature for such time as experience has shown to be necessary to heat the contents throughout to at least 100° C. The temperature is then allowed to fall slowly to below the boiling-point of water, when the tins can be taken out of the pressure chamber, or they are placed in pans filled with water or a solution of calcium chloride and are therein heated till thoroughly cooked. Sometimes a small aperture is pierced through the lid, to allow of the escape of the expanding air, such holes before cooling closed by means of a drop of solder. This process, which was originally intro- duced by Francois Appert early in the 19th century, is employed on an enormous scale, especially in America. The use of lacquered tins, having the inner surface of the tin covered with a heat-resisting varnish, is gradually extending. Imperfect sterilization shows itself in many cases by gas development within the tin, which causes the ends to become convex and drummy. More frequently than not the contents of the larger tins, containing meat or other animal products, are not absolutely sterile, but the conditions are mostly such that the organisms which have survived the cooking process cannot develop. When they can develop without formation of gas dangerous products of decomposition may be produced without showing themselves to taste or smell. Numerous cases of so-called ptomaine poison- ing have thus occurred; these are more frequently associated with preserved fish and lobster than with meats, although no class of preserved animal food is free from liability of ptomaine formation. The formation of poisonous substances has never been traced to preserved fruit or other material poor in nitrogen. The mode of preserving food in china or glass is quite similar, but the losses by breakage are not inconsiderable. Food which has been preserved in tins is sometimes transferred to glass and re-sterilized, the feeling against " tinned " food caused by the " Chicago scandals " not having entirely subsided. Were it not for the facts that sterilization is rarely quite perfect, and that the food attacks the tin, the contents of tin canisters ought to keep for an indefinite length of time. Under existing circumstances, however, there is a distinct limit to the age of soundness of canned food.

Preservation by Chemicals. — Salt is the oldest chemical pre- servative and, either alone or in conjunction with saltpetre and with wood-smoke, has been used for many centuries, mainly as a meat preservative. It is used either dry in layers strewn on the surface of the meat or fish to be preserved, or in the form of brine in which the meat is submerged or which

is injected into the carcasses. The preserving power of salt is but moderate. It has the great advantage that in ordinary doses it is non- injurious, that an excess at once betrays itself in the taste, and that it can be readily removed by soaking in water. When aided by wood-smoke, which depends for its preservative power upon traces of creosote and formaldehyde, it is, however, quite efficient. The addition of saltpetre is principally for the purpose of giving to the meat a bright pink tint. The strongly saline taste of pickled meat or salted butter appears gradually to have become repugnant to a large part of mankind, and other pre- servatives have come into use, possessing greater bactericidal power and less taste. The serious objection attaching to them is cHscussed in the article Adulteration. At the present time the use of borax or boracic acid is almost universal in England. Meat which has been exposed to the vapours of formaldehyde, and has thus been superficially sterilized, is also coming into commerce in increasing quantities. Formaldehyde in itself is distinctly poisonous, and has the property of combining with albuminoids and rendering them completely insoluble in the digestive secretions. Salicylic and benzoic acids are not in- frequently used to stop fermentation of saccharine beverages

to last fresh and sweet on the consumer's table for a considerable length of time. Sulphurous acid and sulphites are chiefly used in the preservation of thin ales, wine and fruit, and sodium fluoride has been found in butter. The whole of these substances possess decided and injurious physiological properties. Alcohol now rarely forms a preservative of food material, its employment being confined to small fruit. The use of sugar as a preservative depends upon the fact that, although in a dilute solution it is highly prone to fermentation and other decomposition, it possesses bactericidal properties when in the form of a concen- trated syrup. A sugar solution containing 30% of water or less does not undergo any biological change; in the presence of organic acids, like those contained in fruit, growth of organisms is inhibited when the percentage of water is somewhat greater. Upon this fact depends the use of sugar in the manufacture of jams, marmalades and jellies. Moulds may grow on the surface of such saccharine preparations, but the interior remains un- affected and unaltered.

Preservation by Drying. — Food materials in which the percent- age of moisture is small (not exceeding about 8 %) are but little liable to bacterial growths, at most to the attacks of innocent Penicittium. Nature preserves the germs in seeds and nuts, which are laden with otherwise decomposable food material, by the simple expedient of water removal. The life of cereal grains and many seeds appears to be unlimited. By the removal of water the most perishable materials, like meat or eggs, can be rendered unchangeable, except so far as the inevitable oxidation of the fatty substances contained in them is concerned and which is independent of life-

action. The drying of meat, upon which a generation ago inventors bestowed a great deal of attention, has become almost obsolete, excepting for compara- tively small articles or animals, like ox tongues or tails and fish. It has been superseded even among less civilized communities by the spread of canned food. Fruit, however, is very largely preserved in the dried state. Grapes are sun-dried and thus form currants, raisins and sultanas, the last variety being often bleached by the addition of sulphites. Plums, apples and pears are artificially dried in ovens on wooden battens or on wire sieves; from the latter they are apt to become contaminated with notable quantities of zinc. Excellent preparations of dried vegetables, including potatoes, carrots, onions, French beans and cabbages, are also manufactured.

The utilization of meat in the form of meat extract belongs to some extent to this class of preserved foods. Its origin is due to J. von Liebig and Max von Pettenkofer, and dates from the middle of the 19th century. The soluble material is extracted mainly from beef, in Australia to some extent from mutton, by means of warm water; the albumen is coagulated by heat and removed, and the broths thus obtained are evaporated in vacuo until the extract contains no more than about 20% of water. One pound of extract is obtained from about 2 5 lb of lean beef.

Preservation by Refrigeration. — At or below the freezing-point of water fungoid organisms are incapable of growth and multipli- cation. Although it has been asserted that many of them perish when kept for some time in the frozen condition, it is certain that the vast majority of bacteria and their germs remain merely dormant. Even so highly organized structures as cereal seeds do not suffer in vitality on being kept for a considerable length of time at the far lower temperature of liquid air. Biological change is, therefore, arrested at freezing-point, and as long as that temperature is maintained food material remains unaltered, except for physical changes depending upon the evaporation of water and of volatile flavouring matters, or chemical altera- tions due to oxidation.

Refrigeration, therefore, affords the means of keeping for a reasonably long time, and without the addition of any pre- servative substance, food in a raw condition. It is the only process of preservation which from a sanitary point of view is entirely unobjectionable as ordinarily and properly employed. Its introduction on a commercial scale has more powerfully affected the economic conditions of England and, to a less degree,

of the United States than any other scientific advance since the establishment of railways and steamboats. Enormous quantities of frozen carcasses, butter, fruit, vegetables and fish are intro- duced in the fresh condition into Great Britain and stored until required. Extreme fluctuations of supply or of price have become almost impossible, and the abundance of Australian and New Zealand ranches, and cf West Indian orchards, has been made readily accessible to the British consumer. For household purposes cooling in ice-chests or ice-chambers suffices to pre- serve food on a comparatively small scale. The ice used for the purpose comes, to a small extent, from natural sources, stored from the winter or imported from northern countries; a far larger quantity is artificially produced by the methods described in the article on Refrigerating, which also contains an account of the means by which low temperatures are produced for industrial purposes of importation and storage. Fleets of steamships fitted with refrigerating machinery and insulated cold-rooms are employed in carrying the food materials, which are deposited in cold-stores at docks, warehouses, markets and hotels. The first cargo of frozen meat was shipped in July 1873 from Melbourne, but arrived in October in an unsatisfactory state. In 1875-1876 sound frozen meat came from America. The first cargo of frozen meat, was successfully brought to the United Kingdom in 1880 from Australia in the " Strathleven," fitted with a Bell-Coleman air machine. The temperature in the cold-storage rooms is generally kept near 34° F., whilst in the chilling chambers a somewhat lower, and in the freezing room or chambers a much lower temperature (between o° and 10° F.) is maintained. The carcasses to be frozen should be cooled slowly at first to ensure even freezing throughout and to prevent damage by the unequal expansion of the outer layer of ice. The carcasses when freezing must be hung separated from each other, but for storage or transportation they are packed tightly together. Fish such as salmon is washed, thoroughly cleansed, and frozen on trays. Butter should be cooled as rapidly as possible to about io° F.; its composition as regards proportion of volatile fatty-acids, &c, remains absolutely unaltered for years. Cheese should only be cold-stored when nearly ripe and should not be frozen. Eggs must be carefully selected, each one being inspected by candle-light. They are placed in cases holding about three hundred, which are taken first to a room in which they are slowly cooled to about 33 F., and are then kept in store just below freezing-point. Particular attention must be paid to the relative humidity of the air in egg stores. Fruit should be quite fresh; grapes may be chilled to 26 F., while lemons cannot safely be kept at a lower temperature than $6°. The time during which soft fruit can be kept even in cold-store is limited, and does not exceed about six weeks.

In the early days of the chilled-meat trade considerable prejudice existed against stored meat. While in many cases the flavour of fresh meat is

rather superior, the food value is in no way altered by cold-storage. 1

Preservation by Pickling other than Salt. — For the preservation of vegetables, vinegar or other solution of acetic acid is used to a limited extent. Eggs are submerged in lime-water or a dilute solution of sodium silicate (soluble glass). During the storage of eggs the more aqueous white of egg yields by endosmosis a portion of its water to the more concentrated yolk, which thereby expands and renders its thin containing-membrane liable to rupture. Fish, such as sardines, sprats and salmon, is preserved by packing in olive or other oil.

The preservation of the most important dairy product, namely, milk, deserves a separate notice. It has already been stated that alkaline liquids, like milk, are more difficult to sterilize by heat than acid materials. In consequence of the alteration in flavour which milk undergoes by long continued boiling, and of the fact

1 Per contra, see the article by Mary E. Pennington in the Year- hook for IQO? (1908) of the U.S. Dept. of Agriculture, pp. 197-206, with illustrations of chickens kept in cold storage for two and three years. The results there shown cast considerable doubt on the efficiency of even refrigeration so far as an " indefinite " period is concerned ; and it is suggested that the consumption of frozen meat may really account for various modern diseases.

that milk forms perhaps the best medium for the growth and propagation of bacterial organisms, there is exceptional difficulty in its sterilization. As secreted by a healthy cow it is a perfectly sterile fluid, and, as shown by Sir J. Lister, when drawn under aseptic conditions and kept under such, it remains definitely fresh and sweet. Bacterial and other pollution at the time of milking arises from the animal, the stable, the milker and the vessels. In animals suffering from tuberculosis and other bacterial affections the milk may be infected within the udder. Milk as it reaches the consumer rarely contains less than 50,000 bacteria and often many millions per cubic centimetre. In fresh country cream 100 millions per cubic centimetre are not unusual. These bacteria are of many kinds, some of them spore-bearing. The spores are more difficult to kill than the adult organism. The first step towards preservation is the removal of the dirt unavoidably present, to the particles of which a considerable proportion of the bacteria adhere. Filtration through cloths or, better, the passing of the milk through centrifugals effects that removal. Subsequent treatment is preferably preceded by a breaking-up of the larger fat-globules by the projection of a jet of the milk under high pressures against a steel or agate plate, a process known as homogenizing. From homogenized milk the cream separates slowly, and does not form the coherent layer thrown up by ordinary milk.

Heating is then effected either after bottling or by passing the milk continuously through pipes in which it is heated to from 160 to 170 F. By a repetition of the heating process on two or more succeeding days, complete sterilization may be effected, although a single treatment is sufficient to render the milk stable for a few days. Many forms of pasteurizing apparatus for milk are in use. Since the general introduction of pasteurization of the skim-milk used in Denmark fo-r the feeding of calves and pigs, tuberculosis in these animals has practically disappeared. On the continent of Europe the use of sterilized milk is now very general. In England it has found little favour in households, but is making rapid progress on board ship.

Milk which has been condensed has for many years found a most extensive sale. The first efforts to condense and thus preserve milk date from 1835, when an English patent was granted to Newton. In 1849 C. N. Horsford prepared condensed milk with the addition of lactose. Commercially successful milk condensation began in 1856. The milk is heated to about 180 F. and filled into large copper vacuum pans, after having been mixed with from 10 to 12 parts of sugar per 100 parts of milk. Evaporation takes place in the pans at about 122 F., and is carried on till the milk is boiled down to such concentration that 100 parts of the condensed milk, including the sugar, contain the solids of 300 parts of milk. Sweetened condensed milk, although rarely quite sterile, keeps indefinitely, and is invariably brought into commerce in tin canisters. The prepara- tion of sweetened condensed milk forms one of the most important branches of manufacture in Switzerland and is steadily increasing in England. Although milk can quite well be preserved in the form of condensed unsweetened milk, which dietetically possesses immense advantages over the sweetened milk in which the balance between carbohydrates and albuminoids is very un- favourable, such unsweetened milk has found little or no favour. Milk powder is manufactured under various patents, the most successful of which depends upon the addition of sodium bi- carbonate and the subsequent rapid evaporation of the milk on steam-heated revolving iron cylinders. Milk powder made from skim-milk keeps well for considerable periods, but full-cream milk develops rancid or tallowy flavours by the oxidation of the finely divided butter-fat. It is largely employed in the prepara- tion of so-called milk chocolates. (O. H.)*

FOOL (O. Fr. fol, modern fou, foolish, from a Late Latin use of follis, bellows, a ball filled with air, for a stupid person, a jester, a wind-bag), a buffoon or jester.

The class of professional fools or jesters, which reached its culminating point of influence and recognized place and function in the social organism during the middle ages, appears to have existed in all times and countries.

Not only have there always

been individuals naturally inclined and endowed to amuse others; there has been besides in most communities a definite class, the members of which have used their powers or weaknesses in this direction as a regular means of getting a livelihood. Savage jugglers, medicine-men, and even priests, have certainly much in common with the jester by profession. There existed in ancient Greece a distinct class of professed fools whose habits were not essentially different from those of the jesters of the middle ages. Of the behaviour of one of these, named Philip, Xenophon has given a picturesque account in the Banquet. Philip of Macedon is said to have possessed a court fool, and certainly these (as well as court poets and court philosophers, with whom they have sometimes been not unreasonably confounded) were common in a number of the petty courts at that era of civilization. Scurrae and moriones were the Roman parallels of the medieval witty fool; and during the empire the manufacture of human mon- strosities was a regular practice, slaves of this kind being much in request to relieve the languid hours. The jester again has from time immemorial existed at eastern courts. Witty stories are told of Bahalul (see D'Herbelot, s.v.) the jester of Harun al- Reshid, which have long had a place in Western fiction. On the conquest of Mexico court fools and deformed human creatures of all kinds were found at the court of Montezuma. But that monarch no doubt hit upon one great cause of the favour of monarchs for this class when he said that " more instruction was to be gathered from them than from wiser men, for they dared to tell the truth." Douce, in his essay On the Clowns and Fools of Shakespeare, has made a ninefold division of English fools, according to quality and place of employment, as the domestic fool, the city or corporation fool, the tavern fool, the fool of the mysteries and moralities. The last is generally called the " vice," and is the original of the stage clowns so common among the dramatists of the time of Elizabeth, and who embody so much of the wit of Shakespeare. A very palpable classification is that which distinguishes between such creatures as were chosen to excite to laughter from some deformity of mind or body, and such as were so chosen for a certain (to all appearance generally very shallow) alertness of mind and power of repartee, — or briefly, butts and wits. The dress of the regular court fool of the middle ages was not altogether a rigid uniform. To judge from the prints and illuminations which are the sources of our knowledge on this matter, it seems to have changed considerably from time to time. The head was shaved, the coat was motley, and the breeches tight, with generally one leg different in colour from the other. The head was covered with a

garment resembling a monk's cowl, which fell over the breast and shoulders, and often bore asses' ears, and was crested with a cockscomb, while bells hung from various parts of the attire. The fool's bauble was a short staff bearing a ridiculous head, to which was some- times attached an inflated bladder, by means of which sham castigations were effected. A long petticoat was also occaˆ sionally worn, but seems to have belonged rather to the idiots than to the wits.

The fool's business was to amuse his master, to excite him to laughter by sharp contrast, to prevent the over-oppression of state affairs, and, in harmony with a well-known physiological precept, by his liveliness at meals to assist his lord's digestion. The names and the witticisms of many of the official jesters at the courts of Europe have been preserved by popular or state records. In England the list is long between Hitard, the fool of Edmund Ironside, and Muckle John, the fool of Charles I., and probably the last official royal fool of England. Many are remembered from some connexion with general or literary history. Scogan was attached to Edward IV., and later was published a collection of poor jests ascribed to him, to which Andrew Boorde's name was attached, but without authority.

Will Sommers, of the time of Henry VIII., seems to have been a kind-hearted as well as a witty man, and occasionally used his influence with the king for good and charitable purposes. Armin, who, in his Nest of Ninnies, gives a full description of Sommers, and introduces many popular fools, says of him —

" Only this much, he was a poor man's friend, And helpt the widow often in her end. The king would ever grant what he would crave, For well he knew Will no exacting knave."

The literature of the period immediately succeeding his death is full of allusions to Will Sommers.

Richard Tarleton, famous as a comic actor, cannot be omitted from any list of jesters. A book of Tarleton's Jests was published in 161 1, and, together with his News out of Purgatory, was re- printed by Halliwell Phillips for the Shakespeare Society in 1844. Archie Armstrong, for a too free use of wit and tongue against Laud, lost his office and was banished the court. The conduct of the archbishop against the poor fool is not the least item of the evidence which convicts him of a certain narrow-mindedness and pettiness. In French history, too, the figure of the court- jester flits across the gay or sombre scene at times with fantastic effect. Caillette and Triboulet are well-known characters of the times of Francis I. Triboulet appears in Rabelais's romance, and is the hero of Victor Hugo's Le Roi s 'amuse, and, with some changes, of Verdi's opera Rigoletto; while Chicot, the lithe and acute

Gascon, who was so close a friend of Henry III., is por- trayed with considerable justness by Dumas in his Dame de Monsoreau. In Germany Rudolph of Habsburg had his Pfaff Cappadox, Maximilian I. his Kunz von der Rosen (whose features, as well as those of Will Sommers, have been preserved by the pencil of Holbein), and many a petty court its jester after jester.

Late in the 16th century appeared Le Sottilissime Astueie di Bertoldo, which is one of the most remarkable books ever written about a jester. It is by Giulio Cesare Croce, a street musician of Bologna, and is a comic romance giving an account of the appearance at the court of Alboin king of the Lombards of a peasant wonderful in ugliness, good sense and wit. The book was for a time the most popular in Italy. A great number of editions and translations appeared, and it was even versified. Though fiction, both the character and the career of Bertoldo are typical of the jester. That the private fool existed as late as the 18th century is proved by Swift's epitaph on Dicky Pearce, the earl of Suffolk's jester.

See Flogel, Geschichte der Hofnarren (Leipzig, 1789) ; Doran, The, History of Court Fools (1858). (W. He.)

FOOLS, FEAST OF (Lat. festum stultorum, fatuorum, follorum, Fr. fete des fous) , the name for certain burlesque quasi-religious festivals which, during the middle ages, were the ecclesiastical counterpart of the secular revelries of the Lord of Misrule. The celebrations are directly traceable to the pagan Saturnalia of ancient Rome, which in spite of the conversion, of the Empire to Christianity, and of the denunciation of bishops and ecclesi- astical councils, continued to be celebrated by the people on the Kalends of January with all their old licence. The custom, indeed, so far from dying out, was adopted by the barbarian conquerors and spread among the Christian Goths in Spain, Franks in Gaul, Alemanni in Germany, and Anglo-Saxons in Britain. So late as the nth century Bishop Burchard of Worms thought it necessary to fulminate against the excesses connected with it (Decretum, xix. c. 5, Migne, Patrologia lat. 140, p. 965). Then, just as it appears to have been sinking into oblivion among the people, the clergy themselves gave it the character of a specific religious festival. Certain days seem early to have been set apart as special festivals for different orders of the clergy: the feast of St Stephen (December 26) for the deacons, St John's day (December 27) for the priests, Holy Innocents' Day for the boys, and for the sub-deacons Circumcision, the Epiphany, or the nth of January. The Feast of Holy Innocents became- a regular festival of children, in which a boy, elected by his fellows of the choir school, functioned solemnly as bishop or archbishop, surrounded by the elder choir-boys as his clergy, while the canons and other clergy took the humbler seats. At first there is no evidence to prove that these celebrations

were characterized by any specially indecorous behaviour; but in the 1 2th century such behaviour had become the rule. In 1180 Jean Beleth, of the diocese of Amiens, calls the festival of the sub-deacons festum stultorum (Migne, Patrol, lat. 202, p. 79).

The burlesque ritual which characterized the Feast of Fools throughout the middle ages was now at its height. A young sub-deacon was elected bishop, vested in the episcopal insignia (except the mitre) and conducted by his fellows to the sanctuary. A mock mass was begun, during which the lections were read cum farsia, obscene songs were sung and dances performed, cakes and sausages eaten at the altar, and cards and dice played upon it.

This burlesquing of things universally held sacred, though condemned by serious-minded theologians, conveyed to the child-like popular mind of the middle ages no suggestion of contempt, though when belief in the doctrines and rites of the medieval Church was shaken it became a ready instrument in the hands of those who sought to destroy them. Of this kind of retribution Scott in The Abbot gives a vivid picture, the Protestants interrupting the mass celebrated by the trembling remnant of the monks in the ruined abbey church, and insisting on substituting the traditional Feast of Fools.

This naive temper of the middle ages is nowhere more con- spicuously displayed than in the Feast of the Ass, which tinder various forms was celebrated in a large number of churches throughout the West. The ass had been introduced into the' ritual of the church in the 9th century, representing either Balaam's ass, that which stood with the ox beside the manger at Bethlehem, that which carried the Holy Family into Egypt, or that on which Christ rode in triumph into Jerusalem. Often the ass was a mere incident in the Feast of Fools; but sometimes he was the occasion of a special festival, ridiculous enough to modern notions, but by no means intended in an irreverent spirit. The three most notable celebrations of the Feast of the Ass were at Rouen, Beauvais and Sens. At Rouen the feast was celebrated on Christmas Day, and was intended to represent the times before the coming of Christ. The service opened with a procession of Old Testament characters, prophets, patriarchs and kings, together with heathen prophets, including Virgil, the chief figure being Balaam on his ass. The ass was a hollow Wooden effigy, within which a priest capered and uttered pro- phecies. The procession was followed, inside the church, by a curious combination of ritual office and mystery play, the text of which,

according to the Ordo processionis asinorum secundum Rothomagensem usum, is given in Du Cange.

Far more singular was the celebration at Beauvais, which was held on the 14th of January, and represented the flight into Egypt. A richly caparisoned ass, on which was seated the prettiest girl in the town holding in her arms a baby or a large doll, was escorted with much pomp from the cathedral to the church of St Etienne. There the procession was received by the priests, who led the ass and its burden to the sanctuary. Mass was then sung; but instead of the ordinary responses to the Introit, Kyrie, Gloria, &c, the congregation chanted " Hin- ham " (Hee-haw) three times. The rubric of the mass for this feast actually runs: In fine Missae Sacerdos versus ad populunt vice, Ite missa est, Hinhannabit : populus vero vice, Deo Gratias, ter respondebit Hinham, Hinham, Hinham (At the close of the mass the priest turning to the people instead of saying, lie missa est, shall bray thrice: the people, instead of Deo gratias, shall thrice respond Hee-haw, Hee-haw, Hee-haw).

At Sens the Feast of the Ass was associated with the Feast of Fools, celebrated at Vespers on the Feast of Circumcision. The clergy went in procession to the west door of the church, where two canons received the ass, amid joyous chants, and led it to the precentor's table. Bizarre vespers followed, sung falsetto and consisting of a medley of extracts from all the vespers of the year. Between the lessons the ass was solemnly fed, and at the conclusion of the service was led by the precentor out into the square before the church (conductus ad ludos); water was poured on the precentor's head, and the ass became the centre of burlesque ceremonies, dancing and buffoonery being carried on far into the night, while the clergy and the serious-minded retired to matins and bed.

Various efforts were made during the middle ages to abolish the Feast of Fools. Thus in 1 198 the chapter of Paris suppressed

its more obvious indecencies; in 1210 Pope Innocent III. forbade the feasts of priestˆ deacons and sub-deacons altogether; and in 1246 Innocent IV. threatened those who disobeyed this prohibition with excommunication. How little effect this hady however, is shown by the fact that in 1265 Odo, archbishop of Sens, could do no more than prohibit the obscene excesses of the feast, without abolishing the feast itself; that in 1444 the university of Paris, at the request of certain bishops, addressed a letter condemning it to all cathedral chapters; and that King Charles VII. found it necessary to order all masters in theology to forbid it in collegiate churches. The festival was, in fact, too popular to succumb to these efforts, and it survived through- out Europe till the Reformation, and even later in France; for in 1645 Mathurin de Neure complains in a letter to Pierre Gassendi of the

monstrous fooleries which yearly on Innocents' Day took place in the monastery of the Cordeliers at Antibesˆ " Never did pagans," he writes, " solemnize with such extrava- gance their superstitious festivals as do they …. The lay- brothers, the cabbage-cutters, those who work in the kitchen . . . occupy the places of the clergy in the church. They don the sacerdotal garments, reverse side out. They hold in their hands books turned upside down, and pretend to read through spectacles in which for glass have been substituted bits of orange-peel."

See B. Picart, CerSmonies et coutumes religieuses de tous les peuples (1723); du Tilliot, Memoire's pour servir a I'kistoire de la fete des Fous (Lausanne, 1741); Aime Cherest, Nouvelles recherches sur la fite des Innocents et la ftte des Fous dans plusieurs eglises et notamment dans celle de Sens (Paris, 1853) ; Schneegans in Mailer's Zeitschrift fur deutSche Kulturgeschichte (1858); H. Bohmer, art. "Narrenfest " in Herzog-Hauck, Realencyklop. (ed. 1903) ; Du Cange, Glossarium (ed. 1884), s.v. " Festum Asinorum."

FOOLSCAP, the cap, usually of conical shape, with a cockscomb running up the centre of the back, and with bells attached, worn by jesters and fools (see Fool) ; also a conical cap worn by dunces. The name is given to a size of writing or printing paper, varying in size from 12X15 in. to 17X13ˆ in. (see Paper). The name is derived from the use of a " fool's cap " as a watermark. A German example of the watermark dating from 1479 was exhibited in the Caxton Exhibition (1877). The New English Dictionary finds no trustworthy evidence for the introduction of the watermark by a German, Sir John Spielmann, at his paper- mill at Dartford in 1580, and states that there is no truth in the familiar story that the Rump Parliament substituted a fool's cap for the royal arms as a watermark on the paper used for the journals of parliament.

FOOL'S PARSLEY, in botany, the popular name for Aethusa Cynapium, a member of the family Umbelliferae, and a common weed in cultivated ground. It is an annual herb, with a fusiform root and a smooth hollow branched stem 1 to 2 ft. high, with much divided (ternately pinnate) smooth leaves and small com- pound umbels of small irregular white flowers. The plant has a nauseous smell, and,like other mernbers of the order (e.g. hemlock, water-drop wort), is poisonous.

FOOT, the lower part of the leg, in vertebrate animals consisting of tarsus, metatarsus and phalanges, on which the body rests when in an upright position, standing or moving (see Anatomy: Superficial and Artistic; and Skeleton: Appendicular). The word is also applied to such parts of invertebrate animals as serve as a foot, either for movement or attachment to a surface. " Foot " is a word common in various forms to Indo-European

languages, Dutch, voet, Ger. Fuss, Dan. fod, &c. The Aryan root is pod-, which appears in Sans, pud, Gr. irovs, iro56s, and Lat. pes, pedis. From the resemblance to the foot, in regard to its position, as the base of anything, or as the lowest member of the body, or in regard to its function of movement, the word is applied to the lowest part of a hill or mountain, the plate of a sewing-machine which holds the material in position, to the part of an organ pipe below the mouth, and the like. In printing the bottom of a type is divided by a groove into two portions known as " feet." Probably referring to the beating of the rhythm with the foot in dancing, the Gr. iroOs and Lat. pes were applied in prosody to a grouping of syllables, one of which is stressed, forming the division of a verse. " Foot," i.e. foot-soldier, was

formerly, with an ordinal number prefixed, the name of the infantry regiments of the British army. It is now superseded by territorial designations, but it still is used in the four regiments of the infantry of the Household, the Foot Guards. As a lineal measure of length the " foot " is of great antiquity, estimated originally by the length of a man's foot (see Weights and Measures). For the ceremonial washing of feet, see Maundy Thursday.

FOOT-AND-MOUTH DISEASE (Aphthous Fever, Epizootic Aphtha, Eczema Epizootica), a virulent contagious andinoculable malady of animals, characterized by initial fever, followed by the formation of vesicles or blisters on the tongue, palate and lips, sometimes in the nostrils, fourth stomach and intestine of cattle, and on parts of the body where the skin is thin, as on the udder and teats, between the claws, on the heels, coronet and pastern. The disease begins suddenly and spreads very rapidly. A rise of temperature precedes the vesicular eruption, which is accompanied by salivation and a peculiar " smacking " of the lips. The vesicles gradually enlarge and eventually break; exposing a red raw patch, which is very sensitive. The animal cannot feed so well as usual, suffers much pain and inconvenience, loses condition, and, if a milk-yielding creature, gives less milk, or, if pregnant, may abort. More or less lameness is a constant symptom, and sometimes the feet become very much diseased and the animal is so crippled that it has to be destroyed. It is often fatal to young animals. It is transmitted by the saliva and the discharges from the vesicles, though all the secretions and excretions are doubtless infective, as well as all articles and places soiled by them. This disease can be produced by injecting the saliva, or the lymph of the vesicles, into the blood or the peritoneal cavity.

If we were to judge by the somewhat vague descriptions of different disorders by Greek and Roman writers, this disease has been a European malady for more than 2000 years. But no reliance can be placed on this evidence, and it is not until we reach the 17th and 18th centuries that we find trustworthy proof of its presence, when it was reported as frequently prevailing extensively in Germany, Italy and France. During the 19th century, owing to the vastly extended commercial relations between civilized countries, it has, like the lung-plague, become widely diffused. In the Old World its effects are now experienced from the Caspian Sea to the Atlantic Ocean. Hungary, Lower Austria, Bohemia, Saxony and Prussia were invaded in 1834. Cattle in the Vosges and in Switzerland were attacked in 1 83 7, and the disease extending to France, Belgium and Holland, reached England in 1839, and quickly spread over the three kingdoms (see also under Agriculture). At this time the importation of foreign animals into England was prohibited, and it was supposed that the infection must have been introduced by surplus ships' stores, probably sheep, which had not been consumed during the voyage. This invasion was followed at intervals by eleven distinct outbreaks, and since 1902 Great Britain has been free of foot-and- mouth disease. From the observations of the best authorities it would appear to be an altogether exotic malady in the west of Europe, always invading it from the east; at least, this has been the course noted in all the principal invasions. It was introduced into Denmark in 1841; and into the United States of America in 1870, from Canada, where it had been carried by diseased cattle from England. It rapidly extended through cattle traffic from the state first invaded to adjoining states, but was eventually extinguished, and does not now appear to be known in North America. It was twice introduced into Australia in 1 87 2, but was stamped out on each occasion. ' It appears to be well known in India, Ceylon, Burma and the Straits Settlements. In 1870 it was introduced into the Andaman Islands by cattle imported from Calcutta, where it was then prevailing, and in the same year it appeared in South America. In South Africa it is frequently epizootic, causing great inconvenience, owing to the bullocks used for draught purposes becoming unfit for work. These cattle also spread the contagion. It is not improbable that it also prevails in central Africa, as Schweinfurth alludes to the cattle of the Dinkas suffering from a disease of the kind.

Though not usually a fatal malady, except in very young animals, or when malignant,, yet it is a most serious scourge. In one year (1892) in Germany, it attacked 150,929 farms, with an estimated loss to the owners of £7,500,000 sterling. It is transmissible to nearly all the domestic animals, but its ravages are most severe among cattle, sheep, goats and swine. Human beings are also liable to infection.

The treatment of affected animals comprises a laxative diet, with salines,

and the application of antiseptics and astringents to the sores. The preventive measures recommended are, isolation of the diseased animals, boiling the milk before use, and thorough disinfection of all places and substances which are capable of conveying the infection.

FOOTBALL, a game between two opposing sides played with a large inflated ball, which is propelled either by the feet alone or by both feet and hands.

Pastimes of the kind were known to many nations of antiquity, and their existence among savage tribes, such as the Maoris, Faroe Islanders, Philippine Islanders, Polynesians and Eskimos, points to their primitive nature. In Greece the kmcKvpot seems to have borne a resemblance to the modern game. Of this we read in Smith's Dictionary of Antiquities — " It was the game at football, played in much the same way as with us, by a great number of persons divided into two parties opposed to one another." Amongst the Romans the harpastum, derived from the Greek verb dp7rafco, I seize, thus showing that carrying the ball was permissible, bore a certain resemblance. Basil Kennett, in his Romae antiquae notitia, terms this missile a " larger kind of ball, which they played with, dividing into two companies and striving to throw it into one another's goals, which was the conquering cast." The harpastum was a gymnastic game and probably played for the most part indoors. The real Roman football was played with the inflated follis, which was kicked from side to side over boundaries, and thus must have closely resembled the modern Association game. Tradition ascribes its introduction in northern Europe to the Roman legions. It has been played in Tuscany under the name of Calcio from the middle ages down to modern times.

Regarding the origin of the game in Great Britain the Roman tradition has been generally accepted, although Irish antiquarians assert that a variety of football has been played in Ireland for over 2000 years. In early times the great football festival of the year was Shrove Tuesday, though the connexion of the game with this particular date is lost in obscurity. William Fitz- stephen, in his History of London (about 1175), speaks of the young men of the city annually going into the fields after dinner to play at the well-known game of ball on the day quae dicitw Carnilevaria. As far as is known this is the first distinct mention of football in England. It was forbidden by Edward II. (1314) in consequence of " the great noise in the city caused by hustling over large balls (rageries de grosses pelotes)." A clear reference is made " ad pilam . . . pedinam " in the Rotuli Clausarum, 39 Edward III. (1365), memb. 23, as one of the pastimes to be prohibited on account of the decadence of archery, and the same thing occurs in 1 2 Richard II. c. 6 (1 388) . Both Henry VIII. and Elizabeth enacted laws against football, which, both then and under the Stuarts and the Georges,

seems to have been violent to the point of brutality, a fact often referred to by prominent writers. Thus Sir Thomas Elyot, in his Bohe named the Governour (1 531), speaks of football as being " nothyng but beastely fury and extreme violence, whereof proceedeth hurte and conse- quently rancour and malice to remayne with thym that be wounded, wherefore it is to be put in perpetual silence." In Stubbes' Anatomic of Abuses (1583) it is referred to as "a develishe pastime . . . and hereof groweth envy, rancour and malice, and sometimes brawling, murther, homicide, and great effusion of blood, as experience daily teacheth." Fifty years later (1634) Davenant is quoted (in Hone's Tabk-Book) as remarking, " I would now make a safe retreat, but methinks I am stopped by one of your heroic games called football; which I conceive (under your favour) not very conveniently civil in the streets, especially in such irregular and narrow roads as Crooked

Lane. Yet it argues your courage, much like your military pastime of throwing at cocks, since you have long allowed these two valiant exercises in the streets."

An evidence of its old popularity in Ireland is that the statutes of Galway in 1527 forbade every other sport save archery, excepting " onely the great foot balle." In the time of Charles II. football was popular at Cambridge, particularly at Magdalene College, as is evidenced by the following extract from the register book of that institution under the date 1679: —

" That no schollers give or receive at any time any treat or collation upon account of ye football play, on or about Michaelmas Day, further than Colledge beere or ale in ye open halle to quench their thirsts. And particularly that that most vile custom of drinking and spending money — Sophisters and Freshmen together — upon ye account of making or not making a speech at that football time be utterly left off and extinguished."

It nevertheless remained for the most part a game for the masses, and never took root, except in educational institutions, among the upper classes until the 19th century. No clubs or code of rules had been formed, and the sole aim seems to have been to drive the ball through the opposing side's goal by fair means or foul. So rough did the game become that James I. forbade the heir apparent to play it, and describes the exercise in his Basilikon Dor on as " meeter for laming than making able the users thereof." Both sexes and all ages seem to have taken part in it on Shrove Tuesday; shutters had

to be put up and houses closed in order to prevent damage; and it is not to be wondered that the game fell into bad repute. Accidents, sometimes fatal, occurred; and Shrove Tuesday " football-day " gradually died out about 1830, though a relic of the custom still remained in a few places. For some thirty years football was only practised at the great English public schools, many of which possessed special games, which in practically all cases arose from the nature of the individual ground. Thus the rough, open game, with its charging, tackling and throwing, which were features of football when it was taken up by the great public schools, would have been extremely dangerous if played in the flagged and walled courts of some schools, as, for example, the old Charterhouse. Hence at such institutions the dribbling style of play, in which Mr Montague Shearman {Football, in the " Badminton Library ") sees the origin of the Association game, came into existence. Only at Rugby (later at some other schools) , which from the firstpossessed an extensive grass field, was the old game preserved and developed, including even its roughness, for actual " hacking " (i.e. intentional kicking of an opponent's legs) was not expressly abolished at Rugby until 1877. The description of the old school game at Rugby contained in Tom Brown's School Days has become classic.

1. Rugby Union. — We have seen that from early times a rudimentary game of football had been a popular form of sport in many parts of Great Britain, and that in the old-established schools football had been a regular game among the boys. In different schools there arose various developments of the original game; or rather, what, at first, must have been a somewhat rough form of horse-play with a ball began to take shape as a definite game, with a definite object and definite rules. Rugby school had developed such a game, and from football played according to Rugby rules has arisen Rugby football. It was about the middle of the 19th century that football — up till that time a regular game only among schoolboys — took its place as a regular sport among men. To begin with, men who had played the game as schoolboys formed clubs to enable them to continue playing their favourite school game, and others were induced to join them; while in other cases, clubs were formed by men who had not had the experience of playing the game at school, but who had the energy and the will to follow the example of those who had had this experience. In this way football was established as a regular game, no longer confined to schoolboys. When football was thus first started, the game was little developed or organized. Rules were very few, and often there was great doubt as to what the rules were. But, almost from the first, clubs were formed to play football according to Rugby rules — that is, according to the rules of the game as played at Rugby school, But even the

Rugby rules of that date were few and vague, and indeed almost unintelligible to those who had not been at Rugby school. Still, the fact that

play was according to Rugby rules produced a certain uniformity; but it was not till the establishment of the English Union, and the commencement of international matches, that a really definite code of rules was drawn up.

It is an interesting question to ask why it was that the game of Rugby school became so popular in preference to the games of other schools, such as Eton, Winchester or Harrow. It was probably very largely due to the reputation and success of Rugby school under Dr Arnold, and this also led most probably to its adoption by other schools; for in i860 many schools besides Rugby played football according to Rugby rules. The rapidity with which the game spread after the middle of the 19th century was remarkable. The Blackheath club, the senior club of the London district, was established in i860, and Richmond, its great rival, shortly afterwards. Before 1870, football clubs had been started in Lancashire and Yorkshire; indeed the Sheffield foot- ball club dates back to 1855. Likewise, in the universities of Oxford and Cambridge, Rugby football clubs had been formed before 1870, and by that date the j,ame had been implanted both in Ireland and South Wales; while in Scotland, before i860, football had taken a hold. Thus by 1870 the game had been established throughout the United Kingdom, and in many districts had been regularly played for a number of years. Rapid as, in some ways, had been the spread of the game between the years 1850 and 1870, it was as nothing to what happened in the following twenty years; for by 1890 Rugby football, together with Association football, had become the great winter amuse- ment of the people, and roused universal interest; while to-day on any fine Saturday afternoon in winter there are tens of thou- sands of people playing football, while those who watch the game can be counted by the hundred thousand. . The causes that led to this great increase in the game and interest taken in it were, undoubtedly, the establishment of the various national Unions and the international matches; and, of course, the local rivalry of various clubs, together with cup or other competitions preva- lent in certain districts, was a leading factor. The establish- ment of the English Union led to a codification of the rules without which development was impossible.

In the year 1871 the English Rugby Union was founded in London. This Union was an association of some clubs and schools which joined together and appointed a committee and officials to draw up a code of rules of the game. From this beginning the English Rugby Union has become the governing body of Rugby football in England, and has been joined by practically all the Rugby clubs in England, and deals with all matters connected with Rugby football, notably the choosing of the international teams. In 1873 the Scottish Football Union was founded in Edinburgh on the same lines, and with the same objects, while in 1880 the Welsh Football Union, and in 1881 the Irish Rugby Football Union, were established as the national Unions of Wales and Ireland, though in both

countries there had been previously Unions not thoroughly representative of the country. All these Unions became the chief governing body within their own country, and one of their functions was to make the rules and laws of the game; but as this had been done to start with by the English Union, the others adopted the English rules, with amendments to them from time to time. This state of affairs had one element of weakness- — viz. that since all the Unions made their own rules, if ever a dispute should arise between any of them, a dead-lock was almost certain to ensue. Such a dispute did occur in 1884 between the English and Scottish Unions. This dispute eventually turned on the question of the right of the English Union to make and interpret the rules of the game, and to be the paramount authority in the game, and superior to the other Unions. Scotland, Ireland and Wales resisted this claim, and finally, in 1889, Lord Kingsburgh and Major Marindin were appointed as a commission to settle the dispute. The result was the establishment of the International Board, which consists of representatives from each Union — six from England, two from each of the others — whose duties were to settle any

question that might arise between the different Unions, and to settle the rules under which international matches were to be played, these rules being invariably adopted by the various Unions as the rules of the game.

With the establishment of the International Board the organ- ization of the game was complete. Still harmony did not prevail, and in 1895 occurred a definite disruption. A number of leading clubs in Yorkshire and Lancashire broke off from the English Union and formed the Northern Union, which since that date has had many accessions, and has become the leading body in the north of England. The question in dispute was the payment of players. Football was originally played by men for the sheer love of the game, and by men who were comparatively well-to-do, and who could give the time to play it; but with the increasing popularity of the game it became the pastime of all classes of the people, and clubs began to grow rich by " drawing big gates,"— that is, large numbers of spectators, frequently many thousands in number, paid for the privilege of witnessing the match. In these circumstances the temptation arose to reimburse the player for any out-of-pocket expenses he might be put to for playing the game, and thus it became universally recognized as legitimate to pay a player's expenses to and from a match. But in the case of working men it often meant that they lost part of their weekly wage when they had to go a distance to play a

match, or to go on tour with their club — that is, go off for a few days and play one or two matches in different parts of the country — and consequently the claim was made on their behalf to recoup them for their loss of wage; while at the same time rich clubs began to be willing to offer inducements to good players to join their club, and these inducements were generally most acceptable in the form of money. In Association football (see below) professionalism — i.e. the hiring and paying of a player for his services — had been openly recognized. A large section of the English Union — the amateur party — would not tolerate anything that savoured of professionalism, and regarded payments made to a player for broken time as illegitimate. The result was the formation of the Northern Union, which allowed such payments, and has practically recognized professionalism. This body has also somewhat altered the laws of the game, and reduced the number of players constituting a team from fifteen to thirteen. In Scotland and Ireland Rugby footballers are strongly amateur; but wherever Rugby football is the popular game of the artisan the professional element is strong.

Besides legislation, one of the functions of the Unions is to select international teams. On the 27th of March 1871 the first international match was played between England and Scotland in Edinburgh. This was a match between teams picked from English and Scottish players. These matches from the first roused widespread interest, and were a great stimulus to the development of the game. With the exception of a few years, when there were disputes between their respective Unions, all the countries of the United Kingdom have annually played one another — England having played Scotland since 1871, Ireland since 1875 and Wales since 1880. Scotland commenced playing Ireland in 1877 and Wales in 1883, while Ireland and Wales met first in 1882 and then in 1884, and since 1887 have played annually. The qualifications of a player for any country were at first vaguely considered to be birth; but they were never definitely settled, and there has been a case of a player playing for two countries. In 1894, however, the International Board decided that no player was to play for more than one country, and this has been. the only pronouncement on the question; and though birth is still looked upon as the main qualification, it is not essential. Though international matches excite interest throughout the United Kingdom, the matches between two rival clubs arouse just as much excitement in their district, particu- larly when the clubs may be taken as representatives of two neighbouring rival towns. But when to this rivalry there is added the inducement to play for a cup, or prize, the excitement is much more intense. Among Rugby players cup competitions have never been so popular as among Association, but the com- petition for the Yorkshire tup was very keen in the days before

the establishment of the Northern Union, and this undoubtedly was the

main cause of the popularity of the game in that county. Similarly the competition for the South Wales Cup from 1878 to 1887 did a great deal to establish the game in that country. The method of carrying on these competitions is, that all the clubs entered are drawn by lot, in pairs, to play together in the first round; the winners of these ties are then similarly drawn in pairs for the next round, until for the final round there is only one pair left, the winner of which takes the cup. An elabora- tion of this competition is the " League system " of the Association game. This, likewise, has not been popular with Rugby players. Still it exists in some districts, especially where clubs are anxious to draw big gates. In the League system a certain number of clubs form a league to play one another twice each season; two points are counted for a win and one for a draw. The club which at the end of the season comes out with most points wins the competition. The advantage of this system over a cup competition is, that interest is kept up during the whole season, and one defeat does not debar a club from eventually coming out first.

It is said that wherever Britons go they take their games with them, and this has certainly been the case with Rugby football, especially in New Zealand, South Africa and Australia. An interchange of football visits between these colonies and the motherland is now an important feature in the game. These tours date from 1888, when an English team visited Australia and New Zealand. In the following season, 1889, a team of New, Zealanders, some of whom were native Maories, came over to England, and by their play even then indicated how well the grammar of the game had been studied in that colony. Sub- sequently several British teams visited at intervals New Zealand and Australia, arid in 1905 New Zealand sent home a team which eclipsed anything previously accomplished. They played altogether thirty-three matches, including fixtures with England, Ireland, Scotland and Wales, and only sustained one defeat, viz. by a try in their match with Wales, a record which speaks for itself. In 1908 a combined team of English and Welsh players toured in New Zealand and Australia, and also visited Canada on their way home. The team was not so strong as could have been wished, and though they did fairly well in Australia, they lost all three " test matches " against New Zealand. In South Africa the game is followed with equal enthusiasm, and the play is hardly inferior, if at all, to that of the New Zealanders. The first British team to visit the Cape went in 1891 through the generosity of Cecil Rhodes, who guaranteed the undertaking against loss. Teams were also sent out in 1896 and 1903; the result of matches played in each visit showing the steady improve- ment of the colonists. In 1906 the South Africans paid their first visit to England, and the result of their tour proved them to be equally formidable with the New Zealanders. England managed to draw with them, but Scotland was the only one of the home Unions to gain a victory. The success of these

colonial visits, more especially financially, created a development very foreign to the intentions of their organizers. The Northern Union as a professional body had drifted into a somewhat parlous state, through suffering on the one hand from a lack of inter- national matches, and on the other from the competition of Association professional teams. The great financial success resulting from the New Zealand tour of 1905 roused the attention of the Northern Union authorities, and they quickly entered into negotiations with New Zealand players to collect a team who would come over and play the Northern Union clubs, the visiting players themselves taking a share of the gate-money. For this purpose a team of New Zealanders toured the north of England in 1907, and their action caused the introduction of professional or Northern Union football in both New Zealand and Australia.

The spread of the game has not, however, been confined to English-speaking races. In France it has found fruitful soil, and numerous clubs exist in that country. Since 1906 inter- national matches have been played between France and England, and the energy of French players, coupled with their national

ilan, makes them formidable opponents. The Rugby code has also obtained a firm footing in Canada, > India, Ceylon and the Argentine.

The game itself is essentially a winter pastime, as two requisite conditions for its enjoyment are a cool atmosphere and a soft though firm turf. The field of play is an oblong, not more than i 10 yds. long nor more than 75 yds. : broad, and it usually approxi- mates to these dimensions. The boundaries are marked by lines, called touch-lines, down the sides, and goal-lines along the ends. The touch-lines are continued beyond the goal-lines for a distance of not more than 25 yds.; and parallel to the goal-line and behind it, at a distance of not more than 25 yds,, is drawn a line called the dead-ball line, joining the ends of the touch-lines produced. On each goal-line, at anequal distance from the touch- lines, are erected two posts, termed goal-posts, exceeding n ft. in height, and generally much more — averaging perhaps from 20 to 30 ft. from the ground, and placed 18 ft. 6 in. apart. At a height of 10 ft. from the ground they are joined by a cross-bar; and the object of the game is to kick the ball over the cross-bar between the upright posts, and so obtain a goal. The ball is egg-shaped (strictly an oblate spheroid), and the official dimensions are— length, n to

11 j in.; length circumference, 30 to 31 in.; width circumference, 25! to 26 in.; weight, 13 to 14ˆ oz. It is made of indiarubber inflated, and covered with. a leather case. Halfway between the two goal-lines there is generally drawn the half-way line, but sometimes it is marked by flags on the touch-line; and 25 yds. from each goal-line there is similarly marked the 25-yds, line. In the original game the side that had gained the majority of goals won the match, and if no goal had been scored, Or an equal number, the game was said to be left drawn; but a- modification was adopted before long. A goal can be kicked from the field in the ordinary course of play; but from the Very first a try goal could be obtained by that side One of whose players either carried the ball across his opponents' goal-line and then touched it down (i.e. on the 1 ground), or touched it down after it had been kicked across the goal-line, before any of his opponents. The "try "is then proceeded with as follows: the ball is takert out by a member of the side obtaining the try in a straight line from the spot where it was " touched down," and is deposited in a selected position on the ground in the field of play, the defending side being all confined behind their own goal-line until the moment the ball is so placed on the ground, when another member of the attacking side endeavours to kick it from the ground (a "place kick ") over the bar and between the goal-posts; Frequently a goal is kicked; very often not. The modification first allowed was to count that side the winner which had gained the majority of tries, provided no goal' or an equal number of goals had been scored; but a majority of one goal took precedence of any number of tries. But this, too, was afterwards abolished, and a system of points instituted by which the side with the majority' of points wins. The numerical value, however, of goals and tries has undergone several changes, the system in roo8 being as follows:— A try counts 3 points. A goal from a try (in Which case the try shall not count) 5 points. A dropped goal (except from a mark or a penalty kick) 4 points; a dropped goal being a goal obtained by a player who drops the ball from his hands and kicks it the moment it rises off the ground, as in the " half-volley " at cricket or tennis. A goal from a mark or penalty kick 3 points. Under the Northern Union code any sort of goal counts 1 points, a try 3 points-, but if a try be converted into a goal,' both try and goal count, i.e. 5 points are scored.

In the game itself not only may the ball be kicked in the direction of the opponents' goal, but it may also be carried; but it must not be thrown forward or knocked on— that is, in the direction of the opponents' goal'— though it may be thrown back. Thus the game is really a combination of football and handball, The main principle is that any one who is not "offside" is in play. A player is offside if he gets in front of the ball- — that is, on the opponents' side of the ball, nearer than a colleague in possession of the ball to the opponents' goal-line; when in this position he must not

interfere with an opponent or touch the

; ball under penalty. The leading feature of the game is the "scrummage." In old days at Rugby school there was practically no limit to the numbers of players on each side, and not infre- quently there would be a hundred or more players on one side This was never prevalent in club football; twenty a-side was the usual number to start with, reduced in 1877 to fifteen a-side, the number still maintained. In the old Rugby big sides the ball got settled amidst a mass of players, and each side attempted to drive it through this mass by shoving, kicking, and otherwise forcing their way through with the ball in front of them. This was the origin of the scrummage.*

*The game is played usually for one hour, or one hour and ten minutes, sometimes for one hour and a half. Each side defends each goal in turn for half the time of play. Of the fifteen players who compose a side, the usual arrangement is that eight are called " forwards,'' and form the scrummage; two " half-backs " are posted outside the scrummage; and four " three-quarter-backs,"' a little behind the halves, stretch in a line across the field, their duties being mainly to run and kick and pass the ball to other members of their own side, and to prevent their opponents from [doing the same. In recent years, owing to the development o£ "passing," the field position of the half-backs has undergone a change. One stands fairly close to the scrummage and is known as the " scrum-half," the other takes a position between the latter and the three-quarters, and is termed the "stand-off- half." Behind the three-quarters comes the "full-back" or " back," a single individual to maintain the last line of defence; his duties are entirely defensive, either to "tackle " an opponent who has managed to get through, or, more usually, to catch and return long kicks. Play is started by one side kicking the •ball off from the centre of the field in the direction of the opponents' goal. The ball is then caught by one of the other side, who either kicks it or runs with it. In running he goes on until he is " tackled," or caught, by one of his opponents, unless he- should choose to " pass " or throw it to another of his own side, who, provided he be not offside, may either kick, or nt% or pass as he chooses. The ball in this way is kept moving until it crosses the touch-line, orgoaUine, or is tackled. If the ball crosses the touch-line both sides line up at right angles to the point where it crossed the line, and the ball is thrown in straight either by one of the same side whose playeT carried the ball across the touch-line, or, if the ball was kicked or thrown out, by one of the opposite side. If the ball crosses the goal- line either a try is gained, as explained above, or if the defending side touch it down first, the other side retire to the line 25 yds. fromi the goal-line, and the defending side kick it up the field. If the ball is tackled the player carrying the ball gets up fronv the ground as soon as possible, and the forwa*ds at once fonr* the scrummage by putting down their heads and*

getting ready- to shove against one another. They shove as soon as the ball! is put down between the two front rows. In the scrummage the object is, by shoving the opponents back or otherwise breaking away with the ball in front, to carry the ball in the direction of the opponents' goaldine by a series of short kicks in which the players run after the ball as fast as possible, urMfe their opponents lie in wait to get the ball, and either by a kick or other device stop the rush. Instead, however, of the forwards breaking" away with the ball, sometimes they let the ball come out of the scrummage to their half-backs, who either kick or run with it, or pass it to the three-quarter-backs, and so the game proceeds until the ball is once more " dead " — that is, brought' to a standstill. The scrummage appears to be. an uninteresting: manoeuvre, and a strange relic of bygone times; but it is not merely a manoeuvre in which weight and strength alone tell- — it also needs a lot of dexterity in moving the ball with the feet,, applying the weight to best advantage, and also in outflanking; the opposing side, as it were — usually termed wheeling- directing all the force to one side of the scrummage and thus; breaking away. As a rule the game is a lively one, for the playeirs a?e rarely at rest; if there is much scrummaging it is ca&d a slow game; but, if much running and passing, a fast or an open game. The spectator, unless he be an expert, prefers the open

game; but in any case the game is always a hard and exciting struggle, frequently with the balance of fortune swaying very rapidly from one side to the other, so that it is a matter of no surprise to find the British public so ardently attached toil. (C.J.N.F.; C.J.B.M.)

2. Association. — It is generally supposed that the English game of Association football is the outcome of the game of foot- ball as played at Cambridge University about the middle of the 19th century. In October 1863 a committee, consisting of representatives of the schools of Eton, Harrow, Rugby, Marl- borough, Shrewsbury and Westminster, drew up a code of laws' which settled the fundamental principle of the "Association " game, as distinguished from other forms of the, game which permitted of handling and carrying the ball. In Association: football the use of the hands or arms, either for the purpose of playing the ball or impeding or holding an opponent, is absolutely prohibited; " dribbling " or kicking the ball with the feet, and propelling it by the head or body, are the methods to be adopted. ; The Cambridge laws specially provided for " kicking " the ball. Laws 13 and 14 provided that "the ball, when in play, may be stopped by

any part of the body, but may not be held or hit by: the hands, arms or shoulders. All charging is fair, but holding, , pushing with the hands, tripping up and shinning are forbidden."

The laws of Association football first took practical shape' as the outcome of a meeting held on the 26th of October 1863 at the Freemasons' Tavern, London. The clubs which sent' delegates were representative of all classes of football then played. The meeting was a momentous one, foroiot only was; the foundation laid of the Football Association, the national; association which has since then controlled the game in England, but as the outcome of the differences of opinion which existed! as to " hacking " being permissible under the laws, the repre- sentatives who favoured the inclusion of the practice, which is now so roundly condemned in both the Association and Rugby games, withdrew and formed the Rugby Union.

The Cambridge laws were considered by the committee of the Football Association at their meeting on the 24th of November! 1863. They took the view that those laws " embraced the true: principles of the game with the greatest simplicity "■; the laws; were " officially " passed on the 1st of December 1863, and the 1 first publication was made in Bell's Life four days later. These laws have from time to time been modified, but the principles as laid down in 1863 have been adhered to; and the Association 1 game itself has altered very little since 1880. The usual dimen- '■. sions for a ground are 120 yds. long by 80 yds. wide, and: the goals are 8 yds. in width with a cross-bar from post to post 8 ft. from the ground. The ball is about 14 oz. in weight, and must be a perfect sphere from 27 to 28 in. in circumference, as> distinguished from the elliptical or egg-shaped Rugby ball. A ; rectangular space extending to 18 yds. in front of the goals, ! and marked with lines on the ground, "constitutes the " penalty area "; within which, at a distance of 12 yds. opposite the centre; of the goal, is the " penalty kick mark." The boundary lines 1 at the sides of the field are called the " touch-lines "; those at the ends (in the centre of which are the goals) being the " goal-i lines." The game is started by a place kick from the centre of : the field of play, and none of the opposite side is allowed to] approach within 10 yds. of the ball when it is kicked off. When: the ball passes over the touch line it has to be thrown in by one' of the opposite side, and can be returned into the field of play in any direction. If it passes over the goal-line at any time; without touching one of the defending side, it has to be kicked 1 out by the goalkeeper or one of the backs from a line marked in front of goal, the spot selected being in front of the post nearest' the point where the ball left the field of play. But should it touch one of the defending side in its transit over the goal-line the attacking side has the privilege of a free kick from the corner flag (a " corner kick "). This is often a great advantage, but such: free kick does not produce a goal unless the ball touches one of the other players on its way to the post. Ordinarily

a goal is scored when the ball goes between the goal-posts and under the cross-bar, not being thrown, knocked on or carried. The regula-

tion duration of a game is an hour and a half, and ends are changed at forty-five minutes. The side winning the toss has the choice of ends or kick-off, and the one obtaining the majority of goals wins. A goal cannot be scored from a free kick except when the free kick has been allowed by the referee as a penalty for certain infringements of the rules by the opposite side,- and if such infringement, take place within the penalty area on the part of a player on the side then defending the goal, and in the judgment of the referee be intentional, a " penalty kick " is awarded to the attacking side. The penalty kick is a free kick from the penalty kick mark, all the players of the defending side being excluded from the penalty area, except the goal- keeper, who is confined to the goal-line; the result, therefore, being an almost certain goal.

A player is always in play as long as there are three of the opposite side between him and the opposite goal at the time the ball is kicked. This " offside " rule gives much trouble to the young player, though why it should do so it is not easy to say. The rule is simple if the words in italics are remembered. The ball must not be carried, knocked or wilfully handled under any pretence whatever, save by the goalkeeper, who is allowed to use his hands in defence of his goal, either by knocking on or throwing, within his own half of the field of play. Thus far he is entitled to go in maintaining his goal, but if he carry the ball the penalty; is a free kick. There are other infringements of the rules which also involve the penalty of a free kick, among them the serious offences of ˆtripping, hacking and jumping at a player. Players are not allowed to wear nails in their boots (except such as have their heads driven in flush with the leather), or metal plates or gutta-percha, and any player discovered infringing this rule is liable to be prohibited from taking further part in a match.

In the early 'sixties of the 19th century there were probably not mere than twenty-five organized clubs playing Association football in the United Kingdom, and these were chiefly confined in the south of England to the universities and public schools. But whilst the game was being established in the south it was making, steady progress in the north, particularly in Yorkshire, where the Sheffield Club had been formed as early as 1854. In 1867 the game had become so well established that it was decided to play an inter-county match. The match, which was played " in the wilds of Battersea Park," terminated in a draw, neither side having obtained a goal; and it did much to stimulate the growing popularity of the game. During the season 1870-1871, only three years later, two matches of an international character were played between Englishmen and Scotsmen in membership with the Football Association; they were not, however,

*recognized as " international " matches. The first real international match, England v. Scotland, was played on the 30th of November 1872 at Partick, Glasgow; the first international match between England and Wales was played at Kenningtbn Oval in 1879; and that between England and Ireland at Belfast in 1882. In 1896 amateur international matches were inaugurated with Germany, Austria and Bohemia; and games are now annually played with Scotland, Wales, Ireland, France, Belgium, Germany, Holland, Austria and other continental countries. As the out- come of the international relations with Scotland, Wales and Ireland, an, International Football Association Board was formed in 1882, when a universal code of laws was agreed upon. Two representatives from each of the four national associations con- stitute the board, whose laws are accepted and observed not only by the clubs and players of the United Kingdom but in all countries wherethe Association game is played. At a meeting held at Paris on the 21st of May 1904 the " International Federa- tion of Association Football " was instituted. It consists of the recognized national associations in * the respective countries: and its objects are to develop and control Association inter- national football. The countries in federation are: Austria, Belgium, Denmark, England, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Sweden and Switzerland.*

The small number of clubs taking part in the game in the early days becomes of interest when compared with the magnitude of

the game in the 20th century. Association football has become one of the most popular of all national sports in the United Kingdom. It is slowly but sure! y taking a similar position on the continent of Europe and is making progress even in the Far East, Japan being one of its latest adherents. In the season of 1871- 1872 the Football Association inaugurated its popular challenge cup competition which is now competed for by both amateur and professional clubs. In the first year fifteen clubs entered, all of which were from the south of England. The first winners of the cup were the Wanderers, who defeated the Royal Engineers in the final tie by one goal to nothing. For the first ten years the competition was mostly limited to the southern clubs, but in the season of 1881-1882 the Blackburn Rovers were only defeated in the final tie by the Old Etonians by one goal to nothing. Pro- fessionalism was then unknown in the game, and comparatively little interest was taken in it except by the players themselves. In the following season of 1882-1883 the cup was for the first time taken north by the

Blackburn Olympic Club, and it remained in the north for the next nineteen years, until in the season of 1900- 1901 it was again brought south by the Tottenham Hotspur Club, who defeated the Sheffield United Club at Bolton by three goals to one. In the following season the cup was again taken north by the Bury Club. In the early days of the competition a few hundred people only attended the final tie, which for many years was played at Kennington Oval in London. In the course of time, however, the interest of the public so largely increased that it became necessary to seek a ground of greater capacity; accordingly in 1893 the final was played at Fallowfield, Man- chester, where it was watched by forty thousand people; in 1894 it was played at Everton and in 1895 at the Crystal Palace. The attendance during the following ten years averaged 80,000 people. The record attendance was in the season of 1900-1901, when the south were contesting with the north, the spectators then being upwards of 113,000. In the season of 1908-1909 356 clubs entered the competition; in 1910-n the number had increased to 404.

The great development of the game necessitated many changes in the system of control. About the year 1880 (although contrary to the rules) a practice of making payment to players crept into the game in the north of England and slowly developed. After some years of debate as to the best method of dealing with this development the Football Association decided in 1885 to legalize and control the payment of players. The rules define a pro- fessional player as one who receives remuneration of any sort above his necessary hotel and travelling expenses actually paid, or is registered as a professional. They further provide that training expenses not paid by the players themselves will be considered as remuneration beyond necessary travelling and hotel expenses. Players competing for any money prizes in football contests are also considered professionals.

In 1888 the Football League, a combination of professional clubs of the north and midlands of England, was formed; and a new scheme was inaugurated for the playing of matches on what is known as the " League " principle, the essential advantage of which is that the clubs in membership of a league agree to play with each other " home and home " matches each season, and also bind themselves under certain penalties to play their best team in all league matches. Six years later the Southern League came into existence, primarily with the object of increasing the interest in the game in the south and west of England. The Football League and the Southern League very soon had their imitators, and in 1909 there were upwards of six hundred league competitions playing under the sanction and control of the Foot- ball Association. The league system also found favour in Scotland, Wales and Ireland, and has extended to most of the colonies where Association football is played. In the season of 1893-1894 the Amateur Cup Competition, restricted to amateur clubs in membership with

the Football Association, was inaugurated. In the first season 32 clubs entered, and the growing popularity of the competition is shown by the fact that in the season of 1908- 1909 there were 229 entries.

The Football Association, founded in 1863 with its eleven clubs,

had in 1909 under its jurisdiction upwards of 10,000 amateur clubs and a quarter of a million of amateur players, and 400 professional clubs with 7000 professional players. It has also directly affiliated 52 county, district and colonial associations, and indirectly in membership a large number of minor associa- tions which are affiliated through the county and district associations. The Army Association includes 316 army clubs in Great Britain and Ireland, together with clubs formed by the various battalions in India, South Africa, Gibraltar and other army stations; and the Royal Navy Football Association comprises all ships afloat having Association football clubs.

The regulations of the Football Association, which is the recognized administrative and legislative body for the game in England, make provision for the sanction and control of leagues and competitions; and its rules, regulations, principles and practices very largely prevail in all national associations. The king is the patron, and the council consists of 56 members, a president, 6 vice-presidents, a treasurer, 10 representatives elected by the clubs in the ten divisions into which the country is subdivided, together with representatives of the army, the navy and of county associations in England which have upwards of 50 clubs in membership, each representative being directly appointed by his association. In 1905 the Football Association became incorporated under the Joint Stock Companies Acts, and as a consequence the word "Limited " appears in its title. It is not, however, a trading body; the shareholders are not entitled to any dividend, bonus or profit, nor may the members of the council, who are the directors, receive any payment for their services. The Scottish Football Association is also an incorpor- ated body with similar powers. Many of the leading clubs of the United Kingdom have also become incorporated, but under the regulations of the Football Association they may not pay a larger dividend to their shareholders than 5%, nor may any of the directors receive payment for their services.

The whole policy of legislation in Association football of late years has been naturally to make the game faster by bringing every one into full play. The great aim accordingly has been to encourage combination and to discourage purely individual efforts. In the early days, though there was a certain amount of cohesion, a player had to rely mainly on himself. Even up to the middle of the 'seventies dribbling was looked upon as the great desideratum; it was the essential for a forward, just as long kicks were the

main object of a back. The development of the game was cf course bound to change all that. The introduction of passing, long or short, but long in particular, placed the dribbler pure and simple at a discount, and necessitated methods with which he was mostly unacquainted. Combined play gradually came to be regarded as the keynote to success. Instead'of one full back, as was originally the case, and one half-back, the defence gradually developed by the addition first of a second half, then of a second full back, and still later of a third half-back, until it came to show, in addition to the goalkeeper of course, two full backs and three half-backs. The eight forwards who used to constitute the attack in the earliest days of the Association have been reduced by degrees, as the science of the game became understood, until they now number only five. The effect of the transition has been to put the attack and defence on a more equal footing, and as a natural consequence to make the game more open and thereby generally more interesting and attractive. Association football is indeed, from the standpoint of the spectator, a much brighter game than it was in its infancy, the result of the new methods bringing every one of the eleven players into full relief throughtout the game. The players who, as a rule, make or mar the success of a side in modern football are the centre forward and the centre half-back. They are the pivot on which the attack and the defence respectively turn. Instead of close dribbling and following up, the new formation makes for accuracy of passing among the forwards, with intelligent support from the half-backs. The net result is practically the effective combina- tion of the whole side. To do his part as it ought to be done every member of an eleven must work in harmony with the rest, and on a definite system, in all cases subordinating his own

latitudinal lines only and was therefore popularly called the " gridiron "; subsequently it was called the " checkerboard." The end lines are called " goal-lines," the side " touch-lines." The two lines 25 yds. from each goal-line, and the middle line, or 55 yard-line, are made broader than the rest. In the middle of each goal-line is a goal, consisting of two uprights exceeding 20 ft. in length, set 18 ft. 6 in. apart with a crossbar 10 ft. from the ground. The ball is in shape and material of the English Rugby type.

A match game consists of two periods {halves) of thirty-five minutes with an interval of fifteen minutes. Practice games usually have shorter halves. There are four officials: the umpire, whose duty it is to watch the conduct of the players and decide regarding fouls; the referee, who decides

questions regarding the progress of the ball and of play; the field judge who assists the referee and keeps the time; and the linesman, who (with two

methods and personal interests to promote the general well-being of the side. (C. W. A.; F. J. W.)

The literature of British football is very extensive, but the following works are among the best: Football in the " Badminton Library " (London, 1904), where the different games played at Eton, Harrow, Rugby, Winchester and other public schools are thoroughly de- scribed; Rev. F. Marshall, Football; the Rugby Game (London, Cassells) ; J. E. Vincent, Football; its History for Five Centuries (London, 1885); C. J. B. Marriott and C. W. Alcock, Football (" Oval Series "); " Football," in the Encyclopaedia of Sport; The Rugby Football Union Handbook, Richardson, Greenwich, Official Annual; and Tfte Football Annual, Merritt and Hatcher (Association Game), London.

United States. — In America the game of football has been elaborated far more than elsewhere, and involves more complica- tions than in England. From colonial times until 1871 a kind of football generally resembling the English Association game was played on the village greens and by the students of colleges and academies. There was no running with the ball, but dribbling, called " babying," was common. In 187 1 a code of rules was drawn up, but they were unsatisfactory and not in- variably observed. "Batting the ball,". i.e. striking the ball forward with the fists, was allowed. There were two backs, sixteen rushers or forwards, and two rovers or " pea- nutters," who lurked near the opponents' goal. During this period the first international foot- ball game was played at Yale between the college team and one made up of old Etonians, the rules being a compromise between the American and the English.

English Rugby, introduced from Canada, was first played at Harvard University, and in 1875 a match under a compromise set of rules, taken partly from the Rugby Union and Diagram of Field

*partly from the existing American game, was .,,,,, -j »l .. . *u u » • < • 1 • ˆt.*

, j .ˆ, -r , r™ c ,, ■ – r 1 The football rules provide that when the ball is put in play m a scrimmage, the

played with Yale. The following year Yale first man who receives F the Da ii, commonly known as the quarter-back, may carry it adopted the regular Rugby Union rules, and f orw ard beyond the line of scrimmage, provided in so doing he crosses such line at least played Harvard under these. Later,-

*several 5 yds. from the point where the snapper-back put the ball in play, and furthermore, other colleges adopted these English rules, that a forward pass may be made provided the ball passes over the line of scrimmage .. t \ m. _ >•■.• • v * j • at least ■> vds. from the point at which the ball is put in play. the field is marked*

*Absence of tradition necessitated expansion *fc ˆgˆua of 5 yds. with white lines parallel to the goal line, for convenience in of these laws, and a convention of colleges pena ii z i ng fouls and for measuring the 10 yds. to be gained in three downs, and also was assembled. Thenceforward annual con- a t intervals of 5 yds. with white lines parallel to the side lines, in order to assist the ventions were held, which from time to time referee in determining whether the quarter-back runs according to rule, or whether, altered and imnlined the rules A collece in case of a forward pass, such pass is legally made. Thus the football field is changed altered ana ampimea tne rules. A college frQm tfae ? diron as in io02i to what now resembles a checkerboard, and the above association was formed, and the game grew in di a g rarn shows exactly how the field should be marked. As the width of the field popularity. Public criticism of the roughness does not divide evenly into 5 yd. spaces, it is wise to run the first line through the shown in the play early threatened its exist- middle point of the field and then to mark off the 5 yds. on*

abstain „„_ f ;_ w ; t i, thp + ransvpr«p linps are distinctlv marked, for instance, bv a line a foot lone-.

1W». 5 10 IS tO IS SO SS 40 4S SO

SO 45 40 3S SO « 10 IS 10 S Ydt

t

*. A

1

T

s

CO

t

•

A

!

!

O

|

1»!

5″

r

♦

rt

I

i !’

8

•

a

-, —

■

+

;

+

?M

.- ,i.

-w

—..

_ -if

.•.—’...

~..

— .

..:-

330

feet

.■---.—. „™,—:’..

.»... »

«...

<•>—>

ence; indeed at one

authorities compelled Harvard to abstain ˆ~g” ~~ ˆ ith ; t he transverse linesare distinctly marked, for instance, by a “line a foot long.

from the annual game with Yale. Changes

in the rules were introduced, and the game has been characterized

by less roughness and by increased skill. It has become the most popular

autumn game in the United States, the principal university matches often attracting crowds of 35,000 and even 40,000 spectators. The association subsequently disbanded, but a Rules Committee, invited by the University Athletic Club of New York, made the necessary changes in the rules from time to time, and these have been accepted by the country at large. In the West associations were formed; but the game in the East is played principally under separate agreements between the contesting universities, all using, however, one code of rules. Later this Rules Committee amalgamated with a new com- mittee of wider representation. Amateur athletic clubs as well as public and private schools have also taken up the game. The American football season lasts from the middle of September to the first of December only, owing to the severity of the American winter. Professional football is not played in America.

The American Rugby game is played by teams of eleven men on a field of 330 ft. long and 160 ft. wide, divided by chalk lines into squares with sides 5 yds. long, leaving a strip 5 ft. wide on each side of the field. Until 1903 the field was divided by

assistants, one representing each eleven) marks the distance gained or lost in each play.

In scoring, a " touchdown " (the English Rugby " try ") counts 5 points, a goal from a touchdown 6 (or one added to the 5 for the touchdown), a " goal from the field," whether from placement or drop-kick, 4, and a " safety " (the English Rugby " touchdown ") 2. Mutatis mutandis, these are made as in English Rugby. American Rugby differs from the English game, because in the scrimmage the men are lined up opposite each other,'and, although separated by the length of the ball, are engaged in a constant man-to-man contest, a,nd also in that a system of " interference " is allowed. Furthermore, a player in the American game is put " on side " when a kicked ball strikes the ground; and forward passing, i.e. throwing the ball toward the opponents' goal, is permissible under certain restrictions. The costume usually consists of a close-fitting jersey with shoulders and elbows padded and reinforced with leather; short trousers with padded thighs and knees, heavy stockings and shoes with leather cleats. In the early period of the game caps were worn, but, as they were impossible to keep on, they were discarded in favour of the wearing of long hair, and the " chrysanthemum head " became the distinguishing mark of the football player. This, however,

proved an inadequate protection, and some players now wear a " head harness " of soft padded leather. Substitutes are allowed in the places of injured players.

The object of the game is identical with that of English Rugby, and the rules in regard to fair catches, punting, drop-kicking, place-kicking, goal-kicking, passing and gentlemanly conduct are practically the same, except that, on a free kick after a fair catch, the opposing players in the American game may not cofrie up to the mark but must keep 10 yds. in front of it. In the American game there is no scrummage in the English sense, nor is the ball thrown in at right angles after going into touch. The element of chance in both these methods of play Was done away with by the enunciation of the principle of the " possession of the ball." In America, when the ball has gone put of bounds or a runner has been tackled and' held and the ball downed, the ball is also put into play by an evolution called a scrimmage, usually called " line-up," which beyond the' name bears no resemblance to the English scrummage. The ball, at every moment of the game, belongs theoretically either to one side or to the other; It may be lost by a fumble, or by the side iri possession not being able to make the required distance of ip yds. in three Successive attempts or by a voluntary kick. In the lihe-up the seven lineˆ men (i.e. forwards) face each other on a line parallel to trie goal- lines on the spot where it was ordered down by the referee. The ball is placed on the ground by the centre-rush, also called the Snapper-back, who, upon the signal being given by his quarter- back, " snaps back " the ball to this player, or to the full-back, by a quick movement of the hand or foot. The moment the ball is snapped-back it is in play. In every scrimmage it is a foul for the side having the ball (attacking side) to obstruct art opponent except with the body (no use may be made of hands or arms); or for the defending side to interfere with the snap-back. The defenders may use their hands and arms only to get their opponents out of the way in order to get at the man with the ball. Each member of the attacking side endeavours, of course, to prevent his opponents from breaking through and interfering with the quarter-back, who requires this protection from his line in order to have time to pass the ball to one of the backs, whom he has notified by a signal to be ready. In the United States a player may be obstructed by an off-side opponent so long as hands and arms are not used. In the line-up this is called " blocking-off " and " interference " when done to protect a friend running with the ball. Interference is one of the most important features of American football. As soon as the ball is passed to one of the half-backs for a run, for example, round one end of the line, his interference must form immediately. This means that one or more of his fellows must accompany and shield him as he runs, blocking off any opponent who trys to tackle him. The first duty of the defence against a

hostile run is therefore to break up the interference, i.e. put these defenders out of the play, so that the runner may be reached and tackled.

The game begins by the captains tossing for choice of kick-pff or goal. If the winner of the toss chooses the goal, on account of the direction of wind, the loser must, kick off and send the ball at least 10 yds. into the opponents' territory from a placer kick from the 55 yds. line. The two ends of the kicking side, who are usually fast runners, get down the field after the bail as quickly as possible, in order to prevent the man who catches the kick-off from running back with the ball. When the kick-off is caught, the catcher with the aid of interference runs it back as far as possible, and as soon as he is tackled and held by his opponents the ball is down, and a line-up takes place, the ball being in the possession of the catcher's side, which now attacks. In order to prevent the so-called " block game," once prevalent, in which neither side made any appreciable progress, the rules provide that the side in possession of the ball must make. at least 10 yds. in three successive attempts, or, failing to do so, must surrender the ball to the enemy, or, as it is called, " lose the ball on downs." This is infrequent in actual play, because if, after two unsuccessful attemptsyor partly successful, it becomes evident that the chances of completing the obligatory 10-yd. gain on the remaining attempt are unfavourable, a forward

pass of a kick is resorted to; rather than risk losing the ball on !the spot. The kick, although resulting in the loss of the ball, nevertheless gives it to the enemy much nearer his goal. When the wind is strong the side favoured by it usually kicks often, as : the other side, not being able to kick back on equal terms, is forced to play a rushing game, which is always exhausting. Again, the kicking game is often resorted to by the Side that has the lead in the score, in order to save its men and yet retain the advantage. The only remaining way to advance the ball is on a free-kick after a fair catch, as in the English game. The free kick may be either a punt, a drop-kick or a kick from placement. Whenever the ball gPes over the side line into touch it is brought ! back to the point where it crossed the line by the man who carried it over, or, if kicked or knocked over, by a man of the side which did not kick it out, and there put in play in one of two ways. Either it may be touched to the ground and then kicked at least 10 yds. towards the opponents' goal, or it may be taken into the field at right angles to the line a distance not less than 5 yds. nor more than 15, and there put down for a line-up, the player who takes it in first declaring how far he will go, so that the opposing team may not be caught napping. , Of the seven men in the line, the centre is chosen for his weight and ability to handle the ball cleanly in snapping back. He must also, in case the full-back is to make the next play, be able to throw the ball from between his legs accurately into the full-back's hands, thus saving the time that would be wasted if the quarter-back were used as an intermediary. The two "guards," who must

also be heavy men, form with the centre the bulk of the line, protecting the backs in offence, and in de- fence blocking the enemy. The two " tackles " must be heavy yet active and aggressive men, as they must not only help the centre and guards in repelling assaults on the middle of the line, but also assist the ends in stopping runs round the line as well as those between tackle and end, a favourite point of attack. The " ends " are chosen for their activity, sure tackling, fast running and ability to follow up the ball after a kick. Of the four players behind the line, the full-back must be a sure catcher and tackier and a fast runner. The two half-backs must also be fast runners and good dodgers. One of them is of ten chosen for his ability to gain ground by " bucking the line," i.e, plunging through the opposing team's line. He must there- f dre be Oyer the average weight, while the other half-back is called upon to gain, by running round the opposing ends. The quarter- back is the commanding general and' therefore the most important member of his side, as with him lies the choice of' plays to be made when on the attack. Courage, coolness, promptness in decision and discrimination in the choice of plays are the qualities absolutely required for this position. As soon as his side obtains the ball, the quarter-back shouts out a signal, consisting of a series of numbers or letters, or both, which denotes a certain play that is to be carried through the moment the ball is snapped back. A good quarter-back thinks rapidly and shouts his signal for the next play as soon as a down has been called and while the scrimmage is forming, so that the plays' are run off rapidly arid the enemy is given as little time as possible to concentrate. The signals, which are secret and often changed to guard them from being solved by the enemy, are formed by designating every position and every space in the line, as well as kicks and Other open plays, by a number or letter. Some signals are called sequence-signals, and indicate a prearranged series of plays for use in certain emergencies. Every manoeuvre of the attacking side is carried out by every member of the team, the ideal being " every man in every play every time." As soon as a signal is s given each man should know what part of the ensuing move will fall to him, in carrying the ball, interfering for the runner, or geU ting down the field under a punt. Every team has its own code. About i8go the system of interference led to momentum and mass plays (wedge-formations, tandems, &c), i.e. to the grouping of bodies of men behind the line, and starting them before the ball was snapped back, so that they struck the line with an acquired momentum that was extremely severe, particularly when met by men equally determined. These plays caused

frequent injuries and led to legislation against them, the most important

law providing for a limitation to the number of men who could be dropped back of the line, and practically keeping seven men drawn up in the line.

Penalties are of three kinds: (1) forfeiture of the game,' for refusing to play when directed to do so by the referee, and f 6 repeated fouls made with the intention of delaying the game; (2) disqualification of players for unnecessary roughness or ungentlemanly conduct; and (3) for infringement of rules, for which certain distances are taken away from the previous gains of the side making the fouls.*

The game resolves itself into a series of scrimmages inter- spersed with runs and kicks. The systematized development of plays places at the disposal of the quarter an infinite variety of attack, which he seeks to direct at the opposing line with bewildering rapidity and dash. During the preliminary games of the season " straight football " is generally played; that is, intricate attacks are avoided and kicks and simple plunges into the line are mainly relied upon. " Trick plays," which comprise all manoeuvres of an intricate nature, are reserved for later and more important matches. Among these is the " fake (false) kick," in which the full-back takes position ad if to receive the ball for a kick, but the ball is passed to a different player for a run. Another play of this kind is the " wing-shift," in which some or all of the players on one side of Centre suddenly change to the other side, thus forming a mass and throwing the opponents' line out of balance. To thfs category belong also " double passes," " false passes," " delayed passes," " delayed runs " and " criss-crosses."

Training for football in America resembles that for other sports in regard to food and hygiene. The coaching systems at the universities differ, but there is generally a head coach, who is assisted by graduates, each of whom pays especial attention to one set of men, one to the men in the centre of the line, one to the backs, another to the ends, &c. Candidates for the teams are put through a severe course of practice in catching punts and hard-thrown passes, in quick starts, falling on the ball, tackling a mechanical dummy, in blocking, breaking through the line, and all kinds of kicking, although in matches the kicking is generally left to one or two men who have shown themselves particularly expert. Every player is taught to < dive for the ball whenever he sees it on the ground, as possession is of cardinal importance in American football, and dribbling for this reason is unknown. When running with the ball the player is taught to take short steps, to follow his interference, that is, not isolate himself from his defenders, and neither to slow up nor shut his eyes when striking the opposing line. Tackling well below the waist is taught, but it is a foul to tackle below the knee. The general rule for defensive work of all kinds is " play low."

See Walter Camp, How to play Football, and the Official Football Guide (annual), both in Spalding's Athletic Library; his Bodk Of College Sports (New York, 1893), Trts American Football (New York, 1894), and his Football (Boston, 1896)— the last in co-operation with L. F. Deland; R. H. Barbour, The Book of School and College Sports (New York, 1904) ; W. H. Lewis, Primer of College Football (Boston, 1896). (E. B.;W.Ca.)

FOOTE, ANDREW HULL (1806-1863), American admiral, was born at Neˆ Haven, Connecticut, on the 12th of September 1806, his father, Samuel Augustus Foote(i 780-1 846), being a prominent lawyer and Whig politician, who as U.S. senator moved in 1,829 " Foote's resolutions " on public lands, in the discussion of which Daniel Webster made his "reply to Hayne." He entered the U.S. navy in 1822, and was commissioned lieutenant in 1830. After cruising round the world (1837-1840) in the." JohnAdaniSj" he was assigned to the Philadelphia Naval Asylum, and later (1846- 1 848) to the Boston Navy Yard. In 1849 he was made commander of the " Perry," and engaged for twp years in Sup- pressing the slave trade on the African coast. In 1856, as commander of the " Portsmouth," he served on the East India station, under Com. James Armstrong, and he captured the Barrier Forts near Canton. From October 1858 to the outbreak of the Civil War, he was in charge of the Brooklyn Navy Yard,

becoming a Ml captain in t86r. In August 1861 he was assigned to' 1 the command "of the naval operations upon the Western Waters;" His exploit - ih ; capturing Fort Henry (on the right bank of the Tennessee 1 river) from the Confederates, on the 6th of February 1862, without the co-operation of General Grant's land forces, 1 who had not arrived in time, was abrilliant success; but their combined attack on v Fort Donelson (12 m. off, on the left bank of the 1 Cumberland river), whither'tn'ost of the Fort Henry garrison had escaped, resulted, before its surrender (Feb. 16), in heavy losses to Foote's gunboats, Foote himself being severely wounded. In March-April he co-operated in the capture of New Madrid (q.v.) and Island No. 10.. Injunehe retired from his command and in July was promoted rear-admiral, and became chief of the Bureau of Equipment and Recruiting. On the, 26th of June 1863 he died at New York.

See the life (1874) by Professor James Masort Hoppin (1820-1906).

■*FOOTE, MARY HALLOCK (1847-), American author and illustrator, was born in Milton, New York, on the 10th of November 1847, of English Quaker ancestry. She was educated at the Poughkeepsie (N.Y.) Female Collegiate Seminary and at the Cooper Institute School of Design for women, in New York. In -1876 'she married Arthur De Wint Foote, a mining engineer, and subsequently lived in the mining regions of California,*

Idaho, Colorado and Mexico. She is best known for her stories, in which,; as in her drawings, she portrays vividly the rough picturesque life, especially the mining life, of the West. Some of her best drawings appear in her own books. Among her publications are The Led-Horse Claim (1883), John Bodewin's TesHmeny '(1886) , The Chosen Valley (1892), Cceur d'Alene (1894);' The Prodigal ' (1900), a novelette; The Desert and the Sown (1902); and several collections of short stories, including A Touch of Sun and other Stories (1003) .

FOOTE, SAMUEL (i72o-i777), ; English dramatist and actor, was baptized at Truro on the 27th of January 1720. Of his attachment to his native Cornwall he gives no better proofs as: an author than by making the country booby Timothy (in The Knights) sound the praises of that county and of its manly pastimes; but towards his'family be' showed a loyal and enduring affection. ■ :His father was a man of good family and position. His mother, Eleanor Goodere, whom he is said in person as well as. in disposition to have •strongly resembled, he liberally Supported in the days of- his prosperity, and after her death indignantly vindicated her Character from the imputations recklessly cast upon it by the revengeful spite of the duchess of Kingston. About the time when Foote came of age, he inherited his first fortune through the murder of his uncle, Sir John Dinely Goodere, Bart., by his brother, Captain Samuel Goodere. Foote was educated at the collegiate school at Worcester, and at Worcester College, Oxford, distinguishing' himself in both places by mimicry and audacious pleasantries Of all kinds, and, although he left Oxford without taking his degree, acquiring a classical training which afterwards enabled him neatly to turn a classical quotation or allusion, and helped to give to his prose style a certain fluency and elegance.

Foote was "designed" for the law, but certainly not by nature. In his chambers at the Temple, and in the Grecian Coffee-house hard by, he learned to know something of lawyers if. not of law, and was afterwards able to jest at the jargon and to mimic the mannerisms of the bar, and to satirize the Latitats of the other branch of the profession with particular success. The famous argument in Hobson v. Nobson, in The Lame Lovers, is almost as good of its kind as that in Bardell v. Pickwick. But a stronger attraction drew him to the Bedford Coffee-house in Covent Garden, and to the theatrical world of which it was the social centre. After he had run through two fortunes (the second of which he appears to have inherited at his father's, death), and had then passed through severe straits, he made his first appearance on the actual stage in 1744. It is said that he had married a young lady in Worcestershire; but the traces of his wife (he affirmed himself that bewas married to his washer- woman) are mysterious, and probably apocryphal.

Foote's first appearance as ah actor was made little more than

two years after that of Garrick, as to whose merits the critics, including Foote himself, were now fiercely at war. His own first venture, as Othello, was a failure; and though he was fairly successful in genteel comedy parts, and was, after a favour- able reception at Dublin, enrolled as one of the regular company at Drury Lane in the winter of 1 745-1 746, he had not as yet made any palpable hit. Finding that his talent lay neither in tragedy nor in genteel comedy, he had begun to wonder " where the devil it did lie," when his successful performance of the part of Bayes in The Rehearsal at last suggested to him the true outlet for his extraordinary gift of mimicry. Following the example of Garrick, he had introduced into this famous part imitations of actors, and had added a variety of other satirical comment in the way of " gag." Engaging a small company of actors, he now boldly announced for the 22nd of April 1747, at the theatre in the Haymarket " gratis," " a new entertainment called the Diversions of the Morning," to which were to be added a farce adapted from Congreve, and an epilogue " spoken by the B-d-d Coffee-house." Foote's success in these Diversions obtained for him the. name of " the English Aristophanes," an absurd compliment, declined by Foote himself (see his letter in The Minor). The Diversions consisted of a series of imitations of actors and other well-known persons, whose various peculi- arities of voice, gesture, manner or dress were brought directly before the spectators, while the epilogue introduced the wits of the Bedford engaged in ludicrous disputation, and specially " took off " an eminent physician (probably the munificent Sir William Browne, whom he afterwards caricatured in The Devil on Two Sticks), and a notorious quack oculist of the day. The actors ridiculed in this entertainment having at once procured the aid of the constables for preventing its repetition, Foote immediately advertised an invitation to his friends to drink a dish of tea with him at the Haymarket on the following day at noon—" and 'tis hoped there will be a great deal of comedy and some joyous spirits; he will endeavour to make the morning as diverting as possible. Tickets for this entertainment to be had at St George's coffee-house, Temple-Bar, without which no person will be admitted. N.B. — Sir Dilbury Diddle will be there, and Lady Betty Frisk has absolutely promised." The device succeeded to perfection; further resistance was abandoned as futile by the actors, whom Foote mercilessly ridiculed in the " instructions to his pupils " which the entertainer pretended to impart (typifying them under characters embodying their several chief peculiarities or defects — the massive and sonorous James Quin as a watchman, the shrill-voiced Lacy Ryan as a razor-grinder, the charming Peg Woffington,

whose tones had an occasional squeak in them, as an orange-woman crying her wares and the bill of the play) ; and Mr Foote's Chocolate, which was afterwards converted into an evening Tea, became an established favourite with the town.

In spite of this success, he seems to have contrived to spend a third fortune, and to have found it necessary to eke out his means by a speculation in small-beer, as is recorded in an amusing anecdote told of him by Johnson. But he could now command a considerable income; and when money came he seems to have freely expended it in both hospitality and charity. During his engagements at Covent Garden and at Drury Lane, of which he was joint-manager, and in professional trips to Scotland, and more especially to Ireland, he appeared both in comedies of other authors and more especially in his own. He played Hartop in his Knights (1 749, printed 1754). Taste (1 7 5 2) , in which parts of the Diversions were incorporated, was followed by some eighteen pieces, the majority of which were produced at the Haymarket, the favourite home of Foote's entertainments. In 176c he succeeded in obtaining for this theatre a licence from the lord chamberlain, afterwards (in 1766) converted into a licence for summer performances for life. The entertainments were a succession of variations on the original idea of the Diversions and the Tea. Now, it was an Auction of Pictures (1748), of part of which an idea may be formed from the second act of the comedy Taste; now, a lecture on Orators (1754), suggested by some bombastic discourses given by Macklin in

his old age at the Piazza coffee-house in Covent Garden, where Foote had amused the audience and confounded the speaker by interposing his humorous comments. The Orators is pre- served in the shape of a hybrid piece, which begins with a mock lecture on the art of oratory and its representatives in England, and ends with a diverting scene of a pot-house forum debate, to which Holberg's Politician- Tinman can hardly have been a stranger. At a later date (1773) a new device was introduced in a Puppet-show. The piece (unprinted) played in this by the puppets was called Piety in Pattens, and professed to show " by the moral how maidens of low degree might become rich from the mere effects of morality and virtue, and by the literature how thoughts of the most commonplace might be concealed under cover of words the most high flown." In other words, it was an attack upon sentimental comedy, which was still not altogether extinguished. An attack upon Garrick in connexion with the notorious Shakespeare jubilee was finally left out from the Puppet-show, and thus was avoided a recurrence of the quarrel which many years before had led to an interchange of epistolary thrusts, and an imitation by Woodward of the imitative Foote.

On the whole, the relations between the two public favourites became very

friendly, and on Foote's part unmistakably affectionate, and they have not been always generously repre- sented by Garrick's biographers. A comparison between the two as actors is of course out of the question; but, though Foote was a buffoon, and his tongue a scurrilous tongue, there is no authentic ground for the suggestion that his character was one of malicious heartlessness. Of Samuel Johnson's opinions of him many records remain in Boswell; when Johnson had at last found his way into Foote's company (he afterwards found it to Foote's own table) he was unable to " resist " him, and, on hearing of Foote's death, he thought the career just closed worthy of a lasting biographical record.

Meanwhile most of poor Foote's friendships in high life were probably those that are sworn across the table, and require " t'other bottle " to keep them up. It is not a pleasant picture — of Lord Mexborough and his royal guest the duke of York, and their companions, bantering Foote on his ignorance of horse- manship, and after he had weakly protested his skill, taking him out to hounds on a dangerous animal. He was thrown and broke his leg, which had to be amputated, the " patientee " (in which character he said he was now making his first appear- ance) consoling himself with the reflection that he would now be able to take off " old Faulkner " (a pompous Dublin alderman with a wooden leg, whom he had brought on the stage as Peter Paragraph in The Orators) " to the life." The duke of York made him the best reparation in his power by promising him a life-patent for the theatre in the Haymarket (1766); and Foote not only resumed his profession, as if, like Sir Luke Limp, he considered the leg he had lost " a redundancy, a mere nothing at all," but ingeniously turned'his misfortune to account in two of his later pieces, The Lame Lover and The Devil on Two Sticks, while, with the true instinct of a public favourite, making constant reference to it in plays and prologues. Though the characters played by him in several of his later plays are comparatively short and light, he continued to retain his hold over the public, and about the year 1774 was beginning to think of withdrawing, at least for a time, to the continent, when he became involved in what proved a fatal personal quarrel. Neither in his entertain- ments nor in his comedies had he hitherto (except in Garrick's case, and it is said in Johnson's) put any visible restraint upon personal satire. The Author, in which, under the infinitely humorous character of Cadwallader, he had brought a Welsh gentleman of the name of Ap-Rice on the stage, had, indeed, been ultimately suppressed. But in general he had pursued his hazardous course, mercilessly exposing to public ridicule and contempt not only fribbles and pedants, quacks or supposed quacks in medicine (as in The Devil on Two Sticks), enthusiasts in religion, such as Dr Dodd (in The Cozeners) and George Whitefield and his connexion (in The Minor). He had not only dared the wrath of the whole Society of Antiquaries (in Tht

Nabob), and been rewarded by the withdrawal, from among the pundits who rationalized away Whittington's Cat, of Horace Walpole and other eminent members of the body, but had in the same play attacked a well-known representative of a very influential though detested element in English society, — the " Nabobs " themselves. But there was one species of cracked porcelain which he was not to try to hold up to contempt with impunity. The rumour of his intention to bring upon the stage, in the character of Lady Kitty Crocodile in The Trip to Calais, the notorious duchess of Kingston, whose trial for bigamy was then (1775) impending, roused his intended victim to the utmost fury; and the means and influence she had at her disposal enabled her, not only to prevail upon the lord chamberlain to prohibit the performance of the piece (in which there is no hint as to the charge of bigamy itself), but to hire agents to vilify Foote's character in every way that hatred and malice could suggest. After he had withdrawn the piece, and letters had been exchanged between the duchess and him equally characteristic of their respective writers, Foote took his revenge upon the chief of the duchess's instruments, a " Reverend Doctor " Jackson, who belonged to the " reptile " society of the journalists of the day, so admirably satirized by Foote in his comedy of The Bankrupt. This man he gibbeted in the character of Viper in The Capuchin, under which name the altered Trip to Calais was performed in 1776. But the resources of his enemies were not yet at an end; and a discharged servant of Foote's was suborned by Jackson to bring a charge of assault and apply for a warrant against him. Though the attempt utterly broke down, and Foote's character was thus completely cleared, his health and spirits had given way in the struggle — as to which, though he seems to have had the firm support of the better part of the public, including such men as Burke and Reynolds, the very audiences of his own theatre had been, or had seemed to be, divided in opinion. He thus resolved to withdraw, at least for a time, from the effects of the storm, let his theatre to Colman, and after making his last appearance there in May 1777, set forth in October on a journey to France. But at Dover he fell sick on the day after his arrival there, and after a few hours died (October 21st). His epitaph in St Mary's church at Dover (written by his faithful treasurer William Jewell) records that he had a hand " open as day for melting charity." His resting- place in Westminster Abbey is without any memorial.

Foote's chief power as an actor lay in his extraordinary gift of mimicry, which extended to the mental and moral, as well as the mere outward and physical peculiarities of the personages whose likeness he assumed. He must have possessed a wonderful flexibility of voice, though his tones are said to

have been harsh when his voice was not disguised, and an incomparable readiness for rapidly assum- ing characters, both in his entertainments and in his comedies, where he occasionally " doubled " parts. The excellent " patter " of some of his plays, such as The Liar and The Cozeners, must have greatly depended for its effect upon rapidity of delivery. In person he was rather short and stout, and coarse-featured; but his over- flowing humour is said to have found full expression in the irresistible sparkle of his eyes.

As a dramatic author he can only be assigned a subordinate rank. He regarded comedy as " an exact representation of the peculiar manners of that people among whom it happens to be performed; a faithful imitation of singular absurdities, particular follies, which are openly produced, as criminals are publicly punished, for the correction of individuals and as an example to the whole community." This he regarded as the utile, or useful purpose, of comedy; the dulce he conceived to be " the fable, the construction, machinery, conduct, plot, and incidents of the piece." For part at least of this view (advanced by him in the spirited and scholarly " Letter " in which he replied, " to the Reverend Author of the ' Remarks, Critical and Christian,' on The Minor "), he rather loftily appealed to classical authority. But he overlooked the indispensableness of the dulce to the comic drama under its primary aspect as a species of art. His comic genius was particularly happy in discovering and reproducing characters deserving of ridicule; and the fact that he not only took them from real life, but closely modelled them on well-known living men and women, was not in himself an artistic sin. Nor indeed was the novelty of this process absolute, though probably no other comic dramatist has ever gone so far in this course, or has pursued it so persistently. The public delighted in his " d — -d fine originals," because it recognized them as copies; and he was himself proud that he had taken them from real persons, instead of their being " vamped from antiquated plays, pilfered from

the French farces, or the baseless beings of the poet's brain." But the real excellence of many of Foote's comic characters lies in the fact that, besides being incomparably ludicrous types of manners, they remain admirable cqmic types of general human nature. Sir Gregory Gazette, and his imbecile appetite for news; Lady Pent- weazel, and her preposterous vanity in her superannuated charms; Mr Cadwallader, and his view of the advantages of public schools (where children may " make acquaintances that may hereafter be useful to them; for between you and I, as to what they learn there, does not signify twopence'); Major Sturgeon and Jerry Sneak; Sir Thomas Lofty, Sir Luke Limp, Mrs Mechlin, and a score or two of other characters, are excellent comic figures in themselves, whatever their origin ; and many of the vices and weaknesses exposed by Foote's vigorous satire will remain the perennial subject of comic treatment so long as a stage

exists. The real defect of his plays lies in the abnormal weakness of their construction, in the absolute contempt which the great majority of them show for the invention or conduct of a plot, and in the unwarrantable subordination of the interest of the action to the exhibition of particular characters. His characters are ready-made, and the action is only incidental to them. With the exception of The Liar (which Foote pretended to have taken from Lope de Vega, but which was really founded on Steele's adaptation of Corneille's Le Menteur), and perhaps of The Bankrupt, there is hardly one of Foote's " comedies " in which the conception and conduct of the action rise above the exigencies of the merest farce. Not that sentimental scenes and even sentimental characters are wanting, but these familiar ingredients are as incapable of exciting real interest as an ordinary farcical action is in itself unable to produce more than transitory amusement. In his earlier plays Foote constantly resorts to the most hackneyed device of farce — a disguise. Of course Foote must have been well aware of the short- comings of his rapidly manufactured productions; he knew that if he might sneer at " genteel comedy ' as suited to the dramatists of the servants' hall, and pronounce the arts of the drama at the great houses to be " directed by the genius of insipidity," he, like the little theatre where he held sway, was looked upon as " an eccentric, a mere summer fly."

At the same time, he was inexhaustible in the devising of comic scenes of genuine farce. An oration of " old masters," an election of a suburban mayor, an examination at the College of Physicians, a newspaper conclave where paragraphs are concocted and reputa- tions massacred — all these and other equally happy situations are brought before the mere reader with unfailing vividness. And everywhere the comic dialogue is instinct with spirit and vigour, and the comic characters are true to themselves with a buoyancy which at once raises them above the level of mere theatrical con- ventionalism. Foote professed to despise the mere caricaturing of national peculiarities as such, and generally used dialect as a mere additional colouring; he was, however, too wide awake to the demands of his public not to treat France and Frenchmen as fair game, and coarsely to appeal to national prejudice. His satire against those everlasting victims of English comedy and farce, the Englishman in Paris and the Englishman returned from Paris, was doubtless well warranted; while at the same time he made fun of the fact that Englishmen are nowhere more addicted to the society of their countrymen than abroad. In general, the purposes of Foote's social satire are excellent, and the abuses against which it is directed are those which it required courage to attack. The tone of his morality is healthy, and his language, though not aiming at refinement, is remarkably free from intentional grossness. He made occasional mistakes; but he was on the right side in the warfare against the pretentiousness of Cant and the effrontery of

Vice, the two master evils of the age and the society in which he lived.

The following is a list of Foote's farces or " comedies " as he calls them, mostly in three, some in two acts, which remain in print. The date of production, and the character originally performed by Foote, are added to the title of each :

The Knights (17 48: Hartop, who assumes the character of Sir Penurious Trifle); Taste (1752), in which part of the Diversions is incorporated; The Englishman in Paris (1753: Young Buck); The Englishman returned from Paris (1756: Sir Charles Buck); The Author (1757: Cadwallader); The Minor (1760: Smirk and Mrs Cole); The Liar (1762); The Orators (1762: Lecturer); The Mayor of Garratt (1763 : Major Sturgeon and Matthew Mug) ; The Patron (1764: Sir Thomas Lofty and Sir Peter Peppercorn); The Com- missary (1765: Mr Zac. Fungus); The Devil upon Two Sticks (1768: Devil, — alias Dr Hercules Hellebore); The Lame Lover (1770: Sir Luke Limp); The Maid of Bath (1771: Mr Flint); The Nabob (1772: Sir Matthew Mite); The Bankrupt (1773: Sir Robert Riscounter); The Cozeners (1774: Mr Aircastle) ; The Capuchin, a second version of The Trip to Calais, forbidden by the censor (1776: O'Donovan). His dramatic works were collected in 1763-1768.

Bibliography. — Foote's biography may be read in W. (" Con- versation ") Cooke's Memoirs of Samuel Foote (3 vols., 1805), which contain, amidst other matter, a large collection of his good things and of anecdotes concerning him, besides two of his previously unpublished occasional pieces (with the Tragedy & la mode, part of the Diversions, in which Foote appeared as Fustian). From this source seems to have been mainly taken the biographical information in the rather grandiloquent essay on Foote prefixed by " Jon Bee "

(John Badcock, fl. 1816-1830, also known as '■ John Httnds") to his useful edition of Foote's Works (3 vols., 1830). Various particulars will be found in Tate Wilkinson's Wandering Patentee (York, 1795) and in other sources. There is an admirable essay on Foote, re-

§rinted with additions, from the Quarterly Review, in John Fbrster's 'ioeraphical Essays (1858). A recent life of Foote is by Percy Fitzgerald (1910). (A. WW.)

FOOTMAN, a name given among articles of furniture to a metal stand, usually of polished steel or brass, and either oblong or oval in shape, for

keeping plates and dishes hot before a dining- room fire. In the days before the general use of hot-water dishes the footman possessed definite utility, but although it is still in occasional use, it is now chiefly regarded as an ornament. It was especially common in the hardware counties of. England, where it is still frequently seen; the simple conventionality of its form is not inelegant.

FOOTSCRAY, a city of Bourke county, Victoria, Australia, on the Saltwater river, 4 m. W. of and suburban to Melbourne. Pop. (1901) 18,301. The city has large bluestone quarries from which most of the building stones in Melbourne and the neighbour- hood is obtained; it is also an important manufacturing. centre, with numerous sugar-mills, jute factories, soap works, woollen- mills, foundries, chemical works and many other minor industries. FOOT-STALL, a word supposed to be a literal translation of piedestal, or pedestal, the lower part of a pier in architecture (see Base).

FOPPA, VINCENZO, Italian painter, was born near Brescia. The dates of his birth and death used to be given as 1400 and 1492; but there is now good reason for substituting 1427 and 1515. He settled in Pavia towards 1456, and was the head of a Lombard school of painting which subsisted up to the advent of Leonardo da Vinci. In 1489 he returned to Brescia. His contemporary reputation was very considerable, his merit in perspective and foreshortening being recognized especially. Among his noted works are a fresco in the Brera Gallery, Milan, the " Martyrdom of St Sebastian "; and a " Crucifixion " in the Carrara gallery, Bergamo, executed in 1455- He worked much in Milan and in Genoa, but many of his paintings are now lost.

See C. J. Ffoulkes and R. Maiocchi, Vincenzo Foppa -(10.10)'.

FORAGE, food for cattle or horses, chiefly the provender collected for the food of the horses of an army. In early usage the word was confined to the dried forage as opposed to grass. From this word comes " foray," an expedition in search of "forage," and hence a pillaging expedition, a raid. The word "forage," directly derived from the Fr. fourrage, comes from a common Teutonic origin, and appears in " fodder," food for cattle. The ultimate Indo-European root, pat, cf. Gr. iraretcBaL, Lat. pascere, to feed, gives " food," " feed," " foster "; and appears also in such Latin derivatives as " pastor," "pasture."

FORAIN, J. L. (1852-), French painter and illustrator, was born in 1852. He became one of the leading modern Parisian caricaturists, who in his merciless exposure of the weaknesses of the bourgeoisie continued the work which was begun by Daumier under the second Empire. The scathing

bitterness of his satire is as clearly derived from Daumier as his pictorial style can be traced to Manet and Degas; but even in his painting he never suppresses the caustic spirit that drives him to caricature. He has, indeed, been rightly called " a Degas pushed on to caricature." In his pen-and-ink work he combines extraordinary economy of means with the utmost power of expression and suggestion. Forain's popularity dates from the publication of his Comidie parisienne, a series of two hundred and fifty sketches republished in book form. He has contributed many admirable, if sometimes over-daring, pages to the Figaro, Le Rire, L'Assiette au beurre, Le Courrier fratiQais, and L'ln- discret. His political drawings for the Figaro were republished in book form under the title of Doux Pays.

FORAKER, JOSEPH BENSON (1846-), American political leader, was born near Rainsboro, Highland county, Ohio, on the 5th of July 1846. He passed his early life on a farm, enlisted as a private in the 89th Ohio Volunteer Infantry in July 1862, served throughout the Civil War, for part of the.

time as an aide on the staff of General H. W. Slocum, and in 1865 received a captain's brevet for "efficient services during the campaigns in North Carolina and Georgia." After the war he spent two years at the Ohio Wesley an University and two years at Cornell. In 1869 he was admitted to the Ohio bar and began practice in Cincinnati. He was a judge of the Cincinnati Superior Court from 1879 to 1882. In 1883 he was the Republican candidate for governor of Ohio, but was defeated; in 1885 and 1887, however, he was elected, but was again defeated in 1889. He then for eight years practised law with great success in Cincinnati. In 1896 he was elected United States senator to succeed Calvin S. Brice (1845-1898); in 1902 was re-elected and served until 1909. In the Senate he was one of the aggressive Republican leaders, strongly supporting the administration of President M'Kinley (whose name he presented to the Republican National Conventions of 1896 and 1900) in the debates preceding, during, and immediately following the Spanish-American War, and later, during the administration of President Roosevelt, was conspicuous among Republican leaders for his independence. He vigorously opposed various measures advocated by the president, and led the opposition to the president's summary discharge of certain negro troops after the Brownsville raid of the 13th of August 1906 (see Brownsville, Texas).

FORAMINIFERA, in zoology, a subdivision of Protozoa, the name selected for this enormous class being that given by A. D'Orbigny in 1826 to the shells characteristic of the majority of the species. He regarded them as minute Cephalopods, whose chambers communicated by pores (foramina). Later on their true nature was discovered by F. Dujardin, working on living forms, and he referred them to his Rhizopoda, char- acterized by

pseudopodia given off from the sarcode (proto- plasm) as organs of prehension and locomotion. W. B . Carpenter in 1862 differentiated the group nearly in its present limits as " Reticularia "; and since then it has been rendered more natural by the removal of a number of simple forms (mostly freshwater) with branching but not reticulate pseudopods, to Filosa, a distinct subclass, now united with Lobbsa into the restricted class of Rhizopoda.

Fig. i a. — -Lieberkiihnia, with reticulate pseudopodia.

A natomy. —Protista Sarcodina, with simple protoplasmic bodies of granular surface, emitting processes which branch and anastomose freely, either from the whole surface or from one or more elongated processes (" stylopods ") ; nucleus one or more (not yet demonstrated in some little known simple forms), usually in genetic relation to granules or strands of matter of similar composition, the " chromidia " scattered through the protoplasm; body naked, or provided with a permanent investment (shell or test), membranous, gelatinous, arenaceous (of compacted or cemented granules), calcareous, or very rarely (in deep sea forms) siliceous, sometimes freely perforated, but never latticed; opening by one or more permanent apertures (" pylomes ") or crevices between compacted sand-granules, often very complex; reproduction by fission 'only in simplest naked forms), or by brood formation; in the latter case one mode of 'brood formation (A) eventuates in amoebiform embryos, the other (B) in flagellate zopspores which are exogamous

gametes, pairing but not with those of their own brood; the coupled cell (" zygote ") when mature in the shelled species gives rise to a very small primitive test-chamber or" microsphere." The adult microspheric animal gives rise to the amoebiform brood which'have a larger primitive test(" megalosphere ") ; andmegalo- spheric forms appear to reproduce by the A type a series Of similar forms before a B brood of gametes is finally borne, to pair and reproduce the microspheric type, which is consequently rare.

The shells require special study. In the lowest forms they are membranous, sometimes encrusted with sand-grains, always very simple, the only complication being the doubling of the pylome in Diplophrys (fig. 2, 1), Shepheardella (fig. 2, 3-5), Ampkilrema (fig. 2, xi), Diapkoropkodon (fig. 2, is). The marine shells are, as we have seen, of cemented particles, or calcareous, glassy, and. regularly perforated, or again calcareous, but porcel- lanous and rarely perforate. These characters have been used

Fig. ib.— Protomyxa auranliaca, Haeck. (After Hjjejfckel.)

1, Adult, containing two diatom f rustules.and threeTintinnid ciliates, with a large Dino- fiagellate just caught by the expanded reticulate pseudo-podia.

Adult encysted andsegmented. Flagellate zoospore jfcst freed

from cyst. Zoospore which . has passed

*into the amoeboid*state.*

as a guide to classification; but some sandy forms have so large a proportion of calcareous cement that they might well be called encrusted calcareous genera, and are also not very constant in respect of the character of perforation. The porcellanbus genera, however, form a compact group, the replacement of the shell by silica in forms dwelling in the red clay of the ocean, abysses, where calcium carbonate is soluble, not really making any difficulty. Moreover, the shells of this group show a deflected process or neck of the embryonic chamber ("camptopyle ") at least in the megalospheric forms, whereas when such a neck exists in other groups it is straight. The opening of the shell is called the pylome. This may be a mere hole where the lateral walls of the body end, or there may be a diaphragmatic ingrowth so as to narrow the entrance. It may be a simple rounded opening, oblong or tri-mu'lti-radiate, or branching (fig. 4, 1); or replaced by a number of coarse pores (" ethmopyle ") (fig. 3, 5a). Again, it may lie at the end of a narrowed tube (" stylopyle "), which in Lagena (fig. 3, p) may project outwards (" ectoselenial "), or inwards (" entoselenial "). In most groups ; the stylopyle is straight; but in the majority of the porcellanous j shells it is bent down on the side of the shell, and constitutes the " flexopyle " of A. Kemna, which being a hybrid term should be replaced by " camptopyle." The animal usually forms a simple shell only after it has attained a certain size, and this " embryonic chamber " cannot grow further. In Spirillina and Ammodiscus there is no pylomic end- wall, and the shell continues to grow as a spiral tube; in Cornuspira (fig. 3, 1) there is a slight constriction indicating the junction of a small embryonic chamber with a camptopyle, but the rest of the shell is a simple flat spiral of several turns. In the majority at least one chamber follows the first, with its own pylome at the distal end. This second chamber may rest on the first, so that the part on which, it rests serves as a party-wall bounding the front of

Fig. 2. — Allogromiidea.

10

, Diplophrys archeri, Barker.

a, Nucleus.

b, Contractile vacuoles.

c, The yellow oil-like body.

Moor pools, Ireland.

, Allogromia oviformis, Duj. a, The numerous nuclei ; near these the elongated bodies represent ingested diatoms. Freshwater. Figs. 2, 3, 1 1 , 12 belong to Rhizopoda Filosa, and are included here to show the character- istic filose pseudopodia in contrast with the reticulate spread of the others.

, Shepheardella taeniiformis, Siddall (Quart. Jour. Micr. &j.,l88o).

Marine. The protoplasm is retracted at both ends into the tubular case, o, Nucleus.

5, Shepheardella taeniiformis; with pseudopodia fully expanded.

6-10, Varying appearance of the nucleus as it is carried along in the streaming protoplasm within the tube.

11, Ampkilrema •wrightianum, Archer.showing membranous shell encrusted with foreign particles. Moor pools, Ire- land.

is, Diaphorophodon mobile,

Archer. [land.

a, Nucleus. Moor pools, Ire-

the newer chamber as well as the back of the older; and this state prevails for all added chambers in such cases. In the

highest vitreous shells, however, each chamber has its complete "proper wall"; while a "supplementary skeleton," a deposit of shelly matter, binds the chambers together into a compact whole. In all cases the protoplasm

from the pylome may deposit additional matter on the outside of the shell, so as to produce very characteristic sculpturing of the surface.

Compound or " polythalamic " shells derive their general form largely from the relations of successive chambers in size, shape and direction. This is well shown in the porcellanous Miliolidae. If we call the straight line uniting the two ends of a chamber the " polar axis," we find that successive chambers

*JiliBk m *..-^*

4

iC

W' if 1 " '■

*45a?f§S». J8| **

Fig. 3. — Various forms of Calcareous Foraminifera.

1, Cornuspira.

2, Spiroloculina.

3, Triloculina.

4, Biloculina.

5, Peneroplis.

6, Orbiculina (cyclical).

7, Orbiculina (young).

8, Orbiculina (spiral). 14, Textularia.

9, Lagena. 15, Disconbina.

10, Nodosaria.

11, Cristettaria.

12, Globigerina.

13, Polymorphina.

16, Polystomella.

17, Planorbulina. IS, Retalia.

19, Nonionina.

have their pylomes at alternate poles; but they lie on different meridians. In Spiroloculina (fig. 3, 2) the divergence between the meridians is 180 , and the chambers are strongly incurved, so that the whole shell forms a flat spiral, of nearly circular outline. In the majority, however, the chambers are crescentic in section, their transverse prolongations being termed " alary " outgrowths, so that successive chambers overlap; when under this condition the angle of successive meridians is still 180 we have the form Biloculina (fig. 3, 4), or with the alary extensions completely enveloping, Uniloculina; when the angle is 120 we have Triloculina, or 144 , Quinqueloculina. Again in Penero- plis (figs. 3, 5, and 4) the shell begins as a flattened shell which tends to straighten out with further growth and additional chambers. In same forms (Spirolina, fig. 22, #) the chambers have a near-ly circular transverse section, and the adult shell is

thus crozier-shaped. In others (which may have the same sculp- ture, and are scarcely distinguishable as species) the chambers are short and wide, drawn out at right angles to the axis, but in the plane of the spiral, and the growing shell becomes fan- shaped or " flabelli- form" (figs. 3 A 4, «). This widening may go on till the outer cham- bers form the greater part of. a circle, as in Orbiculina (fig. 3, 6-8) where, moreover, each large chamber is sub- divided by incomplete vertical bulkheads into a tier of chamberlets; each chamberlet has a distinct pylemic pore opening to the outside or to those of the next outer zone. In Orbitolites (figs. 5, 6) we have a centre on a somewhat Milioline type; and after a few chambers in spiral

Fig. 4. — Modifications of Peneroplis. 1, Dendritina; 2, Eu- Peneroplis.

Fig. 5. — Shell of simple type of Orbitolites, showing primordial chamber a, and circumambient chamber b, surrounded by successive rings of chamberlets connected by circular galleries which open at the margin by pores.

succession, complete circles of chambers are formed. In the

larger forms the new zones are of greater height, and horizontal

bulkheads divide

the chamberlets

into vertical tiers,

each with its own

pylomic pore.

The Cheilostomel- lidae (fig. 3, 13) re- produce among perforate vitreous 1 genera what we ‘ have already seen in the Miliolida: Orbitoides (fig. 10, #) and Cycloclypeus, among the Num- mulite group, with a very finely per- forate wall, recall the porcellanous Orbiculina and Orbitolites.

In flat spiral forms (figs. 22, 1, 7; 3, 2, 16, J!), &c.) all the chambers may be freely exposed; or the successivx chambers be wider transversely than their predecessors

Fig. 6. — Animal of simple type of Orbito- lites, showing primordial segment a, and circumambient segment 6, surrounded by annuli of sub- segments connected by radial and circular stolon-proccsscs.

and overlap by ” alary extensions,” becoming ” nautiloid “; in

extreme cases only the last turn or whorl is seen (fig. 11). When the spiral axis is conical the shell may be ” rota- loid,” the larger lower chambers partially con- cealing the upper smaller ones (fig. 3, 12, 15, 17, 18); or they may leave, as in Palel- lina, a wide central conical cavity— which, in this genus, is finally occupied by later formed ” supplement- ary ” chambers. When Fig. 7.— Section of Rotalia beccarii, the successive chambers showing the canal system, a, b, c, in the are disposed around a substance of the intermediate skeleton; longitudinal central d, tubulated chamber-wall. axis they may be said

to ” alternate ” like the leaves of a plant. If the arrangement

Fig. 8. — Internal cast of Polystomella craticulata.

o >,

d,d

Retral processes, proceeding from the posterior margin of one of the segments.

b, b 1 , Smooth anterior margin of

the same segment. e, e l , e’,

c, C 1 , Stolons connecting succes-

sive segments and uniting /, /', f 2 , themselves with the di-

verging branches of the meridional canals. , Three turns of one of the spiral canals. Three of the meridional

canals. Their diverging branches.

is distichous we get such forms as Polymorphina, Textularia and Frondicularia (fig. 3, 13, 14), if tristichous, Tritaxia. Such

Fig. 9. — Operculina laid open, to show its internal structure.

a, Marginal cord seen in cross

section at a', [chambers.

6, b, External walls of the

c, c, Cavities of the chambers. c', c', Their alar prolongations.

d, d, Septa divided at a", a", and

at d", so as to lay open the g, an arrangement may coexist with a spiral twist of the axis for at least part of its course, as in the crozier-shaped Spiroplecta.

interseptal canals, the general distribution of which is seen in the septa e, e; the lines radiating from e, e point to the secondary pores. Non-tubular columns.

Two phenomena interfere with the ready availability of the characters of form for classificatory ends — dimorphism and multiformity.

Dimorphism. — The majority of foraminiferal shells show two types, the rarer with a much smaller central chamber than that of the more frequent. The chambers are called microsphere

Fig. 10. — 1, Piece of Nummulitic Limestone from the Pyrenees, showing Nummulites laid open by fracture through the median plane; 2, vertical section of Nummulite; 3, Orbitoides.

and megalosphere, the forms in which they occur microsphaeric and megalosphaeric forms, respectively. We shall study below their relation to the reproductive cycle.

Multiformity— -Many of the Polythalamia show different types of chamber-succession at different ages. We Have noted

Fig. 11. — Vertical section of portion of Nummulites, showing the investment of the earlier whorls by the alar prolongations of the later.

a, b,

c, c, d,.

e,e'

Marginal cord., /,

Chamber of outer whorl. Whorl invested by a. g, g,

One of the chambers of the 1 fourth whorl from the margin. [closed whorls, h, h, Marginal portions of the en-

Investing portion of the outer whorl.

Spaces left between the in- vesting portions of succes- sive whorls.

Sections of the partitions dividing these.

this phenomenon in such crozier forms as Peneroplis, as well as in discoid forms; it is very frequent. Thus the microspheric Bildculina form the first few chambers in quinqueloculine succession. The microspheric forms attain to a greater size when adult than the megalospheric; and in Orbitolites the microsphere has a straight outlet, orthostyle, instead of the deflected campto- style one, so general in porcellanous types; and the spiral succession is con- tinued for more turns before reaching the fan-shaped and finally cyclic stage. Globigerina, whose cham- bers are nearly spherical, _ T , r '. „ _ ..•_ 4. u Fig. 12. — Internal surface of wall is sometimes seen to be of two chambers > a > a > of Nummu lites, enclosed in a spherical test, showing the orifices of its minute perforate, but without a tubuli. pylome, and known as b > b > The septa containing canals.

r\,-L.,i; tt,„ „i i j c, c, Extensions of these canals in the

Orbulina; the chambered intermediate skeleton.

Globigerma-shell is d, d, Larger pores.

attached at first inside the

wall of the Orbulina, but ultimately disappears. The ultimate

fate of the Orbulina shell is unknown; but it obviously marks

a turning-point in the life-cycˆe.

Protoplasmic Body and Reproduction.— The protoplasm is not differentiated into ecto- and endosarc, although it is often denser

in the central part within the shell, and clearer in the pseudopodial ramifications and the layer (or stalk in the monothalamicˆforrns) from which it is given off. In pelagic forms like Globigenna the external layer is almost if not quite identical in structure with the extracapsular protoplasm of Radiolaria (j.».), being differentiated into granular strands traversing a clear jelly ; rich in large vacuoles (alveoli), and uniting outside the jelly to form the basal. layer of the pseudopods; these again are radiolarian in character. Hence E. R. Lankester justly enough compares the shell here to the central capsule of the Radiolarian, though the comparison tnust not be

pushed too far. . The cyto- , =2-3jrˆisa§eteT?i's-«w i __- plasm contains, granules of # fˆfeˆSˆS^^^^^^5 various kinds, and ˆ the in- "^* K ^^"S'^ < > ˆK?SSv l %8n, ternal protoplasni;.f ; is some

times pigmented. The Chry- somonad Flagellate, Zooxan- Ikelta, so. abundant,, in its resting state— the/ so-called " yellow cells " — in the ex- tracapsular protoplasm of Radiolaria (q.v.) also occurs in the outer protoplasm of many Foraminifera, not only pelagic but also bottom- dwellers, such as Orbitolites.

The nucleus is single in the

Nuda and Allogromidia and

in the megalospheric forms

Fig. I3.-Internal cast of two of higher Foraminifera; but*

chambers, a, a, of Nummulites, the microsphere forms when

radial canals between them passing adult contain many simple

into 6, marginal plexus. similar nuclei. The nucleus

*in every case gives off granules and irregular masses *{" chromidia ") of similar reac- tions, which play an important part in reproduction. During*

the maturation of the microsphere the nu0pi.disappear; and the cytoplasm breaks flp into, a large nunitjgr grf^zoospores, each of which is Soon provided with a single iftideus, wtoSwet, entirely derived from the parent-nucleus or frorri the coalescence of ehromidia, or from both these sources is still uncertain.— These zoospores are amoeboid; they soon secrete a shell and reveal themselves as megalospheres," the original state of the megalospheric forms. In the adult megalosphere the solitary nucleus disappears and is re- placed by hosts of minute vesicular nuclei, formed by the .concen- tration of ehromidia. Each nucleus aggregates around it a proper zone of dense protoplasm ; by two successive mitotic divisions eacji mass becomes quadri-nucleate, and splits up into four biflageOate, uninucleate zoospores. These are pairing-cells or gametes, though they will not pair with members of the same brood: In the zygote resulting from pairing two nuclei soon fuse into one; but this again divides into two; an embryonic shell is secreted, and this is the microspheric type, which is multinuclear from the first. F. Schaudinn compares the nuclei of the adult Foraminifera with the (vegetative) meganucleus of Infusora (q.v.) and the chrbmidial mass with the micronucleus, whose chief function is reproductive.

Since megalospheric forms are by far the most abundant, it seems probable that under most conditions they also give rise to; megalo- spheric young like themselves; and that the production of zoospores.

Fig. i^.-^-Vertical section of tubulated chamber-walls, a, a, of Nummulites. b, b, Marginal cord ; c, cavity of chamber ; d,d, non- tubulated columns.

pairing to pass into the microspheric form, is only occasional, and possibly seasonal. This life-history we owe to the researches of Schaudinn and J. J. Lister.

In several species (notably Patellina) plastogamy, the union of the cytoplasmic bodies without nuclear fusion, has been noted, as a prelude to the resolution of the conjoined protoplasm into uni- nucleate amoebulae.

Calcituba, a porcellanous type, which after forming the embryonic chamber with its deflected pylome grows into branching stems, may fall apart into sections, or the protoplasm may escape and break up into small amoebulae. Of the reproduction of the simplest forms we know little. In Mihrogrifmia the Cell undergoes fission within the test, and on its completion the daughter-cells may emerge as biflagellate zoospores.

The sandy shells- are a very interesting series. In Astrorhiza the sand grains are loosely agglutinated, without mineral cement; they leave numerous pores for the exit of the protoplasm, and there are no true pylomes. In

other forms the union of the grains by a calcareous or ferruginous cement necessitates the existence of distinct pylomes. ; • Many of the species reproduce the varieties of form found in calcareous tests; some are finely perforated, others not. Many of the larger ones have their walls thickened internally and traversed by complex passages; this structure is called iaby-

Fig. iˆ.—~Cycloclypeus.

rinthic (fig. 19, g, h). The shell of Endothyra, a form only known to Us by its abundance in Carboniferous and Triassic strata, is largely composed of calcite; and is sometimes perforated.

*It is noteworthy that though of similar habitat each species selects its own size or sort;, of, sand, some utilizing the siliceous spicules of sponges,, ‘ ‘Despite the roughness of the materials, they are often so laid a» to yield a perfectly smooth inner wall; and is6lJSetimes the outer wall may. be as simple. As we can find.no record of a deflectedˆ stytoj»j*le to the priipitive chamber of the polytnajamous Arenacia, it «* safe to conclude that they have no close alliartfce with the Poiigejltanea. \ v ‘.■-”*

‘V Classification.

I. «;©QA.’— Protoplasmic body without any pellicle or shell save in the resting encysted condition, sometimes forming Colonial aggregates by coalescence of pseudopods’ \Myxo-

! first uniflagellate or amoeboid from birth. Fresh-water ?aind matins genera Protogenes (Haeckel), Biomyxa (Leidy),*

: Myxod-iclyum (Haeckel), Protomyxa (Haeckel) (fig.‘lB).

*‘**■■- This ‘■■ grtnip of very simple forms includes many of Haeckel’s Monera, defined as ” cytodes,” masses of proto- plasm without a nucleus. A nucleus (or nuclei) has, however, been demonstrated by improved methods of staining in so many that it is probable that this distinction will fail to the ground.*

I I . Allogromidiaceae (figs. 1 a , 2) . — Protoplasmic body protected

in adult state by an imperforate test with one or two openings (pylomes) for the exit of the stylopod; test simple, gelatinous, membranous, sometimes incrusted with foreign bodies, never calcareous nor arenaceous; reproduction by fission alone ““firk Wif n – Fresh- water or marine

*fiera AiktgromiA litttHfiˆr Jjtf& > * theca. (Schaud.;, .” ‘ ‘■ jCteierk&hnia (CI.*

*V *?; S hit p he ar del la*

.. (Siddall)' (fig. .2,

! i-10}, ; Diphphrys"*

(Barker), Amphi-

ˆ0 : '#rema (Arch.) (fig.*

2, . Ii), Diaphoro-

phoion (Arcn.){fig.

*j; is), are possibly FlG- tf.—Heterostegina, *

i> Filosa. This –

' group differs from the preceding in its simple test, but, like it, includes many fresh-water species, which possess contractile vacuoles.

III. Astrorhizidiaceae.— Simple forms, rarely polythalamous

(some Rliabdamminidae), but often branching or radiate; test arenaceous, loosely compacted and traversed by chinks for pseudopodia (Astrorhizidae), or dense, and opening by one or more terminal p> lomes at ends of branches. Marine, 4 Fam. The test of some Astrorhizidae is so loose that it falls to pieces when taken out of water. Haliphysema is remarkable for its history in relation to the " gastraea theory." Pilulina has a neat globular shell of sponge- spicules and fine sand. Genera, Astrorhiza (Sandanl)

FORAMINIFERA

Hi

IV.

V.

(fig. 22), Pilulina (Carptr.) (fig. 19), Saccammina (Sars) (fig. 19), Rhabdammina (Sars), Botellina (Carptr.), Hali- physema (Bowerbank) (fig. 22).

Lituolidaceae. — Shell arenaceous, usually fine-grained, definite and often polythalamic, recalling in structure calcareous forms. Lituola (Lamk.) (fig. 19), Endothyra (Phil.), Ammodiscus (Reuss), Loftusia (Brady), Haplo-

phragmium (Reuss) (fig. 22), Thurammina (Brady) (fig. 22).

Miliolidaceae. — Shells porcellanous imperforate, almost invariably with a camptostyle leading from the embryonic

tfMˆdffri

VIII. Lagenidaceae.— Shells vitreous, often sculptured, mono or polythalamic, finely perforate; chambers flask-shaped, with a protruding or an intumed stylopyle; Lagena (Walker & Boys) (fig. 4, 9) ; Nodosaria (Lamk.) (figs. 23, 4; 4, 10); Polymorphic (d'Orb.) (fig. 4, is); Crutellaria (Lamk.) (fig. 4, 11); Frondicularia (Def.) (fig. 23, 3). IX. Globigerinidaceae— Shells vitreous, coarsely perforated; chambers few spheroidal rapidly increasing in size ; arranged in a trochoid or nautiloid spiral. Globigerina (Lamk,) (23, 6; 4, 12); Hasiigerina (Wyville Thompson) (fig. 23, 5) ; Orbu- lina (d'Orb,) (fig. 23, 8). X. Rotalidaceae. — Shells vitreous, finely perforate; walls thick, often double, but without an intermediate party- . layer traversed by canals; form usually

spiral or trochoid. Discorbina (Parker & Jones) (fig. 4, IS) ; Planorb'nlina ;k (d'Orb.; (fig. 4, 17); Rotalia- (Lamk.)

(figs. 23, ./,; ‘ ” ~ –*

■:■:'■ (fig. 23, 10);

- 23, 0>.,

7,21); Calcarina (d'Orb.) Pplytrema (Risso) |fig.

Modified from F. Schaudinn, in Lang's Zoologie.

Fig. 17. — Life Cycle of Polystontella crispa.

A , Young megalospheric individual.

B, Adult decalcified.

C, Later stage, resolving itself into two 1,

flagellate gametes.

D, Conjugation, [zygote. 3,

E, Microspheric individual produced from 4.

F, The same resolved itself into pseudo- 5,

podiospores which are growing into new megalospheric individuals.

Principal nucleus, and 2, subsidiary nuclei of megalospheric form.

Nuclei.

Nuclei in multiple division.

Chromidia derived from J,..

VI.

VII.

chamber; Cornuspira (Schultze) (fig. 3) ; Miliola (Lamk.), including as subgenera Spiroloculina (d'Orb.)' (figs. 3 and 22); Trlloculina (d'Orb.) (fig. 3); Bilocidina (d'Orb.) (fig. 3) ; Uniloculina (d'Orb.) ; Quinqueloculina (d'Orb.) ; Peneroplis (Montfort). (figs. 22, 3; 3), with form Dendritina (fig. 4, 1); Orbiculina (Lamk.) (fig. 3, 6-8); Orbitolites (Lamk.) (figs. 5, 6); Vertebralina (d'Orb.) (fig. 22); Squamulina (Sch.) (fig. 22) ; Calciiuba (Schaudinn).

Textulariadaceae. — Shells perforate, vitreous or (in the larger forms) arenaceous, in two or three alternating ranks (distichous or tristichous). Textularia (Defrance) (fig.

21).

Cheilostomellaceae.— Shells vitreous, thin, the chambers doubling forwards and backwards as in Miliolidae. Cheilq- stomella (Reuss).

Fig. 18. — Bilocidina depressa d'Orb., transverse' sections showing dimorphism. (From Lister.)

a, Megalospheric shell X 30, showing uniform gi'bwth, biloculine throughout.

b, Microspheric shell X 90, showing multiform growth, quinqueloculine at first, and then multiform.

XI. Nummulinidaceae.— As in Rotalidaceae, but with a thicker finely perforated shell, often well developed, and a supple- mentary skeleton traversed by branch- ing canals as an additional partyVwall between the proper chamber-walls. Nonionina (d'Orb.) (fig. 4, 19); Fus'u- lina (Fischer) (fig. 20) ; Polystomella (Lamk.) (figs. 4, 16; 8); Operculina (d'Orb.) (fig. 9); Heterostegina '(d'Orb.) (fig. 16); Cycloclypeus (Carptr.) (fig. 15); Nummiclites (Lamk.) (figs. 10, n,

12, 13, 14).

"Eozoon canad?nse," described as a species of this order by J. W. Dawson and Carpenter, has been pronounced by a series of enquirers, most of whom started with a belief in its organic structure, to be merely a complex mineral concretion in ophicalcite, a rock composed of an admixture of silicates (mostly serpentine and pyroxene) and calcite.

Distribution in Vertical Space. — Owing to their lack of organs for active locomotion the Foraminifera are all crawling or attached, with the exception of a few genera (very rich in species, however) which float near the surface of the ocean, constituting part pf the pelagic plankton (q.v.). Thus the majority are littoral or deep-sea, sometimes attached to other bodies or even burrowing in the tests of other Foraminifera; most of 'the fresh-water forms are sapropelic, inhabiting the layer of organic

debris at the surface of the bottom mud ditches of pools, ponds and lakes. The deep-sea species below a certain depth cannot possess a calcareous shell, for this would be dissolved; and it is in these that we find limesalts sometimes replaced by silica. The pelagic floating genera are also specially modified. Their shell is either thin or extended many times by long slender tapering spines, and the protoplasm outside has the same character as that of the Radiolaria (q.v.), being differentiated into jelly containing enormous vacuoles and traversed by reticulate strands of granular protoplasm. These coalesce into a peripheral zone from which protrude the pseudo-

Fig. 19. — Arenaceous Foraminifera.

a, Exterior of Saccammina.

b, The same laid open.

c, Portion of test more highly

magnified.

d, Pilulina. [magnified.

e, Portion of test more highly

/, Nautiloid Lituola, exterior.

g, Chambered interior.

h, Portion of labyrinthic cham- ber wall, showing component sand-grains.

pods, here rather radiate than reticulate. Most genera and most species are cosmopolitan; but local differences are often marked. Foraminifera abound in the shore sands and the crevices of coral reefs. The membranous shelled forms decay without leaving traces. The sandy or calcareous shells of dead Foraminifera constitute a large proportion of littoral sand, both below and above tide marks; and, as shown in the boring on Funafuti, enter largely into the constituents of coral rock. They may accumulate in the mud of the bottom to constitute Foraminiferal ooze. The source of these shells in the latter case is double: (1) shells of bottom-dwellers accumulate on the spot; (2) shells of dead plankton forms sink down in a continuous shower, to form a layer at the bottom of the ocean, during which process the spines are dissolved by the sea-water. Thus is formed an ooze known as " Globigerina-ooze," being formed largely of that genus and its ally Hastigerina; below 3000 fathoms even the tests themselves are dissolved. Casts of their bodies

in glauconite (a green ferrous silicate, whose composition has not yet been accurately determined) are, however, frequently left. Glauconitic casts of perforate shells, notably Globigerina, have been found in Lower Cambrian (e.g. Hollybush Sandstone), and the shells themselves in Siberian limestones of that age. It is only when we pass into the Silurian Wenlock limestone that sandy shells make their appearance. Above this horizon Foraminifera are more abundant as constituents, partial or principal of calcareous rocks, the genus Endolhyra being indeed almost confined to Carboniferous beds. The genus Fusulina (fig. 20) and Saccammina (fig. 19) give their names (from their

Fig. 20. — Section of Fusulina Limestone.

respective abundance) to two limestones of the Carboniferous series^ Porcellanous shells become abundant only from the Lias upwards. The glauconitic grains of the Greensand forma- tions are chiefly foraminiferal casts. Chalk is well known to consist largely of foraminiferal shells, mostly vitreous, like the north Atlantic globigerina ooze. In the Maestricht chalk more littoral conditions prevailed, and we find such large-sized

Fig. 21.— Microscopic Organisms in Chalk from Gravesend. a, b, c, d, Textularia globulosa; e, e, e, e, Rotalia aspera; f, Textularia aculeata ; g, Planularia hexas ; h, Navicula.

species as Orhitoid.es (vitreous) and Orbitolites (porcellanous; figs; 5, 6), &c. In the Eocene Tertiaries the Calcaire Grossier of the Paris basin is mainly composed of Miliolid forms. Num- mulites occur in English beds

and in the Paris basin; but the great beds of these, forming reef-like masses of limestone, occur farther south, extending from the Pyrenees through the southern and eastern Alps to Egypt, Sinai, and on to north India. The peculiar structure occurring in the Lower Laurentian limestone, as well as other limestones of Archean age described as a Num- mulitaceous genus, " Eozoon," by Carpenter and Dawson, and abundantly illustrated in the 9th edition of his encyclopaedia, is now universally regarded as of inorganic origin. " Looking

63‘5

a4

Fig. 22. — Imperforata.

7, Spiroloculina planulata, Lamarck, showing five “coils”; porcellanous. 2, Young ditto, with shell dissolved and protoplasm stained so as to show the seven nuclei n.

j, Spirolina (Peneroplis); a sculptured imperfectly coiled shell; porcellanous.

4, Vertebralina, a simple shell consisting of chambers succeeding one another in a straight line; porcellanous.

“5, 6, Thurammina papillata, Brady, a sandy form. 5 Is broken open so as to show an inner chamber; recent. X 25.

7, Haplophragmtum canariensis. a sandy form; recent.

8, Nucleated reproductive bodies (bud-spores) of Haliphysema.

Q, Squamulina laevis, M. Schultze; X 40; a simple porcellanous Miliolide.

70, Protoplasmic core removed after treatment with weak chromic acid from the shell of Haliphysema tumanovitzii, Bow. «, Vesicular nuclei, stained with haematoxylin. (After Lankester.)

77, Haliphysema tumanovitzii; X 25 diam.; living specimen, showing the wine- glass-shaped shell built up of sand-grains and sponge-spicules, and the abundant proto- plasm p, issuing from the mouth of the shell and spreading partly over its projecting constituents.

is. Shell of Astrorkha limicola, Sand.; X t; showing the branching of the test on some of the rays usually broken away in preserved specimens (original).

13, Section of the shell of Marsipelh, showing thick walls built of sand-grains.

Fig. 23. — Perforata.

1, Spiral arrangement of simple chambers of a Reticularian shell, as in small Rotalio.

2, Ditto, with double septal walls, and supplemental shell -substance (shaded), as in large Rolalia.

5, Diagram to show the mode in which successively-formed chambers may com- pletely embrace their predecessors, as in Frondicularia.

4 f Diagram of a simple straight series of non-embracing chambers, as in Nodo saria.*

5, Hasligerina murrayi, Wyv. Thomson, a. Bubbly (vacuolated) protopl.nsm, en- closing b, the perforated Globigerina -like shell (conf. central capsule of Radiolaria). From the peripheral protoplasm project, not only fine pseudopodia, but hollow spines of calcareous matter, which are set on the shell, and have an axis of active protoplasm. Pelagic; drawn in the living state.

6, Globigerina bulloides, d'Orb., showing the punctiform perforations of the shell and the main aperture.

7, Fragment of the shell of Globigerina, seen from within, and highly magnified, a, F

8, Orbulina universe, d'Orb. Pelagic example, with adherent radiating calcareous SDines (hollow), and internally a small Globigerina. shell. It is probably a develop- mental phase of Globigerina, a, Orbulina shell; b, Globigerina shell.

p, Polytrema miniaceum, Lin.; X, 12. Mediterranean. Example of a branched adherent calcareous perforate Recticularian.

10, Calcarina spenghri, Gmel.; X 10. Tertiary, Sicily. Shell dissected so as to show the spiral arrangement of the chambers, and the copious secondary shell substance. a 2 , a 3 , a, Chambers of three successive coils in section, showing the thin primary wall (finely tubulate) of each; 6, b, b, b, perforate surfaces of the primary wall of four tiers of chambers, from which the secondary shell substance has been cleared away; cf, c', secondary or intermediate shell substance in seclion, showing coarse canals; d, section of secondary shell substance at right angles to c'; e, tubercles of secondary shell sub- stance on the surface; /, /, club-like processes of secondary shell substance.*

at the almost universal diffusion of existing Foraminifera and the

continuous accumulation of their shells over vast areas of the ocean-bottom, they are certainly doing more than any other group of organisms to separate carbonate of lime from its solution in sea-water, so as to restore to the solid crust of the earth what is being continuously withdrawn from it by solution of the calcareous materials of the land above sea-level." (E. R. Lan- kester, "Protozoa," Ency. Brit. 9th ed.)

Historical. — The Foraminifera were discovered as we have seen by A. d'Orbigny. C. E. Ehrenberg added a large number of species, but it was to F. Dujardin in 1835 that we owe the recognition of their true zoological position and the characters of the living animal. W. B. Carpenter and W. C. Williamson in England contributed largely to the study of the shell, the latter being the first to call attention to its multiform character in the development of a single species, and to utilize the method of thin sections, which has proved so fertile in results. W. K. Parker and H. B. Brady, separately, and in collaboration, described an enornious number of forms in a series of papers, as well as in the monograph by the latter of the Foraminifera of the " Challenger " expedition. Munier-Chalmas and Schlum- berger brought out the fact of dimorphism in the group, which was later elucidated and incorporated in the full cytological study of the life-cycle of Foraminifera by J. J. Lister and F. Schaudinn, independently, but with concurrent results.

Literature. — The chief recent books are: F. Chapman, The Foraminifera (1902), and J. J. Lister, " The Foraminifera," in E. R. Lankester's Treatise on Zoology (1903), in which full bibliographies will be found. For a final resume of the long controversy on Eozoon, see George P. Merrill in Report of the U.S. National Museum (1906), p. 635. Other classifications of the Foraminifera will be found by G. H. Theodor Eimer and C. Fickert in Zeitschr. fur wissenschaftliche Zoologie, Ixv. (1899), p. 599, and L. Rhumbler in Archiv fiir Protisten- kunde, iii. (1903-1904) ; the account of the reproduction is based on the researches of J. J. Lister, summarized in the above-cited work, and of F. 'Schaudinn, in Arbeiten des kaiserlichen Gesundheitsamts , xix. (1903). We must also cite W. B. Carpenter, W. K. Parker and T. Rymer Jones, Introduction to the Study of the Foraminifera (Ray Society) (1862); W. B. Carpenter, " Foraminifera," in Ency. Brit., 9th ed. ; W. C. Williamson, On the Recent Foraminifera of Great Britain (Ray Society), (1858); H. B. Brady, "The Foraminifera," in Challenger Reports, ix. (1884) ; A. Kemna, in Ann. de la soc. royale zoologique et malacologique de Belgique, xxxvii. (1902), p. 60; xxxix. (1904), p. 7.

Appendix. — The Xenophyophoridae are asmallgroupof bottom- dwefting Sarcodina which show a certain resemblance to arenaceous Foraminifera, though observations in the living state show that the character of the pseudopodia is lacking. The multinucleate proto- plasm is contained in

branching tubes, aggregated into masses of definite form, bounded by a common wall of foreign bodies (sponge spicules, &c.) cemented into a membrane. The cytoplasm contains granules of BaSOi and pellets of faecal matter. All that is known of reproduction is the resolution of the pellet9 into uninucleate cells. (F. E. Schultze. Wissenschaftliche Ergebnisse der deulschen Tiefsee- Expedition, vol. xi., 1905, pt. i.) (M. Ha.)

FORBACH, a town of Germany in the imperial province of Alsace-Lorraine, on an affluent of the Rossel, and on the railway from Metz to Saarbrucken, 55 m. S.W. of the latter. Pop. (1905) 8193. It has a Protestant and a Roman Catholic (Gothic) church, a synagogue and a Progymnasium. Its industries include the manufacture of tiles, pasteboard wares and gardening implements, while there are coal mines in the vicinity. After the battle on the neighbouring heights of Spicheren (6th of August 1870), in which the French under General Frossard were defeated by the Germans under General von Gliimer, the town was occupied by the German troops, and at the conclusion of the war annexed to Germany. On the Schlossberg near the town are the ruins of the castle of the counts of Forbach, a branch of the counts of Saarbrucken.

See Besler, Geschichte des Schlosses, der Herrschaft und der Stadt Forbach (1895).

FORBES, ALEXANDER PENROSE (1817-1875), Scottish divine, was born at Edinburgh on' the 6th of June 1817. He was the second son of John Henry Forbes, Lord Medwyn, a judge of the court of session, and grandson of Sir William Forbes of Pitsligo. He studied first at the Edinburgh Academy, then for two years under the Rev. Thomas Dale, the poet, in Kent, passed one session at Glasgow University in 1833, and,

having chosen the career of the Indian civil service, completed his studies with distinction at Halleybury College. In 1836 he went to Madras' and secured eatfy promotion, but in conse- quence of ill-health he was obliged to return to Englarid. He then entered Brasenose College, Oxford, where in 1841 he obtained the Boden Sanskrit scholarship, and graduated in 1844. He was at Oxford during the early years of the movement known as Puseyism, and was powerfully influenced by association with Newman, Pusey and Keble. This led him to resign his Indian appointment. In 1844 he was ordained deacoa and priest in the English Church, and held curacies at Aston, Rowant and St Thomas's, Oxford; but being naturally attracted to the Episcopal Church of his native land, then recovering from long depression, he removed in 1846 to Stonehaven, the chief town of Kincardineshire. The same year, however, he was appointed to the vicarage of St Saviour's, Leeds, a church founded to preach and. illustrate Tractarian principles. In 1848 Forbes was called to succeed Bishop Moir in

the see of Brechin. He removed the episcopal residence to Dundee, where he resided till his death, combining the pastoral charge of the congregation with the duties of the see. When he came to Dundee the churchmen were accustomed owing to their small numbers to worship in a room over a bank. Through his energy several churches were built, and among them the pro-cathedral of St Paul's. He was prose- cuted in the church courts for heresy, the accusation being founded on his primary charge, delivered and published in 1857, in which he set forth his views on the Eucharist. He made a powerful defence of the charge, and was acquitted with " a censure and an admonition." Keble wrote in his defence, and was present at his trial at Edinburgh, Forbes was a good scholar, a scientific theologian and a devoted worker, and was much beloved. He died at Dundee on the 8th of October 1875.

Principal works: A Short Explanation of the Nicene Creed (1852) ; An Explanation of the Thirty+ntne Articles (2 vols., 1867 and 1868); Commentary on the Seven Penitential Psalms (1847') ; Commentary on the Canticles (1853). See Mackey's Bishop Forbes, a Memoir.

FORBES, ARCHIBALD (1838-1900), British war correspondent, the son of a Presbyterian minister in Morayshire, was born on the 17th of April 1838, and was educated at Aberdeen University. Entering the Royal Dragoons as a private, he gained, while in the service, considerable practical experience of military life and affairs. Being invalided from his regiment, he settled in London, and became a journalist. When the Franco- German War broke out in 1870, Forbes was sent to the front as war correspondent td the Morning Advertiser, and in this capacity he gained valuable information as to the plans of the Parisians for withstanding a siege. Transferring his services to the Daily News, his brilliant feats in the transmission of intelligence drew world-wide attention to his despatches. He was with the German Symy from the beginning of the campaign-, and he after- wards witnessed the rise and fall of the Commune. Forbes afterwards proceeded to Spain, where he chronicled the outbreak of the second Carlist War; but his work here was interrupted by a visit to India, where he spent eight months upon a mission of investigation into the Bengal famine of 1874. Then he returned to Spain, and followed at various times the Carlist, the Republican and the Alfonsist forces. As representative of the Daily News, he accompanied the prince of Wales in his tour through India in 1875-1876. Forbes went through the Servian campaign of 1876, and was present at all the important engagements. In the Russo-Turkish campaign of 1877 he achieved striking jour- nalistic successes at great personal risk. Attached to the Russian army, he witnessed most of the principal operations, and re-mained continuously in the field until attacked by fever. His letters, together with those of his colleagues, MacGahan and Millet, were republished by the Daily News. On recovering from his fever, Forbes

proceeded to Cyprus, in order to witness the British occupation. The same year (1878) he went to India, and in the winter accompanied the Khyber Pass force to Jalalabad He was present at the taking of Ali Musjid, and marched with several expeditions against the hill tribes. Burma was Forbes's next field of adventure, and at Mandalay, the capital, he had several interesting interviews with King Thibaw. He left Burma

hurriedly for South Africa, where, in consequence of the disaster of lsandlwana, a British force was collecting for the invasion of Zululand. He was present at the victory of Ulundi, and his famous ride of. 1 20 m . in fifteen hours, by which he was enabled to convey the first news of the battle to England, remains one of the finest achievements in journalistic enterprise. Forbes subsequently delivered many lectures on his war experiences to large audiences. His closing years were spent in literary work. He had some years before published a military novel entitled Drawn from Life, and a volume on his experiences of the war between France and Germany. These were now followed by numerous publications, including Glimpses through the Cannon Smoke (1880); Souvenirs of some Continents (1885); William I. of Germany : a Biography (1888); Havelock, in the "English Men of Action " Series (1890); Barracks, Bivouacs, and Battles (1891); The Afghan Wars, 1839-80 (1892); Czar and Sultan (1895); Memories and Studies of War and Peace (1895), in many respects autobiographic; and Colin Campbell, Lord Clyde (1896). He died on the 30th of March 1900.

FORBES, DAVID (1828-1876), British mineralogist, metal- lurgist and chemist, brother of Edward Forbes (q.v.), was born on the 6th of September 1828, at Douglas, Isle of Man, and received his early education there and at Brentwood in Essex. When a boy of fourteen he had already acquired a remarkable knowledge of chemistry. This subject he studied at the university of Edinburgh, and he was still young when he was appointed superintendent of the mining and metallurgical works at Espedal in Norway. Subsequently he became a partner in the firm of Evans & Askin, nickel-smelters, of Birmingham, and in that capacity during the years 1857-1860 he visited Chile, Bolivia and Peru. Besides reports for the Iron and Steel Institute, of which, during the last years of his life, he was foreign secretary, he wrote upwards of 50 papers on scientific subjects, among which are the following: " The Action of Sulphurets on Metallic Silicates at High Temperatures," Rep. Brit. Assoc, 1855, pt. ii. p. 62; " The Relations of the Silurian and Meta- morphic Rocks of the south of Norway," ib. p. 82; " The Causes producing Foliation in Rocks," J own. Geol. Soc. xi.,

1855; "The Chemical Composition of the Silurian and Cambrian Limestones," Phil. Mag. xiii. pp. 365-373, 1857; " The Geology of Bolivia and Southern Peru," Journ. Geol. Soc. xvii. pp. 7-62, 1861; "The Mineralogy of Chile," Phil. Mag., 1865; " Researches in British Mineralogy," Phil. Mag., 1867-1868. His observations on the geology of South America were given in a masterly essay, and these and subsequent researches threw much light on igneous and metamorphic phenomena and on the resulting changes in rock -formations. He also contributed important articles on chemical geology to the Chemical News and Geological Magazine (1867 and 1868). In England he was a pioneer in microscopic petrology. He was elected F.R.S. in 1858. He died in London on the 5th of December 1876.

See Obituary by P. M. Duncan in Quart. Journ. Geol. Soc, vol. xxxiii., 1877, p. 41; and by J. Morris in Geol. Mag., 1877, p. 45.

FORBES, DUNCAN, of Culloden (1685-1747), Scottish statesman, was born at Bunchrew or at Culloden near Inverness on the 10th of November 1685. After he had completed his studies at the universities of Edinburgh and Leiden, he was admitted advocate at the Scottish bar in 1709. His own talents and the influence of the Argyll family secured his rapid advancement, which was still further helped by his loyalty to the Hanoverian cause at the period of the rebellion in 1 715. In £722 Forbes was returned member for Inverness, and in 1725 he succeeded Dundas of Arniston as lord advocate. He inherited the patrimonial estates on the death of his brother in 1 734, and in 1737 he attained to the highest legal honours in Scotland, being made lord president of the court of session. As lord advocate, he had laboured to improve the legislation and revenue of the country, to extend trade and encourage manufactures, and no less to render the government popular and respected in Scotland. In the proceedings which followed the memorable Porteous mob, for example, when the government brought in a bill for disgracing the lord provost of Edinburgh, for fining

the corporation, and for abolishing the town-guard and city^gate, Forbes both spoke and voted against the measure as an un^- warranted outrage on the national feeling. As lord president also he carried out some useful legal reforms; and his term of office was characterized by quick and impartial administration of the law.

The rebellion of 1745 found him at his post, and it tried all his patriotism. Some years before (1738) he had repeatedly and earnestly urged upon the government the expediency of embodying Highland regiments, putting them underthe command of colonels whose loyalty could be relied upon, but officering them with the native chieftains and cadets of old families in the

north. " If government," said he, " pre-engages the Highlanders in the manner I propose, they will not only serve well against the enemy abroad, but will be hostages for the good behaviour of their relations at home; and I am persuaded that it will be absolutely impossible to raise a rebellion in the Highlands." In 1739, with Sir Robert Walpole's approval, the original (1730) six companies (locally enlisted) of the Black Watch were formed into the famous " Forty-second " regiment of the line. The credit given to the earl of Chatham in some histories for this movement is an error; it rests really with Forbes and his friend Lord Islay, afterwards 3rd duke of Argyll (see the Autobio- graphy of the 8th duke of Argyll, vol. i. p. 8 sq., 1906).

On the first rumour of the Jacobite rising Forbes hastened to Inverness, and through his personal influence with the chiefs of Macdonald and Macleod, those two powerful western clans were prevented from taking the field for Charles Edward; the town itself also he kept loyal and well protected at the commence- ment of the struggle, and many of the neighbouring proprietors were won over by his persuasions. His correspondence with Lord Lovat, published in the Culloden papers, affords a fine illustration of his character, in which the firmness of loyal principle and duty is found blended with neighbourly kindness and consideration. But at this critical juncture of affairs, the apathy of the government interfered considerably with the success of his negotiations. Advances of arms and money arrived too late, and though Forbes employed all his own means and what money he could borrow on his personal security, his re- sources were quite inadequate to the emergency. It is doubtful whether these advances were ever fully repaid. Part was doled out to him, after repeated solicitations that his credit might be maintained in the country; but it is evident he had fallen into disgrace in consequence of his humane exertions to mitigate the impolitic severities inflicted upon his countrymen alter their disastrous defeat at Culloden. The ingratitude of the government, and the many distressing circumstances connected with the insurrection, sunk deep into the mind of Forbes. He never fairly rallied from the depression thus caused, and after a period of declining health he died on the 10th of December 1747.

Forbes was a patriot without ostentation or pretence, a true Scotsman with no narrow prejudice, an accomplished and even erudite scholar without pedantry, a man of genuine piety without asceticism or intolerance. His country long felt his influence through her reviving arts and institutions; and the example of such a character in that coarse and venal age, and among a people distracted by faction, political strife, and national anti- pathies, while it was invaluable to his contemporaries in a man of high position, is entitled to the lasting gratitude and veneration of his countrymen. In his intervals of leisure he cultivated with some success the study of philosophy, theology and biblical criticism. He is said to have been

a diligent reader of the Hebrew Bible. His published writings, some of them of im- portance, include — A Letter to a Bishop, concerning some Important Discoveries in Philosophy and Theology (1732); Some Thoughts concerning Religion, natural and revealed, and the Manner of Understanding Revelation (1735); and Reflections on Incredulity (2nd ed., 1750).

His correspondence was collected and published in 1815, and a memoir of him (from the family papers) was written by Mr Hill Burton, and published along with a Life of Lord Lovat, in 1847. His statue by Roubillac stands in the Parliament House, Edinburgh.

FORBES, EDWARD (1815-1854), British naturalist, was born at Douglas, in the Isle of Man, on the 12th of February

181 5. While still a child, when not engaged in reading, or in the writing of verses and drawing of caricatures, he occupied himself with the collecting of insects, shells, minerals, fossils, plants and other natural history objects. From his fifth to his eleventh year, delicacy of health precluded his attendance at any school, but in 1828 he became a day scholar at Athole House Academy in Douglas. In June 1831 he left the Isle of Man for London, where he studied drawing-. In October, how- ever, having given up all idea of making painting his profession, he returned home; and in the following month he matriculated as a student of medicine in the university of Edinburgh. His vacation in 1832 he spent in diligent work on the natural history of the Isle of Man. In 1833 he made a tour in Norway, the botanical results of which were published in Loudon's Magazine of Natural History for 1835-1836. In the summer of 1834 he devoted much time to dredging in the Irish Sea; and in the succeeding year he travelled in France, Switzerland and Germany.

• Born a naturalist; and having no relish for the practical duties of a surgeon, Forbes in the spring of 1836 abandoned the idea of taking a medical degree, resolving to devote himself to science and literature. The winter of 1836-1837 found him at Paris, where he attended the lectures at the Jardin des Plantes on natural history, comparative anatomy, geology and mineralogy. Leaving Paris in April 1837, he went to Algiers, and there obtained materials for a paper on land and freshwater Mollusca, published in the Annals of Natural History, vol. ii. p. 250. In the autumn of the same year he registered at Edinburgh as a student of literature; and in 1838 appeared his first volume, Malacologia Monensis, a synopsis of the species

of Manx Mollusca. During the summer of 1838 he visited Styria and Carniola, and made extensive botanical collections. In the following autumn he read before the British Association at Newcastle a paper on the distribution of terrestrial Pulmonifera in Europe, and was commissioned to prepare a similar report with reference to the British Isles. In 1841 was published his History of British Star-fishes, embodying extensive observations and containing 120 illustrations, inclusive of humorous tail-pieces, all designed by the author. On the 17th of April of the same year Forbes, accompanied by his friend William Thompson, joined at Malta H.M. surveying ship " Beacon," to which he had been appointed naturalist by her commander Captain Graves. From that date until October 1842 he was employed in investigating the botany, zoology and geology of the Mediterranean region. The results of these researches were made known in his " Report on the Mollusca and Radiata of the Aegean Sea, presented to the British Association in 1843," and in Travels in Lycia, published in conjunction with Lieut, (afterwards Admiral) T. A. B. Spratt in 1847. In the former treatise he discussed the influence of climate and of the nature and depth of the sea bottom upon marine life, and divided the Aegean into eight biological zones; his conclusions with respect to bathymetrical distribution, however, have naturally been modified to a considerable extent by the more recent explorations of the deep seas.

Towards the end of the year 1842 Forbes, whom family misfortunes had now thrown upon his own resources, sought and obtained the curatorship of the museum of the Geological Society of London. To the duties of that post he added in 1843 those of the professorship of botany at King's College. • In November 1844 he resigned the curatorship of the Geological Society, and became palaeontologist to the Geological Survey of Great Britain. Two years later he published in the Memoirs of the Geological Survey, i. 336, his important essay " On the Connexion between the distribution of the existing Fauna and Flora of the British Isles, .and the Geological Changes which have affected their Area, especially during. the epoch of the Northern Drift." It is therein pointed out that, in accordance with the theory of their origin from various specific centres, the plants of Great Britain may be divided into five well-marked groups: the W. and S.W. Irish, represented in the N. of Spain, the S.E. Irish and S.W. English, related to the flora of the Channel

Isles and the neighbouring part of France; the S.E. English, characterized by species occurring on the opposite French coast ; a group peculiar to mountain summits, Scandinavian in type; and, lastly, a general or Germanic flora. From, a variety of argu- ments the conclusion is drawn that the greater part of the terrestrial animals and flowering plants of the British Islands migrated thitherward, over continuous land, at three distinct periods, before, during and after the glacial epoch. On this isubject Forbes's

brilliant generalizations are now regarded as only partially true (see C. Reid's Origin of the British Flora, 1899). In the autumn of 1848 Forbes married the daughter of General Sir C. Ashworth; and in the same year was published his Monograph of the British Naked-eyed Medusae (Ray Society). The year 1851 witnessed the removal of the collections of the Geological Survey from Craig's Court to the museum in Jermyn Street, and the appointment of Forbes as professor of natural history to the Royal School of Mines just established in con- junction therewith. In 1852 was published the fourth and concluding volume of Forbes and S. Hanley's History of British Mollusca; also his Monograph of the Echinodermata of the British Terliaries (Palaeontographical Soc).

In 1853 Forbes held the presidency of the Geological Society of London, and in the following year he obtained the fulfilment of a long-cherished wish in his appointment to the professorship of natural history in the university of Edinburgh, vacant by the death of R. Jameson, his former teacher. Since his return from the East in 1842, the determination and arrangement of fossils, frequent lectures, and incessant literary work, including the preparation of his palaeontological memoirs, had precluded Forbes from giving that attention to the natural history pursuits of his earlier life which he had earnestly desired. It seemed that at length he was to find leisure to reduce to order his stores of biological information. He lectured at Edinburgh, in the summer session of 1854, and in September of that year he occupied the post of president of the geological section at the Liverpool meeting of the British Association. But he was taken ill just after he had commenced his winter's course of lectures in Edinburgh, and after not many days' illness he died at Wardie, near Edinburgh, on the 18th of November 1854.

See Literary Gazette (November 25, 1854) ; Edinburgh New Philo- sophical Journal (New Ser.), (1855); Quart. Journ. Geol. Soc. (May 1855); G. Wilson and A. Geikie, Memoir of Edward Forbes (1861), in which, pp. 575-583, is given a list of Forbes's writings. . See also Literary Papers, edited by Lovell Reeve (1855). The following works were issued posthumously: " On the Tertiary Fluviomarine Formation of the Isle of Wight " (Geol. Survey), edited by R. A. C. Godwin-Austen (1856); "The Natural History of the European Seas," edited and continued by R. A. C. Godwin-Austen (1859).

FORBES, JAMES DAVID (1809-1868), Scottish physicist, was the fourth son of Sir William Forbes, 7th baronet of Pitsligo, and was born at Edinburgh on the 20th of April 1809. He entered the university of Edinburgh in 1825, and soon afterwards began to contribute papers to the Edinburgh Philosophical Journal anonymously under the signature " A." At the age of nineteen he became a fellow of the Royal Society of Edinburgh,

and in 183 2 he was elected to the Royal Society of London. A year later he was appointed professor of natural philosophy in Edinburgh University, in succession to Sir John Leslie and in competition with Sir David Brewster, and during his tenure of that office, which he did not give up till i860, he not only proved himself an active and efficient teacher, but also did much to improve the internal conditions of the university. In 1859 he was appointed successor to Brewster in the principalship of the United College of St Andrews, a position which he held until his death at Clifton on the 31st of December 1868.

As a scientific investigator he is best known for his researches on heat and on glaciers. Between 1836 and 1844 he published in the Trans. Roy. Soc. Ed. four series of " Researches on Heat," in the course of which he described the polarization of heat by tourmaline, by transmission through a bundle of thin mica plates inclined to the transmitted ray, and by reflection from the multiplied surfaces of a pile of mica plates placed at the polarizing angle, and also its circular polarization by two internal

reflections in rhombs of rock-salt. His work won him the Rufnford medal of the Royal Society in 1838, and in 1843 he received its Royal medal for a paper on the " Transparency of the Atmosphere and the Laws of Extinction of the Sun's Rays passing through it." In 1846 he began experiments on the temperature of the earth at different depths and in different soils near Edinburgh, which yielded determinations of the thermal conductivity of trap-tufa, sandstone and pure loose sand. Towards the end of his life he was occupied with experimental inquiries into the laws of the conduction of heat in bars, and his last piece of work was to show that the thermal conductivity of iron diminishes with increase of temperature. His attention was directed to the question of the flow of glaciers in 1840 when he met Louis Agassiz at the Glasgow meeting of the British Association, and in subsequent years he made several visits to Switzerland and also to Norway for the purpose of obtaining accurate data. His observations led him to the view that a glacier is an imperfect fluid or a viscous body which is urged down slopes of a certain inclination by the mutual pressure of its parts, and involved him in some controversy with Tyndall and others both as to priority and to scientific principle. Forbes was also interested in geology, and published memoirs on the thermal springs of the Pyrenees, on the extinct volcanoes of the Vivarais (Ardeche), on the geology of the Cuchullin and Eildon hills, &c. In addition to about 150 scientific papers, he wrote Travels through the Alps of Savoy and Other Parts of the Pennine Chain, with Observations on the Phenomena of Glaciers (1843); Norway

and its Glaciers (1853) ; Occasional Papers on the Theory of Glaciers (1859) ; A Tour of Mont Blanc and Monte Rosa (1855). He was also the author (1852) of the " Dissertation on the Progress of Mathematical and Physical Science," published in the 8th edition of the Encyclopaedia Britannica.

See Forbes' s Life and Letters, by Principal Shairp, Professor P. G. Tait and A. Adams- Reilly (1873); Professor Forbes and his Bio- graphers, by J. Tyndall (1873).

FORBES, SIR JOHN (1787-1861), British physician, was born at Cuttlebrae, Banffshire, in 1787. He attended the grammar school at Aberdeen, and afterwards entered Marischal College. After serving for nine years as a surgeon in the navy, he graduated M.D. at Edinburgh in 1817, and then began to practise in Penzance, whence he removed to Chichester in 1822. He took up his residence in London in 1840, and in the following year was appointed physician to the royal household. He was knighted in 1853, and died on the 13th of November 1861 at Whitchurch in Berkshire. Sir John Forbes was better known as an author and editor than as a practical physician. His works include the following: — Original Cases . . illustrating the Use of the Stethoscope and Percussion in the Diagnosis of Diseases of the Chest (1824); Illustrations of Modern Mesmerism (184s); A Physician's Holiday (1st ed., 1849); Memorandums made in Ireland in the Autumn of 1852 (2 vols., 1853); Sight- seeing in Germany and the Tyrol in the Autumn of 1855 (1856). He was joint editor with A. Tweedie and J. Conolly of The Cyclopaedia of Practical Medicine (4 vols., 1833-1835); and in i8,?6 he founded the British and Foreign Medical Review, which, after a period of prosperity, involved its editor in pecuniary loss, and was discontinued in 1847, partly in consequence of the advocacy in its later numbers of doctrines obnoxious to the profession.

FORBES, a municipal town of Ashburnham county, New South Wales, Australia, 289 m. W. by N. from Sydney, on the Lachlan river, and with a station on the Great Western railway. Pop. (1901) 4313. Its importance as a commercial centre is due to its advantageous position between the northern and southern markets. It has steam-sawing and flour-mills, breweries and wool-scouring establishments; while the surrounding country produces good quantities of cereals, lucerne, wine and fruit.

FORBES-ROBERTSON, JOHNSTON (1853-), English

actor, was the son of John Forbes-Robertson of Aberdeen, an art critic. He was educated at Charterhouse, and studied at the Royal Academy schools with a view to becoming a painter. But though he kept up his interest in that art, in 1874 he turned

to the theatre,making his first appearance in London as Chastelard, in Mary, Queen of Scots. He studied under Samuel Phelps, from whom he learnt the traditions of the tragic stage. He played with the Bancrofts and with John Hare, supported Miss Mary Anderson in both England and America, and also acted at different times with Sir Henry Irving. His refined and artistic style, and beautiful voice and elocution made him a marked man on the English stage, and in Pinero's The Profligate at the Garrick theatre (1889), under Hare's management, he established his position as one of the most individual of London actors. In 1895 he started under his own management at the Lyceum with Mrs Patrick Campbell, producing Romeo and Juliet, Hamlet, Macbeth and also some modern plays; his impersonation as Hamlet was especially fine, and his capacity as a romantic actor was shown to great advantage also in John Davidson's For the Crown and in Maeterlinck's PelUas and Melisande. In 1900 he married the actress Gertrude Elliott, with whom, as his leading lady, he appeared at various theatres, producing in subsequent years The Light that Failed, Madeleine Lucette Riley's Mice and Men, and G. Bernard Shaw's Caesar and Cleopatra, Jerome K. Jerome's Passing of the Third Floor Back, &c. His brothers, Ian Robertson (b. 1858) and Norman Forbes (b. 1859), had also been well-known actors from about 1878 onwards.

FORBIN, CLAUDE DE (1656-1733), French naval commander, was born in Provence, of a family of high standing, in 1656. High-spirited and ungovernable in his boyhood, he ran away from his home, and through the influence of an uncle entered the navy, serving his first campaign in 1675. For a short time he quitted the navy and entered the army, but soon returned to his first-choice. He made under D'Estrees the American campaign, and under Duquesneˆthat of Algiers in 1683, on all occasions distinguishing himself by his impetuous courage. The most remarkable episode of his life was his mission to Siam. During the administration of the Greek adventurer Phaulcon in that country, the project was formed of introducing the Christian religion and European civilisation, and the king sent an embassy to Louis XIV. In response a French embassy was sent out, Forbin accompanying the chevalier de Chaumont with the rank of major. When Chaumont returned to France, Forbin was induced to remain in the service of the Siamese king, and accepted, though with much reluctance, the posts of grand admiral, general of all the king's armies and governor of Bangkok. His position, however, was soon made untenable by the jealousy and intrigues of the minister Phaulcon; and at the end of two years he left Siam, reaching France in 1688. He was afterwards fully engaged in active service, first with Jean Bart in the war with England, when they were both captured and taken to Plymouth. They succeeded in making their escape and were soon serving their country again. Forbin was wounded at the battle of La Hogue, and greatly distinguished himself at the battle of Lagos.

He served under D'Estrees at the taking of Barcelona, was sent ambassador to Algiers, and in 1702 took a brilliant part in the Mediterranean in the War of the Spanish Succession. In 1 706 he took command of a squadron at Dunkirk, and captured many valuable prizes from the Dutch and the English. In 1708 he was entrusted with the command of the squadron which was to convey the Pretender to Scotland; but so effectually were the coasts guarded by Byng that the expedi- tion failed, and returned to Dunkirk. Forbin was now beginning to be weighed down with the infirmities of age and the toils of service, and in 1710 he retired to a country house near Marseilles. There he spent part of his time in writing his memoirs, published in 1730, which are full of interest and are written in a graphic and attractive style. Forbin died on the 4th of March 1733.

FORCELLINI, EGIDIO (1688-1768), Italian philologist, was born at Fener in the district of Treviso and belonged tc a very poor family. He went to the seminary at Padua in 1704, studied under FacCiolati, and in due course attained to the priesthood. From 1724 to 173 1 he held the office of rector of the seminary at Ceneda, and from 1751 to 1765 that of father confessor in the seminary of Padua. The remaining years of his life were

mainly spent in his native village. He died at Padua in 1768 before the Completion of the great work on which he had long co-operated with Facciolati. This was the vast Latin Lexicon (see Facciolati), which has formed the basis of all similar works that have since been published. He was engaged with his Herculean task for nearly 35 years, and the transcription of the manuscript by Luigi Violato occupied eight years more.

FORCHHAMMER, JOHANN GEORG (1 794-1865), Danish mineralc~ist and geologist, was born at Husum, Schleswig, on the 24th of July 1794, and died at Copenhagen on the 14th of December 1865. After studying at Kiel and Copenhagen from 1815 to 1818, he joined Oersted and Lauritz Esmarch in their mineralogical exploration of Bornholm, and took a considerable share in the labours of the expedition. In 1820 he obtained his doctor's degree by a chemical treatise De mangano, and immediately after set out on a journey through England, Scotland and the Faeroe Islands. In 1823 he was appointed lecturer at Copenhagen University on chemistry and mineralogy; in 1829 he obtained a similar post in the newly established poly- technic school; and in 1831 he was appointed professor of mineralogy in the university, and in 1848 became curator of the geological museum. From 1835 to 1837 he made many contribu- tions to the geological survey of Denmark. On the death of H. C. Oersted in 1851, he

succeeded him as director of the polytechnic school and secretary of the Academy of Sciences. In 1850 he began with J. Steenstrup and Worsaae various anthropological publications which gained a high reputation. As a public instructor Forchhammer held a high place and con- tributed potently to the progress of his favourite studies in his native country. He interested himself in such practical questions as the introduction of gas into Copenhagen, the establishment of the fire-brigade at Rosenberg and the boring of artesian wells.

Among his more important works are—Loerebog i de enkelte Radicalers Chemi (1842); Danmarks geognostiske Forhold (1835); Om de Bornholmske Kulformationer (1836) ; Dit my ere Kridt i Dan- mark (1847); Bidrag til Skildringen of Danmarks geographiske Forhold (1858). A list of his contributions to scientific periodicals, Danish, English and German, will be found in the Catalogue of Scientific Papers published by the Royal Society of London. One of the most interesting and most recent is " On the Constitution of Sea Water at Different Depths and in Different Latitudes," in the Proceedings of the Roy. Soc. xii. (1862-1863).

FORCHHAMMER, PETER WILHELM (1801-1894), German classical archaeologist, was born at Husum in Schleswig on the 23rd of October 1 801 . He was educated at the Liibeck gymnasium and the university of Kiel, with which he was connected for nearly 65 years. In 1830-1834 and 1838-1840 he travelled in Italy, Greece, Asia Minor and Egypt. In 1843 he was appointed professor of philology at Kiel and director of the archaeological museum founded by himself in co-operation with Otto Jahn. He died on the 8th of January 1894. Forchhammer was a democrat in the best sense of the word, and from 1871 to 1873 represented the progressive party of Schleswig-Holstein in the German Reichstag. His published works deal chiefly with topography and ancient mythology. His travels had convinced him that a full and comprehensive knowledge of classical antiquity could only be acquired by a. thorough acquaintance with Greek and Roman monuments and works of art, and a detailed examination of the topographical and climatic condi- tions of the chief localities of the ancient world. These principles are illustrated in his Hellenika. Griechenland. Im Neuen das Alte (1837), which contains his theory of the origin and explana- tion of the Greek myths, which he never abandoned, in spite of the attacks to which it was subjected. According to him, the myths arose from definite local (especially atmospheric and aquatic) phenomena, and represented the annually recurring processes of nature as the acts of gods and heroes; thus, in Achill (1853) , the Trojan War is the winter conflict of the elements in that district. Other similar short treatises are: DieGriindung Roms (1868); Daduchos (1875), on the language of the myths and mythical buildings; Die Wander ungen der Inachostochler lo (1880); Prolegomena zur Mythologie als Wisscnsrhaft und Lexikon der

Mylhensprache (1891). Amongst his topographical works mention may be made of: Topographic von Allien (1S41);

Beschreibung der Ebene von Troja {to$q), a commentary on a map of the locality executed by T. A. Spratt (see Journal of the Royal Geographical Society, xii., 1842); Topograpkia The- barum Heptapylarum (1854); Erkldrung der Ilias (1884), on the basis of the topographical and physical peculiarities of the plain of Troy. His Demokratenbuchlein (1849), in the main a discussion of the Aristotelian theory of the state, and Die Athener und Sokrates (1837), in which, contrary to the almost universal opinion, he upheld the procedure of the Athenians as perfectly legal and their verdict as a perfectly just one, also deserve notice.

For a full list of his works see the obituary notice by E. Alberti in C. Bursian's Biographisches Jahrbuchfur Altertumskunde, xx, (1897) ; also J. Sass in Allgemeine deutsche Biographie, and A. Hoeck and L. C. Pertsch, P. W. Forchhammer (1898).

FORCHHEIM, a town of Germany, in the kingdom of Bavaria, near the confluence of the Wiesent and the Regnitz, 16 m. S.S.E. of Bamberg. Pop. (1905) 8417. It has four Roman Catholic churches, including the Gothic Collegiate church and a Pro- testant church. Among the other public buildings are the progymnasium and an orphanage. The industries of the 1 town include spinning and weaving, bleaching and dyeing, bone and glue works, brewing and paper-making. The spacious chateau occupies the site of the Carolingian palace which was destroyed in 1246.

Forchheim is of very early origin, having been the residence of the Carolingian sovereigns, including Charlemagne, in the 9th century. Consequently many diets were held here, and here also Conrad I. and Louis the Child were chosen German kings. The town was given by the emperor Henry II. in 1007 to the bishopric of Bamberg, and, except for a short period during the nth century, it remained in the possession of the bishops until 1802, when it was ceded to Bavaria. In August 1796 a battle took place near Forchheim between the French and the Austrians. The fortifications of the town were dis- mantled in 1838.

See Hubsch, Chronik der Stadt Forchheim (Nuremberg, 1867).

FORD, EDWARD ONSLOW jooi), English sculptor,

was born in London. He received some education as a painter in Antwerp and as a sculptor in Munich under Professor Wag- miiller, but was mainly self-taught. His first contribution to the Royal Academy, in 1875, was a bust of his wife, and in portraiture he may be said to have achieved his

greatest success. His busts are always extremely refined and show his sitters at their best. Those (in bronze) of his fellow-artists Arthur Hacker (1894), Briton Riviere and Sir W. Q. Orchardson (1895), Sir L. Alma Tadema (1896), Sir Hubert von Herkomer and Sir John Millais (1897), and of A; J. Balfour are all striking likenesses, and are equalled by that in marble of Sir Frederick Bramwell (for the Royal Institution) and by many more. He gained the open competition for the statue of Sir Rowland Hill, erected in 1882 outside the Royal Exchange, and followed it in 1883 with "Henry Irving as Hamlet," now in the Guildhall art gallery. This seated statue, good as it is, was soon surpassed by those of Dr Dale (1898, in the city museum, Birmingham) and Professor Huxley (1900), but the colossal memorial staW of Queen Victoria (1901), for Manchester, was less successful. The standing statue of W. E. Gladstone (1894, for the City Liberal Club, London) is to be regarded as one of Ford's better portrait works. The colossal " General Charles Gordon," camel-mounted, for Chatham, "Lord Strathnairn," an equestrian group for Knightsbridge, and the " Maharajah of Mysore " (1900) comprise his larger works of the kind. A beautiful nude recumbent statue of Shelley (1892) upon a cleverly-designed base, which is not quite impeccable from the point of view of artistic taste, is at University College, Oxford, and a simplified version was presented by him to be set up on the shore of Viareggio, where the poet's body was washed up. Ford's ideal work has great charm and daintiness; his statue " Folly " (1886) was bought by the trustees of the Chantrey Fund, and was followed by other statues or statuettes of a similar order: " Peace " (1890), which secured his election as an associate of the Royal Academy, "Echo" (1895), on which he was elected full member, "The

Egyptian Singer " (18819), " Applause " (1893), " Glory to the Dead" (1001) and "Snowdrift" (1902). Ford's influence on the younger generation of sculptors was considerable and of good effect. His charming disposition rendered him extremely popular, and when he died a monument was erected to his memory (C. Lucchesi, sculptor, J. W. Simpson, architect) in St John's Wood, near to where he dwelt.

See Sculpture; also M. H. Spielmann, British Sculpture and Sculptors of To-day (London, 1901).

FORD, JOHN (1586-C1640), English dramatist, was baptized on the 17th of April 1586 at Ilsington in north Devon. He came of a good family; his father was in the commission of the peace and his mother was a sister of Sir John Popham, successively attorney-general and lord chief ' justice. The

name of John Ford appears in the university register of Oxford as matriculating at Exeter College in 1601. Like a cousin and namesake (to whom, with other members of the society of Gray's Inn, he dedicated his play of The Lover's Melancholy), the future dramatist entered the profession of the law, being admitted of the Middle Temple in 1602; but he seems never to have been called to the bar. Four years afterwards he made his first appearance as an author with an elegy called Fame's Memorial, or the Earl of Devonshire deceased, and dedicated to the widow of the earl (Charles Blount, Lord Mountjoy, " coronized," to use Ford's expression, by King James in 1603 for his services in Ireland) — a lady who would have been no unfitting heroine for one of his own tragedies of lawless passion, the famous Penelope, formerly Lady Rich. This panegyric, which is accompanied by a series of epitaphs and is composed in a strain of fearless extravagance, was, as the author declares, written "unfee'd"; it shows that Ford sympathized, as Shakespeare himself is supposed to have done, with the " awkward fate " of the countess's brother, the earl of Essex. Who the " flint-hearted Lycia " may be, to whom the poet seems to allude as his own disdainful mistress, is unknown; indeed, the record of Ford's private life is little better than a blank. To judge, however, from the dedications, prologues and epilogues of his various plays, heseemsto have enjoyed the patron- age of the earl, afterwards duke, of Newcastle, " himself a muse " after a fashion, and Lord Craven, the supposed husband of the ex-queen of Bohemia. Ford's tract of Honor Triumphant, or the Peeres Challenge (printed 1606 and reprinted by the Shakespeare Society with the Line of Life, in 1843), and the simultaneouslypub- lished verses The Monarches Meeting, or the King of Denmarkes Welcome into England, exhibit him as occasionally meeting the festive demands of court and nobility; and a kind of moral essay by him, entitled A Line of Life (printed 1620), which contains references to Raleigh, ends with a climax of fulsome praise to the address of King James I. Yet at least one of Ford's plays {The Broken Heart, iii. 4) contains an implied protest against the absolute system of government generally accepted by the dramatists of the early Stuart reigns. Of his relations with his brother-authors little is known; it was natural that he should exchange complimentary verses with James Shirley, and that he should join in the chorus of laments over the death of Ben Jonson. It is more interesting to notice an epigram in honour of Ford by Richard Crashaw, morbidly passionate in one direction as Ford was in another. The lines run: " Thou cheat'st us, Ford ; mak'st one seem two by art : What is Love's Sacrifice but the Broken Heart ? "

It has been concluded that in the latter part of his life he gratified the tendency to seclusion for which he was ridiculed in The Time Poets (Choice Drollery, 1656) by withdrawing from business and from literary life in London, to his native place; but nothing is known as to the date of his

death. His career as a dramatist very probably began by collaboration with other authors. With Thomas Dekker he wrote The Fairy Knight and The Brislowe Merchant (licensed in 1624, but both unpub- lished), with John Webster A late Murther of the Sonne upon the Mother (licensed in 1624). A play entitled An ill Beginning has a good End, brought on the stage as early as 1613 and attri- buted to -Ford, was. (if his) his earliest acted play; whether Sir Thomas Overbury's Life and untimely Death (1615) was a x.

play is extremely doubtful; some lines of indignant regret by Ford on the same subject are still preserved. He is also said to have written, at dates unknown, The London Merchant (which, however, was an earlier name for Beaumont and Fletcher's Knight of the Burning Pestle) and The Royal Combat; a tragedy by him, Beauty in a Trance, was entered in the Stationers' Register in 1653, but never printed. These three (or four) plays were among those destroyed by Warburton's cook. The Queen, or the Excellency of the Sea, a play of inverted passion, containing some fine sensuous lines, printed in 1653 by Alexander Singhe for private performance, has been recently edited by W. Bang (Materialienzur Kunde d.alteren engl. Dramas, 13, Louvain, 1906), and is by him on internal evidence confidently claimed as Ford's. Of the plays by Ford preserved to us the dates span little more than a decade — the earliest, The Lover's Melancholy, having been acted in 1628 and printed in 1629, the latest, The Lady's Trial, acted in 1638 and printed in 1639.

When writing The Lover's Melancholy, it would seem that Ford had not yet become fully aware of the bent of his own dramatic genius, although he was already master of his powers of poetic expression. He was attracted towards domestic tragedy by an irresistible desire to sound the depths of abnormal conflicts between passion and circumstances, to romantic comedy by a strong though not widely varied imaginative faculty, and by a delusion that he was possessed of abundant comic humour. In his next two works, undoubtedly those most characteristic- ally expressive of his peculiar strength, 'Tis Pity she's a Whore (acted c. 1626) and The Broken Heart (acted c. 1629), both printed in 1633 with the anagram of his name Fide Honor, he had found horrible situations which required dramatic explana- tion by intensely powerful motives. Ford by no means stood alone among English dramatists in his love of abnormal subjects; but few were so capable of treating them sympathetically, and yet without that reckless grossness or extravagance of expression which renders the morally repulsive aesthetically intolerable, or converts the horrible into the grotesque. For in Ford's genius there was real refinement, except when the " supra- sensually sensual " impulse or the humbler self-delusion referred to came into play. In a third tragedy, Love's Sacrifice (acted c. 1630; printed in 1633), he again worked on similar materials; but this time he

unfortunately essayed to base the interest of his plot upon an unendurably unnatural possibility- — doing homage to virtue after a fashion which is in itself an insult. In Perkin Warbeck (printed 1634; probably acted a year later) he chose an historical subject of great dramatic promise and psychological interest, and sought to emulate the glory of the great series of Shakespeare's national histories. The effort is one of the most laudable, as it was by no means one of the least successful, in the dramatic literature of this period. The Fancies Chaste and Noble (acted before 1636, printed 1638), though it includes scenes of real force and feeling, is dramatically a failure,, of which the main idea is almost provokingly slight and feeble; and The Lady's Trial (acted 1638, printed 1639) is only redeemed from utter wearisomeness by an unusually even pleasingness of form. There remain two other dramatic works, of very different kinds, in which Ford co-operated with other writers, the mask of The Sun's Darling (acted 1624, printed 1657), hardly to be placed in the first rank of early compositions, and The Witch of Edmonton (printed 1658, but probably acted about 1621), in which we see Ford as a joint writer with Dekker and Rowley of one of the most powerful domestic dramas of the English or any other stage.

A few notes may be added on some of the more remarkable of the plays enumerated. A wholly baseless anecdote, condensed into a stinging epigram by Endymion Porter, asserted that The Lover's Melancholy was stolen by Ford from Shakespeare's papers. Un- doubtedly, the madness of the hero of this play of Ford's occasionally recalls Hamlet, while the heroine is one of the many, and at the same time one of the most pleasing, parallels to Viola. But neither of them is a copy, as Friar Bonaventura in Ford's second play may be said to be a copy of Friar Lawrence, whose kindly pliability he disagreeably exaggerates, or as D'Avolos in Love's Sacrifice is clearly modelled on Iago. The plot of The Lover's Melancholy, which is ineffective because it leaves no room for suspense in the mind of

the reader, seems original; in the dialogue, on the other hand, a justly famous passage in Act i. (the beautiful version of the story of the nightingale's death) is translated from Strada; while the scheme of the tedious interlude exhibiting the various forms of madness is avowedly taken, together with sundry comments, from Burton's Anatomy of Melancholy. Already in this play Ford exhibits the singular force of his pathos; the despondent misery of the aged Meleander, and the sweetness of

the last scene, in which his daughter comes back to him, alike go to the heart. A situation — hazardous in spite of its comic substratum — between Thaumasta and the pretended Parthenophil is conducted, as Gifford points out, with real delicacy; but the comic scenes are merely stagy, not-withstanding, or by reason of, the effort expended on them by the author.

'Tis Pity she's a Whore has been justly recognized as a tragedy of extraordinary power. Mr Swinburne, in his eloquent essay on Ford, has rightly shown what is the meaning of this tragedy, and has at the same time indicated wherein consists its poison. He dwells with great force upon the different treatment applied by Ford to the characters of the two miserable lovers — brother and sister. " The sin once committed, there is no more wavering or flinching possible to him, who has fought so hard against the demoniac posses- sion ; while she who resigned body and soul to the tempter, almost at a word, remains liable to the influences of religion and remorse." This different treatment, shows the feeling of the poet — the feeling for which he seeks to evoke our inmost sympathy — ;to oscillate between the belief that an awful crime brings with it its awful punishment (and it is sickening to observe how the argument by which the Friar persuades Annabella to forsake her evil courses mainly appeals to the physical terrors of retribution), and the notion that there is something fatal, something irresistible, and therefore in a sense self-justified, in so dominant a passion. The key-note to the conduct of Giovanni lies in his words at the close of the first scene—

" All this I'll do, to free me from the rod Of vengeance; else I'll swear my fate's my god."

Thus there is no solution of the conflict between passion on the one side, and law, duty and religion on the other; and passion triumphs,' in the dying words of " the student struck blind and mad by passion " —

" O, I bleed fast!

Death, thou'rt a guest long look'd for; I embrace

Thee and thy wounds: O, my last minute comes!

Where'er I go, let me enjoy this grace

Freely to view my Annabella's face."

It has been observed by J. A. Symonds that " English poets have given us the right key to the Italian temperament. . . . The love of Giovanni and Annabella is rightly depicted as more imaginative than sensual." It is difficult to allow the appositeness of this special illustration ; on the other

hand, Ford has even in this case shown his art of depicting sensual passion without grossness of expression; for the exception in Annabella's language to SoranzO seems to have a special intention, and is true to the pressure of the situation and the revulsion produced by it in a naturally weak and yielding mind. The entire atmosphere, so to speak, of the play is stifling, and is not rendered less so by the underplot with Hippolita.

'Tis Pity she's a Whore was translated into French by Maurice Maeterlinck under the title of Annabella, and represented at the Theatre de l'CEuvre in 1894. The translator prefixes to the version an eloquent appreciation of Ford's genius, especially in his portraits of women, whose fate it is to live "dans les tenebres, les craintes et les larmes."

Like this tragedy, The Broken Heart was probably founded upon some Italian or other novel of the day ; but since in the latter instance there is nothing revolting in the main idea of the subject, the play commends itself as the most enjoyable, while, in respect of many excellences, an unsurpassed specimen of Ford's dramatic genius. The complicated plot is constructed with greater skill than is usual with this dramatist, and the pathos of particular situations, and of the entire character of Penthea — a woman doomed to hopeless misery, but capable of seeking to obtain for her brother a happiness which his cruelty has condemned her to forego— has an intensity and a depth which are all Ford's own. Even the lesser characters are more pleasing than usual, and some beautiful lyrics are interspersed in the play.

Of the other plays written by Ford alone, only The Chronicle His- torie of Perkin Warbeck. A Strange Truth, appears to call for special attention. A repeated perusal of this drama suggests the judgment that it is overpraised when ranked at no great distance from Shake- speare's national dramas. Historical truth need not be taken into consideration in the matter; and if, notwithstanding James Gairdner's essay appended to his Life and Reign of Richard III., there are still credulous persons left to think and assert that Perkin was not an impostor, they will derive little satisfaction from Ford's play, which with really surprising skill avoids the slightest indication as to the poet's own belief on the subject. That this tragedy should have been reprinted in 17 14 and acted in 1745 only shows that the public, as is often the case, had an eye to the catastrophe rather

than to the development of the action. The dramatic capabilities of the subject are, however, great, and it afterwards attracted Schiller, who, however, seems to have abandoned it in favour of the similar theme of the Russian Demetrius. Had Shakespeare treated it, he would hardly have contented himself with investing the hero with the nobility given by Ford to this personage of his play, — for it is hardly possible to speak of a

personage as a character when the clue to his conduct is intentionally withheld. Nor could Shakespeare have failed to bring out with greater variety and distinctness the dramatic features in Henry VII., whom Ford depicts with sufficient distinctness to give some degree of individuality to the figure, but still with a tenderness of touch which would have been much to the credit of the dramatist's skill had he been writing in the Tudor age. The play is, however, founded on Bacon's Life, of which the text is used by Ford with admirable discretion, and on Thomas Gainsford's True and Wonderful History of Perkin Warbeck (1618). The minor characters of the honest old Huntley, whom the Scottish king obliges to bestow his daughter's hand upon Warbeck, and of her lover the faithful " Dalyell," are most effectively drawn; even "the men of judgment," the adventurers who surround the chief adventurer, are spirited sketches, and the Irishman among them has actually some humour; while the style of the play is, as befits a " Chronicle History," so clear and straightforward as to make it easy as well as interesting to read.

The Witch of Edmonton was attributed by its publisher to William Rowley, Dekker, Ford, " &c," but the body of the play has been generally held to be ascribable to Ford and Dekker only. The subject of the play was no doubt suggested by the case of the reported witch, Elizabeth Sawyer, who was executed in 1621. Swinburne agrees with Gifford in thinking Ford the author of the whole of the first act; and he is most assuredly right in considering that " there is no more admirable exposition of a play on the English stage." Supposing Dekker to be chiefly responsible for the scenes dealing with the unfortunate old woman whom persecution as a witch actually drives to become one, and Ford for the domestic tragedy of the bigamist murderer, it cannot be denied that both divisions of the subject are effectively treated, while the more important part of the task fell to the share of Ford. Yet it may be doubted whether any such division can be safely assumed; and it may suffice to repeat that no domestic tragedy has ever taught with more effective simplicity and thrilling truthfulness thfe homely double lesson of the folly of selfishness and the mad rashness of crime.

With Dekker Ford also wrote the mask of The Sun's Darling; or, as seems most probable, they founded this production upon Phaeton, an earlier mask, of which Dekker had been sole author. Gifford holds that Dekker's hand is perpetually traceable in the first three acts of The Sun's Darling, and through the whole of its comic part, but that the last two acts are mainly Ford's. If so, he is the authpr of the rather forced occasional tribute on the accession of King Charles I., of which the last act largely consists. This mask, which furnished abundant opportunities for the decorators, musicians and dancers, in showing forth how the seasons and their delights are successively exhausted by a " wanton darling," Ray- bright the

grandchild of the Sun, is said to have been very popular. It is at the same time commonplace enough in conception; but there is much that is charming in the descriptions, Jonson and Lyly being respectively laid under contribution in the course of the dialogue, and in one of the incidental lyrics.

Ford owes his position among English dramatists to the intensity of his passion, in particular scenes and passages where the character, the author and the reader are alike lost in the situation and in the sentiment evoked by it; and this gift is a supreme dramatic gift. But his plays — with the exception of The Witch of Edmonton, in which he doubtless had a prominent share — too often disturb the mind like a bad dream which ends as an unsolved dissonance; and this defect is a supreme dramatic defect. It is not the rigid or the stolid who have the most reason to complain of the insufficiency of tragic poetry such as Ford's; nor is it that morality only which, as Ithocles says in The Broken Heart, " is formed of books and school-traditions," which has a right to protest against the final effect of the most powerful creations of his genius. There is a morality which both " Keeps the soul in tune, At whose sweet music all our actions dance,"

and is able to physic

" The sickness of a mind Broken with griefs."

Of that morality — or of that deference to the binding power within man and the ruling power above him — tragedy is the truest expounder, even when it illustrates by contrasts; but the; tragic poet who merely places the problem before us, and bids us stand aghast with him at its cruelty, is not to be reckoned among the great masters of a divine art.

FORD, R.^-FORDUN, JOHN OF

643

Bibliography. — The best edition of Ford is that by Gifford, with notes and introduction, revised with additions to both text and notes by Alexander Dyce (1869). An edition of the Dramatic Works of Massinger and Ford appeared in 1840, with an introduction by Hartley Coleridge. The Best Plays of Ford were edited for the " Mermaid Series " in 1888, with an introduction by W. H. Havelock Ellis, and reissued in 1903. A. C. Swinburne's Essay on Ford" is reprinted among his Essays and Studies (1875). Perkin Warbeck and 'Tis Pity were translated into German by F. Bodenstedt in i860; and the latter again by F. Blei in 1904. The probable sources of the various plays are discussed in Emil Koeppel's Quellenstudien zu den Dramen George Chapman's, Philip Massinger's und John Ford's

(1897). (A. W. W.)

FORD, RICHARD (1796-1858), English author of one of the earliest and best of travellers' Handbooks, was the eldest son of Sir Richard Ford, who in 1789 was member of parliament for East Grinstead, and for many years afterwards chief police magistrate of London. His mother was the daughter and heiress of Benjamin Booth, a distinguished connoisseur in art. He was called to the bar, but never practised, and in 1830-1833 he travelled in Spain, spending much of his time in the Alhambra and at Seville. His first literary work (other than contributions to the Quarterly Review) was a pamphlet, An Historical Inquiry into the Uncfiangeable Character of a War in Spain (Murray, 1837), in reply to one called the Policy of England towards Spain, issued under the patronage of Lord Palmerston. He spent the winter of 1839-1840 in Italy, where he added largely to his collection of majolica; and soon after his return he began, at John Murray's invitation, to write his Handbook for Travellers in Spain, with which his name is chiefly associated. He died on the 1st of September 1858, leaving a fine private collection of pictures to his widow (d. 1910), his third wife, a daughter of Sir A. Molesworth.

FORD, THOMAS (b. c. 1580), English musician, of whose life little more is known than that he was attached to the court of Prince Henry, son of James I. His works also are few, but they are sufficient to show the high stage of efficiency and musical knowledge which the English school had attained at the beginning of the 1 7th century. They consist of canons and other concerted pieces of vocal music, mostly with lute accompaniment. The chief collection of his works is entitled Musike of Sundrie Kinds set forth in Two Books, &c. (1607), and the histories of music by Burney and Hawkins give specimens of his art. Together with Dowland, immortalized in one of Shakespeare's sonnets, Ford is the chief representative of the school which preceded Henry Lawes.

FORDE, FRANCIS (d. 1770), British soldier, first appears in the army list as a captain in the 39th Foot in 1 746. This regiment was the first of the king's service to serve in India (hence its motto Primus in Indis), and Forde was on duty there when in 17 SS he became major, at the same time as Eyre Coote, soon to become his rival, was promoted captain. At the express invita- tion of Clive, Forde resigned his king's commission to take the post of second in command of the E.I. Company's troops in Bengal. Soon after Plassey, Forde was sent against the French of Masulipatam. Though feebly supported by the motley rabble of an army which Anandraz, the local ally, brought into the field, Forde pushed ahead through difficult country and came upon the enemy entrenched at Condore. For four days the two armies faced one another; on the fifth both commanders resolved on the offensive and an encounter ensued. In spite of the want of spirit shown by Anandraz

and his men, Forde in the end succeeded in winning the battle, which was from first to last a brilliant piece of work. Nor did he content himself with this; on the same evening he stormed the French camp, and his pursuit was checked only by the guns of Masulipatam itself. The place was quickly invested on the land side, but difficulties crowded upon Forde and his handful of men. For fifty days little advance was made; then Forde, seeing the last avenues of escape closing behind him, ordered an assault at midnight on the 25th of January 1759. The Company's troops lost one-third of their number, but the storm was a brilliant and astounding success. Forde received less than no reward. The Company refused to confirm his lieut. -colonel's commission,

and he found himself junior to Eyre Coote, his old subaltern in the 39th Foot. Nevertheless he continued to assist Clive, and on the 25th of November 1759 won a success comparable to Condore at Chinsurah (or Biderra) against the Dutch. A year later he at last received his commission, but was still opposed by a faction of the directors which supported Coote. Clive himself warmly supported Forde in these quarrels. In 1769, with Vansittart and Scrafton, Colonel Forde was sent out with full powers to investigate every detail of Indian administra- tion. Their ship was never heard of after leaving the Cape of Good Hope on the 27th of December.

Monographs on Condore, Masulipatam and Chinsurah will be found iri Malleson's Decisive Battles of India.

FORDHAM, formerly a village of Westchester county, New York, U.S.A., and now a part of New York City. It lies on the mainland, along the eastern bank of the Harlem river, E. of the northern end of Manhattan Island. It is the seat of Fordham University (Roman Catholic), founded in 1841 as St John's College, and since 1846 conducted by the Society of Jesus. In 1907 the institution was rechartered as Fordham University, and now includes St John's College high school and grammar school, St John's College, the Fordham University medical school (all in Fordham), and the Fordham University law school (42 Broadway, New York City). In 1907-1908 the university had 96 instructors and (exclusive of 364 students in the high school) 236 students, of whom 105 were in St John's College, 31 in the medical school, and 100 in the law school. In Fordham still stands the house in which Edgar Allan Poe lived from 1844 to 1849 and in which he wrote " Annabel Lee," " Ulalume," &c.

The hamlet of Fordham was established in 1669 by Jan Arcer (a Dutchman, who called himself " John Archer " after coming to America) , who in that year received permission from Francis Lovelace, colonial governor of New York, to settle sixteen families on the mainland close by a fording-place of the Spuyten Duyvil Creek, near where that stream enters

the Harlem river. Between 1655 and 1671 Archer bought from the Indians the tract of land lying between Spuyten Duyvil Creek and the Harlem river on the east and the Bronx river on the west, and extending from the hamlet of Fordham to what is now High Bridge. In 1671 Governor Lovelace erected this tract into the manor of Fordham. In 1846 it was included with Morrisania in the township of West Farms; and in 1872 with part of the township of Yonkers was erected into the township of Kings- bridge, which in 1874. was annexed to the city of New York, and in 1898 became a part of the borough of the Bronx, New York City.

FORDUN, JOHN OF (d. c. 1384), Scottish chronicler. The statement generally made that the chronicler was born at Fordoun (Kincardineshire) has not been supported by any direct evidence. It is certain that he was a secular priest, and that he composed his history in the latter part of the 14th century; and it is probable that he was a chaplain in the cathedral of Aberdeen. The work of Fordun is the earliest attempt to write a continuous history of Scotland. We are informed that Fordun's patriotic zeal was roused by the removal or destruction of many national records by Edward III. and that he travelled in England and Ireland, collecting material for his history. This work is divided into five books. The first three are almost entirely fabulous, and form the groundwork on which Boece and Buchanan afterwards based their historical fictions, which were exposed by Thomas Innes in his Critical Essay (i. pp. 201-214). The 4th and 5th books, though still mixed with fable, contain much valuable information, and become more authentic the more nearly they approach the author's own time. The 5th book concludes with the death of King David I. in 1153. Besides these five books, Fordun wrote part of another book, and collected materials for bringing down the history to a later period. These materials were used by a continuator who wrote in the middle of the 15th century, and who is identified with Walter Bdwer (?.>.), abbot of the monastery of Inchcolm. The additions.' of Bower form eleven books, and bring down the narrative to the death of King James I. in 1437. According*

to the custom of the time, the continuator did not hesitate to interpolate Fordun's portion of the work, with additions of his own, and the whole history thus compiled, is known as the Scotickronicm.

The first printed edition of Fordun's work was that of Thomas Gale in his Scriptores quindecim (vol. iii.), which was published in lMSS. and editions.

FORECLOSURE, in the law of mortgage, the extinguishment by order of the

court of a mortgagor's equity of redeiiiption. In the law of equity the object of every mortgage transaction is eventually the repayment of a debt, the mortgaged property being incidental by way of security. Therefore, although the day named for repayment of the loan has passed and the mort- gagor's estate is consequently forfeited, equity steps in to mitigate the harshness, of the common law, and will decree a reconveyance of the mortgaged property on payment of the principal, interest and costs. This- right of the mortgagor to relief is termed his " equity of redemption." But the right must be exercised within a reasonable time, .otherwise he will be foreclosed his equity of redemption and the mortgagee's possession converted into an absolute ownership. Such fore- closure is enforced in equity by a foreclosure action. An action is brought by the mortgagee against the mortgagor in the chancery division of the High Court in England, claiming that an account may be taken of the principal and interest due to the mortgagee, and that the mortgagor may be directed to pay the same, with costs, by a day to be appointed by the court and that in default thereof he may be foreclosed his equity of redemption. English county courts have jurisdiction in fore- closure actions where the mortgage or charge does not exceed £500, or where the mortgage is for more than £500, but less than that sum has been actually advanced. In a Welsh mortgage there is no right to foreclosure. (See also Mortgage.)

FOREIGN OFFICE, that department of the executive of the United Kingdom which is concerned with foreign affairs. The head of the Foreign Office is termed principal secretary of state for foreign affairs and his office dates from 1782. Between that date and the Revolution there had been only two secretaries of state, whose duties were divided by a geographical division of the globe into northern and southern departments. The! duties of the secretary of the northern department of Europe comprised dealings with the northern powers of Europe, while the secretary of the southern department of Europe communi- cated with France, Spain, Portugal, Switzerland, Italy, Turkey, and also looked after Irish and colonial business, and carried out the work of the Home Office. In 1782 the duties of these two secretaries were revised, the northern department becoming the Foreign Office. The secretary for foreign affairs is the official agent of the crown in all communications between Great Britaid and foreign powers; his intercourse is carried on either through the representatives of foreign states in Great Britain or through representatives of Great Britain abroad. He negotiates all treaties or alliances with foreign states, protects British subjects residing abroad, and demands satisfaction for any injuries they may sustain at the hands of foreigners. He is assisted by two under-secretaries of state (one of them a politician, the other a permanent civil servant), three assistant under-secretaries (civil servants), a librarian, a head of the treaty department and a staff of clerks. The departments of the Foreign Office are

the African, American, commercial and sanitary, consular, eastern (Europe), far eastern, western (Europe), parliamentary, financial, librarian and keeper of the papers, treaties and registry. In the case of important despatches and correspondence, these, with the drafts of answers, are sent first to the permanent under-sectetary, then to the prime minister, then to-the sovereign and, lastly, are circulated among the members of the cabinet. The salary of the secretary for foreign affairs is £5000 per annum,

that of the permanent under-secretary £2000, the parliamentary under-secretary and the first assistant under-secretary, £1506, and the other assistant under-secretaries £1200. See Anson, Laio and Custom of (lie Constitution, part ii.

FORELAND, NORTH and SOUTH, two chalk headlands on the Kent coast of England, overlooking the Strait of Dover, the North Foreland forming the eastern projection of the Isle of Thanet, and the South standing 3 m. N.E. of Dover. Both present bold cliffs to the sea, and command beautiful views over the strait. On the North Foreland (51° 22J' N., 1° 27′ E.) there is a lighthouse, and on the South Foreland (51° 85′ N., i° 23', E.) there are two. There is also a Foreland on the north coast of Devonshire, 2\ m. N.E. of Lynmouth, a fine projection of the highlands of Exmoor Forest, overlooking the Bristol Channel, and forming the most northerly point of the county.

FORESHORE, that part of the seashore which lies between high- and low-water mark at ordinary tides. In the United Kingdom it is ordinarily and prima facie vested in the crown, except where it may be vested in a subject by ancient grant or charter from the crown, or by prescription. Although numerous decisions, dating from 1795, have confirmed the prima facie title of the crown, S. A. Moore in his History of the Foreshore contends that the presumption is in favour of the subject rather than of the crown. But a subject can establish a title by proving an express grant from the crown or giving sufficient evidence of user from which a grant may be presumed. The chief acts showing title to foreshore are, taking wreck or royal fish, right of fishing, mining, digging and taking sand, seaweed, &c, em- banking and enclosing. There is a public right of user in that part of the foreshore which belongs to the crown, for the purpose of navigation or fishery, but there is no right of passage over lands adjacent to the shore, except by a particular custom. So that, in order to make the right available, there must be a highway or other public land giving access to the foreshore. Thus it has been held that the public have no legal right to trespass on land above high-water mark for the purpose of bathing in the sea, though if they can get to it they may bathe there (Blundell v. Catteral, 1821, 5 B. & Ad. 268). There is no right in the public to take sand, shells or seaweed from the shore, nor, except in certain places by local custom, have fishermen the

right to use the foreshore or the soil above it for drawing up their boats, o'r, for drying their nets or similar purposes.

See S. A. Moore, History of the Foreshore and the Law relating thereto (1888); Coulson and Forbes, Law of Waters (1902).

FORESTALLING, in English criminal law, the offence of buying merchandise, victual, &c, coming to market, or making any bargain for buying the same, before they shall be in the market ready to be sold, or making any motion for enhancing the price, or dissuading any person from coming to market or forbearing to bring any of the things to market, &c. See Engrossing. .

FOREST LAWS, the general term for the old English restric- tion laws, dealing with forests. One of the most cherished prerogatives of the king of England, at the time when his power was at the highest, was that of converting any portion of the country into a forest in which he might enjoy the pleasures of the chase. The earliest struggles between the king and the people testify to the extent to which this pre- rogative became a public grievance, and the charter by which its exercise was bounded (Carta de Foresta) was in substance part of the greatest constitutional code imposed by his barons upon King John. At common law it appears to have been the right of the king to make a forest where he pleased, provided that certain legal formalities were observed. The king having a continual care for the preservation of the realm, and for the peace and quiet of his subjects, he had therefore amongst many privi- leges this prerogative, viz. to have his place of recreation wheresoever he would appoint. 1 Land once afforested became subject to a peculiar system of laws, which, as well as the for- malities: required to constitute a valid afforestment, have been carefully ascertained by the Anglo-Norman lawyers. " A forest," 1 Coke, 4 Inst., 300.

says Man wood, " is a certain territory of woody grounds and fruitful pastures, privileged for wild beasts and fowls of forest, chase, and warren to rest, and abide there in the safe protection of the king, for his delight and pleasure; which territory of ground so privileged is mered and bounded with unremovable marks, meres and boundaries, either known by matter of record or by prescription; and also replenished with wild beasts of venery or chase, and with great coverts of vert, for the succour of the said beasts there to abide: for the preservation and continuance of which said place, together with the vert and venison there are particular officers, laws, and

privileges belong- ing to the same, requisite for that purpose, and proper only to a forest and to no other place." x And the same author distinguishes a forest, as " the highest franchise of princely pleasure," from the inferior franchises of chase, park and warren— named in the order of their importance. The forest embraces all these, and it is distinguished by having laws and courts of its own, according to which offenders are justiceable. An offender in a chase is to be punished by the common law; an offender in. a forest by the forest law. A chase is much the same as a park, only the latter is enclosed, and all of them are distinguished according to the class of wild beasts to which the privilege extended. Thus beasts of forest (the " five wild beasts of venery ") were the hart, the hind, the hare, the boar and the wolf. The beasts of chase were also five, viz. the buck, the doe, the fox, the marten and the roe. The beasts and fowls of warren were the hare, the coney, the pheasant and the partridge.

The courts of the forest were three in number, viz. the court of attachments, swainmote and justice-seat. The court of attachments (called also the wood-mote) is held every forty days for the foresters to bring in their attachments concerning any hurt done to vert or venison (in viridi et venatione) in the forest, and for the verderers to receive and mark the same, but no conviction takes place. The swainmote, held three times in the year, is the court to which all the freeholders within the forest owe suit and service, and of which the verderers are the judges. In this court all offences against the forest laws may be tried, but no judgment or punishment follows. This is reserved for the justice-seat, held every third year, to which the rolls of offences presented at the court of attachment, and tried at the swainmote, are presented by verderers. The justice-seat is the court of the chief justice in eyre, who, says Coke, " is commonly a man of greater dignity than knowledge of the laws of the forests; and therefore where justice-seats are to be held some other persons whom the king shall appoint are associated with him, who together are to determine omnia placita forestae," . There were two chief justices for the forests intra and ultra Trentam respectively. The necessary officers of a forest are a steward, verderers, foresters, regarders, agisters and woodwards. The verderer was a judicial officer chosen in full county by the free- holders in the same manner as the coroner. His office was to view and receive the attachments of the foresters, and to mark them on his rolls. A forester was " an officer sworn to preserve the vert and venison in the forest, and to attend upon the wild beasts within his bailiwick." The regarders were of the nature of visitors: their duty was to make a regard (visitatio nemorum) every third year, to inquire of all offences, and of the concealment of such offences by any officer of the forest. The business of the agister was to look after the pasturage of the forest, and to receive the payments for the same by persons entitled to pasture their cattle in the forests. Both the pasturage and

the payment were called " agistment." The woodward was the officer who had the care of the woods and vert and presented offences at the court of attachment.

The legal conception of a forest was thus that of a definite territory within which the code of the forest law prevailed to the exclusion of the common law. The ownership of the soil might be in any one, but the rights of the proprietor were limited by the laws made for the protection of the king's wild beasts. These laws, enforced by fines often arbitrary and excessive, wefe a great grievance to the unfortunate owners of land within or

1 Manwood's Treatise of the Forest Laws (4th edhion, 1717).

in the neighbourhood of theforest. The offence of "purpresture " may be cited as an example. This was an encroachment on the forest rights, by building a house within the forest, and it made no difference whether the land belonged to the builder or not. In either case it was an offence punishable by fines at discretion. And if a man converted woodlands within the forest into arable land, he was guilty of the offence known as " assarting," whether the covert belonged to himself or not.

The hardships of the forest laws under the Norman kings, and their extension to private estates by the process of afforest- ment, were among the grievances which united the barons and people against the king in the reign of John. The Great Charter of King John contains clauses relating to the forest laws, but no separate charter of the forest. The first charter of the forest is that of Henry III., issued in 12.17. " As an important piece of legislation," said Stubbs, 2 " it must be compared with the forest assize of 1184, and with 44th, 47th and 48th clauses of the charter of John. It is observable that most of the abuses which are remedied by it are regarded as having sprung up since the accession of Henry II.; but the most offensive afforestations have been made under Richard and John. These latter are at once disafforested; but those of Henry II. only so far as the.y had been carried out to the injury of the landowners and outside of the royal demesne." Land which had thus been once forest land and was afterwards disafforested was known as purlieu— derived by Man wood from the French pur and lieu, i.e. "a place exempt from the forest." The forest laws still applied in a modified manner to the purlieu. The benefit of the disafforest- ment existed only for the owner of the lands; as to all other persons the land was forest still, and the king's wild beasts were to " have free recourse therein and safe return to the forest, without any hurt or destruction other than by the owners of the lands in the purlieu where they shall be found, and that only to hunt and chase them back again towards the forest Without any forestalling " (Man wood, On the Forest Laws — article "Purlieu").

The revival of the forest laws was one of the means resorted to by Charles I. for raising a revenue independently of parliament, and the loyal forests in Essex were so enlarged that they were hyperbolically said to include the whole county. The 4th earl of Southampton was nearly ruined by a decision that stripped him of his estate near the New Forest. The boundaries of Rockingham Forest were increased from 6 m. to 60, and enormous fines imposed on the trespassers, — -Lord Salisbury being assessed in £20,000, Lord Westmoreland in £19,000, Sir Christopher Hatton in £12,000 (Hallam's Constitutional History of England, c. viii.). By the statute 16 Charles I. c. 16 (1640) the royal forests were determined for ever according to their boundaries in the twentieth year of James, all subsequent enlargements being annulled.

The forest laws, since the Revolution, have fallen into complete disuse.

FORESTS AND FORESTRY. Although most people know what a forest (Lat. foris, " out of doors ") is, a definition of it which suits all cases is by no means easy to give. Manwood, in his treatise of the Lawes of the Forest (1598), defines a forest as " a certain territory of woody grounds, fruitful pastures, privi- leged for wild beasts and fowls of forest, chase and warren, to rest and abide in, in the safe protection of the king, for his princely delight and pleasure." This primitive definition has, in modern times, when the economic aspect of forests came more into the foreground, given place to others, so that forest may, in a general way, now be described as " an area which is for the most part set aside for the production of timber and other forest produce, or which is expected to exercise certain climatic effects, or to protect the locality against injurious influences."

As far as conclusions can now be drawn, it is probable that the greater part of the dry land of the earth was, at some time, covered with forest, which consisted of a variety of trees and shrubs grouped according to climate, soil and configuration of the several localities. When the old trees reached their limit J Decum4nts Illustrative ef English History^. 338.

of life, they disappeared, and younger trees took their place. The conditions for an uninterrupted regeneration of the forest were favourable, and the result was vigorous production by the creative powers of soil and climate. Then came man, and by degrees interfered, until in most countries of the earth the area under forest has been considerably reduced. The first decided interference was probably due to the establishment of domestic animals; men burnt the forest to obtain pasture for their flocks.

Subsequently similar measures on an ever-increasing scale were employed to prepare the land for agricultural purposes. More recently enormous areas of forests were destroyed by reckless cutting and subsequent firing in the extraction of timber for economic purposes.

It will readily be understood that the distribution and character of the now remaining forests must differ enormously (see Plants : Distribution). Large portions of the earth are still covered with dense masses of tall trees, while others contain low scrub or grass land, or are desert. As a general rule, natural forests consist of a number of different species intermixed; but in some cases certain species, called gregarious, have succeeded in obtaining the upper hand, thus forming more or less pure forests of one species only. The number of species differs very much. In many tropical forests hundreds of species may be found on a comparatively small area, in other cases the number is limited. Burma has several thousand species of trees and shrubs, Sind has only ten species of trees. Central Europe has about forty species, and the greater part of northern Russia, Sweden and Norway contains forests consisting of about half a dozen species. Elevation above the" sea acts similarly to rising latitude, but the effect is much more rapidly produced. Generally speaking, it may be said that the Tropics and adjoining parts of the earth, wherever the climate is not modified by considerable elevation, contain broad-leaved species, palms, bamboos, &c. Here most of the best and hardest timbers are found, such as teak, mahogany and ebony. The northern countries are rich in conifers. Taking a section from Central Africa to North Europe, it will be found that south and north of the equator there is a large belt of dense hardwood forest; then comes the Sahara, then the coast of the Mediterranean with forests of cork oak; then Italy with oak, olive, chestnut, gradually giving place to ash, sycamore, beech, birch and certain species of pine; in Switzerland and Germany silver fir and spruce gain ground. Silver fir disappears in central Germany, and the countries around the Baltic contain forests consisting chiefly of Scotch pine, spruce and birch, to which, in Siberia, larch must be added, while the lower parts of the ground are stocked with hornbeam, willow, alder and poplar. In North America the distribution is as follows: Tropical vegetation is found in south Florida, while in north Florida it changes into a subtropical vegetation consisting of evergreen broad-leaved species with pines on sandy soils. On going north in the Atlantic region, the forest becomes temperate, containing deciduous broad-leaved trees and pines, until Canada is reached, where larches, spruces and firs occupy the ground. Around the great lakes on sandy soils the broad-leaved forest gives way to pines. On proceeding west from the Atlantic region the forest changes into a shrubby vegetation, and this into the prairies. Farther west, towards the Pacific coast, extensive forests are found consisting, according to latitude and elevation above the sea, of pines, larches, fir, Thujas and

Tsugas. In Japan a tropical vegetation is found in the south, comprising palms, figs, ebony, mangrove and others. This is followed on proceeding north by subtropical forests containing evergreen oaks, Podocarpus, tree-ferns, and, at higher elevations, Crypto- meria and Chamaecyparis. Then follow deciduous broad-leaved forests, and finally firs, spruces and larches. In India the char- acter of the forests is governed chiefly by rainfall and elevation. Where the former is heavy evergreen forests of Guttiferae, Dipterocarpeae, Leguminosae, Euphorbias, figs, palms, ferns, bamboos and india-rubber trees are found. Under a less copious rainfall deciduous forests appear, containing teak and sal (Shorea robusta) and a great variety of other valuable trees. Under a still smaller rainfall the vegetation becomes, sparse,

containing acacias, Dalbergia sissoo and Tamarix. Where the rainfall is very light or nil, desert appears. In the Himalayas, subtropical to arctic conditions are found, the forests containing, according to elevation, pines, firs, deodars, oaks, chestnuts, magnolias, laurels, rhododendrons and bamboos. Australia, again, has its own particular flora of eucalypts, of which some two hundred species have been distinguished, as well as wattles. Some of the eucalypts attain an enormous height.

Utility of Forests— In the economy of man and of nature forests are of direct and indirect value, the former chiefly through the produce which they yield, and the latter through the in fluence which they exercise upon climate, the regulation of moisture, the 1 stability of the soil, the healthiness and beauty of a country and allied subjects. The indirect utility will be dealt with first. A piece of land bare of vegetation is, throughout the year, exposed to the full effect of sun and air currents, and the climatic conditions which are produced by these agencies. If, on the other hand, a piece of land is covered with a growth of plants, and especially with a dense crop of forest vegetation, it enjoys the benefit of certain agencies which modify the effect' of sun and wind on the soil and the adjoining layers of air. These modifying agencies are as follows: (i) The crowns of the trees intercept the rays of the sun and the falling rain; they obstruct the movement of air currents, and reduce radiation at night. (2) The leaves, flowers and fruits, augmented by certain plants which grow in the shade of the trees, form a layer of mould, or humus, which protects the soil against rapid changes of temperature, and greatly influences the movement of water in it. (3) The roots of the trees penetrate into the soil in all directions," and bind it together. The effects of these agencies have been observed from ancient times, and widely differing views have been taken of them. Of late years, however, more careful observations have been made at so-called parallel stations, that is to say, one station in the middle of a forest, and another outside at some distance from its edge, but otherwise exposed to the same general conditions. In this way, the following results

have been obtained: (1) Forests reduce the temnerature of the air and soil to a moderate extent, and render the climate more equable. (2) They increase the relative humidity of the air, and reduce evaporation. (3) They tend to increase the precipitation of moisture. As regards the actual rainfall, their effect in low lands is nil or very small; in hilly countries it is probably greater, but definite results have not yet been obtained owing to the difficulty of separating the effect of forests from that of other factors. (4) They help to regulate the water supply, produce a more sustained feeding of springs, tend to reduce violent floods, and render the flow of water in rivers more continuous. (5) They assist in preventing denudation, erosion, landslips, avalanches, the silting up of rivers and low lands and the formation of sand dunes. (6) They reduce the velocity of air-currents, protect adjoining fields against cold or dry winds, and afford shelter to cattle, game and useful birds. (7) They may, under certain conditions, improve the healthiness of a country, and help in its defence. (8) They increase the beauty of a country, and produce a healthy aesthetic influence upon the people.

The direct utility of forests is chiefly due to their produce, the capital which they represent, and the work which they pro- vide. The principal produce of forests consists of timber and firewood. Both are necessaries for the daily life of the people. Apart from a limited number of broad-leaved species, the conifers have become the most "important timber trees in the economy of man. They are found in greatest quantities in the countries around the Baltic and in North America. In modern times iron and other materials have, to a considerable extent, replaced timber, while coal, lignite, and peat compete with firewood; nevertheless wood is still indispensable, and likely to remain so. This is borne out by the statistics of the most civilized nations. Whereas the population of Great Britain and Ireland, during the period 1 880-1000. increased by about 20%, thcimports of timber, during the same period, increased by 45%; in other words, every .head of population in 1900 used more timber than

wenty years earlier. Germany produced in 1880 about as much timber as she required; in 1899 she imported 4,600,000 tons, valued at £14,000,000, and her imports are rapidly increasing, although the yield capacity of her own forests is much higher now than it was formerly. Wood is now used for many purposes which formerly were riot thought of. The manufacture of the wood pulp annually imported into Britain consumes at least 2,000,000 tons of timber. A fabric closely resembling silk is now made of spruce wood. The variety of other, or minor, produce yielded by

forests is very great, and much of it is essential for the well-being of the people and for various industries. The yield of fodder is of the utmost importance in countries subject to periodic droughts; in many places field crops could not be grown successfully without the leaf-mould and brushwood taken from the forests. As regards industries, attention need only be drawn to such articles as commercial fibre, tanning materials, dye-stuffs, lac, turpentine, resin, rubber, gutta- percha, &c. Great Britain and Ireland alone import every year such materials to the value of £12,000,000, half of this being represented by rubber.

The capital employed in forests consists chiefly of the value of the soil and growing stock of timber. The latter is, ordinarily, of much greater value than the former wherever a sustained annual yield of timber is expected from a forest. In the case of a Scotch pine forest, for instance, the value of the growing stock is, under the above-mentioned condition, from three to five times that of the soil. The rate of interest yielded by capital invested in forests differs, of course, considerably according to circum- stances, but on the whole it may, under proper management, be placed equal to that yielded by agricultural land; it is lower than the agricultural rate on the better classes of land, but higher on the inferior classes. Hence the latter are specially indicated for the forest industry, and the former for the pro-duction of agricultural crops. Forests require labour in a great variety of ways, such as (1) general administration, formation, tending and harvesting; (2) transport of produce; and (3) industries which depend on forests for their prime material. The labour indicated under the first head differs considerably according to circumstances, but its amount is smaller than that required if the land is used for agriculture. Hence forests provide additional labour only if they are established on surplus lands. Owing to the bulky nature of forest produce its transport forms a business of considerable magnitude, the amount of labour being perhaps equal to half that employed under the first head. The greatest amount of labour is, however, required in the working up of the raw material yielded by forests. In this respect attention may be drawn to the chair industry in and around High Wycombe in Buckinghamshire, where more than 20,000 workmen are employed in converting the beech, grown on the adjoining chalk hills, into chairs and tools of many patterns. Complete statistics for Great Britain are not available under this head, but it may be mentioned that in Germany the people employed in the forests amount to 2-3 % of the total population; those employed on transport of forest produce i-i %; labourers employed on the various wood industries, 8 6 %; or a total of 12 %. An important feature of the work connected with forests and their produce is that a great part of it can be made to fit in with the requirements of agriculture; that is to say, it can be done at seasons when field crops do not require attention. Thus the rural labourers or small farmers can earn some

money at times when they have nothing else to do, and when they would probably sit idle if no forest work were obtainable.

Whether, or how far, the utility of forests is brought out in a particular country depends on its special conditions, such as (1) the position of a country, its communications, and the control which it exercises over other countries, such as colonies; (2) the quantity and quality of substitutes for forest produce available in the country; (3) the value of land and labour, and the returns which land yields if used for other purposes; (4) the density of population; (5) the amount of capital available for investment; (6)" "the climate' and configuration,' especially

the geographical position, whether inland or on the border of the sea, &c. No general rule can be laid down, showing whether forests are required in a country, or, if so, to what extent; that question must be answered according to the special circumstances of each case.

The subjoined table shows the forests of various European states:—

Countries.

Sweden Norway Russia, including Fin

land . Bosnia and

govina . Bulgaria Turkey . Servia . Rumania . Spain . Hungary . Austria . Greece . Luxemburg Switzerland Germany France . Italy . Denmark Belgium Portugal Holland Great Britain

Herze

Area of

Forests, in

Acres.

49,000,000 17,000,000

518,000,000.

6,400,000

7,600,000

11,200,000

3,900,000

6,400,000

21,200,000

22,500,000

24,000,000

2,000,000

200,000

2,100,000

35,000,000

24,000,000

10,400,000

600,000

1,300,000

770,000

560,000

3,000,000

Per- centage of Total Area of Country under Forest

40

5o

30 20

32 18

17

28

32 13 30 20 26 18

15

6 18

3-5

7 4

Per- centage of Forest Area be- longing to the State.

33 28

61

78 30

37 40 84 15 7 80

5 34 12

4

24

5

Forest Area per Head of Popula- tion, in

Acres.

9-5 76

5-9

4-0 2-3

i-7 i-5 i”3

1-2 1-2

•9

•85 •82

•7 •6 •6 •3

•25 •2

•15 •1

•07

These data exhibit considerable differences, since the per- centage of the forest area varies from 3-5 to 50, and the area per head of population from -07 to 9-5 acres. Russia, Sweden and Norway may as yet have more forest than they require for their own population. On the other hand, Great Britain and Ireland, Germany, Denmark, Portugal, Holland, and even Belgium, France and Italy have not a sufficient forest area to meet their own requirements; at the same time, they are all sea-bound countries, and importation is easy, while most of them are under the influence of moist sea winds, which reduces to a subordinate position the importance of forests for climatic reasons.

Intimately connected with the area of forests in a country is the state of ownership — whether they belong to the state, corporations or to private persons. Where, apart from the financial aspect and the supply of work, forests are not required for the sake of their indirect effects, and where importation from other countries is easy and assured, the government of the country need not, as a rule, trouble itself to maintain or acquire forests. Where the reverse conditions exist, and especi- ally where the cost of transport over long distances becomes prohibitive, a wise administration will take measures to assure the maintenance of a suitable proportion of the country under forest. This can be done either by maintaining or constitut- ing a suitable area of state forests, or by exercising a certain amount of control over corporation and even private forests. Such measures are more called for in continental countries than in those which are sea-bound, as is proved by the above statistics.

Supply of Timber — Imports and Exports. — The following table shows the net imports and exports of European countries (average data, calculated from the returns of recent years).

The only timber-exporting countries of Europe are Russia, Sweden, Norway, Austria-Hungary and Rumania; all the others either have only enough for their own consumption, or import timber. Great Britain and Ireland import now upwards of 10,660,000 tons a year, Germany about 4,600,000 tons, and

Belgium about 1,300,000 tons. Holland, France, Portugal, Spain and Italy are all importing countries, as also are Asia Minor, Egypt and Algeria. The

west coast of Africa exports hardwoods, and imports coniferous timber. The Cape and Natal import considerable quantities of pine and fir wood. Australasia Net Imports and Exports of European Countries;

Countries.

Quantities in Tons.

Value in £ Sterling.

Imports.

Exports.

Imports.

Exports.

United Kingdom .

10,004,000

26,540,000

Germany .

4,600,000

14,820,000

> . .

Belgium

1,300,000

5,040,000

France

1,230,000

35950,000

Italy ….

620,000

2,100,000

Spain ….

470,000

1,500,000

Denmark .

470,000

1,250,000

Switzerland

204,000

480,000

Holland . . .

180,000

720,000

Servia ….

110,000

160,000

Portugal

60,000

200,000

Greece ….

35- 000

130,000

Rumania

400,000

840,000

Norway

1 ,300,000

- - ■

2,200,000

Austria – Hungary

with Bosnia and

Herzegovina

3,996,000

1 1 ,400,000

Sweden

4,460,000

7,930,000

Russia with Fin-

land ….

• *Total . .*

6,890,000

10.440,000

19,283,000

17,046,000

56,890,000

32,810,000

Net Imports .

2,237,000

24,080,000

These net imports are received from non-European countries. They consist chiefly of valuable hardwoods, like teak, mahogany, eucalypts and others.

exports hardwoods and some Kauri pine from New Zealand, but imports larger quantities of light pine and fir timber. British India and Siam export teak and small quantities of fancy woods. The West Indies and South America export hardwoods, and import pine and fir wood. The United States of America will not much longer be a genuine exporting country, since they import already almost as much timber from Canada as they export. Canada, exports considerable quantities of timber. The Dominion has still a forest area of 1,250,000 sq. m., equal to 38 %'of the total area, and giving 165 acres of forest for every inhabitant, Although only about one-third of the forest area can be called regular timber land, Canada possesses an enormous forest wealth, with which she might supply permanently nearly all other countries deficient in material, if the governing bodies in the several provinces would only determine to stop the present fearful waste caused by axe and fire, and to introduce a regular system of management. As matters stand, the supplies of the most valuable timber of Canada, the white or Weymouth pine (Pinus strobus), arc nearly exhausted, the great stores of spruce in the eastern- provinces are being rapidly destroyed, and the forests of Douglas fir in the western provinces have been attacked for export to the United States and to other countries.

Taking the remaining stocks of the whole earth together, it may be said that a sufficient quantity of hardwoods is available, but the only countries which are able to supply coniferous timber for export on a considerable scale are Russia, Sweden, Norway, Austria and Canada. As these countries have practically, to supply the rest of the world, and as the management of ˆheir forests is far from satisfactory, the question of supplying light pine and fir timber, which forms the very staff of life of the wood industries, must become a very serious matter before many years have passed. Unmistakable signs of the coming crisis are every- where visible to all who wish to see, and it is difficult to over-state the gravity of the problem, when it is remembered, for instance, that 87 % of all the timber imported into Great Britain consists of light pine and fir, and that most of the other importing countries are similarly situated. In some of these countries little or no room exists for the extension of woodland, but this statement does not apply to Great Britain and Ireland, which

contain upwardsof 12,000,000 acres of waste land, and 13,500,000 acres of mountain and heath land used for light grazing. One- fourth of that area, if put under forest, would produce all the timber now imported which can be grown in Britain, that is to say, about 95 % of the total.

The subjoined table shows the movements of timber within the greater part of the British empire:-—

Net Imports and

Exports into and from

the British Empire.

Annual Average

Annual Average ;

during the Years

during the Years

Countries.

1 884-1 888.

1960-1003.

Net ■

Net

Net.

Net

Imports.

Exports.

Imports.

Exports..,

I ‘

£

‘■ ■*’£*■■■

£

United Kingdom .

15,000,000

26,540,000

Australasia

1,284,000

568,000

Africa .

72,000

737,9°°

West Indies,

Honduras ami

Guiana .

207,000

71,000

India, Ceylon and

Mauritius .

528,000

. ,

580,000

Dominion of

Canada . Total

4,025,000

4,789,000

16,356,000

4,760,000

27,845,000

5,440,000

Net Imports

11,596,000

22,405,000

Total increase in

16 years

10,809,000

Average annual

increase of net

imports

... 675,562

Forest Management. — In early times there was practically no forest management. As long as the forests occupied con- siderable areas, their produce was looked upon as the free gift of nature, like air and water; men took it, used it, and. even destroyed it without let or hindrance. With the gradual increase of population and the consequent reduction of the forest area,, proprietary ideas developed; people claimed the ownership of certain forests, and proceeded to protect them against outsiders. Subsequently the law of the country was called in to help in protection, leading to the 'promulgation of special forest laws. By degrees it was found that mere protection was. not sufficient, and that steps must be taken to enforce a more judicious treat- ment, as well as to limit the rem6val of timber to what the forests were capable «f producing permanently. 'The teaching of natural science arid of political economy was brought to bear upon the subject, so that now forestry has become a special science. This is recognized in many countries, amongst which Germany stands first, closely followed by France, Austria, Denmark and Belgium. Of non-European countries the palm belongs to British India, and then follow Ceylon, the Malay States, the Cape of Good Hope and Japan. The United States of America have also turned their attention to the subject. Most of the British colonics are, in this respect, as yet in a backward state, and the matter has still to be fought out in Great Britain and Ireland, though many writers have urged the importance of the question upon the public and the

government. There can be no doubt that all civilized countries must, sooner or later, adopt a rational and systematic treatment of their forests.

For details as to the separate countries, see the articles under the country headings; in this article only some of the more important countries are dealt with, in so far as the history of their forestry is important. A few notes on Germany and France will be given, because in these countries forest management has been brought to highest perfection; Italy is mentioned, because she has allowed her forests to be destroyed; and a short description of forestry in the United Kingdom and in India follows. A separate section is devoted to the United States.

Germany is in general well- wooded. The winters being long and severe, an abundant supply of fuel is almost as essential as, a sufficient supply of food. This necessity has led, along

with a passion for the chase- to the preservation of forests, and to the establishment of an admirable system of forest cultivation, almost as carefully conducted as field tillage. The Black Forest stretches the whole length of the grand-duchy of Baden and part of the kingdom of Wurttemberg, from the Neckar to Basel and the Lake of Constance. The vegetation resembles that of the Vosges; forests of spruce, silver fir, Scotch pine, and, mingled with bircheS, beech and oak, are the chief woods met with. Until comparatively recent times large quantities of timber derived from these forests were floated down the Rhine to Holland and also shipped to England. Now the greater part of it is used locally for construction, or it is converted into paper pulp. In the grand-duchy of Hesse the Odenwald range of mountains, stretching between the Main and the Neckar, contains the chief supply of timber. In the province of Nassau there are the large wooded tracts of the Taunus mountain range and the Westerwald.

In Rhenish Prussia valuable forests lie partly in the Eifel, on the borders of Belgium, and on the mountains overhanging the Upper Moselle, but they do not furnish such stately trees as the Black Forest and the Odenwald. The Spessart, near Aschaffenburg in Bavaria, is one of the most extensive forests of middle Germany, containing large masses of fine oak and beech ; with plantations of coniferous trees, such as spruceˆ Scotch pine and silver fir. Bavaria possesses other fine forest tracts, such as the Baierischewald on the Bohemian frontier, the Kranzberg near Munich, and the Frankenwald in the north of the kingdom. North Germany has extensive forests on the

Harz and Thiiringian Mountains, while in East Prussia large tracts of flat ground are covered with Scotch pine, spruce, oak and beech.

Every German state has its forest organization. In Prussia the department is presided over by the Oberland Forstmeister at Berlin, while each province, or part of a province, has an Oberforstmeister, under whom a number of Oberffirsters admini- strate the state and communal forests. These, again, are assisted by a lower class of orficials called Forsters. The Oberforsters throughout Germany are educated at special schools of forestry, of which in 1909 the following nine existed:

In Prussia: at Eberswalde and Mtindeh.

In Bavaria: at Munich and Aschaffenburg.

In Saxony: at Tharand.

In Wurttemberg: at Tubingen.

In Baden: at Carlsruhe.

In Hesse: at Giessen.

In the grand-duchy of Saxony: at Eisenach.

The schools at Munich, Tubingen and Giessen form part of the universities at these places; that at Carlsruhe is attached to the technical high school; the others are academies for the study of forestry only, but there is a tendency to transfer them all to the universities. The subordinate staff are trained for their work in so-called silvicultural schools, of which a large number exist. In this way the German forests have been brought to a high degree of productiveness, but the material derived from them falls far short of the requirements, although the forests occupy 26 % of the total area of the country; hence the net imports of timber amount already to 4,600,000 tons a year, and they are steadily rising.

France. — The principal timber tree of France is the oak. The cork oak is grown extensively in the south and in Corsica. The beech, ash, elm, maple, birch, walnut, chestnut and poplar are all important trees, while the silver fir and spruce form magnificent forests in the Vosges and Jura Mountains, and the Aleppo and friaritime pines are cultivated in the south and south-west. About one-seventh of the entire territory is still covered with wood.

Forest legislation took its rise in France about the middle of the 1 6th century, and the great minister Sully urged the enforce- ment of restrictive forest laws. In 1669 a fixed treatment of state forests was enacted.

Duhamel in 1755 published his famous work on forest trees. Reckless destruction of the forests, however, was in progress, and the Revolution of 1789 gave a fresh stimulus to the work of devastation. The usual results have followed in the frequency and destructiveness of floods, which' have washed away the soil from the hillsides and valleys of many districts,

especially in the south, and the frequent inundations of the last fifty years are no doubt caused by the deforesting of the sources of the Rhone and Sa6ne. Laws were passed in i860 and 1864, providing for the reforesting, " reboisement," of the slopes of mountains, and these laws take effect on private as well as state property. Thousands of acres are annually planted in the departments of Hautes and Basses Alpes; and during the summer of 1875, when much injury was done by floods in the south of France, the Durance, formerly the most dangerous in this respect of French rivers, gave little cause for anxiety, as it is round the head waters of this river that the chief plantations have been formed. While tracts formerly covered with wood have been replanted, plantations have been formed on the shifting sands or dunes along the coast of Gascony. A forest of Pinus pinaster, 150 m. in length, now stretches from Bayonne to the mouth of the Gironde, raised by means of sowing steadily continued since 1789; the cultivation of the pine, along with draining, has transformed low marshy grounds into productive soil extending over an area of about two million acres. The forests thus created provide annually some 600ˆ000 tons of pit timber for the Welsh coal mines.

The state forest department is administered by the director- general, who has his headquarters at Paris, assisted by a board of administration, charged with the working of the forests, questions of rights and law, finance and plantation works.

The department is supplied with officers from the forest school at Nancy. This institution was founded in 1824, when M. Lorentz, who had studied forestry in Germany, was appointed its first director. .

Italy. — The kingdom of Italy comprises such different climates that within its limits we find the birch and pines of northern Europe, and the olive, fig, manna-ash, and palm of more southern latitudes. By the republic of Venice and the duchy of Genoa forestal legislation was attempted at various periods from the 15th century downwards. These efforts were not successful, as the governments were lax in enforcing the laws. In 1789 Pius VI. issued regulations prohibiting felling without licence, and later orders were published by his successors in the pontifical states. In Lorhbardy the woods, which in 1830 reached nearly down to Milan, have almost disappeared. The province of Como contains only a remnant of the primitive forests, and the same may also be said of the southern slopes of

Tirol. At Ravenna there is still a large forest of stone pine, Pinus pinea, though it has been much reduced. The plains of Tuscany are adorned with planted trees, the olive, mulberry, fig and almond. Sardinia is rich in woods, which cover one-fifth of the area, and contain a large amount of oak, Querent suber, robur and cerris. In Sicily the forests have long been felled, save the zone at the base of Mount Etna.

The destruction of woods has been gradual but persistent; at the end of the 17th century the effects of denudation were first felt in the destructive force given to mountain torrents by the deforesting of the Apennines. The work of devastation continued until a comparatively recent time. • In 1867 the monastic property of Vallombrosa, Tuscany, 30 m. from Florence, was purchased by government for the purposes of a forest academy, which was opened in 1869. As only 4% of the total forest area belongs to the state, it is doubtful whether much good can now be done.

Great Britain and Ireland. — The British Isles were formerly much more extensively wooded than at present. The rapid increase of population led to the disforesting of woodland; the climate required the maintenance of household fires during a great part of the year, and the increasing demand for arable land and the extension of manufacturing industries combined to cause the diminution of woodland. The proportion of forest is now very small, and yields but a fraction of the required annual supply of timber which is imported with facility from America, northern Europe and the numerous British colonies.

Owing to the nature of the climate of the British Islands, with its abundance of atmospheric moisture and freedom from such extremes of heat and cold as are prevalent in continental

Europe, a great variety of trees are successfully cultivated. In England and Ireland oak and beech are on the whole the most plentiful trees in the low and fertile parts; in the south of Scotland the beech and ash are perhaps most common, while the Scotch fir and birch are characteristic of the arboreous vegetation in the Highlands. Although few extensive forests now exist, woods of small area, belts of planting, clumps of trees, coppice and hedgerows, are generally distributed over the country, constituting a mass of wood of considerable importance, giving a clothed appearance in many parts, and affording illustrations of skilled arboriculture not to be found in any other country.

The principal state forests in England are Windsor Park, 14,000 acres; the New Forest, &c, in Hampshire, 76,000 acres; and the Dean Forest in Gloucestershire, 22,500 acres. The total extent of crown forests is about 125,000 acres. A large pro- portion of the crown forests, having been formed with the object of supplying timber for the navy, consists of oak. The largest forests in Scotland are in Perthshire, Inverness-shire and Aberdeenshire. Of these the most notable are the earl of Mansfield's near Scone (8000 acres), the duke of Atholl's larch plantations near Dunkeld (10,000 acres), and in Strathspey a large extent of Scotch pine, partly native, partly planted, be- longing to the earl of Seafield. In the forests of Mar and Inver- cauld, the native pine attains a great size, and there are also large tracts of indigenous birch in various districts. Ireland was at one time richly clothed with wood; this is proved by the abundant remains of fallen trees in the bogs which occupy a large surface of the island. In addition to the causes above alluded to as tending to disforest England, the long unsettled state of the country also conduced to the diminishing of the woodlands.

The forests of Great Britain and Ireland, in spite of the large imports of timber, have not been appreciably extended up to the present time because (1) the rate at which foreign timber has been laid down in Britain is very low, thus keeping down the price of home-grown timber; (2) foreign timber is preferred to home-grown material, because it is in many cases of superior quality, while the latter comes into the market in an irregular and intermittent manner; (3) nearly the whole of the waste lands is private property. As regards prices, it can be shown that the lowest point was reached about the year 1888, in con- sequence of the remarkable development of means of communica- tion, that prices then remained fairly stationary for some years, and that about 1894 a slow but steady rise set in, showing during the years 1894-1904 an increase of about 20 % all round. This was due to the gradual approach of the coming crisis in the supply of coniferous timber to the world. It can be shown that even with present prices the growing of timber can be made to pay, provided it is carried on in a rational and economic manner. Improved silvicultural methods must be applied, so as to produce a better class of timber, and the forests must be managed according to well-arranged working plans, which provide for a regular and sustained out-turn of timber year by year, so as to develop a healthy and steady market for locally-grown material. Unfortunately the private proprietors of the waste lands are in many cases not in a financial position to plant. Starting forests demands a certain outlay in cash, and the pro- prietor must forgo the income, however small, hitherto derived from the land until the plantations begin to yield a return. In these circumstances the state may well be expected to help in one or all of the following ways: (1) The equipment of forest schools, where economic

forestry, as elaborated by research, is taught; (2) the management of the crown forests on economic principles, so as to serve as patterns to private proprietors; (3) advances should be made to landed proprietors who desire to plant land, but are short of funds, just as is done in the case of improvements of agricultural holdings; and (4) the state might acquire surplus lands in certain parts of the country, such as congested districts, and convert them into forests. Action in these directions would soon lead to substantial benefits. The income of landed proprietors would rise, a considerable sum of money now sent abroad would remain in the country, and forest industries would spring up, thus helping to counteract

the ever-increasing flow of people from the country into the large towns, where only too many must join the army of the unem- ployed. Even within a radius of 50 m. of London 700,000 acres of land are unaccounted for in the official agricultural returns. In Ireland more than 3,000,000 acres are waiting to be utilized, and it is well worth the consideration of the Irish Land Com- missioners whether the lands remaining on their hands, when buying and breaking up large estates, should not be converted into state forests. Such a measure might become a useful auxiliary in the: peaceful settlement of the Irish land question. No doubt success depends upon the probable financial results. There are at present no British; statistics to prove such success; hence, by way of illustration, it may be stated what the results have been in the kingdom of Saxony, which, from an industrial point of view, is comparable with England. That country has 432,085 acres of state forests, of which about one-eighth are stocked with broad-leaved species, and seven-eighths with conifers. Some of the forests are situated on low lands, but the bulk of the area is found in the hilly parts of the country up to an elevation of 3000 ft. above the sea. The average price realized of late years per cubic foot of wood amounts to sd. , and yet to such perfection has the management been brought by a well-trained staff, that the mean annual net revenue, after meeting all expenses, comes to 2 is. an acre all round. , There can be no doubt that, under the more favourable climate of Great Britain, even better results can be obtained, especially if it is remembered that foreign supplies of coniferous timber must fall off, or, at any rate, the price per cubic foot rise considerably.

These things have been recognized to some extent, and a movement has been set on foot to improve matters. The Commissioners of Woods and a number of private proprietors had rational working plans prepared for their forests, and instruction in forestry has been developed. There is now a well-equipped school of forestry connected with the university of Oxford, while Cambridge is following on similar lines; instruction in forestry is given at the university of Edinburgh, the Durham College of Science, at Bangor, Cirencester and other places. The Commissioners of Woods have purchased an estate of 12,500 acres in Scotland, which will be converted into a

crown forest, so as to serve as an example. The experience thus gained will prove valuable should action ever be taken on the lines suggested by a Royal Commission on Coast Erosion, Reclamation of Tidal Lands and Afforestation, which reported on the last subject in 1909. '

India. — The history of forest administration in India is exceed- ingly instructive to all who take an interest in the welfare of the British Empire, because it places before the reader an account of the gradual destruction of the greater part of the natural forests, a process through which most other British colonies are now passing, and then it shows how India emerged trium- phantly from the self-inflicted calamity. As far as information goes, India was, in the early times, for the most part covered with forest. Subsequently settlers opened out the country along fertile valleys and streams, while nomadic tribes, moving from pasture to pasture, fired alike hills and plains. This process went on for centuries. With the advent of British rule forest destruction became more rapid than ever, owing to the increase of population, extension of cultivation, the multiplication of herds of cattle, and the universal firing of the forests to produce fresh crops of grass. Then railways came, and with their ex- tension the forests suffered anew, partly on account of the increased demand for timber and firewood, and partly on account of the fresh impetus given to cultivation along their routes. Ultimately, when failure to meet the requirements of public works was brought to notice, it was recognized that a grievous mistake had been made in allowing the forests to be recklessly destroyed. Already in the early part of the 19th century sporadic efforts were made to protect the forests in various parts of the country, and these continued intermittently; but the first organized steps were taken about the year 1855, when Lord Dalhbusie was governor-general. At that time conservators of forests existed in Bombay, Madras and Burma.

Soon afterwards other appointments followed, and in 1864 an organized state department, presided over by the inspector- general of forests, was established. Since then the Indian Forest Department has steadily grown, so that it has now become of considerable importance for the welfare of the people, as well as for the Indian exchequer.

The first duty of the department was to ascertain the position and extent of the remaining forests, and more particularly of that portion which still belonged to the state. Then a special forest law was passed, which was superseded in 1878 by an im- proved act, providing for the legal formation of permanent state forests; the determination, regulation, and, if necessary,

com- mutation of forest rights; the protection of the forests against unlawful acts and the punishment of forest offences; the protec- tion of forest produce in transit; the constitution of a staff of forest officers, provision to invest them with suitable legal powers, and the determination of their duties and liabilities. The officers who administered the department in its infancy were mostly botanists and military officers. Some of these became excellent foresters. In order to provide a technically trained staff arrange- ments were made in 1866 by Sir Dietrich Brandis, the first inspector-general of forests, for the training of young Englishmen at the French Forest School at Nancy and at similar institutions in Germany. In 1876 the students were concentrated at Nancy, and in 1885 an English forest school for India was organized in connexion with the Royal Indian Engineering College, at Cooper's Hill. In 1 905 the school was transferred to the university of Oxford. The imperial forest staff of India consisted in 1909 of — officers not specially trained before entering the department, 17; officers trained in France and Germany, 23; officers trained at Cooper's Hill, 143 — total 184.

In 1878 a forest school was started at Dehra Dun, United Provinces, for the training of natives of India as executive officers on the provincial staff. Since then a similar school, though on a smaller scale, has been established at Tharrawaddy in Burma. About 500 officers of this class have been appointed. In addition, there are about 11,000 subordinates, foresters and forest guards, who form the protective staff. The school at Dehra Dun has lately been converted into the Imperial Forest College.

The progress made since 1864 is really astonishing. According to the latest available returns, the areas taken under the manage- ment of the department are — reserved state forests, or permanent forest estates, 91,272 sq. m.; other state forests, 141,669 sq. m.; or a total of 232,941 sq. m., equal to 24 % of the area over which they are scattered. At present, therefore, the average charge of each member of the controlling staff comprises 1266 sq. m.; that of each executive officer, 446 sq. m.; and that of each protective official, 21 sq. m. It is the intention to increase the executive and protective staff considerably, in the same degree as the management of the forests becomes more detailed. Of the above-mentioned area the Forest Survey Branch, established in 1872, has up to date surveyed and mapped about 65,000 sq. m. From 1864 onwards efforts were made to introduce systematic management into the forests, based upon working plans, but, as the management had been provincialized, there was no central or continuous control. This was remedied in 1884, when a central Working Plans Office, under the inspector-general of forests, was established. This officer has since then controlled the preparation and execution of the plans, a procedure which has led to most beneficial results. Plans referring to about 38,000 sq. m. are now (1909) in operation, and

after a reasonable lapse of time there should not be a single forest of importance which is not worked on a well-regulated plan, and on the principle of a sustained yield. While the danger of overworking the forests is thus being gradually eliminated, their yield capacity is in- creased by suitable silvicultural treatment and by fire protection. Formerly most of the important forests were annually or period- ically devastated by jungle fires, sometimes lighted accidentally, in other cases purposely. Now 38,000 sq. m. of forest are actually protected against fire by the efforts of the department, and it is the intention gradually to extend protection to all permanent

state forests. Grazing of cattle is of great importance in India; at the same time it is liable to interfere seriously with the repro- duction of the forests. To meet both requirements careful and minute arrangements have been made, according to which at present 38,000 sq. m. are closed to grazing; 19,000 sq. m. are closed only against the grazing of goats, sheep and camels; while 176,000 sq. m. are open to the grazing of all kinds of cattle. The areas closed in ordinary years form a reserve of fodder in years of drought and scarcity. During famine years they are either opened to grazing, or grass is cut in them and transported to districts where the cattle are in danger of starvation. The service rendered in this way by a wise forest administration should not be underrated, since one of the most serious calamities of a famine— the want of cattle to cultivate the land — is thus, if not avoided, at any rate considerably reduced. During 1907 the government of India established a Research Institute, with six members engaged in collecting data regarding silviculture, forest botany, forest zoology, forest economics, working plans, and chemistry in connexion with forest produce and production. The institute is likely to lead to further substantial progress in the management of the forests.

The financial results of forest administration in India for the years 1865 to 1905 show the progress made:

Period .

Mean Annual Net Revenue.

Percentage of

Annual Increase

during Period.

1 865-1 870 1 870-1 875 1875-1880 1880-1885 1 885-1 890 1890-1895 1895-1900 1900-1905

Rupees.

1.372,733 1,783,248 2,224,687

3.385.745 5,066,671

7.370,572

7,923.484 9,004,367

30 25 52 50 44 7 12

The highest percentage of increase occurred in the period 1880-1885. The revenue since 1886 has been considerably increased by the annexation of Upper Burma.

Apart from the net revenue, large quantities of produce are given free of charge, or at reduced rates, to the people of the country. Thus, in 1904-1905, the net revenue amounted to Rs. 11,062,094, while the produce given free or at reduced rates was valued at Rs. 3,500,661, making a total net benefit derived from the state forests during that year of Rs. 14,562,755, or in round figures one million pounds sterling. The out-turn during the same year amounted to 252 million cub. ft. of timber and fuel and 215 million bamboos. The receipts from the sale of other forest produce came to 9 million rupees, out of a total gross revenue of 24 million rupees.

These results are highly creditable to the government of India, which has led the way towards the introduction of rational forest management into the British empire, thus setting an example which has been followed more or less by various colonies. Even the movement in the United Kingdom during late years is due to it. Apart from India, substantial progress has been made in Cape Colony, Ceylon, the Straits Settlements and the Federated Malay States. Other British colonies are more backward in this respect. Energetic action is urgently wanted, especially in Canada and Australasia, where an enormous state property is threatened by destruction.

Literature. — The following works of special interest may be mentioned: W. Schlich, A Manual of Forestry (London) (vols, i., ii. and hi. by W. Schlich; vols. iv. and v. by W. R. Fisher; 3rd ed. of vol. i., 1906, of vol. ii., 1904, of vol. iii., 1905; 2nd ed. of vol. iv., 1907; 2nd ed. of vol. v., 1908); Baden-Powell, Forest Law (London, 1893); Brown, The Forester (ed. by Nisbet, Edinburgh and London, 10×55); Broilliard, Le Traitement des bois (Paris, 1894); Huffel, Economie forestiere (Paris, 1904-1907) ; Lorey, Handbuch der Forstwissenschaft (2nd ed. by Stoetzer, Tubingen, 1903); Ross- massler, Der Wald. (W. Sch.)

United States The Forest Regions. — The great treeless region east of the Rocky Mountains separates the wooded area of the United

States into two grand divisions, which may be called the Eastern and the Western forests. The Eastern forest is characterized by the predominance, on the whole, of broad-leafed trees, the comparative uniformity of its general types over wide areas, and its naturally unbroken distribution. In the Western forest conifers are conspicuously predominant; the individual species often reaches enormous and even unequalled dimensions, the forest is frequently interrupted by treeless areas, and the tran- sitions from one type to another are often exceedingly abrupt. Both divisions are botanically and commercially rich in species. The Eastern forest may conveniently be subdivided into three members:

1. The Northern forest, marked by great density and large volume of standing timber, and a comparative immunity, in its virgin condition, from fire. The characteristic trees are maples, birches and beech {Fagus atropunicea) , among the hardwoods and white pine {Pinus strobus), spruce (Picea rubens and Picea mariana) and hemlock (Tsuga canadensis) among conifers.

2. The Southern forest is on the whole less dense than the Northern, and more frequently burned over. Among its char- acteristic trees are the longleaf {Pinus palustris) and other pines, oaks, gums, bald cypress (Taxodium distichum) and white cedar (Chamaecyparis thyoides).

3. The Central Hardwood forest, which differs comparatively little from adjacent portions of the Northern and Southern forests except in the absence of conifers. Among its trees are the chestnut (Castanea dentata), hickories, ashes and other hardwoods already mentioned.

The Western division has two members:

1. The Pacific Coast forest, marked by the great size of its trees and the vast accumulations of merchantable timber. Among its characteristic species are the redwood {Sequoia semper- virens) and the big tree {S. W ashingtoniana) , the Douglas fir {Pseudotsuga taxifolia), sugar pine {Pinus lambertiana) , western hemlock {Tsuga heterophylla), giant arborvitae {Thuja plicata) and Sitka spruce {Picea sitchensis).

2. The Rocky Mountain forest, whose characteristic species are the western yellow pine {Pinus ponder osa), Engelmann spruce

{Picea engelmanni) and lodgepole pine {Pinus murrayana) . This forest is frequently broken by treeless areas of greater or less extent, especially towards the south, and it suffers greatly from fire. Stibarid in character, except to the north and at high elevations, the vast mining interests of the region and its treeless surroundings give this forest an economic value out of proportion to the quantities of timber it contains.

This distribution of the various forests is indicated on the first of the two accompanying maps. The second map shows the situation of the national forests hereafter mentioned.

The forests of Alaska fall into two main divisions: the com- mercial though undeveloped forests of the south-east coast, which occur along the streams and on the lower slopes of the mountains and consist chiefly of western hemlock {Tsuga heterophylla), Sitka spruce {Picea sitchensis), yellow cedar {Chamaecyparis nootkatensis) and giant arborvitae {Thuja plicata), usually of large size and uninjured by fire; and the vast interior forests, swept by severe fires, and consisting chiefly of white and black spruces {Picea canadensis and nigra), paper birch {Betula papyrifera) and aspen {Populus tremuloides) , all of small size but of great importance in connexion with mining. Northern Alaska and the extreme western coast regions are entirely barren.

The National Forest Policy. — The forest policy of the United States may be said to have had its origin in 1 799 in the enactment of a law which authorized the purchase of timber suitable for the use of the navy, or of land upon which such timber was growing. It is true that Taws were in force under the early governments of Massachusetts, New Jersey and other colonies, providing for the care and protection of forest interests in various ways, but these laws were distinctly survivals of tend- encies acquired in Europe, and for the most part of little Use. It was not until the apparent approach of a dangerous shortage in certain timber supplies that the first real step in forest policy was taken by the United States. Successive laws passed from 181 7 to 1831 strove to give larger effect to the original enactment, but without permanent influence towards the preservation of the live oak {Quercus oirginiana Mill.), which was the object in vie'W. A long period of inaction followed these early measures. In

FOREST REGIONS

OF THE

UNITED STATES

The unshaded areas are treeless, except along the Streams

*UftHefl Sft<» Pcp*rtmtirt ol AgricMHyft, FtcW S«nr*

enttyVMnu.

FORESTS AND FORESTRY

653

1 83 1 the solicitor of the treasury assumed a partial responsibility for the care and protection of the public timber lands, and in kˆss this duty was transferred to the commissioner of the general land office in the Department of the Interior. The effect of these changes upon forest protection was unimportant. When, however, at the close of the Civil War railway building in the United States took on an unparalleled activity, the destruction of forests by fire and the axe increased in a corresponding ratio, and public sentiment began to take alarm. Action by several of the states slightly preceded that of the Federal government, but in 1876 Congress, acting under the inspiration of a memorial from the American Association for the Advancement of Science, authorized the appointment of an officer (Dr Franklin B. Hough) under the commissioner of agriculture, to collect and distribute information upon forest matters. His office became in 1880 the division of forestry in what is now the United States Department of Agriculture.

As the railways advanced into the treeless interior,, public interest in tree-planting became keen. In 1873 Congress passed and later amended and repealed the timber culture acts, which granted homesteads on the treeless public lands to settlers who planted one-fourth of their entries with trees. Though these measures were not successful in themselves they directed atten- tion towards forestry. The act which repealed them in 1891 contained a clause which lies at the foundation of the present forest policy of the United States. By it the president was authorized to set aside " any part of the public lands wholly or in part covered with timber or undergrowth, whether of com- mercial value or not, as public reservations, and the President shall, by public proclamation, declare the establishment of such reservations and the limits thereof." Some eighteen million acres had been proclaimed as reservations at the time when, in 1896, the National Academy of Sciences was asked by the secretary of the interior to make an investigation and report upon " the inauguration of a rational forest policy for the forest lands of the United States." Upon the recommendation of a commission named by the Academy, Presiderit Cleveland estab- lished more than twenty-one million acres of new reserves on trie 22nd of February 1897. His action was widely misunder- stood and attacked, but it awakened a public interest in forest questions without which the rapid progress of forestry in the United States since that time

could never have been made.

Within a few months after the proclamation of the Cleveland reserves the present national forest policy took definite shape. Under this policy the national government holds and manages, in the common interest of all users of the forests or its products, such portions of the public lands as have been set aside by presidential proclamation in accordance with the act of 1891. These lands are held against private acquisition under the Homestead Act (except as to agricultural lands as hereafter mentioned) , the Timber and Stone Act, and other laws under which the United States disposes of its unappropriated public domain, but not against private acquisition under the Mineral Land Laws. They are selected from lands believed to be more valuable for forest purposes than for agriculture, and are managed with the purpose of securing from them the best and largest possible returns, present and future, whether in the form of water for irrigation or power, of timber, of forage for stock, or of any other beneficial product. The aggregate area of the reserves, or national forests, has been steadily increased until they now include nearly all the timber lands left of the public domain.

The general lines of this policy were in part laid down by the commission already mentioned, in its report submitted to the secretary of the interior, May 1, 1897, and by the act of June 4, 1897, which was largely shaped by the work of the commission. Until this act was passed the national forests had been in theory closed against any form ol use; nor had the possibility of securing forest preservation by wise use received much thought from those who had favoured their creation. Such a state of affairs could not continue. Before long public opinion would have forced the opening to use of the resources thus arbitrarily locked up, and in the absence of any administrative

system providing for conservative use, the national forests would inevitably have been abolished, and the whole policy of governr ment forest holdings would have ceased. The act of June 4, 1897 was therefore of the first importance. This act con- ferred upon the secretary of the interior general powers for the proper management of the national forests through the general land office of his department. It provided for the designation and sale of dead, mature and large timber; authorized the secretary to permit free use of timber in small quantities by settlers, miners and residents; empowered him to " make such rules and regulations and establish such service as will insure the objects of such reservations, namely, to regulate their occupancy and use and to preserve the forests thereon from destruction "; and made violation of the act or of such rules and regulations a misdemeanour. The statute limited the power to establish forest reservations to the purpose of improving and protecting the forest,

securing favourable conditions of water flows, and furnishing a continuous supply of timber for the use and necessities of citizens of the United States. Lands found, upon due examination, to be more valuable for other purposes than for forest uses might be eliminated from any reservation, and all mineral lands within the reservations were left open to private appropriation under the mineral laws. The rights of settlers and claimants were safeguarded, and civil and criminal jurisdiction, except so far as the punishment of offences against the United States in the reservations was concerned, was reserved to the States. '

While the administration of the national forests was entrusted to the general land office, the same act assigned the surveying and mapping of them to the United States Geological Survey,' which has published descriptions and maps of some of the more important.

No attempt was made in the general land office to develop' a technical forest service. There were, indeed, at the time of passage of the act, less than ten trained foresters in the United States, no means of training more, and very little conception, of what forestry actually meant. The purpose of the administra- tion was therefore mainly protection against trespass and fire, particularly the latter. Regulations were made giving effect to the provisions of the act of June 4, set forth above, but in the absence of technical knowledge as to what might safely be done, the tendency was rather to restrict than to extend the use of the forest. Meanwhile, however, there was rapidly develop- ing in another branch of the government service an organization qualified for actual forest management.

One year after the passage of the act of June 4, 1897, the division of forestry in the Department of Agriculture ceased to be merely a bureau of information, and became an active agency for introducing the actual practice of forestry among private owners and for conducting the investigations upon which a sound American forest practice could be based. The work awakened great interest among forest owners, and exerted a powerful educational influence upon the country at large. The division extended its work and became (July 1, 1901) the Bureau of Forestry. It drew into its employment for a time nearly all the men who were preparing themselves in increasing numbers (at first abroad, then in the newly-founded schools in the United States) for the profession of forestry, and was soon recognized as qualified to speak authoritatively on technical questions connected with the administration of the national forests. This led to a request from the secretary of the interior for the advice of the bureau on such questions. Working plans were accordingly undertaken for a number of the forests. The general land office, however, was not ready to attempt active forest management. Though some timber was sold and the grazing of stock regulated to some extent, the main object of the land office

administration continued to be protection against fire. Many of the regulations which it made could not be enforced.

The disadvantages of dispersal of the Federal government forest work among three separate agencies grew more and more apparent, until, on the 1st of February 1905, control of the 63,000,000 acres of forest reserves which up to that time had been set aside was transferred from the general land office to

United Stiics Dccanmcni q« Agriculture. Porett Service.

the Bureau of Forestry. In recognition of its new duties the designation of the bureau became the Forest Service.

Other provisions of the act which affected the transfer were that forest supervisors and rangers should be selected, so far as possible, from qualified citizens of the state or territory in which each forest was situated, and that all money received from the sale of any products or the use of any land or resources of the national forests should be covered into the treasury and constitute a special fund for their protection, administration, improvement and extension. Five days later a statute gave forest officers the power to arrest trespassers; and on the 3rd of March the lieu land selection law was repealed. This law had opened the way for grave abuses through the exchange of worth- less land by private owners within the forests for an equal area of valuable timber lands outside.

The law has been modified since by the change of the old name " Forest Reserves " to " National Forests." The act of June 11, 1906, opened to homestead entry lands within national forests found by examination to be chiefly valuable for

agriculture. The administration and improvement of the national forests are now provided for directly by congressional appro- priation. The power to create national forests conferred on the president by the act of March i8or has been repealed for the states of Washington, Oregon, Idaho, Montana, Wyoming and Colorado, but for no others.

The Forest Service began in earnest the development of all the resources of the national forests. Mature timber was sold wherever there was a demand for it and the permanent welfare of the forests and protection of the streams permitted, but always so as to prevent waste, guard against fire, protect young growth and ensure reproduction. Regulations were adopted which allowed small sales to be made -without formality or delay, secured for the government the full value of timber sold, and eliminated unnecessary routine. Care was taken to safeguard the interests of the government and provide for the maintenance of good technical standards. The conduct of local business was entrusted to local officers. Large transactions with general policies were controlled from Washington, but with careful

provision for first-hand knowledge and close touch with the work in the field. Business efficiency and the convenience of the public were carefully studied. In short, an organization was created capable of handling safely, speedily and satisfactorily the com- plex business of making useful a forest property of vast extent, scattered through sixteen different states of an aggregate area of over 1,500,000 sq. m. and with a population of 9,000,000.

The growth since the 1st of July 1897 of the area of the national forests, of the expenditures of the government for forestry, and of the receipts from the national forests, is shown by the statement which follows. Though the act of June 4, 1897, became effective immediately upon its passage, the fiscal year 1899 was the first of actual administration, because the first for which Congress made the appropriation necessary to carry out the law.

forest is ripe for the axe, the demand is strong, and control by trained men makes it safe to cut more freely. The increase is marked both in small and in large sales, but a score of sales for less than $5000 are made against one for more. The total cut is still far below the annual increment of the forests. As the demand grows restrictions must increase in order to husband the present supply until the next crop matures.

3. The stumpage price would seem on the face of the figures to have risen from about one dollar to more than three dollars per thousand board-feet. The receipts, however, for any one year are not exclusively for the timber cut in that year, since payments are made in advance. In the year 1907 the average price obtained was something less than $2-50 per thousand. It is therefore true that stumpage prices have risen greatly, although conditions new to the American lumbermen are im-

Area of National Forests, Annual Expenditures of the Federal Government for Forestry and National Forest Administration,

and Receipts from National Forests, 1898-IQ09.

Area of

Fiscal

National Forests

Division of Forestry

General

Receipts from

Receipts from

Expenditures upon

Year. 1

at Close of Year

(Bureau of Forestry,

Land Office.

National Forests.

National Forests,

National Forests,

(June 30).

Forest Service).

per Acre.

per Acre.

Acres.

$

$

$

$

1

1898

40,866,184

20,000-00

1899

46,168,439

28,520-00

175,000-00

7,534-83

0-00016

0-0038

1900

46,515,039

48,520-00

210,000-00

36,754-02

•00078

•0045

1901

46,3 2 4,479

88,520-00

325,000-00

29,250-88

•00063

•0070

1902

51-896,357

185,449-00

300,000-00

25,43l-87

•00049

•0060

1903

62,211,240

291,860-00

304,135-00

45,838-08

•00074

•0054

1904

62,611,449

350,000-00

375,000-00

58,436-19

•00093

•0072

1905

85,693,4 2 2

632,232-362

*217, 907-64**

73,276-i5

•00085

•0059

1906

106,994,018

1,191,400-21

767,219-96

•00717

•0089

1907

150,832,665

1,800,595-20

1,571,059-44

•01041

•0097

1909

167,677,749

2,948, i53-° 8

1,807,276-66

•00931

•0151

Until 1906, the sole source of receipts was the sale of timber. In the fiscal year 1907, however, timber sales furnished less than half the receipts. The following statement concerning the timber sales of the fiscal years 1904-1907 will serve to bring out the change that followed the transfer of control to the forest service in the midst of the fiscal year 1905 : —

Fiscal Year.

Amount of Timber Sold.

Amount of Timber Cut.

Receipts from Timber Sales.

1904 1905 1906 1907

Bd.-ft.

H2,773,7io

113,661,508

328,230,326

1,044,855,000

Bd.-ft.

58,435,000

68,475,000

138,665,000

194,872,000

58,436-19

73,270-i5

245,013-49 686,813-12

These figures show (1) a large excess each year in the amount of timber sold over that cut and paid for; (2) nine times as much timber sold at the end of the four-year period as at the beginning and three times as much cut; and (3) a much higher price obtained per thousand board-feet at the end of the period than at the beginning. Each of these matters calls for comment. The sales are of stumpage only; the government does no logging on its own account.

• i. More timber is sold each year than is cut and paid for, because many of the sales extend over several years. With increasing sales the amount sold, each year for future removal has exceeded the amount to be removed during that year under sales of earlier years. Large sales covering a term of years are made because the national forests contain much overmature timber, which needs removal, but which is frequently too in- accessible to be saleable in small amounts. To prevent specula- tion the time allowed for cutting is never more than five years, and cutting must begin at once and be continued steadily.

2. The volume of sales has increased rapidly because much

1 The United States fiscal year ends June 30, and receives its designation from the calendar year in which it terminates. Thus, the fiscal year 1898 is the year July 1, 1897-June 30, 1898.

2 Administration transferred to Bureau of Forestry, February 1, ˆOS-

posed. Full utilization of all merchantable material, care of young growth in felling and logging, and the piling of brush, to be subsequently burned by the forest officers if burning is necessary, are among these conditions. Timber to be cut must first be marked by the forest officers. Sales of more than $100 in value are made only after public advertisement.

Only the simplest forms of silviculture have as yet been introduced. The vast area of the national forests, the com- paratively sparse population of the West, the rough and broken character of the forests themselves, and the newness of the problems which their management presents, make the general application of intensive methods for the present impracticable. Natural reproduction is secured. The selection system is most used, often under the rough and ready method of an approximate diameter limit, with the reservation of seed trees where needed. The tendency, however, is strongly towards a more flexible and effective application of the selection principle, as a better trained field force is developed and as market

conditions improve.

One conspicuous achievement was the reduction of loss by fires on the national forests. During the unusually dry season of 1905 there were only eight fires of any importance, and the area burned over amounted only to about -16 of 1 % of the total area. In 1906 about -12 of 1% was burned. This was accomplished by efficient patrol, co-operation of the public, and by preventive measures, such as piling and burning the brush on cut-over areas.

Since the beginning of 1906 the largest source of income from the national forests was their use for grazing. Stock-raising is one of the most important industries of the West. Formerly cattle and sheep grazed freely on all parts of the public domain. In the early days of the national forests the wisdom of permitting any grazing at all upon them was sharply questioned. Un-restricted grazing had led to friction between individuals, the deterioration of much of the range through overstocking, and serious injury to the forests and stream flow. The forests of the West, however, are largely of open growth and contain many grassy parks, the results of old fires, and many high mountain meadows. Under proper regulations the grass and

other forage plants which they produce in great quantity can be used without detriment to the forests themselves, and with great benefit to the stock industry, which often can find summer pasturage nowhere else. Except in southern California grazing is now permitted on all national forests unless the watersheds furnish water for domestic use; but the time of entering and leaving, the number of head to be grazed by each applicant, and the part of the range to be occupied are carefully prescribed. Planted areas and cut-over areas are closed to stock until the young growth is safe from harm, and goats are allowed only in the brushland of the foothills.

The results of regulation, in addition to the protection of forest growth and streams, are the prevention of disputes, improved range, better stock, stable conditions in the stock industry, and the best use of the range in the interest of progress and development. The first right to graze stock on the forests is given to residents, small owners and those who have used the range before. Thus the crowding out of the weaker by the stronger and of the settler by the roving outsider has been stopped. In 1906 the forest service began to impose a moderate charge for the use of the national forest range. The following statement shows the amount of stock grazed on the national forests 1904-09, and the receipts for the grazing charge: —

Year.

Number of Cattle and Horses.

Number of Sheep and Goats.

Receipts.

1904

1905 1906 1907 1909

610,091

692,124

1,015,148

1,200,158

1,581,404

1,806,722

1,709,987 5,763,100 6,657,083 7,819,594

$

514,692.87

863,920.32

1,032,185-70

A work of enormous magnitude which has now begun is planting on the national forests. Atipresent, with low stumpage prices and incomplete utilization of forest products, clear cutting with subsequent planting is not practicable. There are, however, many million acres of denuded land within the national forests which require planting. Such planting is still confined chiefly to watersheds which supply cities and towns with water. The first planting was done in 1892, in California. Since then similar work has been done on city watersheds in Colorado, Utah, Idaho and New Mexico. Other plantations are in the Black Hills national forest, where large areas of cut-over and burned-over land are entirely without seed trees, and in the sandhill region of Nebraska. Up to 1 908 about 2 ,000,000 seedlings had been planted, on over 2000 acres — a small beginning, but the work was entirely new and presented many hard

problems.

The nursery operations of the forest service are concentrated at seven stations, located in southern California, Nebraska, Colorado, New Mexico (2), Utah and Idaho, where stock is raised for local planting and for shipment elsewhere. These nurseries are small. Their annual productive capacity is between 8,000,000 and 10,000,000 seedlings. Each nursery is practically an experimental forest-planting station, at which a large variety of species are grown and various methods are tried.

The organization of the administrative work of the national forests is by single forests. On the 1st of January 1908 the total number of forests was 165 with a total area of 162,023,190 acres (on April 7, 1909, the numbers were 146 national forests in the U.S. with 167,672,467 acres, besides two in Alaska with 26,761,626 and one in Porto Rico with 65,950 acres). In charge of each forest is a forest supervisor. Under the supervisors are forest rangers and forest guards, whose duties include patrol, marking timber and scaling logs, enforcing the regulations and conducting some of the minor business arising from the use of the forests. Guards are temporary employes; rangers are employed by the year. The supervisors report directly to and receive instructions from the central office at Washington. In this office there are four branches — operation, grazing, silviculture and products — each of which directs that part of the work which belongs to it, dealing directly with the supervisor. For inspection purposes, however, the forests are separated into six districts, in each of

which is located a chief inspector with a corps of assistants. The inspectors are without administrative authority, but assist by their counsel the supervisors, and through inspection reports keep the Washington office informed of the condition of all lines of administrative work in progress. Administrative officers alternate frequently between field and office duties.

The number of forest officers in the several grades on the 1st of January 1008 were: 6 chief inspectors, 26 inspectors, 106 forest supervisors, 41 deputy forest supervisors, 820 forest rangers and 283 forest guards. The total number of employds of the forest service on the same date, including the clerical force, was 2034.

Besides the administration of the national forests, the forest service conducts general investigations, carries on an extensive educational work, and co-operates with private owners who contemplate forest management upon their own tracts. This last work is undertaken because of the need of bringing forestry into practice, the lack of trained foresters outside of the employ of the government, and the lack of information as to how to apply forestry and what returns may be obtained . Co-operation takes the form of

advice upon the ground and, on occasion, of the making of working plans. The educational work of the service is performed chiefly through publications, the purpose of which is to spread very widely a knowledge of the importance of forestry to the nation and of the principles upon which its practice rests. The investigations which the service conducts extend from studies of the natural distribution and classification of American forests and of their varied silvicultural problems to statistics of lumber production and laboratory researches which bear upon the economical utilization of forest products. As examples of these researches may be mentioned tests of the strength of timber, studies of the preservative treatment of wood for various uses, wood-pulp investigations and studies in wood chemistry.

Forest Instruction. — Most of the men now in the forest service received their training in the United States. There are several professional schools of forestry. The Yale Forest School, which was opened as a department of Yale University in September 1900, offers a two-years' graduate course with abundant field work, and also conducts a summer school of forestry, especially adapted to the training of forest rangers and special students, at Milford, Pennsylvania. The university of Michigan and Harvard University also offer a two-years' graduate course in forestry. The Pennsylvania State College has recently established a four-years' undergraduate course in forestry. The Biltmore Forest School in North Carolina, the oldest of all these schools, offers a one-year course in technical forestry. A large number of the agricultural colleges give instruction in forestry. Among these are Nebraska, Minnesota, Maine, Michigan, Washington and Mississippi agricultural colleges, the university of Georgia and Iowa State College. Berea College, Kentucky, deserves special mention as a college which has done valuable work in teaching forestry without attempting to turn out professional foresters.

Forestry among the States. — Among the states forestry has hardly reached the stage of practical application on the ground. New York holds 1,500,000 acres of forest land. It has a commis- sion to care for its forest preserve, and to protect the forest land throughout the state from fire. The constitution of the state, however, prohibits the cutting of timber on state land, and thus confines the work entirely to protection of the forest and to the planting of waste areas. Pennsylvania is at present showing the most efficient activity in working out a forest policy. It has state forests of 820,000 acres, a good fire law more and more satisfactorily enforced, and eight nurseries for growing planting material. In 1905, 160,000 white pine seedlings were set out. It has also a school for forest rangers, to be employed on the state forests, and it has just established a state professional school of forestry.

Twenty-six of the states have regularly appointed forest officers, six have

carried on studies of forest conditions in co-operation with the forest service, and there if scarcely one which is not actively interested in forestry. Laws, generally good, to prevent damage from forest fires, have been enacted by practically all

the states, but their enforcement has unfortunately been lax. Public sentiment, however, is making rapid progress,. Among the best laws are those of Maine, New Hampshire, Minnesota, New York, Pennsylvania and Wisconsin. The New York law, for example, provides for the appointment of one or more fire- wardens in each town of the counties in which damage by fire is especially to be feared, In other counties supervisors of towns are ex-officio fire-wardens. A chief fire-warden has general supervision of their work. The wardens, half of the cost of whose services is paid by the state, receive compensation only for the time actually employed in fighting fires. They may command the service of any citizen to assist them. Setting fire to woods or waste lands belonging to the state or to another, if such fire results in loss, is punishable by a fine not exceeding $250 or imprisonment not exceeding one year, or both, and damages are provided for the person injured. Since fire is beyond question the most dangerous enemy of forests in the United States, the measures taken against it are of vital importance.

The following table shows the amount of forest land held by the different states, and by the territory of Hawaii: — Area of State Forest Reservations, 1907.

Connecticut Hawaii Indiana . Maryland Michigan . Minnesota New Jersey New York Pennsylvania Wisconsin

Forestry on Private Lands

1 ,360 acres

“7.532 „

2,000 „

3.540 „

39.ooo „

42,800 ,,

2.474 ..

.439.998 „

820,000 ,,

254,072 „

r. — The practice of forestry among private owners is of old date. One of the earliest instances was that of Jared Eliot, who, in 1730, began the systematic cutting of timber land to supply charcoal for an iron furnace at Old Salisbury, Connecticut. The successful planting of waste lands with timber trees in Massachusetts dates from about ten years later. But such examples were comparatively rare until recent times. At present the intelligent harvesting of timber with a view to successive crops, which is forestry, is much more common than is usually supposed. Among farmers it is especially frequent. It was begun among lumbermen by the late E. S. Coe, of Bangor, Maine, who made a practice of restricting the cut of spruce from his forests to trees 10, 12 or sometimes even 14 in. in diameter, with the result that much of his land yielded, during his life, a second crop as plentiful as the first. Many owners of spruce lands have followed his example, but until very recently without improving upon it. Systematic forestry on a large scale among lumbermen was begun in the Adirondacks during the summer of 1898 on the lands of Dr W. S. Webb and Hon. W. C. Whitney, of a combined area of over 100,000 acres, under the superintendence of the then Division of Forestry. In these forests spruce, maple, beech and birch predominate, but the spruce alone is at present of the first commercial import- ance. The treatment is a form of the selection system. Under it a second crop of equal yield would be ripe for the axe in thirty- five years. Spruce and pine are the only trees cut. The work had been executed, at least up to the year 1902, with great satisfaction to the owners and the lumbering contractors, as well as to the decided benefit of the forest. The lumbering is regulated by the following rules, and competent inspectors are employed to see that they are rightly carried out: (1) No trees shall be cut which are not. marked. (2) All trees marked shall be cut. (3) No trees shall be left lodged in the woods, and none shall be overlooked by the skidders or haulers. (4) All merchantable logs which are as large as 6 in. in diameter at the small end must be utilized. (5) No stumps shall be cut more than 6 in. higher than the stump is wide. (6) No spruce shall be

used for bridges, corduroy, skids, slides, or for any purpose except building camps, dams or booms, unless it is absolutely necessary on account of lack of other timber. (7) All merchant- able spruce used for skidways must be cut into logs and hauled out. (8) Contractors must not do any unnecessary damage

to young growth in lumbering; and if any is done, they must discharge the men who did it.

These two instances of forestry have been most useful and effective among lumbermen and other owners of forest land in the north-east. Among those which have followed their example are the Berlin Mills Paper Company in northern New Hampshire, the Cleveland Cliffs Iron Company in northern Michigan, and the Delaware and Hudson Railroad Company in New York, all of which have employed professional foresters.

The most notable instance of forestry in the south is on the estate of George W. Vanderbilt at Biitmore, N.C. This was the first case of systematic forestry under regular working plans in the United States. It was begun in 1891 on about 4000 acres, and has since been extended until it now covers about 100,000 acres. A professional forester with a corps of trained rangers under him is in charge of the work. The Pennsylvania Railroad has recently employed a trained forester and several assistants and has undertaken systematic forestry on a large scale.

The effect of the work of the forest service in assisting private owners is evidenced by the fact that down to the year 1908 670 wood lots and timber tracts had been examined by agents of the forest service, of which 250 were tracts over 400 acres in extent, and planting plans had been made for 436 owners covering a total area of 80,000 acres. Expert advice is also given to wood lot owners upon application by many of the state foresters.

American Practice, — The conditions under which forestry is practised in Europe and in America differ so widely that rules which are received as axiomatic in the one must often be rejected in the other. Among these conditions in America are the highly developed and specialized methods and machinery of lumbering, the greater facilities for transportation and conse- quent greater mobility of the lumber trade, the vast number of small holdings of forest land, and the enormous supply of low-grade wood in the timbered regions. High taxes on forest properties, cut-over as well as virgin, notably in the north-western pineries, and the firmly established habits of lumbermen, are factors of great importance. From these and other considera- tions it follows that such generally accepted essentials of European methods of forestry as a sustained annual yield, a permanent

force of forest labourers, a permanent road system and the like, are in most cases utterly inapplicable in the United States at the present day in private forestry. Methods of forest manage- ment, to find acceptance, must there conform as closely as possible to existing methods of lumbering. Rules of marked simplicity, the observance of which will yet secure the safety of the forest, must open the way for more refined methods in the future. For the present a periodic or irregular yield, temporary means of transport, constantly changing crews, and an almost total ignorance of the silvics of all but a few of the most important trees— all combine to enforce the simplest silvicultural treatment and the utmost concentration of purpose on the two main objects of forestry, which are the produqtion of a net revenue and the perpetuation of the forest. Such concentration has been followed in practice by complete success.

The forests with which the American forester deals are rich in species,usually endowed with abundant powers of reproduction, and, over a large part of their range, greatly dependent for their composition and general character upon the action of forest fires. Of the commercially valuable trees there may be said to be, in round numbers, a hundred out of a total forest flora of about 500 species, but many trees not yet of importance in the lumber trade will become so hereafter, as has already happened in many cases. The attention of the forester must usually be concen- trated upon the growth and reproduction of a single species, and never of more than a very few. Thus the silvicultural problems which must be solved in the practice of forestry in America are fortunately less complicated than the presence of so many kinds of trees in forests of such diverse types would naturally seem to indicate.

The forest fire problem is one of the most difficult with which the American forester has to deal. It is probable that forest

fires have had more to do with the character and distribution of forests in America than any other factor except rainfall. With an annual range over thousands of square miles, in many portions of the United States they occur regularly year after year on the same ground. Trees whose thick bark or abundant seeding gives them peculiar powers of resistance, frequently owe their exclusive possessions of vast areas purely to the action of fire. On the economic side fire is equally influential. The probability, or often the practical certainty, of fire after the first cut, commonly determines lumbermen to leave no merchantable tree standing. Forest fires are thus the most effective barriers to the intro- duction of forestry. Excessive taxation

of timber land is another of almost equal effect. Because of it lumbermen hasten to cut, and afterwards often to abandon, lands which they cannot afford to hold. This evil, which only the progress of public sentiment can control, is especially prevalent in certain portions of the white pine belt.

Forest Associations. — Public sentiment in favour of the pro- tection of forests is now widespread and increasingly effective throughout the United States. As the general understanding of the objects and methods of forestry becomes clearer, the tendency, formerly very marked, to confound ornamental tree planting and botanical matters with forestry proper is rapidly growing less. At the same time, the number and activity of associations dealing with forest matters is increasing with notable rapidity. There are now about thirty such associations in the United States. One of these, the Society of American Foresters, is composed exclusively of professional foresters. The American Forestry Association is the oldest and largest. It has been influential in preparing the ground work of popular interest in forestry, and especially in advocating and securing the adoption of the federal forest reservation policy, the most important step yet taken by the national government. It publishes as its organ a monthly magazine called Forestry and Irrigation. The Pennsylvania Forestry Association has been instrumental in placing that state in the forefront of forest progress. Its organ is a bi-monthly publication called Forest Leaves. Other states which have associations or societies of special influence in forest matters are California, Massachusetts, Minnesota, Colorado, New Hampshire, Georgia and Oregon. Arbor Day, instituted in Nebraska in 1872 as a day for shade-tree planting by farmers who had settled on the treeless prairies, has been taken up as a means of interesting school children in the planting of trees, and has spread until it is now observed in every state and territory. It continues to serve an admirable purpose.

Lumbering. — According to the census report for 1905 the capital invested in logging operations in the United States was $90,454,596, the number of employes engaged 146,596, and their wages $66,990,000; sawmills represented an invested capital of $381,621,000, and employed 223,674 persons, whose wages were $100,311,000, while planing mills represented a

capital of $222,294,000 and employed 132,030 persons whose wages were $66,434,000.

All the operations of the lumber trade in the United States are controlled, and to no small degree determined, by the peculiar unit of measure which has been adopted. This unit, the board- foot, is generally defined as a board one foot long, one foot wide and one inch thick, but in reality it is equivalent to 144 cub. in. of manufactured lumber in any form. To

purchase logs by this measure one must first know about what each log will yield in one-inch boards. For this purpose a scale or table is used, which gives the contents of logs of various diameters and lengths in board feet. Under such a standard the purchaser pays for nothing but the saleable lumber in each log, the inevitable waste in slabs and sawdust costing him nothing.

The table at foot gives the estimated consumption of wood for certain purposes in the United States in 1006.

In addition to this amount, an immense quantity of wood is used each year for fuel, posts and other domestic purposes, and the total annual consumption is not less than 20 billion cub. ft.

The years 1890 to 1906 were marked by rapid changes in the rank of the important timber trees with reference to the amount of timber cut, and a shifting of the important centres of produc- tion. Among coniferous trees, white pine has yielded suc- cessively to yellow pine and Douglas fir, while the scene of greatest activity has shifted from the Northern forest to the Southern, and from there is rapidly shifting to the Pacific Coast. The total cut of coniferous lumber has increased steadily, but that of the hardwoods is falling off, and in 1906 it was 15% less than in 1899, while inferior hardwoods are "gradually assuming more and more importance, and the scene of greatest activity has passed from the middle west to the south and the Appalachian region,

Conifers. — The coniferous supply of the country is derived from four forest regions: (1) The Northern forest; (2) the Southern forest ; (3) the Pacific Coast forest ; and (4) the Rocky Mountain forest.

1. The Northern forest was long the chief source of the coni- ferous lumber production in the United States. The principal timber tree of this region is the white pine, usually known in Europe as the Weymouth pine. It has an average height when mature of no ft., with a diameter a little less than 3 ft., but the virgin timber is approaching exhaustion. White pine was one of the first trees to be cut extensively in the United States, and Maine, the pine tree state, was at first the centre of production. In 1851 the cut of white pine on the Penobscot river was 144 million ft., that of spruce 14 million and of hemlock 11 million. Thirty years later the pine cut had sunk to 23 million, spruce had risen to 118 million, and hemlock had passed pine by a million feet. Meanwhile, the centre of production had passed from the north woods to the Lake States, and for many years this region was the scene of the most vigorous lumbering activity in the world. The following figures show the cut for the Lake

Product.

Output 1906.

Equivalent Wood Volume.

Estimated Woods Waste. 1

Estimated Mill Waste. 2

Total Wood Volume Consumed.

Lumber —

Conifers …. Hardwoods

Pulpwood …. Wood distillation .

Staves — •

Tight cooperage

Slack cooperage Poles

Round mine timbers Hewn cross ties

30,200,000 thousand bd. ft. 7,300,000 „ ,,

11,900,000 ,, ,,

2,900,000 cords

1,200,000 ,,

146,000,000 sets

267,000,000

1,097,000,000

3,500,000

300,000 thousand bd. ft.

165,000,000 cub. ft.

77>500,ooo

Million cub. ft.

2517 612 107 261 108 32

22 27 35 50 165 207

Million cub. ft.

1173

577 54 79 12

33

36 22

15

30

35

503

Million cub. ft.

2170 461 109

. 45

32 21

Million cub. ft.

5860

1650

270

34°

120

no

90 70 50 80 200 710

4H3

2569

2838

9550

1 Woods waste includes tops, stumps, cull logs and butts, but does not include defective trees left or trees used for road purposes.

2 Mill waste includes bark, kerf, slabs and edgings.

States from 1873 to 1006. It is certain that the remarkable decline in the cut of white pine which these figures show will continue still farther.

1873 1874

i875

1876 1877 1878 1879 1880 1881 1882 1883 1884 1885 1886 1887 1888 1889

3.993.78o,ooo 3.75i. 306,000

3.968,553.000 3,879,046,000

3.595,333.496 3,629,472,759 4,806,943,000 5.651.295.000 6,768,856,749

7.55 2 .i5o,744

7,624,789,786

7.935.033.054 7.053.094.555 7,425,368,443 7.757,916,784 8,388,716,460 8,183,050,755

1890 1891 1892

1893 1894

1895 1896

1897 1898 1899 1900 1901 1902 1903 1904

1905 1906

8,597,659.352 7,879,948,349 8,594,222,802 7,326,263,782 6,821,516,412 7,050,669,235

5.725.763,035 6,233,454,000 6,155.300,000 6,056,508,000 5,485,261,000 5,336,000,000 5,294,000,000 4,792,000,000 4,220,000,000 3,777,000,000 3,032,000,000

Second to the white pine among the coniferous lumber trees of the Northern forest is the hemlock (Tsuga canadensis). It is used chiefly for construction purposes and furnishes a com- paratively low grade of lumber.

The spruce (Picea rubens) is used chiefly for lumber, but it is in large and increasing demand in the manufacture of paper pulp. For the latter purpose hemlock, poplar (Populus tremu- loides and P. grandidentata) and several other woods are also employed, but on a smaller scale. The total consumption of wood for paper in the United States for 1906 was 3,660,000 cords, of which 2,500,000 was spruce. Of this, however, 720,000 cords were imported from Canada.

2. The chief product of the Southern forest is the yellow pine. This is the collective term for the longleaf, shortleaf, loblolly and Cuban pines. Of these the longleaf pine (Pinus palustris Mill.) , called pitch-pine in Europe, is the most important: Its timber is probably superior in strength and durability to that of any other member of the genus Pinus, and in addition to its value as a timber tree it is the source of naval stores in the United States. The average size of the mature longleaf pine is 90 ft. in height and 20 in. in diameter. Shortleaf (Pinus echinata) and loblolly (P. taeda) are other important members of this group. Their wood very closely resembles that of the longleaf pine and is often difficult to distinguish from it. The trees are also of about the same size and height. Loblolly is, however, of more rapid growth. The total cut of yellow pine in 1906 was 11,661,000,000 board ft.; it has perhaps not yet reached its maximum, but is certainly near it.

Another important coniferous tree of the Southern forest is the bald cypress (Taxodium distichum), which grows in- the swamps. The cut in 1906 was 839,000,000 board ft., a gain of 69% over 1899.

3. But the great supply of coniferous timber is now on the Pacific Coast. The Douglas fir (Pseudotsuga taxifolia), also known as Douglas spruce, red fir and Oregon pine, is the foremost tree in Oregon and Washington, and the redwood in California. When mature. the Douglas fir averages 200 ft. in height and 4 ft. in diameter, and the redwood 225 ft. in height and 8 ft.

in diameter. Other important trees of the Pacific Coast are sugar pine (Pinus lambertiana) , western red cedar (Thuja plicata), western larch (Larix Occident 'ah 's) , Sitka spruce (Picea sitchensis), western hemlock (Tsuga heterophylla) and western yellow pine (Pinus ponder osa). These trees wil all be of increasing importance.

Logging on the Pacific Coast is characterized by the use of powerful machinery and by extreme skill in handling enormous weights. This is especially true in California, where the logs of redwood and of the big tree (Sequoia W ashingtoniana) are often more than 10 ft. in diameter. Logging is usually done by wire cables operated by donkey-engines. The journey to the mill is usually by rail. The mills are often of great_size, built on piles oyer tide water and so arranged that their product is delivered directly from the saws and dry kilns to vessels moored alongside. The products of the Pacific Coast forest make their way over land to the markets of the central and eastern states

and into foreign markets. Among the lumber-producing states, Washington has in seven years jumped from fifth place to first, and its output has increased from 1,428,000,000 board ft. in 1899 to 4,305,000,000 ft. in 1906. Oregon and California have increased their output from 734,000,000 each in 1899 to 1,605,000,000 and 1,349,000,000 ft. respectively in 1906. Of the total output of these three states (7,259,000,006 ft.) 4,880,000,000 ft. is Douglas fir and 660,000,000 redwood.

4. The important lumber trees of the Rocky Mountain forest are the western yellow pine, the lodgepole pine, the Douglas fir and the Engelmann spruce. The Douglas fir, here extremely variable in size and value, reaches in this region average dimen- sions of perhaps 80 ft. in height by 2 ft. in diameter, the western yellow pine 90 ft. by 3 ft. and the Engelmann spruce 60 ft. by 2 ft. Mining, railroad and domestic uses chiefly absorb the annual timber product, which is considerable in quantity, and of vast importance to the local population. The lumber output of the Rocky Mountain region is, however, increasing very rapidly both in the north and in the south-west. One of the largest mills in the United States is in Idaho.

The following table summarizes the cut of the important coniferous species during the years 1899-1906:

Per Cent Increase

Kind.

1899.

1904.

1906.

(+) or Decrease (—) since 1899.

Million

Million

Million

ft.

ft.

ft.

Yellow Pine .

9,659

ii,533

11,661

+ 20-7

Douglas Fir

1,737

2,928

4,970

+ 186-2

White Pine

7.742

5,333

4,584

- 40-8

Hemlock .

3.421

3,269

3,537

+ 3-4

Spruce .

1,448

1,304

1,645

+ 13-6

Western Pine

944

1,279

1,387

+ 46-9

Cypress

496

750

839

+ 69-3

Redwood .

360

519

683

+ 83-2

Cedar .

233

223

358

+ 537

26,040

27,138

29,664

+ 14

Hardwoods. — The hardwood supply of the country is derived almost entirely from the eastern half of the continent, and comes from each of the three great Eastern forest regions.

The following table shows the cut of the important species of hardwoods for 1899 and 1906:

Per Cent

Kind.

1899.

1906.

Increase (+). or Decrease (—).

Thousand

Thousand

Feet.

Feet.

Oak

4,438,027

2,820,393

- 36-5

Maple .

633,466

882,878

+ 39-4

Poplar .

1,115,242

693,076

- 37-9

Red gum .

285,417

453,678

+ 59-o

Chestnut .

206,688

407,379

+ 97-1

Basswood .

308,069

376,838

+ 22-3

Birch . .

132,601

370,432

+ 179-4

Cottonwood

415,124

263,996

- 36-4

Beech .

(a)

275,661

Elm . .

456,731

224,795

- 50-8

Ash . .

269,120

214,460

- 20-8

Hickory

96,636

148,212

+ 53-4

Tupelo .

(a)

47,882

Walnut. .

38,681

48,174

+ 24-5

Sycamore .

29,715

(a)

All other .

208,504

87,637

- 58-0

1 Total

8,634,021

7,315,491

- i5 : 3

a Not separately reported.

Oak, which in 1899 furnished over half the entire output, has fallen off 36-5 %. Yellow poplar, which in 1899 was second among the hardwoods, has fallen off 38 % and now occupies third place; and elm, the great stand-by in slack cooperage, has fallen 50-8 %. On the other hand less valuable species like maple and red gum have advanced 39 and 59 % respectively.

The decrease is largely due to the fact that the hardwoods grow naturally on the better classes of soil, and in the eastern

66o,

/FOREYˆFQ&BA&SHIRE

United States where the population has always been the densest, and as a consequence of this, a large proportion of the original hardwood land has been cleared up and put under cultivation. The hardwood supply of the

future must be ohtained phiefly from the Appalachian region, where the conditions are less favourable to agriculture.

In addition to the lumber cut, enormous quantities of hard- woods are used each year for railroad ties, telephone and other poles, piles, fence posts and fuel, and there is a great amount of waste in the course of lumbering and manufacture.

Authorities. — Sargent, Silva of North America (Boston, 1891- 1897), Manual of Trees of North America (Boston, 1903); Lemmon, Handbook of West American Cone-Bearers (San Francisco, 1895); Bruncken, North American Forests and Forestry (New York, 1900); Fernow, Economics of Forestry (New York, 1902) ; Pinchot, The Adirondack Spruce (New York, 1898) ; Pinchot and Graves, The White Pine (New York, 1896). See also the various publications of the U.S. forest service, including especially the following general works: ■ Forest Influences-, Primer of Forestry; the Timber Supply of the United States; the Waning Hardwood Supply; Forest Products of the United States in iqo6; Exports and Imports of Forest Products in 1906 ; Federal and Stale Forest Laws ; Regulations and Instructions for the Use of the National Forests; The Use of the National Forests; also part v. of the Nineteenth and of the Twenty-first Annual Reports of the United States Geological Survey, and vol. ix. of the 10th Census Report on the Forests of North America; and Reports of the State Forestry Commissions of New York, New Hampshire, Maine, Pennsylvania, Michigan, Ohio, &c, and of the State Geological Surveys of New Jersey, Maryland and North Carolina. (G. P.)

FOREY, HUE FREDERIC (1804-1872), marshal of France, was born at Paris on the 5th of January 1804, and entered the army from St Cyr in 1824. He took part in the earlier Algerian campaigns, and became captain in 1835. Four years later he was given command of a battalion of chasseurs a pied and in 1844 he became colonel. At the Revolution of 1848 Cavaignac made him a general of brigade. He took an active part in the coup d'Uat of the 2nd of December 185 1, and Napoleon III. made him a general of division shortly afterwards. He held a superior command in the Crimean War, and in the Italian campaign of 1859 distinguished himself very greatly in the action of Montebello (20th May). In 1862 Forey was placed in command of the French expeditionary corps in Mexico, with the fullest civil and military powers, and he crowned a successful campaign by the capture of Mexico city in May 1863, receiving as his reward the marshal's baton. From December 1863 to 1867 he held high commands in France, but in the latter year he was struck with paralysis and had to retire. Marshal Forey died at Paris on the 20th of June 1872.

FORFAR, a royal, municipal and police burgh, and capital of the county of

Forfarshire, Scotland. Pop. (1901) 12,117. It lies at the east end of the Loch of Forfar in the valley of Strathmore, and is 13 m. N. by E. of Dundee by road and 21J m. by the Caledonian railway. It is also situated on the same company's main line to Aberdeen and sends off a branch to Brechin. The principal buildings comprise the court house, the county hall (with portraits by Raeburn, Romney, Opie and others), the town hall, the Meffan Institute (including the free library), the infirmary, poorhouse and the Reid ball, founded by Peter Reid, a merchant in the burgh who also gave the public park. The burgh unites with Montrose, Arbroath, Brechin and Inverbervie (the Montrose group of burghs) in returning one member to parliament. The Loch of Forfar, ij m. long by \ m. wide, is drained by Dean Burn, and contains pike and perch. On a gravel bank or spit in the north-west of the lake stood a castle which was sometimes used as a residence by Margaret, queen of Malcolm Canmore. The staple industries are linen and jute manufactures, but brewing, tanning, bleaching, rope- making and iron-founding are also carried on.

Forfar is at least as old as the time of Malcolm Canmore, for the first parliament after the defeat of Macbeth met in the old castle, which stood on a mound on the northern side of the town. The parliaments of William the Lion, Alexander II. and Robert II. also assembled within its walls. The town, which was created a royal burgh by David I., was burnt down about the middle of the 13th century. Edward I. captured the

castle on one of his incursions, but in 1307 Robert Bruce seized it, put its defenders to the sword and then destroyed it, its site being now marked by the town cross. Previous to the reign of James VI. the weekly market was held on Sunday, but after the union of the crowns parliament enacted that it should be held on Friday. The town sided with Charles I. during the Civil War, and Charles II. presented the Cross to it out of regard for the loyalty shown to his father. Forfar seems to have played a less reputable part in the persecution of witches. In 1661 a crown commission was issued for' the trial of certain miserable creatures, Some of whom were condemned to be burnt. In the same year one John Ford for his services as a witch-finder was admitted a burgess along with Lord Kingborne. The witches' bridle, a gag to prevent them from speaking, whilst being led to execution, is still preserved in the county hall. One mile to the E. lie the ruins of Restenhet Priory, where a son of Robert Bruce was buried. For twenty five years after the Reformation it was used as the parish church and afterwards by the Episco- palians, until they obtained a chapel of their own in ,182?. '...':- ,

FORFARSHIRE, or Angus, an eastern county of Scotland, bounded N. by the shires of Kincardine and Aberdeen, W. by Perthshire, S. by the Firth of Tay and E. by the North' Sea. It has an area of 559,171 acres, or 873-7 sq. m. The island of Rossie and the Ben Rock belong to the shire,

Forfarshire is characterized by great variety of surface and may be divided physically into four well-marked sections, ., , In the most northerly of these many of the rugged masses, of the Grampians are found; this belt is succeeded by Strathmore, or the Howe of Angus, a fertile valley, from 6 to 8 m, broad, which is a continuation of the Howe of the Mearns, and runs south-westwards till it enters Strathearn, to the southtwest of Perth; the,n come theSidlaw HjLUs and a number of isolated heights, which in turn give way to the plain of the coast and the Firth. The mountains are all in the northern division and belong to the Binchinnin group (sometimes rather inexactly called the Braes of Angus) of the Grampian ranges. Among the highest masses, most of which lie on or near the confines of the bordering counties, are Glas Maql (3502 ft.) on the summit of which the shires of Aberdeen, Forfar and Perth meet, Cairn-na-Glasha (3484), Fafernie (3274), Broad Cairn (3268), Creag Leacach (3238), Tolmount (3143), Tom Buidhe (3140), Driesh (3105), Mount Keen (3077) and Mayar (3043), while peaks of upwards of 2000 ft. are numerous. The Sidlaw Hills— -the greater part of . which, however, belongs to Perthshire— are much less lofty and of less striking appearance. They have a breadth of from 3 to 6 m., the highest points within the county being Craigowl Hill (1493 ft.), Auchterhouse Hill (1399) and Gallow Hill (1,242), None of the rivers is navigable, and only three are of any im portance. The Isla, rising in Cairn-na-Glasha, flows southwards then turns S.E. and finally S.W. till it enters the Tay after a course of 45 m. Its chief tributaries on the right are the Alythy Erich.t and Lunan, and on the left the iSfewton, Melgam and Dean. Near- Bridge of Craig is the fall of Reekie Linn (79 ft.), so named from the fact that when the stream js in flood the spray rises in a dense cloud like smoke (reek). Near old Airlie Castle are the cascades called the Slugs of Auchrannie. The North Esk, formed by the ; confluence of the Lee and Mark at Invermark, after a south-easterly course of 28 m. enters the North Sea 3 m. N. of Montrose. On the right bank it receives; the West Water and Cruick and on the left the Tarf and Luther. It gives the title of earl of Northesk to a branch of the Carnegie family] The South Esk rises in the Grampians near Mount Fafernie and not far from its source forms the Falls of Bachnagairn; after flowing towards the southeast, it bends eastwards near Tannadic$ and reaches the North Sea at Montrose, the length of its course being 48 m. Its principal affluents are the Prosen on the right and the Noran on the left. It supplies the title of earl of Southesk to. another branch of the Carnegies. The Jakes are small, the two largest being the Loch of Fprfar and the mountain-girt Loch Lee (1 m. long by i m. wide). Lintrathen (circular in shape and about § m. across), to the north of Airlie Castle, supplies Dundee with drinking water. The glens of the Forfarshire*

Grampians are remarkable for their beauty, and several of them for the wealth of their botanical specimens. The largest and finest of them are Glen Isla, in which are the ruins of Forter Castle, destroyed by Argyll in 1640, and the earl of Aiflie's shooting-lodge of the Tulchan; Glen Clova, near the entrance to which islands Cortachy Castle, the seat of the earl of Airlie; Glen Esk and Glen Prosen.

Geology. — -A great earth fracture traverses this county from near Edzell on theN.E. to Lintrathen Loch on the S.W. Between Cortachy and the south-western boundary" this fault runs in Old Red Sandstone, but north-east of that place it forms the junction line of Silurian and Old Red; and in a general way we may say that on the N.W. side of the fault the metamorphosed Silurian rocks are found, while the remainder of the county is occupied by the Old Red Sandstone. On the margin of the disturbance the Silurian rocks are little-altered grey and green clay slates with bands of pebbly grit; farther towards the N.W. we find the same rocks metamorphosed into mica schists and gneisses with pebbly quartzites. Rising up through the schists between Cam Bannock and Mount Battock is a great mass of granite. The Old Red Sandstone extends from this county into Perthshire and Kincardineshire; here some 20,000 ft. of these deposits are seen ; an important part being formed of volcanic tuffs and lavas which are regularly interbedded in the sandstones and conglomerates. North of Dundee some of the lower beds are traversed by intrusive dolerites, and Dundee Law is probably the remains of an old vent through which some of the contempor- aneous lavas, &c, were discharged. The Old Red Rocks have been subjected to a good deal of folding, as may be seen along the coast. The principal direction of strike is from N.E. to S.W. A synclinal fold occupies Strathmore, and between Longforgan and Montrose the northern extension of the Sidlaw Hills is an anticlinal fold. Two fish-bearing beds occur in the county ; from the lower one many large Eurypterids have been obtained. The well-known paving flags of Arbroath belong to the lower part of the formation. The Upper Old Red Sandstone is found only in one spot about a mile north of Arbroath. During the Glacial period the ice travelled south-eastward across Strathmore and over the Sidlaw Hills; abundant evidence of this transporting agent is to be seen in the form of morainic deposits, the most striking of which is the great transverse barrier of Glenairn in the valley of the S. Esk, half a mile in length and about 200 ft. high. Relics of the same period are found round the coast in the form of raised beaches at 100, 50 and 25 ft. above the present sea-level.

Climate and Agriculture. —On the whole the climate is healthy and favourable to agricultural pursuits. The mean temperature for the year is 47-3° F., for January 38° and for July 50°. The average annual rainfall is

34 in., the coast being considerably drier than the uplands. In the low-lying districts of the south the harvest is nearly as early as it is in the rest of Scotland, but in the north it is often late. The principal wheat districts are Strathmore and the neighbourhood of Dundee and Arbroath; and the yield is well up to the best Scottish average. Barley, an important crop, has increased steadily. Oats, however, though still the leading crop, have somewhat declined. Potatoes are mostly grown near the seaboard in the higher ground ; turnips also are largely raised. The northern belt, where it is not waste land, has been turned into sheep walks and deer forests. The black-faced sheep are the most common in the mountainous country; cross-bred sheep in the lowlands. Though it is their native county (where they date from 1808), polled Angus are not reared so generally as in the neighbouring shire of Aberdeen, but shorthorns are a favourite stock and Irish cattle are imported for winter-feeding. Excepting in the vicinity of the towns there are no dairy farms. Horses are raised success- fully, Clydesdales being the commonest breed, but the small native garrons are now little used. Pigs also are reared. Save perhaps in the case of the crofts, or very small holdings of less than 10 acres, farm management is fully abreast of the times.

Other Industries.— The ■ staple industries are the jute and flax manufactures.- Their headquarters are in Dundee, but they flourish also at other places. Shipbuilding is carried on at Dundee, Arbroath and Montrose. The manufactures of jams', confectionery, leather, machinery, soap and chemicals, are all of great and growing value. Sandstone quarries employ many hands and the deep-sea fisheries, of which Montrose is the centre, are of considerable importance. The netting of salmon at the mouth of the North Esk is also a profitable pursuit.

Two railway companies serve the county. The North British, entering from the south by the Tay Bridge, follows the coast north-eastwards, sending off at Montrose a branch to Bervie, The Caledonian runs up Strathmore to Forfar, whence it diverges due east to Guthrie, where it again resumes its north-6asterly course to Dubton and Marykirk; it reaches Dundee from Perth by the shore of the estuary of the Tay, and sends branches from Dundee to Kirriemuir via Monikie and Forfar and to Alyth Junction via Newtyle, while a short line from Dubton gives it touch with Montrose.

Population and Government. — The population was 277,735 i n 1801, and 284,083 in 1901, when 1303 spoke Gaelic and English, aiid 13 Gaelic only. The chief towns are Arbroath (pop. in 1901, 22,308), Brechin (8941), Broughty Ferry (10,484), Carnoustie (5204), Dundee (161,173), Forfar (11,397), Kirriemuir (4096), Monifieth (2134) and Montrose (12,427). Forfarshire returns one member to-' Parliament. It is a sheriffdom and there is a resident sheriff-substitute at Dundee and another

at Forfar, the county town; and courts are held also at Arbroath. In addition to numerous boajd schools there are secondary schools at Dundee, Montrose, Arbroath, Brechin, Forfar and Kirriemuir, and technical schools at Dundee and Arbroath. Many of the elementary schools earn grants for higher education. The county council and the Dundee and Arbroath town councils expend the "residue" grant in subsidizing science and art and technical schools and classes, including University College, the textile 1 school, the technical institute, the navigation school, and the workshop schools at Dundee, the technical school at Arbroath, besides cookery, dairy, dress-cutting, laundry, plumbing and veterinary science classes at different places.

History. — In the time of the Romans the country now known as Forfarshire was inhabited by Picts, of whose occupation there are evidences in remains of weems, or underground houses. Traces of Roman camps and stone forts are common, and there are vitrified forts at Finhaven, Dumsturdy Muir, the hill of Laws near Monifieth and at other points. Spearheads, battle- axes, sepulchral deposits, Scandinavian bronze pins, and other antiquarian relics testify to periods of storm and stress before the land settled down into order, towards which the Church was a powerful contributor. In the earliest days strife was frequent. The battle in which Agricola defeated Galgacus is supposed to have occurred in the Forfarshire Grampians (a.d. 84); the Northumbrian King Egfrith and the Pictish king Burde fought near Dunnichen in 685, the former being slain; conflicts with the Danes took place at Aberlemno and other spots; Elpin king of the Scots was defeated by Aerigus in the parish of Liff in 730; at Restennet, about 835, the Picts and Scots had a bitter encounter. In later times the principal historical events, whether of peace or war, were more immediately connected with burghs than with the county as a whole. There is some doubt whether the county was named Angus, its title for several centuries, after a legendary Scottish prince or from the hill of Angus to the east of the church of Aberlemno. It was early governed by hereditary earls and was made a hereditary sheriffdom by David II. The first earl of Angus (by charter of 1389) was George Douglas, an illegitimate son of the 1st earl of Douglas by Margaret Stuart, who was countess of Angus in her own right. On the death of the 1st and only duke of Douglas, who was also 13th earl of Angus, in 1761, the earldom merged in the dukedom of Hamilton. Precisely when 1 the shire became known by the name of the county town has not been ascertained, but probably the -usage dates from the 16th century. Among old castles are the roofless square tower of Red Castle at the mouth of the Lunan; the tower of the castle of Auchinleck; the stronghold of Tnverquharity near Kirriemuir; the castle of Finhaven; the two towers of old Edzell Castle; the ruins of Melgund Castle, which are fairly complete; the small castle of Newtyle, and the old square tower and

gateway of the castle of Craig.

See A. Jervise, Memorials of Angus and Mearns (Edinburgh, 1895); Land of the Lindsays (Edinburgh, 1882) ; Epitaphs and Inscriptions (Edinburgh, 1879); Earl of Crawford, Lives of' thr

Lindsays (London, 1835) ; Sir VV. Fraser, History of the Carnegies (Edinburgh, 1867); A. H. Millar, Historical Castles and Mansions (Paisley, 1890); G. Hay, History of Arbroath (Arbroath, 1876); D. D. Black, History of Brechin (Edinburgh, 1867).

FORFEITURE (from " forfeit," originally an offence, and hence a fine exacted as a penalty for such; derived through the O. Fi. forf ait, from the late Lat. forts factum, a trespass, that which is done foris, outside), in English law, the term applied (1) to loss or liability to the loss of property in consequence of an offence or breach of contract; (2) to the property of which the party is deprived.

Under the common law, conviction and attainder on indict- ment for treason or felony was followed not only by forfeiture of the life of the offender, but also by forfeiture of his lands and goods. In the case of treason all the traitor's lands of whomso- ever holden were forfeited to the king; in the case of felony (including felo-de-se, or suicide), the felon's lands escheated (exceciderunt) to his immediate lord, subject to the king's right to waste them for a year and a day. This rule did not apply to lands held in gavelkind in the county of Kent. The goods of traitors and felons were forfeited to the king. The desire of the king and his officers to realize the profits of these forfeitures was one of the chief motives for instituting the circuits of the king's justices throughout England; and from time to time conflicts arose from attempts by these justices to extend the law of treason — under which the king levied all the forfeitures — at the expense of feloay, in which the lord of the felon benefited by the escheats. As regards theft, the king's rights overrode those of the owner of the stolen property, until, in the reign of Henry VIII. , provision was made for restitution of the goods to the owner if he prosecuted the thief to conviction. In Pepys's Diary, 21st of January 1667-1668, will be found an illustration of the working of the old law. We find that on the suicide of his brother-in-law, Pepys at once applied to the king personally and obtained a grant of the brother-in-law's estate in favour of his widow and children should the inquest find a verdict of felo-de-se. It was common practice for persons anticipating conviction for treason or felony to assign all their property to

others to avoid the forfeiture ; and in some instances the accused refused to plead to the indictment and endured the peine forte et dure, until death supervened, to avoid these consequences of conviction. The royal rights to forfeitures arising within particular areas were frequently granted by charter to corpora- tions or individuals. In 1897 the courts had to interpret such charters granted to the town of Nottingham in 1399 and 1448. All forfeitures and escheats with respect to conviction and attainder for treason and felony were abolished as from the 4th of July 1870, except forfeitures consequent upon the now disused process of outlawry, and the forfeitures included in the penalties of praemunire.

The term " forfeit " is also applied to penalties imposed by statute for acts or omissions which are neither treasonable nor felonious. In such statutes the forfeiture enures in favour of the crown unless the statute indicates another destination; and unless a particular method of enforcing the forfeiture is indicated it is enforceable as a debt to the crown and has priority as such. The words " forfeit and pay " are often used in imposing a pecuniary penalty for a petty misdemeanour, and where they are used the court dealing with the case must not only convict the offender but adjudicate as to the forfeiture.

Statutory forfeitures in some cases extend to specific chattels, e.g. of a British merchant-ship when her character as such is fraudulently dissimulated (Merch. Shipp. Act 1894, ss. 70, 76), or of goods smuggled in contravention of the customs acts or books introduced in violation of the copyright acts. Recognis- ances are said to be forfeited when the conditions are broken and an order of court is made for their enforcement as a crown debt against the persons bound by them.

The term " forfeiture " is now most commonly used with reference to real property, i.e. with reference to the rights of lords of the manor or lessors to determine the estate or interest of a copyholder or lessee for breach of the customary or con-

tractual terms of tenure. It is also applied to express the deprivation of alimited owner of settled property, real or personal, for breach of the conditions by which his rights are limited; e.g. by becoming bankrupt or attempting to charge or alienate his interest. As a general rule, the courts " lean against for- feitures " of this kind; and are astute to defeat the claim of the superior landlord or other person seeking to enforce them. By legislation pf 188 1 and 1892 there is jurisdiction to grant relief upon terms against the forfeiture of a lease for breach of certain classes of covenant, e.g. to pay rent or to insure.

FORGERY (derived through the French from Latin fabricare, to construct),

in English law, " the fraudulent making or altera- tion of a writing to the prejudice of another man's right," or " the false making, or making male animo, of any written instrument for the purpose of fraud or deceit." This definition, it will be seen, comprehends all fraudulent tampering with documents. " Not only the fabrication and false making of the whole of a written instrument, but a fraudulent insertion, altera- tion or erasure, even of a letter, in any material part of a true instrument whereby a new operation is given to it, will amount to forgery , — and this though it be afterwards executed by another person ignorant of the deceit " (Russell on Crimes and Misdemeanours, vol. ii.). Changing the word Dale into Sale in a lease, so that it appears to be a lease of the manor of Sale instead of the manor of Dale, is a forgery. And when a country banker's note was made payable at the house of a banker in London who failed, it was held to be forgery to alter the name of such London banker to that of another London banker with whom the country banker had subsequently made his notes payable. As to the fraud, " an intent to defraud is presumed to exist if it appears that at the time when the false document was made there was in existence a specific person, ascertained or unascertained, capable of being defrauded thereby; and this presumption is not rebutted by proof that the offender took or intended to take measures to prevent such person from being defrauded in fact, nor by the fact that he had or thought he had a right to the thing to be obtained by the false document" (Stephen's Digest of the Criminal Law). Thus when a man makes a false acceptance to a bill of exchange, and circulates it, intending to take it up and actually taking it up before it is presented for payment, he is guilty of forgery. Even if it be proved as a matter of fact that no person could be defrauded (as when A forges a cheque in B's name on a bank from which B had withdrawn his account), the intent to defraud will be presumed. But it would appear that if A knew that B had withdrawn his account, the absence of fraudulent intention would be inferred. A general intention to cheat the public is not the kind of fraud necessary to constitute forgery. Thus if a quack forges a diploma of the college of surgeons, in order to make people believe that he is a member of that body, he is not guilty of forgery.

The crime of forgery in English law has been from time to time dealt with in an enormous number of statutes. It was first made a statutory offence in 1562, and was punishable by fine, by standing in the pillory, having both ears cut off, the nostrils slit up and seared, the forfeiture of land and perpetual imprisonment. It was made capital, without benefit of clergy in 1634. The most notable cases of those who have suffered the extreme penalty of the law are those of the Rev. Dr W. Dodd in 1777, for forging Lord Chesterfield's name on a bond, and Henry Fauntleroy, a partner in the banking-house of Marsh, Sibbald & Co., for the appropriation by means of forged instruments of money entrusted to the bank, in 1824. " Anthony

Hammond, in the title Forgery of his Criminal Code, has enumerated more than 400 statutes which contain provisions against the offence " (Sir J. T. Coleridge's notes to Blackstone). Blackstone notices the increasing severity of the legislature against forgery, and says that " through the number of these general and special provisions there is now hardly a case possible to be conceived wherein forgery that tends to defraud, whether in the name of a real or fictitious person, is not made a capital crime." These acts were consolidated in 1830. The later

statutes, fixing penalties from penal servitude for life downwards, were consolidated by the Forgery Act 1861. It would take too much space to enumerate all the varieties of the offence with their appropriate punishments. The following condensed summary is based upon chapter xlv. of Sir J. Stephen's Digest of the Criminal Law.

1. Forgeries punishable with penal servitude for life as a maximum are —

(a) Forgeries of the great seal, privy seal, &c.

(b) Forgeries of transfers of stock, India bonds, exchequer bills, bank-notes, deeds, wills, bills of exchange, &c.

(c) Qbliterations or alterations of crossing on a cheque.

(d) Forgeries of registers of birth, &c, or of copies thereof and others.

2. Forgeries punishable with fourteen years' penal servitude are —

(a) Forgeries of debentures.

(b) Forgeries of documents relating to the registering of deeds, &c.

(c) Forgeries of instruments purporting to be made by the account- ant general and other officers of the court of chancery, &c.

(d) Drawing bill of exchange, &c, on account of another, per procuration or otherwise, without authority.

(e) Obtaining property by means of a forged instrument, knowing it to be forged, or by probate obtained on a forged will, false oath, &c.

3. Forgeries punishable with seven years' penal servitude: — Forgeries of seals of courts, of the process of courts, of certificates, and of documents to

be used in evidence, &c.

By the Merchandise Marks Acts 1887 and 1801, forgery of trade marks is an offence punishable on conviction by indictment with imprisonment not exceeding two years or to fine, or both, and on conviction by summary proceedings with imprisonment not exceeding four months or with a fine.

The Forged Transfers Act 1891, made retrospective by the Forged Transfers Act 1892, enables companies and local authorities to make compensation by a cash payment out of their funds for any loss arising from a transfer of their stocks, shares or securities through a forged transfer.

United States. — Forgery is made a crime by statute in most if not all the states, in addition to being a common law cheat. These statutes have much enlarged the common definition of this crime. It is also made a crime by a Federal statute (U.S. Rev. Stat., ch. 5), which includes forgery of national banknotes, letters patent, public bid, record, signature of a judge, land warrants, powers of attorney, ships' papers or custom-house documents, certificates of naturalization, &c; the punishment is by fine or by imprisonment from one to fifteen years with or without hard labour.

In Illinois, fraudulently connecting together different parts of several banknotes or other genuine instruments so as to pro- duce one additional note or instrument with intent to pass all as genuine, is a forgery of each of them (Rev. Stats. 1901, ch. 38, § 108). The alleged instrument must be apparently capable of defrauding {Goodman v. People [1907], 228, 111. 154).

In Massachusetts, forgery of any note, certificate or bill of credit issued by the state treasurer and receiver general, or by any other officer, for a debt of that commonwealth, or a bank bill of any bank, is punishable by imprisonment for life or any term of years (Rev. Laws 1902, ch. 209, §§ 4 and 5).

In New York, forgery includes the false making, counterfeiting, alteration, erasure or obliteration of a genuine instrument (Penal Code, § 520). An officer or agent of a corporation who with intent to defraud sells, pledges or issues a fraudulent scrip, share certificate, is guilty of forgery in third degree. Falsely making any instrument which purports to be issued by a corpora- tion bearing a pretended signature of a person falsely indicated as an officer of the company, is forgery just as if such person were in truth such officer (id. § 519). Counterfeiting railroad tickets is forgery in the third degree. Falsely certifying that the execution of a deed has been acknowledged is forgery (id. §511). So also is the forging a fictitious name (People v. Browne [1907], 103 N.Y. suppl. 903). Punishment for forgery

in the first degree may be twenty years, in the second degree ten years, in the third degree five years.

In Pennsylvania, fraudulently making, signing, altering, utter- ing or publishing any written instrument other than bank bills, cheques or drafts, was punishable by fine and imprisonment

" by separate or solitary confinement at labour for a term not exceeding ten years " (L. 1860, March 31); forging bank bills, &c, for a term not exceeding five years. Defacing, removing, or counterfeiting brands from lumber floating- in any river is punishable by imprisonment for a term not exceeding two years or a fine (L. 1887, May 23). Fraudulently using the registered mark of another on lumber is punishable by fine or imprisonment by solitary confinement for a term not exceeding three years (id.).

In Tennessee, forgery may be committed by typewriting the body of and signature to an instrument which may be the subject of forgery (1906; State v. Bradley, 116 Tenn. 711).

In Vermont, the act of 1904, p. 135, no. 115, § 24, authorizes licensees to sell intoxicating liquors only on the written pre- scription of a legally qualified physician stating that it " is given and necessary for medicinal use." It was held that a prescription containing no such statement was invalid and the alteration thereof was not forgery (1906; State v. McManus, 78 St. 433).

Authorities. — Pollock and Maitland, History of English Law; Stephen, Digest of Criminal Law; History of Criminal Law; L. O. Pike, History of Crime in England, 1873-1876; Russell, On Crimes; Archbold, Criminal Pleadings.

FORGET-ME-NOT, or Scorpion-Grass (Ger. Vergissmein- nicht, Fr. gr&millet, scorpionne), the name popularly applied to the small annual or perennial herbs forming the genus Myosotis of the natural order Boraginaceae, so called from the Greek fivs, a mouse, and 08s, an ear, on account of the shape of the leaves. The genus is represented in Europe, north Asia, North America and Australia, and is characterized by oblong or linear stem-leaves, flowers in terminal scorpioid cymes, small blue, pink or white flowers, a five-cleft persistent calyx, a salver- or funnel-shaped corolla, having its mouth closed by five short scales and hard, smooth, shining nutlets. The common or true forget-me-not, M. palustris, is a perennial plant growing to a height of 6 to 18 in., with rootstock creeping, stem clothed with lax spreading hairs, leaves light green, and somewhat shining, buds pink, becoming blue as they expand, and corolla rotate, broad, with retuse lobes and bright blue with a yellow centre. The divisions

of the calyx extend only about one-third the length of the corolla, whereas in the other British species of Myosotis it is deeply cleft. The forget-me-not, a favourite with poets, and the symbol of constancy, is a frequent ornament of brooks, rivers and ditches, and, according to an old German tradition, received its name from the last words of a knight who was drowned in the attempt to procure the flower for his lady. It attains its greatest perfection under cultivation, and, as it flowers throughout the summer, is used with good effect for garden borders; a variety, M. strigulosa, is more hairy and erect, and its flowers are smaller. In M. versicolor the flowers are yellow when first open and change generally to a dull blue; sometimes they are permanently yellowish-white. Of the species in cultivation, M. dissitiflora, 6 to 8 in., with large handsome abundant sky-blue flowers, is the best and earliest, flowering from February onwards; it does well in light cool soils, prefer- ring peaty ones, and should be renewed annually from seeds or cuttings. M. rupicola, or M. alpeslris, 2 to 3 in., intense blue, is a fine rock plant, preferring shady situations and gritty soil; M. azorica (a native of the Azores) with purple, ultimately blue flowers about half an inch across, has a similar habit but larger flowers; M. syhatica, 1 ft., blue, pink or white, used for spring bedding, should be sown annually in August.

FORGING, the craft of the smith, or " blacksmith," exercised on malleable iron and steel, in the production of works of con- structive utility and of ornament. It differs from founding (q.v.) in the fact that the metal is never melted. It is essentially a moulding process, the iron or steel being worked at a full red, or white, heat when it is in a plastic and more or less pasty condition. Consequently the tools used are in the main counter- parts of the shapes desired, and they mould by impact. AH the operations of forging may be reduced to a few very simple ones: (1) Reducing or drawing down from a larger to a smaller section ("fullering" and "swaging"); (2) enlargement of a smaller to a larger portion (" upsetting "); (3) bending, or turning round

to afiy angle of curvature; (4) uniting one piece of metal to •another (" welding "); (5) the formation of holes by punching; and (6) severance, or cutting off. These include all the operations that are done at the anvil. In none of these processes, the last excepted, is the use of a sharp cutting tool involved, and therefore there is no violence done to the fibre of the malleable metal. Nor have the tools of the smith any sharp edges, except the cutting- off tools or" setts." The essential fact of the flow of the metal, which is viscous when at a full red heat, must never be lost sight of; and in

forging wrought iron the judgment of the smith must be exercised in arranging the direction of the fibre in a way best calculated to secure maximum strength.

Fullering denotes the preliminary roughing-down of the material

between tools haying convex edges; swaging, the completion or

finishing process between swages, or dies of definite shape,

er,a Z nearly hemispherical in form. When a bar has to be re-

aad swaging.

duced from larger to smaller dimensions, it is laid upon a fuller or round-faced stake, set in the anvil, or, in some cases, on a fiat face (fig. i), and blows are dealt upon that port-ion

of the face which lies exactly opposite with a fullering tool A, grasped by a rather loosely-fitting handle and struck on its head .by a sledge. The position of the piece of work is quickly changed at brief intervals in order to bring successive portions under the action of the swages until the re-duction is completed; the upper face, and if a bottom fuller is used the under face also, is thus left corrugated slightly. These corrugations are thrn removed either by a flatter, if the sur- faces are plane (fig. 2), or by hollow swages, if the cross section is circular (fig. 3). Spring swages (fig. 4) are frequently used instead Of separate " top and bottom tools." Frequently swaging is prac-

Fig. 1.

Fig. 2.

Fig. 3.

tised at once, without the preliminary detail of fullering. It is adopted when the amount of reduction is slight, and also when a steam hammer or other type of power hammer is available. This process of drawing down or fullering is, wnen practicable, adopted in preference to either upsetting or welding, because it is open to no objection, and involves no risk of damage to the material, while it

improves the metal by consolidating its fibres. But its limitations in anvil work lie in the tediousness of the very much less in

Fig.

operation, when the part to be reduced is

diameter, and very much longer, than the original piece of bar.

Then there are other alternatives.

If a long bar is required to have an enlargement at any portion of its length, not very much larger in diameter than the bar, nor of Upsetting S reat length, upsetting is the method adopted. The part to be enlarged is heated, the parts adjacent remaining cold, and an end is hammered, or else lifted and dropped heavily on the anvil or on an iron plate, with the result that the heated por- tion becomes both shortened and enlarged (figs. 5 and 6). This process is only suitable for relatively short lengths, and has the dis- advantage that the fibres of wrought iron are liable to open, and so cause weakening of the upset portion. But steel, which has no direction of fibre, can be upset without injury; this method is therefore commonly adopted in steel work, in power presses to an equal extent with drawing down. The alternative to upsetting is generally to weld a larger to a smaller bar or section, or to encircle the bar with a ring and weld the two (fig. 7), and then to impart any shape desired to the ring in swages.

Bending is effected cither by the hammer or by the simple exercise of leverage, the heated bar bring pulled round a fulcrum, ft is always, when practicable, preferable to cutting out a curved or

*angular shape with a hot sett or to welding. The Continuity of the fibre in iron is preserved by bending, and the risk of an im- perfect weld is avoided. Hence it is a simple and safe B .. process which is constantly being performed at the anvil. Ben< *"W< An objection to sharp bends, or those having a small radius, is that the fibres become extended on the outer radius, the cross section being*

Fig. 5.

Fig. 6.

Fig. 7.

at the same time reduced below that of the bar itself. This is met by imparting a preliminary amount of upsetting to the part to be bent, sufficient to counteract the amount of reduction due to extension of the fibres. A familiar example is seen in the corners of dip cranks.

The property possessed by pieces of iron or steel of uniting auto- geneously while in a condition of semi-fusion is very valuable. When portions which differ greatly in dimensions have to w . be united, welding is the only

method practicable at the We, » ,a S- anvil. It is also generally the best to adopt when union has to be made between pieces at right angles, or when a piece on which much work has to be done is required at the end of a long plain bar, as in the tension rods of cranes and other structures with eyes. The art of welding depends chiefly on having perfectly clean joint

Fig.8. Fig. 9.

faces, free from scale, so that metal can unite to metal; union would be prevented by the presence of oxide or of dirt. Also it is essential to have a temperature sufficiently high, yet not such as to overheat the metal. A dazzling white, at which small particles of metal begin to drop off, is suitable for iron, but steel must not be made so hot. A very few hammer blows suffice to effect the actual union; if the joint be faulty, no amount of subsequent hammering will weld it. The forms of weld-joints include the scarf (figs. 8 and 9), the butt (fig. io), the V (fig. 11) and the glut, one form of which

Fig. 10. Fig. ii.

is shown in fig. 12 ; the illustrations are of bars prepared for welding. These forms give the smith a suitable choice for different conditions. A convexity is imparted to the joint faces in order to favour the expulsion of slag and dirt during the closing of the joint; these undesirable matters become entangled between concave faces: The ends are upset or enlarged in order to leave enough metal to be dressed down flush, by swaging or by flattering. The proportional lengths of the joint faces shown are those which conform to good practice. The fluxes used for welding are numerous. Sand alone is generally dusted on wrought iron, but steel requires borax applied on the joint while in the fire, and also dusted on the joint at the anvil and on the face of the latter itself. Electric welding is largely taking the place of the hand process, but machines are required to maintain the parts in contact during the passage of the current. Butt joints are employed,

and a large quantity of power is absorbed, but the output is im- mensely greater than that of hand-made welds.

When holes are not very large they are formed by punching, but j laree holes are preferably produced by bending a rod round and welding it, so forming an eye (fig. 13). Small holes „ h . are often punched simply as a preliminary stage in the n ” ,ca,B ˆ formation of a larger hole by a process of drifting. A piece of work to be punched is supported either on the anvil or on a ring of metal termed a bolster, laid on the anvil, through which the burr, when severed, falls. But in making small holes through a thick mass, no burr is produced, the metal yielding sideways and forming an

enlargement or boss. Examples occur in the wrought iron stanchions

Fig. 13.

that carry light hand railing. In such cases the hole has to be punched from each face, meeting in the centre. Punching under power hammers is done similarly, but occupies less time.

The cutting-off or severance of material is done either on hot of cold metal. In the first case the chisels used, " hot setts," have _ keener cutting angles than those employed for the second,

cutting- termed " cold setts." One sett is held in a hole in the ' anvil face, the " anvil chisel," the other is handled and

struck with a sledge.

The difference between iron and steel at the forge is that iron possesses a very marked fibre whereas steel does not. Many forgings therefore must be made differently according as they are in iron or in steel. In the first the fibre must never be allowed to run transversely to the axis of greatest tensile or bending stress, but must be in line therewith. For this reason many forgings, of which a common eye or loop (fig. 13) is a typical example, that would be stamped from a solid piece if made in steel, must be bent round from bar and welded if in wrought iron. Further, welding which is practically uniformly trustworthy in wrought iron, is dis- trusted in steel. The difference is due to the very fibrous character of iron, the welding of which gives much less anxiety to the smith than that of steel. Welds in iron are frequently made without any flux, those in steel never. Though mention has only been made of iron and steel, other alloys are forged, as those of aluminium, delta metal, &c. But the essential operations are alike, the differences being in temperature at which the forging is done and nature of the fluxes used for welding. For hardening and tempering, an important section of smith's work, see Annealing.

Die Forging. — The smith operating by hand uses the above methods only. There is, however, a large and increasing volume of forgings produced in other ways, and comprehended under the general terms, " die forging " or " drop forging."

Little proof is needed to show that the various operations done at the anvil might be performed in a more expeditious way by the aid of power-operated appliances; for the elementary processes of reducing, and enlarging, bending, punching, &c.,are extremely simple, and the most

elaborate forged work involves only a repetition of these. The fact that the material used is entirely plastic when raised to a white heat is most favourable to the method of forging in matrices or dies. A white hot mass of metal can be placed in a matrix, and stamped into shape in a few blows under a hammer with as much ease as a medal can be stamped in steel dies under a coining press. But much detail is involved in the translation of the principle into practice. The parallel between coining dies and forging dies does not go far. The blank for the coin is prepared to such exact dimensions that no surplus material is left over by the striking of the coin, which is struck while cold. But the blank used in die forging is generally a shapeless piece, taken without any preliminary preparation, a mere lump, a piece of bar or rod, which may be square or round irrespective of whether the ultimate forging is to be square, or round, or flat or a combination of forms. At the verge of the welding heat to which it is raised, and under the intensity of the impact of hammer blows rained rapidly on the upper die, the metal yields like lead, and flows and fills the dies.

Herein lias a difference between striking a coin and moulding a forging. A large amount of metal is squeezed out beyond the concavity of the forging dies, and this would, if allowed to flow over between the joints, prevent the dies from being closed on the forging. There are two methods adopted for removing this " fin," or ' flash " as it is termed, one being that of suppression, applicable to circular work, the other that of stripping, applied to almost all other cases.

The suppression of fin means that the circular bar is rotated in the dies (fig._ 14) through a small arc, alternating between every few blows, with the result that the fin is obliterated immediately when formed, this being done at the same time that reduction of section is being effected over a portion or the whole of the bar.

Stripping means that when a considerable amount of fin has

z

been formed, it is removed by laying the forging on a die pierced

right through with an opening of the same shape and area as the

forging, and then dealing the forging a blow with the hammer.

The forging is thus knocked through the die, leaving the severed

or stripped fin behind. The

forging ' is then returned to

the dies and again treated,

and the stripping may be

repeated twice, or even

oftener, before the forging

can be completed.

Figs. 15 and 16 illustrate the bottom dies of a set for forging in a particular form of eye, the top dies being of exactly the same shape. The first operation takes place in fig. 15, in which a bar of metal is reduced to a globular and cylindrical form, being constantly rotated mean- while. The shank portion is then drawn down in the parallel recess to the left. The shape of the eye is com- f pleted in fig. 16, and the shank in the recess to the left of that. Fig. bottom dies.

1

Fig. 14.

17 shows how a lever is stamped between, top and The hole in the larger boss is formed by punching, the punches nearly meeting in the centre, and the centre for the hole to be drilled subsequently in the smaller boss is located by a conical projection in the top die. ,

X7

^777

7 r

L

Fig. 16.

Fig. 15.

It is evident that the methods of die forging, though only explained here in barest outline, constitute a principle of extensive application.

An intricate or ornamental forging) which might occupy a smith a quarter of a day in making at the anvil, can often be produced in dies within five minutes (fig. 18). On the other hand, there ip the cost of the preparation of the dies, which is often heavy, so that the question of method is resolved into the relative one of the cost of

Fig. 17. Fig. 18.

dies, distributed over the number of identical forgings required. From this point of view it is clear that given say a thousand forgings; ordered all alike, the cost of even expensive dies distributed over the whole becomes only an infinitesimal amount per forging.

There is, further, the very important fact that forgings which are produced in dies are uniform and generally of more exact dimen- sions than anvil-made articles. This is seen to be an advantage when forgings have to be turned or otherwise tooled in the engineer', machine shop, since it lessens the amount of work required there.*

Fig. 19.

Besides, for many purposes such forcings do not require tooling at all, or only superficial grinding, while anvil-made ones would, in consequence of their slight inaccuracies.

Yet again, die forging is a very elastic system, and herein lies much of its value. Though it reaches its highest development when thousands of similar pieces are wanted, it is also adaptable to a hundred, or even to a dozen, similar forgings. In such cases economy is secured by using dies of a very cheap character; or, by employing such dies as supplementary to anvil work for effecting neat finish to more precise dimen j sions than can be ensured at the anvil. In the first case use is made of dies of cast iron moulded from patterns (fig. 19) instead of having their matrices laboriously cut in steel with drills, chisels and milling tools. In the second, preliminary drawing . down is done under the steam hammer, and bending and welding at the anvil, or under the steam hammer,until the f orgingsare brought approxi- mately to their final shape and dimensions. Then they are reheated and inserted in the dies, when a few blows under the steam or drop hammer suffice to impart a neat and accurate finish.

The limitations of die forging are chiefly those due to large dimen- sions. The system is most successful for the smallest forgings arid dies which can be handled by one man without the assistance of cranes ; and massive forgings are not required in such large numbers as are those of small dimensions. But there are many large articles manufactured which do not strictly come under the term forgings, in which the aid of dies actuated by powerful hydraulic presses is utilized. These include work that is bent, drawn and shaped from steel plate, of which the fittings of railway wagons

constitute by far the largest proportion. The dies used for some of these are massive, and a single squeeze from the ram of the hydraulic press employed bends the steel plate between the dies to shape at once. Fairly massive forgings are also produced in these presses.

Die forging in its highest developments invades the craft of the skilled smith. In shops where it is adopted entirely, the only craftsmen required are the few who have general charge of the shops. The men who attend to th'e machines are not smiths, but unskilled helpers. (J. G. H.)

FORK (Lat. furca), an implement formed of two or more prongs at the end of a shaft or handle, the most familiar type of which is the table-fork for use in eating. In agriculture and horticulture the fork is used for pitching hay, and other green crops, manure, &c. ; commonly this has two prongs, " tines " ; for digging, breaking up surface soil, preparing for hand weeding and for planting the three-pronged fork is used. , The word is also applied to many objects which are characterizedby branching ends, as the tuning-fork, with two branching metal prongs, which on being struck vibrates and gives a musical note, used to give a standard of pitch; to the branching into two streams of a river, or the junction where a tributary runs into the main river; and in the human body, to that part where the legs branch off from the trunk.

The furca, two pieces of wood fastened together in the form of the letter A, was used by the Romans as an instrument of punishment. It was placed over the shoulders of the criminal, and his hands were fastened to it, condemned slaves were com- pelled to carry it about with them, and those sentenced to be flogged would be tied to it; crucifixions were sometimes carried out on a similar shaped instrument. From the great defeat of the Romans by the Samnites at the battle of the Caudine Forks {Furculae Caudinae), a narrow gorge, where the vanquished were compelled to pass under the yoke {jugum), as a sign of submission, the expression " to pass through or under the forks " has been loosely used of such a disgraceful surrender. The " forks " in any allusion to this defeat should refer to the topo- graphical name and not to the jugum, which consisted of two upright spears with a third placed transversely as a cross-bar.

FORKEL, JOHANN NIKOLAUS (1749-1818), German musician, was born on the 22nd of February 1749 at Meeder in Coburg. He was the son of a cobbler, and as a practical musician, especially as a pianoforte player, achieved some eminence; but his claims to a more abiding name rest chiefly upon his literary skill and deep research as an historian of musical science and literature. He was an enthusiastic admirer of J. S. Bach, whose music he did much to popularize. His library, which was accumulated with care and discrimination at a time

when rare books were cheap, forms a valuable portion of the royal library in Berlin and also of the library of the Koniglicher Institut fur Kirchenmusik. He was organist to the university church of Gottingen, obtained the degree of doctor of philosophy, and in 1778 became musical director of the university. He died at Gottingen on the 20th of March 1818. The following is a list of his principal works: Uber die Theorie der Musik (Gottingen, 1777); Musikalisch kriiische Bibliothek (Gotha, 1778); Allgemeine Geschichte der Musik (Leipzig, 1788). The last is his most important work. He also wrote a Dictionary of Musical Literature, which is full of valuable material. To his musical compositions, which are numerous, little interest is to-day to be attached. But it is worth noting that he wrote variations on the English national anthem " God save the king " for the clavichord, and that Abt Vogler wrote a sharp criticism on them, which appeared at Frankfort in 1793 together with a set of variations as he conceived they ought to be written.

FORLI (anc. Forum Livii), a town and episcopal see of Emilia, Italy, the capital of the province of Forli, 40 m. S.E. of Bologna by rail, 108 ft. above sea-level. Pop. (1901) 15,461 (town); 43,321 (commune). Forli is situated on the railway between Bologna and Rimini. It is connected by steam tramways with Ravenna and Meldola, and by a road through the Apennines with Pontassieve. The church of S. Mercuriale stands in the principal square, and contains, besides paintings, some good carved and inlaid choir stalls by Alessandro dei Bigni. The facade has been considerably altered, but the campanile, erected in 1178-1180, still exists; it is 252 ft. in height, square and built of brickwork, and is one of the finest of Lombard campanili. The pictures in this church are the work of Marco Palmezzano (1456-1537) and others; S. Biagio and the municipal picture gallery also contain works by him. The latter has other interest- ing pictures, including a fresco representing an apprentice with pestle and mortar (Pestapepe), the only authentic work in Forli of Melozzo da Forli (1438-1494), an eminent master whose style was formed under the influence of Piero della Francesca, and who was the master of Palmezzano; the frescoes in the Sforza chapel in SS. Biagio e Girolamo are from the former's designs, though executed by the latter. The church also contains the fine tomb (1466) of Barbara Manfredi. The cathedral (Santa Croce) has been almost entirely rebuilt since 1844. The Palazzo del Podesta, now a private house, is a brick building of the 15th century. The citadel (Rocca Ravaldina), constructed about 1360-1370, and later rebuilt, is now used as a prison. Flavio Biondo, the first Renaissance writer on the topography of ancient Rome (1388-1463), was a native of Forli.

Of the ancient Forum Livii, which lay on the Via Aemilia, hardly anything is known. In the 12th century we find Forli in league with Ravenna, and in the 13 th the imperial count of the province of Romagna resided there. In

1275 Forli defeated Bologna with great loss. Martin IV. sent an army to besiege it in 1282, which was driven out after severe fighting in the streets; but the town soon afterwards surrendered. In the 14th and 15th centuries it was under the government of the Ordelafn; and in 1500 was taken by Caesar Borgia, despite a determined resistance by Caterina Sforza, widow of Girolamo Riario. Forli finally became a part of the papal state in 1504. (T. As.)

FORLIMPOPOLI (anc. Forum Popillii), a village of Emilia, Italy, in the province of Forli, from which it is 5 m. S.E. by rail, 105 ft. above sea-level. Pop. (1901) 2299 (town); 5795 (com- mune). The ancient Forum Popillii, a station on the Via Aemilia, was destroyed by Grimuald in 672. Whether its site is occupied by the present town is not certain; the former should perhaps be sought a mile or so farther to the S.E., where were found most of the inscriptions of which the place of discovery is certain. Forlimpopoli was again destroyed by Cardinal Albornoz in 1360, and rebuilt by Sinibaldo Ordelaffi, who constructed the well- preserved medieval castle (1380), rectangular with four circular towers at the corners. (T. As.)

FORLORN HOPE (through Dutch verloren hoop, from Ger. verlorene Haufe = " lost troop "; Haufe, " heap," being equiva- lent in the 17th century to "body of troops"; the French

equivalent is enf 'ants perdus) , a military term (sometimes shortened to " forlorn "), used in the 16th and 17th centuries for a body of troops thrown out in front of the line of battle to engage the hostile line, somewhat after the fashion of skirmishers, though they were always solid closed bodies. These troops ran great risks, because they were often trapped between the two lines of battle as the latter closed upon one another, and fired upon or ridden down by their friends; further, their mission was to facilitate the attacks of their own main body by striking the first blow against or meeting the first shock of the fresh and unshaken enemy. In the following century (18th), when lines of masses were no longer employed, a thin line of skirmishers alone preceded the three-deep line of battle, but the term " forlorn hope " continued to be used for picked bodies of men entrusted with dangerous tasks, and in particular for the storming party at the assault of a fortress. In this last sense " forlorn hope " is often used at the present time. The misunderstanding of the word " hope " has led to various applications of " forlorn hope," such as to an enterprise offering little chance of success, or, further still from the original meaning, to the faint or desperate hope of such success.

FORM (Lat. forma), in general, the external shape, appearance, configuration of an object, in contradistinction to the matter of which it is composed; thus a speech may contain excellent arguments, — the matter may be good, while the style, grammar, arrangement, — the form — is bad. The term, with its adjective " formal " and the derived nouns " formality " and " formalism," is hence contemptuously used for that which is superficial, unessential, hypocritical: chap, xxiii. of Matthew's gospel is a classical instance of the distinction between the formalism of the Pharisaic code and genuine religion. With this may be compared the popular phrases " good form " and " bad form " applied to behaviour in society: so " format " (from the French) is technically used of the shape and size, e.g. of a book (octavo, quarto, &c.) or of a cigarette. The word " form " is also applied to certain definite objects: in printing a body of type secured in a chase for printing at one impression (" form " or " forme "); a bench without a back, such as is used in schools (perhaps to be compared with O. Fr. s'asseoir en forme, to sit in a row) ; a mould or shape on or in which an object is manufactured; the lair or nest of a hare. From its use in the sense of regulated order comes the application of the term to a class in a school (■'.' sixth form," "fifth form," &c); this sense has been explained without sufficient ground as due to the idea of all children in the same class sitting on a single form (bench).

The word has been used technically in philosophy with various shades of meaning. Thus it is used to translate the Platonic LSia, d8os, the permanent reality which makes a thing what it is, in contrast with the particulars which are finite and subject to change. Whether Plato understood these forms as actually existent apart from all the particular examples, or as being of the nature of immutable physical laws, is matter of discussion. For practical purposes Aristotle was the first to distinguish between matter (vKrf) and form (etSos). To Aristotle matter is the undifferentiated primal element: it is rather that from which things develop (vKOKtintvov , diivafus) than a thing in itself (tvepyeia). The development of particular things from this germinal matter consists in differentiation, the acquiring of particular forms of which the knowable universe consists (cf. Causation for the Aristotelian " formal cause "). The perfection of the form of a thing is its entelechy (fVTe\kx e ˆ a) i n virtue of which it attains its fullest realization of function {De anima, ii. 2, ri y.tv vki) Sbvap-is to 8i elSos «i > T€Xex«i). Thus the entelechy of the body is the soul. The origin of the differentia- tion process is to be sought in a " prime mover " {ftpCrrov uvovv), i.e. pure form entirely separate (xupwrov) from all matter, eternal, unchangeable, operating not by its own activity but by the impulse which its own absolute existence excites in matter (cos ep&fltvov, ob uvovnevov). The Aristotelian conception of form was nominally, though perhaps in most cases unintelligently, adopted by the Scholastics, to whom, however, its

origin in the observation of the physical universe was an entirely foreign

idea. The most remarkable adaptation is probably that of Aquinas, who distinguished the spiritual world with its " sub- sistent forms " (formae separatae) from the material with its " inherent forms "which exist only in combination with matter. Bacon, returning to the physical standpoint, maintained that all true research must be devoted to the discovery of the real nature or essence of things. His induction searches for the true " form " of light, heat and so forth, analysing the external " form " given in perception into simpler " forms " and their " differences." Thus he would collect all possible instances of hot things, and discover that which is present in all, excluding all those qualities which belong accidentally to .'one or more of the examples investigated: the "form " of heat is the residuum common to all. Kant transferred the term from the objective to the sub- jective sphere. All perception is necessarily conditioned by pure "forms of sensibility," i.e. space and time: whatever is perceived is perceived as having special and temporal relations (see Space and Time; Kant). These forms are not obtained by abstraction from sensible data, nor are they strictly speaking innate: they are obtained " by the very action of the mind from the co-ordination of its sensation."

FORMALIN, or Formaldehyde, CH 2 or H-CHO, the first member of the series of saturated aliphatic aldehydes. It is most readily prepared by passing the vapour of methyl alcohol, mixed with air, over heated copper or platinum. In order to collect the formaldehyde, the vapour is condensed and absorbed, either in water or alcohol. It may also be obtained, although only in small quantities, by the distillation of calcium formate. At ordinary temperatures formaldehyde is a gas possessing a pungent smell; it is a strong antiseptic and disinfectant, a 40% solution of the aldehyde in water or methyl alcohol, sold as formalin, being employed as a deodorant, fungicide and preservative. It is not possible to obtain the alde- hyde in a pure condition, since it readily polymerizes. It is a strong reducing agent; it combines with ammonia to form hexamethylene tetramine, (CH 2)6N 4 , and easily " condenses " in the presence of many bases to produce compounds which apparently belong to the sugars (q.v.). It renders glue or gelatin insoluble in water, and is used in the coal-tar colour industry in the manufacture of para-rosaniline, pyronines and rosamines. Several polymers have been described. Para-formaldehyde, or trioxymethylene, obtained by concentrating solutions of form- aldehyde in vacuo, is a white crystalline solid, which sublimes at about ioo° C. and melts at a somewhat higher temperature, changing back into the original form. It is insoluble in cold water, alcohol and ether. A diformaldehyde is supposed to separate as white flakes when the vapour is passed into chloro- form (Kbrber, Pharm. Zeit., 1904, xlix. p. 609); F. Auerbach and H. Barschall (Chem. Zentr., 1907, ii. p. 1734) obtained three polymers by acting with concentrated

sulphuric acid on solutions of formaldehyde, and a fourth by heating one of the forms so obtained. The strength of solutions of formaldehyde may be ascertained by the addition of excess of standard ammonia to the aldehyde solution (hexamethylene tetramine being formed), the excess of ammonia being then estimated by titration with standard acid. On the formation of formaldehyde by the oxidation of methane at high temperatures, see W. A. Bone (Journ. Chem. Soc, 1902, 81, p. 535; 1903, 83, p. 1074). Form- aldehyde also appears to be a reduction product of carbon dioxide (see Annual Reports of the Chemical Society).

FORMAN, ANDREW (c. 1465-1521), Scottish ecclesiastic, was educated at the university of St Andrews and entered the service of King James IV. about 1489. He soon earned the favour of this king, who treated him with great generosity and who on several occasions sent him on important embassies to the English, the French and the papal courts. In 1501 he became bishop of Moray and in July 1513 Louis XII. of France secured his appoint- ment as archbishop of Bourges, while pope Julius II. promised to make him a cardinal. In 15 14 during a long absence from his own land Forman was nominated by Pope Leo X. to the vacant archbishopric of St Andrews and was made papal legate in Scotland, but it was some time before he secured possession of

tie see owing to the attempts of Henry VIII. to subject Scotland to England and to the efforts of his rivals, Gavin Douglas, the poet, and John Hepburn, prior of St Andrews, and their sup- porters. Eventually, however, he resigned some of his many benefices, the holding of which had made him unpopular, arid through the good offices of the regent, John Stewart, duke of Albany, obtained the coveted archbishopric and the primacy ‘ of Scotland. Afterwards he was one of the vice-regents of the kingdom and he died on the i ith of March 1 5 2 1 . As archbishop he issued a series of constitutions which are printed in J. Robert- son’s Concilia Scotiae (1866). Mr Andrew Lang (History of Scotland, vol. i.) describes Forman as “the Wolsey of Scotland, and a fomenter of the war which ended at Flodden.”

See the biography of the archbishop which forms vol. ii. pf The Archbishops of St Andrews, by J. Herkless and R. K. Hannay (1909):.

FORMAN, SIMON (1552-1611), English physician and astro- loger, was born in 1552 at Quidham, a small village near Wilton, Wiltshire. At the age of fourteen he became apprentice to a druggist at Salisbury, but at the end of four years he exchanged this profession for that of a schoolmaster.

Shortly afterwards he entered Magdalen College, Oxford, where he studied chiefly medicine and astrology. After continuing the same studies- in Holland he commenced practice as a physician in Philpot Lane, London, but as he possessed no diploma, he on this account underwent more than one term of imprisonment. Ultimately, however, he obtained a diploma from Cambridge university, and established himself as a physician and astrologer at Lambeth, where he was consulted, especially as a physician, by many persons of rank, among others by the notorious countess of Essex. He expired suddenly while crossing the Thames in a boat on the 12th of September 161 1.

A list of Forman's works on astrology is given in Bliss's edition of the Athenae Oxonienses; many of his MS. works are contained in the Bodleian Library, the British Museum and the Plymouth Library. A Brief Description of the Forman MSS. in the Public Library,. Plymouth, was published in 1853.

FORMERET, a French architectural term for the wall-rib carrying the web or filling-in of a vault (q.v.).

FORMEY, JOHANN HEINRICH SAMUEL (1711-1797), Franco-German author, was born of French parentage at Berlin on the 3 1st of May 1 7 1 1 . He was educated for the ministry, and at the age of twenty became pastor of the French church at Brandenburg. Having in 1736 accepted the invitation of a congregation in Berlin, he was in the following year chosen pro- fessor of rhetoric in the French college of that city and in 1739 professor of philosophy. On the organization of the academy of Berlin in 1744 he was named a member, and in 1748 became its perpetual secretary. He died at Berlin on the 7th of March 1797. His principal works are La Belle Wolfienne (1741-1750, 6, vols.), a kind of novel written with the view of enforcing the precepts of the Wolfian philosophy; Bibliotheque critique, on memoir es pour servir a I'histoire litter air e ancienne et moderne (1746); Le Philosophe chretien ˆ(1750); L'Emile chretien (1764), intended as an answer to the Entile of Rousseau; and Souvenirs d'un citoyen (Berlin, 1789). He also published an immense number of contemporary memoirs is. the transactions of the Berlin Academy.

FORMIA (anc. Formiae, called Mola di Gaeta until recent times), a town of Campania, Italy, in the province of Castrta, from which it is 48 m. W.N.W. by rail. Pop. (io°i) 5Si4 (town); 8452 (commune). It is situated at the N.W. extremity of the Bay of Gaeta, and commands beautiful views. It lay on the ancient Via Appia, and was much frequented as a resort by wealthy Romans. There was considerable imperial property here and along the coast as far as Sperlonga, and there are numerous remaias of ancient villas along the coast and on the slopes above it. The so-called villa of

Cicero contains two well- preserved nymphaea with Doric architecture.. Its site is now occupied by the villa Caposele, once a summer residence of the kings of Naples. There are many other modern villas, and the sheltered hillsides (for the mountains rise abruptly behind the town) are covered with lemon, orange and pomegranate gardens. The now deserted promontory of the Monte Scauri to the E. is*

also covered with remains of ancient villas; the hill is crowned by a large tomb, known as Torre Giano. To the E. at Scauri is a large villa with substructions in " Cyclopean " work. The ancient Formiae was, according to the legend, the home of the Laestrygones, and later a Spartan colony ('OpiM.ai.Sta to tdop/wv, Strabo v. 3> 6, p. 233). It was a Volscian town, and, like Fundi, received the civitas sine suffragio from Rome in 338 (or 332 B.C.) because the passage through its territory had always been secure. This was strategically important for the Romans, as the military road definitely constructed by Appius Claudius in 312 B.C., still easily traceable by its remains, and in part followed by the high-road, traversed a narrow pass, which could easily be blocked, between Fundi and Formiae. In 188 B.C., with Fundi, it received the full citizenship, and, like it, was 1 to a certain extent under the control of a praefectus sent from Rome, though it retained its three aediles. Mamurra was a native of Formia. Cicero possessed a favourite villa here, and was murdered in its vicinity in 43 B.C., but neither the villa nor the tomb can be identified with any certainty. It was devastated by Sextus Pompeius, and became a colony, with duoviri as chief magistrates, under Hadrian. Portus Caietae (the modern Gaeta) was dependent upon it.

See T. Ashby, " Dessins inedits de Carlo Labruzzi," in Melanges de I'ecole francaise de Rome (1903), 410 seq. (T. As.)

FORMIC ACID, H 2 C0 2 or HCOOH, the first member of the series of aliphatic monobasic acids of the general formula CˆH 2 „0«i It is distinguished from the other members of the series by certain characteristic properties; for example, it shows an aldehydic character in reducing silver salts to metallic silver, and it does not form an acid chloride or an acid anhydride. Its nitrile (prussic acid) has an acid character, a property not possessed by the nitriles of the other members of the series; and, by the abstraction of the elements of water from the acid, carbon monoxide is produced, a reaction which finds no parallel in the higher members of the series. Finally, formic acid is, as shown by the determination of its affinity constant, a much stronger acid than the other acids of the series. It occurs naturally in red ants (hat. formica), in stinging nettles, in some mineral waters, in- animal secretions and in muscle. It may be prepared artificially by the oxidation of methyl alcohol and of formaldehyde; by the rapid heating of oxalic acid (J. Gay- Lussac, Ann. chim. phys., 1831 [2] 46, p.

218), but best by heating oxalic acid with glycerin, at a temperature of 100-110° C. (M. Berthelot, Ann., 1856, 98, p. 139). In this reaction a glycerol ester is formed as an intermediate product, and undergoes decomposition by the water which is also produced at the same time.

C 8 H5(OH)3+H 2 C 3 04 = C 3 H S (OH) 1! -OCHO+C0 2 +H 2 C,H i (OH) ! 0-CHO+H 2 Q = C,H R (OH),+H 2 CO J .

Many other synthetical processes for the production of the acid or its salts are known. Hydrolysis of hydrocyanic acid by means of hydrochloric acid yields formic acid. Chloroform boiled with alcoholic potash forms potassium formate (J. Dumas, Berzelhis Jahresberichte, vol. 15, p. 371), a somewhat similar decomposition being shown by chloral and aqueous potash (J. v. Liebig, Ann., 1832, I, p. 198). Formates are also produced by the action of moist carbon monoxide on soda lime at 190-220° C. (V. Merz and

J. Tibicira, Ber., 1880, 13, p. 23; A. Geuther, Ann., 1880, 202, p. 317), or by the action of moist carbon dioxide on potassium (H. Kolbe and R. Schmitt, Ann., 1861, 119, p. 251). H. Moissan

(Comptes rend., 1902, 134, p. 261) prepared potassium formate by passing a current of carbon monoxide or carbon dioxide over heated potassium hydride,

*KH+C0 2 =*KHC0 2 and KH+2CO = KHC0 2 +C.*

A concentrated acid may be obtained from the diluted acid either by neutralization with soda, the sodium salt thus obtained being then dried and heated with the equivalent quantity of anhydrous oxalic acid (Lorin, Bull. soc. chim., 37, p. 104), or the lead or copper salt may be decomposed by dry sulphuretted hydrogen at 130° C. L. Maqueflne (Bull. soc. chim., 1888, 50, p. 662) distils the commercial acid, in vacuo, with concentrated sulphuric acid below 75 C.

Formic acid is a colourless, sharp-smelling liquid, which crystal- lizes at p° C., melts at 8‘6° C. and boils at ioo-8° C. Its specific gravity is 1-22 (20°/4°). It is miscible in all proportions with water, alcohol and ether! When heated with zinc dust, the acid decomposes into carbon monoxide and hydrogen: The sodium and potassium salts, when heated to 406 G, give oxalates and carbonates of the

alkali metals, but the magnesium, calcium and barium salts yield carbonates only. The free acid, when heated with concentrated sulphuric acid, is decomposed into water and pure carbon monoxide ; when heated with nitric acid, it is oxidized first to oxalic acid and finally to carbon dioxide. The salts of the acid are known as for- mates, and are mostly soluble in water, those of silver and lead being the least soluble. They crystallize well and are readily decomposed. Concentrated sulphuric acid converts them into sulphates, with simultaneous liberation of carbon monoxide. The calcium salt, when heated with the calcium salts of higher homologues, gives aldehydes. The silver and mercury salts, when heated, yield the metal, with liberation of carbon dioxide and formation of free formic acid; and the ammonium salt, when distilled, gives some formamide, HCONH 2 . The esters of the acid may be obtained by distilling a mixture of the sodium or potassium salts and the corresponding alcohol with hydrochloric or sulphuric acids.

Formamide, HCONH 2 , is obtained by heating ethyl formate with ammonia; by heating ammonium formate with urea to 140° C,

2HCO-ONH 4 +CO(NH 2) 2 =2HCONH 2 +(NH 4) 2 C0 8 ; by heating ammonium formate in a sealed tube for some hours at 230° C, or by the action of sodium amalgam on a solution of potassium cyanate (H. Basarow, Ber., 1871, 4, p. 409). It is a liquid which boils in vacuo at 150°, but at 192-195° C. under ordinary atmospheric pressure, with partial decomposition into carbon monoxide and ammonia. It dissolves mercuric oxide, with the formation of mercuric formamide, (HCONH) 2 Hg.

FORMOSA, a northern territory of the Argentine republic, bounded N. by Bolivia, N.E. and E. by Paraguay, S. by the Chaco Territory, and W. by Salta, with the Pilcomayo and Bermejo forming its northern and southern boundaries. Estimated area, 41,402 sq. m. It is a vast plain, sloping gently to the S.E., covered with marshes and tropical forests. Very little is known of it except small areas along the Bermejo and Paraguay rivers, where attempts have been made to form settlements. The unexplored interior is still occupied by tribes of wild Indians. The climate is hot, the summer tempera- ture rising to a maximum of 104° F. Timber-cutting is the principal occupation of the settlers, though stock-raising and agriculture engage some attention in the settlements on the Paraguay. The capital, Formosa (founded 1879), is a small settlement on the Paraguay with a population of about 1000 in 1900. The settled population of the territory_was 4829 in 1895, which it was estimated had increased to 13,431 in 1905. The nomadic Indians are estimated at 8000.

FORMOSA (called Taiwan by the Chinese, and following them by the Japanese, into whose possession it came after their war with China in

1895), an island in the western Pacific Ocean, between the Southern and the Eastern China Sea, separated from the Chinese mainland by the Formosa Strait, which has a width of about 90 m. in its narrowest part. The island is 223 m. long and from 60 to 80 m. broad, has a coast-line measuring 731 m., an area of 13,429 sq. m. — being thus nearly the same size as Kiushiu, the most southern of the four chief islands forming the Japanese empire proper — and extends from 20° 56′ to 25° 15′ N. and from 120° to 122° E. It forms part of the long line of islands which are interposed as a protective barrier between the Asiatic coast and the outer Pacific, and is the cause of the immunity from typhoons enjoyed by the ports of China from Amoy to the Yellow Sea. Along the western coast is a low pHtin, not exceeding 20 m. in extreme width; on the east coast there is a rich plain called Giran, and there are also sonic fertile valleys in the neighbourhood of Karenko and Pinan, extending up the longitudinal valleys of the rivers Karenko and Pinan, between which and the east coast the Taito range intervenes; but the rest of the island is mountainous and covered with virgin forest. In the plains the soil is generally of sand or alluvial clay, covered in the valleys with a rich vegetable mOuld. The scenery of Formosa is frequently of majestic beauty, and to this it is indebted for its European name, happily bestowed by the early Spanish navigators.

On the addition of Formosa to her dominions, Fuji ceased to be Japan's highest mountain, and took the third place on the list. Mount Morrison (14,270 ft.), which the Japanese re-named Niitaka-yama (New High Mountain), stands first, and Mount Sylvia (12,480 ft.), to which they give the name of Setzu-zan (Snowy Mountain), comes second. Mount Morrison stands

nearly under the Tropic of Cancer. It is not volcanic, but consists of argillaceous schist and quartzite. An ascent made by Dr Honda of the imperial university of Japan showed that, up to a height of 6000 ft., the mountain is clothed with primeval forests of palms, banyans, cork trees, camphor trees, tree ferns, interlacing creepers and dense thickets of rattan or stretches of grass higher than a man's stature. The next interval of 1000 ft. has gigantic cryptomerias and chamoecyparis; then follow pines; then, at a height of 9500 ft., a broad plateau, and then alternate stretches of grass and forest up to the top, which consists of several small peaks. There is no snow. Mount Morrison, being surrounded by high ranges, is not a conspicuous object. Mount Sylvia lies in 24° 30′ N. lat. There are many other mountains of considerable elevation. In the north is Getsurdbi-zan (4101 ft.); and on either side of Setzu-zan, with which they form a range running due east and west across the island, are Jusampunzan (4698 ft.) and Kali-zan (7027 ft.). Twenty-two miles due south of Kali-zan stands Hakumosha-zan (5282 ft.), and just 20 m. due south of Hakumosha-zan

begins a chain of three peaks, Suisha-zan (6200 ft.), Hoo-zan (4928), and Niitaka-yama. These five mountains, Hari-zan, Hakumosha- zan, Suisha-zan, Hoo-zan and Niitaka-yama, stand almost exactly under 121 E. long., in the very centre of the island. But the backbone of the island lies east of them, extending S. from Setzu-zan through Gokan-zan, and Noko-zan and other peaks and bending S.W. to Niitaka-yama. Yet farther south, and still lying in line down the centre of the island, are Sankyakunan- zan (3752 ft.), Shurogi-zan (5729 ft.), Poren-zan (4957 ft.), and Kado-zan (9055 ft.), and, finally, in the south-east Arugan^zan (4985 ft.). These, it will be observed, are all Japanese names, and the heights have been determined by Japanese observers. In addition to these remarkable inland mountains, Formosa's eastern shores show magnificent cliff scenery, the bases of the hills on the seaside taking the form of almost perpendicular walls as high as from 1500 to 2500 ft. Volcanic outbreaks of steam and sulphur-springs are found. Owing to the precipitous character of the east coast few rivers of any size find their way to the sea in that direction. The west coast, on the contrary, has many streams, but the only two of any considerable length are the Kotansui, which rises on Shurogi-zan, and has its mouth at Toko after a course of some 60 m. and the Seirakei, which rises on Hakumosha-zan, and enters the sea at a point 57 m. farther north after a course of 90 m.

The climate is damp, hot and malarious. In the north, the driest and best months are October, November and December; in the south, December, January, February and March. The sea immediately south of Formosa is the birthplace of innumer- able typhoons, but the high mountains of the island protect it partially against the extreme violence of the wind.

Flora and Fauna.— The vegetation of the island is charac- terized by tropical luxuriance, — the moutainous regions being clad with dense forest, in which various species of palms, the camphor-tree {Laurns Camphora) , and the aloe are conspicuous. Consul R. Swinhoe obtained no fewer than 65 different kinds of timber from a large yard in Taiwanfu; and his specimens are now to be seen in the museum at Kew. The tree which supplies the materials for the pith paper of the Chinese is not uncommon, and the cassia tree is found in the mountains. Travellers are especially struck with the beauty of some of the wild flowers, more especially with the lilies and convolvuluses ; and European greenhouses have been enriched by several Formosan orchids and other ornamental plants. The pine-apple grows in abundance. In the lowlands of the western portion, the Chinese have intro- duced a large number of cultivated plants and fruit trees. Rice is grown in such quantities as to procure for Formosa, in former days, the title of the " granary of China "; and the sweet potato, taro, millet, barley, wheat and maize are also cultivated. Camphor, sugar, tea, indigo, ground peanuts, jute, hemp, oil and rattans are all articles of export.

The Formosan fauna has been but partially ascertained; but at least three kinds of deer, wild boars, bears, goats, monkeys (probably Macacus speciosus), squirrels, and flying squirrels

are fairly common, and panthers and wild cats are not unfrequent. A poisonous but beautiful green snake is often mentioned by travellers. Pheasants, ducks, geese and snipe are abundant, and Dr C. Collingwood in his Naturalist's Rambles in the China Seas mentions Ardea prasinosceles and other species of herons, several species of fly-catchers, kingfishers, shrikes and larks, the black drongo, the Cotyle sinensis and the Prinia sonitans. Dogs are kept by the savages for hunting. The horse is hardly known, and his place is taken by the ox, which is regularly bridled and saddled and ridden with all dignity. The rivers and neigh- bouring seas seem to be well stocked with fish, and especial mention must be made of the turtles, flying-fish, and brilliant coral-fish which swarm in the waters warmed by the Kurosiwo current, the gulf-stream of the Pacific. Shell-fish form an important article of diet to both the Chinese and the aborigines along the coast — a species of Cyrena, a species of Tapes, Cytheraea petechiana and Modiola teres being most abundant.

Population. — The population of Formosa, according to a census in 1904, is estimated at 3,022,687, made up as follows: aborigines 104,334, Chinese 2,860,574 and Japanese 51,770. The inhabitants of Formosa may be divided into four classes: the Japanese, who are comparatively few, as there has not been much tendency to immigration; the Chinese, many of whom immigrated from the neighbourhood of Amoy and speak the dialect of that district, while others were Hakkas from the vicinity of Swatow; the subjugated aborigines, who largely intermingled with the Chinese; and the uncivilized aborigines of the eastern region who refuse to recognize authority and carry on raids as opportunity occurs. The semi-civilized aborigines, who adopted the Chinese language, dress and customs, were called Pe-pa-hwan (Anglice Pepo-hoans), while their wilder brethren bear the name of Chin-hwan or " green savages," otherwise Sheng-fan or " wild savages." They appear to belong to the Malay stock, and their language bears out the supposition. They are broken up into almost countless tribes and clans, many of which number only a few hundred individuals, and their language consequently presents a variety of dialects, of which no classification has yet been effected: in the district of Posia alone a member of the Presbyterian mission distin- guished eight different mutually unintelligible dialects. The people themselves are described as of " middle height, broad- chested and muscular, with remarkably large hands and feet, the eyes large, the forehead round, and not narrow or receding in many instances, the nose broad, the mouth large and disfigured with betel."

The custom of tattooing is universal. In the north of the island at least, the dead are buried in a sitting posture under the bed on which they have expired. Petty wars are extremely common, not only along the Chinese frontiers, but between the neighbouring clans; and the heads of the slain are carefully preserved as trophies. In some districts the young men and boys sleep in the skull-chambers, in order that they may be inspired with courage. Many of the tribes that had least intercourse with the Chinese show a considerable amount of skill in the arts of civilization. The use of Manchester prints and other European goods is fairly general; and the women, who make a fine native cloth from hemp, introduce coloured threads from the foreign stuffs, so as to produce ornamental devices. The office of chieftain is sometimes held by women.

The chief town is Taipe (called by the Japanese Taihoku), which is on the Tamsui-yei river, and has a population of about 118,000, including 5850 Japanese. Taipe may be said to have two ports; one, Tamsui, at the mouth of the river Tamsui-yei, 10 m. distant on the north-west coast, the other Kelung (called by the Japanese Kiirun), on the north-east shore, with which it is connected by rail, a run of some 18 m. The foreign settle- ment at Taipe lies outside the walls of the city, and is called Twatutia (Taitotei by the Japanese). Kelung (the ancient Pekiang) is an excellent harbour, and the scenery is very beauti- ful. There are coal-mines in the neighbourhood. Tamsui (called Tansui by the Japanese) is usually termed Hobe by foreigners. It is the site of (he first foreign settlement, has a population of about 7000, but caDnot be made a good harbour

without considerable expenditure. On the west coast there is no place of any importance until reaching Anping (23 N. lat.), a port where a few foreign merchants reside for the sake of the sugar trade. It is an unlovely place, surrounded by mud flats, and a hotbed of malaria. It has a population of 4000 Chinese and 200 Japanese. At a distance of some 2\ m. inland is the former capital of Formosa, the walled city of Tainan, which has a population of 100,000 Chinese, 2300 Japanese, and a few British merchants and missionaries. Connected with Anping by rail (26 m.) and laying south of it is Takau, a treaty port. It has a population of 6800, and is prettily situated on two sides of a large lagoon. Six miles inland from Takau is a prosperous Chinese town called Fengshan (Japanese, Hozan). The anchor- ages on the east coast are Soo, Karenko and Pinan, which do not call for special notice. Forty-seven m. east of the extreme south coast there is a little island called Botel-tobago (Japanese, Koto-sho), which rises to a height of 1914 ft. and is inhabited by a tribe whose customs differ essentially from those of the natives on the main island.

Administration and Commerce. — The island is treated as an outlying territory; it has not been brought within the full purview of the Japanese constitution. Its affairs are administered by a governor-general, who is also commander-in-chief of the forces, by a bureau of civil government, and by three prefectural governors, below whom are the heads of twenty territorial divisions called cho; its finances are not included in the general budget of the Japanese empire; it is garrisoned by a mixed brigade taken from the home divisions; and its currency is on a silver basis. One of the first abuses with which the Japanese had to deal was the excessive use of opium by the Chinese settlers. To interdict the importation of the drug altogether, as is done in Japan, was the step advocated by Japanese public opinion. But, influenced by medical views and by the almost insuperable difficulty of enforcing any drastic import veto in the face of Formosa's large communications by junk with China, the Japanese finally adopted the middle course of licensing the preparation and sale of the drug, and limiting its use to persons in receipt of medical sanction. Under the administration of the Japanese the island has been largely developed. Among other industries gold-mining is advancing rapidly. In 1902 48,400 oz. of gold representing a value of £168,626 were obtained from the mines and alluvial washings. Coal is also found in large quantities near Kelung and sulphur springs exist in the north of the island.

An extensive scheme of railway construction has been planned, the four main lines projected being (1) from Takau to Tainan; (2) from Tainan to Kagi; (3) from Kagi to Shoka; and (4) from Shoka to Kelung; these four forming, in effect, a main trunk road running from the south-west to the north-east, its course being along the foot of the mountains that border the western coast-plains. The Takau-Tainan section (26 m.) was opened to traffic on the 3rd of November 1900, and by 1905 the whole line of 259 m. was practically complete. Harbour improvements also are projected, but in Formosa, as in Japan proper, paucity of capital constitutes a fatal obstacle to rapid development.

There are thirteen ports of export and import, but 75 % oj-jhe total business is done at Tamsui. Tea and camphor are the staple exports. The greater part of the former goes to Amoy for re-shipment to the west, but it is believed that if harbour improvements were effected at Tamsui so as to render it accessible for ocean-going steamers, shipments would be made thence direct to New York. The camphor trade being a government monopoly, the quantity exported is under strict control.

History. — The island of Formosa must have been known from a very early date to the Chinese who were established in the Pescadores. The inhabitants are mentioned in the official works of the Yuan dynasty as Tung-fan or eastern barbarians; and under the Ming dynasty the island

begins to appear as Kilung. In the beginning of the 16th century it began to be known to the Portuguese and Spanish navigators, and the latter at least made some attempts at establishing settlements or missions. The Dutch were the first, however, to take footing in the island;

in 1624 they built a fort, Zelandia, on the east coast, where subsequently rose the town of Taiwan, and the settlement was maintained for thrity-seven years. On the expulsion of the Ming dynasty in China, a number of their defeated adherents came over to Formosa, and under a leader called in European accounts Coxinga, succeeded in expelling the Dutch and taking possession of a good part of the island. In 1682 the Chinese of Formosa recognized the emperor K'ang-hi, and the island then began to form part of the Chinese empire. From the close of the 17th century a long era of conflict ensued between the Chinese and the aborigines. A more debased population than the peoples thus struggling for supremacy could scarcely be conceived. The aborigines, Sheng-fan, or " wild savages," deserved the appellation in some respects, for they lived by the chase and had little knowledge even of husbandry; while the Chinese themselves, uneducated labourers, acknowledged no right except that of might. The former were not implacably cruel or vindictive. They merely clung to their homesteads, and harboured a natural resentment against the raiders who had dispossessed them. Their disposition was to leave the Chinese in unmolested possession of the plain. But some of the most valuable products of the island, as camphor and rattan, are to be found in the upland forests, and the Chinese, whenever they ventured too far in search of these products, fell into ambushes of hill-men who neither gave nor sought quarter, and who regarded a Chinese skull as a specially attractive article of household furniture. A violent rebellion is mentioned in 1788, put down only after the loss, it is said, of 100,000 men by disease and sword, and the expenditure of 2,000,000 taels of silver. Reconciliation never took place on any large scale, though it is true that, in the course of time, some fitful displays of administrative ability on the part of the Chinese, and the opening of partial means of communication, led to the pacification of a section of the Sheng-fan, who thenceforth became known as Pe-pa-hwan (Pepohoan).

In the early part of the 19th century the island was chiefly known to Europeans on account of the wrecks which took place on its coasts, and the dangers that the crews had to run from the cannibal propensities of the aborigines, and the almost equally cruel tendencies of the Chinese. Among the most notable was the loss in 1842 of the British brig " Ann," with fifty-seven persons on board, of whom forty-three were executed at Taichu. By

the treaty of Tientsin (i860) Taichu was opened to European commerce, but the place was found quite unsuitable for a port of trade, and the harbour of Tam-sui was selected instead. From 1859 both Protestant and Presbyterian missions were established in the island. An attack made on those at Feng-shan (Hozan) in 1868 led to the occupation of Fort Zelandia and Anping by British forces; but this action was disapproved by the home government, and the indemnity demanded from the Chinese restored. In 1874 the island was invaded by the Japanese for the purpose of obtaining satisfaction for the murder of a shipwrecked crew who had been put to death by one of the semi-savage tribes on the southern coast, the Chinese govern- ment being either unable or unwilling to punish the culprits. A war was averted through the good offices of the British minister, Sir T. F. Wade, and the Japanese retired on payment of an indemnity of 500,000 taels. The political state of the island during these years was very bad; in a report of 1872 there is recorded a proverb among the official classes, " every three years an outbreak, every five a rebellion "; but subsequent to 1877 some improvement was manifested, and public works were pushed forward by the Chinese authorities. In 1884, in the course of belligerent proceedings arising out of the Tongking dispute, the forts at Kelung on the north were bombarded by the French fleet, and the place was captured and held for some months by French troops. An attack on the neighbouring town of Tamsui failed, but a semi-blockade of the island was main- tained by the French fleet during the winter and spring of 1884-1885. The troops were withdrawn on the conclusion of peace in June 1885.

In 1895 the island was ceded to Japan by the treaty of

Shimonoseki at the close of the Japanese war. The resident Chinese officials, however, refused to recognize the cession, declared a republic, and prepared to offer resistance. It is even said they offered to transfer the sovereignty to Great Britain if that power would accept it. A formal transfer to Japan was made in June of the same year in pursuance of the treaty, the ceremony taking place on board ship outside Kelung, as the Chinese commissioners did not venture to land. The Japanese were thus left to take possession as best they could, and some four months elapsed before they effected a landing on the south of the island. Takau was bombarded and captured on the 15th of October, and the resistance collapsed. Liu Yung-fu, the notori- ous Black Flag general, and the back-bone of the resistance, sought refuge in flight. The general state of the island when the Japanese assumed possession was that the plain of Giran on the eastern coast and the hill-districts were inhabited by semi- barbarous folk, the western plains by Chinese of a degraded type, and that between the two there existed a traditional and con- tinuous feud, leading to mutual displays of merciless and murderous violence. By many of these Chinese settlers the Japanese conquerors, when they came to occupy the island,

were regarded in precisely the same light as the Chinese them- selves had been regarded from time immemorial by the abori- gines. Insurrections occurred frequently, the insurgents receiv- ing secret aid from sympathizers in China, and the difficulties of the Japanese being increased not only by their ignorance of the country, which abounds in fastnesses where bandits can find almost inaccessible refuge, but also by the unwillingness of experienced officials to abandon their home posts for the purpose of taking service in the new territory.

Bibliography. — C. Imbault-Huart, L'lle Formose, histoire et description (Paris, 1893), 4 ; J. D. Clark, Formosa (Shanghai, 1896); W. A. Pickering, Pioneering in Formosa (London, 1898); George Candidius, A Short Account of the Island of Formosa in the Indies . . ., vol. i.; Churchill's Collection of Voyages (1744); Robert Swinhoe, Notes on the Island of Formosa, read before the British Association (1863) ; W. Campbell, " Aboriginal Savages of Formosa," Ocean Highways (April 1873) ; H. J. Klaproth, Description de Vile de Formose, mem. rel. d VAsie (1826); Mrs T. F. Hughes, Notes of a Six Years' Residence in Formosa (London, 1881); Y. Takekoshi, Japanese Rule in Formosa (transl. by G. Braithwaite) (London, 1907).

FORMOSUS, pope from 891 to 896, the successor of Stephen V. (or VI.). He first appears in history when, as bishop of Porto, he was sent on an embassy to the Bulgarians. Having afterwards sided with a faction against John VIII., he was excommunicated, and compelled to take an oath never to return to Rome or again to assume his priestly functions. From this oath he was, however, absolved by Marinus, the successor of John VIII., and restored to his dignities; and on the death of Stephen V. in 891 he was chosen pope. At that time the Holy See was engaged in a struggle against the oppression of the princes of Spoleto, and a powerful party in Rome was eager to obtain the intervention of Arnulf, king of Germany, against these dangerous neighbours. Formosus himself shared this view; but he was forced to yield to circum- stances and to consecrate as emperor Lambert, the young son of Guy of Spoleto. Guy had already been consecrated by Stephen V., and died in 894. In the following year Arnulf succeeded in seizing Rome, and Formosus crowned him emperor. But, as he was advancing on Spoleto against Lambert, Arnulf was seked with paralysis, and was forced to return to Germany. Overwhelmed with chagrin, Formosus died on the 4th of April 896. The discords in which he had been involved continued after his death. The validity of his acts was contested on the pretext that, having been originally bishop of Porto, he could not be a legitimate t°pe. The fundamental factor in these dissensions was the rivalry between the princes of Spoleto and the Carolingian house, represented by the king of Germany. The body of Formosus was disinterred in 897 by Stephen VI., and treated with contumely as that of a usurper of the papal

throne; but Theodore II. restored it to Christian burial, and at a council presided over by John IX. the pontificate of Formosus was declared valid and all his acts confirmed. (L. D.)*

FORMULA (Lat. diminutive of forma, shape, pattern, &c, especially used of rules of judicial procedure), in general, a stereotyped form of words to be used on stated occasions, for specific purposes, ceremonies, &c. In the sciences, the word usually denotes a symbolical statement of certain facts; for example, a chemical formula exhibits the composition of a sub- stance (see Chemistry) ; a botanical formula gives the differentia of a plant; a dentition formula indicates the arrangement and number of the teeth of an animal.

FORNER, JUAN BAUTISTA PABLO (1756-1799), Spanish satirist and scholar, was born at Merida (Badajoz) on the 23rd of February 1756, studied at the university of Salamanca, and was called to the bar at Madrid in 1783. During the next few years— under the pseudonyms of " Tome Cecial," " Pablo Segarra," " Don Antonio Varas," " Bartolo," " Pablo Igno- causto," " El Bachiller Reganadientes," and " Silvio Liberio " — Forner was engaged in a series of polemics with Garcia de la Huerta, Iriarte and other writers; the violence of his attacks was so extreme that he was finally forbidden to publish any controversial pamphlets, and was transferred to a legal post at Seville. In 1796 he became crown prosecutor at Madrid, where he died on the 17th of March 1799. Forner's brutality is almost unexampled, and his satirical writings give a false impression of his powers. His Oration apologetica par la Esparia y su merito literario (1787) is an excellent example of learned advocacy, far superior to similar efforts made by Denina and Antonio Cavanilles; and his posthumous Exequias de la lengua castellana (printed in the Biblioteca de autores espan'oles, vol. lxiii.) testifies to his scholarship and taste.

FORRES (Gaelic, far uis, " near water "), a royal and police burgh of Elginshire, Scotland. Pop. (1891) 3971; (1901) 43 1 7. It is situated on the Findhorn, which sweeps past the town and is crossed by a suspension bridge about a mile to the W., n m. W. of Elgin by the Highland railway, and 6 m. by road from Findhorn, its port, due north. It is one of the most ancient towns in the north of Scotland. King Donald (892-900), son of Constantine, died in Forres, not without suspicion of poisoning, and in it King Duff (961-967) was murdered. Macbeth is said to have slain Duncan in the first structure that gave its name to Castlehill, which was probably the building demolished in 1297 by the adherents of Wallace. The next

castle was a royal residence from 11 89 to 13 71 and was occupied occasionally by William the Lion, Alexander II. and David II. It was burned down by the Wolf of Badenoch in 1390. The ruins on the hill, however, are those of a later edifice and are surmounted by a granite obelisk, 65 ft. high, raised to the memory of Surgeon James Thomson, a native of Cromarty, who at the cost of his life tended the Russian wounded on the field of the Alma. The public buildings include the town hall, a fine and commodious house on the site of the old tolbooth; the Falconer museum, containing among other exhibits several valuable – fossils, and named after Dr Hugh Falconer (1808-1865), the distinguished palaeontologist and botanist, a native of the town; the mechanics' institute; the agricultural and market hall; Leanchoil hospital and Anderson's Institution for poor boys. The cross, in Decorated Gothic, stands beside the town hall. Adjoining the town on the south-east is the beautifully-wooded Cluny Hill, a favourite public resort, carrying on its summit the tower, 70 ft. high, which was erected in 1806 to the memory of Nelson, and on its southern slopes a well-known hydropathic. An excellent golf-course extends from Kinloss to Findhorn. The industries comprise the manufacture of chemicals and artificial manures, granite polishing, flour and sawmills, boot- and shoe-making, carriage- building and woollen manufactures. There is also considerable trade in cattle.

Sueno's Stone, about 23 ft. high, probably the finest sculptured monolith in Scotland, stands in a field to the east of the town. Its origin and character have given rise to endless surmises. It is carved with figures of soldiers, priests, slaughtered men and captives on one side, and on the other with a cross and Runic ornamentation. One theory is that it is a relic of the early Christian church, symbolizing the battle of life and the triumph

of good over evil. According to an older tradition it was named after Sueno, son of Harold, king of Denmark, who won a victory on the spot in 1008, A third conjecture is that it commemorates the expulsion of the Danes from Moray in 1014. Skene's view is that it chronicles the struggle in 900 between Sigurd, earl of Orkney, and Maelbrigd, Maormor of Moray. Another storied stone is called the Witches' Stone, because it marks the place near Forres where Macbeth is said to have encountered the weird sisters. • ■ . .

Forres is one of the Inverness district group of parliamentary burghs, the other members being Nairn, Fortrose and Inverness. The town is amongst the healthiest in Scotland and has the lowest rainfall in the county.

Within 2 m. of Forres, to the S.W., lie the beautiful woods of Altyre, the seat of the Gordon-Cummings. Three miles farther south is Relugas House, the favourite residence of Sir Thomas Dick Lauder, romantically situated

on a height near the con- fluence of the Divie and the Findhorn. Not far away stand the ruins of the old castle of Dunphail. On the left bank of the Findhorn, 3 J m. W. of Forres, is situated Brodie Castle, partly ancient and. partly modern. The Brodies — the old name of their estate was Brothie, from the Irish broth, a ditch, in allusion to the trench that ran from the village of Dyke to the north of the house— were a family of great consequence at the period of the Covenant. Alexander B rodie (i6i7-i68o),the fourteenth laird, was one of the commissioners who went to the Hague to treat with Charles II., and afterwards became a Scottish lord of session and, an English judge. He and his son were regarded as amongst the staunchest of the Presbyterians. Farther south is the forest of Darnaway, famous for its .oaks, in which stands the earl of Moray's mansion of Darnaway Castle. It occupies the site of the castle which was built by Thomas Randolph, the first earl. Attached to it is the great hall, capable of accommo- dating 1000 men, with an open roof of fine dark oak, the only remaining portion of the castle that was erected by Archibald Douglasˆ earl of Moray, in 1450. Queen Mary held a council in it in 1562. Earl Randolph's chair, not unlike the coronation chair, has been preserved. Kinloss Abbey, now in ruins, stands some 2j m. to the N.E. of Fbrres. It was founded in 1150 by David I., and remained in the hands of the Cistercians till its suppression at the Reformation. Robert Reid, who ruled from 1526 to 1540, was its greatest abbot. His hobby was gardening; and it is believed that many of the 123 varieties of pears and 146 varieties of apples for which the district is famous were due to his skill and enterprise. Edward I. stayed in the abbey for a short time in 1303 and Queen Mary spent two nights in it in

1562.

FORREST, EDWIN (1806-1872), American actor, was born at Philadelphia, Pennsylvania, on the 9th of March 1806, of Scottish and German descent. He made his first stage appearance on the 27th of November 1820, at the Walnut Street theatre, in Home's Douglas. In 1826 he had a great success in New York as Othello. He played at Drury Lane in the Gladiator in 1836, but his Macbeth in 1845 was hissed by the English audience, and his affront to Macready in Edinburgh shortly afterwards — when he stood up in a private box and hissed him, — was fatal to his popularity in Great Britain. His jealousy of Macready resulted in the Astor Place riot in 1849. In 1837 he had married Catherine, daughter of John Sinclair, an English singer, and his divorce suit in 1852 was a cause. celebre which hurt his reputation and soured his temper. His last appearance was as Richelieu in Boston in 1871. He died on the 12th of December 1872. He had amassed a large fortune, much of which he left by will to found a home for aged actors.

See Lawrence Barrett's Edmn Forrest (Boston, 1881).

FORREST, SIR JOHN (.1847-), West Australian statesman and explorer, son of William Forrest, of Bunbury, West Australia, was born hear Bunbury, on the 22nd of August 1847, and educated at Perth, W.A. In 1865 he became connected with the Government Survey Department at Perth, and in 1869 led an exploring expedition into the interior in search of D. Leichardt, penetrating through bush and salt-marshes as far inland as

1 23 E. In 1870 he again made an expedition from Perth to Adelaide, along the southern shores. In 1874, with his brother Alexander Forrest (born 1849), he explored eastwards from Champion Bay, following as far as possible the 26th parallel, and striking the telegraph line between Adelaide and Port Darwin; a distance of about 2000 m. was covered in about five months with horses and without carriers, a particularly fine achievement (see Australia: Exploration). John Forrest also surveyed in 1878 the north-western district between the rivers Ashburton and Lady Grey, and in 1882 the Fitzroy district. In 1876 he was made deputy surveyor-general, receiving the thanks of the colony for his services and a grant of 5000 acres of land; for a few months at the end of 1878 he acted as com- missioner of crown lands and surveyor-general, being given the full appointment in 1883 and retaining it till 1890. ; When the colony obtained in 1890 its constitution Of self-government, Sir John Forrest (who was made K.C.M.G. in 1891, and G.C.M.G. in 1901) became its first premier, and he held that position till in 1901 he joined the Commonwealth government, first as minister for defence, later as minister for home affairs and postmaster-general, resigning the office of federal treasurer in July 1907. His influence in West Australia was one of an almost autocratic character, owing to the robust vigour of his personality and his success in enforcing his views (see Western Australia: History). In 1897 he was made a member of the Privy Council. Sir John Forrest married in 1876 Margaret Hamersley. He published Explorations in Australia (1876) and Notes on Western Australia (1884-1887).*

FORREST, NATHAN BEDFORD (1821-1877), Confederate cavalry general in the American Civil War, was born near Chapel Hill, Tennessee, on the 13th of July 1821. Before his father's death in 1837 the family had removed te Mississippi, and for some years thereafter it was supported principally by Nathan, who was the eldest son. Thus he never received any formal education (as witnessed by the uncouth phraseology and spelling of his war despatches), but he managed to teach himself with very fair

success, and is said to have possessed considerable ability as a mathematician. He was in turn a horse and cattle trader in Mississippi, and a slave dealer and horse trader in Memphis, until 1859, when he took to cotton planting in north-western Missis- sippi, where he acquired considerable wealth. At the outbreak of the Civil War in 1801 he volunteered as a private, raised a cavalry battalion, of which he was lieut.-colonel, and in February 1862 took part in the defence of Fort Donelson, and refusing, like Generals Floyd and Pillow, to capitulate with the rest of the Confederate forces, made his way out, before the surrender, with all the mounted troops there. He was promptly made a colonel and regimental commander, and fought at Shiloh with distinction, receiving a severe wound. Shortly after this he was promoted brigadier-general (July 1862). At the head of a mounted brigade he took a brilliant part in General Bragg's autumn campaign, and in the winter of 1862ˆ1863 he was continually active in raiding the hostile lines of communication. These raids have been the theme of innumerable discussions, and on the whole their value seems to have been overrated. At the same time, and apart from the question of their utility, Forrest's raids were uniformly bold and skilful, and are his chief title to fame in the history of the cavalry arm. Indeed, next to Stuart and Sheridan, he was the finest cavalry leader of the whole war. One of the most remarkable of his actions was his capture, near Rome, Georgia, after five days of marching and fighting, of an entire cavalry brigade under Colonel A.D. Streight (April 1863). He was present at the battle of Chickamauga in September, after which (largely on account of his criticism of General Bragg, the army commander) he was transferred to the Mississippi. Forrest was made a major-general in December 1863. In the winter of 1863-1864 he was as active as ever, and in the spring of 1864 he raided as far north as Paducah, Ky. On the 12th of April 1864 he assaulted and captured Fort Pillow, in Tennessee on the Mississippi; U.S. negro troops formed a large part of the garrison and according to survivors many were massacred after the fort had surrendered. The " Massacre of Fort Pillow " has been the x. 22

subject of much controversy and there is much conflicting testimony regarding it, but it seems probable that Forrest himself had no part in it. On the 10th of June Forrest decisively defeated a superior Federal force at Brice's Cross Roads, Miss., and throughout the year, though the greatest efforts were made by the Federals to crush him, he raided in Mississippi, Tennessee and Alabama with almost unvarying success. He was once more with the main Confederate army of the West in the last disastrous campaign of Nashville, and fought stubborn rearguard actions to cover the retreat of the broken Confederates. In February 1865 he was made a lieut. -general, but the struggle was almost at an end and General James H. Wilson, one of the ablest of the Union cavalry generals, rapidly forced back

the few Confederates, now under Forrest's command, and stormed Selma, Alabama, on the 2nd of April. The surrender of General Forrest and his whole command, under the agreement between General Richard Taylor and General E. S. Canby, followed on the 9th of May, After the war he lived in Memphis. He sold his cotton plantation in 1867, and for some years was president of the Selma, Marion and Memphis Railroad. He died at Memphis, Tennessee, on the 29th of October 1877.

The military character of General Forrest, apart from questions of his technical skill, horsemastership and detail special to his arm of the service, was admittedly that of a great leader. He never commanded a large force of all arms. He was uneducated, and had neither experience of nor training for the strategical handling of great armies. Yet his personality and his natural soldierly gifts were such that General Sherman considered him " the most remarkable man the Civil War produced on either side." Joseph Johnston, the Confederate general whose great- ness lay above all in calm and critical judgment, said that Forrest; had he had the advantage of a thorough military training, " would have been the great central figure of the war."

See the biographies by J. A. Wyeth (1899) and J. H. Mathes (1902).

FORSKAL, PETER (1736-1763), Swedish traveller and naturalist, was born in Kalmar in 1 736. He studied at Gottingen, where he published a dissertation entitled Dubia de principiii philosophiae recentioris (1756). Thence he returned to his native country, which, however, he had to leave after the publicaf tion of a pamphlet entitled PensHes sur la liberie civile (1759). By Linnaeus he was recommended to Frederick V. of Denmark, who appointed him to accompany Carsten Niebuhr in an expedi- tion to Arabia and. Egypt in 1761. He died of the plague at Jerim in Arabia on the nth of July 1763.

His friend and companion, Niebuhr, was entrusted with the care of editing his MSS., and published in 1775 Descriptions animalium, avium, amphibiorum, pisciuni, insectorum, vermium, quae in itin. Orient, observavit Petrus Forskdl. In the same year appeared also his account of the plants of Arabia Felix and of lower Egypt, under the title of Flora Aegyptiaco-Arabicd. .

FORSSELL, HANS LUDVIG (1843-1901), Swedish historian and political writer, the son of Adolf Forssell, a distinguished mathematician, was born at Gefle, where his father was pro- fessor, on 14th January 1843. At the age of sixteen he became a, student in Upsala University, where he distinguished himself, and where, in 1866, having taken the degree of doctor, he was appointed reader in history. At the age of thirty, however,

Forssell, who had already shown remarkable business capacity, was called to Stockholm, where he filled one important post after another in the Swedish civil service. In 1875 he was appointed head of the treasury, and in 1880 was transferred to the, department of inland revenue, of which he continued to be president until the time of his death. In addition to the re sponsibilities which these offices devolved upon him, Forssell was constantly called to serve on royal commissions, and his political influence was immense. In spite of all these public duties, which he carried through with the utmost diligence, Forssell also found leisure for an abundant literary activity. Of his historical writings the most important were: The Administrative and Economical History of Sweden after Gustavus I. (1869-1875) and Sweden in 1571 (1872). He was also for several years, in company with the poet Wirsen, editor of the Swedish Literary Review. He published two volumes of Studies and,

Criticisms (1875, 1888). In the year 1881, at the death of the historian Anders Fryxell, Forssell was elected to the vacant seat on the Swedish Academy. The energy of Forssell was so great, and he understood so little the economy of strength, that he unquestionably overtaxed his vital force. His death, however, which occurred with great suddenness on the 2nd of August 1901 while he was staying at San Bernardino in Switzerland, was wholly unexpected. There was little of the typical Swedish urbanity in Forssell's exterior manner, which was somewhat dry and abrupt. Like many able men who have from early life administered responsible public posts, there appeared a certain want of sympathy in his demands upon others. His views were distinct, and held with great firmness; for example, he was a free-trader, and his consistent opposition to what he called "■ the new system " had a considerable effect on Swedish policy. He was not exactly an attractive man, but he was a capable, upright and efficient public servant. In 1867 he married Miss Zulamith Eneroth, a daughter of the well-known pomologist of Upsala; she survived him, with two sons and two daughters. (E. G.)

FORST (originally Forsta or Forste), a town of Germany, in the Prussian province of Brandenburg, on the Neisse, 44 m. S.E. of Frankfort-on-Oder. Pop. (1905) 33,757. It has two Evangelical, a Roman Catholic and an Old Lutheran church; there are two schools and two hospitals in the town. The chief industry of Forst is the manufacture of cloth, but spinning, dyeing and the making of artificial flowers are also carried on. Founded in the 13th

century, Forst passed in 1667 to the duke of Saxe-Merseburg, becoming part of electoral Saxony in 1740. It was ceded to Prussia in 181 5.

FORSTER, FRANCOIS (1790-1872), French engraver, was born at Locle in Neufchatel, on the 22nd of August 1790. In 1805 he was apprenticed to an engraver in Paris, and he also studied painting and engraving simultaneously in the Ecole des Beaux-Arts. His preference was ultimately fixed on the latter art, and on his obtaining in 1814 the first " grand prix de gravure," the king of Prussia, who was then with the allies in Paris, bestowed on him a gold medal, and a pension of 1500 francs for two years. With the aid of this sum he pursued his studies in Rome, where his attention was devoted chiefly to the works of Raphael. In 1844 he succeeded Tardieu in the Academy. He died at Paris on the 27th of June 1872. Forster occupied the first position among the French engravers of his time, and was equally successful in historical pieces and in portraits. Among his works may be mentioned — The Three Graces, and La Vierge de la ligende, after Raphael; La Vierge au bas-relief, after Leonardo da Vinci; Francis I. and Charles V., after Gros; St Cecilia, after Paul Delaroche; Albert Diirer and Henry IV., after Porbus; Wellington, after Gerard; and Queen Victoria, after Winterhalter.

FORSTER, FRIEDRICH CHRISTOPH (1791-1868), German historian and poet, was the second son of Karl Christoph Forster (1751-1811), and consequently a brother of the painter, Ernest Joachim Forster (1800-1885). Born at Munchengosserstadt on the Saale on the 24th of September 1791, he received his early education at Altenburg, and after a course of theology at Jena, devoted some time to archaeology and the history of art. At the outbreak of the War of Liberation in 1 8 1 3 , he joined the army, quickly attaining the rank of captain; and by his war-songs added to the national enthusiasm. On the conclusion of the war he was appointed professor at the school of engineering and artillery in Berlin, but on account of some democratic writings he was dismissed from this office in 181 7. He then became connected with various journals until about 1829, when he received an appointment at the royal museum in Berlin, with the title of court councillor (H of rat). He was the founder and secretary of the Wissenschaftlicher Kunstverein in Berlin, and died in Berlin on the 8th of November 1868. Forster's principal works are: Beitrage zur neueren Kriegsgeschichte (Berlin, 1816); Grundziige der Gesehichte des preussischen Staates (Berlin, 1818); Der Feldmarschall Bliicher und seine Umgebungen (Leipzig, 1820); Friedrich der Grosse, Jugendjahre, Bildung und Geist CBerlin, 1822); Albrccht von Wallenstein (Potsdam, 1834);

Friedrich Wilhelm I., Konig von Preussen (Potsdam, 1834-1835); Die Hofe und Kabinette Europas im 18. Jahrhundert (Potsdam, 1 836-1839); Leben

und Taten Friedrichs des Grossen (Meissen, 1840-1841); Wallensteins Prozess (Leipzig, 1844); and Preussens Helden in Krieg und Frieden, Heuere und neueste preussische Gesehichte, 7 volumes (Berlin, 1849-1860). The three concluding volumes of this work contain the history of the war of liberation of 1813-14-15. He brought out an edition of Hegel's works, adapted several of Shakespeare's plays for the theatre, wrote a number of poems and an historical drama, Gustav Adolf (Berlin,

1832).

Many of his lesser writings were collected and published as Kriegslieder, Romanzen, Erzahlungen und Legenden (Berlin, 1838). The beginning of an autobiography of Forster, edited by H. Kletke, has been published under the title, Kunst und Leben (Berlin, 1873).

FORSTER, JOHANN GEORG ADAM (1754-1794), German traveller and author, was born at Nassenhuben, a small village near Danzig, on the 2 7th of November 1 7 54. His father, Johann Reinhold Forster, a man of great scientific attainments but an intractable temper, was at that time pastor of the place; the family are said to have been of Scottish extraction. In 1765 the elder Forster was commissioned by the empress Catherine to inspect the Russian colonies in the province of Saratov, which gave his son an opportunity of acquiring the Russian language and the elements of a scientific education. After a few years the father quarrelled with the Russian government, and went to England, where he obtained a professorship of natural history and the modern languages at the famous non- conformist academy at Warrington. His violent temper soon compelled him to resign this appointment, and for two years he and his son earned a precarious livelihood by translations in London— a practical-education, however, exceedingly useful to the younger Forster, who became a thorough master of English, and acquired many of the ideas which chiefly influenced his subsequent life. At length the turning point in his career came in the shape of an invitation for him and his father to accompany Captain Cook in his third voyage round the world. Such an expedition was admirably calculated to call forth Forster's peculiar powers. His account of Cook's voyage {A Voyage round the World, London, 1777; in German, Berlin, 1778-1780), is almost the first example of the glowing yet faithful description of natural phenomena which has since made a knowledge of them the common property of the educated world. The publication of this work was, however, impeded for some time by differences with the admiralty, during which Forster proceeded to the continent to obtain an appointment for his father as professor at Cassel, and found to his surprise that it was conferred upon himself. The elder Forster, however, was soon provided for elsewhere, being appointed professor of natural history at Halle. At Cassel Forster formed an intimate

friendship with the great anatomist Sommerring, and about the same time made the acquaintance of Jacobi, who gave him a leaning towards mysticism from which he subequently emancipated himself. The want of books and scientific apparatus at Cassel induced him to resort frequently to Gottingen, where he became betrothed to Therese Heyne, the daughter of the illustrious philologist, a clever and cultivated woman, but ill- suited to be Forster's wife. To be able to marry he accepted (1784) a professorship at the university of Wilna, which he did not find to his taste. The penury and barbarism of Polish circumstances are graphically described in his and his wife's letters of this period. After a few years' residence at Wilna he resigned his appointment to participate in a scientific expedition projected by the Russian government, and upon the relinquish- ment of this undertaking became librarian to the elector of Mainz. He actively promoted the incorporation of the left bank of the Rhine with France and in 1793 went to Paris to carry on the negotiations. Meanwhile, however, the Germans seized Mainz, and Forster — already disheartened by the turn of events in France— was cut off from all return. Domestic sorrows were added to his political troubles and he died suddenly at Paris on the 10th of January 1794.

Forster's masterpiece is his Ansichten vom Niederrhein, von Brabant, Flandern, Holland, England und Frankreich (1791- 1794), one of the ablest books of travel of the 18th century. His style is clear and vivid; his method of describing what he sees extraordinarily plastic; above all, he has the art of pre- senting objects to us from their most interesting and attractive side. The same qualities are also more or less conspicuous in his minor writings. By his translation (from the English) of the Sakuntala of Kalidasa (1791), he first awakened German interest in Indian literature.

Forster's Samtliche Werke appeared at Leipzig in 9 vols, in 1843. The Ansichten vom Rhein, &c, has been frequently reprinted (best edition by A. Leitzmann, Halle, 1893); Leitzmann has also pub- lished (Stuttgart, 1894) a selection of Forster's Kleine Schriften, which originally appeared in 6 vols. (1789-1797). His correspond- ence was published by his wife (2 vols., Leipzig, 1829); his Brief – wechsel mit Sommerring by H. Hettner (Brunswick, 1877). See J. Moleschott, G. Forster, der Naturforscher des Volks (1854; 3rd ed., 1874); K. Klein, G. Forster in Mainz (Gotha, 1863); A. Leitz- mann, G. Forster (Vorlesung) (Halle, 1893).

FORSTER, JOHN (1812-1876), English biographer and critic, was born on the 2nd of April 181 2 at Newcastle. His father, who was a Unitarian and

belonged to the junior branch of a good Northumberland family, was a cattle-dealer. After being well grounded in classics and mathematics at the grammar school of his native town, John Forster was sent in 1828 to Cambridge, but after only a month's residence he removed to London, where he attended classes at University College, and was entered at the Inner Temple. He devoted himself, however, chiefly to literary pursuits. He contributed to The True Sun, The Morning Chronicle and to The Examiner, for which he acted as literary and dramatic critic; and the influence of his powerful in- dividuality soon made itself felt. His Lives of the Statesmen of the Commonwealth (1836-1839) appeared partly in Lardner's Cyclopaedia. He published the work separately in 1840 with a Treatise on the Popular Progress in English History. Its merits obtained immediate recognition, and Forster became a prominent figure in that distinguished circle of literary men which included Bulwer, Talfourd, Albany, Fonblanque, Landor, Carlyie and Dickens. Forster is said to have been for some time engaged to Letitia Landon, but the engagement was broken off, and Miss Landon married George Maclean. In 1843 he was called to the bar but he never became a practising lawyer. For some years he edited the Foreign Quarterly Review; in 1846, on the retirement of Charles Dickens, he took charge for some months of the Daily News; and from 1847 to 1856 he edited the Examiner. From 1836 onwards he contributed to the Edinburgh Quarterly and Foreign Quarterly Reviews a variety of articles, some of which were republished in two volumes of Biographical and Historical Essays (1858). In 1848 appeared his admirable Life and Times of Oliver Goldsmith (revised in 1 8 54) . Continuing his researches into English history under the early StuartSj he published in i860 the Arrest of the Five Members by Charles I. — A Chapter of English History rewritten, and The Debates on the Grand Remonstrance, with an Introductory Essay on English Freedom. These were followed by his Sir John Eliot: a Bio- graphy (1864), elaborated from one of his earlier studies for the Lives of Eminent British Statesmen. In 1868 appeared his Life of Landor, and, on the death of his friend Alexander Dyce, Forster undertook the publication of his third edition of Shakes- peare. For several years he had been collecting materials for a life of Swift, but he interrupted his studies in this direction to write his standard Life of Charles Dickens. He had long been intimate with the novelist, and it is by this work that John Forster is now chiefly remembered. The first volume appeared in 1872, and the biography was completed in 1874. Towards the close of 1875 the first volume of his Life of Swift was published; and he had made some progress in the preparation of the second at the time of his death on the 2nd of February 1876. In 1855 Forster had been appointed secretary to the lunacy commission, and from 1861 to 1872 he held the office of a commissioner in lunacy. His valuable collection of manuscripts, including the original copies of Charles Dickens's novels, together with his

books and pictures, was bequeathed to South Kensington Museum.

An admirable account of him by Henry Morley is prefixed to the official handbook (1877) of the Dyce and Forster bequests.

FORSTER, JOHN COOPER (1823-1886), British surgeon, was born in 1823 in Lambeth, London, where his father and grand- father before him had been local medical practitioners. He entered Guy's hospital in 1841, was appointed demonstrator of anatomy in 1850, assistant-surgeon, iSss, and surgeon, 1870. He became a member of the College of Surgeons in 1844, fellow in 1849 and president in 1884. He was a prompt and sometimes bold operator. In 1858 he performed practically the first gastrostomy in England for a case of cancer of the oesophagus. Among his best-known papers were discussions of acupressure, syphilis, hydrophobia, intestinal obstruction, modified obturator hernia, torsion, and colloid cancer of the large intestine; and he published a book on Surgical Diseases of Children in i860,, founded on his ex- perience as surgeon to the hospital for children and women in Waterloo Road. He died suddenly in London ©n the 2nd of March 1886.

FORSTER, WILLIAM EDWARD (1818-1886), British states- man, was born of Quaker parents at Bradpole in Dorsetshire on the nth of July 1818. He was educated at the Friends' school at Tottenham, where his father's family had long been settled, and on leaving school he was put into business. He declined, however, on principle, to enter a brewery. Becoming in due time a woollen manufacturer in a large way at Bradford, Yorkshire (from which after his marriage he moved to Burley-i 1- Wharf edale) , he soon made himself known as a practical philan- thropist. In 1846-1847 he accompanied his father to Ireland as distributor of the Friends' relief fund for the famine in COnnemara, and the state of the country made a deep impression oh him. In 1849 he wrote a preface to a new edition of Clarkson'f; Life of William Pcnn, defending the Quaker statesman against Macaulay's criticisms. In 1850 he married Jane Martha, eldest daughter of the famous Dr Arnold of Rugby. She was not a. Quaker, and her husband was formally excommunicated for marrying her, but the Friends who were commissioned to announce the sentence " shook hands and stayed to luncheor,," Forster thereafter ranked himself as a member of the Church yf England, for which, indeed, he was in later life charged with having too great a partiality. There were no children of 1 he marriage, but when Mrs Forster's brother, William Arnold, died in 1859, leaving four orphans, the Forsters adopted them as their own.

One of these children was Mr H. 0. Arnold-Forster (1855- 1909), the Well-known Liberal- Unionist member of parliament, who eventually became a member of Mr Balfour's cabinet; he was secretary to the

admiralty (1900-1903), and then secretary of state for war (1903-1905), and was the author of numerous educational books published by Cassell & Co., of which firm he was a director.

W. E. Forster gradually began to take an active part in public affairs by speaking and lecturing. In 1858 he gave a lecture before the Leeds Philosophical Institution on " How we Tay India." In 1859 he stood as Liberal candidate for Leeds, but was beaten. But he was highly esteemed in the West Riding, and in 1861 he was returned unopposed for Bradford. In 1865 (unopposed) and in 1868 (at the head of the poll) he was again returned. He took a prominent part in parliament in the debates on the American Civil War, and in 1868 was made under- secretary for the colonies in Earl Russell's ministry. It was then that he first became a prominent advocate of imperial federation. In 1866 his attitude on parliamentary reform attracted a good deal of attention. His speeches were full of knowledge of the real condition of the people, and contained something like an original programme of Radical legislation. " We have other things to do," he said, " besides extending the franchise. We want to make Ireland loyal and contented; we want to get rid of pauperism in this country; we want to fight against a class which is more to be dreaded than the holders of a £7 franchise— I mean the dangerous class in our large towns. We want to see

whether we cannot make for the agricultural labourer some better hope than the workhouse in his old age. We want to have Old England as well taught as New England." In these words he heralded the education campaign which occupied the country for so many years afterwards. Directly the Reform Bill had passed, the necessity of " inducing our masters to learn their letters" (in Robert Lowe's phrase) became pressing. Mr Eorster and Mr Card well, as private members in opposition, brought in' Education Bills in 1867 and 1868; and in i368, when the Liberal party returned to office, Mr Forster was appointed vice-president of the council, with the duty of preparing a government measure for national education. The Elementary Education Bill (see Education) was introduced on the 17th of February 1870. The religious difficulty at once came to the front. The Manchester Education Union and the Birmingham Education League had already formulated in the provinces the two opposing theories, the former standing for the preservation of denomina- tional interests, the latter advocating secular rate-aided education as the only means of protecting Nonconformity against the Church. The Dissenters were by no means satisfied with Forster's " conscience clause" as contained in the bill, and

they regarded him, the ex-Quaker, as a deserter from their own side; while they resented the " 25th clause,", permitting school boards to pay the fees of needy children at denominational schools out of the rates, as an insidious attack upon themselves, By the 14th of March, when the second reading came on, the controversy had assumed threatening proportions; and Mr Dixon, the Liberal" member for Birmingham and chairman of the Education League, moved an amendment, the effect of which was to prohibit all religious" education in board schools. The govern- ment made its rejection a question of confidence, and the amend- ment was withdrawn; but the result was the insertion of the Cowper-Temple clause as a compromise before the bill passed. Extremists on both sides abused Forster, but the government had a difficult set of circumstances to deal with, and he acted like a prudent statesman in contenting himself with what he could get. An ideal bill was impracticable; it is to Forster's enduring credit that the bill of 1870, imperfect as it was, estab- lished at last some approach to a system of national education in England without running absolutely counter to the most cherished English ideas and without ignoring the principal agencies already in existence.

Forster's next important work was in passing the Ballot Act of 1872, but for several years afterwards his life was uneventful. In 1874 he was again returned for Bradford, in spite of Dissenting attacks, and he took his full share of the work of the Opposition Front Bench. In 1875, when Mr Gladstone " retired," he was strongly supported for the -leadership of the Liberal party, but declined to be nominated against Lord Hartington. In the same year he was elected F.R.S., and made lord rector of Aberdeen University. In 1876, when the Eastern question was looming large, he visited Servia and Turkey, and his subsequent speeches on the subject were marked by studious moderation, distasteful to extremists on both sides, On Mr Gladstone's return to office in 1880 he was made chief secretary for Ireland, with Lord Cowper as lord-lieutenant. He carried the Compensation for Disturbance Bill through the Commons, only to see it thrown out in the Lords, and his task was made more difficult by the agitation which arose in consequence. During the gloomy autumn and winter of 1880-1881 Forster's energy and devotion in grappling with the situation in Ireland (see Ireland) were indefatigable, his labour was enormous, and the personal risks he ran were many; but he enjoyed the Irish character in spite of all obstacles, and inspired genuine admiration in all his coadjutors. On the 24th of January 1881 he introduced a new Coercion Bill in the House of Commons, to deal with the growth of the Land league, and in the course of his speech declared it to be " the most painful duty " he had ever had to perform, and one which would have prevented his accepting his office if he had known that it would fall upon him. The bill passed, among its provisions being one enabling the Irish government to arrest without trial

persons " reasonably suspected " of crime and

conspiracy. The Irish party used every opportunity in and out of parliament for resenting this act, and Forster was kept con- stantly on the move between Dublin and London, conducting his campaign against crime and anarchy and defending it in the House of Commons. His scrupulous conscientiousness and anxiety to meet every reasonable claim availed him nothing with such antagonists, and the strain was intense and continuous. He was nicknamed " Buckshot " by the Nationalist press, on the supposition that he had ordered its use by the police when firing on a crowd. On the 13 th of October Mr Parnell was arrested, and on the 20th the Land League was proclaimed. From that time Forster's life was in constant danger, and he had to be escorted by mounted police when he drove in Dublin. Early in March 1882 he visited some of the worst districts in Ireland, and addressed the crowd at Tullamore on the subject of outrages, denouncing the people for their want of courage in not assisting the government, but adding, " whether you do or not, it is the duty of the government to stop the outrages, and stop them we will." Forster's pluck in speaking out like this was fully appreciated in England, but it was not till after the revelations connected with the Phoenix Park murders that the dangers he had confronted were properly realized, and it became known that several plans to murder him had only been frustrated by the merest accidents. On the 2nd of May Mr Gladstone announced that the government intended to release Mr Parnell and his fellow-prisoners in Kilmainham, and that both Lord Cowper and Mr Forster had in consequence resigned; and the following Saturday Forster's successor, Lord Frederick Cavendish, was, with Mr Burke, murdered in Phoenix Park. It was characteristic of the man that Forster at once offered to go back to Dublin temporarily as chief secretary, but the offer was declined. His position naturally attracted universal attention towards him, particularly during the debates which ensued in parliament on the " Kilmainham Treaty." But Mr Gladstone's influence with the Liberal party was paramount, in spite of the damaging appearance of the compact made with Parnell, and Forster's pointed criticisms only caused thoroughgoing partisans to accuse him of a desire to avenge himself. It was not till the next session that he delivered his fiercest attack on Parnell in the debate on the address, denouncing him for his connexion with the Land League, and quoting against him the violent speeches of his supporters and the articles of his newspaper organs. It was on this occasion that Parnell, on Forster's charging him, not with directly planning or perpetrating outrages or murder, but with conniving at them, ejaculated "It's a lie "; and, replying on the next day, the Irish leader, instead of disproving Forster's charges, bitterly denounced his methods of administra- tion. Though, during the few remaining years of his life, Forster's political record covered various

interesting subjects, his connexion with these stormy times in Ireland throws them all into shadow. He died on the 6th of April 1886, on the eve of the introduction of the Home Rule Bill, to which he was stoutly opposed. In the interval there had been other questions on which he found himself at variance with Gladstonian Liberal- ism, for instance, as regards the Sudan and the Transvaal, nor was he inclined to stomach the claims of the Caucus or the Birmingham programme. When the Redistribution Act divided Bradford into three constituencies, Forster was returned for the central division, but he never took his seat in the new parliament. Forster, like John Bright, was an excellent representative of the English middle-class in public life. Patriotic, energetic, independent, incorruptible, shrewd, fair-minded, he was endowed not only with great sympathy with progress, but also with a full faculty for resistance to mere democraticism. He was tall (the Yorkshiremen called him " Long Forster ") and strongly though stiffly built, and, with his simple tastes and straightforward manners and methods, was a typical North-country figure. His oratory was rough and unpolished, but full of freshness and force and genuine feeling. It was Forster who, when appealing to the government at the time of Gordon's danger at Khartum, spoke of Mr Gladstone as able " to persuade most people of most things, and himself of almost anything," and though the phrase

was much resented by Mr Gladstone's entourage, the truth that underlay it may be taken as representing the very converse of his own character. His personal difficulties with some of his colleagues, both in regard to the Education Act of 1870 and his Irish administration, must be properly understood if a complete comprehension of his political career is to be obtained. For an account of them we need only refer to the Life of the Right Hon. W. E. Forster, by Sir T. Wemyss Reid. (H. Ch.)

FORSYTH, PETER TAYLOR (1848-), British Noncon- formist divine, was bprn at Aberdeen in 1848. He took first-class honours in classics at Aberdeen, subsequently studied at Got- tingen (under Ritschl) and at New College, Hampstead, and entered the Congregational ministry. Having held pastorates at Shipley, Hackney, Manchester, Leicester and Cambridge, he became principal of Hackney Theological College, Hampstead, in 1901. In 1907 he delivered the Lyman Beecher lectures on preaching at Yale University, published as Positive Preaching and Modern Mind. Among his other publications may be mentioned Religion in Recent Art, and articles in the Contemporary Review, Hibbert Journal, and London Quarterly. He was chairman of the Congregational Union of England and Wales in 1005.

FORTALEZA (usually called Ceara by foreigners), a city and port of Brazil and the capital of the state of Ceara, on a crescent-shaped indentation of the coast-line immediately W. of Cape Mucuripe or Mocoripe, i\ m. from the mouth of the Ceara river, in lat. 3 42′ S., long. 38 30′ W. Pop. (1890) of the municipality, including a large rural district, 40,902. The city stands on an open sandy plain overlooking the sea, and is regularly laid out, with broad, well-paved, gas-lighted streets and numerous squares. Owing to the aridity of the climate the vegetation is less luxuriant than in most Brazilian cities. The temperature is usually high, but it is modified by the strong sea winds. Fortaleza has suffered much from epidemics of yellow-fever, small-pox and beri-beri, but the climate is con- sidered to be healthy. A small branch of the Ceara. river, called the Pajehu, traverses the city and divides it into two parts, that on its right bank being locally known as Outeiro. Fortaleza is the see of a bishopric, created in 1854, but it has no cathedral, one of its ten churches being used for that purpose. Its public buildings include the government house, legislative chambers, bishop's palace, an episcopal seminary, a lyceum (high school), Misericordia hospital, and asylums for mendicants and the insane. The custom-house stands nearer the seashore, if m. from the railway station in the city, with which it is connected by rail. The port is the principal outlet for the products of the state, but its anchorage is an open roadstead, one of the most dangerous on the northern coast of Brazil, and all ships are compelled to anchor well out from shore and discharge into lighters. Port improvements designed by the eminent engineer Sir John Hawkshaw have been under construction for many years, but have made very slow progress. The Baturit6 railway, built by the national government partly to give employment to starving refugees in times of long-continued droughts, connects the city and its port with fertile regions to the S.W., and extends to Senador Pompeu, 178 m. distant. The exports include sugar, coffee, rubber, cotton, rum, rice, beans, fruits, hides and skins.

Fortaleza had its origin in a small village adjoining a fort established at this point in early colonial times. In 1654 it took the name of Villa do Forte da Assumpcao, but it was generally spoken of as Fortaleza. In 18 10 it became the capital of Ceara, and in 1823 it was raised to the dignity of a city under the title of Fortaleza da Nova Braganca.

FORT AUGUSTUS, a village of Inverness-shire, Scotland. Pop. (1901) 706. It is delightfully situated at the south-western extremity of Loch Ness, about 30 m. S. W. of Inverness, on the rivers Oich and Tarff and the Caledonian Canal. A branch line connects with Spear. Bridge on the West Highland railway via Invergarry. The fort, then called Kilchumin, was built in 1716 for the purpose of keeping the Highlanders in check, and was enlarged in 1730 by General Wade. It was captured by the Jacobites in 174s, but reoccupied after the battle of Culloden,

when it received its present name in honour of William Augustus, duke of Cumberland, the victorious general. The fort was used as a sanatorium until 185.7, when it was bought by the 12th Lord ■ Lovat, whose son presented it in 1876 to the English order of Benedictines. Within four 1 years there rose upon its site a pile of stately buildings under the title of St Benedict's Abbey and school, a monastic and collegiate institution intended for the higher education of the sons of the Roman Catholic nobility and gentry. The series of buildings consists of the college, monastery, hospice and scriptorium — the four forming a quadrangle con- nected by beautiful cloisters. Amongst its benefactors were many Catholic Scots and English peers and gentlemen whose arms are emblazoned on the windows of the spacious refectory hall. The summit of the college tower is no ft. high.

FORT DODGE, a city and the county-seat of Webster county, Iowa, U.S.A., on the Des Moines river, 85 m. (by rail) N. by W. from Des Moines. Pop. (1890) 4S71 ; (190a) 12,162 ; (1905, state census) 14,369, (2269 being foreign-born); (1910) 15, 543- It is served by the Illinois Central, the Chicago Great Western, the Minneapolis & Saint Louis, and the Fort Dodge, Des Moines & Southern railways, the last an electric interurban line. Eureka Springs and Wild Cat Cave are of interest to visitors, and attractive scenery is furnished by the river and its bordering bluffs. The river is here spanned by the Chicago . Great Western railwaysteel bridge, or viaduct, one of the longest in the country. Fort Dodge is the seat of Tobin College (420 students in 1907- 1908), a commercial and business school, with preparatory, normal and classical departments, and courses in oratory and music; among its other institutions are St Paul's, school (Evangelical Lutheran), two Roman Catholic schools, Corpus Christi Academy and the Sacred Heart school, Our Lady of Lourdes convent and a Carnegie library. Oleson Park and Reynold's Park are the city's principal parks. Immediately surrounding Fort Dodge is a rich farming country. To the E. of the city lies a gypsum bed, extending over an area of about 50 sq. m., and considered to be the most valuable in the United States; to the S. coal abounds; there are also limestone quarries and deposits of clay in the vicinity — the clay being, for the most part, obtained by mining.
FortDodgeisamarketfortheproducts of the surrounding country, and is a shipping centre of con- siderable importance. It has various manufactures, including gypsum, plaster, oatmeal, brick and tile, sewer pipe, pottery, foundry and machine-shop products, and shoes. In 1905 the value of all the factory products was $3,025,659, an increase of 200-8% over that for 1900. Fort Clark was erected on the site in 1850 to protect settlers against the Indians; in 185 1 the name was changed by order of the secretary of war to Fort Dodge in honour of Colonel Henry Dodge (1782-1867), who was a lieutenant-colonel of Missouri Volunteers in the War of 181 2, served with distinction asacolonel of Michigan Mounted Volunteers in the

Black Hawk War; resigned from the military service in March 1833, was governor of Wisconsin Territory from 1836 to 1841 and from 1846 to 1848, and was a delegate from Wisconsin Territory to Congress from 1841 to 1845, and a United States senator from Wisconsin in 1848-1857. The fort was abandoned in 1853, and in 1854 a town was laid out. It was chartered as a city in 1869. From the. gypsum beds near Fort Dodge was taken in 1868 the block of gypsum from which was modelled the " Cardiff Giant," a rudely-fashioned human figure, which was buried near Cardiff, Onondaga county, New York, where it was " discovered " late in: 1869. It wad then exhibited in various parts of the country as a " petrified man." The hoax was finally exposed by Professor Othniel C. Marsh of Yale; and George Hall of Binghamton, N.Y., confessed to the fraud, his object having been to discredit belief in the " giants " of Genesis vi. 4. (See " The Cardiff Giant: the True Story of a Remarkable Deception," by Andrew D. White, in the Century Magazine, vol. xlii., 1902.)

FORT EDWARD, a village of Washington county, New York, U.S.A., in the township of Fort Edward, on the Hudson river, 56 m. by rail N. of Albany. Pop. of the village (1900) 3521, of whom 385 were foreign-born; (1005) 3806; (1910) 3762: of

the township, including the village (1900), 5216; (1905, 5300; (1910) 5740. The village lies mostly at the foot of a steep hill, is at the junction of the main line and the Glens Falls branch of the Delaware & Hudson railway, and is also served by electric line to Albany and Glens Falls; the barge canal connecting Lake Champlain and the Hudson river enters the Hudson here. The river furnishes good water-power, which is used in the manufacture of paper and wood pulp, the leading industry. Shirts and pottery (flower pots, jars and drain tile) are manu- factured also. The village is the seat of the Fort Edward Collegiate Institute, a non-sectarian school for girls, which was founded in 1854 and until 1893 was coeducational. The village owns and operates the waterworks. Indian war parties on their way to Canada were accustomed to make a portage from this place, the head of navigation for small boats on the Hudson, to Lake George or Lake Champlain, and hence it was known as the Great Carrying Place. Governor (afterwards Sir) Francis Nicholson in 1709, in his expedition against Canada, built here a stockade which was named Fort Nicholson. Some years afterwards John Henry Lydius (1693-1791) established a settlement and protected it by a new fort, named Fort Lydius, but this was destroyed by the French and Indians in 1745. In 1755, a third fort was built by General Phineas Lyman (1716- 1774), as preliminary to

the expedition against Crown Point under General William Johnson, and was named Fort Lyman; in 1756 Johnson renamed it Fort Edward in honour of Edward, Duke of York. In the War for Independence Fort Edward was the headquarters of General Philip Schuyler while he and his troops were blocking the march of General Burgoyne's army from Fort Ticonderoga. When a part of Burgoyne's forces was distant only 3 or 4 m. from Fort Edward, on Fort Edward Hill, on the 27th of July 1777, the leader of an Indian band whose assistance the British had sought is supposed to have murdered Jane McCrea (c. 1757-1777), a young-girl who had been visiting friends in Fort Edward, and who was to be escorted on that day to the British camp and there to be married to David Jones, a loyalist serving as a lieutenant in Burgoyne's army; it is possible that she was shot accidentally by Americans pursuing her Indian escorts, but her death did much to rouse local sentiment against Burgoyne and his Indian allies, and caused many volunteers to join the American army resisting Burgoyne's invasion. A monument has been erected by the Jane McCrea Chapter of the Daughters of the American Revolution near the spot where she was killed, and she is buried in Union Cemetery in Fort Edward. Fort Edward township was erected in 181 8 from a part of the township of Argyle. Fort Edward village was incorporated in 1852.

See R. O. Bascom, The Fort Edward Book (Fort Edward, 1903).

FORTESCUE, SIR JOHN (c. 1394-c 1476), English lawyer, the second son of Sir John Fortescue, of an ancient family in Devonshire, was born at Norris, near South Brent, in Somerset- shire. He was educated at Exeter College, Oxford. During the reign of Henry VI. he was three times appointed one of the governors of Lincoln's Inn. In 1441 he was made a king's sergeant at law, and in the following year chief justice of the king's bench. As a judge Fortescue is highly recommended for his wisdom, gravity and uprightness; and he seems to have enjoyed great favour with the king, who is said to have given him some substantial proofs of esteem and regard. He held his office during the remainder of the reign of Henry VI., to whom he steadily adhered; and having faithfully served that un- fortunate monarch in all his troubles, he was attainted of treason in the first parliament of Edward IV. When Henry subsequently fled into Scotland, he is supposed to have appointed Fortescue, who appears to have accompanied him in his flight, chancellor of England. In 1463 Fortescue accompanied Queen Margaret and her court in their exile on the Continent, and returned with them afterwards to England. During their wanderings abroad the chancellor wrote for the instruction of the young prince Edward his celebrated work De laudibus legum Angliae.. On the defeat of the Lancastrian party he made his submission to Edward IV., from whom he received a general pardon dated

Westminster, October 13, 147 1. He died at an advanced age, but the exact date of his death has not been ascertained. ‘ Fortescue’s masterly vindication of the laws of England, though received with great favour by the learned of the profession to whom it was communicated, did not appear in print until the reign of Heriry VIII., when it. was published, but without a date. It was subsequently many times reprinted. Another valuable and learned Work by Fortescue, written in English, was published in 1714, under the title of The Difference between an Absolute and a Limited Monarchy, In the Cotton library there is a manuscript of this work, in the title of which it is said to have been addressed to Henry VI. ; but many passages show plainly that it was written in favour of Edward IV. A revised edition of this work, with a very valuable historical and biographical introduction, was published in 1 885 by Charles Plummer, under the title The Governance of England. All 91 Fortescue’s minor writings appear in The Works of Sir John Fortescue, now first Collected and Arranged, published in 1869 for private circulation, by his descendant, Lord Clermont.

Authorities. — Plummer’s Introduction to The Governance of England; Life in Lord Clermont’s edition; Gairdner’s Paston Letters; Foss’s Lives of the Judges.

FORTESCUE, SIR JOHN (c. 1531-1607), English statesman, was the eldest son of Sir Adrian Fortescue (executed in 1539), and of his second wife, Anne, daughter of Sir William Reade or Rede of Borstall in Buckinghamshire. The exact date of his birth is unrecorded. 1 He was restored in blood and to his estate at Shirburn in Oxfordshire in 1551. Through his father’s mother, Alice, daughter of Sir Geoffrey Boleyn, he was a second cousin once removed from Queen Elizabeth. He acquired early a considerable reputation as a scholar and was chosen to direct the Princess Elizabeth’s classical studies in Mary’s reign. On the accession of Elizabeth he was appointed keeper of the great wardrobe. He was returned in 1572 to parliament for Walling- ford, in 1586 for Buckingham borough, in 1588 and 1597 for Buckingham county, and in 1601 for Middlesex. In 1589 he was appointed chancellor of the exchequer and a member of the privy council. In 1592 he was knighted, and in November 1601, in addition to his two great offices, he received that of chancellor of the duchy of Lancaster. By means of his lucrative employments he amassed great wealth, with which he bought large estates in Oxfordshire and Buckinghamshire, and kept up much state and a large household. He took a prominent part in public business, was a member of the court of the star chamber and an ecclesiastical commissioner, sat on various important commissions, and as chancellor of the exchequer explained the queen’s financial needs and proposed subsidies in parliament. On the death of Elizabeth he suggested that certain restrictions should be imposed on

James's powers, in order probably to limit the appointment of Scotchmen to office, 2 but his advice was not followed. He was deprived by James of the chancellorship of the exchequer, but evidently did not forfeit his favour, as he retained his two other offices and entertained James several times at Henden and Salden. In 1604 Sir John, who stood for Buckinghamshire, was defeated by Sir Francis Goodwin, whose election, however, was declared void by the lord chancellor on the ground of a sentence of outlawry under which he lay, and Fortescue was by a second election returned in his place: This incident gave rise to a violent controversy, regarding the chan- cellor's jurisdiction in deciding disputed elections to parliament, which was repudiated by the Commons but maintained by the king. The matter after much debate was ended by a compromise, which, while leaving the principle unsettled, set aside the elec- tions of both candidates and provided for the issue of a new writ. Fortescue was then in February 1606 returned for Middlesex, which he represented till his death on the 23rd of December 1607. He was buried in Mursley church in Buckinghamshire, where a monument was erected to his memory. His long public career was highly honourable, and he served his sovereign and country with unswerving fidelity and honesty. His learned attainments too were considerable — Camden styles him " vir integer, Graece,

1 The inscription on his tomb states that he was 76 at his death on the 23rd of December 1607 (Lord Clermont's Hist, of the Family of Fortescue, 377), but according to a statement ascribed to himself, he was born the same year as Queen Elizabeth and therefore in 1533 (Bucks. Architect, and Archaeolog. Soc. Records of Bucks, i. p. 89).

2 David Lloyd's State Worthies (1670), 556.

Latineque apprime eruditus," 1 and his scholarship is also praised by Lloyd, while his friendship with Sir Thomas Bodley procured gifts of books and manuscripts to the latter's library. Fortescue married (1) Cecily, daughter of Sir Edmund Ashfield of Ewelme, by whom, besides a daughter, he had two sons, Sir Francis and Sir William; and (2) Alice, daughter of Christopher Smyth of Annabels in Hertfordshire, by whom he had one daughter. His descent in the male line became extinct with the death of Sir John Fortescue, 3rd baronet, in 1717.

Bibliography. — Article in the Diet, of Nat. Biography; Lord Clermont's Hist, of the Family of the Fortescues; Hist. Notices of the Parishes of Swyncombe and Ewelme, by A. Napier, p. 390 ; D. Lloyd's State Worthies

(1670), p. 556; Add. MSS. 12497 f. 143 (" Sir John Fortescue's meanes of gaine by Sir R. Thikstin told me [Sir Julius Caesar]"); Hist. MSS. Comm., Marquis of Salisbury's MSS.; Spedding's Life of Bacon ; Architectural and Archaeological Soc. for Bucks, Records of Bucks, vol. i. p. 86. (P. C. Y.)

FORTEVIOT, a village and parish of Perthshire, Scotland, on the Water of May, a right-hand affluent of the Earn, 6| m. S.W. of Perth. Pop. of parish (1901) 562. It is a place of remote antiquity, having been a capital of the Picts, when thedistrict was known as Fortrenn, and afterwards of the Scots. The army led by Edward Baliol camped here before the battle of Dupplin (1332), in which the regent, Donald, earl of Mar, was slain along with 13,000 out of 30,000 men. The parish of Findo-Gask adjoining it on the N.W. contains remains of a Roman road, station and outpost, besides the " auld hoose " of Gask in which the Baroness Nairne was born, and which forms the theme of one of her most popular songs. The new house in which she died dates from 1801.

*FORT GEORGE, a military station of Inverness-shire, Scotland. It lies 12 m. N.E. of Inverness, and is the terminus of the small branch line connecting with the Highland railway at Gollanfield junction. It occupies a sandy promontory forming the extreme end of the southern shore of Inner Moray Firth (also called the Firth of Inverness), which is here only 1 in. wide. There is communication by ferry with Fortrose on the opposite coast of * the Black Isle. The fort was begun in 1 748, partly after the plan of one of Vauban's works, and named in honour of George II. Wolfe, who saw it in course of erection in 1751, was much im- pressed with it and thought it would, when finished, be " the most considerable fortress and best situated in Great Britain." It covers 16 acres and contains accommodation for nearly 2200 men. It is the depot of the Seaforth Highlanders, and a military training-ground of some size and importance because the surrounding country gives ample facilities for exercise and manoeuvres. General Wade's road is maintained in good order. Fort George, it is said, had almost been chosen as the place of detention for Napoleon when the claims of St Helena were put forward. About 2 m. S.E. is the fishing village of Campbelltown, in growing repute as a seaside resort. Midway between the fort and Inverness stands Castle Stuart, a shooting-box of the earl of Moray.*

FORTH, a river and firth of the east of Scotland. The river is formed by two head streams, Duchray Water (12 m.) and Avondhu (10 m.), or Laggan as it is called after it leaves Loch Ard, both rising in the north-east of Ben Lomond in Stirlingshire, and uniting 1 m. west of Aberfoyle. From this point till it receives the Kelty, the Forth continues to be a Perthshire stream, but afterwards it becomes the dividing line between the counties of

Perth and Stirling as far as the confluence of the Allan. Thence it belongs to Stirlingshire to a point ij m. due west of Cambus, whence it serves as the boundary between the shires of Stirling and Clackmannan. Owing to the extremely tortuous character of its course between Gartmore and Alloa — the famous " links of the Forth," — the actual length of the river is 66 m., or nearly double the distance in a direct line (30 m.) between the source of the Duchray and Kincardine, where the firth begins. The river drains an area of 645 sq. m. Its general direction is mainly easterly with a gentle trend towards the south, and the principal tributaries on the left are the Goodie, Teith, Allan and Devon, and on the right, the Kelty, Boquhan 1 Annates, 613.

and Bannock. The alluvial plain extending from Gartmore to the county town is called the Carse of Stirling. The places 'of interest on the banks are Aberfoyle, Kippen, Stirling, Cambus- kenneth, Alloa and Kincardine, but after it crosses the Highland line the Forth does not present many passages of remarkable beauty. There are bridges at Aberfoyle, Gartmore, Frew, Drip and Stirling (2), besides railway viaducts at Stirling and Alloa, and there are ferries at Stirling (for Cambuskenneth), Alloa (for South Alloa) and Kincardine (for Airth). The tide rises to 4! m. above Stirling, where the river is navigable at high water by vessels of 100 tons. There is, however, a brisk shipping trade at Alloa, where the dock accommodates vessels of at least 300 tons.

The Firth of Forth extends from Kincardine to the North Sea, that is, to an imaginary line drawn, just west of the Isle of May, from the East Neuk of Fife to the mouth of the Tyne in Hadding- tonshire — a distance of 48 m. Thus, according to some calcula- tions, the Forth measures from source to sea 1 14 m. The width of the firth varies from \ m. at Kincardine and if m. at Queens- ferry to 65 m. at Leith and 175 m. at the mouth. The chief affluents are, on the south, the Carron, Avon, Almond, Leith, Esk and Tyne, and on the north, the Tiel, Leven, Kiel and Dreel. The principal ports on the south shore are Grangemouth, Bo'ness, Granton and Leith, and on the north, Burntisland and Kirkcaldy; but fishery centres and holiday resorts are very numerous on both coasts. Since the opening of the Forth Bridge (see Bridges) in 1890 the ferries at Queensferry and Burntisland have greatly diminished in importance. The fisheries are still considerable, though the oyster trade is dwindling. The larger islands are Inchcolm, with the ruins of an abbey, Inchkeith, with fortifications and a lighthouse, and the Isle of May, with a lighthouse. The anchorage of St Margaret's Hope, with the naval base of Rosyth, lies off the shore of Fife immediately to the west of the Forth Bridge.

The Forth was the Bodotria of Tacitus and the Scots Water of the chroniclers of the nth and 12th centuries; while Bede (d. 735) knew the

firth as Sinus orientalis (the Eastern Gulf), and Nennius (fl. 796) as Mare Friesicum (the Frisian Sea).

FORTIFICATION AND SIEGECRAFT. "Fortification" is the military art of strengthening positions against attack. The word (La.t.forlis, strong, and facere, to make) implies the creation of defences. Thus the boy who from the top of a mound defies his comrades, or shelters from their snowballs behind a fence, is merely taking advantage of ground; but if he puts up a hurdle on his mound and stands behind that he has fortified his position.

Fortification consists of two elements, viz. protection and obstacle. The protection shields the defender from the enemy's missiles; the obstacle prevents the enemy from coming to close quarters, and delays him under fire.

Protection may be of several kinds, direct or indirect. Direct protection is given by a wall or rampart of earth, strong enough to stop the enemy's missiles. The value of this is reduced in proportion as the defender has to expose himself to return the enemy's fire, or to resist his attempts to destroy the defences. Indirect protection is given by distance, as for instance by a high wall placed on a cliff so that the defender on the top of the wall is out of reach of the enemy's missiles if these are of short range, such as arrows. This kind of defence was very popular in the middle ages. In the present day the same object is attained by pushing out detached forts to such a distance from the town they are protecting that the besieger cannot bombard the town as long as he is outside the forts. Another form of indirect protection of great importance is concealment.

The obstacle may consist of anything which will impede the enemy's advance and prevent him from coming to close quarters. In the earliest forms of fortification the protecting wall was also the obstacle, or it may be a wet or dry ditch, an entanglement, a swamp, a thorn hedge, a spiked palisade, or some temporary expedient, such as crows' feet or chevaux de frise. The two elements must of course be arranged in combination. The besieged must be able to defend the obstacle from their protected position, otherwise it can be surmounted or destroyed at leisure. But a close connexion is no longer essential. The effect of modern

firearms permits of great elasticity in the disposition of the obstacle; and this simplifies some of the problems of defence.

Protection must be arranged mainly with reference to the enemy's methods of attack and the weapons he uses. The obstacle, on the other hand, should be of such a nature as to bring out the best effects of the defender's weapons. It follows from this that a well-armed force operating against a badly- armed uncivilized enemy may use with advantage very simple old-fashioned methods of protection; or even dispense with it altogether if the obstacle is a good one.

When the assailant has modern weapons the importance of protection is very great. In fact, it may be said that in propor- tion as missile weapons have grown more effective, the importance of protection and the difficulty of providing it have increased, while the necessity for a monumental physical obstacle has decreased.

The art of the engineer who is about to fortify consists in appreciating and harmonizing all the conditions of the problem, such as the weapons in use, nature of the ground, materials available, temper of assailants and defenders, strategical possi- bilities, expenditure to be incurred, and so forth. Few of these conditions are in themselves difficult to understand, but they are so many and their reactions are so complex that a real familiarity with all of them is essential to successful work. The keynote of the solution should be simplicity; but this is the first point usually lost sight of by the makers of " systems," especially by those who during a long period of peace have time to give play to their imaginations.

Fortification is usually divided into two branches, namely permanent fortification and field fortification. Permanent fortifica- tions are erected at leisure, with all the resources that a state can supply of constructive and mechanical skill, and are built of enduring materials. Field fortifications are extemporized by troops in the field, perhaps assisted by such local labour and tools as may be procurable, and with materials that do not require much preparation, such as earth, brushwood and light timber. There is also an intermediate branch known as semi- permanent fortification. This is employed when in the course of a campaign it becomes desirable to protect some locality with the best imitation of permanent defences that can be made in a short time, ample resources and skilled civilian labour being available.

The objects of fortification are various. The vast enceintes of Nineveh and Babylon were planned so that in time of war they might give shelter to the whole population of the country except the field army, with their flocks and herds and household stuff. The same idea may be seen to-day in the walls of such cities as Kano. In the middle ages feudal lords built castles for security against the attacks of their neighbours, and also to watch over towns or bridges or fords from which they drew revenue; whilst rich towns

were surrounded with walls merely for the protection of their own inhabitants and their property. The feudal castles lost their importance when the art of cannon- founding was fairly developed; and in the leisurely wars of the 17th and 1 8th centuries, when roads were few and bad, a swarm of fortified towns, large and small, played a great part in delaying the march of victorious armies.

In the present day isolated forts are seldom used, and only for such purposes as to block passes in mountainous districts. Fortresses are used either to protect points of vital importance, such as capital cities, military depots and dockyards, or at strategic points such as railway junctions. Combinations of fortresses are also used for more general strategic purposes, as will be explained later.

I. History

The most elementary type of fortification is the thorn hedge,

a type which naturally recurs from age to age under primitive

conditions. Thus, Alexander found the villages of the

methods. Hyrcanians defended by thick hedges, and the same

arrangements may be seen to-day among the least

civilized tribes of Africa. The next advance from the hedge is

the bank of earth, with the exterior made steep by revetments of sods or hurdle-work. This has a double advantage over the hedge, as, besides being a better obstacle against assault, it gives the defenders an advantage of position in a hand-to-hand fight. Such banks formed the defences of the German towns in Caesar's time, and they were constructed with a high degree of skill. Timber being plentiful, the parapets were built of alternate layers of stones, earth and tree trunks. The latter were built in at right angles to the length of the parapet, and were thus very difficult to displace, while the earth prevented their being set on fire. The bank was often strengthened by a palisade of tree trunks or hurdle-work.

After the bank the most important step in advance for a nation progressing in the arts was the wall, of masonry, sun-dried brick or mud. The history of the development of the wall and of the methods of attacking it is the history of fortification for several thousand years.

The first necessity for the wall was height, to give security against escalade. The second was thickness, sothat the defenders might have a platform on

the top which would give them space to circulate freely and to use their weapons. A lofty wall, thick enough at the top for purposes of defence, would be very ex- pensive if built of solid masonry; therefore the plan was early introduced of building two walls with a filling of earth or rubble between them. The face of the outer wall would be carried up a few feet above the platform, and crenellated to give protection against arrows and other projectiles.

The next forward step for the defence was the construction of towers at intervals along the wall. These provided flanking fire along the front; they also afforded refuges for the garrison in case of a successful escalade, and from them the platform could be enfiladed.

The evolution of the wall with towers was simple. The main requirements were despotic power and unlimited labour. Thus the finest examples of the system known to history are also amongst the earliest. One of these was Nineveh, built more than 2000 years B.C. The object of its huge -perimeter, more than 50 m., has been mentioned. The wall was 120 ft. high and 30 ft. thick; and there were 1500 towers.

After this no practical advance in the art of fortification was made for a very long time, from a constructional point of view. Many centuries indeed elapsed before the inventive genius of man evolved engines and methods of attack fit to cope with such colossal obstacles.

The earliest form of attack was of course escalade, either by ladders or by heaping up a ramp of faggots or other portable materials. When the increasing height of walls made escalade too difficult, other means of attack had to be invented. Probably the first of these were the ram, for battering down the walls, and mining. The latter might have two objects: (a) to drive an underground gallery below the wall from the besiegers' position into the fortress, or (6) to destroy the wall itself by undermining.

The use of missile engines for throwing heavy projectiles probably came later. They are mentioned in the preparations made for the defence of Jerusalem against the Philistines in the 8th century B.C. They are not mentioned in connexion with the siege of Troy. At the sieges of Tyre and Jerusalem by Nebuchad- rezzar in 587 B.C. we first find mention of the ram and of movable towers placed on mounds to overlook the walls.

The Asiatics, however, had not the qualities of mind necessary for a systematic development of siegecraft, and it was left for the Greeks practically to create this science. Taking it up in the 5th century B.C. they soon, under Philip Hme^* 1 of Macedon and Alexander, arrived at a very high degree of skill. They invented and systematized methods which were

afterwards perfected by the Romans. Alexander's siegecraft was extremely practical. His successors endeavoured to improve on it by increasing the size of their missile and other engines, which, however, were so cumbrous that they were of little use. When the Romans a little later took up the science they returned to the practical methods of Alexander, and by the time of Caesar's 'wars had become past-masters of it. The

highest development of siegecraft before the use of gunpowder was probably attained in the early days of the Roman empire. The beginning of the Christian era is therefore a suitable period at which to take a survey of the arts of fortification and siege- craft as practised by the ancients.

In fortification the wall with towers was still the leading idea.

The towers were preferred circular in plan, as this form offered the

best resistance to the ram. The wall was usually re-

Condltlons ; n f orcec j by a ditch, which had three advantages: it

°pe n ' a X increased the height of the obstacle, made the bringing

Chrl tf it U P°' tne engines of attack more difficult, and supplied

s material for the filling of the wall. In special cases, as at

Jerusalem and Rhodes, the enclosure walls were doubled

and trebled. Citadels were also built on a large scale.

The typical site preferred by the Romans for a fortified town was on high ground sloping to a river on one side and with steep slopes falling away on the other three sides. At the highest point was a castle serving as citadel. The town enclosure was designed in accordance with the character of the surrounding country. Where the enemy's approach was easiest, the walls were higher, flanking towers stronger and ditches wider and deeper. Some of the towers were made high for look-out posts. If there was a bridge over the river, it was defended by a bridge-head on the far side; and stockades defended by towers were built out from either bank above and below the bridge, between which chains or booms could be stretched to bar the passage.

The natural features of the ground were skilfully utilized. Thus when a large town was spread over an irregular site broken by hills, the enceinte wall would be carried over the top of the hills; and in the intervening valleys the wall would not only be made stronger, but would be somewhat drawn back to allow of a flanking defence from the hill tops on either side. The walls would consist of two strong masonry faces, 20 ft. apart, the space between filled with earth and stones. Usually when the lie of the ground was favourable, \he outside of the wall would be much higher than the inside, the parapet walk perhaps being but a little above the level of the town. Palisades were used to strengthen the ditches, especially before the gates.

There was little scope, however, in masonry for the genius of Roman warfare, which had a better opportunity in the active work of attack and defence. For siegecraft the Roman legions were specially apt. No modern engineer, civil or military, accustomed to rely on machinery, steam and hydraulic apparatus, could hope to emulate the feats of the legionaries. In earthworks they ex- celled; and in such work as building and moving about colossal wooden towers under war conditions, they accomplished things at which nowadays we can only wonder.

The attack was carried on mainly by the use of" engines," under which head were included all mechanical means of attack — towers, missile engines such as catapults and balistae, rams of different kinds, " tortoises " (see below), &c. Mining, too, was freely resorted to, also approach trenches, the use of which had been introduced by the Greeks.*

The object of mining, as has been said, might be the driving of a gallery under the wall into the interior of the place, or the destruction of the wall. The latter was effected by excavating large chambers under the foundations. These were supported while the excavation was proceeding by timber struts and planking. When the chambers were large enough the timber supports were burnt and the wall collapsed. The besieged replied to the mining attack by counter- mines. With these they would undermine and destroy the be- siegers' galleries, or would break into them and drive out the workers, either by force of arms or by filling the galleries with smoke.

Breaches in the wall were made by rams. These were of two kinds. For dislodging the cemented masonry of the face of the wall, steel-pointed heads were used; when this was done, another head, shaped like a ram's head, was substituted for battering down the filling of the wall.

For escalade they used ladders fixed on wheeled platforms; but the most important means of attack against a high wall were the movable towers of wood. These were built so high that from their tops the parapet walk of the

wall could be swept with arrows and stones; and drawbridges were let down from them, by which a storming party could reach the top of the wall. The height of the towers was from 70 to 150 ft. They were moved on wheels of solid oak or elm, 6 to 12 ft. in diameter and 3 to 4 ft. thick. The ground floor contained one or two rams. The upper floors, of which there might be as many as fifteen, were furnished with missile engines of a smaller kind. The archers occupied the top floor. There also were placed reservoirs of water to extinguish fire. These were filled by force pumps and fitted with hose made of the intestines of cattle. Drawbridges, either hanging or worked on rollers,, were placed at the proper height to give access to the top of the wall, or to a breach, as might be required. Apollodorus proposed to place a couple of rams in the upper part of the tower to destroy the crenellations of the wall.

The siege towers had of course to be very solidly built of strong timbers to resist the heavy stones thrown by the engines of the

defence. They were protected against fire by screens of osiers, plaited rope or raw hides. Sometimes it was necessary, in order to gain greater height, to place them on high terraces of earth. In that case they would be built on the site. At the siege of Marseilles, described by Caesar, special methods of attack had to be employed on account of the strength of the engines used by the besieged and their frequent sallies to destroy the siege works. A square fort, with brick walls 30 ft. long and 5 ft. thick, was built in front of one of the towers of the town to resist sorties. This fort was subse- quently raised to a height of six storeys, under shelter of a roof which projected beyond the walls, and from the eaves of which hung heavy mats made of ships' cables. The mats protected the men working at the walls, and as these were built up the roof was gradually raised by the use of endless screws. The roof was made of heavy beams and planks, over which were laid bricks and clay, and the whole was covered with mats and hides to prevent the bricks from being dislodged. This structure was completed without the loss of a man, and could only have been built by the Romans, whose soldiers were all skilled workmen.

Although these towers were provided with bridges by which storming parties could reach the top of the wall, their main object was usually to dominate the defence and keep down the fire from the walls and towers. Under this protection breaching operations could be carried on. The approaches to the wall were usually made under shelter of galleries of timber or hurdle- work, which were placed on wheels and moved into position as required. When the wall was reached, a shelter of stronger construction, known as a " rat," was placed in position against it. Under this a ram was swung or worked on rollers; or the rat might.be used as a shelter for miners or for workmen cutting away the face of the wall. The great rat at Marseilles, which

extended from the tower already described to the base of the tower of the city, was 60 ft. long, and built largely of great beams 2 ft. square, connected by iron pins and bands. It was unusually narrow, the ground sills of the side walls being only 4 ft. apart. This was no doubt in order to keep down the weight of the structure, which, massive as it was, had to be movable. The sloping roof and sides of timber were protected, like those of the tower, with bricks and moist clay, hides and wool mattresses. Huge stones and barrels of blazing pitch were thrown from the wall upon this rat without effect, and under its cover the soldiers loosened and removed the foundations of the tower until it fell down.

In order that it might be possible to move these heavy structures, it was usually necessary to fill up the ditch or to level the surface of the ground. For this purpose an " approach tortoise " was often used. This was a shelter, something between the ordinary gallery and the rat, which was moved end on towards the wall, and had an open front with a hood, under cover of which the earth brought up for filling the ditch was distributed.

The missile engines threw stones up to 600 lb weight, heavy darts from 6 to 12 ft. long, and Greek fire. Archimedes at the siege of Syracuse even made some throwing 1800 lb. The ranges varied, according to the machine and the weight thrown, up to 600 yds. for direct fire and 1000 yds. for curved fire. At the siege of Jeru- salem Titus employed three hundred catapults of different sizes and forty balistae, of which the smallest threw missiles of 75 lb weight. At Carthage Scipio found 120 large and 281 medium catapults, 23 large and 52 small balistae, and a great number of scorpions and other small missile engines.

Screens and mantlets for the protection of the engine-workers were used in great variety.

In addition to the above, great mechanical skill was shown in the construction of many kinds of machines for occasional purposes. A kind of jib crane of great height on a movable platform was used to hoist a cage containing fifteen or twenty men on to the wall. A long spar with a steel claw at the end, swung in the middle from a lofty frame, served to pull down the upper parts of parapets and overhanging galleries. The defenders on their side were not slow in replying with similar devices. Fenders were let down from the wall to soften the blow of the ram, or the ram heads were caught and held by cranes. Grapnels were lowered from cranes to seize the rats and overturn them. Archimedes used the same idea in the defence of Syracuse for lifting and sinking the Roman galleys. Wooden towers were built on the walls to overtop the towers of the besiegers. Many devices for throwing fire were employed. The tradition that Archimedes burnt the Roman fleet, or a portion of it, at Syracuse, by focusing the rays

of the sun with reflectors, is supported by an experiment made by Buffon in 1747. With a re- flector having a surface of 50 sq. ft., made up of 168 small mirrors each 6 by 8 in., lead was melted at a distance of 140 ft. and wood was set on fire at 160 ft.

_ The development of masonry in permanent fortification had long since reached its practical limit, and was no longer proof against the destructive methods that had been evolved. The extemporized defences were, as is always the case, worn down by a resolute besieger, and the attack was stronger than the defence.

Through the dark ages the Eastern Empire kept alive the twin sciences of fortification and siegecraft long enough for the Crusaders to learn from them what had been lost in the West,

mate

ages.

Byzantium, however, always a storehouse of military science, while conserving a knowledge of the ancient methods and the great missile engines, contributed no new ideas to fortification, so far as we know. In practice the Byzantines favoured multiplie'd enceintes or several concentric lines of defence. This of course is always a tendency of decadent nations.

In the West the Roman fortifications remained standing, and the Visigoths, allies of Rome, utilized their principles in the defences of Carcassonne, Toulouse, &c. in the 5th century. Viollet-le-Duc's description and illustrations of the defences of Carcassonne will give a very good idea of the methods then in use: —

" The Visigoth fortification of the city of Carcassonne, which is still preserved, offers an analogous arrangement recalling those described by Vegetius. The level of the town is much more elevated than the ground outside, and almost as high as the parapet walks. The curtain walls, of great thickness, are composed of two faces of small cubical masonry alternating with courses of brick; the middle portion being filled, not with earth but with rubble run with lime. The towers were raised above these curtains, and their com- munication with the latter might be cut off, so as to make of each

tower a small inde- pendent fort ; ex- ternally these towers are cylindrical, and on the side of the town square ; they rest, also towards the country, upon a cubical base or foundation. We subjoin (fig. 1) the plan of one of these towers with the cur- tains adjoining. A is the plan of the ground-level; B the plan of the first storey at the level of the parapet. We see, at C and D, the two excavations formed in front of the gates of the tower to intercept, when the drawbridges were raised,' all communication between the town or the parapet walk and the several storeys of the tower. From the first storey access was had to the upper crenellated or battlemented portion of the tower by a ladder of wood placed interiorly against the side of the flat wall. The external ground-level was much lower than that of the tower, and also beneath the ground-level of the town, from which it was reached by a descending flight of from ten to fifteen steps. Fig. 2 shows the tower and its two curtains on the

FlG. 1. — Plan of one of the Towers at Carcassonne.

Fig. 2. — One of the Towers at Carcassonne, inside view.

side of the town ; the bridges of communication are supposed to have been removed. The battlemented portion at the top is covered with a roof, and open on the side of the town in order to permit the defenders of the tower to see what was going on therein, and also to allow of their hoisting up stones and other projectiles by means of a rope and pulley. Fig. 3 shows the same tower on the side towards the country; we have added a postern, the sill of which is sufficiently raised above the ground to necessitate the use of a scaling or step ladder, to obtain ingress. The postern is defended, as was customary, by a palisade or barrier, each gate or postern being provided with a work of this kind."

Meanwhile, in western Europe, siegecraft had almost dis- appeared. Its perfect development was only possible for an army like that of the Romans. The Huns and Goths knew

Fig. 3.

-One of the Towers at Carcassonne, outside view.

nothing of it, and the efforts of Charlemagne and others of the

Frankish kings to restore the art were hampered by the fact that

their warriors despised handicrafts and understood nothing

but the use of their weapons. During the dark ages the towns

of the Gauls retained their old Roman and Visigoth defences,

which no one knew properly how to attack, and accordingly the

sieges of that period dragged themselves out through long years,

and if ultimately

successful were so as

a rule only through

blockade and famine.

It was not until the

nth century that

siegecraft was revived

in the West on the

ancient lines.

By this time a new

departure of great

importance _ ., , , . Castles.

had been

*made in the seig- neurial castle (q.v.), which restored for some centuries a defi- nite superiority to the defence. Built primarily as strong- holds for local mag- nates or for small bodies of warriors dominating a conquered country, the conditions which called them into existence offered several marked advantages. The defences of a town had to follow the growth of the town, and would naturally have weak points. It was not to be expected that a town would develop itself in the manner most suitable for defence; nor indeed that any position large enough for a town could be found that would be naturally strong all round. But the site of a castle could be chosen purely for its natural strength, without regard, except as a secondary consideration, to*the protection of anything outside it; and as its area was small it was often easy to find a natural position entirely suited for the purpose. In fact it frequently happened that the existence of such a position was the raison d'etre of the castle. A small hill with steep sides might well be un- approachable in every direction by such cumbrous structures as*

towers and rats, while the height of the hill, added to the height of the walls, would be too much for the besiegers' missiles. If the sides of the hill were precipitous and rocky, mining became impossible, and the site was perfect for defence. A castle built under such conditions was practically impregnable; and this was the cause of the independence of the barons in the nth and 12th centuries. They could only be reduced by blockade, and a blockade of long duration was very difficult in the feudal age.

A very instructive example of 12th-century work is the Chateau Gaillard, built by Richard Coeur-de-Lion in 11 96. This great castle, with ditches and escarpments cut out of the solid rock, and extensive outworks, was completed in one year. In the article Castle will be found the plan of the main work, which is here supplemented by an elevation of the donjon (or keep). The waved face of the inner or main wall of the castle, giving a divergent fire over the front, is an interesting feature in advance of the time. So also is the masonry protection of the machicolation at the top of the donjon, a protection which at that time was usually given by wooden hoardings. After the death of Richard, Philip Augustus besieged the chateau, and carried it after a blockade of seven months and a regular attack of one month. In this attack the tower at A was first mined, after which the whole of that outwork was abandoned by the defenders. The outer enceinte was next captured by sur- prise; and finally the gate of the main wall was breached by the pioneers. When this happened a sudden rush of the besieger?

prevented the remains of the garrison from gaining the shelter of the donjon, and they had to lay down their arms.

Chateau Gaillard, designed by perhaps the greatest general of his time, exemplifies in its brief resistance the weak points of the designs of the 12 th century. It is easy to understand how at each step gained by the besiegers the very difficulties which had been placed in the way of their further advance prevented the garrison from reinforcing strongly the points attacked. In the 13th century many influences were at work in the development of castellar fortification. The experience of such sieges as that of Chateau Gaillard, and still more that gained in the Crusades, the larger garrisons at the disposal of the great feudal lords, and the importance of the interests which they had to protect in their towns, led to a freer style of design. We must also take note of an essential difference between the forms

of attack preferred by the Roman soldiery and by the medieval chivalry. The former, who were artisans as well as soldiers, pre- ferred in siege works the cer- tain if laborious methods of breaching and mining. The latter, who considered all manual labour beneath them and whose only ideal of warfare was personal combat, affected the tower and its bridge, giving access to the top of the wall rather than the rat and battering- ram. They were also fond of surprises, which the bad discipline of trie time favoured.

We find, therefore, im- portant progress in enlarg- ing the area of defence and in improving arrangements for flanking. The size and height of all works were increased. The keep of Coucy Castle, built in 1220, was 200 ft. high. Mon- targis Castle, also built about this time, had a central donjon and a large open enclosure, within which the whole garrison could move freely, to reinforce quickly any threatened point. The effect of flanking fire was increased by giving more projection to the towers, whose sides were in some cases made at right angles to the curtain walls.

We find also a tendency, the influence of which lasted long after medieval times, towards complexity and multiplication of defences, to guard against surprise and localize successful assaults. Great attention was paid to the " step by step " defence. Flanking towers were cut off from their walls and arranged for separate resistance. Complicated entrances with traps and many doors were arranged. Almost all defence was from the tops of the walls and towers, the loopholes on the lower storeys being mainly for light and air and reconnoitring. Machicouli galleries (for vertical defence) were protected either by stone walls built out on corbels, or by strong timber hoardings built in war time, for which the walls were prepared beforehand by recesses left in the masonry. Loopholes and crenelles were protected by shutters. Great care and much ingenuity were expended on details of all kinds.

Already in the 12th century the engineers of the defence had made provision for countermining, by building chambers and galleries at the base of the towers and walls. Further protection for the towers against the pioneer attack was given by carrying out the masonry in front of the tower in a kind of projecting horn. This was found later to have the further advantages of doing away with the dead ground in front of the tower unseen from the curtain, and of increasing the projection and therefore

Fig. 4. — Donjon, Ch&teau Gaillard.

Fig. 5. — Plan of Carcassonne, 13th century.

the flanking power of the tower itself. The arrangement is seen in several of

the towers at Carcassonne, and has in it the germ of the idea of the bastion.

The defences of Carcassonne, remodelled in the latter half of the 13th century on the old Visigoth foundations, exemplify some of the best work of the period. Figs. 5 and 6 (reproduced from Viollet- le-Duc) show the plan of the defences of the town and castle, and a bird's-eye view of the castle with its two barbicans. The thick black line shows the main wall; beyond this are the lists and then the moat. It will be noted that the wall of the lists as well as the main wall is defended by towers. There are only two gates. That on the east is de- fended by two great towers and a semicircular bar- bican. The gate of the castle, on the west, has a most complicated approach defended by a labyrinth of gates and flanking walls, which can- not be shown on this small scale, and beyond these ' is a huge circular barbican in several storeys, capable of holding 1500 men. On the side of the town the castle is protected by a wide moat, and the entrance is masked by another large semicircular barbi- can. An interest- ing feature of the general arrange- ment is the import- ance which the lists have assumed. The slight wooden barricade of older times has developed into a wall with towers; and the effect is that the besieger, if he gains a footing in the lists, has a very narrow space in which to work the engines of attack. The castle, after the Roman fashion, adjoins the outer wall of the town, so that there may be a possibility of communicating with a relieving force from outside after the town has fallen. There were also several posterns, small openings made in the wall at some height above the ground, for use with rope ladders.

The siegecraft of the period was still that of the ancients. Mining was the most effective form of attack, and the approach to the walls was covered by engines throwing great stones against the hoardings of the parapets, and by cross-bowmen who were sheltered behind light mantlets moved on wheels. Barrels of burning pitch and other incendiary projectiles were thrown as before; and at one siege we read of the carcasses of dead horses and barrels of sewage being thrown into the town to breed pestilence, which had the effect of forcing a capitulation.

With all this the attack was inferior to the defence. As Professor C. W. C. Oman has pointed out, the mechanical application of the three powers of tension, torsion and counter- poise (in the missile engines) had its limits. If these engines were enlarged they grew too costly and unwieldy. If they were multiplied it was impossible on account of their short range and great bulk to concentrate the fire of enough of them on a single portion of the wall.

It is difficult to give anything like an accurate account, in a small space, of the changes in fortification which took place in the first two centuries after the introduction of gunpowder, introduc- The number of existing fortifications that had to be "on of modified was infinite, so also was the number of gua " attempted solutions of the new problems. Engineers had

not yet begun to publish descriptions of their " systems "; also the new names and terms which came into use with the new works were spread over Europe by engineers of different countries, and adopted into new languages without much accuracy.

Artillery was in use for some time before it began to have any effect on the design of fortification. The earliest cannon threw so very light a projectile that they had no effect on masonry and

powder.

were more useful for the defence than the attack. Later, larger pieces were made, which acted practically as mortars, throwing stone balls with high elevation, and barrels of burning com- position. In the middle of the 15th century the art of cannon- founding was much developed by the brothers Bureau in France. They introduced iron cannon balls and greatly strengthened the guns. In 1428 the English besieging Orleans were entirely defeated by the superior artillery of the besieged. By 1450 Charles VII. was furnished with so powerful a siege train that he captured the whole of the castles in Normandy from the English in one year.

But the great change came after the invasion of Italy by Charles VIII. with a greatly improved siege train in 1494. The astonishing rapidity with which castles and fortified towns fell

before him proved the uselessness of the old defences. It became neces- sary to create a new system of defences, and, says Cosseron de Villenoisy, " thanks to the mental activity of the Renaissance and the warlike conditions pre- vailing every- where, the time could not have been more fav- ourable." There is no doubt that the engineers of Italy as a body were responsible for the first ad- vance in fortifi- cation. There, where vital and mental energy were at boiling- point, and where the first striking demonstration of the new force had been given, the greatest intellects, men such as Leonardo da Vinci, Michelangelo and Machiavelli, busied themselves over the problem of defence.

It has been claimed that Albert Diirer was the first writer on modern fortification. This was not so; Diirer's work was published in 1527, and more than one Italian engineer, certainly Martini of Siena and San Gallo, had preceded him. Also Machia- velli, writing between 1512 and 1527,

had offered some most valuable criticisms and general principles. Diirer, moreover, had little influence on the progress of fortification; though we may see in his ideas, if we choose, the germ of the " polygonal " system, developed long afterwards by Montalembert. Diirer's work was to some extent a connecting link between the old fortification and the new. He proposed greatly to enlarge the old towers; and he provided both them and the curtains with vaulted chambers for guns (casemates) in several tiers, so as to command both the ditch and the ground beyond it. His projects were too massive and costly for execution, but his name is associated with the first practical gun casemates.

Before beginning to trace the effect of gunpowder on the design of fortification, it may be noted that two causes weakened the influence of the castles. First, their owners were slow to adopt the new ideas and abandon their high strong walls for low extended parapets, and, secondly, they had not the men necessary for long lines of defence. At the same time the corporations of the towns had learnt to take an active part in

Fig. 6. — Carcassonne Castle and Barbican.

warfare, and provided trained and disciplined soldiers in larg numbers.

When artillery became strong enough to destroy masonry from a distance two results followed: it was necessary to modify the masonry defences so as to make them less vulnerable, and to improve the means of employing the guns of the defence. For both these purposes the older castles with their restricted area were little suited, and we must now trace the development of the fortified towns.

Probably the first form of construction directly due to the appear- ance of the new weapons was the bulwark (boulevard, baluardo or bollwerk). This was an outwork usually semicircular in plan, built of earth consolidated with timber and revetted The but with hurdles. Such works were placed as a shield in wark – front of the gates, which could be destroyed even by the early light cannon-balls; and they offered at the same time advanced positions for the guns of the defence. They were found so useful for gun positions for flanking fire that later they were placed in front of towers or at intervals along the walls for that purpose.

This, however, was only a. temporary expedient, and we have now to consider the radical modifications in designs. These affected both the construction and trace of the walls.

The first lesson taught by improved artillery was that the walls should not be set up on high as targets, but in some manner screened. One method of

doing this in the case of old works was _. by placing bulwarks in front of them. In other cases the lists or outer walls, being surrounded by moats, were already partially screened and suitable for conversion into the main defence; and as with improved flanking defence great height was no longer essential, the tops of the walls were in some cases cut down. In new 'works it was natural to sink the wall in a ditch, the earth from which was useful for making ramparts.

As regards resistance to the effect of shot, it was found that thin masonry walls with rubble filling behind them were very easily destroyed. A bank of earth behind the wall lessened the vibration of the shot, but once a breach was made the earth came down, making a slope easy of ascent. To obviate this, horizontal layers of brushwood, timber and sometimes masonry were built into the earth bank, and answered very well (fig. 7).

Fig. 7.

•w

wstmmt

Fig. 8.

Fig. 9.

Another expedient of still greater value was the use of counter- forts. The earliest counterforts were simply buttresses built inward from the wall into the rampart instead of outward (fig. 8). Their effect was to strengthen the wall and make the breaches more difficult of ascent. An alternative arrangement for strengthening the wall was an arched gallery built behind it under the rampart (fig. 9). This construction was in harmony with the idea, already familiar, of a passage in the wall from which countermines could be started; but it has the obvious weakness that the destruction of the face wall takes away one of the supports of the arch. The best arrangement, which is ascribed to Albert Diirer, was the " counter-arched revetment." This consisted of a series of arches built between the counterforts, with their axes at right angles to the face of the wall. Their advantage was that, while supporting the wall and taking all the weight of the rampart, they formed an obstacle after the destruction of the wall more difficult to sur- mount than the wall itself and very hard to destroy. The counter- arches might be in one, two or three tiers, according to the height of the wall (figs. 10 and 11, the latter without the earth of the rampart and showing also a countermine gallery).

A more important question, however, than the improvement of the passive defence or obstacle was the development of the active

The ram part.

Fig. 10.

defence by artillery. For this purpose it was necessary to find room for the working of the guns. At the outset it was of course a question of modifying the existing defences at as little cost as possible. With this object the roofs of towers were removed and platforms for guns substituted, but this only gave room for one or two guns. Also the loopholes in the lower storeys of towers were converted into embrasures to give a grazing fire over the ditch ; this became the commonest method of strengthen- ing old works for cannon, but was of little use as the resulting field of fire was so small. In some cases the towers were made larger, with a semi- circular front and side walls at right angles to the cur- tain. Such towers built at Langres early in the 16th century had walls 20 ft. thick to resist battering.

Even in new works some attempts were made to combine artillery defence with pure masonry protection. The works of Albert Durer in theory, and the bridge-head of Schaffhausen in practice, are the best examples of this. The Italian engineers also showed much ingenuity in arranging for the defence of ditches with masonry caponiers. These were developed from external buttresses, and equally with the casemated flanking towers of Durer contained the germs of the idea of " polygonal " defence.

The natural solution, however, which was soon generally adopted, was the rampart ; that is, a bank of earth thrown up behind the wall, which, while strengthening the wall as already indicated, offered plenty of space for the disposal of the guns.

The ditch, which had only been occasionally used in ancient and

medieval fortification, now became essential and characteristic.

Serving as it did for the double purpose of supplying

earth for a rampart and allowing the wall to be sunk for

concealment, it was found also to have a definite use as an obstacle.

Hitherto the wall had sufficed for this purpose, the ditch being

useful mainly to prevent the besieger from bringing up his engines of attack.

When the wall (or escarp) was lowered, the obstacle offered by the ditch was increased by revet- ting the far side of it with a counterscarp. Beyond the counterscarp wall some of the earth excavated from the ditch was piled up to increase the protection given to the escarp wall. This earth was sloped down gently on the outer side to meet the natural surface of the ground in such a manner as to be swept by the fire from the ramparts and was called the glacis.

Now, however, a new diffi- In all times a chief element in a successful defence has action by the besieged outside the walls. The old

Fig. 11.

culty arose, consisted i:

ditches, when they existed, had merely a slope on the far side leading up to the ground-level ; and the ditch was a convenient place in which troops preparing for a sortie could assemble with- out being seen by the enemy, and ascend the slope to make their attack. The introduction of the counterscarp wall prevented sorties from the ditch. At first it was customary, after the intro- duction of the counterscarp, to leave a narrow space on the top of it, behind the glacis, for a patrol path. Eventually the difficulty was met by widening this patrol path into a space of about 30 ft., in which there was room for troops to assemble. This was known as the covered way.

With this last addition the ordinary elements of a profile of modern fortification were complete and are exemplified in fig. 12.

Parapet

Fig. 12.

Up to the gunpowder period the trace of fortifications, that is, the plan on which they were arranged on the ground, was very simple. It was merely a question of an enclosure wall adapted to the site and provided with towers at suitable intervals. The

The trace.

foot of the wall could be seen and defended everywhere, from the tops of the towers and the machicoulis galleries. The intro- duction of ramparts and artillery made this more diffi- cult in two ways. The rampart, interposed between the defenders and the face of the wall, put a stop to

vertical defence. Also with the inferior gun-carriages of the time very little depression could be given to the guns, and thus the top of the enceinte wall, with or without a rampart, was not a suitable position for guns intended to flank the ditch in their immediate neighbourhood. The problem of the " trace " therefore at the beginning of the 16th century was to rearrange the line of defence so as to give due opportunity to the artillery of the besieged, both to oppose the besiegers' breaching batteries and later to defend the breaches. At the outset the latter role was the more important.

In considering the early efforts of engineers to solve this problem we must remember that for economical reasons they had to make the best use they could of the existing walls. At first for flanking purposes casemates on the ditch level were used, the old flanking towers being enlarged for the purpose. Masonry galleries were constructed across the ditch, containing casemates which could fire to either side, and after this casemates were used in the counterscarps. Some use was also made of the fire from detached bulwarks. It was soon realized, however, that the flanking defence of the body of the place ought not to be dependent on outworks, and that greater freedom was required for guns than was consistent with casemate defence. The bulwark (which in its earliest shape suggests that it was in some sort the offspring of the barbican, placed to protect an entrance) gave plenty of space for guns, but was too detached for security. The enlarged tower, as an integral part of the lines, gave security, and its walls at right angles to the curtain gave direct flanking fire, but the guns in it were too cramped. The blending of the two ideas produced the bastion, an element of fortification which dominated the science for three hundred years, and so impressed itself on the imagination that to this day any strong advanced position in a defensive line is called by that name by unscientific writers. The word had been in use for a long time in connexion with extemporized towers or platforms for flanking purposes, the earliest forms being bastille, bastide, bastillon, and in its origin it apparently refers rather to the quality of work in the construc- tion than to its defensive intention.

The earliest bastions were modified bulwarks with straight faces and flanks, attached to the main wall, for which the old towers often acted as keeps; and at first the terms bulwark and bastion were more or less interchangeable. Fig. 13, taken from a con- temporary MS. by Viollet-le-Duc, shows a bastion . added to the old wall of Troyes about 1528. On the other hand, in fig. 14 (taken from an English MS. of 1559, which again is based on the Italian work of Zanchi pub- lished in 1554), we find a a spoken of as " bulwarks " and b b as " bastilions." The triangular works between the bastilions are de- scribed as " ram- parts," intended to protect the curtains from breaching fire. (We may also notice in this design the broad ditch, the counterscarp with narrow covered way, and loopholes indicating counterscarp galleries.)

Towards the end of the 16th century the term " bulwark " began to be reserved for banks of earth thrown up a little distance in front of the main wall to protect it from breaching fire, and it thus reverted to its original defensive intention. The term " bastion " henceforth denoted an artillery position connected by flanks to the main wall; and the question of the arrangement of these flanks was -one of the main preoccupations of engineers.

Fig. 13. — Bastion at Troyes.

Flanks retired, casemated or open, or sometimes in several tiers were proposed in infinite variety.

Thus, while in the early part of the 16th century the actual modification of existing defences was proceeding very slowly on account of the expense involved, the era of theoretical " systems " had begun, based on the mutual relations of flank and face. These can be grouped under three heads as follows : —

i. The cremaillere or indented trace: Faces and flanks succeeding each other in regular order (fig. 15).

J"

Fig. 15. Fig. 16.

2. The tenaille trace: Flanks back to back between the faces (fig. 16). The development of the flanks in this case gives us the star trace (fig. 17).

Fig. 17. Fig. 18.

3. The bastioned trace: Flanks facing each other and connected by curtains (fig. 18).

In comparing these three traces it will be observed that unless casemates are used the flanking in the first two is incomplete. Guns on the ramparts of the faces cannot defend the flanks, and therefore there are " dead " angles in the ditch. In the bastioned trace there is no " dead " ground, provided the flanks are so far apart that a shot from the rampart of a flank can reach the ditch at the centre of the curtain.

Here was therefore the parting of the ways. For those who objected to casemate fire, the bastioned trace was the way of salvation. They were soon in the majority; perhaps b tioaed because the symmetry and completeness of the idea trace. captivated the imagination. At all events the

bastioned trace, once fairly developed, held the field in one form or another practically without a rival until near the end of the 18th century. The Italian engineers, who were supreme throughout most of the 16th century, started it; the French, who took the lead in the following century, developed it, and officially never deserted it until late in the 19th century, when the increasing power of artillery made enceintes of secondary importance.

It will be useful at this point to go forward a little, with a couple of explanatory figures, in order to get a grasp of the component

Fig. 19.

parts of the bastioned trace as ultimately developed, and of its outworks.

In fig. 19 ABCD represents part of an imaginary line drawn round the place to be fortified, forming a polygon, regular or irregular.

ABC is an exterior angle or angle of the polygon.

BC is an exterior side.

zz is an interior side.

abcdefghijk is the trace of the enceinte.

bcdef is a bastion.

zdef is a demi-bastion.

de is a face of the bastion. . ef is a flank of the bastion.

fg is the curtain.

bf is the gorge. (Two demi-bastions with the connecting curtain make the bas- tioned front, defghi.)

zd bisecting the exterior angle ABC is the capital of the bastion.

xy is the perpendicular, the proportionate length of which to the exterior side BC (usually about one-sixth) is an important element of the trace.

e/C is the angle of defence.

BC/ is the diminished angle.

cde is the flanked angle or salient angle of the bastion.

e is the shoulder of the bastion.

def is the angle of the shoulder.

efg is the angle of the flank.

The line of the escarp is called the magistral line since it regulates the trace. When plans of fortifications are given without much detail, this line, with that of the counterscarp and the crest of the parapet, are often the only ones shown, — the crest of the parapet, as being the most important line, whence the fire proceeds, being usually emphasized by a thick black line.

Fig. 20, reproduced from a French engraving of 1705, shows an imaginary place fortified as a hexagon with bastions and all the

Fig. 20.

different kinds of outworks then in use. The following is the ex- planation of its figuring and lettering.

1. Flat bastion: Placed in the middle of a curtain when the lines of defence were too long for musketry range.

2. Demi-bastion: Used generally on the bank of a river.

3. Tenaille bastion: Used when the flanked angle is too acute; that is, less than 70°.

4. Redans: Used along the bank of a river, or when the parapet of the covered way can be taken in reverse from the front.

A, B. Ravelins.

C. Demi-lunes: So called from the shape of the gorge. They differ from the ravelins in being placed in front of the bastions instead of the curtains.

D. Counter-guards: Used instead of demi-lunes, which were then going out of fashion.

E. Simple tenaille.

F. Double tenaille (see L and M).

(If the tenaille E is reduced in width towards the gorge, as shown alternatively, it is called a swallow-tail. If the double tenaille is

reduced as at G, it is called a bonnet de pretre. Such works were rarely used.)

H. Hornwork: Much used for gates, &c.

I. Crown-work.

K. Crowned hornwork.

L. M. New forms of tenaille: (N.B. — These are the forms which ultimately retained the name.)

N. New form of work called a demi-lune lunettee, the ravelin N being protected by two counter-guards, O.

P. Re-entering places of arms.

Q. Traverses.

R. Salient places of arms.

5. Places of arms without traverses. T. Orillon, to protect the flank V. X. A double bastion or cavalier.

Y. A retrenchment with a ditch, of the breach Z.

6. Traverses to protect the terreplein of the ramparts from

enfilade.

Turning back now to the middle of the 16th century we find in the early examples of the use of the bastion that there is no attempt made to defend its faces by flanking fire, the .curtains being considered the only weak points of the enceinte. Accord- ingly, the flanks are arranged at right angles to the curtain, and the prolongation of the faces sometimes falls near the middle of it. When it was found that the faces needed protection, the first attempts to give it were made by erecting cavaliers, or raised parapets, behind the parapet of the curtain or in the bastions.

The first example of the complete bastioned system is found in Paciotto's citadel of Antwerp, built in 1568 (fig. 21). Here we

Fig. 21.

have faces, flanks and curtain in due proportion; the faces long enough to contain a powerful battery, and the flanks able to defend both curtain and faces. The weak points:of this trace, due to its being arranged on a small pentagon, are that the terre- plein or interior space of the bastions is rather cramped, and the salient angles too acute.

In the systems published by Speckle of Strassburg in 1589 we find a distinct advance. Speckle's actual constructions in fortification are of no great importance; but he was a century. g reat; traveller and observer, and in his work, published just before his death, he has evidently assimilated, and to some exfent improved, the best ideas that had been put forward up to that time.

Two specimens from Speckle's work are well worth studying as connecting links between the 16th and 17th centuries.

Fig. 22 is early 16th-century work much improved. There are no outworks, except the covered way, now fully developed, with a battery in the re-entering place of arms. The bastions are large, but the faces directed on the curtain get little protection from the Hanks. To make up for this they are flanked by the large cavaliers in the middle of the curtain. The careful arrangement of the flank should be noted; part of it is retired, with two tiers of fire, some of which is arranged to bear on the face of the bastion. The great saliency of the bastion is a weak point, but the whole arrangement is simple and strong.

In the second example, known as Speckle's " reinforced trace " (fig- 2 3) > we find him anticipating the work of the next century. The ravelin is here introduced, and made so large that its faces are in prolongation of those of the bastions. Speckle's other favourite

ideas are here : the cavaliers and double parapets and his own particular invention of the low batteries behind the re-entering place of arms and the gorge of the ravelin. These low batteries did not find favour with other writers, being liable to be too easily destroyed by the besiegers'batteries crowning the salients of the covered way.

Speckle's book is of great import- anceas embodying the best work of the period. His own ideas are large and simple, but rather in advance of the powers of the artillery of his day.

At the begin- ning of the 17th century we find the Italian en- gineers following Paciotto in de- veloping the com- plete bastioned p IG 22 trace; but they

got on to a bad line of thought in trying to reduce everything to symmetry and system. The era of geometrical Tfie/rai fortification (or, as Sir George Clarke has called it, century. " drawing-board " fortification) had already begun with Marchi, and his followers busied themselves entirely in finding geometrical solutions for the application of symmetrical bastioned fronts to such imaginary forms of perimeter as the oval, club, heart, figure of eight, &c. Marchi, however, was one of the first to think of prolonging the resistance of a place by means of outworks such as the ravelin. De Villenoisy says that Busca was the first to discuss the proportions and functions of

Fig. 23. — Speckle's Reinforced Trace.

all the component parts of a front; and Floriani, about 1630, was the last of the important Italians. The characteristics of a good deal of Spanish fortification carried out at this time were, according to the same authority, that the works were well adapted to sites, and the masonry excellent but too much exposed, while the bastions were too small. The Dutch and German schools will be referred to later.

The French engineers now began to take the lead in adapting the principles already established to actual sites. In the first half of the century the names of de Ville and Pagan stand out as having contributed valuable studies to the advancement of the science. In putting forward their designs they discussed very fully such practical questions as the length of the line of defence, whether this should be governed by the range of artillery or musketry fire, the length of flanks, the use in them of orillons, casemates and retired flanks, the size of bastions, &c.

It is the latter half of the 17th century, however, which is one

of the most important periods in the history of fortification, chiefly because it was illuminated by the work of Vauban. It was at this time also that a prodigious output of purely theoretical fortification began, which went on till the French Revolution. Many of the "systems" published at this time were elaborated by men who had no practical knowledge of the subject,

some of them priests who were engaged in educating the sons of the upper classes, and who had to teach the elements of fortification among other things. They naturally wrote treatises, which were valuable for their clearness of style; and with their industry and ingenuity the elaboration of existing methods was a very congenial task. Most of these essays took the form of multiplication and elaboration of outworks on an im- possible scale, and they culminated in such fantastic extravagances as the system of Rhana, published in 1769 (fig. 24). These proposals, however, were of no practical importance.

The work of the . real masters who knew more than they published can always be recognized by its com- Vaubaa parative simplicity. The greatest of these was Sebastien le Prestre de Vauban (

Vauban's " first system," as variously described by other writers even in his own time, is pieced together from some

of the early examples of his work. The " second system " is the " tower bastion " defence of Bel- fort and Landau (1684- 1688), obviously suggested by a design of Castriotto's one hundred years earlier; and the " third system " is the front of Neu- Breisach (1698), which is merely Landau slightly FlG- 24- improved. In other

works, between 1688 and 1698, he did not keep to the tower bastion idea.

It will be convenient to take the " first system," as reproduced in the Royal Military Academy text book of fortification (fig. 25) as typical of much of Vauban's work. It may be observed that he sometimes uses the straight flank, and sometimes the curved flank with orillon. Parapets in several tiers are never used, nor cavaliers. The ravelin is almost always used. It is small, having little artillery power and giving no protection to the shoulders of the bastions. Sometimes it has flanks and occasion- ally a keep.

The tenaille is very generally found. In this form, viz. as a shield to the escarp of the curtain, it was probably invented by

him. Fig. 25 shows two forms. In both the parapet of the tenaille had to be kept low, so that the flanks might defend a breach at the shoulder of the opposite bastion, with artillery fire striking within 12 ft. of the base of the escarp. Traverses are used for the first time on the covered way to guard against enfilade fire; and the re-entering place of arms, to which Vauban attached considerable importance, is large. For the construction of the trace an average length of about

Fig. 25. — Vauban's First System.

400 yds. (which, however, is a matter entirely dependent on the site) may be taken for the exterior side. The perpendicular, except for polygons of less than six sides, is one-sixth, and the faces of the bastions two-sevenths of the exterior side. The flanks are chords of arcs struck from the opposite shoulder as centres. An arc described with the same radius, but with the angle of the flank as a centre, and cutting the perpendicular produced outwardly, gives the salient of the ravelin; the prolongations of the faces of the ravelin fall upon the faces of the bastions at II yds. from the shoulders. The main ditch has a width of 38 yds. at the salient of the bastions, and the counterscarp is directed upon the shoulders of the adjoining bastions. The ditch of the ravelin is 24 yds. wide throughout.

As regards the profile the bastions and curtain have a command of 25 ft. over the country, 17 ft. over the crest of the glacis and 8 ft. over the ravelin. The ditches are 18 ft. deep throughout. The parapets are 18 ft. thick with full revetments. In his later works he used demi-revetments.

Fig. 26 shows the tower bastions of Neu-Breisach, or the so-called •" third system." It is worth introducing, simply as showing that even a mind like Vauban's could not resist in old age the tendency to duplicate defences. Here the main bastions and tenaille are detached from the enceinte. The line of the enceinte is broken with flanks and further flanked by the towers. The ravelin is large and has a keep. The section through the face of' the bastion shows a demi-revetment with wide berm, and a hedge as an additional obstacle.

After Vauban died, though the theories continued, the valuable additions to the system were few. Among his successors in the early part of the 18th century Cormontaingne (g.v.) has the greatest reputation, though his experience K(/J ˆ n . and authority fell far short of Vauban's. He was a turies. clear thinker and writer, and the elements of the system were distinctly advanced by him. His trace includes an enlarged ravelin with flanks, the ends of which were intended to close the gaps at the end of the tenaille, and a keep to the ravelin with flanks. He provides a very large re-entering place of arms, also with a keep, the ditches of which are carefully traced so as to be protected from enfilade by the salients of the ravelin and bastion. He was also in favour of a permanent retrenchment of the gorge of the bastion. His works were printed, with many alterations, more than twenty years after his death, to serve as a text-book for the school of Mezieres. This school was estab- lished in 1748, and from this time forward there was an official school of thought, based on Vauban. Cormontaingne's work, therefore, represents the modifications of Vauban's ideas accepted

HISTORY]

by French engineers in the latter part of the 18th century. The school of Mezieres was afterwards replaced by that of Metz, which carried on its traditions. Such schools are necessarily conservative, and hence, in spite of the gradual improvement in ordnance and firearms, we find the main elements of the bastioned system remaining unchanged right up to the period of

Fig. 26. — Neu-Breisach.

the Franco-German War in 1870. Chasseloup-Laubat tells us that, before the Revolution, to attempt novelties in fortification was to write one's self down ignorant. How far the general form of the bastion with its outworks had become crystallized is evident from a cursory comparison of fig. 27 with Vauban's

Noizet.

early work. This figure is the front of the Metz school in 1822, by General Noizet.

Since, therefore, the official view was that the general outlines of the system were sacred, the efforts of orthodox engineers from Cormontaingne's time onwards were given to improvements of detail, and mainly to retard breaching operations as long as possible. We find enormous pains being bestowed on the study of the comparative heights of the masonry walls and crest levels; with the introduction here and there of glacis slopes in the ditches,

put in both to facilitate their defence and to protect portions of the escarps.

Among the unorthodox two names deserve mention. The first of these is Chasseloup-Laubat (

Chasseloup's main proposals to improve the bastioned system were two : :

First, in order to prevent the bastions from being breached through the gaps made by the ditch of the ravelin, he threw forward the ravelin and its keep outside the main glacis. This had the further advantage of giving great saliency to the ravelin for cross- fire over the terrain of the attack. On the other hand, it made the ravelin liable to capture by the gorge. It is probable that this system would have lent itself to a splendid defence by an able commander with a strong force; but under the opposite conditions it has a

dangerous element of weakness.

Secondly, in order to get freedom to use longer fronts than those admissible for the ordinary bastioned trace, he proposed to extend his exterior side up to about 650 yds. and to break the faces of his bastions; the portion next the shoulder being defended from the flank of the collateral bastion and coinciding with the line of defence, and the portion next the salient, up to about 80 yds. in length, being defended from a central keep or caponier placed in front of the tenaille. The natural criticism of this arrangement is that it combines some of the defects of both the bastioned and polygonal systems without getting the full advantages of either.

Fig. 28 shows a half front of Chasseloup's system, of ordinary length, as actually constructed. The section shows an interesting

Fig. 28.-

Casemates shaded

-Chasseloup-Laubat.

detail, viz. the Chasseloup mask — a detached mask with tunnels for the casemate guns to fire through, the intention of which is to save them from being destroyed from a distance.

The second name is that of Captain Choumara of the French Engineers, born in 1787, whose work was published in 1827.

*Two leading ideas are due to him. The first is that of the " independence of parapets." A glance at any of the plans that have already been shown will show that hitherto the crests of parapets had always been traced parallel to the escarp or magistral *line. Choumara pointed out that, while it was necessary for the escarp to be traced in straight lines with reference to the flanking arrangements, there was no such necessity as regards the parapets. By making the crest of the parapet quite independent of the escarp line he obtained great freedom of direction for his fire. The second idea is that of the " inner glacis." This was a glacis parapet placed in the main ditch to shield the escarp; its effect being to prevent the escarp of the body of the place from being breached in the usual way by batteries crowning the crest of the covered way.*

The need for Choumara's improvements has passed by, but he was in his time a real teacher. One sentence of his strikes a resounding note: " What is chiefly required in fortification is simplicity and strength. It is not on a few little contrivances carefully hidden that one can rely for a good defence. The fate of a place should not depend on the intelligence of a corporal shut up in a small post prepared for his detachment."

t Before leaving the bastioned system it will be of interest to study a couple of actual and complete examples, one irregular and one regular. Fig. 29 shows the defences of Sedan as they were at the end of the 17th century. One sees the touch of Vauban here and there, but the work is for the most part apparently early 17th century. It will be observed that on the river side of the town the defence consists of very irregular bastions with duplicated wet

Fig. 29. — Sedan in 1705.

ditches (see the Dutch style, below) ; and on the other side, where water is not available, strength is sought for by pushing a succession of hornworks far out.

Fig. 30 is Saarlouis, constructed by Vauban in 1680 in his early manner, a remarkable example of symmetry. Vauban of course never thought of aiming at symmetry, which is of itself neither good nor bad, but it is interesting to note such a perfect example of the system.

It must here be remarked that the reproach of " geometrical fortification is in no way applicable to the works of Vauban and his immediate successors. The true geometric fortification, which worshipped symmetry as a fetish, marked, as has been already pointed out, the decadence of the Italian school. Vauban and his fellows excelled in adapting works to sites, the real test of the engineer.

The bastioned system was the 17th-century solution of the forti- fication problem. Given an artillery and musketry of short range and too slow for effective frontal defence, a ditch is necessary as an obstacle. What is the best means of flanking the ditch and of protecting the flanking arrangements? If Vauban elected for the bastion, we must before criticizing his choice remember that he was the most experienced engineer of his day, a man of the first ability and quite without prejudice. What is matter for regret is that the authority of Vauban should have practically paralysed the French school during the 18th and most of the 19th century, so that while the conditions of attack and defence were gradually altering they could admit no change of idea, and their best men, who could not help being original, were struggling against the whole weight of official opposition.

” \ Again, such duplication of outworks as we see at Sedan is not geometric fortification. It is a definite attempt to retard the attack, on ground favourable to it, by successive lines of defence. As to the policy of this, no axiom can be laid down. Nowadays most of us think, as Machiavelli did, that a single line of defence is best and that

a second line only serves to suggest the advisability of retreat. There are also, of course, the recognized drawbacks of outworks, difficulty of retreat, of relief and so forth, and the moral effect of their loss. But the engineers of such defences as Ostend and Candia might well say, ” Oh, if only when we had held on to that bastion for so many months we had had a second and a third line of permanent

Fig. 30.

retrenchment to fall back upon, we could have held the place for ever.” And who shall say that they were wrong ? Let us at all events remember that the leading engineers of that time were men who had passed their lives in a state of war, and that we ourselves in comparison with them are the theorists.

From the end of the 16th century the Dutch methods of fortification acquired a great reputation, thanks to the stout resistance offered to the Spaniards by some of their fortresses, the three years’ defence of Ostend being sc ˆ 00 ” c perhaps the most striking example. Prolonged de- fences, which were mainly due to the desperate energy of the besieged, were credited to the quality of their defences. In point of fact the Dutch owed more to nature, and more still to their own spirit, than to art; but they showed a good deal of skill in adapting recent ideas to their needs.

Three conditions governed the development of the Dutch works at this time, viz. want of time, want of money and abun- dance of water. When the Netherlands began their revolt against Spain, they would no doubt have been glad enough of expensive masonry fortresses on such models as Paciotto’s citadel of Antwerp. But there was neither time nor money for such works. Something had to be extemporized, and fortunately for them they had wet ditches to take the place of high revetted walls. Everywhere water was near the surface, and rivers or canals were available for inundations. A wide and shallow ditch, while making a good obstacle, was also the readiest means of obtaining earth for the ramparts. High command was, owing to the flatness of the country, unnecessary and even undesirable, as it did not allow of grazing fire.

What the Dutch actually did in strengthening their towns gives little evidence of system. Starting as a rule from an existing enceinte, sometimes

a medieval wall, they would provide a broad wet ditch. No further provision was usually made on the sides of the town which were additionally protected by a river or inundation. On the other sides the wet ditch was made still broader, and sometimes contained a counterguard, some- times ravelins and lunettes. These were quite irregular in their design and relation to each other. At the foot of the glacis would be found another but narrower wet ditch, which was a peculiarly Dutch feature; and sometimes if the town was in a bend of a river there would be a canal cut across the bend in a straight line, strengthened by several redans.

Speaking generally, they endeavoured to provide for the want

of a first-class masonry obstacle by multiplication of wet ditches, and further to strengthen these obstacles by great quantities of palisading, for which purpose the timber of old ships was used. They also recognized the inherent weaknesses . of wet ditches, as, for instance, that when frozen they no longer provide an obstacle; and they studied the means, not only of causing inundations, but also of arranging to empty as well as to fill the ditches at will. Simon Stevin was the leader in this work.

Nevertheless a Dutch school of design did come into existence at this time. The leaders, early in the 17th century, were Simon Stevin, Maurice and Henry of Nassau, Marollois and Freitag. The fortress of Coevorden, constructed by Prince Maurice, of which fig. 31 shows a front, is a well-known example of this, and the section shows clearly some typical features of the school.

Fig. 31. — Coevorden.

The elements of the plan are those of the early bastioned trace, but we find added both ravelins and lunettes, very regular in design. There is also the ditch at the foot of the glacis, and surrounding the rampart of the enceinte a continuous fausse-braie. This work, which partook of the nature of both boulevard and counterguard, served several purposes. It was desirable that the weight of the rampart should be drawn back a little from the edge of the ditch, and the fausse-braie filled what would otherwise have been dead ground at the foot of the rampart. It also afforded a grazing fire over the ditch, which was very important, and which the rampart supported by a plunging fire.

Coehoorn (q.v.), the contemporary and nearest rival to Vauban, was the greatest light of the Dutch school. Like Vauban he was distinguished as a fighting engineer, both in attack and defence; but in the attack he differed from him in relying more on powerful artillery fire than systematic earth-works. He introduced the Coehoorn mortar. His " first system," which was employed at Mannheim (fig. 32), is repro- duced for the sake of comparison with the Coevorden front designed a hundred years earlier. Among other points will be

Coehoorn.

Fig. 32. — Coehoorn's First System.

noticed the combination of wet and dry ditches; the very broad main ditch with counterguard; the roomy keep of the ravelin; the expansion of the fausse-brais into an independent low parapet; and the powerful flanking fire in three tiers.

The " tenaille " system and the " polygonal " system which grew out of it are mainly identified with the German school. That school, says von Zastrow, does not, like that of France, represent the authoritative teaching of an school. official establishment, but rather the general practice of the German engineers. It was founded on the principles of Diirer, Speckle and especially Rimpler, and much influenced in execution by Montalembert. " The German engineers desired a simple trace, a strong fortification with retrenchments and keeps, bomb-proof accommodation and an organization suitable for an offensive defence."

These had always been the German principles. Already in the 1 6th century the Prussian defences of Kustrin, Spandau and Peitz had large bomb-proof casemates sufficient for a great part of the garrison. The same thing is seen in the defences of Giogau, Schweidnitz, &c, built by Frederick the Great. These works show various applications of the tenaille system. In 1776 Frederick became acquainted with the work of Montalem- bert, and his influence is seen in the casemates of Kosel.

Whether through the influence of Albert Diirer or not cannot be said, but while the bastion was being developed in France the tenaille and the accompanying casemates from the first found acceptance in Germany, and thence in eastern and northern Europe. De Groote, who wrote in 1618, produced a sort of tenaille system, and may have been the inspiration of Rimpler. Dillich (1640), Landsberg the elder (1648), Griendel d'Aach (1677), Werthmuller (1685) and others advocated both bastion and tenaille, sometimes in combination; the German bastion being usually distinguished by short faces and long flanks.

Rimpler, who was present at the siege of Candia (taken by the Turks in 1669) and died at that of Vienna in 1683, exercised a great influence. He had been struck by the weakness of the early Italian bastions at Candia, and published a book in 1673 called Fortification with Central Bastions, which was practically the polygonal trace. Zastrow thinks that Rimpler inspired Montalembert. He left unfortunately no designs to illustrate his ideas.

Landsberg the younger (1670-1746), a major-general in the Prussian service, who saw many sieges, also had a great influence. He appears to have been the first who frankly advocated the tenaille alone, chiefly on the ground that the flank, which was the most im- portant part of the bastioned system, was also the weakest. Fig. 33 shows his system, published in

1712.

It was, however, ultimately a French- man, Marc Rene Montalembert (q.v.), who was the great apostle of the tenaille, though in his later years he leaned more to the polygonal trace. He objected to the bastioned trace on many grounds; principally that the bastion was a shell trap, that the flanks by ^^"and crossing their fire lost the advantage of the full carnot. range of their weapons, and that the curtain was useless for defence. He took the view that the bastions with their ravelins constituted practically a tenaille trace, spoilt by the detachment of the ravelins and cramped by the presence of the curtains and flanks. His tenaille system consisted of redans, with salient angles of 6o° or more, flanking each other at right angles; from which he gave to his system the name of " per- pendicular fortification."

Lazare Carnot (q.v.), the "Organizer of Victory," was, in

Fig. 33.

Fig. 34.

fortification, a follower of Montalembert, and produced in 1797 a tenaille system (fig. 34) on strong and simple lines.

In 1 8 12 Carnot offered three systems. For a dry and level site he recommended a bastioned trace ; but for wet ditches and for irregular ground, tenaille traces. Both of these latter differ from his 1797 trace in

that the re-entering angle is reinforced by a tenaille whose faces are parallel to the main faces and reach almost to the salients. There are also counterguards in front of the salients, whose ends overlap the ends of the tenaille. (N.B. To avoid confusion between

the tenaille trace and the tenaille, it should be noted that the latter is a low de- tached parapet placed in front of the escarp of the body of the place, partly as a shield, and partly as an additional line of defence. It is used in front of the curtain in the bastioned trace, and in the re-entering angle in the tenaille trace.)

Other important features of Carnot's work were: a continuous general retrench- ment, or interior parapet, following more or less the lines of the main parapet; the use of the detached wall in place of the escarp revetment; and the countersloping glacis. This last (of which Carnot was not the inventor), instead of sloping gently outwards from a crest raised about 8 ft. down to the natural level of the ground, sloped inwards from the ground-level to the bottom of the ditch. The advantage of the additional obstacle of the counterscarp was thus lost to the defence. On the other hand, the besiegers' saps, as they progressed down the glacis, were exposed to a plunging fire from the parapet.

Carnot was also, like Coehoorn, a great believer in the mortar; but while Coehoorn introduced the small portable mortar that bears his name, Carnot expected great results from a 13 in. mortar throwing 600 iron balls at each discharge. He

endeavoured to prove mathemati- cally that the dis- charge of these mortars would in due course kill off

*Fig. 35. — Mortar-casemate*and Detached Wall. , . . ,*

besieging force.

These mortars he emplaced in open fronted mortar-casemates, in concealed positions. Fig. 35 shows in section one of these mortar-casemates, placed between the parapet of the retrench- ment and a detached wall.

The leading idea of Montalembert was that for a successful defence it was necessary for the artillery to be superior to that

of the enemy. This idea led him to the adoption of The poly- , . ˆ

gonai casemates in several tiers; in preference to open trace. parapets, exposed to artillery fire of all kinds, high angle, ricochet and reverse. In considering the defects of bastions he had arrived at the conclusion that for

flanking purposes two forms of trace were preferable; either the tenaille

form, connecting the ravelins with the body of the place, or the form in ■which the primary flank- ing elements, instead of facing each other with overlapping fire, as with j the bastions, should be I placed back to back in the middle of the exterior side Fig. 36 is an ex- ample of this. The central Fig. 36. — Montalembert, 1786. flanking work resulting

from this arrangement is the caponier of the early Italians, reintroduced and developed; and with it Montalembert laid the foundation of the polygonal system of our own time.

Montalembert was one of the first to foresee the coming necessity for detached forts, and it was for these that he chiefly

proposed to use his caponier flanking, preferring the tenaille system for large places. In abandoning the bastioned trace he was already committed to the principle of casemate defence for ditches; and the combination of this principle with his desire for an overwhelming artillery defence led him in the course of years of controversial writing into somewhat extravagant proposals. For instance, for a square fort of about 400 yds. side, he proposed over 1000 casemate guns; and one of his caponier sections shows 10 tiers of masonry gun-casemates one above the other. Confiding in the power of such an artillery, he freely exposed the upper parts of his casemates to direct fire. Montalembert is said to have contributed more new ideas to fortification than any other man. His designs must be considered in some ways unworkable and unsound, but all the best work of the 1 9th century rests on his teaching. The Germans, who already used the tenaille system and made free provision of bomb-proof casemates, took from him the polygonal trace and the idea of the entrenched camp.

The polygonal system in fortification implies straight or slightly broken exterior sides, flanked by casemated caponiers. The caponier is the vital point of the front, and is protected in important works by a ravelin and keep. The essence of the system is its simplicity, which allows of its being applied to any sort of ground, level or broken, and to long or short fronts.

The final period of smooth bore artillery is an important one in the history of fortification. It is true that the many expensive works that were constructed at this time were obsolete almost as soon as they were finished; but this was 'eatnnch'ed inevitable, thanks to the pace at which the world was camps. travelling. After the Napoleonic wars the Germanic Confederation began to strengthen its frontiers; and considering that they had not derived much strategic advantage from their existing fort- resses, the Ger- \ \ mans took up Montalembert's idea of entrench- ed camps,

utiliz- ing at the same time his poly- gonal system with modifica- tions for the main enceintes. The Prussians began with the fortresses of Cob- lenz and Cologne ; later Posen, KSnigsberg and other places were treated on the same lines. The Austrians con- structed, among other places, Linz and Verona. The Germanic Confederation reinforced Mainz with improved works, and re- organized en- entirely Rastatt and Ulm. The Bavarians built Germersheim and Ingolstadt. While all these works were conceived in the spirit of Rimpler and Monta- lembert, they showed the differences of national temperament. The Prussian works, simple in design, relied upon powerful artillery fire, and exposed a good deal of masonry to the enemy's view. The Austrians covered part of their masonry with earth and gave more attention to detail.

Fig. 37. — Front at Posen.

The German development of the polygonal system at this time is not of great importance, since the great masonry caponiers were designed without sufficient consideration for the increasing powers of artillery. One example (fig. 37) is given for the sake of historical comparison. It is a front of Posen.

" The exterior side of the front is about 650 yds. (600 metres) long. It is flanked by a central caponier, which is protected by a detached bastion. . . . The main front is broken back to flank the faces of the bastion from casemates behind the escarp, as well as from the parapet.

" The central caponier forms the keep of the whole front and sweeps both the interior and the ditch by its flanking fire. It has two floors of gun-casemates and one for musketry, and Posen. on t jj e t0 p ; s a p ara p e t completely commanding alike the outworks and the body of the place. It contains barrack accom- modation for a battalion of 1000 men, and has a large inner courtyard closed at the gorge by a detached wall. The caponier is itself flanked by three small caponiers at the head, and one at the inner end of each flank.

" The escarp of the body of the place is a simple detached wall; that of the detached bastion is either a detached wall with piers and arches, or a counter-arched revetment. At the salient of the bastion there is a mortar battery under the rampart, and a casemated traverse for howitzers upon the terreplein. The flanks of the bastion are parallel to those of the

caponier, and at the same distance from it as the faces.

" Masonry blockhouses, loopholed for musketry, are provided as keeps of the re-entering and salient places of arms. In the latter case they have stairs leading down into a counterscarp gallery, which serves as a base for countermine galleries, and is connected with the detached bastion by a gallery under the ditch. The counter- scarp is not revetted if the ditch is wet.

" The angle of the polygon should not be less than 160°, in order that the prolongation of the main ditch may fall within the salients of the detached bastions of the neighbouring fronts, and the masonry of the caponiers may thus be hidden from outside view." (R.M.A. Text-book of F. & M.E., 1886.)

We have now reached a period when the " detached fort " becomes of more importance than the organization of the enceinte. The early conception of the r61e of detached forts in connexion with the fortress was to form an entrenched camp within which an army corps could seek safety if necessary. The idea had occurred to Vauban, who added to the permanent defences of Toulon a large camp defended by field parapets attached to one side of the fortress. The substitution of a ring of detached forts, while giving it the greater safety of permanent instead of field defences, gave also a wider area and freer scope for the operations of an army seeking shelter under the guns of a fortress, and at the same time made siege more difficult by increasing the line of investment. The use of the detached fort as a means of protecting the body of the place from bombardment had not yet been made necessary by increased range of artillery.

When these detached forts were first used by Germany the scope of the idea had evidently not been realised, as they were placed much too close to the fortress. Those at Cologne, for instance, were only some 400 or 500 yds. in advance of the ramparts. The same leading idea is seen in most of these forts as in the new enceintes; i.e. a lunette, with a casemated keep at the gorge. The keep is the essential part of the work, the rampart of the lunette serving to protect it from frontal artillery fire. The keep projects to the rear, so as not only to be able to flank its own gorge, but to give some support to the neighbouring works with guns protected from frontal fire. This is a valuable arrangement, which is still sometimes used. The front ditches of the lunettes were flanked by caponiers. Some of the larger forts were simple quadrangular works with casemate barracks and caponier ditch defence.

In 1830, in Austria, the archduke Maximilian made an entirely fresh departure with the defences of Linz. The idea was to provide an entrenched camp at the least possible cost, whose works should require the smallest

possible garrison. With this object Linz was surrounded with a belt of circular towers spaced about 600 yds. apart. The towers, 25 metres in diameter, were enclosed by a ditch and glacis, and contained 3 tiers of casemates. The masonry was concealed from view by the ditch and glacis. On the top of the tower was an earlh parapet, over which a battery of 13 guns fired en barbette. In order to find room for

The de tached fort.

so many guns in the restricted space, the whole 13 were placed parallel and close together on a single specially designed mounting.

This new departure was received with a certain amount of approval at the time, which is somewhat difficult to account for, as a more faulty system could hardly be devised; but the experiment was never repeated.

The credit for much of the clear views and real progress made in Germany during this period is due to General von Brese- Winiari, inspector-general of the Prussian engineers.

France, for a few years after 181 5, could spare little money for fortifications, and nothing was done but repairs and minor improvements on the old lines. Belgium, having some money in hand, rebuilt and improved in detail a number of bastioned fortresses which had fallen into disrepair.

In 1830 France began to follow the lead of Germany with entrenched camps. The enceinte of Paris was reconstructed, and detached forts were added at a cost, according to von Zastrow, of £8,000,000. The Belgian and German frontiers

j§MBi

The Fortress of ANTWERP

Fig. 38.

of France being considered fairly protected by the existing fortresses, they turned their attention to the Swiss and Italian frontiers, and constructed three fortresses with detached forts at Belfort, Besancon and Grenoble. The cost of the new works at Lyons was, according to the same writer, £1,000,000 without the armament. Here and elsewhere the enceinte was simplified on account of the advanced defences. That of Paris, which was influenced by political considerations, was a simple bastioned trace with rather long fronts and without ravelins or other outworks; the escarp was high and therefore exposed, and the counterscarp was not revetted.

As regards the detached forts there was certainly a want of clearness of conception. Those of Paris were simply fortresses in miniature, square or pentagonal figures with bastioned fronts and containing defensible barracks. Those of Lyons were much more carefully designed, but the authors wavered between two ideas. Unwilling to give up the bastion, but evidently hankering after the new caponiers, they produced a type which it is difficult to praise. The larger works were irregular four- or five-sided figures with bastioned fronts; and practically the whole interior space was taken up by a large keep, with its ditch, on the

ENCEINTE OF ANTWERP

Note.TAe reliefs are given in feel relatively to the plana of srte.f+ aboue l - t>elt>u».

b. Shell Stores

c. Gun Rooms . d.Barrack Rooms e. Guard Rooms /. Blockhouses

Fig. 39.

Emery Wilkcrjg

polygonal system. The smaller works, instead of a keep, had defensible barracks in the gorge.

During the period 1855-1870 a considerable impulse was given to the science of fortification, both by the Crimean War and the Period arr ival of the rifled gun. One immediate result of these from 1855 was the condemnation of masonry exposed to artillery to 1370. fire. The most important work of the period was the new scheme of defence of Antwerp, initiated in 1859. This is chiefly interesting as giving us the last and finest ex- pression of the medieval enceinte, at a time when the war between the polygonal and bastioned traces was still raging, though the boom of the long-range guns had already given warning that a new era had begun. Antwerp is also asso- ciated with the name of General Brialmont (g.v.), of the Belgian engineers, whom posterity will no doubt regard as the greatest writer on fortification of the latter half of the 19th century.

We give in figs. 38, 39 and 40 the general plan of the 1859 defences of

Antwerp, the plan of a front of the enceinte, and its Antwerp, sections, as showing almost the last word of fortification before the arrival of high explosives.

The defences of Antwerp were designed, as the strategic centre of the national defence of Belgium, for an entrenched camp for 100,000 men. The length of the enceinte is about 9 m. The detached fcrts, which on the sides not defended by inundation are about i| m. apart and from 2 to 3 m. in front of the enceinte, are powerful works, arranged for a garrison of 1000 men. They have each a frontal crest-line of over 780 yds. and are intended for an armament of 120 guns and 15 mortars.

The general

arrangement of the fronts of the en- ceinte should be compared with the earlier German type of Posen. It will be noticed that while the large casemated capo- nier at Posen breaks the enceinte and flanks it both with- out and within, at Antwerp the capo- nier is detached — a much sounder arrangement — and flanks the front only. The defence of the faces rests on the width of the wet ditches and on the flanking power of the caponier; there is no attempt to add to it by fausse-braie or detached wall. The dimensions are everywhere very generous, allowing free movement for the troops of the defence ; the cov- ered way is 22 yds.

*. 36--->*J2*

Section on G H. Low Battery

_J?

>oFcet

Fig. 40. — Sections of fig. 39.

HISTORY]

FORTIFICATION AND SIEGECRAFT

6 95

wide and there is a double terreplein on the face. The parapet of the face is 27 ft. thick. The masonry of the casemate guns in the caponier, first flank and low battery, is protected by earth, d, la Haxo.

In 1859 Austria acknowledged the influence of the new artillery with some new forts at Verona. The detached forts built by Radetzky in 1848 were

only from 1000 to 2000 yds. distant from the ramparts. Those now added, of which fig. 41 is an example, were from 3000 to 4000 yds. out.

In the same year the land defences of some of the British dockyards were taken in hand. These first serious attempts at

Period from 1870 to 188S.

Fig. 41. — Austrian Fort at Verona.

permanent fortification in England were received with approval on the continent, as constituting an advance on anything that had been done before. The detached forts intended to keep an enerhy outside bombarding distance were roomy works with small keeps. The parapets were organized for artillery and the ditches were defended by caponiers or counterscarp galleries. The forts were spaced about a mile apart and arranged so as to support each other by their fire.

The sieges of the Franco-German War of 1870 are alluded to in the section below dealing with the " Attack of Fortresses." As regards their effect on the designs of fortification the most important thing to note is the distance to which it was thought necessary to throw out the detached forts. These distances were of course in- fluenced by the character of the ground, but for the most part they were very largely increased. Thus at Paris the fort at St Cyr was 18,000 yds. from the enceinte; at Verdun the distances varied from 2300 to 12,000 yds.; at Belfort the new forts were from 4500 to 11,500 yds. out; at Metz 2300 to 4500; and at Strassburg 5200 to 10,000. – One result of these increased distances was of course to increase very largely the length of the zone of investment, and therefore the strength necessary for the besieging force.

As regards the character of the works, the typical shape adopted both in France and Germany was a very obtuse-angled lunette, shallow from front to rear. The German type had one parapet only, which was organized for ,artillery and heavily traversed, the living casemates being under this parapet. The ditch defence was provided for by caponiers and a detached wall (see fig. 42).

The French forts had two parapets, that in the rear being placed over living casemates (in two tiers, as shown in the section of fig. 43 by a dotted line), and commanding the front one. There was a long controversy as to whether the artillery of the fort should be on the upper or the lower parapet, the advocates pf the upper parapet attaching great importance to the command that the guns would have over the country in front. The other school, objecting to having guns on the skyline, preferred to

sacrifice the command and place them on the lower parapet, as in fig. 43, the infantry occupying the upper parapet. It will be observed that the bastioned trace is abandoned, the ditches, like those of the German fort, being defended by caponiers.

While a great deal of work was done on these lines, a very active controversy had already begun on the general question as to whether guns should be employed in forts at all. Some

Section on A.B. Fig. 42. — German Fort about 1880.

declared that the accuracy and power of artillery had already developed so far, that guns in fixed and visible positions must needs be put out of action in a very short time. The remedy proposed by these was the removal of the guns from the forts into " wing-batteries " which should be less conspicuous; but soon the broader idea was put forward of placing the guns in concealed positions and moving them from one to another by means of

Fig. 43. — French Fort about 1880.

previously prepared roads or railways. Others declared that there was no safety for the guns outside the forts, and that the use of steel turrets and disappearing cupolas was the only solution of the difficulty. General Brialmont, who had by this time become the first European authority on fortification ques- tions, ranged himself on the side of the turrets. The younger

school were largely in favour of mobility and expressed them- selves eagerly in a shower of pamphlets.

It was at this juncture that a new factor was introduced, namely, the obus-torpille, or long shell with high-explosive bursting charge. With its appearance we say good-bye to the old school and enter upon the consideration of the fortification of to-day.

II. Modern Permanent Fortification

Modern fortification dates by universal consent from 1885.

The Germans had begun experiments a year or two before this,

with long shell containing large charges of gun-cotton.

fl' gb 'uh' e ˆ Ut '• was t ' le ex P er i mentsat F° rt Malmaisonin France long shell i n I 886 that set the military world speculating on the future of fortification. The fort was used as a target for 8-in. shell of five calibres length containing large charges of melinite. The reported effects of these made a tremendous sensation, and it was thought at first that the days of permanent fortification were over. Magazine casemates were destroyed by a single shell, and revetment walls were overturned and practicable breaches made by two or three shells falling behind them. It must be remembered, however, that the works were not adapted to meet this kind of fire. The casemates had enough earth over them to tamp the shell thoroughly, but not enough to prevent it from coming into contact with the*

masonry, and the latter was not thick enough to resist the ex- plosion of the big charges. Other experiments were made in the same direction in Germany, Holland, Belgium and Austria. The Germans used shell containing from 60 to 130 lb of high explosive.

After the first alarm had subsided foreign engineers set about adapting their works to meet the new projectiles. Revetments were enormously strengthened, and designed so that their weight resisted overturning. Concrete roofs were made from 6 to 10 ft. thick, and in many cases the surface of the concrete was left bare so as to expose a hard surface to the shell without any earth tamping. The idea of cupolas and shielded guns gained ground, and is now practically accepted all over the continent of Europe. In many cases the main armament, in some only the safety armament (see below), is in cupolas in the forts.

But meanwhile Europe had been flooded with literature on the subject, and the whole policy of fortification as well as its minutest details were discussed ab ovo. The extremists of both sides revelled in their opportunity. Some declared that, with the use of heavy guns and armour, fortresses could be made stronger than ever. Others held that modem fortresses were far too expensive, that their use led to strategic mistakes, and (arguing from certain well-known examples) that extemporized field defences could offer as good a resistance as permanent works.

VmtiyViVutu,

Prom Plessii and Legrand's Manuel complet de la fortification, by permission.

Fig. 44. — Metz in 1899.

MODERN)

1. 2.

3- 4-

5-

European military opinion generally is now more or less agreed on the following lines: —

Important places must be defended by fortresses.

Their girdle of forts must be far enough out to prevent the

bombardment of the place. An enceinte is desirable, but need not be elaborate. A few guns (called ” safety armament “) should be in the forts,

and these must be protected by armour. The bulk of the artillery of the defence should be outside the

forts; the direct-fire guns preferably in cupolas, the howitzers

in concealed positions.

6. The forts should be connected by lines of entrenched infantry

positions and obstacles, permanent bomb-proof shelters being provided for the infantry.

7. There should be ample communications — radial and peripheral

— between the place and the forts, both by road and rail.

8. Special lines of communication — such as mountain passes-

should be closed by barrier forts.

These considerations will now be taken somewhat more in detail, but first it will be useful to deal with the plan of Metz in 1899 (fig. 44).

Here the fortifications of successive periods can be readily recog- nized. First the old enceinte, unaltered by the Germans and now M , dedass&e. Next the detached forts, begun by the French

engineers in “1868 and still unfinished in 1870, can be readily recognized

by their bastioned trace. Among them are Fort Manteuffel, formerly St Julien, and Fort Goeben (fig. 45), formerly Queuleu. These were not altered in their general lines.

From Plessix and Legrand's Manuel complet de la fortification, by permission.

Fig. 45. — Fort Goeben, Metz.

This early line of detached forts, less than 3000 yds. from the enceinte, was completed by the Germans with forts of polygonal type such as Fort Prinz August. The hill of St Quentin (fig. 46), a very important point, was converted into a fortified position, with two forts and connecting parapets, and a communication running north to Fort Alvensleben.

The arrangement of wing batteries in connexion with the forts can be clearly noted at Fort Manteuffel. These are reinforced by other batteries either for the defence of the intervals or to dominate important lines of approach such as the valley of the Moselle (canal battery at Montigny) . To these were added later armoured batteries.

There are also infantry positions, shelters and magazines in con- nexion with this line.

Finally some new forts of modern type were commenced in 1899 at about 9000 yds. from the place.

Leaving out of consideration at present the strategic use of Fortresses S rou P s °f fortresses, the places which, as mentioned above, are intrinsically worth being defended as fortresses are: —

(a) Centres of national, industrial or military resources.

(b) Places which may serve as points d'appui for manoeuvres.

(c) Points of intersection of important railroads. id) Bridges over considerable rivers.

(e) Certain lines of communication across a frontier.

Examples of (a) are Paris, Antwerp, Lyons, Verdun. Again for (a) and (b), as is pointed out by Plessix and Legrand, Metz in the hands of the Germans may serve both as a base of supplies and a point d'appui for one flank. Strassburg is a bridge-head giving the Germans a secure retreat across the Rhine if beaten in the plains of Alsace, • and an opportunity of resuming the offensive when they have re-formed behind the river.

The distance of detached forts from the place depends on the range of the siege artillery and the distance at which it can usually be established from the forts, and is variously rhe given by different continental writers at from 4 to 9 km. ring of (4500 to 10,000 yds.). The bombarding range of siege detached howitzers with heavy shells is considered to be about torts ‘ 8000 yds., and if it is possible for them to be emplaced within say 2000 yds. of the forts, this would give a minimum distance of 6000 yds. from the forts to the body of the place. Some writers extend the minimum distance to 7 km., or nearly 8000 yds. In practice, however, it must happen that the position of the forts is determined to a very large extent by the lie of the ground. Thus some good positions for forts may be found within 4000 or

From Plessix and Legrand’s Manuel complet de la fortification, by permission.

Fig. 46. — St Quentin position, Metz.

5000 yds. of the place, and no others suitable on the same front within 15,000 yds. In that case the question of expense might necessitate choosing the nearer positions. Some examples of the actual distances of existing forts have already been given. Others, more recent, are, at Bucharest 7-10 km., Lyons 8-105, Copenhagen 7-8 and Paris 14-17. Strategic pivots are in a different category from other fortresses. While not necessarily protected from bombardment, they may yet have one or two forts thrown out from 9 to 12 km., to get advantage of ground. Such are Langres, Epinal and Belfort.

The Enceinte. — The desirability of this is almost universally allowed; but often it is more as a concession to tradition than for any solid reason. The idea is that behind the line of forts, which is the main defensive position, any favourable points that exist should be provisionally fortified to assist in a ” step-by-step ” defence: and behind these again the body of the place should be surrounded by a last line of defence, so that the garrison may resist to the last moment. It may be remarked that apart from the additional expense of an enceinte, such a position would not, under modern conditions, be the most favourable for the last stages of a defence. Again, there is the difficulty that it is practically impossible to shut in a large modern town by a continuous enceinte. It has been proposed to construct the enceinte in sections in front of the salient portions of the place. This system of course abandons several of the chief advantages claimed for an enceinte.

In actual practice enceintes have been constructed since 1870 in France and other countries, consisting of a simple wall 10 or 12 ft. high with a banquette and loopholes at intervals. This of course can only be looked

upon as a measure of police. For war purposes, in face of modern artillery, it is a reductio ad absurdum.

The Safety Armament.— II the bulk of the artillery is to be placed in positions prepared on the outbreak of war, it is considered very necessary that a few heavy long-range guns should be permanently in position ready at any moment to keep an enemy at a distance, forcing him to open his first batteries at long range and checking the advance of his investment line. Such guns would naturally be in secure positions inside the forts, and if they are to be worked from such positions they must have armour to shield them from the concentrated fire of the numerous field artillery that a besieger could bring to bear from the first.

Artillery outside the forts constitutes the most important part of the defence, and there is room for much discussion as to whether it should have positions prepared for it beforehand

or should be placed in positions selected as the attack develops itself. On the one hand the preparation of the positions before- The ques- hand, which in many cases means the use of armour tion of and concrete, increases very largely the initial expense art/ '" Jr of the defence, and ties the defender somewhat in ' the special dispositions that become desirable once the attack has taken shape. Moreover, such expenditure must be incurred on all the fronts of the fortress, whereas the results would only be realized on the front or fronts actually attacked. On the other hand much time and labour are involved in emplacing heavy and medium artillery with extemporized protection, and this becomes ,a serious considera- tion when one remembers how much work of all kinds is necessary in preparing a fortress against attack. Again, to avoid the danger of a successful attack on the intervals between the forts before their defences have been fully completed, the fire of the guns in the intermediate positions might be urgently required. The solution in any given case would no doubt depend on the import- ance of the place. In most cases a certain amount of compromise will come in, some preparation being made for batteries, without their being completed. Armoured batteries of whatever kind must in any case be prepared in peace time. It should not be overlooked that as, whatever theories may exist about successive lines of defence, the onus of the defence will now lie on the fort line, just as it formerly did on the enceintes, so that line should be fully prepared, and should not have to

commence its fight in a position of inequality.

Defence of Intervals of Forts. — The frontal fire of the batteries in the intervals and the flanking fire of some of the guns in the forts will play an important part, but the main reliance should be on infantry defence. A fully prepared fortress would have practically a complete chain of infantry fighting positions and obstacles between the forts, at all events on the fronts likely to be seriously attacked. The positions would consist largely of fire trenches, with good communications; but it is pretty generally recognized that there

Section and Elevation No.i

Barrier torts.

But in

must be some points d'appui in the shape of redoubts or infantry forts, and also bomb-proof shelter for men, ammunition and stores near the fighting line. This is usually included in the redoubts. If they are to resist the heaviest shell, such shelters must be built in peace time.

Communications are of the first importance, not merely to facilitate the movement of the enormous stores of ammunition and materials required in the fighting line, but also that defenders may fully utilize the advantage of acting on interior lines. They should include both railways and roads running from the centre of the place to the different sectors of defence, and all round, in rear of the line of forts; also ample covered approaches to the fighting line. Concealment is essentia., and where the lie of the ground does not help, it must be got from earth parapets or plantations.

The principal use of barrier forts is in country where the necessary line of communication cannot be easily diverted. For instance, in a comparatively flat country a barrier fort commanding a road or railway is of little use because roads may be found passing round it, or a line of railway may be diverted for some miles to avoid it mountainous country, where such diversion is impossible, it will be necessary for the enemy to capture the fort before he can advance; and the impossibility of surrounding it, the few positions from which siege artillery can be brought into play, and the fact that there is practically only one road of approach to be denied, make these positions peculiarly suitable for forts with armoured batteries. Italy makes considerable use of such forts for the defence of frontier passes.

General Brialmont's Theoretical Claim for the Defence of a Country. — Before going into details, it is worth while to state the full claim of strategic fortification advanced by General Brialmont, the most thorough of all its

advocates. It is as follows : —

A. Fortify the capital.

B. Fortify the points where main lines of communication pass a

strategic barrier.

C. Make an entrenched camp at the most important centre of

communication in each zone of invasion: and support it by one or two places arranged so as to make a fortified district.

Section N0.5

From Brialmont's Progres de la defense des Hats et de la fortification permdnente depuis Vauban, by permission of M. le Commandant G. Meeiis.

Fig. 47.

MODERN]

FORTIFICATION AND SIEGECRAFT

699

D. Close with barrier forts the lines necessary to an enemy across

mountains or marshes.

E. Make a central place behind a mountain chain as a pivot for

the army watching it.

F. Defend mountain roads by provisional fortifications.

G. Make a large place in each theatre of war which is far from the principal theatre, and where the enemy might wish to estab- lish himself.

H. Fortify coasts and harbours.

Objections to these proposals will be readily supplied by the

Section No.i

Section N0.3

WB ˆE?

Section No. 4

Section N0.5

From Brialmont's Progres de la defense des (tats el de la fortification depuis Vauban, by permission of Commandant G. Meeiis.

FlG. 48.

Types of detached forts.

officials of the national treasury and the commanders-in-chief of the active armies.

So many types of detached forts have been proposed by competent authorities, as well as actually constructed in recent years, that it is impossible here to consider all of them, and a few only will be reproduced of these which are most representative of modern con- tinental thought.

Taking first the type of heavily armed fort, which contains guns for the artillery fight as well as safety armament, we must give precedence to General Brialmont. The two works here shown are taken from the Progres de la defense des etats, fife, published in 1898. The pentagonal fort (fig. 47) has two special features. In section 1 is shown a concrete infantry parapet, with a gallery in which the defenders of the parapet may take shelter from the bombardment preceding an assault. In section 2 it will be seen that the counter- scarp galleries flanking the ditch are drawn back from the face of the counterscarp. This is to counteract proposals that have been made to obscure the view from the flanking galleries, and perhaps drive the defenders out of them by throwing smoke-producing materials into the ditch at the moment of an assault. The arrangement may save the occupants of the galleries from excessive heat and noxious fumes, but will not of' course prevent the smoke from obscuring the view.

The following points may be noticed about this design in comparing it with earlier types. There is no escarp, the natural slope of the rampart being carried down to the bottom of the ditch. There is a •counterscarp to the faces, but no covered way. The flanks have no counterscarp, but a steel fence at the foot of the slope, and the covered way which- is utilized for a wire en- tanglement which is under the fire of the parapet. The gorge has a

very slight bastioned indentation, which allows for an efficient flanking of the ditch by a couple of machine guns placed in a single casemate on either side.

The abolition of the covered way as such is note- worthy. It marks an essential difference between the fort and the old enceinte profiles; showing that offensive action is not expected from the garrison of the fort, and is the duty of the troops of the inter- mediate lines.

The great central mass of concrete containing all the casemates and the gun-cupolas, a very popular feature, is omitted in this design, advantage being taken of the great lateral extent of the fort to spread the casemates under the faces, flanks and gorge, with a communication across the centre of the fort. This arrangement gives more freedom to the disposition of the cupolas. The thickness of the con- crete over the casemate arches is more than 8 ft.

Communication between ‘ʲ ^^jJj i JLf^J^Xi i ᴸ^ ^

the faces and the counter- ■^^•■«^^^¥P7«n^ S i s ^\ K ^

scarp galleries is obtained Section on A B.

by posterns under the ditch. From Brialmont’s Progres de la defense des etats, &c, by permission of Commandant G. Meeus.

The armament, which is all Fig. 49.— Fort Molsheim, Strassburg.

protected by cupolas, is

powerful. It consists of two 150-mm. (6 in.) guns, four 120-mm.

(4-7 in.) guns, two 210-mm. (8-4 in.) howitzers, two 210-mm. (8-4

in.) mortars, four 57-mm. Q.F. guns for close defence. There is

also a shielded electric light projector in the centre.

This fort is a great advance on General Brialmont’s designs before These were marked by great complexity of earth parapets

This parapet has no concrete shelter for the defenders. The case- mates are all collected in the keep and the gorge, with a passage all round giving access to the parapet and the cupolas.

Fig. 49 is a German work, Fort Molsheim at. Strassburg. This is a simple type of triangular fort., The main mass of concrete rests on the gorge, and

is divided by a narrow courtyard to give light and air to the front casemates. The fort has a medium armament for the artillery fight, consisting of four 6-in. howitzers in cupolas. On each face are two small Q.F. guns in cupolas for close defence, for which purpose, it will be seen, there is also an infantry parapet. At the angles are look-out turrets. The ditch has escarp and counterscarp, and is defended by counterscarp galleries at the angles. There is no covered way. The thickness of concrete over the casemates, where it is uncovered, is about 10 ft.

Fig. 50 is Fort Lyngby at Copenhagen. The new Copenhagen defences ate very. interesting, giving evidence of clear and original thought, and effectiveness combined with economy. There is one special feature worth rioting about the outer ring of forts, of which Lyngby is one. These works are intended for the artillery fight only, their main armament being four 6-in. guns (in pairs) and three 6-in. howitzers all in cupolas. The armament for immediate defence is*

a. Cupola for Howitzer

b. Cupola for Q.F. gun

c. Observing Cupola

1885. _ . _ . . .

and various chicanes which would not long survive bombardment. This type is simple and powerful. It is also very expensive.

The second Brialmont fort (fig. 48) is selected because it shows a keep or citadel, an inner work designed to hold out after the capture of the outer parapet. General Brialmont held strongly to the necessity of keeps for all important works. History of course gives instances of citadels which have enabled the garrison to recapture the main work with assistance, or caused a really useful delay in the progress of the general attack. It affords still more instances in which the keeps have made no resistance, or none of any value. Some think that the existence of- a keep encourages the defenders of the main work; others that it encourages the idea of retreat. The British school of thought is against keeps. In any case they add largely to expense.

In the present design the keep is a mass of concrete, which depends for the defence of its front ditches on counterscarp galleries in the main work, the few embrasures for frontal defence being practically useless. Its main function is to prevent the attackers from estab- lishing themselves on the gorge, thus leaving the way open for a reinforcement from outside to enter (assisted by bamboo flying bridges) through the passages left for the purpose in the outer and inner gorge parapets.

As regards the main work, the arrangements for defence of the ditch and the armament are similar to the design last considered.

trifling, consisting of only two 57-mm. guns and a machine-gun. There is no provision for infantry defence. The ditch has no escarp or counterscarp, and is flanked by counterscarp galleries at the salient.

It is usual in the case of works so slightly organized for their own defence, and intended only for the long-range artillery fight, to with- draw them somewhat from the front line. The Danish engineers, however, have not hesitated to put these works in the very front line, some 2000 metres in front of the permanent intermediate batteries. The object of this is to force the enemy to establish his heavy artillery at such long ranges that it will be able to afford little assistance to the trench attack of the infantry. The intermediate batteries, being withdrawn, are comparatively safe. They therefore do not require expensive protection, and can reserve their strength to resist the advance of the attack. The success of this arrangement will depend on the fighting strength of the cupolas under war conditions; and what that may be, war alone can tell us.

In the details of these works, besides the bold cutting down of defensive precautions, we may note the skilful and economical use of layers of large stones over the casemates to diminish the thickness of concrete required. The roofs of the casemates are stiffened underneath with steel rails, and steel lathing is used to prevent lumps of concrete from falling on the occupants. The living casemates look out on the gorge, getting plenty of light and air, while the magazines are under the cupolas.

The forts above described are all armed with a view to their taking an important part in the distant artillery fight. The next type to be considered (fig. 51) is selected mainly because it is a good example of the use of concealed flanking batteries, known on the continent as batteries traditores, which seem to be growing in popularity.

This design by Colonel Voorduin of the Dutch engineers has a

a. Cupola for 2 6”guns i. Cupola for J 6”Howitzer

c. Disappearing Cupola for Q.F. gun

d. Machine gun

e. Observing Station

Section No. 1

Section N0.2

From Brialmont's Progres de la defense des itats, &c, by permission of Commandant G. Meeiis.

Fig. 50. — Fort Lyngby, Copenhagen.

medium armament, which is not intended for the artillery duel, but to command the immediate front of the neighbouring forts and the intervals. The fort is long and narrow, with small casemate accom- modation. It contains eight 4'7-in. guns. Two of these are in a

cupola concealed from view, though not protected, by a bank of earth in front. The other six are in an armoured battery behind the cupola. It may be remarked that as the cupola gets no real protection from the covering mass of earth, it would be better to be able to utilize the fire of its guns to the front. The baiterie Iraditore, if properly protected overhead, would be very difficult to silence, and its flanking fire would probably be available up to the last moment. There is very much to be said both for and against the policy of so emplacing the guns. The im- mediate defence of the work, with the aid of a broad wet ditch, is easy ; but the great mass of concrete, which is in- tended to form arl indestructible plat- form and breastwork for the infantry, would seem to be a needless expense.

Fig. 52, designed by the Austrian lieutenant field-marshal Moritz Ritter von Brunner (1 839-1 904) , is selected as a type of the intermediate fort which is intended only to be a strong point in the infantry line of defence between the main forts. It has a pro- tected armament, but this, which consists only of four small Q.F. guns in cupolas, is for its own defence, and not to take part in the artillery duel. There is also a movable armament of four light Q.F. guns on wheels, for which a shelter is provided between the two observatory cupolas. The garrison would be a half com- pany of infantry, for whom casemates are provided in the gorge. The gorge ditch is flanked by a caponier, but there is no flank defence for the front ditch. This is de- fended by a glacis parapet. At

the bottom of the ditch is a wire entanglement and the glacis slope is planted with thorns. The thickness of concrete on the casemates is 2 metres (6 ft. 7 in.). This is a strong and simple form of infantry work, but considering its r61e it appears to be needlessly expensive.

*pW.fWi;****”*

From LeJthner’s Bestdndige Befestigung.

Fig. 51.

Fig- 53 is an Italian type of barrier fort in mountainous country. A powerful battery of eight medium guns protected by a Gruson shield commands the approach. The fort with its dwelling case- mates is surrounded by a deep ditch flanked by counterscarp galleries. There are certain apparent weaknesses in the type, but the difficulties of the attackjn such country and its limitations must be borne in mind.

Modern Details of Protection and Obstacle. — After considering the above types of fort, it will be of use to note some of the details in which modern construction has been modified to provide against the increasing power of artillery.

The penetration of projectiles varies according to the nature of the soil — the lighter the better for protection. Sand offers the greatest resistance to penetration, clay the least. Bomb- ˆ Since, however, the penetration of heavy shells fired tectloa. from long ranges with high elevation may be 20 ft. or more in ordinary soil, we can no longer look to earth alone as a source of protection against bombardment. Again a moderate quantity of earth over a casemate increases the ex- plosive effect of a shell by ” tamping ” it, that is by preventing the force of the explosion from being wasted in the open air.

47’-6 -, „ 47ˆ’

ji j- •/. • : .‘V

fif’As-i Section No. 3*

From Brtalmont’s Progres da la mandant G. Meeiis.

defense des ctats, &c. t by permission of Com-

Fig. 52.

We find therefore that in most modern designs the tops of casemates are

left uncovered, or with only a few inches of earth over them, in which grass may be grown for concealment.

For the materials of casemates and revetment walls exposed to fire, concrete (q.v.) has entirely replaced masonry and brick- work, not because of its convenience in construction, but because it offers the best resistance. The exact composition of the concrete is a matter that demands great care and knowledge. It should be, like an armour plate, hard on the surface and tough within. The great thickness of 10 ft. of concrete for casemate arches, very generally prescribed on the continent in important positions, is meant to meet the danger of several successive shells striking the same spot. To stop a single shell of any siege calibre in use at present, 5 ft. of good concrete would be enough. A good deal is expected from the use of " reinforced concrete " (that is concrete strengthened by steel) both for revetment walls and casemates.

Parapets are frequently made continuous or glacis-wise, that is the superior slope is prolonged to the bottom of the ditch so Parapets. that the whole rampart can be swept by the fire of the defenders from the crest, and there is no dead ground in front of it. It is also common to build the crest of the parapet in solid concrete, with sometimes a concrete banquette, so that bombardment shall not destroy the line the defenders have to

man in repelling an assault. This concrete parapet may be further reinforced by hinged steel bullet-proof plates, to give head cover; which when not in use hang down behind the crest. The escarp is falling into disfavour, on account of the great expense of a revetment that can withstand breaching fire. A counterscarp of very solid construction is generally used, it is low and gives cover to a wire entanglement in the ditch. This may be supplemented by a steel unclimbable

A

Obstacles.

Section on AB.

From General Rocchi's Traccia per lo studio delta fortificazione, by permission.

Fig. 53.

fence, and by entanglements or thorn plantations on the covered way and the lower slopes of the parapet. Entanglements are attached to steel posts bedded in concrete. The upper parts of revetments and the foundations of walls are protected against the action of shells, that falling steeply might

act as mines to overturn them, by thick aprons of large stones. Fig. 54 shows most of these dispositions.

Electric search-lights are now used in all important works and batteries. They are usually placed in disappearing cupolas. They are of great value for discovering working parties at night, and lighting up the foreground during an ughts.' attack; and since only the projector need be exposed, they are not very vulnerable. Their value, however, must not be over-estimated. The most powerful search-light can in no way compare with daylight as an illuminant, and, like all other mechanical contrivances, they have certain marked drawbacks in war. They may give rise to a false confidence; an important light may fail at a critical moment; and in foggy weather they are useless.

The use of armour (see also Armour-Plates) for coast batteries followed closely upon its employment for ships, for those were the days of short ranges and close fighting, and it seemed natural not to leave the battery in a position of inferiority to

From Deguise'sia Fortification permanetile, by permission of J. Polieunis.

Fig. 54.

Armour.

the ship in the matter of protection. In England the coast battery for a generation after the Crimean War was a combination of masonry and iron; and in i860 Brialmont employed armoured turrets at Antwerp in the forts which commanded the Scheldt. For land defence purposes, however, engineers were very slow to adopt armour. Apart from all questions of difficulty of manufacture, expense, &c, the idea was that sea and land fronts were radically different. It was pointed out that a ship gun, fired from an unsteady platform, had not enough accuracy to strike repeated blows on the same spot; so that a shield which was strong enough to resist a single shot would give complete protection. A battery on a land front, on the other hand, was exposed to an accurate fire from guns which could strike successive blows on the same spot, and break down the resistance of the strongest shield. But in time continental opinion gradually began to turn in favour of iron protection. Practical types of disappearing and revolving cupolas were produced, and many engineers were influenced in their favour

by the effect of the big high-explosive shell. Eventually it was argued that, after all, the object of fortification is not to obtain a resisting power without limit, but to put the men and guns of a work in an advantageous position to defend themselves as long as possible against a superior force; and that from this point of view armour cannot but add strength to defensive works.

The question has of course long passed beyond the stage of theory. Practically every European state uses iron or steel casemates and cupolas. German, Danish, Italian and other types of forts so armed have been shown. Recent French types have not been published, but it is known that cupolas are employed; and Velichkc, the Russian authority, long an uncompromising opponent of armour, in the end changed his views. These countries have had to proceed gradually, by improving existing fortresses, and with such resources as could be spared from the needs of the active armies. Among the smaller states Rumania and Belgium have entered most freely into the new way. In England, which is less directly interested, opinion has been led by Sir George Clarke, since the publication in 1890 of his well-known book on fortification. Having witnessed officially the experiments at Bucharest in 1S85 with a St Chamond turret and a Gruson cupola, he expressed himself very strongly against the whole system. Besides pointing out very clearly the theoretical objections to it, and the weak points of the con-

structions under experiment, he added: " The cost of the French turret was about £10,000 exclusive of its armament, and for this sum about six movable overbank guns of greater power could be provided." In view of the weight that belongs of right to his criticisms it is as well to point out that while this remark is quite true, yet the six guns would require also six gun detach- ments, with arrangements for supply, &c; a consideration which alters the working of this apparently elementary sum. The whole object of protection is to enable a few men and guns successfully to oppose a larger number.

At the time when Sir George Clarke's first edition came out, such extravagances were before the public as Mougin's fort; "a mastless turret ship," as he called it, " buried up to the deck-level in the ground and manned by mechanics." Such ideas tended to throw discredit on the more reasonable use of armour, but whether the system be right or wrong, it exists now and has to be taken account of. Nowhere has it been applied more boldly than in Rumania. The defences of Bucharest (designed by Brialmont) consist of 18 main and 18 small forts, with intermediate batteries. The main forts are some 4500 yds. apart, and 11,000 to 12,000 yds. from the centre of the place. The typical armament of a main fort is six 6-in. guns in three cupolas (one for indirect fire), two 8-4-in. howitzers in cupolas, one 4'7-in. howitzer in a cupola, six small Q.F. guns in

disappearing cupolas. The total armament of the place (all protected) is eighty-six 6-in. guns, seventy-four 8-4-in. howitzers, eighteen 4-7-in. howitzers, 127 small calibre Q.F. guns in disappear- ing cupolas, 476 small calibre Q.F. guns in casemates for flanking the ditches. The " Sereth Line " will be described later.

Different Forms of Protection: Casemate, Cupola, &c. — The broad difference between casemates or shielded batteries and turrets and cupolas is that the former are fixed while the latter revolve and in some cases disappear. The casemate thus has the disadvantages that the arc of fire of the gun, which has to fire through a fixed embrasure or port-hole, is very limited, and that the muzzle of the gun and the port-hole, the weak points of the system, are constantly exposed to the fire of the enemy. The advantage of the casemate lies in its comparative cheapness and the greater strength of a fixed structure. It is well suited for barrier forts (fig. 53) and other analogous positions; and the Italians amongst other nations have so employed it at such places as the end of the Mont Cenis tunnel. Steel and iron case- mates are also useful as caponiers for ditch flanking (fig. 55).

Turrets and Cupolas. — The difference between a turret and a cupola is that the former is cylindrical with a flat or nearly flat top and presents a vertical target; while the latter is a flattened

From Leithner's Bestdndige Bcfestigung , by permission.

Fig. 55.

dome, the vertical supports of which are entirely concealed. The turret appears to be little used. The object of both forms is at once to give an all-round arc of fire to the guns and to allow of the weak point of the structure, the port-hole and muzzle of the gun, being turned away from the enemy in the intervals of firing. Both usually emerge from a mass of concrete, which is strengthened round the opening by a collar of chilled cast iron about 12 to 15 in. thick.

There are four types of cupolas, viz. (a) Disappearing, (b) Oscillat- ing, (c) Central pivot, (d) On roller rings.

(a) Disappearing cupolas are used chiefly for small quick-firing guns, on account of the expense of the various systems. They can c . be used for

medium guns. The details of the best foreign

upo as. S y S tems are secret, (b) The oscillating turret is a Mougin type, in which the turret is supported in the centre by a knife-edge on which it can swing. The oscillation is controlled by powerful springs. The effect of it is that after firing, the front of the cupola with the port-hole swings downwards under cover, and is held there until the gun is ready to fire again, (c) Schumann's centre pivot is understood to be approved in Germany. It has been adopted in Rumania and Belgium for howitzer cupolas. It is only suitable for a single piece; d is strong and steady — the best cupola for coast batteries; c and d are best for rapid fire because they can be loaded without lowering. They are suited for long guns.

The following types are illustrated as being generally representative of the different classes of cupola.

Fig. 56 is a section of Messrs Krupp's typical cupola for one 6-in. gun. The shield is of nickel steel, the collar of cast steel. A small space is left between the cupola and its collar to prevent the possi- bility of the shield jamming after being damaged. The guns are muzzle-pivoting and thickened out near the muzzle by the addition of a ring, so as to close the port as much as possible. The recoil is controlled within narrow limits both to economize space and to prevent the smoke from the muzzle from getting into the cupola. To facilitate the elevation and depression of the gun (with muzzle pivotings the breech has of course to be moved through a much larger arc than with ordinary mountings) it is balanced by a counterweight. The cupola rests on a roller ring and is traversed by a winch. It can be turned through a complete circle in about one minute.

Fig. 59 shows a disappearing turret for an electric light projector.

Fig. 60 shows a Krupp transportable cupola for a 5-7-cm. gun. This is drawn on a four-wheeled carriage, and when coming into action slides on rollers on to a platform in the parapet. It weighs about 2\ tons, and with carriage and platform about 4 tons.

Fig. 56. — Cupola for 6-in. gun (Friedr. Krupp A.G.)

a Schumann shielded mortar (sphere-mortar, this case it will be observed that the cupola is replaced by M\ enlargement of the encircling collar ; and the mortar (8-4-in. calibre) is enclosed in a sphere of cast iron, so as to close completely the opening of the collar in any position.

Fig. 58 shows a Gruson cupola for one 4-7-111. Q.F. howitzer.

Fig. 57 shows Kugelmbrser). In

From Leithner's Bestandige Befestigung.

Fig. 57.— Gruson (Spherical Mortar.

The mechanism of these cupolas is for the most part simpler than it appears. Counterweights and hand winches are much in use for the lighter natures of guns. The armouring of course keeps pace with improvements in manufacture. The chilled cast iron first made popular by the Gruson firm is now little used except for such purposes as the collar round a cupola. Wrought iron, steel and compound plates for the tops of cupolas have all been tried, the most recent Krupp-Gruson designs being of nickel steel.

The sighting in some cases may be done by sights on the gun, with suitable enlargements in the port-hole; in others by sights affixed to the cupola itself (which of course can give horizontal direction only) ; in others training and elevation are given in accordance with the readings on electric dials, or instruc- tions by telephone or speaking tube. There is of course nothing unreasonable in this in the case of indirect fire guns and howitzers, for if not firing from cupolas they would be behind the shelter of some wood or quarry.

Schumann's System: "Armoured Fronts. ' ' — Lieut. – Colonel Maximilian Schumann (1827-1889) of the Prussian engineers, who took a very prominent part in the design and advocacy of armoured defences, eventually produced a system which dispensed entirely with forts and relied on the fire of protected guns. It consists of several lines of bat- teries for Q.F. guns and howitzers in cupolas. He considered that such bat- teries would be able to defend their own front, and the infantry garrison was not to be called into action except in the case of the enemy breaking through at some point of the line.

This system was actually adopted by Rumania (1889-1892) for the Sereth Line. There are three routes by which the Russians can enter the country across the Sereth river: through Focshani, Nemolassa and Galatz. These three routes are barred by bridge-heads, those at Focshani, the most important, being on the left bank of the Milkov, a tribu- tary of the Sereth.

The Focshani works consist of 71 batteries arranged on a semicircular front about 12 m. long and from 8000 to 10,000 yds. in advance of the bridges. The batteries are placed in three lines, which are about 500 yds. apart, and are subdivided into groups. The normal group consists of 5 batteries, of which 3 arc in the first line, T in the second, and I in the third. The first-line batteries each contain five small Q.F. guns in travelling

cupolas. The second-line batteries, each six small Q.F. guns in disappearing cupolas. The third-line batteries have one 120-mm. gun in a cupola, and two 210-mm. spherical mortars with Gruson shields. The immediate defence of the batteries consists of a glacis planted with thorn bushes and a wire entanglement.

The fortification of these three bridge-heads are said to have cost about £1,100,000. But the system of " armoured fronts " is never likely to be reproduced, having been condemned by all authoritative continental opinion. Its defects have been summarized by Schroeter as follows: weakness of artillery at long ranges, want of security against a surprise rush; the neglect of the use of infantry in the defence, and the difficulty of command. This last is the most

From Leithner's Bestdndige Bejestigung.

Fig. 58.— Cupola for 4-7-in. Howitzer.

serious of all. It is indeed difficult to conceive that any one should expect half-a-dozen expert gunners, each shut up in an iron box with a guii, to stop the rush of a thousand men, even by day. But imagine the feelings of the gunner on the night of a big attack, alone in his box, his nerves already strained by a preliminary bombardment and nights of watching. He hears the sounds of battle all around ; he knows nothing of the progress of the attack, but expects every- thing, and feels every moment the door of his box being opened and the bayonet entering his back. No wise commander would submit his troops to such a test.

Sir George Clarke and Unarmoured Systems. — Before leaving the subject of fortresses it is necessary to consider the ideas of those who, while recognizing the necessity for places permanently organized for defence, prefer to treat them more from the point of view of perfected field defences. It is to the credit of English military science that Sir George Clarke may be taken as the representative of this school of thought. His study of fortification, as he tells us, began with a history of the defence of Plevna (q.v.). He was led to compare the resistance made behind extemporized defences at such places as Sevastopol, Kars and Plevna, with those at other places fortified in the most complete manner known to science. From this comparison he drew the conclusion that the true strength of fortification does not depend on great masonry works intricately pieced together at vast expense, but on organization, communications and invisibility. In his 1907

edition he says: —

" Future defences will divide themselves naturally into the following categories: (1) Permanent works wholly constructed in peace time and forming the key points of the position. (2) Gun emplacements, magazines and shelters for men in rear of the main line, all concrete struc- tures and platforms to be completed, though some earthwork may be left until the position is placed in a state of defence. (3) Field works, trenches, &c, guarding the intervals between the permanent defences in the main line, or providing rear positions. These should be deliberately planned in time of peace ready to be put in hand at short notice. The essence of a well-fortified position is that the weapons of the defender shall obtain the utmost possible scope of action,

and that those of the attacker shall have the minimum chances of effecting injury."

Since Sir George Clarke published his first edition in 1890 conti- nental ideas have expanded a good deal. The foregoing statement as to the three categories of defences would be accepted anywhere now: the differences of opinion come in ˆdoubts when we reach the stage of classifying under the first head the permanent works to be constructed in peace time. In most countries these would include forts with guns for the artillery duel, forts with safety armaments, fixed batteries with or without armour, and forts for infantry only. Sir George

Drawn from illustration in Leithner's Bestandigc Bejestigung, by permission. Fig. 59. — Disappearing Turret for Searchlight.

Clarke will have no armour for guns except in certain special cases of barrier forts. Heavy guns and howitzers requiring permanent emplacements (concrete platforms, &c.) must either be well concealed or be provided with alternative positions. The only permanent works which he admits are for infantry. They are redoubts of simple form intended for 350 or 400 men, with casemate accommodation for three-fourths of that number. Fig. 61 shows the design: — two rows of casemates, one under the front parapet, one under a parados; frontal musketry defence; obstacle consisting of entanglements, mines, &c, with or without escarp and counterscarp.

" The intervals (he says) between the infantry redoubts may be about 2500 yds. ; but this will necessarily depend upon the con- formation of the ground. Where there are good artillery positions falling within the sphere of protection of the redoubts, large intervals will be permissible. Thus, in the case of an extended line of defence where the ground offers marked tactical features, the idea of a continuous chain of permanent works may be

abandoned in favour

Fig. 60.— Transportable Cupola for 5-7-cm. Gun (Friedr. Krupp A.G.).

- Datum Line.

Sketch plan of a Redoubt

From Sir George S. Clarke's Fortification, by permission of John Murray.

Fig. 6i.

of groups of redoubts guarding the artillery positions. In this case, the redoubts in a group might be distributed on a curve bent back in approximately horse-shoe form."

The keystones of the close defence of the fighting line in future will undoubtedly be these infantry redoubts, and therefore it is of great interest to compare with the above types two studies put forward by Schroeter {Die Festung in der heutigen Kriegfiihrung), one in his first edition in 1898 (fig. 62), and the other in the second in 1905 (fig. 63). In both these the defensive arrangements are merely trenches of field profile with entanglements, the command and the obstacle being less than in Sir George 1 Clarke's work; and it will be noticed that in the 1905 type, published after the Russo-Japanese War, the plan is much

M

aa. Shelters for 120 men each 6> Latrine cc. Sentry posts d. Washplace

it. Sentry posts for Entanglement Isplinter-proofl From Schroeter's Die Festung in der heutigen Kriegfiihrung, by permission of £. S. Mittler u. Sohn.

Fig. 62.

less simple and arrangements for close flanking defence have been introduced. But these works of Schroeter's are merely infantry supporting points in a line which contains forts of the triangular type with guns, and armoured batteries, as well as a very com- plete arrangement of field defences and communications; while Sir G. Clarke's redoubts are the only

permanent works giving casemate protection in the front line.

The comparative merits of either design for an infantry redoubt are not of much importance. It is agreed that the main line of defence must consist of a more or less continuous line of field defences and obstacles, and that at some points in the line there should be infantry supporting points with bomb-proof protection capable of resisting big shells. The open question is, what additional works, if any, are required for the artillery, whether for the medium and heavy guns that will take part in the " artillery duel," or for the lighter natures that will help in the close fight and defence of the intervals. Is it best for the defenders to rely on armoured protection or on concealment for his guns?

*Official opinion outside England has certainly sanctioned armour, since all over the continent it is to 0ppos , n some extent adopted in views as practice. National practice to armour, is usually based on the advice ^""P *'- of the most distinguished ' officers of the day, and therefore it is unsafe to condemn it hastily. Sir George Clarke and those who are with him — and they are many, both inGreat Britain and abroad — object entirely to armour. He says {Fortification, ed. 1907, p. 96): "The great advantage possessed by the attack in all ages has been the employment of a mobile artillery against armaments cribbed, cabined and confined by fortification. It is necessary to perpetuate this ad- vantage?" Of course the effect of long-range weapons, in increasing the length of front that can be held by a given force, has given much greater*

ATTACK]

FORTIFICATION AND SIEGECRAFT

707

Scale of Yards for Ptan <

3? 4° 5f> ' '

aa....Shettersfor 120 men eaah i&c. Wash-houses &c.pnpdftd

for defence of gorges ltd.. ..-.Ditch defence nee... .Sentry posts.

Scale of Yards for Section AB.

Section on CD.

Scale of Yards for Sections CD. EF

From Schroder's Die Festung in der heutigen Kriegfiihrung, by permission of E. S. Mittler u. Sohn.

Fig. 63.

freedom of action to the defence and this should be taken full advantage of.

The argument as to the vulnerability of shielded guns is not at present strong. Sir George says (ib. p. 94), " If the high angle fire … is ever to find a favourable opportunity, it will surely be against a cupola, the site of which can generally be determined with accuracy." On the other hand he says (p. 90), " During the long and costly experiments carried on at Bucharest in 1885-1886, 164 rounds were fired from the Krupp 21 cm. mortar at targets of about 40 sq. metres area " (about 430 sq. ft.) " without obtaining a single hit. The range was 2700 yds.; the targets were towers built upon a level plain; the shooting conditions were ideal, and the fall of each shell was telephoned back to the firing point; but it must have been evident to the least instructed observer that to attempt to group 6 or 8 shells on an invisible area 2 metres square would have been absolutely futile." These facts are adduced to prove that it is not necessary to give great thickness to concrete casemates, to resist successive bursts of shells in the same place; but surely they are equally applicable to cupolas. Again (p. 252), " The experience gained at Port Arthur was not altogether encouraging as regards the use of high angle fire. The Russian vessels in the harbour were sunk by opening their sea-valves. . . . Fire was subsequently directed upon them from n in. howitzers at ranges up to about 7500 yds. This was deliberate practice from siege batteries at stationary targets; but the effect was distinctly disappointing." The cupolas therefore can hardly be considered ideal targets: and the probability is that they would hold their own against both direct and indirect fire for a long time. There are other

and stronger arguments against the general use of them, all of which are clearly set forth by Sir George Clarke.

The worst objections to the cupola are the military disadvantages of isolation and immobility, and the multiplication of mechanical arrange- ments. For a successful round from a disappearing cupola, the elevating and traversing arrangements, the elevating and loading gear of the gun, and the telephone communica- tion, must all be in good order. At night the successful co-operation of the searchlight is also in many cases necessary.

The teaching of history is all against immobile mechanical defences. Initiative, surprise, unforeseen offensive action, keeping the besieger in ignorance of the dispositions of the garrison, and of what progress he is making: all these, with their influ- ence on the morale of both sides, tend towards successful defences and do not point towards the use of armour.

It may further be said that the use of armour as a general rule is unnecessary, because a concealed battery is a protected one; and with the long ranges now usual for heavy guns and howitzers, there is not generally much difficulty about concealment.

In the opinion, however, of the present writer an exception must be made for guns intended to flank the line of defence, which would generally need bomb-proof over-head cover. Further, when we leave theory and come to the consideration of actual problems of defence, it will often be found that it is necessary to place guns in certain positions where good con- cealment cannot be got. In such cases some form of protection must be given if the guns are to engage the concealed batteries of the attack.

III. The Attack of Fortresses

In considering the history of siegecraft since the introduction of gunpowder, there are three main lines of development to follow, viz. the gradually increasing power of artillery, the systematizing of the works of attack, and in recent times the change that has been brought about by the effect of modern small-arm fire.

Cannon appear to have been first used in sieges as mortars, to destroy hoardings by throwing round stones and barrels of burning composition. Early in the 1 5th century we find cannon throwing metal balls, not only against hoarding and battlements, but also to breach the bases of the walls. It was only possible to work the guns very slowly, and archers or crossbowmen were needed in support of them, to drive the defenders from the crenellations or loopholes of the battlements. At that period the artillery was used in place of the medieval siege engines and in much the same manner. The guns of the defence were in- accurate, and being placed high on the walls were made ineffective by bad mountings, which did not allow of proper depression. The besieger therefore could place his guns close to the walls, with only the protection of a few large gabions filled with earth, set up on the ground on either side of the muzzle.

In the course of the 15th century the power of artillery was largely increased, so that walls and gates were destroyed by it in an astonishingly short time. Three results shortly followed.

[ATTACK

The guns of the defence having gained equally in effectiveness, greater protection was needed for the attack batteries; bastions and outworks were introduced to keep the besieger at a distance from the inner walls; and the walls were sunk in ditches so that they could only be breached by batteries placed on the edge of the glacis.

Early in the 16th century fortresses were being rapidly re- modelled on these lines, and the difficulties of the attack were at once very much increased. The tendency of the assailants was still to make for the curtain, which had always been considered the weak point; but the besiegers now found that they had to bring their guns right up to the edge of the ditch before they could make a breach, and in doing so had to pass over ground which was covered by the converging fire from the faces of the bastions. Towards the end of the century the attack of the curtain was delayed and the cross-fire over the ground in front increased by the introduction of ravelins.

The slight gabion protection for the siege batteries was at first replaced by strong timber shelters. These were found in- adequate; but a still greater difficulty was that of bringing up the siege guns to their positions, emplacing them and maintaining communication with them under fire. In addition to this, the guns of the defence until they could be overpowered (a slow process) dominated a wide belt of ground in front of the fortress; and unless the besiegers could find some means of maintaining a strong guard close to their batteries these were liable to be destroyed by sorties from the covered way.

Gradually the whole problem of siege work centred round the artillery. The besiegers found that they had first to bring up enough guns to overpower those of the defence; then Siegecraft ˆ a(j vanC e their guns to positions from which they Vaubaa. could breach the walls; and throughout these opera- tions to protect them against sorties. Breaches once made, the assault could follow on the old lines.

The natural solution of the difficulty of approach to the battery positions was the use of trenches. The Turks were the first to make systematic use of them, having probably inherited the idea from the Eastern Empire. The soldiers of Christendom, however, strongly disliked digging, and at first

great leaders like Bayard and Montluc had themselves to use pick and shovel, t6 give their men an example. In due course the necessity of the trenches was recognized, but the soldiers never took kindly to them, and the difficulty was dealt with in a manner reminiscent of the feudal ages, by impressing large bodies of peasantry as workmen whenever a siege was in contemplation.

Through the 16th and most of the 17th century, therefore, we find the attack being conducted by means of trenches leading to the batteries, and supported by redoubts often called " places of arms " also made by trench work. During this period the result of a siege was always doubtful. Both trenches and batteries were arranged more or less at haphazard without any definite plan; and naturally it often happened that offensive action by the besieged against the trenches would disorder the attack and at times delay it indefinitely. Fig. 64, taken from a late 17th-century print by de Fer of Paris, gives a good idea of the general practice of that day when Vauban's methods were not yet generally known.

Another weak point about the attack was that after the escarp walls had been strengthened to resist artillery fire as has been described, there was no clear idea as to how they should be breached. The usual process was merely an indiscriminate pounding from batteries established on the crest of the glacis. Thus there were cases of sieges being abandoned after they had been carried as far as the attempt to breach.

It is in no way strange that this want of method should have characterized the attack for two centuries after artillery had begun to assert its power. At the outset many new ideas had to be assimilated. Guns were gradually growing in power; sieges were conducted under all sorts of conditions, sometimes against medieval castles, sometimes against various and widely-differing examples of the new fortification; and the military systems of the time, were not favourable to the evolution of

method. It is the special feature of Vauban's practical genius for siege warfare that he introduced order into this chaos and made the issue of a siege ,under normal conditions, a mere matter of time, usually a very short time.

The whole of Vauban's teaching and practice cannot be condensed into the limits of this article, but special reference must be made to several points. The most important of these is his general arrangement of the attack, teˆhine The ultimate object of the attack works was to make a breach for the assaulting columns. To do this it was necessary to establish breaching batteries on the crest of the glacis; and before this could be done it was necessary to overpower the enemy's artillery. This preliminary operation is

nowadays called the " artillery duel." In Vauban's day the effective range of guns was 600 to 700 yds. He tells us that it was cus- tomary to establish batteries at 1000 yds. from the place, but

Fig. 64. — Siege-works of the 17th century.

that at that range they did little more than make a great deal of noise. The first object of the attack, therefore, after the preliminary operations of investment, &c, had been completed, was to establish batteries within 600 or 700 yds. of the place, to counter-batter or enfilade all the faces bearing on the front of attack; and to protect these batteries against sorties. After the artillery of the defences had been subdued — if it could not be absolutely silenced — it was necessary to push trenches to the front so that guns might be conveyed to the breaching positions and emplaced there in batteries. Throughout these processes it was necessary to protect the working parties and the batteries against sorties.

For this purpose Vauban devised the Places d'armes or lignes paralleles. He tells us that they were first used in 1673 at the siege of Maestricht, where he conducted the attack, and which was captured in thirteen days after the opening of the trenches. The object of these parallels was to provide successive positions for the guard of the trenches, where they could be at hand to repel sorties. The latter were most commonly directed against the trenches and batteries, to destroy them and drive out the working parties. The most vulnerable points were the heads of the approach trenches. It was necessary, therefore, that the guard of the trenches should be in a position to reach the heads of the approaches more quickly than the besieged could do so from the covered way. This was provided for as follows.

The first parallel was usually established at about 600 yds. from the placej this being considered the limiting range of action

The attack.

of a sortie. The parallel was a trench 12 to 15 ft. wide and 3 ft. deep, the excavated earth being thrown forward to make a parapet 3 or 4 ft. high. In front of the first parallel and close to it were placed the batteries of the " first artillery position."

While these batteries were engaged in silencing the enemy's artillery, for

which purpose most of them were placed in pro- longation of the faces of the fortress so as to enfilade them, the " Approach Trenches " were being pushed forward. The normal attack included a couple of bastions and the ravelin between, with such faces of the fortress as could support them; and the approach trenches (usually three sets) were directed on the capitals of the bastions and ravelin, advancing in a zigzag so arranged that the prolongations of the trenches always fell clear of the fortress and could not be enfiladed.

Fig. 65, taken from Vauban's Attack and Defence of Places, shows clearly the arrangement of trenches and batteries.

After the approach trenches had been carried forward nearly half-way to the most advanced points of the covered way, the " second parallel " was constructed, and again the approach trenches were pushed forward. Midway between the second parallel and the covered way, short branches called Demi-parallels were thrown out to either flank of the attacks: and finally at the foot of the glacis came the third parallel. Thus there was always a secure position for a sufficient guard of the trenches. Upon an alarm the working parties could fall back and the guard would advance.

Trenches were either made by common trenchwork, flying trench- work or sap. In the first two a considerable length of trench was excavated at one time by a large working party extended along the trench: flying trenchwork (formerly known as flying sap) being distinguished from common trenchwork by the use of gabions, by the help of which protection could be more quickly obtained. Both these kinds of trenchwork were commenced at night, the position of the trench having been previously marked out by tape. The " tasks " or quantities of earth to be excavated by each man were

trench 1 ft. 6 in. wide and deep. "To protect the head of the trench he had a shield on wheels, under cover of which he placed the gabions in position one after another as the sap-head pro- „ . gressed. Other men following strengthened the parapet p ng '

with fascines, and increased the trench to a depth of 3 ft., and a width of 2 ft. 6 in. to 3 ft. Fig. 66, taken from Vauban's treatise on the attack, shows the process clearly. The sap after being completed to this extent could be widened at leisure to ordinary trench dimensions by infantry working parties.

Regular Attack (Vauban).

so calculated that by daybreak the trench would afford a fair amount of cover. Flying trenchwork was generally used for the 2nd parallel and its

approaches, and as far beyond it as possible. In proportion as the attack drew nearer to the covered way, the fire of the defenders' small-arms and wall-pieces naturally grew more effective, though by this time most of their artillery would have been dismounted by the fire of the siege batteries. It therefore became necessary before reaching the 3rd parallel to have recourse to sap.

Sapping required trained men. It consisted in gradually pushing forward the end of a narrow trench in the desired direction. At the sap-head was a squad of sappers. The leading man excavated a

Fig. 66. — Sapping (Vauban).

As the work at the sap-head was very dangerous, Vauban encouraged his sappers by paying them on the spot at piecework rates, which increased rapidly in proportion to the risk. He thus stimulated all concerned to do their best, and reckoned that under average con- ditions he could depend on a rate of progress for an ordinary sap of about 50 yds. in 24 hours.

It is interesting to compare the more recent method of sapping with that above de- scribed (fig. 67 taken from the Instruction in Military Engin- eering, 1896). It is no longer possible to place gabions in position at the sap – head under fire. Accordingly the leading sapper excavates to the full depth of 4 ft. 6 in., and the rate of progress is retarded proportionately, so that an advance of only 15 to 30 yds. in 24 hours can be reckoned on instead of 50. The head of the sap is protected by a number of half-filled sandbags, which the leading sapper throws forward as he goes on. The nearer the approaches drew to the covered way, the more oblique became the zig- zags, so that little forward progress was made in propor- tion to the length of the trench. The approaches were then carried straight to the front, by means of the " double sap," which consisted of two single saps worked together with a parapet on each side (fig. 68). To protect these from being enfiladed from the front, traverses had to be left at intervals, usually by turning the two saps at right angles to right or left for a few feet, then forward, and so on as shown in fig. 69, the distance apart of these traverses being of course regulated by the height from which the enemy's fire commanded the trench.

The later stages in the attack are illustrated in fig. 70. From the third parallel the attack was pushed forward up the glacis by means of the double sap. It was then pushed right and left along the glacis, a little distance from the crest of the covered way. This was called " crowning " the covered way,

[ATTACK

and on the position thus gained breaching batteries were estab- lished in full view of the escarp. WhUe the escarp was being

breached, if it was intended to use a systematic attack Later throughout, a mine gallery (see Mining below) was S the attack, driven under the covered way and an opening made

through the counterscarp into the ditch. The sap was then pushed across the ditch, and if necessary up the breach, the defenders' resistance being kept under by musketry and artillery fire from the covered way. The ravelin and bastions were thus captured successively, and where the bastions had been re- trenched the same methods were used against the retrenchment. Vauban showed how to breach the escarp with the least expenditure of ammunition. This was done by making, with successive shots placed close together (which was feasible even in those days from a position so close as the crest of the covered way) horizontal and vertical cuts through the revetment wall. The portion of revetment enclosed by the cuts being thus detached from support was overturned by the pressure of the

From Military Engineering, by permission of the Controller of H. M. Stationery Office.

Fig. 67. — Deep Sap.

earth from the rampart. Ricochet fire was also the invention of Vauban. He showed how, in enfilading the face of a work, by using greatly reduced charges a shot could be made to drop over the crest of the parapet and skim along the terreplein, dismounting guns and killing men as it went.

The constant success of Vauban must be ascribed to method and thorough organization. There was a deadly certainty 18th- about his system that gave rise to the saying " Place

century assiegee, place prise." He left nothing to chance, principles and preferred as a rule the slow and pertain progress of defence. of saps across' the ditch and up the breach to the loss and delay that might follow an unsuccessful assault. His con- temporary and nearest rival Coehoorn tried to shorten sieges by heavy artillery fire and attacks across the open; but in the long run his sieges were slower than Vauban's.

So much a matter of form did the attack become under these conditions,

that in comparing the supposed defensive powers of different systems of fortification it was usual to calculate the number of days that would be required in each case before the breach was opened, the time being measured by the number of hours of work required for the construction of the various trenches and batteries. It began to be taken as a matter of course that no place under any circumstances could hold out more than a given number of days; and naturally, when the whole question had become one of formula, it is not surprising to find that places were very often surrendered without more than a perfunctory show of resistance.

The theory of defence at this time appeared to be that since it was impossible to arrest the now methodical and protected progress of the besiegers' trenches, no real resistance was possible until after they had reached the covered way, and this idea is at the root of the extraordinary complications of outworks and multiplied lines of ramparts thatcharacterizedthe "systems" of this period. No doubt if a successor to Vauban could have

li!fM#

g|.'

brought the same genius to bear on the actual defence of places as he did en the attack, he would have discovered that the essence of successful defence lay in offensive action outside the body of the place, viz. with trench against trench. For want of such a man the engineers of the defence resigned themselves contentedly to the loss of the open ground outside their walls, and relied either upon successive permanent lines of defence, or if these did not exist, upon extem- porized retrenchments, usually at the gorge of the a- bastion.

It is curious that such experienced soldiers as most of them were should not have realized the fatal effect upon the minds of the defenders which this almost passive abandon- ment of line after line must needs produce. Even a civilian — Machiavelli— had seen into the truth of the matter years before when he said (Treatise on the Art of War, Book vii.) : " And here I ought to give an advice … to those who are construct- ing a fortress, and that

is, not to establish within its circuit fortifications which may serve as a retreat to troops who have been driven back from the first line. ... I maintain that there is no greater danger for a fortress than rear fortifications whither troops can retire in case of a reverse; for once the soldier knows that he has a secure retreat after he has abandoned the first post, he does in fact abandon it and so causes the loss of the entire fortress."

It must, however, be remembered that in those days when soldiers were mostly of a separate or professional caste, the whole thing had become a matter of business. Fighting was so much regulated by the laws and customs of war that men thought nothing of giving up a place if, according to accepted opinion, the enemy had advanced so far that they could no longer hope to defend it successfully. Once this idea had set in it became hopeless to expect successful defences, save now and then when

> iW

Fig. 68.— Double Sap.

some officer of very unusual re- solution was in command. This is the real reason for the feeble re- sistance so often made by fortresses in the 17th and 1 8th centuries, which has been attributed to in- herent weakness fortifications.

0mmmwmmmMm\wwwMmmmtlw& , ■

Fig. 69. — Direct advance by Double Sap.

Custom exacted that a commandant should not give up a place until there was an open breach or, perhaps, until he had stood at least one assault. Even Napoleon recognized this limitation of the powers of the defence when in the later years of his reign he was trying to impress upon his governors the importance of their charge. The limitation was perfectly unnecessary, for history at that time could have afforded plenty of instances of places that had been successfully defended for many months after breaches were opened, and assault after assault repulsed on the same breach. But the same soldiers of the 17th and 1 8th centuries who had. created this artificial condition of affairs,

established it by making it an understood thing that a garrison which surrendered without giving too much trouble after a breach had been opened should have honourable consideration; while if they put the besiegers to the pains of storming the breach, they were liable to be put to the sword.

It has been necessary to dwell at some length on the siegecraft of Vauban and his time, not merely for its historical interest,

but because the system he introduced was practically Wa'" S "' ar unaltered until the end of the 19th century. The

sieges of the Peninsular War were conducted on his lines; so was that of Antwerp in 1830; and as far as the disposi- tion of siege trenches was concerned, the same system remained in the Crimea, the Franco-German War and the Russo-Turkish War. The sieges in the Napoleonic wars were few, except in the Iberian peninsula. These last differed from those of the Vauban period and the 18th century in this, that instead of being deliber- ately undertaken with ample means, against fortresses that answered to the requirements of the time, they were attempted

Crimea.

Fig. 70. — Later Stages of the Attack (Vauban).

with inadequate forces and materials, against out-of-date works. The fortresses that Wellington besieged in Spain had rudimentary outworks, and escarps that could be seen and breached from a distance. At that time, though the power of small arms had increased very slightly since the last century, there had been a distinct improvement in artillery, so that it was possible to breach a visible revetment at ranges from 500 to 1000 yds. Wellington was very badly off for engineers, siege artillery and material. Trench works could only be carried out on a small scale and slowly. Time being usually of great importance, as in the first two sieges of Badajoz, his technical advisers endeavoured to shorten sieges by breaching the escarp from a distance — a new departure — and launching assaults from trenches that had not reached the covered way. Under these circumstances the direct attacks on breaches failed several times, with great loss of life. Wellington in one or two earlier despatches reflected on his engineers for not establishing their batteries on the crest of the glacis. The failures are, however, clearly due to attempts to push sieges to a conclusion without proper preparation.

So much has been written of late years in criticism of the fortifica- tion to what may be called the Vauban period that it is important to note what were the preparations considered necessary for a siege

at that time {Journals of Sieges in Spain, 1811 to 1814). Sir John Jones summarizes his own experience in Spain and the data accumu- lated by practical engineers in former sieges from the time of Vauban onwards, in the following conclusions: The actual work of entrenching, sapping, &c, on the front attacked was much the same whether the fortress contained 5000 or 10,000 men. On the other hand the guard of the trenches was proportionate to the fighting men inside the fortress. (The total number of

men had of course to be sufficient to allow three or four complete shifts or " reliefs " for all work and duties.) Adding a proportion of men for camp and other duties, he calculates, for the vigorous siege of an ordinary place situated in open country and containing 5000 men, a corps of 32,080 effectives, and remarks further that this force would be greatly exhausted after a month's service. The same place held by 10,000 would call for a besieging army of 50,830 men (guards and duties increasing, but not working parties). Thus the besieger should if possible have a superiority of 7 to 1 if the garrison numbered 5000, 6 to 1 if 10,000 and 5 to I if 15,000 and so on. As regards artillery, he should have as many, and if possible twice as many, guns as those of the defender on the front of attack, as well as howitzers for sweep- ing every line subject to enfilade and mortars for destroying traverses, &c. Later in the siege, more howitzers and mortars to clear the

covered way and places of arms, and finally, after the covering of the covered way, fifty additional battering guns would be required. It is apparent from this that the practical engineers of the day i looked upon a siege as a seri- ous matter, and did not find permanent fortifications want- ing in defensive strength.

During the long peace that followed the Napoleonic wars, one advance was made in siege- craft. In England in 1824 successful experiments were carried out in breaching an unseen wall by curved or indirect fire from howitzers. At Antwerp in 1830 the in- creasing power and range of artillery, and especially of howitzers, were used for bombarding purposes, the breaches there being mostly made by mines. Then came one of the world's great sieges; that of Sevastopol in 1854-1855 (see Crimean War). The outstanding lesson of Sevastopol is the value of an active defence; of going out to meet the besieger, with countertrench and countermine. This lesson has increased in value for us in pro- portion to the increased power of the rifle.

In comparing the resistance made behind the earthworks of Sevastopol with the recorded defences of permanent works, it is essential to remember that the conditions there were 'quite abnormal. Sir John Jones has told us what the relative forces of besiegers and besieged should be, and the necessary preponderance of artillery for the attack. The following quotations may be added :

" The siege corps should be sufficiently strong — (1) To invest the fortress completely, and maintain the investment against all the efforts of the garrison. (2) If a regular siege is contemplated, to execute and guard all the siege works required for it. Complete investment may sometimes be impossible, but experience has repeatedly shown that the difficulties of a siege are enormously increased if the garrison are able to draw fresh troops and supplies from outside, and to rid themselves of their sick and wounded " (Lewis). Again as regards artillery: " In a regular attack, where every point is gained inch by inch, it is impossible to succeed without overpowering the defensive artillery "; and " it is useless to attempt to sap near a place till its artillery fire is subdued . . . "(Jones).

These conditions were so far from being fulfilled at Sevastopol that (a) there was no investment — in fact the Russians came nearer to investing the Allies; (5) the Russians had the preponderance in guns almost throughout; (c) the Russian force in and about Sevastopol was numerically superior to that of the Allies. We must add to this that Todleben had been able to get rid oi most of his

civilian population, and those who remained were chiefly dockyard workmen, able to give most valuable assistance on the defence works. The circumstances were therefore exceptionally favourable to an active defence. The weak point about the extemporized earthworks, which eventually led to the fall of the place, was the want of good bomb-proof cover near the parapets.

The Franco-German War of 1870 produced no great novelty. The Germans were not anxious to undertake siege operations when it could be avoided. In several cases minor Franco- fortresses surrendered after a slight bombardment. War, In others, after the bombardment failed, the Germans

contented themselves with establishing a blockade or detaching a small observing force. By far the most interesting siege was that of Belfort (q.v.). Here Colonel Denfert-Rochereau employed the active defence so successfully by extemporizing detached redoubts and fortifying outlying villages, that he obliged the besiegers (who, however, were a small force at first) to take up an investing line 25 m. long; and succeeded in holding the village of Danjoutin, 2000 yds. in advance of the enceinte, for two months after the siege began. He also used indirect fire, withdrawing guns from the

ramparts and placing them in the ditches, in the open spaces of the town, &c. At Paris the French found great advantage in placing batteries in inconspicuous positions outside the forts. Their direct fire guns were at' a disadvantage in being fired through embrasures. These had served their purpose when artillery fire was very inaccurate, but had now for a long time been recognized by the best engineers as out of date. The Germans since the siege of Duppel in 1864 had mounted their siege guns on " overbank " carriages; that is, high carriages which made it possible to fire the guns over the parapet of the battery without embrasures.," The guns in the Paris forts which were further handicapped by conspicuous parapets and the bad shooting of the gunners were easily silenced.

At Strassburg indirect fire against escarps was used. The escarp of Lunette 53 was successfully breached by this method. The breaching battery was 870 yds. distant, and the shot struck the face of the wall at an angle (horizontally) of 55 , the effect being observed and reported from the counterscarp. 1000 rounds from 60-pounder guns sufficed to make a breach 30 yds. wide.

Fig. 71 is a good example of the attack in the late stages. It will be observed that batteries for mortars and field guns are established in the captured lunettes. The narrow wet ditch of Lunette 53 was crossed by a dam of earth and fascines, the headway protected by a parapet or screen of sandbags.

" Lunette 52 was unrevetted, and its ditch was more than 60 yds. wide, and 6 to 9 ft. deep. ... It was determined to effect the passage by a cask bridge, for which the casks were furnished by breweries near at hand. . . . The formation of the bridge was begun at nightfall. A pioneer swam across, hauled over a cable, and made it fast to the hedge on the berm. Four men were stationed in the water, close to the covered way, the casks were rolled down to them one after the other, and fitted with saddles, so as to form piers . . . these piers were successively boomed out along the line of the cable. ... In two hours the bridge was finished, and the lunette was entered. . . . The work had not been discovered by the besieged, and the formation of lodgments inside the lunette was already begun, when the noise made by some troops in passing the bridge attracted attention, and drew a fire which cost the besiegers about 50 men. A dam was afterwards substituted for the bridge, as it was repeatedly struck by shells." (R.E. Professional Papers, vol. xix.)

It is curious to realize that this happened at so recent a time. Such operations would be impossible now, as long as any defending guns remained in action.

On the whole it may be said that siegecraft gained practically nothing from the Franco-German War. The Russo-Turkish

war taught less, Plevna (q.v.) having been defended Modern ˆ g el(j wor] iS anc j attacked by the old-fashioned tare. methods. For the last ten years of the 19th century

military opinion was quite at a loss as to how the sieges of the future would work out. As guns and projectiles continued to improve the ” attaque brusquee ” proposed by von Sauer had many adherents. It was thought that a heavy bombardment would paralyse resistance and open the way for an attack, to be delivered by great numbers and with special appliances for crossing obstacles. Others thought that the strength of the defence, as manifested by the Plevna field works,

would be greater than ever when the field works were backed by permanent works, good communications and the resources of a fortress. One thing was obvious— namely, that as long as the artillery of the place, of even the smallest calibres, remained unsubdued, the difficulty of trenchwork and sapping would be enormously increased, and no one seemed to have formed a clear conception of how that difficulty was to be met. A lecture delivered in Germany about 1895 is worth quoting as a fair example of the vagueness of idea then prevailing: ” For the attack, the following is the actual procedure : Accumulation and preparation of material for attack before the fortress: advance of attacking artillery, covered by infantry. Artillery duel. Throwing forward of infantry: destruction of the capability for defence of the position attacked; when possible by long-

*{-> ’•”**

From Textbook of Fortification, by permission of the Controller H.M. Stationery Office.

‘ˆ Fig. 71. — Strassburg, Lunettes 52 and 53, 1870.

range artillery fire, otherwise by the aid of the engineers. Occu- pation of the defensive position. Assault on the inner lines of the fortress.” That seemed quite a simple prescription, but the necessary drugs were wanting. And even since Port Arthur great uncertainty as to the future of the attack remains.

Modern artillery has much simplified the construction of siege batteries. Formerly siege batteries and rampart batteries opposed each other with direct fire at ranges not too long for the unaided human eye, and the shells, travelling with low velocity, bit into the parapets, and, exploding, produced their full effect. Accordingly the task of the gunners was, by accurate fire,

to destroy the parapets and embrasures, and to dismount the guns. The parapets of siege batteries were therefore made from 18 to 30 ft. thick, and the con- struction of such batteries, with traverses, &c, involved much work. The height of parapet necessary for proper protection being 7 ft. 6 in. to 8 ft., a great deal of labour could be saved by sinking the gun-platforms about 4 ft. below the surface level, but of course this was only possible where rock or water were not near the surface.

The effect of modern projectiles was to reduce the thickness of earth necessary for parapets. High velocity projectiles are very easily deflected upwards by even a slight bank of earth. This is

especially the case with sand. Loose earth is better than compacted earth, and clay offers the least resistance to penetration. These facts were taken note of in England more than on the Continent in the design of instructional siege batteries.

The construction of batteries is moreover vastly simplified by the long ranges at which artillery will fight in future. It will as a rule be possible to place howitzer batteries in such positions that even from balloons it will be difficult to locate them; and even direct fire batteries can easily be screened from view. This renders parapets unnecessary, and probably no more protection will be used than light splinter-proof screens to stop shrapnel bullets or fragments of common shell. Moreover batteries can be constructed at leisure and by daylight.

The most important point about the modern battery is the gun platform for the larger natures of guns and howitzers. These require very solid construction to resist the heavy shock of discharge. Not long ago it was thought that the defence would have larger ordnance than the attack, as anything heavier than an 8 in. howitzer required a concrete bed, which could not be made at short notice. The Japanese, however, at Port Arthur made concrete platforms for 1 1 in. howitzers. It may be remarked that difficulties which loom largely in peace are often overcome easily enough under the stress of war.

Another gain to the attack is in connexion with magazines. The old powder magazines were particularly dangerous adjuncts to batteries, and had to be very carefully bomb-proofed. Such pro- pellants as cordite, however, are comparatively harmless in the open. They are very difficult to detonate,

and if set on fire do not explode like gunpowder. It is therefore unnecessary to provide bomb-proof magazines for them in connexion with the batteries.

In future sieges the question of supply will be more important than it has ever been. Leaving out of the question the bringing up of supplies from the base of operations, the task of distribution at the front is a very large one. The Paris siege manoeuvres of 1894 furnish some instructive data on this point. The main siege park was at Meaux, 10 m. from the 1st artillery position, and the average distance from the 1st artillery position to the principal fort attacked was 5000 yds. The front of attack on Fort Vaujours and its collateral batteries covered 10,000 yds. There were 24 batteries in the 1st artillery position; say 100 guns, spread over a front of 4000 yds. To connect Meaux with the front, the French laid some 30 m. of narrow gauge railway largely along existing roads. The line was single, with numerous branches and sidings. They ran 11 regular trains to the front daily and half-a-dozen supplementary. The amount of artillery material sent up was over 5000 tons, without any projectiles; but it can easily be imagined that large demands were also made on transport for other purposes. For instance, one complete bakery train was sent up daily. The amount of ammuni- tion sent up would be limited only by the power of transporting it. A siege train of 100 pieces could probably dispose of from 500 to 1000 tons of ammunition a day, at the maximum rate of firing.

But the most important question affecting the sieges of the future (putting aside accidental circumstances) will be the configuration of the ground. Assuming that local conditions do not specially favour the artillery of either side, it is highly probable that the artillery duel will result in a deadlock. If the besiegers' guns do not succeed in silencing those of the defence from the 1st or distant artillery position (which, whether they are in cupolas or in concealed positions, will in any case be an extremely difficult task), it will be necessary for the infantry to press in; to feel for weak points, and to fight for those that offer better positions for fire and observation. In doing this they will have to face the defenders' infantry, entrenched, backed by their unsilenced guns, and having secure places of assembly from which to deliver counter-attacks. The distance to which they can work forward and establish themselves under these conditions will depend on the ground. It will then be for the engineers to cross the remaining space by sap. This, under present conditions, will be a tedious process, and may even take long enough to cause the failure of the siege.

As to the manner of the sap, it will certainly be " deep," as long as the defence retains any artillery power. When the 4 ft. 6 in. sap already described was first introduced, it was known as a "deep sap " ; but the sieges of the future will probably necessitate a true deep sap, that is one in which the whole of the necessary cover is got below the surface of the

earth.

Such a sap may consist of an open trench, about 6 ft. deep, the whole of the excavated earth being carried away through the trench to the rear; or a blinded trench, covered in as it progresses by splinter-proof timbers and earth; or a tunnelled trench, leaving a foot or so of surface earth undisturbed. In either case nothing should be visible from the front to attract artillery fire. As the sap is completed, it will sometimes be necessary to add a slight parapet in places, to give command over the foreground for the rifles of the guard of the trenches.

The sap will have to be pushed up quite close to the defenders' trenches and obstacles. After that further progress must either be made by mining, or as seems very probable, by getting the better of the defenders in a contest with shells from short-range mortars.

Just as in the feudal ages a castle was built on some solitary eminence which lent itself to the defensive methods of the time, so in the future the detached forts and supporting points in the girdle

of a fortress will be sited where smooth and gentle slopes of ground give the utmost opportunity to the defenders' fire, and the least chance of concealment to the enemy. There will be considerable latitude of choice in the defensive positions; though not, of course, . the same latitude as when the existence of a precipitous hill was the raison d'itre of the castle. In some places, as at Port Arthur, the whole country-side may by reason of its steep and broken slopes be unfavourable to the defence, though even then genius will turn the difficulties to account. But wherever it is possible the defender will provide for a space of 1000 yds. or so, swept by fire and illuminated by searchlights, in front of his lines. That space will have to be crossed by sap, and it needs little imagination to realize how great the task will be for the besieger.

There are other modern methods of siege warfare to be noticed, the use of which is common to besiegers and besieged. Much is expected of balloons; but the use of these in war is unlikely to correspond to peace expectations. They must be kept at a consider- able distance from the enemy's guns, a distance which will increase as the means of range-finding improve ; and as the height from which they can observe usefully is limited, so is the observers' power to search out hidden objects behind vertical screens. Thus, suppose a captive balloon at a height of 2000 ft., and distant 4000 yds. from an enemy's howitzer battery: and suppose the battery placed behind a steep hill-side or a grove of trees, at such a distance that a shell fired with 30° elevation can just clear this screen. The line of sight from the observer to the battery is inclined to the horizontal

at y. , 0OO ‘ that is §, or roughly io°. It is obvious, therefore, that

the observer cannot see the battery.

Balloon observers are expected to assist the batteries by marking the effects of their fire. For this to be done on any practical scale a balloon would be required for each battery: that is, for only 100 guns, some 20 or 25 balloons. These would require an equal number of highly skilled observers (of whom there are not too many in existence), besides the other balloon personnel and accessories, and the means of making gas, which is too much to expect, even if an enemy were obliging enough to give notice of his intentions.

Telephones and all other means of transmitting intelligence rapidly are now of the utmost importance to both attack and defence. Maps marked with numbered squares are necessary for directing artillery fire, especially from cupolas. Organization in every branch will give better results than ever before, and the question of communication and transport from the base of supplies right up to the front needs detailed study, in view of the great weight of ammunition and supplies that will have to be handled.

The use of light mortars for the trenches, introduced by Coehoorn and revived with extemporized means at Port Arthur, needs great attention. It may be prophesied that the issue of important sieges in the future, when skilfully conducted on both sides with sufficient resources, will depend mainly on the energy of the defenders in trench work, on mining and countermining in connexion with the trenches, and on the use of light mortars made to throw large charges of high explosive for short distances with great accuracy.

For a brief narrative of the siege of Port Arthur in 1904, one of the greatest sieges of history, both as regards its epic interest and its military importance, the reader is referred to the article Russo- Japanese War.

Definitions.— The following definitions may be useful, but have no place in the evolution of the attack, to which this section is mainly devoted.

Investment. — This most necessary, almost indispensable operation of every siege consists in surrounding the fortress about to be be- sieged, so as to cut off its communications with the outside world. Preliminary investment which is carried out by cavalry and light troops before the arrival of the besieging force, consists in closing the roads so as to shut out supplies and reinforcements. Close investment should be of such a character as to prevent any sort. of communication, even by single messengers or spies. The term ” blockade ” is sometimes loosely used

instead of investment.

Lines of Circumvallation and Contravallation. — These now obsolete terms were in great use until the 19th century. The circumvallation was a line of parapet which the besieger made outside the investing position of his own force, to protect it when there was a chance of attack by a relieving army. The line of contravallation was the line of parapet and trench sometimes made by the besieger all round the town he was attacking, to check the sorties of the garrison.

Observing Force. — When circumstances make the reduction of a particular fortress in the theatre of operations unnecessary a force is often detached to " observe " it. The duty of this force will be to watch the garrison and prevent any hostile action such as raids on the lines of communications.

Bombardment.— -This operation, common to all ages, consists in a general (sometimes an indiscriminate) fire against either the whole target offered by the fortress or a particular section of that target. In ancient and medieval times the effect of a bombardment — whether of ordinary missiles, of incendiary projectiles, or of poisonous matters tending to breed pestilence — upon a population closely crowded within its walls was very powerful. In the present day little military importance is attached to bombardment, since under modern conditions it cannot do much real harm.

7M-

FORTIFICATION AND SIEGECRAFT

[MINING

IV. Military Mining

It has been noted already that mining is one of the most ancient resources of siege warfare. The use of gunpowder in mining operations dates from the end of the 15th century. When Shakespeare makes Fluellen say, at Henry V.'s siege of Harfleur, " th'athversaryisdigt himself four yards under the countermines; I think 'a will plow up all, if there is not better directions," he is anticipating the development of siegecraft by nearly 100 years. Pedro di Navarro, a Spanish officer, is credited with the first practical use of explosive mines. He employed them with great success at the siege of Naples in 1503; and afterwards, when rebuilding the Castello Nuovo after the siege, was probably the first to make permanent provision for their use in counter- mines. Countermining had been a measure of defence against the earlier methods of attack-mining; the object being to break into the

besiegers' galleries and fight hand to hand for the posses- sion of them. When the explosive mine was introduced, it became the object of the defenders to establish their counter- mines near the besiegers' galleries and destroy them by the effect of the explosion. In the 400 years or so that have passed this branch of warfare has changed less than any other. Methods of mining have not advanced much, and the increased power of high explosives as compared with gunpowder has its least advantage in moving masses of earth.

When a besieger has arrived by means of trenches within a certain distance of the enemy's works without having subdued their fire, he may find that the advance by sap becomes too slow and too dangerous. He can then advance underground by means of mine galleries, and by exploding large charges at the heads of these galleries can make a series of craters. These craters are then occupied by infantry, and are connected with each other and with the parallel in rear by trenches, thus forming a new parallel. If not interfered with by the defenders the besieger can advance in this way until he reaches the counterscarp. His mines will now be turned to a new purpose, viz. to breach the counterscarp and afterwards the escarp. This is done by placing suitable charges at intervals behind the scarps at such a height above the foundations that the pressure of the earth above the mine will more than counterbalance the resistance of the masonry.

But if the defenders are active, they will countermine. There

is as a general rule this broad difference between the mines of

the defence and those of the attack, that the defenders

f do not wish the surface of the ground broken, lest*

mines. increased opportunities of getting cover should be

offered to the besiegers. The object of the defence,

therefore, is to destroy the besiegers' galleries without forming

craters, and for this purpose they generally endeavour to get

underneath the attack galleries. The defenders may, however,

wish, if the opportunity is allowed them, to explode mines under

the attack parallels, in which case there is of course no objection

to disturbing the surface.

" At the commencement of the subterranean war the main object of the defence is to force the besieger to take to mining operations as early as possible, as it is a tedious operation and will prolong the siege. Every endeavour must be made to push forward counter- mines so as to meet and check the attack. On the approach of the opponents to each other careful listening for the enemy must be resorted to. To this end it is necessary at irregular intervals to suspend all work for some minutes at a time, closing doors of com- munication and employing experienced listeners at the heads of the countermines. This matter is a most important one, as a premature explosion of the defender's mines is a double loss to the defender, a loss of a mine and an advantage to the enemy in more than one way. As soon as the overcharged mines of the besieger have been fired, a heavy fire should be brought to bear on the craters, and if possible sorties should be made to prevent the enemy occupying them. At the same time every effort should be made underground to surround with galleries, and as it were isolate, the craters so as to prevent the besieger making a new advance from them. The efforts of the attack at this stage will probably be directed to the formation of what are called " Boule shafts " (i.e. shafts partially lined in which charges are hastily fired with little or no tamping), and to meet these in time the defender may resort to the use of boring tools, and so place charges somewhere in advance of the heads of the counter-

mines. His great object must be to prevent as long as possible the besieger from getting underground again; and these occasions, when the power of resistance is temporarily equal to, if not greater than, that of the attack, should be made the most of by the defence." (Lewis, Text-book on Fortification, &c, 1893.)

The defence has the advantage, in the case of fortresses r of being able to establish beforehand a system of countermine galleries in masonry. Many systems have been worked out for this purpose. A good typical arrangement is that of General Marescot, published in 1799, shown in fig. 72

Marescot's

System

*Section on mm. *

m > ^ — ■'s^j^^ ^ i ^^ .

Section on ae. ,

From Textbook o] Fortification, by permission of the Controller H.M. Stationery Office.

Fig. 72.

The main galleries (those running out in a straight line from the counterscarp gallery e to three of the points a) fall gently to the front to a depth of 30 or 40 ft. below the surface — the deeper they are the less they will suffer from the enemy's mines. Branch galleries (marked c b + d c) run obliquely upward from them to right and to left, leading to the mines, which are placed at various depths, according to circumstances.

Two main points must be observed in any system of counter- mines: the branch galleries must run obliquely forward, so as not to present their sides to the action of the enemy's mines; and the distance between the ends of the branches from adjacent main galleries should be such that the enemy cannot pass between them unheard. This distance will vary with the nature of the soil, but may be taken roughly as 20 yds. A convenient size for main galleries is 6 ft. high by 3 ft. wide: branch galleries may be 5 ft. by 3 ft. When the enemy is approaching, other branch galleries, called listeners, will be pushed out from main

and branch galleries. The section to fig. 1 of fig. 72 shows openings left for the purpose.

Another use of mines in defence is in connexion with breaches. A permanent arrangement for this purpose, by General Dufour, is shown in fig. 72. Yet another use, on which much ingenuity was expended in the 18th century, is to extemporize retrench- ments.

The charges of mines depend of course upon the effect which is desired. When the charge is strong enough to produce a crater, the radius of the circular opening on the surface Different £ tne g roun(j ; s ca u e d the radius of the crater. The kinds of , . , ,. ,

mines. line drawn from the centre of the charge to the nearest

surface, which is expressed in feet, is called the line of least resistance (L.L.R.). When a mine produces a crater the diameter of which is equal to the line of least resistance, it is called a one-lined crater; when the diameter is double the L.L.R., a two-lined crater and so on. Common mines are those which produce a two-lined crater. Over-charged mines produce craters greater than two-lined, and undercharged mines less. A camou- flet does

not produce a crater; it is used when the object is to destroy an enemy's gallery without breaking the surface. Fig. 73 shows sections of the different kinds of mines, with their

Action of a Common Mine

Probable spheroids of rupture for overcharged Mines

Crater Charge

3 lined 1027 lbs. (3-05 C) '

Mined 2312 „ (6-86C) ', 50 5.(3-361.).

5lined4374 „ P2-98C) [6l'e„(4-U.) ."..",„_»!

6lined7397„ (21-95C) , 72" 6,(4-0 1.)

5 7 lined 11569 „ (34-33 C) i 85'6(5-7i.) „

From Instructions in Military Engineering, by permission of the Controller of H.M. Stationery Office.

Fig. 73. — Mines.

craters and the effect they will produce downwards and horizon- tally in ordinary earth.

Consideration of this figure will show that it is possible to place a long charge at such a depth below the surface that it will destroy all galleries of the enemy within a considerable radius, without much disturbing the surface of the ground.

Bored mines, which have been alluded to above, are a com- paratively recent innovation. When the enemy is heard at work in one of his galleries and his position approximately determined by the jound, it is necessary to drive a branch gallery with all speed in that direction, and when it has advanced as far as appears necessary, to load, tamp and discharge a mine before the enemy can fire his own mine. This is one of the most delicate and dangerous operations of war, and success will fall to those who are at the same time most skilful and most determined. The work can be hastened and made

less dangerous as follows: Instead of driving a branch gallery, a hole several inches in diameter is bored in the required direction. With suitable tools there is no difficulty in driving a straight bore hole 20 or 30 ft. long. A small charge of high explosives is then pushed up to the end of the

borehole and fired. This forms a small camouflet chamber by compressing the earth around it. Into this chamber the charge for the mine is passed up the bore-hole. No tamping of course is required.

Mine warfare is slow, dangerous and uncertain in its results. It will certainly delay the besiegers' advance very much and may do so indefinitely. One point is distinctly in favour of the defence, namely that when ground has been much mined it becomes charged with poisonous gases. Some explosives are less noxious than others in this way, and it will be advantageous for the attack, but not necessarily for the defence, to make use of these.

Calculation of Charges. — The quantity of powder required for a charge is expressed in lbs. in terms of L.L.R. 3 , and the following formulae are used :

/ = L.L.R. in feet, r — radius of crater in feet, c = powder charge in pounds, i = a variable dependent on the nature of the soil.

s For a common mine c = — I 3

For an overcharged mine c = -£_i;{.g(r _M]3

For an undercharged mine c = —{l — -g(l — r)\ 3 .

The values-to be given to 5 are ;

Nature of Soil. Value of s.

Very light earth o-8o

Common earth i-oo

Hard sand . . •" 1-25*

Earth mixed with stones 1-40

Clay mixed with loam 1-55

Inferior brickwork 1 -66

Rock or good new brickwork 2-25

Very good old brickwork 2-50

Military mining is carried on by means of vertical shafts and horizontal or inclined galleries. When the soil is very stiff, very little or even no lining is

required for shafts and galleries; but usually they have to be lined either with cases or frames.

Cases make a complete lining of 2 in. planking. Frames are used at intervals of 4 or 5 ft. to support a partial lining of planks. Cases are of course preferable in other respects ; but in ordinary soil they take up more timber.

There are two kinds of gallery in ordinary use in the British service, namely the common gallery whose interior dimensions with cases are 5 ft. 6 in. X2 ft., and the branch gallery which shafts and is 4 ft.X2 ft. The shaft has about the same dimensions as ~ a u er i es a branch gallery. Formerly it was sometimes necessary ^^ in the systematic attack of a fortress to get guns down into the ditch. For this purpose a " great gallery " was used, 6 ft. 6 in. in height and 6 ft. 8 in. wide, internal dimensions.

Miners' Tools. — These are few and simple." The pick and shovel differ from the ordinary types in having rather shorter helves suitable for the confined space in which they are used. There is also a push- pick, an implement with a straight helve and a pointed shovel head 6 in. long and 3J in. wide. The miner's truck, used for drawing the earth from the end of the gallery to the bottom of the shaft, is a small wooden truck holding about 2 cub. ft. of earth. Formerly the noise of the wheels of the truck passing over the uneven wooden floor of the gallery was very liable to be heard by the enemy. To obviate this they now have leather tyres and should run on battens nailed to the floor. The miner's bucket is a small canvas bucket with a couple of ropes attached, by which the earth can be drawn up the shaft. Nowadays, however, the truck itself has chains attached to it, by which it is drawn up, with the aid of a windlass, to the surface. By this method more earth can be taken up in one lift, and time and labour are not wasted in transferring the contents of the truck to the bucket.

Ventilation is an important point. The breath of the miners and the burning of their candles (when electric light is not available) vitiates the air in the galleries; so that even in clean ground a gallery should not be driven more than 60 ft. without providing some means of renewing the air. This is usually done by forcing fresh air, by means of a pump or bellows, through a flexible hose to the head of the gallery. Where mines have been fired close by, there is great danger from poisonous gases filtering through the soil into the gallery. This difficulty is nowadays met by the use of special apparatus, such as helmets into which fresh air is pumped, so that the wearers need not breathe the air of the gallery at all. Ventilation can also be assisted by boring holes vertically to the surface of the ground.

Where a point has been reached at which it is proposed to fire a mine, a chamber juet large enough to hold the charge is cut in the

side of the gallery. The object of this is to keep the charge out of the direct line of the gallery and thus increase the force of the explosion. The charge may be placed in canvas bags, barrels or boxes, precautions being taken against damp.

The operation of loading is of the first importance, for if the mine is not exploded with success, not only is valuable time lost, which „. may give the enemy his opportunity, but it will probably

Charging ˆ necessarv ˆ untamp the mine in order to renew the mines. f uze; an operation attended by considerable danger. The loading of the mine should therefore be done by the officer in charge with his own hands. He has to work in a very cramped position and practically in the dark (unless with electric light) as of course no naked lights can be allowed near powder. Everything should therefore be prepared beforehand to facilitate the loading of the mine and placing of the fuze. At Chatham a iooo lb mine, at the end of a gallery 136 ft. long, has been loaded in 30 minutes. The powder was passed up the gallery by hand in sandbags, and emptied into a box of the required size.

Whatever method of firing (see below) is employed, the officer who loads the mine must be careful to see that it is so arranged as to make firing certain, and that the leads passing out of the gallery are not liable to damage in the process of tamping.

Tamping. — This operation consists in filling up the head of the gallery solidly, for such a distance that there shall be no possibility of the charge wasting its force along the gallery. The distance depends on the charge and on the solidity of the tamping. For a common mine it should extend to about § L.L.R. from the charge, when the tamping is of earth in sandbags; for a 3-lined crater, to about 2 L.L.R. Tamping can be improved by jamming pieces of timber across the shaft or gallery among the other filling.

Firing. — This may be done electrically, or by mean's of safety or instantaneous fuze or powder hose.

Electric firing is the safest and best, and allows of the charge being exploded at any given moment. For this purpose electric fuzes (for powder) or electric detonators (for guncotton or other high explosive) are employed.

The current that fires them is passed through copper wire leads.

The safety fuze used in the British service burns at the rate of about 3 ft. a minute. Instantaneous fuze burns at the rate of a mile a minute. Both can be fired under water. They are often used in conjunction, a considerable length of instantaneous fuze, leading from the charge, being connected to a short length of safety fuze.

Powder hose, an old-time expedient, can be extemporized by making a tube of strong linen, say 1 in. in diameter, and filling it with powder. It burns at the rate of 10 to 20 ft. per second.

Explosives. — The old-fashioned gunpowder of the grained black variety is still the best for most kinds of military mines. Pebble and prism powders do not give as good results, presumably because their action is so slow that some of the gases of explosion can escape through the pores of the earth. High explosives, with their quick shattering and rending effect, are little more effective than gun- powder in actually moving large quantities of earth. Most of them give off much more poisonous fumes than gunpowder. Some recent high explosives, however, have been specially designed to be com- paratively innocuous in this respect.

Some formulae have been given above for the calculation of charges. It will, however, simplify matters for the reader to record some actual instances of charges fired both in peace and war.

In the matter of scientific experiment we find Vauban as usual leading the way, and the following results among others were obtained by him at Tournay in 1686 and 1689: A charge of 162 lb placed 13 ft. below the surface produced a crater of 13 ft. radius (a two-lined crater, or " common mine "). Galleries were destroyed at distances equal to the L.L.R. in both horizontal and vertical directions. Double the charge, placed at double the depth, i.e. 324 lb with an L.L.R. of 27 ft. made no crater, but like the first destroyed galleries below it and on each side at distances equal to the L.L.R. A charge of 3828 lb with L.L.R. of 37 ft. made a two-lined crater and destroyed a gallery distant 61 ft. horizontally.

Bernard Forest de Belidor, a French engineer, made many experi- ments at La Fere about 1732, and 20 years later, as a general officer and inspector of miners, continued them on a larger scale. His experiments were directed towards destroying an enemy's galleries at greater distances than had hitherto been supposed possible, by means of very large charges (in proportion to the L.L.R.) which he called " globes of compression." In one of them a charge of 4320 lb of powder placed only 15 ft. 9 in. below the surface damaged or " compressed " a gallery distant 65 ft. horizontally.

The radius of the crater was 34 ft. 8 in.

At Frederick the Great's siege of Schweidnitz in 1762 some very large charges were exploded. One of them, of 5400 lb with an L.L.R. of 16 ft. 3 in., made a crater of 42 ft. 3 in. radius. Readers of Carlyle's Frederick the Great may recall his description of the contest of the rival engineers on this occasion.

At Graudenz in 1862 (experiments) a charge of 1031 lb of powder placed Io ft. deep, untamped, in a vertical shaft, made a crater of 15 ft. 6 in. radius. A charge of 412 lb of guncotton, calculated as

being equivalent to the above charge of powder and placed under the same conditions, made a crater of 14 ft. radius. The absence of tamping in both cases of course placed the gunpowder at a dis- advantage.

Perhaps the most interesting mine ever fired was that at the siege of Petersburg in the American Civil War, in June 1864. The circumstances were all abnormal, and the untechnical account of it in Battles and Leaders of the Civil War (vol. 1 e iv.) is well worth perusal. No mining tools or materials ˆj ersbur X and no military miners were available; and no one had jgff' any confidence in the success of the attempt except its originator, Lieut. Colonel Pleasants, a mining engineer by prof ession, his regiment which was recruited from a mining population, and General Burnside the corps commander. The opposing entrench ments were 130 yds. apart. The mine gallery was started behind the Federal lines and driven a distance of 510 ft. till it came under a field redoubt in the Confederate lines. There two branches were made right and left, each about 38 ft. long, and in them eight mines aggregating 8000 lb of powder were placed. The first attempt to fire them failed, and an officer and a sergeant volunteered to enter the gallery to seek the cause of the failure. A defective splice in two lengths of fuze was thus discovered and repaired. At the second attempt all the mines were fired simultaneously with success, and made a gigantic crater 170 ft. long by 60 ft. wide and 30 ft. deep. The occupants of the redoubt, at least several hundred men (they have been stated at 1000), were blown up and mostly killed. The assault which followed, however, failed completely, for want of organization. The infantry was drawn up in readiness to advance, but no outlets had been provided from the parallel, and this and other causes delayed the occupation of the crater and gave the defending artillery a moment's respite. Thus the assailants gained the crater but could not advance beyond it in face of the defenders' fire, nor could they establish themselves within it, on its steep clay sides, for want of entrenching tools. A good many troops were sent for- wards in support, but being in many cases

of inferior quality, they could not be induced to go forward, and huddled in disorder in the already overcrowded crater. Over 1000 of these were captured when the Confederates retook the crater by a counter-attack and the total loss of the Federals in the attack was nearly 4000.

The wars of the last generation have done little or nothing to advance the science of military mining, but a good deal has been done in peace to improve the means. Electric lighting and electric firing of mines will be a great help; modern drilling machines may be used to go through rock; ventilating arrangeˆ ments are much improved; and the use of bored mines is sure to have great developments. The Russo-Japanese War taught nothing new in mine-warfare, or as to the effects of mines, but the siege of Port Arthur had this moral among others; just as in future, in the frontal attack of positions, trench must oppose trench, so in fortress warfare mines will be more necessary than ever. It appears that they will be essential to destroy both the ditch-flanking arrangements of forts and the escarp or other permanent obstacle beyond the ditch.

V. Field Fortification

Field Fortifications, now more often spoken of as field defences, are those which are constructed at short notice, with the means locally available, usually when the enemy is near at hand. Subject to the question of time, a very high degree of strength can be given to them, if the military situation makes it worth while to expend sufficient labour. A century or more ago, the dividing line between permanent and field fortification was very rigidly drawn, since in those days a high masonry escarp surmounted by a rampart was essential to a permanent fortress, and these could naturally not be extemporized. Works without masonry, in other ways made as strong as possible with deep ditches and heavy timbers, — such as would require about six weeks for their construction — were known as semi-permanent, and were used for the defence of places which acquired strategic importance in the course of a war, but were not immediately threatened. The term field fortification was reserved for works constructed of lighter materials, with parapets and ditches of only moderate development. Redoubts of this class required a fortnight at most for their construction.

In modern fortification if cupolas and deep revetted ditches were essential to permanent defences, the dividing line would be equally clear. But as has been shown, this is not universally admitted, and where the resources exist, the use of our present

means of construction, such as steel joists, railway rails, rein- forced concrete and wire, in conjunction with the defensive power of modern fire-arms, makes it possible to extemporize in a very short time works having much of the resisting power of a permanent fortress. Further, such works can be expanded from the smallest beginnings; and, if the site is not too exposed, in the presence of the enemy.

Field fortification offers, as regards the actual constructions, a very limited scope to the engineer; and a little consideration will show that its defensive possibilities were not greatly affected by the change from machine-thrown projectiles to those fired by rude smooth-bore guns. There is therefore nothing in the history of this branch of the subject that is worth tracing, from the earliest ages to about the end of the 18th century. One or two points may be noticed. The use of obstacles is probably one of the earliest measures of defence. Long before missile weapons had acquired such an importance as to make it worth while to seek shelter from them, it would obviously have been found desirable to have some means of checking the onrush of an enemy physically or numerically superior. Hence the use by savage tribes, to this day, of pits, pointed stakes hidden in the grass, entanglements and similar obstacles. In this direction the ages have made no change, and the most highly civilized nations still use the same obstacles on occasion. 1 Another use of field defences common to all ages is the protec- tion of camps at night, where small forces are operating against an enemy more numerous but inferior in arms and discipline. In daylight such an enemy is not feared, but at night his numbers might be dangerous. Hence the Roman practice of making each foot-soldier carry a couple of stakes for palisades; and the simple defence of a thorn zariba used by the British for their camps in the Sudan.

Palisades and trenches, abatis and sharpened stakes have always been used. Except wire, there is practically no new material. As to methods, the laagers of the Boers are preceded by the wagon-forts of the Hussites, and those no doubt by similar arrangements of British or Assyrian war chariots; and so in almost every direction it will be found that the expedient of to-day has had its forerunners in those of the countless yester- days. The only really marked change in the arrangements of field defences has been caused not by gunpowder but by quick- firing rifled weapons. For that reason it is worth while to consider briefly what were the principles of field fortification at the end of the 18th century. That period has been chosen because it gives us the result of a couple of centuries of constant fighting between disciplined troops with fairly effective fire- arms. The field defences of the 19th century are transitional in character. Based mainly on the old methods, they show only faint attempts at adaptation to new

conditions, and it was not till quite the end of the century that the methods now accepted began to take shape.

The essential elements of fieldworks up to the time of the Peninsular War were command and obstacle; now they are protection and concealment.

The command and obstacle were as necessary in the days of smooth-bore muskets and guns as in those of javelins and arrows. When the enemy could get close up to a °/fl'/tf C wor k without serious loss, and attack in close order, defences. t ne defenders needed a really good obstacle in front of them. Moreover, since they could not rely on their fire alone to repulse the attack, they needed a two-deep line, with reserves close at hand, to meet it with the " arme blanche." For this purpose a parapet 7 or 8 ft. high, with a steep slope, perhaps palisaded, up which the attackers must climb after passing the obstacle, was excellent. The defenders after firing their last volley could use their bayonets from the top of the parapet with the advantage of position. The high parapet had also the advantage that the attackers could not tell what was going on inside the redoubt, and the defenders were sheltered from their fire as well from view until the last moment.

The strength of a fortified line in the i8th century depended principally on its redoubts. Lines of shelter trenches had little

power of defence at the time, unless they held practically as many men as would haveWfficed to fight in the open. Obstacles on the other hand had a greater value, against the inelastic tactics of the time, than they have now. A good position there- fore was one which offered good fire-positions for redoubts and plenty of facilities for creating obstacles. Strong redoubts which could resist determined assaults; good obstacles in the intervals, guns in the redoubts to sweep the intervals, and troops in formed bodies kept in reserve for counter-strokes — these were the essentials in the days of the smooth-bore.

The redoubts were liable to a heavy cannonade by field-guns before the attack. To withstand this, the parapets had to be made of a suitable thickness — from 4 or 5 ft. upwards — according to the time available, the resisting nature of the soil, and the severity of the bombardment expected.

The whole of the earth for the parapet was as a rule obtained from the ditch, in order to make as much as possible of this obstacle. The garrison in all parts of the interior of the redoubt were to be sheltered, if possible, from the enemy's fire, and with this object great pains were bestowed on the principle of " de- filade." The object of defilade, which was a great fetish in theoretical works, was so to arrange the height of the parapet with

reference to the terreplein of a work that a straight line (not, be it observed, the trajectory of the projectiles) passing from the muzzle of a musket or gun on the most commanding point of the enemy's position, over the crest of the parapet, should just clear the head of a defender standing in any part of the work. This problem of defilade became quite out of date after the development of time shrapnel, but was nevertheless taught with great rigour till within the last twenty years.

The sectional area of the ditch was calculated so that with an addition of about 10% for expansion it would equal that of the parapet. If a wider and deeper ditch was considered neces- sary, the surplus, earth could be used to form a glacis.

The interior of the redoubt had to afford sufficient space to allow the garrison to sleep in it, which was sometimes a matter of some difficulty if a small irregularly shaped work had to contain a strong garrison. Consideration of the plan and sections of these works will show that the banquette for infantry with its slopes, and the gun platforms, took off a good deal from the interior space within the crest-line. Guns were usually placed at the salients, where they could get the widest field of fire. They were sometimes placed on the ground level, firing through embrasures in the parapet, and sometimes on platforms so as to fire over the parapet {en barbette).

As in permanent fortification, immense pains were taken to elaborate theoretically the traces of works. A distinction was made between forts and redoubts, the former being those which were arranged to flank their own ditches, while the redoubts did not. Redoubts again were classed as " closed," those which had an equally strong defence all round; and " half-closed," those which had only a slight parapet or timber stockade for the gorge or rear faces. Open works (those which had no gorge defence) were named according to their trace, as redans and lunettes. A redan is a work with two faces making a salient angle. It was frequently used in connexion with straight lines of trench or breastwork. A lunette is a work with two faces, usually forming an obtuse angle, and two flanks.

The forts described in the text-books, as might be expected, were designed with great ingenuity, with bastioned or demi- bastioned fronts, star traces, and so forth, and in the same books intricate calculations were entered into to balance the remblai and deblai, that is, the amount of earth in the parapets with that excavated from the ditches. In practice such niceties of course disappeared, though occasionally when the ground allowed of it star forts and bastioned fronts were employed.

On irregular ground the first necessity was to fit the redoubt to the ground

on which it stood, so as to sweep the whole of the foreground, and this was generally a sufficiently difficult matter without adding the complications of flanking defences. Sir John Jones, speaking of the traces of the several works in the Torres Vedras lines, says: —

Torres Vedras,

" The redoubts were made of every capacity, from that of fig. 74 o, limited by want of space on the ground it occupied to 50 men and two pieces of artillery, to that of fig. 74 b, for 500 men and six pieces of artillery, the importance of the object to be attained being the only guide in forming the dimensions. Many of the redoubts first thrown up, even some of the smallest, were shaped like stars, under the idea of procuring a flank defence for the ditches; but this construction was latterly rejected, it being found to cut up the interior space, and to be almost fallacious with

Fig. 74. — Torres Vedras Works.

respect to flank defence, the breadth of the exterior slopes being in some cases equal to the whole length of the flanks so obtained. Even when, from the greater size of the work, some flanking fire was thus gained, the angle formed by the faces was generally so obtuse that it demanded more coolness in the defenders than ought reasonably to be expected to aim along the ditch of the opposite face: and further, this construction prevented the fire of the work being more powerful in front than in rear.

In order to decide on the proper trace of a work, it is necessary to consider whether its object be to prevent an enemy establishing himself on the ground on which it is to be placed, or whether it be to insure a heavy fire of artillery on some other point in its vicinity. In the first case every consideration should be sacrificed to that of adding to its powers of self-defence by flanks or other expedients. In the second, its powers of resistance are secondary to the estab- lishment of a powerful offensive fire and its trace cannot be too simple. Latterly, the shape of the redoubts was invariably that most fitted to the ground, or such as best parried the enfilade fire or musketry plunge of neighbouring heights, care being taken to present the front of fire deemed necessary towards the pass, or other object to be guarded; and such will generally be found the best rule of proceeding.

This recommendation, however, is not intended to apply to isolated works of large dimensions, and more particularly to those considered the key of

any position. No labour or expense should be spared to render such works capable of resisting the most furious assaults, either by breaking the parapet into flanks, or forming a flank defence in the ditch ; for the experience gained in the Peninsula shows that an unflanked work of even more than an ordinary field profile, if skilfully and determinedly assaulted, will generally be carried …. Nor does the serious evil of curtailing the interior space, which renders breaks in the outline so objectionable in small works, apply to works of large dimensions. .. .Under this view the great work on Monte Agraca (fig. 75) must be considered as very

Fig. 75. — Monte Agraca, Torres Vedras.

defective, the flank defence being confined to an occasional break of a few feet in the trace, caused by a change of direction in the contour of the height, whilst the interior space is more than doubly sufficient for the number of its allotted garrison to encamp.

Interior and other Defences. — This work, however, had some of its salient points . . . cut off by earthen lines of parapet, steeply

revetted externally, and so traced as to serve for traverses to the interior. It had also three or four small enclosed posts formed within it; and the work at Torres Vedras (fig. 76) had each of its salient points formed into an independent post. These interior defences and retrenchments were intended to guard against a general panic amongst the garrison, which would necessarily be composed in part

Fig. 76. — Torres Vedras Works.

of indifferent troops, and also to prevent the loss of the work by the entry of the assailants at any weak or ill-defended point. Such interior lines to rally on are absolutely essential to the security of a large field-work. They serve as substitutes for a blockhouse or tower, placed in the interior of all well-constructed permanent earthen works, and merit far more attention than they generally receive. „ The small circular windmills of stone, which were frequently found occupying salient knolls . . . readily converted into admir- able interior posts of that nature. The profile of the several works varied on every face and flank, according to its liability to be attacked or cannonaded ; the only general rule enforced being that all ditches should be at least 15 ft. wide at top and 10 ft. in depth, and the crest of the parapet have at least 5 ft. command over the crest of the counterscarp. No parapet exceeded 10 ft. in thickness, unless exposed to be severely cannonaded, and few more than 6 or 8 ft.; and some, on high knolls, where artillery could not by any possibility be brought against them, were made of stone or rubble less than 2 ft. in thickness, to gain more interior space, and allow

full liberty for the use of the defenders' bayonets."

Fig. 77 gives two typical sections of these works.

Fig. 77.

The works of Torres Vedras have been chosen for illustration because they offer very good historical examples, and also because of the value of the critical remarks of Sir John Jones who as a captain was the engineer in charge of their construction. At the same time it must be remembered that they differ from ordinary field-works in having an unusual degree of strength, plenty of time and civilian labour having been available for their construction. In this respect they approximate more to semi- permanent works, the main reason why they did not receive under the circumstances a greater development of ditch and parapet being that in addition to the large number of works required, much labour was expended in abatis, inundations, scarping hill-sides and constructing roads.*

Some further remarks of Sir John on the situations of the works are very instructive: —

" Many of the redoubts were placed on very elevated situations on the summit of steep hills, which gave them a most imposing

appearance; but it was in reality a defect . . . for the fire of their artillery on the object to be guarded became so plunging as to lose half its powers; the musketry could not be made to scour the face of the hill sufficiently; and during the night both arms became of most uncertain effect.

" The domineering situation of the redoubts, however, gave con- fidence to the young troops which composed their garrisons, pro- tected them from a cannonade, and screened their interior from musketry, unless fired at a high angle, and consequently at random. These considerations perhaps justify the unusually elevated sites selected for most of the redoubts on the lines, though they cannot induce an approval of them as a general measure."

The chief principle of the period was thus that the redoubts were the most important features of lines of defence, and that they combined physical obstacle and protection with good musketry and artillery positions. The

value of concealment was not ignored, but it was as a rule subordinated to other considerations.

The principles of this time remained unaltered until after the Crimean War. In the American Civil War the power of the rifle began to assert itself, and it was found that a simple breastwork defended by a double rank of men could protect itself by its fire against an ordinary assault. This power of the rifle gave greatly enhanced importance to any defences that could be hastily extemporized behind walls, hedges or any natural cover. About the period of the Franco- German War other considerations came in. The increased velocity of artillery projectiles reduced in some ways their destructive effects against earth parapets, because the shell had an increasing tendency to deflect upwards on striking a bank of loose earth. Also the use of shrapnel made it impossible for troops to find cover on the terrepleinof a work some distance behind the parapet.

These considerations, however, were not fully realized at that time. The reason was partly a want of touch between the engineers and the non-technical branches of most armies, and partly that original writers from the Napoleonic wars to the present day have been more occupied with the primary question of the value of field defences as a matter of tactics than with their details considered from the standpoint of fortification.

There was always an influential school of writers who declaimed against all defences, as being injurious to the offensive spirit so essential to success. Those writers who treated of the arrange- ments of defences devoted themselves to theoretical details of trace quite after the old style; discussing the size and shape of typical redoubts, their distance apart and relation to lines of trenches, &c. The profiles — the thick parapet with command of 7 ft. or more, the deep ditch, and the inadequate cover behind the parapet — remained as they had been for a century.

The American Civil War showed the power of rifles behind slight defences. Plevna in 1877 taught a further lesson. It proved the great resisting power of extemporized lines; but more than that, webegin to find new arrangements for protection against shell fire (see plans and sections in Greene's The Russian Army and its Campaign in Turkey). The trace of the works and the sections of parapet and ditch suggest Torres Vedras; but a multiplication of interior traverses and splinter-proof shelters show the necessity for a different class of protection. The parapet was designed according to the old type, for want of a better; the traverses and shelters were added later, to meet the necessities of the case. The Turks also used two or three tiers of musketry fire, as for instance one from the crest of the glacis, one from the parapet, and one from a traverse in rear of it. This, however, is a development which will not be necessary in future, thanks to

magazine rifles.

From 1877 to 1899 the efficiency of rifles and guns rapidly increased, and certain new principles, causing the field defences Principles ˚f tne present day to differ radically from those of of modem the 18th century, remained to be developed. These field mav be considered under the following heads: the

defences. na t ure f protection required, the diminished need of obstacle, and the adaptation of works to ground.

The principle that thickness of parapet is no longer required, to resist artillery fire, was first laid down at Chatham in 1896.

The distance at which guns now engage makes direct hits on parapets comparatively rare. Further, a shell striking near the crest of a parapet may perhaps kill one man if he is in the way, and displace a bushel of earth. That is nothing. It is the contents of the shell, whether shrapnel or explosive, that is the source of danger and not the shell itself. Thus the enemy's object is to burst his : common shell immediately behind the parapet, or his shrapnel a short distance in front of it, in order to get searching effect. It follows that a parapet is thick enough if it suffices to stop rifle bullets, since the same thickness will a fortiori keep out shrapnel bullets or splinters of shell. For this purpose 3 ft. is enough.

Real protection is gained by a trench close in rear of the parapet, deep enough to give shelter from high angle shrapnel, and narrow enough to minimize the chance of a common shell dropping into it. This protection is increased by frequent traverses across the trench.

The most essential point of all is concealment. In gaining this we say good-bye finally to the old type of work. Protection is now given by the trench rather than the parapet; command and the ditch-obstacle (which furnished the earth for the high parapet) are alike unnecessary. Concealment can therefore be studied by keeping the parapet down to the lowest level above the surface from which the foreground can be seen. This may be 18 in. or less.

The need of obstacle, in daylight and when the defenders are not abnormally few, has practically disappeared. For night work, or when the assailant is so strong as to be able to force home his attack in face of protected rifle fire, what is needed is not a deep ditch immediately in front of the parapet, difficult to climb, but also difficult to flank, but an obstacle that will detain him under fire at short range. It may be an entangle- ment, an abatis, an inundation: anything that will check the rush and make him

move slowly.

In the adaptation of works to ground, the governing factor is the power of the rifle in frontal defence. We have seen that in Peninsular times great reliance was placed on the flanking defence of lines by guns in redoubts. Infantry extended behind a simple line of trench could not resist a strong attack without such support. Now, however, infantry behind a slight trench, with a good field of fire should be able to defend themselves against any infantry attack.

This being so, the enemy's artillery seeks to locate the trenches and to cover them with a steady hail of shells, 'so as to force the defenders to keep down under cover. If they can succeed in doing this, it is possible for the attacking infantry to advance, and the artillery fire is kept up until the last moment, so that the attack may have the narrowest possible space to cover after the defenders have manned their parapets and opened fire. Fig. 78 shows the action of various natures of projectiles.

*Gun shrapnel.tlme fuze_*

Gun Luddite common shell p. /

From Mil. Engineering, by permission of the Controller of H.M. Stationery Office.

Fig. 78. — Effect of Projectiles. We need not here discuss the role of the defenders' artillery in replying to that of the enemy and playing on the attack; nor for the moment consider how far the defence of the trenches while under artillery fire can be made easier by overhead cover. The main question is— what is, in view of the nature of the attack,

the best disposition of lines of trench; and do they require the addition of redoubts ?

The most important point, with the object of protection, is that the trenches must not be conspicuous; this is the best defence against artillery. With the object of resistance by their own fire they must have a good view, or, as it is generally described, no dead ground in front of them. For this purpose 300 or 400 yds. may be enough if the ground is even and affords no cover.

This necessity for invisibility, together with the shallowness of the zone that suffices for producing a decisive fire effect, has of late years very much

affected the choice of ground for a line of trenches.

For a defensive position on high ground, it was usually laid down until the South African War that a line of trenches should be on the " military crest " (Fr. crele militaire), i.e. the highest Siting of p i n t on the hill from which the whole of the slopes in trenches. f ront can |, e se en. Thus in the three sections of ground shown in fig. 79 it would be at a, b and c respectively. The simplicity

Fig. 80.

Fig. 79.

of this prescription made it attractive and it came to be rather abused in the text-books. There were, even before the improvements in artillery, objections to it, because on most slopes the military crest would be found at very different elevations on different- parts of the line, so that by a strict adherence to the rule some of the trenches would be placed near the top of the hill, and some in dangerous isolation near the bottom. Moreover a rounded hill has no military crest. . .

Further, we have to consider nowadays not only the position of the fire-trenches, but those of supports, reserves and artillery, and the whole question is extremely difficult.

For instance, considering the sections alone, as if they did not vary along the line, the positions at a and b, fig. 79, are bad because they are on the sky-line and therefore a good mark for artillery. That at b is especially bad because the slope in front is so steep that the defenders would have to expose themselves very much to fire down it, and the artillery fire against them can be kept up until the very last moment. The position c has the advantage of not being on the sky-line, but the position of the supports in rear is exposed.

Such a position as that at (LtgZSgSdizMyifi&r?^ d, fig. 80, is good, but pro-*

tected or concealed com- munications must be made for the supports coming from e overthe brow of the hill.

Another possible position for the infantry line is at/, fig. 81, with the guns on the high ground behind. They might easily be quite concealed from the enemy's artillery. The drawback is that no

retirement up the

exposed slope

would be possible

for them, except

at night. The fire

from / will be

Fig. 81. grazing, which will

be a great advantage as compared with the plunging fire that would

be obtained from a position up the hill.

It is idle, however, to give more than the most cursory consideration to sections of imaginary positions. It is only by actual practice on the ground that skill can be attained in laying out positions, and only a trained soldier with a good eye can succeed in it. Briefly, the advantages of view and position given by high ground must be paid for in some degree by exposure to the enemy's artillery; and at least as much consideration — possibly as much labour — must be given to communications with the fire-trenches as to the trenches themselves. Irregular ground simplifies the question of concealment but also gives cover to the enemy's approach. The lie of the ground will itself dictate the position of the trenches, subject to the pre-dispositions of the responsible officer. On flat featureless ground the general trace of the trenches should be irregular. This makes a more difficult target for artillery, and affords a certain amount of cross and flanking fire, which is a very great advantage. Great care should, however, be taken not to expose the trenches to oblique or enfilade fire; or at least to protect them, if so exposed, by traversing.

Fig. 82.

Concealment of trenches is generally attempted by covering the freshly turned earth of the small parapet with sods, leafy branches or grass. In this connexion it should be remembered Trenches that after a day or two cut leaves and grass wither and may become conspicuous against a green surface. Where the ground is so even that a good view of the foreground is possible from the surface level, the trench may be made without a parapet; but this entails great labour in removing and disposing of the excavated earth. A common device is to conceal the parapet as well as possible and to make a dummy trench some distance away to draw fire.

Besides the direct concealment of trenches, care must be taken that the site

is not conspicuous. Thus a trench should not be placed along the meeting line of two different kinds of cultivation, or along the edge of a belt of heather on a hill- side, or where a difference of gradient is sharply defined; or where any conspicuous landmark would help the enemy's artillery to get the < range

Trpnrhps irp H ! ! H Note:- Sur/rfM .art may*

irencnes are ji ! ,.§ be heaped or spread

broadly distill- f[• «£#f|' in rear of trench

guished as "fire

trenches" and

" cover trenches,"

according as they

are for the firing

line or supporting troops. The following simple types are taken

from the 1908 edition of Military Engineering (part 1): field

Defences." . .

Fig. 82 is the most common form of fire trench, in which labour is saved by equalizing trench and parapet. This would take ij to 2 hours in ordinary soil. Fig. 83 shows the same trench improved by 2 or 3 hours' more work. Fig. 84 shows a fire trench without parapet, with cover trench and communication.

The addition of a loophole of sand-bags, sodded on the top for

Couer Trench

Fig. 83.

From Mil. Engineering: Field Defences (1908), by permission of the Controller H. M. Stationery Office.

Fig. 84.

concealment (called head-cover), gives increased protection, but at the cost of greater prominence for the parapet (fig. 85). Overhead cover can only

be provided in fire trenches by giving the parapet still greater height and it is not usually done. Portions of the trench not used for firing can, however, be given splinter-proof protection by putting over them branches or bundles, covered with a few inches of earth: or by boards, or sheets of corrugated iron if they can be had. A better plan when time permits is to provide cover trenches immediately behind and communicating with the fire trench.

The question of redoubts has been a vexed one for years; partly they were thought to be unnecessary in view of the resisting power of a line of trenches, but chiefly because the redoubt was Redoubt& always imagined as one of the older type, with a high conspicuous parapet. Of course a redoubt of such a nature would be readily identified and made untenable. But the idea of a redoubt does not neces- s a r i 1 y [imply command. Its object is that it shall be capable of all-round de- fence. There can be no doubt that as there is always a pos- sibility of lines being pierced somewhere, it is desirable, unless the whole line is to be thrown into confusion Controile and forced

back, to have ….

some point at which the defenders can maintain themselves. This is not possible unless at such points .there is provision for defence towards both flanks and rear, that is to say, when there are redoubts, which can hold on after certain portions of the line have been lost and thereby can localize the enemy's success and simplify

*Plate – i -• •■-•'. T**

U

A

From Mil. Engineering: Field Defences, by permission of the H. M. Stationery Office.

Fig. 85.

the action of supporting troops. In order that redoubts may exercise this function, all that is necessary is that their defenders should be able to see the ground for a furlong in front of them in every direction. Their parapets, therefore, need be in no way more conspicuous than those of the neighbouring fire trenches, and in that case there is no fear of their

drawing special attention from the enemy's artillery. Whatever theories may have been nut forward en the subject in practice they are constantly used, and in the Russo- Japanese War, where the experience of South Africa was already available, we find them in the fighting lines on both sides

Fig. 86.

The modern type of field redoubt is a fire trench, no more con- spicuous than the others, in any simple form adapted to the ground that will give effective all-round fire, such as a square with blunted

H

— r

*L_*

^

10 men

jl

Fig. 87.

angles. Enhanced strength may be given by deepening the trenches and improving the overhead cover; and special use may here be made of obstacles.

Within the redoubt cover may be provided for men in excess of those required to man the parapet, by means of cover trenches and

■£~

Fig 88.

field casemates Fig. 86 gives the general idea of such a redoubt, and figs. 87, 88 the plan and section of the interior shelters. Such a work can easily be made quite invisible from a distance. It gives excellent cover against shrapnel, but would not be tenable against howitzer common shell, if the enemy did manage to bring an accurate fire to bear on it.

Fig. 89 shows the section of a parapet with two shelters behind it for a work with a high command of 5 or 6 ft. This work would

From Mil. Engineering: Field Defences (1908), by permission of the

Controller H.M. Stationery Office.

Fig. 89.

require a concealed position, which can often be found a little in rear of the firing line.

In the South African War a good deal of interest was excited by a type of trench used by the Boers. It was very narrow at the surface, giving only just room for a man to stand; but undercut or hollowed out below, so that he could sit down with very good

cover. Such a section is only possible In very firm soil. Apart from this, the type is really only suited to rifle pits, as a trench proper should have room for officers and N.C.O s to move along within it. The Boers showed great skill in concealing their trenches. One good point was that there was generally something making a background immediately behind the men's heads, so that they did not stand out in relief when raised above the parapet.

In the Russo-Japanese War the Russian trenches at the outset were of old-fashioned type and very conspicuous. Later on better types were evolved. Figs. 90 and 91 are a couple of sections from Port Arthur; the first borrowed from the Boers but wider at the

Loophole

Boer,

Russian

lad

Japanese

types-

About Ift.of earth — ~ Shielded loophole

-zmirW&i'"

From Russo-Japanese War: British Officers' Reports, vol. il'. t by permission of the Controller H.M. Stationery Office.

Figs. 90 and 91.

top. The Japanese appear to have taken their type mainly from the latest

British official books, but applied them with great skill to the ground studying especially invisibility. In their prepared positions they used large redoubts manned by several companies.

Cover for Guns. — Some degree of cover for guns, in addition to the shield, is always desirable. If the gun stands on the natural surface of the ground, the cover is called an epaulment. In that case a bank is thrown up in front of the gun, about I ft. high in the centre, and

From Mil. Engineering : Field Defences, by permission of the Controller H. M. Stationery Office.

Fig. 92. — Gun-pit.

3 ft. 6 in. high at the ends. On either side of the gun and close up to the bank is a small pit for the gunners. The rest of the earth for the epaulment is got from a trench in front. If the gun is sunk, the shelter is called a gun-pit.

In this case there is no bank immediately in front of the gun. Shelter can be got more quickly with a pit than an epaulment, but it is generally undesirable to break the surface of the ground.

The commonest forms of obstacle now used are abatis and wire entanglements. Fig. 93 shows a well-finished type of abatis. The branches are stripped and pointed, and the butts are Obstacles. t, ur j e(j anf j pegged firmly down. Wire entanglement may be added to this with advantage. An abatis should be protected from artillery fire, which is sometimes done by placing it in a shallow excavation with the earth thrown up in front of it.

From Mil. Engineering: Field Dejences, by permission of the Controller H.M. Stationery Office.

Fig. 93. — Abatis.

Wire may be used as a high or low entanglement or as a fence or trip wire or concealed obstacle. The usual form of high wire entangle- ment consists of several rows of stout stakes 4 or 5 ft. long, driven firmly into the ground about 6 ft. apart, and connected horizontally and diagonally with barbed wire.

Palisades axe still used, and need no description. They were formerly often made bullet-proof, but this is no longer possible. Fraises are seldom heard of now, though they may appear occasion- ally in a modified form. They were much used in connexion with deep ditches, and are palisades placed so as to project horizontally from the escarp, or sloping forward in the bottom of the ditch. Military pits both deep and shallow (the latter, shown in fig. 95, called trous de loup) are not so much used as formerly, because the obstacle is hardly worth the labour expended on it. Both,

Fig. 94. — Crows' Feet.

Fig. 95. — Plan and section of Trous-de-loup.

however, were employed in the Russo-Japanese War. Crows' feet, formerly much used as a defence against cavalry, are practically obsolete. They consisted of four iron spikes joined together at their bases in such a manner that however they were thrown down one point would always be pointing upwards (fig. 94). Chevaux-de-frise (q.v.) were formerly a much-used type of obstacle.

The best obstacle is that which can be made to fulfil a given object with the least expenditure of time and labour. From this point of view barbed wire is far the best. One of its greatest advantages is that it gives no cover whatever to the enemy.

Fougasses have always for convenience been classed as obstacles. A fougasse is a charge of powder buried at the bottom of a sloping pit. Over the powder is a wooden shield, 3 or 4 in. thick, and over the shield a quantity of stones are piled. The illustration, fig. 96, gives a clear idea of the arrangement. A fougasse of this form, charged with 80 lb of powder, will throw 5 tons of stones over a surface 160 yds. long by 120 wide. They may be fired by powder hose, fuze or electricity. Their actual effect is very often a matter 0i chance, but the moral effect is usually considerable.

Dams are most effective obstacles, when circumstances allow of their use. They are constructed by military engineers as small temporary dams would be in civil works.

A most important question, especially in connexion with obstacles, is that of lighting up the foreground at night. Portable electric searchlights are most valuable, especially for detecting the enemy's movements at some distance; but their use will naturally always be restricted. Star shells and parachute lights fired from guns are not of much use for the immediate foreground, and do not burn very long. They were formerly chiefly of use in siege works, to light up an enemy's working parties. Germany has

introduced lightballs fired from pistols, which will probably have a considerable future.

Various civilian forms of flare-light would be very useful to illuminate obstacles, but cannot well be carried in the field. Bonfires are very useful when material is available. They require careful treatment, e.g. they must be so arranged that they can be lighted instantaneously (they may be lighted automatically, by means of a trip wire and a fuze) ; they must give a bright light at once (this can be ensured with shavings or straw sprinkled with petroleum) ; they must be firmly built so that the enemy cannot destroy them easily; and if possible there should be a screen arranged behind them so that they may not light up the defence as well as the attack.

Illumina tlon.

Block- houses,

Blockhouses are familiar to the public from the part they played in the South African War of 1899-1902. In the old-fashioned permanent fortification they were used as keeps in such positions as re-entering places of arms and built of masonry. Stone blockhouses have long been used in the Balkans for frontier outposts; they are sometimes built cruciform, so as to get some flanking defence. In the form of bullet-proof log- cabins they have played a great part in warfare between pioneer settlers and savages.

Fuze

Powder Box

From Mil. Engineering, by permission of the Controller H.M. Stationery Office.

Fig. 96. — Fougasse.

In the 19th century blockhouses were usually designed to give partial protection against field artillery; the walls being built of two thicknesses of logs with earth between them, the roof flat and covered with 2 or 3 ft. of earth, and earth being piled against the walls_ up to the loopholes. Nowadays they are employed only in positions where it is not likely that artillery will be brought against them : but they may be made tenable for a while even under artillery fire if they are surrounded by a trench and parapet.

Blockhouses are especially useful for small posts protecting such points as railway bridges, which the enemy may attempt to destroy by cavalry raids. The essential feature is a bullet-proof loop-holed wall, arranged for all-round fire, with enough interior space for the garrison to sleep in. The roof may be simply weatherproof. Some arrangement for storing water must be provided. Circular block- houses -were very popular in South Africa. They were made of sheets of corrugated iron fastened 6 in. apart on a wooden framework, the space between the sheets being filled with small stones. The loop-holes were made of sheet-iron frames inserted in the walls. Fig- 97 shows a section of one of these blockhouses.

Corrugated Iron Shield with loophole 'Bank of earth

Corrugated Iron

By permission of the Controller H.M. Stationery Office. ,

Fig. 97. — Blockhouse, South Africa, 1900-1902.

The defence of woods was formerly an important branch of field defences. Abatis and entanglements could readily be extemporized, trunks of trees made strong breastworks, and the wood w . concealed the numbers of the defenders. A wood was °° s '

therefore generally considered a useful addition to a line of defence. It was customary to hold the front edge of the wood, the irregularities of the outline being utilized for frontal and flanking fire, while obstacles were disposed some 50 yds. in front. In a carefully pre- pared position, clearings would be made parallel to the front and some distance back from it, for support positions, and great attention was paid (in theory at least) to clearing communications, erections, signposts, &c, so that the defending troops might move freely in any desired direction.

Woods, however, had their inherent drawbacks. The ground is hard to dig, clearing involves great labour; and communication, at the best, is cramped. Nowadays a wood can hardly be considered a strong defensive element in a line. The front of it is an excellent ranging mark for artillery, and positions within the wood are not easily made, because of the difficulty of trenching, and the fact that no reasonable amount of timber will make a breastwork proof against the modern bullet. Once an enemy gets a footing within a wood, the position is more favourable to offensive than to defensive action. If a wood has to be occupied in a line of defence, it is probable that in most cases the rear edge or a line slightly behind it would be the best to fortify, though the front edge would no doubt be held by the fighting line at the outset.

The defence of villages is another question which has been much affected by recent improvements in artillery. Formerly villages were very important adjuncts to a line of defence, and villages. strong points for a detached force to hold. There were indeed always drawbacks. The preparations for defence entailed

a good deal of labour, and the defending force was scattered in houses and enclosures, so that control and united action were difficult. But the value of the ready-made protection afforded by walls was so great — and sometimes even decisive — that villages were occupied as a matter of course. This is certainly now changed, but precisely to what extent it will be impossible to say, until after the next European war. A village under fire is not now an ideal defensive position. A single shrapnel penetrating the outer wall may kill all the occupants of a room; a single field-howitzer shell may practically ruin a house. At the same time, a house or line of houses may (without any preliminary labour at all) give verf good protection against shell fire to troops behind them. Further, the value to the defence of the slightest cover, once the infantry attack has developed, is so great that the ruins of walls and houses occupied at the right moment may prove an impregnable stronghold. This class of fighting, however, does not properly come under the present heading. For the details of the defence of walls, houses, &c, see the official Mil. Engineering (1908).

Entrenching under Fire. — Progress in this direction has been delayed by the reluctance of military authorities to add a portable entrenching tool to the heavy burden already carried by the infantry soldier. Further delay has resulted from the attempts of enthusiastic inventors to produce a tool that shall weigh nothing, go easily in the pocket, and be available as a pick, shovel, saw, hand-axe or cork- screw. A tool that will serve more than one use is seldom satisfactory for any.

The object of entrenching under fire is to enable attacking infantry,

when their advance is checked by the enemy's fire, to maintain the

ground they have won by extemporizing cover where

w "rf none exists. The need of this was first felt in the American porized Civil War, and towards the close of it a small entrenching cover • spade 22 in. long and weighing only I \ rib was introduced

by Brigadier-General H. W. Benham into the Army of the Potomac. Since that time a great number of patterns haye been tried, including shovel, trowel and adze types. The most popular of these has been the Linnemann spade, which is used by most continental armies and by the Japanese. The Austrian form of this tool is a rectangular spade with straight handle. The length over all is a little less than 20 in. The blade is 8 in. long by 6 wide. One side of it has a saw edge, and the other a cutting edge. For carriage, the blade is enclosed in a leather case, which is strapped to the pack or the waist-belt. In the British army the Wallace combined pick and shovel was used for some time, but was eventually dropped. There was always great doubt whether the utility of a portable entrenching tool was such as to justify the inconvenience caused to the soldier in carrying it. But the experience of the Russo-Japanese War seems to have finally established the necessity of it, and also the fact that it must generally be used lying clown. For this purpose and for convenience in carrying it on the person, a very light short-handled tool is required.

The soldier lying down cannot attempt to dig a trench, but can make a little hole by his side as he lies, and put the earth in front of his head. A method introduced by the Japanese is that at each check in the advance the front line should do this, and, as they go forward, the supporting lines in succession should improve the cover thus commenced.

There are few things that soldiers dislike more, in the way of training, than trenchwork. For men unused to it. it is tiring and _ . tedious work, and it is difficult for them to realize its

ene a . importance. At the same time it is a commonplace of recent history that men who have been in action a few times develop a great affection for the shovel. The need of trenches grows with the growth of firearms, and the latest feature of modern tactics is the use of them in attack as well as in defence. The observation has often been made — with what truth as a general proposition we cannot here discuss — that modern battles tend more and more to resemble a siege. The weaker side, it is said, entrenches itself; the other bombards and attacks. After gaining as much ground as they can, the attacking troops wait for nightfall and entrench ; perhaps making a further advance and entrenchment before dawn. In the last stage the attack might even be reduced to gaining ground by sapping. In open and featureless ground, where the rifle and gun have full play, the trench is to the modern soldier very much what the breast-plate was to the man-at-arms, an absolute essantial.

The most important point in connexion with modern field fortifica- tion is the effect on both strategy and tactics of the increased resisting power of the defence. A small force well entrenched can check the frontal attack of a

very much larger force, and while holding its position can make itself felt over a wider radius than ever before. This must needs have a marked effect on strategy, and it is quite possible to foresee such an ultimate triumph of field fortification as that one force should succeed in surrounding another stronger than itself, and by entrenching prevent the latter from breaking out and compel its surrender.

VI. Conclusion

In tracing the history of the science of fortification and in outlining the practice of our own time it has been necessary to

dwell chiefly on the material means of defence and attack. The human element has had to be almost ignored. But here comes in the paradox, that the material means are after all the least important element of defence. Certainly it is inconceivable that the designer of a fortress should not try to make it as strong as is consistent with the object in view and the means at his disposal. And yet while engineers in all ages have sought eagerly for strength and refinements of strength, the fact remains that the best defences recorded in history owed little to the builder's art. The splendid defence in 1667 of Candia, whose enceinte, of early Italian design, was already obsolete but whose capture cost the Turks 100,000 men; the three years defence of Ostend in 1601 ; the holding of Arcot by Clive, are instances that present themselves to the memory at once. The very weight of the odds against them sometimes calls out the best qualities of the defenders; and the man when at his best is worth many times more than the rampart behind which he fights. But it would be a poor dependence deliberately to make a place weak in order to evoke these qualities. One cannot be sure that the garrison will rise to the occasion, and the weakness of the place has very often been found an excuse for giving it up with little or no resistance.

Very much depends on the governor. Hence the French saying, " tant vaut l'homme, tant vaut la place." Among modern men we think of Todleben (not governor, but the soul of the defence) at Sevastopol, Fenwick Williams at Kars, Denfert- Rochereau at Belfort, and Osman Pasha at Plevna. The sieges of the 16th and 17th centuries offer many instances in which the event turned absolutely on the personal qualities of the governor; in some cases distinguished by courage, skill and foresight, in others by incapacity, cowardice or treachery. The reader is referred to Carnot's Defense des places fortes for a most interesting summary of such cases, one or two of which are quoted below.

Naarden was besieged by the prince of Orange in September 1673 and defended by Philippe de Proce, sieur Dupas. The duke of Luxemburg visited the place some hours before it was invested, and arranged with Dupas to T

ff h spllit relieve him as soon as he had Collected his cavalry, defence. But the governor lost his head when he saw the enemy encamped round the place, and surrendered it before he had even lost the covered way. He was subsequently tried by a council of war and sentenced to be degraded before the troops and im- prisoned for life. The reason the court gave for not condemning him to death was that they could find no regulation which condemned a man to loss of life for being a coward. (At that period the decapitation of a governor who was considered to have failed in his duty was not uncommon.) This man, however, was not wanting in physical courage. He was in prison at Grave when it was besieged a year later, obtained leave to serve as a volunteer in the defence, fought well and was killed.

A similar case occurred in the English Civil War. In 1645 the young governor of the royal post at Bletchingdon House was entertaining a party of ladies from Oxford, when Cromwell appeared and summoned him to surrender. The attacking force had no firearm more powerful than a carbine, but the governor, overawed by Cromwell's personality, yielded. Charles I., who was usually merciful to his officers, caused this governor to be shot.

A defence of another kind was that of Quillebceuf in 1592. Henry IV. had occupied it and ordered it to be fortified. Before the works had been well begun, Mayenne sent 5000 men to retake it. Bellegarde undertook its defence, with 115 soldiers, 45 gentlemen and a few inhabitants. He had ammunition but not much provisions. With these forces and a line of defence a league in length, he sustained a siege, beat off an assault on the 17th day, and was relieved immediately afterwards. The relieving forces were astonished to find that he had been defend- ing not a fortified town but a village, with a ditch which, in the places where it had been begun, measured no more than 4 ft. wide and deep.

At that period the business aspect of siege warfare already

alluded to had been recognized, but many commanders retained the old spirit of chivalry in their reluctance to say the " loth word." The gallant Marshal d'Esse, who feared nothing but the idea of dying in his bed, was lying ill at his country house when he was sent for by the king. He was ordered to take command at Therouanne, then threatened by Charles V.,

and made his farewell with these words, which remind us somewhat of Grenville: " Sire, je m'y en vais done de bon et loyal cceur; mais j'ai oui' dire que la place est mal envitaillee, non pas seulement pourvue de palles, de tranches, ni de hottes pour remparer et remuer la terre; mais lors, quand entendrez que Therouanne est prise, dites hardiment que d'Esse est gueri de sa jaunisse et mort." And he made good his word, for he was killed at the breach by a shot from the arquebus of a Spanish soldier.

Sometimes the ardour of defence inspired the whole body of the inhabitants. Fine examples of this are the defences of Rochelle (1627) and Saint-Jean de L6ne (1636), but these are too long to quote. We may, however, mention Livron, which is curious. In 1574 Henry III. sent one of his favourites, Saint Lary Bellegarde, against the Huguenots in the Dauphine. Being entrusted with a good army, this gentleman hoped to achieve some distinction. He began by attacking the little town of Livron, which had no garrison and was defended only by the inhabitants. But he was repulsed in three assaults, and the women of the town conceived such a contempt for him that they came in crowds to empty their slops at the breach by way of insult. This annoyed him very much, and he ordered a fresh assault. The women alone sustained this one, repulsed it lightheartedly, and the siege was raised.

The history of siege warfare has more in it of human interest than any other branch of military history. It is full of the personal element, of the nobility of human endurance and of dramatic surprises. And more than any battles in the open field, it shows the great results of the courage of men fighting at bay. Think of Clive at Arcot. With 4 officers, 1 20 Europeans and 200 sepoys, with two 18-pounders and 8 lighter guns, he held the fort against 150 Europeans and some 10,000 native troops. " The fort " (says Orme) " seemed little capable of sustaining the impending siege. Its extent was more than a mile in circumference. The walls were in many places ruinous; the rampart too narrow to admit the firing of artillery; the parapet low and slightly built; several of the towers were decayed, and none of them capable of receiving more than one piece of cannon; the ditch was in most places fordable, in others dry and in some choked up," &c. These feeble ramparts were commanded almost everywhere by the enemy's musketry from the houses of the city outside the fort, so that the defenders were hardly able to show themselves without being hit, and much logs was suffered in this way. Yet with his tiny garrison, which numbered about one man for every 7 yds. of the enclosure, Clive sustained a siege of 50 days, ending with a really severe assault on two large open breaches, which was repulsed, and after which the enemy hastily decamped.

Such feats as this make arguments about successive lines of defence and the

necessity of keeps seem very barren. History, as far as the writer knows, shows no instances where successive lines have been held with such brilliant results.

Clive's defence of his breaches, which by all the then accepted rules of war were untenable, brings us to another point which has been already mentioned, namely, that a garrison might honour- ably make terms when there was an open breach in their main line of defence. This is a question upon which Carnot delivers himself very strongly in endeavouring to impress upon French officers the necessity of defence to the last moment. Speaking of Cormontaingne's imaginary Journal of the Attack of a Fortress (which is carried up to the 35th day, and finishes by the words " It is now time to surrender "), he says with great scorn: " Crillon would have cried, ' It is time to begin fighting.' He would have said as at the siege of Quillebceuf , ' Crillon is within, the enemy is without.' Thus when Bayard was defending the shattered walls of M6zieres, M. de Cormontaingne, if he had been there, would have said, ' It is time to surrender.' Thus when Guise

was repairing the breaches of Metz under the redoubled fire of the enemy, M. de Cormontaingne, if he had been there, would have said, ' It is time to surrender.' " Carnot of course allows that Cormontaingne was personally brave. His scorn is for the accepted principle not for the man.*

It is interesting to contrast with this passage some remarks by Sir John Jones, made in answer to Carnot's book. He says in the notes to the second volume of the Journals of the Sieges in Spain: " When the breach shall be £'"" pushed properly forward, if the governor insists upon / asfc « the ceremony of his last retrenchment being stormed, as by so doing he spills the blood of many brave men without a justifiable object, his life and the lives of the garrison should be made the forfeit. A system enforced by terror must be counter- acted by still greater terror. Humanity towards an enemy in such a case is cruelty to one's own troops. . . . The principle to be combated is not the obligation to resist behind the breach — for where there is a good retrenchment the bastion should be disputed equally with the counter-guard or the ravelin and can as safely be so — but the doctrine that surrender shall not take place when successful resistance becomes hopeless."*

Carnot's word is " fight to the last." Sir John Jones says the commander has no right to provoke further carnage when resistance is hopeless. The question of course is, When is resist- ance hopeless? Sir John Jones's reputation leaves little doubt that if he had been commanding a fortress on British soil he would not have thought resistance hopeless as long as there was anything whatever left to defend. The reason why these two men of similar temper are found in opposition is quite simple. When Carnot wrote,

the French army occupied most of the important fortresses of Europe, and it was to the interest of the emperor that if attacked they should be held to the last moment, in order to cause the enemy as much delay and loss as possible. Jones, on the other hand, was one of the engineers who were engaged in besieging those fortresses, and his argu ments were prompted by sympathy for his own countrymen whose lives were sacrificed by the prolongation of such resistance.

A century has passed since Carnot and Jones wrote, and the ideas in which they had been educated were those of the pre- Napoleonic era. In the 18th century fortresses were many, good roads few, and campaigns for the most part leisurely. To the European nations of that time, inheritors of a perennial state of war, the idea of concentrating the national resources on a short and decisive campaign had not occurred. The " knock-out blow " had not been invented. All these conditions are now so changed that' new standards must be and indeed have been set up, both for the defence of places and the general employment of fortification.

As regards the conduct of the defence, the massacre of a garrison as a penalty for holding out too long would meet with no sympathy in the present day. On the other hand, the issue of modern wars is worked out so rapidly that if a fortress is well defended, with the advantage of the present weapons, there is always a chance of holding out till the close of the war. If the place is worth holding, it should as a rule be held to the bitter end on the chance of a favourable turn in affairs; moreover, the maintenance of an important siege under modern conditions imposes a severe strain on the enemy and immobilizes a large number of his troops.

In concluding this article some elementary considerations in connexion with the use of permanent defences may be noticed, though the general question of strategic fortification is outside its scope. The objects of fortification differ, Per t "L a °' as has been shown, from age to age. In former times fences. a peaceful people exposed to the raids of piratical Norsemen might find their refuge tower essential; later, a robber- baron might look on his castle as so much capital invested; a wealthy medieval town might prove the value of its walls more than once in a generation; a country without a standing army might gain time for preparation by means of fortresses barring the roads across the frontier. But how does the question stand to-day among European countries which can mobilize

their full fighting strength at a few hours' notice? It can only be answered

when the circumstances of a particular country are examined.

If we assume such an impossible case as that of two nations of equal fighting strength and equal resources standing ready The use ‘ n arms to defend a common frontier, and that the and abuse theatre of war presents no difficulties on either side, oiiort- then the use of permanent fortifications, merely as nsses – an adjunct to military strength, is wrong. Fortresses do not decide the issue of a campaign; they can only influence it. It is better, therefore, to put all the money the fortress would have cost, and all the man-power that its maintenance implies, into the increase and equipment of the active army. For the fate of the fortress must depend utlimately on the result of the operations of the active armies. Moreover, the very assumption that resources on both sides are equal means that the nation which has spent money on permanent fortifications will have the smaller active army, and therefore condemns itself beforehand to a defensive r61e.

This general negation is only useful as a corrective to the tendency to over-fortify, for such a case cannot occur. In practice there will always be occasion for some use of fortification. A mountain range may lend itself to an economical defence by a few men and some inexpensive barrier forts. A nation may have close to its frontier an important strategic centre, such as a railway junction, or a town of the first manufacturing importance, which must be protected. In such a case it may be necessary to guard against accidents by means of a fortress. Again, if one nation is admittedly slower in mobilization than the other, it may be desirable to guard one portion of the frontier by fortresses so as to force invasion into a district where concentra- tion against it is easiest.

As for the defence of a capital, this cannot become necessary if it stands at a reasonable distance from the frontier until the active armies have arrived at some result. If the fighting strength of the country has been practically destroyed, it is not of much use to stand a siege in the capital. There can be but one end, and it is better, as business men say, to cut losses. If the fighting strength is not entirely destroyed and can be recruited within a reasonable time, say two or three months, then it appears that under modern conditions the capital might be held for that time by means of extemporized defences. The question is one that can only be decided by going into the circumstances of each particular case.

The case of a weak country with powerful and aggressive neighbours is in a different category. If she stands alone she will be eaten up in time, fortifications or no fortifications; but if she can reckon on assistance from outside, it may be worth while to expend most of the national resources on permanent defences.

These hypothetical cases have, however, no value, except as illustrations to the most elementary arguments. The actual problems that soldiers and statesmen have to consider are too complex to be dealt with in generalities, and no mere treatise can supply the place of knowledge, thought and practice.

Bibliography. — The more important works on the subject are: Diirer, Unterricht zur Befestigung (Nuremberg, 1527); Speckle, Architectur von Festungen (Strassburg, 1589); Fritach, L' Architecture mil. ou laf. nouvelle (Paris, 1637); Pagan, Les Fortif. (Paris, 1689); de Ville, Les Fortif. (Lyons, 1629) ; de Fer, Introduction d. la fortifica- tion (Paris, 1723); B. F. de Belidor, Science des Ingenieurs, &c. (Paris, 1729); works of Coehoorn, Vauban, Montalembert, Cormon- taingne; Mandar, De V architecture des forteresses (Paris, 1801); Chasseloup-Laubat, Essais sur quelques parties de I'artil. el de la fortification (Milan, 181 1); Carnot, Defense des places fortes (Paris, 1812); Jones, Journals of Sieges in Spain (3rd ed., London, 1846); T. Choumara, Memoire sur la fortification (1847); A. von Zastrow, Geschichte der bestdndigen Befestigung (n.d., Fr. trans.); works of Sir C. Pasley; Noizet, Principes de fortif. (Paris, 1859); Dufour, De la fortif. permanente (Paris, 1850); E. Viollet le Due, V Architecture militaire au moyen dge (Paris, 1854); Cosseron de Villenoisy, Essai historique sur la fortification (Paris, 1869); works of Brialmont (j.v.) ; Delambre, La Fortification dans ses rapports avec la tactique et la strategic (Paris, 1887) ; v. Sauer, Angriff und Verteidigung fester Platze (Berlin, 1885); Schroeter, Die Festung in der heutigen Krieg- filhrung (Berlin, 1898-1906); Baron E. v. Leithner, Die bestandige

Befestigung und der Festungskrieg (Vienna, 1894-1899); W. Staven-hagen, Grundriss der Befestigungslehre (Berlin, 1900-1909) ; Plessix and Legrand, Manuel complet de fortification (Paris, 1900, new edition 1909); Ritter v. Brunner, Die bestandige Befestigung (Vienna, 1909), Die Feldbefestigung (Vienna, 1904) ; Rocchi, Traccia per lo studio delta fortificazione permanente (Turin, 1902) ; Sir G. S. Clarke, Fortification (1907) ; V. Deguise, La Fortification permanente contemporaine (Brussels, 1908) ; Royal Military Academy, Text-book of Fortification, pt. ii. (London, 1893); British official Instruction in Military Engineering, pts. i., ii. andiv. (London, 1900-1908). (L. J.)

FORTLAGE, KARL (1 806-1 881), German philosopher, was born at Osnabriick. After teaching in Heidelberg and Berlin, he became professor of philosophy at Jena (1846), a post which he held till his death. Originally a follower of Hegel, he turned to Fichte and Beneke (q.v.), with whose insistence on psychology as the basis of all philosophy he fully agreed. The fundamental idea of his psychology isimpulse, which combines representation (which presupposes consciousness) and feeling (i.e.

pleasure). Reason is the highest thing in nature, i.e. is divine in its nature, God is the absolute Ego and the empirical egos are his instruments.

Fortlage's chief works are: Genetische Geschichte d. Philos. seit Kant (Leipzig, 1852); System d. Psych, als empirische Wissenschaft (2 vols., Leipzig, 1855) ; Darstellung und Kritik der Beweise fur das Dasein Gottes (Heidelberg, 1840) ; Beitrage zur Psych, als Wissen- schaft (Leipzig, 1875).

FORT LEE, a borough of Bergen county, New Jersey, U.S.A., in the N.E. part of the state, on the W. bank of the Hudson river, opposite the northern part of New York City. Pop. (1905) 3433; (1910) 4472. It is connected with the neighbouring towns and cities by electric railways, and by ferry with New York City, of which it is a residential suburb. The main part of the borough lies along the summit of the Palisades; north of Fort Lee is an Interstate Palisades Park. Early in the War of Independence the Americans erected here a fortification, first called Fort Constitu- tion but later renamed Fort Lee, in honour of General Charles Lee. The name of the fort was subsequently applied to the village that grew up in its vicinity. From the 1 5th of September until the 20th of November 1776 Fort Lee was held by Gen. Nathanael Greene with a garrison of 3500 men, but the capture by the British of Fort Washington on the opposite bank of the river and the crossing of the Hudson by Lord Cornwallis with 5000 men made it necessary for Greene to abandon this post and join Washington in the famous " retreat across the Jerseys." An attempt to recapture Fort Lee was made by General Anthony Wayne in 1780, but was unsuccessful. On the site of the fort a monument, designed by Carl E. Tefft and consisting of heroic figures of a Continental trooper and drummer boy, was erected in 1908. The borough of Fort Lee was incorporated in 1904.

FORT MADISON, a city and the county-seat of Lee county, Iowa, U.S.A., on the Mississippi river, in the S.E. corner of the state, and about 20 m. S.W. of Burlington. Pop. (1890) 7901; (1900) 9278, of whom 1025 were foreign-born; (1905) 8767; (1910) 8900. Fort Madison is served by the Atchison, Topeka & Santa Fe (which has repair shops here) and the Chicago, Burlington & Quincy railways. The city has various manufactures, including canned goods, chairs, paper and farm implements; the value of its factory product in 1905 was $2,378,892, an increase of go- 8% over that of 1900. Fort Madison is the seat of one of Iowa's penitentiaries. A stockade fort was erected on the site of the city in 1808, but was burned in 1813. Permanently settled in 1833, Fort Madison was laid out as a town in 1836, and was chartered as a city in 1839.

FORTROSE (Gaelic for t'rois, " the wood on the promontory "), a royal and police burgh, and seaport of the county of Ross and Cromarty,

Scotland. Pop. (1901) 1179. It is situated on the south-eastern coast of the peninsula of the Black Isle, 8 m. due N.N.E. of Inverness, 26J m. by rail. It is the terminus of the Black Isle branch of the Highland railway; there is com- munication by steamer with Inverness and also with Fort George, 2j m. distant, by ferry from Chanonry Ness. Fortrose consists of the two towns of Rosemarkie and Chanonry, about 1 m. apart, which were united into a free burgh by James II. in 14 55 and created a royal burgh in 1 590. It is a place of consider- able antiquity, a monastery having been established in the 6th century by St Moluag, a friend of Columba's, and St Peter's

church built in the 8th century. In n 24 David I. instituted the bishopric of Ross, with its seat here, and the town acquired some fame for its school of theology and law. The cathedral is believed to have been founded in 1330 by the countess of Ross (her canopied tomb, against the chancel wall, still exists) and finished in 1485 by Abbot Fraser, whose previous residence at Melrose is said to account for the Perpendicular features of his portion of the work. It was Early Decorated in style, cruciform in plan, and built of red sandstone, but all that is left are the south aisles of the nave and the chancel, with the chapter-house, a two-storeyed structure, standing apart near the north-eastern corner. The cathedral and bishop's palace were destroyed by order of Cromwell, who used the stones for his great fort at Inverness. Another relic of the past survives in the bell of 1460. These ruins form the chief object of interest in the town, but other buildings include the academy and the Black Isle com- bination poorhouse. The town is an agricultural centre of some consequence, and the harbour is kept in repair. Rosemarkie, in the churchyard of which is an ancient Celtic cross, is much resorted to for sea-bathing, and there is a golf course in Chanonry Ness. The burgh belongs to the Inverness district group of parliamentary burghs.

FORT SCOTT, a city and the county-seat of Bourbon county, Kansas, U.S.A., on the Marmaton river, about 100 m. S. of Kansas City, Missouri. Pop. (1880) 5372; (1890) 11,946; (1900) 10,322, of whom 1205 were negroes; (1910 census) 10,463. It is the point of intersection of the Kansas City, Fort Scott & Memphis (St Louis & San Francisco system), the Missouri, Kansas & Texas, and the Missouri Pacific railways, and has in consequence a large traffic. The city is built on a rolling plain. Among its institutions are an Epworth house (1899), Mercy hospital (1889), the Goodlander home, and a Carnegie library. Near the city there is a national cemetery. Fort Scott is in the midst of the Kansas mineral fields, and its trade in bituminous coal is especially important. Building stones, cement rock, clays, oil and gas, lead and zinc are also found in the neighbourhood.

An excellent white sulphur water is procured from artesian wells about 800 ft. deep, and there is a mineral- water bath house. The city is also a trading centre for a rich farming region, and is a horse and mule market of considerable importance. Among its manufactures are mat- tresses, syrup, bricks, pottery, cement and foundry products. In 1905 the total value of the city's factory product was $1,349,026, being an increase of 89% since 1900. The city owns and operates its waterworks. The fort after which the city is named was established by the Federal government in 1842, at a time when the whole of eastern Kansas was still parcelled out among Indian tribes; it was abandoned in 1855. The town was platted in 1857, and Fort Scott was chartered as a city in i860.

FORT SMITH, a city and the county-seat of Sebastian county, on the extreme W. border of Arkansas, U.S.A., lying about 440 ft. above sea-level, on the S. bank of the Arkansas river, at its junction with the Poteau, and at the point where the Arkansas breaks through the Boston mountains. Pop. (1890) 11,311; (1900) 11,587, of whom 2407 were of negro descent and 684 -were foreign-born; (1910 census) 23,975. Transportation is afforded by the river and by six railways, the St Louis & San Francisco, the St Louis, Iron Mountain & Southern, the Arkansas Central, the Fort Smith & Western, the Midland Valley and the Kansas City Southern. A belt line round the business centre of the city facilitates freight transfers. Some of the business streets are unusually broad, and the streets in the residential district are well shaded. Fort Smith is the business centre of a fine agricultural country and of the Arkansas coal and natural gas region. It has extensive wholesale jobbing interests and a large miscellaneous trade, partly in its own manufactures, among which are cotton and timber products, chairs, mattresses and other furniture, wagons, brooms and bricks. In 1905 the total value of the factory product was $2,329,454, an increase of 66-2% since 1900. The public schools have a rich endowment: the proceeds of lands (about

200 acres) once belonging to the local military reservation, which — except the part occupied by a national cemetery — was given by Congress to the city in 1884. Near the centre of the city are a Catholic academy, convent and infirmary; and there is a Carnegie library. A United States army post was established here in 181 7; the town was laid out in 182 1; and the county was created in 185 1. Fort Smith was incorporated as a town in 1842, and was chartered as a city in 1845. All transportation was by river and wagon until 1876, when the railway was completed from Little Rock. The military post, in earlier years the chief depot for the western forts, was abandoned in 187 1. During the Civil War Fort Smith was strongly in sympathy with the Confederacy. The fort was seized by state troops in April 1 86 1, and was reoccupied by the Union forces in September 1863. There was considerable unrest due to border " bush-

whacking " throughout the war, and several skirmishes took place here in 1864. The area of the city was more than doubled in 1905.

FORTUNA (Fortune), an Italian goddess of great antiquity, but apparently not native at Rome, where, according to universal Roman tradition, she was introduced by the king Servius Tullius as Fors Fortuna, and established in a temple on the Etruscan side of the Tiber outside the city, and also under other titles in other shrines. In Latium she had two famous places of worship, one at Praeneste, where there was an oracle of Fortuna primigenia (the first-born), frequented especially by women who, as we may suppose, desired to know the fortunes of their children or their own fortune in child-birth; the other at Antium, well known from Horace's ode (i. 35). It is highly probable that Fortuna was never a deity of the abstract idea of chance, but represented the hopes and fears of men and especially of women at different stages of their life and experience; thus we find her worshipped as time went on under numerous cult-titles, such as muliebris, virilis, hujusce diet, equestris, redux, &c, which connected her supposed powers with individuals, groups of individuals, or particular occasions. Gradually she became more or less closely identified with the Gr. Tvxn, and was represented on coins, &c, with a cornucopia as the giver of prosperity, a rudder as the controller of destinies, and with a wheel, or standing on a ball, to indicate the uncertainty of fortune. In this semi-Greek form she came to be worshipped over the whole empire, and Pliny (N.H. ii. 22) declares that in his day she was invoked in all places and every hour. She even became identified with Isis, and as Panthea was supposed to combine the attributes of all other deities.

The best account of this difficult subject is to be found in Roscher's Mythological Lexicon (s.v.) ; see also Wissowa, Religion und Kultus der Rotner, p. 206 foil. (\y. W. F.)*

FORTUNATIANUS, ATILIUS, Latin grammarian, flourished in the 4th century a.d. He was the author of a treatise on metres, dedicated to one of his pupils, a youth of senatorial rank, who desired to be instructed in the Horatian metres. The manual opens with a discussion of the fundamental ideas of metre and the chief rules of prosody, and ends with a detailed analysis of the metres of Horace. The chief authorities used are Caesius Bassus and the Latin adaptation by Juba the grammarian of the Texˆ V of Heliodorus. Fortunatianus being a common name in the African provinces, it is probable that the author was a countryman of Juba, Terentianus Maurus and Victorinus.

Editions of the A rs in H. Keil , Grammatici Latini, vi . , and separately by him (1885).

FORTUNATUS, the legendary hero of a popular European chap-book. He was a native, says the story, of Famagusta in Cyprus, and meeting the goddess of Fortune in a forest received from her a purse which was continually replenished as often as he drew from it. With this he wandered through many lands, and at Cairo was the guest of the sultan. Among the treasures which the sultan showed him was an old napless hat which had the power of transporting its wearer to any place he desired. Of this hat he feloniously possessed himself, and returned to Cyprus, where he led a luxurious life. On his death he left the

purse and the hat to his sons Ampedo and Andelosia; but they were jealous of each other, and by their recklessness and folly soon fell on evil days. The moral of the story is obvious: men should desire reason and wisdom before all the treasures of the world. In its full form the history of Fortunatus occupies in Karl Simrock's Die deutschen Volksbiicher, vol. iii., upwards of 158 pages. The scene is continually shifted — from Cyprus to Flanders, from Flanders to London, from London to France; and a large number of secondary characters appear. The style and allusions indicate a comparatively modern date for the authorship; but the nucleus of the legend can be traced back to a much earlier period. The stories of Jonathas and the three jewels in the Gesta Romanorum, of the emperor Frederick and the three precious stones in the Cento Novelle anliche, of the Mazin of Khorassan in the Thousand and one Nights, and the flying scaffold in the Bahar Danush, have all a certain similarity. The earliest known edition of the German text of Fortunatus appeared at Augsburg in 1509, and the modern German in- vestigators are disposed to regard this as the original form. Innumerable versions occur in French, Italian, Dutch and English. The story was dramatized by Hans Sachs in 1553, and by Thomas Dekker in 1600; and the latter's comedy appeared in a German translation in Englische Komodien und Tragodien, 1620. Ludwig Tieck has utilized the legend in his Phantasus, and Adelbert von Chamisso in his Peter Schlemihl; and Ludwig Uhland left an unfinished narrative poem entitled " Fortunatus and his Sons."

See Dr Fr. W. V. Schmidt's Fortunatus und seine Sohne, eine Zauber-Tragbdie, von Thomas Decker, mil einem Anhang, &c. (Berlin, 1819) ; Joseph Johann Gorres, Die deutschen Volksbiicher (1807).

FORTUNATUS, VENANTIUS HONORIUS CLEMENTIANUS

(530-609), bishop of Poitiers, and the chief Latin poet of his time, was

born near Ceneda in Treviso in 530. He studied at Milan and Ravenna, with the special object of excelling as a rhetorician and poet, and in 565 he journeyed to France, where he was received with much favour at the court of Sigbert, king of Austrasia, whose marriage with Brunhild he celebrated in an epithalamium. After remaining a year or two at the court of Sigbert he travelled in various parts of France, visiting persons of distinction, and composing short pieces of poetry on any subject that occurred to him. At Poitiers he visited Queen Radegunda, who lived there in retirement, and she induced him to prolong his stay in the city indefinitely. Here he also enjoyed the friendship of the famous Gregory of Tours and other eminent ecclesiastics. He was elected bishop of Poitiers in 599, and died about 609. The later poems of Fortunatus were collected in 1 1 books, and consist of hymns (including the Vexilla regis prodeunt, Englished by J. M. Neale as " The royal banners forward go "), epitaphs, poetical epistles, and verses in honour of his patroness Radegunda and her sister Agnes, the abbess of a nunnery at Poitiers. He also wrote a large poem in 4 books in honour of St Martin, and several lives of the saints in prose. His prose is stiff and mechanical, but most of his poetry has an easy rhythmical flow.

An edition of the works of Fortunatus was published by C. Brower at Fulda in 1603 (2nd ed., Mainz, 1617). The edition of M. A. Luschi (Rome, 1785) was afterwards reprinted in Migne's Patrologiae ciirsiis computus, vol. Ixxxviii. See the edition by Leo and Krusch (Berlin, 1881-1885). There are French lives by Nisard (1880) and Leroux (1885).

FORTUNE, ROBERT (1813-1880), Scottish botanist and traveller, was born at Kelloe in Berwickshire on the 16th of September 1813. He was employed in the botanical garden at Edinburgh, and afterwards in the Royal Horticultural Society's garden at Chiswick, and upon the termination of the Chinese War in 1842 was sent out by the Society to collect plants in China. His travels resulted in the introduction to Europe of many beautiful flowers; but another journey, undertaken in 1848 on behalf of the East India Company, had much more important consequences, occasioning the successful introduction into India of the tea-plant. In subsequent journeys he visited Formosa and Japan, described the culture of the silkworm and the manufacture of rice paper, and introduced many trees,

shrubs and flowers now generally cultivated in Europe. The incidents of his travels were related in a succession of interesting books. He died in London on the 13th of April 1880.

FORTUNY, MARIANO JOSE MARIA BERNARDO (1838- 1874), Spanish painter, was born at Reus on the nth of June 1838. His parents, who were in poor circumstances, sent him for education to the primary school of his native town, where he received some instruction in the rudiments of art.

When he was twelve years old his parents died and he came under the care of his grandfather, who, though a joiner by trade, had made a collection of wax figures, with which he was travelling from town to town. In the working of this show the boy took an active part, modelling and painting many of the figures; and two years later, when he reached Barcelona, the cleverness of his handiwork made so much impression on some people in authority there that they induced the municipality to make him an allowance of forty-two francs monthly, so that he might be enabled to go through a systematic course of study. He entered the Academy of Barcelona and worked there for four years under Claudio Lorenzale, and in March 1857 he gained a scholarship that entitled him to complete his studies in Rome. Then followed a period of more than two years, during which he laboured steadily at copies of the old pictures to which he had access at Rome. To this period an end was put by the outbreak of the war between Spain and the emperor of Morocco, as Fortuny was sent by the authorities of Barcelona to paint the most striking incidents of the campaign. The expedition lasted for about six months only, but it made upon him an impression that was powerful enough to affect the whole course of his subsequent development, and to implant permanently in his mind a pre- ference for the glitter and brilliancy of African colour. He re-turned to Spain in the summer of i860, and was commissioned by the city of Barcelona to paint a large picture of the capture of the camps of Muley-el-Abbas and Muley-el-Hamed by the Spanish army. After making a large number of studies he went back to Rome, and began the composition on a canvas fifteen metres long; but though it occupied much of his time during the next few years, he never finished it. He busied himself instead with a wonderful series of pictures, mostly of no great size, in which he showed an astonishing command over vivacities of technique and modulations of colour. He visited Paris in 1868 and shortly afterwards married the daughter of Federico Madrazo, the director of the royal museum at Madrid. Another visit to Paris in 1870 was followed by a two years' stayat Granada, but then he returned to Rome, where he died somewhat suddenly on the 21st of November 1874 from an attack of malarial fever, contracted while painting in the open air at Naples and Portici in the summer of 1874.

The work which Fortuny accomplished during his short life is distinguished by a superlative facility of execution and a marvellous cleverness in the arrangement of brilliant hues, but the qualities of his art are those that are attainable by a master of technical resource rather than by a deep thinker. His insight into subtleties of illumination was extraordinary, his dexterity was remarkable in the extreme, and as a colourist he was vivacious to the point of extravagance. At the same time in such pictures as " La Vicaria " and " Choosing a Model," and in some of his Moorish subjects, like " The Snake Charmers " and " Moors playing with a Vulture," he showed himself

to be endowed with a sensitive appreciation of shades of character and a thorough understanding of the peculiarities of a national type. His love of detail was instinctive, and he chose motives that gave him the fullest opportunity of displaying his readiness as a craftsman.

See Davillier, Fortuny, sa vie, son ceuvre, sa correspondance, Sfc. (Pans, 1876); C. Yriarte, Fortuny (Artistes cUibres series) (Paris, !889)- (A. L. B.)

FORT WAYNE, a city and the county-seat of Allen county, Indiana, U.S.A., 102 m. N.E. of Indianapolis, at the point where the St Joseph and St Mary's rivers join to form the Maumee river. Pop. (1880) 26,880; (1890) 35,3935 (1900) 45,115, of whom 6791 were foreign-born; (1910, census) 63,933. It is served by the Cincinnati, Hamilton & Dayton, the Fort Wayne,

Cincinnati & Louisville, the Grand Rapids & Indiana, the Lake Shore & Michigan Southern, the New York, Chicago & St Louis, the Pennsylvania and the Wabash railways, and also by inter- urban electric lines. The site of the city is high (about 770 ft. above sea-level) and level, and its land area was in 1906 a little more than 6 sq. m. The streets are laid out on a rectangular plan and bordered by a profusion of shade trees. The city has several parks, including Lawton Park (31 acres), in which there is a monument in honour of Major-General Henry Ware Lawton (1843- 1 899), who lived in Fort Wayne for a time, Lake Side Park (22 acres), Reservoir Park (13 acres), Piqua Park (1 acre), and Old Fort Park (i acre), which is on the site of Old Fort Wayne. The educational institutions include the German Concordia Collegium (Lutheran), founded in 1839, and having 220 students in 1908, and the state school for feeble-minded youth (1879). The city has a Carnegie library. Fort Wayne is one of the most important railway centres in the Middle West, and several railways maintain here their principal car and repair shops, which add greatly to the value of its manufacturing industries; in 1905 it ranked first among the cities of the state in the value of cars constructed and repaired by steam-railway companies. The other manufactories include foundries and machine shops, iron and steel mills, knitting mills, planing mills, sash and door, car-wheel, electrical machinery, and woodenware factories and flour mills. In 1905 the total value of the factory product of the city was $15,129,562, showing an increase of 34-3%. since 1900.

The Miami Indians had several villages in the immediate neigh- bourhood,

and the principal one, Kekionaga (Miami Town or Great Miami Village), was situated on the E. bank of the St Joseph river, within the limits of the present city. On the E. bank of the St Mary's a French trading post was built about 1680. In 1 749-1 7 50 the French fort (Fort Miami) was moved to the E. bank of the St Joseph. The English occupied the fort in 1 760 and Pontiac captured it in May 1763, after a siege of more than three months. In 1 790 the Miami villages were destroyed. In Septem- ber 1794 General Anthony Wayne built on the S. bank of the Maumee river the stockade fort which was named in his honour, the site of which forms the present Old Fort Park. By the treaty of Greenville, concluded by General Wayne on the 3rd of August 1795, a piece of land 6 sq. m. in area, including the tract of the Miami towns, was ceded to the United States, and free passage to Fort Wayne and down the Maumee to Lake Erie was "guaranteed to the people of the United States by the Indians. By the treaty of Fort Wayne, concluded by General W. H. Harrison on the 7 th of June 1803, the tract about Vincennes reserved to the United States by the treaty of Greenville was described and defined; by the second treaty of Fort Wayne, concluded by Harrison on the 30th of September 1809, the Indians sold to the United States about 2,900,000 acres of land, mostly S.E. of the Wabash river. In September 1813 Fort Wayne was besieged by Indians, who withdrew on the arrival, on the 1 2th of September, of General Harrison with about 2700 men from Kentucky and Ohio. The fort was abandoned on the 19th of April 1819 and no trace of it remains. The first per- manent settlement here was made in 18-15, and the village was an important fur-trading depot until 1830. The opening of the Wabash & Erie canal in 1843 stimulated its growth. A town was platted and was made the county-seat in 1824; and in 1840 Fort Wayne was chartered as a city.

See W. A. Brice, History of Fort Wayne (Ft. Wayne, 1868); John B. Dillon, History of Indiana, from its Earliest Exploration by Europeans to the Close of the Territorial Government in 1816 (Indiana- polis, Ind., 1859); and Charles E. Slocum, History of the Maumee River Basin, from the Earliest Accounts to its Organization into Counties (Defiance, Ohio, 1905).

FORT WILLIAM, the principal town of Thunder Bay district, Ontario, Canada, 426 m. (by rail) E.S.E. of Winnipeg, on the Kaministiquia river, about a mile from Lake Superior." It is the lake terminus of the Canadian Pacific railway, of the new Grand Trunk Pacific railway, and of several steamship lines. Port Arthur, the terminus of the Canadian Northern railway, lies 4 m. to the N.E. Fort William contains numerous grain

elevators, railway repair shops and docks, and has a large export trade in grain and other farm produce. Minerals are also exported from the mining district, of which it is the centre. Industries, such as saw, planing and flour

mills, have also sprung up. The population was 4800 in 1901, but has since increased with great rapidity.

FORT WILLIAM, a police burgh of Inverness-shire, Scotland. Pop. (1901) 2087. It lies at the north-eastern end of Loch Linnhe, an arm of the sea, about 62 m. S.S.W. of Inverness by road or canal, and was, in bygone days, one of the keys of the Highlands. It is 122! m. N.E. of Glasgow by the West Highland railway. The fort, at first called Kilmallie, was built by General Monk in 1655 to hold the Cameron men in subjection, and was enlarged in 1690 by General Hugh Mackay, who renamed it after William III., the burgh then being known as Maryburgh in honour of his queen. Here the perpetrators of the massacre of Glencoe met to share their plunder. The Jacobites unsuccessfully besieged it in 1715 and 1746. The fort was dismantled in i860, and demolished in 1890 to provide room for the railway and the station. Amongst the public buildings are the Belford hospital, public hall, court house and the low-level meteorological observatory, constructed in 1891, which was in connexion with the observatory on the top of Ben Nevis, until the latter was closed in 1904. Its great industry is distilling, and the dis- tilleries, about 2 m. N.E., are a familiar feature in the landscape. Beyond the railway station stands the obelisk to the memory of Ewen Maclachlan (1775-1822), the Gaelic poet, who was born in the parish. Fort William is a popular tourist resort and place of call for the steamers passing through the Caledonian canal. The town is the point from which the ascent of Ben Nevis — 45 m. E.S.E. as the crow flies — is commonly made. At Corpach, about 2 m. N., the Caledonian canal begins, the series of locks between here and Banavie — within little more than a mile- being known as " Neptune's Staircase." Both the Lochy and the Nevis, enter Loch Linnhe immediately to the north of Fort William. A mile and a half from the town, on the Lochy, stands the grand old ruin of Inverlochy Castle, a massive quadrangular pile with a round tower at each corner, a favourite subject with landscape painters. Close by is the scene of the battle of the 2nd of February 1645, m which Montrose completely defeated the earl of Argyll. The modern castle, in the Scottish Baronial style, ij m. to the N.E. of this stronghold and farther from the river, is the seat of Lord Abinger.

FORT WORTH, a city and the county-seat of Tarrant county, Texas, U.S.A., about 30 m. W. of Dallas, on the S. bank of the West Fork of the Trinity river. Pop. (1880) 6663; (1890) 23,076; (1900) 26,688, of whom 1793 were foreign-born and 4249 were negroes; (1910, census) 73,312. It is served by the Chicago, Rock Island & Gulf, the Fort Worth & Denver City, the Fort Worth & Rio Grande, and the St Louis, San Francisco & Texas of the " Frisco " system, the Gulf, Colorado & Santa Fe, the Houston & Texas Central, the International & Great Northern, the Missouri, Kansas & Texas, the St Louis South- western, the Texas &

Pacific, and the Trinity & Brazos Valley (Colorado & Southern) railways. Fort Worth is beautifully situated on a level space aboye the river. It is the seat of Fort Worth University (coeducational), a Methodist Episcopal in- stitution, which was established as the Texas Wesleyan College in 1 88 1, received its present name in 1889, comprises an academy, a college of liberal arts and sciences, a conservatory of music, a law school, a medical school, a school of commerce, and a depart- ment of oratory and elocution, and in 1907 had 802 students; the Polytechnic College (coeducational; Methodist Episcopal, South) , which was established in 1890, has preparatory, collegiate, normal, commercial, and fine arts departments and a summer school, and in 1906 had 12 instructors and (altogether) 696 students; the Texas masonic manual training school; a kinder- garten training school; St Andrews school (Protestant Episcopal), and St Ignatius Academy (Roman Catholic). There are several good business, municipal and county buildings, and a Carnegie library. On the 3rd of April 1909 a fire destroyed ten blocks in the centre of the city. Fort Worth lies in the

midst of a stock-raising and fertile agricultural region; there is an important stockyard and packing establishment just outside the city; and considerable quantities of cotton are raised in the vicinity. Among the products are packed meats, flour, beer, trunks, crackers, candy, paint, ice, paste, cigars, clothing, shoes, mattresses, woven wire beds, furniture and overalls; and there are foundries, iron rolling mills and tan- neries. In 1905 the total value of the city's factory product was $5,668,391, an increase of 62-5 % since 1900; Fort Worth in 1900 ranked fifth among the cities of the state in the value of its factory product; in 1905 it ranked fourth. Fort Worth's numerous railways have given it great importance as a commercial centre. The municipality owns and operates the waterworks and the electric-lighting plant.

A military post was established here in 1849, being called first Camp Worth and then Fort Worth. It was abandoned in 1853. A settlement grew up about the fort, and the city was incorporated in 1873. The fort and the settlement were named in honour of General William Jenkins Worth (1794-1849), a native of Hudson, New York,, who served in the War of 1812, commanded the United States forces against the Seminole Indians in 1841-1842, served under both General Taylor and General Scott in the Mexican War, distinguishing himself at Monterey (where he earned the brevet of major-general) and in other engagements, and later commanded the department of Texas. In 1907 Fort Worth adopted a commission form of government.

FORTY, the cardinal number equal to four tens. The word is derived from the 0. Eng. feowertig, a combination of feower, four, and tig, an old form of " ten," used as a suffix, cf. Icel. liu, Dan. ti, ten, and Ger. vierzig, forty. The name " The Forty " has been given to various bodies composed of that number of members, particularly to a judicial body in ancient Athens, who tried small cases in the rural districts, and to a court of criminal jurisdiction and two civil appeal courts in the Venetian republic. The French Academy (see Academies) has also been known as " The Forty " or " The Forty Immortals." The period just before the repeal of the corn laws in the United Kingdom is frequently alluded to, particularly by the free trade school, as the "hungry forties"; and the "roaring forties" is a sailor's name for the' stormy region between the 40th and 50th latitudes N. and S., but more particularly applied to the portion of the north Atlantic lying between those latitudes.

FORUM (Lat. from forts, "out of doors"), in Roman antiquity, any open place used, like the Greek ayopa, for the transaction of mercantile, judicial or political business, some- times merely as a promenade. It was level, rectangular in form, surrounded by porticoes, basilicas, courts of law and other public buildings. In the laws of the Twelve Tables the word is used of the vestibule of a tomb (Cicero, De legibus, ii. 24) ; in a Roman camp the forum was an open place immediately beside the praetorium; and the term was no doubt originally applied generally to the space in front of any public building or gateway. In Rome (q.v.) itself, however, during the period of the early history, forum was almost a proper name, denoting the flat and formerly marshy space between the Palatine and Capitoline hills (also called Forum Romanum), which probably even during the regal period afforded the accommodation necessary for such public meetings as could not be held within the area Capitolina. In early times the Forum Romanum was used for athletic games, and over the porticoes were galleries for spectators; there were also shops of various kinds. But with the growth of the city and the increase of provincial business, more than one forum became necessary, and under the empire a considerable number of civilia (judicial) and venalia (mercantile) fora came into existence. In addition to the Forum Romanum, the Fora of Caesar and Augustus belonged to the former class; the Forum boarium (cattle), holitorium (vegetable), piscarium (fish), pistorium (bread), vinarium (wine), to the latter. The Fora of Nerva (also called transitorium or pcrvium, because a main road led through it to the Forum Romanum), Trajan, and Vespasian, although partly intended to facilitate the course of public

business, were chiefly erected to embellish the city. The con- struction of separate markets was not, however, necessarily the rule in the provincial fora; thus, in Pompeii, at the north-east end of the forum, there was a macettum (market), and shops for provisions and possibly money changers,

and on the east side a building supposed to have been the clothworkers' exchange, and at Timgad in North Africa (a military colony founded under Trajan) the whole of the south side of the forum was occupied by shops. The forum was usually paved, and although on festal occasions chariots were probably driven through, it was not a thoroughfare and was enclosed by gates at the entrances, of which traces have been found at Pompeii. When the sites for new towns were being selected, that for the forum was in the centre, and the two main streets crossed one another close to but not through it. At Timgad the main streets are some 5 or 6 ft. lower than the forum. The word forum frequently appears in the names of Roman market towns; as, for example, in Forum Appii, Forum Julii (Frejus), Forum Livii (Forli), Forum Sempronii (Fossombrone). These fora were distinguished from mere vici by the possession of a municipal organization, which, however, was less complete than that of a prefecture. In legal phraseology, which distinguishes the forum commune from the forum privUegiatum, and the forum generate from .the forum speciale, the word is practically equivalent to " court " or " jurisdiction." For the fora at Rome, see Rome: Archaeology, and works quoted.

FORUM APPII, an ancient post station on the Via Appia, 43 m. S.E. of Rome, founded, no doubt, by the original con- structor of the road. Horace mentions it as the usual halt at the end of the first day's journey from Rome, and describes it as full of boatmen and cheating innkeepers. The presence of the former was due to the fact that it was the starting-point of a canal which ran parallel to the road through the Pomptine Marshes, and was used instead of it at the time of Strabo and Horace (see Appia, Via). It is mentioned also as a halting place in the account of Paul's journey to Rome (Acts xxviii. 15). Under Nerva and Trajan the road was repaired; one inscription records expressly the paving with silex (replacing the former gravelling) of the section from Triponlium, 4 m. N.W., to Forum Appii; the bridge near Tripontium was similarly repaired, and that at Forum Appii, though it bears no inscription, is of the same style. Only scanty relics of antiquity have been found here; a post station was placed here by Pius VI. when the Via Appia was reconstructed. (T. As.)

FORUM CLODII, a post station on the Via Clodia, about 23 m. N.W. of Rome (not 32 m. as in the Antonine Itinerary), situated above the western bank of the Lacus Sabatinus (mod. Lake of Bracciano), and connected with the Via Cassia at Vacanae by a branch road which ran round the N. side of the lake {Ann. Inst., 1859, 43). The site is marked by the church of SS. Marcus, Marcianus and Liberatus, which was founded in the 8th or 9th century a.d. Inscriptions mentioning the Foro- Clodienses have come to light on the spot; and an inscription of the Augustan period, which probably stood over the door of a villa, calls the place Pausilypon — a name justified by the beauty of the site.

See Notizie degli scavi (1889), 5; D- Vaglieri, ibid. (1895), 342.

FORUM TRAIANI (mod. Fordongianus), an ancient town of Sardinia, on the river Thyrsus (Tirso), and a station on the Roman road through the centre of the island from Carales to Olbia and Turris Libisonis. Many of its ruins have been destroyed since i860. The. best preserved are the baths, erected over hot mineral springs. The tanks for collecting the water and the large central piscina are noteworthy. The bridge over the Tirso has been to some extent modernized. On the opposite bank are the scanty remains of an amphitheatre.. Not far off is a group of nuraghi, of which that of St Barbara in the ccmmune of Villanova Truschedda is one of the finest.

See Taramelli in Notizie degli scavi (1903), 469.

FOSBROKE, THOMAS DUDLEY (1770-1842), English anti- quary, was born in London on the 27th of May 1770. He was educated at St Paul's school and Pembroke College, Oxford,

graduating M.A. in 1792. In that year he was ordained and became curate of Horsley, Gloucestershire, where he remained till 1810. He then removed to Walford in Herefordshire, and remained there the rest of his life, as curate till 1830, and after- wards as vicar. His first important work, British Monachism (2 vols., 1802), was a compilation, from manuscripts in the British Museum and Bodleian libraries, of facts relating to English monastic life. In 1799 Fosbroke had been elected fellow of the Society of Antiquaries. The work for which he is best remembered, the Encyclopaedia of Antiquities, appeared in 1824. A sequel to this, Foreign Topography, was published in 1828. Fosbroke published many other volumes. He died at Walford on the 1st of January 1842.

FOSCARI, FRANCESCO (1373-1457), doge of Venice, belonged to a noble Venetian family, and held many of the highest offices of the republic— ambassador, president of the Forty, member of the Council of Ten, inquisitor, procurator of St Mark, avvo- gadore di comun, &c. His first wife was Maria Priuli and his second Maria Nani; of his many children all save one son (Jacopo) died young. But although a capable administrator he was ambitious and adventurous, and the reigning doge Tommaso Mocenigo, when speaking on his deathbed of the various candidates for the succession, warned the council against electing Foscari, who, he said, would perpetually plunge the republic into disastrous and costly wars. Nevertheless Foscari was elected (1423) and reigned for thirty-four years.

In pro- claiming the new doge the customary formula which recognized the people's share in the appointment and asked for their approval — the last vestige of popular government — was finally dropped.

Foscari's reign bore out Mocenigo's warning and was full of wars on the terra ferma, and through the doge's influence Venice joined the Florentines in their campaign against Milan, which was carried on with varying success for eight years. In 1430 an attempt was made on Foscari's life by a noble to whom he had refused an appointment; and three years later a conspiracy of young bloods to secure the various offices for themselves by illicit intrigues was discovered. These events, as well as the long and expensive wars and the unsatisfactory state of Venetian finances, induced Foscari to ask permission to abdicate, which was, however, refused. In 1444 began that long domestic tragedy by which the name of Foscari has become famous. The doge's son Jacopo, a cultivated and intelligent but frivolous and irresponsible youth, was in that year accused of the serious crime of having accepted presents from various citizens and forei

at first he refused, but was finally obliged to conform to their wishes and retired on a yearly pension of 1 500 ducats. Within a week Pasquale Malipiero was elected in his place and two days later (1st of November 1457) Francesco Foscari was dead.

The story is a very sad and pathetic one, but legend has added many picturesque though quite apocryphal details, most of them tending to show the iniquity and harshness of Jacopo's judges and accusers, whereas, as we have shown, he was treated with exceptional leniency. The most accurate account is contained in S. Romanin's Storia documentata di Venezia, lib. x. cap. iv. vii. and x. (Venice, 1855); where the original authorities are quoted; see also Berlan, I due Foscari (Turin, 1852). Among the poetical works on the subject Byron's tragedy is the most famous (1821), and Roger's poem Italy (1821); Giuseppe Verdi composed an opera on the subject entitled I due Foscari. (L. V.)*

FOSCOLO, UGO (1778-1827), Italian writer, was born at Zante in the Ionian Isles on the 26th of January 1778. On the death of his father, a physician at Spalatro, in Dalmatia, the family removed to Venice, and in the University of Padua Foscolo prosecuted the studies begun in the Dalmatian grammar school. The fact that amongst his Paduan masters was the abbe Cesarotti, whose version of Ossian had made that work highly popular in Italy, was not without influence on Foscolo's literary tastes, and his early knowledge of modern facilitated his studies in ancient Greek. His literary ambition revealed itself by the appearance in 1797 of his tragedy Tieste — a production which obtained a certain degree of success. Foscolo,

who, from causes not clearly explained, had changed his Christian name Niccolo to that of Ugo, now began to take an active part in the stormy political discussions which the fall of the republic of Venice had provoked. He was a prominent member of the national committees, and addressed an ode to Napoleon the liberator, expecting from the military successes of the French general, not merely the overthrow of the effete Venetian oligarchy, but the establishment of a free republican government.

The treaty of Campo Formio (17th Oct. 1797), by which Napoleon handed Venice over to the Austrians, gave a rude shock to Foscolo, but did not quite destroy his hopes. The state of mind produced by that shock is reflected in the Letters of Jacopo Ortis (1798), a species of political Werther, — for the hero of Foscolo embodies the mental sufferings and suicide of an undeceived Italian patriot just as the hero of Goethe places before us the too delicate sensitiveness embittering and at last cutting short the life of a private German scholar. The story of Foscolo, like that of Goethe, had a groundwork of melancholy fact. Jacopo Ortis had been a real personage; he was a young student of Padua, and committed suicide there under circumstances akin to those described by Foscolo. At this period Foscolo's mind appears to have been only too familiar with the thought of suicide. Cato and the many classical examples of self-destruction scattered through the pages of Plutarch appealed to the imaginations of young Italian patriots as they had done in France to those of the heroes and heroines of the Gironde. In the case of Foscolo, as in that of Goethe, the effect produced on the writer's mind by the composition of the work seems to have been beneficial. He had seen the ideal of a great national future rudely shattered; but he did not despair of his country, and sought relief in now turning to gaze on the ideal of a great national poet. At Milan, whither he repaired after the fall of Venice, he was engaged in other literary pursuits besides the composition of Ortis. The friendship formed there with the great poet Parini was ever afterwards remembered with pride and gratitude. The friendship formed with another celebrated Milanese poet soon gave place to a feeling of bitter enmity. Still hoping that his country would be freed by Napoleon, he served as a volunteer in the French army, took part in the battle of the Trebbia and the siege of Genoa, was wounded and made prisoner. When released he returned to Milan, and there gave the last touches to his Ortis, published a translation of and commentary upon Callimachus, commenced a version of the Iliad, and began his translation of Sterne's Sentimental Journey. The result of a memorandum prepared for Lyons, where, along with other Italian delegates, he was to have laid before Napoleon the state of Italy, only proved that the views cherished by him for his

country were too bold to be even submitted to the dictator of France. The year 1807 witnessed the appearance of his Carme sui sepolcri, of which the entire spirit and language may be described as a sublime effort to seek refuge in the past from the misery of the present and the darkness of the future. The mighty dead are summoned from their tombs, as ages before they had been in the masterpieces of Greek oratory, to fight again the battles of their country. The inaugural lecture on the origin and duty of literature, delivered by Foscolo in January 1809 when appointed to the chair of Italian eloquence at Pavia, was conceived in the same spirit. In this lecture Foscolo urged his young countrymen to study letters, not in obedience to academic traditions, but in their relation to individual and national life and growth. The sensation produced by this lecture had no slight share in provoking the decree of Napoleon by which the chair of national eloquence was abolished in all the Italian universities. Soon afterwards Foscolo's tragedy of Ajax was represented but with little success at Milan, and its supposed allusions to Napoleon rendering the author an object of suspicion, he was forced to remove from Milan to Tuscany. The chief fruits of his stay in Florence are the tragedy of Ricciarda, the Ode to the Graces, left unfinished, and the completion of his version of the Sentimental Journey (1813). His version of Sterne is an important feature in his personal history. When serving with the French he had been at the Boulogne camp, and had traversed much of the ground gone over by Yorick; and in his memoir of Didimo Cherico, to whom the version is ascribed, he throws much curious light on his own character. He returned to Milan in 1813, until the entry of the Austrians; thence he passed into Switzerland, where he wrote a fierce satire in Latin on his political and literary opponents; and finally he sought the shores of England at the close of 1816.

During the eleven years passed by Foscolo in London, until his death there, he enjoyed all the social distinction which the most brilliant circles of the English capital confer on foreigners of political and literary renown, and experienced all the misery which follows on a disregard of the first conditions of domestic economy. His contributions to the Edinburgh and Quarterly Reviews, his dissertations in Italian on the text of Dante and Boccaccio, and still more his English essays on Petrarch, of which the value was enhanced by Lady Dacre's admirable translations of some of Petrarch's finest sonnets, heightened his previous fame as a man of letters. But his want of care and forethought in pecuniary matters involved him in much em- barrassment, and at last consigned him to a prison; and when released he felt bitterly the change in his social position, and the coldness now shown to him by many whom he had been accustomed to regard as friends. His general bearing in society — if we may accept on this point the

testimony of so keen an observer and so tolerant a man as Sir Walter Scott — had un- happily not been such as to gain and retain lasting friendships. He died at Turnham Green on the 10th of October 1827. Forty- four years after his death, in 1871, his remains were brought to Florence, and with all the pride, pomp and circumstance of a great national mourning, found their final resting-place beside the monuments of Macchiavelli and Alfieri, of Michelangelo and Galileo, in Italy's Westminster Abbey, the church of Santa Croce. To that solemn national tribute Foscolo was fully entitled. For the originality of his thoughts and the splendour of his diction his country honours him as a great classic author. He had assigned to the literature of his nation higher aims than any which it previously recognized. With all his defects of character, and through all his vicissitudes of fortune, he was always a sincere and courageous patriot.

Ample materials for the study of Foscolo's character and career may be found in the complete series of his works published in Florence by Le Monnier. The series consists of Prose letterarie, (4 vols., 1850); Epistolario (3 vols., 1854); Prose politiche (1 vol., 1850); Poesie (1 vol., 1856); Lettere di Ortis (1 vol., 1858); Saggi di critica storico-letteraria (1st vol., 1859; 2nd vol., 1862). To this series must be added the very interesting work published at Leghorn in 1876, Lettere inedite del Foscolo, del Giordani, e delta Signora di Stael, a Vincenzo Monti. The work published at Florence in the summer of 1878, Vita di Ugo Foscolo, di Pellegrino Artusi, throws

much doubt on the genuineness of the text in Foscolo's writings as given in the complete Florence edition, whilst it furnishes some curious and original illustrations of Foscolo's familiarity with the English language. (J. M. S.)

FOSS, EDWARD (1787-1870), English lawyer and biographer, was born in London on the 16th of October 1787. He was a solicitor by profession, and on his retirement from practice in 1840, he devoted himself to the study of legal antiquities. His Judges of England (9 vols., 1848-1864) is a standard work, characterized by accuracy and extensive research. Biographia Juridica, a Biographical Dictionary of English Judges, appeared shortly after his death. He assisted in founding the Incorporated Law Society, of which he was president in 1842 and 1843. He died of apoplexy on the 27th of July 1870.

FOSSANO, a town and episcopal see of Piedmont, Italy, in the province of Cuneo, 15 m. N.E. of it by rail, 1180 ft. above sea-level. Pop. (1901) 7696 (town), 18,175 (commune). It has an imposing castle with four towers, begun by Filippo d'Acaia in 13 14. The cathedral was reconstructed at the end of the 1 8th century. The place began to acquire some importance in the 13th century. It appears as a commune in 1237,

but in 1251 had to yield to Asti. It finally surrendered in 1314 to Fillippo d'Acaia, whose successor handed it over to the house of Savoy. It lies on the main line from Turin to Cuneo, and has a branch line to Mondovi.

FOSSANUOVA, an abbey of Italy, in the province of Rome, near the railway- station of Sonnino, 64 m. S.E. of Rome. It is the finest example of a Cistercian abbey, and of the Burgundian Early Gothic style, in Italy, and dates from the end of the 12th to the end of the 13th century. The church (1187-1208) is closely similar to that of Casamari. The other conventual buildings also are noteworthy. Thomas Aquinas died here in

1274.

See C. Enlart, Orieines francaises de I' architecture gothique en Italie (Paris, 1894) (Bibliotheque des ecoles francaises d'Athenes et de Rome, fasc. 66).

FOSSE (or Foss) WAY, the Early English name of a Roman road or series of roads in Britain, used later by the English, running from Lincoln by Leicester and Bath to Exeter. Almost all the Roman line is still in use as modern road or lane. It passes from Lincoln through Newark and Leicester (the Roman Ratae) to High Cross (Venonae) , where it intersects Watling Street at a point often called " the centre of England." Hence it runs to Moreton-in-the-Marsh, Cirencester, Bath and Uchester, crosses the hills near Chard, Axminster and Honiton, and enters Exeter. Antiquaries have taken it farther, usually to Totnes, but without warrant. (See further under Ermine Street.) (F. J. H.)

FOSSICK (probably an English dialectical expression, meaning fussy or troublesome), a term applied by the gold diggers of Australia to the search for gold by solitary individuals, in untried localities or in abandoned diggings. A " fossicker," or pocket miner, is one who buys up the right to search old claims, in the hope of finding gold overlooked by previous diggers.

FOSSOMBRONE (anc. Forum Sempronii), a town and episcopal see of the Marches, Italy, in the province of Pesaro and Urbino, 11 m. E.S.E. of the latter by road, 394 ft. above sea-level. Pop. (1901) town, 7531, commune, 10,847. The town is situated in the valley of the Metauro, in the centre of fine scenery, at the meeting-point of roads to Fano, to the Furlo pass and Fossato di Vico (the ancient Via Flaminia), to Urbino and to Sinigaglia, the last crossing the river by a fine bridge. The cathedral, rebuilt in 1772-1784, contains the chief work of the sculptor Domenico Rosselli of Rovezzano, a richly sculptured ancona of 1480. S. Francesco has a lunette by him over the portal. The library, founded by a nephew of Cardinal

Passionei, contains some antiquities. Above the town is a medieval castle. There is a considerable trade in silk.

The ancient Forum Sempronii lay about 2 m. to the N.E. at S. Martino al Piano, where remains still exist. It was a station on the Via Flaminia and a municipium. The date of its founda- tion is not known. Excavations in 1879-1880 led to the discovery of a house and of other buildings on the ancient road (A.

Vernarecci in Notizie degli scavi, 1880, 458). It already had a bishop in the years 499-502. In 1295 the Malatesta obtained possession of it, and kept it until 1444, when it was sold, with Pesaro, to Federico di Montefeltro of Urbino, and with the latter it passed to the papacy under Urban VIII. in 1631.

FOSSOMBRONI, VITTORIO, Count (1754-1844), Tuscan statesman and mathematician, was born at Arezzo. He was educated at the university of Pisa, where he devoted himself particularly to mathematics. He obtained an official appoint- ment in Tuscany in 1782, and twelve years later was entrusted by the grand duke with the direction of the works for the drainage of the Val di Chiana, on which subject he had published a treatise in 1789. In 1796 he was made minister for foreign affairs, but on the French occupation of Tuscany in 1799 he fled to Sicily. On the erection of the grand duchy into the ephemeral kingdom of Etruria, under the queen-regent Maria Louisa, he was ap- pointed president of the commission of finance. In 1809 he went to Paris as one of the senators for Tuscany to pay homage to Napoleon. He was made president of the legislative commission on the restoration of the grand duke Ferdinand III. in 18 14, and subsequently prime minister, which position he retained under the grand duke Leopold II. His administration, which was only terminated by his death, greatly contributed to promote the well-being of the country. He was the real master of Tuscany, and the bases of his rule were equality of all subjects before the law, honesty in the administration of justice and toleration of opinion, but he totally neglected the moral improvement of the people. At the age of seventy-eight he married, and twelve years afterwards died, in 1844.

Bibliography.— Gino Capponi, II Conte V. Fossombroni, A. von Reumont, Gesckichte Toscanas unter dem Hause Lothringen-Habsburg (Gotha, 1877); Zobi, Storia civile della Toscana (Florence, 1850- 1853); Galeotti, Delle Leggi e dell' amministrazione della Toscana (Florence, 1847); Baldasseroni, Leopoldo II. (Florence, 1871); see also under Capponi, Gino; Ferdinand III., of Tuscany, and Leopold II., of Tuscany. (L. V.)*

FOSTER, SIR CLEMENT LE NEVE (1841-1904), English geologist and mineralogist, the second son of Peter Le Neve Foster (for many years secretary of the Society of Arts), was born at Camberwell on the 23rd of March 1841. After receiving his early education at Boulogne and Amiens, he studied succes- sively at the Royal School of Mines in London and at the mining college of Freiburg in Saxony. In i860 he joined the Geological Survey in England, working in the Wealden area and afterwards in Derbyshire. Conjointly with William Topley (1841-1894) he communicated to the Geological Society of London in 1865 the now classic paper " On the superficial deposits of the Valley of the Medway, with remarks on the Denudation of the Weald." In this paper the sculpturing of the Wealden area by rain and rivers was ably advocated. Retiring from the Geological Survey in 1865, Foster devoted his attention to mineralogy and mining in Cornwall, Egypt and Venezuela. In 1872 he was appointed an inspector of mines under the home office for the S.W. of England, and in 1880 he was transferred to the N. Wales district. In 1890 he was appointed professor of mining at the Royal College of Science and he held this post until the close of his life. His later work is embodied largely in the reports of mines and quarries issued annually by the home office. He was distinguished for his extensive scientific and practical knowledge of metalliferous mining and stone quarrying. He was elected F.R.S. in 1892 and was knighted in 1903. While investigating the cause of a mining disaster in the Isle of Man in 1897 his constitution suffered much injury from carbonic- oxide gas, and he never fully recovered from the effects. He died in London on the 19th of April 1904. He published Ore and Stone Mining, 1894 (ed. 5, 1904); and The Elements of Mining and Quarrying, 1903.

FOSTER, GEORGE EULAS (1847-), Canadian politician and financier, was born in New Brunswick on the 3rd of September 1847, of U.E. Loyalist descent. After a brilliant university career at the university of Brunswick, at Edinburgh and Heidelberg, he returned to Canada and taught in various local schools, eventually becoming professor of classics and

history in the local university. In 1882 he became Conservative member for King's County, N.B., in the Dominion parliament, and in 1885 entered the cabinet of Sir John Macdonald as minister of marine and fisheries; in 1888 he became minister of finance, which position he held till the defeat of his party in 1896. A careful and even brilliant financier, and a keen debater, he became known as a strong believer in protection for Canadian industries and in preferential trade within the British empire.

FOSTER, JOHN (1770-1843), English author and dissenting minister, generally known as the " Essayist," was born in a small farmhouse near Halifax, Yorkshire, on the 17 th of September 1770. Partly from constitutional causes, but partly also from the want of proper companions, as well as from the grave and severe habits of his parents, his earlier years were enshrouded in a somewhat gloomy and sombre atmosphere, which was never afterwards wholly dissipated. His youthful energy, finding no proper outlet, developed within him a tendency to morbid intensity of thought and feeling; and, according to his own testimony, before he was twelve years old he was possessed of a " painful sense of an awkward but entire individuality."

The small income accruing to Foster's parents from their farm they supplemented by weaving, and at an early age he began to assist them by spinning wool by the hand wheel, and from his fourteenth year by weaving double stuffs. ,Even ■" when a child," however, he had the " feelings of a foreigner in the place"; and though he performed his monotonous task with conscientious diligence, he succeeded so indifferently in fixing his wandering thoughts upon it that his work never without difficulty passed the ordeal of inspection. He had acquired a great taste for reading, to gratify which he sometimes shut himself up alone in a barn, afterwards working at his loom " like a horse," to make up for lost time. He had also at this period " a passion for making pictures with a pen." Shortly after completing his seventeenth year he became a member of the Baptist church at Hebden Bridge, with which his parents Were connected; and with the view of preparing himself for the ministerial office he began about the same time to attend a seminary at Brearley Hall conducted by his pastor Dr Fawcett.

After remaining three years at Brearley Hall he was admitted to the Baptist College, Bristol, and on finishing his course of study at this institution he obtained aii engagement at Newcastle- on-Tyne, where he preached to an audience of less than a hundred persons, in a small and dingy room situated near the river at the top of a flight of steps called Tuthill Stairs. At Newcastle he remained only three months. In the beginning of 1793 he proceeded to Dublin, where, after failing as a preacher, he attempted to revive a classical and mathematical school, but with so little success that he did not prosecute the experiment for more than eight or nine months. From 1797 to 1799 he was minister of a Baptist church at Chichester, but though he applied himself with more earnestness and perseverance than formerly to the discharge of his ministerial duties, his efforts produced little apparent impression, and the gradual diminution of his hearers necessitated his resignation. After employing himself for a few months at Battersea in the instruction of twenty African youths brought to England by Zachary Macaulay, with the view of having them trained to aid as missionaries to

their fellow-country- men, he in 1800 accepted the charge of a small congregation at Downend, Bristol, where he continued about four years. In 1804, chiefly through the recommendation of Robert Hall, he became pastor of a congregation at Frome, but a swelling in the thyroid gland compelled him in 1806 to resign his charge. In the same year he published the volume of Essays on which his literary fame most largely if not mainly rests. They were written in the form of letters addressed to the lady whom he afterwards married, and consist of four papers, — " On a Man writing Memoirs of himself"; "On Decision of Character"; " On the Application of the Epithet Romantic "; and " On some Causes by which Evangelical Religion has been rendered un- acceptable to Men of Cultivated Taste." The success of this work was immediate, and was so considerable that on resigning his charge he determined to adopt literature as his profession.

The Eclectic Review was the only periodical with which he estab- lished a connexion; but his contributions to that journal, which were begun in 1807, number no fewer than 185 articles. On his marriage in May 1808 he removed to Bourton-on-the- Water, a small village in Gloucestershire, where he remained till 181 7, when he returned to Downend and resumed his duties to his old congregation. Here he published in 1820 his Essay on Popular Ignorance, which was the enlargement of a sermon originally preached on behalf of the British and Foreign School Society. In 1821 he removed to Stapleton near Bristol, and in 1822 he began a series of fortnightly lectures at Broadmead chapel, Bristol, which were afterwards published. On the settlement of Robert Hall at Bristol this service was discontinued, as in such circumstances it appeared to Foster to be " altogether superfluous and even bordering on impertinent." The health of Foster during the later years of his life was somewhat infirm, the result chiefly of the toil and effort of literary composition; and the death of his only son, his wife and the greater nutnber of his most intimate friends combined with his bodily ailments to lend additional sombreness to his manner of regarding the events and arrangements of the present world — the " visage of death " being almost his " one remaining luminary." He died at Stapleton on the 15th of October 1843.

The cast of Foster's mind was meditative and reflective rather than logical or metaphysical, and though holding moderately Calvinistic views, his language even in preaching very seldom took the mould of theological forms. Though always retaining his connexion with the Baptist denomination, the evils result- ing from organized religious communities seemed to him so great that he came to be " strongly of opinion that

churches are useless and mischievous institutions, and the sooner they are dissolved the better." The only Christian observances which he regarded as of any importance were public worship and the Lord's Supper, and it so happened that he never administered the ordinance of baptism. His cast of thought is largely coloured by a constant reference to the " endless future." He was a firm believer in supernatural appearances, and cherished a longing hope that a ray of light from the other world might sometimes in this way be vouchsafed to mortals. As a writer he was most painstaking and laborious in his choice of diction, and his style has its natural consequent defects, though the result is eloquent in its way.

Besides the works already alluded to, Foster was the author of a Discourse on Missions (1818); " Introductory Essay" to Dod- dridge's Rise and Progress of Religion (1825); "Observations on Mr Hall's Character as a Preacher," prefixed to the collected edition of Hall's Works (1832); an " Introduction " to a pamphlet by Mr Marshman on the Serampore Missionaries; several political letters to the Morning Chronicle, and contributions to the Eclectic Review, published posthumously in 2 vols., 1844. His Life and Corre- spondence, edited by J. E. Ryland, was published in 1846.

FOSTER, SIR MICHAEL (1836-1007), English physiologist, was born at Huntingdon on the 8th of March 1836. After graduating in medicine at London University in 1859, he began to practise in his native town, but in 1867 he returned to London as teacher of practical physiology at University College, where two years afterwards he became professor. In 1870 he was appointed by Trinity College, Cambridge, to its praelectorship in physiology, and thirteen years later he became the first occupant of the newly-created chair of physiology in the university, holding it till 1903. He excelled as a teacher and administrator, and had a very large share in the organization and development of the Cambridge biological school. From 1881 to 1903 he was one of the secretaries of the Royal Society, and in that capacity exercised a wide influence on the study of biology in Great Britain. In 1899 he was created K.C.B., and served as president of the British Association at its meeting at Dover. In the following year he was elected to represent the university of London in parliament. Though returned as a Unionist, his political action was not to be dictated by party considerations, and he gravitated towards Liberalism; but he played no prominent part in parliament and at the election of 1906 was defeated. His chief writings were a Textbook of Physiology

(1876), which became a standard work, and Lectures on the History of Physiology in the 16th, 17th and 18th Centuries (1901), which consisted of lectures delivered at the Cooper Medical College, San Francisco, in 1900. He died suddenly in London on the 29th of January 1907.

FOSTER, MYLES BIRKET (1825-1899), English painter, was born at North Shields. At the age of sixteen he entered the workshop of Ebenezer Landells, a wood engraver, with whom he worked for six years as an illustrative draughtsman, devoting himself mainly to landscape. During the succeeding fifteen years he became famous as a prolific and accomplished illustrator, but about 1 86 1 abandoned illustration for painting, and gained wide popularity by his pictures, chiefly in water colours, of landscapes and rustic subjects, with figures, mainly of children. He was elected in i860 associate and in 1862 full member of the Royal Society of Painters in Water Colours. His work is memor- able for its delicacy and minute finish, and for its daintiness and pleasantness of sentiment.

See Birket Foster, his Life and Work (extra number of the Art Journal) by Marcus B. Huish (1890), an interesting sketch; and Birket Foster, R.W.S., by H. M. Cundall (London, 1906), a very complete and fully illustrated biography.

FOSTER, STEPHEN COLLINS (1826-1864), American song and ballad writer, was born near Pittsburg, Pennsylvania, on the 4th of July 1826. He was the youngest child of a merchant of Irish descent who became a member of the state legislature and was related by marriage to President Buchanan. Stephen early showed talent for music, and played upon the flageolet, the guitar and the banjo; he also acquired a fair knowledge of French and German. He was sent to school in Towanda, Pennsylvania, and later to Athens, Pennsylvania, and when thirteen years old he wrote the song " Sadly to Mine Heart Appealing." At sixteen he wrote " Open thy Lattice, Love "; at seventeen he entered his brother's business house, Cincinnati, Ohio, where he remained about three years, composing meanwhile such popular pieces as " Old Uncle Ned," " O Susannah!" and others. He then adopted song-writing as a profession. His chief successes were songs written for the negro melodists or Christy minstrels. Besides those mentioned the following attained great popularity: " Nelly was a Lady," " Old Kentucky Home," " Old Folks at Home," " Massa's in de Cold, Cold Ground," &c. For these and other songs the composer received considerable sums, "Old Folks at Home" bringing him, it is said, 15,000 dollars. For most of his songs Foster wrote both songs and music. In 1850 he married and moved to New York, but soon returned to Pittsburg. His reputation rests chiefly on his negro melodies, many of which have been popular on both sides of the Atlantic and sung in many tongues. " Old Black Joe," the last of these negro melodies, appeared in 1861. His later songs were senti- mental ballads. Among these are " Old Dog Tray," " Gentle Annie," " Willie, we have missed you," &c. His " Come where my Love lies Dreaming " is a well known vocal quartet. Al- though as a musician and composer Foster has little claim to high rank, his song-writing gives him a prominent place in the modern developments of popular music.

He died at New York on the 13th of January 1864.

FOSTORIA, a city, partly in Seneca, partly in Hancock, and partly in Wood county, Ohio, U.S.A., 35 m. S. by E. of Toledo. Pop. (1890) 7070; (1900) 7730 (584 foreign-bom); (1910)9597. It is served by the Baltimore & Ohio, the New York, Chicago & St Louis, the Ohio Central,, the Lake Erie & Western, and the Hocking Valley railways, and by two interurban electric lines. The city is situated in an agricultural region, and oil abounds in the vicinity. Among the city's manufactures are glass, flour, planing mill products, brass and iron, carriages, barrels, incan- descent lamps, carbons, wire nails and fences, automobile engines and parts, railway torpedoes and muslin underwear. The waterworks are owned and operated by the municipality. In 1832, upon the coming of the first settlers, two towns, Rome and Risdon, were laid out on the site of what is now Fostoria. A bitter rivalry arose between them, but they were finally united under one government, and the city thus formed was named in

honour of Charles W. Foster, whose son Charles Foster (1828- 1004), governor of the state from 1880 to 1884 and secretary of the United States treasury from 1891 to 1893, did much to pro- mote its growth. Fostoria was chartered as a city in 1854.

FOTHERGILL, JOHN (17 12-1780), English physician, was born of a Quaker family on the 8th of March 171 2 at Carr End in Yorkshire. He took the degree of M.D. at Edinburgh in 1736, and after visiting the continent of Europe he in 1740 settled in London, where he gained an extensive practice. In the epidemics of influenza in 1775 and 1776 he is said to have had sixty patients daily. In his leisure he made a study of conchology and botany; and at Upton, near Stratford, he had an extensive botanical garden where he grew many rare plants obtained from various parts of the world. He was the patron of Sidney Parkinson, the South Sea voyager. A translation of the Bible (1764 sq.) by Anthony Purver, a Quaker, was made and printed at his expense. His pamphlet entitled " Account of the Sore Throat attended with Ulcers" (1748) contains one of the first descriptions of diphtheria in English, and was translated into several languages. He died in London on the 26th of December 1780.

FOTHERINGHAY, a village of Northamptonshire, England, picturesquely situated on the left bank of the river Nene, 1 \ m. from Elton station on the Peterborough branch of the London & North-Western railway. The castle, of which nothing but the earthworks and foundations remain, is famous as

the scene of the imprisonment of Mary queen of Scots from September 1 586 to her trial and execution on the 8th of February 1587. The earthworks, commanding a ford of the river, are apparently of very early date, and probably bore a castle from Norman times. It became an important stronghold of the Plantagenets from the time of Edward III., and was the birthplace of Richard III. in 1452. The church of St Mary and All Saints, originally collegiate, is Perpendicular, and only the nave with aisles, and the tower surmounted by an octagon, remain; but the building is in the best style of its period. Edward, second duke of York, who was killed at the battle of Agincourt in 1415, Richard, the third duke, and his duchess. Cicely (d. 1495), also his son the earl of Rutland, who with Richard himself, fell at the battle of Wakefield in 1460, are buried in the church. Their monuments were erected by Queen Elizabeth, who found the choir and tombs in ruins.

FOUCAULT, JEAN BERNARD LEON (1819-1868), French physicist, was the son of a publisher at Paris, where he was born on the 18th of September 1819. After an education received chiefly at home, he studied medicine, which, however, he speedily abandoned for physical science, the improvement of L. J. M. Daguerre's photographic processes being the object to which he first directed his attention. During three years he was experimental assistant to Alfred Donne (1801-1878) in his course of lectures on microscopic anatomy. With A. H. L. Fizeau he carried on a series of investigations on the intensity of the light of the sun, as compared with that of carbon in the electric arc, and of lime in the flame of the oxyhydrogen blowpipe; on the interference of heat rays, and of light rays differing greatly in lengths of path; and on the chromatic polarization of light. In 1849 he contributed to the Comptes Rendus a description of an electromagnetic regulator for the electric arc lamp, and, in conjunction with H. V. Regnault, a paper on binocular vision. By the use of a revolving mirror similar to that used by Sir Charles Wheatstone for measuring the rapidity of electric currents, he was enabled in 1850 to demonstrate the greater velocity of light in air than in water, and to establish that the velocity of light in different media is inversely as the refractive indices of the media. For his demonstration in 1851 of the diurnal motion of the earth by the rotation of the plane of oscilla- tion of a freely suspended, long and heavy pendulum exhibited by him at the Pantheon in Paris, and again in the following year by means of his invention the gyroscope, he received the Copley medal of the Royal Society in 1855, and in the same year he was made physical assistant in the imperial observatory at Paris. In Seotember of that year he discovered that the force required for the rotation of a copper disk becomes greater when

it is made to rotate with its rim between the poles of a magnet, the disk at the same time becoming heated by the eddy or " Foucault currents "

induced in its metal. Foucault invented in 1857 the polarizer which bears his name, and in the succeeding year devised a method of giving to the speculum of reflecting telescopes the form of a spheroid or a paraboloid of revolution. With Wheatstone's revolving mirror he in 1862 determined the absolute velocity of light to be 298,000 kilometres (about 185,000 m.) a second, or 10,000 kilom. less than that obtained by previous experimenters. He was created in that year a member of the Bureau des Longitudes and an officer of the Legion of Honour, in 1864 a foreign member of the Royal Society of London, and next year a member of the mechanical section of the Institute. In 1865 appeared his papers on a modification of Watt's governor, upon which he had for some time been experi- menting with a view to making its period of revolution constant, and on a new apparatus for regulating the electric light; and in the following year {Compt. Rend, lxiii.) he showed how, by the deposition of a transparently thin film of silver on the outer side of the object glass of a telescope, the sun could be viewed without injuring the eye by excess of light. Foucault died of paralysis on the nth of February 1868 at Paris. From the year 1845 he edited the scientific portion of the Journal des Dibats. His chief scientific papers are to be found in the Comptes Rendus,

1847-1869.

See Revue cours scient. vi. (1869), pp. 484-489; Proc. Roy. Soc. xvii. (1869), pp. lxxxiii.-lxxxiv. ; Lissajous, Notice historique sur la vie et les travaux de Leon Foucault (Paris, 1875).

FOUCHE, JOSEPH, Duke of Otranto (1763-1820), French statesman, was born in a small village near Nantes on the 21st of May 1763. His father, a seafaring man, destined him for the sea; but the weakness of his frame and the precocity of his talents soon caused this idea to be given up. He was educated at the college of the Oratorians at Nantes, and showed marked aptitude for studies both literary and scientific. Desiring to enter the teaching profession he was sent to an institution kept by brethren of the same order at Paris. There also he made rapid progress, and soon entered upon tutorial duties at the colleges of Niort, Saumur, Vendome, Juilly and Arras. At Arras he had some dealings with Robespierre at the time of the begin- ning of the French Revolution (1789).

In October 1790 he was transferred by the Oratorians to their college at Nantes, owing to irregularities due to his zeal for revolutionary principles; but at Nantes he showed even more democratic fervour. His abilities and the zeal with which he espoused the most subversive notions brought him into favour with the populace at Nantes; he became a leading member of the local Jacobin club; and on the dissolution of the college of the Oratorians at Nantes in May 1792, Fouche gave up all connexion with the

church, whose major vows he had not taken. After the downfall of the monarchy on the 10th of August 1792, he was elected as deputy for the department of the Lower Loire to the National Convention which met at the autumnal equinox and proclaimed the republic. The literary and pedagogic sympathies of Fouche at first brought him into touch with Condorcet and the party, or group, of the Girondists; but their vacillation at the time of the trial and execution of Louis XVI. (December 1792-January 21, 1793) led him to espouse the cause of the Jacobins, the less scrupulous and more thoroughgoing champions of revolutionary doctrine. On the question of the execution of the king, Fouche, after some pre- liminary hesitations, expressed himself with the utmost vigour in favour of immediate execution, and denounced those who " wavered before the shadow of a king."

The crisis which resulted from the declaration of war by the Convention against England and Holland (Feb. 1, 1793), and a little later against Spain, brought Fouche into notoriety as one of the fiercest of the Jacobinical fanatics who then held power at Paris. While the armies of the first coalition threatened the north-east of France, a revolt of the royalist peasants of Brittany and la Vendee menaced the Convention on the west. That body deputed Fouche with a colleague, Villers, to proceed

to the west as commissioners invested with almost dictatorial powers for the crushing of the revolt of " the whites." The vigour with which he carried out these duties earned him other work, and he soon held the post of commissioner of the republic in the department of the Nievre. Together with Chaumette, he helped to initiate the atheistical movement, the founders of which in the autumn of 1793 began to aim at the extinction of Christianity in France. In the department of the Nievre he ransacked the churches, sent their spoils to the treasury and established the cult of the goddess of Reason. Over the cemeteries, he ordered these words to be inscribed: " Death is an eternal sleep." He also waged war against luxury and wealth, and desired to abolish the use of money. The new cult was inaugurated at Paris at Notre Dame by the strange orgy known as " The Festival of Reason " (November 10, 1793).

Fouche then proceeded to Lyons to execute the vengeance of the Convention on that city, which had revolted against the new Jacobin tyranny. Preluding his work by a festival remark- able for its obscene parody of religious rites, he then, along with his colleague, Collot d'Herbois, set the guillotine and cannon to work with a rigour which made his name odious. Modern research, however, proves that at the close of

those horrors Fouche exercised a moderating influence. Outwardly his conduct was marked by the utmost rigour, and on his return to Paris early in April 1794, he thus characterised his policy: " The blood of criminals fertilises the soil of liberty and estab- lishes power on sure foundations." By that time Robespierre had struck down the other leaders of the atheistical party; but early in June 1794, at the time of the " Festival of the Supreme Being," Fouche ventured to mock at the theistic revival which Robespierre then inaugurated. Sharp passages of arms took place between them, and Robespierre procured the ejection of Fouche from the Jacobin Club (July 14, 1794). Fouche, however, was working with his customary skill and energy, and along with Tallien and others, managed to effect the overthrow of the theistic dictator on Thermidor 10 (July 28), 1794. The ensuing reaction in favour of more merciful methods of government threatened to sweep away the group of Terrorists who had been mainly instrumental in carrying through the coup d'itat of Thermidor; but, thanks largely to the skill of Fouche in intrigue, they managed for a time to keep at the head of affairs. Discords, however, crept in which left him for a time almost isolated, and it needed all his ability to withstand the attacks of the moderates. A vigorous attack on him by Boissy d'Anglas, on the 9th of August 1795, caused him to be arrested, but the troubles which ensued in Vendemiaire averted the doom that seemed to be pending; and he owed his release to the amnesty which was passed on the proclamation of the new constitution of the year

I79S-

In the ensuing period, known as that of the Directory (1795- 1799), Fouche remained at first in obscurity, but tne relations which he had with the communists, once headed by Chaumette and now by Francois N. (" Gracchus ") Babeuf (q.v.), helped him to rise once more. He is said to have betrayed to the director Barras the secret of the strange plot which Babeuf and a few accomplices hatched in the year 1796; but recent research has tended to throw doubt on the assertion. His rise from poverty was slow, but in 1797 he gained an appointment for the supply of military maliriel, which offered opportunities direct and indirect. After offering his services to the royalists, whose movement was then gathering force, he again decided to support the Jacobins and the director Barras (q.v.). In the coup d'etat of Fructidor 1797 he made himself serviceable to Barras, who in 1798 appointed him to be French ambassador to the Cisalpine republic. At Milan he carried matters with so high a hand against the Gallophobes of that government that his actions were disavowed and he himself was removed ; but in the confused state in which matters then were, he was able for a time to hold his own and to intrigue successfully against his successor. Early in 1799 he returned to Paris, and after a brief tenure of office as ambassador at The Hague, he became minister of police at Paris (July 20, 1799). The

newly elected director, Sieyes (q.v.),

was then in the ascendant and desired to curb the excesses of the Jacobins, who had recently reopened their club. Fouche, casting consistency to the winds, closed the Jacobins club in a manner at once daring and clever. Thereupon he hunted down the pamphleteers and editors, whether Jacobins or royalists, who were obnoxious to the government, so that at the time of the return of Bonaparte from Egypt (October 1799) the ex- Jacobin was one of the most powerful men in France.

Knowing well the unpopularity of the directors, Fouche lent himself to the schemes of Bonaparte and Sieyes for their over- throw. His activity in furthering the coup d'etat of Brumaire 18-19 (November 9-10), 1799, procured him the favour of Bonaparte, who kept him in office (v. Napoleon I.). In the ensuing period of the Consulate (1 799-1 804) Fouche behaved with the utmost adroitness. While curbing the royalists and extreme Jacobins who at first alone opposed Bonaparte, Fouche was careful to temper as far as possible the arbitrary actions of the new master of France. In this difficult task he acquitted himself with so much skill as to earn at times the gratitude even of the royalists. Thus, while countermining a foolish intrigue of theirs in which the duchesse de Guiche was the chief agent, Fouche took care that she should escape. Equally skilful was his action in the affair of the so-called Arena-Ceracchi plot, in which the agents provocateurs of the police were believed to have played a sinister part. The chief " conspirators " were easily ensnared and were executed when the affair of Nivose (December 1800) enabled Bonaparte to act with rigour. This far more serious attempt (in which royalist conspirators exploded a bomb near the First Consul's carriage with results disastrous to the bystanders) was soon seen by Fouche to be the work of royalists; and when the First Consul, eager to entrap the still formidable Jacobins, sought to fasten the blame on them, Fouche firmly declared that he would not only assert but would prove that the outrage was the work of royalists. All his efforts, however, failed to avert the punishment which Bonaparte was resolved to inflict on the leading Jacobins. In other matters (especially in that known as the Plot of the Placards in the spring of 1802) Fouche was thought to have secured the Jacobins concerned from the vengeance of the First Consul. In any case the latter resolved to rid himself of a man who had too much power and too much skill in intrigue to be desirable as a sub-ordinate. On the proclamation of Bonaparte as First Consul for life (August 1, i8o'2) Fouche was deprived of his office; but the blow was softened by the suppression of the ministry of police and by the attribution of most of its duties to an extended ministry of justice. Fouche also became a senator and received half of the reserve funds of the police which had accumulated during his tenure of office. He continued, however, to intrigue through his spies, whose information was so superior to that of the new minister of

police as to render great services to Napoleon at the time of the Cadoudal-Pichegru conspiracy (February- March 1804).

As a result Napoleon, now emperor, brought back Fouche to the re-constituted ministry of police (July 1804); he also later on entrusted to him that of the interior. His work was no less important than at the time of the Consulate. His police agents were ubiquitous, and the terror which Napoleon and Fouch6 inspired, owing to their proven ability to benefit by plots, partly accounts for the absence of conspiracies after 1804. After Austerlitz (December 1805) Fouche uttered the mot of the occasion: "Sire, Austerlitz has shattered the old aristocracy; the boulevard St Germain no longer conspires."

That Napoleon retained some feeling of distrust, or even of fear, of Fouche was proved by his conduct in the early days of 1808. While engaged in the campaign of Spain, the emperor heard rumours that Fouche and Talleyrand, once bitter enemies, were having interviews at Paris in which Murat, king of Naples, was concerned. At once the sensitive autocrat hurried to Paris, but found nothing to incriminate Fouche. In that year Fouche received the title of duke of Otranto. During the absence of Napoleon in Austria in the campaign of 1809, the British Walcheren expedition threatened for a time the safety of

Antwerp. Fouche thereupon issued an order to the prefects of the northern departments of the empire for the mobilization of 60,000 National Guards. He added to the order a statement in which occurred the words: "Let us prove to Europe that although the genius of Napoleon can throw lustre on France, his presence is not necessary to enable us to repulse the enemy." The emperor's approval of the measure was no less marked than his disapproval of the words just quoted. The next months brought further causes of friction between emperor and minister. The latter, knowing the desire of his master for peace at the close of the year 1809, undertook on his own account to make secret overtures to the British ministry. A little later Napoleon opened negotiations and found that Fouche had forestalled him. His rage against his minister was extreme, and on the 3rd of June 1810 he dismissed him from his office. However, as it was not the emperor's custom completely to disgrace a man who might again be useful, Fouche received the governorship of Rome. He went thither, not as governor but as fugitive, for on receiving the emperor's order to give up certain important documents of his former ministry, he handed over only a few, declaring that the rest were destroyed. At this the emperor's anger

burst forth again, and FoucM en learning, after his arrival at Florence, that the storm was still raging at Paris, prepared to sail to the United States. Compelled, however, by stress of weather and sickness to put back again, he found a mediator in Elisa Bona- parte, grand duchess of Tuscany, thanks to whom he was allowed to settle at Aix and finally to return to his domain of Point Carre. In 181 2 he sought vainly to turn Napoleon from the projected invasion of Russia; and on the return of the emperor in haste from Smorgorii to Paris at the close of that year, the ex-minister of police was suspected of complicity in the con- spiracy of General Malet, which came so strangely near to success. From this suspicion Fouch6 cleared himself and gave the emperor useful advice concerning internal affairs and the diplomatic situation. Nevertheless, the emperor, still distrustful of the arch-intriguer, ordered him to undertake the government of the Illyrian provinces. On the break-up of the Napoleonic system in Germany in October 1813 Fouche was ordered to repair to Rome and thence to Naples, in order to watch the movements of Murat. Before Fouche arrived at Naples Murat threw off the mask and invaded the Roman territory, whereupon Fouche received orders to return to France. He arrived at Paris on the 10th of April 1814 at the time when Napoleon was being con- strained by his marshals to abdicate.

The conduct of Fouche at this crisis was characteristic. ˆAs senator he advised the senate to send a deputation to the comte d'Artois, brother of Louis XVIIL, with a view to a reconciliation between the monarchy and the nation. A little later he ad- dressed to Napoleon, then at Elba, a letter begging him in the interests of peace and of France to withdraw to the United States. To the new sovereign Louis XVIIL he sent an appeal in favour of liberty and recommending the adoption of measures which would conciliate all interests. It was not successful, but Fouche remained unmolested.

This was far from satisfying him, and when he found that there were no hopes of advancement, he entered into relations with conspirators who sought the overthrow of the Bourbons. Lafayette and Davout were concerned in the affair, but their refusal to take the course desired by Fouche and other bold spirits led to nothing being done. Soon Napoleon escaped from Elba and made his way in triumph to Paris. Shortly before his arrival at Paris (March 19, 1815) Louis XVIIL sent to Fouche an offer of the ministry of police, which he declined, saying, " It is too late; the only plan to adopt is to retreat." He then foiled an attempt of the royalists to arrest him, and on the arrival of Napoleon he received for the third time the port- folio of police. That, however, did not prevent him from entering into secret relations with Metternich at Vienna, his aim being then, as always, to prepare for all eventualities. Meanwhile he used all his powers to induce the emperor to popularise his rule, and he is said to have caused

the insertion of the words "The sovereignty resides in the people; it is the source of

power " in the declaration of the council of state. But the autocratic tendencies of Napoleon could scarcely be held in check, and Fouche seeing the fall of the emperor to be imminent, took measures to expedite it and secure his own interests. On the 22nd of June Napoleon abdicated for the second time, and Fouche was next day elected president of the commission which provisionally governed France. Already he was in touch with Louis XVIIL, then at Ghent, and now secretly received the overtures of his agent at Paris. While ostensibly working for the recognition of Napoleon II., he facilitated the success of the Bourbon cause, and thus procured for himself a place in the ministry of Louis XVIIL Even his skill, however, was unequal to the task of conciliating hot-headed royalists who remembered his vote as regicide and his fanaticism as terrorist. He resigned office, and after acting for a brief space as ambassador at Dresden, he retired to Prague. Finally he settled at Trieste, where he died on the 25th of December 1820. He had accumulated great wealth.

Marked at the outset by fanaticism, which, though cruel, was at least conscientious, Fouche's character deteriorated in and after the year 1794 into one of calculating cunning. The transi- tion represented all that was worst in the life of France during the period of the Revolution and Empire. In Fouche the enthusiasm of the earlier period appeared as a cold, selfish and remorseless fanaticism; in him the bureaucracy of the period 1795ˆ1799 and the autocracy of Napoleon found their ablest instrument. Yet his intellectual pride prevented him sinking to the level of a mere tool. .His relations to Napoleon were marked by a certain aloofness. He multiplied the means of resistance even to that irresistible autocrat, so that though removed from office, he was never wholly disgraced. Despised by all for his tergiversations, he nevertheless was sought by all on account of his cleverness. He repaid the contempt of his superiors and the adulation of his inferiors by a mask of im- penetrable reserve or scorn. He sought for power and neglected no means to make himself serviceable to the party whose success appeared to be imminent. Yet, while appearing to be the servant of the victors, present or prospective, he never gave himself to any one party. In this versatility he resembles Talleyrand, of whom he was a coarse replica. Both professed, under all their shifts and turns, to be desirous of serving France. Talleyrand certainly did so in the sphere of diplomacy; Fouch6 may occasionally have done so in the sphere of intrigue.

Bibliography. — Fouche wrote some political pamphlets and reports, the chief of which are Reflexions sur le jugement de Louis Capet (1 793) ; Reflexions sur V education publique (1793); Rapport et projel de lot relatif aux colleges (1793); Rapport sur la situation de Commune- Affranchie

[Lyons] (1794); Lettre aux prefets concernant les pretres. Sic. (1801); also the letters of 1815 noted above, and a Lettre au due de Wellington (18 17). The best life of Fouche is that by L. Madelin, Fouche (2 vols., Paris, 1901). The so-called Fouche Memoirs are not genuine, but they were apparently compiled, at least in part, from notes written by Fouche, and are often valuable, though their account of events (e.g. of the negotiations of 1809-1810) is not seldom untrustworthy. For those negotiations see Coquelle, Napoleon et VAngleterre (Paris, 1903, Eng. trans., London, 1904). For the plots with which Fouche had to deal see E. Daudet, La Police et les Chouans sous le Consulat et V Empire (Paris, 1895); P. M. C. Desmarest, Temoignages historiques, ou quinze ans de haute police (Paris, 1833, 2nd ed., 1900); E. Picard, Bonaparte et Moreau (Paris, 1005); G. A. Thierry, Conspirateurs et gens de police; le complot de libelles (Paris, 1903) (Eng. trans., London, 1903); H. Welschinger, Le Due d'Enghien (Paris, 1888) ; E. Guillon, Les Complots militaires sous le Consulat et I 1 Empire (Paris, 1894). (J. Hl. R.)

FOUCHER, SIMON (1644-1696), French philosopher, was born at Dijon on the 1st of March 1644. He was the son of a merchant, and appears to have taken orders at a very early age. For some years he held the position of honorary canon at Dijon, but this he resigned in order to take up his residence in Paris. He graduated at the Sorbonne, and spent the remainder of his life in literary work in Paris, where he died on the 27th of April 1696. In his day Foucher enjoyed considerable repute as a keen opponent of Malebranche. His philosophical standpoint was one of scepticism in regard to external perception. He revived the old arguments of the Academy, and advanced them with much ingenuity against Malebranche's doctrine. Otherwise

his scepticism is subordinate to orthodox belief, the fundamental dogmas of the church seeming to him intuitively evident. His object was to reconcile his religious with his philosophical creed, and to remain a Christian without ceasing to be an academician. His writings against Malebranche were collected under the title Dissertations sur la recherche de la verite, 1693.

See F. Rabbe, L 'Abbe Simon Foucher (1867); C. Jourdain in Dictionnaire des sciences philosophiques (1875), pp. 557-559.

FOUCQUET, JEAN, or Jehan (c. 1415-1485), French painter, born at Tours, is the most representative and national French painter of the 15th century. Of his life little is known, but it is certain that he was in Italy

about 1437, where he executed the portrait of Pope Eugenius IV., and that upon his return to France, whilst retaining his purely French sentiment, he grafted the elements of the Tuscan style, which he had acquired during his sojourn in Italy, upon the style of the Van Eycks, which was the basis of early 15th-century French art, and thus became the founder of an important new school. He was court painter to Louis XI. Though his supreme excellence as an illuminator and miniaturist, of exquisite precision in the rendering of the finest detail, and his power of clear characterization in work on this minute scale, have long since procured him an eminent position in the art of his country, his importance as a painter was only realized when his portraits and altarpieces were for the first time brought together from various parts of Europe in 1904, at the exhibition of the French Primitives held at the Bibliotheque Nationale in Paris. One of Foucquet's most important paintings is the diptych, formerly at Notre Dame de Melun, of which one wing, depicting Agnes Sorel as the Virgin, is now at the Antwerp Museum and the other in the Berlin Gallery. The Louvre has his oil portraits of Charles VII., of Count Wilczek, and of Jouvenal des Ursins, besides a portrait drawing in crayon; whilst an authentic portrait from his brush is in the Liechtenstein collection. Far more numerous are his illuminated books and miniatures that have come down to us. The Brentano-Laroche collection at Frankfort contains forty miniatures from a Book of Hours, painted in 1461 for Etienne Chevalier who is portrayed by Foucquet on the Berlin wing of the Melun altarpiece. From Foucquet's hand again are eleven out of the fourteen miniatures illustrating a translation of Josephus at the Bibliotheque Nationale. The second volume of this MS., unfortunately with only one of the original thirteen miniatures, was discovered and bought in 1903 by Mr Henry Yates Thompson at a London sale, and restored by him to France. See CEuvres de Jehan Foucquet (Curmer, Paris, 1866-1867); A. de Champeaux and P. Gauchery, CEuvres a" art executees pour le due de Berry; " Facsimiles of two histories by Jean Foucquet " from vols. i. and ii. of the Anciennetes des Juifs (London, 1902); Charles Blanc, Histoire des peintres de toutes les ecoles (introduction) ; and Georges Lafenestre, Jehan Fouquet (Paris, 1902).

FOUGERES, a town of north-western France, capital of an arrondissement in the department of Ille-et-Vilaine, 30 m. N.E. of Rennes by rail. Pop. (1906) 21,847. Fougeres is built on the summit and slopes of a hill on the left bank of the Nancon, a tributary of the Couesnon. It was formerly one of the strongest places on the frontier towards Normandy, and it still preserves some portions of its medieval fortifications, notably a gateway of the 15th century known as the Porte St Sulpice. The castle, which is situated in the lower part of the town, directly overlooking the Nangon, is now a picturesque ruin, but gives abundant evidence in its towers and outworks of its former strength and magnificence. The finest of the towers

was erected in 1242 by Hugues of Lusignan, and named after Melusine, the mythical foundress of the family. The churches of St Leonard and St Sulpice both date, at least in part, from the 1 5th century. An hotel de ville and a belfry, both of the 1 5th century, are of architectural interest, and the town possesses many curious old houses. There is a statue of General B. de Lari Coisiere (d. 181 2), born in the town. Fougeres is the seat of a subprefect, and has a tribunal of first instance, a chamber of commerce and a communal college. It is the chief industrial town of its department, being a centre for the manufacture of boots a Dd shoes; tanning and leather-dressing and the manu-

facture of sail-cloth and other fabrics are also important in- dustries. Trade is in dairy produce and in the granite of the neighbouring quarries. Fougeres frequently figures in Breton history from the nth to the 15th century. It was taken by the English in n 66, and again in 1448; and the name of Surienne, the captor on the second occasion, is still borne by one of the towers of the castle. In 1488 it was taken by the troops of Charles VIII. under la Tremoille. In the middle ages Fougeres was a lordship of some importance, which in the 13th century passed into the possession of the family of Lusignan, and in 1307 was confiscated by the crown and afterwards changed hands many times. In 1793, during the wars of the Vendee, it was occupied by the insurgents.

FOUILLEE, ALFRED JULES EMILE (1838-), French philosopher, was born at La Poueze on the 18th of October 1838. He held several minor philosophical lectureships, and from 1864 was professor of philosophy at the lycees of Douai, Montpellier and Bordeaux successively. In 1867 and 1868 he was crowned by the Academy of Moral Science for his work on Plato and Socrates. In 1872 he was elected master of con j ferences at the Ecole Normale, and was made doctor of philosophy in recognition of his two treatises; Platonis Hippias Minor sive Socratica contra liberum arbitrium argumenta and La Liberie et le determinisme. The strain of the next three years' continuous work undermined his health and his eyesight, and he was com- pelled to retire from his professorship. During these years he had published works on Plato and Socrates and a history of philosophy (1875); but after his retirement he further developed his philosophical position, a speculative eclecticism through which he endeavoured to reconcile metaphysical idealism with the naturalistic and mechanical standpoint of science. In L' ' Evolutionnisme des idees-forces (1890), La Psychologie des idees-forces (1893), and La Morale des idees-forces (1907), is elaborated his doctrine of idees-forces, or of mind as efficient cause through the tendency of ideas to realize themselves in appropriate movement. Ethical and sociological developments of this theory succeed its physical and psychological treatment, the consideration of the antinomy of freedom being especially important. Fouillee's wife, who by a previous

marriage was the mother of the poet and philosopher Jean Marie Guyau (1854- 1888), is well known, under the pseudonym of " G. Bruno," as the author of educational books for children.

His other chief works are; L'Idee moderne du droit en Allemagne, en Angleterre et en France (Paris, 1878); La Science sociale con- temporaine (1880); La Propriety sociale et la democratic (1884); Critique des systimes de morale conlemporains (1883); La Morale, I'art et la religion d'apres Guyau (1889) ; L ' Avenir de la mUaphysique fondee sur V experience (1889) ; V Enseignement au point de vue national (1891); Descartes (1893); Temperament et caractere (2nd ed., 1895); Le Mouvement positiviste et la conception sociologique du monde (1896) ; Le Mouvement idealiste et la reaction contre la science positive (1896) ; La Psychologie du pevple frangais (2nd ed., 1898); La France au point de vue moral (1900) ; L'Esquisse psychologique des peuples europeens (1903); Nietzsche et V " immoralisme " (1903); Le Mora- lisme de Kant (1905).

FOULD, ACHILLE (1800-1867), French financier and politician, was born at Paris on the 17th of November 1800. The son of a rich Jewish banker, he was associated with and afterwards succeeded his father in the management of the business. As early as 1842 he entered political life, having been elected in that year as a deputy for the department of the Hautes Pyrenees. From that time to his death he actively busied himself with the affairs of his country. He readily acquiesced in the revolution of February 1848, and is said to have exercised a decided influence in financial matters on the provisional government then formed. He shortly afterwards published two pamphlets against the use of paper money, entitled, Pas d'Assignats ! and Observations sur la question financiere. During the presidency of Louis Napoleon he was four times minister of finance, and took a leading part in the economical reforms then made in France. His strong conservative tendencies led him to oppose the doctrine of free trade, and disposed him to hail the coup d'etat and the new empire. On the 25th of January 1852, in consequence of the decree confiscating the property of the Orleans family,

he resigned the office of minister of finance, but was on the same day appointed senator, and soon after rejoined the govern- ment as minister of state and of the imperial household. In this capacity he directed the Paris exhibition of 1855. The events of November i860 led once more to his resignation, but he was recalled to the ministry of finance in November of the following year, and retained office until the publication of the imperial

letter of the 19th of January 1867, when Smile Ollivier became the chief adviser of the emperor. During his last tenure of office he had reduced the floating debt, which the Mexican war had considerably increased, by the negotiation of a loan of 300 millions of francs (1863). Fould, besides uncommon financial abilities, had a taste for the fine arts, which he developed and refined during his youth by visiting Italy and the eastern coasts of the Mediterranean. In 1857 he was made a member of the Academy of the Fine Arts. He died at Tarbes on the 5th of October 1867.

FOULIS, ANDREW (1712-1775) and ROBERT (1707-1776), Scottish printers and publishers, were the sons of a Glasgow maltman. Robert was apprenticed to a barber; but his ability attracted the attention of Dr Francis Hutcheson, who strongly recommended him to establish a printing press. After spending 1738 and 1739 in England and France in company with his brother Andrew, who had been intended for the church and had received a better education, he started business in 1741 in Glasgow, and in 1743 was appointed printer to the university. In this same year he brought out Demetrius Phalereus de elocutione, in Greek and Latin, the first Greek book ever printed in Glasgow; and this was followed in 1774 by the famous nmo edition of Horace which was long but erroneously believed to be immaculate: though the successive sheets were exposed in the university and a reward offered for the discovery of any inaccuracy, six errors at least, according to T. F. Dibdin, escaped detection. Soon afterwards the brothers entered into partner- ship, and they continued for about thirty years to issue carefully corrected and beautifully printed editions of classical works in Latin, Greek, English, French and Italian. They printed more than five hundred separate publications, among them the small editions of Cicero, Tacitus, Cornelius Nepos, Virgil, Tibullus and Propertius, Lucretius and Juvenal; a beautiful edition of the Greek Testament, in small 4to; Homer (4 vols, fol., 1756-1758); Herodotus, Greek and Latin (9 vols. i2mo, 1761); Xenophon, Greek and Latin (12 vols. i2mo, 1762-1767); Gray's Poems; Pope's Works; Milton's Poems. The Homer, for which Flax- man's designs were executed, is perhaps the most famous produc- tion of the Foulis press. The brothers spared no pains, and Robert went to France to procure manuscripts of the classics, and to engage a skilled engraver and a copper-plate printer. Unfortunately it became their ambition to establish an institution for the encouragement of the fine arts; and though one of their chief patrons, the earl of Northumberland, warned them to " print for posterity and prosper," they spent their money in collecting pictures, pieces of sculpture and models, in paying for the education and travelling of youthful artists, and in copying the masterpieces of foreign art. Their countrymen were not ripe for such an attempt, and the " Academy " not only proved a failure but involved the projectors in ruin. Andrew died on the 18th of September 1775, and his

brother went to London, hoping to realize a large sum by the sale of his pictures. They were sold for much less than he anticipated, and Robert returned broken-hearted to Scotland, where he died at Edinburgh on the 2nd of June 1776. Robert was the author of a Catalogue of Paintings with Critical Remarks. The business was afterwards carried on under the same name by Robert's son Andrew.

See W. J. Duncan, Notices and Documents illustrative of the Literary History of Glasgow, printed for the Maitland Club (1831), which inter alia contains a catalogue of the works printed at the Foulis press, and another of the pictures, statues and busts in plaster of Paris produced at the " Academy " in the university of Glasgow.

FOULLON, JOSEPH FRANQOIS (1717-1789), French admini- strator, was born at Saumur. During the Seven Years' War he ■•vas intendant-general of the armies, and intendant of the army and navy under Marshal de Belle-Isle. In 1 77 1 he was appointed

intendant of finances. In 1789, when Necker was dismissed, Foullon was appointed minister of the king's household, and was thought of by the reactionary party as a substitute. But he was unpopular on all sides. The farmers-general detested him on account of his severity, the Parisians on account of his wealth accumulated in utter indifference to the sufferings of the poor; he was reported, probably quite without foundation, to have said, " If the people cannot get bread, let them eat hay." After the taking of the Bastille on the 14th of July, he withdrew to his estate at Vitry and attempted to spread the news of his death; but he was recognized, taken to Paris, carried off with a bundle of hay tied to his back to the hotel de ville, and, in spite of the intervention of Lafayette, was dragged out by the populace and hanged to a lamp-post on the 22nd of July 1789.

See Eugene Bonnemere, Histoire des paysans (4th ed., 1887), tome iii. ;,C. L. Chassin, Les Elections et les cahiers de Paris en 1789. (Paris, 1889), tomes iii. and iv.

FOUNDATION (Lat. fundatio, from fundare, to found), the act of building, constituting or instituting on a permanent basis; especially the establishing of any institution by endowing or providing it with funds for its continual maintenance. The word is thus applied also to the institutions so established, such as a college, monastery or hospital; and the terms " on the foundation," or " foundationer," are used of members of such a college or society who enjoy, as fellows, scholars, &c, the benefits of the endowment. Formerly " foundation " also meant the charter or incorporation of any such institution or society, and it is still applied to the funds used for the endowment of such institutions.

The terms " old foundation " and " new foundation " used in connexion with the organizing of English cathedral chapters have no reference to the age of the cathedrals. At the time of the Reformation under Henry VIII. the old college chapters were left unchanged, and are referred to as the " old foundations," but the monastic chapters were all suppressed, consequently new chapters had to be formed for their cathedrals and these constitute the " new foundations."

" Foundation " also means the base (natural or artificial) on which any erection is built up; generally made below the level of the ground (see Foundations below). A foundation- stone is one of the stones at the base of a building, generally a corner-stone, frequently laid with a public ceremony to celebrate the commencement of the building. The term is also applied to the ground-work of any structure, such as, in dress-making, the underskirt over which the real skirt is hung, any material used for stiffening purposes, as " foundation muslin or net." In knitting or crochet the first stitches on to which all the rest are worked are called the " foundation chain." In gem-cutting the " foundation-square " is the first of eight squares round the edges of a brilliant made in bevel planes and from which the angles are all removed to form three-corner facets.

FOUNDATIONS, in building. The object of foundations is to distribute the weight of a structure equally over the ground. In the construction of a building the weights are concentrated at given points on piers, columns, &c, and these foundations require to be spread so as to reduce the weight to an average. In the preparation of a foundation care must be taken to prevent the lateral escape of the soil or the movement of a bed upon sloping ground, and it is also necessary to provide against any damage by the action of the atmosphere. The soils met with in ordinary practice, such as rock, gravel, chalk, clay and sand, vary as to their capabilities of bearing weight. There is no provision in any English building acts as to the load that may be placed on any of these soils, but under the New York Building Code it is provided that, where no test of the sustaining power of the soil is made, different soils, excluding mud, at the bottom of the footings shall be deemed to safely sustain the following loads to the superficial foot :

per sq. ft.

Soft clay 1 ton.

Ordinary soft clay and sand, together in layers,

wet and springy 2 tons.

Loam, clay or fine sand, firm and dry … 3 tons. Very firm coarse sand,

stiff gravel or hard clay 4 tons.

FOUNDATIONS

739

*A comparison of the pressure exerted on an ordinary founda- tion by the walls of the several thicknesses and heights provided for by the London Building Act of 1894, and a com- Load on parison of a few of the principal authorities, will be tioa. 3 * found useful in helping us to arrive at a decision as to what can safely be allowed. Take as an example a wall of the warehouse class, 70 ft. high, whose section at the base for a height of 27 ft. is 25 bricks thick (or 225 in.), and for the same distance in height again is 2 bricks thick (or 18 in.), the remainder to the top being 15 bricks thick (or 14 in.). The weight of brickwork per foot run of such a wall is 4-05 tons on any area of 3-75 ft. super, of brickwork. According to the act the concrete is to project 4 in. on each side; we have then an additional area of -66 ft. super, to add, thus making the total foundation area of each foot run of wall 4-41 ft. super, to take a weight of 4-05 tons or nearly a ton per foot super, (viz. •9 ton.)*

Another factor must, however, be taken into consideration, viz. the weight distributed from the loaded floor and from the roof. In this case there would be at least six floors, and the entire weight could hardly be taken at less than 6 tons, which would give a total weight of 10-05 t° ns on an area °f 4‘4 I ft. super, or a load of 2- 28 tons per foot super. This is on the assumption that no extra weight has been thrown on the founda- tions by openings or piers, or by girders, &c, in which case, in addition to the work being executed in cement, the foundations should be increased in area. Piers always involve a great increase of weight on the foundations, and in very many instances this increased weight, instead of being provided for by increasing the area of the foundations and so reducing the weight per foot super., is only partly met by the improper method of merely increasing the depth of the concrete, whiie keeping the same projection of concrete round the footings as for the walls. As an example take an iron column to carry a safe load of 80 tons, standing on a York stone template, and in turn supported by a brick pier 225 in. square. In this case we should have, after allowing for the projection of concrete on either side, an area of 4 ft. 5 in. square, or 19-6 ft. super., and this would give a pressure of 4-1 tons per foot on the foundations, or almost twice as much as in the previous example of a warehouse wall. Here, instead of increasing the depth of the concrete, it would be necessary to increase its width; if it were made 6 ft. square, we should have an area of 36 ft. super, to take the 80 tons, and thus the pressure would only be 2-2 tons per foot, and the cost of the foundation be much the same.

If we compare a section of wall of the dwelling-house class, as prescribed by the London Building Act, we find that, taking a wall 50 ft. high and having a thickness at base of 225 in. as for the warehouse wall to which we have referred, we have a wall weighing 3-75 tons per foot super, on an area of 4-41 feet super., or -85 ton per foot without weight of floors and roof as against the -g ton in the warehouse example. To this must be added the weight of, say, 5 floors and roof at a total of 3 tons per foot run of wall, and we then have an aggregate of 6-75 tons per foot run and 1-50 tons per foot super, as against 2-28 tons in the warehouse class.

If we turn from the act to text-books we find that Colonel Seddon in the A ide Memoir gives the load which ordinary founda- tions will bear as a safe load per foot super, as follows:

tons.

Rock, moderately hard 9

Rock of strength of good concrete … 3

Rock, very soft I '8

Firm earth 1 to 1 5

Hard clay I to ii

Clean dry gravel and clean sharp sand prevented from spreading sideways . I to 1 5

Most of the work in London may be classed under one of the latter heads, and according to this table we have, when we erect walls in accordance with the building act, to overload our foundations.

As to the possibility of spreading weights, we have as an example the chimney at Adkin's Soap Works in Birmingham,

312 ft. high, so arranged that its pressure on the foundations is only 1 J tons per foot super.; also the great St Rollox chimney at Glasgow, which has a pressure of if tons; the weight of the Eiffel Tower (7500 tons) is so spread over 4 bases, each 130 ft. square, that the pressure is only -117 ton, or 2ˆ cwt., per foot super. The Tower Bridge has a load of 16 tons per foot on the granite bed under the columns of towers, reduced by spreading to an actual pressure on the clay foundation of 4 tons. The piers under the Holborn Viaduct have a load of 2\ tons only, those of the Imperial Institute 2j tons, and those of the destructor cells and chimney shaft at Great Yarmouth 4 tons 6f cwt. per foot super. From these various examples it

would appear that on sound clay or gravel foundation a load of from 2j to 4 tons may be employed with safety.

One of the first and most important requirements in preparing drawings for a large building is to ascertain the nature of the sub- soil and strata at different levels over the proposed site, so as to be able to arrange the footings accordingly at the '™ various depths and to decide as to the various forms and a ˆ s '

methods to be employed. For this purpose trial holes or borings are sunk until a suitable bed or bottom is found, upon which the concrete foundation may safely be put. If no such solid bottom is found, as often happens near the water side, special foundations must be employed, such as dock, gridiron, cantilever and pile founda- tions, &c, all of which will be described hereafter. As examples of the varying subsoils we may mention the following, in which will be noticed the great depths dug before getting through the made ground : At the Bank of England there were 22 ft. of made ground resting on 4 ft. of gravel. Some of the made ground was of ancient date, and preserved relics of Roman occupation. In some parts the subsoils have been excavated for ballast or gravel, as at Kensington, or for brick earth, as at Highbury, and the pits filled in with rubbish. Rock, which forms an excellent and unchanging foundation in one situation, may prove a dangerous foundation in another. Thus chalk forms a good limestone foundation in certain positions, but when it dips towards a slope or a cliff with an outcrop of the gault or underlying clay, it is a very unsuitable foundation for any building, as the landslips in the Isle of Wight and on the Dorsetshire coast bear witness. A boring made in Tallis Street, near the Thames embankment, showed: (1) 18 in. ballast, dirty; (2) 6 in. greensand, wet and dirty ; (3) 2 ft. peat clay ; (4) 6 in. greensand ; (5) 5i ft. peaty bog ; (6) 9 ft. running sand ; and (7) 4 ft. clean ballast, resting at a depth of 23 ft. below the ground line upon blue clay. A boring at Highbury New Park gave: (1) 2 ft. made ground, (2) 18 ft. loam, (3) 9 ft. sand, (4) 4 ft. peat, and (5) 8 ft. gravel and sand. These examples show that while trial holes should always be made before designing a foundation, to ascertain the nature of the subsoil, care must be taken not to calculate upon uniformity. Thus at the block 2 of the admiralty extension new buildings (London) , one of the trial holes upon the south-west side of the old buildings showed the clay to b p about 295 ft. below the surface of the ground, while actual excavation proved the dip of the clay to be such that in the execution of the new building it became necessary to underpin the north-west corner of the old building at the deepest part 42 ft. below the ground. The foundations of block 1 of the new admiralty buildings are placed in a dock, built upon the London clay at a depth of 30 ft. in solid concrete 6 ft. thick. At the Hotel Victoria, in Northumberland Avenue (London), the various subsoils are as follows: (1) 385 ft. made ground

clay and gravel mixed, (2) 4 ft. gravel and sand, (3) 6 ft. rising sand ; (4) 2 ft. fine ballast, and at a depth of 50 ft. blue clay. At the south end the clay was 43 ft. down and at the north end 37 ft. The front wall was constructed on a concrete bed 9 ft. wide. The site was surrounded by a similar wall of concrete about 6 ft. wide, forming a species of boxes, and the whole was covered with a depth of 6 ft. of concrete upon which the walls were raised. The foundation for 53 Parliament Street, where running sand was encountered, was constructed with short piles, 7 or 8 ft. long and 6 in. diam., pointed and placed as close together as possible over the whole foundation, the tops were then sawn off level, and a concrete raft, 7 or 8 ft. thick, was built over the whole area. At the Institution of Civil Engineers, Great George Street, Westminster, the foundations to the two party walls upon each side of the building were carried down about 22 ft. below the pavement level, that on the west side being 22 ft. deep and that on the east side 24 ft.

The London Building Act and the model by-laws prohibit the erection of buildings on sites that have been used as " shoots " for faecal matter or vegetable refuse, and in such cases the objectionable material must be removed prior to the Consrruc- commencement of building operations, and the holes °"' from which it was taken filled up with dry brick or other rubbish well rammed. Foundations are usually executed by excavators or navvies, and the tools and implements used are boning rods, level pegs lines, spirit level, pickaxe, various shovels, wheel-barrow, rammer or punner, &c. In digging the ordinary trenches and*

Fig. i.

excavations, should the ground be loose, planking and strutting have to be employed. This consists of rough boarding put along the sides of the trenches and wedged tight with waling pieces and struts; this work is done by navvies. Figs. I and 2 show the general forms of planking and strutting for the different soils.

In very large works of excavation in soft soil a steam digger is used for the bulk of the work. It consists of a large steel bucket with a cutting edge; this is lowered by means of a crane into the

excavation, and on being withdrawn cuts off a portion of soil which is hoisted and deposited in carts for re- moval to any desired posi- tion within the radius com- manded by the crane. The work of trimming the exca-

vation to a regular shape must always be done by manual labour.

Concrete for filling into the foundations is usually mixed by navvies; for large works it is sometimes mixed by machinery.

In order that the work of excavating and constructing the foundations may proceed in a water-logged site, pumps have to be employed, and where the inrush of water is great it is usual to sink a sump hole lower than the depth required for the foundations, and to use a steam pump kept going day and night. The foundation of a wall is required to be as follows in accordance with the London Building and Amendment Acts: " The projection of the bottom of the footings of every wall on each side of the wall shall be at least equal to half of the thickness of the wall at its base, unless an adjoining wall interferes, in which case the projection may be omitted where that wall adjoins, and the diminution of the footings of every wall shall be formed in regular offsets and the height from the bottom of such footing to the base of the wall shall be at least equal to two-thirds of the thickness of the wall at its base." (See Brickwork.) The base of a wall is the thickness above the footing; the footing is the brickwork built directly on the top of the concrete and diminishing in width in every course. Thus: " The projection of the bottom footing to be equal to one-half the

thickness of wall on both sides " means that a I3i-in. Avail would require to have three courses of footings, the bottom one being 27 in. wide. " The • height from the bottom of such footing to the base of the wall shall be at least equal to two-thirds the thickness of wall at its base " means that in the case of a I3j-in. wall the height of footings would have to be 9 in., or three courses of brick- work, each measur- ing 3 in.

The New . York Building Code enters more fully into the require- ments for the foundation of walls as regards depth than that in use in London. Section 25, Part 5, requires that every building, except buildings erected upon solid rock, or upon wharves and piers on the water front, shall have foundations of brick, stone, iron or concrete laid not less then 4 ft. below the surface of the earth, on the solid ground or level surface of rock, or upon piles or ranging timbers when solid earth or rock is not found. Piles intended to sustain a wall, pier or post, shall be spaced not more than 36 in. nor less than 20 in. on centres ; they must be driven to a solid bearing if practic- able, and their number must be sufficient to support the super- structure proposed. No pile shall be used of less dimensions than 5 in. at the small end and 10 in. at the butt for short piles, orˆiles 30 ft. or less in length. No pile shall be weighted with a load exceed- ing 40,000 lb. When a pile is not driven to refusal, its safe sustaining

h'mherirvz ii\ ■naderapy finr\ grout\a

Fig. 2.

power shall be determined by the following formula: twice the weight of the hammer in tons multiplied by the height of the fall in feet divided by the least penetration of pile under the last blow in inches plus one. There are also further requirements as to piles, &c, and the commissioner of buildings must be notified when the piles are to be driven.

The New York Code, Section 26, further goes on to say that foundation walls shall be constructed to include all walls and piers built below the curb level or nearest tier of beams to the curb, to serve as supports for the walls, piers, columns, girders, posts or beams. Foundation walls shall be built of stone, brick, Portland cement concrete, iron or steel. If built of rubble stone or Portland cement concrete, they shall be at least 8 in. thicker than the wall above them to a depth of 12 ft. below the curb level, and for every additional 10 ft. or part thereof deeper, they shall be increased 4 in. in thickness. If built of brick, they shall be at least 4 in. thicker than the wall next above them to a depth of 12 ft. below the curb level, and for every additional 10 ft. or part thereof deeper, they shall be increased 4 in. in thickness. The footing or base course shall be of stone or concrete, or both, or of concrete and stepped up brickwork of sufficient thickness and area to bear safely the weight to be imposed thereon. If the footing or base course be of concrete, the concrete shall not be less than 12 in. thick; if of stone, the stones shall not be less than 2X3 ft. and at least 8 in. in thickness for walls, and not less than 10 in. in thickness if under piers, columns or posts. The footing or base course, whether formed of concrete or stone, shall be at least 12 in. wider than the bottom width of walls, and at least 12 in. wider on all sides than the bottorn width of said piers, columns or posts. If the superimposed load is such as to cause undue trans- verse strain on a footing projecting 12 in., the thickness of such footing is to be increased so as to carry the load with safety. For small structures and for small piers sustaining light loads the com- missioner of buildings having jurisdiction may, in his discretion, allow a reduction in the thickness and projection specified for footing or base courses. All base stones shall be bedded and laid crosswise, edge to edge. If stepped-up footing of brick is used in place of stone above the concrete, the offsets if laid in single courses shall each not exceed I J in., or, if laid in double courses, then each shall not exceed 3 in. offsetting the first course of brickwork back one-half the thickness of the concrete base, so as properly to distribute the load to be imposed thereon. It will be seen by the foregoing that the American acts are far more extensive than in London. The London Building Act mentions that the footings of a wall shall rest upon the solid ground or concrete or upon other solid substructure. The building act amendment says: " The foundations of the walls of every house or building shall be formed of a bed of good concrete not less than 9 in. thick, and projecting at least 4 in. on each side of the

lowest course of footings."

Various Types of Foundations.— -The most natural foundations for walls are those constructed where the walls are built directly upon the ground ; this is only possible where the ground is very hard or consists of rock, and in either of these cases the ground is simply levelled arid the building commenced.

The next and most universally recognized method, which might safely be said to be adopted in 95 % of all modern buildings, is the system of placing a bed of concrete under the walls, digging trenches where the walls are to come until a solid bottom is reached, and in these laying the concrete. The London Building Act requires this concrete bed to be at least 4 in. wider than the bottom course of footings on each side of the wall, but it is generally made 6 in. wider on each side and in general circumstances the depth of the concrete is varied according to the weight placed upon it.

Where a site is in close proximity to a river or old water-course, &c, where deep basements are excavated, or where the ground lies low, naturally water is met with, and where water is the ground is soft. It is here that special foundations are required.

In certain cases it is necessary to use concrete legs or stilts. These are placed in such positions as to take the weights of the building, and sunk to depths of 40 ft. more or less as the case may require according to the nature of the ground; and on Concrete the tops of these stilts concrete arches or lintels are P' ers < turned over (fig. 3). As an example of the stilt principle, e Sl or mention may be made of some premises at Stratford and s s " a church at South Bermondsey, London, in which concrete piers were sunk at 12 ft. centres apart and 4! ft. square, in pot holes dug out of made ground; then concrete arches were formed over the intervening untrustworthy ground with a minimum thickness of 18 in. or the piers were connected by concrete lintels 3 ft. thick in which steel joists were embedded. At Sion College, Victoria Em- bankment, London, the foundations were formed with cement concrete stilts or piers 8 ft. square, and going down to the London clay; from the tops of these stilts brick arches were turned, spanning the spaces between the piers, and upon these arches the walls were built.

Pile foundations, used in the case of soft ground, for small works, consist either of stout scaffold poles or of timbers varying from 6 in. to 12 in. square according to requirements (fig. 4). The bottom ends of these timbers have an iron shoe with a point, so as to be easily driven into the ground, and the tops of the timbers have an iron band round, so that when the timbers are being driven in

the band prevents them from splitting (fig. 5). The methods of driving these piles are various. The usual plan is to erect a tempor- wfe ary structure, upon one side of which is a guide path

fouada- f ace d with sheet-iron so as to give a smooth face. Up ” and down this guide path a heavy iron weight, called a ” s ” _ monkey, is worked ; the monkey is hoisted to the top of the guide path by means of a crab worked by hand or steam, and

LONGITUDINAL SECTION

TRANSVERSE SECTION

Fig. 3.

when released descends with a good force, and so drives the piles into the ground. The monkey usually weighs from 2 cwt. to 10 cwt. and is allowed a drop of 15 to 40 ft.

Piles are driven all round under the walls at varying intervals or under piers where the weights of a building are to be concentrated. In the erection of the Chicago public library four Norway pine piles, each with an average diameter of 13 in., were driven to a depth of 52J ft. and loaded with a dead load of 50-7 tons per pile for a period of two weeks, and no settlement taking place 30 tons per pile was adopted as a safe load. The following are some examples of loads used in practice: passenger station, Harrison Street, Chicago, piles 50 ft.

Fig. 4.

in length, each carrying 25 tons; elevator, Buffalo, N.Y., piles 20 ft. in length, weight 25 tons; Trinity church, Boston, 2 tons; Schiller building, Chicago, 55 ‘tons per pile, but in this case the building settled considerably. All timber grillage and the tops of all piles should be kept below the lowest water level, and be capped with concrete or stone. In Boston it is obligatory to cap with blocks of granite.

Another form of foundation takes the shape of Portland cement concrete blocks, and is used chiefly for bridges and in marshy land, Concrete < "^ c ' ' n some cases cylinders of brickwork are built, and olles. * ne centres ar e filled with blocks of concrete and grouted

in. The Yarmouth destructor cells and chimney shaft were built in this way; the cylinders were constructed of 9 in. brickwork built in Portland cement, the lower 4 ft. being encased in a wooden drum with cutting edge sunk into the gravel and sand

at least 2 ft. The cylinders were sunk by the aid of a grab, the bottom being levelled and the concrete blocks laid by a diver. Use is also made of piles consisting of Portland cement concrete having steel rods embedded in it, and provided with iron shoes and head for driving (fig. 6).

Cast iron screw piles (fig. 7) used in very loose sandy soils, consist of large hollow cast iron columns with flat screw blades cast on the lower ends. The projection of this screw from the pile may vary from 9 in. to 18 in. with a pitch of from one-quarter to one-half of the projection, the blade making a little over one turn round the shaft. For most requirements a diameter of screw from 3! to 4! ft. will be found sufficient, a sandy foundation requiring the largest. The lower end of the tube is generally left open, the edge being

hradashoe ˆfˆndcpile.

Fig. 5. Fig. 6. Fig. 7. Fig. 8.

bevelled and occasionally provided with teeth to assist in cutting into and penetrating the soil.

Another system of piling known as sheet piling (fig. 8), consists in driving piles into the ground at intervals, and between these, also driven into the ground, are timbers measuring 3 in. by 9 in., which form a wall to keep the soft earth up under the building. In this way the earth is prevented from spreading out and so causing the building to settle unevenly.

Another kind of foundation, known as plank foundation (fig. 9), consists of elm planks, about 9 in. by 3 in. laid across the trench and spiked together; on the top of these are laid similar planks but at right angles to the last, and upon the platform thus formed the wall is built. This method is used in soft ground.

Caissons are usually employed by engineers for the construction of the foundations of bridge piers, but instances of their use in foundations for buildings are to be found in the American Caissons Surety and the Manhattan Life Insurance buildings, New York City. The latter building is 242 ft. high to the parapet, and the dome and tower rise 108 ft. higher. The building is carried

Plank founda- tions.

PLANK FOUMOATIorfc

Fig. 9.

on 16 solid masonry piers, taken down 54 ft. below the street level to solid rock, and these piers support the 34 cast iron columns upon which the building is erected. The piers to each building were constructed by the pneumatic caisson process (see Caisson).

A good plan for foundations when the ground is loose and sandy is to build upon wells of brickwork, a method which has been suc- cessfully practised in Madras. The wells are made circular, about 3 ft. in diameter and one brick thick. The first course is laid and cemented together on the surface of the ground when it is dry, and the earth is excavated inside and round about it to allow it to sink. Then another is laid over it and again sunk. The well is thus built downwards. The brickwork is sunk bodily to a depth of 10 ft. or more, according

Well founda- tions.

*to building to be erected upon it, and the interior is filled up with rubble work. All the public buildings at Madras were erected upon foundations of this kind. Well foundations were employed under the city hall, Kansas City, and the Stock Exchange, Chicago. * Coffer dams are wooden structures used to keep back the water whilst putting in foundations on the waterside, and are constructed with two rows of timbers, 12 in. square as piles spaced about 6 ft. apart, and filled in between with a double row of 2 in. or 3 in. boards, the space between the rows being packed with clay puddle (fig. 10). The general rule for the thickness of a coffer dam is to make it equal to the depth of water. An interesting*

Cotter dams.

Fig. 10.

example of a coffer dam is that at the Keyham dock extension, where piles varied in length from 65 ft. to 85 ft. They were driven in a double row 5 ft. apart, and over 13,000 were used.

Dock foundations are constructed after the fashion of a large concrete tank, and are adapted to large sites where a difficulty arises as to the ingress of water. They are considered the best method of constructing a

building on soft ground and of keeping a building dry (fig. 11). This type of foundation was used at the new colonial office, Whitehall, and the new admiralty buildings at St James's Park, A few buildings treated after the style of a dock, but in some instances without the enclosing walls, are the following:

Dock founda- tions.

London London.

Fig. 11.

At the admiralty buildings already mentioned a concrete retaining wall completely surrounds the exterior below the ground, and is joined up to the underpinning work; the whole site being covered with concrete 6 ft. thick, a huge tank is formed of an average inside clear depth of 20 ft. in which the basements are built. The new " Old Bailey " buildings in Newgate Street, London, are constructed on a concrete table 5 ft. thick, as also are the Army and Navy Auxiliary Stores, Victoria Street. At Kennet's Wharf, near South- wark Bridge, a concrete table, 8 ft. thick, was spread all over the

site, with an extra thickness under the walls. Foundations formed similarly to dock foundations, but in addition having steel joists and rods inserted in the thickness of the concrete table, to tie the whole together, are known as gridiron foundations.

In the Hennebique concrete system, all beams, &c, are formed with small rods and then surrounded with concrete; it is designed for floors and for spreading the weight of a building over an extended foundation on soft ground.

Where a heavy wall is to be built against an old one and there is not sufficient room for the foundations, the plan is adopted of building pier foundations at some distance from the pro-

posed new wall. On the top of these piers rest Caat «e ver steel cantilevers over steel pin rockers upon cast ™> ua ° am iron bedplates; the cantilevers are secured at one " oˆs • end to a column, while the other ends go through the full thickness of the new wall. Upon these last ends is placed a steel girder upon which the wall is built. This construction (fig. 12) has been used in America, and in the Ritz Hotel, Piccadilly, London.

Another form of cantilever foundations was employed in the case of some premises at Carr's Lane, Birmingham, partly built over the Great Western railway tunnel (fig. 13). In this instance large piers were built below the ground at the side of the tunnel. From the tops of these piers large steel

cantilevers were erected projecting over the crown of the tunnel, and on these steel girders were fixed and the building constructed upon them.

In modern Tunis, a section of which city is built on marshy ground, the subsoil is an oozy sediment, largely deposited by the sewage water from the ancient or Arab p OU nda- quarter of the city, which is situated on an adjacent tlons In hill. This semi-fluid mud has a depth of about Tunis 33 ft. To prepare the soil for supporting an ordinary house, pits from 8 ft. to 10 ft. square are exca- vated to a depth of about 10 ft., to the level of the ground water. A mixture is made of the excavated soil and powdered fat lime, procured from clinkers and unburnt stone from the lime-kilns, which soon crumbles to fine dust when exposed to the air. The mixture is thrown into pits in layers about 12 in. thick and rammed down for a very long time by specially trained labourers. A gang of 15 or 20 men will work at least 10 or 12 days ramming for the foundations of a moderate-sized house. An extremely hard bed is thus obtained, reaching to within 18 in. of the surface of the ground, and on this artificial bed the foundations of the building are laid. Although this method of construc- \i/ tion is crude, it is stated that the practical results are v superior to those obtained by using piles, concrete or other

recognized methods, and in all cases the cost is much less, for labour is cheap.

A novel and interesting foundation was designed for a signal station at Cape Henlopen, Delaware. This is built on top of the highest sandhill at Cape Henlopen, so Buildlnst that the observer may have an unobstructed sa JZ

view; it rises about 80 ft. above the level of the sea and is exposed to all winds and weather, while it is absolutely required that it shall stand firmly planted in such a way that even a hurricane shall not shake it or make it tremble, since that would affect the sight of the telescope in the observatory. The usual mode of securing such a building is by means of a foundation of screw piles or of heavy timbers sunk into the sand; this method, however, has the disadvantage that if

Jhis qprder tailed down and wanted wilfi slnuctunc above

dia gram or

Fig. 12.

the wind shifts the sand away from around the foundation, it becomes undermined and its effect is destroyed. To avoid such an accident, recourse was had to the following design, which was considered to be cheap and at

the same time to provide an effective anchorage. The building is entirely of wood; it has a cellar, above which are two rooms one above the other, and the whole is

surmounted by the observatory proper. First, the ground sill is a square of 20 ft., made of yellow pine sticks mortised together and pinned with stout trunnels. The sill of the observatory is made likewise of heavy timbers, 12 ft. long. The two sills are joined together by four stout yellow pine corner posts, which in turn are mortised into both sills. The posts are 26 ft. in length. Five feet above the lower sill is the sill which supports the floor of the first room. Ten feet above this is the sill which supports the upper room. Both these sills again are mortised into the corner posts. The structure is sheathed outside with German siding, and inside with rough boards covered with felt, and again by tongued and grooved yellow pine boards. The observatory proper, octagonal in shape, is securely mortised into the top sill and covered with a

fenfot

r-

plan oj batemmT.

Fig. 13. — Cantilever Foundation over Railway Tunnel.

corrugated iron roof conical in shape. The cellar is floored with 3 in. wood, and boarded all round on the inside of the posts. A pit Was first dug in the sand about 6 ft. deep and fully 20 ft. wide on the bottom. The cellar sill was laid on this bottom, and the structure built upon it; thus the whole depth of cellar is sunk below the top of the hill or the level of the sand. The cellar was then filled up with sand and packed solid all round, consequently the building is anchored in its place by the load in the cellar, about 100 tons in weight. _

The subject of foundations, being naturally of the first importance, is one that calls for most careful study. It is not of so much import- ance that the ground be hard or even rocky as that it be compact and of similar consistency throughout. It is not always that a site answers to this description, and the problem of what will be the best form of foundation to use in placing a building, more especially if that building be of large dimensions and consequently great weight, on a site of soft yielding soil, is one that is often most difficult of solution. The foregoing article indicates in

a brief manner some of the obstacles the architect or engineer is required to surmount before his work can even be started on its way to completion.

Authorities. — The principal books for reference on this subject are: A Practical Treatise on Foundations, by W. M. Patton, C. E.; Building Construction and Superintendence, part i., by F. E. Kidder; Notes on Building Construction, vols. i. ii. and iii. ; Aide Memoir, vol. ii., by Colonel Seddon, R.E.; Advanced Building Construction, by C. F. Mitchell; Modern House Construction, by G. L. Sutcliffe; Building Construction, by Professor Henry Adams; Practical Building Construction, by J. P. Allen. (J. Bt.)

FOUNDING (from La,t.fimdere, to pour), the process of casting in metal, of making a reproduction of a given object by running molten metal into a mould taken in sand, loam or plaster from that object. To enable the founder to prepare a mould for the casting, he must receive a pattern similar to the casting required. Some few exceptions occur, to be noted presently, but the above statement is true of perhaps 98 % of all castings produced. The construction of such patterns gives employment to a large number of highly skilled men, who can only acquire the necessary knowledge through an apprenticeship lasting from five to seven years. A knowledge of two trades at least is involved in the work of pattern construction — that of the craft itself and that of the moulder and founder. Patterns have to be constructed strongly. They are generally of wood, and they thus require skill in the use of woodworking tools and the making of timber joints, together with a knowledge of the behaviour of timber, &c. Some few patterns are made in iron, brass or white metal alloys. They have to be embedded in a matrix of sand by the founder, and being enclosed, they have to be withdrawn without inflicting any damage in the way of fracture in the sand. Since cast work involves shapes that are often very intricate, including projections and hollow spaces of all forms, it is obvious that the withdrawal of the patterns without entailing tearing up and fracture of the sand must involve many difficult problems that have to be as fully understood by the pattern-maker as by the moulder. It is from this point of view that the work of the pattern- maker should be approached in the first place. No closed mould can possibly be made without one or more joints, for if a pattern is wholly enclosed in a matrix of sand it cannot be withdrawn except by making a parting in the sand, and it is not difficult to conceive that the parting in the pattern might advantageously be made to coincide, either exactly or approximately, with that of the mould. Nor must obstacles exist to the free withdrawal of patterns. They must therefore not be wider or larger in the lower than in the upper parts; actually they are made a trifle smaller or " tapered." Nor may they have any lateral extensions into the lower sand, unless these can be made to withdraw separately from the main portion of the pattern. Finally, there are many internal spaces which cannot be formed by a pattern directly in the sand,

but provision for which must be made by some means extraneous to the pattern, as by cores.

A single example must illustrate the main principles which have just been stated. The object selected is a bracket which involves questions of joints, of cores, of pattern construction and of moulding. The casting, the pattern, and its mould are illustrated. Fig. 1 illustrates in plan the casting of a double bracket, the end elevation of which is seen in fig. 2; the pattern of which presents obvious

Fig. 1.

Fig. 2.

difficulties in the way of withdrawal from a mould, supposing it were made just like its casting. But if it be made as in fig. 3, with the open spaces A, B, in fig. 2, occupied with core prints, and the pieces A, A in fig. 3 left loosely skewered on, everything will " de- liver " freely. Moreover the pattern might be made solidly as sliown in fig. 3, or else jointed and dowelled in the plane a-a, a£ in fig. 4, or along the upper faces of the prints b-b, fig. 3. The

timber shadings in figs. 3 and 4 illustrate points in the most suitable arrangement of material. The prints are " boxed up." Fig. 4 shows a certain stage of the moulding, in which one half of the pattern has been " rammed " in sand, and turned over in the " bottombox," and the upper half is ready to be rammed in the " top box," with " runner pin " or " git stick " A, set in place. The lower loose piece has had its skewer removed during the ramming. Fig. 5 illustrates the mould completed and ready for pouring. The boxes have been

parted, the pattern has been withdrawn, cores inserted in the impres- sions left by the prints, vents taken from the central body of cinders, the pouring "" basin made and the

boxes cottered a together.

Every single detail now briefly noted in connexion with this bracket is applied and modified in an almost infinite number of ways to suit the ever varying character of work. Yet

Fir 1 foundry

f IG ‘ 3- this process does not

touch some of the great subdivisions of moulding and casting. There is a large volume of large and heavy work for which complete patterns and core boxes are never made, because of the great expense that would be involved in the pattern construction. There are also some cases in which the methods adopted would not permit of the use of patterns, as in that group of work in which the sand or loam is ” swept ” to the form required for the moulds and cores by means of striking boards, loam boards, core boards or strickles. In these classes of moulding the loose green sands and core sands are not much used; instead, loam — a wet and plastic sand mixture — is employed, supported against bricks (loam moulds) or against core bars and plates, and hay ropes (loam cores). All heavy marine engine cylinders are thus made by sweeping, and all massive cores for engine cylinders and large pipes, besides much large circular and cylindrical work, as foundation cylinders, soap pans, lead pans, mortar pans, large propeller blades, &c. In these cases the edge of the striking board is a counterpart of the profile of the work swept up. Joints also have to be made in such moulds, not of course in order to provide for the removal of a pattern, but for the exposure

n

Joint

It

Joint

*I**

Fig. 4.

of the separate parts in course of construction, and for closing them up, or putting them together in their due relations. These joints also are swept by the boards, generally cut to produce suitable ” checks,” or ” registers ” to ensure that they accurately fit together. Fig. 6, showing a portion of a swept-up mould, illustrates the general arrangement. A plate, A, carries a quantity of bricks, B, which are embedded in loam, and break joint. To a striking bar, C, sup- ported in a step, a striking board or sweeping board,

D, is bolted, and is swept round against plastic loam, which is afterwards dried. The check on the board at A corresponds with a similar check on the board which strikes the interior of the pan, and by which top and bottom portions of the mould are registered together. This is indicated in dotted outline. Its mould also is swept on bricks, and

turned over into place, and the metal is poured into the space b, b, between the two moulds. There is also a large group of swept-up work which is not symmetrical about a centre of rotation. Then the movements of the sweeping boards are controlled by the edges of " core plates," or of " core irons " (fig. 7). Bend pipes, and the

A

T0T

TenT

i

'■:'•&■'>

t

Vert

ft

tqt

It

Fig. 5. volute casings of centrifugal pumps and pipes, afford examples of this kind. In fig. 7, A is the core iron, held down by weights, and B the " strickle," sweeping up the half bend C, two such halves pasted together completing the core.

^^^^^ ■'^^J^W^wJ \ A

*; i— ly£**-*

Fig. 6. Core-making is a special department of foundry work, often involving as much detail as the construction and moulding of patterns. Two perfectly plain boxes are shown in figs. 8 and 9, in both of which provision exists for removing the box parts from the core after the latter has been rammed. Core boxes are jointed and tapered, and often have loose pieces within them, and also prints, into the impressions of which other cores are

inserted.

f Vl!“l^yMV-“;”:. l ^

rxrfw&Kxavmvmm&xiiM’/irMiiuie. mni/timmi

Fig. 7.

Machine-moulding. — There is a development of modern methods of founding which is effecting radical changes in some departments of foundry practice, namely, moulding by machines. The advantages of this method are manifold, and its limitations

are being lessened continually. There are two broad departments between which machine-moulding is divided. One, of less importance, is that of toothed wheels; the other is that of general work, except of a very massive character.

Gear-wheel moulding machines are essentially a special adaptation of the mechanism of the dividing engine, by means of which, instead of using a complete pattern of a toothed wheel, two or three pattern teeth are used, and the machine takes charge of the correct pitching or division of the teeth moulded therefrom, leaving to the moulder the

Fig. 8.

Fig. 9.

work only of turning the handle of the division plate, and ramming the sand around the pattern teeth. The result is accurate pitching, and the use of two or three teeth instead of a full pattern, together with any core boxes and striking boards that are necessary for the arms.

The other department of machine moulding includes nearly every conceivable class of work of small and medium dimensions. There are some dozens of distinct types of machines in use, for no one type is suitable for all classes of moulds, while some are designed specially for one or two kinds only.

The fundamental principles of operation are briefly these: The pattern parts constitute, by their method of attachment to a plate or table A (fig. 10), an integral portion of the machine, so that they

must partake of

A

_

“V£

J-

Fig. 10.

certain move- ments which are imparted to it. Often pat- terns mounted, as in fig. 10, are moulded by hand, without any aid from a machine, by methods of ” plate – mould- ing.” The de- livery of the pattern from the sand is in- variably ac- complished by a perpendicular movement of a portion of the machine (fig. 11), withdraw- ing either the pattern from the mould or the mould from the pattern.

The important point is that the perpendicu- lar movement, being under the coercion of the vertical guides provided in the hand machines, or the hydraulic

ram in fig. 11, is free from the unsteadiness which is incidental to withdrawal by the hands of the meulder ; and if the machine

Eerformed nothing more than this it would justify its existence, ittle or no taper is required in the pattern, and the moulds are more nearly uniform in dimensions than hand-made moulds. But there are other advantages. In machine-moulding the joint

faces for parting moulds are produced by the faces of the plates on which the pattern is mounted (figs. 10 and 11), instead of by the hands and trowel of the moulder. When the joint face is of irregular outline, as it often is, this item alone saves a good deal of time, which again is multiplied by the number of moulds repeated, often amounting to thousands. Further, provision is generally made on machine plates for the ingates and runners (fig. 10) through which the metal enters the mould, the preparation of which in hand work occupies a considerable amount of time. Another great advantage applies especially to the case of deep moulds. These give much trouble in hand-moulding in consequence of the liability of the sand to become torn up during the withdrawal of the pattern. But in machine-moulding such patterns are encircled by a plate, termed a ” stripping plate,” which is pierced to allow the patterns to pass through, and which, being maintained firmly on the sand during the lifting of the pattern, prevents it from becoming torn up. This is not merely a matter of

convenience, but is a necessity in numerous instances. The most familiar example is that of the teeth of gear wheels, in which even a very slight amount of taper interferes with accurate engagement, and this is representative of many other portions of mechanism. These stripping

^

X ^ r

Fig. 11.

plates are of metal, but in order to save the cost of filing them in iron or steel, many are cheaply made by casting a white metal alloy round the actual pattern itself in the first place, the white metal being enclosed and retained in a plain iron frame which forms the body of the plate. Lastly, many machines, but not the majority, include provision for mechanically ramming the sand around the pattern by power instead of by hand. This is really the least valuable feature of a moulding machine, because it is not applicable to any but rather shallow moulds. It is commonly used for these, but the consistence and homogeneity of a mass of sand round a pattern having deep perpendicular sides can only be ensured by careful hand ramming.

The highest economies of machine-moulding are obtained when (1) several small patterns are mounted and moulded at once on a single plate (fig. 10); (2) when top and bottom parts of a mould are produced on different machines, carrying each its moiety of the pattern ; (3) when the machine and pattern details are simplified so much that the labour of trained moulders is displaced by that of unskilled attendants who are taught in a month or two the few simple operations required. That is the direction in which repetitive casting is now rapidly tending.

In fig. 11 A is the plate, which in its essentials corresponds with the plate A in fig. 10, but which in the machine is made to swivel so as to bring each half of the pattern B, B in turn uppermost for ramming in the box parts C, C. The ramming is done by hand, the final squeeze being imparted against the presser D by the action of the hydraulic ram E pushing the plate, mould and box up against D. The plate being then lowered, and turned over, the further descent of the ram withdraws the bottom box from the pattern, which is the stage seen in the illustration. Then the half mould is run away on the carriage F, provided with wheels to run on rails.

Though casting in iron, steel, the bronzes, aluminium, &c, is

carried on by different men in distinct shops, yet the foregoing principles and methods apply to all alike. Work is done in green, i.e. moist sand, in dry sand (the moulds being dried before being used), and in plastic loam (which is subsequently dried). Hand and machine moulding are practised in each, the last-named excepted. The differences in working are those due to the various characteristics of the different metals and alloys, which involve differences in the sand mixtures used, in the dimensions of the pouring channels, of the temperature at which the metal or alloy must be poured, of the fluxing and cleansing of the metal, and other details of a practical character. Hence the practice which is suitable for one department must be modified in others. Many castings in steel would inevitably fracture if poured into moulds prepared for iron, many iron castings would fracture if poured into moulds suitable for brass, and neither brass nor steel would fill a mould having ingates proportioned suitably for iron.

A special kind of casting is that into " chill moulds," adopted in a considerable number of iron castings, such as the railway wheels in the United States, ordinary tramway wheels, the rolls of iron and steel rolling mills, the bores of cast wheel hubs, &c. The chill ranges in depth from j in. to I in., and is produced by pouring a special mixture of mottled, or strong, iron against a cold iron surface, the parts of the casting which are not required to be chilled being sur- rounded by an ordinary mould of sand. The purpose of chill-casting is to produce a surface hardness in the metal.

The shrinkage of metal is a fact which has to be taken account of by the pattern-maker and moulder. A pattern and mould are made larger than the size of the casting required by the exact amount that the metal will shrink in cooling from the molten to the cold state. This amount varies from J in. in 15 in., in thin iron castings, to j in. in 12 in. in heavy ones. It ranges from fV m – to ˆV in. per foot in steel, brass and aluminium. Its variable amount has to be borne in mind in making light and heavy castings, and castings with or without cores, for massive cores retard shrinkage. It is also a fruitful cause of fracture in badly proportioned castings, particularly of those in steel. Brass is less liable to suffer in this respect than iron, and iron much less than steel. (J. G. H.)

FOUNDLING HOSPITALS, originally institutions for the reception of ' ' foundlings, "i.e. children who have been abandoned or exposed, and left for the public to find and save. The early history of such institutions is connected with the practice of infanticide, and in western Europe where social disorder was rife and famine of frequent occurrence, exposure and extensive sales of children were the necessary consequences. Against these evils, which were noticed by several councils, the church provided a rough

system of relief, children being deposited (jactati) in marble shells at the church doors, and tended first by the matricularii or male nurses, and then by the nutricarii or foster- parents. 1 But it was in the 7th and 8th centuries that definite institutions for foundlings were established in such towns as Treves, Milan and Montpellier. In the 15th century Garcias, archbishop of Valencia, was a conspicuous figure in this charitable work; but his fame is entirely eclipsed by that of St Vincent de Paul, who in the reign of Louis XIII., with the help of the countess of Joigny, Mme le Gras and other religious ladies, rescued the foundlings of Paris from the horrors of a primitive institution named La Couche (rue St Landry), and ultimately obtained from Louis XIV. the use of the Bicetre for their accom- modation. Letters patent were granted to the Paris hospital in 1670. The Hotel-Dieu of Lyons was the next in importance. No provision, however, was made outside the great towns; the houses in the cities were overcrowded and administered with laxity; and in 1784 Necker prophesied that the state would yet be seriously embarrassed by this increasing evil. 2 From 1452 to 1789 the law had imposed on the seigneurs de haute justice the duty of succouring children found deserted on their territories. The first constitutions of the Revolution undertook as a state debt the support of every foundling. For a time premiums were given to the mothers of illegitimate children, the " enfants de la patrie." By the law of 12 Brumaire, An II. " Toute recherche de la paternite est interdite," while by art. 341 of the Code Napoleon, " la recherche de la maternite est admise."

France. — The laws of France relating to this part of what is called L 'Assistance Publique are the decree of January 1811, the instruction of February 1823, the decree o f the 5th of March 1852, the law of

1 See Capitularia regum Francorum, ii. 474.

2 De V administration des finances, iii. 136; see also the article " Enfant expose " in Diderot's Encyclopedic, 1755, and Chamousset's Mimoire politique sur les enfants, 1757.

the 5th of May 1869, the law of the 24th of July 1889 and the law of the 27th of June 1904. These laws carry out the general principles of the law of 7 Frimaire An V., which completely decentralized the system of national poor relief established by the Revolution. The enfants assistes include, besides (1) orphans and (2) foundlings proper, (3) children abandoned by their parents, (4) ill-treated, neglected or morally abandoned children whose parents have been deprived of their parental rights by the decision of a court of justice, (5) children, under sixteen vears of age, of parents condemned for certain crimes, whose parental rights have been delegated by a tribunal to the state. Children classified under 1-5 are termed pupilles de V assistance, " wards of public charity," and are distin- guished by the

law of 1904 from children under the protection of the state, classified as: (1) enfants secourus, i.e. children whose parents or relatives are unable, through poverty, to support them; (2) enfants en depot, i.e. children of persons undergoing a judicial sentence and children temporarily taken in while their parents are in hospital, and (3) enfants en garde, i.e. children who have either committed or been the victim of some felony or crime and are placed under state care by judicial authority. The asylum which receives all these children is a departmental (etablissement diposilaire), and not a communal institution. The etablissement depositaire is usually the ward of an hospice, in which — with the exception of children en depdt — the stay is of the shortest, for by the law of 1904, continuing the principle laid down in 181 1, all children under thirteen years of age under the guardianship of the state, except the mentally or physically infirm, must be boarded out in country districts. They are generally apprenticed to some one engaged in the agricultural industry, and until majority they remain under the guardianship of the administrative commissioners of the department. The state pays the whole of the cost of inspection and supervision. The expenses of administration, the " home " expenses, for the nurse (nourrice sedentaire) or the wet nurse (nourrice au sein), the prime de survie (premium on survival), washing, clothes, and the " out- door " expenses, which include (1) temporary assistance to un- married mothers in order to prevent desertion ; (2) allowances to the foster-parents {nourriciers) in the country for board, school-money, &c. ; (3) clothing; (4) travelling-money for nurses and children; (5) printing, &c. ; (6) expenses in time of sickness and for burials and apprentice fees — are borne in the proportion of two-fifths by the state two-fifths by the department, and the remaining fifth by the communes. The following figures show the number of children (exclusive of enfants secourus) relieved at various periods :

Year. Number relieved.

1890 …. 95.701

1895 …. 121,201

1900 …. 138,308

1905 …. 149.803

The droit de recherche is conceded to the parent on payment of a small fee. The decree of 181 1 contemplated the repayment of all expenses by a parent reclaiming a child. The same decree directed a lour or revolving box (Drehcylinder in Germany) to be kept at each hospital. These have been discontinued. The " Assistance Publique " of Paris is managed by a "

directeur " appointed by the minister of the interior, and associated with a representative conseil de surveillance. The Paris Hospice des Enfants-Assistes contains about 700 beds. There are also in Paris numerous private charities for the adoption of poor children and orphans. It is impossible here to give even a sketch of the long and able controversies which have occurred in France on the principles of management of found- ling hospitals, the advantages of tours and the system of admission

Belgium. — -In this country the arrangements for the relief of foundlings and the appropriation of public funds for that purpose very much resemble those in France, and can hardly be usefully described apart from the general questions of local government and poor law administration. The Commissions des Hospices Civiles, however, are purely communal bodies, although they receive pecuniary assistance from both the departments and the state. A decree of 181 1 directed that there should be an asylum and a wheel for receiving foundlings in every arrondissement. The last " wheel," that of Antwerp, was closed in i860. (See Des Institutions de bienfaisance et de prevoyance en Belgique, 1850 a i860, par M. P. Lentz.)

Italy is very rich in foundling hospitals, pure and simple, orphans and other destitute children being separately provided for. (See Delia caritct preventiva in Italia, by Signor Fano.) In Rome one branch of the Santo Spirito in Sassia (so called from the Schola Saxonum built in 728 by King Ina in the Borgo) has, since the time of Pope Sixtus IV., been devoted to foundlings. The average annual number of foundlings supported is about 3000. (See The Charitable Institutions of Rome, by Cardinal Morichini.) In Venice the Casa degli Esposti or foundling hospital, founded in 1346, and receiving 450 children annually, is under provincial administration. The splendid legacy of the last doge, Ludovico Manin, is applied to the

support of about 160 children by the " Congregazione di Carita " acting through 30 parish boards (deputazione fratcrnate) .

Austria. — InAustriafoundling hospitals occupied a very prominent place in the general instructions which, by rescript dated 16th of April 1781, the emperor Joseph II. issued to the charitable endowment commission. In 1818 foundling asylums and lying-in houses were declared to be state institutions. They were accordingly supported by the state treasury until the fundamental law of 20th October i860 handed them over to the provincial committees. They are now local institutions, depending on provincial funds, and are quite separate from the ordinary parochial poor institute.

Admission is gratuitous when the child is actually found on the street, or is sent by a criminal court, or where the mother undertakes to serve for four months as nurse or midwife in an asylum, or produces a certificate from the parish priest and " poor-father " (the parish inspector of the poor-law administration) that she has no money. In other cases payments of 30 to 100 florins are made. When two months old the child is sent for six or ten years to the houses in the neighbourhood of respectable married persons, who have certificates from the police or the poor-law authorities, and who are inspected by the latter and by a special medical officer. These persons receive a constantly diminishing allowance, and the arrangement may be determined by 14 days' notice on either side. The foster-parents may retain the child in their service or employment till the age of twenty-two, but the true parents may at any time reclaim the foundling on reimbursing the asylum and compensating the foster- parents.

Russia. — Under the old Russian system of Peter I. foundlings were received at the church windows by a staff of women paid by the state. But since the reign of Catherine II. the foundling hospitals have been in the hands of the provincial officer of public charity (prykaz obshestvennago pryzrenya). The great central institutions (Vospitatelnoi Dom), at Moscow and St Petersburg (with a branch at Gatchina), were founded by Catherine. When a child is brought the baptismal name is asked, and a receipt is given, by which the child may be reclaimed up to the age of ten. The mother may nurse her child. After the usual period of six years in the country very great care is taken with the education, especially of the more promis- ing children. The hospital is a valuable source of recruits for the public service. Malthus (The Principles of Population, vol. i. p. 434) has made a violent attack on these Russian charities. He argues that they discourage marriage and therefore population, and that the best management is unable to prevent a high mortality. He adds: " An occasional child murder from false shame is saved at a very high price if it can be done only by the sacrifice of some of the best and most useful feelings of the human heart in a great part of the nation." It does not appear, however, that the rate of illegitimacy in Russia is comparatively high ; it is so in the two great cities. The rights of parents over the children were very much re- stricted, and those of the government much extended by a ukase issued by the emperor Nicholas in 1837. The most eminent Russian writer on this subject is M. Gourov. See his Recherclies sur les enfants trouves, and Essai sur Vhistoire des enfants trouves (Paris,

l82 9)-

In America, foundling hospitals, which are chiefly private charities, exist in most of the large cities.

Great Britain. — The Foundling Hospital of London was incor- porated by royal charter in 1739 " for the maintenance and education of exposed and deserted young children." The petition of Captain Thomas Coram, who isentitled to the whole credit of the foundation, 1 states as its objects " to prevent the frequent murders of poor miserable children at their birth, and to suppress the inhuman custom of exposing new-born infants to perish in the streets." At first no questions were asked about child or parent, but a distin- guishing mark was put on each child by the parent. These were often marked coins, trinkets, pieces of cotton or ribbon, verses written on scraps of paper. The clothes, if any, were carefully recorded. One entry is, " Paper on the breast, clout on the head. ' The applications became too numerous, and a system of balloting with red, white and black balls was adopted. In 1756 the House of Commons came to a resolution that all children offered should be received, that local receiving places should be appointed all over the country, and that the funds should be publicly guaranteed. A basket was accordingly hung outside the hospital; the maximum age for admission was raised from two to twelve months, and a flood of children poured in from the country workhouses. In less than four years 14,934 children were presented, and a vile trade grew up among vagrants of undertaking to carry children from the country to the hospital, — an undertaking which, like the French meneurs, they often did not perform or performed with great cruelty. Of these 15,000 only 4400 lived to be apprenticed out. The total ex- pense was about £500,000. This alarmed the House of Commons. After throwing out a bill which proposed to raise the necessary funds by fees from a general system of parochial registration, they came to the conclusion that the indiscriminate admission should be discontinued. The hospital, being thus thrown on its own resources, adopted a pernicious system of receiving children with considerable

1 Addison had suggested such a charity {Guardian, No. 3).

sums (e.g. £100), which sometimes ted to the children being re- claimed by the parent. This was finally stopped in 1801; and it is now a fundamental rule that no money is received. The com- mittee of inquiry must now be satisfied of the previous good char- acter and present necessity of the mother, and that the father of the child has deserted it and the mother, and that the reception of the child will probably replace the mother in the course of virtue and in the way of an honest livelihood. All the children at the Foundling hospital are those of unmarried women, and they are all first child-en of their mothers. The principle is in fact that laid down by Fielding in Tom Jones — " Too true I am afraid it is that many women have become abandoned and have sunk to the last degree of vice by being unable to retrieve the first slip." At present the hospital supports about 500 children up to the age of fifteen. The average annual number of applications is over 200, and of admissions between 40 and 50. The

children used to be named after the patrons and governors, but the treasurer now prepares a list. Children are seldom taken after they are twelve months old. On reception they are sent down to the country, where they stay until they are about four or five years old. At sixteen the girls are generally apprenticed as servants for four years, and the boys at the age of fourteen as mechanics for seven years. There is a small benevolent fund for adults. The musical service, which was origin- ally sung by the blind children only, was made fashionable by the generosity of Handel, who frequently had the " Messiah " per- formed there, and who bequeathed to the hospital a MS. copy (full score) of his greatest oratorio. The altar-piece is West's picture of Christ presenting a little Child. In 1774 Dr Burney and Signor Giardini made an unsuccessful attempt to form in connexion with the hospital a public music school, in imitation of the Conserva- torium of the Continent. In 1847, however, a successful " Juvenile Band " was started. The educational effects of music have been found excellent, and the hospital supplies many musicians to the best army and navy bands. The early connexion between the hospital and the eminent painters of the reign of George II. is one of extreme interest. The exhibitions of pictures at the Foundling, which were organized by the Dilettanti Club, undoubtedly led to the formation of the Royal Academy in 1768. Hogarth painted a portrait of Captain Coram for the hospital, which also contains his March to Finchley, and Roubillac's bust of Handel. (See History and Objects of the Foundling Hospital, with Memoir of its Founder, by J. Brownlow.)

In 1704 the Foundling hospital of Dublin was opened. No inquiry was made about the parents, and no money received. From 1500 to 2000 children were received annually. A large income was derived from a duty on coal and the produce of car licences. In 1822 an admission fee of £5 was charged on the parish from which the child came. This reduced the annual arrivals to about 500. In 1829 the select committee on the Irish miscellaneous estimates recommended that no further assistance should be given. The hospital had not preserved life or educated the foundlings. The mortality was nearly 4 in 5, and the total cost £10,000 a year. Accordingly in 1835 Lord Glenelg (then Irish Secretary) closed the institution.

Scotland never seems to have possessed a foundling hospital. In !759 J°hn Watson left funds which were to be applied to the pious and charitable purpose " of preventing child murder " by the establishment of a hospital for receiving pregnant women and taking care of their children as foundlings. But by an act of parlia- ment in 1822, which sets forth " doubts as to the propriety " of the original purpose, the money was given to trustees to erect a hospital for the maintenance and education of destitute children.

Authorities. — Histoire stalistiaue et morale des enfants trouves byMM.TermeetMontfalcon(Pans, 1837) (the authors were eminent medical men at Lyons, connected with the administration of the foundling hospital) ; Remacle, Des hospices d 'enfants trouves en Europe (Paris, 1838); Hiigel Die Findelhduser und das Findelwesen Europas (Vienna, 1863) ; Emm'nghaus, " Das Armenwesen und die Armengesetzgebung," in Europdischen Staaten (Berlin, 1870); Sennichon, Histoire des enfants abandonnes (Paris, 1880) ; the annual Rapport sur le service des enfants assistes du departement de la Seine; Epstein, Studien zur Frage der Findelanstalten (Prague, 1882); Florence D. Hill, Children of the State (2nd ed., 1889). For United States, see H. Folks, Care of Neglected and Dependent Children (1901) ; A. G. Warner, American Charities (enlarged, 1908) and Reports of Massachusetts State Board of Charities. Information may also be got in the Reports on Poor Laws in Foreign Countries, communicated to the Local Government Board by the foreign secretary ; A ccounts and Papers (1875), vol. !xv. c. 1225; Report of Committee on the Infant Life Protection Bill (1890) ; Report of Lords Committee on the Infant Life Protection Bill (1896). (See also Charity and Charities.)

FOUNTAIN (Late Lat. fontana, from fons, a spring), a term applied in a restricted sense to such outlets of water as, whether fed by natural or artificial means, have contrivances of human art at a point where the water emerges. A very early existing example is preserved in the carved Babylonian basin (about 3000 B.C.) found at Tello, the ancient Lagash, and Layard mentions an Assyrian fountain, found by him in a gorge of the river Gomel,

which consists of a series of basins cut in the solid rock and descending in steps to the stream. The water had been originally led from one to the other by small conduits, the lowest of which was ornamented by two rampant lions in relief. The term is applied equally to the simpler arrangements for letting water gush into an ornamental basin or to the more elaborate ones by which water is mechanically forced into high jets; and a " fountain " may be either the ornamental receptacle or the jet of water itself. In modern times the examples of ornamental or useful fountains are legion, and it will suffice here to mention some of the more important facts of historical interest.

Among the Greeks fountains were very common in the cities. Springs being very plentiful in Greece, little engineering skill was required to convey the water from place to place. Receptacles of sufficient size were made for it at

the springs; and to maintain its purity, structures were raised enclosing and covering the receptacle. In Greece they were dedicated to gods and goddesses, nymphs and heroes, and were frequently placed in or near temples. That of Pirene at Corinth (mentioned also by Herodotus) was formed of white stone, and contained a number of cells from which the pleasant water flowed into an open basin. Legend connects it with the nymph Pirene, who shed such copious tears, when bewailing her son who had been slain by Diana, that she was changed into a fountain. The city of Corinth possessed many fountains. In one near the statues of Diana and Belle- rophon the water flowed through the hoofs of the horse Pegasus. The fountain of Glauce, enclosed in the Odeum, was dedicated to Glauce, because she was said to have thrown herself into it believing that its waters could counteract the poisons of Medea. Another Corinthian fountain had a bronze statue of Poseidon standing on a dolphin from which the, water flowed. The fountain constructed by THeagenes at Megara was remarkable for its size and decorations, and for the number of its columns. One at Lerna was surrounded with pillars, and the structure contained a number of seats affording a cool summer retreat. Near Pharae was a grove dedicated to Apollo, and in it a fountain of water. Pausanias gives a definite archi- tectural detail when he says that a fountain at Patrae was reached from without by descending steps. Mystical, medicinal, surgical and other qualities, as well as supernatural origin, were ascribed to fountains. One at Cyane in Lycia was said to possess the quality of endowing all persons descending into it with power to see whatever they desired to see; while the legends of fountains and other waters with strange powers to heal are numerous in many lands. The fountain Enneacrunus at Athens was called Callirrhoe before the time the water was drawn from it by the nine pipes from which it took its later name. Two temples were above it, according to Pausanias, one dedicated to Demeter and Persephone, and the other to Triptolemus. The fountain in the temple of Erechtheus at Athens was supplied by a spring of salt water, and a similar spring supplied that in the temple of Poseidon Hippios at Mantinea.

The water-supply of Rome and the works auxiliary to it were on a scale to be expected from a people of such great practical power. The remains of the aqueducts which stretched from the city across the Campagna are amongst the most striking monu- ments of Italy. Vitruvius (book viii.) gives minute particulars concerning the methods to be employed for the discovery, testing and distribution of water, and describes the properties of different waters with great care, proving the importance which was attached to these matters by the Romans. The aqueducts supplied the baths and the public fountains, from which last all the populace, except such as could afford to pay for a separate pipe to their houses, obtained their water. These fountains were therefore of large size and numerous. They

were formed at many of the castetla of the aqueducts. According to Vitruvius, each castellum should have three pipes, — one for public fountains, one for baths and the third for private houses. Considerable revenue was drawn from the possessors of private water-pipes. The Roman fountains were generally decorated with figures and heads. Fountains were often also the ornament of Roman villas and country houses; in those so situated the water gener-

ally fell from above into a large marble basin, with at times a second fall into a still lower receptacle. Two adjacent houses in Pompeii had very remarkable fountains. One, says Gell, " is covered with a sort of mosaic consisting of vitrified tesserae of different colours, but in which blue predominates. These are sometimes arranged in not inelegant patterns, and the grand divisions as well as the borders are entirely formed and ornamented with real sea-shells, neither calcined by the heat of the eruption nor changed by the lapse of so many centuries " {P&m- peiana, i. 196). Another of large size was similarly decorated with marine shells, and is supposed to have borne two sculptured figures, one of which, a bronze, is in the museum at Naples. This fountain projects 5 ft. 7 in. from the wall against which it is placed, and is 7 ft. wide in front, while the height of the structure up to the eaves of the pediment is 7 ft. 7 in. On a central column in the piscina was a statue of Cupid, with a dove, from the mouth of which water issued. Cicero had, at his villa at Formiae, a fountain which was decorated with marine shells.

Fountains were very common in the open spaces and at the crossways in Pompeii. They were supplied by leaden pipes from the reservoirs, and had little ornament except a human or animal head, from the mouth of which it was arranged that the water should issue. Not only did simple running fountains exist, but the remains of jets d'eau have been found; and a drawing exists representing a vase with a double jet of water, standing on a pedestal placed in what is supposed to have been the impluvium of a house. There was also a jet d'eau at the eastern end of the peristyle of the Fullonica at Pompeii.

As among the Greeks, so with the early Celts, traces of super- stitious beliefs and usages with relation to fountains can be traced in monumental and legendary remains. Near the village of Primaleon in Brittany was a very remarkable monument, — ■ one possibly unique, as giving distinct proof of the existence of an ancient cult of fountains. Here is a dolmen composed of a horizontal table supported by two stones only, one at each end. All the space beneath this altar is occupied by a long square basin formed of large flat stones, which receives a fountain of water. At Lochrist is another vestige of the Celtic cult of fountains. Beneath the church, and at the foot of the hill upon which it is built, is a sacred fountain, near which is

erected an ancient chapel, which with its ivy-covered walls has a most romantic appearance. A Gothic vault protects this fountain. Miraculous virtues are still attributed to its water, and on certain days the country people still come with offerings to draw it (see La Poix de Freminville, Antiquitesdela Bretagne, i. p. 101). In the enchanted forest of Brochelande, so famous from its connexion with Merlin, was the fountain of Baranton, which was said to possess strange characteristics. Whoever drew water from it, and sprinkled the steps therewith, produced a tremendous storm of thunder and hail, accompanied with thick darkness.

Christianity transferred to its own uses the ancient religious feeling concerning fountains. Statues of the Virgin or of saints were erected upon the rude structures that collected the water and preserved its purity. There is some uniformity in the architectural characteristics of these structures during the middle ages. A very common form in rural districts was that in which the fountain was reached by descending steps (fontaine grotte). A large basin received the water, sometimes from a spout, but often from the spring itself. This basin was covered by a sort of porch or vault, with at times moulded arches and sculptured figures and escutcheons. On the bank of the Clain at Poitiers is a fountain of this kind, the Fontaine Joubert, which though restored in 1597 was originally a structure of the 1 4th century. This kind of fountain is frequently decorated with figures of the Virgin or of saints, or with the family arms of its founder; often, too, the water is the only ornament of the structure, which bears a simple inscription. A large number of these fountains are to be found in Brittany and indeed through- out France, and the great antiquity of some of them is proved by the superstitions regarding them which still exist amongst the peasantry. A form more common in populous districts was that of a large open basin, round, square, polygonal, or lobed in

form, with a columnar structure at the centre, from the lower part of which it was arranged that spouts should issue, playing into an open basin, and supplying vessels brought for the purpose in the cleanest and quickest manner. The columns take very various forms, from that of a simple regular geometrical solid, with only grotesque masks at the spouts, to that of an elaborate and ornate Gothic structure, with figures of virgins, saints and warriors, with mouldings, arches, crockets and finials. At Provins there is a fountain said to be of the 12 th century, which is in form an hexagonal vase with a large column in the centre, the capital of which is pierced by three mouths, which are furnished with heads of bronze projecting far enough to cast the water into the basin. In the public market-place at

Brunswick is a fountain of the 1 5th century, of which the central structure is made of bronze. Many fountains are still existing in France and Germany which, though their actual present structure may date no earlier than the 15th or 16th century, have been found on the place of, and perhaps may almost be considered as restora- tions of, pre-existing fountains. Except in Italy few fountains are of earlier date than the 14th century. Two of that date are at the abbey of Fontaine Daniel, near Mayenne, and another, of granite, is at Limoges. Some of these middle-age fountains are simple, open reservoirs enclosed in structures which, however plain, still carry the charm that belongs to the stone-work of those times. There is one of this kind at Cully, Calvados, walled on three sides, and fed from the spring by two circular openings. Its only ornamentation is a small empty niche with mouldings. At Lincoln is a fountain of the time of Henry VIII., in front of the church of St Mary Wickford. At Durham is one of octangular plan, which bears a statue of Neptune.

The decay of architectural taste in the later centuries is shown by the fountain of Limoges. It is in form a rock representing Mount Parnassus, upon which are carved in relief Apollo, the horse Pegasus, Philosophy and the Nine Muses. At the top Apollo, in the 16th-century costume, plays a harp. Rocks, grass and sheep fill up the scene.

Purely ornamental fountains and jets d'eau are found in or near many large cities, royal palaces and private seats. The celebrated Fontana di Trevi, at Rome, was erected early in the 18th century under Pope Clement XII., and has all the character- istics of decadence. La Fontana Paolina and those in the piazza of St Peter's are perhaps next in celebrity to that of Trevi, and are certainly in better taste. At Paris the Fontaine des Innocens (the earliest) and those of the Place Royal, of the Champs Elysees and of the Place de la Concorde are the most noticeable. The fountain of the lions and other fountains in the Alhambra palace are, with their surroundings, a very magnificent sight. The largest jets d'eau are those at Versailles, at the Sydenham Crystal Palace and at San Ildefonso.

About the earliest drawing of any drinking fountain in England occurs in Moxon's Tutor to Astronomie and Geographic (1659); it is " surmounted by a diall, which was made by Mr John Leak, and set upon a composite column at Leadenhall corner, in the majoralty of Sir John Dethick, Knight." The water springs from the top and base of the column, which stands upon a square pedestal and bears four female figures, one at least of which represents the costume of the period.

In the East the public drinking fountains are a very important institution. In Cairo alone there are three hundred. These " sebeels " are not only to be seen in the cities, but are plentiful in the fields and villages.

The Metropolitan Drinking Fountain Association (1859) has done much to provide faculties in London for both man and beast to get water to drink in the streets. And in the United States liberal provision has also been made by private and public enterprise.

FOUNTAINS ABBEY, one of the most celebrated ecclesiastical ruins in England. It lies in the sequestered valley of the river Skell, 3 m. S.W. of the city of Ripon in Yorkshire. The situation is most beautiful. The little Skell descends from the uplands of Pateley Moor to the west a clear swift stream, traversing a valley clothed with woods, conspicuous among which are some

ancient yew trees which may have sheltered the monks who first sought retreat here. Steep rocky hills enclose the vale. Mainly on the north side of the stream, in an open glade, rise the picturesque and extensive ruins, the church with its stately tower, and the numerous remnants of domestic buildings which enable the great abbey to be almost completely reconstructed in the mind. The arrangements are typical of a Cistercian house (see Abbey). Building began in earnest about 1135, and was continued steadily until the middle of the 13th century, after which the only important erection was Abbot Huby's tower (c. 1500). The demesne of Studley Royal (marquess of Ripon) contains the ruins. It is in part laid out in the formal Dutch style, the work of John Aislabie, lord of the manor in the early partof the 1 8th century. Near the abbey is the picturesque Jacobean mansion of Fountains Hall.

In 1 132 the prior and twelve monks of St Mary's abbey, York, being dissatisfied with the easy life they were living, left the monastery and with the assistance of Thurstan, archbishop of York, founded a house in the valley of the Skell, where they adopted the Cistercian rule. While building their monastery the monks are said to have lived at first under an elm and then under seven yew trees called the Seven Sisters. Two years later they were joined by Hugh, dean of St Peter's, York, who brought with him a large sum 6f money and a valuable collection of books. His example was followed by Serlo, a monk of St Mary's abbey, York, and by Tosti, a canon of York, and others. Henry I. and succeeding sovereigns granted them many privileges. During the reign of Edward I. the monks appear to have again suffered from poverty, partly no doubt owing to the invasion of the Scots, but partly also through their own " misconduct and ex- travagance." On account of this Edward I. in 1291 appointed John de Berwick custodian of the abbey so that he might pay their debts from the issues of their estates, allowing them enough for their maintenance, and Edward II. in 1319 granted them exemption from taxes. After the Dissolution Henry VIII. sold the manor and site of the monastery to Sir Richard Gresham, and from him after passing through several families it came to the marquess of Ripon.

See Victoria County History, Yorkshire; Dugdale, Monasticon; Surtees Society, Memorials of the Abbey of St Mary of Fountains, collected and edited by J. R. Walbran (1863-78).

FOUQUfi, FERDINAND ANDRE (1 828-1904), French geologist and petrologist, was born at Mortain, dept. of La Manche, on the 21st of June 1828. At the age of twenty-one he entered the £cole Normale in Paris, and from 1853 to 1858 he held the ap- pointment of keeper of the scientific collections. In 1877 he became professor of natural history at the College de France, in Paris, and in 1881 he was elected a member of the Academy of Sciences. As a stratigraphical geologist he rendered much assistance on the Geological Survey of France, but in the course of time he gave his special attention to the study of volcanic phenomena and earthquakes, to minerals and rocks; and he was the first to introduce modern petrographical methods into France. His studies of the eruptive rocks of Corsica, Santorin and else- where; his researches on the artificial reproduction of eruptive rocks, and his treatise on the optical characters of felspars deserve special mention; but he was perhaps best known for the joint work which he carried on with his friend Michel Levy. He died on the 7th of March 1904. His chief publications were: Santorin et ses eruptions, 1879; (with A. Michel Levy) MinSralogie micro graphique, Roches eruptives franqaises (2 vols., 1879) ; and Synthase des mineraux et des roches (1881).

F0UQU6, FRIEDRICH HEINRICH KARL DE LA MOTTE, Baron ˆ777-1843), German writer of the romantic movement, was born on the 12th of February 1777 at Brandenburg. His grandfather had been one of Frederick the Great's generals and his father was a Prussian officer. Although not originally intended for a military career, Friedrich de la Motte Fouqu6 ultimately gave up his university studies at Halle to join the army, and he took part in the Rhine campaign of 1 794. The rest of his life was devoted mainly to literary pursuits. Like so many of the younger romanticists, Fouque owed his introduction to

literature to A. W. Schlegel, who published his first book, Dramalische Spicle von Pellegrin in 1804. His next work, Romanzen vom Tal Ronceval (1805), showed more plainly his allegiance to the romantic leaders, and in the Historie vom edlen Ritter Galmy (1806) he versified a 16th-century romance of medieval chivalry. Sigurd der Schlangentoter, ein Heldenspiel (1808), the first modern German dramatization of the Nibelungen saga, attracted attention to him, and influenced considerably subsequent versions

of the story, such as Hebbel's Nibelungen and Wagner's Ring des Nibelungen. These early writings indicate the lines which Fouque's subsequent literary activity followed; his interests were divided between medieval chivalry on the one hand and northern mythology on the other. In 1813, the year of the rising against Napoleon, he again fought with the Prussian army, and the new patriotism awakened in the German people left its mark upon his writings.

Between 1810 and 1815 Fouque's popularity was at its height; the many romances and novels, plays and epics, which he turned out with extraordinary rapidity, appealed exactly to the mood of the hour. The earliest of these are the best— Undine, which appeared in 181 1, being, indeed, one of the most charming of all German Marchen and the only work by which Fouque's memory still lives to-day. A more comprehensive idea of his powers may, however, be obtained from th'e two romances Der Zauberring (1813) and Die Fahrten Tkiodulfs des Islanders (181 5) . From 1820 onwards the quality of Fouque's work rapidly degenerated, partly owing to the fatal ease with which he wrote, partly to his inability to keep pace with the changes in German taste. He remained the belated romanticist, who, as the reading world turned to new interests, clung the more tenaciously to the paraphernalia of romanticism ; but in the cold, sober light of the post-romantic age, these appeared merely flimsy and theatrical. The vitalizing imaginative power of his early years deserted him, and the sobriquet of a " Don Quixote of Romanticism " which his enemies applied to him was not unjustified.

Fouqufe's first marriage had been unhappy and soon ended in divorce. His second wife, Karoline von Briest (1773-1831) enjoyed some reputation as a novelist in her day. After her death Fouque married a third time. Some consolation for the ebbing tide of popular favour was afforded him by the munifi- cence of Frederick William IV. of Prussia, who granted him a pension which allowed him to spend his later years in comfort. He died in Berlin on the 23rd of January 1843.

Fouque's Ausgewahlte Werke, edited by himself, appeared in 12 vols. (Berlin, 1841); a selection, edited by M. Koch, will be found in Kurschner's Deutsche Nationalliteratur, vol. 146, part ii. (Stuttgart, 1893) ; Undine, Sintram, &c, in innumerable reprints. Biblio- graphy in Goedeke's Grundriss zur Geschichte der deutschen Dichtung (2nd ed., vi. pp. 115 ff., Dresden, 1898). Most of Fouque's works have been translated, and the English versions of Aslauga's Knight (by Carlyle), Sintram and his Companions and Undine, have been frequently republished. For Fouque's life cp. Lebensgeschichte des Baron Friedrich de la Motte Fouque. Aufgezeichnet dutch ihn selbst (Halle, 1840), (only to the year 1813), and also the introduction to Koch's selections in the Deutsche Nationalliteratur.

(J. G. R.)

FOUQUET (or Foucquet), NICOLAS (1615-1680), viscount of Melun and of Vaux, marquis of Belle-Isle, superintendent of finance in France under Louis XIV., was born at Paris in 1615. He belonged to an influential family of the noblesse de la robe, and after some preliminary schooling with the Jesuits, at the age of thirteen was admitted as avocat at the parlement of Paris. While still in his teens he held several responsible posts, and in 1636, when just twenty, he was able to buy the post of maitre des requites. From 1642 to 1650 he held various intendancies at first in the provinces and then with the army of Mazarin, and, coming thus in touch with the court, was permitted in 1650 to buy the important position of procureur gin&ral to the parlement of Paris. During Mazarin's exile Fouquet shrewdly remained ioyal to him, protecting his property and keeping him informed of the situation at court.

Upon the cardinal's return, Fouquet demanded and received as reward the office of superintendent of the finances (1653), a position which, in the unsettled condition of the government, threw into his hands not merely the decision as to which funds

should be applied to meet the demands of the state's creditors, but also the negotiations with the great financiers who lent money to the king. The appointment was a popular one with the moneyed class, for Fouquet's great wealth had been largely augmented by his marriage in 1651 with Marie de Castille, who also belonged to a wealthy family of the legal nobility. His own credit, and above all his unfailing confidence in himself, strengthened the credit of the government, while his high position at the parlement (he still remained procureur general) secured financial transactions from investigation. As minister of finance, he soon had Mazarin almost in the position of a suppliant. The long wars, and the greed of the courtiers, who followed the example of Mazarin, made it necessary at times for Fouquet to mee^ the demands upon him by borrowing upon his own credit, but he soon turned this confusion of the public purse with his own to good account. The disorder in the accounts became hopeless; fraudulent operations were entered into with impunity, and the financiers were kept in the position of clients by official favours and by generous aid whenever they needed it. Fouquet's fortune now surpassed even Mazarin's, but the latter was too deeply implicated in- similar operations to interfere, and was obliged to leave the day of reckoning to his agent and successor Colbert. Upon Mazarin's death Fouquet expected to be made head of the government; but Louis XIV. was suspicious of his poorly dissembled ambition, and it was with Fouquet in mind that he made the well-known statement, upon assuming the govern- ment, that he would be his own chief minister. Colbert fed the king's displeasure with adverse reports upon the

deficit, and made the worst of the case against Fouquet. The extravagant expenditure and personal display of the superintendent served to intensify the ill-will of the king. Fouquet had bought the port of Belle Isle and strengthened the fortifications, with a view to taking refuge there in case of disgrace. He had spent enormous sums in building a palace on his estate of Vaux, which in extent, magnificence, and splendour of decoration was a forecast of Versailles. Here he gathered the rarest manuscripts, the finest paintings, jewels and antiques in profusion, and above all sur- rounded himself with artists and authors. The table was open to all people of quality, and the kitchen was presided over by Vatel. Lafontaine, Corneille, Scarron, were among the multitude of his clients. In August 1661 Louis XIV., already set upon his destruction, was entertained at Vaux with a file rivalled in magnificence by only one or two in French history, at which Moliere's Les Fdcheux was produced for the first time. The splendour of the entertainment sealed Fouquet's fate. The king, however, was afraid to act openly against so powerful a minister. By crafty devices Fouquet was induced to sell his office of pro- cureur gineral, thus losing the protection of its privileges, and he paid the price of it into the treasury.

Three weeks after his visit to Vaux the king withdrew to Nantes, taking Fouquet with him, and had him arrested when he was leaving the presence chamber, flattered with the assurance of his esteem. The trial lasted almost three years, and its viola- tion of the forms of justice is still the subject of frequent mono- graphs by members of the French bar. Public sympathy was strongly with Fouquet, and Lafontaine, Madame de Sevigne and many others wrote on his behalf; but when Fouquet was sentenced to banishment, the king, disappointed, " commuted " the sentence to imprisonment for life. He was sent at the beginning of 1665 to the fortress of Pignerol, where he undoubtedly died on the 23rd of March 1680. 1 Louis acted throughout " as though he were conducting a campaign," evidently fearing that Fouquet would play the part of a Richelieu. Fouquet bore himself with manly fortitude, and composed several mediocre translations in prison. The devotional works bearing his name are apocryphal. A report of his trial was published in Holland, in 15 volumes, in 1665-1667, in spite of the remonstrances which Colbert addressed to the States-General. A second edition under the title of (Euvres de M. Fouquet appeared in 1696.

1 Fouquet has been identified with the " Man with the Iron Mask " (see Iron Mask), but this theory is auite impossible.

See Cheruel, MSmoires sur la vie publique et privSe de Fouquet . . . d'apres

ses lettres et des pieces inedites (2 vols. , Paris, 1 864) ; J . Lair, Nicolas Foucquet, procureur general, surintendant des finances, ministre d'ittat de Louis XIV (2 vols., Paris, 1890) ; U. V. Chatelain, Le Surintendant Nicolas Fouquet, protecteur des lettres, des arts et des sciences (Paris, 1905) ; R. Pfnor et A. France, Le Chdteau de Vaux-le-Vicomte dessine et grave (Paris,

FOUQUIER-TINVILLE, ANTOINE QUENTIN (1746-1795), French revolutionist, was born at Herouel, a village in the department of the Aisne. Originally a procureur attached to the Chatelet at Paris, he sold his office in 1783, and became a clerk under the lieutenant-general of police. He seems to have early adopted revolutionary ideas, but little is known of the part he played at the outbreak of the Revolution. When the Revolu- tionary Tribunal of Paris was established on the 10th of March 1793, he was appointed public prosecutor to it, an office which he filled until the 28th of July 1794. His activity during this time earned him the reputation of one of the most terrible and sinister figures of the Revolution. His function as public prosecutor was not so much to convict the guilty as to see that the proscriptions ordered by the faction for the time being in power were carried out with a due regard to a show of legality. He was as ruthless and as incorrupt as Robespierre himself; he could be moved from his purpose neither by pity nor by bribes; nor was there in his cruelty any of that quality which made the ordinary Jacobin enrage by turns ferocious and sentimental. It was this very quality of passionless detachment that made him so effective an instrument of the Terror. He had no forensic eloquence; but the cold obstinacy with which he pressed his charges was more convincing than any rhetoric, and he seldom failed to secure a conviction.

His horrible career ended with the fall 'of Robespierre and the terrorists on the 9th Thermidor. On the 1st of August 1794 he was imprisoned by order of the Convention and brought to trial. His defence was that he had only obeyed the orders of the Com- mittee of Public Safety; but, after a trial which lasted forty-one days, he was condemned to death, and guillotined on the 7th of May 1795.

See Memoire pour A. Q. Fouquier ex-accusateur public pres le tribunal revolutionnaire, &c. (Paris, 1794); Domenget, Fouquier- Tinville et le tribunal revolutionnaire (Paris, 1878); H. Wallon, Histoire du tribunal revolutionnaire de Paris (1 880-1 882) (a work of general interest, but not always exact) ; George Lecocq, Notes et documents sur Fouquier-Tinville (Paris, 1885). See also the docu- ments relating to his trial enumerated by M. Tourneux in Biblio- graphie de I'histoire de Paris pendant la Revolution Francaise, vol. i. Nos. 4445-4454 (1890).

FOURCHAMBAULT, a town of central France in the depart- ment of

Nievre, on the right bank of the Loire, 45 m. N.W. of Nevers, on the Paris-Lyon railway. Pop. (1906) 4591. It owes its importance to its extensive iron-works, established in 1821, which give employment to 2000 workmen and produce engineer- ing material for railway, military and other purposes. Among the more remarkable chefs-d'ceuvre which have been produced at Fourchambault are the metal portions of the Pont du Carrousel, the iron beams of the roof of the cathedral at Chartres, and the vast spans of the bridge over the Dordogne at Cubzac. A small canal unites the works to the Lateral canal of the Loire.

FOURCROY, ANTOINE FRANCOIS, Comte de (1 755-1809), French chemist, the son of an apothecary in the household of the duke of Orleans, was born at Paris on the 15th of June 1755. He took up medical studies by the advice of the anatomist Felix Vicq d'Azyr (1 748-1 794), and after many difficulties caused by lack of means finally in 1780 obtained his doctor's diploma. His attention was specially turned to chemistry by J. B. M. Bucquet (1746-1780), the professor of chemistry at the Medical School of Paris, and in 1784 he was chosen to succeed P. J. Macquer (1718-1784) as lecturer in chemistry at the college of the Jardin du Roi, where his lectures attained great popularity. He was one of the earliest converts to the views of Lavoisier, which he helped to promulgate by his voluminous writings, but though his name appears on a large number of chemical and also physiological and pathological memoirs, either alone or with others, he was rather a teacher and an organizer than an

original investigator. A member of the committees for public instruction and public safety, and later, under Napoleon, director general of instruction, he took a leading part in the establishment of schools for both primary and secondary educa- tion, scientific studies being especially provided for. Fourcroy died at Paris on the 16th of December 1809, the very day on which he had been created a count of the French empire. By his conduct as a member of the Convention he has been accused of contributing to the death of Lavoisier. Baron Cuvier in his Eloge historique of Fourcroy repels the charge, but he can scarcely be acquitted of time-serving indifference, if indeed active, though secret, participation be not proved against him.

The Royal Society's Catalogue of Scientific Papers enumerates 59 memoirs by Fourcroy himself, and 58 written jointly by him and others, mostly L. N. Vauquelin.

FOURIER, FRANQOIS CHARLES MARIE (1772-1837), French socialist writer, was born at Besancon in Franche-Comt6 on the 7th of April 1772. His father was a draper in good circumstances, and Fourier received an excellent education at the college in his native town. After completing his studies there he travelled for some time in France, Germany and Holland.

On the death of his father he inherited a considerable amount of property, which, however, was lost when Lyons was besieged by the troops of the Convention. Being thus deprived of his means of livelihood Fourier entered the army, but after two years' service as a chasseur was discharged on account of ill- health. In 1803 he published a remarkable article on European politics which attracted the notice of Napoleon, some of whose ideas were foreshadowed in it. Inquiries were made after the author, but nothing seems to have come of them. After leaving the army Fourier entered a merchant's office in Lyons, and some years later undertook on his own account a small business as broker. He obtained in this way just sufficient to supply his wants, and devoted all his leisure time to the elaboration of his first work on the organization of society.

During the early part of his life, and while engaged in com- merce, he had become deeply impressed with the conviction that social arrangements resulting from the principles of individualism and competition were essentially imperfect and immoral. He proposed to substitute for these principles co-operation or united effort, by means of which full and harmonious development might be given to human nature. The scheme, worked out in detail in his first work, TMorie des quatre mouvements (2 vols., Lyons, 1808, published anonymously), has for foundation a particular psychological proposition and a special economical doctrine. Psychologically Fourier held what may with some laxity of language be called natural optimism, — the view that the full, free development of human nature or the unrestrained indulgence of human passion is the only possible way to happiness arid virtue, and that misery and vice spring from the unnatural restraints imposed by society on the gratification of desire. This principle of harmony among the passions he regarded as his grandest discovery — a discovery which did more than set him on a level with Newton, the discoverer of the principle of attraction or harmony among material bodies. Throughout his works, in uncouth, obscure and often unintelligible language, he endeavours to show that the same fundamental fact of harmony is to be found in the four great departments, — society, animal life, organic life and the material universe. In order to give effect to this principle and obtain the resulting social harmony, it was needful that society should be reconstructed; for, as the social organism is at present constituted, innumerable restrictions are imposed upon the free development of human desire. As practical principle for such a reconstruction Fourier advocated co-operative or united industry. In many respects what he says of co-operation, in particular as to the enormous waste of economic force which the actual arrangements of society entail, still deserves attention, and some of the most recent efforts towards extension of the co-operative method, e.g. to house-keeping, were in essentials anticipated by him. But the full realization of his scheme

demanded much more than the mere admission that co-operation is economically more

efficacious than individualism. Society as a whole must be organized on the lines requisite to give full scope to co-operation and to the harmonious evolution of human nature. The details of this reorganization of the social structure cannot be given briefly, but the broad outlines may be thus sketched. Society, on his scheme, is to be divided into departments or phalanges, each phalange numbering about 1600 persons. Each phalange inhabits a phalanstere or common building, and has a certain portion of soil allotted to it for cultivation. The phalansteres are built after a uniform plan, and the domestic arrangements are laid down very elaborately. The staple industry of the phalanges is, of course, agriculture, but the various series and groupes into which the members are. divided may devote themselves to such occupations as are most to their taste; nor need any occupation become irksome from constant devotion to it. Any member of a group may vary his employment at pleasure, may pass from one task to another. The tasks regarded as menial or degrading in ordinary society can be rendered attractive if advantage is taken of the proper principles of human nature : thus children, who have a natural affinity for dirt, and a fondness for " cleaning up," may easily be induced to accept with eagerness the functions of public scavengers. It is not, on Fourier's scheme, necessary that private property should be abolished, nor is the privacy of family life impossible within the phalanstere. Each family may have separate apartments, and there may be richer and poorer members. But the rich and poor are to be locally intermingled, in order that the broad distinction between them, which is so painful a feature in actual society, may become almost imperceptible. Out of the common gain of the phalange a certain portion is deducted to furnish to each member the minimum of subsistence; the remainder is distributed in shares to labour, capital and talent, — five-twelfths going to the first, four-twelfths to the second and three-twelfths to the third. Upon the changes requisite in the private life of the members Fourier was in his first work more explicit than in his later writings. The institution of marriage, which imposes unnatural bonds on human passion, is of necessity abolished; a new and ingeniously constructed system of licence is substituted for it. Considerable offence seems to have been given by Fourier's utterances with regard to marriage, and generally the later advocates of his views are content to pass the matter over in silence or to veil their teaching under obscure, and metaphorical language.

The scheme thus sketched attracted no attention when the Theorie first appeared, and for some years Fourier remained in his obscure position at Lyons. In 181 2 the death of his mother put him in possession of a small sum of money, with which he retired to Bellay in order to perfect his second work. The Traite de I 'association agricole domestique was published in 2 vols, at Paris in 1822, and a summary appeared in the following year. After its publication the author proceeded to Paris in the hope that some wealthy capitalist might be induced to attempt the realization of the projected scheme. Disappointed in this expectation he returned to Lyons. In 1826 he again visited Paris, and as a considerable portion of his means had been expended in the publication of his book, he accepted a clerkship in an American firm. In 1829 and 1830 appeared what is probably the most finished exposition of his views, Le Nouveau Monde industriel. In 1831 he attacked the rival socialist doc- trines of Saint-Simon and Owen in the small work Pieges et charlatanisme de deux sectes, St Simon et Owen. His writings now began to attract some attention. A small body of adherents gathered round him, and the most ardent of them was Victor Considerant (q.v.). In 1832 a newspaper, Le Phalanstere ou la reforme industrielle was started to propagate the views of the school, but its success was not great. In 1833 it declined from a weekly to a monthly, and in 1834 it died of inanition. It was revived in 1836 as Le Phalange, and in 1843 became a daily paper, La Democratic pacifique. In 1850 it was suppressed.

Fourier did not live to see the success of his newspaper, and the only practical attempt during his lifetime to establish a phalanstere was a complete failure. In 1832 M. Baudot Dulary,

deputy for Seine-et-Oise, who had become a convert, purchased an estate at Conde-sur-Vesgre, near the forest of Rambouillet, and proceeded to establish a socialist community. The capital supplied was, however, inadequate, and the community broke up in disgust. Fourier was in no way discouraged by this failure, and till his death, on the 10th of October 1837, he lived in daily expectation that wealthy capitalists would see the merits of his scheme and be induced to devote their fortunes to its realization. It may be added that subsequent attempts to establish the phalanstere have been uniformly unsuccessful. 1

Fourier seems to have been of an extremely retiring and sensi- tive disposition. He mixed little in society, and appeared, indeed, as if he were the denizen of some other planet. Of the true nature of social arrangements, and of the manner in which they naturally grow and become organized, he must be pronounced extremely ignorant. The faults of existing institutions presented themselves to him in an altogether distorted manner, and he never appears to have recognized that the evils of actual

society are immeasurably less serious than the consequences of his arbitrary scheme. Out of the chaos of human passion he supposed harmony was to be evolved by the adoption of a few theoretically disputable principles, which themselves impose restraints even more irksome than those due to actual social facts. With regard to the economic aspects of his proposed new method, it is of course tq> be granted that co-operation is more effective than individual effort, but he has nowhere faced the question as to the probable consequences of organizing society on the abolition of those great institutions which have grown with its growth. His temperament was too ardent, his imagination too strong, and his acquaintance with the realities of life too slight to enable him justly to estimate the merits of his fantastic views. That this description of him is not expressed in over-strong language must be clear to any one who not only considers what is true in his works,- — and the portion of truth is by no means a peculiar discovery of Fourier's, — but who takes into account the whole body of his speculations, the cosmological and historical as well as the economical and social. No words can adequately describe the fantastic nonsense which he pours forth, partly in the form of general speculation on the universe, partly in the form of prophetic utterances with regard to the future changes in humanity and its material environment. From these extra- ordinary writings it is no extreme conclusion that there was much of insanity in Fourier's mental constitution.

Authorities. — Ch. Pellarin, Fourier, sa vie et sa theorie (5th ed., 1872); Sargant, Social Innovators (1859); Reybaud, Reformateurs modernes (7th ed., 1864) ; Stein, Socialismus und Communismus des heutigen Frankreichs (2nd ed., 1848); A. J. Booth, Fortnightly Review, N. S., vol. xii.; Czynskl, Notice bibliographique sur C. Fourier (1841) ; Ferraz, Le Socialisme, le naturalisme etle positivisme (1877) ; Considerant, Exposition abregee du systeme de Fourier (1845) ; ' Transon, Theorie soCietaire de Charles Fourier (1832) ; Stein, Geschichte der sozialen Bewegung in F/ ankreich (1850); Mario, Untersuchungen iiber die Organisation der Arbeit (1853) ; J. H. Noyes, History of American Socialisms (1870); Bebel, Charles Fourier (1888) ; Varschauer, Geschichte des Sozialismus und Kommunismus im 19. Jahrhundert (1903) ; Sambuc, Le Socialisme de Fourier (1900) ; M. Hillquit, History of Socialism in the United States (1903) ; H. Bourgin, Fourier, contribution d, VHude de socialisme frangais (1905). (R. Ad.)

FOURIER, JEAN BAPTISTE JOSEPH (1 768-1830), French mathematician, was born at Auxerre on the 21st of March 1768. He was the son of a tailor, and was left an orphan in his eighth year; but, through the kindness of a friend, admission was gained for him into the military school of his native town, which was then under the direction of the Benedictines of Saint-Maur. He soon distinguished himself as a student and

made rapid progress, especially in mathematics. Debarred from entering the army on account of his lowness of birth and poverty, he was appointed

1 Several experiments were made to this end in the United States (see Communism) by American followers of Fourier, whose doctrines were introduced there by Albert Brisbane (1809-1890). Indeed, in the years between 1840 and 1850, during which the movement waxed and waned, no fewer than forty-one phalanges were founded, of which some definite record can be found. The most interesting of all the experiments, not alone from its own history, but also from the fact that it attracted the support of many of the most intel- lectual and cultured Americans was that of Brook Farm (q.v.).

professor of mathematics in the school in which he had been a pupil. In 1787 he became a novice at the abbey of St Benoit-sur- Loire; but he left the abbey in 1789 and returned to his college, where, in addition to his mathematical duties, he was frequently called to lecture on other subjects, — rhetoric, philosophy and history. On the institution of the Ecole Normale at Paris in 1795 he was sent to teach in it, and was afterwards attached to the Ecole Polytechnique, where he occupied the chair of analysis. Fourier was one of the savants who accompanied Bonaparte to Egypt in 1798; and during this expedition he was called to discharge important political duties in addition to his scientific ones. He was for a time virtually governor of half Egypt, and for three years was secretary of the Institut du Caire; he also delivered the funeral orations for Kleber and Desaix. He returned to France in 1801, and in the following year he was nominated prefect of Isere, and was created baron and chevalier of the Legion of Honour. He took an important part in the preparation of the famous Description de I'Egypte and wrote the historical introduction? He held his prefecture for fourteen years; and it was during this period that he carried on his elaborate and fruitful investigations on the conduction of heat. On the return of Napoleon from Elba, in 181 5, Fourier published a royalist proclamation, and left Grenoble as Napoleon entered it. He was then deprived of his prefecture, and, although immediately named prefect of the Rh6ne, was soon after again deprived. He now settled at Paris, was elected to the Academie des Sciences in 18 16, but in consequence of the opposition of Louis XVIII. was not admitted till the following year, when he succeeded the Abbe Alexis de Rochon. In 1822 he was made perpetual secretary in conjunction with Cuvier, in succession to Delambre. In 1826 Fourier became a member of the French Academy, and in 1827 succeeded Laplace as president of the council of the Ecole Polytechnique. In 1828 he

became a member of the government commission established for the encouragement of literature. He died at Paris on the 16th of May 1830.

As a politician Fourier achieved uncommon success, but his fame chiefly rests on his strikingly original contributions to science and mathematics. The theory of heat engaged his attention quite early, and in 181 2 he obtained a prize offered by the Academie des Sciences with a memoir in two parts, TMorie des mouvements de la chaleur dans les corps solides. The first part was republished in 1822 as La Theorie analytique de la chaleur, which by its new methods and great results made an epoch in the history of mathematical and physical science (see below: Fourier's Series). An English translation has been published by A. Freeman (Cambridge, 1872), and a German by Weinstein (Berlin, 1884). His mathematical researches were also concerned with the theory of equations, but the question as to his priority on several points has been keenly discussed. After his death Navier completed and published Fourier's unfinished work, Analyse des Equations indUermine.es (1 83 1) , which contains much original matter. In addition to the works above mentioned, Fourier wrote many memoirs on scientific subjects, and eloges of distinguished men of science. His works have been collected and edited by Gaston Darboux with the title (Euvres de Fourier (Paris, 1880-1890).

For a list of Fourier's publications see the Catalogue of Scientific Papers of the Royal Society of London. Reference may also be made to Arago, " Joseph Fourier," in the Smithsonian Report (1871).

FOURIER'S SERIES, in mathematics, those series which proceed according to sines and cosines of multiples of a variable, the various multiples being in the ratio of the natural numbers; they are used for the representation of a function of the variable for values of the variable which lie between prescribed finite limits. Although the importance of such series, especially in the theory of vibrations, had been recognized by D. Bernoulli, Lagrange and other mathematicians, and had led to some dis- cussion of their properties, J. B. J. Fourier (see above) was the first clearly to recognize the arbitrary character of the functions which the series can represent, and to make any serious attempt to prove the validity of such representation; the series are

consequently usually associated with the name of Fourier. More general cases of trigonometrical series, in which the multiples are given as the roots of certain transcendental equa- tions, were also considered by Fourier.

Before proceeding to the consideration of the special class of series to be discussed, it is necessary to define with some precision what is to be understood by the representation of an arbitrary function by an infinite

series. Suppose a function of a variable x to be arbitrarily given for values of x between two fixed values a and b; this means that, corresponding to every value of x such that a-ˆxˆb, a definite arithmetical value of the function is assigned by means of some prescribed set of rules. A function so defined may be denoted by /(x); the rules by which the values of the function are determined may be embodied in a single explicit analytical formula, or in several such formulae applicable to different portions of the interval, but it would be an undue restriction of the nature of an arbitrarily given function to assume a priori that it is necessarily given in this manner, the possibility of the repre- sentation of such a function by means of a single analytical ex- pression being the very point which -we have to discuss. The variable x may be represented by a point at the extremity of an interval measured along a straight line from a fixed origin; thus we may speak of the point c as synonymous with the value x — c of the variable, and of f{c) as the value of the function assigned to the point c. For any number of points between a and b the function may be discontinuous, i.e. it may at such points undergo abrupt changes of value; it will here be assumed that the number of such points is finite. The only discontinuities here considered will be those known as ordinary discontinuities. Such a discontinuity exists at the point c if f(c+t), f(c — e) have distinct but definite limiting values as c is indefinitely diminished ; these limiting values are known as the limits on the right and on the left respectively of the function at c, and may be denoted by /(c+o), f{c — o). The discontinuity consists therefore of a sudden change of value of the function from/(c — o) to /(c+o), as x increases through the value c. If there is such a discontinuity at the point x = o, we may denote the limits on the right and on the left respectively by/(+o),/(— o).

Suppose we have an infinite series Ui (x) --Ui{x) + . . . --u n (x) f . . . in which each term -is a function of x, of known analytical form; let any value x = c(a — c = b) be substituted in the terms of the series, and suppose the sum of n terms of the arithmetical series so obtained approaches a definite limit as n is indefinitely increased; this limit is known as the sum of the series. If for every value of c such that a = c -ˆb the sum exists and agrees with the value of

/(c), the series 2u„(x) is said to represent the function(/x) between

the values a, b of the variable. If this is the case for all points within the given interval with the exception of a finite number, at any one of which either the series has no sum, or has a sum which does not agree with the value of the function, the series is said to represent " in general " the function for the given interval. If the sum of n terms of the series be denoted by S„(c), the condition that S„(c) converges to the value /(c) is that, corresponding to any finite positive number S as small as we please, a

value n% of n can be found such that if n=»i, |/(c) — S„(c)|<8.

Functions have also been considered which for an infinite number of points within the given interval have no definite value, and series have also been discussed which at an infinite number of points in the interval cease either to have a sum, or to have one which agrees with the value of the function; the narrower conception above jvill however be retained in the treatment of the subject in this article, reference to the wider class of cases being made only in connexion with the history of the theory of Fourier's Series.

*Uniform Convergence of Series. — If the series «i(x) +«2(x) + . . . + ih(x)-- . . .converge for every value of * in a given interval a to 6, and its sum be denoted by S(x), then if, corresponding to a finite positive number S, as small as we please, a finite number rti can be found such that the arithmetical value of S(x) — S„(x), where n p-rei is less than S, for every value of x in the given interval, the series is said to converge uniformly in that interval. It may however happen that as x approaches a particular value the number of terms of the series which must be taken so that | S(x) — S„(x) | may be*

uniform, but non-uniformity of convergence of the series does not necessarily imply discontinuity in the sum.

Form of Fourier's Series. — If it be assumed that a function f(x) arbitrarily given for values of x such that 0

, . . time , . +A„ sm- — f- . . .,

, . vx , . . 2irx . Ai sin -y f Aj sin j +

I

and if it be further assumed that the series is in general uniformly convergent throughout the interval o to /, the form of the co- efficients A can be determined. Multiply each term of the series

by sin— j-, and integrate the product between the limits o and I, then in virtue of the property I sin — j— sin — j- dx = 0, or \l, accord- ing as n'is not, or is, equal to re, we have J/A„ = j /(x) sin-j-dx, and

thus the series is of the form T 2sin-y- l /(*)

. nirx, sin- j ax

This method of determining the coefficients in the series would not be valid without the assumption that the series is in general uniformly convergent, for in accordance with a known theorem the sum of the integrals of the separate terms of the series is otherwise not necessarily equal to the integral of the sum. This assumption

being made, it is further assumed that/(x) is such that J /(x)sin-y dx

has a definite meaning for every value of n.

Before we proceed to examine the justification for the assumptions made, it is desirable to examine the result obtained, and to deduce other series from it. In order to obtain a series of the form

Bo+Bi cosˆ- + B 2 cos-jˆ-(-

+B„ cos-ˆ — h

for the representation of f(x) in the interval o to I, let us apply the

series (i) to represent the function /(x) sin 7

, nirx p.. , . tx ■ ; i —j— I J \x) sin j sin –

iirx n, , .. (

we thus find

iS sin:

h

1 ~ . mrx i jSsin-

.(»-

(n + l)irX 5 J

dx.

I

vx fh, . , . 2„ . irX nirx P ,, ., nirx , j 1 f(x)dx +7-2 sin-7-cos— r- I /(x) cos —7— dx.

On rearrangement of the terms this becomes

1

hence /(x) is represented for the interval o to / by the series of cosines

1 Pit w 1 2S nirx p., . nirx, , N

j 1 /(x)dx+j2 cos-T— j f(x) cos —r-dx . . . (2)

We have thus seen, that with the assumptions made, the arbitrary function f(x) may be represented, for the given interval, either by a series of sines, as in (1), or by a series of cosines, as in (2). Some important differences between the two series must, however, be noticed. In the first place, the series of sines has a vanishing sum when x — o or x = /; it therefore does not represent the function at the point x = o, unless /(o) =0, or at the point x = l, unless /(/) =0, whereas the series (2) of cosines may represent the function at both these points. Again, let us consider what is represented by (1) and (2) for values of x which do not lie between o and /. As/(x) is given only for values of x between o and /, the series at points beyond these limits have no necessary connexion with/(x) unless we suppose that j{x) is also given for such general values of x in such a way that the series continue to represent that function. If in (1) we change x into x, leaving the coefficients unaltered, the series changes sign, and if x be changed into x+2/, the series is unaltered ; we infer that the series (1) represents an odd function of x and is periodic of period 2/; thus (1) will represent f(x) in general for values of x between ±00, only if f(x) is odd and has a period 2/. If in (2) we change x into — x, the series is unaltered, and it is also unaltered by changing x into X+2Z; from this we see that the series (2) repre sents /(x) for values of x between ±00 , only if /(x) is an even function, and is periodic of period 2I. In general a function /(x) arbitrarily given for all values of x between ==oo is neither periodic nor odd, nor even, and is therefore not represented by either (1) or (2) except for the interval o to /.*

From (1) and (2) we can deduce a series containing both sines and cosines, which will represent a function /(x) arbitrarily given in the interval -/ to /, for that interval. We can express by (1) the function ||/(x) —/(—x)j which is an odd function, and thus this function is represented for the interval — / to +/ by

2 _ . nirx 7 S Sln 1

fl i{f{x) ~

-/(‘

,, . nirx, -x)j sin —j— dx;

we can also express i|/(x)-f/(x)}, which is an even function, by means of (2), thus for the interval — / to +/ this function is repre sented by

J /Jl{/()+/(–)}<**+ ?Z cos" 7 ""

/ 1 ji;wtm – *;|i"tj It must be observed that /(

-x) is absolutely independent of /(x),

the former being not necessarily deducible from the latter by putting —x for x in a formula; both /(*) and /(— x) are functions given arbitrarily and independently for the interval o to /. On adding the expressions together we obtain a series of sines and cosines which represents /(x) for the interval —I to I. The integrals

nirx, 1 sin —j-dx

j /(— *) cos ?j?dx, j /(— x) sir are equivalent to

- J- ! /(x) cos ˆdx, +f~ o 'f(x) sin 2j5fa, thus the series is

1 r l 1, \j , 'v nirx P., . nirx, . iS . nirx P r, ■> ■ nirx, Jl)J { – x)dx+ l 1 C0 ~rjJˆ C0S **l dx +7T sln -j-J,/()**sin-7-d*,

which may be written

Jˆ'W+llfrˆ'

nir(x-x')

■dx'

(3)

The series (3), which represents a function /(x) arbitrarily given for the interval — / to /, is what is known as Fourier's Series; the expressions (1) and (2) being regarded as the particular forms which (3) takes in the two cases, in which /(— x) = — /(x), or_f(— x) =/(x) respectively. The expression (3) does not represent /(x) at points beyond the interval -/ to I, unless /(x) has a period 2/. For a value of x within the interval, at which f(x) is discontinuous, the sum of the series may cease to represent /(x) , but, as will be seen" hereafter, has the value J{/(x+o)+/(x-o)j, the mean of the limits at the points on the right and the left. The series represents the function at x = o, unless the function is there discontinuous, in which case the series is !{/(o)/(— o)j; the series does not necessarily represent the

function at the points I and — /, unless/© =f(—lj. Its sum at either of these points is 5 (/(/)+/(- 1)-

Examples of Fourier's Series. — (a) Let /(x) be given from o to I, by f(x)=c, when o

We have

P ,, s . nirx , fV . nirx, f I . nirx , I f(x) sm— r-dx = c \ sin— j- dx— c\ sin- 7— dx

= ■ — (cos n-ir— 2 cos \nir-- 1).

This vanishes if n is odd, and \in-\m, but \(n = ˆm+2 it is equal to \cljntr\ the series is therefore

4c

4c /l . 2ttx , 1 . 6ttx , 1 . lOirx , v \2 sm ~T + 1 sm ~T-+S Sln -1— +

•)•

For unrestricted values of x, this series represents the ordinates of the series of straight lines in fig. I, except that it vanishes at the points o, il, I, U . . .

-21

21

Fig. 1.

We find similarly that the same function is represented by the

4c / xx 1 7{ cos T~2 COS

Zirx . 1 5irx

-r+5 C0S r

during the interval o to I ; for general values of x the series repre- sents the ordinate of the broken line in fig. 2, except that it vanishes at the points |/, U .

-21

Fig. 2.

(6) Let /(x)=x from o to il, and f{x)=l-x, from \l to /; then

p . . . nirx, pi . nirx, , p ,, . . nirx, J J(x) sin -j-dx=j ^ x sin-7-dx+ J ,^1-x) sin -^dx

nir . P . nw , P (

~o — — 5—? sin -r\ — c

2 » 2 7r 2 2 ‘ nir\

P nir —; — cos- Znir

H cos reir –

nir

nw (cos-n — cos nir

)

Hii C0S ~2 + nV Sln 1 = nV sm T

FOURIER’S SERIES

755

hence the sine series is

*(■

1 . 3«c 1 . 5tx -psin-p+^sin-j-

-...)

For general values of x, the series represents the ordinates of the row of broken lines in fig. 3.

Fig. 3. The cosine series, which represents the same function for the interval o to I, may be found to be

2«c , 1 6ir* , 1 10ir*

1. 211

+gjCOS

“+g 2 COS-

: +

■■)

This series represents for general values of x the ordinate of the set of broken lines in fig. 4.

Fig. 4.

*DiricUet's Integral. — The method indicated by Fourier, but first carried out rigorously by Dirichlet, of proving that, with certain restrictions as to the nature of the function fix), that function is in general represented by the series (3), consists in finding the sum of n + l terms of that series, and then investigating the limiting value of the sum, when » is increased indefinitely. It thus appears that the series is convergent, and that the value towards which its sum converges is i{f(x+o)-tf(x-o)}, which is in general equal to f(x). It will be convenient throughout to take —r to t as the given in- terval; any interval -I to / may be reduced to this by changing * into lx/ w, and thus there is no loss of generality.*

We find by an elementary process that

l+cos (x-')+ cos 2 (-') + • • • '+ cos n(x-x')*

sin H± V-s)

2

2 sin Hx'—x) Hence, with the new notation, the sum of the first m+i terms of (3) is

. 2n-f-i, , .

»!_„/( ) ? , , , , Ax'.*

"J- 2 sin i(x'-x)*

*If we suppose f{x) to be continued beyond the interval it to x, in such a way that f(x) = *f{x s r2ir), we may replace the limits in this integral by x +ir, x-t respectively; if we then put x'~x = 2z, and*

let /(') = F W » the expression becomes I ' F(z) . dz, where*

7T_/ — sin z

m = 2n+l ; this expression may be written in the form

ic« nz) ˆ dz+ ±r% n – z fi«m iz (4)

■xj sin Z tj sin Z w

We require therefore to find the limiting value, when m is

-dz ; the form of the second

of pF(z)-

indefinitely increased, „ . . „,

J Jo sin z

integral being essentially the same. This integral, or rather the slightly more general one J F(z)— = — dz, when 0< h<\ir, is known as Dirichlet's integral. If we write X(z)=F(z)ˆ— , the integral

becomes

j> >

sinz

sin mz

z, which is the form in which the integral

is frequently considered.

The Second Mean-Value Theorem. — The limiting value of Dirich- let's integral may be conveniently investigated by means of a theorem in the integral calculus known as the second mean-value theorem. Let a, b be two fixed finite numbers such that a(x) are two functions which have finite and determinate values everywhere in the interval except for a finite number of points; suppose further that the functions /(*), (x) are integrable throughout the interval, and that as x increases from a to b the function / (x) is monotone, i.e. either never diminishes or never increases ; the theorem is that

J b J(x){x)dx ~f(a+0)p a 4,{x)dx+f(.b-b) pˆ.{x)dx

when £ is some point between a and b, and f(a),f(b) may be written for/(o +o), fib-o) unless a or b is a point of discontinuity of the function f(x) . To prove this theorem, we observe that, since the product of two

integrable functions is an integrable function, J f(x)

and may be regarded as the limit of the sum of a series

f(Xo)(Xt,) (Zi-Xo) /(*l) . . • +/(*n-l)0(*n-l) (x„-Xn-l)

where Xo — a, x n — b and X\, x% . . . Xn-\ are »-i intermediate points. We can express (x r) (x r+ i-x r) in the form Y r+ i-Y r , by

K=r putting Y r = 2 (x K -i) (xk—Xk-i), Yo = o.

K=i Writing X, for/fo.), the series becomes

X (Y 1 -Yo)+X 1 (Y 2 -Y 1)+. . . +X„_i(Y„-Y„_,) or Y 1 (Xo-X 1)+Y 2 (X 1 X 2)|-. . . + Y„(Xˆ,-X») + Y»X„. Now, by supposition, all the numbers Yi, Y 2 . . . Y„ are finite, and all the numbers X r _i-X r are of the same sign, hence by a known algebraical theorem the series is equal to M (Xo-X„) + Y„X„ where M is a number intermediate between the greatest and the least of the numbers Yi, Y2, . . . Y„. This remains true however many partial intervals are taken, and therefore, when their number is increased indefinitely, and their breadths are diminished indefinitely according to any law, we have

Pj(x)(x)dx = {f(a)-f(b)}M +/(6)J '<*

when M is intermediate between the greatest and least values

which I {x)dx can have, when x is in the given integral. Now

this integral is a continuous function of its upper limit x, and there- fore there is a value of x in the interval, for which it takes any particular value between the greatest and least values that it has.

There is therefore a value J between a and b, such that M = I (x)dxi

hence

pj(x)(x)dx = {/(o) -f(b)}Pj,(x)dx +f(b)P a

=Mp*(x)dx+f(b) P

If the interval contains any finite numbers of points of discontinuity of f(x) or ix), the method of proof still holds good, provided these points are avoided in making the subdivisions; in particular if either of the ends be a point of discontinuity of f(x), we write /(a +0) orfib-o), for /(a) or fib), it being assumed that these limits exist.

Functions, with Limited Variation. — The condition that/(«), in the mean-value theorem, either never increases or never diminishes as x increases from a to b, places a restrictionˆupon the applications of the theorem. We can, however, show that a function fix) which is finite and continuous

between a and b, except for a finite number of ordinary discontinuities, and which only changes from increasing to diminishing or vice versa, a finite number of times, as x increases from a to b, may be expressed as the difference of two functions f iix), fiix), neither of which ever diminishes as x passes from a to b, and that these functions are finite and continuous, except that one or both of them are discontinuous at the points where the given function is discontinuous. Let o, /3 be two consecutive points at which/(a:) is discontinuous, consider any point xi, such that a

*Let (,) = [/(M,)-/(o+o)] +[/(M 2)-/(«,)] + ... +[/(M r)-/(m,_i)] + [/(*i)-/(m r)]; now let xi increase until it reaches the value M r+ i at which fix) is again a maximum, then let*

**(*i)«rj(Mi)-/(o+o)[/(M,)-/(w,)] . . . + [/(M r)-/(« r _,)] + [/(M r+ ,)-/(m r)] ; and suppose as x increases beyond the value M r+ i, ˆ(#1) remains constant until the next minimum m r +i is reached, when it again becomes variable; we see that ˆ(#1) is essentially positive and never diminishes as x increases.*

Let

*x(«i)-[/(MiH(«i)[/(Md-/(«i)] ... , then let Xi increase until it is beyond the next maximum M r i, and then let x(*i)=[/(Mi)-/(»»,)l[/(M s)-/(»» 1)]+ . . .*

+[/(M f ,)-/(,)] thus x(*i) never diminishes, and is alternately constant and variable. We see that ˆ(xi)-x(*i) is continuous as Xi increases from a to P, and that iK£i)-x(*i) = /(*i)~/(a °)> an d when Xi reaches p, we have ˆ(/3)~x(**i**) =/(/**3-o)-/(o-)-o). Hence it is seen that between o and /».**/() = bK*)/(a+o)x(**), where iK**)+/(a+o), x(«) are con tinuous and never diminish as * increases; the same reasoning*

*applies to every continuous portion of f(x), for which the functions **l>{x), x(x) are formed in the same manner; we now take /i(x) = 4**{x) + f(a+o) +C,fi(x) — x(x) +C, where C is constant between consecutive discontinuities, but may have different values in the next interval between discontinuities; the C can be so chosen that neither fi(x) nor fiix) diminishes as x increases through a value for which f(x) is discontinuous. We thus see that/(x) =fi(x)-f 2 (x), where fi(x), fa{x) never diminish as x increases from a to b, and are discontinuous only where /(*) is so. The function f(x) is a particular case of a class of functions denned and discussed by Jordan, under the name " func- tions with limited variation"*

(fonctions A variation bornle); in general such functions have not necessarily only a finite number of maxima and minima.

Proof of the Convergence of Fourier's Series. — It will now be assumed that a function f(x) arbitrarily given between the values -jr and +7r, has the following properties: —

(a) The function is everywhere numerically less than some fixed positive number, and continuous except for a finite number of values of the variable, for which it may be ordinarily discontinuous.

(b) The function only changes from increasing to diminishing or vice versa, a finite number of times within the interval; this is usually expressed by saying that the number of maxima and minima is finite.

These limitations on the nature of the function are known as Dirichlet's conditions; it follows from them that the function is integrable throughout the interval.

On these assumptions, we can investigate the limiting value of Dirichlet's integral; it will be necessary to consider only the case of a function F(z) which does not diminish as z increases from o to %t, since it has been shown that in the general case the difference of two such functions may be taken. The following lemmas will be required :

I. Since

(~ s) nmz dz = nil+2cos2z+2cos4 2 + ...+2cos2»2)<2z=4; J o sin 2 J a -s*

this result holds however large the odd integer m may be.

2. Ifo

/"Psin mz, J -— dz

sin z where a

'3 sin mz

——■ (sin mz dz-\ — r— = { sin mz dz

sin oj « sin 0J y

f.

sin z

‘dz

\sm a sin 0/ a precisely similar proof shows that I I

\J a Z

, fP sin mz , fP sin mz tegrals J

m sin a

‘P sin mz, I 4

hence the int_ ,

zero, as m is indefinitely increased.

■/:

Tt I r°° sinfl

value theorem I C ^^dt

\J a. a

hence Lft = °° J ^—j-de

d8\ cannot exceed

dz, converge to the limit

For by the mean-

[2.2

K

— a sin 8

dB

= ~<-

A « ai ” Ta.

sin B j a _ _ sin a

a>0,

therefore (5_ ˆ

increases as a

but lim

r

sin 8

dB= l'

hence

diminishes, sin 8 ,„ I

when 0

where a < w, and <- where a

■*K*

CP sin 8

It follows that

■*d8 I ˆ it, provided oˆf a*

To find the limit written in the form

of HfW si " "" &

J sinz

we observe that it may be

x,,,-,,, sin mz, F(0)j —rr—dz

sin z

where jti is a fixed, number as small as we please; hence if we use lemma (i), and apply the second mean-value theorem,

Si

F(z fJ?JBdz- o v ' sin 2

■*5F(0)*

1F(z)-F(0)1-

-dz

+ {F(M +o)-F

(o)| f* 1 ^-

n J n sin

‘■dz + {F(br-o)-F

«° > ‘J7 !

sin z

when £* lies between /i and Jjr. When m is indefinitely increased, the two last integrals have the limit zero in virtue of lemma (2). To evaluate the first integral on the right-hand side, Jet G(z) =

{F(z)-F(o)j -2—^ and observe that G(z) increases as z increases

from o to m, hence if we apply the mean-value theorem

/**,,,. sin mz , I I „ . . fn sin mz , I G – ~~ r~ dz \ = | g< ^m) J $ — '

/mtl

2

sin0„

< 7tG(m),

where o < £

chosen that j-G(m) <|e,and thus that (G(z) ' —d

\J z

H has been so fixed, m may now be so chosen that

F(0)I

< Je. When

u:

‘. .sin mz, F(«) _ : _ . dz-

s,

sin z ” 2 It has now been shown that when m is indefinitely increased

F(z)— j— — dz-^-F(fl) has the limit zero. sin z 2

Returning to the form (4), we now see that the limiting value of

y

•1 ~ / .Oil* tit.

F(z)—.

sin z

: dz + -C” vj

F(z)

:OUF!;

hence the sum of re + i terms of the series

1 n xr \j , 1^. Psr w nw(x-x l) ,

2iJ _ t f(.x)dx +j2 \J(x l) cos — y j — >&x

converges to the value l{f(x + o) +f(x-o)}, or to f(x) at a point where /(*) is continuous, provided /(x) satisfies Dirichlet’s conditions for the interval from -/ to /.

Proof that Fourier’s Series is in General Uniformly Convergent. — To prove that Fourier’s Series converges uniformly to its sum for all values of x, provided that the immediate neighbourhoods of the points of discontinuity olfix) are excluded, we have

If

!F(2)5

-|F(o)

<7tG(m) +

+:

m sin 11

4

<;&«+2m)-/(*)} +*

sin m

+

m sin

4ˆ

m sin 11

4

? {F(frr-o)-F(o)|

\f(X +2 M)-f(x)}

l{/(+ x) -/(*)}.*

m sin J 1 Using this inequality and the corresponding one for F(-z), we have

|S 2 ˆ,(»)-/(x)|+2M)-/(x)| + |/(2 /)/{)|]

*+A|w cosec fi, where A is some fixed number independent of m. In any interval (a, b) in which /(*) is continuous, a value mi of n can be chosen such that, for every value of * in (a, b), |/(x+2,u)-/(x)|, \f{x-2n)-f{x)\ are less than an arbitrarily prescribed positive number t, provided 11 = m. Also a value ms of m can be so chosen that eju 2 cosec M2<|i?, where rf is an arbitrarily assigned positive number. Take for /* the lesser of the numbers m, m, then | S2„+i- f{x){*

Case of a Function with Infinities. — The limitation that f(x) must be numerically less than a fixed positive number throughout the interval may, under a certain restriction, be removed. Suppose F(z') is indefinitely great in the neighbourhood of the point 2 = c, and is

~ F(z)dz are both zero, as e is indefinitely diminished, then

f:

P.

F(2)

-dz denotes the limit when 6 = 0,

= of

■« F(g) «nj 2 w

”” ” Jc+e

. , , , , -dz, both these limits existing ; the

sin z Jc+e’ sin z & ‘

first of these integrals has §7rF(-f-o) for its limiting value when mis in-definitely increased, and the second has zero for its limit. The theorem therefore holds if F(z) has an infinity up to which it is absolutely integrable;’ this will, for example, be the case if F(z) near the point C is of the form x(2) (z-c)~+\l/(z), where x©, ‘A© are finite, and o*

The Ultimate Values of the Coefficients in Fourier’s Series. — If f(x) is everywhere finite within the given interval ~r to +»r, it can be shown that a n , b n , the coefficients of cos nx, sin nx in the series which represent the function, are such that na n , nb n , however

FOURIER’S SERIES

757

great n is, are each less than a fixed finite quantity. For writing A) =/iW /»(). we have C fi(x)cos nxdx =f l (~ir+0) C cos nxdx A fi(-0) C cos nxdx*

hence •

sin «J „, sin wf

/i(x) cosMxdx = fi(ir+0)^— +/i(ir-0) n

f-

with a similar expression, with f 2 (x) for /ifr), { being between v and — 7t ; the result then follows at once, and is obtained similarly for’the other coefficient.

If f(x) is infinite at x = c, and is of the form r x _Jk near the point

c, where o < K < I , the integral ˆ / -« +e (x)

I f(x) cos nxdx contains portions of the form j jzˆrg.cosnxdx

f.

(x-c)

k cos nxdx; consider the first of these, and put x = c+«,

it thus becomes |

f cos n(cA-u)*

t (cA-u) g— cos n{c-u)du,

which is of the form

4>(c+0e)J ‘

du ; now let nu = v, the integral becomes

0(c+0e)

cos n

is nc C nt (

-

hence n 1 ~ K C f(x) cos nxdx becomes, as n is definitely increased,

J ~T

of the form (c) \ cos nc I — g

which is finite, both the integrals being convergent and of known

value. The other integral has a similar property, and we infer

that n l_ Ko n , n l ~Kb„ are less than fixed finite numbers.

The Differentiation of Fourier’s Series. — If we assume that the

differential coefficient of a function f(x) represented by a Fourier’s

Series exists, that function /'(*) is not necessarily representable by

the series obtained by differentiating the terms of the Fourier's

Series, such derived series being in fact not necessarily convergent.

Stokes has obtained general formulae for finding the series which

represent f'(x),f"(x) — the successive differential coefficients of a

limited function f(x). As an example of such formulae, consider

the sine series (i);/(x) is represented by

2 „ . nwx C l £ , \ ■ n-rx , -7-2 sin-j- J f(x) sm—j-dx;

on integration by parts we have I /(*) sin— j-dx

~ ° = M t[/(+0) */(W>)+Z COSˆl/(a+0)-/(a-0)!]*

A I f (x) cos— rdx

where a represent the points where f(x) is discontinuous. Hence

if f(x) is represented by the series 2a„ sin series ~Zb „ cos — ■— ,we have the relation

and /'(*) by the

b n —

*ˆ«.r[/(0) */(M>) 2 cosˆf |/(a+0)/(a-0)i]*

hence only when the function is everywhere continuous, and/(+o), f(l—o) are both zero, is the series which represents f'(x) obtained at once by differentiating that which represents f(x). The form of the coefficient a„ discloses the discontinuities of the function and of its differential coefficients, for on continuing the integration by parts we find

*«»-ˆ[/(0) */(«>) 2cosˆ5{/(a+0)-/(a-0)}]*

+Jˆ[/'(+0) ±/'(H>) + 2sinˆf {f'(fi+0)-f(fi-Q)i] +&c. where (i are the points at which f'(x) is discontinuous.

History and Literature of the theory

The history of the theory of the representation of functions by series of sines and cosines is of great interest in connexion with the progressive

development of the notion of an arbitrary function of a real variable, and of the peculiarities which such a function may possess; the modern views on the foundations of the infini- tesimal calculus have been to a very considerable extent formed in this connexion (see Function). The representation of functions by these series was first considered in the 18th century, in connexion with the problem of a vibrating cord, and led to a controversy as to the possibility of such expansions. In a memoir published in 1747 (Memoirs of the Academy of Berlin, vol. iii.) D'Alembert showed that the ordinate y at any time t of a vibrating cord satisfies a differential

*equation of the form jj£ = o 2 rd' where * is measured along the*

undisturbed length of the cord, and that with the ends of the cord of length / fixed, the appropriate solution is y =f(atA-x) -f(at-x), where

/ is a function such that f(x)=f(xA-2l); in another memoir in the same volume he seeks for functions which satisfy this condition. In the year 1748 (Berlin Memoirs, vol. iv.) Euler, in discussing

the problem, gave f(x) —a sin 7+/S sin —, — h . . . as a particular

solution, and maintained that every curve, whether regular or irregular, must be representable in this form. This was objected to by D'Alembert (1750) and also by Lagrange on the ground that irregular curves are inadmissible. D. Bernoulli (Berlin Memoirs, vol. ix., 1753) based a similar result to that of Euler on physical intuition; his method was criticized by Euler (1753). The question was then considered from a new point of view by Lagrange, in a memoir on the nature and propagation of sound (Miscellanea Taurensia, 1759; CEuvres, vol. i.), who, while criticizing Euler's method, considers a finite number of vibrating particles, and then makes the. number of them infinite; he did not, however, quite fully carry out the determination of the coefficients in Bernoulli's Series. These mathematicians were hampered by the narrow conception of a function, in which it is regarded as necessarily continuous; a discontinuous function was considered only as a succession of several different functions. Thus the possibility of the expansion of a broken function was not generally admitted. The first cases in which rational functions are expressed in sines and cosines were given by Euler (Subsidium calculi sinuum, Novi Comm. Petrop., vol. v., 1 754-1 755), who obtained the formulae

i# = sin -§ sin 2 + % sin 30 . . .

*l! – * 2*

12 4 = cos Arl cos 3... In a memoir presented to the Academy of St Petersburg in 1777, but not published until 1798, Euler gave the method

*afterwards used by Fourier, of determining the coefficients in the expansions ; he remarked that if * is expansible in the form*

A + Bcos + Ccos20 + ...,thenA = ; (i > d,B = (#cos*

The second period in the development of the theory commenced in 1807, when Fourier communicated his first memoir on the Theory of Heat to the French Academy. His exposition of the present theory is contained in a memoir sent to the Academy in 181 1, of which his great treatise the Theorie analytique de la chaleur, pub- lished in 1822, is, in the main, a reproduction. Fourier set himself to consider the representation of a function given graphically, and was the first fully to grasp the idea that a single function may consist of detached portions given arbitrarily by a graph. He had an accurate conception of the convergence of a series, and although he did not give a formally complete proof that a function with discontinuities is representable by the series, he indicated in particular cases the method of procedure afterwards carried out by Dirichlet. As an exposition of principles, Fourier's work is still worthy of careful perusal by all students of the subject. Poisson's treatment of the subject, which has been adopted in English works (see the Journal de I'ecole poly technique, vol. xi., 1820, and vol. xii., 1823, and also his treatise, Theorie de la chaleur, 1835),

r ir 1-h 2

depends upon the equality j _Jw 1-2/tcos (x-a) + h 2da

*1 /*7T 1 /■•X*

= 2w I f(a)da + -2h" I f(a) cosn(x~a)da

where o < h < 1 ; the limit of the integral on the left-hand side is

evaluated when_A = i, and found to be i{f(x + o)A-f(x— o)j, the

series on the right-hand side becoming Fourier's Series. The

equality of the two limits is then inferred. If the series is assumed

to be convergent when h = i, by a theorem of Abel's its sum is

continuous with the sum for values of h less than unity, but a

proof of the convergency for h = l is requisite for the validity of

Poisson's proof; as Poisson gave no such proof of convergency,

his proof of the general theorem cannot be accepted. The deficiency

cannot be removed except by a process of the same nature as that

afterwards applied by Dirichlet. The definite integral has been

carefully studied by Schwarz (see two memoirs in his collected

tPu 5 2 u works on the integration of the equation r-^ + r-5 = 0), who showed

that the limiting value of the integral depends upon the manner in which the limit is approached. Investigations of Fourier's Series were also given by Cauchy (see his " Memoire sur les developpe- ments des fonctions en series periodiques," Mem. de Vlnst., vol. vi., also CEuvres completes, vol. vii.); his method, which depends upon a use of complex variables, was accepted, with some modification, as valid by Riemann, but one at least of his proofs is no longer regarded as satisfactory. The first completely satisfactory in- vestigation is due to Dirichlet ; his first memoir appeared in Crelle's Journal for 1829, and the second, which is a model of clearness, in Dove's Repertorium der Physik. Dirichlet laid down certain definite sufficient conditions in regard to the nature of a function which is expansible, and found under these conditions the limiting value of the sum of n terms of the series. Dirichlet's determination of the sum of the series at a point of discontinuity has been criticized by Schlafli (see Crelle's Journal, vol. lxxii.) and by Du Bois-Reymond (Mathem. Annaien, vol. vii.), who maintained that the sum is really

indeterminate. Their objection appears, however, to rest upon a misapprehension as to the meaning of the sum of the series ; if Xi be the point of discontinuity, it is possible to make x approach x\, and n become indefinitely great, so that the sum of the series takes any assigned value in a certain interval, whereas we ought to make x = Xi first and afterwards n = oo , and no other way of going to the double limit is really admissible. Other papers by Dircksen (Crelle, vol. iv.) and Bessel (Astronomische Nachrichten, vol. xvi.), on similar lines to those by Dirichlet, are of inferior importance. Many of the investigations subsequent to Dirichlet 's have the object of freeing a function from some of the restrictions which were imposed upon it in Dirichlet's proof, but no complete set of necessary and sufficient conditions as to the nature of the function has been ob- tained. Lipschitz (" De explicatione per series trigonometricas," Crelle's Journal, vol. lxiii., 1864) showed that, under a certain con- dition, a function which

has an infinite number of maxima and minima in the neighbourhood of a point is still expansible; his condition is that at the point of discontinuity 0, \f(P+d)-f(p) | < B«" as S converges to zero, B being a constant, and a a positive exponent. A somewhat wider condition is

/(/S+5) -/(/?)) log 5 = o, 5 = o for which Lipschitz's results would hold. This last condition is adopted by Dini in his treatise (Sopra la serie di Fourier, &c, Pisa,

1880).

The modern period in the theory was inaugurated by the publi- cation by Riemann in 1867 of his very important memoir, written in 1854, Tiber die Darstellbarkeit einer Function durch eine trigo- nometrische Reihe. The first part of his memoir contains a historical account of the work of previous investigators; in the second part there is a discussion of the foundations of the Integral Calculus, and the third part is mainly devoted to a discussion of what can be inferred as to the nature of a function respecting the changes in its value for a continuous change in the variable, if the function is capable of representation by a trigonometrical scries. Dirichlet and probably Riemann thought that all continuous functions were everywhere representable by the series; this view was refuted by Du Bois-Reymond (Abh. der Bayer. Akad. vol. xii. 2). It was shown by Riemann that the convergence or non-convergence of the series at a particular point x depends only upon the nature of the function in an arbitrarily small neighbourhood of the point x. The first to call attention to the importance of the theory of uniform convergence of series in connexion with Fourier's Series was Stokes, in his memoir " On the Critical Values of the Sums of Periodic Series " (Camb. Phil. Trans., 1847 ; Collected Papers, vol. i.). As the method of determin- ing the coefficients in a trigonometrical scries is invalid unless the series converges in general uniformly, the question arose whether series with coefficients other than those of Fourier exist which represent arbitrary functions. Heine showed (Crelle's Journal, vol. lxxi., 1870, and in his treatise Kugelfunctionen, vol. i.) that Fourier's Series is in general uniformly convergent, and that if there is a uniformly convergent series which represents a function, it is the only one of the kind. G. Cantor then showed {Crelle's Journal, vols, lxxii. lxxiii.) that even if uniform convergence be not demanded, there can be but one convergent expansion for a function, and that it is that of Fourier. In the Math. Ann. vol. v., Cantor extended his investigation to functions having an in- finite number of discontinuities. Important contributions to the theory of the series have been published by Du Bois-Reymond (Abh. der Bayer. Akademie, vol. xii., 18/5, two memoirs, also in Crelle's Journal, vols, lxxiv. lxxvi. Ixxix.), by Kronecker (Berliner Berichte, 1885), by O. Holder (Berliner Berichte, 1885), by Jordan (Comptes rendus, 1881, vol. xcii.), by Ascoli (Math.

Annal., 1873, and Annali di matematica, vol. vi.), and by Genocchi (Atti delta R. Ace. di Torino, vol. x., 1875). Hamilton's memoir on " Fluctuating Functions " (Trans. R.I. A., vol. xix., 1842) may also be studied with profit in this connexion. A memoir by Broden (Math. Annalen, vol. Hi.) contains a good investigation of some of the most recent results on the subject. The scope of Fourier's Series has been extended by Lebesgue, who introduced a conception of integration wider than that due to Riemann. Lebcsgue's work on Fourier's Series will be found in his treatise, Lecons sur les series trigono metriques (1906) ; also in a memoir, " Sur les series trigonometriqucs," Annates sc. de I'ecole normale superieure, series ii. vol. xx. (1903), and in a paper " Sur la convergence des series de Fourier," Math. Annalen, vol. lxiv. (1905).

Authorities. — The foregoing historical account has been mainly- drawn from A. Sachse's work, " Versuch einer Geschichte der Darstellung willkiirlicher Functionen einer Variabeln durch trigono- metrische Reihen," published in Schlomilch's Zeitschrift fur Mathe- malik, Supp., vol. xxv. 1880, and from a paper by G. A. Gibson " On theHistory of the Fourier Series " (Proc. Ed. Math. Soc. vol. xi.). Reiff '3 Geschichte der unendlichen Reihen may also be consulted, and also the first part of Riemann's memoir referred to above. Besides Dini's treatise already referred to, there is a lucid treatment of the subejet from an elementary point of view in C. Neumann's treatise, Uber die nach Kreis-, Kugel- und Cylinder- Functionen fortschreitenden Kntwickelungen. Jordan's discussion of the subject in his Cotirs d' analyse is worthy of ,11 trillion ; an account of functions with limited variation is given in vol. i. ; see also a paper by Study

in the Math. Annalen, vol. xlvii. On the second mean-value theorem papers by Bonnet (Brux. Memoires, vol. xxiii., 1849, Lionville's Journal, vol. xiv., 1849), by Du Bois-Reymond (Crelle's Journal, vol. Ixxix., 1875), by Hankel (Zeitschrift fur Math, und Physik, vol. xiv., 1869), by Meyer (Math. Ann., vol. vi., 1872) and by Holder (Gottinger Anzeigen, 1894) may be consulted; the most general form'of the theorem has been given by Hobson (Proc. London Math. Soc, Series II. vol. vii., 1909). On the theory of uniform convergence of series, a memoir by W. F. Osgood (Amer, Journal of Math, xix.) may be with advantage consulted. On the theory of series in general, in relation to the functions which they can represent, a memoir by Baire (Annali, di matematica, Series III. vol. iii.) is of great import- ance. Bromwich's Theory of Infinite Series (1908) contains much information on the general theory of series. B6cher's " Intro- duction to the Theory of Fourier's Series," Annals of Math., Series II. vol. vii., 1906, will be found useful. See also Carslaw's In- troduction to the Theory of Fourier's Series and Integrals, and the Mathematical Theory of the Conduction of Heat (1906). A full account of the theory will be found in Hobson's treatise On the Theory of Functions of a Real- Variable and on

the Theory of Fourier's Series (1907). (E. W. H.)

FOURMIES, a town of northern France, in the department of Nord, on an affluent of the Sambre, 39 m. S.E. of Valenciennes by rail. Pop. (1906) 13,308. It is one of the chief centres in France for wool combing and spinning, and produces a great variety of cloths. The glass-works of Fourmies date from 1 599, and were the first established in the north of France. Iron is worked in the vicinity, and there are important forges and foundries. Enamel-ware is also manufactured. In 1891 labour troubles brought about military intervention and consequent bloodshed. A board of trade arbitration and a school of com- merce and industry are among the public institutions.

FOURMONT, ETIENNE (1683-1745), French orientalist, was born at Herbelai, near Saint Denis, on the 23rd of June 1683. He studied at the College Mazarin, Paris, and afterwards in the College Montaigu, where his attention was attracted to Oriental languages. Shortly after leaving the college he published a Traduction du commentaire du Rabbin Abraham Aben Esra sur I'ecclesiaste. In 17 11 Louis XIV. appointed Fourmont to assist a young Chinese, Hoan-ji, in compiling a Chinese grammar. Hoan-ji died in 17 16, and it was not until 1737 that Fourmont published Meditationes Sinicae and in 1742 Grammatica Sinica. He also wrote Reflexions critiques sur les histoires des anciens peuples (1735), and several dissertations printed in the Memoires of the Academy of Inscriptions. He became professor of Arabic in the College de France in 171 5. In 17 13 he was elected a member of the Academy of Inscriptions, in 1738 a member of the Royal Society of London, and in 1742 a member of that of Berlin. He died at Paris on the 19th of December 1745.

His brother, Michel Fourmont (1 690-1 746) , was also a member of the Academy of Inscriptions, and professor of the Syriac language in the Royal College, and was sent by the government to copy inscriptions in Greece.

An account of fitienne Fourmont's life and a catalogue of his works will be found in the second edition (1747) of his Reflexions critiques.

FOURNET, JOSEPH JEAN BAPTISTE XAVIER (1801-1869), French geologist and metallurgist, was born at Strassburg on the 15th of May 1801. He was educated at the Ecole des Mines at Paris, and after considerable experience as a mining engineer he was in 1834 appointed professor of geology at Lyons. He was a man of wide knowledge and extensive research, and wrote memoirs on chemical and mineralogical subjects, on eruptive rocks, on the structure of the Jura, the metamorphism of the Western Alps, on the formation of oolitic limestones, on kaolin-ization and on metalliferous veins. On metallurgical subjects also he was

an acknowledged authority; and he published observations on the order of sulphurability of metals (hi de Four-net). He died at Lyons on the 8th of January 1869. His chief publications were: £tudes sur les depots mitallif'eres (Paris, 1834); Histoire de la dolomie (Lyons, 1847); De I 'extension des terrains houillers (1855); Giologie lyonnaise (Lyons, 1861).

FOURNIER, PIERRE SIMON (17 12-1768), French engravei and typefounder, was born at Paris on the 15th of September 1713. He was the son of a printer, and was brought up to his father's business. After studying drawing under the painter

Colson, he practised for some time the art of wood-engraving, and ultimately turned hjs attention to the engraving and casting of types. lie designed many new characters, and his foundry became celebrated not only in France, but in foreign countries. Not content with his practical achievements, he sought to stimulate public interest in his art by the production of various works on the subject. In 1737 he published his Table des proportions qu'il faut observer entre les caracteres, which was followed by several other technical treatises. In 1758 he assailed the title of Gutenberg to the honour awarded him as inventor of printing, claiming it for Schoffer, in his Dissertation sur I'origine et les progres de I'art de graver en bois. This gave rise to a controversy in which Schopflin and Baer were his opponents. Fournier's contributions to this debate were collected and re-printed under the title of Traites historiques et critiques sur I'origine de Vimprimerie. His principal work, however, was the Manuel typographique, which appeared in 2 vols. 8vo in 1764, the first volume treating of engraving and type-founding, the second of printing, with examples of different alphabets. It was the author's design to complete the work in four volumes, but he did not live to execute it. He died at Paris on the 8th of October 1768.

FOURNIER L'HERITIER, CLAUDE (.1745-1825), French revolutionist, called " l'Americain," was born at Auzon (Haute- Loire) on the 21st of December 1745, the son of a poor weaver. He went to America to seek his fortune, and started at San Domingo an establishment for making tafia (an inferior quality of rum), but lost his money in a fire. Returning to France he threw himself into the Revolution with enthusiasm, and specially distinguished himself by the active part he took in the organization of the popular armed force by means of which the most famous of the revolutionary coups were effected. His influence was principally manifested in the insurrections of the 5th and 6th of October 1789, the 17th of July

1791, and the 20th of June and the 10th of August 1792. He was on bad terms v with the majority of the politicians, and particularly with Marat, and spent a great part of his time in prison, all the governments regarding him as an agitator and accusing him of inciting to insurrection. Arrested for the first time for trying to force an entrance into the club of the Cordeliers, from which he had been expelled, he was released, but was in prison from the 12th of December 1793 to the 21st of September 1794, and again from the gth of March 1795 to the 26th of October 1795. After the attempt on the First Consul in the rue Sainte-Nicaise he was deported to Guiana, but was allowed to return to France in 1809. In 181 1, while under surveillance at Auxerre, he was accused of having provoked an emeule against taxes known as the droits reunis (afterwards called contributions indirectes), and was imprisoned in the Chateau d'lf, where he remained till 1814. On the second restoration of the Bourbons Fournier was confined for about nine months in the prison of La Force. After 1816 he was left unmolested, turned royalist, and passed his last years in importuning the Restoration government for compensation for his lost property in San Domingo. He died in obscurity.

For further details see preface to F. A. Aulard's edition of Fournier's Memoires secrets (Paris, 1890), published by the Societe de l'histoire de la Revolution.

FOURTOU, MARIE FRANCOIS OSCAR BARDY DE (1836- 1897), French politician, was born at Riberac (Dordogne) on the 3rd of January 1836, and represented his native department in' the National Assembly after the Franco- German War. There he proved a useful adherent to Thiers, who made him minister of public works in December 1872. He was minister of religion in the cabinet of May 18-24, 1873, being the only member of the , Right included by Thiers in that short-lived ministry. As minister of education, religion and the fine arts in the recon- structed cabinet of the due de Broglie he had used his adminis- trative powers to further clerical ends, and as minister of the interior in Broglie's cabinet in 1877 he resumed the adminis- trative methods of the Second Empire. With a well-known Bonapartist, Baron R. C. F. Reille, as his secretary, he replaced

republican functionaries by Bonapartist partisans, reserving a few places for the Legitimists. In the general elections ol that year he used the whole weight of officialdom to secure a majority for the Right, to support a clerical and reactionarj programme. He accompanied Marshal MacMahon in his toui through southern France, and the presidential manifesto oi September, stating that the president would rely solely on the Senate should the elections prove unfavourable, was generally attributed to Fourtou. In spite of these efforts the cabinet fell, and a commission was appointed to inquire into their uncon- stitutional abuse of power. Fourtou was unseated

in consequence of the revelations made in the report of the commission. In the Chamber of Deputies Gambetta gave the lie direct to Fourtou's allegation that the republican party opposed every republican principle that was not antiquated. A duel was fought in con- sequence, but neither party was injured. He was re-elected to the chamber in 1879 and entered the Senate the next year. Failing to secure re-election to the Senate in 1885 he again entered the popular chamber as Legitimist candidate in 1889, but he took no further active part in politics. He died in Paris in 1897.

His works include Histoire de Louis XVI (1840); Histoire de Saint Pie V (1845) ; Mme Swetchine, sa vie et ses ceuvres (2 vols., 1859); La Question italienne (i860); De la contre-revolution (1876); and Mimoires d'un royaliste (2 vols., ig ot "

FOUSSA, or Fossa, the native name of Cryptoprocla ferox, a somewhat cat-like or civet-like mammal peculiar to Madagascar, where it is the largest carnivorous animal. It is about twice the size of a cat (5 ft. from nose to end of tail), with short close fur of nearly uniform pale brown. Little is known of its habits, except that it is nocturnal, frequently attacks and carries off goats, and especially kids, and shows great ferocity when wounded, on which account it is much dreaded by the natives. An example lived in the London zoological gardens for nearly fourteen years. See Carnivora.

FOWEY (usually pronounced Foy), a seaport and market- town in the Bodmin parliamentary division of Cornwall, England, on the Great Western railway, 25 m. by sea W. of Plymouth. Pop. (1901) 2258. It lies on the west shore of the picturesque estuary of the river Fowey, close to the water's edge, and sheltered by a screen of hills. Its church of St Nicholas is said to have been built in the 14th century, on the site of a still older edifice dedicated to St Finbar of Cork. It has a fine tower and late Norman doorway. Within are a priest's chamber over the porch, a handsome oak ceiling, a 15th-century pulpit, and some curious monuments and brasses. Place House, adjacent to the church, is a highly ornate Tudor building. A few ancient houses remain in the town. Deep-sea fishing is carried on; but the staple trade consists in the export of china clay and minerals, coal being imported. Fowey harbour, which is easy of access in clear weather, will admit large vessels at any state of the tide. St Catherine's Fort, dating from the days of Henry VIII. and now ruined, stands at the harbour's mouth, and once formed the main defence of the town. Opposite the town, and connected with it by Bodeneck Ferry, is the village of Polruan. Its main features are St Saviour's Chapel, with an ancient rood- stone, and the remains of Hall House, which was garrisoned during the civil wars of the 17th century.

Fowey (Fawy, Vawy, Fowyk) held a leading position amongst Cornish ports from the reign of Edward I. to the days of the Tudors. The numerous references to the privateering exploits of its ships in the Patent and Close Rolls and the extraordinary number of them at the siege of Calais in 1346 alike testify to its importance. During this period the king's mandates were addressed to the bailiffs or to the mayor and bailiffs, and no charter of incorporation appears to have been granted until the reign of James II. Under the second charter of 1690 the common council consisted of a mayor and eight aldermen and these with a recorder elected the free burgesses. A member for Fowey and Looe was summoned to a council at Westminster in 1340, but from that date until 1571, when it was entrusted with the privilege of returning two members, it had no parliamentary representation. By the Reform Act of 1832 it lost both its

members. It had ceased to exercise its municipal functions a few years previously. In 1316 the prior of Tywardreath, as lord of the manor, obtained the right to hold a Monday market and two fairs on the feasts of St Finbar and St Lucy, but by the charter of 1690 provision was made for a Saturday market and three fairs, on the 1st of May, 10th of September and Shrove Tuesday, and only these three continue to be held.

FOWL (Dan. Fugl, Ger. Vogel), a term originally used in the sense that bird J now is, but, except in composition,— as sea-fowl, wild-fowl and the like, — -practically almost confined 2 at present to designate the otherwise nameless species which struts on our dunghills, gathers round our barn-doors, or stocks our poultry yards — the type of the genus Gallus of ornithologists, of which four well-marked species are known. The first of these is the red jungle-fowl of the greater part of India, G. ferrugineus, — called by many writers G. bankiva, — which is undoubtedly the parent stock of all the domestic races (cf. Darwin, Animals and Plants under Domestication, i. pp. 233-246) . It inhabits northern India from Sind to Burma and Cochin China, as well as the Malay Peninsula and many of the islands as far as Timor, besides the Philippines. It occurs on the Himalayas up to the height of 4.000 ft., and its southern limits in the west of India proper are, according to Jerdon, found on the Raj-peepla hills to the south of the Nerbudda, and in the east near the left bank of the Godavery, or perhaps even farther, as he had heard of its being killed at Cummum. This species resembles in plumage what is commonly known among poultry-fanciers as the " Black-breasted game " breed, and this is said to be especially the case with examples from the Malay countries, between which and examples from India some differences are observable — the latter

having the plumage less red, the ear-lappets almost invariably white, and slate-coloured legs, while in the former the ear-lappets are crimson, like the comb and wattles, and the legs yellowish. If the Malayan birds be considered distinct, it is to them that the name G. bankiva properly applies. This species is said to be found in lofty forests and in dense thickets, as well as in ordinary bamboo-jungles, and when cultivated land is near its haunts, it may be seen in the fields after the crops are cut in straggling parties of from 10 to 20. The crow to which the cock gives utterance morning and evening is just like that of a bantam, never prolonged as in most domestic birds. The hen breeds from January to July, according to the locality; and lays from 8 to 12 creamy- white eggs, occasionally scraping together a few leaves or a little dry grass by way of a nest. The so-called G. giganteus, formerly taken by some ornithologists for a distinct species, is now regarded as a tame breed of G. ferrugineus or bankiva. The second good species is the grey jungle-fowl, G. sonnerati, whose range begins a little to the northward of the limits of the preceding, and it occupies the southern part of the Indian peninsula, without being found elsewhere. The cock has the end of the shaft of the neck-hackles dilated, forming a horny plate, like a drop of yellow sealing-wax. His call is very peculiar, being a broken and imperfect kind of crow, quite unlike that of G. ferrugineus and more like a cackle. The two species where their respective ranges overlap, occasionally interbreed in a wild state, and the present readily crosses in confinement with domestic poultry, but the hybrids are nearly always sterile. The third species is the Sinhalese jungle-fowl, G. stanleyi (the G. lafayettii of some authors), peculiar to Ceylon. This also greatly resembles in plumage some domestic birds, but the cock is red beneath, tad has a yellow comb with a red edge and purplish-red cheeks and wattles. He has also a singularly different voice, his crow being dissyllabic. This bird crosses readily with tame hens, but the hybrids are believed to be infertile. The fourth species, G. varius (the G. furcatus of some authors), inhabits Java and the islands eastwards as far as Flores. This differs remarkably from the others in not possessing hackles, and

1 Bird (cognate with breed and brood) was originally the young of any animal, and an early Act of the Scottish parliament speaks of " Wolf-birdis," i.e. Wolf-cubs.

2 Like Deer (Dan. Dyr. Ger. Tier). Beast, too, with some men has almost attained as much specialization.

in having a large unserrated comb of red and blue and only a single chin wattle. The predominance of green in its plumage is another easy mark of distinction. Hybrids between this species and domestic birds are often produced, but they are most commonly sterile. Some of them have been mistaken for distinct species, as- those which have received the names of G.

aeneus and G. temmincki.

Several circumstances seem to render it likely that fowls were first domesticated in Burma or the countries adjacent thereto, and it is the tradition of the Chinese that they received their poultry from the West about the year 1400 B.C. By the Institutes of Manu, the tame fowl is forbidden, though the wild is allowed to be eaten— showing that its domestication was accomplished when they were written. The bird is not mentioned in the Old Testament nor by Homer, though he has 'AXewcop (cock) as the name of a man, nor is it figured on ancient Egyptian monuments. Pindar mentions it, and Aristophanes calls it the Persian bird, thus indicating it to have been introduced to Greece through Persia, and it is figured on Babylonian cylinders between the 6th and 7th centuries B.C. It is sculptured on the Lycian marbles in the British Museum (c. 600 B.C.), and E. Blyth remarks {Ibis, 1867, p. 157) that it is there represented with the appearance of a true jungle-fowl, for none of the wild Galli have the upright bearing of the tame breed, but carry their tail in a drooping position. For further particulars of these breeds see Poultry. (A. N.)

FOWLER, CHARLES (1792-1867), English architect, was born at Cullompton, Devon, on the 17th of May 1792. After serving an apprenticeship of five years at Exeter, he went to London in 1814, and entered the office of David Laing, where he remained till he commenced practice for himself. His first work of importance was the court of bankruptcy in Basinghall Street, finished in 1821. In the following year he gained the first premium for a design for the new London bridge, which, however, was ultimately built according to the design of another architect. Fowler's other designs for bridges include one con- structed across the Dart at Totnes. He was also the architect for the markets of Covent Garden and Hungerford, the new market at Gravesend, and Exeter lower market, and besides several churches he designed Devon lunatic asylum (1845), the London fever hospital (1849), and the hall of the Wax Chandlers' Company, Gresham Street (1853). For some years he was honorary secretary of the institute of British architects, and he was afterwards created vice-president. He retired from his profession in 1853, and died at Great Marlow, Bucks, on the 26th of September 1867.

FOWLER, EDWARD (1632-1714), English divine, was born in 1632 at Westerleigh, Gloucestershire, and was educated at Corpus Christi College, Oxford, afterwards migrating to Trinity College, Cambridge. He was successively rector of Norhill, Bedfordshire (1656) and of All Hallows, Bread Street, London (1673), and in 1676 was elected a canon of Gloucester, his friend Henry More, the Cambridge Platonist, resigning in his favour. In 1681 he became vicar of St Giles, Cripplegate, but after four years was suspended for Whiggism. When the Declaration of Indulgence

was published in 1687 he successfully influenced the London clergy against reading it. In 1 69 1 he was consecrated bishop of Gloucester and held the see until his death on the 26th of August 1714. Fowler was suspected of Pelagian ten- dencies, and his earliest book was a Free Discourse in defence of The Practices of Certain Moderate Divines called Latitudinarians (1670). The Design of Christianity, published by him in the following year, in which he laid stress on the moral design of revelation, was criticized by Baxter in his How far Holiness is the Design of Christianity (1671) and by Bunyan in his Defence of the Doctrine of Justification by Faith (1672), the latter describing the Design as " a mixture of Popery, Socinianism and Quakerism," a horrid accusation to which Fowler replied in a scurrilous pamphlet entitled Dirt Wip'd Off. He also published, in 1693, Twenty-Eight Propositions, by which the Doctrine of the Trinity is endeavoured to be explained, challenging with some success the Socinian position.

FOWLER, JOHN (1826-1864), English inventor, was born at Melksham, Wilts, on the nth of July 1826. He learned practical engineering at Middlesborough-on-Tees, and about 1850 invented a mechanical system for the drainage of land. In 1852 he began experiments in steam cultivation, and in 1858 the Royal Agricultural Society awarded him the prize of £500 which it had offered for a steam-cultivator that should be an economic substitute for the plough or the spade. In i860 he founded at Hunslet, Leeds, the firm of Fowler & Co., manu- facturers of agricultural machinery, traction engines, &c. He died at Ack worth, Yorkshire, on the 4th of December 1864. , FOWLER, SIR JOHN (1817-1898), English civil engineer, was born on the 15th of July 1817 at Wadsley Hall, near Sheffield, where his father was a land-surveyor. At the age of sixteen he became a pupil of John Towlerton Leather, the engineer of the Sheffield water-works. The latter's uncle, George Leather, was engineer of the Great Aire and Calder Navigation Company, of the Goole Docks, and other similar works, and Fowler passed occasionally into his employment, in which he acquired a thorough knowledge of hydraulic engineering. The era of railway construction soon swept both Fowler and his employers into its service, and one of his first employments was to oppose the route of the Midland railway, chosen by the Stephensons, which left Sheffield on a branch line, and was therefore strongly resented by the inhabitants. The prestige of the Stephensons carried all before it, but in later life Sir John Fowler had the satisfaction of seeing the opposition of his clients justified, and Sheffield placed on the main line. In 1838 he went into the office of John Urpeth Rastrick, one of the leading railway engineers of the day, where he was employed in designing bridges for the line from London to

Brighton, and also in surveying for railways in Lancashire. In 1839 he went as representative of Mr Leather to take charge of the construction of the Stockton & Hartlepool railway and remained as manager of the line after it was finished. In 1844 he began his independent career as an engineer, and from the first was largely employed, more particu- larly in laying out the small railway systems which eventually were amalgamated under the title of the Manchester, Sheffield & Lincolnshire. In the course of this work he designed a bridge known as Torksey Bridge, which was disallowed by the Board of Trade inspector, Captain (afterwards Field-Marshal Sir) Lintorn Simmons. The engineering profession espoused Fowler's side in the controversy which followed, and as a result the verdict of the Board of Trade was modified. The episode was the beginning of a warm friendship between these distinguished representatives of civil and military engineering. Fowler was engineer of the London Metropolitan railway, the pioneer of underground railways, and noteworthy in that it was mostly made not by tunnelling, but by excavating from the surface and then covering in the permanent way; and he lived to be one of the engineers officially connected with the deep tunnelling " tube" system extensively adopted for electric railways in London. He was also engaged in the making of railways in Ireland, and in 1867 he was selected by Disraeli to serve on a commission to advise the government in respect of a proposal for a state- purchase of the Irish railway system. He also carried out considerable works in relation to the Nene Valley drainage and the reclamation of land at the Norfolk estuary.

In 1865 he was elected president of the Institution of Civil Engineers, the youngest president who had ever sat in the chair. He was strongly opposed to the project of a Channel tunnel to France, and in 1872 he endeavoured to obtain the consent of parliament to a Channel ferry scheme, whereby trains were to be transported across the strait in large ferry steamers. The proposal involved the making of enlarged harbours at Dover and Audresselles on the French coast, and the bill, after passing the Commons, was thrown out by the casting vote of the chairman of a committee of the House of Lords. In 1875 he was enabled to render, in his private capacity, a signal service to the Italian government, which was 'much embarrassed by impracticable proposals pressed on it by Garibaldi for a rectification of the course of the Tiber and other engineering works. He had

several interviews with the Italian patriot, and persuaded him of the impracticable nature of his plan, thereby obtaining for the government leisure to devise a more reasonable scheme. For eight years from 187 1 he acted as general engineering adviser in Egypt to the Khedive Ismail. He projected a railway to the Sudan, and also the reparation of the barrage. These and many other plans came to an end owing to financial reasons. But the maps and surveys for the railway were given to the war office, and

proved most useful to Lord Wolseley in his Nile expedition. For his service Fowler was made K.C.M.G. (1885). He was created a baronet in 1890 on the completion of the Forth bridge, of which with his partner Sir Benjamin Baker he was joint engineer. He died at Bournemouth on the 20th of November

1898.

FOWLER, WILLIAM (c. 1560-1614), Scottish poet, was born about the year 1560. He attended St Leonard's college, St Andrews, between 1574 and 1578, and in 1581 he was in Paris studying civil law. In 1581 he issued a pamphlet against John Hamilton and other Catholics, who had, he said, driven him from his country. He subsequently (about ?i59o) became private secretary and Master of Requests to Anne of Denmark, wife of James VI., and was renominated to these offices when the queen went to England. In 1609 his services were rewarded by a grant of 2000 acres in Ulster. His sister Susannah Fowler married Sir John Drummond, and was mother of the poet William Drummond of Hawthornden. On the title-page of The Triumphs of Petrarke, Fowler styles himself " P. of Hawick," which has been held to mean that he was parson of Hawick, but this is doubtful. A MS. collection of seventy-two sonnets, entitled The Tarantula of Love, and a translation (1587) from the Italian of the Triumphs of Petrarke are preserved in the library of the university of Edinburgh, in the collection bequeathed by his nephew, William Drummond. Two other volumes of his manu- script notes, scrolls of poems, &c, are preserved among the Drummond MSS., now in the library of the Society of Anti- quaries of Scotland. Specimens of Fowler's verses were pub- lished in 1803 by John Leyden in his Scottish Descriptive Poems. Fowler contributed a prefatory sonnet to James VI. 's Furies; and James, in return, commended, in verse, Fowler's Triumphs.

FOX, CHARLES JAMES (1749-1806), British statesman and orator, was the third son of Henry Fox, 1st Lord Holland, and his wife, Lady Caroline Lennox, eldest daughter of Charles Lennox, 2nd duke of Richmond. He was born at 9 Conduit Street, Westminster, on the 24th of January 1749. The father, who treated his children with extreme indulgence, allowed him to choose his school, and he elected to go to one kept at Wands- worth by a French refugee, named Pampelonne. In a very short time he asked to be sent to Eton, where he went in 1757. At Eton he did no more work than was acceptable to him, but he had an inborn love of literature, and he laid the foundation of that knowledge of the classic languages which in after years was the delight of his life. The vehemence of his temper was con- trolled by an affectionate disposition. When quite a boy hf checked his own tendency to fits of passion on learning that hit father trusted him to cure his defects.

That he learnt anything, and that he grew up an amiable and magnanimous man, were solely due to his natural worth, for no one ever owed less to education or to family example. The relations of Lord Holland to his sons would be difficult to parallel. He not only treated them, and in particular Charles, as friends and companions in pleasure from the first, but he did his best to encourage them in dissipation. In 1 763 he took Charles for a tour on the continent, introduced him to the most immoral society of the time and gave him money with which to gamble. The boy came back to Eton a precocious rake. It was his good fortune that he did go back, for he was subjected to a wholesome course of ridicule by the other boys, and was flogged by Dr Barnard, the headmaster. In 1764 Charles proceeded to Hertford College, Oxford. At Oxford, as at Eton, he read literature from natural liking, and he paid some attention to mathematics. His often quoted saying that he found mathe- matics entertaining was probably meant as a jest at the expense

of Sir G. Macartney, to whom he was writing, and who was known to maintain that it was useless. His own account of his school and college training, given in a letter to the same corre- spondent (6th August 1767), is: " I employed almost my whole time at Oxford in the mathematical and classical know- ledge, but more particularly in the latter, so that I understand Latin and Greek tolerably well. I am totally ignorant in every part of useful knowledge. I am more convinced every day how little advantage there is in being what at school and the uni- versity is called a good scholar: one receives a good deal of amusement from it, but that is all. At present I read nothing but Italian, which I am immoderately fond of, particularly of the poetry. ... As for French, I am far from being so thorough a master of it as I could wish, but I know so much of it that I could perfect myself in it at any time with very little trouble, especially if I pass three or four months in France." The passage is characteristic. It shows at once bis love of good literature and his thoroughness. Fox's youth was disorderly, but it was never indolent. He was incapable of half doing anything which he did at all. He did perfect himself in French, and he showed no less determination to master mere sports. At a later period when he had grown fat he accounted for his skill in taking " cut balls " at tennis by saying that he was a very " painstaking man." He was all his life a great and steady walker.

The disorders of his early years were notorious, and were a common subject of gossip. In the spring of 1767 he left Oxford and joined his father on the continent during a tour in France and Italy. In 1768 Lord Holland

bought the pocket borough of Midhurst for him, and he entered on his parliamentary career, and on London society, in 1 769. Within the next few years Lord Holland reaped to the full the reward for all that was good, and whatever was evil, in the training he had given his son. The affection of Charles Fox for his father was unbounded, but the passion for gambling which had been instilled in him as a boy proved the ruin of the family fortune. He kept racehorses, and bet on them largely. On the racecourse he was successful, and it is another proof of his native thoroughness that he gained a reputation as a handicapper. It is said that he won more than he lost on the course. At the gambling table he was unfortunate, and there can be little question that he was fleeced both in London and in Paris by unscrupulous players of his own social rank, who took advantage of his generosity and whose worth- lessness he knew. In the ardour of his passion Fox took his losses and their consequences with an attractive gaiety. He called the room in which he did business with the Jew money- lenders his " Jerusalem chamber." When his elder brother had a son, and his prospects were injured, he said that the boy was a second Messiah, who had appeared for the destruction of the Jews. " He had his jest, and they had his estate." In 1774 Lord Holland had to find £140,000 to pay the gambling debts of his sons. For years Charles lived in pecuniary embarrassment, and during his later years, when he had given up gambling, he was supported by the contributions of wealthy friends, who in 1793 formed a fund of £70,000 for his benefit.

His public career did not supply him with a check on habits of dissipation in the shape of the responsibilities of office. He began, as was to be expected in his father's son, by supporting the court; and in 1770, when only twenty-one, he was appointed a junior lord of the admiralty with Lord North. During the violent conflict over the Middlesex election (see Wilkes, John) he took the unpopular side, and vehemently asserted the right of the House of Commons to exclude Wilkes. In 1772 during the proceedings against Crosby and Oliver — a part of the " Wilkes and liberty " agitation — he and Lord North were attacked by a mob and rolled in the mud. But Fox's character was incom- patible with ministerial service under King George III. The king, himself a man of orderly life, detested him as a gambler and a rake. And Fox was too independent to please a master who expected obedience. In February 1772 he threw up his place to be free to oppose the Royal Marriage Act, on which the king's heart was set. He returned to office as junior lord of the treasury in December. But he was insubordinate; his

sympathy- with the American colonies, which were now beginning to resist the claims of the mother country to tax them, made him intolerable to the king and he was dismissed in February 1774. The death of his father on the 1st of July of that year removed an influence which tended to keep him

subordinate to the court, and his friendship for Burke drew him into close alliance with the Rockingham Whigs. From the first his ability had won him admiration in the House of Commons. He had prepared to distinguish himself as an orator by the elaborate cultivation of his voice, which was naturally harsh and shrill. His argumentative force was recognized at once, but the full scope of his powers was first shown on the 2nd of February 1775, when he spoke on the disputes with the colonies. The speech is unfortunately lost, but Gibbon, who heard it, told his friend Holroyd (afterwards Earl of Sheffield) that Fox, " taking the vast compass of the question before us, discovered powers for regular debate which neither his friends hoped nor his enemies dreaded."

His great political career dates from that day. It is unique among the careers of British statesmen of the first rank, for it was passed almost wholly in opposition. Except for a few months in 1782 and 1783, and again for a few months before his death in 1806, he was out of office. If he was absolutely sincere in the statement he made to his friend Fitzpatrick, in a letter of the 3rd of February 1778, his life was all he could have wished. " I am," he wrote, " certainly ambitious by nature, but I really have, or think I have, totally subdued that passion. I have still asmuch vanity as ever, which is a happier passion by far, because great reputation I think I may acquire and keep, great situation I never can acquire, nor if acquired keep, without making sacrifices that I never will make." His words show that he judged himself and read the future accurately. Yet it was certainly a cause of bitter disappointment to him that he had to stand by while the country was in his opinion not only misgoverned, but led to ruin. His reputation as an orator and a political critic, which was great from the first and grew as he lived, most assuredly did not console him for his impotence as a statesman. Of the ca,uses which rendered his brilliant capacity useless for the purpose of obtaining practical success the most important, perhaps the only one of real importance, was his personal character. Lord John Russell (afterwards Earl Russell), his friendly biographer, has to confess that Fox might have joined in the confession of Mirabeau: " The public cause suffers for the immoralities of my youth." His reputation as a rake and gambler was so well established at the very beginning of his career that when he was dismissed from office in 1774 there was a general belief among the vulgar that he had been detected in actual theft. His perfect openness, the notoriety of his bank- ruptcies and of the seizure of his books and furniture in execution, kept him before the world as a model of dissipation. In 1776, when he was leading the resistance to Lord North's colonial policy, he " neither abandoned gaming nor his rakish life. He was seldom in bed before five in the morning nor out of it before two at noon." At the most important crisis of his life in 1783, he almost made an ostentation of disorder and of indifference not only to appearances, but

even to decency. Horace Walpole has drawn a picture of him at that time which Lord Holland, Fox's beloved and admiring nephew, speaking from his early recollec- tions of his uncle, confesses has " some justification." Coming from such an authority the certificate may be held to confirm the substantial accuracy of Walpole. " Fox lodged in St James's Street, and as soon as he rose, which was very late, had a levee of his followers and of the gaming club at Brooks's — all his disciples. His bristly black person, and shagged breast quite open and rarely purified by any ablutions, was wrapped in a foul linen nightgown and his bushy hair dishevelled. In these cynic weeds and with Epicurean good humour did he dictate his politics, and in this school did the heir of the empire attend his lessons and imbibe them." That this cynic manner, and Epicurean speech, were only the outside of a manly and generous nature was well known to the personal friends of Fox, and is now universally allowed. But by the bulk of his contemporaries,

who could not fail to see the weaknesses he ostentatiously displayed, Fox was, not unnaturally, suspected as being immoral and untrustworthy. Therefore when he came into collision with the will of the king he failed to secure the confidence of the nation which was his only support. Nor ought any critical admirer of Fox to deny that George III. was not wholly wrong when he said that the great orator " was totally destitute of discretion and sound judgment." Fox made many mistakes, due in some cases to vehemence of temperament, and in others only to be ascribed to want of sagacity. That he fought unpopular causes is a very insufficient explanation of his failure as a practical statesman. He could have profited by the reaction which followed popular excitement but for his bad reputation and his want of discretion.

During the eight years between his expulsion from office in 1774 and the fall of Lord North's ministry in March 1782 he may indeed be said to have done one very great thing in politics. He planted the seed of the modern Liberal party as opposed to the pure Whigs. In political allegiance he became a member of the Rockingham party and worked in alliance with the marquis and with Burke, whose influence on him was great. In opposing the attempt to coerce the American colonists, and in assailing the waste and corruption of Lord North's administration, as well as the undue influence of the crown, he was at one with the Rockingham Whigs. During the agitation against corruption, and in favour of honest management of the public money, which was very strong between 1779 and 1782, he and they worked heartily together. It had a considerable effect, and prepared

the way for the reforms begun by Burke and continued by Pitt. But if Fox learnt much from Burke he learnt with originality. He declined to accept the revolution settlement as final, or to think with Burke that the constitution of the House of Commons could not be bettered. Fox acquired the conviction that, if the House was to be made an efficient instrument for restraining the interference of the king and for securing good government, it must cease to be filled to a very large extent by the nominees of boroughmongers and the treasury. He be- came a strong advocate for parliamentary reform. In all ways he was the ardent advocate of what have in later times been known as " Liberal causes," the removal of all religious dis- abilities and tests, the suppression of private interests which hampered the public good, the abolition of the slave trade, and the emancipation of all classes and races of men from the strict control of authority.

A detailed account of his activity from 1774 to 1782 would entail the mention of every crisis of the American War of In- dependence and of every serious debate in parliament. Through- out the struggle Fox was uniformly opposed to the coercion of the colonies and was the untiring critic of Lord North. While the result must be held to prove that he was right, he prepared future difficulties for himself by the fury of his language. He was the last man in the world to act on the worldly-wise maxim that an enemy should always be treated as if he may one day be a friend, and a friend as if he might become an enemy. On the 29th of November 1779 Fox was wounded in a duel with Mr William Adam, a supporter of Lord North's whom he had savagely denounced. He assailed Lord North with unmeasured invective, directed not only at his policy but at his personal character, though he well knew that the prime minister was an amiable though pliable man, who remained in office against his own wish, in deference to the king who appealed to his loyalty. When the disasters of the American war had at last made a change of ministry necessary, and the king applied to the Whigs, through the intermediary of Lord Shelburne, Fox made a very serious mistake in persuading the marquess of Rockingham not to insist on dealing directly with the sovereign. The result was the formation of a cabinet belonging, in Fox's own words, partly to the king and partly to the country — that is to say, partly of Whigs who wished to restrain the king, and partly of the king's friends, represented by Lord Shelburne, whose real function was to baffle the Whigs. Dissensions began from the first, and were peculiarly acute between Shelburne

and Fox, the two secretaries of state. The old division of duties by which the southern secretary had the correspondence with the colonies and the western powers of Europe, and the northern secretary with the others, had been abolished on the formation of the Rockingham cabinet. All foreign affairs were entrusted to Fox. Lord Shelburne meddled in the negotiations for the peace at Paris. He also persuaded his colleagues to grant some

rather scandalous pensions, and Fox's acquiescence in this abuse after his recent agitation against Lord North's waste did him injury. When the marquess of Rockingham died on the 1st of July 1782, and the king offered the premiership to Shelburne, Fox resigned, and was followed by a part of the Rockingham Whigs.

In refusing to serve under Shelburne he was undoubtedly consistent, but his next step was ruinous to himself and his party. On the 14th of February 1783 he formed a coalition with Lord North, based as they declared on " mutual goodwill and confidence." Plausible excuses were made for the alliance, but to the country at large this union, formed with a man whom he had denounced for years, had the appearance of an un- scrupulous conspiracy to obtain office on any terms. In the House of Commons the coalition was strong enough to drive Shelburne from office on the 24th of February. The king made a prolonged resistance to the pressure put on him to accept Fox and North as his ministers (see Pitt, William). On the 2nd of April he was constrained to submit to the formation of a new ministry, in which the duke of Portland was prime minister and Fox and North were secretaries of state. The new administration was ill liked by some of the followers of both. Fox increased its unpopularity both in the House and in the country by consenting against the wish of most of his colleagues to ask for the grant of a sum of £100,000 a year to the prince of Wales. The act had the appearance of a deliberate offence to the king, who was on bad terms with his son. The magnitude of the sum, and his acquiescence in the grant of pensions by the Shelburne ministry, convinced the country that his zeal for economy was hypocritical. The introduction of the India Bill in November 1783 alarmed many vested interests, and offended the king by the provision which gave the patronage of India to a commission to be named by the ministry and removable only by parliament. The coalition, and Fox in particular, were assailed in a torrent of most telling invective and caricature. Encouraged by the growing unpopularity of his ministers, George III. gave it to be understood that he would not look upon any member of the House of Lords who voted for the India Bill as his friend. The bill was thrown out in the upper House on the 17th of December, and next day the king dismissed his ministers.

Fox now went into opposition again. The remainder of his life may be divided into four portions — his opposition to Pitt during the session of 1784; his parliamentary activity till his secession in 1797; his retirement till 1800; his return to activity and his short tenure of office before his death in 180.6. During the first of these periods he deepened his unpopularity by assailing the undoubted prerogatives of the crown, by claiming for the House of Commons the right to override not only the king and the Lords but the opinion of the country, and by resisting a dissolution. This last pretension came very ill from a statesman who in 1780 had

advocated yearly elections. He lost ground daily before the steady good judgment and un- blemished character &f Pitt. When parliament was dissolved at the end of the session of 1784. the country showed its senti- ments by unseating 180 of the followers of Fox and North. Immense harm was done to both by the publication of a book called The Beauties of Fox, North and Burke, a compilation of their abuse of one another in recent years.

Fox himself was elected for Westminster with fewer votes than Admiral Lord Hood, but with a majority over the ministerial candidate, Sir Cecil Wray. The election was marked by an amazing outflow of caricatures and squibs, by weeks of rioting in which Lord Hood's sailors fought pitched battles in St James's Street with Fox's hackney coachmen, and by the intrepid canvassing of Whig ladies. The beautiful duchess of Devonshire

(Georgiana Spencer) is said to have won at least one vote for Fox by kissing a shoemaker who had a romantic idea of what constituted a desirable bribe. The high bailiff refused to make a return, and the confirmation of Fox's election was delayed by the somewhat mean action of the ministry. He had, however, been chosen for Kirkwall, and could fight his cause in the House. In the end he recovered damages from the high bailiff. In his place in parliament he sometimes supported Pitt and sometimes opposed him with effect. His criticism on the ministers' bill for the government of India was sound in principle, though the evils he foresaw did not arise. Little excuse can be made for his opposition to Pitt's commercial policy towards Ireland. But as Fox on this occasion aided the vested interests of some English manufacturers he secured a certain revival of popularity. His support of Pitt's Reform Bill was qualified by a just dislike of the ministers' proposal to treat the possession of the franchise by a constituency as a property and not as a trust. His un- successful opposition to the commercial treaty with France in 1787 was unwise and most injurious to himself. He committed himself to the proposition that France was the natural enemy of Great Britain, a saying often quoted against him in coming years. It has been excused on the ground that when he said France he meant the aggressive house of Bourbon. A statesman whose words have to be interpreted by an esoteric meaning cannot fairly complain if he is often misunderstood. In 1788 he travelled in Italy, but returned in haste on hearing of the illness of the king. Fox supported the claim of the prince of Wales to the regency as a right, a doctrine which provoked Pitt into declaring that he would " unwhig the gentleman for the rest of his life." The friendship between him and the prince of Wales (see

George IV.) was always injurious to Fox. In 1787 he was misled by the prince's ambiguous assurances into denying the marriage with Mrs Fitzherbert. On discovering that he had been deceived he broke off all relations with the prince for a year, but their alliance was renewed. During these years he was always in favour of whatever measures could be described as favourable to emancipation and to humanity. He actively promoted the impeachment of Warren Hastings, which had the support of Pitt. He was always in favour of the abolition of the slave trade (which he actually effected during his short tenure of office in 1806), of the repeal of the Test Acts, and of concessions to the Roman Catholics, both in Great Britain and in Ireland.

The French Revolution affected Fox profoundly. Together with almost all his countrymen he welcomed the meeting of the states-general in 1789 as the downfall of a despotism hostile to Great Britain. But when the development of the Revolution caused a general reaction, he adhered stoutly to his opinion that the Revolution was essentially just and ought not to be con- demned for its errors or even for its crimes. As a natural consequence he was the steady opponent of Pitt's foreign policy, which he condemned as a species of crusade against freedom in the interest of despotism. Between 1790 and 1800 his un- popularity reached its height. He was left almost alone in parliament, and was denounced as the enemy of his country. On the 6th of May 1791 occurred the painful scene in the House of Commons, in which Burke renounced his friendship. In 1792 there was some vague talk of a coalition between him and Pitt, which came to nothing. It should be noted that the scene with Burke took place in the course of the debate on the Quebec Bill, in which Fox displayed real statesmanship by criticizing the division of Upper from Lower Canada, and other provisions of the bill, which in the end proved so injurious as to be unworkable. In this year he carried the Libel Bill. In 1792 his ally, the duke of Portland, and most of his party left him. In 1 797 he withdrew from parliament, and only came forward in 1798 to reaffirm the doctrine of the sovereignty of the people at a great Whig dinner. On the 9th of May he was dismissed from the privy council.

The interval of secession was perhaps the happiest in his life. In 1783 he formed a connexion with Elizabeth Bridget Cane, commonly known as Mrs Armstead or Armistead, an amiable

and well-mannered woman to whom he was passionately attached. In company with her he established himself at St Anne's Hill near Chertsey in Surrey. In 1795 he married her privately, but did not avow his marriage till 1802. In his letters he spoke of her always as Mrs Armistead, and some of his friends — Mr Coke of Holkham, afterwards Lord Leicester, with whom he stayed every year, being one of them — would not invite her to

their houses. It is hard to explain this solitary instance of shabby conduct in a thoroughly generous man towards a person to whom he was unalterably attached and who fully deserved his affection. Fox's time at St Anne's was largely spent in garden- ing, in the enjoyment of the country, and in correspondence on literary subjects with his nephew, the 3rd Lord Holland, and with Gilbert Wakefield, the editor of Euripides. His letters show that he had a very sincere love for, and an enlightened appreciation of, good literature. Greek and Italian were his first favourites, but he was well read in English literature and in French, and acquired some knowledge of Spanish. His favourite authors were Euripides, Virgil and Racine, whom he defends against the stock criticisms of the admirers of Corneille with equal zeal and insight.

Fox reappeared in parliament to take part in the vote of censure on ministers for declining Napoleon's overtures for a peace. The fall of Pitt's firs t ministry and the formation of the Addington cabinet, the peace of Amiens, and the establishment of Napoleon as first consul with all the powers of a military despot, seemed to offer Fox a chance of resuming power in public life. The struggle with Jacobinism was over, and he could have no hesitation in supporting resistance to a successful general who ruled by the sword, and who pursued a policy of perpetual aggression. During 1802 he visited Paris in company with his wife. An account of his journey was published in 181 1 by his secretary, Mr Trotter, in an otherwise poor book of reminiscence. It gives an attractive picture of Fox's good-humour, and of his enjoyment of the " species of minor comedy which is constantly exhibited in common life." His main purpose in visiting Paris was to superintend the transcription of the correspondence of Barillon, which he needed for his proposed life of James II. The book was never finished, but the fragment he completed was published in 1808, and was translated into French by Armand Carrel in 1846. Fox was not favourably impressed by Napoleon. He saw a good deal of French society, and was himself much admired for his hearty defence of his rival Pitt against a foolish charge of encouraging plots for Napoleon's assassination. On his return he resumed his regular attendance in the House of Commons. The history of the renewal of the war, of the fall of Addington's ministry, and of the formation of Pitt's second administration is so fully dealt with in the article on Pitt (q.v.) that it need not be repeated here.

The death of Pitt left Fox so manifestly the foremost man in public life that the king could no longer hope to exclude him from office. The formation of a ministry was entrusted by the king to Lord Grenville, but when he named Fox as his proposed secretary of state for foreign affairs George III. accepted him without demur. Indeed his hostility seems to a large extent to have died out. A long period of office might now have appeared to lie before Fox, but his health was undermined. Had he lived it may be

considered as certain that the war with Napoleon would have been conducted with a vigour which was much wanting during the next few years. In domestic politics Fox had no time to do more than insist on the abolition of the slave trade. He, like Pitt, was compelled to bow to the king's invincible determination not to allow the emancipation of the Roman Catholics. When a French adventurer calling himself Guillet de la Gevrilliere, whom Fox at first " did the honour to take for a spy," came to him with a scheme for the murder of Napoleon, he sent a warning on the 20th of February to Talley- rand. The incident gave him an opportunity for reopen :.,g negotiations for peace. A correspondence ensued, and British envoys were sent to Paris. But Fox was soon convinced that the French ministers were playing a false game. He was resolved not to treat apart from Russia, then the ally of Great Britain,

nor to consent to the surrender of Sicily, which Napoleon insisted upon, unless full compensation could be obtained for King Ferdinand. The later stages of the negotiation were not directed by Fox, but by colleagues who took over his work at the foreign office when his health began to fail in the summer of 1806. He showed symptoms of dropsy, and operations only procured him temporary relief. After carrying his motion for the abolition of the slave trade on the 10th of June, he was forced to give up attendance in parliament, and he died in the house of the duke of Devonshire, at Chiswick, on the 13th of September 1806. His wife survived him till the 8th of July 1842. No children were born of the marriage. Fox is buried in Westminster Abbey by the side of Pitt.

The striking personal- appearance of Fox has been rendered very familiar by portraits and by innumerable caricatures. The latter were no doubt deliberately exaggerated, and yet a com- parison between the head of Fox in Sayer's plate " Carlo Khan's triumphal entry into Leadenhall," and in Abbot's portrait, shows that the caricaturist did not depart from the original. Fox was twice painted by Sir Joshua Reynolds, once when young in a group with Lady' Sarah Bunbury and Lady Susan Strangeways, and once at full length. A half-length portrait by the German painter, Karl Anton Hickel, is in the National Portrait Gallery, where there is also a terra-cotta bust by Nollekens.

Authorities. — The materials for a life of Fox were first collected by his nephew, Lord Holland, and were then revised and rearranged by Mr Allen and Lord John Russell. These materials appear as Memoirs and Correspondence of C. J. Fox (London, 1853-1857). On them Lord John

Russell based his Life and Times of C. J. Fox (London, 1859-1866); Sir G. O. Trevelyan's Early History of C. J. Fox (London. 1880) brings new evidence; Charles James Fox, a Political Study, by J. L. Le B. Hammond (London, 1903), is a scries of studies written by an extreme admirer. His Speeches were collected and published in 1815. The newspaper articles (e.g. in The Times) published on the occasion of the centenary of his death contain interesting appreciations. See also Lloyd Sanders, The Holland House Circle (1908). (D. H.)

FOX, EDWARD (c. 1496-1538), bishop of Hereford, was born about 1496 at Dursley in Gloucestershire; he is said on very doubtful authority to have been related to Richard Fox (q.v.). From Eton he proceeded to King's College, Cambridge, and after graduating was made secretary to Wolsey. In 1528 he was sent with Gardiner to Rome to obtain from Clement VII. a decretal commission for the trial and decision of the case between Henry VIII. and Catherine of Aragon. On his return he was elected provost of King's College, and in August 1529 was the means of conveying to the king Cranmer's historic advice that he should apply to the universities of Europe rather than to the pope. This introduction led eventually to Cranmer's promotion over Fox's head to the archbishopric of Canterbury. After a brief mission to Paris in October 1529, Fox in January 1530 befriended Latimer at- Cambridge and took an active part in persuading that university and Oxford to decide in the king's favour. He was sent to employ similar methods of persuasion at the French universities in 1 530-1 531, and was also engaged in negotiating a closer league between England and France. In April 1533 he was prolocutor of convocation when it decided against the validity of Henry's marriage with Catherine, and in 1534 published his treatise De vera differentia regiae potestatis et ecclesiae (second ed. 1538, English transl. 1548). Various ecclesiastical prefer- ments were now granted him, including the archdeaconry of Leicester (1531) and the bishopric of Hereford (1535)- I n iS3S~ 1536 he was sent to Germany to discuss the basis of a political and theological understanding with the Lutheran princes and divines, and had several interviews with Luther, who could not be persuaded of the justice of Henry VIII.'s divorce. The principal result of the mission was the Wittenberg articles of 1536, which had no slight influence on the English Ten Articles of the same year. Bucer dedicated to him in 1536 his Com- mentaries on the Gospels, and Fox's Protestantism was also illustrated by his patronage of Alexander Aless, whom he defended before Convocation. Fox is credited with the authorship of several proverbial sayings, such as " the surest way to peace is a constant preparedness for war " and " time and I will challenge

any two in the world." The former at any rate is only a variation of the Latin si vis pdcem, para helium, and probably the latter is not more original in Fox than in Philip II., to whom it is usually ascribed. Fox died

on the 8th of May 1 538 and was buried in the church of St Mary Mounthaw, London. His chief distinction is perhaps that he was the most Lutheran of Henry VIII.'s bishops, and was largely responsible for the Ten Articles of 1536.

See Letters and Papers of Henry VIII., vols, iv.-xiv. ; Cooper's Athenae Cantabrigienses; Diet. Nat. Biogr.; R. W. Dixon's Church History ; G. Mentz, Die Wittenberger Artikel von 1536 (1905). (A. F.P.)

FOX, GEORGE (1624-1691), the founder of the " Society of Friends " or " Quakers," was born at Drayton, Leicestershire, in July 1624. His father, Christopher Fox, called by the neigh- bours " Righteous Christer," was a weaver by occupation; and his mother, Mary Lago, " an upright woman and accom- plished above most of her degree," was " of the stock of the martyrs." George from his childhood " appeared of another frame than the rest of his brethren, being more religious, inward, still, solid and observing beyond his years"; and he himself declares: " When I came to eleven years of age I knew pureness and righteousness; for while a child I was taught how to walk to be kept pure." Some of his relations wished that he should be educated for the ministry; but his father apprenticed him to a shoemaker, who also dealt in wool and cattle. In this service he remained till his nineteenth year. According to Penn, " he took most delight in sheep," but he himself simply says: " A good deal went through my hands. . . . People had generally a love to me for my innocency and honesty." In 1643, being upon business at a fair, and having accompanied some friends to the village public-house, he was troubled by a proposal to " drink healths," and withdrew in grief of spirit. " When I had done what business I had to do I returned home, but did not go to bed that night, nor could I sleep, but sometimes walked up and down, and sometimes prayed and cried to the Lord, who said unto me, 'Thou seest [how young people go together into vanity and old people into the earth; thou must forsake all, both young and old, and keep out of all, and be a stranger unto all.' Then, at the command of God, on the ninth day of the seventh month, 1643, I left m y relations and broke off all familiarity or fellowship with old or young."

Thus briefly he describes what appears to have been the greatest moral crisis in his life. The four years which followed were a time of great perplexity and distress, though sometimes " I had intermissions, and was sometimes brought into such a heavenly joy that I thought I had been in Abraham's bosom." He would go from town to town, "travelling up and down as a stranger in the earth, which way the Lord inclined my heart; taking a chamber to myself in the town where I came, and tarrying sometimes a month, more or less, in a place "; and the reason he gives for this migratory habit is that he was " afraid both of professor and profane, lest, being a tender young man, he should be hurt by conversing much with

either." The same fear often led him to shun all society for days at a time; but frequently he would apply to " professors " for spiritual direction and consolation. These applications, however, never proved successful; he invariably found that his advisers " possessed not what they professed." Some recommended marriage, others enlistment as a soldier in the civil wars; one " ancient priest " bade him take tobacco and sing psalms; another of the same fraternity, " in high account," advised physic and blood-letting.

About the beginning of 1646 his thoughts began to take more definite shape. One day, approaching Coventry, " the Lord opened to him " that none were true believers but such as were born of God and had passed from death unto life; and this was soon followed by other "openings" to the effect that "being bred at Oxford or Cambridge was not enough to fit and qualify men to be ministers of Christ," and that " God who made the world did not dwell in temples made with hands." He also experienced deeper manifestations of Christ within his own soul. " When I myself was in the deep, shut up under all [the burden of corruptions], I could not believe that I should ever

overcome; my troubles, my sorrows and my temptations were so great that I thought many times I should have despaired, I was so tempted. But when Christ opened to me how He was tempted by the same devil, and overcame him and bruised his head, and that through Him, and His power, light, grace and spirit, I should overcome also, I had confidence in Him; so He it was that opened to me, when I was shut up and had no hope nor faith. Christ, who had enlightened me, gave me His light to believe in; He gave me hope which He himself revealed in me; and He gave me His spirit and grace, which I found sufficient in the deeps and in weakness." In 1647 he records that at a time when all outward help had failed " I heard a voice which said, ' There is one, even Christ Jesus, that can speak to thy condition.' And when I heard it my heart did leap for joy." In the same year he first openly declared his message in the neighbourhood of Dukinfield and Manchester (see Friends, Society of).

In 1649, as he was walking towards Nottingham, he heard the bell of the " steeple house " of the city, and was admonished by an inward voice to go forward and cry against the great idol and the worshippers in it. Entering the church he found the preacher engaged in expounding the words, " We have also a more sure word of prophecy," from which the ordinary Protestant doctrine of the supreme authority of Scripture was being

enforced in a manner which appeared to Fox so defective or erroneous as to call for his immediate and most energetic protest. Lifting up his voice against the preacher's doctrine, he declared that it is not by the Scripture alone, but by the divine light by which the Scriptures were given, that doctrines ought to be judged. He was carried off to prison, where he was detained for some time, and from which he was released only by the favour of the sheriff, whose sympathies he had succeeded in enlisting. In 1650 he was imprisoned for about a year at Derby on a charge of blasphemy. On his release, overwrought and weakened by six months spent " in the common gaol and dungeon," he performed what was almost the only and certainly the most pronounced act of his life which had the appearance of wild fanaticism. Through the streets of Lichfield, on market day, he walked barefoot, crying, " Woe to the bloody city of Lich field." His own explanation of the act, connecting it with the martyrdom of a thousand Christians in the time of Diocletian, is not convincing. His proceeding was probably due to a horror of the city arising from a subconscious memory of what he must have heard in childhood from his mother (" of the stock of the martyrs ") concerning a martyr, a woman, burnt in the reign of Mary at Lichfield, who had been taken thither from Mancetter, a village two miles from his home in which he had worked as a journeyman shoemaker (see The Martyrs Glover and Lewis of Mancetter, by the Rev. B. Richings). He must also have heard of the burning of Edward Wightman in the same city in 161 2, the last person burned for heresy in England.

It would be here out of place to follow with any minuteness the details of his subsequent imprisonments, such as that at Carlisle in 1653; London 1654; Launceston 1656; Lancaster 1660, and again in 1663, whence he was taken to Scarborough in 1665; and Worcester 1673. During these terms of imprison- ment his pen was not idle, as is amply shown by the very numerous letters, pastorals and exhortations which have been preserved; while during his intervals of liberty he was unwearied in the work of "declaring truth" in all parts of the country. In 1669 he married Margaret, widow of Judge Fell, of Swarth- moor, near Ulverston, who, with her family, had been among his earliest converts. In 1671 he visited Barbados, Jamaica, and the American continent, and shortly after his return in 1673 he was, as has been already noted, apprehended in Worcester- shire for attending meetings that were forbidden by the law. At Worcester he suffered a captivity of nearly fourteen months. In 1677 he visited Holland along with Barclay, Penn and seven others; and this visit he repeated (with five others) in 1684. The later years of his life were spent mostly in London, where he continued to speak in public, comparatively unmolested,

until within a few days of his death, which took place on the 13th of January 1691 (1690 o.s.).

William Penn has left on record an account of Fox from personal knowledge — a Brief Account of the Rise and Progress of the People called Quakers, written as a preface to Fox's Journal. Although a man of large size and great bodily strength, he was " very temperate, eating little' and sleeping less." He was a man of strong personality, of measured utterance, " civil " (says Penn) " beyond all forms of breeding." From his Journal we gather that he had piercing eyes and a very loud voice, and wore good clothes. Unlike the Roundheads, he wore his hair long. Even before his marriage with Margaret Fell he seems to have been fairly well off; he does not appear to have worked for a living after he was nineteen, and • yet he had a horse, and speaks of having money to give to those who were in need. He had much practical common-sense, and keen sympathy for all who were in distress and for animals. The mere fact that he was able to attract to himself so considerable a body of re- spectable followers, including such men as Ellwood, Barclay, Penington and Penn, is sufficient to prove that he possessed in a very eminent degree the power of conviction, persuasion, and moral ascendancy; while of his personal uprightness, single-mindedness and sincerity there can be no question.

The writings of Fox are enumerated in Joseph Smith's Catalogue of Friends' Books. The Journal is especially interesting; of it Sir James Mackintosh has said that " it is one of the most extraordinary and instructive narratives in the world, which no reader of competent judgment can peruse without revering the virtue of the writer." The Journal was originally published in London in 1694; the edition known as the Bicentenary Edition, with notes biographical and historical (reprint of 1901 or later), will be found the most useful in practice. An exact transcript of the Journal has been issued by the Cambridge University Press. A Life of George Fox, by Dr Thomas Hodgkin; The Fells of Swarthmoor Hall, by Maria Webb ; and The Life and Character of George Fox, by John Stephenson Rowntree, are valuable. For a mention of other works, and for details of the principles and history of the Society of Friends, to- gether with some further information about Fox, see the article Friends, Society of. (A. N. B.)

FOX, RICHARD (c. 1448-1528), successively bishop of Exeter, Bath and Wells, Durham, and Winchester, lord privy seal, and founder of Corpus Christi College, Oxford, was born about 1448 at Ropesley near Grantham, Lincolnshire. His parents belonged to the yeoman class, and there is some obscurity about Fox's early career. It is not known at what school he was educated, nor at what college, though the presumption is in favour of Magdalen, Oxford, whence he drew so many members of his subsequent foundation, Corpus Christi. He also appears to have studied at Cambridge, but nothing definite is known of the first thiry-five years of his career. In 1484 he was in Paris, whether merely for the sake of learning or because he had rendered himself obnoxious to Richard III. is a matter of specula-

tion. At any rate he was brought into contact with the earl of Richmond, who was then beginning his quest for the English throne, and was taken into his service. In January 1485 Richard intervened to prevent Fox's appointment to the vicarage of Stepney on the ground that he was keeping company with the " great rebel, Henry ap Tuddor."

The important offices conferred on Fox immediately after the battle of Bosworth imply that he had already seen more extensive political service than can be traced in records. Doubt- less Henry VII. had every reason to reward his companions in exile, and to rule like Ferdinand of Aragon by means of lawyers and churchmen rather than trust nobles like those who had made the Wars of the Roses. But without an intimate knowledge of Fox's political experience and capacity he would hardly have made him his principal secretary, and soon afterwards lord privy seal and bishop of Exeter (1487). The ecclesiastical preferment was merely intended to provide a salary not at Henry's expense; for Fox never saw either Exeter or the diocese of Bath and Wells to which he was translated in 1492. His activity was confined to political and especially diplomatic channels; so long as Morton lived, Fox was his subordinate, but after the archbishop's death he was second to none in Henry's confidence, and he had an important share in all the diplomatic

work of the reign. In 1487 he negotiated a treaty with James III. of Scotland, in 1491 he baptized the future Henry VIII., in 1492 he helped to conclude the treaty of Etaples, and in 1497 he was chief commissioner in the negotiations for the famous commercial agreement with the Netherlands which Bacon seems to have been the first to call the Magnus Intercursus.

Meanwhile in 1494 Fox had been translated to Durham, not merely because it was a richer see than Bath and Wells but because of its political importance as a palatine earldom and its position with regard to the Borders and relations with Scotland. For these reasons rather than from any ecclesiastical scruples Fox visited and resided in his new diocese; and he occupied Norham Castle, which he fortified and defended against a Scottish raid in Perkin Warbeck's interests (1497)- But his energies were principally devoted to pacific purposes. In that same year he negotiated Perkin's retirement from the court of James IV., and in 1498- 1499 he completed the negotiations for that treaty of marriage between the Scottish king and Henry's daughter Margaret which led ultimately to the union of the two crowns in 1603 and of the two kingdoms in 1707. The marriage itself did not take place until 1503, just a century before the accession of

James I.

This consummated Fox's work in the north, and in 1501 he was once more translated to Winchester, then reputed the richest bishopric in England. In that year he brought to a conclusion marriage negotiations not less momentous in their ultimate results, when Prince Arthur was betrothed to Catherine of Aragon. His last diplomatic achievement in the reign of Henry VII. was the betrothal of the king's younger daughter Mary to the future emperor Charles V. In 1 500 he was elected chancellor of Cambridge University, an office not confined to noble lords until a much more democratic age, and in 1507 master of Pembroke Hall in the same university. The Lady Margaret Beaufort made him one of her executors, and in this capacity as well as in that of chancellor, he had the .chief share with Fisher in regulating the foundation of St John's College and the Lady Margaret professorships and readerships. His financial work brought him a less enviable notoriety, though a curious freak of history has deprived him of the credit which is his due for " Morton's fork." The invention of that ingenious dilemma for extorting contributions from poor and rich alike is ascribed as a tradition to Morton by Bacon; but the story is told in greater detail of Fox by Erasmus, who says he had it from Sir Thomas More, a well-informed contemporary authority. It is in keeping with the somewhat malicious saying about Fox reported by Tyndale that he would sacrifice his father to save his king, which after all is not so damning as Wolsey's dying words.

The accession of Henry VIII. made no immediate difference to Fox's position. If anything, the substitution of the careless pleasure-loving youth for Henry VII. increased the power of his ministry, the personnel of which remained unaltered. The Venetian ambassador calls Fox " alter rex " and the Spanish ambassador Carroz says that Henry VIII. trusted him more than any other adviser, although he also reports Henry's warning that the bishop of Winchester was, as his name implied, " a fox indeed." He was the chief of the ecclesiastical statesmen who belonged to the school of Morton, believed in frequent parlia- ments, and opposed the spirited foreign policy which laymen like Surrey are supposed to have advocated. His colleagues were Warham and Ruthal, but Warham and Fox differed on the question of Henry's marriage. Fox advising the completion of the match with Catherine while Warham expressed doubts as to its canonical validity. They also differed over the pre- rogatives of Canterbury with regard to probate and other questions of ecclesiastical jurisdiction.

Wolsey's rapid rise in 1511 put an end to Fox's influence. The pacific policy of the first two years of Henry VIII.'s reign was succeeded by an adventurous foreign policy directed mainly against France; and Fox complained that no one durst do anything in opposition to Wolsey's wishes.

Gradually Warham and Fox retired from the government; the occasion of Fox's

resignation of the privy seal was Wolsey's ill-advised attempt to drive Francis I. out of Milan by financing an expedition led by the emperor Maximilian in 1516. Tunstall protested, Wolsey took Warham 's place as chancellor, and Fox was succeeded by Ruthal, who, said the Venetian ambassador, " sang treble to Wolsey's bass." He bore Wolsey no ill-will, and warmly con- gratulated him two years later when warlike adventures were abandoned at the peace of London. But in 1522 when war was again declared he emphatically refused to bear any part of the responsibility, and in 1523 he opposed in convocation the financial demands which met with a more strenuous resistance in the House of Commons.

He now devoted himself assiduously to his long-neglected episcopal duties. He expressed himself as being as anxious for the reformation of the clergy as Simeon for the coming of the Messiah; but while he welcomed Wolsey's never-realized promises, he was too old to accomplish much himself in the way of remedying the clerical and especially the monastic depravity, licence and corruption he deplored. His sight failed during the last ten years of his life, and there is no reason to doubt Matthew Parker's story that Wolsey suggested his retirement from his bishopric on a pension. Fox replied with some warmth, and Wolsey had to wait until Fox's death before he could add Winchester to his archbishopric of York and his abbey of St Albans, and thus leave Durham vacant as he hoped for the illegitimate son on whom (aged 18) he had already conferred a deanery, four archdeaconries, five prebends and a chancellor- ship.

The crown of Fox's career was his foundation of Corpus Christi College, which he established in 151 5-1 5 16. Originally he in- tended it as an Oxford house for the monks of St Swithin's, Winchester; but he is said to have been dissuaded by Bishop Oldham, who denounced the monks and foretold their fall. The scheme adopted breathed the spirit of the Renaissance; provision was made for the teaching of Greek, Erasmus lauded the institu- tion and Pole was one of its earliest fellows. The humanist Viveswas brought from Italy to teach Latin, and the reader in theology was instructed to follow the Greek and Latin Fathers rather than the scholastic commentaries. Fox also built and endowed schools at Taunton and Grantham, and was a benefactor to numerous other institutions. He died at Wolvesey on the 5th of October 1528; Corpus possesses several portraits and other relics of its founder.

See Letters and Papers of Henry VII. and Henry VIII., vols, i.-iv. ; Spanish and Venetian Calendars of State Papers; Gairdner's Lollardy and the Reformation and Church History 1485-1558; Pollard's

Tipttrv vTTT • I nnrrman'c JP/i/iV-i' i-n 1 X7» ct™,i, ..^1 .. . ~ + U — ~..^1 :..•„-

Henry VIII. ; Longman's Political History, vol. v. ; other authorities cited in the article by Dr T. Fowler (formerly president of Corpus) in the Diet. Nat. Biog. (A. F. P.)

FOX, ROBERT WERE (1789-187 7), English geologist and natural philosopher, was born at Falmouth on the 26th of April 1789. He was a member of the Society of Friends, and was descended from members who had long settled in Cornwall, although he was not related to George Fox who had introduced the community into the county. He was distinguished for his researches on the internal temperature of the earth, being the first to prove that the heat increased definitely with the depth ; his observations being conducted in Cornish mines from 1815 for a period of forty years. In 1829 he commenced a series of experiments on the artificial production of miniature metalli- ferous veins by means of the long-continued influence of electric currents, and his main results were published in Observations on Mineral Veins {Rep. Royal Cornwall Polytech. Soc., 1836). He was one of the founders in 1833 of the Royal Cornwall Poly- technic Society. He constructed in 1834 an improved form of deflector dipping needle. In 1848 he was elected F.R.S. His garden at Penjerrick near Falmouth became noted for the number of exotic plants which he had naturalized. He died on the 25th of July 1877. (See A Catalogue of the Works of Robert Were Fox, F.R.S. , with a Sketch of his Life, by J. H. Collins,

1878.)

His daughter, Caroline Fox (1819-1871), born at Falmouth on the 24th of May 1819, is well known as the authoress of a

diary, recording memories of many distinguished people, such as John Stuart Mill, John Sterling and' Carlyle. Selections from her diary and correspondence (1835-1871) were published under the title of Memories of Old Friends (ed. by H. N. Pym, 1881; 2nd ed., 1882). She died on the 12th of January 1871.

FOX, SIR STEPHEN (1627-1716), English statesman, born on the 27th of March 1627, was the son of William Fox, of Farley, in Wiltshire, a yeoman farmer. At the age of fifteen he first obtained a situation in the household of the earl of North- umberland; then he entered the service of Lord Percy, the earl's brother, and was present with the royalist army at the battle of Worcester as Lord Percy's deputy at the ordnance board. Accompanying Charles II. in his flight to the continent, he was appointed manager of the royal household, on Clarendon's recommendation as " a young man bred under the severe discipline of Lord Percy . . . very well qualified with languages, and all other parts of clerkship, honesty and discretion." The skill with which he managed the exiguous finances of the exiled court earned him further confidence and promotion. He was employed on several important missions, and acted eventually as intermediary between the king and General Monk. Honours and emolument were his reward after the Restoration; he was appointed to the lucrative offices of first clerk of the board of green cloth and paymaster-general of the forces. In November 1 66 1 he became member of parliament for Salisbury. In 1665 he was knighted, was returned as M.P. for Westminster on the 27th of February 1679, and succeeded the earl of Rochester as a commissioner of the treasury, filling that office for twenty-three years and during three reigns. In 1680 he resigned the pay- mastership and was made first commissioner of horse. In 1684 he became sole commissioner of horse. He was offered a peerage by James II., on condition of turning Roman Catholic, but refused, in spite of which he was allowed to retain his com- missionerships. In 1685 he was again M. P. for Salisbury, and opposed the bill for a standing army supported by the king. During the Revolution he maintained an attitude of decent reserve, but on James's flight, submitted to William III., who confirmed him in his offices. He was again elected for West- minster in 1691 and 1695, for Cricklade in 1698, and finally in 1713 once more for Salisbury. He died on the 28th of October 1 716. It is his distinction to have founded Chelsea hospital, and to have contributed £13,000 in aid of this laudable public work. Though his place as a statesman is in the second or even the third rank, yet he was a useful man in his generation, and a public servant who creditably discharged all the duties with which he was entrusted. Unlike other statesmen of his day, he grew rich in the service of the nation without being suspected of corruption,

and without forfeiting the esteem of his con- temporaries.

He was twice married (1651 and 1703); by his first wife, Elizabeth Whittle, he had seven sons, who predeceased him, and three daughters; by his second, Christian Hopes, he had two sons and two daughters. The elder son by the second marriage, Stephen (1704-1776), was created Lord Ilchester and Stavordale in 1747 and earl of Ilchester in 1756; in 1758 he took the additional name of Strangways, and his descendants, the family of Fox-Strangways, still hold the earldom of Ilchester. The younger son, Henry, became the 1st Lord Holland (q.v.).

FOX, SIR WILLIAM (1812-1893), New Zealand statesman, third son of George Townshend Fox, deputy-lieutenant for Durham county, was born in England on the 9th of June 181 2, and educated at Wadham College, Oxford, where he took his degree in 1832. Called to the bar in 1842, he emigrated im- mediately thereafter to New Zealand, where, on the death of Captain Arthur Wakefield, killed in 1843 in the Wairau massacre, he became the New Zealand Company's agent for the South Island. While holding this position he made a memorable exploring march on foot from Nelson to Canterbury, through Cannibal Gorge, in the course of which he discovered the fertile pastoral country of Amuri. In 1848 Governor Grey made Fox attorney-general, but he gave up the post almost at once in order to join the agitation, then at its height, for a free constitu-

tion. As the political agent of the Wellington settlers he sailed to London in 1850 to urge their demands in Downing Street. The colonial office, however, refused to recognize him, and, after publishing a sketch of the New Zealand settlements, The Six Colonies of New Zealand, and travelling in the United States, he returned to New Zealand and again threw himself with energy into public affairs. When government by responsible ministers was at last initiated, in 1856, Fox ousted the first ministry and formed a cabinet, only to be himself beaten in turn after holding office but thirteen days. In 1861 he regained office, and was somewhat more fortunate, for he remained premier for nearly thirteen months. Again, in the latter part of 1863 he took office: this time with Sir Frederick Whitaker as premier, an arrangement which endured for another thirteen months. Fox's third premier- ship began in 1869 and lasted until 1872. His fourth, which was a matter of temporary convenience to his party, lasted only five weeks in March and April 1873. Soon afterwards he left politics, and, though he reappeared after some years and led the attack which overthrew Sir George Grey's ministry in 1879, he lost his seat in the dissolution which followed in that year and did not again enter parliament. He was made K.C.M.G. in 1880.

For the thirty years between 1850 and 1880 Sir William Fox was one of

the half-dozen most notable public men in the colony. Impulsive and controversial, a fluent and rousing speaker, and a ready writer, his warm and sympathetic nature made him a good friend and a troublesome foe. He was, considered for many years to be the most dangerous leader of the Opposition in the colony's parliament, though as premier he was at a disadvantage when measured against more patient and more astute party managers. His activities were first devoted to secure self- government for the New Zealand colonists. Afterwards his sympathies made him prominent among the champions of the Maori race, and he laboured indefatigably for their rights and to secure permanent peace with the tribes and a just settlement of their claims. It was during his third premiership that this peace, so long deferred, was at last gained, mainly through the influence and skill of Sir Donald M'Lean, native minister in the Fox cabinet. Finally, after Fox had left parliament he devoted himself, as joint-commissioner with Sir Francis Dillon Bell, to the adjustment of the native land-claims on the west coast of the North Island. The able reports of the commissioners were his last public service, and the carrying out of their recom- mendations gradually removed the last serious native trouble in New Zealand. When, however, in the course of the native wars from i860 to 1870 the colonists of New Zealand were exposed to cruel and unjust imputations in England, Fox zealously defended them in a book, The War in New Zealand (1866), which was not only a spirited vindication of his fellow- settlers, but a scathing criticism of the generalship of the officers commanding the imperial troops in New Zealand. Throughout his life Fox was a consistent advocate of total abstinence. It was he who founded the New Zealand Alliance, and he un- doubtedly aided the growth of the prohibition movement after- wards so strong in the colony. He died on the 23rd of June 1893, exactly twelve months after his wife, Sarah, daughter of William Halcombe. (W. P. R.)

FOX, a name (female, " vixen ") properly applicable to the single wild British representative of the family Canidae (see Carnivora), but in a wider sense used to denote fox-like species from all parts of the world, inclusive of many from South America which do not really belong to the same group. The fox was included by Linnaeus in the same genus with the dog and the wolf, under the name of Canis vulpes, but at the present day is regarded by most naturalists as the type of a separate genus, and should then be known as Vulpes alopex or Vulpes vulpes. From*

1 The word is common to the Teutonic languages, cf. Dutch vos, Ger. Fuchs; the ultimate origin is unknown, but a connexion has been suggested with Sanskrit puccha, tail. The feminine " vixen " represents the O. Eng. fyxen, due to the change from to y, and addition of the feminine termination -en, cf . O. Eng. gy den, goddess, and Ger. Fuchsin, vixen. The v, for /, is common in southern English pronunciation; vox, for

fox, is found in the Ancren Riiule, c. 1230.

dogs, wolves, jackals, &c, which constitute the genus Canis in its more restricted sense, foxes are best distinguished by the circumstance that in the skull the (postorbital) projection immediately behind the socket for the eye has its upper surface concave, with a raised ridge in front, in place of regularly convex. Another character is the absence of a hollow chamber, or sinus, within the frontal bone of the forehead. Foxes are likewise distinguished by their slighter build, longer and bushy tail, which always exceeds half the length of the head and body, sharper muzzle, and relatively longer body and shorter limbs. Then again, the ears are large in proportion to the head, the pupil of the eye is elliptical and vertical when in a strong light, and the female has six pairs of teats, in place of the three to five pairs found in dogs, wolves and jackals. From the North American grey foxes, constituting the genus or subgenus Urocyon, the true foxes are distinguished by the absence of a crest of erectile long hairs along the middle line of the upper surface of the tail, and also of a projection (subangular process) to the postero-inferior angle of the lower jaw. With the exception of certain South African species, foxes differ from wolves and jackals in that they do not associate in packs, but go about in pairs or are solitary.

From the Scandinavian peninsula and the British Islands the range of the fox extends eastwards across Europe and central and northern Asia to Japan, while to the south it embraces northern Africa and Arabia, Persia, Baluchistan, and the north- western districts of India and the Himalaya. On the North American side of the Atlantic the fox reappears. With such an enormous geographical range the species must of necessity present itself under a considerable number of local phases, differ- ing from one another to a greater or less degree in the matters of size and colouring. By some naturalists many of these local forms are regarded as specifically distinct, but it seems better and simpler to class them all as local phases or races of a single species primarily characterized by the white tip to the tail and the black or dark-brown hind surface of the ear. The " foxy red " colouring of the typical race of north-western Europe is too well known to require description. From this there is a more or less nearly complete gradation on the one hand to pale- coloured forms like the white-footed fox (V. aiopex leucopus) of Persia, N.W. India and Arabia, and on the other to the silver or black fox (V. a. argentatus) of North America which yields the valuable silver-tipped black fur. Silver foxes apparently also occur in northern Asia.

To mention all the other local races would be superfluous, and it will suffice to note that the North African fox is known as V. a. niloticus, the Himalayan as V. a. montanus, the Tibetan as V. a. wadelli, the North American red or cross fox as V. a. pennsyhanicus, and the Alaskan as V. a. harrimani; the last named, like several other animals from Alaska, being the largest of its kind.

The cunning and stratagem of the fox have been proverbial for many ages, and he has figured as a central character in fables from the earliest times, as in Aesop, down to " Uncle Remus," most notably as Reynard {Raginohardus, strong in counsel) in the great medieval beast-epic " Reynard the Fox " (q.v.). It is not unlikely that, owing to the conditions under which it now lives, these traits are even more developed in England than elsewhere. In habits the fox is to a great extent solitary, and its home is usually a burrow, which may be excavated by its own labour, but is more often the usurped or deserted tene- ment of a badger or a rabbit. Foxes will, however, often take up their residence in woods, or even in water-meadows with large tussocks of grass, remaining concealed during the day and issuing forth on marauding expeditions at night. Rabbits, hares, domesticated poultry, game-birds, and, when these run short, rats, mice and even insects, form the chief diet of the fox. When living near the coast foxes will, however, visit the shore at low water in search of crabs and whelks; and the old story of the fox and the grapes seems to be founded upon a partiality on the part of the creature for that fruit. Flesh that has become tainted appears to be specially acceptable; but it is a curious fact that on no account will a fox eat any kind of bird of prey. x. 25

After a gestation of from 60 to 65 days, the vixen during the month of April gives birth to cubs, of which from five to eight usually go to form a litter. When first born these are clothed with a uniform slaty-grey fur, which in due course gives place to a coat of more tawny hue than the adult livery. In a year and a half the cubs attain their full development; and from observa- tions on captive specimens it appears that the duration of life ought to extend to some thirteen or fourteen years. In the care and defence of her young the vixen displays extraordinary solicitude and boldness, altogether losing on such occasions her accustomed timidity and caution. Like most other young animals, fox-cubs are exceedingly playful, and may be seen chasing one another in front of the mouth of the burrow, or evert running after their own tails.

Young foxes can be tamed to a certain extent, and do not then emit the well-known odour to any great degree unless excited. The species cannot, however, be completely domesticated, and never displays the affectionate traits of the dog. It was long believed that foxes and dogs would never

interbreed; but several instances of such unions have been recorded, although they are undoubtedly rare. When suddenly confronted in a situation where immediate escape is impossible, the fox, like the wolf, will not hesitate to resort to the death-feigning instinct. Smartness in avoiding traps is one of the most distinctive traits in the character of the species; but when a trap has once claimed its victim, and is consequently no longer dangerous, the fox is always ready to take advantage of the gratuitous meal.

Red fox-skins are largely imported into Europe for various purposes, the American imports alone formerly reaching as many as 60,000 skins annually. Silver fox is one of the most valuable of all furs, as much as £480 having been given for an unusually fine pair of skins in 1902.

Of foxes certainly distinct specifically from the typical repre- sentative of the group, one of the best known is the Indian Vulpes bengalensis, a species much inferior in point of size to its European relative, and lacking the strong odour of the latter, from which it is also distinguished by the black tip to the tail and the pale-coloured backs of the ears. The corsac fox (V. cor sac), ranging from southern Russia and the Caspian provinces across Asia to Amurland, may be regarded as a northern repre- sentative of the Indian species; while the pale fox (V. pallidus), of the Suakin and Dongola deserts, may be regarded as the African representative of the group. Possibly the kit-fox (V. velox), which has likewise a black tail- tip and pale ears, may be the North American form of the same group. The northern fennec (V. famelicus), whose range extends apparently from Egypt and Somaliland through Palestine and Persia into Afghan- istan, seems to form a connecting link between the more typical foxes and the small African species properly known as fennecs. The long and bushy tail in the northern species has a white tip and a dark gland-patch near the root, but the backs of the ears are fawn-coloured. The enormous length of the ears and the small bodily size (inferior to that of any other member of the family) suffice to distinguish the true fennec (V. zerda) of Algeria and Egypt, in which the general colour is pale and the tip of the relatively short tail black. South of the Zambezi the group reappears in the shape of the asse-fox or fennec. (V. cama), a dark-coloured species, with a black tip to the long, bushy tail and reddish-brown ears.

Passing from South Africa to the north polar regions of both the Old and the New World, inclusive of Iceland, we enter the domain of the Arctic fox (V. lagopus), a very distinct species characterized by the hairy soles of its feet, the short, blunt ears, the long, bushy tail, and the great length of the fur in winter. The upper parts in summer are usually brownish and the under parts white; but in winter the whole coat, in this phase of the species, turns white. In a second phase of the species, the colour, which often

displays a slaty hue (whence the name of blue fox), remains more or less the same throughout the year, the winter coat being, however, recognizable by the great length of the fur. Many at least of the " blue fox " skins of the fur- trade are white skins dyed. About 2000 blue fox-skins were

annually imported into London from Alaska some five-and- twenty years ago. Arctic foxes feed largely on sea-birds and lemmings, laying up hidden stores of the last-named rodents for winter use.

The American grey fox, or Virginian fox, is now generally ranged as a distinct genus (or a subgenus of Canis) under the name of Urocyon cinereo-argentatus, on account of being dis- tinguished, as already mentioned, by the presence of a ridge of long erectile hairs along the upper surface of the tail and of a projection to the postero-inferior angle of the lower jaw. The prevailing colour of the fur of the upper parts is iron-grey.

The so-called foxes of South America, such as the crab-eating fox (C. thous), Azara's fox (C. azarae), and the colpeo (C. magel- lanicus), are aberrant members of the typical genus Canis. On the other hand, the long-eared fox or Delalande's fox (Otocyon megalotis) of south and east Africa represents a totally distinct genus.

See St George Mivart, Dogs, Jackals, Wolves and Foxes (London, 1890); R. I. Pocock, "Ancestors and Relatives of the Dog," in The Kennel Encyclopaedia (London, 1907). For fox-hunting, see Hunting. (R. L.)*

FOXE, JOHN (1516-1587), the author of the famous Book of Martyrs, was born at Boston, in Lincolnshire, in 1516. At the age of sixteen he is said to have entered Brasenose College, Oxford, where he was the pupil of John Harding or Hawarden, and had for room-mate Alexander Nowell, afterwards dean of St. Paul's. His authenticated connexion at the university is, however, with Magdalen College. He took his B.A. degree in 1537 and his M.A. in 1543. He was lecturer on logic in 1540- 1541. He wrote several Latin plays on Scriptural subjects, of which the best, De Christo triumphante, was repeatedly printed, (London, 1551 ; Basel, 1556, &c), and was translated into English by Richard Day, son of the printer. He became a fellow of Magdalen College in 1539, resigning in 1545. It is said that he refused to conform to the rules for regular attendance at chapel, and that he protested both against the enforced celibacy of fellows and the obligation to take holy orders within seven years of their election. The customary statement that he was expelled from his fellowship is based on the untrustworthy biography attributed to his son Samuel Foxe, but the college records state that he resigned of his own accord and ex honesta

causa. The letter in which he protests to President Oglethorpe against the charges of irreverence, &c, brought against him is printed in Pratt's edition (vol. i. Appendix, pp. 58-61).

On leaving Oxford he acted as tutor for a short time in the house of the Lucys of Charlecote, near Stratford-on-Avon, where he married Agnes Randall. Late in 1547 or early in the next year he went to London. He found a patron in Mary Fitzroy, duchess of Richmond, and having been ordained deacon by Ridley in 1550, he settled at Reigate Castle, where he acted as tutor to the duchess's nephews, the orphan children of Henry Howard, earl of Surrey. On the accession of Queen Mary, Foxe was deprived of his tutorship by the boys' grandfather, the duke of Norfolk, who was now released from prison. He retired to Strassburg, and occupied himself with a Latin history of the Christian persecutions which he had begun at the suggestion of Lady Jane Grey. He had assistance from two clerics of widely differing opinions — from Edmund Grindal, who was later, as archbishop of Canterbury, to maintain his Puritan convictions in opposition to Elizabeth; and from John Aylmer, afterwards one of the bitterest opponents of the Puritan party. This book, dealing chiefly with Wycliffe and Huss, and coming down to 1500, formed the first outline of the Actes and Monuments. It was printed by Wendelin Richelius with the title of Commentarii rerum in ecclesia gestarum (Strasburg, 1554). In the year of its publication Foxe removed to Frankfort, where he found the English colony of Protestant refugees divided into two camps. He made a vain attempt to frame a compromise which should be accepted by the extreme Calvinists and by the partisans of the Anglican doctrine. He removed (1555) to Basel, where he worked as printer's reader to Johann Herbst or Oporinus. He made steady progress with his great book as he received

reports from England of the religious persecutions there, and he issued from the press of Oporinus his pamphlet Ad inclytos ac praepotentes Angliae proceres . . . supplicatio (1557), a plea for toleration addressed to the English nobility. In 1559 he com- pleted the Latin edition 1 of his martyrology and returned to England. He lived for some time at Aldgate, London, in the house of his former pupil, Thomas Howard, now duke of Norfolk, who retained a sincere regard for his tutor and left him a small pension in his will. He became associated with John Day the printer, himself once a Protestant exile. Foxe was ordained priest by Edmund Grindal, bishop of London, in 1560, and besides much literary work he occasionally preached at Paul's Cross and other places. His work had rendered great service, to the government, and he might have had high preferment in the Church but for the Puritan views which he consistently maintained. He held, however, the prebend of Shipton in Salisbury cathedral, and is said to have been for a short time rector of Cripplegate.

In 1563 was issued from the press of John Day the first English edition of the Actes and Monuments of these latter and perillous Dayes, touching matters of the Church, wherein are comprehended and described the great Persecution and horrible Troubles that have been wrought and practised by the Romishe Prelates, specially e in this Realme of England and Scotland, from the yeare of our Lorde a thousande to the time now present. Gathered and collected according to the true Copies and Wrytinges certificatorie as well of the Parties themselves that Suffered, as also out of the Bishop's Registers, which were the Doers thereof, by John Foxe, commonly known as the Book of Martyrs. Several gross errors which had appeared in the Latin version, and had been since exposed, were corrected in this edition. Its popularity was immense and signal. The Marian persecution was still fresh in men's minds, and the graphic narrative intensified in its numerous readers the fierce hatred of Spain and of the Inquisition which was one of the master passions of the reign. Nor was its influence transient. For generations the popular conception of Roman Catholicism was derived from its bitter pages. Its accuracy was immediately attacked by Catholic writers, notably in the Dialogi sex (1566), nominally from the pen of Alan Cope, but in reality by Nicholas Harpsfield and by Robert Parsons in Three Conversions of England (1570). These criticisms induced Foxe to produce a second corrected edition, Ecclesiastical History, conlayning the Actes and Monuments of things passed in every kynges tyme . . . in 1570, a copy of which was ordered by Convocation to be placed in every collegiate church. Foxe based his accounts of the martyrs partly on authentic documents and reports of the trials, and on statements received direct from the friends of the sufferers, but he was too hasty a worker and too violent a partisan to produce anything like a correct or impartial account of the mass of facts with which he had to deal. Anthony a Wood says that Foxe " believed and reported all that was told him, and there is every reason to suppose that he was purposely misled, and continually deceived by those whose interest it was to bring discredit on his work," but he admits that the book is a monument of his industry, his laborious research and his sincere piety. The gross blunders due to carelessness have often been exposed, and there is no doubt that Foxe was only too ready to believe evil of the Catholics, and he cannot always be exonerated from the charge of wilful falsification of evidence. It should, however, be remembered in his honour that his advocacy of religious toleration was far in advance of his day. He pleaded for the despised Dutch Anabaptists, and remon- strated with John Knox on the rancour of his First Blast of the Trumpet. Foxe was one of the earliest students of Anglo- Saxon, and he and Day published an edition of the Saxon gospels under the patronage of Archbishop Parker. He died on the 18th of April 1587 and was buried at St Giles's, Cripplegate.

1 Printed by Oporinus and Nicolaus Brylinger. The title is Rerum in

ecclesia gestarum . . . pars prima, in qua primum de rebus per Angliam et Scotiam gestis atque in primis de horrenda sub Maria nuper regina persecutione narratio continetur.

A list of his Latin tracts and sermons is given by Wood, and others, some of which were never printed, appear in Bale. Four editions of the Actes and Monuments appeared in Foxe's lifetime. The eighth edition (1641) contains a memoir of Foxe purporting to be by his son Samuel, the MS. of which is in the British Museum (Lans- downe MS. 388). Samuel Foxe's authorship is disputed, with much show of reason, by Dr S. R. Maitland in On the Memoirs of Foxe ascribed to his Son (1841). The best-known modern edition of the Martyrology is that (1837-1841) by the Rev. Stephen R. Cattley, with an introductory life by Canon George Townsend. The numer- ous inaccuracies of this life and the frequent errors of Foxe's narra- tive were exposed by Dr Maitland in a series of tracts (1837-1842), collected (1841-1842) as Notes on the Contributions of the Rev. George Townsend, M.A. . . . to the New Edition of Fox's Martyrology. The criticism lavished on Cattley and Townsend 's edition led to a new one (1846-1849) under the same editorship. A new text prepared by the Rev. Josiah Pratt was issued (1870) in the " Refor- mation Series " of the Church Historians of England, with a revised version of Townsend's Life and appendices giving copies of original documents. Later edition by W. Grinton Berry (1907).

Foxe's papers are preserved in the Harleian and Lansdowne collections in the British Museum. Extracts from these were edited by J. G. Nichols for the Camden Society (1859). See also W. Winters, Biographical Notes on John Foxe (1876); James Gairdner, History of the English Church in the Sixteenth Century.

FOXGLOVE, a genus of biennial and perennial plants of the natural order Scrophulariaceae. The common or purple foxglove,

Foxglove (Digitalis purpurea), one-third nat. size. Corolla cut open showing the showing the thick axial pla

four stamens ; rather than half nat. size. 2. Unripe fruit cut lengthwise,

centa bearing numerous small

seeds.

Ripe capsule split open.

D. purpurea, is common in dry hilly pastures and rocky places and by road-sides in various parts of Europe ; it ranges in Great Britain from Cornwall and Kent to Orkney, but it does not occur in Shetland or in some of the eastern counties of England.

It flourishes best in siliceous soils, and is not found in the Jura and Swiss Alps. The characters of the plant are as follows: stem erect, roundish, downy, leafy below, and from 18 in. to 5 ft. or more in height; leaves alternate, crenate, rugose, ovate or elliptic oblong, and of a dull green, with' the under surface downy and paler than the upper; radical leaves together with their stalks often a foot in length; root of numerous, slender, whitish fibres; flowers i£-2j in. long, pendulous, on one side of the stem, purplish crimson, and hairy and marked with eye-like spots within; segments of calyx ovate, acute, cleft to the base; corolla bell-shaped 'with a broadly two-lipped obtuse mouth, the upper lip entire or obscurely divided; stamens four, two longer than the other two (didynamous) ; anthers yellow and bilobed ; capsule bivalved, ovate and pointed; and seeds numerous, small, oblong, pitted and of a pale brown. As Parkinson re- marks of the plant, " It flowreth seldome before July, and the seed is ripe in August "; but it may occasionally be found in blossom as late as September. Many varieties of the common foxglove have been raised by cultivation, with flowers varying in colour from white to deep rose and purple; in the variet}' gloxinioides the flowers are almost regular, suggesting those of the cultivated gloxinia. Other species of foxglove with variously coloured flowers have been introduced into Britain from the continent of Europe. The plants may be propagated by un- dowered off-sets from the roots, but being biennials are best raised from seed.

The foxglove, probably from folks'-glove, that is fairies' glove, is known by a great variety of popular names in Britain. In the south of Scotland it is called bloody fingers; farther north, dead-men's-bells; and on the eastern borders, ladies' thimbles, wild mercury and Scotch mercury. In Ireland it is generally known under the name of fairy thimble. Among its Welsh synonyms are menyg-ellyllon (elves' gloves), menyg y llwynog (fox's gloves), bysedd cochion (redfingers) and bysedd y cum (dog's fingers). In France its designations are gants de notre dame and doigts de la Vierge. The German name Fingerhut (thimble) suggested to Fuchs, in 1542, the employment of the Latin adjective digitalis as a designation for the plant. Other species of foxglove or Digitalis although found in botanical collections are not generally grown. For medicinal uses see Digitalis.

FOX INDIANS, the name, from one of their clans, of an Algon- quian tribe, whose former range was central Wisconsin. They call themselves Muskwakiuk, " red earth people." Owing to heavy losses in their wars with the Ojibways and the French, they allied themselves with the Sauk tribe

about 1780, the two tribes being now practically one.

FOX MORCILLO, SEBASTIAN (i526?i559?), Spanish scholar and philosopher, was born at Seville between 1526 and 1528. About 1548 he studied at Louvain, and, following the example of the Spanish Jew, Judas Abarbanel, published commentaries on Plato and Aristotle in which he endeavoured to reconcile their teaching. In 1559 he was appointed tutor to Don Carlos, son of Philip II., but did not live to take up the duties of the post, as he was lost at sea on his way to Spain. His most original work is the De imitatione, seu de informandi styli ratione librill . (1554), a dialogue in which the author and his brother take part under the pseudonyms of Caspar and Francisco Enuesia. Among Fox Morcillo's other publications are : (1) In Topica Ciceronis paraphrasis et scholia (1550); (2) In Platonis Timaeum com mentarii (1554); (3) Compendium ethices philosophiae ex Platone, Aristotele, aliisque philosophis collcctum; (4) De historiae in- stitutione dialogus (1557), and (5) De naturae philosophia.

He is the subject of an excellent monograph by Urbano Gonzalez de Calle, Sebastian Fox Morcillo: estudio historico-critico de sus doctrinas (Madrid, 1903).

FOY, MAXIMILIEN SEBASTIEN (1775-1825), French general and statesman, was born at Ham in Picardy on the 3rd of February 1775. He was the son of an old soldier who had fought at Fontenoy and had become post-master of the town in which he lived. His father died in 1780, and his early instruc- tion was given by his mother, a woman of English origin and of

superior ability. He continued his education at the college of Soissons, and thence passed at the age of fifteen to the artillery school of La Fere. After eighteen months' successful study he entered the army, served his first campaign in Flanders (i 7gi-92) , and was present at the battle of Jemmapes. He soon attained the rank of captain, and served successively under Dampierre, Jourdan, Pichegru and Houchard. In 1794, in consequence of having spoken freely against the violence of the extreme party it Paris, he was imprisoned by order of the commissioner of the Convention, Joseph Lebon, at Cambray, but regained his liberty soon after the fall of Robespierre. He served under Moreau in the campaigns of 1796 and 1797, distinguishing himself in many engagements. The leisure which the treaty of Campo Formio gave him he devoted to the study of public law and modern history, attending the lectures of Christoph Wilhelm von Koch

(1737-1813), the famous professor of public law at Strass- burg. He was recommended by Desaix to the notice of General Bonaparte, but declined to serve on the staff of the Egyptian expedition. In the campaign of Switzerland (1798) he dis- tinguished himself afresh, though he served only with the greatest reluctance against a people which possessed republican institu- tions. In Massena's brilliant campaign of 1799 Foy won the rank of chef de brigade. In the following year he served under Moncey in the Marengo campaign and afterwards in Tirol.

Foy's republican principles caused him to oppose the gradual rise of Napoleon to the supreme power and at the time of Moreau's trial he escaped arrest only by joining the army in Holland. Foy voted against the establishment of the empire, but the only penalty for his independence was a long delay before attaining the rank of general. In 1806 he married a daughter of General Baraguay d'Hilliers. In the following year he was sent to Constantinople, and there took part in the defence of the Darda- nelles against the English fleet. He was next sent to Portugal, and thenceforward he served in the Peninsular War from first to last. Under Junot he won at last his rank of general of brigade, under Soult he held a command in the pursuit of Sir John Moore's army, and under Massena he fought in the third invasion of Portugal (1810). Massena reposed the greatest confidence in Foy, and employed him after Busaco in a mission to the emperor. Napoleon now made Foy's acquaintance for the first time, and was so far impressed with his merits as to make him a general of division at once. The part played by General Foy at the battle of Salamanca won him new laurels, but above all he distinguished himself when the disaster of Vittoria had broken the spirit of the army. Foy rose to the occasion; his resistance in the Pyrenees was steady and successful, and only a wound (at first thought mortal) which he received at Orthez prevented him from keeping the field to the last. At the first restoration of the Bourbons he received the grand cross of the Legion of Honour and a command, and on the return of Napoleon from Elba he declined to join him until the king had fled from the country. He held a divisional command in the Waterloo campaign, and at Waterloo was again severely wounded at the head of his division (see Waterloo Campaign). After the second restoration he returned to civil life, devoting his energies for a time to his projected history of the Peninsular War, and in 1819 was elected to the chamber of deputies. For this position his experience and his studies had especially fitted him, and by his first speech he gained a commanding place in the chamber, which he never lost, his clear, manly eloquence being always employed on the side of the liberal principles of 1789. In 1823 he made a powerful protest against French intervention in Spain, and after the dissolution of 1824 he was re-elected for three constituencies. He died at Paris on the 28th of November 1825, and his funeral was attended, it is said, by 100,000 persons. His early

death was regarded by all as a national calamity. His family was provided for by a general subscription.

The Histoire de la guerre de la Peninsula sous Napoleon was pub- lished from his notes in 1827, and a collection of his speeches (with memoir by Tissot) appeared in 1826 soon after his death. See Cuisin, Vie militaire, politique, &c, du general Foy; Vidal, Vie militaire et politique du general Foy.

FRAAS, KARL NIKOLAS (1810-1875), German botanist and agriculturist, was born at Rattelsdorf, near Bamberg, on the 8th of September 1810. After receiving his preliminary education at, the gymnasium of Bamberg, he in 1830 entered the university o5 Munich, where he took his doctor's degree in 1834. Having devoted great attention to the study of botany, he went to Athens in 1835 as inspector of the court garden; and in April 1836 he became professor of botany at the university. In 1842 he returned to Germany and became teacher at the central agricultural school at Schleissheim. In 1847 he was appointed professor of agriculture at Munich, and in 1851. director of the central veterinary college. For many years he was secretary of the Agricultural Society of Bavaria, but resigned in 1861. He died at his estate of Neufreimann, near Munich, on the 9th of November 1875.

His principal works are: 2>otx«a r»js BoraviKijs (Athens, 1835); Synopsis florae classicae (Munich, 1845) ; Klima und Pflanzenwelt in der Zeit (Landsh., 1847); Histor.encyklopad. Grundriss der Land wirthschaftslehre (Stuttgart, 1848); Geschichte der Lqndwirthschaft (Prague, 1851); Die Schule des Landbaues (Munich, 1852); Baierns Rinderrassen (Munich, 1853); Die kiinstliche Fischerzeugung (Munich, 1854) ; Die Natur der Landwirthschaft (Munich, 1857) ; Buch der Nalur fur Landwirthe (Munich, i860); Die Ackerhaukrisen und ihre Heilmittel (Munich, 1866); Das Wurzelleben der Cultur- pflanzen (Berlin, 1872) ; and Geschichte der Landbau und Forstwissen- schaft seit dent i6 tcn Jahrh. (Munich, 1865). He also founded and edited a weekly agricultural paper, the Schranne.

FRACASTORO [Fracastorius], GIROLAMO [Hieronymus] (1483-1553), Italian physician and poet, was born at Verona in 1483. It is related of him that at his birth his lips adhered so closely that a surgeon was obliged to divide them with his in- cision knife, and that during his infancy his mother was killed by lightning, while he, though in her arms at the moment, escaped unhurt. Fracastoro became eminently skilled, not only in medicine and belles-lettres, but in most arts and sciences. He studied at Padua, and became professor of philosophy there in 1502, afterwards practising as a physician in Verona. It was by his advice that Pope Paul III., on account of the prevalence of a contagious distemper, removed the council of Trent to

Bologna. He was the author of many works, both poetical and medical, and was intimately acquainted with Cardinal Bembo, Julius Scaliger, Gianbattista Ramusie (q.v.), and most of the great men of his time. In 151 7, when the builders of the citadel of San Felice (Verona) found fossil mussels in the rocks, Fracastoro was consulted about the marvel, and he took the same view — follow- ing Leonardo da Vinci, but very advanced for those days — that they were the remains of animals once capable of living in the locality. He died of apoplexy at Casi, near Verona, on the 8th of August 1553; and in 1559 the town of Verona erected a statue in his honour.

The principal work of Fracastoro is a kind of medical poem entitled Syphilidis, sive Morbi Gallici, libri tres (Verona, 1530), which has been often reprinted and also translated into French and Italian. Among his other works (all published at Venice) are De vini temper atur a (1534); Homocentricorum (1535); De sym- patha et antipathia rerum (1546); and De contagionibus (1546). His complete works were published at Venice in 1555, and his poetical productions were collected and printed at Padua in 1728.

FRAGONARD, JEAN-HONORE (173 2-1 806), French painter, was born at Grasse, the son of a glover. He was articled to a Paris notary when his father's circumstances became straitened through unsuccessful speculations, but he showed such talent and inclination for art that he was taken at the age of eighteen to Boucher, who, recognizing the youth's rare gifts but disinclined to waste his time with one so inexperienced, sent him to Chardin's atelier. Fragonard studied for six months under the great luminist, and then returned more fully equipped to Boucher, whose style he soon acquired so completely that the master entrusted him with the execution of replicas of his paintings. Though not a pupil of the Academy, Fragonard gained the Prix de Rome in 1752 with a painting of " Jeroboam sacrificing to the Idols," but before proceeding to Rome he continued to study for three years under Van Loo. In the year preceding his departure he painted the " Christ washing the Feet of the Apostles " now at Grasse cathedral. In 1755 he took up his abode at the French Academy in Rome, then presided over by Natoire. There he

benefited from the study of the old masters whom he was set to copy— always remembering Boucher's parting advice not to take Raphael and Michelangelo too seriously. He successively passed through the studios of masters as widely different in their aims and technique as Chardin,

Boucher, Van Loo and Natoire, and a summer sojourn at the Villa d'Este in the company of the abbe de Saint-Non, who engraved many of Fragonard's studies of these entrancing gardens, did more towards forming his personal style than, all the training at the various schools. It was in these romantic gardens, with their fountains, grottos, temples and terraces, that he conceived the dreams which he was subsequen tly to embody in his art. Added to this influence was the deep impression made upon his mind by the florid sumptuousness of Tiepolo, whose works he had an opportunity of studying in Venice before he returned to Paris in 1761. In 1765 his " Coresus et Callirhoe " secured his admission to the Academy. It was made the subject of a pompous eulogy by Diderot, and was bought by the king, who had it reproduced at the Gobelins factory. Hither- to Fragonard had hesitated between religious, classic and other subjects; but now the demand of the wealthy art patrons of Louis XV. 's pleasure-loving and licentious court turned him definitely towards those scenes of love and voluptuousness with which his name will ever be associated, and which are only made acceptable by the tender beauty of his colour and the virtuosity of his facile brushwork — such works as the " Serment d'amour " (Love Vow), "Le Verrou " (The Bolt), "La Culbute " (The Tumble), " La Chemise tnlevee " (The Shift Withdrawn), and " The Swing " (Wallace collection), and his decorations for the apartments of Mme du Barry and the dancer Marie Guimard.

The Revolution made an end to the ancien rigime, and Fra- gonard, who was so closely allied to its representatives, left Paris in 1793 and found shelter in the house of his friend Maubert at Grasse, which he decorated with the series of decorative panels known as the " Roman d'amour de la jeunesse," originally painted for Mme du Barry's pavilion at Louvreciennes. The panels in recent years came into the possession of Mr Pierpont Morgan. Fragonard returned to Paris early in the 19th cen- tury, where he died in 1806, neglected and almost forgotten. For half a century or more he was so completely ignored that Lubke, in his history of art (1873), omits the very mention of his name. But within the last thirty years he has regained the posi- tion among the masters of painting to which he is entitled by his genius. If the appreciation of his art by the modern collector can be expressed in figures, it is significant that the small and sketchy " Billet Doux," which appeared at the Cronier sale in Paris in 1905 and was subsequently exhibited by Messrs Duveen in London (1906), realized close on £19,000 at the H6tel Drouot.

Besides the works already mentioned, there are four important pictures by Fragonard in the Wallace collection: " The Foun- tain of Love," " The Schoolmistress," " A Lady carving her Name on a Tree " (usually known as " Le Chiffre d'amour ") and " The Fair-haired Child." The Louvre contains thirteen examples of his art,: among them the " Coresus," " The

Sleeping Bacchante," " The Shift Withdrawn," " The Bathers," " The Shepherd's Hour" ("L'Heure du berger"), and "Inspiration." Other works are in the museums of Lille, Besancon, Rouen, Tours, Nantes, Avignon, Amiens, Grenoble, Nancy, Orleans, Marseilles, &c, as well as at Chantilly. Some of Fragonard's finest work is in the private collections of the Rothschild family in London and Paris.

See R. Portalis, Fragonard (Paris, 1899), fully illustrated; Felix Naquet, Fragonard (Paris, 1890); Virgile Josz, Fragonard — mteurs du XVIII' siecle (Paris, 1901); E. and J.' de Goncourt, L'Art du dix-huitieme siecle — Fragonard (Paris, 1883). (P. G. K.)

FRAHN, CHRISTIAN MARTIN (1 782-1851), German numis- matist and historian, was born at Rostock. He began his Oriental studies under Tychsen at the university of Rostock, and afterwards prosecuted them at Gottingen and Tubingen. He became a Latin master in Pestalozzi's famous institute in 1804, returned home in 1806, and in the following year was chosen to fill the chair of Oriental languages in the Russian university of Kazan. Though jn 181; he was invited to succeed Tychsen at

Rostock, he preferred to go to St Petersburg, where he became director of the Asiatic museum and councillor of state. He died at St Petersburg.

Frahn wrote over 150 works. Among the more important are: Numophylacium orientale Pototianum (1813) ; De numorum Bulghari- corum fonte antiquissimo (1816) ; Das muhammedanische Miinz- kabinet des asialischen Museum der kaiserl. Akademie der Wissen- schaften zu St Petersburg (1821); Numi cufici ex variis museis selecti (1823); Notice d'une centaint d'ouvrages arabes, &c, qui manquent en grande partie aux Woliotheques de V Europe (1834); and Nova supplementa ad recensionem Num. Muham. Acad. Imp. Set. Petro- politanae (1855). His description of some medals struck by the Samanid and Bouid princes (1804) was composed in Arabic because he had no Latin types.

FRAME, a word employed in many different senses, signifying something joined together or shaped. It is derived ultimately from O.E. fram, from, in its primary meaning " forward." In constructional work it connotes the union of pieces of wood, metal or other material for purposes of enclosure as in the case of a picture or mirror frame. Frames intended for these uses are of great artistic interest but comparatively modern origin. There is no record of their existence earlier than the 16th century, but the decorative opportunities which they afforded caused speedy popularity in an artistic age, and the Renaissance found in the picture frame a rich and attractive means of expression. The impulses which made frames beautiful have long been ex- tinct or dormant, but fine work was produced in such profusion

that great numbers of examples are still extant. Frames for pictures or mirrors are usually square, oblong, round or oval, and, although they have usually been made of wood or com- position overlaid upon wood, the richest and most costly materials have often been used. Ebony, ivory and tortoiseshell; crystal, amber and mother-of-pearl; lacquer, gold and silver, and almost every other metal have been employed for this purpose. The domestic frame has in fact varied from the simplest and cheapest form of a plain wooden moulding to the most richly carved examples. The introduction in the 17th century of larger sheets of glass gave the art of frame-making a great essor, and in the 18th century the increased demand for frames, caused chiefly by the introduction of cheaper forms of mirrors, led to the invention of a composition which could be readily moulded into stereotyped patterns and gilded. This was eventually the deathblow of the artistic frame, and since the use of composition moulding became normal, no important school of wood-carving has turned its attention to frames. The carvers of the Renaissance, and down to the middle of the 18th century, produced work which was often of the greatest beauty and elegance. In England nothing comparable to that of Grinling Gibbons and his school has since been produced. Chippendale was a great frame maker, but he not only had recourse to composition, but his designs were often extravagantly rococo. Even in France there has been no return of the great days when Oeben enclosed the looking-glasses which mirrored the Pompadour in frames that were among the choicest work of a gorgeous and artificial age. In the decoration of frames as in so many other respects France largely followed the fashions of Italy, which throughout the 16th and 17 th centuries produced the most elaborate and grandiose, the richest and most palatial, of the mirror frames that have come down to us. English art in this respect was less exotic and more restrained, and many of the mirrors of the 18th century received frames the grace and simplicity of which have ensured their constant reproduction even to our own day.

FRAMINGHAM, a township of Middlesex county, Massa- chusetts, U.S.A., having an area of 27 sq. m. of hilly surface, dotted with lakes and ponds. Pop. (1890) 9239; (1900) 11,302, of whom 2391 were foreign-born; (1910 census) 12,948. It is served by the Boston & Albany, and the New York, New Haven & Hartford railways. Included within the township are three villages, Framingham Center, Saxonville and South Framingham, the last being much the most important. Framing- ham Academy was established in 1792, and in 1851 became a part of the public school system. A state normal school (the first normal school in the United States, established at Lexington

in 1839, removed to Newton in 1844 and to Framingham in 1853) is situated here; and near South Framingham, in the township of Sherborn, is the state reformatory prison for women. South Framingham has large manufactories of paper tags, shoes, boilers, carriage wheels and leather board; formerly straw braid and bonnets were the principal manufactures. Saxonville manufactures worsted cloth. The value of the township's factory products increased from $3,007,301 in 1900 to $4,173,579 in 1905, or 38-8%. Framingham was first settled about 1640, and was named in honour of the English home (Framlingham) of Governor Thomas Danforth (1622-1699), to whom the land once belonged. In 1700 it was incorporated as a township. The " old Connecticut path," the Boston-to-Worcester turnpike, was im- portant to the early fortunes of Framingham Center, while the Boston & Worcester railway (1834) made the greater fortune of South Framingham.

See J. H. Temple, History of Framingham . . . 1640-1880 (Framingham, 1887).

FRAMLINGHAM, a market town in the Eye parliamentary division of Suffolk, 91 m. N.E. from London by a branch of the Great Eastern railway. Pop. (1901) 2526. The church of St Michael is a fine Perpendicular and Decorated building of black flint, surmounted by a tower 96 ft. high. In the interior there are a number of interesting monuments, among which the most noticeable are those of Thomas Howard, 3rd duke of Norfolk, and of Henry Howard, the famous earl of Surrey, who was beheaded by Henry VIII. The castle forms a picturesque ruin, consisting of the outer walls 44 ft. high and 8 ft. thick, 13 towers about 58 ft. high, a gateway and some outworks. About half a mile from the town is the Albert Memorial Middle Class College, opened in 1865, and capable of accommodating 300 boys. A bronze statue of the Prince Consort by Joseph Durham adorns the front terrace.

Framlingham (Frendlingham, Framalingaham) in early Saxon times was probably the site of a fortified earthwork to which St Edmund the Martyr is said to have fled from the Danes in 870. The Danes captured the stronghold after the escape of the king, but it was won back in 921, and remained in the hands of the crown, passing to William I. at the Conquest. Henry I. in 1 100 granted it to Roger Bigod, who in all probability raised the first masonry castle. Hugh, son of Roger, created earl of Norfolk in 1141, succeeded his father, and the manor and castle remained in the Bigod family until 1306, when in default of heirs it reverted to the crown, and was granted by Edward II. to his half-brother Thomas de Brotherton, created earl of Norfolk in 13 1 2. On an account roll of Framlingham Castle of 1324 there is an entry of " rent received from the borough," also of " rent from those living outside the borough," and in all probability

burghal rights had existed at a much earlier date, when the town had grown into some importance under the shelter of the castle. Town and castle followed the vicissitudes of the dukedom of Norfolk, passing to the crown in 1405, and being alternately restored and forfeited by Henry V., Richard III., Henry VII., Edward VI., Mary, Elizabeth and James I., and finally sold in 1635 to Sir Robert Hitcham, who left it in 1636 to the master and fellows of Pembroke Hall, Cambridge.

In the account roll above mentioned reference is made to a fair and a market, but no early grant of either is to be found. In 1792 two annual fairs were held, one on Whit Monday, the other on the 10th of October; and a market was held every Saturday. The market day is still Saturday, but the fairs are discontinued.

See Robert Hawes, History of Framlingham in the County of Suffolk, edited by R. Loder (Woodbridge, 1798).

FRANC, a French coin current at different periods and of varying values. The first coin so called was one struck in gold by John II. of France in 1360. On it was the legend Johannes Dei gracia Francorum rex; hence, it is said, the name. It also bore an effigy of King John on horseback, from which it was called a franc a cheval, to distinguish it from another coin of the same value, issued by Charles V., on which the king was represented standing upright under a Gothic dais; this

coin was termed a. franc a pied. As a coin it disappeared after the reign of Charles VI., but the name continued to be used as an equivalent for the livre tournois, which was worth twenty sols. French writers would speak without distinction of so many livres or so many francs, so long as the sum mentioned was an even sum; otherwise livre was the correct term, thus "trots livres " or " trois francs," but " trois livres cinq sols." In 1795 the livre was legally converted into the franc, at the rate of 81 livres to 80 francs, the silver franc being made to weigh exactly five grammes. The franc is now the unit of the monetary system and also the money of account in France, as well as in Belgium and Switzerland. In Italy the equivalent is the lira, and in Greece the drachma. The franc is divided into 100 centimes, the lira into 100 centesimi and the drachma into 100 lepta. Gold is now the standard, the coins in common use being ten and twenty franc pieces. The twenty franc gold piece weighs 6-4516 grammes, -900 fine. The silver coins are five, two, one, and half franc pieces. The five franc silver piece weighs 25 grammes, -900 fine, while the franc piece weighs 5 grammes, ■835 fine. See also Money.

FRANCAIS, ANTOINE, Count (1756-1836), better known as Francois or Nantes, French politician and author, was born at Beaurepaire, in the

department of Isere. In 1791 he was elected to the legislative assembly by the department of Loire Inferieure, and was noted for his violent attacks upon the farmers general, the pope and the priests; but he was not re-elected to the Convention. During the Terror, as he had belonged to the Girondin party, he was obliged to seek safety in the mountains. In 1798 he was elected to the council of Five Hundred by the department of Isere, and became one of its secretaries; and in the following year he voted against the Directory. He took office under the consulate as prefect of Charente Inferieure, rose to be a member of the council of state, and in 1804 obtained the important post of director-general of the indirect taxes (droits reunis) . The value of his services was recognized by the titles of count of the empire and grand officer of the Legion of Honour. On the second restoration he retired into private life; but from 1819 to 1822 he was representative of the department of Isere, and after the July revolution he was made a peer of France. He died at Paris on the 7th of March 1836.

Francais wrote a number of works, but his name is more likely to be preserved by the eulogies of the literary men to whom he afforded protection and assistance. It is sufficient to mention Le Manuscrit de feu M. Jerome (1825); Recueil de fadaises compost sur la montagne a I'usage des habitants de la plaine (1826); Voyage dans la vallee des originaux (1828); Tableau de la vie rurale, oh Vagriculture enseignee d'une manure dramatique (1829).

FRAN5AIS, FRANQOIS LOUIS (1814-1897), French painter, was born at Plombieres (Vosges), and, on attaining the age of fifteen, was placed as office-boy with a bookseller. After a few years of hard struggle, during which he made a precarious living by drawing on stone and designing woodcut vignettes for book illustration, he studied painting under Gigoux, and subsequently under Corot, whose influence remained decisive upon Francais's style of landscape painting. He generally found his subjects in the neighbourhood of Paris, and though he never rivalled his master in lightness of touch and in the lyric poetry which is the principal charm of Corot's work, he is still counted among the leading landscape painters of his country and period. He ex- hibited first at the Salon in 1837 and was elected to the Academie des Beaux-Arts in 1890. Comparatively few of his pictures are to be found in public galleries, but his painting of " An Italian Sunset " is at the Luxembourg Museum in Paris. Other works of importance are "Daphnis et Chloe" (1872), "Bas Meudon" (1861), "Orpheus" (1863), "Le Bois sacre" (1864), "Le Lac deNemi" (1868).

FRANCATELLI, CHARLES ELME (1805-1876), Anglo- Italian cook, was born in London, of Italian extraction, in 1805, and was educated in France, where he studied the art of cookery. Coming to England, he was employed successively by various noblemen, subsequently becoming

manager of Crockford's club. He left Crockford's to become chief cook to Queen Victoria, and afterwards he was chef at the Reform Club. He was-the

author of The Modern Cook (1845), which has since been fre- quently republished; of a Plain Cookery Book for the Working Classes (1861), and of The Royal English and Foreign Con- fectionery Book (1862). Francatelli died at Eastbourne on the 10th of August 1876.

FRANCAVILLA FONTANA, a town and episcopal see of Apulia, Italy, in the province of Lecce, 22 m. by rail E. by N. of Taranto, 460 ft. above sea-level. Pop. (1001) 17,759 (town); 20,510 (commune). It isln a fine situation, and has a massive square castle of the Umperiali family, to whom, with Oria, it was sold by S. Carlo Borromeo in the 16th century for 40,000 ounces of gold, which he distributed in one day to the poor.

FRANCE, ANATOLE (1844-), French critic, essayist and novelist (whose real name was Jacques Anatole Thibault), was born in Paris on the 16th of April 1844. His father was a book- seller, one of the last of the booksellers, if we are to believe the Goncourts, into whose establishment men came, not merely to order and buy, but to dip, and turn over pages and discuss. As a child he used to listen to the nightly talks on literary subjects which took place in his father's shop. Nurtured in an atmosphere so essentially bookish, he turned naturally to literature. In 1868 his first work appeared, a study of Alfred de Vigny, followed in 1873 by a volume of verse, Les Poemes dores, dedicated to Leconte de Lisle, and, as such a dedication suggests, an outcome of the " Parnassian " movement; and yet another volume of verse appeared in 1876, Les Noces corinthiennes. But the poems in these volumes, though unmistakably the work of a man of great literary skill and cultured taste, are scarcely the poems of a man with whom verse is the highest form of expression.

He was to find his richest vein in prose. He himself, avowing his preference for a simple, or seemingly simple, style as compared with the artistic style, vaunted by the Goncourts — a style com- pounded of neologisms and " rare " epithets, and startling forms of expression— observes: " A simple style is like white light. It is complex, but not to outward seeming. In language, a beautiful and desirable simplicity is but an appearance, and results only from the good order and sovereign economy of the various parts of speech." And thus one may say of his own style that its beautiful translucency is the result of many qualities — felicity, grace, the

harmonious grouping of words, a perfect measure. Anatole France is a sceptic. The essence Of his philosophy, if a spirit so light; evanescent, elusive, can be said to have a philosophy, is doubt. He is a doubter in religion, metaphysics, morals, politics, aesthetics, science — a most genial and kindly doubter, and not at all without doubts even as to his own negative conclusions. Sometimes his doubts are expressed in his own person — as in the Jardin d'epicure (1894) from which the above extracts are taken, or Le Livre de mon ami (1885), which may be accepted, perhaps, as partly autobiographical; sometimes, as in La Rotisserie de la reine Pedauque (1893) and Les Opinions de M. Jerome Coignard (1893), or L'Orme du mail (1897), Le Mannequin d' osier (1897), L'Anneau d'amithyste (1899), and M. Bergcret a Paris (1901), he entrusts the expression of his opinions, dramatically, to some fictitious character — the abbe Coignard, for instance, projecting, as it were, from the 1 8th century some very effective criticisms on the popular political theories of contemporary France — or the M. Bergeret of the four last-named novels, which were published with the collective title of Histoire contemporaine. This series deals with some modern problems, and particularly, in L'Anneau d'amelhysle and M . Bergeret a Paris, with the humours and follies of the anti-Dreyfusards. All this makes a piquant combination. Neither should reference be omitted to his Crime de Sylveslre Bonnard (1881), crowned by the Institute, nor to works more distinctly of fancy, such as Balthasar (1889), the story of one of the Magi or Thais (1890), the story of an actress and courtesan of Alexandria, whom a hermit converts, but with the loss of his own soul. His ironic ccmedy, Crainquebille (Renaissance theatre, 1903), was founded on his novel (1902) of the same year. His more recent work includes his anti-clerical Vie de Jeanne d 1 'Arc (1908); his pungent satire the lie des penguins (1908); and a volume of stories, I^cs Scpl Fannies dc la Barbc- Blent (1909) .

Lightly as he bears his erudition, it is very real and extensive, and is notably shown in his utilization of modern archaeological and historical research in his fiction (as in the stories in Sur une pierre blanche). As a critic — see the Vie litteraire (1888-1892), reprinted mainly from Le Temps — he is graceful and appreciative. Academic in the best sense, he found a place in the French Academy, taking the seat vacated by Lesseps, and was received into that body on the 24th of December 1896. In the affaire Dreyfus he sided with M. Zola.

For studies of M. Anatole France's talent see Maurice Barres, Anatole France (1885) ; Jules Lemaitre, Les Contemporains (2nd series, 1886); and G. Brandes, Anatole France (1908). In 1908 Frederic Chapman began an edition of The works of Anatole France in an English translation (John Lane).

FRANCE, a country of western Europe, situated between 51 5′ and 42° 20′ N., and 4° 42′ W. and 7 39′ E. It is hexagonal in form, being bounded N.W. by the North Sea, the Strait of Dover (Pas de Calais) and the English Channel (La Manche), W. by the Atlantic Ocean, S.W. by Spajn, S.E. by the Mediter- ranean Sea, E. by Italy, Switzerland and Germany, N.E. by Germany, Luxemburg and Belgium. From north to south its length is about 600 m., measured from Dunkirk to the Col de Falgueres; its breadth from east to west is 528 m., from the Vosges to Cape Saint Mathieu at the extremity of Brittany. The total area is estimated 1 at 207,170 sq. m., including the island of Corsica, which comprises 3367 sq. m. The coast-line of France extends for 384 m. on the Mediterranean, 700 on the North Sea, the Strait of Dover and the Channel, and 865 on the Atlantic. The country has the advantage of being separated from its neighbours over the greater part of its frontier by natural barriers of great strength, the Pyrenees forming a powerful bulwark on the south-west, the Alps on the south-east, and the Jura and the greater portion of the Vosges Mountains on the east. The frontier generally follows the crest line of these ranges. Germany possesses both slopes of the Vosges north of Mont Donon, from which point the north-east boundary is conventional and unprotected by nature.

France is geographically remarkable for its possession of great natural and historical highways between the Mediterranean and the Atlantic Ocean. The one, following the depression between the central plateau and the eastern mountains by way of the valleys of the Rhone and Saone, traverses the Cote d'Or hills and so gains the valley of the Seine; the other, skirting the southern base of the Cevennes, reaches the ocean by way of the Garonne valley. Another natural highway, traversing the lowlands to the west of the central plateau, unites the Seine basin with that of the Garonne.

Physiography. — A line drawn from Bayonne through Agen, Poitiers, Troyes, Reims and Valenciennes divides the country roughly into two dissimilar physical regions — to the west and north-west a country of plains and low plateaus; in the centre, east and south-east a country of mountains and high plateaus with a minimum elevation of 650 ft. To the west of this line the only highlands of importance are the granitic plateaus of Brittany and the hills of Normandy and Perche, which, uniting with the plateau of Beauce, separate the basins of the Seine and Loire. The highest elevations of these ranges do not exceed 1400 ft. The configuration of the region east of the dividing line is widely different. Its most striking feature is the mountainous and eruptive area known as the Massif Central, which covers south-central France. The central point of this huge tract is formed by the mountains of Auvergne comprising the group of Cantal, where the Plomb du Cantal attains 6096 ft., and that of Mont Dore, containing the Puy de Sancy (6188 ft.), the culminating point of the Massif, and to the north the lesser elevations of the Monts Dome. On the west the downward

slope is gradual by way of lofty plateaus to the heights of Limousin and Marche and the table-land of Quercy, thence to the plains of Poitou, Angoumois and Guienne. On the east only river valleys divide the Auvergne mountains from those of Forez and Margeride, western spurs of the Cevennes. On the south the Aubrac mountains and the barren plateaus known as the Gausses intervene between them and the Cevennes. The main range of the Cevennes (highest point Mont Lozere, 5584 ft.) sweeps in a wide curve from the granitic table-land of Morvan in the north along the right banks of the Sa6ne and Rh6ne to the Montagne Noire in the south, where it is separated from the Pyrenean system by the river Aude. On the south-western border of France the Pyrenees include

1 By the Service geographique dc Varmee.

FRANCE

(Physical Divisions) Scale, 1:5,700.000 English Miles 9 •? V 3° V> 5°

Land below 800 /««t

Land between 600 A 1500 feet…. Land between 1500 4 3000 feet… Larnd above 3000 feet..

du Lio„

MED IT ERRAN EA

N SEA

*Q Meridian o 1 * of Greenwich £)*

p Longitude East 6″ of Greenwich G

several peaks over 10,000 ft. within French territory; the highest elevation therein, the Vignemale, in the centre of the range, reaches 10,820 ft. On the north their most noteworthy offshoots are, in the centre, the plateau of Lannemezan from which rivers radiate fanwise to join the Adour and Garonne; and in the east the Corbiere. On the south-eastern frontier the French Alps, which include Mont Blanc (15,800 ft.), and, more to the south, other summits over 1 1 ,000 ft. in height, cover Savoy and most of Dauphine and Provence, that is to say, nearly the whole of France to the

south and east of the Rh6ne. North of that river the parallel chains of the Jura form an arc of a circle with its convexity towards the north-west. In the southern and most elevated portion of the range there are several summits exceeding 5500 ft. Separated from the Jura by the defile of Belfort (Trouee de Belfort) the Vosges extend northward parallel to the course of the Rhine. Their culminating points in French territory, the Ballon d'Alsace and the Hohneck in the southern portion of the chain, reach 4100 ft. and 4480 ft. The Vosges are buttressed on the west by the Faucilles, which curve southwards to meet the plateau of Laugres, and by the plateaus of Haute-

Err.ery Walker sc.

Marne, united to the Ardennes on the north-eastern frontier by the wooded highlands of Argonne.

Seaboard. — The shore of the Mediterranean encircling the Gulf of the Lion (Golfe du Lion) 1 from Cape Cerbera to Martigues is low- lying and unbroken, and characterized chiefly by lagoons separated from the sea by sand-dunes. The coast, constantly encroaching on the sea by reason of the alluvium washed down by the rivers of the Pyrenees and Gevennes, is without important harbours saving tha;t of Cette, itself continually invaded by the sand. East of Martigues the coast is rocky and of greater altitude,, and is broken by projecting capes (Couronne, Croisette, Sicie, the peninsula of Giens and Cape Antibes), and by deep gulfs forming secure roadsteads such as those of Marseilles, which has the chief port in France, Toulon, with its great naval harbour, and Hyeres, to which may be added the Gulf of St Tropez.

Along the Atlantic coast from the mouth of the Adour to the

1 The etymology of this name (sometimes wrongly written Golfe de Lyon) is unknown.

estuary of the Gironde there stretches a monotonous line of sand- dunes bordered by lagoons on the land side, but towards the sea harbourless and unbroken save for the Bay of Arcachon. To the north as far as the rocky point of St Gildas, sheltering the mouth of the Loire, the shore, often occupied by salt marshes (marshes of Poitou and Brittany), is low-lying and hollowed by deep bays sheltered by large islands, those of Oleron and

Re lying opposite the ports of Rochefort and La Rochelle, while Noirmoutier closes the Bay of Bourgneuf.

Beyond the Loire estuary, on the north shore of which is the port of St Nazaire, the peninsula of Brittany projects into the ocean and here begins the most rugged, wild and broken portion of the French seaboard; the chief of innumerable indentations are, on the south the Gulf of Morbihan, which opens into a bay protected to the west by the narrow peninsula of Quiberon, the Bay of Lorient with the port of Lorient, and the Bay of Concarneau; on the west the dangerous Bay of Audierne and the Bay of Douarnenez separated from the spacious roadstead of Brest, with its important naval port, by the peninsula of Crozon, and forming with it a great indentation sheltered. by Cape St Mathieu on the north and by Cape Raz on the south; on the north, opening into the English Channel, the Morlaix roads, the Bay of St Brieuc, the estuary of the Ranee, with the port of St Malo and the Bay of St Michel. Numerous small archipelagoes and islands, of which the chief are Belle lie, Groix and Ushant, fringe the Breton coast.- North of the Bay of St Michel the peninsula of Cotentin, terminating in the promontories of Hague and Barfleur, juts north into the English Channel and closes the bay of the Seine on thewest. Cherbourg, its chief harbour, lies on the northern shore between the two promontories. The great port of Le Havre stands at the mouth of the Seine estuary, which opens into the bay of. the Seine on the east. North of that point a line of high cliffs, in which occur the ports of Fecamp and Dieppe, stretches nearly to the sandy estuary of the Somme. North of that river the coast is low-lying and bordered by sand-dunes, to which succeed on the Strait of Dover the cliffs in the neighbourhood of the port of Boulogne and the marshes and sand-dunes of Flanders, with the ports of Calais and Dunkirk, the latter the principal French port on the North Sea.

To the maritime ports mentioned above must be added the river ports of Bayonne (on the Adour) , Bordeaux (on the Garonne) , Nantes (on the Loire), Rouen (on the Seine). On the whole, however, France is inadequately provided with natural harbours; her long tract of coast washed by the Atlantic and the Bay of Biscay has scarcely three or four good seaports, and those on the southern shore of the Channel form a striking contrast to the spacious maritime inlets on the English side.

Rivers. — The greater part of the surface of France is divided between four principal and several secondary basins.

The basin of the Rh6ne, with an area (in France) of about 35,000 sq. m., covers eastern France from the Mediterranean to the Vosges, from the Cevennes and the Plateau de Langres to the crests of the Jura and the Alps. Alone among French rivers, the Rh6ne, itself Alpine in character in its

upper course, is partly fed by Alpine rivers (the Arve, the Isere and the Durance) which have their floodsin spring at the melting of the snow, and are maintained by glacier- water in summer. The Rhdne, the source of which is in Mont St Gothard, in Switzerland, enters France by the narrow defile of L'Ecluse, and has a somewhat meandering course, first flowing south, then north-west, and then west as far as Lyons, whence it runs straight south till it reaches the Mediterranean, into which it discharges itself by two principal branches, which form the delta or island of the Camargue. The Ain, the Sa6ne (which rises in the Faucilles and in the lower part of its course skirting the regions of Bresse and Dombes, receives the Doubs and joins the Rhone at, Lyons), the Ardeche and the Gard are the affluents on the right; on the left it is joined by the Arve, the Isere, the DrSme and the Durance. The small independent river, the Var, drains that portion of the Alps which fringes the Mediterranean.*

The basin of the Garonne occupies south-western France with the exception of the tracts covered by the secondary basins of the Adour, the Aude, the Herault, the Orb and other smaller rivers, and the low- lying plain of the Landes, which is watered by numerous coast rivers, notably by the Leyre. Its area is nearly 33,000 sq. m., and extends from the Pyrenees to the uplands of Saintonge, Perigord and Limousin. The Garonne rises in the valley of Aran (Spanish Pyrenees), enters France near Bagneres-de-Luchon, has first a north-west course, then bends to the north-east, and soon resumes its first direction. Joining the Atlantic between Royan and the Pointe de Grave, opposite the tower of Cordouan. In the lower part of its course, from the Bec-d'Ambez, where it receives the Dordogne, it becomes considerably wider, and takes the name of Gironde. The principal affluents are the Ariege, the Tarn with the Aveyron and the Agout, the Lot and the Dordogne, which descends from Mont Dore-les- Bains, and joins the Garonne at Bec-d'Ambez, to form the Gironde. All these affluents are on the right, and with the exception of the Ariege, which descends from the eastern Pyrenees, rise in the moun- tains of Auvergne and the southern Cevennes, their sources often lying 'close to those of the rivers of the Loire and Rhone basins. The Neste, a Pyrenean torrent, and the Save, the Gers and the Baise, "■•'sing nn the plateau of Lannemezan, are the principal left-hand

tributaries of the Garonne. North of the basin of the Garonne an area of over 3800 sq. m. is watered by the secondary system of the Charente, which descends from Cheronnac (Haute- Vienne), traverses AngoulSme and falls into the Atlantic near Rochefort. Farther to the north a number of small rivers, the chief of which is the Sevre Niortaise, drain the coast region to the south of the plateau of Gatine.

The basin of the Loire, with an area of about 47,000 sq. m., includes a

great part of central and western France or nearly a quarter of the whole country. The Loire rises in Mont Gerbier de Jonc, in the range of the Vivarais mountains, flows due north to Nevers, then turns to the north-west as far as Orleans, in the neigh- bourhood of which it separates the marshy region of the Sologne (j.v.) on the south from the wheat-growing region of Beauce and the Gatinais on the north. Below Orleans it takes its course towards the south-west, and lastly from Saumur runs west, till it reaches the Atlantic between Paimbceuf and St Nazaire. On the right the Loire receives the waters of the Furens, the Arroux, the Nievre, the Maine (formed by the Mayenne and the Sarthe with its affluent the Loir), and the Erdre, which joins the Loire at Nantes; on the left, the Allier (which receives the Dore and the Sioule), the Loiret, the Cher, the Indre, the Vienne with its affluent the Creuse, the Thouet, and the Sevre-Nantaise. The peninsula of Brittany and the coasts of Normandy on both sides of the Seine estuary are watered by numerous independent streams. Amongst these the Vilaine, which passes Rennes and Redon, waters, with its tributaries, an area of 4200 sq. m. The Orne, which rises in the hills of Normandy and falls into the Channel below Caen, is of considerably less importance.

The basin of the Seine, though its area of a little over 30,000 sq. m. is smaller than that of any of the other main systems, comprises the finest network of navigable rivers in the country. It is by far the most important basin of northern France, those of the Somme and Scheldt in the north-west together covering less than 5000 sq. in., those of the Meuse and the Rhine in the north-east less than 7000 sq. m. The Seine descends from the Langres plateau, flows north- west down to Mery, turns to the west, resumes its north-westerly direction at Montereau, passes through Paris and Rouen and dis- charges itself into the Channel between Le Havre and Honfleur. Its affluents are, on the right, the Aube; the Marne, which joins the Seine at Charenton near Paris; the Oise, which has its source in Belgium and is enlarged by the Aisne; and the Epte; on the left the Yonne, the Loing, the Essonne, the Eure and the Rille.

Lakes. — France has very few lakes. The Lake of Geneva, which forms 32 m. of the frontier, belongs to Switzerland. The most important French lake is that of Grand-Lieu, between Nantes and Paimbceuf (Loire-Inferieure), which presents a surface of 17,300 acres. There may also be mentioned the lakes of Bourget and Annecy (both in Savoy), St Point (Jura), Paladru (Isere) and Nantua (Ain). The marshy districts of Sologne, Brenne, Landes and Dombes still contain large undrained tracts. The coasts present a number of maritime inlets, forming inland bays, which communicate with the sea by channels of greater or less width. Some of these are on the south-west coast, in the Landes, as Carcans, Lacanau, Biscarosse, Cazau, Sanguinet ; but more are to be found in the south and south-east, in

Languedoc and Provence, as Leucate, Sigean, Thau, Vaccares, Berre, &c. Their want of depth prevents them from serving as roadsteads for shipping, and they are useful chiefly for fishing or for the manufacture of bay-salt.

Climate. — The north and north-west of France bear a great resem- blance, both in temperature and produce, to the south of England, rain occurring frequently, and the country being consequently suited for pasture. In the interior the rains are less frequent, but when they occur are far more heavy, so that there is much less difference in the annual rainfall there as compared with the rest of the country than in the number of rainy days. The annual rainfall for the whole of France averages about 32 in. The precipitation is greatest on the Atlantic seaboard and in the elevated regions of the interior. It attains over 60 in. in the basin of the Adour (71 in. at the western extremity of the Pyrenees), and nearly as much in the Vosges, Morvan, Cevennes and parts of the central plateau. The zone of level country extending from Reims and Troyes to Angers and Poitiers, with the exception of the Loire valley and the Brie, receives less than 24 in. of rain annually (Paris about 23 in.), as also does the Mediterranean coast west of Marseilles. The pre- vailing winds, mild and humid, are west winds from the Atlantic; continental climatic influence makes itself felt in the east wind, which is frequent in winter and in the east of France, while the mistral, a violent wind from the north-west, is characteristic of the Mediterranean region. The local climates of France may be grouped under the following seven designations; (1) Sequan climate, char- acterizing the Seine basin and northern France, with a mean temperature of 50 F., the winters being cold, the summers mild; (2) Breton climate, with a mean temperature of 51 -8° F., the winters being mild, the summers temperate, it is characterized by west and south-west winds and frequent fine rains; (3) Girondin climate (characterizing Bordeaux, Agen, Pau, &c), having a _ mean of 53-6° F., with mild winters and hot summers, the prevailing wind is from the north-west, the average rainfall about 28 in. ; (4) Auvergne climate, comprising the Cevennes, central plateau, Cler- mont, Limoges and Rodez, mean temperature 5I-8″ F., with cold

winters and hot summers; (5) Vosges climate (comprehending Epinal, Mezieres and Nancy), having a mean of 48-2° F., with long and severe winters and hot and rainy summers; (6) Rh6ne climate (experienced by Lyons, Chalon, Macon, Grenoble) mean tempera- ture 51-8° F., with cold and wet winters and hot summers, the prevailing winds are north and

south; (7) Mediterranean climate, ruling at Valence, Nimes, Nice and Marseilles, mean temperature, 57-5° F., with mild winters and hot and almost rainless summers.

Flora and Fauna. — The flora of southern France and the Medi- terranean is distinct from that of the rest of the country, which does not differ in vegetation from western Europe generally. Evergreens predominate in the south, where grow subtropical plants such as the myrtle, arbutus, laurel, holm-oak, olive and fig; varieties of the same kind are also found on the Atlantic coast (as far north as the Cotentin), where the humidity and mildness of the climate favour their growth. The orange, date-palm and eucalyptus have been acclimatized on the coast of Provence and the Riviera. Other trees of southern France are the cork-oak and the Aleppo and mari- time pines. In north and central France the chief trees are the oak, the beech, rare south of the Loire, and the hornbeam ; less important varieties are the birch, poplar, ash, elm and walnut. The chestnut covers considerable areas in Perigord, Limousin and Beam; resinous trees (firs, pines, larches, &c.) form fine forests in the Vosges and Jura.

The indigenous fauna include the bear, now very tare but still found in the Alps and Pyrenees, the wolf, harbouring chiefly in the Cevennes and Vosges, but in continually decreasing areas; the fox, marten, badger, weasel, otter, the beaver in the extreme south of the Rhone valley, and in the Alps the marmot; the red deer and roe deer are preserved in many of the forests, and the wild boar is found in several districts; the chamois and wild goat survive in the Pyre- nees and Alps. Hares, rabbits and squirrels are common. Among birds of prey may be mentioned the eagle and various species of hawk, and among game-birds the partridge and pheasant. The reptiles include the ringed-snake, slow-worm, viper and lizard. (R, Tr.)

Geology. — Many years ago it was pointed out by Elie de Beaumont and Dufrˆnoy that the Jurassic rocks of France form upon the map an incomplete figure of 8. Within the northern circle of the 8 lie the Mesozoic and Tertiary beds of the Paris basin, dipping inwards; within the southern circle lie the ancient rocks of the Central Plateau, from which the later beds dip outwards. Outside the northern circle lie on the west the folded Palaeozoic rocks of Brittany, and on the north the Palaeozoic massif of the Ardennes. Outside the southern circle lie on the west the Mesozoic and Tertiary beds of the basin of the Garonne, with the Pyrenees beyond, and on the east the Mesozoic and Tertiary beds of the valley of the Rh&ne, with the Alps beyond.

In the geological history of France there have been two great periods of folding since Archean times. The first of these occurred towards the close of the Palaeozoic era, when a great mountain system was raised in the north

running approximately from E. to W., and another chain arose in the south, running from S.W. to N.E. Of the former the remnants are now seen in Brittany and the Ardennes; of the latter the Cevennes and the Montagne Noire are the last traces visible on the surface. The second great folding took place in Tertiary times, and to it was due the final elevation of the Jura and the Western Alps and of the Pyrenees. No great mountain chain was ever raised by a single effort, and folding went on to some extent in other periods besides those mentioned. There were, moreover, other and broader oscillations which raised or lowered extensive areas without much crumpling of the strata, and to these are due some of the most important breaks in the geological series.

The oldest rocks, the gneisses and schists of the Archean period, form nearly the whole of the Central Plateau, and are also exposed in the axes of the folds in Brittany. The Central Plateau has probably been a land mass ever since this period, but the rest of the country was flooded by the Palaeozoic sea. The earlier deposits of that sea now rise to the surface in Brittany, the Ardennes, the Montagne Noire and the CeVennes, and in all these regions they are intensely folded. Towards the close of the Palaeozoic era France had become a part of a great continent ; in the north the Coal Measures of the Boulonnais and the Nord were laid down in direct connexion with those of Belgium and England, while in the Central Plateau the Coal Measures were deposited in isolated and scattered basins. The Permian and Triassic deposits were also, for the most part, of continental origin; but with the formation of the Rhaetic beds the sea again began to spread, and throughout the greater part of the Jurassic period it covered nearly the whole of the country except the Central Plateau, Brittany and the Ardennes. Towards the end of the period, however, during the deposition of the Portlandian beds, the sea again retreated, and in the early part of the Cretaceous period was limited (in France) to the catchment basins of the Sa6ne and Rh6ne — ;in the Paris basin the contemporaneous deposits were chiefly estuarine and were confined to the northern and eastern rim. Beginning with the Aptian and Albian the sea again gradually spread over the country and attained its maximum in the early part of the Senonian epoch, when once more the ancient massifs of the Central Plateau, Brittany and the Ardennes, alone rose above the waves. There was still, however, a well-marked difference between the deposits of the northern and the southern parts of France, the

former consisting of chalk, as in England, and the latter of sandstones and limestones with Hippurites. During the later part of the Cretaceous period the sea gradually retreated and left the whole country dry.

During the Tertiary period arms of the sea spread into France — in the Paris basin from the north, in the basins of the Loire and the Garonne from

the west, and in the Rh6ne area from the south. The changes, however, were too numerous and complex to be dealt with here.

In France, as in Great Britain, volcanic eruptions occurred during several of the Palaeozoic periods, but during the Mesozoic era the

MEDITERRANEAN SEA

Quaternary Tertiary Cretaceous Jurassic

EncfyVAUur K.

Siiuro-Cambrian

WBi Archaean A mtetamorphia l-tt-tj Plutonic Rockt \W Volcanic Hocks

^^ Tri aspic HB Permian BH Carboniferous F"'8&\ Devonian

country was free from outbursts, except in the regions of the Alps and Pyrenees. In Tertiary times the Central Plateau was the theatre of great volcanic activity from the Miocene ,to the Pleistocene periods, and many of the volcanoes remain as nearly perfect cones to the present day. The rocks are mainly basalts and andesites, together with trachytes and phonolites, and some of the basaltic flows are of enormous extent.

On the geology of France see the classic Explication de la carte geologique de la France (Par,is, vol. i. 1841, vol. ii. 1848), by Dufrdnoy and Elie de Beaumont; a more modern account, with full references, is given by A. de Lapparent, Traiti de geologie (Paris, 1906).

(J. A. H.) Population.

The French nation is formed of many different elements. Iberian influence in the south-west, Ligurian on the shores of the Mediterranean, Germanic immigrations from east of the Rhine and Scandinavian immigrations in the north-west have tended to produce ethnographical diversities which ease of intercommunication and other modern conditions have failed to obliterate. The so-called Celtic type, exemplified by individuals of rather less than average height, brown-haired and brachy- cephalic, is the fundamental element in the nation and peoples the region between the Seine and the Garonne; in southern France a different type, dolichocephalic, short and with black hair and eyes, predominates. The tall, fair and blue-eyed individuals who are found to the north-east of the Seine and in Normandy appear to be nearer in race to the Scandinavian and Germanic invaders; a tall and darker type with long faces and aquiline noses occurs in some parts of Franche-Comtfe and Champagne, the Vosges and the Perche. From

the Celts has been derived the gay, brilliant and adventurous temperament easily moved to extremes of enthusiasm and depression, which

X

l)

(KJij

,r-ki

C : .. f

\ i

a j/ fk,

t ‘■ V

w&j?“wj

h

2rV /c

T^pJP’

X 4?

*\ 1 i **

r”

/^ Oj > >-

m&

^4i

-;‘r ‘

sM

BWJSpSI;

^

^’- i.

i §”■/■£ JU:

^ s /-/-

•

*A**

rfS|&»

Eifrx?

/! ^£l

^“i ^

fr

Z 1^”

a) &§h|

^f^«Vfe

*feSs^T^*

sffflaXPin

ip

/V—

w

i^’-ysf<

4%*

K

ill

tSfTsS

U.

“•(»;£“1?o g

2

H

KWaˆ

a

tˆfwfial

z

j3ggjgij||j

M

$Pˆf

y)

＝ˆ&p＝

-djjjfs-fv

[WaLoˆ

l-irrt :

4SS Jc’

tf /’

°o

.

• *V i*

＞. \ *

“jsg

**?*

/ CD

*” £ * v*

‘

X

Fw 5,5 ! /Af

~u

1JJ

CO

o

>,;j? ^/f” ‘■■’ .... –

—- — ~-

O

iM’t S&4H& ‘■

t/i

5&

W

-a B

l.2.3> aw 7 q. 3- w

“^

a

Ul

i-J

i^^fl ^A

55:

O J V&

■■’ *^fc ’”■

o

J§|b“V%

< *:

bSˆWˆ Sft

«;

•if \ %°” “ˆ

jglSf *; ■ % &

WL W “c»

Q

‘•£,-8 <»

Uj_

V

iiˆ”i«-ˆ— — — 4”-“i~ — ˆ~~ i ~

8£%i “o

*5 ‘

ˆ%£« s CD’

*sj3gr «■■ ■

[Xl

3}c tP**ˆˆ ■ ˆ ;:

1

5SH?

•Ig!

10

:ˆ?*”

rst

*:*r>^*

Wf?#J

py„

rMJj

L^<-<-:

lis

■■3£&-

Q

POPULATION]

FRANCE

779

combined with logical and organizing faculties of a high order, the heritage from the Latin domination, and with the industry, frugality and love of the soil natural in an agricultural people go to make up the national character. The Bretons, who most nearly represent the Celts, and the Basques, who inhabit parts of the western versant of the Pyrenees, have preserved their distinctive languages and customs, and are ethnically the most interesting sections of the nation; the Flemings of French Flanders where Flemish is still spoken are also racially distinct. The immigration of Belgians into the northern departments and of Italians into those of the south-east exercise a constant modifying influence on the local populations.

During the 19th century the population of France increased to a less extent than that of any other country (except Ireland) for which definite data exist, and during the last twenty years of that period it was little more than stationary. The following table exhibits the rate of increase as indicated by the censuses from 1876 to 1906. Population.

1876 36,905,788

1881 37,672,048

1886 38,218,903

1891 …. 38,342,948

1896 …. 38.517-975

1901 …. 38,961,945

1906 …. 39,252,245

Thus the rate of increase during the decade 1891- 190 1 was -16%, whereas during the same period the population of England increased 1-08%. The birth- rate markedly decreased during the 19th century; despite an increase of population between 1801 and 1901 amounting to 40%, the number of births in the former was 904,000, as against 857,000 in the latter year, the diminution being accompanied by a decrease in the annual number of deaths. 1 In the following table the decrease in births and deaths for the decennial periods during the thirty years ending 1900 are compared.

Births.

. 935,000 or 25-4 per 1000

. 909,000 ,, 23-9 ,,

■ • *853,000 „ 22-2*

*Deaths**

. 870,900 or 23-7 per 1000

. 841,700 ,, 22-1 „

. 829,000 ,, 21-5 ,,

About two-thirds of the French departments, com- prising a large proportion of those situated in mountainous districts and in the basin of the Garonne, where the birth-rate is especially feeble, show a decrease in population. Those which show an in- crease usually possess large centres of industry and are already thickly populated, e.g. Seine and Pas-de-Calais. In most departments the principal cause of decrease of population is the attraction of great centres. The average density of population in France is about 190 to the square mile, the tendency being for the large towns to increase at the expense of the small towns as well as the rural communities. In 1901 37 % of the population lived in centres containing more than 2000 inhabitants, whereas in 1861 the proportion was 28%. Besides the industrial districts the most thickly populated regions include the coast of

the depart- ment of Seine-Inferieure and Brittany, the wine-grow- ing region of the Bordelais and the Riviera. 2

1 In 1907 deaths were superior in number to births by nearly 20,000.

2 The following list comprises the three most densely- populated and the three most sparsely populated depart- ments in France:

In the quinquennial period 1901-1905, out of the total number of births the number of illegitimate births to every 1000 inhabitants was 2-0, as compared with 2-1 in the four preceding periods of like duration.

In 1906 the number of foreigners in France was 1,009,415 as compared with 1,027,491 in 1896 and 1,115,214 in 1886. The departments with the largest population of foreigners were Nord (191,678), in which there is a large proportion of Belgians; Bouches-du-Rhone (123,497), Alpes-Maritimes (93,554), Var (47,475), Italians being numerous in these three departments; Seine (153,647), Meurthe-et-Moselle(44,595), Pas- de-Calais (21,436) and Ardennes (21,401).

The following table gives the area in square miles of each of the eighty-seven departments with its population according to the census returns of 1886, 1896 and 1906:

1871-1880 1881-1890 1891-1900

1871-1880 1881-1890 1891-1900

Departments.

Inhabitants to the Square Mile.

Seine

. 20,803

Basses-Alpes .

■ *42*

Nord . .

850

Hautes-Alpes .

• *49*

Rhdne . .

778

Lozere .

• 64

Ain .

Aisne .

Allier .

Alpes-Maritimes

Ardeche

Ardennes .

Ariege

Aube .

Aude .

Aveyron .

Basses-Alpes

Basses- Pyrenees

Belfort, Territoire de

Bouches-du- Rh6ne

Calvados .

Cantal

Charente .

Charente-Inferieure

Cher …

Correze

Corse (Corsica)

C6te-d'Or .

C6tes-du-Nord

Creuse

Deux- Sevres

Dordogne .

Doubs . . ;

Drome

Eure . . .

Eure-et-Loir

Finistere .

Gard .

Gers .

Gironde

Haute-Garonne

Haute-Loire

Haute-Marne .

Hautes-Alpes .

Haute-Sa6ne

Haute-Savoie

Hautes-Pyrenees

Haute-Vienne .

Herault

Ille-et-Vilaine .

Indre .

Indre-et-Loire .

Isere .

Jura .

Landes

Loir : et-Cher

Loire .

Loire-Inferieure

Loiret

Lot .

Lot-et-Garonne

Lozere

Maine-et-Loire

Manche

Marne

Mayenne .

Meurthe-et-Moselle

Meuse

Morbihan .

Nievre

Nord .

'Area, sq. m.

2,249 2,867 2,849 1,442

2,145 2,028

1,893 2,326 2,448 3,386 2,698 2,977 235 2,026

2,197 2,231

2,305 2,791 2,819 2,273 3,367 3,392 2,786 2,164 2,337

3,56i

2,030

2,533 2,330 2,293

2,713 2,270 2,428 4,140 2,458

i,93i

2,415 2,178

2,075

i,775 i,75o

2,144 2,403 2,699 2,666 2,377 3,179

i,95i 3,6i5

2,479 1,853 2,694 2,629 2,017 2,079

1,999 2,706

2,475

3,i67

2,012 2,038 2,409 2,738 2,659 2,229

Population.

1886.

364,408

555,925 424,582 238,057 375,472 332,759 237,619 257,374 332,080 415,826 129,494 432,999 79,758 604,857 437,267 241,742 366,408 462,803 355,349 326,494 278,501

38i,574

628,256 284,942 353,766 492,205 310,963

3H,6i5

358,829

283,719 707,820 417,099 274,391 775,845 481,169 320,063 247,781 122,924

290,954 275,018 234,825 363,182

439,044 621,384 296,147 340,921 581,680 281,292 302,266 279,214 603,384 643,884 374,875

27i,5H

307-437 141,264 527,680 520,865

429-494 340.063

431.693 291,971 535.256 347-645 1,670,184

1896.

351.569 541.613 424.378 265,155 363,501 318,865 219,641 251,435 310,513 389,464 118,142

423,572 88,047 673,820 417,176 234,382 356,236 453,455 347,725 322,393 290,168 368,168 616,074 279,366

346,694 464,822 302,046

303,491 340,652 280,469 739,648 416,036 250,472 809,902

459,377 316,699 232,057 113,229 272,891 265,872 218,973

375,724 469,684 622,039 289,206 337,064

568,933 266,143 292,884

278,153 625,336 646,172 371,019 240,403 286,377

132,151 514,870 500,052

439,577 321,187 466,417 290,384 552,028

333,899 1,811,868

1906.

345,856 534,495 417,961 334,007

347,HO

317,505 ‘ 205,684 243,670 308,327 377,299 113,126 426,817 95,421 765,918 403,431 228,690

351,733 453,793 343.484 317.430 291,160

357-959 611,506 274,094 339.466 447.052 298,438 297,270

33°, H

273.823 795.103

421,166 231,088 823,925 442,065 314,770

221,724 107,498 263,890 260,617

209,397 385,732 482,799 611,805 290,216

337,916 562,315 257,725 293.397

276,019

643,943 666,748

364,999

216,611 274,610 128,016

513,490 487,443 434,157 305,457 517,508

280,220

573,152

313,972

1,895,861

780

FRANCE

Departments.

Area,

Population.

sq. m.

1886.

1896.

1906.

Oise

2,272

403,146

404.511

410,049

Orne .

2,372

367,248

339.162

315,993

Pas-de-Calais .

2,606

853.526

906,249

1,012,466

Puy-de-D6rae .

3.094

570,964

555.078

535,419

Pyrenees-Orientales

1.599

211,187

208,387

213,171

Rh8ne

1,104

772,912

839.329

858,907

Sa6ne-et-Loire .

3.330

625,885

621,237

613.377

Sarthe

2,410

436,111

425.077

421,470

Savoie

2.389

267,428

259.790

253.297

Seine .

185

2,961,089

3.340,514

3,848,618

Seine-Inferieure

2,448

833.386

837,824

863,879

Seine-et-Marne

2,289

355.136

359.044

361,939

Seine-et-Oise

2,184

618,089

669,098

749,753

Somme

2 .423

548,982

543.279

532,567

Tarn .

2,231

358,757

339,827

330,533

Tarn-et-Garonne

1,440

214,046

200,390

188,553

Var .

2,325

283,689

309,191

324,638

Vaucluse .

1,381

241,787

236,313

239,178

Vendee

2,708

434,808

44L735

442,777

Vienne

2,719

342,785

338,“4

333.621

Vosges

2,279

413.707

421,412

429,812

Yonne

2,880

355.364

332,656

315,199

Total .

207,076

38,218,903

38,517,975

39,252,245

The French census uses the commune as the basis of its returns, and employs the following classifications in respect to communal population: (1) Total communal population. (2) Population comptee d part, which includes soldiers and sailors, inmates of prisons, asylums, schools, members of religious communities, and workmen temporarily engaged in public works. (3) Total municipal population, i.e. communal population minus the population comptee d part. (4) Population municipale agglomirie au chef lieu de la commune, which embraces the urban population as opposed to the rural population. The following tables, showing the growth of the largest towns in France, are drawn up on the basis of the fourth classification, which is used through out this work in the articles on French towns, except where otherwise stated.

In 1906 there were in France twelve towns with a population of over 100,000 inhabitants. Their growth or decrease from 1886 to 1906 is shown in the following table :

1886.

1896.

1906.

Paris

2,294,108

2,481,223

2,7”,93i

Lyons

344.124

398,867

430,186

Marseilles .

249.938

332,515

421,116

Bordeaux

225,281

239,806

237,707

Lille . . .

143,135

160,723

196,624

St Etienne

103,229

120,300

130,940

Le Havre .

109,199

117,009

129,403

Toulouse

123,040

124,187

125,856

Roubaix

89,781

113,899

“9,955

Nantes .

110,638

107,137

118,244

Rouen

100,043

106,825

1 1 1 ,402

Reims

91,130

99,001

102,800

In the same years the following eighteen towns, now numbering from 50,000 to 100,000 inhabitants, each had :

1886.

1896.

1906.

Nice

61,464

69,140

99.556

Nancy .

69,463

83,668

98,302

Toulon .

53,941

70,843

87,997

Amiens

68,177

74,808

78,407

Limoges

56,699

64,718

75,906

Angers .

65,152

69,484

73,585

Brest

59,352

64,144

71,163

Nimes .

62,198

66,905

70,708

Montpellier

45,930

62,717

65,983

Dijon

50,684

58,355

65,516

Tourcoing

41,183

55.705

62,694

Rennes .

52,614

57.249

62,024

Tours

51,467

56,706

61,507

Calais

52,839

50,818

59,623

Grenoble

43,260

50,084

58,641

Orleans

51,208

56,915

57,544

Le Mans

46,991

49.665

54,907

Troyes .

44,864

50,676

51,228

[RELIGION

Of the population in 1901, 18,916,889 were males and J 9> 533,899 females, an excess of females over males of 617,010, i.e. 1-6% or about 508 females to every 492 males. In 1 881 the proportion was 501 females to every 499 males, since when the disparity has been slightly more marked at every census. Below is a list of the departments in which the number of women to every thousand men was (1) greatest and (2) least.

(2)

Belfort 886

Basses-Alpes . . . 893

Var 894

Meuse 905

Hautes-Alpes . . . 908

Meurthe-et-Moselle . 918

Haute-Savoie. . . 947

Departments from which the adult males emigrate

regularly either to sea or to seek employment in towns

tend to fall under the first head, those in which large

bodies of troops are stationed under the second.

The annual number of emigrants from France is small. The Basques of Basses-Pyrenees go in considerable numbers to the Argentine Republic, the inhabitants of Basses Alpes to Mexico and the United States, and there are important French colonies in Algeria and Tunisia.

The following table shows the distribution of the active population of France according to their occupations in

1901.

(I)

Creuse

• 1131

C6tes-du-Nord .

. 1117

Calvados .

. 1 100

Cantal

. 1098

Seine-Inferieure .

. 1084

Basses- Pyrenees .

. 1080

Occupation.

Forestry and agriculture. Manufacturing industries

Trade

Domestic service .

Transport

Public service …. Liberal professions Mining, quarries .

Fishing

Unclassed

Grand Total

Males.

5,517,617

3,695,213

1,132,621

223,861

617,849

1,157,835

226,561

261,320

63,372

H,3l6

12,910,565

Females.

2,658,952

2,124,642

689,999

791,176

212,794

139.734 173,278

5.031 4,400

4.504

6,804,510

Total.

8,176,569

5,819.855 1,822,620

1,015,037 830,643

1,297,569

399,839

266,351

67,772

18,820

19,715,075

Religion.

Great alterations were made with regard to religious matters in France by a law of December 1905, supplemented by a law of January 1907 (see below, Law and Institutions). Before that time three religions (cultes) were recognized and supported by the state— the Roman Catholic, the

Protestant (subdivided into the Reformed and Lutheran) and the Hebrew. In Algeria the Mahommedan religion received similar recognition. By the law of 1905 all the churches ceased to be recognized or supported by the state and became entirely separated therefrom, while the adherents of all creeds were permitted to form associa- tions for public worship (associations cultuelles), upon which the expenses of maintenance were from that time to devolve. The state, the departments, and the communes were thus relieved from the payment of salaries and grants to religious bodies, an item of expenditure which amounted in the last year of the old system to £1,101,000 paid by the state and £302,200 contri- buted by the departments and communes. Before these altera- tions the relations between the state and the Roman Catholic communion, by far the largest and most important in France, were chiefly regulated by the provisions of the Concordat of 180 1, concluded between the first consul, Bonaparte, and Pope Pius VII. and by other measures passed in 1802.

France is divided into provinces and dioceses as follows:

Archbishoprics. Bishoprics.

Paris . . . Chartres, Meaux, Orleans, Blois, Versailles. Aix . . . Marseilles, Frejus, Digne, Gap, Nice, Ajaccio. Albi . . . Rodez, Cahors, Mende, Perpignan. Auch . . . Aire, Tarbes, Bayonne. Avignon . . Nimes, Valence, Viviers, Montpellier. Besancon. . Verdun, Bellay, St Die, Nancy. Bordeaux . Agen, AngoulSme, Poitiers, Perigueux, La Rochelle,

Lucon. Bourges . . Clermont, Limoges, Le Puy, Tulle, St Flour. Cambrai . . Arras.

Chambery . Annecy, Tarentaise, St Jean-de-Maurienne. Lyons . . . Autun, Langres, Dijon, St Claude, Grenoble.

Archbishoprics. Bishoprics.

Reims . . . Soissons, Chalons-sur-Marne, Beauvais, Amiens. Rennes . . Quimper, Vannes, St Brieuc. Rouen . . . Bayeux, Evreux, Sees, Coutances. Sens . . . Troyes, Nevers, Moulins. Toulouse . . Montauban, Pamiers, Carcassonne. Tours . . Le Mans, Angers, Nantes, Laval.

The dioceses are divided into parishes each under a parish priest known as

a curt or desservant (incumbent). The bishops and arch- bishops, formerly nominated by the government and canonically confirmed by the pope, are now chosen by the latter. The appoint- ment of cures rested with the bishops and had to be confirmed by the government, but this confirmation is now dispensed with. The archbishops used to receive an annual salary of £600 each and the bishops £400.

The archbishops and bishops are assisted by vicars-general (at salaries previously ranging from £100 to £180), and to each cathedral is attached a chapter of canons. A cure, in addition to his regular salary, received fees for baptisms, marriages, funerals and special masses, and had the benefit of a free house called a presbytere. The total personnel of state-paid Roman Catholic clergy amounted in 1903 to 36,169. The Roman priests are drawn from the seminaries, established by the church for the education of young men intending to join its ranks, and divided into lower and higher seminaries (grands et petits semindires) , the latter giving the same class of instruction as the lycees.

The number of Protestants may be estimated at about 600,000 and the Jews at about 70,000. The greatest number of Jews is to be found at Paris, Lyons and Bordeaux, while the departments of the centre and of the south along the range of the Cevennes, where Calvinism flourishes, are the principal Protestant localities, Nimes being the most important centre. Considerable sprinklings of Protestants are also to be found in the two Charentes, in Dauphine, in Paris and in Franche-Comte. The two Protestant bodies used to cost the state about £60,000 a year and the Jewish Church about £6000.

Both Protestant churches have a parochial organization and a presbyterian form of church government. In the Reformed Church (far the more numerous of the two bodies) each parish has a council of presbyters, consisting of the pastor and lay-members elected by the congregation. Several parishes form a consistorial circum- scription, which has a consistorial council consisting of the council of presbyters of the chief town of the circumscription, the pastor and one delegate of the council of presbyters from each parish and other elected members. There are 103 circum- scriptions (including Algeria), which are grouped into 21 provincial synods composed of a pastor and lay dele- gate from each consistory. All the more important questions of church

discipline and all decisions regulating the doctrine and practice of the church are dealt with by the synods. At the head of the whole organization is a General Synod, sitting at Paris. The organization of the Lutheran Church (Eglise de la confession d' Augsburg) is broadly similar. Its consistories are grouped into two special synods, one at Paris and one at

Montbeliard (for the department of Doubs and Haute-SaSne and the territory of Belfort, where the churches of this denomination are principally situated). It also has a general synod — composed of 2 inspectors, 1 5 pastors elected by the synod of Paris, and 6 by that of Montbeliard, 22 laymen and a delegate of the theological faculty at Paris— which holds periodical meetings and is represented in its relations with the government by a permanent executive commission.

The Jewish parishes, called synagogues, are grouped into depart- mental consistories (Paris, Bordeaux, Nancy, Marseilles, Bayonne, Lille, Vesoul, Besangon and three in Algeria). Each synagogue is served by a rabbi assisted by an officiating minister, and in each consistory is a grand rabbi. At Paris is the central consistory, controlled by the government and presided over by the supreme grand rabbi.

Agriculture.

Of the population of France some 17,000,000 depend upon agriculture for their livelihood, though only about 6,500,000 are engaged in work on the land. The cultivable land of the country occupies some 195,000 sq. m. or about 94% of the total area; of this 171,000 sq. m. are cultivated. There are besides 12,300 sq. m. of uncultivable area covered by lakes, rivers, towns, &c. Only the roughest estimate is possible as to the

1 Inspectors are placed at the head of the synodal circumscriptions; their functions are to consecrate candidates for the ministry, install the pastors, &c

sizes of holdings, but in general terms it may be said that about 3 million persons are proprietors of holdings under 25 acres in extent amounting to between 15 and 20% of the cultivated area, the rest being owned by some 750,000 proprietors, of whom 150,000 possess half the area in holdings averaging 400 acres in extent. About 80% of holdings (amounting to about 60% of the cultivated area) are cultivated by the proprietor; of the rest approximately 13% are let on lease and 7% are worked on the system known as metayage (q.v.).

The capital value of land, which greatly decreased during the last twenty years of the 19th century, is estimated at £3,120,000,000, and that of stock, buildings, implements, &c, at £340,000,000. The value per acre of land, which exceeds £48 in the departments of Seine, Rh6ne and those fringing the north-west coast from Nord to Manche inclusive, is on the average about £29, though it drops to £16 and less in Morbihan, Landes, Basses-Pyrenees, and parts of the Alps and the central plateau.

While wheat and wine constitute the staples of French agricul- ture, its distinguishing characteristic is the variety of its products. Cereals occupy about one-third of the cultivated area. For the production of wheat, in respect of which France is self-supporting, French Flanders, the Seine basin, notably the Beauce and the Brie, and the regions bordering on the lower course of the Loire and the upper course of the Garonne, are the chief areas. Rye, on the other hand, one of the least valuable of the cereals, is grown chiefly in the poor agricultural territories of the central plateau and western Brittany. Buckwheat is cultivated mainly in Brittany. Oats and barley are generally cultivated, the former more especially in the Parisian region, the latter in Mayenne and one or two of the neigh- bouring departments. Meslin, a mixture of wheat and rye, is produced in the great majority of French departments, but to a marked extent in the basin of the Sarthe. Maize covers considerable areas in Landes, Basses-Pyrenees and other south-western de- partments.

Average Acreage

Average Production

Average

Yield

(Thousands of Acres).

(Thousands of Bushels).

per Acre (Bushels).

1886-1895.

1896-1905.

1886-1895.

1 896- 1 905.

1886-1895.

1896-1905.

Wheat ….

17,004

16,580

294,564

317,707

17-3

191

Meslin ….

720

491

12,193

8,826

16-9

17-0

Rye ….

3,888

3,439

64,651

56,612

166

16-4

Barley ….

2,303

1,887

47,197

41,066

20-4

21-0

Oats ….

9,507

9,601

240,082

253,799

25-2

26-4

Buckwheat

1,484

1,392

• *26,345*

23,136

17-7

16-6

Maize ….

i,39i

1-330

25,723

24,459

18-4

18-4

Forage Crops. — The mangold-wurzel, occupying four times the acreage of swedes and turnips, is by far the chief root-crop in France.

It is grown largely in the departments of Nord and Pas-de-Calais

_ _ , „ , „ and in those of the Seine basin, the southern limit of its cultivation

Its consistories are grouped^ into two special I being roughly a line drawn from Bordeaux to Lyons. The average

area occupied by it in the years from 1896 to 1905 was 1,043,000 acres, the total average production being 262,364,000 cwt. and the average production per acre 10 J tons. Clover, lucerne and sainfoin make up the bulk of artificial pasturage, while vetches, crimson clover and cabbage are the other chief forage crops.

Vegetables. — Potatoes are not a special product of any region, though grown in great quantities in the Bresse and the Vosges. Early potatoes and other vegetables [primeurs) are largely cultivated in the districts bordering the English Channel. Market-gardening is an important industry in the regions round Paris, Amiens and Angers, as it is round Toulouse, Montauban, Avignon and in southern France generally. The market-gardeners of Paris and its vicinity have a high reputation for skill in the forcing of early vegetables under glass.

Potatoes: Decennial Averages.

Acreage.

Total Yield (Tons).

Average Yield per Acre (Tons).

1 886- 1 895 1 896-1905

3,690,000 3.735.000

11,150,000 11,594,000

3-02

3'i

Industrial Plants? — The manufacture of sugar from beetroot, owing to the increased use of sugar, became highly important during

2 Cultures industrielles — Under this head the French group beetroot, hemp, flax and other plants, the products of which pass through some process of manufacture before they reach the con- sumer.

the latter half of the 19th century, the industry both of cultivation and manufacture being concentrated in the northern departments of Aisne, Nord, Pas-de-Calais, Somme and Oise, the first named supplying nearly a quarter of the whole amount produced in France.

Flax and hemp showed a decreasing acreage from 1881 onwards. Flax is cultivated chiefly in the northern departments of Nord, Seine-Inferieure, Pas-de-Calais, C6tes-du-Nord, hemp in Sarthe, Morbihan and Maine-et-Loire.

Colza, grown chiefly in the lower basin of the Seine (Seine- Inferieure and Eure), is the most important of the oil-producing plants, all of which show a diminishing acreage. The three principal regions for the production of tobacco are the basin of the Garonne (Lot-et-Garonne, Dordogne, Lot and Gironde), the basin of the Isere (Isere and Savoie) and the department of Pas-de-Calais. The state controls its cultivation, which is allowed only in a limited number of departments. Hops cover only about 7000 acres, being almost confined to the departments of Nord, C6te d'Or and Meurthe-et-Moselle.

Decennial Averages 1896-IQ05.

Acreage.

Production (Tons).

Average Yield

per Acre

(Tons).

Sugar beet . Hemp . Flax . . . Colza Tobacco . • .

672,000 64,856

57,893 102,454

41,564

6,868,000 18,451 ' 17,857 ' 47,697 22,453

■28 ‘ ■30 ‘ •46

•54

Vineyards (see Wine). — The vine grows generally in France, except in the extreme north and in Normandy and Brittany. The great wine-producing regions are :

1. The country fringing the Mediterranean coast and including ‘Herault (240,822,000 gals, in 1905), and Aude (117,483,000 gals, in

1905), the most productive departments in France in this respect.

2. The department of Gironde (95,559,000 gals, in 1905), whence come Medoc and the other wines for which Bordeaux is f he market.

3. The lower valley of the Loire, including Touraine and Anjou, and the district of Saumur.

4. The valley of the Rhone.

5. The Burgundian region, including C6te d’Or and the valley of the Sa6ne (Beaujolais, Maconnais).

6. The Champagne.

7. The Charente region, the grapes of which furnish brandy, as do those of Armagnac (department of Gers).

The decennial averages for the years 1 896-1905 were as follows: Acreage of productive vines . . 4,056,725

Total production in gallons . . 1,072,622,000

Average production in gallons per acre . . 260 Fruit. — Fruit-growing is general all over France, which, apart from bananas and pine-apples, produces in the open air all the ordinary species of fruit which its inhabitants consume. Some of these may be specially mentioned. The cider apple, which ranks first in importance, is produced in those districts where cider is the habitual drink, that is to say, chiefly in the region north-west of a line drawn from Paris to the mouth of the Loire. The average annual production of cider dur- ing the years 1896 to 1905 was 304,884,000 gallons. Dessert apples and pears are grown there and in the country on both banks of the lower Loire, the valley of which abounds in orchards wherein many varieties of fruit flourish and in nursery-gardens. The hilly

regions of Limousin, Perigord and the Cevennes are the home of the chestnut, which in some places is still a staple food ; walnuts grow on the lower levels of the central plateau and in lower Dauphine and Provence, figs and almonds in Provence, oranges and citrons on the Mediter- ranean coast, apricots in central France, the olive in Provence and the lower valleys of the Rhoneand Durance. Truffles arc found under

along the coast of the Mediterranean. Silk-worm rearing, which is encouraged by state grants, is carried on in the valleys mentioned and on the Mediterranean coast east of Marseilles. The numbers of growers decreased from 139,000 in 1891 to 124,000 in 1905. The decrease in the annual average production of cocoons is shown in the preceding table.

Snails are reared in some parts of the country as an article of food, those of Burgundy being specially esteemed.

Stock-raising.~From this point of view the soil of France may be divided into four categories :

1. The rich pastoral regions where dairy-farming and the fattening of cattle are carried on with most success, viz. (a) Normandy, Perche, Cotentin and maritime Flanders, where horses are bred in great numbers; (6) the strip of coast between the Gironde and the mouth of the Loire; (e) the Morvan including the Nivernais and the Charolais, from which the famous Charolais breed of oxen takes its name; id) the central region of the central plateau including the districts of Cantal and Aubrac, the home of the famous beef-breeds of Salers and Aubrac. 2 The famous pre-sale sheep are also reared in the Vendee and Cotentin.

2. The poorer grazing lands on the upper levels of the Alps, Pyrenees, Jura and Vosges, the Landes, the more outlying regions of the central plateau, southern Brittany , Sologne, Berry, Champagne- Pouilleuse, the Crau and the Camargue, these districts being given over for the most part to sheep-raising.

3. The plain of Toulouse, which with the rest of south-western France produces good draught oxen, the Parisian basin, the plains of the north to the east of the maritime region, the lower valley of the Rh6ne and the Bresse, where there is little or no natural pastur- age, and forage is grown from seed.

4. West, west-central and eastern France outside these areas, where meadows are predominant and both dairying and fattening are general. Included therein are the dairying and horse-raising district of northern Brittany and the dairying regions of Jura and Savoy.

In the industrial regions of northern France cattle are stall-fed with the waste products of the beet-sugar factories, oil-works and distilleries. Swine, bred all over France, are more numerous in Brittany, Anjou (whence comes the well-known breed of Craon), Poitou, Burgundy, the west and north of the central plateau and Beam. Upper Poitou and the zone of south-western France to the north of the Pyrenees are the chief regions for the breeding of mules. Asses are reared in Beam, Corsica, Upper Poitou, the Limousin, Berry and other central regions. Goats are kept in the mountainous regions (Auvergne, Provence, Corsica). The best poultry come from the Bresse, the district of Houdan (Seine-et-Oise) , the district of Le Mans and Crevecceur (Calvados).

• The pres naturels (meadows) and herbages (unmown pastures) of France, i.e. the grass-land of superior quality as distinguished from paturages et pacages, which signifies pasture of poorer quality, in- creased in area between 1895 and 1905 as is shown below: 1895 (Acres). 1905 (Acres).

Pres naturels . . 10,852,000 11,715,000

Herbages . . . 2,822,000 3,022,000

The following table shows the number of live stock in the country at intervals of ten years since 1885.

Cattle.

Sheep and Lambs.

Pigs.

Horses.

Mules.

Asses.

Cows.

Other Kinds.

Total.

1885 1895 1905

6,414,487 6,359,795 7,515,564

6,690,483 6,874,033 6,799,988

13,104,970 13,233,828

H,3i5,552

22,616,547 21,163,767 17,783,209

5,881,088 6,306,019

7,558,779

2,911,392 2,812,447 3,169,224

238,620 211,479 198,865

387,227

357,778 365,181

Silk Cocoons.

1891-1895.

1 896- 1 900.

1901-1905.

Annual average pro-~) duction over quin- [quennial periods f in lb. J

19,587,000

17,696,000

16,566,000

the oaks of Perigord, Comtat-V'enaissin and lower DauphiniS. The mulberry grows in the valleys of the Rhone and its tributaries, the Isere, the Drdme, the Ardeche, the Gard and the Durance, and also

1 Fibre only. In the years 1896-1905, 8130 tons of hemp-seed and 12,137 tons of flax-seed was the average annual production in addition to fibre.

Agricultural Organization. — In France the interests of agriculture are entrusted to a special ministry, comprising the following divi- sions: (1) forests, (2) breeding-studs (haras); (3) agriculture, a department which supervises agricultural instruction and the dis- tribution of grants and premiums; (4) agricultural improvements, draining, irrigation, &c. ; (5) an intelligence department which prepares statistics, issues information as to

prices and markets, &c. The minister is assisted by a superior council of agriculture, the members of which, numbering a hundred, include senators, deputies and prominent agriculturists. The ministry employs inspectors, whose duty it is to visit the different parts of the country and to report on their respective position and wants. The reports which they furnish help to determine the distribution of the moneys dispensed by the state in the form of subventions to agricultural

2 The chief breeds of horses are the Boulonnais (heavy draught), the Percheron (light and heavy draught), the Anglo-Norman (Tight draught and heavy cavalry)and the Tarbais of the western Pyrenees (saddle horses and light cavalry). Of cattle besides the breeds named the Norman (beef and milk), the Limousin (beef), the MontbHiard, the Bazadais,_ the Flamand, the Breton and the 1'arthenais breeds may be mentioned.

societies and in many other ways. The chief type of agricultural society is the cornice agricole, an association for the discussion of agricultural problems and the organization of provincial shows. There are besides several thousands of local syndicates, engaged in the purchase of materials and sale of produce on the most advan- tageous terms for their members, credit banks and mutual insurance societies (see Co-operation). Three societies demand special mention: the Union centrale des agriculteurs de France, to which the above syndicates are affiliated; the Societi nalionaled' agricul- ture, whose mission is to further agricultural progress and to supply the government with information on everything appertaining thereto and the Societe des agriculteurs de France.

Among a variety of premiums awarded by the state are those for the best cultivated estates and for irrigation works, and to the owners of the best stallions and brood-mares. Haras or stallion stables containing in all over 3000 horses are established in twenty- two central towns, and annually send stallions, which are at the disposal of private individuals in return for a small fee, to various stations throughout the country. Other institutions belonging to the state are the national sheep-fold of Rambouillet (Seine-et-Oise) and the cow-house of Vieux-Pin (Orne) for the breeding of Durham cows. Four different grades of institution for agricultural instruction are under state direction : (1) farm-schools and schools of apprentice- ship in dairying, &c, to which the age of admission is from 14 to 16 years; (2) practical schools, to which boys of from 13 to 18 years of age are

admitted. These number forty-eight, and are intended for sons of farmers of good position ; (3) national schools, which are established at Grignon (Seine-et-Oise), Rennes and Montpellier, candidates for which must be 17 years of age; (4) the National Agronomic Institute at Paris, which is intended for the train- ing of estate agents, professors, &c. There are also depart- mental chairsof agriculture, the holders of which giveinstruc- tion in training-colleges and elsewhere and advise farmers.

Forests. — In relation to its total extent, France presents but a very limited area of forest land, amounting to only 36,700 sq. m. or about 18% of the entire surface of the country. Included under the denomination of " forest " are lands — surfaces boisees — which are bush rather than forest. The most wooded parts of France are the mountains and plateaus of the east and of the north-east, comprising the pine-forests of the Vosges and Jura (including the beau- tiful Forest of Chaux), the Forest of Haye, the Forest of Ardennes, the Forest of Argonne, &c. ; the Landes, where replanting with maritime pines has transformed large areas of marsh into forest; and the departments of Var and Ariege. The Central Mountains and the Morvan also have considerable belts of wood. In the Parisian region there are the Forests of Fontainebleau (66 sq. m.), of Compiegne (56 sq. m.), of Rambouillet, of Villers-Cotterets, &c. The Forest of Orleans, the largest in France, covers about 145 sq. m. The Alps and Pyrenees are in large part deforested, but reafforesta- tion with a view to minimizing the effects of avalanches and sudden floods is continually in progress.

Of the forests of the country approximately one-third belongs to the state, communes and public institutions. The rest belongs to private owners who are, however, subject to certain restrictions. The Department of Waters 1 and Forests (Administration des Eaux et Forets) forms a branch of the min- istry of agriculture. It is adminis- tered by a director-general, who has his headquarters at Paris, assisted by three administrators who are charged with the working of the forests, questions of rights and law, finance and plantation works. The estab- lishment consists of 32 conservators, each at the head of a district com- prising one or more departments, 200 inspectors, 215 sub-inspectors and about 300 gardes generaux. These officials form the higher grade of the service (agents). There are besides several thousand forest-rangers and other employes {proposes). The de- partment is supplied with officials of the higher class from the National School of Waters and Forests at Nancy, founded in 1824.

Industries.

In France, as in other countries, the development of machinery,

1 The department is also entrusted with surveillance over river-fishing,

pisciculture and the amelioration of pasture.

whether run by steam, water-power or other motive forces, has played a great part in the promotion of industry; the increase in the amount of steam horse-power employed in industrial establishments is, to a certain degree, an index to the activity of the country as regards manufactures.

The appended table shows the progress made since 1850 with regard to steam power. Railway and marine locomotives are not included.

No. of

No. of

Total

Years.

Establishments.

Steam-Engines.

Horse- Power.

1852

6,543

6,080

76,000

1861

14,153

15,805

191,000

1871

22,192

26,146

316,000

1881

35.712

44,oio

576,000

1 891

46,828

58,967

916,000

1901

58,151

75,866

1,907,730

1905

61,112

79.203

2,232,263

With the exception of Loire, Bouches-du-Rhone and Rhone, the chief industrial departments of France are to be found in the north and north-east of the country. In 1901 and 1896 those in which the working inhabitants of both sexes were engaged in industry as opposed to agriculture to the extent of 50 % (approxi- mately) or over, numbered eleven, viz.: —

Departments.

Total Working

Population

(1901).

Industrial

Population

(1901).

Percentage engaged in Industry.

1901.

1896.

Nord …. Territoire de Belfort Loire …. Seine …. Bouches-du-Rh6ne . Rh6ne

Meurthe-et-Moselle Ardennes . Vosges

Pas-de-Calais . Seine-Inferieure

848,306

40,703 292,808

2,071,344 341.823 449,121 215,501 139,270 208,142 404.153 428,591

544.177

24.470

167,693

1,143.809

187,801

243.571

115.214

73.250

107,547 200,402 206,612

64-15

6o-io

57-27 55-22

54-94 54-23 53-46 52-60

5I-67

49-58

48-21

63-45 58-77 54-73 53-54 51-00

54-78 50-19 52-42 51-05 46-55 49-85

The department of Seine, comprising Paris and its suburbs, which has the largest manufacturing population, is largely occupied with the manufacture of dress, millinery and articles of luxury (perfumery, &c), but it plays the leading part in almost every great branch of industry with the exception of

Groups.

Basins.

Departments.

Average Production

(Thousands of

Metric Tons)

1901-1905.

Nord and Pas-de- j Calais . I

Valenciennes Le Boulonnais

Nord, Pas-de-Calais Pas-de-Calais

| 20,965

Loire – -j

St Etienne and Rive-de-Gier

Communay

Ste Foy l'Argentiere

Roannais

Loire I sere Rh6ne Loire

3.601

Gard . . . . j

Alais Aubenas Le Vigan

Gard, Ardeche

Ardeche

Gard

f 1.954

Bourgogne and J Nivernais . . 1

Decize

La Chapelle-sous-Dun

Bert

Sincey ‘

Nievre

Sa6ne-et-Loire Allier C6te-d’Or

t 1,881

Tarn and Aveyron <

Aubin

Carmaux and Albi

Rodez

St Perdoux

Aveyron Tarn Aveyron Lot

r 1.770

Bourbonnais . . -j

Commentry and Doyet St Eloi L'Aumance La Queune

Allier

Puy-de-D6me Allier Allier

r 994

7 8 4

FRANCE

[INDUSTRIES

spinning and weaving. The typically industrial region of France is the department of Nord, the seat of the woollen industry, but also prominently concerned in other textile industries, in metal working, and in a variety of other manufactures, fuel for which is supplied by its coal-fields. The following sketch of the manufacturing industry of France takes account chiefly of those of its branches which are capable in some degree of localization. Many of the great industries of the country, e.g. tanning, brick-making, the manufacture of garments, &c, are evenly distributed throughout it, and are to be found in or near all larger centres of population.

Coal. — The principal mines of France are coal and iron mines. The production of coal and lignite averaging 33,465,000 metric tons 1 in the years 1901-1905 represents about 73 % of the total consump- tion of the country;' the surplus is supplied from Great Britain, Belgium and Germany. The preceding table shows the average out- put of the chief coal-groups for the years 1901-1905 inclusive. The Flemish coal-basin, employing over 100,000 hands, produces 60% of the coal mined in France.

French lignite comes for the most part from the department of Bouches-du-Rh6ne (near Fuveau).

The development of French coal and lignite mining in the 19th century, together with records of prices, which rose considerably at the end of the period, is set forth in the table below:

Average Yearly

Average Price

Production

per Ton at

Years.

(Thousands of

Pit Mouth

Metric Tons).

(Francs).

1821-1830

1.495

10-23

1831-1840

2,571

9-83

1 841-1850

4.078-5

9.69

1851-1860

6,857

n-45

1861-1870

11,831

ii-6i

1871-1880

16,774

M-34

1 881-1890

21,542

u-55

1891-1900

29,190

11-96

1901-1905

33,465

14-18

Iron. — The iron-mines of France are more numerous than its coal- mines, but they do not yield a sufficient quantity of ore for the needs of the metallurgical industries of the country; as will be seen in the table below the production of iron in France gradually in- creased during the 19th century; on the other hand, a decline in prices operated against a correspondingly marked increase in its annual value.

Years.

Average Annual

Production (Thousands of Metric Tons).

Price per Metric Ton (Francs) .

1841-1850 1851-1860 1861-1870 1871-1880 1 881-1890 1891-1900 1901-1905

1247

24I4-5

3035

2514

2934

4206

6072

6-76

5-51 4-87 539 3-99 3-37 3-72

The department of Meurthe-et-Moselle (basins of Nancy and Longwy-Briey) furnished 84 % of the total output during the quin- quennial period 1901-1905, may be reckoned as one of the principal iron-producing regions of the world. The other chief producers were Pyrenees-Orientales, Calvados, Haute-Marne (Vassy) andSa6ne- et-Loire (Mazenay and Change).

Other Ores. — The mining of zinc, the chief deposits of which are at Malines (Gard), Les Bormettes (Var) and Planioles (Lot), and of lead, produced especially at Chaliac (Ardeche), ranks next in im- portance to that of iron. Iron-pyrites come almost entirely from

Sain-Bel (Rhone), manganese chiefly from Ariege and Sa6ne-et- Loire, antimony from the departments of Mayenne, Haute-Loire and Cantal. Copper and mispickel are mined only in small quantities. The table below gives the average production of zinc, argentiferous lead, iron-pyrites and other ores during the quinquennial period

1901-1905.

Production (Thousands of Metric Tons).

Value £

Zinc Lead . Iron-pyrites . Other ores

60-3

18-5

297-2

36-0

206,912

100,424

170,312

68,376

Salt, &c. — Rock-salt is worked chiefly in the department of Meurthe-et-

Moselle,which produces more than half the average annual product of salt. For the years 1 896-1 905- this was 1,010,000 tons, including both rock- and sea-salt. The salt-marshes of the Medi- terranean coast, especially the Etang de Berre and those of Loire- Inferieure, are the principal sources of sea-salt. Sulphur is obtained near Apt (Vaucluse) and in a few other localities of south-eastern France; bituminous schist near Autun (Sa6ne-et-Loire) and Buxieres (Allier). The most extensive peat- workings are in the valleys of the Somme; asphalt comes from Seyssel (Ain) and Puy- de-D6me.

The mineral springs of France are numerous, of varied character and much frequented. Leading resorts are: in the Pyrenean region, Amelie-les-Bains, Bagneres-de-Luchon, Bagneres-de-Bigorre, Bareges, Cauterets, Eaux-Bonnes, Eaux-Chaudes and Dax; in the Central Plateau, Mont-Dore, La Bourboule, Bourbon l'Archam- bault, Vichy, Royat, Chaudes-Aigues, Vals, Lamalon; in the Alps, Aix-les- Bains and Evian; in the Vosges and Faucilles, Plombieres, Luxeuil, Contrexeville, Vittel, Martigny and Bourbonne-les-Bains. Outside these main groups St Amand-les-Eaux and Foyes-les-Eaux may be mentioned.

Quarry-Products. — Quarries of various descriptions are numerous all over France. Slate is obtained in larg'e quantities from the departments of Maine-et- Loire (Angers), Ardennes (Fumay) and Mayenne (Renaze). Stone-quarrying is specially active in the departments round Paris, Seine-et-Oise employing more persons in this occupation than any other department. The environs of Creil (Oise) and Chateau-Landon (Seine-et-Marne) are noted for their freestone (pierre de tattle), which is also abundant at Euville and Lerouville in Meuse ; the production of plaster is particularly important in the environs of Paris, of kaolin of fine quality at Yrieix (Haute- Vienne), of hydraulic lime in Ardeche (Le Teil), of lime phosphates in the department of Somme, of marble in the departments of Haute-Garonne (St Beat), Hautes-Pyrenees (Campan, Sarrancolin), Isere and Pas-de-Calais, and of cement in Pas-de-Calais (vicinity of Boulogne) and Isere (Grenoble). Paving-stone is supplied in large quantities by Seine-et-Oise, and brick-clay is worked chiefly in Nord, Seine and Pas-de-Calais. The products of the quarries of France for the five years 1901-1905 averaged £9,311,000 per annum in value, of which building material brought in over two-thirds.

Metallurgy. — The average production and value of iron and steel manufactured in France in the last four decades of the 19th century is shown below:

Years.

Cast Iron.

Wrought Iron and Stee!.

Product

(Thousands

of Metric

Tons).

Value (Thousands

Product

(Thousands

of Metric

Tons).

Value

(Thousands

oi£).

I86I-1870

1871-1880

I881-1890 189I-I900

1903

II9I-5

1391 1796 2267

284I

5012 5783 5119 5762 7334

844 1058-5 1376 1686 1896

8,654 11,776 11,488 14,540 15.389

Taking the number of hands engaged in the industry as a basis of comparison, the most important departments as regards iron and steel working in 1901 were:

Department.	*Chief Centres.*	*Hands engaged in Production of Pig-Iron and Steel.*	*Hands engaged in Production of Engineering Material and Manufactured Goods.*
Seine	*Lille, Anzin, Denain, Douai, Hautmont, Maubeuge*	*600*	*14,000*
Nord	*Rive-de-Gier, Firminy, St Etienne, St diamond*	*9.5oo*	*16,500*
Meurthe-et-Moselle	*Pont-a-Mousson, Frouard, Longwy, Nancy*	*800*	*102,500*
Ardennes	*Charleville, Nouzon*		

45,000

17,500

6,500

23,000

1 The metric ton = 1000 kilogrammes or 2204 lb.

INDUSTRIES]

FRANCE

785

Rh6ne (Lyons), Sa6ne-et-Loire (Le Creusot, Chalon-sur-Sa6ne) and Loire-Inferieure (Basse-Indre, Indret, Cougron, Trignac) also play a considerable part in this industry.

The chief centres for the manufacture of cutlery are Chatterlerault ˆVienne), Langres (Haute-Marne) and Thiers (Puy-de-D6me) ; 'for that of arms St Etienne, Tulle and Chatterlerault; for that of watches and clocks, Besancon (Doubs) and Montbeliard (Doubs) ; for that of optical and mathematical instruments Paris, Morez (Jura) and St Claude (Jura) ; for that of locksmiths' ware the region of Vimeu (Pas-de-Calais).

There are important zinc works at Auby and St Amand (Nord) and Viviez (Aveyron) and Noyelles-Godault (Pas-de-Calais) ; there are lead works at the latter place, and others of greater importance at Coueron (Loire-Inferieure). Copper is smelted in Ardennes and Pas-de-Calais. The production of these metals, which are by far the most important after iron and steel, increased steadily during the period 1890-1905, and reached its highest point in 1905, details for which year are given below:

Zinc.

Lead.

Copper.

Production (in metric tons) Value

43,200

£1,083,000

24,100

£386,000

7,600

£526,000

Wool. — In 1901, 161,000 persons were engaged in the spinning and other preparatory processes and in the weaving of wool. The woollen industry is carried on most extensively in the department of Nord (Roubaix, Tourcoing, Fourmies). Of second rank are Reims and Sedan in the Champagne group; Elbeuf, Louviers and Rouen in Normandy; and Mazamet (Tarn).

Cotton. — In 1901, 166,000 persons were employed in the spinning and weaving of cotton, French cotton goods being distinguished chiefly for the originality of their design. The cotton industry is distributed in three principal groups. The longest established is that of Normandy, having its centres at Rouen, Havre, Evreux, Falaise and Flers. Another group in the north of France has its centres at Lille, Tourcoing, Roubaix, St Quentin and Amiens. That of the Vosges, which has experienced a great extension since the loss of Alsace-Lorraine, comprises Epinal, St Die, Remiremont and Belfort. Other groups of less importance are situated in the Lyonnais (Roanne and Tarare) and Mayenne (Laval and Mayenne).

Silk. — The silk industry occupied 134,000 hands in 1901. The silk fabrics of France hold the first place, particularly the more expensive kinds. The industry is concentrated in the departments bordering the river Rh6ne, the chief centres being Lyons (Rh6ne), Voiron (Isere), St Etienne and St diamond (Loire) (the two latter being especially noted for their ribbons and trimmings) and Annonay (Ardeche) and other places in the departments of Ain, Gard and DrSme.

Flax, Hemp, Jute, &c. — The preparation and spinning of these materials and the manufacture of nets and rope, together with the weaving of linen and other fabrics, give occupation to. 112,000 persons chiefly in the departments of Nord (Lille, Armentieres, Dunkirk), Somme (Amiens) and Maine-et-Loire (Angers, Cholet).

Hosiery, the manufacture of which employs 55,000 hands, has its chief centre in Aube (Troyes). The production of lace and guipure, occupying 112,000 persons, is carried on mainly in the towns and villages of Haute-Loire and in Vosges (Mirecourt), Rh6ne (Lyons), Pas-de-Calais (Calais) and Paris.

Leather. — Tanning and leather-dressing are widely spread in- dustries, and the same may be said of the manufacture of boots and shoes, though these trades employ more hands in the department of Seine than elsewhere; in the manufacture of gloves Isere (Gren- oble) and Aveyron (Millau) hold the first place amongst French departments.

Sugar.— The manufacture of sugar is carried on in the depart- ments of the north, in which the cultivation of beetroot is general — Aisne, Nord, Somme, Pas-de-Calais, Oise and Seine-et-Marne, the three first being by far the largest producers. The increase in production in the last twenty years of the 19th century is indicated in the following table : —

Years.

Annual Average of Men employed.

Average Annual Production in Metric Tons.

1881-1891 1891-1901 1901-1906

43,108 42,841

43.o6i

415.786 696,038 820,553

Alcohol. — The distillation of alcohol is in the hands of three classes of persons. (1) Professional distillers (bouilleurs et distillateurs de profession) • (2) private distillers {bouilleurs de cru) under state control, (3) small private distillers, not under state control, but giving notice to the state that they distil. The two last classes number over 400,000 (1903), but the quantity of alcohol distilled by them is small. Beetroot, molasses and grain are the chief sources of spirit. The department of Nord produces by far the greatest quantity, its average annual output in the decade 1895-1904

being 13,117,000 gallons, or about 26% of the average annual production of France during the same period (49,945,000 gallons). Aisne, Pas-de-Calais and Somme rank next to Nord.

Glass is manufactured in the departments of Nord (Aniche, &c), Seine, Loire (Rive-de-Gier) and Meurthe-et-Moselle, Baccarat in the latter department being famous for its table-glass. Limoges is the chief centre for the manufacture of porcelain, and the artistic products of the national porcelain factory of Sevres have a world- wide reputation.

The manufacture of paper and cardboard is largely carried on in Isere

(Voiron), Seine-et-Oise (Essonnes), Vosges (Epinal) and of the finer sorts of paper in Charente (AngoulSme). That of oil, candles and soap has its chief centre at Marseilles. Brewing and malting are localized chiefly in Nord. There are well-known chemical works at Dombasle (close to Nancy) and Chauny (Aisne) and in Rh6ne.

Occupations. — The following table, which shows the approximate numbers of persons engaged in the various manufacturing industries of France, who number in all about 5,820,000, indicates their relative importance from the point of view of employment :

Occupation.

1901.

1866. ”

Baking .

Milling

Charcuterie

Other alimentary industries .

163,500 99,400 39,600

161,500

Alimentary industries: total

464,000

308,000

Gas-works

Tobacco factories

Oil-works

Other ” chemical ” l industries

26,000 16,000 10,000 58,000

Chemical industries: total .

110,000

49,000

Rubber factories

Paper factories

9,000 61,000

| 25,000

Typographic and lithographic printing Other branches of book production

76,000 23,000

Book production: total

99,000

38,000

Spinning and weaving ….

892,000

1,072,000

Clothing, millinery and making up of fabrics generally . . .

1 ,484,000

[761,000

Basket work, straw goods, feathers

39,000

Leather and skin

338,000

286,000

Joinery

Builder's carpentering …. Wheelwright's work ….

Cooperage

Wooden shoes

Other wood industries ….

153,000 94,900 82,700 46,600 52,400

280,400

Wood industries: total

710,000

671,000

Metallurgy and metal working

783,000

345,ooo

Goldsmiths' and jewellers' work .

35,ooo

55,ooo

Stone-working

56,000

12,000

Construction, building, decorating

572,000

443,000

Glass manufacture

Tiles

Porcelain and faience ….

Bricks

Other kiln industries ….

43,000 29,000 27,000 17,000 45,000

Kiln industries: total

161 000

110,000

Some 9000 individuals were engaged in unclassified industries.

Fisheries. — The fishing population of France is most numerous in the Breton departments of Finistere, C6tes-du-Nord and Morbihan and in Pas-de-Calais. Dunkirk, Gravelines, Boulogne and Paimpol send considerable fleets to the Icelandic cod-fisheries, and St Malo, Fecamp, Granville and Cancale to those of Newfoundland. The Dogger Bank is frequented by numbers of French fishing-boats.

1 Includes manufactories of glue, tallow, soap, perfumery, ferti- lizers, soda, &c.

Besides the above, Boulogne, the most important fishing port in the country, Calais, Dieppe, Concarneau, Douarnenez, Les Sables d'Olonne, La Rochelle, Marennes and Arcachon are leading ports for the herring, sardine, mackerel and other coast-fisheries of the ocean, while Cette, Agde and other Mediterranean ports are engaged in the tunny and anchovy fisheries. Sardine preserving is an important industry at Nantes and other places on the west coast. Oysters are reared chiefly at Marennes, which is the chief French market for them, and at Arcachon, Vannes, Oleron, Auray, Cancale and Courseulles. The total value of the produce of fisheries increased from £4,537,000 in 1892 to £5,259,000 in 1902. In 1902 the number of men employed in the home fisheries was 144,000 and the number of vessels 25,481 (tonnage 127,000); in the deep-sea fisheries 10,500 men and 450 vessels (tonnage 51,000) were employed.

Communications.

Roads. — Admirable highways known as routes nationales and kept up at the expense of the state radiate from Paris to the great towns of France. Averaging 525 ft. in breadth, they covered in 1905 a distance of nearly 24,000 m. The Ecole des Ponts et Chaussees at Paris is maintained by the

government for the training of the engineers for the construction and upkeep of roads and bridges. Each department controls and maintains the routes departemenlales, usually good macadamized roads connecting the chief places within its limits and extending in 1903 over 9700 m. The routes nationales and the routes departe- mentales come under the category of la grande voirie and are under the supervision of the Ministry of Public Works. The urban and rural district roads, covering a much greater mileage and classed as la petite voirie, are maintained chiefly by the communes under the supervision of the Minister of the Interior.

Waterways. 1 — The waterways of France, 7543 m. in length, of which canals cover 3031 m., are also classed under la grande voirie; they are the property of the state, and for the most part are free of tolls. They are divided into two classes. Those of the first class, which comprise rather less than half the entire system, have a minimum depth of 6| ft., with locks 126 ft. long and 17 ft. wide;- those of the second class are of smaller dimen- sions. Water traffic, which is chiefly in heavy merchandise, as coal, building materials, and agriculture and food produce, more than doubled in volume between 1881 and 1905. The canal and river system attains its greatest utility in the north, north- east and north-centre of the country; traffic is thickest along the Seine below Paris; along the rivers and small canals of the rich departments of Nord and Pas-de-Calais and along the Oise and the canal of St Quentin whereby they communicate with Paris; along the canal from the Marne to the Rhine and the succession of waterways which unite it with the Oise; along the Canal de 1'Est (departments of Meuse and Ardennes); and along the waterways uniting Paris with the Saone at Chalon (Seine, Canal du Loing, Canal de Briare, Lateral canal of the Loire and Canal du Centre) and along the Saone between Chalon and Lyons.

In point of length the following are the principal canals :

Miles. Est (uniting Meuse with Moselle and Sa6ne) . . 270

From Nantes to Brest 225

Berry (uniting Montlugon with the canalized Cher

and the Loire canal) 163

Midi (Toulouse to Mediterranean via Beziers) ; see

Canal . . . 175

Burgundy (uniting the Yonne and Saone) . . . 151

Lateral canal of Loire 137

From Marne to Rhine (on French territory) . . 131

Lateral canal of Garonne 133

Rh6ne to Rhine (on French territory) . . .119

Nivernais (uniting Loire and Yonne) 111

Canal de la Somme 97

Centre (uniting Saone and Loire) 81

Canal de l'Ourcq .67

Ardennes (uniting Aisne and Canal de l'Est) . . 62

From Rh6ne to Cette 77

Canal de la Haute Marne .60

St Quentin (uniting Scheldt with Somme and Oise) 58

1 See the Guide officiel de la navigation intSrieure issued by the ministry of public works (Paris, 1903).

The chief navigable rivers are :

Total

First Class

navigated Length.

Navigability.

Miles.

Miles.

Seine

339

293

Aisne

37

37

Marne

114

114

Oise .

99

65

Yonne

67

53

Rh6ne

309

30

Sa6ne

234

234

Adour

72

21

Garonne

289

96

Dordogne

167

26

Loire .

452

35

Charente

106

16

Vilaine

91

31

Escaut (in

France)

39

39

Scarpe

4i

41

Lys .

45

45

Aa .

18

18

Railways.- — The first important line in France, from Paris to Rouen, was constructed through the instrumentality of Sir Edward Blount (1809-1905), an English banker in Paris, who was afterwards for thirty years chairman of the Ouest railway. After the rejection in 1838 of the government's proposals for the construction of seven trunk lines to be worked by the state, he obtained a concession for that piece of line on the terms that the French treasury would advance one -third of the capital at 3% if he would raise the remaining two-thirds, half in France and half in England. The contract for building the railway was put in the hands of Thomas Brassey ; English navvies were largely employed on the work, and a number of English engine-drivers were employed when traffic was begun in 1843. A law passed in 1842 laid the foundation of the plan under which the railways have since been developed, and mapped out nine main lines, running from Paris to the frontiers and from the Mediterranean to the Rhine and to' the Atlantic coast. Under it the cost of the necessary land was to be found as to one-third by the state and as to the residue locally, but this arrangement proved unworkable and was abandoned in 1845, when it was settled that the state should provide the land and construct the earthworks and stations, the various companies which obtained concessions being left to make the permanent way, provide rolling stock and work the lines for certain periods. Construction proceeded under this law, but not with very satisfactory results, and new arrange- ments had to be made between 1852 and 1857, when the railways were concentrated in the hands of six great companies, the Nord, the Est, the Ouest, the Paris-Lyon-Mediterranee, the Orleans and the Midi. Each of these companies was allotted a definite sphere of influence, and was granted a concession for ninety-nine years from its date of formation, the concessions thus terminating at various dates between 1950 and i960. In return for the privileges granted them the companies undertook the construction out of their own unaided resources of 1500 m. of subsidiary lines, but the railway expenditure of the country at this period was so large that in a few yearsjthey found it impossible to raise the capital they required. In these circumstances the state agreed to guarantee the interest on the capital, the sums it paid in this way being regarded as advances to be reimbursed in the future with interest at 4 %. This measure proved success- ful and the projected lines were completed. But demands for more lines were constantly arising, and the existing companies, in view of their financial position, were disinclined to undertake their construction. The government therefore found itself obliged to inaugurate a system of direct subventions, not only to the old large companies, but also to new small ones, to encourage the development of branch and local lines, and local authorities were also empowered to contribute a portion of the required capital. The result came to be that many small lines were begun ■by companies that had not the means to complete them, and again the state had to come to the rescue. In

1878 it agreed to spend £20,000,000 in purchasing and completing a number of

these lines, some of which were handed over to the great companies, while others were retained in the hands of the govern- ment, forming the system known as the Chemins de Fer de l'Etat. Next year a large programme of railway expansion was adopted, at an estimated cost to the state of £140,000,000, and from 1880 to 1882 nearly £40,000,000 was expended and some 1800 m. of line constructed. Then there was a change in the financial situation, and it became difficult to find the money required. In these circumstances the conventions of 1883 were concluded, and the great companies partially relieved the government of its obligations by agreeing to contribute a certain proportion of the cost of the new lines and to provide the rolling stock for working them. In former cases when the railways had had recourse to state aid, it was the state whose contributions were fixed, while the railways were left to find the residue; but on this occasion the position was reversed. The state further guaranteed a minimum rate of interest on the capital invested, and this guarantee, which by the convention of 1859 had applied to " new " lines only, was now extended to cover both " old " and " new " lines, the receipts and expenditure from both kinds being lumped together. As before, the sums paid out in respect of guaranteed dividend were to be regarded as advances which were to be paid back to the state out of the profits made, when these permitted, and when the advances were wiped out, the profits, after payment of a certain dividend, were to be divided between the state and the railway, two-thirds going to the former and one-third to the latter. All the companies, except the Nord, have at one time or another had to take advantage of the guarantee, and the fact that the Ouest had been one of the most persistent and heavy borrowers in this respect was one of the reasons that induced the government to take it over as from the 1st of January 1900. By the 1859 conventions the state railway system obtained an entry into Paris by means of running powers over the Ouest from Chartres, and its position was further im- proved by the exchange of certain lines with the Orleans company. The great railway systems of France are as follows:

1. The Nord, which serves the rich mining, industrial and farming districts of Nord, Pas-de-Calais, Aisne and Somme, connecting with the Belgian railways at several points. Its main lines run from Paris to Calais, via Creil,

Amiens and Boulogne, from Paris to Lille, via Creil and Arras, and from Paris to Maubeuge via Creil, Tergnier and St Quentin.

2. The Ouest-Etat, a combination of the West and state systems. The former traversed Normandy in every directionand connected Paris with the towns of Brittany. Its chief lines ran from Paris^to Le Havre via Mantes and Rouen, to Dieppe via Rouen, to Cherbourg, to Gran- ville and to Brest. The state railways served a large portion of western France, their chief lines being from Nantes via La Rochelle to Bor- deaux, and from Bordeaux/via Saintes, Niort and Saumur to Chartres.

3. The Est, running from Paris via Chalons and Nancy to Avri- court (for Strassburg) , via Troyes and Langres to Belfort and on via Basel to the Saint Gotthard, and via Reims and Mezieres to Longwy.

4. The Orleans, running from Paris to Orleans, and thence serving Bordeaux via Tours, Poitiers and Angouleime, Nantes via Tours and Angers, and Montauban and Toulouse via Vierzon and Limoges.

5. The Paris-Lyon-Mediterranee, connecting Paris with Marseilles via Moret, Laroche, Dijon, M&con and Lyons, and with Nimes via Moret, Nevers and Clermont-Ferrand. It establishes communi- cation between France and Switzerland and Italy via Macon and Culoz (for the Mt. Cenis Tunnel) and via Dijon and Pontarlier (for the Simplon), and also has a direct line along the Mediterranean coast from Marseilles to Genoa via Toulon and Nice.*

6. The Midi (Southern) has lines radiating from Toulouse to Bordeaux via Agen, to Bayonne via Tarbes and Pau, and to Cette via Carcassonne, Narbonne and Beziers. From Bordeaux there is also a direct line to Bayonne and Irun (for Madrid), and at the other end of the Pyrenees a line leads from Narbonne to Perpignan and Barcelona.

The following table, referring to lines " of general interest," indi- cates the development of railways after 1885:

Year.

1885 1890

1895 1900 1904

Mileage.

18,650 20,800 22,650

23,8l8

24.755

Receipts in

Thousands

of £.

42,324 46,145 50,542 60,674 60,589

Expenses in

Thousands

ot£.

23.508 24.239 27.363 32,966

3L477

Passengers carfied (1000's).

214.451 241,119 348,852 453.193 433.913

Goods carried

(1000 Metric

Tons).

75.192

92,506

100,834

126,830

I30,H4

Narrow gauge and normal gauge railways " of local interest covered 3905 m. in 1904.

Commerce.

After entering on a regime of free trade in i860 France gradu- ally reverted

towards protection; this system triumphed in the Customs Law of 1892, which imposed more or less considerable duties on imports — a law associated with the name of M. Meline. While raising the taxes both on agricultural products and manu- factured goods, this law introduced, between France and all the powers trading with her, relations different from those in the past. It left the government free either to apply to foreign countries the general tariff or to enter into negotiations with them for the application, under certain conditions, of a minimum tariff. The policy of protection was further accentuated by raising the impost on corn from 5 to 7 francs per hectolitre (25 bushels). This system, however, which is opposed by a powerful party, has at various times undergone modifications. On the one hand it became necessary, in face of an inadequate harvest, to suspend in 1898 the application of the law on the import of corn. On the other hand, in order to check the decline of exports and neutralize the harmful effects of a prolonged customs war, a commercial treaty was in 1896 concluded with Switzerland, carrying with it a reduction, in respect of certain articles, of the imposts which had been fixed by the law of 1892. An accord was likewise in 1898 effected with Italy, which since 1886 had been in a state of economic rupture with France, and in July 1899 an accord was concluded with the United States of America. Almost all other countries, moreover, share in the benefit of the minimum tariff, and profit by the modifications it may suc- cessively undergo.

Being in the main a self-supporting country France carries on most of her trade within her own borders, and ranks below

Commerce, in Millions of Pounds Sterling.

General

Special

Imports.

Exports.

Total.

Imports.

Exports.

Total.

1876-1880

2IO-I

175-3

385-4

I7I-7

I35-I

306-8

1881-1885

224-1

177-8

401-9

183-4

135-3

318-7

1886-1890

208 -2

179-4

387-6

168-8

137-6

306-4

1891-1895

205-9

178-6

384-5

163-0

133-8

296-8

1896-1900

237-8

201 -0

438-8

171-9

150-8

322-7

1901-1905

233-3

227-5

460-8

182-8

174-7

357-5

Great Britain, Germany and the United States in volume of exterior trade. The latter is subdivided into general commerce, which includes all goods entering or leaving the country, and special commerce which includes imports for home use and exports of home produce. The above table shows the develop- ments of French trade during the years from 1876 to 1905 by means of quinquennial averages. A permanent body (the com- mission permanente des valeurs) fixes the average prices of the

Articles of Food —

1886-1890

I 891-1895

1396-1900

I 901-1905

Raw Materials l

1 886- 1 890 1891-1895

I 896- 1 900

1901-1905

Manufactured

Articles 2 I 886-1 890

1 891-1895

I 896-1 900

1901-1905

Imports.

Value

(Thousands

of£>.

58,856

50,774 42,488

33.631

85.778

88,211

101,727

116,580

24.125 24.054 27.330 32,554

Per cent of Total

Value.

34-9

30-9

24-9

18-4

5o-8

54-3 59-2 63-8

14-3 14-8

1-5-9 17-8

Exports.

Value

(Thousands

of£).

30,830

28,287 27,838 28,716

33,848 32,557 40,060

47,385

72,917 72,906 82,270 98,582

Per cent of Total Value.

22-4

2I-I

18-6 16-5

24-6 24-4 26-6 27-1

53-o

54-5 54-8 56-4

1 Includes horses, mules and asses.

2 Except certain manufactures which come under the category of articles of food.

articles in the customs list; this value is estimated at the end of the year in accordance with the variations that have taken place and is applied provisionally to the following year.

Amongst imports raw materials (wool, cotton and silk, coal, oil- seeds, timber, &c.) hold the first place, articles of food (cereals, wine, coffee, &c.) and manufactured goods (especially machinery) ranking next. Amongst exports manufactured goods (silk, cotton and woollen goods, fancy wares, apparel, &c.) come before raw materials and articles of food (wine and dairy products bought chiefly by England).

Divided into these classes the imports and exports (special trade) for quinquennial periods from 1886 to 1905 averaged as shown in the preceding table.

The decline both in imports and in exports of articles of food, which is the most noteworthy fact exhibited in the preceding table, was due to the almost prohibitive tax in the Customs Law of 1892, upon agricultural products.

The average value of the principal articles of import and export (special trade) over quinquennial periods following 1890 is shown in the two tables below.

Principal Imports {Thousands of £).

1891-1895.

1 896- 1 900.

1901-1905.

Coal, coke, &c

Cotton, raw ….

Flax

Fruit and seeds (oleaginous) Hides and skins, raw .

Silk, raw

Timber

Wheat

Wine

Wool, raw

7,oi8

6,106 7,446 2,346 7,175 6,141 2,181 9,488 6,054

10,352 9,972

13,372

9,883 4,553 7,722

2,435

6,207

5,261

3,632

10,391

6,284

5,276

io,454

16,750

io,539

3,717

11,987 3,173

8,464

6,369 4,614

11,765 6,760

i,995

5,i67

16,395

Principal Exports (Thousands of £).

Apparel

Brandy and other spirits .

Butter

Cotton manufactures .

Haberdashery 1 . . .

Hides, raw

Hides, tanned or curried .

Iron and steel, manufac- tures of

Millinery

Motor cars and vehicles .

Paper and manufactures of

Silk, raw, thrown, waste and cocoons ….

Silk and waste silk, manu factures of … .

Wine

Wool, raw

Wool, manufactures of

1891-1895. 1896-1900.

4,726 2,402 2,789 4,233 5,830 2,839 4,037

i,957

2,095

4,738

9,769

8,824

5,003

1 1 ,998

4,5i3 i,93i

2,783 5,874 6,039 3,494 4,321

2,849

3,308

160

2,H5

4,807

io,443

9,050

7,8i3

10,190

1901-1905.

5,079 1,678 2,618 7,965 6,599 4,813 4,753

4,201 4,951 2,147 2,551

6,090

11,463. 9,139 9,159

8,459

The following were the countries sending the largest quantities of goods (special trade) to France (during the same periods as in previous table).

Trade with Principal Countries. Imports (Thousands of £).

1891-1895.

1 896- 1 900.

1901-1905.

Germany

Belgium

United Kingdom .

Spain

United States …. Argentine Republic

13,178 15,438 20,697 10,294 15,577 7,"9

13,904

I3,H3

22,132 10,560 18,491 10,009

17,363

' 13,057

22,725

6,525 2 19,334 10,094

Trade with Principal Countries. Exports (Thousands of £).

Germany Belgium

United Kingdom United States . Algeria .

1891-1895. 1896-1900. 1901-1905.

13,712

19,857

39,3 10

9,337

7,872

16,285

22,135

45,203

9,497

9,434

21,021 24,542 49,156 10,411 11,652

Other countries importing largely into France are Russia, Algeria and British India, whose imports in each case averaged over £9, 000,000 in value in the period 1901-1905 ; China (average value £7,000,000) ; and Italy (average value £6,000,000).

The following are the principal countries receiving the exports of France (special trade), with values for the same periods.

1 Includes small fancy wares, toys, also wooden wares and furni- ture, brushes, &c.

2 Decrease largely due to Spanish-American War (1898).

The other chief customers of France were Switzerland and Italy, whose imports from France averaged in 1 901-1905 nearly £10,000,000 and over £7,200,000 respectively in value. In the same period Spain received exports from France averaging £4,700,000.

The trade of France was divided between foreign countries and her colonies in the following proportions (imports and exports combined).

.

General Trade.

Special Trade.

Foreign Countries.

Colonies.

Foreign Countries.

Colonies.

1891-1895

I 896-1900

1901-1905

92-00 91-18 90-41

8-oo

8-82 9-59

90-89 89-86 88-78

9-n

10-14

11-22

Marseilles .

. 88-8

Le Havre .

• 79-5

Paris .

. 42-8

Dunkirk .

• 34-8

Bordeaux .

• *27-4*

The respective shares of the leading customs in the tfa.de of the country is approximately shown in the following table, which gives the value of their exports and imports (general trade) in 1905 in millions sterling.

£

Boulogne …. 17-5

Calais 14-1

Dieppe …. 13-5 Rouen . . . . .11-3 Belfort-Petit-Croix . 10-7

In the same year the other chief customs in order of importance were Tourcoing, Jeumont, Cette, St Nazaire and Avricourt.

The chief local bodies concerned with commerce and industry are the chambres de commerce and the chambres consultatives d'arts et manufactures, the members of which are elected from their own number by the traders and industrialists of a certain standing. They are established in the chief towns, and their principal function is to advice the government on measures for improving and facilitat- ing commerce and industry within their circumscription. See also Banks and Banking ; Savings Banks ; Post and Postal Service.

Shipping. — The following table shows the increase in tonnage of sailing and steam shipping engaged in foreign trade entered and cleared at the ports of France over quinquennial periods from 1890.

Entered.

Cleared.

French.

Foreign.

French.

Foreign.

1891-1895

I 896-1900

1901-1905

4,277,967 4,665,268 4,782,101

9,947,893 12,037,571 14,744,626

4,521,928 5,005,563 5,503,463

10,091,000 12,103,358 14,823,217

The increase of the French mercantile marine (which is fifth in importance in the world) over the same period is traced in the following table. Vessels of 2 net tons and upwards are enumerated.

1891-1895

I 896- I 900

1901-1905

Sailing.

Number

of Vessels.

H,l83

14,327 14,867

Tonnage.

402,982 437,468 642,562

Steam.

Number

of Vessels.

1 182 1231

1388

Tonnage.

502,363

504,674 617,536

Total.

Number

of Vessels.

15,365 15,558 16,255

Tonnage.

905,345

942,142

*1 ,260*098*

At the beginning of 1908 the total was 17,193 (tonnage, 1,402,647); of these 13,601 (tonnage, 81,833) were vessels of less than 20 tons, while 502 (tonnage, 1,014,506) were over 800 tons.

The increase in the tonnage of sailing vessels, which in other countries tends to decline, was due to the bounties voted by parlia- ment to its merchant sailing fleet with the view of increasing the number of skilled seamen. The prosperity of the French shipping trade is hampered J}y the costliness of shipbuilding and by the scarcity of outward-bound cargo. Shipping has been fostered by paying bounties for vessels constructed in France and sailing under the French flag, and by reserving the coasting trade, traffic between France and Algeria, &c, to French vessels. Despite these mono- polies, three-fourths of the shipping in French ports is foreign, and France is without shipping companies comparable in importance to those of other great maritime nations. ' The three chief companies are the Messageries Maritimes (Marseilles and Bordeaux), the Compagnie Generate Transatlantique (Le Havre, St Nazaire and Marseilles) and the Chargeurs Reunis (Le Havre).

GOVERNMENT]

FRANCE

789

Government and Administration.

Central Government.— The principles upon which the French constitution is based are representative government (by two chambers), manhood suffrage, responsibility of ministers and irresponsibility of the head of the state. Alterations or modifica tions of the constitution can only be effected

by the National Assembly, consisting of both chambers sitting together ad hoc. The legislative power resides in these two chambers — the Senate and the Chamber of Deputies; the executive is vested in the president of the republic and the ministers. The members of both chambers owe their election to universal suffrage; but the Senate is not elected directly by the people and the Chamber of Deputies is.

The Chamber of Deputies, consisting of 584 members, is elected by the scrutin d'arrondissement (each elector voting for one deputy) for a term of four years, the conditions of election being as follows: Each arrondissement sends one deputy if its population does not exceed 100,000, and an additional deputy for every additional 100,000 inhabitants or fraction of that number. Every citizen of twenty-one years of age, unless subject to some legal disability, such as actual engagement in military service, bankruptcy or condemnation to certain punishments, has a vote, provided that he can prove a residence of six months' duration in any one town or commune. A deputy must be a French citizen, not under twenty-five years old. Each candidate must make, at least five days before the elections, a declaration setting forth in what constituency he intends to stand. He may only stand for one, and all votes given for him in any other than that specified in the declaration are void. To secure election a candidate must at the first voting poll an absolute majority and a number of votes equal to one-fourth of the number of electors. If a second poll is necessary a relative majority is sufficient.

The Senate (see below, Law and Institutions) is composed of 300 members who must be French citizens at least forty years of age. They are elected by the " scrutin de liste " for a period of nine years, and one-third of the body retires every three years. The department which is to elect a senator when a vacancy occurs is settled by lot.

Both senators and deputies receive a salary of £600 per annum. No member of a family that has reigned in France is eligible for either chamber.

: Bills may be proposed either by ministers (in the name of the president of the republic), or by private members, and may be initiated in either chamber, but money-bills must be submitted in the first place to the Chamber of Deputies. Every bill is first examined by a committee, a member of which is chosen to " report " on it to the chamber, after which it must go through two readings (deliberations) , before it is presented to the other chamber. Either house may pass a vote of no confidence in the government, and in practice the government resigns in face of (the passing of such a vote by the deputies, but not if it is passed by the Senate only. The chambers usually assemble in January each year, and the ordinary

session lasts not less than five months; usually it continues till July. There is an extraordinary session from October till Christmas. ; The president (see below, Law and Institutions) is elected for

seven years, by a majority of votes, by the Senate and Chamber of Deputies sitting together as the National Assembly. Any French citizen may be chosen president, no fixed age being required. The only exception to this rule is that no member of a royal family which has once reigned in France can be elected. The president receives 1,200,000 francs (£48,000) a year, half as salary, half for travelling expenses and the charges incumbent upon the official representative of the country. Both the chambers are summoned by the president, who has the power of dissolving the Chamber of Deputies with the assent of the Senate. When a change of Government occurs the president chooses a prominent parliamentarian as premier and president of the council. This personage, who himself holds a portfolio, nominates the other ministers, his choice being subject to the ratification of the chief of the state. The ministerial council (conseil des ministres) is presided over by the president of the republic; less formal meetings (conseils de cabinet) under the presidency of the premier, or even of some other minister, are also held.

The ministers, whether members of parliament or not, have the right to sit in both chambers and can address the house whenever they choose, though a minister may only vote in the chamber of which he happens to be a member. There are twelve ministries 1 comprising those of justice; finance; war; the interior; marine; colonies; public instruction and fine arts; foreign affairs; commerce and industry; agriculture; public works; and labour and public thrift. Individual ministers are responsible for all acts done in connexion with their own departments, and the body of ministers collectively is responsible for the general policy of the government.

The council of state (conseil d'etat) is the principal council of the head of the state and his ministers, who consult it on various legislative problems, more particularly on questions of administration. It is divided for despatch of business into four sections, each of which corresponds to a group of two or three ministerial departments, and is composed of (1) 32 councillors "en service ordinaire" (comprising a vice-president and sectional presidents), and 10 councillors " en service extraordinaire," i.e. government officials who are deputed to watch the interests of the ministerial departments to which they belong, and in matters not concerned with those departments have a merely con- sultative position; (2) 32 maitres des requites; (3) 40 auditors.

The presidency of the council of state belongs ex officio to the minister of justice.

The theory of " droit administratif" lays down the principle that an agent of the government cannot be prosecuted or sued for acts relating to his administrative functions before the ordinary tribunals. Consequently there is a special system of administra- tive jurisdiction for the trial of " le contentieux administratif " or disputes in which the administration is concerned. The council of state is the highest administrative tribunal, and includes a special " Section du contentieux " to deal with judicial work of this nature.

Local' Government. — France is divided into 86 administrative departments (including Corsica) or 87 if the Territory of Belfort, a remnant of the Haut Rhin department, be included. These departments are subdivided into 362 arrondissements, 291 1 cantons and 36,222 communes.

Departments.

Capital Towns.

Ancient Provinces. 2

AiN

Aisne ….

Alpes-Maritimes

Ariege ….

Aude …. Aveyron ….

Bourg ……

Laon

Nice

Foix

Troyes

Carcassonne

Rodez

Bourgogne (Bresse, Bugey, Valromey, Dombes).

Tle-de-France ; Picardie.

Bourbonnais.

Languedoc (Vivarais).

Champagne.

Foix; Gascogne (Couserans).

Champagne; Bourgogne.

Languedoc.

Guienne (Rouergue).

1 The administration of posts, telegraphs and telephones is assigned to the ministry of commerce and industry or to that of public works.

2 The province or provinces named are those out of which the department was chiefly formed.

79°

FRANCE

[GOVERNMENT

Departments.

Capital Towns.

Ancient Provinces.

Basses-Alpes .

Basses-Pyrenees

Belforx, Territoire de

Bouches-du-Rh6ne

Calvados .

Cantal

Ch a rente

Charente-Inferieure

Cher • .

Correze .

Cote-d'Or

cotes-du-nord

Creuse

Deux-Sevres .

Dordogne

Doubs

Drome

EURE .

Eure-et-Loir .

FlNISTERE

Gard . Gers •

GlRONDE .

Haute-Garonne

Haute-Loire .

Haute-Marne

Hautes-Alpes

Haute-Sa6ne .

Haute-Savoie

Hautes-Pyrenees

Haute-Vienne

Herault

Ille-et-Vilaine

Indre

Indre-et-Loire

Isere .

Jura •

Landes

Loire

Loire-Inferieure

Loiret

Loir-et-Cher .

Lot

Lot-et-Garonne

Lozere

Maine-et-Loire

Manche .

Marne . .

Mayenne

Meurthe-et-Moselle

Meuse

Morbihan

Nievre

NORD , OlSE .

Orne .

Pas-de-Calais

Puy-de-D6me .

Pyrenees-Orientales

Rhone

Sa6ne-et-Loire

Sarthe

Savoie

Seine

Seine-et-Marne

Seine-et-Oise

Seine-Inferieure

SOMME

Tarn

T a rn-et-Ga ronne

Var .

Vaucluse

Vendee

Vienne

Vosges

VONNE

Corse (Corsica)

Digne

Pau .

Belfort .

Marseilles

Caen …

Aurillac

AngoulSme

La Rochelle

Bourges

Tulle

Dijon

St Brieuc .

Gueret

Niort

Perigueux

Besancon .

Valence

Evreux

Chartres .

Quimper .

Nlmes

Auch .

Bordeaux .

Toulouse .

Le Puy . .

Chaumont

Gap …

Vesoul

Annecy

Tarbes

Limoges .

Montpellier

Rennes

Chateauroux .

Tours

Grenoble .

Lons-le-Saunier

M ont-de-Marsan

St-Etienne

Nantes

Orleans

Blois .

Cahors

Agen . . . .

Mende

Angers

St-L6

Chalons-sur-Marne

Laval.

Nancy

Bar-le-Duc

Vannes

Nevess

Lille

Beauvais .

Alencpn

Arras

Clermont-Ferrand ,

Perpignan

Lyon

Macon . . .

Le Mans .

Chambery

Paris

Melun

Versailles .

Rouen

Amiens

Albi . . . .

Montauban

Draguignan

Avignon

La Roche-sur-Yon .

Poitiers

Epinal

Auxerre

Ajaccio

Provence.

Beam; Gascogne (Basse- Navarre, Soule, Labourd).

Alsace.

Provence.

Normandie (Bessin, Bocage).

Auvergne.

Angoumois; Saintonge.

Aunis; Saintonge.

Berry ; Bourbonnais.

Limousin.

Bourgogne (Dijonnais, Auxois).

Bretagne.

Marche.

Poitou.

Guienne (Perigord).

Franche-Comte; Montbeliard.

Dauphine.

Normandie ; Perche.

Orleanais ; Normandie.

Bretagne.

Languedoc.

Gascogne (Astarac, Armagnac).

Guienne (Bordelais, Bazadais).

Languedoc; Gascogne (Comminges).

Languedoc (Velay) ; Auvergne; Lyonnais.

Champagne (Bassigny, Vallage).

Dauphine.

Franche-Comte.

Gascogne. Limousin ; Marche. Languedoc. Bretagne. Berry. . Touraine. Dauphine. Franche-Comte. Gascogne (Landes, Chalosse). Lyonnais. Bretagne.

Orleanais (Orleanais proper, Gatinais, Dunois). Orleanais. Guienne (Quercy). Guienne ; Gascogne. Languedoc (Gevaudan). Anjou.

Normandie (Cotentin). Champagne. Maine ; Anjou. Lorraine ; Trois-Eveches. Lorraine (Barrois, Verdunois). Bretagne.

Nivernais; Orleanais. Flandre; Hainaut. Ile-de-France. Normandie ; Perche. Artois; Picardie. Auvergne.

Roussillon ; Languedoc. Lyonnais; Beaujolais. Bourgogne. Maine; Anjou.

Ile-de-France.

Ile-de-France; Champagne.

Ile-de-France.

Normandie.

Picardie.

Languedoc (Albigeois).

Guienne; Gascogne; Languedoc. I

Provence.

Comtat; Venaissin; Provence; Principaute d 'Orange.

Poitou.

Poitou ; Touraine.

Lorraine.

Bourgogne ; Champagne.

Corse.

Before 1790 France was d small military governments.

vided into thirty-three great and seven often called provinces, which are,

however, to be distinguished from the provinces formed under the feudal system. The great governments were : Alsace, Saintonge and Angoumois, Anjou, Artois, Aunis, Auvergne, Beam and Navarre, Berry, Bourbonnais, Bourgogne (Burgundy), Bretagne (Brittany), Champagne, Dauphine, Flandre, Foix, Franche-Comte, Guienne and Gascogne (Gascony), lle-de-France, Languedoc, Limousin, Lorraine, Lyonnais, Maine, Marche, Nivernais, Normandie, Orleanais, Picardie,

Poitou, Provence, Roussillon, Touraine and Corse. The eight small governments were: Paris, Boulogne and Boulonnais, Le Havre, Sedan,

Toulois, Pays Messin and Verdunois and Saumurois.

At the head of each department is a prefect, a political official nominated by the minister of the interior and appointed by the president, who acts as general agent of the government and representative of the central authority. To aid him the prefect

has a general secretary and an advisory body (conseil de pre- fecture), the members of which are appointed by the president, which has jurisdiction in certain classes of disputes arising out of administration and must, in certain cases, be consulted, though the prefect is not compelled to follow its advice. The prefect supervises the execution of the laws; has wide authority in regard to policing, public hygiene and relief of pauper children; has the nomination of various subordinate officials; and is in correspondence with the subordinate functionaries in his depart- ment, to whom he transmits the orders and instructions of the government. Although the management of local affairs is in the hands of the prefect his power with regard to these is checked by a deliberative body known as the general council {conseil giniral). This council, which consists for the most part of business and professional men, is elected by universal suffrage, each canton in the department contributing one member. The general council controls the departmental administration of the prefect, and its decisions on points of local government are usually final. It assigns its quota of taxes {contingent) to each arrondissement, authorizes the sale, purchase or exchange of departmental property, superintends the management thereof, authorizes the construction of new roads, railways or canals, and advises on matters of local interest. Political questions are rigorously excluded from its deliberations. The general council, when not sitting, is represented by a permanent delega- tion {commission dipartementale).

As the prefect in the department, so the sub-prefect in the arrondissement, though with a more limited power, is the representative of the central authority. He is assisted, and in some degree controlled, in his work by the district council {conseil d' arrondissement) , to which each canton sends a member, chosen by universal suffrage. As the arrondissement has neither property nor budget, the principal business of the council is to allot to each commune its share of the direct taxes imposed on the arrondissement by the general council.

The canton is purely an administrative division, containingˆ on an average, about twelve communes, though some exceptional communes are big enough to contain more than one canton. It is the seat of a justice of the peace, and is the electoral unit for the general council and the district council.

The communes, varying greatly in area and population, are the administrative units in France. The chief magistrate of the commune is the mayor {maire), who is (1) the agent of the central government and charged as such with the local promulga- tion and execution of the general laws and decrees of the country; (2) the executive head of the municipality, in which capacity he supervises the police, the revenue and public works of the commune, and acts as the representative of the corporation in general. He also acts as registrar of births, deaths and marriages, and officiates at civil marriages. Mayors are usually assisted by deputies {adjoints). In a commune of 2500 inhabitants or less there is one deputy; in more populous communes there may be more, but in no case must the number exceed twelve, except at Lyons, where as many as seventeen are allowed. Both mayors and deputy mayors are elected by and from among members of the municipal council for four years. This body consists, according to the population of the commune, of from 10 to 36 members, elected for four years on the principle of the scrutin de listc by Frenchmen who have reached the age of twenty-one years and have a six months' residence qualification.

*The local affairs of the commune are decided by the municipal council, and its decisions become operative after the expiration of a month, save in matters which involve interests transcending those of the commune. In such cases the prefect must approve them, and in some cases the sanction of the general council or even ratification by the president is necessary. The council also chooses communal delegates to elect senators; and draws up the list of rSpartiteurs, whose function is to settle how the * commune's share of direct taxes shall be allotted among the taxpayers. The sub-prefect then selects from this list ten of whom he approves for the post. The meetings of the council are open to the public.*

Justice.

The ordinary judicial system of France comprises two classes of courts: (1) civil and criminal, (2) special, including courts dealing only with purely commercial cases; in addition there are the administrative courts, including bodies, the Conseil d'Etat and the Conseils de Prefecture, which deal, in their judicial capacity, with cases coming under the droit administratis . Mention may also be made of the Tribunal des Conflits, a special court whose function it is to decide which is the competent tribunal when an

administration and a judicial court both claim or refuse to deal with a given case.

Taking the first class of courts, which have both civil and criminal jurisdiction, the lowest tribunal in the system is that of the juge de paix.

In each canton is a juge de paix, who in his capacity as a civil judge takes cognizance, without appeal, of disputes where the amount sought to be recovered does not exceed £12 in value. Where the amount exceeds £12 but not £24 an appeal lies from his decision to the court of first instance. In some particular cases where special promptitude or local knowledge is necessary, as disputes between hotelkeepers and travellers, and the like, he has jurisdiction (subject to appeal to the court of first instance) up to £60. He has also a criminal jurisdiction in contraventions, i.e. breaches of law punishable by a fine not exceeding 12s. or by imprisonment not exceeding five days. If the sentence be one of imprisonment or the fine exceeds 4s., appeal lies to the court of first instance. It is an important function of the juge de paix to endeavour to reconcile disputants who come before him, and no suit can be brought before the court of first instance until he has endeavoured without success to bring the parties to an agreement.

Tribunaux de premiere instance, also called tribunaux d' arrondissement, of which there is one in every arrondissement (with few exceptions), besides serving as courts of appeal from the juges de paix have an original jurisdiction in matters civil and criminal. The court consists of a president, one or more vice-presidents and a variable number of judges. A procureur, or public prosecutor, is also attached to each court. In civil matters the tribunal takes cognizance of actions relating to personal property to the value of £60, and actions relating to land to the value of 60 fr. (£2 : 8s.) per annum. When it deals with matters involving larger sums an appeal lies to the courts of appeal. In penal cases its jurisdiction extends to all offences of the class known as dilits — offences punishable by a more serious penalty than the " contraventions " dealt with by the juge de paix, but not entailing such heavy penalties as the code applies to crimes, with which the assize courts (see below) deal. When sitting in its capacity as a criminal court it is known as the tribunal correclionnel. Its judgments are in-variably subject in these matters to appeal before the court of appeal.

There are twenty-six courts of appeal {cours d'appel), to each of which are attached from one to five departments. Cours d'Appel. Departments depending on them.

Paris . . Seine, Aube, Eure-et-Loir, Marne, Seine-et-Marne,

Seine-et-Oise, Yonne. Agen . . . Gers, Lot, Lot-et-Garonne. Aix . . . Basses-

Alpes, Alpes ; Maritimes, Bouches-du-Rh6ne,

Var. Amiens . Aisne, Oise, Somme.

Angers . . Maine-et-Loire, Maj'enne, Sarthe. Bastia . . Corse.

Besan£ON . Doubs, Jura, Haute-Sa6ne, Territoire de Belfort. Bordeaux . Charente, Dordogne, Gironde. Bourges . . Cher, Indre, Nievre. Caen . . . Calvados, Manche, Orne. Chambery . Savoie, Haute-Savoie. Dijon . . . C&te-d'Or, Haute-Marne, Sa6ne-et-Loire. Douai. . . Nord, Pas-de-Calais. Grenoble . Hautes-Alpes, Dr6me, Isere. Limoges . . Correze, Creuse, Haute-Vienne. Lyons . . Ain, Loire, Rhone.

Montpellier Aude, Aveyron, Herault, Pyrenees-Orientales. Nancy . . Meurthe-et-Moselle, Meuse, Vosges, Ardennes. Nimes . . Ardechc, Gard, Lozerc, Vaucluse.

Cours d'Appel Orleans . Pau . . . Poitiers . Rennes .

RlOM . .

Rouen . . Toulouse. .

Departments depending on them. Indre-et-Loire, Loir-et-Cher, Loiret. Landes, Basses-Pyrenees, Hautes-Pyrenees. Charente-Inferieure, Deux-Sevres, Vendee, Vienne. C6tes-du-Nord, Finistere, Ille-et-Vilaine, Loire-

Inferieure, Morbihan. Allier, Cantal, Haute-Loire, Puy-de-D6me. Eure, Seine-Inferieure. Ariege, Haute-Garonne, Tarn, Tarn-et-Garonne.

At the head of each court, which is divided into sections (chambres), is a premier president. Each section (chambre) con- sists of a president de chambre and four judges (conseillers). Procureurs-generaux and avocats-generaux are also attached to the parquet, or permanent official staff, of the courts of appeal. The principal function of these courts is the hearing of appeals both civil and criminal from the courts of first instance; only in some few cases (e.g. discharge of bankrupts) do they exercise an original jurisdiction. One of the sections is termed the chambre des mises en accusation. Its function is to examine criminal cases and to decide whether they shall be referred for trial to the lower courts or the cours d'assises. It

may also dismiss a case on grounds of insufficient evidence.

The cours d'assises are not separate and permanent tribunals. Every three months an assize is held in each department, usually at the chief town, by a conseiller, appointed ad hoc, of the court of appeal upon which the department depends. The cour d'assises occupies itself entirely with offences of the most serious type, classified under the penal code as crimes, in accordance with the severity of the penalties attached. The president is assisted in his duties by two other magistrates, who may be chosen either from among the conseillers of the court of appeal or the presidents or judges of the local court of first instance. In this court and in this court alone there is always a jury of twelve. They decide, as in England, on facts only, leaving the application of the law to the judges. The verdict is given by a simple majority.

In all criminal prosecutions, other than those coming before the juge de paix, a secret preliminary investigation is made by an official called a juge d' instruction. He may either dismiss the case at once by an order of " non-lieu," or order it to be tried, when the prosecution is undertaken by the procureur or procureur-gineral. This process in some degree corre- sponds to the manner in which English magistrates dismiss a case or commit the prisoner to quarter sessions or assizes, but the powers of the juge d' instruction are more arbitrary and absolute.

The highest tribunal in France is the cour de cassation, sitting at Paris, and consisting of a first president, three sectional presidents and forty-five conseillers, with a ministerial staff (parquet) consisting of a procureur-general and six advocates- general. It is divided into three 'sections: the Chambre des Requites, or court of petitions, the civil court and the criminal court. The cour de cassation can review the decision of any other tribunal, except administrative courts. Criminal appeals usually go straight to the criminal section, while civil appeals are generally taken before the Chambre des Requetes, where they undergo a preliminary examination. If the demand for re- hearing is refused such refusal is final; but if it is granted the case is then heard by the civil chamber, and after argument cassation (annulment) is granted or refused. The Court of Cassation does not give the ultimate decision on a case; it pronounces, not on the question of fact, but on the legal principle at issue, or the competence of the court giving the original decision. Any decision, even one of a cour d'assises, may be brought before it in the last resort, and may be cassS — annulled. If it pronounces cassation it remits the case to the hearing of a court of the same order.

Commercial courts (tribunaux de commerce) are established in all the more important commercial towns to decide as expediti- ously as possible

disputed points arising out of business trans- actions. They consist of judges, chosen, from among the leading merchants, and elected by commercants patentees depuis cinq ans, i.e. persons who have held the licence to trade (see Finance) for

five years and upwards. In the absence of a tribunal de commerce commercial cases come before the ordinary tribunal d'arrondisse- ment.

In important industrial towns tribunals called conseils de prud'hommes are instituted to deal with disputes between employers and employees, actions arising out of contracts of apprenticeship and the like. They are composed of employers and workmen in equal numbers and are established by decree of the council of state, advised by the minister of justice. The minister of justice is notified of the necessity for a conseil de prud'hommes by the prefect, acting on the advice of the municipal council and the Chamber of Commerce or the Chamber of Arts and Manufactures. The judges are elected by employers and workmen of a certain standing. When the amount claimed exceeds £12 appeal lies to the tribunaux d'arrondissement.

Police. — Broadly, the police of France may be divided into two great branches — administrative police (la police admini- strative) and judicial police (la police judiciaire), the former having for its object the maintenance of order, and the latter charged with tracing out offenders, collecting the proofs, and delivering the presumed offenders to the tribunals charged by law with their trial and punishment. Subdivisions may be, and often are, named according to the particular duties to which they are assigned, as la police politique, police des mceurs, police sanitaire, &c. The officers of the judicial police comprise the juge de paix (equivalent to the English police magistrate), the maire, the commissaire de police, the gendarmerie and, in rural districts, the gardes champUres and the gardes forestiers. Gardiens de la paix (sometimes called sergents de mile, gardes de mile or agents de police) are not to be confounded with the gendarmerie, being a branch of the administrative police and corresponding more or less nearly with the English equivalent " police constables," which the gendarmerie do not, although both perform police duty. The gendarmerie, however, differ from the agents or gardes both in uniform and in the fact that they are for the most part country patrols. The organization of the Paris police, which is typical of that in other large towns, may be outlined briefly. The central administration (administration centrale) comprises three classes of functions which together constitute la police. First there is the office or cabinet of the prefect for the general police (la police ginerale), with bureaus for various objects, such as the safety of the president of the republic, the regulation and order of public ceremonies, theatres, amusements and entertainments, &c; secondly, the judicial police (la police judiciaire), with numerous bureaus also, in constant communica-

tion with the courts of judicature; thirdly, the administrative police (la police administrative) including bureaus, which super- intend navigation, public carriages, animals, public health, &c. Concurrently with these divisions there is the municipal police, which comprises all the agents in enforcing police regulations in the streets or public thoroughfares, acting under the orders of a chief (chef de la police municipale) with a central bureau. The municipal police is divided into two principal branches — the service in uniform of the agents de police and the service out of uniform of inspecteurs de police. In Paris the municipal police are divided among the twenty arrondissements, which the uniform police patrol (see further Paris and Police).

Prisons. — The prisons of France, some of them attached to the ministry of the interior, are complex in their classification. It is only from the middle of the 19th century that close attention has been given to the principle of individual separation. Cellular imprisonment was, however, partially adopted for persons awaiting trial. Central prisons, in which prisoners lived and worked in association, had been in existence from the commence- ment of the 19th century. These prisons received all sentenced to short terms of imprisonment, the long-term convicts going to the bagnes (the great convict prisons at the arsenals of Rochefort, Brest and Toulon), while in 1851 transportation to penal colonies ‘ was adopted. In 1869 and 1871 commissions were appointed to inquire into prison discipline, and as a consequence of the report of the last commission, issued in 1874, the principle of cellular

confinement was put in operation the following year. There were, however, but few prisons in France adapted for the cellular system, and the process of reconstruction has been slow. In 1898 the old Paris prisons of Grande-Roquette, Saint-Pelagie and Mazas were demolished, and to replace them a large prison with 1500 cells was erected at Fresnes-les-Rungis. There are (1) the maison d’ arret, temporary places of durance in every arrondissement for persons charged with offences, and those sentenced to more than a year’s imprisonment who are awaiting transfer to a maison centrale; (2) the maison de justice, often part and parcel of the former, but only existing in the assize court towns for the safe custody of those tried or condemned at the assizes; (3) departmental prisons, or maisons de correction, for summary convictions, or those sentenced to less than a year, or, if provided with sufficient cells, those amenable to separate con-

finement; (4) maisons centrales and penitenciers agricoles, for all sentenced to imprisonment for more than a year, or to hard labour, or to those condemned to travaux forces for offences com- mitted in prison. There are eleven maisons centrales, nine for men (Loos, Clairvaux, Beaulieu, Poissy, Melun, Fontevrault, Thouars, Riom and Nimes); two for women (Rennes and Montpellier). The penitenciers agricoles only differ from the maisons centrales in the matter of regime; there are two — at Castelluccio and at Chiavari (Corsica). There are also re- formatory establishments for juvenile offenders, and depdts de surett for prisoners who are travelling, at places where there are no other prisons. For the penal settlements at a distance from France see Deportation.

Finance.

At the head of the financial organization of France, and exercising a general jurisdiction, is the minister of finance, who co-ordinates in one general budget the separate budgets prepared by his colleagues and assigns to each ministerial department the sums necessary for its expenses.

The financial year in France begins on the 1st of January,

and the budget of each financial year must be laid on the table

_, . of the Chamber of Deputies in the course of the ordinary Budget . , , ,r …... . J

session of the preceding year in time for the discussion

upon it to begin in October and be concluded before the 31st of December. It is then submitted to a special commission of the Chamber of Deputies, elected for one year, who appoint a general reporter and one or more special reporters for each of the minis- tries. When the Chamber of Deputies has voted the budget it is submitted to a similar course of procedure in the Senate. When the budget has passed both chambers it is promulgated by the president under the title of Loi des finances. In the event of its not being voted before the 31st of December, recourse is had to the system of " provisional twelfths " (douziemes provisoires) , whereby the government is authorized by parliament to incur expenses for one, two or three months on the scale of the previous year. The expenditure of the government has several times been regulated for as long as six months upon this system.

In each department an official collector (Tresorier payeur general) receives the taxes and public revenue collected therein and accounts _ ,. for them to the central authority in Paris. In view of his

axa on. res p 0ns ;t}ii;ties he has, before appointment, to pay a large deposit to the treasury. Besides receiving taxes, they pay the creditors of the state in their departments, conduct all operations affecting departmental loans, buy and sell government stock {rentes) on behalf of individuals, and conduct certain banking operations. The tresorier nearly always lives at the chief town of the department, and is assisted by a receveur particulier des finances in each arrondisse- ment (except that in which the trSsorier himself resides). From the receveur is demanded a security equal to five times his total income. The direct taxes are actually collected by percepteurs. In the commune an official known as the receveur municipal receives all moneys due to it, and, subject to the authorization of the mayor, makes all payments due from it. In communes with a revenue of less than £2400 the percepteur fulfils the functions of receveur municipal, but a special official may be appointed in communes with large incomes.

The direct taxes fall into two classes. (1) Impots de repartition (apportionment), the amount to be raised being fixed in advance annually and then apportioned among the departments. They

include the land tax, 1 the personal and habitation tax (contribution personnelle-mobiliere), and door and window tax. (2) Impots de quotite, which are levied directly on the individual, who pays his quota according to a- fixed tariff. These comprise the tax on buildings 1 and the trade-licence tax (impot des patentes). Besides these, certain other taxes {taxes assimilees aux contributions directes) are included under the heading of direct taxation, e.g. the tax on property in mortmain, dues for the verification of weights and measures, the tax on royalties from mines, on horses, mules and carriages, on cycles, &c.

The land tax falls upon land not built upon in proportion to its net yearly revenue. It is collected in accordance with a register of property (cadastre) drawn up for the most part in the first half of the 19th century, dealing with every piece of property in France, and giving its extent and value and the name of the owner. The re- sponsibility of keeping this register accurate and up to date is divided between the state, the departments and the communes, and involves a special service and staff of experts. The building tax consists of a levy of 3-20% of the rental value of the property, and is charged upon the owner.

The personal and habitation tax consists in fact of two different taxes, one imposing a fixed capitation charge on all citizens alike of every department, the charge, however, varying according to the department from 1 fc. 50 c. (is. 3d.) to 4 fcs. 50 c. (3s. 9d.), the other levied on every occupier of a furnished house or of apartments in proportion to its rental value.

The tax on doors and windows is levied in each case according to the number of apertures, and is fixed with reference to population, the inhabitants of the more populous paying more than those of the less populous communes.

The trade-licence tax (impdt des patentes) is imposed on every person carrying on any business whatever; it affects professional men, bankers and manufacturers, as well as wholesale and retail traders, and consists of (1) a fixed duty levied not on actual profits but with reference to the extent of a business or calling as indicated by number of employes, population of the locality and other considerations. (2) An assessment on the letting value of the premises in which a business or profession is carried on.

The administrative staff includes, for the purpose of computing the individual quotas of the direct taxes, a director assisted by contrSleurs in each department and subordinate to a central authority in Paris, the direction generate des contributions directes.

The indirect taxes comprise the charges on registration; stamps; customs; and a group of taxes specially described as "indirect taxes."

Registration (enregistrement) duties are charged on the transfer of property in the way of business (a titre onSreux); on changes in ownership effected in the way of donation or succession (S titre gratuit), and on a variety of other transactions which must be registered according to law. The revenue from stamps includes as its chief items the returns from stamped paper, stamps on goods traffic, securities and share certificates and receipts and cheques. .

The Direction generate de I' enregistrement, des domaines el du timbre, comprising a central department and a director and staff of agents in each department, combines the administration of state property (not including forests) with the exaction of registration and stamp duties.

The Customs(douane), at one time only a branch of the administra- tion of the contributions indirectes, were organized in 1869 as a special service. The central office at Paris consists of a directeur general and two administrateurs, nominated by the president of the republic. These officials form a council of administration presided over by the minister of finance. The service in the departments comprises brigades, which are actually engaged in guarding the frontiers, and a clerical staff (service de bureau) entrusted with the collection of the duties. There are twenty-four districts, each under the control of a directeur, assisted by inspectors, sub-inspectors and other officials. The chief towns of these districts are Algiers, Bayonne, Besancon, Bordeaux, Boulogne, Brest, Chambery, Charleville, Dunkirk,

Epinal, La Rochelle, Le Havre, Lille, Lyons, Marseilles, Montpellier, Nancy, Nantes, Nice.Paris, Perpig nan,Rouen, St-Malo,Valenciennes. There is also an official performing the functions of a director at Bastia, in Corsica.

The group specially described as indirect taxes includes those on alcohol, wine, beer, cider and other alcoholic drinks, on passenger and goods traffic by railway, on licences to distillers, spirit-sellers, &c, on salt and on sugar of home manufacture. The collection of these excise duties as well as the sale of matches, tobacco and gun- powder to retailers, is assigned to a special service in each department subordinated to a central administration. To the above taxes must be added the tax on Stock Exchange transactions and the tax of 4 % on dividends from stocks and shares (other than state loans).

Other main sources of revenue are: the domains and forests managed by the state; government monopolies, comprising tobacco, matches, gunpowder; posts, telegraphs, telephones; and state

1 The tax on land (proprietes non bdties) and that on buildings (proprietes baties) are included under the head of contribution fonciere.

railways. An administrative tribunal called the cour des comptes subjects the accounts of the state's financial agents (tresoriers- payeurs, receveurs of registration fees, of customs, of indirect taxes, &c.) and of the communes 1 to a close investigation, and a vote of definitive settlement is finally passed by parliament. The Cour des Comptes, an ancient tribunal, was abolished in 1 791, and reorganized by Napoleon I. in 1807. It consists of a president and no other officials, assisted by 25 auditors. All these are nominated for life by the president of the republic. Besides the accounts of the state and of the communes, those of charitable institutions 1 and training colleges 1 and a great variety of other public establishments are scrutinized by the Cour des Comptes.

The following table shows the rapid growth of the state revenue of France during the period 1875-1905, the figures for the specified years representing millions of pounds.

1875-

1880.

1885.

I89O.

I895.

Average

1896-1900.

Average

1901-1905.

108

118

122

129

137

144

H7

Of the revenue in 1905 (1503 million pounds) the four direct taxes produced approximately 20 millions. Other principal items of revenue were: Registration 25 millions, stamps 73 millions, customs 18 millions, inland revenue on liquors 163 millions, receipts from the tobacco monopoly 18 millions, receipts from post office 103 millions.

Since 1875 the expenditure of the state has passed through con- siderable fluctuations. It reached its maximum in 1883, descended ExoeadI- ‘ n ’”^ ano ” “889, and since then has continuously in- ta Jˆ ‘ creased. It was formerly the custom to divide the credits voted for the discharge of the public services into two heads — the ordinary and extraordinary budget. The ordinary budget of expenditure was that met entirely by the produce of the taxes, while the extraordinary budget of expenditure was that which had to be incurred either in the way of an immediate loan or in aid of the funds of the floating debt. The policy adopted after 1890 of incorporating in the ordinary budget the expenditure on war, marine and public works, each under its own head, rendered the ” extraordinary budget ” obsolete, but there are still, besides the ordinary budget, budgets annexes, comprising the credits voted to certain establishments under state supervision, e.g. the

National Savings Bank, state railways, &c. The growth of the expenditure of France is shown in the following summary figures, which represent millions of pounds.

1875-

1880.

1885.

1890.

1895-

Average

1 896-1 900.

Average

1901-1905.

117

135

139

132

137

H3

H7

The chief item of expenditure (which totalled 148 million pounds in 1905) is the service of the public debt, which in 1905 cost 48! million pounds sterling. Of the rest of the sum assigned to the ministry of finance (59J millions in all) 8J millions went in the ex- pense of collection of revenue. The other ministries with the largest outgoings were the ministry of war (the expenditure of which rose from 253 millions in 1895 to over 30 millions in 1905), the ministry of marine (iof millions in 1895, over 123 millionsin 1905), the ministry of public works (with an expenditure in 1905 of over 20 millions, 10 millions of which was assigned to posts, telegraphs and telephones) and the ministry of public instruction, fine arts and public worship, the expenditure on education having risen from 7 5

millions in 1895 to 9J millions in 1905.

Public Debt. — The national debt of France is the heaviest of any country in the world.. Its foundation was laid early in the 15th century, and the continuous wars of succeeding centuries, combined with the extravagance of the monarchs, as well as deliberate dis- regard of financial and economic conditions, increased it at an alarm- ing rate. The duke of Sully carried out a revision in 1604, and other attempts were made by Mazarin and Colbert, but the extravagances of Louis XV. swelled it again heavily. In 1764 the national debt amounted to 2,360,000,000 livres, and the annual change to 93,000,000 livres. A consolidation was effected in 1793, but the lavish issue of assignats (q.v.) destroyed whatever advantage might have accrued, and the debt was again dealt with by a law of the 9th of Vendemiaire year VI. (27th of September 1797), the annual interest paid yearly to creditors then amounting to 40,216,000 francs (£1,600,000). During the Directory a sum of £250,000 was added to the interest charge, and by 1814 this annual charge had risen to £2,530,000. This large increase is to be accounted for by the fact that during the Napoleonic regime the government steadily refused to issue in- convertible paper currency or to meet war expenditure by borrowing. The following table shows the increase of the funded debt since

1814. 5

1 With revenues of over £1200.

‘ For a history of the French debt, see C. F. Bastable, Public Finance (1903).

Date.

Nominal Capital (Millions of £).

Interest (Millions of £).

April 1, 1814

April 1, 1830

March 1, 1848

January 1, 1852

1871

1876

1887

1895

1905

5°f

177

2 3 8|

220f

498i

796j

986J

io38| J

i°37i

z 2

8

9f

15! 30

34i 32i

31

The French debt as constituted in 1905 was made up of funded debt and floating debt as follows :

Funded Debt.

Perpetual 3 % rentes £888,870,400

Terminable 3 % rentes 148,490,400

Total of funded debt £1,037,360,800

Guarantees to railway companies, &c. (in

capital) £89,724,080

Other debt in capital 46,800,840

Floating Debt.

Exchequer bills

Liabilities on behalf of communes and public establishments, including departmental services

Deposit and current accounts of Caisse des depots, &c, including savings banks .

Caution money of Tresoriers payeurs-generaux

Other liabilities

Total of floating debt ….

£9,923.48o

17.366,520

15,328,840 1,431,680 6,456,200

£50,506,720

Departmental Finances. — Every department has a budget of its own, which is prepared and presented by the prefect, voted by the departmental council and approved by decree of the president of the republic. The ordinary receipts include the revenues from the property of the department, the produce of additional centimes, which are levied in conjunction with the direct taxes for the main- tenance of both departmental and communal finances, state sub- ventions and contributions of the communes towards certain branches of poor relief and to maintenance of roads. The chief expenses of the departments are the care of pauper children and lunatics, the maintenance of high-roads and the service of the departmental debt.

Communal Finances. — The budget of the commune is prepared by the mayor, voted by the municipal council and approved by the prefect. But in communes the revenues of which exceed £120,000, the budget is always submitted to the president of the republic. The ordinary revenues include the produce of " additional centimes " allocated to communal purposes, the rents and profits of communal property, sums produced by municipal taxes and dues, concessions to gas, water and other companies, and by the octroi (q.v.) or duty on a variety of articles imported into the commune for local

con- sumption. The repairing of highways, the upkeep of public build- ings,. the support of public education, the remuneration of numerous officials connected with the collection of state taxes, the keeping of the cadastre, &c, constitute the principal objects of communal expenditure.

Both the departments and the communes have considerable public debts. The departmental debt in 1904 stood at 24 million pounds, and the communal debt at 153 million pounds. (R. Tr.)

Army.

Recruiting and Strength. — Universal compulsory service was adopted after the disasters of 1870-1871, though in principle it had been established by Marshal Niel's reforms a few years before that date. The most important of the recruiting laws passed since 1870 are those of 1872, 1889 and 1905, the last the " loi de deux ans " which embodies the last efforts of the French war department to keep pace with the ever-growing numbers of the German empire. Compulsory service with the colours is in Germany no longer universal, as there are twice as many able-bodied men presented by the recruiting com- missions as the active army can absorb. France, with a greatly inferior population, now trains every man who is physically capable. This law naturally made a deep impression on military Europe, not merely because the period of colour service was reduced — Germany had taken this step years before — but because of the almost entire absence of the usual exemptions.

3 In 1894 the rentes then standing at 4}% were reduced to 3i%, and in 1902 to 3 %. ,

Even bread-winners are required to serve, the state pensioning their dependants (75 centimes per diem, up to 10% of the strength) during their period of service. Dispensations, and also the one-year voluntariat, which had become a short cut for the so-called " intellectual class " to employment in the civil service rather than a means of training reserve officers, were abolished. Every Frenchman therefore is a member of the army practically or potentially from the age of twenty to the age of forty-five. Each year there is drawn up in every commune a list of the young men who attained the age of twenty during the previous year. These young men are then examined by a revising body (Conseil de revision cantonal) composed of civil and military officials. Men physically unfit are wholly

exempted, and men who have not, at the time of the examination, attained the required physical standard are put back for re-examination after an interval. Men who, otherwise suitable, have some slight infirmity are drafted into the non-combatant branches. The minimum height for the infantry soldier is 1-54 m., or 5 ft. I in., but men of special physique are taken below this height. In 1904, under the old system of three-years' service with numerous total and partial exemptions, 324,253 men became liable to incorporation, of whom 25,432 were rejected as unfit, 55,265 were admitted as one-year volunteers, 62,160 were put back, 27,825 had already enlisted with a view to making the army a career, 5257 were taken for the navy, and thus, with a few extra details and casualties, the contingent for full service dwindled to 147,549 recruits. In 1906, 326,793 men had to present themselves, 25,348 had already enlisted, 4923 went to the navy, 68,526 were put back, 33,777 found unfit, which, deducting 3128 details, gives an actual incorporated contingent of 191,091 young men of twenty-one to serve for two full years (in each case, for the sake of comparison, men put back from former years who were enrolled are omitted). In theory a two-years' contingent of course should be half as large again as a three-years' one, but in practice, France has not men enough for so great an increase. Still the law of 1905 provides a system whereby there is room with the colours for every available man, and moreover ensures his services. The net gain in the 1906 class is not far short of 50,000, and the proportion of the new contingent to the old is practically 5 : 4. The loi des cadres of 1907 introduced many important changes of detail supplementary to the loi de deux ans. Important changes were also made in the provisions and administration of military law. The active army, then, at a given moment, say November 1, 1908, is composed of all the young men, not legally exempted, who have reached the age of twenty in the years 1906 and 1907. It is at the disposal of the minister of war, who can decree the recall of all men dis- charged to the reserve the previous year and all those whose time of service has for any reason been shortened. The reserves of the active army are composed of those who have served the legal period in the active army. These are recalled twice, in the eleven years during which they are members of the reserve, for refresher courses. The active army and its reserve are not localized, but drawn from and distributed over the whole of France. The advantages of a purely territorial system have tempted various War Ministers to apply it, but the results were not good, owing to the want of uniformity in the military qualities and the political subordination of the different districts. One result of this is that mobilization and concentration are much slower processes than they are in Germany.

The Territorial Army and its reserve (members of which undergo two short periods of training) are, however, allocated to local service. The soldier

spends six years in the Territorial Army, and six in the reserve of the Territorial Army. The reserves of the active army and the Territorial Army and its reserve can only be recalled to active service in case of emergency and by decree of the head of the state.

The total service rendered by the individual soldier is thus twenty-five years. He is registered at the age of twenty, is called to the colours on the 1st of October of the next year, discharged to the active army reserve on the 30th of September of the second year thereafter, to the Territorial Army at the

same date thirteen complete years after his incorporation, and finally discharged from the reserve of the Territorial Army on the twenty-fifth anniversary of his entry into the active army. On November 1, 1908, then the active army was composed of the classes registered 1906 and 1907, the reserve of the classes 1895-1905, the Territorial Army of those of 1880-1894 and the Territorial Army reserve of those of 1883-1888.

In 1906 the peace strength of the army in France was estimated at 53 2 >S93 officers and men; in Algeria 54,580; in Tunis 20,320; total 607,493. Deducting vacancies, sick and absent, the effective strength of the active army in 1906 was 540,563; of the gendarmerie and Garde Republicaine 24,512; of colonial troops in the colonies 58,568. The full number of persons liable to be called upon for military service and engaged in such service is calculated (1908) as 4,800,000, of whom 1,350,000 of the active army and the younger classes of army reserve would constitute the field armies set on foot at the outbreak of war. 150,000 horses and mules are maintained on a peace footing and 600,000 on a war footing.

Organization. — The general organization of the French army at home is based on the system of permanent army corps, the headquarters of which are as follows: I. Lille, II. Amiens, III. Rouen, IV. Le Mans, V. Orleans, VI. Chalons-sur-Marne, VII. Besancon, VIII. Bourges, IX. Tours, X. Rennes, XI. Nantes, XII. Limoges, XIII. Clermont-Ferrand, XIV. Lyons, XV. Marseilles, XVI. Montpellier, XVII. Toulouse, XVIII. Bordeaux,' XIX. Algiers and XX. Nancy. Each army corps consists in principle of two infantry divisions, one cavalry brigade, one brigade of horse and field artillery, one engineer battalion and one squadron of train. But certain army corps have a special organization. The VI. corps (Chalons) and the VII. (Besancon) consist of three divisions each, and the XIX. (Algiers) has three divisions of its own as well as the division occupying Tunis. In addition to these corps there are eight permanent cavalry divisions with headquarters at Paris, Lune- ville, Meaux, Sedan, Reims, Lyons, Melun and Dole. The military government of Paris is independent of the army corps system and comprises, besides a division of the colonial army corps (see below), 3! others detached from

the II., III., IV. and V. corps, as well as the 1st and 3rd cavalry divisions and many smaller bodies of troops. The military government of Lyons is another independent and special command; it comprises practically the XIV. army corps and the 6th cavalry division. The infantry division consists of 2 brigades, each of 2 regiments of 3 or 4 battalions (the 4 battalion regiments have recently been reduced for the most part to 3), with 1 squadron cavalry and 1 2 batteries, attached from the corps troops, in war a pro- portion of the artillery would, however, be taken back to form the corps artillery (see Artillery and Tactics). The cavalry division consists of 2 or 3 brigades, each of 2 regiments or 8 squadrons, with 2 horse artillery batteries attached. The army corps consists of headquarters, 2 (or 3) infantry divisions, 1 cavalry brigade, 1 artillery brigade (2 regiments, comprising 21 field and 2 horse batteries), 1 engineer battalion, &c. In war a group of " Rimailho " heavy howitzers (see Ordnance: Heavy Field and Light Siege Units) would be attached. It is proposed, and accepted in principle, to increase the number of guns in the army corps by converting the horse batteries in 18 army corps to field batteries, which, with other measures, enables the number of the latter to be increased to 36 (144 guns).

The organization of the " metropolitan troops " by regiments is (a) 163 regiments of line infantry, some of which are affected to " regional " duties and do not enter into the composition of their army corps for war, 31 battalions of chasseurs d pied, mostly stationed in the Alps and the Vosges, 4 regiments of Zouaves, 4 regiments of Algerian tirailleurs (natives, often called Turcos 1), 2 foreign legion regiments, 5 battalions of African light infantry (disciplinary regiments), &c; (b) 12

1 Algerian native troops are recruited by voluntary enlistment. But in 1908, owing to the prevailing want of trained soldiers in France, it was proposed to set free the white troops in Algeria by applying the principles of universal service to the natives, as in Tunis.

regiments of cuirassiers, 32 of dragoons, 21 of chasseurs a cheval, 14 of hussars, 6 of chasseurs d'Afrique and 4 of Spahis (Algerian natives); (c) 40 regiments of artillery, comprising 445 field batteries, 14 mountain batteries and 52 horse batteries (see, however, above), 18 battalions of garrison artillery, with in addition 13 companies of artificers, &c; (d) 6, regiments of engineers forming 22 battalions, and 1 railway regiment; (e)

20 squadrons of train, 27 legions of gendarmerie and the. Paris Garde Republicaine, administrative and medical units.

Colonial Troops. — These form an expeditionary army corps in France to which are attached the actual corps of occupation to the various colonies, part white, part natives. The colonial army corps, headquarters at Paris, has three divisions, at Paris, Toulon and Brest.

The French colonial (formerly marine) infantry, recruited by voluntary enlistment, comprises 18 regiments and 5 independent battalions (of which 12 regiments are at home), 74 batteries of field, fortress and mountain artillery (of which 32 are at home), with a few cavalry and engineers, &c, and other services in proportion. The native troops include 13 regiments and 8 independent battalions. The strength of this army corps is 28,700 in France and 61,300 in the colonies.

Command. — The commander-in-chief of all the armed forces is the president of the Republic, but the practical direction of affairs lies in the hand of the minister of war, who is assisted by the Conseil supirieur de la guerre, a body of senior generals who have been selected to be appointed to the higher commands in war. The vice-president is the destined commander-in-chief of the field armies and is styled the generalissimo. The chief of staff of the army is also a member of the council. In war the latter would probably remain at the ministry of war in Paris, and the generalissimo would have his own chief of staff. The ministry of war is divided into branches for infantry, cavalry, &c. — and services for special subjects such as military law, explosives, health, &c. The general staff (itat major de I'armee) has its functions classed as follows: personnel; material and finance; 1st bureau (organization and mobilization), 2nd (intelligence), 3rd (military operations and training) and 4th (communications and transport); and the famous historical section. The president of the Republic has a military household, and the minister a cabinet, both of which are occupied chiefly with questions of promotion, patronage and decorations.

The general staff and also the staff of the corps and divisions are composed of certificated (breveles) officers who have passed all through the Ecole de Guerre. In time of peace an officer is attached to the staff for not more than four years. He must then return to regimental duty for at least two years.

The officers of the army are obtained partly from the old- established military schools, partly from the ranks of the non- commissioned officers, the proportion of the latter being about one-third of the total number of officers. Artillery and engineer officers come from the Ecole Polytechnique,

infantry and cavalry from the Ecole speciale militaire de St-Cyr. Other important training institutions are the staff college (Ecole superieure de Guerre) which trains annually 70 to 90 selected captains and lieutenants; the musketry school of Chalons, the gymnastic school at Joinville-le-Pont and the schools of St Maixent, Saumur and Versailles for the preparation of non-commissioned officers for commissions in the infantry, cavalry, artillery and en- gineers respectively. The non-commissioned officers are, as usual in universal service armies, drawn partly from men who voluntarily enlist at a relatively early age, and partly from men who at the end of their compulsory period of service are re-engaged. Voluntary enlistments in the French army are permissible, within certain limits, at the age of eighteen, and the engages serve for at least three years. The law further provides for the re-engagement of men of all ranks, under conditions varying according to their rank. Such re-engagements are for one to three years' effective service but may be extended to fifteen. They date from the time of the legal expiry of each man's com- pulsory active service. Rengagis receive a bounty, a higher rate of pay and a pension at the conclusion of their service.

The total number of men who had re-enlisted stood in 1903 at

8594.

Armament. — The field artillery is armed with the 75 mm. gun, a shielded quick-firer (see Ordnance: Field Equipments, for illustration and details); this weapon was the forerunner of all modern models of field gun, and is handled on tactical principles specially adapted for it, which gives the French field artillery a unique position amongst the military nations. The infantry, which was the first in Europe to be armed with the magazine rifle, still carries this, the Lebel, rifle which dates from 1886. It is believed, however, that a satisfactory type of auto- matic rifle (see Rifle) has been evolved and is now (1908) in process of manufacture. Details are kept strictly secret. The cavalry weapons are a straight sword (that of the heavy cavalry is illustrated in the article Sword), a bamboo lance and the Lebel carbine.

It is convenient to mention in this place certain institutions attached to the war department and completing the French military organization. The Hotel des Invalides founded by Louis XIV. and Louvois is a house of refuge for old and infiim soldiers of all grades. The number of the inmates is decreasing; but the institution is an expensive one. In 1875 the " Invalides " numbered 642, and the h6tel cost the state 1,123,053 francs. The order of the Legion of Honour is treated under Knighthood and Chivalry. The medaille militaire is awarded to private soldiers and non-commissioned officers who have distinguished themselves or rendered long and

meritorious services. This was introduced in 1852, carries a yearly pension of 100 frs. and has been granted occasionally to officers.

Fortifications. — After 1870 France embarked upon a policy of elaborate frontier and inner defences, with the object of ensuring, as against an unexpected German invasion, the time necessary for the effective development of her military forces, which were then in process of reorganization. Some information as to the types of fortification adopted in 1870-1875 will be found in Fortification and Siegecraft. The general lines of the scheme adopted were, as follows: On the Meuse, which forms the principal natural barrier on the side of Lorraine, Verdun (q.v.) was fortified as a large entrenched camp, and along the river above this were constructed a series of forts d'arret (see Meuse Line) ending in another entrenched camp at Toul (q.v.). From this point a gap (the IrouSe d'Epinal) was left, so as " in some sort to canalize the flow of invasion " (General Bonnal), until the upper Moselle was reached at Epinal (q.v.). Here another entrenched camp was made and from it the "Moselle line " (q.v.) of forts d'arret continues the barrier to Belfort (q.v.), another large entrenched camp, beyond which a series of fortifica- tions at Montbeliard and the Lomont range carries the line of defence to the Swiss border, which in turn is protected by works at Pontarlier and elsewhere. In rear of these lines Verdun- Toul and Epinal-Belfort, respectively, lie two large defended areas in which under certain circumstances the main armies would assemble preparatory to offensive movements. One of these areas is defined by the three fortresses, La Fere, Laon and Reims, the other by the triangle, Langres — Dijon — Besancon. On the side of Belgium the danger of irruption through neutral territory, which has for many years been foreseen, is provided against by the fortresses of Lille, Valenciennes and Maubeuge, but (with a view to tempting the Germans to attack through Luxemburg, as is stated by German authorities) the frontier between Maubeuge and Verdun is left practically undefended. The real defence of this region lies in the field army which would, if the case arose, assemble in the area La Fere-Reims-Laon. On the Italian frontier the numerous forts d'arret in the mountains are strongly supported by the entrenched camps of Besancon, Grenoble and Nice. Behind all this huge development of fixed defences lie the central fortresses of Paris and Lyons. The defences, of the Spanish frontier consist of the entrenched camps of Bayonne and Perpignan and the various small forts d'arrit of the Pyrenees. Of the coast defences the principal are Toulon, Antibes, Rochefortj Lorient, Brest, Oleron, La Rochelle, Belle- Isle, Cherbourg, St-Malo, Havre, Calais, Gravelines and Dunkirk

NAVY]

FRANCE

A' number of the older fortresses, dating for the most part from Louis XIV.'s time, are still in existence, but are no longer of military importance. Such are Arras, Longwy, Mezieres and Montmedy.

Navy.

Central Administration. — The head of the French navy is the Minister of Marine, who like the other ministers is appointed by decree of the head of the state, and is usually a civilian. He selects for himself a staff of civilians (the cabinet du ministre), which is divided into bureaux for the despatch of business. The head of the cabinet prepares for the consideration of the minister all the business of the navy, especially questions of general importance. His chief professional assistant is the chefd'etat-major giniral (chief of the general staff) , a vice-admiral, who is responsible for the organization of the naval forces, the mobilization and movements of the fleet, &c.

The central organization also comprises a number of depart- ments (services) entrusted with the various branches of naval administration, such as administration of the active fleet, con- struction of ships, arsenals, recruiting, finance, &c. The minister has the assistance of the Conseil supirieur de la Marine, over which he presides, consisting of three vice-admirals, the chief of staff and some other members. The Conseil supirieur devotes its attention to all questions touching the fighting efficiency of the fleet, naval bases and arsenals and coast defence. Besides the Conseil supirieur the minister is advised on a very wide range of naval topics (including pay, quarters and recruiting) by the Comiti consultatif de la Marine. Advisory committees are also appointed to deal with special subjects, e.g. the commissions de classement which attend to questions of promotion in the various branches of the navy, the naval works council and others.

The French coast is divided into five naval arrondissements, which have their headquarters at the five naval ports, of which Cherbourg, Brest, and Toulon are the most important, Lorient and Rochefort being of lesser degree. All are building and fitting-out yards. Each arrondissement is divided into sous- arrondissements, having their centres in the great commercial ports, but this arrangement is purely for the embodiment of the men of the Inscription Maritime, and has nothing to do with the dockyards as naval arsenals. In each arrondissement the vice-admiral, who is naval prefect, is the immediate repre- sentative of the minister of marine, and has full direction and command of the arsenal, which is his headquarters. He is thus commander-in-chief, as also governor-designate for time of war, but

his authority does not extend to ships belonging to organized squadrons or divisions. The naval prefect is assisted by a rear- admiral as chief of the staff (except at Lorient and Rochefort, where the office is filled by a captain), and a certain number of other officers, the special functions of the chief of the staff having relation principally to the efficiency and personnel of the fleet, while the " major-general," who is usually a rear-admiral, is concerned chiefly with the materiel. There are also directors of stores, of naval construction, of the medical service, and of the submarine defences (which are concerned with torpedoes, mines and torpedo-boats), as well as of naval ordnance and works, The prefect directs the operations of the arsenal, and is responsible for its efficiency and for that of the ships which are there in reserve. In regard to the constitution and maintenance of the naval forces, the administration of the arsenals is divided into three principal departments, the first concerned with naval construction, the second with ordnance, including gun-mountings and small-arms, and the third with the so-called submarine defences, dealing with all torpedo materiel.

The French navy is manned partly by voluntary enlistment, partly by the transference to the navy of a certain proportion of each year's recruits for the army, but mainly by a system known as inscription maritime. This system, devised and introduced by Colbert in i68i f has continued, with various modifications, ever since. All French sailors between the ages of eighteen and fifty must be enrolled as members of the armle de mer. The term sailor is used in a very wide sense and includes

all persons earning their living by navigation on the sea, or in the harbours or roadsteads, or on salt lakes or canals within the maritime domain of the state, or on rivers and canals as far as the tide goes up or sea-going ships can pass. The inscript usually begins his service at the age of twenty and passes through a period of obligatory service lasting seven years, and generally comprising five years of active service and two years furlough.

Besides the important harbours already referred to, the French fleet has naval bases at Oran in Algeria, Bizerta in Tunisia, Saigon in Cochin China andHongaj inTongking, Diego- Suarez in Madagascar, Dakar in Senegal, Fort de France in Martinique, Noumea in New Caledonia.

The ordnance department of the navy is carried on by a large detachment of artillery officers and artificers provided by the war office for this special duty.

The fleet is divided into the Mediterranean squadron, the Northern squadron, the Atlantic division, the Far Eastern division, the Pacific division, the Indian Ocean division, the Cochin China division.

The chief naval school is the Ecole navale at Brest, which is devoted to the training of officers; the age of admission is from fifteen to eighteen years, and pupils after completing their course pass a year on a frigate school. At Paris there is a more advanced school (£cole supirieure de la Marine) for the supplementary training of officers. Other schools are the school of naval medicine at Bordeaux with annexes at Toulon, Brest and Roche-fort; schools of torpedoes and mines and of gunnery at Toulon, &c, &c. The icoles d' hydro graphic established at various ports are for theoretical training for the higher grades of the merchant service. (See also Navy.)

The total personnel of the armie de mer in 1909 is given as 56,800 officers and men. As to the number of vessels, which fluctuates from month to month, little can be said that is wholly accurate at any given moment, but, very roughly, the French navy in 1909 included 25 battleships, 7 coast defence ironclads, 19 armoured cruisers, 36 protected cruisers, 22 sloops, gunboats, &c, 45 destroyers, 319 torpedo boats, 71 submersibles and submarines and 8 auxiliary cruisers. It was stated that, according to proposed arrangements, the principal fighting elements of the fleet would be, in 1919, 34 battleships, 36 armoured cruisers, 6 smaller cruisers of modern type, 109 destroyers, 170 torpedo boats and 171 submersibles and submarines. The budgetary cost of the navy in 1908 was stated as 312,000,000 fr. (£12,480,000). (C. F. A.)

Education.

The burden of public instruction in France is shared by the communes, departments and state, while side by side with the public schools of all grades are private schools subjected to a state supervision and certain restrictions. At the head of the whole organization is the minister of public instruction. He is assisted and advised by the superior council of public instruc- tion, over which he presides.

France is divided into sixteen acadimies or educational districts, having their centres at the seats of the universities. The capitals of these acadimies, together with the departments included in them, are tabulated below:

Academies. Departments included in them.

Paris …. Seine, Cher, Eure-et-Loir,Loir-et-Cher,Loiret,

Marne, Oise, Seine-et-Marne, Seine-et-Oise. Aix Bouches-du-Rh6ne, Basses- Alpes,Alpes-Mari-

times, Corse, Var, Vaucluse. Besanjon . . . Doubs, Jura, Haute-Sa6ne, Territoire de

Belfort. Bordeaux . . . Gironde, Dordogne, Landes, Lot-et-Garonne,

Basses- Pyrenees. Caen …. Calvados, Eure, Manche, Orne, Sarthe, Seine-

Inferieure. Chambery . . . Savoie, Haute-Savoie. Clermont-Ferranb Puy-de-D6me, Allier, Cantal, Correze, Creuse,

Haute-Loire.

Dijon C6te-d'Or,Aube,Haute-Marne,Nievre,Yonne.

Grenoble . . . Isere, Hautes-Alpes, Ardeche, Drome. Lille …. Nord, Aisne, Ardennes, Pas-de-Calais, Somme. Lyons …. Rh6ne, Ain, Loire, Sa6ne-et-Loire.

79»

FRANCE

[EDUCATION

Academies. montpellier

Nancy Poitiers

Rennes . Toulouse .

Departments included in them. Herault, Aude, Gard, Lozere, Pyrenees-

Orientales. Meurthe-et-Moselle, Meuse, Vosges. Vienne, Charente, Charente-Inferieure, Indre,

Indre-et-Loire, Deux-Sevres, Vendee, Haute-

Vienne. Ille-et-Vilaine, C6tes-du-Nord, Finistere,Loire-

Inferieure, Maine-et-Loire, Mayenne, Mor-

bihan. Haute-Garonne, Ariege, Aveyron, Gers, Lot,

Hautes-Pyrenees, Tarn, Tarn-et-Garonne. There is also an academie comprising Algeria.

For the administrative organization of education in France see Education.

Any person fulfilling certain legal requirements with regard to capacity, age and character may set up privately an educational establishment of any grade, but by the law of 1904 all religious congregations are prohibited

from keeping schools of any kind whatever.

Primary Instruction. — All primary public instruction is free and compulsory for children of both sexes between the ages of six and thirteen, but if a child can gain a certificate of primary studies at the age of eleven or after, he may be excused the rest of the period demanded by law. A child may receive instruction in a public or private school or at home. But if the parents wish him to be, taught in a private school they must give notice to the mayor of the commune of their intention and the school chosen. If educated at home, the child (after two years of the compulsory period has expired) must undergo a yearly examination, and if it is unsatisfactory the parents will be compelled to send him to a public or private school.

Each commune is in theory obliged to maintain at least one public primary school, but with the approval of the minister, the departmental council may authorize a commune to combine with other communes in the upkeep of a school. If the number of in- habitants exceed 500, the commune must also provide a special school for girls, unless the Departmental Council authorizes it to substitute a mixed school. Each department is bound to maintain two primary training colleges, one for masters, theotherfor mistresses of primary schools. There are two higher training colleges of primary instruction at Fontenay-aux- Roses and St Cloud for the training of mistresses and masters of training colleges and higher primary schools.

The Laws of 1882 and 1886 ” laicized ” the schools of this class, the former suppressing religious instruction, the latter providing that only laymen should be eligible for masterships. There were also a great many schools in the control of various religious congre- gations, but a law of 1904 required that they should all be suppressed within ten years from the date of its enactment.

Public primary schools include (1) ecoles maternettes — infant schools for children from two to six years old; (2) elementary primary schools — these are the ordinary schools for children from six to thirteen; (3) higher primary schools (ecoles primaires superieures) and “supplementary courses”; these admit pupils who have gained the certificate of primary elementary studies (certificat d’ etudes primaires), offer a more advanced course and prepare for technical instruction; (4) primary technical schools (ecoles manuelles d’apprentissage, ecoles primaires superieures professionnelles) kept by the communes or departments. Primary courses for adults are instituted by the prefect on the recommenda- tion of the municipal council and academy inspector.

Persons keeping private primary schools are free with regard to their

methods, programmes and books employed, except that they may not use books expressly prohibited by the superior council of public instruction. Before opening a private school the person proposing to do so must give notice to the mayor, prefect and academy inspector, and forward his diplomas and other particulars to the latter official.

Secondary Education. — Secondary education is given by the state in lycees, by the communes in colleges and by private individuals and associations in private secondary schools. It is not compulsory, nor is it entirely gratuitous, but the fees are small and the state offers a great many scholarships, by means of which a clever child can pay for its own instruction. Cost of tuition (simply) ranges from £2 to £16 a year. The lycees also take boarders — the cost of boarding ranging from £22 to £52 a year. A lycee is founded in a town by decree of the president of the republic, with the advice of the superior council of public instruction. The municipality has to pay the cost of building, furnishing and upkeep. At the head of the lycee is the principal (proviseur), an official nominated by the minister, and assisted by a teaching staff of professors and charge's de cours or teachers of somewhat lower standing. To become pro- fessor in a lycee it is necessary to pass an examination known as the " agregation," candidates for which must be licentiates of a faculty (or have passed through the Hcole normale superieure).

The system of studies — reorganized in 1902 — embraces a full

curriculum of seven years, which is divided into two periods. The first lasts four years, and at the end of this the pupil may obtain (after examination) the " certificate of secondary studies." During the second period the pupil has a choice of four courses: (1) Latin and Greek; (2) Latin and sciences; (3) Latin and modern languages ; (4) sciences and modern languages. At the end of this period he presents himself for a degree called the Baccalaureat de I'enseignement secondaire. This is granted (after two examinations) by the faculties of letters and sciences jointly (see below), and in most cases it is necessary for a student to hold this general degree before he may be enrolled in a particular faculty of a university and proceed to a Baccalaureat in a particular subject, such as law, theology or medicine.

The colleges, though of a lower grade, are in most respects similar to the lycees, but they are financed by the communes : the professors may have certain less important qualifications in lieu of the " agre- gation." Private secondary schools are subjected to state inspection. The teachers must not belong to any congregation, and must have a diploma of aptitude for teaching and the degree of " licencie." The establishment of lycees for girls was first attempted in 1880. They give an education similar to that offered

in the lycees for boys — with certain modifications — in a curriculum of five or six years. There is a training-college for teachers in secondary schools for girls at Sevres.

Higher education is given by the state in the universities, and in special higher schools; and, since the law of 1875 established the freedom of higher education, by private individuals and bodies in private schools and " faculties " (facultes libres). The law of 1880 reserved to the state " faculties " the right to confer degrees, and the law of 1896 established various universities each containing one or more faculties. There are five kinds of faculties: medicine, letters, science, law and Protestant theology. The faculties of letters and sciences, besides granting the Baccalaureat de I'enseigne- ment secondaire, confer the degrees of licentiate and doctor (la Licence, le Doctoral). The faculties of medicine confer the degree of .doctor of medicine. The faculties of theology confer the degrees of bachelor, licentiate and doctor of theology. The faculties of law confer the same degrees in law and also grant " certificates of capacity," which enable the holder to practise as an avoue; a licence is necessary for the profession of barrister. Students of the private faculties have to be examined by and take their degrees from the state faculties. There are 2 faculties of Protestant theology (Paris and Montauban) ; 12 faculties of law (Paris, Aix, Bordeaux, Caen, Grenoble, Lille, Lyons, Montpellier, Nancy, Poitiers, Rennes, Toulouse); 3 faculties of medicine (Paris, Montpellier and Nancy), and 4 joint faculties of medicine and pharmacy (Bordeaux, Lille, Lyons, Toulouse) ; 15 faculties of sciences (Paris, Besancon, Bor- deaux, Caen, Clermont, Dijon, Grenoble, Lille, Lyons, Marseilles, Montpellier, Nancy, Poitiers, Rennes, Toulouse) ; 15 faculties of letters (at the same towns, substituting Aix for Marseilles). The private faculties are at Paris (the Catholic Institute with a faculty of law) ; Angers (law, science and letters) ; Lille (law, medicine and pharmacy, science, letters); Lyons (law, science, letters); Marseilles (law) ; Toulouse (Catholic Institute with faculties of theology and letters). The work of the faculties of medicine and pharmacy is in some measure shared by the ecoles superieures de pharmacie (Paris, Montpellier, Nancy), which grant the highest degrees in pharmacy, and by the ecoles de plein exercice de medecine et de pharmacie (Marseilles, Rennes and Nantes) and the more numerous ecoles preparatoires de medecine et de pharmacie; there are also ecoles preparatoires & I'enseignement superieur des sciences et des lettres at Chambery, Rouen and Nantes.

Besides the faculties there are a number of institutions, both state-supported and private, giving higher instruction of various special kinds. In the first class must be mentioned the College de France, founded 1530, giving courses of highest study of all sorts, the Museum of Natural History, the Ecole des Chartes (palaeography and archives), the School of Modern

Oriental Languages, the Ecole Pratique des Hautes Etudes (scientific research), &c. All these institutions are in Paris. The most important free institution in this class is the Ecole des Sciences Politiques, which prepares pupils for the civil services and teaches a great number of political subjects, connected with France and foreign countries, not included in the state programmes.

Commercial and technical instruction is given in various in- stitutions comprising national establishments such as the ecoles nationales professionnelles of Armentieres, Vierzon, Voiron and Nantes for the education of working men ; the more advanced ecoles d' arts et metiers of Chalons, Angers, Aix, Lille and Cluny ; and the Central School of Arts and Manufactures at Paris ; schools depending on the communes and state in combination, e.g. the ecoles pratiques de commerce et d'industrie for the training of clerks and workmen; private schools controlled by the state, such as the ecoles superieures de commerce; certain municipal schools, such as the Industrial Institute of Lille; and private establishments, e.g. the school of watch-making at Paris. At Paris the Ecole Superieure des Mines and the Ecole des Ponts et Chaussees are controlled by the minister of public works, the Ecole des Beaux-Arts, the Ecole des Arts Decoratifs and the Conservatoire National de Musique et de De- clamation by the under-secretary for fine arts, and other schools

mentioned elsewhere are attached to several of the ministries. In the provinces there are national schools of fine art and of music and other establishments and free subventioned schools.

In addition to the educational work done by the state, communes and private individuals, there exist in France a good many societies which disseminate instruction by giving courses of lectures and holding classes both for children and adults. Examples of such bodies are the Society for Elementary Instruction, the Polytechnic Association, the Philotechnic Association and the French Union of the Young at Paris; the Philomathic Society of Bordeaux; the Popular Education Society at Havre; the Rhone Society of Pro- fessional Instruction at Lyons; the Industrial Society of Amiens and others.

The highest institution of learning is the Inshlut de trance, founded and kept up by the French govern- ment on behalf of science and literature, and

composed of five academies: the Academie francaise, the Academie des Inscriptions et Belles-Lettres, the Academie des Sciences, the Academie des Beaux- Arts and the Academie des Sciences Morales et Politiques (see Academies). The Academie de Medecine is a separate body.

Colonies.

In the extent and importance of her colonial dominion France is second only to Great Britain. The following table gives the name, area and population of each colony and protectorate as well as the date of acquisition or establishment of a pro- tectorate. It should be noted that the figures for area and population are, as a rule, only estimates, but in most instances they probably approximate closely to accuracy. Detailed notices of the separate countries will be found under their several heads:

Poor Relief (Assistance publique). — In France the pauper, as such, has no legal claim to help from the community, which however, is bound to providefordestitute children (see Foundling Hospitals) and pauper lunatics (both these being under the care of the department), aged and infirm people without resources and victims of incurable illness, and to furnish medical assistance gratuitously to those without resources who are afflicted with curable illness. The funds for these purposes are provided by thedepartment, the commune and the central authority.

Colony.

In Asia — Establishments in India. In Indo-China —

Annam .

Cambodia

Cochin-China.

Tongking

Laos

Kwang-Chow-Wan

Total in Asia .

There are four main types of public benevolent institutions, all of which are communal in character: (i) The hdpital, for maternity cases and cases of curable illness; (2) the hospice, where the aged poor, cases of incurable malady, orphans, foundlings and other children without means of support,

and in some cases lunatics, are received; (3) the bureau de bien-faisance, charged with the provision of out-door relief (secours d domicile) in money or in kind, to the aged poor or those who, though capable of working, are prevented from doing so by illness or strikes; (4) the bureau d'assistance, which dispenses free medical treatment to the destitute.

These institutions are under the super- vision of a branch of the ministry of the interior. The hospices and h6pitaux and the bureaux de bienfaisance, the founda- tion of which is optional for the commune, are managed by committees consisting of the mayor of the municipality and six members, two elected by the municipal council and four nominated by the prefect. The members of these committees are un- paid, and have no concern with ways and means which are in the hands of a paid treasurer (receveur) . The bureaux de bien- faisance in the larger centres are aided by unpaid workers (commissaires or dames de charite), and in the big towns by paid inquiry officers. Bureaux d'assistance exist in every commune, and are managed by the combined committees of the hospices and the bureaux de bienfaisance or by one of these in municipalities, where only one of those institutions exists.

No poor-rate is levied in France. Funds for h6pitals, hospices and bureaux de bienfaisance comprise :

1. A 10% surtax on the fees of admission to places of public

.amusement.

2. A proportion of the sums payable in return for concessions land in municipal cemeteries.

Profits of the communal Monts de Piete (pawn-shops). Donations, bequests and the product of collections

churches. The product of certain fines

In Africa and the Indian Ocean —

Algeria

Algerian Sahara

Tunisia

West Africa —

Senegal

Upper Senegal and_Niger (including part of Sahara)

Guinea

Ivory Coast

Dahomey

Congo (French Equatorial Africa) —

Gabun

Mid. Congo

Ubangi-Chad

Madagascar

Nossi-be Island

Ste Marie Island

Comoro Islands

Somali Coast

Reunion

St Paul {

Amsterdam)

Kerguelen 1

Date of Acquisition.

Total in Africa and Indian Ocean.

In America —

Guiana

Guadeloupe

Martinique

St Pierre and Miquelon ….

Total in America .

In Oceania — New Caledonia and Dependencies Establishments in Oceania ….

Total in Oceania ….

Grand Total

1683-175°

1883 1863 1862 1883

1893 1808

1830-1847

1872-1890

1881

1626

1880

1848

1842

1 863- 1 894

1839

1882 1 885-1 899 1885-1896

1840

1750 1 843-1 886 1 862-1 884

1643

1892

1893

Area in sq. m.

200

60,000 65,000 22,000 46,000 100,000 325

293,525

1626 1634 1635 1635

1854-1887 1841-1881

185,000

760,000

51,000

74,000

1,580,000

107,000

129,000

40,000

700,000

228,000

760

12,000

965

3

19

1,400

Population.

273,000

6,000,000 1,500,000 3,000,000 6,000,000 600,000 189,000

17,562,000

3.869,147

51,000

619

380

92

52,092

7.500 1,641

9.I4I

4,223,905

5,231,850

2,000,000

1,800,000

4,000,000 2,500,000 2,000,000 1,000,000

376,000

259,000

3,015,000

2,664,000

82,000

50,000

173.315

uninhabited

25. I5L 165

30,000

182,112

182,024

6,500

400,636

72,000 34.300

106,300

43,220,101

of

3-

4-

5-

6. Subventions from the departments and communes.

7. Income from endowments.

(R. Tr.)

It will be seen that nearly all the colonies and protectorates lie within the tropics. The only countries in which there is a con- siderable white population are Algeria, Tunisia and New Caledonia. The " year of acquisition " in the table, when one date only is given, indicates the period when the country or some part of it first fell under French influence, and does not imply continuous possession since.

Government. — The principle underlying the administration of the French possessions overseas, from the earliest days until the close of the 19th century, was that of " domination " and " assimilation," notwithstanding that after the loss of Canada and the sale of Louisiana France ceased to hold any considerable colony in which Europeans could settle in large numbers. With

1 Kerguelen lies in the Great Southern Ocean, but is included here for the sake of convenience.

the vast extension of the colonial empire in tropical countries in the last quarter of the 19th century the evils of the system of assimilation, involving also intense centralization, became obvious. This, coupled with the realization of the fact that the value to France of her colonies was mainly commercial, led at length to the abandonment of the attempt to impose on a great number of diverse peoples, some possessing (as in Indo-China and parts of West Africa) ancient and highly complex civilizations, French laws, habits of mind, tastes and manners. For the policy of assimilation there was substituted the policy of " association," which had for aim the development of the colonies and protectorates upon natural, i.e. national, lines. Existing civilizations were respected, a considerable degree of autonomy was granted, and every effort made to raise the moral and economic status of the natives. The first step taken in this direction was in 1900 when a law was passed which laid down that the colonies were to provide for their own civil ex- penditure. This law was followed by further measures tending to decentralization and the protection of the native races.

The system of administration bears nevertheless many marks of the "assimilation" era. None of the French possessions is self-governing in the manner of the chief British colonies. Several colonies, however, elect members of the French legisla- ture, in which body is the power of fixing the form of govern- ment and the laws of each colony or protectorate. In default of legislation the necessary measures are taken by decree of the head of the state; these decrees having the force of law. A partial exception to this rule is found in Algeria, where all laws in force in France before the conquest of the country are also (in theory, not in practice) in force in Algeria. In all colonies Europeans preserve the political rights they held in France, and these rights have been extended, in whole or in part, to various classes of natives. Where these rights have not been conferred, native races are subjects and not citizens. To this rule Tunisia presents an exception, Tunisians retaining their nationality and laws.

In addition to Algeria, which sends three senators and six deputies to Paris and is treated in many respects not as a colony but as part of France, the colonies represented in the legislature are: Martinique, Guadeloupe and Reunion (each electing one senator and two deputies), French India (one senator and one deputy), Guiana, Senegal and Cochin-China (one deputy each). The franchise in the three first-named colonies is enjoyed by all classes of inhabitants, white, negro and mulatto, who are all French citizens. In India the franchise is exercised without distinction of colour or nationality; in Senegal the electors are the inhabitants (black and white) of the communes which have been given full powers. In Guiana and Cochin-China the franchise is restricted to citizens, in which category the natives

(in those colonies) are not included. 1 The inhabitants of Tahiti though accorded French citizenship have not been allotted a representative in parliament. The colonial repre- sentatives enjoy equal rights with those elected for constituencies in France.

The oversight of all the colonies and protectorates save Algeria and Tunisia is confided to a minister of the colonies (law of March 20, 1894) 2 whose powers correspond to those exercised in France by the minister of the interior. The colonial army is nevertheless attached (law of 1900) to the ministry of war. The colonial minister is assisted by a number of organizations of = which the most important is the superior council of the colonies (created by decree in 1883), an advisory body which includes the senators and deputies elected by the colonies, and delegates elected by the universal suffrage of all citizens in the colonies and protectorates which do not return members to parliament. To the ministry appertains the duty of fixing the duties on foreign produce in those colonies which have not been, by law, subjected to the same tariff as in France. (Nearly all the colonies save those

1 In 1906 the number of registered electors in these colonies was 199,055, of whom 106,695 exercised their suffrage.

2 In the case of Madagascar by decree of the nth of December

1895.

of West Africa and the Congo have been, with certain modifica- tions, placed under the French tariff.) The budget of all colonies not possessing a council general (see below) must also be approved by the minister. Each colony and protectorate, including Algeria, has a separate budget. As provided by the law of 1900 all local charges are borne by the colonies — supplemented at need by grants in aid — but the military expenses are borne by the state. In all the colonies the judicature has been rendered independent of the executive.

The colonies are divisible into two classes, (1) those possessing considerable powers of local self-government, (2) those in which the local government is autocratic. To this second class may be added the protectorates (and some colonies) where the native form of government is maintained under the supervision of French officials.

Class (1) includes the American colonies, Reunion, French India, Senegal, Cochin-China and New Caledonia. In these colonies the system of assimilation was carried to great lengths. At the head of the administration is a governor under whom is a secretary-general, who replaces him at need.

The governor is aided by a privy council, an advisory body to which the governor nominates a minority of unofficial members, and a council general, to which is confided the control of local affairs, including the voting of the budget. The councils general are elected by universal suffrage of all citizens and those who, though not citizens, have been granted the political franchise. In Cochin- China. in place of a council general, there is a colonial council which fulfils the functions of a council general.

In the second class of colonies the governor, sometimes assisted by a privy council, on which non-official members find seats, sometimes simply by a council of administration, is re- sponsible only to the minister of the colonies. In Indo-China, West Africa, French Congo and Madagascar, the colonies and protectorates are grouped under governors-general, and to these high officials extensive powers have been granted by presidential decree. The colonies under the governor-general of West ' Africa are ruled by lieutenant-governors with restricted powers, the budget of each colony being fixed by the governor-general, who is assisted by an advisory government council comprising representatives of all the colonies under his control. In Indo- China the governor-general has under his authority thelieutenant- governor of the colony of Cochin-China, and the residents superior at the courts of the kings of Cambodia and Annam and in Tongking (nominally a viceroyalty of Annam). There is a superior council for the whole of Indo-China on which the natives and the European commercial community are repre- sented, while in Cochin-China a privy council, and in the pro- tectorates a council of the protectorate, assists in the work of administration. In each 1 of the governments general there is a financial controller with extensive powers who corresponds directly with the metropolitan authorities (decree of March 22, 1907). Details and local differences in form of government will be found under the headings of the various colonies and pro- tectorates.

Colonial Finance. — The cost of the extra-European possessions, other than Algeria and Tunisia, to the state is shown in the expenses of the colonial ministry. In the budget of 1885 these expenses were put at £1,380,000; in 1895 they had increased to £3,200,000 and in 1900 to £5,100,000. In 1905 they were placed at £4,431,000. Fully three-fourths of the state contributions is expenditure on military necessities; in addition there are subventions to various colonies and to colonial railways and cables, and the expenditure on the penitentiary establishments ; an item not properly chargeable to the colonies. In return the state receives the produce of convict labour in Guiana and New Caledonia. Save for the small item of military expenditure Tunisia is no charge to the French exchequer. The similar expenses of Algeria borne by the state are not separately shown, but are estimated at £2,000,000.

The colonial budgets totalled in 1907 some £16,760,000, being divisible into six categories: Algeria £4,120,000; Tunisia £3,640,000; Indo-China 3 about £5,000,000; West Africa £1,600,000; Madagascar £960,000; all other colonies combined £1,440,000.

3 The Indo-China budget is reckoned in piastres, a silver coin of fluctuating value (is. rod. to 2s.). The budget of 1907 balanced at 50,000,000 piastres.

The authorized colonial loans, omitting Algeria and Tunisia, during the period 1884-1904 amounted to £19,200,000, the sums paid for interest and sinking funds on loans varying from £600,000 to £800,000 a year. The amount of French capital invested in French colonies and protectorates, including Algeria and Tunisia, was estimated in 1905 at £120,000,000, French capital invested in foreign countries at the same date being estimated at ten times that amount (see Ques. Dip. et Col., February 16, 1905).

Commerce. — The value of the external trade of the French posses- sions, exclusive of Algeria and Tunisia, increased in the ten years 1896-1905 from £18,784,060 to £34.957,479- I n the last-named year the commerce of Algeria amounted to £24,506,020 and that of Tunisia to £5,969,248, making a grand total for French colonial trade in 1905 of £65,432,746. The figures were made up as follows :

Imports.

Exports.

Total.

Algeria

£i5-355.5oo

£9,150,520

£24,506,020

Tunisia

3,638,185

2,331,063

5,969,248

Indo-China

10,182,411

6,75 ,3o6

16,932,717

West Africa . .

3,874,698

2,248,317

6,123,015

Madagascar

1,247,936

914,024

2,161,960

All other colonies .

4,258,134

5,481,652

9,739-786

Total

£38,556,864

£26,875,882

£65,432,746

Over three-fourths of the trade of Algeria and Tunisia is with France and other French possessions. In the other colonies and protectorates more than

half the trade is with foreign countries. The foreign countries trading most largely with the French colonies are, in the order named, British colonies and Great Britain, China and Japan, the United States and Germany. The value of the trade with British colonies and Great Britain in 1905 was over £7,200,000. (F. R. C.)

Bibliography. — P. Joanne, Diciionnaire geographique et adminis- trative de la France (8 vols., Paris, 1890-1905); C. Brossard, La France et ses colonies (6 vols., Paris, 1900-1906) ; O. Reclus, Le Plus Beau Royaume sous le ciel (Paris, 1899) ; Vidai de La Blache, La France. Tableau geographique (Paris, 1908); V. E. Ardouin- Dumazet, Voyage en France (Paris, 1894); H. Havard, La France artistique et monumentale (6 vols., Paris, 1 892-1 895); A. Lebon and P. Pelet, France as it is, tr. Mrs W. Arnold (London, 1888); articles on " Local Government in France " in the Stock Exchange Official Intelligence Annuals (London, 1908 and 1909); M. Block, Diciion- naire de I' administration francaise, the articles in which contain full bibliographies (2 vols., Paris, 1905) ; E. Levasseur, La France et ses colonies (3 vols., Paris, 1890) ; M. Fallex and A. Mairey, La France et sis colonies au debut du XX e siecle, which has numerous biblio- graphies (Paris, 1909); J. du Plessis de Grenedan, Geographie agricole de la France et du monde (Paris, 1903); F. de St Genis, La Propriete rurale en France (Paris, 1902) ; H. Baudrillart, Les Popu- lations agricoles de la France (3 vols., Paris, 1885-1893); J. E. C. Bodley, France (London, 1899) ; A. Girault, Principes de colonisation et de legislation coloniale (3 vols., Paris, 1907-1908) ; Les Colonies francaises, an encyclopaedia edited by M. Petit (2 vols., Paris, 1902). Official statistical works: Annuaire statistique de la France (a summary of the statistical publications of the government), Statistique agricole annuelle, Statistique de I'industrie minirale et des appareils de vapeur, Tableau general du commerce et de la navigation, Reports on the various colonies issued annually by the British Foreign Office, &c. Guide Books: Karl Baedeker, Northern France, Southern France; P. Joanne, Nord, Champagne et Ardenne; Nor- mandie ; and other volumes dealing with every region of the country.

History

The identity of the earliest inhabitants of Gaul is veiled in obscurity, though philologists, anthropologists and archaeologists are using the glimmer of traditions collected by ancient Pre " historians to shed a faint twilight upon that remote

q s ° c past. The subjugation of those primitive tribes did not mean their annihilation: their blood still flows in the veins of Frenchmen; and they survive also on those megalithic monuments (see Stone Monuments) with which the soil cf France is dotted, in the drawings and sculptures of caves

hollowed out along the sides of the valleys, and in the arms and ornaments yielded by sepulchral tumuli, while the names of the rivers and mountains of France probably perpetuate the first utterances of those nameless generations.

The first peoples of whom we have actual knowledge are the Iberians and Ligurians. The Basques who now inhabit both sides of the Pyrenean range are probably the last representatives of the Iberians, who came from Spain to settle between the Mediterranean and the Bay of Biscay. The Ligurians, who exhibited the hard cunning characteristic of the Genoese Riviera,

must have been descendants of that Indo-European vanguard who occupied all northern Italy and the centre and south-east of France, who in the 7th century B.C. received the Phocaean immigrants at Marseilles, and who at a much later period were encountered by Hannibal during his '}j^ ar fans, march to Rome, on the banks of the Rhone, the frontier of the Iberian and Ligurian territories. Upon these peoples it was that the conquering minority of Celts or Gauls imposed themselves, to be succeeded at a later date by the Roman aristocracy.

When Gaul first enters the field of history, Rome has already laid the foundation of her freedom, Athens dazzles the eastern Mediterranean with her literature and her art, while in the west Carthage and Marseilles are lining opposite t ™g(£ Us ° shores with their great houses of commerce. Coming from the valley of the Danube in the 6th century, the Celts or Gauls had little by little occupied central and southern Europe long before they penetrated into the plains of the Saone, the Seine, and the Loire as far as the Spanish border, driving out the former inhabitants of the country. A century later their political hegemony, extending from the Black Sea to the Strait of Gibraltar, began to disintegrate, and the Gauls then embarked on more distant migrations, from the Columns of Hercules to the plateaux of Asia Minor, taking Rome on their way. Their empire in Gaul, encroached upon in the north by the Belgae, a kindred race, and in the south by the Iberians, gradually contracted in area and eventually crumbled to pieces. This process served the turn of the Romans, who little by little had subjugated first the Cisalpine Gauls and afterwards those in- habiting the south-east of France, which was turned into a Roman province in the 2nd century. Up to P" this time Hellenism and the mercantile spirit of the Conquest. Jews had almost exclusively dominated the Mediter- ranean littoral, and at first the Latin spirit only won foothold for itself in various spots on the western coast — as at Aix in Provence (123 B.C.) and at*

Narbonne (118 B.C.). A refuge of Italian pauperism in the time of the Gracchi, after the triumph of the oligarchy the Narbonnaise became a field for shameless exploitation, besides providing, under the proconsulate of Caesar, an excellent point of observation whence to watch the intestine quarrels between the different nations of Gaul.

These are divided by Caesar in his Commentaries into three groups: the Aquitanians to the south of the Garonne; the Celts, properly so called, from the Garonne to the Seine andtheMarne; and the Belgae, from the Seine to the ^"f 1 ?"' Rhine. But these ethnological names cover a very otaaui. great variety of half-savage tribes, differing in speech and in institutions, each surrounded by frontiers of dense forests abounding in game. On the edges of these forests stood isolated dwellings like sentinel outposts; while the inhabitants of the scattered hamlets, caves hollowed in the ground, rude circular huts or lake-dwellings, were less occupied with domestic life than with war and the chase. On the heights, as at Bibracte, or on islands in the rivers, as at Lutetia, or protected by marshes, as at Avaricum, oppida — at once fortresses and places of refuge, like the Greek Acropolis — kept watch and ward over the beaten tracks and the rivers of Gaul.

These primitive societies of tall, fair-skinned warriors, blue- eyed and red-haired, were gradually organized into political bodies of various kinds— kingdoms, republics and federations — and divided into districts or pagi (pays) to which divisions the minds of the country folk have remained faithfully attached ever since. The victorious aristocracy of the kingdom dominated the other strengthened by the prestige of birth, the ownership of the soil and the practice of arms. Side by side with this martial nobility the Druids constituted a priesthood unique in ancient times; neither hereditary as in India, nor composed of isolated priests as in Greece, nor of independent colleges as at Rome, it was a true corporation, which at first possessed great moral authority, though by Caesar's time it had lost both strength and prestige. Beneath these were the common people attached to the soil,

11

Political Institu- tions ot Oaul.

classes,

who did not count for much, but who reacted against the in- sufficient protection of the regular institutions by a voluntary subordination to certain powerful chiefs.

This impotence of the state was a permanent cause of those discords and revolts, which in the ist century B.C. were so

singularly favourable to Caesar's ambition. Thus Oao/'"' " aIter eight years of incoherent struggles, of scattered

revolts, and then of more and more energetic efforts, Gaul, at last -aroused by Vercingetorix, for once concentrated her strength, only to perish at Alesia, vanquished by Roman discipline and struck at from the rear by the conquest of Britain (58-50 B.C.).

This defeat completely altered the destiny of Gaul, and she became one of the principal centres of Roman civilization.

Of the vast Celtic empire which had dominated OaSf" Europe nothing now remained but scattered remnants

in the farthest corners of the land, refuges for all the vanquished Gaels, Picts or Gauls; and of its civilization there lingered only idioms and dialects — Gaelic, Pict and Gallic —which gradually dropped out of use. During five centuries Gaul was unfalteringly loyal to her conquerors; for to conquer is nothing if the conquered be not assimilated by the conqueror, and Rome was a past-mistress of this art. The personal charm of Caesar and the prestige of Rome are not of themselves sufficient to explain this double conquest. The generous and enlightened policy of the imperial administration asked nothing of the people of Gaul but military service and the payment of the tax; in return it freed individuals from patronal domination, the people from oligarchic greed or Druidic excommunication, and every one in general from material anxiety. Petty tyrannies gave place to the great Pax Romana. The Julio-Claudian dynasty did much to attach the Gauls to the empire; they always occupied the first place in the mind of Augustus, and the revolt of the Aeduan Julius Sacrovir, provoked by the census of a.d. 21, was easily repressed by Tiberius. Caligula visited Gaul and founded literary comoetitions at Lyons, which had become the political and intellectual capital of the country. Claudius, who was a native of Lyons, extended the right of Roman citizenship to many of his fellow-townsmen, gave them access to the magis- tracy and to the senate, and supplemented the annexation of Gaul by that of Britain. The speech which he pronounced on this occasion was engraved on tables of bronze at Lyons, and is the first authentic record of Gaul's admission to the citizenship of Rome. Though the crimes of Nero and the catastrophes which resulted from

his downfall, provoked the troubles of the year a.d. 70, the revolt of Sabinus was in the main an attempt by the Germans to pillage Gaul and the prelude to military insurrections. The government of the Flavians and the Antonines completed a definite reconciliation. After the extinction of the family of Augustus in the ist century Gaul had made many emperors — Galba, Otho, Vitellius, Ves- pasian and Domitian; and in the 2nd century she provided Gauls to rule the empire — Antoninus (138-161) came from Nimes and Claudius from Lyons, as did also Caracalla later on

(211-217).

The romanization of the Gauls, like that of the other subject nations, was effected by slow stages and by very diverse means,

furnishing an example of the constant adaptability andpolhi- °f R° man policy. It was begun by establishing a caltraas- network of roads with Lyons as the central point, formation an(j by the development of a. prosperous urban life a^l”””” in the increasingly wealthy Roman colonies; and it

was continued by the disintegration into independent cities of nearly all the Gaulish states of the Narbonnaise, together with the substitution of the Roman collegial magistracy for the isolated magistracy of the Gauls. This alteration came about more quickly in the north-east in the Rhine-land than in the west and the centre, owing to the near neighbourhood of the legions on the frontiers. Rome was too tolerant to impose her own institutions by force; it was the conquered peoples who collectively and individually solicited as a favour the right »f adopting the municipal system, the magistracy, the sacerdotal

and aristocratic social system of their conquerors. The edict of Caracalla, at the beginning of the 3rd century, by conferring the right of citizenship on all the inhabitants of the empire, completed an assimilation for which commercial relations, schools, a taste for officialism, and the adaptability and quick in- telligence of the race had already made preparation. The Gauls now called themselves Romans and their language Romance. There was neither oppression on the one hand nor servility on the other to explain this abandonment of their traditions. Thanks to the political and religious unity which a common worship of the emperor and of Rome gave ,them, thanks to administrative centralization tempered by a certain amount of municipal autonomy, Gaul prospered throughout three centuries.

But this stability of the Roman peace had barely been realized when events began to threaten it both from within and without. The Pax Romana having rendered any armed force _ unnecessary amid a formerly very

bellicose people, only ofthe eight legions mounted guard over the Rhine to protect imperial it from the barbarians who surrounded the empire, authority The raids made by the Germanson theeasternfrontiers, the incessant competitions for the imperial power, and the repeated revolts of the Pretorian guard, gradually undermined the internal cohesion of Gaul; while the insurrections of the Bagaudae aggravated the destruction wrought by a grasping treasury and by barbarian incursions; so that the anarchy of the 3rd century soon aroused separatist ideas. Under Postumus Gaul had already attempted to restore an independent though short-lived empire (258-267); and twenty-eight years later the tetrarchy of Diocletian proved that the blood now circulated with difficulty from the heart to the extremities of an empire on the eve of disintegration. Rome was to see her universal dominion gradually menaced from all sides. It was in Gaul that the decisive revolutions of the time were first prepared; Constantine's crusades to overthrow the altars of paganism, and Julian's campaigns to set them up again. After Constantine the emperors of the East in the 4th century merely put in an occasional appearance at Rome; they resided at Milan or in the prefectorial capitals of Gaul — at Aries, at Treves (Trier), at Reims or in Paris. The ancient territorial divisions — Belgium, Gallia Lugdunensis (Lyonnaise), Gallia Narbonensis (Narbonnaise) — were split up into seventeen little provinces, which in their turn were divided into two dioceses. Thus the great historic division was made between southern and northern France. Roman nationality persisted, but the administrative system was tottering.

Upon ground that had been so well levelled by Roman legis- lation aristocratic institutions naturally flourished. From the 4th century onward the balance of classes was dis- social dis- turbed by the development of a landed aristocracy organUa- that grew more powerful day by day, and by the tioaot corresponding ruin of the small proprietors and in- ° dustrial and commercial corporations. The members of the curia who assisted the magistrates in the cities, crushed by the burden of taxes, now evaded as far as possible public office or senatorial honours. The vacancies left in this middle class by this continual desertion were not compensated for by the pro- gressive advance of a lower class destitute of personal property and constantly unsettled in their work. The peasants, no less than the industrial labourers, suffered from the absence of any capital laid by, which alone could have enabled them to improve their land or to face a time of bad harvests. Having no credit they found themselves at the mercy of their neighbours, the great landholders, and by degrees fell into the position of tenants, or into servitude. The curia was thus emptied both from above and from below. It was in vain that the emperors tried to rivet the chains of the curia in this hereditary bondage, by attaching the small proprietor to his glebe, like the artisan to his gild and the soldier to his legion. To such a

miserable pretence of freedom they all preferred servitude, which at least ensured them a livelihood; and the middle class of freemen thus became gradually extinct.

FRANCE

at the end of the ioth. Century

Acauisitions under Phillip VI and John II, 1328-64..

Acquisitions under Chanes V, 1364-80……

Fiefs of the Crown ..

FRANCE

The Eastern Frontier, 1598-1789

English Miles o 50 100 150

Emery Walker sc

HISTORY]

FRANCE

803

The aristocracy, on the contrary, went on increasing in power, and eventually became masters of the situation. It was through

them that the emperor, theoretically absolute, practi- Absorp- C ally carried on his administration; but he was no landand longer either strong or a divinity, and possessed power by nothing but the semblance of omnipotence. His the arts- official despotism was opposed by the passive but Out"! ° invincible competition of an aristocracy, more powerful*

than himself because it derived its support from the revived relation of patron and dependants. But though the aristocracy administered, yet they did not govern. They suffered, as did the Empire, from a general state of lassitude. Like their private life, their public life, no longer stimulated by struggles and difficulties, had become sluggish; their power of initiative was enfeebled. Feeling their incapacity they no longer embarked on great political schemes; and the army, the instrument by which such schemes were carried on, was only held together by the force of habit. In this society, where there was no traffic in anything but wealth and ideas, the soldier was nothing more than an agitator or a parasite. The egoism of the

upper classes held military duty in contempt, while their avarice depopulated the countryside, whence the legions had drawn their recruits. And now come the barbarians! A prey to perpetual alarm, the people entrenched themselves behind those high walls of the oppida which Roman security had razed to the ground, but imperial impotence had restored, and where life in the middle ages was destined to vegetate in unrestful isolation.

*Amidst this general apathy, intellectual activity alone persisted. In the 4th century there was a veritable renaissance in Gaul, the Intel- * ast out burst of a dying flame, which yet bore witness*

lectaal also to the general decadence. The agreeable versi- decadence fication of an amateur like Ausonius, the refined of Oaui. panegyrics of a Eumenius, disguising nullity of thought beneath elegance of form, already foretold the perilous sterility of scholasticism. Art, so widespread in the wealthy villas of Gaul, contented itself with imitation, produced nothing original and remained mediocre. Human curiosity, no longer concerned with philosophy and science, seemed as though stifled, religious polemics alone continuing to hold public attention. Disinclina- tion for the self-sacrifice of active life and weariness of the things of the earth lead naturally to absorption in the things of heaven. After bringing about the success of the Asiatic cults of Mithra and Cybele, these same factors now assured the triumph over exhausted paganism of yet another oriental religion— Christianity — after a duel which had lasted two centuries.

This new faith had appeared to Constantine likely to infuse young and healthy blood into the Empire. In reality Christianity,

which had contributed not a little to stimulate the Christian- political unity of continental Gaul, now tended to Qaul. dissolve it by destroying that religious unity which

had heretofore been its complement. Before this there had been complete harmony between Church and State; but afterwards came indifference and then disagreement between political and religious institutions, between the City of God and that of Caesar. Christianity, introduced into Gaul during the 1st century of the Christian era by those foreign merchants who traded along the coasts of the Mediterranean, had by the middle of the 2nd century founded communities at Vienne, at Autun and at Lyons. Their propagandizing zeal soon exposed them to the wrath of an ignorant populace and the contempt of the educated; and thus it was that in a.d. 177, under Marcus Aurelius, the Church of Lyons, founded by St Pothinus, suffered those persecutions which were the effective cause of her ultimate victory. These Christian communities, disguised under the legally authorized name of burial societies, gradually formed a vast secret

cosmopolitan association, superimposed upon Roman society but incompatible with the Empire. Christianity had to be either destroyed or absorbed. The persecutions under Aurelian and Diocletian almost succeeded in accomplishing the former; the Christian churches were saved by the instability of the existing authorities, by military anarchy and by the incursions of the barbarians. Despite tortures and martyrdoms, and thanks

to the seven apostles sent from Rome in 250, during the 3rd century their branches extended all over Gaul.

The emperors had now to make terms with these churches, which served to group together all sorts of malcontents, and this was the object of the edict of Milan (313), xrhtmph by which the Church, at the outset simply a Jewish of Chris- institution, was naturalized as Roman; while in 325 tlanity in the Council of Nicaea endowed her with unity. But aaul ‘ for the security and the power thus attained she had to pay with her independence. On the other hand, pagan and Christian elements in society existed side by side without intermingling, and even openly antagonistic to each other — one aristocratic and the other democratic. In order to induce the masses of the people once more to become loyal to the imperial form of govern- ment the emperor Julian tried by founding a new religion to give its functionaries a religious prestige which should impress the popular mind. His plan failed ; and the emperor Theodosius, aided by Ambrose, bishop of Milan, preferred to make the Christian clergy into a body of imperial and conservative officials; while in return for their adhesion he abolished the Arian heresy and paganism itself, which could not survive without his support. Thenceforward it was in the name of Christ that persecutions took place in an Empire now entirely won over to Christianity.

In Gaul the most famous leader of this first merciless, if still perilous crusade, was a soldier-monk, Saint Martin of Tours. Thanks to him and his disciples in the middle of the 4th century and the beginning of the 5th many of the ˆP laa, /f l ‘ towns possessed well-established churches; but the church. militant ardour of monks and centuries of labour were needed to conquer the country districts, and in the mean- time both dogma and internal organization were subjected to important modifications. As regards the former the Church adopted a course midway between metaphysical explanations and historical traditions, and reconciled the more extreme theories; while with the admission of pagans a great deal of paganism itself was introduced. On the other hand, the need for political and social order involved the necessity for a disciplined and homogeneous religious body; the exercise of power, more- over, soon transformed the democratic Christianity of the earlier churches into a federation of little conservative monarchies. The increasing number of her adherents, and her inexperience of government on such a vast and complicated scale, obliged her to comply

with political necessity and to adopt the system of the state and its social customs. The Church was no longer a fraternity, on a footing of equality, with freedom of belief and tentative as to dogma, but an authoritative aristocratic hier- archy. The episcopate was now recruited from the great families in the same way as the imperial and the municipal public services. The Church called on the emperor to convoke and preside over her councils and to combat heresy; and in order more effectually to crush the latter she replaced primitive independence and local diversity by uniformity of doctrine and worship, and by the hierarchy of dioceses and ecclesiastical provinces. The heads of the Church, her bishops, her metropolitans, took the titles of their pagan predecessors as well as their places, and their jurisdiction was enforced by the laws of the state. Rich and powerful chiefs, they were administrators as much as priests: Germanus (Germain), bishop of Auxerre (d. 448), St Eucherius of Lyons (d. 45°), Apollinaris Sidonius of Clermont (d. c. 490) assumed the leadership of society, fed the poor, levied tithes, administered justice, and in the towns where they resided, surrounded by priests and deacons, ruled both in temporal and spiritual matters.

But the humiliation of Theodosius before St Ambrose proved that the emperor could never claim to be a pontiff, and that the dogma of the Church remained independent of the _ A sovereign as well as of the people; if she sacrificed church's her liberty it was but to claim it again and maintain independ- it more effectively amid the general languor. The e ^? ttbc Church thus escaped the unpopularity of this decadent empire, and during the 5th century she provided a refuge for all those who, wishing to preserve the Roman unity, were terrified

The bar- barian invasion.

by the blackness of the horizon. In fact, whilst in the Eastern Church the metaphysical ardour of the Greeks was spending itself in terrible combats in the oecumenical councils over the interpretation of the Nicene Creed, the clergy of Gaul, more simple and strict in their faith, abjured these theological logo- machies; from the first they had preferred action to criticism and had taken no part in the great controversy on free-will raised by Pelagius. Another kind of warfare was about to absorb their whole attention; the barbarians were attacking the frontiers of the Empire on every side, and their advent once again modified Gallo-Roman civilization.

For centuries they had been silently massing themselves around ancient Europe, whether Iberian, Celtic or Roman. Many times already during that evening of a decadent civilization, their threatening presence had seemed like a dark cloud veiling the radiant sky of the peoples established on the Mediterranean seaboard. The cruel lightning of the sword of Brennus had illumined the night, setting Rome or Delphi on fire. Sometimes the storm had burst over Gaul, and there had been need of a Marius to stem the torrent of Cimbri and Teutons, or of a Caesar to drive back the Helvetians into their mount ains. On the morrow the western horizon would clear again, until some such disaster as that which befell Varus would come to mortify cruelly the pride of an Augustus. The Romans had soon abandoned hope of conquering Germany, with its fluctuating frontiers and nomadic inhabitants. For more than two centuries they had remained prudently entrenched behind the earthworks that extended from Cologne to Ratisbon (Regensburg) ; but the intestine feuds which prevailed among the barbarians and were fostered by Rome, the organizatipn under bold and turbulent chiefs of the bands greedy for booty, the pressing forward on populations already settled of tribes in their rear; all this caused the Germanic invasion to filter by degrees across the frontier. It was the work of several genera- tions and took various forms, by turns and simultaneously colonization and aggression; but from this time forward the pax romana was at an end. The emperors Probus, Constantine, Julian and Valentinian, themselves foreigners, were worn out with repulsing these repeated assaults, and the general enervation of society did the rest. The barbarians gradually became part of the Roman population; they permeated the army, until after Theodosius they recruited it exclusively; they permeated civilian society as colonists and agriculturists, till the command of the army and of important public duties was given over to a Stilicho or a Crocus. Thus Rome allowed the wolves to mingle with the dogs in watching over the flock, just at a time when the civil wars of the 4th century had denuded the Rhenish frontier of troops, whose numbers had already been diminished by Con- stantine. Then at the beginning of the 5th century, during a furious irruption of Germans fleeing before Huns, the limes was carried away (406-407) ; and for more than a hundred years the torrent of fugitives swept through the Empire, which retreated behind the Alps, there to breathe its last.

Whilst for ten years Alaric's Goths and Stilicho's Vandals were drenching Italy with blood, the Vandals and the Alani from the steppes of the Black Sea, dragging in their wake the ™ e reluctant German tribes who had been allies of Rome

inOaui. an d who had already settled down to the cultivation of their lands, invaded the now abandoned Gaul, and having come as far as the Pyrenees, crossed over them. After the passing of this torrent the Visigoths,

under their kings Ataulphus, Wallia and Theodoric, still dazzled by the splendours of this immense empire, established themselves like submissive vassals in Aquitaine, with Toulouse as their capital. About the same time the Burgundians settled even more peaceably in Rhenish Gaul, and, after 456, to the west of the Jura in the valleys of The the Saone and the Rhone. The original Franks of

Franks Germany, already established in the Empire, and before pressed upon by the same Huns who had already forced Clovia. t j le Q ot jˆ s across the Danube, passed beyond the Rhine and occupied north-eastern Gaul ; Ripuarians of the Rhine establishing themselves on the Sambre and the Meuse, and

Salians in Belgium, as far as the great fortified highroad from Bavai to Cologne. Accepted as allies, and supported by Roman prestige and by the active authority of the general Aetius, all these barbarians rallied round him and the Romans of Gaul, and in 451 defeated the hordes of Attila, who had advanced as far as Orleans, at the great battle of the Catalaunian plains.

*Thus at the end of the 5th century the Roman empire was nothing but a heap of ruins, and fidelity to the empire was now only maintained by the Catholic Church; she alone The clergy survived, as rich, as much honoured as ever, and more and the powerful, owing to the disappearance of the imperial barbar- officials for whom she had found substitutes, and the * decadence of the municipal bodies into whose inheritance she had entered. Owing to her the City of God gradually replaced the Roman imperial polity and preserved its civilization; while the Church allied herself more closely with the new kingdoms than she had ever done with the Empire. In the Gothic or Burgundian states of the period the bishops, after having for a time opposed the barbarian invaders, sought and obtained from their chief the support formerly received from the emperor. Apollinaris Sidonius paid court to Euric, since 476 the independent king of the Visigoths, against whom he had defended Auvergne; and Avitus, bishop of Vienne, was- graciously received by Gundibald, king of the Burgundians. But these princes were Arians, i.e. foreigners among the Catholic population; the alliance sought for by the Church could not reach her from that source, and it was from the rude and pagan Franks that she gained the material support which she still lacked. The conversion of Clovis was a master- stroke; it was fortunate both for himself and for the Franks. Unity in faith brought about unity in law.*

Clovis was king of the Sicambrians, one of the tribes of the Salian Franks. Having established themselves in the plains of Northern Gaul, but driven by the necessity of finding new land to cultivate, in the days of their king

*Childeric C p 0V,s ' ? they had descended into the fertile valleys of the chief. Somme and the Oise. Clovis's victory at Soissons over the last troops left in the service of Rome (486) extended their settlements as far as the Loire. By his conversion, which was due to his wife Clotilda and to Remigius, bishop of Reims, more than to the victory of Tolbiac over the Alamanni, Clovis made definitely sure of the Roman inhabitants and gave the Church an army (496). Thenceforward he devoted himself to the foundation of the Frankish monarchy by driving the ex- hausted and demoralized heretics out of Gaul, and by putting himself in the place of the now enfeebled emperor. In 500 he conquered Gundibald, king of the Burgundians, reduced him to a kind of vassalage, and forced him into reiterated promises of conversion to orthodoxy. In 507 he conquered and killed Alaric II., king of the Arian Visigoths, and drove the latter into Spain. Legend adorned his campaign in Aquitaine with miracles; the bishops were the declared allies of both him and his son Theuderich (Thierry) after his conquest of Auvergne. At Tours he received from the distant emperor at Constantinople the diploma and insignia of palricius and Roman consul, which legalized his military conquests by putting him in possession of civil powers. From this time forward a great historic trans- formation was effected in the eyes of the bishops and of the Gallo-Romans; the Frankish chief took the f"^ place of the ancient emperors. Instead of blaming officer. * him for the murder of the lesser kings of the Franks, his relatives, by which he had accomplished the union of the Frankish tribes, they saw in this the hand of God rewarding a faithful soldier and a converted pagan. He became their king, their new David, as the Christian emperors had formerly been; he built churches, endowed monasteries, protected St Vaast (Vedastus, d. 540), first bishop of Arras and Cambrai, who restored Christianity in northern Gaul. Like the emperors before him Clovis, too, reigned over the Church. Of his own authority he called together a council at Orleans in 511, the year of his death. He was already the grand distributor of ecclesi- astical benefices, pending the time when his successors were to confirm the episcopal elections, and his power began to take*

on a more and more absolute character. But though he felt the ascendant influence of Christian teaching, he was not really penetrated by its spirit; a professing Christian, and a friend to the episcopate, Clovis remained a barbarian, crafty and ruthless. The bloody tragedies which disfigured the end of his reign bear sad witness to this; they were a fit prelude to that period during the course of which, as Gregory of Tours said, " barbarism was let loose."

The conquest of Gaul, begun by Clovis, was finished by his sons: Theuderich, Chlodomer, Childebert and Clotaire. In

three successive campaigns, from 523 to 532, they ofCiovls. annihilated the Burgundian kingdom, which had

maintained its independence, and had endured for nearly a century.

Favoured by the war between Justinian, the. East Roman emperor, and Theodoric's Ostrogoths, the Frankish kings divided Provence among them as they had done in the case of Burgundy. Thus the whole of Gaul was subjected to the sons of Clovis, except Septimania in the south-east, where the Visigoths still maintained their power. The Frankish armies then overflowed into the neighbouring countries and began to pillage them. Their disorderly cohorts made an attack upon Italy, which was repulsed by the Lombards, and another on Spain with the same want of success; but beyond the Rhine they embarked upon the conquest of Germany, where Clovis had already reduced to submission the country on the banks of the Maine, later known as Franconia. In 531 the Thuringians in the centre of Germany were brought into subjection by his eldest son, King Theuderich, and about the same time the Bavarians were united to the Franks, though preserving a certain autonomy. The Merovingian monarchy thus attained the utmost limits of its territorial expansion, bounded as it was by the Pyrenees, the Alps and the Rhine; it exercised influence over the whole of Germany, which it threw open to the Christian missionaries, and its conquests formed the first beginnings of German history.

But to these wars of aggrandizement and pillage succeeded those fratricidal struggles which disgraced the whole of the sixth

century and arrested the expansion of the Merovingian

power. When Clotaire, the last surviving son of

Clovis, died in 561, the kingdom was divided between his four sons like some piece of private property, as in 511, and according to the German method. The capitals of these four kings — Charibert, who died in 567, Guntram, Sigebert and Chilperic — were Paris, Orleans, Reims and Soissons — all near one another and north of the Loire, where the Germanic inhabitants predominated; but their respective boundaries were so confused that disputes were inevitable. There was no trace of a political idea in these disputes; the mutual hatred of two women aggra- vated jealousy to the point of causing terrible civil wars from 561 to 613, and these finally created a national conflict which resulted in the dismemberment of the Frankish empire. Recog- nized, in fact, already as separate provinces were Austrasia, or the eastern kingdom, Neustria, or north-west Gaul and Burgundy; Aquitaine alone was as yet undifferentiated.

Sigebert had married Brunhilda, the daughter of a Visigoth king; she was beautiful and well educated, having been brought

up in Spain, where Roman civilization still flourished. Fredegond chilperic

had married Galswintha, one of Brunhilda's Brunhilda. sisters, for the sake of her wealth; but despite this

marriage he had continued his amours with a waiting- woman named Fredegond, who pushed ambition to the point of crime, and she induced him to get rid of Galswintha. In order to avenge her sister, Brunhilda incited Sigebert to begin a war which terminated in 575 with the assassination of Sigebert by Fredegond at the very moment when, thanks to the help of the Germans, he had gained the victory, and with the imprisonment of Brunhilda at Rouen. Fredegond subsequently caused the death of Merovech (Merovee), the son of Chilperic, who had been secretly married to Brunhilda, and that of Bishop Praetextatus, who had solemnized their union. After this, Fredegond en- deavoured to restore imperial finance to a state of solvency, and to set up a more regular form of government in her Neustria, which was less romanized and less wealthy than Burgundy,

Civil wars.

where Guntram was reigning, and less turbulent than the eastern kingdom, where most of the great warlike chiefs with their large landed estates were somewhat impatient of royal authority. But the accidental death of two of her children, the assassination of her husband in 584, and the advice of the Church, induced her to make overtures to her brother-in-law Guntram. A lover of peace through sheer cowardice,, and as depraved in his morals as Chilperic, Guntram had played a vacillating and purely self-interested part in the family tragedy. He declared himself the protector of Fredegond, but his death in 593 delivered up Burgundy and Neustria to Brunhilda's son Childebert, king of Austrasia, in consequence of the treaty of Andelot, made in 587. An ephemeral triumph, however; for Childebert died in 596, followed a year later by Fredegond.

The whole of Gaul was now handed over to three children: Childebert's two sons, Theudebert and Theuderich (Thierry), and the son of Fredegond, Clotaire II. The latter, having vanquished the two former at Latofao in Brunhilda. 596, was in turn beaten by them at Dormelles in 600, and a year later a fresh fratricidal struggle broke out between the two grandsons of the aged Brunhilda. Theuderich joined with Clotaire against Theodobert, and invaded his brother's kingdom, conquering first an army of Austrasians and then one composed of Saxons and Thuringians. Strife began again in 613 in consequence of Theuderich's desire to join Austrasia to Neustria, but his death delivered the kingdoms into the hands of Clotaire II. This weak king leant for support upon the nobles of Burgundy and Austrasia, impatient as they were of obedience to a woman and the representative of Rome. The ecclesiastical party also abandoned Brunhilda because of her

persecution of their saints, after which Clotaire, having now got the upper hand, thanks to the defection of the Austrasian nobles, of Arnulf, bishop of Metz, with his brother Pippin, and of Warnachaire, mayor of the palace, made a terrible end of Brunhilda in 613. Her long reign had not lacked intelligence and even greatness; she alone, amid all these princes, warped by self-indulgence or weakened by discord, had behaved like a statesman, and she alone understood the obligations of the government she had inherited. She wished to abolish the fatal tradition of dividing up the kingdom, which so constantly prevented any possible unity; in opposition to the nobles she used her royal authority to maintain the Roman principles of order and regular administra- tion. Towards the Church she held a courteous but firm policy, renewing relations between the Frankish kingdom and the pope; and she so far maintained the greatness of the Empire that tradition associated her name with the Roman roads in the north of France, entitling them " les chaussees de Brunehaut."

*Like his grandfather, Clotaire II. reigned over a once more united Gaul of Franks and Gallo-Romans, and like Clovis he was not too well obeyed by the nobles; moreover, his had been a victory more for the aristocracy than for the crown, since it limited the power of the latter. Not that the permanent constitution of the 18th of October 614 was of the nature of an anti-monarchic revolution, for the royal power still remained very great, decking itself with the pompous titles of the Empire, arid continuing to be the dominant institution; but the reservations which Clotaire II. had to make in conceding the demands of the bishops and great laymen show the extent and importance of the concessions these latter were already aiming at. The bishops, the real inheritors of the imperial idea of government, had become great landowners through enormous donations made to the Church, and allied as they were to the aristocracy, whence their ranks were continually recruited, they had gradually identified themselves with the interests of their class and had adopted its customs; while thanks to long minorities and civil wars the aristocracy of the high officials had taken ah equally important social position. The treaty of Andelot in 587 had already decided that the benefices or lands granted to them by the kings should be held for life. In the 7th century the Merovingian kings adopted the custom of summoning them all, and not merely the officials of their Pahtium, to discuss political affairs; they began, moreover**

Clotaire II.

to choose their counts or administrators from among the great landholders. This necessity for approval and support points to yet another alteration in the nature of the royal power, absolute as it was in theory.

The Mayoralty of the Palace aimed a third and more serious

blow at the royal authority. By degrees, the high officials

of the Palatium, whether secular or ecclesiastical,

Tae and also the provincial counts, had rallied round

The palace. ˆ e mayors of the palace as their real leaders. As

under the Empire, the Palatium was both royal court and centre of government, with the same bureaucratic hierarchy and the same forms of administration; and the mayor of the palace was premier official of this itinerant court and ambulatory government. Moreover, since the palace controlled the whole of each kingdom, the mayors gradually extended their official authority so as to include functionaries and agents of every kind, instead of merely those attached immediately to the king's person. They suggested candidates for office for the royal selection, often appointed office-holders, and, by royal warrant, supported or condemned them. Mere subordinates while the royal power was strong, they had become, owing to the frequent minorities, and to civil wars which broke the tradition of obedience, the all-powerful ministers of kings nominally absolute but without any real authority. Before long they ceased to claim an even greater degree of independence than that of Warnachaire, who forced Clotaire II. to swear that he should never be deprived of his mayoralty of Burgundy; they wished to take the first place in the kingdoms they governed, and to be able to attack neighbouring kingdoms on their own account. A struggle, motived by self-interest, no doubt; but a struggle, too, of opposing principles. Since the Frankish monarchy was now in their power some of them tried to re- establish the unity of that monarchy in all its integrity, together with the superiority of the State over the Church; others, faithless to the idea of unity, saw in the disintegration of the state and the supremacy of the nobles a warrant for their own independence. These two tendencies were destined tc strive ˆagainst one another during an entire century (613-714), and to occasion two periods of violent conflict, which, divided by a kind of renascence of royalty, were to end at last in the triumphant substi- tution of the Austrasian mayors for royalty and aristocracy alike. The first struggle began on the accession of Clotaire II., when Austrasia, having had a king of her own ever since 561,

demanded one now. In 623 Clotaire was obliged straggle t0 sen< ˆ ner ms

son Dagobert and even to extend his between territory. But in Dagobert's name two men ruled, monarchy representing the union of the official aristocracy and

the Church. One, Pippin of Landen, derived his

power from his position as mayor of the palace, from great estates in Aquitaine and between the Meuse and the Rhine, and from the immense number of his supporters; the other, Arnulf, bishop of Metz, sprang from a great family, probably of Roman descent, and was besides immensely wealthy in worldly possessions. By the union of their forces Pippin and Arnulf were destined to shape the future. They had already, in 613, treated with Clotaire and betrayed the hopes of Brunhilda, being consequently rewarded with the guardianship of young Dagobert. Burgundy followed the example of Austrasia, demanded the abolition of the mayoralty, and in 627 succeeded in obtaining her independence of Neustria and Austrasia and direct relations with the king.

The death of Clotaire (629) was the signal for a revival of the royal power. Dagobert deprived Pippin of Landen of

his authority and forced him to fly to Aquitaine; cence of but st ˆ he ˆˆ t0 &i ve ˆhe Austrasians his son Sigebert monarchy III. for their king (634). He made administrative under progresses through Neustria and Burgundy to recall 6294639’ *k e nobles to their allegiance, but again he was forced*

to designate his second son Clovis as king of Neustria. He did subdue Aquitaine completely, thanks to his brother Charibert, with whom he had avoided dividing the kingdom, and he tried to restore his own demesne, which had been despoiled

and mayoralty.

by the granting of benefices or by the pious frauds of the Church. In short, this reign was one of great conquests, impossible except under a strong government. Dagobert’s victories over Samo, king of the Slavs along the Elbe, and his subjugation of the Bretons and the Basques, maintained the prestige of the Frankish empire; while the luxury of his court, his taste for the fine arts (ministered to by his treasurer Eloi 1), his numerous achievements in architecture — especially the abbey of St Denis, burial-place of the kings of France — the brilliance and the power of the churchmen who surrounded him and his revision of the Salic law, ensured for his reign, in spite of the failure of his plans for unity, a fame celebrated in folksong and ballad.

But for barbarous nations old-age comes early, and after Dagobert’s death

(639), the monarchy went swiftly to its doom. The mayors of the palace again became supreme, Tne <. Rola and the kings not only ceased to appoint them, but faineants" might not even remove them from office. Such mayors .(do- were Aega and Erchinoald, in Neustria, Pippin and aota,a x Otto in Austrasia, and Flaochat in Burgundy. One k,ogs) – of them, Grimoald, son of Pippin, actually dared to take the title of king in Austrasia (640). This was a premature attempt and barren of result, yet it was significant; and not less so is the fact that the palace in which these mayors bore rule was a huge association of great personages, laymen and ecclesiastics who seem to have had much more independence than in the 6th century. We find the dukes actually raising troops without the royal sanction, and even against the king. In 641 the mayor Flaochat was forced to swear that they should hold their offices for life; and though these offices were not yet hereditary, official dynasties, as it were, began to be estabKshed permanently within the palace. The crown lands, the governor-ships, the different offices, were looked upon as common property to be shared between themselves. Organized into a compact body they surrounded the king and were far more powerful than he. In the general assembly of its members this body of officials decided the selection of the mayor; it presented Flaochat to the choice of Queen Nanthilda, Dagobert's widow; after long discussion it appointed Ebrojin as mayor; it submitted requests that were in reality commands to the Assembly of Bon- neuil in 616 and later to Childeric in 670. Moreover, the countries formerly subdued by the Franks availed themselves of this opportunity to loosen the yoke; Thuringia was lost by Sigebert in 641, and the revolt of Alamannia in 643 set back the frontier of the kingdom from the Elbe to Austrasia. Aquitaine, hitherto the common prey of all the Frankish kings, having in vain tried to profit by the struggles between Fredegond and Brunhilda, and set up an independent king, Gondibald, now finally burst her bonds in 670. Then came a time when the kings were mere children, honoured with but the semblance of respect, under the tutelage of a single mayor, Erbroin of Neustria.

This representative of royalty, chief minister for four-and- twenty years (656-681), attempted the impossible, endeavouring to re-establish unity in the midst of general dissolution struggh and to maintain intact a royal authority usurped between everywhere- by the hereditary power of the great Ebroia and palatine families. He soon stirred up against himself Leger. all the dissatisfied nobles, led by Leger (Leodegarius), bishop of Autun and his brother Gerinus. Clotaire III.'s death gave the signal for war. Ebroin's enemies set up Childeric II. in opposition to Theuderich, the king whom he had chosen without summoning the great provincial officials. Despite a temporary triumph, when Childeric was forced to recognize the principle of hereditary succession in public offices, and when the mayor-

alties of Neustria and Burgundy were alternated to the profit of both, Leger soon fell into disgrace and was exiled to that very monastery of Luxeuil to which Ebroi'n had been relegated. Childeric having regained the mastery restored the mayor's office, which was immediately disputed by the two rivals; Ebrojin was successful and established himself as mayor of the palace in the room of Leudesius, a partisan of Leger (675),

1 St Eligius, bishop of Noyon, apostle of the Belgians and Frisians (d. 659?).

following this up by a distribution of offices and dignities right and left among his adherents. Leger was put to death in 678, and the Austrasians, commanded by the Carolingian Pippin II., with whom many of the chief Neustrians had taken refuge, were dispersed near Laon (680). But Ebro'in was assassinated next year in the midst of his triumph, having like Fredegond been unable to do more than postpone for a quarter of a century the victory of the nobles and of Austrasia; for his successor, Berthar, was unfitted to carry on his work, having neither his gifts and energy nor the powerful personality of Pippin. Berthar met his death at the battle of Tertry (687), which gave the king into the hands of Pippin, as also the Tertry° f r(>yal treasure and the mayoralty, and by thus enabling him to reward his followers made him supreme over the Merovingian dynasty. Thenceforward the degenerate descendants of Clovis offered no further resistance to his claims, though it was not until 752 that their line became extinct.

In that year the Merovingian dynasty gave place to the rule of Pippin II. of Heristal, who founded a Carolingian empire fated to be as ephemeral as that of the Merovingians. This political victory of the aristocracy was merely the consummation of a slow subterranean revolution which by innumerable reiterated blows had sapped the structure of the body politic, and was about to transfer the people of Gaul from the Roman monarchical and administrative government to the sway of the feudal system.

The Merovingian kings, mere war-chiefs before the advent of Clovis, had after the conquest of Gaul become absolute hereditary Causes of nionarchs, thanks to the disappearance of the popular the fail of assemblies and to the perpetual state of warfare. the Mero- They concentrated in their own hands all the powers vlngians. o ˆ t £ e em pj rej judicial, fiscal and military; and even the so-called " rois faineants " enjoyed this unlimited power, in spite of the general disorder and the civil wars. To make their authority felt in the provinces they had an army of officials at their disposal — a legacy, this, from imperial Rome — who represented them in the eyes of their various peoples. They had therefore only to keep up this established government, but they could not manage even this much; they allowed the idea of the common interests of kings and their subjects gradually to die out, and forgetting that national taxes are a necessary impost, a charge for service rendered by the state, they had treated these as though they were illicit and unjustifiable spoils. The tax- payers, with the clergy at their head, adopted the same idea, and every day contrived fresh methods of evasion. Merovingian justice was on the same footing as Merovingian finance: it was arbitrary, violent and self-seeking. The Church, too, never failed to oppose it — at first not so much on account of her own ambitions as in a more Christian spirit — and proceeded to weaken the royal jurisdiction by repeated interventions on behalf of those under sentence, afterwards depriving it of authority over the clergy, and then setting up ecclesiastical tribunals in opposition to those held by the dukes and counts. At last, just as the kingdom had become the personal property of the king, so the officials — dukes, counts, royal vicars, tribunes, cenlenarii — who had for the most part bought their unpaid offices by means of presents to the monarch, came to look upon the public service rather as a mine of official wealth than as an administrative organization for furthering the interests, material or moral, of the whole nation. They became petty local tyrants, all the more despotic because they had nothing to fear save the distant authority of the king's missi, and the more rapacious because they had no salary save the fines they inflicted and the fees that they contrived to multiply. Gregory of Tours tells us that they were robbers, not protectors of the people, and that justice and the whole administrative apparatus were merely engines of in- satiable greed. It was the abuses thus committed by the kings and their agents, who did not understand the art of gloving the iron hand, aided by the absolutely unfettered licence of conduct and the absence of any popular liberty, that occasioned the gradual increase of charters of immunity.

*Immunity**

Immunity was the direct and personal privilege which forbade any royal official or his agents to decide cases, to levy taxes, or to exercise any

administrative control on the domains of a bishop, an abbot, or one of the great secular nobles. On thousands of estates the royal government gradually allowed the law of the land to be superseded by local law, and public taxation to change into special contributions; so that the duties of the lower classes towards the state were transferred to the great landlords, who thus became loyal adherents of the king but absolute masters on their own territory. The Merovingians had no idea that they were abdicating the least part of their authority, nevertheless the deprivations acquiesced in by the feebler kings led of necessity to the diminu- tion of their authority and their judicial powers, and to the abandonment of public taxation. They thought that by granting immunity they would strengthen their direct control; in reality they established the local independence of the great landowners, by allowing royal rights to pass into their hands. Then came confusion between the rights of the sovereign and the rights of property. The administrative machinery of the state still existed, but it worked in empty air: its taxpayers disappeared, those who were amenable to its legal jurisdiction slipped from its grasp, •and the number of those whose affairs it should have directed dwindled away. Thus the Merovingians had shown themselves incapable of rising above the barbarous notion that royalty is a personal asset to the idea that royalty is of the state, a power belonging to the nation and instituted for the benefit of all. They represented in society nothing more than a force which grew feebler and feebler as other forces grew strong; they never stood for a national magistracy.

Society no les,s than the state was falling asunder by a gradual

process of decay. Under the Merovingians it was a hierarchy

wherein grades were marked by the varied scale of the n , .,

... .. , ,., ,. Disruption

wergild, a man being worth anything from thirty to six //re*

hundred gold pieces. The different degrees were those social

of slave, freedman, tenant-farmer and great landowner. frame '

work

As in every social scheme where the government is without real power, the weakest sought protection of the strongest; and the system of patron, client and journeyman, which had existed among the Romans, the Gauls and the Germans, spread rapidly in the 6th and 7th centuries, owing to public disorder and the inadequate protection afforded by the government. The Church's patronage provided some with a refuge from violence; others

ingratiated themselves with the rich for the sake of shelter and security; others again sought place and honour from men of power; while women, churchmen and warriors alike claimed the king's direct and personal protection. ' '

This hierarchy of persons, these private relations of man to man, were recognized by custom in default of the law, and were soon strengthened by another and territorial hierarchy. The large estate, especially if it belonged to the Church, // c y um> very soon absorbed the few fields of the freeman. In order to farm these, the Church and the rich landowners granted back the holdings on the temporary and conditional terms of tenancy-at-will or of the beneficium, thus multiplying endlessly the land subject to their overlordship and the men who were dependent upon them as tenants. The kings, like private individuals and ecclesiastical establishments, made use of the beneficium to reward their servants; till finally their demesne was so reduced by these perpetual grants that they took to dis- tributing among their champions land owning the overlordship of the Church, or granted their own lands for single lives only. These various " benefactions " were, as a rule, merely the indirect methods which the great landowners employed in order to absorb the small proprietor. And so well did they succeed, that in the 6th and 7th centuries the provincial hierarchy consisted of the cultivator, the holder of the beneficium and the owner; while this dependence of one man upon another affected the personal liberty of a large section of the community, as well as the condition of the land. The great landowner tended to become not only lord over his tenants, but also himself a vassal of the king.

Thus by means of immunities, of the beneficium and of patronage, society gradually organized itself independently of the state, since it required further security. Such Herlstal. ex tra security was first provided by the conqueror of Tertry; for Pippin II. represented the two great families of Pippin and of Arnulf, and consequently the two interests then paramount, i.e. land and religion, while he had at his back a great company of followers and vast landed estates. For forty years (615-655) the office of mayor of Aus- trasia had gone down in his family almost continuously in direct descent from father to son. The death of Grimoald had caused the loss of this post, yet Ansegisus (Ansegisel), Arnulf 's son and Pippin's son-in-law, had continued to hold high office in the Austrasian palace; and about 680 his son, Pippin II., became master of Austrasia, although he had

held no previous office in the palace. His dynasty was destined to supplant that of the Merovingian house.

Pippin of Heristal was a pioneer; he it was who began all that his descendants were afterwards to carry through. Thus he gathered the nobles about him not by virtue of his position, but because of his own personal prowess, and because he could assure them of justice and protection; instead of being merely the head of the royal palace he was the absolute lord of his own followers.- Moreover, he no longer bore the title of mayor, but that of duke or prince of the Franks; and the mayoralty, like the royal power now reduced to a shadow, became an hereditary possession which Pippin could bestow upon his sons. The reigns of Theuderich III., Clovis III. or Childebert III. are of no significance except as serving to date charters and diplomas. Pippin it was who administered justice in Austrasia, appointed officials and dis- tributed dukedoms; and it was Pippin, the military leader, who defended the frontiers threatened by Frisians, Alamanni and Bavarians. Descended as he was from Arnulf, bishop of Metz, he was before all things a churchman, and behind his armies marched the missionaries to whom the Carolingian dynasty, of which he was the founder, were to subject all Christendom. Pippin it was, in short, who governed, who set in order the social confusions of Neustria, who, after long wars, put a stop to the malpractices of the dukes and counts, and summoned councils of bishops to make good regulations. But at his death in 714 the child-king Dagobert III. found himself subordinated to Pippin's two grandsons, who, being minors, were under the wardship of their grandmother Plectrude.

Pippin's work was almost undone — a party among the Neustrians under Raginfrid, mayor of the palace, revolted against Pippin II. 's adherents, and Radbod, duke of Charles t ne Frisians, joined them. But the Austrasians (715-741). a PPealed to an illegitimate son of Pippin, Charles Martel, who had escaped from the prison to which Plectrude, alarmed at his prowess, had consigned him, and took him for their leader. With Charles Martel begins the great period of Austrasian history. Faithful to the traditions of the Austrasian mayors, he chose kings for himself — Clotaire IV. , then Chilperic II. and lastly Theuderich IV. After Theuderich's death (737) he left the throne vacant until 742, but he himself was king in all but name; he presided over the royal tribunals, appointed the royal officers, issued edicts, disposed of the funds of the treasury and the churches, conferred immunities upon adherents, who were no longer the king's nobles but his own, and even appointed the bishops, though there was nothing of the ecclesiastic about him- self. He decided questions of war and peace, and re-established unity in Gaul by defeating the Neustrians and the Aquitanian followers of Duke Odo (Eudes) at Vincy in 717. When Odo, brought to bay, appealed for help to the Arab troops of Abd-ar- Rahman, who after

conquering Spain had crossed the Pyrenees, Charles, like a second Clovis, saved Catholic Christendom in its peril by crushing the Arabs at Tours (732). The retreat of the Arabs, who were further weakened by religious disputes, enabled him to restore Frankish rule in Aquitaine in spite of Hunald, son of Odo. But Charles's longest expeditions were made into Germany, and in these he sought the support of the Church, then

the greatest of all powers since it was the depositary of the Roman imperial tradition.

No less unconscious of his mission than Clovis had been, Charles Martel also was a soldier of Christ. He protected the missionaries who paved the way for his militant invasions. Without Charles him the apostle of Germany, the English monk Boniface, Martel would never have succeeded in preserving the purity and the of the faith and keeping the bishops submissive to Church. the Holy See. The help given by Charles had two very far- reaching results. Boniface was the instrument of the union of Rome and Germany, of which union the Holy Roman Empire in Germany was in the 10th century to become the most perfect expression, continuing up to the time of Luther. And Boniface also helped on the alliance between the papacy and the Carolingian dynasty, which, more momentous even than that between Clovis and the bishops of Gaul, was to sanctify might by right.

This union was imperative ipr the bishops of Rome if they wished to establish their supremacy, and their care for orthodoxy by no means excluded all desire of domination. Mere „. . religious authority did not secure to them the obedience Martel and of either the faithful or the clergy; moreover, they Gregory had to consider the great secular powers, and in this m ' respect their temporal position in Italy was growing unbear- able. Their relations with the East Roman emperor (sole lord of the world after the Roman Senate had sent the imperial insignia to Constantinople in 476) were confined to receiving insults from him or suspecting him of heresy. Even in northern Italy there was no longer any opposition to the progress of the Lombards, the last great nation to be established towards the end of the 6th century within the ancient Roman empire — their king Liudprand clearly intended to seize Italy and even Rome itself. Meanwhile from the south attacks were being made by the rebel dukes of Spoleto and Beneventum. Pope Gregory III. cherished dreams of an alliance with the powerful duke of the Franks, as St Remigius before him had thought of uniting with Clovis against the Goths. Charles Martel had protected Boniface on his German missions: he would perhaps lend Gregory the support of his armies. But the warrior, like Clovis aforetime, hesitated to put himself at the disposal of the priest. When it was a question of winning followers or keeping them, he had not scrupled to lay hands on

ecclesiastical property, nor to fill the Church with his friends and kinsfolk, and this alliance might embarrass him. So if he loaded the Roman ambassadors with gifts in 739, he none the less remembered that the Lombards had just helped him to drive the Saracens from Provence. However, he died soon after this, on the 22nd of October 741, and Gregory III. followed him almost immediately.

*Feeling his end near, Charles, before an assembly of nobles, had divided his power between his two sons, Carloman and Pippin III. The royal line seemed to have been forgotten for six years, but in 742 Pippin brought a Jbe Cant- son of Chilperic II. out of a monastery and made him dynasty. king. This Childeric III. was but a shadow — and knew it. He made a phantom appearance once every spring at the opening of the great annual national convention known as the Campus Martius (Champ de Mars) : a dumb idol, his chariot drawn in leisurely fashion by oxen, he disappeared again into his palace or monastery. An unexpected event re-established unity in the Carolingian family. Pippin's brother, the pious Carloman, became a monk in 747, and Pippin, now sole ruler of the kingdom, ordered Childeric also to cut off his royal locks; after which, being king in all but name, he adopted that title in 752. Thus ended the revolution which had been going on for two centuries. The disappearance of Grippo, Pippin's illegitimate brother, who, with the help of all the enemies of the Franks — Alamanni, Aquitanians and t ?? pl *! tbe Bavarians — had disputed his power, now completed the 752-768. work of centralization, and Pippin had only to maintain it. For this the support of the Church was indispensable, and Pippin understood the advantages of such an alliance better than Charles Martel. A son of the Church, a protector of bishops, a president of councils, a collector of relics, devoted to Boniface*

(whom he invited, as papal legate, to reform the clergy of Austrasia), he astutely accepted the new claims of the vicar of St Peter to the headship of the Church, perceiving the value of an alliance with this rising power.

Prudent enough to fear resistance if he usurped the Merovingian crown, Pippin the Short made careful preparations for his Sacred accession, and discussed the question of the dynasty character with Pope Zacharias. Receiving a favourable opinion, of the new he had himself anointed and crowned by Boniface monarchy. j n t j ie name f the bishops, and was then proclaimed king in an assembly of nobles, counts and bishops at Soissons

in November 751. Still, certain disturbances made him see that aristocratic approval of his kingship might be strengthened if it could claim a divine sanction which no Mero- vingian had ever received. Two years later, therefore, he de- manded a consecration of his usurpation from the pope, and in St Denis on the 28th of July 754 Stephen II. crowned and anointed not only Pippin, but his wife and his two sons as well.

The political results of this custom of coronation were all- important for the Carolingians, and later for the first of the

Capets. Pippin was hereby invested with new dignity, Plppl " and when Boniface's anointing had been confirmed "papacy. by that of the pope, he became the head of the Frankish

Church, the equal of the pope. Moreover, he astutely contrived to extend his priestly prestige to his whole family; his royalty was no longer merely a military command or a civil office, but became a Christian priesthood. This sacred character was not, however, conferred gratuitously. On the very day of his coronation Pippin allowed himself to be proclaimed patrician of the Romans by the pope, just as Clovis had been made consul. Thistitle of theimperial court was purely honorary, but it attached him still more closely to Rome, though without lessening his independence. He had besides given a written promise to defend the Church of Rome, and that not against the Lombards only. Qualified by letters of the papal chancery as " liberator and defender of the Church," his armies twice (754- 756) crossed the Alps, despite the opposition of the Frankish aristocracy, and forced Aistulf, king of the Lombards, to cede to him the exarchate of Ravenna and the Pentapolis. Pippin gave them back to Pope Stephen II., and by this'famous donation founded that temporal power of the popes which was to endure until 1870. He also dragged the Western clergy into the pope's quarrel with the emperor at Constantinople, by summoning the council of Gentiily, at which the iconoclastic heresy was condemned (767). Matters being thus settled with Rome, Pippin again took up his wars against the Saxons, against the Arabs (whom he drove from Narbonne in 758), and above all against Waifer, duke of Aquitaine, and his ally, duke Tassilo of Bavaria. This last war was carried on systematically from 760 to 768, and ended in the death of Waifer and the definite establishment of the Frankish hold on Aquitaine. When Pippin died, aged fifty-four, on the 24th of September 768, the whole of Gaul had submitted to his authority.

Pippin left two sons, and before he died he had, with the consent of the dignitaries of the realm, divided his kingdom

between them, making theelder, Charles(Charlemagne) , maane" king of Austrasia, and giving the younger, Carloman,

Burgundy, Provence, Septimania, Alsace and Alamannia, and half of Aquitaine to each. On the 9th of October 768 Charles was enthroned at Noyon in solemn assembly, and Carloman at Soissons. The Carolingian sovereignty was thus neither hereditary nor elective, but was handed down by the will of the reigning king, and by a solemn acceptance of the future king on the part of the nobles. In 771 Carloman, with whom Charles had had disputes, died, leaving sons; but bishops, abbots and counts all declared for Charles, save a few who took refuge in Italy with Desiderius, king of the Lombards. Desiderius, whose daughter Bertha or Desiderata Charles, despite the pope, had married at the instance of his mother Bertrade, supported the rights of Carloman's sons, and threatened Pope Adrian in Rome itself after he had despoiled him of Pippin's territorial gift. At the pope's appeal Charles crossed the Alps, took

Verona and Pavia after a long siege, assumed the iron crown of the Lombard kings (June 774), and made a triumphal entry into Rome, which had not formed part of the pope's desires. Pippin's donation was restored, but the protectorate was no longer so distant, respectful and intermittent as the pope liked. After the departure of the imperious conqueror, a fresh revolt of the Lombards of Beneventum under Arichis, Desiderius's son-in-law, supported by a Greek fleet, obliged Pope Adrian to write fresh entreaties to Charlemagne; and in two campaigns (776-777) the latter conquered the whole Lombard kingdom. But another of Desiderius's daughters, married to the powerful duke Tassilo of Bavaria, urged her husband to avenge her father, now imprisoned in the monastery of Corbie. After endless intrigues, however, the duke, hemmed in by three different armies, had in his turn to submit (788), and all Italy was now subject to Charlemagne. These wars in Italy, even the fall of the Lombard kingdom and the recapture of the duchy of Bavaria, were merely episodes: Charlemagne's great war was against the Saxons and lasted thirty years (772-804).

The work of organizing the three great Carolingian conquests— Aquitaine, Italy and Saxony — had yet to be done. Charlemagne approached it with a moderation equal to the vigour which he had shown in the war. But by multiplying ˆ tt a "j"l its advance-posts, the Frankish kingdom came into conquests. contact with new peoples, and each new neighbour meant a new enemy. Aquitaine. bordered upon Mussulman Spain; the Avars of Hungary threatened Bavaria with their tireless horsemen; beyond the Elbe and the Saal the Slavs were perpetually at war with the Saxons, and to the north of the Eider were the Danes. All were pagans; all enemies of Charlemagne, defender of Christ's Church, and hence the appointed conqueror of the world.

Various causes — the weakening of the Arabs by the struggle between the

Omayyads and the Abbasids just after the battle of Tours; the alliance of the petty Christian kings of w ars wtth the Spanish peninsula; an appeal from the northern the Arabs, amirs who had revolted against the new caliphate of Slavs and Cordova (755] — made Charlemagne resolve to cross anes \ the Pyrenees. He penetrated as far as the Ebro, but was defeated before Saragossa; and in their retreat the Franks were attacked by Vascons, losing many men as they came through the passes. This defeat of the rear-guard, famous for the death of the great Roland and the treachery of Ganelo, induced the Arabs to take the offensive once more and to conquer Septimania. Charlemagne had created the kingdom of Aquitaine especially to defend Septimania, and William, duke of Toulouse, from 790 to 806, succeeded in restoring Frankish authority down to the Ebro, thus founding the Spanish March with Barce- lona as its capital. For two centuries and a half the Avars, a remnantof the Huns entrenched in the Hungarian Mesopotamia, had made descents alternately upon the Germans and upon the Greeks of the Eastern empire. They had overrun Bavaria in the very year of its subjugation by Charlemagne (788), and it took an eight-years' struggle to destroy the robber stronghold. The empire thus pushed its frontier-line on from the Elbe to the Oder, ever as it grew menaced by increasing dangers. The sea came to the help of the depopulated land, and Danish pirates, Widukind's old allies, came in their leathern beats to harry the coasts of t e North Sea and the Channel. Permanent armies and walls across isthmuses were alike useless; Charlemagne had to build fleets to repulse his elusive foes (808-810), and even after forty years of war the danger was only postponed.*

Meanwhile Pippin's Frankish kingdom, vast and powerful as it had been, was doubled. All nations from the Oder to the Elbe and from the Danube to the Atlantic were subject or tributary, and Charlemagne's power even crossed m a«ne's these frontiers. At his summons Christian princes empire. and Mussulman amirs flocked to his palaces. The kings of Northumbria and Sussex, the kings of the Basques and of Galicia, Arab amirs of Spain and Fez, and even the caliph of Bagdad came to visit him in person or sent gifts by the hands of ambassadors. A great warrior and an upright ruler, his

conquests recalled those of the great Christian emperors, and the Church completed the parallel by training him in her lore. This still barely civilized German literally went to school to the English Alcuin and to Peter of Pisa,

who, between two campaigns, taught him history, writing, grammar and astronomy, satisfying also his interest in sacred music, literature (religious literature especially) , and the traditions of Rome and Constantinople. Why should he not be the heir of their Caesars? And so, little by little, this man of insatiable energy was possessed by the ambition of restoring the Empire of the West in his own favour.

There were, however, two serious obstacles in the way: first, the supremacy of the emperor of the East, which though nominal charie- rather than real was upheld by peoples, princes, and magne even by popes; secondly, the rivalry of the bishops emperor f Rome, who since the early years of Adrian's pontificate had claimed the famous " Donation of Constantine " (q.v.) . According to that apocryphal document, the emperor after his baptism had ceded to the sovereign pontiff his imperial power and honours, the purple chlamys, the golden crown, " the town of Rome, the districts and cities of Italy and of all the West." But in 797 the empress of Constantinople had just deposed her son Constantine VI. after putting out his eyes, and the throne might be considered vacant; while on the other hand, Pope Leo III., who had been driven from Rome by a revolt in 799, and had only been restored by a Frankish army, counted for little beside the Frankish monarch, and could not but submit to the wishes of the Carolingian court. So when next year the king of the Franks went to Rome in person, on Christmas Eve of the year 800 and in the basilica of St Peter the pope placed on his head the imperial crown and did him reverence " after the established custom of the time of the ancient emperors." The Roman ideal, handed down in tradition through the centuries, was here first revived.

This event, of capital importance for the middle ages, was fertile in results both beneficial and the reverse. It brought about the rupture between the West and Constantinople. Then Charlemagne raised the papacy on the ruins of Lombardy to the position of first political power in Italy; and the universal Church, headed by the pope, made common cause with the Empire, which all the thinkers of that day regarded as the ideal state. Confusion between these powers was inevitable, but at this time neither Charles, the pope, nor the people had a suspicion of the troubles latent in the ceremony that seemed so simple. Thirdly, Charlemagne's title of emperor strengthened his other title of king of the Franks, as is proved by the fact that at the great assembly of Aix-la-Chapelle in 802 he demanded from all, whether lay or spiritual, a new oath of allegiance to himself as Caesar. His increased power came rather from moral value, from the prestige attaching to one who had given proof of it, than from actual authority over men or centralization; this is shown by the division between the Empire and feudalism. Universal sovereignty claimed as a heritage from Rome had a profound influence upon popular imagination, but in no way

modified that tendency to separation of the various nations which was already manifest. Charles himself in his government preferred to restore the ancient Empire by vigorous personal action, rather than to follow old imperial traditions; he intro- duced cohesion into his " palace," and perfect centralization into his official administration, inspiring his followers and servants, clerical and lay, with a common and determined zeal. The system was kept in full vigour by the missi dominici, who regularly reported or reformed any abuses of administration, and by the courts, military, judicial or political, which brought to Charlemagne the strength of the wealth of his subjects, carry- ing his commands and his ideas to the farthest limits of the Empire. Under him there was in fact a kind of early renaissance after centuries of barbarism and ignorance. The Care- This em Peror, who assumed so high a tone with his Hngian subjects, his bishops and his counts, who undertook Reaais- to uphold public order in civil life, held himself no sauce. j egs responsive f or the eternal salvation of men's souls in the other world. Thanks to Charlemagne, and through the

restoration of order and of the schools, a common civilization was prepared for the varied elements of the Empire. By his means the Church was able to concentrate in the palatine academy all the intellectual culture of the middle ages, having preserved some of the ancient traditions of organization and administration and guarded the imperial ideal. Charlemagne apparently wished, like Theodoric, to use German blood and Christian unity to bring back life to the great body of the Empire. Not the equal of Caesar or Augustus in genius or in the la stingness of his work, he yet recalls them in his capitularies, his periodic courts, his official hierarchy, his royal emissaries, his ministers, his sole right of coinage, his great public works, his campaigns against barbarism and heathenry, his zeal for learning and literature, and his divinity as emperor. Once more there existed a great public entity such as had not been seen for many years; but its duration was not to be a long one.

Charlemagne had for the moment succeeded in uniting western Europe under his sway, but he had not been able to arrest its evolution towards feudal dismemberment. He had, o/ sso / u . doubtless conscientiously, laboured for the recon- Hon of the stitution of the Empire; but it often happens that Frankish

individual wills produce results other than those at

Empire.

which they aimed, sometimes results even contrary to their wishes, and this was what happened in Charlemagne's case. He had restored the superstructure of the imperial monarchy, but he had likewise strengthened

and legalized methods and institutions till then private and insecure, and these, passing from custom into law, undermined the foundations of the structure he had thought himself to be repairing. A quarter of a century after his death his Empire was in ruins.

The practice of giving land as a beneficium to a grantee who swore personal allegiance to the grantor had persisted, and by his capitularies Charlemagne had made these personal engage- ments, these contracts of immunity- — hitherto not transferable, nor even for life, but quite conditional — regular, legal, even obligatory and almost indissoluble. The beneficium was to be as practically irrevocable as the oath of fidelity. He submitted to the yoke of the social system and feudal institutions at the very moment when he was attempting to revive royal authority; he was ruler of the state, but ruler of vassals also. The monar- chical principle no longer sufficed to ensure social discipline; the fear of forfeiting the grant became the only powerful guarantee of obedience, and as this only applied to his personal vassals, Charlemagne gave up his claim to direct obedience from the rest of the people, accepting the mediation of the counts, lords and bishops, who levied taxes, adjudicated and administered in virtue of the privileges of patronage, not of the right of the state. The very multiplication of offices, so noticeable at this time, furthered this triumph of feudalism by multiplying the links of personal dependence, and neutralizing more and more the direct action of the central authority. The frequent con- vocations of military assemblies, far from testifying to political liberty, was .simply a means of communicating the emperor's commands to the various feudal groups.

Thus Charlemagne, far from opposing, systematized feudalism, in order that obedience and discipline mighfe pass from one man to another down to the lowest grades of society, and he succeeded for his own lifetime. No authority was more weighty or more respected than that of this feudal lord of Gaul, Italy and Germany; none was more transient, because it was so purely personal.

When the great emperor was buried at Aix-la-Chapelle in 814, his work was entombed with him. The fact was that his successors were incapable of maintaining it. Twenty- Causes for nine years after his death the Carolingian Empire had the dis- been divided into three kingdoms; forty years later solution one alone of these kingdoms had split into seven; while when a century had passed France was a litter of tiny states each practically independent. This disintegration was caused neither by racial hate nor by linguistic patriotism. It was the weakness of princes, the discouragement of freemen and landholders confronted by an inexorable system of financial

of the Empire.

HISTORY]

FRANCE

8n

and military tyranny, and the incompatibility of a vast empire with a too primitive governmental system, that wrecked the work of Charlemagne.

The Empire fell to Louis the Pious, sole survivor of his three sons. At the Aix assembly in 813 his father had crowned him with his own hand, thus avoiding the papal sanction Louis the t k a) . k ac j been a i mos t forced upon himself in 800. Pious (814' . 1 , 11 . 1 . 1

840). Louis was a gentle and well-trained prince, but weak

and prone to excessive devotion to the Church. He had only reigned a few years when dissensions broke out on all sides, as under the Merovingians. Charlemagne had assigned their portions to his three sons in 781 and again in 806; like Charles Martel and Pippin the Short before him, however, what he had divided was not the imperial authority, nor yet countries, but the whole system of fiefs, offices and adherents which had been his own patrimony. The division that Louis the Pious made at Aix in 817 among his three sons, Lothair, Pippin and Louis, was of like character, since he reserved the supreme authority for himself, only associating Lothair, the eldest, with him in the government of the empire. Following the advice of his ministers Walla and Agobard, supporters of the policy of unity, Louis the Pious put Bernard of Italy, Charlemagne's grandson, to death for refusing to acknowledge Lothair as co- emperor; crushed a revolt in Brittany; and carried on among the Danes the work of evangelization begun among the Slavs. A fourth son, Charles, was born to him by his second wife, Judith of Bavaria. Jealousy arose between the children of the two marriages. Louis tried in vain to satisfy his sons and their followers by repeated divisions — at Worms (829) and at Aix (831) — in which there was no longer question of either unity or subordination. Yet his elder sons revolted against him in 831 and 832, and were supported by Walla and Agobard and by their followers, weary of all the contradictory oaths demanded of them. Louis was deposed at the assembly of Compiegne (833), the bishops forcing him to assume the garb of a penitent; but he was re-established on his throne in St Etienne at Metz, the 28th of February 835, from which time until his death in 840 he fell more and more under the influence of his ambitious wife, and thought only of securing an inheritance for Charles, his favourite son.

Hardly was Louis buried in the basilica of Metz before his sons flew to arms. The first dynastic war broke out between Lothair,

who by the settlement of 817 claimed the whole The sons monarcn y with the imperial title, and his brothers the Pious. Louis and Charles. Lothair wanted, with the Empire,

the sole right of patronage over the adherents of his house, but each of these latter chose his own lord according to individual interests, obeying his fears or his preferences. The three brothers finished their discussion by fighting for a whole day (June 25th, 841) on the plain of Fontanet by Auxerre; but the battle decided nothing, so Charles and Louis, in order to get the better of Lothair, allied themselves and their vassals by an

oath taken in the plain of Strassburg (Feb. 14th, 842). The ˆ This, the first document in the vulgar tongue in the burs oath, history of France and Germany, was merely a mutual

contract of protection for the two armies, which never- theless did not risk another battle. An amicable division of the imperial succession was arranged, and after an assessment of the empire which took almost a year, an agreement was signed at Verdun in August 843.

This was one of the important events in history. Each brother received an equal share of the dismembered empire. Partitio Louis had the territory on the right bank of the Rhine, of the with Spires, Worms and Mainz " because of the abund-

fimp'rea' ance of wine." Lothair took Italy, the valleys of the

Rhone, the Saone and the Meuse, with the two capitals

of the empire, Aix-la-Chapelle and Rome, and the title of emperor. Charles had all the country watered by the Scheldt, the Seine, the Loire and the Garonne, as far as the Atlantic and the Ebro. The partition of Verdun separated once more, and definitively, the lands of the eastern and western Franks. The former became modern Germany, the latter

Verdun

{843)

France, and each from this time forward had its own national existence. However, as . the boundary between the possessions of Charles the Bald and those of Louis was not strictly defined, and as Lothair's kingdom, having no national basis, soon dis- integrated into the kingdoms of Italy,

Burgundy and Aries, in Lotharingia, this great undefined territory was to serve as a tilting-ground for France and Germany on the very morrow of the treaty of Verdun and for ten centuries after.

Charles the Bald was the first king of western France. Anxious as he was to preserve Charlemagne's traditions of government, he was not always strong enough to do so, and warfare within his own dominions was often forced on him. cbarles The Norse pirates who had troubled Charlemagne (843-877). showed a preference for western France, justified by the easy access afforded by river estuaries with rich monasteries on their shores. They began in 841 with the sack of Rouen; and from then until 912, when they made a settlement in one part of the country, though few in numbers they never ceased attacking Charles's kingdom, coming in their ships up the Loire as far as Auvergne, up the Garonne to Toulouse, and up the Seine and the Scheldt to Paris, where they made four descents in forty years, burning towns, pillaging treasure, destroying harvests and slaughtering the peasants or carrying them off into slavery. Charles the Bald thus spent his life sword in hand, fighting unsuccessfully against the Bretons, whose two kings, Nomenoe and Erispoe, he had to recognize in turn; and against the people of Aquitaine, who, in full revolt, appealed for help to his brother, Louis the German. He was beaten everywhere and always: by the Bretons at Ballon (845) and Juvardeil (851); by the people of Aquitaine near Angouleme (845); and by the Northmen, who several times extorted heavy ransoms from him. Before long, too, Louis the German actually allied himself with the people of Brittany and Aquitaine, and invaded France at the summons of Charles the Bald's own vassals. Though the treaty of Coblenz (860) seemed to reconcile the two kings for the moment, no peace was ever possible in Charles the Bald's kingdom. His own son Charles, king of Aquitaine, revolted, and Salomon proclaimed himself king of Brittany in succession to Erispoe, who had been assassinated. To check the Bretons and the Normans, who were attacking from the Atlantic and the Mediterranean, Charles the Bald found himself obliged to entrust the defence of the country to Robert the Strong, ancestor of the house of Capet and duke of the lands between Loire and Seine. Robert the Strong, however, though many times victorious over the incorrigible pirates, was killed by them in a fight at Brissarthe (866).

Despite all this, Charles spoke authoritatively in his capitularies, and though incapable of defending western France, coveted other crowns and looked obstinately eastwards. fl . He managed to become king of Lorraine on the death fth e of his nephew Lothair II., and emperor and king of kingdom Germany on that of his other nephew Louis II. (875); '"to large though only by breaking the compact of the year 800. /,e/S ' In 876, the year before his death, he took a third crown, that of Italy, though not without a fresh defeat at Andernach by Louis the German's troops. His

titles increased, indeed, but not his power; for while his kingdom was thus growing in area it was falling to pieces. The duchy with which he rewarded Robert the Strong was only a military command, but became a powerful fief. Baldwin I. (d. 879), count of Flanders, turned the country between the Scheldt, the Somme and the sea into another feudal principality. Aquitaine and Brittany were almost independent, Burgundy was in full revolt, and within thirty years Rollo, a Norman leader, was to be master of the whole of the lower Seine from the Cotentin to the Somme. The fact was that between the king's inability to defend the kingdom, and the powerlessness of nobles and peasants to protect themselves from pillage, every man made it his business to seek new protectors, and the country, in spite of Charles the Bald's efforts, began to be covered with strongholds, the peasant learning to live beneath the shelter of the donjon keeps. Such vassals gave themselves utterly to the lord who guarded them, working for him sword

or pickaxe in hand. The king was far away, the lord close at hand. Hence the sixty years of terror and confusion which came between Charlemagne and the death of Charles the Bald suppressed the direct authority of the king in favour of the nobles, and prepared the way for a second destruction of the monarchy at the hands of a stronger power (see Feudalism).

Before long Charles the Bald's followers were dictating to him; and in the disaffection caused by his feebleness and cowardice prelates and nobles allied themselves Establish' aga i ns t him. If they acknowledged the king's authority feudalism, at the assemblies of Yiitz (near Thionville) in 844, they forced from him a promise that they should keep their fiefs and their dignities; and while establishing a right of control over all his actions they deprived him of his right of jurisdiction over them. Despite Charles's resistance his royal power dwindled steadily: an appeal to Hincmar, archbishop of Reims, entailed concessions to the Church. In 856 some of his vassals deserted him and went over to Louis the German. To win them back Charles had to sign a new charter, by the terms of which loyalty was no longer a one-sided engagement but a reciprocal contract between king and vassal. He gave up his personal right of distributing the fiefs and honours which were the price of adherence, and thus lost for the Carolingians the free disposal of the immense territories they had gradually usurped; they retained the over-lordship, it is true, but this over-lordship, without usufruct and without choice of tenant, was but a barren possession.

Like their territories public authority little by little slipped from the grasp of the Carolingians, largely because of their Decay of abuse of their too great power. They had concentrated the Caro- the entire administration in their own hands. Like Hngian Charlemagne, Louis the Pious and Charles the Bald power. were omn jp t en t_ There were no provincial assemblies, no municipal bodies, no merchant-gilds, no autonomous churches; the people had no means of making themselves heard; they had no place in an administration which was completely in the hands of a central hierarchy of officials of all ranks, from dukes to scabini, with counts, viscounts and centenarii in between. However, these dukes and counts were not merely officials : they too had become lords of fideles, of their own advocati, centenarii and scabini, whom they nominated, and of all the free men of the county, who since Charlemagne's time had been first allowed and then commanded to " commend " themselves to a lord, receiving feudal benefices in return. Any deprivation or super- session of the count might impoverish, dispossess or ruin the vassals of the entire county; so that all, vassals or officials, small and great, feeling their danger, united their efforts, and lent each other mutual assistance against the permanent menace of an overweening monarchy. Hence, at the end of the 9th century, the heredity of offices as well as of fiefs. In the dis- ordered state of society official stability was a valuable warrant of peace, and the administrative hierarchy, lay or spiritual, thus formed a mould for the hierarchy of feudalism. There was no struggle with the king, simply a cessation of obedience; for without strength or support in the kingdom he was powerless to resist. In vain Charles the Bald affirmed his royal authority in the capitularies of Quierzy-sur-Oise (857), Reims (860), Pistes (864), Gondreville (872) and Quierzy-sur-Oise (877); each time in exchange for assent to the royal will and renewal of oaths he had to acquiesce in new safeguards against himself and by so much to diminish that power of protection against violence and injustice for which the weak had always looked to the throne. Far from forbidding the relation of lord and vassal, Charles the Bald imposed it upon every man in his kingdom, himself proclaim- ing the real incapacity and failure of that theoretic royal power to which he laid claim. Henceforward royalty had no servants, since it performed no service. There was no longer the least hesitation over the choice between liberty with danger and subjection with safety; men sought and found in vassalage the right to live, and willingly bartered away their liberty for it.

The degeneration of the monarchy was clearly apparent on the death of Charles the Bald, when his son, Louis the Stammerer, was only assured of the throne, which had passed by £ 00 / s the right of birth under the Merovingians and been Stem- hereditary under the earlier Carolingians, through his merer election by nobles and bishops under the direction of

Hugh the Abbot, successor of Robert the Strong, each voter having been won over by gift of abbeys, counties or manors. When Louis died two years later (879), the same nobles met, some at Creil, the rest at Meaux, and the first party chose Louis of Germany, who preferred Lorraine to the crown; while the rest anointed Louis III. and Carloman, sons of the tou / s ///. late king, themselves deciding how the kingdom was aadCario- to be divided between the two princes. Thus the ma " (879 ~ king no longer chose his own vassals; but vassals and fief-holders actually elected their king according to the material advantages they expected from him. Louis III. and Carloman justified their election by their brilliant victories over the Normans at Saucourt (881) and near Epernay (883) ; but at their deaths (882-884), the nobles, instead of taking Louis's boy-son, Charles the Simple, as king, chose Charles the Fat, king of Germany, because he was emperor and seemed powerful. He united once more the dominions of Charlemagne; but he disgraced the imperial throne !? £ s by his feebleness, and was incapable of using his (884-888.) immense army to defend Paris when it was besieged by the Normans. Expelled from Italy, he only came to France to buy a shameful peace. When he died in January 888 he had not a single faithful vassal, and the feudal lords resolved never again to place the sceptre in a hand that could not wield the sword.

The death-struggle of the Carolingians lasted for a century of uncertainty and anarchy, during which time the bishops, counts and lords might well have suppressed the monarchy had they been hostile to it. Such, however, struggle of was not their policy; on the contrary, they needed a theCaro- king to act as agent for their private interests, since f"^' a ° s _. he alone could invest their rank and dignities with an official and legitimate character. They did not at once agree on Charles's successor; for some of them chose Eudes (Odo), son of Robert the Strong, for his brilliant defence of Paris against the Normans in 885; others Guy, duke of Spoleto in Italy, who had himself crowned at Langres; while many wished for Arnulf, illegitimate son of Carloman, king of Germany and emperor. Eudes was victor in the struggle, and was crowned and anointed at Compiegne on the 29th of February 888; but five years later, meeting with defeat after defeat at the hands of the Normans, his followers deserted from him to Charles the Simple, grandson of Charles the Bald, who was also supported by Fulk, archbishop of Reims.

*This first Carolingian restoration took place on the 28th of January 893, and thenceforward throughout this warlike period from 888 to 936 the crown passed from one dynasty to the other according to the interests of the nobles. g"° * After desperate strife, an agreeement between the two (888-893). rivals, Arnulf's support, and the death of Odo, secured it for Charles III., surnamed the Simple. His subjects remained faithful to him for a good while, as he put an end to the Norman invasions which had*

desolated the kingdom for two centuries, and cowed those barbarians, much to the benefit of France. By the treaty of St Clair-sur-Epte (911) their leader Rolf (Rollo) obtained one of Charles's daughters in marriage and the district of the Lower Seine which the Normans had long occupied, on condition that he and his men ceased their attacks and accepted Christianity. Having thus tranquillized the west, Charles took advantage of Louis the Child's death, and conquered Lorraine, in spite of opposition from Conrad, JJ 'simple king of Germany (921). But his preference for his new (893-929). conquest, and for a Lorrainer of low birth named Hagano, aroused the jealousy and discontent of his nobles. They first elected Robert, count of Paris (923), and then after his death in a successful battle near Soissons against Charles the*

Simple, Rudolph of Burgundy, his son-in-law. But Herbert of Vermandois, one of the successful combatants at Rudolph of g i ssonS) coveted the countship of Laon, which (923-936 Rudolph refused him; and he thereupon proclaimed Charles the Simple, who had confided his cause to him, as king once more. Seeing his danger Rudolph ceded the count- ship to Herbert, and Charles was relegated to his prison until his death in 929. After unsuccessful wars against the nobles of the South, against the Normans, who asserted that they were bound to no one except Charles the Simple, and against the Hungarians (who, now the Normans were pacified, were acting their part in the East), Rudolph had a return of good fortune in the years between 930 and 936, despite the intrigues of Herbert of Vermandois. Upon his death the nobles assembled to elect a king; and Hugh the Great, Rudolph's brother-in-law, moved by irresolution as much as by prudence, instead of taking the crown, preferred to restore the Carolingians once more in the person of Charles the Simple's son, Louis d'Outremer, himself claiming numerous privileges and enjoying the exercise of power unencumbered by a title which carried with it the jealousy of the nobles.*

This restoration was no more peaceful than its predecessor. The Carolingians had as it were a fresh access of energy, and the Louis IV struggle against the Robertinians went on relentlessly. the Both sides employed similar methods: one was sup-

Foreigner ported by Normandy, the other by Germany; the (936-954.) arc hi3i s hop of Reims was for the Carolingians, the Robertinians had to be

content with the less influential bishop of Sens. Louis soon proved to Hugh the Great, who was trying to play the part of a mayor of the palace, that he was by no means a roi faineant; and the powerful duke of the Franks, growing uneasy, allied himself with Herbert of Vermandois, William of Normandy and his brother-in-law Otto I. king of Germany, who resented the loss of Lorraine. Louis defended himself with energy, aided chiefly by the nobles of the South, by his relative Edmund, king of the English, and then by Otto himself, whose brother-in-law he also had become. A peace advantageous to him was made in 942, and on the deaths of his two opponents, Herbert of Vermandois and William of Nor- mandy, all seemed to be going well for him; but his guardian- ship of Richard, son of the duke of Normandy, aroused fresh strife, and on the 13th of July 945 he fell into an ambush and suffered a captivity similar to his father's of twenty-two years before. No one had befriended Charles the Simple, but Louis had his wife Gerberga, who won over to his cause the kings of England and Germany and even Hugh. Hugh set him free, insisting, as payment for his aid, on the cession of Laon, the capital of the kingdom and the last fortified town remaining to the Carolingians (946). Louis was hardly free before he took vengeance, harried the lands of his rival, restored to the archiepiscopal throne of Reims Artald, his faithful adviser, in place of the son of Herbert of Vermandois, and managed to get Hugh excommunicated by the council of Ingelheim (948) and by the pope. A two years' struggle wearied the rivals, and they made peace in 950. Louis once more held Laon, and in the following year further strengthened his position by a successful expedition into Bur- gundy. Still his last years were not peaceful; for besides civil wars there were two Hungarian invasions of France (951 and 954).

Louis's sudden death in 954 once more placed the Carolingian line in peril, since he had not had time to have his son Lothair crowned. For a third time Hugh had the disposal of (9°S4-986). tne crown ; an d ne was no more tempted to take it him- self in 954 than in 923 or 936: it was too profitless a possession. Thanks to Hugh's support and to the good offices of Otto and his brother Bruno, archbishop of Cologne and duke of Lorraine, Lothair was chosen king and crowned at Reims. Hugh exacted, as payment for his disinterestedness and fidelity, a renewal of his sovereignty over Burgundy with that of Aquitaine as well; he was in fact the viceroy of the kingdom, and others imitated him by demanding indemnities, privileges and con- firmation of rights, as was customary at the beginning of a reign.

Hugh strengthened his position in Burgundy, Lorraine and Normandy by means of marriages; but just as his power was at its height he died (956). His death and the minority of his sons, Hugh Capet and Eudes, gave the Carolingian dynasty thirty years more of life.

For nine years (956-965) Bruno, archbishop of Cologne, was regent of France, and thanks to him there was a kind of entente cordiole between the Carolingians and the Robertinians and Otto. Bruno made Lothair recognize Hugh as duke of France and Eudes as duke of Burgundy; but the sons preserved the father's enmity towards king Louis, despite the archbishop's repeated efforts. His death deprived Lothair of a wise and devoted guardian, even if it did set him free from German influence; and the death of Odalric, archbishop of Reims, in 969, was another fatal loss for the Carolingians, succeeded as he was by Adalbero, who, though learned, pious and highly intelligent, was none the less ambitious. On the death of Otto I. (973) Lothair wished to regain Lorraine; but his success was small, owing to his limited resources and the uncertain support of his vassals. In 980, regretting his fruitless quarrel with Otto II., who had ravaged the whole country as far as Paris, and fearing that even with the support of the house of Vermandois he would be crushed like his father Louis IV. between the duke of France and the emperor, who could count on the archbishop of Reims, Lothair made peace with Otto — a great mistake, which cost him the prestige he had gained among his nobles by his fairly success- ful struggle with the emperor, drawing down upon him, moreover, the swift wrath of Hugh, who thought himself tricked. Otto, meanwhile, whom he was unwise enough to trust, made peace secretly' with Hugh, as it was his interest to play off his two old enemies one against the other. However, Otto died first (983), leaving a three-year-old son, Otto III., and Lothair, hoping for Lorraine, upheld the claims of Henry of Bavaria, who wished to oust Otto. This was a war-signal for Archbishop Adalbero and his adviser Gerbert, devoted to the idea of the Roman empire, and determined that it should still be vested in the race of Otto, which had always been beneficent to the Church.

They decided to set the Robertinians against the Carolingians, and on their advice Hugh Capet dispersed the assembly of Compiegne which Lothair had commissioned to ex- amine Adalbero's behaviour. On Lothair's death in (Q86-987) 986, Hugh surrounded his son and successor, Louis V., with intrigues. Louis was a weak-minded and violent young man with neither authority nor prestige, and Hugh tried to have him placed under tutelage. After Louis V.'s sudden death, aged twenty, in 987, Adalbero and Gerbert, with the support of the reformed Cluniac clergy, at the Assembly of Senlis eliminated from the succession the rightful heir, Charles of Lorraine, who, without influence or wealth, had become a stranger in his own country, and elected Hugh Capet, who, though rich and powerful, was superior neither in intellect nor character. Thus the triple alliance of Adalbero's bold and adroit imperialism with the cautious and vacillating ambition of the duke of the Franks, and the impolitic hostility towards Germany of the ruined Carolingians, resulted in the unlooked-for advent of the new

Capetian dynasty.

This event completed the evolution of the forces that had produced feudalism, the basis of the medieval social system. The idea of public authority had been replaced by one Dlsmem- that was simpler and therefore better fitted for a half- berment of civilized society — that of dependence of the weak on the king- the strong, voluntarily entered on by means of mutual m ‘ contract. Feudalism had gained ground in the 8th century; feudalism it was which had raised the first Carolingian to the throne as being the richest and most powerful person in Austrasia; and Charlemagne with all his power had been as utterly unable as the Merovingians to revive the idea of an abstract and im- personal state. Charlemagne’s vassals, however, had needed him; while from Charles the Bald onward it was the king who needed the vassals — a change more marked with each successive prince. The feudal system had in fact turned against the throne, the vassals using it to secure a permanent hold upon offices and

fiefs, and to get possession of estates and of power. After Charles the Bald’s death royalty had only, so to speak, a shell — administra- tive officialdom. No longer firmly rooted in the soil, the monarchy was helpless before local powers which confronted it, seized upon the land, and cut off connexion between throne and people. The king, the supreme lord, was the only lord without lands, a nomad in his own realms, merely lingering there until starved out. Feudalism claimed its new rights in the capitulary of Quierzy-sur- Oise in 857; the rights of the monarchy began to dwindle in

877-

But vassalage could only be a cause of disintegration, not of unity, and that this disintegration did not at once spread in- definitely was due to the dozen or so great military commands — Flanders, Burgundy, Aquitaine, &c. — which Charles the Bald had been obliged to establish on a strong territorial basis. One of these great vassals, the duke of France, was amply provided with estates and offices, in contrast to the landless Carolingian, and his power, like that of the future kings of Prussia and Austria, was based on military authority, for he had a frontier — that of Anjou. Then the inevitable crisis had come. For a hundred years the great feudal lords had disposed of the crown as they pleased, handing it back and forward

from one dynasty to another. At the same time the contrast between the vast proportions of the Carolingian empire and its feeble administra- tive control over a still uncivilized community became more and more accentuated. The Empire crumbled away by degrees. Each country began to.lead its own separate existence, stammer- ing its own tongue; the different nations no longer understood one another, and no longer had any general ideas in common. The kingdoms of France and Germany, still too large, owed their existence to a series of dispossessions imposed on sovereigns too feeble to hold their own, and consisted of a great number of small states united by a very slight bond. At the end of the 10th century the duchy of France was the only central part of the kingdom which was still free and without organization. The end was bound to come, and the final struggle was between Laon, the royal capital, and Reims, the ecclesiastical capital, the former carrying with it the soil of France, and the latter the crown. The Capets captured the first in 985 and the other in 987. Thenceforth all was over for the Carolingians, who were left with no heritage save their great name.

Was the day won for the House of Capet? In the nth century the kings of that line possessed meagre domains scattered about

in the He de France among the seigniorial possessions ofCapet Se °f Brie, Beauce, Beauvaisis and Valois. They were

hemmed in by the powerful duchy of Normandy, the counties of Blois, Flanders and Champagne, and the duchy of Burgundy. Beyond these again stretched provinces prac- tically impenetrable to royal influence: Brittany, Gascony, Toulouse, Septimania and the Spanish March. The monarchy lay stifling in the midst of a luxuriant feudal forest which sur- rounded its only two towns of any importance: Paris, the city of the future, and Orleans, the city of learning. Its power, exercised with an energy tempered by prudence, ran to waste like its wealth in a suzerainty over turbulent vassals devoid of common government or administration, and was undermined by the same lack of social discipline among its vassals which had sapped the power of the Carolingians. The new dynasty was thus the poorest and weakest of the great civil and ecclesiastical lordships which occupied the country from the estuary of the Scheldt to that of the Llobregat, and bounded approximately by the Meuse, the Saone and the ridge of the Cevennes; yet it cherished a great ambition which it revealed at times during its first century (987-1108) — a determination not to repeat the Carolingian failure. It had to wait two centuries after the revolu- tion of 987 before it was strong enough to take up the dormant tradition of an authority like that of Rome; and until then it cunningly avoided unequal strife in which, victory being im- possible, reverses might have weakened those titles, higher than any due to feudal rights, conferred by the heritage of the Caesars and the

coronation at Reims, and held in reserve for the future.

The new dynasty thus at first gave the impression rather of decrepitude than of youth, seeming more a continuation of the Carolingian monarchy than a new departure. Hugh Capet's reign was one of disturbance and danger; Jf®*. behind his dim personality may be perceived the (987-996). struggle of greater forces — royalty and feudalism, the French clergy and the papacy, the kingdom of France and the Empire. Hugh Capet needed more than three years and the be- trayal of his enemy into his hands before he could parry the attack of a quite second-rate adversary, Charles of Lorraine (990), the last descendant of Charlemagne. The insubordination of several great vassals — the count of Vermandois, the duke of Burgundy, the count of Flanders — who treated him as he had treated the Carolingian king; the treachery of Arnulf, archbishop of Reims, who let himself be won over by the empress Theophano; the papal hostility inflamed by the emperor against the claim of feudal France to independence, — all made it seem for a time as though the unity of the Roman empire of the West would be secured at Hugh's expense and in Otto's favour; but as a matter of fact this papal and imperial hostility ended by making the Capet dynasty a national one. When Hugh died in 996, he had succeeded in maintaining his liberty mainly, it is true, by diplomacy, not force, despite opposing powers and his own weakness. Above all, he had secured the future by associating his son Robert with him on the throne; and although the nobles and the archbishop of Reims were disturbed by this suspension of the feudal right of election, and tried to oppose it, they were unsuccessful.*

Robert the Pious, a crowned monk, resembled his father in eschewing great schemes, whether from timidity or prudence; yet from 996 to 1031 he preserved intact the authority „ . rf he had inherited from Hugh, despite many domestic dis- the Pious turbances. He maintained a defiant attitude towards (996- Germany; increased his heritage; strengthened his 1031)- royal title by the addition of that of duke of Burgundy after fourteen years of pillage; and augmented the royal domain by adding several countships on the south-east and north-west. Limited in capacity, he yet understood the art of acquisition.

Henry I., his son, had to struggle with a powerful vassal, Eudes, count of Chartres and Troyes, and was obliged for a time to abandon his father's anti-German policy. Eudes, who was rash and adventurous, in alliance with the fjˆ?' " queen-mother, supported the second son, Robert, 106O). and captured the royal town of Sens. In order to retake it Henry ceded the beautiful valley of the Saone and the Rhone to the German emperor Conrad, and henceforth the kingdom of Burgundy was, like Lorraine, to follow the fortunes of Germany. Henry had besides to invest his brother

with the duchy of Burgundy — a grave error which hampered French politics during three centuries. Like his father, he subsequently managed to retrieve some of the crown lands from William the Bastard, the too-powerful duke of Normandy; and he made a praiseworthy though fruitless attempt to regain possession of Lorraine for the French crown. Finally, by the coronation of his son Philip (1059) he confirmed the hereditary right of the Capets, soon to be superior to the elective rights of the bishops and great barons of the kingdom. The chief merit of these early Capets, indeed, was that they had sons, so that their dynasty lasted on without disastrous minorities or quarrels over the division of inheritance.

Philip I. achieved nothing during his long reign of forty-eight years except the necessary son, Louis the Fat. Unsuccessful even in small undertakings he was utterly incapable of great ones; and the two important events of his fjgeo. reign took place, the one against his will, the other 1108). without his help. The first, which lessened Norman aggression in his kingdom, was William the Bastard's conquest of England (1066); the second was the First Crusade preached by the French pope Urban II. (1095). A few half-hearted campaigns against recalcitrant vassals and a long and obstinate quarrel with the papacy over his adulterous union with Bertrade de Montfort, countess of Anjou, represented the total activity

of Philip's reign; he was greedy and venal, by no means disdain- ing the petty profits of brigandage, and he never left his own domains.

After a century's lethargy the house of Capet awoke once more with Louis VI. and began the destruction of the feudal polity. Louis VI. F° r thirty-four years of increasing warfare this active the Fat and energetic king, this brave and persevering soldier, (1108- never spared himself, energetically policing the royal

mr >- demesne against such pillagers as Hugh of Le Puiset

or Thomas of Marie. There was, however, but little difference yet between a count of Flanders or of Chartres and Louis VI., the possessor of a but small and perpetually disturbed realm, who was praised by his minister, the monk Suger, for making his power felt as far as distant Berri! This was clearly shown when he attempted to force the great feudal lords to recognize his authority. His bold endeavour to establish William Ciito in Flanders ended in failure; and his want of strength was particularly

humiliating in his unfortunate struggle with Henry I., king of the English and duke of Normandy, who was powerful and well served, the real master of a comparatively weak baron- age. Louis only escaped being crushed because he remembered, as did his successors for long after him, that his house owed its power to the Church.

The Church has never loved weakness; she has always had a secret sympathy for power, whatever its source, when she could hope to capture it and make it serve her ends. Louis VI. de- fended her against feudal robbers; and she supported him in his struggles against the nobles, making him, moreover, by his son's marriage with the heiress of Aquitaine, the greatest and richest landholder of the kingdom. But Louis was not the obedient tool she wished for. With equal firmness and success he vindi- cated his rights, whether against the indirect attacks of the papacy 'on his independence, or the claims of the ecclesiastical courts which, in principle, he made subordinate to the jurisdic- tion of the crown; whether in episcopal elections, or in ecclesi- astical reforms which might possibly imperil his power or his revenues. The prestige of this energetic king, protector of the Church, of the infant communes in the towns, and of the peasants as against the constant oppressions of feudalism, became still greater at the end of his reign, when an invasion of the German emperor Henry V. in alliance with Henry Beauclerk of Normandy (Henry I. of England), rallied his subjects round the oriflamme of St Denis, awakening throughout northern France the unanimous and novel sentiment of national danger.

Unfortunately his successor, Louis VII., almost destroyed his work by a colossal blunder, although circumstances seemed much in his favour. Germany and England, the two Louis VII. P ow ers especially to be dreaded, were busy with the Young internal troubles and quarrels of succession. On the {1137- other hand, thanks to his marriage with Eleanor

of Aquitaine, Louis's own domains had been increased by the greater part of the country between the Loire and the Pyrenees; while his father's minister, the monk Suger, continued to assist him with his moderation and prudence. His first successes against Theobald of Champagne, who for thirty years had been the most dangerous of the great French barons and had refused a vassal's services to Louis VI., as well as the adroit diplomacy with which he wrested from Geoffrey the Fair, count of Anjou, a part of the Norman Vexin long claimed by the French kings, in exchange for permitting him to conquer Normandy, augured well for his boldness and activity, had he but confined them to serving his own interests. The second crusade, under- taken to expiate his burning of the church of Vitry, inaugurated a series of magnificent but fruitless exploits; while his wife was the cause of domestic quarrels still more disastrous. Piety and a thirst for glory impelled Louis to take the lead in this fresh expedition to the Holy

Land, despite the . opposition of Suger, and the hesitation of the pope, crusade. Bernard of Clairvaux and the barons. The alliance with the German king Conrad III. only enhanced the difficulties of an enterprise already made hazardous by the misunderstandings between Greeks and Latins. The Crusade

ended in the double disaster of military defeat and martial dishonour (1147-1140); and Suger's death in 1151 deprived Louis of a counsellor who had exercised the regency skilfully and with success, just at the very moment when his divorce from Eleanor was to jeopardize the fortunes of the Capets.

For the proud and passionate Eleanor married, two months later (May 1152), the young Henry, count of Anjou and duke of Normandy, who held, besides these great fiefs, the whole of the south-west of France, and in two #' va '0'<" ? years' time the crown of England as well. Henry and Angevins. Louis at once engaged in the first Capet- Angevin duel, destined to last a hundred years (1152-1242). When France and England thus entered European history, their conditions were far from being equal. In England royal power was strong; the size of the Angevin empire was vast, and the succession assured. It was only abuse of their too-great powers that ruined the early Angevin kings. France in the 12th century was merely a federation of separate states, jealously independent, which the king had to negotiate with rather than rule; while his own possessions, shorn of the rich heritage of Aquitaine, were, so to speak, swamped by those of the English king. For some time it was feared that the French kingdom would be entirely ab- sorbed in consequence of the marriage between Louis's daughter and Henry II. 's eldest son. The two rivals were typical of their states, Henry II. being markedly superior to Louis in political resource, military talent and energy. He failed, however, to realize his ambition of shutting in the Capet king and isolating him from the rest of Europe by crafty alliances, notably that with the emperor Frederick Barbarossa — while watching an opportunity to supplant him upon the French throne. It is extraordinary that Louis should have escaped final destruction, considering that Henry had subdued Scotland, retaken Anjou from his brother Geoffrey, won a hold over Brittany, and schemed successfully for Languedoc. But the Church once more came to the rescue of her devoted son. The retreat to France of Pope Alexander III., after he had been driven from Rome by the emperor Frederick in favour of the anti-pope Victor, revived Louis's moral prestige. Henry II. 's quarrel with Thomas Becket, archbishop of Canterbury, which ran its course in France (1164- 1 1 7 1) as a struggle for the independence and reform of the Church, both threatened by the Constitutions of Clarendon, and ended with the murder of Becket in 1172, gave Louis yet another advantage over his rival. Finally the birth of Philip Augustus (1165), after thirty years of childless wedlock,

saved the kingdom from a war of succession just at the time when the powerful Angevin sway, based entirely upon force, was jeopardized by the rebellion of Henry II. 's sons against their father. Louis naturally joined the coalition of n 73, but showed no more vigour in this than in his other wars; and his fate would have been sealed had not the pope checked Henry by the threat of an interdict, and reconciled the combatants (n 77). Louis had still time left to effect the coronation of his son Philip Augustus (n 79), and to associate him with himself in the exercise of the royal power for which he had grown too old and infirm.

Philip Augustus, who was to be the bitterest enemy of Henry II. and the Angevins, was barely twenty before he revealed the full measure of his cold energy and unscrupulous phmp ambition. In five years (1180-1186) he rid himself Augustus of the overshadowing power of Philip of Alsace, count (ftso- of Flanders, and his own uncles, the counts of)-

Champagne; while the treaty of May 20th, 1186, was his first rough lesson to the feudal leagues, which he had reduced to powerlessness, and to the subjugated duke of Burgundy and count of Flanders. Northern and eastern France recognized the suzerainty of the Capet, and Philip Augustus was now bold enough to attack Henry II., the master of the west, whose friendly neutrality (assured by the treaty of Gisors) had made possible the successive defeats of the great French barons. Like his father, Philip understood how to make capital out of the quarrels of the aged and ailing Henry II. with his sons, especially with Richard, who claimed his French heritage in his father's lifetime., and raised up enemies for the disunited Angevins even

in Germany. After two years of constant defeat, Henry's capitulation at Azai proved once more that fortune is never with the old. The English king had to submit himself to " the advice and desire of the king of France," doing him homage for all continental fiefs (1187-1189).

The defection of his favourite son John gave Henry his death- blow, and Philip Augustus found himself confronted by a new king of England, Richard Coeur de Lion, as powerful, Augustus besides being younger and more energetic. Philip's and ambition could not rest satisfied with the petty

*Richard principalities of Amiens, Vermandois and Valois, Lion. * which he had added to the royal demesne. The third crusade, undertaken, sorely*

against Philip's will, in alliance with Richard, only increased the latent hostility between the two kings; and in 1101 Philip abandoned the enterprise in order to return to France and try to plunder his absent rival. Despite his solemn oath no scruples troubled him: witness the large sums of money he offered to the emperor Henry VI. if he would detain Richard, who had been made prisoner by the duke of Austria on his return from the crusade; and his negotiations with his brother John Lackland, whom he acknowledged king of England in exchange for the cession of Normandy. But Henry VI. suddenly liberated Richard, and in five years that " devil set free " took from Philip all the profit of his trickery, and shut him off from Normandy by the strong fortress of Chateau- Gaillard (1104-1109).

Happily an accident which caused Richard's death at the siege of Chalus, and the evil imbecility of his brother and suc- Phiiip cessor, John Lackland, brilliantly restored the fortunes

Augustus of the Capets. The quarrel between John and his and John nephew Arthur of Brittany gave Philip Augustus Lackland. Qne Q j f-jj 0se opportunities of profiting by family discord which, coinciding with discontent among the various peoples subject to the house of Anjou, had stood him in such good stead against Henry II. and Richard. He demanded renunciation on John's part, not of Anjou only, but of Poitou and Normandy — of all his French-speaking possessions, in fact — in favour of Arthur, who was supported by William des Roches, the most powerful lord of the region of the Loire. Philip's divorce from Ingeborg of Denmark, who appealed successfully to Pope Innocent III., merely delayed the inevitable conflict. John of England, moreover, was a past-master in the art of making enemies of his friends, and his conduct towards his vassals of Aquitaine furnished a judicial pretext for conquest. The royal judges at Paris condemned John, as a felon, to death and the forfeiture of his fiefs (1203), and the murder of Arthur com- pleted his ruin. Philip Augustus made a vigorous onslaught on Normandy in right of justice and of superior force, took the formidable fortress of Chateau-Gaillard on the Seine after several months' siege, and invested Rouen, which John abandoned, fleeing to England. In Anjou, Touraine, Maine and Poitou, lords, towns and abbeys made their submission, won over by Philip's bribes despite Pope Innocent III.'s attempts at inter- vention. In 1208 John was obliged to own the Plantagenet continental power as lost. There were no longer two rival monarchies in France; the feudal equilibrium was destroyed, to the advantage of the duchy of France.

But Philip in his turn nearly allowed himself to be led into an attempt at annexing England, and so reversing for his own benefit the work of the Angevins (12 13); but, happily for the future of the dynasty, Pope Innocent HI. prevented this. Thanks to the ecclesiastical sanction of his royalty,

Philip had successfully braved the pope for twenty years, in the matter of Ingeborg and again in that of the German schism, when he had supported Philip of Swabia against Otto of Brunswick, the pope's candidate. In 12 13, John Lackland, having been in con- flict with Innocent regarding the archiepiscopal see of Canterbury, had made submission and done homage for his kingdom, and Philip wished to take vengeance for this at the expense of the rebellious vassals of the north-west, and of Renaud and Ferrand, counts of Boulogne and Flanders, thus combating English influence in those quarters.

This was a return to the old Capet policy; but it was also menacing to many interests, and sure to arouse energetic re- sistance. John seized the opportunity to consolidate coalition against Philip a European coalition, which included against most of the feudal lords in Flanders, Belgium and mmp Lorraine, and the emperor Otto IV. So dangerous did A "j ustus – the French monarchy already seem! John began ( )- operations with an attack from Anjou, supported by the notably capricious nobles of Aquitaine, and was routed by Philip's son at La Roche aux Moines, near Angers, on the 2nd of July 1214. Twenty-five days later the northern allies, intending to surprise the smaller French army on its passage over the bridge at Bouyines, themselves sustained a complete defeat. This first national victory had not only a profound effect on the whole kingdom, but produced consequences of far-reaching importance: in Germany it brought about Otto's fall before Frederick II.; in England it introduced the great drama of 1215, the first act of which closed with Magna Carta — John Lackland being forced to acknowledge the control of his barons, and to share with them the power he had abused and disgraced. In France, on the con- trary, the throne was exalted beyond rivalry, raised far above a feudalism which never again ventured on acts of independence or rebellion. Bouvines gave France the supremacy of the West. The feudalism of Languedoc was all that now remained to conquer.

The whole world, in fact, was unconsciously working for Philip Augustus. Anxious not to risk his gains, but to consolidate them by organization, Philip henceforth until his death in 1223 operated through diplomacy alone, leaving to others the toil and trouble of conquests, the advantages of which were not for them. When his son Louis wished to wrest the English crown from John, now crushed by his barons, Philip intervened without seeming to do so, first with the barons, then with Innocent III., supporting and disowning his son by turns; until the latter, held in check by Rome, was forced to sign the treaty of Lambeth (12 1 7). When the Church and the needy and fanatical nobles of northern and central France destroyed the feudal dynasty of Toulouse and the rich civilization of the south in the Albigensian crusade, it was for Philip Augustus that their leader, Simon de Montfort, all unknowing, conquered Languedoc. At last, instead of the two

Frances of the langue d'oc and the langue d'oil, there was but one royal France comprising the whole kingdom.

Philip Augustus was not satisfied with the destruction of a turbulent feudalism; he wished to substitute for it such unity and peace as had obtained in the Roman Empire; Admini – and just as he had established his supremacy over the tration of feudal lords, so now he managed to extend it over the Philip clergy, and to bend them to his will. He took ad- Au s astas – vantage of their weakness in the midst of an age of violence. By contracts of " pariage " the clergy claimed and obtained the king's protection even in places beyond the king's jurisdiction, to their common advantage. Philip thus set the feudal lords one against the other; and against them all, first the Church, then the communes. He exploited also the townspeople's need for security and the instinct of independence which made them claim a definite place in the feudal hierarchy. He was the actual creator of the communes, although an interested creator, since they made a breach in the fortress of feudalism and extended the royal authority far beyond the king's demesne. He did even more: he gave monarchy the instruments of which it still stood in need, gathering round him in Paris a council of men humble in origin, but wise and loyal; while in n 90 he instituted baillis and seneschals throughout his enlarged dominions, all-powerful over the nobles and subservient to himself. He filled his treasury with spoils harshly wrung from all classes; thus inaugurating the monarchy's long and patient labours at enlarging the crown lands bit by bit through taxes on private property. Finally he created an army, no longei the temporary feudal ost, but a more or less permanent royal force. By virtue of all these organs of government the throne guaranteed peace, justice and a secure future, having routed

feudalism with sword and diplomacy. Philip's son was the first of the Capets who was not crowned during his father's lifetime ; a fact clearly showing that the principle of heredity had now been established beyond discussion.

Louis VIII. 's short reign was but a prolongation of Philip's in its realization of his two great designs: the recovery from

Henry III. of England of Poitou as far as the Garonne; \%?23- ' an d tne cr usade against the Albigenses, which with 1226). small pains procured him the succession of Amaury

de Montfort, and the Languedoc of the counts of Toulouse, if not the whole of Gascony. Louis VIII. died on his return from this short campaign without having proved his full worth.

But the history of France during the nth and 12th centuries does not entirely consist of these painful struggles of the Capet

dynasty to shake off the fetters of feudalism. France, French no l° n g er s P ut U P mto separate fragments, now began activity. to exercise both intellectual and military influence

over Europe. Everywhere her sons gave proof of rejuvenated activity-. The Christian missions which others were reviving in Prussia and beginning in Hungary were under- taken on a vaster scale by the Capets. These " elder sons of the Church " made themselves responsible for carrying out the " work of God," and French pilgrims in the Holy Land pre- pared the great movement of the Crusades against the infidels. Religious faith, love of adventure, the hope of making ad- vantageous conquests, anticipations of a promised paradise — all combined to force this advance upon the Orient, which though failing to rescue the sepulchre of Christ, the ephemeral kingdoms of Jerusalem and Cyprus, the dukedom of Athens, or the Latin empire of Constantinople, yet gained for France that prestige for military glory and religious piety which for centuries constituted her strength in the Levant (see Crusades) . At the call of ,the pope other members of the French chivalry also made victorious expeditions against the Mussulmans, and founded the Christian kingdom of Portugal. Obeying that enterprising spirit which was to take them to England half a century later, Normans descended upon southern Italy and wrested rich lands from Greeks and Saracens.

In the domain of intellect the advance of the French showed a no less dazzling and a no less universal activity; they sang Intel- as well as they fought, and their epics were worthy

lectuat of their swordsmanship, while their cathedrals were develop- hymns in stone as ardent as their soaring flights of men ' devotion. In this period of intense religious life

France was always in the vanguard. It was the ideas of Cluniac monks that freed the Church from feudal supremacy, and in the nth century produced a Pope Gregory VII.; the spirit of free investigation shown by the heretics of Orleans inspired the rude Breton, Abelard, in the 12th century; and with Gerbert and Fulbert of Chartres the schools first kindled that brilliant light which the university of Paris, organized by Philip Augustus, was to shed over the world from the heights of Sainte-Genevieve. In the quarrels of the

priesthood under the Empire it was St Bernard, the great abbot of Clairvaux, who tried to arrest the papacy on the slippery downward path of theocracy; finally, it was in Suger's church of St Denis that French art began that struggle between light against darkness which, culminating in Notre-Dame and the Sainte- Chapelle, was to teach the architects of the world the delight of building with airiness of effect. The old basilica which contains the history of the monarchy sums up the whole of Gothic art to this day, and it was Suger who in the domain of art and politics brought forward once more the conception of unity. The courteous ideal of French chivalry, with its " delectable " language, was adopted by all seigniorial Europe, which thus became animated, as it were, by the life-blood of France. Simi- larly, in the universal movement of those forces which made for freedom, France began the age-long struggle to maintain the rights of civil society and continually to enlarge the social categories. The townsman enriched by commerce and the emancipated peasant tried more or less valiantly to shake off

the yoke of the feudal system, which had been greatly weakened, if not entirely broken down, by the crusades. Grouped around their belfry-towers and organized within their gilds, they made merry in their free jocular language over their own hardships, and still more over the vices of their lords. They insinuated themselves into the counsels of their ignorant masters, and though still sitting humbly at the feet of the barons, these upright and well-educated servitors were already dreaming of the great deeds they would do when their tyrants should have vacated their high position, and when royalty should have summoned them to power.

By the beginning of the 13th century the Capet monarchy was so strong that the crisis occasioned by the sudden death of Louis VIII. was easily surmounted by the foreign woman and the child whom he left behind him. It

Louis IX.

(1226-

is true that that woman was Blanche of Castile, and 1270). that child the future Louis IX. A virtuous and very devout Spanish princess, Blanche assumed the regency of the kingdom and the tutelage of her child, and carried them on for nine years with so much force of character and capacity for rule that she soon impressed the clamorous and C astue. disorderly leaders of the opposition (1 226-1 235). By the treaty of Meaux (1229), her diplomacy combined with the influence of the Church to prepare effectually for the annexation of Languedoc to the kingdom, supplementing this again by a portion of Champagne; and the marriage of

her son to Margaret of Provence definitely broke the ties which held the country within the orbit of the German empire. She managed also to keep out of the great quarrel between Frederick II. and the papacy which was convulsing Germany. But her finest achievement was the education of her son; she taught him that lofty religious morality which in his case was not merely a rule for private conduct, but also a political programme to which he remained faithful even to the detriment of his apparent interests. With Louis IX. morality for the first time permeated and dominated politics; he had but one end: to do justice to every one and to reconcile all Christendom in view of a general crusade.

*The oak of Vincennes, under which the king would sit to mete out justice, cast its shade over the whole political action of Louis IX. He was the arbiter of townspeople, of feudal lords and of kings. The interdiction of the judicial Louis IX.'s duel, the " quarantaine le roi," i.e. " the king's truce policy of of forty days " during which no vengeance might a * bltra ' be taken for private wrongs, and the assurement^ went far to diminish the abuses of warfare by allowing his mediation to make for a spirit of reconciliation throughout his kingdom. When Thibaud (Theobald), count of Champagne, attempted to marry the daughter of Pierre Mauclerc, duke of Brittany, without the king's consent, Louis IX., who held the county of Champagne at his mercy, contented himself with exacting guarantees of peace. Beyond the borders of France, at the time of the emperor Frederick II. 's conflict with a papacy threatened in its temporal powers, though he made no response to Frederick's appeal to the civil authorities urging them to present a solid front against the pretensions of the Church, and though he energetically supported the latter, yet he would not admit her right to place kingdoms under interdict, and refused the imperial crown which Gregory IX. offered him for one of his brothers. He always hoped to bring about an honourable agreement between the two adversaries, and in his estimation*

1 The assurement {assecuratio, assecuramentum) differed from the truce, which was a suspension of hostilities by mutual consent, in so far as it was a peace forced by judicial authority on one of the parties at the request of the other. The party desiring protection applied for the assurement, either before or during hostilities, to any royal, seigniorial or communal judge, who thereupon cited the other party to appear and take an oath that^he would assure the person, property and dependents of his adversary (qu'il Vassurera, elle et les siens)^. This custom, which became common in the 13th century, of course depended for its effectiveness on the degree of respect inspired in the feudal nobles by the courts. It was difficult, for instance, to refuse or to violate an assurement imposed by a royal bailli or by the parlement itself. See A. Luchaire, Manuel des institutions francaises (Paris, 1892), p. 233. — (W. A. P.)

the advantages of peace outweighed personal interest. In matters concerning the succession in Flanders, Hainaut and Navarre; in the quarrels of the princes regarding the Empire, and in those of Henry III. of England with his barons; it was because of his justice and his disinterestedness that he was appealed to as a trusted mediator. His conduct towards Henry III. was certainly a most characteristic example of his behaviour. The king of England had entered into the coalition formed by the nobility of Poitou and the count of Toulouse to prevent

the execution of the treaty of 1229 and the enfeoffment Louis IX. £ poitou to the king's brother Alphonse. Louis IX.

defeated Henry III. twice within two days, at Taille-

bourg and at Saintes,and obliged him to demand a truce (1242). It was forbidden that any lord should be a vassal both of the king of France and of the king of England. After this Louis IX. had set off upon his first crusade in Egypt (1248-54), and on his return he wanted to make this truce into a definite treaty and to " set love " between his children and those of the English king. By a treaty signed at Paris (1259), Henry III. renounced all the conquests of Philip Augustus, and Louis IX. those of his father Louis VIII. — an example unique in history of a victorious king spontaneously giving up his spoil solely for the sake of peace and justice, yet proving by his act that honesty is the best policy; for monarchy gained much by that moral authority which made Louis IX. the universal arbitrator.

But his love of peace and concord was not always " sans grands despens " to the kingdom. In 1258, by renouncing his rights over

Roussillon and the countship of Barcelona, conquered The by Charlemagne, he made an advantageous bargain

7Vinfef e0 because he kept Montpellier; but he committed a

grave fault in consenting to accept the offers regarding Sicily made by Pope Urban IV. to his brother the count of Anjou and Provence. That was the origin of the expeditions into Italy on which the house of Valois was two

centuries later to squander the resources of France unavailingly, compromising beyond the Alps its interests in the Low Countries and upon the Rhine. But Louis IX. 's worst error was his obsession with regard to the crusades, to which he sacrificed everything. Despite the signal failure of the first crusade, when he had been taken prisoner; despite the protests of his mother, of his counsellors, and of the pope himself, he flung himself into the mad adventure of Tunis. Nowhere was his blind faith more plainly shown, combined as it was with total ignorance of the formidable migrations that were convulsing Asia, and of the complicated game of politics just then proceeding between the Christian nations and the Moslems of the Mediterranean. At Tunis he found his death, on the 25th of August 1270.

The death of Louis IX. and that of his brother Alphonse of Poitiers, heir of the count of Toulouse, made Philip III., the _. ... m Bold, legitimate master of northern France and undis- the Bold' puted sovereign of southern France. From the latter (1270- he detached the comtat Venaissin in 1274 and gave it to

I28S). the papacy, which held it until 1 79 1. But he had not

his father's great soul nor disinterested spirit. Urged by Pope Martin IV. he began the fatal era of great international wars by his unlucky crusade against the king of Aragon, who, thanks to the massacre of the Sicilian Vespers, substituted his own predomin- ance in Sicily for that of Charles of Anjou. Philip returned from Spain only to die at Perpignan, ending his insignificant reign as he had begun it, amid the sorrows of a disastrous retreat (1 270-1 285) . His reign was but a halting-place of history between those of Louis IX. and Philip the Fair, just when the transition was taking place from the last days of the middle ages to the modern epoch.

The middle ages had been dominated by four great problems. The first of these had been to determine whether there should Philip IV. be a universal empire exercising tutelage over the the Fair nations; and if so, to whom this empire should (1285- belong, to pope or emperor. The second had been 1314). the extens i on t0 the East of that Catholic unity which

reigned in the West. Again, for more than a century, the question had also been debated whether the English kings were

to preserve and increase their power over the soil of France. And, finally, two principles had been confronting one another in the infernal life of all the European states: the feudal and the monarchical principles. France had not escaped any of these: conflicts ; but Philip the Fair was the initiator or the instrument (it is difficult to say which) who was to put an end to both

imperial and theocratic dreams, and to the international crusades; who was to remove the political axis from the centre of Europe, much to the benefit of the western monarchies, now definitely emanci- pated from the feudal yoke and firmly organized against both the Church and the barons. The hour had come for Dante, the great Florentine poet, to curse the man who was to dismember the empire, precipitate the fall of the papacy and discipline feudalism.

Modern in his practical schemes and in his calculated purpose, Philip the Fair was still more so in his method, that of legal procedure, and in his agents, the lawyers. With him , „. the French monarchy defined its ambitions, and little character by little forsook its feudal and ecclesiastical character of Philip in order to clothe itself in juridical forms. His aggres- the Falr > s sive and litigious policy and his ruthless financial g ‘ method were due to those lawyers of the south and of Normandy who had been nurtured on Roman law in the universities of Bologna or Montpellier, had practised chicanery in the provincial courts, had gradually thrust themselves into the great arena of politics, and were now leading the king and filling his parlement. It was no longer upon religion or morality, it was upon imperial and Roman rights that these chevaliers es lots based the prince’s omnipotence; and nothing more clearly marks the new tradition which was being elaborated than the fact that all the great events of Philip the Fair’s reign were lawsuits.

The first of these was with the papacy. The famous quarrel between the priesthood and the Empire, which had culminated at Canossa under Gregory VII., in the apotheosis of phiiipthe the Lateran council under Innocent III., and again Fair and in the fall of the house of Hohenstaufen under Innocent the IV., was reopened with the king of France by Boniface Pa P ac ˆ VIII. The quarrel began in 1294 about a question of money. In his bull Clericis laicos the pope protested against the taxes levied upon the French clergy by the king, whose expenses were increasing with his conquests. But he had not insisted; because Philip, between feudal vassals ruined by the crusades and lower classes fleeced by everybody, had threatened to forbid the exportation from France of any ecclesiastical gold and silver. In 1301 and 1302 the arrest of Bernard Saisset, bishop of Pamiers, by the officers of the king, and the citation of this cleric before the king’s tribunal for the crime of lese-majeste, revived the conflict and led Boniface to send an order to free Saisset, and to put forward a claim to reform the kingdom under the threat of excommunication. In view of the gravity of the occasion Philip made an unusually extended appeal to public opinion by convoking the states-general at Notre-Dame in Paris (1302). Whatever were their views as to the relations between ecclesiastical and secular jurisdiction, the French clergy, ruined by the dues levied by the papal court, ranged themselves on the national side with the nobility and

the bourgeoisie; whereupon the king, with a bold stroke far ahead of his time, gave tit for tat. His chancellor, Nogaret, went to Anagni to seize the pope and drag him before a council; but Boniface died without confessing himself vanquished. As a matter of fact the king and his lawyers triumphed, where the house of Swabia had failed. After the death of Boniface the splendid fabric of the medieval theocracy gave place to the rights of civil society, the humiliation of Avignon, the disruption of the great schism, the vain efforts of the councils for reform, and the radical and heretical solutions of Wycliffe and Huss.

*The affair of the Templars was another legal process carried out by the same Nogaret. Of course this military religious order had lost utility and justification when the Holy phlllp the Land had been evacuated and the crusades were over. Fair and Their great mistake had lain in becoming rich, and < *e rich to excess, through serving as bankers to princes, Tem P Iars – kings and popes; for great financial powers soon became*

unpopular. Philip took advantage of this hatred of the lower classes and the cowardice of. his creature, Pope Clement V., to satisfy his desire for money. The trial of the order (1307- 1313) was a remarkable example of the use of the religious tribunal of the Inquisition as a political instrument. There was a dramatic completeness about this unexpected result of the crusades. A general arbitrary arrest of the Templars, the sequestration of their property, examination under torture, the falsifying of procedure, extortion of money from the pope, the auto-da-fe of innocent victims, the dishonest pillaging of their goods by the joint action of the king and the pope: such was the outcome of this vast process of secularization, which foreshadowed the events of the 16th and 18th centuries.

External policy had the same litigious character. Philip the Fair instituted suits against his natural enemies, the king

of England and the count of Flanders, foreign princes Philip the holding possessions within his kingdom; and against Edward 1. tne emperor, whose ancient province of Lorraine and

kingdom of Aries constantly changed hands between Germany and France. Philip began by interfering in the affairs of Sicily and Aragon, his father's inheritance; after which, on the pretext of a quarrel between French and English sailors, he set up his customary procedure: a citation of the king of

England before the parlement of Paris, and in case of default a decree of forfeiture; the whole followed by execution — that is to say by the unimportant war of 1295. A truce arranged by Boniface VIII. restored Guienne to Edward I., gave him the hand of Philip's sister for himself and that of the king's daughter for his son (1298).

A still more lengthy and unfortunate suit was the attempt of Philip the Fair and his successors to incorporate the Flemish

fief like the English one (1300-1326), thus coming Phtup the j nto con fl; C (- w ith p ro ud and turbulent republics Flanders, composed of wool and cloth merchants, weavers,

fullers and powerful counts. Guy de Dampierre, count of Namur, who had become count of Flanders on the death of his mother Margaret II. in 1279 — an ambitious, greedy and avaricious man — was arrested at the Louvre on account of his attempt to marry his daughter to Edward I.'s eldest son without the consent of his suzerain Philip. Released after two years, he sided definitely with the king of England when the latter was in arms against Philip; and being only weakly supported by Edward, he was betrayed by the nobles who favoured France, and forced to yield up not only his personal liberty but the whole of Flanders (1300). The Flemings, however, soon wearying of the oppressive administration of the French governor, Jacques de Chatillon, and the recrudescence of patrician domination, rose and overwhelmed the French chivalry at Courtrai (1302) — a prelude to the coming disasters of the Hundred Years' War. Philip's double revenge, on sea at Zierikzee and on land at Mons-en-Pevele (1304), led to the signing of a treaty at Athis-sur- Orge(i3os).

The efforts of Philip the Fair to expand the limits of his kingdom on the eastern border were more fortunate. His Eastern marriage had gained him Champagne; and he after- poiicy of wards extended his influence over Franche Comte, Philip the Bar and the bishoprics of Lorraine, acquiring also ar ' Viviers and the important town of Lyons — all this

less by force of arms than by the expenditure of money. Disdain- ing the illusory dream of the imperial crown, still cherished by his legal advisers, he pushed forward towards that fluctuating eastern frontier, the line of least resistance, which would have yielded to him had it not been for the unfortunate interruption of the Hundred Years' War.

His three sons, Louis X., Philip V. the Tall, and Charles IV., continued his work. They increased the power of the monarchy . politically by destroying the feudal reaction excited

of Philip m I 3 I 4 by the tyrannical conduct of the jurists, like the Pair Enguerrand de Marigny , and by the increasingfinancial YfJg' extortions of their father; and they also — notably

Philip V., one of the most hard-working of the Capets — increased it on the administrative side by specializing the services

of justice and of finance, which were separated from the king's council. Under these mute self-effacing kings the progress of royal power was only the more striking. With them the senior male line of the house of Capet became extinct.

During three centuries and a half they had effected great things: they had founded a kingdom, a royal family and civil institutions. The land subject to Hugh Capet in 987, barely representing two of the modern departments J' be "'y' 1 of France, in 1328 covered a space equal to fifty-nine c^^" of them. The political unity of the kingdom was only fettered by the existence of four large isolated fiefs: Flanders on the north, Brittany on the west, Burgundy on the east and Guienne on the south. The capital, which for long had been movable, was now established in the Louvre at Paris, fortified by Philip Augustus. Like the fiefs, feudal institutions at large had been shattered. The Roman tradition which made the will of the sovereign law, gradually propagated by the teaching of Roman law — the law of servitude, not of liberty — and already proclaimed by the jurist Philippe de Beaumanoir as superior to the customs, had been of immense support to the interest of the state and the views of the monarchs; and finally the Capets, so humble of origin, had created organs of general administration common to all in order to effect an administrative centralization. In their grand council and their domains they would have none but silent, servile and well-disciplined agents. The royal exchequer, which was being painfully elaborated in the chambre des comptes, and the treasury of the crown lands at the Louvre, together barely sufficed to meet the expenses of this more compli- cated and costly machinery. The uniform justice exercised by the parlement spread gradually over the whole kingdom by means of cas royaux (royal suits) , and at the same time the royal coinage became obligatory. Against this exaltation of their power two adversaries might have been formidable; but one, the Church, was a captive in Babylon, and the second, the people, was deprived of the communal liberties which it had abused, or humbly effaced itself in the states-general behind the declared will of the king. This well-established authority was also supported by the revered memory of " Monseigneur Saint Louis "; and it is this prestige, the strength of this ideal superior to all other, that explains how the royal prerogative came to survive the mistakes and misfortunes of the Hundred Years' War.

On the extinction of the direct line of the Capets the crown passed to a younger branch, that of the Valois. Its seven representatives (1328-1498) were on the whole very inferior to the Capets, and, with the exception of Advent of Charles V. and Louis XL, possessed neither their y a/otei political sense nor even their good common sense; they cost France the loss of her great advantage over all other countries. During this century and a half France passed through two very severe crises; under the first five Valois the Hundred Years' War imperilled the kingdom's independence; and under Louis XL the struggle against the house of Burgundy endangered the territorial unity of the monarchy that had been established with such pains upon the ruins of feudalism.

Charles the Fair having died and left only a daughter, the nation's rights, so long in abeyance, were once more regained. An assembly of peers and barons, relying on two precedents under Philip V. and Charles IV., declared ˆJl'f VI ' that " no woman, nor therefore her son, could in 1350). accordance with custom succeed to the monarchy of France." This definite decision, to which the name of the Salic law was given much later, set aside Edward III., king of England, grandson of Philip the Fair, nephew of the late kings and son of their sister Isabel. Instead it gave the crown to the feudal chief, the hard and coarse Philip VI. of Valois, nephew of Philip the Fair. This at once provoked war between the two monarchies, English and French, which, including periods of truce, lasted for a hundred and sixteen years. Of active warfare there were two periods, both disastrous to begin with, but ending favourably: one lasted from 1337 to 1378 and the other from 1413 to 1453, thirty-three years of distress and folly coming in between.

However, the Hundred Years' War was not mainly caused by the pretensions of Edward III. to the throne of the Capets; The since after having long hesitated to do homage to

Hundred Philip VI. for his possessions in Guienne, Edward at years' i as t brought himself to it — though certainly only after

ar ' lengthy negotiations, and even threats of war in 133 1.

It is true that six years later he renounced his homage and again claimed the French inheritance; but this was on the ground of personal grievances, and for economic and political reasons. There was a natural rivalry

between Edward III. and Philip VI., both of them young, fond of the life of chivalry, festal magnifi- cence, and the " belles apertises d'armes." This rivalry was aggravated by the enmity between Philip VI. and Robert of Artois, his brother-in-law, who, after having warmly supported the disinheriting of Edward III., had been convicted of deceit in a question of succession, had revenged himself on Philip by burning his waxen effigy, and had been welcomed with open arms at Edward's court. Philip VI. had taken reprisals against him in 1336 by making his parlement declare the forfeiture of Edward's lands and castles in Guienne; but the Hundred Years' War, at first simply a feudal quarrel between vassal and suzerain, soon became a great national conflict, in consequence of what was occurring in Flanders.

The communes of Flanders, rich, hard-working, jealous of their liberties, had always been restive under the authority of their counts and the influence of their suzerain, the king of France. The affair at Cassel, where Philip VI. had avenged the injuries done by the people of Bruges in 1325 to their count, Louis of Nevers, had also compromised English interests. To attack the English through their colonies, Guienne and Flanders, was to injure them in their most vital interests — cloth and claret; for England sold her wool to Bruges in order to pay Bordeaux for her wine. Edward III. had replied by forbidding the exportation of English wool, and by threatening the great industrial cities of P'landers with the transference to England of the cloth manufacture — an excellent means of stirring them up against the French, as without wool they could do nothing. Workless, and in desperation, they threw themselves on Edward's mercy, by the advice of a rich citizen of Ghent, Jacob van Artevelde (q.v.); and their last scruples of loyalty gave way when Edward decided to follow the counsels of Robert of Artois and of Artevelde, and to claim the crown of France.

The war began, like every feudal war of that day, with a solemn defiance, and it was soon characterized by terrible disasters. The destruction of the finest French '"• fleet that had yet been seen, surprised in the port of*

Sluys, closed the sea to the king of France; the struggle was continued on land, but with little result. Flanders tired of it, but fortunately for Edward III. Brittany now took fire, through a quarrel of succession, analogous to that in France, between Charles of Blois (who had married the daughter of the late duke and was a nephew of Philip VI., by whom he was supported) and John of Montfort, brother of the old duke, who naturally asked assistance from the king of England. But here, too, nothing important was accomplished; the capture of John of Montfort at Nantes deprived Edward of Brittany at the very moment when he finally lost Flanders by the death of Artevelde, who was killed by the people of Ghent in 1345. Under the influence of Godefroi d'Harcourt, whom Philip VI. had wished to destroy

on account of his ambitions with regard to the duchy of Normandy, Edward III. now invaded central France, ravaged Normandy, getting as near to Paris as Saint- Germain; and profiting by Philip VI. 's hesita- tion and delay, he reached the north with his spoils by dint of forced marches. Having been pursued and encountered at _. Crecy, Edward gained a complete victory there on the

defeat at 26th of April 1346. The seizure of Calais in 1347, Crecy and despite heroic resistance, gave the English a port th fJ a ˆ'. az where they could always find entry into France, just when the queen of England had beaten David of Scotland, the ally of France, at Neville's Cross, and when Charles of Blois, made prisoner in his turn, was held captive

defeat at Sluys.

in London. The Black Death put the finishing touch to the military disasters and financial upheavals of this unlucky reign; though before his death in 1350 Philip VI. was fortunate enough to augment his territorial acquisitions by the purchase of the rich port of Montpellier, as well as by that of Dauphing, which extended to the Alpine frontier, and was to become the appanage of the eldest son of the king of France (see Dauphine and Dauphin).

Philip VI.'s successor was his son John the Good — or rather, the stupid and the spendthrift. This noble monarch was un- speakably brutal (as witness the murders, simply on suspicion, of the constable Raoul de Brienne, count John the of Eu, and of the count of Harcourt) and incredibly (1350). extravagant. His need of money led him to debase the currency eighty-one times between 1350 and 1355. And this money, so necessary for the prosecution of the war with England, which had been interrupted for a year, thanks to the pope's intervention, was lavished by him upon his favourite, Charles of La Cerda. The latter was murdered in 1354 by order of Charles of Navarre, the king's son-in-law, who also prevented the levying of the taxes voted by the states in 1355 with the object of replenishing the treasury. The Black Prince took this opportunity to ravage the southern provinces, and then marched to join the duke of Lancaster and Charles of Navarre in Normandy. John the Good managed to bring the English army to bay at Maupertuis, ˆmlrf. not far from Poitiers; but the battle was conducted with such a want of intelligence on his part that the French army was overwhelmed, though very superior in numbers, and King John was made prisoner, after a determined resistance, on the 19th of September 1356.

The disaster at Poitiers almost led to the establishment in France of institutions analogous to those which England owed to Bouvines. The king

a prisoner, the dauphin dis- credited and deserted, and the nobility decimated, Th f e .ˆf tes the people — that is to say, the states-general — could ° 356 raise their voice. Philip the Fair had never regarded the states-general as a financial institution, but merely as a moral support. Now, however, in order to obtain substantial help from taxes instead of mere driblets, the Valois needed a stronger lever than cunning or force. War against the English assured them the support of the nation. Exactions, debasement of the currency and extortionate taxation were ruinous palliatives, and insufficient to supply a treasury which the revenue from crown lands and various rights taken from the nobles could not fill even in times of peace. By the 14th century the motto " N'impose qui ne veut " (i.e. no taxation without consent) was as firmly established in France as in England. After Crecy Philip VI. called the states together regularly, that he might obtain subsidies from them, as an assistance, an "aid" which subjects could not refuse their suzerain. In return for this favour, which the king could not claim as a right, the states, feeling their power, began to bargain, and at the session of November 1355 demanded the participation of all classes in the tax voted, and obtained guarantees both for its levy and the use to be made of it. A similar situation in England had given birth to political liberty; but in France the great crisis of the early 15th century stifled it. It was with this money that John the Good got himself beaten and taken prisoner at Poitiers. Once more the states-general had to be convoked. Confronted by a pale weakly boy like the dauphin Charles and the remnants of the discredited council, the situation of the states was stronger than ever. Predominant in influence were the deputies Robert le from the towns, and above all the citizens of the Coq and capital, led by Robert le Coq, bishop of Laon, and Btienne Etienne Marcel, provost of the merchants of Paris. Marce – Having no cause for confidence in the royal administration, the states refused to treat with the dauphin's councillors, and proposed to take him under their own tutelage. He himself hesitated whether to sacrifice the royal authority, or else, without resources or support, to resist an assembly backed by public opinion. He decided for resistance. Under pretext of

grave news received from his father, and of an interview at Metz with his uncle, the emperor Charles IV., he begged the states to adjourn till the 3rd of November 1356. This was a political coup d'etat, and when the time had expired he attempted a financial coup d'itat by debasing the currency. An uprising obliged him to call the states-general together again in

February 1357, when they transformed themselves into a deliberative, independent and permanent assembly by means of the Grande Ordonnance.

In order to make this great French charter really effective resistance to the royal authority should have been collective, _ national and even popular, as in the case of the charters

Grande of 1 2i 5 and 1258 in England. But the lay and ecclesi- Ordon- astical feudal lords continued to show themselves nance of j n F rance) as everywhere else except across the Straits of Dover, a cause of division and oppression. More- over, the states were never really general; those of the Langue d'oc and the Langue d'oil sometimes acted together; but there was never a common understanding between them and always two Frances within the kingdom. Besides, they only represented the three classes who alone had any social standing at that period: the nobles, the clergy, and the burgesses of important towns. Etienne Marcel himself protested against councillors " de petit Stat." Again, the states, intermittently convoked according to the king's good pleasure, exercised neither periodical rights nor effective control, but fulfilled a duty which was soon felt as onerous. Indifference and satiety spread speedily; the bourgeoisie forsook the reformers directly they had recourse to violence (February 1358), and the Parisians became hostile when Etienne Marcel complicated his revolutionary work by intrigues with Navarre, releasing from prison the grandson of Louis X., the Headstrong, an ambitious, fine-spoken courter of popularity, covetous of the royal crown. The dauphin's flight from Paris excited a wild outburst of monarchist loyalty and anger against the capital among the nobility and in the states- general of Compiegne. Marcel, like the dauphin, was not a man to turn back. But neither the support of the peasant insurgents —the " Jacques "—who were annihilated in the market of Meaux, nor a last but unheeded appeal to the large towns, nor yet the- uncertain support of Charles the Bad, to whom Marcel in despair proposed to deliver up Paris, saved him from being put to death by the royalist party of Paris on the 31st of July

I3S8.

Isolated as he was, Etienne Marcel had been unable either to seize the government or to create a fresh one. In the reaction which followed his downfall royalty inherited the financial administration which the states had set up to check extravagance. The " elus " and the superintendents, instead of being delegates of the states, became royal functionaries like the baillis and the provosts; imposts, hearth-money (Jouage), salt-tax (gabelle), sale- dues (droits de venle), voted for the war, were levied during the whole of Charles V.'s reign and added to his personal revenue. The opportunity of

founding political liberty upon the vote and the control of taxation, and of organizing the administration of the kingdom so as to ensure that the entire military and financial resources should be always available, was gone beyond recall.

Re-establishing the royal authority in Paris was not enough ; an end had to be put to the war with England and Navarre, and

this was effected by the treaty of Bretigny (1360). T ne t . King John ceded Poitou, Saintonge, Agenais, Perigord Bretigny. and Limousin to Edward III., and was offered his

liberty for a ransom of three million gold crowns; but, unable to pay that enormous sum, he returned to his agreeable captivity in London, where he died in 1364.

Yet through the obstinacy and selfishness of John the Good, France, in stress of suffering, was gradually realizing herself.

*More strongly than her king she felt the shame of 111*4. V ‘ defeat. Local or municipal patriotism waxed among*

peasants and townsfolk, and combined with hatred

of the English to develop national sentiment. Many of the conquered repeated that proud, sad answer of the men

(1364 1380)

pagnies.”

of Rochelle to the English: ” We will acknowledge you with our lips; but with our hearts, never ! ”

The peace of Bretigny brought no repose to the kingdom. War having become a congenial and very lucrative industry, its cessation caused want of work, with all the evils Toe that entails. For ten years the remnants of the armies ” Orandes of England, Navarre and Brittany — the ” Grandes Co” 1 – Compagnies,” as they were called’ — ravaged the country; although Charles V., ” durement subtil et sage,” succeeded in getting rid of them, thanks to du Guesclin, one of their chiefs, who led them to any place where fighting was going on — to Brittany, Alsace, Spain. Charles also had all towns and large villages fortified; and being a man of affairs he set about undoing the effect of the treaty of Bretigny by alliances with Flanders, whose heiress he married to his brother Philip, duke of Burgundy; with Henry, king of Castile, and Ferdinand of Portugal, who possessed fine

navies; and, finally, with the emperor Charles IV. Financial and military preparations were made no less seriously when the harsh administration of the Black Prince, to whom Edward III. had given Guienne in fief, provoked the nobles of Gascony to complain to Charles V. Cited before the court of Paris, the Black Prince refused to attend, and war broke out in Gascony, Poitou and Normandy, but with fresh tactics (1369). Whilst the English adhered to the system of wide circuits, under Chandos or Robert Knolles, Charles V. limited himself to defending the towns and exhausting the enemy without taking dangerous risks. Thanks to the prudent constable du Guesclin, sitting quietly at home he re- conquered bit by bit what his predecessors had lost upon the battlefield, helm on head and sword in hand; and when he died in 1380, after the decease of both Edward III. and the Black Prince, the only possessions of England in a liberated but ruined France were Bayonne, Bordeaux, Brest, Cherbourg and Calais.

The death of Charles V. and dynastic revdlutions in England stopped the war for thirty-five years. Then began an era of internal disorder and misery. The men of that period, coarse, violent and simple-minded, with few ?(%. political ideas, loved brutal and noisy pleasures — 1422). witness the incredible festivities at the marriage of Charles VI., and the assassinations of the constable de Clisson, the duke of Orleans and John the Fearless. It would have needed an energetic hand to hold these passions in check; and Charles VI. was a gentle-natured child, twelve years of age, who attained his majority only to fall into a second childhood. Thence arose a question which remained without reply during the whole of his reign. Who should have possession of the royal person, and, consequently, of the royal power ? Tae u ag > s Should it be the uncles of the king, or his followers ancles and Clisson and Bureau de la Riviere, whom the nobles theMar- called in mockery the Marmousets ? His uncles first mousets – seized the government, each with a view to his own particular interests, which were by no means those of the kingdom at large. The duke of Anjou emptied the treasury in conquering the kingdom of Naples, at the call of Queen Joanna of Sicily. The duke of Berry seized upon Languedoc and the wine-tax. The duke of Burgundy, heir through his wife to the countship of Flanders, wanted to crush the democratic risings among the Flemings. Each of them needed money, but Charles V., pricked by conscience on his death-bed, forbade the levying of the hearth-tax (1380). His brother's attempt to re-establish it set Paris in revolt. The Maillotins of Paris found imitators in other great towns; and in Auvergne and Vivarais ff,, rerolt the Tuchins renewed the Jacquerie. Revolutionary Maillotins. attempts between 1380 and 1385 to abolish all taxes were echoed in England, Florence and Flanders. These isolated rebellions, however, were crushed by the ever-ready coalition of royal and feudal forces at Roosebeke (1382). Taxes and subsidies were maintained and the hearth-money re-established.*

The death of the duke of Anjou at Bari (1384) gave pre- ponderant influence to Philip the Bold, duke of Burgundy, who increased the large and fruitless expenses of his Burgundian

policy to such a point that on the return of a last unfortunate expedition into Gelderland Charles VI., who had been made by him to marry Isabel of Bavaria, took the govern- M ˆCharles ment from his uncles on the 3rd of May 1389, and vi. recalled the Marmousets. But this young king, aged

only twenty, very much in love with his young wife and excessively fond of pleasure, soon wrecked the delicate poise of his mental faculties in the festivities of the H6tel Saint- Paul; and a violent attack of Pierre de Craon on the constable de Clisson having led to an expedition against his accomplice, the duke of Brittany, Charles was seized by insanity on the road. The Marmousets were deposed, the king's brother, the duke of Orleans, set aside, and the old condition of affairs began again (1392).

The struggle was now between the two branches of the royal family, the Orleanist and the Burgundian, between the aristo- cratic south and the democratic north; while the Strugs deposition of Richard II. of England in favour of the Ar- Henry of Lancaster permitted them to vary civil war magnacs by war against the foreigner. Philip the Bold, duke and the £ Burgundy, the king's uncle, had certain advantages gundlaas. over hi s rival Louis of Orleans, Charles VI. 's brother: superiority in age, relations with the Lancastrians and with Germany, and territorial wealth and power. The two adversaries had each the same scheme of government: each wanted to take charge of Charles VI., who was intermittently insane, and to exclude his rival from the pillage of the royal exchequer; but this rivalry of desires brought them into opposi- tion on all the great questions of the day — the war with England, the Great Schism and the imperial election. The struggle became acute when John the Fearless of Burgundy succeeded his father in 1404. Up to this time the queen, Isabel of Bavaria, had been held in a kind of dependency upon Philip of Burgundy, who had brought about her marriage ; but less eager for influence than for money, since political questions were unintelligible to her and her situation was a precarious one, she suddenly became favourable to the duke of Orleans. Whether due to passion or caprice this cost the duke his life, for John the Fearless had him assassinated in 1407, and thus let loose against one another the Burgundians and the Armagnacs, so-called because the son of*

the murdered duke was the son-in-law of the count of Armagnac (see Armagnac). Despite all attempts at reconciliation the country was divided into two parties. 'Paris, with her tradesmen — the butchers in particular — and her university, played an important part in this quarrel; for to be master of Paris was to be master of the king. In 1413 the duke of Burgundy gained the upper hand there, partly owing to the rising of the Cabochiens, i.e. the butchers led by the skinner Simon Caboche, partly to the hostility of the university to the Avignon pope and partly to the Parisian bourgeoisie.

Amid this reign of terror and of revolt the university, the only moral and intellectual force, taking the place of the impotent Th Or- states-general and of a parlement carefully restricted to doaaance the judiciary sphere, vainly tried to re-establish a firm Cabo- monarchical system by means of the Ordonnance Cabo- ch,eaae ' chienne; but this had no effect, the government being now at the mercy of the mob, themselves at the mercy of incapable hot-headed leaders. The struggle ended in becoming one between factions of the townsmen, led respectively by the hfichier Cirasse and by Jean Caboche. The former overwhelmed John the Fearless, who fled from Paris; and the Armagnacs, re-entering on his exit, substituted white terror for red terror, from the 12th of December 1413 to the 28th of July 1414. The butchers' organization was suppressed and all hope of reform lost. Such disorders allowed Henry V. of England to take the offensive again.

The Armagnacs were in possession of Paris and the king when Henry V. crushed them at Agincourt on the 25th of . . October 141 5. It was as at Crecy and Poitiers;

the French chivalry, accustomed to mere playing at battle in the tourneys, no longer knew how to fight. Charles of Orleans being a captive and his father-in-law, the count of

Armagnac, highly unpopular, John the Fearless, hitherto prudently neutral, re-entered Paris, amid scenes of carnage, on the invitation of the citizen Perrinet le Clerc.

Secure from interference, Henry V. had occupied the whole of Normandy and destroyed in two years the work of Philip Augustus. The duke of B urgundy , feeling as incapable of coming to an understanding with the masterful Th t, treat y Englishman as of resisting him unaided, tried to 1420. effect a reconciliation with the Armagnacs, who had with them the heir to the throne, the dauphin Charles; but his assassination at Montereau in 1419 nearly caused the destruction of the kingdom, the whole Burgundian party going over to the side of the English. By the treaty of Troyes (1420) the son of John the Fearless, Philip the Good, in order to

avenge his father recognized Henry V. (now married to Catherine, Charles VI. 's daughter) as heir to the crown of France, to the detriment of the dauphin Charles, who was disavowed by his mother and called in derision " the soi-disant dauphin of Viennois," When Henry V. and Charles VI. died in 1422, Henry VI. — son of Henry V. and Catherine — was proclaimed at Paris king of France and of England, with the concurrence of Philip the Good, duke of Burgundy. Thus in 1428 the English occupied all eastern and northern France, as far as the Loire; while the two most important civil powers of the time, the parlement and the university of Paris, had acknowledged the English king.

But the cause of greatest weakness to the French party was still Charles VII. himself, the king of Bourges. This youth of nineteen, the ill-omened son of a madman and of a Bavarian of loose morals, was a symbol of France, f^f'J'ff,, timorous and mistrustful. The chateaux of the «$/). Loire, where he led a restless and enervating existence, held an atmosphere little favourable to enthusiasm and energy. After his victories at Cravant (1423) and Verneuil (1424), the duke of Bedford, appointed regent of the kingdom, had given Charles VII. four years' respite, and these had been occupied in violent intrigues between the constable de Richemont 1 and the sire de la Tremoille, the young king's favourites, and solely desirous of enriching themselves at his expense. The king, melancholy spectacle as he was, seemed indeed to suit that tragic hour when Orleans, the last bulwark of the south, was besieged by the earl of Salisbury, now roused from inactivity (1428). He had neither taste nor capacity like Philip VI. or John the Good for undertaking "belles apertises d'armes"; but then a lack of chivalry combined with a temporizing policy had not been particularly unsuccessful in the case of his grandfather Charles V.

Powerful aid now came from an unexpected quarter. The war had been long and cruel, and each successive year naturally increased feeling against the English. The damage done to Burgundian interests by the harsh yet impotent government of Bedford, disgust at the iniquitous treaty of Troyes, the monarchist loyalty of many of the warriors, the still deeper sentiment felt by men like Alain Chartier towards " Dame France," and the " great misery that there was in the kingdom of France "; all these suddenly became incarnate in the person of Joan of Arc, a young peasant of Domremy in Lorraine. Determined in her faith and proud in her meekness, in opposition to the timid counsels of the military leaders, to the interested delays of the courtiers, to the scruples of the experts and the quarrelling of the doctors, she quoted her " voices," who had, she said, commissioned her to raise the siege of Orleans and to conduct the gentle dauphin to Reims, there to be crowned. Her sublime folly turned out to be wiser than their wisdom; in two months, from May to July 1429, she had freed Orleans, destroyed the prestige of the English army at Patay, and dragged the

doubting and passive king against his will to be crowned at Reims. All this produced a marvellous revulsion of political feeling throughout France, Charles VII. now becoming incontestably " him to whom the kingdom of France ought to belong." After Reims Joan's first thought was for Paris, and to achieve the final overthrow

1 Earl of Richmond; afterwards Arthur, duke of Brittany {q.v.).

of the English; while Charles VII. was already sighing for the easy life of Touraine, and recurring to that policy of truce which was so strongly urged by his counsellors, and so keenly irritating to the clear-sighted Joan of Arc. A check before Paris allowed the jealousy of La Tremoille to waste the heroine for eight months on operations of secondary importance, until the day when she was captured by the Burgundians under the walls of Compiegne, and sold by them to the English. The latter incontinently prosecuted her as a heretic; they had, indeed, a great interest in seeing her condemned by the Church, which would render her conquests sacrilegious. After a scandalous four months' duel between this simple innocent girl and a tribunal of crafty malevolent ecclesiastics and doctors of the university of Paris, Joan was burned alive in the old market-place of Rouen, on the 30th of May 143 1 (see Joan or Arc).

On Charles VII. 's part this meant oblivion and silence until the day when in 1450, more for his own sake than for hers, he caused her memory to be rehabilitated; but Joan had given the country new life and heart. From 1431 to 1454 the struggle against the English went on energetically; and the king, relieved in 1433 of his evil genius, La Tremoille, then became a man once more, playing a kingly part under the guidance of Dunois, Richemont, La Hire and Saintrailles, leaders of worth on the field of battle. Moreover, the English territory, a great triangle, with the Channel for base and Paris for apex, was not a really solid position. Yet the war seemed interminable; until at last Philip of Burgundy, for long embarrassed by his English alliance, decided in 1435 to become reconciled with Charles VII. This was in consequence of the death of his sister, who had been married to Bedford, and the return of his brother- in-law Richemont into the French king's favour. The treaty of Arras, which made him a sovereign prince for life, though harsh, at all events gave a united France the opportunity of

expelling the English from the east, and allowed the king to re-enter Paris in 1436. From 1436 to 1439 there was a terrible repetition of what happened after the Peace of Bretigny; famine, pestilence, extortions and, later, the aristocratic revolt of the Praguerie, completed the ruin of the country. But thanks to the permanent tax of the taille during this time of truce Charles VII. was able to effect the great military reform of the Compagnies d'Ordonnance, of the Francs-Archers, and of the artillery of the brothers Bureau. From this time forward the English, ruined, demoralized and weakened both by the death of the duke of Bedford and the beginnings of the Wars of the Roses, continued to lose territory on every recurrence of conflict. Normandy was lost to them at Formigny (1450), and Guienne, English since the 12th century, at Castillon (1453). They kept only Calais; and now it was their turn to have a madman, Henry VI., for king.

France issued from the Hundred Years' War victorious, but terribly ruined and depopulated. It is true she had de- finitely freed her territory from the stranger, and quemes of through the sorrows of defeat and the menace of the Han- disruption had fortified her national solidarity, and ana defined her patriotism, still involved in and not yet

dissociated from loyalty to the monarchy. A happy awakening, although it went too far in establishing royal absolutism ; and a victory too complete, in that it enervated all the forces of resistance. The nation, worn out by the long disorders consequent on the captivity of King John and the insanity of Charles VI., abandoned itself to the joys of peace. Preferring the solid advantage of orderly life to an unstable liberty, it acquiesced in the abdication of 1439, when the States consented to taxation for the support of a permanent army without any periodical renewal of their authorization. No doubt by the prohibition to levy the smallest taille the feudal lords escaped direct taxation; but from the day when the privileged classes selfishly allowed the taxing of the third estate, provided that they themselves were exempt, they opened the door to monarchic absolutism. The principle of autocracy triumphed everywhere over the remnants of local or provincial authority, in the sphere of industry as in that of administration;

Years' War.

while the gild system became much more rigid. A loyal bureau- cracy, far more powerful than the phantom administration of Bourges or of Poitiers, gradually took the place of the court nobility; and thanks to this the institutions of control which the war had called into power — the provincial states-general — were nipped in the bud, withered by the people's poverty of political idea and by the blind worship of royalty.

Without the nation's concurrence the king's creatures were now to endow royalty with all the organs necessary for the exertion of authority; by which imprudent compliance, and above all thanks to Jacques Cceur (q.v.), the financial independence of the provinces dis- appeared little by little, and all the public revenues were left at the discretion of the king alone (1436-1440). By this means, too, and chiefly owing to the constable de Richemont and the brothers Bureau, the first permanent royal army was established (i445).

Henceforward royalty, strengthened by victory and organized for the struggle, was able to reduce the centrifugal social forces to impotence. The parlement of Paris saw its monopoly Monarch- encroached upon by the court of Toulouse in 1443, tea/cen- and by the parlement of Grenoble in 1453. The <"■»- university of Paris, compromised with the English, t ' '" like the parlement, witnessed the institution and growth of privileged provincial universities. The Church of France was isolated from the papacy by the Pragmatic Sanction of Bourges (1438) only to be exploited and enslaved by royalty. Monarchic centralization, interrupted for the moment by the war, took up with fresh vigour its attacks upon urban liberties, especially in the always more independent south. It caused a slackening of that spirit of communal initiative which had awakened in the midst of unprecedented disasters. The decimated and im- poverished nobility proved their impotence in the coalitions they attempted between 1437 and 1442, of which the most important, the Praguerie, fell to pieces almost directly, despite the support of the dauphin himself.*

The life of society, now alarmingly unstable and ruthlessly cruel, was symbolized by the danse macabre painted on the walls of the cemeteries; the sombre and tragic art social

of the 15th century, having lost the fine balance ute% shown by that of the 13th, gave expression in its mournful realism to the general state of exhaustion. The favourite subject of the mysteries and of other artistic manifesta- tions was no longer the triumphant Christ of the middle ages, nor the smiling and teaching Christ of the 13 th century, but the Man of sorrows and of death, the naked bleeding Jesus, lying on the knees of his mother or crowned with thorns. France, like the Christ, had known all the bitterness and weakness of a Passion.

The war of independence over, after a century of fatigue, regrets and doubts, royalty and the nation, now more united and more certain of each other, resumed the methodic and utilitarian war of widening boundaries. Leaving dreams about crusades to the poets, and to a papacy delivered from schism, Charles VII. turned his attention to the ancient appanage of Lothair, Alsace and Lorraine, those lands of the north and the east whose

frontiers were constantly changing, and which seemed to invite aggression. But the chance of annexing them without great trouble was lost; by the fatal custom of appanages the Valois had set up again those feudal institutions which the Capets had found such difficulty in destroying, and Louis XI. was to make sad experience of this.

*To the north and east of the kingdom extended a wide territory of uncertain limits; countries without a chief like Alsace; principalities like Lorraine, ecclesiastical lordships like the bishopric of Liege; and, most important of ™ eHou ** all, a royal appanage, that of the duchy of Burgundy, \ui2y. which dated back to the time of John the Good. Through marriages, conquests and inheritance, the dukes of Burgundy had enormously increased their influence; while during the Hundred Years' War they had benefited alternately by their criminal alliance with the English and by their self-' interested reconciliation with their sovereign. They soon*

appeared the most formidable among the new feudal chiefs so imprudently called into being by Louis XL's predecessors. Fleeing from the paternal wrath which he had drawn down upon himself by his ambition and by his unauthorized marriage with Charlotte of Savoy, the future Louis XL had passed five years of voluntary exile at the court of the chief of the House of Burgundy, Philip the Good; and he was able to appreciate the territorial power of a duchy which extended from the Zuyder Zee to the Somme, with all the country between the Sa6ne and the Loire in addition, and its geographical position as a commercial intermediary between Germany, England and France. He had traversed the fertile country of Flanders; he had visited the rich commercial and industrial republics of Bruges and Ghent, which had escaped the disasters of the Hundred Years' War; and, finally, he had enjoyed a hospitality as princely as it was self-interested at Brussels and at Dijon, the two capitals, where he had seen the brilliancy of a court unique in Europe for the ideal of chivalric life it offered.

But the dauphin Louis, although a bad son and impatient for the crown, was not dazzled by all this. With very simple

tastes, an inquiring mind, and an imagination always b?!l!f at work, he combined a certain easy good-nature

1483). which inspired confidence, and though stingy in

spending money on himself, he could be lavish in buying men either dangerous or likely to be useful. More inclined to the subtleties of diplomacy than to the risks of battle, he had recognized and speedily grasped the disadvantages of warfare. The duke of Burgundy, however rich and powerful, was still the king's vassal; his wide but insecure authority, of too rapid growth and unpopular, lacked sovereign rights. Hardly, there-fore, had Louis XL heard of his father's death than he made his host aware of his perfectly independent spirit, and his very definite intention to be master in his own house.

But by a kind of poetic justice, Louis XL had for seven years, from 1465 to 1472, to struggle against fresh Pragueries, called _, Leagues of the Public Weal (presumably from their

Leagues disregard of it), composed of the most powerful of the French nobles, to whom he had set the example of

Public revolt. His first proceedings had indeed given no

promise of the moderation and prudence afterwards to characterize him; he had succeeded in exasperating all parties; the officials of his father, " the well-served," whom he dismissed in favour of inferiors like Jean Balue, Oliver le Daim and Tristan Lermite; the clergy, by abrogating the Pragmatic Sanction; the university of Paris, by his ill-treatment of it; and the nobles, whom he deprived of their hunting rights, among them being those whom Charles VII. had been most careful to conciliate in view of the inevitable conflict with the duke of Burgundy — in particular, Francis II., duke of Brittany. The repurchase in 1463 of the towns of the Somme (to which Philip the Good, now grown old and engaged in a quarrel with his son, the count of Charolais, had felt obliged to consent on considera- tion of receiving four hundred thousand gold crowns), and the intrigues of Louis XL during the periodical revolts of the Li6gois against their prince-bishop, set the powder alight. On three different occasions (in 1465, 1467 and 1472), Louis XL's own brother, the duke of Berry, urged by the duke of Brittany, the count of Charolais, the duke of Bourbon, and the other feudal lords, attempted to set up six kingdoms in France instead of one, and to impose upon Louis XL a regency which should give them enormous pensions. This was their idea of Public Weal.

Louis XL won by his favourite method, diplomacy rather than arms. At the time of the first league, the battle

of Montlhery (16th of July 1465) having remained the Bold, undecided between the two equally badly organized

armies, Louis XL conceded everything in the treaties of Conflans and Saint-Maur — promises costing him little, since he had no intention of keeping them. But during the course of the second league, provoked by the recapture of Normandy, which he had promised to his brother in exchange for Berry, he was nearly caught in his own trap. On the 15th of June 1467 Philip the Good died, and the accession of the count of

*Charolais was received with popular risings. In order to embarrass him Louis XL ,had secretly encouraged the people of Liege to revolt; but preoccupied with the marriage of Charles the Bold with Margaret of York, sister of Edward IV. of England, he wished to negotiate personally with him at Peronne, and hardly had he reached that place when news arrived there of the revolt of Liege amid cries of " Vive France." Charles the Bold, proud, violent, pugnacious, as treacherous as his rival, a hardier soldier, though without his political sagacity, im- prisoned Louis in the tower where Charles the Simple r * efa < er – had died as a prisoner of the count of Vermandois. ptronae. He only let him depart when he had sworn in the treaty of Peronne to fulfil the engagements made at Conflans and Saint-Maur to assist in person at the subjugation of rebellious Liege, and to give Champagne as an appanage to his ally the duke of Berry.*

*Louis XL, supported by the assembly of notables at Tours (1470), had no intention of keeping this last promise, since the duchy of Champagne would have made a bridge between Burgundy and Flanders — the two isolated S , '*L°' f , branches of the house of Burgundy. He gave the duke coalitions. of Berry distant Guienne. But death eventually rid him of the duke in 1472, just when a third league was being organized, the object of which was to make the duke of Berry king with the help of Edward IV., king of England. The duke of Brittany, Francis II., was defeated; Charles the Bold, having failed at Beauvais in his attempt to recapture the towns of the Somme which had been promised him by the treaty of Conflans, was obliged to sign the peace of Senlis (1472). This was the end of the great feudal coalitions, for royal vengeance soon settled the account of the lesser vassals; the duke of Alencon was condemned to prison for life; the count of Armagnac was killed; and " the Germans " were soon to disembarrass Louis of Charles the Bold.*

Charles had indeed only signed the peace so promptly because he was looking eastward towards that royal crown and territorial cohesion of which his father had also dreamed. The Charles king, he said of Louis XL, is always ready. He wanted the Bold' . to provide his future sovereigntywith organs analogous imperial to those of France; a permanent army, and a judiciary III. for his son. Thus either he or his son-in-law Maximilian would have been emperor.*

But the Tarpeian rock was a near neighbour of the Capitol. Frederick — distrustful, and in the pay of Louis XI. — evaded a meeting arranged at Trier, and Burgundian influence in Alsace was suddenly brought to a violent end by the ˆt”°/ putting to death of its tyrannical agent, Peter von the Bold. Hagenbach. Charles thought to repair the rebuff of Trier at Cologne, and wasted his resources in an attempt to win over its elector by besieging the insignificant town of Neuss. But the ” universal spider ” — as he called Louis XL— was weaving his web in the darkness, and was eventually to entangle him in it. First came the reconciliation, in his despite, of those irreconcilables, the Swiss and Sigismund of Austria; and then the union of both with the duke of Lorraine, who was also disturbed at the duke of Burgundy’s ambition. In vain Charles tried to kindle anew the embers of former feudal intrigues; the execution of the duke of Nemours and the count of Saint Pol cooled all enthusiasm. In vain did he get his dilatory friends, the English Yorkists, to cross the Channel; on the 29th of August 1475, at Picquigny, Louis XI. bribed them with a sum of seventy-five thousand crowns to forsake him, Edward further undertaking to guarantee the loyalty of the duke of Brittany. Exasperated, Charles attacked and took Nancy,

wishing, as he said, ” to skin the Bernese bear and wear its fur.” To the hanging of the brave garrison of Granson the Swiss re- sponded by terrible reprisals at Granson and at Morat (March to June 1476); while the people of Lorraine finally routed Charles at Nancy on the 5th of January 1477, the duke himself falling in the battle.

*The central administration of Burgundy soon dibappeared, swamped by the resurgence of ancient local liberties; the army Ruin of fell to pieces; and all hope of joining the two limbs the house of the great eastern duchy was definitely lost. As for of Bur- t jj e remnants that were left, French provinces and *”” y ‘ imperial territory, Louis XL claimed the whole. He seized everything, alleging different rights in each place; but he displayed such violent haste and such trickery that he threw the heiress of Burgundy, in despair, into the arms of Maximilian of Austria. At the treaty of Arras (December 1482) Louis XL received only Picardy, the Boulonnais and Burgundy; by the marriage of Charles the Bold’s daughter the rest was annexed to the Empire, and later to Spain. Thus by Louis XL’s short-sighted error the house of Austria established itself in the Low Countries. An age-long rivalry between the houses of France and Austria was the result of this*

disastrous marriage; and as the son who was its issue espoused the heiress of a now unified Spain, France, hemmed in by the Spaniards and by the Empire, was thenceforward to encounter them everywhere in her course. The historical progress of France was once more endangered.

The reasons of state which governed all Louis XL's external policy also inspired his internal administration. If they justified The him in employing lies and deception in international

admlais- affairs, in his relations with his subjects they led him trationof t0 re g arc i as lawful everything which favoured his

" 8 ' authority; no question of right could weigh against it. The army and taxation, as the two chief means of domina- tion within and without the kingdom, constituted the main bulwarks of his policy. As for the nobility, his only thought was to diminish their power by multiplying their number, as his predecessors had done; while he reduced the rebels to submission by his iron cages or the axe of his gossip Tristan Lermite. The Church was treated with the same unconcerned cynicism; he held her in strict tutelage, accentuating her moral decadence still further by the manner in which he set aside or re-established the Pragmatic Sanction, according to the fluctuations of his financial necessities or his Italian ambitions. It has been said that on the other hand he was a king of the common people, and certainly he was one of them in his simple habits, in his taste for rough pleasantries, and above all in his religion, which was limited to superstitious practices and small devoutncsses. But in the states of Tours in 1468 he evinced the same mistrust for fiscal control by the people as for the privileges of the nobility. He inaugurated that autocratic rule which was to continue gaining strength until Louis XV. 's time. Louis XL was the king of the bourgeoisie; he exacted much from them, but paid them back with interest by allowing them to reduce the power of all who were above them and to lord it over all who were below. As a matter of fact Louis XL's most faithful ally was death. Saint-Pol, Nemours, Charles the Bold, his brother the duke of Berry, old Rene of Anjou and his nephew the count of Maine, heir to the riches of Provence and to rights over Naples — the skeleton hand mowed down all his adversaries as though it too were in his pay; until the day when at Plessis- les-Tours it struck a final blow, claimed its just dues from Louis XL, and carried him off despite all his relics on the 30th of August 1483.

There was nothing noble about Louis XL but his aims, and nothing great but the results he attained; yet however different Charles ˆ e m 'ght have been he could not have done better, vm. and for what he achieved was the making of France. Brittany This was soon seen after his death in the reaction 1498) which menaced his work and those who had served

him; but thanks to himself and to his true successor, his eldest daughter Anne, married to the sire de Beaujeu, a

*younger member of the house of Bourbon, the set-back was only partial. Strife began immediately between the numerous malcontents and the Beaujeu party, who had charge of the little Charles VIII. These latter prudently made conces- sions: reducing the taille, sacrificing some of Louis XL's w * r creatures to the rancour of the parlement, and restoring i4ss'. a certain number of offices or lands to the hostile princes (chief of whom was the duke of Orleans), and even consenting to a convocation of the states-general at Tours (1484). But the elections having been favourable to royalty, the Beaujeu family made the states reject the regency desired by the duke of Orleans, and organize the king's council after their own views. When they subsequently eluded the conditions imposed by the states, the deputies — nobles, clergy and burgesses — showed their incapacity, to oppose the progress of despotism. In vain did the malcontent princes attempt to set up a new League of Public Weal, the Guerre folk (Mad War), in which the duke of Brittany, Francis II., played the part of Charles the Bold, dragging in the people of Lorraine and the king of Navarre. In vain did Charles VIII. , his majority attained, at once abandon in the treaty of Sable the benefits gained by the victory of Saint-Aubin du Cormier (1488). In vain did Henry VII. of England, Ferdinand the Catholic, and Maximilian of Austria try to prevent the annexation of Brittany by France; its heiress Anne, deserted by every one, made peace and married Charles VIII. in 1 49 1. There was no longer a single great fief in France to which the malcontents could fly for refuge.*

It now remained to consolidate the later successes attained by the policy of the Valois — the acquisition of the duchies of Burgundy and Brittany; but instead there was a sudden change and that policy seemed about to be «maen° lost in dreams of recapturing the rights of the Angevins licence." over Naples, and conquering Constantinople. Charles VIII. , a prince with neither intelligence nor resolution, his head stuffed with chivalric romance, was scarcely freed from his sister's control when he sought in Italy a fatal distraction from the struggle with the house of Austria. By this " war of magnificence " he caused an interruption of half a century in the growth of national sentiment, which was only revived by Henry II.; and he was not alone in thus leaving the bone for the shadow, his contemporaries, Ferdinand the Catholic when delivered from the Moors, and Henry VII. from the power of the English nobles, followed the same superficial policy, not taking the trouble to work for that real strength which comes from the adhesion of willing subjects to their sovereign. They only cared to aggrandize themselves, without thought of national feeling or geographical conditions. The great theorist of these " conquistadores " was Machiavelli. The regent, Anrie of Beaujeu, worked in her daughter's interest to the

detriment of the kingdom, by means of a special treaty destined to prevent the property of the Bourbons from reverting to the crown; while Anne of Brittany did the like for her daughter Claude. Louis XII., the next king of France, thought only of the Milanese; Ferdinand the Catholic all but destroyed the Spanish unity at the end of his life by his marriage with Germaine de Foix; while the house of Austria was for centuries to remain involved in this petty course of policy. Ministers followed the example of their self-seeking masters, thinking it no shame to accept pensions from foreign sovereigns. The preponderating consideration everywhere was direct material advantage; there was dis- proportion everywhere between the means employed and the poverty of the results, a contradiction between the interests of the sovereigns and those of their subjects, which were associated by force and not naturally blended. For the sake of a morsel of Italian territory every one forgot the permanent necessity of Opposing the advance of the Turkish crescent, the two horns of which were impinging upon Europe on the Danube and on the Mediterranean.

Italy and Germany were two great tracts of land at the mercy of the highest bidder, rich and easy to dominate, where these coarse and alien kings, still reared on medieval traditions, were for fifty years to gratify their love of conquest. Italy was their

first battlefield; Charles VIII. was summoned thither by Lodovico II Moro, tyrant of Milan, involved in a quarrel with

his rival, Ferdinand II. of Aragon. The Aragonese laitaly™ ˆad snatched the kingdom of Naples from the

French house of Anjou, whose claims Louis XI. had inherited in 1480. To safeguard himself in the rear Charles VIII. handed over Roussillon and Cerdagne (Cerdana) to Ferdinand the Catholic (that is to say, all the profits of Louis XL's policy) ; gave enormous sums of money to Henry VII. of England; and finally, by the treaty of Senlis ceded Artois and Franche-Comte to Maximilian of Austria. After these fool's bargains the paladin set out for Naples in 1494. His journey was long and triumphant, and his return precipitate; indeed it very nearly ended in a disaster at Fornovo, owing to the first of those Italian holy leagues which at the least sign of friction were ready to turn against France. At the age of twenty-eight, however, Charles VIII. died without issue (1498).

The accession of his cousin, Louis of Orleans, under the title of Louis XII., only involved the kingdom still further in this

*Italian imbroglio. Louis did indeed add the fief of f/**?-* 7 ’” Orleans to the royal domain and hastened to divorce ISO). Jeanne of France in order to marry Anne, the widow*

of his predecessor, so that he might keep Brittany. But he complicated the Naples affair by claiming Milan in con- sideration of the marriage of his grandfather, Louis of Orleans, to Valentina, daughter of Gian Galeazzo Visconti, duke of Milan. In 1499, appealed to by Venice, and encouraged by his favourite, Cardinal d’Amboise (who was hoping to succeed Pope Alexander VI.), and also by Cesare Borgia, who had lofty ambitions in Italy, Louis XII. conquered Milan in seven months and held it for fourteen years; while Lodovico Sforza, betrayed by his Swiss mercenaries, died a prisoner in France. The kingdom of Naples was still left to recapture; and fearing to be thwarted by Ferdinand of Aragon, Louis XII. proposed to this master of roguery that they should divide the kingdom according to the treaty of Granada (1500). But no sooner had Louis XII. assumed the title of king of Naples than Ferdinand set about despoiling him of it, and despite the bravery of a Bayard and a -Louis d’Ars, Louis XII., being also betrayed by the pope, lost Naples for good in 1504. The treaties of Blois occasioned a vast amount of diplomacy, and projects of marriage between Claude of France and Charles of Austria, which came to nothing but served as a prelude to the later quarrels between Bourbons and Habsburgs.

It was Pope Julius II. who opened the gates of Italy to the horrors of war. Profiting by Louis XII.‘s weakness and the emperor Maximilian’s strange capricious character, this martial pope sacrificed Italian and religious interests alike in order to re-establish the temporal power of the papacy. . Jealous of Venice, at that time the Italian state best provided with powers of expansion, and unable to subjugate it single-handed, Julius succeeded in obtaining help from France, Spain and the Empire. The league of Cambrai (1508) was his finest diplomatic achieve- ment. But he wanted to be sole master of Italy; so in order to expel the French ” barbarians ” whom he had brought in, he appealed to other barbarians who were far more dangerous — Spaniards, Germans and Swiss — to help him against Louis XII., and stabbed him from behind with the Holy League of 151 1.

Weakened by the death of Cardinal d’Amboise, his best counsellor, Louis XII. tried vainly in the assembly of Tours

and in the unsuccessful council of Pisa to alienate the Louis Xll. p renc ij dergy from a papacy which was now so little Julius II. worthy of respect. But even the splendid victories

of Gaston de Foix could not shake that formidable coalition; and despite the efforts of Bayard, La Palice and La Tremoille, it was the Church that triumphed. Julius II. died in the hour of victory; but Louis XII. was obliged to evacuate Milan, to which he had sacrificed everything, even France itself, with that political stupidity characteristic of the first Valois. He died almost immediately after this, on the 1st of January 151 5, and his subjects, recognizing his thrift, his justice and the secure prosperity of the kingdom, forgot the

seventeen years of war in which they had not been consulted, and rewarded him with the fine title of Father of his People.

As Louis XII. left no son, the crown devolved upon his cousin and son-in-law the count of Angouleme, Francis I. No sooner king, Francis, in alliance with Venice, renewed the chimerical attempts to conquer Milan and Naples; Fff.V' 131 ' also cherishing dreams of his own election as emperor 1347). and of a partition of Europe. The heroic episode of Marignano, when he defeated Cardinal Schinner's Swiss troops (13-1 5 of September 1515), made him master of the duchy of Milan and obliged his adversaries to make peace. Leo X., Julius II. 's successor, by an astute volte-face exchanged Parma and the Concordat for a guarantee of all the Church's possessions, which meant the defeat of French plans (1515). The Swiss signed the permanent peace which they were to maintain until the Revolution of 1789; while the emperor and the king of Spain recognized Francis II. 's very precarious hold upon Milan. Once more the French monarchy was pulled up short by the indigna- tion of all Italy (1518).

The question now was how to occupy the military activity of a young, handsome, chivalric and gallant prince, " ondoyant et divers," intoxicated by his first victory and his tardy accession to fortune. This had been hailed with c ˆ aracter joy by all who had been his comrades in his days of Francis 1. difficulty; by his mother, Louise of Savoy, and his sister Marguerite; by all the rough young soldiery; by the nobles, tired of the bourgeois ways of Louis XL and the patri- archal simplicity of Louis XII. ; and finally by all the aristocracy who expected now to have the government in their own hands. So instead of heading the crusade against the Turks, Francis threw himself into the electoral contest at Frankfort, which resulted in the election of Charles V., heir of Ferdinand the Catholic, Spain and Germany thus becoming united. Pope Leo X., moreover, handed over three-quarters of Italy to the new emperor in exchange for Luther's condemnation, thereby kindling that rivalry between Charles V. and the king of France which was to embroil the whole of Europe throughout half a century (1510-1559), from Pavia to St Quentin.

The territorial power of Charles V., heir to the houses of Burgundy,

Austria, Castile and Aragon, which not only arrested the traditional policy of France but hemmed her Rtvahyot in on every side ; his pretensions to be the head of Francis 1. Christendom; his ambition to restore the house of aBd Burgundy and the Holy Roman Empire; his grave s

and forceful intellect all rendered rivalry both inevitable and formidable. But the scattered heterogeneity of his possessions, the frequent crippling of his authority by national privileges or by political discords and religious quarrels, his perpetual straits for money, and his cautious calculating character, almost outweighed the advantages which he possessed in the terrible Spanish infantry, the wealthy commerce of the Netherlands, and the inexhaustible mines of the New World. Moreover, Francis I. stirred up enmity everywhere against Charles V., and after each defeat he found fresh support in the patriotism of his subjects. Immediately after the treaty of Madrid (1526), which Francis I. was obliged to sign after the disaster at Pavia and a period of captivity, he did not hesitate between Defeat at his honour as a gentleman and the interests of his Pavia and kingdom. Having been unable to win over Henry inaiyot VIII. of England at their interview on the Field of Mam4 – the Cloth of Gold, he joined hands with Suleiman the Magnificent, the conqueror of Mohacs; and the Turkish cavalry, crossing the Hungarian Puszta, made their way as far as Vienna, while the mercenaries of Charles V., under the constable de Bourbon, were reviving the saturnalia of Alaric in the sack of Rome (1527). In Germany, Francis I. assisted the Catholic princes to maintain their political independence, though he did not make the capital he might have made of the reform movement. Italy remained faithful to the vanquished in spite of all, while even Henry VIII. of England, who only needed bribing, and Wolsey, accessible to flattery, took part in the temporary coalition. Thus did France, menaced with disruption, embark upon a course of action imposed

upon her by the harsh conditions of the treaty of Madrid. — otherwise little respected — and later by those of Cambrai (1529) ; but it was not till later, too late indeed, that it was denned and became a national policy.

After having, despite so many reverses and mistakes, saved Burgundy, though not Artois nor Flanders, and joined to the

crown lands the domains of the constable de Bourbon prose- wno na(I g° ne over t° Charles V., Francis I. should cutloa of have had enough of

defending other people's independˆ romantic ence as we u as hi s own, and should have thought more 'ions °ˆ kis interests in the north and east than of Milan.

Yet between 1531 and 1547 he manifested the same regrets and the same invincible ambition for that land of Italy which Charles V., on his side, regarded as the basis of his strength. Their antagonism, therefore, remained unabated, as also the contradiction of an official agreement with Charles V., combined with secret intrigues with his enemies. Anne de Montmorency, now head of the government in place of the headstrong chancellor Duprat, for four years upheld a policy of reconciliation and of almost friendly agreement between the two monarchs (1531- J 535)- The death of Francis I.'s mother, Louise of Savoy (who had been partly instrumental in arranging the peace of Cambrai), the replacement of Montmorency by the bellicose Chabot, and the advent to power of a Burgundian, Granvella, as Charles V.'s prime minister, put an end to this double-faced policy, which attacked the Calvinists of France while supporting the Lutherans of Germany; made advances to Clement VII. while pretending to maintain the alliance with Henry VIII. (just then consummat- ing the Anglican schism); and sought an alliance with Charles V. without renouncing the possession of Italy. The death of the duke of Milan provoked a third general war (1536-1538);

but after the conquest of Savoy and Piedmont and a at Nice. fruitless invasion of Provence by Charles V., it resulted

in another truce, concluded at Nice, in the interview at Aigues-mortes, and in the old contradictory policy of the treaty of Cambrai. This was confirmed by Charles V.'s triumphal journey through France (1539).

Rivalry between Madame d'Etampes, the imperious mistress of the aged Francis I., and Diane de Poitiers, whose ascendancy

over the dauphin was complete, now brought court

Fourth intrigues and constant changes in those who held

outbreak rr ° ,. .„ ; = , .

of war. omce, to complicate still further this wearisome

policy of ephemeral ” combinazioni ” with English, Germans, Italians and Turks, which urgent need of money always brought to naught. The disillusionment of Francis I., who had hitherto hoped that Charles V. would be generous enough to give Milan back to him, and then the assassination of Rincon, his ambassador at Constantinople, led to a fourth war (1544-1546), in the course of which the king of England went over to the side of Charles V.

Unable in the days of his youth to make Italy French, when age began to come upon him, Francis tried to make France Royal ab- Italian. In his chateau at Blois he drank greedily sohitism of the cup of Renaissance art; but he found the wider exciting draughts of diplomacy which he imbibed

from Machiavelli’s Prince even more intoxicating, and he headed the ship of state straight for the rock of absolutism. He had been the first king ” du bon plaisif ” (” of his own good pleasure “) — a ” Caesar,” as his mother Louise of Savoy proudly hailed him in 151 5 — and to a man of his gallant and hot-headed temperament love and war were schools little calculated to teach moderation in government. Italy not only gave him a taste for art and letters, but furnished him with an arsenal of despotic maxims. Yet his true masters were the jurists of the southern universities, passionately addicted to centralization and autocracy, men like Duprat and Poyet, who revived the persistent tradition of Philip the Fair’s legists. Grouped together on the council of affairs, they managed to control the policy of the common council, with its too mixed and too independent membership. They successfully strove to separate ” the grandeur and superexcellence of the king ” from the rest of the nation; to isolate the nobility amid the seductions of a court lavish in

promises of favour and high office; and to win over the bourgeoisie by the buying and selling and afterwards by the hereditary transmission of offices. Thanks to their action, feudalism was attacked in its landed interest in the person of the constable de Bourbon; feudalism in its financial aspect by the execution of superintendent Semblancay and the special privileges of towns and provinces by administrative centraliza- tion. The bureaucracy became a refuge for the nobles, and above all for the bourgeois, whose fixed incomes were lowered by the influx of precious metals from the New World, while the wages of artisans rose. All those time-worn medieval institutions which no longer allowed free scope to private or public life were demolished by the legists in favour of the monarchy.

Their masterstroke was the Concordat of 1516, which meant an immense stride in the path towards absolutism. While Germany and England, where ultramontane doctrines had been allowed to creep in, were seeking a remedy Tnecoam

*■ . 4 u *• r ,, 6 . } cordatot*

against the economic exactions of the papacy in a jsis. reform of dogma or in schism, France had supposed herself to have found this in the Pragmatic Sanction of Bourges. But to the royal jurists the right of the churches and abbeys to make appointments to all vacant benefices was a guarantee of liberties valuable to the clergy, but detestable to themselves because the clergy thus retained the great part of public wealth and authority. By giving the king the ecclesiastical patronage they not only made a docile instrument of him, but endowed him with a mine of wealth, even more productive than the sale of offices, and a power of favouring and rewarding that trans formed a needy and ill-obeyed king into an absolute monarch. To the pope they offered a mess of pottage in the shape of annates and the right of canonical institution, in order to induce him to sell the Church of France to the king. By this royal reform they completely isolated the monarchy, in the presumptuous pride of omnipotence, upon the ruins of the Church and the aristocracy, despite both the university and the parlement of Paris.

Thus is explained Francis I.'s preoccupation with Italian adventures in the latter part of his reign, and also the inordinate squandering of money, the autos-da-fe in the provinces and in Paris, the harsh repression of reform and free thought, and the sale of justice; while the nation became impoverished and the state was at the mercy of the caprices of royal mistresses — all of which was to become more and more pronounced during the twelve years of Henry II. 's government. • Henry II. shone but with a reflected light — in his private life eflected from his old mistress, Diane de Poitiers, and in his political action reflected from the views of Mont morency or the Guises. He only showed his own ˆV}? 11 ' personality in an egoism more narrow-minded, in issq.) hatred yet bitterer than his father's; or in a haughty and jealous insistence upon an absolute authority which he never had the wit to maintain.

The struggle with Charles V. was at first delayed by differences with England. The treaty of Ardres had left two bones of contention: the cession of Boulogne to England and the exclusion of the Scotch from the terms of He " r y IL peace. At last the regent, the duke of Somerset, Charles v. endeavoured to arrange a marriage between Edward VI., then a minor, and Mary Stuart, who had been offered in marriage to the dauphin Francis by her mother, Marie of Lorraine, a Guise who had married the king of Scotland. The transference of Mary Stuart to France, and the treaty of

1550 which restored Boulogne to France for a sum of 400,000 crowns, suspended the state of war; and then Henry II. 's opposition to the imperial policy of Charles V. showed itself everywhere: in Savoy and Piedmont, occupied by the French and claimed by Philibert Emmanuel, Charles V.'s ally; in Navarre, unlawfully conquered by Ferdinand the Catholic and claimed by the family of Albret; in Italy, where, aided and abetted by Pope Paul III., Henry II. was trying to regain support; and, finally, in Germany, where after the victory of Charles V. at Miihlberg (1547) the Protestant princes called Henry II. to their aid', offering to

subsidize him and cede to him the towns of Metz, Toul and Verdun. The Protestant alliance was substituted for the Turkish alliance, and Henry II. hastened to accept the offers made to him (1552); but this was rather late in the day, for the reform movement had produced civil war and evoked fresh forces. The Germans, in whom national feeling got the better of imperialistic ardour, as soon as they saw the French at Strassburg, made terms with the emperor at Passau and permitted Charles to use all his forces against Henry II. The

defence of Metz by Francis of Guise was admirable of MetL. an< i successful; but in Picardy operations continued

their course without much result, owing to the in- capacity of the constable de Montmorency. Fortunately, despite the marriage of Charles V.'s son Philip to Mary Tudor, which gave him the support of England (1554), and despite the religious pacification of Germany through the peace of

Augsburg (1555), Charles V., exhausted by illness Vaucettes. anc ' by thirty years of intense activity, in the truce

of Vaucelles abandoned Henry II. 's conquests — Piedmont and the Three Bishoprics. He then abdicated the government of his kingdoms, which he divided between his son Philip II. and his brother Ferdinand (1556). A double victory, this, for France.

Henry II. 's resumption of war, without provocation and without allies, was a grave error; but more characterless than

ever, the king was urged to it by the Guises, whose Het "y "• influence since the defence of Metz had been supreme Philip 11. at court and who were

perhaps hoping to obtain

Naples for themselves. On the other hand, Pope Paul IV. and his nephew Carlo Caraffa embarked upon the struggle, because as Neapolitans they detested the Spaniards, whom they Peace 0/ considered as " barbarous " as the Germans or the Cateau- French. The constable de Montmorency's disaster Cam ' at Saint Quentin (August 1557), by which Philip II.

ress ' had not the wit to profit, was successfully avenged by Guise, who was appointed lieutenant-general of the kingdom. He took Calais by assault in January 1558, after the English had held it for two centuries, and occupied Luxemburg. The treaty of Cateau-Cambresis (August 1550) finally put an end to the Italian follies, Naples, Milan and Piedmont; but it also lost Savoy, making a gap in the frontier for a century. The question of Burgundy was definitely settled, too; but the Netherlands had still to be conquered. By the possession of the three bishoprics and the recapture of Calais an effort towards a natural line of frontier and towards a national policy seemed indicated; but while the old soldiers could not forget Marignano, Ceresole, nor Italy perishing with the name of France on her lips, the secret alliance between the cardinal of Lorraine and Granvella against the Protestant heresy foretold the approaching subordination of national questions to religious differences, and a decisive attempt to purge the kingdom of the new doctrines.

The origin and general history of the religious reformation in the r6th century are dealt with elsewhere (see Church

History and Reformation). In France it had formation, originally no revolutionary character whatever; it

proceeded from traditional Gallican theories and from the innovating principle of humanism, and it began as a protest against Roman decadence and medieval scholasticism. It found its first adherents and its first defenders among the clerics and learned men grouped around Faber (Lefevre) of Staples at Meaux; while Marguerite of Navarre, " des Roynes la non pareille,"was the indefatigable Maecenas of these innovators, and the incarnation of the Protestant spirit at its purest. The reformers shook off the yoke of systems in order boldly to renovate both knowledge and faith; and, instead of resting on the abstract a priori principles within which man and nature had been imprisoned, they returned to the ancient methods of observation and analysis.. In so doing, they separated intellectual from popular life; and acting in this spirit, through the need of a moral renaissance, they reverted to primitive Christianity, substituting the inner and individual authority of conscience for the general and external authority of the Church. Their

efforts would not, however, have sufficed if they had not been seconded by events; pure doctrine would not have given birth to a church, nor that church to a party; in France, as in Germany, the religious revolution was conditioned by an economic and social revolution.

The economic renaissance due to the great maritime discoveries had the consequence of concentrating wealth in the hands of the bourgeoisie. Owing to their mental qualities, their tendencies and their resources, the bourgeoisie had been, if not alone, at least most apt in profiting by the development of industry, "by the extension of commerce, and by the formation of a new and mobile means of enriching themselves. But though the bourgeois had acquired through capitalism certain sources of influence, and gradually monopolized municipal and public functions, the king and the peasants had also benefited by this revolution. After ? hundred and fifty years of foreign war and civil discord, at 1 period when order and unity were ardently desired, an absolute monarchy had appeared the only power capable of realizing such aspirations. The peasants, moreover, had profited by ths reduction of the idle landed aristocracy; serfdom had decreased or had been modified; and the free peasants were mofe prosperous, had reconquered the soil, and were selling their produce at a higher rate while they everywhere paid less exorbitant rents. The victims of this process were the urban proletariat, whose treatment by their employers in trade became less and less protective and beneficent, and the nobility, straitened in their financial resources, uprooted from their ancient strongholds, and gradually despoiled of their power by a monarchy based on popular support. The unlimited sovereignty of the prince was established upon the ruins of the feudal system; and the capitalism of the merchants and bankers upon the closing of the trade-gilds to workmen, upon severe economic pressure and upon the exploitation of the artisans' labour.

Though reform originated among the educated classes it speedily found an echo among the industrial classes of the 1 6th century, further assisted by the influence of German and Flemish journeymen. The popular forma'tiba reform-movement was essentially an urban movement; ot religious although under Francis I. and Henry II. it had already ««»'*"<« begun to spread into the country. The artisans, p p r ˆ jc& labourers and small shop-keepers who formed the first nucleus of the reformed church were numerous enough to provide an army of martyrs, though too few to form a party. Revering the monarchy and established institutions, they endured forty years of persecution before they took up arms. It was only during the second half of Henry II. 's reign that Protestantism, having achieved its religious evolution, became a political party. Weary of being trodden under foot, it now demanded much more radical reform, quitting the ranks of peaceable citizens to pass into the only militant class of the time and adopt its customs. Men like Cohgny, d'Andelot and Conde took the place of the*

timid Lefevre of Staples and the harsh and bitter Calvin; and the reform party, in contradiction to its doctrines and its doctors, became a political and religious party of opposition, with all the compromises that presupposes. The struggle against it was no longer maintained by the university and the parlement alone, but also by the king, whose authority it menaced.

With his intrepid spirit, his disdain for ecclesiastical authority and his strongly personal religious feeling, Francis I. had for a moment seemed ready to be a reformer himself; „ . but deprived by the Concordat of all interest in the secutloa confiscation of church property, aspiring to political under alliance with the pope, and as mistrustful of popular Fra p c,a L forces as desirous of absolute power and devoted Henry It. to Italy, he paused and then drew back. Hence came the revocation in 1540 of the edict of tolerance of Coucy (1535), and the massacre of the Vaudois (1545). Henry II., a fanatic, went still further in his edict of Chateaubriant (1551), a code of veritable persecution, and in the coup d'etat carried out in the parlement against Antoine du Bourg and his colleagues (1559). At the same time the pastors of the reformed religion,

met in synod at Paris, were setting down their confession of faith founded upon the Scriptures, and their ecclesiastical discipline founded upon the independence of the churches. Thenceforward Protestantism adopted a new attitude, and refused obedience to the orders of a persecuting monarchy when contrary to its faith and its interests. After the saints came men. Hence those wars of religion which were to hold the monarchy in check for forty years and even force it to come to terms.

In slaying Henry II. Montgomery's lance saved the Protestants for the time being. His son and successor, Francis II., was but

a nervous sickly boy, bandied between two women: disss' " nis motner > Catherine de' Medici, hitherto kept in the 1560). background, and his wife, Mary Stuart, queen of*

Scotland, who being a niece of the Guises brought her uncles, the constable Francis and the cardinal of Lorraine, into power. These ambitious and violent men took the government out of the hands of the constable de Montmorency and the princes of the blood: Antoine de Bourbon, king of Navarre, weak, credulous, always playing a double game on account of his

preoccupation with Navarre; Conde, light-hearted and brave, but not fitted to direct a party; and the cardinal de Bourbon, a mere "nonentity. The only plan which these princes could adopt in the struggle, once they had lost the king, was to make a following for themselves among the Calvinist malcontents and the gentlemen disbanded after the Italian wars. The Guises, strengthened by the failure of the conspiracy of Amboise, which had been aimed at them, abused the advantage due to their victory. Despite the edict of Romorantin, which by giving the bishops the right, of cognizance of heresy prevented the introduction of the Inquisition on the Spanish model into France; despite the assembly of Fontainebleau, where an attempt was made at a compromise acceptable to both Catholics and moderate Calvinists; the reform party and its Bourbon leaders, arrested at the states-general of Orleans, were in danger of their lives. The death of Francis II. in December 1560 compromised the influence of the Guises and again saved Protestantism.

Charles IX. also was a minor, and the regent should legally have been the first prince of the blood, Antoine de Bourbon;

but cleverly flattered by the queen-mother, Catherine waseo- ˆ e ' M ec tici, he let her take the reins of government. 1S74). Hitherto Catherine had been merely the resigned

and neglected wife of Henry II., and though eloquent, insinuating and ambitious, she had been inactive. She had attained the age of forty-one when she at last came into power amidst the hopes and anxieties aroused by the fall of the Guises and the return of the Bourbons to fortune. Indifferent in religious matters, she had a passion for authority, a character- istically Italian adroitness in intrigue, a fine political sense, and the feeling that the royal authority might be endangered both by Calvinistic passions and Catholic violence. She decided for a system of tolerance; and Michel de 1'Hopital, the new chancellor, was her spokesman at the states of Orleans (1560). He was a good and honest man, moderate, conciliatory and temporizing, anxious to lift the monarchy above the strife of parties and to reconcile them; but he was so little practical that he could believe in a reformation of the laws in the midst of all the violent passions which were now to be let loose. These two, Catherine and her chancellor, attempted, like Charles V. at Augsburg, to bring about religious pacification as a necessary condition for the maintenance of order; but they were soon overwhelmed by the different factions.

On one side was the Catholic triumvirate of the constable de Montmorency, the duke of Guise, and the marshal de St

Andre; and on the other the Huguenot party of

Conde and Coligny, who, having obtained liberty

of conscience in January 1561, now demanded liberty of worship. The colloquy at Poissy between the cardinal of Lorraine and Theodore Beza (September 1561), did not end in the agreement hoped for, and the duke of Guise so far abused its spirit as to embroil the French Calvinists with the German

The parties.

Lutherans. The rupture seemed irremediable when the assembly of Poissy recognized the order of the Jesuits, which the French church had held in suspicion since its foundation. However, yielding to the current which was carrying the greater part of the nation towards reform, and despite the threats of Philip II. who dreaded Calvinistic propaganda in his Netherlands, Michel de l'H6pital promulgated the edict of January 17, 1562 — a true charter of enfranchisement for the tolerance. Protestants. But the pressure of events and of parties was too strong; the policy of toleration which had mis- carried at the council of Trent had no chance of success in France.

The triumvirate's relations with Spain and Rome were very close; they had complete ascendancy over the king and over Catherine; and now the massacre of two hundred character Protestants at Vassy on the 1st of March 1562 made of the the cup overflow. The duke of Guise had either retigious ordered this, or allowed it to take place, on his return wars ' from an interview with the duke of Wiirttemberg at Zabern, where he had once more demanded the help of his Lutheran neighbours against the Calvinists; and the Catholics having celebrated this as a victory the signal was given for the commence- ment of religious wars. When these eight fratricidal wars first began, Protestants and Catholics rivalled one another in respect for royal authority; only they wished to become its masters so as to get the upper hand themselves. But in course of time, as the struggle became embittered, Catholicism itself grew revolutionary; and this twofold fanaticism, Catholic and Protestant, even more than the ambition of the leaders, made the war a ferocious one from the very first. Beginning with surprise attacks, if these failed, the struggle was continued by means of sieges and by terrible exploits like those of the Catholic Montluc and the Protestant des Adrets in the south of France. Neither of these two parties was strong enough to crush' the other, owing to the apathy and continual desertions of the gentle- men-cavaliers who formed the elite of the Protestant army and the insufficient numbers of the Catholic forces. Allies from outside were therefore called in, and this it was that gave a European character to these wars of religion; the two parties were parties of foreigners, the Protestants being supported by German Landsknechts and Elizabeth of England's cavalry, and the royal army by Italian, Swiss or

Spanish auxiliaries. It was no longer patriotism but religion that distinguished the two ■camps. There were three principal theatres of war: in the north Normandy and the valley of the Loire, where Orleans, the general centre of reform, ensured communications between the south and Germany; in the south-west Gascony and Guienne; in the south-east Lyonnais and Vivarais.

In the first war, which lasted for a year (1562-1563), the triumvirs wished to secure Orleans, previously isolated. The threat of an English landing decided them to lay siege to Rouen, and it was taken by assault; but this F '™' cost the life of the versatile Antoine de Bourbon. On war , the 19th of December 1562 the duke of Guise barred the way to Dreux against the German reinforcements of d'Andelot, who after having threatened Paris were marching to join forces with the English troops for whom Coligny and Conde had paid by the cession of Havre. The death of marshal de St Andre, and the capture of the constable de Montmorency and of Conde, which marked this indecisive battle, left Coligny and Guise face to face. The latter's success was of brief duration ; for on the 18th of February 1563 Poltrot de Mer6 assassinated him before Orleans, which he was trying to take once and for all. Catherine, relieved by the loss of an inconvenient preceptor, and by the disappearance of the other leaders, became mistress of the Catholic party, of whose strength and popularity she had now had proof, and her idea was to make peace at once on the best terms possible. The egoism of Conde, who got himself made lieutenant-general of the kingdom, and bargained for freedom of worship for the Protestant nobility only, compromised the future of both his church and his party, though rendering possible the peace of Amboise, concluded the igth of March

civil war.

1563. All now set off together to recapture Havre from the English.

The peace, however, satisfied no one; neither Catholics (because of the rupture of religious unity) nor the parlements;

the pope, the emperor and king of Spain alike protested Peace of a g ams t it. Nor yet did it satisfy the Protestants, (t563). Se wn0 considered its concessions insufficient, above all

for the people. It was, however, the maximum of tolerance possible just then, and had to be reverted to; Catherine and Charles IX. soon saw that the times were not ripe for a third party, and that to enforce real toleration would require an absolute power which they did not possess. After three years the Guises reopened hostilities against Coligny, whom they accused of having plotted the murder of their chief; while the Catholics, egged on by the Spaniards, rose against the Protestants, who had been made uneasy by an interview between Catherine and her daughter Elizabeth, wife of Philip II. of Spain, at Bayonne, and by the duke of Alva's persecutions of the reformed church of the Netherlands — a daughter-church of Geneva, like their own. The second civil war began like the

first with a frustrated attempt to kidnap the king, at Second tne cas tl e of Montceaux, near Meaux, in September

1567; and with a siege of Paris, the general centre

of Catholicism, in the course of which the constable de Montmorency was killed at Saint-Denis. Conde, with the men-at-arms of John Casimir, son of the Count Palatine, tried

*to starve out the capital; but once more the defection Peace of f t jj e n0D i es obliged him to sign a treaty of peace at fume*au. Longjumeau on the 23rd of March 1568, by which*

the conditions of Amboise were re-established. After the attempt at Montceaux the Protestants had to be contented with Charles IX. 's word.

This peace was not of long duration. The fall of Michel de l'H6pital, who had so often guaranteed the loyalty of the

Huguenots, ruined the moderate party (May 1568).

Catholic propaganda, revived by the monks and the

Jesuits, and backed by the armed confraternities and by Catherine's favourite son, the duke of Anjou, now entrusted with a prominent part by the cardinal of Lorraine; Catherine's complicity in the duke of Alva's terrible persecution in the Netherlands; and her attempt to capture Coligny and Conde at Noyers all combined to cause a fresh outbreak of hostilities in the west. Thanks to Tavannes, the duke of Anjou gained easy victories at Jarnac over the prince of Conde, who was killed, and at Moncontour over Coligny, who was wounded (March- October 1569); but these successes were rendered fruitless by the jealousy of Charles IX. Allowing the queen of Navarre to shut herself up in La Rochelle, the citadel of the reformers, and the king to loiter over the siege of Saint Jean d'Angely, Coligny pushed

boldly forward towards Paris and, having reached Burgundy, defeated the royal army at Arnay-le-duc. Catherine had exhausted all her resources; and having failed in her project of remarrying Philip II. to one of her daughters, and of betrothing Charles IX. to the eldest of the Austrian archduchesses, exasperated also by the presumption of the Lorraine family, who aspired to the marriage of their nephew with Charles IX. 's Pe ce of s ' ster » sne signed the peace of St Germain on the 8th st of August 1570. This was the culminating point of

Germain Protestant liberty; for Coligny exacted and obtained, (1570.) g rst) iib er ty f conscience and of worship, and then, as a guarantee of the king's word, four fortified places: La Rochelle, a key to the sea; La Charite, in the centre; Cognac and Montauban in the south.

*The Guises set aside, Coligny, supported as he was by Jeanne d'Albret, queen of Navarre, now received all Charles IX. 's Coiieny favour. Catherine de' Medici, an inveterate match- and the maker, and also uneasy at Philip II. 's increasing Nether. power, made advances to Jeanne, proposing to marry fands * her own daughter, Marguerite deValois,to Jeanne's son, Henry of Navarre, now chief of the Huguenot party. Coligny was a Protestant, but he was a Frenchman before all; and wishing to reconcile all parties in a national struggle, he*

Third war.

" trumpeted war " {cornait la guerre) against Spain in the Netherlands — despite the lukewarmness of Elizabeth of England and the Germans, and despite the counter-intrigues of the pope and of Venice. He succeeded in getting French troops sent to the Netherlands, but they suffered defeat. None the less Charles IX. still seemed to see only through the eyes of Coligny; till Catherine, fearing to be supplanted by the latter, dreading the results of the threatened war with Spain, and egged on by a crowd of Italian adventurers in the pay of Spain — men like Gondi and Birague, reared like herself in the political theories and customs of their native land — saw no hope but in the assassi- nation of this rival in her son's esteem. A murderous attack upon Coligny, who had opposed the candidature of Catherine's favourite son, the duke of Anjou, for the throne of Poland, having only succeeded in wounding him and in exciting the Calvinist leaders, who were congregated in Paris for the occasion of Marguerite deValois'marriage with the king of Navarre, Catherine and the Guises resolved together to put them all to death. There followed the wholesale massacre of St Bartholomew's gtBar. Eve, in Paris and in the provinces; a natural con- thotomew, sequence of public and private hatreds which had August poisoned the entire social organism. This massacre 2 .' had the effect of preventing the expedition into Flanders, and destroying Francis I.'s*

policy of alliance with the Protestants against the house of Austria.

Catherine de' Medici soon perceived that the massacre of St Bartholomew had settled nothing. It had, it is true, dealt a blow to Calvinism just when, owing to the reforms of the council of Trent, the religious ground had been T ˆ e i f ariy crumbling beneath it. Moreover, within the party po utiq U ea. itself a gulf had been widening between the pastors, supported by the Protestant democracy and the political nobles. The reformers had now no leaders, and their situation seemed as perilous as that of their co-religionists in the Netherlands; while the sieges of La Rochelle and Leiden, the enforced exile of the prince of Orange, and the conversion under pain of death of Henry of Navarre and the prince of Conde, made the common danger more obvious. Salvation came from the very excess of the repressive measures. A third party was once more formed, composed of moderates from the two camps, and it was recruited quite as much by jealousy of the Guises and by ambition as by horror at the massacres. There were the friends of the Mont- morency party — Damville at their head; Coligny's relations; the king of Navarre; Conde; and a prince of the blood, Catherine de' Medici's third son, the duke of Alencon, tired of being kept in the background. This party took shape at the „ ... end of the fourth war, followed by the edict of war. Boulogne (1573), forced from Charles IX. when the Edict of Catholics were deprived of their leader by the election B °"°f " e of his brother, the duke of Anjou, as king of Poland. A year later the latter succeeded his brother on the throne of France as Henry III. This meant a new lease of power for the queen-mother.

The politiqiies, as the supporters of religious tolerance and an energetic repression of faction were called, offered their alliance to the Huguenots, but these, having foimed themselves, by means of the Protestant Union, into a sort of republic within the kingdom, hesitated to accept. It is, however, easy to bring about an understanding between people in whom religious fury has been extinguished either by patriotism or by ambition, like that of the duke of Alencon, who had now escaped from the Louvre where he had been confined on account of his intrigues. The compact was concluded at Millau; Conde becoming a Protestant once more in order to treat with Damville, Montmorency's brother. Henry of Navarre escaped from Paris. The new king, Henry III., vacillating and vicious, and Catherine herself, eager for war as she was, had no means of separating the ˆfy ,u ' Protestants and the politiques. Despite the victory iss9)'. of Guise at Dormans, the agreement between the duke of Alencon and John Casimir's German army obliged the royal party to grant all that the allied forces demanded of them

Fifth

War.

HISTORY]

FRANCE

831

in the "peace of Monsieur," signed at Beaulieu on the 6th of May

1576, the duke of Alenfon receiving the appanage of Anjou,

Touraine and Berry, the king of Navarre Guienne,

DcSCC fit

Monsieur an(ˆ Conde Picardy, while the Protestants were granted (IST6). freedom of worship in all parts of the kingdom

except Paris, the rehabilitation of Coligny and the other victims of St Bartholomew, their fortified towns, and an equal number of seats in the courts of the parlements.

This was going too fast; and in consequence of a reaction against this too liberal edict a fourth party made its appearance,

that of the Catholic League, under the Guises — Henry Catholic ˆ e Balafre, duke of Guise, and his two brothers, Charles, League. duke of Mayenne, and Louis, archbishop of Reims

and cardinal. With the object of destroying Calvinism by effective opposition, they imitated the Protestant organization of provincial associations, drawing their chief supporters from the upper middle class and the lesser nobility. It was not at first a demagogy maddened by the preaching of the irreconcilable clergy of Paris, but a union of the more honest and prudent classes of the nation in order to combat heresy. Despite the immorality and impotence of Henry III. and the Protestantism of Henry of Navarre, this party talked of re-establishing the authority of the king; but in reality it inclined more to the Guises, martyrs in the good cause, who were supported by Philip II. of Spain and Pope Gregory XIII. A sort of popular govern- ment was thus established to counteract the incapacity of royalty, and it was in the name of the imperilled rights of the people that, from the States of Blois onward, this Holy League demanded the re-establishment of Catholic unity, and set the religious right of the nation in opposition to the divine right of incapable or evil-doing kings (1576).

In order to oust his rival Henry of Guise, Henry III. made a desperate effort to outbid him in the eyes of the more extreme

Catholics, and by declaring himself head of the League of Blois BS degraded himself into a party leader. The League, (1576). furious at this stroke of policy, tried to impose a council

of thirty-six advisers upon .the king. But the deputies of the third estate did not support the other two orders, and the latter in their turn refused the king money for making war si th w on ˆ e heretics, desiring, they said, not war but the an destruction of heresy. This would have reduced*

peace of Henry III. to impotence; fortunately for him, how- f/«y ™ C ever > tne Drea k 0I the Huguenots with the " Mal- Sevea'th contents," and the divisions in the court of Navarre war and and in the various parties at La Rochelle, allowed peace of Henry III., after two little wars in the south west,

during which fighting gradually degenerated into

brigandage, to sign terms of peace at Bergerac (1577), which much diminished the concessions made in the edict of Beaulieu. This peace was confirmed three years after by that of Fleix. The suppression of both the leagues was stipulated for (1580). It remained, however, a question whether the Holy League would submit to this.

The death of the duke of Anjou after his mad endeavour to establish himself in the Netherlands (1584), and the accession Union °f Henry of Navarre, heir to the effeminate Henry III., between reversed the situations of the two parties: the Pro- the dulses testants again became supporters of the principle of pa/// // heredity and divine right; the Catholics appealed

to right of election and the sovereignty of the people. Could the crown of the eldest daughter of the Church be allowed to devolve upon a relapsed heretic? Such was the doctrine officially preached in pulpit and pamphlet. But between Philip II. on the one hand — now master of Portugal and delivered from William of Orange, involved in strife with the English Protestants, and desirous of avenging the injuries inflicted upon him by the Valois in the Netherlands — and the Guises on the other hand, whose cousin Mary Stuart was a prisoner of Queen Elizabeth, there was a common interest in supporting one another and pressing things forward. A definite agreement was made between them at Joinville (December 31, 1584), the religious and popular pretext being the danger of leaving the

Fleix

kingdom to the king of Navarre, and the ostensible end to secure the succession to a Catholic prince, the old Cardinal de Bourbon, an ambitious and violent man of mean intelligence; while the secret aim was to secure the crown for the Guises, "who had already attempted to fabricate for themselves a genealogy tracing their descent from Charlemagne. In the meantime Philip II., being rid of Don John of Austria, whose ambition he dreaded, was to crush the Protestants of England and the Netherlands ; and the double result of the compact at Joinville was to allow French politics to be controlled by Spain, and to transform the wars of religion into a purely political quarrel.

The pretensions of the Guises were, in fact, soon manifested in the declaration of Peronne (March 30, 1585) against the foul court of the Valois; they were again manifested in a The com- furious agitation, fomented by the secret council mltteeot of the League at Paris, which favoured the Guises, Slxteeaai and which now worked on the people through their ars ' terror of Protestant retaliations and the Church's peril. Incited by Philip II., who wished to see him earning his pension ot 600,000 golden crowns, Henry of Guise began the war in the end of April, and in a few days the whole kingdom was on fire. The situation was awkward for Henry III., who had not Eighth the courage to ask Queen Elizabeth for the soldiers war of the and money that he lacked. The crafty king of Navarre t !t ree . being unwilling to alienate the Protestants save by an e " r & apostasy profitable to himself, Henry III., by the treaty of Nemours (July 7, 1585), granted everything to the head of the League in order to save his crown. By a stroke of the pen he suppressed Protestantism, while Pope Sixtus V., who had at first been unfavourable to the treaty of Joinville as a purely political act, though he eventually yielded to the solicitations of the League, excommunicated the two Bourbons, Henry and Conde. But the duke of Guise's audacity did not make Henry III. forget his desire for vengeance. He hoped to ruin him by attaching him to his cause. His favourite Joyeuse was to defeat the king of Navarre, whose forces were very weak, while Guise was to deal with the strong reinforcement of Germans that Elizabeth was sending to Henry of Navarre. Exactly the contrary happened. By the defeat of Joyeuse at Coutras Henry III. found himself wounded on his strongest side ; and by Henry of Guise's successes at Vimory and Auneau the Germans, who should have been his best auxiliaries against the League, were crushed (October-November 1587).

The League now thought they had no longer anything to fear. Despite the king's hostility the duke of Guise came to Paris, urged thereto by Philip II., who wanted to occupy Paris and be master of the Channel coasts whilst he ? h ay Z f ˆ launched his invincible Armada to avenge the death of cadeSi

Mary Stuart in 1587. On the Day of the Barricades (May 12, 1588) Henry III. was besieged in the Louvre by the populace in revolt; but his rival dared not go so far as to depose the king, and appeased the tumult. The king, having succeeded in taking refuge at Chartres, ended, however, by granting him in the Act of Union all that he had refused in face of the barricades — the post of lieutenant-general of the kingdom and the proscription of Protestantism. At the second assembly of the states of Blois, called together on account of the need for money(is88), all of Henry III.'s enemies who were elected showed themselves even bolder than in 1576 in claiming the ˆ"ifthe" control of the financial administration of the kingdom; dulses at but the destruction of the Armada gave Henry III., the second already exasperated by the insults he had received, ˆˆfˆ new vigour. He had the old Cardinal de Bourbon f Blois. imprisoned, and Henry of Guise and his brother the cardinal assassinated (December 23, 1588). On the 5th of January, 1589, died his mother, Catherine de'Medici, the astute Florentine.

" Now I am king! " cried Henry III. But Paris being dominated by the duke of Mayenne, who had escaped assassina- tion, and by the council of "Sixteen," the chiefs of the League, most of the provinces replied by open revolt, and Henry III.

had no alternative but an alliance with Henry of Navarre. Thanks to this he was on the point of seizing Paris, Assassins- w h en j n his turn he was assassinated on the ist of Henry in. August 1589 by a Jacobin monk, Jacques Clement; with his dying breath he designated the king of Navarre as his successor.

Between the popular League and the menace of the Protestants it was a question whether the new monarch was to be powerless in his turn. Henry IV. had almost the whole of his Bourbons, kingdom to conquer. The Cardinal de Bourbon, king according to the League and proclaimed under the title of Charles X., could count upon the Holy League itself, upon the Spaniards of the Netherlands, and upon the pope. Henry IV. was only supported by a certain number of the Calvinists and by the Catholic minority of the Politiques, who, however, gradually induced the rest of the nation to rally round the only legitimate prince. The nation wished for the establishment of internal unity through religious tolerance and the

extinction of private organizations; it looked for the extension of France's external power through the abasement of the house of Spain, protection of the Protestants in the Netherlands and Germany, and independence of Rome. Henry IV., moreover, was forced to take an oath at the camp of Saint Cloud to associate the nation in the affairs of the kingdom by means of the states-general. These three conditions were interdependent; and Henry IV., with his persuasive manners, his frank and charming character, and his personal valour, seemed capable of keeping them all three.

The first thing for this soldier-king to do was to conquer his kingdom and maintain its unity. He did not waste time by withdrawing towards the south; he kept in the neigh- ""?' IV ' bourhood of Paris, on the banks of the Seine, within reach of help from Elizabeth; and twice — at Arques and at Ivry (1580-1590) — he vanquished the duke of Mayenne, lieutenant-general of the League. But after having tried to seize Paris (as later Rouen) by a coup-de-main, he was obliged to raise the siege in view of reinforcements sent to Mayenne by the duke of Parma. Pope Gregory XIV., an enthusiastic supporter of the League and a strong adherent of Spain, having succeeded Sixtus V., who had been very luke- warm towards the League, made Henry IV.'s position still more serious just at the moment when, the old Cardinal de Bourbon having died, Philip II. wanted to be declared the pro- tector of the kingdom in order that he might dismember it, and when Charles Emmanuel of Savoy, a grandson of Francis I., and Charles III., duke of Lorraine, a son-in-law of Henry II., were both of them claiming the crown. Fortunately, however, the Sixteen had disgusted the upper bourgeoisie by their demagogic airs; while their open alliance with Philip II., and their accept- ance of a Spanish garrison in Paris had offended the patriotism of the Politiques or moderate members of the League. Mayenne, who oscillated between Philip II. and Henry IV., was himself obliged to break up and subdue this party of fanatics and theologians (December 1591). This game of see-saw between the Politiques and the League furthered his secret ambition, but also the dissolution of the kingdom; and the pressure of public opinion, which desired an effective monarchy, put an end to this temporizing policy and caused the convocation of the states- general in Paris (December ˆ92). Philip II., through States- the duke of Feria's instrumentality, demanded the o/Mftk throne for his daughter Isabella, grand-daughter of Henry II. through her mother. But who was to be her husband? The archduke Ernest of Austria, Guise or Mayenne? The parlement cut short these bargainings by condemning all ultramontane pretensions and Spanish intrigues. The unpopu- larity of Spain, patriotism, the greater predominance of national questions in public opinion, and weariness of both religious disputation and indecisive warfare, all these sentiments were expressed in the wise and clever pamphlet entitled the Satire Menipp&e. What had been a slow

movement between 1585 and 1 592 was quickened by Henry IV.'s abjuration of Protestant- ism at Saint-Denis on the 23rd of July 1593.

The coronation of the king at Chartres in February 1594 completed the rout of the League. The parlement of Paris declared against Mayenne, who was simply the mouth- ˆfc/ urfl y oa piece of Spain, and Brissac, the governor, surrendered of Henry the capital to the king. The example of Paris and' iV.,Jufy Henry IV.'s clemency rallied round him all prudent 23 ' ,S93 ' Catholics, like Villeroy and Jeannin, anxious for national unity; but he had to buy over the adherents of the League, who sold him his own kingdom for sixty million francs. The pontifical absolution of September 17, 1595, finally stultified the League, which had been again betrayed by the unsuccessful plot of Jean Chastel, the Jesuit's pupil.

Nothing was now left but to expel the Spaniards, who under cover of religion had worked for, their own interests alone. Despite the brilliant charge of Fontaine-Francaise in Burgundy (June 5, 1595), and the submission of the vferwtoi' heads of the League, Guise, Mayenne, Joyeuse, and '

Mercceur, the years 159S-1597 were not fortunate for Henry IV.'s armies. Indignant at his conversion, Elizabeth, the Germans, and the Swiss Protestants deserted him ; while the taking of Amiens by the Spaniards compromised for the moment the future both of the king and the country. But exhaustion of each other, by which only England and Holland profited, brought about the Peace of Vervins. This confirmed the results of the treaty of Cateau-Cambresis (May 2, 1598), that is to say, the decadence of Spanish power, and its inability either to conquer or to dismember France.

The League, having now no reason for existence, was dissolved; but the Protestant party remained very strong, with its political organization and the fortified places which the assemblies of Millau, Nimes and La Rochelle Ed-'ctot (I S73~iS74) had established in the south and the west. 1598.*' It was a republican state within the kingdom, and,, '*

being unwilling to break with it, Henry IV. came to terms by the edict of Nantes, on the 13th of April 1598. This was" a compromise between the royal government and the Huguenot government, the latter giving up the question of public worship, which was only authorized where it, had existed before 1597 and in two towns of each bailliage, with the exception of Paris; but it secured liberty of conscience throughout the kingdom, state payment for its ministers, admission to all employments, and courts composed equally of Catholics and Protestants in the parlements. An authorization to hold synods and political assemblies, to open schools, and to occupy a hundred strong places for eight years at the expense of the

king, assured to the Protestants not only rights but privileges. In no other country did they enjoy so many guarantees against a return of persecution. This explains why theedict of Nantes was not registered without some difficulty.

Thus the blood-stained 16th century closed with a promise of religious toleration and a dream of international arbitration. This was the end of the long tragedy of civil strife and of wars of conquest, mingled with the sound of Results of madrigals and psalms and pavanes. It had been the oaswars". golden age of the arquebus and the viol, of sculptors and musicians, of poets and humanists, of fratricidal conflicts and of love-songs, of mignons and martyrs. At the close of this troubled century peace descends upon exhausted passions; and amidst the choir of young and ardent voices celebrating the national reconciliation, the tocsin no longer sounds its sinister and persistent bass. Despite the leagues of either faith, religious liberty was now confirmed by the more free and generous spirit of Henry IV.

Why was this king at once so easygoing and so capricious? Why, again, had the effort and authority of feudal and popular resistance been squandered in the follies of the League and to further the ambitions of the rebellious Guises? Why had the monarchy been forced to purchase the obedience of the upper classes and the provinces with immunities which enfeebled it without limiting it? At all events, when the kingdom had been reconquered from the Spaniards and religious strife ended, in order to fulfil his engagements, Henry IV. need only have

associated the nation with himself in the work of reconstructing the shattered monarchy. But during the atrocious holocausts formidable states had grown up around France, observing her and threatening her; and on the other hand, as on the morrow of the Hundred Years' War, the lassitude of the country, the lack of political feeling on the part of the upper classes and their selfishness, led to a fresh abdication of the nation's rights. The need of living caused the neglect of that necessity for control which had been maintained by the states-general from 1560 to 1593. And this time, moderation on the part of the monarchy no longer made for success. Of the two contrary currents which have continually mingled and conflicted throughout the course of French history, that of monarchic absolutism and that of aristocratic and democratic liberty, the former was now to carry all

before it.

The kingdom was now issuing from thirty-eight years of civil war. Its inhabitants had grown unaccustomed to work; Tne its finances were ruined by dishonesty, disorder, and

Bourbons, a very heavy foreign debt. The most characteristic France la symptom of this distress was the brigandage carried ,6t0m on incessantly from 1398 to 1610. Side by side with

this temporary disorder there was a more serious administrative disorganization, a habit of no longer obeying the king. The harassed population, the municipalities which under cover of civil war had resumed the right of self-government, and the parlements elated with their social importance and their security of position, were not alone in abandoning duty and obedience. Two powers faced each other threateningly: the organized and malcontent Protestants; and the provincial governors, all great personages possessing an armed following, theoretically agents of the king, but practically independent. The Montmorencys, the D'Epernons, the Birons, the Guises, were accustomed to consider their offices as hereditary property. Not that these two powers entered into open revolt against the king; but they had adopted the custom of recriminating, of threatening, of coming to understandings with the foreign powers, which with some of them, like Marshal Biron, the D'Entragues and the due de Bouillon, amounted to conspiracy (1602-1606).

As to the qualifications of the king: he had had the good fortune not to be educated for the throne. Without much learning and sceptical in religious matters, he had the Character jj ve i v intelligence of the Gascon, more subtle than profound, more brilliant than steady. Married to a woman of loose morals, and afterwards to a devout Italian, he was gross and vulgar in his appetites and pleasures. He had retained all the habits of a country gentleman of his native Beam, careless, familiar, boastful, thrifty, cunning, combined since his sojourn at the court of the Valois with a taint of corruption. He worked little but rapidly, with none of the bureaucratic pedantry of a Philip II. cloistered in the dark towers of the Escurial. Essentially a man of action and a soldier, he preserved his tone of command after he had reached the throne, the inflexibility of the military chief, the conviction of his absolute right to be master. Power quickly intoxicated him, and his monarchy was therefore anything but parliamentary. His personality was everything, institutions nothing. If, at the gathering of the notables at Rouen in 1596, Henry IV. spoke of putting himself in tutelage, that was but preliminary to a demand for money. The states-general, called together ten times in the 16th century, and at the death of Henry III. under promise of convocation, were never assembled.

To put his absolute right beyond all control he based it upon religion, and to this sceptic disobedience became a heresy. He tried to make the clergy into an instrument of government by recalling the Jesuits, who had been driven away in 1 594, partly from fear of their regicides, partly because they have always been the best teachers of servitude; and he gave the youth of the nation into the hands of this cosmopolitan and ultramontane clerical order. His government was personal, not through departments; he retained the old council though reducing its members; and his ministers, taken from every party, were never — not even Sully — anything more than mere clerks, without independent position,

at Henry IV.

mere instruments of his good pleasure. Fortunately this was not always capricious.

Henry IV. soon realized that his most urgent duty was to resuscitate the corpse' of France. Pilfering was suppressed, and the revolts of the malcontents — the Gauthiers of Tlle Normandy, the Croquants and Tard-avise's of Perigord achieve- and Limousin — were quelled, adroitly at first, and mentsof later with a sterner hand. He then provided for the Henr y 7V • security of the country districts, and reduced the taxes on the peasants, the most efficacious means of making them productive and able to pay. Inspired by Barthelemy de Laff6mas (1545- 161 2), controller-general of commerce, and by Olivier de Serres (1539-1619), 1 Henry IV. encouraged the culture of silk, though without much result, had orchards planted and marshes drained; while though he permitted the free circulation of wine and corn, this depended on the harvests. But the twofold effect of civil war — the ruin of the farmers and the scarcity and high price of rural labour — was only reduced arbitrarily and by fits and starts.

Despite the influence of Sully, a convinced agrarian because of his horror of luxury and love of economy, Henry IV. likewise attempted amelioration in the towns, where the state of affairs was even worse than in the country. But the In< j" sirt f t edict of 1597, far from inaugurating individual liberty, ˆf eary /v, was but a fresh edition of that of 1581, a second preface to the legislation of Colbert, and in other ways no better respected than the first. As for the new features, the syndical courts proposed by Laffemas, they were not even put into practice. Various industries, nevertheless, concurrent with those of England, Spain and Italy, were created or reorganized: silk-weaving, printing, tapestry, &c. Sully at least provided renascent manufacture with the roads necessary for communica- tion and planted them with trees. In external commerce Laffemas and Henry IV. were equally the precursors of Colbert, freeing raw material and prohibiting the import of products similar to those manufactured within the kingdom.

Without regaining that preponderance in the Levant which had been secured after the victory of Lepanto and before the civil wars, Marseilles still took an honourable place there, confirmed by the renewal in 1604 of the capitulations of Francis I. with the sultan. Finally, the system of commercial companies, anti- pathetic to the French bourgeoisie, was for the first time practised on a grand scale; but Sully never understood that movement of colonial expansion, begun by Henry II. in Brazil and continued in Canada by Champlain, which had so marvellously enlarged the European horizon. His point of view was altogether more limited than that of Henry IV.; and he did not foresee, like Elizabeth, that the future would belong to the peoples whose national energy took that line of action.

His sphere was essentially the superintendence of finance, to which he brought the same enthusiasm that he had shown in fighting the League. Vain and imaginative, his reputation was enormously enhanced by his ofsuUy " Economies royales "; he was no innovator, and being a true representative of the nation at that period, like it he was but lukewarm towards reform, accepting it always against the grain. He was not a financier of genius; but he administered the public moneys with the same probity and exactitude which he used in managing his own, retrieving alienated property, straightening accounts, balancing expenditure and receipts, and amassing a reserve in the Bastille. He did not reform the system of aides and tailles established by Louis XL in 1482; but by charging much upon indirect taxation, and slightly lessening the burden of direct taxation, he avoided an appeal to the states-general and gave an illusion of relief.

Nevertheless, economic disasters, political circumstances and the personal government of Henry IV. (precursor in this also

1 Olivier de Serres, sieur de Pradel, spent most of his life on his model farm at Pradel. In 1599 he dedicated a pamphlet on the cultivation of silk to Henry IV., and in 1600 published his ThSdtre d' agriculture et menage des champs, which passed through nineteen editions up to 1675.

achieve meat.

of Louis XIV.) rendered his task, impossible or fatal. The

nobility remained- in debt and disaffected; and the clergy, more

.„.,_ remarkable for wealth and breeding than for virtues, Criticism ° ‘

of Henry were won over to the ultramontane ideas of the iv.’ s triumphant Jesuits. The rich bourgeoisie began more

and more to monopolize the magistracy; and though

the country-people were somewhat relieved from the burden which had been crushing them, the working-classes remained impoverished, owing to the increase of prices which followed at a distance the rise of wages. Moreover, under insinuating and crafty pretexts, Henry IV. undermined as far as he could the right of control by the states-general, the right of remonstrance by the parlements, and the communal franchises, while ensuring the impoverishment of the munici- palities by his fiscal methods. Arbitrary taxation, scandalous intervention in elections, forced candidatures, confusion in their financial administration, bankruptcy and revolt on the part of the tenants: all formed an anticipation of the personal rule of Richelieu and Louis XIV.

Thus Henry IV. evinced very great activity in restoring order and very great poverty of invention in his methods. His sole

original creation, the edict of La Paulette in 1604, Edict of was disastrous. In consideration of an annual payment ette , of one-sixtieth of the salary, it- made hereditary

offices which had hitherto been held only for life; and the millions which it daily poured into the royal exchequer removed the necessity for seeking more regular and better distributed resources. Political liberty and social justice were equally the losers by this extreme financial measure, which paved the way for a catastrophe.

In foreign affairs the abasement of the house of Austria remained for Henry IV., as it had been for Francis I. and Henry

II., a political necessity, while under his successors Foreign j t was to become a mechanical obsession. The peace Henry iv. of Vervins had concluded nothing. The difference

concerning the marquisate of Saluzzo, which the duke of Savoy had seized upon in 1588, profiting by Henry III.‘s embarrassments, is only worth mentioning because the treaty of Lyons (1601) finally dissipated the Italian mirage, and because, in exchange for the last of France’s possessions beyond the Alps, it added to the royal domain the really French territory of La Bresse, Bugey, Valromey and the district of Gex. The great external affair of the reign was the projected war upon which Henry IV. was about

to embark when he was assassinated. The " grand design " of Sully, the organization of a " Christian Republic " of the European nations for the preservation of peace, was but the invention of an irresponsible minister, soured by defeat and wishing to impress posterity. Henry IV., the least visionary of kings, was between 1598 and 1610 really hesitating between two great contradictory political schemes: the war clamoured for by the Protestants, politicians like Sully, and the nobility; and the Spanish alliance, to be cemented by marriages, and preached by the ultramontane Spanish camarilla formed by the queen, Pere Coton, the king's confessor, the minister Villeroy, and Ubaldini, the papal nuncio. Selfish and suspicious, Henry IV. consistently played this double game of policy in conjunction with president Jeannin. By his alliance with the Grisons (1603) he guaranteed the integrity of the Valtellina, the natural approach to Lombardy for the imperial forces; and by his intimate union with Geneva he controlled the routes by which the Spaniards could reach their hereditary possessions in Franche-Comte and the Low Countries from Italy. But having defeated the duke of Savoy he had no hesita- tion in making sure of him by a marriage; though the Swiss might have misunderstood the treaty of Brusol (.1610) by which he gave one of his daughters to the grandson of Philip II. On the other hand he astonished the Protestant world by the imprudence of his mediation between Spain and the rebellious United Provinces (1609). When the succession of Cleves and of Julich, so long expected and already discounted by the treaty of Halle (1610), was opened up in Germany, the great war was largely due to an access of senile passion for the charms of the

princesse de Conde. The stroke of Ravaillac's knife caused a timely descent of the curtain upon this new and tragi-comic Trojan War. Thus, here as elsewhere, we see a vacillating hand-to-mouth policy, at the mercy of a passion for power or for sensual gratification. The Cornette blanche of Arques, the Poule au pdt of the peasant, successes as a lover and a dashing spirit, have combined to surround Henry IV. with a halo of romance not justified by fact.

The extreme instability of monarchical government showed itself afresh after Henry IV. 's death. The reign of Louis XIII., a perpetual regency by women, priests, and favourites, Tne was indeed a curious prelude to the grand age of the regency of French monarchy. The eldest son of Henry IV. Marie de' being a minor, Marie de' Medici induced the parlement medlcl – to invest her with the regency, thanks to Villeroy and contrary, to the last will of Henry IV. This second Florentine, at once jealous of power and incapable of exercising it, bore little resem- blance to her predecessor. Light-minded, haughty, apathetic and cold-hearted, she took a sort of passionate delight in changing Henry IV.'s whole system of government. Who would support her in this ? On one side were the former ministers,

Sillery and president Jeannin, ex-leaguers but loyalists, no lovers of Spain and still less of Germany; on the other the princes of the blood and the great nobles, Conde, Guise, Mayenne and Nevers, apparently still much more faithful to French ideas, but in reality convinced that the days of kings were over and that their own had arrived. Instead of weakening this aristocratic agitation by the see-saw policy of Catherine de' Medici, Marie could invent no other device than to despoil the royal treasure by distributing places and money to the chiefs of both parties. The savings all expended and Sully fallen into disgrace, she lost her influence and became the almost unconscious instrument of an ambitious man of low birth, the Florentine Concini, who was to drag her down with him in his fall; petty shifts became thenceforward the order of the day.

Thus Villeroy thought fit to add still further to the price already paid to triumphant Madrid and Vienna by disbanding the army, breaking the treaty of Brusol, and abandon- ing the Protestant princes beyond the Rhine and the /j!?{? xm ' trans-Pyrenean Moriscos. France joined hands with 1443), Spain in the marriages of Louis XIII. with Anne of Austria and Princess Elizabeth with the son of Philip III., and the Spanish ambassador was admitted to the secret council of the queen. To soothe the irritation of England the due de Bouillon was sent to London to offer the hand of the king's sister to the prince of Wales. Meanwhile, however, still more was ceded to the princes than to the kings; and after a pretence of drawing the sword against the prince of Conde, rebellious through jealousy of the Italian surroundings of the queen-mo thei,' recourse was had to the purse. The peace of Sainte Menehould, four years after the death of Henry IV., was a virtual abdication of the monarchy (May 1614) ; it was time for a move in the other direction. Villeroy inspired the regent with the idea of an armed expedition, accompanied by the little king, into the West. The convocation of the states-general was about to take place, wrung, as in all minorities, from the royal weakness— this time by Conde; so the elections were influenced in the monarchist interest. The king's majority, solemnly proclaimed on the 28th of October 1614, further strengthened the throne; while owing to the bungling of the third estate, who did not contrive to gain the support of the clergy and the nobility by some sort of con- cessions, the states-general, the last until 1789, proved like the others a mere historic episode, an impotent and inorganic expedient. In vain Conde tried to play with the parlement of Paris the same game as with the states-general, in a sort of anticipation of the Fronde. Villeroy demurred; and the parlement, having illegally assumed a political role, broke with Conde and effected a reconciliation with the court. After this double victory Marie de' Medici could at last undertake the famous journey to Bordeaux and consummate the Spanish marriages. In order not to countenance by his presence an act which had been the pretext for his opposition, Cond6 rebelled

once more in August 1615; but he was again pacified by the governorships and pensions of the peace of Loudun (May 1616).

But Villeroy and the other ministers knew not how to reap the full advantage of their victory. They had but one desire, to put themselves on a good footing again with Conde, Concini, i ns t ea d f applying themselves honestly to the service d'Aocrt. of the king. The " marshals," Concini and his wife Leonora Galigai, more influential with the queen and more exacting than ever, by dint of clever intrigues forced the ministers to retire one after another; and with the last of Henry IV. 's " greybeards " vanished also all the pecuniary reserves left. Concini surrounded himself with new men, insignificant persons ready to do his bidding, such as Barbin or Mangot, while in the background was Richelieu, bishop of Lucon. Conde now began intrigues with the princes whom he had previously betrayed; but his pride dissolved in piteous entreaties when Themines, captain of the guard, arrested him in September 161 6. Six months later Concini had not even time to protest when another captain, Vitry, slew him at the Louvre, under orders from Louis XIII., on the 24th of April 161 7.

Richelieu had appeared behind Marie de' Medici; Albert de Luynes rose behind Louis XIII., the neglected child whom he had contrived to amuse. " The tavern remained the same, having changed nothing but the bush." De Luynes was made a duke and marshal in Concini's place, with no better title; while the due d'Epernon, supported by the queen-mother (now in disgrace at Blois), took Conde's place at the head of the opposition. The treaties of Angoulfime and Angers (1610- 1620), negotiated by Richelieu, recalled the " unwholesome " treaties of Sainte-Menehould and Loudun. The revolt of the Protestants was more serious. Goaded by the vigorous revival of militant Catholicism which marked the opening of the 17th century, de Luynes tried to put a finishing touch to the triumph of Catholicism in France, which he had assisted, by abandoning in the treaty of Ulm the defence of the small German states against the ambition of the ruling house of Austria, and by sacrificing the Protestant Grisons to Spain. The re-establish- ment of Catholic worship in Beam was the pretext for a rising among the Protestants, who had remained loyal during these troublous years; and although the military organization of French Protestantism, arranged by the assembly of La Rochelle, had been checked in 1621, by the defection of most of the reformed nobles, like Bouillon and Lesdiguieres, de Luynes had to raise the disastrous siege of Montauban.

Death alone saved him from the disgrace suffered by his predecessors (December 15, 1621).

*From 1621 to 1624 Marie de' Medici, re-established in credit, prosecuted her intrigues; and in three years there were three different ministries: de Luynes was succeeded by the * e 'fJ™. "' prince de Conde, whose Montauban was found at Medici. Montpellier; the Brularts succeeded Conde, and having, like de Luynes, neglected France's foreign interests, they had to give place to La Vieuville; while this latter was arrested in his turn for having sacrificed the interests of the English Catholics in the negotiations regarding the marriage of Henrietta of France with the prince of Wales. All these personages were undistinguished figures beyond whom might be discerned the cold clear-cut profile of Marie de' Medici's secretary, now a cardinal, who was to take the helm and act as viceroy during eighteen years.*

Richelieu came into power at a lucky moment. Every one was sick of government by deputy; they desired a strong hand Cardinal an< ˆ an energetic foreign policy, after the defeat of Richelieu the Czechs at the White Mountain by the house of 1624- Austria, the Spanish intrigues in the Valtellina, and

1642. t jj e resum ption of war between Spain and Holland.

Richelieu contrived to raise hope in the minds of all. As president of the clergy at the states-general of 1614 he had figured as an adherent of Spain and the ultramontane interest; he appeared to be a representative of that religious party which was identical with the Spanish party. But he had also been put into the ministry by the party of the Politiques, who had

terminated the civil wars, acclaimed Henry IV., applauded the Protestant alliance, and by the mouth of Miron, president of the third estate, had in 1614 proclaimed its intention to take up the national tradition once more. Despite the concessions necessary at the outset to the partisans of a Catholic alliance, it was the programme of the Politiques that Richelieu adopted and laid down with a master's hand in his Political Testament.

To realize it he had to maintain his position. This was very difficult with a king who " wished to be governed and yet was impatient at being governed." Incapable of applying himself to great affairs, but of sane and even acute to "' s xia – judgment, Louis XIII. excelled only in a passion for nkhelleu. detail and for manual pastimes. He realized the superior qualities of his minister, though with a lively sense of his own dignity he often wished him more discreet and less imperious; he had confidence in him but did not love him. Cold-hearted and formal by nature, he had not even self-

love, detested his wife Anne of Austria — too good a Spaniard — and only attached himself fitfully to his favourites, male or female, who were naturally jealously suspected by the cardinal. He was accustomed to listen to his mother, who detested Richelieu as her ungrateful protege. Neither did he love his brother, Gaston of Orleans, and the feeling was mutual; for the latter, remaining for twenty years heir-presumptive to a crown which he could neither defend nor seize, posed as the beloved prince in all the conspiracies against Richelieu, and issued from them each time as a Judas. Add to this that Louis XIII., like Richelieu himself, had wretched health, aggravated by the extravagant medicines of the day; and it is easy to understand how this pliable disposition which offered itself to the yoke caused Richelieu always to fear that his king might change his master, and to declare that " the four square feet of the king's cabinet had been more difficult for him to conquer than all the battlefields of Europe."

Richelieu, therefore, passed his time in safeguarding himself from his rivals and in spying upon them; his suspicious nature, rendered still more irritable by his painful practice of a dissimula- tion repugnant to his headstrong character, making him fancy himself threatened more than was actually the case. He brutally suppressed six great plots, several of which were scandalous, and had more than fifty persons executed; and he identified himself with the king, sincerely believing that he was maintaining the royal authority and not merely his own. He had a preference for irregular measures rather than legal prosecutions, and a jealousy of all opinions save his own. He maintained his power through the fear of torture and of special commissions. It was Louis XIII. whose cold decree ordained most of the rigorous sentences, but the stain of blood rested on the cardinal's robe and made his reasons of state pass for private vengeance. Chalais was beheaded at Nantes in 1626 for having upheld Gaston of Orleans in his refusal to wed Mademoiselle de Montpensier, and Marshal d'Ornano died at Vincennes for having given him bad advice in this matter; while the duellist de Boutteville was put to the torture for having braved the edict against duels. The royal family itself was not free from his attacks; after the Day of Dupes (1630) he allowed the queen-mother to die in exile, and publicly dishonoured the king's brother Gaston of Orleans by the publication of his confessions; Marshal de Marillac was put to the torture for his ingratitude, and the constable de Montmorency for rebellion (1632). The birth of Louis XIV. in 1638 confirmed Richelieu in power. However, at the point of death he roused himself to order the execution of the king's favourite, Cinq-Mars, and his friend de Thou, guilty of treason with Spain (1642).

Absolute authority was not in itself sufficient; much money was also needed. In his state-papers Richelieu has shown that at the outset he desired that the Huguenots should share no longer in public affairs, that the nobles should Pi "ji??'f cease to behave as rebellious subjects, and the

*powerful %cheSeu. provincial governors as suzerains over the lands committed to their charge. With his passion for the uniform and the useful on a grand scale, he hoped by means of the Cod**

Michaud to put an end to the sale of offices, to lighten imposts, to suppress brigandage, to reduce the monasteries, &c. To do this it would have been necessary to make peace, for it was soon evident that war was incompatible with these reforms. He chose war, as did his Spanish rival and contemporary Olivaresi War is expensive sport; but Richelieu maintained a lofty attitude towards finance, disdained figures, and abandoned all petty details to subordinate officials like D'Effiat or Bullion. He therefore soon reverted to the old and worse measures, including the debasement of coinage, and put an extreme tension on all the springs of the financial system. The land-tax was doubled and trebled by war, by the pensions of the nobles, by an extortion the profits of which Richelieu disdained neither for himself nor for his family; and just when the richer and more powerful classes had been freed from taxes, causing the wholesale oppression of the poorer, these few remaining were jointly and severally answerable. Perquisites, offices, forced loans were multiplied to such a point that a critic of the times, Guy Patin, facetiously declared that duties were to be exacted from the beggars basking in the sun. Richelieu went so far as to make poverty systematic and use famine as a means of govern- ment. This was the price paid for the national victories.

Thus he procured money at all costs, with an extremely crude fiscal judgment which ended by exasperating the people; hence numerous insurrections of the poverty-stricken; Dijon rose in revolt against the aides in 1630, Provence against the tax-officers (Mus) in 1631, Paris and Lyons in 1632, and Bordeaux against the increase of customs in 1635. In 1636 the Croquants ravaged Limousin, Poitou, Angoumois, Gascony and Pengord; in 1639 it needed an army to subdue the Va-nu-pieds (bare-feet) in Normandy. Even the rentiers of the H6tel-de-Ville, big and little, usually very peaceable folk, were excited by the curtail- ment of their incomes, and in 1630 and 1642 were roused to fury.

*Every one had to bend before this harsh genius, who insisted on uniformity in obedience. After the feudal vassals, decimated struggle k v * ne wars °* reU gi° n an d tne executioner's hand, with the and after the recalcitrant taxpayers, the Protestants, Proust- in their turn, and by their own fault,*

*experienced this. *”’*• While Richelieu was opposing the designs of the pope*

and of the Spaniards in the Valtellina, while he was arming the duke of Savoy and subsidizing Mansfeld in Germany, Henri, due de Rohan, and his brother Benjamin de Rohan, due de Soubise, the Protestant chiefs, took the initiative in a fresh revolt despite the majority of their party (1625). This Huguenot rising, in stirring up which Spanish diplomacy had its share, was a revolt of discontented and ambitious individuals who trusted for success to their compact organization and the ultimate assistance of England. Under pressure of this new danger and urged on by the Catholic devdts, supported by the influence of Pope Urban VIII. , Richelieu concluded with Spain the treaty of Monzon (March 5, 1626), by which the interests of his allies Venice, Savoy and the Grisons were sacrificed without their being consulted. The Catholic Valtellina, freed from the claims of the Protestant Grisons, became an independent state under the joint protection of France and Spain; the question of the right of passage was left open, to trouble France during the campaigns that followed; but the immediate gain, so far as Richelieu was concerned, was that his hands were freed to deal with the Huguenots.

Soubise had begun the revolt (January 1625) by seizing Port Blavet in Brittany, with the royal squadron that lay there, and in command of the ships thus acquired, combined with those of La Rochelle, he ranged the western coast, intercepting commerce. In September, however, Montmorency succeeded, with a fleet of English and Dutch ships manned by English seamen, in defeating Soubise, who took refuge in England. La Rochelle was now invested, the Huguenots were hard pressed also on land, and, but for the reluctance of the Dutch to allow their ships to be used for such a purpose, an end might have been made of the Protestant opposition in France; as it was, Richelieu was forced to accept the mediation of England and conclude a treaty with the Huguenots (February 1626).

He was far, however, from forgiving them for their attitude or being reconciled to their power. So long as they retained their compact organization in France he could undertake no successful action abroad, and the treaty was in effect no more than a truce that was badly observed. The oppression of the French Protestants was but one of the pretexts for the English expedition under James I.‘s favourite, the duke of Buckingham, to La Rochelle in 1627; and, in the end, this intervention of a foreign power compromised their cause. When at last the citizens of the great Huguenot stronghold, caught between two dangers, chose what seemed to them the least and threw in their lot with the English, they definitely proclaimed their attitude as anti-national; .and when, on the 29th of October 1628, after a heroic resistance, the city surrendered to the French king, this was hailed

not as a victory for Catholicism only, but for France. The taking of La Rochelle was a Peace ot crushing blow to the Huguenots, and the desperate t ˆg alliance which Rohan, entrenched in the Cevennes, entered into with Philip IV. of Spain, could not prolong their resistance. The amnesty of Alais, prudent and moderate in religious matters, gave back to the Protestants their common rights within the body politic. Unfortunately what was an end for Richelieu was but a first step for the Catholic patty.

The little Protestant group eliminated, Richelieu next wished to establish Catholic religious uniformity; for though in France the Catholic Church was the state church, unity did not exist in it. There were no fixed principles in the Kkheiieu relations between king and church, hence incessant catto/fcs. conflicts between Gallicans and Ultramontanes, in which Richelieu claimed to hold an even balance. Moreover, a Catholic .movement for religious reform in the Church of France began during the 17th century, marked by the creation of seminaries, the foundation of new orthodox religious orders, and the organization of public relief by Saint Vincent de Paul. Jansenism was the most vigorous contemporary effort to renovate not only morals but Church doctrine (see Jansenism). But Richelieu had no love for innovators, and showed this very plainly to du Vergier de Hauranne, abbot of Saint Cyran, who was imprisoned at Vincennes for the good of Church and State. In affairs of intellect dragooning was equally the policy; and, as Corneille learnt to his cost, the French Academy was created in 1635 simply to secure in the republic of letters the same unity and conformity to rules that was enforced in the state.

Before Richelieu, there had been no effective monarchy and no institutions for controlling affairs; merely advisory institu- tions which collaborated somewhat vaguely in the Destntc- administration of the kingdom. Had the king been tion of willing these might have developed further; but public Richelieu ruthlessly suppressed all such growth, and s P lrlt – they remained embryonic. According to him, the king must decide in secret, and the king's will must be law. No one might meddle in political affairs, neither parlements nor states-general; still less had the public any right to judge the actions of the government. Between 1631 and the edict of February 1641 Richelieu strove against the continually renewed opposition of the parlements to his system of special commissions and judgments; in 1641 he refused them any right of interference in state affairs; at most would he consent occasionally to take counsel with assemblies of notables. Provincial and municipal liberties were no better treated when through them the king's subjects attempted to break loose from the iron ring of the royal commissaries and intendants. In Burgundy, Dijon saw her municipal liberties restricted in 1631; the provincial assembly of Dauphine was suppressed from 1628 onward, and that of Languedoc in 1629; that of Provence was in 1639 replaced by communal assemblies, and that of

Normandy was prorogued from 1639 to 1642. Not that Richelieu was hostile to them in principle; but he was obliged at all hazards to find money for the upkeep of the army, and the provincial states were a slow and heavy machine to put in motion. Through an excessive reaction against the disintegration that had menaced the kingdom after the dissolution of the League, he fell into the abuse of

over-centralization; and depriving the people of the habit of criticizing governmental action, he taught them a fatal acquiescence in uncontrolled and undisputed authority. Like one of those physical forces which tend to reduce everything to a dead level, he battered down alike characters and fortresses; and in his endeavours to abolish faction, he killed that public spirit which, formed in the 16th century, had already produced the Ripublique of Bodin, de Thou's History of his Times, La Boetie's Contre un, the Satire M&nippee, and Sully's Economies royales.

In order to establish this absolute despotism Richelieu created no new instruments, but made use of a revolutionary institution Methods °f tne ˆth century, namely " intendants " (q.v.), employed agents who were forerunners of the commissaries of byRiche- t ne Convention, gentlemen of the long robe of inferior ea ' condition, hated by every one, and for that reason the

more trustworthy. > He also drew most of the members of his special commissions from the grand council, a supreme adminis- trative tribunal which owed all its influence to him.

However, having accomplished all these great things, the treasury was left empty and the reforms were but ill-established;

for Richelieu's policy increased poverty, neglected results. the toiling and suffering peasants, deserted the cause

of the workers in order to favour the privileged classes, and left idle and useless that bourgeoisie whose intellectual activity, spirit of discipline, and civil and political culture would have yielded solid support to a monarchy all the stronger for being limited. Richelieu completed the work of Francis I.; he endowed France with the fatal tradition of autocracy. This priest by education and by turn of mind was indifferent to material interests, which were secondary in his eyes; he could organize neither finance, nor justice,

nor an army, nor the colonies, but at the most a system of police. His method was not to reform, but to crush. He was great chiefly in negotiation, the art par excellence of ecclesiastics. His work was entirely abroad; there it had more continuity, more future, perhaps because only in his foreign policy was he unhampered in his designs. He sacrificed everything to it; but he ennobled it by the genius and audacity of his conceptions, by the energetic tension of all the muscles of the body politic.

The Thirty Years' War in fact dominated all Richelieu's foreign policy; by it he made France and unmade Germany.

It was the support of Germany which Philip II. had poifcyof lacked in order to realize his Catholic empire ; and the Richelieu, election of the archduke Ferdinand II. of Styria as

emperor gave that support to his Spanish cousins (1 6 1 9) . Thenceforward all the forces of the Habsburg monarchy would be united, provided that communication could be main- tained in the north with the Netherlands and in the south with the duchy of Milan, so that there should be no flaw in the iron vice which locked France in on either side. It was therefore Of the highest importance to France that she should dominate the valleys of the Alps and Rhine. As soon as Richelieu became minister in 1624 there was an end to cordial relations with Spain. He resumed the policy of Henry IV., confining his military operations to the region of the Alps, and contenting himself at first with opposing the coalition of the Habsburgs with a coalition of Venice, the Turks, Bethlen Gabor, king of Hungary, and the Protestants of Germany and Denmark. But the revolts of the French Protestants, the resentment of the nobles at his dictatorial power, and the perpetual ferment of intrigues and treason in the court, obliged him almost immediately to draw back. During these eight years, however, Richelieu had pressed on matters as fast as possible.

While James I. of England was trying to get a general on the cheap in Denmark to defend his son-in-law, the elector palatine,

Richelieu was bargaining with the Spaniards in the lag policy, treatv °f Monzon (March 1626); but as the strained except la relations between France and England forced him Italy, to conciliate Spain still further by the treaty of April

1627, the Spaniards profited by this to carry on an

intrigue with Rohan, and in concert with the duke of Savoy, to occupy Montferrat when the death of Vicenzo II.

1624- 1630.

(December 26, 1627) left the succession of Mantua, under the will of the late duke, to Charles Gonzaga, duke of Nevers, a Frenchman by education and sympathy. But the taking of La Rochelle allowed Louis to force the pass of Susa, to induce the duke of Savoy to treat with him, and to isolate the Spaniards in Italy by a great Italian league between Genoa, Venice and the dukes of Savoy and Mantua (April 1629). Unlike the Valois, Richelieu only desired to free Italy from Spain in order to restore her independence.

The fact that the French Protestants in the Cevennes were again in arms enabled the Habsburgs and the Spaniards to make a fresh attack upon the Alpine passes; but after the peace of Alais Richelieu placed himself at the head of forty thousand men, and stirred up enemies everywhere against the emperor, victorious now over the king of Denmark as in 162 1 over the elector palatine. He united Sweden, now reconciled with Poland, and the Catholic and Protestant electors, disquieted by the edict of Restitution and the omnipotence of Wallenstein; and he aroused the United Provinces. But the disaffection of the court and the more extreme Catholics made it impossible for him as yet to enter upon a struggle against both Austria and Spain; he was only able to regulate the affairs of Italy with much prudence. The intervention of Mazarin, despatched by the pope, who saw no other means of detaching Italy from Spain than by introducing France into the affair, brought about the signature of the armistice of Rivalte on the 4th of September 1630, soon developed into the peace of Cherasco, which re-established the agreement with the still fugitive duke of Savoy (June 163 1). Under the harsh tyranny of Spain, Italy was now nothing but a lifeless corpse; young vigorous Germany was better worth saving. So Richelieu's envoys, Brulart de Leon and Father Joseph, disarmed 1 the emperor at the diet of Regens- burg, while at the same time Louis XIII. kept Casale and Pinerolo, the gates of the Alps. Lastly, by the treaty of Fontaine- bleau (May 30th, 1631), Maximilian of Bavaria, the head of the Catholic League, engaged to defend the king of France against all his enemies, even Spain, with the exception of the emperor. Thus by the hand of Richelieu a union against Austrian imperial- ism was effected between the Bavarian Catholics and the Protestants who dominated in central and northern Germany.

Twice had Richelieu, by means of the purse and not by force of arms, succeeded in reopening the passes of the Alps and of the Rhine. The kingdom at peace and the Huguenot m c i,eiieu party ruined, he was now able to engage upon his and policy of prudent acquisitions and apparently dis- Gustavus interested alliances. But Gustavus Adolphus, king Adol P bus – of Sweden, called in by Richelieu and Venice to take the place of the played-out king of Denmark, brought danger to all parties. He would not be content merely to serve French interests in Germany, according to the terms of the secret treaty of Barwalde (June 1631); but, once master of Germany

arid the rich valley of the Rhine, considered chiefly the interests of Protestantism and Sweden. Neither the prayers nor the threats of Richelieu, who wished indeed to destroy Spain but not Catholicism, nor the death of Gustavus Adolphus at Ltitzen (1632), could repair the evils caused by this immoderate ambition. A violent Catholic reaction against the Protestants ensued; and the union of Spain and the Empire was consolidated just when that of the Protestants was dissolved at Nordlingen, despite the efforts of Oxenstierna (September 1634). Moreover, Wallenstein, who had been urged by Richelieu to set up an independent kingdom in Bohemia, had been killed on the 23rd of February 1634. In the course of a year Wiirttemberg and Franconia were reconquered from the Swedes; and the duke of Lorraine, who had taken the side of the Empire, called in the Spanish arid the imperial forces to open the road to the Netherlands through Franche-Comte.

His allies no longer able to stand alone, Richelieu was obliged to intervene directly (May'igth, 1635). By the treaty of Saint- Germain-en-Laye he purchased the army of Bernard of Saxe-

1 Ferdinand is reported to have said: " Le capucin m'a desarme avec son scapulaire et a mis dans capuchon six bonnets electoraux."

Weimar; by that of Rivoli he united against Spain the dukes of Modena, Parma and Mantua; he signed an open alliance with ~ the league of Heilbronn, the United Provinces and

Preach Sweden; and after these alliances military operations Thirty began, Marshal de la Force occupying the duchy of Lor- raine. Richelieu attempted to operate simultaneously in the Netherlands by joining hands with the Dutch, and on the Rhine by uniting with the Swedes; but the bad organization of the French armies, the double invasion of the Spaniards as far as Corbie and the imperial forces as far as the gates of Saint-Jean-de-Losne (1636), and the death of his allies, the dukes of Hesse-Cassel, Savoy and Mantua at first frustrated his efforts. A decided success was, however, achieved between 163ˆ and 1640, thanks to Bernard of Saxe-Weimar and after- wards to Guebriant, and to the parallel action of the Swedish generals, Baner, Wrangel and Torstensson. Richelieu obtained Alsace, Breisach and the forest-towns on the Rhine; while in the north, thanks to

the Dutch and owing to the conquest of Artois, marshals de la Meilleraye, de Chatillon and de Breze forced the barrier, of the Netherlands. Turin, the capital of Piedmont, was taken by Henri de Lorraine, comte d'Harcourt; the alliance with rebellious Portugal facilitated the occupation of Roussillon and almost the whole of Catalonia, and Spain was reduced to defending herself; while the embarrassments of the Habsburgs at Madrid made those of Vienna more tractable. The diet of Regensburg, under the mediation of Maximilian of Bavaria, decided in favour of peace with France, and on the 25th of December 1641 the preliminary settlement at Hamburg fixed the opening of negotiations to take place at Munster and Osnabriick. Richelieu's death (December 4, 1642) prevented him from seeing the triumph of his policy, but it can be judged by its results; in 1624 the kingdom had in the east only the frontier of the Meuse to defend it from invasion; in 1642 the whole of Alsace, except Strassburg, was occupied and the Rhine guarded by the army of Guebriant. Six months later, on the 14th of May 1643, Louis XIII. rejoined his minister in his true kingdom, the land of shades.

But thanks to Mazarin, who completed his work, France gathered in the harvest sown by Richelieu. At the outset no one believed that the new cardinal would have any Mazarin, success. Every one expected from Anne of Austria a change in the government which appeared to be justified by the persecutions of Richelieu and the disdainful unscrupulousness of Louis XIII. On the 16th of May the queen took the little four-year-old Louis XIV. to the parlement of Paris which, proud of playing a part in politics, hastened, contrary to Louis XIII. 's last will, to acknowledge the command of the little king, and to give his mother " free, absolute and entire authority." The great nobles were already looking upon themselves as established in power, when they learnt with amazement that the regent had appointed as her chief adviser, not Gaston of Orleans, but Mazarin. The political revenge which in their eyes was owing to them as a body, the queen claimed for herself alone, and she made it a romantic one. This Spaniard of waning charms, who had been neglected by her husband and insulted by Richelieu, now gave her indolent and full-blown person, together with absolute power, into the hands of the Sicilian. Whilst others were triumphing openly, Mazarin, in the shadow and silence of the interregnum, had kept watch upon the heart of the queen; and when the old party of Marie de' Medici and Anne of Austria wished to come back into power, to impose a general peace, and to substitute for the Protestant alliances an understanding with Spain, the arrest of Francois de Vendome, duke of Beaufort, and the exile of other important nobles proved to the great families that their hour had gone by (September 1643).

Mazarin justified Richelieu's confidence and the favour of Anne of Austria. It was upon his foreign policy that he relied to maintain his authority

*within the kingdom. Thanks to him, *he duke of Enghien (Louis de Bourbon, afterwards prince of Conde), appointed commander-in-chief at the age of twenty- two, caused the downfall of the renowned Spanish infantry at*

1643-

166k

Rocroi; and he discovered Turenne, whose prudence tempered Conde's overbold ideas. It was he too who by renewing the tradi- tional alliances and resuming against Bavaria, Fer- dinand III.'s most powerful ally, the plan of common Treaties action with Sweden which Richelieu had sketched out, pˆaita " pursued it year after year: in 1644 at Freiburg im Breisgau, despite the death of Guebriant at Rottweil; in

1645 at Nordlingen, despite the defeat of Marienthal; and in

1646 in Bavaria, despite the rebellion of the Weimar cavalry; to see it finally triumph at Zusmarshausen in May 1648. With Turenne dominating the Eiser and the Inn, Conde victorious at Lens, and the Swedes before the gates of Pragueˆthe emperor, left without a single ally, finally authorized his plenipotentiaries to sign on the 24th of October 1648 the peace about which negotiations had been going on for seven years. Mazarin had stood his ground notwithstanding the treachery of the duke of Bavaria, the defection of the United Provinces, the resistance of the Germans, and the general confusion which was already pervading the internal affairs of the kingdom.

The dream of the Habsburgs was shattered. They had wished to set up a centralized empire, Catholic and German; but the treaties of Westphalia kept Germany in its passive and fragmentary condition; while the Catholic and Protestant princes obtained formal recognition of their territorial inde- pendence and their religious equality. Thus disappeared the two principles which justified the Empire's existence; the universal sovereignty to which it laid claim was limited simply to a German monarchy much crippled in its powers; and the enfranchisement of the Lutherans and Calvinists from papal jurisdiction cut the last tie which bound the Empire to Rome. The victors' material benefits were no less substantial: the con- gress of Munster ratified the final cession of the Three Bishoprics and the conquest of Alsace, and Breisach and Philippsburg completed these acquisitions. The Spaniards had no longer any hope of adding Luxemburg to their Franche-Comte; while the Holy Roman Empire in Germany, taken in the rear by Sweden (now mistress of the Baltic and the North Sea), cut off for good from the United Provinces and the Swiss cantons, and enfeebled by the

recognized right of intervention in German affairs on the part of Sweden and France, was now nothing but a meaningless name.

Mazarin had not been so fortunate in Italy, where in 1642 the Spanish remained masters. Venice, the duchy of Milan and the duke of Modena were on his side; the pope and the grand- duke of Tuscany were trembling, but the romantic expedition of the duke of Guise to Naples, and the outbreak of the Fronde, saved Spain, who had refused to take part in the treaties of Westphalia and whose ruin Mazarin wished to compass.

It was, however, easier for Mazarin to remodel the map of Europe than to govern France. There he found himself face to face with all the difficulties that Richelieu had neglected to solve, and that were now once more giving trouble. staie The Lit de Justice of the 18th of May 1643 na(i proved kingdom. authority to remain still so personal an affair that the person of the king, insignificant though that was, continued to be regarded as its absolute depositary. Thus regular obedience to an abstract principle was under Mazarin as incomprehensible to the idle and selfish nobility as it had been under Richelieu. The parlement still kept up the same extra-judicial pretensions; but beyond its judicial functions it acted merely as a kind of town- crier to the monarchy, charged with making known the king's edicts. Yet through its right of remonstrance it was the only body that could legally and publicly intervene in politics; a large and independent body, moreover, which had its own demands to make upon the monarchy and its ministers. Richelieu, by setting his special agents above the legal but complicated machinery of financial administration, had so corrupted it as to necessitate radical reform; all the more so because financial charges had been increased to a point far beyond what the nation could bear. With four armies to keep up, the insurrection in Portugal to maintain, and pensions to serve the needs of the allies) the burden had become a -crushing one.

Richelieu had been able to surmount these difficulties because he governed in the name of a king of full age, and against isolated adversaries; while Mazarin had the latter against Richelieu jjj m j n a coa ijt; on which had lasted ten years, with "mazarin. the further disadvantages of his foreign origin and a royal minority at a time when every one was sick of government by ministers. He was the very opposite of Richelieu, as wheedling in his ways as the other had been haughty and scornful, as devoid of vanity and rancour as Richelieu had been full of jealous care for

his authority; he was gentle where the other had been passionate and irritable, with an intelligence as great and more supple, and a far more grasping nature.

It was the fiscal question that arrayed against Mazarin a coalition of all petty interests and frustrated ambitions; this was always the Achilles' heel of the French monarchy, F dun- Clal wmc h m l6 4 8 was at tne ˆ ast extremity for money. cuttles. AH imposts were forestalled, and every expedient for obtaining either direct or indirect taxes had been exhausted by the methods of the financiers. As the country districts could yield nothing more, it became necessary to demand money from the Parisians and from the citizens of the various towns, and to search out and furbish up old disused edicts — edicts as to measures and scales of prices — at the very moment when the luxury and corruption of the parvenus was insulting the poverty and suffering of the people, and exasperating all those officials who took their functions seriously.

*A storm burst forth in the parlement against Mazarin as the patron of these expedients, the occasion for this being the edict of redemption by which the government renewed for */«f' /C "' nme y ears tne " Paulette " which had now expired, parlement. by withholding four years' salary from all officers of the Great Council, of the Chambres des comptes, and of the Courdes aides. The parlement, although expressly exempted, associated itself with their protest by the decree of union of May 13, 1648, and deliberations in a body upon the reform of the state. Despite the queen's express prohibition, the in- surrectionary assembly of the Chambre Saint Louis criticized the whole financial system, founded as it was upon usury, claimed the right of voting taxes, respect for individual liberty, and the suppression of the intendants, who were a menace to the new bureaucratic feudalism. The queen, haughty and exasperated though she was, yielded for the time being, because the invasion of the Spaniards in the north, the arrest of Charles I. of England, and the insurrection of Masaniello at Naples made the moment a critical one for monarchies; but immediately after the victory at Lens she attempted a coup d'etat, arresting the leaders, and among them Broussel, a popular member of the parlement (August 26, 1648). Paris at once rose in revolt — a Paris of swarming and unpoliced streets, that had been making French history ever since the reign of Henry IV., and that had not forgotten the barricades of the League. Once more a pretence of yielding had to be made, until Conde's arrival enabled the court to take refuge at Saint-Germain (January 15, 1649).*

Civil war now began against the rebellious coalition of great nobles, lawyers of the parlement, populace, and mercenaries The J ust set f ree fro m the Thirty Years' War. It lasted

Fronde four years, for motives often as futile as the Grande (1648- Mademoiselle's ambition to wed little Louis XIV., I6S2). Cardinal de Retz's red hat, or Madame de Longueville's

stool at the queen's side; it was, as its name of Fronde indicates, a hateful farce, played by grown-up children, in several acts.

Its first and shortest phase was the Fronde of the Parlement. At a period when all the world was a little mad, the parlement Toe had imagined a loyalist revolt, and, though it raised

Fronde an armed protest, this was not against the king but of the against Mazarin and the persons to whom he had

aremen. delegated p 0Wer , p, U f the parlement soon became disgusted with its allies — the princes and nobles, who had only drawn their swords in order to beg more effectively with arms in their hands; and the Parisian mob, whose fanaticism had been aroused by Paul de Gondi, a warlike ecclesiastic, a Catiline in a cassock, who preached the gospel at the dagger's point.

When a suggestion was made to the parlement to receive an envoy from Spain, the members had no hesitation in making terms with the court by the peace of Rueil (March 11, 1649), which ended the first Fronde.

As an entr'acte, from April 1649 to January 1650, came the affair of the Petits Mattres: Conde, proud and violent; Gaston of Orleans, pliable and contemptible; Conti, the Tae simpleton; and Longueville, the betrayed husband. Fronde The victor of Lens and Charenton imagined that every ot the one was under an obligation to him, and laid claim to a Pr,aceg – dictatorship so insupportable that Anne of Austria and Mazarin — assured by Gondi of the concurrence of the parlement and people — had him arrested. To defend Conde the great con- spiracy of women was formed: Madame de Chevreuse, the subtle and impassioned princess palatine, and the princess of Conde vainly attempted to arouse Normandy, Burgundy and the mob of Bordeaux; while Turenne, bewitched by Madame de Longueville, allowed himself to become involved with Spain and was defeated at Rethel (December 1 5, 1650) . Unfortunately, after his custom when victor, Mazarin forgot his promises — above all, Gondi's cardinal's hat. A union was effected between the two Frondes, that of the Petits Maitres and that of the parlements, and Mazarin was obliged to flee for safety to the electorate of Cologne (February 1651), whence he continued to govern the queen and the kingdom by means of secret letters. But the heads of the two Frondes — Conde, now set free from prison at Havre, and Gondi who detested him — were not long in quarrelling fatally. Owing to

Mazarin's exile and to the king's attainment of his majority (September 5, 1651) quiet "was being restored, when the return of Mazarin, jealous of Anne of Austria, nearly brought about another reconciliation of all his opponents (January 1652). Conde resumed civil war with the support of Spain, because he was not given Mazarin's place; but though he defeated the royal army at Bleneau, he was surprised at Etampes, and nearly crushed by Turenne at the gate of Saint- Antoine. Saved, however, by the Grande Mademoiselle, daughter of Gaston of Orleans, he lost Paris by the disaster of the H6tel de Ville July 4, 1652), where he had installed an insurrectionary government. A general weariness of civil war gave plenty of opportunity after this to the agents of Mazarin, who in order to facilitate peace made a pretence of exiling himself for a second time to Bouillon. Then came the final collapse: Conde having taken refuge in Spain for seven years, Gaston of Orleans being in exile, Retz in prison, and the parlement reduced to its judiciary functions only, the field was left open for Mazarin, who, four months after the king, re-entered in triumph that Paris which had driven him forth with jeers and mockery (February 1653).

The task was now to repair these four years of madness and folly. The nobles who had hoped to set up the League again, half counting upon the king of Spain, were held in The check by Mazarin with the golden dowries of his adminis- numerous nieces, and were now employed by him in tration of warfare and in decorative court functions; while Mazarln – others, De Retz and La Rochefoucauld, sought consolation in their Memoirs or their Maxims, one for his mortifications and the other for his rancour as a statesman out of employment. The parlement, which had confused political power with judiciary administration, was given to understand, in the session of April 13, iˆSS, at Vincennes, that the era of political manifestations was over; and the money expended by Gourville, Mazarin's agent, restored the members of the parlement to docility. The power of the state was confided to middle-class men, faithful servants during the evil days: Abel Servien, Michel le Tellier, Hugues de Lionne. Like Henry IV. after the League, Mazarin, after having conquered the Fronde, had to buy back bit by bit the kingdom he had lost, and, like Richelieu, he spread out a network of agents, thenceforward regular and permanent, who assured him of that security without which he could never have carried on his vast plunderings in peace and quiet. His imitator and superintendent, Fouquet, the Maecenas of the future Augustus, concealed this gambling policy beneath the lustre of the arts and the glamour of a literature remarkable for

elevation of thought ana vigour oi style, and further characterized by the proud though somewhat restricted freedom conceded to men like Corneille, Descartes and Pascal, but soon to disappear. It was also necessary to win back from Spain the territory which the Frondeurs had delivered up to her. Both countries, exhausted by twenty years of war, were incapable Spala. °f bringing it to a successful termination, yet neither would be first to give in; Mazarin, therefore, dis- quieted by Conde's victory at Valenciennes (1656), reknit the bond of Protestant alliances, and, having nothing to expect from Holland, he deprived Spain of her alliance with Oliver Cromwell (March 23, 1657). A victory in the Dunes by Turenne, now reinstalled in honour, and above all the conquest of the Flemish seaboard, were the results (June 1658); but when, in order to prevent the emperor's intervention in the Netherlands, Mazarin attempted, on the death of Ferdinand III., to wrest the Empire from the Habsburgs, he was foiled by the gold of the Spanish envoy Pe&aranda (1657). When the abdication of Christina of Sweden caused a quarrel between Charles Gustavus of Sweden and John Casimir of Poland, by which the emperor and the elector of Brandenburg hoped to profit, Mazarin (August 15, 1658) leagued the Rhine princes against them; while at the same time the substitution of Pope Alexander VII. for Innocent X., and the marriage of Mazarin's two nieces with the duke of Modena and a prince of the house of Savoy, made Spain anxious about her Italian possessions. The suggestion of a marriage between Louis XIV. and a princess of Savoy decided Spain, now brought to bay, to accord him the t t^ hand of Maria Theresa as a chief condition of the peace

Pyrenees, of the Pyrenees (November 1659). Roussillon and Artois, with a line of strongholds constituting a formidable northern frontier, were ceded to France; and the acquisition of Alsace and Lorraine under certain conditions was ratified. Thus from this long duel between the two countries Spain issued much enfeebled, while France obtained the pre- ponderance in Italy, Germany, and throughout northern Europe, as is proved by Mazarin's successful arbitration at Copenhagen and at Oliva (May-June 1660). That dream of Henry IV. and Richelieu, the ruin of Philip II. 's Catholic empire, was made a realized fact by Mazarin; but the clever engineer, dazzled by success, took the wrong road in national policy when he hoped to crown his work by the Spanish marriage.

The development of events had gradually enlarged the royal prerogative, and it now came to its full flower in the administra- tive monarchy of the 17th century. Of this system

U°661- X ' V ' Louis XIV – was to be the ctief ex P onent – His it IS). reign

may be divided into two very distinct periods.

The death of Colbert and the revocation of the edict of Nantes brought the first to a close (1661-1683-1685); coin- ciding with the date when the Revolution in England definitely reversed the traditional system of alliances, and when the administration began to disorganize. In the second period (1685-1715) all the germs of decadence were developed until the moment of final dissolution.

In a monarchy so essentially personal the preparation of the heir to the throne for his position should have been the chief

task. Anne of Austria, a devoted but unintelligent

fLo is" mo ther, knew no method of dealing with her son.

xiv. save devotion combined with the rod. His first

preceptors were nothing but courtiers; and the most intelligent, his valet Laporte, developed in the royal child's mind his natural instinct of command, a very lively sense of his rank, and that nobly majestic air of master of the world which he preserved even in the commonest actions of his life. The continual agitations of the Fronde prevented him from persever- ing in any consistent application during those years which are the most valuable for study, and only instilled in him a horror of revolution, parliamentary remonstrance, and disorder of all kinds; so that this recollection determined the direction of his government. Mazarin, in his later years, at last taught him his trade as king by admitting him to the council, and by instructing him in the details of politics and of administration.

In 1661 Louis XIV. was a handsome youth of twenty-two, of splendid health and gentle serious mien; eager for pleasure, but discreet and even dissimulating; his rather mediocre intellectual qualities relieved by solid common sense; fully alive to his rights and his duties.

*The duties he conscientiously fulfilled, but he considered he need render no account of them to any one but his Maker, the last humiliation for God's vicegerent being " to take the law from his people." In the solemn language of w * the " Memoirs for the Instruction of the Dauphin " ideas. he did but affirm the arbitrary and capricious character of his predecessors' action. As for his rights, Louis XIV. looked upon these as plenary and unlimited. Representative of God upon earth, heir to the sovereignty of the Roman emperors, a universal suzerain and master over the goods and the lives of his vassals, he could conceive no other bounds to his authority than his own interests or his obligations towards God, and in this he was a willing*

believer of Bossuet. He therefore had but two aims: to increase his power at home and to enlarge his kingdom abroad. The army and taxation were the chief instruments of his policy. Had not Bodin, Hobbes and Bossuet taught that the force which gives birth to kingdoms serves best also to feed and sustain them? His theory of the state, despite Grotius and Jurieu, rejected as odious and even impious the notion of any popular rights, anterior and superior to his own. A realist in principle, Louis XIV. was terribly utilitarian and egotistical in practice; and he exacted from his subjects an absolute, continual and obligatory self-abnegation before his public authority, even when improperly exercised.

This deified monarch needed a new temple, and Versailles, where everything was his creation, both men and things, adored its maker. The highest nobility of France, beginning The f 0rms with the princes of the blood, competed for posts of Louis in the royal household, where an army of ten thousand xlv – ‘ s soldiers, four thousand servants, and five thousand moaarch y- horses played its costly and luxurious part in the ordered and almost religious pageant of the king’s existence. The ” anciennes cohues de France,” gay, familiar and military, gave place to a stilted court life, a perpetual adoration, a very ceremonious and very complicated ritual, in which the demigod ” pontificated ” even ” in his dressing-gown.” To pay court to himself was the first and only duty in the eyes of a proud and haughty prince who saw and noted everything, especially any one’s absence. Versailles, where the delicate refinements of Italy and the grave politeness of Spain were fused and mingled with French vivacity, became the centre of national life and a model for foreign royalties ; hence if Versailles has played a considerable part in the history of civilization, it also seriously modified the life of France. Etiquette and self-seeking became the chief rules of a courtier’s life, and this explains the division of the nobility into two sections: the provincial squires, embittered by neglect; and the courtiers, who were ruined materially and intellectually by their way of living. Versailles sterilized all the idle upper classes, exploited the industrious classes by its extravagance, and more and more broke relations between king and kingdom.

But however divine, the king could not wield his power unaided. Louis XIV. called to his assistance a hierarchy of humbly submissive functionaries, and councils over which he regularly presided. Holding the very name x °y? s of roi faineant in abhorrence, he abolished the office ministers. of mayor of the palace— that is to say, the prime minister — thus imposing upon himself work which he always regularly performed. In choosing his collaborators his principle was never to select nobles or ecclesiastics, but persons of inferior birth. Neither the immense fortunes amassed by these men, nor the venality and robust vitality which made their families veritable races of ministers, altered the fact that De Lionne, Le Tellier,

Louvois and Colbert were in themselves of no account, even though the parts they played were much more important than Louis XIV. imagined. This was the age of plebeians, to the great indignation of the duke and peer Saint Simon. Mere

reflected lights, these satellites professed to share their master's

honor of all individual and collective rights of such a despotism, nature as to impose any check upon his public authority.

Louis XIV. detested the states-general and never convoked them, and the parlements were definitely reduced to silence in 1673; he completed the destruction of municipal liberties, under pretext of bad financial administration; suffered no public, still less private criticism; was ruthless when his exasperated subjects had recourse to force; and made the police the chief bulwark of his government. Prayers and resignation were the only solace left for the hardships endured by his subjects. All the ties of caste, class, corporation and family were severed; the jealous despotism of Louis XIV. destroyed every opportunity of taking common action; he isolated every man in private life, in individual interests, just as he isolated himself more and more from the body social. Freedom he tolerated for himself alone.

His passion for absolutism made him consider himself master of souls as well as bodies, and Bossuet did nothing to contravene

an opinion which was, indeed, common to every W«if K sovereign of his day. Louis XIV., like Philip II., Church. pretending to not only political but religious authority,

would not allow the pope to share it, still less would he abide any religious dissent; and this gave rise to many conflicts, especially with the pope, at that time a temporal sovereign both at Rome and at Avignon, and as the head of Christendom bound to interfere in the affairs of France. Louis XIV. 's pride caused the first struggle, which turned exclusively upon questions of form, as in the affair of the Corsican Guard in 1662. The question of the right of regale (right of the Crown to the revenues of vacant abbeys and bishoprics), which touched the essential rights of sovereignty, further inflamed the hostility between Innocent XI. and Louis XIV. Conformably with the traditions of the administrative monarchy in 1673, the king

wanted to extend to the new additions to the kingdom his rights of receiving the revenues of vacant bishoprics and making appointments to their benefices, including taking oaths of fidelity from the new incumbents. A protest raised by the bishops of Pamiers and Aleth, followed by the seizure of their revenues, provoked the intervention of Innocent XL in 1678; but the king was supported by the general assembly of the clergy, which declared that, with certain exceptions, the regale extended over the whole kingdom (1681). The pope ignored the decisions of the assembly; so, dropping the regale, the king demanded that, to obviate further conflict, the assembly should define the limits of the authority due respectively to the king, the Church and the pope. This was the object of the Declaration of the Four Deciara- Articles: the pope has no power in temporal matters; tion of general councils are superior to the pope in spiritual the Four affairs ; the rules of the Church of France are inviolable ; Articles. decisions f the pope in matters of faith are only irre- vocable by consent of the Church. The French laity transferred to the king this quasi-divine authority, which became the political theory of the ancien regime; and since the pope refused to submit, or to institute the new bishops, the Sorbonne was obliged to interfere. The affair of the " diplomatic prerogatives," when Louis XIV. was decidedly in the wrong, made relations even more strained (1687), and the idea of a schism was mooted with greater insistence than in 1681. The death of Innocent XI. in 1689 allowed Louis XIV. to engage upon negotiations rendered imperative by his check in the affair of the Cologne bishopric, where his candidate was ousted by the pope's. In 1693, under the pontificate of Innocent XII., he went, like so many others, to Canossa.

Recipient now of immense ecclesiastical revenues, which, owing to the number of vacant benefices, constituted a powerful engine of government, Louis XIV. had immense power over the French Church. Religion began to be identified with the state; and the king combated heresy and dissent, not only as a religious duty, but as a matter of political expediency, unity of faith being obviously conducive to unity of law.

Richelieu having deprived the Protestants of all political guarantees for their liberty of conscience, an anti-Protestant

party (directed by a cabal of religious devotees, the Compagni& du Saint Sacrement) determined to suppress it completely by- conversions and by a Jesuitical interpretation of the l^is terms of the edict of Nantes. Louis XIV. made xiv. and this impolitic policy his own. His passion for absolu- tne Pro ' tism, a religious zeal that was the more active because testants – it had to compensate for many affronts to public and private morals, the financial necessity of augmenting the free donations of the clergy, and the political necessity of relying upon that body in his conflicts with the pope, led the king between 1661 and 1685 to embark upon a double campaign of

arbitrary proceedings with the object of nullifying the edict, conversions being procured either by force or by bribery. The promulgation and application of systematic measures from above had a response from below, from the corporation, the urban workshop, and the village street, which supported ecclesiastical and royal authority in its suppres- sion of heresy, and frequently even went further: individual and local fanaticism co-operating with the head of the state, the intendants, and the military and judiciary authorities. Protestants were successively removed from the states-general, the consulates, the town councils, and even from the humblest municipal offices; they were deprived of the charge of their hospitals, their academies, their colleges and their schools, and were left to ignorance and poverty; while the intolerance of the clergy united with chicanery of procedure to invade their places of worship, insult their adherents, and put a stop to the practice of their ritual. Pellisson's methods of conversion, considered too slow, were accelerated by the violent „ persecution of Louvois and by the king's galleys, s / on / until the day came when Louis XIV., deceived by the the edict clergy, crowned his record of complaisant legal methods ?!J^ ates by revoking the edict of Nantes. This was the signal for a Huguenot renaissance, and the Camisards of the.Cevennes held the royal armies in check from 1 703 to 1 7 1 1 . Notwithstand- ing this, however, Louis XIV. succeeded only too well, since Protestantism was reduced both numerically and intellectually. He never perceived how its loss threw France back a full century, to the great profit of foreign nations; while neither did the Church perceive that she had been firing on her own troops.

The same order of ideas produced the persecution of the Jansenists, as much a political as a religious sect. Founded by a bishop of Ypres on the doctrine of predestination, £ 0u/s and growing by persecution, it had speedily recruited xiv. and adherents among the disillusioned followers of the the Jan- Fronde, the Gallican clergy, the higher nobility, even senlsts – at court, and more important still, among learned men and thinkers, such as the great Arnauld, Pascal and Racine. Pure and austere, it enjoined the strictest morals in the midst of corruption, and the most dignified self-respect in face of idolatrous servility. Amid general silence it was a formidable and much dreaded body of opinion; and in order to stifle it Louis XIV., the tool of his confessor, the Jesuit Le Tellier, made use of his usual means. The nuns of Port Royal were in their turn sub- jected to persecution, which, after a truce between 1666 and 1679, became aggravated by the affair of the regale, the bishops of Aleth and Pamiers being Jansenists. Port Royal was de- stroyed, the nuns dispersed, and the ashes of the dead scattered to the four winds. The bull Unigenitus launched by Pope Clement XL in 17 13 against a Jansenist book by Father Quesnel rekindled a quarrel, the end of which Louis XIV. did not live to see, and

which raged throughout the 18th century.

Bossuet, Louis XIV.'s mouthpiece, triumphed in his turn over the quietism of Madame Guyon, a mystic who recognized neither definite dogmas nor formal prayers, but abandoned herself " to the torrent of the forces of J™'^ God." Fenelon, who in his Maximes des Saints had cibertins. given his adherence to her doctrine, was obliged to submit in 1699; but Bossuet could not make the spirit of authority prevail against the religious criticism of a Richard Simon or the philosophical polemics of a Bayle. He might exile their persons; but their doctrines, supported by the

Colbert.

and finance,

scientific and philosophic work of Newton and Leibnitz, were to triumph over Church and religion in the 18th century.

The chaos of the administrative system caused difficulties no less great than those produced by opinions and creeds. Traditional rights, differences of language, provincial autonomy, ecclesiastical assemblies, parlements, governors, intendants — vestiges of the past, or promises for the future — all jostled against and thwarted each other. The central authority had not yet acquired a vigorous constitution, nor destroyed all the intermediary authorities. Colbert now offered his aid in making Louis XIV. the sole pivot of public life, as he had already become the source of religious authority, thanks to the Jesuits and to Bossuet.

Colbert, an agent of Le Tellier, the honest steward of Mazarin's dishonest fortunes, had a future opened to him by the fall of Fouquet (1661). Harsh and rough, he compelled admiration for his delight in work, his aptitude in disentangling affairs, his desire of continually aug- menting the wealth of the state, and his regard for the public welfare without forgetting his own. Born in a draper's shop, this great administrator always preserved its narrow horizon, its short-sighted imagination, its taste for detail, and the conceit of the parvenu; while with his insinuating ways, and knowing better than Fouquet how to keep his distance, he made himself indispensable by his savoir-faire and his readiness for every emergency. He gradually got everything into his control: finance, industry, commerce, the fine arts, the navy and colonies, the administration, even the fortifications, and —

through his uncle Pussort — the law, with all the profits attaching to its offices.

His first care was to restore the exhausted resources of the country and to re-establish order in finance. He began by measures of liquidation: the Chambre ardente of Colbert jggj t0 jggj t0 d ea j w ; tn fa & farmers of the revenue, the condemnation of Fouquet, and a revision of the funds. Next, like a good man of business, Colbert determined that the state accounts should be kept as accurately as those of a shop; but though in this respect a great minister, he was less so in his manner of levying contributions. He kept to the old system of revenues from the demesne and from imposts that were reactionary in their effect, such as the taille, aids, salt-tax (gabelle) and customs; only he managed them better. His forest laws have remained a model. He demanded less of the taille, a direct impost, and more from indirect aids, of which he created the code — not, however, out of sympathy for the common people, towards whom he was very harsh, but because these aids covered a greater area and brought in larger returns. He tried to import more method into the very unequal distribution of taxation, less brutality in collection, less confusion in the fiscal machine, and more uniformity in the matter of rights; while he diminished the debts of the much-involved towns by putting them through the bankruptcy court. With revolu- tionary intentions as to reform, this only ended, after several years of normal budgets, in ultimate frustration. He could never make the rights over the drink traffic uniform and equal, nor restrict privileges in the matter of the taille; while he was soon much embarrassed, not only by the coalition of particular interests and local immunities, which made despotism acceptable by tempering it, but also by Louis XIV.'s two master-passions for conquest and for building. To his great chagrin he was obliged to begin borrowing again in 1672, and to have recourse to " affaires extraordinaires "; and this brought him at last to his grave.

Order was for Colbert the prime condition of work. He desired all France to set to work as he did " with a contented air and rubbing his hands for joy"; but neither Colbert general theories nor individual happiness preoccupied his attention. He made economy truly political: that is to say, the prosperity of industry and commerce afforded him no other interest than that of making the country wealthy and the state powerful. Louis XIV.'s aspirations towards glory chimed in very well with the extremely positive

and industry.

views of his minister; but here too Colbert was an innovator and an unsuccessful one. He wanted to give 1 7th-century France the modern and industrial character which the New World had imprinted on the maritime states; and he created industry on a grand scale with an energy of labour,

a prodigious genius for initiative and for organization; while, in order to attract a foreign clientele, he imposed upon it the habits of meticulous probity common to a middle-class draper. But he maintained the legislation of the Valois, who placed industry in a state of strict dependency on finance, and he instituted a servitude of labour harder even than that of individuals; his great factories of soap, glass, lace, carpets and cloth had the same artificial life as that of contemporary Russian industry, created and nourished by the state. It was therefore necessary, in order to compensate for the fatal influence of servitude, that administra- tive protection should be lavished without end upon the royal manufactures; moreover, in the course of its development, industry on a grand scale encroached in many ways upon the resources of smaller industries. After Colbert's day, when the crutches lent by privilege were removed, his achievements lost vigour; industries that ministered to luxury alone escaped decay; the ojthers became exhausted in struggling against the persistent and teasing opposition of the municipal bodies and the bourgeoisie — conceited, ignorant and terrified at any innova- tion — and against the blind and intolerant policy of Louis XIV.

Colbert, in common with all his century, believed that the true secret of commerce and the indisputable proof of a country's prosperity was to sell as many of the products of national industry to the foreigner as possible, while Co, ˆ ert purchasing as little as possible. In order to do this, ""mmerce. he sometimes "figured as a free-trader and sometimes as a protectionist, but always in a practical sense; if he imposed prohibitive tariffs, in 1664 and 1667, he also opened the free ports of Marseilles and Dunkirk, and engineered the Canal du midi. But commerce, like industry, was made to rely only on the instigation of the state, by the intervention of officials; here, as throughout the 'national life, private initiative was kept in subjection and under suspicion. Once more Colbert failed; with regard to internal affairs, he was unable to unify weights and measures, or to suppress the many custom-houses which made France into a miniature Europe; nor could he in external affairs reform the consulates of the Levant. He did not understand that, in order to purge the body of the nation from its traditions of routine, it would be necessary to reawaken individual energy in France. He believed that the state, or rather the bureaucracy, might be the motive power of national activity.

His colonial and maritime policy was the newest and most fruitful part of his work. He wished to turn the eyes of con- temporary adventurous France towards her distant interests, the wars of religion having diverted her Col ˆ r t attention from them to the great profit of English colonies. and Dutch merchants. Here too he had no pre- conceived ideas; the royal and monopolist companies were never for him an end but a means; and after much experimenting he at length attained success. In the course of twenty

years he created many dependencies of France beyond sea. To her colonial empire in America he added the greater part of Santo Domingo, Tobago and Dominica; he restored Guiana; prepared for the acquisition of Louisiana by supporting Cavelier de la Salle; extended the suzerainty of the king on the coast of Africa from the Bay of Arguin to the shores of Sierra Leone, and instituted the first commercial relations with India. The population of the Antilles doubled; that of Canada quintupled; while if in 1672 at the time of the war with Holland Louis XIV. had listened to him, Colbert would have sacrificed his pride to the acquisition of the rich colonies of the Netherlands. In order to attach and defend these colonies Colbert created a navy which became his passion; he took convicts to man the galleys in the Mediterranean, and for the fleet in the Atlantic he established the system of naval reserve which still obtains. But, in the 18th century, the monarchy, hypnotized by the classical battle-fields

of Flanders and Italy, madly squandered the fruits of Colbert's work as so much material for barter and exchange.

In the administration, the police and the law, Colbert preserved all the old machinery, including the inheritance of office. In Colbert the great codification of laws, made under the direction and the of his uncle Pussort, he set aside the parlement of admlais- p ar i S; an(j justice continued to be ill-administered and cruel. The police, instituted in 1667 by La Reynie, became a public force independent of magistrates and under the direct orders of the ministers, making the arbitrary royal and ministerial authority absolute by means of lettres de cachet (q.v.), which were very convenient for the government and very terrible for the individuals concerned.

Provincial administration was no longer modified; it was regularized. The intendant became the king's factotum, not purchasing his office but liable to dismissal, the government's confidential agent and the real repository of royal authority, the governor being only for show (see Intendant).

Colbert's system went on working regularly up to the year 1675; lrom that time forward he was cruelly embarrassed for money, and, seeking new sources of revenue, Colbert's De 8S e(l f° r subsidies from the assembly of the clergy. work. He did not succeed either in stemming the tide of

expense, nor in his administration, being in no way in advance of his age,

and not perceiving that decisive reform could not be achieved by a government dealing with the nation as though it were inert and passive material, made to obey and to pay. Like a good Cartesian he conceived of the state as an immense machine, every portion of which should receive its impulse from outside — that is from him, Colbert. Leibnitz had not yet taught that external movement is nothing, and inward spirit everything. As the minister of an ambitious and magnifi- cent king, Colbert was under the hard necessity of sacrificing everything to the wars in Flanders and the pomp of Versailles — a gulf which swallowed up all the country's wealth; — and, amid a society which might be supposed submissively docile to the wishes of Louis XIV., he had to retain the most absurd financial laws, making the burden of taxation weigh heaviest on those who had no other resources than their labour, whilst landed property escaped free of charge. Habitual privation during one year in every three drove the peasants to revolt: in Boulonnais, the Pyrenees, Vivarais, in Guyenne from 1670 onwards and in Brittany in 1675. Cruel means of repression assisted natural hardships and the carelessness of the administra- tion in depopulating and laying waste the countryside; while Louis XIV.'s martial and ostentatious policy was even more disastrous than pestilence and famine, when Louvois' advice prevailed in council over that of Colbert, now embittered and desperate. The revocation of the edict of Nantes vitiated through a fatal contradiction all the efforts of the latter to create new manufactures; the country was impoverished for the benefit of the foreigner to such a point that economic condi- tions began to alarm those private persons most noted for their talents, their character, or their regard for the public welfare; such as La Bruyere and Fenelon in 1692, Bois-Guillebert in 1697 and Vauban in 1707. The movement attracted even the ministers, Boulainvilliers at their head, who caused the intendants to make inquiry into the causes of this general ruin. There was a volume of attack upon Colbert; but as the fundamental system remained unchanged, because reform would have necessitated an attack upon privilege and even upon the constitution of the monarchy, the evil only went on increasing. The social condition of the time recalls that of present-day Morocco, in the high price of necessaries and the extortions of the financial authorities; every man was either soldier, beggar or smuggler.

Under Pontchartrain, Chamillard and Desmarets, the expenses of the two wars of 1688 and 1701 attained to nearly five milliards. In order to cover this recourse was had as usual, not to remedies, but to palliatives worse than the evil: heavy usurious loans, debasement of the coinage, creation of stocks that were per- petually being converted, and ridiculous charges which the

bourgeois, sickened with officialdom, would endure no longer. Richelieu himself had hesitated to tax labour; Louis XIV. trod the trade organizations

under foot. It was necessary R ecourse to have recourse to revolutionary measures, to direct to revoiu- taxation, ignoring all class distinction. In 1695 the tioaary graduated poll-tax was a veritable coup d'etat against measures – privileged persons, who were equally brought under the tax; in 1 7 10 was added the tithe (dixieme), a tax upon income from all landed property. Money scarce, men too were lacking; the institution of the militia, the first germ of obligatory enlist- ment, was a no less important innovation. But these were only provisionary and desperate expedients, superposed upon the old routine, a further charge in addition to those already existing; and this entirely mechanical system, destructive of private initiative and the very sources of public life, worked with diffi- culty even in time of peace. As Louis XIV. made war continually the result was the same as in Spain under Philip II. : depopula- tion and bankruptcy within the kingdom and the coalitions of Europe without.

In 1660 France was predominant in Europe; but she aroused no jealousy except in the house of Habsburg, enfeebled and divided against itself. It was sufficient to remain faithful to the practical policy of Henry IV., of _ˆ5"/ Richelieu and of Mazarin: that of moderation in Louis xiv. strength. This Louis XIV. very soon altered, while yet claiming to continue it; he superseded it by one principle: that of replacing the proud tyranny of the Habsburgs of Spain by another. He claimed to lay down the law everywhere, in the preliminary negotiations between his ambassador and the Spanish ambassador in London, in the affair of the salute exacted from French vessels by the English, and in that of the Corsican guard in Rome; while he proposed to become the head of the crusade against the Turks in the Mediterranean as in Hungary.

The eclipse of the great idea of the balance of power in Europe was no sudden affair; the most flourishing years of the reign were still enlightened by it: witness the repurchase of Dunkirk from Charles II. in 1662, the cession of the duchies of Bar and of Lorraine ˆnd the war against Portugal. But soon the partial or total conquest of the Spanish inheritance proved " the grandeur of his beginnings and the meanness of his end." Like Philip the Fair and like Richelieu, Louis XIV. sought support for his external policy in that public opinion which in internal matters he held so cheap; and he found equally devoted auxiliaries in the jurists of his parlements.

It was thus that the first of his wars for the extension of frontiers began, the War of Devolution. On the death of his father-in-law, Philip IV. of Spain, he transferred into the realm of politics a civil custom of inheritance De 'ˆ j Um prevailing in Brabant, and laid claim to Flanders in tloa, 1667. the name of his wife Maria Theresa. The Anglo-Dutch War (1665-1667), in which he was by way of supporting the United Provinces without engaging his fleet, retarded this enterprise by a year. But after his mediation in the

treaty of Breda (July 1667), when Hugues de Lionne, secretary of state for foreign affairs, had isolated Spain, he substituted soldiers for the jurists and cannon for diplomacy in the matter of the queen's rights.

The secretary of state for war, Michel le Tellier, had organized his army; and thanks to his great activity in reform, especially after the Fronde, Louis XIV. found himself in possession of an army that was well equipped, well clothed, well provisioned, and very different from the rabble of the Thirty Years' War, fitted out by dishonest jobbing contractors. Severe discipline, suppression of fraudulent interference, furnishing of clothes and equipment by the king, regulation of rank among the officers, systematic revictualling of the army, settled means of manufacturing and furnishing arms and ammunition, placing of the army under the direct authority of the king, abolition of great military charges, subordination of the governors of strong- holds, control by the civil authority over the soldiers effected by means of paymasters and commissaries of stores; all this organization of the royal army was the work of le Tellier.

His son, Frangois Michel le Tellier, marquis de Louvois, had one sole merit, that of being his father's pupil. A parvenu of the middle classes, he was brutal in his treatment of the lower orders and a sycophant in his behaviour towards the powerful; prodigiously active, ill-obeyed — as was the custom — but much dreaded. From 1677 onwards he did but finish perfecting Louis XIV. 's army in accordance with the suggestions left by his father, and made no fundamental changes: neither the definite abandonment of the feudal arriere-ban and of recruiting — sources of disorder and insubordination — nor the creation of the militia, which allowed the nation to penetrate into all the ranks of the army, nor the adoption of the gun with the bayonet, — which was to become the ultima ratio of peoples as the cannon was that of sovereigns,— nor yet the uniform, intended to strengthen esprit de corps, were due to him. He maintained the institutions of the day, though seeking to diminish their abuse, and he perfected material details; but misfortune would have it that instead of remaining a great military administrator he flattered Louis XIV. 's megalomania, and thus caused his perdition.

Under his orders Turenne conquered Flanders (June- August 1667); and as the queen-mother of Spain would not give in, Conde occupied Franche Comte in fourteen days T m Mp,e . (February 1668). But Europe rose up

in wrath; the "be Hague. United Provinces and England, jealous and disquieted by this near neighbourhood, formed with Sweden the triple alliance of the Hague (January 1668), ostensibly to offer their mediation, though in reality to prevent the occupation of the Netherlands. Following the advice of Colbert and de Lionne, Louis XIV. appeared to accede, and by the treaty of Aix-la-Chapelle he preserved his conquests in Flanders (May 1668).

This peace was neither sufficient nor definite enough for Louis XIV.; and during four years he employed all his diplomacy to isolate the republic of the United Provinces in Aix^a- Europe, as he had done for Spain. He wanted to ruin Chapeiic. this nation both in a military and an economic sense, in order t« annex to French Flanders the rest of the Catholic Netherlands allotted to him by a secret treaty for parti- tioning the Spanish possessions, signed with his brother-in-law the emperor Leopold on the 19th of January 1668. Colbert — very envious of Holland's wealth — prepared the finances, le Tellier the army and de Lionne the alliances. In vain did the grand- pensionary of the province of Holland, Jan de Witt, offer concessions of all kinds; both England, bound by the secret treaty of Dover (January 1670), and France had need of this war. Avoiding the Spanish Nether- lands, Louis XIV. effected the passage of the Rhine in June 1672; and the disarmed United Provinces, which had on their side only Brandenburg and Spain, were occupied in a few days. The brothers de Witt, in consequence of their fresh offer to treat at any price, were assassinated; the broken dykes of Muiden arrested the victorious march of Conde and Turenne; while the popular and military party, directed by the stadtholder William of Orange, took the upper hand and preached resistance to the death. " The war is over," said the new secretary of state for foreign affairs, Arnauld de Pomponne; but Louvois and Louis XIV. said no. The latter wished not only to take possession of the Netherlands, which were to be given up to him with half of the United Provinces and their colonial empire; he wanted " to play the Charlemagne," to re-establish Catholicism in that country as Philip II. had formerly attempted to do, to occupy all the territory as far as the Lech, and to exact an annual oath of fealty. But the patriotism and the religious fanaticism of the Dutch revolted against this insupportable tyranny. Power had passed from the hands of the burghers of Amsterdam into those of William of Orange, who on the 30th Peace of ° August 1673, profiting by the arrest of the army Nijm- brought about by the inundation and by the fears of*

yegea, Europe, joined in a coalition with the emperor, the 1678. king of Spain, the duke of Lorraine, many of the

princes of the Empire, and with England, now at last enlightened as to the projects of Catholic restoration which Louis XIV. was

War with Holland.

planning with Charles II. It was necessary to evacuate and then to settle with the United Provinces, and to turn against Spain. After fighting for five years against the whole of Europe by land and by sea, the efforts of Turenne, Conde and Duquesne culminated at Nijmwegen in fresh acquisitions (1678). Spain had to cede to Louis XIV., Franche Comte, Dunkirk and half of Flanders. This was another natural and glorious result of the treaty of the Pyrenees. The Spanish monarchy was disarmed.

But Louis XIV. had already manifested that unmeasured and restless passion for glory, that claim to be the exclusive arbiter of western Europe, that blind and narrow insistence, which were to bear out his motto "■ Seul je^^a. contre tous." Whilst all Europe was disarming he kept his troops, and used peaee as a means of conquest. Under orders from Colbert de Croissy the jurists came upon the scene once more, and their unjust decrees were sustained by force of arms. The Chambres de Reunion sought for and joined to the kingdom those lands which were not actually dependent upon his new conquests, but which had formerly been so: such as Saarbriicken, Deux Ponts (Zweibrticken) and Montbeliard in 1680, Strassburg and Casale in 1681. The power of the house of Habsburg Was paralysed by an invasion of the Turks, and Louis XIV. sent 35>°°° men into Belgium; while Luxemburg was occupied by Crequi and Vauban. The truce of Ratisbon (Regensburg) imposed upon Spain completed the work of the peace of Nijmwegen (1684); and thenceforward Louis XIV.'s terrified allies avoided his clutches while making ready to fight him.

*This was the moment chosen by Louis XIV.'s implacable enemy, William of Orange, to resume the war. His surprise of Marshal Luxembourg near Mons, after the signature of the peace of Nijmwegen, had proved that in his eyes ˆraˆge! "' war was the basis> of his authority in Holland and in Europe. His sole arm of support amidst all his allies was not the English monarchy, sold to Louis XIV., but Protestant England, jealous of France and uneasy about her independence. Being the husband of the duke of York's daughter, he had an understanding in this country with Sunderland, Godolphin and Temple— a party whose success was retarded for several years by the intrigues of Shaftesbury. But Louis XIV. added mistake to mistake; and the revocation of the edict of Nantes added religious hatreds to political jealousies. At the same time the Catholic powers responded by the league of Augsburg (July 1686) to his policy of unlimited aggrandisement, ■ ˆ2sjliii*f The unsuccessful attempts of Louis XIV. to force his partisan Cardinal Wilhelm Egon von Fiirstenberg (sec Furstenberg: House) into the electoral see of Cologne; the bombardment of Genoa; the humiliation of the pope in Rome itself by the marquis de Lavardin; the seizure of the Huguenot emigrants at Mannheim, and their imprisonment at*

Vincennes under pretext of a plot, precipitated the conflict. The question of the succession in the Palatinate, where Louis XIV. supported the claims of his sister-in-law the duchess of Orleans, gave the signal for a general war. The French armies devastated the Palatinate instead of attacking William of Orange in the Nether- lands, leaving him free to disembark at Torbay, usurp the throne of England, and construct the Grand Alliance of 1689.

Far from reserving all his forces for an important struggle elsewhere, foreshadowed by the approaching death of Charles II. of Spain, Louis XIV., isolated in his turn, committed the error of wasting it for a space of ten years in a War of the war of conquest, by which he alienated all that remained ˆuiance. ” to him of European sympathy. The French armies, notwithstanding the disappearance of Conde and Turenne, had still glorious days before them with Luxembourg at Fleurus, at Steenkirk and at Neerwinden (1690-1693), and with Catinat in Piedmont, at Staffarda, and at Marsaglia; but these successes alternated with reverses. Tourville’s fleet, victorious at Beachy Head, came to grief at La Hogue (1692); and though the ex. peditions to Ireland in favour of James II. were unsuccessful, thanks to the Huguenot Schomberg, Jean Bart and Duguay-

Trouin ruined Anglo-Dutch maritime commerce. Louis XIV. assisted in person at the sieges of Mons and Namur, operations for which he had a liking, because, like Louvois, who died in 1691, he -thought little of the French soldiery in the open field. After three years of strife, ruinous to both sides, he made the first overtures of peace, thus marking an epoch in his foreign policy; though William took no unfair advantage of this, remaining content with the restitution of places taken by the Chambres de Reunion, except Strassburg, with a frontier-line of fortified

places for the Dutch, and with the official deposition ptwfcfc of the Stuarts. But the treaty of Ryswick (1697)

marked the condemnation of the policy pursued since that of Nijmwegen. While signing this peace Louis XIV. was only thinking of the succession in Spain. By partitioning her in advance with the other strong powers, England and Holland, by means of the treaties of the Hague and of London (1698-1699), — as he had formerly done with the emperor in i668, ; — he seemed at first to wish for a pacific solution of the eternal conflict between the Habsburgs and the Bourbons, and to restrict himself to the

perfecting of his natural frontiers; but on the death of Charles II. of Spain (1700) he claimed everything in favour of his grandson, the duke of Anjou, now appointed universal heir, though risking the loss of all by once more letting himself fall into imprudent and provocative action in the dynastic interest.

English public opinion, desirous of peace, had forced William III. to recognize Philip V. of Spain; but Louis XIV. 's mainten- Warofthe ance °^ t ' ie eventual right of his grandson to the crown Spanish of France, and the expulsion of the Dutch, who had Succes- no t recognized Philip V"., from the Barrier towns, sloa '. brought about the Grand Alliance of 1701 between

the maritime Powers and the court of Vienna, desirous of parti- tioning the inheritance of Charles II. The recognition Of the Old Pretender as James III., king of England, was only a response to the Grand Alliance, but it drew the English Tories into an inevitable war. Despite the death of William III. (March 19, 1702) his policy triumphed, and in this war, the longest in the reign, it was the names of the enemy's generals, Prince Eugene of Savoy, Mazarin's grand-nephew, and the duke of Marlborough, which sounded in the ear, instead of Conde, Turenrie and Luxembourg. Although during the first campaigns (1 701^1 703) in Italy, in Germany and in the Netherlands success was equally balanced, the successors of Villars — thanks to the treason of the duke of Savoy — were defeated at Hachstadt and Landau, and were reduced to the defensive (1704). In 1706 the defeats at Ramillies and Turin led to the evacuation of the Netherlands and Italy, and endangered the safety" of Dauphine. In 1708 Louis XIV. by a supreme effort was still able to maintain his armies; but the rout at Oudenarde, due to the misunderstanding between the duke of Burgundy and Vend6me, left the northern frontier exposed, and the cannons of the Dutch were heard at Marly. Louis XIV. had to humble himself to the extent of asking the Dutch for peace; but they forgot the lesson of 1673, and revolted by their demands at the Hague, he made a last appeal to arms and to the patriotism of his subjects at Malplaquet (September 1709). After this came invasion. Nature herself conspired with the enemy in the disastrous winter of 1709.

What saved Louis XIV. was not merely his noble constancy of resolve, the firmness of the marquis de Torcy, secretary of state for foreign affairs, the victory of Vendome at Villaviciosa, nor the loyalty of his people. The interruption of the conferences at Gertruydenberg having obliged the Whigs and Marlborough to resign their power into the hands of the Tories, now sick of war, the death of the emperor Joseph I. (April 1711), which risked the reconstruction of Charles V.'s colossal and unwieldy monarchy upon the shoulders of the archduke Charles, and Marshal Villars' famous victory

of Denain (July 1 7 1 2) combined to render possible

*the treaties of Utrecht, Rastatt and Baden (1713-1714). J*** 1?' These gave Italy and the Netherlands to the Habsburgs, 1713. ' Spain and her colonies to the Bourbons, the places on*

the coast and the colonial commerce to England (who had the lion's share), and a royal crown to the duke of Savoy

and the elector of Brandenburg. The peace of Utrecht was to France what the peace of Westphalia had been to Austria, and curtailed the former acquisitions of Louis XIV.

The ageing of the great king was betrayed not only by the fortune of war in the hands of Villeroy, la Feuillade, or Marsin; disgrace and misery at home were worse than defeat. Bad of By the strange and successive deaths of the Grand Louis Dauphin (1711), the duke and duchess of Burgundy Xiv.'s (1712} — who had been the only joy of the old monarch reign. —and of his two grandsons (1712-1714), it seemed as though his whole family were involved under the same curse. The court, whose sentimental history has been related by Madame de la layette, its official splendours by Loret, and its intrigues by the due de Saint-Simon, now resembled an infirmary of morose invalids, presided over by Louis XIV. 's elderly wife, Madame de Maintenon, under the domination of the Jesuit le Tellier. Neither was it merely the clamours of the people that arose against the monarch. All the more remarkable spirits of the time, like prophets in Israel, denounced a tyranny which put Chamillart at the head of the finances because he played billiards well, and Villeroy in command of the armies although he was utterly untrustworthy; which sent the " patriot " Vauban into disgrace, banished from the court Catinat, the Pere la Pensee, " exiled" to Cambrai the too clear sighted Fenelon, and suspected Racine of Jansenism and La Fontaine of independence.

Disease and famine; crushing imposts and extortions; official debasement of the currency; bankruptcy; state prisons; religious and political inquisition; suppression of all institutions for the safe-guarding of rights; tyranny by the intendants; royal, feudal and clerical oppression burdening every faculty and every necessary of life; " monstrous and incurable luxury "; the horrible drama of poison; the twofold adultery of Madame de Montespan; and the narrow bigotry of Madame de Maintenon— all concurred to make the end of the reign a sad contrast with the splendour of its beginning. When reading Moliere and Racine, Bossuet and Fenelon, the campaigns of Turenne, or Colbert's ordinances; when enumerating the countless literary and scientific institutions of the great century; when considering the port of Brest, the Canal du Midi, Perrault's colonnade of

the Louvre, Mansart's Invalides and the palace of Versailles, and Vauban's fine fortifications — admiration is kindled for the radiant splendour of Louis XIV. 's period. But the art and literature expressed by the genius of the masters, reflected in the tastes of society, and to be taken by Europe as a model throughout a whole century, are no criterion of the social and political order of the day. They were but a magnificent drapery of pomp and glory thrown across a background of poverty, ignorance, super- stition, hypocrisy and cruelty; remove it, and reality appears in. all its brutal and sinister nudity. The corpse of Louis XIV., left to servants for disposal, and saluted all along the road to Saint Denis by the curses of a noisy crowd sitting in the cabarets, celebrating his death by drinking more than their fill as a com- pensation for having suffered too much from hunger during his lifetime — such was the coarse but sincere epitaph which popular opinion placed on the tomb of the " Grand Monarque." The 1 nation, restive under his now broken yoke, received with a joyous anticipation, which the future was to discount, the royal infant whom they called Louis the Well-beloved, and whose funeral sixty years later was to be greeted with the same proofs of disillusionment.

The death of Louis XIV. closed a great era of French history; the 1 8th century opens upon a crisis for the monarchy. From 1 7 1 5 to 1 7 23 came the reaction of the Regency, with its character marvellous effrontery, innovating spirit and frivolous otthe immorality. From 1723 to 1743 came the mealy- eighteenth mouthed despotism of Cardinal Fleury, and his ceatar y- apathetic policy within and without the kingdom. From 1743 to 1 7 74 came the personal rule of Louis XV. , when all the different powers were in conflicts — the bishops and parlement quarrelling, the government fighting against the clergy and the magistracy, and public opinion in declared opposition to the state. Till at last, from 1774 to 1789, came Louis XVI. with his honest illusions.

his moral pusillanimity and his intellectual impotence, to aggravate still further the accumulated errors of ages and to prepare for the inevitable Revolution.

The 1 8th century, like the 17th, opened with a political coup d'etat. Louis XV. was five years old, and the duke of Tlle Orleans held the regency. But Louis XIV. had in his

Regency will delegated all the power of the government to a (ins- council on which the duke of Maine, his legitimated

son, had the first, but Madame de Maintenon and the Jesuits the predominant place. This collective administration, designed to cripple the action of the regent, encountered a two- fold opposition from the nobles and the parlement; but on the 2nd of September 171 5 the emancipated parlement set aside the will in favour of the duke of Orleans, who thus together with the title of regent had all the real power. He therefore reinstituted the parlement in its ancient right of remonstrance (suspended since the declarations of 1667 and 1673), and handed over ministerial power to the nobility, replacing the secretaries of state by six councils composed in part of great nobles, on the advice of the famous due de Saint-Simon. The due de Noailles, president of the council of finance, had the direction of this " Poly synodic"

The duke of Orleans, son of the princess palatine and Louis XIV. 's brother, possessed many gifts — courage, intelligence

and agility of mind — but he lacked the one gift of Orleans. usm g these to good advantage. The political crisis

that had placed him in power had not put an end to the financial crisis, and this, it was hoped, might be effected by substituting partial and petty bankruptcies for the general bankruptcy cynically advocated by Saint-Simon. The reduction of the royal revenues did not suffice to fill the treasury; while the establishment of a chamber of justice (March 1716) had no other result than that of demoralizing the great lords and ladies already mad for pleasure, by bringing them into contact with the farmers of the revenue who purchased impunity from them. A very clever Scotch adventurer named John Law (q.v.) now offered his assistance in dealing with the enormous debt of more than three milliards, and in providing the treasury. Being well acquainted with the mechanism of banking, he had adopted views as to cash, credit and the circulation of values which contained an admixture of truth and falsehood. Authorized after many difficulties to organize a private bank of deposit and account, which being well conceived prospered and revived commerce, Law proposed to lighten the treasury by the profits accruing to a great maritime and colonial company. Payment for the shares in this new Company of the West, with a capital of a hundred millions, was to be made in credit notes upon the government, converted into 4% stock. These aggregated funds, needed to supply the immense and fertile valley of the Mississippi, and the annuities of the treasury destined to pay for the shares, were non-transferable. Law's idea was to ask the bank for the floating capital necessary, so that the bank and the Company of the West were to be supplementary to each other; this is what was called Law's system. After the chancellor D'Aguesseau and the due de Noailles had been replaced by D'Argenson alone, and after the // de justice of the 26th of August 1 7 18 had deprived the parlement, hostile to Law, of the authority left to it, the bank became royal and the Company of the West universal. But the royal bank, as a state establish- ment, asked for compulsory privilege to increase the emission of its credit notes, and that they should receive a premium upon all metallic specie. The Company of the Indies became the grantee for the farming of tobacco, the coinage of metals, and farming in general; and in order to procure funds it multiplied the output of shares, which were adroitly launched and became more and more sought for on the exchange in the rue Quin- campoix. This soon caused a frenzy of stock-jobbing, which disturbed the stability of private fortunes and social positions, and depraved customs and manners with the seductive notion of easily obtained riches. The nomination of Law to the con- troller-generalship, re-established for his benefit on the resignation of D'Argenson (January 5, 1720), let loose still wilder speculation ;*

till the day came when he could no longer face the terrible difficulty of

meeting both private irredeemable shares with a variable return, and the credit notes redeemable at sight and guaranteed by the state. Gold and silver were proscribed; the bank and the company were joined in one; the credit notes and the shares were assimilated. But credit cannot be commanded either by violence or by expedients; between July and September 1720 came the suspension of payments, the flight of Law, and the disastrous liquidation which proved once again that respect for the state's obligations had not yet entered into the law of public finance.

Reaction on a no less extensive scale characterized foreign policy during the Regency. A close alliance between France and her ancient enemies, England and Holland, was The , concluded and maintained from 171 7 to 1739: France, Anglo- after thirty years of fighting, between two periods of Dutcn bankruptcy; Holland reinstalled in her commercial Aa,aa c&. position; and England, seeing before her the beginning of her empire over the seas — all three had an interest in peace. On the other hand, peace was imperilled by Philip V. of Spain and by the emperor (who had accepted the portion assigned to them by the treaty of Utrecht, while claiming the whole), by Savoy and Brandenburg (who had profited too much by European conflicts not to desire their perpetuation), by the crisis from which the maritime powers of the Baltic were suffering, and by the Turks on the Danube. The dream of Cardinal Alberoni, Philip V.'s minister, was to set fire to all this inflammable material in order to snatch therefrom a crown of some sort to satisfy the maternal greed of Elizabeth Farnese; and this he might have attained by the occupation of Sardinia and the expedition to Sicily (1717-1718), if Dubois, a priest without a religion, a greedy parvenu and a diplomatist of second rank, though tenacious and full of resources as a minister, had inot placed his common sense at the disposal of the regent's interests and those of European peace. He signed the triple alliance at the Hague, succeeding with the assistance of Stanhope, the English minister, in engaging the emperor therein, after attempt- ing this for a year and a half. Whilst the Spanish fleet was destroyed before Syracuse by Admiral Byng, the intrigue of the Spanish ambassador Cellamare with the duke of Maine to exclude the family of Orleans from the succession on Louis XV. 's death was discovered and repressed; and Marshal Berwick burned the dockyards at Pasajes in Spain. Alberoni's dream was shattered by the treaty of London in 1720.

Seized in his turn with a longing for the cardinal's hat, Dubois paid for it by the registering of the bull Unigenitus and by the persecution of the Jansenists which the regent had stopped. After the majority of Louis XV. had been proclaimed on the 16th of February 1723, Dubois was the first to depart; and four months after his disappearance the duke of Orleans, exhausted by his excesses, carried with him into the grave that spirit of reform which he had compromised by his frivolous voluptuous- ness

(December 2, 1723).

The Regency had been the making of the house of Orleans; thenceforward the question was how to humble it, and the due de Bourbon, now prime minister — a great-grandson Ministry of the great Conde, but a narrow-minded man of otthe limited intelligence, led by a worthless woman — ducde set himself to do so. The marquise de Prie was the Bourboa – first of a series of publicly recognized mistresses; from 1723 to 1726 she directed foreign policy and interna} affairs despite the king's majority, moved always more by a spirit of vengeance than by ambition. This sad pair were dominated by the self- interested and continual fear of becoming subject to the son of the Regent, whom they detested; but danger came upon them from elsewhere. They found standing in their way the very man who had been the author of their fortunes, Louis XV. 's tutor, uneasy in the exercise of a veiled authority; for the churchman Fleury knew how to wait, on condition of ultimately attaining his end. Neither the festivities given at Chantilly in honour of the king, nor the dismissal (despite the most solemn promises) of the Spanish infanta, who had been betrothed

to Louis XV., nor yet the young king's marriage to Maria Leszczynska (1725) — a marriage negotiated by the marquise de Prie in order to bar the throne from the Orleans family — could alienate the sovereign from his old master. The irritation kept up by the agents of Philip V., incensed by this affront, and the discontent aroused by the institutions of therinquantieme and the militia, by the re-establishment of the feudal tax on Louis XV.'s joyful accession, and by the resumption of a persecu- tion of the Protestants and the Jansenists which had apparently died out, were cleverly exploited by Fleury; and a last ill-timed attempt by the queen to separate the king from him brought about the fall of the due de Bourbon, very opportunely for France, in June 1726.

From the hands of his unthinking pupil Fleury eventually received the supreme direction of affairs, which he retained for Cardinal seventeen years. He was aged seventy-two when Fleury, he thus obtained the power which had been his un- 1726? measured though not ill-calculated ambition. Soft-

17 spoken and polite, crafty and suspicious, he was

pacific by temperament and therefore allowed politics to slumber. His turn

for economics made Orry, 1 the controller-general of finance, for long his essential partner. The latter laboured at re-establishing order in fiscal affairs; and various measures like the impost of the dixieme upon all property save that of the clergy, together with the end of the corn famine, sufficed to restore a certain amount of well-being. Religious peace was more difficult to secure; in fact politico-religious quarrels dominated all the internal policy of the kingdom during forty years, and gradually compromised the royal authority. The Jesuits, returned to power in 1723 with the due de Bourbon and in 1726 with Fleury, rekindled the old strife regarding the bull Unigenitus in opposition to the Gallicans and the Jansenists. The retractation imposed upon Cardinal de Noailles, and his replacement in the archbishopric of Paris by Vintimille, an unequivocal Molinist, excited among the populace a very violent agitation against the court of Rome and the Jesuits, the prelude to a united Fronde of the Sorbonne and the parlement. Fleury found no other remedy for this agitation — in which appeal was made even to miracles— than lits de justice and lettres de cachet; Jansenism remained a potent source of trouble within the heart of Catholicism.

This worn-out septuagenarian, who prized rest above every- thing, imported into foreign policy the same mania for economy and the same sloth in action. He naturally adopted Fleury's tne j,j ea f reconciling Louis XIV. 's descendants, policy. who had all been embroiled ever since the Polish marriage. He succeeded in this by playing very adroitly on the ambition of Elizabeth Farnese and her husband Philip V., who was to reign in France notwithstanding any renunciation that might have taken place. Despite the birth of a dauphin (September 1729), which cut short the Spanish intrigues, the reconciliation was a lasting one (treaty of Seville) ; it led to common action in Italy, and to the installation of Spanish royalties at Parma, Piacenza, and soon after at Naples. Fleury, supported by the English Hanoverian alliance, to which he sacrificed the French navy, obliged the emperor Charles VI. to sacrifice the trade of the Austrian Netherlands to the maritime powers and Central Italy to the Bourbons, in order to gain recognition for his Pragmatic Sanction. The question of the succession in France lay dormant until the end of the century, and Fleury thought he had definitely obtained peace in the treaty of Vienna (1731).

The war of the Polish succession proved him to have been deceived. On the death of Augustus II. of Saxony, king of Poland, Louis XV.'s father-in-law had been proclaimed king by the Polish diet. This was an ephemeral success, ill-prepared and obtained by taking a sudden advantage of national senti- ment; it was soon followed by a check, owing to a Russian and

1 Jean Orry Louis Orry de Fulvy (1703-1751), counsel to the parlement in

1 723, intendant of finances in I 737, founded at Vincennes the manufactory of porcelain which was bought in 1750 by the farmers general and transferred to Sevres.

German coalition and the baseness of Cardinal Fleury, who, in order to avoid intervening, pretended to tremble before an imaginary threat of reprisals on the part of England. But Chauvelin, the keeper of the seals, supported by po%ˆ, e public opinion, avenged on the Rhine and the Po the Succcs- unlucky heroism of the comte de Plelo at Danzig, 2 the ˆJˆy 733 " vanished dream of the queen, the broken word of Louis XV. , and the treacherous abandonment of Poland. Fleury never forgave him for this: Chauvelin had checkmated him with war; he checkmated Chauvelin with peace, and hastened to replace Marshals Berwick and Villars by diplomatists. The third treaty of Vienna (1738), the reward of so much effort, would only have claimed for France the little duchy of Bar, had not Chauvelin forced Louis XV. to obtain Lorraine for his father-in-law — still hoping for the reversion of the crown; but Fleury thus rendered impossible any influence of the queen, and held Stanislaus at his mercy. In order to avenge himself upon Chauvelin he sacrificed him to the cabinets of Vienna and London, alarmed at seeing him revive the national tradition in Italy.

Fleury hardly had time to breathe before a new conflagration broke out in the east. The Russian empress Anne and the emperor Charles VI. had planned to begin dismember- ing the Turkish empire. More fortunate than Plelo, V" Villeneuve, the French ambassador at Constantinople, q'lsUoa. endeavoured to postpone this event, and was well supported; he revived the courage of the Turks and provided them with arms, thanks to the comte de Bonneval (g.v.), one of those adventurers of high renown whose influence in Europe during the first half of the eighteenth century is one of the most piquant features of that period. The peace of Belgrade (September 1739) was, by its renewal -of the capitulations, a great material success for France, and a great moral victory by the rebuff to Austria and Russia.

France had become once more the arbiter of Europe, when the death of the emperor Charles VI. in 1740 opened up a new period of wars and misfortunes for Europe and for Waroftbe the pacific Fleury. Everyone had signed Charles VI.'s Austrian Pragmatic Sanction, proclaiming the succession-rights Succes- of his daughter, the archduchess Maria Theresa; but sl0 "' on his death there was a general renunciation of signatures and an attempt to divide the heritage. The safety of the house of Austria depended on the attitude of France; for Austria could no longer harm her. Fleury's inclination was not to misuse France's traditional policy by exaggerating it, but to respect his sworn word; he dared not press his opinion, however, and yielded to the fiery impatience of young hot-heads like the two Belle-Isles, and of all those who, infatuated by Frederick II.,

felt sick of doing nothing at Versailles and were backed up by Louis XV.'s bellicose mistresses. He had to experience the repeated defections of Frederick II. in his own interests, and the precipitate retreat from Bohemia. He had to humble himself before Austria and the whole of Europe; and it was high time for Fleury, now fallen into second childhood, to vanish from the scene (January 1743).

Louis XV. was at last to become his own prime minister and to reign alone; but in reality he was more embarrassed than pleased by the responsibility incumbent upon him. He therefore retained the persons who had composed ˆ B ™°" a/ Fleury's staff; though instead of being led by a single tolls XV. one of them, he fell into the hands of several, who disputed among themselves for the ascendancy: Maurepas, incomparable in little things, but neglectful of political affairs ; D'Argenson, bold, and strongly attached to his work as minister

2 Louis Robert Hippolyte de Brehan, comte de Plelo (1699-1734), a Breton by birth, originally a soldier, was at the time of the siege of Danzig French ambassador to Denmark. Enraged at the return to Copenhagen, without having done anything, of the French force sent to help Stanislaus, he himself led it back to Danzig and fell in an attack on the Russians on the 27th of May 1734. Plelo was a poet of considerable charm, and well-read both in science and literature.

See Marquis de Brehan, Le Comte de Plelo (Nantes, 1874); R. Rathery, Le Comte de Plelo (Paris, 1876); and P. Boye, Stanislaus Leszczynski el le troisicme traile de Vienne (Paris, 1898).

of war; and the cardinal de Tencin, a frivolous and worldly priest. Old Marshal de Noailles tried to incite Louis XV. to take his kingship in earnest, thinking to cure him by war of his effeminate passions; and, in the spring of 1744, the king's grave illness at Metz gave a momentary hope of reconciliation between him and the deserted queen. But the due de Richelieu, a roue who had joined hands with the sisters of the house of Nesle and was jealous of Marshal de Noailles, soon regained his lost ground; and, under the influence of this panderer to his pleasures, Louis XV. settled down into a life of vice. Holding aloof from active affairs, he tried to relieve the incurable boredom of satiety in the violent exercise of

hunting, in supper-parties with his intimates, and in spicy indiscretions. Brought up religiously and to shun the society of women, his first experiences in adultery had been made with many scruples and intermittently. Little by little, however, jealous of power, yet incapable of exercising it to any purpose, he sank into a sensuality which became utterly shameless under the influence of his chief mistress the duchesse de Chateauroux.

Hardly had a catastrophe snatched her away in the zenith of her power when complete corruption and the flagrant triumph of egoism supervened with the accession to power of the marquise de Pompadour, and for nearly twenty years (1745-1764) the whims and caprices of this little bourgeoise ruled the realm. A prime minister in petticoats, she had her political system: reversed the time- honoured alliances of France ; appointed or disgraced ministers, directed fleets and armies, concluded treaties, and failed in all her enterprises ! She was the queen of fashion in a society where corruption blossomed luxuriantly and exquisitely, and in a century of wit hers was second to none. Amidst this extraordinary instability, when everything was at the mercy of a secret thought of the master, the mistress alone held lasting sway; in a reign of all-pervading satiety and tedium, she managed to remain indispensable and bewitching to the day of her death.

Meanwhile the War of the Austrian Succession broke out again, and never had secretary of state more intricate questions to solve than had D'Argenson. In the attempt ai'ˆi – t0 ma ke a stage-emperor of Charles Albert of Bavaria, Chapelle. defeat was incurred at Dettingen, and the French were driven back on the Rhine (1 743) . The Bavarian dream dissipated, victories gained in Flanders by Marshal Saxe, another adventurer of genius, at Fontenoy, Raucoux and Lawfeld (1745-1747), were hailed with joy as continuing those of Louis XIV. ; even though they resulted in the loss of Germany and the doubling of English armaments. The " disinterested " peace of Aix-la-Chapelle (October 1748) had no effectual result other than that of destroying in Germany, and for the benefit of Prussia, a balance of power that had yet to be secured in Italy, despite the establishment of the Spanish prince Philip at Parma. France, meanwhile, was beaten at sea by England, Maria Theresa's sole ally. While founding her colonial empire England had come into collision with France; and the rivalry of the Hundred Years' War had immediately sprung up again ! between the two countries. Engaged already in both Canada and in India (where Dupleix was founding an empire with a mere handful of men), it was to France's interest not to become involved in war upon the Rhine, thus falling into England's continental trap. She did fall into it, however: for the sake of conquering Silesia for the king of Prussia, Canada was left exposed by the capture of Cape Breton; while in order to restore this same Silesia to Maria Theresa, Canada was lost and with it India.

France had worked for the king of Prussia from 1740 to 1748; now it was Maria Theresa's game that was played in TheS ven l ˆ e Seven Years' War. In 1755, the English having Years' made a sudden attack upon the French at sea, and War, Frederick II. having by a fresh volterface passed into

alliance with Great Britain, Louis XV. 's government accepted an alliance with Maria Theresa in the treaty of the 1st of May 1 756. Instead of remaining upon the defensive in this continental war — merely accessory as it was — he made

1756 1763.

it his chief affair, and placed himself under the petticoat govern- ment of three women, Maria Theresa, Elizabeth of Russia and the marquise de Pompadour. This error-rˆthe worst of all — laid the foundations of the Prussian and British empires. By three battles, victories for the enemies of France — Rossbach in Germany, 1757, Plassey in India, 1757, and Quebec in Canada, 1759 (owing to the recall of Dupleix, who was not bringing in large enough dividends to the Company of the Indies, and to the abandonment of Montcalm, who could not interest any one in " a few acres of snow "), the expansion of Prussia was assured, and the British relieved of French rivalry in the expansion of their empire in India and on the North American continent.

Owing to the blindness of Louis XV. and the vanity of the favourite, the treaties of Paris and Hubertusburg (1763) once more proved the French splendid in their conceptions, Treaties ot but deficient in action. Moreover, Choiseul, secretary Paris and of state for foreign affairs since 1758, made out of this Hubertus' deceptive Austrian alliance a system which put the urs ' finishing touch to disaster; and after having thrown away everything to satisfy Maria Theresa's hatred of Frederick II,, the reconciliation between these two irreconcilable Germans at Neisse and at Neustadt (1769-17 70) was witnessed by France, to the prejudice of Poland, one of her most ancient adherents. The expedient of the Family Compact, concluded, with Spain in 1 761 — with a view to taking vengeance upon England, whose fleets were a continual thorn in the side to France— served only to involve Spain herself in misfortune. Choiseul, who at least had a policy that was sometimes in the right, and who was very anxious to carry it out, then realized that the real quarrel had to be settled with England. Amid the anguish of defeat and of approaching ruin, he had an acute sense of the actualities of the case, and from 1763 to 1766 devoted himself passionately to the reconstruction of the navy. To compensate for the loss of the colonies he annexed Lorraine (1 766) , and by the acquisition of Corsica in 1768 he gave France an intermediary position in the Mediterranean, between friendly Spain and Italy, looking forward to the

time when it should become a stepping-stone to Africa.

But Louis XV. had two policies. The incoherent efforts which he made to repair by the secret diplomacy of the comte de Broglie the evils caused by his official policy only aggravated his shortcomings and betrayed his weak- ˆ!"L tl ness. The contradictory intrigues of the king's , of Poland. secret proceedings in the candidature of Prince Xavier, the dauphine's brother, and: the patriotic efforts of the confedera- tion of Bar, contributed to bring about the Polish crisis which the partition of 1772 resolved in favour of Frederick II.; and the Turks were, in their turn dragged into the same disastrous affair. Of the old allies of France, Choiseul preserved at least Sweden by the coup d'etat of Gustavus III.; but instead of being as formerly the centre of great affairs, the cabinet of Versailles lost all its credit, and only exhibited before the eyes of con- temptuous Europe France's extreme state of decay.

The nation felt this humiliation, and showed all the greater irritation as the want of cohesion in the government and the anarchy in the central authority became more and more intolerable in home affairs. Though the adminis- tat ˆ aat tration still possessed a fund of tradition and a Louts XV. personnel which, including many men of note, protected it from the enfeebling influence of the court, it looked as though chance regulated everything so far as the government was concerned. These fluctuations were owing partly to the character of Louis XV., and partly also to the fact that society in the 18th century was too advanced in its ideas to submit without resistance to the caprice of such a man. His'mistresses were not the only cause of this; for ever since Fleury's advent political parties had come to the fore. From 1749 to 1757 the party of religious devotees grouped round the queen and the king's daughters, with the dauphin as chief and the comte D'Argenson , and Machault d'Arnouville, keeper of the seals, as lieutenants, had worked against Madame de Pompadour (who leant for support upon the parlements, the Jansenists and the philosophers)

and had gained the upper hand. Thenceforward poverty, disorders, and consequently murmurs increased. The financial reform attempted by Machault d'ArnoUville between 1745 and 1740— a reduction of the debt through, the impost of the twentieth and the edict of 1749 against: the extensive pro- perty held in mortmain by the Church— after his disgrace only resulted in failure. The army, which D'Argenson (likewise dismissed

by Madame de Pompadour) had been from 1743 to 1747 trying to restore by useful reforms, was riddled by cabals. Half the people in the kingdom were dying of hunger, while the court was insulting poverty by its luxury and waste; and from 1750 onwards political ferment was everywhere manifest. It found all the more favourable foothold in that the Church, the State's best ally, had made herself more and more unpopular. Her refusal of the sacraments to those who would not accept the bull Unigenitus (1746) was exploited in the eyes of the masses, as in those of more enlightened people was her selfish and short-sighted resistance to the financial plans of Machault. The general discontent was expressed by the parlements in their attempt to establish a political supremacy amid universal confusion, and by the popular voice in pamphlets recalling by their violence those of the League. Every one expected and desired a speedy revolution that should put an end to a policy which alternated between overheated effervescence, abnormal activity and lethargy. Nothing can better show the point to which things had descended than the attempted assassination of Louis the Well-beloved by Damiens in 1757.

Choiseul was the means of accelerating this revolution, not

only by his abandonment of diplomatic traditions, but still

more by his improvidence and violence. He reversed

seu ' the policy of his predecessors in regard to the parle orient. Supported by public opinion, which clamoured for guarantees against abitrary power, the parlements had dared not only to insist on being consulted as to the budget of the state in 1763, but to enter upon a confederation throughout the whole of France, and on repeated occasions to ordain a general strike of the judicial authorities. Choiseul did not hesitate to attack through lits de justice or by exile a judiciary oligarchy which doubtless rested its pretensions merely on wealth, high birth, or that encroaching spirit that was the only counteracting agency to the monarchy. Louis XV., wearied with their clamour, called them to order. Choiseul's religious policy was no less venturesome; after the condemnation in 1750 of the Jesuits who were involved in the bankruptcy of Father de la Valette, their general, in the Antilles, he had the order dissolved for refusing to modify its constitution (1761-1764). Thus, not content with encouraging writers with innovating ideas to the prejudice of traditional institutions, he attacked, in the order of the Jesuits, the strongest defender of these latter, and delivered over the new generation to revolutionary doctrines.

. A woman had elevated him into power; a woman brought him to the ground. He succumbed to a coalition of the chancellor The Tri- Maupeou, the due d'Aiguillon and the Abbe Terray, umvlrate, which depended on the

favour of the king's latest 1T70′ mistress, Madame du Barry (December 1770); and

1TJ4 ‘ the Jesuits were avenged by a stroke of authority

similar to that by which they themselves had suffered. Following on an edict registered by the lit de justice, which forbade any remonstrance in political matters, the parlement had resigned, and had been imitated by the provincial parlements; whereupon Maupeou, an energetic chancellor, suppressed the parlements and substituted superior councils of magistrates appointed by the king (1771)ˆ This reform was justified by the religious intolerance of the parlements; by their scandalous trials of Calas, Pierre Paul Sirven (1709-1777), the chevalier de la Barre and the comte de Lally; by the retrograde spirit that had made them suppress the Encyclopaedia in 1759 and condemn £mile in 1763; and by their selfishness in perpetuating abuses by which they profited. But this reform, being made by the minister of a hated sovereign, only aided in exasperating public opinion, which was grateful to the parlements in that their remonstrances had not always been fruitless.

The new Ideas,

Thus all the buttresses of the monarchical institution began to fall to pieces: the Church, undermined by the heresy of Jansenism, weakened by the inroads of philosophy, Aacleot discredited by evil-livers among the priesthood, and influences divided against itself, like all losing parties; the aadlasti- nobility of the court, still brave at heart, : though tutlon& incapable of exertion and reduced to beggary, having lost all respect for discipline and authority, not only in the camp, but in civilian society; and the upper-class officials, narrow-minded and egotistical, unsettling by their opposition the royal authority which they pretended to safeguard. Even the ” liberties,” among the few representative institutions which the ancien rigime had left intact in some provinces, turned against the people. The estates opposed most of the intelligent and humane measures proposed by such intendants as Tourny and Turgot to relieve the peasants, whose distress was very great; they did their utmost to render the selfishness of the privileged classes more oppressive and vexatious.

Thus the terrible prevalence of poverty and want; the successive famines; the mistakes of the government; the scandals of the Pare aux Cerfs; and the parlements playing the Roman senate: all these causes, added together and multiplied, assisted in setting a general fermentation to work. The philosophers only helped to pre- cipitate a movement which they had not created; with- out pointing to absolute power as the cause of the trouble, and without pretending to upset the traditional system, they attempted to

instil into princes the feeling of new and more precise obligations towards their subjects. Voltaire, Montesquieu, the Encyclopaedists and the Physiocrats (recurring to the tradition of Bayle andFontenelle), by dissolving in their analyti- cal crucible all consecrated beliefs and all fixed institutions, brought back into the human society of the 18th century that humanity which had been so rudely eliminated. They demanded freedom of thought and belief with passionate insistence; they ardently discussed institutions and conduct; and they imported into polemics the idea of natural rights superior to all political arrangements. Whilst some, like Voltaire and the Physiocrats, representatives of the privileged classes and careless of political rights, wished to make use of the omnipotence of the prince to accomplish desirable reforms, or, like Montesquieu, adversely criticized despotism and extolled moderate governments, other, plebeians like Rousseau, proclaimed the theory of the social contract and the sovereignty of the people. So that during this reign of frivolity and passion, so bold in conception and so poor in execution, the thinkers contributed still further to mark the contrast between grandeur of plan and mediocrity of result.

The preaching of all this generous philosophy, not only in France, but throughout the whole of Europe, would have been in vain had there not existed at the time a social class interested in these great changes, and capable of compassing them. Neither the witty and lucid form in which the philosophers clothed their ideas in their satires, romances, stage-plays and treatises, nor the salons of Madame du Deffand, Madame Geoffrin and Mademoiselle de Lespinasse, could possibly have been sufficiently far-reaching or active centres of political propaganda. The former touched only the more highly educated classes; while to the latter, where privileged individuals alone had entry, novelties were but an undiluted stimulant for the jaded appetites of persons whose ideas of good-breeding, moreover, would have drawn the line at martyrdom.

The class which gave the Revolution its chiefs, its outward and visible forms, and the irresistible energy of its hopes, was the bourgeoisie, intelligent, ambitious and rich; in ~. . the forefront the capitalists and financiers of the haute geolsie— bourgeoisie, farmers-general and army contractors, theiacar- who had supplanted or swamped the old landed and na “«”» »’ military aristocracy, had insensibly reconstructed the interior of the ancient social edifice with the gilded and incon- gruous materials of wealth, and in order to consolidate or increase their monopolies, needed to secure themselves against the arbitrary action of royalty and the bureaucracy.

Next came the crowd of stockholders and creditors of the state, who, in face of the government's " extravagant anarchy," no longer felt safe from partial or total bankruptcy. More powerful still, and more masterful, was the commercial, industrial and colonial bourgeoisie; because under the Regency and under Louis XV. they had been more productive and more creative. Having gradually revolutionized the whole economic system, in Paris, in Lyons, in Nantes, in Bordeaux, in Marseilles, they could not tamely put up with being excluded from public affairs, which had so much bearing upon their private or collective enterprises. Finally, behind this bourgeoisie, and afar off, came the crowd of serfs, rustics whom the acquisition of land had gradually enfranchised, and who were the more eager to enjoy their definitive liberation because it was close at hand.

The habits and sentiments of French society showed similar changes. From having been almost exclusively national during Louis XIV. 's reign, owing to the perpetual state formation °i war ar »d to a sort of proud isolation, it had gradually ot man- become cosmopolitan. After the peace of Aix-la-ners and chapelle, France had been flooded from all quarters cus oms. o j t ˆ e c j v jjj ZC(j wor i < j ; DU t especially from England, by a concourse of refined and cultured men well acquainted with her usages and her universal language, whom she had received sympathetically. Paris became the brain of Europe. This revolution in manners and customs, coinciding with the revolution in ideas, led in its turn to a transformation in feeling, and to new aesthetic needs. Gradually people became sick of openly avowed gallantry, of shameless libertinism, of moral obliquity and of the flattering artifices of vice; a long shudder ran through the selfish torpor of the social body. After reading the 2V ' ouvelle-H tloH.se, Clarissa and Sir Charles Grandison, fatigued and wearied society revived as though beneath the fresh breezes of dawn. The principle of examination, the reasoned analysis of human conditions and the discussion of causes, far from culminating in disillusioned nihilism, every- where aroused the democratic spirit, the life of sentiment and of human feeling: in the drama, with Marivaux, Diderot and La Chaussee; in art, with Chardin and Greuze; and in the salons, in view of the suppression of privilege. So that to Louis XV. 's cynical and hopeless declaration: " Apres moi le deluge," the setting 18th century responded by a belief in progress and an appeal to the future. A long-drawn echo from all classes hailed a revolution that was possible because it was necessary.

If this revolution did not burst forth sooner, in the actual lifetime of Louis XV., if in Louis XVI. 's reign there was a renewal of loyalty to the king,

before the appeal to liberty was made, that is to be explained by this hope of recovery. But Louis XVI.'s reign (1774-1792) was only to be a temporary halting-place, an artifice of history for passing through the transition period whilst elaborating the transformation which was to revolutionize, together with France, the whole world.

Louis XVI. was twenty years of age. Physically he was stout, and a slave to the Bourbon fondness for good living; Louis xvi. intellectually a poor creature and but ill-educated, he loved nothing so much as hunting and lock- smith's work. He had a taste for puerile amusements, a mania for useless little domestic economies in a court where millions vanished like smoke, and a natural idleness which achieved as its masterpiece the keeping a diary from 1766 to 1792 of a life so tragic, which was yet but a foolish chronicle of p trifles. Add to this that he was a virtuous husband, a kind father, a fervent Christian and a good-natured man full of excellent intentions, yet a spectacle of moral pusillanimity and ineptitude.

From 1770 onwards lived side by side with this king, rather

than at his side, the archduchess Marie Antoinette of Austria —

one of the very graceful and very frivolous women

Mark wn0 were t De found at Versailles, opening to life

like the flowers she so much loved, enamoured of

pleasure and luxury, delighting to free herself from

the formalities of court life, and mingling in the amusements

Antola- ttte.

of society; lovable and loving, without ceasing to be virtuous. Flattered and adored at the outset, she very soon furnished a sinister illustration to Beaumarchais' Basile; for evil tongues began to calumniate the queen: those of her brothers-in-law, the due d'Aiguillon (protector of Madame du Barry and dismissed from the ministry), and the Cardinal de Rohan, recalled from his embassy in Vienna. She was blamed for her friendship with the comtesse de Polignac, who loved her only as the dispenser of titles and positions; and when weary of this persistent begging for rewards, she was taxed with her preference for foreigners who asked nothing. People brought up against her the debts and expenditure due to her belief in the inexhaustible resources of France; and hatred became definite when she was suspected of trying to imitate her mother Maria Theresa and play the part of ruler, since her husband neglected his duty. They then became

persuaded that it was she who caused the weight of taxation; in the most infamous libels comparison was made between her freedom of behaviour and that of Louis XV. 's former mistresses. Private envy and public misconceptions very soon summed up her excessive unpopularity in the menacing nickname, " L'Autrichienne." (See Marie Antoinette.)

All this shows that Louis XVI. was not a monarch capable of directing or suppressing the inevitable revolution. His reign was but a tissue of contradictions. External p ort i gB affairs seemed in even a more dangerous position than policy ot those at home. Louis XVI. confided to Vergennes Loula the charge of reverting to the traditions of the crown XVL and raising France from the humiliation suffered by the treaty of Paris and the partition of Poland. His first act was to release French policy from the Austrian alliance of 1756; in this he was aided both by public opinion and by the confidence of the king — the latter managing to set aside the desires of the queen, whom the ambition of Maria Theresa and Joseph II. hoped to use as an auxiliary. Vergennes' object was a double one: to free the kingdom from English supremacy and to shake off the yoke of Austria. Opportunities offered themselves simul- taneously. In 1 7 7 5 the English colonies in America rebelled, and Louis XVI., after giving them secret aid and encouragement almost from the first, finally in February 1778, despite Marie Antoinette, formed an open alliance with them; while when Joseph II., after having partitioned Poland, wanted in addition to balance the loss of Silesia with that of Bavaria, Vergennes pre- vented him from doing so. In vain was he offered a share in the partition of the Netherlands by way of an inducement. France's disinterested action in the peace of Teschen (1779) restored to her the lost adherence of the secondary states. Europe began to respect her again when she signed a Franco-Dutch-Spanish alliance (1779-1780), and when, after the capitulation of the English at Yorktown, the peace of Versailles (1783) crowned her efforts with at least formal success. Thenceforward, partly from prudence and partly from penury, Vergennes cared only for the maintenance of peace — a not too easy task, in opposition to the greed of Catherine II. and Joseph II., who now wished to divide the Ottoman empire. Joseph II., recogniz- ing that Louis XVI. would not sacrifice the "sick man" to him, raised the question of the opening of the Scheldt, against the Dutch. Vainly did Joseph II. accuse his sister of ingratitude and complain of her resistance; the treaty of Fontainebleau in 1785 maintained the rights of Holland. Later on, Joseph II., sticking to his point, wanted to settle the house of Bavaria in the Netherlands; but Louis XVI. supported the confederation of princes (Fürstenbund) which Frederick II. called together in order to keep his turbulent neighbour within bounds. Ver- gennes completed his work by signing a commercial treaty in 1786 with England, whose commerce and industry were favoured above others, and a second in 1787 with Russia.

He died in 1787, at an opportune moment for himself; though he had temporarily raised France's position in Europe, his work was soon ruined by the very means taken to secure its successes: warfare and armaments had hastened the " hideous bankruptcy."

From the very beginning of his reign Louis XVI. fell into

contradictions and hesitation in internal affairs, which could

not but bring him to grief. He tried first of all to Internal g 0Vern i n accordance with public opinion, and was Louis xvi. induced to flatter it beyond measure; in an extreme

of inconsistency he re-established the parlements, the worst enemies of reform, at the very moment when he was calling in the reformers to his councils.

Turgot, the most notable of these latter, was well fitted to play his great part as an enlightened minister, as much from

the principle of hard work and domestic economy JjZjZ?' traditional in his family, as from a maturity of mind 1776. developed by extensive study at the Sorbonne and*

by frequenting the salons of the Encyclopaedists. He had proved this by his capable administration in the pay- master's office at Limoges, from 1761 to 17 74. A disciple of Quesnay and of Gournay, he tried to repeat in great affairs the experience of liberty which he had found successful in small, and to fortify the unity of the nation and the government by social, political and economic reforms. He ordained the free circulation of grain within the kingdom, and was supported by Louis XVI. in the course of the flour-war {guerre des farines) (April-May 1775); he substituted a territorial subsidy for the royal corvee — so burdensome upon the peasants — and thus tended to abolish privilege in the matter of imposts; and he established the freedom of industry by the dissolution of privileged trade corporations (1776). Finance was in a deplorable state, and as controller-general he formulated a new fiscal policy, consisting of neither fresh taxation nor loans, but of retrenchment. At one fell stroke the two auxiliaries on which he had a right to count failed him: public opinion, clamouring for reform on condition of not paying the cost; and the king,

too timid to dominate public opinion, and not knowing how to refuse the demands of privilege. Economy in the matter of public finance implies a grain of severity in the collection of taxes as well as. in expenditure. By the former Turgot hampered the great interests ; by the second he thwarted the desires of courtiers not only of the second rank but of the first. Therefore, after he had aroused the complaints of the commercial world and the bourgeoisie, the court, headed by Marie Antoinette, profited by the general excitement to overthrow him. The Choiseul party, which had gradually been reconstituted, under the influence of the queen, the princes, parlement, the prebendaries, and the trade corpora- tions, worked adroitly to eliminate this reformer of lucrative abuses. The old courtier Maurepas, jealous of Turgot and desirous of remaining a minister himself, refrained from defending his colleague; and when Turgot, who never knew how to give in, spoke of establishing assemblies of freeholders in the communes and the provinces, in order to relax the tension of over-centraliza- tion, Louis XVI., who never dared to pass from sentiment to action, sacrificed his minister to the rancour of the queen, as he had already sacrificed Malesherbes (1776). Thus the first governmental act of the queen was an error, and dissipated the hope of replacing special privileges by a general guarantee given to the nation, which alone could have postponed a revolu- tion. It was still too early for a Fourth of August; but the queen's victory was none the less vain, since Turgot's ideas were taken up by his successors.

The first of these was Necker, a Genevese financier. More able than Turgot, though a man of smaller ideas, he abrogated

the edicts registered by the lits de justice; and unable I"™"' or not daring to attack the evil at its root, he thought 1781. ne cou ld suppress its symptoms by a curative process

of borrowing and economy. Like Turgot he failed, and for the same reasons. The American war had finally exhausted the exchequer, and, in order to replenish it, he would have needed to inspire confidence in the minds of capitalists; but the resumption in 1778 of the plan of provincial assemblies charged with remodelling the various imposts, and his compte-rendu in which he exhibited the monarchy paying its pensioners for their inactivity as it had never paid its agents for their zeal, aroused a fresh outburst of anger. Necker was carried away in his turn by the reaction he had helped to bring about (1781).

Having fought the oligarchy of privilege, the monarchy next tried to rally it to its side, and all the springs of the old regime were strained to the breaking-point. The military Theretum rule of the marquis de Segur eliminated the plebeians of feudal- from the army; while the great lords, drones in the Ism to the hive, worked with a kind of fever at the

enforcement ottens,ve – of their seigniorial rights; the feudal system was making a last struggle before dying. The Church claimed her right of ordering the civil estate of all Frenchmen as an absolute mistress more strictly than ever. Joly de Fleury and D 'Ormesson, Necker's successors, pushed their narrow spirit of reaction and the temerity of their inexperience to the furthest limit; but the reaction which reinforced the privileged classes was not sufficient to fill the coffers of the treasury, and Marie Antoinette, who seemed gifted with a fatal perversity of instinct, confided the finances of the kingdom to Calonne, an upper-class official and a veritable Cagliostro of finance.

From 1783 to 1787, this man organized his astounding system of falsification all along the line. His unbridled prodigality, by spreading a belief in unlimited resources, augmented the confidence necessary for the success of perpetual S j""*' loans; until the day came when, having exhausted the 17S ˆ system, he tried to suppress privilege and fall back upon the social reforms of Turgot, and the financial schemes of Necker, by suggesting once more to the assembly of notables a territorial subsidy from all landed property. He failed, owing to the same reaction that was causing the feudal system to make inroads upon the army, the magistracy and industry; but in his fall he put on the guise of a reformer, and by a last wild plunge he left the monarchy, already compromised by the affair of the Diamond Necklace (q.v.), hopelessly exposed (April 1787).*

The volatile and brilliant archbishop Lomenie de Brienne was charged with the task of laying the affairs of the ancien regime before the assembly of notables, and with asking the nation for resources, since the monarchy could no Lominie longer provide for itself; but the notables refused, and referred the minister to the states-general, the repre- sentative of the nation. Before resorting to this extremity, Brienne preferred to lay before the parlement his two edicts regarding a stamp duty and the territorial subsidy; to be met by the same refusal, and the same reference to the states- general. The exile of the parlement to Troyes, the arrest of various members, and the curt declaration of the king's absolute authority (November 9, 1787) were unsuccessful in breaking down its resistance. The threat of Chretien Francois de Lamoig- non, keeper of the seals, to imitate Maupeou, aroused public opinion and caused a fresh confederation of the parlements of the kingdom. The royal government was too much exhausted to overthrow even a decaying power like that of the parlements, and being still more afraid of the future representatives of the French people than of the supreme courts, capitulated to the insurgent parlements. The recalled parlement seemed at the pinnacle of power.

Its next action ruined its ephemeral popularity, by claiming the convocation of the states-general " according to the formula observed in 1614," as

already demanded by the estates of Dauphine at Vizille on the 21st of July 1788. j^^.°' The exchequer was empty; it was necessary to comply. The royal declaration of the 23rd of September 1788 convoked the states-general for the 1st of May 1789, and the fall of Brienne and Lamoignon followed the recall of Necker. Thenceforward public opinion, which was looking for something quite different from the superannuated formula of 1614, abandoned the parle- ments, which in their turn disappeared from view; for the struggle beginning between the privileged classes and the govern- ment, now at bay, had given the public, through the states-general, that means of expression which they had always lacked.

The conflict immediately changed ground, and an engagement began between privilege and the people over the twofold question of the number of deputies and the mode of voting. Voting by head, and the double representation of the third estate {tiers, Hat); this was the great revolution; voting by order meant the

de Brienne.

■*8 s-3*

FRANCE

[HISTORY

continued domination of privilege, and the lesser revolution. The monarchy, standing apart, held the balance, but needed a decisive

policy. Necker, with little backing at court, could not Prelude to act energetically, and Louis XVI., wavering between general. " Necker and the queen, chose the attitude most

convenient to his indolence and least to his interest: heremained neutral, and his timidity showed clearly in the council of the 27th of December 1788. Separating the two questions which were so closely connected, and despite the sensational brochure of the abbe Sieyes, " What is the Third Estate? " he pronounced for the doubling of the third estate without deciding as to the vote by head, yet leaving it to be divined that he preferred the vote by order. As to the programme there was no more decisive resolution; but the edict of convocation gave it to be understood that a reform was under consideration: " the establishment of lasting and permanent order in all branches of the administration." The point as to the place of convoca- tion gave rise to a compromise between the too-distant centre of France and too-tumultuous Paris. Versailles was chosen " because of the hunting! " In the procedure of the elections

the traditional system of the states-general of 1614 electorate. was preserved, and the suffrage was almost universal,

but in two kinds : for the third estate nearly all citizens over twenty-five years of age, paying a direct contribu- tion, voted — peasants as well as bourgeois; the country clergy were included among the ecclesiastics; the Smaller nobility among the nobles; and finally, Protestants were electors and eligible.

According to custom, documents (colliers) were drawn up, containing a list of grievances and proposals for reform. All the

orders were agreed in demanding prudently modified addresses reform: the vote on the budget, order in finance,

regular convocation of the states-general, and a written constitution in order to get rid of arbitrary rule. The address of the clergy, inspired by the great prelates, sought to make inaccurate lamentations over the progress of impiety a means of safeguarding their enormous spiritual and temporal powers, their privileges and exemptions, and their vast wealth. The nobility demanded voting by order, the maintenance of their privileges, and, above all, laws to protect them against the arbitrary proceedings of royalty. The third estate insisted on the vote by head, the graduated abolition of privilege in all govern- mental affairs, a written constitution and union. The programme went on broadening as it descended in the social scale.

The elections sufficed finally to show that the ancien rigime, characterized from the social point of view by inequality, from

the political point of view by arbitrariness, and from elections tne religious point of view by intolerance, was com- pleted from the administrative point of view by in- extricable disorder. As even the extent of the jurisdiction of the bailliages was unknown, convocations were made at haphazard, according to the good pleasure of influential persons, and in these assemblies decisions were arrived at by a process that confused every variety of rights and powers, and was governed by no logical principle; and in this extreme confusion terms and affairs were alike involved.

Whilst the bureaucracy of the ancien rSgime sought for desperate expedients to prolong its domination, the whole social

body gave signs of a yet distant but ever nearing dis- ™u aier . integration. The revolution was already complete currents before it was declared to the world. Two distinct oithe currents of disaffection, one economic, the other

tiZn" 1 "' philosophic, had for long been pervading the nation.

There had been much suffering throughout the 17th and 1 8th centuries; but no one had hitherto thought of a politico-social rising. But the other, the philosophic current, had been set going in the 18th century; and the policy of despotism tempered by privilege had been criticized in the name of liberty as no longer justifying itself by its services to the state. The ultramontane and oppressively burdensome church had been taunted with its lack of Christian charity, apostolic poverty and primitive virtue. All vitality had been sapped

from the old order of nobles, reduced in prestige by the savonnette d vilains (office purchased to ennoble the holder), enervated by court life, and so robbed of its roots in the soil, from which it had once drawn its strength, that it could no longer live save as a ruinous parasite on the central monarchy. Lastly, to come to the bottom of the social scale, there were the common people, taxable at will, subject to the arbitrary and burdensome forced labour of the corvee, cut off by an impassable barrier from the privileged classes whom they hated. For them the right to work had been asserted, among others by Turgot, as a natural right opposed to the caprices of the arbitrary and selfish aristocracy of the corporations, and a breach had been made in the tyranny of the masters which had endeavoured to set a barrier to the astonishing outburst of industrial force which was destined to characterize the coming age.

The outward and visible progress of the Revolution, due primarily to profound economic disturbance, was thus accelerated and rendered irresistible. Economic reformers found a moral justification for their dissatisfaction in philosophical theories; the chance conjunction of a philosopho-political idea with a national deficit led to the preponderance of the third estate at the elections, and to the predominance of the democratic spirit in the states-general. The third estate wanted civil liberty above all; political liberty came second only, as a means and guarantee for the former. They wanted the abolition of the feudal system, the establishment of equality and a share in power. Neither the family nor property was violently attacked; the church and the monarchy still appeared to most people two respectable and respected institutions. The king and the privileged classes had but so to desire it, and the revolution would be easy and peaceful.

Louis XVI. was reluctant to abandon a tittle of his absolute power, nor would the privileged classes sacrifice their time- honoured traditions; they were inexorable. The king, more ponderous and irresolute every day, vacillated fl eet i n ? 01 between Necker the liberal on one side and Marie general. Antoinette, whose feminine pride was opposed to any concessions, with the comte d'Artois, a mischievous nobody who could neither choose a side nor stick to one, on the other. When the states-general opened on the

5th of May 1789 Louis XVI. had decided nothing. The conflict between him and the Assembly immediately broke out, and became acute over the verification of the mandates; the third estate desiring this to be made in common by the deputies of the three orders, which would involve voting by head, the suppression of classes and the preponderance of the third estate. On the refusal of the privileged classes and after an interval of six weeks, the third estate, considering that they represented 96 % of the nation, and in accordance with the proposal of Sieyes, declared that they represented the nation and therefore were authorized to take resolutions unaided, the first being that in future no arrangement for taxation could take place without their consent.

The king, urged by the privileged classes, responded to this first revolutionary act, as in 1614, by closing the Salle des Menus Plaisirs where the third estate were sitting; where- 0atB o/ upon, gathered in one of the tennis-courts under the the presidency of Bailly, they swore on the 20th of June tennis- not to separate before having established the con- courL stitution of the kingdom.

Louis XVI. then decided, on the 23rd, to make known his policy in a royal lit de justice. He declared for the lesser reform, the fiscal, not the social; were this rejected, he declared The Lltde that " he alone would arrange for the welfare of his Justice of people." Meanwhile he annulled the sitting of the June 23 > 17th, and demanded the immediate dispersal of the Assembly. The third estate refused to obey, and by the mouth of Bailly and Mirabeau asserted the legitimacy of the Revolution. The refusal of the soldiers to coerce the Assembly showed that the monarchy could no longer rely on the army; and a few days later, when the lesser nobility and the lower ranks of the clergy had united with the third estate whose cause was their own, the king yielded, and on the 27th of June commanded both orders to join in the National Assembly, which was thereby

recognized and the political revolution sanctioned. But at the same time, urged by the " infernal cabal " of the queen and the comte d'Artois, Louis XVI. called in the foreign regiments — the only ones of which he could be certain — and dismissed Necker. The Assembly, dreading a sudden attack, demanded the withdrawal of the troops. Meeting with a refusal, Paris

opposed the king's army with her citizen-soldiers; and T fth ag by the

taking of the Bastille, that mysterious dark Bastille. fortress which personified the ancien regime, secured

the triumph of the Revolution (July 14). The king was obliged to recall Necker, to mount the tricolor cockade at the Hotel de Ville, and to recognize Bailly as mayor of Paris and La Fayette as commander of the National Guard, which remained in arms after the victory. The National Assembly had right on its side after the 20th of June and might after the 14th of July. Thus was accomplished the Revolution which was to throw into the melting-pot all that had for centuries appeared fixed and stable.

As Paris had taken her Bastille, it remained for the towns and country districts to take theirs — all the Bastilles of feudalism.

Want, terror and the contagionof examplesprecipitated 3P° n ” the disruption of governmental authority and of the anarchy, old political status; and sudden anarchy dislocated

all the organs of authority. Upon the ruins of the central administration temporary authorities were founded in various isolated localities, limited in area but none the less defiant of the government. The provincial assemblies of Dauphine and elsewhere gave the signal; and numerous towns, following the example of Paris, instituted municipalities whichsub- stituted their authority for that of the intendants and their sub- ordinates. Clubs were openly organized, pamphlets and journals appeared, regardless of administrative orders; workmen’s unions multiplied in Paris, Bordeaux and Lyons, in face of drastic pro- hibition; and anarchy finally set in with the defection of the army in Paris on the 23rd of June at Nancy, at Metz and at Brest. The crying abuses of the old regime, an insignificant factor at the outset, soon combined with the widespread agrarian distress, due to the unjust distribution of land, the disastrous exploitation of the soil, the actions of the government, and the severe winter of 1 788. Discontent showed itself in pillage and incendiarism on country estates; between March and July 1789 more than three hundred agrarian riots took place, uprooting the feudal idea of property, already compromised by its own excesses. Not only did pillaging take place; the boundaries or property were also ignored, and people no longer held themselves bound to pay taxes. These jacqueries hastened the movement of the regular revolution.*

The decrees of the 4th of August, proposed by those noble ” patriots ” the due d’Aiguillon and the vicomte de Noailles,

who had already on the 23rd of June made armed T f e ht t resistance to the evacuation of the Hall of Assembly, August 4. P ut the final touch to the revolution begun by the

provincial assemblies, by liberating land and labour, and proclaiming equality among all Frenchmen. Instead of exasperating the demands of the peasants and workmen by repression and raising civil war between the bourgeoisie and the proletariat, they drew a distinction between personal servitude, which was suppressed, and the rights of contract, which were to be redeemed — a laudable but impossible distinction. The whole feudal system crumbled before the revolutionary in- sistence of the peasants; for their masters, bourgeois or nobles, terrified by prolonged riots, capitulated and gradually had to consent to make the resolutions of the 4th of August a reality.

Overjoyed by this social liberation, the Assembly awarded Louis XVI. the title of " renewer of French liberty"; but Elabora- remaining faithful to his hesitating policy of the tion of the 23rd of June, he ratified the decrees of the 4th of constltu- August, only with a very ill grace. On the other hand, tion. the privileged classes, and notably the clergy, who saw

the whole traditional structure of their power threatened, now rallied to him, and when after the 28th of August the Assembly

set to work on the new constitution, they combined in the effort to recover some of the position they had lost. But whatever their theoretical agreement on social questions, politically they were hopelessly at odds. The bourgeoisie, conscious of their opportunity, decided for a single chamber against the will of the noblesse; against that of the king they declared it permanent, and, if they accorded him a suspensory veto, this was only in order to guard them against the extreme assertion of popular rights. Thus the progress of the Revolution, so far, had left the mass of the people still excluded from any constitutional influence on the government, which was in the hands of the well-to-do classes, which also controlled the National Guard and the munici- palities. The irritation of the disfranchised proletariat was more- over increased by the appalling dearness of bread and food generally, which the suspicious temper of the times — -fomented by the tirades of Marat in the Ami du peuple — ascribed to English intrigues in revenge for the aid given by France to the American colonies, and to the treachery in high places that made these intrigues successful. The climax came with the rumour that the court was preparing a new military coup d'Uat, a rumour that seemed to be confirmed by indiscreet toasts proposed at a banquet by the officers of the guard at Versailles; and on the night of the 5th to the 6th of October a Parisian mob forced the king and royal family to return with them to Paris amid cries of "We are bringing the baker, the baker's wife and the little baker's boy! " The Assembly followed; and henceforth king and Assembly were more or less under the influence of the whims and passions of a populace maddened by want and suspicion, by the fanatical or unscrupulous incitements of an

unfettered press, and by the unrestrained oratory of obscure demagogues in the streets, the cafes and the political clubs.

Convened for the purpose of elaborating a system that should conciliate all interests, the Assembly thus found itself forced into a conflict between the views of the people, who feared betrayal, and the courts which dreaded being overwhelmed. This schism was reflected in the parties of the Assembly; the absolutists of the extreme Right; the moderate monarchists of the Right and Centre; the constitutionalists of the Left Centre and Left; and, finally, on the extreme Left the democratic revolutionists, among whom Robespierre sat as yet all but unnoticed. Of talent there was enough and to spare in the Assembly; what was' conspicuously lacking was common sense and a practical knowledge of affairs. Of all the orators who declaimed from the tribune, Mirabeau alone realized the perils of the situation and possessed the power of mind and will to have mastered them. Unfortunately, however, he was dis- credited by a disreputable past, and yet more by the equivocal attitude he had to assume in order to maintain his authority . in the Assembly while working in what he believed to be the true interests of the court. His political ideal for France was that of the monarchy, rescued from all association with the abuses of the old regime and "broad-based upon the people's will "; his practical counsel was that the king should frankly proclaim this ideal to the people as his own, should compete with the Assembly for popular favour, while at the same time using every means to win over those by whom his authority was flouted. For a time Mirabeau influenced the counsels of the court through the comte de Montmorin; but the king neither trusted him nor could be brought to see his point of view, and Marie Antoinette, though she resigned herself to negotiating with him, was very far from sympathizing with his ideals. Finally, all hope of the conduct of affairs being entrusted to him was shattered when the Assembly passed a law forbidding its members to become ministers.

The attempted reconciliation with the king having failed, the Assembly ended by working alone, and made the control that it should have exerted an instrument, not of co- Dec / ara . operation but of strife. It inaugurated its legislative tion of the labours by a metaphysical declaration of the Rights rights of of Man and of the Citizen (October 2, 1789). This maa ' enunciation of universal verities, the bulk of which have, sooner

or later, been accepted by all civilized nations as " the gospel of modern times," was inspired by all the philosophy of the 18th century in France and by the Contrat Social. It comprised various rational and humane ideas, no longer theological, but profoundly and deliberately thought out: ideas as to the sovereign-right of the nation, law by general consent, man superior to the pretensions of caste and the fetters of dogma, the vindication of the ideal and of human dignity. Unable to rest on historic precedent like England, the Constituent Assembly took as the basis for its labours the tradition of the thinkers.

Upon the principles proclaimed in this Declaration the con- stitution of 1 791 was founded. Its provisions are discussed else- where (see the section below on Law and Institutions) ; The .„ here it will suffice to say that it established under the

coastitu- . 1 r 1 1 • • 1

tioa. sovereign people, for the king was to survive merely

as the supreme executive official, a wholly new model of government in France, both in Church and State. The historic divisions of the realm were wiped out; for the old provinces were substituted eighty-three departments; and with the provinces vanished the whole organization, territorial, administrative and ecclesiastical, of the ancien regime. In one respect, indeed, the system of the old monarchy remained intact; the tradition of centralization established by Louis XIV. was too strong to be overthrown, and the destruction of the historic privileges and immunities with which this had been ever in conflict only served to strengthen this tendency. In 1791 France was pulverized into innumerable administrative atoms incapable of cohesion; and the result was that Paris became more than ever the brain and nerve-centre of France. This fact was soon to be fatal to the new constitution, though the admini- strative system established by it still survives. Paris was in effect dominated by the armed and organized proletariat, and this proletariat could never be satisfied with a settlement which, while proclaiming the sovereignty of the people, had, by means of the property qualification for the franchise, established the political ascendancy of the middle classes. The settlement had, in fact, settled nothing; it had, indeed, merely intensified the profound cleavage between the opposing tendencies; for if the democrats were alienated by the narrow franchise, the Civil Constitution of the Clergy, which cut at the very roots of the Catholic system, drove into opposition to the Revolution not only the clergy themselves but a vast number of their flocks.

The policy of the Assembly, moreover, hopelessly aggravated its misunderstanding with the king. Louis, indeed, accepted the constitution

and attended the great Feast of Federation (July 14, 1790), when representatives from all the new depart- ments assembled in the Champ de Mars to ratify the work of the Assembly; but the king either could not or would not say the expected word that would have dissipated mistrust. The Civil Constitution of the Clergy, too, seemed to him not only to violate his rights as a king, but his faith as a Christian also; and when the emigration of the nobility and the death of Mirabeau (April 2, 1 791) had deprived him of his natural supporters and his only adviser, resuming the old plan of withdrawing to the army of the marquis de Bouille at Metz, he made his ill-fated attempt to escape from Paris (June 20, 1791). The flight to Varennes was an irreparable error; for during the king's absence and until his return the insignificance of the royal power became apparent. La Fayette's fusillade of the republicans, who demanded the deposition of the king (July 17, 1791), led to a definite split between the democratic party and the bourgeois party. Vainly did Louis, brought back a captive to Paris, swear on the 14th of September 1791 solemnly mere lip-service to the constitution; the mistrustful party of revolution abandoned the constitution they had only just obtained, and to guard against the sovereign's mental reservations and the selfish policy of the middle classes, appealed to the main force of the people. The conflict between the ancien regime and the National Assembly ended in the defeat of the royalists.

Through lassitude or disinterestedness the men of 1791, on

Robespierre's suggestion, had committed one last mistake, by leaving the task of putting the constitution into practice to new men even more inexperienced than ™ lete # te – themselves. Thus the new Assembly's time was Assembly occupied in a conflict between the Legislative Assembly (Oct /, and the king, who plotted against it; and, as a result, t791 ~ the monarchy, insulted by the proceedings of the 20th f/ˆ/ 0, of June, was eliminated altogether by those of the 10th of August 1792.

The new Assembly which had met on the 1st of October 1791 had a majority favourable to the constitutional monarchy and to the bourgeois franchise. But, among these bourgeois those who were called Feuillants, from the name of Jˆ/ es . their club (see Feuillants, Club of the), desired the strict and loyal application of the constitution without encroach- ing upon the authority of the king; the triumvirate, Duport, Barnave and Lameth, were at the head of this party. The Jacobins, on the contrary, considered that the king should merely be hereditary president of the Republic, to be deposed if he attempted to violate the constitution, and that universal suffrage should be established. The dominant group among these was that of the Girondins or Girondists, so called because its most brilliant members had been elected in the Gironde (see Girondists). But the republican party was more powerful without than within. Their chief was

not so much Robespierre, president of the parliamentary and bourgeois club of the Jacobins (q.v.), which had acquired by means of its two thousand affiliated branches great power in the provinces, as the advocate Danton, president of the popular and Parisian club of the Cordeliers (q.v.). Between the Feuillants and the Jacobins, the independents, incapable of keeping to any fixed programme, vacillated some- times to the right, sometimes to the left.

But the best allies of the republicans against the Feuillants were the royalists pure and simple, who cared nothing about the constitution, and claimed to " extract good from the excess of evil." The election of a Jacobin, Petion, fˆMˆs. instead of Bailly, the resigning mayor, and La Fayette, the candidate for office, was their first achievement. The court, on its side, showed little sign of a conciliatory spirit, though, realizing its, danger, it attempted to restrain the foolish violence of the emigres, i.e. the nobles who after the sup- pression of titles of nobility in 1790 and the arrest imigris. of the king at Varennes, had fled in a body to Coblenz and joined Louis XVI. 's brothers, the counts of Provence and Artois. They it was who set in motion the national and European conflict. Under the prince of Conde they had Collected a little army round Trier; and in concert with the " Austrian Committee " of Paris they solicited the armed intervention of monarchical Europe. The declaration of Pilnitz, which was but an excuse for non-interference on the part of the emperor and the king of Prussia, interested in the prolongation of these Declare- internal troubles, was put forward by them as an punitz. assurance of forthcoming support (August 27, 1791). At the same time the application of the Civil Constitution of the Clergy roused the whole of western La Vendee; and in face of the danger threatened by the refractory clergy and by the army of the emigre's, the Girondins set about confounding the court with the Feuillants in the minds of the public, and com- promising Louis XVI. by a national agitation, denouncing him as an accomplice of the foreigner. Owing to the decrees against the comte de Provence, the emigrants, and the refractory priests, voted by the Legislative Assembly decrees. in November 1791, they forced Louis XVI. to show his hand by using his veto, so that his complicity should be plainly declared, to replace his Feuillant ministry — disparate in birth, opinions and ambitions— by the Girondin ministry of Dumouriez-Roland (March 10), no more united than the other, but believers in a republican crusade for the overthrow of thrones, that of Louis XVI. first of all; and finally to declare war against the king of Bohemia and Hungary, a step also desired by the court in the hope of ridding itself of the Assembly at the first note of victory (April 20, 1792).

The war.

HISTORY]

But when, owing to the disorganization of the army through emigration and desertion, the ill-prepared Belgian war was

followed by invasion and the trouble in La Vendee ˆ 0Cfe /' increased, all France suspected a betrayal. The June 20. Assembly, in order to reduce the number of hostile

forces, voted for the exile of all priests who had refused to swear to the Civil Constitution and the substitution of a body of twenty thousand volunteer national guards, under the authority of Paris, for the king's constitutional guard (May 27 -June 8, 1792). Louis XVI. 's veto and the dismissal of the Girondin ministry — thanks to an intrigue of Dumouriez, analogous to that of Mirabeau and as ineffectual — dismayed the Feuillants and maddened the Girondins; the latter, to avert popular fury, turned it upon the king. The imeute of the 20th of June, a burlesque which, but for the persistent good-humour of Louis XVI., might have become a tragedy, alarmed but did not overthrow the monarchy.

The bourgeoisie, the Assembly, the country and La Fayette, one of the leaders of the army, now embarked upon a royalist

reaction, which would perhaps have been efficacious,

'otBmas- had Jt n0t been f ° r the entTy int0 the affair ° f the wick. Prussians as allies of the Austrians, and for the insolent

manifesto of the duke of Brunswick. The Assembly's cry of " the country in danger " (July n) proved to the nation that the king was incapable of defending France against the foreigner; and the appeal of the federal volunteers in Paris gave to the opposition, together with the war-song of the Mar- seillaise, the army which had been refused by Louis XVI., now disarmed. The vain attempts of the Gironde to reconcile the king and the Revolution, the ill-advised decree of the Assembly on the 8th of August, freeing La Fayette from his guilt in for- saking his army; his refusal to vote for the deposition of the king, and the suspected treachery of the court, led to the success of the republican forces when, on the 10th of August, the mob of Paris organized by the revolutionary Commune rose against the monarchy.

*The suspension and imprisonment of the king left the supreme authority nominally in the hands of the Assembly, but actually Theiasar- * n tnose °f tne Commune, consisting of delegates nctional from the administrative*

sections of Paris. Installed commune a t the Hotel de Ville this attempted to influence the ofParis. discredited government, entered into conflict with the Legislative Assembly, which considered its mission at an end, and paralyzed the action of the executive council, particularly during the bloody days of September, provoked by the discovery of the court's intrigues with the foreigner, The by the treachery of La Fayette, the capture of Longwy,

September the investiture of Verdun by the Prussians (August mas- 19-30) , and finally by the incendiary placards of Marat.

sacres. Danton, a master of diplomatic and military operations, had to avoid any rupture with the Commune. Fortunately, on the very day of the dispersal of the Legislative Assembly, Dumouriez saved France from a Prussian invasion by the victory of Valmy, and by unauthorized negotiations which prefigured those of Bonaparte at Leoben (September 22,

1792).

The popular insurrection against Louis XVI. determined the simultaneous fall of the bourgeois regime and the establish- ment of the democracy in power. The Legislative Assembly, without a mandate for modifying a constitution that had become inapplicable with the suspension of the monarch, had before disappearing convoked a National Convention, and as the reward of the struggle for liberty had replaced the limited franchise by universal suffrage. Public opinion became re- publican from an excess of patriotism, and owing to the propa- ganda of the Jacobin club; while the decree of the 25th of August 1792, which marked the destruction of feudalism, now abolished in principle, caused the peasants to rally definitely to the Republic.

This had hardly been established before it became distracted by the fratricidal strife of its adherents, from September 22, 1792, to the 18th Fructidor (September 4, 1797). The electoral

assemblies, in very great majority, had desired this Republic to be democratic and equalizing in spirit, but on the face _. _ of it, liberal, uniform and propagandist; in conse- vention, quence, the 782 deputies of the Convention were not Sept. 21, divided on principles, but only by personal rivalries ,T92 ' and ambition. They all wished for a unanimity and 17 g g ' harmony impossible to obtain; and being unable to convince they destroyed one another.

The Girondins in the Convention played the part of the Feuillants in the Legislative Assembly. Their party was not well disciplined, they purposely

refrained from making it so, and hence their ruin. Oratorically they repre-
parties. sented the spirit of the South; politically, the ideas of the bourgeoisie in opposition to the democracy — which they despised although making use of it — and the federalist system, from an objection to the preponderance of Paris. Paris, on the other hand, had elected only deputies of the Mountain, as the more advanced of the Jacobins were called, that party being no more settled and united than the others. They drew support from the Parisian democracy, and considered the decentralization of the Girondins as endangering France's unity, circumstances demanding a strong and highly concentrated government; they opposed a republic on the model of that of Rome to the Polish republic of the Gironde. Between the two came the Plaine, the Marais, the troop of trembling bourgeois, sincerely attached to the Revolution, but very moderate in the defence of their ideas; some seeking a refuge from their timidity in hard-working committees, others partaking in the violence of the Jacobins out of weakness or for reasons of state.

The Girondins were the first to take the lead; in order to retain it they should have turned the Revolution into a govern- ment They remained an exclusive party, relying on the mob but with no influence over it. Without a

The Girondins.

leader or popular power, they might have found both in Danton; for, occupied chiefly with the external danger, he made advances towards them, which they repulsed, partly in horror at the proceedings of September, but chiefly because they saw in him the most formidable rival in the path of the govern- ment. They waged war against him as relentlessly as did the Constitutionalists against Mirabeau, whom he resembled in his extreme ugliness and his volcanic eloquence. They drove him into the arms of Robespierre, Marat and the Commune of Paris. On the other hand, after the 23rd of September they declared Paris dangerous for the Convention, and wanted to reduce it to " eighty-three influential members." Danton and the Mountain responded by decreeing the unity and indivisibility of the Republic, in order to emphasize the suspicions of federalism which weighed upon the Girondins.

The trial of Louis XVI. still further enhanced the contrasts of ideas and characters. The discovery of fresh proofs of treachery in the iron chest (November 20, 1792) gave the Moun- Trial ana tain a pretext for forcing on the clash of parties and death of raising the question not of legality but of public safety. Louis By the execution of the king (January 21, 1793) they " cast down a king's head as a challenge to the kings of Europe." In order to preserve popular favour and their direction of the Republic, the Girondins had not dared to pronounce against the sentence of death, but

had demanded an appeal to the people which was rejected; morally weakened by this equivocal attitude they were still more so by foreign events.

*The king's death did not result in the unanimity so much desired by all parties; it only caused the reaction on themselves of the hatred which had been hitherto concentrated upon the king, and also an augmentation in the armies ™** of the foreigner, which obliged the revolutionists to coalition. face all Europe. There was a coalition of monarchs, and the people of La Vendee rose in defence of their faith. Dumouriez, the conqueror of Jemappes (November 6, 1792), who invaded Holland, was beaten by the Austrians (March 1793). A levy of 300,000 men was ordered; a Committee of General Security was charged with the search for suspects; and thence- forward military occurrences called forth parliamentary crises*

and the Qlronde.

and popular upheavals. Girondins and Jacobins unjustly accused one another of leaving the traitors, the conspirators, the " stipendiaries of Coblenz " unpunished. To avert the danger threatened by popular dissatisfaction, the Gironde was persuaded to vote for the creation of a revolutionary tribunal to judge suspects, while out of spite against Danton who de- manded it, they refused the strong government which might have made a stand against the enemy (March 10, 1793). This was the first of the exceptional measures which were to call down ruin upon them. Whilst the insurrection in La Vendee was spreading, and Dumouriez falling back upon Neerwinden, sentence of death was laid upon imigr6s and refractory priests; the treachery of Dumouriez, disappointed in his Belgian projects, gave grounds First com- ˆ or au> kinds of suspicion, as that of Mirabeau had mlttee of formerly done, and led the Gironde to propose the public new government which they had refused to Danton. safety. qˆe transformation of the provisional executive council into the Committee of Public Safety— omnipotent save in financial matters — was voted because the Girondins meant to control it; but Danton got the upper hand (April 6).

The Girondins, discredited in Paris, multiplied their attacks

upon Danton, now the master: they attributed the civil war

and the disasters of the foreign campaign to the

Struggle d eS p tism of the Paris Commune and the clubs; they

between ,».,.... 1 r-. i

the com- accused Marat of instigating the September massacres ;

mune and they began the supreme struggle by demanding the election of a committee of twelve deputies, charged with breaking up the anarchic authorities in Paris (May 18). The complete success of the Girondin proposals; the arrest of Hebert— the violent editor of the Pere Duchine; the insurrection of the Girondins of Lyons against the Montagnard Commune; the bad news from La Vendee — the military reverses; and the economic situation which had compelled the fixing of a maximum price of corn (May 4) excited the " moral insurrections " of May 31 and June 2. Marat himself sounded the tocsin, and Hanriot, at the head of the Parisian army, surrounded the Convention. Despite the efforts of Danton and the Committee of Public Safety, the arrest of the Girondins sealed the victory of the Mountain.

The threat of the Girondin Isnard was fulfilled. The federalist insurrection, to avenge the violation of national representation, responded to the Parisian insurrection. Sixty-nine Fallot departmental governments protested against the violence done to the Convention; but the ultra- democratic constitution of 1 793 deprived the Girondins, who were arming in the west, the south and the centre, of all legal, force. To the departments that were hostile to the dictatorship of Paris, and the tyranny of Danton or Robespierre, it promised the referendum, an executive of twenty-four citizens, universal suffrage, and the free exercise of religion. The populace, who could not understand this parliamentary quarrel, and were in a hurry to set up a national defenceˆ abandoned the Girondins, and the latter excited the enthusiasm of only one person, Charlotte Corday, who by the murder of Marat ruined them irretrievably. The battle of Brecourt was a defeat without a fight for their party without stamina and their general without troops (July 13); while on the 31st of October their leaders perished on the guillotine, where they had been preceded by the queen, Marie Antoinette. The Girondins and their adversaries were differen- tiated by neither religious dissensions nor political divergency, but merely by a question of time. The Girondins, when in power, had had scruples which had not troubled them while scaling the ladder; idols of Paris, they had flattered her in turn, and when Paris scorned them they sought support in the provinces. A great responsibility for this defeat of the liberal and republican bourgeoisie, whom they represented, is to be laid upon Madame Roland, the Egeria of the party. An ardent patriot and re- publican, her relations with Danton resembled those of Marie Antoinette with Mirabeau, in each case a woman spoilt by flattery, enraged at indifference. She was

the ruin of the Gironde, but taught it how to die.

The fall of the Gironde left the country disturbed by civil war,

the Qlronde.

and the frontiers more seriously threatened than before Valmy. Bouchotte, a totally inefficient minister for war, the Commune's man of straw, left the army without food or ammunition, while the suspected officers remained inactive. In the Angevin Vendee 1 the incapable leaders let themselves be beaten at Aubiers, Beaupreau and Thouars, at a time when Cathelineau was taking possession of Saumur and threatening Nantes, the capture of which would have permitted the insurgents in La Vendee to join those of Brittany and receive provisions from England. Mean- while, the remnants of the Girondin federalists were overcome by the disguised royalists, who had aroused the whole of the Rhone valley from Lyons to Marseilles, had called in the Sardinians, and handed over the fleet and the arsenal at Toulon to the English, whilst Paoli left Corsica at their disposal. The scarcity of money due to the discrediting of the assignats, the cessation of commerce, abroad and on the sea, and the bad harvest of 1793, were added to all these dangers, and formed a serious menace to France and the Convention.

This meant a hard task for the first Committee of Public Safety and its chief Danton. He was the only one to understand the conditions necessary to a firm government; he caused the adjournment of the decentralizing constitution J h , edl f'. of 1793, and set up a revolutionary government. The of the P Committee of Public Safety, now a permanency, first annulled the Convention and was itself the central 00 l "" B Jij e authority, its organization in Paris being the twelve safety. committees substituted for the provisional executive committee and the six ministers, the Committee of General Security for the maintenance of the police, and the arbitrary Revolutionary Tribunal. The execution of its orders in the departments was carried out by omnipotent representatives " on mission " in the armies, by popular societies — veritable missionaries of the Revolution— and by the revolutionary committees which were its backbone.*

*Despite this Reign of Terror Danton failed; he could neither dominate foes within nor divide those without. Representing the sane and vigorous democracy, and like Jefferson a friend to liberty and self-government, he had been tenure . * obliged to set up the most despotic of governments in face of internal anarchy and foreign invasion. Being of a temperament that expressed itself only in action, and neither a theorist nor a cabinet-minister, he held the views of a statesman without having a following sufficient to realize them. Moreover, the proceedings of the 2nd of June, when the*

Commune of Paris had triumphed, had dealt him a mortal blow. He is his turn tried to stem the tumultuous current which had borne him along, and to prevent discord; but the check to his policy of an understanding with Prussia and with Sardinia, to whom, like Richelieu and D'Argenson, he offered the realization of her transalpine ambition in exchange for Nice and Savoy, was added to the failure of his temporizing methods in regard to the federalist insurgents, and of his military operations against La Vendee. A man of action and not of cunning shifts, he succumbed on the 10th of July to the blows of his own govern- ment, which had passed from his hands into those of Robespierre, his ambitious and crafty rival.

The second Committee of Public Safety lasted until the 27th of July 1794. Composed of twelve members, re-eligible every month, and dominated by the triumvirate, second Robespierre, Saint- Just and Couthon, it was stronger committee than ever, since it obtained the right of appointing of public leaders, disposed of money, and muzzled the press. sa e y ' Many of its members were sons of the bourgeoisie, men who having been educated at college, thanks to some charitable agency, in the pride of learning, and raised above their original station, were ready for anything but had achieved nothing They had plenty of talent at command, were full of classical tirades against tyranny, and, though sensitive enough in their private life, were bloodthirsty butchers in their public relations. Such were Robespierre, Saint- Just, Couthon, Billaud-Varenne. Cambon, Thuriot, Collot d'Herbois, Barrere and Prieur d» la M&rne. Working hand in. hand with these politicians, not*

always in accordance with them, but preserving a solid front, were the specialists, Carnot, Robert Lindet, Jean Bon Saint- Andre and Prieur de la Cote d'Or, honourable men, anxious above all to safeguard their country. At the head of the former type Robespierre, without special knowledge or exceptional talent, devoured by jealous ambition and gifted with cold grave eloquence, enjoyed a great moral ascendancy, due to his in- corruptible purity of life and the invariably correct behaviour that had been wanting in Mirabeau, and by the persevering will

France was saved by them and by that admirable outburst of patriotism which provided 750,000 patriots for the army

through the general levy of the 16th of August 1793, Defeat of a ; (} e(j j

moreover, by the mistakes of her enemies. coalition. Instead of profiting by Dumouriez's treachery and

the successes in La Vendee, the Coalition, divided over the resuscitated Polish question, lost time on the frontiers of this new Poland of the west which was sacrificing itself for the sake of a Universal Republic. Thus in January 1794 the territory of France was cleared of the Prussians and Austrians by the victories at Hondschoote, Wattignies and Wissembourg; the army of La Vendee was repulsed from Granville, over- whelmed by Hoche's army at Le Mans and Savenay, and its leaders shot; royalist sedition was suppressed at Lyons, Bordeaux, Marseilles and Toulon; federalist insurrections were wiped out by the terrible massacres of Carrier at Nantes, the atrocities of Lebon at Arras, and the wholesale executions of Fouche and Collot d'Herbois at Lyons; Louis XVI. and Marie Antoinette guillotined, the tmigrSs dispersed, denied or forsaken by all Europe.

But the triumphant Mountain was not as united as it boasted. The second Committee of Public Safety had now to struggle

against two oppositions: one of the left, represented parties. ˆy Hebert, the Commune of Paris and the Cordeliers;

another of the right, Danton and his followers. The former would not admit that the Terror was only a temporary method of defence; for them it was a permanent system which was even to. be strengthened in order to crush all who were hostile to the Revolution. Their sanguinary violence was com- bined with an anti-religious policy, not atheistical, but inspired by mistrust of the clergy, and by a civic and deistic creed that was a direct outcome of the federations. To these latter were due the substitution of the Republican for the Gregorian calendar, and the secular Feasts of Reason (November 19, 1793). The followers of Hubert wanted to push forward the movement of May 31, 1793, in order to become masters in their turn; while those of Danton were by way of arresting it. They considered it

time to re-establish the reign of ordinary laws and IftfiH!? r justice; sick of bloodshed, with Camille Desmoulins

they demanded a " Committee of Clemency." A

deist and therefore hostile to " anti-religious masque- rades," while uneasy at the absolute authority of the Paris Commune, which aimed at suppressing the State, and at its armed propaganda abroad, Robespierre resumed the struggle against its illegal power, so fatal to the Gironde. His boldness succeeded (March 24, 1794), and then, jealous of Danton's activity and statesmanship, and exasperated by the jeers of his friends, he

rid himself of the party of tolerance by a parody of justice (April 5).

Robespierre now stood alone. During five months, while affecting to be the representative of " a reign of justice and Robes- virtue," he laboured at strengthening his politico- pierre's religious dictatorship — already so formidably armed — dictator- with new powers. " The incorruptible wanted to

become the invulnerable" and the scaffold of the

of toler- ance.

ship.

guillotine was crowded. By his dogma of the supreme state

*Robespierre founded a theocratic government with the police as an Inquisition. The festival of the new doctrine, which turned the head of the new pontiff (June 8), the loi de Prairial, or " code of legal murder " (June 10), which gave the deputies themselves into his hand; and the multiplication of executions at a time when the victory of Fleurus (June 25) showed the uselessness and barbarity of this aggravation of the Reign of Terror provoked against him the victorious coalition of revenge, lassitude and fear. Vanquished and imprisoned, he refused to take part in the illegal action proposed m i ior * by the Commune against the Convention. Robespierre was no man of action. On the 9th Thermidor (July 27, 1794) he fell into the gulf that had opened on the 31st of May, and through which the 18th Brumaire was visible.*

Although brought about by the Terrorists, the tragic fall of Robespierre put an end to the Reign of Terror; for their chiefs having disappeared, the subordinates were too much j- Wrrf divided to keep up the dictatorship of the third committee Committee of Public Safety, and reaction soon set in. of public After a change in personnel in favour of the surviving satef y- Dantonists, came a limitation to the powers of the Committee of Public Safety, now placed in dependence upon the Convention; and next followed the destruction of the revolutionary system, the Girondin decentralization and the resuscitation of depart- mental governments; the reform of the Revolutionary Tribunal on the 10th of August; the suppression of the Commune of Paris on the 1st of September, and of the salary of forty sous given to members of the sections; the abolition of the maximum, the suppression of the Guillotine, the opening of the prisons, the closing of the Jacobin club (November 11), and the hence- forward insignificant existence of the popular societies.

Power reverted to the Girondins and Dantonists, who re- entered the

Convention on the 18th of December; but with them re-entered likewise the royalists of Lyons, „ .. Marseilles and Toulon, and further, after the peace of tion of the Basel, many young men set free from the army, hostile royalist to the Jacobins and defenders of the now moderate aaTt y- and peace-making Convention. These muscadins and in- croyables, led by Freron, Tallien and Barras — former revolu- tionists who had become aristocrats — profited by the restored liberty of the press to prepare for days of battle in the salons of the merveilleuses Madame Tallien, Madame de Stael and Madame Recamier, as the sans-culottes had formerly done in the clubs. The remnants of Robespierre's faction became alarmed at this Thermidor reaction, in which they scented royalism. Aided by famine, by the suppression of the maximum, and by the imminent bankruptcy of the assignats, they en- deavoured to arouse the working classes and the former Hanriot companies against a government which was trying to destroy the republic, and had broken the busts of Marat and guillotined Carrier and Fouquier-Tinville, the former public prosecutor. Thus the risings of the 12th Germinal (April 1, 1795) p and of the 1st Prairial (May 20) were economic revolts risings of rather than insurrections excited by the deputies of the Germinal Mountain; in order to suppress them the reactionaries aad called in the army. Owing to this first intervention of the troops in. politics, the Committee of Public Safety, which aimed not so much at a moderate policy as at steering a middle course between the Thermidorians of the Right and of the Left, was able to dispense with the latter.

*The royalists now supposed that their hour had come. In the south, the companions of Jehu and of the Sun inaugurated a " White Terror," which had not even the apparent excuse of the public safety or of exasperated patriotism. r ** At the same time they prepared for a twofold in- terror.*

surrection against the republic — in the west with the help of England, and in the east with that of Austria — by an attempt to bribe General Pichegru. But though the heads of the government wanted to put an end to the Revolution they had no thought of restoring the monarchy in favour of the Comte de Provence, who had taken the title of Louis XVIII. on hearing of the death of the dauphin in the Temple, and still less of bringing

Military achieve- ments of the con- ventlon.

back the ancien regime. Hoche crushed the insurrection of the Chouans and

the Bretons at Quiberon on the 2nd of July 1705, and Pichegru, scared, refused to entangle himself any further.

To cut off all danger from royalists or terrorists the Convention now voted the Constitution of the year III.; suppressing that The con- °^ I 7°3> ‘ n order to counteract the terrorists, and stuution re-establishing the bourgeois limited franchise with of the election in two degrees — a less liberal arrangement than year ill. that granted from 1789 to 1792. The chambers of the Five Hundred and of the Ancients were elected by the moneyed and intellectual aristocracy, and were to be re-elected by thirds annually. The executive authority, entrusted to five Directors, was no more than a definite and very strong Committee of Public Safety; but Sieyes, the author of the new constitution, in opposi- tion to the royalists, had secured places of refuge for his party by reserving posts as directors for the regicides, and two-thirds of the deputies' seats for members of the Convention. In self-defence against this continuance of the policy and the The 13th personnel of the Convention — a modern " Long Parlia- tnialre. ment " — the royalists, persistent street-fighters and masters in the " sections " after the suppression of the daily indemnification of forty sous, attempted the insurrection of the 13th Vendemiaire (October 5, 1795), which was easily put down by General Bonaparte.

Thus the bourgeois republic reaped the fruits of its predecessor's external policy. After the freeing of the land in January 1794 an impulse had been given to thespiritof conquestwhich had gradually succeeded to the disinterested fever of propaganda and overheated patriotism. This it was which had sustained Robespierre's dictatorship; and, owing to the " amalgam " and the re-establishment of discipline, Belgium and the left bank of the Rhine' had been con- quered and Holland occupied, simultaneously with Kosciusko's rising in Poland, Prussia's necessity of keeping and extending her Polish acquisitions, Robespierre's death, the prevalent desires of the majority, and the continued victories of Pichegru, Jourdan and Moreau, enfeebled the coalition. At Basel (April- July 1795) republican France, having rejoined the ££ t j' ° concert of Europe, signed the long-awaited peace with Prussia, Spain, Holland and the grand-duke of Tuscany. But thanks to the past influence of the Girondin party, who had caused the war, and of the regicides of the Mountain, this peace not only ratified the conquest of Belgium, the left bank of the Rhine and Santo Domingo, but paved the way for fresh conquests; for the old spirit of domination and persistent hostility to Austria attracted the destinies of the Revolution definitely towards war.

The work of internal construction amidst this continued battle against the whole world had been no less remarkable. The Constituent Assembly had been more destructive than constructive; but the Convention preserved

intact those fundamental principles of civil liberty which had been the main results of the Revolution: the equality so dear to the French, and the sovereignty of the people — the foundation of democracy. It also managed to engage private interests in state reform by creating the Grand Livre de la Dette Publique (September 13-26, 1793), and enlisted peasant and bourgeois savings in social reforms by the distribu- tion and sale of national property. But with views reaching beyond equality of rights to a certain equality of property, the committees, as regards legislation, poor relief and instruction, laid down principles which have never been realized, save in the matter of the metric system; so that the Convention which was dispersed on the 16th of October 1795 made a greater impression on political history and social ideas than on institu- tions. Its disappearance left a great blank.

During four years the Directory attempted to fill this blank. Being the outcome of the Constitution of the year III., it should have been the organizing and pacifying government of the Republic ; in reality it sought not to create, but to preserve its own existence. Its internal weakness, between the danger of anarchy and the opposition of the monar-

Internal achieve- ments.

The Directory.

chists, was extreme; and it soon became discredited by its own coups d'Uat and by financial impotence in the eyes of a nation sick of revolution, aspiring towards peace and the resumption of economic undertakings. As to foreign affairs, its aggressive policy imperilled the conquests that had been the glory of the Convention, and caused the frontiers of France, the defence of which had been a point of honour with the Republic, to be called in question. Finally, there was no real government on the part of the five directors: La Revelliere-Lepeaux, an honest roan but weak; Reubell, the negotiator of the Hague; Letourneur, an officer of talent; Barras, a man of intrigue, corrupt and without real convictions; and Carnot, the only really worthy member. They never understood one another, and never con- sulted together in hours of danger, save to embroil matters in politics as in war. Leaning on the bourgeois, conservative, liberal and anti-clerical republicans, they were no more able than was the Thermidor party to re-establish the freedom that had been suspended by revolutionary despotism; they created a ministry of police, interdicted the clubs and popular societies, distracted the press, and with partiality undertook the separation of Church and State voted on the 18th of September 1794. Their real defence against counter revolution was the army; but, by a further contradiction, they reinforced the army attached to the Revolution while seeking an alliance with the peace- making bourgeoisie. Their party had

therefore no more homo- geneity than had their policy.

Moreover the Directory could not govern alone; it had to rely upon two other parties, according to circumstances: the republican-democrats and the disguised royalists. The former, purely anti-royalist, thought only of n a ˆ, s remedying the sufferings of the people. Roused by the collapse of the assignats, following upon the ruin of industry and the arrest of commerce, they were still further exasperated by the speculations of the financiers, by the jobbery which prevailed throughout the administration, and by the sale of national property which had profited hardly any but the bourgeoisie. After the 13th Vendemiaire the royalists too, deceived in their hopes, were expecting to return gradually to the councils, thanks to the high property qualification for the franchise. Under the name of " moderates " they demanded an end to this war which England continued and Austria threatened to recommence, and that the Directory from self- interested motives refused to conclude; they desired the abandonment of revolutionary proceedings, order in finance and religious peace.

The Directory, then, was in a minority in the country, and had to be ever on the alert against faction; all possible methods seemed legitimate, and during two years appeared st ˆ successful. Order was maintained in France, even the against royalist west being pacified, thanks to Hoche, who the finished his victorious campaign of 1796 against royalists. StofHet, Charette and Cadoudal, by using mild and just measures to complete the subjection of the country. The greatest danger lay in the republican-democrats and their socialist ally, Francois Noel (" Gracchus ") Babeuf (q.v.). The former had united the Jacobins and the more violent members of the Conven- tion in their club, the Societe du Pantheon; and fjˆJJ? their fusion, after the closing of the club, with the the re- secret society of the Babouvists lent formidable publican- strength to this party, with which Barras was secretly de ™ocra

ended merely in the arrest and guillotining of Babeuf (September 9, 1796- May 25, 1797).

The liquidation of the financial inheritance of the Convention was no less difficult. The successive issues of assignats, and the Financial multiplication of counterfeits made abroad, had so policy depreciated this paper money that an assignat of 100 ottbe francs was in February 1796 worth only 30

centimes; Directory. wn jj e tne government, obliged to accept them at their nominal value, no longer collected any taxes' and could not pay salaries. The destruction of the plate for printing assignats, on the 18th of February 1796, did not prevent the drop in the forty milliards still in circulation. Territorial mandates were now tried, which inspired no greater confidence, but served to liquidate two-thirds of the debt, the remaining third being con- solidated by its dependence on the Grand Livre (September 30, 1797). This widespread bankruptcy, falling chiefly on the bourgeoisie, inaugurated a reaction which lasted until 1830 against the chief principle of the Constituent Assembly, which had favoured indirect taxation as producing a large sum without imposing any very obvious burden. The bureaucrats of the old system — having returned to their offices and being used to these indirect taxes — lent their assistance, and thus the Directory was enabled to maintain its struggle against the Coalition.

*All system in finance having disappeared, war provided the Directory, now in extremis, with a treasury, and was its only source for supplying constitutional needs; while it B olic" al < >P ene d a path to the military commanders who were P ° *' to be the support and the glory of the state. England remaining invulnerable in her insular position despite Hoche's attempt to land in Ireland in 1796, the Directory resumed the traditional policy against Austria of conquering the natural frontiers, Carnot furnishing the plans; hence the war in southern Germany, in which Jourdan and Moreau were repulsed by an inferior force under the archduke Charles, and Bonaparte's triumphant Italian campaign. Chief of an army that he had made irresistible, not by honour but by glory, and master of wealth by rapine, Bonaparte imposed his will upon the Directory, which he provided with funds. After having separated the Pied- montese from the Austrians, whom he drove back into Tyrol, and repulsed offensive reprisals of Wurmser and Alvinzi on four occa- sions, he stopped short at the preliminary negotiations of Leoben just at the moment when the Directory, discouraged by the problem of Italian reconstitution, was preparing the army of the Rhine to re-enter the field under the command of Hoche. Bona- parte thus gained the good opinion of peace-loving Frenchmen; he partitioned Venetian territory with Austria, contrary to French interests but conformably with his own in Italy, and henceforward was the decisive factor in French and European policy, like Caesar or Pompey of old. England, in consternation, offered in her turn to negotiate at Lille.*

These military successes did not prevent the Directory, like the Thermidorians, from losing ground in the country. Every Struggle strategic truce since 179 5 had been marked by a political against crisis; peace reawakened opposition. The constitu- te tional party, royalist in reality, had made alarming royalists. p r0 g resSi chiefly owing to the Babouvist

conspiracy ; they now tried to corrupt the republican generals, and Conde procured the treachery of Pichegru, Kellermann and General Ferrand at Besancon. Moreover, their Clichy club, directed by the abbe Brottier, manipulated Parisian opinion; while many of the refractory priests, having returned after the liberal Public Worship Act of September 1795, made active propaganda against the principles of the Revolution, and plotted the fall of the Directory as maintaining the State's independence of the Church. Thus the partial elections of the year V. (May 20, 1797) had brought back into the two councils a counter-revolu- tionary majority of royalists, constitutionalists of 179 1, Catholics and moderates. The Director Letourneur had been replaced by Barthelemy, who had negotiated the treaty of Basel and was a constitutional monarchist. So that the executive not only found it impossible to govern, owing to the opposition of the councils and a vehement press-campaign, but was distracted

by ceaseless internal conflict. Carnot and Barthelemy wished to meet ecclesiastical opposition by legal measures only, and demanded peace; while Barras, La Revelliere and Reubell saw no other remedy save military force. The attempt of the counter-revolutionaries to make an army for themselves out of the guard of the Legislative Assembly, and the success of the Catholics, who had managed at the end of August 1797 to repeal the laws against refractory priests, determined the Directory to appeal from the rebellious parliament to the ready swords of Augereau and Bernadotte. On the 18th Fructidor (September 4, 1797) Bonaparte's lieutenants, backed up by the whole army, stopped the elections in forty-nine departments, and deported to Guiana many deputies of both councils, journalists and non-juring priests, as well as the director Barthelemy, though Carnot escaped into Switzerland. The royalist party was once more overthrown, but with it the republican constitution itself. Thus every act of violence still further confirmed the new empire of the army and the defeat of principles, preparing the way for military despotism.

Political and financial coups d'etat were not enough for the directors. In order to win back public opinion, tired of inter-

18th Fructidor.

Aggressive

necine quarrels and sickened by the scandalous immorality of the generals and of those in power, policy and to remove from Paris an army which after having of the given them a fresh lease of life was now a menace to lrector y- them, war appeared their only hopeful course. They attempted to renew the designs of Louis XIV. and anticipate those of Napoleon. But Bonaparte saw what they were planning; and to the rupture of the

negotiations at Lille and an order for the resumption of hostilities he responded by a fresh act of dis- obedience and the infliction on the Directory of the peace of Campo-Formio, on October 17, 1797. The directors were con- soled for this enforced peace by acquiring the left bank of the Rhine and Belgium, and for the forfeiture of republican principles by attaining what had for so long been the ambition of the monarchy. But the army continued a menace. To avoid disbanding it, which might, as after the peace of Basel, have given the counter-revolution further auxiliaries, the Directory appointed Bonaparte chief of the Army of England, and employed Jourdan to revise the conscription laws so as to make military service a permanent duty of the citizen, since war was now to be the permanent object of policy. The Directory finally conceived the gigantic project of bolstering up the French Republic — the triumph of which was celebrated by the peace of Campo-Formio — by forming the neighbouring weak states into tributary vassal republics. This system had already been applied to the Batavian republic in 1795, to the Ligurian and Cisalpine republics in June 1797; it was extended to that of Mulhausen on the 28th of January 1798, to the Roman republic in February, to the Helvetian in April, while the Parthenopaean republic (Naples) was to be established in 1799. This was an international coup de force, which presupposed that all these nations in whose eyes independence was flaunted would make no claim to enjoy it; that though they had been beaten and pillaged they would not learn to conquer in their turn; and that the king of Sardinia, dispossessed of Milan, the grand-duke of Tuscany who hdd given refuge to the pope when driven from Rome, and the king of Naples, who had opened his ports to Nelson's fleet, would not find allies to make a stand against this hypocritical system.

What happened was exactly the contrary. Meanwhile, the armies were kept in perpetual motion, procuring money for the impecunious Directory, making a diversion for internal Coup discontent, and also permitting of a " reversed d'etat of Fructidor," against the anarchists, who had got the the 22nd upper hand in the partial elections of May 1798. orfal. The social danger was averted in its turn after the clerical danger had been dissipated. The next task was to relieve Paris of Bonaparte, who had already refused to repeat Hoche's unhappy expedition to Ireland and to attack England at home without either money or a navy. The pecuniary

resources of Berne and the wealth of Rome fortunately tided over the

financial difficulty and provided for the expedi- tion to Egypt, which permitted Bonaparte to wait

toˆM 6 ” for the fruit t0 ri P en “~ Le – tiU the Directory should be ruined in the eyes of France and of all Europe. The disaster of Aboukir (August i, 1798) speedily decided the coalition pending between England, Austria, the Empire, Portugal, Naples, Russia and Turkey. The Directory had to make a stand or perish, and with it the Republic. The directors had thought France might retain a monopoly The in numbers and in initiative. They soon perceived

coalition. tnat enthusiasm is not as great for a war of policy and conquest as for a war of national defence; and the army dwindled, since a country cannot bleed itself to death. The law of conscription was voted on the 5th of September 1798; and the tragedy of Rastadt, where the French commissioners were assassinated, was the opening of a war, desired but ill-prepared for, in which the Directory showed hesitation in strategy and incoherence in tactics, over a disproportionate area in Germany, Switzerland and Italy. Military reverses were inevitable, and responsibility for them could not be shirked. As though shattered by a reverberant echo from the cannon of the Trebbia, the Directory crumbled to pieces, succumbing on the 18th of June 1799 beneath the reprobation showered on Treilhard, Merlin de Douai, and La Revelliere-Lepeaux. A few more military disasters, royalist insurrections in the south, Chouan disturbances in Normandy, Orleanist intrigues and the end came. To soothe the populace and protect the frontier more was required than the resumption, as in all grave crises of the Revolution, of terrorist measures such as forced taxation or the law of hostages; the new Directory, Sieyes presiding, saw that for the indispensable revision of the constitution “a head and a sword ” were needed. Moreau being unattainable, Joubert was to be the sword of Sieyes; but, when he was killed at the battle of Novi, the sword of the Revolution fell into the hands of Bonaparte.

Although Brune and Massena retrieved the fight at Bergen and Zurich, and although the Allies lingered on the frontier as they had done after Valmy, still the fortunes of the Directory were not restored. Success was reserved for Bonaparte, suddenly landing at Frejus with the prestige of his victories in the East, and now, after death, appearing as sole master of the armies. He manoeuvred among the parties as on the 13th Vende- miaire. On the 18th Brumaire of the year VIII. France and the army fell together at his feet. By a twofold coup d’etat, parliamentary and military, he culled the fruits of the Directory’s systematic aggression and unpopularity, and realized the universal desires of the rich bourgeoisie, tired of warfare; of the wretched populace; of landholders, afraid of a return to the old order of things; of royalists, who looked upon Bonaparte as a future Monk; of

priests and their people, who hoped for an indulgent treatment of Catholicism; and finally of the immense majority of the French, who love to be ruled and for long had had no efficient government. There was hardly any one to defend a liberty which they had never known. France had, indeed, remained monarchist at heart for all her revolutionary appearance; and Bonaparte added but a name, though an illustrious one, to the series of national or local dictatorships, which, after the departure of the weak Louis XVI., had maintained a sort of informal republican royalty.

On the night of the 19th Brumaire a mere ghost of an Assembly abolished the constitution of the year III., ordained the provisionary Consulate, and legalized the coup d'etat in favour of Bonaparte. A striking and singular event; for the history of France and a great part of Europe was now for fifteen years to be summed up in the person of a single man (see Napoleon). This night of Brumaire, however, seemed to be a victory for Sieyes rather than for Bonaparte. He it was who originated the project which the legislative commissions, charged with elaborating the new constitution, had to discuss. Bonaparte's

Coup d'etat of the 18th Brumaire.

Hoche's

The Con- sulate, Sept 11, 1799-May

18, 1804.

cleverness lay in opposing Daunou's plan to that of Sieyes, and in retaining only those portions of both which could serve his ambition. Parliamentary institutions annulled by the The c0n . complication of three assemblies — the Council of State smutton which drafted bills, the Tribunate which discussed of the ■ them without voting them, and the Legislative ˆ ear VW/. Assembly which voted them without discussing them; poptilar suffrage, mutilated by the lists of notables (on whichthe members of the Assemblies were to be chosen by the conservative senate) ; and the triple executive authority of the consuls, elected for ten years: all these semblances of constitutional authority were adopted by Bonaparte. But he abolished the post of Grand Elector, which Sieyes had reserved for himself, in order to reinforce the real authority of the First Consul himself— by leaving the two other consuls, Cambaceres and Lebrun, as well as the Assemblies, equally weak. Thus the aristocratic constitution of Sieyes was transformed into an unavowed dictatorship, a public ratification of which the First Consul obtained by a third coup d'Hat from the intimidated and yet reassured electors- reassured by his dazzling but unconvincing offers of peace to the victorious Coalition (which repulsed them), by the rapid dis-

armament of La Vendee, and by the proclamations in which he filled the ears of the infatuated people with the new talk of stability of government, order, justice and moderation. He gave every one a feeling that France was governed once more by a real statesman, that a pilot was at the helm.

Bonaparte had now to rid himself of Sieyes and those re- publicans who had no desire to hand over the republic to one man, particularly of Moreau and Massena, his military rivals. The victory of Marengo (June 14, 1800) momentarily in the balance, but secured by Desaix and Kellermann, offered a further opportunity to his jealous ambition by increasing his popularity. The royalist plot of the Rue Saint-Nicaise (December 24, 1800) allowed him to make a clean sweep of the democratic republicans, who despite their innocence were deported to Guiana, and to annul Assemblies that were a mere show by making the senate omnipotent in constitutional matters; but it was necessary for him to transform this deceptive truce into the general pacification so ardently desired for the last eight years. The treaty of Luneville, signed in February 1801 with Austria who had been disarmed by Moreau's victory at Hohenlinden, restored peace to the continent, gave nearly the whole of Italy to France, and permitted Bonaparte to eliminate from the Assemblies all the leaders of the opposition in the discussion of the Civil Code. The Concordat (July 1801), drawn up not in the Church's interest but in that of his own policy, by giving satisfaction to the religious feeling of the country, allowed him to put down the constitutional democratic Church, to rally round him the consciences of the peasants, and above all to deprive the royalists of their best weapon. The " Articles Organiques " hid from the eyes of his companions in arms and councillors a reaction which, in fact if not in law, restored to a submissive Church, despoiled of her revenues, her position as the religion of the state. The peace of Amiens with England (March 1802), of which France's allies, Spain and Holland, paid all suLte".'''' the costs, finally gave the peacemaker a pretext for endowing himself with a Consulate, not for ten years but for life, as a recompense from the nation. The Rubicon was crossed on that day: Bonaparte's march to empire began with the constitution of the year X. (August 1802).

Before all things it was now necessary to reorganize France, ravaged as she was by the Revolution, and with her institutions in a state of utter corruption. The touch of the master was at once revealed to all the foreigners who rushed to gaze at the man about whom, after so many cata-strophesandstrangeadventures, Paris, "la villelumiere," and all Europe were talking. First of all, Louis XV.' of roads was improved and that of Louis XVI. 's canals developed; then industry put its shoulder to the wheel; order and discipline were re-established everywhere, from the frontiers to the capital, and brigandage suppressed; and finally there was Paris, the city of cities I Everything was in process of transformation:

Internal reorgani- zation.

,‘s system

HISTORY]

FRANCE

861

a second Rome was arising, with its forum, its triumphal arches, its shows and parades; and in this new Rome of a new Caesar fancy, elegance and luxury, a radiance of art and learning from the age of Pericles, and masterpieces rifled from the Nether- lands, Italy and Egypt illustrated the consular peace. The Man of Destiny renewed the course of time. He borrowed from the ancien regime its plenipotentiaries; its over-centralized, strictly utilitarian administrative and bureaucratic methods; and afterwards, in order to bring them into line, the subservient pedantic scholasticism of its university. On the basis laid down by the Constituent Assembly and the Convention he constructed or consolidated the funds necessary for national institutions, local governments, a judiciary system, organs of finance, banking, codes, traditions of conscientious well-disciplined labour, and in short all the organization which for three-quarters of a century was to maintain and regulate the concentrated activity of the French nation (see the section Law and Institutions). Peace and order helped to raise the standard of comfort. Provisions, in this Paris which had so often suffered from hunger and thirst, and lacked fire and light, had become cheap and abundant; while trade prospered and wages ran high. The pomp and luxury of the nouveaux riches were displayed in the salons of the good Josephine, the beautiful Madame Tallien, and the ” divine ” Juliette Recamier.

But the republicans, and above all the military, saw in all this little but the fetters of system; the wily despotism, the bullying The re- police, the prostration before authority, the sympathy publican lavished on royalists, the recall of the emigres, the opposi- contempt for the Assemblies, the purification of the Hon. Tribunate, the platitudes of the servile Senate, the

silence of the press. In the formidable machinery of state, above all in the creation of the Legion of Honour, the Concordat, and the restoration of indirect taxes, they saw the rout of the Revolu- tion.’ But the expulsion of persons like Benjamin Constant and Madame de Stael sufficed to quell this Fronde of the salons. The expedition to San Domingo reduced the republican army to a nullity; war demoralized or scattered the leaders, who were jealous of their ” comrade ” Bonaparte; and Moreau, the last of his

rivals, cleverly compromised in a royalist plot, as Danton had formerly been by Robespierre, disappeared into exile. In contradistinction to this opposition of senators and republican generals, the immense mass of the people received the ineffaceable impression of Bonaparte's superiority. No suggestion of the possibility of his death was tolerated, of a crime which might cut short his career. The conspiracy of Cadoudal and Pichegru, after Bonaparte's refusal to give place to Louis XVIIL, and the political execution of the due d'Enghien, provoked an outburst of adulation, of which Bonaparte took advantage to put the crowning touch to his ambitious dream.

The decision of the senate on the 18th of May 1804, giving him the title of emperor, was the counterblast to the dread „ . , he had excited. Thenceforward " the brow of the emperor emperor broke through the thin mask of the First May 18, Consul." Never did a harder master ordain more I80 h'ik imperiously, nor understand better how to command 1814. ' obedience. " This was because," as Goethe said, " under his orders men were sure of accomplishing their ends. That is why they rallied round him, as one to inspire them with that kind of certainty." Indeed no man ever con- centrated authority to such a point, nor showed mental abilities at all comparable to his: an extraordinary power of work, prodigious memory for details and fine judgment in their selec- tion; together with a luminous decision and a simple and rapid conception, all placed at the disposal of a sovereign will. No head of the state gave expression more imperiously than this Italian to the popular passions of the French of that day: abhorrence for the emigrant nobility, fear of the ancien regime, dislike of foreigners, hatred of England, an appetite for conquest evoked by revolutionary propaganda, and the love of glory. In this Napoleon was a soldier of the people : because of this he judged and ruled his contemporaries. Having seen their actions in the stormy hours of the Revolution, he despised them and

looked upon them as incapable of disinterested conduct, con- ceited, and obsessed by the notion of equality. Hence his colossal egoism, his habitual disregard of others, his jealous passion for power, his impatience of all contradiction, his vain untruthful boasting, his unbridled self-sufficiency and lack of moderation — passions which were gradually to cloud his clear faculty of reasoning. His genius, assisted by the impoverish- ment of two generations, was like the oak which admits beneath its shade none but the smallest of saplings. With the exception of Talleyrand, after 1808 he would have about him only mediocre people, without initiative, prostrate at the feet of the giant: his tribe of paltry, rapacious and embarrassing Corsicans; his admirably subservient generals; his selfish ministers, docile agents, apprehensive of the future, who for fourteen long years felt a prognostication of defeat and discounted the inevitable catastrophe.

■ *So France had no internal history outside the plans and transformations to which Napoleon subjected the institutions of the Consulate, and the after-effects of his wars. Well knowing that his fortunes rested on the delighted acquiescence of France, Napoleon expected to continue indefinitely fashioning public opinion according to his pleasure. To his contempt for men he added that of all ideas which might put a bridle on his am- bition; and to guard against them, he inaugurated the Golden Age of the police that he might tame every moral force to his hand. Being essentially a man of order, he loathed, as he said, all demagogic action, Jacobinism and visions of liberty, which he desired only for himself. To make his will predominant, he stifled or did violence to that of others, through his bishops, his gendarmes, his university, his press, his catechism. Nourished likeFrederickll.andCatherinethe Great in 18th-century maxims, neither he nor they would allow any of that ideology to filter through into their rough but regular ordering of mankind. Thus the whole political system, being summed up in the emperor, was bound to share his fall.*

*Although an enemy of idealogues, in his foreign policy Napoleon was haunted by grandiose visions. A condottiere of the Renais- sance living in the 19th century, he used France, and all those nations annexed or attracted by the Revolu- ˆJura/ 1 * * tion, to resuscitate the Roman conception of the idea. Empire for his own benefit. On the other hand, he was enslaved by the history and aggressive idealism of the Conven tion, and of the republican propaganda under the Directory; he was guided by them quite as much as he guided them. Hence the immoderate extension given to French activity by his classical Latin spirit; hence also his conquests, leading on from one to another, and instead of being mutually helpful interfering with each other; hence, finally, his not entirely coherent policy, interrupted by hesitation and counter-attractions. This explains the retention of Italy, imposed on the Directory from 1796 on- ward, followed by his criminal treatment of Venice, the founda- tion of the Cisalpine republic — a foretaste of future annexation's — the restoration of that republic after his return from Egypt, and in view of his as yet inchoate designs, the postponed solution of the Italian problem which the treaty of Luneville had raised.*

Marengo inaugurated the political idea which was to continue its development until his Moscow campaign. Napoleon dreamed as yet only of keeping the duchy of Milan, setting aside Austria, and preparing some new enterprise in the East or in Egypt. The peace of Amiens, which cost him Egypt, could only seem to him a temporary truce; whilst he was gradually extending his authority in Italy, the cradle of his race, by the union of Pied- mont, and by his tentative plans regarding Genoa, Parma, Tuscany and Naples. He wanted to make this his Cisalpine Gaul, laying siege to the Roman state on every hand, and pre- paring in the Concordat for the moral

and material servitude of the pope. When he recognized his error in having raised the papacy from decadence by restoring its power over all the churches, he tried in vain to correct it by the Articles Organiques — wanting, like Charlemagne, to be the legal protector of the pope, and eventually master of the Church. To conceal his plan he aroused French colonial aspirations against England, and also

the memory of the spoliations of 1763, exasperating English jealousy of France, whose borders now extended to the Rhine, and laying hands on Hanover, Hamburg and Cuxhaven. By the " Recess " of 1803, which brought to his side Bavaria, Wiirttem- berg and Baden, he followed up the overwhelming tide of revolu- tionary ideas in Germany, to stem which Pitt, back in power, appealed once more to an Anglo-Austro-Russian coalition against this new Charlemagne, who was trying to renew the old Empire, who was mastering France, Italy and Germany; who finally on the 2nd of December 1804 placed the imperial crown upon his head, after receiving the iron crown of the Lombard kings, and made Pius VII. consecrate him in Notre-Dame.

After this, in four campaigns from 1805 to 1809, Napoleon transformed his Carolingian feudal and federal empire into one modelled on the Roman empire. The memories of imperial Rome were for a third time, after Caesar and Charlemagne, to modify the historical evolution of France. Though the vague plan for an invasion of England fell to the ground Ulm and Austerlitz obliterated Trafalgar, and the camp at Boulogne put the best military resources he had ever commanded at Napoleon's disposal.

In the first of these campaigns he swept away the remnants of the old Roman-Germanic empire, and out of its shattered

fragments created in southern Germany the vassal Presburg, states of Bavaria, Baden, Wurttemberg, Hesse- 1805. Darmstadt and Saxony, which he attached to France

under the name of the Confederation of the Rhine; but the treaty of Presburg gave France nothing but the danger of a more centralized and less docile Germany. On the other hand, Napoleon's creation of the kingdom of Italy, his annexation of Venetia and her ancient Adriatic empire — wiping out the humiliation of 1797 — and the occupation of Ancona, marked a new stage in his progress towards his Roman Empire. His good fortune soon

led him from conquest to spoliation, and he complicated his master-idea of the grand empire by his Family Compact; the clan of the Bonapartes invaded European monarchies, wedding with princesses of blood- royal, and adding kingdom to kingdom. Joseph replaced the dispossessed Bourbons at Naples; Louis was installed on the throne of Holland; Murat became grand-duke of Berg, Jerome son-in-law to the king of Wurttemberg, and Eugene de Beau- harnais to the king of Bavaria; while Stephanie de Beauharnais married the son of the grand-duke of Baden.

Meeting with less and less resistance,Napoleon went still further and would tolerate no neutral power. On the 6th of August 1806 Jena. ˆ e 1 ° rce d the Habsburgs, left with only the crown of

Austria, to abdicate their Roman-Germanic title of emperor. Prussia alone remained outside the Confederation of the Rhine, of which Napoleon was Protector, and to further her decision he offered her English Hanover. In a second campaign he destroyed at Jena both the army and the state of Frederick William III., who could not make up his mind between the Napoleonic treaty of Schbnbrunn and Russia's counter-proposal at Potsdam (October 14, 1806). The butchery at Eylau and the

*vengeance taken at Friedland finally ruined Frederick Priediaad. * ne Great's work, and obliged Russia, the ally of*

England and Prussia, to allow the latter to be despoiled, and to join Napoleon against the maritime tyranny of the former. After Tilsit, however (July 1807), instead of trying to reconcile Peace of Europe to his grandeur, Napoleon had but one thought : Tilsit, to make use of his success to destroy England and "isor 8 ' complete his Italian dominion. It was from Berlin,

on the 21st of November 1806, that he had dated the first decree of a continental blockade, a monstrous conception intended to paralyze his inveterate rival, but which on the con- trary caused his own fall by its immoderate extension oental °f the empire. To the coalition of the northern powers blockade, he added the league of the Baltic and Mediterranean

ports, and to the bombardment of Copenhagen by an English fleet he responded by a second decree of blockade, dated from Milan on the 17th of December 1807. But the application of the Concordat and the taking of Naples

led to the first of those struggles with the pope, in which were formulated two antagonistic doctrines: Napoleon declaring himself Roman emperor, and Pius VII. renewing the theocratic affirmations of Gregory VII. The former's Roman ambition was made more and more plainly visible by the

occupation of the kingdom of Naples and of the Marches, and the entry.of Miollis into Rome; while Junot invaded Portugal, Radet laid hands on the pope himself, and Murat took possession of formerly Roman Spain , whither Joseph was afterwards to be transferred. But Napoleon little knew the flame he was kindling. No more far-seeing than the Directory or the men of the year III., he thought that, with energy and execution, he might succeed in the Peninsula as he had succeeded in Italy in 1796 and 1797, in Egypt, and in Hesse, and that he might cut into Spanish granite as into Italian mosaic or " that big cake, Germany." He stumbled unawares upon the revolt of a proud national spirit, evolved through ten historic centuries; and the trap of Bayonne, together with the enthron- ing of Joseph Bonaparte, made the contemptible prince of the Asturias the elect of popular sentiment, the representative of religion and country.

Napoleon thought he had Spain within his grasp, and now suddenly everything was slipping from him. The Peninsula became the grave of whole armies and a battlefield Ballen for England. Dupont capitulated at Bailen into the hands of Castafios, and Junot at Cintra to Wellesley; while Europe trembled at this first check to the hitherto invincible imperial armies. To reduce Spanish resistance Napoleon had in his turn to come to terms with the tsar Alexander at Erfurt; so that abandoning his designs in the East, he could make the Grand Army evacuate Prussia and return in force to Madrid.

Thus Spain swallowed up the soldiers who were wanted for Napoleon's other fields of battle, and they had to be replaced by forced levies. Europe had only to wait, and he warrant. would eventually be found disarmed in face of a last coalition; but Spanish heroism infected Austria, and showed the force of national resistance. The provocations of Talley- rand and England strengthened the illusion: Why should not the Austrians emulate the Spaniards? The campaign of 1809, however, was but a pale copy of the Spanish insurrection. After a short and decisive action in Bavaria, Napoleon opened up the road to Vienna for a second time; and after the two days' battle at Essling, the stubborn fight at Wagram, the failure of a patriotic insurrection in northern Germany and of the English expedition against Antwerp, the treaty of Vienna (December 14, 1809), with the annexation of the Illyrian provinces, completed the colossal empire. Napoleon profited, in fact, by this Vienna. campaign which had been planned for his overthrow. The pope was deported to Savona beneath the eyes of indifferent Europe, and his domains were incorporated in the Empire; the senate's decision on the 17th of February 1810 created the title of king of Rome, and made Rome the capital of Italy. The pope banished, it was now desirable to send away those to whom Italy had been more or less promised. Eugene de Beauharnais, Napoleon's stepson, was transferred to Frankfort, and Murat carefully watched until the time should come to take

him to Russia and instal him as king of Poland. Between 1810 and 181 2 Napoleon's divorce of Josephine, and his marriage with Marie Louise of Austria, followed by the birth of the king of Rome, shed a brilliant light upon his future policy. He renounced a federation in which his brothers were not sufficiently docile; he gradually withdrew power from them; he concentrated all his affection and ambition on the son who was the guarantee of the continuance of his dynasty. This was the apogee of his reign.

But undermining forces were already at work: the faults in- herent in his unwieldy achievement. England, his chief enemy, was persistently active; and rebellion both of the Beginning governing and the governed broke out everywhere, of the end. Napoleon felt his impotence in coping with the Spanish Uprising insurrection, which he underrated, while yet unable °^^ to suppress it altogether. Men like Stein, Harden- borg and Scharnhorst were secretly preparing Prussia's retaliation. Napoleon's material omnipotence could not stand

Treachery.

against the moral force of the pope, a prisoner at Fontainebleau ; and this he did not realize. The alliance arranged at Tilsit was seriously shaken by the Austrian marriage, the threat of a Polish restoration, and the unfriendly policy of Napoleon at Con- stantinople. The very persons whom he had placed in power were counteracting his plans: after four years' experience Napoleon found himself obliged to treat his Corsican dynasties like those of the ancien regime, and all his relations were betraying him. Caroline conspired against her brother and against her husband; the hypochondriacal Louis, now Dutch in his sympathies, found the supervision of the blockade taken from him, and also the defence of the Scheldt, which he had refused to ensure; Jerome, idling in his harem, lost that of the North Sea shores; and Joseph, who was attempting the moral conquest of Spain, was continually insulted at Madrid. The very nature of things was against the new dynasties, as it had been against the old.

After national insurrections and family recriminations came treachery from Napoleon's ministers. Talleyrand betrayed his designs to Metternich, and had to be dismissed; Fouche corresponded with Austria in 1809 and 1810, entered into an understanding with Louis, and also with England; while

Bourrienne was convicted of peculation. By a natural con- sequence of the spirit of conquest he had aroused, all these par- venus, having tasted victory, dreamed of sovereign power: Bernadotte, who had helped him to the Consulate, played Napoleon false to win the crown of Sweden; Soult, like Murat, coveted the Spanish throne after that of Portugal, thus anticipat- ing the treason of 1813 and the defection of 1814; many persons hoped for " an accident " which might resemble the tragic end of Alexander and of Caesar. The country itself, besides, though flattered by conquests, was tired of self-sacrifice. It had become satiated; "the cry of the mothers rose threateningly" against " the Ogre." and his intolerable imposition of wholesale conscrip- tion. The soldiers themselves, discontented after Austerlitz, cried out for peace after Eylau. Finally, amidst profound silence from the press and the Assemblies, a protest was raised against imperial despotism by the literary world, against the excom- municated sovereign by Catholicism, and against the author of the continental blockade by the discontented bourgeoisie, ruined by the crisis of 181 1.

Napoleon himself was no longer the General Bonaparte of his campaign in Italy. He was already showing signs of physical decay; the Roman medallion profile had coarsened, Degenera- the obese body was often lymphatic. Mental degenera- Napohon. tion, too, betrayed itself in an unwonted irresolution. At Eylau, at Wagram, and later at Waterloo, his method of acting by enormous masses of infantry and cavalry, in a mad passion for conquest, and his misuse of his military resources, were all signs of his moral and technical decadence; and this at the precise moment when, instead of the armies and govern- ments of the old system, which had hitherto reigned supreme, the nations themselves were rising against France, and the events of 1792 were being avenged upon her. The three campaigns of two years brought the final catastrophe.

Napoleon had hardly succeeded in putting down the revolt in Germany when the tsar himself headed a European insurrec- tion against the ruinous tyranny of the continental campaign, blockade. To p U t a stop to this, to ensure his own access to the Mediterranean and exclude his chief rival, Napoleon made a desperate effort in 1812 against a country as invincible as Spain. Despite his victorious advance, the taking of Smolensk, the victory on the Moskwa, and the entry into Moscow, he was vanquished by Russian patriotism and religious fervour, by the country and the climate, and by Alexander's refusal to make terms. After this came the lament- able retreat, while all Europe was concentrating against him. Pushed back, as he had been in Spain, from bastion to bastion, after the action on the Beresina, Napoleon had to fall back upon the frontiers of 1809, and then — having refused the peace offered him by Austria at the congress of Prague, from a dread of losing Italy, where each of his victories had marked a stage in the accomplishment of his dream — on those of 1805,

despite

Liitzen and Bautzen, and on those of 1802 after his defeat at Leipzig, where Bernadotte turned upon him, Moreau figured among the Allies, and the Saxons and Bavarians forsook him. Following his retreat from Russia came Cam ‘ his retreat from Germany. After the loss of Spain, /s;ff«. reconquered by Wellington, the rising in Holland pre- liminary to the invasion and the manifesto of Frankfort which proclaimed it, he had to fall back upon the frontiers of 1795; and then later was driven yet farther back upon those of 1792, despite the wonderful campaign of 1814 against the invaders, in which the. old Bonaparte of 1796 seemed to have returned. Paris capitulated on the 30th of March, and the ” Delenda Carthago,” pronounced against England, was spoken of Napoleon. The great empire of East and West fell in ruins with the emperor’s abdication at Fontainebleau.

The military struggle ended, the political struggle began. How was France to be governed? The Allies had decided on the eviction of Napoleon at the Congress of Chatillon; and the precarious nature of the Bonapartist monarchy Downfall in France itself was made manifest by the exploit of Empire. General Malet, which had almost succeeded during the Russian campaign, and by Laine’s demand for free exercise of political rights, when Napoleon made a last appeal to the Legis- lative Assembly for support. The defection of the military and civil aristocracy, which brought about Napoleon’s abdication, the refusal of a regency, and the failure of Bernadotte, who wished to resuscitate the Consulate, enabled Talleyrand, vice- president of the senate and desirous of power, to persuade the Allies to accept the Bourbon solution of the difficulty. The declaration of St Ouen (May 2, 1814) indicated that the new monarchy was only accepted upon conditions. After Napoleon’s abdication, Snd exile to the island of Elba, came the Revolution’s abdication of her conquests: the first treaty of Paris (May 30th) confirmed France’s renunciation of Belgium and the left bank of the Rhine, and her return within her pre-revolutionary frontiers, save for some slight rectifications.

After the scourge of war, the horrors of conscription, and the despotism which had discounted glory, every one seemed to rejoice in the return of the Bourbons, which atoned for humiliations by restoring liberty. But questions of F Vj% s form, which aroused questions of sentiment, speedily Bourbons. led to grave dissensions. The hurried armistice of the 23rd of April, by which the comte d’Artois delivered over disarmed France to her conquerors; Louis XVIII. ‘s excessive gratitude to the prince regent of England; the return of the emigre’s; the declaration of St Ouen, dated from the nineteenth year of the new reign; the charter of June 4th, ” concedee el octroy ee,” maintaining the effete doctrine of legitimacy in a country permeated with the idea of national sovereignty; the slights put upon the

army; the obligatory processions ordered by Comte Beugnot, prefect of police; all this provoked a conflict not only between two theories of government but between two groups of men and of interests. An avowedly imperialist party was soon again formed, a centre of heated opposition to the royalist party; and neither Baron Louis' excellent finance, nor the peace, nor the charter of June 4th — which despite the irritation of the emigres preserved the civil gains of the Revolution — prevented the man who was its incar- nation from seizing an opportunity to bring about another military coup d'etat. Having landed in the Bay of Jouan on the 1st of March, on the 20th Napoleon re-entered the Tuileries in triumph, while Louis XVIII. fled to Ghent. By the Acte additionnel of the 2 2ndof April he induced Carnot and Fouche — the last of the Jacobins — and the heads of the Liberal opposition, Benjamin Constant and La Fayette, to side Hundred with him against the hostile Powers of Europe, occupied Days. in dividing the spoils at Vienna. He proclaimed his March- intention of founding a new democratic empire; and jˆf French policy was thus given another illusion, which was to be exploited with fatal success by Napoleon's namesake. But the cannon of Waterloo ended this adventure (June 18, 181 5), and, thanks to Fouche's treachery, the triumphal progress of

Milan, Rome, Naples, Vienna, Berlin, and even of Moscow, was to end at St Helena.

The consequences of the Hundred Days were very serious; France was embroiled with all Europe, though Talleyrand's clever diplomacy had succeeded in causing division xviu. over Saxony and Poland by the secret Austro-Anglo- French alliance of the 3rd of January 1815, and the Coalition destroyed both France's pol : tical independence and national integrity by the treaty of peace of November 20th: she found herself far weaker than before the Revolution, and in the power of the European Alliance. The Hundred Days divided the nation itself into two irreconcilable parties: one ultra-royalist, eager for vengeance and retaliation, refusing to accept the Charter; the other imperialist, composed of Bona- partists and Republicans, incensed by their defeat — of whom Beranger was the Tyrtaeus — both parties equally revolutionary and equally obstinate. Louis XVIIL, urged by his more fervent supporters towards the ancien rSgime, gave his policy an exactly contrary direction; he had common-sense enough to maintain the Empire's legal and administrative tradition, accepting its institutions of the Legion of Honour, the Bank, the University, and the

imperial nobility — modifying only formally certain rights and the conscription, since these had aroused the nation against Napoleon. He even went so far as to accept advice from the imperial ministers Talleyrand and Fouch6. Finally, as the chief political organization had become thoroughly demoralized, he imported into France the entire constitutional system of England, with its three powers, king, upper hereditary chamber, and lower elected chamber; with its plutocratic electorate, and even with details like the speech from the throne, the debate on the address, &c. This meant importing also difficulties such as ministerial responsibility, as well as electoral and press legislation.

Louis XVIIL, taught by time and misfortune, wished not to reign over two parties exasperated by contrary passions and desires; but his dynasty was from the outset implicated in the struggle, which was to be fatal to it, between old France and revolutionary France. Anti-monarchical, liberal and anti- clerical France at once recommenced its revolutionary work; the whole 19th century was to be filled with great spasmodic upheavals, and Louis XVIIL was soon overwhelmed by the White Terrorists of 1815.

Vindictive sentences against men like Ney and Labedoyere were followed by violent and unpunished action by the White Terror, which in the south renewed the horrors of St Bartholomew and the September massacres. The elections of August 14, 1815, made under the influence of these royalist and religious passions, sent the " Chambre introuvable " to Paris, an unforeseen revival of the ancien regime. Neither the substitution of the due de Richelieu's ministry for that of Talleyrand and Fouche, nor a whole series of repressive laws in violation of the charter, were successful in satisfying its tyrannical loyalism, and Louis XVIIL needed something like a coup d'etat, in September 1816, to rid himself of the " ultras."

He succeeded fairly well in quieting the opposition between the dynasty and the constitution, until a reaction took place The Con- Detween I ˆ 2 ° an d 1822. State departments worked stliutional regularly and well, under the direction of Decazes, party's Laine, De Serre and Pasquier, power alternating rule ' between two great well-disciplined parties almost in

the English fashion, and many useful measures were passed: the reconstruction of finance stipulated for as a condition of evacuation of territory occupied by foreign troops; the electoral law of February 5, 1817, which, by means of direct election and a qualification of three hundred francs, renewed the pre- ponderance of the bourgeoisie; the Gouvion St-Cyr law of

1 8 18, which for half a century based the recruiting of the French army on the national principle of conscription; and in

18 19, after Richelieu's dismissal, liberal regulations for the press under control of a commission. But the advance of the Liberal movement, and the election of the generals— Foy, Lamarque, Lafayette and of Manuel, excited the " ultras " and caused the

dismissal of Richelieu; while that of the constitutional bishop Gregoire led to the modification in a reactionary direction of the electoral law of 1817. The assassination of the due de Berry, second son of the comte d'Artois (attributed to the influence of Liberal ideas), caused the downfall of Decazes, and caused the king — more weak and selfish than ever — to override the charter and embark upon a reactionary path. After 1820, Madame du Cayla, a trusted agent of the ultra-royalist party, gained great influence over the king; and M. de The cil Villdle, its leader, supported by the king's brother, on8M° soon eliminated the Right Centre by the dismissal of the due de Richelieu, who had been recalled to tide over the crisis— just as the fall of M. Decazes had signalized the defeat of the Left Centre (December 15, 1821) — and moderate policy thus received an irreparable blow.

Thenceforward the government of M. de Villdle — a clever statesman, but tied to his party— did nothing for six years but promulgate a long series of measures against Liberalism and the social work of the Revolution; to retain power it had to. yield to the impatience of the comte d'Artois and the majority. The suspension of individual liberty, the re-establishment of the censorship; the electoral right of the " double vote," favouring taxation of the most oppressive kind; and the handing over of education to the clergy: these were the first achievements of this anti-revolutionary ministry. The Spanish expedition, in which M. de Villele's hand was forced by Montmorency and Chateaubriand, was the united work of the association of Catholic zealots known as the Congregation and of the autocratic powers of the Grand Alliance; it was responded to — as at Naples and in Spain — by secret Carbonari societies, and by severely repressed military conspiracies. Politics now bore the double imprint of two rival powers: the Congregation and Carbonarism. By 1824, nevertheless, the dynasty seemed firm — the Spanish War had reconciled the army, by giving back military prestige; the Liberal opposition had been decimated; revolutionary conspiracies discouraged; and the increase of public credit and material prosperity pleased the whole nation, as was proved by the " Chambre retrouvte " of 1824. The law of septennial elections tranquillized public life by suspending any legal or regular manifestation by the nation for seven years.

It was the monarchy which next became revolutionary, on the accession of Charles X. (September 16, 1824). This incon- sistent prince soon exhausted his popularity, and „ remained the fanatical head of those

*emigres who had * ”*

learnt nothing and forgotten nothing. While the opposition became conservative as regards the Charter and French liberties, the king and the clerical party surrounding him challenged the spirit of modern France by a law against sacrilege, by a bill for re-establishing the right of primogeniture, by an indemnity of a milliard francs, which looked like compensation given to the emigres, and finally by the ” loi de liberie et d ‘amour ” against the press. The challenge was so definite that in 1826 the Chamber of Peers and the Academy had to give the Villele ministry a lesson in Liberalism, for having lent itself to this ancien regime reaction by its weakness and its party-promises. The elections ” d e colire et de vengeance ” of January 1 8 2 7 gave the Lef t a majority, and the resultant short-lived Martignac the con- ministry tried to revive the Right Centre which had stitutional supported Richelieu and Decazes (January 1828). ?ffl /es ‘ Martignac’s accession to power, however, had only meant personal concessions from Charles X., not any conces- sion of principle: he supported his ministry but was no real stand-by. The Liberals, on the other hand, made bargains for supporting the moderate royalists, and Charles X. profited by this to form a fighting ministry in conjunction with the prince de Polignac, one of the emigres, an ignorant and visionary person, and the comte de Bourmont, the traitor of Waterloo. Despite all kinds of warnings, the former tried by a coup d’etat to put into practice his theories of the supremacy of the royal prerogative; and the battle of Navarino, the French occupation of the Morea, and the Algerian expedition could not make the nation forget this conflict at home. The united opposition of monarchist

Liberals and imperialist republicans responded by legal resist- ance, then by a popular coup d’itat, to the ordinances of July

1830, which dissolved the intractable Chamber, elimi- j[e … nated licensed dealers from the electoral list, and of/830. muzzled the press. After fighting for three days against*

the troops feebly led by the Marmont of 1814, the workmen, driven to the barricades by the deliberate closing of Liberal workshops, gained the victory, and sent the white flag of the Bourbons on the road to exile.

The rapid success of the ” Three Glorious Days ” (” les Trois Glorieuses “), as the July Days were called, put the leaders of the Repabll- parliamentary

opposition into an embarrassing position. can and While they had contented themselves with words, Orieanist the sm all Republican-Imperialist party, aided by the parties. a i mos t entire absence of the army and police, and by the convenience which the narrow, winding, paved streets of those times offered for fighting, had determined upon the revolution and brought it to pass. But the Republican party, which desired to re-establish the Republic of 1703, recruited chiefly from among the students and workmen, and led by Godefroy Cavaignac, the son of a Conventionalist, and by the chemist Raspail, had no hold on the departments nor on the dominating opinion in Paris. Consequently this premature attempt was promptly seized upon by the Liberal bourgeoisie and turned to the advan- tage of the Orieanist party, which had been secretly organized since 1829 under the leadership of Thiers, with the National as its organ. Before the struggle was yet over, Benjamin Constant, Casimir Perier, Lafitte, and Odilon Barrot had gone to fetch the duke of Orleans from Neuilly, and on receiving his promise to defend the Charter and the tricolour flag, installed him at the Palais Bourbon as lieutenant-general of the realm, while La Fayette and the Republicans established themselves at the Hotel de Ville.

An armed conflict between the two governments was Philippe, imminent, when Lafayette, by giving his support to

Louis Philippe, decided matters in his favour. In order to avoid a recurrence of the difficulties which had arisen with the Bourbons, the following preliminary conditions were imposed upon the king: the recognition of the supremacy of the people by the title of " king of the French by the grace of God and the will of the people," the responsibility of ministers, the suppression of hereditary succession to the Chamber of Peers, now reduced to the rank of a council of officials, the suppression of article 14 of the charter which had enabled Charles X. to super- sede the laws by means of the ordinances, and the liberty of the press. The qualification for electors was lowered from 300 to 200 francs, and that for eligibility from 1000 to 500 francs, and the age to 25 and 30 instead of 30 and 40; finally, Catholicism lost its privileged position as the state religion. The bourgeois National Guard was made the guardian of the charter. The liberal ideas of the son of Philippe Egalite, the part he had played at Valmy and Jemappes, his gracious manner and his domestic virtues, all united in winning Louis Philippe the good opinion of the public.

He now believed, as did indeed the great majority of the electors, that the revolution of 1830 had changed nothing but

the head of the state. But in reality the July monarchy V™ was affected by a fundamental weakness. It sought

*monarchy *° m °del itself upon the English monarchy, which*

rested upon one long tradition. But the tradition of France was both twofold and contradictory, i.e. the Catholic- legitimist and the revolutionary. Louis Philippe had them both against him. His monarchy had but one element in common with the English, namely, a parliament elected by a limited electorate. There was at this time a cause of violent outcry against the English monarchy, which, on the other hand, met with firm support among the aristocracy and the clergy. The July monarchy had no such support. The aristocracy of the ancien regime and of the Empire were alike without social influence; the clergy, which had paid for its too close alliance with Charles X. by a dangerous unpopularity, and foresaw the rise of democracy, was turning more and more towards the people, the future source of all power. Even the monarchical principle

itself had suffered from the shock, having proved by its easy defeat how far it could be brought to capitulate. Moreover, the victory of the people, who had shown themselves in the late struggle to be brave and disinterested, had won for the idea of national supremacy a power which was bound to increase. The difficulty of the situation lay in the doubt as to whether this expansion would take place gradually and by a progressive evolution, as in England, or not.

Now Louis Philippe, beneath the genial exterior of a bourgeois and peace-loving king, was entirely bent upon recovering an authority which was menaced from the very first on the one hand by the anger of the royalists at their failures, and on the other hand by the impatience of the republicans to follow up their victory. He wanted the insurrection to stop at a change in the reigning family, whereas it had in fact revived the revolutionary tradition, and restored to France the sympathies of the nationalities and democratic parties oppressed by Metternich's " system." The republican party, which had retired from power but not from activity, at once faced the new king with the serious problem of the acquisition of political power by the people, and continued to remind him of it. He put himself at the head of the party of progress (" parti du mouvement ") as opposed to the (" parti de la cour ") court party, and of the " resistance," which considered that it was now necessary " to check the revolution in order to make it fruitful, and in order to save it." But none of these parties were homogeneous; in the chamber they split up into a republican or radical Extreme Left, led by Garnier-Pages and parties Arago; a dynastic Left, led by the honourable and sincere Odilon Barrot; a constitutional Right Centre and Left Centre, differing in certain slight respects, and presided over respectively by Thiers, a wonderful political orator, and Guizot, whose ideas were those of a strict doctrinaire; not to mention a small party which clung to the old legitimist creed, and was dominated by the famous avocal

Berryer, whose eloquence was the chief ornament of the cause of Charles X.'s grandson, the comte de Chambord. The result was a ministerial majority which was always uncertain; and the only occasion on which Guizot succeeded in consolidating it during seven years resulted in the overthrow of the monarchy.

Louis Philippe first summoned to power the leaders of the

party of " movement," Dupont de l'Eure, and afterwards Lafitte, in order to keep control of the progressive forces for his own ends. They wished to introduce democratic reforms and to uphold throughout Europe th,e revolution, which had spread from France into Belgium, Germany, Italy and Poland, while Paris was still in a state of unrest. But Louis Philippe took fright at the attack on the Chamber of Peers after the trial of the ministers of Charles X., at the sack of the church of Saint Germain l'Auxerrois and the archbishop's palace (February, 1831), and at the terrible strike of the silk weavers at Lyons. Casimir Perier, who was both a Liberal and a believer in a strong government, was then charged with the task of heading the resistance to advanced ideas, and applying the principle of non-intervention in foreign affairs (March 13, 183 1). After his death by cholera in May 1832, the agitation which he had succeeded by his energy in checking at Lyons, at Grenoble and in the Vendee, where it had been stirred up by the romantic duchess of Berry, began to gain ground. The struggle against the republicans was still longer; for having lost all their chance of attaining power by means of the Chamber, they proceeded to reorganize themselves into armed secret societies. The press, which was gaining that influence over public opinion which had been lost by the parliamentary debates, openly attacked the government and the king, especially by means of caricature.

Between 1832 and 1836 the Soult ministry, of which

Guizot, Thiers and the due de Broglie were members, Th ?,?‘ , , ‘ , , ... ***T ‘ publican***

*had to combat the terrible insurrections in Lyons crush**.*

and Paris (1834). The measures of repression were

threefold: military repression, carried out by the National

Guard and the regulars, both under the command of Bugeaud;

judicial repression, effected by the great trial of April 1835;

and legislative repression, consisting in the laws of September, which, when to mere ridicule had succeeded acts of violence, such as that of Fieschi (July 28th, 1835), aimed at facilitating the condemnation of political offenders and at intimidating the press. The party of ” movement ” was vanquished.

But the July Government, born as it was of a popular move- ment, had to make concessions to popular demands. Casimir

Perier had carried a law dealing with municipal V’u ols organization, which made the municipal councils policy, elective, as they had been before the year VIII.; and

in 1833 Guizot had completed it by making the conseils gineraux also elective. In the same year the law dealing with primary instruction had also shown the mark of new ideas. But now that the bourgeoisie was raised to power it did not prove itself any more liberal than the aristocracy of birth and fortune in dealing with educational, fiscal and industrial questions. In spite of the increase of riches, the bourgeois regime maintained a fiscal and social legislation which, while it assured to the middle class certainty and permanence of benefits, left the labour- ing masses poor, ignorant, and in a state of incessant agitation. The Orleanists, who had been unanimous in supporting the king, disagreed, after their victory, as to what powers he was

to be given. The Left Centre, led by Thiers, held Ixiaiist that he sh ould reign but not govern; the Right party. Centre, led by Guizot, would admit

him to an active

part in the government; and the third party (tiers- parti) wavered between these two. And so between 1836 and 1840, as the struggle against the king's claim to govern passed from the sphere of outside discussion into parliament, we see the rise of a bourgeois socialist party, side by side with the now dwindling republican party. It no longer confined its demands to universal suffrage, on the principle of the legitimate representation of all interests, or in the name of justice. Led by Saint-Simon, Fourier, P. Leroux and Lamennais, it aimed at realizing a better social organization for and by means of the state. But the question was by what means this was to be accomplished. The secret societies, under the influence of Blanqui and Barbes, two revolutionaries who had revived the traditions of Babeuf, were not willing to wait for the complete education of the masses, necessarily a long process. On the 1 2th of May 1839 the Society des Saisons made an attempt to overthrow the bourgeoisie by force, but was defeated. Democrats like Louis Blanc, Ledru-Rollin and Lamennais continued to repeat in support of the wisdom of universal suffrage the old pro- fession of faith: vox populi, vox Dei. And finally this republican doctrine, already confused, was still further complicated by a kind of mysticism which aimed at reconciling the most extreme differences of belief, the Catholicism of Buchez, the Bonapartism of Cormenin, and the humanitarianism of the cosmopolitans. It was in vain that Auguste Comte, Michelet and Quinet denounced this vague humanitarian mysticism and the pseudo- liberalism of the Church. The movement had now begun.

At first these moderate republicans, radical or communist, formed only imperceptible groups. Among the peasant classes, The an d even in the industrial centres, warlike passions

Bona- were still rife. Louis Philippe tried to find an outlet prtist f or tnem m tne Algerian war, and later by the revival revival. ˆ tne Napoleonic legend, which was held to be no longer dangerous, since the death of the duke of Reichstadt in 1832. It was imprudently recalled by Thiers' History of the Consulate and Empire, by artists and poets, in spite of the pro- phecies of Lamartine, and by the solemn translation of Napoleon I.'s ashes in 1840 to the Invalides at Paris.

All theories require to be based on practice, especially those which involve force. Now Louis Philippe, though as active as p _ his predecessors had been slothful, was the least warlike

mentary °f men – His only wish was to govern personally, as opposition George III. and George IV. of England had done, to the especially in foreign affairs, while at home was being

nyal waged the great duel between Thiers and Guizot,

with Mole as intermediary. Thiers, head of the cabinet of the 22nd of February 1836, an astute man but not pliant

enough to please the king, fell after a few months, in consequence of his attempt to stop the Carlist civil war in Spain, and to support the constitutional government of Queen Isabella. Louis Philippe hoped that, by calling upon Mole to form a ministry, he would be better able to make his personal authority felt. From 1837 to 1839 Mole aroused opposition on all hands; this was empha- sized by the refusal of the Chambers to vote one of those endow- ments which the king was continually asking them to grant for his children, by two dissolutions of the Chambers, and finally by the Strasburg affair and the stormy trial of Louis Napoleon, son of the former king of Holland (1836-1837). At the elections of 1839 Mole was defeated by Thiers, Guizot and Barrot, who had combined to oppose the tyranny of the " Chateau," and after a long ministerial crisis was replaced by Thiers (March 1, 1840). But the latter was too much in favour of war to please the king, who was strongly disposed towards peace and an alliance with Great Britain, and consequently fell at the time of the Egyptian question, when, in answer to the treaty of London concluded behind his back by Nicholas I. and Palmerston on the 15th of July 1840, he fortified Paris and proclaimed his intention to give armed support to Mehemet Ali, the ally of France (see Mehemet Ali). But the violence of popular Chauvinism and the renewed attempt of Louis Napoleon at Boulogne proved to the holders of the doctrine of peace at any price that in the long- run their policy tends to turn a peaceful attitude into a warlike one, and to strengthen the absolutist idea.

In spite of all, from 1840 to 1848 Louis Philippe still further extended his activity in foreign affairs, thus bringing himself into still greater prominence, though he was already ,

frequently held responsible for failures in foreign m i a i s try. politics and unpopular measures in home affairs. The catchword of Guizot, who was now his minister, was: Peace and no reforms. With the exception of the law of 1842 concern- ing the railways, not a single measure of importance was proposed by the ministry. France lived under a regime of general corrup- tion: parliamentary corruption, due to the illegal conduct of the deputies, consisting of slavish or venal officials; electoral corruption, effected by the purchase of the 200,000 electors constituting the " pays Ugal" who were bribed by the advantages of power; and moral corruption, due to the reign of the pluto- cracy, the bourgeoisie, a hard-working, educated and honourable class, it is true, but insolent, like all newly enriched parvenus in the presence of other aristocracies, and with unyielding selfishness

maintaining an attitude of suspicion towards the people, whose aspirations they did not share and with whom they did not feel themselves to have anything in common. This led to a slackening in political life, a sort of exhaustion of interest throughout the country, an excessive devotion to material prosperity. Under a superficial appearance of calm a tempest was brewing, of which the industrial writings of Balzac, Eugene Sue, Lamartine, H. Heine, Vigny, Montalembert and Tocqueville were the premonitions. But it was in vain that they denounced this supremacy of the bourgeoisie, relying on its two main sup- ports, the suffrage based on a property qualification and the National Guard, for its rallying-cry was the " Enrichissez-votis " of Guizot, and its excessive materialism gained a sinister dis- tinction from scandals connected with the ministers Teste and Cubieres, and such mysterious crimes as that of Choiseul-Praslin, 1 In vain also did they point out that mere riches are not so much a protection to the ministry who are in power as a temptation to the majority excluded from power by this barrier of wealth.

1 Charles LaureHugues Theobald, due de Choiseul-Praslin (1805- 1847), was deputy in 1839, created a peer of France in 1840. He had married a daughter of General Sebastiani, with whom he lived on good terms till 1840, when he entered into open relations with his children's governess. The duchess threatened a separation; and the duke consented to send his mistress out of the house, but did not cease to correspond with and visit her. On the 1 8th of August 1847 the duchess was found stabbed to death, with more than thirty wounds, in her room. The duke was arrested on the 20th and imprisoned in the Luxembourg, where he died of poison, self-administered on the 24th. It was, however, popularly believed that the government had smuggled him out of the country and that he was living under a feigned name in England.

of the banquets,

It was in vain that beneath the inflated haute bourgeoisie which speculated in railways and solidly supported the Church, behind the shopkeeper clique who still remained Voltairian, who enviously applauded the pamphlets of Cormenin on the luxury of the court, and who were bitterly satirized by the pencil of Daumier and Gavarni, did the thinkers give voice to the mutter- ings of an immense industrial proletariat, which were re-echoing throughout the whole of western Europe.

In face of this tragic contrast Guizot remained unmoved, blinded by the superficial brilliance of apparent success and

prosperity. He adorned by flights of eloquence his Oulzot's invariable theme: no new laws, no reforms, no foreign PWty" complications, the policy of material interests. He

preserved his yielding attitude towards Great Britain in the affair of the right of search in 1841, and in the affair of the missionary Pritchard at Tahiti (1843-1845). And when the marriage of the due de Montpensier with a Spanish infanta in 1846 had broken this entente cordiale to which he clung, it was only to yield in turn to Metternich, when he took possession of Cracow, the last remnant of Poland, to protect the Sonderbund in Switzerland, to discourage the Liberal ardour of Pius IX., and to hand over the education of France to the Ultramontane clergy. Still further strengthened by the elections of 1846, he refused the demands of the Opposition formed by a coalition of the Left Centre and the Radical party for parliamentary and electoral reform, which would have excluded the officials from the Chambers, reduced the electoral qualification to 100 francs, and added to the number of the electors the capacitaires whose competence was guaranteed by their education. For Guizot the whole country was represented by the pays Ugal," consisting of the king, the ministers, the deputies and the

*electors. When the Opposition appealed to the country, ^"IHl" 1 *" he flung down a disdainful challenge to what " les*

brouillons et les badauds appellent le peuple." The

challenge was taken up by all the parties of the Opposi- tion in the campaign of the banquets got up somewhat artificially in 1 84 7 in favour of the extension of the franchise. The monarchy had arrived at such a state of weakness and corruption that a determined minority was sufficient to overthrow it. The pro- hibition of a last banquet in Paris precipitated the catastrophe. The monarchy which for fifteen years had overcome its adversaries collapsed on the 24th of February 1848 to the astonishment of all. The industrial population of the faubourgs on its way towards the centre of the town was welcomed by the National Guard, The Re- amon g cr >es of " Vive la reforme." Barricades were volution raised after the unfortunate incident of the firing on 0/ Feb. 24, the crowd in the Boulevard des Capucines. On the I848 ' 23rd Guizot's cabinet resigned, abandoned by the

petite bourgeoisie, on whose support they thought they could depend. The heads of the Left Centre and the dynastic Left, Mole and Thiers, declined

the offered leadership. Odilon Barrot accepted it, and Bugeaud, commander-in-chief of the first military division, who had begun to attack the barri- cades, was recalled. But it was too late. In face of the insurrection which had now taken possession of the whole capital, Louis Philippe decided to abdicate in favour of his grandson, the comte de Paris. But it was too late also to be content with the regency of the duchess of Orleans. It was now the turn of the Republic, and it was proclaimed by Lamartine in the name of the pro- visional government elected by the Chamber under the pressure of the mob.

This provisional government with Dupont de l'Eure as its president, consisted of Lamartine for foreign affairs, Cremieux The Pro- f° r J ustice > Ledru-Rollin for the interior, Carnot for visional public instruction, Gondchaux for finance, Arago for Govern- the navy, and Bedeau for war. Garnier-Pages was ment mayor of Paris. But, as in 1830, the republican-

socialist party had set up a rival government at the H6tel de Ville, including L. Blanc, A. Marrast, Flocon, and the workman Albert, which bid fair to involve discord and civil war. But this time the Palais Bourbon was not victorious over the Hotel de Ville. It had to consent to a fusion of the two bodies,

in which, however, the predominating elements were the moderate republicans. It was doubtful what would eventually be the policy of the new government. One party, seeing that in spite of the changes in the last sixty years of all political institutions, the position of the people had not been improved, demanded a reform of society itself, the abolition of the privileged position of property, the only obstacle to equality, and as an emblem hoisted the red flag. The other party wished to maintain society on the basis of its ancient institutions, and rallied round the tricolour.

The first collision took place as to the form which the revolu- tion of 1848 was to take. Were they to remain faithful to their original principles, as Lamartine wished, and accept the decision of the country as supreme, or were they, suffrage. as the revolutionaries under Ledru-Rollin claimed, to declare the republic of Paris superior to the universal suffrage of an insufficiently educated people? On the 5th of March the government, under the pressure of the Parisian clubs, decided in favour of an immediate reference to the people, and direct universal suffrage, and adjourned it till the 26th of April. In this fateful and unexpected decision, which instead of adding to the electorate the educated classes, refused by Guizot, admitted to it the unqualified masses, originated the Constituent Assembly of the 4th of May 1848. The provisional government having resigned, the republican and anti-socialist majority on the 9th of May entrusted the supreme power to an executive The commission consisting of five members: Arago,

Executive Marie, Gamier-Pages, Lamartine and Ledru-Rollin. Commis- But the spell was already broken. This revolution sioa ‘ which had been peacefully effected with the most generous aspirations, in the hope of abolishing poverty by organizing industry on other bases than those of competition and capitalism, and which had at once aroused the fraternal sympathy of the nations, was doomed to be abortive.

The result of the general election, the return of a constituent assembly predominantly moderate if not monarchical, dashed the hopes of those who had looked for the establishment, by a peaceful revolution, of their ideal socialist state; but they were not prepared to yield without a struggle, and in Paris itself they commanded a formidable force. In spite of the preponderance of the ” tricolour ” party in the provisional government, so long as the voice of France had not spoken, the socialists, supported by the Parisian proletariat, had exercised an influence on policy out of all proportion to their relative numbers or personal weight. By the decree of the 24th of February the provisional govern- ment had solemnly accepted the principle of the ” right to work,” and decided to establish ” national workshops ” for the unem- ployed; at the same time a sort of industrial parliament was established at the Luxembourg, under the presidency of Louis Blanc, with the object of preparing a scheme for the organization of labour; and, lastly, by the decree of the 8th of March the property qualification for enrolment in the National Guard had been abolished and the workmen were supplied with arms. The socialists thus formed, in some sort, a state within the state, with a government, an organization and an armed force.

In the circumstances a conflict was inevitable; and on the 15th of May an armed mob, headed by Raspail, Blanqui and Barbes, and assisted by the proletariat Guard, attempted to overwhelm the Assembly. They were defeated by the bourgeois battalions of the National Guard; but the situation none the less remained highly critical. The national workshops were producing the results that might have been foreseen. It was impossible to provide remunerative work even for the genuine unemployed, and of the thousands who applied the greater number were employed in perfectly useless digging and refilling; soon even this expedient failed, and those for whom work could not be invented were given a half wage of 1 franc a day. Even this pitiful dole, with no obligation to work, proved attractive, and all over France workmen threw up their jobs and streamed to Paris, where they swelled the ranks of the army under the red flag. It was soon clear that the continuance of this experi- ment would mean financial ruin; it had been proved by the entente of the 15th of May that it constituted a perpetual menace

to the state; and the government decided to end it. The method chosen was scarcely a happy one. On the 21st of June M. de Falloux decided in the name of the parliamentary commission on labour that the workmen should be discharged within three days and such as were able-bodied should be forced to enlist. A furious insurrection at once broke out. Throughout Days. tne whole of the 24th, 25th and 26th of June, the

eastern industrial quarter of Paris, led by Pujol, carried on a furious struggle against the western quarter, led by Cavaignac, who had been appointed dictator. Vanquished and decimated, first by fighting and afterwards by deportation, the socialist party was crushed. But they dragged down the Republic in their ruin. This had already become unpopular with the peasants, exasperated by the new land tax of 45 centimes imposed in order to fill the empty treasury, and with the bourgeois, in terror of the power of the revolutionary clubs and hard hit by the stagnation of business. By the " massacres " of the June Days the working classes were also alienated from it; and abiding fear of the " Reds " did the rest. " France," wrote the duke of Wellington at this time, " needs a Napoleon! I cannot yet see him . . . Where is he ? " :

France indeed needed, or thought she needed, a Napoleon; and the demand was soon to be supplied. The granting of universal suffrage to a society with Imperialist stitutlon" sympathies, and unfitted to reconcile the principles of 1848. of order with the consequences of liberty, was indeed bound, now that the political balance in France was so radically changed, to prove a formidable instrument of reaction; and this was proved by the election of the president of the Republic. On the 4th of November 1 848 was promulgated the new constitution, obviously the work of inexperienced hands, proclaiming a democratic republic, direct universal suffrage and the separation of powers; there was to be a single permanent assembly of 750 members elected for a term of three years by the scrutin de liste, which was to vote on the laws prepared by a council of state elected by the Assembly for six years; the executive power was delegated to a president elected for four years by direct universal suffrage, i.e. on a broader basis than that of the chamber, and not eligible for re-election; he was to choose his ministers, who, like him, would be responsible. Finally, all revision was made impossible since it involved obtaining three times in succession a majority of three-quarters of the deputies in a special assembly. It was in vain that M. Grevy, in the name of those who perceived the obvious and inevitable risk of creating, under the name of a president, a monarch and more than a king, proposed that the head of the state should be no more than a

removable president of the ministerial council. Lamartine, thinking that he was sure to be the choice of the electors under universal suffrage, won over the support of the Chamber, which did not even take the pre- caution of rendering ineligible the members of families which had reigned over France. It made the presidency an office dependent upon popular acclamation.

The election was keenly contested; the socialists adopted as their candidate Ledru-Rollin, the republicans Cavaignac; and the recently reorganized Imperialist party Prince Napoleon. Bonaparte. Louis Napoleon, unknown in 1835, and forgotten or despised since 1840, had in the last eight years advanced sufficiently in the public estimation to be elected to the Constituent Assembly in 1848 by five departments. He owed this rapid increase of popularity partly to blunders of the government of July, which had unwisely aroused the memory of the country, filled as it was with recollections of the Empire, and partly to Louis Napoleon's campaign carried on from his prison at Ham by means of pamphlets of socialistic tendencies. Moreover, the monarchists, led by Thiers and the committee of the Rue de Poitiers, Were no longer content even with the safe dictatorship of the upright Cavaignac, and joined forces with the Bonapartists. On the 10th of December the peasants gave over 5,000,000 votes to a name: Napoleon, which stood for order at all costs, against 1 ,400,000 for Cavaignac. l T. T. de Martens, Recueil des traites, &c, xii. 248.

Assembly.

For threeyears there went on an indecisive struggle between the heterogeneous Assembly and the prince who was silently awaiting his opportunity. He chose as his ministers men but little inclined towards republicanism, for Bxpedi- preference Orleanists, the chief of whom was Odilon 'jgjj" Barrot. In order to strengthen his position, he endeavoured to conciliate the reactionary parties, without committing himself to any of them. The chief instance of this was the expedition to Rome, voted by the Catholics with the object of restoring the papacy, which had been driven out by Garibaldi and Mazzini. The prince-president was also in favour of it, as beginning the work of European renovation and recon- struction which he already looked upon as his mission. General Oudinot's entry into Rome provoked in Paris a foolish insurrec- tion in favour of the Roman republic, that of the Chateau d'Eau, which was crushed on the 13th of June 1849. On the other hand, when Pius IX., though only just restored, began to yield to the general movement of reaction, the president demanded that he should set up a Liberal government. The pope's dilatory reply having been accepted by his ministry, the president replaced it on the 1st of November by the Fould-Rouher cabinet.

This looked like a declaration of war against the Catholic and monarchist

majority in the Legislative Assembly which had been elected on the 28th of May in a moment of panic. But the prince-president again pretended to be TheLegia- playing the game of the Orleanists, as he had done 'fj™ m in the case of the Constituent- Assembly. The comple- mentary elections of March and April 1850 having resulted in an unexpected victory for the advanced republicans, which struck terror into the reactionary leaders, Thiers, Berryer and Monta- lembert, the president gave his countenance to a clerical campaign against the republicans at home. The Church, which had failed in its attempts to gain control of the university under Louis XVIII. and Charles X., aimed at setting up a rival establishment of its own. The Loi Falloux- of the 1 5th of March 1850, under the pretext of establishing the liberty p^l ux ,. of instruction promised by the charter, again placed the teaching of the university under the direction of the Catholic Church, as a measure of social safety, and, by the facilities which it granted to the Church for propagating teaching in harmony with its own dogmas, succeeded in obstructing for half a century the work of intellectual enfranchisement effected by the men of the 18th century and of the Revolution. The electoral law of the 31st of May was another class law directed against subversive ideas. It required as a proof of Electoral three years' domicile the entries in the record of direct taxes, thus cutting down universal suffrage by taking away the vote from the industrial population, which was not as a rule stationary. The law of the 16th of July aggravated the severity of the press restrictions by re-establishing the " caution money " (cautionnement) deposited by proprietors and editors of papers with the government as a guarantee of good behaviour. Finally, a skilful interpretation of the law on clubs and political societies suppressed about this time all the Republican societies. It was now their turn to be crushed like the socialists.

*But the president had only joined in Montalembert's cry of "Down with the Republicans!" in the hope of effecting a revision 6f the constitution without having recourse to a coup d'etat. His concessions only increased the feiwa boldness of the monarchists; while they had only thePresl- accepted Louis Napoleon as president in opposition dent and to the Republic and as a step, in the direction of the *? e .. monarchy. A conflict was now inevitable between SSem his personal policy and the majority of the Chamber, who were-, moreover, divided into legitimists and Orleanists, in spite of the death of Louis Philippe in August 1 8 56. Louis Napoleon skilfully exploited their projects for a restoration of the monarchy, which he knew to be unpopular in the country, and which gave him the opportunity of furthering his own personal ambitions. From the 8th of August to the 12th of November 1S50 he went about France stating the case for a revision of the constitution in speeches which he varied according to each place; he held*

law ot May 31.

HISTORY]

FRANCE

869

reviews, at which cries of ” Vive Napolion ” showed that the army was with him; he superseded General Changarnier, on whose arms the parliament relied for the projected monarchical coup d’etat; he replaced his Orleanist ministry by obscure men devoted to his own cause, such as Morny, Fleury and Persigny, and gathered round him officers of the African army, broken men like General Saint- Arnaud; in fact he practically declared open war.

*His reply to the votes of censure passed by the Assembly, and their refusal to increase his civil list, was to hint at a vast com- munistic plot in order to scare the bourgeoisie, and to denounce Coup tne e l ec t ora l * aw OI the 3 1st of May in order to gain the*

d’Etat of support of the mass of the people. The Assembly re- Dec2, taliated by throwing out the proposal for a partial ‘ ‘ reform of that article of the constitution which pro-

hibited the re-election of the president and the re-establish- ment of universal suffrage (July). All hope of a peaceful issue was at an end. When the questors called upon the Chamber to have posted up in all barracks the decree of the 6th of May 1848 concerning the right of the Assembly to demand the support of the troops if attacked, the Mountain, dreading a restoration of the monarchy, voted with the Bonapartists against the measure, thus disarming the legislative power. Louis Napoleon saw his opportunity. On the night between the 1st and 2nd of December 1S51, the anniversary of Austerlitz, he dissolved the Chamber, re-established universal suffrage, had all the party leaders arrested, and summoned a new assembly to prolong his term of office for ten years. The deputies who had met under Berry er at the Mairie of the tenth arrondissement to defend the constitution and proclaim the deposition of Louis Napoleon were scattered by the troops at Mazas and Mont Valerian. The resistance organized by the republicans within Paris under Victor Hugo was soon subdued by the intoxicated soldiers. The more serious resistance in the departments was crushed by declaring a state of siege and by the ” mixed commissions.” The plebiscite of the 20th of December ratified by a huge majority the coup d’ Stat in favour of the prince-president, who alone reaped the benefit of the excesses ■of the Republicans and the reactionary passions of the monarchists.

*The second attempt to revive the principle of 1789 only served as a preface to the restoration of the Empire. The new anti- parliamentary constitution of the 14th of January I*f . 1852 was to a large extent merely a repetition of that Empire. of the year VIII. All executive power was entrusted to the head of the state, who was solely responsible to the people, now powerless to exercise any of their rights. He was to nominate the members of the council of state, whose duty it was to prepare the laws, and of the senate, a body permanently established as a constituent part of the empire. One innovation was made, namely, that the Legislative Body was elected by universal suffrage, but it had no right of initiative, all laws being proposed by the executive power. This new and violent political change was rapidly followed by the same consequence as had attended that of Brumaire. On the 2nd of December 1852, France, still under the effect of the Napoleonic virus, and the fear of anarchy, conferred almost unanimously by a plebiscite the supreme power, with the title of emperor, upon Napoleon III.*

But though the machinery of government was almost the same under the Second Empire as it had been under the First, the principles upon which its founder based it were different. The function of the Empire, as he loved to repeat, was to guide the people internally towards justice and externally towards perpetual peace. Holding his power by universal suffrage, and having frequently, from his prison or in exile, reproached former oligarchical governments with neglecting social questions, he set out to solve them by organizing a system of government based on the principles of the " Napoleonic Idea," i.e. of the emperor, the elect of the people as the representative of the democracy, and as such supreme; and of himself, the representative of the great Napoleon, " who had sprung armed from the Revolution like Minerva from the head of Jove," as the guardian of the

social gains of the revolutionary epoch. But he soon proved that social justice did not mean liberty; for he acted in such a way that those of the principles of 1848 which he had preserved became a mere sham. He proceeded to paralyze all those active national forces which tend to create the public spirit of a people, such as parliament, universal suffrage, the press, education and associations. The Legislative Body was not allowed either to elect its own president or to regulate its own procedure, or to propose a law or an amendment, or to vote on the budget in detail, or to make its deliberations public. It was a dumb parliament. Similarly, universal suffrage was supervised and controlled by means of official candidature, by forbidding free speech and action in electoral matters to the Opposition, and by a skilful ad- justment of the electoral districts in such a way as to overwhelm the Liberal vote in the mass of the rural population. The press was subjected to a system of cautionnements, i.e. " caution money," deposited as a guarantee of good behaviour, and avertissements, i.e. requests by the authorities to cease publication ■ of

certain articles, under pain of suspension or suppression; while books were subject to a censorship. France was like a sick- room, where nobody might speak aloud. In order to counteract the opposition of individuals, a surveillance of suspects was instituted. Orsini's attack on the emperor in 1858, though purely Italian in its motive, served as a pretext for increasing the severity of this regime by the law of general security {sureti ginerale) which authorized the internment, exile or deportation of any suspect without trial. In the same way public instruction was strictly supervised, the teaching of philosophy was sup- pressed in the Lycees, and the disciplinary powers of the adminis- tration were increased. In fact for seven years France had no political life. The Empire was carried on by a series of plebiscites. Up to 1857 the Opposition did not exist; from then till i860 it was reduced to five members: Darimon, Emile Ollivier, Henon, J. Favre and E. Picard. The royalists waited inactive after the new and unsuccessful attempt made at Frohsdorf in 1853, by a combination of the legitimists and Orleanists, to re-create a living monarchy out of the ruin of two royal families. Thus the events of that ominous night in December were closing the future to the new generations as well as to those who had grown up during forty years of liberty.

But it was not enough to abolish liberty by conjuring up the spectre of demagogy. It had to be forgotten, the great silence had to be covered by the noise of festivities and material Materlat enjoyment, the imagination of the French people had prosperity to be distracted from public affairs by the taste for aeon- work, the love of gain, the passion for good living. d J tlon ? t The success of the imperial despotism, as of any other, espo was bound up with that material prosperity which would make all interests dread the thought of revolution. Napoleon III., therefore, looked for support to the clergy, the great financiers, industrial magnates and landed proprietors. He revived on his own account the " Let us grow rich " of 1840. Under the influence of the Saint-Simonians and men of business great credit establishments were instituted and vast public works entered upon: the Credit foncier de France, the Credit mobilier, the conversion of the railways into six great companies between 1852 and 1857. The rage for speculation was increased by the inflow of Californian and Australian gold, and consumption was facilitated by a general fall in prices between 1856 and i860, due to an economic revolution which was soon to overthrow the tariff wall, as it had done already in England. Thus French activity flourished exceedingly between 1852 and 1857, and was merely temporarily checked by the crisis of 1857. The universal Exhibition of 1855 was its culminating point. Art felt the effects of this increase of comfort and luxury. The great en- thusiasms of the romantic period were over; philosophy became sceptical and literature merely amusing. The festivities of the court at Compiegne set the fashion for the bourgeoisie, satisfied with this energetic

government which kept such good guard over their bank balances.

If the Empire was strong, the emperor was weak. At once headstrong and a dreamer, he was full of rash plans, but irresolute

in carrying them out. An absolute despot, he remained what his life had made him, a conspirator through the very mysticism of his mental habit, and a revolutionary by reason of his demagogic imperialism and his democratic chauvinism. In his rfbpoteoa p m ; on tne artificial work of the congress of Vienna, Ueas. involving the downfall of his own family and of

France, ought to be destroyed, and Europe organized as a collection of great industrial states, united by community- of interests and bound together by commercial treaties, and expressing this unity by periodical congresses presided over by himself, and by universal exhibitions. In this way he would reconcile the revolutionary principle of the supremacy of the people with historical tradition, a thing which neither the Restoration nor the July monarchy nor the Republic of 1848 had been able to achieve. Universal suffrage, the organization of Rumanian, Italian and German nationality, and commercial liberty; this was to be the work of the Revolution. But the , creation of great states side by side with France brought with it the necessity for looking for territorial compensation elsewhere, and consequently for violating the principle of nationality and abjuring his system of economic peace. Napoleon III.'s foreign policy was as contradictory as his policy in home affairs, " L'Empire, c'est la paix," was his cry; and he proceeded to make war.*

So long as his power was not yet established, Napoleon III. made especial efforts to reassure European opinion, which had

been made uneasy by his previous protestations Crimean a 8 amst tne treaties of 1815. The Crimean War, in War. which, supported by England and the king of Sardinia,

he upheld against Russia the policy of the integrity of the Turkish empire, a policy traditional in France since Francis I., won him the adherence both of the old parties and and the Liberals. And this war was the prototype of all the rest. It was entered upon with no clearly defined military purpose, and continued in a hesitating way. This was the cause, after the victory of the allies at the Alma (September 14, 1854), of the long and costly siege of

Sevastopol (September 8, 1855). Napoleon III., whose joy was at its height owing to the signature of a peace which excluded Russia from the Black Sea, and to the birth of the prince imperial, which ensured the continuation of his dynasty, thought that the time had arrived to make a beginning in applying his system. Count Walewski, his minister for foreign affairs, gave a sudden and unexpected extension of scope to the deliberations of the congress which met at Paris in 1856 by inviting the plenipotentiaries to consider the questions of Greece, Rome, Naples, &c. This motion contained the principle of all the upheavals which were to effect such changes in Europe between 1859 and 1871. It was Cavour and Piedmont who immediately benefited by it, for thanks to Napoleon III. they were able to lay the Italian question before an assembly of diplomatic Europe.

It was not Orsini's attack on the 14th of January 1858 which brought this question before Napoleon. It had never ceased to

occupy him since he had taken part in the patriotic in Italy. conspiracies in Italy in his youth. The triumph of his

armies in the East now gave him the power necessary to accomplish this mission upon which he had set his heart. The suppression of public opinion made it impossible for him to be enlightened as to the conflict between the interests of the country and his own generous visions. The sympathy of all Europe was with Italy, torn for centuries past between so many masters; under Alexander II. Russia, won over since the interview of Stuttgart by the emperor's generosity rather than conquered by armed force, offered no opposition to this act of justice; while England applauded it from the first. The emperor, divided between the empress Eugenie, who as a Spaniard and a devout Catholic was hostile to anything which might threaten the papacy, and Prince Napoleon, who as brother-in-law of Victor Emmanuel favoured the cause of Piedmont, hoped to conciliate both sides by setting up an Italian federation, intending to reserve the presidency of it to Pope Pius IX., as a mark of respect to the moral authority of the Church. Moreover, the

very difficulty of the undertaking appealed to the emperor, elated by his recent success in the Crimea. At the secret meeting between Napoleon and Count Cavour (July 20, 1858) the eventual armed intervention of France, demanded by Orsini before he mounted the scaffold, was definitely promised.

*The ill-advised Austrian ultimatum demanding the immediate cessation of Piedmont's preparations for war precipitated the Italian expedition. On the 3rd of May 1859 Napoleon declared his intention of making Italy " free from the ˆyftf" 1 * Alps to the Adriatic." As he had done four years ago, franca. he plunged into the war with no settled scheme and without*

preparation; he held out great hopes, but without reckoning what efforts would be necessary to realize them. Two months later, in spite of the victories of Montebello, Magenta and Solferino, he suddenly broke off, and signed the patched-up peace of Villafranca with Francis Joseph (July 9) . Austria ceded Lombardy to Napoleon III., who in turn ceded it to Victor Emmanuel; Modena and Tuscany were restored to their respective dukes, the Romagna to the pope, now president of an Italian federation. The mountain had brought forth a mouse.

The reasons for this breakdown on the part of the emperor in the midst of his apparent triumph were many. Neither Magenta nor Solferino had been decisive battles. Further, his idea of a federation was menaced by the 7, .. revolutionary movement which seemed likely to drive problem. out all the princes of central Italy, and to involve him in an unwelcome dispute with the French clerical party. More- over, he had forgotten to reckon with the Germanic Confedera- tion, which was bound to come to the assistance of Austria. The mobilization of Prussia on the Rhine, combined with military difficulties and the risk of a defeat in Venetian territory, rather damped his enthusiasm, and decided him to put an end to the war. The armistice fell upon the Italians as a bolt from the blue, convincing them that they had been betrayed; on all sides despair drove them to sacrifice their jealously guarded inde- pendence to national unity. On the one hand the Catholics were agitating throughout all Europe to obtain the independence of the papal territory; and the French republicans were pro- testing, on the other hand, against the abandonment of those revolutionary traditions, the revival of which they had hailed so enthusiastically. The emperor, unprepared for the turn which events had taken, attempted to disentangle this confusion by suggesting a fresh congress of the Powers, which should reconcile dynastic interests with those of the people. After a while he gave up the attempt and resigned himself to the position, his actions having had more wide-reaching results than he had wished. The treaty of Zurich proclaimed the fallacious principle of non- intervention (November 10, 1859); and then, by the treaty of Turin of the 24th of May i860, Napoleon threw over his ill- timed confederation. He conciliated the mistrust of Great Britain by replacing Walewski, who was hostile to his policy, by Thouvenel, an anti-clerical and a supporter of the English alliance, and he counterbalanced the increase of the new Italian kingdom by the acquisition of Nice and Savoy. Napoleon, like all French governments, only succeeded in finding a provisional solution for the Italian problem.

But this solution would only hold good so long as the emperor was in a powerful position. Now this Italian war, in which he had given his support to revolution beyond the Alps, and, c . . .. though unintentionally, compromised the temporal and pro- power of the popes, had given great offence to the tectionist Catholics, to whose support the establishment of the

˚PP˚ s,m Empire was largely due. A keen Catholic opposition sprang up, voiced in L. Veuillot's paper the Univers, and was not silenced even by the Syrian expedition (i860) in favour of the Catholic Maronites, who were being persecuted by the Druses. On the other hand, the commercial treaty with Great Britain which was signed in January i860, and which ratified the free- trade policy of Richard Cobden and Michael Chevalier, had brought upon French industry the sudden shock of foreign competition. Thus both Catholics and protectionists made the discovery that absolutism may be an excellent thing when it

serves their ambitions or interests, but a bad thing when it is exercised at their expense. But Napoleon, in order to restore the prestige of the Empire before the newly-awakened hostility of public opinion, tried to gain from the Left the support which he had lost from the Right. After the return from Italy the general amnesty of the 16th of August 1859 had marked the evolution of the absolutist empire towards the liberal, and later parliamentary empire, which was to last for ten years.

Napoleon began by removing the gag which was keeping the country in silence. On the 24th of November i860," by a coup d'Uat matured during his solitary meditations," Lib al ˆe a cons Pi ra tor in his love of hiding his mysterious Empire. thoughts even from his ministers, he granted to the Chambers the right to vote an address annually in answer to the speech from the throne, and to the press the right of reporting parliamentary debates. He counted on the latter concession to hold in check the growing Catholic opposition, which was becoming more and more alarmed by the policy of laissez faire practised by the emperor in Italy. But the government majority already showed some signs of independence. The right of voting on the budget by sections, granted by the emperor in 1 86 1, was a new weapon given to his adversaries. Everything conspired in their favour : the anxiety of those candid friends who were calling attention to the defective budget; the com- mercial crisis, aggravated by the American Civil War; and above all, the restless spirit of the emperor, who had annoyed his opponents in i860 by insisting on an alliance with Great Britain in order forcibly to open the Chinese ports for trade, in 1863 by his ill-fated attempt to put down a republic and set up a Latin empire in Mexico in favour of the archdukeMaximilian of Austria, and from 1861 to 1863 by embarking on colonizing experiments in Cochin China and Annam.

The same inconsistencies occurred in the emperor's European politics. The support which he had given to the Italian cause The had aroused the eager hopes of other nations. The

policy of proclamation of the kingdom of Italy on the 18th of national- February 1861 after the rapid annexation of Tuscany ,sm ' and the kingdom of Naples had proved the danger

of half measures. But when a concession, however narrow, had been made to the liberty of one nation, it could hardly be refused to the no less legitimate aspirations of the rest. In 1863 these " new rights " again clamoured loudly for recogni tion, in Poland, in Schleswig and Holstein, in Italy, now indeed united, but with neither frontiers nor capital, and in the Danubian principalities. In order to extricate himself from the Polish impasse, the emperor again had recourse to his expedient — ■ always fruitless because always inopportune — of a congress. He was again unsuccessful : England refused even to admit the principle of a congress, while Austria, Prussia and Russia gave their adhesion only on conditions which rendered it futile, i.e. they reserved the vital questions of Venetia and Poland.

Thus Napoleqfi had yet again to disappoint the hopes of Italy, let Poland be crushed, and Germany triumph over Denmark in the Schleswig-Holstein question. These inconsistencies resulted in a combination of the opposition parties, Catholic, Liberal and Republican, in the Union liberalc. The elections of May- June 1863 gained the Opposition forty seats and a leader, Thiers, who at once urgently gave voice to its demand for " the necessary liberties."

*It would have been difficult for the emperor to mistake the importance of this manifestation of French opinion, and in view The °^ n * s international failures, impossible to repress it.*

regime of The sacrifice of Persigny, minister of the interior, conces- w ho was responsible for the elections, the substitution sions. £ or tne m j n ; sters without portfolio of a sort of presidency

of the council filled by Rouher, the " Vice-Emperor," and the nomination of V. Duruy, an anti-clerical, as minister of public instruction, in reply to those attacks of the Church which were to culminate in the Syllabus of 1864, all indicated a distinct rapprochement between the emperor and the Left. But though the opposition represented by Thiers was rather constitutional than dynastic, there was another and irreconcilable opposition,

that of the amnestied or voluntarily exiled republicans, of whom Victor Hugo was the eloquent mouthpiece. Thus those who had formerly constituted the governing classes were again showing signs of their ambition to govern. There appeared to be some risk that this movement among the bourgeoisie might spread to the people. As Antaeus recruited his strength by touching the earth Napoleon believed that he would consolidate his menaced power by again turning to the labouring masses, by whom that power had been established.

This industrial policy he embarked upon as much from motives of interest as from sympathy, out of opposition to the bourgeoisie, which was ambitious of governing or desirous of his i adu strltil overthrow. His course was all the easier, since he had policy only to exploit the prejudices of the working classes, of the They had never forgotten the loiChapelle of 1701, which Empire. by forbidding all combinations among the workmen had placed them at the mercy of their employers, nor had they forgotten how the limited suffrage had conferred upon capital a political monopoly which had put it out of reach of the law, nor how each time they had left their position of rigid isolation in order to save the Charter or universal suffrage, the triumphant bourgeoisie had repaid them at the last with neglect. The silence of public opinion under the Empire and the prosperous state of business had completed the separation of the labour party from the political parties. The visit of an elected and paid labour delega- tion to the Universal Exhibition of 1862 in London gave the emperor an opportunity for re-establishing relations with that party, and these relations were to his mind all the more profitable, since the labour party, by refusing to associate their social and industrial claims with the political ambitions of the bourgeoisie, maintained a neutral attitude between the parties, and could, if necessary, divide them, while by its keen criticism of society it aroused the conservative instincts of the bourgeoisie and con- sequently checked their enthusiasm for liberty. A law of the 23rd of May 1863 gave the workmen the right, as in England, to save money by creating co-operative societies. Another law, of the 25th of May 1864, gave them the right to enforce better conditions of labour by organizing strikes. Still further, the emperor permitted the workmen to imitate their employers by establishing unions for the permanent protection of their interests. And finally, when the ouvriers, with the characteristic French tendency to insist on the universal application of a theory, wished to substitute for the narrow utilitarianism of the English trade- unions the ideas common to the wage-earning classes of the whole world, he put no obstacles in the way of their leader M. Tolain's plan for founding an International Association of Workers (SocigtS Internationale des Travailleurs),. At the same time he encouraged the provision made by employers for thrift and relief and for improving the condition of the working- classes.

Thus assured of support, the emperor, through the mouth- piece of M. Rouher, who was a supporter of the absolutist regime. was able to refuse all fresh claims on the part of the Liberals. He was aided by the cessation of the in- faioT" dustrial crisis as the American civil war came to an end, by the apparent closing of the Roman question by the con- vention of the 1 5th of September, which guaranteed to the papal states the protection of Italy, and finally by the treaty of the 3ot h of October 1864, which temporarily put an end to the crisis of the Schleswig-Holstein question. But after 1865 the momentary agreement which had united Austria and Prussia for the purpose of administering the conquered duchies gave place to a silent antipathy which foreboded a rupture. Yet, though the Austro- Prussian War of 1866 was not unexpected, its rapid termination and fateful outcome came as a severe and sudden shock to France. Napoleon had hoped to gain fresh prestige for his throne and new influence for France by an intervention at the proper moment between combatants equally matched and mutually exhausted. His calculations were upset and his hopes dashed by the battle of Sadowa (Koniggratz) on the 4th of July. The treaty of Prague put an end to the secular rivalry of Habsburg and Hohen- zollcrn for the hegemony of Germany, which had been France's

opportunity; and Prussia could afford to humour the just claims of Napoleon by establishing between her North German Con- federation and the South German states the illusory frontier of the Main. The belated efforts of the French emperor to obtain " compensation " on the left bank of the Rhine, at the expense of the Soutn German states, made matters worse. France realized with an angry surprise that on her eastern frontier had arisen a military power by which her influence, if not her existence, was threatened; that in the name of the principle of nationality unwilling populations had been brought under the sway of a dynasty by tradition militant and aggressive, by tradition the enemy of France; that this new and threatening power had destroyed French influence in Italy, which owed the acquisition of Venetia to a Prussian alliance and to Prussian arms; and that all this had been due to Napoleon, outwitted and out- manoeuvred at every turn, since his first interview with Bis- marck at Biarritz in October 1865.

All confidence in the excellence of imperial regime vanished at once. Thiers and Jules Fa vre as representatives of the Opposition denounced in the Legislative Body the maces- blunders of 1866. Emile Ollivier split up the

*official sionsof majority by the amendment of the 45, and gave it to Napoleon ˆ e understood that a reconciliation with the Empire would be impossible until the emperor would grant entire liberty. The recall of the French troops from Rome, in accordance with the convention of 1864, also led to further attacks by the Ultramontane party, who were alarmed for the s . papacy. Napoleon III. felt the necessity for developing between "the great act of i860 " by the decree of the 19th of ollivier January 1867. In spite of Rouher, by a secret agree- *'"'. ment with Ollivier the right of interpellation was*

" " restored to the Chambers. Reforms in press supervision and the right of holding meetings were promised. It was in vain that M. Rouher tried to meet the Liberal opposition by organizing a party for the defence of the Empire, the "Union dynastique." But the rapid succession of international reverses prevented him from effecting anything.

The year 1867 was particularly disastrous for the Empire. In Mexico " the greatest idea of the reign " ended in a humiliating withdrawal before the ultimatum of the United States, lS6T. e while Italy, relying on her new alliance with Prussia and already forgetful of her promises, was mobilizing the revolutionary forces to complete her unity by conquering Rome. The chassepots of Mentana were needed to check the Garibaldians. And when the imperial diplomacy made a belated attempt to obtain from the victorious Bismarck those territorial compensations on the Rhine, in Belgium and in Luxemburg, which it ought to have been possible to exact from him earlier at Biarritz, Benedetti added to the mistake of asking at the wrong time the humiliation of obtaining nothing (see Luxemburg). Napoleon did not dare to take courage and confess his weakness. And finally was seen the strange contrast of France, though reduced to such a state of real weakness, courting the mockery of Europe by a display of the external magnificence which concealed her decline. In the Paris transformed by Baron Haussmann and now become almost exclusively a city of pleasure and frivolity, the opening of the Universal Exhibition was marked by Berezowski's attack on the tsar Alexander II., and its success was clouded by the tragic fate of the unhappy emperor Maximilian of Mexico. Well might Thiers exclaim, " There are no blunders left for us to make."

But the emperor managed to commit still more, of which the consequences both for his dynasty and for France were irrepar- able. Old, infirm and embittered, continually keeping his ministers in suspense by the uncertainty and secrecy of his plans, surrounded by a people now bent almost entirely on pleasure, and urged on by a growing opposition, there now remained but two courses open to Napoleon III.: either to arrange a peace which should last, or to prepare for a decisive war. He allowed himself to drift in the direction of war, but without bringing things to a necessary state of

*preparation. It was in vain that Count Beust revived on be*half of the Austrian*

Peace or war.

government the project abandoned by Napoleon since 1866 of a settlement on the basis of the status quo with reciprocal dis- armament. Napoleon refused, on hearing from Colonel Stoffel, his military attache at Berlin, that Prussia would not agree to disarmament. But he was more anxious than he was willing to show. A reconstitution of the military organization seemed to him to be necessary. This Marshal Niel was unable to obtain either from the Bonapartist Opposition, who feared the electors, in whom the old patriotism had given place to the commercial or cosmopolitan spirit, or from the Republican opposition, who were unwilling to strengthen the despotism. Both of them were blinded by party interest to the danger from outside. '

The emperor's good fortune had departed; he was abandoned by men and disappointed by events. He had vainly hoped that, though by the laws of May-June 1868, granting the Actioa freedom of the press and authorizing meetings, he had of the conceded the right of speech, he would retain the right of revqiw action ; but he had played into the hands of his enemies. 0Ba " es – Victor Hugo's Chdtiments, the insults of Rochefort's Lanterne, the subscription for the monument to Baudin, the deputy killed at the barricades in 185 1, followed by Gambetta's terrible speech against the Empire on the occasion of the trial of Deles- cluze, soon showed that the republican party was irreconcilable, \ and bent on the Republic. On the other hand, the Ultramontane party were becoming more and more discontented, while the industries formerly protected were equally dissatisfied with the free-trade reform. Worsestill,the working classes had abandoned their political neutrality, which had brought them nothing but unpopularity, and gone over to the enemy. Despising Proudhon's impassioned attacks' on the slavery of communism, they had gradually been won over by the collectivist theories of Karl Marx or the revolutionary theories of Bakounine, as set forth at the congresses' of the International. At these Labour con- gresses, the fame of which was only increased by the fact that they were forbidden, it'had been affirmed that the social emanci- pation of the worker was inseparable from his political emancipa- tion. Henceforth the union between the internationalists and the republican bodrgeois was an accomplished fact. The Empire, taken by surprise, sought to curb both the middle classes and the labouring classes, and forced them both into revolutionary actions. On every side took place strikes, forming as it Were a review of the effective forces of the Revolution.

The elections of May 1869, made during these disturbances, inflicted upon

the Empire a serious moraldefeat. In spite of the revival by the government of the cry of the red Tne terror, Ollivier, the advocate of conciliation, was pariia- rejected by Paris, while 40 irreconcilables and 116 mentary members of the Third Party were elected. Concessions Bm P tt ‘ e – had to be made to these, so by the senatus-Consulte of the 8th of September 1869 a parliamentary monarchy was substituted for personal government. On the 2nd of January 1870 Ollivier was placed at the head of the first homogeneous, united and responsible ministry. But the republican party, unlike the country, which hailed this reconciliation of liberty and order, refused to be content with the liberties they had won; they refused all compromise, declaring themselves more than ever decided upon the overthrow of the Empire. The murder of the journalist Victor Noir by Pierre Bonaparte, a member of the imperial family, gave the revolutionaries their long desired opportunity (January 10). But the entente ended in a failure,, and the emperor was able to answer the personal threats against him by the overwhelming victory of the plebiscite of the 8th of May 1870.

But this success, which should have consolidated the Empire, determined its downfall. It was thought that a diplomatic success should complete it, and make the’ country Tne forget liberty for glory. It was in vain that after the Franco- parliamentary revolution of the 2nd of January that German prudent statesman Comte Daru revived, through war ‘ Lord Clarendon, Count Beust’s plan of disarmament after Sadowa. He met with a refusal from Prussia and from the imperial entourage. The Empress Eugenie was credited with

the remark, ” If there is no war, my son will never be emperor.” The desired pretext was offered on the 3rd of July 1870 by the – b candidature of a Hohenzollern prince for the throne

Hoheo- of Spain. To the French people it seemed that Prussia, zoltern barely mistress of Germany, was reviving against candl- France the traditional policy of the Habsburgs. France, having rejected for dynastic reasons the candidature of a Frenchman, the due de Montpensier, saw herself threatened with a German prince. Never had the emperor, now both physically and morally ill, greater need of the counsels of a clear-headed statesman and the support of an enlightened public opinion if he was to defeat the statecraft of Bismarck. But he could find neither.

Ollivier's Liberal ministry, wishing to show itself as jealous for national interests as any absolutist ministry, bent upon The doing something great, and swept away by the force

deciara- of that opinion which it had itself set free, at once Hon of accepted the war as inevitable, and prepared for it war ' with a light heart. In face of the decided declaration

of the due de Gramont, the minister for foreign affairs, before the Legislative Body of the 6th of July, Europe, in alarm, supported the efforts of French diplomacy and obtained the withdrawal of the Hohenzollern candidature. This did not suit the views either of the war party in Paris or of Bismarck, who wanted the other side to declare war. The ill-advised action of Gramont in demanding from King William one of those promises for the future which are humiliating but never binding, gave Bismarck his opportunity, and the king's refusal was transformed by him into an insult by the " editing " of the Ems telegram. The chamber, in spite of the desperate efforts of Thiers and Gambetta, now voted by 246 votes to 10 in favour of the war.

France found herself isolated, as much through the duplicity of Napoleon as through that of Bismarck. The disclosure to the diets of Munich and Stuttgart of the written text of isolated. tne c lai ms laid by Napoleon on the territories of Hesse and Bavaria had since the 22nd of August 1866 estranged southern Germany from France, and disposed the southern states to sign the military convention with Prussia. Owing to a similar series of blunders, the rest of Europe had become hostile. Russia, which it had been Bismarck's study both during and after the Polish insurrection of 1863 to draw closer to Prussia, learnt with annoyance, by the same indiscretion, how Napoleon was keeping his promises made at Stuttgart. The hope of gaining a revenge in the East for her defeat of 1856 while France was in difficulties made her decide on a benevolent neutrality. The disclosure of Benedetti's designs of 1867 on Belgium and Luxemburg equally ensured an unfriendly neutrality on the part of Great Britain. The emperor counted at least on the alliance of Austria and Italy, for which he had been negotiating since the Salzburg interview (August 1867). But Austria, having suffered at his hands in 1850 and 1866, was not ready and asked for a delay before joining in the war; while the hesitating friendships of Italy could only be won by the evacuation of Rome. The chassepots of Mentana, Rouher's " Never," and the hostility of the Catholic empress to any secret article which should open to Italy the gates of the capital, deprived France of her last friend.

Marshal Leboeuf's armies were no more effective than Gramont's alliances. The incapacity of the higher officers of the French army, the lack of

*preparation for war at f?*fl th headquarters, the selfishness and shirking of responsi- Empire. * bility on the part of the field officers, the absence of any fixed plan when failure to mobilize had destroyed all chance of the strong offensive which had been counted on, and the folly of depending on chance, as the emperor had so often*

*. * In the 14th volume of his L'Empire liberal (1909) M. fimile Ollivier gives a detailed and illuminating account of the events that led up to the war. He indignantly denies that he ever said that he contemplated it " with a light heart," and says that he disapproved of Gramont's demand for " guarantees," to which he was not privy. His object is to prove that France was entrapped by Bismarck into a position in which she was bound in honour to declare war. (Ed.)*

done successfully, instead of scientific warfare, were all plainly to be seen as early as the insignificant engagement of Saarbrucken. Thus the French army proceeded by diastrous stages from Weissenburg, Forbach, Froeschweiler, Borny, Gravelotte, Noisse- ville and Saint-Privat to the siege of Metz and the slaughter at Illy. By the capitulation of Sedan the Empire lost its only support, the army, and fell. Paris was left unprotected and emptied of troops, with only a woman at the Tuileries, a terrified Assembly at the Palais-Bourbon, a ministry, that of Palikao, without authority, and leaders of the Opposition who fled as the catastrophe approached. (P. W.)

The Third Republic 1870-1909

The Third Republic may be said to date from the revolution of the 4th of September 1870, when the republican deputies of Paris at the hotel de ville constituted a provisional g orera . government under the presidency of General Trochu, mental military governor of the capital. The Empire had National fallen, and the emperor was a prisoner in Germany. 'Jmo'"' As, however, since the great Revolution regimes in France have been only passing expedients, not inextricably associated with the destinies' of the people, but bound to disappear when accounted responsible for national disaster, the surrender of Louis Napoleon's sword to William of Prussia did not disarm the country. Hostilities were therefore continued; The pro- visional government had to assume the part of a Committee of National Defence, and while insurrection was threatening in Paris, it had, in the face of the invading Germans, to send a delegation to Tours to maintain the relations of France with the outside world. Paris was invested, and for five months endured siege, bombardment and famine. Before the end of October the capitulation of Metz, by the treason of Marshal Bazaine, deprived France of the last relic of its regular army. With indomitable courage the garrison of Paris made useless sorties, while an army of irregular troops vainly essayed to resist the invader, who had reached the valley of the*

Loire. The acting Government of National Defence, thus driven from Tours, took refuge at Bordeaux, where it awaited the capitulation of Paris, which took place on the 29th of January 1871. The same day the preliminaries of peace were signed at Versailles, which, confirmed by the treaty of Frankfort of the 10th of May, trans- ferred from France to Germany the whole of Alsace, excepting Belfort, and a large portion of Lorraine, including Metz, with a money indemnity of two hundred millions sterling.

On the 13th of February 1871 the National Assembly, elected after the capitulation of Paris, met at Bordeaux and assumed the powers hitherto exercised by the Government of p oua a a – National Defence. Since the meeting of the states- tion of the general in 1789 no representative body in France had Third ever contained so many men of distinction. Elected fi p " t to conclude a peace, the great majority of its members were monarchists, Gambetta, the rising hope of the republicans, having discredited his party in the eyes of the weary population by his efforts to carry on the war. The Assembly might thus have there and then restored the monarchy had not the monarchists been divided among themselves as royalist supporters of the comte de Chambord, grandson of Charles X., and as Orleanists favouring the claims of the comte de Paris, grandson of Louis Philippe. The majority being unable to unite on the essential point of the choice of a sovereign, decided to allow the Republic, declared on the morrow of Sedan, to liquidate the disastrous situation. Consequently, on the 17th of February the National Assembly elected Thiers as " Chief of the Executive Power of the French Republic," the abolition of the Empire being formally voted a fortnight later. The old minister of Louis Philippe, who had led the opposition to the Empire, and had been the chief opponent of the war, was further marked out for the position conferred on him by his election to the Assembly in twenty-six departments in recognition of his tour through Europe after the first defeats, undertaken in the patriotic hope of obtaining the intervention of the Powers on behalf of France. Thiers composed a ministry, and announced that the first duty of the government

before examining constitutional questions, would be to reorganize the forces of the nation in order to provide for the enormous war indemnity which had to be paid to Germany before the territory could be liberated from the presence of the invader. The tacit acceptance of this arrangement by all parties was known as the " pacte de Bordeaux." Apart from the pressure of patriotic con- siderations, it pleased the republican minority to

have the govern- ment of France officially proclaimed a Republic, while the monarchists thought that pending their choice Of a monarch it might popularize their cause not to have it associated with the imposition of the burden of war taxation. From this for- tuitous and informal transaction, accepted by a monarchical Assembly, sprang the Third Republic, the most durable regime established in France since the ancient monarchy disappeared in 1792.

The Germans marched down the Champs Elysees on the 1st of March 1871, and occupied Paris for forty-eight hours.

The National Assembly then decided to remove its Commune, sittings to Versailles; but two days before its arrival

at the palace, where the king of Prussia had just been proclaimed German emperor, an insurrection broke out in Paris. The revolutionary element, which had been foremost in pro- claiming the Republic on the 4th of September, had shown signs of disaffection during the siege. On the conclusion of the peace the triumphal entry of the German troops, the threatened disbanding of the national guard by an Assembly known to be anti-republican, and the resumption of orderly civic existence after the agitated life of a suffering population isolated by siege, had excited the nerves of the Parisians, always prone to revolution. The Commune was proclaimed on the 18th of March, and Paris was declared to be a free town, which recognized no government but that chosen by the people within its walls, the communard theory being that the state should consist of a federation of self-governing communes subject to no central power. Administrative autonomy was not, however, the real aim of the insurgent leaders. The name of the Commune had always been a rallying sign for violent revolutionaries ever since the Terrorists had found their last support in the munici- pality of Paris in 1704. In 187 1 among the communard chiefs were revolutionaries of every sect, who, disagreeing on govern- mental and economic principles, were united in their vague but perpetual hostility to the existing order of things. The regular troops of the garrison of Paris followed the National Assembly to Versailles, where they were joined by the soldiers of the armies of Sedan and Metz, liberated from captivity in Germany. With this force the government of the Republic commenced the second siege of Paris, in order to capture the city from the Commune, which had established the parody of a government there, having taken possession of the administrative departments and set a minister at the head of each office. The second siege lasted six weeks under the eyes of the victorious Germans encamped on the heights overlooking the capital. The presence of the enemy, far from restraining the humiliating spectacle of Frenchmen waging war on Frenchmen in the hour of national disaster, seemed to encourage the fury of the combatants. The communards, who

had begun their reign by the murder of two generals, concluded it, when the Versailles troops were taking the city, with the massacre of a number of eminent citizens, including the archbishop of Paris, and with the destruction by fire of many of the finest historical buildings, including the palace of the Tuileries and the h6tel de ville. History has rarely known a more unpatriotic crime than that of the insurrection of the Commune; but the punishment inflicted on the insurgents by the Versailles troops was so ruthless that it seemed to be a counter- manifestation of French hatred for Frenchmen in civil disturbance rather than a judicial penalty applied to a heinous offence. The number of Parisians killed by French soldiers in the last week of May 187 1 was probably 20,000, though the partisans of the Commune declared that 36,000 men and women were shot in the streets or after summary court-martial.

It is from this point that the history of the Third Republic commences. In spite of the doubly tragic ending of the war

*the vitality of the country seemed unimpaired. With ease and without murmur it supported the new burden of taxation called for by the war indemnity and by the reorganization „ . of the shattered forces of France. Thiers was thus iicans'ana aided in- his task of liberating the territory from the Monarch- presence of the enemy. His proposal at Bordeaux to '*** afttr make the " essai loyal " of the Republic, as the form of government which caused the least division among Frenchmen, was discouraged by the excesses of the Commune which associated republicanism with revolutionary disorder. Nevertheless, the monarchists of the National Assembly received a note of warning that the country might dispense with their services unless they displayed governmental capacity, when in July 187 1 the re- publican minority was largely increased at the bye-elections. The next month, within a year of Sedan, a provisional constitution was voted, the title of president of the French Republic being then conferred on Thiers. The monarchists consented to this against their will; but they had their own way when they conferred constituent powers on the Assembly in opposition to the republicans, who argued that it was a usurpation of the sovereignty of the people for a body elected for another purpose to assume the power of giving a constitution to the land without a special mandate from the nation. The debate gave Gambetta his first opportunity of appearing as a serious politician. The " fou furieux " of Tours, whom Thiers had denounced for his efforts to prolong the hopeless war, was about to become the chief support of the aged Orleanist statesman whose supreme achievement was to be the foundation of the Republic.*

It was in 1872 that Thiers practically ranged himself with Gambetta and the republicans. The divisions in the monarchical party made an immediate restoration impossible.

This situation induced some of the moderate deputies, !???L .,

1 » /-.!• 1 Inters ana

whose tendencies were Orleanist, to support the aambetta.

organization of a Republic which now no longer

found its chief support in the revolutionary section of the nation,

and it suited the ideas of Thiers, whose personal ambition was

not less than his undoubted patriotism. Having become

unexpectedly chief of the state at seventy-four he had no wish

to descend again to the position of a minister of the Orleans

dynasty which he had held at thirty-five. So, while the royalists

refused to admit the claims of the comte de Paris, the old minister

of Louis Philippe did his best to undermine the popularity of

the Orleans tradition, which had been great among the Liberals

under the Second Empire. He moved the Assembly to restore

to the Orleans princes the value of their property confiscated

under Louis Napoleon. This he did in the well-founded belief

that the family would discredit itself in the eyes of the nation by

accepting two millions sterling of public money at a moment

when the country was burdened with the war indemnity. The

incident was characteristic of his wary policy, as in the face

of the anti-republican majority in the Assembly he could not

openly break with the Right; and when it was suggested that

he was too favourable to the maintenance of the Republic he

offered his resignation, the refusal of which he took as indicating

the indispensable nature of his services. Meanwhile Gambetta, by his popular eloquence, had won for himself in the autumn a triumphal progress, in the course of which he declared at Grenoble that political power had passed into the hands of " une couche sociale nouvelle," and he appealed to the new social strata to put an end to the comedy of a Republic without republicans. When the Assembly resumed its sittings, order having been restored in the land disturbed by war and revolution, the financial system being reconstituted and the reorganization of the army planned, Thiers read to the house a presidential message which marked such a distinct movement towards the Left that Gambetta led the applause. " The Republic exists," said the president, " it is the lawful government of the country, and to devise anything else is to devise the most terrible of revolutions."

The year 1873 was full of events fateful for the history of France. It opened with the death of Napoleon III. at Chislehurst; but the disasters amid which the Second Empire had ended were too

recent for tlie youthful promise of his heir to be regarded as having any connexion with the future fortunes of France, except by the small group of Bonapartists. Thiers remained the centre of interest. Much as the monarchists disliked him, they at first shrank from upsetting him before they were ready with a scheme of monarchical restoration, and while Gambetta's authority was growing in the land. But when the Left Centre

*took alarm at the return of radical deputies at numerous by-elections the reaction- aries utilized the divisions in the republican party, and for the only time in the history of the Third Republic they gave proof of parliamentary adroitness. The date for the evacuation of France by the German troops had been advanced, largely owing to Thiers' successful efforts to raise the war indemnity. The monar- chical majority, therefore, thought the moment had Hesigaa- arrived when his services might safely be dispensed Thiers. wit h, an{ ˆ the campaign against him was ably con- ducted by a coalition of Legitimists, Orleanists and Bonapartists. The attack on Thiers was led by the due de Broglie, the son of another minister of Louis Philippe and grandson of Madame de Stael. Operations began with the removal from the chair of the Assembly of Jules Grevy, a moderate republican, who was chosen president at Bordeaux, and the substitution of Buffet, an old minister of the Second Republic who had rallied to the Empire. A debate on the political ten- dency of the government brought Thiers himself to the tribune to defend his policy. He maintained that a conservative Republic was the only regime possible, seeing that the monarchists in the Assembly could not make a choice between their three pretenders to the throne. A resolution, however, was carried which provoked the old statesman into tendering his resignation. This time it was not declined, and the majority with unseemly M . . haste elected as president of the Republic Marshal MacMahoa MacMahon, due de Magenta, an honest soldier of president royalist sympathies, who had won renown and a ducal "'wit**' t'tle on the battlefields of the Second Empire. In the p " ' eyes of Europe the curt dismissal of the aged liberator of the territory was an act of ingratitude. Its justification would have been the success of the majority in forming a stable monarchical government; but the sole result of the 24th of May 1873 was to provide a definite date to mark the opening of the era of anti-republican incompetency in France which has lasted for more than a generation, and has been perhaps the most effective guardian of the Third Republic.*

The political incompetency of the reactionaries was fated never to be corrected by the intelligence of its princes or of its chiefs, and the year which saw Thiers dismissed to make way for a restoration saw also that restoration indefinitely postponed by the fatal action of the legitimist pretender. The comte de Paris went to Frohsdorf to abandon to the comte de Chambord his claims to the crown as the heir of the July Monarchy, and to accept the position of dauphin, thus implying that his grand- father Louis Philippe was a usurper. With the " Government of Moral Order" in command the restoration of the monarchy seemed imminent, when the royalists had their hopes dashed by the announcement that " Henri V." would accept the throne only on the condition that the nation adopted as the standard of France the white flag— at the very sight of which Marshal

MacMahon said the rifles in the army would go off by themselves. The comte de Chambord's refusal to accept the tricolour was probably only the pretext of a childless man who Tae had no wish to disturb his secluded life for the ultimate

Chambord. benefit of the Orleans family which had usurped his crown, had sent him as a child into exile, and out- raged his mother the duchesse de Berry. Whatever his motive, his decision could have no other effect than that of establishing the Republic, as he was likely to live for years, during which the comte de Paris' claims had to remain suspended. It was not possible to leave the land for ever under the government im- provised at Bordeaux when the Germans were masters of France; so the majority in the Assembly decided to organize another provisional government on more regular lines, which might possibly last till the comte de Chambord had taken the white flag

*to the grave, leaving the way to the throne clear for the comte de Paris. On the 10th of November 1873 a Bill was passed which instituted the Septennate, whereby the executive power was confided to Marshal MacMahon for seven The years. It also provided for the nomination of a com- *^ a " mission of the National Assembly to take in hand the enactment of a constitutional law. Before this an important constitutional innovation had been adopted. Under Thiers there were no changes of ministry. The president of the Republic was perpetual prime minister, constantly dismissing individual holders of portfolios, but never changing at one moment the whole council of ministers. Marshal MacMahon, the day after his appointment, nominated a cabinet with a vice-president of 'the Council as premier, and thus inaugurated the system of ministerial instability which has been the most conspicuous feature of the government of the Third Republic. Under the Septennate the ministers, monarchist or moderate republican, were socially and perhaps intellectually of a higher class than those who governed France during the last twenty years of the 10th century. But the duration of the cabinets was just as brief, thus displaying the fact, already similarly demonstrated under the Restoration and the July Monarchy, that in France parlia- mentary government is an importation not suited to the national temperament.*

The due de Broglie was the prime minister in MacMahon's first two cabinets which carried on the government of the country up to the first anniversary of Thiers' resignation. The due de Broglie's defeat by a coalition of Legitimists and Bonapartists with the Republicans displayed the mutual attitude of parties. The Royalists, chagrined that the fusion of the two branches of the Bourbons had not brought the comte de Chambord to the throne, vented their rage on the Orleanists, who had the chief share in the government without being able to utilize it for their dynasty. The

Bonapartists, now that the memory of the war was receding, were winning elections in the provinces, and were further encouraged by the youthful promise of the Prince Imperial. The republicans had so improved their position that the due d'Audiffret-Pasquier, great-nephew of the chancellor Pasquier, tried to form a coalition ministry with M. Waddington, afterwards ambassador of the Republic in London, and other members of the Left Centre. Out of this uncertain state of affairs was evolved the constitution which has lasted the longest of all those that France has tried since the abolition of the old monarchy in 1792. Its birth was due to chance. Not being able to restore a monarchy, the National Assembly was unwill- ing definitively to establish a republic, and as no limit was set by the law on the duration of its powers, it might have continued the provisional state of things had it not been for the Bona- partists. That party displayed so much activity in agitating for a plebiscite, that when the rural voters at by-elections began to rally tc the Napoleonic idea, alarm seized the constitutionalists of the Right Centre who had never been persuaded by Thiers' exhortations to accept the Republic. Consequently in January 1875 the Assembly, having voted the general principle that the legislative power should be exercised by a Senate and a Chamber of Deputies, without any mention of the Coasiitu- executive regime, accepted by a majority of one a ^"a™" 1 ' momentous resolution proposed by M. Wallon, a member of the Right Centre. It provided that the president of the Republic should be elected by the absolute majority of the Senate and the Chamber united as a National Assembly, that he should be elected for seven years, and be eligible for re-election. Thus by one vote the Republic was formally established, " the Father of the Constitution " being M. Wallon, who began his political experiences in the Legislative Assembly of 1849, and survived to take an active part in the Senate until the twentieth century.*

The Republic being thus established, General de Cissey, who had become prime minister, made way for M. Buffet, but retained his portfolio of war in the new coalition cabinet, which contained some distinguished members of the two central groups, includ- ing M. Leon Say. A fortnight previously, at the end of February

1 875 j were passed two statutes defining the legislative and executive powers in the Republic, and organizing the Senate. Provisions These joined to a third enactment, voted in July, form of the Con- the body of laws known as the " Constitution of 1875," atitutkm which though twice

revised, lasted without essential ‘ of MS. alteration to the twentieth century. The legislative power was conferred on a Senate and a Chamber of Deputies, which might unite . in. congress to revise the constitution if they both agreed that revision was necessary, and, which were bound so to meet for the election of the president of the Republic when a vacancy occurred. It was enacted that the president so elected should retain office for seven years, and be eligible for re-election at the end of his term. He was also held to be irresponsible, except in the case of high treason. The other principal prerogatives bestowed on the presidential office by the constitution of 1875 were the right of initiating laws concurrently with the members of the two chambers; the promulgation of the laws; the right of dissolving the Chamber of Deputies before its legal term on the advice of the Senate, and that of adjourning the sittings of both houses for a month; the right of pardon; the disposal of the armed forces of the country; the reception of diplomatic envoys, and, under certain limitations, the power to ratify treaties. The constitution relieved the president of the responsibility of private patronage, by providing that every act of his should be countersigned by a minister. The con- stitutional law provided that the Senate should consist of 300 members, 75 being nominated for life by the National Assembly, and the remaining 225 elected for nine years by the departments and the colonies. Vacancies among the life members, after the dissolution of the National Assembly, were filled by the Senate until 1884, when the nominative system was abolished, though the survivors of it were not disturbed. The law of 1875 enacted that the elected senators, who were distributed among the departments en a rough basis of population should be elected for nine years, a third of them retiring triennially. It was pro- vided that the senatorial electors in each department should be the deputies, the members of the conseil giniral and of the conseils d’arr ondissement, and delegates nominated by the municipal councils of each commune. As the municipal delegates composed the majority in each electoral college, Gambetta called the Senate the Grand Council of the Communes; but in practice the senators elected have always been the nominees of the local deputies and of the departmental councillors (conseillers gtneraux). The Constitutional Law further provided that the deputies should be elected to the Chamber for four years by direct man- Scrutl nooc * su 2rage, which had been enjoyed in France ever d’amn- since 1848. The laws relating to registration, which is dtssement of admirable simplicity in France, were left practically a J ,d u s V vtia the same as under the Second Empire. From 1875 to ■ ” e ‘ 1885 the elections were held on the basis of scrutin d’arrondissement, each department being divided into single- member districts. In 1885 scrutin de liste was tried, the depart- ment being the electoral unit, and each elector having as many votes as there were seats ascribed to the department without the power to cumulate — like the voting in the city of London when it returned four members. In 1889 scrutin d’*

arrondissetnent was resumed. The payment of members continued as under the Second Empire, the salary now being fixed at 0000 francs a year in both houses, or about a pound sterling a day. The Senate and the Chamber were endowed with almost identical powers. The only important advantage given to the popular house in the paper constitution was its initiative in matters of finance, but the right of rejecting or of modifying the financial proposals of the Chamber was successfully upheld by the Senate. In reality the Chamber of Deputies has overshadowed the upper house. The constitution did not prescribe that ministers should be selected from either house of parliament, but in practice the deputies have been in cabinets in the proportion of five to one in excess of the senators. Similarly the very numerous ministerial crises which have taken place under the Third Republic have with the rarest exceptions been caused by votes in the lower chamber. Among minor differences between the two houses

ordained by the constitution was the legal minimum age of their members, that pf senators being forty and of deputies twenty-ifive. It was enacted,- moreover, that the Senate, by presidential decree, could be constituted into a high court for the trial of certain offences against the security of the state.

The constitution thus produced,, the fourteenth since the Revolution of 1780, was the issue of a monarchical Assembly forced by circumstances to establish a republic. It 1x was therefore distinguished from Others which preceded pˆ/ˆ,/ it in that it contained no declaration of principle, and parties no doctrinal theory. The comparative excellence of under the the work must be recognized, seeing that it has lasted. "ˆˆJˆ" But it owed its duration, as it owed its origin and its character j to the weakness of purpose and to the dissensions of the monarchical parties. The first legal act under the new constitution was the selection by the expiring National Assembly of seventy-five nominated; senators, and here the reactionaries gave a crowning example of that folly which has ever marked their conduct each time- they have had the chance of scoring an advantage agaiiist the Republic. The principle of nomination had been carried in the National Assembly by the Right and opposed by the Republicans. But the quarrels of the Legitimists with the due de Broglie and his party were so bitter that the former made a present of the nominated element in the Senate to the Republicans in order to spite the Orleanjsts; so out Of seventy-five senators nominated by the monarchical Assembly, fifty-seven Republicans were chosen. Without this suicidal act the Republicans would have been in a woeful minority in the Senate when parliament met in 1876 after the first elections under the new system of parliamentary government. The slight advantage which, in spite of their self-destruction, the reactionaries maintained in the upper house was outbalanced by the republican success at the elections to the Chamber. In a house of over 500 members only about 1 50 monarchical deputies were returned, of whom half were*

Bonapartists. The first cabinet under the new constitution was formed by Dufatire, an old minister of Louis Philippe like Thiers, and like him born in the 18th century. The premier now took the title of president of the council, the chief of the state no longer presiding at the meetings of ministers, though he continued to be present at their deliberations. Although the republican victories at the elections were greatly due to the influence of Gambetta,none of hisp&rtiaanB was included in the ministry, which was composed of members of the two central groups. At the end of 1876 Dufaure retired, but nearly all his ministers retained their portfolips under the presidency of Jules Simon, a pupil of Victor Cousin, who first entered political life in the Constituent Assembly of 1848, and was later a leading member of the opposition in the last seven years of the Second Empire. : ,

The premiership of Jules Simon came to an end with the abortive coup d'itat of 1877, commonly called from its date; the Seize Mai. After the election of Marshal MacMahon l

to the presidency, the clerical party, irritated at the 'Mdil87f.' failure to restore the comte de Chambord, commenced •,.

a campaign in favour of the restitution of the temporal power to the Pope. It provoked the Italian government to make common cause with Germany, as Prince Bismarck was likewise attacked by the French clericals for his ecclesiastical policy. At >l£it Jules Simon, who was a liberal most friendly to Catholicism, had to accept a resolution of the Chamber, inviting the ministry to adopt the same disciplinary policy towards the Church which had been followed by the Second Empire and the Monarchy .of July. It was on this occasion that Gambetta used his famous expression, " Le ctiricalisme, votia I'ennemi." Some days later a letter appeared in the Journal officiel, dated 16th May 1877', signed by President MacMahon, informing Jules Simon that he had no longer his confidence, as it was clear that he had lost that influence over the Chamber which a president of the Council ought to exercise. The dismissal of the prime minister and the presidential acts which followed did not infringe the letter of the new constitution; yet the proceeding was regarded as a coup d'itat in favour of the clerical reactionaries. The due de

Broglie formed an anti-republican ministry, ana Marshal Mac- Mahon, in virtue of the presidential prerogative conferred by the law of 1875,

adjourned parliament for a month. When the Chamber reassembled the republican majority of 363 denounced the coalition of parties hostile to the Republic. The president, again using his constitutional prerogative, obtained the author- ization of the Senate to dissolve the Chamber. Meanwhile the Broglie ministry had put in practice the policy, favoured by all parties in France, of replacing the functionaries hostile to it with its own partisans. But in spite of the administrative electoral machinery being thus in the hands of the reactionaries, a republican majority was sent back to the Chamber, the sudden death of Thiers on the eve of his expected return to power, and the demonstration at his funeral, which was described as a silent insurrection, aiding the rout of the monarchists. The due de Broglie resigned, and Marshal MacMahon sent for General de Rochebouet, who formed a cabinet of unknown reactionaries, but it lasted only a few days, as the Chamber refused to vote supply. Dufaure was then called back to office, and his moderate republican ministry lasted for the remainder of the MacMahon presidency.

Thus ended the episode of the Seize Mai, condemned by the whole of Europe from its inception. Its chief effects were to prove again to the country the incompetency of the monarchists, and by associating in the public mind the Church with this ill-conceived venture, to provoke reprisals from the anti-clericals when they came into power. After the storm, the year 1878 was one of political repose. The first international exhibition held at Paris after the war displayed to Europe how the secret of France's recuperative power lay in the industry and artistic instinct of the nation. Marshal MacMahon presided with

dignity over the f fetes held in honour of the exhibition, Jules an d na cl he pleased he might have tranquilly fulfilled

Qrivy the term of his Septennate. But in January 1879 president jj e ma de a difference of opinion on a military question °ReoubUc. an excuse for resignation,and Jules Grevy, the president

of the Chamber, was elected to succeed him by the National Assembly, which thus met for the first time under the Constitutional Law of 1875.

Henceforth the executive as well as the legislative power was in the hands of the republicans. The new president was a leader of the bar, who had first become known in the Constituent Assembly of 1848 as the advocate of the principle that a republic would do better without a president. M. Waddington was his first prime minister, and Gambetta was elected president of the Chamber. The latter, encouraged by his rivals in the idea that the time was not ripe for him openly to direct the affairs of the country, thus put himself, in spite of his occult dictatorship, in a position of

official self-effacement from which he did not emerge until the jealousies of his own party-colleagues had undermined the prestige he had gained as chief founder of the Republic. The most active among them was Jules Ferry, minister of

Education, who having been a republican deputy for Ferry. Paris at the end of the Empire, was one of the members

of the provisional government proclaimed on 4th September 1870. Borrowing Gambetta's cry that clericalism was the enemy, he commenced the work of reprisal for the Seize Mai. His educational projects of 1879 were thus anti-clerical in tendency, the most famous being article 7 of his education bill, which prohibited members of any " unauthorized " religious orders exercising the profession of teaching in any school in France, the disability being applied to all ecclesiastical com- munities, excepting four or five which had been privileged by special legislation. This enactment, aimed chiefly at the Jesuits, was advocated with a sectarian bitterness which will be associated with the name of Jules Ferry long after his more statesmanlike qualities are forgotten. The law was rejected by the Senate, Jules Simon being the eloquent champion of the clericals, whose intrigues had ousted him from office. The unauthorized orders were then dissolved by decree; but though the forcible expulsion of aged priests and nuns gave rise to painful scenes, it cannot be said that popular feeling was excited in their favour, so

grievously had the Church blundered in identifying itself with the conspiracy of the Seize Mai.

Meanwhile the death of the Prince Imperial in Zululand had shattered the hopes of the Bonapartists, and M. de' Freycinet, a former functionary of the Empire, had become prime minister at the end of 1879. He had retained Jules Ferry at the ministry of Education, but unwilling to adopt all his anti-clerical policy, he resigned the premiership in September 1880. The constitution of the first Ferry cabinet secured the further exclusion from office of Gambetta, to which, however, he preferred his " occult dictator- ship." In August he had, as presfdent of the Chamber, accom- panied M. Gr6vy on an official visit to Cherbourg, and the accla- mations called forth all over France by his speech, which was a hopeful defiance to Germany, encouraged the wily chief of the state to aid the republican conspiracy against the hero of the Republic. In 1881 the only political question before the country was the destiny of Gambetta. i His influence in the Chamber was such that in spite of the opposition of the prime minister he carried his electoral scheme of scrutin de liste, descend- ing from the presidential chair to defend it. Its rejection by the Senate caused no conflict between the houses. The check was inflicted not on the Chamber, but on Gambetta, who

counted on his popularity to carry the lists of his candidates in all the republican departments in France as a quasi -plebiscitary demonstration in his favour. His rivals dared not openly quarrel with him; There was the semblance of a reconciliation between him and Ferry, and his name was the rallying-cry of the Republic at the general election, which was conducted on the old system of scrutin d ‘ arrondissement.

The triumph for the Republic was great, the combined force of reactionary members returned being less than one-fifth of the new Chamber. M. Grevy could no longer abstain from asking Gambetta to form a ministryˆ but he had ° a ‘ n6etta bided his time till jealousy of the ” occult power ” minister. of the president of the Chamber had undermined his position in parliament.: Consequently, when on the 14th of November i88t Gambetta announced the composition of his cabinet, ironically called the ” grand ministere,” which was to consolidate the Republic and to be the apotheosis of its chief, a great feeling of disillusion fell on the country, for his colleagues were untried politicians. The best known was Paul Bert, a man of science, who as the ” reporter ” in the Chamber of the Ferry Education Bill had distinguished himself as an aggressive free- thinker, and he inappropriately was named minister of public worship. All the conspicuous republicans who had held office refused to serve under Gambetta. His cabinet was condemned in advance. His enemies having succeeded in ruining its com- position, declared that the construction of a one-man machine was ominous of dictatorship, and the ” grand minislere ” lived for only ten weeks.

Gambetta was succeeded in January 1882 by M. de Freycinet, who having first taken office in the Dufaure cabinet of 1877, and having continued to hold office at intervals until 1899, was the most successful specimen of a ” ministrable ” — Qˆfo,tt

Gambetta’s death was followed by a period of anarchy, during which Prince Napoleon, the son of Jerome, king of Westphalia, placarded the walls of Paris with a manifesto. The Chamber thereupon voted the exile of the members of the families which

had reigned in France. The Senate rejected the measure, and a conflict arose between the two houses. M. Duclerc resigned the

premiership in January 1883 to his minister of the tuahm. Interior, M.

Fallieres, a Gascon lawyer, who became

president of the Senate in 1899 and president of the Republic in 1 906. He held office for three weeks, when Jules Ferry became president of the council for the second time. Several of the closest of Gambetta's friends accepted office under the old enemy of their chief, and the new combination adopted the epithet "opportunist," which had been invented by Gambetta in 1875 to justify the expediency of his alliance with Thiers. The Opportunists thenceforth formed an important group stand- ing between the Left Centre, which was now excluded from office, and the Radicals. It claimed the tradition of Gambetta, but the guiding principle manifested by its members was that of securing the spoils of place. To this end it often allied itself with the Radicals, and the Ferry cabinet practised this policy in 1883 when it removed the Orleans princes from the active list in the army as the illogical result of the demonstration of a Bonaparte. How needless was this proceeding was shown a few months later when the comte de Chambord died, as his death, which finally fused the Royalists with the Orleanists, caused no commotion in France.

The year 1884 was unprecedented seeing that it passed without a change of ministry. Jules Ferry displayed real admini- Rerisioa strative ability, and as an era of steady government of the Con- seemed to be commencing, the opportunity was taken stltuiloa, to revise the Constitution. The two Chambers there-

1884. £ Qre met j n con g re s Sj anc [enacted that the republican form of government could never be the subject of revision, and that all members of families which had reigned in France were ineligible for the presidency of the Republic— a repetition of the adventure of Louis Bonaparte in the middle of the century being thus made impossible. It also decided that the clauses of .the law of 1875 relating to the organization of the Senate should no longer have a constitutional character. This permitted the reform of the Upper House by ordinary parliamentary procedure. So an organic law was passed to abolish the system of nominating senators, and to increase the number of municipal delegates in the electoral colleges in proportion to the population of the communes. The French nation, for the first time since it had enjoyed political life, had revised a constitution by pacific means without a revolution. Gambetta being out of the way, his favourite electoral system of scrutinˆde liste had no longer any terror for his rivals, so it was voted by the Chamber early in

1885. Before the Senate had passed it into law the Ferry ministry had fallen at the end of March, after holding office for twenty-five months, a term rarely exceeded in the annals of the Third Republic. This long tenure of power had excited the dissatisfaction of jealous politicians, and the news

of a slight disaster to the French troops in Tongking called forth all the pent-up rancour which Jules Ferry had inspired in various groups. By the exaggerated news of defeat Paris was excited

to the brink of a revolution. The approaches of the Chamber were invaded by an angry mob, and Jules Ferry was the object of public hate more bitter than any man had called forth in France since Napoleon III. on the days after Sedan. Within the Chamber he was attacked in all quarters. The Radicals took the lead, supported by the Monarchists, who remembered the anti-clerical rigour of the Ferry laws, by the Left Centre, not sorry for the tribulation of the group which had supplanted it, and by place-hunting republicans of all shades. The attack was led by a politician who disdained office. M. Georges Clemenceau, who had originally come to Paris from the Vendee as a doctor, had as a radical leader in the Chamber used his remarkable talent as an overthrower of ministries, and nearly every one of the eight ministerial crises which had already occurred during the presidency of Grevy had been hastened by his mordant eloquence.

The next prime minister was M. Brisson, a radical lawyer and journalist, who in April 1885 formed a cabinet of " concent ration " — that is to say, it was recruited from various groups with the

Toogklog.

idea of concentrating all republican forces in opposition to the re-actionaries. MM. de Freycinet and Carnot, afterwards president of the Republic, represented the moderate element in this ministry, which superintended the general elections under scrutin de liste. That system was recommended by its advocates as a remedy for the rapid decadence in the composition of the Chamber. Manhood suffrage, which had returned to the National Assembly a distinguished body of men to conclude peace with Germany, had chosen a very different type of representative to sit in the Chamber created by the constitution of 1875. At each succeed- ing election the standard of deputies returned grew lower, till Gambetta described them contemptuously as " sous-veUrinaires," indicating that they were chiefly chosen from the petty pro- fessional class, which represented neither the real democracy nor the material interests of the country. His view was that the election of members by departmental lists would ensure the candidature of the best men in each region, who under the system of single-member districts were apt to be neglected in favour of local politicians representing narrow interests. When his death had removed the fear of his using scrutin de liste as a plebiscitary organization, parliament sanctioned its trial. The result was not what its promoters anticipated. The composition of the Chamber was indeed transformed, but only by tt885 the substitution of reactionary deputies for republicans. Of the votes polled, 45% were given*

to the Monarchists, and if they had obtained one-half 0/ the abstentions the Republic would have come to an end. At the same time the character of the republican deputies returned was not improved; so the sole effect of scrutin de liste was to show that the electorate, weary of republican dissensions, was ready to make a trial of monarchical government,if only the reactionary party proved that it contained statesmen capable of leading the nation. So menacing was the situation that the republicans thought it wise not further to expose their divisions in the presidential election which was due to take place at the end of the year. Consequently, on the 28th of December 1885, M. Grevy, in spite of his growing unpopularity, was elected president of the Republic for a second term of seven years. .

The Brisson cabinet at once resigned, and on the 7th of January 1886 its most important member, M. de Freycinet, formed his third ministry, which had momentous influence on the history of the Republic. The new minister of war 8ˆ„;J™ r# was General Boulanger,a smart soldier of no remarkable military record; but being the nominee of M. Clemenceau, he began his official career by taking radical measures against command- ing officers of reactionary tendencies. He thus aided the govern- ment in its campaign against the families which had reigned in France, whose situation had been improved by the result of the elections. The fetes given by the comte de Paris to celebrate his daughter's marriage with the heir-apparent of Portugal moved the republican majority in the Chambers to expel from France the heads of the houses of Orleans and of Bonaparte, with their eldest sons. The names of all the princes on the army list were erased from it, the decree being executed with un- seemly ostentation by General Boulanger, who had owed early promotion to the protection of the due d'Aumale, and on that prince protesting he was exiled too. Meanwhile General Bou- langer took advantage of Grevy's unpopularity to make himself a popular hero, and at the review, held yearly on the 14th of July, the anniversary of the fall of the Bastille, his acclamation by the Parisian mob showed that he was taking an unexpected place in the imagination of the people. He continued to work with the Radicals, so when they turned out M. de Freycinet in December 1886, one of their group, M. Goblet, a lawyer from Amiens, formed a ministry, and retained Boulanger as minister of war. M. Clemenceau, however, withdrew his support from the general, who was nevertheless loudly patronized by the violent radical press. His bold attitude towards Germany in connexion with the arrest on the German frontier of a French official named Schnaebele so roused the enthusiasm of the public, that M. Goblet was not sorry to resign in May 1887 in order to get rid of his too popular colleague.

To form the twelfth of his ministries, Grevy called upon M. Rouvier, an Opportunist from Marseilles, who had first held office in Gambetta's short-lived cabinet. General Boulanger acaadal° n was sent to command a corps d'armie at Clermont- Ferrand; but the popular press and the people clamoured for the hero who was said to have terrorized Prince Bismarck, and they encouraged him to play the part of a plebiscitary candidate. There were grave reasons for public dis- content. Parliament in 1887 was more than usually sterile in legislation, and in the autumn session it had to attend to a scandal which had long been rumoured. The son-in-law of Grevy, Daniel Wilson, a prominent deputy who had been an under secretary of state, was accused of trafficking the decoration of the Legion of Honour, and of using the Elysee, the president's official residence, where he lived, as an agency for his corrupt practices. The evidence against him was so clear that his colleagues in the Chamber put the government into a minority in order to pre- cipitate a presidential crisis, and on Grevy refusing to accept this hint, a long array of politicians, representing all the republican groups, declined his invitation to aid him in forming a new ministry, all being bent on forcing his resignation. Had General Boulanger been a man of resolute courage he might at this crisis have made a coup d'etat, for his popularity in the street and in the army increased as the Republic sank deeper into scandal and anarchy. At last, when Paris was on the brink of revolution, Grevy was prevailed on to resign. Thecandidates for his succes- sion to the presidency were two ex-prime ministers, MM. Ferry and de Freycinet, and Floquet, a barrister, who had been con- spicuous in the National Assembly for his sympathy with the Com- mune. The Monarchists had no candidate ready, and resolved to vote for Ferry, because they believed that if he were elected his unpopularity with the democracy would cause an insurrection in Paris and the downfall of the Republic. MM. de Freycinet and Floquet each looked for the support of the Radicals, and each had made a secret compact, in the event of his election, to restore General Boulanger to the war office. But M. Clemenceau, fearing the election of Jules Ferry, advised his followers to vote for an " outsider," and after some manoeuvring the congress elected by a large majority Sadi Carnot.

The new president, though the nominee of chance, was an excellent choice. The grandson of Lazare Carnot, the ' 'organizer m c m t °^ v i c,;or y " °f tne Convention, he was also a man of president unsullied probity. The tradition of his family name, of the only less glorious than that of Bonaparte in the annals Republic, f tne Revolution, was welcome to France, almost ready to throw herself into the arms of a soldier of fortune, while his blameless repute reconciled some of those whose opposition to the Republic had been quickened by the mean vices of Grevy. But the name

and character of Carnot would have been powerless to check the Boulangist movement without the incompetency of its leader, who was getting the democracy at his back without knowing how to utilize it. The new president's first prime minister was M. Tirard, a senator who had held office in six of Grevy's ministries, and he formed a cabinet of politicians as colourless as himself. The early months of 1888 were occupied with the trial of Wilson, who was sentenced to two years' imprisonment for fraud, and with the conflicts of the government with General Boulanger, who was deprived of his command for coming to Paris without leave. Wilson appealed against his sentence, and General Boulanger was elected deputy for the department of the Aisne by an enormous majority. It so happened that the day after his election a presidential decree was signed on the advice of the minister of war removing General Boulanger from the army, and the court of appeal quashed Wilson's conviction. Public feeling was profoundly moved by the coincidence of the release of the relative of the ex-president by the judges of the Republic on the same day that its ministers expelled from the army the popular hero of universal suffrage.

As General Boulanger had been invented by the Radicals it was thought that a Radical cabinet might be a remedy to cope with him, so M. Floquet became president of the council

in April 1888, M. de Freycinet taking the portfolio of war, which he retained through many ministries. M. Floquet's chief

Boulanglsm.

achievement was a duel with General Boulanger, in which, though an elderly civilian, he wounded him. Nothing, however, checked the popularity of the military politi- cian, and though he was a failure as a speaker in the Chamber, several departments returned him as their deputy by great majorities. The Bonapartists had joined him, and while in his manifestos he described himself as the defender of the Republic, themassof the Monarchists, with the consent of the comte deParis, entered the Boulangist camp, to the dismay both of old-fashioned Royalists and of many Orleanists, who resented his recent treatment of the due d'Aumale. The centenary of the taking of the Bastille was to be celebrated in Paris by an international exhibition, and it appeared likely that it would be inaugurated by General Boulanger, so irresistible seemed his popularity. In January 1880 he was elected member for the metropolitan department of the Seine with a quarter of a million votes, and by a majority of eighty thousand over the candidate of the government. Had he marched on the Elysee the night of his election, nothing could have saved the parliamentary Republic; but again he let his chance go by. The government in alarm proposed the restoration of scrutin d'arrondissement as the electoral system

for scrutin de liste. The change was rapidly enacted by the two Chambers, and was a significant commentary on the respective advantages of the two systems. M. Tirard was again called to form a ministry, and he selected as minister of the interior M. Constans, originally a professor at Toulouse, who had already proved himself a skilful manipulator of elections when he held the same office in i"88i. He was therefore given the supervision of the machinery of centralization with which it was supposed that General Boulanger would have to be fought at the general election. That incomplete hero, how- .

ever, saved all further trouble by flying the country fjM," when he heard that his arrest was imminent. The government, in order to prevent any plebiscitary manifestation in his favour, passed a law forbidding a candidate to present himself for a parliamentary election in more than one con- stituency; it also arraigned the general on the charge of treason before the Senate sitting as a high court, and he was sentenced in his absence to perpetual imprisonment. Such measures were needless. The flight of General Boulanger was the death of Boulangism. He alone had saved the Republic which had done nothing to save itself. Its government had, on the contrary, displayed throughout the crisis an anarchic feebleness and incoherency which would have speeded its end had the leader of the plebiscitary movement possessed sagacity or even common courage.

The elections of 1880 showed how completely the reactionaries had compromised their cause in the Boulangist failure. Instead of 45% of the votes polled as in 1885, they obtained only 21%, and the comte de Paris, the pretender of constitutional monarchy, was irretrievabty prejudiced by his alliance with the military adventurer who had outraged the princes of his house. A period of calm succeeded the storm of Boulangism, and for the first time under the Third Republic parliament set to work to produce legislation useful for the state, without rousing party passion, as in its other period of activity when the Ferry educa- tion laws were passed. Before the elections of 1889 the reform of the army was undertaken, the general term of active com- pulsory service was made three years, while certain classes hitherto dispensed from serving, including ecclesiastical semin- arists and lay professors, had henceforth to undergo a year's military trLining. ˆhe new parliament turned its attention to social and labour questions, as the only clouds on the political horizon were the serious strikes in the manufacturing districts, which displayed the growing political organization of the socialist party. Otherwise nothing disturbed the calm of the country. The young due d'Orleans vainly tried to ruffle it by breaking his exile in order to claim his citizen's right to perform his military service. The cabinet was rearranged in March 1890, M. de Freycinet becoming prime minister for the fourth time, and

retaining the portfolio of war. All seemed to point to the con- solidation of the Republic, and even the Church made signals of reconciliation. Cardinal Lavigerie, a. patriotic missionary and statesman, entertained the officers of the fleet at Algiers, and proposed the toast of the Republic to the tune of the " Marseillaise " played by his peres blancs. The royalist Catholics protested, but it was soon intimated that the archbishop of Algiers' demonstration was approved at Rome. The year 1891 was one of the few in the annals of the Republic which passed without a change of ministry, but the agitations of 1892 were to counterbalance the repose of the two preceding years.

The first crisis arose out of the peacemaking policy of the Pope. Following up his intimation to the archbishop of Algiers,

Leo XIII. published in February 1892 an encyclical, T nccUcal bidding French Catholics accept the Republic as the 1692. ' firmly established form of government. The papal

injunction produced, a new political group called the " Rallies," the majority of its members being Monarchists who rallied to the Republic in obedience to the Vatican. The most conspicuous among them was Comte Albert de Mun, an eloquent exponent in the Chamber of legitimism and Christian socialism. The extreme Left mistrusted the adhesion of the new converts to the Republic, and ecclesiastical questions were the constant subjects of acrimonious debates in parliament. In the course of one of them M. de Ereycinet found himself in a minority. He ceased to: be prime minister, being succeeded by M. Loubet, a lawyer from Montelimar, who had previously held office for three months in the first Tirard cabinet; but M. de Freycinet continued to hold his portfolio of war. The confusion of the republican groups kept pace with the disarray of the reactionaries, and outside parliament the frequency of anarchist outrages did not increase public confidence. The only figure in the Republic which grew in prestige was that of M. Carnot, who in his frequent presidential tours dignified his office, though his modesty made him unduly efface his own personality.

When the autumn session of 1892 began all other questions were overwhelmed by the bursting of the Panama scandal.

The company associated for the piercing of the Isthmus I* e of Panama, undertaken by M. de Lesseps, the maker

scandal. of the Suez Canal, had become insolvent some years

before. Fifty millions sterling subscribed by the thrift of France had disappeared, but the rumours involving political personages in the disaster were so confidently asserted to be reactionary libels, that a minister of the Republic; after- wards sent to penal servitude for corruption, obtained damages for the publication of one of them. It was known that M. de Lesseps was to be tried for misappropriating the money sub- scribed; but considering the vast sums lost by the public, little interest was taken in the matter till it was suddenly stirred by the dramatic suicide of a well-known Jewish financier closely connected with republican politicians, driven to death, it was said, by menaces of blackmail. Then succeeded a period of terror in political circles. Every one who had a grudge against an enemy found vent for it in the press, and the people of Paris lived in an atmosphere of delation. Unhappily it was true that ministers and members of parliament had been subsidized by the Panama company. Floquet, the president of the Chamber, avowed that when prime minister he had laid hands on £12,000 of the company's funds for party purposes, and his justification of the act threw a light on the code of public morality of the parliamentary Republic. Other politicians were more seriously implicated on the charge of having accepted subsidies for their private purposes, and emotion reached its height when the cabinet ordered the prosecution of two of its members for corrupt traffic of their offices. These two ministers were afterwards discharged, and they seem to have been accused with recklessness; but their prosecution by their own colleagues proved that the statesmen of the Republic believed that their high political circles were sapped with corruption. Finally, only twelve senators and deputies were committed for trial, and the only one convicted was a minister of M. de Freycinet's third cabinet, who pleaded guilty to receiving large bribes from the Panama company. The

public regarded the convicted politician as a scapegoat, believing that there were numerous delinquents in parliament, more guilty than he, who had not even been prosecuted. This feeling was aggravated by the sentence passed, but afterwards remitted, &n the aged M. de Lesseps, who had involved French people in misfortune only because he too sanguinely desired to repeat the triumph he had achieved for France by his great work in Egypt;

Within the nation the moral result of the Panama affair was a general feeling that politics had become under _the Republic a profession unworthy of honest citizens. The sentiment evoked by the scandal was one of sceptical lassitude rather than of indignation. The reactionaries had crowned their record of political incompetence. At a crisis which gave legitimate oppor- tunity to a respectable and patriotic Opposition they

showed that the country had nothing to expect from them but incoherent and exaggerated invective. If the scandal had come to light in the time of General Boulanger the parliamentary Republic would not have survived it. : As it was, the sordid story did little more than produce several changes , of ministry. M. Loubet resigned the premiership in December 1892 to M. Ribot, a former functionary of the Empire, whose ministry lived for three stormy weeks. On the first day of 1893 M. Ribot formed his second cabinet, which survived till the end of March, when he was suc- ceeded; by his minister of education, M. Charles Dupuy,, an ex- professor who had never held office till.four months previously, M. Dupuy, having taken the portfolio of the interior, supervised the general election of 1803, which took place amid the profound indifference of the population, except in certain localities where personal antagonisms excited violence. An intelligent Oppose tion would have roused the country at the polls against the regime compromised by the Panama affair. Nothing of the sort occurred and the electorate preferred, the doubtful probity of their reˆ publican representatives to the certain incompetence of thfj reactionaries. The adversaries of the Republic polled only 16% of the votes recorded, and the chief feature of the election was the increased return of socialist and radical-socialist deputies. When parliament met it turned out the Dupuy ministry* and M. Casimir-Perier quitted the presidency of the Chamber to take his place. The new prime minister was the bearer of an eminent name, being the grandson of the statesman of 183 1, and the great-grandson of the owner of Vizille, where the estates of Dauphine met in 1788, as a prelude to the assembling of the states-general the next year. His acceptance of office aroused additional interest because he was a minister possessed of in- dependent wealth, and therefore a rare example of a French politician free from the imputation of making a living out of politics. Neither his repute nor his qualities gave long life to ■his ministry, which fell in four months, and M. Dupuy was. sent for again to form a cabinet in May 1894.*

Before the second Dupuy ministry had been in office a month President Carnot died by the knife of an anarchist at Lyons. He was perhaps the most estimable politician of the Assasalaa . Third Republic. Although the standard of political tion of life was not elevated under his presidency, he at all pre'*"' events set a good personal example, and to have filled Carnot unscathed the most conspicuous position in the land during a period unprecedented for the scurrility of libels on public men was a testimony to his blameless character. As the term of his septennate was near, parliament was not unprepared for a presi- dential election, and M. Casimir-Perier, who had been spoken of as his possible successor, was elected by the Congress casimlr- which met at; Versailles on the 27th of June 1894, three Perier days after Carnot's; assassination. The election of pre»Wen<, one*

who bore respectably a name not less distinguished 4 ' in history than that of Carnot seemed to ensure that the Republic would reach the end of the century under the headship of a president of exceptional prestige. But instead of remaining chief of the state for seven years, in less than seven months M. Casimir- Perier astonished France and Europe by his resignation. Scurril- ously defamed by the socialist press, the new president found that the Republicans in the Chamber were not disposed to defend him in his high office; so, on the 15th of January 189s, he seized

the occasion of the retirement of the Dupuy ministry to address a message to the two houses intimating his resignation of the presidency, which, he said, was endowed with too many responsi- bilities and not sufficient powers.

This time the Chambers were unprepared 'for a presidential vacancy, and to fill it in forty-eight hours was necessarily a Ftttx matter of haphazard. The choice of the congress fell

Paare on Felix Faure, a merchant of Havre, who, though president, minister of marine in the retiring cabinet, was one of ,89S ' the least-known politicians who had held office. The

selection was a good one, and introduced to the presidency a type of politician unfortunately rare under the Third Republic — a successful man of business, Felix Faure had a fine presence and polished manners, and having risen from a humble origin he displayed in his person the fact that civilization descends to a lower social level in France than elsewhere. Although he was in a sense a man of the people the Radicals and Socialists in the Chambers had voted against him. Their candidate, like almost all democratic leaders in France, had never worked with his hands — M, Brisson, the son of an attorney at Bourges, a member of the Parisian bar, and perpetual candidate for the presidency. Nevertheless the Left tried to take possession of President Faure. His first ministry, composed of moderate republicans ., and presided over by M. Rihot, lasted until the autumn session of 1895, when it was turned out and a radical cabinet was formed by M. Leon Bourgeois, an ex-functionary, who when a prefect had been suspected of reactionary tendencies.

The Bourgeois cabinet of 1895 was remarkable as the first ministry formed since 1877 which did not contain a single member of the outgoing cabinet.

It was said to be exclusively radical in its composition, and thus to indicate that the days of " republican concentration " were over, and that the Republic, being firmly established, an era of party government on the English model had arrived. The new ministry, however, on analysis did not differ in character from any of its predecessors. Seven of its members were old office-holders of the ordinary " ministrable " type. The most conspicuous was M. Cavaignac, the son of the general who had opposed Louis Bonaparte in 1848, and the grandson of J. B. Cavaignac, the regicide member of the Convention. Like Carnot and Casimir-Pener, he was, therefore, one of those rare politicians of the Republic who possessed some hereditary tradition. An ambitious man, he was now classed as a Radical on the strength of his< advocacy of the income-tax, the principle of which has never been popular in France, as being adverse to the secretive habits of thrift cultivated by the people, which are a great source of the national wealth. The radicalism of the rest of the ministry was not more alarming in character, and its tenure of office was without legislative result. Its fall, how- ever, occasioned the only constitutionally interesting ministerial crisis of the twenty-four which had taken place since Grevy's election to the presidency sixteen years before. The Senate, disliking the fiscal policy of the government, refused to vote supply in spite of the support which the Chamber gave to the ministry. The collision between the two houses did not produce the revolutionary rising which the Radicals predicted, and the Senate actually forced the Bourgeois cabinet to resign amid profound popular indifference.

The new prime minister was M. Meline, who began his long political career as a member of the Commune in 187 1, but was so little compromised in the insurrection that Jules Simon gave him an under-secretaryship in his ministry of 1876. After that he was once a cabinet minister, and was for a year president of the Chamber. He was chiefly known as a protectionist; but it was as leader of the Progressists, as the Opportunists now called themselves, that he formed his cabinet in April 1896, which was announced as a moderate ministry opposed to the policy of the Radicals. It is true that it made no attempt to tax incomes, but otherwise its achievements did not differ from those of other ministries, radical or concentration, except in its long survival. It lasted for over two years, and lived as long as the second Ferry cabinet. Its existence was prolonged by certain incidents of the Franco-Russian alliance. The visit of the Tsar to Paris

in October 1896, being the first official visit paid by a Euro- pean sovereign to the Republic, helped the government overthe critical period at which ministries usually succumbed, and it was further strengthened in parliament by the P™" ' invitation to the president of the Republic to return alliance. the imperial visit at St Petersburg in 1897. The Chamber came to its*

normal term that autumn; but a law had been passed fixing May as the month for general elections, and the ministry was allowed to retain office till the dissolution at Easter 1898.

The long duration of the Meline government was said to be a further sign of the arrival of an era of party government with its essential accompaniment, ministerial stability. But in the country there was no corresponding sign that the electorate was being organized into two parties of Progressists and Radicals; while in the Chamber it was ominously observed that persistent opposition to the moderate ministry came from nominal sup- porters of its views, who were dismayed at one small band of fellow-politicians monopolizing office for two years. The last election of the century was therefore fought on a confused issue, the most tangible results being the further reduction of the Monarchists, who secured only 12% of the total poll, and the advance of the Socialists, who obtained nearly 20% of the votes recorded. The Radicals returned were less numerous than the Moderates, but with the aid of the Socialists they nearly balanced them. A new group entitled Nationalist made its appearance, supported by a miscellaneous electorate representing the mal- content element in the nation of all political shades from mon- archist to revolutionary socialist. The Chamber, so composed; was as incoherent as either of its predecessors. It refused to re- elect the radical leader M. Brisson as its president, and then refused its confidence to the moderate leader M. Meline. M. Brisson, the rejected of the Chamber, was sent for to form a ministry, on the 28th of June 1898, which survived till the adjourn ment, only to be turned out when the autumn session began. M. Charles Dupuy thus became prime minister for the third time with a cabinet of the old concentration pattern, and for the third time in less than five years under his premiership the Presidency of the Republic became vacant. Felix Faure had increased in pomposity rather than in popularity. His contact with European sovereigns seems to have made htm over-conscious of tiW: his superior rank, and he cultivated habits which death at austere republicans make believe to be the mono- President poly of frivolous courts. The regular domesticity Faure – of middle-class life may not be disturbed with impunity when age is advancing, and Felix Faure died with tragic unexpected* ness on the 16th of February 1899. The joys of his high office, were so dear to him that nothing but death would have induced him to lay it down before the term of his septeiinate. There was therefore no candidate in waiting for the vacancy; and as Paris was in an agitated mood the majority in the Congress elected M. Loubet president of the Republic, because he happened to hold the second place of dignity in the state, the presidency of the Senate, and was, moreover, a politician who had president. the confidence of the republican groups as an adversary of plebiscitary pretensions. His only competitor was M. Meline, whose ambitions were not realized, in spite*

of the alliance of his Progressist supporters with the Monarchists and Nationalists. The Dupuy ministry lasted till June 1899, when a new cabinet was formed by M. Waldeck-Rousseau, who, having held office under Gambetta and Jules Ferry, had relinquished politics for the bar, of which he had become a distinguished leader. Though a moderate republican, he was the first prime minister to give portfolios to socialist politicians. This was the distinguishing feature of the last cabinet of the century — the thirty-seventh which had taken office in the twenty-six years which had elapsed since the resignation of Thiers in 1873,

It is now necessary to go back a few years in order to refer to a matter which, though not political in its origin, in its de- velopment filled the whole political atmosphere of France in the closing period of the 19th century. Soon after the failure of the Boulangist movement a journal was founded at Paris called the

Libre Parole. Its editor, M. Drumont, was known as the author of La France juive, a violent anti-Semitic work, written to de- nounce the influence exercised by Jewish financiers in Aat,m the politics of the Third Republic. It may be said to

have started the anti-Semitic movement in France,

Semitic movement.

where hostility to the Jews had not the pretext existing in those lands which contain a large Jewish population exercising local rivalry with the natives of the soil, or spoiling them with usury. That state of things existed in Algeria, where the indigenous Jews were made French citizens during the Franco-Prussian War to secure their support against the Arabs in rebellion. But political anti-Semitism was introduced into Algeria only as an offshoot of the movement in continental France, where the great majority of the Jewish community were of the same social class as the politicians of the Republic. Primarily directed against the Jewish financiers, the movement was originally looked upon as a branch of the anti-capitalist propaganda of the Socialists. Thus the Libre Parole joined with the revolutionary press in attacking the repressive legislation provoked by the dynamite outrages of the anarchists, clerical reactionaries who supported it being as scurrilously abused by the anti-Semitic organ as its republican authors. The Panama affair, in the exposure of which the Libre Parole took a prominent part

soon after its foundation, was also a bond between anti- Semites and Socialists, to whom, however, the Monarchists, always incapable of acting alone, united their forces. The implication of certain Jewish financiers with republican politicians in the Panama scandal aided the anti-Semites in their special propaganda, of which a main thesis was that the government of the Third Republic had been organized by its venal politicians for the benefit of Jewish immigrants from Germany, who had thus enriched themselves at the expense of the laborious and un- suspecting French population. The Libre Parole, which had become a popular organ with reactionaries and with malcontents of all classes, enlisted the support of the Catholics by attributing the anti-religious policy of the Republic to the influence of the Jews, skilfully reviving bitter memories of the enaction of the Ferry decrees, when sometimes the laicization of schools or the expulsion of monks and nuns had been carried out by a Jewish functionary. Thus religious sentiment and race prejudice were introduced into a movement which was at first directed against capital; and the campaign was conducted with the weapons of scurrility and defamation which had made an unlicensed press under the Third Republic a demoralizing national evil;

An adroit feature of the anti-Semitic campaign was an appeal to national patriotism to rid the army of Jewish influence. The Co d Jews, it was said, not content with directing the

nation of financial, and thereby the general policy of the Re- Captain public, had designs on the French army, in which they Dreyfus. w i s hed to act as secret agents of their German kindred. In October 1894 the Libre Parole announced that a Jewish officer of artillery attached to the general staff, Captain Alfred Dreyfus, had been arrested on the charge of supplying a government of the Triple Alliance with French military secrets. Tried by court-martial, he was sentenced to military degradation and to detention for life in a fortress. He was publicly degraded at Paris in January 1895, a few days before Casimir-Perier resigned the presidency of the Republic, and was transported to the lie du Diable on the coast of French Guiana. His con- viction, on 'the charge of having betrayed to a foreign power documents relating to the national defence, was based on the alleged identity of his handwriting with that of an intercepted covering-letter, which contained a list of the papers treason- ably communicated. The possibility of his innocence was not raised outside the circle of his friends; the Socialists, who sub- sequently defended him, even complained that common soldiers were shot for offences less than that for which this richly con- nected officer had been only transported. The secrecy of his trial did not shock public sentiment in France, where at that time all civilians charged with crime were interrogated by a judge in private, and where all accused persons are presumed guilty until proved innocent. In a land subject to invasion there was

less disposition to criticize the decision of a military tribunal acting in the defence of the nation even than there would have been in the case of a doubtful judgment passed in a civil court, The country was practically unanimous that Captain Dreyfus had got his deserts. A few, indeed, suggested that had he not been a Jew he would never have been accused; but the greater number replied that an ordinary French traitor of Gentile birth would have been forgotten from the moment of his condemnation. The pertinacity with which some of his co-religionists set to work to show that he had been irregularly condemned seemed to justify the latter proposition. But it was not a Jew who brought about the revival of the affair. Colonel Picquart, an officer of great promise, became head of. the intelligence department at the war office, and in 1896 informed the minister of his suspicion that the letter on which Dreyfus had been condemned was written by a certain Major Esterhazy. The military authorities, not wishing to have the case reopened, sent Colonel Picquart on foreign service, and put in his place Colonel Henry. The all- seeing press published various versions of the incident, and the anti-Semitic journals denounced them as proofs of a Jewish conspiracy against the French army.

At the end of 1897 M. Scheurer-Kestner, an Alsatian devoted to France and a republican senator, tried to persuade his political friends to reopen the case; but M. Meline, the prime n n ytus- minister, declared in the name of the Republic that the B rds aa a Dreyfus affair no longer existed. The fact that the anti-Drty senator who championed Dreyfus was a Protestant tuKardt – encouraged the clerical press in its already marked tendency to utilize anti-Semitism as a weapon of ecclesiastical warfare. But the religious side-issues of the question would have had little importance had not the army been involved in the con- troversy, which had become so keen that all the population, outside that large section of it indifferent to all public questions, was divided into " Dreyfusards " and " anti-Dreyfusards." The strong position of the latter was due to their assuming the position of defenders of the army, which, at an epoch when neither the legislature nor the government inspired respect, and the Church was the object of polemic, was the only institution in France to unite the nation by appealing to its martial and patriotic instincts. That is the explanation of the enthusiasm of the public for generals and other officers by whom the trial of Dreyfus and subsequent proceedings had been conducted in a manner repugnant to those who do not favour the arbitrary ways of military dictatorship, which, however, are not unpopular in France. The acquittal of Major Esterhazy by a court-martial, the conviction of Zola by a civil tribunal for a violent criticism of the military authorities, and the imprisonment without trial of Colonel Picquart for his efforts to exonerate Dreyfus, were practically approved by the nation. This was shown by the result of the general elections in May 1898. The clerical reaction- aries were almost swept out

of the Chamber, but the overwhelm- ing republican majority was practically united in its hostility to the defenders of Dreyfus, whose only outspoken representatives were found in the socialist groups. The moderate Meline ministry was succeeded in June 1898 by the radical Brisson ministry. But while the new prime minister was said to be personally disposed to revise the sentence on Dreyfus, his civilian minister of war, M. Cavaignac, was as hostile to revision as atiy of his military predecessors — General Mercier, under whom the trial took place, General Zurlinden, and General Billot, a re- publican soldier devoted to the parliamentary regime.

The radical minister of war in July 1898 laid before the Chamber certain new proofs of the guilt of Dreyfus, in a speech so convincing that the house ordered it to be placarded poˆocai in all the communes of France. The next month results of ColonelHenry, the chief of the intelligence department, Dreyfus confessed to having forged those new proofs, and then a " tfol, • committed suicide. M. Cavaignac thereupon resigned office, but declared that the crime of Henry did not prove the innocence of Dreyfus. Many, however, who had hitherto accepted the judgment of 1894, reflected that the offence of a guilty man did not heed new crime for its proof. It was further remarked that

the forgery had been committed by the intimate colleague of the officers of the general staff, who had zealously protected Esterhazy, the suspected author of the document on which Dreyfus had been convicted. An uneasy misgiving became widespread; but partisan spirit was too excited for it to cause a general revulsion of feeling. Some journalists and politicians of the extreme Left had adopted the defence of Dreyfus as an anti-clerical movement in response to the intemperate partisan- ship of the Catholic press on the other side. Other members of the socialist groups, not content with criticizing the conduct of the military authorities in the Dreyfus affair, opened a general attack on the French army, — an unpopular policy which allowed the anti-Dreyfusards to utilize the old revolutionary device of making the word " patriotism " a party cry. The defamation and rancour with which the press on both sides flooded the land obscured the point at issue. However, the Brisson ministry just before its fall remitted the Dreyfus judgment to the criminal division of the cour de cassation — the supreme court of revision in France. M. Dupuy formed a new cabinet in November 1898, and made M. de Freycinet minister of war, but that adroit office-holder, though a civilian and a Protestant, did not favour the anti-military

and anti-clerical defenders of Dreyfus. The refusal of the Senate, the stronghold of the Republic, to re-elect M. Scheurer-Kestner as its vice-president, showed that the opportunist minister of war understood the feeling of parliament, which was soon displayed by an extraordinary proceeding. The divisional judges, to whom the case was remitted, showed signs that their decision would be in favour of a new trial of Dreyfus. The republican legislature, therefore, disregarding the principle of the separation of the powers, which is the basis of constitutional government, took the arbitrary step of interfer- ing with the judicial authority. It actually passed a law with- drawing the partly-heard cause from the criminal chamber of the cour de cassation, and transferring it to the full court of three divisions, in the hope that a majority of judges would thus be found to decide against the revision of the sentence on Dreyfus. This flagrant confusion of the legislative with the judicial power displayed once more the incompetence of the French rightly to use parliamentary institutions; but it left the nation indifferent. It was during the passage of the bill that the president of the Republic suddenly died. Felix Faure was said to be hostile to the defenders of Dreyfus and disposed to utilise the popular enthusiasm for the army as a means of making the presidential office independent of parliament. The Chambers, therefore, in spite of their anti-Dreyfusard bias, were determined not to relinquish any of their constitutional prerogative. The military and plebiscitary parties were now fomenting the public discontent by noisy demonstrations. The president of the Senate, M. Loubet, as has been mentioned, was known to have no sympathy with this agitation, so he was elected president of the Republic by a large majority at the congress held at Versailles on 1 8th February 1899. The new president, who was unknown to the public, though he had once been prime minister for nine months, was respected in political circles; but his elevation to the first office of the State made him the object of that defama- tion which had become the chief characteristic of the partisan press under the Third Republic. He was recklessly accused of having been an accomplice of the Panama frauds, by screening certain guilty politicians when he was prime minister in 1892, and because he was not opposed to the revision of the Dreyfus sentence he was wantonly charged with being bought with Jewish money. Meanwhile the united divisions of the cour de cassation were, in spite of the intimidation of the legislature, reviewing the case with an independence worthy of praise in an ill-paid magistracy which owed its promotion to political influence. Instead of justifying the suggestive interference of parliament it revised the judgment of the court-martial, and ordered Dreyfus to be re-tried by a military tribunal at Rennes. The Dupuy ministry, which had wished to prevent this decision, resigned, and M. Waldeck-Rousseau formed a heterogeneous cabinet in which Socialists, who for the first time took office, had for their colleague as minister of war General de Galliffet, whose chief

political fame had been won as the executioner of the Commu- nards after the insurrection of 1871. Dreyfus was brought back from the Devil's Island, and in August 1899 was put upon his trial a second time. His old accusers, led 2f? B ? by (jeneral Meraer, the minister of war of 1894, Dreyfus. redoubled their efforts to prove his guilt, and were permitted by the officers composing the court a wide license according to English ideas of criminal jurisprudence. The published evidence did not, however, seem to connect Dreyfus with the charges brought against him. Nevertheless the court, by a majority of five to two, found him guilty, and with illogical inconsequence added that there were in his treason extenuating circumstances. He was sentenced to ten years' detention, and while it was being discussed whether the term he had already served would count as part of his penalty, the ministry completed the inconsequency of the situation by advising the president of the Republic to pardon the prisoner. The result of the second trial satisfied neither the partisans of the accused, who desired his rehabilitation, some of them reproaching him for accepting a pardon, nor his adversaries, whose vindictiveness was unsated by the penalty he had already suffered. But the great mass of the French people, who are always ready to treat a public question with indifference, were glad to be rid of a controversy which had for years infected the national life.

The Dreyfus affair was severely judged by foreign critics as a miscarriage of justice resulting from race-prejudice. If that simple appreciation rightly describes its origin, it .„ . became in its development one of those scandals character symptomatic of the unhealthy political condition of otthe France, which on a smaller scale had often recurred Dre ˆ. s under the Third Republic, and which were made the " g pretext by the malcontents of all parties for gratifying their animosities. That in its later stages it was not a question of race-persecution was seen in the curious phenomenon of journals owned or edited by Jews leading the outcry against the Jewish officer and his defenders. That it was not a mere episode of the rivalry between Republicans and Monarchists, or between the advocates of parliamentarism and of military autocracy, was evident from the fact that the most formidable opponents of Dreyfus, without whose hostility that of the clericals and reactionaries would have been ineffective, were republican politicians. That it was not a phase of the anti-capitalist movement was shown by the zealous adherence of "the socialist leaders and journalists to the cause of Dreyfus; indeed, one remarkable result of the affair was its diversion of the socialist party and press for several years from their normal campaign against property. The Dreyfus affair was utilized by the reac- tionaries against the Republic, by the clericals against the non-Catholics, by the anti-clericals against the Church, by the military party against the parliamentarians, and by the revolutionary socialists against the army. It was also conspicuously utilized by rival republican politicians

against one another, and the chaos of political groups was further confused by it.

An epilogue to the Dreyfus affair was the trial for treason before the Senate, at the end of 1899, of a number of persons, mostly obscure followers either of M. Deroulede the poet, who advocated a plebiscitary republic, or of the due Jjyf/ d'Orleans, thepretenderof theconstitutionalmonafchy. i899. On the day of President Faure's funeral M. Deroulede had vainly tried to entice General Roget, a zealous adversary of Dreyfus, who was on duty with his troops, to march on the Elysee in order to evict the newly-elected president of the Republic. Other demonstrations against M. Loubet ensued, the most offensive being a concerted assault upon him on the racecourse at Auteuil in June 1899. The subsequent resistance to the police of a band of anti-Semites threatened with arrest, who barricaded themselves in a house in the rue Chabrol, in the centre of Paris, and, with the marked approval of the populace, sustained a siege for several weeks, indicated that the capital was in a condition not far removed from anarchy. M. Deroulede, indicted at the assizes of the Seine for his misdemeanour on the day of President Faure's funeral, had been triumphantly

acquitted. It was evident that no jury would convict citizens prosecuted for political offences and the government therefore decided to make use of the article of the Law of 1875, which allowed the Senate to be constituted a high court for the trial of offences endangering the state. A respectable minority of the Senate, including M. Wallon, the venerable " Father of the Constitution " of 1875, vainly protested that the framers of the law intended to invest the upper legislative chamber with judicial power only for the trial of grave crimes of high treason, and not of petty political disorders which a well-organized government ought to be able to repress with the ordinary machinery of police and justice. The outvoted protest was justified by the proceedings before the High Court, which, un- dignified and disorderly,, displayed both the fatuity of the so- called conspirators and the feebleness of the government which had to cope with them. The trial proved that the plebiscitary faction was destitute of its essential factor, a chief to put forward for the headship of the state, and that it was resolved, if it over- turned the parliamentary system, not to accept under any conditions the due ;d'Orleans, the only pretender before the public. It was shown that royalists and plebiscitary republicans alike had utilized as an organization

of disorder the anti-Semitic propaganda which had won favour among the masses as a nationalist movement to protect the French from foreign competition. The evidence adduced before the high court revealed, moreover, the curious fact that certain Jewish royalists had given to the due d'Orleans large sums of money to found anti-Semitic journals as the surest means of popularizing his cause.

The last year of the 19th century, though uneventful for France, was one of political unrest. This, however, did not take

the form of ministerial crises, as, for the fourth time parties at since responsible cabinets were introduced in 1873, the dose a whole year, from the 1st of January to the 31st of oftbe December, elapsed without a change of ministry.

his domestic policy exasperated a large section of the political world, including one half of the Progressive group which he had helped to found, displayed qualities of statesman- ship always respected in France, but rarely exhibited under the Third Republic. He had proved himself to be what the French call un homme de gouvernement— that is to say, an authoritative administrator of unimpassioned temperament capable of govern- ing with the arbitrary machinery of Napoleonic centralization. His alliance with the extreme Left and the admission into his cabinet of socialist deputies, showed that he understood which wing of the Chamber it was best to conciliate in order to keep the government in his hands for an abnormal term. The advent to office of Socialists disquieted the respectable and prosperous commercial classes, which in France take little part in politics, though they had small sympathy with the nationalists, who were the most violent opponents of the Waldeck-Rousseau ministry. The alarm caused by the handing ov6t of important departments of the state to socialist politicians arose upon a danger which is not always understood beyond the; borders of France. Socialism in France is a movement appealing to the revolutionary instincts of the French democracy, advocated in vague terms by the members of rival groups or sects. Thus the increasing number of socialist deputies in parliament had pro- duced no legislative results, and their presence .in the cabinet was not feared on that account. The fear which their office- holding inspired was due to the immense administrative patron- age which the centralized system confides to each member of the government. French ministers are wont to bestow the places at their disposal on their political friends, so the prospect of administrative posts being filled all over the land by revolu- tionaries caused some uneasiness. Otherwise the presence of Socialists on the ministerial bench seemed to have no other effect than that of partially muzzling the socialist groups in the Chamber. • The opposition to the

government was heterogeneous. It included the few Monarchists left in the Chamber, the Nation- alists, who resembled the Boulangists of twelve years before, and who had added anti-Semitism to the articles of the revisionist

creed, and a number of republicans, chiefly of the old Opportunist group, which had renewed itself under the name of Progressist at the time when M. Waldeck-Rousseau was its most important member in the Senate.

The ablest leaders of this Opposition were all malcontent Republicans; and this fact seemed to show that if ever any form of monarchy were restored in France, political office would probably remain in the hands of men who were former ministers of the Third Republic. Thus the most conspicuous opponents of the cabinet were three ex-prime ministers, MM. Meline, Charles Dupuy and Ribot. Less distinguished republican " ministrables " had their normal appetite for office whetted in 1900 by the international exhibition at Paris. It brought the ministers of the day into unusual prominence, and endowed them with large subsidies voted by parliament for official entertainments. The exhibition was planned on too ambitious a scale to be a financial success. It also called forth the just regrets of those who deplored the tendency of Parisians under the Third Republic to turn their once brilliant city into an international casino. Its most satisfactory feature was the proof it displayed of the industrial inventiveness and the artistic instinct of the French. The political importance of the exhibition lay in the fact that it determined the majority in the Chamber not to permit the foreigners attracted by it to the capital to witness a ministerial crisis. Few strangers of distinction, how- ever, came to it, and not one sovereign of the great powers visited Paris; but the ministry remained in office, and M. Waldeck-Rousseau had uninterrupted opportunity of showing his governmental ability. The only change in his cabinet took place when General de Galliffet resigned the portfolio of war to General Andre. The army, as represented by its officers, had shown symptoms of hostility to the ministry in consequence of the pardon of Dreyfus." The new minister of war repressed such demonstrations with proceedings of the same arbitrary character as those which had called forth criticism in England when used in the Dreyfus affair. In both cases the high-handed policy was regarded either with approval or with indifference by the great majority of the French nation, which ever since the Revolution has shown that its instincts are in favour of authorita- tive government. The emphatic support given by the radical groups to the autocratic policy of M. Waldeck-Rousseau and his ministers was not surprising to those who have studied the history of the French democracy. It has always had a taste for despotism since it first became a political power in the days of the Jacobins, to whose early protection General Bonaparte owed his career. On the other hand liberalism has always been repugnant to the masses, and the only period in which the Liberals governed the country was under the rfigime of limited

suffrage— during the Restoration and the Monarchy of July.

The most important event in France during the last year of the century, not from its political result, but from the lessons it taught, was perhaps the Paris municipal election. The quadrennial renewal of all the municipal councils of France took place in May 1900. The municipality of the capital had been for many years in the hands of the extreme Radicals and the revolutionary Socialists. The Parisian electors now sent to the H6tel de Ville a council in which the majority were Nationalists, in general sympathy with the anti-Semitic and plebiscitary movements. The nationalist councillors did not, however, form one solid party, but were divided into five or six groups, represent- ing every shade of political discontent, from monarchism to revisionist-socialism. While the electorate of Paris thus pro- nounced for the revision of the Constitution, the provincial elections, as far as they had a political bearing, were favourable to the ministry and to the Republic. M. Waldeck-Rousseau accepted the challenge of the capital, and dealt with its repre- sentatives with the arbitrary weapons of centralization which the Republic had inherited from the Napoleonic settlement of the Revolu tion. Municipal autonomy is unknown in France, and the town council of Paris has to submit to special restrictions on its liberty of action. The prefect of the Seine is always present at its meetings as agent of the government and the minister of

the interior can veto any of its resolutions. The Socialists, when their party ruled the municipality, clamoured in parliament for the removal of this administrative control. But now am/the being in a minority they supported the government provinces, in its anti-autonomic rigours. The majority of the municipal council authorized its president to invite to a banquet, in honour of the international exhibition, the provincial mayors and a number of foreign municipal magnates, including the lord mayor of London. The ministers were not invited, and the prefect of the Seine thereupon informed the president of the municipality that he had no right, without consulting the agent of the government, to offer a banquet to the provincial mayors; atid they, with the deference which French officials instinctively show to the central authority, almost all refused the invitation to the H6tel de Ville. The municipal banquet was therefore abandoned, but the government gave one in the Tuileries gardens, at which no fewerthan 22,000 mayors paid their respects to the chief of the state. These events showed that, as in the Terror, as at the coup d'itat of 1851, and as in the insurrection of the Commune, the French provinces were never disposed to follow the political lead of the capital, whether the opinions prevailing there were Jacobin or reactionary. These incidents displayed the tendency of the French democracy, in Paris and in the country alike, to submit to and even to encourage the arbitrary working of administrative centralization. The elected mayors of the provincial communes, urban and rural, quitted themselves like well-drilled functionaries of the state, respectful of their hierarchical superiors, just as in the days when they were the nominees of the government; while the population of Paris, in spite of its perennial proneness to revolu- tion, accepted the rebuff inflicted on its chosen representatives without any hostile demonstration. The municipal elections in Paris afforded fresh proof of the unchanging political ineptitude of the reactionaries. The dissatisfaction of the great capital with the government of the Republic might, in spite of the reluctance of the provinces to follow the lead of Paris, have had grave results if skilfully organized. But the anti-republican groups, instead of putting forward men of high ability or reputation to take possession of the H6tel de Ville, chose their candidates among the same inferior class of professional politicians as the Radicals and the Socialists whom they replaced on the municipal council.

The beginning of a century of the common era is a purely artificial division of time. Yet it has often marked a turning- point in the history of nations. This was notably the at'he case i n F rance ' n 1800. The violent and anarchical opening phases of the Revolution of 1789 came to an end with ofthe the 18th century; and the dawn of the 19th was coincident with the administrative reconstruction of France by Napoleon, on lines which endured with little modification till the end of that century, surviving seven revolutions of the executive power. The opening years of the 20th century*

saw no similar changes in the government of the country. The Third Republic, which was about to attain an age double that reached by any other regime since the Revolution, continued to live on the basis of the Constitution enacted in 1875, before it was five years old. Yet it seems not unlikely that historians of the future may take the date 1900 as a landmark between two distinct periods in the evolution of the French nation.

With the close of the rgth century the Dreyfus affair came practically to an end. Whatever the political and moral causes Results of the agitation which attended it, its practical result of the was to strengthen the Radical and Socialist parties in D £ y f" s the Republic, and to reducetounprecedentedimpotence the forces of reaction. This was due more to the maladroitness of the Reactionaries than to the virtues or the prescience of the extreme Left, as the imprisonment of the Jewish captain, which agitated and divided the nation, could not have been inflicted without the ardent approval of Republicans of all shades of opinion. But when the majority at last realized that a mistake had been committed, the Reactionaries, in great

measure through their own unwise policy, got the chief credit for it. Consequently, as the clericals formed the militant section of the anti-Republican parties, and as the Radical-Socialists were at that time keener in their hostility to the Church than-in their zeal for social or economic reform, the issue of the Dreyfus affair brought about an anti-clerical movement, which, though initiated and organized by a small minority, met with nothing to resist it in the country, the reactionary forces being effete and the vast majority of the population indifferent. The main and absorbing feature therefore of political life in France in the first years of the 20th century was a campaign against the Roman Catholic Church, unparalleled in energy since the Revolution. Its most striking result was the rupture of the Concordat between France and the Vatican. This act was additionally important as being the first considerable breach made in the administrative structure reared by Napoleon, which had hitherto survived all the vicissitudes of the 19th century. Concurrently with this the influence of the Socialist party in French policy largely increased. A primary principle professed by the Socialists throughout Europe is pacificism, and its dissemination in France acted in two very different ways. It encouraged in the French people a growth of anti-military spirit, which showed some sign of infecting the national army, and it impelled the government of the Republic to be zealous in cultivating friendly relations with other powers. The result of the latter phase of pacificism was that France, under the Radical-Socialist administrations of the early years of the 20th century,

enjoyed a measure of international prestige of that superficial kind which is expressed by the state visits of crowned heads to the chief of the executive power, greater than at any period sjnee the Second Empire.

The voting of the law which separated the Church from the state will probably mark a capital date in French history; so, as the ecclesiastical policy of successive ministries filled almost entirely the interior chronicles of France policy for the first five years of the new century, it will be convenient to set forth in order the events which during that period led up to the passing of the Separation Act.

The French legislature during the first session of the Soth century was chiefly occupied with the passing of the Associations Law. That measure, though it entirely changed the legal position of all associations in France, was primarily directed against the religious associations of the Roman Catholic Church. Their influence in the land, according to the anti-clericals, had been proved by the Dreyfus affair to be excessive. The Jesuits were alleged, on their own showing, to exercise considerable power over the officers of the army, and in this way to have been largely responsible for the blunders of the Dreyfus case. Another less celebrated order, which took an active part against Dreyfus, the Assumptionists, had achieved notoriety by its journalistic enterprise, its cheap newspapers of wide circulation being re- markable for the violence of their attacks on the institutions and men of the Republic. The mutual antagonism between the French government and religious congregations is a tradition which dates from the ancient monarchy and was continued by Napoleon I. long before the Third Republic adopted it in the legislation associated with the names of Jules Ferry and Paul Bert. The prime minister, under whose administration the 20th century succeeded the 19th, was M. Waldeck-Rousseau, who had been the colleague of Paul Bert in Gambetta's grand minister e, and in 1883 had served Under Jules Ferry in his second ministry. He had retired from political life, though he remained a member of the Senate, and was making a large fortune at the bar, when in June 1899, at pecuniary sacrifice, he consented to form a ministry for the purpose of " liquidating " the Dreyfus affair. In 1900, the year after the second condemnation of Dreyfus and his immediate pardon by the government, M. Waldeck-Rousseau in a speech at Toulouse announced that legislation was about to be undertaken on the subject of associa- tions. –

At that period the hostility of the Revolution to the principle of associations of all kinds, civil as well as religious, was still enforced by the law. With the exception of certain commercial

societies subject to special legislation, no association composed of more than twenty persons could be formed without govern- mental authorization which was always revocable, the restriction applying equally to political and social clubs and to religious communities. The law was the same for all, but was differently applied. Authorization was rarely refused to political or social societies, though any club was liable to have its authorization withdrawn arid to be shut up or dissolved. But to religious orders new authorization was practically never granted. Only four of them, the orders of Saint Lazare, of the Saint Esprit, of the Missions Etrangeres and of Saint Sulpice, were authorized under the Third Republic — the,ir authorization dating from the First Empire and the Restoration. The Freres de la Doctrine Chretienne were also recognized, not, however, as a religious congregation under the jurisdiction of the minister of public worship, but as a teaching body under that of the minister of education. All the great historical .orders, preaching, teaching or comtemplative, were " unauthorized "; they led a precarious life on sufferance, having as corporations no civil existence, and being subject to dissolution at a moment's notice by the administrative authority. In spite of this disability and of the decrees of 1880 directed against unauthorized monastic orders they had so increased under the anti-clerical Republic, that the religious of both sexes were more numerous in France at the beginning of the 20th century than at the end of the ancient monarchy. Moreover, in the twenty years during which un- authorized Orders had been supposed to be suppressed under the Ferry Decrees, their numbers had become six times more numerous than before, while it was the authorized Congregations which had diminished. The bare catalogue of the religious houses in the land, with the value of their properties (estimated by M. Waldeck-Rousseau at a milliard — £40,000,000) filled two White Books of two thousand pages, presented to parlia- ment on the 4th of December 1900. The hostility to the Con- gregations was not confined to the anti-clericals. The secular clergy were suffering materially from the enterprising competition of their old rivals the regulars. Had the legislation for defining the legal situation of the religious orders been undertaken with the sole intention of limiting their excessive growth, such a measure would have been welcome to the parochial clergy. But they saw that the attack upon the congregations was only preliminary to a general attack upon the Church, in spite of the sincere assurances of the prime minister, a statesman of con- servative temperament, that no harm would accrue to the secular clergy from the passing of the Associations Law.

In January 1901, on the eve of the first debate in the Chamber of Deputies

on the Associations bill, a discussion took place which showed that the rupture of the Concordat might UonsBlU. be nearing the range of practical politics, though ‘ parliament was as yet unwilling to take it into consider-

tion. The archbishop of Paris, Cardinal Richard, had pub- lished a letter addressed to him by Leo XIII. deploring the projected legislation as being a breach of the Concordat under which the free exsrcise of the Catholic religion in France was assured. The Socialists argued that this letter was an intolerable • intervention on the part of the Vatican in the domestic politics of the Republic, and proposed that parliament should after voting the Associations Law proceed to separate Church and State. M. Waldeck-Rousseau, the prime minister, calm and moderate, declined to take this view of the pope’s letter, and the resolution was defeated by a majority of more than two to one. But another motion, proposed by a Nationalist, that the Chamber should declare its resolve to maintain the Concordat, was rejected by a small majority. The discussion of the Associations bill was then commenced by the Chamber and went on until the Easter recess. Its main features when finally voted were that the right to associate for purposes not illicit should be henceforth free of all restrictions, though ” juridical capacity ” would be accorded only to such associations as were formally notified to the administrative authority. The law did not, however, accord liberty of association to religious ” Congregations,” none of which could be formed without a special statute, and

any constituted without such authorization would be deemed illicit. The policy of the measure, as applying to religious orders, was attacked by the extreme Right and the extreme Left from their several standpoints. The clericals proposed that under the new law all associations, religious as well as civil, should be free. The Socialists proposed that all religious com- munities, authorized or unauthorized, should be suppressed. The prime minister took a middle course. But he went farther than the moderate Republicans, with whom he was generally classed. While he protected the authorized religious orders against the attacks of the extreme anti-clericals, he accepted from the latter a new clause which disqualified any member of an unauthorized order from teaching in any school. This was a blow at the principle of liberty of instruction, which had always been supported by Liberals of the old school, who had no sympathy with the pretensions of clericalism. Consequently this provision, though voted by a large majority, was opposed by the Liberals of the Republican party, notably by M. Ribot, who had been twice prime minister, and M. Aynard, almost the sole survivor of .the Left Centre. It was remarked that in these, as in all subsequent debates on ecclesiastical questions, the ablest defenders of the Church were not found among the clericals, but among the Liberals, whose primary doctrine was that of tolerance, which they believed ought to be applied to the exercise of the religion nominally professed by a large

majority of the nation. Few of the ardent professors of that religion gave effective aid to the Church during that period of crisis. M. de Mun still used his eloquence in its defence, but the brilliant Catholic orator had entered his sixtieth year with health impaired, and among the young reactionary members there was not one who displayed any talent. At the other end of the Chamber M. Viviani, a Socialist member for Paris, made an eloquent speech. As was anticipated the bill received no serious opposi- tion in the Senate. Though not in sympathy with the attacks of the Socialists in the Chamber on property, the Upper House had as a whole no objection to their attacks on the Church, and had become a more persistently anti-clerical body than the Chamber of Deputies. The bill was therefore passed without any serious amendments, even those which were moved for the purpose of affirming the principle of liberty of education being supported by very few Republican senators. In the debates some of the utterances of the prime minister were important. On the proposal of M. Rambaud, a professor who was minister of education in the Meline cabinet of 1896, that religious associa- tions should be authorized by decree and not by law, M. Waldeck- Rousseau said that inasmuch as vows of poverty and celibacy were illegal, nothing but a law would suffice to give legality to any association in which such vows were imposed on the members. It was thus laid down by the responsible author of the law that the third clause, providing that any association founded for an illicit cause was null, applied to religious com- munities. On the other hand the prime minister in another speech repudiated the suggestion that the proposed law was aimed against any form of religion. He argued that the religious orders, far from being essential to the existence of the Church, were a hindrance to the work of the parochial clergy, and that inasmuch as the religious orders were organizations independent of the State they were by their nature and influence a danger to the State. Consequently their regulation had become necessary in the interests both of Church and State. The general suppres- sion of religious congregations, the prime minister said, was not contemplated; the case of each one would be decided on its merits, and he had no doubt that parliament would favourably consider the authorization of those whose aim was to alleviate misery at home or to extend French influence abroad. The tenor of M. Waldeck-Rousseau's speech was eminently Con- cordatory. One of his chief arguments against the religious orders was that they were not mentioned in the Concordat, and that their unregulated existence prejudiced the interests of the Concordatory clergy. The speech was therefore an official declaration in favour of the maintenance of the relations between Church and State. That being so, it is important to notice that

by a majority of nearly two to one the Sehate voted the placard- ing of the prime minister's speech in all the communes of France, and that the mover of the resolution was M. Combes, senator of the Charente-Inferieure, a politician of advanced views who up to that date had held office only once, when he was minister of education and public worship for about six months, in the Bourgeois administration in 1805-1896.

The " Law relating to the contract of Association " was promulgated on the 2nd of July 1901, and its enactment was the Socialism on ˆ v political event of high importance that year. The Socialists, except in their anti-clerical capacity, were more active outside parliament than within. Early in the year some formidable strikes took place. At Montceau-les-Mines in Burgundy, where labour demonstrations had often been violent, a new feature of a strike was the formation of a trade- union by the non-strikers, who called their organization "the yellow trade-union " (le syndicat jaune) in opposition to the red trade-union of the strikers, who adopted the revolutionary flag and were supported by the Socialist press. At the same time the dock-labourers at Marseilles went out on strike, by the orders of an international trade-union in that port, as a protest against the dismissal of a certain number of foreigners. The number of strikes in France had increased considerably under the Waldeck-Rousseau government. Its opponents attributed this to the presence in the cabinet of M. Millerand, who had been ranked as a Socialist. On the other hand, the revolutionary Socialists excommunicated the minister of commerce for having joined a " bourgeois government " and retired from the general congress of the Socialist party at Lyons, where MM. Briand and Viviani, themselves future ministers, persuaded the majority not to go so far. The federal committee of miners projected a general strike in all the French coal-fields, and to that end organized a referendum. But of 125,000 miners inscribed on their lists nearly 70,000 abstained from voting, and although the general strike was voted in October by a majority of 34,000, it was not put into effect. Another movement favoured by the Socialists was that of anti-militarism. M. Herve, a professor at the lycee of Sens, had written, in a local journal, the Pioupiou de I'Yonne, on the occasion of the departure of the conscripts for their regiments, some articles outraging the French flag. He was prosecuted and acquitted at the assizes at Auxerre in November, a number of his colleagues in the teaching profession coming forward to testify that they shared his views. The local educational authority, the academic council of Dijon, however, dismissed M. Herve from his official functions, and its sentence was confirmed by the superior council of public education to which he had appealed. Thereupon the Socialists in the Chamber, under the lead of M. Viviani, violently attacked the Government shortly before the prorogation at the end of the year. M. Leygues, the minister of education,

defended the policy of his department with equal vigour, declaring that if a professor in the " university " claimed the right of publishing unpatriotic and anti-military opinions he could exercise it only on the condition of giving up his employment under government — a thesis which was supported by the entire Chamber with the exception of the Socialists. This manifestation of anti-military spirit, though not widespread, was the more striking as it followed close upon a second visit of the emperor and empress of Russia to France, which took place in September 1901 and was of a military rather than of a popular character. The Russian sovereigns did not come to Paris. After a naval display at Dunkirk, where they landed, they were the guests of President Loubet at Compiegne, and concluded their visit by attending a review near Reims of the troops which had taken part in the Eastern manoeuvres. Compared with the welcome given by the French population to the emperor and empress in 1896 their reception on this occasion was not enthusiastic. By not visiting Paris they seemed to wish to avoid contact with the people, who were per- suaded by a section of the press that the motive of the imperial journey to France was financial. The Socialists openly repudi- ated the Russian alliance, and one of them, the mayor 6f Lille, who refused to decorate his municipal buildings when the

sovereigns visited the department of the Nord, was neither revoked nor suspended, although he publicly based his refusal on grounds insulting to the tsar.

It may be mentioned that the census returns of 1901 showed that the total increase of the population of France since the previous census in 1896 amounted only to 412,364, of which 289,662 was accounted for by the capital, while on the other hand the population of sixty out of eighty-seven departments had diminished.

As the quadrennial election of the Chamber of Deputies was due to take place in the spring of 1902, the first months of that year were chiefly occupied by politicians in preparing for it, though none of them gave any sign of being aware that tfhe legislation to be effected by the new Chamber would be the most important which any parliament had undertaken under the constitution of 1875. At the end of the recess the prime minister in a speech at Saint Etienne, the capital of the Loire, of which department he was senator, passed in review the work of his ministry. With regard to the future, on the eve of the election which was to return the Chamber destined to disestablish the Church, he assured the secular clergy that they must not consider the legislation of the last session as menacing them: far from that, the- recent law, directed primarily against those monastic orders which were anti-Republican associations, owning political journals and organizing electioneering funds (whose members he described as " moines ligueurs et moines d'affaires "), would be a guarantee of the Republic's protection of

the parochial clergy. The presence of his colleague, M. Millerand, on this occasion showed that M. Waldeck-Rousseau did not intend to separate himself from the Radical-Socialist group which had supported his government ; and the next day the Socialist minister of commerce, at Firminy, a mining centre in the same department, made a speech deprecating the pursuit of unpractical social ideals, which might have been a version of Gambetta's famous discourse on opportunism edited by an economist of the school of Leon Say. The Waldeck-Rousseau programme for the elections seemed therefore to be an implied promise of a moderate opportunist policy which would strengthen and unite the Republic by conciliating all sections of its supporters. When parliament met, M. Delcasse, minister for foreign affairs, on a proposal to suppress the Embassy to the Vatican, declated that even if the Concordat were ever revoked it would still b6 necessary for France to maintain diplomatic relations with the Holy See. On the other hand, the ministry voted, against the moderate Republicans, for an abstract resolution, proposed by M. Brisson, in favour of the abrogation of the Loi Falloux of 1850, which law, by abolishing the monopoly of the " university," had established the principle of liberty of education. Another abstract resolution, supported by the government, which subsequently become law, was voted in favour of the reduction of the terms of compulsory military service from three years to two.

The general elections took place on the 27th of April 1902; with the second ballots on the nth of May, and were favourable to the ministry, 321 of its avowed supporters being jtesigaa- returned and 268 members of the Opposition, including Hon of 140 " Progressist " Republicans, many of whom were Waideck- deputies whose opinions differed little from those of ousseau – M. Waldeck-Rousseau. In Paris the government lost a few seats which were won by the Nationalist group of reactionaries. The chief surprise of the elections was the announcement made by M. Waldeck-Rousseau on the 20th of May, while the president of the Republic was in Russia on a visit to the tsar, of his intention to resign office. No one but the prime minister's intimates knew that his shattered health was the true cause of his resignation, which was attributed to the unwillingness of an essentially moderate man to be the leader of an advanced party and the instrument of an immoderate policy. His retirement from public life at this crisis was the most important event of its kind since the death of his old master Gambetta. He had learned opportunist statesmanship in the short-lived grand ministers and in the long-lived Ferry administration of r883-

1885, after which he had become an inactive politician in the Senate, while making a large fortune at the bar. In spite of having eschewed politics he had been ranked in the public mind with Gambetta and Jules Ferry as one of the small number of politicians of the Republic who had risen high above mediocrity. While he had none of the magnetic exuberance which furthered the popularity of Gambetta, his cold inexpansiveness had not made him unpopular as was his other chief, Jules Ferry. Indeed, his unemotional coldness was one of the elements of the power with which he dominated parliament; and being regarded by the nation as the strong man whom France is always looking for, he was the first prime minister of the Republic whose name was made a rallying cry at a general election. Yet the country gave him a majority only for it to be handed over to other politicians to use in a manner which he had not contemplated. On the 3rd of June 1902 he formally resigned office, his ministry having lasted for three years, all but a few days, a longer duration than that of any other under the Third Republic.

M. Loubet called upon M. Leon Bourgeois, who had already been prime minister under M. Felix Faure, to form a ministry, but he had been nominated president of the new M. Combes chamber. The president of the Republic then offered minister. tne P ost t0 ^. Brisson, who had been twice prime minister in 1885 and 1898, but he also refused. A third member of the Radical party was then sent for, M. Emile Combes, and he accepted. The senator of the Charente Inf6rieure, in his one short term of office in the Bourgeois ministry, had made no mark. But he had attained a minor prominence in the debates of the Senate by his ardent anti-clericalism. He had been educated as a seminarist and had taken minor orders, without proceeding to the priesthood, and had subsequently practised as a country doctor before entering parliament. M. Combes retained two of the most important members of the Waldeck- Rousseau cabinet, M. Delcasse, who had been at the foreign office for four years, and General Andre, who had become war minister in 1900 on the resignation of General de Galliffet. General Andre was an ardent Dreyfusard, strongly opposed to clerical and reactionary influences in the army. Among the new ministers was M. Rouvier, a colleague of Gambetta in the grand ministere and prime minister in 1 887 , whose participation in the Panama affair had caused his retirement from official life. Being a moderate opportunist and reputed the ablest financier among French politicians, his return to the ministry of finance reassured those who feared the fiscal experiments of an administration supported by the Socialists. The nomination as minister of marine of M. Camille Pelletan (the son of Eugene Pelletan, a notable adversary of the Second Empire), who had been a Radical-Socialist deputy since 1881, though new to office, was less reassuring. M. Combes reserved for himself

the departments of the interior and public worship, meaning that the centralized administration of France should be in his own hands while he was keeping watch over the Church. But in spite of the prime minister's extreme anti-clericalism there was no hint made in his ministerial declaration, on the 10th of June 1902, on taking office that there would be any question of the new Chamber dealing with the Concordat or with the relations of Church and state. M. Combes, however, warned the secular clergy not to make common cause with the religious orders, against which he soon began vigorous action. Before the end of June he directed the Prefets of the departments to bring political pressure to bear on all branches of the public service, and he obtained a presidential decree closing a hundred and twenty-five schools, which had been recently opened in buildings belonging to private individuals, on the ground that they were conducted by members of religious associations and that this brought the schools under the law of 1901. Such action seemed to be opposed to M; Waldeck-Rousseau's interpretation of the law; but the Chamber having supported M. Combes he ordered in July the closing of 2500 schools, conducted by members of religious orders, for which authorization had not been requested. This again seemed contrary to the assurances of M. Waldeck-Rousseau, and it called forth vain protests in the name of liberty from Radicals of the

old school, such as M. Goblet, prime minister in 1886, and from Liberal Protestants, such as M. Gabriel Monod. The execution of the decrees closing the schools of the religious orders caused some violent agitation in the provinces during the parliamentary recess. But the majority of the departmental councils, at their meetings in August, passed resolutions in favour of the govern- mental policy, and a movement led by certain Nationalists, including M. Drumont, editor of the anti-semitic Libre Parole, and M. Francois Coppee, the Academician, to found a league having similar aims to those of the " passive resisters " in our country, was a complete failure. On the reassembling of parlia- ment, both houses passed votes of confidence in the ministry and also an act supplementary to the Associations Law penalizing the opening of schools by members of religious orders.

In spite of the ardour of parliamentary discussions the French public was less moved in 1902 by the anti-clerical action of the government than by a vulgar case of swindling known as the "Humbert affair." The wife of a former deputy %£j rt for Seine-et-Marne, who was the son of M.. Gustave Humbert, minister of justice in 1882, had for many years main- tained a luxurious establishment, which included a political salon, on the strength of her assertion that she and her family had inherited several millions sterling from one Crawford, an English- man. Her story being believed by certain bankers she had been enabled to borrow colossal sums on the legend, and*

had almost married her daughter as a great heiress to a Moderate Republican deputy who held a conspicuous position in the Chamber. The flight of the Humberts, the exposure of the fraud and their arrest in Spain excited the French nation more deeply than the relative qualities of M. Waldeck-Rousseau and M. Combes or the woes of the religious orders. A by-election to the Senate in the spring of 1902 merits notice as it brought back to parliament M. Clemenceau, who had lived in comparative retirement since 1893 when he lost his seat as deputy for Draguignan, owing to a series of unusually bitter attacks made against him by his political enemies. He had devoted his years of retirement to journalism, taking a leading part in the Dreyfus affair on the side of the accused. His election as senator for the Var, where he had formerly been deputy, was an event of importance unanticipated at the time.

The year 1903 saw in progress a momentous development of the anti-clerical movement in France, though little trace of this is found in the statute-book. The chief act of parliament of that year was one which interested the '"""" population much more than any law affecting the movement Church. This was an act regulating the privileges of the bouilleurs de cru, the. peasant proprietors who, permitted to distil from their produce an annual quantity of alcohol sup- posed to be sufficient for their domestic needs, in practice fabri- cated and sold so large an amount as to prejudice gravely the inland revenue. As there were a million of these illicit distillers in the land they formed a powerful element in the electorate. The crowded and excited debates affecting their interests, in which Radicals and Royalists of the rural districts made common cause against Socialists and Clericals of the towns, were in striking contrast with the less animated discussions concerning the Church. The prime minister, an anti-clerical zealot, bitterly hostile to the Church of which he had been a minister, took advantage of the relative indifference of parliament and of the nation in matters ecclesiastical. The success of M. Combes in his campaign against the Church was an example of what energy and pertinacity can do. There was no great wave of popular feeling on the question, no mandate given to the deputies at the general election or asked for by them. Neither was M. Combes a popular leader or a man of genius. He was rather a trained politician, with a fixed idea, who knew how to utilize to his ends the ability and organization of the extreme anti-clerical element in the Chamber, and the weakness of the extreme clerical party. The majority of the Chamber did not share the prime minister's animosity towards the Church, for which at the same time it had not the least enthusiasm, and under the concordatory lead of M. Waldeck-Rousseau it would have been content to*

curb clerical pretensions without having recourse to extreme measures of repression. It was, however, equally content to follow the less tolerant guidance of M. Combes. Thus, early in the session of 1903 it approved of his circular forbidding the priests of Brittany to make use of the Breton language in their religious instruction under pain of losing their salaries. It like- wise followed him on the 26th of January when he declined to accept, as being premature and unpractical, a Socialist resolution in favour of suppressing the budget of public worship, though the majority was' indeed differently composed on those two occasions. In the Senate on the 29th of January M. Waldeck- Rousseau indicated what his policy would have been had he retained office, by severely criticizing his successor's method of applying the Associations Law. Instead of asking parliament to judge on its merits each several demand for authorization made by a congregation, the government had divided the re- ligious orders into two chief categories, teaching orders and preaching orders, and had recommended that all should be suppressed by a general refusal of authorization. The Grande Chartreuse was put into a category by itself as a trading associa- tion and was dissolved; but Lourdes, which with its crowds of pilgrims enriched the Pyrenean region and the railway com- panies serving it, was spared for electioneering reasons. A dispute arose between the government and the Vatican on the nomination of bishops to vacant sees. The Vatican insisted on the words " nobis nominavit " in the papal bulls instituting the bishops nominated by the chief of the executive in France under the Concordat. M. Combes objected to the pronoun, and main- tained that the complete nomination belonged to the French government, the Holy See having no choice in the matter, but only the power of canonical institution. This produced a dead- lock, with the consequence that no more bishops were ever again appointed under the Concordat, which both before and after the Easter recess M. Combes now threatened to repudiate. These menaces derived an increased importance from the failing health of the pope. Leo XIII. had attained the great age of ninety- three, and on the choice of his successor grave issues depended. He died on the 20th of July 1903. The conclave indicated as his successor his secretary of state, Cardinal Rampolla, an able exponent of the late pope's diplomatic methods and also a warm friend of France. It was said to be the latter quality which induced Austria to exercise its ancient power of veto on the choice of a conclave, and finally Cardinal Sarto, patriarch of Venice, a pious prelate inexperienced in diplomacy, was elected and took the title of Pius X. In September the inauguration of a statue of Renan at Treguier, his birthplace, was made the occasion of an anti-clerical demonstration in Catholic and reactionary Brittany, at which the prime minister made a militant speech in

the name of the freethinkers of France, though Renan was a Voltairian aristocrat who disliked the aims and methods of modern Radical-Socialists. In the course of his speech M. Combes pointed out that the anti-clerical policy of the government had not caused the Republic to lose prestige in the eyes of the monarchies of Europe, which were then showing it unprecedented attentions. This assertion was true, and had reference to the visit of the king of England to the president of the Republic in May and the projected visit of the king of Italy. That of Edward VII., which was the first state visit of a British sovereign to France for nearly fifty years, was returned by President Loubet in July, and was welcomed by all parties, excepting some of the re- actionaries. M. Millevoye, a Nationalist deputy for Paris, in the Patrie counselled the Parisians to remember Fashoda, the Transvaal War, and the attitude of the English in the Dreyfus affair, and to greet the British monarch with cries of " Vivent les Boers." M. Deroulede, the most interesting member of the Nationalist party, wrote from his exile at Saint-Sebastien protesting against the folly of this proceeding, which merits to be put on record as an example of the incorrigible ineptitude of the reactionaries in France. The incident served only to prove their complete lack of influence on popular feeling, while it damaged the cause of the Church at a most critical moment by showing that the only persons in France willing to insult a

friendly monarch who was the guest of the nation, belonged to the clerical party. Gf the royal visits that of the king of Italy was the more important in its immediate effects on the history of France, as will be seen in the narration of the events of 1904.

The session of 1904 began with the election of a new president of the Chamber, on the retirement of M. Bourgeois. The choice fell on M. Henri Brisson, an old Radical, but not a Socialist, who had held that post in 1881 and had subsequently filled it on ten occasions, the election to the office being annual. The narrow majority he obtained over M. Paul Bertrand, a little- known moderate Republican, by secret ballot, followed by the defeat of M. Jaures, the Socialist leader, for one of the vice-presidential chairs, showed that one half of the Chamber was of moderate tendency. But, as events proved, the Moderates lacked energy and leadership, so the influence of the Radical prime minister prevailed. In a debate on the 22nd of January on the expulsion of an Alsatian priest of French birth from a French frontier department by the French police, M. Ribot, who set an example of activity to younger men of the moderate groups, reproached M. Combes with reducing all questions in which the French nation was interested to the single one of anti- clericalism, and the prime minister retorted that it was solely for that purpose that he took office. In pursuance of this policy a bill was introduced, and was passed by the Chamber before Easter, interdicting from teaching all members of

religious orders, authorized or not authorized. Among other results tGis law, which the Senate passed in the summer, swept out of exist- ence the schools of the Freres de la Doctrine Chretienne (Christian Brothers) and closed in all 2400 schools before the end of the year.

This drastic act of anti-clerical policy, which was a total repudiation by parliament of the principle of liberty of education, should have warned the authorities of the Church of the relentless attitude of the government. The most superficial observation ought to have shown them that the indifference of the nation would permit the prime minister to go to any length, and common prudence should have prevented them from affording him any pretext for more damaging measures. The President of the Republic accepted an invitation to return the visit of the king of Italy. When it was submitted to the Chamber on March 25th, 1904, a reactionary deputy moved the rejection of the vote for the expenses of the journey on the ground that the chief of the French executive ought not to visit the representative of the dynasty which had plundered the papacy. The amendment was rejected by a majority of 502 votes to 12, which showed that at a time of bitter controversy on ecclesiastical questions French opinion was unanimous in approving the visit of the president of the Republic to Rome as the guest of the king of Italy. Nothing could be more gratifying to the entire French nation, both on racial and on traditional grounds, than such a testimony of a complete revival of friendship with Italy j of late years obscured by the Triple Alliance. Yet the Holy See saw fit to advance pretensions inevitably certain to serve the ends of the extreme anti-clericals, whose most intolerant acts at that moment, such as the removal of the crucifixes from the law- courts, were followed by new electoral successes. Thus the reactionary majority on the Paris municipal council was displaced by the Radical-Socialists on the 1st of May, the day that M. Loubet returned from his visit to Rome. On the 16th of May M. Jaures' Socialist organ, L'HumaniU, published the text of a protest, addressed by the pope to the powers having diplo- matic relations with the Vatican, against the visit of the president of the Republic to the King of Italy. This document, dated the 28th of April, was offensive in tone both to France and to Italy. It intimated that while Catholic sovereigns refrained from visiting the person who, contrary to right, exercised civil sovereignty in Rome, that " duty" was even more "imperious" for the ruler of France by reason of the " privileges " enjoyed by that country from the Concordat; that the journey of M. Loubet to " pay homage " within the pontifical see to that person was an insult to the sovereign pontiff; and that only for reasons of special gravity was the nuncio permitted to remain

in Paris. The publication of this document caused some joy among the extreme clericals, but this was nothing to the exulta- tion of the extreme anti-clericals, who saw that the prudent diplomacy of Leo XIII., which had risen superior to many a provocation of the French government, was succeeded by a papal policy which would facilitate their designs in a manner

unhoped for. Moderate men were dismayed, seeing Diplomatic that the Concordat was now in instant danger; but 'Same!' tne majority of the French nation remained entirely

indifferent to its fate. Within a week France took the initiative by recalling the ambassador to the Vatican, M. Nisard, leaving a third-secretary in charge. In the debate in the Chamber upon the incident, the foreign minister, M. Delcasse, said that the ambassador was recalled, not because the Vatican had protested against the visit of the president to the king of Italy, but because it had communicated this protest, in terms offensive to France, to foreign powers. The Chamber on the 27th of May approved the recallof the ambassador by the large majority of 420 to 90. By a much smaller majority it rejected a Socialist motion that the Nuncio should be given his passports. The action of the Holy See was not actually an infringement of the Concordat; so the government, satisfied with the effect produced on public opinion, which was now quite prepared for a rupture with the Vatican, was willing to wait for a new pretext, which was not long in coming. Two bfshops, Mgr. Geay of Laval and Mgr. Le Nordez of Dijon, were on bad terms with the clerical reactionaries in their, dioceses. The friends of the prelates, including some of their episcopal brethren, thought that their chief offence was their loyalty to the Republic, and it was an unfortunate coincidence that these bishops, subjected to proceedings which had been unknown under the long, pontificate of Leo XIII., should have been two who had incurred the animosity of anti-republicans. Their enemies accused Mgr. Geay of immorality and Mgr. Le Nordez of being in league with the freemasons. The bishop of Laval was summoned by the Holy Office, without any communication with the French government, to resign his see, and he submitted the citation forthwith to the minister of public worship. The French charge d'affaires at the Vatican was instructed to protest against this grave infringement of an article of the Concordat, and, soon after, against another violation of the Concordat committed by the Nuncio, who had written to the bishop of Dijon ordering him to suspend his ordinations, the Nuncio being limited, like all other ambassadors, to communicating the instructions of his government through the intermediary of the minister for foreign affairs. The Vatican declined to give any satisfaction to the French government and summoned the two bishops to

Rome under pain of suspension. So the French charge d'affaires was directed to leave Rome, after having informed the Holy See that the government of the Republic considered that the mission of the apostolic Nuncio in Paris was terminated. Thus came to an end on the 30th of July 1904 the diplomatic relations which under the Concordat had subsisted between France and the Vatican for more than a hundred years. Twelve days later M. Waldeck-Rousseau died, having lived just long enough to see this unanticipated result of his policy. It was said that his resolve to regulate the religious associations arose from his feeling that whatever injustice had been com- mitted in the Dreyfus case had been aggravated by the action of certain unauthorized orders. However that may be, his own utterances showed that he believed that his policy was one of finality. But he had not reckoned that his legislation, which needed hands as calm and impartial as his own to apply it, would be used in a manner he had not contemplated by sectarian politicians who would be further aided by the self-destructive policy of the highest authorities of the Church. When parliament assembled for the autumn session a general feeling was expressed, by moderate politicians as well as by supporters of the Combes ministry, that disestablishment was inevitable. The prime minister said that he had been long in favour of it, though the previous year he had intimated to M. Nisard, ambassador to the Vatican, that he had not a majority in parliament to vote

it. But the papacy and the clergy had since done everything to change that situation. The Chamber did not move in the matter beyond appointing a committee to consider the general question, to which M. Combes submitted in his own name a bill for the separation of the churches from the State.

During the last three months of 1904 public opinion was diverted to the cognate question of the existence of masonic delation in the army. M. Guyot de Villeneuve, Wgr Nationalist deputy for Saint Denis, who had been office dismissed from the army by General de Galliffet in dlfflm connexion with the Dreyfus affair, brought before the ca,t,es – Chamber a collection of documents which, it seemed, had been abstracted from the Grand Orient of France, the headquarters of French freemasonry, by an official of that order. These papers showed that an elaborate system of espionage and delation had been organized by the freemasons throughout France for the purpose of obtaining information as to the political opinions and religious practices of the officers of the army, and that this system was worked with the connivance of certain officials of the ministry of war. Its aim appeared to be to ascertain if officers went to mass or sent their children to convent schools or in any way were in sympathy with the Roman Catholic religion, the names of officers so secretly denounced being placed on a black-list at the War Office, whereby they were disqualified for promotion. There was no doubt about the authenticity of the documents or of the facts which they

revealed. Radical ex-ministers joined with moderate Republicans and reactionaries in denouncing the system. Anti-clerical deputies declared that, it was no use to cleanse the war office of the influence of the Jesuits, which was alleged to have prevailed there, if it were to be replaced by another occult power, more demoralizing because more widespread. Only the Socialists and a few of the Radical- Socialists in the Chamber supported the action of the freemasons. General Andre, minister of war, was so clearly implicated, with the evident approval of the prime minister, that a revulsion of feeling against the policy of the anti-clerical cabinet began to Operate in the Chamber. Had the opposition been wisely guided there can be little doubt that a moderate ministry would have been called to office and the history of the Church in France might have been changed. But the reactionaries, with their accustomed folly, played into the hands of their adversaries. The minister of war had made a speech which produced a bad impression. As he stepped down from the tribune he was struck in the face by a Nationalist deputy for Paris, a much younger man than he. The cowardly assault did not save the minister, who was too deeply compromised in the delation scandal. But it saved the anti-clerical party, by rallying a number of waverers who, until this exhibition of reactionary policy, were prepared to go over to the Moderates, from the " bloc," as the ministerial majority was called. The Nationalist deputy was committed to the assizes on the technical charge of assaulting a functionary while performing his official duties; Towards the end of the year, on the eve of his trial, he met with a violent death, and the circumstances which led to it, when made public, showed that this champion of the Church was a man of low morality. General Andre had previously resigned and was succeeded as minister of war by M. Berteaux, a wealthy stock-broker and a Socialist.

The Combes cabinet could not survive the delation scandal, in spite of the resignation of the minister of war and the in- eptitude of the opposition. On the 8th of January Pall 1905, two days before parliament met, an election took of the place in Paris to fill the vacancy caused by the death Combes of the Nationalist deputy who had assaulted General m,n,str y- Andre. The circumstances of his death, at that time partially revealed, did not deter the electors from choosing by a large majority a representative of the same party, Admiral Bienaime, who the previous year had been removed for political reasons from the post of maritime prefect at Toulon, by M. Camille Pelletan, minister of marine. A more serious check to the Combes ministry was given by the refusal of the Chamber to re-elect as president M. Brisson, who was defeated by a majority of twenty-

five by M. Doumer, ex-Governor-General of Indo-China, who, though he had entered politics as a Radical, was now supported by the anti-republican reactionaries as well as by the moderate Republicans. A violent debate arose on the question of expelling from the Legion of Honour certain members of that order, including a general officer, who had been involved in the delation scandal. M. Jaures, the eloquent Socialist deputy for Albi, who played the part of Eminence grise to M. Combes in his anti- clerical campaign, observed that the party which was now demanding the purification of the order had been in no hurry to expel from it Esterhazy long after his crimes had been proved in connexion with the Dreyfus case. The debate was inconclusive, and the government on the 14th of January obtained a vote of confidence by a majority of six. But M. Combes, whose animosity towards the church was keener than his love of office, saw that his ministry would be constantly liable to be put in a minority, and that thus the consideration of separation might be postponed until after the general elections of 1906. So he announced his resignation in an unprecedented manifesto addressed to the president of the Republic on the 18th January. M. Rouvier, minister of finance in the outgoing government, was called upon for the second time in his career to form a ministry. A moderate opportunist himself, he intended to form jfaZvier a coalition cabinet in which all groups of Republicans, ministry, from the Centre to the extreme Left, would be repre- sented. But he failed, and the ministry of the 24th of January 1905 contained no members of the Republican opposi- tion which had combated M. Combes. The prime minister retained the portfolio of finance; M. Delcasse remained at the foreign office, which he had directed since 1898, and M. Berteaux at the war office; M. Etienne, member for Oran, went to the ministry of the interior; another Algerian deputy, M. Thomson, succeeded M. Camille Pelletan at the ministry of marine, which department was said to have fallen into inefficiency; public worship was separated from the department of the interior and joined with that of education under M. Bienvenu-Martin, Radical-Socialist deputy for Auxerre, who was new to official life. Although M. Rouvier, as befitted a politician of the school of WaldeckrRousseau, disliked the separation of the churches from the state, he accepted that policy as inevitable. After the action of the Vatican in 1904, which had produced the rupture of diplomatic relations with France, many moderates who had been persistent in their opposition to the Combes ministry, and even certain Nationalists, accepted the principle of separation, but urged that it should be effected on liberal terms. So on the 27th of January, after the minister of education and public worship had announced that the government intended to introduce a separation bill, a vote of confidence was obtained by a majority ˚f 373 lo 99, half of the majority being opponents of the Combes

ministry of various Republican and reactionary groups, while the minority was composed of 84 Radicals and Socialists and only 15 reactionaries.

On the 2 1 st of March the debates on the separation of the churches from the state began. A commission had been appointed in 1904 to examine the subject. Its reporter was M. The Aristide Briand, Socialist member for Saint Etienne.

tion™aw. According to French parliamentary procedure, the reporter of a commission, directed to draw up a great scheme of legislation, can make himself a more important person in conducting it through a house of legislature than the minister in charge of the bill. This is what M. Briand succeeded in doing. He produced with rapidity a " report " on the whole question, in which he traced with superficial haste the history of the Church in France from the baptism of Clovis, and upon this drafted a bill which was accepted by the government. He thus at one bound came from obscurity into the front rank of politicians, and in devising a revolutionary measure learned a lesson of moderate statesmanship. In conducting the debates he took the line of throwing the responsibility for the rupture of the Concordat on the pope. The leadership of the Opposition fell on M. Ribot, who had been twice prime minister of the Republic and was not a practising Catholic. He recognized that separation

had become inevitable,; but argued that it could be accomplished as a permanent act only in concert with the Holy See. The clerical party in the Chamber did little in defence of the Church. The abbes Lemire and Gayraud, the only ecclesiastics in parlia- ment, spoke with moderation, and M. Groussau, a Catholic jurist, attacked the measure with less temperate zeal; but the best serious defence of the interests of the Church came from the Republican centre. Few amendments from the extreme Left were accepted by M. Briand, whose general tone was moderate and not illiberal. One feature of the debates was the reluctance of the prime minister to take part in them, even when financial clauses were discussed in which his own office was particularly concerned. The bill finally passed the Chamber on the 3rd of July by 341 votes against 233, the majority containing a certain number of conservative Republicans and Nationalists. At the end the Radical-Socialists manifested considerable discontent at the liberal tendencies of M. Briand, and declared that the measure as it left the Chamber could be considered only pro- visional. In the Senate it underwent no amendment whatever, not a single word being altered. The prime minister, M. Rouvier, never once opened his lips during the lengthy debates, in the course of which M. Clemenceau, as a philosophical Radical who voted for the bill, criticized it as too concordatory, while M. Meline, as a moderate Republican, who voted against it, pre- dicted that it would create such a state of things as would necessitate new negotiations with Rome a

few years later. It was finally passed by a majority of 181 to 102, the complete number of senators being 300, and three days later, on the 9th of December 1905, it was promulgated as law by the president of the Republic.

The main features of the act were as follows. The first clauses guaranteed liberty of conscience and the free practice of public worship, and declared that henceforth the Republic neither recognized nor remunerated any form of religion, except in the case of chaplains to public schools, hospitals and prisons. It provided that after inventories had been taken of the real and personal property in the hands of religious bodies, hitherto remunerated by the state, to ascertain whether such property belonged to the state, the department, or the commune, all such property should be transferred to associations of public worship {associations cultuelles) established in each commune in accordance with the rules of the religion which they represented, for the pur- pose of carrying on the practices of that religion. As the Vatican subsequently refused to permit Catholics to take part in these associations, the important clauses relating to their organization and powers became a dead letter, except in the case of the Pro- testant and Jewish associations, which affected only a minute proportion of the religious establishments under the act. Nothing, therefore, need be said about them except that the chief discus- sions in the Chamber took place with regard to their constitution, which was so amended, contrary to the wishes of the extreme anti-clericals, that many moderate critics of the original bill thought that thereby the regular practice of the Catholic reˆ ligion, under episcopal control, had been safeguarded. A system of pensions for ministers of religion hitherto paid by the state was provided, according to the age and the length of service of the ecclesiastics interested, while in small communes of under a thousand inhabitants the clergy were to receive in any case their full pay for eight years. The bishops' palaces were to be left gratuitously at the disposal of the occupiers for two years, and the presbyteries and seminaries for five years. This provision too became a dead letter, owing to the orders given by the Holy See to the clergy. Other provisions enacted that the churches should not be used for political meetings, while the services held in them were protected by the law from the acts of disturbers. As the plenary operation of the law depended on the associations cultuelles, the subsequent failure to create those bodies makes it useless to give a complete exposition of a statute of which they were an essential feature.

The passing of the Separation Law was the chief act of the last year of the presidency of M. Loubet. One other important measure has to be noted, the law reducing compulsory military

[Hisrontr

service to two years. The law of 1889 had provided a general service of three years, with an extensive system of dispensations accorded to persons for domestic reasons, or because they belonged to certain categories of students, such citizens being let off with one year's service with the colours or being entirely exempted. The new law exacted two years' service from every Frenchman, no one being exempted save for physical incapacity. Under the act of 1905 even the cadets of the military college of Saint Cyr and of the Polytechnic had to serve in the ranks before entering those schools. Anti-military doctrines continued to be encouraged by the Socialist party, M. Herve, the professor who had been revoked in 1901 for his suggestion of a military strike in case of war and for other unpatriotic utterances, being elected a member of the administrative committee of the Unified Socialist party, of which M. Jaures Was one of the chiefs. At a congress of elementary schoolmasters at Lille in August, anti- military resolutions were passed and a general adherence was given to the doctrines of M. Herve. At Longwy, in the Eastern coal-field, a strike took place in September, during which the military was called out "to keep order and a workman was killed in a cavalry charge. The minister of war, M. Berteaux, visited the scene of the disturbance, and was reported to have saluted the red revolutionary flag which was borne by a procession of strikers singing the " Internationale."

During the autumn session in November M. Berteaux suddenly resigned the portfolio of war during a sitting of the Chamber, and was succeeded by M. Etienne, minister of the interior r a moderate politician who inspired greater confidence. Earlier in the year other industrial strikes of great gravity had taken place, notably at Limoges, among the potters, where several deaths took place in a conflict with the troops and a factory was burnt. Even more serious were the strikes in the govern- ment arsenals in November. At Cherbourg and Brest only a small proportion of the workmen went out, but at Lorient, Rochefort and especially at Toulon the strikes were on a much larger scale. In 1905 solemn warnings were given in the Chamber of the coming crisis in the wine-growing regions of the South. Radical-Socialists such as M. Doumergue, the deputy for Nimes and a member of the Combes ministry, joined with monarchists such as M. Lasies, deputy of the Gers, in calling attention to the distress of the populations dependent on the vine. They argued that the wines of the South found no market, not because of the alleged over-production, but because of the competition of artificial wines; that formerly only twenty departments of France were classed in the atlas as wine-producing, but that thanks to the progress of chemistry seventy departments were now so described. The

deputies of the north of France and of Paris, irrespective of party, opposed these arguments, and the government, while promising to punish fraud, did not seem to take very seriously the legitimate warnings of the representatives of the South.

The Republic continued to extend its friendly relations with foreign powers, and the end of M. Loubet's term of office was signalized by a procession of royal visits to Paris, some of which the president returned. At the end of May the king of Spain came and narrowly escaped assassination from a bomb which was thrown at him by a Spaniard as he was returning with the president from the opera. In October M. Loubet returned this visit at Madrid and went on to Lisbon to see the king of Portugal, being received by the queen, who was the daughter of the comte de Paris and the sister of the due d'Orleans, both exiled by the Republic. In November the king of Portugal came to Paris, and the president of the Republic also received during the year less formal visits from the kings of England and of Greece.

One untoward international event affecting the French ministry occurred in June 190s. M. Delcass6 (see section on Exterior Policy) , who had been foreign minister longer aonˆf"ˆ tnan an y h°lder of that office under the Republic, DehasaA resigned, and it was believed that he had been sacrificed by the prime minister to the exigencies of Germany, which power was said to be disquieted at his having, in connexion

with the Morocco question, isolated Germany by promoting the friendly relations of France with England, Spain and Italy. Whether it be true or not that the French government was really in alarm at the possibility of a declaration of war by Germany, the impression given was unfavourable, nor was it removed when M. Rouvier himself took the portfolio of foreign affairs.

The year 1906 is remarkable in the history of the Third Republic in that it witnessed the renewal of all the public powers in the state. A new president of the Republic M Pa g SknB was elected on the 17 th of January ten days after the president triennial election of one third of the senate, and the of the general election of the chamber of deputies followed RwbUc in May — the ninth which had taken place under the constitution of 1875. The senatorial elections of the 7th of January showed that the delegates of the people who chose the members of the upper house and represented the average opinion of the country approved of the anti-clerical legislation of parliament. The election of M. Fallieres, president of the senate, to the presidency of the Republic was therefore anticipated, he being the candidate of the parliamentary majorities which had disestablished the church. At the congress of the two chambers held at Versailles on the 17th of January he received the absolute majority of" 449 votes out of 849

recorded. The candidate of the Opposition was M. Paul Doumer, whose anti-clericalism in the past was so extreme that when married he had dispensed with a religious ceremony and his children were unbaptized. So the curious spectacle was presented of the Moderate Opportunist M. Fallieres being elected by Radicals and Socialists, while the Radical candidate was supported by Moderates and Reactionaries. For the second time a president of the senate, the second official personage in the Republic, was advanced to the chief magistracy, M. Loubet having been similarly promoted. As in his case, M. Fallieres owed his election to M. Clemenceau. When M. Loubet was elected M. Clemenceau had not come to the end of his retirement from parliamentary life; but in political circles, with his powerful pen and otherwise^ he was resuming his former influence as a " king-maker." He knew of the precariousness Of Felix Faure's health and of the indiscretions of the elderly president. So when the presidency suddenly became vacant in January 1899 he had already fixed his choice on M. Loubet, as a candidate whose unobtrusive name excited no jealousy among the republicans. At that moment, owing to the crisis caused by the Dreyfus affair, the Republic needed a safe man to protect it against the attacks of the plebiscitary party which had been latterly favoured by President Faurei M. Constans, it was said, had in 1899 desired the presidency of the senate, vacant by M. Loubet's promotion, in preference to thepostof ambassador at Constantinople. But M. Clemenceau, deeming that his name had been too much associated with polemics in the past, contrived the election of M. Fallieres to the second place of dignity in the Republic, so as to have another safe candidate in readiness for the Elys6e in case President Loubet suddenly disappeared. M. Loubet, however, completed his septennate, and to the end of it M. Fallieres was regarded as his probable successor. As he fulfilled his high duties in the senate inoffensively without making enemies among his political friends, he escaped the fate which had awaited other presidents- designate of the Republic. Previously to presiding over the senate this Gascon advocate, who had represented his native Lot-et-Garonne, in either chamber, since 1876, had once been prime minister for three weeks in 1883. He had also held office in six other ministries, so no politician in France had a larger experience in administration and in public affairs.

On New Year's Day 1906, the absence of the Nuncio from the presidential reception of the diplomatic body marked con- spicuously the rupture of the Concordat; for hitherto the repre- sentative of the Holy See had; ranked as doyen of the ambassadors to the Republic, whatever the relative seniority of his colleagues, and in the name of all the foreign powers had officially saluted the chief of the state. On the 20th of January the inventories of the churches were commenced, under the 3rd clause of the

Separation Act, for the purpose of assessing the value of the furniture and Other objects which they contained. In Paris they occasioned some disturbance; but as the protesting rioters were led by persons whose hostility to the Republic was more notorious than their love for religion, the demonstrations were regarded as political rather than religious. In certain rural districts, where the church had retained its influence and where its separation from the state was unpopular, the taking of the inventories was impeded by the inhabitants, and in some places, where the troops were called out to protect the civil authorities, further feeling was aroused by the refusal of officers to act. But, as a rule, this first manifest operation of the Separation Law was received with indifference by the population. One region where popular feeling was displayed in favour of the church was Flanders, where, in March, at Boeschepe on the P Belgian frontier, a man was killed during the taking*

ministry, of an inventory. This accident caused the fall of the ministry. The moderate Republicans in the Chamber, who had helped to keep M. Rouvier in office, withheld their support in a debate arising out of the incident, and the govern- ment was defeated by thirty-three votes. M. Rouvier resigned, and the new president of the Republicsent forM. Sarrien, a Radical of the old school from Burgundy, who had been deputy for his native Sa6ne-et-Loire from the foundation of the Chamber in 1876 and had previously held office in four cabinets. In M. Sarrien's ministry of the 14th of March 1906 the president of the council was only a minor personage, its real conductor being M. Clemenceau, who accepted the portfolio of the interior. Upon him, therefore devolved the function of " making the elections " cu. °f 1906, as it is the minister at the Place Beauvau, meaceau where all the wires of administrative government are minister centralized, who gives the orders to the prefectures ottbe at eacn general election. As in France ministers sit

0T ' and speak in both houses of parliament, M. Clemenceau, though a senator, now returned, after an absence of thirteen years, to the Chamber of Deputies, in which he had played a mighty part in the first seventeen years of its existence. His political ex- perience was unique. From an early period after entering the Chamber in 1876 he had exercised there an influence not exceeded by any deputy. Yet it was not until 1906, thirty years after his first election to parliament, that he held office— though in 1888 he just missed the presidency of the Chamber, receiving the same number of votes as M. Meline, to whom the post was allotted by right of seniority. He now returned to the tribune of the Palais Bourbon, on which he had been a most formidable orator. During his career as deputy his

eloquence was chiefly destructive, and of the nineteen ministries which fell between the election of M. Grevy to the presidency of the Republic in 1879 and his own departure from parliamentary life in 1893 there were few of which the fall had not been expedited by his mordant criticism or denunciation. He now came back to the scene of his former achievements not to attack but to defend a ministry. Though his old occupation was gone, his re-entry excited the keenest interest, for at sixty-five he remained the biggest political figure in France. After M. Clemenceau the most interesting of the new ministers was M. Briand, who was not nine years old when M. Clemenceau had become conspicuous in political life as the mayor of Montmartre on the eve of the Commune. M. Briand had entered the Chamber, as Socialist deputy for Saint fitienne, only in 1902. The mark he had made as "reporter" of the Separation Bill has been noted, and oil that account he became minister of education and public worship — the terms of the Separation Law necessitating the continuation of a department for ecclesiastical affairs. As he had been a militant Socialist of the " unified " group of which M. Jaures was the chief, and also a member of the superior council of labour, his appointment indicated that the new ministry courted the support of the extreme Left. It, however, contained some moderate men, notably M. Poincar6, who had the repute of making the largest income at the French bar after M. Waldeck-Rousseau gave up his practice, and who became for the second time minister of finance. The portfolios of the colonies and of public works were

also given to old ministers of moderate tendencies, M. Georges Leygues and M. Barthou. A former prime minister, M. Leon Bourgeois, went to the foreign office, over which he had already presided, besides having represented France at the peace con- ference at the Hague; while MM. fitienne and Thomson re- tained their portfolios of war and marine. The cabinet contained so many men of tried ability that it was called the ministry of all the talents. But the few who understood the origin of the name knew that it would be even more ephemeral than was the British ministry of 1806; for the fine show of names belonged to a transient combination which could not survive the approaching elections long enough to leave any mark in politics.

Before the elections took place grave labour troubles showed that social and economical questions were more likely to give anxiety to the government than any public movement resulting from the disestablishment of the church. Progress Almost the first ministerial act of M. Clemenceau was ism™ to visit the coal basin of the Pas de Calais, where an accident causing great loss of life was followed by an uprising of the working population of the region, which spread into the adjacent department of the Nord and caused the minister of the intericr to take unusual precautions to prevent violent demonstra- tions in Paris on Labour Day, the 1st of May.

The activity of the Socialist leaders in encouraging anti^capitalist agitation did not seem to alarm the electorate. Nor did it show any sym- pathy with the appeal of the pope, who in his encyclical letter, Vehementer nos, addressed to the French cardinals on the nth of February, denounced the Separation Law. So the result of the elections of May 1906 was a decisive victory for the anti- clericals and Socialists.

A brief analysis of the composition of the Chamber of Deputies is always impossible, the limits of the numerous groups being ill-defined. But in general term's the majority supporting the radical policy of the bloc in the last parliament, which had usually mustered about 340 votes, now numbered more than 400, including 230 Radical-Socialists and Socialists. The gains of the extreme Left were chiefly at the expense of the moderate or progressist republicans, who, about 120 strong in the old Chamber, now came back little more than half that number. The anti- republican Right, comprising Royalists, Bonapartists and Nationalists, had maintained their former position and were about 130 all told. The general result of the polls of the 6th and 20th of May was thus an electoral vindication of the advanced policy adopted by the old Chamber and a repudiation of moderate Republicanism; while the stationary condition of the reactionary groups showed that the tribulations inflicted by the last parlia- ment on the church had not provoked the electorate to increase its support of clerical politicians.

The Vatican, however, declined to recognize this unmistakable demonstration. The bishops, taking advantage of their release from the concordatory restrictions which had withheld from them the faculty of meeting in assembly, had met at a preliminary conference to consider their plan of action under the Separation Law. They had adjourned for further instructions from the Holy See, which were published on the 10th of August 1906, . in a new encyclical Gravissimo officii, wherein, to the consterna- tion of many members of the episcopate, the pope interdicted the associations cultuelles, the bodies which, under the Separation Law, were to be established in each parish, to hold and to organize the church property and finances, and were essential to the working of the act. On the 4th of September the bishops met again and passed a resolution of submission to the Holy See. In spite of their loyalty they could not but deplore an injunction which inevitably would cause distress to the large majority of the clergy after the act came into operation on the 12 th of December I0o6. They knew only too well how hopeless was the idea that the distress of the clergy would call forth any revulsion of popular feeling in France. The excitement of the public that summer over a painful clerical scandal in the diocese of Chartres showed that the interest taken by the mass of the population in church matters was not of a kind which would aid the clergy in their difficult situation.

At the close of the parliamentary recess M. Sarrien resigned the premiership on the pretext of ill-health, and by a presidential decree of the 25th of October 1906 M. Clemenceau, The cie- wno had been called to fill the vacancy, took office. 'ministry. MM. Bourgeois, Poincare, Etienne and Leygues retired with M. Sarrien. The new prime minister placed at the foreign office M. Pichon, who had learned politics on the staff of the Justice, the organ of M. Clemenceau, by whose influence he had entered the diplomatic service in 1893, after eight years in the chamber of deputies. He had been minister at Pekin during the Boxer rebellion and resident at Tunis, and he was now radical senator for the Jura. M. Caillaux, a more adventurous financier than M. Rouvier or M. Poincare, who had been Waldeck-Rousseau's minister of finance, resumed that office. The most significant appointment was that of General Picquart to the war office. The new minister when a colonel had been willing to sacrifice his career, although he was an anti-Semite, to redressing the injustice which he believed had been inflicted on a Jewish officer — whose second condemnation, it may be noted, had been quashed earlier in 1906. M. Viviani became the first minister of labour (Travail et Prevoyance sociale). The creation of the office and the appointment of a socialist lawyer and journalist to fill it showed that M. Clemenceau recognized the increasing prominence of social and industrial questions and the growing power of the trade-unions.

The acts and policy of the Clemenceau ministry and the events which took place during the years that it held office are too near the present time to be appraised historically. It seems not unlikely that the first advent to power, after thirty-five years of strenuous political life, of one who must be ranked among the ablest of the twenty-seven prime ministers of the Third Republic will be seen to have been coincident with an important evolution in the history of the French nation. The separation of the Roman Catholic Church from the state, by the law of December 1905, had deprived the Socialists, the now most powerful party of the extreme Left, of the chief outlet for their activity, which hitherto had chiefly found its scope in anti-clericalism. Having no longer the church to attack they turned their attention to economical questions, the solution of which had always been their theoretical aim. At the same period the law relating to the Contract of Association of 1901, by removing the restrictions (save in the case of religious communities) which previously had prevented French citizens from forming association without the authoriza- tion of the government, had formally

abrogated the individualistic doctrine of the Revolution, which in all its phases was intolerant of associations. The law of June 1791 declared the destruction of all corporations of persons engaged in the same trade or profession to be a fundamental article of the French constitution, and it was only in the last six years of the Second Empire that some tolerance was granted to trade-unions, which was extended by the Third Republic only in 1 884. In that year the prohibition of 1791 was repealed. Not quite 70 unions existed at the end of 1884. In 1890 they had increased to about 1000, in 1894 to 2000, and in 1 90 1, when the law relating to the Contract of Association was passed, they numbered 3287 with 588,832 members. The law of 1901 did not specially affect them; but this general act, completely emancipating all associations formed for secular purposes, was a definitive break with the individualism of the Revolution which had formed the basis of all legislation in France for nearly a century after the fall of the ancient monarchy. It was an encouragement and at the same time a symptom of the spread of anti-individualistic doctrine. This was seen in the accelerated increase of syndicated workmen during the years succeeding the passing of the Associations Law, who in 1909 were over a million strong. The power exercised by the trade-unions moved the functionaries of the government, a vast army under the centralized system of administration, numbering not less than 800,000 persons, to demand equal freedom of association for the purpose of regulating their salaries paid by the state and their conditions of labour. This movement brought into new relief the long-recognized incompatibility of parliamentary government with administrative centralization as organized by Napoleon.

In another direction the increased activity in the rural districts of the Socialists, who hitherto had chiefly worked in the industrial centres, indicated that they looked for support from the peasant proprietors, whose ownership in the soil had hitherto opposed them to the practice of collectivist doctrine. In the summer of 1907 an economic crisis in the wine-growing districts of the South created a general discontent which spread to other rural regions. The Clemenceau ministry, while opposing the excesses of revolu- tionary socialism and while incurring the strenuous hostility of M. Jaures, the Socialist leader, adopted a programme which was more socialistic than that of any previous government of the republic. Under its direction a bill for the imposition of a graduated income tax was passed by the lower house, involving a scheme of direct taxation which would transform the interior fiscal system of France. But the income tax was still only a project of law when M. Clemenceau unexpectedly fell in July 1909, being succeeded as prime minister by his colleague M. Briand. His ministry had, however, passed one important measure which individualists regarded as an act of state-socialism. It took a long step towards the nationalization of railways by purchasing the important Western line and adding it to the

relatively small system of state railways. Previously a more generally criticized act of the representatives of the people was not of a nature to augment the popularity of parlia- mentary institutions at a period of economic crisis, when senators and deputies increased their own annual salary, or indemnity as it is officially called, to 1 5,000 francs. (J. E. C. B.)

Exterior Policy 1870-1909 The Franco-German War marks a turning-point in the history of the exterior policy of France as distinct as does the fall of the ancient monarchy or the end of the Napoleonic epoch.

The new

With the disappearance of the Second Empire, by eBO ch its own fault, on the field of Sedan in September 1870, ”’

followed in the early months of 187 1 by the proclamation of the German empire at Versailles and the annexation of Alsace and Lorraine under the treaty of peace of Frankfort, France descended from its primacy among the nations of conti- nental Europe, which it had gradually acquired in the half- century subsequent to Waterloo. It was the design of Bismarck that united Germany, which had been finally established under his direction by the war of 1870, should take the place hitherto occupied by France in Europe. The situation of France in 187 1 in no wise resembled that after the French defeat of 181 5, when the First Empire, issue of the Revolution, had been upset by a coalition of the European monarchies which brought back and supported on his restored throne the legitimate heir to the French crown. In 187 1 the Republic was founded in isolation, France was without allies, and outside its frontiers the form of its executive government was a matter of interest only to its German conquerors. Bismarck desired that France should remain isolated in Europe and divided at home. He thought that the Republican form of government would best serve these ends. The revolutionary tradition of France would, under a Republic, keep aloof the monarchies of Europe, whereas, in the words of the German ambassador at Paris, Prince Hohenlohe, a ” monarchy would strengthen France and place her in a better position to make alliances and would threaten our alliances.” At the same time Bismarck counted on governmental instability under a Republic to bring about domestic disorganization which would so disintegrate the French nation as to render it unformidˆ able as a foe and ineffective as an ally. The Franco-German War thus produced a situation unprecedented in the mutual relations of two great European powers. From that situation resulted all the exterior policy of France, for a whole generation, colonial as well as foreign.

In 1875 Germany saw France in possession of a constitution which gave

promise of durability if not of permanence. German opinion had already been perturbed by the facility and speed with which France had paid off the colossal war indemnity exacted by the conqueror, thus giving proof of the inexhaustible resources of the country and of its powers of recuperation. The

The crisis of 1875.

successful reorganization of the French army under the military- law of 1872 caused further alarm when there appeared to be some possibility of the withdrawal of Russia from the Dreikaiser- bund, which had set the seal on Germany's triumph and France's abasement in Europe. It seemed, therefore, as though it might be expedient for Germany to make a sudden aggression upon France before that country was adequately prepared for war, in order to crush the nation irreparably and to remove it from among the great powers of Europe.

The constitution of the Third Republic was voted by the National Assembly on the 25th of February 1875. The new constitution had to be completed by electoral laws and other complementary provisions, so it could not become effective until the following year, after the first elections of the newly founded Senate and Chamber of Deputies. M. Buffet was then charged by the president of the republic, Marshal MacMahon, to form a provisional ministry in which the due Decazes, who had been foreign minister since 1873, was retained at the Quai d'Orsay. The cabinet met for the first time on the 1 ith of March, and ten days later the National Assembly adjourned for a long recess.

It was during that interval that occurred the incident known as " The Scare of 1875." The Kulturkampf had left Prince Bismarck in a state of nervous irritation. In all directions he was on the look out for traces of Ultra-montane intrigue. The clericals in France after the fall of Thiers had behaved with great indiscretion in their desire to see the temporal power of the pope revived. But when the reactionaries had placed MacMahon at the head of the state, their divisions and their political ineptitude had shown that the government cf France would soon pass from their hands, and of this the voting of the Republican constitution by a monarchical assembly was the visible proof. Nevertheless Bismarck, influenced by the presence at Berlin of a French ambassador, M. de Gontaut-Biron, whom he regarded

as an Ultramontane agent, seems to have thought otherwise. A military party at Berlin affected alarm at a law passed by the French Assembly on the 12th of March, which continued a provision increasing from three to four the battalions of each infantry regiment, and certain journals, supposed to be inspired by Bismarck, argued that as the French were preparing, it might be well to anticipate their designs before they were ready. Europe was scared by an article on the 6th of May in The Times, professing to reveal the designs of Bismarck, from its Paris correspondent, Blowitz, who was in relations with the French foreign minister, the due Decazes, and with Prince Hohenlohe, German ambassador to France, both being prudent diplomatists, and, though Catholics, opposed to Ultramontane pretensions. Europe was astounded at the revelation and aiarmed at the alleged imminence of war. In England the Disraeli ministry addressed the governments of Russia, Austria and Italy, with a view to restraining Germany from its aggressive designs, and Queen Victoria wrote to the German emperor to plead the cause of peace. It is probable that there was no need either for this intervention or for the panic which had produced it. We know now that the old emperor William was steadfastly opposed to a fresh war, while his son, the crown prince Frederick, who then seemed likely soon to succeed him for a long reign, was also determined that peace should be maintained. The scare had, however, a most important result, in sowing the seeds of the subsequent Franco-Russian alliance. Notwithstanding that the tsar Alexander II. was on terms of affectionate intimacy with his uncle, the emperor William, he gave a personal assurance to General Le Flo, French ambassador at St Petersburg, that France should have the " moral support " of Russia in the case of an aggression on the part of Germany. It is possible that the danger of war was exaggerated by the French foreign minister and his ambassador at Berlin, as is the opinion of certain French historians, who think that M. de Gontaut-Biron, as an old royalist, was only too glad to see the Republic under the protec- tion, as it were, of the most reactionary monarchy of Europe. At the same time Bismarck's denials of having acted with

terrorizing intent cannot be accepted. He was more sincere when he criticized the ostentation with which the Russian Chancellor, Prince Gortchakoff, had claimed for his master the char- acter of the defender of France and the obstacle to German ambitions. It was in memory of this that, in 1878 at the congress of Berlin, Bismarck did his best to impair the advantages which Russia had obtained under the treaty of San Stefano.

The events which led to that congress put into abeyance the prospect of a serious understanding between France and Russia. The insurrection in Herzegovina in July 1875 reopened the Eastern question, and in the Orient the interests /sf^* pf France and Russia had been for many years con- flicting, as witness the controversy concerning the Holy Places, which was

one of the causes of the Crimean War. France had from the reign of Louis XIV. claimed the exclusive right of protecting Roman Catholic interests in the East. This claim was supported not only by the monarchists, for the most part friendly to Russia in other respects, who directed the foreign policy of the Third Republic until the Russo-Turkish War of 1877, but by the Republicans, who were coming into perpetual power at the time of the congress of Berlin — the ablest of the anti-clericals, Gambetta, declaring in this connexion that " anti-clericalism was not an article of exportation." The defeat of the monarchists at the elections of 1877, after the " Seize Mai," and the departure from office of the due Decazes, whose policy had tended to prepare the way for an alliance with the tsar, changed the attitude of French diplomacy towards Russia. M. Waddington, the first Republican minister for foreign affairs, was not a Russophil, while Gambetta was ardently anti-Russian, and he, though not a minister, was exercising that preponderant influence in French politics which he retained until 1882, the last year of his life. Many Republicans considered that the monarchists, whom they had turned out, favoured the support of Russia not only as a defence against Germany, which was not likely to be effective so long as a friendly uncle and nephew were reigning at Berlin and at St Petersburg respectively, but also as a possible means of facilitating a monarchical restora- tion in France. Consequently at the congress of Berlin M. Waddington and the other French delegates maintained a very independent attitude towards Russia. They supported the resolutions which aimed at diminishing the advantages obtained by Russia in the war, they affirmed the rights of France over the Holy Places, and they opposed the anti-Semitic views of the Russian representatives. The result of the congress of Berlin seemed therefore to draw France and Russia farther apart, especially as Gambetta and the Republicans now in power were more disposed towards an understanding with England. The contrary, however, happened. The treaty of Berlin, which took the place of the treaty of San Stefano, was the ruin of Russian hopes. It was attributed to the support given by Bismarck to the anti-Russian policy of England and Austria at the congress, the German chancellor having previously discouraged the project of an alliance between Russia and Germany. The consequence was that the tsar withdrew from the Dreikaiserbund, and Germany, finding the support of Austria inadequate for its purposes, sought an understanding with Italy. Hence arose the Triple Alliance of 1882, which was the work of Bismarck, who thus became eventually the author of the Franco-Russian alliance, which was rather a sedative for the nervous tempera- ment of the French than a remedy necessary for their protection. The twofold aim of the Triplice was the development of the Bismarckian policy of the continued isolation of France and of the maintenance of the situation in Europe acquired by the German empire in 1 8 7 1 . The most obvious alliance for Germany was that with Russia, but it was clear that it could be obtained

only at the price of Russia having a free hand to satisfy its ambitions in the East. This not only would have irritated England against Germany, but also Austria, and so might have brought about a Franco-Austrian alliance, and a day of reckoning for Germany for the combined rancours of two nations, left by 1866 and 1871. It was thus that Germany allied itself first

with Austria and then with Italy, leaving Russia eventually to unite with France.

As the congress of Berlin took in review the general situation of the Turkish empire, it was natural that the French delegates should formulate the position of France in Egypt. questioB. Thus the powers of Europe accepted the maintenance of the condominium in Egypt, financial and administrative, of England and France. Egypt, nominally a province of the Turkish empire, had been invested with a large degree of autonomy, guaranteed by an agreement made in 1840 and 1841 between the Porte and the then five great powers, though some opposition was made to France being a party to this compact. By degrees Austria, Prussia and Russia (as well as Italy when it attained the rank of a great power) had left the international control of Egypt to France and England by reason of the pre- ponderance of the interests of those two powers on the Nile.

In 1875 the interests of England in Egypt, which had hitherto been considered inferior to those of France, gained a superiority owing to the purchase by the British government of the shares of the khedive Ismail in the Suez Canal. Whatever rivalry there may have been between England and France, they had to present a 1 united front to the pretensions of Ismail, whose prodigalities made him impatient of the control which they exercised over his finances. This led to his deposition and exile. The control was re-established by his successor Tewfik on the 4th of September 1879. The revival ensued of a so-called national party, which Ismail for his own purposes had encouraged in its movement hostile to foreign domination. In September 1881 took place the rising led by Arabi, by whose action an assembly of notables was convoked for the purpose of deposing the government authorized by the European powers. The fear lest the sultan should intervene gave an appearance of harmony to the policy of England and France, whose interests were too great to permit of any such interference. At the end of 1870 the first Freycinet cabinet had succeeded that of M. Waddington and had in turn been succeeded in September 1880

by the first Ferry cabinet. In the latter the foreign minister was M. Barthelemy Saint- Hilaire, an aged philosopher who had first taken part in politics when he helped to dethrone Charles X. in 1830. In September 188 1 he categorically invited the British government to join France in a military intervention to oppose any interference which the Porte might attempt, and the two powers each sent a war-ship to Alexandria. On the 14th of November Gambetta formed his grand ministhe, in which he was foreign minister. Though it lasted less than eleven weeks, important measures were taken by it, as Arabi had become under-secretary for war at Cairo, and was receiving secret encouragement from the sultan. On the 7th of January 1882, at the instance of Gambetta, a joint note was presented by the British and French consuls to the khedive, to the effect that their governments were resolved to maintain the status quo, Gambetta having designed this as a consecration of the Anglo-French alliance in the East. There- upon the Porte protested, by a circular addressed to the powers, against this infringement of its suzerainty in Egypt. Meanwhile, the assembly of notables claimed the right of voting the taxes and administering the finances of the country, and Gambetta, considering this as an attempt to emancipate Egypt from the financial control of Europe, moved the British government to join with France in protesting against any interference on the part of the notables in the budget. But when Lord Granville accepted this proposal Gambetta had fallen, on the 26th of January, being succeeded by M. de Freycinet, who for the second time became president of the council and foreign minister. Gambetta fell nominally on a scheme of partial revision of the constitution. It included the re-establishment of scrulin de liste, a method of voting to which many Republicans were hostile, so this gave his enemies in his own party their opportunity. He thus fell the victim of republican jealousy, nearly half the Re- publicans in the chamber voting against him in the fatal division. The subsequent debates of 1882 show that many of Gambetta's adversaries were also opposed to his policy of uniting with England an the Egyptian question. Henceforth the interior

affairs of Egypt have little to do with the subject we are treating; but some of the incidents in France which led to the English occupation of Egypt ought to be mentioned. M. de Freycinet was opposed to any armed intervention by France; but in the face of the feeling in the country in favour of maintaining the traditional influence of France in Egypt, his declarations of policy were vague. On the 23rd of February 1882 he said that he would assure the non-exclusive preponderance in Egypt of France and England by means of an understanding with Europe, and on the nth of May that he wished to retain for France its peculiar position of privileged influence. England and France sent to Alexandria a combined squadron, which did not prevent a massacre of Europeans there on the nth of June,

the khedive being now in the hands of the military party under Arabi. On the nth of July the English fleet bombarded Alexandria, the French ships in anticipation of that action having departed the previous day. On the 18th of July the Chamber debated the supplementary vote for the fleet in the Mediterranean, M. de Freycinet declaring that France would take no active part in Egypt except as the mandatory of the European powers. This was the occasion for the last great speech of Gambetta in parlia- ment. In it he earnestly urged close co-operation with England, which he predicted would otherwise become the mistress of Egypt, and in his concluding sentences he uttered the famous " Ne rompez jamais I 'alliance anglaise." A further vote, pro- posed in consequence of Arabi's open rebellion, was abandoned, as M. de Freycinet announced that the European powers declined to give France and England a collective mandate to intervene in their name. In the Senate on the 25th of July M. Scherer, better known as a philosopher than as a politician, who had Gambetta's confidence, read a report on the supplementary votes which severely criticized the timidity and vacillation of the government in Egyptian policy. Four days later in the Chamber M. de Freycinet proposed an understanding with England limited to the protection of the Suez Canal. Attacked by M. C16menceau on the impossibility of separating the question of the canal from the general Egyptian question, the ministry was defeated by a huge majority, and M. de Freycinet fell, having achieved the distinction of being the chief instrument in removing Egypt from the sphere of French interest.

Some of the Republicans whose votes turned out M. de Frey- cinet wanted Jules Ferry to take his place, as he was considered to be a strong man in foreign policy, and Gambetta, for this reason, was willing to see his personal enemy at the head of public affairs. But this was prevented by M. Clemenceau and the extreme Left, and the new ministry was formed by M. Duclerc, an old senator whose previous official experience had been under the Second Republic. On its taking office on the 7th of August, the ministerial declaration announced that its policy would be in conformity with the vote which, by refusing supplies for the occupation of the Suez Canal, had overthrown M.'de Freycinet. The declaration characterized this vote as " a measure of reserve and of prudence -but not as an abdication." Nevertheless the action of the Chamber — which was due to the hostility to Gambetta of rival leaders, who had little mutual affection, including MM. de Freycinet, Jules Ferry, CMmenceau and the president of the Republic, M. Grevy, rather than to a desire to abandon Egypt — did result in the abdication of France. After England single-handed had subdued the rebellion and restored the authority of the khedive, the latter signed a decree on the nth of January 1883 abolishing the joint control of England and France. Henceforth Egypt continued to be a frequent topic of debate in the Chambers; the interests of France in respect of the Egyptian finances,

the judicial system and other institu- tions formed the subject of diplomatic correspondence, as did the irritating question of the eventual evacuation of Egypt by England. But though it caused constant friction between the two countries up to the Anglo-French convention of the 8th of April 1904, there was no longer a French active policy with regard to Egypt. The lost predominance of France in that country did, however, quicken French activity in other rep'ons of northern Africa.

The idea that the Mediterranean might become a French lake has, in different senses, been a preoccupation for France and for

its rivals in Europe ever since Algeria became a French plSkt"" P rov i n ce by a series of fortuitous incidents — an insult

offered by the dey to a French consul, his refusal to make reparation, and the occasion it afforded of diverting public attention in France from interior affairs after the Revolution of 1830. The French policy of preponderance in Egypt had only for a secondary aim the domination of the Mediterranean. The French tradition in Egypt was a relic of Napoleon's vain scheme to become emperor of the Orient even before he had made himself emperor of the West. It was because Egypt was the highway to India that under Napoleon III. the French had con- structed the Suez Canal, and for the same reason England could never permit them to become masters of the Nile delta. But the possessors of Algeria could extend their coast-line of North Africa without seriously menacing the power which held Gibraltar and Malta. It was Italy which objected to a French occupation of Tunis. Algeria has never been officially a French " colony." It is in many respects administered as an integral portion of French territory, the governor-general, as agent of the central power, exercising wide jurisdiction. Although the Europeans in Algeria are less than a seventh of the population, and although the French are actually a minority of the European inhabitants — Spaniards prevailing in the west, Italians and Maltese in the east — the three departments of Constantine, Algiers and Oran are administered like three French departments. Consequently, when disturbances occurred on the borderland separating Constantine from Tunis, the French were able to say to Europe that the integrity of their national frontier was threat- ened by the proximity of a turbulent neighbour. The history of the relations between Tunis and France were set forth, from the French standpoint, in a circular, of which Jules Ferry was

said to be theauthor, addressed bytheforeignminister,M.Barthelemy Saint-Hilaire on the oth of May 1881, to the diplomatic agents of France abroad. The most important point emphasized by

the French minister was the independence of Tunis

from the Porte, a situation which would obviate diffi- culties with Turkey such as had always hampered the European powers in Egypt. In support of this contention a protest made by the British government in 1830, against the French conquest of Algiers, was quoted, as in it Lord Aberdeen had declared that Europe had always treated the Barbary states as independent powers. On the other hand, there was the incident of the bey of Tunis having furnished to Turkey a contingent during the Crimean War, which suggested a recognition of its vassalage to the Sublime Porte. But in 1864, when the sultan had sent a fleet to La Goulette to affirm his " rights " in Tunis, the French ambassador at Constantinople intimated that France declined to have Turkey for a neighbour in Algeria. France also in 1868 essayed to obtain control over the finances of the regency; but England and Italy had also large interests in the country, so an international financial commission was appointed. In 187 1, when France was disabled after the war, the bey obtained from Constantinople a firman of investiture, thus recognizing the suzerainty of the Porte. Certain English writers have reproached the Foreign Office for its lack of foresight in not taking advantage of France's disablement by establishing England as the pre-ponderant power in Tunis. The fact that five-sixths of the com- merce of Tunis is now with France and Algeria may seem to justify such regrets. Yet by the light of subsequent events it seems probable that England would have been diverted from more profitable undertakings had she been saddled with the virtual administration and military occupation of a vast territory which such preponderance would have entailed. The wonder is that this opportunity was not seized by Italy; for Mazzini and other workers in the cause of Italian unitv. before the Bourbons ha,d been driven from Naples, had cast ?yes on Tunis, lying over against the coasts of Sicily at a distance of barely 100 m., as a favourable field for colonization and as the key of the African Mediterranean. But when Rome became once more the capital of Italy, Carthage was not fated to fall again under its domination

Tunis.

and the occasion offered by France's temporary impotence was neglected. In 1875 when France was rapidly recovering, there went to Tunis as consul an able Frenchman, M. Roustan, who became virtual ruler of the regency in spite of the resistance of the representative of Italy. French action was facilitated by the attitude of England. On the 26th of July 1878 M. Wadding- ton wrote to the marquis d'Harcourt, French ambassador in

London, that at the congress of Berlin Lord Salisbury had said to him—the two delegates being the foreign ministers of their respective governments — in reply to his protest, on behalf of France, against the proposed English occupation of Cyprus, " Do what you think proper in Tunis: England will offer no opposition." This was confirmed by Lord Salisbury in a despatch to Lord Lyons, British ambassador in Paris, on the 8th of August, and it was followed in October by an intimation made by the French ambassador at Rome that France intended to exercise a preponderant influence in Tunis. Italy was not willing to accept this situation. In January 1881 a tour made by King Humbert in Sicily, where he received a Tunisian mission, was taken to signify that Italy had not done with Tunis, and it was answered in April by a French expedition in the regency sent from Algeria, on the pretext of punishing the Kroumirs who had been marauding on the frontier of Constantine. Itwasonthisoccasion that M. Barthelemy Saint-Hilaire issued the circular quoted above. France nominally was never at war with Tunis; yet the result of the invasion was that that country became virtually a French possession, although officially it is only under the pro-tection of France. The treaty of El Bardo of the 12th of May 1881, confirmed by the decree of the 22nd of April 1882, placed Tunis under the protectorate of France. The country is administered under the direction of the French Foreign Office, in which there is a department of Tunisian affairs. The governor is called minister resident-general of France, and he also acts as foreign minister, being assisted by seven French and two native ministers.

The annexation of Tunis was important for many reasons. It was the first successful achievement of France after the disasters of the Franco-German War, and it was the first enterprise of serious utility to France undertaken ˆf Africa beyond its frontiers since the early period of the Second territory. Empire. It was also important as establishing the hegemony of France on the southern shores of the Mediterranean. When M. Jules Cambon became governor-general of Algeria, his brother M. Paul Cambon having been previously French resident in Tunis and remaining the vigilant ambassador to a Mediter- ranean power, a Parisian wit said that just as Switzerland had its Lac des quatre Cantons, so France had made of the midland sea its Lac des deux Catnbons. The jeu d'esprit indicated what was the primary significance to the French of their becoming masters of the Barbary coast from the boundary of Morocco to that of Tripoli. Apart from the Mediterranean question, when the scramble for Africa began and the Hinterland doctrine was asserted by European powers, the possession of this extended coast-line resulted in France laying claim to the Sahara and the western Sudan. Consequently, on the maps, the whole of north- west Africa, from Tunis to the Congo, is claimed by France with the exception of the relatively small areas on the coast belonging to Morocco, Spain,

Portugal, Liberia, Germany and England. On this basis, in point of area, France is the greatest African power, in spite of British annexations in south and equatorial Africa, its area being estimated at 3,866,950 sq. m. (including 227,950 in Madagascar) as against 2,101,411 more effectively possessed by Great Britain. The immensity of its domain on paper is no doubt a satisfaction to a people which prefers to pursue its policy of colonial expansion without the aid of emigra- tion. The acquisition of Tunis by France is also important as an example of the system of protectorate as applied to coloniza- tion. Open annexation might have more gravely irritated the powers having interests in the country. England, in spite of Lord Salisbury's suggestions to the French foreign minister, was none too pleased with France's policy; while Italy, with its subjects outnumbering all other European settlers in the

regency, was in a mood to accept a pretext for a quarrel for the reasons already mentioned. Apart from these considerations

the French government favoured a protectorate tectorate because it did not wish to make of Tunis a second system. Algeria. While the annexation of the latter had

excellent commercial results for France, it had not been followed by successful colonization, though it had cost France 160 millions sterling in the first sixty years after it became French territory. The French cannot govern at home or abroad without a centralized system of administration. The organization of Algeria, as departments of France with their administrative divisions, was not an example to imitate. In the beylical government France found, ready-made, a sufficiently centralized system, such as did not exist in Algeria under native rule, which could form a basis of administration by French functionaries under the direction of the Quai d'Orsay. The result has not been unpleasing to the numerous advocates in France of protectorates as a means of colonization. Accord- ing to M. Paul Leroy-Beaulieu, the most eminent French authority on colonization, who knows Tunis well, a protectorate is the most pacific, the most supple, and the least costly method of colonization in countries where an organized form of native government exists; it is the system in which the French can most nearly approach that of English crown colonies. One evil which it avoids is the so-called representative system, under which senators and deputies are sent to the French parliament not only from Algeria as an

integral part of France, but from the colonies of Martinique, Guadeloupe and French India, while Cochin- China, Guiana and Senegal send deputies alone. These sixteen deputies and seven senators attach themselves to the various Moderate, Radical and Socialist groups in parliament, which have no connexion with the interests of the colonies; and the consequent introduction of French political controversies into colonial elections has not been of advantage to the oversea possessions of France. From this the protectorate system has spared Tunis, and the paucity of French immigration will con- tinue to safeguard that country from parliamentary representa- tion. After twenty years of French rule, of 120,000 European residents in Tunis, not counting the army, only 22,000 were French, while nearly 70,000 were Italian. If under a so-called representative system the Italians had demanded nationalization, for the purpose of obtaining the franchise, complications might have arisen which are not to be feared under a protectorate.

But of all the results of the French annexation of Tunis, the most important was undoubtedly the Triple Alliance, into

which Italy entered in resentment at having been Trial deprived of the African territory which seemed marked

Alliance, out as ; ts natural field for colonial expansion. The

most manifest cause of Italian hostility towards France had passed away four years before the annexation of Tunis, when the reactionaries, who had favoured the restitution of the temporal power of the pope, fell for ever from power. The clericalism of the anti-republicans, who favoured a revival of the fatal policy of the Second Empire whereby France, after Magenta and Solferino, had by leaving its garrison at St Angelo, been the last obstacle to Italian unity, was one of the chief causes of their downfall. For after the war with Germany, the mutilated land and the vanquished nation had need to avoid wanton provocations of foreign powers. Henceforth the French Republic, governed by Republicans, was to be an anti-clerical force in Europe, sympathizing with the Italian occupation of Rome. But to make Italy realize that France was no longer the enemy of complete Italian unity it would have been necessary that all causes of irritation between the two Latin sister nations were removed. Such causes of dissension did, however, remain, arising from economic questions. The maritime relations of the two chief Mediterranean powers were based on a treaty of navigation of 1862 — when Venice was no party to it being an Austrian port — which Crispi denounced as a relic of Italian servility towards Napoleon III. Commercial rivalry was induced by the industrial development of northern Italy, when freed from Austrian rule. Moreover, the emigrant propensity

of the Italians flooded certain regions of France with Italian cheap labour, with the natural result of bitter animosity between the intruders and the inhabitants of the districts thus invaded. The annexation of Tunis, coming on the top of these causes of irritation, exasperated Italy. A new treaty of commerce was nevertheless signed between the two countries on the 3rd of November 1881. Unfortunately for its stability, King Humbert the previous week had gone to Vienna to see the emperor of Austria. In visiting in his capital the former arch- enemy of Italian unity, who could never return the courtesy, Rome being interdicted for Catholic sovereigns by the " prisoner of the Vatican," Humbert had only followed the example of his father Victor Emmanuel, who went both to Berlin and to Vienna in 1873. But that was when in France the due de Broglie was prime minister of a clerical government of which many of the supporters were clamouring for the restitution of the temporal power. King Humbert's visit to Vienna at the moment when Gambetta, the great anti-clerical champion, was at the height of his influence was significant for other reasons. Since the 7th of October 1879 Germany and Austria had been united by a defensive treaty, and though its provisions were not published until 1888, the two central empires were known to be in the closest alliance. The king of Italy's visit to Vienna, where he was accompanied by his ministers Depretis and Mancini, had therefore the same significance as though he had gone to Berlin also. On the 20th of May 1882 was signed the treaty of the Triple Alliance, which for many years bound Italy to Germany in its relations with the continental powers. The alliance was first publicly announced on the 13th of March 1883, in the Italian Chamber, by Signor Mancini, minister for foreign affairs. The aim of Italy in joining the combination was alliance with Germany, the enemy of France. The connexion with Austria was only tolerated because it secured a union with the powerful government of Berlin. It effected the complete isolation of France in Europe. An understanding between the French Republic and Russia, which alone could alter that situation, was impracticable, as its only basis seemed to be the possibility of having a common enemy in Germany or even in England. But that double eventuality was anticipated by a secret convention concluded at Skiernewice in September 1884 by the tsar and the German emperor, in which they guaranteed to one another a benevolent neutrality in case of hostilities between England and Russia arising out of the Afghan question.

It will be convenient here to refer to the relations of France with Germany and Italy respectively in the years succeeding the signature of the Triple Alliance. With Germany both Gambetta, who died ten weeks before the treaty was announced and who was a strong Russophobe, and his adversary Jules Ferry were inclined to come to an understanding. But in this they had not the support of French opinion. In September 1883 the king of Spain had visited the sovereigns of Austria and Germany^ Alphonso

XII., to prove that this journey was not a sign of hostility to France, came to Paris on his way home on Michaelmas Day on an official visit to President Gr6vy. Unfortunately it was announced that the German emperor had made the king colonel of a regiment of Uhlans garrisoned at Strassburg, the anniversary of the taking of which city was being celebrated by the emperor by the inauguration of a monument made out of cannon taken from the French, on the very eve of King Alphonso's arrival. Violent protests -were made in Paris in the monarchical and in not a few republican journals, with the result that the king of Spain was hooted by the crowd as he drove with the president from the station to his embassy, and again on his way to dine the same night at the Elysee. The incident was closed by M. Grevy's apologies and by the retirement of the minister of war, General Thibaudin, who under pressure from the extreme Left had declined to meet le roi uhlan. Though it displayed the bitter hostility of the population towards Germany, the incident did not aggravate Franco-German relations. This was due to the policy of the prime minister,, Jules Ferry, who to carry it out made himself foreign minister in November, in the place of Challemel-Lacour, who resigned.

Jules Ferry's idea was that colonial expansion was the surest means for France to recover its prestige, and that this could

*be obtained only by maintaining peaceful relations German w * t ' 1 a ^ ^ e P owers 0I Europe. His consequent relations, unpopularity caused his fall in April 1885, and the next*

year a violent change of military policy was marked by the arrival of General Boulanger at the ministry of war, where he remained, in the Freycinet and Goblet cabinets, from January 1886 to the 17th of May 1887. His growing popu- larity in France was answered by Bismarck, who asked for an increased vote for the German army, indicating that he considered Boulanger the coming dictator for the war of revenge; so when the Reichstag, on the 14th of January 1887, voted the supplies for three years, instead of for the seven demanded by the chancellor, it was dissolved. Bismarck redoubled his efforts in the press and in diplomacy, vainly attempting to come to an under- standing with Russia and with more success moving the Vatican to order the German Catholics to support him. He obtained his vote for seven years in March, and the same month renewed the Triple Alliance. In April the Schnaebele incident seemed nearly

to cause war between France and Germany. The .com- missary-special, an agent of the ministry of the interior, at Pagny-sur-Moselle, the last French station on the frontier of the annexed territory of Lorraine, having stepped across the boundary to regulate some official matter with the corresponding func- tionary on the German side, was arrested. It was said that Schnaebele was arrested actually on French soil, and on whichever side of the line he was standing he had gone to meet. the German official at the request of the latter. Bismarck justified the outrage in a speech in the Prussian Landtag which suggested that it was impossible to live at peace with a nation so bellicose as the French. In France the incident was regarded as a trap laid by the chancellor to excite French opinion under the aggres- sive guidance of Boulanger, and to produce events which would precipitate a war. The French remained calm, in spite of the growing popularity of Boulanger. The Goblet ministry resigned on the 17th of May 1887 after a hostile division on the budget, and the opportunity was taken to get rid of the minister of war, who posed as the coming restorer of Alsace and Lorraine to France. The Boulangist movement soon became anti-Republican, and the opposition to it of successive ministries improved the official relations of the French and German governments. The circum- stances attending the fall of President Grevy the same year strengthened the Boulangist agitation, and Jules Ferry, who seemed indicated as his successor, was discarded by the Republi- can majority in the electoral congress, as a revolution was threatened in Paris if the choice fell on " the German Ferry." Sadi Carnot was consequently elected president of the Republic on the 3rd of December 1887. Three months later, on the 9th of March 1888, died the old emperor William who had personified the conquest of F ranee by Germany. His son, the pacific emperor Frederick, died too, on the 15th of June, so the accession of William II., the pupil of Bismarck, at a moment when Boulanger threatened to become plebiscitary dictator of France, was ominous for the peace of Europe. But in April 1889 Boulai.ger ignominiously fled the country, and in March 1890 Bismarck fell. France none the less rejected all friendly overtures made by the young emperor. In February 1891 his mother came to Paris and was unluckily induced to visit the scenes of German triumph near the capital — the ruins of St Cloud and the Chateau of Versailles where the German empire was proclaimed. The incident called forth such an explosion of wrath from the French press that it was clear that France had not forgotten 1871. By this time, however, France was no longer isolated and at the mercy of Germany, which by reason of the increase of its population while that of France had remained almost stationary, was, under the system of compulsory military service in the two countries, more than a match for its neighbour in a single- handed conflict. Even the Triple Alliance ceased to be a terror for France. An understanding arose between France and Russia preliminary to the Franco-Russian alliance, which became the pivot of

French exterior relations until the defeat of Russia

and Italy.

in the Japanese war of 1904. So the second renewal of the Triplice was forthwith answered by a visit of the French squadron to Kronstadt in July 1891.

While such were the relations between France and the principal party to the Triple Alliance, the same period was marked by bitter dissension between France and Italy. Tunis had made Italy Gallophobe, but the diplomatic Prance relations between the two countries had been courteous until the death of Depretis in 1887. When Crispi succeeded him as prime minister, and till 1891 was the director of the exterior policy of Italy, a change took place. Crispi, though not the author of the Triple Alliance, entered with enthusiasm into its spirit of hostility to France. The old Sicilian revolutionary hastened to pay his respects to Bismarck at Fried- richsruh in October 1887, the visit being highly approved in Italy. Before that the French Chamber had, in July 1886, by a small majority, rejected a new treaty of navigation between France and Italy, this being followed by the failure to renew the commercial treaty of 1 881. Irritating incidents were of constant occurrence. In 1888 a conflict between the French consul at Massowah and theltalians who occupied that Abyssinian port induced Bismarck to instruct the German ambassador in Paris to tell M. Goblet, minister for foreign affairs in the Floquet cabinet, in case he should refer to the matter, that if Italy were involved thereby in complications it would not stand alone — this menace being communicated to Crispi by the Italian ambassador at Berlin and officially printed in a green-book. But after Bismarck's fall relations improved a little, and in April 1890 the Italian fleet was sent to Toulon to salute President Carnot in the name of King Humbert, though this did not prevent the French government being suspected of having designs on Tripoli. Italian opinion was again incensed against France by the action of the French clericals, represented by a band of Catholic " pilgrims " who went to Rome to offer their sympathy to the pope in the autumn of 1891, and outraged the burial-place of Victor Emmanuel by writing in the visitors' register kept at the Pantheon the words " Vive le pape." In August 1893 a fight took place at Aigues Mortes, the medieval walled city On the salt marshes of the Gulf of Lyons, between French and Italian workmen, in which seven Italians were killed. But Crispi had gone out of office early in 1891, and the ministers who succeeded him were more disposed to prevent a rupture between Italy and France^ Crispi became prime minister again in December 1893, but this time without the portfolio of foreign affairs. He placed at the Consulta Barpn Blanc, who though a strong partisan of the Triple Alliance was closely attached to France, being a native of Savoy, where he spent his yearly vacations on

French soil. That the relations between the two nations were better was shown by what occurred after the murder of President Carnot in June 1804. The fact that the assassin was an Italian might have caused trouble a little earlier; but the grief of the Italians was so sincere, as shown by popular demonstrations at Rome, that no anti-Italian violence took place in France, and in the words of the French ambassador, M. Billot, Caserio's crime seemed likely to further an under- standing between the two peoples. The movement was very slight and made no progress during the short presidency of M. Casimir-Perier. On the 1st of November 1894 Alexander III. died, when the Italian press gave proof of the importance attri- buted by the Triplice to the Franco-Russian understanding by expressing a hope that the new tsar would put an end to it. But on the 10th of June 1895, the foreign minister, M. Hanotaux, intimated to the French Chamber that the understanding had become an alliance, and on the 17th the Russian ambassador in Paris conveyed to M. Felix Faure, who was now president of the Republic, the collar of St Andrew, while the same day the French and Russian men-of-war, invited to the opening of the Kiel Canal, entered German waters together. The union of France with Russia was no doubt one cause of the cessation of Italian hostility to France ; but others were at work. The in- auguration of the statue of MacMahon at Magenta the same week as the announcement of the Franco-Russian alliance showed that

there was a disposition to revive the old sentiment of fraternity which had once united France with Italy. More important was the necessity felt by the Italians of improved commercial re- lations with the French. Crispi fell on the 4th of March 1896, after the news of the disaster to the Italian troops at Adowa, the war with Abyssinia being a disastrous legacy left by him. The previous year he had caused the withdrawal from Paris of the Italian ambassador Signor Ressmann, a friend of France, transferring thither Count Tornielli, who during his mission in London had made a speech, after the visit of the Italian fleet to Toulon, which qualified him to rank as a misogallo. But with the final disappearance of Crispi the relations of the two Latin neighbours became more natural. Commerce between them had diminished, and the business men of both countries, excepting certain protectionists, felt that the commercial rupture was mutually prejudicial. Friendly negotiations were initiated on both sides, and almost the last act of President Felix Faure before his sudden death — M. Delcasse being then foreign minister — was to promulgate, on the 2nd of February 1890, a new com- mercial arrangement between France and Italy which the French

parliament had adopted. By that time M. Barrere was ambassador at the Quirinal and was engaged in promoting cordial relations between Italy and France, of which Count Tornielli in Paris had already become an ardent advocate. Italy remained a party to the Triple Alliance, which was renewed, for a third period in 1902. But so changed had its significance become that in October 1903 the French Republic received for the first time an official visit from the sovereigns of Italy. This reconciliation of France and Italy was destined tohave most important results outside the sphere of the Triple Alliance. The return visit which President Loubet paid to Victor Emmanuel III. in April 1904, it being the first time that a French chief of the state had gone to Rome since the pope had lost the temporal sovereignty, provoked a protest from the Vatican which caused the rupture of diplomatic relations between France and the Holy See, followed by the repudiation of the Concordat by an act passed in France, in 1905, separating the church from the state.

*While the decadence of the Triple Alliance had this important effect on the domestic affairs of France, its inception had pro- duced the Franco-Russian alliance, which took France *JJjJJ out of its isolation in Europe, and became the pivot of its exterior policy. It has been noted that in the years succeeding the Franco-Prussian War the tsar Alexander II. had shown a disposition to support France against German aggression, as though to make up for his neutrality during the war, which was so benevolent for Germany that his uncle William I. had ascribed to it a large share of the German victory. The assassination of Alexander II. by revolutionaries in 188 1 made it difficult for the new autocrat to cultivate closer relations with a Republican government, although the Third Republic, under the influence of Gambetta, to whom its consolidation was chiefly due, had repudiated that proselytizing spirit, inherited from the great Revolution, which had disquieted the monarchies of Europe in 1848 and had provoked their hostility to the Second Republic. But the Triple Alliance which was concluded the year after the murder of the tsar indicated the possible expediency of an understanding between the two great powers of the West and the East, in response to the combination of the three central powers of Europe, — though Bismarck after his fall revealed that in 1884 a secret treaty was concluded between Germany and Russia, which was, however, said to have in view a war between England and Russia. Internal dissension on the subject of colonial policy in the far East, followed by the fall of Jules Ferry and the Boulangist agitation were some of the causes which prevented France from strengthening its position in Europe by seeking a formal understanding with Russia in the first part of the reign of Alexander III. But when the Boulangist movement came to an end, entirely from the incompetency of its leader, it behoved the government of the Republic to find a means of satisfying the strong patriotic sentiment revealed in the*

nation, which, directed by a capable and daring soldier, would have swept away the parliamentary republic and estab-

lished a military dictatorship in its place. The Franco-Russian understanding provided that means, and Russia was ready for it, having become, by the termination in 1890 of the secret treaty with Germany, not less isolated in Europe than France. In July 1 89 1, when the French fleet visited Kronstadt the incident caused such enthusiasm throughout the French nation that the exiled General Boulanger's existence would have been forgotten, except among his dwindling personal followers, bad he not put an end to it by suicide two months later at Brussels. The Franco-Russian understanding united all parties, not in love for one another but in the idea that France was thereby about to resume its place in Europe. The Catholic Royalists ceased to talk of the restitution of the temporal power of the pope in their joy at the deference of the government of the republic for the most autocratic monarchy of Christendom; the Boulangists, now called Nationalists, hoped that it would lead to the war of revenge with Germany, and that it might also be the means of humiliating England, as shown by their resent- ment at the visit of the French squadron to Portsmouth on its way home from Kronstadt. It is, however, extremely improbable that the understanding and subsequent alliance would have been effected had the Boulangist movement succeeded. For the last thing that the Russian government desired was war with Ger- many. What it needed and obtained was security against German aggression on its frontier and financial aid from France; so a French plebiscitary government, having for its aim the restitution of Alsace and Lorraine, would have found no support in Russia. As the German chancellor, Count von Caprivi, said in the Reichstag on the 27th of November 1891, a few weeks after a Russian loan had been subscribed in France nearly eight times over, the naval visit to Kronstadt had not brought war nearer by one single inch. Nevertheless when in 1893 the Russian fleet paid a somewhat tardy return visit to Toulon, where it was reviewed by President Carnot, a party of Russian officers who came to Paris was received by the population of the capital, which less than five years before had acclaimed General Boulanger, with raptures which could not have been exceeded had they brought back to France the territory lost in 1871. In November 1894, Alexander III. died, and in January 1895, M. Casimir-Perier resigned the presidency of the Republic, to which he had succeeded only six months before on the assassi- nation of M. Carnot. So it was left to Nicholas II. and President Felix Faure to proclaim the existence of a formal alliance between France and Russia. It appears that in 1891 and 1892, at the time of the first public manifestations of friendship between France and Russia, in the words of M. Ribot, secret conventions were signed by him, being foreign minister, and M. de Freycinet, president of the council, which secured for France " the support of Russia for the

maintenance of the equilibrium in Europe "; and on a later occasion the same statesman said that it was after the visit of the empress Frederick to Paris in 189 1 that Alexander III. made to France certain offers which were accepted. The word " alliance " was not publicly used by any minister to connote the relations of France with Russia until the 10th of June 1895, when M. Hanotaux used the term with cautious vagueness amid the applause of the Chamber of Deputies. Yet not even when Nicholas II. came to France in October 1896 was the word " alliance " formally pronounced in any of the official speeches. But the reception given to the tsar and tsaritsa in Paris, where no European sovereign had come officially since William of Germany passed down the Champs Elysees as a conqueror, was of such a character that none could doubt that this was the consecration of the alliance. It was at last formally proclaimed by Nicholas II., on board a French man-of-war, on the occasion of the visit of the president of the Republic to Russia in August 1897. From that date until the formation of M. Briand's cabinet in 1909, nine different ministries succeeded one another and five ministers of foreign affairs; but they all loyally sup- . ported the Franco-Russian alliance, although its popularity diminished in France long before the war between Russia and Japan, which deprived it of its efficacy in Europe. In 1901 Nicholas II. came again to France and was the guest of President

Loubet at Compiegne. His visit excited little enthusiasm in the nation, which was disposed to attribute it to Russia's financial need of France; while the Socialists, now a strong party which provided the Waldeck-Rousseau ministry with an important part of its majority in the Chamber, violently attacked the alliance of the Republic with a reactionary autocracy. However anomalous that may have been it did not prevent the whole French nation from welcoming the friendship between the governments of Russia and of France in its early stages; Nor can there be any doubt that the popular instinct was right in according it that welcome. France in its international rela- tions was strengthened morally by the understanding and by the alliance, which also served as a check to Germany. But its association with Russia had not the results hoped for by the French reactionaries. It encouraged them in their opposition to the parliamentary Republic during the Dreyfus agitation; the more so because the Russian autocracy is anti-Semitic. It also made a Nationalist of one president of the Republic, Felix Faure, whose head was so turned by his imperial frequentations that he adopted some of the less admirable practices of

princes, and also seemed ready to assume the bearing of an autocrat. His sudden death was as great a relief to the parliamentary Republicans as it was a disappointment to the plebiscitary party, which anti-Dreyfusism, with its patriotic pretensions, had again made a formidable force in the land. But the election of the pacific and constitutional M. Loubet as president of the Republic at this critical moment in its history counteracted any reactionary influence which the Russian alliance might have had in France; so the general effect of the alliance was to strengthen the Republic and to add to its prestige. The visit of the tsar to Paris, the first paid by a friendly sovereign since the Second Empire, impressed a population, proud of its capital, by an outward sign which seemed to show that the Republic was not an obstacle to the recognition by the monarchies of Europe of the place still held by France among the great powers. Before M. Loubet laid down office the nation, grown more republican, saw the visit of the tsar followed by those of the kings of England and of Italy, who might never have been moved to present their respects to the French Republic had not Russia shown them the way.

While the French rejoiced at the Russian alliance chiefly as a check to the aggressive designs of Germany, they also liked the association of France with a power regarded as with " S hostile to England. This traditional feeling was not England, discouraged by one of the chief artificers Of the alliance, Baron Mohrenheim, Russian ambassador in Paris, who until 1884 had filled the same position in London, where he had not learned to love England, and who enjoyed in France a popularity rarely accorded to the diplomatic agent of a foreign power. An entente cordiale has since been initiated between England and France. But it is necessary to refer to the less agreeable relations which existed between the two countries, as they had some influence on the exterior policy of the Third Republic. England and France had no causes of friction within Europe. But in its policy of colonial expansion, during the last twenty years of the 19th century, France constantly encountered England all over theglobe. Thefirstimportant enterprise beyond the seas seriously undertaken by France after the Franco-German War. was, as we have seen, in Tunis. But even before that question had been mentioned at the congress of Berlin, in 1878, France had become involved in an adventure in the Far East, which in its developments attracted more public attention at home than the extension of French territory in northern Africa. Had these pages been written before the end of the 19th century it would have seemed necessary to trace the operations of France in Indo-China with not less detail than has been given to the establishment of the protectorate in Tunis. But French hopes of founding a great empire in the Far East came to an end with the partial resuscitation of China and the rise to power of Japan. As we have seen, Jules Ferry's idea was that in colonial expansion France would find the best means of

recovering prestige after the defeat of 1870-71 in the years

of recuperation when it was essential to be diverted from European complications. Jules Ferry was not a friend of Gambetta, in spite of later republican legends. But the policy of colonial expansion in Tunis and in Indo-China, associated with Ferry's name, was projected by Gambetta to give satisfaction to France for the necessity, imposed, in his opinion, on the French govern- ment, of taking its lead in foreign affairs from Berlin. How Jules Ferry developed that system we know now from Bismarck's subsequent expressions of regret at Ferry's fall. He believed that, had Ferry remained in power, an amicable arrangement would have been made between France and Germany, a formal agreement having been almost concluded to the effect that France should maintain peaceable and friendly relations with Germany, while Bismarck supported France in Tunis, in Indo-China and generally in its schemes of oversea colonization. Even though the friendly attitude of Germany towards those schemes was not official the contrast was manifest between the benevolent tone of the German press and that of the English, which was generally hostile. Jules Ferry took his stand on the position that his policy was one not of colonial conquest, but of colonial conserva- tion, that without Tunis, Algeria was insecure) that without Tongking and Annam, there was danger of losing Cochin-China, where the French had been in possession since 1861. It was on the Tongking question that Ferry fell. On the 30th of March 1885, on the news of the defeat of the French troops at Lang-Son, the Chamber refused to vote the money for carrying on the cam- paign by a majority of 306 to 149. Since that day public opinion in France has made amends to the memory of Jules Ferry. His-patriotic foresight has been extolled. Criticism has not been spared for the opponents of his policy in parliament of whom the most conspicuous, M. Clemenceau and M. Ribot,havesurvived to take a leading part in public affairs in the 20th century. The attitude of the Parisian press, which compared Lang-Son with Sedan and Jules Ferry with Emile Ollivier, has been generally deplored, as has that of the public which was ready to offer violence to the fallen minister, and which was still so hostile to him in 1887 that the congress at Versailles was per- suaded that there would be a revolution in Paris if it elected " the German Ferry " president of the Republic. Nevertheless his adversaries in parliament, in the press and in the street have been justified — not owing to their superior sagacity, but owing to a series of unexpected events which the most foreseeing statesmen of the world never anticipated. The Indo-China dream of Jules Ferry might have led to a magnificent empire in the East to compensate for that which Dupleix lost and Napoleon failed to reconquer.

The Russian alliance, which came at the time when Ferry's policy was justified in the eyes of the public, too late for him to enjoy any credit, gave a new impetus to the French idea of establishing an empire in the Far East.

In the opinion of all the prophets of Europe the great international struggle in the near future was to be that of England with Russia for the possession of India. If Russia won, France might have a share in the dismembered Indian empire, of which part of the frontier now marched with that of French Indo-China, since Burma had become British and Tongking French. Such aspirations were not formulated in white-books or in parliamentary speeches. Indeed, the apprehension of difficulty with England limited French ambition on the Siamese frontier. That did not prevent dangerous friction arising between England and France on the question of the Mekong, the river which flows from China almost due south into the China Sea traversing the whole length of French Indo-China, and forming part of the eastern boundary of Upper Burma and Siam. The aim of France was to secure the whole of the left bank of the Mekong, the highway of commerce from southern China. The opposition of Siam to this delimitation Was believed by the French to be inspired by England, the supremacy of France on the Mekong river being prejudicial to British commerce with China. The inevitable rivalry between the two powers reached an acute crisis in 1893, the British ambassador in Paris being Lord Dufforir., who well understood the question, upper Burma having been annexed to India under

his viceroyalty in 1885. The matter was not settled until 1894; when not only was the French claim to the left bank of the Mekong allowed, but the neutrality of a 25-kilometre zone on the Siamese bank was conceded as open to French trade. It is said that at one moment in July 1893 England and France were more nearly at war than at any other international crisis under the Third Republic, not excluding that of Fashoda, though the acute tension between the governments was unknown to the public.

The Panama affair had left French public opinion in a nervous condition. Fantastic charges were brought not only in the press, but in the chamber of deputies, against newspapers and politicians of having accepted bribes from the British govern- ment. At the general election in August and September 1893 M. Clemenceau was pursued into his distant constituency in the Var by a crowd of Parisian politicians, who brought about his defeat less by alleging his connexion with the Panama scandal than by propagating the legend that he was the paid agent of England. The official republic, which changed its prime minister three times and its foreign minister twice in 1893, M. Develle filling that post in the Ribot and Dupuy ministries and M. Casimir-Perier in his own, repudiated with energy the calumnies as to the

attempted interference of England in French domestic affairs. But the successive governments were not in a mood to make concessions in foreign questions, as all France was under the glamour of the preliminary manifestations of the Russian alliance. This was seen, a few weeks after the elections, in the wild enthusiasm with which Paris received Admiral Avelane and his officers, who had brought the Russian fleet to Toulon to return the visit of the French fleet to Kronstadt in 1S91. The death of Marshal MacMahon, who had won his first renown in the Crimea, and his funeral at the Invalides while the Russians were in Paris, were used to emphasize the fact that the allies before Sebastopol were no longer friends. The projector of the French empire in the Far East did not live to see this phase of the seeming justification of the policy which had cost him place and popularity. Jules Ferry had died on the 17th of March 1893, only three weeks after his triumphant rehabilitation in the political world by his election to the presidency of the Senate, the second post in the state. The year he died it seemed as though with the active aid of Russia and the sympathy of Germany the possessions of France in south-eastern Asia might have indefinitely expanded into southern China. A few years later the defeat of Russia by Japan and the rise of the sea-power of the Japanese practic- ally ended the French empire in Indo-China. What the French already had at the end of the last century is virtually guaranteed to them only by the Anglo- Japanese alliance. It is in the irony of things that these possessions which were a sign of French rivalry with England should now be secured to France by England's friendliness. For it is now recognized by the French that the defence of Indo-China is impossible.

Had the French dream been realized of a large expansion of territory into southern China, the success of the new empire would have been based on free Chinese labour. This might have counterbalanced an initial obstacle to all French colonial schemes, more important than those which arise from international difficulties — the reluctance of the French to establish themselves as serious colonists in their oversea possessions. We have noted how Algeria, which is nearer to Toulon and Marseilles than are Paris and Havre, has been comparatively neglected by the French, after eighty years of occupation, in spite of the amenity of its climate and its soil for European settlers. The new French colonial school advocates the withdrawal of France from adventures in distant tropical countries which can be reached only by long sea voyages, and the . concentration of French activity in the northern half of the African continent. Madagascar is, as we have seen, counted as Africa in computing the area of French colonial territory. But it lies entirely outside the scheme of African colonization, and in spite of the loss of life and money incurred in its conquest, its retention is not popular with the new school, although the first claim of France to it was as long ago as the reign of Louis XIII., when in 1642 a company was

founded under

African policy.

the protection of Richelieu for the colonization of the island. The French of the 19th and 20th centuries may well be considered less enterprising in both hemispheres than were their ancestors of the 17th, and Madagascar, after having been the cause of much ill-feeling between England and France under the Third Republic down to the time of its formal annexation, by the law of the 9th of August 1896, is not now the object of much interest among French politicians. On the African continent it is different. When the Republic succeeded to the Second Empire the French African possessions outside Algiers were inconsiderable in area. The chief was Senegal, which though founded as a French station under Louis XIII., was virtually the creation of Faidherbe under the Second Empire, even in a greater degree than were Tunis and Tongking of Jules Ferry under the Third Republic. There was also Gabun, which is now included in French Congo. Those outposts in the tropics became the starting-points for the expansion of a French sphere cf influence in north Africa, which by the beginning of the 20th century made France the nominal possessor of a vast territory stretching from the equatorial region on the gulf of Guinea to the Mediterranean. A large portion of it is of no importance, including the once mysterious Timbuktu and the wilds of the waterless Sahara desert. But the steps whereby these wide tracts of wilderness and of valuable territory came to French be marked on the maps in French colours, by inter- aa d national agreement, are important, as they were English associated with the last serious official dispute between rivalry. England and France before the period of entente. M. Hanotaux, who was foreign minister for the then unprecedented term of four years, from 1894 to 1898, with one short interval of a few months, has thrown an instructive light on the feeling with which French politicians up to the end of the 19th century regarded England. He declared in 1909, with the high authority of one who was during years of Anglo-French tension the mouth- piece of the Republic in its relations with other powers, that every move in the direction of colonial expansion made by France disquieted and irritated England. He complained that when France, under the stimulating guidance of Jules Ferry, undertook the reconstitution of an oversea domain, England barred the way — in Egypt, in Tunis, in Madagascar, in Indo-China, in the Congo, in Oceania. Writing with the knowledge of an ex-foreign minister, who had enjoyed many years of retirement to enable him to weigh his words, M. Hanotaux asserted without any qualification that when he took office England " had conceived a triple design, to assume the position of heir to the Portuguese possessions in Africa, to destroy the independence of the South African republics, and to remain in perpetuity in Egypt." We have not to discuss the truth of those propositions, we have only to note the

tendency of French policy; and in so doing it is useful to remark that the official belief of the Third Republic in the last period of the 19th century was that England was the enemy of French colonial expansion all over the globe, and that in the so-called scramble for Africa English ambition was the chief obstacle to the schemes of France, M. Hanotaux, with the authority of official know- ledge, indicated that the English project of a railway from the Cape of Good Hope to Cairo was the provocation which stimu- lated the French to essay a similar adventure; though he denied that the Marchand mission and other similar expeditions about to be mentioned were conceived with the specific object of preventing the accomplishment of the British plan. The explora- tions of Stanley had demonstrated that access to the Great Lakes and the Upper Nile could be effected as easily from the west coast of Africa as from other directions. The French, from their ancient possession of Gabun, had extended their operations far to the east, and had by treaties with European powers obtained the right bank of the Ubanghi, a great affluent of the Congo, as a frontier between their territory and that of the Congo Independent State. They thus found themselves, with respect to Europe, in possession of a region which approached the valley of the Upper Nile. Between the fall of Jules Ferry in 1885 and the beginning of the Russian alliance came a period

of decreased activity in French colonial expansion. The un- popularity of the Tongking expedition was one of the causes of the popularity of General Boulanger, who diverted the French public from distant enterprises to a contemplation of the German frontier, and when Boulangism came to an end the Panama affair took its place in the interest it excited. But the colonial party in France did not lose sight of the possibility of establishing Upper a position on the Upper Nile. The partition of Africa Nile seemed to offer an occasion for France to take com-

explora- pensation for the English occupation of Egypt. In 1892 the Budget Commission, on the proposal of M. Etienne, deputy for Oran, who had three times been colonial under secretary, voted 300,000 francs for the despatch of a mission to explore and report on those regions, which had not had much attention since the days of Emin. But the project was not then carried out. Later, parliament voted a sum six times larger for strengthening the French positions on the Upper Ubanghi and their means of communication with the coast. But Colonel Monteil's expedition, which was the consequence of this vote, was diverted, and the 1,800,000 francs were spent at Loango, the southern port of French Congo, and on the Ivory Coast, the French territory which lies between Liberia and the British Gold Coast Colony, where a prolonged war ensued with Samory, a Nigerian chieftain. In September 1894, M. Delcasse being colonial minister, M. Liotard was appointed commissioner of the Upper Ubanghi with instructions to extend French influence in the Bahr-el-Ghazal up to the Nile. In addition to official missions, numerous expeditions of French explorers took place in Central Africa during this period, and negotiations were continually going on between the British and French governments. Towards the end of 1895 Lord Salis- bury, who had succeeded Lord Kimberley at the foreign office, informed Baron de Courcel, the French ambassador, that an expedition to the Upper Nile was projected for the purpose of putting an end to Mahdism. M. Hanotaux was not at this moment minister of foreign affairs. He had been succeeded by M. Berthelot, the eminent chemist, who resigned that office on the 26th of March 1896, a month before the fall of the Bour- geois cabinet of which he was a member, in consequence of a question raised in the chamber on this subject of the English expedition to the Soudan. According to M. Hanotaux, who returned to the Quai d'Orsay, in the Meline ministry, on the 29th of April 1896, Lord Salisbury at the end of the previous year, in announcing the expedition confidentially to M. de Courcel, had assured him that it would not go beyond Dongola without a preliminary understanding with France. There must have been a misunderstanding on this point, as after reaching Dongola in September 1896 the Anglo-Egyptian army proceeded up the

Nile in the direction of Khartoum. Before M. Hanotaux resumed office the Marchand mission had been formally planned. On the 24th of February 1896 M. Guieysse, colonial minister in the Bourgeois ministry, had signed Captain Marchand's instructions to the effect that he must march through the Upper Ubanghi, in order to extend French influence as far as the Nile, and try to reach that river before Colonel Colvile, who was leading an expedition from the East. He was also advised to conciliate the Mahdi if the aim of the mission could be benefited thereby. M. Liotard was raised to the rank of governor of the Upper Ubanghi, and in a despatch to him the new colonial minister, M. Andre Lebon, wrote that the Marchand mission was not to be considered a military enterprise, it being sent out with the intention of maintaining the political line which for two years M. Liotard had persistently been following, and of which the establishment of France in the basin of the Nile ought to be the crowning reward. Two days later, on the 25th of June 1896, Captain Marchand embarked for Africa. This is not the place for a description of his adventures in crossing the continent or when Fashoda. he encountered General Kitchener at Fashoda, two months after his arrival there in July 1898 and a fortnight after the battle of Omdurman and the capture of Khartoum. The news was made known to Europe by the

Marchand mission.

sirdar's telegrams to the British government in September announcing the presence of the French mission at Fashoda. Then ensued a period of acute tension between the French and English governments, which gave the impression to the public that war between the two countries was inevitable. But those who were watching the situation in France on the spot knew that there was no question of fighting. France was unprepared, and was also involved in the toils of the Dreyfus affair. Had the situation been that of a year later, when the French domestic controversy was ending and the Transvaal War beginning, England might have been in a very difficult position. General Kitchener declined to recognize a French occupation of any part of the Nile valley. A long discussion ensued between the British and French governments, which was ended by the latter deciding on the 6th of November 1898 not to maintain the Marchand mission at Fashoda. Captain Marchand refused to return to Europe by way of the Nile and Lower Egypt, marching across Abyssinia to Jibuti in French Somaliland, where he embarked for France. He was received with well-merited enthusiasm in Paris. But the most remarkable feature of his reception was that the ministry became so alarmed lest the popularity of the hero of Fashoda should be at the expense of that of the parliamentary republic, that it put an end to the public acclamations by despatching him secretly from the capital — a somewhat similar treatment having been accorded to General Dodds in 1893 on his return to France after conquering Dahomey.

The Marchand mission had little effect on African questions at issue between France and Great Britain, as a great settlement had been effected while it was on its way across the Continent. On the 14th of June 1898, the tjˆof' day before the fall of the Meline ministry, when M. isss. Hanotaux finally quitted the Quai d'Orsay, a conven- tion of general delimitation was signed at Paris by that minister and by the British ambassador, Sir Edmund Monson, which as regards the respective claims of England and France covered in its scope the whole of the northern half of Africa from Sene- gambia and the Congo to the valley of the Nile. Comparatively little attention was paid to it amid the exciting events which followed, so little that M. de Courcel has officially recorded that three months later, on the eve of the Fashoda incident, Lord Salisbury declared to him that he was not sufficiently acquainted with the geography of Africa to express an opinion on certain questions of delimitation arising out of the success of the British expedition on the Upper Nile. The convention of June 1898 was, however, of the highest importance, as it affirmed the junction into one vast territory of the three chief African domains of France, Algeria and Tunis, Senegal and the Niger, Chad and the Congo, thus conceding to France the whole of the north-western continent with the exception of Morocco, Liberia and the European colonies on the Atlantic. This arrangement, which was completed by an additional convention on the 21st of March 1899, made Morocco a legitimate object of French ambition.

*The other questions which caused mutual animosity between England and France in the decline of the 19th century had nothing whatever to do with their conflicting inter- The national interests. The offensive attitude of the entente English press towards France on account of the ˆ**. Dreyfus affair was repaid by the French in their criticism of the Boer War. When those sentimental causes of mutual irritation had become less acute, the press of the two countries was moved by certain influences to recognize that it was in their interest to be on good terms with one another. The importance of their commerical relations was brought into relief as though it were a new fact. At last in 1903 state visits between the rulers of England and of France took place in their respective capitals, for the first time since the early days of the Second Empire, followed by an Anglo-French convention signed on the 8th of April 1904. By this an arrangement was come to on outstanding questions of controversy between England and France in various parts of the world. France undertook not to interfere with the action of England in Egypt,*

England.

while England made a like undertaking as to French influence in Morocco. France conceded certain of its fishing rights in Newfoundland which had been a perpetual source of irritation between the two countries for nearly two hundred years since the treaty of Utrecht of 17 13. In return England made several concessions to France in Africa, including that of the Los Islands off Sierra Leone and some rectifications of frontier on the Gambia and between the Niger and Lake Chad. Other points of difference were arranged as to Siam, the New Hebrides and Madagascar. The convention of 1904 was on the whole more advantageous for England than for France. The free hand which England conceded to France in dealing with Morocco was a somewhat burdensome gift owing to German interference; but the incidents which arose from the Franco-German conflict in that country are as yet too recent for any estimate of their possible consequences.

One result was the retirement of M. Delcasse from the foreign office on the 6th of June 1005. He had been foreign minister

for seven years, a consecutive period of rare length, Tl>e . fM only once exceeded in England since the creation of Oekassi. ‘ the office, when Castlereagh held it for ten years,

and one of prodigious duration in the history of the Third Republic. He first went to the Quai d’Orsay in the Brisson ministry of June 1898, remained there during the Dupuy ministry of the same year, was reappointed by M. Waldeck-Rousseau in his cabinet which lasted from June 1899 to June 1902, was retained in the post by M. Combes till his ministry fell in January 1005, and againby his successor M. Rouvier till his own resignation in June of that year. M. Delcasse had thusan uninterruptedreign at the foreign office during a long critical period of transition both in the interior politics of France and in its exterior relations. He went to the Quai d’Orsay when the Dreyfus agitation was most acute, and left it when parliament, was absorbed in dis- cussing the separation of church and state. He saw the Franco- Russian alliance lose its popularity in the country even before the Russian defeat by the Japanese in the last days of his ministry. Although in the course of his official duties at the colonial office he had been partly responsible for some of the expeditions sent to Africa for the purpose of checking British influence, he was fully disposed to pursue a policy which might lead to a friendly understanding with England. In this he differed from M. Hanotaux, who was essentially the man of the Franco-Russian alliance, owing to it much of his prestige, including his election to the French Academy, and Russia, to which he gave exclu- sive

allegiance, was then deemed to be primarily the enemy of England. M. Delcasse on the contrary, from the first, desired to assist a rapprochement between England and Russia as pre- liminary to the arrangement he proposed between England and France. He was foreign minister when the tsar paid his second visit to France, but there was no longer the national unanimity which welcomed him ini896. M. Delcasse also accom- panied President Loubet to Russia when he returned the tsar's second visit in 1902. But exchange of compliments between France and Russia were no longer to be the sole international ceremonials within the attributes of the French foreign office; M. Delcasse was minister when the procession of European sovereigns headed by the kings of England and of Italy in 1903 came officially to Paris, and he went with M. Loubet to London and to Rome on the president's return visits to those capitals — – the latter being the immediate cause of the rupture of the con- cordat with the Vatican, though M. Delcasse was essentially a concordatory minister. His retirement from the Rouvier ministry in June 1905 was due to pressure from Germany in consequence of his opposition to German interference in Morocco. His resignation took place just a week after the news had arrived of the destruction of the Russian fleet by the Japanese, which completed the disablement of the one ally of France. The impression was current in France that Germany wished to give the French nation a fright before the understanding with England had reached an effective stage, and it was actually believed that the resignation of M. Delcasse averted a declaration of war. Although that belief revived to some extent the fading enmity

of the French towards the conquerors of Alsace-Lorraine, the fear which accompanied it moved a considerable section of the nation to favour an understanding with Germany in preference to, or even at the expense of, friendly relations with England. M. C16menceau, who only late in life came into office, and attained it at the moment when a better understanding with England was progressing, had been throughout his long career, of all French public men in all political groups, the most, con- sistent friend of England. His presence at the head of affairs was a guarantee of amicable Anglo-French relations, so far as they could be protected by statesmanship.

By reason of the increased duration and stability of ministries, the personal influence of ministers in directing the foreign policy of France has in one sense become greater in the 20th century than in those earlier periods when France had first to recuperate its strength after the war and then to take its exterior policy from Germany. Moreover, not only have cabinets lasted longer, but the foreign minister has often been retained in a succession of them. Of the thirty years which in 1909 had elapsed since Marshal MacMahon retired and the republic was governed by republicans, in the first fifteen years from 1879 to 1894 fourteen different persons held the

office of minister of foreign affairs, while six sufficed for the fifteen years succeeding the latter date. One must not, however, exaggerate the effect of this greater stability in office-holding upon continuity of policy, which was well maintained even in the days when there was on an average a new foreign minister every year. Indeed the most marked breach in the continuity of the foreign policy of France has been made in that later period of long terms of office, which, with the repudiation of the Concordat, has seen the withdrawal of the French protectorate over Roman Catholic missions in the East — though it is too soon to estimate the result. In another respect France has under the republic departed a long way from a tradi- tion of the Quai d'Orsay. It no longer troubles , itself on the subject of nationalities. Napoleon III., who had more French temperament than French blood in his constitution, was an idealist on this question, and one of the causes of his own down- fall and the defeat of France was his sympathy in this direction with German unity. Since Sedan little has been done in France to further the doctrine of nationalities. A faint echo of it was heard during the Boer war, but French sympathy with the struggling Dutch republics of South Africa was based rather on anti-English sentiment than on any abstract theory. (J. E. C. B.)

Bibliography of French History. — The scientific study of the history of France only begins with the 16th century. It Was hampered at first by the traditions of the middle ages and by a servile imitation of antiquity. Paulus Aemilius of Verona (De rebus gestis Francorum, 15 17), who may be called the first of modern historians, merely applies the oratorical methods of the Latin historiographers. It is not till the second half of the century that history emancipates itself; Catholics and Protestants alike turn to it for arguments in their religious and political controversies. Francois Hotman published (1574) his Franco-Gallia; Claude Fauchet his Antiquites gauloises et francoises (1579); fitienne Pasquier his Recherches de la France (161 1), "the only work of erudition of the 16th century which one can read through without being bored." Amateurs like Petau, A. de Thou, Bongars and Peiresc collected libraries to which men of learning went to draw their knowledge of the past; Pierre Pithou, one of the authors of the Satire Menippee, published the earliest annals of France (Annates Francorum, 1588, and Historiae Francorum scriptores coetanei XL, I 596), Jacques Bongars collected in his Gesta Dei per Francos (1611- 161 7) the principal chroniclers of the Crusades. Others made a study of chronology like J. J- Scaliger (De emendatione temporum, 1583 ; Thesaurus temporum, 1606), sketched the history of literature, like Francois Grude, sieurof La Croix in Maine (Bibliotheque francoise, 1584), and Antoine du Verdier (Catalogue de tous les auteurs qui ont ecrit ou traduit enfrangois, 1585), or discussed the actual principles of historical research, like Jean Bodin (Methodus adfacilem historiarum cagnilionem, 1566) and Henri

Lancelot Voisin de La Popeliniere (Histoire des histoires, 1599).

But the writers of history are as yet very inexpert; the Histoire gentrale des rois de France of Bernard de Girard, seigneur de Haillan (1576), the Grandes Annates de France of Francois de Belleforest (1579), the Inventaire general de Vhistoire de France of Jean de Serre (1597), the Histoire generate de France depuis Pharamond of Scipion Dupleix (1621-1645), the Histoire de France (1643-1651) of Francois Eudes de Mezeray, and above all his AbrSge chronologique de Vhistoire*

de France (1668), are compilations which were eagerly read when they appeared, but are worthless nowadays. Historical research lacked method, leaders and trained workers; it found them all in the 17th century, the golden age of learning which was honoured alike by laymen, priests and members of the monastic orders, especially the Benedictines of the congregation of St Maur. The publication of original documents was carried on with enthusiasm. To Andr6 Duchesne we owe two great collections of chronicles: the Historiae Normannomm scriptores antiqui (1619) and the Historiae Francorum scriptores, continued by his son Francois (5 vols., 1636-1649). These publications were due to a part only of his prodigious activity ; his papers and manuscripts, preserved in the Bibliotheque Nationale at Paris, are an inexhaustible mine. Charles du Fresne, seigneur du Cange, published Villehardouin (1657) and Joinville (1668); Etienne Baluze, the Gapitularia regum Francorum (1674), the Nova collectio conciliorum (1677), the Vitae paparum Avenionensium (1693). The clergy were very much aided in their work by their private libraries and by their co-operation; Pere Philippe Labbe published his Bibliotheca nova manuscriptorum (1657), and began (1671) his Collection des conciles, which was successfully completed by his colleague Pere Cossart (18 vols.). In 1643 the Jesuit Jean Bolland brought out vol. i. of the Acta sanctorum, a vast collection of stories and legends which has not yet been completed beyond the 4th of November. (See Bollandists.) The Benedictines, for their part, published the Acta sanctorum ordinis sancti Benedicti (9 vols., 1668-1701). One of the chief editors of this collection, Dom Jean Mabillon, published on his own account the Vetera analecta (4 vols., 1675-1685) and prepared the Annates ordinis sancti Benedicti (6 vols., 1703-1793). To Dom Thierri Ruinart we owe good editions of Gregory of Tours and Fredegarius (1699). The learning of the 17th century further inaugurated those specialized studies which are important aids to

history. Mabillon in his De re diplomatica (1681) creates the science of documents or diplomatics. Adrien de Valois lays a sound foundation for historical geography by his critical edition of the Notitia Galliarum (1675). Numismatics finds an en- lightened pioneer in Francois Leblanc (Traite historique des monnaies de France, 1690). Du Cange, one of the greatest of the French scholars who have studied the middle ages, has defined terms bearing on institutions in his Glossarium mediae et infimae latinitatis (1678), recast by the Benedictines (1733), with an important supple- ment by Dom Carpentier (1768), republished twice during the 19th century, with additions, by F. Didot (1840-1850), and by L. Favre at Niort (1883-1888); this work is still indispensable to every student of medieval history. Finally, great biographical or bibliographical works were undertaken ; the Gallia christiana, which gave a chrono- logical list of the archbishops, bishops and abbots of the Gauls and of France, was compiled by two twin brothers, Scevole and Louis de Sainte-Marthe, and by the two sons of Louis (4 vols., 1656) ; a fresh edition, on a better plan, and with great additions, was begun in 1715 by Denys de Sainte-Marthe, continued throughout the 18th century by the Benedictines, and finished in the 19th century by Barthelemy Haureau (1856-1861).

As to the nobility, a series of researches and publications, begun by Pierre d'Hozier (d. 1660) and continued well on into the 19th century by several of his descendants, developed into the Armorial general de la France, which was remodelled several times. A similar work, of a more critical nature, was carried out by Pere Anselme (Histoire genSalogique de la maison de France et des grands officiers de la couronne, 1674) and by Pere Ange and Pere Simplicien, who completed the work (3rd ed. in 9 vols., 1726-1733). Critical biblio- graphy is especially represented by certain Protestants, expelled From France by the revocation of the Edict of Nantes. Pierre Bayle, the sceptic, famous for his Dictionnaire critique (1699), which is in part a refutation of the Dictionnaire historique et geo- raphique published in 1673 by the Abbe Louis Moreri, was the .jrst to publish the Nouvelles de la republique des lettres (1684-1687), which was continued by Henri Basnage de Beauval under the title of Histoire des ouvrages des savants (24 vols.). In imitation of this, Jean Le Clerc successively edited a Bibliotheque universelleet historique (1686-1693), a Bibliotheque choisie (1703-1713), and a Bibliotheque ancienne et moderne (1714-1727). These were the first of our " periodicals."

The 18th century continues the traditions of the 17th. The Benedictines still for some time hold the first place. Dom Edmond Martene visited numerous archives (which were then closed) in France and neighbouring countries, and drew from them the material for two important collections: Thesaurus novus anecdotorum (9 vols., 1 717, in collaboration with Dom Ursin Durand) and Veterutn scrip- torum collectio (9 vols., 1724-1733). Dom

Bernard de Montfaucon also travelled in search of illustrated records of antiquity; private collections, among others the celebrated collection of Gaignieres (now in the Bibliotheque Nationale), provided him with the illus- trations which he published in his Monuments de la monarchic francoise (5 vols., 1729-1733). The text is in two languages, Latin and French. Dom Martin Bouquet took up the work begun by the two Duchesnes, and in 1738 published vol. i. of the Historians of France (Rerum Gallicarum et Francicarum scriptores), an enormous collection which was intended to include all the sources of the history of France, grouped under centuries and reigns. He produced the first eight volumes himself; his work was continued by several

£

collaborators, the most active of whom was Dom Michel J. Brial, and already comprised thirteen volumes when it was interrupted by the Revolution. In 1733, Antoine Rivet de La Grange produced vol. i. of the Histoire litteraire de la France, which in 1789 numbered twelve volumes. While Dom C. Francois Toustaint and Dom Rene Prosper Tassin published a Nouveau Traite de diplomatique (6 vols., 1750-1765), others were undertaking the Art de verifier les dates (1750; new and much enlarged edition in 1770). Still others, with more or less success, attempted histories of the provinces.

In the second half of the 18th century, the ardour of the Benedic- tines of St Maur diminished, and scientific work passed more and more into the hands of laymen. The Acad6mie des Inscriptions et Belles-lettres, founded in 1663 and reorganized in 1701, became its chief instrument, numbering among its members Denis Francois Secousse, who continued the collection of Ordonnances des rois de France, begun (1723) by J. de Lauriere; J.-B. de La Curne de Sainte Palaye (Mimoires sur I'ancienne chevalerie, 1759-1781; Glossaire de la langue francaise depuis son origine iusqu'a la fin de Louis XI V, printed only in 1875-1882) j J.B. d'Anville (Notice sur I'ancienne Gaule tiree des monuments, 1760) ; and L. G. de Briiquigny, the greatest of them all, who continued the publication of the Ordon nances, began the Table chronologique des dipldmes concernani I'histoire de France (3 vols., 1769-1783), published the Diplomata, chartae, ad res Francicas spectantia (1791, with the collaboration of La Porte du Theil), and directed fruitful researches in the archives in London, to enrich the Cabinet des chartes, where Henri Bertin (1719- 1792), an enlightened minister of Louis XV., had in 1764 set himself the task of collecting the documentary sources of the national history. The example set by the religious orders and the government bore fruit. The general assembly of the clergy gave orders that its Prods verbaux (9 vols., 1 767-1 789) should be printed; some of the provinces decided to have their history written, and mostly applied to

the Benedictines to have this done. Brittany was treated by Dom Lobineau (1707) and Dom Morice (1742); the duchy of Bur- gundy by Dom Urbairi Plancher (1 739-1 748); Languedoc by Dom Dominique Vaissete (1730-1749, in collaboration with Dom Claude de Vic; new ed. 1873-1893); for Paris, its secular history was treated by Dom Michel Felibien and Dom Lobineau (1725), and its ecclesiastical history by the abbe Lebeuf (1745-1760; new ed.

1883-1890).

This ever-increasing stream of new evidence aroused curiosity, gave rise to pregnant comparisons, developed and sharpened the critical sense, but further led to a more and more urgent need for exact information. The Acadfemie des Inscriptions brought out its Histoire de VAcademie avec les memoir es de litter ature HrSs de ses registres (vol. i. 1717; 51 vols, appeared before the Revolution, with five indexes; vide the Bibliographic of Lasteyrie, vol. iii. pp. 256 et seq.). Other collections, mostly of the nature of bibliographies, were the Journal des savants (m vols., from 1665 to 1792; vide the Table mithodique by H. Cocheris, i860); the Journal de Trhoux, or Mimoires pour I'histoire des sciences et des beaux-arts, edited by Jesuits (265 vols., 1701-1790); the Mercure de France (977 vols., from 1724 to 1791). To these must be added the dictionaries and encyclopaedias : the Dictionnaire de Moreri, the last edition of which numbers 10 vols. (1759); the Dictionnaire geographique, historique et politique des Gaules et de la France, by the abbe J. J. Expilly (6 vols., 1762-1770; unfinished); the Repertoire universel et raisonnS de jurisprudence civile, criminelle, canonique et bSnificiale, by Guyot (64 vols., 1775-1786; supplement in 17 vols., 1784-1785), reorganized and continued by Merlin de Douai, who was afterwards one of the Montagnards, a member of the Directory, and a count under the Empire.

The historians did not use to the greatest advantage the treasures of learning provided for them ; they were ior the most part super- ficial, and dominated by their political or religious prejudices. Thus works like that of Pere Gabriel Daniel (Histoire de France, 3 vols., 1 713), of President Henault (AbrSge chronologique, 1744; 25 editions between 1770 and 1834), of the abbe Paul Francois Velly and those who completed his work (Histoire de France, 33 vols., 1765 to 1783), of G. H. Gaillard (Histoire de la rivalite de la France et de I'Angleterre, 11 vols., 1771-1777), and of L. P. Anquetil (1805), in spite of the brilliant success with which they met at first, have fallen into a just oblivion. A separate place must be given to the works of the theorists and philosophers: Histoire de I'ancten gouverne- ment de la France, by the Comte de Boulainvilliers (1727), Histoire critique de I'etablissement de la monarchic francoise dans les deux Gaides, by the abbe f. B. Dubos (1734); L' Esprit des lots, by the president de

Montesquieu (1748); the Observations sur I'histoire de France, by the abbe de Mably (1765) ; the Theorie de la politique de la monarchic francaise, by Marie Pauline de Lezardiere (1792). These works have, if nothing else, the merit of provoking reflection.

At the time of the Revolution this activity was checked. The religious communities and royal academies were suppressed, and France violently broke with even her most recent past, which was considered to belong to the ancien rSgime. When peace was re- established, she began the task of making good the damage which had been done, but a greater effort was now necessary in order to revive the spirit of the institutions which had been overthrown. The new state, which was, in spite of all, bound by so many ties to the former order of things, seconded this effort, and during the

whole of the 19th century, and even longer, had a strong influence on historical production. The section of the Institut de France, which in 1816 assumed the old name of Academie des Inscriptions et Belles-lettres, began to reissue the two series of the Memoires and of the Notices et extraits des manuscrits tires de la bibliotheque royale (the first volume had appeared in 1787); began (1844) that of the Memoires prisentes par divers savants and the Comptes rendus (subject index 1857-1900, by G. Ledos, 1906); and continued the Recueil des historiens de France, the plan of which was enlarged by degrees {Historiens des croisades, obituaires, pouillis, comptes, &c.), the Ordonnances and the Table chronologique des dipldmes. During the reign of Louis Philippe, the ministry pf the interior reorganized the administration of the archives of the departments, communes and hospitals, of which the Inventaires sommaires are a mine of precious information (see the Rapport au ministre, by G. Servois, 1902). In 1834 the ministry of public instruction founded a com- mittee, which has been called since 1881 the Comite des Travaux historiques et scientifiques, under the direction of which have been published: (1) the Collection des documents inedits relatifs a I'histoire de France (more than 260 vols, have appeared since 1836); (2) the Catalogue general des manuscrits des bibliotheques de France; (3) the Dictionnaires topographiques (25 vols, have appeared)); and the Repertoires archeologiques of the French departments (8 vols, between 1861 and 1888) ; (4) several series of Bulletins, the details of which will be found in the Bibliographic of Lasteyrie. At the same time were founded or reorganized, both in Paris and the departments, numerous societies, devoted sometimes partially and sometimes exclusively to history

and archaeology; the Academie Celtique (1804), which in 1813 became the Societe des Antiquaires de France (general index by M. Prou, 1894); the Societe de l'Histoire de France (1834); the Societe del'Ecole des Chartes (1839) ; the Societe de l'Histoire de Paris et de l'lle-de-France (1874; four decennial indexes), &c. The details will be found in the excellent Bibliographic generate des travaux historiques et archeologiques publiis par ks societes savantes de France, which has appeared since 1885 under the direction of Robert de Lasteyrie.

Individual scholars also associated themselves with this great literary movement. Guizot published a Collection de memoires relatifs a I'histoire de France (31 vols., 1824-1835); Buchon, a Collection des chroniques nationales frangaises Scrites en langue vulgaire du XIII' au XVI' siecle (47 vols., 1824-1829), and a Choix de chroniques et memoires sur I'histoire de France (14 vols., 1836-1841); Petitot and Monmerque, a Collection de mSmoires relatifs a I'histoire de France (131 vols., 1819-1829); Michaud and Poujoulat, a Nouvelle Collection de memoires pour servir a I'histoire de France (32 vols., 1 836-1 839); Barriere and de Lescure, a Biblio-theque de memoires relatifs a I'histoire de France pendant le X VIII' siecle (30 vols., 1855-1875); and finally Bervilfe and Barriere, a Collection des mSmoires relatifs a la Revolution Frangaise (55 vols., 1820-1827). The details are to be found in the Sources de I'histoire de France, by Alfred Franklin (1876). The abbe J. P. Migne in his Palro'.ogla Latina (221 vols.,1844-1864), re-edited a number of texts anterior to the 13th century. Under the second empire, the ad- ministration of the imperial archives at Paris published ten volumes of documents (Monuments historiques, 1866; Layettes du trSsor des chartes, 1863, which were afterwards continued up to 1270; Actes du parlement de Paris, 1863-1867), not to mention several volumes of Inventaires. The administration of the Bibliotheque imperiale had printed the Catalogue general de I'histoire de France (10 vols., 1855-1870; vol. xi., containing the alphabetical index to the names of the authors, appeared in 1895). Other countries also supplied a number of useful texts ; there is much in the English Rolls series, in the collection of Chroniques beiges, and especially in the Monumenta Germaniae historica.

At the same time the scope of history and its auxiliary sciences becomes more clearly denned ; the Ecole des Chartes produces some excellent palaeographers, as for instance Natalis de Wailly (Elements de paleographie, 1838), and L. Delisle (q.v.), who has also left traces of his profound researches in the most varied departments of medieval history (Bibliographic des travaux de M. Leopold Delisle, 1902) ; Anatole de Barthelemy made a study of coins and medals, Douet d'Arcq and G. Demay of seals. The works of Alexandre Lenoir (MusSe des monuments frangais, 1800-1822), of Arcisse de Caumont (Histoire de V architecture du moyen dge, 1837 ; AbScSdaire ou rudiment d'archSologie, 1850), of A.

Napoleon Didron (Annates archeologiques, 1844), of Jules Quicherat (Melanges d' archedlogie et d'histoire, pub- lished after his death, 1886), and the dictionaries of Viollet le Due (Dictionnaire raisonne de V architecture frangaise, 1853-1868 ; Diction- naire du mobilier frangais, 1855) displayed to the best advantage one of the most brilliant sides of the French intellect, while other sciences, such as geology, anthropology, the comparative study of languages, religions and folk-lore, and political economy, continued to enlarge the horizon of history. The task of writing the general history of a country became more and more difficult, especially for one man, but the task was none the less undertaken by several historians, and by some of eminence. Francois Guizot treated of the Histoire de la civilisation en France (1 828-1 830); Augustin Thierry after the Recits des temps merovingiens (1840) published the Monuments de I'histoire du tiers Hat (1849-1856), the intro- duction to which was expanded into a book (1855) ; Charles Simonde

de Sismondi produced a mediocre Histoire des frangais in 3 1 vols. (1821-1844), and Henri Martin a Histoire de France in 16 vols. (1847-1854), now of small use except for the two or three last cen- turies of the ancien regime. Finally J. Michelet, in his Histoire de France (17 vols.; 1833-1856) and his Histoire de la Revolution (7 vols., 1847-1853), aims at reviving the very soul of the nation's past.

After the Franco-German War begins a better organization of scientific, studies, modelled on that of Germany. The Ecole des Hautes Etudes, established in 1868, included in its programme the critical study of the sources, both Latin and French, of the history of France; and from the seminaire of Gabriel Mpnod came men of learning, already prepared by studying at the Ecole des Chartes: Paul Viollet, who revived the study of the history of French law; Julien Havet, who revived that of Merovingian diplomatics; Arthur Giry, who resumed the study of municipal institutions where it had been left by A. Thierry, prepared the Annates carolingiennes (written by his pupils, Eckel, Favre, Lauer, Lot, Poupardin), and brought back into honour the study of diplomatics (Manuel de diplomatique, 1894); Auguste Molinier, author of the Sources de I'histoire de France (1902-190.4; general index, 1906), &c. Auguste Longnon introduced at the Ecole des Hautes Etudes the study of historical geography (Atlas historique de la France, in course of publication since 1888). The universities, at last reorganized, popularized the employment of the new methods. The books of Fustel de Coulanges and Achille Luchaire on the middle ages, and those of A. Aulard on the revolution, gave, a strong, though well- regulated, impetus to historical production. The Ecole du Louvre (1881) increased the value of the museums and placed the history of art among the studies of higher education, while the Musee archeologique of St-Germain-en-Laye offered a fruitful field for research on

Gallic and Gallo-Roman antiquities. Rich archives, hitherto inaccessible, were thrown open to students; at Rome those of the Vatican (Registres pontificaux, published by students at the French school of archaeology, since 1884); at Paris, those of the Foreign Office (Recueil des instructions donnSes aux ambassadeurs depuis le traitS de Westphalie, 16 vols., 1885-1901; besides various collections of diplomatic papers, inventories, &c). Those of the War Office were used by officers who published numerous documents bearing on the wars of the Revolution and the Empire, and on that of 1870-1871). In 1904 a commission, generously endowed by the French parlement, was entrusted with the task of publishing the documents relating to economic and social life of the time of the Revolution, and four volumes had appeared by 1908. Certain towns, Paris, Bordeaux, &c, have made it a point of honour to have their chief historical monuments printed. The work now becomes more and more specialized. L'Histoire de France, by Ernest Lavisse (1900, &c), is the work of fifteen different authors. It is therefore more than ever necessary that the work should be under sound direction. The Manuel de bibliographic historique of Ch. V. Langlois (2nd edition, 1901-1904) is a good guide, as is his Archives de I'histoire de France (189 1, in collaboration with H. Stein).

Besides the special bibliographies mentioned above, it will be useful to consult the Bibliotheque historique of Pere Jacques Lelong (1719; new ed. by Fevret de Fontette, 5 vols., 1768-1778); the Geschichte der historischen Forschung und Kunst of Ludwig Wachler (2 vols., 1812-1816); the Bibliographic de la France, established in 1811 (1st series, 1811-1856, 45 vols.; 2nd series, 1 vol. per annum since 1857) ; the publications of the Societe de Bibliographie (Poly- biblion, from 1868 on, &c.) ; the Bibliographie de I'histoire de France, by Gabriel Monod (1888) ; the Repertoire of the abbe Ulysse Chevalier (Biobibliograpkie; new ed. 1 903-1907; and Topobibliographie, 1894-1899). Bearing exclusively on the middle ages are the Biblio- theca historica medii aevi of August Potthast (new ed. 1896) and the Manuel (Les Sources de I'histoire de France, 1 901, &c.) of A. Molinier; but the latter is to be continued up to modern times, the 16th century having already been begun by Henri Hausser (1st part, 1906). Finally, various special reviews, besides teaching historical method by criticism and by example, try to keep their readers au courant with literary production; the Revue critique d'histoire et de littSrature (1866 fol.), the Revue des questions historiques (1866 fob), the Revue historique (1876 fob), the Revue d'histoire moderne et contemporaine, accompanied annually by a valuable Repertoire mSthodique (1898 fol.) ; the Revue de synthese historique (1900 fob), &c. (C. B.)*

French Law and Institutions

Celtic Period. — The remotest times to which history gives us access with referenqe to the law and institutions formerly existing in the country which is now called France are those in which the dominant race at least was Celtic. On the whole, our knowledge is small of the law and institutions of these Celts, or Gauls, whose tribes constituted independent Gaul. For their reconstruction, modern scholars draw upon two sources; firstly, there is the information furnished by the classical writers and by Caesar and Strabo in particular, which is trustworthy but some- what scanty; the other source, which is not so pure, consists in

the accounts found in those legal works of the middle ages written in the neo-Celtic dialects, the most important and the greater number of which belong to Ireland. A reconstruction from them is always hazardous, however delicate and scientific be the criticism which is brought to bear on it, as in the case of d'Arbois de Jubainville, for example. Moreover, in the historical evolution of French institutions those of the Celts or Gauls are of little importance. Not one of them can be shown to have survived in later law. What has survived of the Celtic race is the blood and temperament, still found in a great many Frenchmen, certain traits which the ancients remarked in the Gauls being still recognizable : helium gerere et argute loqui.

■*Roman Period. — It was the Roman conquest and rule which really formed Gaul, for she was Romanized to the point of losing almost completely that which persists most stubbornly in a conquered nation, namely, trie language; the Breton-speaking population came to France later, from Britain. The institutions of Roman Gaul became identical with those of the Roman empire, provincial and municipal government undergoing the same evolution as in the other parts of the empire. It was under Roman supremacy too, as M. d'Arbois de Jubainville has shown, that the ownership of land became personal and free in Gaul, The law for the Gallo-Romans was that which was administered by the conventus of the magistrate; there are only a few peculi- arities, mere Gallicisms, resulting from conventions or usage, which are pointed out by Roman jurisconsults of the classical age. The administrative reforms of Diocletian and Constantine applied to Gaul as to the rest of the empire. Gaul under this rule consisted of seventeen provinces, divided between two dioceses, ten in the diocese of the Gauls, under the authority of the praetorian prefect, who resided at Treves; and the other seven in the dioecesis septem provinciarum,*

under the authority of a vicarius. The Gallo-Romans became Christian with the other subjects of the empire; the Church extended thither her powerful organization modelled on the administrative organiza- tion, each civitas having a bishop, just as it had a curia and municipal magistrates. But, although endowed with privileges by the Christian emperors, the Church did not yet encroach upon the civil power. She had the right of acquiring property, of holding councils, subject to the imperial authority, and of the free election of bishops. But only the first germs of ecclesiastical jurisdiction are to be traced. In virtue of the laws, the bishops were privileged arbitrators, and in the matter of public sins exercised a disciplinary jurisdiction over the clergy and the faithful. In the second half of the 4th century, monasteries appeared in Gaul. After the fall of the Western empire, there was left to the Gallo-Romans as an expression of its law, which was also theirs, a written legislation. It consisted of the imperial constitutions, contained in the Gregorian, Hermogenian and Theodosian codes (the two former being private compilations, and the third an official collection), and the writings of the five jurists (Gaius, Papinian, Paulus, Ulpian and Modestinus), to which Valentinian III. had in 426 given the force of law.

The Barbarian Invasion. — The invasions and settlements of the barbarians open a new period. Though there were robbery and violence in every case, the various barbarian kingdoms set up in Gaul were established under different conditions. In those of the Burgundians and Visigoths, the owners of the great estates, which had been the prevailing form of landed property in Roman Gaul, suffered partial dispossession, according to a system the rules regulating which can, in the case of the Bur- gundians, be traced almost exactly. It is doubtful whether a similar process took place in the case of the Frankish settlements, but their first conquests in the north and east seem to have led to the extermination or total expulsion of the Gallo-Roman population. It is impossible to say to what extent, in these various settlements, the system of collective property prevailing among the Germanic tribes was adopted. Another important difference was that, in embracing Christianity, some of the barbarians became Arians, as in the case of the Visigoths and Burgundians; others Catholic, as in the case of the Franks. This was probably the main cause of the absorption of the other

kingdoms into the Frankish monarchy. In each case, however, the barbarian king appeared as wishing not to overthrow the Roman administration, but to profit by its continuation. The kings of the Visigoths and Burgundians were at first actually representatives of the Western empire, and Clovis himself was ready to accept from the emperor Anastasius the title of consul; but these were but empty forms, similar to the fictitious ties which long existed or still exist between China or Turkey and certain parts of their former empires, now separated from them for

ever.

As soon as the Merovingian monarch had made himself master of Gaul, he set himself to maintain and keep in working order the administrative machinery of the Romans, save that the administrative unit was henceforth no longer the provincia but the civitas, which generally took the name of pagus, and was placed under the authority of a count, comes or grafio (Graf). Perhaps this was not entirely an innovation, for it appears that at the end of the Roman supremacy certain civitates had already a comes. Further, several pagi could be united under the authority of a dux. The pagus seems to have generally been divided into hundreds (centcnae).

But the Roman administrative machinery was too delicate to be handled by barbarians; it could not survive for long, but underwent changes and finally disappeared. Thus the Merovingians tried to levy the same direct taxes as the Romans had done, the capitatio terrena and the capitatio htimana, but they ceased to be imposts reassessed periodically in accordance with the total sum fixed as necessary to meet the needs of the state, and became fixed annual taxes on lands or persons; finally, they disappeared as general imposts, continuing to exist only as personal or territorial dues. In the same way the Roman municipal organization, that of the curiae, survived for a considerable time under the Merovingians, but was used only for the registration of written deeds; under the Carolingians it disappeared, and with it the old senatorial nobility which had been that of the Empire. The administration of justice (apart from the king's tribunal) seems to have been organized on a system borrowed partly from Roman and partly from Germanic institutions; it naturally tends to assume popular forms. Justice is administered by the count {comes) or his deputy (centenarius or vicarius) , but on the verdict of notables called in the texts boni homines or rachimburgii. This takes place in an assembly of all the free subjects, called mallus, at which every free man is bound to attend at least a certain number of times a year, and in which are promulgated the general acts emanating from the king. The latter could issue commands or prohibitions under the name of bannus, the violation of which entailed a fine of 60 solidi; the king also administered justice {in palalio), assisted by the officers of his household, his jurisdic- tion being unlimited and at the same time undefined. He could hear all causes, but was not bound to hear any, except, apparently, accusations of deliberate failure of justice and breach of trust on the part of the rachimburgii.

But what proved the great disturbing element in Gallo-Roman society was the fact that the conquerors, owing to their former customs and the degree of their civilization, were all warriors, men whose chief interest was to become practised in the handling of arms, and whose normal state was that of war. It is true that under the Roman empire all the men of a civitas were

obliged, in case of necessity, to march against the enemy, and under the Frankish monarchy the count still called together his pagenses for this object. But the condition of the barbarian was very different; he lived essentially for fighting. Hence those gatherings or annual reviews of the Campus Martins, which continued so long, in Austrasia at least. They constituted the chief armed force; for mercenary troops, in spite of the assertions of some to the contrary, play at this period only a small part. But this military class, though not an aristocracy (for among the Franks the royal race alone was noble), was t6 a large extent independent, and the king had to attach these leudes or fideles to himself by gifts and favours. At the same time the authority of the king gradually underwent a

change in character, though he always claimed to be the successor of the Roman emperor. It gradually assumed that chancier domestic or personal character that, among the at the Germans, marked most of the relations between Mcrovla- me n. The household of the king gained in political J?" .. importance, by reason that the heads of the principal "' ' offices in the palace became at the same time high public officials. There was, moreover, a body of men more especially attached to the king, the antrustions (q.v.) and the commensals (convivae regis) whose vieregeld (i.e. the price of a man's life in the system of compensation then prevalent) was three times greater than that of the other subjects of the same race.*

The Frankish monarch had also the power of making laws, which he exercised after consulting the chief men of the kingdom, both lay and ecclesiastical, in the placita, which were meetings differing from the Campus Martius and apparently modelled principally on the councils of the Church. But throughout the kingdom in many places the direct authority of the king over the people ceased to make itself felt. The immunitates, granted chiefly to the great ecclesiastical properties, limited this authority in a curious way by forbidding public officials to exercise their functions in the precinct of land which was immunis. The judicial and fiscal rights frequently passed to the landowner, who in any case became of necessity the intermediary between the supreme power and the people. In regard to this last point, moreover, the case seems to have been the same with all the great landowners or potentes, whose territory was called potestas, and who gained a real authority over those living within it; later in the middle ages they were called homines potestatis (hommes de poeste).

Other principles, arising perhaps less from Germanic custom strictly speaking than from an inferior level of civilization, also contributed towards the weakening of the royal power. The monarch, like his contemporaries, considered the kingdom and the rights of the king over it to be his property; consequently, he had the power of dealing with it as if it were a private posses- sion; it is this which gave rise to the concessions of royal rights to individuals, and later to the partitions of the kingdom, and then of the empire, between the sons of the king or emperor, to the exclusion of the daughters, as in the division of an inherit- ance in land. This proved one of the chief weaknesses of the Merovingian monarchy.

In order to rule the Gallo-Romans, the barbarians had had inevitably to ask the help of the Church, which was the repre- sentative of Roman civilization. Further, the Mero- PosUloa vingian monarch and the Catholic Church had come Chunh. mt0 close alliance in their struggle with the Arians. The result for the Church had been that she gained new privileges, but at the same time became to a certain extent dependent. Under the Merovingians the election of the bishop a clero et populo is only valid if it obtains the assent {assensus) of the king, who often directly nominates the prelate. But at the same time the Church retains her full right of acquiring property, and has her jurisdiction partially recognized; that is to say, she not only exercises more freely than ever a disciplinary jurisdiction, but the bishop, in place of the civil power, ad- ministers civil and criminal justice over the clergy. The councils had for a long time forbidden the clergy to cite one another before secular tribunals; they had also, in the 6th century, forbidden secular judges under pain of excommunication to cite before them and judge the clergy, without permission of the bishop. A decree of Clotaire II. (614) acknowledged the validity of these claims, but not completely; a precise interpretation of the text is, however, difficult.

*The Merovingian dynasty perished of decay, amid increasing anarchy. The crown passed, with the approval of the papacy, to an Austrasian mayor of the palace and his family, C*r°lia- one of those mayors of the palace (i.e. chief officer of the king's household) who had been the last support of the preceding dynasty. It was then that there developed a certain number of institutions, which offered them- selves as useful means of consolidating the political organism,*

glan period.

and were in reality the direct precursors of feudalism. One was the royal benefice (beneficium) , of which, without 'doubt, the Church provided both the model and, in the first instance; the material. The model was the precaria, a form of concession by which it was customary for the Church to grant the possession of her lands to free men; this practice she herself had

*copied from the five-years leases granted by the Roniari exchequer. Gradually, however, the precaria had become a concession made, in most cases, free and for life. As regards the material, when the Austrasian mayors of the palace (probably Charles _^_ Martel) wished to secure the support of the fideles tings by fresh benefits, the royal treasury being exhausted, ofthe they turned to the Church, which was at that time the ***' greatest landowner, and took lands from her to give to '*

their warriors. In order to disguise the robbery it was decided— – perhaps as an afterthought — that these lands should be held as precariae from the Church, or from the monastic houses which had furnished them. Later, when the royal treasury was reorganized, the grants of land made by the kings naturally took a similar form: the beneficium, as a free grant for life. Under the Merovingians royal grants of land were in principle made in full ownership, except, as Brunner has shown, that provision was made for a revocation under certain circumstances. No special services seem to have been attached to the benefice, whether granted by the king or by some other person, but, in the second half of the 9th century at least, the possession of the benefice is found as the characteristic of the military class and the fbrm of their pay. This we find clearly set forth in the treatise de ecclesiis et capeUis of Hincmar of Reims. The beneficium, in obedience to a natural law, soon tended to crystallize into a' perpetual and hereditary right. Another institution akin to the beneficium was the senior abus; by the commendatio, a form of solemn contract, probably of Germanic origin, and chiefly characterized by the placing of the hands between those of the lord, a man swore absolute fidelity to another man, who became his senior. It became the generally received idea (as expressed in the capitularies) that it was natural and normal for every free man to have a senior. At the same time a benefice was never granted unless accompanied by the commendatio oi iht beneficiary to the grantor. As the most important seniores were thus bound to the king and received from him their benefices; he expected through them to command their men; but in reality the king disappeared little by little in the senior. The king granted as benefices not only lands, but public functions, such as those of count or dux, which thus became possessions, held, first for life, and later as hereditary properties. The Capitulary of Kiersy-sur-Oise (877), which was formerly considered to have made fiefs legally and generally hereditary, only proves that it was already the custom for benefices of this kind, honor es, to pass from the father to one of the sons.

Charlemagne, while sanctioning these institutions, tried to arrest the political decomposition. He reorganized the administra- tion of justice, fixing the respective jurisdictions of the count and the centenarius, substituting for the rachim- Sf ?™ ot burgii permanent scabini, chosen by the count in the mi! j^ e , presence of the people, and defining the relations*

of the count, as the representative of the central authority, with the advocati or judices of immunitates and potentates. He re- organized the army, determining the obligations and the military outfit of free men according to their means. Finally, he estab- lished those regular inspections by the missi dominici which are the subject of so many of his capitularies. From the De ordine palatii of Hincmar of Reims, who follows the account of a con- temporary of the great emperor, we learn that he also regularly established two general assemblies, conventus or placita, hv the year, one in the autumn, the other in the spring, which were attended by the chief officials, lay and ecclesiastical. It was here that the capitularies (g.v.) and all important measures were first drawn up and then promulgated. The revenues of the Carolingian monarch (which are no longer indentical with the finances of the state) consisted chiefly in the produce of the royal lands (villae), which the king and his suite often came and

consumed on the spot; and it is known how carefully Charle- magne regulated the administration of the villae. There were also the free gifts which the great men were bound, according to custom, to bring to the conventus, the contributions

c f ra, j a ‘ 1 of this character from the monasteries practically gian fiscal , , 1 , .. • 1

system. amounting to a tax; the regular personal or tern tonal

dues into which the old taxes had resolved themselves ; the profits arising from the courts (the royal bannus, and the fredum, or part of the compensation-money which went to the king) ; finally, numberless requisitions in kind, a usage which had without doubt existed continuously since Roman times. The Church was loaded with honours and had added a fresh pre- rogative to her former privileges, namely, the right of levying a real tax in kind, the tithe. Since the 3rd century she had tried to exact the payment of tithes from the faithful, interpreting as applicable to the Christian clergy the texts in the Old Testament bearing on the Levites; Gallican councils had repeatedly proclaimed it as an obligation, though, it appears, with little success. But from the reign of Pippin the Short onwards the civil law recognized and sanctioned this obligation, and the capitularies of Charlemagne and Louis the Debonnaire contain numerous provisions dealing with it. Ecclesiastical jurisdiction Tht extended farther and farther,

but Charlemagne, the

Church protector of the papacy, maintainedfirmly his authority under over the Church. He nominated its dignitaries, both Charh- bishops and abbots, who were true ecclesiastical

- *‘ officials, parallel with the lay officials. In each pagus, bishop and count owed each other mutual support, and the missi on the same circuit were ordinarily a count and a bishop. In the first collection of capitularies, that of Ansegisus, two books out of four are devoted to ecclesiastical capitularies.*

What, then, was the private and criminal law of this Frankish monarchy which had come to embrace so many different races ? The law The men of Roman descent continued under the Roman under the law, and the conquerors could not hope to impose their Frank customs upon them. The authorized expression of monarchy. ˆ R oman i aw was henceforth to be found in the Lex romana Wisigothorum or Breviarium Alarici, drawn up by order of Alaric II. in 506. It is an abridgment of the codes, of that of Theodosius especially, and of certain of the writings of the jurists included under the Law of Citations. As to the barbarians, they had hitherto had nothing but customs, and these customs, of which the type nearest to the original is to be found in the oldest text of the Lex Salica, were nothing more than a series of tariffs of compensations, that is to say, sums of money due to the injured party or his family in case of crimes committed against individuals, for which crimes these compensations were the only penalty. They also introduced a barbarous system of trial, that by com-purgation, i.e. exculpation by the oath of the defendant supported by a certain number of cojurantes, and that by ordeal, later called judicium Dei. In each new kingdom the barbarians naturally kept their own laws, and when these men of different races all became subject to the Frankish monarchy, there evolved itself a system (called the personnaliti des lois) by which every subject had, in principle, the right to be tried by the law of the race to which he belonged by birth (or sometimes for some other reason, such as emancipation or marriage). When the two adversaries were of different race, it was the law of the defendant which had to be applied. The customs of the barbarians had been drawn up in Latin. Sometimes, as in the case of the first text of the Salic law, the system on which they were compiled is not exactly known; but it was generally done under the royal authority. At this period only these written documents bear the name of ” law ” (leges romanorum; leges barbarorum) , and at least the tacit consent of the people seems to have been required for these collections of laws, in accordance with an axiom laid down in a later capitulary; lex fit consensu populi et constitutione regis. It is noteworthy, too, that in the process of being drawn up in Latin, most of the leges barbarorum were very much

Romanized.

In the midst of this diversity, a certain number of causes tended to produce a partial unity. The capitularies, which had in themselves the force of law, when there was no question of

modifying the leges, constituted a legislation which was the same for all; often they inflicted corporal punishment for grave offences, which applied to all subjects without distinction. Usage and individual convenience led to the same result. The Gallo- Romans, and even the Church itself, to a certain extent, adopted the methods of trial introduced by the Germans, as was likely in a country relapsing into barbarism. On the other hand, written acts became prevalent among the barbarians, »and at the same time they assimilated a certain amount of Roman law; for these acts continued to be drawn up in Latin, after Roman models, which were in most cases simply misinterpreted owing to the general ignorance. The type is preserved for us in those collections of Formulae, of which complete and scientific editions have been published by Eugene de Roziere and Carl Zeumer. During this period, too, the Gallican Church adopted the collec- tion of councils and decretals, called later the Codex canonum ecclesiae Gallicanae, which she continued to preserve. This collection was that of Dionysius Exiguus, which was sent to Charlemagne in 774 by Pope Adrian I. But in the course of the 9th century apocryphal collections were also formed in the Gallican Church: the False Capitularies of Benedictus Levita, and the False Decretals of Isidorus Mercator (see Decretals).

All the subjects of the Frankish monarchy were not of equal status. There was, strictly speaking, no nobility, both the Roman and the Germanic nobility having died out; but slavery continued to exist. The Church, however, was preparing the transformation of the slave into the serf, by giving force and validity to their marriages, in cases, at least, when the master had approved of them, and by forbidding the latter unjustly to seize the slave's peculium. But between the free man (ingenuus) and the slave lay a number of persons of intermediate status; they possessed legal personality but were subject to incapacities of various kinds, and had to perform various duties towards other men. There was, to begin with, the Roman colonist (colonus), a class as to the origin of which there is still a contro- versy, and of which there is no clear mention in the laws before the 4th century; they and their children after them were attached perpetually to a certain piece of land, which they were allowed to cultivate on payment of a rent. There were, further, the liti (litus or lidus), a similar class of Germanic origin; also the greater number of the freedmen or descendants of freedmen. Many free men who had fled to the great landowners for protec- tion took, by arrangement or by custom, a similar position. Under the Merovingian r6gime, and especially under the Carolin- gians, the

occupation of the land tended to assume the character of tenure; but free ownership of land continued to exist under the name of alod (alodis), and there is even evidence for the existence of this in the form of small properties, held by free men; the capitularies contain numerous complaints and threats against the counts, who endeavoured by the abuse of their power to obtain the surrender of these properties.

Period of Anarchy and the Rise of Feudalism. — The 10th and nth centuries were a period of profound anarchy, during which feudalism was free to develop itself and to take defini- tive shape. At that time the French people mav be Aoa ff a y

. , , 1. , • 1 1 . , ~ , ana feudal

said to have lived without laws, without even fixed origins.

customs and without government. The legislative power was no longer exercised, for the last Carolingian capitularies date from the year 884, and the first laws of the Capetian kings (if they may be called laws) do not appear till during the 12th century. During this period the old capitularies and leges fell into disuse and in their place territorial customs tended to grow up, their main constituents being furnished by the law of former times, but which were at the outset ill-defined and strictly local. As to the government, if the part played by the Church be excepted, we shall see that it could be nothing but the applica- tion of brute force. In this anarchy, as always happens under similar conditions, men drew together and formed themselves into groups for mutual defence. A nucleus was formed which was to become the new social unit, that is to say, the feudal group. Of this the centre was a chief, around whom gathered men capable of bearing arms, who commended themselves to

him according to the old form of vassalage, per mantis. They owed him fidelity and assistance, the support of their arms but not of their purse, save in quite exceptional cases; while he owed them protection. Some of them lived in his castle or fortified house, receiving their equipment only and eating at his table. Others received lands from him, which were, or later became, fiefs, on which they lived casati. The name &ei,feudum, does not appear, however, till towards the end of this period; these lands are frequently called beneficia as before; the term most in use at first, in many parts, is casamentum. The fief, moreover, was generally held for life and

did not become generally hereditary till the second half of the nth century. The lands kept by the chief and those which he granted to his men were for the most part rented from him, or from them, for a certain amount in money or in kind. All these conditions had already existed previously in much the same form; but the new develop- ment is that the chief was no longer, as before, merely an inter- mediary between his men and the royal power. The group had become in effect independent, so organized as to be socially and politically self-sufficient. It constituted a small army, led, naturally, by the chief, and composed of his feudatories, supplemented in case of need by the rustici. It also formed an assembly in which common interests were discussed, the lord, according to custom, being bound to consult his feudatories and they to advise him to the best of their power. It also formed a court of justice, in which the feudatories gave judgment under the presidency of their lord; and all of them claimed to be subject only to the jurisdiction of this tribunal composed of their peers. Generally they also judged the villeins (villani) and the serfs dependent on the group, except in cases where the latter obtained as a favour judges of their own status, which was, however, at that time a very rare occurrence.

Under these conditions a nobility was formed, those men becoming nobles who were able to devote themselves to the profession of arms and were either chiefs or soldiers in one of the groups which have just been described. The term designating a noble, miles, corresponds also to that of knight (Fr. chevalier, Low Lat. caballerius) , for the reason that chivalry, of which the origins are uncertain, represents essentially the technical skill and professional duties of this military class. Every noble was destined on coming of age to become a knight, and the knight equally as a matter of course received a fief, if he had not one already by hereditary title. This nobility, moreover, was not a caste but could be indefinitely recruited by the granting of fiefs and admission to knighthood (see Knighthood and Chivalry).

The state of anarchy was by now so far advanced that war became an individual right, and the custom of private war arose. Every man had in principle the right of making war ™ r ate to defend his rights or to avenge his wrongs. Later on, doubtless, in the 13th century, this was a privilege of the noble (gentilhomme); but the texts defining the limits which the Church endeavoured to set to this abuse, namely, the Peace of God and the Truce of God, show that this was at the outset a power possessed by men of all classes. Even a man who had appeared in a court of law and received judgment had the choice of refusing to accept the judgment and of making war instead. Justice, moreover, with its frequent employment of trial by combat, did not essentially differ from private war.*

It is unnecessary to go further and to affirm, with certain historians of our

time, for example Guilhermoz and See, that the only free men at that time, besides the clergy, were the nobles, all the rest being serfs. There are many indications which lead us to assume, not only in the towns but even in the country districts, the existence of a class of men of free status who were not milites, the class later known in the 13 th century as vilains, hommes de poeste, and, later, roturiers. The fact more probably was that only the nobles and ecclesiastics were exempt from the exactions of the feudal lords; while from all the others the seigneurs could at pleasure levy the taille (a direct and arbitrary tax), and those innumerable rights then called consuetudines.

Free ownership, the allodium, even under the form of small freeholds, still existed by way of exception in many parts.

Had, then, the main public authority disappeared? This is practically the contention of certain writers, who, like M. See, maintain that real property, the possession of a domain, conferred on the big landed proprietor all rights of taxation, command and coercion over the inhabitants of his domain, who, according to this view, were always serfs. But this is an exaggeration of the thesis upheld by old French authors, who saw in feudalism, though in a different sense, a confusion of property with sovereignty. It appears that in this state of political disintegra- tion each part of the country which had a homogeneous character tended to form itself into a higher unit. In this unit there arose •a powerful lord, generally a duke, a count, or a viscount, who sometimes came to be called the capitalis dominus. He was either a former official of the monarchy, whose function had become hereditary, or a usurper who had formed himself on this model. He laid claim to an authority other than that conferred by the possession of real property. He still claimed, to exercise over the whole of his former district certain rights, which we see him sometimes surrendering for the benefit of churches or monasteries. His court of justice was held in the highest honour, and to it were referred the most important affairs. But in this district there were generally a number of more or less powerful lords, who as a rule had as yet no particular feudal title and are often given the name of principes. Often, but not always, they had commended themselves to this duke or count by doing homage.

On the other hand, the royal power continued to exist, being recognized by a considerable part of old Gaul, the regnum Francorum. But under the last of the Carolingians it had in fact become elective, as is shown by the elections powTn" of Odo and Robert before that of Hugh Capet. The electors were the chief lords and prelates of the regnum Fran- corum. But following a clever policy, each king during, his lifetime took as partner of his kingdom his eldest son and con- secrated and crowned him in advance, so that the first Of the Capetians revived the principle of heredity in favour

of the eldest son, while establishing the hereditary indivisibility of the kingdom. This custom was recognized at the accession of Louis the Fat, but the authority of the king was very weak, being merely a vague allegiance. His only real authority lay where his own possessions were, or where there had not arisen a duke, a count, or lord of equal rank with them. He maintained, however, a general right of administering justice, a curia, the jurisdiction of which seems to have been universal. Jt is true that the parties in a suit had to submit themselves to it voluntarily, and could accept or reject the judgment given, but this was at that time the general rule. The king dispensed justice surrounded by the officers of his household (domestici), who thus formed his council; but these were not the only ones to assist him, whether in court or council. Periodically, at the great yearly festivals, he called together the chief lords and prelates of his kingdom, thus carrying on the tradition of the Carolingian placila or conventus; but little by little, with the appropriation of the honores, the character of the gathering changed; it was no longer an assembly of officials but of independent lords. This was now called the curia regis.

While the power of the State was almost disappearing, that of the Church, apart from the particular acts of violence of which she was often the victim, continued to grow. Her jurisdiction gained ground, since her procedure chutch. was reasonable and comparatively scientific (except that she admitted to a certain extent compurgation by oath and the judicia Dei, with the exception of trial by combat). Not only was the privilege of clergy, by which accused clerks were brought under her jurisdiction, almost absolute, but she had cognizance of a number of causes in which laymen only were concerned, marriage and everything nearly or remotely affecting it, wills, crimes and offences against religion; and even contracts, when the two parties wished it or when the agreement was made on oath, came within her competence. Such, then, were th«r

ecclesiastical or Christian courts (coursd'eglise, course de chritienU) . The Church, moreover, remained in close connexion with the crown, the king preserving a quasi-ecclesiastical character, while the royal prerogatives with regard to the election of bishops were maintained more successfully than the rights of the crown, though in many of the great fiefs they none the less passed to the count or the duke. It was at this time too that the Church tried to break the last ties which still kept her more or less dependent on the civil power; this was the true import of the Investiture

Contest (see Investiture, and Church History), though this was not very acute in France.

The period of the true feudal monarchy is embraced by the 1 2th and 13th centuries, that is to say, it was at this time that the

*crown again assumed real strength and authority; r 6 * . but so far it had no organs and instruments save those monarchy, which were furnished by feudalism, now organized*

under a regular hierarchy, of which the king was the head, the " sovereign enfeoffer of the kingdom " (souverain fieffeux du royaume), as he came later on to be called. This new position of affairs was the result of three great factors : . the revival of Roman Law, the final organization of feudalism and the rise of the privileged towns. The revival of Roman

law began in France and Italy in the second half law.'" of tne IItn century, developing with extraordinary

brilliance in the latter country at the university of Bologna, which was destined for a long time to dominate Europe. Roman law spread rapidly in the French schools and universities, except that of Paris, which was closed to it by the papacy; and the influence of this study was so great that it transformed society. On the one hand it contributed largely to the reconstitution of the royal power, modelling the rights of the king on those of the Roman emperor. On the other hand it wrought a no less profound change in private law. From this time dates the division of old France into the Pays de droit ecrit, in which Roman law, under the form in which it was codified by Justinian,

was received as the ordinary law; and the Pays de customs, coutume, where it played only a secondary part, being

generally valid only as ratio scripta and not as lex scripta. In this period the customs also took definitive form, and over and above the local customs properly so called there were formed customs known as general, which held good through a whole province or bailliage, and were based on the jurisprudence of the higher jurisdictions.

The final organization of feudalism resulted from the struggle for organization which was proceeding in each district where Final t ' le more powerful lords compelled the others to do

organiza- them homage and become their vassals; the capitalis tloa of dominus had beneath him a whole hierarchy, and was feudalism. }^[mse \f a p ar t { the feudal system of France (see Feudalism). Doubtless in the

case of lords like the dukes of Brittany and Burgundy, the king could not actually demand the strict fulfilment of the feudal obligations; but the principle was established. The question now arises, did free and absolute property, the allodium, entirely disappear in this process, and were all lands held as tenures ? It continued to exist, by way of exception, in most districts, unchanged save in the burden of proof of ownership, with which, according to the customs, sometimes the lord and sometimes the holder of the land was held

charged. In one respect, however, namely in the eft"** administration of justice, the feudal hierarchy had of justice, absolute sway. Towards the end of the 13th century*

*Beaumanoir clearly laid down this principle: " All secular jurisdiction in France is held from the king as a fief or an arriere-fief. " Henceforth it could also be said that " All justice emanates from the king. " The law concerning fiefs became settled also from another point of view, the fief becoming patrimonial; that is to say, not only hereditary, but freely alienable by the vassal, subject in both cases to certain rights of transfer due to the lord, which were at first fixed by agreement and later by custom. * The most salient features of feudal succession were the right of primogeniture and the perference given to heirs-male; but from the 13th century onwards the*

right of primogeniture, which had at first involved the total exclusion of the younger members of a family, tended to be modified, except in the case of the chief lords, the eldest son obtaining the preponderant share or priciput. Non-noble (roturier) tenancies also became patrimonial in similar circum-stances, except that in their case there was no right of primo- geniture nor any privilege of males. The tenure of serfs did not become alienable, and only became hereditary by certain devices.

Feudal society next saw the rise of a new element within it: the privileged towns. At this time many towns acquired privileges, the movement beginning towards the end of the nth century; they were sanctioned by a formal ^f 6 ,, ^' concession from the lord to whom the town was sub-towns. ject, the concession being embodied in a charter or in a record of customs (coutume) . Some towns won for themselves true political rights, for instance the right of self-administration, rights of justice over the inhabitants, the right of not being taxed except by their own consent, of maintaining an armed force, and of controlling it themselves. Others only obtained civil rights, e.g. guarantees against the arbitrary rights of justice and taxation of the lord or his provost. The chief forms of municipal organization at this time were the commune juree of the north artd east, and the consulat, which came from Italy and penetrated as far as Auvergne

and Limousin. The towns with important privileges formed in feudal society as it were a new class of lordships; but their lords, that is to say their burgesses, were inspired by quite a new spirit. The crown courted their support, taking them under its protection, and championing the causes in which they were interested (see Commune) . Finally, it is in this period, under Philip Augustus, that the great fiefs began to be effectually reannexed to the crown, a process which, continued by the kings up to the end of the ancien rSgime, re- founded for their profit the territorial sovereignty of France.

The crown maintained the machinery of feudalism, the chief central instruments of which were the great officers of the crown, the seneschal, butler, constable and chancellor, who areat were to become irremovable officials, those at least officers of who survived. But this period saw the rise of a thecrmrn special college of dignitaries, that of the Twelve Peers " ad ; P eers of France, consisting of six laymen and six ecclesi- astics, which took definitive shape at the beginning of the 13th century. We cannot yet discern with any certainty bv what process it was formed, why those six prelates and those six great feudatories in particular were selected rather than others equally eligible. But there is no doubt that we have here a result of that process of feudal organization mentioned above; the formation of a similar assembly of twelve peers occurs also in a certain number of the great fiefs. Besides the part which they played at the consecration of kings, the peers of France formed a court in which they judged one another under the presidency of the king, their overlord, according to feudal custom. But the cour des pairs in this sense was not separate from the curia regis, and later from the parlement of Paris, of which the peers of France were by right members. From this time, too, dates another important institution, that of the maltres des rtquetes.

The legislative power of the crown again began to be exercised during the 12th century, and in the 13th century had full authority over all the territories subject to the crown. Beau- manoir has a very interesting theory on this subject. f^mya!' The right of war tends to regain its natural equilibrium, power. the royal power following the Church in the endeavour to check private wars. Hence arose the quarantaine le roi, due to Philip Augustus or Saint Louis, by which those relatives of the parties to a quarrel who had not been present at the quarrel were rendered immune from attack for forty days after it; and above all the assicrements imposed by the king or lord; on these points too Beaumanoir has an interesting theory. The rule was, moreover, already in force by which private wars had to cease during the time that the king was engaged in a foreign war. But the most appreciable progress took place in the

administrative and judicial institutions. Under Philip Augustus arose the royal bailiis (see Bailiff: section Bailli), and seneschals (q.v.), who were the representatives of the king in the provinces, and superior judges. At the same time the form of the feudal courts tended to change, as they began more and more to be influenced by the Romano-canonical law. Saint Louis had striven to abolish trial by combat, and the Church had condemned other forms of ordeal, the purgatio vulgaris. In most parts of the country the feudal lords began to give place in the courts of law to the provosts (prtvdts) and bailiis of the lords or of the crown, who were the judges, having as their councillors the avocats (advocates) and procureurs (procurators) of the assize. The feudal courts, which were founded solely on the relations of homage and tenure, before which the vassals and tenants as such appeared, disappeared in part from the 13th century on. Of the seigniorial jurisdictions there soon remained only the hautes or basses justices (in the 14th century arose an intermediate grade, the moyenne justice) , all of which were considered to be concessions of the royal power, and so delegations of the public authority. As a result of the application of Roman and canon law, there arose the appeal strictly so called, both in the class of royal and Of seigniorial jurisdictions, the case in the latter instance going finally before a royal court, from which henceforth there was no appeal. In the 13th century too appeared the theory of crown cases (cos royaux), cases which the lords became in- competent to try and which were reserved for the royal court. Finally, the curia regis was gradually transformed into a regular court of justice, the Parlement (q.v.), as it was already called in the second half of the 13th century. At this time the king no longer appeared in it regularly, and before each session (for it was not yet a permanent body) a list of properly qualified men was drawn up in advance to form the parlement, only those whose names were on the list being capable of sitting in it. Its main function had come to be that of a final court of appeal. At the various sessions, which were regularly held at Paris, appeared the bailiis and seneschals, who were called upon to answer for the cases they had judged and also for their administration. The accounts were received by members of the parlement at the Temple, and this was the origin of the Cour or Chambre des Comptes.

At the end of this period the nobility became an exclusive class. It became an established rule that a man had to be noble in order to be made a knight, and even in order to commons acquire a fief; but in this latter respect the king aad the made exceptions in the case of rotttriers, who were Church la licensed to take up fiefs, subject to a payment known ceatmy as t ‘ le droits de franc-fief. The roturiers, or villeins who were not in a state of

thraldom, were already a numerous class not only in the towns but in the country. The Church maintained her privileges; a few attempts only were made to restrain the abuse, not the extent, of her jurisdic- tion. This jurisdiction was, during the 12th century, to a certain extent regularized, the bishop nominating a special functionary to hold his court; this was the officialis (Ft. official), whence the name of officiality later applied in France to the ecclesiastical jurisdictions. On one point, however, her former rights were diminished. She preserved the right of freely acquiring personal and real property, but though she could still acquire feudal tenures she could not keep them; the customs decided that she must vider les mains, that is, alienate the property again within a year and a day. The reason for this new rule was that the Church, the ecclesiastical establishment, is a proprietor who does not die and in principle does not surrender her property; consequently, the lords had no longer the right of exacting the transfer duties on those tenures which she acquired. It was 'xjssible, however, to compromise and allow the Church to keep the tenure on condition of the consent not only- of the lord directly concerned, but of all the higher lords up to the capitalis dominus; it goes without saying that this concession was only obtained by the payment of pecuniary compensations, the chief of which was the droit d'amnrtisscment, paid to these different lords. In this period the form of the episcopal elections under-

went a change, the electoral college coming to. consist only of' the canons composing the chapter of the cathedral' church i • But except for the official candidatures, which were abused by the kings and great lords, the elections were regular; the Pragmatic Sanction, attributed to Saint-Louis, whichimplies the contrary, is nowadays considered apocryphal by the best critics.

Finally, it must be added that during the 13th century criminal law was profoundly modified. Under the influence of Roman law a system of arbitrary penalties replaced those laid down by the customs, which had usually been Ia ^^; M ; fixed and cruel. The criminal procedure of the feudal law. courts had been based on the right of accusation '

vested only in the person wronged and his relations; for this was substituted the inquisitorial procedure (processus per inquisilionem) , which had developed in the canon law at the very end of the 1 2th century, and was to become the ■ procedure A V extraordinaire of the anciefi regime, which was conducted in secret and without free defence and debate. Of this procedure torture came to be an ordinary and regular part.

The customs, which at that time contained almost the whole of the law for a great part of France, were not fixed by being written down. In that part of France which was subject to customary law (la France coutumiere) they

customs, were defined when necessary by the verdict of a jury of practitioners in what was called the enqtiUe par turbes; some of them, however, were, in part at least, authentically recorded in seigniorial charters, chartes de ville or ckartes de coulume. Their rules were also recorded by experts in private works or collections called livres coutumiers, or simply coutumiers (customaries). The most notable of these are Les Coutumes de Beauvoisis of Philippe de Beaumanoir, which Montesquieu justly quotes as throwing light on those times; also the Tr'es ancienne coutume de Normandie and the Grand Coutumier de Normandie; the Conseil a un ami of Pierre des Fontaines, the &ablissements de Saint Louis; the Livre de jo slice et de pleL At the same time the clerks of important judges began to collect in registers notable decisions; it is in this way that we haye preserved to us the old decisions of the exchequer of Normandy, and the Olim registers of the parlement of Paris. .■•■_.

The Limited Monarchy. — The 14th and 15th centuries were the age of the limited monarchy. Feudal institutions kept their political importance; but side by side with them arose others of which the object was the direct exercise of the royal authority; others also arose from the very heart of feudalism, but at the same time transformed its laws in order to adapt them to the new needs of the crown. In this period certain rules for the succession to the throne were fixed by precedents: the exclusion of women and of male descendants in the female line, and the principle that a king could not by an act of will change the succession of the crown. The old curia regis dis- appeared and was replaced by the parlement as to its judicial functions, while to fulfil its deliberative functions there was formed a new body, the royal council (conseil du roi), an ad- ministrative and governing council, which was in no way of a feudal character. The number of its members was at first small, but they tended to increase; soon the brevet of conseiller du roi en ses Cornells was given to numerous representatives of the clergy and nobility, the great officers of the crown becoming members by right. Side by side with these officials, whose power was then at its height, there were gradually evolved mdre subservient ministers who could be dispensed with at will; the secretaires des commandements du roi of the 15th century, who in the 16th century developed into the secretaires d'etat, and were themselves descended from the clercs du secret and secretaires des finances of the 14th century. The College of th? Twelve Peers of France had not its full numbers at, the end of the 13th century; the six ecclesiastical peerages existed and continued to exist to the end, together with the archbishopric and bishoprics to which they were attached, not being suppressed ; but several of the great fiefs to which six lay peerages had been attached had been annexed to the crown. To fill these vacancies, Philip the Pair raised the duchies of Brittany and Anjou and

vlacial estates.

Royal taxation.

the countship of Artois to the rank of peerages of France. This really amounted to changing the nature of the institution; for the new peers held their rank merely at the king's will, though the rank continued to belong to a great barony and to be handed down with it. Before long peers began to be created when there were no gaps in the ranks of the College, and there was a constant increase in the numbers of the lay peers.

At the beginning of the 14th century appeared the states general (etots g&niraux), which were often convoked, though not staUa at fixed intervals, throughout the whole of the 14th general century and the greater part of the 15th. Their and pro- power reached its height at a critical moment of the Hundred Years' War during the reign of King John. At the same time there arose side by side with them, and from the same causes, the provincial estates, which were in miniature for each province what the states general were for the whole kingdom. Of these provincial assemblies some were founded in one or other of the great fiefs, being convoked by the duke or count under the pressure of the same needs which led the king- to convoke the states general; others, in provinces which had already been annexed to the crown, probably had their origin in the councils summoned by the bailli or seneschal to aid. him in his administration. Later it became a privilege for a province to have its own assembly; those which did so were never of right subject to the royal taille, and kept, at least formally, the right of sanctioning, by means of the assembly, the subsidies which took its place. Hence it became the endeavour of the crown to suppress these provincial assemblies, which in the 14th century were to be found everywhere; from the outset of the 15th century they began to disappear in central France.

The most characteristic feature of this period was the institu- tion of universal taxation by the c/own. So far the king's sole revenues were those which he exacted, in his capacity of feudal lord, wherever another lord did not intervene between him and the inhabitants; in addition to the in- come arising from certain crown rights which he had preserved or regained. But these revenues, known later as the income of the royal domain and later still as the finances ordinaires, became insufficient in proportion as the

royal power increased; it became a necessity for the monarch to be able to levy imposts throughout the whole extent of the provinces annexed to the crown, even upon the subjects of the different lords. This he could only do by means of the co-operation of those lords, lay and ecclesiastical, who alone had the right of taxing their subjects; the co-operation of the privileged towns, which had the right to tax themselves, was also necessary. It was in order to obtain this consent that the states general, in most cases, and the pro- vincial assemblies, in all cases, were convoked. In some cases, however, the king adopted different methods; for instance, he sometimes utilized the principle of the feudal aids. In cases where his vassals owed him, as overlord, a pecuniary aid, he substituted for the sum paid directly by his vassals a tax levied by his own authority on their subjects. It is in this way that for thirty years the necessary sums were raised, without any vote from the states general, to pay the ransom of King John. But in principle the taxes were in the 14th century sanctioned by the states general. Whatever form they took, they were given the generic name of Aids or auxilia, and were considered as occasional and extraordinary subsidies, the king being obliged in principle to " live of his own " (vivre de son domaine). Certain aids, it is true, tended to become permanent under the reign of Charles VI.; but the taxes subject to the consent of the states general were at first the sole resource of Charles VII. In the second half of his reign the two chief taxes became permanent: in 1435 that of the aids (a tax on the sale of articles of con- sumption, especially on wine), with the formal consent of the states general, and that of the taille in 1439. In the latter case the consent of the states general was not given; but only the nobility protested, for at the same time as the royal taille became permanent the seigniorial taille was suppressed. These imposts were increased, on the royal authority, by Louis XI. After his death the states general, which met at Tours in 1484, endeavoured

The army.

to re-establish the periodical vote of the tax, and only granted it for two years, reducing it to the sum which it had reached at the death of Charles VII. But the promise that they would again be convoked before the expiry of two years was not kept. These imposts and that of the gabelle were henceforth permanent. Together with the taxes there was evolved the system of their administration. Their main outlines were laid down by the states general in the reign of King John, in 1355 and the following years. For the administration of the subsidies which they granted, they nominated from among their own numbers surintendants gintraux or geniraux des finances, and further, for each diocese or equivalent district, Mus. Both had not only the active administration but also judicial rights, the latter constituting courts of the first instance and the former courts of final appeal. After 1360 the crown again adopted this organiza- tion, which had

before been only temporary; but henceforth giniraux and Mus were nominated by the king. The ilus, or officiers des elections, only existed in districts which were subject to the royal taille; hence the division, so important in old France, into pays d'ilections and pays d'itats. The Mus kept both administration and jurisdiction; but in the higher stage a differentiation was made: the gSneraux des finances, who numbered four, kept the administration, while their jurisdiction as a court of final appeal was handed over to another body, the cour des aides, which had already been founded at the end of the 14th century. Besides the four gtn&raux des finances, who administered the taxation, there were four Treasurers of France {trisoritrs de France), who administered the royal domain; and these eight officials together formed in the 1 5th century a kind of ministry of finance to the monarchy.

The army also was organized. On the one hand, the military service attached to the fiefs was transformed for the profit of the king, who alone had the right of making war: it became the arriere-ban, a term which had formerly applied to the levie en masse of all the inhabitants in times of national danger. Before the 14th century the king had only had the power of calling upon his own immediate vassals for service. Henceforth all possessors of fiefs owed him, whether within the kingdom or on the frontiers, military service without pay and at their own expense. This was for long an important resource for the king. But Charles VII. organized an army on another footing. It comprised the francs-archers furnished by the parishes, a militia which was only summoned in case of war, but in time of peace had to practise archery, and companies of gendarmerie or heavy cavalry, forming a permanent establish- ment, which were called compagnies d'ordonnance. It was chiefly to provide for the expense of the first nucleus of a per- manent army that the taille itself had been made permanent.

The new army led to the institution of the governors of pro- vinces, who were to command the troops quartered there. At first they were only appointed for the frontiers and fortified places, but later the kingdom was divided into gouvernements gSneraux. There were at first twelve of these, which were called in the middle of the 16th century the douze anciens gouvernements. Although, strictly speaking, they had only military powers, the governors, always chosen from among the great lords, became in the provinces the direct representatives of the king and caused the baillis and seneschals to take a secondary place.

The courts of law continued to develop on the lines already laid down. The parlement, which had come to be a judicial committee nominated every year, but always consisting in fact of the samepersons, changed in the course of the courts!" 14th century into a body of magistrates who were

permanent but as yet subject to removal. During this period were evolved its organization and definitive features (see Parle- ment) . The provincial parlements had arisen after and in imita- tion of that of Paris, and had for the most part taken the place of some superior jurisdiction which had formerly existed in the same district when it had been independent (like Provence) or had formed one of the great fiefs (like Normandy or Burgundy); It was during this period also that the parlements acquired the right of opposing the registration, that is to say, the promulgation

of laws, of revising them, and of making representations (remon- trances) to the king when they refused the registration, giving the reasons for such refusal. The other royal jurisdictions were completed (see B aiuff, Chatelet) . Besides them arose another of great importance, which was of military origin, but came to include all citizens under its sway. These were the provosts of the marshals of France (prevdts des marlchaux de France), who were officers of the Marechaussee (the gendarmerie of the time); they exercised criminal jurisdiction without appeal in the case of crimes committed by vagabonds and fugitives from justice, this class being called their gibier (game) , and of a number of crimes of violence, whatever the rank of the offender. Further, another class of officers was created in connexion with the law courts: the " king's men " (gens du roi), the procureurs and avocats du roi, who were at first simply those lawyers who represented the king in the law courts, or pleaded for him when he had some interest to follow up or to defend. Later they became officers of the crown. Itf the case of the procureurs du roi this development took place in the firsf.half of the 14th century. Their duty was not only to represent the king in the law courts, whether as plaintiff or defendant, but also to take care that in each case the law was applied, and to demand its application. From this time on the procureurs du roi had full control over matters concerning the public interest, and especially over public prosecution. In this period, too, appeared what was afterwards called justice retenue, that is to say, the justice which the king administered, or was supposed to administer, in person. It was based on the idea that, since all justice and all judicial power reside in the king, he could not deprive himself of them by delegating their exercise to his officers and to the feudal lords. Consequently he could, if he thought fit, take the place of the judges and call up a case before his own council. He could reverse even the decisions of the courts : of final appeal, and in some cases used this means of appealing against the decree's of the parlements (proposition d'erreur,

requite civile, pourvoi en rtvision) . In these cases the king was supposed to judge in person; in reality they were examined by the mattres des requites and submitted to the royal council (conseil du roi), at which. the king was always supposed to be present and which had in itself no power of giving a decision. For this purpose there was soon formed a special committee of the council, which was called the conseil prive or de justice. At the end of the 15th century, Charles VIII., in order to relieve the council of some of its func- tions, created a new final court, the grand conseil, to deal with a number of these cases. But before long it again became the custom to appeal to the conseil du roi, so that the grand conseil became almost useless. The king frequently, by means of lettres de justice, intervened in the procedure of the courts, by granting benefices, by which rules which were too severe were modified, and faculties or facilities for overcoming difficulties arising from flaws in contracts or judgments, cases at that time not covered by the common law. By lettres de grdce he granted reprieve or pardon in individual cases. The most extreme form of intervention by the king was made by means of lettres de cachet (q.v.), which ordered a subject to go without trial into a state prison or into exile.

The condition of the Church changed greatly during this period. The jurisdiction of the officialitSs was very much reduced, even over the clergy. They ceased to be competent to judge actions concerning the possession of real property, in which the clergy were defendants. In criminal law the theory of the cas privilegie, which appears in the 14th century, enabled the royal judges to take action against and judge the clergy for all serious crimes, though without the power of inflicting any penalties but arbitrary fines, the ecclesiastical judge remaining competent, in accordance with the privileges of clergy, to try the offender for the same crime as what was technically called a dilit commun. The development of juris- prudence gradually removed from the officialitis causes of a purely secular character in which laymen only were concerned, such as wills and contracts; and in matrimonial cases their jurisdiction was limited to those in which the foedus matrimonii

was in question. For the acquisition of real property by ecclesi- astical establishments the consent of the king to the amortize- ment was always necessary, even in the case of allodial lands; and if it was a case of feudal tenures the king and the direct overlords alone kept their rights, the intermediate lords being left out of the question.

As regards the conferring of ecclesiastical benefices, from the 14th century onwards the papacy encroached more and more upon the rights of the bishops, in whose gift the inferior benefices generally were, and of the

electors, who Pa i"' usually conferred the superior benefices; at the same meats. time it exacted from newly appointed incumbents heavy dues, which were included under the generic name of annates (q.v.). During the Great Schism of the Western Church, these abuses became more and more crying, until by a series of edicts, promulgated with the consent and advice of the parlement and the clergy, the Gallican Church was restored to the possession of its former liberties, under the royal authority. Thus France was ready to accept the decrees of reform issued by the council of Basel (q.v.), which she did, with a few modifications, in the Pragmatic Sanction of Charles VII., adopted after a solemn assembly of the clergy and nobles at Bourges and registered by the parlement of Paris in 1438. It suppressed the annates and most of the means by which the popes disposed of the inferior benefices: the reservations and the gratioe expectativae. . For the choice of bishops and abbots, it restored election by the chapters and convents. The Pragmatic Sanction, however, was never recognized by the papacy, nor was it consistently and strictly applied by the royal power. The transformation :of the civil and criminal law under the influence of Roman and canon law had become more and more marked. The production of the coutumiers, or livres de pratiques, also continued. The chief of them were: in the 14th century, the Stylus Vetus Curiae Parla- menti of Guillaume de Breuil; the Tres ancienne coutume de Bretagne; the Grand Coutumier de France, or Coutumier de Charles VI.; the Somme rural of Boutillier; in the 15th century, for Auvergne, the Practica forensis of Masuer. Charles VII., in an article of the Grand Ordonnance of Montil-les-Tours (1453), ordered the general customs to be officially recorded under the supervision of the crown. It was an enormous work, which would almost have transformed them into written laws; but up to the 16th century little recording was done, the procedure established by the Ordonnance for the purpose not being very suitable.

*The Absolute Monarchy. — From the 16th century to the Revolution was the period of the absolute monarchy, but it can be further divided into two periods: that of the _, establishment of this regime, from 1515 to about mem \ 1673; and that of the ancien rSgime when definitively under the established, from 1673 to 1789. The reigns of Francis *** 8/ «"» I. and Henry II. clearly laid down the principle of the a """" v y ' absolute power of the crown and applied it effectually, as is plainly seen from the temporary disappearance of the states general, which were not assembled under these two reigns. There were merely a few assemblies of notables chosen by the royal power, the most important of which was that of Cognac, under Francis I., summoned to advise on the non-fulfilment of the treaty of Madrid. It is true that in the second half of the 1 6th century the states general reappeared. They were summoned in 1560 at Orleans, then in 1561 at Pontoise, and in 1576 and 1588 at Blois. The League even*

convoked one, which was held at Paris in 1503. This represented a crucial and final struggle. Two points were then at issue: firstly, whether France was to be Protestant or Catholic; secondly, whether she was to have a limited or an absolute monarchy. The two problems were not necessarily bound up with one another. For if the Protestants desired political liberty, many of the Catholics wished for it too, as is proved by the writings of the time, and even by the fact that the League summoned the estates. But the states general of the 1 6th century, in spite of their good in- tentions and the great talents which were at their service, were dominated by religious passions, which made them powerless

for any practical purpose. They only produced a few great ordinances of reform, which were not well observed. They were, however, to be called together yet again, as a result of the disturbances which followed the death of Henry IV.; but their dissensions and powerlessness were again strikingly exemplified and they did not reappear until 1789. Other bodies, however, which the royal power had created, were to carry on the struggle against it. There were the parlements, the political rivals of the states general. Thanks to the principle according to which no law came into effect so long as it had not been registered by them, they had, as we have seen, won for themselves the right of a preliminary discussion of those laws which were presented to them, and of refusing registration, explaining their reasons to the king by means of the remonlrances. The royal power saw in this merely a concession from itself, a consultative power, which ought to yield before the royal will, when the latter was clearly manifested, either by letlres de jussion or by the actual words and presence of the king, when he came in person to procure the registration of a law in a so-called lit de justice. But from the 1 6th century onwards the members of the parlements claimed, on the strength of a historical theory, to have inherited the powers of the ancient assemblies (the Merovingian and Carolingian placita and the curia regis), powers which they, moreover, greatly exaggerated. The successful assertion of this claim would have made them at once independent of and necessary to the crown. During the minority of kings, they had possessed, in fact, special opportunities for asserting their preten- sions, particularly when they had been called upon to intervene in the organization of the regency. It is on this account that at the beginning of the reign of Louis XIV. the parlement of Paris wished to take part in the government, and in 1648, in concert with the other supreme courts of the capital, temporarily imposed a sort of charter of liberties. But the first Fronde, of which the

parlement was the centre and soul, led to its downfall, which was completed when later on Louis XIV. became all-powerful. The ordinance of 1667 on civil procedure, and above all a declara- tion of 1673, ordered the parlement to register the laws as soon as it received them and without any modification. It was only after this registration that they were allowed to draw up remonstrances, which were henceforth futile. The nobles, as a body, had also become politically impotent. They had been sorely tried by the wars of religion, and Richelieu, in his struggles against the governors of the provinces, had crushed their chief leaders. The second Fronde was their last effort (see Fronde). At the same time the central government underwent changes. The great officers of the crown disappeared one by one. The office of constable of France was suppressed by purchase during the first half of the 17th century, and of those in the first rank only the chancellor survived till the Revolution. But though his title could only be taken from him by condemnation on a capital charge, the king was able to deprive him of his functions by taking from him the custody and use of the seal of France, which were entrusted to a garde des sceaux. Apart from the latter, the king's real ministers were the secretaries of state, generally four in number, who were always removable and were not chosen from among the great nobles. For purposes of internal adminis- tration, the provinces were divided among them, each of them corresponding by despatches with those which were assigned to him. Any other business (with the exception of legal affairs, which belonged to the chancellor, and finance, of which we shall speak later) was divided among them according to convenience. At the end of the 16th century, however, were evolved two regular departments, those of war and foreign affairs. Under Francis I. and Henry II., the chief administration of finance underwent a change; for the four gineraux des finances, who had become too powerful, were substituted the intendants des finances, one of whom soon became a chief minister of finance, with the title surintendant. The gineraux des finances, like the trisoriers de France, became provincial officials, each at the head of a giniralite (a superior administrative district for purposes of finance) ; under Henry III. the two functions were combined and assigned to the bureaux des finances. The fall of Fouquet

led to the suppression of the office of surintendant; but soon Colbert again became practically a minister of finance, under the name of contrdleur gSneral des finances, both title and office continuing to exist up to the Revolution.

The conseil du rot, the origin of which we have described, was an important organ of the central government, and for a long time included among its members a large number of repre- sentatives of the nobility and clergy. Besides the councillors of state (conseillers d'Stat), its ordinary members, the great officers of the crown and secretaries of state, princes of

the blood and peers of France were members of it by right. Further, the king was accustomed to grant the brevet of councillor to a great number of the nobility and clergy, who could be called upor to sit in the council and give an opinion on matters of importance. But in the 17th century the council tended to differentiate its functions, forming three principal sections, one for political, one for financial, and the third for legal affairs. Under Louis XIV. it took a definitely professional, administrative and technical character. The conseillers & brevet were all suppressed in 1673, and the peers of France ceased to be members of the council. The political council, or conseil d'en haut, had no ex officio members, not even the chancellor; the secretary of state for foreign affairs, however, necessarily had entry to it; it also included a small number of persons chosen by the king and bearing the title of ministers of state (ministres d'(tai). The other important sections of the conseil du roi were the conseil des finances, organized after the fall of Fouquet, and the conseil des depSches, in which sat the four secretaries of state and where everything concerned with internal administration (except finance) was dealt with, including the legal business connected with this administration. As to the government and the prepara- tion of laws, under Louis XIV. and Louis XV., the conseil du roi often passed into the background, when, as the saying went, a minister who was projecting some important measure travail- lait seul avec le roi (worked alone with the king), having from the outset gained the king's ear.

The chief authority in the provincial administration belonged in the 16th century to the governors of the provinces, though, strictly speaking, the governor had only military powers in his gouvernement; for, as we have seen, he p " >vla ˆ lal was the direct representative of the king for general tratioa. purposes. But at the end of this century were created the intendants of the provinces, who, after a period of conflict with the governors and the parlements, became absolute masters of the administration in all those provinces which had no provincial estates, and the instruments of a complete administrative centralization (see Intend ant).

The towns having a corps de ville, that is to say, a municipal organization, preserved in the 16th century a fairly wide autonomy, and played an important part in the wars of religion, especially under the League. But under t £ns. Louis XIV. their independence rapidly declined. They were placed under the tutelage of the intendants, whose sanction, or that of the conseil du roi, was necessary for all acts of any importance. In the closing years of the 17 th century, the municipal officials ceased, even in principle, to be elective. Their functions ranked as offices which were, like royal offices, saleable and heritable. The pretext given by the edicts were the intrigues and dissensions caused by the elections; the real cause was that the government wanted to sell these offices, which is proved by the fact that it frequently allowed towns to redeem them and tore-establish the elections.

The sale of royal offices is one of the characteristic features of the ancien rigime. It had begun early, and, apparently, with the office of councillor of the parlement of Paris, when this became permanent, in the second half of the 14th omxs. century. It was first practised by magistrates who wished to dispose of their office in favour of a successor of their own choice. The resignatio in favorem of ecclesiastical benefices served as model, and at first care was taken to conceal the money transaction between the parties. The crown winked at these resignations in consideration of a payment in money,

But in the 16th century, under Francis I. at the latest, the crown itself began officially to sell offices, whether newly created or vacant by the death of their occupiers, taking a fee from those upon whom they were conferred.- Under Charles IX. the right of resigning in favorem was recognized by law in the case of royal officials, in return for a payment to the treasury of a certain proportion of the price. In the case of judicial offices there was a struggle for at least two centuries between the system of sale and another, also imitated from canon law, i.e. the election or presentation of candidates by the legal corporations. The ordinances of the second half of the 16th century, granted in answer to complaints of the states general, restored and con- firmed the latter system, giving a share in the presentation to the towns or provincial notables and forbidding sales. The system of sale, however, triumphed in the end, and, in the case of judges, had, moreover, a favourable result, assuring to them that irremovability which Louis XI. had promised in vain; for, under this system, the king could not reasonably dismiss an official arbitrarily without refunding the fee which he had paid. On the other hand, it contributed to the development of the Spices, or dues paid by litigants to the judges. The system of sale, and with it irremovability, was extended to all official functions, even to financial posts. The process was completed by the recognition of the rights in the sale of offices as hereditary, i.e. the right of resigning the office on payment of a fee, either in favour of a competent descendant or of a third party, passed to the heirs of an official who had died without having exercised this right himself. It was established under Henry IV. in 1604 by the system called the Paulette, in return for the payment by the official of an annual fee {droit annuel) which was definitely fixed at a hundredth part of the price of the office. Thus these offices, though the royal nomination was still required as well as the professional qualifications required by the law, became heritable property

in virtue of the finance attached to them. This led to the formation of a class of men who, though bound in many ways to the crown, were actually independent. Hence the tendency in the 18th century to create new and important functions under the form, not of offices, but of simple commissions.

In this period of the history of France were evolved and defined the essential principles of the old public law. There were, p d . in the first place, the fundamental laws of the realm, mental which were true constitutional principles, established laws of for the most part not by law but by custom, and France. considered as binding in respect of the king himself; so that, although he was sovereign, he could neither abrogate, nor modify, nor violate them. There was, however, some discus- sion as to what rules actually came under this category, except in the case of two series about which there was no doubt. These were, on the one hand, those which dealt with the succession to the crown and forbade the king to change its order, and those which proclaimed the inalienability of the royal domain, against which no title by prescription was valid. This last principle, introduced in the 14th century, had been laid down and defined by the edict of Moulins in 1566; it admitted only two exceptions: the formation of appanages (q.v.), and selling (engagement), to meet the necessities of war, with a perpetual option of redeem- ing it.

There was in the second place the theory of the rights, franchises and liberties of the Gallican Church, formed of elements some of which were of great antiquity, and based on the conditions which had determined the relations of the Gallican Church with the crown and papacy during the Great Schism and under the Pragmatic Sanction of Bourges, and defined at the end of the 16th and the beginning of the 17th century. This body of doctrine was defined by the writings of three men especially, Guy Coquille, Pierre Pithou and Pierre Dupuy, and was solemnly confirmed by the declaration of the clergy of France, or Declara- tion des quatres articles of 1682, and by the edict which promul- gated it. Its substance was based chiefly on three principles: firstly, that the temporal power was absolutely independent of the spiritual power; secondly, that the pope had authority over the clergy of France in temporal matters and matters of

discipline only by the consent of the king; thirdly, that the king had authority over and could legislate for the Gallican Church in temporal matters and matters of discipline. The old public law provided a safeguard against the violation of these rules. This was the process known as the appel comme d'abus, formed of various elements, some of them very ancient, and definitely established during the 16th century. It was heard before the parlements, but could, like every other case, be evoked before the royal council. Its effect was to annul any act of the ecclesiastical authority

due to abuse or contrary to French law. The clergy were, when necessary, reduced to obedience by means of arbitrary fines and by the seizure of their temporalities. The Pragmatic Sanction had been abrogated and replaced by the Concordat of 15 15, concluded between Francis I. and Leo X., which remained in force until suppressed by the Constituent Assembly. The Concordat, moreover, preserved many of the enactments of the Pragmatic Sanction, notably those which protected the collation of the inferior benefices from the encroachments of the papacy, and which had introduced reforms in certain points of discipline. But in the case of the superior benefices (bishoprics and abbeys) election by the chapters was suppressed. The king of France nominated the candidate, to whom the pope gave canonical institution. As a matter of fact, the pope had no choice; he had to institute the nominee of the king, unless he could show his unworthiness or incapacity, as the result of inquiries regularly conducted in France; for the pope it was, as the ancient French authors used to say, a case of compulsory collation. The annates were re-established at the time of the Concordat, but considerably diminished in comparison with what they had been before the Pragmatic Sanction. We must add, to complete this account, that many of the inferior benefices, in France as in the rest of Christendom, were conferred according to the rules of patronage, the patron, whether lay or ecclesiastic, presenting a candidate whom the bishop was bound to appoint, provided he was neither incapable nor unsuitable. There was some difficulty in getting the Concordat registered by the parlement of Paris, and the latter even announced its intention of not taking the Concordat into account in those cases concerning benefices which might come before it. The crown found an easy method of making this opposition ineffectual, namely, to transfer to the Grand Conseil the decision of cases arising out of the application of the Concordat.

In the 16th century also, contributions to the public services drawn from the immense possessions of the clergy were regu- larized. Since the second half of the 12th century at least, the kings had in times of urgent need asked for subsidies from the church, and ever since the Saladin tithe (dime saladine) of Philip Augustus this contribution had assumed the form of a tithe, taking a tenth part of the revenue of the benefices for a given period. Tithes of this kind were fairly frequently granted by the clergy of France, either with the pope's consent or without (this being a disputed point). After the conclusion of the Concordat, Leo X. granted the king a tithe (ddcime) under the pretext of a projected war against the Turks; hitherto con- cessions of this kind had been made by the papacy in view of the Crusades or of wars against heretics. The concession was several times renewed, until, by force of custom, the levying of these tithes became permanent. But in the middle of the 16th century the system changed. The crown was heavily in debt, and its needs had increased. The property of the

clergy having been threatened by the states general of 1560 and 1561, the king proposed to them to remit the bulk of the tithes and other dues, in return for the payment by them of a sum equivalent to the proceeds of the taxes which he had mortgaged. A formal contract to this effect was concluded at Poissy in 1561 between the king and the clergy of France, represented by the prelates who were then gathered together for the Colloquy of Poissy with the Protestants, and some of those who had been sitting at the states general of Pontoise. The fulfilment of this agreement was, however, evaded by the king, who diverted part of the funds provided by the clergy from their proper purpose. In 1580,

after a period of ten years which had been agreed on, a new assembly of the clergy was called together and, after protesting against this action, renewed the agreement, which was hence- f or ward always renewed every ten years. Such was the definitive form of the contribution of the clergy, who also acquired the right of themselves assessing and levying these taxes on the holders of benefices. Thus every ten years there was a great assembly of the clergy, the members of which were elected. There were two stages in the election, a preliminary one in the dioceses and a further election in the ecclesiastical provinces, each province sending four deputies to the general assembly, two of the first rank, that is to say, chosen from the episcopate, and two of the second rank, which included all the other clergy. The dons gratuits (benevolences) voted by the assembly comprised a fixed sum equivalent to the old tithes and supplementary sums paid on one occasion only, which were sometimes considerable. The church, on her side, profited by this arrangement in order to obtain the commutation or redemption of the taxes affecting ecclesiastics considered as individuals. This settlement only applied to the " clergy of France," that is to say, to the clergy of those districts which were united to the crown before the end of the 1 6th century. The provinces annexed later, called pays Strangers, or pays conquis, had in this matter, as in many others, an arrangement of their own. At last, under Louis XV. the edict of 1749, concernant les ttablissements et acquisitions des gens de mainmorte, was completely effective in subordinating the acquisition of property by ecclesiastical establishments to the consent and control of the crown, rendering them incapable of acquiring real property by bequests.

At the end of the 16th century a wise law had been made which, in spite of the traces which it bore of past struggles, had estab- lished a reasonable balance among the Christians of France. The edict of Nantes, in 1598, granted the Protestants full civil rights, liberty of conscience and public worship in many places, and notably in all the royal bailliages. The Catholics, whose religion was essentially a state religion, had never accepted this arrangement as final, and at last, in 1685, under Louis XIV., the edict of Nantes was revoked and the Protestant pastors expelled from France. Their followers were forbidden to leave the country, but many succeeded nevertheless in escaping abroad. The position of those who remained behind was peculiar. Laws passed in 1715 and 1724 established the legal theory that there were no longer any Protestants in France, but only vieux catho- liqites and nouveaux convertis. The result was that henceforth they had no longer any regular civil status, the registers con-

taining the lists of Catholics enjoying civil rights being kept by the Catholic clergy.

The form of government established under Louis XIV. was preserved without any fundamental modification under Louis XV. After the death of Louis XIV., however, the regent, under the inspiration of the due de St Simon, made trial of a system of which the latter had made a study while in a close correspondence with the duke of Burgundy. It consisted in substituting for the authority of the ministers, secretaries of state and controller- general councils, or governmental bodies, mainly composed of great lords and prelates. These only lasted for a few years, when a return was made to the former organization. The parle- ments had regained their ancient rights in consequence of the parlement of Paris having, in 171 5, set aside the will of Louis XIV. as being contrary to the fundamental laws of the kingdom, in that it laid down rules for the composition of the council of regency, and limited the power of the regent. This newly revived power they exercised freely, and all the more so since they were the last surviving check on the royal authority. During this reign there were numerous conflicts between them and the government, the causes of this being primarily the innumerable incidents to which the bull Unigenitus gave rise, and the increase of taxation; proceedings against Jesuits also figure conspicuously in the action of the pariements. They became at this period the avowed representatives of the nation; they contested the validity of the registration of laws in the lits de justice, asserting that laws could only be made obligatory when the registration

had been freely endorsed by themselves. Before the registration of edicts concerning taxation they demanded a statement of the financial situation and the right of examining the accounts. Finally, by the theory of the classes, which considered the various pariements of France as parts of one and the same body, they established among them a political union. These pretensions the crown refused to recognize Louis XV. solemnly condemned them in a lit de justice of December 1770, and in 177 1 the chan- cellor Maupeou took drastic measures against them. The magistrates of the parlement of Paris were removed, and a new parlement was constituted, including the members of the grand conseil, which had also been abolished. The com des aides of Paris, which had made common cause with the parlement, was also suppressed. Many of the provincial pariements were re-organized, and a certain number of useful reforms were carried out in the jurisdiction of the parlement of Paris; the object of these, however, was in most cases that of diminishing its import- ance. These actions, the coup d'Stat of the chancellor Maupeou, as they were called, produced an immense sensation. The repeated conflicts of the reign of Louis XV. had already given rise to a whole literature of books, pamphlets and tracts in which the rights of the crown were discussed. At the same time the political*

philosophy of the 18th century was disseminating new principles, and especially those of the supremacy of the people and the differentiation of powers, the government of England also became known among the French. Thus men's minds were being prepared for the Revolution.

The personal government of Louis XVI. from 1774 to 1789 was chiefly marked by two series of facts. Firstly, there was the partial application of the principles propounded by the French economists of this period, the Physiocrats, who had a political doctrine peculiar to themselves. They were not in favour of political liberty, but attached on the contrary to the absolute monarchy, of which they did not fear the abuses because they were convinced that so soon as they should be known, reason (evidence) alone would suffice to make the crown respect the " natural and essential laws of bodies politic " (Lois naturelles et essentielles des soci&Us politiques, the title of a book by Mercier de La Riviere). On the other hand, they favoured civil and economic liberty. They wished, in particular, to decentralize the administration and restore to the landed proprietors the administration and levying of taxes, which they wished to reduce to a tax on land only. This school came into power with Turgot, who was appointed controller-general of the finances, and laid the foundations of many reforms. He actually accomplished for the moment one very important reform, namely, the suppression of the trade and craft gilds (communauUs, jurandes et maitrises). This organization, which was common to the whole of Europe (see Gilds), had taken definitive shape in France in the 13th and 14th centuries, but had subsequently been much abused. Turgot suppressed the privileges of the maitres, who alone had been able to work on their own account, or to open shops and workshops, and thus proclaimed the freedom of labour, industry and commerce. However, the old organization, slightly amended, was restored under his successor Necker. It' was Turgot's purpose to organize provincial and other inferior assemblies, whose chief business was to be the assessment of taxes. Necker applied this idea, partially and experimentally, by creating a few of these provin- cial assemblies in various gineraliUs of the pays d'elections. A general reform on these lines and on a very liberal basis was proposed by Calonne to the assembly of notables in 1787, and it was brought into force for all the. pays d' elections, though not under such good conditions, by an edict of the same year. Louis XVI. had inaugurated his reign by the restoration of the pariements; all the bodies which had been suppressed by Maupeou and all the officials whom he had dismissed were restored, and all the bodies and officials cieated by him were suppressed. But it was not long before the old struggle between the crown and pariements again broke out. It began by the conservative opposition offered by the parlement of Paris tc Turgot's reforms. But the real struggle broke out in 1787

over the edicts coming from the assembly of notables, and particularly over the two new taxes, the stamp duty and the land tax. The parlement of Paris refused to register them, asserting that the consent of the taxpayers, as represented by the states general, was necessary to fresh taxation. The struggle seemed to have come to an end in September; but in the following November it again broke out, in spite of the king's promise to summon the states general. It reached its height in May 1788, when the king had created a cour pliniere distinct from the parlements, the chief function of which was to register the laws in their stead. A widespread agitation arose, amounting to actual anarchy, and was only ended by the recall of Necker to power and the promise to convoke the states general for 1789. Various Institutions. — The permanent army which, as has been stated above, was first established under Charles VII., The army. was developed and organized during the ancien regime. The gendarmerie or heavy cavalry was continuously increased in numbers. On the other hand, the francs archers fell into disuse after Louis XL; and, after a fruitless attempt had been made under Francis I. to establish a national infantry, the system was adopted for this also of recruiting permanent bodies of mercenaries by voluntary enlistment. First there were the " old bands " (vieilles bandes), chiefly those of Picardy and Piedmont, and at the end of the 1 6th century appeared the first regiments, the number of which was from time to time increased. There were also in the service and pay of the king French and foreign regiments, the latter principally Swiss, Germans and Scots. The system of purchase penetrated also to the army. Each regiment was the property of a great lord; the captain was, so to speak, owner of his company, or rather a contractor, who, in return for the sums paid him by the king, recruited his men and gave them their uniform, arms and equipment. In the second half of the reign of Louis XIV. appeared the militia (milices) . To this force each parish had to furnish one recruit, who was at first chosen by the assembly of the inhabitants, later by drawing lots among the bachelors or widowers without children, who were not exempt. The militia was very rarely raised from the towns. The purpose for which these men were employed varied from time to time. Sometimes, as under Louis XIV., they were formed into special active regiments. Under Louis XV. and Louis XVI. they were formed into rigiments provinciaux, which constituted an organized reserve. But their chief use was during war, when they were individually incorporated into various regiments to fill up the gaps.

Under Louis XV., with the due de Choiseul as minister of war, great and useful reforms were effected in the army. Choiseul suppressed what he called the " farming of companies " (com- pagnie-ferme) ; recruiting

became a function of the state, and voluntary enlistment a contract between the recruit and the state. Arms, uniform and equipment were furnished by the king. Choiseul also equalized the numbers of the military units, and his reforms, together with a few others effected under Louis XVI., produced the army which fought the first campaigns of the Revolution.

One of the most distinctive "features of the ancien regime was excessive taxation. The taxes imposed by the king were numerous, and, moreover, hardly any of them fell on taxation. ˆ parts of the kingdom. To this territorial inequality was added the inequality arising from privileges. Ecclesiastics, nobles, and many of the crown officials were exempted from the heaviest imposts. The chief taxes were the taille {q.v.) , the aides and the gabelle (q.v.) , or monopoly of salt, the consumption of which was generally made compulsory up to the amount determined by regulations. In the 17th and 18th centuries certain important new taxes "were established: from 1695 to 1698 the capitation, which was re-established in 1701 with considerable modifications, and in 17 10 the tax of the dixietne, which became under Louis XV. the tax of the vingliemes. These two imposts had been established on the principle of equality, being designed to affect every subject in proportion to his income; but so strong was the system of privileges, that

as a matter of fact the chief burden fell upon the roturiers. The income of a roturier who was not exempt was thus subject in turn to three direct imposts: the taille, the capitation and the vingliemes, and the apportioning or assessment of these, was extremely arbitrary. In addition to indirect taxation strictly so called, which was very extensive in the 1 7th and 18th centuries, France under the ancien regime was subject to the traites, or customs, which were not only levied at the frontiers on foreign trade, but also included many internal custom-houses for trade between different provinces. Their origin was generally due to historical reasons; thus, among the provinces reputtes etrangeres were those which in the 14th century had refused to pay the aids for the ransom of King John, also certain provinces which had refused to allow customs offices to be established on their foreign frontier. Colbert had tried to abolish these internal' duties, but had only succeeded to a limited extent.

The indirect taxes, the traites and the revenues of the royal domain were farmed out by the crown. At first a separate contract had been made for each impost in each election, but later they were combined into larger lots, as is shown by the name of one of the customs districts, I'enceinle des cinq grosses fermes. From the reign of Henry IV. on the levying of each indirect impost was farmed en bloc for the whole kingdom, a system known as the fermes generates; but the real ferme ginerale, including all the imposts and

revenues which were farmed in the whole of France, was only established under Colbert. The ferme generate was a powerful company, employing a vast number of men, most of whom enjoyed various privileges. Besides the royal taxes, seigniorial imposts survived under the form of tolls and market dues. The lords also often possessed local monopolies, e.g. the right of the common bakehouse (four banal), which were called the banalites.

The organization of the royal courts of justice underwent but few modifications during the ancien regime. The number of parlements, of cours des aides and of cours des comples. increased; in the 17th century the name of conseil ˆ rts ot superieur was given to some new bodies which actually discharged the functions of the parlement, this being the period of the decline of the parlement. In the 16th century, under Henry II., had been created presidiaux, or courts of final juris- diction, intended to avoid numerous appeals in small cases, and above all to avoid a final appeal to the parlements. Seigniorial courts survived, but were entirely subordinate to the royal jurisdictions and were badly officered by ill-paid and ignorant judges, the lords having long ago lost the right to sit in them in person. Their chief use was to deal with cases concerning the payment of feudal dues to the lord. Both lawyers and people would have preferred only two degrees of justice; and an ordinance of May 1788 realized this desire in the main. It did not suppress the seigniorial jurisdictions, but made their extinc- tion a certainty by allowing litigants to ignore them and go straight to the royal judges. This was, however, reversed on the recall of Necker and the temporary triumph of the parlements.

The ecclesiastical jurisdictions survived to the end, but with diminished scope. Their competency had been considerably reduced by the Ordinance of Villers Cotterets of 1539, and by an edict of 1693. But a series of ingenious legal Ecclesi- theories had been principally efficacious in gradually depriving them of most of the cases which had hitherto come under them. In the 18th century the privilege of clergy did not prevent civil suits in which the clergy were defendants from being almost always taken before secular tribunals, and ever since the first half of the 17 th century, for all grave offences, or cas priviUgies, the royal judge could pronounce a sentence of corporal punishment on a guilty cleric without this necessitating his previous degradation. The inquiry into the case was, it is true, conducted jointly by the royal and the ecclesiastical judge, but each of them pronounced his sentence independently. All cases concerning benefices came before the royal judges. Finally, the officialites had no longer as a rule any jurisdiction over laymen, even in the matter of marriage, except in questions of betrothals, and sometimes in cases of opposition to marriages.

astieal courts.

The parish priests, however, continued to enter declarations of baptisms, marriages and burials in registers kept according to the civil laws.

The general customs of the pays coutumiers were almost all officially recorded in the 16th century, definite procedure for this purpose having been adopted at the end of the tows.”” 8 ‘ x S tn century. Drafts were prepared by the officials of the royal courts in the chief town of the district in which the particular customs were valid, and were then submitted to the government. The king then appointed com- missioners to visit the district and promulgate the customs on the spot. For the purpose of this publication the lords, lay and ecclesiastical, of the district, with representatives of the towns and of various bodies of the inhabitants, were summoned for a given day to the chief town. In this assembly each article was read, discussed and put to the vote. Those which were approved by the majority were thereupon decreed (decretes) by the com- missioners in the king’s name; those which gave rise to diffi- culties were put aside for the parlement to settle when it registered the coutume. The coutumes in this form became practically written law; henceforward their text could only be modified by a formal revision carried out according to the same procedure as the first version. Throughout the 16th century a fair number of coutumes were thus revised (reformees) , with the express object of profiting by the observations and criticisms on the first text which had appeared in published commentaries and notes, the most important of which were those of Charles Dumoulin. In the 16th century there had been a revival of the study of Roman law, thanks to the historical school, among the most illustrious representatives of which were Jacques Cujas, Hugues Doneau and Jacques Godefroy; but this study had only slight influence on practical jurisprudence. Certain institutions, however, such as contracts and obligations, were regulated throughout the whole of France by the principles of Roman law. ‘ Legislation by ordonnances, edits, declarations or letlres patentes, emanating from the king, became more and more frequent; but the character of the grandes ordonnances, which were of a far-reaching and comprehensive nature, underwent a change during this period. Inthe 14th, 1 5th and 16th centuries they had been mainly ordonnances de reformation (i.e. revising previous laws), which were most frequently drawn up after a sitting of the states general, in accordance with the suggestions submitted by the deputies. The last of this type was the ordinance of 1629, promulgated after the states general of 1614 and the assemblies of notables which had followed it. In the 17th and 18th

centuries they became essentially codifications, comprising a systematic and detailed statement of the whole branch of law. There are two of these series of codifying ordin- ances: the first under Louis XIV., inspired by Colbert and carried out under his direction. The chief ordinances of this group are that of 1667 on civil procedure (code of civil pro- cedure); that of 1670 on the examination of criminal cases (code of penal procedure); that of 1673 on the commerce of merchants, and that of 1681 on the regulation of shipping, which form between them a complete code of commerce by land and sea. The ordinance of 1670 determined the formalities of that secret and written criminal procedure, as opposed to the hearing of both parties in a suit, which formerly obtained in France; it even increased its severity, continuing the employment of torture, binding the accused by oath to speak the truth, and refusing them counsel save in exceptional cases. The second series of codifications was made under Louis XV., through the action of the chancellor d'Aguesseau. Its chief result was the regulation, by the ordinances of 1731, 1735 and 1747, of deeds of gift between living persons, wills, and property left in trust. Under Louis XVI. some mitigation was made of the criminal law, notably the abolition of torture. >

The feudal regime, in spite of the survival of seigniorial couits and tolls, was no longer of any political importance; but it still furnished the common form of real property. The fief, although it still implied homage from the vassal, no longer involved any service on his part (excepting that of the arriirc-ban due to the

king); but when a fief changed hands the lord still exacted his

profits. Tenures held by roturiers, in addition to some similar

rights of transfer, were generally subject to periodical

and fixed contributions for the profit of the lord. This ttaure

system was still further complicated by tenures which

were simply real and not feudal, e.g. that by payment of

ground rent, which were superadded to the others, and had

become all the heavier since, in the 18th century, royal rights of

transfer had been added to the feudal rights. The inhabitants

of the country districts were longing for the liberation of real

property.

Serfdom had disappeared from most of the provinces of the kingdom; among all the coutumes which were officially codified, not more than ten or so still recognized this institution, serfdom This had been brought about especially by the agency of the custom by which serfs had been transformed into roturiers. An edict of Louis XVI. of 1779 abolished serfdom on crown lands, and mitigated the condition of the serfs who still existed on the domains of individual lords. The nobility still remained a privileged class, exempt from certain taxes. Certain offices were restricted to the nobility; according to an edict of Louis XVI. (1781) it was even necessary to be a noble in order to become an officer in the army. In fact, es ˆ a t e ˆ the royal favours were reserved for the nobility. Certain rules of civil and criminal procedure also distinguished nobles from roturiers. The acquisition of fiefs had ceased to bring nobility with it, but the latter was derived from three sources: birth, lettres d'anoblissement granted by the king and appointment to certain offices. In the 17th and 18th centuries thVpeers of France can be reckoned among the nobility, forming indeed its highest grade, though the rank of peer was still attached to a fief, which was handed down with it; on the eve of the Revolution there were thirty-eight lay peers. The rest of the nation, apart from the ecclesiastics, consisted of the roturiers, who were not subject to the disabilities of the serfs, but had not the privileges of the nobility. Hence the three orders (estates) of the kingdom: the clergy, the nobility and the tiers Hat (third estate). An edict of Louis XVI. had made a regular civil status possible to the Protestants, and had thrown open offices and professions to them, though not entirely; but the exercise of their religion was still forbidden.*

The Revolution. .ˆWith the Revolution France entered the ranks of constitutional countries, in which the liberty of men is guaranteed by fixed and definite laws; from this time on, she has had always (except in the interval between two revolutions) a written constitution, which could not be touched by the ordinary legislative power. The first constitution was that of 1791; the states general of 1789, transformed by their own will, backed by public opinion, into the Constituent Assembly, drew it up on their own authority. But their work did not stop there. They abolished the whole of the old public law of France and part of the criminal law, or rather, transformed it in accordance with the principles laid down by the political philosophy of the 18th century. The principles which were then proclaimed are still, on most points, the foundation of modern French law. The development resulting from this extraordinary impetus can be divided into two quite distinct phases: the first, from 1789 to the coup d'etat of the 18th Brumaire in the year VIII., was the continuation of the impulse of the Revolution; the second includes the Consulate and the first Empire, and was, as it were, the marriage or fusion of the institutions arising from the

Revolu tion with those of the ancien rSgime.

On the whole, the constitutional law of the Revolution is a remarkably united whole, if we consider only the two consitutions which were effectively applied during 'this first phase, fheCon- that of the 3rd of September 1791, and that of the sututioas 5th Fructidor in the year III. It is true that between otthe them occurred the ultra-democratic constitution of the fjlˆ ' 24th of June 1793, the first voted by the Convention; but although this was ratified by the popular vote, to which it had been directly submitted, in accordance with a principle pro- claimed by the Convention and kept in force under the Consulate

and the Empire, it was never carried into effect. It was first suspended by the establishment of the revolutionary government strictly so called, and after Thermidor, under the pretext of completing it, the Convention put it aside and made a new one, being taught by experience. As long as it existed it was the sovereign assembly of the Convention itself which really exercised the executive power, governing chiefly by means of its great committees.

The constitution, of 1791 was without doubt monarchical, in so far as it preserved royalty. The constitution of the year III. was, on the contrary, republican. The horror of monarchy was still so strong at that time that an executive college was created, a Directory of five members, one of whom retired every year; they were elected by a complicated and curious procedure, in which each of the two legislative councils played a distinct part. But this difference, though apparently essential, was not in reality very profound ; this is proved, for example, by the fact that the Directory had distinctly more extensive powers than those con- ferred on Louis XVI. by the Constituent Assembly. On almost all points of importance the two constitutions were similar. They were both preceded by a statement of principles, a " Declara- tion of the Rights of Man and of the Citizen." They were both based on two principles Which they construed alike: the sovereignty of the people and the separation of powers. Both of them {with the exception of what has been said with regard to the ratification of constitutions after 1793) recognized only repre- sentative government. From the principle of the sovereignty of the people they had not deduced universal suffrage; though, short of this, they had extended the suffrage as far as possible. According to the constitution of 1791, in addition to the

con- ditions of age and residence, an elector was bound to pay a direct contribution equivalent to three days' work; the con- stitution of the year III. recognized the payment of any direct contribution as sufficient; it even conferred on every citizen the right of having himself enrolled, without any other qualifica- tion than a payment equivalent to three days' work, and thus to become an elector. Further, neither of the two constitutions admitted of a direct suffrage; the elections were carried out in two stages, and only those who paid at a higher rating could be chosen as electors for the second stage. The executive power, which was in the case of both constitutions clearly separated from the legislative, could not initiate legislation. The Directory had no veto; Louis XVI. had with difficulty obtained a merely suspensive veto, which was overridden in the event of three legislatures successively voting against it. The right of dis- solution was possessed by neither the king nor the Directory. Neither the king's ministers nor those of the Directory could be members of the legislative body, nor could they even be chosen from among its ranks. The ministers of Louis XVI. had, how- ever, thanks to an unfortunate inspiration of the Constituent Assembly of 1791, the right of entry to, and, to a certain extent, of speaking in the Legislative Assembly; the constitution of the year III. showed greater wisdom in not bringing them in any way into contact with the legislative power. The greatest and most notable difference between the two constitutions was that that of 1791 established a single chamber which was entirely renewed every two years; that of the year III., on the contrary, profiting by the lessons of the past, established two chambers, one-third of the members of which were renewed every year. Moreover, the two chambers, the Council of Five Hundred and the Council of Ancients, were appointed by the same electors, and almost the only difference between their members was that of age.

*The Revolution entirely abolished the ancien regime, and in the first instance whatever remained of feudalism^ The Con- AboUtioa stituent Assembly, in the course of its immense work of the of settlement, wished to draw distinctions, abolishing "v*n* " absolutely, without indemnity, all rights which had amounted in the beginning to a usurpation and could not be justified, e.g. serfdom and seigniorial courts of justice. On the other hand, it declared subject to redemption such feudal charges as had been the subject of contract or of a concession of lands. But as it was almost impossible to discover the exact*

origin of various feudal rights, the Assembly had proceeded to do this by means of certain legal assumptions which sometimes admitted of a proof to the contrary. It carefully regulated the conditions and rate of repurchase, and forbade the creation in the future of any perpetual charge which could not be redeemed: a principle that has remained permanent in French law. This was a rational and equitable solution; but in a period of such violent

excitement it could not be maintained. The Legislative Assembly declared the abolishment without indemnity of all feudal rights for which the original deed of concession could not be produced; and to produce this was, of course, in most cases impossible. Finally, the Convention entirely abolished all feudal rights, and commanded that the old deeds should be destroyed; it maintained on the contrary, though subject to redemption, those tenures and charges which were solely connected with landed property and not feudal.

With feudalism had been abolished serfdom. Further, the Constituent Assembly suppressed nobility; it even forbade any one to assume and bear the titles, emblems and arms of nobility. Thus was established the equality of citizens before the law. The Assembly also proclaimed the liberty of labour and industry, and suppressed the corporations of artisans and workmen, the jurandes and maitrises, as Turgot had done. But, in order to maintain this liberty of the individual, it forbade all associations between workers, or employers, fearing that such contracts would again lead to the formation of corporations similar to the old ones. It eveh forbade and declared punishable, as being contrary to the declaration of the rights of man and the citizen, combinations or strikes, or an agreement between workmen or employers to refuse to work or to give work except on given conditions. Such, for a long time, was French legislation on this point.

The Constituent Assembly gave to France a new administrative division, that into departments, districts, cantons and communes; and this division, which was intended to make the Admlnls- old provincial distinctions disappear, had to serve all tntlve purposes, the department being the unit for all public re »'S» n/ ' services. This settlement was definitive, with the exception of certain modifications' in detail, and exists to the present day. But there was a peculiar administrative organism depending on this arrangement. The constitution of 1791, it is true, made the king the titulary head of the executive power; but the internal administration of the kingdom was not actually in his hands. It was deputed, under his orders, to bodies elected in each department, district and commune. The municipal bodies were directly elected by citizens duly qualified; other bodies were chosen by the method of double election. Each body consisted of two parts: a council, for deliberative purposes, and a bureau or directoire chosen by the council from among its numbers to form the executive. These were the only instruments for the general administration and for that of the direct taxes. The king could, it is true, annul the illegal acts of these bodies, but not dismiss their members; he could merely suspend them from exercising their functions, but the matter then went before the Legislative Assembly,, which could maintain or remit the suspension as it thought fit. The king had not a single agent chosen by himself for general administrative purposes. This was a reaction, though a very exaggerated one, against the excessive

centralization of the ancien rigime, and resulted in an absolute administrative anarchy. The organization of the revolutionary government partly restored the central authority; the councils of the departments were suppressed; the Committee of Public Safety and the " repre- sentatives of the people on mission " were able to remove and replace the members of the elected: bodies; and also, by an ingenious arrangement, national agents were established in the districts. The constitution of the year III. continued in this course, simplifying the organization established by the Constituent Assembly, while maintaining its principle. The department had an administration of five members, elected as in the past, but having executive as well as deliberative functions. The district was suppressed. The communes retained only a

municipal agjnt elected by themselves, and the actual municipal body, the importance of which was considerably increased, was removed to the canton, and consisted of the municipal agents from each commune, and a president elected by the duly qualified citizens of the canton. The Directory was represented in each departmental and communal administration by a commissary appointed and removable by itself, and could dismiss the members of these administrations.

The Constituent Assembly decided on the complete reorganiza- tion of the judicial organization. This was accomplished on a very simple plan, which realized that ideal of the two system. degrees of justice which, as we have noticed, was .that of France under the ancien rigime. In the lower degrees it created in each canton a justice of the peace (juge de paix), the idea and name of which were borrowed from England, but which differed very much from the English justice of the peace. He judged, both with and without appeal, civil cases of small importance; and, in cases which did not come within his competency, it was his duty to try to reconcile the parties. In each district was established a civil court composed of five judges. This completed the judiciaL organization, except for the court of cassation, which had functions peculiar to itself, never judging the facts of the case but only the application of the law. For cases coming under the district court, the Assembly had not thought fit to abolish the guarantee of the appeal in cases involving sums above a certain figure. But by a curious arrangement the district tribunals could hear appeals from one another. With regard to penal prosecutions, there was in each department a criminal court which judged crimes with the assistance of a jury; it < consisted of

judges borrowed from district courts, and had its own president and public prosecutor. Correctional tribunals, composed of juges de paix, dealt with misdemeanours. The Assembly preserved the commercial courts, or consular jurisdictions, of the ancien regime. There was a court of cassation, the purpose of which was to preserve the unity of jurisprudence in France; it dealt with matters of law and not of fact, considering appeals based on the violation of law, whether in point of matter or of form, and if such violation were proved, sending the matter before another tribunal of the same rank for re-trial. All judges were elected for a term of years; ike juges de paix by the primary assembly of the canton, the district judges by the electoral assembly consisting of the electors of the second degree for the district, the members of the court of cassation by the electors of the departments, who were divided for the purpose into two series, which voted alternately. The Constituent Assembly did, it is true, require professional guarantees, by proof of a more or less extended exercise of the profession of lawyer from all judges except the juges de paix. But the system was really the same as that of the administrative organization. The king only appointed the commissaires du roi attached to the district courts, criminal tribunals and the court of cassation; but the appointment once made could not be revoked by him. These commissaries fulfilled one of the functions of the old ministere public, their duty being to demand the application of laws. The Convention did not change this general organization; but it suppressed the professional guarantees required in the case of candidates for a judgeship, so that hence- forth all citizens were eligible; and it also caused new elections to take place. Moreover, the Convention, either directly or by means of one of its committees, not infrequently removed and replaced judges without further election. The constitution of the year III. preserved this system, but introduced one consider- able modification. It suppressed the district courts, and in their place created in each department a civil tribunal consisting of twenty judges. The idea was a happy one, for it gave the courts more importance, and therefore more weight and dignity. But this reform, beneficial as it would be nowadays, was at the time premature, in view of the backward condition of means of communication.

The Constituent Assembly suppressed the militia and main- tained the standing army, according to the old type, the numbers it which were henceforth to be fixed every year by the Legis-

lative Assembly. The army was to be recruited by voluntary enlistment, careful rules for which were drawn up; the only change was in the system of appointment to ranks; _. , promotion went chiefly by seniority, and in the lower ranks a system of nomination by equals or inferiors was organized. The Assembly proclaimed, however, the principle of compulsory and personal service, but under a particular form, that of the National Guard, to which- all qualified citizens belonged, and in which almost all ranks

were conferred by election. Its chief purpose was to maintain order at home; but it could be called upon to furnish detachments for defence against foreign invasion. This was an institution which, with many successive modifications, and after various long periods of inactivity followed by a revival, lasted more than three- quarters of a century, and was not suppressed till 187 1. For purposes of war the Convention, in addition to voluntary, enlist- ments and the resources furnished by the National Guards, and setting aside the forced levy of 200,000 men in 1793, decided on the expedient of calling upon the communes to furnish, men, a course which revived the principle of the old militia. But the Directory drew up an important military law, that of the 6th Fructidor of the year VI., which established compulsory military service for all, under the form of conscription strictly so called. Frenchmen aged from 20 to 25 (defenseurs consents) were divided into five classes, each including the men born in the same year, and were liable until they were 25 years old to be called up 'for active service, the whole period of service not exceeding four years. No class was called upon until the younger classes had been exhausted, and the sending of substitutes was forbidden. This law, with a few later modifications, provided for the French armies up to the end of the Empire.

The Constituent Assembly abolished nearly all the taxes of the ancien regime. Almost the only taxes preserved were the stamp duty and that on the registration of acts _ :. (the old contrSle and centieme denier), and these were completely reorganized; the customs were maintained only at the frontiers for foreign trade. In the establishment of new taxes the Assembly was influenced by two sentiments; the hatred which had been inspired by the former arbitrary taxation, and the influence of the school of the Physiocrats. Consequently it did away with indirect taxation on objects of consumption, and made the principal direct tax the tax on land. Next in importance were the contribution personnelle et mobiliere and the patentes. The essential elements of the former were a sort of capitation-tax equivalent to three days' work, which was the distinctive and definite sign of a qualified citizen, and a tax on personal income, calculated according to the rent paid. The patentes were paid by traders, and were also based on the amount of rent. These taxes, though considerably modified later, are still essentially the basis of the French system of direct taxation. The Constituent Assembly had on principle repudiated the tax on the gross income, much favoured under the ancien rlgime, which everybody had felt to be arbitrary and oppressive. The system of public contributions under the Convention was arbitrary and revolutionary, but the councils of the Directory, side by side with certain bad laws devised to tide over temporary crises, made some excellent laws on the subject of taxation. They resumed the regulation of the land tax, improving and partly altering it, and also

dealt with the contribution personnelle et mobiliere, the patentes, and the stamp and registration duties. It was at this time, too, that the door and window tax, which still exists, was provisionally established; there was also a partial reappearance of indirect taxation, in particular the octrois of the towns, which had been suppressed by the Constituent Assembly. ,

The Constituent Assembly gave the Protestants liberty of worship and full rights; it also gave Jews the' status of citjzen, which they had not had under the ancien rigime, together with political rights. With regard to the gˆˆ" s Catholic Church, the Assembly placed at the disposal of the nation the property of the clergy, which had already, in the course of the 18th century, been regarded by most political

writers as a national possession; at the same time it provided for salaries for the members of the clergy and pensions for those who had been monks. It abolished tithes and the religious orders, and forbade the re-formation of the latter in the future. The ecclesiastical districts were next reorganized, the depart- ment being always taken as the chief unit, and a new church was organized by the civil constitution of the clergy, the bishops being elected by the electoral assembly of the department (the usual electors), and the cures by the electoral assembly of the district. This was an unfortunate piece of legislation, inspired partly by the old Gallican spirit, partly by the theories on civil religion of J. J. Rousseau and his school, and, together with the civic oath imposed on the clergy, it was a source of endless troubles. The constitutional church established in this way was, however, abolished as a state institution by the Convention. By laws of the years III. and IV. the Convention and the Directory, in proclaiming the liberty of worship, declared that the Republic neither endowed nor recognized any form of worship. Buildings formerly consecrated to worship, which had not been alienated, were again placed at the disposal of worshippers for this purpose, but under conditions which were hard for them to accept.

The Assemblies of the Revolution, besides the laws which, by abolishing feudalism, altered the character of real property, Civil law P asse d many others concerning civil law. The most important are those of 1792, passed by the Legislative Assembly, which organized the registers of the etat civil kept by the municipalities, and laid down rules for marriage as a purely civil contract. Divorce was admitted to a practically unlimited extent; it

was possible not only for causes determined by law, and by mutual consent, but also for incompatibility of temper and character proved, by either husband or wife, to be of a persistent nature. Next came the laws of the Conven- tion as to inheritance, imposing perfect equality among the natural heirs and endeavouring to ensure the division of properties. Illegitimate children were considered by these laws as on the same level with legitimate children. The Convention and the councils of the Directory also made excellent laws on the ad- ministration of kypotheques, and worked at the preparation of a Civil Code (see Code Napoleon). In criminal law lnˆ ” a their work was still more important. In 1791 the Constituent Assembly gave France her first penal code. It was inspired by humanitarian ideas, still admitting capital punishment, though accompanied by no cruelty in the execution; but none of the remaining punishments was for life. Long imprisonment with hard labour was introduced. Finally, as a reaction against the former system of arbitrary penalties, there came a system of fixed penalties determined, both as to its assessment and its nature, for each offence, which the judge could not modify. The Constituent Assembly also reformed the procedure of criminal trials, taking English law as model. It introduced the jury, with the double form of jury d' accusation and jury de jugement. Before the judges procedure was always public and oral. The prosecution was left in principle to the parties concerned, plaintiffs or dbnonciateurs civiques, and the preliminary investigation was handed over to two magistrates ; one was the juge de paix, as in English procedure at this period, and the other a magistrate chosen from the district court and called the directeur dujury. The Convention, before separating, passed the Code des dSlits et des peines of the 3rd Brumaire in the year IV. This piece of work, which was due to Merlin de Douai, was intended to deal with criminal procedure and penal law; but only the first part could be completed. It was the procedure established by the Constituent Assembly, but further organized and improved.

The Consulate and the Empire.— The constitutional law of the Consulate and the Empire is to be found in a series of docu ments called later the Constitutions de I' Empire, the constitution promulgated during the Hundred Days being consequently given the name of Acle additionnel aux Constitutions de V Empire. These documents consist of (1) the Constitution of the 22nd Frimairc of the year VIII., the work of SieySs and Bonaparte,

the text on which the others were based; (2) the senalus consul te of the 16th Thermidor in the year X., establishing the consulate for life; and (3) the senatus consulte of the 28th Floreal in the year XII., which created the Empire. These constitutional acts, which were all, whether in their full text or in principle, sub- mitted to the popular vote by means of a plibiscile, had all the same object: to assure absolute power to Napoleon, while preserving

the forms and appearance of liberty. Popular suffrage was maintained, and even became universal; but, since the system was that of suffrage in many stages, which, moreover, varied very much, the citizens in effect merely nominated the candidates, and it was the Senate, playing the part of grand ilecteur which Sieyes had dreamed of as his own, which chose from among them the members of the various so-called elected bodies, even those of the political assemblies. According to the constitution of the year VIII., the first consul (to whom had been added two colleagues, the second and third consuls, who did not disappear until the Empire) possessed the executive power in the widest sense of the word, and he alone could initiate legislation. There were three representative assemblies in existence, elected as we have seen; but one of them, the Corps Legislatif, passed laws without discussing them, and without the power of amehding the suggestions of the government. The Tribunate, on the contrary, discussed them, but its vote was not necessary for the passing of the law. The Senate was the guardian and preserver of the constitution; in addition to its role of grand ilecteur, its chief function was to annul laws and acts submitted to it by the Tribunate as being unconstitutional. This original organization was naturally modified during the course of the Consulate and the Empire; not only did the emperor obtain the right of directly nominating senators, and the princes of the imperial family, and grant dignitaries of the Empire that of entering the Senate by right; but a whole body, the Tribunate, which was the only one which could preserve some independence, disappeared, without resort having been had to a plebiscite; it was modified and weakened by senatus consulte of the year X., and was suppressed in 1807 by a mere senatus consulte. The importance of another body, on the contrary, the conseil d'etat, which had been formed on the improved type of the ancient conseil du roi, and consisted of members appointed by Napoleon and carefully chosen, continu- ally increased. It was this body which really prepared and discussed the laws; and it was its members who advocated them before the Corps Legislatif, to which the Tribunate also sent orators to speak on its behalf. The ministers, who had no relation with the legislative power, were merely the agents of the head of the state, freely chosen by himself. Napoleon, however, found these powers insufficient, and arrogated to himself others, a fact which the Senate did not forget when it proclaimed his downfall. Thus he frequently declared war upon his own authority, in spite of the provisions to the contrary made by the constitution of the year VIII. ; and similarly, under the form of dicrels, made what were really laws. They were afterwards called dicrets-lois , and those that were not indissolubly associated with the political regime of the Empire, and survived it, were subsequently declared valid by the court of cassation, on the ground that they had not been submitted to the Senate as unconstitutional, as had been provided by the constitution of the year VIII.

*This period saw the rise of a whole new series of great organic laws. For administrative organization, the most important was that of the 28th Pluvi6se in the year VIII. It established as chief authority for each department a traTlve prefect, and side by side with him a conseil gtniral changes for deliberative purposes; for each arrondissement una*r (corresponding to the old district) a sub-prefect (sous- c °**vl* te prejel) and a conseil d' arrondissement; and for each Empin. commune, a mayor and a municipal council. But all these officials, both the members of the councils and the individual agents, were appointed by the head of the state or by the prefect, so that Centralization was restored more completely than ever. Together with the prefect there was also established a conseil*

de prefecture, having administrative functions, and generally acting as a court of the first instance in disputes and litigation arising out of the acts of the administration; for the Constituent Assembly had removed such cases from the jurisdiction of the civil tribunals, and referred them to the administrative bodies themselves. The final appeal in these disputes was to the conseil d'itat, which was supreme judge in these matters. In 1807 was created another great administrative jurisdiction, the cour des comptes, after the pattern of that which had existed under the ancien rtgime.

Judicial organization had also been fundamentally altered. The system of election was preserved for a time in the case of the juges de paix and the members of the court of changes, cassation, but finally disappeared there, even where it had already been no more than a form. The magistrates were in principle appointed for life, but under the Empire a device was found for evading the rule of irremovability. For the judgment of civil cases there was a court of first instance in every arrondissement, and above these a certain number of courts of appeal, each of which had within its province several departments. The separate criminal tribunals were abolished in 1809 by the Code a" Instruction Criminelle, and the magistrates forming the cour d'assises, which judged crimes with the aid of a jury, were drawn from the courts of appeal arid from the civil tribunals. The jury d'accusalion was also abolished by the Code d 'Instruction Criminelle, and the right of pronouncing the indictment was transferred to a chamber of the court of appeal. The correctional tribunals were amalgamated with the civil tribunals of the first instance. The tribunal de cassation, which took under the Empire the name of cour de cassation, consisted of magistrates appointed f6r life, and still kept its powers. The ministere public (consisting

of imperial avocats and procureurs) was restored in practically the same form as under the ancien rtgime.

The former system of taxation was preserved in principle, but with one considerable addition: Napoleon re-established indirect taxation on articles of consumption, which had been abolished by the Constituent Assembly; the chief of these were the duties on liquor (droits rSunis, or excise) and the monopoly of tobacco.

The Concordat concluded by Napoleon with the papacy on the 26th Messidor of the year IX. re-established the Catholic religion in France as the form of worship recognized cortst"" an< ˆ en dowed by the state. It was in principle drawn up on the lines of that of 1516, and assured to the head of the French state in his dealings with the papacy the same prerogatives as had formerly been enjoyed by the kings; the chief of these was that he appointed the bishops, who after- wards had to ask the pope for canonical institution. The territorial distribution of dioceses was preserved practically as it had been left by the civil constitution of the clergy. The state guaranteed the payment of salaries to bishops and cures; and the pope agreed to renounce all claims referring to the appropriation of the goods of the clergy made by the Constituent Assembly. Later on, a decree restored to the fabriques (vestries) such of their former possessions as had not been alienated, and the churches which had not been alienated were restored for the purposes of worship. The law of the 18th Germinal in the year X., ratifying the Concordat, reasserted, under the name of articles organiques du culte calkolique, all the main principles contained in the old doctrine of the liberties of the Gallican Church. The Concordat did not include the restoration of the religious orders and congregations; Napoleon sanctioned by decrees only a few establishments of this kind.

One important creation of the Empire was the university. The ancien regime had had its universities for purposes of in- struction and for the conferring of degrees; it had J^^*" also, though without any definite organization, such secondary schools as the towns admitted within their walls, and the primary schools of the parishes. The Revolution suppressed the universities and the teaching congregations. The constitution of the year III. proclaimed the liberty of

Taxation.

instruction and commanded that public schools, both elementary and secondary, should be established. Under the Directory there was in each department an icole centrale, in which all branches of human knowledge were taught. Napoleon, develop- ing ideas which had been started in. the second half of the 18th century, founded by laws and decrees of 1806,

1808 and 181 1 the Universite de France, which provided and organized higher, secondary and primary education; this was to be the monopoly of the state, carried on by its facultSs, lycees and primary schools. No private educational establishment could be opened without the authorization of the state.

But chief among the documents dating from this period are the Codes, which still give laws to France. These are the Civil Code of 1804, the Code de Procedure Civile of 1806, the Code de Commerce of 1807, the Code d' Instruction codes. Criminelle of 1809, and the Code Penal of 18 10. These monumental works, in the elaboration of which the conseil d'etat took the chief part, contributed, to a greater or less extent, towards the fusion of the old law of France with the laws of the Revolution. It was in the case of the Code Civil that this task presented the greatest difficulty (see Code Napoleon). The Code de Commerce was scarcely more than a revised and emended edition of the ordonnances of 1673 andi68t; while the Code de Procedure Civile borrowed its chief elements from the ordonnance of 1667. In the case of the Code d' Instruction Criminelle a distinctly new departure was made; the procedure introduced by the Revolution into courts where judgment was given remained public and oral, with full liberty of defence; the preliminary procedure, however, before the examining court (Juge d'instruction or chambre des mises en accusation) was borrowed from the ordonnance of 1670; it was the procedure of the old law, without its cruelty, but secret and written, and generally not in the presence of both parties. The Code Pinal maintained the principles of the Revolution, but increased the penalties. It substituted for the system of fixed penalties; in cases of temporary punishment, a maximum and a minimum, between the limits of which judges could assess the amount. Even in the case of misdemeanours, it admitted the system of extenuating circumstances, which allowed them still further to decrease and alter the penalty in so far as the offence was mitigated by such circumstances. (See further under Napoleon I.)

The Restored Monarchy— ˆThe Restoration and the Monarchy of July, though separated by a revolution, form one period in the history of French institutions, a period in which the same regime was continued and developed. This Coasti— was the constitutional monarchy, with a parliamentary „ „"„ft„ body consisting of two chambers, a system imitated from England. The same constitution was preserved under these two monarchies — the charter granted by Louis XVIII: in 1814. The revolution of 1830 took place in defence of the charter which Charles X. had violated by the ordonnances of July, so that this charter was naturally preserved under the " July Monarchy." It was merely revised by the Chamber of Deputies, which had been one of the movers of the revolution, and by what remained of the House of Peers. In order to give the constitution the

appearance of originating in the will of the people, the preface, which made it appear to be a favour granted by the king, was destroyed. The two chambers acquired the initiative in legislation, which had not been recognized as theirs under the Restoration, but from this time on belonged to them equally with the king. The sittings of the House of Peers were henceforth held in public; but this chamber underwent another and more fundamental transformation. The peers were nomin- ated by the king, with no limit of numbers, and according to the charter of 1814 their appointment could be either for life or hereditary; but, in execution of an ordinance of Louis XVIII., during the Restoration they were always appointed under the latter condition. Under the July Monarchy their tenure of office was for life, and the king had to choose them from among twenty-two classes of notables fixed by law. The franchise for the election of the Chamber of Deputies had been limited by a system of money qualifications; but while, tinder the

Restoration, it had been necessary, in order to be an elector, to pay three hundred francs in direct taxation, this sum was reduced in 183 1 to two hundred francs, while in certain cases even a smaller amount sufficed. In order to be elected as a deputy it was necessary, according to the charter of 1814, to pay a thousand francs in direct taxation, and according to that of 1830. five hundred francs. From 181 7 onwards there was direct suffrage, the electors directly electing the deputies. The idea of those who had framed the charter of 1814 had been to give the chief influence to the great landed proprietors, though the means adopted to this end were not adequate: in 1830 the chief aim had been to give a preponderating influence to the middle and lower middle classes, and this had met with greater success. The House of Peers, under the name of cour des pairs, had also the" function of judging attempts and plots against the security of the state, and it had frequently to exercise this function both under the Restoration and the July Monarchy.

This was a period of parliamentary government; that is, of government by a cabinet, resting on the responsibility of the ministers to the Chamber of Deputies. The only interruption was that caused by the resistance of Charles X. at the end of his reign, which led to the revolution of July. Parliamentary govern- ment was practised regularly and in an enlightened spirit under the Restoration, although the Chamber had not then all the powers which it has since acquired. It is noteworthy that during this period

the right of the House of Peers to force a ministry to resign by a hostile vote was not recognized. By the creation of a certain number of new peers, a fournSe de pairs, as it was then called, the majority in this House could be changed when necessary. But the government of the Restoration hadto deal with two extreme parties of a very opposite nature: the Ultras, who wished to restore as far as possible the ancien regime, to whom were due the acts of the chambre introuvable of 18 16, and later the laws of the ministry of Villele, especially the law of sacrilege and that voting compensation to the dispossessed nobles, known as the milliard des Emigres; and on the other hand the Liberals, including the Bonapartists and Republicans, who were attached to the principles of the Revolution, In order to prevent either of these parties from predominating in the chamber, the government made a free use of its power of dis- solution. It further employed two means to check the progress of the Liberals; firstly, there were various alterations successively made in the electoral law, and the press laws, frequently restrictive in their effect, which introduced the censorship and a preliminary authorization in the case of periodical publications, and gave the correctional tribunals jurisdiction in cases of press offences. The best electoral law was that of 18 17, and the best press laws were those of 1819; but these were not of long duration. Under the July Monarchy parliamentary government, although its machinery was further perfected, was not so brilliant. The majorities in the Chamber of Deputies were often uncertain, so much so, that more than once the right of dissolution was exer- cised in order to try by new elections to arrive at an undivided and certain majority. King Louis Philippe, though sober- minded, wished to exercise a personal influence on the policy of the cabinet, so that there were then two schools, represented respectively by Thiers and Guizot, one of which held the theory that " the king reigns but does not govern" ; while the other maintained that he might exercise a personal influence, provided that he could rely on a ministry supported by a majority of the Chamber of Deputies. But the weak point in the July Monarchy was above all the question of the franchise. A powerful move- ment of opinion set in towards demanding an extension, some wishing for universal suffrage, but the majority proposing what was called the adjonciion des capacilSs, that is to say, that to the number of qualified electors should be added those citizens who, by virtue of their professions, capacity or acquirements, were inscribed after them on the general list for juries. But the government obstinately refused all electoral reform, and held to the law of 183 1. It also refused parliamentary reform, by which was meant a rule which would have made most public offices incompatible with the position of deputy, the Chamber of

Deputies befog at that time full of officials. The press, thanks to the Charter, was perfectly free, without either censorship or preliminary

authorization, and press offences Were judged by a jury.

In another respect also the Restoration and the July Monarchy were at One, the second continuing the spirit of the first, viz.- in maintaining in principle the civil, legal and adminis- The trative institutions of the Empire. The preface to system the charter of 1814 sanctioned and guaranteed most ottbe of the legal rights won by the Revolution; even the [fJJ* 1] ***.. alienation cf national property .wa,s confirmed. It was said, it is true, that the old nobility regained their titles, and that the nobility of the Empire kept those which Napoleon had given them; but these were merely titles and nothing more'*** ***there was no : privileged nobility, and the equality of citizens before the law was maintained. Judicial and administrative organization, the system of taxation, military organization, the relations of church and state,, remained the same, and the univer- sity also continued to exist. The government did, it is true, negotiate a new Concordat with the papacy in 181 7, but did not dare even to submit it to the chambers. The most important reform was that of the law concerning recruiting for the army. The charter of 1814 had promised the abolition pf conscription, in the form in which it had been created by the law of the year VI. The law of the 10th. of March 1818 actually established a new system. The contingent voted by the chambers for annual incorporation into the standing army was divided up among all the cantons; and, in order to furnish it, lots were drawn among all the men of a certain class, that is to say, among the young Frenchmen who arrived at their majority that year. Those who were not chosen by lot were definitely set free from military service. The sending of substitutes,; a custom which had been permitted by Napoleon, was recognized. This was the type of all the laws on recruiting in France, of which there were a good number in succession up to 1867. On other points they vary*** *in particular as to the duration of service, which was six years, and later eight years, under the" Restoration; but the system remained the same. –*

The Restoration produced a code, the Code forestier of 1827, for the regulation of forests (eaux etforets). In 1816 a law had abolished divorce, making marriage indissoluble, as it had been in the old law. But the best laws of this period were those on finance. Now, for the first time, was introduced the practice of drawing up regular budgets, voted before the year to which they applied, and divided since 1819 into the budget of expenditure' and budget of receipts.

Together with other institutions of the Empire, the Restora- tion had preserved the exaggerated system of administrative centralization established in the year VIII. ; and proposals for its relaxation submitted to the chambers had come to nothing. It was only under the July Monarchy that it was relaxed. The municipal law of the 21st of March 183 1 made

the municipal councils elective, and extended widely the right of voting in the elections for them; the maires and their assistants continued to be appointed by the government, but had to be chosen from among the members of the municipal councils. The hiw of the 22nd of June 1833 made the general councils of the departments also elective, and brought the adjonciion des capacites into effect for their election. The powers of these bodies were enlarged in 1838, and they gained the right of electing their president. In 1833 was granted another liberty, that of primary education; but in spite of violent protestations, coming especially from the Catholics, secondary and higher education continued to be a monopoly of the state. Many organic laws were promulgated, one concerning the National Guard, which was reorganized in order to adapt it to the system of citizen qualifications; one in 1832 on the recruiting of. the army, fixing the period of service at seven years; and another in 1834 securing the status of officers. A law of the nth of June 1842 established the great railway lines. In 183? the Code Pinal and Code d 'Instruction Criminelle were revised, with the object of lightening penalties; the system of extenuating circumstances, as recognized by a jury, was

extended to the judgment of .all crimes. There was also a re- vision of Book III. of the Code de Commerce, treating of bank- ruptcy. Finally ,from this period date the laws of the 3rd of May 1841, on expropriation for purposes of public utility, and of the 30th of June 1838, on the treatment of the insane, which is still in force. Judicial organization remained as it was, but the amount of the sum up to which civil tribunals of the first instance could judge without appeal was raised from 1000 francs to 1500, and the competency of thejuges de paix was widened.

The Second Republic and the Second Empire.— From, the point of view of constitutional law, the Second Republic and the Second Empire were each in a certain sense a return to the past. The former revived the tradition of the Assemblies of the Revolution; the latter was obviously and avowedly an imitation of the Con- sulate and the First Empire.

The provisional government set up by the revolution of the 24th of February 1848 proclaimed universal suffrage, and by Rcpubii- this means was elected a Constituent Assembly, which can con- sat till May 1849, and, after first organizing various nutation forms of another provisional government, passed the of 1848. Republican constitution of the 4th of

November 184S. This constitution, which was preceded by a preface recalling the Declarations of Rights of the Revolution, gave the legislative power to a single permanent assembly, elected by direct universal suffrage, and entirely renewed every three years. The executive authority, with very extensive powers, was given to a president of the Republic, also elected by the universal and direct suffrage of the French citizens. The constitution was not very clear upon the point of whether it adopted parliamentary government in the strict sense, or whether the president, who was declared responsible, was free to choose his ministers and to retain or dismiss them at his own pleasure. This gave rise to an almost permanent dispute between the president, who claimed to have his own political opinions and to direct the government, and the Assembly, which wished to carry on the traditions of cabinet government and to make the ministers fully responsible to itself. Consequently, in January 1851, a solemn debate was held, which ended in the affirmation of the responsibility of ministers to the Assembly. On the other hand, the president, though very properly given great power by the constitution, was not imme- diately eligible for re-election on giving up his office. Now Louis Napoleon, who was elected president on, the loth of December 1848 by a huge majority, wished to be re-elected. Various propositions were submitted to the Assembly in July 1851 with a view to modifying the constitution; but they could not succeed, as the number of votes demanded by the constitution for the convocation of a Constituent Assembly was not reached. More- over, the Legislative Assembly elected in May 1849 was very different from the Constituent Assembly of 1848. The latter was animated by that spirit of harmony and, in the main, of adhesion to the Republic which had followed on the February Revolution. The new assembly, on the contrary, was composed for the most part of representatives of the old parties, and had monarchist aspirations. By the unfortunate law of the 31st of May 1850 it even tried by a subterfuge to restrict the universal suffrage guaranteed by the constitution. It suspended the right of hold- ing meetings, but, on the whole, respected the liberty of the press. It was especially impelled to these measures by the growing fear of socialism. The result was the coup d'etat of the 2nd of December 1851. A detail of some constitutional importance is to be noticed in this period. The conseil d'itat, which had remained under the Restoration and the July Monarchy an administrative council and the supreme arbiter in administrative trials, acquired new importance under the Second Republic. The ordinary conseillers d'itat {en service ordinaire) were elected by the Legislative Assembly, and consultation , with the conseil d'itat was often insisted on by the constitution or by law. This was the means of obtaining a certain modifying power as a sub» stitute for the second chamber, which had not met with popular approval. During its short existence the Second Republic produced many important laws. It abolished tbe penalty of death for political crimes, and suppressed negro sjavcry in the

colonies. The election of conseillers gineraux was thrown open to universal suffrage, and the municipal councils were allowed to elect the makes and their colleagues. Thd law of the 15th of March 1850 established the liberty of secondary education, but it conferred certain privileges on the Catholic clergy, a clear sign of the spirit of social conservatism which was the leading motive for its enactment. Certain humanitarian laws were passed, applying to the working classes.

With the coup d'itat of the 2nd of December 1851 began a new era of constitutional plebiscites and disguised absolutism. The proclamations of Napoleon on the 2nd of December constitu- contained a criticism of parliamentary government, tioaat and formulated the wish to restore to France the •"»• !■*• constitutional institutions of the Consulate and the ,8S2 ' Empire, just as she had preserved their civil, administrative and military institutions. Napoleon asked the people for the powers necessary to draw up a constitution on these principles; the plebiscite issued in a vast majority of votes in his favour, and the constitution of the 14th of January 1852 was the result. It bore a strong resemblance to the constitution of the First Empire after 1807. The executive power was conferred on Louis Napoleon for ten years, with the title of president of the Republic and very extended powers. Two assemblies were created. The conservative Senate, composed of ex officio members (cardinals, marshals of France and admirals) and life members appointed by the head of the state, was charged with the task of seeing that the laws were constitutional, of opposing the promulgation of unconstitutional laws, and of receiving the petitions of citizens; it had also the duty of providing everything not already provided but necessary for the proper working of the constitution. The second assembly was the Corps Ligislatif, elected by direct universal suffrage for six years, which passed the laws, the government having the initiative in legislation. This body was not altogether a corps des muets, as in the year VIII. , but its powers were very limited; thus the general session assured to it by the constitution was only for three months, and it could only discuss and put to the vote amendments approved by the conseil d'itat) the ministers did not in any way come into contact with it and could not be members of it, being responsible only to the head of the state, and only the Senate having the right of accusing them before a high court of justice. The conseil d'itat was composed in the same way and had the same authority as it had possessed from the year VIII. to 1814; and it was the members of it who supported projected laws before the Corps Legislatif. To this was added a Draconian press legislation; not only were press offences, many of which were mere expressions of opinion, judged not by a jury but by the correctional tribunals; but further, political papers could not be founded without an authorization, and were subject to a regular administrative discipline; they could be warned, suspended or suppressed*

without a trial, by a simple act of the administration. The constitution of January 1852 was still Republican in name, though less so than that of the yeaT VIII. The period corresponding with the Consulate was also shorter in the case of Louis Napoleon. The year 1852 had not come to an end before a senatus consulte, that of the 10th of November, ratified by a plebiscite, re-established the imperial rank in favour of Napoleon III.; it also conferred on him certain new powers, especially with reference to the budget and foreign treaties; thus ˆ, estor ff h various cracks, which experience had revealed in the E mpaVm original structure of the Empire, were filled up. This period was called that of the empire autoritaire. Further features of it were the free appointment of the maires by the emperor, the oath of fidelity to him imposed on all officials, and the legal organization of official candidatures for the elections-. Two measures marked the highest point reached by this system: the loi de sureti generate of the 27th of February 1858, which allowed the government to intern in France or Algeria, or t© exile certain French citizens, without a trial. The other was the senatus consulte of tine 17th of February 1858, which made the validity of candidatures for the Corps Legislatif subject

to a preliminary oath of fidelity on the part of the candidate. But for various causes, which cannot be examined here, a series of measures was soon to be initiated which were gradually to

lead back again to political liberty, and definitively rhe . to found what has been called the empire liberal.

literal. O ne ˚y one the different rules and proceedings of

parliamentary government as it had existed in France regained their force. The first step was the decree of the 24th of November i860, which re-established for each ordinary session the address voted by the chambers in response to the speech from the throne. In 1867 this movement took a more decisive form. It led to a new constitution, that of the 21st of May 1870, which was again ratified by popular suffrage. While maintaining the Empire and the imperial dynasty, it organized parliamentary government practically in the form in which it had operated under the July Monarchy, with two legislative chambers, the Senate and the Corps Legislatif, the consent of both of which was necessary for legislation, and which, together with the emperor, had the initiative in this matter. The laws of the nth of

May 1868 and the 6th of June 1868 restored to a certain extent the liberty of the press and of holding meetings, though without abolishing offences of opinion, or again bringing press offences under the jurisdiction of a jury. Laws of the 22nd and 23rd of July 1870 gave the conseils gSniraux, whose powers had been somewhat widened, the right of electing their presidents, and provided that the maires and their colleagues should be chosen from among the members of the municipal councils.

The legislation of the Second Empire led to a considerable number of reforms. Its chief aim was the development of

*commerce, industry and agriculture, and generally the aadsoclal material prosperity of the country. The Empire, reforms though restricting liberty in political matters, increased under the jj ; n economic matters. Such were the decrees and Empire. ‘ aws * J ˆ5 2 an ˆ I ˆ5 3 relating to land-banks (itablisse-*

menls de cridit fonder) and that of 1857 on trade-marks, those of 1863 and 1867 on commercial companies, that of 1858 on general stores (magasins generaux) and warrants, that of 1856 on drainage, that of 1865 on the associations syndicates de propriStaires, that of 1866 on the mercantile marine. The law of the 14th of June 1865 introduced into France the institution, borrowed from England, of cheques. But of still greater import- ance for economic development than all these laws were the

treaties concluded by the emperor with foreign powers, Com- } n or(i er to introduce, as far as possible, free exchange

treaties. of commodities; the chief of these, which was the

model of all the others, was that concluded with Great Britain on the 23rd of January i860. Moreover, the law of the 25th of May 1864 admitted for the first time the right of strikes and lock-outs among workmen or employers, annulling articles 414 and following of the Code Pinal, which had so far made them a penal offence, even when not accompanied by fraudulent practices, threats or violence, tending to hinder the liberty of labour. The superannuation fund (caisse des retraites pour la vieillesse), supported by voluntary payments from those participating in it, which had been created by the law of the 18th of June 1850, was reorganized and perfected, and a law of the nth of July 1868 established, with the guarantee of the state, two funds for voluntary insurance, one in case of death, the other against accidents occurring in industrial or agricultural employ- ment. A decree of 1863 established in principle the freedom of bakeries, and another in 1864 that of theatrical management. Criminal law was the subject of important legislation. Two codes were promulgated

on special points, the codes of military Reforms J ust i ce f° r the land forces (1857) and for the naval lathe forces (1858). But the common law was also largely criminal remodelled. A law of the 10th of June 1858, it is true, ‘ created certain new crimes, with a view to protecting

the members of the imperial family, and that of the 17th of July 1S56 increased the powers and independence of the juges d’ instruction; but, on the other hand, useful improvements were introduced by laws of 1856 and 1865, and notably with regard to precautionary detention and provisional release with or

without bail. A law of the 20th of May 1863 organized a simple and rapid procedure, copied from that followed in England before the police courts, for summary jurisdiction. A law of 1868 permitted the revision of criminal trials after the death of •the condemned person. But the most far-reaching reforms took place in 1854, namely, the abolition of the total loss of civil rights which formerly accompanied condemnation to imprisonment for life, and the law of the 30th of May on penal servitude (travaux forces) which substituted transportation to the colonies for the system of continental convict prisons. Finally, in 1863, there was a revision of the Code Pinal, which, in the process of lightening penalties, made a certain number of crimes into misdemeanours, and in consequence transferred the judgment of them from the assize courts to the correctional tribunals. In civil legislation may be ??. noted the law of the 23rd of March 1855 on hypothecs ˆJa ”’ (see Code Napoleon); that of the 22nd of July 1857, which abolished seizure of the person (contrainte par corps) for civil and commercial debts; and finally, the law of the 14th of July 1866, on literary copyright. The system of taxation was hardly modified at all, except for the establishment of a tax on the income arising from investments Taxation (shares and bonds of companies) in 1857, and the tax arm y. on carriages (1862). On the 1st of February 1868 was promulgated an important military law, which, however, passed the Corps Legislatif with some difficulty. It asserted the principle of universal compulsory military service, at least, in time of war. It preserved, however, the system of drawing lots ‘to determine the annual contingent to be incorporated into the standing army; the term of service was fixed at five years, and it was still permissible to send a substitute. But able-bodied men who were not included in the annual contingent formed a reserve force called the garde nalionale mobile, each department organizing its own section. These gardes mobiles, though they were not effectively organized or exercised under the Empire, took part in the war of 1870-71.

The Third Republic. — The Third Republic had at first a provisional government, unanimously acclaimed by the people of Paris. It was accepted by France, exercised full powers’, and sustained by 110 means ingloriously

a desperate struggle against the enemy; a certain number of its dicrets-lois are still in force. After the capitulation of Paris, a National Assembly was elected to treat with Germany. It was elected in accordance with the electoral law of 1849, which had been revived with a few modifications, and it met at Bordeaux to the number of 753 members on the 13th of February -18.71. It was a sovereign assembly, since France had no longer a constitution, and for this very reason it claimed from the outset constituent powers; the Republican party at the time, however, contested this claim, the majority in the assembly being frankly monarchist, though dividedas to the choice of a monarch. But for some time the National Assembly either could not or would not exercise this power, and up to 1875 affairs remained in a provisional state,' legalized and regulated this time by the Assembly. This was an application, though unconscious, of a form of government which M. Grevy had proposed to the Constituent Assembly in 1848. There was a single assembly; with one man elected by it as head of the executive power (the first to be elected was M. Thiers, who received the title of president of the Republic in August 1871), who was responsible to the Assembly and governed with the help of ministers chosen by himself, who were also responsible to it. Thiers fell on the 24th of May 1873. His place was taken by Marshal MacMahon,on whom the Assembly later conferred, in November 1873, the position of president of the Republic for seven years, when the refusal of the comte de Chambord to accept the tricolour in place of the white flag of the Bourbons had made any attempt to restore the monarchy impossible. Henceforth the definitive adoption of the Republican form of government became inevitable, and the opinion of the country began to turn in this direction, as was shown by the elections of deputies which took place to fill up the gaps occurring in the Assembly. The Assembly, however, shrank from the inevitable

solution, and when a discussion was begun in January 1875 on the projected constitutional laws prepared by the commission des trente, the only proposals made by the latter were for a more complete organization of the powers of one man, Marshal MacMahon. But on the 30th of January 1875 was adopted, by 353 votes to 352, an amendment by M. Wallon which provided for the election of an indefinite succession of presidents of the Republic; this amounted to a definitive recognition establish- of the Republic. In this connexion it has often been meat of said that the Republic was established by a majority the of one. This is not an accurate statement, for it was

Republic on]y the case on the firgt rea(ii n g f the law; the

majority on the second and third readings increased until it became considerable. There was a strong movement in the direction of a reconciliation between the parties; and there had been a rapprochement between the Republicans and the Right Centre. At the end of February were passed and promulgated two constitutional laws, that of the 25th of February 1875, on the organization of the public powers, and that of the 24th of February 1875, on the organization of the senate. In the middle of the year they were supplemented by a third, that of the 16th of July 1875, on the relations between the public powers.

Thus was built up the actual constitution of France. It differs fundamentally, both in form and contents, from previous The constitutions. As to its form, instead of a single

French methodical text divided into an uninterrupted series of CoastHu- articles, it consisted of three distinct laws. As to Hon. matter, it is obviously a work of an essentially practical

nature, the result of compromise and reciprocal concessions. It does not lay down any theoretical principles, and its provisions, which were arrived at with difficulty, confine themselves strictly to what is necessary to ensure the proper operation of the governmental machinery. The result is a compromise between Republican principles and the rules of constitutional and parlia- mentary monarchy. On this account it has been accused, though unjustly, of being too monarchical. Its duration, by far the longest of any French constitution since 1791, is a sign of its value and vitality. It is in fact a product of history, and not of imagination. Its composition is as follows. The legislative power was given to two elective chambers, having equal powers, the vote of both of which is necessary for legislation, and both having the right of initiating and amending laws. The constitu- tion assures them an ordinary session of five months, which opens by right on the second Tuesday in January. One house, the Chamber of Deputies, is elected by direct universal suffrage and is entirely renewed every four years; the other, the Senate, consists of 300 members, divided by the law of the 27th of February 1875 into two categories; 75 of the senators were elected for life and irremovable, and the first of them were elected by the National Assembly, but afterwards it was the Senate itself which held elections to fill up vacancies. The 225 remaining senators were elected by the departments and by certain colonies, among which they were apportioned in proportion to the popula- tion; they are elected for nine years, a third of the house being renewed every three years. The electoral college in each depart- ment which nominated them included the deputies, the members of the general council of the department and of the councils of

the arrondissements, arid one delegate elected by each municipal council, whatever the importance of the commune. This was practically a system of election in two and, partly, three degrees, but with this distinguishing feature, that the electors of the second degree had not been chosen purely with a view to this election, but chiefly for the exercise of other functions. The most important elements in this electoral college were the delegates from the municipal councils, and by giving one delegate to each, to Paris just as to the smallest commune in France, the National Assembly intended to counterbalance the power of numbers, which governed the elections for the Chamber of Deputies, and, at the same time, to give a preponderance to the country districts. The 75 irremovable senators were another precaution against the danger from violent waves of public opinion. The executive power was entrusted to a president,

elected forseven years (as Marshal MacMahon had been in 1873), by the Chamber and the Senate, combined into a single body under the name of National Assembly. He is always eligible for re-election, and is irresponsible except in case of high treason. His powers are of the widest, including the initiative in legislation jointly with the two chambers, the appointment to all civil and military offices, the disposition, and, if he wish it, the leadership of the armed forces, the right of pardon, the right of negotiating treaties with foreign powers, and, in principle, of ratifying them oh his own authority, the consent of the two chambers being required only in certain cases defined by the constitution. The nomination of conseillers d'etat for ordinary service, whom the National Assembly had made elective, as in 1848, and elected itself, was restored to the president of the Republic, together with the right of dismissing them. But these powers he can only exercise through the medium of a ministry, politically and jointly responsible to the 'chambers, and forming a council, over which the president usually presides.

The French Republic is essentially a parliamentary republic. The right of dissolving the Chamber of Deputies before the expiration of its term of office belongs to the president, but in order to do so he must have, besides a ministry which will take the responsibility for it, the preliminary sanction of the Senate. The Senate is at the same time a high court of justice, which can judge the president of the Republic and ministers accused of crimes committed by them in the exercise of their functions; in these two cases the prosecution is instituted by the Chamber of Deputies. The Senate can also be called upon to judge any person accused of an attempt upon the safety of the state, who is then seized by a decree of the president of the Republic, drawn up in the council of ministers. Possible revision of the constitution is provided for very simply: it has to be proposed as a law, and for its acceptance a resolution passed by each chamber separately, by an absolute majority, is necessary. The revision is then carried out by the Senate and

the Chamber of Deputies to form a National Assembly. There have been two revisions since 1875. The first time, in 1879, it was simply a question of transferring the seat of the government and of the chambers back to Paris from Versailles, where it had been fixed by one of the constitutional laws. The second time, in 1884, more fundamental modifications were required. The most important point was to change the composition and election of the Senate. With a view to this, the new constitutional law of the 14th of August 1884 abolished the constitutional character of a certain number of articles of the law of the 24th of February 187S, thus. making it possible to modify them by an ordinary law. This took place in the same year; the 75 senators for life were suppressed for the future by a process of extinction, and their seats divided among the most populous departments. Further, in the electoral college which elects the senators, there was allotted to the municipal councils a number of delegates proportionate to the number of members of the councils, which depends on the importance of the commune. The law of the 14th of August 1884 also modified the constitution in another important respect. The law of the 25th of February 1875 had admitted the possibility not only of a partial, but even of a total revision, which could affect and even change the form of the state. The law of the 14th of August 1884, however, declared that no proposition for a revision could be accepted which aimed at changing the republican form of government. The composition of the Chamber of Deputies was not fixed by the constitution, and consequently admitted more easily of variation. Since 1871 the mode of election has oscillated between the scrutin de liste for the departments and the scrutin uninominal for the arrondissements. The organic law of the 30th of November 1875 had established the latter system; in 1885 the scrutin de lisle was established by law, but in 1889 the scrutin d'arrondissement was restored; and in this same year, on account of the ambitions of General Boulanger and the suggestion which was made for a sort of plebiscite in his favour, was passed the law on plural candidatures, which forbids anyone to become a candidate lor the Chamber of Deputies in more than one district at a time.

The system established by the constitution of 1875 has worked excellently in some of its departments; for instance, the mode of Working electing the president of the Republic. Between 1875 of the and 1906 there were seven elections, sometimes under constMw tragic or very difficult conditions; the election has tlea ' always taken place without delay or obstruction,

and the choice has been of the best. The high court of justice, which has twice been called into requisition, in 1889 and in 1899-1900, has acted as an efficient check, in spite of the diffi- culties confronting such a tribunal when feeling runs high. Parliamentary government in the form set up by the constitution, besides the criticism to which this system is open in all countries where it is established, even in England, met with special difficulties in France. In the first place, the useful but rather secondary r61e assigned to the president of the Republic has by no means satisfied all those who have occupied this high office. Two presidents have resigned on the ground that their powers were insufficient. Another, even after re-election, had to withdraw in face of the opposition of the two chambers, being no longer able to obtain.a parliamentary ministry. It is difficult, however, to accept the theory of an eminent American political writer, Mr John W. Burgess, 1 that in order to attain to a position of stable equilibrium, the French Republic ought to adopt the presidential system of the United States. In France this sharp division between the two powers has never been observed except in those periods when the representative assemblies were power- less, under the First and Second Empires. It is true that the apparent multiplicity of parties and their lack of discipline, together with the French procedure of interpellations and the orders of the day by which they are concluded, make the forma- tion of homogeneous and lasting cabinets difficult; but since the end of the 19th century there has been great progress in this respect. Another difficulty arose in 1896. The Senate, appealing to the letter of the constitution and relying on its elective char- acter, claimed the right of forcing a ministry to resign by its vote, in the same way as the Chamber of Deputies. The Senate was victorious in the struggle, and forced the ministry presided over by M. Leon Bourgeois to resign; but the precedent is not decisive, for in order to gain its ends the Senate had recourse to the means of refusing to sanction the taxes, declining to consider the proposals for the supplies necessary for the Madagascar expedition so long as the ministry which it was attacking was in existence. The weakest point in the French parliamentary organism is perhaps the right of dissolution. It is difficult of application, for the reason that the president must obtain the preliminary consent of the Senate before exercising it; more- over, this valuable right has been discredited by its abuse by Marshal MacMahon in the campaign of the 16th of May 1877, on which occasion he exercised his right of dissolution against a chamber, the moderate but decidedly republican majority in which was re-elected by the country.

The legislative reforms carried out under the Third Republic

are very numerous. As to public law, it is only possible to

Reforms mention here those of a really organic character,

under the chief among which are those which safeguard and

Third regulate the exercise of the liberties of the individual. Republic The law of the 3Qtn of j une lggl> moc jig e(j j n I0OI)

established the right of holding meetings. Public meetings, whether for ordinary or electoral purposed, may be held without preliminary authorization; the law of 1881 prescribed a declara- tion made by a certain number of citizens enjoying full civil and political rights, which is now remitted. The only really restrictive provision is that which does not allow them to be held in the public highway, but only in an enclosed space. But this is made necessary by the customs of France. The law of the 2 1 st of July i88r on the press is one of the most liberal in the world. By it all offences committed by any kind of publication are submitted to a jury; the punishment for the mere expression of obnoxious opinions is abolished, the only punishment being for slander, libel, defamation, inciting to crime, and in certain

1 Political Science and Comparative Constitutional Law (Boston,

1896).

cases the publication of false news. The law of the 1st of July 1901 established in France the right of forming associations. It recognizes the legality of all associations strictly so called, the objects of which are not contrary to law or to public order or morality. On condition of a simple declaration to the admini- strative authority, it grants them a civil status in a wide sense of the term. Religious congregations, on the contrary, which are not authorized by a law, are forbidden by this law. Tbe This was not a new principle; but the traditional rule religious in France both before and after the Revolution, congnga- except that under certain governments authorization tlons ‘ by decree had sufficed. As a matter of fact the unauthorized congregations had been tolerated for a long time, although on various occasions, and especially in 188 1, their partial dissolution had been proclaimed by decrees. The law of 1901 dissolved therii all, and made it an offence to belong to such a congregation. The members of unauthorized congregations, and later, in 1904, even those of the authorized congregations, were disqualified from teaching in any kind of establishment. The liberty of primary education was confirmed and reorganized by the law of the 30th of October 1886, which simply deprived the clergy of the privileges granted them by the law of 1850, though the latter remains in force with regard to the liberty of secondary education. A law passed by the National Assembly (July 12, 1875) established the liberty of higher education. It even went beyond this, for it granted to students in private g^™aon facultes who aspired to state degrees the right of

being ‘

*examined before a board composed partly of private and partly of state professors. The law of the 18th of March 1880 abolished this privilege. Another law, that of the 22nd of March 1882, made primary education obligatory, though allowing parents to send their children either to private schools or to those of the state; the law of the 16th of June 188 1 established secular (laique) education in the case of the latter. The Third Republic alsd organized secondary education for girls in lycees or special colleges (colleges de fille). Finally, a law of the 10th of July 1896 dealing with higher education and the faculties of the state reorganized the universities, which form distinct bodies, enjoying a fairly wide autonomy. A law of the 19th of December 1905, abrogating that of the 18th Germinal in the year X., which had sanctioned the Concordat, proclaimed the separa- separa- tion of the church from the state. It is based on the tienof principle of the secular state (Hat laique) which recog- < *»«* nizes no form of religion, though respecting the right aad ˆ tate – of every citizen to worship according to his beliefs, arid it aimed at organizing associations of citizens, the object of which was to collect the funds and acquire the property necessary for the maintenance of worship, under the form of associations cultuelles, differing in certain respects from the associations sanctioned by the law of the ist of July 1901, but having a wider scope. It also handed over to these regularly formed associations the pro- perty of the ecclesiastical establishments formerly in existence, while taking precaution's to ensure their proper application, and allowed the associations the free use of the churches and places of worship belonging to the state, the departments or the communes. If no association culluelle was founded in a parish, the property of the former fabrique should devolve to the com- mune. But this law was condemned by the papacy, as contrary to the church hierarchy; and almost nowhere were associations cultuelles formed, except by Protestants and Jews, who complied with the law. After many incidents, but no church having been closed, a new law of the 2nd of January 1907 was enacted. It permits the public exercise of any cult, by means of ordinary associations regulated by the law of the ist of July 1901, and even of public meetings summoned by individuals. Failing all associa- tions, either cultuelles or otfcers, churches, with their Ornaments and furniture, are left to the disposition of the faithful and ministers, for the purpose of exercising the cult; and, on certain conditions, the long use of them can be granted as a free gift to ministers of the cult.*

Among the organic laws concerning administrative affairs there are two of primary importance; that of the 10th of

August 187 1, on the conseih g&niraux, considerably Increased

the powers and independence of these elective bodies, Admlai- , ^^jjichi have become important deliberative assemblies, changes. tne i f sessions being held in public. The law of 187 1

created a new administrative organ for the depart- ments, the commission dipartmentale, elected by the council- general of the department from among its own members and associated with the administrationjjf the prefect. The other law is the municipal law of the 5th of April 1884, which effected a widespread decentralization; the makes and their adjoints are elected by the municipal council.

The war of 1870-71 necessarily led to a modification of the military organization. The law of the 25th of July 1872 estab- Reorgaal- lished the principle of compulsory service for all, first in xatioa the standing army, the period of service in which was otthe fixed at five years, then in the reserve, and finally in *""?• the territorial army. Buttheapplicationofthisprinciple was by no means absolute, only holding good in time of war. Each annual class was divided into two parts, by means of draw- ing lots, and in time of peace one of these parts had only a year of service with the active army. The previous exemptions, based either on the position of supporter of the family (as in the case of the son of a widow or aged father, &c.) or on equivalent services rendered to the state (as in the case of young ecclesiastics or members of the teaching profession), were preserved, but only held good for service in the active army in times of peace. Finally, the system of conditional engagement for a year allowed young men, for the purposes of study or apprenticeship to their profession, only to serve a year with the active army in time of peace. By this means it was sought to combine the advantages of an army of veterans with those of a numerous and truly national army. But the conditional volunteering (volontariat conditionnel) for a year was open to too great a number of people, and so brought the system into discredit. As those who profited by it had to be clothed and maintained at their own expense, and the sum which they had to furnish for this purpose was generally fixed at 1500 francs, it came to be considered the privilege of those who could pay this sum. A new law of the 15th of July 1889 lessened the difference between the two terms which it attempted to reconcile. It reduced the term of service in the active army to three years, and the exemptions, which Were still preserved, merely reduced the period to a year in times of peace. The same reduction was also granted to those

who were really pursuing important scientific, technical or professional studies; the system was so strict on this point that the number of those who profited by those exemptions did not amount to 2000 in a year. This was a compromise between two opposing principles; the democratic principle of equality, being the stronger, was bound to triumph. The law of the 21st of March 1905 reduced the term of service in the active army to two years, but made it equal for all, admit- ting of no exemption, but only certain facilities as to the age at which it had to be accomplished.

In 1883 the judicial personnel was reorganized and reduced in number. With the exception of a few modifications the main

lines of judicial organization remained the same. Justice j n jgˆ Q t h e conse ii d'etat was also reorganized. The

whole fabricof administrative jurisdiction was carefully

organized, and almost entirely separated from the active administration.

The system of taxation has remained essentially unaltered; we may notice, however, the laws of 1897, 1898 and 1900, which abolished or lessened the duties on so called hygienic drinks (wine, beer, cider) , and the financial law of 1 901, which rearranged and increased the transfer fees, and established a system of progressive taxation in the case of succession dues.

The labour laws, which generally partook of the nature both of public and of private law, are a sign of our times. Under

the Third Republic they have been numerous, the f?ˆf mos t notable being: the law of the 21st of March lion. T ^^4 on professional syndicates, which introduced*

the liberty of association in matters of this kind before it became part of the common law (see Trade Unions) ;

and taxation.

the law of the 9th of April 1898 on the liability for accidents incurred during work, and those which have completed it; that of the 22nd of December 1892 on conciliation and arbitration in the case of collective disputes between employers and workmen; that of the 29th of June 1893 on the hygiene and safeguarding of workers in industrial establishments, and the laws which regulate the work of children and women in factories; finally, that of the 15th of July 1893 on free medical attendance (see Labour Legislation).

As to criminal law, there have been more than fifty enactments, mostly involving important modifications, due to more scientific ideas of punishment, so that we may say that it has been almost entirely recast since the establishment Criminal of the Third Republic. The separate system applied in cases of preventive detention and imprisonment for short periods; liberation before the expiry of the term of sentence, subject to the condition that no fresh offence shall be committed within a given time; transportation to the colonies of habitual offenders; the remission of the penalty in the case of first offenders, and the lapsing of the penalty when a certain time has gone by without a fresh condemnation; greater facilities for the rehabilitation of condemned persons, which now became simply a matter for the courts, and occurred as a matter of course at the end of a certain time; such were the chief results of this legislation. Finally, the law of the 8th of December 1897 completely altered the form of the preliminary examination before the juge d' instruction, which had been the weakest point in the French criminal procedure, though it was still held in private; the new law made this examination really a hearing of both sides, and made the appearance of counsel for the defence practically compulsory.

As to private law, both civil and commercial, we could enumerate between 1871 and 1906 more than a hundred laws which have modified it, sometimes profoundly, and have for the most part done very useful work without attracting much attention. They are generally examined and drawn up by commissions of competent men, and pass both chambers almost without discussion. There have, however, been a few which aroused public interest and even deep feeling: Firstly, there was the law of the 27th of July 1884, and those which completed it; this law re-established divorce, which had been abolished since 1816, but only permitted it for certain definite causes determined by law. On the other hand, the law of the 6th of February 1893 increased the liberty and independence of a woman who Was simply judicially separated, in order to encourage separation,as opposed to divorce, when the conditions allowed it. The law of the 25th of March 1896 on the succession of illegitimate children, who were recognized by the parents, treated them not in the same way as legitimate children, but gave them the title of heirs in the succession of their father and mother, together with much greater rights than they had possessed under the Code Civil. The law of the 24th of July 1899, on the protection of children who are ill-treated or morally neglected, also modified some of the provisions of the law as applied to the family, with a view to greater justice and humanity. Finally, on the occasion of the centenary of the Code Civil (see Code Napol£on), a commission, composed of members of the chambers, magistrates, professors of law, lawyers, political writers, and even novelists and dramatic authors, was given the task of revising the whole structure of the code.

See generally Adhemar Esmein, Cours Slementaire d'histoire du droit frdncais (6th ed., 1906); J. Brissand, Cours d'histoire generate du droit frangais public et privS (1904) ; Ernest Glasson, Histoire du droit et des institutions en France (1887-1904) ; Paul Viollet, Histoire des institutions politiques et administratives de la France (3rd ed., 1903); Fustel de Coulanges, Histoire des institutions politiques de I'ancienne France; Jacques Flach, Les Origines de I'ancienne France (1875-1889) ; Achille Luchaire, Histoire des institutions tnonarchiques de la France sous les premiers Capetiens (2nd ed., 1900); Hippolyte Taine, Les Origines de la France contemporaine (1878-1894) ; Adhemar Esmein, Elements de droit constitutional franQais et compare (4th ed., 1906) : Leon Duguit et Henry Monnier, Les Constitutions et les princi- pales Ms politiques de la France depuis 1789 (1898). (J. P. E.)

m°

FRANCESCHI— FRANCESCHINI

FRANCESCHI, JEAN BAPTISTE, Baron (1766-1813), French general, was born at Bastia on the 5th of December 1766 and entered the French service in 1793. He took part in the opera- tions in Corsica in the following year, and received a wound at the siege of San Fiorenzo. After this he left the island and was appointed a field officer in the French Army of Italy, with which he served from 1795 to 1799. He served as a general officer in the campaign of Marengo, in the Naples campaign of 1805-1806, and in the Peninsular War from 1807 to 1809. He was created a baron by Napoleon. He commanded a Neapolitan brigade in the Russian War of 181 2, and after the retreat from Moscow took refuge, with the remnant of his command, in Danzig, where in the course of the siege of 1813 he died on the 19th of March.

Two other generals of brigade in Napoleon's wars bore the name of Franceschi, and the three have often been mistaken for each other. The first was born at Lyons, Jean Baptiste Marie Franceschi-Delonne (1767-1810), who served throughout the Revolutionary campaign on the Rhine, took part in the campaign of Zurich in 1799, and distinguished himself very greatly by his escape from, and subsequent return to, Genoa, when in 1800 Massena was closely besieged in that city. He became a cavalry colonel in 1803, was promoted general of brigade on the field of Austerlitz, and served in southern Italy and in Spain on the staff of King Joseph Bonaparte. During the Peninsular War he won great distinction as a cavalry general, and in 1810 Napoleon made him a baron. At this time he was a prisoner in the hands of the Spaniards, into whose hands he had fallen while bearing important despatches during the campaign of Talavera. He was harshly treated by his captors, and died at Carthagena on the 23rd

of October 1810. The second was Francois Franceschi-Losio (1770-1810), born at Milan, who entered the French Revolutionary army in 1795. He served through the Italian campaign of 1796-97, and subsequently, like Franceschi-Delonne, with Massena at Zurich and at Genoa, and at the headquarters of King Joseph in Italy and Spain. He was killed in a duel by the Neapolitan colonel Filangieri in 1810.

FRANCESCHI, PIERO (or Pietro) DE' (c. 1416-1492), Italian painter of the Umbrian school. This master is generally named Piero della Francesca (Peter, son of Frances), the tradition being that his father, a woollen-draper named Benedetto, had died before his birth. This is not : correct, for,,the mother's name was Romana, and the father continued living during many years of Piero's career. The painter is also named Piero Borghese, from his birthplace, Borgo San Sepolcro, in Umbria. The true family name was, as above stated, Franceschi, and the family still exists under the name of Martini-Franceschi.

Piero first received a scientific education, and became an adept in mathematics and geometry. This early bent of mind and course of study influenced to a large extent his development as a painter. He had more science than either Paolo Uccello or Mantegna, both of them : his contemporaries, the former older and the latter younger. Skilful in linear perspective, he fixed rectangular planes in perfect order and measured them, and thus got his figures in true proportional height. He preceded and excelled Domenico Ghirlandajo in projecting shadows, and rendered with considerable truth atmosphere, the harmony of colours, and the relief of objects. He was naturally therefore excellent in architectural painting, and, in point of technique, he advanced the practice of oil-colouring in Italy.

The earliest trace that we find of Piero as a painter is in 1439, when he was an apprentice of Domenico Veneziano, and assisted him in painting the chapel of S. Egidio, in S. Maria Novella of Florence. Towards 1450 he is said to have been with the same artist in Loreto; nothing of his, however, can now be identified in that locality. In 1451 he was by himself, painting in Rimini, where a fresco still remains. Prior to this he had executed some extensive frescoes in the Vatican; but these were destroyed when Raphael undertook on the same walls the " Liberation of St Peter " and other paintings. His most extensive extant series of frescoes is in the choir of S. Francesco in Arezzo, — the

"History of the Cross," beginning with legendary subjects of the death and burial of Adam, and going on to the entry of Heraclius into Jerusalem after the overthrow of Chosrdes. This series is, in relation to its period, remarkable for effect, movement, and mastery of the nude. The subject of the " Vision of Constantine " is particularly vigorous in chiaroscuro; and a

preparatory design of the same composition was so highly effective that it used to be ascribed to Giorgione, and might even (accord- ing to one authority) have passed for the handiwork of Correggio or of Rembrandt. A noted fresco in Borgo San Sepolcro, the " Resurrection," may be later than this series; it is preserved in the Palazzo de' Conservatori. An important painting of the " Flagellation of Christ," in the cathedral of Urbino, is later still, probably towards 1470. Piero appears to have been much in his native town of Borgo San Sepolcro from about 1445, and more especially after 1454, when he finished the series in Arezzo. He grew rich there, and there he died, and in October 1492 was buried.

Two statements made by Vasari regarding "Piero della Francesca" are open to much controversy. He says that Piero became blind at the age of sixty, which cannot be true, as he continued paint- ing some years later; but scepticism need perhaps hardly go to the extent of inferring that he was never blind at all. Vasari also says that Fra Luca Pacioli, a disciple of Piero in scientific matters, defrauded his memory by appropriating his researches without acknowledgment. This is hard upon the friar, who constantly shows a great reverence for his master in the sciences. One of Pacioli's books was published in 1509, and speaks of Piero as still living. Hence it has been propounded that Piero lived to the patriarchal age of ninety-four or upwards ; but, as it is now stated that he was buried in 1492, we must infer that there is some mistake in relation to Pacioli's remark — perhaps the date of writing was several years earlier than that of publication. Piero was known to have left a manuscript of his own on perspective; this remained undiscovered for a long time, but eventually was found by E. Harzen in the Ambrosian library of Milan, ascribed to some supposititious " Pietro, Pittore di Bruges." The treatise shows a knowledge of perspective as dependent on the point of distance.

In the National Gallery, London, are three paintings attributed to Piero de' Franceschi Another work, a profile of Isotta da Rimini, may safely be rejected. The " Baptism of Christ," which used to be the altar-piece of the Priory of the Baptist in Borgo San Sepolcro, is an important example; and still more so the " Nativity," with the Virgin kneeling, and five angels singing to musical instruments. This is a very interesting and characteristic specimen, and has indeed been praised somewhat beyond its deservings on aesthetic grounds.*

Piero's earlier style was energetic but unrefined, and to the last he lacked selectness of form and feature. The types of his visages are peculiar, and the costumes (as especially in the Arezzo series) singular. He used to work assiduously from clay models swathed in real drapery. Luca Signorelli was his pupil, and probably to some extent Perugino ; and his own influence, furthered by that of Signorelli, was potent over all Italy. Belonging as he

does to the Umbrian school, he united with that style something of the Sienese and more of the Florentine mode.

Besides Vasari and Crowe & Cavalcaselle, the work by W. G. Waters, Piero della Francesca (1899) should be consulted.

(W. M. R.)

FRANCESCHINI, BALDASSARE (1611-1689),; Italian painter of the Tuscan school, named, from Volterra the place of his birth, II Volterrano, or (to distinguish him from Ricciarelli) II Volterrano Giuniore, was the son. of a sculptor in alabaster. At a very early age he learned from Cosimo Daddi some of the elements of art, and he started as an assistant to his father This employment being evidently below the level of his talents, the marquises Jnghirami placed him, at the age of sixteen, under the Florentine painter Matteo, Rosselli. In the ensuing year he had advanced sufficiently to execute in Volterra some frescoes, skilful in foreshortening, followed by other frescoes for the Medici family in the Valle della Petraia. In 1652 the marches: Filippo Niccolini, being minded to employ Franceschini upon the frescoes for the cupola and back-wall of his chapel uTS. Croce, Florence, despatched him to various parts of Italy to perfect his style. The painter, in a tour which lasted some months, took more especially to the qualities distinctive of the schools of Parma and Bologna, and in a measure to those of Pietro da Cortona, whose acquaintance he made in Rome. He then undertook the paintings commissioned by Niccolini, which*

constitute his most noted performance, the design being good, and the method masterly. Franceschini ranks higher in fresco than in oil painting. His works in the latter mode were not unfrequently left unfinished, although numerous specimens remain, the cabinet pictures being marked by much sprightliness of invention. Among his best oil paintings of large scale is the " St John the Evangelist " in the church of S. Chiara at Volterra. One of his latest works was the fresco of the cupola of the Annun- ziata, Florence, which occupied him for two years towards 1683, a production of much labour and energy. Franceschini died of apoplexy at Volterra on the 6th of January 1689. He is reckoned among those painters of the decline of art to whom the general name of " machinist " is applied.

He is not to be confounded with another Franceschini of the same class, and of rather later date, also of no small eminence in his time — the Cavaliere Marcantonio Franceschini (1648- 1729), who was a Bolognese.

FRANCHE-COMT&, a province of France from 1674 to the Revolution. It was bounded on the E. by Switzerland, on the S. by Bresse and Bugey, on the N. by Lorraine, and on the W. by the duchy of Burgundy and by Bassigny, embracing to the E. of the Jura the valley of the Saone and most of that of the Doubs. Under the Romans it corresponded to Maxima Sequanorum, and after having formed part of the kingdom of Burgundy was in the early part of the middle ages split up into the four countships of Portois, Varais, Amons and Escuens. In the 10th century these four countships were united to form a whole, which came to be called the countship of Burgundy, and belonged at that time to the family of the counts of Macon.

The limits of the countship were definitely settled under Otto William, son of Albert or Adalbert, king of Italy (fio27), who on the death of his father-in-law, Henry (1002), tried to seize the duchy of Burgundy ,but without success. The countship, which formed a fief dependent on the kingdom of Burgundy, passed to Renaud I., the second son of Otto William. When the kingdom of Burgundy was joined to the Germanic empire, he refused to pay homage to the emperor Henry III., whose suzerainty over him never existed except in theory. William I., surnamed the Great or Headstrong (1059-1087), still further added to- the power of his house by marrying Etiennette, heiress of the count of Vienne, and by acquiring from his cousin Guy, when the latter became a monk at Cluny, the countship of Macon. One of his sons, Guy, became pope, under the name of Calixtus

II. His grandson, Renaud III. (1097-1148), in his turn refused to pay homage to the emperor Lothair, who retaliated by con- fiscating his dominions and giving them to Conrad of Zahringen. Renaud, however, succeeded in maintaining until his death his possession of the countships of Burgundy, Vienne and Macon. He left as sole heiress a daughter, Beatrix, whom his brother William III. imprisoned, in order to make an attempt on her inheritance; she was set free, however, by the emperor Frederick Barbarossa, who married her in 1156.

On the death of Beatrix (1185) the countship of Burgundy passed to Otto I. (1 190-1200), the youngest but one of her sons, who had to dispute its possession with Stephen, count of Auxonne, the grandson of William III. Beatrix, the daughter and heiress of Otto I. (1200-1231), married Otto, duke of Meran (fi234), under whose government the inhabitants of Besancon, which had been since the time of Frederick Barbarossa an imperial city, formed themselves definitely into a commune. Alix, daughter of Beatrix and of Otto of Meran, and heiress to the countship of Burgundy, marri5d Hugh of Chalon, son of John the Ancient or the Wise (d. 1248), and a descendant of William

III. and consequently of William the Headstrong, thus bringing the

countship back into the family of its former lords. His son Otto IV. (1279-1303) engaged in war against the bishop of Basel, and the German king Rudolph I., who supported the latter, entered Franche-Comte and besieged Besancon, but without success (1289). Otto, in fulfilment of the treaties of Ervennes and Vincennes (1291-1295) gave Jeanne, his daughter by Mahaut of Artois, in marriage to Philip, count of Poitiers, son of Philip the Fair. The latter took over the administration

of the countship in spite of strong opposition from the nobles of the country, but their leader, John of Ghalon-Arlay, was compelled to make his submission. Another of Otto's daughters married Charles IV., the Handsome, and both princesses, together with their sister-in-law Margaret of Burgundy, were concerned in the celebrated trial of the Tour de Nesle. Jeanne, however, continued to govern her countship when Philip her. husband became king of France (Philip V., " the Long "). Jeanne, their daughter and heiress, married Odo IV., duke of Burgundy (1330-1347), and her sister Margaret became the wife of Louis II., count of P'landers. The countship returned to Margaret at the death of Odo IV., who was succeeded in his duchy by his grandson Philip of Rouvre.

The marriage of Philip the Bold with Margaret, daughter of Louis of Male, caused Franche-Comte to pass to the princes of the ducal house of Burgundy, who kept it up till the death of Charles the Bold (1477). On his death Louis XI. laid claim to the government of the countship as well as of the duchy, as trustee for the property of the princess Mary, who was closely related to him and destined to marry the dauphin (later Charles VIII.). French garrisons occupied the principal towns, and the lord of Craon was appointed governor of the country. In consequence of his severity there was a general rising, and at the same time Mary married Maximilian, archduke of Austria, to whom her father had formerly betrothed her (Aug. 1477). The French were expelled from the fortified towns and Craon beaten by the people of D61e. Charles of Amboise, who took his place, reconquered the province, and even Besancon submitted to the authority of the king of France, who promised to respect its privileges.

On the death of Louis XI. (1483) , the estates of Franche-Comte recognized as sovereign his son Charles, who was betrothed to the little Margaret of Burgundy, daughter of Maximilian and Mary (d. 1482), but when Charles VIII. refused Margaret's hand in order to marry Anne of Brittany there was a fresh rising, and the French were again driven out. The treaty of Senlis (23rd May 1483) put an end to the struggle: Charles abandoned all his pretensions, and Maximilian was thus left in possession of Franche-Comte, the sovereignty of which he handed on to his son Philip and ultimately to the crown of Spain. He had, however, constituted his daughter Margaret sovereign-governess of Franche-Comte for life, and under the

administration of this princess (who died in 1530), as under the rule of Charles V., the country enjoyed comparative independence, paying a " don gratuit" of 200,000 livres every three years, and being actually governed by the parliament of D&le, and by governors chosen from the nobility of the country. It was Franche-Comte which furnished Philip II. of Spain with one of his best counsellors, Cardinal Perrenot de Granvella.

In the 16th century the country was disturbed by the preaching of Protestant doctrines, which gained adherents especially in the district of Montbeliard, and later by the wars between France and Spain. In 1 595 the armies of Henry IV. levied contributions on Besancon and other towns; but the people of Franche-Comte succeeded in obtaining special terms of neutrality in order to shelter themselves from injury from either of the parties in the war, and enjoyed a period of calm under the government of the infanta Isabella Clara Eugenie and the archduke Albert (1599- 1621). But the country suffered greatly from the ravages of the Thirty Years' War, from the presence of the army of the Condes, which besieged Dole, from the devastation of the troops of Gallas, and later of those of Bernard of Saxe-Weimar. The peace of Westphalia (1648) confirmed Spain in the possession of Franche- Comte. In 1668 the French again entered it, and the conquest, of which the foundations had been laid by the intrigues of the abbot of Watteville and the French party constituted by him, was easily accomplished by Conde and Luxemburg, Louis XIV. directing the army in Franche-Comte for some time in person, None the less, the country was restored to Spain at the peace of Aix-la-Chapelle (1668), but in 1674 Louis headed another expedition there. Besancon capitulated after a siege of twenty- seven days, and D61e and Salins also fell into the hands ot the invaders.

In 1678 the treaty of Nijmwegen gave Franche-Comte to France (the principality of Montbeliard remaining in the posses- sion of the house of Wiirttemberg, which had acquired it by marriage), and it was in celebration of this conquest that the Arc de Triomphe of the Portes Saint Denis and Saint Martin at Paris was erected. Franche-Comte became a military govern- ment (gouvernement). The estates ceased to meet, and the old " don gratuil " was replaced by a tax which became increasingly heavy. Louis made Besancon, which Vaubaii fortified, into the capital of the province, and transferred to it the parliament and the university, the seat of which had hitherto been D61e. For purposes of administration, the county was divided among the four great bailliages of Besancon, Dole, Amont (chief town Vesoul) and Aval (chief town Salins). At the Revolution were

formed from it the departments of Jura, Doubs and Haute- Sa6ne.

See Dunod, Histoire des Sequanois; Hist, du comte de Bourgogne (Dijon, 1 735-1 740) ; E. Clerc, Essai surV histoire de la Franche-Comte (2nd ed., Besancon, 1870). (R. Po.)

FRANCHISE (from .0. Fr. franchise, freedom, franc, free), in English law, a royal privilege or branch of the crown's pre- rogative subsisting in the hands of a subject. A franchise is an incorporeal hereditament, and arises either from royal grants or from prescription which presupposes a grant. Such franchises are bodies corporate, the right to hold a fair, market, ferry, free fishery, &c. The term is also applied to the right of voting at elections and the qualifications upon which that right is based (see Registration; Representation; Vote). In the United States the term is especially applied to the right or powers of partial appropriation of public property by exclusive use, or to a privilege of a public nature conferred on a corporation created for the purpose.

FRANCIA (c. 1450-1517), a Bolognese painter, whose real name was Francesco Raibolini, his father being Marco di Giacomo Raibolini, a carpenter, descended from an old and creditable family, was born at Bologna about 1450. He was apprenticed to a goldsmith currently named Francia, and from him probably he got the nickname whereby he is generally known; he more- over studied design under Marco Zoppo. The youth Was thus originally a goldsmith, and also an engraver of dies and niellos, and in these arts he became extremely eminent. He was particu- larly famed for his dies for medals; he rose to be mint-master at Bologna, and retained that office till the end of his life. A famous medal of Pope Julius II. as liberator of Bologna is ascribed to his hand, but not with certainty. As a type-founder he made for Aldus Manutius the first italic type.

At a mature age— having first, it appears, become acquainted with Mantegna — he turned his attention to painting. His earliest k.nown picture is dated 1494 (not 1490, as ordinarily stated). It shows so much mastery that one is compelled to believe that Raibolini must before then have practised painting for some few years. This work is now in the Bologna gallery, — the " Virgin enthroned, with Augustine and five other saints." It is an oil picture, and was originally painted for the church of S. Maria della Misericordia, at the desire of the Behtivoglio family, the rulers of Bologna. The same patrons employed him upon frescoes in their own palace; one of " Judith and Holo- phernes " is especially noted, its style recalling that of Mantegna. Francia probably studied likewise the works of Perugino; and he became a friend and ardent admirer of Raphael, to whom he addressed an enthusiastic sonnet. Raphael cordially responded to the

Bolognese master's admiration, and said, in a letter dated in 1 508, that few painters or none had produced Madonnas more beautiful, more devout, or better portrayed than those of Francia. If we may trust Vasari — but it is difficult to suppose that he was entirely correct— the exceeding value which Francia set on Raphael's art brought him to his grave. Raphael had consigned to Francia his famous picture of " St Cecilia," destined for the church of S. Giovanni in Monte, Bologna; and Francia, on inspecting it, took so much to heart his own inferiority, at the advanced age of about sixty-six, to the youthful Umbrian, that he sickened and shortly expired on the 6th of January 1517.

A contemporary record, after attesting his pre-eminence as a goldsmith, jeweller and painter, states that he was " most hand- some in person and highly eloquent."

Distanced though he may have been by Raphael, Francia is rightly regarded as the greatest painter of the earlier Bolognese school, and hardly to be surpassed as representing the art termed " antico-moderno," or of the " quattrocento." It has been well observed that his style is a medium between that of Perugino and that of Giovanni Bellini; he has somewhat more of spontaneous naturalism than the former, and of abstract dignity in feature and form than the latter. The magnificent portrait in the Louvre of a young man in black, of brooding thoughtfulness and saddened profundity of mood, would alone suffice to place Francia among the very great masters, if it could with confidence be attributed to his hand, but in all probability its real author was Franciabigio ; it had erewhile passed under the name of Raphael, of Giorgione, or of Sebastian del Piombo. The National Gallery, London, contains two remarkably fine specimens of Francia, once combined together as principal picture and lunette, — the " Virgin " and " Child and St Anna " enthroned, surrounded by saints, and (in the lunette) the " Pieta," or lamentation of angels over the dead Saviour. They come from the Buonvisi chapel in the church of S. Frediano, Lucca, and were among the master's latest paintings. Other leading works are— in Munich, the " Virgin " sinking on her knees in adoration of the Divine Infant, who is lying in a garden within a rose trellis; in the Borghese gallery, Rome, a Peter Martyr; in Bologna, the frescoes in the church of St Cecilia, illustrating the life of the saint, all of them from the design of Raibolini, but not all executed by himself. His landscape backgrounds are of uncommon excellence. Francia had more than 200 scholars. Marcantonio Raimondi, the famous engraver, is the most renowned of them; next to him Amico Aspertini, and Francia's own son Giacomo, and his cousin Julio. Lorenzo Costa was much associated with Francia in pictorial work.

Among the authorities as to the life and work of Francia may be mentioned J. A.Calvi, Memorie delta vita di Francesco Raibolini (18 12), and

especially G. C. Williamson, Francia (1900). (W. M. R.)

FRANCIA, JOSt GASPAR RODRIGUEZ (c. 1757-1840), dictator of Paraguay, was born probably about 1757. According to one account he was of French descent; but the truth seems to be that his father, Garcia Rodriguez Francia, was a native of S. Paulo in Brazil, and came to Paraguay to take charge of a plantation of black tobacco for the government. He studied theology at the college of Cordova de Tucuman, and is said to have been for some time a professor in that faculty; but he afterwards turned his attention to the law, and practised in Asuncion. Having attained a high reputation at once for ability and integrity, he was selected for various important offices. On the declaration of Paraguayan independence in 1 81 1, he was appointed secretary to the national junta, and exercised an influence on affairs greatly out of proportion to his nominal position. When the congress or junta of 1813 changed the constitution and established a duumvirate, Dr Francia and the Gaucho general Yegres were elected to the office. In 1814 he secured his own election as dictator for three years, and at the end of that period he obtained the dictatorship for life. In the accounts which have been published of his ad- ministration we find a strange mixture of capacity and caprice, of far-sighted wisdom and reckless infatuation, strenuous endeavours after a high ideal and flagrant violations of the simplest principles of justice. He put a stop to the foreign commerce of the country, but carefully fostered its internal industries; Was disposed to be hospitable to strangers from other lands, and kept them prisoners for years; lived a life of republican simplicity, and punished with Dionysian severity the slightest want of respect. As time went on he appears to have grown more arbitrary and despotic. Deeply imbued with the principles of the French Revolution, he was a stern antagonist of the church. He abolished the Inquisition, suppressed the college of theology, did away With the tithes, and inflicted endless indignities on the priests. He discouraged marriage

both by precept and example, and left behind him several illegitimate children. For the extravagances of his later years the plea of insanity has been put forward. On the 20th of September 1840 he was seized with a fit and died.

The first and fullest account of Dr Fraricia was given to the world by two Swiss surgeons, Rengger and Longchamp, whom he had detained from 1819 to 1825 — Essai historique sur la revolution de Paraguay et la gouvernement dictatorial du docteur Francia (Paris, 1827). Their work was almost immediately translated into English under the title of The Reign of Doctor Joseph G. R. De Francia in Paraguay (1827). About eleven years

after there appeared at London Letters on Paraguay, by J. P. and W. P. Robertson, two young Scotsmen whose hopes of commercial success had been rudely destroyed by the dictator s interference. The account which they gave of his character and government was of the most unfavourable description, and they rehearsed and emphasized their accusations in Francia 's Reign of Terror (1839) and Letters on South America (3 vols., 1843). From the very pages of his detractors Thomas Carlyle succeeded in extracting materials for a brilliant defence of the dic- tator " as a man or sovereign of iron energy and industry, of great and severe labour." It appeared in the Foreign Quarterly Review for 1843, and is reprinted in his Critical and Miscellaneous Essays. Sir Richard F. Burton gives a graphic sketch of Francia's life and a' favourable notice of his character in his Letters from the Battlefields of Paraguay (1870), while C. A. Washburn takes up a hostile position in his History of Paraguay (1871).

FRANCIABIGIO (1482-1525), Florentine painter. The name of this artist is generally given as Mercantonio Franciabigio; it appears, however, that his only real ascertained name was Francesco di Cristofano; and that he was currently termed Francia Bigio, the two appellatives being distinct. He was born in Florence, and studied under Albertinelli for some months. In 1505 he formed the acquaintance of Andrea del Sarto; and after a while the two painters set up a shop in common in the Piazza del Grano. Franciabigio paid much attention to anatomy and perspective, and to the proportions of his figures, though these are often too squat and puffy in form. He had a large stock of artistic knowledge, and was at first noted for diligence. As years went on, and he received frequent commissions for all sorts of public painting for festive occasions, his diligence merged in something which may rather be called workmanly offhandedness. He was particularly proficient in fresco, and Vasari even says that he surpassed all his contemporaries in this method — a judgment which modern connoisseurship does not accept. In the court of the Servites (or cloister of the Annunziata) in Florence he painted in. 15 13 the "Marriage of the Virgin," as a portion of a series wherein Andrea del Sarto was chiefly concerned. The friars having uncovered this work before it was quite finished, Franciabigio was so incensed that, seizing a mason's hammer, he struck at the head of the Virgin, and some other heads; and the fresco, which would otherwise be his masterpiece in that method, remains thus mutilated. At the Scalzo, in another series of frescoes on which Andrea was likewise employed, he executed in 1518-1519 the " Departure of John the Baptist for the Desert," and the " Meeting of the Baptist with Jesus"; and, at the Medici palace at Poggio a Caiano, in 1521, the " Triumph of Cicero." Various works which have been ascribed to Raphael are now known or reasonably deemed to be by Franciabigio. Such are the " Madonna del Pozzo," in the Uffizi Gallery; the half figure of a " Young

Man," in the Louvre (see also Francia); and the famous picture in the Fuller-Maitland collection, a " Young Man with a Letter." These two works show a close analogy in style to another in the Pitti gallery, avowedly by Franciabigio, a " Youth at a Window," and to some others which bear this painter's recognized monogram. The series of portraits, taken collectively, placed beyond dispute the eminent and idiosyncratic genius of the master. Two other works of his, of some celebrity, are the " Calumny of Apelles," in the Pitti, and the " Bath of Bathsheba " (painted in 1523), in the Dresden gallery.

FRANCIS (Lat. Franciscus, Ital. Francesco, Span. Francisco, Fr. Francois, Ger. Franz), a masculine proper name meaning "Frenchman." As a Christian name it originated with St Francis of Assisi, whose baptismal name was Giovanni, but who was called Francesco by his father on returning from a journey

in France. The saint's fame made the name exceedingly popular from his day onwards.

FRANCIS I. (1708-1765), Roman emperor and grand duke of Tuscany, second son of Leopold Joseph, duke of Lorraine, and his wife Elizabeth Charlotte, daughter of Philip, duke of Orleans, was born on the 8th of December 1708. He was connected with the Habsburgs through his grandmother Eleanore, daughter of the emperor Ferdinand III., and wife of Charles Leopold of Lorraine. The emperor Charles VI. favoured the family, who, besides being his cousins, had served the house of Austria with distinction. He had designed to marry his daughter Maria Theresa to Clement, the elder brother of Francis. On the death of Clement he adopted the younger brother as her husband. Francis was brought up at, Vienna with Maria Theresa on the understanding that they were to be married, and a real affection arose between them. At the age of fifteen, when he was brought to Vienna, he was established in the Silesian duchy of Teschen, which had been mediatized and granted to his father by the emperor in 1722. He succeeded his father as duke of Lorraine in 1729, but the emperor, at the end of the Polish War of Succes;- sipn, desiring to compensate his candidate Stanislaus Leszczynski for the loss of his crown in 1735, persuaded Francis to exchange Lorraine for the reversion of the grand duchy of Tuscany, On the 12th of February 1736 he was married to Maria Theresa, and they went for a short time to Florence, when he succeeded to the grand duchy in 1737 on the death of John Gaston, the last of the ruling house of Medici. His wife secured his election to the Empire on the 13th of September 1745, in succession to Charles VII., and she made him co-regent of her hereditary dominions. Francis was well content to leave the reality of power to his able wife. He had a natural fund of good sense and some business capacity, and was a useful assistant

to Maria Theresa in the laborious task of governing the complicated Austrian dominions, but his functions appear to have been of a purely secretarial character. He died suddenly in his carriage while returning from the opera at Innsbruck on the 18th of August 1765.

See A. von Arneth, Geschichte Maria Theresias (Vienna, 1863-

1879)-

FRANCIS II. (1768-1835), the last Roman emperor, and, as Francis I., first emperor of Austria, was the son of Leopold II., grand-duke of Tuscany, afterwards emperor, and of his wife Maria Louisa, daughter of Charles III. of Spain. He was born at Florence on the 12th of February 1768. In 1784 he was brought to Vienna to complete his education under the eye of his uncle the emperor Joseph II., who was childless. Joseph was repelled by the frigid and retiring character of his nephew, and is said to have treated him with an impatient contempt which confirmed his natural timidity; but after the marriage of Francis to Elizabeth of Wurttemberg (1788) their relations improved. At the close of his uncle's reign he saw some service in the ill-conducted war with Turkey, and kept a careful diary of his experiences. The death of his wife in childbirth on the 18th of February 1790 was followed by the death of his uncle on the 20th; and Francis acted as regent with Prince Kaunitz until his father came from Florence. On the 19th of September he married his first cousin Maria Theresa, daughter of Ferdinand, king of Naples, by whom he was the father of his successor Ferdinand I., of Maria Louisa, wife of Napoleon, and of the archduke Francis, father of the emperor Francis Joseph. After her death (1807) he married Maria Ludovica Beatrix of Este (1808), and when she died he made a fourth marriage with Carolina Augusta of Bavaria (1816).

He succeeded to the Austrian dominions and the empire on the death of his father on the 1st of March 1792. The position was a trying one for a young prince twenty-four years of age. The dominions of the house of Austria, widely scattered in the Low Countries, Germany and Italy, were exposed to the attacks of the French revolutionary governments and of Napoleon. He was dragged into all the coalitions against France, and in the early days of his reign he had to guard against the ambition of Prussia, and the aggressions of Russia in Poland and Turkey.

For long he had no adviser save such diplomatists as Prince Kaunitz and Thugut, who had been trained in the old Austrian diplomacy. His own best

quality was an invincible patience supported by reliance on the loyalty of his subjects, and a sense of his duty to the state. (For the general events of this reign till 1815 see Europe, Austria, Napoleon, French Revolutionary Wars, &c.) The emperor's firmness averted what would have been an irreparable loss of position. Seeing that the Empire was in the last stage of dissolution, and that, even were it to survive, it would pass from the house of Habsburg to that of Bonaparte, he in 1804 assumed the title of hereditary emperor of Austria. The object of this prudent measure was double. In the first place, he guarded against the danger that his house should sink to a lower rank than the Russian or the French. In the second place, he gave some semblance of unity to his com- plex dominions in Germany, Bohemia, Hungary and Italy, by providing a common title for the supreme ruler. His action was justified when, in 1806, the establishment of the Confedera- tion of the Rhine forced him to abdicate the empty title of Holy Roman emperor.

In 1805 he made an important change in the working of his administration. He had hitherto been assisted by a cabinet minister who was in direct relation with all the " chanceries " and boards which' formed the executive government, and who acted a the channel of communication between them and the emperor, and was in fact a prime minister. In 1805 Napoleon insisted on the removal of Count Colloredo, who held the post. From that time forward the emperor Francis acted as his own prime minister, superintending every detail of his administration. In foreign affairs after 1809 he reposed full confidence in Prince Metternich. But Metternich himself declared at the close of his life that he had sometimes held Europe in the palm of his hand, but never Austria. Francis was sole master, and is entitled to whatever praise is due to his government. It follows that he must bear the blame for its errors. The history of the Austrian empire under his rule and since his death bears testimony to both his merits and his limitations. His indomitable patience and loyalty to his inherited task enabled him to triumph over Napoleon. By consenting to the marriage of his daughter, Marie Louise, to Napoleon in 18 10, he gained a respite which he turned to good account. By following the guidance of Metternich in foreign affairs he was able to intervene with decisive effect in 1 8 13. The settlement of Europe in 1815 left Austria stronger and more compact than she had been in 1792, and that this was the case was largely due to the emperor.*

During the twenty years which preceded his death in 1835, Francis continued to oppose the revolutionary spirit. He had none of the mystical tendencies of the tsar Alexander I., and only adhered to the half fantastic Holy Alliance of 181 5 out of pure politeness. But he was wholly in sympathy with the policy of " repression " which came, in popular view, to be identified with the Holy Alliance; and though Metternich was primarily

re- sponsible for the part played by Austria in the " policing " of Europe, Francis cannot but be held personally responsible for the cruel and impolitic severities, associated especially with the sinister name of the fortress prison of the Spielberg, which made so many martyrs to freedom. It is not surprising that Francis was denounced by Liberals throughout Europe as a tyrant and an obscurantist. But though at home, as abroad, he met all sugges- tions of innovation by a steady refusal to depart from old ways, he was always popular among the mass of his subjects, who called him " our good Kaiser Franz." In truth, if in the spirit of the traditional Landesvater he chastised his disobedient children mercilessly, he was essentially a well-meaning ruler who for- warded the material and moral good of his subjects according to his lights. But he held that, by the will of God, the whole sovereign authority resided in his person, and could not be shared with others without a dereliction of duty on his part and disastrous consequences; and his capital error as a ruler of Austria was that he persisted in maintaining a system of adminis- tration which depended upon the indefatigable industry of a single man, and was entirely outgrown by the modern develop-

ment of his subjects. Before his death, government in Austria was almost choked, and it broke down under a successor who had not his capacity for work. Like his ancestor Philip II. of Spain, Francis carried caution, and a disposition to sleep upon every possible proposal, to a great length. He died on the 2nd of March 1835.

See Baron J. A. Helfert, Kaiser Franz und die osterreichischen Befreiungs-Kriege (Vienna, 1867). Ample bibliographies will be found in Krones von Marchland's Grundriss der osterreichischen Geschichte (Berlin, 1882).

FRANCIS I. (1494-1547), king of France, son of Charles of Valois, count of Angouleme, and Louise of Savoy, was born at Cognac on the 1 2th of September 1494. The count of Angouleme, who was the great-grandson of King Charles V., died in 1496, and Louise watched over her son with passionate tenderness. On the accession of Louis XII. in 1498, Francis became heir- presumptive. Louis invested him with the duchy of Valois, and gave him as tutor Marshal de Gie, and, after Gie's disgrace in 1503, the sieur de Boisy, Artus Gouffier. Francois de Roche- fort, abbot of St Mesmin, instructed Francis and his sister Marguerite in Latin and history; Louise herself taught them Italian and Spanish; and the library of the chateau at Amboise was well stocked with romances of the Round Table, which exalted the lad's imagination. Francis showed an even greater love for violent exercises, such as hunting, which was his ruling passion, and tennis, and for tournaments, masquerades and amusements of all kinds. His earliest gallantries are described by his sister in the 25th and 42nd stories of the Heptameron. In 1 507 Francis was betrothed to Claude, the

daughter of Louis XII., and in 1 508 he came to court. In 1 5 1 2 he gained his first military experience in Guienne, and in the following year he commanded the army of Picardy. He married Claude on the 18th of May 1514, and succeeded Louis XII. on the 1st of January 1515. Of noble bearing, and, in spite of a very long and large nose, extremely handsome, he was a sturdy and valiant knight, affable, courteous, a brilliant talker and a facile poet. He had a sprightly wit, some delicacy of feeling, and some generous impulses which made him amiable. These brilliant qualities, however, were all on the surface. At bottom the man was frivolous, profoundly selfish, unstable, and utterly incapable of consistency or application. The ambassadors remarked his negligence, and his ministers complained of it. Hunting, tennis, jewelry and his gallantry were the chief preoccupations of his life.

His character was at once authoritative and weak. He was determined to be master and to decide everything himself, but he allowed himself to be dominated and easily persuaded. Favourites, too, without governing entirely for him, played an important part in his reign. His capricious humour elevated and deposed them with the same disconcerting suddenness. In the early years of his reign the conduct of affairs was chiefly in the hands of Louise of Savoy, Chancellor Antoine Duprat, Secretary Florimond Robertet, and the two Gouffiers, Boisy and Bonnivet. The royal favour then elevated Anne de Montmorency and Philippe de Chabot, and in the last years of the reign Marshal d'Annebaud and Cardinal de Tournon. Women too had always a great influence over Francis — his sister, Marguerite d' Angouleme, and his mistresses. Whatever the number of these, he had only two titular mistresses — at the beginning of the reign Francoise de Chateaubriant, and from about 1526 to his death Anne de Pisseleu, whom he created duchesse d'Etampes and who entirely dominated him. It has not been proved that he was the lover of Diane de Poitiers, nor does the story of " La belle Ferronniere " appear to rest on any historical foundation. 1

Circumstances alone gave a homogeneous character to the foreign policy of Francis. The struggle against the emperor Charles V. filled the greater part of the reign. In reality, the policy of Francis, save for some flashes of sagacity, was irresolute and vacillating. Attracted at first by Italy, dreaming of fair feats of prowess, he led the triumphal Marignano expedition, which gained him reputation as a knightly king and as the most powerful prince in Europe. In 1519, in spite of wise counsels,

1 On this point see Paulin Paris, Htudes sur le regne de Francois I".

he stood candidate for the imperial crown. The election of Charles V. caused an inevitable rivalry between the two monarchs which accentuated still further the light and chivalrous temper of the king and the cold and politic character of the emperor. Francis's personal intervention in this struggle was seldom happy. He did not succeed in gaining the support of Henry VIII. of England at the interview of the Field of the Cloth of Gold in 1520; his want of tact goaded the Constable de Bourbon to extreme measures in 152 2-1 5 23; and in the Italian campaign of 1525 he proved himself a mediocre, vacillating and foolhardy leader, and by his blundering led the army to the disaster of Pavia (the 25th of February 1525), where, however, he fought with great bravery. " Of all things," he wrote to his mother after the defeat, " nothing remains to me but honour and life, which is safe " — the authentic version of the legendary phrase " All is lost save honour." He strove to play the part of royal captive heroically, but the prison life galled him. He fell ill at Madrid and was on the point of death. For a moment he thought of abdicating rather than of ceding Burgundy. But this was too great a demand upon his fortitude, and he finally yielded and signed the treaty of Madrid, after having drawn up a secret protest . After Madrid he wavered unceasingly between two courses, either that of continuing hostilities, or the policy favoured by Montmor- ency of peace and understanding with the emperor. At times he had the sagacity to recognize the utility of alliances, as was shown by those he concluded with the Porte and with the Protestant princes of Germany. But he could never pledge himself frankly in one sense or the other, and this vacillation prevented him from attaining any decisive results. At his death, however, France was in possession of Savoy and Piedmont.

In his religious policy Francis showed the same instability. Drawn between ■ various influences, that of Marguerite d'Angouleme, the du Bellays, and the duchesse d'Etampes, who was in favour of the Reformation or at least of toleration, and the contrary influence of the uncompromising Catholics, Duprat, and then Montmorency and de Tournon, he gave pledges successively to both parties. In the first years of the reign, following the counsels of Marguerite, he protected Jacques Lefevre of Etaples and Louis de Berquin, and showed some favour to the new doctrines. But the violence of the Reformers threw him into the arms of the opposite party. The affair of the Placards in 1534 irritated him beyond measure, and determined him to adopt a policy of severity. From that time, in spite of occasional indulgences shown to the Reformers, due to his desire to conciliate the Protestant powers, Francis gave a free hand to the party of repression, of which the most active and most pitiless member was Cardinal de Tournon; and the end of the reign was sullied by the massacre of the Waldenses (1545).

Francis introduced new methods into government. In his reign the monarchical authority became more imperious and more absolute. His was the government " du bon plaisir." By the unusual development he gave to the court he converted the nobility into a brilliant household of dependants. The Concordat brought the clergy into subjection, and enabled him to distribute benefices at his pleasure among the most docile of his courtiers. He governed in the midst of a group of favourites, who formed the conseil des affaires. The states-general did not meet, and the remonstrances of the parlement were scarcely tolerated. By centralizing the financial administration by the creation of the Tresor de I'Epargne, and by developing the military establish- ments, Francis still further strengthened the royal power. His government had the vices of his foreign policy. It was uncertain, irregular and disorderly. The finances were squandered in gratifying the king's unbridled prodigality, and the treasury was drained by his luxurious habits, by the innumerable gifts and pensions he distributed among his mistresses and courtiers, by his war expenses and by his magnificent buildings. His govern- ment, too, weighed heavily upon the people, and the king was less popular than is sometimes imagined.

Francis owes the greater measure of his glory to the artists and men of letters who vied in celebrating his praises. He was pre-eminently the king of the Renaissance. Of a quick and

cultivated intelligence, he had a sincere love of letters and art He holds a high place in the history of humanism by the founda- tion of the College de France; he did not found an actualicollege, but after much hesitation instituted in 1530, at the instance of Guillaume Bude(Budaeus), Lecteurs royaux, who in spite of the opposition of the Sorbonne were granted full liberty to teach Hebrew, Greek, Latin, mathematics, &c. The humanists Bud6, Jacques Colin and Pierre Duchatel were the king's intimates, and Clement Marot was his favourite poet. Francis sent to Italy for artists and for works of art, but he protected his own countrymen also. Here, too, he showed his customary indecision, wavering between the two schools. At his court he installed Benvehuto Cellini, Francesco Primaticcio and Rosso del Rosso, but in the buildings at Chambord, St Germain, Villers-Cotterets and Fontainebleau the French tradition triumphed over the Italian.

Francis died on the 31st of March 1547, of a disease of the urinary ducts according to some accounts^ of syphilis according to others. By his first wife Claude (d. 1524) he had three sons and four daughters: Louise, who died in infancy; Charlotte, who died at the age of eight; Francis (d. 1536); Henry, who came to the throne as Henry II.; Madeleine, who became queen of Scotland; Charles (d. 1545); and Margaret, duchess of Savoy. In 1 530 he married Eleanor, the sister of the emperor Charles V.

Authorities. — For the official acts of the reign, the Catalogue des actes de Francois I", published by the Academie des Sciences morales et politiques (Paris, 1887-1907), is a valuable guide. The Bibliotheque Nationale,. the National Archives, &c, contain a mass of unpublished documents. Of the published documents, see N. Camuzat, Meslanges historigues . . . (Troyes; 1619); G. Ribier, Lettres et memoires d'estat (Paris, 1666); Letters de Marguerite d'Angouleme, ed. by F. Genin (Paris, 1841 and 1842) ; the Correspond- ence of Castillon and Marillac (ed. by Kaulek, Paris, 1885), of Odet de Selve (ed. by Lefevre-Pontalis, Paris, 1888), and of Guillaume Pellicier (ed. by Tausserat-Radel, Paris, 1900) ; Captivite du rot Francois I", and PoSsies de Francois I' r (both ed. by Champollion- Figeac, Paris, 1847, of doubtful authenticity); Relations des am- bassadeurs venitiens, &c. Of the memoirs and. chronicles, see the journal of Louise of Savoy in S. Guichenoft's Histoire de la maison de Savoie, vol.'iv." (ed. of 1778-1780); Journdl de Jean Barillon, ed. by de Vaissiere (P&ris, 1897-1899) ; Journal d'un bourgeois de Paris, ed. by Lalanne (Paris, 1854); Cronique du ray Francois I", ed. by Guiffrey (Paris, 1868); and the memoirs of Fleuranges, Montluc, Tavannes, Vieilleville, Brantfime and especially Martin du Bellay (coll. Michaud and Poujoulat). Of the innumerable secondary authorities, see especially Paulin Paris, Etudes sur le regnede Francois I" (Paris, 1885), in which the apologetic tendency is excessive; and H. Lemonnier in vol. v. (Paris, 1 903-1904) of E. Lavisse's Histoire de France, which gives a list of the principal secondary authorities. There is a more complete bibliographical study by V. L. Bourrilly in the Revue d'histoire moderne et contemporaine, vol. iv. (1902-1903). The printed sources have been catalogued by H. Hauser, Les Sources de V histoire de France, XVI" siecle, tome ii, (Paris, 1907). (J. I.)

FRANCIS II. (1544-1560), king of France, eldest son of Henry II. and of Catherine de' Medici, was born at Fontainebleau on the 19th of January 1544. He married the famous Mary Stuart, daughter of James V. of Scotland, on the 25th of April 1558, and ascended the French throne on the 10th of July 1559. During his short reign the young king, a sickly youth and of feeble understanding, was the mere tool of his uncles Francis, duke of Guise, and Charles, cardinal of Lorraine, into whose hands he virtually delivered the reins of government. The exclusiveness with which they were favoured, and their high-handed pro- ceedings, awakened the resentment of the princes of the blood, Anthony king of Navarre and Louis prince of Conde, who gave their countenance to a conspiracy (conspiracy of Amboise) with the Protestants against the house of Guise. It was, however, discovered shortly before the time fixed for its execution in March 1560, and an ambush having been prepared, most of the conspirators were either killed or taken prisoners. Its leadership and organization had been entrusted to Godfrey de Barri, lord of la Renaudie (d. 1560); and the

prince of Conde, who was not present, disavowed all connexion with the plot. The duke of Guise was now named lieutenant-general of the kingdom, but his Catholic leanings were somewhat held in check by the

chancellor Michel de l'Hopital, through whose mediation the edict of Romorantin, providing that all cases of heresy should be decided by the bishops, was passed in May 1 560, in opposition to a pro- posal to introduce the Inquisition. At a meeting of the states- general held at Orleans in the December following, the prince of Conde, after being arrested, was condemned to death, and ex- treme measures were being enacted against the "Huguenots; but the deliberations of the Assembly were broken off , and the prince was saved from execution, by the king's somewhat sudden death, on the 5th of the month, from an abscess in the ear.

Principal Authorities. — " Lettres de Catherine de Medicis," edited by Hector de la Ferriere (1880 seq.), and " Negociations . . . relatives au regne de Francois II," edited by Louis Paris (1841), both in the Collection de documents inediis sur I'histoire de France; notice of Francis, duke of Guise, in the Nouvelle Collection des memoires pour servir a I'histoire de France, edited by J. F. Michaud and J. J. F. Poujoulat, series i. vol. vi. (1836 seq.); Memoires de Condi servant d'eclaircissement … a I'histoire de M. de Thou, vols, i and ii. (1743); Pierre de la Place, Commentaires de I'estat de la religion el de la republique sous les rots Henri II, Francois II, Charles IX (1565); and Louis Regriier de la Planche, Histoire de I'estat de France . . . sous . . . Francois II (Panthion litteraire, new edition, 1884). See also Ernest Lavisse, Histoire de France (vol. vi. by J. H. Mariejol, 1904), which contains a bibliography.

*FRANCIS I. (1777*1830), king of the Two Sicilies, was the son of Ferdinand IV. (I.) and Maria Carolina of Austria. He married Clementina, daughter of the emperor Leopold II. of Austria, in 1796, and at her death Isabella, daughter of Charles IV. of Spain. After the Bourbon family fled from Naples to Sicily in 1806, and Lord William Bentinck, the British resident, had established a constitution and deprived Ferdinand IV. of all power, Francis was appointed regent (181 2). On the fall of Napoleon his father returned to Naples and suppressed the Sicilian constitution and autonomy, incorporating his two kingdoms into that of the Two Sicilies (1816); Francis then assumed the revived title of duke of Calabria. While still heir- apparent he professed liberal ideas, and on the outbreak of the revolution of 1820 he accepted the regency apparently in a friendly spirit towards the new constitution. But he was playing a double game and proved to be the accomplice of his father's treachery. On succeeding to the*

throne in 1825 he cast aside the mask of liberalism and showed himself as reactionary as his father. He took little part in the government,' which he left in the hands of favourites and police officials, and lived with his mistresses, surrounded by soldiers, ever in dread of assassination. During his reign the only revolutionary move- ment was the outbreak on the Cilento (1828), savagely repressed by the marquis Delcarretto, an ex-Liberal turned reactionary.

See Nisco, II Reame di Napoli sotto Francesco I (Naples, 1893).

FRANCIS II. (1836-1894), king of the Two Sicilies, son of Ferdinand II. and Maria Cristina of Savoy, was the last of the Bourbon kings of Naples. His education had been much neglected and he proved a man of weak character, greatly influenced by his stepmother Maria Theresa of Austria, by the priests, and by the Camarilla, or reactionary court set. He ascended the throne on the death of his father (22nd of May 1859). < As prime minister he at once appointed Carlo Filangieri, who, realizing the importance of the Franco- Piedmontese victories in Lombardy, advised Francis to accept the alliance with Piedmont proposed by Cavour. On the 7th of June apart of the Swiss Guard mutinied, and while the king mollified them by promising to redress their grievances, General Nunziante collected other troops, who surrounded the mutineers and shot them down. The incident resulted in the disbanding of the whole Swiss Guard, the strongest bulwark of the dynasty. Cavour again proposed an alliance to divide the papal states between Piedmont and Naples, the province of Rome excepted, but Francis rejected an idea which to him savoured of sacrilege. Filangieri strongly advocated a constitution Ss the only measure which might save the dynasty, and on the king's refusal he resigned. Meanwhile the revolutionary parties were conspiring for the overthrow of the Bourbon9 in Calabria and Sicily, and Garibaldi was preparing for a raid in the south. A conspiracy in Sicily was discovered and the plotters punished with brutal

severity, but Rosalino Pilo and Francesco Crispi had organized the movement, and when Garibaldi landed at Marsala (May i860) he conquered the island with astonishing ease. These events at last frightened Francis into granting a constitution, but its promulgation was followed by disorders in Naples and the resignation of ministers, and Liborio Romano became head of the government. The disintegration of the army and navy proceeded apace, and Cavour sent a Piedmontese squadron carrying troops on board to watch events. Garibaldi, who had crossed the straits of Messina, was advancing northwards and was everywhere received by the people as a liberator. Francis, after long hesitations and even an appeal to Garibaldi himself, left Naples (6th of September) with his wife Maria Sophia, the court, the diplomatic corps (the French and English ministers excepted), and went by sea to Gaeta, where a large part of the army was

concentrated. The next day Garibaldi entered Naples, was enthusiastically welcomed, and formed a provisional government. King Victor Emmanuel had decided on the in- vasion of the papal states, and after occupying Romagna and the Marche entered the Neapolitan kingdom. Garibaldi's troops defeated the Neapolitan royalists on the Volturno (1st and and of October), while the Piedmontese captured Capua. Only Gaeta, Messina, and Civitella del Tronto still held out, and the siege of the former by the Piedmontese began on the 6th of November i860. Both Francis and Maria Sophia behaved with great coolness and courage, and even when the French fleet, whose presence had hitherto prevented an attack by sea, was withdrawn, they still resisted; it was not until the 12th of February 186 1 that the fortress capitulated. Thus the kingdom of Naples was incorporated in that of Italy, and the royal pair from that time forth led a wandering life in Austria, France and Bavaria. Francis died on the 27th of December 1894 at Arco in Tirol. His widow survived him.

Francis II. was weak-minded, stupid and vacillating, but, although his short reign was stained with some cruel massacres and persecutions, he was less of a tyrant than his father. The courage and dignity he displayed during his reverses inspired pity and respect. But the fact that he protected brigandage in his former dominions and countenanced the most abominable crimes in the nameof legitimismgreatlydiminishedthesympathy which was felt for the fallen monarch.

Bibliography. — R. de Cesare, La Fine d' un regno, vol. ii. (Citta di Castello, 190O) gives a detailed account of the reign of Francis II., while H. R. Whitehouse's Collapse of the Kingdom of Naples (New York, 1899) may be recommended to English readers; Nisco's Francesco II (Naples, 1887) should also be consulted. See under Naples; Garibaldi; Bixio; Cavour; Italy; Filangieri ; &c.

(L. V.)*

FRANCIS IV. (1779-1846) duke of Modena, was the son of the archduke Ferdinand, Austrian governor of Lombardy, who acquired the duchy of Modena through his wife Marie Beatrice, heiress of the house of Este as well as of many fiefs of the Mala- spina, Pio da Carpi, Pico della Mirandola, Cib6, and other families. At the time of the French invasion (1796) Francis was sent to Vienna to be educated, and in 1809 was appointed governor of Galicia. Later he went to Sardinia, where the exiled King Victor Emmanuel I. and his wife Maria Theresa were living in retirement. The latter arranged a marriage between her daughter Marie Beatrice and Francis, and a secret family compact was made whereby if the king and his two brothers died without male issue, the Salic law would be changed so that Francis should succeed to the kingdom instead of

Charles Albert of Carignano (N. Bianchi, Storia della diplomazia europea in Italia, i. 42-43). On the fall of Napoleon in 18 14 Francis received the duchy of Modena, including Massa-Carrara and Lunigiana; his mother's advice was " to be above the law . . . never to forgive the Republicans of 1796, norto listen to the complaints of his subjects, whom nothing satisfies; the poorer they are the quieter they »Te " (Silingardi, " Ciro Menotti," in Rivista europea, Florence,

1880).

The duke was well received at Modena; inordinately ambitious, strong-willed, immensely rich, avaricious but not unintelligent, he soon proved one of the most reactionary despots in Italy.

FRANCIS V. OF MODENAˆFRANCIS OF ASSIST

937.

He still hoped to acquire either Piedmont or some other part of northern Italy, and he was in touch with the Sanfedisti and the Concistoro, reactionary Catholic associations opposed, to the Carbonari, but not always friendly to Austria. Against the Carbonari and other Liberals he issued the severest edicts, and although there was no revolt at Modena in 1821 as in Piedmont and Naples, he immediately instituted judicial proceedings against the supposed conspirators. Some 350 persons were arrested and tortured, 56 being condemned to death (only a few of them were executed) and 237 to imprisonment; a large number, however, escaped, including Antonio Panizzi (afterwards director of the British Museum). The ferocious police official Besini who conducted the trials was afterwards murdered. The duke actually proposed to Prince Metternich, the Austrian chancellor, an agreement whereby the various Italian rulers were to arrest every Liberal in the country on a certain day, but the project fell through owing to opposition from the courts of Florence and Rome. At the congress of Verona Metternich made another attempt to secure the Piedmontese succession for Francis, but without success. The duke became ever more despotic; Modena swarmed with spies and informers, education was hampered, feudalism strengthened; for the duke hoped to consolidate his power by means of the nobility, and the least expression of liberalism, or even failure to denounce a Carbonaro, involved arrest and imprisonment. But strange to say, in 1830 we find Francis actually coquetting with revolution. Having lost all hope of acquiring the Piedmontese throne, he entered into negotiations with the French Orleanist party with a view to obtaining its support in his plans for extending his dominions' He was thus brought into touch with Ciro Menotti (1 798-1831) and the Modenese Liberals; what the nature of the connexion

was is still obscure, but it was certainly short-lived and merely served to betray the Carbonari. As soon as Francis learned that a conspiracy was on foot to gain possession of the town, he had Menotti and several other conspirators arrested on the night of the 3rd of February 1831, and sent the famous message to the governor of Reggio: " The conspirators are in my hands; send me the hangman " (there is some dombt as to the authenticity of the actual words). But the revolt broke out in other parts of the duchy and in Rornagna, and Francis retired to Mantua with Menotti. A provisional government was formed at Modena which proclaimed that " Italy is one," but the duke returned a few weeks later with Austrian troops, and resistance was easily quelled. Then the political trials began; Menotti and two others were executed, and hundreds condemned to imprisonment. The population was now officially divided into four classes, viz. " very loyal, loyal, less loyal, and disloyal," and the reaction became worse than ever, the duke interfering in the minutest details of administration, such as hospitals, schools, and roads. New methods of procedure were introduced to deal with political trials, but the ministerial cabal by which the country was administered intrigued and squabbled to such an extent that it had to be dismissed.

On the 20th of February 1846 Francis died. Although he had many domestic virtues and charming manners, was charitable in times of famine, and was certainly the ablest of the Italian despots, Liberalism was in his eyes the most heinous of crimes, and his reign is one long record of barbarous persecution. (L. V.)*

FRANCIS V. (1819-1S75), duke of Modena, son of Francis IV., succeeded his father in 1846. Although less cruel and also less intelligent than his father, he had an equally high opinion of his own authority. His reign began with disturbances at Fiviz- zano and Pontremoli, which Tuscany surrendered to him accord- ing to treaty but against the wishes of the inhabitants (1847), and at Massa and Carrara, where the troops shot down the people. Feeling his position insecure, the duke asked for and obtained an Austrian garrison, but on the outbreak of revolution throughout Italy and at Vienna in 1848, further disorders occurred in the duchy, and on the 20th of March he fled with his family to Mantua. A provisional government was formed, and volunteers were raised who fought with the Piedmontese against Austria. But after the Piedmontese defeat Francis returned to

Modena, with Austrian assistance, in August and conferred many appointments on Austrian officers. Like his father, he interfered in the minutest details of administrationj and instituted proceed- ings against all who were suspected of Liberalism, Not content with the severity of his judges, he overrode their sentences in favour of harsher. punishments. The

disturbances at Carrara were ruthlessly suppressed, and the prisons filled with politicals. In 1859 numbers of young Modenese fled across the frontier to join the Piedmontese army, as war with Austria seemed imminent; and after the Austrian defeat at Magenta the duke left Modena to lead his army in person against the Piedmontese, taking with him the contents of the state treasury and many valuable books, pictures, coins, tapestries and furniture from the palace. The events of 1859-1860 made his return impossible; and after a short spell of provisional government the duchy was united to Italy. He retired to Austria, and died at Munich in November 1875.

*Bibliography.— N. Bianchi, I Ducati Estensi (Turin, 1852); Galvani, Metnorie di S.A.R. Francesco IV (Modena, 1847); Docu- ment riguardanti il governo degli Austro-Estensi in Modetta (Modena, i860) ; C. Tivaroni, U Italia durante il dominio austriaco, i. 606*653 (Turin, 1892), arid L'ltalia degli Italiani, i. 114-125 (Turin, 1895); Silingardi, " Ciro Menotti," in the Rwista europea (Florence, 1880) ; F. A. Gualterio, Gli ultimi rivolgimenti italiani (Florence, 1850); Bayard de Volo, Vila di Francesco V (4 vols., Modena, 1878-1885).*

(L. V.)*

FRANCIS OF ASSISI, ST. (1181 or 1182-1226), founder of the Franciscans (q.v.), was born in 1181 or 1 182 at Assisi, one of the independent municipal towns of Umbria. He came from the upper middle class, his father, namedPietro Bernardone, being one of the larger merchants of the city. Bernardone's commercial enterprises made him travel abroad, and it was from the fact that the father was in France at the time of his son's birth that the latter was called Francesco. His education appears to have been of the slightest, even for those days. It is difficult to decide whether words of the early biographers imply that his youth was not free from irregularities; in any case, he was the recognized leader of the young men of the town in their revels; he was, however, always conspicuous for his charity to the poor. When he was twenty (1201) the neighbour- ing and rival city of Perugia attempted to restore by force of arms the nobles who had been expelled from Assisi by the burghers and the populace, and Francis took part in the battle fought in the plain that lies between the two cities; the men of Assisi were defeated and Francis was among the prisoners. He spent a year in prison at Perugia, and when peace was made at the end of 1202 he returned to Assisi and recommenced his old life.

Soon a serious and prolonged illness fell upon him, during which he entered into himself and became dissatisfied with his way of life. On his recovery he set out on a military expedition, but at the end of the first day's march

he fell ill, and had to stay at Spoleto and return to Assisi. This disappointment brought on again the spiritual crisis he had experienced in his illness, and for a considerable time the conflict went on within him. One day he gave a banquet to his friends, and after it they sallied forth with torches, singing through the streets, Francis being crowned with garlands as the king of the revellers; after a time they missed him, and on retracing their steps they found him in a trance or reverie, a permanently altered man. He devoted himself to solitude, prayer and the service of the poor, and before long went on a pilgrimage to Rome. Finding the usual crowd of beggars before St Peter's, he exchanged his clothes with one of them, and experienced an overpowering joy in spending the day begging among the rest. The determining episode of his life followed soon after his return to Assisi; as he was riding he met a leper who begged an alms; Francis had always had a special horror of lepers, and turning his face he rode on; but immediately an heroic act of self-conquest was wrought in him; returning he alighted, gave the leper all the money he had about him, and kissed his hand. From that day he gave himself up to the service of the lepers and the hospitals. To the confusion of his father and brothers he went about dressed in rags, so that his old companions pelted him with mud.

Things soon came to a climax with his father: in consequence of his profuse alms to the poor and to the restoration of the ruined church of St Damian, his father feared his property would be dissipated, so he took Francis before the bishop of Assisi to have him legally disinherited; but without waiting for the documents to be drawn up, Francis cast off his clothes and gave them back to his father, declaring that now he had better reason to say " Our Father which art in heaven," and having received a cloak from the bishop, he went off into the woods of Mount Subasio singing a French song; some brigands accosted him and he told them he was the herald of the great king (1206).

The next three years he spent in the neighbourhood of Assisi in abject poverty and want, ministering to the lepers and the outcasts of society. It was now that he began to frequent the ruined little chapel of St Mary of the Angels, known as the Portiuncula, where much of his time was passed in prayer. One day while Mass was being said therein, the words of the Gospel came to Francis as a call: " Everywhere on your road preach and say — The kingdom of God is at hand. Cure the sick, raise the dead, cleanse the lepers, drive out devils. Freely have you received, freply give. Carry neither gold nor silver nor money in your girdles, nor bag, nor two coats, nor sandals, nor staff, for the workman is worthy of his hire "

(Matt. x. 7-10). He at once felt that this was his vocation, and. the next day, layman as he was, he went up to Assisi and began to preach to the poor (1209). Disciples joined him, and when they were twelve in number Francis said: "Let us go to our Mother, the holy Roman Church, and tell the pope what the Lord has begun to do through us, and carry it out with his sanction." They obtained the sanction of Innocent III., and returning to Assisi they gave themselves up to their life of apostolic preaching and work among the poor.

The character and development of the order are traced in the article Franciscans; here the story of Francis's own life and the portrayal of his personality will be attempted. To delineate in a few words the character of the Poverello of Assisi is indeed a difficult task. There is such a many-sided richness, such a tenderness, such a poetry, such an originality, such a distinction revealed by the innumerable anecdotes in the memoirs of his disciples, that his personality is brought home to us as one of the most lovable and one of the strongest of men. It is probably true to say that no one has ever set himself so seriously to imitate the life of Christ and to carry out so literally Christ's work in Christ's own way. This was the secret of his love of poverty as manifested in the following beautiful prayer which he addressed to our Lord: " Poverty was in the crib and like a faithful squire she kept herself armed in the great combat Thou didst wage for our redemption. During Thy passion she alone did not forsake Thee. Mary Thy Mother stopped at the foot of the Cross, but poverty mounted it with Thee and clasped Thee in her embrace unto the end; and when Thou wast dying of thirst, as a watchful spouse she prepared for Thee the gall. Thou didst expire in the ardour of her embraces, nor did she leave Thee when dead, O Lord Jesus, for she allowed not Thy body to rest elsewhere than in a borrowed grave. O poorest Jesus, the grace I beg of Thee is to bestow on me the treasure of the highest poverty. Grant that the distinctive mark of our Order may be never to possess anything as its own under the sun for the glory of Thy name, and to have no other patrimony than begging " (in the Legenda 3 Soc.) . This enthusiastic love of poverty is certainly the keynote of St Francis's spirit; and so one of his disdples in an allegorical poem (translated into English as The Lady of Poverty by Montgomery Carmichael, 1901), and Giotto in one of the frescoes at Assisi, celebrated the " holy nuptials of Francis with Lady Poverty."

Another striking feature of Francis's character was his constant joyousness; it was a precept in his rule, and one that he enforced strictly, that his friars should be always rejoicing in the Lord. He retained through life his early love of song, and during his last illness he passed much of his time in singing. His love of nature, animate and inanimate, was very keen and manifested itself in ways that appear somewhat naive. His preaching to

the birds is a favourite representation of St Francis in art. All creatures he called his " brothers " or " sisters " — the chief example is the poem of the " Praises of the Creatures," wherein " brother Sun," " sister Moon," " brother Wind," and " sister Water " are called on to praise God. In his last illness he was cauterized, and on seeing the burning iron he addressed " brother Fire," reminding him how he had always loved him and asking him to deal kindly with him. It would be an anachronism to think of Francis as a philanthropist or a " social worker " or a revivalist preacher, though he fulfilled the best functions of all these. Before everything he was an ascetic and a mystic — an ascetic who, though gentle to others, wore out his body by self-denial, so much so that when he came to die he begged pardon of ■" brother Ass the body " for having unduly ill treated it: a mystic irradiated with the love of God, endowed in an extra- ordinary degree with the spirit of prayer, and pouring forth his heart by the hour in the tenderest affections to God and our Lord. St Francis was a deacon but not a priest.

From the return of Francis and his eleven companions from Rome to Assisi in 1 269 or 1 2 10, theirwork prospered ina wonderful manner. The effect of their preaching, and their example and : their work among the poor, made itself felt throughout Umbria and brought about a great religious revival. Great numbers came to join the new order which responded so admirably to the needs of the time. In 1212 Francis invested St Clara (q.v.) with the Franciscan habit, and so instituted the " Second Order," that of the nuns. As the friars became more and more numerous their missionary labours extended wider and wider, spreading first over Italy, and then to other countries. Francis himself set outy probably in 1212, for the Holy Land to preach the Gospel to the Saracens, but he was shipwrecked and had to return. A year or two later he went into Spain to preach to the Moors, but had again to return without accomplishing his object (1215 probably). After another period of preaching in Italy and watching over the development of the order, Francis once again set out for the East (12 19). This time he was successful; he made his way to Egypt, where the crusaders were besieging Damietta, got himself taken prisoner and was led before the sultan, to whom he openly preached the Gospel. The sultan sent him back to the Christian camp, and he passed on to the Holy Land. Here he remained until September 1220. During his absence were manifested the beginnings of the troubles in the order that were to attain to such magnitude after his death. The circumstances under which, at an extraordinary general chapter convoked by him shortly after his return, he resigned the office of minister- general (September 1220) are explained in the article Francis- cans : here, as illustrating the spirit of the man, it is in place to cite the words in which his abdication was couched: "Lord, I give Thee back this family which Thou didst entrust to me. Thou knowest, most sweet Jesus, that I have no more the power and the qualities to continue to

take care of it. I entrust it, therefore, to the ministers. Let them be responsible before Thee at the Day of Judgment, if any brother by their negligence,. or their bad example, or by a tooseverepunishment,shallgo astray." These words seem to contain the mere truth: Francis's peculiar religious genius was probably not adapted for the government of an enormous society spread over the world, as the Friars Minor had now become.

The chief works of the next years were the revision and final redaction of the Rule and the formation or organization of the " Third Order " or " Brothers and Sisters of Penance," a vast confraternity of lay men and women who tried to carry out, without withdrawing from the world, the fundamental principles of Franciscan life (see Tertiaries) .

If for no other reason than the prominent place they hold in art, it would not be right to pass by the Stigmata without a special mention. The story is well known; two years before his death Francis went up Mount Alverno in the Apennines with some of his disciples, and after forty days of fasting and prayer and contemplation, on the morning of the 14th of September 1224 '(to use Sabatier's words), "he had a vision: in the warm rays of the rising sun he discerned suddenly a strange

figure. A seraph with wings extended flew towards him from the horizon and inundated him with pleasure unutterable. At the centre of the vision appeared a cross, and the seraph was nailed to it. When the vision disappeared Francis felt sharp pains mingling with the delights of the first moment. Disturbed to the centre of his being he anxiously sought the meaning of it all, and then he saw on his body the Stigmata of the Crucified." The early authorities represent the Stigmata not as bleeding wounds, the holes as it were of the nails, but as fleshy excrescences resembling in form and colour the nails, the head on the palm of the hand, and on the back as it were a nail hammered down. In the first edition of the Vie, Sabatier rejected the Stigmata; but he changed his mind, and in the later editions he accepts their objective reality as an historically established fact; in an appendix he collects the evidence: there exists what is according to all probability an autograph of Br. Leo, the saint's favourite disciple and companion on Mount Alverno at the time, which describes the circumstances of the stigmatization; Elias of Cortona (q.v.), the acting superior, wrote on the day after his death a circular letter wherein he uses language clearly implying that he had himself seen the Stigmata, and there is a considerable amount of contemporary authentic second hand evidence.

On the strength of this body of evidence Sabatier rejects all theories of fraud or hallucination, whatever may be the explanation of the phenomena.

Francis was so exhausted by the sojourn on Mount Alverno that he had to be carried back to Assisi. The remaining months of his life were passed in great bodily weakness and suffering, and he became almost blind. However, he worked on with his wonted cheerfulness and joyousness. At last, on the 3rd of October 1226, he died in the Portiuncula at the age of forty-five. Two years later he was canonized by Gregory IX., whom, as Cardinal Hugolino of Ostia, he had chosen to be the protector of his order.

The works of St Francis consist of the Rule (in two redactions), the Testament, spiritual admonitions, canticles and a few letters. They were first edited by Wadding in 1623. Two critical editions were published in 1904, one by the Franciscans of Quaracchi near Florence, the other (in a longer and a shorter form) by Professor H. Boehmer of Bonn. Sabatier and Goetz (see below) have investigated the authenticity of the several works; and the four lists, while exhibiting slight variations, are in substantial accord. Besides the works, properly so called, there is a considerable amount of traditional matter — anecdotes, sayings, sermons— preserved in the biographies and in the Fioretli; 1 a great deal of this matter is no doubt substantially authentic, but it is not possible to subject it to any critical sifting.

Note on Sources.— The sources for the life of St Francis and early Franciscan history are very numerous, and an immense literature has grown up around them. Any attempt to indicate even a selec- tion of this literature would here be impossible and also futile; for the discovery of new documents has by no means ceased, and the criticism of the materials is still in full progress, nor can it be said that final results have yet emerged from the discussion. Students will find the chief materials in the following collections: Archiv fiir Litteratur und Kirchengeschichte des Mittelalters (ed. by Ehrle and Denifle, 1885, &c); publications of the Franciscans of Quaracchi (list to be obtained from Herder, Freiburg im Breisgau) ; and the two series edited by Paul Sabatier, Collection aVttud.es et de documents sur I'histoire religieuse et litleraire du moyen age (5 vols, published up to 1906) and Opuscules de critique historique (12 fascicules) : the easiest and most consecutive way of following the controversy is by the aid of the " Bulletin Hagiographique " in Analecta Bollan- diana. Relatively popular accounts of the most important sources are supplied in the introductory chapters of Sabatier's Vieˆ de S. Francois and Speculum perfeclionis, and Lempp's Frere Elie de Cortone.

Concerning the life of St Francis and the beginnings of the order, the chief

documents that come under discussion are : the two Lives by Thomas of Celano (1228 and 1248 respectively; Eng. trans. with introduction by A. G. Ferrers Howell, 1908), of which the only critical edition is that of Friar Ed. d'Alencon (1906) ; the so-called Legenda trium sociorum; the Speculum perfectionis, discovered by Paul Sabatier and edited in 1898 (Eng. trans, by Sebastian Evans,

1 The Little Flowers of St Francis.

Mirror of Perfection, 1899). Sabatier's theory as to the nature of these documents was, in brief, that the Speculum perfectionis was the first of all the Lives of the saint, written in 1227 by Br. Leo, his favourite and most intimate disciple, and that the Legenda 3 Soc. is what it claims to be — the handiwork of Leo and the two other most intimate companions of Francis, compiled in 1246; these are the most authentic and the only true accounts, Thomas of Celano's Lives being written precisely in opposition to them, in the interests of the majority of the order that favoured mitigations of the Rule especially in regard to poverty. For ten years the domain of Franciscan origins was explored and discussed by a number of scholars; and then the whole ground was reviewed by Professor W. Goetz of Munich in a study entitled Die Quellen zur Ceschichte des hi. Franz von Assisi (1904). His conclusions are substantially the same as those of Pere van Ortroy , the Bollandist , and Friar Lemmens, an Observant Franciscan, and are the direct contrary of Sabatier's : the Legenda 3 Soc. is a forgery ; the Speculum perfectionis is a com- pilation made in the 14th century, also in large measure a forgery, but containing an element (not to be precisely determined) derived from Br. Leo; on the other hand, Thomas of Celano's two Lives are free from the " tendencies " ascribed to them by Sabatier, and that of 1248 was written with the collaboration of Leo and the other companions; thus the best sources of information are those portions of the Speculum that can with certainty be carried back to Br. Leo, and the Lives by Thomas of Celano, especially the second Life. Goetz's criticism of the documents is characterized by exceeding carefulness and sobriety. Of course he does not suppose that his conclusions are in all respects final; but his investigations show that the time has not yet come when a biography of St Francis could be produced answering to the demands of modern historical criticism. The official life of St Francis is St Bonaventura's Legenda, published in a convenient form by the Franciscans of Quaracchi (1898) ; Goetz's estimate of it (op. cit.) is much more favourable than Sabatier's.

Paul Sabatier's fascinating and in many ways sympathetic Vie de S. Francois (1894; 33rd ed., 1906; Eng. trans, by L. S. Houghton, 1 901) will probably for a long time to come be accepted by the ordinary reader as a substantially correct portrait of St Francis; and yet Goetz declares that

the most competent and independent critics have without any exception pronounced that Sabatier has depicted St Francis a great deal too much from the standpoint of modern religiosity, and has exaggerated his attitude in face of the church {op. cit. p. 5). In articles in the Hist. Vierteljahrsschrift (1902, 1903) Goetz has shown that Sabatier's presentation of. St Francis's relations with the ecclesiastical authority in general, and with Cardinal Hugolino (Gregory IX.) in particular, is largely based on misconception; that the development of the order was not forced on Francis against his will; and that the differences in the order did not during Francis's lifetime attain to such a magnitude as to cause him during his last years the suffering depicted by Sabatier. This from a Protestant historian like Goetz is most valuable criticism. In truth Sabatier's St Francis is an anachronism — a man at heart, a modern pietistic French Protestant of the most liberal type, with a veneer of 13th century Catholicism.

Of lives of St Francis in English may be mentioned those by Mrs Oliphant (2nd ed., 1871) and by Canon Knox Little (1897). For general information and references to the literature of the subject, see Otto Zockler, Askese und Monchtum (1897), ii. 470-493, and his article in Herzog's Realencyklopddie (ed. 3), " Franz von Assisi " (1899); also Max Heimbucher, Orden und Kongregationen (1896), i. § 38. The chapter on St Francis ˆn Emile Gebhart's Italie mystique (ed. 3, 1899) is very remarkable; indeed, though this writer is as little ecclesiastically-minded as Sabatier himself, his general picture of the state of religion in Italy at the time is far truer; here also Sabatier has given way to the usual temptation of biographers to exalt their hero by depreciating everybody else. (E. C. B.)

FRANCIS OF MAYRONE [Francisctjs de Mayronis] (d. 1325), scholastic philosopher, was born at Mayrone in Provence. He entered the Franciscan order and subsequently went to Paris, where he was a pupil of Duns Scotus. At the Sorbonne he acquired a great reputation for ability in discussion, and was known as the Doctor Illuminatus and M agister Acutus. He became a professor of philosophy, and took part in the discussions on the nature of Universals. Following Duns Scotus, he adopted the Platonic theory of ideas, and denied that Aristotle had made any contribution to metaphysical speculation. It is a curious commentary on the theories of Duns Scotus that one pupil, Francis, should have taken this course, while another pupil, Occam, should have used his arguments in a diametrically opposite direction and ended in extreme Nominalism.

His works Were collected and published at Venice in 1 520 under the title Praeclarissima ac multum subtilia scripta Illuminati Doctoris Franciscide Mayronis, &c.

FRANCIS OF PAOLA (or Paula), ST, founder of the Minims, a religious

order in the Catholic Church, was born of humble

parentage at Paola in Calabria in 141 6, or according to the fiollandists 1438. As a boy he entered a Franciscan friary, but left it and went to live as a hermit in a cave on the seashore near Paola. Soon disciples joined him, and with the bishop's approval he built a church and monastery. At first they called themselves " Hermits of St Francis "; but the object they proposed to themselves was to go beyond even the strict Francis- cans in fasts and bodily austerities of all kinds, in poverty and in humility; and therefore, as the Franciscans were the Minors (minores, less), the new order took the name of Minims (minimi, least). By 1474 a number of houses had been established in southern Italy and Sicily, and the order was recognized and approved by the pope. In 1482 Louis XI. of France, being on his deathbed and hearing the reports of the holiness of Francis, sent to ask him to come and attend him, and at the pope's command he travelled to Paris. On this occasion Philip de Comines in his Memoirs says: " I never saw any man living so holily, nor out of whose mouth the Holy Ghost did more mani- festly speak." He remained with Louis till his death, and Louis' successor, Charles VIII., held him in such high esteem that he kept him in Paris, and enabled him to found various houses of his order in France; in Spain and Germany, too, houses were founded during Francis's lifetime. He never left France, and died in 1507 in the monastery of his order at Plessis-les-Tours.

The Rule was so strict that the popes long hesitated to confirm it in its entirety; not until 1506 was it finally sanctioned. The most special feature is an additional vow to keep a perpetual Lent of the strictest kind, not only flesh meat but fish and all animal products — eggs, milk, butter, cheese, dripping — being forbidden, so that the diet was confined to bread, vegetables, fruit and oil, and water was the only drink. Thus in matter of diet the Minims surpassed in austerity all orders in the West, and probably all permanently organized orders in the East. The strongly ascetical spirit of the Minims manifested itself in the title borne by the superiors of the houses — not abbot (father), or prior, or guardian, or minister, or rector, but corrector; and the general superior is the corrector general. Notwithstanding its extreme severity the order prospered. At the death of the founder it had five provinces — Italy, France, Tours, Germany, Spain. Later there were as many as 450 monasteries, and some missions in India. There never was a Minim house in England or Ireland. It ranks as one of the Mendicant orders. In 1909 there were some twenty monasteries, mostly in Sicily, but one in Rome (S. Andrea delle Fratte), and one in Naples, in

Marseilles and in Cracow. There have been Minim nuns (only one convent has survived, till recently at Marseilles) and Minim Tertiaries, in imitation of the Franciscan Tertiaries. The habit of the Minims is black.

See Helyot, Hist, des ordres religieux (17 14), vii. c. 56; Max Heimbucher, Orden und Kongregationen (1896), i. §52; the article " Franz von Paula " in Wetzer und Welte, Kirchenlexicon (ed. 2), and in Herzog, Realencyklopadie (ed. 3); Catholic Dictionary, art. " Minims." (E. C. B.)

FRANCIS (Francois) OF SALES, ST (1567-1622), bishop of Geneva and doctor of the Church (1877), was born at the castle of Sales, near Annecy, Savoy. His father, also Francois, comte de Sales, but better known as M. de Boisy, a nobleman and soldier, had been employed in various affairs of state, but in 1560, at the age of thirty-eight, settled down on his ancestral estates and married Francoise de Sionnay, a Savoyard like himself, and an heiress. St Francis, the first child of this union, was born in August 1567 when his mother was in her fifteenth year. M. de Boisy was renowned for his experience and sound judgment, and both parents were distinguished by piety, love of peace, charity to the poor, qualities which early showed themselves in their eldest son.

He received his education first at La Roche, in the Arve valley, then at the college of Annecy, founded by Eustace Chappius, ambassador in England of Charles V., in 1549. At the age of thirteen or fourteen he went to the Jesuit College of Clermont at Paris, where he stayed till the summer of 1588, and where he

laid the foundations of his profound knowledge, while perfecting himself in the exercises of a young nobleman and practising a life of exemplary virtue. At this time also he developed an ardent love of France, a country which was politically in antagon- ism with his own, though so closely linked to it geographically, socially and by language. At the end of 1588 he went to Padua, to take his degree in canon and civil law, a necessary prelude in Savoy at that time to distinction in a civil Career. His heart, however, especially from the date of his receiving the tonsure (1578), was already turned towards the Church, and he gave his attention even more to theology, under the great masters Antonio Possevino, S.J., and Gesualdo, afterwards general df the Friars Minor, than to his legal course. " At Padua," he said to a friend, " I studied law to please my father, and theology to please myself." In that licentious university Francis found the greatest difficulty in resisting attacks on his virtue, and once at least had to draw his sword to defend his personal safety against a band of ruffians. The gentleness for which he was already renowned was not that of a weak, but of a strong character. He returned to Savoy in 1592, andj while seeking the occasion to overcome his father's resistance to his resolution of

embracing the ecclesiastical profession, took the diploma of advocate to the senate. Meantime, without his knowledge, his friends procured for him the post of provost of the chapter of Geneva, an honour which reconciled M. de Boisy to the sacrifice of more ambitious hopes. After a year of zealous work as preacher fend director he was sent by the bishop, Claude de Granier, to try and win back the province of Chablais, which had embraced Calvinism when usurped by Bern in 1535, and had retained it even after its restitution to Savoy in 1564. At first the people refused to listen to him, for he was represented to them as an instrument of Satan, and all who bad dealings with him were threatened with the vengeance of the consistory. He therefore wrote out his message on sheets which were passed from hand to hand, and these, with the spectacle of his virtues and disinterested- ness, soon produced a strong effect. The sheets just spoken of still exist in the Chigi library at Rome, and were published, though with many alterations, in 1672, under the title of Les Controverses. This must be considered the first work of St Francis.

The re-erection of a wayside cross in Annemasse, at the gates of Geneva, amid an enormous concourse of converts, an event which closed the three years of his apostolate, led to the com- position of the DSfense . . . de la Croix, published in 1600. An illness brought on by toil and privation forced him to leave his work to others for nearly a year, but in August 1598 he re- turned to his field of labour, and in October of that year practi- cally the whole country was Catholic again. Up to that time preaching and conference had been the only weapons employed. The stories of the use of soldiers to produce simulated con- versions are incorrect. 1 Possibly the lamentable events of the campaigns of 1585 in Gex and Chablais have been applied to the

1 This, at least, is the account given by Catholic authorities. Less favourable is the view taken by non-Catholic historians, which seems in some measure to be confirmed by St Francis himself. According to this, Duke Charles Emmanuel or Savoy, who succeeded his more tolerant father in 1580, was determined to reduce the Chablais to the Catholic religion, by peaceful means if possible, by force if necessary. After two years of preaching Francis wrote to the duke {(Euiires compl. ii. p. 551) : " During 27 months I have scattered the seed of the Word of God in this miserable land ; shall I say among thorns or on stony ground? Certainly, save for thfe conversion of the seigneur d'Avully and the advocate Poncet, I have little to boast of." In the winter of 1596-1597 Francis was at Turin, and at his suggestion the duke decided on a regular plan for the coercion of the refractory Protestants. This plan anticipated that employed later by Louis XIV. against the Huguenots in France. The Calvinist ministers were expelled; Protestant books were confiscated and destroyed; the acts of Protestant lawyers and officials were declared invalid. The country was

flooded with Jesuits and friars, whose arguments were reinforced by quartering troops, veterans of the Indian wars in Mexico, on the refractory inhabitants. Those whose stubborn persistence in error survived all these inducements to repent were sent into exile. Seethe article " Franz von Sales " by J. Ehni in Herzog-Hauck, Realencyklopadit (3rd ed., Leipzig, 1899). (W A. P.)

period 1594-1598. In October of this last year, however, the duke of Savoy, who came then to assist in person at the great religious feasts which celebrated the return of the country to unity of faith, expatriated such of the leading men as obstinately refused even to listen to the Catholic arguments. He also forbade Calvinist ministers to reside in the Chablais, and substituted Catholic for Huguenot officials. St Francis concurred in these measures, and, three years later, even requested that those who, as he said, " follow their heresy, rather as a party than a religion," should be ordered either to conform or to leave their country, with leave to sell their goods. His conduct, judged not by a modern standard, but by the ideas of his age, will be found compatible with the highest Christian charity, as that of the duke with sound political prudence. At this time he was nominated to the pope as coadjutor of Geneva, 1 and after a visit to Rome he assisted Bishop de Granier in the administration of the newly converted countries and of the diocese at large.

In 1602 he made his second visit to the French capital, when his transcendent qualities brought him into the closest relations with the court of Henry IV., and made him the spiritual father of that circle of select souls who centred round Madame Acarie. Among the celebrated personages who became his life friends from this time were Pierre de Berulle, fovnder of the French Oratorians, Guillaume Duval, the scholar, and the due de Bellegarde, the latter a special favourite of the king, who begged to be allowed to share the Saint's friendship. At this time also his gift as a preacher became fully recognized, and de Sanzea, afterwards bishop of Bethlehem, records that Duval exhorted all his students of the Sorbonne to listen to him and to imitate this, " the true and excellent method of preaching." His principles are expressed in the admirable letter to Andre Fremyot of October 1604.

De Granier died in September 1602, and the new bishop entered on the administration of his vast diocese, which, as a contemporary says, " he found brick and left marble." His first efforts were directed to securing a virtuous and well- instructed clergy, with its consequence of a people

worthy of their pastors. All his time was spent in preaching, confessing, visiting the sick, relieving the poor. His zeal was not confined to his diocese. In concert with Jeanne Francoise Fremyot (1572-1641), widow of the baron de Chantal, whose acquaintance he made while preaching through Lent at Dijon in 1604, he founded the order of the Visitation, in favour of " strong souls with weak bodies," as he said, deterred from entering the orders already existing, by their inability to undertake severe corporal austerities. The institution rapidly spread, counting twenty houses before his death and eighty before that of St Jeanne. The care of his diocese and of his new foundation were not enough for his ardent charity, and in 1609 he published his fiimous Introduction to a Devout Life, a work which was at once translated into the chief European languages and of which he himself published five editions. In 1616 appeared his Treatise on the Love of God, which teaches that perfection of the spiritual life to which the former work is meant to be the " Introduction." The important Lents of 1617 and 1618 at Grenoble were a prelude to a still more important apostolate in Paris, " the theatre oi the world," as St Vincent de Paul calls it. This third visit to the great city lasted from the autumn of 1618 to that of 1619; the direct object of it was to assist in negotiating the marriage of the prince of Piedmont with Chretienne of France, but nearly all his time was spent in preaching and works of mercy, spiritual or corporal. He was regarded as a living saint. St Vincent scarcely left him, and has given the most extraordinary testi- monies (as yet unpublished) of his heroic virtues. Mere Angelique Arnaud, who at this time put herself under his direction and wished to join the Order of the Visitation, attracted by its humility and sweetness, may be named as the most interesting of his innumerable penitents of this period. He returned to Savoy, and after three years more of unwearying labour died at Lyons on the 28th of December 1622. A universal outburst of venera- tion followed; indeed his cult had already begun, and after 1 With the title of NicopoKs in partibus.~&D.

an episcopal inquiry the pontifical commission in view of his beatification was instituted by decree of the 21st of July 1626, a celerity unique in the annals of the Congregation of Rites. The depositions of witnesses were returned to Rome in 1632, but meantime the forms of the Roman chancery had been changed by Urban VIII., and the advocates could not at once continue their work. Eventually a new commission was issued in 1656, and on its report, into which were inserted nineteen of the former depositions, the " servant of God " was beatified in 1661. The canonization took place in 1665.

Besides the works which we have named, there were published posthumously his Entreliens, i.e. a selection of the lectures given to the Visitation, reported by the sisters who heard them, some of his sermons, a large number of his letters, various short treatises of devotion. The first

edition of his united or so-called " Complete " works was published at Toulouse in 1637. Others followed in 1641, 1647, 1652, 1663, 1669, 1685. The Lettres and Opuscules were re- published in 1768.

The only modern editions of the complete works which it is worth while to name are those of Blaise (1821), Vires (1856-1858), Migne (1861), and the critical edition published by the Visitation of Annecy, of which the 14th volume appeared in 1905.

The biography of St Francis de Sales was written immediately after his death by the celebrated P. de La Riviere and Dom John de St Francois (Goulu), as Well as by two other authors of less import- ance. The saint's nephew and successor, Charles Auguste de Sales, brought out a more extended life, Latin and French, in 1635. The lives of Giarda (1650), Maupas du Tour (1657) and Cotolendi (1687) add little to Charles Auguste. Marsollier's longer life, in two volumes (1 700) , is quite untrustworthy ; still more so that by Loyau d'Amboise (1833), which is rather a romance than a biography. The lives by Hamon (1856) and Perennes (i860), without adding much to preced- ing biographies, are serious and edifying. A complete life, founded on the lately discovered process of 1626 and the new letters, was being prepared by the author of the present article at the time of his death. With the Lives must be mentioned the Esprit du B. F. de Sales by Camus, bishop of Belley, who, amid innumerable errors, gives various interesting traits and sayings of his saintly friend. Among the very numerous modern studies may be named an essay by Leigh Hunt entitled " The Gentleman Saint " {The Seer, pt. ii. No. 41); a remarkable causerie by Sainte-Beuve (Lundis, 3rd Jan. 1853); Le Reveil du sentiment religieux en France au XVII' siecle, by Strowski (Paris, 1898) ; Four Essays on S. F. de S. and Three Essays on S. F. de S. as Preacher, by Canon H. B. Mackey. (H.B. M.)

FRANCIS, SIR PHILIP (1740-1818), English politician and pamphleteer, the supposed author of the Letters of Junius, and the chief antagonist of Warren Hastings, was born in Dublin on the 22nd of October 1740. He was the only son of Dr Philip Francis (c. 1708-1773), a man of some literary celebrity in his time, known by his translations of Horace, Aeschines and Demosthenes. He received the rudiments of an excellent education at a free school in Dublin, and afterwards spent a year or two (1751-1752) under his father's roof at Skeyton rectory, Norfolk, and elsewhere, and for a short time he had Gibbon as a fellow-pupil. In March 1753 he entered St Paul's school, London, where he remained for three years and a half, becoming a proficient classical scholar. In 1756, immediately on his leaving school, he was appointed to a junior clerkship in the secretary of state's office by Henry Fox (afterwards Lord Holland), with whose family Dr Francis was at that time on intimate terms; and this

post he retained under the succeeding administration. In 1758 he was employed as secretary to General Bligh in the expedition against Cherbourg; and in the same capacity he accompanied the earl of Kinnoul on his special embassy to the court of Portugal in 1760.

In 1 761 he became personally known to Pitt, who, recognizing his ability and discretion, once and again made use of his services as private amanuensis. In 1762 he was appointed to a principal clerkship in the war office, where he formed an intimate friendship with Christopher D'Oyly, the secretary of state's deputy, whose dismissal from office in 1772 was hotly resented by "Junius"; and in the same year he married Miss Macrabie, the daughter of a retired London merchant. His official duties brought him into direct relations with many who were Well versed in the politics of the time. In 1763 the great constitutional questions arising out of the arrest of Wilkes began to be sharply canvassed. It was natural that Francis, who from a very early age had been in the habit of writing occasi&Hally to the newspapers,

should be eager to take an active part in the discussion, though his position as a government official made it necessary that his intervention should be carefully disguised. He is known to have written to the Public Ledger and Public Advertiser, as an advocate of the popular cause, on many occasions about and after the year 1763; he frequently attended debates in both Houses of Parliament, especially when American questions were being discussed; and between 1769 and 1771 he is also known to have been favourable to the scheme for the overthrow of the Grafton government and afterwards of that of Lord North, and for persuading or forcing Lord Chatham into power. In January 1769 the first of the Letters of Junius appeared, and the series was continued till January 21, 1772. They had been pre- ceded by others under various signatures such as ," Candor," " Father of Candor," " Anti-Sejanus," " Lucius," "Nemesis," which have all been attributed, some of them certainly in error, to one and the same hand. The authorship of the Letters of Junius has been assigned to Francis on a variety of grounds (see Junius).

In March 1772 Francis finally left the war office, and in July of the same year he left England for a tour through France, Germany arid Italy, which lasted until the following December. On his return he was contemplating emigration to New England, when in June 1773 Lord North, on the recommendation of Lord Barrington, appointed him a member of the newly constituted supreme council of Bengal at a salary of £10,000 per annum.

Along with his colleagues Monson and Clavering he reached Calcutta in October 1774, and a long struggle with Warren Hastings, the governor-general, immediately began. These three, actuated probably by petty personal motives, combined to form a majority of the council in harassing opposition to the governor-general's policy; and they even accused him of corruption, mainly on the evidence of Nuncomar. The death of Monson in 1776, and of Clavering in the following year, made Hastings again supreme in the council. But a dispute with Francis, more than usually embittered, led in August 1780 to a minute being delivered to the council board by Hastings, in which he stated that " he judged of the public conduct of Mr Francis by his experience of his private, which he had found to be void of truth and honour." A duel was the consequence, in which Francis received a dangerous wound (see Hastings, Warren). Though his recovery was rapid and complete, he did not choose to prolong his stay abroad. He arrived in England in October 1781, and was received with little favour.

Little is known of the nature of his occupations during the next two years, except that he was untiring in his efforts to pro- cure first the recall, and afterwards the impeachment of his hitherto triumphant adversary. In 1783 Fox produced his India Bill, which led to the overthrow of the coalition government. In 1784 Francis was returned by the borough of Yarmouth, Isle of Wight; and although he took an opportunity to disclaim every feeling of personal animosity towards Hastings, this did not prevent him, on the return of the latter in 1785, from doing all in his power to bring forward and support the charges which ultimately led to the impeachment resolutions of 1 7 8 7 . Although excluded by a majority of the House from the list of the managers of that impeachment, Francis was none the less its most energetic promoter, supplying his friends Burke and Sheridan with all the materials for their eloquent orations and burning invectives. At the general election of 1790 he was returned member for Bletchingley. He sympathized warmly and actively with the French revolutionary doctrines, expostulating with Burke on his vehement denunciation of the same. In 1793 he supported Grey's motion for a return to the old constitutional system of representation, and so earned the title to be regarded as one of the earliest promoters of the cause of parliamentary reform; and he was one of the founders of the " Society of the Friends of the People." The acquittal of Hastings in April 1795 dis- appointed Francis of the governor-generalship, and in 1798 he had to submit to the additional mortification of a defeat in the general election. He was once more successful, however, in 1802, when he sat for Appleby, 'and it seemed as if the great

ambitions of his life were about to be realized when the Whig party came into power in 1806. His disappointment was great when the governor-generalship was, owing to party exigencies, conferred on Sir Gilbert Elliot

(Lord Minto) ; he declined, it is said, soon afterwards the government of the Cape, but accepted a K.C.B. Though re-elected for Appleby in 1806, he failed to secure a seat in the following year; and the remainder of his life was spent in comparative privacy.

Among the later productions of his pen were, besides the Plan of a Reform in the Election of the House of Commons, pamph- lets entitled Proceedings in the House of Commons on the Slave Trade (1796), Reflections on the Abundance of Paper in Circulation and the Scarcity of Specie (1810), Historical Questions Exhibited (181 8), and a Letter to Earl Grey on the Policy of Great Britain and the Allies towards Norway (1814). His first wife, by whom he had six children, died in 1806, and in 1814 he married his second wife, Emma Watkins, who long survived him, and who left voluminous manuscripts relating to his biography. Francis died on the 23rd of December 1818. In his domestic relations he was exemplary, and he lived on terms of mutual affection with a wide circle of friends. He was, however, full of vindictiveness, dissimulation and treachery, and there can be little doubt that in his historic conflict with Warren Hastings unworthy personal motives played a leading part.

Bibliography.— For the evidence identifying Francis with Junius see the article Junius, and the authorities there cited. See also Memoirs of Sir Philip Francis, with Correspondence and Journals, by Joseph Parkes and Herman Merivale (2 vols., London, 1867); The Francis Letters, edited by Beata Francis and Eliza Keary (2 vols., London, 1901); Sir J. F. Stephen, The Story of Nuncomar and the Impeachment of Sir E.Impey (2 vols., London, 1885) ; Lord Macaulay's Essay on " Warren Hastings " ; G. B. Malleson, Life of Warren Hastings (London, 1894); G. W. Forrest, The Administration of Warren Hastings, 1772-1785 (Calcutta, 1892); Sir Leslie Stephen's article on Francis in Diet, of Nat. Biog. vol. xx.

FRANCIS JOSEPH I. (1830-), emperor of Austria, king of Bohemia, and apostolic king of Hungary, was the eldest son of the archduke Francis Charles, second son of the reigning emperor Francis I., being born on the 18th of August 1830. His mother, the archduchess Sophia, was daughter of Maximilian I., king of Bavaria. She was a woman of great ability and strong character, and during the years which followed the death of the emperor Francis was probably the most influential personage at the Austrian court; for the emperor Ferdinand, who succeeded in 1835, was physically and mentally incapable of performing the duties of his office; as he was childless, Francis Joseph was in the direct line of succession. During the disturbances of 1848, Francis Joseph spent some time in Italy, where, under Radetzky, at the battle of St Lucia, he had his first experience of warfare. At the end of that year, after the rising of Vienna and capture of the city by Windischgratz, it was clearly desirable that there should be a

more vigorous ruler at the head of the empire, and Ferdinand, now that the young archduke was of age, was able to carry out the abdication which he and his wife had long desired. All the preparations were made with the utmost secrecy; on the 2nd of December 1848, in the archiepiscopal palace at Olmiitz, whither the court had fled from Vienna, the emperor abdicated. His brother resigned his rights of succession to his son, and Francis Joseph was proclaimed emperor. Ferdinand retired to Prague, where he died in 1875.

The history of the Dual Monarchy during his reign is told under the heading of Austria-Hungary, and here it is only necessary to deal with its personal aspects. The young emperor was during the first years of his reign completely in the hands of Prince Felix Schwarzenberg, to whom, with Windischgratz and Radetzky, he owed it that Austria had emerged from the revolution apparently stronger than it had been before. The first task was to reduce Hungary to obedience, for the Magyars refused to acknowledge the validity of the abdication in so far as it con'- cerned Hungary, on the ground that such an act would only be valid with the consent of the Hungarian parliament. A further motive for their attitude was that Francis Joseph, unlike his predecessor, had not taken the oath to observe the Hungarian constitution, which it was the avowed object of Schwarzenberg

to overthrow. In the war which followed the emperor himself took part, but it was : not brought to a successful conclusion till the help of the Russians had been called in. Hungary, deprived of her ancient constitution, became an integral part of the Austrian empire. The new reign began, therefore, under sinister omens, with the suppression of liberty in Italy, Hungary and Germany. In 1853 a Hungarian named Lebenyi attempted to assassinate the emperor, and succeeded in inflicting a serious wound with a knife. With the death of Schwarzenberg in 1852 the personal government of the emperor really began, and with it that long series of experiments of which Austria has been the subject. Generally it may be said that throughout his long reign Francis Joseph remained the real ruler of his dominions; he not only kept in his hands the appointment and dismissal of his ministers, but himself directed their policy, and owing to the great know- ledge of affairs, the unremitting diligence and clearness of apprehension, to which all who transacted business with him have borne testimony, he was able to keep a very real control even of the details of government.

The recognition of the separate status of Hungary, and the restoration of

the Magyar constitution in 1866, necessarily made some change in his position, and so far as concerns Hungary he fully accepted the doctrine that ministers are responsible to parliament. In the other half of the monarchy (the so-called Cisleithan) this was not possible, and the authority and influence of the emperor were even increased by the contrast with the weaknesses and failures of the parliamentary system. The most noticeable features in his reign were the repeated and sudden changes of policy, which, while they arose from the extreme difficulty of finding any system by which the Habsburg monarchy could be governed, were due also to the personal idiosyncrasies of the emperor. First we have the attempt at the autocratic centralization of the whole monarchy under Bach; the personal influence of the emperor is seen in the conclusion of the Concordat with Rome, by which in 1855 the work of Joseph II. was undone and the power of the papacy for a while restored. The foreign policy of this period brought about the complete isolation of Austria, and the " ingratitude " towards Russia, as shown during the period of the Crimean War, which has become proverbial, caused a permanent estrangement between the two great Eastern empires and the imperial families. The system led inevitably to bankruptcy and ruin; the war of 1859, by bringing it to an end, saved the monarchy. After the first defeat Francis Joseph hastened to Italy; he commanded in person at Solferino, and by a meeting with Napoleon arranged the terms of the peace of Villafranca. The next six years, both in home and foreign policy, were marked by great vacillation. In order to meet the universal discontent and the financial difficulties constitutional government was introduced; a parlia- ment was established in which all races of the empire were represented, and in place of centralized despotism was established Liberal centralization under Schmerling and the German Liberals. But the Magyars refused to send representatives to the central parliament; the Slavs, resenting the Germanizing policy of the government, withdrew; and the emperor had really withdrawn his confidence from Schmerling long before the constitution was suspended in 1865 as a first step to a reconciliation with Hungary. In the complicated German affairs the emperor in vain sought for a minister on whose knowledge and advice he could depend. He was guided in turn by the inconsistent advice of Schmerling, Rechberg, Mensdorff, not to mention more obscure counsellors, and it is not surprising that Austria was repeatedly outmatched and outwitted by Prussia. In 1863, at the Fiirstentag in Frankfort, the emperor made an attempt by his personal influence to solve the German question. He invited all the German sovereigns to meet him in conference, and laid before them a plan for the reconstruction of the con- federation. The momentary effect was immense; for some of the halo of the Holy Empire still clung round the head of the house of Habsburg, and Francis Joseph was welcomed to the ancient free city with enthusiasm. In spite of this, however, and of the skill with which he presided over the debates, the

conference came to nothing owing to the refusal of the king of Prussia to attend.

The German question was settled definitively by the battle of Koniggratz in 1866; and the emperor Francis Joseph, with characteristic Habsburg opportunism, was quick to accommodate himself to the new circumstances. Above all, he recognized the necessity for reconciling the Magyars to the monarchy; for it was their discontent that had mainly contributed to the collapse of the Austrian power. He had already, in 1859, as the result of a visit to Budapest, made certain modifications in the Bach system by way of concession to Magyar sentiment, and in 1 86 1 he had had an interview with Deak, during which, though unconvinced by that statesman's arguments, he had at least assured himself of his loyalty. He now made Beust, Bismarck's Saxon antagonist, the head of his government, as the result of whose negotiations with Deak the Austro-Hungarian Com- promise of 1867 was agreed upon. A law was passed by the Hungarian diet regularizing the "abdication of Ferdinand; at the beginning of June Francis Joseph signed the inaugural diploma and took the oath in Magyar to observe the constitution; on the 8th he was solemnly crowned king of Hungary. The traditional coronation gift of 100,000 florins he assigned to the widows and orphans of those who had fallen in the war against Austria in 1849.

Once having accepted the principle of constitutional govern- ment, the emperor-king adhered to it loyally, in spite of the discouragement caused by party struggles embittered by racial antagonisms. If in the Cisleithan half of the monarchy parlia- mentary government broke down, this was through no fault of the emperor, who worked hard to find a modus vivendi between the factions, and did not shrink from introducing manhood suffrage in the attempt to establish a stable parliamentary system. This expedient, indeed, probably also conveyed a veiled threat to the Magyar chauvinists, who, discontented with the restrictions placed upon Hungarian independence under the Compromise, were agitating for the complete separation of Austria and Hungary under a personal union only; for universal suffrage in Hungary would mean the subordination of the Magyar minority to the hitherto subject races. For nearly forty years after the acceptance of the Compromise the attitude of the emperor-king towards the Magyar constitution had been scrupu- lously correct. The agitation for the completely separate organization of the Hungarian army, and for the substitution of Magyar for German in words of command in Hungarian regiments, broke down the patience of the emperor, tenacious of his prerogative as supreme " war lord " of the common army. A Hungarian deputation which came to Vienna in September 1905 to urge the Magyar claims was received ungraciously by the emperor, who did not offer his hand to the members,addressed them in German, and referred them

brusquely to the chancellor, Count Goluchowski. This incident caused a considerable sensa- tion, and was the prelude to a long crisis in Hungarian affairs, during which the emperor-king, while quick to repair the un- fortunate impression produced by his momentary pique, held inflexibly to his resolve in the matter of the common army.

In his relations with the Slavs the emperor displayed the same conciliatory disposition as in the case of the Magyars; but though he more than once held out hopes that he would be crowned at Prague as king of Bohemia, the project was always abandoned. In this, indeed, as in other cases, it may be said that the emperor was guided less by any abstract principles than by a common-sense appreciation of the needs and possi- bilities of the moment. Whatever his natural prejudices or natural resentments, he never allowed these to influence his policy. The German empire and the Italian kingdom had been built up out of the ruins of immemorial Habsburg ambitions; yet he refused to be drawn into an alliance with France in 1869 and 1870, and became the mainstay of the Triple Alliance of Austria-Hungary, Germany and Italy. His reputation as a consistent moderating influence in European policy and one of the chief guarantors of European peace was indeed rudely shaken in October 1908, the year in which he celebrated his

sixty years' jubilee as emperor, by the issue of the imperial rescript annexing Bosnia and Herzegovina to the Habsburg dominions, in violation of the terms of the treaty of Berlin. But his opportunism was again justified by the result. Europe lost an ideal; but Austria gained two provinces.

In his private life the emperor was the victim of terrible catastrophes — his wife, his brother and his only son having been destroyed by sudden and violent deaths. He married in 1854 Elizabeth, daughter of Maximilian Joseph, duke of Bavaria, who belonged to the younger and non-royal branch of the house of Wittelsbach. The empress, who shared the remarkable beauty common to all her family, took little part in the public life of Austria. After the first years of married life she was seldom seen in Vienna, and spent much of her time in travelling. She built a castle of great beauty and magnificence, called the Achilleion, in the island of Corfu, where she often resided. In 1867 she accompanied the emperor to Budapest, and took much interest in the reconciliation with the Magyars. She became a good Hungarian scholar, and spent much time in Hungary. An admirable horsewoman, in later years she re- peatedly visited England and Ireland for the hunting season. In 1897 she was assassinated at Geneva by an Italian anarchist; previous attempts had been made on her

and on her husband during a visit to Trieste.

There was one son of the marriage, the crown prince Rudolph (1857-1880). A man of much ability and promise, he was a good linguist, and showed great interest in natural history. He published two works, Fifteen Days on the Danube and A Journey in the East, and also promoted the publication of an important illustrated work giving a full description of the whole Austro-Hungarian monarchy; he personally shared the labours of the editorial work. In 1881 he married Stephanie, daughter of the king of the Belgians. On 30th January 1889 he committed suicide at Mayerling, a country house near Vienna. He left one daughter, Elizabeth, who was betrothed to Count Alfred Windischgratz in 1901. In 1900 his widow, the crown princess Stephanie, married Count Lonyay; by this she sacrificed her rank and position within the Austrian monarchy. Besides the crown prince the empress gave birth to three daughters, of whom two survive: Gisela (born 1857), who married a son of the prince regent of Bavaria; and Marie Valerie (born 1868), who married the archduke Franz Salvator of Tuscany.

See J. Emitter, Kaiser Franz Joseph (2 vols., Vienna, 1898); J. Schnitzer, Franz Joseph I. und seine Zeit (2 vols., ib., 1899); Viribis unitis. Das Buch vom Kaiser, with introduction by J. A. v. Halfert, ed. M. Herzig (ib., 1898); R. Rostok, Die Regierungszeit des K. «. K. Franz Joseph I. (3rd ed. ib., 1903).

PUDJTED IN O.S.A.

VOL11_FRANCISCANS-GIBSON-_W

Britannica

THE

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

FIRST editi

on, published in three volumes, 1768—

-I77I.

SECOND

, , ten ,

1777-

-1784.

THIRD

,, eighteen ,

1788-

-1797.

FOURTH

,, twenty ,

, 1801-

-1810.

FIFTH ,

,, twenty ,

1815-

-1817.

SIXTH

,, twenty ,

1823-

-1824.

SEVENTH

,, twenty-one ,

1830-

-1842.

EIGHTH

,, twenty-two ,

1853-

-i860

NINTH

,, twenty-five ,

l875-

-1889

TENTH

, ninth edition and eleven

supplementary volumes,

1902-

-1903

ELEVENTH

, published in twenty-nine volume

:s, 1910-

-1911

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the UNIVERSITY OF CAMBRIDGE

All rights reserved

THE

ENCYCLOPAEDIA BRITANNICA

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME XI

FRANCISCANS to GIBSON

New York

Encyclopaedia Britannica, Inc.

342 Madison Avenue

Copyright, in the United States of America, 1910,

by

The Encyclopedia Britannica Company.

INITIALS USED IN VOLUME XL TO IDENTIFY INDIVIDUAL

CONTRIBUTORS, 1 WITH THE HEADINGS OF THE

ARTICLES IN THIS VOLUME SO SIGNED.

A. B. R.

A. B. W. K.

A. Ca.

A. E. H. L.

A. E. S.

A. Ge. A. Go.* A. G. B.*

A. G, D. A. H. Sm.

A.M.*

Author of Text Book

A.

M.

c.

A.

N.

A.

N.

B.

A.

N.

W.

A.

R.

C.

A

S.

M.

A

W

. H.*

on\ Fruit.

{

Alfred Barton Rendle, M.A., D.Sc, F.R.S., F.L.S. Keeper, Department of Botany, British Museum. Classification of Flowering Plants; &c.

Sir Alexander Blackie William Kennedy, LL.D., F.R.S.

Emeritus Professor of Engineering, University College, London. Engineer to Board of Ordnance.

Arthur Cayley, LL.D., F.R.S.

See the biographical article, Cayley, Arthur.

Augustus Edward Hough Love, M.A., D.Sc, F.R.S.

Sedleian Professor of Natural Philosophy in the University of Oxford. Fellow of Queen's College; formerly Fellow of St John's College, Cambridge Secretary to the London Mathematical Society.

Arthur Everett Shipley, M.A., D.Sc, F.R.S.

Master of Christ's College, Cambridge. Reader in Zoology, Cambridge University Joint-editor of the Cambridge Natural History.

Sir Archibald Geikie, LL.D.

See the biographical article, Geikie, Sir A.

Rev. Alexander Gordon, M.A.

Lecturer on Church History in the University of Manchester.

Hon. Archibald Graeme Bell, M.Inst. C.E.

Director of Public Works and Inspector of Mines, Trinidad. Member of

Executive and Legislative Councils, Inst. C.E.

Arthur George Doughty, C.M.G., M.A., Litt.D., F.R.,Hist.S.

Dominion Archivist of Canada. Member of the Geographical Board of Canada. Author of The Cradle of New France; &c. Joint-editor of Documents relating to the Constitutional History of Canada. V.

Arthur Hamilton Smith, M.A., F.S.A. f

Keeper of the Department of Greek and Roman Antiquities in the British Museum. J Gem Member of the Imperial German Archaeological Institute. Author of Catalogue j of Greek Sculpture in the British Museum ; &c.

Rev. Allen Menzies, D.D.

Professor of Divinity and Biblical Criticism, University of St Andrews. Author of History of Religion ; &c. Editor of Review of Theology and Philosophy.

Agnes Mary Clerke.

See the biographical article, Clerke, Agnes M.

Alfred Newton, F.R.S.

See the biographical article, Newton, Alfred.

Alfred Neave Brayshaw, LL.B.

Author of Bible Notes on the Hebrew Prophets.

Alfred North Whitehead, M.A., D.Sc, F.R.S.

Fellow and Lecturer in Mathematics, Trinity College, Cambridge. A Treatise on Universal Algebra; &c.

Consulting 1 Friction.

-! Gauss. Hon. J Function: Functions of

Real Variables.

Gastrotrieha.

Geology.

Franck, Sebastian; Gallars.

J Georgetown, British [Guiana.

4 Frontenac et Palluau.

II. (in part).

I

Free Church of Scotland

(in part).

Galileo.

f Frigate-Bird; Gadwall; IGannet; Gare Fowl.

S Friends, Society of.

(in

, , , Geometry: VI.

Author of A aMVIL

part)

Alexander Ross Clarke, C.B., F.R.S. .

Colonel, Royal Engineers. Royal Medallist, Royal Society, 1887. In charge ot] Geodesy (in part). the trigonometrical operations of the Ordnance Survey, 1854-1881.

Alexander Stuart Murray, LL.D.

See the biographical article, Murray, Alexander Stuart.

Arthur William Holland.

Formerly Scholar of St John's College,

1900.

1 A complete list, showing all individual contributors,

■I Gem: II. (in part).

Frederick II., Roman

Emperor; French Revolution:

Republican Calendar; Germany: History (in part) I and Bibliography. appears in the final volume.

Oxford. Bacon Scholar of Gray's Inn

A.

W

. W.

B.

A.

W.

R

B.

S.

P.

C.

B.

C.

D.

W.

C.

E.

•

INITIALS AND HEADINGS OF ARTICLES

C. F. A.

C. H. Ha. C. K. S. C. Mi. C. M. K.

C. PI. C. R. B.

C. R. C.

C. T.*

G. We.

C. W. W.

D. C. D. F. T.

D.H.

Adolphus William Ward, Litt.D., LL.D. See the biographical article, Ward, A. W.

Hon. Bertrand Arthur William Russell, M.A., F.R.S.

Formerly Fellow of Trinity College, Cambridge. Author of Foundations of Geometry ; Principles of Mathematics ; &c.

Bertha Surtees Philpotts, M.A. (Dublin).

Formerly Librarian of Girton College, Cambridge.

Charles Bemont, Litt.D. (Oxon.).

See the biographical article, Bemont, C.

Hon. Carroll Davidson Wright. See the biographical article, Wright,

{

Garrick, David (in part).

Geometry: VI. (in part),

{

Hon. Carroll Davidson.

Charles Everitt, M.A., F.C.S., F.G.S., F.R.A.S. Sometime Scholar of Magdalen College, Oxford.

Charles Francis Atkinson.

Formerly Scholar of Queen's College, Oxford. Captain, 1st City of London (Royal Fusiliers). Author of The Wilderness and Cold Harbour.

Carlton Huntley Hayes, A.M., Ph.D.

Assistant Professor of History in Columbia University, New York City, of the American Historical Association.

Member -i

Germany: Archaeology.

Fustel De Coulanges; . Gascony.

Friendly Societies:

United Slates.

Geometry: History.

Franco-German War

(in part); French Revolutionary

Wars: Military

Operations; Germany: Army; < Gibraltar: History.

Gelasius II.

Author of Sixty Years of Victorian Literature ; Immortal \ Gaskell, Elizabeth.

Garashanin.

Free Ports.

Clement King Shorter. Editor of The Sphere. Memories ; The Brontes, Life and, Letters ; &c.

Chedomille Mijatovich.

Senator of the Kingdom of Servia. Envoy Extraordinary and Minister Plenipoten- tiary of the King of Servia to the Court of St James's, 1895-1900 and 1902-1903.

Sir Charles Malcolm Kennedy, K.C.M.G., C.B. (1831-1908).

Head of Commercial Department, Foreign Office, 1872-1893. Lecturer on Inter- national Law, University College, Bristol. Commissioner in the Levant, 1870-1871, at Paris, 1872-1886. Plenipotentiary, Treaty of the Hague, 1882. Editor of Kennedy's Ethnological and Linguistic Essays; Diplomacy and International Law.

Christian Pfister, D.-es.-L. f Franks*

Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour. Author I '

of Etudes sur le regne de Robert le Pieux; Le Duche merovingien d' Alsace et la legende 1 Freflegona;

dc Sainte-Odile. I Germanic Laws, Early.

Charles Raymond Beazley, M.A., D.Litt., F.R.G.S., F.R.Hist.S.

Professor of Modern History in the University of Birmingham. Formerly Fellow of Merton College, Oxford, and University Lecturer in the History of Geography. Lothian Prizeman, Oxford, 1889. Lowell Lecturer, Boston, 1908. Author of Henry the Navigator ; The Dawn of Modern Geography ; &c.

Gerard of Cremona.

Claude Regnier Conder, LL.D.

Colonel, Royal Engineers. Formerly in command of Survey of Palestine. Author of The City of Jerusalem ; The Bible and the East ; The Hittites and their Language ; &c.

Galilee (in part); Galilee, Sea of (in part).

Rev. Charles Taylor, M.A., D.D., LL.D. (1840-1908). f

Formerly Master of St John's College, Cambridge. Vice-Chancellor, Cambridge -j Geometrical Continuity. University, 1887-1888. Author of Geometrical Conies; &c. (.

Cecil Weatherly.

Formerly Scholar of Queen's College, Oxford.

Barrister-at-Law.

Gate.

Galilee, Sea of (in part).

Sir Charles William Wilson, K.C.B., K.C.M.G., F.R.S. (1836-1907).

Major-General, Royal Engineers. Secretary to the North American Boundary Commission, 1858-1862. British Commissioner on the Servian Boundary Com- mission. Director-General of the Ordnance Survey, 1886-1894. Director-General" of Military Education, 1895-1898. Author of From Korti to Khartoum; Life of Lord Clive; &c.

Dugald Clerk, M.Inst.C.E., F.R.S. f

Director of the National Gas Engine Co., Ltd. Inventor of the Clerk Cycle GasK Gas Engine. Engine. L

Donald Francis Tovey. f

Balliol College, Oxford. Author of Essays in Musical Analysis, comprising The \ Fugue. Classical Concerto, The Goldberg Variations, and analyses of many other classical 1 works. L

David Hannay. ("French Revolutionary Wars:

Formerly British Vice-consul at Barcelona. Author of Short History of Royal < Naval Operations. Navy, 1217-1688; Life of Emilio Castelar ; &c. t

INITIALS AND HEADINGS OF ARTICLES

Vll

E. Br.

E. B. EI.

El* C« Oa

E. E. E.G. E. J. D. E. 0.*

E. Pr.

E. W. B.

F. C. C. F. C. M.

F. F.*

F. G. M. B. F. H. B. F. J. H.

F. N. M. F. R. C.

F.

R. H.

F.

S.

F.

W.R.*

G.

E.

G.

L.

G

Sa.

Formerly \ Fulk, King ot Jerusalem.

Franciscans; Friar.

j Gibson, John.

j Fryxell; Garland, John.

{

Galuppi.

Gastric Ulcer.

Ernest Barker, M.A.

Fellow of, and Lecturer in Modern History at, St John's College, Oxford. Fellow and Tutor of Merton College. Craven Scholar, 1895.

Edwin Bailey Elliott, M.A., F.R.S., F.R.A.S.

Waynflete Professor of Pure Mathematics, and Fellow of Magdalen College, Oxford. .1 (j eome + rv m Formerly Fellow of Queen's College, Oxford. President of London Mathematical] ueomelr J» »». Society, 1896-1898. Author of Algebra of Quantics; &c.

Right Rev. Edward Cuthbert Butler; O.S.B., D.Litt. (Dublin).

Abbot of Downside Abbey, Bath. Author of " The Lausiac History of Palladius

in Cambridge Texts and Studies.

Lady Eastlake.

See the biographical article, Eastlake, Sir C. L.

Edmund Gosse, LL.D.

See the biographical article, Gosse, Edmund.

Edward Joseph Dent, M.A., Mus.Bac.

Formerly Fellow of King's College, Cambridge.

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc. _ f

Consulting Surgeon to St Mary's Hospital, London, and to the Children's Hospital, J Great Ormond Street ; late Examiner in Surgery at the Universities of Cambridge, j Durham and London. Author of A Manual of Anatomy for Senior Students. I

Edgar Prestage. f

Special Lecturer in Portuguese Literature in the University of Manchester. J Garˆa OJ Commendador Portuguese Order of S. Thiago. Corresponding Member of Lisbon | Garrett. Royal Academy of Sciences and Lisbon Geographical Society ; &c. *-

Sir Edward William Brabrook, C.B., F.S.A. f

Barrister-at-Law, Lincoln's Inn. Chief Registrar of Friendly Societies, 1891-1904. J um~_.ii,. Cn-! B ti„« Author of Building Societies; Provident Societies and Industrial Welfare; Institutions \ * nBnttl y societies.

of Thrift; &c. I

Frederick Cornwallis Conybeare, M.A., D.Th. (Geissen).

Fellow of the British Academy. Formerly Fellow of University College, Oxford. Author of The Ancient Armenian Texts of Aristotle; Myth, Magic and Morals; &c.

Francis Charles Montague, M.A.

Astor Professor of European History, University College, London. Formerly Fellow of Oriel College, Oxford. Author of Limits cf Individual Liberty; chapters in Cambridge Modern History; &c.

Sir James Fortescue-Flannery, Bart., M.P., M.Inst.C.E.

Ex- President of the Institute of Marine Engineers. M.P. for the Maldon Division of Essex, 1910. M.P. for the Shipley Division of Yorkshire, 1895-1906.

Frederick George Meeson Beck, M.A.

Fellow and Lecturer in Classics, Clare College, Cambridge.

Francis Henry Butler, M.A.

Worcester College, Oxford. Associate of Royal School of Mines.

Francis John Haverfield, M.A., LL.D., F.S.A.

Camden Professor of Ancient History in the University of Oxford. Fellow of Brasenose College. Fellow of the British Academy. Formerly Censor, Student, ■ Tutor and Librarian of Christ Church, Oxford. Ford's Lecturer, 1906-1907. Author of Monographs on Roman History, especially Roman Britain ; &c.

Colonel Frederic Natusch Maude, C.B.

Lecturer in Military History, Manchester University. Author of War and the World's Policy; The Leipzig Campaign; The Jena Campaign.

Frank R. Cana.

Author of South Africa from the Great Trek to the Union.

Friedrich Robert Helmert, Ph.D., D.Ing.

Professor of Geodesy, University of Berlin.

Francis Storr.

Editor of the Journal of Education, London. Officer d'Acaddmie (Paris).

Frederick William Rudler, I.S.O., F.G.S.

Curator and Librarian of the Museum of Practical Geology, London, 1879-1902. President of the Geologists' Association, 1 887-1 889.

Rev. George Edmundson, M.A., F.R.Hist.S.

Formerly Fellow and Tutor of Brasenose College, Oxford. Ford's Lecturer, 1909.

Georg Lunge.

See the biographical article. Lunge, G.

George Saintsbury, D.C.L., LL.D.

See the biographical article, Saintsbury, G.

Funeral Rites. -j French Revolution. Fuel: Liquid.

("Germany: Ethnography and \ Early History.

■j Frankincense; Galls.

Gaul.

J Franco-German War

(_ (in part).

French Congo; German East Africa; German South-West Africa.

-j Geodesy (in part).

{

Games, Classical.

J Garnet; [Gem: I.

1 Gelderland (Duchy).

J Fuel: Gaseous;

\ Gas: Manufacture, II.

(“French Literature; \ Gautier.

Vlll

INITIALS AND HEADINGS OF ARTICLES

G. W. T. H.B. H. B. W.

H. Ch.

H. C. L. H. F. Ba.

H. L. C.

H.

M.

•

H.

M.

W.

H.

N.

H.

R.

M.

H. W. C. D.

H. W. S.

I. A.

J. A. P.

J. A. H.

J.

B.B.

J.

B. MeM

J.

Ga.

J

G. C.

A

J. G. R.

Author of 4 Fuel: Solid.

Rev. Griffiths Wheeler Thatcher, M.A., B.D. f

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and i GhazalL Old Testament History at Mansfield College, Oxford. I

Hilary Bauermann, F.G.S. (d. 1909).

Formerly Lecturer on Metallurgy at the Ordnance College, Woolwich.

A Treatise on the Metallurgy of Iron. I,

Horace Bolingbroke Woodward, F.R.S., F.G.S. f

Late Assistant Director, Geological Survey of England and Wales. Wollaston J Qaudry. Medallist, Geological Society. Author of The History of the Geological Society of 1 ”

London; &c. *-

Hugh Chisholm, M.A. f Gambetta;

Formerly Scholar of Corpus Christi College, Oxford. Editor of the nth edition-ˆ Garnett, Richard; of the Encyclopaedia Britannica; Co-editor of the 10th edition. I George IV. {in part).

Hon. Henry Cabot Lodge.

See the biographical article, Lodge, Henry Cabot.

Henry Frederick Baker, M.A., D.Sc, F.R.S.

Fellow and Lecturer of St John's College, Cambridge.

Mathematics in the University. Author of Abel's Theorem and the Allied Theory ; &c,

Hugh Longbourne Callendar, F.R.S. , LL.D.

Professor of Physics, Royal College of Science, London. Formerly Professor of – Physics in MacGill College, Montreal, and in University College, London.

Hugh Mitchell.

Barrister-at-Law, Inner Temple.

H. Marshall Ward, M.A., D.Sc, F.R.S. (d. 1905).

Formerly Professor of Botany, Cambridge. President of the British Mycological Society. Author of Timber and Some of its Diseases; The Oak; Sack's Lectures on' the Physiology of Plants ; Diseases in Plants ; &c.

Henry Nicol.

Hugh Robert Mill, D.Sc, LL.D.

Director of British Rainfall Organization. Editor of British Rainfall. Formerly President of the Royal Meteorological Society. Hon. Member of Vienna Geographi- cal Society. Hon. Corresponding Member of Geographical Societies of Paris, Berlin, Budapest, St Petersburg, Amsterdam, &c. _ Author of The Realm of Nature; The International Geography; &c.

Henry William Carless Davis, M.A.

Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls College, Oxford, 1895-1902. Author of England under the Normans and Angevins; Charlemagne.

J. Gallatin.

f Function: Functions of Cayley .Lecturer m -J Com p lex Variables.

Fusion.

Gibraltar {in part).

Fungi {in part).

French Language {in part).

Geography.

Geoffrey, Archbishop of

York; Geoffrey of Monmouth; Gerard;

Gervase of Canterbury; Gervase of Tilbury.

{

H. Wickham Steed. —

Correspondent of The Times at Rome (1897-1902) and Vienna.

Israel Abrahams, M.A. “v _ _ ._

Reader in Talmudic and Rabbinic Literature in the University of Cambridge. Formerly President, Jewish Historical Society of England. Author of A Short History of Jewish Literature; Jewish Life in the Middle Ages; Judaism; &c.

John Ambrose Fleming, M.A., D.Sc, F.R.S.

Pender Professor of Electrical Engineering in the University of London. Fellow of University College, London. Formerly Fellow of St John’s College, Cambridge, and Lecturer on Applied Mechanics in the University. Author of Magnets and Electric Currents.

Garibaldi.

Frank, Jakob; Frankel, Zecharias; Frankl, Ludwig A.; Friedmann, Meir; Gaon; Geiger {in part); Gersonides.

Galvanometer.

John Allen Howe, B.Sc

Curator and Librarian of the Museum of Practical Geology, London. The Geology of Building Stones.

John Bagnall Bury, LL.D., D.C.L.

See the biographical article, Bury, J. B.

John Bach McMaster, LL.D.

Professor of American History in the University of Pennsylvania. A History of the People of the United States ; &c.

Author of -j Fuller's Earth.

Gibbon, Edward.

Author of J Garfield, James Abram.

-j Gardiner, Stephen.

James Gairdner, LL.D., C.B.

See the biographical article, Gairdner, J.

John George Clark Anderson, M.A. f

Censor and Tutor of Christ Church, Oxford. Formerly Fellow of Lincoln College ; J Galatia. Craven Fellow, Oxford, 1896. Conington Prizeman, 1893. [

John George Robertson, M.A., Ph.D.

Prolessor of German, University of London. ture ; Schiller after a Century ; &c.

f Freiligrath; Author of History of German Litem- -j German Literature.

INITIALS AND HEADINGS OF ARTICLES

IX

J. Hn.

J. H. Gr.

J. H. H. J. H. R.

J. HI. R.

J. Mt. J. P.-B. J. Si. J. S. Bl.

J. S. F.

J. T. Be. J. T. C.

J. V. B. J. Ws.

J. W. He.

K. S.

L. D. L. H.*

L. J. S.

L. V. M. G.

M. N. T.

Justus Hashagen, Ph.D.

Privat-dozent in Medieval and Modern History, University of Bonn. Das Rheinland und die franzosische Herrschaft.

[Frederick Augustus I, Author of “I and II.;

L Frederick William I.

Fellow j Geometry, V. -f Fust.

John Hilton Grace, M.A., F.R.S.

Lecturer in Mathematics at Peterhouse and Pembroke College, Cambridge, of Peterhouse.

John Henry Hessels, M.A.

Author of Gutenberg: an Historical Investigation.

John Horace Round, M.A., LL.D. (Edin.). f

Author of Feudal England; Studies in Peerage and Family History; Peerage and A Geoffrey De Montbray. Pedigree; &c. L

John Holland Rose, M.A., Litt.D. r

Christ’s College, Cambridge. Lecturer on Modern History to the Cambridge J (i aT(i an » University Local Lectures Syndicate. Author of Life of Napoleon I. ; Napoleonic 1 uarQane – Studies ; The

Development of the European Nations ; The Life of Pitt ; &c. L

James Moffatt, M.A., D.D.

Jowett Lecturer, London, 1907.

Author of Historical New Testament ; &c.

James George Joseph Penderel-Brodhurst. Editor of the Guardian (London).

James Sime, M.A. (1843-1895).

Author of A History of Germany ; &c.

John Sutherland Black, M.A., LL.D.

Assistant Editor 9th edition Encyclopaedia Britannica. Encyclopaedia Biblica.

Joint-editor of

j Galatians, Epistle to the. -I Furniture.

/Frederick the Great

1 {in part).

[Free Church of Scotland

the 1 (in part).

John Smith Flett, D.Sc, F.G.S. f

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in Edin- J Fulgurite; burgh University. Neill Medallist of the Royal Society of Edinburgh. Bigsby 1 Gabbro. Medallist of the Geological Society of London. I

John T. Bealby. f

Joint-author of Stanford's Europe. Formerly Editor of the Scottish Geographical A Georgia (Russia), (in pari), Magazine. Translator of Sven Hedin's Through Asia, Central Asia and Tibet; &c. I

Joseph Thomas Cunningham, M.A., F.Z.S. r

Lecturer on Zoology at the South-Western Polytechnic, London.

Formerly J Ga s tr noda Fellow of University College, Oxford. Assistant Professor of Natural History in 1 uttsvlo l” JU< *' the University of Edinburgh. Naturalist to the Marine Biological Association. L

James Vernon Bartlet, M.A., D.D. (St. Andrews). f

Professor of Church History, Mansfield College, Oxford. Author of The Apostolic 1 Frommel. Age; &c. I

Lecturer on Horticulture to the Middlesex County Council. Author of Practical \ F ™^ and Flower Farming

Guide to Garden Plants; French Market Gardening; &c. |_ U’ w part).

James Wycliffe Headlam, M.A.

Staff Inspector of Secondary Schools under the Board of Education. Formerly Fellow of King’s College, Cambridge. Professor of Greek and Ancient History at Queen’s College, London. Author of Bismarck and the Foundation of the German Empire; &c.

Kathleen Schlesinger. r

Author of The Instruments of the Orchestra; &c. Editor of the Portfolio of Musical J Free Reeo Vl « r ator; A rchaeology. y Geige.

Frederick III. of Prussia; Germany: History (in part).

Louis Duchesne.

See the biographical article, Duchesne, L. M. O.

A Gelasius I.

Louis Halphen, D.-es.-L. f Fulk Nerra;

Principal of the course of the Faculty of Letters in the University of Bordeaux. J Geoffrey, Count Of Anjou; Author of Le Comte d’ ‘Anjou au XI’ siecle; Recueil des acies angevines; &c. Geoffrev Plantaganet

Leonard James Spencer, M.A. r

Assistant in Department of Mineralogy, British Museum. Formerly Scholar J Ra1 e na of Sidney Sussex College, Cambridge, and Harkness Scholar. Editor of the | Mineralogical Magazine. I

Linda Mary Villari.

See the biographical article, Villari, Pasquale.

Moses Gaster, Ph.D.

Chief Rabbi of the Sephardic communities of England. Vice-President, Zionist Congress, 1898, 1899, 1900. Ilchester Lecturer at Oxford on Slavonic and Byzan- , . tine Literature, 1886 and 1891. President, Folk-lore Society of England. Vice- \ Ghica. President, Anglo-Jewish Association. Author of History of Rumanian Popular Literature; A New Hebrew Fragment of Ben-Sira; The Hebrew Version of the Secretum Secretorum of A ristotle. I

Marcus Niebuhr Tod, M.A. f

Fellow and Tutor of Oriel College, Oxford. University Lecturer in Epigraphy, -j Gerousia. Joint-author of Catalogue of the Sparta Museum. L

f Frederick III. King of 1 Sicily.

X

0. Ba.

0. H. P. A.

P. A. A. P. GL

P. La.

P.M. R. Ad.

R. A. S. M.

R. Ca.

R. H. Q. R.L.»

R. N. B.

R.Pr. R. P.S.

R. We.i S.A.C.

INITIALS AND HEADINGS OF ARTICLES

St. c. S. R. G.

T. As.

Genealogy: Modern.

Oswald Barron, F.S.A.

Editor of The Ancestor, 1902ˆ1905. Hon. Genealogist to Standing Council of the Honourable Society of the Baronetage.

Olaus Magnus Friedrich Henrici, Ph.D., LL.D., F.R.S. .

Professor of Mechanics and Mathematics in the Central Technical College of the J rˆ™,,,*™ 1 T1 „_., Tn City and Guilds of London Institute. Author of Vectors and Rotors; Congruent | ** eome “y> *•> “•» ami “!• Figures; &c. L

Paul Daniel Alphandery. I*

Professor of the History of Dogma, Ecole pratique des hautes Etudes, Sorbonne, -j Fraticelli Paris. Author of Les Idees morales chez les heterodoxes latines au debut du XIII’ siecle. *•

Philip A. Ashworth, M.A., Doc.Juris. [

New College, Oxford. Barrister-at-Law. Translator of H. R. von Gneist’s History A. Germany: Geography, of the English Constitution. L

Peter Giles, M.A., LL.D., Litt.D. r

Fellow and Classical Lecturer of Emmanuel College, Cambridge, and University J r. Reader in Comparative Philology. Formerly Secretary of the Cambridge Philo- 1 logical Society. Author of Manual of Comparative Philology ; &c. I

Philip Lake, M.A., F.G.S. f

Lecturer on Physical and Regional Geography in Cambridge University. Formerly J «,„_,„ . r 1

of the Geological Survey of India. Author of Monograph of British Cambrian \ uerman y- Geology. Trilobites. Translator and editor of Kayser’s Comparative Geology. I

Paul Meyer.

See the biographical article, Meyer, M. P. H. L

Robert Adamson, LL.D.

See the biographical article. Adamson, Robert.

A French Language (in part).

A Gassendi (in part).

Robert Alexander Stewart Macalister, M.A., F.S.A.

St John's College, Cambridge. Director of Excavations for the Palestine Explora- – tion Fund.

Robert Carruthers, LL.D. (1799-1878).

Editor of the Inverness Courier, 1 828-1 878. Part-editor of Chambers's Cyclopaedia of English Literature; Lecturer at the Philosophical Institution, Edinburgh." Author of History of Huntingdon ; Life of Pope.

Rev. Robert Hebert Quick, M.A., (1831-1891).

Trinity College, Cambridge. Formerly Lecturer on Education, Cambridge. Author of Essays on Educational Reformers.

Gadara; Galilee (in part); Galilee, Sea of (in part); Gerasa; Gerizim; Gezer; Gibeon.

Garriek, David (in part).

University of A Froebel.

Richard Lydekker, F.R.S., F.Z.S., F.G.S.

Member of the Staff of the Geological Survey of India, 1874-1882. Author of. Catalogues of Fossil Mammals, Reptiles and Birds in British Museum; The Deer of all Lands ; &c.

Robert Nisbet Bain (d. 1909).

Assistant Librarian, British Museum, 1883-1909. Author of Scandinavia, the Political History of Denmark, Norway and Sweden, 1 513-1900 ; The First Romanovs, 1613 to 1725 ; Slavonic Europe, the Political History of Poland and Russia from 1469 to 1796 ; &c.

Galago; Galeopithecus; Ganodonta; Gelada; Gibbon.

Frederick II. and III. of Denmark and Norway. . Gedymin.

Robert Priebsch, Ph.D.

Professor of German Philology, University of London. schriften in England ; &c.

Author of Deutsche Hand- A German Language.

Phene Spiers, F.S.A., F.R.I.B.A.

Formerly Master of the Architectural School, Royal Academy, London. Past President of Architectural Association. Associate and Fellow of King's College, London. Corresponding Member of the Institute of France. Editor of Fergusson's History of Architecture. Author of Architecture: East and West; &c.

Gamier, J.

Richard Webster, A.M. (Princeton).

Formerly Fellow in Classics, Princeton University. ianus; &c.

Editor of The Elegies of Maxim- J Franklin, Benjamin.

Stanley Arthur Cook, M.A.

Editor for Palestine Exploration Fund. Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904-1908. Council of Royal Asiatic Society, 1904- 1905. Author of Glossary 0} Aramaic Inscriptions; The Laws of Moses and the Code 0} Hammurabi; Critical Notes on Old Testament History; Religion of Ancient Palestine, &c.

Viscount St Cyres.

See the biographical article, Iddesleigh, ist Earl of.

Genealogy: Biblical; Genesis.

Samuel Rawson Gardiner, LL.D., D.C.L. See the biographical article, Gardiner, S. R.

Thomas Ashby, M.A., D.Litt. (Oxon.).

Director of British School of Archaeology at Rome. Formerly Scholar at Christ Church, Oxford. Craven Fellow, 1897. Conington Prizeman, 1906. Member of" the Imperial German Archaeological Institute.

A. Gallicanism.

("George I., II., III.;

I George IV. (in part).

Frascati Fregellae; Frascati; Fregellae; Fucino, Lago Di; Fulginiae; Fusaro, Lago; Gabii; Gaeta; Gallipoli (Italy); iGela; Genoa.

INITIALS AND HEADINGS OF ARTICLES

XI

T. Ba.

T. C. H. T. E. H.

T. G. S.

T. H. H.*

T. KLL.

V.B.L.

V. H. B.

W. A. B.

C

W. A. P.

W. Ba.

W. Be. W. C. W. Cu.

W. E. D.

w.

Fr.

w.

F. C.

w.

Hu.

w.

J. H.*

w.

L. F.

w

L. G.

Sir Thomas Barclay, M.P. f

Member of the Institute of International Law. Member of the Supreme Council J Geneva Convention, of the Congo Free State. Officer of the Legion of Honour. Author of Problems of International Practice and Diplomacy; &c. M.P. for Blackburn, 1910. '-

Thomas Callan Hodson. J

Registrar, East London College, University of London. Late Indian Civil Service, "j Genn&. Author of The Metheis ; &c. I

Thomas Erskine Holland, K.C., D.C.L., LL.D.

Fellow of All Souls College, Oxford. Professor of International Law and Diplomacy in the University of Oxford, 1874-1910. Fellow of the British Academy. Bencher J Qentili. of Lincoln's Inn. Author of Studies in International Law; The Elements of Juris- prudence; Alberici Gentilis de jure belli; The Laws of War on Land; Neutral Duties in a Maritime War ; &c.

Thomas Gaskell Shearman (d. 1900).

Author of The Single Tax; Natural Taxation; Distribution of Wealth; &c.

Colonel Sir Thomas Hungerford Holdich, K.C.M.G., K.C.I.E., D.Sc.

Superintendent Frontier Surveys, India, 1892-1898. Gold Medallist,

R.G.S. . (London), 1887. Author of The Indian Borderland; The Countries of the King's Award; India; Tibet; &c.

Rev. Thomas Martin Lindsay, D.D,

Principal and Professor of Church History, United Free Church College, Glasgow. Author of Life of Luther ; &c.

George, Henry.

Ganges.

Gerson (in part).

Vivian Byam Lewes, F.I. C, F.C.S.

Professor of Chemistry, Royal Naval College, Greenwich. Gas Examiner to City of London.

Vernon Herbert Blackman, M.A., D.Sc

Chief Superintending \ Gas: Manufacture, I.

Professor of Botany in the University of Leeds. College, Cambridge.

Formerly Fellow of St John's \ Fungi {in part).

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D. (Bern). Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880-1881. Author of Guide du Haut Dauphine; The Range of the Todi; Guide to Grindelwald; Guide to Switzerland; The Alps in Nature and in History; &c. Editor of Tiie Alpine Journal, 1880-1881 ; &c.

Walter Alison Phillips, M.A.

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, Oxford. Author of Modern Europe ; &c.

William Bacher, Ph.D.

Professor of Biblical Science at the Rabbinical Seminary, Budapest.

Sir Walter Besant.

, See the biographical article, Besant, Sir W.

Sir William Crookes, F.R.S.

See the biographical article, Crookes, Sir William.

The Ven. William Cunningham, M.A., D.D. i

Archdeacon of Ely. Birkbeck Lecturer in Ecclesiastical History, Trinity College, Cambridge. Fellow of the British Academy. Fellow of Trinity College, Cambridge. Author of Growth of English Industry and Commerce; &c.

William Ernest Dalby, M.A., M.Inst.C.E., M.I.M.E.

Professor of Civil and Mechanical Engineering at the City and Guilds of London Institute Central Technical College, South Kensington. Formerly University Demonstrator in the Engineering Department of Cambridge University. Author of The Balancing of Engines ; Valves and Valve Gear Mechanism ; &c.

Frauenfeld; Frejus;

Fribourg;

Gap; Garda, Lake of;

Gemmi Pass; Geneva;

Geneva, Lake of.

Frederick II. of Prussia

(in part) ; Gentleman; Gentz, Friedrich; Germany: History (in part)

Gamaliel.

< Froissart.

J Gem, Artificial.

Free Trade.

Friction (in part).

William Fream, LL.D. (d. 1906).

Formerly Lecturer on Agricultural Entomology, University of Edinburgh Agricultural Correspondent of The Times.

William Feilden Craies, M.A.

Barrister-at-Law, Inner Temple. Lecturer on Criminal Law, King's College, London. Editor of Archbold's Criminal Pleading (23rd edition).

Rev. William Hunt, M.A., Litt.D.

President of the Royal Historical Society 1 905-1909. Author of History of English Church, 597-1066; The Church of England in the Middle Ages; Political History of England, 1760-1801 ; &c.

William James Hughan.

Past S.G.D. of the Grand Lodge of England. Author of Origin of the English Rite of Freemasonry. I

Walter Lynwood Fleming, A.M., Ph.D. (

Professor of History in Louisiana State University. Author of Documentary ■< Freedmen's Bureau. History of Reconstruction ; &c. [

William Lawson Grant, M.A. _ _ r

Professor of Colonial History, Queen's University, Kingston, Canada. Formerly J _ ., „. ., j m

Beit Lecturer in Colonial History, Oxford University. Editor of Acts of the Privy 1 ua “> Blr Alexander 1. Council (Canadian Series). I

and J Fruit and Flower Farming

I (in part).

Game Laws;

Gaming and Wagering.

Freeman, Edward A.;

Froude;

Gardiner, Samuel Rawson.

Freemasonry.

Xll

w.

H.

R.

w.

R.

B.*

w.

S.

P.

INITIALS AND HEADINGS OF ARTICLES

William Michael Rossetti.

See the biographical article, Rossetti, Dante G.

William Raimond Baird, LL.D.

Author of Manual of American College Fraternities ; &c. Editor of The Beta Theta Pi.

Walter Sutherland Parker.

Deputy Chairman, Fur Section, London Chamber of Commerce.

{Puseli; Gaddi; Gainsborough; Ghirlandajo, Domenico; Ghirlandajo, Ridolfo.

j Fraternities, College.

| Fur.

PRINCIPAL UNSIGNED ARTICLES

Franz Josef Land.

Fuero.

Genius.

German Baptist Brethren.

Free Church Federation.

Furnace.

Gentian.

German Catholics.

French Guinea.

Galapagos Islands.

Gentianaceae.

Gettysburg.

French West Africa.

Galicia.

George, Saint.

Geyser.

Friedland.

Galway.

George Junior Republic.

Ghazni.

Frisian Islands.

Gambia.

Georgia (U.S.A.).

Ghent.

Frisians.

Gawain.

Geraniaceae.

Ghor.

Fronde, The.

Gelatin.

Geranium.

Giant.

ENCYCLOPEDIA BRITANNICA

ELEVENTH EDITION

VOLUME XI

FRANCISCANS (otherwise called Friars Minor, or Minorites; also the Seraphic Order ; and in England Grey Friars, from the colourofthehabit, which , however, is now brown rather than grey) , a religious order founded by St Francis of Assisi {q.v.). It was in 1 206 that St Francis left his father's house and devoted himself to a life of poverty and to the service of the Door, the sick and the lepers; and in 1200 that he felt the call to add preaching to his other ministrations, and to lead a life in the closest imitation of Christ's life. Within a few weeks disciples began to join them- selves to him; the condition was that they should dispose of all their possessions. When their number was twelve Francis led the little flock to Rome to obtain the pope's sanction for their undertaking. Innocent III. received them kindly, but with some misgivings as to the feasibility of the proposed manner of life; these difficulties were overcome, and the pope accorded a provisional approval by word of mouth: they were to become clerics and to elect a superior. Francis was elected and made a promise of obedience to the pope, and the others promised obedience to Francis.

This formal inauguration of the institute was in 1 209 or (as seems more probable) 12 10. Francis and his associates were first known as " Penitents of Assisi," and then Francis chose the title of " Minors." On their return to Assisi they obtained from the Benedictine abbey on Mount Subasio the use of the little chapel of St Mary of the Angels, called the Portiuncula, in the plain below Assisi, which became the

cradle and headquarters of the order. Around the Portiuncula they built themselves huts of branches and twigs, but they had no fixed abode; they wandered in pairs over the country, dressed in the ordinary clothes of the peasants, working in the fields to earn their daily bread, sleeping in barns or in the hedgerows or in the porches of the churches, mixing with the labourers and the poor, with the lepers and the outcasts, ever joyous — the ” joculatores ” or “jongleurs ” of God — ever carrying out their mission of preaching to the lowly and to the wretched religion and repentance and the kingdom of God. The key-note of the movement was the imitation of the public life of Christ, especially the poverty of Christ. Francis and his disciples were to aim at possessing nothing, absolutely nothing, so far as was compatible with life; they were to earn their bread from day to day by the work of their hands, and only when they could not do so were they to beg;

they were to make no provision for the morrow, lay by no store, accumulate no capital, possess no land; their clothes should be the poorest and their dwellings the meanest; they were forbidden to receive or to handle money. On the other hand they were bound only to the fast observed in those days by pious Christians, and were allowed to eat meat — the rule said they should eat whatever was set before them; no austerities were imposed, beyond those inseparable from the manner of life they lived.

Thus the institute in its original conception was quite different from the monastic institute, Benedictine or Canon Regular. It was a confraternity rather than an order, and there was no formal novitiate, no organization. But the number of brothers increased with extraordinary rapidity, and the field of work soon extended itself beyond the neighbourhood of Assisi and even beyond Umbria — within three or four years there were settle- ments in Perugia, Cortona, Pisa, Florence and elsewhere, and missions to the Saracens and Moors were attempted by Francis himself. About 12 17 Franciscan missions set out for Germany, France, Spain, Hungary and the Holy Land; and in 12 19 a number of provinces were formed, each governed by a provincial minister. These developments, whereby the little band of Umbrian apostles had grown into an institute spread all over Europe and even penetrating to the East, and numbering thousands of members, rendered impossible the continuance of the original free organization whereby Francis’s word and ex- ample were the sufficient practical rule of life for all: it was necessary as a condition of efficiency and even of existence and permanence that

some kind of organization should be provided. From an early date yearly meetings or chapters had been held at the Portiuncula, at first attended by the whole body of friars; but as the institute extended this became unworkable, and after 1 2 19 the chapter consisted only of the officials, provincial ministers and others. During Francis's absence in the East (1219-1220) a deliberate movement was initiated by the two vicars whom he had left in charge of the order, towards assimilat- ing it to the monastic orders. Francis hurried back, bringing with him Elias of Cortona, the provincial minister of Syria, and immediately summoned an extraordinary general chapter (September 1220). Before it met he had an interview on the situation with Cardinal Hugolino of Ostia (afterwards Gregory IX.), the great friend and supporter of both Francis and Dominic,

and he went to Honorius III. at Orvieto and begged thatHugolino should be appointed the official protector of the order. The request was granted, and a bull was issued formally approving the order of Friars Minor, and decreeing that before admission every one must pass a year's novitiate, and that after profession it was not lawful to leave the order. By this bull the Friars Minor were constituted an order in the technical sense of the word. When the chapter assembled, Francis, no doubt from a genuine feeling that he was not able to govern a great world-wide order, practically abdicated the post of minister-general by appointing a vicar, and the policy of turning the Friars Minor into a great religious order was consistently pursued, especially by Elias, who a year later became Francis's vicar.

St Francis's attitude towards this change is of primary importance for the interpretation of Franciscan history. There can be little doubt that his affections never altered from his first love, and that he looked back regretfully on the " Umbrian idyll " that had passed away; on the other hand, there seems to be no reason for doubting that he saw that the methods of the early days were now no longer possible, and that he acquiesced in the inevitable. This seems to be Professor Goetz's view, who holds that Sabatier's picture of Francis's agonized sadness at witnessing the destruction of his great creation going on under his eyes, has no counterpart in fact, and who rejects the view that the changes were forced on Francis against . his tetter judgment by Hugolino and Elias (see " Note on Sources " at end of article Francis of Assisi; also Elias of Cortona) ; Goetz holds that the only conflict was the inevitable one between in unrealizable ideal and its practical

working among average men. i5ut there does seem to be evidence that Francis deplored tendencies towards a departure from the severe simplicity of life and from the strict observance of poverty which he considered the ground-idea of his institute. In the final redaction of his Rule made in 1223 and in his Testament, made after it, he again clearly asserts his mind on these subjects, especially on poverty; and in the Testament he forbids any glosses in the interpretation of the Rule, declaring that it is to be taken simply as it stands. Sabatier's view as to the differ- ence between the " First Rule " and that of 1223 is part of his general theory, and is, to say the least, a grave exaggeration. No doubt the First Rule, which is fully four times as long, gives a better picture of St Francis's mind and character; the later Rule has been formed from the earlier by the elimination of the frequent scripture texts and the edificatory element ; but the greater portion of it stood almost verbally in the earlier.

On Francis's death in 1226 the government of the order rested in the hands of Elias until the chapter of 1227. At this chapter Elias was not elected minister-general; the building of the great basilica and monastery at Assisi was so manifest a violation of St Francis's ideas and precepts that it produced a reaction, and John Parenti became St Francis's first successor. He held fast to St Francis's ideas, but was not a strong man. At the chapter of 1230 a discussion arose concerning the binding force of St Francis's Testament, and the interpretation of certain portions of the Rule, especially concerning poverty, and it was determined to submit the questions to Pope Gregory IX., who had been St Francis's friend and had helped in the final redaction of the Rule. He issued a bull, Quo elongati, which declared that as the Testa- ment had not received the sanction of the general chapter it was not binding on the order, and also allowed trustees to hold and administer money for the order. John Parenti and those who wished to maintain St Francis's institute intact were greatly disturbed by these relaxations; but a majority of the chapter of 1232, by a sort of coup d'etat, proclaimed Elias minister-general, and John retired, though in those days the office was for life. Under Elias the order entered on a period of extraordinary extension and prosperity: the number of friars in all parts of the world increased wonderfully, new provinces were formed, new missions to the heathen organized, the Franciscans entered the universities and vied with the Dominicans as teachers of theology and canon law, and as a body they became influential in church and state. With all this side of Elias's policy the great bulk of the order sympathized; but his rule was despotic and tyrannical and his private life was lax — at least according to any Franciscan standard, for no charge of grave irregularity was ever brought against him. And so a

widespread movement against his govern- ment arose, the backbone of which was the university element at Paris and Oxford, and at a dramatic scene in a chapter held in the presence of Gregory IX. Elias was deposed (1239).

The story of these first years after St Francis's death is best told by Ed. Lempp, Frere £.lie de Cortone (1901) (but see the warning at the end of the article Elias of Cortona).

At this time the Franciscans were divided into three parties: there were the Zealots, or Spirituals, who called for a literal observance of St Francis's Rule and Testament; they deplored all the developments since 1219, and protested against turning the institute into an order, the frequentation of the universities and the pursuit of learning; in a word, they wished to restore the life to what it had been during the first few years— the hermitages and the huts of twigs, and the care of the lepers and the nomadic preaching. The Zealots were few in' number but of great consequence from the fact that to them belonged most of the first disciples and the most intimate companions of St Francis. They had been grievously persecuted under Elias — Br. Leo and others had been scourged, several had been imprisoned, one while trying to escape was accidentally killed, and Br. Bernard, the " first disciple," passed a year in hiding in the forests and mountains hunted like a wild beast. At the other extreme was a party of relaxation, that abandoned any serious effort to practise Franciscan poverty and simplicity of life. Between these two stood the great middle party of moderates, who desired indeed that the Franciscans should be really poor and simple in their manner of life, and really pious, but on the other hand approved of the development of the Order on the lines of other orders, of the acquisition of influence, of the cultivation of theology and other sciences, and of the frequenting of the universities.

The questions of principle at issue in these controversies is reason- ably and clearly stated, from the modern Capuchin standpoint, in the "Introductory Essay" to The Friars and how they came to England, by Fr. Cuthbert (1903).

The moderate party was by far the largest, and embraced nearly all the friars of France, England and Germany. It was the Moderates and not the Zealots that brought about Elias's deposition, and the next general ministers belonged to this party. Further relaxations of the law of poverty, however, caused a reaction, and John of Parma, one of the Zealots, became minister- general, 1247-1257. Under him the more extreme of the Zealots took up and exaggerated the theories of the Eternal Gospel of the Calabrian Cistercian abbot Joachim of Fiore

(Floris) ; some of their writings were condemned as heretical, and John of Parma, who was implicated in these apocalyptic tendencies, had to resign. He was succeeded by St Bonaventura (1257-1274), one of the best type of the middle party. He was a man of high character, a theologian, a mystic, a holy man and a strong ruler. He set himself with determination to effect a working compromise, and proceeded with firmness against the extremists on both sides. But controversy and recrimination and persecution had stiffened the more ardent among the Zealots into obstinate fanatics — some of them threw themselves into a movement that may best be briefly described as a recrudescence of Mon- tanism (see Emile Gebhart's Italie mystique, 1899, cc. v. and vi.), and developed into a number of sects, some on the fringe of Catholic Christianity and others beyond its pale. But the majority of the Zealot party, or Spirituals, did not go so far, and adopted as the principle of Franciscan poverty the formula " a poor and scanty use " (usus pauper el tenuis) of earthly goods, as opposed to the " moderate use " advocated by the less strict party. The question thus posed came before the Council of Vienne, 1312, and was determined, on the whole, decidedly in favour of the stricter view. Some of the French Zealots were not satisfied and formed a semi-schismatical body in Provence; twenty-five of them were tried before the Inquisition, and four were burned alive at Marseilles as obstinate heretics, 1318. After this the schism in the Order subsided. But the disintegrating forces produced by the Great Schism and by the other disorders of the 14th century caused among the Franciscans the same relaxations and corruptions, and also the same reactions and reform movements, as among the other orders.

The chief of these reforms was that of the Observants, which began at Foligno about 1370. The Observant reform was on the basis of the " poor and scanty use " of worldly goods, but it was organized as an order and its members freely pursued

theological studies; thus it did not represent the position of the original Zealot party, nor was it the continuation of it. The Observant reform spread widely throughout Italy and into France, Spain and Germany. The great promoters of the move- ment were St Bernardine of Siena and St John Capistran. The council of Constance, 1415, allowed the French Observant friaries to be ruled by a vicar of their own, under the minister- general, and the same privilege was soon accorded to other countries. By the end of the middle ages the Observants had some 1400 houses divided into 50 provinces. This movement produced a "half-reform" among the Conventuals or friars

of the mitigated observance; it also called forth a number of lesser imitations or congregations of strict observance.

After many attempts had been made to bring about a working union among the many observances, in 1517 Leo X. divided the Franciscan order into two distinct and independent bodies, each with its own minister-general, its own provinces and provincials and its own general chapter: (1) The Conventuals, who were authorized to use the various papal dispensations in regard to the observance of poverty, and were allowed to possess property and fixed income, corporately, like the monastic orders: (2) The Observants, who were bound to as close an observance of St Francis's Rule in regard to poverty and all else as was practically possible.

At this time a great number of the Conventuals went over to the Observants, who have ever since been by far the more numerous and influential branch of the order. Among the Observants in the course of the sixteenth century arose various reforms, each striving to approach more and more nearly to St Francis's ideal; the chief of these reforms were the Alcantarines in Spain (St Peter of Alcantara, St Teresa's friend, d. 1562), the Riformati in Italy and the Recollects in France: all of these were semi-independent congregations. The Capuchins {q.v.), established c. 1525, who claim to be the reform which approaches nearest in its conception to the original type, became a distinct order of Franciscans in 1610. Finally Leo XIII. grouped the Franciscans into three bodies or orders — the Conventuals; the Observants, embracing all branches of the strict observance, except the Capuchins; and the Capuchins — which together constitute the " First Order." For the " Second Order," or the nuns, see Clara, St, and Clares, Poor; and for the "Third Order " see Tertiaries. Many of the Tertiaries live a fully monastic life in community under the usual vows, and are formed into Congregations of Regular Tertiaries, both men and women. They have been and»are still very numerous, and give themselves up to education, to the care of the sick and of orphans and to good works of all kinds.

No order has had so stormy an internal history as the Francis- cans; yet in spite of all the troubles and dissensions and strivings that have marred Franciscan history, the Friars Minor of every kind have in each age faithfully and zealously carried on St Francis's great work of ministering to the spiritual needs of the poor. Always recruited in large measure from among the poor, they have ever been the order of the poor, and in their preaching and missions and ministrations they have ever laid themselves out to meet the needs of the poor. Another great work of the Franciscans throughout the whole course of their

history has been their missions to the Mahommedans, both in western Asia and in North Africa, and to the heathens in China, Japan and India, and North and South America; a great number of J.he friars were martyred. The news of the martyrdom of five of his friars in Morocco was one of the joys of St Francis's closing years. Many of these missions exist to this day. In the Univer- sities, too, the Franciscans made themselves felt alongside of the Dominicans, and created a rival school of theology, wherein, as contrasted with the Aristotelianism of the Dominican school, the Platonism of the early Christian doctors has been perpetuated. The Franciscans came to England in 1224 and immediately made foundations in Canterbury, London and Oxford; by the middle of the century there were fifty friaries and over 1200 friars in England; at the Dissolution there were some 66 Fran- ciscan friaries, whereof some six belonged to the Observants

(for list see Catholic Dictionary and F. A. Gasquet's English Monastic Life, 1004). Though nearly all the English houses belonged to what has been called the " middle party," as a matter of fact they practised great poverty, and the com- missioners of Henry VIII. often remark that the Franciscan Friary was the poorest of the religious houses of a town. The English province was one of the most remarkable in the order, especially in intellectual achievement; it produced Friar Roger Bacon, and, with the single exception of St Bonaventure, all the greatest doctors of the Franciscan theological school — Alexander Hales, Duns Scotus and Occam.

The Franciscans have always been the most numerous by far of the religious orders; it is estimated that about the period of the Reformation the Friars Minor must have numbered nearly 100,000. At the present day the statistics are roughly (including lay-brothers): Observants, 15,000, Conventuals, 1500; to these should be added 9500 Capuchins, making the total number of Franciscan friars about 26,000. There are various houses of Observants and Capuchins in England and Ireland ; and the old Irish Conventuals survived the penal times and still exist.

There have been four Franciscan popes: Nicholas IV. (1288- 1292), Sixtus IV. (1471-1484), Sixtus V. (1585-1590), Clement XIV. (1769-1774); the three last were Conventuals.

The great source for Franciscan history is Wadding's Annates; it has been many times continued, and now extends in 25 vols. fol. to the year 1622. The story is also told by Helyot, Hist, des ordres religieux (17 14), vol. vii. Abridgments, with references to recent literature, will

be found in Max Heimbucher, Orden und Kongrega- tionen (1896), i. §§ 37-51; in Wetzer und Welte, Kirckenlexicon (2nd ed\), articles ” Armut (III.),” ” Franciscaner orden” (this article contains the best account of the inner history and the polity of the order up to 1886); in Herzog, Realencyklopddie (3rd ed.), articles ” Franz von Assisi ” (fullest references to literature up to 1899), ” Fraticellen.” Of modern critical studies on Franciscan origins, K. Miiller’s Anfdnge des Minoritenordens und der Buss- bruderschaften (1885), and various articles by F. Ehrle in Archiv fur Litteratur- und Kirchengeschichte des Mittelalters and Zeitschrift fur Katholische Theologie, deserve special mention. Eccleston’s charm- ing chronicle of ” The Coming of the Friars Minor into England ” has been translated into English by the Capuchin Fr. Cuthbert, who has prefixed an Introductory Essay giving by far the best account in English of ” the Spirit and Genius of the Franciscan Friars ” {The Friars and how they came to England, 1903). Fuller in- formation on the English Franciscans will be found in A. G. Little’s Grey Friars in Oxford (Oxford Hist. Soc., 1892). (E. C. B.)

FRANCK. The name of Franck has been given indiscriminately but improperly to painters of the school of Antwerp who belong to the families of Francken (q.v.) and Vrancx (q.v.). One artist truly entitled to be called Franck is Gabriel, who entered the gild of Antwerp in 1605, became its president in 1636 and died in 1639. But his works cannot now be traced.

FRANCK, C&SAR (182 2-1 890), French musical composer, a Belgian by birth, who came of German stock, was born at Liege on the 10th of December 1822. Though one of the most remarkable of modern composers, C6sar Franck laboured for many years in comparative obscurity. After some preliminary studies at Liege he came to Paris in 1837 and entered the con- servatoire. He at once obtained the first prize for piano, trans- posing a fugue at sight to the astonishment of the professors, for he was only fifteen. He won the prize for the organ in 1841, after which he settled down in the French capital as teacher of the’ piano. His earliest compositions date from this period, and include four trios for piano and strings, besides several piano pieces. Ruth, a biblical cantata was produced with success at the Conservatoire in 1846. An opera entitled Le Valet de ferme was written about this time, but has never been performed. For many years Franck led a retired life, devoting himself to teaching and to his duties as organist, first at Saint- Jean-Saint-Francois, then at Ste Clotilde, where he acquired a great reputation as an improviser. He also wrote a mass, heard in 1861, and a quantity of motets, organ pieces and other works of a religious character.

Franck was appointed professor of the organ at the Paris conservatoire, in succession to Benoist, his old master, in 1872, and the following year he Was naturalized a Frenchman. Until then he was esteemed as a clever and conscientious musician,

but he was now about to prove his title to something more. A revival of his early oratorio, Ruth, had brought his name again before the public, and this was followed by the production of Redemption, a work for solo, chorus and orchestra, given under the direction of M. Colonne on the ioth of April 1873. The unconventionally of the music rather disconcerted the general public, but the work nevertheless made its mark, and Franck became the central figure of an enthusiastic circle of pupils and adherents whose devotion atoned for the comparative indifference of the masses. His creative power now manifested itself in a series of works of varied kinds, and the name of Franck began gradually to emerge from its obscurity. The following is an enumeration of his subsequent compositions: Rebecca (1881), a biblical idyll for solo, chorus and orchestra; Les Beatitudes, an oratorio composed between 1870 and 1880, perhaps his greatest work; the symphonic poems, Les £olides (1876), Le Chasseur maudit (1883), Les Djinns (1884), for piano and orchestra; Psyche (1888), for orchestra and chorus; symphonic variations for piano and orchestra (1885); symphony in D (1889); quintet for piano and strings (1880); sonata for piano and violin (1886); string quartet (1889); prelude, choral and fugue for piano (1884); prelude, aria and finale for piano (1889); various songs, notably “La Procession” and “Les Cloches du Soir.” Franck also composed two four-act operas, Hulda and Ghiselle, both of which were produced at Monte Carlo after his death, which took place in Paris on the 8th of November 1890. The second of these was left by the master in an unfinished state, and the instrumentation was completed by several of his pupils.

Cesar Franck’s influence on younger French composers has been very great. Yet his music is German in character rather than French. A more sincere, modest, self-respecting composer probably never existed. In the centre of the brilliant French capital he was able to lead a laborious existence consecrated to his threefold career of organist, teacher and composer. He never sought to gain the suffrages of the public by unworthy concessions, but kept straight on his path, ever mindful of an ideal to be reached and never swerving therefrom. A statue was erected to the memory of Cesar Franck in Paris on the 22nd of October 1904, the occasion producing a panegyric from Alfred Bruneau, in which he speaks of the composer’s works as ” cathedrals

in sound.”

FRANCK, or Frank [latinized Francus], SEBASTIAN (c. 1499-c. 1543), German freethinker, was born about 1499 at Donauworth, whence he constantly styled himself Franck von jW’ord. He entered the university of Ingoldstadt (March 26, 1 51 5), and proceeded thence to the Dominican College, incor- porated with the university, at Heidelberg. Here he met his subsequent antagonists, Bucer and Frecht, with whom he seems to have attended the Augsburg conference (October 1518) at which Luther declared himself a true son of the Church. He afterwards reckoned the Leipzig disputation (June- July 1519) and the burning of the papal bull (December 1520) as the begin- ning of the Reformation. Having taken priest’s orders, he held in 1524 a cure in the neighbourhood of Augsburg, but soon (1525) went over to the Reformed party at Nuremberg and became preacher at Gustenfelden. His first work (finished September 1527) was a German translation with additions (1528) of the first part of the Diallage, or Conciliatio locorum Scripturae,. directed against Sacramentarians and Anabaptists by Andrew Althamer, then deacon of St Sebald’s at Nuremberg. On the 17th of March 1528 he married Ottilie .Beham, a gifted lady, whose brothers, pupils of Albrecht Diirer, had got into trouble through Anabaptist leanings. In the same year he wrote a very popular treatise against drunkenness. In 1529 he produced a free version (Klagbrief der armen Diirftigen in England) of the famous Supply- cacyon of the Beggers, written abroad (1528?) by Simon Fish. Franck, in his preface, says the original was in English; else- where he says it was in Latin; the theory that his German was really the original is unwarrantable. Advance in his religious ideas led him to seek the freer atmosphere of Strassburg in the autumn of 1529. To his translation (153°) of a Latin Chronicle

and Description of Turkey, by a Transylvanian captive, which had been prefaced by Luther, he added an appendix holding up the Turks as in many respects an example to Christians, and presenting, in lieu of the restrictions of Lutheran, Zwinglian and Anabaptist sects, the vision of an invisible spiritual church, universal in its scope. To this ideal he remained faithful. At Strassburg began his intimacy with Caspar Schwenkfeld, a con- genial spirit. Here, too, he published, in 1S31, his most im» portant work, the Chronica, Zeitbuch und Geschichtsbibel, largely a compilation on the basis of the Nuremberg Chronicle (1493), and in its treatment of social and religious questions connected with the Reformation, exhibiting a strong sympathy with heretics, and an unexampled fairness to all kinds of freedom in opinion. It is too much to call him ” the first of German historians “; he is a forerunner of Gottfried Arnold, with more vigour and

directness of purpose. Driven from Strassburg by the authorities, after a short imprisonment in December 1531, he tried to make a living in 1532 as a soapboiler at Esslingen, removing in 1533 for a better market to Ulm, where (October 28, 1 534) he was admitted as a burgess.

His Weltbuch, a supplement to his Chronica, was printed at Tubingen in 1534; the publication, in the same year, of his Paradoxa at Ulm brought him into trouble with the authorities. An order for his banishment was withdrawn on his promise to submit future works for censure. Not interpreting this as apply- ing to works printed outside Ulm, he published in 1538 at Augs- burg his Guldin A rch (with pagan parallels to Christian sentiments) and at Frankfort his Germaniae chronicon, with the result that he had to leave Ulm in January 1539. He seems henceforth to have had no settled abode. At Basel he found work as a printer, and here, probably, it was that he died in the winter of 1542-1543. He had published in 1539 his Kriegbuchlein des Friedens (pseu- donymous), his Schrifflliche und ganz griindliche Auslegung des 64 Psalms, and his Das verbiitschierte mit sieben Siegeln ver- schlossene Buch (a biblical index, exhibiting the dissonance of Scripture); in 1541 his Spruchwdrter (a collection of proverbs, several times reprinted with variations); in 1542 a new edition of his Paradoxa; and some smaller works.

Franck combined the humanist's passion for freedom with the mystic's devotion to the religion of the spirit. His breadth of human sympathy led him to positions which the comparative study of religions has made familiar, but for which his age was unprepared. Luther contemptuously dismissed him as a " devil's mouth." Pastor Frecht of Nuremberg pursued him with bitter zeal. But his courage did not fail him, and in his last year, in a public Latin letter, he exhorted his friend John Campanus to maintain freedom of thought in face of the charge of heresy.

See Hegler, in Hauck's Realencyklopadie (1899); C. A. Hase, Sebastian Franck von Word (1869); J. F. Smith, in Theological Review (April 1874); E. Tausch, Sebastian Franck von Donauworth und seine Lehrer (1893). (A. Go.*)

FRANCKE, AUGUST HERMANN (1663-1727), German Pro- testant divine, was born on the 22nd of March 1663 at Liibeck. He was educated at the gymnasium in Gotha, and afterwards at the universities of Erfurt, Kiel, where he came under the influence of the pietist Christian Kortholt (1633-1694), and Leipzig. During his student career he made a special study of Hebrew and Greek; and in order to

learn Hebrew more thoroughly, he for some time put himself under the instructions of Rabbi Ezra Edzardi at Hamburg. He graduated at Leipzig, where in 1685 he became a Privatdozent. A year later, by the help of his friend P. Anton, and with the approval and encouragement of P. J, Spener, he founded the Collegium Philobiblicum, at which a number of graduates were accustomed to meet for the systematic study of the Bible, philologically and practically. He next passed some months at Liineburg as assistant or curate to the learned superintendent, C. H. Sandhagen (1639-1697), and there his religious life was remarkably quickened, and deepened. On leaving Liineburg he spent some time in Hamburg, where he became a teacher, in a private school, and made the acquaintance of Nikolaus Lange (1659-1720). After a long visit to Spener,

who was at that time a court preacher in Dresden, he returned to Leipzig in the spring of 1689, and began to give Bible lectures of an exegetical and practical kind, at the same time resuming the Collegium Philobiblicum of earlier days. He soon became popular as a lecturer; but the peculiarities of his teaching almost immediately aroused a violent opposition on the part of the university authorities; and before the end of the year he was interdicted from lecturing on the ground of his alleged pietism. Thus it was that Francke's name first came to be publicly associated with that of Spener, and with pietism. Prohibited from lecturing in Leipzig, Francke in 1690 found work at Erfurt as " deacon " of one of the city churches. Here his evangelistic fervour attracted multitudes to his preaching, including Roman Catholics, but at the same time excited the anger of his opponents ; and the result of their opposition was that after a ministry of fifteen months he was commanded by the civil authorities (27th of September 1691) to leave Erfurt within forty-eight hours. The same year witnessed the expulsion of Spener from Dresden.

In December, through Spener's influence, Francke accepted an invitation to fill the chair of Greek and oriental languages in the new university of Halle, which was at that time being organized by the elector Frederick III. of Brandenburg; and at the same time, the chair having no salary attached to it, he was appointed pastor of Glaucha in the immediate neighbourhood of the town. He afterwards became professor of theology. Here, for the next thirty-six years, until his death on the 8th of June 1727, he continued to discharge the twofold office of pastor and professor with rare energy and success. At the very outset of his labours he had been profoundly impressed with a sense of his responsibility towards the numerous outcast children who

were growing up around him in ignorance and crime. After a number of tentative plans, he resolved in 1695 to institute what is often called a ” ragged school,” supported by public charity. A single room was at first sufficient, but within a year it was found necessary to purchase a house, to which another was added in 1697. In 1698 there were 100 orphans under his charge to be clothed and fed, besides 500 children who were taught as day scholars. The schools grew in importance and are still known as the Francke’sche Stiftungen. The education given was strictly religious. Hebrew was included, while the Greek and Latin classics were neglected; the Homilies of Macarius took the place of Thucydides. The same principle was consistently applied in his university teaching. Even as professor of Greek he had given great prominence in his lectures to the study of the Scriptures; but he found a much more congenial sphere when, in 1698, he was appointed to the chair of theology. Yet his first courses of lectures in that department were readings and expositions of the Old and New Testament; and to this, as also to hermeneutics, he always attached special importance, believing that for theology a sound exegesis was the one indispensable requisite. ” Theo- logus nascitur in scripturis,” he used to say; but during his occupancy of the theological chair he lectured at various times upon other branches of theology also. Amongst his colleagues were Paul Anton (1661-1730), Joachim J. Breithaupt (1658-1732) and Joachim Lange (1670-1744), — men like-minded with him- self. Through their influence upon the students, Halle became a centre from which pietism (q.v.) became very widely diffused over Germany.

His principal contributions to theological literature were : Mann-ductio ad lectionem Scripturae Sacrae (1693); Praelectiones hermeneuticae (171 7); Commentatio de scopo librorum Vete.ris et Novi Testamenti (1724); and Lectiones paraenelicae (1726-1736). The Manuductio was translated into English in 1813, under the title A Guide to the Reading and Study of the Holy Scriptures. An account of his orphanage, entitled Segensvolle Fussstapfen, &c. (1709), which subsequently passed through several editions, has also been partially translated, under the title The Footsteps of Divine Providence: or, The bountiful Hand of Heaven defraying the Expenses of Faith. See H. E. F. Guericke’s A. H. Francke (1827), which has been trans- lated into English (The Life of A. H. Francke, 1837); Gustave Kramer’s Beitrdge zur Geschichte A. H. Francke’s (1861), and Neue Beilrage (1875); A. Stein, A. H. Francke (3rd ed., 1894); article in Herzog-Hauck’s Realencyklopadie (ed. 1899); Knuth, Die Francke’ schen Sliftungen (2nd ed., 1903).

FRANCKEN. Eleven painters of this family cultivated their art in

Antwerp during the 16th and 17th centuries. Several of these were related to each other, whilst many bore the same Christian name in succession. Hence unavoidable confusion in the subsequent classification of paintings not widely differing in style or execution. When Franz Francken the first found a rival in Franz Francken the second, he described himself as the “elder,” in contradistinction to his son, who signed himself the ” younger.” But when Franz the second was threatened with competition from Franz the third, he took the name of ” the elder,” whilst Franz the third adopted that of Franz ” the younger.”

It is possible, though not by any means easy, to sift the works of these artists. The eldest of the Franckens, Nicholas of Herenthals, died at Antwerp in 1596, with nothing but the reputation of having been a painter. None of his works remain. He bequeathed his art to three children. Jerom Francken, the eldest son, after leaving his father’s house, studied under Franz Floris, whom he afterwards served as an assistant, and wandered, about 1 560, to Paris. In 1 566 he was one of the masters employed to decorate the palace of Fontainebleau, and in 1574 he obtained the appointment of court painter from Henry III., who had just returned from Poland and visited Titian at Venice. In 1603, when Van Mander wrote his biography of Flemish artists, Jerom Francken was still in Paris living in the then aristocratic Faubourg St Germain. Among his earliest works we should distinguish a ” Nativity ” in the Dresden museum, executed in co- operation with Franz Floris. Another of his important pieces is the ” Abdication of Charles V.” in the Amsterdam museum. Equally interesting is a “Portrait of a Falconer,” dated 1558, in the Brunswick gallery. In style these pieces all recall Franz Floris. Franz, the second son of Nicholas of Herenthals, is to be kept in memory as Franz Francken the first. He was born about 1544, matriculated at Antwerp in 1567, and died there in 1616. He, too, studied under Floris, and never settled abroad, or lost the hard and gaudy style which he inherited from his master. Several of his pictures are in the museum of Antwerp; one dated. 1597 in the Dresden museum represents ” Christ on the Road to Golgotha,” and is signed by him as D. 6 (Den ouden) F. Franck. Ambrose, the third son of Nicholas of Herenthals, has bequeathed to us more specimens of his skill than Jerom or Franz the first. He first started as a partner with Jerom at Fontainebleau, then he returned to Antwerp, where he passed for his gild in 1573, and he lived at Antwerp till 1618. His best works are the ” Miracle of the Loaves and Fishes ” and the ” Martyrdom of St Crispin,” both large and ambitious com- positions in the Antwerp museum. In both these pieces a fair amount of power is displayed, but marred by want of atmosphere and shadow or by

hardness of line and gaudiness of tone. There is not a trace in the three painters named of the influence of the revival which took place under the lead of Rubens. Franz Francken the first trained three sons to his profession, the eldest of whom, though he practised as a master of gild at Antwerp from 1600 to 1610, left no visible trace of his labours behind. Jerom the second took service with his uncle Ambrose. He was born in 1578, passed for his gild in 1607, and in 1620 produced that curious picture of ” Horatius Codes defending the Sublician Bridge ” which still hangs in the Antwerp museum. The third son of Franz Francken the first is Franz Francken the second, who signed himself in pictures till 1616″ theyounger,” from 1630 till his death ” the elder ” F. Francken. These pictures are usually of a small size, and are found in considerable numbers in continental collections. Franz Francken the second was born in 1581. In 1605 he entered the gild, of which he subsequently became the president, and in 1642 he died. His earliest composition is the ” Crucifixion ” in the Belvedere at Vienna, dated 1606. His latest compositions as ” the younger” F. Francken are the ” Adoration of the Virgin ” (1616) in the gallery of Amsterdam, and the ” Woman taken in Adultery ” (1628) in Dresden. From 1616 to 1630 many of his pieces are signed F. Francken; then come the ” Seven Works of Charity ” (1630) at Munich, signed ” the elder F. F.,” the ” Prodigal Son ”

FRANCO-GERMAN WAR

(1633) at the Louvre, and other almost countless examples. It is in F. Francken the second’s style that we first have evidence of the struggle which necessarily arose when the old customs, hardened by Van Orley and Floris, or Breughel and De Vos, were swept away by Rubens. But F. Francken the second, as before observed, always clung to small surfaces; and though he gained some of the freedom of the moderns, he lost but little of the dryness or gaudiness of the earlier Italo-Flemish revivalists. F. Francken the third, the last of his name who deserves to be recorded, passed in the Antwerp gild in 1639 an d died at Antwerp in 1667. His practice was chiefly confined to adding figures to the architectural or landscape pieces of other artists. As Franz Pourbus sometimes put in the portrait figures for Franz Francken the second, so Franz Francken the third often introduced the necessary personages into the works of Pieter Neefs the younger (museums of St Petersburg, Dresden and the Hague). In a ” Moses striking the Rock,” dated 1654, of the Augsburg gallery, this last of the Franckens signs D. 6 (Den ouden) F. Franck. In the pictures of this artist we most clearly discern the effects of Rubens’s example.

FRANCO-GERMAN WAR (1870-1871). The victories of Prussia in

1866 over the Austrians and their German allies (see Seven Weeks' War) rendered it evident to the statesmen and soldiers of France that a struggle between the two nations could only be a question of time. Army reforms were at once under- taken, and measures were initiated in France to place the armament and equipment of the troops on a level with the requirements of the times. The chassepot, a new breech-loading rifle, immensely superior to the Prussian needle-gun, was issued; the artillery trains were thoroughly overhauled, and a new machine-gun, the mitrailleuse, from which much was expected,' introduced. Wide schemes of reorganization (due mainly to Marshal Niel) were set in motion, and, since these required time to mature, recourse was had to foreign alliances in the hope of delaying the impending rupture. In the first week of June 1870, General Lebrun, as a confidential agent of the emperor Napoleon III., was sent to Vienna to concert a plan of joint operations with Austria against Prussia. Italy was also to be included in the alliance, and it was agreed that in case of hostilities the French armies should concentrate in northern Bavaria, where the Austrians and Italians were to join them, and the whole immense army thus formed should march via Jena on Berlin. To what extent Austria and Italy committed themselves to this scheme remains uncertain, but that the emperor Napoleon believed in their bona fides is beyond doubt.

Whether the plan was betrayed to Prussia is also uncertain, and almost immaterial, for Moltke's plans were based on an accurate estimate of the time it would take Austria to mobilize and on the effect of a series of victories on French soil. At any rate Moltke was not taken into Bismarck's confidence in the affair of Ems in July 1870, and it is to be presumed that the chancellor had already satisfied himself that the schemes of operations prepared by the chief of the General Staff fully provided against all eventualities. These schemes were founded on Clausewitz's view of the objects to be pursued in a war against France — in the first place the defeat of the French field armies and in the second the occupation of Paris. On these lines plans for the strategic deployment of the Prussian army were prepared by the General Staff and kept up to date year by year as fresh circumstances (e.g. the co-operation of the minor German armies) arose and new means of communication came into existence. The campaign was actually opened on a revise of 1868-1869, to which was added, on the 6th of May 1870, a secret memo- randum for the General Staff.

Under the German organization then existing the preliminary to all active operations was of necessity full and complete mobilization. Then followed transport by road and rail to the line selected for the " strategic deployment," and it was essential that no part of these

operations should be disturbed by action on the part of the enemy. But no such delay imposed itself of necessity upon the French, and a vigorous offensive was so much

in harmony with their traditions that the German plan had to be framed so as to meet such emergencies. On the whole, Moltke concluded that the enemy could not undertake .

this offensive before the eighth day after mobilization, deploy? At that date about five French army corps (150,000 meat men) could be collected near Metz, and two corps of the (70,000) near Strassburg; and as it was six days' march araofcs" from Metz to the Rhine, no serious attack could be delivered before the fourteenth day, by which day it could be met by superior forces near Kirchheimbolanden. Since, however, the transport of the bulk of the Prussian forces could not begin till the ninth day, their ultimate line of detrainment need not be fixed until the French plans were disclosed, and, as it was important to strike at the earliest moment possible, the deployment was provisionally fixed to be beyond the Rhine on the line Wittlich-Neunkirchen-Landau. Of the thirteen North German corps three had to be left behind to guard the eastern frontier and the coast, one other, the VIII., was practically on the ground already and could concentrate by road, and the remaining nine were distributed to the nine through railway lines available. These ten corps were grouped in three armies, and as the French might violate Belgian neutrality or endeavour to break into southern Germany, two corps (Prussian Guard and Saxon XII. corps) were temporarily held back at a central position around Mainz, whence they could move rapidly up or down the Rhine valley. If Belgian neutrality remained unmolested, the reserve would join the III. army on the left wing, giving it a two to one superiority over its adversary; all three armies would then wheel to the right and combine in an effort to force the French army into a decisive battle on the Saar on or about the twenty-third day. As in this wheel the army on the right formed the pivot and was required only to stand fast, two corps only were allotted to it; two corps for the present formed the III. army, and the remaining five were assigned to the II. army in the centre.

When (i6th-r7th July) the South German states decided to throw in their lot with the rest, their three corps were allotted to the III. army, the Guards and Saxons to the II. army, whilst the three corps originally left behind were finally distributed one to each army, so that up to the investment of Metz the order of battle was as follows:

Headquarters :

(General v. Moltke, chief of staff).

(I. corps, v. Manteuffel) VII. „ v. Zastrow

VIII. ,, v. Goeben

(1st) and 3rd cavalry divisions

Total . . 85,000

Guard Pr. August of Wiirttem- berg (II. corps, v. Fransecky) III. „ v. Alvensleben II.

The king of Prussia

I. Army: f

General v. Steinmetz J

(C. of S., v. Sperling) 1

II. Army: Prince Frederick Charles – (C. of S., v. Stiehle)

III. Army: crown prince of Prussia (C. of S., v. Blumenthal)

IV. ,, v. Alvensleben I. IX. „ v. Manstein X. „ v. Voigts-Rhetz XII. ■ ,, (Saxons) crown prince

of Saxony 5th and 6th cavalry divisions

Total . . 210,000 V. corps, v. Kirchbach (VI.) „ v. Tiimpling XI. „ v. Bose

I. Bavarian, v. der Tann

II. „ v. Hartmann

S te m bergdiv.j vWerder

L (2nd) and 4th cavalry divisions

Total . . 180,000

Grand Total . . 475,000 (The units within brackets were those at first retained in Germany.)

On the French side no such plan of operations was in existence when on the night of the 15th of July Krieg mobil was telegraphed all over

Prussia. An outline scheme had indeed been Positions prepared as a basis for agreement with Austria and of the ■■ Italy, but practically no details were fixed, and the French troops were without transport and supplies. Never /orces – theless, since speed was the essence of the contract, the troops

FRANCO-GERMAN WAK

1st corps 5th corps 2nd corps 4th corps

3rd corps Guard 6th corps 7th corps

If therefo

were hurried up without waiting for their reserves, and delivered, as Moltke had foreseen, just where the lie of the railways and convenience of temporary supply dictated, and the Prussian Intelligence Department was able to inform Moltke on the 22nd of July (seventh day of mobilization) that the French stood from right to left in the following order, on or near the frontier:

. Marshal MacMahon, duke of Magenta, Strassburg

. General de Failly, Saargemund and Bitche

. General Frossard, St Avoid

. General de Ladmirault, Thionville

With, behind them:

. Marshal Bazaine, Metz

. General Bourbaki, Nancy

. Marshal Canrobert, Chalons

. General Felix Douay, Belfort

e they began a forward movement on the 23rd (eighth day) the case foreseen by Moltke had arisen, and it became necessary to detrain the II. army upon the Rhine. Without waiting for further confirmation of this intelligence, Moltke, with the consent of the king, altered the arrangements accordingly, a decision which, though foreseen, exercised the gravest influence on the course of events. As it happened this decision was pre- mature, for the French could not yet move. Supply trains had to be organized by requisition from the inhabitants,

and even arms and ammunition procured for such reserves as had succeeded in joining. Nevertheless, by almost superhuman exertions on the part cf the railways and administrative services, all essential deficiencies were made good, and by the 28th of July (13th day) the troops had received all that was absolutely indis- pensable and might well have been led against the enemy, who, thanks to Moltke's premature action, were for the moment at a very serious disadvantage. But the French generals were unequal to their responsibilities. It is now clear that, had the great Napoleon and his marshals been in command, they would have made light of the want of cooking pots, cholera belts, &c, and, by a series of rapid marches, would have concentrated odds of at least three to one upon the heads of the Prussian columns as they struggled through the defiles of the Hardt, and won a victory whose political results might well have proved decisive.

To meet this pressing danger, which came to his knowledge during the course of the 29th, Moltke sent a confidential staff officer, Colonel v. Verdy du Vernois, to the III. army to impress upon the crown prince the necessity of an immediate advance to distract the enemy's attention from the I. and II. armies; but, like the French generals, the crown prince pleaded that he could not move until his trains were complete. Fortunately for the Germans, the French intelligence service not only failed to inform the staff of this extraordinary opportunity, but it allowed itself to be hypnotized by the most amazing rumours. In imagination they saw armies of 100,000 men behind every forest, and, to guard against these dangers, the French troops were marched and counter-marched along the frontiers in the vain hope of discovering an ideal defensive position which should afford full scope to the power of their new weapons.

As these delays were exerting a most unfavourable effect on public opinion not only in France but throughout Europe, the emperor decided on the 1st of August to initiate a movement towards the Saar, chiefly as a guarantee of good faith to the Austrians and Italians.

On this day the French corps held the following positions from right to left:

. Hagenau

. Forbach

. St Avoid

. Bouzonville

. Bitche

. Chalons

. Belfort and Colmar

. near Metz

1st corps 2nd corps 3rd corps 4th corps 5th corps 6th corps 7th corps Guard .

The French 2nd corps was directed to advance on the following morning direct on Saarbnicken, supported on the flanks by two divisions from the 5th and 3rd corps. The order was duly carried out, and the Prussians (one battalion, two squadrons and a

battery), seeing the overwhelming numbers opposed to them, fell back fighting and vanished to the northward, having given a very excellent example of steadiness and dis- cipline to their enemy. 1 The latter contented them- ˆj£f ot selves by occupying Saarbnicken and its suburb St briicken. Johann, and here, as far as the troops were concerned, the incident closed. Its effect, however, proved far-reaching. The Prussian staff could not conceive that nothing lay behind this display of five whole divisions, and immediately took steps to meet the expected danger. In their excitement, although they had announced the beginning of the action to the king's head-quarters at Mainz, they forgot to notify the close and its results, so that Moltke was not in possession of the facts till noon on the 3rd of August. Meanwhile, Steinmetz, left without instructions and fearing for the safety of the II. army, the heads of whose columns were still in the defiles of the Hardt, moved the I. army from the neighbourhood of Merzig obliquely to his left front, so as to strike the flank of the French army if it continued its march towards Kaiserslautern, in which direction it appeared to be heading.

Whilst this order was in process of execution, Moltke, aware that the II. army was behind time in its march, issued instructions to Steinmetz for the 4th of August which entailed a withdrawal to the rear, the idea being that both p? !ac l' armies should, if the French advanced, fight a defensive Frederick battle in a selected position farther back. Steinmetz Charles obeyed, though bitterly resenting the idea of retreat. C‘”” This movement, further, drew his left across the roads reserved for the right column of the II. army, and on receipt of a peremptory order from Prince Frederick Charles to evacuate the road,

Steinmetz telegraphed for instructions direct to the king, over Moltke's head. In reply he received a telegram from Moltke, ordering him to clear the road at once, and couched in terms which he considered as a severe reprimand. An ex- planatory letter, meant to soften the rebuke, was delayed in transmission and did not reach him till too late to modify the orders he had already issued. It must be remembered that Steinmetz at the front was in a better position to judge the apparent situation than was Moltke at Mainz, and that all through the day of the 5th of August he had received intelli- gence indicating a change of attitude in the French army.

The news of the German victory at Weissenburg on the 4th (see below) had in fact completely paralysed the French head- quarters, and orders were issued by them during the course of the 5th to concentrate the whole army of the ? a f ? 0/ Rhine on the selected position of Cadenbronn. As a eren." preliminary, Frossard's corps withdrew from Saar- briicken and began to entrench a position on the Spicheren heights, 3000 yds. to the southward. Steinmetz, therefore, being quite unaware of the scheme for a great battle on the Saar about the 1 2th of August, felt that the situation would best be met, and the letter of his instructions strictly obeyed, by moving his whole command forward to the line of the Saar, and orders to this effect were issued on the evening of the 5th. In pursuance of these orders, the advance guard of the 14th division (Lieutenant General von Kameke) reached Saarbnicken about 9 a.m. on the 6th, where the Germans found to their amazement that the bridges were intact. To secure this advantage was the obvious duty of the commander on the spot, and he at once ordered his troops to occupy a line of low heights beyond the town to serve as a bridge-head. As the leading troops deployed on the heights Frossard's guns on the Spicheren Plateau opened fire, and the advanced guard battery replied. The sound of these guns unchained the whole fighting instinct carefully developed by a long course of Prussian manoeuvre training. Everywhere, generals and troops hurried towards the cannon thunder. Kameke, even more in the dark than Steinmetz as to Moltke's intentions and the strength of his adversaries, attacked at once, precisely as he would have done at manoeuvres, and in half an hour his men were committed beyond recall. As each fresh unit reached the field it was hurried into action where its services 1 This was the celebrated " baptSme de feu " of the prince imperial.

were most needed, and each fresh general as he arrived took a new view of the combat and issued new orders. On the other side, Frossard, knowing the strength of his position, called on his neighbours for support, and determined to hold his ground. Victory seemed certain. There were sufficient troops within easy reach to have ensured a crushing numerical superiority. But the other generals had not been trained to mutual support, and thought only of their own immediate security, and their staffs were too inexperienced to act upon even good intentions; and, finding himself in the course.of the afternoon left to his own devices, Frossard began gradually to withdraw, even before the pressure of the 13th German division on his left flank (about 8 p.m.) compelled his retirement. When darkness ended the battle the Prussians were scarcely aware of their victory. Stein- metz, who had reached the field about 6 p.m., rode back to his headquarters without issuing any orders, while the troops bivouacked where they stood, the units of three army corps being mixed up in almost inextricable confusion. But whereas out of 42,900 Prussians with 120 guns, who in the morning lay within striking distance of the enemy, no fewer than 27,000, with 78 guns were actually engaged; of the French, out of 64,000 with 210 guns only 24,000 with go guns took part in the action. Meanwhile on the German left wing the III. army had begun its advance. Early on the 4th of August it crossed the frontier and fell upon a French detachment under Abel Douay, Mioa of ˆjjˆjj had. been placed near Weissenburg, partly to burg. cover the Pigeonnier pass, but principally to consume

the supplies accumulated in the little dismantled fortress, as these could not easily be moved. Against this force of under 4000 men of all arms, the Germans brought into action successively portions of three corps, in all over 25,000 men with 90 guns. After six hours' fighting, in which the Germans lost some 1500 men, the gallant remnant of the French withdrew deliberately and in good order, notwithstanding the death of their leader at the critical moment. The Germans were so elated by their victory over the enemy, whose strength they naturally overestimated, that "they forgot to send cavalry in pursuit, and thus entirely lost touch with the enemy.

Next day the advance was resumed, the two Bavarian corps moving via Mattstall through the foothills of the Vosges, the V. corps on their left towards Preuschdorf, and the XL farther to the left again, through the wooded plain of the Rhine valley. The 4th cavalry division scouted in advance, and army head- quarters moved to Sulz. About noon the advanced patrols discovered MacMahon's corps in position on the left bank of the Sauer (see Worth: Battle of). As his army was dispersed over a wide area, the crown prince determined to devote the 6th to

concentrating the troops, and, probably to avoid alarming the enemy, ordered the cavalry to stand fast.

At night the outposts of the I. Bavarians and V. corps on the Sauer saw the fires of the French encampment and heard the noise of railway traffic, and rightly conjectured the approach of reinforcements. MacMahon had in fact determined to stand in the very formidable position he had selected, and he counted on receiving support both from the 7th corps (two divisions of which were being railed up from Colmar) and from the 5th corps, which lay around Bitche. It was also quite possible, and the soundest strategy, to withdraw the bulk of the troops then facing the German I. and II. armies to his support, and these would reach him by the 8th. He was therefore justified in accepting battle, though it was to his interest to delay it as long as possible.

At dawn on the 6th of August the commander of the V. corps outposts noticed certain movements in the French lines, and to clear up the situation brought his guns into action. vr'rffi -ˆ s at Spicheren, the sound of the guns set the whole machinery of battle in motion. The French artillery immediately accepted the Prussian challenge. The I. Bavarians, having been ordered to be ready to move if they heard artillery fire, immediately advanced against the French left, encountering presently such a stubborn resistance that parts of their line began to give way. The Prussians of the V. corps felt that they

could not abandon their allies, and von Kirchbach, calling on the XL corps for support, attacked with the troops at hand. When the crown prince tried to break off the fight it was too late. Both sides were feeding troops into the firing line, as and where they could lay hands on them. Up to 2 p.m. the French fairly held their own, but shortly afterwards their right yielded to the overwhelming pressure of the XL corps, and by 3.30 it was in full retreat. The centre held on for another hour, but in its turn was compelled to yield, and by 4.30 all organized resistance was at an end. The debris of the French army was hotly pursued by the German divisional squadrons towards Reichshofen, where serious panic showed itself. When at this stage the supports sent by de Failly from Bitche came on the ground they saw the hopelessness of intervention, and retired whence they had come. Fortunately for the French , the German 4th cavalry division, on which the pursuit should have devolved, had been forgotten by the German staff, and did not reach the front before darkness fell. Out of a total of 82,000 within reach of the battlefield, the Germans succeeded in bringing into action 77,500. The French, who might have had 50,000 on the field, deployed only 37,000, and these suffered a

collective loss of no less than 20,100; some regiments losing up to 90% and still retaining some semblance of discipline and order.

Under cover of darkness the remnants of the French army escaped. When at length the 4th cavalry division had succeeded in forcing .a way through the confusion of the battlefield, all touch with the enemy had been lost, and being without firearms the troopers were checked by the French stragglers in the woods and the villages, and thus failed to establish the true line of retreat of the French. Ultimately the latter, having gained the railway near Luneville, disappeared from the German front altogether, and all trace of them was lost until they were discovered, about the 26th of August, forming part of the army of Chalons, whither they had been conveyed by rail via Paris. This is a remarkable example of the strategical value of railways to an army operating in its own country.

In the absence of all resistance, the III. army now proceeded to carry out the original programme of marches laid down in Moltke's memorandum of the 6th of May, and marching on a broad front through a fertile district it reached the line of the Moselle in excellent order about the 17th of August, where it halted to await the result of the great battle of Gravelotte- St Privat.

We return now to the I. army at Saarbriicken. Its position on the morning of the 7 th of August gave cause for the gravest anxiety. At daylight a dense fog lay over the country, and through the mist sounds of heavy firing came *°^£ oa from the direction of Forbach, where French stragglers the Saar. had rallied during the night. The confusion on the battlefield was appalling, and the troops in no condition to go forward. Except the 3rd, 5th and 6th cavalry divisions no closed troops were within a day's march; hence Steinmetz decided to spend the day in reorganizing his infantry, under cover of his available cavalry. But the German cavalry and staff were quite new to their task. The 6th cavalry division, which had bivouacked on the battlefield, sent on only one brigade towards Forbach, retaining the remainder in reserve. The 5th, thinking that the 6th had already undertaken all that was necessary, withdrew behind the Saar, and the 3rd, also behind the Saar, reported that the country in its front was unsuited to cavalry movements, and only sent out a few officers' patrols. These were well led, but were too few in number, and their reports were consequently unconvincing.

In the course of the day Steinmetz became very uneasy, and ultimately he decided to concentrate his army by retiring the VII. and VIII. corps behind the river on to the I. (which had arrived near Saarlouis), thus

clearing the Saarbrucken-Metz road for the use of the II. army. But at this moment Prince Frederick Charles suddenly modified his views. During the 6th of August his scouts had reported considerable French forces near Bitche (these were the 5th, de Failly's corps), and early in the morning of the 7th he received a telegram from Moltke

informing him that MacMahon's beaten army was retreating on the same place (the troops observed were in fact those which had marched to MacMahon's assistance). The prince forthwith deflected the march of the Guards, IV. and X. corps, towards Rohrbach, whilst the IX. and XII. closed up to supporting distance behind them. Thus, as Steinmetz moved away to the west and north, Frederick Charles was diverging to the south and east, and a great gap was opening in the very centre of the German front. This was closed only by the III. corps, still on the battle-field, and by portions of the X. near Saargemiind, 1 whilst within striking distance lay 130,000 French troops, prevented only by the incapacity of their chiefs from delivering a decisive counter-stroke.

Fortunately for the Prussians, Moltke at Mainz took a different view. Receiving absolutely no intelligence from the front during the 7th, he telegraphed orders to the I. and II. armies (10.25 v.u.) to halt on the 8th, and impressed on Steinmetz the necessity of employing his cavalry to clear up the situation. The I. army had already begun the marches ordered by Stein- metz. It was now led back practically to its old bivouacs amongst the unburied dead. Prince Frederick Charles only conformed to Moltke's order with the III. and X. corps; the remainder executed their concentration towards the south and east.

During the night of the 7th of August Moltke decided that the French army must be in retreat towards the Moselle and forthwith busied himself with the preparation of fresh tables of march for the two armies, his object being to swing up the left wing to outflank the enemy from the south. This work, and the transfer of headquarters to Homburg, needed time, hence no fresh orders were issued to either army, and neither commander would incur the responsibility of moving without any. The I. army therefore spent a fourth night in bivouac on the battle- field. But Constantin von Alvensleben, commanding the III. corps, a man of very different stamp from his colleagues, hearing at first hand that the French had evacuated St Avoid, set his corps in motion early in the morning of the 10th August down the St Avold-Metz road, reached St Avoid and obtained con- clusive evidence that the French were retreating.

During the 9th the orders for the advance to the Moselle were issued. These were based, not on an exact knowledge of where the French army actually stood, but on the opinion ˆtb”” Moltke had formed as to where it ought to have been Moselle. on military grounds solely, overlooking the fact that the French staff were not free to form military decisions but were compelled to bow to political expediency.

Actually on the 7th of August the emperor had decided to attack the Germans on the 8th with the whole Rhine Army, but this decision was upset by alarmist reports from the beaten army of MacMahon. He then decided to retreat to the Moselle, as Moltke had foreseen, and there to draw to himself the remnants of MacMahon’s army (now near Luneville). At the same time he assigned the executive command over the whole Rhine Army to Marshal Bazaine. This retreat was begun during the course of the 8th and 9th of August; but on the night of the 9th urgent telegrams from Paris induced the emperor to suspend the move- ment, and during the 10th the whole army took up a strong position on the French Nied.

Meanwhile the II. German army had received its orders to march in a line of army corps on a broad front in the general direction of Pont-a-Mousson, well to the south of Metz. The I. army was to follow by short marches in echelon on the right ; only the III. corps was directed on Falkenberg, a day’s march farther towards Metz along the St Avold-Metz road. The movement was begun on the 10th, and towards evening the French army was located on the right front of the III. corps. This entirely upset Moltke’s hypothesis, and called for a complete modification of his plans, as the III. corps alone could not be expected to resist the impact of Bazaine’s five corps. The III. corps therefore received orders to stand fast for the moment, and the remainder of the II. army was instructed to wheel to the 1 The II. corps had not yet arrived from Germany.

right and concentrate for a great battle to the east of Metz on the 1 6th or 17th.

Before, however, these orders had been received the sudden retreat of the French completely changed the situation. The Germans therefore continued their movement towards the Moselle. On the 13th the French took up a fresh position 5 m. to the east of Metz, where they were located by the cavalry and the advanced guards of the I. army.

Again Moltke ordered the I. army to observe and hold the enemy, whilst the II. was to swing round to the north. The cavalry was to scout beyond the Moselle and intercept all communication with the

heart of France (see Metz). f£.f e l f . By this time the whole German army had imbibed the Borny. idea that the French were in full retreat and endeavour- ing to evade a decisive struggle. When therefore during the morning of the 14th their outposts observed signs of retreat in the French position, their impatience could no longer be restrained; as at Worth and Spicheren, an outpost commander brought up his guns, and at the sound of their fire, every unit within reach spontaneously got under arms (battle of Colombey- Borny). In a short time, with or without orders, the I., VII., VIII. and IX. corps were in full march to the battle-field. But the French too turned back to fight, and an obstinate engage- ment ensued, at the close of which the Germans barely held the ground and the French withdrew under cover of the Metz forts. ‘

Still, though the fighting had been indecisive, the conviction of victory remained with the Germans, and the idea of a French retreat became an obsession. To this idea Moltke gave expression in his orders issued early on the 15th, in which he laid down that the ” fruits of the victory ” of the previous evening could only be reaped by a vigorous pursuit towards the passages of the Meuse, where it was hoped the French might yet be overtaken. This order, however, did not allow for the hopeless inability of the French staff to regulate the movement of congested masses of men, horses and vehicles, such as were now accumulated in the streets and environs of Metz. Whilst Bazaine had come to no definite decision whether to stand and fight or continue to retreat, and was merely drifting under the impressions of the moment, the Prussian leaders, in particular Prince Frederick Charles, saw in imagination the French columns in rapid orderly move- ment towards the west, and calculated that at best they could not be overtaken short of Verdun.

In this order of ideas the whole of the II. army, followed on its right rear by two-thirds of the I. army (the I. corps being detached to observe the eastern side of the fortress), were pushed on towards the Moselle, the cavalry far in advance towards the Meuse, whilst only the 5th cavalry division was ordered to scout towards the Metz- Verdun road, and even that was disseminated over far too wide an area.

Later in the day (15th) Frederick Charles sent orders to the III. corps, which was on the right flank of his long line of columns and approaching the Moselle at Corny and Noveant, to march via Gorze to Mars-la-Tour on the Metz-Verdun road; to the X. corps, strung out along the road from Thiaucourt to Pont- a-Mousson, to move to Jarny; and for the remainder to push on westward to seize the Meuse crossings. No definite information as to the French army reached him

in time to modify these instructions.

Meanwhile the 5th (Rheinbaben's) cavalry division, at about 3 p.m. in the afternoon, had come into contact with the French cavalry in the vicinity of Mars-la-Tour, and gleaned intelligence enough to show that no French infantry had as yet reached Rezonville. The commander of the X. corps at Thiaucourt, informed of this, became anxious for the security of his flank during the next day's march and decided to push out a strong flanking detachment under von Caprivi, to support von Rhein- baben and maintain touch with the III. corps marching on his right rear.

Von Alvensleben, to whom the 6th cavalry division had mean- while been assigned, seems to have received no local intelligence whatsoever; and at daybreak on the 16th he began his march

in two columns, the 6th division on Mars-la-Tour, the 5th towards the Rezonville-Vionville plateau. And shortly after 9.15 a.m. he suddenly discovered the truth. The entire French Battle of armv l av on l" s "Sˆ 1 fl an k) an d ms nearest supports vionvilie- were almost a day's march distant. In this crisis he Mars-la- made up his mind at once to attack with every Tour – available man, and to continue to attack, in the con-

viction that his audacity would serve to conceal his weakness. All day long, therefore, the Brandenburgers of the III. corps, supported ultimately by the X. corps and part of the IX., attacked again and again. The enemy was thrice their strength, but very differently led, and made no adequate use of his superiority (battle of Vionville-Mars-la Tour) .

Meanwhile Prince Frederick Charles, at Pont-a-Mousson, was still confident in the French retreat to the Meuse, and had even issued orders for the 17th on that assumption. Firing had been heard since 0.15 a.m., and about noon Alvensleben's first report had reached him, but it was not till after 2 that he realized the situation. Then, mounting his horse, he covered the 15 m. to Flavigny over crowded and difficult roads within the hour, and on his arrival abundantly atoned for his strategic errors by his unconquerable determination and tactical skill. When darkness put a stop to the fighting, he considered the position. Cancelling all previous orders, he called all troops within

reach to the battle-field and resigned himself to wait for them. The situation was indeed critical. The whole French army of five corps, only half of which had been engaged, lay in front of him. His own army lay scattered over an area of 30 m. by 20, and only some 20,000 fresh troops — of the IX. corps — could reach the field during the forenoon of the 17 th.

It August. He did not then know tnat M °l tke nad already inter- vened and had ordered the VII., VIII. and II. corps 1 to his assistance. Daylight revealed the extreme exhaustion of both men and horses. The men lay around in hopeless confusion amongst the killed and wounded, each where sleep had over- taken him, and thus the extent of the actual losses, heavy enough, could not be estimated. Across the valley, bugle sounds revealed the French already alert, and presently a long line of skirmishers approached the Prussian position. But they halted just beyond rifle range, and it was soon evident that they were only intended to cover a further withdrawal. Presently came the welcome intelligence that the reinforcements were well on their way.

About noon the king and Moltke drove up to the ground, and there was an animated discussion as to what the French would do next. Aware of their withdrawal from his immediate front, Prince Frederick Charles reverted to his previous idea and insisted that they were in full retreat towards the north, and that their entrenchments near Point du Jour and St Hubert (see map in article Metz) were at most a rearguard position. Moltke was inclined to the same view, but considered the alterna- tive possibility of a withdrawal towards Metz, and about 2 p.m. orders were issued to meet these divergent opinions. The whole army was to be drawn up at 6 a.m. on the 18th in an echelon facing north, so as to be ready for action in either direction. The king and Moltke then drove to Pont-a-Mousson, and the troops bivouacked in a state of readiness. The rest of the 17th was spent in restdring order in the shattered III. and X. corps, and by nightfall both corps were reported fit for action. Strangely enough, there were no organized cavalry reconnaissances, and no intelligence of importance was collected during the night of the i7th-i8th.

Early on the 18th the troops began to move into position in the following order from left to right: XII. (Saxons), Guards, IX., VIII. and VII. The X. and III. were retained in reserve.

The idea of the French retreat was still uppermost in the prince's mind, and the whole army therefore moved north. But between 10 and n a.m. part of the truth — viz. that the French had their backs to Metz and stood in battle order

1 Of the I. army the I. corps was retained on the east side of Metz. The II. corps belonged to the II. army, but had not yet reached the front.

from St Hubert northwards — became evident, and the II. army, pivoting on the I., wheeled to the right and moved eastward. Suddenly the IX. corps fell right on the Battle ot centre of the French line (Amanvillers) , and a most oraveiotte- desperate encounter began, superior control, as before, Saiat ceasing after the guns had opened fire. Prince Frederick PH ˆ at Charles, however, a little farther north, again asserted his tactical ability, and about 7 p.m. he brought into position no less than five army corps for the final attack. The sudden collapse of French resistance, due to the frontal attack of the Guards (St Privat) and the turning movement of the Saxons (Roncourt), rendered the use of this mass unnecessary, but the resolution to use it was there. On the German right (I. army), about Gravelotte, all superior leading ceased quite early in the afternoon, and at night the French still showed an unbroken front. Until midnight, when the prince's victory was reported, the suspense at head- quarters was terrible. The I. army was exhausted, no steps had been taken to ensure support from the III. army, and the IV. corps (II. army) lay inactive 30 m. away.

This seems a fitting place to discuss the much-disputed point of Bazaine's conduct in allowing himself to be driven back into Metz when fortune had thrown into his hands the great opportunity of the 16th and 17th of August. He inf/iett. had been appointed to command on the 10th, but the presence of the emperor, who only left the front early on the 16th, and their dislike of Bazaine, exercised a disturbing influence on the headquarters staff officers. During the retreat to Metz the marshal had satisfied himself as to the inability of his corps commanders to handle their troops, and also as to the ill-will of the staff. In the circumstances he felt that a battle in the open field could only end in disaster; and, since it was proved that the Germans could outmarch him, his army was sure to be overtaken and annihilated if he ventured beyond the shelter of the fortress. But near Metz he could at least inflict very severe punishment on his assailants, and in any case his presence in Metz would neutralize a far superior force of the enemy for weeks or months. What use the French government might choose to make of the breathing space thus secured was their business, not his; and subsequent events showed that, had they not forced MacMahon's hand, the existence of the latter's nucleus army of trained troops might have prevented the investment of Paris. Bazaine was condemned by court-martial after the war, but if the case were reheard to-day it is certain that no charge of treachery could be sustained.

On the German side the victory at St Privat was at once followed up by the headquarters. Early on the 19th the invest- ment of Bazaine's army in Metz was commenced. A new army, the Army of the Meuse (often called the IV.), was as soon as possible formed of all troops not required for the maintenance of the investment, and marched off under the command of the crown prince of Saxony to discover and destroy the remainder of the French field army, which at this moment was known to be at Chalons.

The operations which led to the capture of MacMahon's army in Sedan call for little explanation. Given seven corps, each capable of averaging 1 5 m. a day for a week in succes- sion, opposed to four corps only, shaken by defeat tsedan. and unable as a whole to cover more than 5 m. a day, the result could hardly be doubtful. But Moltke's method of conducting operations left his opponent many openings which could only be closed by excessive demands on the marching power of the men. Trusting only to his cavalry screen to secure information, he was always without any definite fixed point about which to manceuvre, for whilst the reports of the screen and orders based thereon were being transmitted, the enemy was free to move, and generally their movements were dictated by political expediency, not by calculable military motives.

Thus whilst the German army, on a front of nearly 50 m., was marching due west on Paris, MacMahon, under political pressure, was moving parallel to them, but on a northerly route, to attempt the relief of Metz.

So unexpected was this move and so uncertain the information which called attention to it, that Moltke did not venture to change at once the direction of march of the whole army, but he directed the Army of the Meuse northward on Damvillers and ordered Prince Frederick Charles to detach two corps from the forces investing Metz to reinforce it. For the moment, therefore, MacMahon's move had succeeded, and the opportunity existed for Bazaine to break out. But at the critical moment the hopeless want of real efficiency in MacMahon's army com- pelled the latter so to delay his advance that it became evident to the Germans that there was no longer any necessity for the III. army to maintain the direction towards Paris, and that the probable point of contact between the Meuse army and the French lay nearer to the right wing of the III. army than to Prince

Frederick Charles's investing force before Metz.

The detachment from the II. army was therefore counter- manded, and the whole III. army changed front to the north, while the Meuse army headed the French off from the east. The latter came into contact with the head of the French columns, during the 29th, about Nouart, and on the 30th at Buzancy (battle of Beaumont) ; and the French, yielding to the force of numbers combined with superior moral, were driven north- westward upon Sedan (q.v.), right across the front of the III. army, which was now rapidly coming up from the south.

During the 31st the retreat practically became a rout, and the morning of the 1st of September found the French crowded around the little fortress of Sedan, with only one line of retreat to the north-west still open. By n a.m. the XL corps (III. army) had already closed that line, and about noon the Saxons (Army of the Meuse) moving round between the town and the Belgian frontier joined hands with the XL, and the circle of investment was complete. The battle of Sedan was closed about 4.15 p.m. by the hoisting of the white flag. Terms were agreed upon during the night, and the whole French army, with the emperor, passed into captivity. (F. N. M.)

Thus in five weeks one of the French field armies was im- prisoned in Metz, the other destroyed, and the Germans were free to march upon Paris. This seemed easy. There could be no organized opposition to their progress, 1 and Paris, if not so defenceless as in 1814, was more populous. Starvation was the best method of attacking an over-crowded fortress, and the Parisians were not thought to be proof against the deprivation of their accustomed luxuries. Even ' Moltke hoped that by the end of October he would be " shooting hares at Creisau," and with this confidence the German III. and IV. armies left the vicinity of Sedan on the 4th of September. The march called for no more than good staff arrangements, and the two armies arrived before Paris a fortnight later and gradually encircled the place — the III. army on the south, tfae IV. on the north side — in the last days of September. Headquarters were established at Versailles. Meanwhile the Third Empire had fallen, giving place on the 4th of September to a republican Government of National Defence, which made its appeal to, and evoked, the spirit of 1 792. Henceforward the French nation, which had left the conduct of the war to the regular army and had been little more than an excited spectator, took the burden upon itself.

The regular army, indeed, still contained more than 500,000 men (chiefly recruits and reservists), and 50,000 sailors, marines, douaniers, &c, were also available. But the Garde Mobile, framed by

Marshal Niel in 1868, doubled this figure, and the addition of the Garde Nationale, called into existence on the 15th of September, and including all able-bodied men of from 31 to 60 years of age, more than trebled it. The German staff had of course to reckon on the Garde Mobile, and did so beforehand, but they wholly underestimated both its effective members and its willingness, while, possessing themselves a system in which all the military elements of the German nation stood close behind

1 The 13th corps (Vinoy), which had followed MacMahon's army at some distance, was not involved in the catastrophe of Sedan, and by good luck as well as good management evaded the German pursuit and returned safely to Paris.

Later opera- tioas.

the troops of the active army, they ignored the potentialities of the Garde Nationale.

Meanwhile, both as a contrast to the events that centred on Paris and because in point of time they were decided for the most part in the weeks immediately following Sedan, we must briefly allude to the sieges conducted by the Germans — Paris (q.v.), Metz (q.v.) and Belfort (q.v.) excepted. Old and ruined as many of them were, the French fortresses possessed consider- able importance in the eyes of the Germans. Strassburg, in particular, the key of Alsace, the standing menace to South Germany and the most conspicuous of the spoils of Louis XIV. 's Raubkriege, was an obvious target. Operations were begun on the 9th of August, three days after Worth, General v. Werder's corps (Baden troops and Prussian Landwehr) making the siege. The French commandant, General Uhrich, surrendered after a stubborn resistance on the 28th of September. Of the smaller fortresses many, being practically unarmed and without garrisons, capitulated at once. Toul, defended by Major Huck with 2000 mobiles, resisted for forty days, and drew upon itself the efforts of 13,000 men and 100 guns. Verdun, commanded by General Guerin de Waldersbach, held out till after the fall of Metz. Some of the fortresses lying to the north of the Prussian line of advance on Paris, e.g. Mezieres, resisted up to January 1871, though of course this was very largely due to the diminution of pressure caused by the appearance of new French field armies in October. On the 9th of September a strange incident took place at the surrender of Laon. A powder magazine was blown up by the soldiers in charge and 300 French and a few German soldiers were killed by the explosion. But as the Germans advanced, their lines of communication were thoroughly organized, and the belt of country

between Paris and the Prussian frontier subdued and garrisoned. Most of these fortresses were small town enceintes, dating from Vauban's time, and open, under the new conditions of warfare, to concentric bombardment from positions formerly out of range, upon which the besieger could place as many guns as he chose to employ. In addition they were usually deficient in armament and stores and garrisoned by newly-raised troops. Belfort, where the defenders strained every nerve to keep the besiegers out of bombarding range, and Paris formed the only exceptions to this general rule.

The policy of the new French government was defined by Jules Favre on the 6th of September. " It is for the king of Prussia, who has declared that he is making war on T]je the Empire and not on France, to stay his hand; we "Defense shall not cede an inch of our territory or a stone of our Natioa- fortresses." These proud words, so often ridiculed a "' as empty bombast, were the prelude of a national effort which re-established France in the eyes of Europe as a great power, even though provinces and fortresses were ceded in the peace that that effort proved unable to avert. They were translated into action by Leon Gambetta, who escaped from Paris in a balloon on the 7th of October, and established the headquarters of the defence at Tours, where already the " Delegation " of the central govern- ment — which had decided to remain in Paris— : had concentrated the machinery of government. Thenceforward Gambetta and his principal assistant de Freycinet directed the whole war in the open country, co-ordinating it, as best they could with the precarious means of communication at their disposal, with Trochu's military operations in and round the capital. His critics — Gambetta's personality was such as to ensure him numerous enemies among the higher civil and military officials, over whom, in the interests of La Patrie, he rode rough-shod — ■ have acknowledged the fact, which is patent enough in any case, that nothing but Gambetta's driving energy enabled France in a few weeks to create and to equip twelve army corps, repre- senting thirty-six divisions (600,000 rifles and 1400 guns), after all her organized regular field troops had been destroyed or neutralized. But it is claimed that by undue interference with the generals at the front, by presuming to dictate their plans of campaign, and by forcing them to act when the troops were unready, Gambetta and de Frsycinet nullified the efforts of themselves and the rest of the nation and subjected France

to a humiliating treaty of peace. We cannot here discuss the justice or injustice of such a general condemnation, or even whether in individual instances Gambetta trespassed too far into the special domain of the soldier. But even the brief narrative given below must at least suggest to the reader the existence amongst the generals and higher officials of a dead weight of passive resistance to the Delegation's orders, of unnecessary distrust of the qualities of the improvised troops, and above all of the utter fear of responsibility that twenty years of literal obedience had bred. The closest study of the war cannot lead to any other conclusion than this, that whether or not Gambetta as a strategist took the right course in general or in particular cases, no one else would have taken any* course whatever.

On the approach of the enemy Paris hastened its preparations for defence to the utmost, while in the provinces, out of reach of the German cavalry, new army corps were rapidly organized out of the few constituted regular units not involved in the previous catastrophes, the depot troops and the mobile national guard. The first-fruits of these efforts were seen in Beauce, where early in October important masses of French troops prepared not only to bar the further progress of the invader but actually to relieve Paris. The so-called " fog of war " — the armed inhabitants, francs-tireurs, sedentary national guard and volunteers — prevented the German cavalry from venturing far out from the infantry camps around Paris, and behind this screen the new 15th army corps assembled on the Loire. But an untimely demonstration of force alarmed the Germans, all of whom, from Moltke downwards, had hitherto disbelieved in the existence of the French new formations, and the still unready 15th corps found itself the target of an expedition of the I. Bavarian corps, which drove the defenders out of Orleans after a sharp struggle, while at the same time another expedition swept the western part of Beauce, sacked Chateaudun as a punishment for its brave defence, and returned via Chartres, which was occupied.

After these events the French forces disappeared from German eyes for some weeks. D'Aurelle de Paladines, the commander of the " Army of the Loire " (15th and 16th corps), improvised a camp of instruction at Salbris in Sologne, several marches out of reach, and subjected his raw troops to a stern regime of drill and discipline. At the same time an " Army of the West " began to gather on the side of Le Mans. This army was almost imaginary, yet rumours of its existence and numbers led the German commanders into the gravest errois, for they soon came to suspect that the main army lay on that side and not on the Loire, and this mistaken impression governed the German dispositions up to the very eve of the decisive events around Orleans in December. Thus

when at last D'Aurelle took the offensive from Tours (whither he had transported his forces, now 100,000 strong) against the position of the I. Bavarian corps near Orleans, he found his task easy. The Bavarians, out- numbered and unsupported, were defeated with heavy losses in the battle of Coulmiers (November 9), and, had it not been for the inexperience, want of combination, and other technical weaknesses of the French, they would have been annihilated. What the results of such a victory as Coulmiers might have been, had it been won by a fully organized, smoothly working army of the same strength, it is difficult to overestimate. As it was, the retirement of the Bavarians rang the alarm bell all along the line of the German positions, and that was all.

Then once again, instead of following up its success, the French army disappeared from view. The victory had emboldened the " fog of war " to make renewed efforts, and resistance to the pressure of the German cavalry grew day by day. The Bavarians were reinforced by two Prussian divisions and by all available cavalry commands, and constituted as an " army detachment " under the grand-duke Friedrich Franz of Mecklen- burg-Schwerin to deal with the Army of the Loire, the strength of which was far from being accurately known. Meantime the capitulation of Metz on the 28th of October had set free the veterans of Prince Frederick Charles, the best troops in the

German army, for field operations. The latter were at first misdirected to the upper Seine, and yet another opportunity arose for the French to raise the siege of Paris. But D'Aurelle utilized the time he had gained in strengthening the army and in imparting drill and discipline to the new units which gathered round the original nucleus of the 15th and 16th corps. All this was, however, unknown and even unsuspected at the German headquarters, and the invaders, feeling the approaching crisis, became more than uneasy as to their prospects of maintaining the siege of Paris.

At this moment, in the middle of November, the general situation was as follows: the German III. and Meuse armies, investing Paris, had had to throw off important detachments to protect the enterprise, which they had ™f eans undertaken on the assumption that no further field campaign. armies of the enemy were to be encountered. The maintenance of their communications with Germany, relatively unimportant when the struggle took place in the circumstances of field warfare, had become supremely necessary, now that the army had come to a standstill and undertaken a great siege, which required heavy guns and constant replenishment of ammunition and stores. The rapidity of the German invasion had left no time for the proper

organization and full garrisoning of these communications, which were now threatened, not merely by the Army of the Loire, but by other forces assembling on the area protected by Langres and Belfort. The latter, under General Cambriels, were held in check and no more by the Baden troops and reserve units (XIV. German corps) under General Werder, and eventually without arousing attention they were able to send 40,000 men to the Army of the Loire. This army, still around Orleans, thus came to number perhaps 150,000 men, and opposed to it, about the 14th of November, the Ger- mans had only the Army Detachment of about 40,000, the II. army being still distant. It was under these conditions that the famous Orleans campaign took place. After many vicissitudes of fortune, and with many misunderstandings between Prince Frederick Charles, Moltke and the grand-duke, the Germans were ultimately victorious, thanks principally to the brilliant fighting of the X. corps at Beaune-la-Rolande(28th of November), which was followed by the battle of Loigny-Poupry on the 2nd of December and the second capture of Orleans after heavy fighting on the 4th of December.

The result of the capture of Orleans was the severance of the two wings of the French army, henceforward commanded respectively by Chanzy and Bourbaki. The latter fell back at once and hastily, though not closely pursued, to Bourges. But Chanzy, opposing the Detachment between Beaugency and the Forest of Marchenoir, was of sterner metal, and in the five days' gene'ral engagement around Beaugency (December 7- n) the Germans gained little or no real advantage. Indeed their solitary material success, the capture of Beaugency, was due chiefly to the fact that the French there were subjected to conflicting orders from the military and the governmental authorities. Chanzy then abandoned little but the field of battle, and on the grand-duke's representations Prince Frederick Charles, leaving a mere screen to impose upon Bourbaki (who allowed himself to be deceived and remained inactive), hurried thither with the II. army. After that Chanzy was rapidly driven north-westward, though always presenting a stubborn front. The Delegation left Tours and betook itself to Bordeaux, whence it directed the government for the rest of the war. But all this continuous marching and fighting, and the growing severity of the weather, compelled Prince Frederick Charles to call a halt for a few days. About the 19th of December, therefore, the Germans (II. army and Detachment) were closed up in the region of Chartres, Orleans, Auxerre and Fontaine- bleau, Chanzy along the river Sarthe about Le Mans and Bourbaki • still passive towards Bourges.

During this, as during other halts, the French government and its

generals occupied themselves with fresh plans of cam- paign, the former with an eager desire for results, the latter (Chanzy excepted) with many misgivings. Ultimately, and

fatally, it was decided that Bourbaki, whom nothing could move towards Orleans, should depart for the south-east, with a view to relieving Belfort and striking perpendicularly against the long line of the Germans' communications. This movement, bold to the point of extreme rashness judged by any theoretical rules of strategy, seems to have been suggested by de Freycinet. As the execution of it fell actually into incapable hands, it is difficult to judge what would have been the result had a Chanzy or a Faidherbe been in command of the French. At any rate it was vicious in so far as immediate advantages were sacrificed to hopes of ultimate success which Gambetta and de Freycinet did wrong to base on Bourbaki's powers of generalship. Late in December, for good or evil, Bourbaki marched off into Franche-Comte and ceased to be a factor in the Loire campaign. A mere calculation of time and space sufficed to show the German headquarters that the moment had arrived to demolish the stubborn Chanzy.

Prince Frederick Charles resumed the interrupted offensive, pushing westward with four corps and four cavalry divisions LeMaas. wmcn converged on Le Mans. There on the 10th, nth and 12th of January 1871 a stubbornly contested battle ended with the retreat of the French, who owed their defeat solely to the misbehaviour of the Breton mobiles. These, after deserting their post on the battlefield at a mere threat of the enemy's infantry, fled in disorder and infected with their terrors the men in the reserve camps of instruction, which broke up in turn. But Chanzy, resolute as ever, drew off his field army intact towards Laval, where a freshly raised corps joined him. The prince's army was far too exhausted to deliver another effective blow, and the main body of it gradually drew back into better quarters, while the grand duke departed for the north to aid in opposing Faidherbe. Some idea of the strain to which the invaders had been subjected may be gathered from the fact that army corps, originally 30,000 strong, were in some cases reduced to 10,000 and even fewer bayonets. And at this moment Bourbaki was at the head of 120,000 men! Indeed, so threaten- ing seemed the situation on the Loire, though the French south of that river between Gien and Blois were mere isolated brigades, that the prince hurried back from Le Mans to Orleans to take

personal command. A fresh French corps, bearing the number 25, and being the twenty-first actually raised during the war, appeared in the field towards Blois. Chanzy was again at the head of 156,000 men. He was about to take the offensive against the 40,000 Germans left near Le Mans when to his bitter disappointment he received the news of the armistice. ” We have still France,” he had said to his staff, undeterred by the news of the capitulation of Paris, but now he had to submit, for even if his improvised army was still cheerful, there were many significant tokens that the people at large had sunk into apathy and hoped to avoid worse terms of peace by discontinuing the contest at once.

So ended the critical period of the ” Defense nationale.” It may be taken to have lasted from the day of Coulmiers to the last day of Le Mans, and its central point was the battle of Beaune-Ia-Rolande. Its characteristics were, on the German side, inadequacy of the system of strategy practised, which became palpable as soon as the organs of reconnaissance met with serious resistance, misjudgment of and indeed contempt for the fighting powers of ” new formations,” and the rise of a spirit of ferocity in the man in the ranks, born of his resentment at the continuance of the war and the ceaseless sniping of the franc-tireur’s rifle and the peasant’s shot-gun. On the French side the continual efforts of the statesmen to stimulate the generals to decisive efforts, coupled with actual suggestions as to the plans of the campaign to be followed (in default, be it said, of the generals themselves producing such plans), and the pro- fessional soldiers’ distrust of half-trained troops, acted and reacted upon one another in such a way as to neutralize the powerful, if disconnected and erratic, forces that the war and the Republic had unchained. As for the soldiers themselves, their most conspicuous qualities were their uncomplaining endurance of fatigues and wet bivouacs, and in action their

capacity for a single great effort and no more. But they were unreliable in the hands of the veteran regular general, because they were heterogeneous in recruiting, and unequal in experience and military qualities, and the French staff in those days was wholly incapable of moving masses of troops with the rapidity demanded by the enemy’s methods of war, so that on the whole it is difficult to know whether to wonder more at their missing success or at their so nearly achieving it.

The decision, as we have said, was fought out on the Loire and the Sarthe. Nevertheless the glorious story of the ” Defense nationale ” includes two other important campaigns — that of Faidherbe in the

north and that of Bourbaki in the east.

In the north the organization of the new formations was begun by Dr Testelin and General Farre. Bourbaki held the command for a short time in November before pro- ceeding to Tours, but the active command in field herbe's operations came into the hands of Faidherbe, a general campaign. whose natural powers, so far from being cramped by years of peace routine and court repression, had been developed by a career of pioneer warfare and colonial administration. General Farre was his capable chief of staff. Troops were raised from fugitives from Metz and Sedan, as well as from depot troops and the Garde Mobile, and several minor successes were won by the national troops in the Seine valley, for here, as on the side of the Loire, mere detachments of the investing army round Paris were almost powerless. But the capitulation of Metz came too soon for the full development of these sources of military strength, and the German I. army under Manteuffel, released from duty at Metz, marched north-eastward, capturing the minor fortresses on its way. Before Faidherbe assumed command, Farre had fought several severe actions near Amiens, but, greatly outnumbered, had been defeated and forced to retire behind the Somme. Another French general, Briand, had also engaged the enemy without success near Rouen. Faidherbe assumed the command on the 3rd of December, and promptly moved forward. A general engagement on the little river Hallue (December 23), east-north-east of Amiens, was fought with no decisive results, but Faidherbe, feeling that his troops were only capable of winning victories in the first rush, drew them off on the 24th. His next effort, at Bapaume (January 2-3, 1871), was more successful, but its effects were counterbalanced by the surrender of the fortress of Peronne (January 9) and the consequent establishment of the Germans on the line of the Somme. Meanwhile the Rouen troops had been contained by a strong German detachment, and there was no further chance of succouring Paris from the north. But Faidherbe, like Chanzy, was far from despair, and in spite of the deficiencies of his troops in equipment (50,000 pairs of shoes, supplied by English contractors, proved to have paper soles), he risked a third great battle at St Quentin (January 19). This time he was severely defeated, though his loss in killed and wounded was about equal to that of the Germans, who were commanded by Goeben. Still the attempt of the Germans to surround him failed and he drew off his forces with his artillery and trains unharmed. The Germans, who had been greatly impressed by the solidity of his army, did not pursue him far, and Faidherbe was preparing for a fresh effort when he received orders to suspend hostilities.

The last episode is Bourbaki's campaign in the east, with its mournful close at Pontarlier. Before the crisis of the last week of November, the French forces under General Cremer, Cambriels' successor, had been so far successful in minor enterprises that, as mentioned above, the right wing of the Loire army, severed from the left by the battle of Orleans and subsequently held inactive at Bourges and Nevers, was ordered to Franche Comte to take the offensive against the XIV. corps and other German troops there, to relieve Belfort and to strike a blow across the invaders' line of communications. But there were many delays in execution. The staff work, which was at no time satisfactory in the French armies of 1870, was complicated by the snow, the bad state of the roads, and the mountainous nature of the country, and Bourbaki, 9. brave general of division in action,

but irresolute and pretentious as a commander in chief, was not the man to cope with the situation. Only the furious courage and patient endurance of hardships of the rank and file, and the good qualities of some of the generals, such as Clinchant, Cremer and Billot, and junior staff officers such as Major Brugere (afterwards generalissimo of the French army), secured what success was attained.

Werder, the German commander, warned of the imposing concentration of the French, evacuated Dijon and Dole just in Thv time to avoid the blow and rapidly drew together his

campaign forces behind the Ognon above Vesoul. A furious in the attack on one of his divisions at Villersexel (January 9) ' — cost him 2000 prisoners as well as his killed and wounded, and Bourbaki, heading for Belfort, was actually nearer to the fortress than the Germans. But at the crisis more time was wasted, Werder (who had almost lost hope of maintaining himself and had received both encouragement and stringent instructions to do so) slipped in front of the French, and took up a long weak line of defence on the river Lisaine, almost within cannon shot of Belfort. The cumbrous French army moved up and attacked him there with 150,000 against 60,000 (January 15-17, 187 1). It was at last repulsed, thanks chiefly to Bourbaki's inability to handle his forces, and, to the bitter disappointment of officers and men alike, he ordered a retreat, leaving Belfort to its fate.

Ere this, so urgent was the necessity of assisting Werder, Manteuffel

had been placed at the head of a new Army of the South. Bringing two corps from the I. army opposing Faidherbe and calling up a third from the armies around Paris, and a fourth from the II. army, Manteuffel hurried southward by Langres to the Saone. Then, hearing of Werder's victory on" the Lisaine, he deflected the march so as to cut off Bourbaki's retreat, drawing off the left flank guard of the latter (commanded with much iclat and little real effect by Garibaldi) by a sharp feint attack on Dijon. The pressure of Werder in front and Manteuffel in flank gradually forced the now thoroughly disheartened French forces towards the Swiss frontier, and Bourbaki, realizing at once the ruin of his army and his own incapacity to re-establish its efficiency, shot himself, though not fatally, on the 26th of January. Clinchant, his successor, acted promptly enough to remove the immediate danger, but on the 29th he was informed of the armistice without at the same time being told that Belfort and the eastern theatre of war had been on Jules Favre's demand expressly excepted from its operation. 1 Thus the French, the leaders distracted by doubts and the worn-out soldiers fully aware that the war was practically over, stood still, while Manteuffel completed his preparations for hemming them in. On the 1 st of February General Clinchant led his troops into Switzerland, where they were disarmed, interned and well cared for by the authorities of the neutral state. The rearguard fought a last action with the advancing Germans before passing the frontier. On the 16th, by order of the French government, Belfort capitulated, but it was not until the nth of March that the Germans took possession of Bitche, the little fortress on the Vosges, where in the early days of the war de Failly had illus- trated so signally the want of concerted action and the neglect of opportunities which had throughout proved the bane of the French armies.

The losses of the Germans during the whole war were 28,000 dead and 101,000 wounded and disabled, those of the French, 156,000 dead (17,000 of whom died, of sickness and wounds, as prisoners in German hands) and 143,000 wounded and disabled. 720,000 men surrendered to the Germans or to the authorities of neutral states, and at the close of the war there were still 250,000 troops on foot, with further resources not immediately available to the number of 280,000 more. In this connexion, and as evidence of the respective numerical yields of the German system working normally and of the French improvised for the emergency, we quote from Berndt (Zahl im Kriege) the following comparative figures: —

1 Jules Favre, it appears, neglected to inform Gambetta of the exception.

End of July . . . French 250,000, Germans 384,000 under arms. Middle of November ,, ioo,ooo „ 425,000 „

After the surrender

of Paris and the

disarmament of

Bourbaki's army . „ 534,000 „ 835,000 „

The date of the armistice was the 28th of January, and that of the ratification of the treaty of Frankfurt the 23rd of May

1871.

Bibliography. — The literature of the war is ever increasing in volume, and the following list only includes a very short selection made amongst the most important works.

General. — German official history, Der deulsch-franzosische Krieg (Berlin, 1872-1881 ; English and French translations) ; monographs of the German general staff (Kriegsgesch. Einzelschriften) ; Moltke, Gesch. des deutsch-franzos. Krieges (Berlin, 1 891 ; English translation) and Gesammelte Schrifien des G. F. M. Grafen v. Moltke (Berlin, 1900-) ; French official history, La Guerre de 1870-1871 (Paris, 1902-) (the fullest and most accurate account) ; P. Lehautcourt (General Palat), Hist, de la guerre de 1870-1871 (Paris, 1901-1907) ; v. Verdy du Vernois, Studien iiber den Krieg . . . auf Grundlage 1870-1871 (Berlin, 1892-1896) ; G. Cardinal von Widdern, Kritische Tage 1870-187 1 (French translation, Journees critiques). Events preceding the war are dealt with in v. Bernhardi, Zwischen zwei Kriegen; Baron Stoffel, Rapports militaires 1866-1870 (Paris, 1871 ; English translation) ; G. Lehmann, Die Mobilmachung 1870-1871 (Berlin, 1905).

For the war in Lorraine: Prince Kraft of Hohenlohe-Ingelfingen, Briefe iiber Strategic (English translation, Letters on Strategy) ; F. Foch, Conduite de la guerre, pt. ii. ; H. Bonnal, Manoeuvre de Saint Privat (Paris, 1904-1906) ; Maistre, Spicheren (Paris, 1908) ; v. Schell, Die Operationen der I. Armee unter Gen. von Steinmetz (Berlin, 1872; English translation) ; F. Hoenig, Taktik der Zukunft (English translation), and 24 Slunden Moltke' schen Strategie (Berlin, 1892; English and French translations).

For the war in Alsace and Champagne: H. Kunz, Schlacht von Worth

(Berlin, 1891), and later works by the same author; H. Bonnal, Frbschweiler (Paris, 1899) ; Hahnke, Die Operationen des III. Armee bis Sedan (Berlin, 1873; French translation).

For the war in the Provinces: v. der Goltz, Leon Gambetta und seine Armeen (Berlin, 1877); Die Operationen der II. Armee an die Loire (Berlin, 1875); Die sieben Tage von Le Mans (Berlin, 1873); Kunz, Die Zusammensetzung der franzos. Provinzialheeren; de Freycinet, La Guerre en province (Paris, 1871); L. A. Hale, The People's War (London, 1904) ; Hoenig, Volkskrieg an die Loire (Berlin, 1892) ; Blifme, Operationen v. Sedan bis zum Ende d. Kriegs (Berlin, 1872 ; English translation) ; v. Schell, Die Operationen der I. Armee unter Gen. v. Goeben (Berlin, 1873; English translation); Count Wartensleben, Feldzug der Nordarmee unter Gen. v. Manteuffel (Berlin, 1872), Operationen der Sudarmee (Berlin, 1872; English translation) ; Faidherbe, Campagne de V armee du nord (Paris, 1872). For the sieges : Frobenius, Kriegsgesch. Beispiele d. Festungskriegs aus d. deutsch.-franz. Kg. (Berlin, 1899-1900); Goetze, Tatigkeit der deutschen Ingenieuren (Berlin, 1871 ; English translation).

The most useful bibliography is that of General Palat ("P. Lehautcourt "). (C. F. A.)

FRANCOIS DE NEUFCHATEAU, NICOLAS LOUIS, Count

(1750-1828), French statesman and poet, was born at Saffais near Rozieres in Lorraine on the 17th of April 1750, the son of a school-teacher. He studied at the Jesuit college of Neufchateau in the Vosges, and at the age of fourteen published a volume of poetry which obtained the approbation of Rousseau and of Voltaire. Neufchateau conferred on him its name, and he was elected member of some of the principal academies of France. In 1783 he was named procureur-general to the council of Santo Domingo. He had previously been engaged on a translation of Ariosto, which he finished before his return to France five years afterwards, but it perished during the shipwreck which

occurred during his voyage home. After the Revolution he was elected deputy suppleant to the National Assembly, was charged with the organization of the Department of the Vosges, and was elected later to the Legislative Assembly, of which he first became secretary and then president. In 1793 he was imprisoned on account of the political sentiments, in reality very innocent, of his drama Pamela ou la vertu rScompensie (Theatre de la Nation, 1st August 1793), but was set free a few days afterwards at the revolution of the 9th Thermidor. In 1797 he became minister of the interior, in which office he distinguished himself by the thoroughness of his administration in all departments. It is to him that France owes its system of inland navigation. He inaugurated the museum of the Louvre,

and was one of the promoters of the first universal exhibition of industrial products. From 1804 to 1806 he was president of the Senate, and in that capacity the duty devolved upon him of soliciting Napoleon to assume the title of emperor. In 1808 he received the dignity of count. Retiring from public life in 1814, heoccupied himself chiefly in the study of agriculture, until his death on the 10th” of January 1828.

Francois de Neufchateau had very multifarious accomplish- ments, and interested himself in a great variety of subjects, but his fame rests chiefly on what he did as a statesman for the encouragement and development of the industries of France. His maturer poetical productions did not fulfil the promise of those of his early years, for though some of his verses have a superficial elegance, his poetry generally lacks force and originality. He had considerable qualifications as a grammarian and critic, as is witnessed by his editions of the Provinciates and Pensees of Pascal (Paris, 1822 and

1826) and Gil Bias (Paris, 1820). His principal poetical works are Poisies diverses (1765); Ode sur les parlements (1771); Nouveaux Conies moraux (1781); Les Vosges (1796); Fables et contes (1814); and Les Tropes, ou les figures de mots (1817). He was also the author of a large number of works on agriculture.

See Recueil des lettres, circulaires, discours et autres actes publics emanes du Qte. Francois pendant ses deux exercices du ministere de Vinterieur (Paris, An. vii.-viii., 2 vols.) ; Notice biographique sur M. le comte Francois de Neufchdteau (1828), by A. F. de Sillery; H. Bonnelier, Memoires sur Francois de Neufchdteau (Paris, 1829); J. Lamoureux, Notice historique et litteraire sur la vie et les ecrits de Francois de Neufchdteau (Paris, 1843) ; E. Meaume, £tude historique et biographique sur les Lorrains revolutionnaires : Palissot, Gregoire, Francois de Neufchdteau (Nancy, 1882); Ch. Simian, Francois de Neufchdteau et les expositions (Paris, 1889).

FRANCONIA (Ger. Franken), the name of one of the stem- duchies of medieval Germany. It stretched along the valley of the Main from the Rhine to Bohemia, and was bounded on the north by Saxony and Thuringia, and on the south by Swabia and Bavaria. It also included a district around Mainz, Spires and Worms, on the left bank of the Rhine. The word Franconia, first used in a Latin charter of 1053, was applied like the words France, Francia and Franken, to a portion of the land occupied by the Franks.

About the close of the 5th century this territory was conquered by Clovis, king of the Salian Franks, was afterwards incorporated with the kingdom of Austrasia, and at a later period came under the rule of Charlemagne. After the treaty of Verdun in 843 it became the centre of the East Frankish or German kingdom, and in theory remained so for a long period, and was for a time the most important of the duchies which arose on the ruins of the Carolingian empire. The land was divided into counties, or gaiien, which were ruled by counts, prominent among whom were members of the families of Conradine and Babenberg, by whose feuds it was frequently devastated. Conrad, a member of the former family, who took the title of ” duke in Franconia ” about the year 900, was chosen German king in 911 as the representative of the foremost of the German races. Conrad handed over the chief authority in Franconia to his brother Eberhard, who remained on good terms with Conrad’s successor Henry I. the Fowler, but rose against the succeeding king, Otto the Great, and was killed in battle in 939, when his territories were divided. The influence of Franconia began to decline under the kings of the Saxon house. It lacked political unity, had no opportunities for extension,

and soon became divided into Rhenish Franconia {Francia rhenensis, Ger. Rheinfranken) and Eastern Franconia {Francia orientalis, Ger. Ostfranken). The most influential family in Rhenish Franconia was that of the Salians, the head of which early in the 10th century was Conrad the Red, duke of Lorraine, and son-in-law of Otto the Great. This Conrad, his son Otto and his grandson Conrad are sometimes called dukes of Franconia: and in 1024 his great- grandson Conrad, also duke of Franconia, was elected German king as Conrad II. and founded the line of Franconian or Salian emperors. Rhenish Franconia gradually became a land of free towns and lesser nobles, and under the earlier Franconian

emperors sections passed to the count palatine of the Rhine, the archbishop of Mainz, the bishops of Worms and Spires and' other clerical and lay nobles; and the name Franconia, or Francia orientalis as it was then called, was confined to the eastern portion of the duchy. Clerical authority was becoming predominant in this region. A series of charters dating from 822 to 1025 had granted considerable powers to the bishops of Wiirzburg, who, by the time of the emperor Henry II., possessed judicial authority over the whole of eastern Franconia. The duchy was nominally retained by the emperors in their own hands until 1115, when the emperor Henry V., wishing to curb the episcopal influence in this neighbourhood, appointed his nephew Conrad of Hohenstaufen as duke of Franconia. Conrad's son Frederick took the title of duke of Rothenburg instead of duke of Franconia, but in 1196, on the death of Conrad of Hohenstaufen, son of the emperor Frederick I., the title fell into disuse. Meanwhile the bishop of Wiirzburg had regained his former power in the duchy, and this was confirmed in 1 168 by the emperor Frederick I.

The title remained in abeyance until the early years of the 15th century, when it was assumed by John II., bishop of Wiirz- burg, and retained by his successors until the bishopric was secularized in 1802. The greater part of the lands were united with Bavaria, and the name Franconia again fell into abeyance. It was revived in 1837, when Louis I., king of Bavaria, gave to three northern portions of his kingdom the names of Upper, Middle and Lower Franconia. In 1633 Bernhard, duke of Saxe- Weimar, hoping to create a principality for himself out of the ecclesiastical lands, had taken the title of duke of Franconia, but his hopes were destroyed by his defeat at Nordlingen in 1634. When Germany was divided into circles by the emperor Maxi- milian I. in 1500, the name Franconia was given to that circle which included the eastern part of the old duchy. The lands formerly comprised in the duchy of Franconia are now divided between the kingdoms of Bavaria and Wiirttemberg, the grand- duchies of Baden and Hesse, and the

Prussian province of Hesse-Nassau.

See J. G. ab Eckhart, Commentarii de rebus Franciae orientalis et episcopatus Wirceburgensis (Wiirzburg, 1729); F. Stein, Geschichte Frankens (Schweinfurt, 1885-1886); T. Henner, Die herzogliche Gewalt der Bischofe von Wiirzburg (Wiirzburg, 1874).

FRANCS -ARCHERS. The institution of the francs-archers was the first attempt at the formation of regular infantry in France. They were created by the ordinance of Montils-les-Tours on the 28th of August 1448, which prescribed that in each parish an archer should be chosen from among the most apt in the use of arms; this archer to be exempt from the tattle and certain obligations, to practise shooting with the bow on Sundays and feast-days, and to hold himself ready to march fully equipped at the first signal. Under Charles VII. the francs-archers dis- tinguished themselves in numerous battles with the English, and assisted the king to drive them from France, During the succeeding reigns the institution languished, and finally dis- appeared in the middle of the 16th century. The francs-archers were also called francs-taupins.

See Daniel, Histoire de la milice francaise (1721) ; and E. Boutaric, Institutions militaires de la France avant les armies permanentes (1863).

FRANCS-TIREURS (” Free-Shooters “), irregular troops, almost exclusively infantry, employed by the French in the war of 1870-1871. They were originally rifle clubs or unofficial military societies formed in the east of France at the time of the Luxem- burg crisis of 1867. The members were chiefly concerned with the practice of rifle-shooting, and were expected in war to act as light troops. As under the then system of conscription the greater part of the nation’s military energy was allowed to run to waste, the francs-tireurs were not only popular, but efficient workers in their sphere of action. As they wore no uniforms, were armed with the best existing rifles and elected their own officers, the government made repeated attempts to bring the societies, which were at once a valuable asset to the armed strength of France and a possible menace to internal order, under military discipline. This was strenuously resisted by the societies, to their sorrow as it turned out, for the Germans treated

captured francs-tireurs as irresponsible non-combatants found with arms in their hands and usually exacted the death penalty. In July 1870, at the outbreak of the war, the societies were brought under the control of the minister of war and organized for field service, but it was not until the 4th of November — by which time the levie en masse was in f6rce — that they were placed under the orders of the generals in the field. After that they were sometimes organized in large bodies and incorporated in the mass of the armies, but more usually they continued to work in small bands, blowing up culverts on the~invaders' lines of communica- tion, cutting off small reconnoitring parties, surprising small posts, &c. It is now acknowledged, even by the Germans, that though the francs-tireurs did relatively little active mischief, they paralysed large detachments of the enemy, contested every step of his advance (as in the Loire campaign), and prevented him from gaining information, and that their soldierly qualities inproved with experience. Their most celebrated feats were the blowing up of the Moselle railway bridge at Fontenoy on the 22nd of January 187 1 (see Les Chasseurs des Vosges by Lieut.-Colonel St Etienne, Toul, 1906), and the heroic defence of Chateaudun by Lipowski's Paris corps and the francs-tireurs of Cannes and Nantes (October 18, 1870). It cannot be denied that the original members of the rifle clubs were joined by many bad characters, but the patriotism of the majority was unquestionable, for little mercy was shown by the Germans to those francs-tireurs who fell into their hands. The severity of the German reprisals is itself the best testimony to the fear and anxiety inspired by the presence of active bands of francs-tireurs on the flanks and in rear of the invaders.

FRANEKER, a town in the province of Friesland, Holland, 5 m. E. of Harlingen on the railway and canal to Leeuwarden. Pop. (1900) 7187. It was at one time a favourite residence of the Frisian nobility, many of whom had their castles here, and it possessed a celebrated university, founded by the Frisian estates in 1585. This was suppressed by Napoleon I. in 181 1, and the endowments were diverted four years later to the support of an athenaeum, and afterwards of a gymnasium, with which a physiological cabinet and a botanical garden are connected. Franeker also possesses a town hall (1591), which contains a planetarium, made by one Eise Eisinga in 1 774-1881. The fine observatory was founded about 1780. The church of St Martin (1420) contains several fine tombs of the i5th-i7th centuries. The industries of the town include silk-weaving, woollen-spinning, shipbuilding and pottery-making. It is also a considerable market for agricultural produce.

FRANK, JAKOB (1726-1791), a Jewish theologian, who founded in

Poland, in the middle of the 18th century, a sect which emanated from Judaism but ended by merging with Christianity. The sect was the outcome of the Messianic mysticism of Sabbetai Zebi. It was an antinomian movement in which the authority of the Jewish law was held to be super- seded by personal freedom. The Jewish authorities, alarmed at the moral laxity which resulted from the emotional rites of the Frankists, did their utmost to suppress the sect. But the latter, posing as an anti-Talmudic protest in behalf of a spiritual religion, won a certain amount of public sympathy. There was, however, no deep sincerity in the tenets of the Frankists, for though in 1759 they were baptized en masse, amid much pomp, the Church soon became convinced that Frank was not a genuine convert. He was imprisoned on a charge of heresy, but on his release in 1763 the empress Maria Theresa patronized him, regarding him as a propagandist of Christianity among the Jews. He thenceforth lived in state as baron of Offenbach, and on his death (1791) his daughter Eva succeeded him as head of the sect. The Frankists gradually merged in the general Christian body, the movement leaving no permanent trace in the synagogue. (I. A.)

FRANK-ALMOIGN (libera eleemosyna, free alms), in the English law of real property, a species of spiritual tenure, whereby a religious corporation, aggregate or sole, holds lands of the donor to them and their successors for ever. It was a tenure dating from Saxon times, held not on the ordinary feudal conditions, but discharged of all services except the trinoda necessitas.

But ” they which hold in frank-almoign are bound of right before God to make orisons, prayers, masses and other divine services for the souls of their grantor or feoffor, and for the souls of their heirs which are dead, and for the prosperity and good life and good health of their heirs which are alive. And therefore they shall do no fealty to their lord, because that this divine service is better for them before God than a’ny doing of fealty ” (Litt. s. 135). It was the tenure by which the greater number of the monasteries and religious houses held their lands; it was ex- pressly exempted from the statute 12 Car.II. c.24 (1660), by which the other ancient tenures were abolished, and it is the tenure by which the parochial clergy and many ecclesiastical and eleemosy- nary foundations hold their lands at the present day. As a form of donation, however, it came to an end by the passing of tire statute Quia Emptores, for by that statute no new tenure of frank-almoign could be created, except by the crown.

See Pollock and Maitland, History of English Law, where the history of frank-almoign is given at length.

FRANKEL, ZECHARIAS (1801-1875), Jewish theologian, one of the founders of the Breslau school of ” historical Judaism.” This school attempts to harmonize critical treatment of the docu- ments of religion with fidelity to traditional beliefs and observ- ances. For a time at least, the compromise succeeded in staying the disintegrating effects of the liberal movement in Judaism. Frankel was the author of several valuable works, among them Septuagint Studies, an Introduction to the Mishnah (1859), and a similar work on the Palestinian Talmud (1870). He also edited the Monatsschrift, devoted to Jewish learning on modern lines. But his chief claim to fame rests on his headship of the Breslau Seminary. This was founded in 1854 for the training of rabbis who should combine their rabbinic studies with secular courses at the university. The whole character of the rabbinate has been modified under the influence of this, the first seminary of the kind. (I. A.)

FRANKENBERG, a manufacturing town of Germany, in the kingdom of Saxony, on the Zschopau, 7 m. N.E. of Chemnitz, on the railway Niederwiesa-Rosswein. Pop. (1905) 13,303. The principal buildings are the large Evangelical parish church, restored in 1874-1875, and the town-hall. Its industries include extensive woollen, cotton and silk weaving, dyeing, the manu- facture of brushes, furniture and cigars, iron-founding and machine building. It is well provided with schools, including one of weaving.

FRANKENHAUSEN, a town of Germany, in the principality of Schwarzburg-Rudolstadt, on an artificial arm of the Wipper, a tributary of the Saale, 36 m. N.N.E. of Gotha. Pop. (1905) 6534. It consists of an old and a new town, the latter mostly rebuilt since a destructive fire in 1833, and has an old chateau of the princes of Schwarzburg, three Protestant churches, a seminary for teachers, a hospital and a modern town-hall. Its industries include the manufacture of sugar, cigars and buttons, and there are brine springs, with baths, in the vicinity. At Frankenhausen a battle was fought on the 15th of May 1525, in which the insurgent peasants under Thomas Miinzer were defeated by the allied princes of Saxony and Hesse.

FRANKENSTEIN, a town of Germany, in the Prussian province of Silesia, on the Pausebach, 35 m. S. by W. of Breslau. Pop. (1905) 7890. It is still surrounded by its medieval walls, has two Evangelical and three Roman Catholic churches, among the latter the parish church with a curious overhanging tower, and a monastery. The industries include the manufacture of artificial manures, bricks, beer and straw hats. There are also mills for grinding the magnesite found in the neighbourhood.

FRANKENTHAL, a town of Germany, in the Bavarian Palatinate, on the Isenach, connected with the Rhine by a canal 3 m. in length, 6 m. N.W. from Mannheim, and on the railways Neunkirchen-Worms and Frankenthal-Grosskarlbach. Pop. (1905) 18,191. It has two Evangelical and a Roman Catholic church, a fine medieval town-hall, two interesting old gates, remains of its former environing walls, several public monuments, including one to the veterans of the Napoleonic wars, and a museum. Its industries include the manufacture

of machinery, casks, corks, soap, dolls and furniture, iron- founding and bell-founding — the famous ” Kaiserglocke ” of the Cologne cathedral was cast here. FrankentHal was formerly famous for its porcelain factory, established here in 1755 by Paul Anton Hannong of Strassburg, who sold it in 1 762 to the elector palatine Charles Theodore. Its fame is mainly due to the modellers Konrad Link (1732-1802) and Johann Peter Melchior (d. 1796) (who worked at Frankenthal between 1779 and 1793). The best products of this factory are figures and groups repre- senting contemporary life, or allegorical subjects in the rococo taste of the period, and they are surpassed only by those of the more famous factory at Meissen. In 1795 the factory was sold to Peter von Reccum, who removed it to Griinstadt.

Frankenthal (Franconodal) is mentioned as a village in the 8th century. A house of Augustinian canons established here in 1 1 19 by Erkenbert, chamberlain of Worms, was suppressed in 1562 by the elector palatine Frederick III., who gave its possessions to Protestant refugees from the Netherlands. In 1577 this colony received town rights from the elector John Casimir, whose successor fortified the place. From 1623 until 1652, save for two years, it was occupied by the Spaniards, and in 1 688-1 689 it was stormed and burned by the French, the fortifications being razed. In 1697 it was reconstituted as a town, and under the elector Charles Theodore it became the capital of the Palatinate. From 1798 to 1814 it was incorporated in the French department of Mont Tonnerre.

See Wille, Stadt «. Festung Frankenthal wahrend des dreissig- jdhrigen Krieges (Heidelberg, 1877); Hildenbrand, Gesck. der Stadt Frankenthal (1893). For the porcelain see Heuser, Frankenthaler Gruppen und Figuren (Spires, 1899).

FRANKENWALD, a mountainous district of Germany, forming the geological connexion between the Fichtelgebirge and the Thuringian Forest. It is a broad well-wooded plateau, running for about 30 m. in a north-westerly direction, descending gently on the north and eastern sides towards the Saale, but more precipitously to the Bavarian plain in the west, and attaining its highest elevation in the Kieferle near Steinheid (2900 ft.). Along the centre lies the watershed between the basins of the Main and the Saale, belonging to the systems of the Rhine and Elbe respectively. The principal tributaries of the Main from the Frankenwald are the Rodach and Hasslach, and of the Saale, the Selbitz.

See H. Schmid, Fiihrer durch den Frankenwald (Bamberg, 1894); Meyer, Thiiringen und der Frankenwald (15th ed., Leipzig, 1900), and Gumbel, Geognoslische Beschreibung des Fichtelgebirges mit dent Frankenwald (Gotha, 1879).

FRANKFORT, a city and the county-seat of Clinton county, Indiana, U.S.A., 40 m. N.W. of Indianapolis. Pop. (1890) 5919; (1900) 7100 (144 foreign-born); (1910) 8634. Frankfort is served by the Chicago, Indianapolis & Louisville, the Lake Erie & Western, the Vandalia, and the Toledo, St Louis & Western railways, and by the Indianapolis & North Western Traction Interurban railway (electric). The city is a division point on the Toledo, St Louis & Western railway, which has large shops here. Frankfort is a trade centre for an agricultural and lumber ing region; among its manufactures are handles, agricultural implements and foundry products. The first settlement in the neighbourhood was made in 1826; in 1830 the town was founded, and in 1875 it was chartered as a city. The city limits were considerably extended immediately after 1900.

FRANKFORT, the capital city of Kentucky, U.S.A., and the county-seat of Franklin county, on the Kentucky river, about 55 m. E. of Louisville. Pop. (1890) 7892; (1900) 9487, of whom 3316 were negroes; (1910 census) 10,465. The city is served by the Chesapeake & Ohio, the Louisville & Nashville, and the Frankfort & Cincinnati railways, by the Central Kentucky Traction Co. (electric), and by steamboat lines to Cincinnati, Louisville and other river ports. It is built among picturesque hills on both sides of the river, and is in the midst of the famous Kentucky ” brue grass region ” and of a rich lumber-producing region. The most prominent building is the Capitol, about 400 ft. long and 185 ft. wide, built of granite and white limestone in the Italian Renaissance style, with 70 large Ionic columns, and a

dome 205 ft. above the terrace line, supported by 24 other columns. The Capitol was built in 1905-1907 at a cost of more than $2,000,000; in it are housed the state library and the library of the Kentucky State Historical Society. At Frankfort, also, are the state arsenal, the state penitentiary and the state home for feeble-minded children, and just outside the city limits is the state coloured normal school. The old capitol (first occupied in 1829) is still standing. In Franklin cemetery rest the remains of Daniel Boone and of Theodore O'Hara (1820-1867), a lawyer, soldier, journalist and poet, who served in the U.S. army in 1846-1848 during the Mexican War, took part in filibustering expeditions to Cuba, served in the Confederate army, and is best known as the author of " The Bivouac of the Dead," a poem written for the burial in Frankfort of some soldiers who had lost their lives at Buena Vista. Here also are the graves of Richard M. Johnson, vice-president of the United States in 1837-1841, and the sculptor Joel T. Hart (1810-1877). The city has a considerable trade with the surrounding country, in which large quantities of tobacco and hemp are produced; its manufactures include lumber, brooms, chairs, shoes, hemp twine, canned vegetables and glass bottles. The total value of the city's factory product in 1905 was $1,747,338, being 31-6% more than in 1900. Frankfort (said to have been named after Stephen Frank, one of an early pioneer party ambushed here by Indians) was founded in 1786 by General James Wilkinson, then deeply interested in trade with the Spanish at New Orleans, and in the midst of his Spanish intrigues. In 1792 the city was made the capital of the state. In 1862, during the famous campaign in Kentucky of General Braxton Bragg (Confederate) and General D. C. Buell (Federal), Frankfort was occupied for a short time by Bragg, who, just before being forced out by Buell, took part in the inauguration of Richard J. Hawes, chosen governor by the Confederates of the state. Hawes, however, never discharged the duties of his office. During the bitter contest for the governor- ship in 1900 between William Goebel (Democrat) and William S. Taylor (Republican), each of whom claimed the election, Goebel was assassinated at Frankfort. (See also Kentucky.) Frankfort received a city charter in 1839.

FRANKFORT-ON-MAIN (Ger. Frankfurt am Main), a city of Germany, in the Prussian province of Hesse-Nassau, prin- cipally on the right bank of the Main, 24 m. above its confluence with the Rhine at Mainz, and 16 m. N. from Darmstadt. Always a place of great trading importance, long the place of election for the German kings, and until 1866, together with Hamburg, Bremen and Liibeck, one of the four free cities of Germany, it still retains its position as one of the leading commercial centres of the German empire. Its situation in the broad

and fertile valley of the Main, the northern horizon formed by the soft outlines of the Taunus range, is one of great natural beauty, the surrounding country being richly clad with orchard and forest.

Frankfort is one of the most interesting, as it is also one of the wealthiest, of German cities. Apart from its commercial importance, its position, close to the fashionable watering-places of Homburg, Nauheim and Wiesbaden, has rendered it " cos- mopolitan " in the best sense of the term. The various stages in the development of the city are clearly indicated in its general plan and the surviving names of many of its streets. The line of the original 12th century walls and moat is marked by the streets of which the names end in -graben, from the Hirschgraben on the W. to the Wollgraben on the E. The space enclosed by these and by the river on the S. is known as the " old town " (Altstadt). The so-called " new town " (Neustadt), added in 1333, extends to the Anlagen, the beautiful gardens and promenades laid out (1806-1812) on the site of the 17th century fortifications, of which they faithfully preserve the general ground plan. Of the medieval fortifications the picturesque Eschenheimer Tor, a round tower 155 ft. high, dating from 1400 to 1428, the Renten- turm (1456) on the Main and the Kuhhirtenturm (c. 1490) in Sachsenhausen, are the sole remains. Since the demolition of the fortifications the city has greatly expanded. Sachsenhausen on the south bank of the river, formerly the seat of a commandery

of the Teutonic Order (by treaty with Austria in 1842 all pro- perty and rights of the order in Frankfort territory were sold to the city, except the church and house), is now a quarter of the city. In other directions also the expansion has been rapid; the village of Bornheim was incorporated in Frankfort in 1877, the former Hessian town of Bockenheim in 1895, and the suburbs of Niederrad, Oberrad and Seckbach in 1900.

The main development of the city has been to the north of the river, which is crossed by numerous bridges and flanked by fine quays and promenades. The Altstadt, though several broad streets have been opened through it, still preserves many of its narrow alleys and other medieval features. The Judengasse (Ghetto), down to 1806 the sole Jews' quarter, has been pulled down, with the exception of the ancestral house of the Rothschild family — No. 148 — which has been restored and retains its ancient facade. As the Altstadt is mainly

occupied by artisans and petty tradesmen, so the Neustadt is the principal business quarter of the city, containing the chief public buildings and the principal hotels. The main arteries of the city are the Zeil, a broad street running from the Friedberger Anlage to the Rossmarkt and thence continued, by the Kaiserstrasse, through the fine new quarter built after 1872, to the magnificent principal railway station; and the Stein weg and Goethestrasse, which lead by the Bockenheimer Tor to the Bockenheimer Landstrasse, a broad boulevard intersecting the fashionable residential suburb to the N.W.

Churches. — The principal ecclesiastical building in Frankfort is the cathedral (Dom). Built of red sandstone, with a massive tower terminating in a richly ornamented cupola and 300 ft. in height, it is the most conspicuous object in the city. Thisbuilding, in which the Roman emperors were formerly elected and, since 1562, crowned, was founded in 8 5 2 by King Louis the German, and was later known as the Salvator Kirche. After its reconstruction (1235-1239), it was dedicated to St Bartholomew. From this period date the nave and the side aisles; the choir was completed in 1315-1338 and the long transepts in 1346-1354. The cloisters were rebuilt in 1348- 1447, and the electoral chapel, on the south of the choir, was completed in 1355. The tower was begun in 1415, but remained unfinished. On the 15th of August 1867 the tower and roof were destroyed by fire and considerable damage was done to the rest of the edifice. The restoration was immediately taken in hand, and the whole work was finished in 1 88 1, including the completion of the tower, according to the plans of the 15th century architect, Hans von Ingelheim. In the interior is the tomb of the German king Gunther of Schwarz- burg, who died in Frankfort in 1349, and that of Rudolph, the last knight of Sachsenhausen, who died in 1371. Among the other Roman Catholic churches are the Leonhardskirche, the Liebfrauenkirche (church of Our Lady) and the Deutschordens- kirche (14th century) in Sachsenhausen. The Leonhardskirche (restored in 1882) was begun in 1219, it is said on the site of the palace of Charlemagne. It was originally a three-aisled basilica, but is now a five-aisled Hallenkirche; the choir was added in 1 3 14. It has two Romanesque towers. The Liebfrauenkirche is first mentioned in 1314 as a collegiate church; the nave was consecrated in 1340. The choir was added in 1 506-1 509 and the whole church thoroughly restored in the second half of the 18th century, when the tower was built (1770). Of the Protestant churches the oldest is the Nikolaikirche, which dates from the 13th century; the fine cast-iron spire erected in 1843 had to be taken down in 1901. The Paulskirche, the principal Evangelical (Lutheran) church, built between 1786 and 1833, is a red sand- stone edifice of no

architectural pretensions, but interesting as the seat of the national parliament of 1848-1849. The Katharinenkirche, built 1678-1681 on the site of an older build- ing, is famous in Frankfort history as the place where the first Protestant sermon was preached in 1522. Among the more noteworthy of the newer Protestant churches are the Peterskirche (1892-1895) in the North German Renaissance style, with a tower 256 ft. high, standing north from the Zeil, the Christus- kirche (1883) and the Lutherkirche (1880-1893). An English church, in Early English Gothic style, situated adjacent to the

Bockenheimer Landstrasse, was completed and consecrated in 1906.

Of the five synagogues, the chief (or Hauptsynagoge) , lying in the Bornestrasse, is an attractive building of red sandstone in the Moorish-Byzantine style.

Public Buildings. — Of the secular buildings in Frankfort, the Romer, for almost five hundred years the Rathaus (town hall) of the city, is of prime historical interest. It lies on the Romer- berg, a square flanked by curious medieval houses. It is first mentioned in 1322, was bought with the adjacent hostelry in 1405 by the city and rearranged as a town hall, and has since, from time to time, been enlarged by the purchase of adjoining patrician houses, forming a complex of buildings of various styles and dates surmounted by a clock tower. The facade was rebuilt (1896-1898) in late Gothic style. It was here, in the Wahlzimmer (or election-chamber) that the electors or their plenipotentiaries chose the German kings, and here in the Kaisersaal (emperors' hall) that the coronation festival was held, at which the new king or emperor dined with the electors after having shown himself from the balcony to the people. The Kaisersaal retained its antique appearance until 1843, when, as also again in 1904, it was restored and redecorated; it is now furnished with a series of modern paintings representing the German kings and Roman emperors from Charlemagne to Francis II., in all fifty-two, and a statue of the first German emperor, William I. New municipal buildings adjoining the " Romer " on the north side were erected in 1900- 1903 in German Renaissance style, with a handsome tower 220 ft. high; beneath it is a public wine-cellar, and on the first storey a grand municipal hall. The palace of the princes of Thurn and Taxis in the Eschenheimer Gasse was built (173 2-1 741) from the designs of Robert de Cotte, chief architect to Louis XIV. of France. From 1806 to 1810 it was the residence of Karl von Dalberg, princeˆ primate of the Confederation of the Rhine, with whose dominions Frankfort had been incorporated by Napoleon. From 181 6 to 1866 it was the seat of the German federal diet, It is now annexed to the principal post office (built 1892-1894),

which lies close to it on the Zeil. The Saalhof , built on the site of the palace erected by Louis the Pious in- 822, overlooking the Main, has a chapel of the 12th century, the substructure dating from Carolingian times. This is the oldest building in Frankfort. The facade of the Saalhof in the Saalgasse dates from 1604, the southern wing with the two gables fromi7i5toi7i7. Of numer- ous other medieval buildings may be mentioned theLeinwandhaus (linendrapers' hall), a 15th century building reconstructed in 1892 as a municipal museum. In the Grosser Hirschgraben is the Goethehaus, a 16th century building which came into the possession of the Goethe family in 1733. Here Goethe lived from his birth in 1 749 until 1 77 5. In 1863 the house was acquired by the Freies deutsche Hochstift and was opened to the public. It has been restored, from Goethe's account of it in Dichtung und Wahrheit, as nearly as possible to its condition in the poet's day, and is now connected with a Goethemuseum (1 897) , with archives and a library of 25,000 volumes representative of the Goethe period of German literature.

Literary and Scientific Institutions. — Few cities of the same size as Frankfort are so richly endowed with literary, scientific and artistic institutions, or possess so many handsome buildings appropriated to their service. The opera-house, erected near the Bockenheimer Tor in 1873-1880, is a magnificent edifice in the style of the Italian Renaissance and ranks among the finest theatres in Europe. There are also a theatre (Schauspielhaus) in modern Renaissance style (1899-1902), devoted especially to drama, a splendid concert hall (Saalbau), opened in 1861, and numerous minor places of theatrical entertainment. The public picture gallery in the Saalhof possesses works by Hans Holbein, Griinewald, Van Dyck, Teniers, Van der Neer, Hans von Kulmbach, Lucas Cranach and other masters. The Stadel Art Institute (Stadel'sches Kunstinstitut) in Sachsenhausen, founded by the banker J. F. Stadel in 1816, contains a picture gallery and a cabinet of engravings extremely rich in works of German art. The municipal library, with 300,000 volumesˆ

boasts among its rarer treasures a Gutenberg Bible printed at Mainz between 1450 and 1455, another on parchment dated 1462, the Institutiones Justiniani (Mainz, 1468), the Theuerdank, with woodcuts by Hans Schaufelein, and numerous valuable autographs. It also contains a fine collection of coins. The Bethmann Museum owes its celebrity principally to Dannecker's " Ariadne," but it also possesses

the original plaster model of Thorwaldsen's " Entrance of Alexander the Great into Babylon." There may also be mentioned the Industrial Art Exhibition of the Polytechnic Association and two conservatories of music. Among the scientific institutions the first place belongs to the Senckenberg' sches naturhistorische Museum, containing valuable collections of birds and shells. Next must be mentioned the Kunstgewerbe (museum of arts and crafts) and the Musical Museum, with valuable MSS. and portraits. Besides the municipal library (Stadtbibliothek) mentioned above there are three others of importance, the Rothschild, the Senckenberg and the Jewish library (with a well-appointed reading-room). There are numerous high-grade schools, musical and other learned societies and excellent hospitals. The last include the large municipal infirmary and the Senckenberg'sches Stift, a hospital and almshouses founded by a doctor, Johann C. Senckenberg (d. 1772). The Royal Institute for experimental therapeutics {Kbnigl.Institul fiir experimentelle Therapie), moved to Frankfort in 1899, attracts numerous foreign students, and is especially concerned with the study of bacteriology and serums.

Bridges. — Seven bridges (of which two are railway) cross the Main. The most interesting of these is the Alte Mainbrucke, a red sandstone structure of fourteen arches, 815 ft. long, dating from the 14th century. On it are a mill, a statue cf Charlemagne and an iron crucifix surmounted by a gilded cock. The latter commemorates, according to tradition, the fowl which was the first living being to cross the bridge and thus fell a prey to the devil, who in hope of a nobler victim had sold his assistance to the architect. Antiquaries, however, assert that it probably marks the spot where criminals were in olden times flung into the river. Other bridges are the Obermainbriicke of five iron arches, opened in 1878; an iron foot (suspension) bridge, the Untermainbrucke; the Wilhelmsbrucke, a fine structure, which from 1849 to 1890 served as a railway bridge and was then opened as a road bridge; and two new iron bridges at Gutleuthof and Niederrad (below the city), which carry the railway traffic from the south to the north bank of the Main, where all lines converge in a central station of the Prussian state railways. This station, which was built in 1883-1888 and has replaced the three stations belonging to private companies, which formerly stood in juxtaposition on the Anlagen (or promenades) near the Mainzer Tor, lies some half-mile to the west. The intervening ground upon which the railway lines and buildings stood was sold for building sites, the sum obtained being more than sufficient to cover the cost of the majestic central terminus (the third largest in the world) , which, in addition to spacious and handsome halls for

passenger accommodation, has three glass-covered spans of 180 ft. width each. Yet the exigencies of traffic demand further extensions, and another large station was in 1909 in process of construction at the east end of the city, devised to receive the local traffic of lines running eastward, while a through station for the north to south traffic was projected on a site farther west of the central terminus.

Frankfort lies at the junction of lines of railway connecting it directly with all the important cities of south and central Germany. Here cross and unite the lines from Berlin to Basel, from Cologne to Wiirzburg and Vienna, from Hamburg and Cassel, and from Dresden and Leipzig to France and Switzerland. The river Main has been dredged so as to afford heavy barge traffic with the towns of the upper Main and with the Rhine, and cargo boats load and unload alongside its busy quays. A well-devised system of electric tramways provides for local communication within the city and with the outlying suburbs.

Trade, Commerce and Industries. — Frankfort has always been more of a commercial than an industrial town, and though of late years it has somewhat lost its pre-eminent position as

a banking centre it has counterbalanced the loss in increased industrial development. The suburbs of Sachsenhausen and Bockenheim have particularly developed considerable industrial activity, especially in publishing and printing, brewing and the manufacture of quinine. Other sources of employment are the cutting of hair for making hats, the production of fancy goods, type, machinery, soap and perfumery, ready-made clothing, chemicals, electro-technical apparatus, jewelry and metal wares. Market gardening is extensively carried on in the neighbourhood and cider largely manufactured. There are two great fairs held in the town, — the Ostermesse, or spring fair, and the Herbstmesse, or autumn fair. The former, which was the original nucleus of all the commercial prosperity of the ci f y, begins on the second Wednesday before Easter; and the latter on the second Wednes- day before the 8th of September. They last three weeks, and the last day save one, called the Nickelchestag, is distinguished by the influx of people from the neighbouring country. The trade in leather is of great and growing importance. A horse fair has been held twice a year since 1862 under the patronage of the agricultural society; and the wool market was reinstituted in 1872 by the German Trade Society (Deutscher Handelsverein). Frankfort has long been famous as one of the principal banking centres of Europe, and is now only second to Berlin, in this respect, among German cities, and it is remarkable for the large business that is done in government stock. In the 17 th century the

town was the seat of a great book- trade; but it has long been distanced in this department by Leipzig. The Frankfurter Journal was founded in 1615, the Postzeitung in 1616, the Neue Frankfurter Zeiiung in 1859, and the Frankfurter Presse in 1866. Of memorial monuments the largest and most elaborate in Frankfort is that erected in 1858 in honour of the early German printers. It was modelled by Ed. von der Launitz and executed by Herr von Kreis. The statues of Gutenberg, Fust and Schoffer form a group on the top; an ornamented frieze presents medallions of a number of famous printers; below these are figures representing the towns of Mainz, Strassburg, Venice and Frankfort; and on the corners of the pedestal are allegorical statues of theology, poetry, science and industry. The statue of Goethe (1844) in the Goetheplatz is by Ludwig von Sch wan- thaler. The Schiller statue, erected in 1863, is the work of a Frankfort artist, Johann Dielmann. A monument in the Bockenheim Anlage, dated 1837, preserves the memory of Guiollett, the burgomaster, to whom the town is mainly indebted for the beautiful promenades which occupy the site of the old fortifications; and similar monuments have been reared to Senckenberg (1863), Schopenhauer, Klemens Brentano the poet and Samuel Thomas Sommerring (1755-1830), the anatomist and inventor of an electric telegraph. In the Opernplatz is an equestrian statue of the emperor Wilhelm I. by Buscher.

Cemeteries. — The new cemetery (opened in 1828) contains the graves of Arthur Schopenhauer and Feuerbach, of Passavant the biographer of Raphael, Ballenberger the artist, Hessemer the architect, Sommerring, and Johann Friedrich Bohmer the historian. The Bethmann vault attracts attention by three bas-reliefs from the chisel of Thorwaldsen; and the Reichenbach mausoleum is a vast pile designed by Hessemer at the command of Wiliiam II. of Hesse, and adorned with sculptures by Zwerger and von der Lausitz. In the Jewish section, which is walled off from the rest of the burying-ground, the most remarkable tombs are those of the Rothschild family.
Parks. — In addition to the park in the south-western district, Frankfort possesses two delightful pleasure grounds, which attract large numbers of visitors, the Palmengarten in the west and the zoological garden in the east of the city. The former is remarkable for the collection of palms purchased in 1868 from the deposed duke Adolph of Nassau.

Government. — The present municipal constitution of the city dates from 1867 and presents some points of difference from the ordinary Prussian system. Bismarck was desirous of giving the city, in view of its former freedom, a more liberal constitution than is usual in ordinary cases. Formerly fifty-four representatives were elected, but

provision was made (in the

constitution) for increasing the number, and they at present number sixty-four, elected for six years. Every two years a third of the number retire, but they are eligible for re-election. These sixty-four representatives elect twenty town-councillors, ten of whom receive a salary and ten do not. The chief burgo- master (Oberbiirgermeister) is nominated by the emperor for twelve years, and the second burgomaster must receive the emperor's approval.

Since 1885 the city has been supplied with water of excellent quality from the Stadtwald, Goldstein and Hinkelstein, and the favourable sanitary condition of the town is seen in the low death rate.

Population. — The population of Frankfort has steadily increased since the beginning of the 19th century; it amounted in 1817 to 41,458; (1840) 55,269; (1864) 77,372; (1871) 59,265; (1875) 103,136; (1890) 179,985; and (1905), including the incorporated suburban districts, 334,951, of whom 175,909 were Protestants, 88,457 Roman Catholics and 21,974 Jews.

History. — Excavations around the cathedral have incontest- ably proved that Frankfort-on-Main (Trajectum ad Moenum) was a settlement in Roman times and was probably founded in the 1st century of the Christian era. It may thus be accounted one of the earliest German — the so-called " Roman " — towns. Numerous places in the valley of the Main are mentioned in chronicles anterior to the time that Frankfort is first noticed. Disregarding popular tradition, which connects the origin of the town with a legend that Charlemagne, when retreating before the Saxons, was safely conducted across the river by a doe, it may be' asserted that the first genuine historical notice of the town occurs in 793, when Einhard, Charlemagne's biographer, tells us that he spent the winter in the villa Frankonovurd. Next year there is mention more than once of a royal palace here, and the early importance of the place is indicated by the fact that in this year it was chosen as the seat of the ecclesiastical council by which image- worship was condemned. The name Frankfort is also found in several official documents of Charle- magne's reign; and from the notices that occur in the early chronicles and charters it would appear that the place was the most populous at least of the numerous villages of the Main district. During the

Carolingian period it was the seat of no fewer than 16 imperial councils or colloquies. The town was probably at first built on an island in the river. It was originally governed by the royal officer or actor dominicus, and down even to the close of the Empire it remained a purely imperial or royal town. It gradually acquired various privileges, and by the close of the 14th century the only mark of dependence was the payment of a yearly tax. Louis the Pious dwelt more frequently at Frankfort than his father Charlemagne had done, and about 823 he built himself a new palace, the basis of the later Saalhof. In 822 and 823 two great diets were held in the palace, and at the former there were present deputies from the eastern Slavs, the Avars and the Normans. The place continued to be a favourite residence with Louis the German, who died there in 876, and was the capital of the East Frankish kingdom. By the rest of the Carolingian kings it was less frequently visited, and this neglect was naturally greater during the period of the Saxon and Salic emperors from 919 to 1137. Diets, however, were held in the town in 951, 1015, 1069 and 1109, and councils in 1000 and 1006. From a privilege of Henry IV., in 1074, granting the city of Worms freedom from tax in their trade with several royal cities, it appears that Frankfort was even then a place of some commercial importance.

Under the Hohenstaufens many brilliant diets were held within its walls. That of 1147 saw, also, the first election of a German king at Frankfort, in the person of Henry, son of Conrad III. But as the father outlived the son, it was Frederick I., Barbarossa, who was actually the first reigning king to be elected here (in n 52). With the beginning of the 13th century the municipal constitution appears to have taken definite shape. The chief official was the royal bailiff (Schultheiss) , who is first mentioned in 1 193, and whose powers were subsequently enlarged by the abolition, in 1219, of the office of the royal Vogt or advo-

catus. About this time a body of Schoflen (scabini, jurats), fourteen in number, was formed to assist in the control ot municipal affairs, and with their appointment the first step was taken towards civic representative government. Soon, however, the activity of the Schoffen became specifically confined to the determination of legal disputes, and in their place a new body (Collegium) of counsellors — Ratmannen — also fourteen in number, was appointed for the general administration of local matters. In 13 1 1, the two burgomasters, now chiefs of the municipality, take the place of the royal Schultheiss. In the 13th century, the Frankfort Fair, which is first mentioned in n 50, and the origin of which must have been long anterior to that date, is referred to as being largely frequented. No fewer than 10 new

churches were erected in the years from 1220 to 1270. It was about the same period, probably in 1 240, that the Jews first settled in the town. In the contest which Louis the Bavarian maintained with the papacy Frankfort sided with the emperor, and it was consequently placed under an interdict for 20 years from 1329 to 1349. On Louis' death it refused to accept the papal conditions of pardon, and only yielded to Charles IV., the papal nominee, when Giinther of Schwarzburg thought it more prudent to abdicate in his favour. Charles granted the city a full amnesty, and confirmed its liberties and privileges.

By the famous Golden Bull of 1356 Frankfort was declared the seat of the imperial elections, and it still preserves an official contemporaneous copy of the original document as the most precious of the eight imperial bulls in its possession. From the date of the bull to the close of the Empire Frankfort retained the position of " Wahlstadt," and only five of the two-and-twenty monarchs who ruled during that period were elected elsewhere. In 1388-1389 Frankfort assisted the South German towns in their wars with the princes and nobles (the Stadtekrieg), and in a consequent battle with the troops of the Palatinate, the town banner was lost and carried to Kronberg, where it was long preserved as a trophy. On peace being concluded in 1391, the town had to pay 12,562 florins, and this brought it into great financial difficulties. In the course of the next 50 years debt was contracted to the amount of 126,772 florins. The diet at Worms in 1495 chose Frankfort as the seat of the newly instituted imperial chamber, or " Reichskammergericht," and it was not till 1527 that the chamber was removed to Spires. At the Reformation Frankfort heartily joined the Protestant party, and in consequence it was hardly treated both by the emperor Charles V. and by the archbishop of Mainz. It refused to subscribe the Augsburg Recess, but at the same time it was not till 1536 that it was persuaded to join the League of Schmal-kalden. On the failure of this confederation it opened its gates to the imperial general Btiren on the 29th of December 1546, although he had passed by the city, which he considered too strong for the forces under his command. The emperor was merciful enough to leave it in possession of its privileges, but he inflicted a fine of 80,000 gold gulden, and until October 1547 the citizens had to endure the presence of from 8000 to 10,000 soldiers. This resulted in a pestilence which not only lessened the population, but threatened to give the death-blow to the great annual fairs; and at the close of the war it was found that it had cost the city no less than 228,931 gulden. In 1552 Frankfort was invested for three weeks by Maurice of Saxony, who was still in arms against the emperor Charles V., but it continued to

hold out till peace was concluded between the principal combatants. Between 1612 and 1616 occurred the great Fettmilch insurrection, perhaps the most remarkable episode in the internal history of Frankfort. The magistracy had been acquiring more and more the character of an oligarchy; all power was practically in the hands of a few closely-related families; and the gravest peculation and malversation took place without hindrance. The ordinary citizens were roused to assert their rights, and they found a leader in Vincenz Fettmilch, who carried the contest to dangerous excesses, but lacked ability to bring it to a successful issue. An imperial commission was ultimately appointed, and the three principal culprits and several of their associates were executed in 1 616. It was not till

1801 that the last mouldering head of the Fettmilch company dropped unnoticed from the Rententurm, the old tower near the bridge. In the words of Dr Kriegk, Geschichte von Frankfurt, (1871), the insurrection completely destroyed the political power of the gilds, gave new strength to the supremacy of the patriciate, and brought no further advantage to the rest of the citizens than a few improvements in the organization and administration of the magistracy. The Jews, who had been attacked by the popular party, were solemnly reinstated by imperial command in all their previous privileges, and received full compensation for their losses.

During the Thirty Years' War Frankfort did not escape. In 1 63 1 Gustavus Adolphus garrisoned it with 600 men, who remained in possession till they were expelled four years later by the imperial general Lamboy. In 1792 the citizens had to pay 2,000,000 gulden to the French general Custine; and in 1796 Kleber exacted 8,000,000 francs. The independence of Frankfort was brought to an end in 1806, on the formation of the Confederation of the Rhine; and in 18 10 it was made the capital of the grand-duchy of Frankfort, which had an area of 3215 sq.m. with 302,100 inhabitants, and was divided into the four districts of Frankfort, Aschaffenburg, Fulda and Hanau. On the reconstitution of Germany in 1815 it again became a free city, and in the following year it was declared the seat of the German Confederation. In April 1833 occurred what is known as the Frankfort Insurrection (Frankfurter Attentat), in which a number of insurgents led by Georg Bunsen attempted to break up the diet. The city joined the German Zollverein in 1836. During the revolutionary period of 1848 the people of Frankfort, where the united German parliament

held its sessions, took a chief part in political movements, and the streets of the town were more than once the scene of conflict. In the war of 1866 they were on the Austrian side. On the 16th of July the Prussian troops, under General Vogel von Falkenstein, entered the town, and on the 18th of October it was formally incorporated with the Prussian state. A fine of 6,000,000 florins was exacted. In 187 1 the treaty which concluded the Franco-German War was signed in the Swan Hotel by Prince Bismarck and Jules Favre, and it is consequently known as the peace of Frankfort.

Authorities. — F. Rittweger, Frankfurt im Jahre 1848 (1898); R. Jung, Das historische Archiv der Stadt Frankfurt (1897) ; A. Home, Geschichte von Frankfurt (4th ed., 1903); H. Grotefend, Quellen zur Frankfurter Geschichte (Frankfort, 1884-1888); J. C. von Fichard, Die Enlslehung der Reichsstadt Frankfurt (Frankfort, 1819); G. L. Kriegk, Geschichte von Frankfurt (Frankfort, 1871); J. F. Bohmer, Urkundenbuch der Reichsstadt Frankfurt (new ed., 1901) ; B. Weber, Zur Reformationsgeschichte der freien Reichsstadt Frankfurt (1895); O. Speyer, Die Frankfurter Revolution 161 2-1616 (1883) ; andL.Woerl, Guide to Frankfort (Leipzig, 1898).

FRANKFORT-ON-ODER, a town of Germany, in the Prussian province of Brandenburg, 50 m. S.E. from Berlin on the main line of railway to Breslau and at the junction of lines to Ciistrin, Posen and Grossenhain. Pop. (1905) 64,943. The town proper lies on the left bank of the river Oder and is connected by a stone bridge (replacing the old historical wooden structure) 900 ft. long, with the suburb of Damm. The town is agreeably situated and has broad and handsome streets, among them the ” Linden,” a spacious avenue. Above, on the western side, and partly lying on the site of the old ramparts, is the residential quarter, consisting mainly of villas and commanding a fine prospect of the Oder valley. Between this suburb and the town lies the park, in which is a monument to the poet Ewald Christian von Kleist, who died here of wounds received in the battle of Kunersdorf. Among the more important public buildings must be noticed the Evangelical Marienkirche (Oberkirche) , a handsome brick edifice of the 13th century with five aisles, the Roman Catholic church, the Rathhaus dating from 1607, and bearing on its southern gable the device of a member of the Hanseatic League, the government offices and the theatre. The university of Frankfort, founded in 1506 by Joachim I., elector of Branden- burg, was removed to Breslau in 181 1, and the academical buildings are now occupied by a school. To compensate it for the loss of its university, Frankfort-on-Oder was long the seat

of the court of appeal for the province, but of this it was deprived in

1879. There are several handsome public monuments, notably that to Duke Leopold of Brunswick, who was drowned in the Oder while attempting to save life, on the 27th of April 1785. The town has a large garrison, consisting of nearly all arms. Its industries are considerable, including the manufacture of machinery, metal ware, chemicals, paper, leather and sugar. Situated on the high road from Berlin to Silesia, and having an extensive system of water communication by means of the Oder and its canals to the Vistula and the Elbe, and being an important railway centre, it has a lively export trade, which is further fostered by its three annual fairs, held respectively at Reminiscere (the second Sunday in Lent), St Margaret's day and at Martin- mas. In the neighbourhood are extensive coal fields.

Frankfort-on-the-Oder owes its origin and name to a settle- ment of Franconian merchants here, in the 13th century, on land conquered by the margrave of Brandenburg from the Wends. In 1253 it was raised to the rank of a town by the margrave John I. and borrowed from Berlin the Magdeburg civic con- stitution. In 1379 it received from King Sigismund, then margrave of Brandenburg, the right to free navigation of the Oder; and from 1368 to about 1450 it belonged to the Hanseatic League. The university, which is referred to above, was opened by the elector Joachim I. in 1506, was removed in 1516 to Kottbus and restored again to Frankfort in 1539, at which date the Reformation was introduced. It was dispersed during the Thirty Years' War and again restored by the Great Elector, but finally transferred to Breslau in 181 1.

Frankfort has suffered much from the vicissitudes of war. In the 15th century it successfully withstood sieges by the Hussites (1429 and 1432), by the Poles (1450) and by the duke of Sagan (1477). In the Thirty Years' War it was successively taken by Gustavus Adolphus (1631), by Wallenstein (1633), by the elector of Brandenburg (1634), and again by the Swedes, who held it from 1640 to 1644. During the Seven Years' War it was taken by the Russians (1759). In 181 2 it was occupied by the French, who remained till March 1813, when the Russians marched in.

See K. R. Hausen, Geschichte der Universitdt und Stadt Frankfurt (1806), and Bieder und Gurnik, Bilder aus der Geschichte der Stadt Frankfurt-an-der-Oder (1898).

FRANKINCENSE, 1 or Olibanum 2 (Gr. XipWcoros, later 0vos; Lat., tus or thus; Heb., lebonah; 3 Ar., lubdn;* Turk., ghyunluk; Hind., ganda-birosa b) , a gum-resin obtained from certain species of trees of the

genus Boswellia, and natural order Burseraceae. The members of the genus are possessed of the following characters: — Bark often papyraceous; leaves deciduous, com-! pound, alternate and imparipinnate, with leaflets serrate or entire; flowers in racemes or panicles, white, green, yellowish or pink, having a small persistent, 5-dentate calyx, 5 petals, 10 stamens, a sessile 3 to 5-chambered ovary, a long style, and a 3-lobed stigma; fruit trigonal or pentagonal; and seed compressed. Sir George Birdwood {Trans. Lin. Soc. xxvii.,

1 Stephen Skinner, M.D. (Etymologicon linguae Anglicanae, Lond., 1 671), gives the derivation: ” Frankincense, Thus, q.d. Incensum (i.e. Thus Libere seu Liberaliter, ut in sacris officiis par est, adolendum.”

2 ” Sic olibanum dixere pro thure ex Graeco 6 \L0avos “(Salmasius, C. S. Plinianae exercitationes, t. ii. p. 926, b. F., Traj. ad Rhen., 1689 fol.). So also Fuchs (Op. didact. pars. ii. p. 42, 1604 fol.), ” Officinis non sine risu eruditorum, Graeco articulo adjecto, Olibanus vocatur.” The term olibano was used in ecclesiastical Latin as early as the pontificate of Benedict IX., in the nth century. (See Ferd. Ughellus, Italia sacra, torn. i. 108, D., Ven., 1717 fol.)

‘ So designated from its whiteness (J. G. Stuckius, Sacror. et sacrific. gent, descrip., p. 79, Lugd. Bat., 1695, fol.; Kitto, Cycl. Bibl. Lit. ii. p. 806, 1870) ; cf. Laben, the Somali name for cream (R. F. Burton, First Footsteps in E. Africa, p. 178, 1856).

4 Written Louan by Garcias da Horta (Aromat. et simpl. medica- ment, hist., C. Clush Atrebatis Exoticorum lib. sept., p. 157, 1605, fol.), and stated to have been derived by the Arabs from the Greek name, the term less commonly used by them being Conder: cf. Sanskrit Kunda. According to Colebrooke (in Astatick Res. ix. p. 379, 1807), the Hindu writers on Materia Medica use for the resin of Boswellia thurifera the designation Cunduru.

6 A term applied also to the resinous exudation of Pinus longifolia (see Dr E. J. Waring, Pharmacopoeia of India, p. 52, Lond., 1868).

187 1) distinguishes five species of Boswellia: (A) B. thurifera, Colebr. (B. glabra and B. serrata, Roxb.), indigenous to the mountainous tracts of central India and the Coromandel coast, and B. papyrifera (Plosslea floribunda, Endl.) of Abyssinia, which, though both thuriferous, are not known to yield any of the olibanum of commerce; and (B) B.

Frereana (see Elemi, vol. x. p. 259), B. Bhua-Dajiana, and B. Carterii, the ” Yegaar,” ” Mohr Add,” and ” Mohr Madow ” of the Somali country, in East Africa, the last species including a variety, the ” Maghrayt d’Sheehaz ” of Hadramaut, Arabia, all of which are sources of true frankincense or olibanum. The trees on the Somali coast are described by Captain G. B. Kempthorne as growing, without soil, out of polished marble rocks, to which they are attached by a thick oval mass of substance resembling a mixture of lime and mortar: the purer the marble the finer appears to be the growth of the tree. The young, trees, he states, furnish the most valuable gum, the older yielding merely a clear glutinous fluid resembling copal varnish. 1 To obtain the frankincense a deep incision is made in the trunk of the tree, and below it a narrow strip of bark 5 in. in length is peeled off. When the milk-like juice (” spuma pinguis,” Pliny) which exudes has hardened by exposure to the atmosphere, the incision is deepened. In about three months the resin has attained the required degree of consistency. The season for gathering lasts from May until the first rains in September. The large clear globules are scraped off into baskets, and the inferior quality that has run down the tree is collected separately. The coast of south Arabia is yearly visited by parties of Somalis, who pay the Arabs for the privilege of collecting frankincense. 2 In the interior of the country about the plain of Dhofar, 3 during the south-west monsoon, frankincense and other gums are gathered by the Beni Gurrah Bedouins, and might be obtained by them in much larger quantities; their lawlessness, however, and the lack of a safe place of exchange or sale are obstacles to the development of trade. (See C. Y. Ward, The Gulf of ‘Aden Pilot, p. 117, 1863.) Much as formerly in the region of Sakhalites in Arabia (the tract between Ras Makalla and Ras Agab) , 4 described by Arrian, so now on the sea-coast of the Somali country, the frankincense when collected is stored in heaps at various stations. Thence, packed in sheep- and goat-skins, in quantities of 20 to 40 lb, it is carried on camels to Berbera, for shipment either to Aden, Makalla and other Arabian ports, or directly to Bombay. 6 At Bombay, like gum-acacia, it is assorted, and is then packed for re-exportation to Europe, China and elsewhere. 6 Arrian re- lates that it was an import of Barbarike on the Sinthus (Indus). The idea held by several writers, including Niebuhr, that frank- incense was a product of India, would seem to have originated in a confusion of that drug with benzoin and other odoriferous substances, and also in the sale of imported frankincense with the native products of India. The gum resin of Boswellia thurifera was described by Colebrooke (in Asiatick Researches, ix. 381), and after him by Dr J. Fleming (lb. xi. 158), as true frankincense, or olibanum; from this, however, it differs in its softness, and tendency to

melt into a mass 7 (Birdwood, loc. cit., p. 146). It is sold in the village bazaars of Khandeish in India under the name of Dup-Salai, i.e. incense of the " Salai tree"; and according to Mr F. Porter Smith, M.B. (Contrib. towards the Mat. Med. and Nat. Hist, of China, p. 162, Shanghai, 1871), is used as incense in China. The last authority also mentions

1 See " Appendix," vol. i, p. 419 of Sir W. C. Harris's Highland of Aethiopia (2nd ed., Lond., 1844); and Trans. Bombay Geog. Soc. xiii. (1857), p. 136.

2 Cruttenden, Trans. Bombay Geog. Soc. vii. (1846), p. 121; S. B. Miles, J. Geog. Soc. (1872).

3 Or Dhafar. The incense of " Dofar " is alluded to by Camoens, Os Lusiadas, x. 201.

4 H. J. Carter, " Comparative Geog. of the South-East Coast of Arabia," in J. Bombay Branch of R. Asiatic Soc. iii. (Jan. 1851), p. 296; and Miiller, Geog. Graeci Minores, i. p. 278 (Paris, 1855).

5 J. Vaughan, Pharm. Journ. xii. (1853) pp. 227-229; and Ward, op. cit. p. 97.

• Pereira, Blem. of Mat. Med. ii. pt. 2, p. 380 (4th ed., 1847).

7 " Boswellia thurifera," . . . says Waring {Pharm. of India, p- 52)1 " has been thought to yield East Indian olibanum, but there is no reliable evidence of its so doing."

olibanum as a reputed natural product of China. Bernhard von Breydenbach, 8 Ausonius, Florus and others, arguing, it would seem, from its Hebrew and Greek names, concluded that olibanum came from Mount Lebanon; and Chardin (Voyage en Perse, &c, 171 1) makes the statement that the frankincense tree grows in the mountains of Persia, particularly Caramania.

Frankincense, or olibanum, occurs in commerce in semi- opaque, round, ovate or oblong tears or irregular lumps, which are covered externally with a white dust, the result of their friction against one another. It has an amorphous internal structure, a dull fracture; is of a yellow to yellowish-brown hue, the purer varieties being almost colourless, or possessing a greenish tinge, and has a somewhat bitter aromatic taste, and a balsamic odour, which is developed by heating. Immersed in alcohol it becomes opaque, and with water it yields an emulsion. It contains about 72% of resin soluble in alcohol

(Kurbatow); a large proportion of gum soluble in water, and apparently identical with gum arabic; and a small quantity of a colourless inflammable essential oil, one of the constituents of which is the body oliben, Ci Hi 6 . Frankincense burns with a bright white flame, leaving an ash consisting mainly of calcium car- bonate, the remainder being calcium phosphate, and the sulphate, chloride and carbonate of potassium (Braconnot). 9 Good frankincense, Pliny tells us, is recognized by its whiteness, size, brittleness and ready inflammability. That which occurs in globular drops is, he says, termed ” male frankincense ” ; the most esteemed, he further remarks, is in breast-shaped drops, formed each by the union of two tears. 10 The best frankincense, as we learn from Arrian, 11 was formerly exported from the neigh- bourhood of Cape Elephant in Africa (the modern Ras Fiel) ; and A. von Kremer, in his description of the commerce of the Red Sea (Aegypten, &c, p. 185, ii. Theil, Leipzig, 1863), observes that the African frankincense, called by the Arabs ” asli,” is of twice the value of the Arabian ” luban.” Captain S. B. Miles (loc. cit., p. 64) states that the best kind of frankincense, known to the Somali as ” bedwi ” or ” sheheri,” comes from the trees ” Mohr Add ” and ” Mohr Madow ” (vide supra), and from a taller species of Boswellia, the ” Boido,” and is sent to Bombay for exportation to Europe; and that an inferior ” mayeti,” the produce of the ” Yegaar,” is exported chiefly to Jeddah and Yemen ports. 12 The latter may possibly be what Niebuhr alludes to as ” Indian frankincense.” 13 Garcias da Horta, in asserting the Arabian origin of the drug, remarks that the term ” Indian ” is often applied by the Arabs to a dark-coloured variety. 14 According to Pliny (Nat. Hist. xiv. 1; cf. Ovid, Fasti i. 337

8 ” Libanus igitur est mons redolentie & summe aromaticitatis. nam ibi herbe odorifere crescunt. ibi etiam arbores thurifere coale- scunt quarum gummi electum olibanum a medicis nuncupatur.” — Perigrinatio, p. 53 (1502, fol.).

9 See, on the chemistry of frankincense, Braconnot, Ann. de chimie, lxviii. (1808) pp. 60-69; Johnston, Phil. Trans. (1839), pp. 301-305; J. Stenhouse, Ann. der Chem. und Pharm. xxxv. (1840) p. 306; and A. Kurbatow, Zeitsch. fur Chem. (1871), p. 201.

10 ” p r aecipua autem gratia est mammoso, cum haerente lacryma priore consecuta alia miscuit se ” (Nat. Hist. xii. 32). One of the Chinese names for frankincense, Ju-hiang, ” milk-perfume,” is explained by the Pen Ts’au (xxxiv. 45), a Chinese work, as being derived from the nipple-like form of its drops. (See E. Bretschneider, On the Knowledge possessed by the Ancient Chinese of the Arabs, &c,

p. 19, Lond., 1871.)

11 The Voyage of Nearchus, loc. cit.

12 Vaughan (Pharm. Journ. xii. 1853) speaks of the Arabian Luban, commonly called Morbat or Shaharree Luban, as realizing higher prices in the market than any of the qualities exported from Africa. The incense of " Esher," i.e. Shihr or Shehr, is mentioned by Marco Polo, as also by Barbosa. (See Yule, op: cit. ii. p. 377.) J. Raymond Wellsted (Travels to the City of the Caliphs, p. 173, Lond., 1840) distinguishes two kinds of frankincense — " Meaty," selling at $4 per cwt., and an inferior article fetching 20% less.

13 " Es scheint, dass selber die Araber ihr eignes Rauchwerk nicht hoch schatzen ; denn die Vornehmen in Jemen brauchen gemeiniglich indianisches Rauchwerk, ja eine grosse Menge Mastix von der Insel Scio " (Beschreibung von Arabien, p. 143, Kopenh., 1772).

14 " De Arabibus minus mirum, qui nigricantem colorem, quo Thus Indicum praeditum esse vult Dioscorides [lib. i. c. 70], Indum plerumque vocent, ut ex Myrobalano nigro quern Indum appellant, patet " (op. sup. cit. p. 157).

sq.), frankincense was not sacrificially employed in Trojan times. It was used by the ancient Egyptians in their religious rites, but, as Herodotus tells us (ii. 86), not in embalming. It constituted a fourth part of the Jewish incense of the sanctuary (Ex. xxx. 34), and is frequently mentioned in the Pentateuch. With other spices it was stored in a great chamber of the house of God at Jerusalem (1 Chron. ix. 20, Neh. xiii. 5-9). On the sacrificial use and import of frankincense and similar substances see Incense. In the Red Sea regions frankincense is valued not only for its sweet odour when burnt, but as a masticatory; and blazing lumps of it are not infrequently used for illumination instead of oil lamps. Its fumes are an excellent insectifuge. As a medicine it was in former times in high repute. Pliny (Nat. Hist. xxv. 82) mentions it as an antidote to hemlock. Avicenna (ed. Plempii, lib. ii. p. 161, Lovanii, 1658, fol.) recommends it for tumours, ulcers of the head and ears, affections of the breast, vomiting, dysentery and fevers. In the East frankincense has been found efficacious as an external application in carbuncles, blind boils and gangrenous sores, and as an internal agent is given in gonorrhoea.

In China it was an old internal remedy for leprosy and struma, and is accredited with stimulant, tonic, sedative, astringent and vulnerary properties. It is not used in modern medicine, being destitute of any special virtues. (See Waring, Pliarm. 0} India, p. 443, &c; and F. Porter Smith, op. cit., p. 162.) Common frankincense or thus, A Metis resina, is the term applied to a resin which exudes from fissures in the bark of the Norway spruce fir, Abies excelsa, D.C.; when melted in hot water and strained it constitutes ” Burgundy pitch,” Fix abielina. The concreted turpentine obtained in the United States by making incisions in the trunk of a species of pine, Pinus australis, is also so designated. It is commercially known as ” scrape,” and is similar to the French ” galipot ” or ” barras.” Common frankincense is an ingredient in some ointments and plasters, and on account of its pleasant odour when burned has been used in incense as a substitute for olibanum. (See Fluckiger and Hanbury, Pharmacographia.) The ” black frankin- cense oil ” of the Turks is stated by Hanbury (Science Papers, p. 142, 1876) to be liquid storax. (F. H. B.)

FRANKING, a term used for the right of sending letters or postal packages free (Fr. franc) of charge. The privilege was claimed by the House of Commons in 1660 in ” a Bill for erecting and establishing a Post Office,” their demand being that all letters addressed to or sent by members during the session should be carried free. The clause embodying this claim was struck out by the Lords, but with the proviso in the Act as passed for the free carriage of all letters to and from the king and the great officers of state, and also the single inland letters of the members of that present parliament during that session only. It seems, however, that the practice was tolerated until 1764, when by an act dealing with postage it was legalized, every peer and each member of the House of Commons being allowed to send free ten fetters a day, not exceeding an ounce in weight, to any part of the United Kingdom, and to receive fifteen. The act did not restrict the privilege to letters either actually written by or to the member, and thus the right was very easily abused, members sending and receiving letters for friends, all that was necessary being the signature of the peer or M.P. in the corner of the envelope. Wholesale franking grew usual, and M.P.‘s supplied their friends with envelopes already signed to be used at any time. In 1837 the scandal had become so great that stricter regulations came into force. The franker had to write the full address, to which he had to add his name, the post-town and the day of the month; the letter had to be posted on the day written or the following day at the latest, and in a post-town not more than 20 m. from the place where the peer or M.P. was then living. On the 10th of January 1 840 parliamentary franking was abolished on the

introduction of the uniform penny rate.

In the United States the franking privilege was first granted in January 1776 to the soldiers engaged in the American War of Independence. The right was gradually extended till it included nearly all officials and members of the public service. By special acts the privilege was bestowed on presidents and their widows.

By an act of the 3rd of March 1845, franking was limited to the president, vice-president, members and delegates in Congress and postmasters, other officers being required to keep quarterly accounts of postage and pay it from their contingent funds. In 1851 free exchange of newspapers was re-established. By an act of the 3rd of March 1863 the privilege was granted the president and his private secretary, the vice-president, chiefs of executive departments, such heads of bureaus and chief clerks as might be designated by the postmaster-general for official letters only; senators and representatives in Congress for all correspondence, senders of petitions to either branch of the legislature, and to publishers of newspapers for their exchanges. There was a limit as to weight. Members of Congress could also frank, in matters concerning the federal department of agricul- ture, ” seeds, roots and cuttings,” the weight to be fixed by the postmaster-general. This act remained in force till the 31st of January 1873, when franking was abolished. Since 1875, by sundry acts, franking for official correspondence, government publications, seeds, &c, has been allowed to congressmen, ex- congressmen (for 9 months after the close of their term), congress- men-elect and other government officials. By special acts of i88r, 1886, 1902, 1909, respectively, the franking privilege was granted to the widows of Presidents Garfield, Grant, McKinley and Cleveland.

FRANKL, LUDWIG AUGUST (1810-1894), Austrian poet. He took part in the revolution of 1848, and his poems on liberty had considerable vogue. His lyrics are among his best work. He was secretary of the Jewish community in Vienna, and did a lasting service to education by his visit to the Orient in 1856. He founded the first modern Jewish school (the Von Lammel Schule) in Jerusalem. His brilliant volumes Nach Jerusalem describing his eastern tour have been translated into English, as is the case with many of his poems. His collected poems appeared in three volumes in 1880. (I. A.)

FRANKLAND, SIR EDWARD (1825-1899), English chemist, was born at Churchtown, near Lancaster, on the 18th of January 1825. After attending the grammar school at Lancaster he spent •six years as an apprentice to a druggist in that town. In 1845 he went to London and

entered Lyon Playfair's laboratory, subsequently working under R. W. Bunsen at Marburg. In 1847 he was appointed science-master at Queen wood school, Hampshire, where he first met J. Tyndall, and in 1851 first professor of chemistry at Owens College, Manchester. Return- ing to London six years later he became lecturer in chemistry at St Bartholomew's hospital, and in 1863 professor of chemistry at the Royal Institution. From an early age he engaged in original research with great success.

Analytical problems, such as the isolation of certain organic radicals, attracted his attention to begin with, but he soon turned to synthetical studies, and he was only about twenty-five years of age when an investigation, doubtless suggested by the work of his master, Bunsen, on cacodyl, yielded the interesting discovery of the organo-metallic compounds. The theoretical deductions which he drew from the consideration of these bodies were even more interesting and important than the bodies themselves. Perceiving a molecular isonomy between them and the inorganic compounds of the metals from which they may be formed; he saw their true molecular type in the oxygen, sulphur or chlorine compounds of those metals, from which he held them to be derived by the substitution of an organic group for the oxygen, sulphur, &c. In this way they enabled him to over- throw the theory of conjugate compounds, and they further led him in 1852 to publish the conception that the atoms of each elementary substance have a definite saturation capacity, so that they can only combine with a certain limited number of the atoms of other elements. The theory of valency thus founded has dominated the subsequent development of chemical doctrine, and forms the groundwork upon which the fabric of modern structural chemistry reposes.

In applied chemistry Frankland's great work was in connexion with water-supply. Appointed a member of the second royal commission on the pollution of rivers in 1 868, he was provided

by the government with a completely-equipped laboratory, in which, for a period of six years, he carried on the inquiries necessary for the purposes of that body, and was thus the means of bringing to light an enormous amount of valuable information respecting the contamination of rivers by sewage, trade-refuse, &c, and the purification of water for domestic use. In 1865, when he succeeded A. W. von Hofmann at the School of Mines, he undertook the duty of

making monthly reports to the registrar- general on the character of the water supplied to London, and these he continued down to the end of his life. At one time he was an unsparing critic of its quality, but in later years he became strongly convinced of its general excellence and wholesomeness. His analyses were both chemical and bacteriological, and his dissatisfaction with the processes in vogue for the former at the time of his appointment caused him to spend two years in devising new and more accurate methods. In 1859 he passed a night on the very top of Mont Blanc in company with John Tyndall. One of the purposes of the expedition was to discover whether the rate of combustion of a candle varies with the density of the atmosphere in which it is burnt, a question which was answered in the negative. Other observations made by Frankland at the time formed the starting-point of a series of experiments which yielded far-reaching results. He noticed that at the summit the candle gave a very poor light, and was thereby led to investigate the effect produced on luminous flames by varying the pressure of the atmosphere in which they are burning. He found that pressure increases luminosity, so that hydrogen, for example, the flame of which in normal circumstances gives no light, burns with a luminous flame under a pressure of ten or twenty atmospheres, and the inference he drew was that the presence of solid particles is not the only factor that determines the light-giving power of a flame. Further, he showed that the spectrum of a dense ignited gas resembles that of an incandescent liquid or solid, and he traced a gradual change in the spectrum of an incandescent gas under increasing pressure, the sharp lines observable when it is ex- tremely attenuated broadening out to nebulous bands as the pressure rises, till they merge in the continuous spectrum as the gas approaches a density comparable with that of the liquid state. An application of these results to solar physics in con- junction with Sir Norman Lockyer led to the view that at least the external layers of the sun cannot consist of matter in the liquid or solid forms, but must be composed of gases or vapours. Frankland and Lockyer were also the discoverers of helium. In 1868 they noticed in the solar spectrum a bright yellow line which did not correspond to any substance then known, and which they therefore attributed to the then hypothetical element, helium.

Sir Edward Frankland, who was made a K.C.B. in 1897, died on the 9th of August 1899 while on a holiday at Golaa, Gud- brandsdalen, Norway.

A memorial lecture delivered by Professor H. E. Armstrong before the London Chemical Society on the 31st of October 1901 contained many personal details of Frankland's life, together with a full discussion of

his scientific work; and a volume of Autobiographical Sketches was printed for private circulation in 1902. His original papers, down to 1877, were collected and published in that year as Experimental Researches in Pure, Applied and Physical Chemistry.

FRANKLIN, BENJAMIN (1706-1790), American diplomat, statesman and scientist, was born on the 17th of January 1706 in a house in Milk Street, opposite the Old South church, Boston, Massachusetts. He was the tenth son of Josiah Franklin, and the eighth child and youngest son of ten children borne by Abiah Folger, his father's second wife. The elder Franklin was born at Ecton in Northamptonshire, England, where the strongly Protestant Franklin family may be traced back for nearly four centuries. He had married young and had migrated from Banbury to Boston, Massachusetts, in 1685. Benjamin could not remember when he did not know how to read, and when eight years old he was sent to the Boston grammar school, being destined by his father for the church as a tithe of his sons. He spent a year there and a year in a school for writing and arithmetic, and then at the age of ten he was taken from school

to assist his father in the business of a tallow-chandler and soap-boiler. In his thirteenth year he was apprenticed to his half- brother James, who was establishing himself in the printing business, and who in 1721 started the New England Courant, one of the earliest newspapers in America.

Benjamin's tastes had at first been for the sea rather than the pulpit; now they inclined rather to intellectual than to other pleasures. At an early age he had made himself familiar with The Pilgrim's Progress, with Locke, On the Human Understanding, and with a volume of The Spectator. Thanks to his father's excellent advice, he gave up writing doggerel verse (much of which had been printed by his brother and sold on the streets) and turned to prose composition. His success in reproducing articles he had read in The Spectator led him to write an article for his brother's paper, which he slipped under the door of the printing shop with no name attached, and which was printed and attracted some attention. After repeated successes of the same sort Benjamin threw off his disguise and contributed regularly to the Courant. When, after various journalistic indiscretions, James Franklin in 1722 was forbidden to publish the Courant, it appeared with Benjamin's name as that of the publisher and was received with much favour, chiefly because of the cleverness of his articles signed " Dr Janus," which, like those previously signed " Mistress Silence Dogood," gave promise of " Poor Richard." But Benjamin's management of the paper, and particularly his free-thinking,

displeased the authorities; the relations of the two brothers gradually grew unfriendly, possibly, as Benjamin thought, because of his brother's jealousy of his superior ability; and Benjamin determined to quit his brother's employ and to leave New England. He made his way first to New York City, and then (October 1723) to Philadelphia, where he got employment with a printer named Samuel Keimer. 1

A rapid composer and a workman full of resource, Franklip was soon recognized as the master spirit of the shop. Sir William Keith (1680-1749), governor of the province, urged him to start in business for himself, and when Franklin had unsuccessfully appealed to his father for the means to do so, Keith promised to furnish him with what he needed for the equipment of a new printing office and sent him to England to buy the materials. Keith had repeatedly promised to send a letter of credit by the ship on which Franklin sailed, but when the Channel was reached and the ship's mails were examined no such letter was found. Franklin reached London in December 1724, and found employ- ment first at Palmer's, a famous printing house in Bartholomew Close, and afterwards at Watts's Printing House. At Palmer's he had set up a second edition of Wollaston's Religion of Nature Delineated. To refute this book and to prove that there could be no such thing as religion, lie wrote and printed a small pam- phlet, A Dissertation on Liberty and Necessity, Pleasure and Pain, which brought him some curious acquaintances, and of which he soon became thoroughly ashamed. After a year and a half in London, Franklin was persuaded by a friend named Denham, a Quaker merchant, to return with hint to America and engage in mercantile business; he accordingly gave up printing, but a few days before sailing he received a tempting offer to remain and give lessons in swimming — his feats as a swimmer having given him considerable reputation — and he says that he might have consented " had the overtures been sooner made." He reached Philadelphia in October 1726, but a few months later Denham died, and Franklin was induced by large wages to return to his old employer Keimer; with Keimer he quarrelled repeatedly, thinking himself ill used and kept only to train apprentices until they could in some degree take his place.

1 Keimer and his sister had come the year before from London, where he had learned his trade; both were ardent members of the fanatic band of " French prophets." He proposed founding a new sect with the help of Franklin, who after leaving his shop ridiculed him for his long square beard and for keeping the seventh day. Keimer settled in the Barbadoes about 1730; and in 1731 began to publish at Bridgetown the semi-weekly Barbadoes Gazette. Selec- tions from it called Caribbeana (1741) and A Brand Plucked from the Burning,

Exemplified in the Unparalleled Case of Samuel Keimer (17J8) are from his pen. He died about 1738.

FRANKLIN, BENJAMIN

25

In 1728 Franklin and Hugh Meredith, a fellow-worker at Keimer's, set up in business for themselves; the capital being furnished by Meredith's father. In 1730 the partnership was dissolved, and Franklin, through the financial assistance of two friends, secured the sole management of the printing house. In September 1729 he bought at a merely nominal price The Pennsylvania Gazette, a weekly newspaper which Keimer had started nine months before to defeat a similar project of Franklin's, and which Franklin conducted until 1 765. Franklin's superior management of the paper, his new type, " some spirited remarks " on the controversy between the Massachusetts assembly and Governor Burnet, brought his paper into immediate notice, and his success both as a printer and as a journalist was assured and complete. In 1731 he established in Philadelphia one of the earliest circulating libraries in America (often said to have been the earliest), and in 1732 he published the first of his Almanacks, under the pseudonym of Richard Saunders. These " Poor Richard's Almanacks " were issued for the next twenty-five years with remarkable success, the annual sale averaging 10,000 copies, and far exceeding the sale of any other publication in the colonies.

Beginning in 1733 Franklin taught himself enough French, Italian, Spanish and Latin to read these languages with some ease. In 1736 he was chosen clerk of the General Assembly, and served in this capacity until 1751. In 1737 he had been appointed postmaster at Philadelphia, and about the same time he organized the first police force and fire company in the colonies; in 1749, after he had written Proposals Relating to the Education of Youth in Pensilvania, he and twenty-three other citizens of Philadelphia formed themselves into an association for the purpose of establishing an academy, which was opened in 1751, was chartered in 1753, and eventually became the University of Pennsylvania; in 1727 he organized a debating club, the " Junto," in Philadelphia, and later he was one of the founders of the American Philosophical Society (1743; incorporated 1780); he took the lead in the organization of a militia force, and in the paving of the city streets, improved the method of street lighting, and assisted in the founding of a city hospital (1751); in brief, he gave the impulse to nearly every measure or project for the welfare and prosperity of Philadelphia undertaken in his day. In T751 he became a member of

the General Assembly of Penn- sylvania, in which he served for thirteen years. In 1753 he and William Hunter were put in charge of the post service of the colonies, which he brought in the next ten years to a high state of efficiency and made a financial success; this position he held until 1774. He visited nearly every post office in the colonies and increased the mail service between New York and Philadelphia from once to three times a week in summer, and from twice a month to once a week in winter. When war with France appeared imminent in 1754, Franklin was sent to the Albany Convention, where he submitted his plan for colonial union (see Albany, N.Y.). When the home govern- ment sent over General Edward Braddock 1 with two regiments of British troops, Franklin undertook to secure the requisite number of horses and waggons for the march against Ft. Duquesne, and became personally responsible for payment to the Pennsylvanians who furnished them. Notwithstanding the alarm occasioned by Braddock's defeat, the old quarrel between the proprietors of Pennsylvania and the assembly prevented any adequate preparations for defence; " with incredible meanness " the proprietors had instructed their governors to approve no act for levying the necessary taxes, unless the vast estates of the proprietors were by the same act exempted. So great was the confidence in Franklin in this emergency that early in T756 the governor of Pennsylvania placed him in charge of the north-western frontier of the province, with power to raise troops, issue commissions and erect blockhouses; and Franklin remained in the wilderness for over a month, superintending the building

1 The meeting between Franklin, the type of the shrewd, cool provincial, and Braddock, a blustering, blundering, drinking British soldier, is dramatically portrayed by Thackeray in the 9th chapter of The Virginians.

of forts and watching the Indians. In February 1757 the assembly, " finding the proprietary obstinately persisted in manacling their deputies with instructions inconsistent not only with the privileges of the people, but with the service of the crown, resolv'd to petition the king against them," and appointed Franklin as their agent to present the petition. He arrived in London on the 27th of July 1757, and shortly afterwards, when, at a conference with Earl Granville, president of the council, the latter declared that " the King is the legislator of the colonies," Franklin in reply declared that the laws of the colonies were to be made by their assemblies, to be passed upon by the king, and when once approved were no longer subject to repeal or amend- ment by the crown. As the assemblies, said he, could not make permanent laws without the king's consent, " neither could he

make a law for them without theirs." This opposition of views distinctly raised the issue between the home government and the colonies. As to the proprietors Franklin succeeded in 1760 in securing an understanding that the assembly should pass an act exempting from taxation the unsurveyed waste lands of the Penn estate, the surveyed waste lands being assessed at the usual rate for other property of that description. Thus the proprietors finally acknowledged the right of the assembly to tax their estates.

The success of Franklin's first foreign mission was, therefore, substantial and satisfactory. During this sojourn of five years in England he had made many valuable friends outside of court and political circles, among whom Hume, Robertson and Adam Smith were conspicuous. In 1759, for his literary and more particularly his scientific attainments, he received the freedom of the city of Edinburgh and the degree of doctor of laws from the university of St Andrews. He had been made a Master of Arts at Harvard and at Yale in 1 7 53 , and at the college of William and Mary in 1756; and in 1762 he received the degree of D.C.L. at Oxford. While in England he had made active use of his remarkable talent for pamphleteering. In the clamour for peace following the death of George II. (25th of October 1760), he was for a vigorous prosecution of the war with France; he had written what purported to be a chapter from an old book written by a Spanish Jesuit, On the Meanes of Disposing the Enetnie to Peace, which had a great effect; and in the spring of 1760 there had been published a more elaborate paper written by Franklin with the assistance of Richard Jackson, agent of Massachusetts and Connecticut in London, entitled The Interest of Great Britain Considered with Regard to Her Colonies, and the Acquisitions of Canada and Guadeloupe (1760). This pamphlet answered the argument that it would be unsafe to keep Canada because of the added strength that would thus be given to any possible move- ment for independence in the English colonies, by urging that so long as Canada remained French there could be no safety for the English colonies in North America, nor any permanent peace in Europe. Tradition reports that this pamphlet had considerable weight in determining the ministry to retain Canada.

Franklin sailed again for America in August 1762, hoping to be able to settle down in quiet and devote the remainder of his life to experiments in physics. This quiet was interrupted, however, by the " Paxton Massacre " (Dec. 14, 1763) — the slaughter of a score of Indians (children, women and old men) at Lancaster, Pennsylvania, by some young rowdies from the town of Paxton, who then marched upon Philadelphia to kill a few Christian Indians there. Franklin,

appealed to by the governor, raised a troop sufficient to frighten away the ” Paxton boys,” and for the moment there seemed a possibility’ of an understanding between Franklin and the proprietors. But the question of taxing the estates of the proprietors came up in a new form, and a petition from the assembly was drawn by Franklin, requesting the king ” to resume the government ” of Penn- sylvania. In the autumn election of 1764 the influence of the proprietors was exerted against Franklin, and by an adverse majority of 25 votes in 4000 he failed to be re-elected to the assembly. The new assembly sent Franklin again to England as its special agent to take charge of another petition for .1 change

of government, which, however, came to nothing.. Matters of much greater consequence soon demanded Franklin’s attention.

Early in 1764 Lord Grenville had informed the London agents of the American colonies that he proposed to lay a portion of the burden left by the war with France upon the shoulders of the colonists by means of a stamp duty, unless some other tax equally productive and less inconvenient were proposed. The natural objection of the colonies, as voiced, for example, by the assembly of Pennsylvania, was that it was a cruel thing to tax colonies already taxed beyond their strength, and surrounded by enemies and exposed to constant expenditures for defence, and that it was an indignity that they should be taxed by a parliament in which they were not represented; at the same time the Pennsylvania assembly recognized it as ” their duty to grant aid to the crown, according to their abilities, whenever required of them in the usual manner.” To prevent the intro- duction of the Stamp Act, which he characterized as ” the mother of mischief,” Franklin used every effort, but the bill was easily passed, and it was thought that the colonists would soon be reconciled to it. Because he, too, thought so, and because he recommended John Hughes, a merchant of Philadelphia, for the office of distributor of stamps, Franklin himself was denounced — he was even accused of having planned the Stamp Act — and his family in Philadelphia was in danger of being mobbed. Of Franklin’s examination, in February 1766, by the House in Committee of the Whole, as to the effects of the Stamp Act, Burke said that the scene reminded him of a master examined by a parcel of schoolboys, and George Whitefield said: ” Dr Franklin has gained immortal honour by his behaviour at the bar of the House. His answer was always found equal to the questioner. He stood unappalled, gave

pleasure to his friends and did honour to his country.” l Franklin compared the position of the colonies to that of Scotland in the days before the union, and in the same year (1766) audaciously urged a similar union with the colonies before it was too late. The knowledge of colonial affairs gained from Franklin’s testimony, probably more than all other causes combined, determined the immediate repeal of the Stamp Act. For Franklin this was a great triumph, and the news of it filled the colonists with delight and restored him to their confidence and affection. Another bill (the Declaratory Act), however, was almost immediately passed by the king’s party, asserting absolute supremacy of parliament over the colonies, and in the succeeding parliament, by the Townshend Acts of 1767, duties were imposed on paper, paints and glass imported by the colonists; a tax was imposed on tea also. The imposition of these taxes was bitterly resented in the colonies, where it quickly crystallized public opinion round the principle of ” No taxation without representation.” In spite of the opposition in the colonies to the Declaratory Act, the Townshend Acts and the tea tax, Franklin continued to assure the British ministry and the British public of the loyalty of the colonists. He tried to find some middle ground of reconciliation, and kept up his quiet work of informing England as to the opinions and conditions of the colonies, and of moderating the attitude of the colonies toward the home government; so that, as he said, he was accused in America of being too much an Englishman, and in England of being too much an American. He was agent now, not only of Pennsylvania, but also of New Jersey, of Georgia and of Massa- chusetts. Hillsborough, who became secretary of state for the colonies in 1768, refused to recognize Franklin as agent of Massachusetts, because the governor of Massachusetts had not approved the appointment, which was by resolution of the assembly. Franklin contended that the governor, as a mere agent of the king, could have nothing to do with the assembly’s appointment of its agent to the king; that ” the King, and not the King, Lords, and Commons collectively, is their sovereign; and that the King, with their respective Parliaments, is their only legislator.” Franklin’s influence helped to oust Hillsborough, and Dartmouth, whose name Franklin suggested, was made

1 Many questions (about 20 of the first 25) were put by his friends to draw out what he wished to be known.

secretary in 1772 and promptly recognized Franklin as the agent of Massachusetts.

In 1 7 73 there appeared in the Public Advertiser one of Franklin’s cleverest hoaxes, ” An Edict of the King of Prussia,” proclaiming that

the island of Britain was a colony of Prussia, having been settled by Angles and Saxons, having been protected by Prussia, having been defended by Prussia against France in the war just past, and never having been definitely freed from Prussia's rule; and that, therefore, Great Britain should now submit to certain taxes laid by Prussia — the taxes being identical with those laid upon the American colonies by Great Britain. In the same year occurred the famous episode of the Hutchinson Letters. These were written by Thomas Hutchinson, Governor of Massachusetts, Andrew Oliver (1706-1774), his lieutenant- governor, and others to William Whately, a member of Parlia- ment, and private secretary to George Grenville, suggesting an increase of the power of the governor at the expense of the assembly, " an abridgement of what are called English liberties," and other measures more extreme than those. undertaken by the government. The correspondence was shown to Franklin by a mysterious " member of parliament " to back up the contention that the quartering of troops in Boston was suggested, not by the British ministry, but by Americans and Bostonians. Upon his promise not to publish the letters Franklin received permission to send them to Massachusetts, where they were much passed about and were printed, and they were soon republished in English newspapers.' The Massachusetts assembly on receiving the letters resolved to petition the crown for the removal of both Hutchinson and Oliver. The petition was refused and was con- demned as scandalous, and Franklin, who took upon himself the responsibility for the publication of the letters, in the hearing before the privy council at the Cockpit on the 29th of January 1774 was insulted and was called a thief by Alexander Wedder- burn (the solicitor-general, who appeared for Hutchinson and Oliver), and was removed from his position as head of the post office in the American colonies.

Satisfied that his usefulness in England was at an end, Franklin entrusted his agencies to the care of Arthur Lee, and on the 21st of March 1775 again set sail for Philadelphia. During the last years of his stay in England there had been repeated attempts to win him (probably with an under-secretaryship) to the British service, and in these same years he had done a great work for the colonies by gaining friends for them among the opposition, and by impressing France with his ability and the excellence of his case. Upon reaching America, he heard of the fighting at Lexington and Concord, and with the news of an actual outbreak of hostilities his feeling toward England seems to have changed completely. He was no longer a peacemaker, but an ardent war- maker. On the 6th of May, the day after his arrival in Phila- delphia, he was elected by the assembly of Pennsylvania a delegate to the Continental Congress in Philadelphia. In October he

was elected a member of the Pennsylvania assembly, but, as members of this body were still required to take an oath of allegiance to the crown, he refused to serve. In the Congress he served on as many as ten committees, and upon the organiza- tion of a continental postal system, he was made postmaster- general, a position he held for one year, when (in 1776) he was succeeded by his son-in-law, Richard Bache, who had been his deputy. With Benjamin Harrison, John Dickinson, Thomas Johnson and John Jay he was appointed in November 1775 to a committee to carry on a secret correspondence with the friends of America " in Great Britain, Ireland and other parts of the world." He planned an appeal to the king of France for aid, and wrote the instructions of Silas Deane who was to convey it. In April 1776 he went to Montreal with Charles Carroll, Samuel Chase and John Carroll, as a member of the commission which conferred with General Arnold, and attempted without success to gain the co-operation of Canada. Immediately after his return from Montreal he was a member of the committee of five appointed to draw up the Declaration of Independence, but he took no actual part himself in drafting that instru- ment, aside from suggesting the change or insertion of a few

words in Jefferson's draft. From July 16 to September 28 he acted as president of the Constitutional Convention of Penn- sylvania.

With John Adams and Edward Rutledge he was selected by Congress to discuss with Admiral Howe (September 1776, at Staten Island) the terms of peace proposed by Howe, who had arrived in New York harbour in July 1776, and who had been an intimate friend of Franklin; but the discussion was fruitless, as the American commissioners refused to treat " back of this step of independency." On the 26th of September in the same year Franklin was chosen as commissioner to France to join Arthur Lee, who was in London, and Silas Deane, who had arrived in France in June 1776. He collected all the money he could command, between £3000 and £4000, lent it to Congress before he set sail, and arrived at Paris on the 22nd of December. He found quarters at Passy, 1 then a suburb of Paris, in a house belonging to Le Ray de Chaumont, an active friend of the American cause, who had influential relations with the court, and through whom he was enabled to be in the fullest communica- tion with the French government without compromising it in the eyes of Great Britain.

At the time of Franklin's arrival in Paris he was already one of the most talked about men in the world. He was a member of every important learned society in Europe; he was a member, and one of the managers, of the Royal Society, and was one of eight foreign members of the Royal Academy of Sciences in Paris. Three editions of his scientific works had already appeared in Paris, and a new edition had recently appeared in London. To all these advantages he added a political purpose— the dismemberment of the British empire — which was entirely congenial to every citizen of France. " Franklin's reputation," wrote John Adams with characteristic extravagance, " was more universal than that of Leibnitz or Newton, Frederick or Voltaire; and his character more esteemed and beloved than all of them. . . . If a collection could be made of all the gazettes of Europe, for the latter half of the 18th century, a greater number of panegyrical paragraphs upon le grand Franklin would appear, it is believed, than upon any other man that ever lived." " Franklin's appearance in the French salons, even before he began to negotiate," says Friedrich Christoph Schlosser, " was an event of great importance to the whole of Europe. . . . His dress, the simplicity of his external appearance, the friendly meekness of the old man, and the apparent humility of the Quaker, procured for Freedom a mass of votaries among the court circles who used to be alarmed at its coarseness and un- sophisticated truths. Such was the number of portraits, 2 busts and medallions of him in circulation before he left Paris that he would have been recognized from them by any adult citizen in any part of the civilized world."

Franklin's position in France was a difficult one from the start, because of the delicacy of the task of getting French aid at a time when France was unready openly to take sides against Great Britain. But on the 6th of February 1778, after the news of the defeat and surrender of Burgoyne had reached Europe, a treaty of alliance and a treaty of amity and commerce between France and the United States were signed at Paris by Franklin, Deane and Lee. On the 28th of October this com- mission was discharged and Franklin was appointed sole pleni- potentiary to the French court. Lee, from the beginning of the mission to Paris, seems to have been possessed of a mania of jealousy toward Franklin, or of misunderstanding of his acts, and he tried to undermine his influence with the Continental Congress. John Adams, when he succeeded Deane (recalled from Paris through Lee's machinations) joined in the chorus of fault-finding against Franklin, dilated upon his social habits, his personal slothfulness and his complete lack of business-like system; but Adams soon came to see that, although careless of details, Franklin was doing what no other

man could have

1 The house is familiar from the drawing of it by Victor Hugo.

1 Many of these portraits bore inscriptions, the most famous of which was Turgot's line, " Eripuit fulmen coelo sceptrumque tyrannis."

done, and he ceased his harsher criticism. Even greater than his diplomatic difficulties were Franklin's financial straits. Drafts were being drawn on him by all the American agents in Europe, and by the Continental Congress at home. Acting as American naval agent for the many successful privateers who harried the English Channel, and for whom he skilfully got every bit of assistance possible, open and covert, from the French government, he was continually called upon for funds in these ventures. Of the vessels to be sent to Paris with American cargoes which were to be sold for the liquidation of French loans to the colonies made through Beaumarchais, few arrived; those that did come did not cover Beaumarchais's advances, and hardly a vessel came from America without word of fresh drafts on Franklin. After bold and repeated overtures for an exchange of prisoners — an important matter, both because the American frigates had no place in which to stow away their prisoners, and because of the maltreatment of American captives in such prisons as Dartmoor — exchanges began at the end of March 1779, although there were annoying delays, and immediately after November 1781 there was a long break in the agreement; and the Americans discharged from English prisons were constantly in need of money. Franklin, besides, was constantly called upon to meet the indebtedness of Lee and of Ralph Izard (1742-1804), and of John Jay, who in Madrid was being drawn on by the American Congress. In spite of the poor condition in Europe of the credit of the strugg- ling colonies, and of the fact that France was almost bankrupt (and in the later years was at war), and although Necker strenu- ously resisted the making of any loans to the colonies, France, largely because of Franklin's appeals, expended, by loan or gift to the colonies, or in sustenance of the French arms in America, a sum estimated at $60,000,000.

In 1 781 Franklin, with John Adams, John Jay, Jefferson, who remained in America, and Henry Laurens, then a prisoner in England, was appointed on a commission to make peace with Great Britain. In the spring of 1782 Franklin had been inform- ally negotiating with Shelburne, secretary of state for the home department, through the medium of Richard Oswald, a Scotch merchant, and had suggested that England should cede Canada to the United States in return for the recognition of loyalist claims by the states. When the formal

negotiations began Franklin held closely to the instructions of Congress to • its commissioners, that they should maintain confidential relations with the French ministers and that they were ” to undertake nothing in the negotiations for peace or truce without their knowledge and concurrence,” and were ultimately to be governed by ” their advice and opinion.” Jay and Adams disagreed with him on this point, believing that France intended to curtail the territorial aspirations of the Americans for her own benefit and for that of her ally, Spain. At last, after the British govern- ment had authorized its agents to treat with the commissioners as representatives of an independent power, thus recognizing American independence before the treaty was made, Franklin, acquiesced in the policy of Jay. The preliminary treaty was signed by the commissioners on the 30th of November 1782, the final treaty on the 3rd of September 1783. Franklin had repeatedly petitioned Congress for his recall, but his letters were unanswered or his appeals refused until the 7th of March 1785, when Congress resolved that he be allowed to return to America; on the 10th of March Thomas Jefferson, who had joined him in August of the year before, was appointed to his place. Jefferson, when asked if he replaced Franklin, replied, ” No one can replace him, sir; I am only his successor.” Before Franklin left Paris on the 12th of July 1785 he had made commercial treaties with Sweden (1783) and Prussia (1785; signed after Franklin’s departure by Jefferson and John Adams). Franklin arrived in Philadelphia on the 13th of September, disembarking at the same wharf as when he had first entered the city. He was immediately elected a member of the municipal council of Philadelphia, becoming its chairman; and was chosen president of the Supreme Executive Council (the chief executive officer) of Pennsylvania, and was re-elected in 1786 and 1787,

serving from October 1785 to October 1788. In May 1787 he was elected a delegate to the Convention which drew up the Federal Constitution, this body thus having a member upon whom all could agree as chairman, should Washington be absent. He opposed over-centralization of government and favoured the Connecticut Compromise, and after the work of the Convention was done used his influence to secure the adoption of the Con- stitution. 1 As president of the Pennsylvania Society for Promoting the Abolition of Slavery, Franklin signed a petition to Congress (12th February 1790) for immediate abolition of slavery, and six weeks later in his most brilliant manner parodied the attack on the petition made by James

Jackson (1757-1806) of Georgia, taking off Jackson's quotations of Scripture with pretended texts from the Koran cited by a member of the Divan of Algiers in opposition to a petition asking for the prohibition of holding Christians in slavery. These were his last public acts. His last days were marked by a fine serenity and calm; he died in his own house in Philadelphia on the 17th of April 1 790, the immediate cause being an abscess in the lungs. He was buried with his wife in the graveyard (Fifth and Arch Streets) of Christ Church, Philadelphia.

Physically Franklin was large, about 5 ft. 10 in. tall, with a well-rounded, powerful figure; he inherited an excellent con- stitution from his parents — " I never knew," says he, " either my father or mother to have any sickness but that of which they dy'd, he at 89, and she at 85 years of age " — but injured it somewhat by excesses; in early life he had severe attacks of pleurisy, from one of which, in 1727, it was not expected that he would recover, and in his later years he was the victim of stone and gout. When he was sixteen he became a vegetarian for a time, rather to save money for books than for any other reason, and he always preached moderation in eating, though he was less consistent in his practice in this particular than as regards moderate drinking. He was always enthusiastically fond of swimming, and was a great believer in fresh air, taking a cold air bath regularly in the morning, when he sat naked in his bedroom beguiling himself with a book or with writing for a half-hour or more. He insisted that fresh, cold air was not the cause of colds, and preached zealously the " gospel of ventila- tion." He was a charming talker, with a gay humour and a quiet sarcasm and a telling use of anecdote for argument. Henri Martin, the French historian, speaks of him as " of a mind altogether French in its grace and elasticity." In 1730 he married Deborah Read, in whose father's house he had lived when he had first come to Philadelphia, to whom he had been engaged before his first departure from Philadelphia for London, and who in his absence had married a ne'er-do-well, one Rogers, who had deserted her. The marriage to Franklin is presumed to have been a common law marriage, for there was no proof that Miss Read's former husband was dead, nor that, as was suspected, a former wife, alive when Rogers married Miss Read, was still alive, and that therefore his marriage to Deborah was .void. His " Debby," or his " dear child," as Franklin usually addressed her in his letters, received into the family, soon after her marriage, Franklin's illegitimate son, William Franklin (1729-1813), 2 with whom she afterwards quarrelled, and whose mother, tradition says, was Barbara, a servant in the Franklin household. Another illegitimate child became the wife of John Foxcroft of Philadelphia. Deborah, who was " as

much dispos'd to industry and frugality as " her husband, was illiterate and shared none of her husband's tastes for literature and science;

1 Notably in a pamphlet comparing the Jews and the Anti- Federalists.

2 William Franklin served on the Canadian frontier with Pennsylvania troops, becoming captain in 1750; was in the post-office in 1754-1756; went to England with his father in 1758; was admitted to legal practice in 1758; in 1763, recommended by Lord Fairfax, became governor of New Jersey; he left the Whig for the Tory party; and in the War of Independence was a faithful loyalist, much to the pain and regret of his father, who, however, was recon- ciled to him in part in 1784. He was held as a prisoner from 1776 until exchanged in 1778; and lived four years in New York, and during the remainder of his life in England with an annual pension of £800 from the crown.

her dread of an ocean voyage kept her in Philadelphia during Franklin's missions to England, and she died in 1774, while Franklin was in London. She bore him two children, one a son, Francis Folger, " whom I have seldom since seen equal'd in everything, and whom to this day [thirty-six years after the child's death] I cannot think of without a sigh," who died (1736) when four years old of small-pox, not having been inoculated; the other was Sarah (1744-1808), who married Richard Bache (1737-1811), Franklin's successor in 1776-1782 as postmaster- general. Franklin's gallant relations with women after his wife's death were probably innocent enough. Best known of his French amies were Mme Helvetius, widow of the philosopher, and the young Mme Brillon, who corrected her " Papa's " French and tried to bring him safely into the Roman Catholic Church. With him in France were his grandsons, William Temple Franklin, William Franklin's natural son, who acted as private secretary to his grandfather, and Benjamin Franklin Bache (1769-1798), Sarah's son, whom he sent to Geneva to be educated, for whom he later asked public office of Washington, and who became editor of the Aurora, one of the leading journals in the Republican attacks on Washington.

Franklin early rebelled against New England Puritanism and spent his Sundays in reading and in study instead of attending church. His free-thinking ran its extreme course at the time of his publication in London of A Dissertation on Liberty and Necessity, Pleasure and Pain (17 25),. which he recognized as one of the great errata of his life. He later called himself a deist, or theist, not discriminating between the terms. To his favourite sister he wrote: " There are some things in your New England doctrine and worship which I do not agree with;

but I do not therefore condemn them, or desire to shake your Taelief or practice of them." Such was his general attitude. He did not believe in the divinity of Christ, but thought " his system of morals and his religion, as he left them to us, the best the world ever saw, or is like to see." His intense practical-mindedness drew him away from- religion, but drove him to a morality of his own (the " art of virtue," he called it), based on thirteen virtues each accompanied by a short precept ; the virtues were Temper- ance, Silence, Order, Resolution, Frugality, Industry, Sincerity, Justice, Moderation, Cleanliness, Tranquility, Chastity and Humility, the precept accompanying the last-named virtue being " Imitate Jesus and Socrates." He made a business-like little notebook, ruled off spaces for the thirteen virtues and the seven days of the week, " determined to give a week's strict attention to each of the virtues successively . . . [going] thro* a course compleate in thirteen weeks and four courses in a year," marking for each day a record of his adherence to each of the precepts. " And conceiving God to be the fountain of wisdom," he " thought it right and necessary to solicit His assistance for obtaining it," and drew up the following prayer for daily use: " O powerful Goodness! bountiful Father ! merciful Guide ! Increase in me that wisdom which discovers my truest interest. Strengthen my resolution to perform what that wisdom dictates. Accept my kind offices to Thy other children, as the only return in my power for Thy continual favours to me." He was by no means prone to overmuch introspection, his great interest in the conduct of others being shown in the wise maxims of Poor Richard, which were possibly too utilitarian but were wonderfully successful in instructing American morals. His Art of Virtue on which he worked for years was never completed or published in any form.

" Benjamin Franklin, Printer," was Franklin's own favourite description of himself. He was an excellent compositor and pressman; his workmanship, clear impressions, black ink and comparative freedom from errata did much to get him the public printing in Pennsylvania and New Jersey, and the printing of the paper money' and other public matters in Delaware. The first book with his imprint is The Psalms of David Imitated in

- For the prevention of counterfeiting continental paper money Franklin long afterwards suggested the use on the different de- nominations of different leaves, having notˆd the infinite variety of leaf venation.

the Language of the New Testament and apply'd to the Christian Slate and Worship. By I. Watts . . ., Philadelphia: Printed by B. F. and H. M. for Thomas Godfrey, and Sold at his Shop, 1729. The first novel printed in America was Franklin's reprint in 1744 of Pamela; and the first American translation from the classics which was printed in America was a version by James Logan (1674-1751) of Cato's Moral Distichs (1735). In 1 744 he published another translation of Logan's, Cicero On Old Age, which Franklin thought typographically the finest book he had ever printed. In 1733 he had established a press in Charleston, South Carolina, and soon after did the same in Lancaster, Pa., in New Haven, Conn., in New York, in Antigua, in Kingston, Jamaica, and in other places. Personally he had little connexion with the Philadelphia printing office after 1748, when David Hall became his partner and took charge of it. But in 1753 he was eagerly engaged in having several of his improvements incorporated in a new press, and more than twenty years after was actively interested in John Walter's scheme of " logography." In France he had a private press in his house in Passy, on which he printed " bagatelles." Franklin's work as a publisher is for the most part closely connected with his work in issuing the Gazette and Poor Richard's Almanack (a summary of the proverbs from which appeared in the number for 1758, and has often been reprinted — under such titles as Father Abraham's Speech, and The Way to Wealth). 1

Of much of Franklin's work as an author something has already been said. Judged as literature, the first place belongs to his Autobiography, which unquestionably ranks among the few great autobiographies ever written. His style in its sim- plicity, facility and clearness owed something to De Foe, something to Cotton Mather, something to Plutarch, more to Bunyan and to his early attempts to reproduce the manner of the third volume of the Spectator; and not the least to his own careful study of word usage. From Xenophon's Memorabilia he learned when a boy the Socratic method of argument. Swift he resembled in the occasional broadness of his humour, in his brilliantly successful use of sarcasm and irony, 2 and in his mastery of the hoax. Balzac said of him that he " invented the lightning-rod, the hoax (' le canard ') and the republic." Among his more famous hoaxes were the " Edict of the King of Prussia " (1773), already described; the fictitious supplement to the Boston Chronicle, printed on his private press at Passy in 1782, and containing a letter with an invoice cf eight packs of 954 cured, dried, hooped and painted scalps of rebels, men, women and children, taken by Indians in the British employ; and another fictitious Letter from the Count de Schaumberg to the Baron Hohendorf commanding the Hessian Troops in America (1777) — the

count's only anxiety is that not enough men will be killed to bring him in moneys he needs, and he urges his officer in command in America " to prolong the war … for I have made arrangements for a grand Italian opera, and I do not wish to be obliged to give it up." 3

Closely related to Franklin's political pamphlets are his writ- ings on economics, which, though undertaken with a political

1 " Seventy-five editions of it have been printed in English, fifty- six in French, eleven in German and nine in Italian. It has been translated into Spanish, Danish, Swedish, Welsh, Polish, Gaelic, Russian, Bohemian, Dutch, Catalan, Chinese, modern Greek and phonetic writing, it has been printed at least four hundred times, and is to-day as popular as ever." — P. L. Ford, in The Many-Sided Franklin (1899).

s Both Swift and Franklin made sport of the typical astrologer almanack-maker.

8 Another hoax was Franklin's parable against religious perse- cution thrown into Scriptural form and quoted by him as the fifty- first chapter of Genesis. In a paper on a " Proposed New Version of the Bible " he paraphrased a few verses of the first chapter of Job, making them a satiric attack on royal government ; but the version may well rank with these hoaxes, and even modern writers have been taken in by it, regarding it as a serious proposal for a " modern- ized " version and decrying it as poor taste. Matthew Arnold, for example, declared this an instance in which Franklin was lacking in his " imperturbable common sense "; and J. B. McMaster, though devoting several pages to its discussion, very ingenuously declares it " beneath criticism."

or practical purpose and not in a purely scientific spirit, rank him as the first American economist. He wrote in 1729 A Modest Enquiry into the Nature and Necessity of a Paper Currency, which argued that a plentiful currency will make rates of interest low and will promote immigration and home manufactures, and which did much to secure the further issue of paper money in Penn- sylvania. After the British Act of 1750 forbidding the erection or the operating of iron or steel mills in the colonies, Franklin wrote Observations concerning the Increase of Mankind and the Peopling of Countries (1751); its thesis was that manufactures come to be common only with a high degree of social development and with great density of population, and that Great Britain need not, therefore, fear the industrial competition of the colonies, but it is better known for the estimate (adopted by Adam Smith) that the population of the colonies would double every quarter-century; and for the likeness to Malthus's 4 " preventive check

” of its statement: ” The greater the common fashionable expense of any rank of people the more cautious they are of marriage.” His Positions to be examined concerning National Wealth (1769) shows that he was greatly influenced by the French physiocrats after his visit to France in 1767. His Wail of a Protected Manufacturer voices a protest against protection as raising the cost of living; and he held that free trade was based on a natural right. He knew Karnes, Hume and Adam Smith, and corresponded with Mirabeau, ” the friend of Man.” Some of the more important of his economic theses, as summarized by W. A. Wetzel, are: that money as coin may have more than its bullion value; that natural interest is determined by the rent of land valued at the sum of money loaned — an anticipation of Turgot; that high wages are not inconsistent with a large foreign trade; that the value of an article is determined by the amount of labour necessary to produce the food consumed in making the article; that manu- factures are advantageous but agriculture only is truly pro- ductive; and that when practicable (as he did not think it practicable at the end of the War of Independence) state revenue should be raised by direct tax.

Franklin as a scientist 5 and as an inventor has been decried by experts as an amateur and. a dabbler; but it should be remembered that it was always his hope to retire from public life and devote himself to science. In the American Philo- sophical Society (founded 1743) scientific subjects were much discussed. Franklin wrote a paper on the causes of earthquakes for his Gazette of the 15th of December 1737; and he eagerly collected material to uphold his theory that waterspouts and whirlwinds resulted from the same causes. In 1743, from the circumstance that an eclipse not visible in Philadelphia because of a storm had been observed in Boston, where the storm although north-easterly did not occur until an hour after the eclipse, he surmised that storms move against the wind along the Atlantic coast. In the year before (1742) he had planned the ” Penn- sylvania fire-place,” better known as the ” Franklin stove,” which saved fuel, heated all the room, and had the same principle as the hot-air furnace ; the stove was never patented by Franklin, but was described in his pamphlet dated 1744. He was much engaged at the same time in remedying smoking chimneys, and as late as 1785 wrote to Jan Ingenhousz, physician to the emperor of Austria, on chimneys and draughts; smoking street lamps he remedied by a simple contrivance. The study of electricity he took up in 1746 when he first saw a Leyden jar, in the mani- pulation of which he became expert and which he improved by the use of granulated lead in the place of water for the interior armatures; he recognized that condensation is due to the dielectric and not to the metal coatings. A note in his diary, dated the

7th of November 1749, shows that he had then 4 Malthus quoted Franklin in his first edition, but it was not until the second that he introduced the theory of the ” preventive check.” Franklin noted the phenomenon with disapproval in his advocacy of increased population; Malthus with approval in his search for means to decrease population.

6 The title of philosopher as used in Franklin’s lifetime referred neither in England nor in France to him as author of moral maxims, but to him as a scientist — a ” natural philosopher. ”

conjectured that thunder and lightning were electrical mani- festations: in the same year he planned the lightning-rod (long known as ” Franklin’s rod “), which he described and recom- mended to the public in 1753, when the Copley medal of the Royal Society was awarded him for his discoveries. The famous experiment with the kite, proving lightning an electrical pheno- menon, was performed by Franklin in June 1752. He overthrew entirely the ” friction ” theory of electricity and conceived the idea of plus and minus charges (1753); he thought the sea the source of electricity. On light Franklin wrote to David Ritten- house in June 1784; the sum of his own conjectures was that the corpuscular theory of Newton was wrong, and that light was due to the vibration of an elastic aether. He studied with some care the temperature of the Gulf Stream. In navigation he suggested many new contrivances, such as water-tight com- partments, floating anchors to lay a ship to in a storm, and dishes that would not upset during a gale; and beginning in 1757 made repeated experiments with oil on stormy waters. As a mathematician he devised various elaborate magic squares and novel magic circles, of which he speaks apologetically, because they are of no practical use. Always much interested in agri- culture, he made an especial effort (like Robert R. Livingston) to promote the use of plaster of Paris as a fertiliser. He took a prominent part in aeronautic experiments during his stay in France. He made an excellent clock, which because of a slight improvement introduced by James Ferguson in 1757 was long known as Ferguson’s clock. In medicine Franklin was considered important enough to be elected to the Royal Medical Society of Paris in- 1777, and an honorary member of the Medical Society of London in 1787. In 1784 he was on the committee which investigated Mesmer, and the report is a document of last- ing scientific value. Franklin’s advocacy of vegetarianism, of sparing and simple diet, and of temperance in the

use of liquors, and of proper ventilation has already been referred to. His most direct contribution to medicine was the invention for his own use of bifocal eyeglasses.

A summary of so versatile a genius is impossible. His services to America in England and France rank him as one of the heroes of the American War of Independence and as the greatest of American diplomats. Almost the only American scientist of his day, he displayed remarkably deep as well as remarkably varied abilities in science and deserved the honours enthusi- astically given him by the savants of Europe.

Bibliography. — Franklin's works were not collected in his own lifetime, and he made no effort to publish his writings. Experiments and Observations on Electricity (London, 1769) was translated into French by Barbeu Dubourg (Paris, 1773); Vaughan attempted a more complete edition, Political, Miscellaneous and Philosophical Pieces (London, 1779); an edition in three volumes appeared after Franklin's death (London, 1806); what seemed the authentic Works, as it was under the care of Temple Franklin, was published at London (6 vols., 1817-1819; 3 vols., 1818) and with some ad- ditional matter at Philadelphia (6 vols., 1818). Sparks's edition (10 vols., Boston, 1836-1842; revised, Philadelphia, 1858) also contained fresh matter; and there are further additions in the edition of John Bigelow (Philadelphia, 1887-1888; 5th ed., 1905) and in that by Albert Henry Smyth (10 vols., New York, 1905-1907). There are important Frankliniana, about 13,000 papers, in the possession of the American Philosophical Society, to which they were conveyed by the son of Temple Franklin's executor, George Fox. Other papers which had been left to Fox lay for years in barrels in a stable garret ; they were finally cleared out, their owner, Mary Fox, intending to send them to a paper mill. One barrel went to the mill. The others, it was found, contained papers belonging to Franklin, and this important collection was bought and presented to the university of Pennsylvania. The valuable Frankliniana collected by Henry Stevens were purchased by Congress in 1885. These MS. collections were first carefully gone over for the edition of the Works by A. H. Smyth. Franklin's Autobiography was begun in 1771 as a private chronicle for his son, Governor William Franklin ; the papers, bringing the story of his father's life down to 1730, were lost by the governor during the War of Independence, and in 1783 came into the possession of Abel James, who restored them to Franklin and urged him to complete the sketch. He wrote a little in 1784, more in 1788, when he furnished a copy to his friend le Veillard, and a little more in 1790. The original manuscript was long in the possession of Temple Franklin, who spent years rearranging the

matter in it and making over into politer English his grandfather's plain-spokenness. So long was the publication delayed that it was generally believed

that Temple Franklin had sold all the papers to the British govern, ment; a French version, Memoires de la vie privee (Paris, 1791), was retranslated into English twice in 1793 (London), and from one of these versions (by Robinson) still another French version was made (Paris, 1798). Temple Franklin, deciding to print, got from le Veillard the copy sent to him in 1788 (sending in return the original with autograph alterations and the final addition), and from the copy published (London, 1817) an edition supposed to be authentic and complete. The complete autograph of the biography, acquired by John Bigelow in 1867 from its French owners, upon collation with Temple Franklin's edition showed that the latter contained 1200 emasculations and that it omitted entirely what had been written in 1790. Bigelow published the complete Autobiography with additions from Franklin's correspondence and other writings in 1868; a second edition (3 vols., Philadelphia, 1888) was published under the title, The Life of Benjamin Franklin, Written by Himself.

In addition to the Autobiography see James Parton, Life and Times of Benjamin Franklin (2 vols., New York, 1864); John T. Morse, Jr., Benjamin Franklin (Boston, 1889, in the American Statesmen series); J. B. McMaster, Benjamin Franklin as a Man of Letters (Boston, 1887, in American Men of Letters series); Paul L. Ford, The Many-Sided Franklin (New York, 1899) and Franklin Bibliography (Brooklyn, 1889); E. E. Hale and E. E. Hale, Jr., Franklin in France (2 vols., Boston, 1888) ; J. H A. Doniql, Histoire de la participation de la France a V etablissement des Etats – Unis d'Ameriaue (Paris, 6 vols., 1886-1900); S. G. Fisher, The True Benjamin Franklin (Philadelphia, 1899); E. Robins, Benjamin Franklin (New York, 1898, in the American Men of Energy series) ; W. A. Wetzel, " Benjamin Franklin as an Economist," No. 9, in series 13 of Johns Hopkins Studies in Historical and Political Science; and the prefaces and biographical matter in A. H. Smyth's edition of the Works (New York, 10 vols., 1905-1907). (R. We.)

FRANKLIN, SIR JOHN (1786-1847), English rear,-adrniral and explorer, was born at Spilsby, Lincolnshire, on the 16th of April 1786. His family was descended from a line of free-holders or " franklins " from whom some centuries earlier they had derived their surname; but the small family estate was sold by his father, who went into business. John, who was the fifth and youngest son and ninth child, was destined for the church. At the age of ten he was sent to school at

St Ives, and soon afterwards was transferred to Louth grammar school, which he attended for two years. About this time his imagination was deeply impressed by a holiday walk of 12 m. which he made with a companion to look at the sea, and he determined to be a sailor. In the hope of dispelling this fancy his father sent him on a trial voyage to Lisbon in a merchantman; but it being found on his return that his wishes were unchanged he was entered as a midshipman on board the ” Polyphemus,” and shortly afterwards took part in her in the hard-fought battle of Copenhagen (2nd of April 1801) . Two months later he joined the ” Investigator,” a discovery-ship commanded by his cousin Captain Matthew Flinders, and under the training of that able scientific officer was employed in the exploration and mapping of the coasts of Australia, where he acquired a correctness of astronomical observation and a skill in surveying which proved of eminent utility in his future career. He was on board the ” Porpoise ” when that ship and the ” Cato ” were wrecked (18th of August 1803) on a coral reef off the coast of Australia, and after this misfortune proceeded to China. Thence he obtained a passage to England in the ” Earl Camden,” East Indiaman, commanded by Captain (afterwards Sir) Nathaniel Dance, and performed the duty of signal midshipman in the famous action of the 15th of February 1804 when Captain Dance repulsed a strong French squadron led by the redoubtable Admiral Linois. On reaching England he joined the ” Bellerophon,” 74, and was in charge of the signals on board that ship during the battle of Trafalgar. Two years later he joined the” Bedford,” attaining the rank of lieutenant the year after, and served in her on the Brazil station (whither the ” Bedford ” went as part of the convoy which escorted the royal family of Portugal to Rio de Janeiro in 1808), in the blockade of Flushing, and finally in the disastrous expedition against New Orleans (1814), in which campaign he displayed such zeal and intelligence as to merit special mention in despatches.

On peace being established, Franklin turned his attention once more to the scientific branch of his profession, and sedulously extended his knowledge of surveying. In 18 18 the discovery of a North-West Passage to the Pacific became again, after a

long interval, an object of national interest, and Lieutenant Franklin was given the command of the ” Trent ” in the Arctic expedition, under the orders of Captain Buchan in the “Dorothea “. During a heavy storm the ” Dorothea ” was so much damaged by the pack-ice

that her reaching England became doubtful, and, much to the chagrin of young Franklin, the ” Trent ” was compelled to convoy her home instead of being allowed to prosecute the voyage alone. This voyage, however, had brought Franklin into personal intercourse with the leading scientific men of London, and they were not slow in ascertaining his peculiar fitness for the command of such an enterprise. To calmness in danger, promptness and fertility of resource, and excellent seamanship, he added an ardent desire to promote science for its own sake, together with a love of truth that led him to do full justice to the merits of his subordinate officers, without wishing to claim their discoveries as a captain’s right. Furthermore, he possessed a cheerful buoyancy of mind, sustained by deep religious principle, which was not depressed in the most gloomy times. It was therefore with full confidence in his ability and exertions that, in 1819, he was placed in command of an expedition appointed to proceed overland from the Hudson Bay to the shores of the Arctic Sea, and to determine the trendings of that coast eastward of the Coppermine river. At this period the northern coast of the American continent was known at two isolated points only, — this, the mouth of the Coppermine river (which, as Franklin discovered, was erroneously placed four degress of latitude too much to the north), and the mouth of the Mackenzie far to the west of it. Lieutenant Franklin and his party, consisting of Dr Richardson, Midshipmen George Back and Richard Hood, and a few ordinary boatmen, arrived at the depot of the Hudson’s Bay Company at the end of August 1819, and making an autumnal journey of 700 m. spent the first winter on the Saskatchewan. Owing to the supplies which had been promised by the North-West and Hudson’s Bay Companies not being forthcoming the following year, it was not until the summer of 182 1 that the Coppermine was ascended to its mouth, and a considerable extent of sea-coast to the eastward surveyed. The return journey led over the region known as the Barren Ground, and was marked by the most terrible sufferings and privations and the tragic death of Lieutenant Hood. The survivors of the expedition reached York Factory in the month of June 1822, having accomplished altogether 5550 m. of travel. While engaged on this service Franklin was promoted to the rank of commander (1st of January 1821), and upon his return to England at the end of 1822 he obtained the post rank of captain and was elected a fellow of the Royal Society. The narrative of this expedition was pub- lished in the following year and became at once a classic of travel, and soon after he married Eleanor, the youngest daughter of William Porden, an eminent architect.

Early in 1825 he was entrusted with the command of a second

overland expedition, and upon the earnest entreaty of his dying wife, who encouraged him to place his duty to his country before his love for her, he set sail without waiting to witness her end. Accompanied as before by Dr (afterwards Sir) John Richardson and Lieutenant (afterwards Sir) George Back, he descended the Mackenzie river in the season of 1826 and traced the North American coast as far as 140 37′ W. long., whilst Richardson at the head of a separate party connected the mouths of the Coppermine and Mackenzie rivers. Thus between the years 181 9 and 1827 he had added 1200 m. of coast-line to the American continent, or one-third of the whole distance from the Atlantic to the Pacific. These exertions were fully appreciated at home and abroad. He was knighted in 1829, received the honorary degree of D.C.L. from the university of Oxford, was awarded the gold medal of the Geographical Society of Paris, and was elected corresponding member of the Paris Academy of Sciences. The results of these expeditions are described by Franklin and Dr Richardson in two magnificent works published in 1824-ˆ829. In 1828 he married bis second wife, Jane, second daughter of John Griffin. His next official employment was on the Mediter- ranean station, in command of the ” Rainbow,” and his ship

soon became proverbial in the squadron for the happiness and comfort of her officers and crew. As an acknowledgment of the essential service which he rendered off Patras in the Greek War of Independence, he received the cross of the Redeemer of Greece from King Otto, and after his return to England he was created knight commander of the Guelphic order of Hanover.

In 1836 he accepted the lieutenant-governorship of Van Diemen’s Land (now Tasmania), and held that post till the end of 1843. His government was marked by several events of much interest, one of his most popular measures being the opening of the doors of the legislative council to the public. He also founded a college, endowing it largely from his private funds, and in 1838 established a scientific society at Hobart Town (now called the Royal Society of Tasmania), the meetings of which were held in Government House and its papers printed at his expense. In his time also the colony of Victoria was founded by settlers from Tasmania; and towards its close, transportation to New South Wales having been abolished, the convicts from every part of the British empire were sent to Tasmania. On an increase of the lieutenant-governor’s salary being voted by the colonial legislature, Sir John declined to derive any advantage from it personally, while he secured the augmentation to his successors. He welcomed eagerly the various expeditions for exploration and surveying which visited Hobart Town, conspicuous among these, and

of especial interest to himself, being the French and English Antarctic expeditions of Dumont d'Urville and Sir James C. Ross — the latter com- manding the " Erebus " and " Terror," with which Franklin's own name was afterwards to be so pathetically connected. A magnetic observatory fixed at Hobart Town, as a dependency of the central establishment under Colonel Sabine, was also an object of deep interest up to the moment of his leaving the colony. That his unflinching effo-ts for the social and political advancement of the colony were appreciated was abundantly proved by the affection and respect shown him by every section of the community on his departure; and several years after- wards the colonists showed their remembrance of his virtues and services by sending Lady Franklin a subscription of £1700 in aid of her efforts for the search and relief of her husband, and later still by a unanimous vote of the legislature for the erection of a statue in honour of him at Hobart Town.

Sir John found on reaching England that there was about to be a renewal of polar research, and that the confidence of the admiralty in him was undiminished, as was shown by his being offered the command of an expedition for the discovery of a North-West Passage to the Pacific. This offer he accepted. The prestige of Arctic service and of his former experiences attracted a crowd of volunteers of all classes, from whom were selected a body of officers conspicuous for talent and energy. Captain Crozier, who was second in command, had been three voyages with Sir Edward Parry, and had commanded the " Terror " in Ross's Antarctic expedition. Captain Fitzjames, who was commanderon board the " Erebus," had been five times gazetted for brilliant conduct in the operations of the first China war, and in a letter which he wrote from Greenland has bequeathed some good-natured but masterly sketches of his brother officers and messmates on this expedition. Thus supported, with crews carefully chosen (some of whom had been engaged in the whaling service), victualled for three years, and furnished with every appliance then known, Franklin's expedition, consisting of the " Erebus" and " Terror " (129 officers and men), with a transport ship to convey additional stores as far as Disco in Greenland, sailed from Greenhithe on the 19th of May 1845. The letters which Franklin despatched from Greenland were couched in language of cheerful anticipation of success, while those received from his officers expressed their glowing hope, their admiration of the seamanlike qualities of their commander, and the happi- ness they had in serving under him. The ships were last seen by a whaler near the entrance of Lancaster Sound, on the 26th of July, and the deep gloom which settled down upon their subsequent movements was not finally raised till fourteen years later.

Franklin's instructions were framed in conjunction with Sir John Barrow and upon his own suggestions. The experience of Parry had established the navigability of Lancaster Sound (leading westwards out of Baffin Bay), whilst Franklin's own surveys had long before satisfied him that a navigable passage existed along the north coast of America from the Fish river to Bering Strait. He was therefore directed to push through Lancaster Sound and its continuation, Barrow Strait, without loss of time, until he reached the portion of land on which Cape Walker is situated, or about long. 08° W., and from that point to pursue a course southward towards the American coast. An explicit prohibition was given against a westerly course beyond the longitude of 08° W., but he v/as allowed the single alternative of previously examining Wellington Channel (which leads out of Barrow Strait) for a northward route, if the naviga- tion here were open.

In 1847, though there was no real public anxiety as to the fate of the expedition, preparations began to be made for the possible necessity of sending relief. As time passed, however, and no tidings reached England, the search began in earnest, and from 1848 onwards expedition after expedition was despatched in quest of the missing explorers. The work of these expeditions forms a story of achievement which has no parallel in maritime annals, and resulted in the discovery and exploration of thousands of miles of new land within the grim Arctic regions, the develop- ment of the system of sledge travelling, and the discovery of a second North-West Passage in 1850 (see Polar Regions). Here it is only necessary to mention the results so far as the search for Franklin was concerned. In this great national under- taking Lady Franklin's exertions were unwearied, and she exhausted her private funds in sending out auxiliary vessels to quarters not comprised in the public search, and by her pathetic appeals roused the sympathy of the whole civilized world.

The first traces of the missing ships, consisting of a few scattered articles, besides three graves, were discovered at Franklin's winter quarters (1845-1846) on Beechey Island, by Captain (afterwards Sir) Erasmus Ommanney of the " Assistance," in August 1851, and were brought home by the " Prince Albert," which had been fitted out by Lady Franklin. No further tidings were obtained until the spring of 1854, when Dr John Rae, then conducting a sledging expedition of the Hudson's Bay Company from Repulse Bay, was told by the Eskimo that (as was inferred) in 1850 white men, to the number of about

forty, had been seen dragging a boat southward along the west shore of King William's Island, and that later in the same season the bodies of the whole party were found by the natives at a point a short distance to the north-west of Back's Great Fish river, where they had perished from the united effects of cold and famine. The latter statement was afterwards disproved by the discovery of skeletons upon the presumed line of route; but indisputable proof was given that the Eskimo had communicated with members of the missing expedition, by the various articles obtained from them and brought home by Dr Rae. In consequence of the information obtained by Dr Rae, a party in canoes, under Messrs Anderson and Stewart, was sent by government down the Great Fish river in 1855, and succeeded in obtaining from the Eskimo at the mouth of the river a considerable number of articles which had evidently belonged to the Franklin expedition; while others were picked up on Montreal Island a day's march to the northward. It was clear, therefore, that a party from the " Erebus " and " Terror " had endeavoured to reach the settlements of the Hudson's Bay Company by the Fish river route, and that in making a southerly course it had been arrested within the channel into which the Great Fish river empties itself. The admiralty now decided to take no further steps to determine the exact fate of the expedition, and granted to Dr Rae the reward of £10,000 which had been offered in 1849 to whosoever should first succeed in obtaining authentic news of the missing men. It was therefore reserved for the latest effort of Lady Franklin to develop, not only the fate of her husband's expedition but also the steps of its progress up to the very verge of success, mingled indeed with almost unprecedented disaster. With all her available means, and

aided, as she had been before, by the subscriptions of sympathiz- ing friends, she purchased and fitted out the little yacht " Fox," which sailed from Aberdeen in July 1857. The command was accepted by Captain (afterwards Sir) Leopold M'Clintock, whose high reputation had been won in three of the government ex- peditions sent out in search of Franklin. Having been com- pelled to pass the first winter in Baffin Bay, it was not till the autumn of 1858 that the " Fox " passed down Prince Regent's Inlet, and put into winter quarters at Port Kennedy at the eastern end of Bellot Strait, between North Somerset and Boothia Felix. In the spring of 1859 three sledging parties went out, Captain (afterwards Sir) Allen Young to examine Prince of Wales Island, Lieutenant (afterwards Captain) Hobson the north and west coasts of King William's Island, and M'Clintock the east and south coasts of the latter, the west coast of Boothia, and the region about the mouth of Great Fish river. This splendid and exhaustive search added

800 m. of new coast-line to the knowledge of the Arctic regions, and brought to light the course and fate of the expedition. From the Eskimo in Boothia many relics were obtained, and reports as to the fate of the ships and men; and on the west and south coast of King William's Island were discovered skeletons and remains of articles that told a terrible tale of disaster. Above all, in a cairn at Point Victory a precious record was discovered by Lieutenant Hobson that briefly told the history of the expedition up to April 25, 1848, three years after it set out full of hope. In 1845-1846 the " Erebus " and " Terror " wintered at Beechey Island on the S.W. coast of North Devon, in lat. 74° 43′ 28″ N., long. 91 39′ 15″ W., after having ascended Wellington Channel to lat. 77° and returned by the west side of Cornwallis Island. This statement was signed by Graham Gore, lieutenant, and Charles F. des Voeux, mate, and bore date* May 28, 1847. These two officers and six men, it was further told, left the ships on May 24, 1847 (no doubt for an exploring journey), at which time all was well.

Such an amount of successful work has seldom been accom- plished by an Arctic expedition within any one season. The alternative course permitted Franklin by his intructions had been attempted but not pursued, and in the autumn of 1846 he had followed that route which was specially commended to him. But after successfully navigating Peel and Franklin Straits on his way southward, his progress had been suddenly and finally arrested by the obstruction of heavy (" palaeocrystic ") ice, which presses down from the north-west through M'Clintock Channel (not then known to exist) upon King William's Island. It must be remembered that in the chart which Franklin carried King William's Island was laid down as a part of the mainland of Boothia, and he therefore could pursue his way only down its western coast. Upon the margin of the printed admiralty form on which this brief record was written was an addendum dated the 25th of April 1848, which extinguished all further hopes of a successful termination of this grand enterprise. The facts are best conveyed in the terse and expressive words in which they were written, and are therefore given verbatim: " April 25th, 1848. H.M. Ships 'Terror' and 'Erebus' were deserted on 22nd April, five leagues N.N.W. of this, having been beset since 12th September 1846. The officers and crews, consisting of 105 souls under the command of Captain F. R. M. Crozier, landed in lat. 69 37′ 42″ N., long. 98 41′ W. This paper was found by Lieut. Irving . . . where it had been deposited by the late Commander Gore in June 1847. Sir John Franklin died on the nth June 1847; and the total loss by deaths in the expedition has been to this date 9 officers and 15 men." The handwriting is that of Captain Fitzjames, to whose signature is appended that of Captain Crozier, who also adds the

words of chief importance, namely, that they would ” start on to-morrow 26th April 1848 for Back’s Fish river.” A briefer record has never been told of so tragic a story.

All the party had without doubt been greatly reduced through want of sufficient food, and the injurious effects of three winters in these regions. They had attempted to drag with them two boats, besides heavily laden sledges, and doubtless had soon

been compelled to abandon much of their burden, and leave one boat on the shore of King William’s Island, where it was found by M’Clintock, near the middle of the west coast, containing two skeletons. The route adopted was the shortest possible, but their strength and supplies had failed, and at that season of the year the snow-covered land afforded no subsistence. An old Eskimo woman stated that these heroic men ” fell down and died as they walked,” and, as Sir John Richardson has well said, they ” forged the last link of the North-West Passage with their lives.” From all that can be gathered, one of the ships must have been crushed in the ice and sunk in deep water, and the other, stranded on the shore of King William’s Island, lay there for years, forming a mine of wealth for the neighbouring Eskimo.

This is all we know of the fate of Franklin and his brave men. His memory is cherished as one of the most conspicuous of the naval heroes of Britain, and as one of the most successful and daring of her explorers. He is certainly entitled to the honour of being the first discoverer of the North-West Passage; the point reached by the ships having brought him to within a few miles of the known waters of America, and on the monument erected to him by his country, in Waterloo Place, London, this honour is justly awarded to him and his companions, — a fact which was also affirmed by the president of the Royal Geo- graphical Society, when presenting their gold medal to Lady Franklin in i860. On the 26th of October 1852 Franklin had been promoted to the rank of rear-admiral. He left an only daughter by his first marriage. Lady Franklin died in 1875 at the age of eighty-three, and a fortnight after her death a fine monument was unveiled in Westminster Abbey, commemorating the heroic deeds and fate of Sir John Franklin, and the insepar- able connexion of Lady Franklin’s name with the fame of her husband. Most of the relics brought home by M’Clintock were presented by Lady Franklin to the United Service

Museum, while those given by Dr Rae to the admiralty are deposited in Greenwich hospital. In 1 864-1 869 the American explorer Captain Hall made two journeys in endeavouring to trace the remnant of Franklin's party, bringing back a number of addi- tional relics and some information confirmatory of that given by M'Clintock, and in 1878 Lieutenant F. Schwatka of the United States army and a companion made a final land search, but although accomplishing a remarkable record of travel discovered nothing which threw any fresh light on the history of the expedition.

See H. D. Traill, Life of Sir John Franklin (1896).

FRANKLIN, WILLIAM BUEL (1823-1903), Federal general in the American Civil War, was born at York, Pennsylvania, on the 27th of February 1823. He graduated at West Point, at the head of his class, in 1843, was commissioned in the Engineer Corps, U.S.A., and served with distinction in the Mexican War, receiving the brevet of first lieutenant for his good conduct at Buena Vista, in which action he was on the staff of General Taylor. After the war he was engaged in miscellaneous engineer- ing work, becoming a first lieutenant in 1853 and a captain in 1857. Soon after the outbreak of the Civil War in 1861 he was made colonel of a regular infantry regiment, and a few days later brigadier-general of volunteers. He led a brigade in the first battle of Bull Run, and on the organization by McClellan of the Army of the Potomac he received a divisional command. He commanded first a division and then the VI. Corps in the operations before Richmond in 1862, earning the brevet of brigadier-general in the U. S. Army; was promoted major- general, U.S. V., in July 1862; commanded the VI. corps at South Mountain and Antietam; and at Fredericksburg com- manded the " Left Grand Division " of two corps (I. and VI.). His part in the last battle led to charges of disobedience and negligence baing preferred against him by the commanding general, General A. E. Burnside, on which the congressional committee on the conduct of the war reported unfavourably to Franklin, largely, it seems, because Burnside's orders to Franklin were not put in evidence. Burnside had issued on the 23rd of January 1863 an order relieving Franklin from duty,

and Franklin's only other service in the war was as commander of the XIX. corps in the abortive Red River Expedition of 1864. In this expedition he received a severe wound at the action of Sabine Cross Roads (April 8, 1864), in consequence of which he took no further active part in the war. He served for a time on the retiring board, and was captured by the Confederates on the nth of July 1864, but escaped the same night. In 1865 he was brevetted major-general in the regular army, and in 1866 he was retired. After the war General Franklin was vice- president of the Colt's Patent Firearms Manufacturing Company, was president of the commission to lay out Long Island City, N.Y. (1871-1872), of the commission on the building of the Connecticut state house (1872-1873), and, from 1880 to 1899, of the board of managers of the national home for disabled volunteer soldiers; as a commissioner of the United States to the Paris Exposition of 1889 he was made a grand officer of the Legion of Honour; and he was for a time a director of the Panama railway. He died at Hartford, Connecticut, on the 8th of March 1903. He wrote a pamphlet, The Gatling Gun for Service Ashore and Afloat (1874).

See A Reply of Major-General William B. Franklin to the Report of the Joint Committee of Congress on the Conduct of the War (New York, 1863; 2nd ed., 1867), and Jacob L. Greene, Gen. W. B. Franklin and the Operations of the Left Wing at the Battle of Fredericks- burg (Hartford, 1900).

FRANKLIN, an organized district of Canada, extending from the Arctic Circle to the North Pole. It was formed by order-in- council on the 2nd of Oct9ber 1895, and includes numerous islands and peninsulas, such as Banks, Prince Albert, Victoria, Wollaston, King Edward and Baffin Land, Melville, Bathurst, Prince of Wales and Cockburn Islands. Of these, Baffin Land alone extends south of the Arctic Circle. The area is estimated at 500,000 sq. m., but the inhabitants consist of a few Indians, Eskimo and fur-traders. Musk-oxen, polar bears, foxes and other valuable fur-bearing animals are found in large numbers. The district is named after Sir John Franklin.

FRANKLIN, a township of Norfolk county, Massachusetts, U.S.A., with an area of 29 sq. m. of rolling surface. Pop. (1900) 5017, of whom 1250 were foreign-born ; (1903, state census) 5244; (1910 census) 5641. The principal village, also named Franklin, is about 27 m. S.W. of Boston, and is served by the New York, New Haven & Hartford railway. Franklin has a public library (housed in the Ray memorial building and containing 7700 volumes in 1910) and is the seat of Dean Academy (Universalist ; founded in 1865), a secondary school

for boys and girls. Straw goods, felt, cotton and woollen goods, pianos and printing presses are manufactured here. The township was incorporated in 1778, previous to which it was a part of Wrentham (1673). It was the first of the many places in the United States named in honour of Benjamin Franklin (who later contributed books for the public library). Horace Mann was born here.

FRANKLIN, a city of Merrimack county, New Hampshire, U.S.A., at the confluence of the Pemigewasset and Winnepe- saukee rivers to form the Merrimac; about 95 m. N.N.W. of Boston. Pop. (1890) 4085; (1900) 5846 (1323 foreign-born); (1910) 6132; area, about 14.4 sq. m. Franklin is served by the Concord Division of the Boston & Maine railway, with a branch' to Bristol (13 m. N.W.) and another connecting at Tilton (about 5 m. E.) with the White Mountains Division. It contains the villages of Franklin, Franklin Falls, Webster Place and Lake City, the last a summer resort. The rivers furnish good water power, which is used in the manufacture of a variety of commodities, including foundry products, paper and pulp, woollen goods, hosiery, saws, needles and knitting machines. The water-works are owned and operated by the municipality. Here, in what was then a part of the town of Salisbury, Daniel Webster was born, and on the Webster farm is the New Hamp- shire orphans' home, established in 187 1. The town of Franklin was formed in 1828 by the union of portions of Salisbury, Sanbornton, Andover and Northfield. The earliest settlement within its limits was made in 1748 in the portion taken from Salisbury. Franklin was incorporated as a city in 1895.

FRANKLIN, a city and the county-seat of Venango county, Pennsylvania, U.S.A., at the confluence of French Creek and Allegheny river, about 55 m. S. by E. of Erie, in the N.W. part of the state. Pop. (1890) 6221; (1900) 7317 (489 being foreign- born) ; (1910) 9767. Franklin is served by the Erie, the Pennsyl- vania, the Lake Shore & Michigan Southern, and the Franklin & Clearfield railways. Its streets are broad and well paved and shaded, and there are two public parks, a public library and many handsome residences. Franklin is the centre of the chief oil region of the state, and from it great quantities of refined oil are shipped. Natural gas also abounds. The city's manufacture include oil-well supplies, boilers, engines, steel castings, iron goods, lumber, bricks, asbestos goods, manifolding paper and

flour. On the site of the present city the French built in 1754 a fortification, Fort Machault, which after the capture of Fort Duquesne by the English was a rallying place for Indians allied with the French. In 1759 the French abandoned and completely destroyed the fort; and in the following year the English built in the vicinity Fort Venango, which was captured by the Indians in 1763 during the Conspiracy of Pontiac, the whole garrison being massacred. In 1787 the United States built Fort Franklin (about 1 m. above the mouth of French Creek) as a protection against the Indians; in 1796 the troops were removed to a strongly built and well-fortified wooden building, known as ” Old Garrison,” at the mouth of French Creek, and in 1803 they were permanently withdrawn from the neighbourhood. Franklin was laid out as a town in T795, was incorporated as a borough in 1828, and was chartered as a city in 1868. Most of its growth dates from the discovery of oil in i860.

FRANKLIN, a town and the county-seat of Williamson county, Tennessee, U.S.A., in the central part of the state, on the Harpelh river, and about 20 m. S.W. of Nashville. Pop.

(1900) 2180; (1910) 2924. Franklin is served by the Louisville 1 usual kind of settlement.

in England to denote a land-holder who was of free but not of noble birth. Some of the older English writers occasionally use it to mean a liberal host. The Latin form of the word is franchilanus.

FRANKLINITE, a member of the spinel group of minerals, consisting of oxides of iron, manganese and zinc in varying proportions, (Fe, Zn, Mn)”(Fe, Mn) 2 “‘0 4 . It occurs as large octahedral crystals often with rounded edges, and as granular masses. The colour is iron-black and the lustre metallic; hardness 6, specific gravity 5-2. It thus resembles magnetite in external characters, but is readily distinguished from this by the fact that it is only slightly magnetic. It is found in considerable amount, associated with zinc minerals (zincite and willemite) in crystalline limestone, at Franklin Furnace, New Jersey, where it is mined as an ore of zinc (containing 5 to 20% of the metal) ; after the extraction of the zinc, the residue is used in the manufacture of spiegeleisen (the mineral containing 15 to 20% of manganese oxides). Associated with franklinite at Franklin Furnace, and found also at some other localities, is another member of the spinel group, namely, gahnite or zinc-spinel, which is a zinc aluminate, ZnAl 2 4 , with a little of the zinc replaced by iron and manganese.

FRANK-MARRIAGE (liberum maritagium) , in real property law, a

species of estate tail, now obsolete. When a man was seized of land in fee simple, and gave it to a daughter on marriage, the daughter and her husband were termed the donees in frank- marriage, because they held the land granted to them and the heirs of their two bodies free from all manner of service, except fealty, to the donor or his heirs until the fourth degree of con- sanguinity from the donor was passed. This right of a freeholder so to give away his land at will was first recognized in the reign of Henry II., and became up to the reign of Elizabeth the most

& Nashville railway. It is the seat of the Tennessee Female College and the Battle Ground Academy, and its chief objects of interest are the battle-ground, the Confederate cemetery and the Confederate monument. During the Civil War Franklin was the scene of a minor engagement on the 10th of April 1863, and of a battle, celebrated as one of the most desperately fought of the war, which took place on the 30th of November 1864. The Union general Schofield, who was slowly withdrawing to Nashville before the advance of General J. B. Hood's army, which he was ordered to hold in check in order to give Thomas time to prepare for battle (see American Civil War, § 32), was unable immediately to cross the Harpeth river and was compelled to entrench his forces south of the town until his wagon trains and artillery could be sent over the stream by means of two small bridges. In the afternoon Schofield's out- posts and advanced lines were attacked by the Confederates in full strength, and instead of withdrawing as ordered they made a determined stand. Thus the assailants, carrying the advanced works by storm, rushed upon the main defences on the heels of the broken advanced guard, and a general engage- ment was brought on which lasted from 3-30 until nine o'clock in the evening. Against, it is said, thirteen separate assaults, all delivered with exceptional fury, Schofield managed to hold his position, and shortly before midnight he withdrew across the river in good order. The engagement was indecisive in its results, but the Union commander's purpose, to hold Hood momentarily in check, was gained, and Hood's effort to crush Schofield was unavailing. The losses were very heavy; Hood's effective forces in the engagement numbered about 27,000, Schofield's about 28,000; the Confederate losses (excluding cavalry) were about 6500, excluding the slightly wounded; six general officers were killed (including Major-General P. K. Cleburne, a brave Irishman who had been a corporal in the British army), six wounded, and one captured; the Union losses (excluding cavalry) were 2326. In two of the Confederate brigades all the general and field officers were killed or wounded.

See J. D. Cox, The Battle of Franklin (New York, 1897).

FRANKLIN, a word derived from the Late Lat. francus, free, and meaning primarily a freeman. Subsequently it was used

FRANKPLEDGE (Lat. francum plegium), an early English institution, consisting (as defined by Stubbs) of an association for mutual security whose members, according to Hallam, ” were perpetual bail for each other.” The custom whereby the inhabitants of a district were responsible for any crime or injury committed by one of their number is old and widespread; it prevailed in England before the Norman Conquest, and is an outcome of the earlier principle whereby this responsibility rested on kinship. Thus a law of Edgar (d. 975) says ” and let every man so order that he have a borh (or surety), and let the borh then bring and hold him to every justice; and if any one then do wrong and run away, let the borh bear that which he ought to bear”; and a law of Canute about 1030 says “and that every one be brought into a hundred and in borh, and let the borh hold and lead him to every plea.” About this time these societies, each having its headman, were called frithborhs, or peace-borhs, and the Normans translated the Anglo-Saxon word by frankpledge. But the history of the frankpledge proper begins not earlier than the time of the Norman Conquest. The laws, which although called the laws of Edward the Confessor were not drawn up until about 1130, contain a clause about frithborhs which decrees that in every place societies of ten men shall be formed for mutual security and reparation. And before this date William the Conqueror had ordered that ” every one who wishes to be regarded as free must be in a pledge, and that the pledge must hold and bring him to justice if he commits any offence “; and the laws of Henry I. ordered every person of substance over twelve years of age to be enrolled in a frank- pledge. This association of ten, or as it often was at a later date of twelve men, was also called a tithing, or decima, and in the north of England was known as tenmanne tale.

The view of frankpledge (visus franciplegii) , or the duty of ascertaining that the law with regard to frankpledges was com- plied with, was in the hands of the sheriffs, who held an itinerant court called the ” sheriff’s tourn ” for this and other purposes. This court was held twice a year, but in 121 7 it was ordered that the view of frankpledge should only be taken once — at Michaelmas. Introduced at or before the time of Henry I., the view was regulated by the Assize of Clarendon of 1166 and

FRANKS, SIR A. W.— FRANKS

by Magna Carta as reissued in 121 7. Although the former of these lays stress upon the fact that the sheriff's supervisory powers are universal many men did not attend his tourn. Some lords of manors and of hundreds held a court of their own for view of frankpledge, and in the 13th century it may be fairly said " of all the franchises, the royal rights in private hands, view of frankpledge is perhaps the commonest." At the end of the same century the court for the view of frankpledge was generally known as the court leet, and was usually a manorial court in private hands. However, the principle of the frank-pledge was still enforced. Thus Bracton says " every male of the age of twelve years, be he free be he serf, ought to be in frankpledge," but he allows for certain exceptions.

As the word frankpledge denotes, these societies were originally concerned only with freemen; but the unfree were afterwards admitted, and during the 13th century the frankpledges were composed chiefly of villains. From petitions presented to parlia- ment in 1376 it seems that the view of frankpledge was in active operation at this time, but it soon began to fall into disuse, and its complete decay coincides with the new ideas of government introduced by the Tudors. In a formal fashion courts leet for the view of frankpledge were held in the time of the jurist Selden, and a few of these have survived until the present day. Sir F. Palgrave has asserted that the view of frankpledge was unknown in that part of the country which had been included in the kingdom of Northumbria. This statement is open to question, but it is highly probable that the system was not so deeply rooted in this part of England as elsewhere. The machinery of the frankpledge was probably used by Henry II. when he introduced the jury of presentment; and commenting on this connexion F. W. Maitland says " the duty of producing one's neighbour to answer accusations (the duty of the frankpledges) could well be converted into the duty of telling tales against him." The system of frankpledge prevailed in some English boroughs. Sometimes a court for view of frankpledge, called in some places a mickleton, whereat the mayor or the bailiffs presided, was held for the whole borough; in other cases the borough was divided into wards, or into leets, each of which had its separate court.

See Pollock and Ma\t\a.Ti

FRANKS, SIR AUGUSTUS WOLLASTON (1826-1807), English antiquary, was born on the 20th of March 1826, and was educated at Eton and at Trinity College, Cambridge. He early showed inclination for antiquarian pursuits, and in 1851 was appointed assistant in the Antiquities Department of the British Museum. Here, and as director

of the Society of Antiquaries, an appointment he received in 1858, he made himself the first authority in England upon medieval antiquities of all descrip- tions, upon porcelain, glass, the manufactures of savage nations, and in general upon all Oriental curiosities and works of art later than the Classical period. In 1866 the British and medieval antiquities, with the ethnographical collections, were formed into a distinct department under his superintendence; and the Christy collection of ethnography in Victoria Street, London, prior to its amalgamation with the British Museum collections, was also under his care. He became vice-president and ultimately president of the Society of Antiquaries, and in 1878 declined the principal librarianship of the museum. He retired on his seventieth birthday, 1896, and died on the 21st of May r8o7. His ample fortune was largely devoted to the collection of ceramics and precious objects of medieval art, most 6f which became the property of the nation, either by donation in his lifetime or by bequest at his death. Although chiefly a medieval antiquary, Franks was also an authority on classical art, especially Roman remains in Britain: he was also greatly interested in book-marks and playing-cards, of both of which he formed important collections. He edited Kemble's Horae Ferales, and wrote numerous memoirs on archaeological subjects. Perhaps his most important work of this class is the catalogue of his own collection of porcelain.

FRANKS. The name Franks seems to have been given in the 4th century to a group of Germanic peoples dwelling north of the Main and reaching as far as the shores of the North Sea; south of the Main was the home of the Alamanni. The names of some of these tribes have come down to us. On the Tabula Peutingeriana appear the " Chamavi qui et Pranci," which should doubtless read "qui et Franci"; these Chamavi apparently dwelt between the Yssel and the Ems. Later, we find them a little farther south, on the banks of the Rhine, in the district called Hamalant, and it is their customs which were brought together in the 9th century in the document known as the Lex Francorum Chamavorum. After the Chamavi we may mention the Attuarii or Chattuarii, who are referred to by Ammianus Marcellinus (xx. 10, 2): " Rheno exinde transmisso, regionem pervasit (Julianus) Francorum quos Atthuarios vocant." Later, the pagus Attuariorum corresponds to the district of Emmerich and Xanten. It should be noted that this name occurs again in the middle ages in Burgundy, not far from Dijon; in all probability a detachment of this people had settled in that spot in the 5th or 6th century. The Bructeri, Ampsivarii and Chatti may also be classed among the Frankish tribes. They are mentioned in a celebrated passage of Sulpicius Alexander, which is cited by Gregory of Tours {Historia Fran- corum, ii. 9). Sulpicius

shows the general Arbogast, a barbarian in the service of Rome, seeking to take vengeance on the Franks (392): ” Collecto exercitu, transgressus Rhenum, Bricteros ripae proximos, pagum etiam quern Chamavi incolunt depopulatus est, nullo unquam occursante, nisi quod pauci ex Ampsivariis et Catthis Marcomere duce in ulterioribus collium jugis apparuere.” It is evidently this Marcomeres, the chief of these tribes, who is regarded by later historians as the father of the legendary Faramund (Pharamund) although in fact Marcomeres has nothing to do with the Salian Franks.

The earliest mention in history of the name Franks is the entry on the Tabula Peutingeriana, at least if we assume that the term ” et Franci ” is not a later emendation. The earliest occurrence of the name in any author is in the Vila Aureliani of Vopiscus (ch. vii.). When, in 241, Aurelian, who was then only a tribune, had just defeated some Franks in the neighbour- hood of Mainz and was marching against the Persians, his troops sang the following refrain :

Mille Sarmatas, mille Francos, semel et semel occidimus ;

Mille Persas, quaerimus.

All these Germanic tribes, which were known from the 3rd century onwards by the generic name of Franks, doubtless spoke a similar dialect and were governed by customs which must scarcely have differed from one another; but this was all they had in common. Each tribe was politically independent; they formed no confederations. Sometimes two or three tribes joined forces to wage a war; but, the struggle over, the bond was broken, and each tribe resumed its isolated life. Waitz holds with some show of probability that the Franks represent the ancient Istaevones of Tacitus, the Alamanni and the Saxons representing the Herminones and the Ingaevones.

Of all these Frankish tribes one especially was to become prominent, the tribe of the Salians. They are mentioned for the first time-in 358, by Ammianus Marcellinus (xvii. 8, 3), who says that the Caesar Julian ” petit primos omnium Francos, videlicet eos quos consuetudo Salios appellavit.” As to the origin of the name, it was long held to be derived from the river Yssel or Saal. It is more probable, however, that it arose from the fact that the Salians for a long period occupied the shores of the salt sea. 1 The Salians inhabited the sea-coast, whereas the Ripuarians dwelt on the banks of the river Rhine.

The Salians, at the time when they are mentioned by Ammianus, occupied Toxandria, i.e. the region south of the Meuse, between that

river and the Scheldt. Julian defeated them completely, but allowed them to remain in Toxandria, not, as of old, as conquerors, but as foederali of the Romans. They perhaps paid tribute, and they certainly furnished Rome with

1 Their legends are connected with the sea, the name Meroveus signifying ” sea-born.”

soldiers; Salii senior es and Salii juniores are mentioned in the Nolitia dignitatum, and Salii appear among the auxilia palatina. At the end of the 4th century and at the beginning of the 5th, when the Roman legions withdrew from the banks of the Rhine, the Salians installed themselves in the district as an independent people. The place-names became entirely Germanic; the Latin language disappeared; and the Christian religion suffered a check, for the Franks were to a man pagans. The Salians were subdivided into a certain number of tribes, each tribe placing at its head a king, distinguished by his long hair and chosen from the most noble family (Historia Francorum, ii. 9).

The most ancient of these kings, reigning over the principal tribe, who is known to us is Chlodio. 1 According to Gregory of Tours Chlodio dwelt at a place called Dispargum, which it is impossible to identify. Towards 43 1 he crossed the great Roman road from Bavay to Cologne, which was protected by numerous forts and had long arrested the invasions of the barbarians. He then invaded the territory of Arras, but was severely defeated at Hesdin-le-Vieux by Aetius, the commander of the Roman army in Gaul. Chlodio, however, soon took his revenge. He explored the region of Cambrai, seized that town, and occupied all the country as far as the Somme. At this time Tournai became the capital of the Salian Franks.

After Chlodio a certain Meroveus (Merowech) was king of the Salian Franks. We do not know if he was the son of Chlodio; Gregory of Tours simply says that he belonged to Chlodio’s stock — ” de hujus stirpe quidam Merovechum regem fuisse adserunt,” — and then only gives the fact at second hand. Perhaps the remarks of the Byzantine historian Priscus may refer to Meroveus. A king of the Franks having died, his two sons disputed the power. The elder journeyed into Pannonia to obtain support from Attila; the younger betook himself to the imperial court at Rome. “I have seen him,” writes Priscus; “he was still very young, and we all remarked his fair hair which fell upon his

shoulders." Aetius welcomed him warmly and sent him back a friend and foederatus. In any case, eventually, Franks fought (451) in the Roman ranks at the great battle of Mauriac (the Catalaunian Fields), which arrested the progress of Attila into Gaul; and in the Vita Lupi, which, though undoubtedly of later date, is a recension of an earlier document, the name of Meroveus appears among the combatants. Towards 457 Meroveus was succeeded by his son Childeric. At first Childeric was a faithful foederatus of the Romans, fighting for them against the Visigoths and the Saxons south of the Loire; but he soon sought to make himself independent and to extend his conquests. He died in 481 and was succeeded by his son Clovis, who conquered the whole of Gaul with the exception of the kingdom of Burgundy and Provence. Clovis made his authority recognized over the other Salian tribes (whose kings dwelt at Cambrai and other cities), and put an end to the domination of the Ripuarian Franks.

These Ripuarians must have comprised a certain number of Frankish tribes, such as the Ampsivarii and the Bructeri. They settled in the 5th century in compact masses on the left bank of the Rhine, but their progress was slow. It was not until the Christian writer Salvian (who was born about 400) had already reached a fairly advanced age that they were able to seize Cologne. The town, however, was recaptured and was not definitely in their possession until 463. The Ripuarians sub- sequently occupied all the country from Cologne to Trier. Aix-la-Chapelle, Bonn and Ziilpich were their principal centres, and they even advanced southward as far as Metz, which appears to have resisted their attacks. The Roman civilization and the Latin language disappeared from the countries which they occupied; indeed it seems that the actual boundaries of the German and French languages nearly coincide with those of their dominion. In their southward progress the Ripuarians 1 The chronicler Fredegarius and the author of the Liber historiae Francorum make Sunno and Marcomeres his predecessors, but in reality they were chiefs of other Frankish tribes. The author of the Liber also claims that Chlodio was the son of Pharamund, but this personage is quite legendary. In the Chronicon of Fredegarius it is already affirmed that the Franks are descended from the Trojans.

encountered the Alamanni, who, already masters of Alsace, were endeavouring to extend their conquests in all directions. There were numerous battles between the Ripuarians and the Alamanni; and the memory of one fought at Ziilpich has come down to us. In this battle Sigebert, the king of the Ripuarians, was wounded in the knee and limped during the remainder of his life — hence his surname Claudus (the Lame) . The Ripuarians long remained allies of Clovis, Sigebert's son Chloderic fighting under the king of the Salian Franks at Vouille

in 507. Clovis, however, persuaded Chloderic to assassinate his father, and then posed as Sigebert's avenger, with the result that Chloderic was himself assassinated and the Ripuarians raised Clovis on the shield and chose him as king. Thus the Salian Franks united under their rule all the Franks on the left bank of the Rhine. During the reigns of Clovis's sons they again turned their eyes on Germany, and imposed their suzerainty upon the Franks on the right bank. This country, north of the Main and the first residence of the Franks, then received the name of Francia Orientalis, and became the origin of one of the duchies into which Germany was divided in the 10th century — the duchy of Franconia (Franken).

The Franks were redoubtable warriors, and were generally of great stature. Their fair or red hair was brought forward from the crown of the head towards the forehead, leaving the nape of the neck uncovered; they shaved the face except the upper lip. They wore fairly close breeches reaching to the knee and a tunic fastened by brooches. Round the waist over the tunic was worn a leathern girdle having a broad iron buckle damascened with silver. From the girdle hung the single-edged missile axe or francisca, the scramasax or short knife, a poniard and such articles of toilet as scissors, a comb (of wood or bone), &c. The Franks also used a weapon called the framea (an iron lance set firmly in a wooden shaft) , and bows and arrows. They protected themselves in battle with a large wooden or wicker shield, the centre of which was ornamented with an ircn boss (umbo). Frankish arms and armour have been found in the cemeteries which abound throughout northern France, the warriors being buried fully armed.

See J. Grimm, Deutsche Rechtsallerthiimer (Gottingen, 1828); K. Miillenhoff, Deutsche Altertumskunde (Berlin, 1883-1900); E. von Wietersheim, Geschichte der Volkerwanderung, 2nd ed., ed. by F. Dahn (Leipzig, 1880-1881); G. Waitz, Deutsche Verfassungs-geschichte, vol. i. (4th ed. revised by Zeumer) ; R. Schroder, " Die Ausbreitung der salischen Franken," in Forschungen zur deutschen Geschichte, vol. xix. ; K. Lamprecht, Frankische Wanderungen und Ansiedelungen (Aix-la-Chapelle, 1882); W. Schultz, Deutsche Geschichte von der Urzeit bis zu den Karolingern, vol. ii. (Stuttgart, 1896); Fustel de Coulanges, Histoire des institutions politiques de Vancienne France — Vinvasion germanique (Paris, 1891). Also the articles Salic Law and Germanic Laws, Early. (C. Pf.)

FRANZ, ROBERT (1815-1892), German composer, was born at Halle on the 28th of June 1815. One of the most gifted of German song writers, he suffered in early life, as many musicians have suffered,

from the hostility of his parents to a musical career. He was twenty years old when, his father's animosity conquered, he was allowed to live in Dessau to study organ- playing under Schneider. The two years of dry study under that famous teacher were advantageous chiefly in making him uncommonly intimate with the works of Bach and Handel, his knowledge of which he showed in his editions of the Matthdus Passion, Magnificat, ten cantatas, and of the Messiah and V Allegro, though some of these editions have long been a subject of controversy among musicians. In 1843 he published his first book of songs, which ultimately was followed by some fifty more books, containing in all about 250 songs. At Halle, Franz filled various public offices, including those of organist to the city, conductor of the Sing-akademie and of the Symphony concerts, and he was also a royal music-director and master of the music at the university. The first book of songs was warmly praised by Schumann and Liszt, the latter of whom wrote a lengthy review of it in Schumann's paper, Die neue Zeitschrift, which later was published separately. Deafness had begun to make itself apparent as early as 1841, and Franz suffered also from a nervous disorder, which in 1868 compelled him to resign his

offices. His future was then provided for by Liszt, Dr Joachim, Frau Magnus and others, who gave him the receipts of a concert tour, amounting to some 100,000 marks. Franz died on the 24th of October 1892. On his seventieth birthday he published his first and only pianoforte piece. It is easy to find here and there among his songs gems that are hardly less brilliant than the best of Schumann's. Certainly no musician was ever more thoughtful and more painstaking. In addition to songs he wrote a setting for double choir of the 117th Psalm, and a four-part Kyrie; he also edited Astorga's Stabat Mater and Durante's Magnificat. FRANZEN, FRANS MIKAEL (1772-1847), Swedish poet, was born at Uleaborg in Finland on the 9th of February 1772. At thirteen he entered the university of Abo, where he attended the lectures of H. G. Porthan (1739-1804), a pioneer in the study of Finnish history and legend. He graduated in 1789, and became " eloquentiae docens " in 1792. Three years later he started on a tour through Denmark, Germany, France and England, returning in 1796 to accept the office of university librarian at Abo. In 1801 he became professor of history and ethics, and in 1 808 was elected a member of the Swedish Academy. On the cession of Finland to Russia, Franzen removed to Sweden, where he was- successively appointed parish priest of Kumla in the diocese of Strengnas (1810),

minister of the Clara Church in Stockholm (1824) and bishop of Hernosand (1831). He died at Sabri parsonage on the 14th of August 1847. From the autumn of 1793, when his Till en ung Flicka and Menniskans anlete were inserted by Kellgren in the Stockholmspost, Franzen grew in popular favour by means of many minor poems of singular simplicity and truth, as Till Selma, Den gamle knekten, Riddar St Goran, De Stnd blommorna, Modren vid vaggan, Nyarsmorgonen and Stjernhimmelen. His songs Goda gosse glaset torn, Sorj ej den gryende dagen forut, Champagnevinet and Bevdringss&ng were widely sung, and in 1797 he won the prize of the Swedish Academy by his S&ng bfver grefve Filip Creutz. Henceforth his muse, touched with the academic spirit, grew more reflective and didactic. His longer works, as Emilieller en afton i Lappland, and the epics Svante Sture eller motet vid Alvastra, Kolumbus eller Amerikas upptUckt and Gustaf Adolf i Tyskland (the last two incomplete), though rich in beauties of detail, are far inferior to his shorter pieces.

The poetical works of Franzen are collected under the title Skalde-stycken (7 vols., 1824-1861) ; new ed., Samlade dikter, with a biography by A. A. Grafstrom (1867-1869); also a selection {Valda dikter) in 2 vols. (1871). His prose writings, Om svenska drottningar (Abo, 1798; Orebro, 1823), Skrifter i obunden stil, vol. i. (1835), Predik- ningar (5 vols., 1841-1845) and Minnesteckningar, prepared for the Academy (3 vols., 1848-1860), are marked by faithful portraiture and purity of style. See B. E. Malmstrom, in the Handlingar of the Swedish Academy (1852, new series 1887), vol. ii. ; S. A. Hollander, Minne af F. M. Franzen (Orebro, 1868); F. Cygnaeus, Teckningar ur F. M. Franzens lefnad (Helsingfors, 1872) ; and Gustaf Ljunggren, Svenska vitterhelens hdfder efter Gustaf III.‘s dod, vol. ii. (1876).

FRANZENSBAD, or Kaiser-Franzem»ad, a town and watering-place of Bohemia, Austria, 152 m. IfeN.W. of Prague by rail. Pop. (1900) 2330. It is situated at an altitude of about 1500 ft. between the spurs of the Fichtelgebirge, the Bohmerwald and the Erzgebirge, and lies 4 m. N.W. of Eger. It possesses a large kursaal, several bathing establishments, a hospital for poor patients and several parks. There are altogether 12 mineral springs with saline, alkaline and ferruginous waters, of which the oldest and most important is the Franzensquelle. One of the springs gives off carbonic acid gas and another contains a considerable proportion of lithia salts. The waters, which have an average temperature between 50-2° F. and 54-5° F., are used both internally and externally, and are efficacious in cases of anaemia, nervous disorders, sexual diseases, specially for women, and heart diseases. Franzensbad is frequently resorted to as an after-cure by

patients from Carlsbad and Marienbad. Another important part of the cure is the so-called moor or mud-baths, prepared from the peat of the Franzensbad marsh, which is very rich in mineral substances, like sulphates of iron, of soda and of potash, organic acids, salt, &c.

The first information about the springs dates from the 16th century, and an analysis of the waters was made in 1565. They

were first used for bathing purposes in 1707. But the foundation of Franzensbad as a watering-place really dates from 1793, when Dr Adler built here the first Kurkaus, and the place received its name after the emperor Francis I.

See Dr Loimann, Franzensbad (3rd ed., Vienna, 1900). FRANZ JOSEF LAND, an arctic archipelago lying E. of Spitsbergen and N. of Novaya Zemlya, extending northward from about 8o° to 82 N., and between 42 and 64 E. It is described as a lofty glacier-covered land, reaching an extreme elevation of about 2400 ft. The glaciers front, with a perpendicular ice-wall, a shore of debris on which a few low plants are found to grow — poppies, mosses and the like. The islands are volcanic, the main geological formation being Tertiary or Jurassic basalt, which occasionally protrudes through the ice-cap in high isolated blocks near the shore. A connecting island-chain between Franz Josef Land and Spitzbergen is probable. The bear and fox are the only land mammals; insects are rare; but the avifauna is of interest, and the Jackson expedition distinguished several new species.

August Petermann expressed the opinion that Baffin may have sighted the west of Franz Josef Land in 1614, but the first actual discovery is due to Julius Payer, a lieutenant in the Austrian army, who was associated with Weyprecht in the second polar expedition fitted out by Count Wilczek on the ship ” Tegetthof ” in 1872. On the 13th of August 1873, the ” Tegetthof ” being then beset, high land was seen to the north- west. Later in the season Payer led expeditions to Hochstetter and Wilczek islands, and after a second winter in the ice-bound ship, a difficult journey was made northward through Austria Sound, which was reported to separate two large masses of land, Wilczek Land on the east from Zichy Land on the west, to Cape Fligely, in 82 5′ N., where Rawlinson Sound branched away to the north-east. Cape Fligely was the highest latitude attained by Payer, and remained the highest attained in the Old World till 1895. Payer reported that from Cape Fligely land (Rudolf Land) stretched north-east to a cape (Cape Sherard Osborn), and mountain ranges were visible to the north, indicating lands beyond the 83rd parallel, to which the names King Oscar Land and Petermann Land were given. In

1879 De Bruyne sighted high land in the Franz Josef Land region, but otherwise it remained untouched until Leigh Smith, in the yacht " Eira," explored the whole southern coast from 42 to 54° E. in 1881 and 1882, discovering many islands and sounds, and ascertaining that the coast of Alexandra Land, in the extreme west, trended to north-west and north.

After Leigh Smith came another pause, and no further mention is made of Franz Josef Land till 1894. In that year Mr Alfred Harmsworth (afterwards Lord Northcliffe) fitted out an expedi- tion in the ship " Windward " under the leadership of Mr F. G. Jackson, with the object of establishing a permanent base from which systematic exploration should be carried on for successive years and, if practicable, a journey should be made to the Pole. Mr Jackson and his party landed at " Elmwood " (which was named from Lord Northcliffe's seat in the Isle of Thanet), near Cape Flora, at the western extremity of Northbrook Island, on the 7th of September. After a preliminary reconnais- sance to the north, which afterwards turned out to be vitally important, the summer of 1895 was spent in exploring the coast to the north-west by a boating expedition. This expedition visited many of the points seen by Leigh Smith, and discovered land, which it has been suggested may be the Gillies Land reported by the Dutch captain Gillies in 1707. In 1896 the Jackson-Harmsworth expedition worked northwards through an archipelago for about 70 m. and reached Cape Richthofen, a promontory 700 ft. high, whence an expanse of open water was seen to the northward, which received the name of Queen Victoria Sea. To the west, on the opposite side of a wide opening which was called the British Channel, appeared glacier-covered land, and an island lay to the northward. The island was probably the King Oscar Land of Payer. To north and north- east was the land which had been visited in the reconnaissance of the previous year, but beyond it a water-sky appeared in the

supposed position of Petermann Land. Thus Zichy Land itself was resolved into a group of islands, and the outlying land sighted by Payer was found to be islands also. Meanwhile Nansen, on his southward journey, had approached Franz Josef Land from the north-east, finding only sea at the north end of Wilczek Land, and seeing nothing of Payer's Rawlinson Sound, or of the north end of Austria Sound. Nansen wintered near Cape Norway, only a few miles from the spot reached by Jackson in 1895. He had finally proved that a deep

oceanic basin lies to the north. On the 17th of June 1896 the dramatic meeting of Jackson and Nansen took place, and in the same year the "Windward" revisited " Elmwood " and brought Nansen home, the work of the Jackson-Harmsworth expedition being continued for another year. As the non-existence of land to the north had been proved, the attempt to penetrate north- wards was abandoned, and the last season was devoted to a survey and scientific examination of the archipelago, especially to the west; this was carried out by Messrs Jackson, Armitage, R. Koettlitz, H. Fisher and W. S. Bruce.

Further light was thrown on the relations of Franz Josef Land and Spitsbergen during 1897 by the discoveries of Captain Robertson of Dundee, and Wyche's Land was circumnavigated by Mr Arnold Pike and Sir Savile Crossley. The latter voyage was repeated in the following year by a German expedition under Dr Th. Lerner and Captain Riidiger. In August 1898 an expedition under Mr Walter Wellman, an American, landed at Cape Tegetthof. Beginning a northward journey with sledges at the end of the winter, Wellman met with an accident which compelled him to return, but not before some exploration had been accomplished, and the eastern extension of the archi- pelago fairly well defined. In June 1899 H.R.H. the duke of Abruzzi started from Christiania in his yacht, the " Stella Polare," to make the first attempt to force a ship into the newly discovered ocean north of Franz Josef Land. The " Stella Polare " succeeded in making her way through the British Channel to Crown Prince Rudolf Land, and wintered in Teplitz Bay, in 81° 33′ N. lat. The ship was nearly wrecked in the autumn, and the party had to spend most of the winter on shore, the duke of Abruzzi suffering severely from frost-bite. In March 1900 a sledge party of thirteen, under Captain Cagni, started northwards. They found no trace of Petermann Land, but with great difficulty crossed the ice to 86° 33′ N. lat., 20 m. beyond Nansen's farthest, and 240 m. from the Pole. The party, with the exception of three, returned to the ship after an absence of 104 days, and the "Stella Polare" returned to Tromso in September 1900. In 1901-1902 the Baldwin-Ziegler expedi- tion also attempted a northward journey from Franz Josef Land.

See Geographical Journal, vol. xi., February 1898; F. G. Jackson, A Thousand Days in the Arctic (1899).

FRANZOS, KARL EMIL (1 848-1 904), German novelist, was born of Jewish parentage on the 25th of October 1848 in Russian Podolia, and spent his early years at Czortkow in Galicia. His father, a district physician, died early, and the boy, after attend- ing the gymnasium of Czernowitz, was obliged to teach in order to support himself and

prepare for academic study. He studied law at the universities of Vienna and Graz, but after passing the examination for employment in the state judicial service abandoned ■ this career and, becoming a journalist, travelled extensively in south-east Europe, and visited Asia Minor and Egypt. In 1877 he returned to Vienna, where from 1884 to 1886 he edited the Neue illustrierte Zeitung. In 1887 he removed to Berlin and founded the fortnightly review Deutsche Dichtung. Franzos died on the 28th of January 1904. His earliest collec- tions of stories and sketches, Aus Halb-Asien, Land und Leule des ostlichen Europas (1876) and Die Juden von Barnow (1877) depict graphically the life and manners of the races of south- eastern Europe. Among other of his works may be mentioned the short stories, Junge Liebe (1878), Stille Geschichten (1880), and the novels Moschko von Parma (1880), Ein Kampf urns Rechl (1882), Der President (1884), Judith Trachtenberg (1890), Der W ahrheiisucher (i8g4).

FRASCATI, a town and episcopal see of Italy, in the province of Rome, 15 m. S.E. of Rome by rail, and also reached by electric tramway via Grottaferrata. Pop. (1901) 8453. The town is situated 1056 ft. above the sea-level, on the N. slopes of the outer crater ring of the Alban Hills, and commands a very fine view of the Campagna of Rome. The cathedral contains a memorial tablet to Charles Edward, the Young Pretender, whose body for some while rested here; his brother, Henry, Cardinal York, owned a villa at Frascati. The villas of the Roman nobility, with their beautiful gardens and fountains, are the chief attrac- tion of Frascati. The earliest in date is the Villa Falconieri, planned by Cardinal Ruffini before 1550; the most important of the rest are the Villa Torlonia (formerly Conti) , Lancelotti (formerly Piccolomini), Ruffinella (now belonging to Prince Lancellotti) , Aldobrandini, Borghese and Mondragone (now a Jesuit school) . The surrounding country, covered with remains of ancient villas, is fertile and noted for its wine. Frascati seems to have arisen on the site of a very large ancient villa, which, under Domitian at any rate, belonged to the imperial house about the 9th century in which period we find in the Liber Pontificalis the names of four churches in Frascata. The medieval ■ stronghold of the counts of Tusculum yq.v.), which occupied the site of the ancient city, was dismantled by the Romans in 1191, and the inhabitants put to the sword or mutilated. Many of the fugitives naturally took refuge in P’rascati. The see of Tusculum had, however, always had its cathedral church in Frascati. For the greater part of the middle ages Frascati belonged to the papacy.

See G. Tomassetti, La Via Latina nel medio evo (Rome, 1886), 170 seq.; T. Ashby in Papers of the British School at Rome, iv. (London, 1907). (T. As.)

FRASER, ALEXANDER CAMPBELL (1S19-), Scottish philosopher, was born at Ardchattan, Argyllshire, on the 3rd of September 1819. He was educated at Glasgow and Edinburgh, where, from 1846 to 1856, he was professor of Logic at New College. He edited the North British Review from 1850 to 1857, and in 1856, having previously been a Free Church minister, he succeeded Sir William Hamilton as professor of Logic and Metaphysics at Edinburgh University. In 1859 he became dean of the faculty of arts. He devoted himself to the study of English philosophers, especially Berkeley, and published a Collected Edition of the Works of Bishop Berkeley with Annota- tions, &c. (1871; enlarged 1901), a Biography of Berkeley (1881), an Annotated Edition of Locke's Essay (1894), the Philosophy of Theism (1896) and the Biography of Thomas Reid (1898). He contributed the article on John Locke to the Encyclopaedia Britannica. In 1904 he published an autobiography entitled Biographia philosophica, in which he sketched the progress of his intellectual development. From this work and from his Gifford lectures we learn objectively what had previously been inferred from his critical wˆiˆs. After a childhood spent in an austerity which stigmatized4ls unholy even the novels of Sir Walter Scott, he began his college career at the age of fourteen at a time when Christopher North and Dr Ritchie were lecturing on Moral Philosophy and Logic. His first philosophical advance was stimulated by Thomas Brown's Cause and Effect, which intro- duced him to the problems which were to occupy his thought. From this point he fell into the scepticism of Hume. In 1836 Sir William Hamilton was appointed to the chair of Logic and Metaphysics, and Fraser became his pupil. He himself says, " I owe more to Hamilton than to any other influence." It was about this time also that he began his study of Berkeley and Coleridge, and deserted his early phenomenalism for the con- ception of a spiritual will as the universal cause. In the Bio- graphia this " Theistic faith " appears in its full development (see the concluding chapter), and is especially important as perhaps the nearest approach to Kantian ethics made by original English philosophy. Apart from the philosophical interest of the Biographia, the work contains valuable pictures of the Land of Lome and Argyllshire society in the early 19th century, of university life in Glasgow and Edinburgh, and a history of the North British Review.

FRASER, JAMES (1818-1885), English bishop, was born at Prestbury, in Gloucestershire, on the 18th of August 1818, and was educated at Bridgnorth, Shrewsbury, and Lincoln College, Oxford. In 1839 he was

Ireland scholar, and took a first class. In 1840 he gained an Oriel fellowship, and was for some time tutor of the college, but did not take orders until 1846. He was successively vicar of Cholderton, in Wiltshire, and rector of Ufton Nervet, in Berkshire; but his subsequent importance was largely due to W. K. Hamilton, bishop of Salisbury, who recom- mended him as an assistant commissioner of education. His report on the educational condition of thirteen poor-law unions, made in May 1859, was described by Thomas Hughes as ” a superb, almost a unique piece of work.” In 1865 he was com- missioned to report on the state of education in the United States and Canada, and his able performance of this task brought him an offer of the bishopric of Calcutta, which he declined, but in January 1870 he accepted the see of Manchester. The task before him was an arduous one, for although his predecessor, James Prince Lee, had consecrated no fewer than 130 churches, the enormous population was still greatly in advance of the ecclesiastical machinery. Fraser worked with the utmost energy, and did even more for the church by the liberality and geniality which earned him the title of ” the bishop of all de- nominations.” He was prominent in secular as well as religious works, interesting himself in every movement that promoted health, morality, or education; and especially serviceable as the friendly, unofficious counsellor of all classes. His theology was that of a liberal high-churchman, and his sympathies were broad. In convocation he seconded a motion for the disuse of the Athanasian Creed, and in the House of Lords he voted for the abolition of university tests. He died suddenly on the 22nd of October 1885.

A biography by Thomas Hughes was published in 1887, and an account of his Lancashire life by J. W. Diggle (1889), who also edited 2 vols, of University and Parochial Sermons (1887).

FRASER, JAMES BAILLIE (1783-1856), Scottish traveller and author, was born at Reelick in the county of Inverness on the nth of June 1783. He was the eldest of the four sons of Edward Satchell Fraser of Reelick, all of whom found their way to the East, and gave proof of their ability. In early life he went to the West Indies and thence to India. In 181 5 he made a tour of exploration in the Himalayas, accompanied by his brother William (d. 1835). When Reza Kuli Mirza and Nejeff Kuli Mirza, the exiled Persian princes, visited England, he was appointed to look after them during their stay, and on their return he accompanied them as far as Constantinople. He was afterwards sent to Persia on a diplomatic mission by Lord Glenelg, and effected a most remarkable journey on horseback through Asia Minor to Teheran. His health, however, was impaired by the exposure. In 1823 he married a daughter of Alexander Fraser Tytler, Lord Woodhouselee,

a sister of the historian Patrick Fraser Tytler. He died at Reelick in January 1856. Fraser is said to have displayed great skill in water-colours, and several of his drawings have been engraved; and the astronomical observations which he took during some of his journeys did considerable service to the cartography of Asia. The works by which h» attained his literary reputation were accounts of his travels and fictitious tales illustrative of Eastern life. In both he employed a vigorous and impassioned style, which was on the whole wonderfully effective in spite of minor faults in taste and flaws in structure.

Fraser's earliest writings are: Journal of a Tour through Part of the Himaia Mountains and to the Sources of the Jumna and the Ganges (1820); A Narrative of a Journey into Khorasan in the Years 1821 and 1822, including some Account of the Countries to the North-East of Persia (1825) ; and Travels and Adventures in the Persian Provinces on the Southern Banks of the Caspian Sea (1826). His romances include The Kuzzilbash, a Tale of Khorasan (1828), and its sequel, The Persian Adventurer (1830) ; Allee Neemroo (1842) ; and The Dark Falcon (1844). He also wrote An Historical and Descriptive Account of Persia (1834I; A Winter's Journey (Tatar) from Constantinople to Teheran (1838) ; Travels in Koordislan, Mesopotamia, &c. (1840) ; Mesopotamia and Assyria (1842); and Military Memoirs of Col. James Skinner (1851).

FRASER, SIR WILLIAM AUGUSTUS, Bart. (1826-1898), Eng- lish politician, author and collector, was born on the 10th of February 1826, the son of Sir James John Fraser, 3rd baronet, a colonel of the 7 th Hussars, who had served on Wellington's staff at Waterloo. He was educated at Eton and at Christ Church, Oxford, entered the 1st Life Guards in 1847, but retired with a captain's rank in 1852. He then set about entering parliament, and the ups and downs of his political career were rather remark- able. He was returned for Barnstaple in 1852, but the election was declared void on account of bribery, and the constituency was disfranchised for two years. At the election of 1857 Sir William, who had meantime been defeated at Harwich, was again returned at Barnstaple. He was, however, defeated in 1859, but was elected in 1863 at Ludlow. This seat he held for only two years, when he was again defeated and did not re-enter parliament until 1874, when he was returned for Kidderminster, a constituency he represented for six years, when he retired. He was a familiar figure at the Carlton Club, always ready with a copious collection of anecdotes of Wellington, Disraeli and Napoleon III. He died on the 17th of August 1898. He was an assiduous collector of relics; and his library was sold for some £20,000. His own books comprise Words on Wellington (1889), Disraeli and his Day (1891), Hie et Ubique (1893),

Napoleon III. (1896) and the Waterloo Ball (1897).

FRASER, the chief river of British Columbia, Canada, rising in two branches among the Rocky Mountains near 52° 45′ N., n8°3o'W. Length 740 m. It first flows N.W. for about 160 m., then rounds the head of the Cariboo Mountains, and flows directly S. for over 400 m. to Hope, where it again turns abruptly and flows W. for 80 m., falling into the Gulf of Georgia at New Westminster. After the junction of the two forks near its northern extremity, the first important tributary on its southern course is the Stuart, draining Lakes Stuart, Fraser and Francois, One hundred miles lower down the Quesnel, draining a large lake of the same name, flows in from the east at a town also so named. Farther on the Fraser receives from the west the Chilcotin, and at Lytton, about 180 m. from the sea, the Thomp- son, its largest tributary, flows in from the east, draining a series of mountain lakes, and receiving at Kamloops the North Thompson, which flows through deep and impassable canyons. Below Hope the Lillooet flows in from the north. The Fraser is a typical mountain stream, rapid and impetuous through all its length, and like most of its tributaries is in many parts not navigable even by canoes. On its southern course between Lytton and Yale, while bursting its way through the Coast Range, it flows through majestic canyons, which, like those of the Thompson, were the scene of many tragedies during the days of the gold-rush to the Cariboo district. At Yale, about 80 m. from its mouth, it becomes navigable, though its course is still very rapid. In the Cariboo district, comprised within the great bend of the river, near Tete Jaune Cache, are many valuable gold deposits. With its tributaries the Fraser drains the whole province from 54 to 49 N., except the extreme south-eastern corner, which is within the basin of the Columbia and its tributary the Kootenay.

FRASERBURGH, a police burgh and seaport, on the N. coast of Aberdeenshire, Scotland. Pop. (1891), 7466; (1901), 9105.- It is situated 47 J m. by rail N. of Aberdeen, from which there is a branch line, of which it is the terminus, of the Great North of Scotland railway. It takes its name from Sir Alexander Fraser, the ancestor of Lord Saltoun, whose seat, Philorth House, lies 2 m. to the south. Sir Alexander obtained for it in 16 1 3 a charter as a burgh of royalty, and also in 1592 a charter for the founding of a university. This latter project, however, was not carried out, and all that remains of the building in- tended for the college is a three-storeyed tower. The old castle of the Frasers on Kinnaird Head now contains a lighthouse, and close by is the Wine Tower, with a cave below. The town cross is a fine structure standing upon a huge hexagon, surmounted by a stone pillar 12 ft. high, ornamented by the royal and Fraser arms. The port

is one of the leading stations of the herring fishery in the north of Scotland and the head

of a fishery district. During the herring season (June to Sep- tember) the population is increased by upwards of i 0,000 per- sons. The fleet numbers more than 700 boats, and the annual value of the catch exceeds £200,000. The harbour, origin- ally constructed as a refuge for British ships of war, is one of the best on the east coast, and has been improved by the widening of the piers and the extension of the breakwaters. It has an area of upwards of eight acres, is easy of access, and affords anchorage for vessels of every size.

FRASERVILLE (formerly Riviere du Loup en Bas),atown and watering-place in Temiscouata county, Quebec, Canada, 107 m. (by water) north-east of Quebec, on the south shore of the St Lawrence river, and at the mouth of the Riviere du Loup, at the junction of the Intercolonial and Temiscouata railways. It contains a convent, boys' college, hospital, several mills, and is a favourite summer resort on account of the angling and shooting, and the magnificent scenery. Pop. (1901) 4569.

FRATER, Frater House or Fratery, a term in architec- ture for the hall where the members of a monastery or friary met for meals or refreshment. The word is by origin the same as " refectory." The older forms, such as freitur, fraytor and the like, show the word to be an adaptation of the O.Fr. fraitour, a shortened form of rejraitour, from the Med. Lat. refeclorium. The word has been confused with frater, a brother or friar, and hence sometimes confined in meaning to the dining-hall of a friary, while " refectory " is used of a monastery.

FRATERNITIES, COLLEGE, a class of student societies peculiar to the colleges and universities of the United States and Canada, with certain common characteristics, and mostly named from two or three letters of the Greek alphabet; hence they are frequently called " Greek Letter Societies." They are organized on the lodge system, and each fraternity comprises a number of affiliated lodges of which only one of any one fraternity is connected with the same institution. The lodges, called " chapters," in memory of the convocations of monks of medieval times, are usually designated by Greek letters also. They are nominally secret, with one exception {Delta Upsilon). Each chapter admits members from the lowest or freshman class, and of course

loses its members as the students depart from college, consequently each chapter has in it at the same time members of all the four college classes and frequently those pursuing postgraduate studies. Where the attendance at a college is large the material from which fraternity members may be drawn is correspondingly abundant, and in some of the large colleges (e.g. at Cornell University and the University of Michigan) there are chapters of over twenty fraternities. All the fraternities aim to be select and to pick their members from the mass of incoming students. Where, however, the material to select from is not abundant and the rival fraternities are numerous, care in selection is impossible, and the chapters at any one college are apt to secure much the same general type of men. Many of the fraternities have, however, on account of a persistent selection of men of about the same tastes at different colleges, acquired a distinct character and individuality; for instance, Alpha Delta Phi is literary.

The first of these fraternities was the Phi Beta Kappa, founded at the College of William and Mary at Williamsburg, Virginia, in 1776. It was a little social club of five students: John Heath, Richard Booker, Thomas Smith, Armistead Smith and John Jones. Its badge was a square silver medal displaying the Greek letters of its name and a few symbols. In 1779 it authorized Elisha Parmelee, one of its members, to establish ” meetings ” or chapters at Yale and Harvard, these chapters being authorized to establish subordinate branches in their respective states. In 1781 the College of William and Mary was closed, its buildings being occupied in turn by the British, French and American troops, and the society ceased to exist. The two branches, however, were established — that at Yale in 1780 and that at Harvard in 1781. Chapters were established at Dartmouth in 1787, at Union in 1817, at Bowdoin in 1824 and at Brown in 1830. This society changed its character in 1826 and became non-secret and purely honorary in character, admitting to membership a

certain proportion of the scholars of highest standing in each class (only in classical courses, usually and with few exceptions only in graduating classes). More recent honorary societies of similar character among schools of science and engineering are Sigma Xi and Tau Beta Pi.

In 1825, at Union College, Kappa Alpha was organized, copying in style of badge, membership restrictions and the like, its predecessor. In 1827 two other similar societies, Sigma Phi and Delta Phi, were founded at the same place. In 1831 Sigma Phi placed a branch at Hamilton College and in 1832 Alpha Delta Phi originated there. In 1833 Psi Upsilon, a fourth society, was organized at Union. In 1835

Alpha Delta Phi placed a chapter at Miami University, and in 1839 Beta Theta Pi originated there, and so the system spread. These fraternities, it will be observed, were all undergraduate societies among the male students. In 1910 the total number of men's general fraternities was 32, with 1068 living chapters, and owning property worth many millions of dollars. In 1864 Theta Xi, the first professional fraternity restricting its membership to students intending to engage in the same profession, was organ- ized. There were in 1910 about 50 of these organizations with some 400 chapters. In addition there are about 100 local societies or chapters acting as independent units. Some of the older of these, such as Kappa Kappa Kappa at Dartmouth, IK A at Trinity, Phi Nu Theta at Wesleyan and Delta Psi at Vermont, are permanent in character, but the majority of them are purely temporary, designed to maintain an organization until the society becomes a chapter of one of the general fra- ternities. In 1870 the first women's society or " sorority," the Kappa Alpha Theta, was organized at De Pauw University. There were in 1910, 17 general sororities with some 300 active chapters.

It is no exaggeration to say that these apparently insignificant organizations of irresponsible students have modified the college life of America and have had a wide influence. Members join in the impressionable years of their youth; they retain for their organizations a peculiar loyalty and affection, and freely contri- bute with money and influence to their advancement.

Almost universally the members of any particular chapter (or part of them) live together in a lodge or chapter house. The men's fraternities own hundreds of houses and rent as many more. The fraternities form a little aristocracy within the college community. Sometimes the line of separation is invisible, sometimes sharply marked. Sometimes this condition militates against the college discipline and sometimes it assists it. Con- flicts not infrequently occur between the fraternity and non- fraternity element in a college.

It can readily be understood how young men living together in the intimate relationship of daily contact in the same house, having much the same tastes, culture and aspirations would form among themselves enduring friendships. In addition each fraternity has a reputation to maintain, and this engenders an esprit du corps which at times places loyalty to fraternity interests above loyalty to college interest or the real advantage of the individual. At commencements and upon other occasions the former members of the chapters return to their chapter houses and help to foster the pride and loyalty of the under- graduates. The chapter houses are commonly owned by corpora- tions

made up of the alumni. This brings the undergraduates into contact with men of mature age and often of national fame, who treat their membership as a serious privilege.

The development of this collegiate aristocracy has led to jealousy and bitter animosity among those not selected for membership. Some of the states, notably South Carolina and Arkansas, have by legislation, either abolished the fraternities at state-controlled institutions or seriously limited the privileges of their members. The constitutionality of such legislation has never been tested. Litigation has occasionally arisen out of attempts on the part of college authorities to prohibit the fraternities at their several institutions. This, it has been held, may lawfully be done at a college maintained by private endow- ment but not at an institution supported by public funds. In

the latter case all classes of the public are equally entitled to the same educational privileges and members of the fraternities may not be discriminated against.

The fraternities are admirably organized. The usual system comprises a legislative body made up of delegates from the different chapters and an executive or administrative body elected by the delegates. Few of the fraternities have any judiciary. None is needed. The financial systems are sound, and the conventions of delegates meet in various parts of the United States, several hundred in number, spend thousands of dollars in travel ‘and entertainment, and attract much public attention. Most of the fraternities have an inspection system by which chapters are periodically visited and kept up to a certain level of excellence.

The leading fraternities publish journals usually from four to eight times during the college year. The earliest of these was the Beta Theta Pi, first issued in 1872. All publish catalogues of their members and the most prosperous have issued histories. They also publish song books, music and many ephemeral and local publications.

The alumni of the fraternities are organized into clubs or associa- tions having headquarters at centres of population. These organizations are somewhat loose, but nevertheless are capable of much exertion and influence should occasion arise.

The college fraternity system has no parallel among the students of

colleges outside of America. One of the curious things about it, however, is that while it is practically uniform throughout the United States, at the three prominent universities of Harvard, Yale and Princeton it differs in many respects from its character elsewhere. At Harvard, although there are chapters of a few of the fraternities, their influence is insignificant, their place being taken by a group of local societies, some of them class organizations. At Yale, the regular system of fraternities obtains in the engineering or technical department (the Sheffield Scientific School), but in the classical department the fraternity chapters are called ” junior ” societies, because they limit their membership to the three upper classes and allow the juniors each year practically to control the chapter affairs. Certain senior societies, of which the oldest is the Skull and Bones, which are inter-fraternity societies admitting freely members of the fraternities, are more prominent at Yale than the fraternities themselves. Princeton has two (secret) literary and fraternal societies, the American Whig and the Cliosophic, and various local social clubs, with no relationship to organizations in other colleges and not having Greek letter names.

At a few universities (for instance, Michigan, Cornell and Vir- ginia), senior societies or other inter-fraternity societies exert great influence and have modified the strength of the fraternity system. Of late years, numerous societies bearing Greek names and imitating the externals of the college fraternities have sprung up in the high schools and academies of the country, but have excited the earnest and apparently united opposition of the authorities of such schools.

See William Raimond Baird, American College Fraternities (6th ed., New York, 1905); Albert C. Stevens, Cyclopedia of Fraternities (Paterson, N. J., 1899) ; Henry D. Sheldon, Student Life and Customs (New York, 1901); Homer L. Patterson, Patterson’s College and School Directory (Chicago, 1904); H. K. Kellogg, College Secret Societies (Chicago, 1874); Albert P. Jacobs, Greek Letter Societies (Detroit, 1879). (W. R. B.*)

FRATICELLI (plural diminutive of Ital. frale, brother), the name given during the 13th, 14th and 15th centuries to a number of religious groups in Italy, differing widely from each other, but all derived more or less directly from the Franciscan movement. Fra Salimbene says in his Chronicle (Parma ed., p. 108): ” All who wished to found a new rule borrowed something from the Franciscan order, the sandals or the habit.” As early as 1238 Gregory IX., in his bull Quoniam abundavit iniquitas, condemned and denounced as forgers {tanquatn falsarios) all who begged or preached in a habit resembling that of the

mendicant orders, and this condemnation was repeated by him or his successors. The term Fraticelli was used contemptuously to denote, not any particular sect, but the members of orders formed on the fringe

of the church. Thus Giovanni Villani, speaking of the heretic Dolcino, says in his Chronicle (bk. viii. ch. 84): ” He is not a brother of an ordered rule, but a Jraticello without an order.” Similarly, John XXII., in his bull Sancta Romana et Universalis Ecclesia (28th of December 1317), condemns vaguely those ” profanae multitudinis viri commonly called Fraticelli, or Brethren of the Poor Life, or Bizocchi, or Beguines, or by all manner of other names.”

Some historians, in their zeal for rigid classification, have regarded the Fraticelli as a distinct sect, and have attempted to discover its dogmas and its founder. Some of the con- temporaries of these religious groups fell into the same error, and in this way the vague term Fraticelli has sometimes been applied to the disciples of Armanno Pongilupo of Ferrara (d. 1 269), who was undoubtedly a Cathar, and to the followers of Gerard Segarelli and Dolcino, who were always known among them- selves as Apostolic Brethren (Apostolici). Furthermore, it seems absurd to classify both the Dolcinists and the Spiritual Franciscans as Fraticelli, since, as has been pointed out by Ehrle {Arch. f. Lit. u. Kirchengesch. des Mittelalters, ii. 107, &c), Angelo of Clarino, in his De septem tribulationibus, written to the glory of the Spirituals, does not scruple to stigmatize the Dolcinists as ” disciples of the devil.” It is equally absurd to include in the same category the ignorant Bizocchi and Segarellists and such learned disciples of Michael of Cesena and Louis of Bavaria as William of Occam and Bonagratia of Bergamo, who have often been placed under this comprehensive rubric.

The name Fraticelli may more justly be applied to the most exalted fraction of Franciscanism. In 1322 some prisoners declared to the inquisitor Bernard Gui at Toulouse that the Franciscan order was divided into three sections — the Con- ventuals, who were allowed to retain their real and personal property; the Spirituals or Beguines, who were at that time the objects of persecution; and the Fraticelli of Sicily, whose leader was Henry of Ceva (see Gui’s Practica Inquisitionis, v.). It is this fraction of the order which John XXII. condemned in his bull Gloriosam Ecclesiam (23rd of January 1318), but without calling them Fraticelli. Henry of Ceva had taken refuge in Sicily at the time of Pope Boniface VIII.‘s persecution of the Spirituals, and thanks to the good offices of Frederick of Sicily, a little colony of Franciscans who rejected all property had soon established itself in the

island. Under Pope Clement V., and more especially under Pope John XXII. , fresh Spirituals joined them; and this group of exalted and isolated ascetics soon began to regard itself as the sole legitimate order of the Minorites and then as the sole Catholic Church. After being excommuni- cated as ” schismatics and rebels, founders of a superstitious sect, and propagators of false and pestiferous doctrines,” they proceeded to elect a general (for Michael of Cesena had disavowed them) and then a pope called Celestine (L. Wadding, Annates, at date 1313). The rebels continued to carry on an active propaganda. In Tuscany particularly the Inquisition made persistent efforts to suppress them; Florence afflicted them with severe laws, but failed to rouse the populace against them. The papacy dreaded their social even more than their dogmatic influence. At first in Sicily and afterwards throughout Italy the Ghibellines gave them a warm welcome; the rigorists and the malcontents who had either left the church or were on the point of leaving it, were attracted by these communities of needy rebels; and the tribune Rienzi was at one time disposed to join them. To overcome these ascetics it was necessary to have recourse to other ascetics, and from the outset the reformed Franciscans, or Franciscans of the Strict Observance, under the direction of their first leaders, Paoluccio da Trinci (d. 1390), Giovanni Stronconi (d. 1405), and St Bernardine of Siena, had been at great pains to restore the Fraticelli to orthodoxy. These early efforts, however, had little success. Alarmed by the number of the sectaries and the extent of their influence, Pope Martin V., who had encouraged the Observants, and particularly Bernardine of Siena, fulminated two bulls (1418 and 1421) against the heretics, and entrusted different legates with the task of hunting them down. These measures failing, he decided, in

1426, to appoint two Observants as inquisitors without territorial limitation to make a special crusade against the heresy of the Fraticelli. These two inquisitors, who pursued their duties under three popes (Martin V., Eugenius IV. and Nicholas V.) were Giovanni da Capistrano and Giacomo della Marca. The latter’s valuable Dialogus contra Fraticellos (Baluze and Mansi, Miscellanea, iv. 505-610) gives an account of the doctrines of these heretics and of the activity of the two inquisitors, and shows that the Fraticelli not only constituted a distinct church but a distinct society. They had a pope called Rinaldo, who was elected in 1429 and was succeeded by a brother named Gabriel. This supreme head of their church they styled ” bishop of

Philadelphia," Philadelphia being the mystic name of their community; under him were bishops, e.g. the bishops of Florence, Venice, &c; and, furthermore, a member of the community named Guglielmo Majoretto bore the title of " Emperor of the Christians." This organization, at least in so far as concerns the heretical church, had already been observed among the Fraticelli in Sicily, and in 1423 the general council of Siena affirmed with horror that at Peniscola there was an heretical pope surrounded with a college of cardinals who made no attempt at concealment. From 1426 to 1449 the Fraticelli were unremittingly pursued, imprisoned and burned. The sect gradually died out after losing the protection of the common people, whose sympathy was now transferred to the austere Observants and their miracle-worker Capistrano. From 1466 to 1471 there were sporadic burnings of Fraticelli, and in 1471 Tommaso di Scarlino was sent to Piombino and the littoral of Tuscany to track out some Fraticelli who had been discovered in those parts. After that date the name disappears from history. See F. Ehrle, " Die Spiritualen, ihr Verhaltnis zum Franzis- kanerorden und zu den Fraticellen ■" and " Zur Vorgeschichte des Concils von Vienne," in Archiv fur Literatur- und Kirchengesckichte des Mittelalters, vols, i., ii., iii. ; Wetzer and Welte, Kirchenlexikon, s.v. " Fraticellen " ; H. C. Lea, History of the Inquisition of the Middle Ages, iii. 129-180 (London, 1888). (P. A.)

FRAUD (L&t.fraus, deceit), in its widest sense, a term which has never been exhaustively defined by an English court of law, and for legal purposes probably cannot usefully be defined. But as denoting a cause of action for which damages can be recovered in civil proceedings it now has a clear and settled meaning. In actions in which damages are claimed for fraud, the difficulties and obscurities which commonly arise are due rather to the complexity of modern commerce and the ingenuity of modern swindlers than to any uncertainty or technicality in the modern law. To succeed in such an action, the person aggrieved must first prove a representation of fact, made either by words, by writing or by conduct, which is in fact untrue. Mere conceal- ment is not actionable unless it amounts not only to suppressio veri, but to suggcstio falsi. An expression of opinion or of intention is not enough, unless it can be shown that the opinion was not really held, or that the intention was not really enter- tained, in which case it must be borne in mind, to use the phrase of Lord Bowen, that the state of a man's mind is as much a matter of fact as the state of his digestion. Next, it must be proved that the representation was made without any honest belief in its truth, that is, either with actual knowledge of its falsity or with a reckless disregard whether it is true or false. It was finally established, after much controversy, in the case of Derry v. Peek in

1889, that a merely negligent misstatement is not action- able. Further, the person aggrieved must prove that the offender made the representation with the intention that he should act on it, though not necessarily directly to him, and that he did in fact act in reliance on it. Lastly, the complainant must prove that, as the direct consequence, he has suffered actual damage capable of pecuniary measurement.

As soon as the case of Derry v. Peek had established, as the general rule of law, that a merely negligent misstatement is not actionable, a statutory exception was made to the rule in the case of directors and promoters of companies who publish prospectuses and similar documents. By the Directors' Liability Act r890, such persons are liable for damage caused by untrue statements in such documents, unless they can prove that they

had reasonable grounds for believing the statements to be true. It is also to be observed that, though damages cannot be re- covered in an action for a misrepresentation made with an honest belief in its truth, still any person induced to enter into a con- tract by a misrepresentation, whether fraudulent or innocent, is entitled to avoid the contract and to obtain a declaration that it is not binding upon him. This is in accordance with the rule of equity, which since the Judicature Act prevails in all the courts. Whether the representation is fraudulent or innocent, the contract is not void, but voidable. The party misled must exercise his option to avoid the contract without delay, and before it has become impossible to restore the other party to the position in which he stood before the contract was made. If he is too late, he can only rely on his claim for damages, and in order to assert this claim it is necessary to prove that the mis- representation was fraudulent. Fraud, in its wider sense of dishonest dealing, though not a distinct cause of action, is often material as preventing the acquisition of a right, for which good faith is a necessary condition. Also a combination or conspiracy by two or more persons to defraud gives rise to liabilities not very clearly or completely defined.

FRAUENBURG, a town of Germany, in the kingdom of Prussia, on the Frische Haff, at the mouth of the Bande, 41 m. S.W. from Konigsberg on the railway to Elbing. Pop. 2500. The cathedral (founded 1329), with six towers, stands on a commanding eminence adjoining the town and surrounded by castellated walls and bastions. This is known as Dom-Frauen- burg, and is the seat of the Roman Catholic bishop of Ermeland. Within the cathedral is a monument to the astronomer Copernicus bearing the inscription Astronomo celeberrimo, cujus nomen et gloria utrumque implevit orbem. There is a small port with inconsiderable trade. Frauenberg was founded in 1287 and received

the rights of a town in 1310.

FRAUENFELD, the capital of the Swiss canton of Thurgau, 27 m. by rail N.E. of Zurich or 14! m. W. of Romanshorn. It is built on the Murg stream a little above its junction with the Thur. It is a prosperous commercial town, being situated at the meeting point of several routes, while it possesses several industrial establishments, chiefly concerned with different branches of the iron trade. In 1900 its population (including the neighbouring villages) was 7761, mainly German-speaking, while there were 5563 Protestants to 2188 Romanists. Frauen- feld is the artillery depot for North-East Switzerland. The upper town is the older part, and centres round the castle, of which the tower dates from the 10th century, though the rest is of a later period. Both stood on land belonging to the abbot of Reichenau, who, with the count of Kyburg, founded the town, which is first mentioned in 1255. The abbot retained all manorial rights till 1803, while the political powers of the Kyburgers (who were the " protectors " of Reichenau) passed to the Habsburgs in 1273, and were seized by the Swiss in 1460 with the rest of the Thurgau. In 1712 the town succeeded Baden in Aargau as the meeting-place of the Federal Diet, and continued to be the capital of the Confederation till its transformation in 1798. In 1799 it was successively occupied by the Austrians and the French. The old Capuchin convent (1591-1848) is now occupied as a vicarage by the Romanist priest. (W. A. B. C.)

FRAUENLOB, the name by which Heineich von Meissen, a German poet of the 13th century, is generally known. He seems to have acquired the sobriquet because in a famous Liederstreit with his rival Regenbogen he defended the use of the word Frau {i.e. frouwe, = \a,dy) instead of Weib (wtp = woman). Frauenlob was born about 1250 of a humble burgher family. His youth was spent in straitened circumstances, but he gradu- ally acquired a reputation as a singer at the various courts of the German princes. In 1278 we find him with Rudolph I. in the Marchfeld, in 1286 he was at Prague at the knighting Of Wenceslaus (Wenzel) II. , and in 1 3 1 1 he was present at a knightly festival celebrated by Waldemar of Brandenburg before Rostock. After this he settled in Mainz, and there according to the popular account, founded the first school of Meistersingers (q.v.). He died in 1318, and was buried in the cloisters of the cathedral at

Mainz. His grave is still marked by a copy made in 1783 of the

original tombstone of 13 18; and in 1842 a monument by Sch wanthaler was erected in the cloisters. Frauenlob's poems make a great display of learning; he delights in far-fetched metaphors, and his versification abounds in tricks of form and rhyme.

Frauenlob's poetry was edited by L. Ettmiiller in 1843; a selection will be found in K. Bartsch, Deutsche Liederdichter des 12. bis 14. Jahrhunderts (3rd ed., 1893). An English translation of Frauenlob's Cantica canticorum, by A. E. Kroeger, with notes, appeared in 1877 at St Louis, U.S.A. See A. Boerkel, Frauenlob (2nd ed., 1881).

FRAUNCE, ABRAHAM (c. 1558-1633), English poet, a native of Shropshire, was born between 1558 and 1560. His name was registered as a pupil of Shrewsbury School in January 157 1/2, and he joined St John's College, Cambridge, in 1576, becoming a fellow in 1580/81. His Latin comedy of Victoria, dedicated to Sidney, was probably written at Cambridge, where he remained until he had taken his M.A. degree in 1583. He was called to the bar at Gray's Inn in 1588, and then apparently practised as a barrister in the court of the Welsh marches. After the death of his patron Sir Philip Sidney, Fraunce was protected by Sidney's sister Mary, countess of Pembroke. His last work was published in 1592, and we have no further knowledge of him until 1633, when he is said to have written an Epithalamium in honour of the marriage of Lady Magdalen Egerton, 7th daughter of the earl of Bridgwater, whose service he may possibly have entered.

His works are: The Lamentations of Amintas for the death if Phyllis (1587), a version in English hexameters of his friend's, Thomas Watson's, Latin Amyntas; The Lawiers Logike, exem- plifying the praecepts of Logike by the practise of the common Lawe (158S); Arcadian Rhetorike (1588); Abrahami Fransi Insignium, Armorum . . . explicatio (1588); The Countess of Pembroke's Yvychurch (1591/2), containing a translation of Tasso's Aminta, a reprint of his earlier version of Watson, " The Lamentation of Corydon for the love of Alexis " (Virgil, eclogue ii.), a short translation from Heliodorus, and, in the third part (1592) " Aminta's Dale," a collection of "conceited" tales supposed to be related by the nymphs of Ivychurch; The Countess of Pembroke's Emanuell (1591); The Third Part of the Countess of Pembroke's Ivychurch, entituled Aminta's Dale (1502). His Arcadian Rhetorike owes much to earlier critical treatises, but has a special interest from its references to Spenser, and Fraunce quotes from the Faerie Queene a year before the publication of the first books. In " Colin Clout's come home again," Spenser speaks of Fraunce as Corydon, on account of his translations of Virgil's second eclogue.

His poems are written in classical metres, and he was regarded by his contemporaries as the best exponent of Gabriel Harvey's theory. Even Thomas Nashe had a good word for " sweete Master France."

The Countess of Pembroke's Emanuell, hexameters on the nativity and passion of Christ, with versions of some psalms, were reprinted by Dr A. B. Grosart in the third volume of his Miscellanies of the Fuller Worthies Library (1872). Joseph Hunter in his Chorus Vatum stated that five of Fraunce's songs were included in Sidney's Astrophel and Stella, but it is probable that these should be attributed not to Fraunce, hut to Thomas Campion. See a life prefixed to the transcription of a MS. Latin comedy by Fraunce, Victoria, by Professor G. C. Moore Smith, published in Bang's Materialien zur Kunde des alteren englischen Dramas, vol. xiv., 1906.

FRAUNHOFER, JOSEPH VON (1787-1826), German optician and physicist, was born at Straubing in Bavaria on the 6th of March 1787, the son of a glazier who died in 1798. He was apprenticed in 1 799 to Weichselberger, a glass-polisher andlooking- glass maker. On the 21st of July 1801 he nearly lost his life by the fall of the house in which he lodged, and the elector of Bavaria, Maximilian Joseph, who was present at his extrication from the ruins, gave him 18 ducats. With a portion of this sum he obtained release from the last six months of his apprenticeship, and with the rest he purchased a glass-polishing machine. He now employed himself in making optical glasses, and in engraving on metal, devoting his spare time to the perusal of works on mathematics and optics. In 1806 he obtained the place of optician in the mathematical institute which in 1804 had been founded at Munich by Joseph von Utzschneider, G. Reichenbach and J. Liebherr; and in 1807 arrangements were made by

Utzschneider for his instruction by Pierre Louis Guinand, a skilled optician, in the fabrication of flint and crown glass, in which he soon became an adept (see R. Wolf, Gesch. der Wissensch. in Deulschl. bd. xvi. p. 586). With Reichenbach and Utz- schneider, Fraunhofer established in 1809 an optical institute at Benedictbeuern, near Munich, of which he in 1818 became sole manager. The institute was in 181 9 removed to Munich, and on Fraunhofer's death came under the direction of G. Merz.

Amongst the earliest mechanical contrivances of Fraunhofer was a machine for polishing mathematically uniform spherical surfaces. He was the inventor of the stage-micrometer, and of a form of heliometer; and in 1816 he succeeded in constructing for the microscope achromatic glasses of long focus, consisting of a single lens, the

constituent glasses of which were in juxta- position, but not cemented together. The great reflecting telescope at Dorpat was manufactured by him, and so great was the skill he attained in the making of lenses for achromatic telescopes that, in a letter to Sir David Brewster, he expressed his willingness to furnish an achromatic glass of 18 in. diameter. Fraunhofer is especially known for the researches, published in the Denkschriften der Miinchener Akademie for 1814-1815, by which he laid the foundation of solar and stellar chemistry. The dark lines of the spectrum of sunlight, earliest noted by Dr W. H. Wollaston {Phil. Trans., 1802, p. 378), were inde- pendently discovered, and, by means of the telescope of a theodolite, between which and a distant slit admitting the light a prism was interposed, were for the first time carefully observed by Fraunhofer, and have on that account been desig- nated ” Fraunhofer’s lines.” He constructed a map of as many as 576 of these lines, the principal of which he denoted by the letters of the alphabet from A to G; and by ascertaining their refractive indices he determined that their relative positions are constant, whether in spectra produced by the direct rays of the sun, or by the reflected light of the moon and planets. The spectra of the stars he obtained by using, outside the object-glass of his telescope, a large prism, through which the light passed to be brought to a focus in front of the eye-piece. He showed that in the spectra of the fixed stars many of the dark lines were different from those of the solar spectrum, whilst other well- known solar lines were wanting; and he concluded that it was not by any action of the terrestrial atmosphere upon the light passing through it that the lines were produced. He further expressed the belief that the dark lines D of the solar spectrum coincide with the bright lines of the sodium flame. He was also the inventor of the diffraction grating.

In 1823 he was appointed conservator of the physical cabinet at Munich, and in the following year he received from the king of Bavaria the civil order of merit. He died at Munich on the 7th of June 1826, and was buried near Reichenbach, whose decease had taken place eight years previously. On his tomb is the inscription ” Approximavit sidera.”

See J. von Utzschneider, Kurzer Umriss der Lebensgeschichte des Herrn Dr J. von Fraunhofer (Munich, 1826) ; and G. Merz, Das Leben und Wirken Fraunhofers (Landshut, 1865)

FRAUSTADT (Polish, Wszowa), a town of Germany, in the Prussian province of Posen, in a flat sandy country, dotted with windmills, 50 m. S.S.W. of Posen, on the railway Lissa-Sagan. Pop. (including a garrison) 7500. It has three Evangelical and two Roman Catholic

churches, a classical school and a teachers' seminary; the manufactures include woollen and cotton goods, hats, morocco leather and gloves, and there is a considerable trade in corn, cattle and wool. Fraustadt was founded by Silesians in 1348, and afterwards belonged to the principality of Glogau. Near the town the Swedes under Charles XII. defeated the Saxons on the 13th of February 1706.

FRAYSSINOUS, DENIS ANTOINE LUC, Comte de (1765- 1841), French prelate and statesman, distinguished as an orator and as a controversial writer, was born of humble parentage at Curieres, in the department of Aveyron, on the 9th of May 1765. He owes his reputation mainly to the lectures on dog- matic theology, known as the " conferences " of Saint Sulpice, delivered in the church of Saint Sulpice, Paris, from 1803 to

1809, to which admiring crowds were attracted by his lucid exposition and by his graceful oratory. The freedom of his lan- guage in 1809, when Napoleon had arrested the pope and de- clared the annexation of Rome to France, led to a prohibition of his lectures; and the dispersion of the congregation of Saint Sulpice in 181 1 was followed by his temporary retirement from the capital. He returned with the Bourbons, and resumed his lectures in 18 14; but the events of the Hundred Days again compelled him to withdraw into private life, from which he did not emerge until February 1816. As court preacher and almoner to Louis XVIII., he now entered upon the period of his greatest public activity and influence. In connexion with the con- troversy raised by the signing of the reactionary concordat of 18 1 7, he published in 18 18 a treatise entitled Vrais Principes de I'eglise Gallicane sur la puissance ecclisiastique, which though unfavourably criticized by Lamennais, was received with favour by the civil and ecclesiastical authorities. The consecration of Frayssinous as bishop of Hermopolis " in partibus," his election to the French Academy, and his appointment to the grand-master- ship of the university, followed in rapid succession. In 1824, on the accession of Charles X., he became minister of public in- struction and of ecclesiastical affairs under the administration of Villele; and about the same time he was created a peer of France with the title of count. His term of office was chiefly marked by the recall of the Jesuits. In 1825 he published his lectures under the title Defense \du christianisme. The work passed through 15 editions within 18 years, and was translated into several European languages. In 1828 he, along with his colleagues in the Villele

ministry, was compelled to resign office, »nd the subsequent revolution of July 1830 led to his retire- ment to Rome. Shortly afterwards he became tutor to the duke of Bordeaux (Comte de Chambord) at Prague, where he con- tinued to live until 1838. He died at St Geniez on the 12th of December 1841.

See Bertrand, Bibl. Sulpicienne (t. ii. 135 sq.; iii. 253) for bibliography, and G. A. Henrion (Paris, 2 vols., 1844) for biography.

FRECHETTE, LOUIS HONORS (1839-1908), French-Cana- dian poet, was born at Levis, Quebec, on the 16th of November 1839, the son of a contractor. He was educated in his native province, and called to the Canadian bar in 1864. He started the Journal de Levis, and his revolutionary doctrines compelled him to leave Canada for the United States. After some years spent in journalism at Chicago, he was in 1874 elected as the Liberal candidate to represent Levis in the Canadian parliament. At the elections of 1878 and 1882 he was defeated, and there- after confined himself to litera ture. He edited La-Patrie and other French papers in the Dominion; and in 1889 was appointed clerk of the Quebec legislative council. He was long a warm advocate of the political union of Canada and the United States, but in later life became less ardent, and in 1897 accepted the honour of C.M.G. from Queen Victoria. He was president of the Royal Society of Canada, and of the Canadian Society of Arts, and received numerous honorary degrees. His works include: Mes Loisirs (1863); La Voix d'un exilS (1867), a satire against the Canadian government; PUe-mele (1877); Les Fleurs boriales, and Les Oiseaux de neige (1880), crowned by the French academy; La Ltgende d'un peuple (1887); two historical dramas, Papineau (1880) and Felix PoutrS (1880); La Noel au Canada (1900), and several prose works and translations. An exponent of local French sentiment, he won the title of the " Canadian Laureate." He died on the 1st of June 1908.

FREDEGOND (Fredigundis) (d. 597), Frankish queen. Origin- ally a serving-woman, she inspired the Frankish king, Chilperic I., with a violent passion. At her instigation he repudiated his first wife Audovera, and strangled his second, Galswintha, Queen Brunhilda's sister. A few days after this murder Chilperic married Fredegond (567). This woman exercised a most per- nicious influence over him. She forced him into war against Austrasia, in the course of which she procured the assassination of the victorious king Sigebert (575) ; she carried on a malignant struggle against Chilperic's sons by his first wife, Theodebert, Merwich and Clovis, who all died tragic deaths; and she per-

sistently endeavoured to secure the throne for her own children. Her first son Thierry, however, to whom Bishop Ragnemod of Paris stood godfather, died soon after birth, and Fredegond tortured a number of women whom she accused of having bewitched the child. Her second son also died in infancy. Finally, she gave birth to a child who afterwards became king as Clotaire II. Shortly after the birth of this third son, Chilperic himself perished in mysterious circumstances (5 84) . Fredegond has been accused of complicity in his murder, but with little show of probability, since in her husband she lost her principal supporter.

Henceforth Fredegond did all in her power to gain the king- dom for her child. Taking refuge at the church of Notre Dame at Paris, she appealed to King Guntram of Burgundy, who took Clotaire under his protection and defended him against his other nephew, Childebert II., king of Austrasia. From that time until her death Fredegond governed the western kingdom. She endeavoured to prevent the alliance between King Guntram and Childebert, which was cemented by the pact of Andelot; and made several attempts to assassinate Childebert by sending against him hired bravoes armed with poisoned scramasaxes (heavy single-edged knives). After the death of Childebert in 59 s she resolved to augment the kingdom of Neustria at the expense of Austrasia, and to this end seized some cities near Paris and defeated Theodebert at the battle of Laffaux, near Soissons. Her triumph, however, was short-lived, as she died quietly in her bed in 597 soon after her victory.

See V. N. Augustin Thierry, Recits des temps merovingiens (Brussels, 1840); Ulysse Chevalier, Bio-bibliographie (2nd ed.), s.v. ” Frede- gonde.” (C. Pf.)

FREDERIC, HAROLD (1856-1898), Anglo-American novelist, was born on the 19th of August 1856 at Utica, N.Y., was edu- cated there, and took to journalism. He went to live in England as London correspondent of the New York Times in 1884, and was soon recognized for his ability both as a writer and as a talker. He wrote several clever early stories, but it was not till he published Illumination (1896), followed by Gloria Mundi (1898), that his remarkable gifts as a novelist were fully realized. He died in England on the 19th of October 1898.

FREDERICIA (Friedericia), a seaport of Denmark, near the S.E. corner of Jutland, on the west shore of the Little Belt opposite the island of Fixnen. Pop. (1901) 12,714. It has railway communication with both south and north, and a steam ferry connects with Middelfart, a seaside

resort and railway station on Fiinen. There is a considerable shipping trade, and the industries comprise the manufacture of tobacco, salt and chicory, and of cotton goods and hats. A small fort was erected on the site of Fredericia by Christian IV. of Denmark, and his successor, Frederick III., determined about 1650 to make it a powerful fortress. Free exercise of religion was offered to all who should settle in the new town, which at first bore the name of Frederiksodde, and only received its present designation in 1664. In 1657 it was taken by storm by the Swedish general Wrangel, and in 1659, after the fortress had been dismantled, it was occupied by Frederick William of Brandenburg. It was not till 1 709-1 7 10 that the works were again put in a state of defence. In 1848 no attempt was made by the Danes to oppose the Prussians, who entered on the 2nd of May, and maintained their position against the Danish gunboats. During the armistice of 1848-1849 the fortress was strengthened, and soon afterwards it stood a siege of two months, which was brought to a glorious close by a successful sortie on the 6th of July 1849. In memory of the victory several monuments have been erected in the town and its vicinity, of which the most noticeable are the bronze statue of the Danish Land Soldier by Bissen (one of Thorvaldsen's pupils), and the great barrow over 500 Danes in the cemetery of the Holy Trinity Church, with a bas-relief by the same sculptor. On the outbreak of the war of 1864, the fortress was again strengthened by new works and an entrenched camp; but the Danes suddenly evacuated it on the 28th of April after a siege of six weeks. The Austro-Prussian army partly destroyed the fortifications, and kept possession of the town till the conclusion of peace.

FREDERICK (Mod. Ger. Friedrich; Ital. Federigo; Fr. Frideric and Fediric; M.H.G. Friderich; O.H.G. Fridurlh, " king or lord of peace," from O.H.G. fridu, AS. frith, " peace," and rth " rich," " a ruler," for derivation of which see Henry), a Christian name borne by many European sovereigns and princes, the more important of whom are given below in the following order: — (i) Roman emperors and German kings; (2) other kings in the alphabetical order of their states; (3) other reigning princes in the same order.

FREDERICK I. (c. n 23-1 190), Roman emperor, surnamed " Barbarossa " by the Italians, was the son of Frederick II. of Hohenstaufen, duke of Swabia, and Judith, daughter of Henry IX. the Black, duke of Bavaria. The precise date and place of his birth,

together with details of his early life, are wanting; but in 1 143 he assisted his maternal uncle, Count Welf VI., in his attempts to conquer Bavaria, and by his conduct in several local feuds earned the reputation of a brave and skilful warrior. When his father died in 1147 Frederick became duke of Swabia, and im- mediately afterwards accompanied his uncle, the German king Conrad III., on his disastrous crusade, during which he greatly distinguished himself and won the complete confidence of the king. Abandoning the cause of the Welfs, he fought for Conrad against them, and in 11 52 the dying king advised the princes to choose Frederick as his successor to the exclusion of his own young son. Energetically pressing his candidature, he was chosen German king at Frankfort on the 4th or 5th of March 1152, and crowned at Aix-la-Chapelle on the 9th of the same month, owing his election partly to his personal qualities, and partly to the fact that he united in himself the blood of the rival families of Welf and Waiblingen.

The new king was anxious to restore the Empire to the position it had occupied under Charlemagne and Otto the Great, and saw clearly that the restoration of order in Germany was a necessary preliminary to the enforcement of the imperial rights in Italy. Issuing a general order for peace, he was prodigal in his concessions to the nobles. Count Welf was made duke of Spoleto and mar- grave of Tuscany; Berthold VI., duke of Zahringen, was en- trusted with extensive rights in Burgundy; and the king's nephew, Frederick, received the duchy of Swabia. Abroad Frederick decided a quarrel for the Danish throne in favour of Svend, or Peter as he is sometimes called, who did homage for his kingdom, and negotiations were begun with the East Roman emperor, Manuel Comnenus. It was probably about this time that the king obtained a divorce from his wife Adela, daughter of Dietpold, margrave of .Vohburg and Cham, on the ground of consanguinity, and made a vain effort to obtain a bride from the court of Constantinople. On his accession Frederick had communicated the news of his election to Pope Eugenius III., but neglected to ask for the papal confirmation. In spite of this omission, however, and of some trouble arising from a double election to the archbishopric of Magdeburg, a treaty was concluded between king and pope at Constance in March 1153, by which Frederick promised in return for his coronation to make no peace with Roger I. king of Sicily, or with the rebellious Romans, without the consent of Eugenius, and generally to help and defend the papacy.

The journey to Italy made by the king in n 54 was the pre- cursor of five other expeditions which engaged his main energies for thirty years, during which the subjugation of the peninsula was the central

and abiding aim of his policy. Meeting the new pope, Adrian IV., near Nepi, Frederick at first refused to hold his stirrup; but after some negotiations he consented and received the kiss of peace, which was followed by his coronation as emperor at Rome on the 18th of June 1155. As his slender forces were inadequate to encounter the fierce hostility which he aroused, he left Italy in the autumn of 11 55 to prepare for a new and more formidable campaign. Disorder was again rampant in Germany, especially in Bavaria, but general peace was restored by Frederick's vigorous measures. Bavaria was transferred from Henry II. Jasomirgott, margrave of Austria, to Henry the Lion, duke of Saxony; and the former was pacified by the erection of his margraviate into a duchy, while Frederick's

step-brother Conrad was invested with the Palatinate of the Rhine. On the 9th of June 1156 the king was married at Wurzburg to Beatrix, daughter and heiress of the dead count of Upper Burgundy, Renaud III., when Upper Burgundy or Franche Comte, as it is sometimes called, was added to his possessions. An expedition into Poland reduced Duke Boleslaus IV. to an abject submission, after which Frederick received the homage of the Burgundian nobles at a diet held at Besancon in October

1157, which was marked by a quarrel between pope and emperor. A Swedish archbishop, returning from Rome, had been seized by robbers, and as Frederick had not punished the offenders Adrian sent two legates to remonstrate. The papal letter when trans- lated referred to the imperial crown as a benefice conferred by the pope, and its reading aroused great indignation. The emperor had to protect the legates from the fury of the nobles; and afterwards issued a manifesto to his subjects declaring that he held the Empire from God alone, to which Adrian replied that he had used the ambiguous word bencficia as meaning benefits, and not in its feudal sense.

In June n 58 Frederick set out upon his second Italian ex- pedition, which was signalized by the establishment of imperial officers called podestas in the cities of northern Italy, the revolt and capture of Milan, and the beginning of the long struggle with pope Alexander III., who excommunicated the emperor on the 2nd of March 1160. During this visit Frederick summoned the doctors of Bologna to the diet held near Roncaglia in November

1158, and as a result of their inquiries into the rights belonging to the kingdom of Italy he obtained a large amount of wealth. Returning to Germany towards the close of 1162, Frederick prevented a conflict between Henry the Lion, duke of Saxony, and a'number of

neighbouring princes, and severely punished the citizens of Mainz for their rebellion against Archbishop Arnold. A further visit to Italy in n 63 saw his plans for the conquest of Sicily checked by the formation of a powerful league against him, brought together mainly by the exactions of the podestas and the enforcement of the rights declared by the doctors of Bologna. Frederick had supported an anti-pope Victor IV. against Alexander, and on Victor's death in n 63 a new anti-pope called Paschal III. was chosen to succeed him. Having tried in vain to secure the general recognition of Victor and Paschal in Europe, the emperor held a diet at Wurzburg in May 1 165; and by taking an oath, followed by many of the clergy and nobles, to remain true to Paschal and his successors, brought about a schism in the German church. A temporary alliance with Henry II., king of England, the magnificent celebration of the canonization of Charlemagne at Aix-la-Chapelle, and the restoration of peace in the Rhineland, occupied Frederick's attention until October 1166, when he made his fourth journey to Italy. Having captured Ancona, he marched to Rome, stormed the Leonine city, and procured the enthronement of Paschal, and the coronation of his wife Beatrix; but his victorious career was stopped by the sudden outbreak of a pestilence which destroyed the German army and drove the emperor as a fugitive to Germany, where he remained for the ensuing six years. Henry the Lion was again saved from a threatening combination; conflicting claims to various bishoprics were decided; and the imperial authority was asserted over Bohemia, Poland and Hungary. Friendly relations were entered into with the emperor Manuel, and attempts made to come to a better understanding with Henry II., king of England, and Louis VII., king of France.

In 1 1 74, when Frederick made his fifth expedition to Italy, the Lombard league had been formed, and the fortress of Ales- sandria raised to check his progress. The campaign was a com- plete failure. The refusal of Henry the Lion to bring help into Italy was followed by the defeat of the emperor at Legnano on the 29th of May 1176, when he was wounded and believed to be dead. Reaching Pavia, he began negotiations for peace with Alexander, which ripened into the treaty of Venice in August 1 1 77, and at the same time a truce with the Lombard league was arranged for six years. Frederick, loosed from the papal ban, recognized Alexander as the rightful pope, and in July 1177 knelt before him and kissed his feet. The possession of the vast

estates left by Matilda, marchioness of Tuscany, and claimed by both pope and emperor, was to be decided by arbitration, and in October 1178 the emperor was again in Germany. Various small feuds were suppressed; Henry the Lion was deprived of his duchy, which was dismembered, and sent into exile; a treaty was made with the Lombard league at Constance in June 1183; and most important of all, Frederick's son Henry was betrothed in 1 1 84 to Constance, daughter of Roger L, king of Sicily, and aunt and heiress of the reigning king, William II. This betrothal, which threatened to unite Sicily with the Empire, made it difficult for Frederick, when during his last Italian expedition in 1184 he met Pope Lucius III. at Verona, to establish friendly relations with the papacy. Further causes of trouble arose, moreover, and when the potentates separated the question of Matilda's estates was undecided; and • Lucius had refused to crown Henry or to recognize the German clergy who had been ordained during the schism. Frederick then formed an alliance with Milan, where the citizens witnessed a great festival on the 27th of January 1186. The emperor, who had been crowned king of Burgundy, or Aries, at Aries on the 30th of July 1178, had this ceremony repeated; while his son Henry was crowned king of Italy and married to Constance, who was crowned queen of Germany.

The quarrel with the papacy was continued with the new pope Urban III., and open warfare was begun. But Frederick was soon recalled to Germany by the news of a revolt raised by Philip of Heinsberg, archbishop of Cologne, in alliance with the pope. The German clergy remained loyal to the emperor, and hostilities were checked by the death of Urban and the election of a new pope as Gregory VIII. , who adopted a more friendly policy towards the emperor. In 1 188 Philip submitted, and immediately afterwards Frederick took the cross in order to stop the victorious career of Saladin, who had just taken Jerusalem. After extensive preparations he left Regensburg in May 1189 at the head of a splendid army, and having overcome the hostility of the East Roman emperor Isaac Angelus, marched into Asia Minor. On the 10th of June 1100 Frederick was either bathing or crossing the river Calycadnus (Geuksu), near Seleucia (Selefke) in Cilicia, when he was carried away by the stream and drowned. The place of his burial is unknown, and the legend which says he still sits in a cavern in the Kyffhauser mountain in Thuringia waiting until the need of his country shall call him, is now thought to refer, at least in its earlier form, to his grandson, the emperor Frederick II. He left by his wife, Beatrix, five sons, of whom the eldest afterwards became emperor as Henry VI.

Frederick's reign, on the whole, was a happy and prosperous time for

Germany. He encouraged the growth of towns, easily suppressed the few risings against his authority, and took strong and successful measures to establish order. Even after the severe reverses which he experienced in Italy, his position in Germany was never seriously weakened; and in 1181, when, almost without striking a blow, he deprived Henry the Lion of his duchy, he seemed stronger than ever. This power rested upon his earnest and commanding personality, and also upon the sup- port which he received from the German church, the possession of a valuable private domain, and the care with which he exacted feudal dues from his dependents.

Frederick I. is said to have taken Charlemagne as his model; but the contest in which he engaged was entirely different both in character and results from that in which his great predecessor achieved such a wonderful temporary success. Though Frederick failed to subdue the republics, the failure can scarcely be said to reflect either on his prudence as a statesman or his skill as a general, for his ascendancy was finally overthrown rather by the ravages of pestilence than by the might of human arms. In Germany his resolute will and sagacious administration subdued or disarmed all discontent, and he not only succeeded in welding the various rival interests into a unity of devotion to himself against which papal intrigues were comparatively powerless, but won for the empire a prestige such as it had not possessed since the time of Otto the Great. The wide contrast between his German and Italian rule is strikingly exemplified in the fact that,

while he endeavoured to overthrow the republics in Italy, he held in check the power of the nobles in Germany, by conferring municipal franchises and independent rights on the principal cities. Even in Italy, though his general course of action was warped by wrong prepossessions, he in many instances manifested exceptional practical sagacity in dealing with immediate diffi- culties and emergencies. Possessing frank and open manners, untiring and unresting energy, and a prowess which found its native element in difficulty and danger, he seemed the embodi- ment of the chivalrous and warlike spirit of his age, and was the model of all the qualities which then won highest admiration. Stern and ambitious he certainly was, but his aims can scarcely be said to have exceeded his prerogatives as emperor; and though he had sometimes recourse when in straits to expedients almost diabolically ingenious in their cruelty, yet his general conduct was marked by a clemency which in that age was exceptional. His quarrel with the papacy was an inherited conflict, not re- flecting at all on his religious faith, but the inevitable con- sequence of inconsistent theories of government, which had been created and could be dissipated only by a long series of events. His interference in

the quarrels of the republics was not only quite justifiable from the relation in which he stood to them, but seemed absolutely necessary. From the beginning, however, he treated the Italians, as indeed was only natural., less as rebellious subjects than as conquered aliens; and it must be admitted that in regard to them the only effective portion of his procedure was, not his energetic measures of repression nor his brilliant victories, but, after the battle of Legnano, his quiet and cheerful acceptance of the inevitable, and the consequent complete change in his policy, by which if he did not obtain the great object of his ambition, he at least did much to render innoxious for the Empire his previous mistakes.

In appearance Frederick was a man of well-proportioned, medium stature, with flowing yellow hair and a reddish beard. He delighted in hunting and the reading of history, was zealous in his attention to public business, and his private life was un- impeachable. Carlyle's tribute to him is interesting: " No king so furnished out with apparatus and arena, with personal faculty to rule and scene to do it in, has appeared elsewhere. A mag- nificent, magnanimous man; holding the reins of the world, not quite in the imaginary sense; scourging anarchy down, and urging noble effort up, really on a grand scale. A terror to evil- doers and a praise to well-doers in this world, probably beyond what was ever seen since."

The principal contemporary authority for the earlier part of the reign of Frederick is the Gesta Friderici imperatoris, mainly the work of Otto, bishop of Freising. This is continued from 1 156 to 1 160 by Rahewin, a canon of Freising, and from 1160 to 1 170 by an anony- mous author. The various annals and chronicles of the period, among which may be mentioned the Chronica regia Coloniensis and the Annates Magdeburgenses, are also important. Other authorities for the different periods in Frederick's reign are Tageno of Passau, Descriptio expeditionis asiaticae Friderici I. ; Burchard, Historia Friderici imperatoris magni; Godfrey of Viterbo, Carmen de gestis Friderici I., which are all found in the Monumenta Germaniae historica. Scriptores (Hanover and Berlin, 1826-1892); Otto Morena of Lodi, Historia rerum Laudensium, continued by his son, Acerbus, also in the Monumenta; Ansbert, Historia de expeditione Friderici, 1187-1196, published in the Fontes rerum Auslriacarum. Scriptores (Vienna, 1855 fol.). Many valuable documents are found in the Monumenta Germaniae selecta, Band iv., edited by M. Doeberl (Munich, 1889-1890).

The best modern authorities are J . Jastrow, Deutsche Geschichte im Zeitalter der Hohenstaufen (Berlin, 1893); W. von Giesebrecht,

Geschichte der deutschen Kaiserzeit, Band iv. (Brunswick, 1877); H. von Biinau, Leben und Thaten Friedrichs I. (Leipzig, 1872); H. Prutz, Kaiser Friedrich I. (Dantzig, 1871-1874);ˆ. Peters, Die Wahl Kaiser Friedrichs I. in the Forschungen zur deutschen Geschichte, Band xx. (Gottingen, 1862-1886) ; W. Gundlach, Barbarossalieder (Innsbruck, 1899). For a complete bibliography see Dahlmann- Waitz, Quellenkunde der deutschen Geschichte (Gottingen, 1894), and U. Chevalier, Repertoire des sources historiques du moyen dge, tome iii. (Paris, 1904).

FREDERICK II. (1194-1250), Roman emperor, king of Sicily and Jerusalem, was the son of the emperor Henry VI. and Con- stance, daughter of Roger I., king of Sicily, and therefore grand- son of the emperor Frederick I. and a member of the Hohenstaufen

family. Born at Jesi near Ancona on the 26th of December 1 194, he was baptized by the name of Frederick Roger, chosen German king at Frankfort in n 96, and after his father's death crowned king of Sicily at Palermo on the 17th of May 11 98. His mother, who assumed the government, died in November 1 198, leaving Pope Innocent III. as regent of Sicily and guardian of her son. The young king passed his early years amid the terrible anarchy in his island kingdom, which Innocent was powerless to check; but his education was not neglected, and his character and habits were formed by contact with men of varied nationalities and interests, while the darker traits of his nature were developed in the atmosphere of lawlessness in which he lived. In 1208 he was declared of age, and soon afterwards Innocent arranged a marriage, which was celebrated the following year, between him and Constance, daughter of Alphonso II. king of Aragon, and widow of Emerich or Imre, king of Hungary. The dissatisfaction felt in Germany with the emperor Otto IV. came to a climax in September 121 1, when a number of influential princes met at Nuremberg, declared Otto deposed, and invited Frederick to come and occupy the vacant throne. In spite of the reluctance of his wife, and the opposition of the Sicilian nobles, he accepted the invitation; and having recognized the papal supremacy over Sicily, and procured the coronation of his son Henry as its king, reached Germany after an adventurous journey in the autumn of 121 2. This step was taken with the approval of the pope, who was anxious to strike a blow at Otto IV.

Frederick was welcomed in Swabia, and the renown of the

Hohenstaufen name and a liberal distribution of promises made his progress easy. Having arranged a treaty against Otto with Louis, son of Philip Augustus, king of France, whom he met at Vaucouleurs, he was chosen German king a second time at Frank- fort on the 5th of December 121 2, and crowned four days later at Mainz. Anxious to retain the support of the pope, Frederick promulgated a bull at Eger on the 12th of July 12 13, by which he renounced all lands claimed by the pope since the death of the emperor Henry VI. in 1197, gave up the right of spoils and all interference in episcopal elections, and acknowledged the right of appeal to Rome. He again affirmed the papal supremacy over Sicily, and promised to root out heresy in Germany. The victory of his French allies at Bouvines on the 27th of July 12 14 greatly strengthened his position, and a large part of the Rhine- land having fallen into his power, he was crowned German king at Aix-la-Chapelle on the 25th of July 1215. His cause continued to prosper, fresh supporters gathered round his standard, and in May 1218 the death of Otto freed him from his rival and left him undisputed ruler of Germany. A further attempt to allay the pope's apprehension lest Sicily should be united with the Empire had been made early in 1 216, when Frederick, in a letter to Inno- cent, promised after his own coronationˆ emperor to recognize his son Henry as king of Sicily, and to place him under the suzerainty of Rome. Henry nevertheless was brought to Germany and chosen German king at Frankfort in April 1220, though Frederick assured the new pope, Honorius III., that this step had been taken without his consent. The truth, however, seems to be that he had taken great trouble to secure this election, and for the purpose had won the support of the spiritual princes by extensive concessions. In August 1220 Frederick set out for Italy, and was crowned emperor at Rome on the 22nd of November 1220; after which he repeated the undertaking he had entered into at Aix-la-Chapelle in 1215 to go on crusade, and made lavish promises to the Church. The clergy were freed from taxation and from lay jurisdiction, the ban of the Empire was to follow the ban of the Church, and heretics were to be severely punished. Neglecting his promise to lead a crusade, Frederick was occupied until 1225 in restoring order in Sicily. The island was seething with disorder, but by stern and sometimes cruel measures the emperor suppressed the anarchy of the barons, curbed the power of the cities, and subdued the rebellious Saracens, many of whom, transferred to the mainland and settled at Nocera, afterwards rendered him valuable military service. Meanwhile the crusade was postponed again and again; until under a threat of excommunication, after the fall of

Damietta in 1221, Frederick definitely undertook by a treaty made at San Germano in 1225 to set out in August 1227 or to submit to this penalty. His own interests turned more strongly to the East, when on the 9th of November 1225, after having been a widower since 1222, he married Iolande (Yolande or Isabella), daughter of John, count of Brienne, titular king of Jerusalem. John appears to have expected that this alliance would restore him to his kingdom, but his hopes were dashed to the ground when Frederick himself assumed the title of king of Jerusalem. The emperor's next step was an attempt to restore the imperial authority in northern Italy, and for the purpose a diet was called at Cremona. But the cities, watchful and suspicious, renewed the Lombard league and took up a hostile attitude. Frederick's reply was to annul the treaty of Constance and place the cities under the imperial ban; but he was forced by lack of military strength to accept the mediation of Pope Honorius and the maintenance of the status quo.

After these events, which occurred early in 1227, preparations for the crusade were pressed on, and the emperor sailed from Brindisi on the 8th of September. A pestilence, however, which attacked his forces compelled him to land in Italy three days later, and on the 29th of the same month he was excommunicated by the new pope, Gregory IX. The greater part of the succeeding year was spent by pope and emperor in a violent quarrel. Alarmed at the increase in his opponent's power, Gregory de- nounced him in a public letter, to which Frederick replied in a clever document addressed to the princes of Europe. The reading of this manifesto, drawing attention to the absolute power claimed by the popes, was received in Rome with such evidences of approval that Gregory was compelled to fly to Viterbo. Having lost his wife Isabella on the 8th of May 1228, Frederick again set sail for Palestine, where he met with considerable success, the result of diplomatic rather than of military skill. By a treaty made in February 1229 he secured possession of Jerusalem, Bethlehem, Nazareth and the surrounding neighbourhood. Entering Jerusalem, he crowned himself king of that city on the 1 8th of March 1229. These successes had been won in spite of the hostility of Gregory, which deprived Frederick of the assist- ance of many members of the military orders and of the clergy of Palestine. But although the emperor's possessions on the Italian mainland had been attacked in his absence by the papal troops and their allies, Gregory's efforts had failed to arouse serious opposition in Germany and Sicily; so that when Frederick returned unexpectedly to Italy in June 1229 he had no difficulty in driving back his enemies, and compelling the pope to sue for peace. The result was the treaty of San Germano, arranged in July

1230, by which the emperpr, loosed from the ban, promised to respect the papal territory, and to allow freedom of election and other privileges to the Sicilian clergy. Frederick was next engaged in completing the pacification of Sicily. In 1231 a series of laws were published at Melfi which destroyed the ascendancy of the feudal nobles. Royal officials were appointed for administrative purposes, large estates were recovered for the crown, and fortresses were destroyed, while the' church was placed under the royal jurisdiction and all gifts to it were pro- hibited. At the same time certain privileges of self-government were granted to the towns, representatives from which were summoned to sit in the diet. In short, by means of a centralized system of government, the king established an almost absolute monarchical power.

In Germany, on the other hand, an entirely different policy was pursued. The concessions granted by Frederick in 1220, together with the Privilege of Worms, dated the 1st of May 1231, made the German princes virtually independent. All jurisdiction over their lands was vested in them, no new mints or toll-centres were to be erected on their domains, and the imperial authority was restricted to a small and dwindling area. A fierce attack was also made on the rights of the cities. Compelled to restore all their lands, their jurisdiction was bounded by their city- walls; they were forbidden to receive the dependents of the princes; all trade gilds were declared abolished; and all official appointments made without the consent of the archbishop or bishop were

annulled. A further attack on the Lombard cities at the diet of Ravenna in 1231 was answered by a renewal of their league, and was soon connected with unrest in Germany. About 1231 a breach took place between Frederick and his elder son Henry, who appears to have opposed the Privilege of Worms and to have favoured the towns against the princes. After refusing to travel to Italy, Henry changed his mind and submitted to his father at Aquileia in 1232; and a temporary peace was made with the Lombard cities in June 1233. But on his return to Germany Henry again raised the standard of revolt, and made a league with the Lombards in December 1234. Frederick, meanwhile, having helped Pope Gregory against the rebellious Romans and having secured the friendship of France and England, appeared in Germany early in 1235 and put down this rising without difficulty. Henry was imprisoned, but his associates were treated

leniently. In August 1235 a splendid diet was held at Mainz, during which the marriage of the emperor with Isabella (1214- 1241), daughter of John, king of England, was celebrated. A general peace (Landfrieden) , which became the basis of all such peaces in the future, was sworn to; a new office, that of imperial justiciar, was created, and a permanent judicial record was first instituted. Otto of Brunswick, grandson of Henry the Lion, duke of Saxony, was made duke of Brunswick-Luneburg; and war was declared against the Lombards.

Frederick was now at the height of his power. His second son, Conrad, was invested with the duchy of Swabia, and the claim of Wenceslaus, king of Bohemia, to some lands which had belonged to the German king Philip was bought off. The attitude of Frederick II. (the Quarrelsome), duke of Austria, had been considered by the emperor so suspicious that during a visit paid by Frederick to Italy a war against him was begun. Compelled to return by the ill-fortune which attended this campaign, the emperor took command of his troops, seized Austria, Styria and Carinthia, and declared these territories to be immediately dependent on the Empire. In January 1237 he secured the election of his son Conrad as German king at Vienna; and in September went to Italy to prosecute the war which had broken out with the Lombards in the preceding year. Pope Gregory attempted to mediate, but the cities refused to accept the insult- ing terms offered by Frederick. The emperor gained a great victory over their forces at Cortenuova in November 1237; but though he met with some further successes, his failure to take Brescia in October 1238, together with the changed attitude of Gregory, turned the fortune of war. The pope had become alarmed when the emperor brought abouˆi marriage between the heiress of Sardinia, Adelasia, and his natural son Enzio, who afterwards assumed the title of king of Sardinia. But as his warnings had been disregarded, he issued a document after the emperor's retreat from Brescia, teeming with complaints against Frederick, and followed it up by an open alliance with the Lombards, and by the excommunication of the emperor on the 20th of March 1239. A violent war of words ensued. Frederick, accused of heresy, blasphemy and other crimes, called upon all kings and princes to unite against the pope, who on his side made vigorous efforts to arouse opposition in Germany, where his emissaries, a crowd of wandering friars, were actively preaching rebellion. It was, however, impossible to find an anti-king. In Italy, Spoleto and Ancona were declared part of the imperial dominions, and Rome itself, faithful on this occasion to the pope, was threatened. A number of ecclesiastics proceeding to a council called by Gregory were captured by Enzio at the sea- fight of

Meloria, and the emperor was about to undertake the siege of Rome, when the pope died (August 1241). Germany was at this time menaced by the Mongols; but Frederick contented himself with issuing directions for a campaign against them, until in 1242 he was able to pay a short visit to Germany, where he gained some support from the towns by grants of extensive privileges.

The successor of Gregory was Pope Celestine IX. But this pontiff died soon after his election; and after a delay of eighteen months, during which Frederick marched against Rome on two occasions and devastated the lands of his opponents, one of his

partisans, Sinibaldo Fiesco,was chosen pope, and took the name of Innocent IV. Negotiations for peace were begun, but the relations of the Lombard cities to the Empire could not be adjusted, and when the emperor began again to ravage the papal territories Innocent fled to Lyons. Hither he summoned a general council, which met in June 1245; but although Frederick sent his justiciar, Thaddeus of Suessa, to represent him, and expressed his willingness to treat, sentence of excommunication and deposition was pronounced against him. Once more an interchange of recriminations began, charged with all the violent hyperbole characteristic of the controversial style of the age. Accused of violating treaties, breaking oaths, persecuting the church and abetting heresy, Frederick replied by an open letter rebutting these charges, and in equally unmeasured terms denounced the arrogance and want of faith of the clergy from the'pope downwards. The source of all the evil was, he declared, the excessive wealth of the church, which, in retaliation for the sentence of excommunication, he threatened to confiscate. In vain the mediation of the saintly king of France, Louis IX., was invoked. Innocent surpassed his predecessors in the ferocity and unscrupulousness of his attacks on the emperor (see Innocent IV.). War soon became general in Germany and Italy. Henry Raspe, landgrave of Thuringia, was chosen German king in opposition to Frederick in May 1246, but neither he nor his successor, William II., count of Holland, was successful in driving the Hohenstaufen from Germany. In Italy, during the emperor's absence, his cause had been upheld by Enzio and by the ferocious Eccelino da Romano. In 1246 a formidable conspiracy of the discontented Apulian barons against the emperor's power and life, fomented by papal emissaries, was discovered and crushed with ruthless cruelty. The emperor's power seemed more firmly established than ever, when suddenly the news reached him that Parma, a stronghold of the imperial authority in the north, had been surprised, while the garrison was off its guard, by the Guelphs. To recover the city was a matter of prime importance, and in 1247 Frederick concentrated his forces round it, building over against it a wooden town which, in anticipation of the success that astrologers had predicted, he named Vittoria. The siege, however, was protracted, and finally, in February 1248, during the absence of the emperor on a hunting expedition, was brought to an end by a sudden sortie of the men of Parma, who stormed the imperial camp. The disaster was complete. The emperor's forces were destroyed or scattered; the

treasury, with the imperial insignia, together with Frederick's harem and some of the most trusted of his ministers, fell into the hands of the victors. Thaddeus of Suessa was hacked to pieces by the mob ; the imperial crown was placed in mockery on the head of a hunch-backed beggar, who was carried back in triumph into the city.

Frederick struggled hard to retrieve his fortunes, and for a while with success. But his old confidence had left him ; he had grown moody and suspicious, and his temper gave a ready handle to his enemies. Pier della Vigna, accused of treasonable designs, was disgraced; and the once all-powerful favourite and minister, blinded now and in rags, was dragged in the emperor's train, as a warning to traitors, till in despair he dashed out his brains. Then, in May 1248, came the tidings of Enzio's capture by the Bolognese, and of his hopeless imprisonment, the captors refusing all offers of ransom. This disaster to his favourite son broke the emperor's spirit. He retired to southern Italy, and after a short illness died at Fiorentino on the 13th of December 1250, after having been loosed from the ban by the archbishop of Palermo. He was buried in the cathedral of that city, where his splendid tomb may still be seen. By his will he appointed his son Conrad to succeed him in Germany and Sicily, and Henry, his son by Isabella of England, to be king of Jerusalem or Aries, neither of which kingdoms, however, he obtained. Frederick left several illegitimate children: Enzio has already been referred to; Frederick, who was made the imperial vicar in Tuscany; and Manfred, his son by the beloved Bianca Lancia or Lanzia, who was legitimatized just before his father's death, and was appointed by his will prince of Tarento and regent of Sicily.

FREDERICK III.

49

The character of Frederick is one of extraordinary interest and versatility, and contemporary opinion is expressed in the words stupor mundi et immutator mirabUis. Licentious and luxurious in his manners, cultured and catholic in his tastes, he united in his person the most diverse qualities. His Sicilian court; was a centre of intellectual activity. Michael Scott, the translator of some treatises of Aristotle and of the commentaries of Averroes, Leonard of Pisa, who introduced Arabic numerals and algebra to the West, and other scholars, Jewish and Mahommedan as well as Christian, were welcome at his court. Frederick himself had a knowledge of six languages, was acquainted with mathematics, philosophy and natural history, and took an interest in medicine and architecture. In 1224 he founded the university of Naples, and he was a liberal patron of the

medical school at Salerno. He formed a menagerie of strange animals, and wrote a treatise on falconry {De arte venandi cum avibus) which is remarkable for its accurate observation of the habits of birds. 1 It was at his court, too, that — as Dante points out — Italian poetry had its birth. Pier della Vigna there wrote the first sonnet, and Italian lyrics by Frederick himself are preserved to us. His wives were kept secluded in oriental fashion; a harem was maintained at Lucera, and eunuchs were a prominent feature of his household. His religious ideas have been the subject of much controversy. The theory of M. Huillard-Breholles that he wished to unite to the functions of emperor those of a spiritual pontiff, and aspired to be the founder of a new religion, is insufficiently supported by evidence to be credible. Although at times he persecuted heretics with great cruelty, he tolerated Mahommedans and Jews, and both acts appear rather to have been the outcome of political considerations than of religious belief. His jests, which were used by his enemies as a charge against him, seem to have originated in religious indifference, or perhaps in a spirit of inquiry which anticipated the ideas of a later age. Frederick's rule in Germany and Italy was a failure, but this fact may be accounted for by the conditions of the time and the inevitable conflict with the papacy. In Germany the enactments of 1220 and 1231 contributed to the disintegration of the Empire and the fall of the Hohenstaufen, while conflicting interests made the government of Italy a problem of exceptional difficulty. In Sicily Frederick was more successful. He quelled disorder, and under his rule the island was prosperous and contented. His ideas of government were those of an absolute monflfch, and he probably wished to surround himself with some of the pomp which had encircled the older emperors of Rome. His chief claim to fame, perhaps, is as a lawgiver. The code of laws which he gave to Sicily in 1 23 1 bears the impress of his personality, and has been described as " the fullest and most adequate body of legislation promulgated by any western ruler since Charlemagne." Without being a great soldier, Frederick was not unskilful in warfare, but was better acquainted with the arts of diplomacy. In person he is said to have been " red, bald and short-sighted," but with good features and a pleasing countenance. It was seriously believed in Germany for about a century after his death that Frederick was still alive, and many impostors attempted to personate him. A legend, afterwards transferred to Frederick Barbarossa, told how he sat in a cavern in the Kyffhausser before a stone table through which his beard had grown, waiting for the time for him to awake and restore to the Empire the golden age of peace.

Thecontemporary documents relating to the reign of Frederick II. are

very numerous. Among the most important are: Richard of San Germano, Chronica regni Siciliae; Annates Placentini, Gibellini; Albert of Stade, Annates; Matthew Paris, Historia major Angliae; Burchard, Chronicon Urspergense. All these are in the Monumenta Germaniae historica. Scriptores] (Hanover and Berlin, 1826-1892). The Rerum Italicarum scriptores, edited by L. A. Muratori (Milan, 1723-1751), contains Annates Mediolanenses; Nicholas of Jamsilla, Historia de rebus gestis Friderici II., and Vita Gregorii IX. pontificis. There are also the Epistolarum libri of Peter della Vigna, edited by J. R. Iselin (Basel, 1740); and Salimbene of Parma's Chronik, published at Parma (1857). Many of the documents concerning the history of the time are found in the Historia diplomatica Friderici II., edited by M. Huillard-Breholles (Paris, 1852-1861); Acta

1 First printed at Augsburg in 1596; a German edition was pub- lished at Berlin in 1896.

imperii selecta. Urkunden deutscher Konige und Kaiser, edited by J. F Bohmer and J. Ficker (Innsbruck, 1870); Acta imperii inedita seculi XIII. Urkunden und Briefe zur Geschichte des Kaiserreichs und des Kbnigreichs Sicilien, edited by E. Winkelmann (Innsbruck, 1880) ; Epistolae saeculi XIII. selecta e regestis pontificum Romano- rum, edited by C. Rodenberg, tome i. (Berlin, 1883) ; P. Pressutti, Regesta Honorii papae III. (Rome, 1888) ; L. Auvray, Les Registres de GrSgoire IX (Paris, 1890).

The best modern authorities are W. von Giesebrecht, Geschichte der deutschen Kaiserzeit, Band v. (Leipzig, 1888); J. Jastrow, Deutsche Geschichte im Zeitalter der Hohenstaufen (Berlin, 1893) ; F. W. Schirrmacher, Kaiser Friedrich der Zweite (Gottingen, 1859- 1865); " Beitrage zur Geschichte Kaiser Friedrichs II." in the For- schungen zur deutschen Geschichte, Band xi. (Gottingen, 1862-1886), and Die letzten Hohenstaufen (Gottingen, 1871); E. Winkelmann, Geschichte Kaiser Friedrichs II und seiner Reiche (Berlin, 1865) and Kaiser Friedrich II. (Leipzig, 1889) ; G. Blondel, Htude sur la politique de I'empereur Frederic II. en Allemagne (Paris, 1892) ; M. Halbe, Friedrich II. und der papstliche Stuhl (Berlin, 1888) ; R. Rohricht, Die Kreuzfahrt des Kaisers Friedrich II. (Berlin, 1874) ; C. Kohler, Das Verhaltnis Kaiser Friedrichs II. zu den Pdpsten seiner Zeit (Breslau, 1888); J. Felten, Papst Gregor IX. (Freiburg, 1886); C. Rodenberg, Innocenz IV. und das Konigreich Sicilien (Halle, 1892); K. Lamprecht, Deutsche Geschichte, Band iii. (Berlin, 1891); M. Huillard-Breholles, Vie et correspondance de Pierre de la Vigne (Paris, 1865) ; A. del Vecchio, La legislazione de Federico II (Turin, 1874) ; and K. Hampe, Kaiser Friedrich II. (Munich, 1899). (A. W. H.*)

FREDERICK III. (1415-1493), Roman emperor, — as Frederick IV., German king, and as Frederick V., archduke of Austria, — son of Ernest of Habsburg, duke of Styria and Carinthia, was born at Innsbruck on the 21st of September 1415. After his father's death in 1424 he passed his time at the court of his uncle and guardian, Frederick IV., count of Tirol. In 1435, together with his brother, Albert the Prodigal, he undertook the government of Styria and Carinthia, but the peace of these lands was disturbed by constant feuds between the brothers, which lasted until AJbert's death in 1463. In 1439 tne deaths of the German king Albert II. and of Frederick of Tirol left Frederick the senior member of the Habsburg family, and guardian of Sigis- mund, count of Tirol. In the following year he also became guardian of Ladislaus, the posthumous son of Albert II., and heir to Bohemia, Hungary and Austria, but these responsibilities brought only trouble and humiliation in their train. On the 2nd of February 1440 Frederick was chosen German king at Frankfort, but, owing to his absence from Germany, the coronation was delayed until the 17 th of June 1442, when it took place at Aix-la- Chapelle.

Disregarding the neutral attitude of the German electors towards the papal schism, and acting under the influence of Aeneas Sylvius Piccolomini, afterwards Pope Pius II., Frederick in 1445 made a secret treaty with Pope Eugenius IV. This developed into the Concordat of Vienna, signed in 1448 with the succeeding pope, Nicholas V., by which the king, in return for a sum of money and a promise of the imperial crown, pledged the obedience of the German people to Rome, and so checked for a time the rising tide of liberty in the German church. Taking up the quarrel between the Habsburgs and the Swiss cantons, Frederick invited the Armagnacs to attack his enemies, but after meeting with a stubborn resistance at St Jacob on the 26th of August 1444, these allies proved faithless, and the king soon lost every vestige of authority in Switzerland. In 1451 Frederick,

disregarding the revolts in Austria and Hungary, travelled to Rome, where, on the 16th of March 1452, his marriage with Leonora, daughter of Edward, king of Portugal, was celebrated, and three days later he was crowned emperor by pope Nicholas. On his return he found Germany seething with indignation. His capitulation to the pope was not forgotten; his refusal to attend the diets, and his apathy in the face of Turkish aggressions, constituted a serious danger; and plans for his deposition failed only because the electors could not unite upon a rival king. In 1457 Ladislaus, king of Hungary and Bohemia, and archduke of Austria, died; Frederick failed to secure either kingdom, but obtained lower Austria, from which, however, he was soon driven by his brother Albert, who occupied Vienna. On Albert's death in 1463 the emperor united upper and lower Austria under his rule, but these possessions were constantly ravaged by George

PodSbrad, king of Bohemia, and by Matthias Corvinus, king of Hungary. A visit to Rome in 1468 to discuss measures against the Turks with Pope Paul II. had no result, and in 1470 Frederick began negotiations for a marriage between his son Maximilian and Mary, daughter and heiress of Charles the Bold, duke of Burgundy. The emperor met the duke at Treves in 1473, when Frederick, disliking to bestow the title of king upon Charles, left the city secretly, but brought about the marriage after the duke's death in 1477. Again attacked by Matthias, the emperor was driven from Vienna, and soon handed over the government of his lands to Maximilian, whose election as king of the Romans he vainly opposed in i486. Frederick then retired to Linz, where he passed his time in the study of botany, alchemy and astronomy, until his death on the 19th of August 1493.

Frederick was a listless and incapable ruler, lacking alike the qualities of the soldier and of the diplomatist, but- possessing a certain cleverness in evading difficulties. With a fine presence, he had many excellent personal qualities, is spoken of as mild and just, and had a real love of learning. He had a great belief in the future greatness of his family, to which he contributed largely by arranging the marriage of Maximilian with Mary of Burgundy, and delighted to inscribe his books and other articles of value with the letters A.E.I. O.U. (Austriae est imperare orbi universo; or in German, Alles Erdreich ist Oesterreich unterthan) . His personality counts for very little in German history. One chronicler says: “He was a useless emperor, and the nation during his long reign forgot that she had a king.” His tomb, a magnificent work in red and white marble, is in the cathedral of St Stephen at Vienna.

See Aeneas Sylvius Piccolomini, De rebus et gestis Friderici III. (trans. Th. Ilgen, Leipzig, 1889); J. Chmel, Geschichte Kaiser Friedrichs IV. und seines Sohnes Maximilians I. (Hamburg, 1840); A. Bachmann, Deutsche Reichs geschichte im Zeitalter Friedrichs III. und Maximilians I. (Leipzig, 1884); A. Huber, Geschichte Oster- reichs (Gotha, 1885-1892); and E. M. Fiirst von Lichnowsky, Geschichte des Hauses Habsburg (Vienna, 1 836-1 844).

FREDERICK HI. (c. 1286-1330), surnamed “the Fair,” German king and duke of Austria, was the second son of the German king, Albert I., and consequently a member of the Habsburg family. In 1298, when his father was chosen German king, Frederick was invested with some of the family lands, and in 1306, when his elder brother Rudolph became king of Bohemia, he succeeded to the duchy of Austria. In 1307 Rudolph died, and Frederick sought to obtain the Bohemian throne; but an expedition into that country was a failure, and his father’s murder in May 1308 deprived him of considerable support. He was equally unsuccessful in his efforts to procure the German crown af this time, and the relations between the new king, Henry VII., and the Habsburgs were far from friendly. Frederick asked not only to be confirmed in the possession of Austria, but to be invested with Moravia, a demand to which Henry refused to accede ; but an arrangement was subsequently made by which the duke agreed to renounce Moravia in return for a payment of 50,000 marks. Frederick then became involved in a quarrel with his cousin Louis IV., duke of Upper Bavaria (afterwards the emperor Louis IV.), over the guardianship of Henry II., duke of Lower Bavaria. Hostilities broke out, and on the 9th of November 13 13 he was defeated by Louis at the battle of Gam- melsdorf and compelled to renounce his claim.

Meanwhile the emperor Henry VII. had died in Italy, and a stubborn contest ensued for the vacant throne. After a long delay Frederick was chosen German king at Frankfort by a minority of the electors on the 19th of October 1314, while a majority elected Louis of Bavaria. Six days later Frederick was crowned at Bonn by the archbishop of Cologne, and war broke out at once between the rivals. During this contest, which was carried on in a desultory fashion, Frederick drew his chief strength from southern and eastern Germany, and was supported by the full power of the Habsburgs. The defeat of his brother Leopold by the Swiss at Morgarten in November 13 1 5 was a heavy blow to him, but he prolonged the struggle for seven years. On the 28th of September 1322 a decisive battle was fought at Muhldorf; Frederick was defeated and sent as a

prisoner to Trausnitz. Here he was retained until three years later a series of events induced Louis to come to terms. By the treaty of Trausnitz, signed on the 13th of March 1325, Frederick acknowledged the kingship of Louis in return for freedom, and promised to return to captivity unless he could induce his brother Leopold to make a similar acknowledgment. As Leopold re- fused to take this step, Frederick, although released from his oath by Pope John XXII., travelled back to Bavaria, where he was treated by Louis rather as a friend than as a prisoner. A suggestion was then made that the kings should rule jointly, but as this plan aroused some opposition it was agreed that Frederick should govern Germany while Louis went to Italy for the imperial crown. But this arrangement did not prove generally acceptable, and the death of Leopold in 13 26 deprived Frederick of a powerful supporter. In these circumstances he returned to Austria broken down in mind and body, and on the 13th of January 1330 he died at Gutenstein, and was buried at Mauerbach, whence his remains were removed in 1783 to the cathedral of St Stephen at Vienna. He married Elizabeth, daughter of James I., king of Aragon, and left two daughters. His voluntary return into captivity is used by Schiller in his poem Deutsche Treue, and by J. L. Uhland in the drama Ludwig der Bayer.

The authorities for the life of Frederick are found in the Pontes rerum Germanicarum. Band i., edited by J. F. Bohmer (Stuttgart, 1843-1868), and in the Fontes rerum Austriacarum, part i. (Vienna, 1855). Modern works which may be consulted are: E. M. Fiirst von Lichnowsky, Geschichte des Hauses Habsburg (Vienna, 1836- 1844) ; Th.' Lindner, Deutsche Geschichte unter den Habsburgern und Luxemburgern (Stuttgart, 1888-1893). R. Dobner, Die Aus- einandersetzung zwischen Ludwig IV. dem Bayer und Friedrich dem Schonen von Osterreich (Gottingen, 1875); E- Kurz, Osterreich unter

Kbnig Friedrich dem Schonen (Linz, 1818); F. Krones, Hand- buch der Geschichte Osterreichs (Berlin, 1876-1879) ; H. Schrohe, Der Kampf der Gegenkonige Ludwig und Friedrich (Berlin, igo2) ; W. Friedensburg, Ludwig IV. der Bayer und Friedrich von Oster- reich (Gottingen, 1877); B. Gebhardt, Handbuch der deutschen Geschichte (Berlin, 1901).

FREDERICK II. (1534-1588), king of Denmark and Norway, son of Christian III., was born at Hadersleben on the ist of July 1534. His mother, Dorothea of Saxe-Lauenburg, was the elder sister of Catherine, the first wife of Gustavus Vasa and the mother of Eric XIV. The two little cousins, born the same year, were destined to be lifelong rivals. At the age of two Frederick was proclaimed successor to the throne at the Rigsdag of Copenhagen (October 30th, 1536), and homage was done to him at Oslo for Norway in 1548. The choice of his governor, the patriotic historiographer HansSvaning, was so far fortunate that it ensured the devotion of the future king of Denmark to everything Danish; but Svaning was a poor pedagogue, and the wild and wayward lad suffered all his life from the defects of his early training. Frederick's youthful, innocent attachment to the daughter of his former tutor, Anna Hardenberg, indisposed him towards matrimony at the beginning of his reign (1558). After the hands of Elizabeth of England, Mary of Scotland and Renata of Lorraine had successively been sought for him, the council of state grew anxious about the succession, but he finally married his cousin, Sophia of Mecklenburg, on the 20th of July 1572.

The reign of Frederick II. falls into two well-defined divisions : (1) a period of war, 1559-1570; and (2) a period of peace, 1570- 1588. The period of war began with the Ditmarsh expedition, when the independent peasant-republic of the Ditmarshers of West Holstein, which had stoutly maintained its independence for centuries against the counts of Holstein and the Danish kings, was subdued by a Dano-Holstein army of 20,000 men in 1559, Frederick and his uncles John andˆLdolphus, dukes of Holstein, dividing the land between them. Equally triumphant was Frederick in his war with Sweden, though here the contest was much more severe, lasting as it did for seven years; whence it is generally described in northern history as the Scandinavian Seven Years' War. The tension which had prevailed between the two kingdoms during the last years of Gustavus Vasa reached breaking point on the accession of Gustavus's eldest son Eric XIV. There were many causes of quarrel between the two ambitious young monarchs, but the detention at Copenhagen in 1563 of a splendid matrimonial embassy on its way to Germany,

to negotiate a match between Eric and Christina of Hesse, which King Frederick for political reasons was determined to prevent, precipitated hostilities. During the war, which was marked by extraordinary ferocity throughout, the Danes were generally victorious on land owing to the genius of Daniel Rantzau, but at sea the Swedes were almost uniformly triumphant. By 1570 the strife had degenerated into a barbarous devastation of border provinces; and in July of the same year both countries accepted the mediation of the Emperor, and peace was finally concluded at Stettin on Dec. 13, 1570. During the course of this Seven Years' War Frederick II. had narrowly escaped the fate of his deposed cousin Eric XIV. The war was very unpopular in Denmark, and the closing of the Sound against foreign shipping, in order to starve out Sweden, had exasperated the maritime powers and all the Baltic states. On New Year's Day 1570 Frederick's difficulties seemed so overwhelming that he threatened to abdicate; but the peace of Stettin came in time to reconcile all parties, and though Frederick had now to re- linquish his ambitious dream of re-establishing the Union of Kalmar, he had at least succeeded in maintaining the supremacy of Denmark in the north. After the peace Frederick's policy became still more imperial. He aspired to the dominion of all the seas which washed the Scandinavian coasts, and before he died he succeeded in suppressing the pirates who so long had haunted the Baltic and the German Ocean. He also erected the stately fortress of Kronborg, to guard the narrow channel of the Sound. Frederick possessed the truly royal gift of discovering and employing great men, irrespective of personal preferences and even of personal injuries. With infinite tact and admirable self-denial he gave free scope to ministers whose superiority in their various departments he frankly recognized, rarely inter- fering personally unless absolutely called upon to do so. His influence, always great, was increased by his genial and unaffected manners as a host. He is also remarkable as one of the few kings of the house of Oldenburg who had no illicit liaison. He died at Antvorskov on the 4th of April 1588. No other Danish king was ever so beloved by his people.

See Lund (Troels), Danmarks og Norges Historic i Slutningen af del XVI. Aarh. (Copenhagen, 1879); Danmarks Riges Historie (Copenhagen, 1897-1905), vol. 3; Robert Nisbet Bain, Scandinavia, cap. 4 (Cambridge, 1905). (R. N. B.)

FREDERICK III. (1609-1670), king of Denmark and Norway, son of

Christian IV. and Anne Catherine of Brandenburg, was born on the 18th of March 1609 at Hadersleben. His position as a younger son profoundly influenced his future career. In his youth'and early manhood there was no prospect of his ascending the Danish throne, and he consequently became the instrument of his father's schemes of aggrandizement in Germany. While still a lad he became successively bishop of Bremen, bishop of Verden and coadjutor of Halberstadt, while at the age of eighteen he was the chief commandant of the fortress of Stade. Thus from an early age he had considerable experience as an adminis- trator, while his general education was very careful and thorough. He had always a pronounced liking for literary and scientific studies. On the 1st of October 1643 Frederick wedded Sophia Amelia of Brunswick Liineburg, whose energetic, passionate and ambitious character was profoundly to affect not only Frederick's destiny but the destiny of Denmark. During the disastrous Swedish War of 1643-1645 Frederick was appointed generalissimo of the duchies by his father, but the laurels he won were scanty, chiefly owing to his quarrels with the Earl-Marshal Anders Bille, w%> commanded the Danish forces. This was Frederick's first collision with the Danish nobility, who ever afterwards regarded him with extreme distrust. The death of his elder brother Christian in June 1647 first opened to him the pros- pect of succeeding to the Danish throne, but the "question was still unsettled when Christian IV. died on the 28th of February 1648. Not till the 6th of July in the same year did Frederick III. receive the homage of his subjects, and only after he had signed a Haandfaestning or charter, by which the already diminished royal prerogative was still further curtailed. It had been doubt- ful at first whether he would be allowed to inherit his ancestral

throne at all; but Frederick removed the last scruples of the Rigsraad by unhesitatingly accepting the conditions imposed upon him.

The new monarch was a reserved, enigmatical prince, who seldom laughed, spoke little and wrote less — a striking contrast to Christian IV. But if he lacked the brilliant qualities of his impulsive, jovial father, he possessed in a high degree the com- pensating virtues of moderation, sobriety and self-control. But with all his good qualities Frederick was not the man to take a clear view of the political horizon, or even to recognize his own and his country's limitations. He rightly regarded the accession of Charles X. of Sweden (June 6th, 1654) as a source of danger to Denmark. He felt that temperament and policy would combine to make Charles an aggressive warrior-king: the only uncertainty was in which direction he would turn his arms first. Charles's invasion of Poland (July 1654) came as a distinct relief to the Danes, though even the Polish War was full of latent peril

to Denmark. Frederick was resolved upon a rupture with Sweden at the first convenient opportunity. The Rigsdag which assembled on the 23rd of February 1657 willingly granted considerable subsidies for mobilization and other military expenses; on the 15th of April Frederick III. desired, and on- the 23rd of April he received, the assent of the majority of the Rigsraad to attack Sweden's German provinces; in the beginning of May the still pending negotiations with that power were broken off, and on the 1st of June Frederick signed the manifesto justify- ing a war which was never formally declared. The Swedish king traversed all the plans of his enemies by his passage of the frozen Belts, in January and February 1658 (see Charles X. of Sweden). The effect of this unheard-of achievement on the Danish government was crushing. Frederick III. at once sued for peace; and, yielding to the persuasions of the English and French ministers, Charles finally agreed to be content with mutilating instead of annihilating the Danish monarchy (treaties of Taastrup, February 18th, and of Roskilde, February 26th, 1658). The conclusion of peace was followed by a remarkable episode. Frederick expressed the desire to make the personal acquaintance of his conqueror; and Charles X. consented to be his guest for three days (March 3-5) at the castle of Fredriksborg. Splendid banquets lasting far into the night, private and intimate conversations between the princes who had only just emerged from a mortal struggle, seemed to point to nothing but peace and friendship in the future. But Charles's insatiable lust for con- quest, and his ineradicable suspicion of Denmark, induced him, on the 17th of July, without any reasonable cause, without a declaration of war, in defiance of all international equity, to endeavour to despatch an inconvenient neighbour.

Terror was the first feeling produced at Copenhagen by the landing of the main Swedish army at Korsor in Zealand. None had anticipated the possibility of such a sudden and brutal attack, and every one knew that the Danish capital was very inadequately fortified and garrisoned. Fortunately Frederick had never been deficient in courage. " I will die in my nest " were the memor- able words with which he rebuked those counsellors who advised him to seek safety in flight. On the 8th of August representatives from every class in the capital urged the necessity of a vigorous resistance ; and the citizens of Copenhagen, headed by the great burgomaster Hans Nansen (q.v.), protested their unshakable loyalty to the king, and their determination to defend Copen- hagen to the uttermost. The Danes had only three days' warning of the approaching danger; and the vast and dilapidated line of defence had at first but 2000 regular defenders. But the government and the people displayed a memorable and ex- emplary energy, under

the constant supervision of the king, the queen, and burgomaster Nansen. By the beginning of September all the breaches were repaired, the walls bristled with cannon, and 7000 men were under arms. So strong was the city by this time that Charles X., abandoning his original intention of carrying the place by assault, began a regular siege; but this also he was forced to abandon when, on the 29th of October, an auxiliary Dutch fleet, after reinforcing and reprovisioning the garrison, defeated, in conjunction with the Danish fleet, the

Swedish navy of 44 liners in the Sound. Thus the Danish capital had saved the Danish monarchy. But it was Frederick III. who profited most by his spirited defence of the common interests of the country and the dynasty. The traditional loyalty of the Danish middle classes was transformed into a boundless enthusi- asm for the king personally, and for a brief period Frederick found himself the most popular man in his kingdom. He made use of his popularity by realizing the dream of a lifetime and converting an elective into an absolute monarchy by the Revolution of 1660 (see Denmark: History). Frederick III. died on the 6th of February 1670 at the castle of Copenhagen.

See R. Nisbet Bain, Scandinavia, caps. ix. and x. (Cambridge, 1905). (R N. B.)

FREDERICK VIII. (1843-), king of Denmark, eldest son of King Christian IX., was born at Copenhagen on the 3rd of June 1843. As crown prince of Denmark he took part in the war of 1864 against Austria and Prussia, and subsequently assisted his father in the duties of government, becoming king on Christian's death in January 1906. In 1869 Frederick married Louise (b. 1851), daughter of Charles XV., king of Sweden, by whom he had a family of four sons and four daughters. His eldest son Christian, crown prince of Denmark (b. 1870), was married in 1898 to Alexandrina (b. 1879), daughter of Frederick Francis III., grand-duke of Mecklenburg-Schwerin; and his second son, Charles (b. 1872), who married his cousin Maud, daughter of Edward VII. of Great Britain, became king of Norway as Haakon VII. in 1905.

FREDERICK I. (1657-1713), king of Prussia, and (as Frederick III.) elector of Brandenburg, was the second son of the great elector, Frederick William, by his first marriage with Louise Henriette, daughter of Frederick Henry of Orange. Born at Konigsberg on the 1

ith of July 1657, he was educated and greatly influenced by Eberhard Danckelmann, and became heir to the throne of Brandenburg through the death of his elder brother, Charles Emil, in 1674. He appears to have taken some part in public business before the death of his father; and the court at Berlin was soon disturbed by quarrels between the young prince and his stepmother, Dorothea of Holstein-Gliicksburg. In 1686 Dorothea persuaded her husband to bequeath outlying portions of his lands to her four sons; and Frederick, fearing he would be poisoned, left Brandenburg determined to prevent any diminution of his inheritance. By promising to restore Schwiebus to Silesia after his accession he won the support of the emperor Leopold I. ; but eventually he gained his end in a peace- able fashion. Having become elector of Brandenburg in May 1688, he came to terms with his half-brothers and their mother. In return for a sum of money these princes renounced their rights under their father's will, and the new elector thus secured the whole of Frederick William's territories. After much delay and grumbling he fulfilled his bargain with Leopold and gave up Schwiebus in 1695. At home and abroad Frederick continued the policy of the great elector. He helped William of Orange to make his descent on England; added various places, including the principality of Neuchatel, to his lands; and exercised some influence on the course of European politics by placing his large and efficient army at the disposal of the emperor and his allies (see Brandenburg). He was present in person at the siege of Bonn in 1689, but was not often in command of his troops. The elector was very fond of pomp, and, striving to model his court upon that of Louis XIV., he directed his main energies towards obtaining for himself the title of king. In spite of the assistance he had given to the emperor his efforts met with no success for some years; but towards 1700 Leopold, faced with the prospect of a new struggle with France, was inclined to view the idea more favourably. Having insisted upon various conditions, prominent among them being military aid for the approaching war, he gave the imperial sanction to Frederick's request in November 1700; whereupon the elector, hurrying at once to Konigsberg, crowned himself with great ceremony king of Prussia on the 18th of January 1701. According to his promise the king sent help to the emperor; and during the War of the Spanish Succession the troops of Brandenburg-Prussia rendered great assistance to the

allies, fighting with distinction at Blenheim and elsewhere. Frederick, who was deformed through an injury to his spine, died on the 25th of February 1713. By his extravagance the king exhausted the treasure amassed by his father, burdened his country with heavy taxes, and reduced its finances to chaos. His constant obligations to the emperor

drained Brandenburg of money which might have been employed more profitably at home, and prevented her sovereign from interfering in the politics of northern Europe. Frederick, however, was not an unpopular ruler, and by making Prussia into a kingdom he undoubtedly advanced it several stages towards its future greatness. He founded the university of Halle, and the Academy of Sciences at Berlin; welcomed and protected Protestant refugees from France and elsewhere; and lavished money on the erection of public buildings.

The king was married three times. His second wife, Sophie Charlotte (1668-1705), sister of the English king George I., was the friend of Leibnitz and one of the most cultured princesses of the age; she bore him his only son, his successor, King Frederick William I.

See W. Hahn, Friedrich I., Konig in Preussen (Berlin, 1876) ; J. G. Droysen, Geschichte der preussischen Politik, Band iv. (Leipzig, 1872) ; E. Heyck, Friedrich I. und die Begrundung des preussischen Konigtums (Bielefeld, 1901) ; C. Graf von Dohna, Memoires origin naux sur le regne et la cour de Frederic I" (Berlin, 1883) ; Aus dem Briefwechsel Konig Friedrichs I. von Preussen und seiner Familie (Berlin, 1901) ; and T. Carlyle, History of Frederick the Great, vol. i. (London, 1872).

FREDERICK II., known as "the Great" (1712-1786), king of Prussia, born on the 24th of January 1712, was the eldest son of Frederick William J. He was brought up with extreme rigour, his father devising a scheme of education which was intended to make him a hardy soldier, and prescribing for him every detail of his conduct. So great was Frederick William's horror of everything which did not seem to him practical, that he strictly excluded Latin from the list of his son's studies. Frederick, however, had free and generous impulses which could not be restrained by the sternest system. Encouraged by his mother, and under the influence of his governess Madame de Roucoulle, and of his first tutor Duhan, a French refugee, he acquired an excellent knowledge of French and a taste for litera- ture and music. He even received secret lessons in Latin, which his father invested with all the charms of forbidden fruit. As he grew up he became extremely dissatisfied with the dull and monotonous life he was compelled to lead; and his discontent was heartily shared by his sister, Wilhelmina, a bright and intelligent young princess for whom Frederick had a warm affection.

Frederick William, seeing his son apparently absorbed in frivolous and effeminate amusements, gradually conceived for him an intense dislike, which had its share in causing him to break off the

negotiations for a double marriage between the prince of Wales and Wilhelmina, and the princess Amelia, daughter of George II., and Frederick; for Frederick had been so indiscreet as to carry on a separate correspondence with the English court and to vow that he would marry Amelia or no one. Frederick William's hatred of his son, openly avowed, displayed itself in violent outbursts and public insults, and so harsh was his treatment that Frederick frequently thought of running away and taking refuge at the English court. He at last resolved to do so during a journey which he made with the king to south Germany in 1730, when he was eighteen years of age. He was helped by his two friends, Lieutenant Katte and Lieutenant Keith ; but by the imprudence of the former the secret was found out. Frederick was placed under arrest, deprived of his rank as crown prince, tried by court-martial, and imprisoned in the fortress of Ciistrin. Warned by Frederick, Keith escaped; but Katte delayed his flight too long, and a Court-martial decided that he should be punished with two years' fortress arrest. But the king was determined by a terrible example to wake Frederick once for all to a consciousness of the heavy responsibility of his position. He changed the sentence on Katte to one of death and ordered the execution to take place in Frederick's presence,

himself arranging its every detail; Frederick's own fate would depend upon the effect of this terrible object-lesson and the response he should make to the exhortations of the chaplain sent to re&son with him. On the morning of the 7th of November Katte was beheaded before Frederick's window, after the crown prince had asked his pardon and received the answer that there was nothing to forgive. On Frederick himself lay the terror of death, and the chaplain was able to send to the king a favourable report of his orthodoxy and his changed disposition. Frederick William, whose temper was by no means so ruthlessly Spartan as tradition has painted it.was overjoyed, and commissioned the clergyman to receive from the prince an oath of filial obedience, and in exchange for this proof of " his intention to improve in real earnest " his arrest was to be lightened, pending the earning of a full pardon. " The whole town shall be his prison," wrote the king; " I will give him employment, from morning to night, in the departments of war, and agriculture, and of the govern- ment. He shall work at financial matters, receive accounts, read minutes and make extracts. . . . But if he kicks or rears again, he shall forfeit the succession to the crown, and even, according to circumstances, life

itself.”

- For about fifteen months Frederick lived in Ciistrin, busy ccording to the royal programme with the details of the Prussian administrative system. He was very careful not to ” kick or rear,” and his good conduct earned him a further stage in the restoration to favour. During this period of probation he had been deprived of his status as a soldier and refused the right to wear uniform, while officers and soldiers were forbidden to give him the military salute; in 1732 he was made colonel in command of the regiment at Neuruppin. In the following year he married, in obedience to the king’s orders, the princess Elizabeth Christina, daughter of the duke of Brunswick-Bevern. He was given the estate of Rheinsberg in the neighbourhood of Neuruppin, and there he lived until he succeeded to the throne. These years were perhaps the happiest of his life. He discharged his duties with so much spirit and so conscientiously that he ultimately gained the esteem of Frederick William, who no longer feared that he would leave the crown to one unworthy of wearing it. At the same time the crown prince was able to indulge to the full his personal tastes. He carried on a lively correspondence with Voltaire and other French men of letters, and was a diligent student of philosophy, history and poetry. Two of his best- known works were written at this time — Considerations sur I’itat present du corps politique de V Europe and his A nti-Macchiavel. In the former he calls attention to the growing strength of Austria and France, and insists on the necessity of some third power, by which he clearly means Prussia, counterbalancing their excessive influence. The second treatise, which was issued by Voltaire in Hague in 1740, contains a generous exposition of some of the favourite ideas of the 18th-century philosophers respecting the duties of sovereigns, which may be summed up in the famous sentence: ” the prince is not the absolute master, but only the first servant of his people.”

On the 31st of May 1740 he became king. He maintained all the forms of government established by his father, but ruled in a far more enlightened spirit; he tolerated every form of re- ligious opinion, abolished the use of torture, was most careful to secure an exact and impartial administration of justice, and, while keeping the reins of government strictly in his own hands, allowed every one with a genuine grievance free access to his presence. The Potsdam regiment of giants was disbanded, but the real interests of the army were carefully studied, for Frederick realized that the two pillars of the

Prussian state were sound finances and a strong army. On the 20th of October 1740 the emperor Charles VI. died. Frederick at once began to make extensive military preparations, and it was soon clear to all the world that he intended to enter upon some serious enterprise. He had made up his mind to assert the ancient claim of the house of Brandenburg to the three Silesian duchies, which the Austrian rulers of Bohemia had ever denied, but the Hohenzollerns had never abandoned. Projects for the assertion of this claim by force of arms had been formed by more than one of Frederick's

predecessors, and the extinction of the male line of the house of Habsburg may well have seemed to him a unique opportunity for realizing an ambition traditional in his family. For this resolution he is often abused still by historians, and at the time he had the approval of hardly any one out of Prussia. He him- self, writing of the scheme in his Memoires, laid no claim to lofty motives, but candidly confessed that "it was a means of acquiring reputation and of increasing the power of the state." He firmly believed, however, in the lawfulness of his claims; and although his father had recognized the Pragmatic Sanction, whereby the hereditary dominions of Charles VI. were to descend to his daughter, Maria Theresa, Frederick insisted that this sanction could refer only to lands which rightfully belonged to the house of Austria. He could also urge that, as Charles VI. had not fulfilled the engagements by which Frederick William's recognition of the Pragmatic Sanction had been secured, Prussia was freed from her obligation.

Frederick sent an ambassador to Vienna, offering, in the event of his rights in Silesia being conceded, to aid Maria Theresa against her enemies. The queen of. Hungary, who regarded the proposal as that of a mere robber, haughtity declined; whereupon Frederick immediately invaded Silesia with an army of 30,000 men. His first victory was gained at Mollwitz on the 10th of April 1 74 1. Under the impression, in consequence of a furious charge of Austrian cavalry, that the battle was lost, he rode rapidly away at an early stage of the struggle — a mistake which gave rise for a time to the groundless idea that he lacked personal courageˆ A second Prussian victory was gained at Chotusitz, near Caslau, on the 17th May 1742; by this time Frederick was master of all the fortified places of Silesia. Maria Theresa, in the heat of her struggle with France and the elector of Bavaria, now Charles VII., and pressed by England to rid herself of Frederick, concluded with him, on the nth of June 1 742, the peace of Breslau, conceding to Prussia, Upper and Lower Silesia as far as the Oppa, together with the county of Glatz. Frederick made good use of the next two years, fortifying his new territory, and repairing the evils

inflicted upon it by the war. By the death of the prince of East Friesland without heirs, he also gained possession of that country (1 744). He knew well that Maria Theresa would not, if she could help it, allow him to remain in Silesia; accordingly, in 1744, alarmed by her victories, he arrived at a secret understanding with France, and pledged himself, with Hesse-Cassel and the palatinate, to maintain the imperial rights of Charles VII., and to defend his hereditary Bavarian lands. Frederick began the second Silesian War by entering Bohemia in August 1744 and taking Prague. By this brilliant but rash venture he put himself in great danger, and soon had to retreat; but in 1745 he gained the battles of Hohen- friedberg, Soor and Hennersdorf ; and Leopold of Dessau (" Der alte Dessauer ")won for him the victory of Kesselsdorf in Saxony. The latter victory was decisive, and the peace of Dresden (December 25, 1745) assured to Frederick a second time the possession of Silesia. (See Austrian Succession, War op the.) Frederick had thus, at the age of thirty-three, raised himself to a great position in Europe, and henceforth he was the most conspicuous sovereign of his time. He was a thoroughly absolute ruler, his so-called ministers being mere clerks whose business was to give effect to his will. To use his own famous phrase, however, he regarded himself as but " the first servant of the state"; and during the next eleven years he proved that the words expressed his inmost conviction and feeling. All kinds of questions were submitted to him, important and unimportant; and he is frequently censured for having troubled himself so much with mere details. But in so far as these details related to expenditure he was fully justified, for it was absolutely essential for him to have a large army, and with a small state this was impossible unless he carefully prevented unnecessary outlay. Being a keen judge of character, he filled the public offices with faithful, capable, energetic men, who were kept up to a high standard of duty by the consciousness that their work might at any time come under his strict supervision. The Academy of Sciences, which had fallen into contempt during

his father's reign, he restored, infusing into it vigorous life; and he did more to promote elementary education than any of his predecessors. He did much too for the economic development of Prussia, especially for agriculture; he established colonies, peopling them with immigrants, extended the canal system, drained and diked the great marshes of the Oderbruch, turning them into rich pasturage, encouraged the planting of fruit trees and of root crops; and, though

in accordance with his ideas of discipline he maintained serfdom, he did much to lighten the burdens of the peasants. All kinds of manufacture, too, particularly that of silk, owed much to his encouragement. To the army he gave unremitting attention, reviewing it at regular intervals, and sternly punishing negligence on the part of the officers. Its numbers were raised to 160,000 men, while fortresses and magazines were always kept in a state of readiness for war. The influence of the king's example was felt far beyond the limits of his immediate circle. The nation was proud of his genius, and displayed something of his energy in all departments of life. Lessing, who as a youth of twenty came to Berlin in 1749, composed enthusiastic odes in his honour, and Gleim, the Halberstadt poet, wrote of him as of a kind of demi-god. These may be taken as fair illustrations of the popular feeling long before the Seven Years' War.

He despised German as the language of boors, although it is remarkable that at a later period, in a French essay on German literature, he predicted for it a great future. He habitually wrote and spoke French, and had a strong ambition to rank as a distinguished French author. Nobody can now read his verses, but his prose writings have a certain calm simplicity and dignity, without, however, giving evidence of the splendid mental qualities which he revealed in practical life. To this period belong his Memoires pour servir a I'histoire de Brandebourg and his poem L' Art de la guerre. The latter, judged as literature, is intolerably dull; but the former is valuable, throwing as it does considerable light on his personal sympathies as well as on the motives of important epochs in his career. He continued to correspond with French writers, and induced a number of them to settle in Berlin, Maupertuis being president of the Academy. In 1752 Voltaire, who had repeatedly visited him, came at Frederick's urgent entreaty, and received a truly royal welcome. The famous Hirsch trial, and Voltaire's vanity and caprice, greatly lowered him in the esteem of the king, who, on his side, irritated his guest by often requiring him to correct bad verses, and by making him the object of rude banter. The publication of Doctor Akakia, which brought down upon the president of the Academy a storm of ridicule, finally alienated Frederick; while Voltaire's wrongs culminated in the famous arrest at Frankfort, the most disagreeable elements of which were due to the mis- understanding of an order by a subordinate official.

The king lived as much as possible in a retired mansion, to which he gave the name of Sanssouci — not the palace so called, which was built after the Seven Years' War, and was never a favourite residence. He rose regularly in summer at five, in winter at six, devoting himself to public business till about eleven. During part of this time, after

*coffee, he would aid his reflections by playing on the flute, of which he was passionately fond, being a really skilful performer. At eleven came parade, and an hour afterwards, punctually, dinner, which continued till two, or later, if conversation happened to be particularly attractive. After dinner he glanced through and signed cabinet orders written in accordance with his morning instructions, often adding marginal notes and postscripts, many of which were in a caustic tone. These disposed of, he amused himself for a couple of hours with literary work; between six and seven he would converse with his friends or listen to his reader (a post held for some time by La Mettrie) ; at seven there was a concert ; and at half-past eight he sat down to supper, which might go on till midnight. He liked good eating and drinking, although even here the cost was sharply looked after, the expenses of his kitchen mounting to no higher figure than £1800 a year. At supper he was always surrounded by a number of his most intimate friends, mainly Frenchmen; and he insisted on the conversation being perfectly

free. His wit, however, was often cruel, and any one who re- sponded with too much spirit was soon made to feel that the licence of talk was to be complete only on one side.

At Frederick's court ladies were seldom seen, a circumstance that gave occasion to much scandal for which there seems to have been no foundation. The queen he visited only on rare occasions. She had been forced upon him by his father, and he had never loved her; but he always treated her with marked respect, and provided her with a generous income, half of which she gave away in charity. Although without charm, she was a woman of many noble qualities; and, like her husband, she wrote French books, some of which attracted a certain attention in their day. She survived him by eleven years, dying in 1797.

Maria Theresa had never given up hope that she would recover Silesia; and as all the neighbouring sovereigns were bitterly jealous of Frederick, and somewhat afraid of him, she had no difficulty in inducing several of them to form a scheme for his ruin. Russia and Saxony entered into it heartily, and France, laying aside her ancient enmity towards Austria, joined the empress against the common object of dislike. Frederick, meanwhile, had turned towards England, which saw in him a possible ally of great importance against the French. A con- vention between Prussia and Great Britain was signed in January 1756, and it proved of incalculable value to both countries, leading as it did to a close alliance during the administration of Pitt. Through the treachery of a clerk in the Saxon foreign office Frederick

was made aware of the future which was being prepared for him. Seeing the importance of taking the initiative, and if possible, of securing Saxony, he suddenly, on the 24th of August 1756, crossed the frontier of that country, and shut in the Saxon army between Pirna and Konigstein, ultimately compelling it, after a victory gained over the Austrians at Lobositz, to surrender. Thus began the Seven Years' War, in which, supported by England, Brunswick and Hesse-Cassel, he had for a long time to oppose Austria, France, Russia, Saxony and Sweden. Virtually the whole Continent was in arms against a small state which, a few years before, had been regarded by most men as beneath serious notice. But it happened that this small state was led by a man of high military genius, capable of infusing into others his own undaunted spirit, while his subjects had learned both from him and his predecessors habits of patience, perseverance and discipline. In 1757, after defeating the Austrians at Prague, lie was himself defeated by them at Kolin; and by the shameful convention of Closter-Seven, he was freely exposed to the attack of the French. In November 1757, how- ever, when Europe looked upon him as ruined, he rid himself of the French by his splendid victory over them at Rossbach, and in about a month afterwards, by the still more splendid victory at Leuthen, he drove the Austrians from Silesia. From this time the French were kept well employed in the west by Prince Ferdinand of Brunswick, who defeated them at Crefeld in 1758, and at Minden in 1 7 59. In the former year Frederick triumphed , at a heavy cost, over the Russians at Zorndorf; and although, through lack of his usual foresight, he lost the battle of Hoch- kirch, he prevented the Austrians from deriving any real advantage from their triumph, Silesia still remaining in his hands at the end of the year. The battle of Kunersdorf, fought on the 1 2th of August 1759, was the most disastrous to him in the course of the war. He had here to contend both with the Russians and the Austrians; and although at first he had some success, his army was in the end completely broken. " All is lost save the royal family," he wrote to his minister Friesenstein ; " the consequences of this battle will be worse than the battle itself. I shall not survive the ruin of the Fatherland. Adieu for ever!" But he soon recovered from his despair, and in 1760 gained the important victories of Liegnitz and Torgau. He had now, however, to act on the defensive, and fortunately for him, the Russians, on the death of the empress Elizabeth, not only withdrew in 1762 from the compact against him, but for a time became his allies. On the 29th of October of that year he gained his last victory over the Austrians at Freiberg. Europe was by that time sick of war, every power being more or less exhausted.

The result was that, on the 15th of February 1763, a few days after the conclusion of the peace of Paris, the treaty of Hubertus- burg was signed, Austria confirming Prussia in the possession of Silesia. (See Seven Years' War.)

It would be difficult to overrate the importance of the con- tribution thus made by Frederick to the politics of Europe. Prussia was now universally recognized as one of the great powers of the Continent, and she definitely took her place in Germany as the rival of Austria. From this time it was inevitable that there should be a final struggle between the two nations for predominance, and that the smaller German states should group themselves around one or the other. Frederick himself acquired both in Germany and Europe the indefinable influence which springs from the recognition of great gifts that have been proved by great deeds.

His first care after the war was, as far as possible, to enable the country to recover from the terrific blows by which it had been almost destroyed; and he was never, either before or after, seen to better advantage than in the measures he adopted for this end. Although his resources had been so completely drained that he had been forced to melt the silver in his palaces and to debase the coinage, his energy soon brought back the national prosperity. Pomerania and Neumark were freed from taxation for two years, Silesia for six months. Many nobles whose lands had been wasted received corn for seed; his war horses were within a few months to be found on farms all over Prussia; and money was freely spent in the re-erection of houses which had been destroyed. The coinage was gradually restored to its proper value, and trade received a favourable impulse by the foundation of the Bank of Berlin. All these matters were carefully looked into by Frederick himself, who, while acting as generously as his circumstances would allow, insisted on every- thing being done in the most efficient manner at the least possible cost. Unfortunately, he adopted the French ideas of excise, and the French methods of imposing and collecting taxes — a system known as the Regie. This system secured for him a large revenue, but it led to a vast amount of petty tyranny, which was all the more intolerable because it was carried out by French officials. It was continued to the end of Frederick's reign, and nothing did so much to injure his otherwise immense popularity. He was quite aware of the discontent the system ex- cited, and the good-nature with which he tolerated the criticisms

directed against it and him is illustrated by a well-known incident. Riding along the Jager Strasse one day, he saw a crowd of people. " See what it is," he said to the groom who was attending him. " They have something posted up about your Majesty," said the groom, returning. Frederick, riding forward, saw a caricature of himself: " King in very melancholy guise," says Preuss (as translated by Carlyle), " seated on a stool, a coffee-mill between his knees, diligently grinding with the one hand, and with the other picking up any bean that might have fallen. ' Hang it lower,' said the king, beckoning his groom with a wave of the finger; ' lower, that they may not have to hurt their necks about it.' No sooner were the words spoken, which spread instantly, than there rose from the whole crowd one universal huzzah of joy. They tore the caricature into a thousand pieces, and rolled after the king with loud ' Lebe Hoch, our Frederick for ever,' as he rode slowly away." There are scores of anecdotes about Frederick, but not many so well authenticated as this.

There was nothing about which Frederick took so much trouble as the proper administration of justice. He disliked the formalities of the law, and in one instance, " the miller Arnold case," in connexion with which he thought injustice had been done to a poor man, he dismissed the judges, condemned them to a year's fortress arrest, and compelled them to make good out of their own pockets the loss sustained by their supposed victim — not a wise proceeding, but one springing from a generous motive. He once defined himself as " l'avocat du pauvre," and few things gave him more pleasure than the famous answer of the miller whose windmill stood on ground which was wanted for the king's garden. The miller sturdily refused to sell it. " Not at any price?" said the king's agent; "could not the king take it

from you for nothing, if he chose ? " " Have we not the Kammergericht at Berlin ? " was the answer, which became a popular saying in Germany. Soon after he came to the throne Frederick began to make preparations for a new code. In 1747 appeared the Codex Fridericianus, by which the Prussian judicial body was established. But a greater monument of Frederick's interest in legal reform was the Allgemeines preussisches Land- recht, completed by the grand chancellor Count Johann H. C. von Carmer (1721-1801) on the basis of the Project des Corporis Juris Fridericiani, completed in the year 1749-1751 by the eminent jurist Samuel von Cocceji (1679-1755). The Landrecht, a work of vast labour and erudition, combines the two systems of German and Roman law supplemented by the law of nature; it was the first German code, but only came into force in 1704, after Frederick's death.

Looking ahead after the Seven Years' War, Frederick saw no means of securing himself so effectually as by cultivating the good- will of Russia. In 1764 he accordingly concluded a treaty of alliance with the empress Catherine for eight years. Six years afterwards, unfortunately for his fame, he joined in the first partition of Poland, by which he received Polish Prussia, without Danzig and Thorn, and Great Poland as far as the river Netze. Prussia was then for the first time made continuous with Branden- burg and Pomerania.

The emperor Joseph II. greatly admired Frederick, and visited him at Neisse,'in Silesia, in 1769, a visit which Frederick returned, in Moravia, in the following year. The young emperor was frank and cordial; Frederick was more cautious, for he detected under the respectful manner of Joseph a keen ambition that might one day become dangerous to Prussia. Ever after these inter- views a portrait of the emperor hung conspicuously in the rooms in which Frederick lived, a circumstance on which some one remarked. " Ab yes," said Frederick, " I am obliged to keep that young gentleman in my eye." Nothing came of these suspicions till 1777, when, after the death of Maximilian Joseph, elector of Bavaria, without children, the emperor took possession of the greater part of his lands. The elector palatine, who lawfully inherited Bavaria, came to an arrangement, which was not admitted by his heir, Charles, duke of Zweibrucken. Under these circumstances the latter appealed to Frederick, who, resolved that Austria should gain no unnecessary advantage, took his part, and brought pressure to bear upon the emperor. Ultimately, greatly against his will, Frederick felt compelled to draw the sword, and in July 1778 crossed the Bohemian frontier at the head of a powerful army. No general engagement was fought, and after a great many delays the treaty of Teschen was signed on the 13th of May 1779. Austria received the circle of Burgau, and consented that the king of Prussia should take the Franconian principalities. Frederick never abandoned his jealousy of Austria, whose ambition he regarded as the chief danger against which Europe had to guard. He seems to have had no suspicion that evil days were coming in France. It was Austria which had given trouble in his time; and if her pride were curbed, he fancied that Prussia at least would be safe. Hence one of the last important acts of his life was to form, in 1785, a league of princes (the " Fiirstenbund ") for the defence of the imperial constitution, believed to be imperilled by Joseph's restless activity. The league came to an end after Frederick's death; but it is of considerable historical interest, as the first open attempt of Prussia to take the lead in Germany.

Frederick's chief trust was always in his treasury and his army. " By continual economy he left in the former the immense sum of 70

million thalers; the latter, at the time of his death, numbered 200,000 men, disciplined with all the strictness to which he had throughout life accustomed his troops. He died at Sanssouci on the 17th of August 1786; his death being hastened by exposure to a storm of rain, stoically borne, during a military review. He passed away on the eve of tremendous events, which for a time obscured his fame; but now that he can be impartially estimated, he is seen to have been In many respects one of the greatest figures in modern history.

He was rather below the middle size, in youth inclined to

stoutness, lean in old age, but of vigorous and active habits. An expression of keen intelligence lighted up his features, and his large, sparkling grey eyes darted penetrating glances at every one who approached him. In his later years an old blue uniform with red facings was his usual dress, and on his breast was gener- ally some Spanish snuff, of which he consumed large quantities. He shared many of the chief intellectual tendencies of his age, having no feeling for the highest aspirations of human nature, but submitting all things to a searching critical analysis. Of Christianity he always spoke in the mocking tone of the ” en- lightened ” philosophers, regarding it as the invention of priests; but it is noteworthy that after the Seven Years’ War, the trials of which steadied his character, he sought to strengthen the church for the sake of its elevating moral influence. In his judgments of mankind he often talked as a misanthrope. He was once conversing with Sulzer, who was a school inspector, about education. Sulzer expressed the opinion that education had of late years greatly improved. ” In former times, your Majesty,” he said, ” the notion being that mankind were natur- ally inclined to evil, a system of severity prevailed in schools; but now, when we recognize that the inborn inclination of men is rather to good than to evil, schoolmasters have adopted a more generous procedure.” ” Ah, my dear Sulzer,” replied the king, ” you don’t know this damned race ” (” Ach, mein lieber Sulzer, er kennt nicht diese verdammte Race “). This fearful saying unquestionably expressed a frequent mood of Frederick’s; and he sometimes acted with great harshness, and seemed to take a malicious pleasure in tormenting his acquaintances. Yet he was capable of genuine attachments. He was beautifully loyal to his mother and his sister Wilhelmina; his letters to the duchess of Gotha are full of a certain tender reverence; the two Keiths found him a devoted friend. But the true evidence that beneath his misanthropical

moods there was an enduring sentiment of humanity is afforded by the spirit in which he exercised his kingly functions. Taking his reign as a whole, it must be said that he looked upon his power rather as a trust than as a source of personal advantage; and the trust was faithfully discharged according to the best lights of his day. He has often been condemned for doing nothing to encourage German literature; and it is true that he was supremely in- different to it. Before he died a tide of intellectual life was rising all about him; yet he failed to recognize it, declined to give Lessing even the small post of royal librarian, and thought Gbtz von Berlichingen a vulgar imitation of vulgar English models. But when his taste was formed, German literature did not exist; the choice was between Racine and Voltaire on the one hand and Gottsched and Gellert on the other. He survived into the era of Kant, Goethe and Schiller, but he was not of it, and it would have been unreasonable to expect that he should in old age pass beyond the limits of his own epoch. As Germans now generally admit, it was better that he let their literature alone, since, left to itself, it became a thoroughly independent product. Indirectly he powerfully promoted it by deepening the national life from which it sprang. At a time when there was no real bond of cohesion between the different states, he stirred among them a common enthusiasm; and in making Prussia great he laid the foundation of a genuinely united empire.

Bibliographical Note. — The main sources for the biography of Frederick the Great are his own works, which, in the words of Leopold von Ranke, ” deal with the politics and wars of the period with the greatest possible objectivity, i.e. truthfulness, and form an imperishable monument of his life and opinions.” A magnificent edition of Frederick’s complete works was issued (1846-1857), at the instance of Frederick William IV., under the supervision of the historian Johann D. E. Preuss (1785-1868). It is in thirty volumes, of which six contain verse, seven are historical, two philosophical, and three military, twelve being made up of correspondence. So long as the various state archives remained largely inaccessible historians relied upon this as their chief authority. Among works belonging to this period may be mentioned Thomas Carlyle, History of Frederick II. of Prussia (6 vols., London, 1858-1865); J. G. Droysen, Friedrich der Grosse (2 vols., Leipzig, 1874-1876, forming part V. of his Geschichte der preussischen Politik); Ranke, Friedrich II., Konig von Preussen (Werke, vols. li. and lii.). A great stimulus

to the study of Frederick’s history has since been given by the pub- lication of collections of documents preserved in various archives. Of these the most important is the great official edition of Frederick’s

political correspondence (Berlin, 1879), of which the thirty-first vol. appeared in 1906. Of later works, based on modern research, may be mentioned R. Koser, Konig Friedrich der Grosse, Bd. 2 (Stutt- gart, 1893 and 1903; 3rd ed., 1905); Bourdeau, Le Grand Frediric (2 vols., Paris, I 900-1902) ; L. Paul-Dubois, Frideric le Grand, d'apres sa correspondance politique (Paris, 1903) ; W. F. Reddaway, Frederick the Great and the Rise of Prussia (London, 1904). Of the numerous special studies may be noticed E. Zeller, Friedrich der Grosse als Philosoph (Berlin, 1886); H. Pigge, Die Staatstheorie Friedrichs des Grossen (Munster, 1904) ; T. von Bernhardi, Friedrich der Grosse als Feldherr (2 vols., Berlin, 1881); Ernest Lavisse, La Jeunesse du Grand Frederic (Paris, 1891, 3rd ed., 1899; Eng. transl., London, 1891); R. Brode, Friedrich der Grosse und der Konflikt mit seinem Vater (Leipzig, 1904) ; W. von Bremen, Friedrich der Grosse (Bd. ii. of Erzieher des preussischen Heeres, Berlin, 1905) ; G. Winter, Friedrich der Grosse (3 vols, in Geisteshelden series, Berlin, 1906); Dreissig Jahre am Hofe Friedrichs des Grossen. Aus den Tagebuchern des Reichsgrafen Ahasucrus Heinrich von Lehndorff, Kammerherm der Konigin Elisabett Christine von Preussen (Gotha, 1907). _ The great work on the wars of Frederick is that issued by the Prussian General Staff: Die Kriege Friedrichs des Grossen (12 vols, in three parts, Berlin, 1890-1904). For a full list of other works see Dahlmann- Waitz, Quellenkunde (Leipzig, 1906). (J- Si.; W. A. P.) .

FREDERICK III. (1831-1888), king of Prussia and German emperor, was born at Potsdam on the 18th of October 1831, being the eldest son of Prince William of Prussia, afterwards first German emperor, and the princess Augusta. He was care- fully educated, and in 1849-1850 studied at the university of Bonn. The next years were spent in military duties and in travels, in which he was accompanied by Moltke. In 1851 he visited England on the occasion of the Great Exhibition, and in 1855 became engaged to Victoria, princess royal of Great Britain, to whom he was married in London on the 25th of January 1858. On the death of his uncle in 1861 and the accession of his father, Prince Frederick William, as he was then always called, became crown prince of Prussia. His education, the influence of his mother, and perhaps still more that of his wife's father, the Prince Consort, had made him a strong Liberal, and he was much dis- tressed at the course of events in Prussia after the appointment of Bismarck as minister. He was urged by the Liberals to put himself into open opposition to the government; this he refused to do, but he remonstrated privately with the king. In June 1863, however, he publicly dissociated himself from the press ordinances which had just been published. He ceased to attend meetings of the council of state,

and was much away from Berlin. The opposition of the crown prince to the ministers was increased during the following year, for he was a warm friend of the prince of Augustenburg, whose claims to Schleswig-Holstein Bismarck refused to support. During the war with Denmark he had his first military experience, being attached to the staff of Marshal von Wrangel; he performed valuable service in arranging the difficulties caused by the disputes between the field marshal and the other officers, and was eventually given a control over him. After the war he continued to support the prince of Augustenburg and was strongly opposed to the war with Austria. During the campaign of 1866 he received the command of an army con- sisting of four army corps; he was assisted by General von Blumenthal, as chief of the staff, but took a very active part in directing the difficult operations by which his army fought its way through the mountains from Silesia to Bohemia, fighting four engagements in three days, and showed that he possessed genuine military capacity. In the decisive battle of Koniggratz the arrival of his army on the field of battle, after a march of nearly 20 m., secured the victory. During the negotiations which ended the war he gave valuable assistance by persuading the king to accept Bismarck's policy as regards peace with Austria. From this time he was very anxious to see the king of Prussia unite the whole of Germany, with the title of emperor, and was impatient of the caution with which Bismarck proceeded. In 1869 he paid a visit to Italy, and in the same year was present at the opening of the Suez Canal; on his way he visited the Holy Land. He played a conspicuous part in the year 1870-1871, being appointed to command the armies of the Southern States,

General Blumenthal again being his chief of the staff; his troops won the victory of Worth, took an important part in the battle of Sedan, and later in the siege of Paris. The popularity he won was of political service in preparing the way for the union of North and South Germany, and he was the foremost advocate of the imperial idea at the Prussian court. During the years that followed, little opportunity for political activity was open to him. He and the crown princess took a great interest in art and industry, especially in the royal museums; and the excavations conducted at Olympia and Pergamon with such great results were chiefly due to him. The crown princess was a keen advocate of the higher education of women, and it was owing to her exertions that the Victoria Lyceum at Berlin (which was named after her) was founded. In 1878, when the emperor was in- capacitated by

the shot, of an assassin, the prince acted for some months as regent. His palace was the centre of all that was best in the literary and learned society of the capital. He publicly expressed his disapproval of the attacks on the Jews in 1878; and the coalition of Liberal parties founded in 1884 was popularly known as the ” crown prince’s party,” but he scrupulously refrained from any act that might embarrass his father’s govern- ment. For many reasons the accession of the prince was looked forward to with great hope by a large part of the nation. Un- fortunately he was attacked by cancer in the throat; he spent the winter of 1887-1888 at San Remo; in January 1888 the operation of tracheotomy had to be performed. On the death of his father, which took place on the 9th of March, he at once journeyed to Berlin; but his days were numbered, and he came to the throne only to die. In these circumstances his accession could not have the political importance which would otherwise have attached to it, though it was disfigured by a vicious outburst of party passion in which the names of the emperor and the empress were constantly misused. While the Liberals hoped the emperor would use his power for some signal declaration of policy, the adherents of Bismarck did not scruple to make bitter attacks on the empress. The emperor’s most important act was a severe reprimand addressed to Herr von Puttkamer, the reactionary minister of the interior, which caused his resignation; in the distribution of honours he chose many who belonged to classes and parties hitherto excluded from court favour. A serious difference of opinion with the chancellor regarding the proposal for a marriage between Prince Alexander of Battenberg and the princess Victoria of Prussia was arranged by the intervention of Queen Victoria, who visited Berlin to see her dying son-in-law. He expired at Potsdam on the 15th of June 18S8, after a reign of ninety-nine days.

After the emperor’s death Professor Geffcken, a personal friend, published in the Deutsche Rundschau extracts from the diary of the crown prince containing passages which illustrated his differences with Bismarck during the war of 1870. The object was to injure Bismarck’s ieputation, and a very unseemly dispute ensued. Bismarck at first, in a letter addressed to the new emperor, denied the authenticity of the extracts on the ground that they were unworthy of the crown prince. Geffcken was then arrested and imprisoned. He had undoubtedly shown that he was an injudicious friend, for the diary proved that the prince, in his enthusiasm for German unity, had allowed himself to con- sider projects which would have seriously compromised the relations of Prussia and Bavaria. The treatment of the crown prince’s illness also gave rise to an acrimonious controversy. It arose from the fact that as early as May 1887 the

German physicians recognized the presence of cancer in the throat, but Sir Moreil Mackenzie, the English specialist who was also consulted, disputed the correctness of this diagnosis, and advised that the operation for removal of the larynx, which they had recommended, should not be undertaken. His advice was followed, and the differences between the medical men were made the occasion for a considerable display of national and political animosity.

The empress Victoria, who, after the death of her husband, was known as the empress Frederick, died on the 5th of August 1 90 1 at the castle of Friedrichskron, Cronberg, near Komburg

v. d. H., where she spent her last years. Of the emperor's children two, Prince Sigismund (1864-1866) and Prince Waldemar (1869-1879), died in childhood. He left two sons, William, his successor as emperor, and Henry, who adopted a naval career. Of his daughters, the princess Charlotte was married to Bernard, hereditary prince of Meiningen; the princess Victoria to Prince Adolf of Schaumburg-Lippe; the princess Sophie to the duke of Sparta, crown prince of Greece; and the princess Margaretha to Prince Friedrich Karl of Hesse.

Authorities. — M. von Poschinger, Kaiser Friedrich (3 vols., Berlin, 1898-1900). Adapted into English by Sidney Whitman, Life of the Emperor Frederick (1901). See also Bismarck, Reflection* and Reminiscences; Rennell Rodd, Frederick, Crown Prince and Emperor (1888) ; Gustav Freytag, Der Kronprinz und die deutsche Kaiserkrone (1889; English translation, 1890); Otto Richter, Kaiser Friedrich III. (2nd ed., Berlin, 1903). For his illness, the official publications, published both in English and German: Die Krankheit Kaiser Friedrichs III. (Berlin, 1888), and Moreil Mac- kenzie, The Fatal Illness of Frederick the Noble (1888). Most of the copies of the Deutsche Rundschau containing the extracts from the crown prince's diary were confiscated, but there is an English edition, published in 1889. (J. W. He.)

FREDERICK III. (1272-1337), king of Sicily, third son of King Peter of Aragon and Sicily, and of Constance, daughter of Manfred. Peter died in 1285, leaving Aragon to his eldest son Alphonso, and Sicily to his second son James. When Alphonso died in 1291 James became king of Aragon, and left his brother Frederick as regent of Sicily. The war between the Angevins and the Aragonese for the possession of Sicily was still in progress, and although the Aragonese were successful in Italy James's position in Spain became very insecure to internal troubles and French attacks. Peace negotiations were begun with Charles II. of Anjou, but were interrupted by the successive deaths of

two popes; at last under the auspices of Boniface VIII. James concluded a shameful treaty, by which, in exchange for being left undisturbed in Aragon and promised possession of Sardinia and Corsica, he gave up Sicily to the Church, for whom it was to be held by the Angevins (1295). The Sicilians refused to be made over once more to the hated French whom they had expelled in 1282, and found a national leader in the regent Frederick. In vain the pope tried to bribe him with promises and dignities; he was determined to stand by his subjects, and was crowned king by the nobles at Palermo in 1296. Young, brave and hand- some, he won the love and devotion of his people, and guided them through the long years of storm and stress with wisdom and ability. Although the second Frederick of Sicily, he called himself third, being the third son of King Peter. He reformed the administration and extended the powers of the Sicilian parliament, which was composed of the barons, the prelates and the representatives of the towns.

His refusal to comply with the pope's injunctions led to a renewal of the war. Frederick landed in Calabria, where he seized several towns, encouraged revolt in Naples, negotiated with the Ghibellines of Tuscany and Lombardy, and assisted the house of Colonna against Pope Boniface. In the meanwhile James, who received many favours from the Church, married his sister Yolanda to Robert, the third son of Charles II. Un- fortunately for Frederick, a part of the Aragonese nobles of Sicily favoured King James, and both John of Procida and Ruggiero di Lauria, the heroes of the war of the Vespers, went over to the Angevins, and the latter completely defeated the Sicilian fleet off Cape Orlando. Charles's sons Robert and Philip landed in Sicily, but after capturing Catania were defeated by Frederick, Philip being taken prisoner (1299), while several Calabrian towns were captured by the Sicilians. For two years more the fighting continued with varying success, until Charles of Valois, who had been sent by Boniface to invade Sicily, was forced to sue for peace, his army being decimated by the plague, and in August 1302 the treaty of Caltabellotta was signed, by which Frederick was recognized king of Trinacria (the name Sicily was not to be used) for his lifetime, and was to marry Eleonora, the daughter of Charles II.; at his death the king- dom was to revert to the Angevins (this clause was inserted chiefly to save Charles's face), and his children would receive

compensation elsewhere. Boniface tried to induce King Charles to

break the treaty, but the latter was only too anxious for peace, and finally in May 1303 the pope ratified it, Frederick agreeing to pay him a tribute.

For a few years Sicily enjoyed peace, and the kingdom was reorganized. But on the descent of the emperor Henry VII., Frederick entered into an alliance with him, and in violation of the pact of Caltabellotta made war on the Angevins again (13 13) and captured Reggio. He set sail for Tuscany to co- operate with the emperor, but on the latter's death (13 14) he returned to Sicily. Robert, who had succeeded Charles II. in 1309, made several raids into the island, which suffered much material injury. A truce was concluded in 13 17, but as the Sicilians helped the north Italian Ghibellines in the attack on Genoa, and Frederick seized some Church revenues for military purposes, the pope (John XXII.) excommunicated him and placed the island under an interdict (1321) which lasted until J 33S- An Angevin fleet and army, under Robert's son Charles, was defeated at Palermo by Giovanni, da Chiaramonte in 1325, and in 1326 and 1327 there were further Angevin raids on the island, until the descent into Italy of the emperor Louis the Bavarian distracted their attention. The election of Pope Benedict XII. (1334), who was friendly to Frederick, promised a respite; but after fruitless negotiations the war broke out once more, and Chiaramonte went over to Robert, owing to a private feud. In 1337 Frederick died at Paternione, and in spite of the peace of Caltabellotta his son Peter succeeded. Frederick's great merit was that during his reign the Aragonese dynasty became thoroughly national and helped to weld the Sicilians into a united people.

Bibliography. — G. M. Mira, Bibliografia Siciliana (Palermo, !875); of the contemporary authorities N. Speciale's " Historia Sicula " (in Muratori's Script, rer. ital. x.) is the most important; for the first years of Frederick's reign see M. Amari, La Guerra del Vespro Siciliano (Florence, 1876), and F. Lanzani, Storia dei Comuni italiani (Milan, 1882); for the latter years C. Cipolla, Storia delle signorie ilaliane (Milan, 1881); also Testa, Vita di Federigo di Sicilia. (L. V.)

FREDERICK I. (c. 1371-1440), elector of Brandenburg, founder of the greatness of the House of Hohenzollern, was a son of Frederick V., burgrave of Nuremberg, and first came into prominence by saving the life of Sigismund, king of Hungary, at the battle of Nicopolis in 1396. In 1397 he became burgrave of Nuremberg, and after his father's death in 1398 he shared Ansbach, Bayreuth, and the smaller possessions of the family, with his only brother John, but became sole ruler after his brother's death in T420. Loyal at first to King Wenceslaus, the king's neglect of Germany drove Frederick to take

part in his deposition in 1400, and in the election of Rupert III., count palatine of the Rhine, whom he accompanied to Italy in the following year. In 1401 he married Elizabeth, or Elsa, daughter of Frederick, duke of Bavaria Landshut (d. 1393), and after spending some time in family and other feuds, took service again with King Sigismund in 1409, whom he assisted in his struggle with the Hungarian rebels. The double election to the German throne in 1410 first brought Frederick into relation with Branden burg. Sigismund, anxious to obtain another vote in the electoral college, appointed Frederick to exercise the Brandenburg vote on his behalf, and it was largely through his efforts that Sigis- mund was chosen German king. Frederick then passed some time as administrator of Brandenburg, where he restored a certain degree of order, and was formally invested with the electorate and margraviate by Sigismund at Constance on the 18th of April 1417 (see Brandenburg). He took part in the war against the Hussites, but became estranged from Sigismund when in 1423 the king invested Frederick of Wettin, margrave of Meissen, with the vacant electoral duchy of Saxe-Wittenberg. In 1427 he sold his rights as burgrave to the town of Nuremberg, and he was a prominent member of the band of electors who sought to impose reforms upon Sigismund. After having been an unsuccessful candidate for the German throne in 1438, Frederick was chosen king of Bohemia in 1440, but declined the proffered honour. He took part in the election of Frederick III.

as German king in 1440, and died at Radolzburg on the 21st of September in the same year. In 1902 a bronze statue was erected to his memory at Friesack, and there is also a marble one of the elector in the ” Siegesallee ” at Berlin.

See A. F. Riedel, Zehn Jahre aus der Geschichte der Ahnherren des preussischen Konigshauses (Berlin, 1851); E. Brandenburg, Konig Sigmund und Kurfurst Friedrich I. von Brandenburg (Berlin, 1891); and O. Franklin, Die deutsche Politik Friedrichs I. Kurfiirsten tor. Brandenburg (Berlin, 185 1).

FREDERICK I. (1425-1476), elector palatine of the Rhine, surnamed ” the Victorious,” and called by his enemies ” wicked Fritz,” second son of the elector palatine Louis III., was born on the 1st of August 1425. He inherited a part of the Palatinate on his father’s death in 1439, but soon surrendered this inherit- ance to his elder brother, the elector Louis IV. On his brother’s death in 1449, however, he became guardian of the young elector Philip, and ruler of the land. In 1451 he persuaded the nobles to recognize him as elector, on condition that Philip should be his successor, a scheme which was disliked by the emperor Frederick III. The elector was successful in various wars with

neighbouring rulers, and was a leading member of the band of princes who formed plans to secure a more efficient government for Germany, and even discussed the deposition of Frederick III. Frederick himself was mentioned as a candidate for the German throne, but the jealousies of the princes prevented any decisive action, and soon became so acute that in 1459 they began to fight among themselves. In alliance with Louis IX., duke of Bavaria- Landshut, Frederick gained several victories during the struggle, and in 1462 won a decisive battle at Seckenheim over Ulrich V., count of Wurttemberg. In 1472 the elector married Clara Tott, or Dett, the daughter of an Augsburg citizen, and by her he had two sons, Frederick, who died during his father's lifetime, and Louis (d. 1524), who founded the lineof the counts of Lowenstein. He died at Heidelberg on the 12th of December 1476, and was succeeded, according to the compact, by his nephew Philip. Frederick was a cultured prince, and, in spite of his warlike career, a wise and intelligent ruler. He added largely to the area of the Palatinate, and did not neglect to further its internal prosperity.

See N. Feeser, Friedrich der Siegreiche, Kurfurst von der Pfalz (Neuburg, 1880) ; C. J. Kremer, Geschichte des Kurfiirsten Friedrichs I. von der Pfalz (Leipzig, 1765); and K. Menzel, Kurfurst Friedrich der Siegreiche von der Pfalz (Munich, 1861).

FREDERICK II. (1482-1556), surnamed "the Wise," elector palatine of the Rhine, fourth son of the elector Philip, was born on the 9th of December 1482. Of an active and adventurous temperament, he fought under the emperor Maximilian I. in 1 508, and afterwards served the Habsburgs loyally in other ways. He worked to secure the election of Charles, afterwards the emperor Charles V., as the successor of Maximilian in 1519; fought in two campaigns against the Turks; and being disappointed in his hope of obtaining the hand of one of the emperor's sisters, married in 1535 Dorothea (d. 1580), daughter of Christian II., who had been driven from the Danish throne. The Habsburgs promised their aid in securing this crown for Frederick, but, like many previous promises made to him, this came to nothing. Having spent his time in various parts of Europe, and incurred heavy debts on account of his expensive tastes, Frederick became elector palatine by the death of his brother, Louis V., in March 1 544- With regard to the religious troubles of Germany, he took up at first the r&le of a mediator, but in 1545 he joined the league of Schmalkalden, and in 1546 broke definitely with the older faith. He gave a little assistance to the league in its war with Charles, but soon submitted to the emperor, accepted the Interim issued from Augsburg in May 1548, and afterwards acted in harmony with Charles. The elector died on the 26th of February 1536, and as he left no children

was succeeded by his nephew, Otto Henry (1 502-1 559). He was a great benefactor to the university of Heidelberg.

Frederick's life, Annates de vita et rebus gestis Friderici II. electoris Palatini (Frankfort, 1624), was written by his secretary Hubert Thomas Leodius; this has been translated into German by E. von Biilow (Breslau, 1849). See also Rott, Friedrich II. von der Pfalz und die Reformation (Heidelberg, 1904).

FREDERICK III.— FREDERICK I.

FREDERICK HI. (1515-1576), called "the Pious," elector palatine of the Rhine, eldest son of John II., count palatine of Simmern, was born at Simmern on the 14th of February 1515. In 1537 he married Maria (d. 1567), daughter of Casimir, prince of Bayreuth, and in 1 546, mainly as a result of this union, adopted the reformed doctrines, which had already made considerable progress in the Palatinate. He lived in comparative obscurity and poverty until 1557, when he became count palatine of Simmern by his father's death, succeeding his kinsman, Otto Henry (1 502-1 559), as elector palatine two years later. Although inclined to the views of Calvin rather than to those of Luther, the new elector showed great anxiety to unite the Protestants; but when these efforts failed, and the breach between the followers of the two reformers became wider, he definitely adopted Calvinism. This form of faith was quickly established in the Palatinate; in its interests the " Heidelberg Catechism " was drawn up in 1563; and Catholics and Lutherans were persecuted alike, while the churches were denuded of all their ornaments. The Lutheran princes wished to root out Calvinism in the Palatinate, but were not willing to exclude the elector from the benefits of the religious peace of Augsburg, which were confined to the adherents of the confession of Augsburg, and the matter came before the diet in 1566. Boldly defending his posi- tion, Frederick refused to give way an inch, and as the Lutherans were unwilling to proceed to extremities the emperor Maximilian II. could only warn him to mend his ways. The elector was an ardent supporter of the Protestants abroad, whom, rather than the German Lutherans, he regarded as his co-religionists. He aided the Huguenots in France and the insurgents in the Nether- lands with men and money; one of his sons, John Casimir (1 543-1 592), took a prominent part in the French wars of religion, while another, Christopher, was killed in 1574 fighting for the Dutch at Mooker Heath. In his later years Frederick failed in his efforts to prevent the election of a member of the Habsburg family as Roman king, to secure the abrogation of the "

ecclesi- astical reservation ” clause in the peace of Augsburg, or to obtain security for Protestants in the territories of the spiritual princes. He was assiduous in caring for the material, moral and educational welfare of his electorate, and was a benefactor to the university of Heidelberg. The elector died at Heidelberg on the 26th of October 1576, and was succeeded by his elder sur- viving son, Louis (1 539-1 583), who had offended his father by adopting Lutheranism.

See A. Kluckhohn, Friedrich der Fromme (Nordlingen, 1877-1879) ; and Briefe Friedrichs des Frommen, edited by Kluckhohn (Bruns- wick, 1868-1872).

FREDERICK IV. (1 574-1610), elector palatine of the Rhine, only surviving son of the elector Louis VI., was born at Amberg on the 5th of March 1574. His father died in October 1583, when the young elector came under the guardianship of his uncle John Casimir, an ardent Calvinist, who, in spite of the wishes of the late elector, a Lutheran, had his nephew educated in his own form of faith. In January 1 592, on the death of John Casimir, Frederick undertook the government of the Palatinate, and continued the policy of his uncle, hostility to the Catholic Church and the. Habsburgs, and co-operation with foreign Protestants. He was often in communication with Henry of Navarre, afterwards Henry IV. of France, and like him was unremitting in his efforts to conclude a league among the German Protestants, while he sought to weaken the Habsburgs by refusing aid for the Turkish War. After many delays and disappoint- ments the Union of Evangelical Estates was actually formed in May 1608, under the leadership of the elector, and he took a prominent part in directing the operations of the union until his death, which occurred on the 1 9th of September 1 6 1 o. Frederick was very extravagant, and liked to surround himself with pomp and luxury. He married in 1593 Louise, daughter of William the Silent, prince of Orange, and was succeeded by Frederick, the elder of his two sons.

See M. Ritter, Geschichte der deutschen Union (Schaffhauseu, 1867-1873) ; and L. Hausser, Geschichte der rheinischen Pfalz (Heidelberg,

1856).

FREDERICK V. (1596-1632), elector palatine of the Rhine and king of Bohemia, son of the elector Frederick IV. by his wife, Louisa Juliana, daughter of William the Silent, prince of Orange, was born at Amberg on the 26th of August 1596. He became elector on his father’s death in September 1610, and was under the guardianship of his kinsman, John II., count palatine of Zweibriicken (d. 1635), until he was

declared of age in July 1614. Having received a good education, Frederick had married Elizabeth, daughter of the English king James I., in February 1 613, and was the recognized head of the Evangelical Union founded by his father to protect the interests of the Protestants. In 1619 he stepped into a larger arena. Before this date the estates of Bohemia, Protestant in sympathy and dissatisfied with the rule of the Habsburgs, had been in frequent communication with the elector palatine, and in August 1619, a few months after the death of the emperor Matthias, they declared his successor, Ferdinand, afterwards the emperor Ferdinand II., deposed, and chose Frederick as their king. After some hesitation the elector yielded to the entreaties of Christian I., prince of Anhalt (1 568-1 630), and other sanguine supporters, and was crowned king of Bohemia at Prague on the 4th of November 1619. By this time the emperor Ferdinand was able to take the aggressive, while Frederick, disappointed at receiving no assistance either from England or from the Union, had few soldiers and little money. Consequently on the, 8th of November, four days after his coronation, his forces were easily routed by the imperial army under Tilly at the White Hill, near Prague, and his short reign in Bohemia ended abruptly. Soon afterwards the Palatinate was overrun by the Spaniards and Bavarians, and after a futile attempt to dislodge them, Frederick, called in derision the " Winter King," sought refuge in the Netherlands. Having been placed under the imperial ban his electorate was given in 1623 to Maximilian I. of Bavaria, who also received the electoral dignity.

The remainder of Frederick's life was spent in comparative obscurity, although his restoration was a constant subject of discussion among European diplomatists. He died at Mainz on the 29th of November 1632, having had a large family, among his children being Charles Louis (1617-1680), who regained the Palatinate at the peace of Westphalia in 1648, and Sophia, who married Ernest Augustus, afterwards elector of Hanover, and was the mother of George I., king of Great Britain. His third son was Prince Rupert, the hero of the English civil war, and another son was Prince Maurice (1620-1652), who also assisted his uncle Charles I. during the civil war. Having sailed with Rupert to the West Indies, Maurice was lost at sea in September 1652.

In addition to the numerous works which treat of the outbreak of the Thirty Years' War see A. Gindely, Friedrich V. von der Pfalz (Prague, 1884); J. Krebs, Die Politik der evangelischen Union im Jahre 1618 (Breslau, 1890-1901) ; M. Ritter, " Friedrich V.," in the Allgemeine deutsche Biographie, Band vii. (Leipzig, 1878); and Deutsche Lieder auf den Winterkonig, edited by R. Wolkan (Prague,

1899)- . . *-

FREDERICK I. (1360-1428), surnamed “the Warlike,” elector and duke of Saxony, was the eldest son of Frederick ” the Stern,” count of Osterland, and Catherine, daughter and heiress of Henry VIII. , count of Coburg. He was born at Alten- burg on the 29th of March 1369, and was a member of the family of Wettin. When his father died in 1381 some trouble arose over the family possessions, and in the following year an arrange- ment was made by which Frederick and his brothers shared Meissen and Thuringia with their uncles Balthasar and William. Frederick’s brother George died in 1402, and his uncle William in 1407. A further dispute then arose, but in 1410 a treaty was made at Naumburg, when Frederick and his brother William added the northern part of Meissen to their lands; and in 1425 the death of William left Frederick sole ruler. In the German town war of 1388 he assisted Frederick V. of Hohen- zollern, burgrave of Nuremberg, and in 1391 did the same for the Teutonic Order against Ladislaus V., king of Poland and prince of Lithuania. He supported Rupert III., elector palatine of the Rhine, in his struggle with King Wenceslaus for the German

throne, probably because Wenceslaus refused to fulfil a promise to give him his sister Anna in marriage. The danger to Germany from the Hussites induced Frederick to ally himself with the German and Bohemian king Sigismund; and he took a leading part in the war against them, during the earlier years of which he met with considerable success. In the prosecution of this enterprise Frederick spent large sums of money, for which he received various places in Bohemia and elsewhere in pledge from Sigismund, who further rewarded him in January 1423 with the vacant electoral duchy of Saxe-Wittenberg; and Frederick’s formal investiture followed at Ofen on the 1st of August 1425. Thus spurred to renewed efforts against the Hussites, the elector was endeavouring to rouse the German princes to aid him in prosecuting this war when the Saxon army was almost annihilated at Aussig on the 16th of August 1426. Returning to Saxony, Frederick died at Altenburg on the 4th of January 1428, and was buried in the cathedral at Meissen. In 1402 he married Catherine of Brunswick, by whom he left four sons and two daughters. In 1409, in conjunction with his brother William, he founded the university of Leipzig, for the benefit of German students who had just left the university of Prague. Frederick’s importance as an historical figure

arises from his having obtained the electorate of Saxe-Wittenberg for the house of Wettin, and transformed the margraviate of Meissen into the territory which afterwards became the kingdom of Saxony. In addition to the king of Saxony, the sovereigns of England and of the Belgians are his direct descendants.

There is a life of Frederick by G. Spalatin in the Scriptores rerum Germanicarum praecipue Saxonicarum, Band ii., edited by J. B. Mencke (Leipzig, 1728-1730). See also C. W. Bottiger and Th. Flathe, Geschichte des Kurstaates und Kbnigreichs Sachsen (Gotha, 1867-1873); and J. G. Horn, Lebens- und Heldengeschichte Friedrichs des Streitbaren (Leipzig, 1733).

FREDERICK II. (1411-1464), called ” the Mild,” elector and duke of Saxony, eldest son of the elector Frederick I., was born on the 22nd of August 141 1. He succeeded his father as elector in 1428, but shared the family lands with his three brothers, and was at once engaged in defending Saxony against the attacks of the Hussites. Freed from these enemies about 1432, and turning his attention to increasing his possessions, he obtained the burgraviate of Meissen in 1439, and some part of Lower Lusatia after a struggle with Brandenburg about the same time. In 1438 it was decided that Frederick, and not his rival, Bernard IV., duke of Saxe-Lauenburg, was entitled to exercise the Saxon electoral vote at the elections for the German throne; and the elector then aided Albert II. to secure this dignity, performing i similar service for his own brother-in-law, Frederick, afterwards the emperor Frederick III., two years later. Family affairs, meanwhile, occupied Frederick’s attention. One brother, Henry, having died in 1435, and another, Sigismund (d. X463), having entered the church and become bishop of Wur*zburg, Frederick and his brother William (d. 1482) were the heirs of their childless cousin, Frederick ” the Peaceful,” who ruled Thuringia and other parts of the lands of the Wettins. On his death in 1440 the brothers divided Frederick’s territory, but this arrange- ment was not satisfactory, and war broke out between them in 1446. Both combatants obtained extraneous aid, but after a desolating struggle peace was made in January 1451, when William received Thuringia, and Frederick Altenburg and other districts. The remainder of the elector’s reign was uneventful, and he died at Leipzig on the 7th of September 1464. By his wife, Margaret (d. i486), daughter of Ernest, duke of Styria, he left two sons and four daughters. In July 1455 occurred the celebrated Prinzenraub, the attempt of a knight named Kunz von Kaufungen (d. 1455) to abduct Frederick’s two sons, Ernest and Albert. Having carried them off from Altenburg, Kunz was making his way to Bohemia when the plot was accidentally discovered and the princes restored.

See W. Schafer, Der Montag vor Kiliani (1855); J. Gersdorf, Einige Aktenstucke zur Geschichte des sachsischen Prinzenraubes (1855); and T. Carlyle, Critical and Miscellaneous Essays, vol. iv. (London, 1899).

FREDERICK HI. (1463-1525), called ” the Wise,” elector of Saxony, eldest son of Ernest, elector of Saxony, and Elizabeth,

daughter of Albert, duke of Bavaria-Munich (d. 1508), was born at Torgau, and succeeded his father as elector in i486. Retaining the government of Saxony in his own hands, he shared the other possessions of his family with his brother John, called ” the Stedfast ” (1468-153 2). Frederick was among the princes who pressed the need of reform upon the German king Maximilian I. in 1495, and in 1500 he became president of the newly-formed council of regency (Reichsregiment) . He took a genuine interest in learning; was a friend of Georg Spalatin; and in 1502 founded the university of Wittenberg, where he appointed Luther and Melanchthon to professorships. In 1493 he had gone as a pilgrim to Jerusalem, and had been made a knight of the Holy Sepulchre; but, although he remained throughout life an adherent of the older faith, he seems to have been drawn into sympathy with the reformers, probably through his connexion with the university of Wittenberg. In 1520 he refused to put into execution the papal bull which ordered Luther’s writings to be burned and the reformer to be put under restraint or sent to Rome; and in 1521, after Luther had been placed under the imperial ban by the diet at Worms, the elector caused him to be conveyed to his castle at the Wartburg, and afterwards protected him while he attacked the enemies of the Reformation. In 1519, Frederick, who alone among the electors refused to be bribed by the rival candidates for the imperial throne, declined to be a candidate for this high dignity himself, and assisted to secure the election of Charles V. He died unmarried at Langau, near Annaberg, on the 5th of May 1525.

See G. Spalatin, Das Leben und die Zeitgeschichte Friedrichs des Weisen, edited by C. G. Neudecker and L. Preller (Jena, 1851); M. M. Tutzschmann, Friedrich der Weise, Kurfurst von Sachsen (Grimma, 1848) ; and T. Kolde, Friedrich der Weise und die Anfdnge der Reformation (Erlangen, 1 881).

FREDERICK, a city and the county-seat of Frederick county, Maryland,U.S.A.,on Carroll’s Creek, atributary of theMonocacy, 61 m. by rail W. by N. from Baltimore and 45 m. N.W. from Washington. Pop. (1890) 8193; (1900) 9296, of whom 1535 were negroes; (1910 census) 10,411. It is served by the Balti- more & Ohio and the

Northern Central railways, and by two interurban electric lines. Immediately surrounding it is the rich farming land of the Monocacy valley, but from a distance it appears to be completely shut in by picturesque hills and mountains; to the E., the Linga ore Hills; to the W., Catoctin Mountain; and to the S., Sugar Loaf Mountain. It is built for the most part of brick and stone. Frederick is the seat of the Maryland school for the deaf and dumb and of the Woman's College of Frederick (1893; formerly the Frederick Female Seminary, opened in 1843), which in 1907-1908 had 212 students, 121 of whom were in the Conservatory of Music. Francis Scott Key and Roger Brooke Taney were buried here, and a beautiful monument erected to the memory of Key stands at the entrance to Mount Olivet cemetery. Frederick has a considerable agricultural trade and is an important manufacturing centre, its industries including the canning of fruits and vegetables, and the manufacture of flour, bricks, brushes, leather goods and hosiery. The total value of the factory product in 1905 was $1,937,921, being 34-7% more than in 1900. The municipality owns and operates its water-works and electric-lighting plant. Frederick, so named in honour of Frederick Calvert, son and afterward successor of Charles, Lord Baltimore, was settled by Germans in 1733, and was laid out as a town in 1745, but was not incorporated until 1817. Here in 1755 General Braddock prepared for his disastrous expedition against the French at Fort Duquesne (Pittsburg). During the Civil War the city was occupied on different occasions by Unionists and Confederates, and was made famous by Whittier's poem " Barbara Frietchie."

FREDERICK AUGUSTUS I. (1750-1827), king of Saxony, son of the elector Frederick Christian, was born at Dresden on the 23rd of December 1750. He succeeded his father under the guardianship of Prince Xavier in 1763, and was declared of age in 1768. In the following year (January 17, 1769) he married Princess Maria Amelia, daughter of Duke Frederick of Zwei- briicken, by whom he had only one child, Princess Augusta (born June 21, 1782). One of his chief aims was the reduction

of taxes and imposts and of the army. He was always extremely methodical and conscientious, and a good example to all his officials, whence his surname " the Just." On account of the claims of his mother on the inheritance of her brother, the elector of Bavaria, he sided with Frederick the Great in the short Bavarian succession war of 1778 against Austria. At the peace of Teschen, which concluded the

war, he received 6 million florins, which he employed partly in regaining those parts of his kingdom which had been lost, and partly in favour of his relatives. In 1785 he joined the league of German princes (Deutscher Fiirsten- bund) formed by Prussia, but without prejudice to his neutrality. Thus he remained neutral during the quarrel between Austria and Prussia in 1790. In the following year he declined the crown of Poland. He refused to join the league against France (February 7, 1792), but when war was declared his duty to the Empire necessitated his taking part in it. Even after the peace of Basel (April 5, 1795) he continued the war. But when the French army, during the following year, advanced into the heart of Germany, he was compelled by General Jourdan to retreat (August 13, 1796). He maintained his neutrality during the war between France and Austria in 1805, but in the following year he joined Prussia against France. After the disastrous battle of Jena he concluded a treaty of peace with Napoleon at Posen (December n, 1806), and, assuming the titie of king, he joined the Confederation of the Rhine. But he did not alter the constitution and administration of his new kingdom. After the peace of Tilsit (July 9, 1807) he was created by Napoleon grand-duke of Warsaw, but his sovereignty of Poland was little more than nominal. There was a kind of friendship between Frederick Augustus and Napoleon. In 1809 Frederick Augustus fought with him against Austria. On several occasions (1807, 181 2, 1813) Napoleon was entertained at Dresden, and when, on his return from his disastrous Russian campaign, he passed through Saxony by Dresden (December 16, 181 2), Frederick Augustus remained true to his friend and ally. It was only during April 1813 that he made overtures to Austria, but he soon afterwards returned to the side of the French. He returned to Dresden on the 10th of May and was present at the terrible battle of August 26 and 27, in which Napoleon's army and his own were defeated. He fell into the hands of the Allies after their entry into Leipzig on the 19th of October 1813; and, although he regained his freedom after the congress of Vienna, he was compelled to give up the northern part — three-fifths — of his kingdom to Prussia (May 21, 1814). He entered Dresden on the 7th of July, and was enthusiastically welcomed by his people. The remainder of his life was spent in repairing the damages caused by the Napoleonic wars, in developing the agricultural, commercial and industrial resources of his kingdom, reforming the administration of justice, establishing hospitals and other charitable institutions, encouraging art and science and promoting education. He had a special interest in botany, and originated the beautiful park at Pillnitz. His reign through- out was characterized by justice, probity, moderation and prudence. He died on the 5th of May 1827.

Bibliography. — The earlier lives, by C. E. Weisse (181 1), A. L. Herrmann (1827), Politz (1830), are mere panegyrics. On the other side see Flathe in Allgemeine deutsche Biographie, and Bottiger Flathe, History of Saxony (2nd ed., 1867 ft".), vols. ii. and iii. ; A. Bonnefons, Un Allie de Napoleon, Frederic Auguste, premier roi de Saxe . . . (Paris, 1902) ; Fritz. Friedrich, Politik Sachsens 1801- 1803 (1898);' P. Riihlmann, Offentliche Meinung . . . 1806-18 13 (1902). There are many pamphlets bearing on the Saxon question and on Frederick Augustus during the years 1814 and 1815. (J. Hn.)

FREDERICK AUGUSTUS II. (1797-18 54), king of Saxony, eldest son of Prince Maximilian and of Caroline Maria Theresa of Parma, was born on the 18th of May 1797. The unsettled times in which his youth was passed necessitated his frequent change of residence, but care was nevertheless taken that his education should not be interrupted, and he also acquired, through his journeys in foreign states (Switzerland 1818, Monte- negro 1838, England and Scotland 1844) and his intercourse with men of eminence, a special taste for art and for natural science. He was himself a good landscape-painter and had a fine

collection of engravings on copper. He was twice married — in 1819 (October 7) to the duchess Caroline, fourth daughter of the emperor Francis I. of Austria (d. May 22, 1832), and in 1833 (April 4) to Maria, daughter of Maximilian I. of Bavaria. There were no children of either marriage. During the govern- ment of his uncles (Frederick Augustus I. and Anthony) he took no part in the administration of the country, though he was the sole heir to the crown. In 1830 a rising in Dresden led to his being named joint regent of the kingdom along with King Anthony on the 13th of September; and in this position his popularity and his wise and liberal reforms (for instance, in arranging public audiences) speedily quelled all discontent. On the 6th of June 1836 he succeeded his uncle. Though he administered the affairs of his kingdom with enlightened liberality Saxony did not escape the political storms which broke upon Germany in 1848. He elected Liberal ministers, and he was at first in favour of the programme of German unity put forward at Frankfort, but he refused to acknowledge the democratic constitution of the German parliament. This attitude led to the insurrection at Dresden in May 1849, which was suppressed by the help of Prussian troops. From that time onward his reign was tranquil and prosperous. Later Count Beust, leader of the Austrian and feudal party in Saxony, became his principal minister and guided his policy on most occasions. His death occurred accidentally through the upsetting of his carriage near Brennbuhel, between Imst and Wenns in Tirol (August 9, 1854). Frederick Augustus devoted his leisure hours

chiefly to the study of botany. He made botanical excursions into different countries, and Flora Marienbadensis, oder Pflanzen und Gebirgs- arten, gesammelt und beschrieben, written by him, was published at Prague by Kedler, 1837.

See Bottiger-Flathe, History of Saxony, vol. iii. ; R. Freiherr von

Friesen, Erinnerungen (2 vols., Dresden, 1881); F. F. Graf von Beust, Aus drei-viertel Jahrhunderten (2 vols., 1887) ; Flathe, in Allg. deutsche Biogr. (J. Hn.)

FREDERICK CHARLES (FRIEDRICH KARL NIKOLAUS),

Prince (1828-1885), Prussian general field marshal, son of Prince Charles of Prussia and grandson of King Frederick William III., was born in Berlin on the 20th of March 1828. He was educated for the army, which he entered on his tenth birthday as second lieutenant in the 14th Foot Guards. He became first lieutenant in 1844, and in 1846 entered the university of Bonn, where he stayed for two years, being accompanied throughout by Major von Roon, afterwards the famous war minister. In 1848 he became a company commander in his regiment, and soon after- wards served in the Schleswig-Hoistein War on the staff of Marshal von Wrangel, being present at the battle of Schleswig (April 23, 1848). Later in 1 848 he became Rittmeister in the Garde du Corps cavalry regiment, and in 1849 major in the Guard Hussars. In this year the prince took part in the campaign against the Baden insurgents, and was wounded at the action of Wiesenthal while leading a desperate charge against entrenched infantry. After this experience the wild courage of his youth gave place to the unshakable resolution which afterwards characterized the prince's generalship. In 1852 he became colonel, and in 1854 major-general and commander of a cavalry brigade. In this capacity he was brought closely in touch with General von Reyher, ■ the chief of the general staff, and with Moltke. He married, in the same year, Princess Marie Anne of Anhalt. In 1857 he became commander of the 1st Guard Infantry division, but very shortly afterwards, on account of disputes concerned with the training methods then in force, he resigned the appoint- ment.

In 1858 he visited France, where he minutely investigated the state of the French army, but it was not long before he was recalled, for in 1859, in consequence of the Franco-Austrian War, Prussia mobilized her forces, and Frederick Charles was made a divisional commander in the II. army corps. In this post he was given the liberty of action which had previously been denied to him. About this time (i860) the prince gave a lecture to the officers of his command on the French

army and its methods, the substance of which (Eine militdrische Denkschrifi

von P. F.K., Frankfort on Main, i860) was circulated more widely than the author intended, and in the French translation gave rise to much indignation in France. In 1861 Frederick Charles became general of cavalry. He was then commander of the III. (Brandenburg) army corps. This post he held from i860 to 1870, except during the campaigns of 1864 and 1866, and in it he dis- played his real qualities as a troop leader. His self-imposed task was to raise the military spirit of his troops to the highest possible level, and ten years of his continuous and thorough training brought the III. corps to a pitch of real efficiency which the Guard corps alone, in virtue of its special recruiting powers, slightly surpassed. Prince Frederick Charles' work was tested to the full when von Alvensleben and the III. corps engaged the whole French army on the 16th of August 1870. In 1864 the prince once more fought against the Danes under his old leader " Papa " Wrangel. The Prussian contingent under Frederick Charles formed a corps of the allied army, and half of it was drawn from the III. corps. After the storming of the Diippel lines the prince succeeded Wrangel in the supreme command, with Lieutenant-General Freiherr von Moltke as his chief of staff. These two great soldiers then planned and brilliantly carried out the capture of the island of Alsen, after which the war came to an end.

In 1866 came the Seven Weeks' War with Austria. Prince Frederick Charles was appointed to command the I. Army, which he led through the mountains into Bohemia, driving before him the Austrians and Saxons to the upper Elbe, where on the 3rd of July took place the decisive battle of Koniggratz or Sadowa. This was brought on by the initiative of the leader of the I. Army, which had to bear the brunt of the fighting until the advance of the II. Army turned the Austrian flank. After the peace he returned to the III. army corps, which he finally left, in July 1870, when appointed to command the II. German Army in the war with France. In the early days of the advance the prince's ruthless energy led to much friction between the I. and II. Armies (see Franco-German War) , while his strategical mistakes seriously embarrassed the great headquarters staff. The advance of the II. Army beyond the Saar to the Moselle and from that river to the Meuse displayed more energy than careful strategy, but herein at least the " Red Prince " (as he was called from the colour of his favourite

hussar uniform) was in thorough sympathy with the king's headquarters on the one hand and the feelings of the troops on the other. Then came the discovery that the French were not in front, but to the right rear of the II. Army (August 16). Alvensleben with the III. corps held the French to their ground at Vionville while the prince hurried together his scattered forces. He himself directed with superb tactical skill the last efforts of the Germans at Vionville, and the victory of St Privat on the 18th was due to his leadership (see Metz), which shone all the more by contrast with the failures of the I. Army at Gravelotte. The prince was left in command of the forces which blockaded Bazaine in Metz, and received the surrender of that place and of the last remaining field army of the enemy. He was promoted at once to the rank of general field marshal, and shortly afterwards the II. Army was despatched to aid in crushing the newly organized army of the French republic on the Loire. Here again he retrieved strategical errors by energy and tactical skill, and his work was in the end crowned by the victory of Le Mans on the 12th of January 187 1. Of all the subordinate leaders on the German side none enjoyed a greater and a better deserved reputation than the Red Prince.

He now became inspector- general of the 3rd "army inspection," and a little later inspector of cavalry, and in the latter post he was largely instrumental in bringing the German cavalry to the degree of perfection in manoeuvre and general training which it gradually attained in the years after the war. He never ceased to improve his own soldierly qualities by further study and by the conduct of manoeuvres on a large scale. His sternness of character kept him aloof from the court and from his own family, and he spent his leisure months chiefly on his various country estates. In 1872 and in 1882 he travelled in the Mediterranean and the Near East. He died on the 15th of June 1885 at Klein-Glienicke

near Berlin, and was buried at the adjacent church of Nikolskoe. His third daughter, Princess Louise Margareta, was married, in March 1879, to the duke of Connaught.

FREDERICK HENRY (1584-1647), prince of Orange, the youngest child of William the Silent, was born at Delft about six months before his father's assassination on the 29th of January 1 584. His mother, Louise de Coligny , was daughter of the famous Huguenot leader, Admiral de Coligny, and was the fourth wife of William the Silent. The boy was trained to arms by his elder brother, Maurice of Nassau, one of the first generals of his age. On the death of Maurice in 1625, Frederick Henry succeeded him in his paternal dignities and estates, and also in the stadt- holderates of the five provinces of Holland,

Zeeland, Utrecht, Overysel and Gelderland, and in the important posts of captain and admiral-general of the Union. Frederick Henry proved himself scarcely inferior to his brother as a general, and a far more capable statesman and politician. During twenty-two years he remained at the head of affairs in the United Provinces, and in his time the power of the stadtholderate reached its highest point. The ” Period of Frederick Henry,” as it is usually styled by Dutch writers, is generally accounted the golden age of the republic. It was marked by great military and naval triumphs, by world-wide maritime and commercial expansion, and by a wonderful outburst of activity in the domains of art and literature. The chief military exploits of Frederick Henry were the sieges and captures of Hertogenbosch in 1629, of Maastricht in 1632, of Breda in 1637, of Sas van Ghent in 1644, and of Hulst in 1645. During the greater part of his administration the alliance with France against Spain had been the pivot of Frederick Henry’s foreign policy, but in his last years he sacrificed the French alliance for the sake of concluding a separate peace with Spain, by which the United Provinces obtained from that power all the advantages for which they had for eighty years been contending. Frederick Henry died on the 14th of March 1647, and was buried with great pomp beside his father and brother at Delft. The treaty of Miinster, ending the long struggle between the Dutch and the Spaniards, was not actually signed until the 30th of January 1648, the illness and death of the stadtholder having caused a delay in the negotiations. Frederick Henry was married in 1625 to Amalia von Solms, and left one son, William II. of Orange, and four daughters.

Frederick Henry left an account of his campaigns in his Memoires de Frederic Henri (Amsterdam, 1743). See Cambridge Mod. Hist. vol. iv. chap. 24, and the bibliography on p. 931.

FREDERICK LOUIS (1707-1751), prince of Wales, eldest son of George II., was born at Hanover on the 20th of January 1707. After his grandfather, George I., became king of Great Britain and Ireland in 17 14, Frederick was known as duke of Gloucester 1 and made a knight of the Garter, having previously been be- trothed to tVilhelmina Sophia Dorothea (1709-1758), daughter of Frederick William I., king of Prussia, and sister of Frederick the Great. Although he was anxious to marry this lady, the match was rendered impossible by the dislike of George II. and Frederick William for each other. Soon after his father became king in 1727 Frederick took up his residence in England and in 1729 was created prince of Wales; but the relations between George II. and his son were very unfriendly, and there existed between, them the jealousy which Stubbs calls the ” incurable bane of royalty.” The faults were not all on one side. The prince’s character

was not attractive, and the king refused to make him an adequate allowance. In 1735 Frederick wrote, or inspired the writing of, the Hisloire du prince Titi, a book containing offensive caricatures of both king and queen; and losing no opportunity of irritating his father, ” he made,” says Lecky, ” his court the special centre of opposition to the govern- ment, and he exerted all his influence for the ruin of Walpole.” After a marriage between the prince and Lady Diana Spencer, afterwards the wife of John, 4th duke of Bedford, had been frustrated by Walpole, Frederick was married in April 1736 to

1 Frederick was never actually created duke of Gloucester, and when he was raised to the peerage in 1 736 it was as duke of Edinburgh only. See G. E. C(okayne), Complete Peerage, sub ” Gloucester.”

FREDERICK WILLIAM I.

Augusta (1719-1772), daughter of Frederick II., duke of Saxe- Gotha, a union which was welcomed by his parents, but which led to further trouble between father and son. George proposed to allow the prince £50,000 a year; but this sum was regarded as insufficient by the latter, whose appeal to parliament was unsuccessful. After the birth of his first child, Augusta, in 1 73 7, Frederick was ordered by the king to quit St James’ Palace, and the foreign ambassadors were requested to refrain from visiting him . The relations between the two were now worse than before. In 1745 George II. refused to allow his sonto command theBritish army against the Jacobites. On the 20th of March 1751 the prince died in London, and was buried in Westminster Abbey. He left five sons and two daughters. The sons were George (afterwards King George III.), Edward Augustus, duke of York and Albany (1739-1767}, William Henry, duke of Gloucester and Edinburgh (1 743-1803), Henry Frederick, duke of Cumber- land (1745-1790), and Frederick William (1750-1765); the daughters were Augusta (1737-1813), wife of Charles William Ferdinand, dukeof Brunswick, and Caroline Matilda (17 51—1775), wife of Christian VII., king of Denmark.

See Lord Hervey of Ickworth, Memoirs of the Reign of George II., edited by J. W. Croker (London, 1884); Horace Walpole, Memoirs of the Reign of George II. (London, 1847); and Sir N. W. Wraxall, Memoirs, edited by H. B. Wheatley, vol. i. (London, 1884).

FREDERICK WILLIAM I. (1688-1740), king of Prussia, son of Frederick I. by his second marriage was born on the 15th of August 1688. He spent a considerable time in early youth at the court of his grandfather, the elector Ernest Augustus of Hanover. On his return to Berlin he was placed under General von Dohna and Count Finkenstein, who trained him to the energetic and regular habits which ever afterwards characterized him. He was soon imbued with a passion for military life, and this was deepened by acquaintance with the duke of Marlborough (1709), Prince Eugene, whom he visited during the siege of Tournai, and Prince Leopold of Anhalt (the ” Old Dessauer “). In nearly every respect he was the opposite of his father, having frugal,

simple tastes, a passionate temper and a determined will. Throughout his life he was always the protectorof thechurchand of religion. But he detested religious quarrels and was very tolerant towards his Catholic subjects, except the Jesuits. His life was simple and puritanical, beingfounded on the teaching of the Bible. He was, however, fond of hunting and somewhat given to drinking. He intensely disliked the French, and highly disapproved of the imitation of their manners by his father and his court. When he came to the throne (February 25, 1713) his first act was to dismiss from the palace every unnecessary official and to regulate the royal household on principles of the strictest parsimony. The greater part of the beautiful furniture was sold. His importance for Prussia is twofold: in internal politics he laid down principles which continued to be followed long after his death. This was a province peculiarly suited to his genius; he was one of the greatest administrators who have everwornthe Prussian crown. His foreign policy was less successful, though under his rule the kingdom acquired some extension of territory. ‘ Thus at the peace of Utrecht (April 11, 17 13), after the War of the Spanish Succession, he acquired the greater part of the duchy of Gelderland. By the treaty of Schwedt, concluded with Russia on the 6th of October, he was assured of an important influence in the solution of the Baltic question, which during the long absence of Charles XII. had become burning; and Swedish Pomerania,as far as the Peene,was occupied by Prussia. But Charles XII. on his return turned against the king, though without success, for the Pomeranian campaign of 171 5 ended in favour of Prussia (fall of Stralsund, December 22). This enabled Frederick William I. to maintain a more independent attitude towards the tsar; he refused, for example, to provide him with troops for a campaign (in Schonen) against the Swedes. When on the 28th of May i7i8,in view of the disturbances in Mecklen- burg, he signed at Havelberg the alliance with Russia, he confined himself to taking up a defensive attitude, and, on the other hand, on the 14th of August 1719 he also entered into relations with his former enemies, England and Hanover. And so, by the treaty of Stockholm (February 1, 1720), Frederick William

succeeded in obtaining the consent of Sweden to the cession of that part of Pomerania which he had occupied (Usedom, Wollin, Stettin, Hither Pomerania, east of the Peene) in return for a payment of 2,000,000 thalers.

While Frederick William I. succeeded in carrying his wishes into effect in this direction, he was unable to realize another project which he had much at heart, namely, the Prussian succes- sion to the Lower Rhine duchies of Jiilich and Berg. The treaty concluded in 1725 at

Vienna between the emperor and Spain brought the whole of this question up again, for both sides had pledged themselves to support the Palatinate-Sulzbach succession (in the event of the Palatinate-Neuberg line becoming extinct). Frederick William turned for help to the western powers, England and France, and secured it by the treaty of alliance signed at Herrenhausen on the 3rd of September 1725 (Leagueof Hanover). But since the western powers soon sought to use the military strength of Prussia for their own ends, Frederick again turned towards the east, strengthened above all his relations with Russia, which had continued to be good, and finally, by the treaty of Wiisterhausen (October 12,1726; ratified at Berlin, December 23, 1 728), even allied himself with his former adversary, the court of Vienna; though this treaty only imperfectly safeguarded Prussian interests, inasmuch as Frederick William consented to renounce his claims to Jiilich. But as in the following years the European situation became more and more favourable to the house of Habsburg, the latter began to try to withdraw part of the con- cessions which it had made to Frederick William. As early as 1728 Dusseldorf, the capital, was excluded from the guarantee of Berg. Nevertheless, in the War of the Polish Succession against France (1734-1735), Frederick William remained faithful to the emperor's cause, and sent an auxiliary force of 10,000 men. The peace of Vienna, which terminated the war, led to a reconciliation between France and Austria, and so to a further estrangement between Frederick William and the emperor. Moreover, in 1738 the western powers, together with the emperor, insisted in identi- cal notes on the recognition of the emperor's right to decide the question of the succession in the Lower Rhine duchies. A breach with the emperor was now inevitable, and this explains why in a last treaty (April 5, 1739) Frederick William obtained from France a guarantee of a part, at least, of Berg (excluding Dusseldorf).

But Frederick William's failures in foreign policy were more than compensated for by his splendid services in the internal administra tion of Prussia. He saw the necessity of rigid economy not only in his private life but in the whole administration of the state. During his reign Prussia obtained for the first time a centralized and uniform financial administration. It was the king himself who composed and wrote in the year 1722 the famous instruction for the general directory (Generaldirektorium) of war, finance and domains. When he died the income of the state was about seven million thalers (£1,050,000). The consequence was that he paid off the debts incurred by his father, and left to his successor a well filled treasury. In the administration of the domains he made three innovations: (1) the private estates of the king were turned into domains of the crown

(August 13, I 7 1 3)> (2) the freeing of the serfs on the royal domains (March 22, 1719)5.(3) the conversion of the hereditary lease into a* short-term lease on the basis of productiveness. His industrial policy was inspired by the mercantile spirit. On this account he forbade the importation of foreign manufactures and the export of raw materials from home, a policy which had a very good effect on the growth of Prussian industries.

The work of internal colonization he carried on with especial zeal. Most notable of all was his retablissement of East Prussia,to which he devoted six million thalers (c. £900,000). His policy in respect of the towns was motived largely by fiscal considerations, but at the same time he tried also to improve their municipal administration; for example, in the matter of buildings, of the letting of domain lands and of the collection of the excisein towns. Frederick William hadmanyopponentsamongthenobles because he pressed on the abolition of the old feudal rights, introduced in East Prussia and Lithuania £ general land tax (the General-

hufenschoss) , and finally in 1739 attacked in a special edict the Legen, i.e. the expropriation of the peasant proprietors. He did nothing for the higher learning, and even banished the philo- sopher Christian Wolff at forty-eight hours' notice " on pain of the halter," for teaching, as he believed, fatalist doctrines. Afterwards he modified his judgment in favour of Wolff, and even, in 1739, recommended the study of his works. He established many village schools, which he often visited in person; and after the year 1717 (October 23) all Prussian parents were obliged to send their children to school {Schulzwang) . He was the especial friend of the Franckische Stiftungen at Halle on the Saale. Under him the people flourished; and although it stood in awe of his vehement spirit it respected him for his firmness, his honesty of purpose and his love of justice. He was devoted also to his army, the number of which he raised from 38,000 to 83,500, so that under him Prussia became the third military power in the world, coming next after Russia and France. There was not a more thoroughly drilled or better appointed force. The Potsdam guard, made up of giants collected from all parts of Europe, sometimes kidnapped, was a sort of toy with which he amused himself. The reviewing of his troops was his chief pleasure. But he was also fond of meeting his friends in the evening in what he called his Tobacco-College, where amid clouds of tobacco smoke he not only discussed

affairs of state but heard the newest ” guard-room jokes.” He died on the 31st of May 1 740, leaving behind him his widow, Sophia Dorothea of Hanover, whom he had married on the 26th of November 1 706. His son was Frederick the Great, who was the opposite of Frederick William. This opposition became so strong in 1730 that the crown prince fled from the court, and was later arrested and brought before a court-martial. A reconciliation was brought about, at first gradually. In later years the relations between father and son came to be of the best (see Frederick II., king of Prussia).

Bibliography. — D. Fassmann, Leben und Thaten Friedrich Wilhelms (2 vols., Hamburg and Breslau, 1735, 1741); F. Forster, Friedrich Wilhelm I. (3 vols., Potsdam, 1834 and 1835) ; C. v. Noorden, Historische Vortrdge (Leipzig, 1884) ; O. Krauske, ” Vom Hofe Friedrich Wilhelms I.,” Hohenzollernjahrbuch, v. (1902); R. Koser, Friedrich der Grosse als Kronprinz (2nd ed., Stuttgart, 1901) ; W. Oncken, ” Sir Charles Hotham und Friedrich Wilhelm I. im Jahre 1730,” Forschungen zur branderiburgischen Geschichte, vol. vii. et seq. ; J. G. Droysen in the Allgemeine deutsche Biographie, vii. (1878), and in Geschichte der preussischen Politik, section iv., vols, ii.iv. (2nd ed., 1868 et seq.); L. v. Ranke, Zwblf Bilcher preussischer Geschichte (1874 et seq.); Stenzel, Geschichte des preus sischen Staates, iii. (1841) ; F. Holke, ” Strafrechtspflege unter Friedrich Wilhelm I.,” Beitrdge zur branderiburgischen Rechts- geschichte, iii. (1894); V. Loewe, ” Allodifikation der Leben unter Friedrich Wilhelm I.;” Forschungen zur brandenburgischen Geschichte, xi.; G. Schmoller, ” Epochen der preuss. Finanzpolitik,” Umrisse und Unter suchungen (Leipzig, 1898), ” Innere Verwaltung unter Friedrich Wilhelm I.,” Preuss. Jahrbiicher, xxvi., ” Stadtewesen unter Friedrich Wilhelm I.,” Zeitschrift fur preussische Geschichte, x. et seq.; B. Reuter, ” K6nig Friedrich Wilhelm I. und das General- Direktorium,” ibid, xii.; V. Loewe, ” Zur Grundungsgeschichte des General-Direktoriums,” Forschungen, &c, xiii. ; R. Stadelmann, Preussens Konige in ihrer Tdtigkeit fur die Landeskultur , vol. i. ” Friedrich Wilhelm I.” (1878); M. Beheim-Schwarzbach, Hohen- zollern’sche Kolonizationen (Leipzig, 1874); W. Naude, “Die merkantilistische Wirtschaftspolitik Friedrich Wilhelms I.,” His- torische Zeitschrift, xc. ; M. Lehmann, ” Werbung, &c, im Heere Friedrich Wilhelms I.,” ibid, lxvii. ; Isaacson, ” Erbpachtsystem in der preussischen Domanenverwaltung,” Zeitschrift fur preuss. Gesch. xi. Cf. also Hohenzollernjahrbuch, viti. (1905), for particulars of his education and death; letters to Prince Leopold of Anhalt-Dessau in the Acta Borussica (1905). English readers will find a picturesque account of him in Thomas Carlyle’s Frederick the Great. (J. Hn.)

FREDERICK WILLIAM II. (1744-1797), king of Prussia, son of Augustus William, second son of King Frederick William I. and of Louise Amalie of Brunswick, sister of the wife of Frederick the Great, was born at Berlin on the 2 5th of September 1744, and became heir to the throne on his father's death in 1757. The boy was of an easy-going and pleasure-loving disposition, averse from sustained effort of any kind, and sensual by nature. His marriage with Elisabeth Christine, daughter of Duke Charles of Brunswick, contracted in 1765, was dissolved in 1769, and he soon afterwards married Frederika Louisa, daughter of the land-

grave Louis IX. of Hesse-Darmstadt. Although he had a numerous family by his wife, he was completely under the in- fluence of his mistress, Wilhelmine Enke, afterwards created Countess Lichtenau, a woman of strong intellect and much ambition. He was a man of singularly handsome presence, not without mental qualities of a high order; he was devoted to the arts — Beethoven and Mozart enjoyed his patronage and his private orchestra had a European reputation. But an artistic temperament was hardly that required of a king of Prussia on the eve of the Revolution; and Frederick the Great, who had employed him in various services — notably in an abortive con- fidential mission to the court of Russia in 1 780 — openly expressed his misgivings as to the character of the prince and his sur- roundings.

The misgivings were justified by the event. Frederick William's accession to the throne (August 17, 1786) was, indeed, followed by a series of measures for lightening the burdens of the people, reforming the oppressive French system of tax-collecting introduced by Frederick, and encouraging trade by the diminu- tion of customs dues and the making of roads and canals. This gave the new king much popularity with the mass of the people; while the educated classes were pleased by his removal of Frederick's ban on the German language by the admission of German writers to the Prussian Academy, and by the active encouragement given to schools and universities. But these reforms were vitiated in their source. In 1 781 Frederick William, then prince of Prussia, inclined, like many sensual natures, to mysticism, had joined the Rosicrucians, and had fallen under the influence of Johann Christof Wollne 1 " (1 73 2-1 800), and by him the royal policy was inspired. Wollner, whom Frederick the Great had described as a " treacherous and intriguing priest," had started life as a poor tutor in the family of General von Itzenplitz, a noble of the mark of Brandenburg, had, after the general's death and to the scandal of king and nobility, married the general's daughter, and with his mother-in-law's assistance settled down on a small estate. By his practical experiments and by his writings he gained a

considerable reputation as an econo- mist; but his ambition was not content with this, and he sought to extend his influence by joining first the Freemasons and after- wards (1779) the Rosicrucians. Wollner, with his impressive personality and easy if superficial eloquence, was just the man to lead a movement of this kind. Under his influence the order spread rapidly, and he soon found himself the supreme director (Oberhauptdirektor) of some 26 ” circles,” which included in their membership princes, officers and high officials. As a Rosicrucian Wollner dabbled in alchemy and other mystic arts, but he also affected to be zealous for Christian orthodoxy, imperilled by Frederick II. ‘s patronage of ” enlightenment,” and a few months before Frederick’s death wrote to his friend the Rosicrucian Johann Rudolph von Bischoffswerder (1741-1803) that his highest ambition was to be placed at the head of the religious department of the state ” as an unworthy instrument in the hand of Ormesus ” (the prince of Prussia’s Rosicrucian name) ” for the purpose of saving millions of souls from perdition and bringing back the whole country to the faith of Jesus Christ.”

Such was the man whom Frederick William II., immediately after his accession, called to his counsels. On the 26th of August 1786 he was appointed privy councillor for finance (Geheimer Oberfinanzrath) , and on the 2nd of October was ennobled. Though not in name, in fact he was prime minister; in all in- ternal affairs it was he who decided; and the fiscal and economic reforms of the new reign were the application of his theories. Bischoffswerder, too, still a simple major, was called into the king’s counsels; by 1789 he was already an adjutant-general. These were the two men who enmeshed the king in a web of Rosicrucian mystery and intrigue, which hampered whatever healthy development of his policy might have been possible, and led ultimately to disaster. The opposition to Wollner was, indeed, at the outset strong enough to prevent his being entrusted with the department of religion; but this too in time was over- come, and on the 3rd of July 1788 he was appointed active privy councillor of state and of justice and head of the spiritual

department for Lutheran and Catholic affairs. War was at once declared on what — to use a later term — we may call the ‘■ modernists.” The king, so long as Wollner was content to condone his immorality (which Bischoffswerder, to do him justice, condemned), was eager to help the orthodox crusade. On the 9th of July was issued

the famous religious edict, which forbade Evangelical ministers to teach anything not contained in the letter of their official books, proclaimed the necessity of protecting the Christian religion against the " enlighteners " {Aufklarer) , and placed educational establishments under the supervision of the orthodox clergy. On the 18th of December a new censorship law was issued, to secure the orthodoxy of all published books; and finally, in 1791, a sort of Protestant Inquisition was established at Berlin (I mmediat-Examinations- commission) to watch over all ecclesiastical and scholastic appointments. In his zeal for orthodoxy, indeed, Frederick William outstripped his minister; he even blamed Wollner's " idleness and vanity " for the inevitable failure of the attempt to regulate opinion from above, and in 1794 deprived him of one of his secular offices in order that he might have more time " to devote himself to the things of God "; in edict after edict the king continued to the end of his reign to make regulations " in order to maintain in his states a true and active Christianity, as the path to genuine fear of God."

The effects of this policy of blind obscurantism far outweighed any good that resulted from the king's well-meant efforts at economic and financial reform; and_even this reform was but spasmodic and partial, and awoke ultimately more discontent than it allayed. But far more fateful for Prussia was the king's attitude towards the army and foreign policy. The army was the very foundation of the Prussian state, a truth which both Frederick William I. and the great Frederick had fully realized; the army had been their first care, and its efficiency had been maintained by their constant personal supervision. Frederick William, who had no taste for military matters, put his authority as " War-Lord " into commission under a supreme college of war (Oberkricgs-Collegium) under the duke of Brunswick and General von Mollendorf. It was the beginning of the process that ended in 1806 at Jena.

In the circumstances Frederick William's intervention in European affairs was not likely to prove of benefit to Prussia. The Dutch campaign of 1787, entered on for purely family reasons, was indeed successful; but Prussia received not even the cosi of her intervention. An attempt to intervene in the war of Russia and Austria against Turkey failed of its object; Prussia did not succeed in obtaining any concessions of territory from the alarms of the Allies, and the dismissal of Hertzberg in 1 79 1 marked the final abandonment of the anti- Austrian tradi- tion of Frederick the Great. For, meanwhile, the French Revolu- tion had entered upon alarming phases, and in August 1791 Frederick William, at the meeting at Pillnitz, arranged with the emperor Leopold to join in supporting the cause of Louis XVI. But

neither the king's character, nor the confusion of the Prussian finances due to his extravagance, gave promise of any effective action. A formal alliance was indeed signed on the 7th of February 1792, and Frederick William took part personally in the campaigns of 1792 and 1793. He was hampered, however, by want of funds, and his counsels were distracted by the affairs of Poland, which promised a richer booty than was likely to be gained by the anti-revolutionary crusade into France. A subsidy treaty with the sea powers (April 19, 1794) filled his coffers; but the insurrection in Poland that followed the partition of 1793, and the threat of the isolated intervention of Russia, hurried him into the separate treaty of Basel with the French Republic (April 5, 1795), which was regarded by the great monarchies as a betrayal, and left Prussia morally isolated in Europe on the eve of the titanic struggle between the monarchical principle and the new political creed of the Revolution. Prussia had paid a heavy price for the territories acquired at the expense of Poland in 1793 and 1795, and when, on the 16th of November 1797, Frederick William died, he left the state in bankruptcy and confusion, the army decayed and the monarchy discredited. xi. 3

Frederick William II. was twice married: (1) in 1765 to Elizabeth of Brunswick (d. 1841), by whom he had a daughter, Frederika, afterwards duchess of York, and from whom he was divorced in 1769; (2) in 1769 to Frederika Louisa of Hesse- Darmstadt, by whom he had four sons, Frederick William III., Louis (d. 1796), Henry and William, and two daughters, Wilhel- mina, wife of William of Orange, afterwards William I., king of the Netherlands, and Augusta, wife of William II., elector of Hesse. Besides his relations with his mattresse en litre, the countess Lichtenau, the king — who was a frank polygamist — contracted two " marriages of the left hand " with Fraulein von Voss and the countess Donhoff.

See article by von Hartmann in Allgent. deutsche Biog. (Leipzig, 1878); Stadelmann, Preussens Konige in ihrer Tdtigkeit fur die Landeskultur,vo. iii. " Friedrich Wilhelm II." (Leipzig, 1885) ; Paulig, Friedrich Wilhelm II. , sein Privatleben u. seine Regierung (Frankf urt-an-der-Oder, 1896).

FREDERICK WILLIAM III. (1770-1840), king of Prussia, eldest son of King Frederick William II., was born at Potsdam on the 3rd of August 1770. His father, then prince of Prussia, was out of favour with Frederick the Great and entirely under the influence of his mistress; and the boy, handed over to tutors appointed by the king, lived a solitary and repressed life which tended to increase the innate weakness of his character. But though his natural defects of intellect

and will-power were not improved by the pedantic tutoring to which he was submitted, he grew up pious, honest and well-meaning; and had fate cast him in any but the most stormy times of his country's history he might well have left the reputation of a model king. As a soldier he received the usual training of a Prussian prince, obtained his lieutenancy in 1784, became a colonel commanding in 1790, and took part in the campaigns of 1792-94. In 1793 he married Louise, daughter of Prince Charles of Mecklenburg- Strelitz, whom he had met and fallen in love with at Frankfort (see Louise, queen of Prussia). He succeeded to the throne on the 16th of November 1797 and at once gave earnest of his good intentions by cutting down the expenses of the royal establish- ment, dismissing his father's ministers, and reforming the most oppressive abuses of the late reign. Unfortunately, however, he had all the Hohenzollern tenacity of personal power without the Hohenzollern genius for using it. Too distrustful to delegate his responsibility to his ministers, he was too infirm of will to strike out and follow a consistent course for himself.

The results of this infirmity of purpose are written large on the history of Prussia from the treaty of Luneville in 1801 to the downfall that followed the campaign of Jena in 1806. By the treaty of Tilsit (July 9th, 1807) Frederick William had to surrender half his dominions, and what remained to him was exhausted by French exactions and liable at any moment to be crushed out of existence by some new whim of Napoleon. In the dark years that followed it was the indomitable courage of Queen Louise that helped the weak king not to despair of the state. She seconded the reforming efforts of Stein and the work of Scharnhorst and Gneisenau in reorganizing the army, by which the resurrection of Prussia became a possibility. When Stein was dismissed at the instance of Napoleon, Hardenberg succeeded him as chancellor (June 18 10). In the following month Queen Louise died, and the king was left alone to deal with circum- stances of ever-increasing difficulty. He was forced to join Napoleon in the war against Russia; and even when the disastrous campaign of 181 2 had for the time broken the French power, it was not his own resolution, but the loyal disloyalty of General York in concluding with Russia the .convention of Tauroggen that forced him into line with the patriotic fervour of his people.

Once committed to the Russian alliance, however, he became the faithful henchman of the emperor Alexander, whose fascinat- ing personality exercised over him to the last a singular power, and began that influence of Russia at the court of Berlin which was to last till Frederick William IV. 's supposed Liberalism was to shatter the cordiality of the entente. That during and after the settlement of 1815

Frederick William played a very secondary part in European affairs is explicable as well by his character as'

by the absorbing character of the internal problems of Prussia. He was one of the original co-signatories of the Holy Alliance, though, in common with most, he signed it with reluctance; and in the counsels of the Grand Alliance he allowed himself to be practically subordinated to Alexander and later to Metternich. In a ruler of his character it is not surprising that the Revolution and its developments had produced an unconquerable suspicion of constitutional principles and methods, which the Liberal agitations in Germany tended to increase. At the various congresses, from Aix-la-Chapelle (1818) to Verona (1822), there- fore, he showed himself heartily in sympathy with the repressive policy formulated in the Troppau Protocol. The promise of a constitution, which in the excitement of the War of Liberation he had made to his people, remained unfulfilled partly owing to this mental attitude, partly, however, to the all but insuperable difficulties in the way of its execution. But though reluctant to play the part of a constitutional king, Frederick William maintained to the full the traditional character of " first servant of the state." Though he chastised Liberal professors and turbulent students, it was in the spirit of a benevolent Landes- vater; and he laboured assiduously at the enormous task of administrative reconstruction necessitated by the problem of welding the heterogeneous elements of the new Prussian kingdom into a united whole. He was sincerely religious; but his well- meant efforts to unite the Lutheran and Reformed Churches, in celebration of the tercentenary of the Reformation (1817), revealed the limits of his paternal power; eleven years passed in vain attempts to devise common formulae; a stubborn Lutheran minority had to be coerced by military force, the con- fiscation of their churches and the imprisonment or exile of their pastors; not till 1834 was outward union secured on the basis of common worship but separate symbols, the opponents of the measure being forbidden to form communities of their own. With the Roman Church, too, the king came into conflict on the vexed question of " mixed marriages," a conflict in which the Vatican gained an easy victory (see Bunsen, C.C.J., Baron von) .

The revolutions of 1830 strengthened Frederick William in his reactionary tendencies; the question of the constitution was indefinitely shelved; and in 183 1 Prussian troops concentrated on the

frontier helped the task of the Russians in reducing the military rising in Poland. Yet, in spite of all, Frederick William was beloved by his subjects, who valued him for the simplicity of his manners, the goodness of his heart and the memories of the dark days after 1806. He died on the 7th of June 1840. In 1824 he had contracted a morganatic marriage with the countess Auguste von Harrach, whom he created Princess von Liegnitz. He wrote Luther in Bezug auf die Kirchenagenda von 1822 und 1823 (Berlin, 1827), Reminiszenzen aus der Kampagne 17Q2 in Frankreich, and Journal meiner Brigade in der Kampagne am Rhein 1703.

The correspondence (Briefwechsel) of King Frederick William III. and Queen Louise with the emperor Alexander I. has been published (Leipzig, 1900) and also that between the king and queen (ib. 1903), both edited by P. Bailleu. See W. Hahn, Friedrich Wilhelm III. und Luise (3rd ed., Leipzig, 1877); M. W. Duncker, Aus der Zeit Friedrichs des Grossen und Friedrich Wilhelms III. (Leipzig, 1876); Bishop R. F. ‘Eylert, Charakterziige aus dem Leben des Kbnigs ton Preussen Friedrich Wilhelm III. (3 vols., Magdeburg, 1843-1846).

FREDERICK WILLIAM IV. (1795-1861), king of Prussia, eldest son of Frederick William III., was born on the 15th of October 1795. From his first tutor, Johann Delbriick, he imbibed a love of culture and art, and possibly also the dash of Liberalism which formed an element of his complex habit of mind. But after a time Delbriick, suspected of inspiring his charge with a dislike of the Prussian military caste and even of belonging to a political secret society, was dismissed, his place being taken by the pastor and historian Friedrich Ancillon, while a military governor was also appointed. By Ancillon he was grounded in religion, in history and political science, his natural taste for the antique and the picturesque making it easy for his tutor to impress upon H-‘m his own hatred of the Revolution and its principles. This hatred was confirmed by the sufferings of his country and family

in the terrible years after 1806, and his first experience of active soldiering was in the campaigns that ended in the occupation of Paris by the Allies in 1814. In action his reckless bravery had earned him rebuke, and in Paris he was remarked for the exact Derformance of his military duties, though he found time to whet his appetite for art in the matchless collections gathered by Napoleon as the spoil of all Europe. On his return to Berlin he studied art under the sculptor Christian Daniel Rauch and the painter and architect Karl Friedrich Schinkel (1781-1841), proving himself in the end a good draughtsman, a born architect and an excellent landscape gardener. At the same time he was being tutored in law by Savigny and in finance

by a series of distinguished masters. In 1 823 he married the princess Elizabeth of Bavaria, who adopted the Lutheran creed. The union, though childless, was very happy. A long tour in Italy in 1828 was the beginning of his intimacy with Bunsen and did much to develop his knowledge of art and love of antiquity.

On his accession to the throne in 1840 much was expected of a prince so variously gifted and of so amiable a temper, and his first acts did not belie popular hopes. He reversed the unfortunate ecclesiastical policy of his father, allowing a wide liberty of dissent, and releasing the imprisoned archbishop of Cologne; he modified the strictness of the press censorship; above all he undertook, in the presence of the deputations of the provincial diets assembled to greet him on his accession, to carry out the long-deferred project of creating a central constitution, which he admitted to be required alike by the royal promises, the needs of the country and the temper of the times. The story of the evolution of the Prussian parliament belongs to the history of Prussia. Here it must suffice to notice Frederick William's personal share in the question, which was determined by his general attitude of mind. He was an' idealist; but his idealism was of a type the exact reverse of that which the Revolution in arms had sought to impose upon Europe. The idea of the sovereignty of the people was to him utterly abhorrent, and even any delegation of sovereign power on his own part would have seemed a betrayal of a God-given trust. " I will never," he declared, " allow to come between Almighty God and this country f plotted parchment, to rule us with paragraphs, and to replace the ancient, sacred bond of loyalty." His vision of the ideal state was that of a patriarchial monarchy, surrounded and advised by the traditional estates of the realm — nobles, peasants, burghers — and cemented by the bonds of evangelical religion; but in which there should be no question of the sovereign power being vested in any other hands than those of the king by divine right. In Prussia, with its traditional loyalty and its old-world caste divisions, he believed that such a conception could be realized, and he took up an attitude half-way between those who would have rejected the proposal for a central diet altogether as a dangerous " thin end of the wedge," and those who would have approximated it more to the modern conception of a parliament. With a charter, or a representative system based on population, he would have nothing to do. The united diet which was opened on the 3rd of February 1847 was no more than a congregation of the diets instituted by Frederick William III. in the eight provinces of Prussia. Unrepresentative though it was — for the industrial working-classes had no share in it — it at once gave voice to the demand for a constitutional system.

This demand gained overwhelmingly in force with the revolu- tionary outbreaks of r848. To Frederick William these came as a complete surprise, and, rudely awakened from his medieval dreamings, he even allowed himself to be carried away for a while by the popular tide. The loyalty of the Prussian army remained inviolate; but the king was too tender-hearted to use military force against his ” beloved Berliners,” and when the victory of the populace was thus assured his impressionable temper yielded to the general enthusiasm. He paraded the streets of Berlin wrapped in a scarf of the German black and gold, symbol of his intention to be the leader of the united Germany; and he even wrote to the indignant tsar in praise of ” the glorious German revolution.” The change of sentiment was, however, apparent rather than real. The shadow of venerable institutions, past or

passing, still darkened his counsels. The united Germany which he was prepared to champion was not the democratic state which the theorists of the Frankfort national parliament were evolving on paper with interminable debate, but the old Holy Roman Empire, the heritage of the house of Habsburg, of which he was prepared to constitute himself the guardian so long as its lawful possessors should not have mastered the forces of disorder by which they were held captive. Finally, when Austria had been excluded from the new empire, he replied to the parliamentary deputation that came to offer him the imperial crown that he might have accepted it had it been freely offered to him by the German princes, but that he would never stoop ” to pick up a crown out of the gutter.”

Whatever may be thought of the manner of this refusal, or of its immediate motives, it was in itself wise, for the German empire would have lost immeasurably had it been the cause rather than the result of the inevitable struggle with Austria, and Bismarck was probably right when he said that, to weld the heterogeneous elements of Germany into a united whole, what was needed was, not speeches and resolutions, but a policy of ” blood and iron.” In any case Frederick William, uneasy enough as a constitutional king, would have been impossible as a constitutional emperor. As it was, his refusal to play this part gave the deathblow to the parliament and to all hope of the immediate creation of a united Germany. For Frederick William the position of leader of Germany now meant the employ- ment of the military force of Prussia to crush the scattered elements of revolution that survived the collapse of the national movement. His

establishment of the northern confederacy was a reversion to the traditional policy of Prussia in opposition to Austria, which, after the emperor Nicholas had crushed the insurrection in Hungary, was once more free to assert her claims to dominance in Germany. But Prussia was not ripe for a struggle with Austria, even had Frederick William found it in his conscience to turn his arms against his ancient ally, and the result was the humiliating convention of Olmiitz (November 29th, 1850), by which Prussia agreed to surrender her separatist plans and to restore the old constitution of the confederation. Yet Frederick William had so far profited by the lessons of 1848 that he consented to establish (1850) a national parliament, though with a restricted franchise and limited powers. The House of Lords (Herrenhaus) justified the king's insistence in calling it into being by its support of Bismarck against the more popular House during the next reign.

In religious matters Frederick William was also largely swayed by bis love for the ancient and picturesque. In concert with his friend Bunsen he laboured to bring about a rapprochement between the Lutheran and Anglican churches, the first-fruits of which was the establishment of the Jerusalem bishopric under the joint patronage of Great Britain and Prussia; but the only result of his efforts was to precipitate the secession of J. H. Newman and his followers to the Church of Rome. In general it may be said that Frederick William, in spite of his talents and his wide knowledge, lived in a dream-land of hisown, out of touch with actuality. The style of his letters reveals a mind enthusiastic and ill-balanced. In the summer of 1857 he had a stroke of paralysis, and a second in October. From this time, with the exception of brief intervals, his mind was completely clouded, and the duties of government were undertaken by his brother William (afterwards emperor), who on the 7th of October 1858 was formally recognized as regent. Frederick William died on the 2nd of January 1861.

Selections from the correspondence (Briefwechsel) of Frederick William IV. and Bunsen were edited by Ranke (Leipzig, 1873); his proclamations, speeches, &c, from the 6th of March 1848 to the 31st of May 1851 have been published (Berlin, 1851); also his correspondence with Bettina von Arnim, Bettina von Arnim und Friedrich Wilhelm IV., ungedruckte Briefe und Aktenstiicke, ed. L. Geiger (Frankfort-on-Main, 1902). See L. von Ranke, Friedrich Wilhelm IV., Konig von Preussen (works 51, 52 also in Allgem. deutsche Biog. vol. vii.), especially for the king's education and the inner history of the debates leading up to the united diet of 1847; H. von PetersdorfT, Konig Friedrich Wilhelm IV. (Stuttgart, 1900); F. Rachfahl, Deutschland, Konig Friedrich Wilhelm IV. und die

Berliner Marzrevolution (Halle, 1901) ; H. von Poschinger (ed.), Unter Friedrich Wilhelm IV. Denkwiirdigkeiten des Mimsters Otto Frhr. von Manteuffel, 1848-1858 (3 vols., Berlin, 1900-1901); and Preussens auswdrtige Politik, 1850-1858 (3 vols., ib., 1902), docu- ments selected from those left by Manteuffel; E. Friedberg, Die Grundlagen der preussischen Kirchenpolitik unter Friedrich Wilhelm IV. (Leipzig, 1882).

FREDERICK WILLIAM (i6 2 o-r688), elector of Brandenburg, usually called the ” Great Elector,” was born in Berlin on the 16th of February 1620. His father was the elector George William, and his mother was Elizabeth Charlotte, daughter of Frederick IV., elector palatine of the Rhine. Owing to the dis- orders which were prevalent in Brandenburg he passed part of his youth in the Netherlands, studying at the university of Leiden and learning something of war and statecraft under Frederick Henry, prince of Orange. During his boyhood a marriage had been suggested between him and Christina, after- wards queen of Sweden; but although the idea was revived during the peace negotiations between Sweden and Brandenburg, it came to nothing, and in 1646 he married Louise Henriette (d. 1667), daughter of Frederick Henry of Orange, a lady whose counsel was very helpful to him and who seconded his efforts for the welfare of his country.

Having become ruler of B randenburg and Prussia by his father’s death in December 1640, Frederick William set to work at once to repair the extensive damage wrought during the Thirty Years’ War, still in progress. After some difficulty he secured his investiture as duke of Prussia from Wladislaus, king of Poland, in October 1641, but was not equally successful in crushing the independent tendencies of the estates of Cleves. It was in Brandenburg, however, that he showed his supreme skill as a diplomatist and administrator. HisVdisorderly troops were replaced by an efficient and disciplined force; his patience and perseverance freed his dominions from the Swedish soldiers; and the restoration of law and order was followed by a revival of trade and an increase of material prosperity. After a tedious struggle he succeeded in centralizing the administration, and controlling and increasing the revenue, while no department of public life escaped his sedulous care (see Brandenburg). The area of his dominions was largely increased at the peace of Westphalia in 1648, and this treaty and the treaty of Oliva in 1660 alike added to his power and prestige. By a clever but unscrupulous use of his intermediate position between Sweden and Poland he procured his recognition as independent duke of Prussia from both powers, and eventually succeeded in crushing the stubborn and lengthened opposition which was offered to his authority by the estates of the duchy (see Prussia). After two checks

he made his position respected in Cleves, and in 1666 his title to Cleves, Jiilich and Ravensberg was definitely recognized. His efforts, however, to annex the western part of the duchy of Pomerania, which he had conquered from the Swedes, failed owing to the insistence of Louis XIV. at the treaty of St Germain- en-Laye in 1679, and he was unable to obtain the Silesian duchies of Liegnitz, Brieg and Wohlau from the emperor Leopold I. after they had been left without a ruler in 1675.

Frederick William played an important part in European politics. Although found once or twice on the side of France, he was generally loyal to the interests of the empire and the Habsburgs, probably because his political acumen scented danger to Brandenburg from the aggressive policy of Louis XIV. He was a Protestant in religion, but he supported Protestant interests abroad on political rather than on religious grounds, and sought, but without much success, to strengthen Branden- burg by allaying the fierce hostility between Lutherans and Calvinists. His success in founding and organizing the army of Brandenburg-Prussia was amply demonstrated by the great victory which he gained over the Swedes at Fehrbellin in June 1675, and by the eagerness with which foreign powers sought his support. He was also the founder of the Prussian navy. The elector assisted trade in every possible way. He made the canal which still bears his name between the Oder and the Spree; established a trading company; and founded colonies on the west coast of Africa. He encouraged Flemings to settle in Brandenburg,

and both before and after the revocation of the edict of Nantes in 1685 welcomed large numbers of Huguenots, who added greatly to the welfare of the country. Education was not neglected; and if in this direction some of his plans were abortive, it was from lack of means and opportunity rather than effort and inclination. It is difficult to overestimate the servicesof the great elector to Brandenburg and Prussia. They can only be properly appreciated by those who compare the condition of his country in 1640 with its condition in 1688. Both actually and relatively its importance had increased enormously; poverty had given place to comparative wealth, and anarchy to a system of government which afterwards made Prussia the most centralized state in Europe. He had scant sympathy with local privileges, and in fighting them his conduct was doubtless despotic. His aim was to make himself an absolute ruler, as he regarded this as

the best guarantee for the internal and external welfare of the state.

The great elector died at Potsdam from dropsy on the oth of May 1688, and was succeeded by his eldest surviving son, Frederick. His personal appearance was imposing, and although he was absolutely without scruples when working for the interests of Brandenburg, he did not lack a sense of justice and generosity. At all events he deserves the eulogy passed upon him by Frederick the Great, ” Messieurs; celui-ci a fait de grandes ckoses.” His second wife, whom he married in 1668, was Dorothea (d. 1689), daughter of Philip, duke of Holstein-Gliicksburg, and widow of Christian Louis, duke of Brunswick-Liineburg; she bore him four sons and three daughters. His concluding years were troubled by differences between his wife and her step-son, Frederick; and influenced by Dorothea he bequeathed portions of Brandenburg to her four sons, a bequest which was annulled under his successor.

See S. de Pufendorf, De rebus gestis Friderici Wilhelmi Magni (Leipzig and Berlin, 1733); L. von Orlich, Friedrich Wilhelm der grosse Kurjiirst (Berlin, 1836); K. H. S. Rodenbeck, Zur Geschichte Friedrich Wilhelms des grossen Kurfiirsten (Berlin, 1851); B. Erdmannsdorffer, Der grosse Kurjiirst (Leipzig, 1879); J. G. Droysen, Geschichte der preussischen Politik (Berlin, 1 855-1 886); M. Philippson, Der grosse Kurjiirst (Berlin, 1897-1903); E. Heyck, Der grosse Kurjiirst (Bielefeld, 1902); Spahn, Der grosse Kurjiirst (Mainz, 1902) ; H. Landwehr, Die Kirchenpolitik des grossen Kur- jiirsten (Berlin, 1894); H. Prutz, Aus des grossen Kurjiirsten letzten Jahren (Berlin, 1897). Also Urkunden und Aktenstiicke zur Geschichte des Kurjiirsten Friedrich Wilhelm von Brandenburg (Berlin, 1864- 1902) ; T. Carlyle, History of Frederick the Great, vol. i. (London, 1858) ; and A. Waddington, Le Grand Electeur et Louis XIV (Paris,

1905)-

FREDERICK-LEMAiTRE, ANTOINE LOUIS PROSPER (1800- 1876) French actor, the son of an architect, was born at Havre on the 28th of July 1800. He spent two years at the Con- servatoire, and made his first appearance at a variety performance in one of the basement restaurants at the Palais Royal. At the Ambigu on the 1 2th of July 1823 he played the part of Robert Macaire in L’Auberge des Adrets. The melodrama was played seriously on the first night and was received with little favour, but it was changed on the second night to burlesque, and thanks to him had a great success. All Paris came to see it, and from that day he was famous. He created a number of parts that added to his popularity, especially Cardillac, Cagliostro and

Cartouche. His success in the last led to an engagement at the Porte St Martin, where in 1827 he produced Trente arts, ou la vie d'un joueur, in which his vivid acting made a profound impression. Afterwards at the Odeon and other theatres he passed from one success to another, until he put the final touch to his reputation as an artist by creating the part of Ruy Bias in Victor Hugo's play. On his return to the Porte St Martin he created the title-role in Balzac's Vaulrin, which was forbidden a second presentation, on account, it is said, of the resemblance of the actor's wig to the well-known toupet worn by Louis Philippe. His last appearance was at this theatre in 1873 as the old Jew in Marie Tudor, and he died at Paris on the 26th of January 1876.

FREDERICKSBURG, a city of Spottsylvania county, Virginia, U.S.A., on the Rappahannock river, at the head of tide-water

navigation, about 60 m. N. of Richmond and about 55 m. S-S-W. of Washington. Pop. (1890) 4528; (1900) 5068 (1621 negroes); (1010) 5874. It is served by the Potomac, Fredericksburg & Piedmont, and the Richmond, Fredericksburg & Potomac railways, and by several coasting steamship lines. The city is built on a series of terraces between the river and hills of con? siderable height. The river is here spanned by iron bridges, and just above the city is a dam 900 ft. long and 18 ft. high. By means of this dam and a canal good water-power is furnished, and the city's manufactures include flour, leather, shoes, woollens, silks, wagons, agricultural implements and excelsior (fine wood- shavings for packing or stuffing). The water- works, gas and electric-lighting plants are owned and operated by the munici- pality. At Fredericksburg are Fredericksburg College (founded in 1893; co-educational), which includes the Kenmore school for girls and the Saunders memorial school for boys (both preparatory) ; a Confederate and a National cemetery (the latter on Marye's Heights), a monument (erected in 1906) to General Hugh Mercer (c. 1720-1777), whose home for several years was here and who fell in the battle of Princeton; and a monument to the memory of Washington's mother, who died here in 1789 and whose home is still standing. Other buildings of interest are the old Rising Sun Hotel, a popular resort during Washington's time, and " Kenmore," the home of Colonel Fielding Lewis, who married a sister of Washington. The city was named in honour of Frederick, father of George III., and was incorporated in 1727, long after its first settlement; in 1871 it was re-chartered by act of the General Assembly of Virginia. The battle of Fredericksburg in the American Civil War was fought on the 13th of December 1862 between the Union forces (Army of the Potomac) under Major-General A. E. Burnside and the Confederates (Army of

Northern Virginia) under General R. E. Lee. In the middle of November, Burnside, newly ap- pointed to command the Army of the Potomac, had manoeuvred from the neighbourhood of Warrenton with a view to beginning an offensive move trom Fredericksburg and, as a preliminary, to seizing a foothold beyond the Rappahannock at or near that place. On arriving near Falmouth, however, he found that the means of crossing that he had asked for had not been forwarded from Washington, and he sat down to wait for them, while, on the other side, the Confederate army gradually assembled south of the Rappahannock in a strong position with the left on the river above Fredericksburg and the right near Hamilton's Crossing on the Richmond railway. On the 10th of December Burnside, having by now received his pontoons, prepared to cross the river and to attack the Confederate entrenched position on the heights beyond the town. The respective forces were Union 122,000, Confederate 79,000. Major-General E. V. Sumner, commanding the Federal right wing (II. and IX. corps), was to cross at Fredericksburg, Major-General W. B. Franklin with the left (I. and VI. corps) some miles below, while the centre (III. and V. corps) under Major-General Joseph Hooker was to connect the two attacks and to reinforce either at need. The Union artillery took position along the heights of the north bank to cover the crossing, and no opposition was encountered opposite Franklin's command, which formed up on the other side during the nth and 12th. Opposite Sumner, however, the Confederate riflemen, hidden in the gardens and houses of Fredericksburg, caused much trouble and considerable losses to the Union pioneers, and a forlorn hope of volunteers from the infantry had to be rowed across under fire before the enemy's skirmishers could be dislodged. Sumner's two corps crossed on the 1 2th. The battle took place next morning.

Controversy has raged round Burnside's plan of action and in particular round his orders to Franklin, as to which it can only be said that whatever chance of success there was in so formidable an undertaking as attacking the well-posted enemy was thrown away through misunderstandings, and that nothing but misunder- standings could be expected from the vague and bewildering orders issued by the general in command. The actual battle can be described in a few words. Jackson held the right of Lee's line, Longstreet the left, both entrenched. Franklin; tied by

his instructions, attacked with one division only, which a little later he

supported by two more (I. corps, Major-General J. F. Reynolds) out of eight or nine available. His left flank was harassed by the Confederate horse artillery under the young and brilliant Captain John Pelham, and after breaking the first line of Stonewall Jackson's corps the assailants were in the end driven back with heavy losses. On the other flank, where part of Longstreet's corps held the low ridge opposite Fredericksburg called Marye's Heights, Burnside ordered in the II. corps under Major-General D. N. Couch about n a.m., and thenceforward division after division, on a front of little more than 800 yds., was sent forward to assault with the bayonet. The " Stone Wall " along the foot of Marye's was lined with every rifle of Longstreet 's corps that could find room to fire, and above them the Confederate guns fired heavily on the assailants, whose artillery, on the height beyond the river, was too far off to assist them. Not a man of the Federals reached the wall, though the bravest were killed a few paces from it, and Sumner's and most of Hooker's brigades were broken one after the other as often as they tried to assault. At night the wrecks of the right wing were withdrawn. Burnside proposed next day to lead the IX. corps, which he had formerly commanded, in one mass to the assault of the Stone Wall, but his subordinates dissuaded him, and on the night of the 15th the Army of the Potomac withdrew to its camps about Falmouth. The losses of the Federals were 12,650 men, those of the Con- federates 4200, little more than a third of which fell on Long- street's corps.

See F. W. Palfrey, Antietam and Fredericksburg (New York, 1881) ; G. W. Redway, Fredericksburg (London, 1906) ; and G. F. R. Henderson, Fredericksburg (London, 1889).

FREDERICTON, a city and port of entry of New Brunswick, Canada, capital of the province, situated on the St John river, 84 m. from its mouth, and on the Canadian Pacific railway. It stands on a plain bounded on one side by the river, which is here f m. broad, and on the other by a range of hills which almost encircle the town. It is regularly built with long and straight streets, and contains the parliament buildings, government house, the Anglican cathedral, the provincial university and several other educational establishments. Fredericton is the chief commercial centre in the interior of the province, and has also a large trade in lumber. Its industries include canneries, tanneries and wooden ware factories. The river is navigable for large steamers up to the city, and above it by vessels of lighter draught. Two bridges, passenger and railway, unite the city with the towns of St Marye's and Gibson on the east side of the river, at its junction with the Nashwaak. The city was founded in 1785 by Sir Guy Carleton,and made the capital of the province, in spite of the jealousy of St John, on account

of its superior strategical position. Pop. (1001) 71 17.

FREOONIA, a village of Chautauqua county, New York, U.S.A., about 45 m. S.W. of Buffalo, and 3 m. from Lake Erie. Pop. (1900) 4127; (1905, state census) 5148; (1910 census) 5285. Fredonia is served by the Dunkirk, Allegheny Valley & Pittsburg railway, which connects at Dunkirk, 3 m. to the N., with the Erie, the Lake Shore & Michigan Southern, the New York, Chicago & St Louis, and the Pennsylvania railways; and by electric railway to Erie, Buffalo and Dunkirk. It is the seat of a State Normal School. The Darwin R. Barker public library contained 9700 volumes in 1908. Fredonia is situated in the grape-growing region of western New York, is an important shipping point for, grapes, and has large grape-vine and general nurseries. The making of wine and of unfermented grape-juice are important industries of the village. Among other manufactures are canned goods, coal dealers' supplies, and patent medicines. The first settlement here was made in 1804, and the place was called Canandaway until 181 7, when the present name was adopted. The village was incorporated in 1829. Fredonia was one of the first places in the United States, if not the first, to make use of natural gas for public purposes. Within the village limits, near a creek, whose waters showed the presence of gas, a well was sunk in 1821, and the supply of gas thus tapped was sufficient to light the streets of the village. Another well was sunk within the

villagelimitsini858. About 1905 natural gas was again obtained by deep drilling near Fredonia and came into general use for heat, light and power. In the Fredonia Baptist church on the 14th of December 1873 a Woman's Temperance Union was organized, and from this is sometimes dated the beginning of the Woman's Christian Temperance Union movement.

FREDRIKSHALD (Frederikshald, Feiedrichshall), a seaport and garrison town of Norway, in Smaalenene ami (county), 85 m. by rail S. by E. of Christiania. Pop. (1900) 1 1 ,948. It is picturesquely situated on both banks of the Tistedal river at its outflow to the Ide fjord, surrounded by several rocky eminences. The chief of these is occupied by the famous fortress Fredriksten, protected on three sides by precipices, founded by Frederick III. (1661), and mainly showing, in its present form, the works of Frederick V. (1766) and Christian VII. (1808). Between it and the smaller Gyldenlove fort a monument marks the spot where Charles XII. was shot in the trenches while besieging the town (17 18). The siege, which was then raised, is further commemorated by a monument to the brave defence of the brothers Peter and Hans Kolbjornsen. Fredrikshald is close to the

Swedish frontier, and had previously (1660) withstood invasion, after which its name was changed from Halden to the present form in 1665 in honour of Frederick III. The town was almost totally destroyed by fire in 1759 and 1826. The castle surrendered to the Swedish crown prince Bernadotte in 1814, and its capture was speedily followed by the conquest of- the kingdom and its union with Sweden. Fredriks-haˆfl is one of the principal ports of the kingdom for the export of timber. Marble of very fine quality and grain is extensively quarried and exported for architectural ornamentation and for furniture-making. Wood-pulp is also exported. The industries embrace granite quarries, wood-pulp factories, and factories for sugar, tobacco, curtains, travelling-bags, boots, &c. There are railway communications with Gothenburg and all parts of Sweden and regular coastal and steamer services.

FREDRIKSTAD (Frederikstad), a seaport and manufactur- ing town of Norway in Smaalenene amt (county), 58 m. S. by E. of Christiania by the Christiania-Gothenburg railway. Pop. (1900) 14,553. It hes at the mouth and on the eastern shore of Christiania fjord, occupying both banks of the great river Glommen, which, descending from the richly-wooded district of Osterdal, floats down vast quantities of timber. The new town on the right bank is therefore a centre of the timber export trade, this place being the principal port in Norway for the export of pit-props, planed boards, and other varieties of timber. There is also a great industry in the making of red bricks, owing to the expansion of Christiania, Gothenburg and other towns. Granite is quarried and exported. Besides the large number of saw and planing mills, there are shipbuilding yards, engine and boiler works, cotton and woollen mills, and factories for acetic acid and naphtha. The harbour, which can be entered by vessels drawing 14 ft., is kept open in winter by an ice-breaker. In the vicinity is the island Hanko, the most fashionable Norwegian seaside resort. The old town on the left bank was founded by Frederick II. in 1567. It was for a long time strongly fortified, and in 1716 Charles XII. of Sweden madea vain attempt to capture it.

FREE BAPTISTS, formerly called (but no longer officially) Freewiix Baptists, an American denomination holding anti- paedobaptist and anti-Calvinistic doctrines, and practically identical in creed with the General Baptists of Great Britain. Many of the early Baptist churches in Rhode Island and through- out the South were believers in ” general redemption ” (hence called ” general ” Baptists) ; and there was a largely attended conference of this Arminian branch of the church at Newport in 1729. But the denomination known as ” Free-willers ” had its rise in 1779-1780, when anti-Calvinists in Loudon, Barrington and Canterbury, New Hampshire, seceded and were organized by

Benjamin Randall (1749-1808), a native of New Hampshire. Randall was an itinerant missionary, who had been preaching for two years before his ordination in 1780; in the same year he was censured for " heterodox " teaching. The work of the church suffered a relapse after his death, and a movement to join

the Freewill Baptists v/ith the " Christians," who were led by Elias Smith (1760-1846) and had been bitterly opposed by Randall, was nearly successful. Between 1820 and 1830 the denomination made considerable progress, especially in New England and the Middle West. The Freewill Baptists were joined in 1841 by many " open-communion Baptists " — those in the Carolinas who did not join the larger body distinguishing themselves by the name of Original Freewill Baptists — and soon afterwards by some of the General Baptists of NorthCarolina and some of the Six Principle Baptists of Rhode Island (who had added the " laying on of hands " to the Five Principles hitherto held); and the abbreviation of the denominational name to " Free Baptists " suggests their liberal policy — indeed open communion is the main if not the only hindrance to union with the " regular " Baptist Church.

Colleges founded by the denomination, all co-educational, are: Hillsdale College, opened at Spring Harbor as Michigan Central College in 1844, and established at Hillsdale, Michigan, in 1855; Bates College, Lewiston, Maine, 1863, r *ow non-sectarian; Rio Grande College, Rio Grande, Ohio, 1ˆ76; and Parker College, Winnebago City, Minnesota, openea in 1888. At the close of 1909 there were 1294 ministers, 1303 churches, and 73,536 members of the denomination in the United States. The Morn- ing Star of Boston, established in 1826, is the most prominent journal published by the church. In British North America, according to a Canadian census bulletin of 1902, there were, in 1901, 24,229 Free Baptists, of whom 15,502 were inhabitants of New Brunswick, 8355 of Nova Scotia, 246 of Ontario, and 87 of Quebec. The United Societies of Free Baptist Young People, an international organization founded in 1888, had in 1907 about 15,000 members. At the close of 1907 the " Original Freewill Baptists " had 120 ministers, 167 churches, and 12,000 members, practically all in the Carolinas.

See I. D. Stewart, History of the Free Will Baptists (Dover, N. H., 1862) for 1780-1830, and his edition of the Minutes of the General

Conference of the Free Will Baptist Connection (Boston, 1887) ; James B. Taylor, The Centennial Record of the Free Will Baptists (Dover, 1881); John Buzzell, MemSir of Elder Benjamin Randall (Parson- field, Maine, 1827); and P. Richardson, ” Randall and the Free Will Baptists,” in The Christian Review, vol. xxiii. (Baltimore, 1858).

FREEBENCH, in English law, the interest which a widow has in the copyhold lands of her husband, corresponding to dower in the case of freeholds. It depends upon the custom of the manor, but as a general rule the widow takes a third for her life of the lands of which her husband dies seised, but it may be an estate greater or less than a third. If the husband surrenders his copyhold and the surrenderee is admitted, or if he contracts for a sale, it will defeat the widow’s freebench. As freebench is regarded as a continuation of the husband’., estate, the widow does not (except by special custom) require to be admitted.

FREE CHURCH FEDERATION, a voluntary association of British Nonconformist churches for co-operation in religious, social and civil work. It was the outcome of a unifying tendency displayed during the latter part of the 19th century. About 1890 the proposal that there should be a Nonconformist Church Congress analogous to the Anglican Church Congress was seriously considered, and the first was held in Manchester on the 7th of November 1892. In the following year it was resolved that the basis of representation should be neither personal (as in the Anglican Church Congress) nor denominational, but territorial. England and Wales have since been completely covered with a network of local councils, each of which elects its due proportion of representatives to the national gathering. This territorial arrangement eliminated all sectarian distinctions, and also the possibility of committing the different churches as such to any particular policy. The representatives of the local councils attend not as denominationalists but as Evangelical Free Churchmen. The name of the organization was changed from Congress to National Council as soon as the assembly ceased to be a fortuitous concourse of atoms, and consisted of duly appointed representatives from the local councils of every part of England. The local councils consist of representatives of the Congregational and Baptist Churches, the Methodist Churches,

the Presbyterian Church of Engla nd , the Free Episcopal Churches, the Society of Friends, and such other Evangelical Churches as the National Council may at any time admit. The constitution states the following as the objects of the National Council: (a) To facilitate fraternal intercourse and co-operation among the Evangelical Free Churches; (b) to assist in the organization of local councils; (c) to

encourage devotional fellowship and mutual counsel concerning the spiritual life and religious activities of the Churches; (d) to advocate the New Testament doctrine of the Church, and to defend the rights of the associated Churches; (e) to promote the application of the law of Christ in every relation of human life. Although the objects of the Free Church councils are thus in their nature and spirit religious rather than political, there are occasions on which action is taken on great national affairs. Thus a thorough-going opposition was offered to the Education Act of 1902 , and whole-hearted support accorded to candidates at the general election of 1906 who pledged them- selves to altering that measure.

A striking feature of the movement is the adoption of the parochial system for the purpose of local work. Each of the associated churches is requested to look after a parish, not of course with any attempt to exclude other churches, but as having a special responsibility for those in that area who are not already connected with some existing church. Throughout the United Kingdom local councils are formed into federations, some fifty in number, which are intermediate between them and the national council. The local councils do what is possible to prevent overlapping and excessive competition between the churches. They also combine the forces of the local churches for evangelistic and general devotional work, open-air services, efforts on behalf of Sunday observance, and the prevention of gambling. Services are arranged in connexion with workhouses, hospitals and other public institutions. Social work of a varied character forms a large part of the operations of the local councils, and the Free Church Girls' Guild has a function similar to that of the Anglican Girls' Friendly Society. The national council engages in mission work on a large scale, and a considerable number of periodicals, hymn-books for special occasions, and works of different kinds explaining the history and ideals of the Evangelical Free Churches have been published. The churches represented in the National Council have 9966 ministers, 55,828 local preachers, 407,991 Sunday-school teachers, 3,416,377 Sunday scholars, 2,178,221 communicants, and sitting accommodation for 8,555,460.

A remarkable manifestation of this unprecedented reunion was the fact that a committee of the associated churches prepared and published a catechism expressing the positive and funda- mental agreement of all the Evangelical Free Churches on the essential doctrines of Christianity (see The Contemporary Review, January 1 899) . The catechism represents substantially the creed of not less than 80,000,000 Protestants. It has been widely circulated throughout Great Britain, the British Colonies and the United States of America,

and has also been translated into Welsh, French and Italian.

The movement has spread to all parts of Australia, New Zealand, South Africa, Jamaica, the United States of America and India. It is perhaps necessary to add that it differs essentially from the Evangelical Alliance, inasmuch as its unit is not an individual, private Christian, but a definitely organized and yisible Church. The essential doctrine of the movement is a particular doctrine of churchmanship which, as explained in the catechism, regards the Lord Jesus Christ as the sole and Divine Head of every branch of the Holy Catholic Church throughout the world. For this reason those who do not accept the deity of Christ are necessarily excluded from the national council and its local constituent councils.

FREE CHURCH OF ENGLAND, a Protestant episcopal church ” essentially one with the established church of England, but free to go into any parish, to use a revised edition of the Book of Common Prayer, to associate the laity with the clergy in the government and work of the church, and to hold communion with Christians of other denominations.” It was founded in. 1844

FREE CHURCH OF SCOTLAND

in opposition to the Tractarian movement, and embodies the distinctively evangelical elements of the Reformation. It pre- serves and maintains to the letter all that is Protestant and evangelical in the liturgy and services of the Anglican church, while its free constitution and revised formularies meet the needs of members of that communion who resent sacerdotal and ritualistic tendencies. There are two dioceses (northern and southern) each with a bishop, about 30 churches and ministers, and about 1300 members.

FREE CHURCH OF SCOTLAND. In one sense the Free Church of Scotland dated its existence from the Disruption of 1843, in another it claimed to be the rightful representative of the National Church of Scotland (see Scotland, Church or) as it was reformed in 1560. 1 In the ecclesiastical history of Scotland the Free Churchman sees three great reforming periods. In his view these deserve to be called reforming on many accounts, but most especially because in them the independence of the church, her inherent scriptural right to exercise a spiritual jurisdiction in which she is responsible to her Divine Head alone, was both earnestly asserted and practically maintained. The first reformation extended from 1560, when the church freely held her

first General Assembly, and of her own authority acted on the First Book of Discipline, to 1592, when her Presbyterian order was finally and fully ratified by the parliament. The second period began in 1638, when, after 20 years of suspended anima- tion, the Assembly once more shook off Episcopacy, and termin- ated in 1649, when the parliament of Scotland confirmed the church in her liberties in a larger and ampler sense than before. The third period began in 1834, when the Assembly made use of what the church believed to be her rights in passing the Veto and Chapel Acts. It culminated in the Disruption of 1843.

The fact that the Church, as ied first by John Knox and after- wards by Andrew Melville, claimed an inherent right to exercise a spiritual jurisdiction is notorious. More apt to be overlooked is the comparative freedom with which that right was actually used by the church irrespective of state recognition. That recog- nition was not given until after the queen's resignation in 1567ˆ but, for several years before it came, the church had been holding her Assemblies and settling all questions of discipline, worship, and administration as they arose, in accordance with the first book of polity or discipline which had been drawn up in 1560. Further, in 1581 she, of her own motion, adopted a second book of a similar character, in which she expressly claimed an inde- pendent and exclusive jurisdiction or power in all matters ecclesiastical, " which flows directly from God and the Mediator Jesus Christ, and is spiritual, not having a temporal head on earth, but only Christ, the only king and governor of his church "; and this claim, though directly negatived in 1584 by the " Black Acts," which included an Act of Supremacy over estates spiritual and temporal, continued to be asserted by the Assemblies, until at last it also was practically allowed in the act of 1592. 3 This legislation of 1592, however, did not long remain in force. An act of parliament in 1606, which " reponed, restored and reintegrated " the estate of bishops to their ancient dignities, prerogatives and privileges, was followed by several acts of various subservient assemblies, which, culminating in that of 161 8, practically amounted to a complete surrender of jurisdiction by the church itself. For twenty years no Assemblies whatever were held. This interval must necessarily be regarded from the Presbyterian point of view as having been one of very deep depression. But a second reformation, characterized by great

1 " It is her being free, not her being established, that constitutes the real historical and hereditary identity of the Reformed National Church of Scotland." See Act and Declaration, &c, of Free Assembly,

1851.

2 In the act Anent the true and holy Kirk, and of those that are declared not to be of the same. This act was supplemented by that of 1579, Anent the Jurisdiction of the Kirk.

3 The Second Book of Discipline was not formally recognized in that act; but all former acts against ” the jurisdiction and dis- cipline of the true Kirk as the same is used and exercised within the realm” were abolished; and all ” liberties, privileges, immunities and freedoms whatsoever ” previously granted were ratified and approved.

energy and vigour, began in 1638. The proceedings of the Assembly of that year, afterwards tardily and reluctantly acquiesced in by the state, finally issued in the acts of parliament of 1649, by which the Westminster standards were ratified, lay-patronage was abolished, and the coronation oath itself framed in accordance with the principles of Presbyterian church government. Another period of intense reaction soon set in. No Assemblies were permitted by Cromwell after 1653; and, soon after the Restoration, Presbytery was temporarily over- thrown by a series of rescissory acts. Nor was the Revolution Settlement of 1690 so entirely favourable to the freedom of the church as the legislation of 1649 had been. Prelacy. was abolished, and various obnoxious statutes were repealed, but the acts rescissory were not cancelled; presbyterianism was re-estab- lished, but the statutory recognition of the Confession of Faith took no notice of certain qualifications under which that docu- ment had originally been approved by the Assembly of 1647 ; 4 the old rights of patrons were again discontinued, but the large powers which had been conferred on congregations by the act of 1649 were not wholly restored. Nevertheless the great principle of a distinct ecclesiastical jurisdiction, embodied in the Con- fession of Faith, was accepted without reservation, and a Presby- terian polity effectively confirmed both then and at the ratifica- tion of the treaty of Union. This settlement, however, did not long subsist unimpaired. In 1712 the act of Queen Anne, restor- ing patronage to its ancient footing, was passed in spite of the earnest remonstrances of the Scottish people. For many years afterwards (until 1784) the Assembly continued to instruct each succeeding commission to make application to the king and the parliament for redress of the grievance. But meanwhile a new phase of Scottish ecclesiastical politics commonly known as Moderatism had been inaugurated, during the prevalence of which the church became even more indifferent than the lay patrons themselves to the rights of her congregations with regard to the ” calling ” of ministers. From the Free Church point of view, the period from which the secessions under Ebenezer Erskine and Thomas Gillespie are dated was also characterized by numerous other abuses on the Church’s part which

amounted to a practical surrender of the most important and distinctive principles of her ancient Presbyterian polity. 6 Towards the beginning of the present century there were many circumstances, both within and without the church, which conspired to bring about an evangelical and popular reaction against this reign of ” Moderatism.” The result was a protracted struggle, which is commonly referred to as the Ten Years’ Conflict, and which has been aptly described as the last battle in the long war which for nearly 300 years had been waged within the church itself, between the friends and the foes of the doctrine of an exclusive ecclesi- astical jurisdiction. That final struggle may be said to have begun with the passing in 1834 of the ” Veto ” Act, by which it was declared to be a fundamental law of the church that no pastor should be intruded on a congregation contrary to the will of the people, 6 and by which it was provided that the simple dissent of a majority of heads of families in a parish should be enough to warrant a presbytery in rejecting a presentee. The question of the legality of this measure soon came to be tried in the civil courts; and it was ultimately answered in a sense unfavourable to the church by the decision (1838) of the court of session in the Auchterarder case, to the effect that a presbytery had no right to reject a presentee simply because the parishioners protested against his settlement, but was bound to disregard the veto (see Chalmers, Thomas). This decision elicited from the Assembly

4 The most important of these had reference to the full right of a constituted church to the enjoyment of an absolutely unrestricted freedom in convening Assemblies. This very point on one occasion at least threatened to be the cause of serious misunderstandings between William and the people of Scotland. The difficulties were happily smoothed, however, by the wisdom and tact of William Carstares.

6 See Act and Declaration of Free Assembly, 185 1.

6 This principle had been asserted even by an Assembly so late as that of 1736, and had been invariably presupposed in the ” call,” which had never ceased to be regarded as an indispensable pre- requisite for the settlement of a minister.

of that year a new declaration of the doctrine of the spiritual independence of the church. The ” exclusive jurisdiction of the civil courts in regard to the civil rights and emoluments secured by law to

the church and the ministers thereof ” was acknowledged without qualification; and continued implicit obedience to their decisions with reference to these rights and emoluments was pledged. At the same time it was insisted on ” that, as is declared in the Confession of Faith of this National Established Church, ‘ the Lord Jesus Christ, as King and Head of the church, hath therein appointed a government in the hand of church officers distinct from the civil magistrate ‘; and that in all matters- touching the doctrine, discipline and government of the church her judicatories possess an exclusive jurisdiction, founded on the Word of God, which power ecclesiastical ” (in the words of the Second Book of Discipline) ” flows immediately from God and the Mediator the Lord Jesus Christ, and is spiritual, not having a temporal head on earth, but only Christ, the only spiritual King and Governor of His Kirk.” And it was resolved to assert, and at all hazards defend, this spiritual jurisdiction, and firmly to enforce obedience to the same upon the office- bearers and members of the church. The decision of the court of session having been confirmed by the House of Lords early in 1830, it was decided in the Assembly of that year that the church, while acquiescing in the loss of the temporalities at Auchterarder, should reaffirm the principle of non-intrusion as an integral part of the constitution of the Reformed Church of Scotland, and that a committee should be appointed to confer with the government with a view to the prevention, if possible, of any further collision between the civil and ecclesiastical authorities. While the conference with the government had no better result than an unsuccessful attempt at compromise by means of Lord Aberdeen’s Bill, which embodied the principle of a dissent with reasons, still graver complications were arising out of the Marnoch and other cases. 1 In the circumstances it was resolved by the Assembly of 1842 to transmit to the queen, by the hands of the lord high commissioner, a ” claim, declara- tion, and protest,” complaining of the encroachments of the court of session, 2 and also an address praying for the abolition of patronage. The home secretary’s answer (received in January 1843) gave no hope of redress. Meanwhile the position of the

1 According to the Free Church ” Protest ” of 1843 it was in these cases decidea(i) that the courts of the church were liable to be compelled to intrude ministers on reclaiming congregations; (2) that the civil courts had power to interfere with and interdict the preaching of the gospel and administration of ordinances as authorized and enjoined by the church ; (3) that the civil courts had power to suspend spiritual censures pronounced by the courts of the church, and to interdict their execution as to spiritual effects, functions and privileges ; (4) that deposed ministers, and probationers deprived of their

licence, could be restored by the mandate of the civil courts to the spiritual office and status of which the church courts had deprived them; (5) that the right of membership in ecclesiastical courts could be determined by the civil courts; (6) that the civil courts had power to supersede the majority of a church court of the Estab- lishment in regard to the exercise of its spiritual functions as a church court, and to authorize the minority to exercise the said functions in opposition to the court itself and to the superior judicatories of the church; (7) that processes of ecclesiastical discipline could be arrested by the civil courts; and (8) that without the sanction of the civil courts no increased provision could be made for the spiritual care of a parish, although such provision left all civil rights and patri- monial interests untouched.

2 The narrative and argument of this elaborate and able document cannot be reproduced here. In substance it is a claim ” as of right ” on behalf of the church and of the nation and people of Scotland that the church shall freely possess and enjoy her liberties, government, discipline, rights and privileges according to law, and that she shah be protected therein from the foresaid unconstitutional and illegal encroachments of the said court of session, and her people securedin their Christian and constitutional rights and liberties. This claim is followed by the ” declaration ” that the Assembly cannot intrude ministers on reclaiming congregations, or carry on the government of Christ’s church subject to the coercion of the court of session ; and by the ” protest ” that all acts of the parliament of Great Britain passed without the consent of the Scottish church and nation, in alteration or derogation of the government, discipline, rights and privileges of the church, as also all sentences of courts in contra- ventionof said government, discipline, rights and privileges, “are and shall be in themselves void and null, and of no legal force or effect.”

evangelical party had been further hampered by the decision of the court of session declaring the ministers of chapels of ease to be unqualified to sit in any church court. A final appeal to parliament by petition was made in March 1843, when, by a majority of 135 (211 against 76), the House of Commons declined to attempt any redress of the grievances of the Scottish Church. 3 At the first session of the following General Assembly (18th May 1843) the reply of the non-intrusion party was made in a protest, signed by upwards of 200 commissioners, to the effect that since, in their opinion, the recent decisions of the civil courts, and the still more recent sanction of these decisions by the legislature, had made it impossible at that time to hold a free Assembly of the church as by law established, they therefore “protest that it shall be lawful for us, and such other

commissioners as may concur with us, to withdraw to a separate place of meeting, for the purpose of taking steps for ourselves and all who adhere to us — maintaining with us the Confession of Faith and standards of the Church of Scotland as heretofore understood — for separating in an orderly way from the Establishment, and thereupon adopting such measures as may be competent to us, in humble dependence on God's grace and the aid of His Holy Spirit, for the advancement of His glory, the extension of the gospel of our Lord and Saviour, and the administration of the affairs of Christ's house according to His holy word. " The reading of this document was followed by the withdrawal of the entire non-intrusion party to another place of meeting, where the first Assembly of the Free Church was constituted, with Dr Thomas Chalmers as moderator. This Assembly sat from the 18th to the 30th of May, and trans- acted a large amount of important business. On Tuesday the 23rd, 396 4 ministers and professors publicly adhibited their names to the Act of Separation and deed of demission by which they renounced all claim to the benefices they had held in con- nexion with the Establishment, declaring them to be vacant, and consenting to their being dealt with as such. By this impressive proceeding the signatories voluntarily surrendered an annual income amounting to fully £100,000.

The first care of the voluntarily disestablished church was to provide incomes for her clergy and places of worship for her people. As early as 1841 indeed the leading principle of a " sustentation fund " for the support of the ministry had been announced by Dr Robert Smith Candlish; and at " Convocation," a private unofficial meeting of the members of the evangelical or non-intrusion party held in November 1842, Dr Chalmers was prepared with a carefully matured scheme according to which " each congregation should do its part in sustaining the whole, and the whole should sustain each congregation." Between November 1842 and May 1843, 647 associations had been formed; and at the first Assembly it was announced that up- wards of £17,000 had already been contributed. At the close of the first financial year (1843-1844) it was reported that the fund had exceeded £61,000. It was participated in by 583 ministers; and 470 drew the full equal dividend of £105. Each successive year showed a steady increase in the gross amount of the fund; but owing to an almost equally rapid increase of the number of new ministerial charges participating in its benefits, the stipend payable to each minister did riot for many years reach the sum of £130 which had been aimed at as a minimum. Thus in 1844- 1845 the fund had risen to £76,180, but the ministers had also increased to 627, and the equal dividend therefore was only £122. During the first

ten years the annual income averaged £84,057; during the next decade £108,643; an d during the third £130,246. The minimum of £150 was reached at last in 1868; and subse- quently the balance remaining after that minimum had been provided was treated as a surplus fund, and distributed among those ministers whose congregations have contributed at certain specified rates per member. In 1878 the total amount received for this fund wa”s upwards of £177,000; in this 1075 ministers participated. The full equal dividend of £157 was paid to 766 ministers; and additional grants of £36 and £18

3 The Scottish members voted with the minority in the proportion of 25 to 12.

4 The number ultimately rose to 474.

were paid out of the surplus fund to 632 and 129 ministers respectively.

To provide for the erection of the buildings which, it was foreseen, would be necessary, a general building fund, in which all should share alike, was also organized, and local building funds were as far as possible established in each parish, with the result that at the first Assembly a sum of £104,776 was reported as already available. By May 1844 a further sum of £123,060 had been collected, and 470 churches were reported as completed or nearly so. In the following year £131,737 was raised and 60 additional churches were built. At the end of four years considerably more than 700 churches had been provided.

During the winter session 1 843-1 844 the divinity students who had joined the Free Church continued their studies under Dr Chalmers and Dr David Welsh (1793-1845); and at the Assembly of 1844 arrangements were made for the erection of suitable collegiate buildings. The New College, Edinburgh, was built in 1847 at a cost of £46,506; and divinity halls were subsequently set up also in Glasgow and Aberdeen. In 1878 there were 13 professors of theology, with an aggregate of 230 students, — the numbers at Edinburgh, Glasgow and Aberdeen respectively being 129, 69 and 32.

A somewhat unforeseen result of the Disruption was the necessity for a duplicate system of elementary schools. At the 1843 Assembly it was

for the first time announced by Dr Welsh that ’” schools to a certain extent must be opened to afford a suitable sphere of occupation for parochial and still more for private teachers of schools, who are threatened with deprivation of their present office on account of their opinions upon the church question.” The suggestion was taken up with very great energy, with the result that in May 1845, 280 schools had been set up, while in May 1847 this number had risen to 513, with an attend- ance of upwards of 44,000 scholars. In 1869 it was stated in an authoritative document laid before members of parliament that at that time there were connected with and supported by the Free Church 598 schools (including two normal schools), with 633 teachers and 64,115 scholars. The school buildings had been erected at a cost of £220,000, of which the committee of privy council had contributed £35,000, while the remainder had been raised by voluntary effort. Annual payments made I to teachers, &c, as at 1869, amounted to £16,000. In accordance 1 with certain provisions of the Education Act of 1872 most of the schools of the Free Church were voluntarily transferred, without compensation, to the local school boards. The normal schools are now transferred to the state.

It has been seen already that during the period of the Ten Years’ Conflict the non-intrusion party strenuously denied that in any one respect it was departing from acknowledged principles of the National Church. It continued to do so after the Disruption. In 1846, however, it was found to have become necessary, ” in consequence of the late change in the outward condition of the church,” to amend the ” questions and formula ” to be used at the licensing of probationers and the ordination of office-bearers. These were amended accordingly; and at the same time it was declared that, ” while the church firmly main- tains the same scriptural principles as to the duties of nations and their rulers in reference to true religion and the Church of Christ for which she has hitherto contended, she disclaims in- tolerant or persecuting principles, and does not regard her Confession of Fai th , or any portion thereof when fairly interpreted, as favouring intolerance or persecution, or consider that her office-bearers by subscribing it profess any principles inconsistent with liberty of conscience and the right of private judgment.” The main difference between the ” formula ” of the Free Church and that of the Established Church (as at the year 1900) was that the former referred to the Confession of Faith simply as ” approven by General Assemblies of this Church,” while the latter described it as ” approven by the General Assemblies of this National Church, and ratified by law in the year 1690, and fre- quently confirmed by divers Acts of Parliament since that time.” The former inserted an additional clause, — ” I also

approve of the general principles respecting the jurisdiction of the church,

and her subjection to Christ as her only Head, which are con- tained in the Claim of Right and in the Protest referred to in the questions already put to me “; and also added the words which are here distinguished by italics, — ” And I promise that through the grace of God I shall firmly and constantly adhere to the same, and to the utmost of my power shall in my station assert, maintain, and defend the said doctrine, worship, discipline and government of this church by kirk-sessions, presbyteries, provincial synods, and general assemblies, together with the liberty and exclusive jurisdiction thereof; and that I shall, in my practice, conform myself to the said worship and submit to the said discipline [and] government, and exclusive jurisdiction, and not endeavour directly or indirectly the prejudice or subversion of the same.” In the year 185 1 an act and declaration anent the publication of the subordinate standards and other authoritative documents of the Free Church of Scotland was passed, in which the historical fact is recalled that the Church of Scotland had formally consented to adopt the Confession of Faith, catechisms, directory of public worship, and form of church government agreed upon by the Westminster Assembly ; and it is declared that ” these several formularies, as ratified, with certain explanations, by divers Acts of Assembly in the years 1645, 1646, and particu- larly in r647, this church continues till this day to acknowledge as her subordinate standards of doctrine, worship and govern- ment.” l

In 1858 circumstances arose which, in the opinion of many, seemed fitted to demonstrate to the Free Church that her freedom was an illusion, and that all her sacrifices had been made in vain. John Macmillan, minister of Cardross, accused of immorality, had been tried and found guilty by the Free Presbytery of Dumbarton. Appeal having been taken to the synod, an attempt was there made to revive one particular charge, of which he had been finally acquitted by the presbytery; and this attempt was successful in the General Assembly. That ultimate court of review did not confine itself to the points appealed, but went into the merits of the whole case as it had originally come before the presbytery. The result was a sentence of suspension. Macmillan, believing that the Assembly had acted with some irregularity, applied to the court of session for an interdict against the execution of that sentence; and for this act he was summoned to the bar of the Assembly to say whether or not it was the case that he had thus appealed. Having answered in the affirmative, he was deposed on the spot. Forthwith he raised a new action (his

previous application for an interdict had been refused) concluding for reduction of the spiritual sentence of deposition and for substantial damages. The defences lodged by the Free Church were to the effect that the civil courts had no right to review and reduce spiritual sentences, or to decide whether the General Assembly of the' Free Church had acted irregularly or not. Judgments adverse to the defenders were delivered on these points; and appeals were taken to the House of Lords. But before the case could be heard there, the lord president took an opportunity in the court of session to point out to the pursuer that, inasmuch as the particular General Assembly against which the action was brought had ceased to exist, it could not therefore be made in any circum- stances to pay damages, and that the action of reduction of the spiritual sentence, being only auxiliary to the claim of damages, ought therefore to be dismissed. He further pointed out that Macmillan might obtain redress in another way, should he be able to prove malice against individuals. Very soon after this deliverance of the lord president, the case as it had stood against the Free Church was withdrawn, and Macmillan gave notice of an action of a wholly different kind. But this last was not per- severed in. The appeals which had been taken to the House of Lords were, in these circumstances, also departed from by the Free Church. The case did not advance sufficiently to show

1 By this formal recognition of the qualifications to the Confession of Faith made in 1647 the scruples of the majority of the Associate Synod of Original Seceders were removed, and 27 ministers, alone with a considerable number of their people, joined the Free Church in the following year.

how far the courts of law would be prepared to go in the direction of recognizing voluntary tribunals and a kind of secondary exclusive jurisdiction founded on contract. 1 But, whether recognized or not, the church for her part continued to believe that she had an inherent spiritual jurisdiction, and remained unmoved in her determination to act in accordance with that resolution " notwithstanding of whatsoever trouble or persecu- tion may arise." 2

In 1863 a motion was made and unanimously carried in the Free Church Assembly for the appointment of a committee to confer with a corresponding committee of the United Presby- terian Synod, and with the representatives of such other dis- established churches as might be

willing to meet and deliberate with a view to an incorporating union. Formal negotiations between the representatives of these two churches were begun shortly afterwards, which resulted in a report laid before the following Assembly. From this document it appeared that the committees of the two churches were not at one on the question as to the relation of the civil magistrate to the church. While on the part of the Free Church it was maintained that he ” may lawfully acknowledge, as being in accordance with the Word of God, the creed and jurisdiction of the church,” and that ” it is his duty, when necessary and expedient, to employ the national resources in aid of the church, provided always that in doing so, while reserving to himself full control over the temporalities which are his own gift, he abstain from all authoritative inter- ference in the internal government of the church,” it was declared by the committee of the United Presbyterian Church that, ‘• inasmuch as the civil magistrate has no authority in spiritual things, and as the employment of force in such matters is opposed to the spirit and precepts of Christianity, it is not within his province to legislate as to what is true in religion, to prescribe a creed or form of worship to his subjects, or to endow the church from national resources. ‘ ‘ In other words, while the Free Church maintained that in certain circumstances it was lawful and even incumbent on the magistrate to endow the church and on the church to accept his endowment, the United Presbyterians main- tained that in no case was this lawful either for the one party or for the other. Thus in a very short time it had been made perfectly evident that a union between the two bodies, if accomplished at all, could only be brought about on the understanding that the question as to the lawfulness of state endowments should be an open one. The Free Church Assembly, by increasing majorities, manifested a readiness for union, even although unanimity had not been attained on that theoretical point. But there was a minority which did not sympathize in this readiness, and after ten years of fruitless effort it was in 1873 found to be expedient that the idea of union with the United Presbyterians should for the time be abandoned. Other negotia- tions, however, which had been entered upon with the Reformed Presbyterian Church at a somewhat later date proved more successful; and a majority of the ministers of that church with their congregations were united with the Free Church in 1876.

(J. S. Bl.) In the last quarter of the 19th century the Free Church con- tinued to be the most active, theologically, of the Scottish Churches. The College chairs were almost uniformly filled by advanced critics or theologians, inspired more or less by Professor A. B. Davidson. Dr A. B. Bruce, author of The Training of the Twelve, &c, was appointed to

the chair of apologetics and New Testament exegesis in the Glasgow College in 1875; Henry Drummond (author of Natural Law in the Spiritual World, &c.) was made lecturer in natural science in the same college in 1877 and became professor in 1884; and Dr George Adam Smith (author of The Twelve Prophets, &c.) was called to the Hebrew chair in 1892. Attempts were made between 1890 and 1895 to bring all these professors except Davidson (similar attacks were also made on Dr Marcus Dods, afterwards principal of the

1 See Taylor Innes, Law of Creeds in Scotland, p. 258 seq.

8 The language of Dr Buchanan, for example, in i860 was {mutatis mutandis) the same as that which he had employed in 1838 in moving the Independence resolution already referred to.

New College, Edinburgh) to the bar of the Assembly for unsound teaching or writing; but in every case these were abortive, the Assembly never taking any step beyond warning the accused that their primary duty was to teach and defend the church's faith as embodied in the confession. In 1892 the Free Church, following the example 6f the United Presbyterian Church and the Church of Scotland (1889), passed a Declaratory Act relaxing the stringency of subscription to the confession, with the result that a small number of ministers and congregations, mostly in the Highlands, severed their connexion with the church and formed the Free Presbyterian Church of Scotland, on strictly and straitly orthodox lines. In 1907 this body had twenty congrega- tions and twelve ministers.

The Free Church always regarded herself as a National Church, and during this period she sought actively to be true to that character by providing church ordinances for the increasing population of Scotland and applying herself to the new problems of non-church-going, and of the changing habits of the people. Her Assembly's committee on religion and morals worked toward the same ends as the similar organization of the Estab- lished Church, and in her, as in the other churches, the standard of parochial and congregational activity was raised and new methods of operation devised. She passed legislation on the difficult problem of ridding the church of inefficient ministers. The use of instrumental music was sanctioned in Free Churches during this period. An association was formed in 1891 to pro- mote the ends of edification, order and reverence in the public services of the church, and published in 1898 A New Directory for Public Worship which does not provide set forms of prayer, but directions as to the matter of prayer in the various services. The Free Church took a large share in the study of hymnology and church music, which led to the

production of The Church Hymnary. From 1885101895 much of the energy of all the Presby- terian churches was absorbed by the disestablishment agitation. In the former year the Free Church, having almost entirely shed the establishment principle on which it was founded, began to rival the United Presbyterian Church in its resolutions calling for the disestablishment of the Church of Scotland. In spite of the offers of the Establishment Assembly to confer with the dissenting churches about union, the assaults upon its status waxed in vigour, till in 1893 the Free Church hailed the result of the general election as a verdict of the constituencies in favour of disestablishment, and insisted upon the government of the day taking up Sir Charles Cameron's bill.

During the last four or five years of the century the Free and United Presbyterian churches, which after the failure of their union negotiations in 1873 had been connected together by a Mutual Eligibility Act enabling a congregation of one church to call a minister from the other, devoted their energy to the arrangement of an incorporating union. The Synod of the United Presbyterian Church resolved in 1896 to " take steps towards union," and in the following year the Free Assembly responded by appointing a committee to confer with a committee of the other church. The joint committee discovered a "remark- able and happy agreement " between the doctrinal standards, rules and methods of the two bodies, and with very little con- cessions, on either side a common constitution and common "questions and formula" for the admission of ministers and office-bearers were arranged. A minority, always growing smaller, of the Free Church Assembly, protested against the pro- posed union, and threatened if it were carried through to test its legality in the courts. To meet this opposition, the suggestion is understood to have been made that an act of parliament should be applied for to legalize the union ; but this was not done, and the union was carried through on the understanding that the question of the lawfulness of church establishments should be an open one.

The supreme courts of the churches met for the last time in their respective places of meeting on the 30th of October 1900, and on the following day the joint meeting took place at which the union was completed, and the United Free Church of Scotland (q.v.) entered on its career. The protesting and

dissenting minority at once claimed to be the Free Church. They met outside the Free Assembly Hall on the 31st of October, and, failing to gain admission to it, withdrew to another hall, where they elected Mr Colin Bannatyne their moderator and held the remaining sittings of the Assembly. It was reported that between 16,000 and 1 7,000 names had been received of persons adhering to the anti-unionist principle. At the Assembly of 1901 it was stated that the Free Church had twenty-five ministers and at least sixty-three congregations. The character of the church is indicated by the fact that its office-bearers were the faithful survivors of the decreasing minority of the Old Free Church, which had protested against the disestablishment resolutions, against the relaxation of subscription, against toleration of the teaching of the Glasgow professors, and against the use in worship of organs or of human hymns. Her congregations were mostly in the Gaelic-speaking districts of Scotland. She was confronted with a very arduous undertaking; her congregations grew in number, but were far from each other and there were not nearly enough ministers. The Highlands were filled, by the Union, with exasperation and dispeace which could not soon subside. The church met with no sympathy or assistance at the hands of the United Free Church, and her work was conducted at first under considerable hardships, nor was her position one to appeal to the general popular sentiment of Scotland. But the little church continued her course with indomitable courage and without any compromise of principle. The Declaratory Act of 1892 was repealed after a consultation of presbyteries, and the old principles as to worship were declared. A professor was obliged to withdraw a book he had written, in which the results of criticism, with regard to the Synoptic Gospels, had been accepted and applied. The desire of the Church of Scotland to obtain relaxation of her formula was declared to make union with her impossible. Along with this unbending attitude, signs of material growth were not wanting. The revenue of the church increased; the grant from the sustentation fund was in 1901 only £75, but from 1903 onwards it was £167.

The decision of the House of Lords in 1904 did not bring the trials of the Free Church to an end. In the absence of any arrangement with the United Free Church, she could only gain possession of the property declared to belong to her by an application in each particular case to the Court of Session, and a series of law-suits began which were trying to all parties. In the year 1905 the Free Church Assembly met in the historic Free Church Assembly Hall, but it did not meet there again. Having been left by the awards of the commission without any station in the foreign mission field, the Free Church resolved to start a foreign mission of her own. The urgent task confronting the church was that

of supplying ordinances to her congregations. The latter numbered 200 in 1907, and the church had as yet only 74 ordained ministers, so that many of the manses allocated to her by the commissioners were not yet occupied, and catechists and elders were called to conduct services where possible. The gallant stand this little church had made for principles which were no longer represented by any Presbyterian church outside the establishment attracted to her much interest and many hopes that she might be successful in her endeavours to do some- thing for the religious life of Scotland. See Scotland, Church of, for bibliography and statistics. (A.M. *) FREEDMEN'S BUREAU (officially the Bureau of Freedmen, Refugees and Abandoned Lands), a bureau created in the United States war department by an act of Congress, 3rd of March 1865, to last one year, but continued until 1872 by later acts passed over the president's veto. Its establishment was due partly to the fear entertained by the North that the Southerners if left to deal with the blacks would attempt to re-establish some form of slavery, partly to the necessity for extending relief to needy negroes and whites in the lately conquered South, and partly to the need of creating some commission or bureau to take charge of lands confiscated in the South. During the Civil War a million negroes fell into the hands of the Federals and had to be cared for. Able-bodied blacks were enlisted in the army, and the women, children and old men were settled in large

camps on confiscated Southern property, where they were cared for alternately by the war department and by the treasury department until the organization of the Freedmen's Bureau. At the head of the bureau was a commissioner, General O. O. Howard, and under him in each Southern state was an assistant commissioner with a corps of local superintendents, agents and inspectors. The officials had the broadest possible authority in all matters that concerned the blacks. The work of the bureau may be classified as follows: (1) distributing rations and medical supplies among the blacks; (2) establishing schools for them and aiding benevolent societies to establish schools and churches; (3) regulating labour and contracts; (4) taking charge of con- fiscated lands; and (5) administering justice in cases in which blacks were concerned. For several years the ex-slaves were under the almost absolute control of the bureau. Whether this control had a good or bad effect is still disputed, the Southern whites and many Northerners holding that the results of the bureau's work were distinctly bad, while others hold that much good resulted from its work. There is now no doubt, however, that while most of the higher officials of the bureau were good men, the subordinate agents were generally without character or judgment and that their interference

between the races caused permanent discord. Much necessary relief work was done, but demoralization was also caused by it, and later the institution was used by its officials as a means of securing negro votes. In educating the blacks the bureau made some progress, but the instruction imparted by the missionary teachers resulted in giving the ex-slaves notions of liberty and racial equality that led to much trouble, finally resulting in the hostility of the whites to negro education. The secession of the blacks from the white churches was aided and encouraged by the bureau. The whole field of labour and contracts was covered by minute regulations, which, good in theory, were absurd in practice, and which failed altogether, but not until labour had been disorganized for several years. The administration of justice by the bureau agents amounted simply to a ceaseless persecution of the whites who had dealings with the blacks, and bloody conflicts sometimes resulted. The law creating the bureau provided for the division of the confiscated property among the negroes, and though carried out only in parts of South Carolina, Florida and Georgia, it caused the negroes to believe that they were to be cared for at the expense of their former masters. This belief made them subject to swindling schemes perpetrated by certain bureau agents and others who promised to secure lands for them. When negro suffrage was imposed by Congress upon the Southern States, the bureau aided the Union League (q.v.) in organizing the blacks into a political party opposed to the whites. A large majority of the bureau officials secured office through their control of the blacks. The failure of the bureau system and its discontinuance in the midst of reconstruction without harm to the blacks, and the intense hostility of the Southern whites to the institution caused by the irritating conduct of bureau officials, are indications that the institution was not well conceived nor wisely administered.

See P. S. Pierce, The Freedmen's Bureau (Iowa City, 1904) ; Report of the Joint Committee on Reconstruction (Washington, 1866.) ; W. L. Fleming (ed.), Documents relating to Reconstruction (Cleveland, O., 1906) ; W. L. Fleming, Civil War and Reconstruction in Alabama (New York, 1905) ; and James W. Garner, Reconstruction in Missis- sippi (New York, 1901). • (W. L. F.)

FREEHOLD, a town and the county-seat of Monmouth county, New Jersey, U.S.A., in the township of Freehold, about 25 m. E. by N. of Trenton. Pop. (1890) 2932; (1900) 2934, of whom 215 were foreign-born and 126 were negroes; (1905) 3064; (1910) 3233. Freehold is served by the Pennsylvania and the Central of New Jersey railways. It is the trade centre of one of the most productive agricultural districts of the state and has various manufactures, including carriages, carpets

and rugs, files, shirts, underwear, and canned beans and peas. The town is the seat of two boarding schools for boys: the Freehold Military School and the New Jersey Military Academy (chartered, 1900; founded in 1844 as the Freehold Institute). One of the residences in the town dates from 1755. A settlement was made in the township about 1650, and the township was incorporated

in 1 693 . In 1 7 1 s the town was founded and was made the county-seat; it was long commonly known (from the county) as Mon- mouth Court-House, but afterwards took (from the township) the name Freehold, and in 1869 it was incorporated as the Town of Freehold. An important battle of the War of Independence, known as the battle of Monmouth, was fought near the court- house on the 28th of June 1778. A short distance N.W. of the court-house is a park in which there is a monument, unveiled on the 13th of November 1884 in commemoration of the battle; the base is of Quincy granite and the shaft is of Concord granite. Surmounting the shaft is a statue representing ” Liberty Triumphant” (the height to the top of which is about 100 ft.). The monument is adorned with five bronze reliefs, designed and modelled by James E. Kelly (b. 1855); one of these reliefs represents ” Molly Pitcher ” (d. 1832), a national heroine, who, when her husband (John C. Hays), an artillerist, was rendered insensible during the battle, served the gun in his place and prevented its capture by the British. 1 Joel Parker (1816- 1888), governor of New Jersey in 1863-1866 and 1872-1875, was long a resident of Freehold, and the erection of the monument was largely due to his efforts. A bronze tablet on a boulder in front of the present court-house, commemorating the old court- house, used asa hospital in the battle of Monmouth, was unveiled in 1907. Freehold was the birthplace and home of Dr Thomas Henderson (1 743-1824), a Whig or Patriot leader in New Jersey, an officer in the War of Independence, and a member of the Continental Congress in 17 79-1 780 and of the national House of Representatives in 1795-1797.

The name Freehold was first used of a Presbyterian church established about 1692 by Scottish exiles who came to East Jersey in 1682-1685 and built what was called the ” Old Scots’ Church ” near the present railway station of Wickatunk in Marlboro’ township, Monmouth county. In this church, in December 1706, John Boyd (d. 1709) was ordained — the first recorded Presbyterian ordination in America. The church was the first regularly constituted Presbyterian church. No

trace of the building now remains in the burying-ground where Boyd was interred, and where the Presbyterian Synod of New Jersey in 1900 raised a granite monument to his memory; his tombstone is preserved by the Presbyterian Historical Society in Philadelphia. John Tennent (1706-1732) became pastor of the Freehold church in 1730, when a new church was built by the Old Scots congregation on White Hill in the present township of Manalapan (then a part of Freehold township) , near the railway station and village called Tennent; his brother William (1705- 1 777)i whose trance, in which he thought he saw the glories of heaven, was a matter of much discussion in his time, was pastor ini733-i777- In 1751-1753 thepresent" Old Tennent Church," then called the Freehold Church, was erected on (or near) the same site as the building of 1730; in it Whitefield preached and in the older building David Brainerd and his Indian converts met. In 1859 this church (whose corporate name is " The First Presby- terian Church of the County of Monmouth ") adopted the name of Tennent, partly to distinguish it from the Presbyterian church organized at Monmouth Court-House (now Freehold) in 1838.

See Frank R. Symmes, History of the Old Tennent Church (2nd ed., Cranbury, New Jersey, 1904).

FREEHOLD, in the English law of real property, an estate in land, not being less than an estate for life. An estate for a term of years, no matter how long, was considered inferior in dignity to an estate for life, and unworthy of a freeman (see Estate). " Some time before the reign of Henry II., but apparently not so early as Domesday, the expression liberum tenementum was introduced to designate land held by a freeman by a free tenure. Thus freehold tenure is the sum of the rights and duties which constitute the relation of a free tenant to his lord." 2 In this

1 Her maiden name was Mary Ludwig. " Molly Pitcher " was a nickname given to her by the soldiers in reference to her carrying water to soldiers overcome by heat in the battle of Monmouth. She married Hays in 1769; Hays died soon after the war, and later she married one George McCauley. She lived for more than forty years at Carlisle, Penn., where a monument was erected to her memory in 1876.

- Digby's History of the Law of Real Property.

sense freehold is distinguished from copyhold, which is a tenure having its origin in the relation of lord and villein (see Copyhold). Freehold is also distinguished from leasehold, which is an estate for a

fixed number of years only. By analogy the interest of a person who holds an office for life is sometimes said to be a freehold interest. The term customary freeholds is applied to a kind of copyhold tenure in the north of England, viz. tenure by copy of court-roll, but not, as in other cases, expressed to be at the will of the lord.

FREELAND, a borough of Luzerne county, Pennsylvania, U.S.A., about 20 m. S. of Wilkes-Barre, in the E. part of the state. Pop. (1890) 1730; (1900) 5254 (1339 foreign-born, many being Slavs); (191 o) 6197. Freeland is served by the Lehigh Valley railway and by electric railway to Upper Lehigh (r m. distant, served by the Central Railroad of New Jersey) and to other neighbouring places. The borough is built on Broad Mountain, nearly 2000 ft. above sea-level, and the chief industry is the mining of coal at the numerous surrounding collieries. Freeland is the seat of the Mining and Mechanical Institute of the Anthracite Region, chartered in 1894, modelled after the German Sleigerschnlen, with elementary and secondary depart- ments and a night school for workmen. The borough has foundries and machine shops of considerable importance, and manufactures silk, overalls, beer and hames. Freeland was first settled about 1842, was laid out in 1870, and was incorporated in 1876.

FREEMAN, EDWARD AUGUSTUS (1823-1892), English historian, was born at Harborne, Staffordshire, on the 2nd of August 1823. He lost both his parents in infancy, was brought up by a grandmother, and was educated at private schools and by a private tutor. He was a studious and precocious boy, more interested in religious matters, history and foreign politics than in boyish things. He obtained a scholarship at Trinity College, Oxford, and a second class in the degree examination, and was elected fellow of his college (1845). While at Oxford he was much influenced by the High Church movement, and thought seriously of taking orders, but abandoned the idea. He married a daughter of his former tutor, the Rev. R. Gutch, in 1847, and entered on a life of study. Ecclesiastical architecture attracted him strongly. He visited many churches and began a practice, which he pursued throughout his life, of making drawings of buildings on the spot and afterwards tracing them over in ink. His first book, save for his share in a volume of English verse, was a History of Architecture (1849). Though he had not then seen any buildings outside England, it contains a good sketch of the development of the art. It is full of youthful enthusiasm and is written in florid language. After some changes of residence he bought a hSuse called Somerleaze, near Wells, Somerset, and settled there in i860.

Freeman’s life was one of strenuous literary work. He wrote many

books, and countless articles for reviews, newspapers and other publications, and was a constant contributor to the Saturday Review until 1878, when he ceased to write for it for political reasons. His Saturday Review articles corrected many errors and raised the level of historical knowledge among the educated classes, but as a reviewer he was apt to forget that a book may have blemishes and yet be praiseworthy. For some years he was an active county magistrate. He was deeply interested in politics, was a follower of Mr Gladstone, and approved the Home Rule Bill of 1886, but objected to the later proposal to retain the Irish members at Westminster. To be returned to Parliament was one of his few ambitions, and in 1868 he unsuccessfully contested Mid-Somerset. Foreign rather than domestic politics had the first place with him. Historical and religious sentiment combined with his destestation of all that was tyrannical to inspire him with hatred of the Turk and sympathy with the smaller and subject nationalities of eastern Europe. He took a prominent part in the agitation which followed “the Bulgarian atrocities”; his speeches were intemperate, and he was accused of uttering the words ” Perish India!” at a public meeting in 1876. This, however, was a misrepresentation of his words. He was made a knight commander

of the order of the Saviour by the king of Greece, and also received an order from the prince of Montenegro.

Freeman advanced the study of history in England in two special directions, by insistence on the unity of history, and by teaching the importance and right use of original authorities. History is not, he urges, to be divided ” by a middle wall of partition ” into ancient and modern, nor broken into fragments as though the history of each nation stood apart. It is more than a collection of narratives; it is a science, ” the science of man in his political character.” The historical student, then, cannot afford to be indifferent to any part of the record of man’s political being; but as his abilities for study are limited, he will, while reckoning all history to be within his range, have his own special range within which he will master every detail {Rede Lecture). Freeman’s range included Greek, Roman and the earlier part of English history, together with some portions of foreign medieval history, and he had a scholarly though general knowledge of the rest of the history of the European world. He regarded the abiding life of Rome as ” the central truth of European history,” the bond of its unity, and he undertook his History of Sicily (1891-1894) partly because it

illustrated this unity. Further, he urges that all historical study is valueless which does not take in a knowledge of original authorities, and he teaches both by example and precept what authorities should be thus described, and how they are to be weighed and used. He did not use manuscript authorities, and for most of his work he had no need to do so. The authorities which he needed were already in print, and his books would not have been better if he had disinterred a few more facts from unprinted sources.

His reputation as a historian will chiefly rest on his History of the Norman Conquest (1867-1876), his longest completed book. In common with his works generally, it is distinguished by exhaustiveness of treatment and research, critical ability, a remarkable degree of accuracy, and a certain insight into the past which he gained from his practical experience of men and institutions. He is almost exclusively a political historian. His saying that ” history is past politics and politics are present history ” is significant of this limitation cf his work, which left on one side subjects of the deepest interest in a nation’s life. In dealing with constitutional matters he sometimes attaches too much weight to words and formal aspects. This gives certain of his arguments an air of pedantry, and seems to lead him to find evidences of continuity in institutions which in reality and spirit were different from what they once had been. As a rule his estimates of character are remarkably able. It is true that he is sometimes swayed by prejudice, but this is the common lot of great historians; they cannot altogether avoid sharing in the feelings of the past, for they live in it, and Freeman did so to an extraordinary degree. Yet if he judges too favourably the leaders of the national party in England on the eve of the Norman Conquest, that is a small matter to set against the insight which he exhibits in writing of Aratus, Sulla, Nicias, William the Conqueror, Thomas of Canterbury, Frederick the Second and many more. In width of view, thoroughness of investiga- tion and honesty of purpose he is unsurpassed by any historian. He never conceals nor wilfully misrepresents anything, and he reckoned no labour too great which might help him to draw a truthful picture of the past. When a place had any important connexion with his work he invariably visited it. He travelled much, always to gain knowledge, and generally to complete his historical equipment. His collected articles and essays on places of historical interest are perhaps the most pleasing of his writings, but they deal exclusively with historical associations and architectural features. The quantity of work which he turned out is enormous, for the fifteen large volumes which contain his Norman Conquest, his unfinished History of Sicily, his William Rufus (1882), and his Essays

(1872-1879), and the crowd of his smaller books, are matched in amount by his uncollected con- tributions to periodicals. In respect of matter his historical work is uniformly excellent. In respect of form and style the case is different. Though his sentences themselves are not wordy, he is extremely diffuse in treatment, habitually repeating an idea

in successive sentences of much the same import. While this habit was doubtless aggravated by the amount of his journalistic work, it seems originally to have sprung from what may be called a professorial spirit, which occasionally appears in the tone of his remarks. He was anxious to make sure that his readers would understand his exact meaning, and to guard them against all possible misconceptions. His lengthy explanations are the more grievous because he insists on the same points in several of his books. His prolixity was increased by his unwillingness, when writing without prescribed limits, to leave out any detail, however unimportant. His passion for details not only swelled his volumes to a portentous size, but was fatal to artistic con- struction. The length of his books has hindered their usefulness. They were written for the public at large, but few save professed students, who can admire and value his exhaustiveness, will read the many hundreds of pages which he devotes to a short period of history. In some of his smaller books, however, he shows great powers of condensation and arrangement, and writes tersely enough. His style is correct, lucid and virile, but gener- ally nothing more, and his endeavour to use as far as possible only words of Teutonic origin limited his vocabulary and makes his sentences somewhat monotonous. While Froude often strayed away from his authorities, Freeman kept his authorities always before his eyes, and his narrative is here and there little more than a translation of their words. Accordingly, while it has nothing of Froude ‘s carelessness and inaccuracy, it has nothing of his charm of style. Yet now and again he rises to the level of some heroic event, and parts of his chapter on the ” Campaign of Hastings ” and of his record of the wars of Syracuse and Athens, his reflections on the visit of Basil the Second to the church of the Virgin on the Acropolis, and some other passages in his books, are fine pieces of eloquent writing.

The high quality of Freeman’s work was acknowledged by all competent judges. He wasmadeD.C.L. of Oxfordand LL.D. of Cambridge honoris causa, and when he visited the United States on a lecturing tour was warmly received at various places, of learning. He served on the royal commission on ecclesiastical courts appointed in 188 1. In 1884 he was appointed regius professor of modern history at Oxford. His lectures were thinly attended, for he did not care to adapt

them to the requirements of the university examinations, and he was not perhaps well fitted to teach young men. But he exercised a wholesome in- fluence over the more earnest students of history among the resident graduates. From 1886 he was forced by ill-health to spend much of his time abroad, and he died of smallpox at Alicante on the 16th of March 1892, while on a tour in Spain. Freeman had a strongly marked personality. Though impatient in temper and occasionally rude, he was tender-hearted and generous. His rudeness to strangers was partly caused by shy- ness and partly by a childlike inability to conceal his feelings. Eminently truthful, he could not understand that some verbal insincerities are necessary to social life. He had a peculiar faculty for friendship, and his friends always found him sym- pathetic and affectionate. In their society he would talk well and showed a keen sense of humour. He considered it his duty to expose careless and ignorant writers, and certainly enjoyed doing so. He worked hard and methodically, often had several pieces of work in hand, and kept a daily record of the time which he devoted to each of them. His tastes were curiously limited. No art interested him except architecture, which he studied throughout his life; and he cared little for literature which was not either historical or political. In later life he ceased to hold the theological opinions of his youth, but remained a devout churchman.

See W. R. W. Stephens, Life and Letters ofE. A, Freeman (London, 1895); Frederic Harrison, Tennyson, Ruskm, Mill and other Literary Estimates (London, 1899); James Bryce, ” E. A. Freeman,” Eng. Hist. Rev., July 1892. (W. Hu.)

FREEMAN, primarily one who is free, as opposed to a slave or serf (see Feudalism; Slavery). The term is more specifically applied to one who possesses the freedom of a city, borough or company. Before the passing of the Municipal Corporations

Act 1835, each English borough admitted freemen according to its own peculiar custom and by-laws. The rights and privileges of a freeman, though varying in different boroughs, generally included the right to vote at a parliamentary election of the borough, and exemption from all tolls and dues. The act of 1835 respected existing usages, and every person who was then an admitted freeman remained one, retaining at the same time all his former rights and privileges. The admission of freemen is now regulated by the

Municipal Corporations Act 1882. By section 201 of that act the term ” freeman ” includes any person of the class whose rights and interests were reserved by the act of 1835 under the name either of freemen or of burgesses. By section 202 no person can be admitted a freeman by gift or by purchase; that is, only birth, servitude or marriage are qualifications. The Honorary Freedom of Boroughs Act 1885, however, makes an exception, as by that act the council of every borough may from time to time admit persons of distinction to be honorary freemen of the borough. The town clerk of every borough keeps a list, which is called ” the freeman’s roll,” and when any person claims to be admitted a freeman in respect of birth, servitude or marriage, the mayor examines the claim, and if it is established the claimant’s name is enrolled by the town clerk.

A person may become a freeman or freewoman of one of the London livery companies by (1) apprenticeship or servitude; (2) patrimony; (3) redemption; (4) gift. This last is purely honorary. The most usual form of acquiring freedom was by serving apprenticeship to a freeman, free both of a company and of the city of London. By an act of common council of 1836 apprenticeship was permitted to freemen of the city who had not taken up the freedom of a company. By an act of common council of 1889 the term of service was reduced from seven years to four years. Freedom by patrimony is always granted to children of a person who has been duly admitted to the freedom. Freedom by redemption or purchase requires the payment of certain entrance fees, which vary with the standing of the com- pany. In the Grocers’ Company freedom by redemption does not exist, and in such companies as still have a trade, e.g. the Apothecaries and Stationers, it is limited to members of the trade.

See W. C. Hazlitt, The Livery Companies of the City of London

(1892).

FREEMASONRY. According to an old ” Charge ” delivered to initiates, Freemasonry is declared to be an ” ancient and honourable institution: ancient no doubt it is, as having sub- sisted from time immemorial; and honourable it must be acknow- ledged to be, as by a natural tendency it conduces to make those so who are obedient to its precepts … to so high an eminence has its credit been advanced that in every age Monarchs them- selves have been promoters of the art, have not thought it derogatory from their dignity to exchange the sceptre for the trowel, have patronised our mysteries and joined in our Assemblies.” For many years the craft has been conducted without respect to clime, colour, caste or creed.

History. — The precise origin of the society has yet to be ascertained, but is not likely to be, as the early records are lost; there is, however, ample evidence remaining to justify the claim for its antiquity and its honourable character. Much has been written as to its eventful past, based upon actual records, but still more which has served only to amuse or repel inquirers, and led not a few to believe that the fraternity has no trustworthy history. An unfavourable opinion of the historians of the craft generally may fairly have been held during the 18th and early in the 19th centuries, but happily since the middle of the latter century quite a different principle has animated those brethren who have sought to make the facts of masonic history known to the brotherhood, as well as worth the study of students in general. The idea that it would require an investigator to be a member of the ” mystic tie ” in order to qualify as a reader of masonic history has been exploded. The evidences collected concerning the institution during the last five hundred years, or more, may now be examined and tested in the most severe manner by literary and critical experts (whether opposed or

favourable to the body), who cannot fail to accept the claims made as to its great antiquity and continuity, as the lineal descendant of those craftsmen who raised the cathedrals and other great English buildings during the middle ages.

It is only needful to refer to the old works on freemasonry, and to compare them with the accepted histories of the present time, to be assured that such strictures as above are more than justified. The premier work on the subject was published in London in 1723, the Rev. James Anderson being the author of the historical portion, introductory to the first ” Book of Constitutions ” of the original Grand Lodge of England. Dr Anderson gravely states that ” Grand Master Moses often marshalled the Israelites into a regular and general lodge, whilst in the wilderness. . . . King Solomon was Grand Master of the lodge at Jerusalem. 1 . . . Nebuchadnezzar became the Grand Master Mason,” &c, devoting many more pages to similar absurdities, but dismisses the important modern innovation (1716- 171 7) of a Grand Lodge with a few lines noteworthy for their brief and indefinite character.

In 1738 a second edition was issued, dedicated to the prince of Wales (” a Master Mason and master of a lodge “), and was the work of the same brother (as respects the historical part), the additions being mainly on the same lines as the former volume, only, if pos- sible, still more ridiculous and extravagant; e.g. Cyrus constituted Jerubbabel ” provincial grand master in Judah “; Charles Martel was ” the Right

Worshipful Grand Master of France, and Edward I. being deeply engaged in wars left the craft to the care of several successive grand masters ” (duly enumerated). Such loose state- ments may now pass unheeded, but unfortunately they do not exhaust the objections to Dr Anderson’s method of writing history. The excerpt concerning St Alban (apparently made from Coles’s Ancient Constitutions, 1728-1729) has the unwarranted additional title of Grand Master conferred on that saint, and the extract con- cerning King /Ethelstan and Prince Edwin from the ” Old MS. Charges ” (given in the first edition) contains still more unauthorized modern terms, with the year added of 926; thus misleading most seriously those who accept the volume as trustworthy, because written by the accredited historian of the Grand Lodge, Junior Grand Warden in 1723. These examples hardly increase our confidence in the author’s accuracy when Dr Anderson comes to treat of the origin of the premier Grand Lodge; but he 1? our only informant as to that important event, and if his version of the occurrence is declined, we are absolutely without any information.

In considering the early history of Freemasonry, from a purely matter-of-fact standpoint, it will be well to settle as a necessary preliminary what the term did and does now include or mean, and how far back the inquiry should be conducted, as well as on what lines. If the view of the subject herein taken be correct, it will be useless to load the investigation by devoting considerable space to a consideration of the laws and customs of still older societies which may have been utilized and imitated by the fraternity, but which in no sense can be accepted as the actual forbears of the present society of Free and Accepted Masons. They were predecessors, or possibly prototypes, but not near relatives or progenitors of the Freemasons. 2

The Mother Grand Lodge of the world is that of England, which was inaugurated in the metropolis on St John Baptist’s day 1717 by four or more old lodges, three of which still flourish. There were other lodges also in London and the country at the time, but whether they were invited to the meeting is not now known. Probably not, as existing records of the period preserve a sphinx-like silence thereon. Likewise there were many scores of lodges at work in Scotland, and undoubtedly in Ireland the craft was widely patronized. Whatever the ceremonies may have been which were then known as Freemasonry in Great Britain and Ireland, they were practically alike, and the venerable Old Charges or MS. constitutions, dating back several centuries, were rightly held by them as the title-deeds of their masonic inheritance.

It was a bold thing to do, thus to start a governing body for the fraternity quite different in many respects to all preceding organizations, and to brand as irregular all lodges which declined

1 If history be no ancient Fable Free Masons came from Tower of Babel. (" The Freemasons; an Hudibrastic poem," London, 1723.) 2 The Early History and Antiquities of Freemasonry and Medieval Builders, by Mr G. F. Fort (U.S.A.), and the Cathedral Builders: The Magestri Comacini, by " Leader Scott " (the late Mrs Baxter), take rather a different view on this point and ably present their arguments. The Rev. C. Kingsley in Roman and Teuton writes of the Comacini, " Perhaps the original germ of the great society of Freemasons."

to accept such authority; but the very originality and audacity of its promoters appears to have led to its success, and it was not long before most of the lodges of the pre-Grand-Lodge era joined and accepted ” constitution ” by warrant of the Grand Master. Not only so, but Ireland quickly followed the lead, so early as 1725 there being a Grand Lodge for that country which must have been formed even still earlier, and probably by lodges started before any were authorized in the Englisn counties. In Scotland the change was not made until 1736, many lodges even then holding aloof from such an organization. Indeed, out of some hundred lodges known to have been active then, only thirty-three responded and agreed to fall into line, though several joined later; some, however, kept separate down to the end of the 19th century, while others never united. Many of these lodges have records of the 17th century though not then newly formed; one in particular, the oldest (the Lodge of Edinburgh, No. 1), possesses minutes so far back as the year 1599.

It is important to bear in mind that all the regular lodges throughout the world, and likewise all the Grand Lodges, directly or indirectly, have sprung from one or other of the three governing bodies named; Ireland and Scotland following the example set by their masonic mother of England in having Grand Lodges of their own. It is not proved how the latter two became ac- quainted with Freemasonry as a secret society, guided more or less by the operative MS. Constitutions or Charges common to the three bodies, not met with elsewhere; but the credit of a Grand Lodge being established to control the lodges belongs to England.

It may be a startling declaration, but it is well authenticated, that there is no other Freemasonry, as the term is now understood, chan what which has been so derived. In other words, the lodges and Grand Lodges in both hemispheres trace their origin and authority back to England for working what are known as the Three Degrees, controlled by regular Grand Lodges. That being so, a history of modern Freemasonry, the direct offspring of the British parents aforesaid, should first of all establish the descent of the three Grand Lodges from the Freemasonry of earlier days ; such continuity, of five centuries or more, being a sine qua non of antiquity and regularity.

It will be found that from the early part of the 18th century back to the 16th century existing records testify to the assemblies of lodges, mainly operative, but partly speculative, in Great Britain, whose

guiding stars and common heritage were the Old Charges, and that when their actual minutes and transactions cease to be traced by reason of their loss, these same MS. Con- stitutions furnish testimony of the still older working of such combinations of freemasons or masons, without the assistance, countenance or authority of any other masonic body; conse- quently such documents still preserved, of the 14th and later centuries (numbering about seventy, mostly in form of rolls), with the existing lodge minutes referred to of the 16th century, down to the establishment of the premier Grand Lodge in 1717, prove the continuity of the society. Indeed so universally has this claim been admitted, that in popular usage the term Free- mason is only now applied to those who belong to this particular fraternity, that of mason being applicable to one who follows that trade, or honourable calling, as a builder.

There is no evidence that during this long period any other organization of any kind, religious, philosophical, mystical or otherwise, materially or even slightly influenced the customs of the fraternity, though they may have done so; but so far as is known the lodges were of much the same character through- out, and consisted really of operatives (who enjoyed practically a monopoly for some time of the trade as masons or freemasons), and, in part, of " speculatives," i.e. noblemen, gentlemen and men of other trades, who were admitted as honorary members.

Assuming then that the freemasons of the present day are the sole inheritors of the system arranged at the so-called " Revival of 1717," which was a development from an operative body to one partly speculative, and that, so far back as the MS. Records extend and furnish any light, they must have worked in Lodges in secret throughout the period noted, a history of Freemasonry

should be mainly devoted to giving particulars, as far as possible, of the lodges, their traditions, customs and laws, based upon actual documents which can be tested and verified by members and non-members alike.

It has been the rule to treat, more or less fully, of the influence exerted on the fraternity by the Ancient Mysteries, the Essenes, Roman Colleges, Culdees, Hermeticisnv Fehm-Gerichte et hoc genus omne, especially the Steinmetzen, the Craft Gilds and the Companionage of France, &c. ; but in view of the separate and independent character of the freemasons, it appears to be quite unnecessary, and the time so employed would be better devoted to a more thorough search after additional evidences of the activity of the craft, especially during the

crucial period overlap- ping the second decade of the 18th century, so as to discover in- formation as to the transmitted secrets of the medieval masons, which, after all, may simply have been what Gaspard Monge felicitously entitles ” Descriptive Geometry, or the Art and Science of Masonic Symbolism.”

The rules and regulations of the masons were embodied in what are known as the Old Charges; the senior known copy being the Regius MS. (British Museum Bibl. Reg. 17 A, i.), which, however, is not so exclusively devoted to masonry as the later copies. David Casley, in his catalogue of the MSS. in the King’s Library (1734), unfortunately styled the little gem A Poem of Moral Duties; and owing to this misdescription its true character was not recognized until the year 1839, and then by a non-mason (Mr Halliwell-Phillipps), who had it reproduced in 1840 and brought out an improved edition in 1844. Its date has been approximately fixed at 1390 by Casley and other authorities.

The curious legend of the craft, therein made known, deals first of all with the number of unemployed in early days and the necessity of finding work, ” that they myght gete here lyvynge therby.” Euclid was consulted, and recommended the ” onest craft of good masonry,” and the genesis of the society is found ” yn Egypte lande.” By a rapid transition, but ” mony erys afterwarde,” we are told that the ” Craft com ynto England yn tyme of good kynge Adelstonus GEthelstan) day,” who called an assembly of the masons, when fifteen articles and as many more points were agreed to for the government of the craft, each being duly described. Each brother was instructed that —

” He must love wel God, and holy Churche algate And hys mayster also, that he ys wythe.”

” The thrydde poynt must be severle. With the prentes knowe hyt wele, Hys mayster cownsel he kepe and close, And hys f elows by hys goode purpose ; The prevetyse of the chamber telle he no mon, Ny yn the logge whatsever they done, Whatsever thou heryst, or syste hem do, Telle hyt no mon, whersever thou go.”

The rules generally, besides referring to trade regulations, are as a whole suggestive of the Ten Commandments in an extended form, winding up with the legend of the Ars quatuor coronatorum, as an incentive to a faithful discharge of the numerous obligations. A second part introduces a more lengthy account of the origin of masonry, in which Noah’s flood and the Tower of Babylon are mentioned as well as the great skill of Euclid, who — ” Through hye grace of Crist yn

heven, He commensed yn the syens seven ” ;

The ” seven sciences ” are duly named and explained. The compiler apparently was a priest, line 629 reading ” And, when ye gospel me rede schal,” thus also accounting for the many religious injunctions in the MS.; the last hundred lines are evidently based upon Urbanitatis (Cott. MS. Caligula An, fol. 88) and Instructions for a Parish Priest (Cott. MS. Claudius A n, fol. 27), instructions such as lads and even men would need who were ignorant of the customs of polite society, correct deportment at church and in the presence of their social superiors.

The recital of the legend of the Quatuor Coronaii has been held by Herr Findel in his History of Freemasonry (Allgemeine Ge- schichte der Freimaurerei, 1862; English editions, 1866-1869) to prove that British Freemasonry was derived from Germany,

but without any justification, the legend being met with in England centuries prior to the date of the Regius MS., and long prior to its incorporation in masonic legends on the Continent.

The next MS., in order, is known as the ” Cooke ” (Ad. MS. 23,198, British Museum), because Matthew Cooke published a fair reproduction of the document in 1861; and it is deemed by competent paleographers to date from the first part of the 15th century. There are two versions of the Old Charges in this little book, purchased for the British Museum in 1859. The compiler was probably a mason and familiar with several copies of these MS. Constitutions, two of which he utilizes and comments upon ; he quotes from a MS. copy of the Policronicon the manner in which a written account of the sciences was preserved in the two historic stones at the time of the Flood, and generally makes known the traditions of the society as well as the laws which were to govern the members.

Its introduction into England through Egypt is noted (where the Children of Israel ” lernyd ye craft of Masonry “), also the ” lande of behest ” (Jerusalem) and the Temple of Solomon (who ” confirmed ye chargys yt David his Fadir ” had made). Then masonry in France is interestingly described; and St Alban and ” iEthelstane with his yongest sone ” (the Edwin of the later MSS.) became the chosen mediums subsequently, as with the other Charges, portions of the Old

Testament are often cited in order to convey a correct idea to the neophyte, who is to hear the document read, as to these sciences which are declared to be free in themselves (Jre in hem selfe). Of all crafts followed by man in this world ” Masonry hathe the moste notabilite,” as con- firmed by ” Elders that were bi for us of masons [who] had these chargys wryten,” and ” as is write and taught in ye boke of our charges.”

Until quite recently no representative or survival of this particular version had been traced, but in 1890 one was dis- covered of 1687 (since known as the William Watson MS.). Of some seventy copies of these old scrolls which have been unearthed, by far the greater proportion have been made public since i860. They have all much in common, though often curious differences are to be detected; are of English origin, no matter where used ; and when complete, as they mostly are, whether of the 16th or subsequent centuries, are noteworthy for an invocation or prayer which begins the recital: — ” The mighte of the ffather of heaven And the wysedome of the glorious Sonne through the grace and the goodnes of the holly ghoste yt been three p’sons and one God be with us at or beginning and give us grace so to gou’ne us here in or lyving that wee maye come to his blisse that nevr shall have ending. — Amen.” (Grand Lodge MS. No. 1, a.d. 1583.)

They are chiefly of the 17th century and nearly all located in England; particulars may be found in Hughan’s Old Charges of the British Freemasons (1872, 1895 and supplement 1906). 1 The chief scrolls, with some others, have been reproduced in facsimile in six volumes of the Quatuor Coronatorum Anligrapha; and the collection in Yorkshire has been published separately, either in the West Yorkshire Reprints or the Ancient York Masonic Rolls. Several have been transcribed and issued in other works.

These scrolls give considerable information as to the tradi- tions and customs of the craft, together with the regulations for its government, and were required to be read to appren- tices long after the peculiar rules ceased to be acted upon, each lodge apparently having one or more copies kept for the purpose. The old Lodge of Aberdeen ordered in 1670 that the Charge was to be ” read at ye entering of everie entered prenteise “; another at Alnwick in 1701 provided —

” Noe Mason shall take any apprentice [but he must] Enter him and give him his Charge, within one whole year after ” ;

1 The service rendered by Dr W. Begemann (Germany) in his ”

Attempt to Classify the Old Charges of the British Masons ” (vol. 1 Trans, of the Quatuor Coronati Lodge, London) has been very great, and the researches of the Rev. A. F. A. Woodford and G. W. Speth have also been of the utmost consequence.

and still another at Swallwell (now No. 48 Gateshead) demanded that ” the Apprentices shall have their Charge given at the time of Registering, or within thirty days after”; the minutes in- serting such entries accordingly even so late as 1754, nearly twenty years after the lodge had cast in its lot with the Grand Lodge of England.

Their Christian character is further emphasized by the ” First Charge that you shall be true men to God and the holy Church “; the York MS. No. 6 beseeches the brethren ” at every meeting and assembly they pray heartily for all Christians “; the Melrose MS. No. 2 (1674) mentions ” Merchants and all other Christian men,” and the Aberdeen MS. (1670) terms the invocation ” A Prayer before the Meeting.” Until the Grand Lodge era, Freemasonry was thus wholly Christian. The York MS. No. 4 of 1693 contains a singular error in the admonitory lines:: — ” The [n] one of the elders takeing the Booke and that hee or shee that is to be made mason, shall lay their hands thereon and the charge shall be given.”

This particular reading was cited by Hughan in 1871, but was considered doubtful; Findel, 2 however, confirmed it, on his visit to York under the guidance of the celebrated masonic student the late Rev. A. F. A. Woodford. The mistake was due possibly to the transcriber, who had an older roll before him, confusing ” they,” sometimes written ” the,” with ” she,” or reading that portion, which is often in Latin, as Me vel ilia, instead of Me vel Mi.

In some of the Codices, about the middle of the 17th century and later, New Articles are inserted, such as would be suitable for an organization similar to the Masons’ Company of London, which had one, at least, of the Old Charges in its possession ac- cording to inventories of 1665 and 1676; and likewise in 1722, termed The Book of the Constitutions of the Accepted Masons. Save its mention (” Book wrote on parchment “) by Sir Francis Palgrave in the Edinb.urgh Review (April 1839) as being in existence ” not long since,” this valuable document has been lost sight of for many years.

That there were signs and other secrets preserved and used by the brethren throughout this mainly operative period may be gathered from discreet references in these old MSS. The Institutions in parchment (22nd of November 1696) of the Dumfries Kilwinning

Lodge (No. 53, Scotland) contain a copy of the oath taken ” when any man should be made “: —

” These Charges which we now reherse to you and all others ye secrets and misterys belonging to free masons you shall faithfully and truly keep, together with ye Counsell of ye assembly or lodge, or any other lodge, or brother, or fellow.”

” Then after ye oath taken and the book kissed ” {i.e. the Bible) the ” precepts” are read, the first being: —

” You shall be true men to God and his holy Church, and that you do not countenance or maintaine any eror, faction, schism or herisey, in ye church to ye best of your under- standing.” (History of No. S3, by James Smith.)

The Grand Lodge MS. No. 2 provides that ” You shall keepe secret ye obscure and intricate pts. of ye science, not disclosinge them to any but such as study and use ye same.”

The Harleian MS. No. 2054 (Brit. Mus.) is still more explicit, termed The free Masons Orders and Constitutions, and. is in the handwriting of Randle Holme (author of the Acodemie of Armory, 1688), who was a member of a lodge in Cheshire. Follow- ing the MS. Constitutions, in the same handwriting, about 1650* is a scrap of paper with the obligation : —

” There is sevrall words and signes of a free Mason to be revailed to yu wch as yu will answr. before God at the Great and terrible day of judgmt. yu keep secret and not to revaile the same to any in the heares of any p’son, but to the Mrs and fellows of the Society of Free Masons, so helpe me God, &c.” (W. H. Rylands, Mas. Mag., 1882.)

2 Findel claims that his Treatise on the society was the cause which ” first impelled England to the study of masonic history and ushered in the intellectual movement which resulted in the writings of Bros. Hughan, Lyon, Gould and others.” Great credit was due to the late German author for his important work, but before its advent the Rev. A. F. A. Woodford, D. Murray Lyon and others in Great Britain were diligent masonic students on similar lines.

It is not yet settled who were the actual designers or architects | of the

grand old English cathedrals. Credit has been claimed for church dignitaries, to the exclusion more or less of the master masons, to whom presumably of right the distinction belonged. In early days the title ” architect ” is not met with, unless the term ” Ingenator ” had that meaning, which is doubtful. As to this interesting question, and as to the subject of building generally, an historical account of Master and Free Masons (Discourses upon Architecture in England, by the Rev. James Dallaway, 1833), and Notes on the Superintendents of English Buildings in the Middle Ages (by Wyatt Papworth, 1887), should be consulted. Both writers were non-masons. The former observes: ” The honour due to the original founders of these edifices is almost invariably transferred to the ecclesiastics under whose patronage they rose, rather than to the skill and design of the master mason, or professional architect, because the only historians were monks. . . . They were probably not so well versed in geometrical science as the master masons, for mathematics formed a part of monastic learning in a very limited degree.” In the Journal of Proceedings R.I.B.A. vol. iv. (1887), a skilful critic (W.H. White) declares that Papworth, in that valu- able collection of facts, has contrived to annihilate all the profes- sional idols of the century, setting up in their place nothing except the master mason. The brotherhood of Bridge-builders, 1 that travelled far and wide to build bridges, and the travelling bodies of Freemasons, 2 he believes never existed; nor was William of Wykeham the designer of the colleges attributed to him. It seems well-nigh impossible to disprove the statements made by Papworth, because they are all so well grounded on attested facts; and the attempt to connect the Abbey of Cluny, or men trained at Cluny, with the original or preliminary designs of the great buildings erected during the middle ages, at least during the 12th and 13th centuries, is also a failure. The whole question is ably and fully treated in the History of Freemasonry by Robert Freke Gould (1886-1887), particularly in chapter vi. on ” Medieval Operative Masonry,” and in his Concise History

(1003)-

The lodge is often met with, either as the tabulatum domicialem (1200, at St Aiban’s Abbey) or actually so named in the Fabric Rolls of York Minster (1370), ye loge being situated close to the fane in course of erection; it was used as a place in which the stones were prepared in private for the structure, as well as occupied at meal-time, &c. Each mason was required to ” swere upon ye boke yt he sail trewly ande bysyli at his power hold and kepe holy all ye poyntes of yis forsayde ordinance ” {Ordinacio Cementanorum) .

As to the term /ree-mason, from the 14th century, it is held by some authorities that it described simply those men who worked " freestone," but there is abundant evidence to prove that, whatever may have been intended at first, /fee-mason soon had a much wider signification, the prefix free being also employed by carpenters (1666), sewers (15th century, tailorsat Exeter) and others, presumably to indicate they were free to follow their trades in certain localities. On this point Mr Gould well observes : " The class of persons from whom the Freemasons of Warrington (1646), Staffordshire (1686), Chester, York, London and their congeners in the 17th century derived the descriptive title, which became the inheritance of the Grand Lodge of England, were free men, and masons of Gilds or Companies " (History, vol. ii. p. 160). Dr Brentano may also be cited: " Wherever the Craft Guilds were legally acknowledged, we find foremost, that the right to exercise their craft, and sell their manufactures, depended upon the freedom of their city " (Development of Guilds, &c, p. 65). In like manner, the privilege of working as a mason was not conferred before candidates had been " made free." The regular free-masons would not work with men, even if they bad a knowledge of their trade, " if uniree," but styled

1 It is not considered necessary to refer at length to the. Fratres Ponlis, or other imaginary bodies of freemasons, as such questions may well be left to the curious and interested student.

- " No distinct trace of the general employment of large migratory bands of masons, going from place to place as a guild, or company, or brotherhood " (Prof. T. Hayter-Lewis, Brit. Arch. Assoc., 1889).

them " Cowans," a course justified by the king's " Maister of Work," William Schaw, whose Statutis and Ordinanceis (28th December 1598) required that " Na maister or fellow of craft ressaue any cowanis to wirk in his societie or companye, nor send nane of his servants to wirk wt. cowanis, under the pane of twentie pounds." Gradually, however, the rule was relaxed, in time such monopoly practically ceased, and the word " cowan " is only known in connexion with speculative Freemasonry. Sir Walter Scott, as a member of Lodge St David (No. 36), was familiar with the word and used it in Rob Roy. In 1707 a cowan was described in the minutes of Mother Lodge Kilwinning, as a mason " without the word," thus one who was not a free mason (History of the Lodge of Edinburgh No. 1, by D. Murray Lyon, 1 goo).

In the New English Dictionary (Oxford, vol. iv., 1897) under "

Freemason ” it is noted that three views have been pro- pounded: — (1) ” The suggestion that free-mason stands for free-stone-mason would appear unworthy of attention, but for the curious fact that the earliest known instances of any similar appellation are mestre mason de franche peer (Act 2 5 Edw. III., 1330), and sculptores lapidum liberorum, alleged to occur in a document of 121 7; the coincidence, however, seems to be merely accidental. (2) The view most generally held is that freemasons were those who were free of the masons' guild. Against this explanation many forcible objections have been brought by Mr G. W. Speth, who suggests (3) that the itinerant masons were called free because they claimed exemption from the control of the local guilds of the towns in which they temporarily settled. (4) Perhaps the best hypothesis is that the term refers to the medieval practice of emancipating skilled artisans, in order that they might be able to travel and render their services wherever any great building was in process of construction.” The late secretary of the Quatuor Coronati Lodge (No. 2076, London) has thus had his view sanctioned by ” the highest tribunal in the Republic of Letters so far as Philology is concerned ” (Dr W. J. Chetwode Crawley in Ars Quatuor Coronatorum, 1898). Still it cannot be denied that members of lodges in the 16th and following centuries exercised the privilege of making free masons and denied the freedom of working to cowans (also called ««-freemen) who had not been so made free; ” the Masownys of the luge ” being the only ones recognized as /reemasons. As to the prefix being derived from the word frere, a sufficient answer is the fact that frequent reference is made to ” Brother /reemasons,” so that no ground for that supposition exists (cf. articles by Mr Gould in the Freemason for September 1898 on ” Free and Freemasonry “).

There are numerous indications of masonic activity in the British lodges of the 17th century, especially in Scotland; the existing records, however, of the southern part of the United Kingdom, though few, are of importance, some only having been made known in recent years. These concern the Masons' Company of London, whose valuable minutes and other docu- ments are ably described and commented upon by Edward Conder, jr., in his Hole Crafte and Fellowship of Masons (1894), the author then being the Master of that ancient company. It was incorporated in 1677 by Charles II., who graciously met the wishes of the members, but as a company the information ” that is to be found in the Corporation Records at Guildhall proves very clearly that in 1376 the Masons' Company existed and was represented in the court of common council.” The title then favoured was ” Masons,” the entry of the term ” Freemasons ” being crossed out. Herbert erroneously overlooked the correc- tion, and stated in his

History of the Twelve Great Livery Com- panies (vol. i.) that the Freemasons returned two, and the Masons four members, but subsequently amalgamated; whereas the revised entry was for the ” Masons ” only. The Company obtained a grant of arms in 1472 (12th year Hen. VIII.), oneof the first of the kind, being thus described : — ■” A feld of Sablys A Cheveron silver grailed thre Castellis of the same garnysshed wt. dores and wyndows of the feld in the Cheveron or Cumpas of Black of Blak “; it is the authority (if any) for all later armorial bearings having a chevron and castles, assumed by other masonic

organizations. This precious document was only discovered in 1871, having been missing for a long time, thus doubtless account- ing for the erroneous representations met with, not having the correct blazon to follow. The oldest masonic motto known is ” God is our Guide ” on Kerwin’s tomb in St Helen’s church, Bishopgate, of 1594; that of ” In the Lord is all our trust ” not being traced until the next century. Supporters consisting of two doric column#are mentioned in 1688 by Randle Holme, but the Grand Lodge of England in the following century used Beavers as operative builders. Its first motto was ” In the beginning was the Word ” (in Greek), exchanged a few years on- ward for ” Relief and Truth,” the rival Grand Lodge (Atholl Masons) selecting ” Holiness to the Lord ” (in Hebrew), and the final selection at the ” Union of December 1813 ” being Audi Vide Tace.

Mr Conder’s discovery of a lodge of ” Accepted Masons ” being held under the wing of the Company was a great surprise, dating as the records do from 1620 to 1621 (the earliest of the kind yet traced in England), when seven were made masons, all of whom were free of the Company before, three being of the Livery; the entry commencing ” Att the making masons.” The meetings were entitled the ” Acception,” and the members of the lodge were called Accepted Masons, being those so accepted and initiated, the term never otherwise being met with in the Records. An additional fee had to be paid by a member of the Company to join the ” Acception,” and any not belonging thereto were mulct in twice the sum; though even then such ” acceptance ” did not qualify for membership of the superior body; the fees for the ” Acception ” being £1 and £2 respectively. In 1638- 1639, when Nicholas Stone entered the lodge (he was Master of the Company 163 2-1633) the banquet cost a considerable sum, showing that the number of brethren present must have been large.

Elias Ashmole (who according to his diary was ” made a Free Mason of Warrington with Colonel Henry Mainwaring,” seven brethen being named as in attendance at the lodge, 16th of October 1646) states that he ” received a summons to appear at a Lodge to be held next day at Masons’ Hall, London.” Accord- ingly on the nth of March 1682 he attended and saw six gentle- men ” admitted into the Fellowship of Free Masons,” of whom three only belonged to the Company; the Master, however, Mr Thomas Wise, the two wardens and six others being present on the occasion as members in their dual capacity. Ashmole adds: ” We all dyned at the Halfe Moone Tavern in Cheapside at a noble dinner prepaired at the charge of the new-accepted Masons.”

It is almost certain that there was not an operative mason present at the Lodge held in 1646, and at the one which met in 1682 there was a strong representation of the speculative branch. Before the year 1654 the Company was known as that of the Freemasons for some time, but after then the old title of Masons was reverted to, the terms ” Acception ” and ” Accepted ” belonging to the speculative Lodge, which, however, in all probability either became independent or ceased to work soon after 1682. It is very interesting to note that subsequently (but never before) the longer designation is met with of ” Free and Accepted Masons,” and is thus a combination of operative and speculative usage.

Mr Conder is of opinion that in the Records ” there is no evidence of any particular ceremony attending the position of Master Mason, possibly it consisted of administering a different oath from the one taken by the apprentices on being entered.” There is much to favour this supposition, and it may provide the key to the vexata quaestio as to the plurality of degrees prior to the Grand Lodge era. The fellow-crafts were recruited from those apprentices who had served their time and had their essay (or sufficient trial of their skill) duly passed; they and the Masters, by the Schaw Statutes of 1598, being only admitted in the presence of ” sex Maisteris and twa enterit prenteissis.” – As a rule a master mason meant one who was master of his trade, i.e. duly qualified; but it sometimes described employers as distinct from journeymen Freemasons; being also a compliment con-

ferred on honorary members during the 17th century in particular.

In Dr Plot’s History of Staffordshire (1686) is a remarkable account of the ” Society of Freemasons,” which, being by an unfriendly critic, is all the more valuable. He states that the custom had spread ” more or less all over the nation “; persons of the most eminent quality did not

disdain to enter the Fellow- ship; they had ” a large parchment volum containing the History and Rules of the Craft of Masonry “; St Amphibal, St Alban, King Athelstan and Edwin are mentioned, and these ” charges and manners ” were ” after perusal approved by King Hen. 6 and his council, both as to Masters and Fellows of this right Worshipfull craft.” It is but fair to add that notwithstanding the service he rendered the Society by his lengthy description, that credulous historian remarks of its history that there is nothing he ever ” met with more false or incoherent.”

The author of the Academie of Armory, previously noted, knew better what he was writing about in that work of 1688 in which he declares: ” I cannot but Honor the Fellowship of the Masons because of its Antiquity; and the more, as being a member of that Society, called Free Masons ” Mr Rylands states that in Harl. MS. 5955 is a collection of the engraved plates for a second volume of this important work, one being devoted to the Arms of the Society, the columns, as supporters, having globes thereon, from which possibly are derived the two pillars, with such ornaments or additions seen in lodge rooms at a later period. In the same year ” A Tripos or Speech delivered at a commence- ment in the University of Dublin held there July n, 1688, by John Jones, then A.B., afterwards D.D.,” contained ” notable evidence concerning Freemasonry in Dublin.” The Tripos was included in Sir Walter Scott’s edition of Dean Swift’s works (1814), but as Dr Chetwode Crawley points out, though noticed by the Rev. Dr George Oliver (the voluminous Masonic author), he failed to realize its historical importance. The satirical and withal amusing speech was partly translated from the Latin by Dr Crawley for his scholarly introduction to the Masonic Re- prints, &c, by Henry Sadler. ” The point seems to be that Ridley (reputed to have been an informer against priests under the barbarous penal laws) was, or ought to have been, hanged; that his carcase, anatomized and stuffed, stood in the library; and that frath scoundrellus discovered on his remains the Free- masons’ Mark.” The importance of the references to the craft in Ireland is simply owing to the year in which they were made, as illustrative of the influence of the Society at that time, of which records are lacking.

It is primarily to Scotland, however, that we have to look for such numerous particulars of the activity of the fraternity from 1 S99 to the establishment of its Grand Lodge in 1736, for an excellent account of which we are indebted to Lyon, the Scottish masonic historian. As early as 1600 (8th of June) the attendance of John Boswell, Esq., the laird of Auchinleck, is entered in the minutes of the Lodge of Edinburgh; he attested the record and added his mark, as did the

other members; so it was not his first appearance. Many noblemen and other gentlemen joined this ancient atelier, notably Lord Alexander, Sir Anthony Alexander and Sir Alexander Strachan in 1634, the king's Master of Work (Herrie Alexander) in 1638, General Alexander Hamilton in 1640, Dr Hamilton in 1647, and many other prominent and distinguished men later; "James Neilsone, Master Sklaitter to His Majestie," who was " entered and past in the Lodge of Linlithgow, being elected a joining member," 2nd March 1654. Quarter-Master General Robert Moray (or Murray) was initiated by members of the Lodge of Edinburgh, at Newcastle on the 20th of May 1641, while the Scottish army was in occupation. On due report to their Alma Mater such reception was allowed, the occurrence having been considered the first of its kind in England until the ancient Records of the Masons' Company were published.

The minute-books of a number of Scottish Lodges, which are still on the register, go back to the 17th century, and abundantly confirm the frequent admission of speculatives as members and officers, especially those of the venerable " Mother Lodge

Kilwinning," of which the.earl of Cassillis was the deacon in 1672, who was succeeded by Sir Alexander Cunningham, and the earl of Eglinton, who like the first of the trio was but an apprentice. There were three Head Lodges according to the Scottish Code of 1590, Edinburgh being " the first and principall," Kilwinning " the secund," and Stirling" the third fudge."

The Aberdeen Lodge (No. 1 tris) has records preserved from 1670, in which year what is known as the Mark Book begins, containing the oldest existing roll of members, numbering 49, all of whom have their marks registered, save two, though only ten were operatives. The names of the earls of Finlater, Enroll and Dunfermline, Lord Forbes, several ministers and professional men are on the list, which was written by a glazier, all of whom had been enlightened as to the " benefit of the measson word," and inserted in order as they " were made fellow craft." The Charter (Old Charges) had to be read at the " entering of everie prenteise," and the officers included a master and two wardens. The lodge at Melrose (No. 1 bis) with records back to 1674 did not join the Grand Lodge until 1891, and was the last of those working (possibly centuries before that body was formed) to accept the modern system of government. Of the many note- worthy

lodges mention should be made of that of ” Canongate Kilwinning No. 2,” Edinburgh, the first of the numerous pendicles of” Mother Lodge Kilwinning, No. o,” Ayrshire, started in 1677; and of the Journeymen No 8, formed in 1707, which was a secession from the Lodge of Edinburgh ; the Fellow Crafts or Journeymen not being satisfied with their treatment by the Freemen Masters of the Incorporation of Masons, &c. This action led to a trial before the Lords of Council and Session, when finally a ” Decreet Arbitral ” was subscribed to by both parties, and the junior organization was permitted ” to give the mason word as it is called ” in a separate lodge. The presbytery of Kelso 1 in 1652 sustained the action of the Rev. James Ainslie in becoming a Freemason, declaring that “there is neither sinne nor scandale in that word ” {i.e. the ” Mason Word “), which is often alluded to but never revealed in the old records already referred to. 2 One Scottish family may be cited in illustration of the continuous working of Freemasonry, whose membership is enshrined in the records of the ancient Lodge of ” Scoon and Perth No. 3 ” and others. A venerable document, lovingly cared for by No. 3, bears date 1658, and recites how John Mylne came to Perth from the ” North Countrie,” and was the king’s Master Mason and VV.M. of the Lodge, his successor being his son, who entered ” King James the sixt as fireman measOne and fellow craft “; his third son John was a member of Lodge No. 1 and Master Mason to Charles I., 1631-1630, and his eldest son was a deacon of No. 1 eleven times during thirty years. To him was apprenticed his nephew, who .vas warden in 1663-1664 and deacon several times. William Mylne was a warden in 1695, Thomas (eldest son) was Master in 1735, and took part in the formation of the Grand Lodge of Scotland. Others of the family continued to join the Lodge No. 1, until Robert, the last of the Mylnes as Freemasons, was initiated in 1754, died in 1811, and ” was buried in St Paul’s cathedral, having been Surveyor to that Edifice for fifty years,” and the last of the masonic Mylnes for five generations. The ” St John’s Lodge,” Glasgow (No. 3 bis), has some valuable old records and a ” Charter Chest ” with the words carved thereon ” God save the King and Masons Craft, 1684.” Loyalty and Charity are the watchwords of the Society.

The Craft Gilds {Corps d’Etat) of France, and their progeny the Companionage, have been fully described by Mr Gould, and the Steinmetzen of Germany would require too detailed notice if we were to particularize its rules, customs and general

‘The Associate Synod which met at Edinburgh, March 1755, just a century later, took quite an opposite view, deciding to depose from office any of their brethren who would not give up their masonic membership (Scots Mag., 1755, p. 158). Papal Bulls have also been

issued against the craft, the first being in 1738; but neither interdicts nor anathemata have any influence with the fraternity, and fall quite harmless.

1 ” We have the Mason Word and second sight, Things for to come we can fortell aright.” (The Muses Threnodie, by H. Adamson, Edin., 1638.)

character, from about the 12th century onward. Much as there was in common between the Stonemasons of Germany and the Freemasons of Great Britain and Ireland, it must be conceded that the two societies never united and were all through this long period wholly separate and independent; a knowledge of Freemasonry and authority to hold lodges in Germany being derived from the Grand Lodge of England during the first half of the 18th century. The theory of the derivation of the Free- masons from the Steinmetzen was first propounded in 1779 by the abbe 1 Grandidier, and has been maintained by more modern writers, such as Fallou, HeidelofI and Schneider, but a thorough examination of their statements has resulted in such an origin being generally discredited. Whether the Steinmetzen had secret signs of recognition or not, is not quite clear, but that the Free-masons had, for centuries, cannot be doubted, though precisely what they were may be open to question, and also what portions of the existing ceremonies are reminiscent of the craft anterior to the Revival of 17 17. Messrs Speth and Gould favour the notion that there were two distinct and separate degrees prior to the third decade of the 18th century {Ars Q.C., 1898 and 1903), while other authorities have either supported the One degree theory, or consider there is not sufficient evidence to warrant a decision. Recent discoveries, however, tend in favour of the first view noted, such as the Trinity College MS., Dublin (” Free Masonry, Feb. 171 1 “), and the invaluable 3 Chetwode Crawley MS. (Grand Lodge Library, Dublin); the second being read in connexion with the Haughfoot Lodge Records, beginning 1702 {Hist, of Freemasonry, by W. F. Vernon, 1893).

Two of the most remarkable lodges at work during the period of transition (1717-1723), out of the many then existing in England, assembled at Alnwick and at York. The origin of the first noted is not known, but there are minutes of the meetings from 1703, the Rules are of 1701, signed by quite a number of members, and a transcript of the Old Charges begins the volume. In 1 708-1 709 a minute provided for a masonic procession, at which the brethren were to walk ” with their aprons on and Comon Square.” The Lodge consisted mainly of operative ” free Brothers,” and continued for many years, a code of by- laws being published in 1763, but it never united with the Grand

Lodge, giving up the struggle for existence a few years further on. The other lodge, the most noteworthy of all the English predecessors of the Grand Lodge of England, was long held at York, the Mecca of English Freemasons. 4 Its origin is unknown, but there are traces of its existence at an early date, and possibly it was a survival of the Minster Lodge of the 14th century. Assuming that the York MS. No. 4 of 1693 was the property of the lodge in that year (which Roll was presented by George Walker of Wetherby in 1777), the entry which concludes that Scroll is most suggestive, as it gives ” The names of the Lodge ” (members) and the ” Lodge Ward(en).” Its influence most probably may be also noted at Scarborough, where ” A private Lodge ” was held on the 10th of July 1705, at which the president ” William Thompson, Esq., and severall others brethren ffree Masons ” were present, and six gentlemen (named) ” were then admitted into the said ffraternity.” These particulars are en- dorsed on the Scarborough MS. of the Old Charges, now owned by the Grand Lodge of Canada at Toronto. ” A narrow folio manuscript Book beginning 7th March 1705-1706,” which was quoted from in 1778, has long been missing, which is much to be regretted, as possibly it gave particulars of the lodge which assembled at Bradford, Yorkshire, ” when 18 Gentlemen of the first families in that neighbourhood were made Masons.” There is, however, another roll of records from 1712 to 1730 happily preserved of this ” Ancient Honble. Society and Fraternity of Free Masons,” sometimes styled ” Company ” or ” Society of Free and Accepted Masons.”

Not to be behind the London fratres, the York brethren formed a Grand Lodge on the 27th of December 1725 (the ” Grand

3 The Chetwode Crawley MS., by W. J. Hughan (Ars. Q.C., 1904).

4 The York Grand Lodge, by Messrs. Hughan and Whytehead (Ars Q.C., 1900), and Masonic Sketches and Reprints (1871), by the former.

Lodge of all England” was its modest title), and was flourishing for years, receiving into their company many county men of great influence. Some twenty years later there was a brief period of somnolence, but in 1761 a revival took place, with Francis Drake, the historian, as Grand Master, ten lodges being chartered in Yorkshire, Cheshire and Lancashire, 1762-1790, and a Grand Lodge of England,

south of the Trent, in 1779, at London, which warranted two lodges. Before the century ended all these collapsed or joined the Grand Lodge of England, so there was not a single representative of ” York Masonry ” left on the advent of the next century.

The premier Grand Lodge of England soon began to constitute new Lodges in the metropolis, and to reconstitute old ones that applied for recognition, one of the earliest of 1720-17 21 being still on the Roll as No. 6, thus having kept company ever since with the three ” time immemorial Lodges,” Nos. 2, 4 and 12. Applications for constitution kept coming in, the provinces being represented from 1723 to 1724, before which time it is likely the Grand Lodge of Ireland 1 had been started, about which the most valuable Caementaria Hibernica by Dr Chetwode Crawley may be consulted with absolute confidence. Provincial Grand Lodges were formed to ease the authorities at headquarters, and, as the society spread, also for the Continent, and gradually throughout the civilized globe. Owing to the custom prevailing before the 18th century, a few brethren were competent to form lodges on their own initiative anywhere, and hence the registers of the British Grand Lodges are not always indicative of the first appearance of the craft abroad. In North America 2 lodges were held before what is known as the first ” regular ” lodge was formed at Boston, Mass., in 1733, and probably in Canada 3 likewise. The same remark applies to Denmark, France, Ger- many, Holland, Italy, Portugal, Russia, Spain, Sweden and other countries. Of the many scores of military lodges, the first war- rant was granted by Ireland in 1732. To no other body of Freemasons has the craft been so indebted for its prosperity in early days as to their military brethren. There were rivals to the Grand Lodge of England during the 18th century, one of considerable magnitude being known as the Ancients or Atholl Masons, formed in 1751, but in December 1813 a junction was effected, and from that time the prosperity of the United Grand Lodge of England, with few exceptions, has been extraordinary. Nothing but a volume to itself could possibly describe the main features of the English Craft from 17 17, when Anthony Sayer was elected the first Grand Master of a brilliant galaxy of rulers. The first nobleman to undertake that office was the duke of Montagu in 1721, the natural philosopher J. T. Desaguliers being his immediate predecessor, who has been credited (and also the Rev. James Anderson) with the honour of starting the premier Grand Lodge; but like the fable of Sir Christopher Wren having been Grand Master, evidence is entirely lacking. Irish and Scottish peers share with those of England the distinction of presiding over the Grand Lodge, and from 1782 to 1813 their Royal Highnesses the duke of Cumberland, the prince of Wales,

or the duke of Sussex occupied the masonic throne. From 1753 to 1813 the rival Grand Lodge had been busy, but ultimately a desire for a united body prevailed, and under the ” ancient ” Grand Master, H.R.H. the duke of Kent, it was decided to amalgamate with the original ruling organiza- tion, H.R.H. the duke of Sussex becoming the Grand Master of the United Grand Lodge. On the decease of the prince in 1843 the earl of Zetland succeeded, followed by the marquess of Ripon in 1874, on whose resignation H.R.H. the prince of Wales became the Grand Master. Soon after succeeding to the throne, 1 The celebrated ” Lady Freemason,” the Hon. Mrs Aldworth (nee Miss St Leger, daughter of Lord Doneraile), was initiated in, Ireland, but at a much earlier date than popularly supposed; certainly not later than 1713, when the venturesome lady was twenty. All early accounts of the occurrence must be received with caution, as there are no contemporary records of the event.

1 History of Freemasonry, by Dr A. G. Mackey (New York, 1898), and the History of the Fraternity Publishing Company, Boston, Mass., give very full particulars as to the United States.

•See History of Freemasonry in Canada (Toronto, 1899), by J. Ross Robertson.

King Edward VII. ceased to govern the English craft, and was succeeded by H.R.H. the duke of Connaught. From 1737 to 1907 some sixteen English princes of the royal blood joined the brotherhood.

From 1723 to 1813 the number of lodges enrolled in England amounted to 1626, and from 1814 to the end of December 1909 as many as 3352 were warranted, making a grand total of 4978, of which the last then granted was numbered 3185. There were in 1909 still 2876 on the register, notwithstanding the many vacancies created by the foundation of new Grand Lodges in the colonies and elsewhere. 4

Distribution and Organization. — The advantage of the cosmo- politan basis of the fraternity generally (though some Grand Lodges still preserve the original Christian foundation) has been conspicuously manifested and appreciated in India and other countries where the votaries of numerous religious systems congregate; but the unalterable basis of a belief in the Great Architect of the Universe remains, for without such a recognition there can be no Freemasonry, and it is now, as it always has been, entirely free from party politics. The charities of the Society in England, Ireland and Scotland are extensive and well organized, their united cost per day not being less than £500,

an d with those of other Grand Lodges throughout the world must amount to a very large sum, there being over two millions of Freemasons. The vast increase of late years, both of lodges and members, however, calls for renewed vigilance and extra care in selecting candidates, • that numbers may not be a source of weakness instead of strength.

In its internal organization, the working of Freemasonry involves an elaborate system of symbolic ritual, 6 as carried out at meetings of the various lodges, uniformity as to essentials being the rule. The members are classified in numerous degrees, of which the first three are ” Entered Apprentice,” ” Fellow Craft ” and ” Master Mason,” each class of which, after initia- tion, can only be attained after passing a prescribed ordeal or examination, as a test of ‘ proficiency, corresponding to the ” essays ” of the operative period.

The lodges have their own by-laws for guidance, subject to the Book of Constitutions of their Grand Lodge, and the regula- tions of the provincial or district Grand. Lodge if located in counties or held abroad.

It is to be regretted that on the continent of Europe Free- masonry has sometimes developed on different lines from that of the ” Mother Grand Lodge ” and Anglo-Saxon Grand Lodges generally, and through its political and anti-religious tendencies has come into contact or conflict with the state authorities 6 or the Roman Catholic church. The ” Grand Orient of France ” (but not the Supreme Council 33°, and its Grand Lodge) is an example of this retrograde movement, by its elimination of the paragraph referring to a belief in the ” Great Architect of the Universe ” from its Statuts et riglements gSneraux. This deplorable action has led to the withdrawal of all regular Grand Lodges from association with that body, and such separation must continue until a return is made to the ancient and inviolable landmark of the society, which makes it impossible for an atheist either to join or continue a member of the fraternity.

The Grand Lodge of England constituted its first lodge in Paris in the year 1732, but one was formed still earlier on the continent at Gibraltar 17 28-1 7 29. Others were also opened in Germany 1733, Portugal 1735, Holland 1735, Switzerland 1740, Denmark 1745, Italy 1763, Belgium 1765, Russia 1771, and

4 The Masonic Records 1717-1894, by John Lane, and the ex- cellent Masonic Yearbook, published annually by the Grand Lodge of England, are the two standard works on Lodge enumeration,

localization and nomenclature. For particulars of the Grand Lodges, and especially that of England, Gould's History is most useful and trustworthy; and for an original contribution to the history of the rival Grand Lodge or Atholl Masons, Sadler's Masonic Facts and Fictions.

6 " A peculiar system of Morality, veiled in Allegory and illus- trated by Symbols " (old definition of Freemasonry).

6 The British House of Commons in 1799 and 1817, in acts of parliament, specifically recognized the laudable character of the society and provided for its continuance on definite lines.

FREEPORT— FREE PORTS

«S

Sweden 1773. In most of these countries Grand Lodges were subsequently created and continue to this date, save that in Austria (not Hungary) and Russia no masonic lodges have for some time been permitted to assemble. There is a union of Grand Lodges of Germany, and an annual Diet is held for the transaction of business affecting the several masonic organizations in that country, which works well. H.R.H. Prince Frederick Leopold was in 1909 Protector, or the " Wisest Master " (Vicarius Salomonis). King Gustav V. was the Grand Master + of the freemasons in Sweden, and the sovereign of the " Order of Charles XIII.," the only one of the kind confined to members of the fraternity.

Lodges were constituted in India from 1730 (Calcutta), 1752 (Madras), and r758 (Bombay); in Jamaica 1742, Antigua 1738, and St Christopher 1739; soon after which period the Grand Lodges of England, Ireland and Scotland had representatives at work throughout the civilized world.

In no part, however, outside Great Britain has the craft flourished so much as in the United States of America, where the first "regular" lodge (i.e. according to the new regime) was opened in 1733 at Boston, Mass. Undoubtedly lodges had been meeting still earlier, one of which was held at Philadelphia, Penna., with records from 1731, which blossomed into a Grand Lodge, but no authority has yet been traced for its proceedings, save that which may be termed " time immemorial right," which was enjoyed by all lodges and brethren who were at work prior to the Grand Lodge era (1716-1717) or who declined to recognize the autocratic proceedings of the premier Grand Lodge of England, just as the brethren did in the city of York. A "

deputation ” was granted to Daniel Coxe, Esq. of New Jersey, by the duke of Norfolk, Grand Master, 5th of June 1730, as Prov. Grand Master of the ” Provinces of New York, New Jersey and Pensilvania,” but there is no evidence that he ever constituted any lodges or exercised any masonic authority in virtue thereof. Henry Price as Prov. Grand Master of New England, and his lodge, which was opened on the 31st of August 1733, in the city of Boston, so far as is known, began ” regular ” Freemasonry in the United States, and the older and independent organization was soon afterwards ” regularized.” Benjamin Franklin (an Initiate of the lodge of Philadelphia) printed and published the Book of Constitutions, 1723 (of London, England), in the ” City of Brotherly Love ” in 1734, being the oldest masonic work in America. English and Scottish Grand Lodges were soon after petitioned to grant warrants to hold lodges, and by the end of the 18th century several Grand Lodges were formed, the Craft becoming very popular, partly no doubt by reason of so many prominent men joining the fraternity, of whom the chief was George Washington, initiated in a Scottish lodge at Fredericks- burg, Virginia, in 1752-1753. In 1907 there were fifty Grand Lodges assembling in the United States, with considerably over a million members.

In Canada in 1909 there were eight Grand Lodges, having about 64,000 members. Freemasonry in the Dominion is be- lieved to date from 1 740. The Grand Lodges are all of com- paratively recent organization, the oldest and largest, with 40,000 members, being for Ontario; those of Manitoba, Nova Scotia and Quebec numbering about 5000 each. There are some seven Grand Lodges in Australia; South Australia coming first as a ” sovereign body,” followed closely by New South Wales and Victoria (of 1884-1889 constitution), the whole of the lodges in the Commonwealth probably having fully 50,000 members on the registers.

There are many additional degrees which may be taken or not (being quite optional), and dependent on a favourable ballot; the difficulty, however, of obtaining admission increases as pro J gress is made, the numbers accepted decreasing rapidly with each advancement. The chief of these are arranged in separate classes and are governed either by the ” Grand Chapter of the Royal Arch,” the ” Mark Grand Lodge,” the ” Great Priory of Knights Templars ” or the ” Ancient and Accepted Rite,” these being mutually complementary and intimately connected as respects England, and more or less so in Ireland, Scotland,

North America and wherever worked on a similar basis; the countries of the continent of Europe have also their own Hauies Grades. (W. J.

H. *).

FREEPORT, a city and the county-seat of Stephenson county, Illinois, in the N.W. part of the state, on the Pecatonica river, 30 m. from its mouth and about ioo v m. N.W. of Chicago. Pop. (1890) 10,189; (1900) 13,258, of whom 2264 were foreign-born; (1910 census) 17,567. The city is served by the Chicago & North-Western, the Chicago, Milwaukee & St Paul, and the Illinois Central railways, and by the Rockford & Interurban electric railway. The Illinois Central connects at South Free- port, about 3 m. S. of Freeport, with the Chicago Great Western railway. Among Freeport 's manufactures are foundry and machine shop products, carriages, hardware specialties, patent medicines, windmills, engines, incubators, organs, beer and shoes. The Illinois Central has large railway repair shops here. The total value of the city's factory product in 1905 was $3,109,302, an increase of 14-8% since 1900. In the sur- rounding country cereals are grown, and swine and poultry are raised. Dairying is an important industry also. The city has a Carnegie library (1901). In the Court House Square is a monument, 80 ft. high, in memory of the soldiers who died in the Civil War. At the corner of Douglas Avenue and Mechanic Street a granite boulder commemorates the famous debate between Abraham Lincoln and Stephen A. Douglas, held in Freeport on the 27th of August 1858. In that debate Lincoln emphasized the differences between himself and the radical anti-slavery men, and in answer to one of Lincoln's questions Douglas declared that the people of a territory, through " unfriendly " laws or denial of legislative protection, could exclude slavery, and that " it matters not what way the Supreme Court may hereafter decide on the abstract question whether slavery may or may not go into a territory under the Constitu- tion." This, the so-called " Freeport doctrine," greatly weakened Douglas in the presidential election of i860. Freeport was settled in 1835, was laid out and named Winneshiek in 1836, and in 1837 under its present name was made the county-seat of Stephenson county. * It was incorporated as a town in 1850 and chartered as a city in 1855.

FREE PORTS, a term, strictly speaking, given to localities where no customs duties are levied, and where no customs super- vision exists. In these ports (subject to payment for specific services rendered, wharfage, storage, &c, and to the observance of local police and sanitary regulations) ships load and unload,, cargoes are deposited and handled, industries are exercised, manufactures are carried on, goods are bought and sold, without any action on the part of fiscal authorities. Ports are likewise designated " free " where a space or zone exists within which commercial operations are conducted

without payment of import or export duty, and without active interference on the part of customs authorities. The French and German designations for these two descriptions of ports are — for the former La Ville franche, Freihsfen; for the latter Le Port franc, Freibezirk or Freilager. The English phrase free port applies to both. 1 The leading conditions under which free ports in Europe derived their origin were as follows: — (1) When public order became re-established during the middle ages, trading centres were gradually formed: Marts for the exchange and purchase of goods arose in different localities. Many Italian settlements, constituting free zones, were established in the Levant. The Hanseatic towns arose in the 12th century. Great fairs became recognized — the Leipzig charter was granted in 1268. These localities were free as regards customs duties, although dues of the nature of octroi charges were often levied. (2) Until the 19th century European states were numerous, and often of small size. Accord- ingly uniform customs tariffs of wide application did not exist.

1 In China at the present time (1902) certain ports are designated ” free and open.” This phrase means that the ports in question are (1) open to foreign trade, and (2) that vessels engaged in oversea voyages may freely resort there. Exemption from payment of customs duties is not implied, which is a matter distinct from the permission granted under treaty engagements to foreign vessels to carry cargoes to and from the ” treaty ports.”

Uniform rates of duty were fixed in England by the Subsidy Act of 1660. In France, before the Revolution (besides the free ports), Alsace and the Lorraine Bishoprics were in trade matters treated as foreign countries. The unification of the German customs tariff began in 1834 with the Steuerverein and the Zollverein. The Spanish fiscal system did not include the Basque provinces until about 1850. The uniform Italian tariff dates from 1861. Thus until very recent times on the Continent free ports were compatible with the fiscal policy and practice of different countries. (3) Along the Mediterranean coast, up to the 19th century, convenient shelter was needed from corsairs. In other continental countries the prevalent colonial and mercantile policy sought to create trans-oceanic trade. Free ports were advantageous from all these points of view.

In following the history of these harbours in Europe, it is to be

observed that in Great Britain free ports have never existed. In 1552 it was contemplated to place Hull and Southampton on this footing, but the design was abandoned. Subsequently the bonding and not the free port system was adopted in the United Kingdom.

Austria-Hungary. — Fiume and Trieste were respectively free ports during the periods 1722-1893 and 1719-1893.

Belgium. — The emperor Joseph II. during his visit to the Austrian Netherlands in June 1781 endeavoured to create a direct trade between that country and India. Ostend was made a free port, and large bonding facilities were afforded at Bruges, Brussels, Ghent and Lou vain. In 1796, however, the revolutionary government abolished the Ostend privileges.

Denmark. — In November 1894 an area of about 150 acres at Copenhagen was opened as a free port, and great facilities are afforded for shipping and commercial operations in order that the Baltic trade may centre there.

France. — Marseilles was a free port in the middle ages, and so was Dunkirk when it formed part of Flanders. In 1669 these privi- leges were confirmed, and extended to Bayonne. In 1784 there was a fresh confirmation, and Lorient and St Jean de Luz were included in the ordonnance. The National Assembly in 1790 maintained this policy, and created free ports in the French West Indies. In 1795, however, all such privileges were abolished, but large bonding facilities were allowed at Marseilles to favour the Leva nt trade. The government of Louis XVIII. in 1814 restored, and in 1871 again revoked, the free port privileges of Marseilles. There are now no free ports in France or in French possessions; the bonding system is in force.

Germany. — Bremen, Hamburg and Liibeck were reconstituted free towns and ports under the treaties of 1814-1815. Certain minor ports, and several landing-stages on the Rhine and the Neckar, were also designated free. As the Zollverein policy became accepted throughout Germany, previous privileges were gradually lessened, and since 1888 only Hamburg remains a free port. There an area of about 2500 acres is exempt from customs duties and control, and is largely used for shipping and commercial purposes. Bremer- haven has a similar area of nearly 700 acres. Brake, Bremen, Cux- haven, Emden, Geestemiinde, Neufahrwasser and Stettin possess Freibezirke areas, portions of the larger port. Heligoland is outside the Zollverein — practically a foreign country.

In Italy free ports were numerous and important, and possessed privileges which varied at different dates. They were — Ancona, during the period 1696-1868; Brindisi, 1 845-1 862; Leghorn (in the 17th and 18th centuries a very important Mediterranean har- bour), 1675-1867; Messina, 1695-1879; Senigallia, 1821-1868, during the month of the local fair. Venice possessed warehouses, equivalent to bonded stores, for German and Turkish trade during the Republic, and was a free port 1851-1873. Genoa was a free port in the time of the Republic and under the French Empire, and was continued as such by the treaties of 1814-1815. The free port was, however, changed into a ” deposito franco ” by a law passed in 1865, and only storing privileges now remain.

Rumania. — Braila, Galatz and Kustenji were free ports (for a period of about forty years) up to 1883, when bonded warehouses were established by the Rumanian government. Sulina remains free. Russia. — Archangel was a free port, at least for English goods, from 1553 to 1648. During this period English products were admitted into Russia via Archangel without any customs payment for internal consumption, and also in transit to Persia. The tsar Alexis revoked this grant on the execution of Charles I. Free ports were opened in 1895 at Kola, in Russian Lapland. Dalny, adjoining Port Arthur, was a free port during the Russian occupation ; and Japan after the war decided to renew this privilege as soon as practicable.

The number of free ports outside Europe has also lessened. The administrative policy of European countries has been gradually adopted in other parts of the world, and customs duties have become almost universal, conjoined with bonding and transhipment facilities. In British colonies and possessions, under an act of parliament passed in 1766, and repealed in 1867, two ports in Dominica and four in Jamaica were free, Malacca, Penang and Singapore have been

free ports since 1824, Hong-Kong since 1842, and Weihaiwei since it was leased to Great Britain in 1898. Zanzibar was a free port during 1892-1899. Aden, Gibraltar, St Helena and St Thomas (West Indies) are sometimes designated free ports. A few duties are, however, levied, which are really octroi rather than customs charges. These places are mainly stations for coaling and awaiting orders.

Some harbours in the Netherlands East Indies were free ports between 1829 and 1899 ; but these privileges were withdrawn by laws passed in 1898-1899, in order to establish uniformity of customs administration. Harbours where custom houses are not maintained will be practically closed to foreign trade, though the governor-

general may in special circumstances vary the application of the new regulations.

Macao has been a free port since 1845. Portugal has no other harbour of this character.

The American Republics have adopted the bonding system. In 1896 a free wharf was opened at New Orleans in imitation of the recent European plan. Livingstone (Guatemala) was a free port during the period 1882-1888.

The privileges enjoyed under the old free port system benefited the towns and districts where they existed; and their aboli- tion has been, locally, injurious. These places were, however, ” foreign ” to their own country, and their inland intercourse was restricted by the duties levied on their products, and by the precautions adopted to prevent evasion of these charges. With fiscal usages involving preferential and deferential treatment of goods and places, the drawbacks thus arising did not attract serious attention. Under the limited means of communication within and beyond the country, in former times, these con- veniences were not much felt. But when finance departments became more completely organized, the free port system fell out of favour with fiscal authorities: it afforded opportunities for smuggling, and impeded uniformity of action and practice. It became, in fact, out of harmony with the administrative and financial policy of later times. Bonding and entrepot facilities, on a scale commensurate with local needs, now satisfy trade requirements. In countries where high customs duties are levied, and where fiscal regulations are minute and rigid, if an extension of foreign trade is desired, and the competition which it involves is a national aim, special facilities must be granted for this pur- pose. In these circumstances a free zone sufficiently large to admit of commercial operations and transhipments on a scale which will fulfil these conditions (watched but not interfered with by the customs) becomes indispensable. The German govern- ment have, as we have seen, maintained a free zone of this nature at Hamburg. And when the free port at Copenhagen was opened , counter measures were adopted at Danzig and Stettin. An agitation has arisen in France to provide at certain ports free zones similar to those at Copenhagen and Hamburg, and to open free ports in French possessions. A bill to this effect was sub- mitted to the chamber of deputies on the 12th of April 1905. Colonial free ports, such as Hong-Kong and Singapore, do not interfere -with the uniformity of the home customs and excise policy. These two harbours in particular have become great shipping resorts and distributing centres. The policy which led to their establishment as free ports has certainly promoted British commercial

interests.

See the Parliamentary Paper on ” Continental Free Ports,” 1904.

(C. M. K.)

FREE REED VIBRATOR (Fr. anche libre, Ger. durchschlagende Zunge, Ital. ancia or lingua libera), in musical instruments, a thin metal tongue fixed at one end and vibrating freely either in surrounding space, as in the accordion and concertina, or enclosed in a pipe or channel, as in certain reed stops of the organ or in the harmonium. The enclosed reed, in its typical and theoretical form, is fixed over an aperture of the same shape but just large enough to allow it to swing freely backwards and forwards, alternately opening and closing the aperture, when driven by a current of compressed air. We have to deal with air under three different conditions in considering the phenomenon of the sound produced by free reeds. (1) The stationary column or stratum in pipe or channel containing the reed, which is normally at rest. (2) The wind or current of air fed from the bellows with a variable velocity and pressure, which is broken up into periodic air puffs as its entrance into pipe or channel is

alternately checked or allowed by the vibrator. (3) The disturbed condition of No. 1 when acted upon by the metal vibrator and by No 2, whereby the air within the pipe is forced into alternate pulses of condensation and rarefaction. The free reed is there- fore not the tone-producer but only the exciting agent, that is to say, the sound is not produced by the communication of the free reed’s vibrations to the surrounding air, 1 as in the case of a vibrating string, but by the series of air puffs punctuated by infinitesimal pauses, which it produces by alternately opening and almost closing the aperture. 2 A musical sound is thus produced the pitch of which depends on the length and thick- ness of the metal tongue; the greater the length, the slower the vibrations and the lower the pitch, while on the contrary, the thicker the reed near the shoulder at the fixed end, the higher the pitch. It must be borne in mind that the periodic vibrations of the reed determine the pitch of the sound solely by the frequency per second they impose upon the pulses of rarefaction and condensation within the pipe.

The most valuable characteristic of the free reed is its power of

producing all the delicate gradations of tone between forte and piano by virtue of a law of acoustics governing the vibration of free reeds, whereby increased pressure of wind pro- duces a proportional increase in the volume of tone. The pitch of any sound depends upon the frequency of the sound-waves, that is, the number per second which reach the ear; the fullness of sound depends upon the amplitude of the waves, or, more strictly speaking, of the swing of the transmitting particles of the medium — greater pressure in the air current (No. 2 above) which sets the vibrator in motion producing amplitude of vibration in the air within the re- ceptacle (No. 3 above) serving as reson- ating medium. The sound produced by the free reed itself is weak and requires to be reinforced by means of an ad- ditional stationary column or stratum of air. Free reed instruments are therefore classified according to the nature of the resonant medium provided: — (1) Free reeds vibrating in pipes, such as the reed stops of church organs on the continent of Europe (in England the reed pipes are generally provided with beating reeds, see Reed Instruments and Clarinet). (2) Free reeds vibrating in reed compartments and reinforced by air chambers of various shapes and sizes as in the har- monium (q.v.). (3) Instruments like the accordion and con- certina having the free reed set in vibration through a valve, but having no reinforcing medium.

The arrangement of the free reed in an organ pipe is simple, and does not differ greatly from that of the beating reed shown in fig. 2 for the purpose of comparison. The reed-box, a rect- angular wooden pipe, is closed at the bottom and covered on one face with a thin plate of copper having a rectangular slit over which is fixed the thin metal vibrating tongue or reed as described above. The reed-box, itself open at the top, is enclosed in a feed pipe having a conical foot pierced with a small hole through which the air current is forced by the action of the bellows. The impact of the incoming compressed air against the reed tongue sets it swinging through the slit, thus causing a disturb- ance or series of pulsations within the reed-box. The air then finds an escape through the resonating medium of a pipe fitting over the reed- box and terminating in an inverted cone covered with a cap in the top of which is pierced a small hole or vent. The quality of tone of free reeds is due to the tendency of air set ‘See H. Hclmholtz, Die Lehre von den Tonempfindungen (Bruns- wick. 1877), p. 166.

! See also Ernst Heinrich and Wilhelm Weber, Wellenlehre (Leipzig, 1825), where a particularly lucid explanation of the pheno- menon is given, pp. 526-530.

From J- B. Biof, Traiti de Physique experimentaie.

Fig. 1. — Grenie's

organ pipe fitted with

free-reed vibrator.

A, Tuning wire.

D, Free reed.

R, Reed-box.

B,C, Feed pipe with conical foot.

T, Part of resonating pipe, the upper end with cap and vent hole being shown separately at the side.

in periodic pulsations to divide into aliquot vibrations or loops,

producing the phenomenon known as

harmonic overtones or upper partials,

which may, in the highly composite

clang of free reeds, be discerned as far

as the 1 6th or 20th of the series. The

more intermittent and interrupted the

air current becomes, the greater the

number of the upper partials produced. 3

The power of the overtones and their

relation to the fundamental note depend

greatly upon the form of the tongue, its

position and the amount of the clearance

left as it swings through the aperture.

Free reeds not associated with reson- ating media as in the concertina are peculiarly rich in harmonics, but as the higher harmonics lie very close together, disagreeable dissonances and a harsh tone result. The

resonating pipe or chamber when suitably accommodated to the reed greatly modifies the tone by reinforcing the harmonics proper to itself, the others sinking into comparative insignificance.

Fig. 2. — Organ pipe fitted with beatingreed. AL, Beating reed. R, Reed box. F/, Tuning wire. TV, Feed pipe. VV, Conical foot. S, Hole through

which compressed

air is fed.

In order to

produce a full rich tone, a resonator should be chosen whose deepest note coincides with the fundamental tone of the reed. The other upper partials will also be reinforced thereby, but to a less degree the higher the harmonics. 4

For the history of the application of the free reed to keyboard instruments see Harmonium. (K. S.)

FREESIA, in botany, a genus of plants belonging to the Iris family (Iridaceae), and containing a single species, F. refracta, native at the Cape of Good Hope. The plants grow from a corm (a solid bulb, as in Gladiolus) which sends up a tuft of long narrow leaves and a slightly branched stem bearing a few leaves and loose one-sided spikes of fragrant narrowly funnel-shaped flowers. Several varieties are known in cultivation, differing in the colour of the flower, which is white, cream or yellow. They form pretty greenhouse plants which are readily increased from seed. They are extensively grown for the market in Guernsey, England and America. By potting successively throughout the autumn a supply of flowers is obtained through winter and spring. Some very fine large-flowered varieties, including rose-coloured ones, are now being raised by various growers in England, and are a great improvement on the older forms.

FREE SOIL PARTY, a political party in the United States, which was organized in 1847-1848 to oppose the extension of slavery into the Territories. It was a combination of the political abolitionists — many of whom had formerly been identified with the more radical Liberty party — the anti-slavery Whigs, and the faction of the Democratic party in the state of New York, called ” Barnburners,” who favoured the prohibition of slavery, in accordance with the ” Wilmot Proviso ” (see Wilmot, David), in the territory acquired from Mexico. The party was prominent in the presidential campaigns of 1848 and 1852. At the

national convention held in Buffalo, N.Y., on the oth and 10th of August 1848, they secured the nomination to the presidency of ex-President Martin Van Buren, who had failed to secure nomination by the Democrats in 1844 because of his opposition to the annexa- tion of Texas, and of Charles Francis Adams, of Massachusetts, for the vice-presidency, taking as their “platform ” a Declaration that Congress, having ” no more power to make a slave than to make a king,” was bound to restrict slavery to the slave states, and concluding, ” we inscribe on our banner ‘Free Soil, Free Speech,Free Labor and Free Man,’ and under it we will fight on and fight ever, until a triumphant victory shall reward our exertions.” The Liberty party had previously, in November 1847, nominated

3 See Helmholtz, op. cit, p. 167.

4 These phenomena are clearly explained at greater length by Sedley Taylor in Sound and Music (London, 1896), pp. 134-153 and pp. 74-86. See also Friedrich Zamminer, Die Musik und die musika-lisch.cn Instrument*, &c. (Giessen, 1855), p. 261.

John P. Hale and Leicester King as president and vice-president respectively, but in the spring of 1848 it withdrew its candidates and joined the “free soil” movement. Representatives of eighteen states, including Delaware, Maryland and Virginia, attended the Buffalo convention. In the ensuing presidential election Van Buren and Adams received a popular vote of 291,263, of which 120,510 were cast in New York. They re- ceived no electoral votes, all these being divided between the Whig candidate, Zachary Taylor, who was elected, and the Democratic candidate, Lewis Cass. The ” free soilers,” however, succeeded in sending to the thirty-first Congress two senators and fourteen representatives, who by their ability exercised an influence out of proportion to their number.

Between 1848 and 1852 the ” Barnburners ” and the ” Hunkers,” their opponents, became partially reunited, the former returning to the Democratic ranks, and thus greatly weakening the Free Soilers. The party held its national convention at Pittsburg, Pennsylvania, on the nth of August 1852, delegates being present from all the free states, and from Delaware, Maryland, Virginia and Kentucky; and John P. Hale, of New Hampshire, and George W. Julian of Indiana, were nominated for the presidency and the vice-presidency respectively, on

a platfqrm which declared slavery ” a sin against God and a crime against man,” denounced the Compromise Measures of 1850, the fugitive slave law in particular, and again opposed the extension of slavery in the Territories. These candidates, however, received no electoral votes and a popular vote of only 156,149, of which but 25,329 were polled in New York. By 1856 they aban- doned their separate organization and joined the movement which resulted in the formation of the powerful Republican party (g.v.), of which the Free Soil party was the legitimate precursor.

FREE-STONE (a translation of the O. Fr. franche pere or pierre, i.e. stone of good quality; the modern French equivalent is pierre de taille, and Ital. pietra molle), stone used in architecture for mouldings, tracery and other work required to be worked with the chisel. The oolitic stones are generally so called, although in some countries soft sandstones are used; in some churches an indurated chalk called ” clunch ” is employed for internal lining and for carving.

FREETOWN, capital of the British colony of Sierra Leone, West Africa, on the south side of the Sierra Leone estuary, about 5 m. from the cape of that name, in 8° 29′ N., 13° 10′ W. Pop. (1901) 34,463. About 500 of the inhabitants are Europeans. Freetown is picturesquely situated on a plain, closed in behind by a succession of wooded hills, the Sierra Leone, rising to a height of 1700 ft. As nearly every house is surrounded by a courtyard or garden, the town covers an unusually large area for the number of its inhabitants. It possesses few buildings of architectural merit. The principal are the governor’s residence and govern- ment offices, the barracks, the cathedral, the missionary institu- tions, the fruit market, Wilberforce Hall, courts of justice, the railway station and the grammar school. Several of these institutions are built on the slopes of the hills, and on the highest point, Sugar Loaf Mountain, is a sanatorium. The botanic gardens form a pleasant and favourite place of resort. The roads are wide but badly kept. Horses do not live, and all wheeled traffic is done by manual labour — hammocks and sedan-chairs are the customary means of locomotion. Notwithstanding that Freetown possesses an abundant and pure water-supply, drawn from the adjacent hills, it is enervating and unhealthy, and it was particularly to the capital, often spoken of as Sierra Leone, that the designation “White Man’s Grave” applied. Since the beginning of the 20th century strenuous efforts have been made to improve the sanitary condition by a new system of drainage, a better water service, the filling up of marshes wherein the malarial mosquito breeds, and in other directions. A light railway 6 m. long, opened in 1904, has been built to Hill Station (900 ft. high), where, on a healthy site, are the residences of the government officials and of other Europeans. As a

consequence the public health has improved, the highest death-rate in the years 1901-1907 being 29-6 per 1000. The town is governed

by a municipality (created in 1893) with a mayor and councillors, the large majority being elective. Freetown was the first place in British West Africa granted local self-government.

Both commercially and strategically Freetown is a place of importance. Its harbour affords ample accommodation for the largest fleets, it is a coaling station for the British navy, the head- quarters of the British military forces in West Africa, the sea terminus of the railway to the rich oil-palm regions of Mendiland, and a port of call for all steamers serving West Africa. Its inhabitants are noted for their skill as traders; the town itself produces nothing in the way of exports.

In consequence of the character of the original settlement (see Sierra Leone), 75% of the inhabitants are descended from non-indigenous Negro races. As many as 150 different tribes are represented in the Sierra Leonis of to-day. Their semi- Europeanization is largely the result of missionary endeavour. The only language of the lower class is pidgin-English — quite incomprehensible to the. newcomer from Great Britain, — but a large proportion of the inhabitants are highly educated men who excel as lawyers, clergymen, clerks and traders. Many members of the upper, that is, the best-educated, class have filled official positions of great responsibility. The most noted citizens are Bishop Crowther and Sir Samuel Lewis, chief justice of Sierra Leone 1882-1894. Both were full-blooded Africans. The Kru-men form a distinct section of the community, living in a separate quarter and preserving their tribal customs.

Since 1861-1862 there has been an independent Episcopal Native Church; but the Church Missionary Society, which in 1804 sent out the first missionaries to Sierra Leone, still maintains various agencies. Furah Bay College, built by the society on the site of General Charles Turner's estate (1 J m. E. of Freetown), and opened in 1828 with six pupils, one of whom was Bishop Crowther, was affiliated in 1876 to Durham University and has a high-class curriculum. The Wesleyans have a high school, a theological college, and other educative agencies. The Moslems, who are among the most law-abiding and intelligent citizens of Freetown, have several state-aided primary schools.

FREE TRADE, an expression which has now come to be appropriated to the economic policy of encouraging the greatest possible commercial intercourse, unrestricted by " protective " duties (see

Protection), between any, one country and its neigh- bours. This policy was originally advocated in France, and it has had its adherents in many countries, but Great Britain stands alone among the great commercial nations of the world in having adopted it systematically from 1846 onwards as the fundamental principle of her economic policy.

In the economic literature of earlier periods, it may be noted that the term ” free trade ” is employed in senses which have no relation to modern usage. The term conveyed no suggestion of unrestricted trade or national liberty when it first appeared in controversial pamphlets; 1 it stood for a freedom conferred and maintained by authority — like that of a free town. The merchants desired to have good regulations for trade so that they might be free from the disabilities imposed upon them by foreign princes or unscrupulous fellow-subjects. After 1640 the term seems to have been commonly current in a different sense. When the practice which had been handed down from the middle ages — of organizing the trade with particular countries by means of privileged companies, which professed to regulate the trade according to the state of the market so as to secure its steady development in the interest of producers and traders — was seriously called in question under the Stuarts and at the Revolu- tion, the interlopers and opponents of the companies insisted on the advantages of a ” Free Trade “; they meant by this that the various branches of commerce should not be confined to particular persons or limited in amount, but should be thrown open to be pursued by any Englishman in the way he thought most profitable himself. 2 Again, in the latter half of the 18th

1 E. Misselden, Free Trade or the Meanes to make Trade Flourish (1622), p. 68; G. Malynes, The Maintenance of Free Trade (1622), p. 105.

2 H. Parker, Of a Free Trade (1648), p. 8.

century, till Pitt’s financial reforms ‘ were brought into operation, the English customs duties on wine and brandy were excessive; and those who carried on a remunerative business by evading these duties were known as Fair Traders or Free Traders. 2 Since 1846 the term free trade has been popularly used, in England, to designate the policy of Cobden {q.v.) and others who advocated the abolition of the tax on

imported corn (see Corn Laws) ; this is the only one of the specialized senses of the term which is at all likely to be confused with the economic doctrine. The Anti-Corn Law movement was, as a matter of fact, a special application of the economic principle; but serious mistakes have arisen from the blunder of confusing the part with the whole, and treating the remission of one particular duty as if it were the essential element of a policy in which it was only an incident. W. E. Gladstone, in discussing the effect of improvements in locomotion on British trade, showed what a large proportion of the stimulus to commerce during the 19th century was to be credited to what he called the " liberalizing legislation " of the free-trade movement in the wide sense in which he used the term. " I rank the introduction of cheap postage for letters, docu- ments, patterns and printed matter, and the abolition of all taxes on printed matter, in the category of Free Trade Legislation. Not only thought in general, but every communication, and every publication, relating to matters of business, was thus set free. These great measures, then, may well take their place beside the abolition of prohibitions and protective duties, the simplifying of revenue laws, and the repeal of the Navigation Act, as forming together the great code of industrial emancipation. Under this code, our race, restored to freedom in mind and hand, and braced by the powerful stimulus of open competition with the world, has upon the whole surpassed itself and every other, and has won for itself a commercial primacy more evident, more comprehensive, and more solid than it had at any previous time possessed." 3 In this large sense free trade may be almost interpreted as the combination of the doctrines of the division of labour and of laissez-faire in regard to the world as a whole. The division of labour between different countries of the world — so that each concentrates its energies in supplying that for the production of which it is best fitted — appears to offer the greatest possi- bility of production; but this result cannot be secured unless trade and industry are treated as the primary elements in the welfare of each community, and political considerations are not allowed to hamper them.

Stated in its simplest form, the principle which underlies the doctrine of free trade is almost a truism; it is directly deducible from the very notion of exchange (q.v.). Adam Smith and his successors have demonstrated that in every case of voluntary exchange each party gains something that is of greater value-in- use to him than that with which he parts, and that consequently in every exchange, either between individuals or between nations, both parties are the gainers. Hence it necessarily follows that, since both parties gain through exchanging, the more facilities there are for exchange the greater will

be the advantage to every individual all round. 4 There is no difficulty in translat- ing this principle into the terms of actual life, and stating the conditions in which it holds good absolutely. If, at any given moment, the mass of goods in the world were distributed among the consumers with the minimum of restriction on interchange, each competitor would obtain the largest possible share of the things he procures in the world's market. But the argument is less conclusive when the element of time is taken into account; what is true of each moment separately is not necessarily true of any period in which the conditions of production, or the requirements of communities, may possibly change. Each individual is likely to act with reference to his own future, but

1 (1787), 27 Geo. III. c. 13.

- Sir Walter Scott, Guy Mannering, chapter v.

3 Gladstone, " Free Trade, Railways and Commerce," in Nine- teenth Century (Feb. 1880), vol. vii. p. 370.

1 Parker states a similar argument in the form in which it suited the special problem of his day. " If merchandise be good for the commonweal, then the more common it is made, the more open it is laid, the more good it will convey to us." Op. cit. 20.

it may often be wise for the statesman to look far ahead, beyond the existing generation. 5 Owing to the neglect of this element of time, and the allowance which must be made for it, the reasoning as to the advantages of free trade, which is perfectly sound in regard to the distribution of goods already in existence, may become sophistical, 6 if it is put forward as affording a complete demonstration of the benefits of free trade as a regular policy. After all, human society is very complex, and any attempt to deal with its problems off-hand by appealing to a simple principle raises the suspicion that some important factor may have been left out of account. When there is such mistaken simplification, the reasoning may seem to have complete certainty, and yet it fails to produce conviction, because it does not profess to deal with the problem in all its aspects. When we concentrate atten- tion on the phenomena of exchange, we are viewing society as a mechanism in which each acts under known laws and is impelled by one particular force— that of self-interest; now, society is, no doubt, in this sense a mechanism, but it is also an organism, 7 and it is only for very short periods, and in a very limited way, that we can venture to neglect its organic character without running the risk of falling into serious mistakes.

The doctrine of free trade maintains that in order to secure the greatest possible mass of goods in the world as a whole, and the greatest possibility of immediate comfort for the consumer, it is expedient that there should be no restriction on the exchange of goods and services either between individuals or communities. The controversies in regard to this doctrine have not turned on its certainty as a hypothetical principle, but on the legitimacy of the arguments based upon it. It certainly supplies a principle in the light of which all proposed trade regulations should be criticized. It gives us a basis for examining and estimating the expense at which any particular piece of trade restriction is carried out; but thus used, the principle does not necessarily condemn the expenditure; the game may be worth the candle or it may not, but at least it is well that we should know how fast the candle is being burnt. It was in this critical spirit that Adam Smith examined the various restrictions and encourage- ments to trade which were in vogue in his day; he proved of each in turn that it was expensive, but he showed that he was conscious that the final decision could not be taken from this standpoint, since he recognized in regard to the Navigation Acts that " defence is more than opulence." 8 In more recent times, the same sort of attitude was taken by Henry Sidgwick, 9 who criticizes various protective expedients in turn, in the light of free trade, but does not treat it as conveying an authoritative decision on their merits. But other exponents of the doctrine have not been content to employ it in this fashion. They urge it in a more positive manner, and insist that free trade pure and simple is the founda- tion on which the economic life of the community ought to be based. By men who advocate it in this way, free trade is set forward as an ideal which it is a duty to realize, and those who hold aloof from it or oppose it have been held up to scorn as if they were almost guilty of a crime. 10 The development of the material resources of the world is undoubtedly an important element in the welfare of mankind; it is an aim which is common to the whole race, and may be looked upon as contributing to the greatest happiness of the greatest number. Competition in the open market seems to secure that each consumer shall obtain the best possible terms; and again, since all men are consumers whether they produce or not, or whatever they produce, the greatest measure of comforts for each seems likely to be attainable on these lines. For those who are frankly cosmopolitan, and who regard material prosperity as at all events the prime object at which public policy should aim, the free-trade doctrine is readily

6 Schmoller, Grundriss der allgemeinen Volkswirtschaftslehre (1904), ii. 607.

6 Byles, Sophisms of Free Trade; L. S. Amery, Fundamental Fallacies of Free Trade, 13.

‘ W. Cunningham, Rise and Decline of the Free Trade Movement, pp. 5-11.

s Wealth of Nations, book iv. chap. ii.

8 Principles of Political Economy, 485.

10 J. Morley, Life of Cobden, i. 230.

transformed, from a mere principle of criticism, till it comes to be regarded as the harbinger of a possible Utopia’. It was in this fashion that it was put forward by French economists and proved attractive to some leading American statesmen in the 18th century. Turgot regarded the colonial systems of the European countries as at once unfair to their dependencies and dangerous to the peace of the world. ” It will be a wise and happy thing for the nation which shall be the first to modify its policy according to the new conditions, and be content to regard its colonies as if they were allied provinces and not subjects of the mother country.” It will be a wise and happy thing for the nation which is the first to be convinced that the secret of ” success, so far as commercial policy is concerned, consists in employing all its land in the manner most profitable for the proprietary, all the hands in the manner most advantageous to the workman personally, that is to say, in the manner in which each would employ them, if we could let him be simply directed by his own interest, and that all the rest of the mercantile policy is vanity and vexation of spirit. When the entire separation of America shall have forced the whole world to recognize this truth and purged the European nations of commercial jealousy there will be one great cause of war less in the world.” 1 Pitt, under the influence of Adam Smith, was prepared to admit the United States to the benefit of trade with the West Indian Colonies; and Jefferson, accepting the principles of his French teachers, would (in contradistinction to Alexander Hamilton) have been willing to see his country re- nounce the attempt to develop manufactures of her own. 2 It seemed as if a long step might be taken towards realizing the free- trade ideal for the Anglo-Saxon race; but British shipowners insisted on the retention of their privileges, and the propitious moment passed away with the failure of the negotiations of

1783. 3 Free trade ceased to be regarded as a gospel, even in France, till the idea! was revived in the writings of Bastiat, and helped to mould the enthusiasm of Richard Cobden. 4 Through his zealous advocacy, the doctrine secured converts in almost every part of the world; though it was only in Great Britain that a great majority of the citizens became so far satisfied with it that they adopted it as the foundation of the economic policy of the country.

It is not difficult to account for the conversion of Great Britain to this doctrine; in the special circumstances of the first half of the 19th century it was to the interest of the most vigorous factors in the economic life of the country to secure the greatest possible freedom for commercial intercourse. Great Britain had, through her shipping, access to all the markets of the world; she had obtained such a lead in the application of machinery to manufactures that she had a practical monopoly in textile manufactures and in the hardware trades; by removing every restriction, she could push her advantage to its farthest extent, and not only undersell native manufactures in other lands, but secure food, and the raw materials for her manufactures, on the cheapest possible terms. Free trade thus seemed to offer the means of placing an increasing distance between Britain and her rivals, and of rendering the industrial monopoly which she had attained impregnable. The capitalist employer had superseded the landowner as the mainstay of the resources and revenue of the realm, and insisted that the prosperity of manufactures was the primary interest of the community as a whole. The expectation, that a thoroughgoing policy of free trade would not only favour an increase of employment, but also the cheapening of food, could only have been roused in a country which was

1 ” Memoire,” 6 April 1776, in CEuvres, viii. 460.

2 Jefferson, Notes on Virginia, 275. See also the articles on Jefferson and Hamilton, Alexander.

9 One incidental effect of the failure to secure free trade was that the African slave trade, with West Indies as a depot for supplying the American market, ceased to be remunerative, and the opposition to the abolition of the trade was very much weaker than it would otherwise have been; see Hochstetter, ” Die wirtschaftlichen und politischen Motive fur die Abschaffung des britischen Sklaven-handels,” in Schmoller, Stoats und Sozialwissenschaftliche For-schungen, xxv. i. 37.

4 J. Welsford, ” Cobden’s Foreign Teacher,” in National Review

(December 1905).

obliged to import a considerable amount of corn. The exceptional weakness, as well as the exceptional strength, of Great Britain, among European countries, made it seem desirable to adopt the principle of unrestricted commercial intercourse, not merely in the tentative fashion in which it had been put in operation by Huskisson, but in the thoroughgoing fashion in which it at last commended itself to the minds of Peel and Gladstone. The ” Manchester men ” saw clearly where their interest lay; and the fashionable political economy was ready to demonstrate that in pursuing their own interest they were conferring the benefit of cheap clothing on all the most poverty-stricken races of mankind. It seemed probable, in the ‘forties and early ‘fifties, that other countries would take a similar view of their own interests and would follow the example which Great Britain had set. 5 That they have not done so, is partly due to the fact that none of them had such a direct, or such a widely diffused, interest in increased commercial intercourse as existed in Great Britain; but their reluctance has been partly the result of the criticism to which the free-trade doctrine has been subjected. The principles expressed in the writings of Friedrich List have taken such firm hold, both in America and in Germany, that these countries have preferred to follow on the lines by which Great Britain successfully built up her industrial prosperity in the 17th and 1 8th century, rather than on those by which they have seen her striving to maintain it since 1846.

Free trade was attractive as an ideal, because it appeared to offer the greatest production of goods to the world as a whole, and the largest share of material goods to each consumer; it is cosmopolitan, and it treats consumption, and the interest of the consumer, as such, as the end to be considered. Hence it lies open to objections which are partly political and partly economic. As cosmopolitan, free-trade doctrine is apt to be indifferent to national tradition and aspiration. In so far indeed as patriotism is a mere aesthetic sentiment, it may be tolerated, but in so far as it implies a genuine wish and intention to preserve and defend the national habits and character to the exclusion of alien elements, the cosmopolitan mind will condemn it as narrow and mischievous. In the first half of the 19th century there were many men who believed that national ambitions and jealousies of every kind were essentially dynastic, and that if monarchies were abolished there would be fewer occasions of war, so that the expenses of the business of government would be enormously curtailed. For Cobden and his contemporaries it was natural to regard the national administrative institutions as maintained for the benefit of the ” classes ” and without much advantage to the ” masses.” But in point of fact, modern times

have shown the existence in democracies of a patriotic sentiment which is both exclusive and aggressive; and the burden of armaments has steadily increased. It was by means of a civil war that the United States attained to a consciousness of national life; while such later symptoms as the recent interpretations of the Monroe doctrine, or the war with Spain, have proved that the citizens of that democratic country cannot be regarded as destitute of self -aggrandizing national ambition.

In Germany the growth of militarism and nationalism have gone on side by side under constitutional government, and certainly in harmony with predominant public opinion. Neither of these communities is willing to sink its individual conception of progress in those of the world at large; each is jealous of the intrusion of alien elements which cannot be reconciled with its own political and social system. And a similar recrudescence of patriotic feeling has been observable in other countries, such as Norway and Hungary: the growth of national sentiment is shown, not only in the attempts to revive and popularize the use of a national language, but still more decidedly in the deter- mination to have a real control over the economic life of the country. It is here that the new patriotism comes into direct conflict with the political principles of free trade as advocated by Bastiat and Cobden; for them the important point was that countries, by becoming dependent on one another, would be prevented from engaging in hostilities. The new nations are 5 Compatriot Club Lectures (1905), p. 306.

determined that they will not allow other countries to have such control over their economic condition, as to be able to exercise a powerful influence on their political life. Each is determined to be the master in his own house, and each has rejected free trade because of the cosmopolitanism which it involves.

Economically, free trade lays stress on consumption as the chief criterion of prosperity. It is, of course, true that goods are produced with the object of being consumed, and it is plausible to insist on taking this test ; but it is also true that consumption and production are mutually interdependent, and that in some ways production is the more important of the two. Consumption looks to the present, and the disposal of actual goods; production looks to the future, and the conditions under which goods can continue to be regularly provided

and thus become available for consumption in the long run. As regards the prosperity of the community in the future it is important that goods should be consumed in such a fashion as to secure that they shall be replaced or increased before they are used up; it is the amount of pro- duction rather than the amount of consumption that demands consideration, and gives indication of growth or of decadence. In these circumstances there is much to be said for looking at the economic life of a country from the point of view which free-traders have abandoned or ignore. It is not on the possibilities of consumption in the present, but on the prospects of production in the future, that the continued wealth of the community depends ; and this principle is the only one which conforms to the modern conception of the essential requirements of sociological science in its wider aspect (see Sociology). This is most obviously true in regard to countries of which the resources are very imperfectly developed. If their policy is directed to securing the greatest possible comfort for each consumer in the present, it is certain that progress will be slow; the planting of industries for which the country has an advantage may be a tedious process; and in order to stimulate national efficiency temporary protection — involving what is otherwise unnecessary immediate cost to the consumer — may seem to be abundantly justified. Such a free trader as John Stuart Mill himself admits that a case may be made out for treating ” infant industries ” as exceptions; 1 and if this exception be admitted it is likely to establish a pre- cedent. After all, the various countries of the world are all in different stages of development; some are old and some are new; and even the old countries differ greatly in the progress they have made in distinct arts. The introduction of machinery has everywhere changed the conditions of production, so that some countries have lost and others have gained a special advan- tage. Most of the countries of the world are convinced that the wisest economy is to attend to the husbanding of their resources of every kind, and to direct their policy not merely with a view to consumption in the present, but rather with regard to the possibilities of increased production in the future.

This deliberate rejection of the doctrine of free trade between nations, both in its political and economic aspects, has not interfered, however, with the steady progress of free commercial intercourse within the boundaries of a single though composite political community. ” Internal free trade,” though the* name was not then current in this sense, was one of the burning questions in England in the 17th century; it was perhaps as important a factor as puritanism in the fall of Charles I. Internal free trade was secured in France in the 18th century; thanks to Hamilton, 2 it was embodied in the constitution of

the United States; it was introduced into Germany by Bismarck; and was firmly established in the Dominion of Canada and the Commonwealth of Australia. It became in consequence, where practicable, a part of the modern federal idea as usually interpreted. There are thus great areas, externally self-protecting, where free trade, as between internal divisions, has been introduced with little, if any, political difficulty, and with considerable economic advantage. These cases are sometimes quoted as justifying the expectation that the same principle is likely to be adopted sooner or later in regard to external trading relations. There

1 T. S. Mill, Principles of Political Economy, book v. chapter x. § 1.

2 F. S. Oliver, Alexander Hamilton, 142.

is some reason, however, for raising the question whether free trade has been equally successful, not only in its economic, but in its social results, in all the large political communities where it has been introduced. In a region like the United States of America, it is probably seen at its best; there is an immense variety of different products throughout that great zone of the continent, so that the mutual co-operation of the various parts is most beneficial, while the standard of habit and comfort is so far uniform 3 throughout the whole region, and the facilities for the change of employment are so many, that there is little in- jurious competition between different districts. In the British empire the conditions are reversed; but though the great self- governing colonies have withdrawn from the circle, in the hope of building up their own economic life in their own way, free trade is still maintained over a very large part of the British empire. Throughout this area, there are very varied physical conditions; there is also an extraordinary variety of races, each with its own habits, and own standard of comfort; and in these circumstances it may be doubted whether the free competition, involved in free trade, is really altogether wholesome. Within this sphere the ideal of Bastiat and his followers is being realized. England, as a great manufacturing country, has more than held her own; India and Ireland are supplied with manufactured goods by England, and in each case the population is forced to look to the soil for its means of support, and for purchasing power. In each case the preference for tillage, as an occupation, has rendered it comparatively easy to keep the people on the land ; but there is some reason to believe that the law of diminish- ing returns is already making itself felt, at all events in India, and is forcing the people into deeper poverty. 4 It may be doubtful in the case of Ireland how far the superiority of England in in- dustrial pursuits has prevented the development of manufactures; the progress in the last

decades of the 18th century was too short- lived to be conclusive; but there is at least a strong impression in many quarters that the industries of Ireland might have flourished if they had had better opportunities allowed them. 5 In the case of India we know that the hereditary artistic skill, which had been built up in bygone generations, has been stamped out. It seems possible that the modern unrest in India, and the discontent in Ireland, may be connected with the economic conditions in these countries, on which free trade has been imposed without their consent. So far the population which subsists on the cheaper food, and has the lower standard of life, has been the sufferer; but the mischief might operate in another fashion. The self-governing colonies at all events feel that competition in the same market between races with different standards of comfort has infinite possibilities of mischief. It is easy to conjure up conditions under which the standard of comfort of wage-earners in England would be seriously threatened.

Since the 9th edition of the Encyclopaedia Britannica was published it has become clear that the free-trade doctrines of Bastiat and Cobden have not been gaining ground in the world at large, and at the opening of the 20th century it could hardly be said with confidence that the question was ” finally settled ” so far as England was concerned. As to whether the interests of Great Britain still demanded that she should continue on the line she adopted in the exceptional conditions of the middle of the 19th century, expert opinion was conspicuously divided; 6 but there remained no longer the old enthusiasm for free trade as

3 The standard is, of course, lower among the negroes and mean whites in the South than in the North and West.

4 F. Beauclerk, “Free Trade in India,” in Economic Review (July 1907), xvii. 284.

6 A. E. Murray, History of the Commercial and Financial Relations between England and Ireland, 294.

6 For the tariff reform movement in English politics see the article on Chamberlain, J. Among continental writers G. Schmoller (Grundriss der allgemeinen Volkswirtschaftslekre, ii. 641) and A. Wagner (Preface to M. Schwab’s Chamberlains Handelspolitik) pronounce in favour of a change, as Fuchs did by anticipation. Schulze-Gaevernitz (Britischer Imperialisms und englischer Frei- handel), Aubry (Etude critique de la politique commercials de VAngle- terre & I’egard de ses colonies) , and Blondel (La politique Protectionniste en Angleterre un

nouveau danger pour la France) are against it.

the harbinger of an Utopia. The old principles of the bourgeois manufacturers had been taken up by the proletariat and shaped to suit themselves. Socialism, like free trade, is cosmopolitan in its aims, and is indifferent to patriotism and hostile to militarism. Socialism, like free trade, insists on material welfare as the primary object to be aimed at in any policy, and, like free trade, socialism tests welfare by reference to possibilities of con- sumption. In one respect there is a difference; throughout Cobden's attack on the governing classes there are signs of his jealousy of the superior status of the landed gentry, but socialism has a somewhat wider range of view and demands ''' equality of opportunity " with the capitalist as well.

Bibliography. — Reference has already been made to the prin- cipal works which deal critically with the free-trade policy. Pro- fessor Fawcett's Free Trade is a good exposition of free-trade principles; so also is Professor Bastable's Commerce of Nations. Among authors who have restated the principles with special reference to the revived controversy on the subject may be men- tioned Professor W. Smart, The Return to Protection, being a Re- statement of the Case for Free Trade (2nd ed., 1906), and A. C. Pigou, Protective and Preferential Import Duties (1906). (W. Cu.)

FREGELLAE, an ancient town of Latium adiectum, situated on the Via Latina,i 1 m. W. N. W. of Aquinum, near the left branch of the Liris. It is said to have belonged in early times to the Opici or Oscans, and later to the Volscians. It was apparently destroyed by the Samnites a little before 330 B.C., in which year the people of Fabrateria Vetus (mod. Ceccano) besought the help of Rome against them, and in 328 B.C. a Latin colony was estab- lished there. The place was taken in 320 B.C. by the Samnites, but re-established by the Romans in 313 B.C. It continued hence- forward to be faithful to Rome; by breaking the bridges over the Liris it interposed an obstacle to the advance of Hannibal on Rome in 212 B.C., and it was a native of Fregellae who headed the deputation of the non-revolting colonies in 209 B.C. It appears to have been a very important and flourishing place owing to its command of the crossing of the Liris, and to its position in a fertile territory, and it was here that, after the rejection of the proposals of M. Fulvius Flaccus for the extension of Roman burgess-rights in 125 B.C., a revolt against Rome broke out. It was captured by treachery in

the same year and destroyed; but its place was taken in the following year by the colony of Fabrateria Nova, 3 m. to the S.E. on the opposite bank of the Liris, while a post station Fregellanum (mod. Ceprano) is mentioned in the itineraries: Fregellae itself, however, continued to exist as a village even under the empire. The site is clearly traceable about \ m. E. of Ceprano, but the remains of the city are scanty.

See G. Colasanti, Fregellae, storia e topografia (1906). (T. As.)

FREIBERG, or Freyberg, a town of Germany in the kingdom of Saxony, on the Munzbach, near its confluence with the Mulde, 19 m. S.W. of Dresden on the railway to Chemnitz, with a branch to Nossen. Pop. (1905) 30,896. Its situation, on the rugged northern slope of the Erzgebirge, is somewhat bleak and uninvit- ing, but the town is generally well built and makes a prosperous impression. A part of its ancient walls still remains; the other portions have been converted into public walks and gardens. Freiberg is the seat of the general administration of the mines throughout the kingdom, and its celebrated mining academy (Bergakademie), founded in 1765, is frequented by students from all parts of the world. Connected with it are extensive collections of minerals and models, a library of 50,000 volumes, and laboratories for chemistry, metallurgy and assaying. Among its distinguished scholars it reckons Abraham Gottlob Werner (1750-1817), who was also a professor there, and Alexander von Humboldt. Freiberg has extensive manufactures of gold and silver lace, woollen cloths, linen and cotton goods, iron, copper and brass wares, gunpowder and white-lead. It has also several large breweries. In the immediate vicinity are its famous silver and lead mines, thirty in number, and of which the principal ones passed into the property of the state in 1886. The castle of Freudenstein or Freistein, as rebuilt by the elector Augustus in 1572, is situated in one of the suburbs and is now used as a military magazine. In its grounds a monument was erected to Werner in 1851. The cathedral, rebuilt in late Gothic style

after its destruction by fire in 1484 and restored in 1893, was founded in the 12 th century. Of the original church a magnifi- cent German Romanesque doorway, known as the Golden Gate (Goldene Pforte), survives. The church contains numerous monuments, among others one to Prince Maurice of Saxony. Adjoining the cathedral is the mausoleum (Begrabniskapelle) , built in 1 594 in the Italian Renaissance style, in which are buried the remains of Henry the Pious and his successors down to John George IV., who died in 1694. Of the other four Protestant churches the most noteworthy is the Peterskirche which, with its three towers, is a conspicuous object on the highest point of the town. Among the other public buildings are the old town-

hall, dating from the 15th century, the antiquarian museum, and the natural history museum. There are a classical and modern, a commercial and an agricultural school, and numerous charitable institutions.

Freiberg owes its origin to the discovery of its silver mines (c. 1163). The town, with the castle of Freudenstein, was built by Otto the Rich, margrave of Meissen, in 117 5, and its name, which first appears in 1 221, is derived from the extensive mining franchises granted to it about that time. In all the partitions of the territories of the Saxon house of Wettin, from the latter part of the 13th century onward, Freiberg always remained common property, and it was not till 1485 (the mines not till 1537) that it was definitively assigned to the Albertine line. The Reforma- tion was introduced into Freiberg in 1536 by Henry the Pious, who resided here. The town suffered severely during the Thirty Years' War, and again during the French occupation from 1806 to 1 8 14, during which time it had to support an army of 700,000 men and find forage for 200,000 horses.

See H. Gerlach, Kleine Chronik von Freiberg (2nd ed., Freiberg, 1898); H. Ermisch, Das Freiberger Stadtrecht (Leipzig, 1889); Errnisch and O. Posse, Urkundenbuch der Stadt Freiberg, in Codex diplom. Sax. reg. (3 vols., Leipzig, 1883-1891); Freibergs Berg- und Hiittenwesen, published by the Bergmannischer Verein (Freiberg, 1883); Ledebur, liber die Bedeutung der Freiberger Bergakademie (ib. 1903) ; Steche, Bau- und Kunstdenkmdler der Amtshauptmann- schaft Freiberg (Dresden, 1884).

FREIBURG, a town of Germany in Prussian Silesia, on the Polsnitz, 35 m. S.W. of Breslau, on the railway to Halbstadt. Pop. (1905) 9917. It has an Evangelical and Roman Catholic church, and its industries include watch-making, linen-weaving and distilling. In the neighbourhood are the old and modern castles of the Fiirstenstein family, whence the town is sometimes distinguished as Freiburg unter dem Fiirstenstein. At Freiburg, on the 22nd of July 1762, the Prussians defended themselves successfully against the superior forces of the Austrians.

FREIBURG IM BREISGAU, an archiepiscopal see and city of Germany in the grand duchy of Baden, 12 m. E. of the Rhine, beautifully situated on the Dreisam at the foot of the Schlossberg, one of the heights of the Black Forest range, on the railway between Basel and Mannheim, 40 m. N. of the former city. Pop. (1905) 76,285. The town is for the most part well built, having several wide and handsome streets and a number of spacious squares. It is kept clean and cool by

the waters of the river, which flow through the streets in open channels; and its old fortifications have been replaced by public walks, and, what is more unusual, by vineyards. It possesses a famous university, the Ludovica Albertina, founded by Albert VI., archduke of Austria, in 1457, and attended by about 2000 students. The library contains upwards of 250,000 volumes and 600 MSS., and among the other auxiliary establishments are an anatomical hall and museum and botanical gardens. The Freiburg minster is considered one of the finest of all-the Gothic churches of Germany, being remarkable alike for the symmetry of its proportions, for the taste of its decorations, and for the fact that it may more correctly be said to be finished than almost any other building of the kind. The period of its erection pro- bably lies for the most part between n 22 and 1252; but the choir was not built till 15 13. The tower, which rises above the western entrance, is 386 ft. in height, and it presents a skilful transition from a square base into an octagonal superstructure, which in its turn is surmounted by a pyramidal spire of the most

exquisite open work in stone. In the interior of the church are some beautiful stained glass windows, both ancient and modern, the tombstones of several of the dukes of Zahringen, statues of archbishops of Freiburg, and paintings by Holbein and by Hans Baldung (c. 1470-1545), commonly called Griin. Among the other noteworthy buildings of Freiburg are the palaces of the grand duke and the archbishop, the old town-hall, the theatre, the Kaufhaus or merchants' hall, a 16th-century building with a handsome facade, the church of St Martin, with a graceful spire restored 1880-1881, the new town-hall, completed 1001, in Renaissance style, and the Protestant church, formerly the church of the abbey of Thennenbach, removed hither in 1839. In the centre of the fish-market square is a fountain surmounted by a statue of Duke Berthold III. of Zahringen; in the Franzis- kaner Platz there is a monument to Berthold Schwarz, the traditional discoverer here, in 1259, of gunpowder; the Rotteck Platz takes its name from the monument of Karl Wenzeslaus von Rotteck (1775-1840), the historian, which formerly stood on the site of the Schwarz statue; and in Kaiser Wilhelm Strasse a bronze statue was erected in 1876 to the memory of Herder, who in the early part of the 10th century founded in Freiburg an institute for draughtsmen, engravers and litho- graphers, and carried on a famous bookselling business. On the Schlossberg above the town there are massive ruins of two castles destroyed by the French in 1744; and about 2 m. to the

N.E. stands the castle of Zahringen, the original seat of the famous family of the counts of that name. Situated on the ancient road which runs by the Hollenpass between the valleys of the Danube and the Rhine, Freiburg early acquired com- mercial importance, and it is still the principal centre of the trade of the Black Forest. It manufactures buttons, chemicals, starch, leather, tobacco, silk thread, paper, and hempen goods, as well as beer and wine.

Freiburg is of uncertain foundation. In 11 20 it became a free town, with privileges similar to those of Cologne; but in 1 2 iq it fell into the hands of a branch of the family of Urach. After it had vainly attempted to throw off the yoke by force of arms, it purchased its freedom in 1366; but, unable to reimburse the creditors who had advanced the money, it was, in 1368, obliged to recognize the supremacy of the house of Hapsburg. In the 17th and 18th centuries it played a consider- able part as a fortified town. It was captured by the Swedes in 1632, 1634 and 1638; and in 1644 it was seized by the Bavarians, who shortly after, under General Mercy, defeated in the neighbourhood the French forces under Enghien and Turenne. The French were in possession from 1677 to 1697, and again in 1713-1714 and 1744; and when they left the place in 1748, at the peace of Aix-!a-Chapelle, they dismantled the fortifications. The Baden insurgents gained a victory at Freiburg in 1848, and the revolutionary government took refuge in the town in June 1849, but in the following July the Prussian forces took possession and occupied it until 1851. Since 1821 Freiburg has been the seat of an archbishop with jurisdiction over the sees of Mainz, ‘ Rottenberg and Limburg.

See Schreiber, Geschichte und Beschreibung des Miinslers zu Frei- burg (1820 and 1825); Geschichte der Stadt und Universitat Frei- burgs (1857-1859); Der Schlossberg bei Freiburg (i860); and Albert, Die Geschichtsschreibung der Stadt Freiburg (1902).

Battles of Freiburg, yd, fjth and 10th of August 1644. — During the Thirty Years’ War the neighbourhood of Freiburg was the scene of a series of engagements between the French under Louis de Bourbon, due d’Enghien (afterwards called the great Conde), and Henri de la Tour d’Auvergne, vicomte de Turenne, and the Bavarians and Austrians commanded by Franz, Freiherr von Mercy.

At the close of the campaign of 1643 the French ” Army of Weimar,” having been defeated and driven into Alsace by the Bavarians, had there been reorganized under the command of Turenne, then a young general of thirty-two and newly promoted to the marshalate. In May 1644 he opened the campaign by recrossing the Rhine and raiding the

enemy's posts as far as Uberlingen on the lake of Constance and Donaueschingen on

the Danube. The French then fell back with their booty and prisoners to Breisach, a strong garrison being left in Freiburg. The Bavarian commander, however, revenged himself by besieging Freiburg (June 27th), and Turenne's first attempt to relieve the place failed. During July, as the siege progressed, the French government sent the due d'Enghien, who was ten years younger still than Turenne, but had just gained his great victory of Rocroy, to take over the command. Enghien brought with him a veteran army, called the " Army of France," Turenne remaining in command of the Army of Weimar. The armies met at Breisach on the 2nd of August, by which date Freiburg had surrendered. At this point most commanders of the time would have decided not to fight, but to manoeuvre Mercy away from Freiburg; Enghien, however, was a fighting general, and Mercy's entrenched lines at Freiburg seemed to him a target rather than an obstacle. A few hours after his arrival, therefore, without waiting for the rearmost troops of his columns, he set the combining armies in motion for Krozingen, a village on what was then the main road between Breisach and Freiburg. The total force immediately available numbered only 16,000 combatants. Enghien and Turenne had arranged that the Army of France was to move direct upon Freiburg by Wolfenweiter, while the Army of Weimar was to make its way by hillside tracks to Wittnau and thence to attack the rear of Mercy's lines while Enghien assaulted them in front. Turenne's march (August 3rd, 1644) was slow and painful, as had been anticipated, and late in the afternoon, on passing Wittnau, he encountered the enemy. The Weimarians carried the outer lines of defence without much difficulty, but as they pressed on towards Merzhausen the resistance became more and more serious. Turenne's force was little more than 6000, and these were wearied with a long day of marching and fighting on the steep and wooded hillsides of the Black Forest. Thus the turning movement came to a standstill far short of Uffingen, the village on Mercy's line of retreat that Turenne was to have seized, nor was a flank attack possible against Mercy's main line, from which he was separated by the crest of the Schonberg. Meanwhile, Enghien's army had at the prearranged hour (4 p.m.) attacked Mercy's position on the Ebringen spur. A steep slope, vineyards, low stone walls and abatis had all to be surmounted, under a galling fire from the Bavarian musketeers, before the Army of France found itself, breathless and in disorder, in front of the actual entrenchments of the crest. A first attack failed, as did an attempt to find an unguarded path round the shoulder of the Schonberg. The situation was grave in the extreme,

but Enghien resolved on Turenne's account to renew the attack, although only a quarter of his original force was still capable of making an effort. He himself and all the young nobles of his staff dismounted and led the infantry forward again, the prince threw his baton into the enemy's lines for the soldiers to retrieve, and in the end, after a bitter struggle, the Bavarians, whose reserves had been taken away to oppose Turenne in the Merzhausen defile, abandoned the entrenchments and disappeared into the woods of the adjoining spur. Enghien hurriedly re-formed his troops, fearing at every moment to be hurled down the hill by a counterstroke; but none came. The French bivouacked in the rain, Turenne making his way across the mountain to confer with the prince, and meanwhile Mercy quietly drew off his army in the dark to a new set of entrenchments on the ridge on which stood the Loretto Chapel. On the 4th of August the Army of France and the Army of Weimar met at Merzhausen, the rearmost troops of the Army of France came in, and the whole was arranged by the major-generals in the plain facing the Loretto ridge. This position was attacked on the 5th. Enghien had designed his battle even more carefully than before, but as the result of a series of accidents the two French armies attacked prematurely and straight to their front, one brigade after another, and though at one moment Enghien, sword in hand, broke the line of defence with his last intact reserve, a brilliant counterstroke, led by Mercy's brother Kaspar (who was killed) , drove out the assailants. It is said that Enghien lost half his men on this day and Mercy one-third of his, so severe was the battle. But the result could

not be gainsaid; it was for the French a complete and costly- failure.

For three days after this the armies lay in position without fighting, the French well supplied with provisions and comforts from Breisach, the Bavarians suffering somewhat severely from want of food, and especially forage, as all their supplies had to be hauled from Villingen over the rough roads of the Black Forest. Enghien then decided to make use of the Glotter Tal to interrupt altogether this already unsatisfactory line of supply, and thus to force the Bavarians either to attack him at a serious disadvantage, or to retreat across the hills with the loss of their artillery and baggage and the disintegration of their army by famine and desertion. With this object, the Army of Weimar was drawn off on the morning of the oth of August and marched round by Betzenhausen and Lehen to Langen Denzling. The infantry of

the Army of France, then the trains, followed, while Enghien with his own cavalry faced Freiburg and the Loretto position.

Before dawn on the ioth the advance guard of Turenne's army was ascending the Glotter Tal. But Mercy had divined his

English Miles J 3 J_

French .1 — I Bavarians B

tt.B. Positions shown art thing o/ 3rd. August. 1644.

EmcryWslIter.se.

adversary's plan, and leaving a garrison to hold Freiburg, the Bavarian army had made a night march on the 9/ioth to the Abbey of St Peter, whence on the morning of the ioth Mercy fell back to Graben, his nearest magazine in the mountains. Turenne's advanced guard appeared from the Glotter Tal only to find a stubborn rearguard of cavalry in front of the abbey. A sharp action began, but Mercy hearing the drums and fifes of the French infantry in the Glotter Tal broke it off and continued his retreat in good order. Enghien thus obtained little material result from his manceuvre. Only two guns and such of Mercy's wagons that were unable to keep up fell into the hands of the French. Enghien and Turenne did not continue the chase farther than Graben, and Mercy fell back unmolested to Rothenburg on the Tauber.

The moral results of this sanguinary fighting were, however, important and perhaps justified the sacrifice of so many valuable soldiers. Enghien's pertinacity had not achieved a decision with the sword, but Mercy had been so severely punished that he was unable to interfere with his opponent's new plan of cam- paign. This, which was carried out by the united armies and by reinforcements from France, while Turenne's cavalry screened them by bold demonstrations on the Tauber, led to nothing less than the conquest of the Rhine Valley from Basel to Coblenz, a task which was achieved so rapidly that the Army of France and its victorious young leader were free to return to France in two months from the time of their appearance in Turenne's quarters at Breisach.

FREIDANK (VrIdanc), the name by which a Middle High German didactic poet of the early 13th century is known. It has been disputed whether the word, which is equivalent to " free- thought," is to be regarded as the poet's real name or only as a pseudonym; the latter is probably the case. Little is known of Freidank's life. He accompanied Frederick II. on his crusade to the Holy Land, where, in the years 12

28-1 2 29, a portion at least of his work was composed; and it is said that on his tomb (if indeed it was not the tomb of another Freidank) at Treviso there was inscribed, with allusion to the character of his style, ” he always spoke and never sang.” Wilhelm Grimm originated the hypothesis that Freidank was to be identified with Walther von der Vogelweide; but this is no longer tenable. Freidank’s work bears the name of Bescheidenheit, i.e. ” practical wisdom,” ” correct judgment,” and consists of a collection of proverbs, pithy sayings, and moral and satirical reflections, arranged under general heads. Its popularity till the end of the 16th century is shown by the great number of MSS. extant.

Sebastian Brant published the Bescheidenheit in a modified form in 1508. Wilhelm Grimm’s edition appeared in 1834 (2nd ed. i860), H. F. Bezzenberger’s in 1872. A later edition is by F. Sandvoss (1877). The old Latin translation, Fridangi Discretio, was printed by C. Lemcke in 1868; and there are two translations into modern German, A. Bacmeister’s (1861) and K. Simrock’s (1867). See also F. Pfeiffer, Uber Freidank (Zur deutschen Liter aturgeschichte, 1855), and H. Paul, Vber die ursprungliche Anordnung von Freidanks Be- scheidenheit (1870).

FREIENWALDE, a town of Germany, in the kingdom of Prussia, on the Oder, 28 m. N.E. of Berlin, on the Frankfort- Angermunde railway. Pop. (1905) 7995. It has a small palace, built by the Great Elector, an Evangelical and a Roman Catholic church, and manufactures of furniture, machinery, &c. The neighbouring forests and its medicinal springs make it a favourite summer resort of the inhabitants of Berlin. A new tower com- mands a fine view of the Oderbruch (see Oder). Freienwalde, which must be distinguished from the smaller town of the same name in Pomerania, first appears as a town in 1364.

FREIESLEBENITE, a rare mineral consisting of sulphanti- monite of silver and lead, (Pb, Ag 2) 5 Sb 4 Sii. The monoclinic crystals are prismatic in habit, with deeply striated prism and dome faces. The colour is steel-grey, and the lustre metallic; hardness 2§, specific gravity 6-2. It occurs with argentite, chalybite and galena in the silver veins of the Himmelsfurst mine at Freiberg, Saxony, where it has been known since 1720. The species was named after J. K. Freiesleben, who had earlier called it Schilf-Glaserz. Other localities are Hiendelaencina near Guadalajara in Spain, Kapnik-Banya in Hungary, and Guanajuato in Mexico. A species separated from freieslebenite by V. von Zepharovich in 187 1, because of differences in crystal- line form, is known as diaphorite (from 5ia < £op

FREIGHT, (pronounced like “weight”; derived from the Dutch vracht or vrecht, in Fr. fret, the Eng. ” fraught ” being the same word, and formerly used for the same thing, but now only as an adjective = ” laden “), the lading or cargo of a ship, and the hire paid for their transport (see Affreightment); from the original sense of water-transport of goods the word has also come to be used for land-transit (particularly in America, by railroad) , and by analogy for any load or burden.

FREILIGRATH. FERDINAND (1810-1876), German poet, was born at Detmold on the 17th of June 1810. He was educated at the gymnasium of his native town, and in his sixteenth year was sent to Soest, with a view to preparing him for a commercial career. Here he had also time and opportunity to acquire a taste for French and English literature. The years from 1831 to 1836 he spent in a bank at Amsterdam, and 1837 to 1839 in a business house at Barmen. In 1838 his Gedichte appeared and met with such extraordinary success that he gave up the

idea of a commercial life and resolved to devote himself entirely to literature. His repudiation of the political poetry of 1841 and its revolutionary ideals attracted the attention of the king of Prussia, Frederick William IV., who, in 1842, granted him a pension of 300 talers a year. He married, and, to be near his friend Emanuel Geibel, settled at St Goar. Before long, however, Freiligrath was himself carried away by the rising tide of liberal- ism. In the poem Ein Glaubensbekennlnis (1844) he openly avowed his sympathy with the political movement led by his old adversary, Georg Herwegh; the day, he declared, of his own poetic trifling with Romantic themes was over; Romanticism itself was dead. He laid down his pension, and, to avoid the inevitable political persecution, took refuge in Switzerland. As a sequel to the Glaubensbekenntnis he published Ca iral (1846), which strained still further his relations with the German authorities. He fled to London, where he resumed the com- mercial life he had broken off seven years before. When the Revolution of 1848 broke out, it seemed to Freiligrath, as to all the liberal thinkers of the time, the dawn of an era of political freedom; and, as may be seen from the poems in his collection of Politische und soziale Gedichte (1840-1851J, he welcomed it with unbounded enthusiasm. He returned to Germany and settled in Diisseldorf; but it was not long before he had again called down upon himself the ill-will of the ruling powers by a poem,

Die Toten an die Lebenden (1848). He was arrested on a charge of lese-majeste, but the prosecution ended in his acquittal. New difficulties arose; his association with the democratic movement rendered him an object of constant suspicion, and in 1851 he judged it more prudent to go back to London, where he remained until 1868. In that year he returned to Germany, settling first in Stuttgart and in 1875 in the neighbouring town of Cannstatt, where he died on the 18th of March 1876.

As a poet, Freiligrath was the most gifted member of the German revolutionary group. Coming at the very close of the Romantic age, his own purely lyric poetry re-echoes for the most part the familiar thoughts and imagery of his Romantic pre- decessors; but at an early age he had been attracted by the work of French contemporary poets, and he reinvigorated the German lyric by grafting upon it the orientalism of Victor Hugo. In this reconciliation of French and German romanticism lay Freiligrath's significance for the development of the lyric in Germany. His remarkable power of assimilating foreign literatures is also to be seen in his translations of English and Scottish ballads, of the poetry of Burns, Mrs Hemans, Longfellow and Tennyson (Englische Gedichte aus neuerer Zeit, 1846; The Rose, Thistle and Shamrock, 1853, 6th ed. 1887); he also translated Shake- speare's Cymbeline, Winter's Tale and Venus and Adonis, as well as Longfellow's Hiawatha (1857). Freiligrath is most original in his revolutionary poetry. His poems of this class suffer, it is true, under the disadvantage of all political poetry — purely temporary interest and the unavoidable admixture of much that has no claim to be called poetry at all — but the agitator Freili- grath, when he is at his best, displays a vigour and strength, a power of direct and cogent poetic expression, not to be found in any other political singer of the age.

Freiligrath's Gedichte have passed through some fifty editions, and his Gesammelte Dichtungen, first published in 1870, have reached a sixth edition (1898). Nachgelassen.es (including a translation of Byron's Mazeppa) was published in 1883. A selection of Freili- grath's best-known poems in English translation was edited by his daughter, Mrs Freiligrath-Kroeker, in 1869; also Songs of a Revolu- tionary Epoch were translated by T- L. Joynes in 1888. Cp. E. Schmidt-Weissenfels, F. Freiligrath, eine Biographie (1876); W. Buchner, F. Freiligrath, ein Dichterleben in Briefen (2 vols., 1881); G. Freiligrath, Erinnerungen an F. Freiligrath (1889); P. Besson, Freiligrath (Paris, 1899); K. Richter, Freiligrath als Vberselzer (I899)- U- G. R.)

FREIND, JOHN (1675-1728), English physician, younger brother of Robert Freind (1667-1751), headmaster of West- minster school, was

born in 1675 at Croton in Northamptonshire. He made great progress in classical knowledge under Richard Busby at Westminster, and at Christ Church, Oxford, under Dean Aldrich, and while still very young, produced, along with Peter Foulkes, an excellent edition of the speeches of Aeschines

and Demosthenes on the affair of Ctesiph&n. After this he began the study of medicine, and having proved his scientific attain- ments by various treatises was appointed a lecturer on chemistry at Oxford in 1704. In the following year he accompanied the English army, under the earl of Peterborough, into Spain, and on returning home in 1707, wrote an account of the expedition, which attained great popularity. Two years later he published his Prelectiones chimicae, which he dedicated to Sir Isaac Newton. Shortly after his return in 1713 from Flanders, whither he had accompanied the British troops, he took up his residence in London, where he soon obtained a great reputation as a physician. In 1 7 16 he became fellow of the college of physicians, of which he was chosen one of the censors in 17 18, and Harveian orator in 1 7 20. In 1 7 2 2 he entered parliament as member for Launceston in Cornwall, but, being suspected of favouring the cause of the exiled Stuarts, he spent half of that year in the Tower. During his imprisonment he conceived the plan of his most important work, The History of Physic, of which the first part .appeared in 1725, and the second in the following year. In the latter year he was appointed physician to Queen Caroline, an office which he held till his death on the 26th of July 1728.

A complete edition of his Latin works, with a Latin translation of the History of Physic, edited by Dr John Wigan, was published in London in 1732.

FREINSHEIM [Freinshemius], JOHANN (1608-1660), German classical scholar and critic, was born at Ulm on the 16th of November 1608. After studying at the universities of Marburg, Giessen and Strassburg, he visited France, where he remained for three years. He returned to Strassburg in 1637, and in 1642 was appointed professor of eloquence at Upsala. In 1647 he was summoned by Queen Christina to Stockholm as court librarian and historiographer. In 1650 he resumed his professor- ship at Upsala, but early in the following year he was obliged to resign on account of ill-health. In 1656 he became honorary professor at Heidelberg, and died on the 31st of August 1660. Freinsheim's literary activity was chiefly devoted to the Roman historians. He first introduced the division into chapters and paragraphs, and by means of carefully compiled indexes illus- trated the lexical peculiarities of each author. He is best known for his

famous supplements to Quintus Curtius and Livy, contain- ing the missing books written by himself. He also published critical editions of Curtius and Floras,

FREIRE, FRANCISCO JOSfc (1719-1773), Portuguese historian and philologist, was born at Lisbon on the 3rd of January 1719. He belonged to the monastic society of St Philip Neri, and was a zealous member of the literary association known as the Academy of Arcadians, in connexion with which he adopted the pseudonym of Candido Lusitano. He contributed much to the improvement of the style of Portuguese prose literature, but his endeavour to effect a reformation in the national poetry by a translation of Horace's Ars poelica was less successful. The work in which he set forth his opinions regarding the vicious taste pervading the current Portuguese prose literature is entitled Maximas sobre a Arte Oratoria (1 745) and is preceded by a chrono- logical table forming almost a social and physical history of Portugal. His best known work, however, is his Vida do Infante D. Henrique (1758), which has given him a place in the first rank of Portuguese historians, and has been translated into French (Paris, 1781). He also wrote a poetical dictionary (Diccionario poetico) and a translation of Racine's Athalie (1762), and his Reflexions sur la langue portugaise was published in 1842 by the Lisbon society for the promotion of useful knowledge. He died at Mafra on the 5th of July 1773.

FREISCHtJTZ, in German folklore, a marksman who by a compact with the devil has obtained a certain number of bullets destined to hit without fail whatever object he wishes. As the legend is usually told, six of the Freikugeln or " free bullets " are thus subservient to the marksman's will, but the seventh is at the absolute disposal of the devil himself. Various methods were adopted in order to procure possession of the marvellous missiles. According to one the marksman, instead of swallowing the sacramental host, kept it and fixed it on a tree, f^ot at it

and caused it to bleed great drops of blood, gathered the drops on a piece of cloth and reduced the whole to ashes, and then with these ashes added the requisite virtue to the lead of which his bullets were made. Various vegetable or animal substances had the reputation of serving the same purpose. Stories about the Freischiitz were especially common in Germany during the 14th, •15th and 1 6th centuries; but

the first time that the legend was turned to literary profit is said to have been by Apel in the Gespensterbuch or ” Book of Ghosts.” It formed the subject of Weber’s opera Der Freischiitz (1821), the libretto of which was written by Friedrich Kind, who had suggested Apel’s story as an excellent theme for the composer. The name by which the Freischiitz is known in French is Robin des Bois.

See Kind, Freyschiitzbuch (Leipzig, 1843) ; RevUe des deux mondes (February 1855); Grasse, Die Quelle des Freischiitz (Dresden, 1875).

FREISING, a town of Germany, in the kingdom of Bavaria, on the Isar, 16 m. by rail N.N.E. of Munich. Pop. (1905) 13,538. Among its eight Roman Catholic churches the most remarkable is the cathedral, which dates from about 1160 and is famous for its curious crypt. Noteworthy also are the old palace of the bishops, now a clerical seminary, the theological lyceum and the town-hall. There are several schools in the town, and there is a statue to the chronicler, Otto of Freising, who was bishop here from 1 138 to 1 1 58. Freising has manufactures of agricultural machinery and of porcelain, while printing and brewing are carried on. Near the town is the site of the Benedictine abbey of Weihenstephan, which existed from 725 to 1803. This is now a model farm and brewery. Freising is a very ancient town and is said to have been founded by the Romans. After being destroyed by the Hungarians in 955 it was fortified by the emperor Otto II. in 976 and by Duke Welf of Bavaria in 1082. A bishopric was established here in 724 by St Corbinianus, whose brother Erimbert was consecrated second bishop by St Boniface in 739. Later on the bishops acquired considerable territorial power and in the 17th century became princes of the Empire. In 1802 the see was secularized, the bulk of its territories being assigned to Bavaria and the rest to Salzburg, of which Freising had been a suffragan bishopric. In 181 7 an archbishopric was established at Freising, but in the following year it was transferred to Munich. The occupant of the see is now called archbishop of Munich and Freising.

See C. Meichelbeck, Historiae Frisingensis (Augsburg, 1 724-1 729, new and enlarged edition 1854).

FREJUS, a town in the department of the Var in S.E. France. Pop. (1906) 3430. It is 285 m. S.E. of Draguignan (the chief town of the department), and 22ˆ m. S.W. of Cannes by rail. It is only important on account of the fine Roman remains that it contains, for it is now a mile from the sea, its harbour having been silted up by the deposits of the Argens river. Since the 4th century it has been a bishop’s see, which is in the ecclesiastical province of Aix en Provence. In modern

times the neighbouring fishing village at St Raphael (25 m. by rail S.E., and on the sea- shore) has become a town of 4865 inhabitants (in 1901); in 1799 Napoleon disembarked there, on his return from Egypt, and re- embarked for Elba in 1814, while nowadays it is much frequented as a health resort, as is also Valescure (2 m. N.W. on the heights above). The cathedral church in part dates from the 12th century, but only small portions of the old medieval episcopal palace are now visible, as it was rebuilt about 1823. The ramparts of the old town can still be traced for a long distance, and there are fragments of two moles, of the theatre and of a gate. The amphitheatre, which seated 12,000 spectators, is in a better state of preservation. The ruins of the great aqueduct which brought the waters of the Siagnole, an affluent of the Siagne, to the town, can still be traced for a distance of nearly 19 m. The original hamlet was the capital of the tribe of the Oxybii, while the town of Forum Julii was founded on its site by Julius Caesar in order to secure to the Romans a harbour independent of that of Marseilles. The buildings of which ruins exist were mostly built by Caesar or by Augustus, and show that it was an important naval station and arsenal. But the town suffered much at the hands of the Arabs, of Barbary pirates, and of its inhabitants,

who constructed many of their dwellings out of the ruined Roman buildings. The ancient harbour (really but a portion of the lagoons, which had been deepened) is now completely silted up. Even in early times a canal had to be kept open by perpetual digging, while about 1700 this was closed, and now a sandy and partly cultivated waste extends between the town and the seashore.

• See J. A. Aubenas, Histoire de Frejus (Frejus, 1881) ; Ch. Lentheric, La Provence Maritime ancienne et moderne (Paris, 1880), chap. vii.

(W. A. B. C.)

FRELINGHUYSEN, FREDERICK THEODORE (1817-1885), American lawyer and statesman, of Dutch descent, was born at Millstone, New Jersey, on the 4th of August 1817. His grand- father, Frederick Frelinghuysen (1753-1804), was an eminent lawyer, one of the framers of the first New Jersey constitution, a soldier in the War of Independence, and a member (1778-1779 and 1782-1783) of the Continental Congress from New Jersey, and in 1 793-1 796 of the United States senate; and his uncle, Theodore (1787-1862), was attorney-general of New Jersey from 1817 to 1829, was a United States senator from New Jersey in 1829-1835, was the Whig candidate for vice-president on the Clay ticket in 1844, and was chancellor of the university of New York in 1839-1850 and president of Rutgers

College in 1850-1862. Frederick Theodore, left an orphan at the age of three, was adopted by his uncle, graduated at Rutgers in 1836, and studied law in Newark with his uncle, to whose practice he succeeded in 1839, soon after his admission to the bar. He became attorney for the Central Railroad of New Jersey, the Morris Canal and Banking Company, and other corporations, and from 1861 to 1867 was attorney-general of New Jersey. In 1861 he was a delegate to the peace congress at Washington, and in 1866 was appointed by the governor of New Jersey, as a Republican, to fill a vacancy in the United States senate. In the winter of 1867 he was elected to fill the unexpired term, but a Democratic majority in the legislature prevented his re-election in 1869. In 1870 he was nominated by President Grant, and confirmed by the senate, as United States minister to England to succeed John Lothrop Motley, but declined the mission. From 187 1 to 1877 he was again a member of the United States senate, in which he was prominent in debate and in com- mittee work, and was chairman of the committee on foreign affairs during the Alabama Claims negotiations. He was a strong opponent of the reconstruction measures of President Johnson, for whose conviction he voted (on most of the specific charges) in the impeachment trial. He was a member of the joint com- mittee which drew up and reported (1877) the Electoral Com- mission Bill, and subsequently served as a member of the com- mission. On the 12th of December 1881 he was appointed secretary of state by President Arthur to succeed James G. Blaine, and served until the inauguration of President Cleveland in 1885. Retiring, with his health impaired by overwork, to his home in Newark, he died there on the 20th of May, less than three months after relinquishing the cares of office.

FREMANTLE, a seaport of Swan county, Western Australia, at the mouth of the Swan river, 12 m. by rail S.W. of Perth. It is the terminus of the Eastern railway, and is a town of some industrial activity, shipbuilding, soap-boiling, saw-milling, smelting-, iron-founding, furniture-making, flour-milling, brewing and tanning being its chief industries. The harbour, by the construction of two long moles and the blasting away of the rocks at the bar, has been rendered secure. The English, French and German mail steamers call at the port. Fremantle became a municipality in 1871; but there are now three separate munici- palities — Fremantle, with a population in 1901 of 14,704; Fremantle East (2494); and Fremantle North (3246). At Rott- nest Island, off the harbour, there are government salt-works and a residence of the governor, also penal and reformatory establishments.

FREMIET, EMMANUEL (1824-), French sculptor, born in Paris, was a nephew and pupil of Rude; he chiefly devoted himself to animal

sculpture and to equestrian statues in armour. His earliest work was in scientific lithography (osteology), and

for a while he served in times of adversity in the gruesome office of ” painter to the Morgue.” In 1843 he sent to the Salon a study of a ” Gazelle,” and after that date was very prolific in his works. His ” Wounded Bear ” and ” Wounded Dog ” were produced in 1850, and the Luxembourg Museum at once secured this striking example of his work. From 1855 to 1859 Fremiet was engaged on a series of military statuettes for Napoleon III. He produced his equestrian statue of ” Napoleon I.” in 1868, and of ” Louis d’Orleans” in 1869 (at the Chateau de Pierrefonds) and in 1874 the first equestrian statue of ” Joan of Arc,” erected in the Place des Pyramides, Paris; this he afterwards (1889) replaced with another and still finer version. In the meanwhile he had exhibited his masterly ” Gorilla and Woman ” which won him a medal of honour at the Salon of 1887. Of the same character, and even more remarkable, is his ” Ourang-Outangs and Borneo Savage ” of 1895, a commission from the Paris Museum of Natural History. Fremiet also executed the statue of ” St Michael ” for the summit of the spire of the Eglise St Michel, and the equestrian statue of Velasquez for the Jardin de l’lnfante at the Louvre. He became a member of the Academie des Beaux-Arts in 1892, and succeeded Barye as professor of animal drawing at the Natural History Museum of Paris.

FREMONT, JOHN CHARLES (1813-1890), American explorer, soldier and political leader, was born in Savannah, Georgia, on the 2 1 st of January 18 13. His father, a native of France, died when the boy was in his sixth year, and his mother, a member of an aristocratic Virginia family, then removed to Charleston, South Carolina. In 1828, after a year’s special preparation, young Fremont entered the junior class of the college of Charleston, and here displayed marked ability, especially in mathematics; but his irregular attendance and disregard of college discipline led to his expulsion from the institution, which, however, conferred upon him a degree in 1836. In 1833 he was appointed teacher of mathematics on board the sloop of war ” Natchez, ” and was so engaged during a cruise along the South American coast which was continued for about two and a half years. Soon after returning to Charleston he was appointed professor of mathematics in the United States navy, but he chose instead to serve as assistant engineer of a survey undertaken chiefly for the purpose of

finding a pass through the mountains for a pro- posed railway from Charleston to Cincinnati. In July 1838 he was appointed second lieutenant of Topographical Engineers in the United States army, and for the next three years he was assistant to the French explorer, Jean Nicholas Nicollet (1786- 1843), employed by the war department to survey and map a large part of the country lying between the upper waters of the Mississippi and Missouri rivers. In 1841 Fremont surveyed, for the government, the lower course of the Des Moines river. In the same year he married Jessie, the daughter of Senator Thomas H. Benton of Missouri, and it was in no small measure through Benton's influence with the government that Fremont was enabled to accomplish within the next few years the exploration of much of the territory between the Mississippi Valley and the Pacific Ocean.

When the claim of the United States to the Oregon territory was being strengthened by occupation, Fremont was sent, at his urgent request, to explore the frontier beyond the Missouri river, and especially the Rocky Mountains in the vicinity of the South Pass, through which the American immigrants travelled. Within four months (1842) he surveyed the Pass and ascended to the summit of the highest of the Wind River Mountains, since known as Fremont's Peak, and the interest aroused by his descriptions was such that in the next year he was sent on a second expedition to complete the survey across the continent along the line of travel from Missouri to the mouth of the Columbia river. This time he not only carried out his instructions but, by further explorations together with interesting descriptions, dispelled general ignorance with respect to the main features of the country W. of the Rocky Mountains: the Great Salt Lake, the Great Basin, the Sierra Nevada Mountains, and the fertile river basins of the Mexican province of California.

xi. 4

His report of this expedition upon his return to Washington, D.C., in 1844, aroused much solicitude for California, which, it was feared, might, in the event of war then threatening between the United States and Mexico, be seized by Great Britain. In the spring of 1845 Fremont was despatched on a third expedition for the professed purposes of further exploring the Great Basin and the Pacific Coast, and of discovering the easiest lines of communication between them, as well as for the secret purpose of assisting the United States, in case of war with Mexico, to gain possession of California. He and his party of sixty-two arrived there in January 1846. Owing to the number of American immigrants who had settled in California, the Mexican

authorities there became suspicious and hostile, and ordered Fremont out of the province. Instead of obeying he pitched his camp near the summit of a mountain overlooking Monterey, fortified his position, and raised the United States flag. A few days later he was proceeding toward the Oregon border when new instructions from Washington caused him to retrace his steps and, perhaps, to consider plans for provoking war. The extent of his responsibility for the events that ensued is not wholly clear, and has been the subject of much controversy; his defenders have asserted that he was not responsible for the seizure of Sonoma or for the so-called ” Bear-Flag War “■; and that he played a creditable part throughout. (For an opposite view see California.) Commodore John D. Sloat, after seizing Monterey, transferred his command to Commodore Robert Field Stockton (1795-1866), who made Fremont major of a battalion; and by January 1847 Stockton and Fremont completed the conquest of California. In the meantime General Stephen Watts Kearny (1 794-1848) had been sent by the Government to conquer it and to establish a government. This created a • conflict of authority between Stockton and Kearny, both of whom were Fremont’s superior officers. Stockton, ignoring Kearny, commissioned Fremont military commandant and governor. But Kearny’s authority being confirmed about the 1st of April, Fremont, for repeated acts of disobedience, was sent under arrest to Washington, where he was tried by court- martial, found guilty (January 1847) of mutiny, disobedience and conduct prejudicial to military discipline, and sentenced to dismissal from the service. President Polk approved of the verdict except as to mutiny, but remitted the penalty, whereupon Fremont resigned.

With the mountain-traversed region he had been exploring acquired by the United States, Fremont was eager for a railway from the Atlantic to the Pacific, and in October 1848 he set out at his own and Senator Benton’s expense to find passes for such a railway along a line westward from the headwaters of the Rio Grande. But he hrd not gone far when he was led astray by a guide, and after the loss of his entire outfit and several of his men, and intense suffering of the survivors from cold and hunger, he turned southward through the valley of the Rio Grande and then westward through the valley of the Gila into southern California. Late in the year 1853, however, he returned to the place where the guide had led him astray, found passes through the mountains to the westward between latitudes 37 and 38 N., and arrived in San Francisco early in May 1854. From the conclusion of his fourth expedition until March 1855, when he removed to New York city, he lived in California, and in December 1849 was elected one of the first two United States senators from the new state. But as

he drew the short term, he served only from the 10th of September 1850 to the 3rd of March 1851. Although a candidate for re-election, he was defeated by the pro-slavery party. His opposition to slavery, howeyer, together with his popularity — won by the successes, hardships and dangers of his exploring expeditions, and by his part in the conquest of California — led to his nomination, largely on the ground of ” availability,” for the presidency in 1856 by the Republicans (this being their first presidential campaign), and by the National Americans or ” Know-Nothings.” In the ensuing election he was defeated by James Buchanan by 174 to 114 electoral votes. Soon after the Civil War began, Fremont was appointed I major-general and placed in command of the western department

with headquarters at St Louis, but his lack of judgment and of administrative ability soon became apparent, the affairs of his department fell into disorder, and Fremont seems to have been easily duped by dishonest contractors whom he trusted. On the 30th of August 1861 he issued a proclamation in which he declared the property of Missourians in rebellion confiscated and their slaves emancipated. For this he was applauded by the radical Republicans, but his action was contrary to an act of congress of the 6th of August and to the policy of the Adminis- tration. On the nth of September President Lincoln, who regarded the action as premature and who saw that it might alienate Kentucky and other border states, whose adherence he was trying to secure, annulled these declarations. Impelled by serious charges against Fremont, the president sent Mont- gomery Blair, the postmaster-general, and Montgomery C. Meigs, the quartermaster-general, to investigate the department; they reported that Fremont’s management was extravagant and inefficient; and in November he was removed. Out of con- sideration for the ” Radicals,” however, Fremont was placed in command of the Mountain Department of Virginia, Kentucky and Tennessee. In the spring and summer of 1862 he co-operated with General N. P. Banks against ” Stonewall ” Jackson in the Shenandoah Valley, but showed little ability as a commander, was defeated by General Ewell at Cross Keys, and when his troops were united with those of Generals Banks and McDowell to form the Army of Virginia, of which General John Pope was placed in command, Fremont declined to serve under Pope, whom he outranked, and retired from active service. On the 31st of May 1864 he was nominated for the presidency by a radical faction of the Republican party, opposed to President Lincoln, but his following was

so small that on the 21st of September he with- drew from the contest. From 1878 to 1881 he was governor of the territory of Arizona, and in the last year of his life he was appointed by act of congress a major-general and placed on the retired list. He died in New York on the 13th of July i8go.

See J. C. Fremont, Report of the Exploring Expedition to the Rocky Mountains, 184?, and to Oregon and North California, 1843-1844 (Washington, 184.5) ; Fremont's Memoirs of my Life (New York, 1887); and J. Bigelow, Memoirs of the Life and Public Services of John C. Fremont (New York, 1856).

FREMONT, a city and the county-seat of Dodge county, Nebraska, U.S.A., about 37 m. N.W. of Omaha, on the N. bank of the Platte river, which here abounds in picturesque bluffs and wooded islands. Pop. (1890) 6747; (1900) 7241 (1303 foreign-born); (1910)8718. It is on the main line of the Union Pacific railway, on a branch of the Chicago, Burlington & Quincy system, and on the main western line of the Chicago & North- Western railway, several branches of which (including the formerly independent Fremont, Elkhorn & Missouri Valley and the Sioux City & Pacific) converge here. The city has an attrac- tive situation and is beautifully shaded. It has a public library and is the .seat of the Fremont College, Commercial Institute and School of Pharmacy (1875), a private institution. There is considerable local trade with the rich farming country of the Platte and Elkhorn valleys; and the wholesale grain interests are especially important. Among the manufactures are flour, carriages, saddlery, canned vegetables, furniture, incubators and beer. The city owns and operates its electric-lighting plant and water-works. Fremont was founded in 1856, and became the county-seat in 1 860. It was chartered as a city (second-class) in 1871, and became a city of the first class in 1901.

FREMONT, a city and the county-seat of Sandusky county, Ohio, U.S.A., on the Sandusky river, 30 m. S.E. of Toledo. Pop. (1890) 7141; (1900) 8439, of whom 1074 were foreign-born; (1910 census) 9939. Fremont is served by the Lake Shore & Michigan Southern, the Lake Shore Electric, the Lake Erie & Western, and the Wheeling & Lake Erie railways. The river is navigable to this point. Spiegel Grove, the former residence of Rutherford B. Hayes, is of interest, and the city has a public library (1873) and parks, in large measure the gifts of his uncle, Sardis Birchard. Fremont is situated in a good agricultural region; oil and natural gas abound in the vicinity; and the city has various manufactures, including boilers, electro-carbons,

cutlery, bricks, agricultural implements, stoves and ranges, safety

razors, carriage irons, sash, doors, blinds, furniture, beet sugar, canned vegetables, malt extract, garters and suspenders. The total factory product was valued at $2,833,385 in 1905, an increase of 23-4% over that of 1900. Fremont is on the site of a favourite abode of the Indians, and a trading post was at times maintained here; but the place is best known in history as the site of Fort Stephenson, erected during the War of 1812, and on the 2nd of August 1813 gallantly and successfully defended by Major George Croghan (1791-1849), with 160 men, against about 1000 British and Indians under Brigadier-General Henry A. Proctor. In 1906 Croghan's remains were re-interred on the site of the old fort. Until 1849, when the present name was adopted in honour of J. C. Fremont, the place was known as Lower Sandusky; it was incorporated as a village in 1829 and was first chartered as a city in 1867.

FREMY, EDMOND (1814-1894), French chemist, was born at Versailles on the 29th of February 1814. Entering Gay- Lussac's laboratory in 183 1, he became preparateur at the Ecole Polytechnique in 1834 and at the College de France in 1837. His next post was that of r&petiteur at the Ecole Polytechnique, where in 1846 he was appointed professor, and in 1850 he suc- ceeded Gay-Lussac in the chair of chemistry at the Museum d'Histoire Naturelle, of which he was director, in succession to M. E. Chevreul, from 1879 to 1891. He died at Paris on the 3rd of February 1894. His work included investigations of osmic acid, of the ferrates, stannates, plumbates, &c, and of ozone, attempts to obtain free fluorine by the electrolysis of fused fluorides, and the discovery of anhydrous hydrofluoric acid and of a series of acides sulphazotis, the precise nature of which long remained a matter of discussion. He also studied the colouring matters of leaves and flowers, the composition of bone, cerebral matter and other animal substances, and the processes of fer- mentation, in regard to the nature of which he was an opponent of Pasteur's views. Keenly alive to the importance of the technical applications of chemistry, he devoted special attention as a teacher to the training of industrial chemists. In this field he contributed to our knowledge of the manufacture of iron and steel, sulphuric acid, glass and paper, and in particular worked at the saponification of fats with sulphuric acid and the utilization of palmitic acid for candle-making. In the later years of his life he applied himself to the problem of obtaining alumina in the crystalline form, and succeeded in making rubies identical with the natural gem not merely in chemical composition but also in physical properties.

FRENCH, DANIEL CHESTER (1850-), American sculptor, was born at Exeter, New Hampshire, on the 20th of April 1850, the son of Henry

Flagg French, a lawyer, who for a time was assistant-secretary of the United States treasury. After a year at the Massachusetts Institute of Technology, French spent a month in the studio of John Q. A. Ward, then began to work on commissions, and at the age of twenty-three received from the town of Concord, Massachusetts, an order for his well-known statue ” The Minute Man,” which was unveiled (April 19, 1875) on the centenary of the battle of Concord. Previously French had gone to Florence, Italy, where he spent a year with Thomas Ball. French’s best-known work is ” Death Staying the Hand of the Sculptor,” a memorial for the tomb of the sculptor Martin Milmore, in the Forest Hills cemetery, Boston ; this received a medal of honour at Paris, in 1900. Among his other works are: a monument to John Boyle O’Reilly, Boston; ” Gen. Cass,” National Hall of Statuary, Washington; ” Dr Gallaudet and his First Deaf-Mute Pupil,” Washington; the colossal ” Statue of the Republic,” for the Columbian Exposition at Chicago; statues of Rufus Choate (Boston), John Harvard (Cambridge, Mass.), and Thomas Starr King (San Francisco, California), a memorial to the architect Richard M. Hunt, in Fifth Avenue, opposite the Lenox library, New York, and a large ” Alma Mater,” near the approach to Columbia University, New York. In collaboration with Edward C. Potter he modelled the ” Washington,” presented to France by the Daughters of the American Revolution; the ” General Grant ” in Fairmount Park,

Philadelphia, and the ” General Joseph Hooker ” in Boston. French became a member of the National Academy of Design (iooi), the National Sculpture Society, the Architectural League, and the Accademia di San Luca, of Rome.

FRENCH, NICHOLAS (1604-1678), bishop of Ferns, was an Irish political pamphleteer, who was born at Wexford. He was educated at Louvain, and returning to Ireland became a priest at Wexford, and before 1646 was appointed bishop of Ferns. Having taken a prominent part in the political disturb- ances of this period, French deemed it prudent to leave Ireland in 1 65 1, and the remainder of his life was passed on the continent of Europe. He acted as coadjutor to the archbishops of Santiago de Compostella and Paris, and to the bishop of Ghent, and died at Ghent on the 23rd of August 1678. In 1676 he published his attack on James Butler, marquess of Ormonde, entitled ” The Unkinde Desertor of Loyall Men and True Frinds,” and shortly afterwards ” The Bleeding Iphigenia.” The most im- portant of his

other pamphlets is the “Narrative of the Earl of Clarendon’s Settlement and Sale of Ireland ” (Louvain, 1668).

The Historical Works of Bishop French, corn- prising the three pamphlets already mentioned and some letters, were published by S. H. Bindon at Dublin in 1846. See T. D. McGee, Irish Writers of the 17th Century (Dublin, 1846); Sir J. T. Gilbert, Contemporary History of Affairs in Ireland, 1641-1652 (Dublin, 1879-1880); and T. Carte, Life of James, Duke of Ortnond (new ed., Oxford, 185 1).

FRENCH CONGO, the general name of the French possessions in equatorial Africa. They have an area estimated at 700,000 sq. m., with a population, also estimated, of 6,000,000 to 10,000,000. The whites numbered (1906) 1278 of whom 502 were officials. French Congo, officially renamed French Equatorial Africa in iqio, comprises — (1) the Gabun Colony, (2) the Middle Congo Colony, (3) the Ubangi Shari Circumscription, (4) the Chad Circuni’ scription. The two last-named divisions form the Ubangi-Shari-Chad Colony.

The present article treats of French Congo as a unit. It is of highly irregular shape. It is bounded W. by the Atlantic, N. by the (Spanish) Muni River Settlements, the German colony of Cameroon and the Sahara, E. by the Anglo-Egyptian Sudan, and S. by Belgian Congo and the Portuguese territory of Kabinda. In the greater part of its length the southern frontier is the middle course of the Congo and the Ubangi and Mbomu, the chief northern affluents of that stream, but in the south-west the frontier keeps north of the Congo river, whose navigable lower course is partitioned between Belgium and Portugal. The coast line, some 600 m. long, extends from 5° S. to i° N. The northern frontier, starting inland from the Muni estuary, after skirting the Spanish settlements follows a line drawn a little north of 2° N. and extending east to 16° E. North of this line the country is part of Cameroon, German territory extending so far inland from the Gulf of Guinea as to approach within 130 m. of the Ubangi. From the intersection of the lines named, at which point French Congo is at its narrowest, the frontier runs north and then east until the Shari is reached in 10° 40′ N. The Shari then forms the frontier up to Lake Chad, where French Congo joins the Saharan regions of French West Africa. The eastern frontier, separating the colony from the Anglo-Egyptian Sudan, is the water-parting between the Nile and the Congo. The Mahommedan sultanates of Wadai and Bagirmi occupy much of the northern part of French Congo (see Wadai and Bagirmi).

Physical Features. — -The coast line, beginning in the north at Corisco Bay, is shortly afterwards somewhat deeply indented by the estuary of

the Gabun, south of which the shore runs in a nearly

straight line until the delta of the Ogow6 is reached, where Cape Lopez projects N.W. From this point the coast trends uniformly S.E. without presenting any striking features, though the Bay of Mayumba, the roadstead of Loango, and the Pointe Noire may be mentioned. A large proportion of the coast region is occupied by primeval forest, with trees rising to a height of 150 and 200 ft., but there is a considerable variety of scenery — open lagoons, mangrove swamps, scattered clusters of trees, park-like reaches, dense walls of tangled underwood along the rivers, prairies of tall grass and patches, of cultivation. Behind the coast region is a ridge which rises from 3000 to 4500 ft., called the Crystal Mountains, then a plateau with an elevation varying from 1500 to 2800 ft., cleft with deep river-

‘4 ° C

N^G % O –

Longitude East 24 of Greenwich

Emery Walker fu

valleys, the walls of which are friable, almost vertical, and in some places 760 ft. high.

The coast rivers flowing into the Atlantic cross four terraces. On the higher portion of the plateau their course is over bare sand ; on the second terrace, from 1200 to 2000 ft. high, it is over wide grassy tracts; then, for some 100 m., the rivers pass through virgin forest, and, lastly, they cross the shore region, which is about 10 m. broad. The rivers which fall directly into the Atlantic are generally unnavigable. The most important, the Ogow6 (q.v.), is, however, navigable from its mouth to N’Jole, a distance of 235 m. Rivers to the south of the Ogowe are the Nyanga, 120 m. long, and the Kwilu. The latter, 320 m. in length, is formed by the Kiasi and the Luete; it has a very winding course, flowing by turns from north to south, from east to west, from south to north-west and from north to south- west. It is encumbered with rocks and eddies, and is navigable only over 38 m., and for five months in the year. The mouth is 1100 ft. wide. The Muni river, the northernmost in the colony, is obstructed by cataracts in its passage through the escarpment to the coast.

Nearly all the upper basin of the Shari (q.v.) as well as the right bank of the lower river is within French Congo. The greater part of the country belongs, however, to the drainage area of the Congo river. In

addition to the northern banks of the Mbomu and Ubangi, 330 m. of the north shore of the Congo itself are in the French pro- tectorate as well as numerous subsidiary streams. For some 100 m. however, the right bank of the Sanga, the most important of these subsidiary streams, is in German territory (see Congo).

Geology. — Three main divisions are recognized in the French Congo: — (1) the littoral zone, covered with alluvium and superficial deposits and underlain by Tertiary and Cretaceous rocks; (2) the mountain zone of the Crystal Mountains, composed of granite, metamorphic and ancient sediments; (3) the plateau of the northern portion of the Congo basin, occupied by Karroo sandstones. The core of the Crystal Mountains consists of granite and schists.

Infolded with them , and on the flanks, are three rock systems ascribed to the Silurian, Devonian and Carboniferous. These are unfossili- ferous, but fossils of Devonian age occur on the Congo (see Congo Free State). Granite covers wide areas north-west of the Crystal Mountains. The plateau sandstones lie horizontally and consist of a lower red sandstone group and an upper white sandstone group. They have not yielded fossils. Limestones of Lower Cretaceous age, with Schloenbachia inflata, occur north of the Gabun and in the Ogowe basin. Marls and limestones with fossils of an Eocene facies over- lie the Cretaceous rocks on the Gabun. A superficial iron-cemented sand, erroneously termed laterite, covers large areas in the littoral zone, on the flanks of the mountains and on the high plateau.

Climate. — The whole of the country being in the equatorial region, the climate is everywhere very hot and dangerous for Europeans. On the coast four seasons are distinguished: the dry season (15th of May to 15th of September), the rainy season (15th of September to 15th of January), then a second dry season (15th of January to 1st of March), and a second rainy season (1st of March to 15th of May). The rainfall at Libreville is about 96 in. a year.

Flora and Fauna. — The elephant, the hippopotamus, the crocodile and several kinds of apes — including the chimpanzee and the rare gorilla — are the most noteworthy larger animals; the birds are various and beautiful — grey parrots, shrikes, fly-catchers, rhinoceros birds, weaver birds (often in large colonies on the palm-trees), ice-birds, from the Cecyle Sharpii to the dwarfish Alcedo cristata, butter-

fly finches, and helmet-birds (Turacus giganteus), as well as more familiar types. Snakes are extremely common. The curious climbing-fish, which frequents the mangroves, the Protopterus or lung-fish, which lies in the mud in a state of lethargy during the dry season, the strange and poisonous Tetrodon guttifer, and the herring- like Pellona africana, often caught in great shoals — are the more remarkable of the fishes. Oysters are got in abundance from the lagoons, and the huge Cardisoma armatum or heart-crab is fattened for table. Fireflies, mosquitoes and sandflies are among the most familiar forms of insect life. A kind of ant builds very striking bent-house or umbrella-shaped nests rising on the tree trunks one above the other.

Among the more characteristic forms of vegetation are baobabs, silk-cotton trees, screw-pines and palms — especially Hyphaene guineensis (a fan-palm), Raphia (the wine-palm), and Elaeis guineen- sis (the oil-palm). Anonaceous plants (notably Anona senegalensis , and the pallabanda, an olive-myrtle-like tree, are common in the prairies; the papyrus shoots up to a height of 20 ft. along the rivers; the banks are fringed by the cottony Hibiscus tiliaceus, ipomaeas and fragrant jasmines ; and the thickets are bound together in one inextricable mass by lianas of many kinds. In the upper Shari region. and that of the Kotto tributary of the Ubangi, are species of the coffee tree, one species attaining a height of over 60 ft. Its bean resembles that of Abyssinian coffee of medium quality. Among the fruit trees are the mango and the papaw, the orange and the lemon. Negro-pepper (a variety of capsicum) and ginger grow wild.

Inhabitants and Chief Towns. — A census, necessarily imperfect, taken in 1906 showed a total population, exclusive of Wadai, of 3,652,000, divided in districts as follows: — Gabun, 376,000; Middle Congo, 259,000; Ubangi-Shari, 2,130,000; Chad, 885,000. The country is peopled by diverse negro races, and, in the regions border- ing Lake Chad and in Wadai, by Fula, Hausa, Arabs and semi- Arab tribes. Among the best-known tribes living in French Congo are the Fang (Fans), the Bakalai, the Batekes and the Zandeh or Niam-Niam. Several of the tribes are cannibals and among many of them the fetish worship characteristic of the West African negroes prevails. Their civilization is of a low order. In the northern regions the majority of the inhabitants are Mahommedans, and it is only in those districts that organized and powerful states exist. Elsewhere the authority of a chief or ” king ” extends, ordinarily, little beyond the village in which he lives. (An account of the chief tribes is given under their names.) The European inhabitants are chiefly of French nationality, and are for the most part traders, officials and missionaries.

The chief towns are Libreville (capital of the Gabun colony) with 3000 inhabitants; Brazzaville, on the Congo on the north side of Stanley Pool (opposite the Belgian capital of Leopoldville) , the seat of the governor-general ; Franceville, on the upper Ogowe ; Loango, an important seaport in 4″ 39′ S.; N'Jole, a busy trading centre on the lower Ogowe ; Chekna, capital of Bagirmi, which forms part of the Chad territory; Abeshr, the capital of Wadai, Bangi on the Ubangi river, the administrative capital of the Ubangi-Shari-Chad colony. Kunde, Lame and Binder are native trading centres near the Cameroon frontier.

Communications. — The rivers are the chief means of internal communication. Access to the greater part of the colony is ob- tained by ocean steamers to Matadi on the lower Congo, and thence round the falls by the Congo railway to Stanley Pool. From Brazza- ville on Stanley Pool there is 680 m. of uninterrupted steam navi- gation N.E. into the heart of Africa, 330 m. being on the Congo and 350 m. on the Ubangi. The farthest point reached is Zongo, where rapids block the river, but beyond that port there are several navigable stretches of the Ubangi, and for small vessels access to the Nile is possible by means of the Bahr-el-Ghazal tributaries. The Sanga, which joins the Congo, 270 m. above Brazzaville, can be

navigated by steamers for 350 m., i.e. up to and beyond the S.E. frontier of the German colony of Cameroon. The Shari is also navigable for a considerable distance and by means of its affluent, the Logone, connects with the Benue and Niger, affording a waterway between the Gulf of Guinea and Lake Chad. Stores for government posts in the Chad territory are forwarded by this route. There is, however, no connecting link between the coast rivers — Gabun, Ogowe and Kwilu and the Congo system. A railway, about 500 m. long, from the Gabun to the Sanga is projected and the surveys for the purpose made. Another route surveyed for a railway is that from Loango to Brazzaville. A narrow-gauge line, 75 m. long, from Brazzaville to Mindule in the cataracts region was begun in November 1908, the first railway to be built in French Congo. The district served by the line is rich in copper and other minerals. From Wadai a caravan route across the Sahara leads to Bengazi on the shores of the Mediterranean. Telegraph lines connect Loango with Brazza- ville and Libreville, there is telegraphic communication with Europe by submarine cable, and steamship communication between Loango and Libreville and Marseilles, Bordeaux, Liverpool and Hamburg.

Trade and Agriculture. — The chief wealth of the colony consists in the products of its forests and in ivory. The natives, in addition to

manioc, their principal food, cultivate bananas, ground nuts and tobacco. On plantations owned by Europeans coffee, cocoa and vanilla are grown. European vegetables are raised easily. Gold, iron and copper are found. Copper ores have been exported from Mindule since 1905. The chief exports are rubber and ivory, next in importance coming palm nuts and palm oil, ebony and other woods, coffee, cocoa and copal. The imports are mainly cotton and metal goods, spirits and foodstuffs. In the Gabun and in the basin of the Ogowe the French customs tariff, with some modifications, prevails, but in the Congo basin, that is, in the greater part of the country, by virtue of international agreements, no discrimination can be made, between French and other merchandise, whilst customs duties must not exceed 10% ad valorem. 1 In the Shari basin and in Wadai the Anglo-French declaration of March 1899 accorded for thirty years equal treatment to British and French goods. The value of the trade rose in the ten years 1896-1905 from £360,000 to £850,000, imports and exports being nearly equal. The bulk of the export trade is with Great Britain, which takes most of the rubber, France coming second and Germany third. The imports are in about equal proportions from France and foreign countries.

Land Tenure. The Concessions Regime. — Land held by the natives is governed by tribal law, but the state only recognizes native ownership in land actually occupied by the aborigines. The greater part of the country is considered a state domain. Land held by Europeans is subject to the Civil Code of France except such estates as have been registered under the terms of a decree of the 28th of March 1899, when, registration having been effected, the title to the land is guaranteed by the state. Nearly the whole of the colony has been divided since 1899 into large estates held by limited liability companies to whom has been granted the sole right of exploiting the land leased to them. The companies holding concessions numbered in 1904 about forty, with a combined capital of over £2,000,000, whilst the concessions varied in size from 425 sq. m. to 54,000 sq. m. One effect of the granting of concessions was the rapid decline in the business of non-concessionaire traders, of whom the most important were Liverpool merchants established in the Gabun before the advent of the French. As by the Act of Berlin of 1885, to which all the European powers were signatories, equality of treatment in commercial affairs was guaranteed to all nations in the Congo basin, protests were raised against the terms of the concessions. The reply was that the critics confused the exercise of the right of proprietorship with the act of commerce, and that in no country was the landowner who farmed his land and sold the produce regarded as a

merchant. Various decisions by the judges of the colony during 1902 and 1903 and by the French cour de cassation in 1905 con- firmed that contention. The action of the companies was, however, in most cases, neither beneficial to the country nor financially successful, whilst the native cultivators resented the prohibition of their trading direct with their former customers. The case of the Liverpool traders was taken up by the British government and it was agreed that the dispute should be settled by arbitration. In September 1908 the French government issued a decree reorganizing and rendering more stringent the control exercised by the local authorities over the concession companies, especially in matters concerning the rights of natives and the liberty of commerce.

History. — The Gabun was visited in the 15th century by the Portuguese explorers, and it became one of the chief seats of the slave trade. It was not, however, till well on in the 19th century that Europeans made any more permanent settlement than was absolutely necessary for the maintenance of their commerce. In 1839 Captain (afterwards Admiral) Bouet- Willaumez obtained for France the right of residence on the left bank, and in 1842 he secured better positions on the right bank. The primary object of the French settlement was to secure a

1 Berlin Act of 1885; Brussels conference of 1890 (see Africa: History).

port wherein men-of-war could revictual. The chief establish- ment, Libreville, was founded in 1849, with negroes taken from a slave ship. The settlement in time acquired importance as a trading port. In 1867 the troops numbered about 1000, and the civil population about 5000, while the official reports about the same date claimed for the whole colony an area of 8000 sq. m. and a population of 186,000. Cape Lopez had been ceded to France in 1862, and the colony's coast-line extended, nominally, to a length of 200 m. In consequence of the war with Germany the colony was practically abandoned in 187 1, the establishment at Libreville being maintained as a coaling depot merely. In 1875, however, France again turned her attention to the Gabun estuary, the hinterland of which had already been partly ex- plored. Paul du Chaillu penetrated (1855-1859 and 1863-1865) to the south of the Ogowe; Walker, an English merchant, explored the Ngunye, an affluent of the Ogowe, in 1866. In 1872-1873 Alfred Marche, a French naturalist, and the marquis de Compiegne 1

explored a portion of the Ogowe basin, but it was not until the expedition of 1875-1878 that the country east of the Ogowe was reached. This expedition was led by Savorgnan de Brazza (q.v.), who was accompanied by Dr Noel Eugene Ballay, and, for part of the time, by Marche. De Brazza's expedition, which was compelled to remain for many months at several places, ascended the Ogowe over 400 m., and beyond the basin of that stream discovered the Alima, which was, though the explorers were ignorant of the fact, a tributary of the Congo. From the Alima, de Brazza and Ballay turned north and finally reached the Gabun in November 1878, the journey being less fruitful in results than the time it occupied would indicate. Returning to Europe, de Brazza learned that Ff. M. Stanley had revealed the mystery of the Congo, and in his next journey, begun December 1879, the French traveller undertook to find a way to the Congo above the rapids via the Ogowe. In this he was successful, and in September 1880 reached Stanley Pool, on the north side of which Brazzaville was subsequently founded. Returning to the Gabun by the lower Congo, de Brazza met Stanley. Both explorers were nominally in the service of the International African Association (see Congo Free State),

but de Brazza in reality acted solely in the interests of ?" , France and concluded treaties with Makoko, " king treaties. °^ tne Batekes," and other chieftains, placing very large

areas under the protection of that country. The con- flicting claims of the Association (which became the Congo Free State) and France were adjusted by a convention signed in February 1885. 2 In the meantime de Brazza and Ballay had more fully explored the country behind the coast regions of Gabun and Loango, the last-named seaport being occupied by France in 1883. The conclusion of agreements with Germany (December 1885 and February-March 1894) and with Portugal (May 1886) secured France in the possession of the western portion of the colony as it now exists, whilst an arrangement with the Congo Free State in 1887 settled difficulties which had arisen in the Ubangi district.

The extensionof French influence northward towardsLake Chad and eastward to the verge of the basin of the Nile followed, though The not without involving the country in serious disputes

advance with the other European powers possessing rights in towards those regions. By creating the posts of Bangi (1890), f" h'd' Wesso and Abiras (1891), France strengthened her

hold over the Ubangi and the Sanga. But at the same time the Congo

Free State passed the parallel of 4 N. — which, after the compromise of 1887, France had regarded as the southern boundary of her possessions — and, occupying the sultanate of Bangasso (north of the Ubangi river), pushed on as far as 9° N. The dispute which ensued was only settled in 1894 and after

1 Louis Eugene Henri Dupont, marquis de Compiegne (1846- ‘877), on his return from the West coast replaced Georg Schwein- furth at Cairo as president of the geographical commission. Arising out of this circumstance de Compiegne was killed in a duel by a German named Mayer.

2 A Franco-Belgian agreement of the 23rd of Dec. 1908 defined precisely the frontier in the lower Congo. Bamu Island in Stanley Pool was recognized as French.

the signature of the convention between Great Britain and the Congo State of the 12th of May of that year, against which both the German and the French governments protested, the last named because it erected a barrier against the extension of French territory to the Nile valley. By a compromise of the 14th of August the boundary was definitely drawn and, in accordance with this pact, which put the frontier back to about 4 N., France from 1895 to 1897 took possession of the upper Ubangi, with Bangasso, Rafai and Zemio. Then began the French encroachment on the Bahr-el-Ghazal; the Marchand expedition, despatched to the support of Victor Liotard, the lieutenant-governor of the upper Ubangi, reached Tambura in July 1897 and Fashoda in July 1898. A dispute with Great Britain arose, and it was decided that the expedition should evacuate Fashoda. The declaration of the 21st of March 1899 finally terminated the dispute, fixing the eastern frontier of the French colony as already stated. Thus, after the Franco-Spanish treaty of June 1900 settling the limits of the Spanish territory on the coast, the boundaries of the French Congo on all its frontiers were deter- mined in broad outline. The Congo-Cameroon frontier was precisely defined by another Franco-German agreement in April 1908, following a detailed survey made by joint com- missioners in 1905 and 1906. For a comprehensive description of these international rivalries see Africa, § 5, and for the con- quest of the Chad regions see Bagirmi and Rabah Zobeir. In the other portions of the colony French rule was accepted by the natives, for the most part, peaceably. For the relations of France with Wadai see that article.

Following the acquisitions for France of de Brazza, the ancient Gabun colony was joined to the Congo territories. From 1886 to 1889 Gabun was, however, separately administered. By decree of the nth of December 1888 the whole of the French possessions were created one ” colony ” under the style of Congo francais, with various subdivisions; they were placed under a com- missioner-general (de Brazza) having his residence at Brazzaville. This arrangement proved detrimental to the economic develop- ment of the Gabun settlements, which being outside the limits of the free trade conventional basin of the Congo (see Africa, § 5) enjoyed a separate tariff. By decree of the 29th of December 1903 (which became operative in July 1904) Congo francais was divided into four parts as named in the opening paragraph. The first commissioner-general under the new scheme was

Emile Gentil, the explorer of the Shari and Chad. In 1905 de Brazza was sent out from France to investigate charges of cruelty and maladministration brought against officials of the colony, several of which proved well founded. De Brazza died at Dakar when on his way home. The French government, after considering the report he had drawn up, decided to retain Gentil as com- missioner-general, making however (decree of 15th of February 1906) various changes in administration with a view to protect the natives and control the concession companies. Gentil, who devoted the next two years to the reorganization of the finances of the country and the development of its commerce, resigned his post in February 1908. He was succeeded by M. Merlin, whose title was changed (June 1908) to that of governor-general.

Administration and Revenue. — The governor-general has control over the whole of French Congo, but does not directly administer any part of it, the separate colonies being under lieutenant-governors. The Gabun colony includes the Gabun estuary and the whole of the coast-line of French Congo, together with the basin of the Ogowe river. The inland frontier is so drawn as to include all the hinter- land not within the Congo free-trade zone (the Chad district ex- cepted). The Middle Congo has for its western frontier the Gabun colony and Cameroon, and extends inland to the easterly bend of the Ubangi river; the two circumscriptions extend east and north of the Middle Congo. There is a general budget for the whole of French Congo ; each colony has also a separate budget and adminis- trative autonomy. As in other French colonies the legislative power is in the French chambers only, but in the absence of specific legis- lation presidential decrees have the force of law. A judicial service independent of the executive exists, but the district administrators also exercise judicial functions. Education is in the hands of the missionaries, upwards of 50 schools being established by 1909. The military force maintained consists of natives officered by Europeans.

Revenue is derived from taxes on land, rent paid by concession companies, a capitation or hut tax on natives, and customs receipts, supplemented by a subvention from France. In addition to defray- ing the military expenses, about £100,000 a year, a grant of £28,000 yearly was made up to 1906 by the French chambers towards the civil expense. In 1907 the budget of the Congo balanced at about /2SO,ooo without the aid of this subvention. In 1909 the chambers sanctioned a

loan for the colony of £840,000, guaranteed by France and to be applied to the establishment of administrative stations and public works. . . .

Bibliography.— Fernand Rouget, L'Expansion colonial* au Congo francais (Paris, 1906), a valuable monograph, with biblio- graphy and maps; A. Chevalier, L'Afrique centrale francaise (Pans, 1907) For special studies see Lacroix, Resultats miner alogiques et zoologiques des recentes explorations de I'Afrique occidental francaise et de la region du Tchad (Paris, 1905) ; M. Barrat, Sur la geologie du Congo francais (Paris, 1895), and Ann. des mines, ser. q. t. vn. (1895) j I Cornet, " Les Formations post-primaires du bassin du Congo, Ann. soc, geol. belg. vol. xxi. (1895). The Paris Bulletin du Museum for 1903 and 1904 contains papers on the zoology of the country. For flora see numerous papers by A. Chevalier in Comptes rendus de Vacademie des sciences (1902-1904), and the Journal d' 'agriculture pratique des pays chauds (190 1, &c). For history, besides Rouget s book, see J. Ancel, " Etude historique. La formation de la colome du Congo francais, 1843-1882," containing an annotated biblio- graphy, in Bull. Com. VAjrique francaise, vol. xii. (1902); the works cited under Brazza; and E. Gentil, La Chute Me V empire de Rabah (Paris, 1902). Of earlier books of travels the most valuable are- Paul du Chaill u, Explorations and Adventures in Equatorial Africa (London, 1861); A Journey to Ashonga Land (London, 1867); and Sir R. Burton, Two Trips to Gorilla Land (London, 1876). Of later works see Mary H. Kingsley, Travels in West Africa (London, 1897)- A B. de Mezieres, Rapport de mission sur le Haut Oubangui, le M'Bomou el le Bahr-el-Chazal (Paris, 1903) ; and C. Maistre, A travers V Afrique centrale du Congo au Niger, 1892-1893 (Pans, 1895). For the story of the concession companies see E. D. Morel, The British Case in French Congo (London, 1903). (F. R. C.)

FRENCH GUINEA, a French colony in West Africa, formerly known as Rivieres du Sud. It is bounded W. by the Atlantic, N. by Portuguese Guinea and Senegal, E. by Upper Senegal and the Ivory Coast, and S. by Liberia and Sierra Leone. With a sea-board running N.N.W. andS.S.E. from 10° 50′ N.to 9 2'N., a distance, without reckoning the indentations, of 170 m., the colony extends eastward 450 m. in a straight line and attains a maximum width N. toS. of nearly 300 m., covering fully 100,000 m., and containing a population estimated at 2,000,000 to

sq.

2,500,000.

Physical Features.— Though in one or two places rocky headlands jut into the sea, the coast is in general sandy, low, and much broken by rivers and deep estuaries, dotted with swampy islands, giving it the appearance of a vast delta. In about 9 30′ N., off the promon- tory of Konakry, lie the Los Islands (q.v.), forming part of the colony. The coast plain, formed of alluvial deposits, is succeeded about 30 m. inland by a line of cliffs, the Susu Hills, which form the first step in the terrace-like formation of the interior, culminating in the massif of Futa Jallon, composed chiefly of Archean and granite rocks. While the coast lands are either densely forested or covered with savannas or park-like country, the Futa Jallon tableland is mainly covered with short herbage. This tableland, the hydro- graphic centre of West Africa, is most elevated in its southern parts, where heights of 5000 ft. are found. Near the Sierra Leone frontier this high land is continued westward to within 20 m. of the sea, where Mount Kakulima rises over 3300 ft. East and south of Futa Jallon the country slopes to the basin of the upper Niger, the greater part of which is included in French Guinea. The southern frontier is formed by the escarpments which separate the Niger basin from those of the coast rivers of Liberia. Besides the Niger, Gambia and Senegal, all separately noticed, a large number of streams running direct to the Atlantic rise in Futa Jallon. Among them are the Great and Little Scarries, whose lower courses are in Sierra Leone, and the Rio Grande which enters the sea in Portuguese Guinea. Those whose courses are entirely in French Guinea include the Cogon (or Componi), the Rio Nunez, the Fatalla (which reaches the sea through an estuary named Rio Pongo), the Konkure, whose estuary is named Rio Bramaya, the Forekaria and the Melakori. The Cogon, Fatallah and Konkure are all large rivers which descend from the plateaus through deep, narrow valleys in rapids and cataracts, and are only navigable for a few miles from their mouth.

Climate. — The climate of the coast district is hot, moist and un- healthy, with a season of heavy rain lasting from May to November, during which time variable winds, calms and tornadoes succeed one another. The mean temperature in the dry season, when the ” harmattan ” is frequent, is 62 Fahr., in the wet season 86°. Throughout the year the humidity of the air is very great. There is much rain in the Futa Jallon highlands, but the Niger basin is some- what drier. In that region and in the highlands the climate is fairly healthy for Europeans and the heat somewhat less than on the coast.

Flora and Fauna. — The seashore and the river banks are lined with mangroves, but the most important tree of the coast belt is the oil- palm. The dense forests also contain many varieties of lianas or rubber vines, huge bombax and bamboos. Gum-producing and kola trees are

abundant, and there are many fruit trees, the orange and citron growing well in the Susu and Futa Jallon districts. The cotton and coffee plants are indigenous; banana plantations surround the villages. The baobab and the karite (shea butter tree) are found only in the Niger districts. The fauna is not so varied as was formerly the case, large game having been to a great extent driven out of the coast regions. The elephant is rare save in the Niger regions. The lion is now only found in the northern parts of Futa Jallon; panthers, leopards, hyenas and wild cats are more common and the civet is found. Hippopotamus, otter and the wild boar are numerous; a species of wild ox of small size with black horns and very agile is also found. The forests contain many kinds of monkeys, including huge chimpanzees ; antelope are widespread but rather rare. Serpents are very common, both venomous and non- venomous; the pythons attain a great size. Fights between these huge serpents and the crocodiles which infest all the rivers are said to be not uncommon. Turtles are abundant along the coasts and in the Los Islands. Oysters are found in large numbers in the estuaries and fixed to the submerged parts of the mangroves. Fresh- water oysters, which attain a large size, are also found in the rivers, particularly in the Niger. Fish are abundant, one large-headed species, in the Susu tongue called khokon, is so numerous as to have given its name to a province, Kokunia. Birds are very numerous; they include various eagles, several kinds of heron, the egret, the marabout, the crane and the pelican; turacos or plantain-eaters, are common, as are other brilliantly plumaged birds. Green and grey parrots, ravens, swallows and magpies are also common.

Inhabitants. — On the banks of the Cogon dwell the Tendas and Iolas, primitive Negro tribes allied to those of Portuguese Guinea (q.v.). All other inhabitants of French Guinea are regarded as com- paratively late arrivals from the interior who have displaced the aborigines. 1 Among the earliest of the new comers are the Baga, the Nalu, the Landuman and the Timni, regarded as typical Negroes {q.v.). This migration southward appears to have taken place before the 17th century. To-day the Baga occupy the coast land between the Cogon and the Rio Pongo, and the Landuman the country immediately behind that of the Baga. The other tribes named are but sparsely represented in French Guinea, the coast region south of the Nunez and all the interior up to Futa Jallon being occupied by the Susu, a tribe belonging to the great Mandingan race, which forced its way seaward about the beginning of the 1 8th century and pressed back the Timni into Sierra Leone. Futa Jallon is peopled principally by Fula {q.v.), and the rest of the country by Malinke and other tribes of Mandingo

{q.v.). The Mandingo, the Fula and the Susu are Mahommedans, though the Susu retain many of their ancient rites and beliefs — those associated with spirit worship and fetish, still the religion of the Baga and other tribes. In the north-west part of Futa Jallon are found remnants of the aborigines, such as the Tiapi, Koniagui and the Bassari, all typical Negro tribes. The white inhabitants number a few hundreds only and are mainly French. Many of the coast peoples show, however, distinct traces of white blood, the result chiefly of the former presence of European slave traders. Thus at the Rio Pongo there are numerous mulattos. South of that river the coast tribes speak largely pidgin English.

Towns. — The principal towns are Konakry the capital, Boke, on the Rio Nunez, Dubreka, on the coast, a little north of Konakry, Benty, on the Melakori, Timbo and Labe, the chief towns of Futa Jallon, Heremakono and Kindia, on the main road to the Niger, Kurussa and Siguiri, on a navigable stretch of that river, and Bissan- dugu, formerly Samory's capital, an important military station east of the Niger. Konakry, in 9 30′ N., 13° 46′ W., population about 20,000, is the one port of entry on the coast. It is built on the little island of Tombo which lies off the promontory of Konakry, the town being joined to the mainland by an iron bridge. During the adminis- tration of Noel Ballay (1848-1902), governor of the colony 1890- 1900, Konakry was transformed from a place of small importance to one of the chief ports on the west coast of Africa and a serious rival to Freetown, Sierra Leone. It has since grown considerably, and is provided with wharves and docks and a jetty 1066 ft. long. There is an ample supply of good water, and a large public garden in the centre of the town. In front of Government House is a statue of M. Ballay. Konakry is a port of call for French, British and German steamship companies, and is in telegraphic communication with Europe. It is the starting-point of a railway to the Niger (see below). The retail trade is in the hands of Syrians. The town is governed by a municipality.

Products and Industry. — French Guinea possesses a fertile soil, and is rich in tropical produce. The chief products are rubber, brought from the interior, and palm oil and palm kernels, obtained in the coast regions. Cotton is cultivated in the Niger basin. Gum copal, ground-nuts and sesame are largely cultivated, partly for

1 Numerous remains of a stone age have been discovered, both on the coast and in the hinterland. See L. Desplagnes, " L'Archeo- logie prehistorique en Guinee francaise," in Bull. Soc. G'eog. Comrn. de Bordeaux. March 1907, and the authorities there cited.

export. Among minor products are coffee, wax and ivory. Large herds of cattle and flocks of sheep are raised in Futa Jallon ; these are sent in considerable numbers to Sierra Leone, Liberia and French Congo. The trade in hides is also of considerable value. The chief grain raised is millet, the staple food of the people. The rubber is mainly exported to Fngland, the palm products to Germany, and the ground-nuts to France.

The principal imports are cotton goods, of which 80% come from Great Britain, rice, kola nuts, chiefly from Liberia, spirits, tobacco, building material, and arms and ammunition, chiefly ” trade guns.” The average annual value of the trade for the period 1900-1907 was about £1,250,000, the annual export of rubber alone being worth £400,000 or more. The great bulk of the trade of the colony is with France and Great Britain, the last-named country taking about 45 % of the total ; Germany comes third. Since April 1905 a surtax of 7 % has been imposed on all goods of other than French origin.

Communications. — The railway from Konakry to the Niger at Kurussa, by the route chosen a distance of 342 m., was begun in 1900, and from 1902 has been built directly by the colony. The first section to Kindia, 93 m., was opened in 1904. The second section, to near Timbo in Futa Jallon, was completed in 1907, and the rails reached Kurussa in 19 10. From Kurussa the Niger is navigable at high water all the way to Bamako in Upper Senegal, whence there is communication by rail and river with St Louis and Timbuktu. Besides the railway there is an excellent road, about 390 m. long, from Konakry to Kurussa, the road in its lower part being close to the Sierra Leone frontier, with the object of diverting trade from that British colony. Several other main roads have been built by the French, and there is a very complete telegraphic system, the lines having been connected with those of Senegal in

1899.

History. — This part of the Guinea coast was made known by the Portuguese voyagers of the 15th century. In consequence, largely, of the dangers attending its navigation, it was not visited by the European traders of the i6th-i8th centuries so frequently as other regions north and east, but in the Rio Pongo, at Mata- kong (a diminutive island near the mouth of the Forekaria), and elsewhere,

slave traders established themselves, and ruins of the strongholds they built, and defended with cannon, still exist. When driven from other parts of Guinea the slavers made this difficult and little known coast one of their last resorts, and many barracoons were built in the late years of the 18th century. It was not until after the restoration of Goree to her at the close of the Napoleonic wars that France evinced any marked interest in this region. At that time the British, from their bases at the Gambia and Sierra Leone, were devoting considerable attention to these Rivieres du Sud (i.e. south of Senegal) and also to Futa Jallon. Rene Caillie, who started his journey to Timbuktu from Boke in 1827, did much to quicken French interest in the district, and from 1838 onward French naval officers, Bouet-Willaumez and his successors, made detailed studies of the coast. About the time that the British government became wearied of its efforts to open up the interior of West Africa, General Faidherbe was appointed governor of Senegal (1854), and under his direction vigorous efforts were made to consolidate French influence. Already in 1848 treaty relations had been entered into with the Nalu, and between that date and 1865 treaties of protectorate were signed with several of the coast tribes. During 1876-1880 new treaties were concluded with the chief tribes, and in 1881 the almany (or emir) of Futa Jallon placed his country under French protection, the French thus effectually preventing the junction, behind the coast lands, of the British colonies of the Gambia and Sierra Leone. The right of France to the littoral as far south as the basin of the Melakori was recognized by Great Britain in 1882; Germany (which had made some attempt to acquire a protectorate at Konakry) abandoned its claims in 1885, while in 1886 the northern frontier was settled in agreement with Portugal, which had ancient settlements in the same region (see Portuguese Guinea). In 1899 the limits of the colony were extended, on the dismemberment of the French Sudan, to include the upper Niger districts. In 1904 the Los Islands were ceded by Great Britain to France, in part return for the abandonment of French fishing rights in Newfoundland waters. (See also Senegal: History.)

French Guinea was made a colony independent of Senegal in 1891, but in 1895 came under the supreme authority of the newly constituted governor-generalship of French West Africa. Guinea has a considerable measure of autonomy and a separate budget.

It is administered by a lieutenant-governor, assisted by a nominated council. Revenue is raised principally from customs and a capitation tax, which has replaced a hut tax. The local budget for 1907 balanced at £205,000. Over the greater part of the country the native princes retain their sovereignty under the superintendence of French officials.

The development of agriculture and education are objects of special solicitude to the French authorities. In general the natives are friendly towards their white masters.

See M. Famechon, Notice sur la Guinee francaise (Paris, 1900); J. Chautard, Etude geophysique et geologique sur le Fouta-Djallon (Paris, 1905); Andre Aran, La Guinie francaise (Paris, 1906), a valuable monograph ; J. Machat, Les Rivieres du Sud et la Fouta-Diallon (Paris, 1906), another valuable work, containing exhaustive bibliographies. Consult also F. Rouget, La Guinee (Paris, 1908), an official publication, the annual Reports on French West Africa, published by the British Foreign Office, and the Carte de la Guinee francaise by A. Meunier in 4 sheets on the scale 1 : 500,000 (Paris, 1902).

FRENCH LANGUAGE. I. Geography.— French is the general name of the north-north-western group of Romanic dialects, the modern Latin of northern Gaul (carried by emigration to some places — as lower Canada — out of France) . In a restricted sense it is that variety of the Parisian dialect which is spoken by the educated, and is the general literary language of France. The region in which the native language is termed French consists of the northern half of France (including Lorraine) and parts of Belgium and Switzerland; its boundaries on the west are the Atlantic Ocean and the Celtic dialects of Brittany; on the north-west and north, the English Channel; on the north- east and east the Teutonic dialects of Belgium, Germany and Switzerland. In the south-east and south the boundary is to a great extent conventional and ill-defined, there being originally no linguistic break between the southern French dialects and the northern Provencal dialects of southern France, north-western Italy and south-western Switzerland. It is formed partly by spaces of intermediate dialects (some of whose features are French, others Provencal), partly by spaces of mixed dialects resulting from the invasion of the space by more northern and more southern settlers, partly by lines where the intermediate dialects have been suppressed by more northern (French) and more southern (Provencal) dialects without these having mixed. Starting in the west at the mouth of the Gironde, the boundary runs nearly north soon after passing Bordeaux; a little north of Angouleme it turns to the east, and runs in this direction into Switzerland to the north of Geneva.

II. External History. — (a) Political. — By the Roman conquests the language of Rome was spread over the greater part of southern and western Europe, and gradually supplanted the native tongues. The language introduced was at first nearly uniform over the whole empire, Latin provincialisms and many more or less general features of the older vulgar language being suppressed by the preponderating

influence of the educated speech of the capital. As legions became stationary, as colonies were formed, and as the natives adopted the language of their conquerors, this language split up into local dialects, the dis- tinguishing features of which are due, as far as can be ascertained (except, to some extent, as to the vocabulary), not to speakers of different nationalities misspeaking Latin, each with the peculiarities of his native language, but to the fact that linguistic changes, which are ever occurring, are not perfectly uniform over a large area, however homogeneous the speakers. As Gaul was not conquered by Caesar till the middle of the first century before our era, its Latin cannot have begun to differ from that of Rome till after that date; but the artificial retention of classical Latin as the literary and official language after the popular spoken language had diverged from it, often renders the chrono- logy of the earlier periods of the Romanic languages obscure. It is, however, certain that the popular Latin of Gaul had become differentiated from that of central Italy before the Teutonic conquest of Gaul, which was not completed till the latter half of the 5th century; the invaders graduaLly adopted the language of their more civilized subjects, which remained unaffected, except in its vocabulary. Probably by this time it had diverged

so widely from the artificially preserved literary language that it could no longer be regarded merely as mispronounced Latin; the Latin documents of the next following centuries contain many clearly popular words and forms, and the literary and popular languages are distinguished as latina and romana. The term gallica, at first denoting the native Celtic language of Gaul, is found applied to its supplanter before the end of the 9th century, and survives in the Breton gallek, the regular term for ” French.” After the Franks in Gaul had abandoned their native Teutonic language, the term francisca, by which this was denoted, came to be applied to the Romanic one they adopted, and, under the loxmfrancaise, remains its native name to this day; but this name was confined to the Romanic of northern Gaul, which makes it probable that this, at the time of the adoption of the name francisca, had become distinct from the Romanic of southern Gaul. Francisca is the Teutonic adjective frankisk, which occurs in Old English in the form frencise; this word, with its umlauted e from a with following *’, survives under the form French, which, though purely Teutonic in origin and form, has long been exclusively applied to the Romanic language and inhabitants of Gaul. The German name franzose, with its accent on, and o in, the second syllable, comes from

franqois, a native French form older than franqais, but later than the Early Old French franceis. The Scandinavian settlers on the north-west coast of France early in the 10th century quickly lost their native speech, which left no trace except in some contributions to the vocabulary of the language they adopted. The main feature since is the growth of the political supremacy of Paris, carrying with it that of its dialect; in 1539 Francis I. ordered that all public documents should be in French (of Paris), which then became the official language of the whole kingdom, though it is still foreign to nearly half its population.

The conquest of England in 1066 by William, duke of Normandy, introduced into England, as the language of the rulers and (for a time) most of the writers, the dialects spoken in Normandy (see also Anglo-Norman Literature) . Confined in their native country to definite areas, these dialects, following their speakers, became mixed in England, so that their forms were used to some extent indifferently; and the constant com- munication with Normandy maintained during several reigns introduced also later forms of continental Norman. As the conquerors learned the language of the conquered, and as the more cultured of the latter learned that of the former, the Norman of England (including that of the English-speaking Lowlands of Scotland) became anglicized; instead of following the changes of the Norman of France, it followed those of English. The accession in n 54 of Henry II. of Anjou disturbed the Norman character of Anglo-French, and the loss of Normandy under John in 1204 gave full play to the literary importance of the French of Paris, majiy of whose forms afterwards penetrated to England. At the same time English, with a large French addition to its vocabulary, was steadily recovering its supremacy, and is officially employed (for the first time since the Conquest) in the Proclamation of Henry III., 1258. The semi-artificial result of this mixture of French of different dialects and of different periods, more or less anglicized according to the date or education of the speaker or writer, is generally termed ” the Anglo-Norman dialect “; but the term is misleading for a great part of its existence, because while the French of Normandy was not a single dialect, the later French of England came from other French provinces besides Normandy, and being to a considerable extent in artificial conditions, was checked in the natural develop- ment implied by the term ” dialect.” The disuse of Anglo-French as a natural language is evidenced by English being substituted for it in legal proceedings in 1362, and in schools in 1387; but law reports were written in it up to about 1600, and, converted into modern literary French, it remains in official use for giving the royal assent to bills of parliament.

(b) Literary. — Doubtless because the popular Latin of northern Gaul

changed more rapidly than that of any other part of the empire, French was, of all the Romanic dialects, the first to be

recognized as a distinct language, and the first to be used in literature; and though the oldest specimen now extant is prob- ably not the first, it is considerably earlier than any existing documents of the allied languages. In 813 the council of Tours ordered certain homilies to be translated into Rustic Roman or into German; and in 842 Louis the German, Charles the Bald, and their armies confirmed their engagements by taking oaths in both languages at Strassburg. These have been preserved to us by the historian Nithard (who died in 853); and though, in consequence of the only existing manuscript (at Paris) being more than a century later than the time of the author, certain alterations have occurred in the text of the French oaths, they present more archaic forms (probably of North-Eastern French) than any other document. The next memorials are a short poem, probably North-Eastern, on St Eulalia, preserved in a manuscript of the 10th century at Valenciennes, and some autograph frag- ments (also at Valenciennes) of a homily on the prophet Jonah, in mixed Latin and Eastern French, of the same period. To the same century belong a poem on Christ's Passion, apparently in a mixed (not intermediate) language of French and Provencal, and one, probably in South-Eastern French, on St Leger; both are preserved, in different handwritings, in a MS. at Clermont- Ferrand, whose scribes have introduced many Provencal forms. After the middle of the 1 ith century literary remains are com- paratively numerous; the chief early representative of the main dialects are the following, some of them preserved in several MSS., the earliest of which, however (the only ones here men- tioned), are in several cases a generation or two later than the works themselves. In Western French are a verse life of St Alexius (Alexis), probably Norman, in an Anglo-Norman MS. at Hildesheim; the epic poem of Roland, possibly also Norman, in an A.-N. MS. at Oxford; a Norman verbal translation of the Psalms, in an A.-N. MS. also at Oxford; another later one, from a different Latin version, in an A.-N. MS. at Cambridge; a Norman translation of the Four Books of Kings, in a probably A.N. MS. at Paris. The earliest work in the Parisian dialect is probably the Travels of Charlemagne, preserved in a late Anglo Norman MS. with much altered forms. In Eastern French, of rather later date, there are translations of the Dialogues of Pope Gregory, in a MS. at Paris, containing also fragments of Gregory's Moralities, and (still later) of some Sermons of St Bernard, in a MS. also in Paris. From the end of the 12th century literary and official documents, often including local charters, abound in almost every dialect, until the growing influence of Paris caused its language to supersede in writing

the other local ones. This influence, occasionally apparent about the end of the 1 2th century, was overpowering in the 15th, when authors, though often dis- playing provincialisms, almost all wrote in the dialect of the capital; the last dialect to lose its literary independence was the North-Eastern, which, being the Romanic language of Flanders, had a political life of its own, and. (modified by Parisian) was used in literature after 1400.

III. Internal History. — Though much has been done in recent years, in the scientific investigation of the sounds, inflexions, and syntax of the older stages and dialects of French, much still remains to be done, and it must suffice here to give a sketch, mainly of the dialects which were imported into England by the Normans — in which English readers will probably take most interest, and especially of the features which explain the forms of English words of French origin. Dates and places are only approximations, and many statements are liable to be modified by further researches. The primitive Latin forms given are often not classical Latin words, but derivatives from these; and reference is generally made to the Middle English (Chaucerian) pronunciation of English words, not the modern.

(a) Vocabulary. — The fundamental part of the vocabulary of French is the Latin imported into Gaul, the French words being simply the Latin words themselves, with the natural changes undergone by all living speech, or derivatives formed at various dates. Comparatively few words were introduced from the Celtic language of the native inhabitants {bee, lieue from the Celtic words given by Latin writers as beccus, leuca), but the number

adopted from the language of the Teutonic conquerors of Gaul is large (guerre =werra; laid=laidh; choisir = kausjan). The words were imported at different periods of the Teutonic supre- macy, and consequently show chronological differences in their sounds (hair = hatan; franqais = frankisk; ecrevisse = krebiz; ichine — skina). Small separate importations of Teutonic words resulted from the Scandinavian settlement in France, and the commercial intercourse with the Low German nations on the North Sea (friper = Norse hripa; chaloupe= Dutch sloop; esl = Old English edst). In the meantime, as Latin (with considerable alterations in pronunciation, vocabulary, &c.) continued in literary, official and ecclesiastical use, the popular language borrowed from time to time various more or less altered

classical Latin words; and when the popular language came to be used in literature, especially in that of the church, these importations largely increased (virginitet Eulalia = virginitdlem; imagena Alexis = i mdginem— the popular forms would probably have been vergedet, emain). At the Renaissance they became very abundant, and have continued since, stifling to some extent the develop- mental power of the language. Imported words, whether Teutonic, classical Latin or other, often receive some modifica- tion at their importation, and always take part in all subsequent natural phonetic changes in the language (Early Old French adversarie, Modern French adversaire). Those French words which appear to contradict the phonetic laws were mostly intro- duced into the language after the taking place (in words already existing in the language) of the changes formulated by the laws in question; compare the late imported laique with the inherited lai, both from Latin laicutn. In this and many other cases the language possesses two forms of the same Latin word, one descended from it, the other borrowed (meuble and mobile from mobilem). Some Oriental and other foreign words were brought in by the crusaders (amiral from amir); in the 16th century, wars, royal marriages and literature caused a large number of Italian words (soldat = soldalo; brave = bravo; caresser = carezzare) to be introduced, and many Spanish ones (alc$ve= alcoba; hdblcr ■ = hablar) . A few words have been furnished by Provencal (abeille, cadenas) , and several have been adopted from other dialects into the French of Paris (esquiver Norman or Picard for the Paris- French eschiver). German has contributed a few (blocus = blochus; choucroute = surkrut); and recently a considerable number have been imported from England (drain, comfortable, flirter). In Old French, new words are freely formed by derivation, and to a less extent by composition; in Modern French, borrowing from Latin or other foreign languages is the more usual course. Of the French words now obsolete some have disappeared because the things they express are obsolete; others have been replaced by words of native forma- tion, and many have been superseded by foreign words generally of literary origin; of those which survive, many have undergone considerable alterations in meaning. A large number of Old French words and meanings, now extinct in the language of Paris, were introduced into English after the Norman Conquest; and though some have perished, many have survived — strife from Old French eslrif (Teutonic strit) ; quaint from cointe (cognitum); remember from remembrer (rememordre); chaplet (garland) from chapelel (Modern French “chaplet of beads”) ; appointment (rendezvous) from appoinlement (now “salary”). Many also survive in other French dialects.

(b) Dialects. — The history of the French language from the period of its earliest extant literary memorials is that of the dialects composing it. But as the popular notion of a dialect as the speech of a definite area, possessing certain peculiarities confined to and extending throughout that area, is far from correct, it will be advisable to drop the misleading divisions into “Norman dialect,” “Picard dialect” and the like, and take instead each important feature in the chronological order (as far as can be ascertained) of its development, pointing out roughly the area in which it exists, and its present state. The local terms used are intentionally vague, and it does not, for instance, at all follow that because ” Eastern” and ” Western” are used to denote the localities of more than one dialectal feature, the

boundary line between the two divisions is the same in each case. It is, indeed, because dialectal differences as they arise do not follow the same boundary lines (much less the political divisions of provinces), but cross one another to any extent, that to speak of the dialect of a large area as an individual whole, unless that area is cut off by physical or alien linguistic boundaries, creates only confusion. Thus the Central French of Paris, the ancestor of classical Modern French, agrees with a more southern form of Romanic (Limousin, Auvergne, Forez, Lyonnais, Dauphine) in having Is, not tsh, for Latin k © before i and e; Ish, not k, for k © before a; and with the whole South in having gu, not w, for Teutonic w; while it belongs to the East in having oi for earlier ei; and to the West in having e, not ei, for Latin a; and i, not ei, from Latin $--i. It may be well to denote that Southern French does not correspond to southern France, whose native language is Provencal. ” Modern French ” means ordinary educated Parisian French.

(c) Phonology. — The history of the sounds of a language is, to a considerable extent, that of its inflections, which, no less than the body of a word, are composed of sounds. This fact, and the fact that unconscious changes are much more reducible to law than conscious ones, render the phonology of a language by far the surest and widest foundation for its dialectology, the importance of the sound-changes in this respect depending, not on their prominence, but on the earliness of their date. For several centuries after the divergence between spoken and written Latin, the history of these changes has to be determined mainly by reasoning, aided by a little direct evidence in the misspellings of inscriptions the semi-popular forms in glossaries, and the warnings of Latin grammarians against vulgarities. With the rise of Romanic literature the materials for tracing the changes become abundant, though as they do not give us the sounds themselves, but only their written representations, much difficulty,

and some uncertainty, often attach to deciphering the evidence. Fortunately, early Romanic orthography, that of Old French included (for which see next section), was phonetic, as Italian orthography still is; the alphabet was imperfect, as many new sounds had to be represented which were not provided for in the Roman alphabet from which it arose, but writers aimed at representing the sounds they uttered, not at using a fixed combination of letters for each word, however they pronounced it. The characteristics of French as distinguished from the allied languages and from Latin, and the relations of its sounds, in- flections and syntax to those of the last-named language, belong to the general subject of the Romanic languages. It will be well, however, to mention here some of the features in which it agrees with the closely related Provencal, and some in which it differs. As to the latter, it has already been pointed out that the two languages glide insensibly into one another, there being a belt of dialects which possess some of the features of each. French and Provencal of the 10th century — the earliest date at which documents exist in both — agree to a great extent in the treatment of Latin final consonants and the vowels preceding them, a matter of great importance for inflections (numerous French examples occur in this section). (1) They reject all vowels, except a, of Latin final (unaccented) syllables, unless preceded by certain consonant combinations or followed by nt (here, as elsewhere, certain exceptions cannot be noticed) ; (2) they do not reject a similarly situated; (3) they reject final (unaccented) m; (4) they retain final s. French and Northern Provencal also agree in changing Latin u from a labio-guttural to a labio- palatal vowel; the modern sound (German u) of the accented vowel of French lune, Provencal luna, contrasting with that in Italian and Spanish luna, appears to have existed before the earliest extant documents. The final vowel laws generally apply to the unaccented vowel preceding the accented syllable, if it is preceded by another syllable, and followed by a single consonant — matin (mdtiUinum), dortoir (dnrmitorium) , with vowel dropped; canevas (cannab&ceum) , armedure, later armSure, now armttre (armdluram), with e—3, as explained below.

On the other hand, French differs from Provencal: (1) in uniformly preserving (in Early Old French) Latin final t, which

is generally rejected in Provencal — French aimet (Latin amat), Provengal ama; aiment (amant), Prov. aman; (2) in always rejecting,

absorbing or consonantizing the vowel of the last syllable but one, if unaccented; in such words as angele (often spelt angle), the c after the g only serves to show its soft sound- French veintre (now vainer e, Latin vincere), Prov. veneer, with accent on first syllable; French esclandre (scandalum), Prov. escandol; French olie (dissyllabic, i = y consonant, now huile), Prov. oli {oleum) ; (3) in changing accented a not in position into ai before nasals and gutturals and not after a palatal, and else- where into & (West French) or ei (East French), which develops an i before it when preceded by a palatal — French main (Latin manum), Prov. man; aigre (dcrem), agre; ele (alam), East French eile, Prov. ala; meitie (medietdtem) , East French moitieit, Prov. meilat; (4) in changing a in unaccented final syllables into the vowel 9 , intermediate to a and e; this vowel is written a in one or two of the older documents, elsewhere e — French aime (Latin ama), Prov. ama; aimes (amas), Prov. amas; aimet (amat), Prov. ama; (5) in changing original au into — French or (aurum), Prov. aur; rober (Teutonic raubon), Prov. raubar; (6) in changing general Romanic &, from accented e and i not in position, into ei — French veine (venam), Prov. vena; peil (pilum), Prov. pel.

As some of the dialectal differences were in existence at the date of the earliest extant documents, and as the existing materials, till the latter half of the nth century, are scanty and of uncertain locality, the chronological order (here adopted) of the earlier sound-changes is only tentative.

(1) Northern French has tsh (written c or ch) for Latin k © and / before palatal vowels, where Central and Southern French have ts (written c or 2) — North Norman and Picard chire (dram), brack (brachium), plache (plateam) ; Parisian, South Norman, &c, cire, braz, place. Before the close of the Early Old French period (12th century) ts loses its initial consonant, and the same happened to tsh a century or two later; with this change the old distinction is maintained — Modern Guernsey and Picard chire, Modern Picard plache (in ordinary Modern French spelling); usual French cire, place. English, having borrowed from North and South Norman (and later Parisian), has instances of both tsh and s, the former • in comparatively small number — chisel (Modern French ciseau = (?) caesellum), escutcheon (ecusson, scutionem); city (cite, clvitatem), place. (2) Initial Teutonic w is retained in the north-east and along the north coast; elsewhere, as in the other Romance languages, g was prefixed — Picard, &c, warde (Teutonic warda), werre (werra) ; Parisian, &c, guarde, guerre. In the I2th century the u or w of gu dropped, giving the Modern French garde, guerre (with gu = g); w remains in Picard and Walloon, but in North Normandy it becomes v — Modern Guernsey vdson, Walloon

wazon, Modern French gazon (Teutonic wason). English has bbth forms, sometimes in words originally the same — wage and gage (Modern French gage, Teutonic wadi) ; warden and guardian (gardien, warding). (3) Latin b after accented o in the imperfect of the first conjugation, which becomes v in Eastern French, in Western French further changes to w, and forms the diphthong ou with the preceding vowel — Norman amowe (am&bam), porlout (portabat); Burgundian ameve, portevet. eve is still retained in some places, but generally the im perfect of the first conjugation is assimilated to that of the others — amoit, like avoit (habebat). (4) The palatalization of every then exist- ing k and g (hard) when followed by a, i or e, after having caused the development of i before the e (East French ei) derived from a not in position, is abandoned in the north, the consonants returning to ordinary k or g, while in the centre and south they are assibilated to tsh or dzh — North Norman and Picard cachier (captidre), kier (carum), cose (causam), eskiver (Teutonic skiuhan), wikel (Teutonic wik + ittwn), gal (gallum), gardin (from Teutonic gard); South Norman and Parisian chacier, chier, chose, eschiver, guichet, jal, jardin. Probably in the 14th century the initial consonant of tsh, dzh dis- appeared, giving the modern French chasser, jardin with ch = sh and j = zh; but tsh is retained in Walloon, and dzh in Lorraine. The Northern forms survive — Modern Guernsey cachier, gardin; Picard cacher, gardin. English possesses numerous examples of both forms, sometimes in related words — catch and chase; wicket, eschew; garden, jaundice (jaunisse, from galbanum). (5) For Latin accented a not in position Western French usually has e, Eastern French ei, both of which take an i before them when a palatal precedes — Norman and Parisian per (parem), oiez (audidtis); Lorraine peir, oieis. In the 17th and 1 8th centuries close 6 changed to open e, except when final or before a silent consonant — amer (amdrum) now having e, aimer (amare) retaining L English shows the Western close e- — peer (Modern French pair, Old French per), chief (chef, caput) ; Middle High German the Eastern ei — lameir (Modern French I'amer, V aimer, la mer = Latin mare). (6) Latin accented e not in position, when it came to be followed in Old French by i unites with this to form i in the Western dialects, while the Eastern have the

diphthongs ei — Picard, Norman and Parisian pire (pejor), piz {pectus) ; Burgundian peire, peiz. The distinction is still preserved — Modern French pire, pis ; Modern Burgundian peire, pei. English words show always i — price (prix, pretium) spite (dSpit, despectum). (7) The nasalization of vowels followed by a nasal consonant did not take place simultaneously with all the vowels. A and e before n (guttural n, as in sing), ft (palatal n), n and m were nasal in the nth

century, such words as lant (tantum) and gent (gentem) forming in the Alexis assonances to themselves, distinct from the assonances with a and e before non-nasal consonants. In the Roland umbre (ombre, untbram) and culchet (couche, collocal) , fier (ferum) and chiens (canes), dit (dictum) and vint (venit), ceinte (cinctam) and veie (vote, viam), brun (Teutonic brun) and fut(fuit) assonate freely, though o (u) before nasals shows a tendency to separation. The nasalization of i and u (= Modern French u) did not take place till the 16th century; and in all cases the loss of the following nasal consonant is quite modern, the older pronunciation of tant, ombre being tant, ombr9, not as now IS, obrh. The nasalization took place whether the nasal consonant was or was not followed by a vowel, femme (feminam), honneur (honorem) being pronounced with nasal vowels m the first syllable till after the 16th century, as indicated by the doubling of the nasal consonant in the spelling and by the phonetic change (in femme and other words) next to be mentioned. English generally has au (now often reduced to a) for Old French a — vaunt (vanter, vdnitdre), tawny (tanne (?) Celtic). (8) The assimilation of e (nasal e) to a (nasal a) did not begin till the middle of the nth century, and is not yet universal, in France, though generally a century later. In the Alexis nasal a (as in tant) is never confounded with nasal e (as in gent) in the assonances, though the copyist (a century later) often writes a for nasal e in unaccented syllables, as in amfant (enfant, infantem) ; in the Roland there are several cases of mixture in the assonances, gent, for instance, occurring in ant stanzas, tant in enl ones. English has several words with a for e before nasals — rank (rang. Old French renc, Teutonic hringa) , pansy (pensee, pensdtam) ; but the majority show e — enter (entrer, intrare), fleam (flamme, Old French fleme, phlebotomum) . The distinction is still preserved in the Norman of Guernsey, where an and en, though both nasal, have different sounds — Idnchier (lancer, lancedre), but mentrie (Old French menterie, from mentiri). (9) The loss of s, or rather 2, before voiced consonants began early, s being often omitted or wrongly inserted in 12th century MSS. — Earliest Old French masle (mas- culum), sisdre (sTceram); Modern French mdle, cidre. In English it has everywhere disappeared — male, cider; except in two words, where it appears, as occasionally in Old French, as d — meddle (mtler, misculare), medlar (neflier, Old French also meslier, mespildrium) . The loss of .j before voiceless consonants (except /) is about two centuries later, and it is not universal even in Parisian — Early Old French feste (festam), escuier (scutdrium); Modern French fete, icuyer, but esperer (sperdre). In the north-east s before / is still retained — Walloon chestai (chdteau, castelhtm), fiess (fete). English shows s regularly — feast, esquire. (10) Medial dh (soft th, as in then), and final th from Latin / or d between vowels, do not

begin to disappear till the latter half of the nth century. In native French MSS. dh is generally written d, and th written t; but the German scribe of the Oaths writes adjudha (adjutam), cadhuna (Greek katd and unam) ; and the English one of the Alexis cuntretha (contrdtam), lothet (laud&tum), and that of the Cambridge Psalter heriteth (hereditdtem). Medial dh often drops even in the last-named MSS., and soon disappears; the same is true for final th in Western French — Modern French contree, loue. But in Eastern French final th, to which Latin t between vowels had probably been reduced through d and dh, appears in the 12th century and later as t, rhyming on ordinary French final / — Picard and Burgundian pechiet (pecedtum) apeleit (appelldtum) . In Western French some final ths were saved by being changed to / — Modern French soif (sitim), mozuf (obsolete, modum). English has one or two instances of final th, none of medial dh — faith (foi, fidem) ; Middle English caritep (chariti, caritdtem), drutS (Old French dru, Teutonic drild); generally the consonant is lost — country, charity. Middle High German shows the Eastern French final consonant — moraliteit (moralite, mordli- titem). (n) T from Latin final t, if in an Old French unaccented syllable, begins to disappear in the Roland, where sometimes aimet (amat), sometimes aime, is required by the metre, and soon drops in all dialects. The Modern French t of aime-t-il and similar forms is an analogical insertion from such forms as dort-il (dormil), where the / has always existed. (12) The change of the diphthong ai to ei and afterwards to ie (the doubling indicates length) had not taken place in the earliest French documents, words with -a* assonating only on words with a; in the Roland such assonances occur, but those of ai on e are more frequent — faire (facere) assonating on parastre (patraster) and on estes (estis) ; and the MS. (half a century later than the poem) occasionally has ei and e for ai — recleimet (recldmat), desfere (disfacere), the latter agreeing with the Modern French sound. Before nasals (as in laine — lanam) and ie (as in paye = pdedtum), ai remained a diphthong up to the 1 6th century, being apparently ei, whose fate in this situation it has followed. English shows ai regularly before nasals and when final, and in a few other words — vain (vain, vdnum), pay (payer, pdedre), wait (guetter, Teutonic wahten) ; but before most consonants it has usually iee — peace (pais, pacum),feat (fait, factum). (13) The loss or transposition

of i (= y-consonant) following the consonant ending an accented syllable begins in the 12th century — Early Old French glorie

(gloriam), estudie (studium), olie (oleum); Modern French gloire, etude, huile. English sometimes shows the earlier form — glory, study; sometimes the later — dower (douaire, Early Old French doarie, dotarium), oil (huile). (14) The vocalization of I preceded by a vowel and followed by a consonant becomes frequent at the end of the 12th century; when preceded by open e, an a developed before the / while this was a consonant — nth century salse (salsa), beltet (belli- tatem), solder (solidare) ; Modern French sauce, beaute, souder. In Parisian, final el followed the fate of el before a consonant, becoming the triphthong eau, but in Norman the vocalization did not take place, and the I was afterwards rejected — Modern French ruisseau, Modern Guernsey russe (rivicellum) . English words of French origin sometimes show / before a consonant, but the general form is u — — scald (echauder, excaliddre), Walter (Gaulier, Teutonic Waldhari); sauce, beauty, soder. Final el is kept — veal (veau, vitellum), seal (sceau, sigillum). (15) In the east and centre ei changes to bi, while the older sound is retained in the north-west and west — Norman estreit (etroit, strictum), preie (proie, praedam), 12th century Picard, Parisian, &c, estroit, proie. But the earliest (10th century) specimens of the latter group of dialects have U — pleier (ployer, plicare) Eulalia, mettreiet (mettrait, mittere habebat) Jonah. Parisian bi, whether from ei or from Old French bi, Si, became in the 15th century ue (spellings with one or oe are not uncommon — mirouer for miroir, miratorium) , and in the following, in certain words, i, now written ai — francais, connatlre, from francois (franceis, franciscum), conoistre (conuistre, cognbscere) ; where it did not undergo the latter change it is now ua or via — roi (rei, regent), croix (cruis, crucem). Before nasals and palatal /, ei (now = «) was kept — veine (vena), veille (vigila), and it everywhere survives unlabialized in Modern Norman — Guernsey itelle (etoile, Stella) with e, ser (soir, serum) with e. English shows generally ei (or ai) for original ei — strait (estreit), prey (preie); but in several words the later Parisian oi — coy (coi, qvietum), loyal (loyal, ligalem). (16) The splitting of the vowel-sound from accented Latin or u not in position, represented in Old French by o and « indifferently, into u, (before nasals), and eu (the latter at first a diphthong, now = German 6), is unknown to Western French till the 12th century, and is not general in the east. The sound in nth century Norman was much nearer to u (Modern French ou) than to (Modern French 6), as the words borrowed by English show uu (at first written u, afterwards ou or ow), never 66; but was probably not quite u, as Modern Norman shows the same splitting of the sound as Parisian. Examples are — Early Old French espose or espuse (sponsam), nom or num (nbmen) , flor or flur (florem) ; Modern French epouse, nom, fleur; Modern Guernsey goule (gueide, gulam),

nom,flleur. Modern Picard also shows u, which is the regular sound before r — flour; but Modern Burgundian often keeps the original Old French 6 — vo (vous, vos). English shows almost always uu — spouse, noun, flower (Early Middle English spuse, nun, flur) ; but nephew with eu (neveu, nepotem). (17) The loss of the u (or w) of qu dates from the end of the 12th century — Old French quart (qvartum), quilier (qvietare) with qu = kw, Modern French quart, quitter with qu = k. In Walloon the w is preserved — coudr (quart), cuitter; as is the case in English — quart, quit. The w of gw seems to have been lost rather earlier, English having simple g — gage (gage, older guage, Teutonic wadi), guise (guise, Teutonic wisa). (18) The change of the diphthong bu to uu did not take place till after the 12th century, such words as Anjou (Andegavum) assonating in the Roland on fort (fortem) ; and did not occur in Picardy, where bu became au cans from older cbus, cols (cous, collos) coinciding with caus from calz (chauds, calidos). English keeps bu distinct from uu — vault for vaut (Modern French voile, volvitam), soder (souder, solidare). (19) The change of the diphthong ie to simple e is specially Anglo-Norman , in Old French of the Continent these sounds never rhyme, in that of England they constantly do, and English words show, with rare exceptions, the simple vowel — fierce (Old French fiers, ferus), chief (chief, caput), with ie = ee; but pannier (panier, panarium). At the beginning of the modern period, Parisian dropped the i of ie when preceded by ch or j — chef, abreger (Old French abregier, abbrevidre) : elsewhere (except in verbs) ie is retained — fier (ferum) , pitii(pietatem). Modern Guernsey retainsieaftercA — ap' rchierlapprocher ,adpropeare) . (20) Some of the Modern French changes have found their places under older ones; those remaining to be noticed are so recent that English examples of the older forms are superfluous. In the 16th century the diphthong au changed to ao and then to 6, its present sound, rendering, for instance, maux (Old French mals, maids) identical with mots (muttos). The au of eau underwent the same change, but its e was still sounded as 3 (the e of que) ; in the next century this was dropped, making veaux (Old French v'eels, vitellos) identical with vaux (vols, valles). (21) A more general and very important change began much earlier than the last; this is the loss of many final consonants. In Early Old French every consonant was pronounced as written; by degrees many of them disappeared when followed by another consonant, whether in the same word (in which case they were generally omitted in writing) or in a following one. This was the state of things in the 16th century; those final consonants which are usually silent in Modern French were still sounded, if before a vowel or at the end of a sentence or a line of poetry, but generally not elsewhere. Thus a large number of

French words had two forms ; the Old French fort appeared as for (though still written fort) before a consonant, fort elsewhere. At a later period final consonants were lost (with certain exceptions) when the word stood at the end of a sentence or of a line of poetry ; but they are generally kept when followed by a word beginning with a vowel. (22) A still later change is the' general loss of the vowel (written e) of unaccented final syllables; this vowel preserved in the 16th century the sound 3, which it had in Early Old French. In later Anglo-Norman final 3 (like every other sound) was treated exactly as the same sound in Middle English ; that is, it came to be omitted or retained at pleasure, and in the 15th century disappeared. In Old French the loss of final 3 is confined to a few words and forms ; the 10th century saveiet (sapebat for sapiebat) became in the Uth saveit, and ore (ad horam), ele (Mam) develop the abbreviated or, el. In the 15th century 3 before a vowel generally disappears — mur, Old French meur (malurum) ; and in the 16th, though still written, 3 after an unaccented vowel, and in the syllable ent after a vowel, does the same — vraiment, Old French vraiement (verblca mente) ; avoient two syllables, as now (avaient), in Old French three syllables (as habebant). These phenomena occur much earlier in the anglicized French of England — 13th century aveynt (Old French aveient). But the universal loss of final e, which has clipped a syllable from half the French vocabulary, did not take place till the 18th century, after the general loss of final consonants; fort and forte, distinguished at the end of a sentence or line in the 16th century as fort and forts, remain distinguished, but as for and fort. The metre of poetry is still constructed on the obsolete pronunciation, which is even revived in singing; " dites, la jeune belle," actually four syllables (dit, la zhoen bel), is considered as seven, fitted with music accordingly, and sung to fit the music (dits, la zhasna bela). (23) In Old French, as in the other Romanic languages, the stress (force, accent) is on the syllable which was accented in Latin; compare the treatment of the accented and unaccented vowels in latro, amds, giving Ure, dime, and in latronem, amatis, giving laron, amkz, the accented vowels being those which rhyme or assonate. At present, stress in French is much less marked than in English, German or Italian, and is to a certain extent variable ; which is partly the reason why most native French scholars find no difficulty in maintaining that the stress in living Modern French is on the same syllable as in Old French. The fact that stress in the French of to-day is independent of length (quantity) and pitch (tone) largely aids the confusion ; for though the final and originally accented syllable (not counting the silent e as a syllable) is now generally pronounced with less force, it very often has a long vowel with raised pitch. In actual pronunciation the chief stress is usually on the first

syllable (counting according to the sounds, not the spelling), but in many polysyllables it is on the last but one; thus in caution the accented (strong) syllable eau, in occasion it is ca. Poetry is still written according to the original place of the stress; the rhyme-syllables of larron, aimez are still ron and mez, which when set to music receive an accented (strong) note, and are sung accordingly, though in speech the la and at generally have the principal stress. In reading poetry, as distinguished from singing, the modern pronunciation is used, both as to the loss of the final 9 and the displacement of the stress, the result being that the theoretical metre in which the poetry is written disappears. (24) In certain cases accented vowels were lengthened in Old French, as before a lost s; this was indicated in the 16th century by a circumflex — bete, Old French beste (bestiam), dme, Old French anme (anima). The same occurred in the plural of many nouns, where a consonant was lost before the s of the flection ; thus singular coc with short vowel, plural cos with long. The plural cos, though spelt cogs instead of co (= koo), is still sometimes to be heard, but, like other similar ones, is generally refashioned after the singular, becoming kbk. In present French, except where a difference of quality has resulted, as in cote (Old French coste, coslam) with and cotte (Old French cote), with 0, short and long vowels generally run together, quantity being now variable and uncertain; but at the beginning of this century the Early Modern distinctions appear to have been generally preserved.

(d) Orthography. — The history of French spelling is based on that of French sounds; as already stated, the former (apart from a few Latinisms in the earliest documents) for several centuries faithfully followed the latter. When the popular Latin of Gaul was first written, its sounds were represented by the letters of the Roman alphabet; but these were employed, not in the values they had in the time of Caesar, but in those they had ac- quired in consequence of the phonetic changes that had meantime taken place. Thus, as the Latin sound u had become 6 (close 0) and u had become y (French u, German u), the letter u was used sometimes to denote the sound 6, sometimes the sound y; as Latin k (written c) had become tsh or ts, according to dialect, before e and i, c was used to represent those sounds as well as that of k. The chief features of early French orthography (apart from the specialities of individual MSS., especially the earliest) are therefore these: — c stood for k and tsh or ts; d for d

and dh (soft th); e for i, b, and 9; g for g and dzh; h was often written in words of Latin origin where not sounded; i (J) stood for i, y consonant, and dzh; o for 6 (Anglo-Norman u) and o; s for 5 and z; t for t and th; u (») for 6 (Anglo-Norman «), y and »; y (rare) for *; z for dz and to. Some new sounds had also to be provided for: where tsh had to be distinguished from non- final to, ch — at first, as in Italian, denoting k before i and e (chi = ki from qvi) — was used for it; palatal / was represented by ill, which when final usually lost one /, and after i dropped its i; palatal n by gn, ng or ngn, to which i was often prefixed; and the new letter w, originally uu {w), and sometimes representing merely uv or mi, was employed for the consonant-sound still denoted by it in English. All combinations of vowel-letters represented diphthongs; thus ai denoted a followed by i, ou either 6u or ou, ui either 6i (Anglo-Norman ui) or yi, and similarly with the others — ei, eu, oi, iu, ie, ue (and oe), and the triphthong ieu. Silent letters, except initial h in Latin words, are very rare; though MSS. copied from older ones often retain letters whose sounds, though existing in the language of the author, had dis- appeared from that of the more modern scribe. The subsequent changes in orthography are due mainly to changes of sound, and find their explanation in the phonology. Thus, as Old French progresses, s, having become silent before voiced con- sonants, indicates only the length of the preceding vowel; e , before nasals, from the change of e (nasal e) to 5 (nasal (ˆrepre- sents a; c, from the change of to to s, represents s ; qu and gu, from the loss of the w of kw and gw, represent k and g (hard); ai, from the change of ai to e, represents b; ou, from the change of ou and 6u to u, represents u; ch and g, from the change of tsh and dzh to sh and zh, represent sh and zh; eu and ue, originally representing diphthongs, represent oe (German 0) ; z, from the change of ts and dz to s and z, represents .? and z. The new values of some of these letters were applied to words not originally spelt with them: Old French k before i and e was replaced by qu (evesque, eveske, Latin episcopum) ; Old French u and for 6, after this sound had split into eu and u, were replaced in the latter case by ou (rous, for ros or rus, Latin russum); s was accidentally inserted to mark a long vowel (pasle, pale, Latin pallidum) ; eu replaced ue and oe {neuf, nuef, Latin novum and novem); z replaced 5 after e (nez, ties, nasum). The use of x for final s is due to an orthographical mistake; the MS. contraction of us being something like x was at last confused with it (iex for ieus, oculos), and, its meaning being forgotten, u was inserted before the x (yeux) which thus meant no more than s, and was used for it after other vowels (voix for vols, vocem). As literature came to be extensively cultivated, traditional as distinct from phonetic spelling began to be influential; and in the 14th century, the close of the Old French

period, this influence, though not overpowering, was strong — stronger than in England at that time. About the same period there arose etymological as distinct from traditional spelling. This practice, the alteration of traditional spelling by the insertion or substitution of letters which occurred (or were supposed to occur) in the Latin (or sup- posed Latin) originals of the French words, became very prevalent in the three following centuries, when such forms as debvoir (debere) for devoir, faulx (Jalsum) for faus, autheur {auctorem, supposed to be authorem) for auteur, poids (supposed to be from pondus, really from pensum) for pois, were the rule. But besides the etymological, there was a phonetic school of spelling (Ramus, in 1562, for instance, writes eime, eimates — with e = £, e = e, and e = a — for aimai, aimastes), which, though unsuccessful on the whole, had some effect in correcting the excesses of the other, so that in the 17th century most of these inserted letters began to drop; of those which remain, some (Jlegme for flemme or fleume, Latin phlegma) have corrupted the pronunciation. Some im- portant reforms — as the dropping of silent s, and its replace- ment by a circumflex over the vowel when this was long; the frequent distinction of close and open e by acute and grave accents; the restriction of i and u to the vowel sound, of/ and v ■ to the consonant ; and the introduction from Spain of the cedilla to distinguish c=s from c = k before a, u and — are due to the 1 6th century. The replacement of oi, where it had assumed the

value b,by ai, did not begin till the last century, and was not the rule till the present one. Indeed, since the 16th century the changes in French spelling have been small, compared with the changes of the sounds; final consonants and final e (unaccented) are still written, though the sounds they represent have dis- appeared.

Still, a marked effort towards the simplification of French orthography was made in the third edition of the Dictionary of the French Academy (1740), practically the work of the Abbe d'Olivet. While in the first (1694) and second (1718) editions of this dictionary words were overburdened with silent letters, supposed to represent better the etymology, in the third edition the spelling of about 5000 words (out of about 18,000) was altered and made more in conformity with the pronunciation. So, for instance, c was dropped in beinfaicteur and object, c in scavoir, d in advocat, s in accroistre, albastre, aspre and bastard, e in the past part, creu, deu, veu, and in such words as alleure, souil- leure; y was replaced by * in cecy, celuy, gay, joye, &c. But those changes were not made systematically, and many pedantic spellings were left untouched, while many inconsistencies still remain in the present orthography (siffler and persifler, souffler and boursoufler, &c). The consequence of those efforts in con- trary

directions is that French orthography is now quite as traditional and unphonetic as English, and gives an even falser notion than this of the actual state of the language it is supposed to represent. Many of the features of Old French orthography, early and late, are preserved in English orthography; to it we owe the use of c for s (Old English c—k only), of j (i) for dzh, of v (u) for v (in Old English written/), and probably of ch for tsh. The English w is purely French, the Old English letter being the runic }>. When French was introduced into England, kw had not lost its w, and the French qu, with that value, replaced the Old English c\ {queen for cben). In Norman, Old French 6 had become very like u, and in England went entirely into it; o, which was one of its French signs, thus came to be often used for u in English {come for cume). U, having often in Old French its Modern French value, was so used in England, and replaced the Old English y {busy for by si, Middle English brud for bryd), and y was often used for i {day for dai). In the 13 th century, when ou had come to represent u in France, it was borrowed by English, and used for the long sound of that vowel {sour for sur) ; and gu, which had come to mean simply g (hard), was occasion- ally used to represent the sound g before * and e {guess for gesse). Some of the Early Modern etymological spellings were imitated in England; fleam and autour were replaced by phlegm and authour, the latter spelling having corrupted the pronunciation.

{e) Inflections. — In the earliest Old French extant, the in- fluence of analogy, especially in verbal forms, is very marked when these are compared with Latin (thus the present participles of all conjugations take ant, the ending of the first, Latin antem), and becomes stronger as the language progresses. Such isolated inflectional changes as saveit into savoit, which are cases of regular phonetic changes, are not noticed here.

(i.) Verbs. — (1) In the oldest French texts the Latin pluperfect (with the sense of the perfect) occasionally occurs — avret {habuerat) , roveret {rogdverat); it disappears before the 12th century. (2) The « of the ending of the 1st pers. plur. mus drops in Old French, except in the perfect, where its presence (as 3) is not yet satisfactorily explained — amoms {amdmus, influenced by sumus), but amames {amavimus). In Picard the atonic ending mes is extended toalltenses, giving amomes, &c. (3) In the present indicative, 2nd person plur., the ending ez of the first conjugation (Latin atis) extends, even in the earliest documents, to all verbs — avez, recevez, oez (habetis, recipitis, auditis) like amez (amatis) ; such forms as dites, faites {dicitis, facitis) being exceptional archaisms. This levelling of the conjugation does not appear at such an early time in the future (formed from the infinitive and from habetis reduced to etis) ; in the

Roland both forms occur, portereiz {portare habetis) assonat- ing on ret {roi, regetn), and the younger porterez on citet {cite, civit&tem), but about the end of the 13th century the older form -eiz, -oiz, is dropped, and -ez becomes gradually the uniform ending for this 2nd person of the plural in the future tense. (4) In Eastern French the 1st plur., when preceded byi, has e, not 0, before the nasal, while Western French has u (or o), as in the present; posciomes {possedmus) in the Jonah homily makes it probable that the latter is the older form — Picard aviemes, Burgundian aviens, Norman

atriums (habebdmus). (5) The subjunctive of the first conjugation has at first in the singular no final e, in accordance with the final vowel laws — plur, plurs, plurt (plbrem, plbres, ploret). The forms are gradually assimilated to those of the other conjugations, which, deriving from Latin am, as, at, have e, es, e(t) ; Modern French pleure, pleures, pleure, like perde, perdes, perde (perdam, perdas, perdat). (6) In Old French the present subjunctive and the 1st sing. pres. ind. generally show the influence of the i or e of the Latin iam, earn, io, eo — Old French muire or moerge {moriat for moridtur), tiegne or tienge (teneat), muir or motrc (morio for morior), tieng or tienc (teneo). By degrees these forms are levelled under the other present forms — Modern French meure and meurs following tneurt (morit for morilur), tienne and tiens following tient {tenet). A few of the older forms remain — the vowel of aie (habeam) and ai (habed) contrasting with that of a (habet). (7) A levelling of which instances occur in the nth century, but which is not yet complete, is that of the accented and unaccented stem-syllables of verbs. In Old French many verb- stems with shifting accent vary in accordance with phonetic laws — parler (parabolare) , amer (amdre) have in the present indicative parol (parabolo), paroles (parabolas), parolet (parabolat), parlums (parabolamus) , parlez (paraboldtis) , parolent (parabolant) ; aim (amb), aimes (amas), aimet (amat), amurns (amamus), amez (amatis), aiment (amanl). In the first case the unaccented, in the second the accented form has prevailed — Modern French parle, parler; aime, aimer. In several verbs, as tenir (tenere), the distinction is retained — tiens, tiens, tient, tenons, tenez, tiennent. (8) In Old French, as stated above, ie instead of e from a occurs after a palatal (which, if a consonant, often split into i with a dental); the diph- thong thus appears in several forms of many verbs of the 1st con- . jugation — preier (= prei-ier, precare), vengier (vindicare), laissier (laxare), aidier (adjutdre). At the close of the Old French period, those verbs in

which the stem ends in a dental replace ie by the e of other verbs — Old French laissier, aidier, laissiez (laxatis), aidiez (adjutdtis) ; Modern French laisser, aider, laissez, aidez, by analogy of aimer, aimez. The older forms generally remain in Picard— laissier, aidier. (9) The addition of e to the 1st sing. pres. ind. of all verbs of the first conjugation is rare before the 13th century, but is usual in the 15th; it is probably due to the analogy of the third person — Old French chant (canto), aim (amo); Modern French chante, aime. (10) In the 13th century j is occasionally added to the 1st pers. sing., except those ending in e (= a) and ai, and to the 2nd sing, of imperatives; at the close of the 16th century this becomes the rule, and extends to imperfects and conditionals in oie after the loss of their e. It appears to be due to the influence of the 2nd pers. sing. — Old French vend (vendb and vende), vendoie (vendebam), parti (partlvi), ting (tenui); Modern French vends, vendais, partis, tins; and donne (dona) in certain cases becomes donnes. (n) The 1st and 2nd plur. of the pres. subj., which in Old French were generally similar to those of the indicative, gradually take an i before them, which is the rule after the 1 6th century — Old French perdons (per- damus), perdez (perddtis); Modern French perdions, perdiez, appar- ently by analogy of the imp. ind. (12) The loss in Late Old French of final s, t, &c, when preceding another consonant, caused many words to have in reality (though often concealed by orthography) double forms of inflection — one without termination, the other with. Thus in the 16th century the 2nd sing. pres. ind. dors (dormxs) and the 3rd dort (dormit) were distinguished as dbrz and dbrt when before a vowel, as dors and dbrt at the end of a sentence or line of poetry, but ran together as dor when followed by a consonant. Still later, the loss of the final consonant when not followed by a vowel further reduced the cases in which the forms were distinguished, so that the actual French conjugation is considerably simpler than is shown by the customary spellings, except when, in consequence of an im- mediately following vowel, the old terminations occasionally appear. Even here the antiquity is to a considerable extent artificial or delusive, some of the insertions being due to analogy, and the popular language often omitting the traditional consonant or inserting a different one. (13) The subsequent general loss of e =a in unaccented final syllables has still further reduced the inflections, but not the distinctive forms — perd (perdit) and perde (perdat) being generally ditinguished as per and perd, and before a vowel as pert and ptrd.

(ii.) Substantives. — (1) In Early Old French (as in Provengal) there are two main declensions, the masculine and the feminine; with a few exceptions the former ditinguishes nominative and accusative in both

numbers, the latter in neither. The nom. and ace. sing, and ace. plur. mas. correspond to those of the Latin 2nd or 3rd declension, the nom. plur. to that of the 2nd declension. The sing, fern, corresponds to the nom. and ace. of the Latin 1st declension, or to the ace. of the 3rd; the plur. fem. to the ace. of the 1st declen- sion, or to the nom. and ace. of the 3rd. Thus masc. tors (taurus), lere (latro) ; tor (taurum) , laron (latrbnem) ; tor (taurt) , laron (latrbnl for nes); tors (taurds), larons (latrbnes); but fem. only ele (dla and dlam),fior (florem); eles (alas), flors (fibres nom. and ace). About the end of the nth century feminines not ending in e = » take, by analogy of the masculines, s in the nom. sing., thus distinguishing nom. flors from ace. flor. A century later, masculines without s in the nom. sing, take this consonant by analogy of the other mascu lines, giving leres as nom. similar to tors. In Anglo-Norman the accusative forms very early begin to replace the nominative, and

soon supersede them, the language following the tendency of con-temporaneous English. In continental French the declension-system was preserved much longer, and did not break up till the 14th century, ˆthough ace. forms are occasionally substituted for nom. (rarely nom. for ace.) before that date. It must be noticed, however, that in the current language the reduction of the declension to one case (generally the accusative) per number appears much earlier than in the language of literature proper and poetry; Froissart, for instance, c. 1400, in his poetical works is much more careful of the declension than in his Chronicles. In the 15th century the modern system of one case is fully established; the form kept is almost always the accusative (sing, without s, plural with s), but in a few words, such as fils (fllius), sceur (soror), pastre (pastor), and in proper names such as Georges, Gilles, &c, often used as vocative (therefore with the form of nom.) ; the nom. survives in the sing. Occasionally both forms exist, in different senses — sire (senior) and seigneur (senior em), on (homo) and homme (hominem). (2) Latin neuters are generally masculine in Old French, and inflected according to their analogy, as dels (caelus for caelum nom.), del (caelum ace), del (caeli for caela nom.), dels (caelos for caela ace); but in some cases the form of the Latin neuter is preserved, as in cors, now corps, Lat. corpus; tens, now temps, Lat. tempus. Many neuters lose their singular form and treat the plural as a feminine singular, as in the related languages — merveille (mirabilia) , feuille (folia). But in a few words the neuter plural termination is used, as in Italian, in its primitive sense — carre (carra, which exists as well as cam), paire (Lat. paria) ; Modern French chars, paires. (3) In Old French the inflectional s often causes phonetic changes in the stem; thus palatal I before s takes t after it, and becomes dental I,

which afterwards changes to u or drops — fit (filium and filii) with palatal l,filz (filius and filios), afterwards fiz, with z = ts (preserved in English Fitz), and then fis, as now (spelt fils). Many consonants before s, as the t of fiz, disappear, and I is vocalized — vif (vivum), mal (malum), nominative sing, and ace plur. vis, maus (earlier mals). These forms of the plural are retained in the 16th century, though often ety- mologically spelt with the consonant of the singular, as in vifs, pronounced vis; but in Late Modern French many of them dis- appear, vifs, with / sounded as in the singular, being the plural of vif, bals (formerly baux) that of bal. In many words, as chant (cantus) and champs (campos) with silent t and p (Old French chans in both cases), maux (Old French mals, sing, mal), yeux (oculBs, Old French mlz, sing, ail) the old change in the stem is kept. Some- times, as in cieux (caelos) and dels, the old traditional and the modern analogical forms coexist, with different meanings. (4) The modern loss of final s (except when kept as z before a vowel) has seriously modified the French declension, the singulars fort (for) and forte (fort) being generally undistinguishable from their plurals forts and fortes. The subsequent loss of 3 in finals has not affected the relation between sing, and plur. forms; but with the frequent recoining of the plural forms on the singular present Modern French has very often no distinction between sing, and plur., except before a vowel. Such plurals as mauxha\e always been distinct from their singular mal; in those whose singular ends in s there never was any dis- tinction, Old French laz (now spelt lacs) corresponding to laqyeus, laqyeum, laqvet and laqvebs.

(iii.) Adjectives. — (1) The terminations of the cases and numbers of adjectives are the same as those of substantives, and are treated in the preceding paragraph. The feminine generally takes no e if the masc. has none, and if there is no distinction in Latin — fem. sing, fort (fortem), grant (grandem), fem. plur. forz (fortes), granz (grandes), like the ace masc. Certain adjectives of this class, and among them all the adjectives formed with the Latin suffix ensis, take regularly, even in the oldest French, the feminine ending e, in Provengal a (courtois, fem. courtoise; commun, fem. commune). To these must not be added dous (Mod. Fr. dolz, dous), fem. douce, which probably comes from a Low Latin dulcius, dulcia. In the nth century some other feminines, originally without e, begin in Norman to take this termination — grande (in a feminine assonance in the Alexis), plur. grandes; but other dialects generally preserve the original form till the 14th century. In the 16th century the e is general in the feminine, and is now universal, except in a few ex pressions — grand' mere (with erroneous apostrophe, grandem, matrem), lettres royaux (literas regales), and most adverbs from adjectives in -ant, -ent —

couramment (currante for -ente mente), sciemment (sciente mente). (2) Several adjectives have in Modern French replaced the masc. by the feminine—Old French masc. roil (rigidum), fem. roide (rigidam) ; Modern French roide for both genders. (3) In Old French several Latin simple comparatives are preserved — maiur (majorem), nom. maire (major) ; graignur (grandiorem) , nom. graindre (grandior) ; only a few of these now survive — pire (pejor), meilleur (melibrem), with their adverbial neuters pis (pejus), mieux (melius). The few simple superlatives found in Old French, as merme (minimum), pesme (pessimus), proisme (proximum), haltisme (altissimum), this last one being clearly a literary word, are now extinct, and, when they existed, had hardly the meaning of a superlative. (4) The modern loss of many final consonants when not before vowels, and the subsequent loss of final », have greatly affected the distinction between the masc. and fem. of adjectives — fort and forte are still distinguished as for and fbrt, but amer (amdrum) and amire (amdram), with their plurals amers and amlres, have run together.

no

FRENCH LITERATURE

(J) Derivation. — Most of the Old French prefixes and suffixes are descendants of Latin ones, but a few are Teutonic (ard = hard), and some are later borrowings from Latin (arte, afterwards aire, irom arium). In Modern French many old affixes are hardly used for forming new words; the inherited ier {arium) is yielding to the borrowed aire, the popular contre {contra) to the learned anti (Greek), and the native ee {dtam) to the Italian ade. The suffixes of many words have been assimilated to more common ones; thus sengler (singtddrem) is now sanglier.

(g) Syntax. — Old French syntax, gradually changing from the ioth to the 14th century, has a character of its own, distinct from that of Modern French; though when compared with Latin syntax it appears decidedly modern.

(1 j The general formal distinction between nominative and accusative is the chief feature which causes French syntax to re- semble that of Latin and differ from that of the modern language; and as the distinction had to be replaced by a comparatively fixed word-order, a serious loss of freedom ensued. If the forms are modernized while the word-order is kept, the Old French V archevesque ne puet flechir li reis Henris (Latin archiepiscopum non potest iiectere rex Henricus) assumes a totally different meaning — t'archeveque ne peut flechir le

roi Henri. (2) The replacement of the nominative form of nouns „by the accusative is itself a syntactical feature, though treated above under inflection. A more modern instance is exhibited by the personal pronouns, which, when not immediately the subject of a verb, occasionally take even in Old French, and regularly in the 16th century, the accusative form; the Old French je qui sui (ego qvi sum) becomes moi qui suis, though the older usage survives in the legal phrase je, soussigne. ... (3) The definite article is now required in many cases where Old French dispenses with it — jo cunquis Engtelerre, suffrir mart (as Modern French avoir faim) ; Modern French VAngleterre, la mort. (4) Old French had distinct pro- nouns for ” this ” and ” that ” — cest (ecce istum) and eel {ecce ilium), with their cases. Both exist in the 16th century, but the present language employs cet as adjective, eel as substantive, in both mean- ings, marking the old distinction by affixing the adverbs ci and li — cet homme-ci, cet homme-ld; celui-ci, celui-la. (5) In Old French, the verbal terminations being clear, the subject pronoun is usually not expressed — si ferai {sic facere habeo), est durs (dilrus est), que feras (quid facere habes)? In the 16th century the use of the pronoun is general, and is now universal, except in one or two impersonal phrases, as n’importe, peu s’en faut. (6) The present participle in Old French in its uninflected form coincided with the gerund (amant = amantem and amando), and in the modern language has been re- placed by the latter, except where it has become adjectival ; the Old French complaingnans leur dolours (Latin plangentes) is’how plaignant leurs douleurs (Latin plangendo). The now extinct use of estre with the participle present for the simple verb is not uncommon in Old French down to the 1 6th century — sont disanz (sunt dicentes) = Modern French Us disent (as English they are saying). (7) In present Modern French the preterite participle when used with avoir to form verb-tenses is invariable, except when the object precedes (an exception now vanishing in the conversational language) — j’ai ecrit les lettres, les lettres que j’ai ecrites. In Old French down to the 1 6th century, formal concord was more common (though by no means necessary), partly because the object preceded the parti- ciple much oftener than now — ad la culur muSe (habet colorem muta- tam), ad faite sa venjance, les turs ad rendues. (8) The sentences just quoted will serve as specimens of the freedom of Old French word-order — the object standing either before verb and participle, between them, or after both. The predicative adjective can stand before or after the verb — hall sunt li pui (Latin podia), e tenebrus e grant. (9) In Old French ne (Early Old French nen, Latin non) suffices for the negation without pas (passum), point (punctum) or mie (rnicam, now obsolete), though these are frequently used — jo ne sui lis sire (je ne suis pas ton

seigneur), autre feme nen ara (il n'aura pas autre femme) . In principal sentences Modern French uses ne by itself only in certain cases — je ne puis marcher, je n"ai Hen. The slight weight as a negation usually attached to ne has caused several originally positive words to take a negative meaning — rien (Latin rem) now meaning " nothing " as well as " something." (10) In Old French interrogation was expressed with substantives as with pronouns by putting them after the verb — est Saul entre les pro- phetes? In Modern French the pronominal inversion (the sub- stantive being prefixed) or a verbal periphrasis must be used — Saul est-il? or est-ce que Saul est?

(h) Summary. — Looking at the internal history of the French language as a whole, there is no such strongly marked division as exists between Old and Middle English, or even between Middle and Modern English. Some of the most important changes are quite modern, and are concealed by the traditional orthography; but, even making allowance for this, the difference between French of the nth century and that of the 20th is less than that between English of the same dates. The most important change in itself and for its effects is probably that which is usually made the division between Old and Modern French, the loss of the formal distinction

between nominative and accusative; next to this are perhaps the gradual loss of many final consonants, the still recent loss of the vowel of unaccented final syllables, and the extension of analogy in conjugation and declension. In its construction Old French is dis- tinguished by a freedom strongly contrasting with the strictness of the modern language, and bears, as might be expected, a much stronger resemblance than the latter to the other Romanic dialects. In many features, indeed, both positive and negative, Modern French forms a class by itself, distinct in character from the other modern representatives of Latin.

IV. Bibliography. — Th%few works which treat of French philo- logy as a whole are now in many respects antiquated, and the important discoveries of recent years, which have revolutionized our ideas of Old French phonology and dialectology, are scattered in various editions, periodicals, and separate treatises. For many things Diez's Grammatik der romanischen Sprachen (4th edition — a reprint of the 3rd — Bonn, 1 876-1 877; French translation, Paris, 1 872-1 875) is still very valuable; Burguy's Grammaire de la Langue aVO'il (2nd edition — a reprint of the 1st — Berlin, 1869-1870) is useful only as a collection of examples. Schwan's Grammatik des Alt- franzosischen, as revised by Behrens in the 3rd edition (Leipzig, 1898 ; French translation, Leipzig and Paris, 1900), is by far the best old French grammar we possess.

For the history of French language in general see F. Brunot, Histoire de la langue franqaise des origines & 1900 (Paris, 1905, 1906, &c). For the history of spelling, A. F, Didot, Observations sur V orthographe ou ortografie franqaise suivies d'une histoire de la reforme orthographique depuis le XV' Steele jusqu' a nos jours (2nd ed., Paris, 1868). For the history of French sounds: Ch. Thurot, De la prononciation franqaise depuis le commencement du XVI' si'ecle, d'apres les lemoignages des grammairiens (2 vols., Paris, 1881-1883). For the history of syntax, apart from various grammatical works of a general character, much is to be gathered from Ad. Tobler's Vermischte Beitrage zur franzdsischen Grammatik (3 parts, 1886, 1894, 1899, parts i. and ii. in second editions, 1902, ,1906). G. Paris's edition of La Vie de S. Alexis (Paris, 1872) was the pioneer of, and retains an important place among, the recent original works on Old French. Darmesteter and Hatzfeld's Le Seizi'eme Si'ecle (Paris, 1878) contains the first good account of Early Modern French. Littrˆ's Dictionnaire de la langue franqaise (4 vols., Paris, 1863-1869, and a Supplement, 1877); and Hatzfeld, Darmes- teter and Thomas, Diet, general de la langue francaise, more con- densed (2 vols., Paris, 1888-1900), contain much useful and often original information about the etymology and history of French words. For the etymology of many French (and also Provencal) words, reference must be made to Ant. Thomas's Essais de philologie franqaise (Paris, 1897) and Nouveaux essais de philologie franqaise (Paris, 1904). But there is no French dictionary properly historical. A Dictionnaire historique de la langue franqaise was begun by the Acadfimie francaise (4 vols., 1 859-1 894), but it was, from the first, antiquated. It contains only one letter (ˆ4) and has not been continued. The leading periodicals now in existence are the Romania (Paris), founded (in 1872) and edited by P. Meyer and G. Paris (with Ant. Thomas since the death of G. Paris in 1903), and the Zeit- schrift fur tomanische Philologie (Halle), founded (in 1877) an d edited by G. Grober. To these reference should be made for infor- mation as to the very numerous articles, treatises and editions by the many and often distinguished scholars who, especially in France and Germany, now prosecute the scientific study of the language. It may be well to mention that, Old French phonology especially being complicated, and as yet incompletely investigated, these publications, the views in which are of various degrees of value, require not mere acquiescent reading, but critical study. The dialects of France in their present state (patois) are now being scientifically investigated. The special works on the subject (dic- tionaries, grammars, &c.) cannot be fully indicated here; we must limit ourselves to the mention of Behreh's Bibliographic des patois gallo-romans (2nd ed., revised Berlin, 1893), and of Gilliˆron and Edmont's

Atlas linguistique de la France (1902 et seq.), a huge publication planned to contain about 1800 maps. (H. N. ; P.M.)

FRENCH LITERATURE. Origins.— The history of French literature in the proper sense of the term can hardly be said to extend farther back than the nth century. The actual manu- scripts which we possess are seldom of older date than the century subsequent to this. But there is no doubt that by the end at least of the nth century the French language, as a completely organized medium of literary expression, was in full, varied and constant use. For many centuries previous to this, literature had been composed in France, or by natives of that country, using the term France in its full modern acceptation; but until the 9th century, if not later, the written language of France, so far as we know, was Latin; and despite the practice of not a few literary historians, it does not seem reasonable to notice Latin writings in a history of French literature. Such a history properly busies itself only with the monuments of French itself from the time when the so-called Lingua Romana Rustica

in

assumed a sufficiently independent form to deserve to be called a new language. This time it is indeed impossible exactly to determine, and the period at which literary compositions, as distinguished from mere conversation, began to employ the new tongue is entirely unknown. As early as the 7th century the Lingua Romana, as distinguished from Latin and from Teutonic dialects, is mentioned, and this Lingua Romana would be of necessity used for purposes of clerical admonition, especially in the country districts, though we need not suppose that such addresses had a very literary character. On the other hand, the mention, at early dates, of certain cantilenae or songs com- posed in the vulgar language has served for basis to a super- structure of much ingenious argument with regard to the highly interesting problem of the origin of the Chansons de Geste, the earliest and one of the greatest literary developments of northern French. It is sufficient in this article, where speculation would be out of place, to mention that only two such cantilenae actually exist, and that neither is French. One of the 9th century, the ” Lay of Saucourt,” is in a Teutonic dialect; the other, the “Song of St Faron,” is of the 7th century, but exists only in Latin prose, the construction and style of which present traces of trans- lation from a poetical and vernacular

original. As far Bar,y as facts go, the most ancient monuments of the written

meats French language consist of a few documents of very various character, ranging in date from the 9th to the nth century. The oldest gives us the oaths interchanged at Strassburg in 842 between Charles the Bald and Louis the German. The next probably in date and the first in literary merit is a short song celebrating the martyrdom of St Eulalia, which may be as old as the end of the 9th century, and is certainly not younger than the beginning of the 10th. Another, the Life of St Leger, in 240 octosyllabic lines, is dated by conjecture about 975. The discussion indeed of these short and fragmentary pieces is of more philological than literary interest, and belongs rather to the head of French language. They are, however, evidence of the progress which, continuing for at least four centuries, built up a literary instrument out of the decomposed and reconstructed Latin of the Roman conquerors, blended with a certain limited amount of contributions from the Celtic and Iberian dialects of the original inhabitants, the Teutonic speech of the Franks, and the Oriental tongue of the Moors who pressed upwards from Spain. But all these foreign elements bear a very small proportion to the element of Latin; and as Latin furnished the greater part of the vocabulary and the grammar, so did it also furnish the principal models and helps to literary composition. The earliest French versification is evidently inherited from that of the Latin hymns of the church, and for a certain time Latin originals were followed in the choice of literary forms. But by the nth century it is tolerably certain that dramatic attempts were already being made in the vernacular, that lyric poetry was largely cultivated, that laws, charters, and such-like documents were written, and that commentators and translators busied themselves with religious subjects and texts. The most important of the extant documents, outside of the epics presently to be noticed, has of late been held to be the Life of Saint Alexis, a poem of 625 decasyllabic lines, arranged in five-line stanzas, each of one assonance or vowel-rhyme, which may be as early as 1050. But the most important development of the nth century, and the one of which we are most certain, is that of which we have evidence remaining in the famous Chanson de Roland, discovered in a manuscript at Oxford and first published in 1837. This poem represents the first and greatest development of French literature, the chansons de geste (this form is now preferred to that with the plural gcslcs). The origin of these poems has been hotly debated, and it is only recently that the importance which they really possess has been accorded to them, — a fact the less remarkable in that, until about 1820, the epics of ancient

France were unknown, or known only through late and disfigured prose versions. Whether they originated in the north or the south is a question on which there have been more than one or two revolutions of opinion, and will probably be others still, but which need not be dealt with here. We possess

Bale poetry.

in round numbers a hundred of these chansons. Three only of them are in Provencal. Two of these, Ferabras and Betonnet d'Hanstonne, are obviously adaptations of French originals. The third, Girartz de Rossilho (Gerard de Roussillon), is un- doubtedly Provencal, and is a work of great merit and originality, but its dialect is strongly tinged with the characteristics of the Langue d'Oiil, and its author seems to have been a native of the debatable land between the two districts. To suppose under these circumstances that the Provencal originals of the hundred others have perished seems gratuitous. It is sufficient to say that the chanson de geste, as it is now extant, is the almost exclusive property of northern France. Nor is there much authority for a supposition that the early French poets merely versified with amplifications the stories of chroniclers. On the contrary, chroniclers draw largely from the chansons, and the question of priority between Roland and the pseudo-Turpin, though a hard one to determine, seems to resolve itself in favour of the former. At most we may suppose, with much probability, that personal and family tradition gave a nucleus for at least the earliest.

Chansons de Geste. — Early French narrative poetry was divided by one of its own writers, Jean Bodel, under three heads — poems relating to French history, poems relating to ancient history, and poems of the Arthurian cycle aeˆesˆ (Matieres de France, de Bretagne, et de Rome) . To the first only is the term chansons de geste in strictness applicable. The definition of it goes partly by form and partly by matter. A chanson de geste must be written in verses either of ten or twelve syllables, the former being the earlier. These verses have a regular caesura, which, like the end of a line, carries with it the licence of a mute e. The lines are arranged, not in couplets or in stanzas of equal length, but in laisses or tirades, consisting of any number of lines from half a dozen to some hundreds. These are, in the earlier examples assonanced, — that is to say, the vowel sound of the last syllables is identical, but the con- sonants need not agree. Thus, for instance, the final words of a tirade of Amis et Amiles (11. 199-206) are erbe, nouvelle, selles, nouvelles, traversent, arrestent, guerre, cortege. Sometimes the tirade is completed by a shorter line, and the later chansons are regularly rhymed. As to the subject, a

chanson de geste must be concerned with some event which is, or is supposed to be, historical and French. The tendency of the trouveres was con- stantly to affiliate their heroes on a particular geste or family. The three chief gestes are those of Charlemagne himself, of Doon de Mayence, and of Garin de Monglane; but there are not a few chansons, notably those concerning the Lorrainers, and the remarkable series sometimes called the Chevalier au Cygne, and dealirg with the crusades, which lie outside these groups. By this joint definition of form and subject the chansons de geste are separated from the romances of antiquity, from the romances of the Round Table, which are written in octosyllabic couplets, and from the romans d'aventures or later fictitious tales, some of which, such as Brun de la Montaigne, are written in pure chanson form.

Not the least remarkable point about the chansons de geste is their vast extent. Their number, according to the strictest definition, exceeds 100, and the length of each chanson volume varies from 1000 lines, or thereabouts, to 20,000 or and even 30,000. The entire mass, including, it may be changes of supposed, the various versions and extensions of each y chanson, is said to amount to between two and three million lines; and when, under the second empire, the publication of the whole Carolingian cycle was projected, it was estimated, taking the earliest versions alone, at over 300,000. The successive developments of the chansons de geste may be illustrated by the fortunes of Huon de Bordeaux, one of the most lively, varied and romantic of the older epics, and one which is interesting from the use made of it by Shakespeare, Wieland and Weber. In the oldest form now extant, though even this is probably not the original, Huon consists of over 10,000 lines. A subsequent version contains 4000 more; and lastly, in the 14th century, a later poet has amplified the legend to the extent of 30,000 lines.

When this point had been reached, Huon began to be turned into prose, was with many of his fellows published and republished during the 15th and subsequent centuries, and retains, in the form of a roughly printed chap-book, the favour of the country districts of France to the present day. It is not, however, in the later versions that the special characteristics of the chansons de geste are to be looked for. Of those which we possess, one and one only, the Chanson de

Roland, belongs in its present form to the nth century. Their date of production extends, speaking roughly, from the 1 ith to the 14th century, their palmy days were the nth and the 12th. After this latter period the Arthurian romances, with more complex attractions, became their rivals, and induced their authors to make great changes in their style and subject. But for a time they reigned supreme, and no better instance of their popularity can be given than the fact that manuscripts of them exist, not merely in every French dialect, but in many cases in a strange macaronic jargon of mingled French and Italian. Two classes of persons were concerned in them. There was the trouvbre who composed them, and the jongleur who carried them about in manuscript or in his memory from castle to castle amd sang them, intermixing frequent appeals to his auditory for silence, declarations of the novelty and the strict copyright character of the chanson, revilings of rival minstrels, and frequently requests for money in plain words. Not a few of the manuscripts which we now possess appear to have been actually used by the jongleur. But the names of the authors, the trouveres who actually composed them, are in very few cases known, those of copyists, continuators, and mere possessors of manuscripts having been often mistaken for them. The moral and poetical peculiarities of the older and more authentic of these chansons are strongly marked, though perhaps not quite so strongly as some of their encomiasts have contended, and as may appear to a reader of the most famous of them, the Chanson de Roland, alone. In that poem, indeed, war and religion are the sole motives employed, and its motto might be two lines from another of the finest chansons (Aliscans, 161-162): —

” Dist k Bertran : ‘ N’avons mais nul losir, Tant ke vivons alons paiens ferir.’ ”

In Roland there is no love-making whatever, and the hero’s betrothed ” la belle Aude ” appears only in a casual gibe of her brother Oliver, and in the incident of her sudden death at the news of Roland’s fall. M. Leon Gautier and others have drawn the conclusion that this stern and masculine character was a feature of all the older chansons, and that imitation of the Arthurian romance is the cause of its disappearance. This seems rather a hasty inference. In Amis et Amiles, admittedly a poem of old date, the parts of Bellicent and Lubias are prominent, and the former is demonstrative enough. In Aliscans the part of the Countess Guibourc is both prominent and heroic, and is seconded by that of Queen Blancheflor and her daughter Aelis. We might also mention Oriabel in Jourdans de Blaivies and others. But it may be admitted that the sex which fights and counsels plays the principal part, that love adventures are not introduced at any great

length, and that the lady usually spares her knight the trouble and possible indignities of a long wooing. The characters of a chanson of the older style are somewhat uniform. There is the hero who is unjustly suspected of guilt or sore beset by Saracens, the heroine who falls in love with him, the traitor who accuses him or delays help, who is almost always of the lineage of Ganelon, and whose ways form a very curious study. There are friendly paladins and subordinate traitors; there is Charlemagne (who bears throughout the marks of the epic king common to Arthur and Agamemnon, but is not in the earlier chanson the incapable and venal dotard which he becomes in the later), and with Charlemagne generally the duke Naimes of Bavaria, the cne figure who is invariably wise, brave, loyal and generous. In a few chansons there is to be added to these a very interesting class of personages who, though of low birth or condition, yet rescue the high-born knights from their enemies. Such are Rainoart in Aliscans, Gautier in Gaydon, Robastre in Gaufrey, Varocher in Macaire. These subjects, uniform rather

than monotonous, are handled with great uniformity if not monotony of style. There are constant repetitions, and it some- times seems, and may sometimes be the case, that the text is a mere cento of different and repeated versions. But the verse is generally harmonious and often stately. The recurrent asson- ances of the endless tirade soon impress the ear with a grateful music, and occasionally, and far more frequently than might be thought, passages of high poetry, such as the magnificent Gram doel por la mort de Rollant, appear to diversify the course of the story. The most remarkable of the chansons are Roland, Aliscans, Gerard de Roussillon, Amiset Amiles, Raoul de Cambrai, Garin le Loherain and its sequel Les quatre Fils Aymon, Les Saisnes (recounting the war of Charlemagne with Witekind), and lastly, Le Chevalier au Cyg»e,which is not a single poem but a series, dealing with the earlier crusades. The most remarkable group is that centring round William of Orange, the historical or half- historical defender of the south of France against Mahommedan invasion. Almost all the chansons of this group, from the long- known Aliscans to the recently printed Chancon de Willame, are distinguished by an unwonted personality of interest, as well as by an intensified dose of the rugged and martial poetry which pervades the whole class. It is noteworthy that one chanson and one only, Floovant, deals with Merovingian times. But the chronology, geography, and historic facts of nearly all are, it is hardly necessary to say, mainly arbitrary.

Arthurian. Romances. — The second class of early French epics consists of the Arthurian cycle, the' Matiere de Bretagne, the earliest known compositions of which are at least a century junior to the

earliest chanson de geste, but which soon succeeded the chansons in popular favour, and obtained a vogue both wider and far more enduring. It is not easy to conceive a greater contrast in form, style, subject and sentiment than is presented by the two classes. In both the religious sentiment is prominent, but the religion of the chansons is of the simplest, not to say of the most savage character. To pray to God and to kill his enemies constitutes the whole duty of man. In the romances the mystical element becomes on the contrary prominent, and furnishes, in the Holy Grail, one of the most important features. In the Carlo- vingian knight the courtesy and clemency which we have learnt to associate with chivalry are almost entirely absent. The genlix her contradicts, jeers at, and execrates his sovereign and his fellows with the utmost freedom. He thinks nothing of strik- ing his corloise moullier so that the blood runs down her cler vis. If a servant or even an equal offends him, he will throw the offender into the fire, knock his brains out, or set his whiskers ablaze. The Arthurian knight is far more of the modern model in these respects. But his chief difference from his predecessor is undoubtedly in his amorous devotion to his beloved, who, if not morally superior to Bellicent, Floripas, Esclairmonde, and the other Carlovingian heroines, is somewhat less forward. Even in minute details the difference is strongly marked. The romances are in octosyllabic couplets or in prose, and their language is different from that of the chansons, and contains much fewer of the usual epic repetitions and stock phrases. A voluminous con- troversy has been held respecting the origin of these differences, and of the story or stories which were destined to receive such remarkable attention. Reference must be made to the article Arthurian Legend for the history of this controversy and for an account of its present state. This state, however, and all subsequent states, are likely to be rather dependent upon opinion than upon actual knowledge. From the point of view of the general historian of literature it may not be improper here to give a caution against the frequent use of the word ” proven ” in such matters. Very little in regard to early literature, except the literary value of the texts, is ever susceptible of proof; although things may be made more or less probable. What we are at present concerned with, however, is a body of verse and prose composed in the latter part of the 12th century and later. The earliest romances, the Saint Graal, the Quite du Saint Graal, Joseph d’Arimathie and Merlin bear the names of Walter Map and Robert de Borron. Artus and part at least of Lancelot du Lac (the whole of which has been by turns attributed and denied to

Walter Map) appear to be due to unknown authors. Tristan came later, and has a stronger mixture of Celtic tradition. At the same time as Walter Map, or a little later, Chr6tien (or Chrestien) de Troyes threw the legends of the Round Table into octosyllabic verse of a singularly spirited and picturesque character. The chief poems attributed to him are the Chevalier au Lyon (Sir Ewain of Wales), the Chevalier & la Charelte (one of the episodes of Lancelot), Eric et Enide, Tristan and Percivale. These poems, independently of their merit, which is great, had an extensive literary influence. They were translated by the German minnesingers, Wolfram von Eschenbach, Gottfried of Strassburg, and others. With the romances already referred to, which are mostly in prose, and which by recent authorities have been put later than the verse tales which used to be post- poned to them, Chretien's poems complete the early forms of the Arthurian story, and supply the matter of it as it is best known to English readers in Malory's book. Nor does that book, though far later than the original forms, convey a very false impression of the characteristics of the older romances. Indeed, the Arthurian knight, his character and adventures, are so much better known than the heroes of the Carlovingian chanson that there is less need to dwell upon them. They had, however, as has been already pointed out, great influence upon their rivals, and their comparative fertility of invention, the much larger number of their dramatis personae, and the greater variety of interests to which they appealed, sufficiently explain their increased popu- larity. The ordinary attractions of poetry are also more largely present in them than in the chansons; there is more description, more life, and less of the mere chronicle. They have been accused of relaxing morality, and there is perhaps some truth in the charge. But the change is after all one rather of manners than of morals, and what is lost in simplicity is gained in refinement. Boon de Mayence is a late chanson, and Lancelot du Lac is an early romance. But the two beautiful scenes, in the former between Doon and Kicolette, in the latter between Lancelot, Galahault, Guinevere, and the Lady of Malehaut, may be compared as instances of the attitude of the two classes of poets towards the same subject.

Romances of Antiquity. — There is yet a third class of early narrative poems, differing from the two former in subject, but agreeing, sometimes with one sometimes with the other in form. These are the classical romances — the Matiere de Rome — which are not much later than those of Charlemagne and Arthur. The chief subjects with which their authors busied themselves were the conquests of Alexander and the siege of Troy, though other classical stories come

in. The most remarkable of all is the romance of Alexandre by Lambert the Short and Alexander of Bernay. It has been said that the excellence of the twelve- syllabled verse used in this romance was the origin of the term alexandrine. The Trojan romances, on the other hand, are chiefly in octosyllabic verse, and the principal poem which treats of them is the Roman de Troie of Benoit de Sainte More. Both this poem and Alixandre are attributed to the last quarter of the 1 2th century. The authorities consulted for these poems were, as may be supposed, none of the best. Dares Phrygius, Dictys Cretensis, the pseudo-Callisthenes supplied most of them. But the inexhaustible invention of the trouveres themselves was the chief authority consulted. The adventures of Medea, the wanderings of Alexander, the Trojan horse, the story of Thebes, were quite sufficient to spur on to exertion the minds which had been accustomed to spin a chanson of some 10,000 lines out of a casual allusion in some preceding poem. It is needless to say that anachronisms did not disturb them. From first to last the writers of the chansons had not in the least troubled themselves with attention to any such matters. Charlemagne himself had his life and exploits accommodated to the need of every poet who treats of him, and the same is the case with the heroes of antiquity. Indeed, Alexander is made in many respects a proto- type of Charlemagne. He is regularly knighted, he has twelve peers, he holds tournaments, he has relations with Arthur, and comes in contact with fairies, he takes flights in the air, dives in the sea and so forth. There is perhaps more avowed imagination

in these classical stories than in either of the other divisions of French epic poetry. Some of their authors even confess to the practice of fiction, while the trouveres of the chansons invariably assert the historical character of their facts and personages, and the authors of the Arthurian romances at least start from facts vouched for, partly by national tradition, partly by the authority of religion and the church. The classical romances, however, are important in two different ways. In the first place, they connect the early literature of France, however loosely, and with links of however dubious authenticity, with the great history and literature of the past. They show a certain amount of scholar- ship in their authors, and in their hearers they show a capacity of taking an interest in subjects which are not merely those directly connected with the village or the tribe. The chansons de geste had shown the creative power and independent character of French literature. There is, at least about the earlier ones, nothing borrowed, traditional or scholarly. They smack of the soil, and they rank France among the very few countries which, in this matter of indigenous growth, have yielded more than folk- songs and fireside tales. The

Arthurian romances, less inde- pendent in origin, exhibit a wider range of view, a greater knowledge of human nature, and a more extensive command of the sources of poetical and romantic interest. The classical epics superadd the only ingredient necessary to an accomplished literature — that is to say, the knowledge of what has been done by other peoples and other literatures already, and the readiness to take advantage of the materials thus supplied.

Romans d'Avenlures. — These are the three earliest develop- ments of French literature on the great scale. They led, however, to a fourth, which, though later in date than all except their latest forms and far more loosely associated as a group, is so closely connected with them by literary and social considera- tions that it had best be mentioned here. This is the roman d'aventures, a title given to those almost avowedly fictitious poems which connect themselves, mainly and centrally, neither with French history, with the Round Table, nor with the heroes of antiquity. These began to be written in the 13th century, and continued until the prose form of fiction became generally pre- ferred. The later forms of the chansons de geste and the Arthurian poems might indeed be well called romans d'aventures them- selves. Ungues Capet, for instance, a chanson in form and class of subject, is certainly one of this latter kind in treatment; and there is a larger class of semi-Arthurian romance, which so to speak branches off from the main trunk. But for convenience sake the definition we have given is preferable. The style and subject of these romans d'aventures are naturally extremely various. Guillaume de Palerme deals with the adventures of a Sicilian prince who is befriended by a were- wolf; Le Roman de I'escoufle, with a heroine whose ring is carried off by a sparrow- hawk (escouflc), like Prince Camaralzaman's talisman; Guy of Warwick, with one of the most famous of imaginary heroes; Meraugis de PortUguez is a sort of branch or offshoot of the romances of the Round Table; Clcomades, the work of the trouvere Adenes le Roi, who also rehandled the old chanson subjects of Ogier and Berle aux grans pies, connects itself once more with the Arabian Nights as well as with Chaucer forwards in the introduction of a flying mechanical horse. There is, in short, no possibility of classifying their subjects. The habit of writing in gestes, or of necessarily connecting the new work with an older one, had ceased to be binding, and the instinct of fiction writing was free; yet those romans d'aventures do not rank quite as high in literary importance as the classes which preceded them. This under-valuation arises rather from a lack of originality and distinctness of savour than from any shortcomings in treatment. Their versification, usually octosyllabic, is pleasant enough; but there is not much distinctness of character about them, and their

incidents often strike the reader with something of the sameness, but seldom with much of the naivete, of those of the older poems. Nevertheless some of them attained to a very high popularity, such, for instance, as the Partenopex de Blois of Denis Pyramus, which has a motive drawn from the story of Cupid and Psyche and the charming Floire et Blanchefleur, giving the woes of a

Christian prince and a Saracen slave-girl. With them may be connected a certain number of early romances and fictions of various dates in prose, none of which can vie in charm with Aucassin et Nicolette (13th century), an exquisite literary pre- sentment of medieval sentiment in its most delightful form.

In these classes may be said to be summed up the literature of feudal chivalry in France. They were all, except perhaps the last, composed by one class of persons, the trouveres, and performed by another, the jongleurs. The latter, indeed, sometimes presumed to compose for himself, and was denounced as a troveor batard by the indignant members of the superior caste. They were all originally intended to be performed in the palais marberin of the baron to an audience of knights and ladies, and, when reading became more common, to be read by such persons. They dealt therefore chiefly, if not exclusively, with the class to whom they were addressed. The bourgeois and the villain, personages of political nonentity at the time of their early composition, come in for far slighter notice, although occasionally in the few curious instances we have mentioned, and others, persons of a class inferior to the seigneur play an important part. The habit of private wars and of insurrection against the sovereign supply the motives of the chanson de geste, the love of gallantry, adventure and foreign travel those of the romances Arthurian and miscellaneous. None of these motives much affected the lower classes, who were, with the early developed temper of the middle- and lower-class Frenchman, already apt to think and speak cynically enough of tournaments, courts, crusades and the other occupations of the nobility. The communal system was springing up, the towns were receiving royal encouragement as a counterpoise to the authority of the nobles. The corruptions and maladministration of the church

attracted the satire rather of the citizens and peasantry who suffered by them, than of the nobles who had less to fear and even something to gain. spread of q q ˆ ot he r hand, the gradual spread of learning, taste. inaccurate and ill-digested perhaps, but still learning,

not only opened up new classes of subjects, but opened them to new classes of persons. The thousands of students who flocked to the schools of Paris were not all princes or nobles. Hence there arose two new classes of literature, the first consisting of the embodiment of learning of one kind or other in the vulgar tongue. The other, one of the most remarkable developments of sportive literature which the world has seen, produced the second indigenous literary growth of which France can boast, namely, the fabliaux, and the almost more remarkable work which is an immense conglomerate of fabliaux, the great beast-epic of the Roman de Renart.

Fabliaux. — There are few literary products which have more originality and at the same time more diversity than the fabliau. The epic and the drama, even when they are independently produced, are similar in their main characteristics all the world over. But there is nothing in previous literature which exactly corresponds to the fabliau. It comes nearest to the Aesopic fable and its eastern origins or parallels. But differs from these in being less allegorical, less obviously moral (though a moral of some sort is usually if not always enforced), and in having a much more direct personal interest. It is in many degrees further removed from the parable, and many degrees nearer to the novel. The story is the first thing, the moral the second, and the latter is never suffered to interfere with the former. These observations apply only to the fabliaux, properly so called, but the term has been used with considerable looseness. The collectors of those interesting pieces, Barbazan, Meon, Le Grand d'Aussy, have included in their collections large numbers of miscellaneous pieces such as dits (rhymed descriptions of various objects, the most famous known author of which was Baudouin de Conde, 13th century), and debats (discussions between two persons or contrasts of the attributes of two things), sometimes even short romances, farces and mystery plays. Not that the fable proper — the prose classical beast-story of " Aesop "— ■ was neglected. Marie de France — the poetess to be mentioned again for her more strictly poetical work — is the most literary

of not a few writers who composed what were often, after the mysterious original poet, named Ysopets. Aesop, Phaedrus, Babrius were translated and imitated in Latin and in the verna- cular by this class of writer, and some of the best known of " fablers " date from

this time. The fabliau, on the other hand, according to the best definition of it yet achieved, is ” the recital, generally comic, of a real or possible incident occurring in ordinary human life.” The comedy, it may be added, is usually of a satiric kind, and occupies itself with every class and rank of men, from the king to the villain. There is no limit to the variety of these lively verse-tales, which are invariably written in eight-syllabled couplets. Now the subject is the mis-adventure of two Englishmen, whose ignorance of the French language makes them confuse donkey and lamb; now it is the fortunes of an exceedingly foolish knight, who has an amiable and ingenious mother-in-law; now the deserved sufferings of an avaricious or ill-behaved priest; now the bringing of an ungrateful son to a better mind by the wisdom of babes and sucklings. Not a few of the Canterbury Tales are taken directly from fabliaux; indeed, Chaucer, with the possible exception of Prior, is our nearest approach to a fabliau-writer. At the other end of Europe the prose novels of Boccaccio and other Italian tale-tellers are largely based upon fabliaux. But their influence in their own country was the greatest. They were the first expression of the spirit which has since animated the most national and popular developments of French literature. Simple and unpretending as they are in form, the fabliaux announce not merely the Cent Nouvelles Nouvelles and the Heptameron, L’Avocat Patelin, and Pantagruel, but also L’Avare and the Roman comique, Gil Bias and Candide. They indeed do more than merely prophesy the spirit of these great performances — they directly lead to them. The prose-tale and the farce are the direct outcomes of the fabliau, and the prose-tale and the farce once given, the novel and the comedy inevitably follow.

The special period of fabliau composition appears to have been the 12th and 13th centuries. It signifies on the one side the growth of a lighter and more sportive spirit than had social yet prevailed, on another the rise in importance of import- other and lower orders of men than the priest and the ance o/ noble, on yet another the consciousness on the part ” aux of these lower orders of the defects of the two privileged classes, and of the shortcomings of the system of polity under which these privileged classes enjoyed their privileges. There is, how- ever, in the fabliau proper not so very much of direct satire, this being indeed excluded by the definition given above, and by the thoroughly artistic spirit in which that definition is observed. The fabliaux are so numerous and so various that it is difficult to select any as specially representative. We may, however, mention, both as good examples and as interesting from their subsequent history, Le Vair Palfroi, treated in English by Leigh Hunt and by Peacock; Le Vilain Mire, the original consciously or unconsciously

followed in Le Medecin malgre lui; Le Roi d' Angleterre et le jongleur d'£li; La houce partie; Le Sot Chevalier, an indecorous but extremely amusing story; Les deux bordeors ribaus, a dialogue between two jongleurs of great literary interest, containing allusions to the chansons de geste and romances most in vogue; and Le vilain qui conquist paradis par plait, one of the numerous instances of what has unnecessarily puzzled moderns, the association in medieval times of sincere and unfeigned faith with extremely free handling of its objects. This lighthearted- ness in other subjects sometimes bubbled over into the fatrasie, an almost pure nonsense-piece, parent of the later amphigouri.

Roman de Renart. — If the fabliaux are not remarkable for direct satire, that element is supplied in more than compensat- ing quantity by an extraordinary composition which is closely related to them. Le Roman de Renart, or History of Reynard the Fox, is a poem, or rather series of poems, which, from the end of the 12th to the middle of the 14th century, served the citizen poets of northern France, not merely as an outlet for literary expression, but also as a vehicle of satirical comment, — now on the general vices and weaknesses of humanity, now on the usual corruptions in church and state, now on the various historical

events which occupied public attention from time to time. The enormous popularity of the subject is shown by the long vogue which it had, and by the empire which it exercised over genera- tions of writers who differed from each other widely in style and temper. Nothing can be farther from the allegorical erudition, the political diatribes and the sermonizing moralities of the authors of Renart le Contre-fait than the sly naivete of the writers of the earlier branches. Yet these and a long and unknown series of intermediate bards the fox-king pressed into his service, and it is scarcely too much to say that, during the two centuries of his reign, there was hardly a thought in the popular mind which, as it rose to the surface, did not find expression in an addition to the huge cycle of Renart.

We shall not deal with the controversies which have been raised as to the origin of the poem and its central idea. The latter may have been a travestie of real persons and actual events, or it may (and much more

probably) have been an expression of thoughts and experiences which recur in every generation. France, the Netherlands and Germany have contended for the honour of producing Renart; French, Flemish, German and Latin for the honour of first describing him. It is sufficient to say that the spirit of the work seems to be more that of the borderland between France and Flanders than of any other district, and that, wherever the idea may have originally arisen, it was incomparably more fruitful in France than in any other country. The French poems which we possess on the subject amount in all to nearly 100,000 lines, independently of mere variations, but including the different versions of Renart le Contre-fait. This vast total is divided into four different poems. The most ancient and remarkable is that edited by Meon under the title of Roman du Renart, and containing, with some additions made by M. Chabaille, 37 branches and about 32,000 lines. It must not, however, be supposed that this total forms a continuous poem like the Aeneid or Paradise Lost. Part was pretty certainly written by Pierre de Saint-Cloud, but he was not the author of the whole. On the contrary, the separate branches are the work of different authors, hardly any of whom are known, and, but for their community of subject and to some extent of treatment, might be regarded as separate poems. The history of Renart, his victories over Isengrim, the wolf, Bruin, the bear, and his other unfortunate rivals, his family affection, his outwittings of King Noble the Lion and all the rest, are too well known to need fresh description here. It is perhaps in the subsequent poems, though they are far less known and much less amusing, that the hold which the idea of Renart had obtained on the mind of northern France, and the ingenious uses to which it was put, are best shown. The first of these is Le Couronnement Renart, a poem of between 3000 and 4000 lines, attributed, on no grounds whatever, to the poetess Marie de France, and describing how the hero by his ingenuity got himself crowned king. This poem already shows signs of direct moral application and generalizing. These are still more apparent in Renart le Noavel, a composition of some 8000 lines, finished in the year 1288 by the Fleming Jacquemart Gielee. Here the personification, of which, in noticing the Roman de la rose, we shall soon have to give extended mention, becomes evident. Instead of or at least beside the lively personal Renart who used to steal sausages, set Isengrim fishing with his tail, or make use of Chanticleer's comb for a purpose for which it was certainly never intended, we have Renardie, an abstraction of guile and hypocrisy, triumphantly prevailing over other and better qualities. Lastly, as the Roman de la rose of William of Lords is paralleled by Renart le Nouvel, so its continuation by Jean de Meung is paralleled by the great miscellany of Renart le Contre-fait, which, even in its existing versions, extends to fully 50,000 lines.

Here we have, besides floods of miscellaneous erudition and discourse, political argument of the most direct and im- portant kind. The wrongs of the lower orders are bitterly urged. They are almost openly incited to revolt ; and it is scarcely too much to say, as M. Lenient has said, that the closely following Jacquerie is but a practical carrying out of the doctrines of the anonymous satirists of Renart le Contre-fait, one of whom (if

indeed there was more than one) appears to have been a clerk of Troyes.

Early Lyric Poetry. — Side by side with these two forms of literature, the epics and romances of the higher classes, and the fabliau, which, at least in its original, represented rather the feelings of the lower, there grew up a third kind, consisting of purely lyrical poetry. The song literature of medieval France is extremely abundant and beautiful. From the 12th to the 15th century it received constant accessions, some signed, some anonymous, some purely popular in their character, some the work of more learned writers, others again produced by members of the aristocracy. Of the latter class it may fairly be said that the catalogue of royal and noble authors boasts few if any names superior to those of Thibaut de Champagne, king of Navarre at the beginning of the 13th century, and Charles d'Orleans, the father of Louis XII., at the beginning of the 15th. Although much of this lyric poetry is anonymous, the more popular part of it almost entirely so, yet M. Paulin Paris was able to enumerate some hundreds of French chansonniers between the nth and the 13th century. The earliest song literature, chiefly known in the delightful collection of Bartsch (Altfranzosische Romanzen mid Pastourellen), is mainly sentimental in character. The collector divides it under the two heads of romances and pastourelles, the former being usually the celebration of the loves of a noble knight and maiden, and recounting how Belle Doette or Eglantine or Oriour sat at her windows or in the tourney gallery, or em- broidering silk and samite in her chamber, with her thoughts on Gerard or Guy or Henry, — the latter somewhat monotonous but naive and often picturesque recitals, very often in the first person, of the meeting of an errant knight or minstrel with a shepherdess, and his cavalier but not always successful wooing. With these, some of which date from the 12th century, may be contrasted, at the other end of the medieval period, the more varied and popular collection dating in their present form from the 15th century, and published in 1875 by M. Gaston Paris. In both alike, making allowance for the difference of their age and the state of the language, may be noticed a charming lyrical faculty and great skill in the elaboration of light and suitable metres. Especially remarkable is the

abundance of refrains of an admirably melodious kind. It is said that more than 500 of these exist. Among the lyric writers of these four centuries whose names are known may be mentioned Audefroi le Bastard (1 2th century) , the author of the charming song of Belle Idoine, and others no way inferior, Quesnes de Bethune, leBastard the ancestor of Sully, whose song-writing inclines to a satirical cast in many instances, the Vidame de Chartres, Charles d'Anjou, King John of Brienne, the chatelain de Coucy, Gace Brusle, Colin Muset, while not a few writers mentioned elsewhere — Guyot de Provins, Adam de la Halle, Jean Bodel and others — were also lyrists. But none of them, except perhaps Audefroi, can compare with Thibaut IV. (1 201-12 53), who united by his possessions and ancestry a connexion V"ct ut . with the north and the south, and who employed the pagne. methods of both districts but used the language of the north only. Thibaut was supposed to be the lover of Blanche of Castile, the mother of St Louis, and a great deal of his verse is concerned with his love for her. But while knights and nobles were thus employing lyric poetry in courtly and sentimental verse, lyric forms were being freely employed by others, both of high and low birth, for more general purposes. Blanche and Thibaut themselves came in for contemporary lampoons, and both at this time and in the times immediately following, a cloud of writers composed light verse, sometimes of a lyric sometimes of a narrative kind, and sometimes in a mixture of both. By far the most remarkable of these is Rutebceuf (a name which _ , is perhaps a nickname), the first of a long series of French poets to whom in recent days the title Bohemian has been applied, who passed their lives between gaiety and misery, and celebrated their lot in both conditions with copious verse. Rutebceuf is among the earliest French writers who tell us their personal history and make personal appeals. But he does not ' confine himself to these. He discusses the history of his times,

upbraids the nobles for their desertion of the Latin empire of Constantinople, considers the expediency of crusading, inveighs against the religious orders, and takes part in the disputes between the pope and the king. He composes pious poetry too, and in at least one poem takes care to distinguish between the church which he venerates and the corrupt churchmen whom he lampoons. Besides Rutebceuf the most characteristic figure of his class and time (about the middle of the 13 th century) is Adam de la Halle, commonly called the Hunchback fa Haifef °f Arras. The earlier poems of Adam are of a senti- mental character, the later ones satirical and somewhat ill-

tempered. Such, for instance, is his invective against his native city. But his chief importance consists in his jeux, the Jeu de lafeuillie, the Jeu de Robin et Marion, dramatic composi- tions which led the way to the regular dramatic form. Indeed the general tendency of the 13th century is to satire, fable and farce, even more than to serious or sentimental poetry. We should perhaps except the lais, the chief of which are known under the name of Marie de France. These lays are exclusively Breton in origin, though not in application, and the term seems originally to have had reference rather to the music to which they were sung than to the manner or matter of the pieces. Some resemblance to these lays may perhaps be traced in the genuine Breton songs published by M. Luzel. The subjects of the lais are indifferently taken from the Arthurian cycle, from ancient story, and from popular tradition, and, at any rate in Marie's hands, they give occasion for some passionate, and in the modern sense really romantic, poetry. The most famous of all is the Lay of the Honeysuckle, traditionally assigned to Sir Tristram.

Satiric and Didactic Works. — Among the direct satirists of the middle ages, one of the earliest and foremost is Guyot de Provins, a monk of Clairvaux and Cluny, whose Bible, as he calls it, contains an elaborate satire on the time (the beginning of the 13th century), and who was imitated by others, especially Hugues de B regy . The same spirit soon betrayed itself in curious travesties of the romances of chivalry, and sometimes invades the later specimens of these romances themselves. One of the earliest examples of this travesty is the remarkable composition entitled Audigier. This poem, half fabliau and half romance, is not so much an instance of the heroi-comic poems which after- wards found so much favour in Italy and elsewhere, as a direct and ferocious parody of the Carlovingian epic. The hero Audigier is a model of cowardice and disloyalty; his father and mother, Turgibus and Rainberge, are deformed and repulsive. The exploits of the hero himself are coarse and hideous failures, and the whole poem can only be taken as a counterblast to the spirit of chivalry. Elsewhere a trouvere, prophetic of Rabelais, describes a vast battle between all the nations of the world, the quarrel being suddenly atoned by the arrival of a holy man bearing a huge flagon of wine. Again, we have the history of a solemn crusade undertaken by the citizens of a country town against the neighbouring castle. As erudition and the fancy for allegory gained ground, satire naturally availed itself of the opportunity thus afforded if, the disputes of Philippe le Bel with the pope and the Templars had an immense literary influence, partly in the concluding portions of the Renart, partly in the Roman de la rose, still to be mentioned, and partly in other satiric allegories of which

the chief is the romance of Pauvel, attributed to Francois de Rues. The hero of this is an allegorical personage, half man and half horse, signifying the union of bestial degradation with human ingenuity and cunning. Fauvel (the name, it may be worth while to recall, occurs in Langland) is a divinity in his way. All the personages of state, from kings and popes to mendicant friars, pay their court to him.

But this serious and discontented spirit betrays itself also in compositions which are not parodies or travesties in form. One of the latest, if not absolutely the latest (for Baudouin Cuvelier's still later Chronique de Du Guesclin is only a Sebourc. most interesting imitation of the chanson form adapted to recent events) , of the chansons de geste is Baudouin de Sebourc, one of the members of the great romance or cycle of

romances dealing with the crusades, and entitled Le Chevalier au Cygne. Baudouin de Sebourc dates from the early years of the 14th century. It is strictly a chanson de geste in form, and also in the general run of its incidents. The hero is dispossessed of his inheritance by the agency of traitors, fights his battle with the world and its injustice, and at last prevails over his enemy Gaufrois, who has succeeded in obtaining the kingdom of Fries- land and almost that of France. Gaufrois has as his assistants two personages who were very popular in the poetry of the time,— viz., the Devil, and Money. These two sinister figures pervade the fabliaux, tales and fantastic literature generally of the time. M. Lenient, the historian of French satire, has well remarked that a romance as long as the Renart might be spun out of the separate short poems of this period which have the Devil for hero, and many of which form a very interesting transition between the fabliau and the mystery. But the Devil is in one respect a far inferior hero to Renart. He has an adversary in the Virgin, who constantly upsets his best-laid schemes, and who does not always treat him quite fairly. The abuse of usury at the time, and the exactions of the Jews and Lombards, were severely felt, and Money itself, as personified, figures largely in the popular literature of the time.

Roman de la Rose. — A work of very different importance from all of these, though with seeming touches of the same spirit, a work which deserves to take rank among the most important of the middle ages, is the Roman de la rose, £ 0rr fe, — one of the few really remarkable books which is the work of two authors, and that not in collaboration but in continuation one of the other. The author of the earlier part was Guillaume de Lorris, who lived in the first half of the 13th century; the author of the later part was Jean de Meung, who was born about the middle of that century, and whose part in the Roman

dates at least from its extreme end. This great poem exhibits in its two parts very different characteristics, which yet go to make up a not inharmonious whole. It is a love poem, and yet it is satire. But both gallantry and raillery are treated in an entirely allegorical spirit; and this allegory, while it makes the poem tedious to hasty appetites of to-day, was exactly what gave it its charm in the eyes of the middle ages. ” It might be described as an Ars amoris crossed with a Quodlibeta. This mixture exactly hit the taste of the time, and continued to hit it for two centuries and a half. When its obvious and gallant meaning was attacked by moralists and theologians, it was easy to quote the example of the Canticles, and to furnish esoteric explanations of the allegory. The writers of the 16th century were never tired of quoting and explaining it. Antoine de Baif, indeed, gave the simple and obvious meaning, and declared that ” La rose c’est d’amours le guerdon gracieux “; but Marot, on the other hand, gives us the choice of four mystical interpretations, — the rose being either the state of wisdom, the state of grace, the state of eternal happiness or the Virgin herself. We cannot here analyse this celebrated poem. It is sufficient to say that the lover meets all sorts of obstacles in his pursuit of the rose, though he has for a guide the metaphorical personage Bel-Accueil. The early part, which belongs to William of Lorris, is remarkable for its gracious and fanciful descriptions. Forty years after Lorris’s jeaB rfe death, Jean de Meung completed it in an entirely Meuag. different spirit. He keeps the allegorical form, and indeed introduces two new personages of importance, Nature and Faux-semblant. In the mouths of these personages and of another, Raison, he puts the most extraordinary mixture of erudition and satire. At one time we have the history of classical heroes, at another theories against the hoarding of money, about astronomy, about the duty of mankind to increase and multiply. Accounts of the origin of loyalty, which would have cost the poet his head at some periods of history, and even communistic ideas, are also to be found here. In Faux-semblant we have a real creation of the theatrical hypocrite. All this miscellaneous and apparently incongruous material in fact explains the success of the poem. It has the one characteristic which has at all times secured the popularity of great works of literature. It holds the mirror up firmly and fully to its age. As we find in Rabelais

the characteristics of the Renaissance, in Montaigne those of the

sceptical reaction from Renaissance and reform alike, in Moliere those of the society of France after Richelieu had tamed and levelled it, in Voltaire and Rousseau respectively the two aspects of the great revolt, — so there are to be found in the Roman de la rose the characteristics of the later middle age, its gallantry, its mysticism, its economical and social troubles and problems, its scholastic methods of thought, its naive acceptance as science of everything that is written, and at the same time its shrewd and indiscriminate criticism of much that the age of criticism has accepted without doubt or question. The Roman de la rose, as might be supposed, set the example of an immense literature of allegorical poetry, which flourished more and more until the Renaissance. Some of these poems we have already mentioned, some will have to be considered under the head of the 15th century. But, as usually happens in such cases and was certain to happen in this case, the allegory which has seemed tedious to many, even in the original, became almost intolerable in the majority of the imitations.

We have observed that, at least in the later section of the Roman de la rose, there is observable a tendency to import into the poem indiscriminate erudition. This tendency is B **? y .. now remote from our poetical habits; but in its own verse. ˆay '**- was on ' v tne natural result of the use of poetry for all literary purposes. It was many centuries before prose became recognized as the proper vehicle for instruc- tion, and at a very early date verse was used as well for educa- tional and moral as for recreative and artistic purposes. French verse was the first born of all literary mediums in modern Euro- pean speech, and the resources of ancient learning were certainly not less accessible in France than in any other country. Dante, in his De vidgari eloquio, acknowledges the excellence of the didactic writers of the Langue d'Oil. We have already alluded to the Bestiary of Philippe de Thaun, a Norman trouvere who lived and wrote in England during the reign of Henry Beauclerc. Besides the Bestiary, which from its dedication to Queen Adela has been conjectured to belong to the third decade of the 12th century, Philippe wrote also in French a Liber de creaturis, both works being translated from the Latin. These works of mystical and apocryphal physics and zoology became extremely popular in the succeeding centuries, and were frequently imitated. A moralizing turn was also given to them, which was much helped by the importation of several miscellanies of Oriental origin, partly tales, partly didactic in character, the most cele- brated of which is the Roman des sept sages, which, under that title and the variant of Dolopalhos, received repeated treatment from French writers both in prose and verse. The odd notion of an Chide moralise used to be ascribed to Philippe de Vitry, bishop of Meaux (i2oi?i3oi?), a person

complimented by Petrarch, but is now assigned to a certain Chretien Legonais. Art, too, soon demanded exposition in verse, as well as science. The favourite pastime of the chase was repeatedly dealt with, notably in the Roi Modus (1325), mixed prose and verse; the Deduits de la chasse (1387), of Gaston de Foix, prose; and the Tresor de Venerie of Hardouin (1394), verse. Very soon didactic verse extended itself to all the arts and sciences. Vegetius and his military precepts had found a home in French octosyllables as early as the 12th century; the end of the same age saw the ceremonies of knighthood solemnly versified, and napes (maps) du monde also soon appeared. At last, in 1245, Gautier of Metz translated from various Latin works into French verse a sort of encyclopaedia, while another, incongruous but known as Vintage du monde, exists from the same century. Profane knowledge was not the only subject which exercised didactic poets at this time. Religious handbooks and commentaries on the scriptures were common in the 13th and following centuries, and, under the title of Castoiements, Enseignements and Doctri naux, moral treatises became common. The most famous of these, the Casloiement d'un pere a. son fils, falls under the class, already mentioned, of works due to oriental influence, being derived from the Indian Panchatantra. In the 14th century the influence of the Roman de la rose helped to render moral verse

frequent and popular. The same century, moreover, which witnessed these developments of well-intentioned if not always judicious erudition witnessed also a considerable change in lyrical poetry. Hitherto such poetry had chiefly Artificial been composed in the melodious but unconstrained verse. forms of the romance and the pastourelle. In the 14th century the writers of northern France subjected themselves to severer rules. In this age arose the forms which for so long a time were to occupy French singers, — the ballade, the rondeau, the rondel, the triolet, the chant royal and others. These received considerable alterations as time went on. We possess not a few Artes poeticae, such as that of Eustache Deschamps at the end of the 14th century, that formerly ascribed to Henri de Croy and now to Molinet at the end of the 15th, and that of Thomas Sibilet in the 16th, giving particulars of them, and these particulars show considerable changes. Thus the term rondeau, which since Villon has been chiefly limited to a poem of 15 lines, where the 9th and 15th repeat the first words of the first, was originally applied both to the rondel, a poem of 13 or 14 lines, where the first two are twice repeated integrally, and to the triolet, one of 8 only, where the first line occurs three times and the second twice. The last is an especially popular metre, and is found where we should least expect it, in the

dialogue of the early farces, the speakers making up triolets between them. As these three forms are closely connected, so are the ballade and the chant royal, the latter being an extended and more stately and difficult version of the former, and the characteristic of both being the identity of rhyme and refrain in the several stanzas. It is quite uncertain at what time these fashions were first cultivated, but the earliest poets who appear to have prac- tised them extensively were born at the close of the 13th and the beginning of the 14th centuries. Of these Guillaume de Machault (c. 1300-1380) is the oldest. He has left us 80,000 verses, never yet completely printed. Eustache Deschamps (c. 1340- c. 1410) was nearly as prolific, but more fortunate as more meritorious, the Societ6 des anciens Textes having at last provided a complete edition of him. Froissart the historian (1333-1410) was also an agreeable and prolific poet. Deschamps, the most famous as a poet of the three, has left us nearly 1200 ballades and nearly 200 rondeaux, besides much other verse all manifest- ing very considerable poetical powers. Less known but not less noteworthy, and perhaps the earliest of all, is Jehannot de Lescurel, whose personality is obscure, and most of whose works are lost, but whose remains are full of grace. Froissart appears to have had many countrymen in Hainault and Brabant who devoted themselves to the art of versification; and the Livre des cent ballades of the Marshal Boucicault (1366-1421) and his friends — c. 1390 — shows that the French gentleman of the 14th century was as apt at the ballade as his Elizabethan peer in England was at the sonnet.

Early Drama. — Before passing to the prose writers of the middle ages, we have to take some notice of the dramatic productions of those times — productions of an ex- tremely interesting character, but, like the immense Mysteries majority of medieval literature, poetic in form. The m / rac / es . origin or the revival of dramatic composition in France has been hotly debated, and it has been sometimes contended that the tradition of Latin comedy was never entirely lost, but was handed on chiefly in the convents by adaptations of the Terentian plays, such as those of the nun Hroswitha. There is no doubt that the mysteries (subjects taken from the sacred writings) and miracle plays (subjects taken from the legends of the saints and the Virgin) are of very early date. The mystery of the Foolish Virgins (partly French, partly Latin), that of Adam and perhaps that of Daniel, are of the 12th century, though due to unknown authors. Jean Bodel and Ruteboeuf, already mentioned, gave, the one that of Saint Nicolas at the confines of the 12th and 13th, the other that of Theophile later in the 13th itself. But the later moralities, soties, and farces seem to be also in part a very probable development of the simpler and earlier

forms of the fabliau and of the tenson or jeu- parti, a poem in simple dialogue much used by both troubadours

and trouveres. The fabliau has been sufficiently dealt with already. It chiefly supplied the subject; and some miracle- plays and farces are little more than fabliaux thrown into dialogue. Of the jeux-partis there are many examples, varying from very simple questions and answers to something like regular dramatic dialogue; even short romances, such as Aucassin et Nicolette, were easily susceptible of dramatization. But the Jeu de la feuillie (or feuillSe) of Adam de la Halle seems to be the earliest piece, profane in subject, containing something more than mere dialogue. The poet has not indeed gone far for his subject, for he brings in his own wife, father and friends, the interest being complicated by the introduction of stock characters (the doctor, the monk, the fool), and of certainfairies — personages already popular from the later romances of chivalry. Another piece of Adam's, Le Jeu de Robin el Marion, also already alluded to, is little more than a simple throwing into action of an ordinary pastourelle with a considerable number of songs to music. Never- theless later criticism has seen, and not unreasonably, in these two pieces the origin in the one case of farce, and thus indirectly of comedy proper, in the other of comic opera.

For a long time, however, the mystery and miracle-plays remained the staple of theatrical performance, and until the 13th century actors as well as performers were more or less taken from the clergy. It has, indeed, been well pointed out that the offices of the church were themselves dramatic performances, and required little more than development at the hands of the mystery writers. The occasional festive outbursts, such as the Feast of Fools, that of the Boy Bishop and the rest, helped on the development. The variety of mysteries and miracles was very great. A single manuscript contains forty miracles of the Virgin, averaging from 1200 to 1500 lines each, written in octo- syllabic couplets, and at least as old as the 14th century, most of them perhaps much earlier. The mysteries proper, or plays taken from the scriptures, are older still. Many of these are exceedingly long. There is a Mystere de I'Ancien Testament, which extends to many volumes, and must have taken weeks to act in its entirety. The Mystere de la Passion, though not quite so long, took several days, and recounts the

whole history of the gospels. The best apparently of the authors of these pieces, which are mostly anonymous, were two brothers, Arnoul and Simon Greban (authors of the Actes des apdlres, and in the – first case of the Passion), c. 1450, while a certain Jean Michel (d. 1493) is credited with having continued the Passion from 30,000 lines to 50,000. But these performances, though they held their ground until the middle of the 16th century and extended their range of subject from sacred to profane history — legendary as in the Destruction de Troie, contemporary as in the Siege d'Orleans — were soon rivalled by the more profane performances of the moralities, the farces and the soties. The palmy time of all these three kinds is the 15th century, while the Confrerie de la Passion itself, the special performers of the sacred drama, only obtained the licence constituting it by an ordinance of Charles VI. in 1402. In order, however, to take in the whole of the medieval theatre at a glance, we may anticipate a little. The Confraternity was not itself the author or performer of the profaner kind of dramatic perform- ance. This latter was due to two other bodies, the clerks of the Bazoche and the Enfans sans Souci. As the Confraternity was chiefly composed of tradesmen and persons very similar to Peter Quince and his associates, so the clerks of the Bazoche were members of the legal profession of Paris, and the Enfans sans Souci were mostly young men of family. The morality was the special property of the first, the sotie of the second. But as the moralities were sometimes decidedly tedious plays, though by no means brief, they were varied by the introduction of farces, of which the jeux already mentioned were the early germ, and of which L'Avocat Patelin, dated by some about 1465 and certainly about 200 years subsequent to Adam de la Halle, is the most famous example.

The morality was the natural result on the stage of the immense literary popularity of allegory in the Roman de la rose and its imitations. There is hardly an abstraction, a virtue, a vice, a

Profane drama.

Soties.

disease, or anything else of the kind, which does not figure in these compositions. There is Bien Advis6 and Mai Advise, the good boy and the bad boy of nursery stories, who fall in respectively with Faith, Reason and Humility, and with Rashness, Luxury and Folly. There is the hero Mange- Tout, who is invited to dinner by Banquet, and meets after dinner very unpleasant company in Colique, Goutte and Hydro-pisie. Honte-de-dire-ses-Peches might seem an anticipation of Puritan nomenclature to an English reader who did not re- member the

contemporary or even earlier personae of Langland's poem. Some of these moralities possess distinct dramatic merit; among these is mentioned Les Blasphemateurs, an early and re- markable presentation of the Don Juan story. But their general character appears to be gravity, not to say dullness. The Enfans sans Souci, on the other hand, were definitely satirical, and nothing if not amusing. The chief of the society was entitled Prince des Sots, and his crown was a hood decorated with asses' ears. The sotie was directly satirical, and only assumed the guise of folly as a stalking-horse for shooting wit. It was more Aristophanic than any other modern form of comedy, and like its predecessor, it perished as a result of its political application. Encouraged for a moment as a political engine at the beginning of the 16th century, it was soon absolutely forbidden and put down, and had to give place in one direction to the lampoon and the prose pamphlet, in another to forms of comic satire more general and vague in their scope. The farce, on the other hand, having neither moral purpose nor political intention, was a purer work of art, enjoyed a wider range of sub- ject, and was in no danger of any permanent extinction. Farcical interludes were interpolated in the mysteries themselves; short farces introduced and rendered palatable the moralities, while the sotie was itself but a variety of farce, and all the kinds were sometimes combined in a sort of tetralogy. It was a short composition, 500 verses being considered sufficient, while the morality might run to at least 1000 verses, the miracle-play to nearly double that number, and the mystery to some 40,000 or 50,000, or indeed to any length that the author could find in his heart to bestow upon the audience, or the audience in their patience to suffer from the author. The number of persons and societies who acted these performances grew to be very large, being estimated at more than 5000 towards the end of the 15th century. Many fantastic personages came to join the Prince des Sots, such as the Empereur de Galilee, the Princes de l'Etrille, and des Nouveaux Maries, the Roi de l'Epinette, the Recteur des Fous. Of the pieces which these societies represented one only, that of Maitre Patelin, is now much known; but many are almost equally amusing. Patelin itself has an immense number of versions and editions. Other farces are too numerous to attempt to classify; they bear, however, in their subjects, as in their manner, a remarkable resemblance to the fabliaux, their source. Conjugal disagreements, the unpleasantness of mothers-in-law, the shifty or, in the earlier stages, clumsy valet and chambermaid, the mishaps of too loosely given ecclesiastics, the abuses of relics and pardons, the extortion, violence, and sometimes cowardice of the seigneur and the soldiery, the cor- ruption of justice, its delays and its pompous apparatus, supply the subjects. The treatment is rather narrative than

dramatic in most cases, as might be expected, but makes up by the liveli- ness of the dialogue for the deficiency of elaborately planned action and interest. All these forms, it will be observed, are directly or indirectly comic. Tragedy in the middle ages is represented only by the religious drama, except for a brief period towards the decline of that form, when the ” profane ” mysteries referred to above came to be represented. These were, however, rather ” histories,” in the Elizabethan sense, than tragedies proper.

Prose History. — In France, as in all other countries of whose literary developments we have any record, literature in prose is considerably later than literature in verse. We have certain glosses or vocabularies possibly dating as far J^^g, back as the 8th or even the 7th century; we have the 1 Strassburg oaths, already described, of the 9th, and a commentary

on the prophet Jonas which is probably as early. In the 10th century there are some charters and muniments in the verna- cular; of the nth the laws of William the Conqueror are the most important document; while the Assises de Jerusalem of Godfrey of Bouillon date, though not in the form in which we now possess them, from the same age. The 12th century gives us certain translations of the Scriptures, and the remarkable Arthurian romances already alluded to; and thenceforward French prose, though long less favoured than verse, begins to grow in importance. History, as is natural, was the first subject which gave it a really satisfactory opportunity of developing its powers. For a time the French chroniclers contented themselves with Latin prose or with French verse, after the fashion of Wace and the Belgian, Philippe Mouskes (1215-1283). These, after a fashion universal in medieval times, began from fabulous or merely literary _origins, and just as Wyntoun later carries back the history of Scotland to the terrestrial paradise, so does Mouskes start that of France from the rape of Helen. But soon prose chronicles, first translated, then original, became common; the earliest of all is said to have been that of the pseudo-Turpin, which thus recovered in prose the language which had originally clothed it in verse, and which, to gain a false appearance of authenticity, it had exchanged still earlier for Latin. Then came French selections and versions from the great series of historical compositions undertaken by the monks of St Denys, the so-called Grandes

Chroniques de France from the date of 1274, when they first took form in the hands of a monk styled Primat, to the reign of Charles V.,‘when they assumed the title just given. But the first really remarkable author who used French prose as a vehicle of historical expression is Geoffroi de Villehardouin, marshal of Champagne, who was born rather after the middle of the 12th century, and died in Greece in 121 2. Under the title of Conquiie de Conslantinoble Villehardouin has left us a history hard’oula °^ tne I0urt h crusade, which has been accepted by all competent judges as the best picture extant of feudal chivalry in its prime. The ConquUe de Constantinoble has been well called a chanson de geste in prose, and indeed in the sur- prising nature of the feats it celebrates, in the abundance of detail, and in the vivid and picturesque poetry of the narration, it equals the very best of the chansons. Even the repetition of the same phrases which is characteristic of epic poetry repeats itself in this epic prose; and as in the chansons so in Villehardouin, few motives appear but religious fervour and the love of fighting, though neither of these excludes a lively appetite for booty and a constant tendency to disunion and disorder. Villehardouin was continued by Henri de Valenciennes, whose work is less remarkable, and has more the appearance of a rhymed chronicle thrown into prose, a process which is known to have been actually applied in some cases. Nor is the transition from Villehardouin to Jean de Joinville (considerable in point of time, for Joinville was not born till ten years after Villehardouin’s death) in point of literary history immediate. The rhymed chronicles of Philippe Mouskes and Guillaume Guiart belong to this interval; and in prose the most remarkable works are the Chronique de Reims, a well-written history, having the interesting characteristics of taking the lay and popular side, and the great compilation edited (in the modern sense) by Baudouin d’Avesnes (1213-1289). Joinville (? 1224-1317), whose special subject is the Life of St Louis, is far more modern than even the half-century which separates him from Villehardouin would lead us to suppose. There is nothing of the knight- errant about him personally, notwithstanding his devotion to his hero. Our Lady of the Broken Lances is far from being his favourite saint. He is an admirable writer, but far less simple than Villehardouin; the good King Louis tries in vain to make him share his own rather high-flown devotion. Joinville is shrewd, practical, there is even a touch of the Voltairean about him; but he, unlike his predecessor, has political ideas and antiquarian curiosity, and his descriptions are often very creditable pieces of deliberate literature.

It is very remarkable that each of the three last centuries of feudalism

should have had one specially and extraordinarily

Johtvllk.

Frolssari.

gifted chronicler to describe it. What Villehardouin is to the 12th and Joinville to the 13th century, that Jean Froissart (1337-14 10) is to the 14th. His picture is the most famous as it is the most varied of the three, but it has special drawbacks as well as special merits. French critics have indeed been scarcely fair to Froissart, because of his early partiality to our own nation in the great quarrel of the time, forgetting that there was really no reason why he as a Hainaulter should take the French side. But there is no doubt that if the duty of an historian is to take in all the political problems of his time, Froissart certainly comes short of it. Although the feudal state in which knights and churchmen were alone of estimation was at the point of death, and though new orders of society were becoming important, though the distress and confusion of a transition state were evident to all, Froissart takes no notice of them. Society is still to him all knights and ladies, tournaments, skirmishes and feasts. He depicts these, not like Joinville, still less like Villehardouin, as a sharer in them, but with the facile and picturesque pen of a sympathizing literary onlooker. As the comparison of the ConquUe de Constantinoble with a chanson de geste is inevitable, so is that of Froissart's Chronique with a roman d'aventures.

For Provencal Literature see the separate article under that heading.

15th Century. — The 15th century holds a peculiar and some- what disputed position in the history of French literature, as, indeed, it does in the history of the literature of all Europe, except Italy. It has sometimes been regarded as the final stage of the medieval period, sometimes as the earliest of the modern, the influence of the Renaissance in Italy already filtering through. Others again have taken the easy step of marking it as an age of transition. There is as usual truth in all these views. Feudality died with Froissart and Eustache Deschamps. The modern spirit can hardly be said to arise before Rabelais and Ronsard. Yet the 15th century, from the point of view of French literature, is much more remarkable than its historians have been wont to confess. It has not the strongly marked and compact originality of some periods, and it furnishes only one name of the highest order of literary interest; but it abounds in names of the second rank, and the very difference which exists between their styles and characters testifies to the existence of a large number of separate

forces working in their different manners on different persons. Its theatre we have already treated by anticipation, and to it we shall afterwards recur. It was the palmy time of the early French stage, and all the dramatic styles" which we have enumerated then came to perfection. Of no other kind of literature can the same be said. The century which witnessed the invention of printing naturally devoted itself at first more to the spreading of old literature than to the production of new. Yet as it perfected the early drama, so it produced the prose tale. Nor, as regards individual and single names, can the century of Charles d'Orleans, of Alain Chartier, of Christine de Pisan, of Coquillart, of Comines, and, above all, of Villon, be said to lack illustrations.

First among the poets of the period falls to be mentioned the shadowy personality of Olivier Basselin. Modern criticism has attacked the identity of the jovial miller, who was once supposed to have written and perhaps 4 e pi saa . invented the songs called vaux de vire, and to have also carried on a patriotic warfare against the English. But though Jean le Houx may have written the poems published under Basselin's name two centuries later, it is taken as certain that an actual Olivier wrote actual vaux de vire at the beginning of the 15th century. About Christine de Pisan (1363-1430) and Alain Chartier (1392-c. 1430) there is no such doubt. Christine was the daughter of an Italian astrologer who was patronized by Charles V. She was born in Italy but brought up in France, and she enriched the literature of her adopted country with much learning, good sense and patriotism. She Chartier. wrote history, devotional works and poetry; and though her literary merit is not of the highest, it is very far from despicable. Alain Chartier, best known to modern readers by

the story of Margaret of Scotland's Kiss, was a writer of a some- what similar character. In both Christine and Chartier there is a great deal of rather heavy moralizing, and a great deal of rather pedantic erudition. But it is only fair to remember that the intolerable political and social evils of the day called for a good deal of moralizing, and that it was the function of the writers of this time to fill up as well as they could the scantily filled vessels of medieval science and learning.

A very different person is Charles d'Orleans (1391-1465), one of the d'OrUaas. g reatest – of grands seigneurs, for he was the father of a king of France, and heir to the duchies of Orleans and Milan. Charles, indeed, if not a Roland or a Bayard, was an admirable poet. He is the best-known and perhaps the best writer of the graceful poems in which an artificial versification is strictly observed, and helps by its recurrent lines and modulated rhymes to give to poetry something of a musical accompaniment even without the addition of music properly so called. His ballades are certainly inferior to those of Villon, but his rondels are un- equalled. For fully a century and a half these forms engrossed the attention of French lyrical poets. Exercises in them were produced in enormous numbers, and of an excellence which has only recently obtained full recognition even in France. Charles d'Orleans is himself sufficient proof of what can be done in them in the way of elegance, sweetness, and grace which some have unjustly called effeminacy. But that this effeminacy was no natural or inevitable fault of the ballades and the rondeaux was fully proved by the most remarkable literary figure of the 15th century in France. To Francois Villon (1431-1463 ?), as to other great single writers, no attempt can be made to do justice in this place. His remarkable life and character especially lie outside our subject. But he is universally recognized as the most important single figure of French literature before the Renaissance. His work is very strange in form, the undoubtedly genuine part of it consisting merely of two compositions, known as the great and little Testament, written in stanzas of eight lines of eight syllables each, with lyrical compositions in ballade and rondeau form interspersed. Nothing in old French literature can compare with the best of these, such as the " Ballade des dames du temps jadis," the " Ballade pour sa mere," " La Grosse Margot," " Les Regrets de la belle Heaulmiere," and others; while the whole composition is full of poetical traits of the most extra- ordinary vigour, picturesqueness and pathos. Towards the end of the cen,tury the poetical production of the time became very large. The artificial measures already alluded to, and others far more artificial and infinitely less beautiful, were largely practised. The typical poet of the end of the 15th century is Guillaume Cretin (d. 1525), who distinguished himself by writing verses with punning rhymes, verses ending with double or treble repetitionsofthesame sound, andmany other tasteless absurdities, in which, as Pasquier remarks, " il perdit toute la grace et la liberte de la composition." The other favourite direction of the poetry of the time was a vein of allegorical moralizing drawn from the Roman de la rose through the medium of Chartier and Christine, which produced " Castles of Love," " Temples of Honour,"and such like. The combination of these drifts in verse-writing produced a school known

in literary history, from a happy phrase of the satirist Coquillart (fj. »(/.), as the “GrandsRhetoriqueurs.” The chief of these besides Cretin were Jean Molinet (d. 1507); Jean Meschinot (c. 1420- 1401), author of the Lunettes des princes; Florimond Robertet (d. 1522); Georges Chastellain (1404-1475), to be mentioned again; and Octavien de Saint-Gelais (1466-1502), father of a better poet than himself. Yet some of the minor poets of the time are not to be despised. Such are Henri Baude (1430-1400), a less pedantic writer than most, Martial d’Auvergne (1440-1508), whose principal work is L’Amant rendu cordelier au ‘service de Vamour, and others, many of whom formed part of the poetical court which Charles d’Orleans kept up at Blois after his release. While the serious poetry of the age took this turn, there was no lack of lighter and satirical verse. Villon, indeed, were it not for the depth and pathos of his poetical sentiment, might

Cretin.

be claimed as a poet of the lighter order, and the patriotic diatribes against the English to which we have alluded easily passed into satire. The political quarrels of the latter part of the century also provoked much satirical composition. The disputes of the Bien Public and those between Louis XI. and Charles of Burgundy employed many pens. The most remark- able piece of the light literature of the first is ” Les Anes Volants,” a ballad on some of the early favourites of Louis. The battles of France and Burgundy were waged on paper between Gilles des Ormes and the above-named Georges Chastelain, typical representatives of the two styles of 15th-century poetry already alluded to — Des Ormes being the lighter and more graceful writer, Chastelain a pompous and learned allegorist. The most remarkable representative of purely light poetry outside the theatre is Guillaume Coquillart (1421-1510), a lawyer of Champagne, who resided for the greater part of his ^” life in Reims. This city, like others, suffered from the pitiless tyranny of Louis XL The beginnings of the standing army which Charles VII. had started were extremely unpopular, and the use to which his son put them by no means removed this unpopularity. Coquillart described the military man of the period in his Monologue du gendarme casse. Again, when the king entertained the idea of unifying the taxes and laws of the different provinces, Coquillart, who was named commissioner for this purpose, wrote on the occasion a satire called Les Droits nouveaux. A certain kind of satire, much less good-tempered than the earlier forms, became indeed common at this epoch. M. Lenient has well pointed out that a new satirical personifica- tion dominates this literature. It is no longer Renart with his cynical gaiety, or the curiously travestied and almost amiable Devil of the Middle Ages. Now it is Death as an incident ever present

to the imagination, celebrated in the thousand repetitions of the Danse Macabre, sculptured all over the buildings of the time, even frequently performed on holidays and in public. With the usual tendency to follow pattern, the idea of the ” dance ” seems to have been extended, and we have a Danse aux aveugles (1464) from Pierre Michaut, where the teachers are fortune, love and death, all blind. All through the century, too, anony- mous verse of the lighter kind was written, some of it of great merit. The folk-songs already alluded to, published by Gaston Paris, show one side of this composition, and many of the pieces contained in M. de Montaiglon’s extensive Recueil des anciennes poesies franQaises exhibit others.

The 1 5th century was perhaps more remarkable for its achieve- ments in prose than in poetry. It produced, indeed, no prose writer of great distinction, except Comines; but it witnessed serious, if not extremely successful, efforts at prose composition. The invention of printing finally substituted the reader for the listener, and when this substitution has been effected, the main inducement to treat unsuitable subjects in verse is gone. The study of the classics at first hand contributed to the same end. As early as 1458 the university of Paris had a Greek professor. But long before this time translations in prose had been made. Pierre Bercheure (Bersuire) (1200-1352) had already translated Livy. Nicholas Oresme (c. 1334-1382), the tutor of Charles V., gave a version of certain Aristotelian works, which enriched the language with a large number of terms, then strange enough, now familiar. Raoul de Presles (13 16-1383) turned into French the De civitate Dei of St Augustine. These writers or others composed Le Songe du vergier, an elaborate discussion of the power of the pope. The famous chancellor, Jean Charlier or Gerson (1363-1429), to whom the Imitation has among so many others been attributed, spoke, constantly and wrote often in the vulgar tongue, though he attacked the most famous and popular work in that tongue, the Roman de la rose. Christine de Pisan .and Alain Chartier were at least as much prose writers as poets; and the latter, while he, like Gerson, dealt much with the reform of the church, used in his Quadriloge invectif really forcible language for the purpose of spurring on the nobles of France to put an end to her sufferings and evils. These moral and didactic treatises were but continuations of others, which for convenience sake we have hitherto left unnoticed. Though

sermon writers.

verse was in the centuries prior to the 1 5th the favourite medium for literary composition, it was by no means the only one; and moral and educational treatises — some referred toabove — already existed in pedestrian phrase. Certain household books (Livres de raison) have been preserved, some of which date as far back as the 13th century. These contain not merely accounts, but family chronicles, receipts and the like. Accounts of travel, especially to the Holy Land, culminated in the famous Voyage of Mandeville which, though it has never been of so much import- ance in French as in English, perhaps first took vernacular form in the French tongue. Of the 14th century, we have a Menagier de Paris, intended for the instruction of a young wife, and a large number of miscellaneous treatises of art, science and morality, while private letters, mostly as yet unpublished, exist in considerable numbers, and are generally of the moralizing character; books of devotion, too, are naturally frequent.

But the most important divisions of medieval energy in prose composition are the spoken exercises of the pulpit and the bar. The beginnings of French sermons have been much B”1y discussed, especially the question whether St Bernard,

whose discourses we possess in ancient, but doubtfully contemporary French, pronounced them in that language or in Latin. Towards the end of the 12th century, however, the sermons of Maurice de Sully (1160-1196) present the first undoubted examples of homiletics in the vernacular, and they are followed by many others — so many indeed that the 13th century alone counts 261 sermon-writers, besides a large body of anonymous work. These sermons were, as might indeed be expected, chiefly cast in a somewhat scholastic form — theme, exordium, development, example and peroration following in regular order. The 14th-century sermons, on the other hand, have as yet been little investigated. It must, however, be remembered that this age was the most famous of all for its scholastic illustrations, and for the early vigour of the Dominican and Franciscan orders. With the end of the century and the beginning of the 15th, the importance of the pulpit begins to revive. The early years of the new age have Gerson for their representative, while the end of the century sees the still more famous names cf Michel Menot (1450-1518), Olivier Maillard (c. 1430-1502), and Jean Rauhn (1443-1514), all remarkable for the practice of a vigorous and homely style of oratory, recoil- ing before no aid of what

we should nowadays style buffoonery, and manifesting a creditable indifference to the indignation of principalities and powers. Louis XL is said to have threatened to throw Maillard into the Seine, and many instances of the bold- ness of these preachers and the rough vigour of their oratory have been preserved. Froissart had been followed as a chronicler by Enguerrand de Monstrelet (c. 1390-1453) and by the historio- graphers of the Burgundian court, Chastelain, already mentioned, whole interesting Chronique de Jacques de Lalaing is much the most attractive part of his work, and Olivier de la Marche. The memoir and chronicle writers, who were to be of so much import- ance in French literature, also begin to be numerous at this period. Juvenal des Ursins (i388-i473),an anonymous bourgeois de Paris (two such indeed), and the author of the Chronique scandaleuse, may be mentioned as presenting the character of minute observation and record which has distinguished the class ever since. Jean le maire de {notdes) Beiges (1473-c. 1525) was historiographer to Louis XII. and wrote Illustrations des Gaules. But Comines (1445-1509) is no imitator of Froissart or of any one else. The last of the quartette of great French medieval historians, he does not yield to any of his three predecessors in originality or merit, but he is very different from them. He fully represents the mania of the time for statecraft, and his book has long ranked with that of Machia- velli as a manual of the art, though he has not the absolutely non-moral character of the Italian. His memoirs, considered merely as literature, show a style well suited to their purport, — not, indeed, brilliant or picturesque, but clear, terse and thoroughly well suited to the expression of the acuteness, observa- tion and common sense of their author.

But prpse was not content with the domain of serious literature.

Comines.

It had already long possessed a respectable position as a vehicle of romance, and the end of the 14th and the beginning of the 15th centuries were pre-eminently the time when the epics of chivalry were re-edited and extended in ™ e Ceat prose. Few, however, of these extensions offer much jvouroZtes. literary interest. On the other hand, the best prose of the century, and almost the earliest which deserves the title of a satisfactory literary medium, was employed for the telling of romances in miniature. The Cent Nouvelles Nouvelles is undoubtedly the first work of prose belles-lettres in French, and the first, moreover, of a long and most remarkable class of literary work in which French writers may challenge all comers with the certainty of victory — the short prose tale of a comic character. This remarkable work has usually been attributed, like the somewhat

similar but later HeptamHron, to a knot of literary courtiers gathered round a royal personage, in this case the dauphin Louis, afterwards Louis XL Some evidence has recently been produced which seems to show that this tradition, which attributed some of the tales to Louis himself, is erroneous, but the question is still undecided. The subjects of the Cent Nouvelles Nouvelles are by no means new. They are simply the old themes of the fabliaux treated in the old way. The novelty is in the application of prose to such a purpose, and in the crispness, the fluency and the elegance of the prose used. The fortunate author or editor to whom these admirable tales have of late been attributed is Antoine de la Salle (1398-1461), who, if this attribution and certain others be correct, must be allowed to be one of the ae° a ” e most original and fertile authors of early French litera- SaUe. ture. La Salle’s one acknowledged work is the story of Petit Jehan de Saintre, a short romance exhibiting great com- mand of character and abundance of delicate draughtsmanship. To this not only the authorship, part-authorship or editorship of the Cent Nouvelles Nouvelles has been added; but the still more famous and important work of L’Avocat Patelin has been assigned by respectable, though of course conjecturing, authority to the same paternity. The generosity of critics towards La Salle has not even stopped here. A fourth masterpiece of the period, Les Quinze Joies de mariage, has also been assigned to him. This last work, like the other three, is satirical in subject, and shows for the time a wonderful mastery of the language. Of the fifteen joys of marriage, or, in other words, the fifteen miseries of husbands, each has a chapter assigned to it, and each is treated with the peculiar mixture of gravity and ridicule which it requires. All who have read the book confess its infinite wit and the grace of its style. It is true that it has been reproached with cruelty and with a lack of the moral sentiment. But humanity and morality were not the strong point of the 15th century. There is, it must be admitted, about most of its productions a lack of poetry and a lack of imagination, produced,, it rnay be, partly by political and other conditions outside litera- ture, but very observable in it. The old forms of literature itself had lost their interest, and new ones possessing influence strength to last and power to develop themselves oftbe had not yet appeared. It was impossible, even if the Renais- taste for it had survived, to spin out the old themes saoce – any longer. But the new forces required some time to set to work, and to avail themselves of the tremendous weapon which the press had put into their hands. When these things had adjusted themselves, literature of a varied and vigorous kind became once more possible and indeed necessary, nor did it take long to make its appearance.

16th Century. — In no country was the literary result of the Renaissance more striking and more manifold than in France. The double effect of the study of antiquity and the religious movement produced an outburst of literary developments of the most diverse kinds, which even the fierce and sanguinary civil dissensions of the Reformation did not succeed in checking. While the Renaissance in Italy had mainly exhausted its effects by the middle of the 16th century, while in Germany those effects only paved the way for a national literature, and did not them- selves greatly contribute thereto, while in England it was not

till the extreme end of t„c period that a great literature was forthcoming — in France almost the whole century was marked by the production of capital works in every branch of literary effort. Not even the 17th century, and certainly not the 18th, can show such a group of prose writers and poets as is formed by Calvin, St Francis de Sales, Montaigne, du Vair, Bodin, d'Aubigne, the authors of the Satire Menippie, Monluc, Brantome, Pasquier, Rabelais, des Periers, Herberay des Essarts, Amyot, Garnier, Marot, Ronsard and the rest of the " Pleiade," and finally Regnier. These great writers are not merely remark- able for the vigour and originality of their thoughts, the freshness, variety and grace of their fancy, the abundance of their learning and the solidity of their arguments in the cases where argument is required. Their great merit is the creation of a language and a style able to give expression to these good gifts. The foregoing account of the medieval literature of France will have shown sufficiently that it is not lawful to despise the literary capacities and achievements of the older French. But the old language, with all its merits, was ill-suited to be a vehicle for any but the simpler forms of literary composition. Pleasant or affecting tales could be told in it with interest and pathos. Songs of charm- ing naivete and grace could be sung; the requirements of the epic and the chronicle were suitably furnished. But it was barren of the terms of art and science; it did not readily lend itself to sustained eloquence, to impassioned poetry or to logical discus- sion. It had been too long accustomed to leave these things to Latin as their natural and legitimate exponent, and it bore marks of its original character as a lingua rustica, a tongue suited for homely conversation, for folk-lore and for ballads, rather than for the business of the forum and the court, the speculations of the study, and

the declamation of the theatre. Efforts had indeed been made, culminating in the heavy and tasteless erudition of the schools of Chartier and Cretin, to supply the defect; but it was reserved for the 16th century completely to efface it. The series of prose writers from Calvin to Montaigne, of poets from Marot to Regnier, elaborated a language yielding to no modern tongue in beauty, richness, flexibility and strength, a language which the reactionary purism of succeeding genera- tions defaced rather than improved, and the merits of which have in still later days been triumphantly vindicated by the confession and the practice of all the greatest writers of modern France.

i6th-Century Poetry. — The first few years of the 16th century were naturally occupied rather with the last developments of the medieval forms than with the production of the new model. The clerks of the Bazoche and the Confraternity of the Passion still produced and acted mysteries, moralities and farces. The poets of the ” Grands Rhetoriqueurs ” school still wrote elaborate allegorical poetry. Chansons de geste, rhymed romances and fabliaux had long ceased to be written. But the press was multiplying the contents of the former in the prose form which they had finally assumed, and in the Cent Nouvelles Nouvelles there already existed admirable specimens of the short prose tale. There even were signs, as in some writers already mentioned and in Roger de Collerye, a lackpenny but light-hearted singer of the early part of the century, of definite enfranchisement in verse. But the first note of the new literature was sounded by Clement Marot (1496/7-1544)’. The son of an elder poet, Jehan des Mares called Marot (1463-1523), Clement at first wrote, like his father’s contemporaries, allegorical and mythological poetry, afterwards collected in a volume with a charming title, V Adolescence cUmentine. It was not till he was nearly thirty years old that his work became really remarkable. From that time forward till his death, about twenty years after- wards, he was much involved in the troubles and persecutions of the Huguenot party to which he belonged; nor was the pro- tection of Marguerite d’Angoultae, the chief patroness of Huguenots and men of letters, always efficient. But his troubles, so far from harming, helped his literary faculties; and his epistles, epigrams, blasons (descendants of the medieval dits), and coq-d- I’dne became remarkable for their easy and polished style, their light and graceful wit, and a certain elegance which had not as yet been even attempted in any modern tongue, though the

Marot

Italian humanists had not been far from it in so ae of their Latin compositions. Around Marot arose a whole school of disciples and

imitators, such as Victor Brodeau (1470 7-1540), the great authority on rondeaux, Maurice Sceve, a fertile author of blasons, Salel, Marguerite herself (1492-1549), of whom more hereafter, and Mellin de Saint Gelais (1491-1558). The last, son of the bishop named above, is a courtly writer of occasional pieces, who sustained as well as he could the style marotique against Ronsard, and who has the credit of introducing the regular sonnet into French. But the inventive vigour of the age was so great that one school had hardly become popular before another pushed it from its stool, and even of the Marotists just mentioned Sceve and Salel are often regarded as chief and member respectively of a Lyonnese coterie, intermediate between the schools of Marot and of Ronsard, containing other members of repute such as Antoine Heroet and Charles Fontaine and claiming Louise Lab6 (v. inf.) herself. Pierre de a onsar ˆ Ronsard (1524-1585) was the chief of this latter. At first a courtier and a diplomatist, physical disqualification made him change his career. He began to study the classics under Jean Daurat (1 508-1 588), and with his master and five other writers, Etienne Jodelle (1532-1573), Remy Belleau (1528-1577), Joachim du Bellay (1525-1560), Jean Antoine de Baif (1532- 1589), and Pontus de Tyard (d. 1605, bishop of Chalons-sur-Saone), composed the famous ” Pleiade.” The object of this band was to bring the French language, in vocabulary, constructions and application, on a level with the puiaae. classical tongues by borrowings from the latter. They would have imported the Greek licence of compound words, though the genius of the French language is but little adapted thereto; and they wished to reproduce in French the regular tragedy, the Pindaric and Horatian ode, the Virgilian epic, &c. But it is an error (though one which until recently was very common, and which perhaps requires pretty thorough study of their work completely to extirpate it) to suppose that they advocated or practised indiscriminate borrowing. On the con- trary both in du Bellay’s famous manifesto, the Dejjense et illustra- tion de la langue franqaise, and in Ronsard’s own work, caution and attention to the genius and the tradition of French are insisted upon. Being all men of the highest talent, and not a few of them men of great genius, they achieved much that they designed, and even where they failed exactly to achieve it, they very often indirectly produced results as important and more beneficial than those which they intended. Their ideal of a separate poetical language distinct from that intended for prose use was indeed a doubtful if not a dangerous one. But it is certain that Marot, while setting an example of elegance and grace not easily to be imitated, set also an example of trivial and, so to speak, pedestrian language which was only too imitable. If France was ever to possess a literature containing something besides fabliaux and farces, the

tongue must be enriched and strengthened. This accession of wealth and vigour it received from Ronsard and the Ronsardists. Doubtless they went too far and provoked to some extent the reaction which Malherbe led. Their importations were sometimes unnecessary. It is almost impossible to read the Franciade of Ronsard, and not too easy to read the tragedies of Jodelle and Garnier, fine as the latter are in parts. But the best of Ronsard's sonnets and odes, the finest of du Bellay's Antiquitis de Rome (translated into English by Spenser), the exquisite Vanneur of the same author, and the Avril of Belleau, even the finer passages of d'Aubigne and du Bartas, are not only admirable in themselves, and of a kind not previously found in French literature, but are also such things as could not have been previously found, for the simple reason that the medium of expression was wanting. They constructed that medium for themselves, and no force of the reaction which they provoked was able to undo their work. Adverse criticism and the natural course of time rejected much that they had added. The charming diminutives they loved so much went out of fashion; their compounds (sometimes it must be confessed, justly) had their letters of naturalization promptly cancelled; many a gorgeous adjective, including some which could trace

Du Bartas.

their pedigree to the earliest ages of French literature, but which bore an unfortunate likeness to the new-comers, was proscribed. But for all that no language has ever had its destiny- influenced more powerfully and more beneficially by a small literary clique than the language of France was influenced by the example and disciples of that Ronsard whom for two centuries it was the fashion to deride and decry.

In a sketch such as the present it is impossible to give a separate account of individual writers, the more important of whom will be found treated under their own names. sardhfts.' The e ˆOTt of the " Pleiade " proper was continued and shared by a considerable number of minor poets, some of them, as has been already noted, belonging to different groups and schools. Olivier de Magny (d. 1560) and Louise Labe (b. 1526) were poets and lovers, the lady deserving far the higher rank in literature. There is more depth of passion in the writings of " La Belle Cordiere," as this Lyonnese poetess was called,

than in almost any of her contemporaries. Jacques Tahureau (1527-1555) scarcely deserves to be called a minor poet. There is less than the usual hyperbole in the contemporary comparison of him to Catullus, and he reminds an Englishman of the school represented nearly a century later by Carew, Randolph and Suckling. The title of a part of his poem — Mignardises amoureuses de I'admiree — is characteristic both of the style and of the time. Jean Doublet (c. 1 5 28-c. 1 580) , Amadis Jamyn (c. 1530-1585), and Jean de la Taille (1540-1608) deserve mention at least as poets, but two other writers require a longer allusion. Guillaume de Salluste, seigneur du Bartas (1 544-1 590) , whom Sylvester's translation, Milton's imitation, and the copious citations of Southey's Doctor, have made known if not familiar in England, was partly a disciple and partly a rival of Ronsard. His poem of Judith was eclipsed by his better-known La Divine Sepmaine or epic of the Creation. Du Bartas was a great user and abuser of the double compounds alluded to above, but his style possesses much stateliness, and has a peculiar solemn eloquence which he shared with the other French Calvinists, and which was derived from the study partly of Calvin and partly of the Bible. Theodore Agrippa d'Aubigne (1552-1630), like du Bartas, was a Calvinist. His genius was of a more varied character. He wrote sonnets and odes as became a Ronsardist, but his chief poetical work is the satirical poem of Les Tragiques, in which the author brands the factions, corruptions and persecutions of the time, and in which there are to be found alexandrines of a strength, vigour and original cadence hardly to be discovered elsewhere, save in Corneille and Victor Hugo. Towards the end of the century, Philippe Desportes (1546-1606) and Jean Bertaut (1552-1611), with much enfeebled strength, but with a certain grace, continue the Ronsardizing tradition. Among their con- temporaries must be noticed Jean Passerat (1534-1602), a writer of much wit and vigour and rather resembling Marot than Ronsard, and Vauquelin de la Fresnaye (1536-1607), the author of a valuable Ars poetica and of the first French satires which actually bear that title. Jean le Houx (fl. c. 1600) continued, rewrote or invented the vaux de vire, commonly known as the work of Olivier Basselin, and already alluded to, while a still lighter and more eccentric verse style was cultivated by Etienne Tabourot des Accords (1 540-1 590), whose epigrams and other pieces were collected under odd titles, Les Bigarrures, Les Touches, &c. A curious pair are Guy du Faur de Pibrac (1529-1584) and Pierre Mathieu (b. 1 563) , authors of moral quatrains, which were learnt by heart in the schools of the time, replacing the distichs of the grammarian Cato, which, translated into French, had served the same purpose in the middle ages.

The nephew of Desportes, Mathurin Regnier (1 573-1613), marks the end, and at the same time perhaps the climax, of the- Regnier. P oetr y °f t ne century. A descendant at once of the older Gallic spirit of Villon and Marot, in virtue of his consummate acuteness, terseness and wit, of the school of Ronsard by his erudition, his command of language, and his scholarship, Regnier is perhaps the best representative of French poetry at the critical time when it had got together all its materials, had

D'Au- bigne.

lost none of its native vigour and force, and had not yet sub- mitted to the cramping and numbing rules and restrictions which the next century introduced. The satirical poems of Regnier, and especially the admirable epistle to Rapin, in which he denounces and rebuts the critical dogmas of Malherbe, are models of nervous strength, while some of the elegies and odes contain expression not easily to be surpassed of the softer feelings of affection and regret. No poet has had more influence on the revival of French poetry in the last century than Regnier, and he had imitators in his own time, the chief of whom was Courval-Sonnet (Thomas Sonnet, sieur de Courval) (1577-1635), author of satires of some value for the history of manners.

i6th-Century Drama. — The change which dramatic poetry underwent during the 16th century was at least as remarkable as that undergone by poetry proper. The first half of the period saw the end of the religious mysteries, the licence of which had irritated both the parliament and the clergy. Louis XII., at the beginning of the century, was far from discouraging the dis- orderly but popular and powerful theatre in which the Confra- ternity of the Passion, the clerks of the Bazoche, and the Enfans sans souci enacted mysteries, moralities, soties and farces. He made them, indeed, an instrument in his quarrel with the papacy, just as Philippe le Bel had made use of the allegorical poems of Jehan de Meung and his fellows. Under his patronage were produced the chief works of Gringore or Gringoire (c. 1480- 1547), by far the most remarkable writer of this class of composi- tion. His Prince des sots and his Mystere de St Louis are among the best of their kind. An enormous volume of composition of this class was produced between 1500 and 1550. One morality by itself, L'Homme juste et I'homme mondain, contains some 36,000 lines. But in 1548, when the Confraternity was formally established at the H6tel de Bourgogne, leave to play sacred subjects was expressly refused it. Moralities and soties dragged on under difficulties till the end of the century, and the farce, which is immortal, continually affected comedy. But the effect of the Renaissance was to sweep away all other vestiges of the

medieval drama, at least in the capital. An entirely new class of subjects, entirely new modes of treatment, and a different kind of performers were introduced. The change naturally came from Italy. In the close relationship with that country which France had during the early years of the century, Italian translations of the classical masterpieces were easily imported. Soon French translations were made afresh of the Electra, the Hecuba, the Iphigenia in Aulis, and the French humanists hastened to compose original tragedies on the classical model, especially as exhibited in the Latin tragedian Seneca. It was impossible that the ” Pleiade ” should not eagerly seize such an opportunity of carrying out its principles, and one of its members, Jodelle (1532-1573), devoting himself mainly to dramatic composition, fashioned at once the first tragedy, R eea iar Cleopatre, and the first comedy, Eugene, thus setting tragedy the example of the style of composition which for two and centuries and a half Frenchmen were to regard as the comedy. highest effort of literary ambition. The amateur performance of these dramas by Jodelle and his friends was followed by a Bacchic procession after the manner of the ancients, which caused a great deal of scandal, and was represented by both Catholics and Protestants as a pagan orgy. The Cleopdtre is remarkable as being the first French tragedy, nor is it destitute of merit. It is curious that in this first instance the curt antithetic aTixofivdia, which was so long characteristic of French plays and plays imitated from them, and which Butler ridicules in his Dialogue of Cat and Puss, already appears. There appears also the grandiose and smooth but stilted declamation which came rather from the imitation of Seneca than of Sophocles, and the tradition of which was never to be lost. Cleopdtre was followed by Didon, which, unlike its predecessor, is entirely in alexandrines, and observes the regular alternation of masculine and feminine rhymes. Jodelle was followed by Jacques Grevin (15407-1570) with a Mort de Cesar, which shows an improvement in tragic art, and two still better comedies, Les j&bahis and La TrSsoriereby Jean de la Taille (1540-1608), who made still further progress

Gamier.

Lartvey.

towards the accepted French dramatic pattern in his Saul fitrieux and his Corrivaux, Jacques, his brother (1341-1562), and Jean de la Peruse (1529-1554), who wrote a MSdee. A very different poet from all these is Robert Garnier (1545- 1601). Garnier is the first tragedian who deserves a place not too far below Rotrou, Corneille, Racine, Voltaire and Hugo, and who may be placed in the same class with them. He chose his subjects indifferently from classical, sacred and medieval literature. SedScie, a play dealing with the capture of Jerusalem by Nebuchadnezzar, is held to be his masterpiece, and Bradamante deserves notice because it is the first tragicomedy of merit in French, and because the famous confidant here makes his first appearance. Garnier's successor, Antoine de Monchr6tien or Montchrestien (c. 1576-1621), set the example of dramatizing contemporary subjects. His masterpiece is L'£cossaise, the first of many dramas on the fate of Mary, queen of Scots. While tragedy thus clings closely to antique models, comedy, as might be expected in the country of the fabliaux, is more independent. Italy had already a comic school of some originality, and the French farce was too vigorous and lively a production to permit of its being entirely overlooked. The first comic writer of great merit was Pierre Larivey (c. 1550-c. 1612), an Italian by descent. Most if not all of his plays are founded on Italian originals, but the translations or adaptations are made with the greatest freedom, and almost deserve the title of original works. The style is admirable, and the skilful management of the action contrasts strongly with the languor, the awkward adjustment, and the lack of dramatic interest found in con- temporary tragedians. Even Moliere found something to use in Larivey.

i6th-Century Prose Fiction. — Great as is the importance of the 16th century in the history of French poetry, its import- ance in the history of French prose is greater still. In poetry the middle ages could fairly hold their own with any of the ages that have succeeded them. The epics of chivalry, whether of the cycles of Charlemagne, Arthur, or the classic heroes, not to mention the miscellaneous romans d'aventures, have indeed more than held their own. Both relatively and absolutely the Franciade of the 16th century, the Pucelle of the 17th, the Henriade of the 18th, cut a very poor figure beside Roland and Percivale, Gerard de Roussillon, and Parthenopex de Blois. The romances, ballads and pastourelles, signed and unsigned, of medieval France were not merely the origin, but in some respects the superiors, of the lyric poetry which succeeded them. Thibaut de Champagne, Charles d'Orleans and Villon need not veil their crests in any society of bards. The charming forms of the rondel, the rondeau and the ballade have won admiration from every competent poet and critic

who has known them. The fabliaux give something more than promise of La Fontaine, and the two great compositions of the Roman du Renart and the Roman de la rose, despite their faults and their alloy, will always command the admiration of all persons of taste and judgment who take the trouble to study them. But while poetry had in the middle ages no reason to blush for her French representatives, prose (always the younger and less forward sister) had far less to boast of. With the exception of chronicles and prose romances, no prose works of any real importance can be quoted before the end of the 1 5th century, and even then the chief if not the only place of importance must be assigned to the Cent Noitvelles Nouvelles, a work of admirable prose, but neces- sarily light in character, and not yet demonstrating the efficacy of the French language as a medium of expression for serious and weighty thought. Up to the time of the Renaissance and the consequent reformation, Latin had, as we have already remarked, been considered the sufficient and natural organ for this expres- sion. In France as in other countries the disturbance in religious thought may undoubtedly claim the glory of having repaired this disgrace of the vulgar tongue, and of having fitted and taught it to express whatever thoughts the theologian, the historian, the philosopher, the politician and the savant had occasion to utter. But the use of prose as a vehicle for lighter themes was more continuous with the literature that preceded.

and serves as a natural transition from poetry and the drama to history and science. Among the prose writers, therefore, of the 1 6th century we shall give the first place to the novelists and romantic writers.

Among these there can be no doubt of the precedence, in every sense of the word, of Francois Rabelais (c. 1490-1553), the one French writer (or with Moliere one of the two) _ . . whom critics the least inclined to appreciate the characteristics of French literature have agreed to place among the few greatest of the world. With an immense erudition representing almost the whole of the knowledge of his time, with an untiring faculty of invention, with the judgment of a philosopher, and the common sense of a man of the world, with an observation that let no characteristic of the time pass un- observed, and with a tenfold portion of the special Gallic gift of good-humoured satire, Rabelais united a height of speculation and depth of insight and a vein of poetical imagination rarely found in any writer, but altogether portentous when taken in conjunction with his other characteristics. His great work has been taken for an exercise of transcendental philosophy, for a concealed theological polemic, for an allegorical history of this and that personage of his time, for a merely

literary utterance, for an attempt to tickle the popular ear and taste. It is all of these, and it is none— all of them in parts, none of them in deliberate and exclusive intention. It may perhaps be called the exposition and commentary of all the' thoughts, feelings, aspirations and knowledge of a particular time and nation put forth in attractive literary form by a man who for once combined the practical and the literary spirit, the power of knowledge and the power of expression. The work of Rabelais is the mirror of the 1 6th century in France, reflecting at once its comeliness and its uncomeliness, its high aspirations, its voluptuous tastes, its political and religious dissensions, its keen criticism, its eager appetite and hasty digestion of learning, its gleams of poetry, and its ferocity of manners. In Rabelais we can divine the " Pleiade " and Marot, the Cymbalum mundi and Montaigne, Amyot and the Amadis, even Calvin and Duperron.

It was inevitable that such extraordinary works as Gargantua and Pantagruel should attract special imitators in the direction of their outward form. It was also inevitable that this imitation should frequently fix upon these Rabelaisian characteristics which are least deserving of imitation, and most likely to be depraved in the hands of imitators. It fell within the plan of the master to indulge in what has been called fatrasie, the huddling together, that is to say, of a medley of language and images which is best known to English readers in the not always successful following of Sterne. It pleased him also to disguise his naturally terse, strong and nervous style in a burlesque envelope of redundant language, partly ironical, partly the result of superfluous erudition, and partly that of a certain childish wantonness and exuberance, which is one of his raciest and pleasantest characteristics. In both these points he was some- what corruptly followed. But fortunately the romancical writers of the 16th century had not Rabelais for their sole model, but were also influenced by the simple and straightforward style of the Cent Nouvelles Nouvelles. The joint influence gives us some admirable work. Nicholas of Troyes, a saddler of Champagne, came too early (his Grand Parangon des nouvelles nouvelles appeared in 1536) to copy Rabelais. But Noel du Fail (d. c. 1585?), a judge at Rennes, shows the double influence in his Propos rustiques and Contes d'Eutrapel, both of which, especially the former, are lively and well-written pictures of contemporary life and thought, as the country magistrate actually saw and dealt with them. In 1558, however, appeared two works of far higher literary and social interest. These are the HeptamSron of the queen of Navarre, and the Contes et joyeux devis of Bonaventure des Periers (c. 1 500-1 544). Des Periers, who was a courtier of Marguerite's, has Periers. sometimes been thought to have had a good deal to do with the first-

named work as well as with the second, and was also the author of a curious Lucianic satire, strongly 1 sceptical in cast, the Cymbalum mundi. Indeed, not merely

the queen's prose works, but also the poems gracefully entitled Les Marguerites de la Marguerite, are often attributed to the literary men whom the sister of Francis I. gathered round her. However this may be, some single influence of power enough to give unity and distinctness of savour evidently presided over the composition of the Heptamiron. tamiroa' Composed as it is on the model of Boccaccio, its tone and character are entirely different, and few works have a more individual charm. The Tales of des Periers are shorter, simpler and more homely; there is more wit in them and less refinement. But both works breathe, more powerfully perhaps than any others, the peculiar mixture of cultivated and poetical voluptuousness with a certain religiosity and a vigorous spirit of action which characterizes the French Renais- sance. Later in time, but too closely connected with Rabelais in form and spirit to be here omitted, came the Mcyen de parvenir of Beroalde de Verville (iss8?i6i2?), a singular fatrasie, uniting wit, wisdom, learning and indecency, and crammed with anec dotes which are always amusing though rarely decorous.

At the same time a fresh vogue was given to the chivalric romance by Herberay's translation of Amadis de Gaula. French writers have supposed a French original for the Qaul. ° Amadis in some lost roman d'aventures. It is of course impossible to say that this is not the case, but there is not one tittle of evidence to show that it is. At any rate the adventures of Amadis were prolonged in Spanish through generation after generation of his descendants. This vast work Herberay des Essarts in 1540 undertook to translate or re- translate, but it was not without the assistance of several followers that the task was completed. Southey has charged Herberay with corrupting the simplicity of the original, a charge which does not concern us here. It is sufficient to say that the French Amadis is an excellent piece of literary work, and that Herberay deserves no mean place among the fathers of French prose. His book had an immense popularity; it was translated into many foreign languages, and for some time it served as a favourite reading book for foreigners studying French. Nor is it to be doubted that the romancers of the Scudery and Calprenede type in the

next century were much more influenced both for good and harm by these Amadis romances than by any of the earlier tales of chivalry.

i6lh-Century Historians. — As in the case of the tale-tellers, so in that of the historians, the writers of the 16th century had traditions to continue. It is doubtful indeed whether many of them can risk comparison as artists with the great names cf Villehardouin and Joinville, Froissart and Comines. The 16th century, however, set the example of dividing the functions of the chronicler, setting those of the historian proper on one side, and of the anecdote-monger and biographer on the other. The efforts at regular history made in this century were not of the highest value. But on the other hand the practice of memoir- writing, in which the French were to excel every nation in the world, and of literary correspondence, in which they were to excel even their memoirs, was solidly founded.

One of the earliest historical writers of the century was Claude de Seyssel (1450-1520), whose history of Louis XII. aims not unsuccessfully at style. De Thou (1553-1617) wrote in Latin, but Bernard de Girard, sieur du Haillan (1537-1610), composed a Histoire ‘de France on Thucydidean principles as transmitted through the successive mediums of Polybius, Guicciardini and Paulus Aemilius. The instance invariably quoted, after Thierry, of du Haillan’s method is his introduction, with appropriate speeches, of two Merovingian statesmen who argue out the relative merits of monarchy and oligarchy on the occasion of the election of Pharamond. Besides du Haillan, la Popelinie’re (c. 1 540-1608), who less ambitiously attempted a history of Europe during his own time, and expended immense labour on the collection of information and materials, deserves mention. There is no such poverty of writers of memoirs. Robert de la Mark, du Bellay, Marguerite de Valois (the youngest or third Marguerite, first wife of Henri IV., 1 553-161 5), Villars, Tavannes, La Tour d’Auvergne, and many others composed

commentaries and autobiographies. • The well-known and very agreeable Histoire du gentil seigneur de Bayart (1524) is by an anonymous “Loyal Serviteur.” Vincent Carloix (fl. 1550), the secretary of the marshal de Vielleville, composed some memoirs abounding in detail and incident. The Lettres of Cardinal d’Ossat (1 536-1604) and the Negociations of Pierre Jeannin (1540-1622) have always had a high place among documents of their kind. But there are four collections of memoirs concerning this time which far exceed all others in interest and importance. The turbulent dispositions of the time, the loose dependence of the nobles and even the smaller gentry on any single or central authority, the rapid changes of political

situations, and the singularly active appetite, both for pleasure and for business, for learning and for war, which distinguished the French gentleman of the 16th century, place the memoirs of Francois de Lanoue (1531-1591), Blaise de Mon[t]luc (1503- 1577), Agrippa d'Aubigne and Pierre de Bourdeille[s] Brantome (1 540-1614) almost at the head of the literature of their class. The name of Brantome is known to all who have the least tincture of French literature, and the works of the others are not inferior in interest, and perhaps superior in spirit and conception, to the Dames Galantes, the Grands Capitaines and the Hommes illustres. The commentaries of Montluc, which Henri Quatre is said to have called the soldier's Bible, are exclusively military and deal with affairs only. Montluc was governor in Guienne, where he repressed the savage Huguenots of the south with a savagery worse than their own. He was, however, a partisan of order, not of Catholicism. He hung and shot both parties with perfect impartiality, and refused to have anything to do with the massacre of St Bartholomew. Though he was a man of no learning, his style is excellent, being vivid, flexible and straightforward. Lanoue, who was a moderate in politics, has left his principles reflected in his memoirs. D'Aubigne, so often to be mentioned, gives the extreme Huguenot side as opposed to the. royalist partisanship of Montluc and the via media of Lanoue. Brantome, on the other hand, is quite free Brantdme. from any political or religious prepossessions, and, indeed, troubles himself very little about any such matters. He is the shrewd and somewhat cynical observer, moving through the crowd and taking note of its ways, its outward appearance, its heroisms arid its follies. It is really difficult to say whether the recital of a noble deed of arms or the telling of a scandalous Story about a court lady gave him the most pleasure, and impossible to say which he did best. Certainly he had ample material for both exercises in the history of his time.

The branches of literature of which we have just given an account may be fairly connected, from the historical point of view, with work of the same kind that went before as well as with work of the same kind that followed them. It was not so with the literature of theology, law, politics and erudition, which the 16th century also produced, and with which it for the first time enlarged the range of composition in the vulgar tongue. Not only had Latin been invariably adopted as the language of composition on such subjects, but the style of the treatises dealing with such matters had been traditional rather than original. In speculative philosophy or metaphysics proper even this century did not witness a great development; perhaps, indeed, such a development was not to be expected until the minds of men had in some degree settled down from their agitation on more practical matters. It is not

without significance that Calvin (1 509-1 564) is the great figure in serious French prose in the first half of the century, Montaigne the corresponding figure in the second half. After Calvin and Montaigne we expect Descartes.

i6th-Century Theologians. — In France, as in all other countries, the Reformation was an essentially popular movement, though from special causes, such as the absence of political calvln. homogeneity, the nobles took a more active part both with pen and sword in it than was the case in England. But the great textbook of the French Reformation was not the work of any noble. Jean Calvin's Institution of the Christian Religion

is a book equally remarkable in matter and in form, in circum- stances and in result. It is the first really great composition in argumentative French prose. Its severe logic and careful arrangement had as much influence on the manner of future thought, both in France and the other regions whither its wide- spread popularity carried it, as its style had on the expression of such thought. It was the work of a man of only seven-and- twenty, and it is impossible to exaggerate the originality of its manner when we remember that hardly any models of French prose then existed except tales and chronicles, which required and exhibited totally different qualities of style. It is indeed probable that had not the Institution been first written by its author in Latin, and afterwards translated by him, it might have had less dignity and vigour; but it must at the same time be remembered that this process of composition was at least equally likely, in the hands of any but a great genius, to produce a heavy and pedantic style neither French nor Latin in character. Some- thing like this result was actually produced in some of Calvin's minor works, and still more in the works of many of his followers, whose lumbering language gained for itself, in allusion to their exile from France, the title of " style refugie." Nevertheless, the use of the vulgar tongue on the Protestant side, and the possession of a work of such importance written therein, gave the Reformers an immense advantage which their adversaries were some time in neutralizing. Even before the Institution, Lefevre d'Etaples (1455-1537) and Guillaume Farel (1480-1565) saw and utilized the importance of the vernacular. Calvin (1500-1564) was much helped by Pierre Viret (1511-1571), who wrote a large number of small

theological and moral dialogues, and of satirical pamphlets, destined to captivate as well as to instruct the lower people. The more famous Beza (Theodore de Beze) (1 519-1605) wrote chiefly in Latin, but he composed in French an ecclesiastical history of the Reformed churches and some translations of the Psalms. Marnix de Sainte Aldegonde (1 530-1 593) , a gentleman of Brabant, followed Viret as a satirical pamphleteer on the Protestant side. On the other hand, the Catholic champions at first affected to disdain the use of the vulgar tongue, and their pamphleteers, when they did attempt it, were unequal to the task. Towards the end of the century a more decent war was waged with Philippe du Plessis Mornay (1 549-1623) on the Protestant side, whose work is at least as much directed against freethinkers and enemies of Christianity in general as against the dogmas and discipline of Rome. His adversary, the redoubtable Cardinal du Perron (1556-1618), 1 who, originally a Calvinist, went over to the other side, employed French most vigorously in controversial works, chiefly with reference to the eucharist. Du Perron was celebrated as the first controversialist of the time, and obtained dialectical victories over all comers. At the same time the bishop of Geneva, St Francis of Sales (1567-1622), supported the Catholic side, partly by controversial works, but still more by his devotional writings. The Introduction to a Devout Life, which, though actually published early in the next century, had been written some time previously, shares with Calvin's Institution the position of the most important theological work of the period, and is in remark- able contrast with it in style and sentiment as well as in principles and plan. It has indeed been accused of a certain effeminacy, the appearance of which is in all probability mainly due to this very contrast. The 16th century does not, like the 17th, dis- tinguish itself by literary exercises in the pulpit. The furious preachers of the League, and their equally violent opponents, have no literary value.

idth-Century Moralists and Political Writers. — The religious dissensions and political disturbances of the time could not fail _ to exert an influence on ethical and philosophical

talgae. thought. Yet, as we have said, the century was not prolific of pure philosophical speculation. The scholastic tradition, though long sterile, still survived, and with it the habit of composing in Latin all works in any way connected with philosophy. The Logic of Ramus in 1555 is cited as the first departure from this rule. Other philosophical works are few, and chiefly express the doubt and the freethinking which

were characteristic of the time. This doubt assumes the form of

positive religious scepticism only in the Cymbalum mundi of Bonaventure des Periers, a remarkable series of dialogues which excited a great storm, and ultimately drove the author to commit suicide. The Cymbalum mundi is a curious anticipation of the 1 8th century. The literature of doubt, however, was to receive its principal accession in the famous essays of Michel Eyguem, seigneur de Montaigne (1533-1592). It would be a mistake to imagine the existence of any sceptical propaganda in this charm- ing and popular book. Its principle is not scepticism but egotism ; and as the author was profoundly sceptical, this quality necessarily rather than intentionally appears. We have here to deal only very superficially with this as with other famous books, but it cannot be doubted that it expresses the mental attitude of the latter part of the century as completely as Rabelais expresses the mental attitude of the early part. There is considerably less vigour and life in this attitude. Inquiry and protest have given way to a placid conviction that there is not much to be found out, and that it does not much matter; the erudition though abundant is less indiscriminate, and is taken in and given out with less gusto; exuberant drollery has given way to quiet irony; and though neither business nor pleasure is decried, both are regarded rather as useful pastimes incident to the life of man than with the eager appetite of the Renaissance. From the purely literary point of view, the style is remarkable from its absence of pedantry in construction, and yet for its rich vocabulary and picturesque brilliancy. The follower and imitator of Montaigne, Pierre Charron (1541-1603), carried his master's scepticism to a some- what more positive degree. His principal book, De la sagesse, scarcely deserves the comparative praise which Pope has given it. On the other hand Guillaume du Vair (1556-1621), a lawyer and orator, takes the positive rather than the negative side in morality, and regards the vicissitudes in human affairs from the religious and theological point of view in a series of works characterized by the special merit of the style of great orators.

The revolutionary and innovating instinct which showed itself in the 16th century with reference to church government and doctrine spread naturally enough to political matters. The intolerable disorder of the religious wars naturally set the thinkers of the age speculating on the doctrines of government in general. The favourite and general study of antiquity helped this tendency, and the great accession of royal power in all the monarchies of Europe invited a speculative if not a practical re- action. The persecutions of the Protestants naturally provoked a republican spirit among them, and the violent antipathy of the League to the houses of Valois and Bourbon made its partisans

adopt almost openly the principles of democracy and tyrannicide.

The greatest political writer of the age is Jean Bodin (1530- 1596), whose Republique is founded partly on speculative con- siderations like the political theories of the ancients, and partly on an extended historical inquiry. Bodin, like most lawyers who have taken the royalist side, is for unlimited monarchy, but notwithstanding this, he condemns religious persecution and discourages slavery. In his speculations on the connexion between forms of government and natural causes, he serves as a link between Aristotle and Montesquieu. On the other hand, the causes which we have mentioned made a large number of writers adopt opposite conclusions. Etienne de la Boetie (1530-1563), the friend of Montaigne's youth, composed the Conlre un or Discours de la servitude volontaire, a protest against the monarchical theory. The boldness of the protest and the affectionate admiration of Montaigne have given la Boetie a much higher reputation than any extant work of his actually deserves. The Contre un is a kind of prize essay, full of empty declamation borrowed from the ancients, and showing no grasp of the practical conditions of politics. Not much more historically based, but far more vigorous and original, is the Franco-Gallia of Francois Hotmann (1524-1590), a work which appeared both in Latin and French, which extols the authority of the states-general, represents them as direct successors of the political institutions of Gauls and Franks, and maintains the

right of insurrection. In the last quarter of the century political animosity knew no bounds. The Protestants beheld a divine instrument in Poltrot de Mere, the Catholics in Jacques Clement. The Latin treatises of Hubert Languet (1 5 1 8-1 58 1) and Buchanan formally vindicated — the first, like Hotmann, the right of re- bellion based on an original contract between prince and people, the second the right of tyrannicide. Indeed, as Montaigne confesses, divine authorization for political violence was claimed and denied by both parties according as the possession or the expectancy of power belonged to each, and the excesses of the preachers and pamphleteers knew no bounds.

Every one, however, was not carried away. The literary merits of the chancellor Michel de l'Hopital (1507-1573) are not very great, but his

efforts to promote peace and moderation were unceasing. On the other side Lanoue, with far greater literary gifts, pursued the same ends, and pointed out the ruinous consequences of continued dissension. Du Plessis Mornay took a part in political discussion even more important than that which he bore in religious polemics, and was of the utmost service to Henri Quatre in defending his cause against the League, as was also Hurault, another author of state papers. Du Vair, already mentioned, powerfully assisted the same cause by his successful defence of the Salic law, the disregard of which by the Leaguer states-general was intended to lead to the admission of the Spanish claim to the crown. But the foremost work against the League was the famous Satire Menippee (1594), Meaippie. ‘ n a literary point of view one of the most remarkable of political books. The Menippee was the work of no single author, but was due, it is said, to the collaboration of five, Pierre Leroi, who has the credit of the idea, Jacques Gillot, Florent Chretien, Nicolas Rapin (1541-1596) and Pierre Pithou (1530-1596), with some assistance in verse from Passerat and Gilles Durand. The book is a kind of burlesque report of the meeting of the states-general, called for the purpose of supporting the views of the League in 1593. It gives an account of the procession of opening, and then we have the supposed speeches of the principal characters — the due de Mayenne, the papal legate, the rector of the university (a ferocious Leaguer) and others. But by far the most remarkable is that attributed to Claude d’Aubray, the leader of the Tiers Etat, and said to be written by Pithou, in which all the evils of the time and the malpractices of the leaders of the League are exposed and branded. The satire is extraordinarily bitter and yet perfectly good-humoured. It resembles in character rather that of Butler, who unquestionably imitated it, than any other. The style is perfectly suited to the purpose, having got rid of almost all vestiges of the cumbrousness of the older tongue without losing its picturesque quaintness. It is no wonder that, as we are told by contemporaries, it did more for Henri Quatre than all other writings in his cause. In connexion with politics some mention of legal orators and writers may be necessary. In 1539 the ordinance of Villers-Cotterets enjoined the exclusive use of the French language in legal procedure. The bar and bench of France during the century produced, however, besides those names already mentioned in other connexions, only one deserving of special notice, that of Etienne Pasquier (1529-1615), author of a celebrated speech against the right of the Jesuits to take part in public teaching. This he inserted in his great work, Recherches de la France, a work dealing with almost every aspect of French history whether political, antiquarian or literary.

16th-century Savants. — One more division, and only one, that of scientific and learned writers pure and simple, remains. Much of the work of this kind during the period was naturally done in Latin, the vulgar tongue of the learned. But in France, as in other countries, the study of the classics led to a vast number of translations, and it so happened that one of the translators deserves as a prose writer a rank among the highest. Many of the authors already mentioned contributed to the literature of translation. Des Periers translated the Platonic dialogue Lysis, la Boetie some works of Xenophon and Plutarch, du Vair the De corona, the In Ctesipkontem and the Pro Milone.

Amyot.

Salel attempted the Iliad, Belleau the false Anacreon, Baif some plays of Plautus and Terence. Besides these Lefevre d'Etaples gave a version of the Bible, Saliat one of Herodotus, and Louis Leroi (1 510-1577), not to be confounded with the part author of the MSnippee, many works of Plato, Aristotle and other Greek writers. But while most if not all of these translators owed the merits of their work to their originals, and deserved, much more deserve, to be read only by those to whom those originals are sealed, Jacques Amyot (1513-1593), bishop of Auxerre, takes rank as a French classic by his translations of Plutarch, Longus and Heliodorus. The admiration which Amyot excited in his own time was immense. Montaigne declares that it was thanks to him that his contemporaries knew how to speak and to write, and the Academy in the next age, though not too much inclined to honour its predecessors, ranked him as a model. His Plutarch, which had an enormous influence at the time, and coloured perhaps more than any classic the thoughts and writings of the 16th century, both in French and English, was then considered his masterpiece. Now- adays perhaps, and from the purely literary standpoint, that position would be assigned to his exquisite version of the ex- quisite story of Daphnis and Chloe. It is needless to say that absolute fidelity and exact scholarship are not the pre- eminent merits of these versions. They are not philological exercises, but works of art.

On the other hand, Claude Fauchet (1530-1601) in two anti- quarian works, Anliquites gauloises et francoises and L'Origine de la langue et de la poesie JranQaise, displays a remarkable critical faculty in sweeping away the fables which had encumbered history. Fauchet had the (for his time) wonderful habit of consulting manuscripts, and we owe to him literary notices of many of the trouveres. At the same time Francois Grude, sieur de la Croix du Maine (1552-1592), and Antoine Duverdier (1 544-1600) founded the study of bibliography in France.

Pasquier's Recherches, already alluded to, carries out the prin- ciples of Fauchet independently, and besides treating the history of the past in a true critical spirit, supplies us with voluminous and invaluable information on contemporary politics and litera- ture. He has, moreover, the merit which Fauchet had not, of being an excellent writer. Henri Estienne [Stephanus] (1528- 1598) also deserves notice in this place, both for certain treatises on the French language, full of critical crotchets, and also for his curious Apologie pour Herodote, a remarkable book not particularly easy to class. It consists partly of a defence of its nominal subject, partly of satirical polemics on the Protestant side, and is filled almost equally with erudition and with the buffoonery and fatrasie of the time. The book, indeed, was much too Rabelaisian to suit the tastes of those in whose defence it was composed.

The 16th century is somewhat too early for us to speak of science, and such science as was then composed falls for the most part outside French literature. The famous potter, Bernard Palissy (1 510-1590), however, was not much less skilful as a fashioner of words than as a fashioner of pots, and his description of the difficulties of his experiments in enamelling, which lasted sixteen years, is well known. The great surgeon Ambrose Pare (c. 1510-1590) was also a writer, and his descrip- tions of his military experiences at Turin, Metz and elsewhere have all the charm of the 16th-century memoir. The only other writers who require special mention are Olivier de Serres (1539-1619), who composed, under the title of Theatre a" agriculture, a complete treatise on the various operations of rural economy, and Jacques du Fouilloux (1521-1580), who wrote on hunting {La Vinerie). Both became extremely popular and were fre- quently reprinted.

lyth-Cenlury Poetry. — It is not always easy or possible to make the end or the beginning of a literary epoch synchronize exactly with historical dates. It happens, however, that for M .. . once the beginning of the 17th century coincides almost exactly with an entire revolution in French literature. The change of direction and of critical standard given by Francois 1 de Malherbe (1 556-1628) to poetry was to last for two whole

centuries, and to determine, not merely the language and complexion, but also the form of French verse during the whole of that time. Accidentally, or as a matter of logical consequence (it would not be proper here to attempt to decide the question), poetry became almost synonymous with drama. It is true, as we shall have to point out, that there were, in the early part of the 17th century at least, poets, properly so called, of no con- temptible merit. But their merit, in itself respectable, sank in comparison with the far greater merit of their dramatic rivals. Theophile de Viau and Racan, Voiture and Saint-Amant cannot for a moment be mentioned in the same rank with Corneille. It is certainly curious, if it is not something more than curious, that this decline in poetry proper should have coincided with the so-called reforms of Malherbe. The tradition of respect for this elder and more gifted Boileau was at one time all-powerful in France, and, notwithstanding the Romantic movement, is still strong. In rejecting a large number of the importations of the Ronsardists, he certainly did good service. But it is difficult to avoid ascribing in great measure to his influence the origin of the chief faults of modern French poetry, and modern French in general, as compared with the older language. He pronounced against "poetic diction" as such, forbade the overlapping (enjambemenf) of verse, insisted that the middle pause should be of sense as well as sound, and that rhyme must satisfy eye as well as ear. Like Pope, he' sacrificed everything to "correctness," and, unluckily for French, the sacrifice was made at a time when no writer of an absolutely supreme order had yet appeared in the language. With Shakespeare and Milton, not to mention scores of writers only inferior to them, safely garnered, Pope and his followers could do us little harm. Corneille and Moliere unfortunately came after Malherbe. Yet it would be unfair to this writer, however badly we may think of his influence, to deny him talent, and even a certain amount of poetical inspiration. He had not felt his own influence, and the very influences which he despised and proscribed produced in him much tolerable and some admir- able verse, though he is not to be named as a poet with Regnier, who had the courage, the sense and the good taste to oppose and ridicule his innovations. Of Malherbe's school, Honorat de Bueil, marquis de Racan (1580-1670), and Francois de Maynard (1582-1646) were the most remarkable. The former was a true poet, though not a very strong one. Like his master, he is best when he follows the models whom that master contemned. Perhaps more than any other poet, he set the example of the classical alexandrine, the smooth and melodious but monotonous and rather effeminate measure which Racine was to bring to the highest perfection, and which his successors, while they could not improve its smoothness, were to make more and more monotonous until the

genius of Victor Hugo once more broke up its facile polish, supplied its stiff uniformity, and introduced vigour, variety, colour and distinctness in the place of its feeble sameness and its pale indecision. But the vigour, not to say the licence, of the 16th century could not thus die all at once. In Theophile de Viau (1591-1626) the early years of the 17th century had their Villon. The later poet was almost as unfortunate as the earlier, and almost as disreputable, but he had a great share of poetical and not a small one of critical power. The Uoile enrag&e under which he complains that he was born was at least kind to him in this respect; and his readers, after he had been forgotten for two centuries, have once more done him justice. Racan and Theophile were followed in the second quarter of the century by two schools which sufficiently well represented the tendencies of each. The first was that of Vincent Voiture (1598-1648), Isaac de Benserade (1612-1601), and other poets such as Claude de Maleville (1597-1647), author of La Belle Matineuse, who were connected more or less with the famous literary coterie of the Hotel de Rambouillet. Theophile was less worthily succeeded by a class, it can hardly be called a school of poets, some of whom, like Gerard Saint-Amant (1594-1660), wrote drinking songs of merit and other light pieces; others, like Paul Scarron (1610- 1660) and Sarrasin (1603? 4? s?-i654), devoted themselves rather to burlesque of serious verse. Most of the great dramatic authors of the time also wrote miscellaneous poetry, and there

was even an epic school of the most singular kind, in ridiculing and discrediting which Boileau for once did undoubtedly good service. The Pucelle of Jean Chapelain (1595-1674), the unfor- tunate author who was deliberately trained and educated for a poet, who enjoyed for some time a sort of dictatorship in French literature on the strength of his forthcoming work, and at whom from the day of its publication every critic of French literature has agreed to laugh, was the most famous and perhaps the worst of these. But Georges de Scudery (1601-1667) wrote an Alaric, the Pere le Moyne (1602-1671) a Saint Louis, Jean Desmarets de Saint-Sorlin (1595-1676), a dramatist and critic of some note, a Clovis, and Saint-Amant a Moise, which were not much better, though Theophile Gautier in his Grotesques has valiantly defended these and other contemporary versifiers. And indeed it cannot be denied that even the epics, especially Saint Louis, contain flashes of finer poetry than France was to produce for more than a century outside of the drama. Some of the lighter poets and classes of poetry just alluded to also produced some remarkable verse. The Pr&cieuses cf the Hotel Rambouillet, with all their absurdities, encouraged if they did not produce good literary work. In their society

there is no doubt that a great reformation of manners took place, if not of morals, and that the tendency to literature elegant and polished, yet not destitute of vigour, which marks the 17th century, was largely developed side by side with much scandal-mongering and anecdotage. Many of the authors whom these influences inspired, such as Voiture, Saint- Evremond and others, have been or will be noticed. But even such poets and wits as Antoine Baudouin de Senece' (1643-1737), Jean de Segrais (1624-1701), Charles Faulure de Ris, sieur de Charleval (1612-1693), Antoine Godeau (1605-1672), Jean Ogier de Gombaud (1 590-1 666), are not without interest in the history of literature; while if Charles Cotin (1604-1682) sinks below this level and deserves Moliere's caricature of him as Trissotin in Les Femmas savantes, Gilles de Menage (1630-1692) certainly rises above it, notwithstanding the companion satire of Vadius. Menage's name naturally suggests the Ana which arose at this time and were long fashionable, stores of endless gossip, some- times providing instruction and often amusement. The Guir- lande de Julie, in which most of the poets of the time celebrated Julie d'Angennes, daughter of the marquise de Rambouillet, is perhaps the best of all such albums, and Voiture, the typical poet of the coterie, was certainly the best writer of vers de societS who is known to us. The poetical war which arose between the Uranistes, the followers of Voiture, and the Jobistes, those of Benserade, produced reams of sonnets, epigrams and similar verses. This habit of occasional versification continued long. It led as a less important consequence to the rhymed Gazettes of Jean Loret (d. 1665), which recount in octosyllabic verse of a light and lively kind the festivals and court events of the early years of Louis XIV. It led also to perhaps the most remarkable non-dramatic poetry of the century, the Contes and Fables of Jean de la Fontaine (1621-1695). No French writer is better known than la Fontaine, and there is no need to dilate on his merits. It has been \vell said that he completes Moliere, and that the two together give something to French literature which no other literature possesses. Yet la Fontaine is after all only a writer of fabliaux, in the language and with the manners of his own century.

All the writers we have mentioned belong more or less to the first half of the century, and so do Valentin Conrart (1603-1675), Antoine Furetiere (1626-1688), Chapelle (Claude Emmanuel) l'Huillier (1626-1686), and others not worth special mention. The latter half of the century is far less productive, and the poetical quality of its production is even lower than the quantity. In it Boileau (1636-1711) is the chief poetical figure. Next to him can only be mentioned Madame Deshoulieres (1638-1694), Guillaume de Brebeuf

(1618-1661), the translator of Lucan, Philippe Quinault (1635-1688), the composer of opera libretti. Boileau's satire, where it has much merit, is usually borrowed direct from Horace. He had a certain faculty as a critic of the slashing order, and might have profitably used it if he had written in prose. But of his poetry it must be said, not so much that it is

Hardy.

bad, as that it is not, in strictness, poetry at all, and the same is generally true of all those who followed him.

iyth-Century Drama. — We have already seen how the medieval theatre was formed, and how in the second half of the 16th century it met with a formidable rival in the classical drama of Jodelle and Gamier. In 1588 mysteries had been prohibited, and with the prohibition of the mysteries the Confraternity of the Passion lost the principal part of its reason for existence. The other bodies and societies of amateur actors had already perished, and at length the Hotel de Bourgogne itself, the home of the con- fraternity, had been handed over to a regular troop of actors, while companies of strollers, whose life has been vividly depicted in the Roman comique of Scarron and the Capitaine Fracasse of Theophile Gautier, wandered all about the provinces. The old farce was for a time maintained or revived by Tabarin, a remark- able figure in dramatic history, of whom but little is known. The great dramatic author of the first quarter of the 17th century was Alexandre Hardy (1569-1631), who surpassed even Heywood in fecundity, and very nearly approached the por- tentous productiveness of Lope de Vega. Seven hundred is put down as the modest total of Hardy's pieces, but not much more than a twentieth of these exist in print. From these latter we can judge Hardy. They are hardly up to the level of the worst specimens of the contemporary Elizabethan theatre, to which, however, they bear a certain resemblance. Marston's Insatiate Countess and the worst parts of Chapman's Bussy d'Ambois may give English readers some notion of them. Yet Hardy was not totally devoid of merit. He imitated and adapted Spanish literature, which was at this time to France what Italian was in the century before and English in the century after, in the most indiscriminate manner. But he had a consider- able command

of grandiloquent and melodramatic expression, a sound theory if not a sound practice of tragic writing, and that peculiar knowledge of theatrical art and of the taste of the theatrical public which since his time has been the special posses- sion of the French playwright. It is instructive to compare the influence of his irregular and faulty genius with that of the regular and precise Malherbe. From Hardy to Rotrou is, in point of literary interest, a great step, and from Rotrou to Corneille a greater. Yet the theory of Hardy only wanted the genius of Rotrou and Corneille to produce the latter. Jean de Rotrou (1610-1650) has been called the French Marlowe, and there is a curious likeness and yet a curious contrast between the two poets. The best parts of Rotrou's two best plays, Venceslas and St Genest, are quite beyond comparison in respect of anything that preceded them, and the central speech of the last-named play will rank with anything in French dramatic poetry. Contemporary with Rotrou were other dramatic writers of considerable dramatic importance, most of them distinguished by the faults of the Spanish school, its declamatory rodomontade, its conceits, and its occasionally preposterous action. Jean de Schelandre (d. 1635) has left us a remarkable work in Tyr et Sidon, which exemplifies in practice, as its almost more remarkable preface by Francois Ogier defends in principle, the English-Spanish model. Theophile de Viau in Pyrame et Thisbe and in PasiphaS produced a singular mixture of the classicism of Gamier and the extra-vagancies of Hardy. Scudery in L' Amour tyrannique and other plays achieved a considerable success. The Marianne of Tristan (1601-1655) and the Sophonisbe of Jean de Mairet (1604-1686) are the chief pieces of their authors. Mairet resembles Marston in something more than his choice of subject. Another dramatic writer of some eminence is Pierre du Ryer (1606-1648). But the fertility of France at this moment in dramatic authors was immense; nearly 100 are enumerated in the first quarter of the century. The early plays of Pierre Corneille (1606-1684) showed all the faults of his contemporaries combined with merits to which none of them except Rotrou, and Rotrou himself only in part, could lay claim. His first play was Melile, a comedy, and in Clitandre, a tragedy, he soon pro- duced what may perhaps be not inconveniently taken as the typical piece of the school of Hardy. A full account of Corneille

xi. S

Rotrou.

Corneille.

Racine.

may be found elsewhere. It is sufficient to say here that his importance in French literature is quite as great in the way of influence and example as in the way of intellectual excellence. The Cid and the Menteur are respectively the first examples of French tragedy and comedy which can be called modern. But this influence and example did not at first find many imitators. Corneille was a member of Richelieu's band of five poets. Of the other four Rotrou alone deserves the title; the remaining three, the prolific abbe de Boisrobert, Guillaume Colletet (whose most valuable work, a MS. Lives of Poets, was never printed, and burnt by the Communards in 187 1), and Claude de Lestoile (1597-1651), are as dramatists worthy of no notice, nor were they soon followed by others more worthy. Yet before many years had passed the examples which Corneille had set in tragedy and in comedy were followed up by unquestionably the greatest comic writer, and by one who long held the position of the greatest tragic writer of France. Beginning with mere farces of the Italian type, and passing from these to comedies still of an Italian character, it was in Les Pricieuses ridicules, acted in 1659, that Moliere (1622-1673), in the words of a spectator, hit ,

at last on " la bonne comedie." The next fifteen years comprise the whole of his best known work, the finest expression beyond doubt of a certain class of comedy that any literature has produced. The tragic masterpieces of Racine (1 639-1 699) were not far from coinciding with the comic masterpieces of Moliere, for, with the exception of the remarkable aftergrowth of Esther and Athalie, they were produced chiefly between 1667 and 1677. Both Racine and Moliere fall into the class of writers who require separate mention. Here we can only remark that both to a certain extent committed and encouraged a fault which distinguished much subsequent French dramatic literature. This was the too great individualiz- ing of one point in a character, and the making the man or woman nothing but a blunderer, a lover, a coxcomb, a tyrant and the like. The very titles of French plays show this influence — they are Le Grondeur, Le Joueur, &c. The complexity of human character is ignored. This fault distinguishes both Moliere and Racine from writers of the very highest order; and in especial it distinguishes the comedy of Moliere and the tragedy of Racine from the comedy and tragedy of Shakespeare. In all probability this and other defects of the French drama (which are not wholly apparent in the work of Moliere and Corneille, are shown in their most favourable light in those of Racine, and appear in all their deformity in the successors of the latter) arise from the rigid adoption of the Aristotelian theory of the drama with its unities and other restrictions, especially as transmitted by Horace through Boileau. This adoption

was very much due to the in- fluence of the French Academy, which was founded unofficially by Conrart in 1629, which received official standing six years later, and which continued the tradition of Malherbe in attempting constantly to school and correct, as the Academy phrase went, the somewhat disorderly instincts of the early French stage. Even the Cid was formally censured for irregularity by it. But it is fair to say that Francois Hedelin, abbe d'Aubignac (1604-1676), whose Pratique du theatre is the most wooden of the critical treatises of the time, was not an academician. It is difficult to say whether the subordination of all other classes of composition to the drama, which has ever since been characteristic of French literature, was or was not due to the predilection of Richelieu, the main protector if not exactly the founder of the Academy, for the theatre. Among the immediate successors and later contemporaries of the three great dramatists we do not find any who deserve high rank as tragedians, though there are some whose comedies are more than respectable. It is at least significant that the restrictions im- posed by the academic theory on the comic drama were far less severe than those which tragedy had to undergo. The latter was practically confined, in respect of sources of attraction, to the dexterous manipulation of the unities; the interest of a plot attenuated as much as possible, and intended to produce, instead of pity a mild sympathy, and instead of terror a mild alarm I (for the purists decided against Corneille that "'admiration was not

a tragic passion ") ; and lastly the composition of long tirades of smooth but monotonous verses, arranged in couplets tipped with delicately careful rhymes. Only Thomas Corneille (1625- 1709), the inheritor of an older tradition and of a great name, deserves to be excepted from the condemnation to be passed on the lesser tragedians of this period. He was unfortunate in possessing his brother's name, and in being, like him, too volumin- ous in his compositions; but Camma, Ariane, Le Comtfi d' Essex, are not tragedies to be despised. On the other hand, the names of Jeande Campistron (1656-1723) and Nicolas Pradon (1632-1698) mainly serve to point injurious comparisons; Joseph Francois Duche (1668-1704) and Antoine La Fosse (1653-1708) are of still less importance, and Quinault's tragedies are chiefly remarkable because he had the good sense to give up writing them and to take to opera. The general excellence of

French comedy, on the other hand, was sufficiently vindicated. Besides the splendid sum of Moliere's work, the two great tragedians had each, in Lc Menteur and Les Plaideurs, set a capital example to their successors, which was fairly followed. David Augustin de Brueys (1640-1723) and Jean Palaprat (1650-1721) brought out once more the ever new Advocat Patelin besides the capital Croiideur already referred to. Quinault and Campistron wrote fair comedies. Florent Carton Dancourt (1661-1726), Charles Riviere Dufresny (c. i654-i724),EdmondBoursault (1638-1701), were all comic writers of considerable merit. But the chief comic dramatist of the latter period of the 17th century was Jean Francois Regnard (165 5-1 709), whose Joueur and .Ltgataire are comedies almost of the first rank.

17th-century Fiction. — In the department of literature which comes between poetry and prose, that of romance-writing, the 17th century, excepting one remarkable develop- Romaace. ment i was not very fertile. It devoted itself to so many new or changed forms of literature that it had no time to anticipate the modern novel. Yet at the beginning of the century one very curious form of romance-writing was diligently cultivated, and its popularity, for the time immense, prevented the introduction of any stronger style. It is remark- able that, as the first quarter of the 17th century was pre- eminently the epoch of Spanish influence in France, the distinctive satire of Cervantes should have been less imitated than the models which Cervantes satirized. However this may be, the romances of 1600 to 1650 form a class of literature vast, isolated, and, perhaps, of all such classes of literature most utterly obsolete and extinct. Taste, affectation or antiquarian diligence have, at one time or another, restored to a just, and sometimes a more than just, measure of reputation most of the literary relics of the past. Romances of chivalry, fabliaux, early drama, Provencal poetry, prose chronicles, have all had, and deservedly, their rebabilitators. But Polexandre and Cleopdtre, CUlie and the Grand Cyrus, have been too heavy for all the industry and energy of literary antiquarians. As we have already hinted, the nearest ancestry which can be found for them is the romances of the Amadis type. But the Amadis, and in a less degree its followers, although long, are long in virtue of incident. The romances of the Clelie type are long in virtue of interminable discourse, moralizing and description. Their manner is not unlike that of the Arcadia and the Euphues which preceded them in England; and they express in point of style the tendency which simultaneously manifested itself all over Europe at this period, and whose chief exponents were Gongora in Spain, Marini in Italy, and Lyly in England. Everybody knows the Carte de Tendre which originally

appeared in Clelie, while most people have heard of the shepherds and shepherdesses who figure in the Astree of Honore D'Urfe (1568-1625), on the borders of the Lignon; but here general knowledge ends, and there is perhaps no reason why it should go much further. It is sufficient to say that Madeleine de Scudery (1607-1701) principally devotes herself in the books above mentioned to laborious gallantry and heroism, La Calprenede (1610-1663) in Cassandre et Cleopdtre to something which might have been the historical novel if it had been constructed on a less preposterous scale, and Marin le Roy de Gomberville (1600-1647) in Polexandre

to moralizings and theological discussions on Jansenist principles, while Pierre Camus, bishop of Belley (1582-1652), in Palombe and others, approached still nearer to the strictly religious story. In the latter part of the century, the example of La Fontaine, though he himself wrote in poetry, helped to recall the tale- tellers of France to an occupation more worthy of them, more suitable to the genius of the literature, and more likely to last. The reaction against the Clelie school produced first Madame de Villedieu (Catherine Desjardins) (1632-1692), a fluent and facile novelist, who enjoyed great but not enduring popularity. The form which the prose tale took at this period was that of the fairy story. Perrault (1628-1703) and Madame d'Aulnoy (d. 1 705) composed specimens of this kind which have never ceased to be popular since. Hamilton (1646-17 20), the author of the well-known M&moires du comte de Gramont, wrote similar stories of extraordinary merit in style and ingenuity. There is yet a third class of prose writing which deserves to be mentioned. It also may probably be traced to Spanish influence, that is to say, to the picaresque romances which the 16th and 17th centuries produced in Spain in large numbers. The most remarkable example of this is the Roman comique of the burlesque writer Scarron. The Roman bourgeois of Antoine Furetiere (1610-1688) also deserves mention as a collection of pictures of the life of the time, arranged in the most desultory manner, but drawn with great vividness, observation and skill. A remarkable writer who had great influence on Moliere has also to be mentioned in this connexion rather than in any other. This is Cyrano de Bergerac (1619-1655), who, besides composing doubtful comedies and tragedies, writing political pamphlets, and exercising the task of literary criticism in objecting to Scarron's burlesques, produced in his Histoires comiques des etats et empires de la lune et du soleil, half romantic and half satirical compositions, in which some have seen the original of Gulliver's Travels, in which others have discovered only a not very successful imitation of Rabelais, and which, without attempting to decide these questions, may fairly be ranked in

the same class of fiction with the masterpieces of Swift and Rabelais, though of course at an immense distance below them. One other work, and in literary influence perhaps the most remarkable of its kind in the century, remains. Madame de Lafayette, Marie de la Vergne (1634-1692), the friend of La Rochefoucauld and of Madame de Sevigne, though she did not exactly anticipate the modern novel, showed the way to it in her stories, the principal of which are Za'ide and still more La Princesse de Cleves. The latter, though a long way from Manon Lescaut, Clarissa, or Tom Jones, is a longer way still from Polex- andre or the Arcadia. The novel becomes in it no longer a more or less fictitious chronicle, but an attempt at least at the display of character. La Princesse de Cleves has never been one of the works widely popular out of their own country, nor perhaps does it deserve such popularity, for it has more grace than strength; but as an original effort in an important direction its historical value is considerable. But with this exception, the art of fictitious prose composition, except on a small scale, is certainly not one in which the century excelled, nor are any of the masterpieces which it produced to be ranked in this class. 17th.-Cent.ury Prose. — If, however, this was the case, it cannot be said that French prose as a whole was unproductive at this time. On the contrary, it was now, and only now, j_ a de that it attained the strength and perfection for which Balzac and it has been so long renowned, and which has perhaps, modem by a curious process of compensation, somewhat preach deteriorated since the restoration of poetry proper in France. The prose Malherbe of French literature was Jean Guez de Balzac (1594-1654). The writers of the 17th century had practically created the literary language of prose, but they had not created a prose style. The charm of Rabelais, of Amyot, of Montaigne, and of the numerous writers of tales and memoirs whom we have noticed, was a charm of exuberance, of naivete, .of picturesque effect — in short, of a mixture of poetry and prose, rather than of prose proper. Sixteenth-century French prose is a delightful instrument in the hands of men and women of 1 genius, but in the hands of those who have not genius it is full

of defects, and indeed is nearly unreadable. Now, prose is essentially an instrument of all work. The poet who has not genius had better not write at all; the prose writer often may and sometimes must dispense with this qualification. He has need, therefore, of a suitable machine

to help him to perform his task, and this machine it is the glory of Balzac to have done more than any other person to create. He produced himself no great work, his principal writings being letters, a few discourses and dissertations, and a work entitled Le Socrale chretien, a sort of treatise on political theology. But if the matter of his work is not of the first importance, its manner is of a very different value. Instead of the endless diff useness of the preceding century, its ill-formed or rather unformed sentences, and its haphazard periods, we find clauses, sentences and paragraphs distinctly planned, shaped and balanced, a cadence introduced which is rhythmical but not metrical, and, in short, prose which is written knowingly instead of the prose which is unwittingly talked. It has been well said of him that he ” icrit pour ecrire “; and such a man, it is evident, if he does nothing else, sets a valuable example to those who write because they have something to say. Voiture seconded Balzac without much intending to do so. His prose style, also chiefly contained in letters, is lighter than that of his contemporary, and helped to gain for French prose the tradition of vivacity and sparkle which it has always possessed, as well as that of correctness and grace.

17th.-Cen.tury History. — In historical composition, especially in the department of memoirs, this period was exceedingly rich. At last there was written, in French, an entire history of France. The author was Francois Eudes de Mezeray (1610-1683), whose work, though not exhibiting the perfection of style at which some of his contemporaries had already arrived, and though still more or less uncritical, yet deserves the title of history. The example was followed by a large number of writers, some of extended works, some of histories in part. Mezeray himself is said to have had a considerable share in the Histoire du roi Henri le grand by the archbishop Perefixe (1605-1670); Louis Maimbourg (1610-1686) wrote histories of the Crusades and of the League; Paul Pellisson (1624-1693) gave a history of Louis XIV. and a more valuable Memoire in defence of the superintendent Fouquet. Still later in the century, or at the beginning of the next, the Pere d’Orleans (1644-1698) wrote a history of the revolutions of England, the Pere Daniel (1649-1728), like d’Orleans a Jesuit, composed a lengthy history of France and a shorter one on the French military forces. Finally, at the end of the period, comes the great ecclesiastical history of Claude Fleury (1640- 1723), a work which perhaps belongs more to the section of erudition than to that of history proper. Three small treatises, however, composed by different authors towards the middle part of the century, supply remarkable instances of prose style in its application to history. These are the Conjurations du comte de Fiesque, written by the famous Cardinal de

Retz (1613-1679), the Conspiration de Walstein of Sarrasin, and the Conjuration des Espagnols contre Venise, composed in 1672 by the abbe de Saint-Real (1639-1692), the author of various historical and critical works deserving less notice. These three works, whose similarity of subject and successive composition at short intervals leave little doubt that a certain amount of intentional rivalry animated the two later authors, are among the earliest and best examples of the monographs for which French, in point of grace of style and lucidity of exposition, has long been the most successful vehicle of expression among European languages. Among other writers of history, as distinguished from memoirs, need only be noticed Agrippa d'Aubigne, whose Histoire universelle closed his long and varied list of works, and Varillas (1624-1696), a historian chiefly remarkable for his extreme untrustworthiness. In point of memoirs and correspondence the period is hardly less fruitful than that which preceded it. The Rigistres-J ournaux of Pierre de l'Etoile (1 540-161 1) consist of a diary something of the Pepys character, kept for nearly forty years by a person in high official employment. The memoirs of Sully (1560-1641), published under a curious title too long to quote, date also from this time.

Henri IV. himself has left a considerable correspondence, which is not destitute of literary merit, though not equal to the memoirs of his wife. What are commonly called Richelieu'? Memoirs were probably written to his order; his Testament politique may be his own. Henri de Rohan (1579-1638) has not memoirs of the first value. Both this and earlier times found chronicle in the singular Historiettes of Gedeon Tallemant des Reaux (1619-1690), a collection of anecdotes, frequently scandal- ous, reaching from the times of Henri IV. to those of Louis XIV., to which may be joined the letters of Guy Patin (1602-1676). The early years of the latter monarch and the period of the Fronde had the cardinal de Retz himself, than whom no one was certainly better qualified for historian, not to mention a crowd of others, of whom we may mention Madame de Motte- ville (1621-1689), Jean H6rault de Gourville (1625-1703), Mademoiselle de Montpensier (" La Grande Mademoiselle ") (1627-1693), Conrart, Turenne and Mathieu Mole (1584-1663), Francois du Val, marquis de Fontenay-Mareuil (1594-1655), Arnauld d'Andilly (1588-1670). From this time memoirs and memoir writers were ever multiplying. The queen of them all is Madame de Sevigne (1 626-1 696), on whom, as on most of the great and better-known writers whom we have had and shall have to mention, it is impossible here to dwell at length. The last half of the century produced crowds of similar but inferior writers. The memoirs of Roger de Bussy-Rabutin (1618-1693) (author of a

kind of scandalous chronicle called Histoire amou- reuse des Gaules) and of Madame de Maintenon (1635-1719) perhaps deserve notice above the others. But this was in truth the style of composition in which the age most excelled. Memoir- writing became the occupation not so much of persons who made history, as was the case from Comines to Retz, as of those who, having culture, leisure and opportunity of observation, devoted themselves to the task of recording the deeds of others, and still more of regarding the incidents of the busy, splendid and cultivated if somewhat frivolous world of the court, in which, from the time of Louis XIV. 's majority, the political life of the nation and almost its whole history were centred. Many, if not most, of these writers were women, who thus founded the cele- brity of the French lady for managing her mother-tongue, and justified by results the taste and tendencies of the blue- stockings and precieuses of the H6tel Rambouillet and similar coteries. The life which these writers saw before them furnished them with a subject to be handled with the minuteness and care to which they had been accustomed in the ponderous romances of the Clelie type, but also with the wit and terseness hereditary in France, and only temporarily absent in those ponderous compositions. The efforts of Balzac and the Academy supplied a suitable language and style, and the increasing tendency towards epigrammatic moralizing, which reached its acme in La Rochefoucauld (1663-1680) and La Bruyere (1639-1696), added in most cases point and attractiveness to their writings.

I7lh-Century Philosophers and Theologians. — To these moralists we might, perhaps, not inappropriately pass at once. But it seems better to consider first the philosophical and _ theological developments of the age, which must share with its historical experiences and studies the credit of producing these writers. Philosophy proper, as we have already had occasion to remark, had hitherto made no use of the vulgar tongue. The 16th century had contributed a few vernacular treatises on logic, a considerable body of political and ethical writing, and a good deal of sceptical speculation of a more or less vague character, continued into our present epoch by such writers as Francois de la Mothe le Vayer (1588-1672), the last representative of the orthodox doubt of Montaigne and Charron. But in metaphysics proper it had not dabbled. The 1 7th century, on the contrary, was to produce in Ren6 Descartes (1 596-1 650), at once a master of prose style, the greatest of French philosophers, and one of the greatest metaphysicians, not merely of France and of the 17th century, but of all countries and times. Even before Descartes there had been considerable and important developments of metaphysical speculation in France. The first I eminent philosopher of French birth was Pierre

Gassendi (1592-

1655). Gassendi devoted himself to the maintenance of a modernized form of the Epicurean doctrines, but he wrote mainly, if not entirely, in Latin. Another sceptical philosopher of a less scientific character was the physicist Gabriel Naude (1600-1653), who, like many others of the philosophers of the time, was accused of atheism. But as none of these could approach Descartes in philosophical power and originality, so also none has even a fraction of his importance in the history of French literature. Descartes stands with Plato, and possibly Berkeley and Malebranche, at the head of all philosophers in respect of style; and in his case the excellence is far more remarkable than in others, inasmuch as he had absolutely no models, and was forced in a great degree to create the language which he used. The Discours de la methode is not only one of the epoch- making books of philosophy, it is also one of the epoch-making books of French style. The tradition of his clear and perfect expression was taken up, not merely by his philosophical disciples, but also by Blaise Pascal (1623-1662) and the school of Port Royal, who will be noticed presently. The very genius of the Cartesian philosophy was intimately connected with this clearness, distinctness and severity of style; and there is something more than a fanciful contrast between these literary characteristics of Descartes, on the one hand, and the elaborate splendour of Bacon, the knotty and crabbed strength of Hobbes, and the commonplace and almost vulgar slovenliness of Locke. Of the followers of Descartes, putting aside the Port Royalists, by far the most distinguished, both in philosophy and in literature, is Nicolas Malebranche (1638-1715). His Recherche braacbe. de ˆ a “ˆ r »ˆi admirable as it is for its subtlety and its consecutiveness of thought, is equally admirable for its elegance of style. Malebranche cannot indeed, like his great master, claim absolute originality. But his excellence as a writer is as great as, if not greater than, that of Descartes, and the Recherche remains to this day the one philosophical treatise of great length and abstruseness which, merely as a book, is delight- ful to read— not like the works of Plato and Berkeley, because of the adventitious graces of dialogue or description, but from the purity and grace of the language, and its admirable adjust- ment to the purposes of the argument. Yet, for all this, philo- sophy hardly flourished in France. It was too intimately connected with theological and ecclesiastical questions, and especially with Jansenism, to escape suspicion and persecution. Descartes himself was for much of his life an exile in Holland and Sweden; and

though the unquestionable orthodoxy of Malebranche, the strongly religious cast of his works, and the remoteness of the abstruse region in which he sojourned from that of the controversies of the day, protected him, other followers of Descartes were not so fortunate. Holland, indeed, became a kind of city of refuge for students of philosophy, though even in Holland itself they were by no means entirely safe from persecution. By far the most remarkable of French philosophical Bayle sojourners in the Netherlands was Pierre Bayle (1647-1706), a name not perhaps of the first rank in respect of literary value, but certainly of the first as regards literary influence. Bayle, after oscillating between the two confessions, nominally remained a Protestant in religion. In philosophy he in the same manner oscillated between Descartes and Gassendi, finally resting in an equally nominal Cartesianism. Bayle was, in fact, both in philosophy and in religion, merely a sceptic, with a scepticism at once like and unlike that of Montaigne, and differenced both by temperament and by circumstance — the scepticism of the mere student, exercised more or less in all histories, sciences and philosophies, and intellectually unable or unwilling to take a side. His style is hardly to be called good, being diffuse and often inelegant. But his great dictionary; though one of the most heterogeneous and unmethodical of compositions, exercised an enormous influence. It may be called the Bible of the 18th century, and contains in the germ all the desultory philosophy, the ill-ordered scepticism, and the critical but negatively critical acuteness of the Aufkldrung.

We have said that the philosophical, theological and moral tendencies of the century, which produced, with the exception

Jan. senlsts.

Port Royal

Pascal.

of its dramatic triumphs, all its greatest literary works, are almost inextricably intermingled. Its earliest years, however, bear in theological matters rather the complexion of the previous century. Du Perron and St Francis of Sales survived until nearly the end of its first quarter, and the most remarkable works of the latter bear the dates of 1608 and later. It was not, however, till some years had passed, till the counter-Reformation had reconverted the largest and most powerful portion of the Huguenot party, and till the influence of Jansenius and Descartes had time to work, that the extraordinary outburst of Gallican theology, both in pulpit and in press, took place.

The Jansenist controversy may perhaps be awarded the merit of provoking this, as far as writing was concerned. The astonishing eloquence of contemporary pulpit oratory may be set down partly to the zeal for conversion of which du Perron and de Sales had given the example, partly to the same taste of the time which encouraged dramatic performances, for the sermon and the tirade have much in common. Jansenius' himself, though a Dutchman by birth, passed much time in France, and it was in France that he found most disciples. These disciples consisted in the first place of the members of the society of Port Royal des Champs, a coterie after the fashion of the time, but one which devoted itself not to sonnets or madrigals but to devotional exercises, study and the teaching of youth. This coterie early adopted the Cartesian philosophy, and the Port Royal Logic was the most remarkable popular hand-book of that school. In theology they adopted Jansenism, and were in consequence soon at daggers drawn with the Jesuits, according to the polemical habits of the time. The most dis- tinguished champions on the Jansenist side were Jean Duvergier de Hauranne, abbe de St Cyran(is8i-i643), and Antoine Arnauld (1 560-1619), but by far the most important literary results of the quarrel were the famous Provinciales of Pascal, or, to give them their proper title, Lettres forties a un provincial. Their literary importance consists, not merely in their grace of style, but in the application to serious discussion of the peculiarly polished and quiet irony of which Pascal is the greatest master the world has ever seen. Up to this time controversy had usually been conducted either in the mere bludgeon fashion of the Scaligers and Saumaises — of which in the vernacular the Jesuit Francois Garasse (1585-1631) had already contributed remarkable examples to literary and moral controversy — or else in a dull and legal style, or lastly under an envelope of Rabelaisian buffoonery such as survives to a considerable extent in the Satire Minippee. Pascal set the example of combining the use of the most terribly effective weapons with good humour, good breeding and a polished style. The example was largely followed, and the manner of Voltaire and his followers in the 18th century owes at least as much to Pascal as their method and matter do to Bayle. The Jansenists, attacked and persecuted by the civil power, which the Jesuits had contrived to interest, were finally suppressed. But the Provinciales had given them an unapproachable superiority in matter of argument and literature. Their other literary works were inferior, though still remarkable. Antoine Arnauld (the younger, often called " the great ") (1612-1694) and Pierre Nicole (1625-1695) managed their native language with vigour if not exactly with grace. They maintained their orthodoxy by writings, not merely against the Jesuits, but also against the Protestants such as the Per- pituitt de la foi due to both, and the

Apologie des Catholiques written by Arnauld alone. The latter, besides being responsible for a good deal of the Logic (L' Art de penser) to which we have alluded, wrote also much of a Grammaire gSnirale composed by the Port Royalists for the use of their pupils; but his principal devotion was to theology and theological polemics. To the latter Nicole also contributed Les Visionnaires, Les Imaginaires and other works. The studious recluses of Port Royal also produced a large quantity of miscellaneous literary work, to which full justice has been done in Sainte-Beuve's well-known volumes.

i?th-Century Preachers. — When we think of Gallican theology during the 17 th century, it is always with the famous pulpit orators of the period that thought is most busied. Nor is this

unjust, for though the most prominent of them all, Jacques Benigne Bossuet (1627-1704) was remarkable as a writer of matter intended to be read, not merely as a speaker of matter intended to be heard, this double character is not possessed by most of the orthodox theologians of the time; and even Bossuet, great as is his genius, is more of a rhetorician than of a philosopher or a theologian. In no quarter was the advance of culture more remarkable in France than in the pulpit. We have already had occasion to notice the characteristics of French pulpit eloquence in the 15th and 16th centuries. Though this was very far from destitute of vigour and imagination, the political frenzy of the preachers, and the habit of introducing anecdotic buf- foonery, spoilt the eloquence of Maillard and of Raulin, of Boucher and of Rose. The powerful use which the Reformed ministers made of the pulpit stirred up their rivals; the advance in science and classical study added weight and dignity to the matter of their discourses. The improvement of prose style and language provided them with a suitable instrument, and the growth of taste and refinement purged their sermons of grossness and buffoonery, of personal allusions, and even, as the monarchy became more absolute, of direct political purpose. The earliest examples of this improved style were given by St Francis de Sales and by Fenouillet, bishop of Marseilles (d. 1652); butjt was not till the latter half of the century, when the troubles of the Fronde had completely subsided, and the church was estab- lished in the favour of Louis XIV., that the full efflorescence of theological eloquence took place. There were at the time pulpit orators of considerable excellence

in England, and perhaps Jeremy Taylor, assisted by the genius of the language, has wrought a vein more precious than any which the somewhat academic methods and limitations of the French teachers allowed them to reach. But no country has ever been able to show a more magnificent concourse of orators, sacred or profane, than that formed by Bossuet, Fenelon (1651-1715), Esprit Flechier (1632-1710), Jules Mascaron (1634-1703), Louis Bourdaloue (1632-1704), and Jean Baptiste Massillon (1663-1742), to whom may be justly added the Protestant divines, Jean Claude (161 9-1687) and Jacques Saurin (1 67 7-1 730) . The characteristics of all these were different. Bossuet, the earliest and certainly the greatest, was also the most universal. He was not merely a preacher; he was, as we have said, a controversialist, indeed somewhat too much of a con- troversialist, as his battle with Fenelon proved. He was a philosophical or at least a theological historian, and his Discours sur I'histoire universelle is equally remarkable from the point of view of theology, philosophy, history and literature. Turning to theological politics, he wrote his Politique tirie de Vecriture sainte, to theology proper his Meditations sur les evangiles and his Elevations sur les mysleres. But his principal work, after all, is his Oraisons fumbres. The funeral sermon was the special oratorical exercise of the time. Its subject and character in- vited the gorgeous if somewhat theatrical commonplaces, the display of historical knowledge and parallel, and the moralizing analogies, in which the age specially rejoiced. It must also be noticed, to the credit of the preachers, that such occasions gave them an opportunity, rarely neglected, of correcting the adulation which was but too frequently characteristic of the period. The spirit of these compositions is fairly reflected in the most famous and often quoted of their phrases, the opening " Mes freres, Dieu seul est grand " of Massillon's funeral discourse on Louis XIV. ; and though panegyric is necessarily by no means absent, it is rarely carried beyond bounds. While Bossuet made himself chiefly remarkable in his sermons and in his writings by an almost Hebraic grandeur and rudeness, the more special character- istics of Christianity, largely alloyed with a Greek and Platonic Fiaclon s P' r >t> displayed themselves in Fenelon. In pure literature he is not less remarkable than in theology, politics and morals. His practice in matters of style was admir- able, as the universally known TeUmaque sufficiently shows to those who know nothing else of his writing. But his taste, both in its correctness and its audacity, is perhaps more admirable still. Despite of Malherbe, Balzac, Boileau and the traditions

Bossuet.

of nearly a century, he dared to speak favourably of Ronsard, and

plainly expressed his opinion that the practice of his own contemporaries and predecessors had cramped and impoverished the French language quite as much as they had polished or puri- fied it. The other doctors whom we have mentioned were more purely theological than the accomplished archbishop of Cambray. Flechier is somewhat more archaic in style than Bossuet or Fenelon, and he is also more definitely a rhetorician than either. Mascaron has the older fault of prodigal and somewhat indis- criminate erudition. But the two latest of the series, Bourdaloue and Massillon, had far the greatest repute in their own time purely as orators, and perhaps deserved this preference. The differ- ence between the two repeated that between du Perron and de Sales. Bourdaloue's great forte was vigorous argument and unsparing denunciation, but he is said to have been lacking in the power of influencing and affecting his hearers. His attraction was purely intellectual, and it is reflected in his style, which is clear and forcible, but destitute of warmth and colour. Massillon, on the other hand, was remarkable for his pathos, and for his power of enlisting and influencing the sympathies of his hearers. Of minor preachers on the same side, Charles de la Rue, a Jesuit (1643-1725), and the Pere Cheminais (1652-1680), according to a somewhat idle form of nomenclature, " the Racine of the pulpit," may be mentioned. The two Protestant ministers whom we have mentioned, though inferior to their rivals, yet deserve honourable mention among the ecclesiastical writers of the period. Claude engaged in a controversy with Bossuet, in which victory is claimed for the invincible eagle of Meaux. Saurin, by far the greater preacher of the two, long continued to occupy, and indeed still occupies, in the libraries of French Protestants, the position given to Bossuet and Massillon on the other side.

ifth-Century Moralists. — It is not surprising that the works of Montaigne and Charron, with the immense popularity of the former, should have inclined the more thoughtful minds in France to moral reflection, especially as many other influences, both direct and indirect, contributed to produce the same result. The constant tendency of the refinements in French prose was towards clearness, succinctness and precision, the qualities most necessary in the moralist. The characteristics of the prevailing philosophy, that of Descartes, pointed in the same direction. It so happened, too, that the times were more favour- able to the thinker and writer on ethical subjects than to the speculator in philosophy proper, in theology or in politics. Both the former subjects exposed their cultivators, as we have seen, to the suspicion of unorthodoxy; and to political specula- tion of any kind the rule of Richelieu, and still more that of Louis XIV., were

in the highest degree unfavourable. No successors to Bodin and du Vair appeared; and even in the domain of legal writings, which comes nearest to that of politics, but few names of eminence are to be found.

Only the name of Omer-Talon (1 595-1652) really illustrates the legal annals of France at this period on the bench, and that of Olivier Patru (1604-1681) at the bar. Thus it happened that the interests of many different classes „ˆl e f 1 ‘ of persons were concentrated upon moralizings, which writing. took indeed very different forms in the hands of Pascal and other grave and serious thinkers of the Jansenist complexion in theology, and in those of literary courtiers like Saint-Evremond (16T3-1703) and La Rochefoucauld, whose chief object was to depict the motives and characters prominent in the brilliant and not altogether frivolous society in which they moved. Both classes, however, were more or less tempted by the cast of their thoughts and the genius of the language to adopt the tersest and most epigrammatic form of expression possible, and thus to originate the ” pensee ” in which, as its greatest later writer, Joubert, has said, ” the ambition of the author is to put a book into a page, a page into a phrase, and a phrase into a word.” The great genius and admirable style of Pascal are certainly not less shown in his Pensies than in his Provinciates, though perhaps the literary form of the former is less strikingly supreme than that of the latter. The author is more dominated by his

subject and dominates it less. Nicole, a far inferior writer as well as thinker, has also left a considerable number of Pensees, which have about them something more of the essay and less of the aphorism. They are, however, though not comparable to Pascal, excellent in matter and style, and go far to justify Bayle in calling their author ” l’une des plus belles plumes de l’Europe.” In sharp contrast with these thinkers, who are invariably not merely respecters of religion but ardently and avowedly religious, who treat morality from the point of view of the Bible and the church, there arose side by side with them, or only a little later, a very different group of moralists, whose writings have been as widely read, and who have had as great a practical and literary influence as perhaps any other class of authors. The earliest to be born and the last to die of these was Charles de Saint-Denis, seigneur de saint- Evremond (1613- 1703). Saint-Evremond was long known rather as a ivremond. conversational wit,

seme of whose good things were handed about in manuscript, or surreptitiously printed in foreign lands, than as a writer, and this is still to a certain extent his reputation. He was at least as cynical as his still better known contemporary La Rochefoucauld, if not more so, and he had less intellectual force and less nobility of character. But his wit was very great, and he set the example of the brilliant societies of the next century. Many of Saint-Evremond's printed works are nominally works of literary criticism, but the moralizing spirit pervades all of them. No writer had a greater influence on Voltaire, and through Voltaire on the whole course of French literature after him. In direct literary value, however, no comparison can be made between Saint-Evremond and the author of the Sentences et maximes morales. Francois, due de la Rochefoucauld (1613-1680), has other literary claims besides those of this famous book. His Memoir es foucauid." were verv favourably judged by his contemporaries, and they are still held to deserve no little praise even among the numerous and excellent works of the kind which that age of memoir-writers produced. But while the MSmoires thus invite comparison, the Maximes et sentences stand alone. Even allowing that the mere publication of detached reflections in terse language was not absolutely new, it had never been carried, perhaps has never since been carried, to such a perfection. Beside La Rochefoucauld all other writers are diffuse, vacillating, unfinished, rough. Not only is there in him never a word too much, but there is never a word too little. The thought is always fully expressed, not compressed. Frequently as the metaphor of minting or stamping coin has been applied to the art of manag- ing words, it has never been applied so appropriately as to the maxims of La Rochefoucauld. The form of them is almost beyond praise, and its excellencies, combined with their immense and enduring popularity, have had a very considerable share in influencing the character of subsequent French literature. Of hardly less importance in this respect, though of considerably less intellectual and literary individuality, was the translator of Theophrastus and the author of the Caracteres, La Bruyere. Jean de la Bruyere (1645-1696), though frequently Bruyere. epigrammatic, did not aim at the same incredible terseness as the author of the Maximes. His plan did not, indeed, render it necessary. Both in England and in France there had been during the whole of the century a mania for character writing, both of the general and Theophrastic kind, and of the historical and personal order. The latter, of which our own Clarendon is perhaps the greatest master, abound in the French memoirs of the period. The former, of which the naive sketches of Earle and Overbury are English examples, culminated in those of La Bruyere, which are not only light and easy in manner and matter, but also in style essentially amusing,

though instructive as well. Both he and La Rochefoucauld had an enduring effect on the literature which followed them — an effect perhaps superior to that exercised by any other single work in French, except the Roman de la rose and the Essais of Montaigne. 17th-century Savants. — Of the literature of the 17th century there only remains to be dealt with the section of those writers who devoted themselves to scientific pursuits or to antiquarian

erudition of one form or another. It was in this century that literary criticism of French and in French first began to'be largely composed, and after this time we shall give it a separate heading. It was very far, however, from attaining the excellence or observing the form which it afterwards assumed. The institution of the Academy led to various linguistic works. One of the earliest of these was the Remarques of the Savoyard Claude Favre de Vaugelas (1595-1650), afterwards re-edited by Thomas Corneille. Pellisson wrote a history of the Academy itself when it had as yet but a brief one. The famous Examen du Cid was an instance of the literary criticism of the time which was afterwards represented by Ren6 Rapin (1621-1687), Dominique Bouhours (1628-1702) and Rene de Bossu (1631-1680), while Adrien Baillet (1649-1706) has collected the largest thesaurus of the subject in his Jugemens des savants. Boileau set the example of treating such subjects in verse, and in the latter part of the century Reflexions, Discourses, Observations, and the like, oh particular styles, literary forms and authors, became exceed- ingly numerous. In earlier years France possessed a numerous band- of classical scholars of the first rank, such as Scaliger and Casaubon, who did not lack followers. But all or almost all this sort of work was done in Latin, so that it contributed little to French literature properly so-called, though the translations from the classics of Nicolas Perrot d'Ablancourt (1 606-1 664) have always taken rank among the models of French style. On the other hand, mathematical studies were pursued by persons of far other arid far greater genius, and, taking from this time forward a considerable position in education and literature in France, had much influence on both. The mathematical dis- coveries of Pascal and Descartes are well known. Of science proper, apart from mathematics, France did not produce many distinguished cultivators in this century. The philosophy of Descartes was not on the whole favourable to such investigations, which were in the next century to be pursued with ardour. Its tendencies found more congenial vent and are more thoroughly exemplified in the famous quarrel between the Ancients _ , and the Moderns. This, of Italian origin, was mainly V ersy started in France by Charles Perrault (1628-1703), between who thereby rendered much less service to literature Ancieats than by his charming

fairy tales. The opposite side ˆoiems. was taken by Boileau, and the fight was afterwards revived by Antoine Houdar[d, t] de la Motte (1672-1731), a writer of little learning but much talent in various ways, and by the celebrated Madame Dacier, Anne Lefevre (16547-1720). The discussion was conducted, as is well known, without very much knowledge or judgment among the disputants on the one side or on the other. But at this very time there were in France students and scholars of the most profound erudition. We have already mentioned Fleury and his ecclesiastical history. But Fleury is only the last and the most popular of a race of omnivorous and untiring scholars, whose labours have ever since, until the modern fashion of first-hand investigations came in, furnished the bulk of historical and scholarly references and quotations. To this century belong le Nain de Tillemont (1637- 1698), whose enormous Histoire des empereurs and Memoir es pour servir a I'histoire ecclisiastique served Gibbon and a hundred others as quarry; Charles Dufresne, seigneur de Ducange (1614-1688), whose well-known glossary was only one of numerous productions; Jean Mabillon (1632-1707), one of the most voluminous of the voluminous Benedictines; and Bernard de Montfaucon (1655-1741), chief of all authorities of the dry-as-dust kind on classical archaeology and art.

Opening of the 18th Century. — The beginning of the 18th century is among the dead seasons of French literature. All the greatest men whose names had illustrated the early reign of Louis XIV. in profane literature passed away long before him, and the last if the least of them, Boileau and Thomas Corneille, only survived into the very earliest years of the new age. The political and military disasters of the last years of the reign were accompanied by a state of things in society unfavourable to literary development. The devotion to pure literature and philo- sophy proper which Descartes and Corneille had inspired had

died out, and the devotion to physical science, to sociology, and to a kind of free-thinking optimism which was to inspire Voltaire and the Encyclopedists had not yet become fashionable. Fenelon and Malebranche still survived, but they were emphatic- ally men of the last age, as was Massillon, though he lived till nearly the middle of the century. The characteristic literary figures of the opening years of the

period are d'Aguesseau, Fontenelle, Saint-Simon, personages in many ways interesting and remarkable, but purely transitional in their characteristics. Bernard le Bovier de Fontenelle (1657-1757) is, indeed, perhaps the most typical figure of the time. He was a dramatist, a moralist, a philosopher, physical and metaphysical, a critic, an historian, a poet and a satirist. The manner of his works is always easy and graceful, and their matter rarely contemptible.

i8th-Century Poetry. — The dispiriting signs shown during the 17 th century by French poetry proper received entire fulfilment in the following age. The two poets who were most prominent at the opening of the period were the abbe de Chaulieu (1639- 1720) and the marquis de la Fare (1644-17 12), poetical or rather versifying twins who are always quoted together. They were both men who lived to a great age, yet their characteristics are rather those of their later than of their earlier contemporaries. They derive on the one hand from the somewhat trifling school of Voiture, on the other from the Bacchic sect of Saint-Amant; and they succeed in uniting the inferior qualities of both with the cramped and impoverished though elegant style of which Fenelon had complained. Their compositions are as a rule lyrical, as lyrical poetry was understood after the days of Malherbe — that is to say, quatrains of the kind ridiculed by Moliere, and Pindaric odes, which have been justly described as made up of alexandrines after the manner of Boileau cut up into shorter or longer lengths. They were followed, however, by the one poet who succeeded in producing something resembling poetry in this artificial style, J. B. Rousseau (1671-1741). Rousseau. Rousseau, who in some respects was nothing so little as a religious poet, was nevertheless strongly influenced, as Marot had been, by the Psalms of David. His Odes and his Cantates are perhaps less destitute of that spirit than the work of any other poet of the century excepting Andre Chenier. Rousseau was also an extremely successful epigrammatist, having in this respect, too, resemblances to Marot. Le Franc de Pompignan (1709-1784), to whom Voltaire's well-known sarcasms are not altogether just, and Louis Racine (1692-1763), who wrote pious and altogether forgotten poems, belonged to the same poetical school; though both the style and matter of Racine are strongly tinctured by his Port Royalist sympathies and education. Lighter verse was represented in the 18th century by the long-lived Saint-Aulaire (1643-1742), by Gentil Bernard (i7io-i775),by the abbe (afterwards cardinal) de Bernis (1715-1794), by Claude Joseph Dorat (1734-1780), by Antoine Bertin (1752-1790) and by Evariste de Parny (1753-1814), the last the most vigorous, but all somewhat deserving the term applied to Dorat of ver luisant du Parnqsse. The jovial traditions of Saint-Amant begat a

similar school of anacreontic songsters, which, represented in turn by Charles Francois Panard (1674- 1765), Charles Colle (1709-1783), Armand Gouffe (1775-1845), and Marc-Antoine-Madeleine Desaugiers (1 7 7 2-182 7) , led directly to the best of all such writers, Beranger. To this class Rouget de Lisle (1 760-1836) perhaps also belongs; though his most famous composition, the Marseillaise, is of a different stamp. Nor is the account of the light verse of the 18th century complete without reference to a long succession of fable writers, who, in an unbroken chain, connect La Fontaine in the 17th century with Viennet in the 19th. None of the links, however, of this chain, with the exception of Jean Pierre Florian (1759-1794) deserve much attention. The universal faculty of Voltaire (1694-1778) showed itself in his poetical productions no less than in his other works, and it is perhaps not least remarkable in verse. It is impossible nowadays to regard the Henriade as anything but a highly successful prize poem, but the burlesque epic of La Pucelle, discreditable as it may be from the moral point of view, is remarkable enough as literature.

Voltaire (poetry).

Chialer.

The epistles and satires are among the best of their kind, the verse tales are in the same way admirable, and the epigrams, impromptus, and short miscellaneous poems generally are the ne plus ultra of verse which is not poetry. The Anglomania of the century extended into poetry, and the Seasons of Thomson set the example of a whole library of tedious descriptive verse, which in its turn revenged France upon England by producing or helping to produce English poems of the Darwin school. The first of these descriptive performances was the Saisons of Jean Francois de Saint-Lambert (17 16-1803), identical in title with its model, but of infinitely inferior value. Saint- Lambert was followed by Jacques Delille (-1738-1813) in Les Jardins, Antoine Marin le Mierre (1723-1793) in Les Pastes, and Jean Antoine Roucher (745-1794) in Les Mois. Indeed, everything that could be described was seized upon by these describers. Delille also trar “slated the Georgics, and for a time was the greatest living poet of France, the title being only dis- puted by Escouchard le B un (1729-1807), a lyrist and ode writer of the school of J. B. Fousseau, but not destitute of energy. The only other poets until Chenier who deserve notice are Nicolas Gilbert (1751-1780) — the French Chatterton, or per- haps rather the French Oldham, who died in a workhouse at twenty-nine after producing some vigorous satires and, at the point of death, an elegy of great beauty; Jacques Charles Louis Clinchaut de Malfilatre (173 2-1 767), another short-lived poet whose ” Ode to the Sun ” has

a certain stateliness; and Jean Baptiste Gresset (1 709-1 777), the author of Ver- Vert and of other poems of the lighter order, which are not far, if at all, below the level of Voltaire. Andre Chenier (1762-1794) stands far apart from the art of his century, though the strong chain of custom, and his early death by the guillotine, prevented him from breaking finally through the restraints of its language and its versification. Chenier, half a Greek by blood, was wholly one in spirit and sentiment. The manner of his verses, the very air which surrounds them and which they diffuse, are different from those of the 18th century; and his poetry is probably the utmost that its language and versification could produce. To do more, the revolution which followed a generation after his death was required.

i8th-Century Drama. — The results of the cultivation of dramatic poetry at this time were even less individually remarkable than those of the attention paid to poetry proper. Here again the astonishing power and literary aptitude of Voltaire gave value to his attempts in a style which, notwithstanding that it counts Racine among its practitioners, was none the less predestined to failure. Voltaire's own efforts in this kind are indisputably as successful as they could be. Foreigners usually prefer Mahomet and Zaire to Bajazet and Mithridate, though there is no doubt that no work of Voltaire's comes up to Polyeucte and Rodogune, as certainly no single passage in any of his plays can approach the best passages of Cinna and Les Horaces. But the remaining tragic writers of the century, with the single exception of Crebillon pere, are scarcely third-rate. C. Jolyot de Crebillon (1674-1762) himself had genius, and there are to be found in his work evidences of a spirit which had seemed to die away with Saint-Genest, and was hardly to revive until Hernani. Of the imitators of Racine and Voltaire, La Motte in Inesde Castro was not wholly unsuccess- ful. Francois Joseph de la Grange- Chancel (1677-1758) copied chiefly the worst side of the author of Britannicus, and Bernard Joseph Saurin (1706-1781) and Pierre-Laurent de Belloy (1727.-1775) performed the same service for Voltaire. Le Mierre and La Harpe, mentioned and to be mentioned, were tragedians; but the Iphigenie en Tauride of Guimond de la Touche (1725-1760) deserves more special mention than anything of theirs. There was an infinity of tragic writers and tragic plays in this century, but hardly any others of them even deserve mention. The muse of comedy was decidedly more happy in her devotees. Moliere was a far safer if a more difficult model than Racine, and the inexorable fashion which had bound down tragedy to a feeble imitation of Euripides did not similarly prescribe an undeviating adherence to Terence. Tragedy had never been, has scarcely been since, anything but an exotic in France; comedy was of

the

soil and native. Very early in the century Alain Ren6 le Sage (1668-1747), in the admirable comedy of Turcaret, produced a work not unworthy to stand by the side of all but his master's best. Philippe Destouches (1680-1754) was also a fertile comedy writer in the early years of the century, and in Le Glorieux and Le Philosophe marie achieved considerable success. As the age went on, comedy, always apt to lay hold of passing events, devoted itself to the great struggle between the Philosophes and their opponents. Curiously enough, the party which engrossed almost all the wit of France had the worst of it in this dramatic portion of the contest, if in no other. The MSchant of Gresset and the Metromanie of Alexis Piron (1680-1773) were far superior to anything produced on the other side, and the Philosophes of Charles Palissot de Montenoy (1730-1814), though scurrilous and broadly farcical, had a great success. On the other hand, it was to a Philosophe that the invention of a new dramatic style was due, and still more the promulgation of certain ideas on dramatic criticism and construction, which, after being filtered through the German mind, were to return to France and to exercise the most powerful influence on its dramatic productions.

This was Denis Diderot (1713-1784), the most fertile (plays). genius of the century, but also the least productive

in finished and perfect work. His chief dramas, the Fils naturel and the Fere de famille, are certainly not great successes; the shorter plays, Est-il bon? est-il michant? and La Piece et le prologue, are better. But it was his follower Michel Jean Sedaine (1719-1707) who, in Le Philosophe sans le savoir and other pieces, produced the best examples of the bour- geois as opposed to the heroic drama. Diderot is sometimes credited or discredited with the invention of the Com&die Larmoy- ante, a title which indeed his own plays do not altogether refuse, but this special variety seems to be, in its invention, rather the property of Pierre Claude Nivelle de la Chaussee (1692-1754). Comedy sustained itself, and even gained ground towards the end of the century; the Jeune Indienne of Nicolas Chamfort (1741- 1794), if not quite worthy of its author's brilliant talent in other paths, is noteworthy, and so is the Billet perdu of Joseph Francois Edouard de

Corsembleu Desmahis (1722-1761), while at the extreme limit of our present period there appears the remark- able figure of Pierre Caron de Beaumarchais (1732-1799). The Mariage de Figaro and the Barbier de Seville are well known as having had attributed to them no mean place among the literary causes and forerunners of the Revolution. Their dramatic and literary value would itself have sufficed to obtain attention for them at any time, though there can be no doubt that their popularity was mainly due to their political appositeness. The most remarkable point about them, as about the school of comedy of which Congreve was the chief master in England at the beginning of the century, was the abuse and superfluity of wit in the dialogue, indiscriminately allotted to all characters alike. It is difficult to give particulars, but would be improper to omit all mention, of such dramatic or quasi-dramatic work as the libretti of operas, farces for performance at fairs and the like. French authors of the time from Le Sage downwards usually managed these with remarkable skill.

i8th-Cenlury Fiction. — With prose fiction the case was alto- gether different. We have seen how the short tale of a few pages had already in the 16th century attained high if not the highest excellence; how at three different periods the fancy for long-winded prose narration developed itself in the prose re- handlings of the chivalric poems, in the Amadis romances, and in the portentous recitals of Gomberville and La Calprenede; how burlesques of these romances were produced from Rabelais to Scarron; and how at last Madame de Lafayette showed the way to something like the novel of the day. If we add the fairy story, of which Perrault and Madame d'Aulnoy were the chief practitioners, and a small class of miniature romances, of which Aucassin et Nicoletle in the 13th, and the delightful Jehan de Paris (of the 15th or 16th, in which a king of England is patriotic- ally sacrificed) are good representatives, we shall have exhausted the list. The 18th century was quick to develop the system of the author of the Princesse de Cleves, but it did not abandon

the cultivation of the romance, that is to say, fiction dealing with incident and with the simpler passions, in devoting itself to the novel, that is to say, fiction dealing with the analysis of sentiment and character. Le Sage, its first great novelist, in his Diable boiteux and Gil Bias, went to Spain not merely for his subject but also for his inspiration and manner, following the lead of the picaroon romance of Rojas and Scarron. Like Fielding, however, whom he much resembles, Le Sage mingled with the romance of incident the most careful attention to char- acter and the most lively portrayal of it, while his style and language are such as to make his work one of the classics of French literature. The novel of character was really founded in France

by the abbe Prevost d'Exilles (1697-1763), the author of Cleveland and of the incomparable Manon Lescaut. The popularity of this style was much helped by the immense vogue in France of the works of Richardson. Side by side with it, however, and for a time enjoying still greater popularity, there flourished a very different school of fiction, of which Voltaire, whose name occupies the first or all but the first place in every branch of literature of his time, was the most brilliant cultivator. This was a direct development of the earlier conte, and consisted usually of the treatment, in a humorous, satirical, and not always over-decent fashion, of contemporary foibles, beliefs, philosophies and occupations. These tales are of every rank of excellence and merit both literary and moral, and range from the astonisjiing wit, grace and humour of Candide and Zadig to the book which is Diderot's one hardly pardonable sin, and the similar but more lively efforts of Crebillon _/ffo (i7°7~i777)- These latter deeps led in their turn to the still lower depths of La Clos and Louvet. A third class of 18th-century fiction consists of attempts to return to the humorous fatrasie of the 1 6th century, attempts which were as much influenced by Sterne as the sentimental novel was by Richardson. The Homme aux quarante Scus of Voltaire has something of this character, but the most characteristic works of the style are the Jacques le fataliste of Diderot, which shows it nearly at its best, and the Compere Mathieu, sometimes attributed to Pigault-Lebrun (I 7S3 _I 835), but no doubt in reality due to Jacques du Laurens (1710-1797), which shows it at perhaps its worst. Another remarkable story-teller was Cazotte (1719-1792), whose Diable amoureux displays much fantastic power, and connects itself with a singular fancy of the time for occult studies and diablerie, manifested later by the patronage shown to Cagliostro, Mesmer, St Germain and others. In this connexion, too, may perhaps also be mentioned most appropriately Bestif de la Bretonne, a remarkably original and voluminous writer, who was little noticed by his contemporaries and successors for the best part of a century. Restif, who was nicknamed the " Rousseau of the gutter," Rousseau du ruisseau, presents to an English imagination many of the characteristics of a non-moral Defoe. While these various schools busied themselves more or less with real life seriously depicted or purposely travestied, the great vogue and success of TSlimaque produced a certain number of didactic works, in which moral or historical information was sought to be conveyed under a more or less thin guise of fiction. Such was the Voyage du jeune Anacharsis of Jean Jacques Barthelemy (1716-1795); such the Numa Pompilius and Gonzalve de Cordoue of Florian (1755-1794), who also deserves notice as a writer of pastorals, fables and short prose tales; such the Belisaire and Les Incas of Jean Francois Marmontel (1723-1799).

Between this class and that of the novel of senti- ment may perhaps be placed Paul et Virginie and La Chaumiere indienne; though Bernardin de Saint-Pierre (1737-1814) should more properly be noticed after Rousseau and as a moralist. Diderot's fiction-writing has already been referred to more than once, but his Religieuse deserves citation here as a powerful specimen of the novel both of analysis and polemic; while his undoubted masterpiece, the Neveu de Rameau, though very difficult to class, comes under this head as well as under any other. There are, however, two of the novelists of this age, and of the most remarkable, who have yet to be noticed, and these are the author of Marianne and the author of Julie. We do

not mention Pierre de Marivaux (1688-1763) in this connexion as the equal of Jean Jacques Rousseau (1712-1778), but merely as being in his way almost equally original and equally remote from any suspicion of school influence. He began with burlesque writing, and was also the author of several comedies, of which Les Fausses Confidences is the principal. But it is in prose fiction that he really excels. He may claim to have, at least in the opinion of his contemporaries, invented a style, though perhaps the term marivaudage, which was applied to it, has a not alto- gether complimentary connotation. He may claim also to have invented the novel without a purpose, which aims simply at amusement, and at the same time does not seek to attain that end by buffoonery or by satire. Gray's definition of happiness, " to lie on a sofa and read endless novels by Marivaux " (it is true that he added Crebillon), is well known, and the production of mere pastime by means more or less harmless has since become so well-recognized a function of the novelist that Marivaux, as one of the earliest to discharge it, deserves notice. The name, however, of Jean Jacques Rousseau is of far different Rousseau, importance. His two great works, the Nouvelle Heloise and Emile, are as far as possible from being perfect as novels. But no novels in the world have ever had such influence, as these. To a great extent this influence was due mainly to their attractions as novels, imperfect though they may be in this character, but it was beyond dispute also owing to the doctrines which they contained, and which were exhibited in novel form.

Such are the principal developments of fiction during the century; but it is remarkable that, varied as they were, and excellent as was some

of the work to which they gave rise, none of these schools was directly very fertile in results or successors. The period with which we shall next have to deal, that from the outbreak of the Revolution to the death of Louis XVIII., is curiously barren of fiction of any merit. It was not till English influence began again to assert itself in the later days of the Restoration that the prose romance began once more to be written.

i8th-Century History. — It is not, however, in any of the departments of belles-lettres that the real eminence of the 18th century as a time of literary production in France consists. In all serious branches of study its accomplishments were, from a literary point of view, remarkable, uniting as it did an extra- ordinary power of popular and literary expression with an ardent spirit of inquiry, a great speculative ability, and even a far more considerable amount of laborious erudition than is generally supposed. The historical studies and results of 18th-century speculation in France are of especial and peculiar importance. There is no doubt that what is called the science of history dates from this time, and though the beginning of it is usually assigned to the Italian Vico, its complete indication may perhaps with equal or greater justice be claimed by the Frenchman Turgot. Before Turgot, however, there were great names in French historical writing, and perhaps the greatest of all is that of Charles Secondat de Montesquieu (1689-1755). The three principal works of this great writer are all historical and at the same time political in character. In the Leltres persanes he handled, with wit inferior to the wit of no other writer even in that witty age, the corruptions and dangers of contemporary morals and politics. The literary charm of this book — the plan of "which was suggested by a work, the Amusements serieux el comiques, of Duf resny (1 648-1 7 24) , a comic writer not destitute of merit — is very great, and its plan was so popular as to lead to a thousand imitations, of which all, except those of Voltaire and Goldsmith, only bring out the immense superiority of the original. Few things could be more different from this lively and popular book than Montesquieu's next work, the Grandeur et decadence des Romains, in which the same acuteness and knowledge of human nature are united with considerable erudi- tion, and with a weighty though perhaps somewhat grandiloquent and rhetorical style. His third and greatest work, the Esprit des lois, is again different both in style and character, and such defects as it has are as nothing when compared with the merits

of its fertility in ideas, its splendid breadth of view, and the felicity with which the author, in a manner unknown before, recognizes the laws underlying complicated assemblages of fact. The style of this

great work is equal to its substance; less light than that of the Lettres, less rhetorical than that of the Grandeur des Romains, it is still a marvellous union of dignity and wit. Around Montesquieu, partly before and partly after him, is a group of philosophical or at least systematic historians, of whom the chief are Jean Baptiste Dubos (1670-1742), and G. Bonnot de Mably (1709-ˆ85). Dubos, whose chief work is not historical but aesthetic {Reflexions sur la poesie et la peinture), wrote a so-called Hisloire critique de I'etablissement de la monarchic franqaise, which is as far as possible from being in the modern sense critical, inasmuch as, in the teeth of history, and in order to exalt the Tiers etat, it pretends an amicable coalition of Franks and Gauls, and not an irruption by the former. Mably (Observa- tions sur I'histoire de la France) had a much greater influence than either of these writers, and a decidedly mischievous one, especially at the period of the Revolution. He, more than any one else, is responsible for the ignorant and childish extolling of Greek and Roman institutions, and the still more ignorant depreciation of the middle ages, which was for a time character- istic of French politicians. Montesquieu was, as we have said, followed by Anne Robert Jacques Turgot (1727-1781), whose writings are few in number, and not remarkable for style, but full of original thought. Turgot in his turn was followed by Condorcet (1 743-1 794), whose tendency is somewhat more sociological than directly historical. Towards the end of the period, too, a considerable number of philosophical histories were written, the usual object of which was, under cover of a kind of allegory, to satirize and attack the existing institutions and government of France. The most famous of these was the Histoire des Indes, nominally written by the Abbe Guillaume Thomas Francois Raynal (1713-1796), but really the joint work of many members of the Philosophe party, especially Diderot. Side by side with this really or nominally philosophical school of history there existed another and less ambitious school, which contented itself with the older and simpler view of the science. The Abbe Rene de Vertot (1655-1735) belongs almost as much to the 17th as to the 18th century; but his principal works, especially the famous Histoire des Chevaliers de Make, date from the later period, as do also the Revolutions romaines. Vertot is above all things a literary historian, and the well-known " Mon siege est fait," whether true or not, certainly expresses his system . Of the same school, though far more comprehensive, was the laborious Charles Rollin (1661-1741), whose works in the original, or translated and continued in the case of the Histoire romaine by Jean Baptiste Louis Crevier (1693-1765), were long the chief historical manuals of Europe. The president Charles Jean Francois Henault (1685-1770), and Louis Pierre Anquetil

(1723-1806) were praiseworthy writers, the first of French history, the second of that and much else. In the same class, too, far superior as is his literary power, must be ranked the historical works of Voltaire, Charles XII, Pierre le Grand, &c. A very perfect example of the historian who is literary first of all is supplied by Claude Carloman de Rulhiere (1735- 1791), whose Revolution en Russie en 1762 is one of the little masterpieces of history, while his larger and posthumous work on the last days of the Polish kingdom exhibits perhaps some of the defects of this class of historians. Lastly must be mentioned the memoirs and correspondence of the period, the materials of history if not history itself. The century opened with the most famous of all these, the memoirs of the due de Saint-Simon (1675-1755), an extraordinary series of pictures of the court of Louis XIV. and the Regency, written in an unequal and incorrect style, but with something of the irregular excellence of the great 16th-century writers, and most striking in the sombre bitterness of its tone. The subsequent and less remarkable memoirs of the century are so numerous that it is almost impos- sible to select a few for reference, and altogether impossible to mention all. Of those bearing on public history the memoirs of Madame de Stael (Mile Delaunay) (1684-1750), of Pierre

Louis de Voyer, marquis d'Argenson (1694-1757), of Charles Pinot Duclos (1704-1772), of Stephanie Felicite de Saint-Aubin, Madame de Genlis (1746-1830), of Pierre Victor de B6senval (1722-1791), of Madame Campan (1752-1822) and of the cardinal de Bernis (1715-1794), may perhaps be selected for mention; of those bearing on literary and private history, the memoirs of Madame d'Epinay (1726-1783), those of Mathieu Marais (1 664-1 737) the so-called Memoir es secrets of Louis Petit de Bachaumont (1690-17 70), and the innumerable writings having reference to Voltaire and to the Philosophe party generally. Here, too, may be mentioned a remarkable class of literature, consisting of purely private and almost confidential letters, which were written at this time with very remarkable literary excellence. As specimens may be selected those of Mademoiselle Aisse (1694-1757), which are models of easy and unaffected tenderness, and those of Madem'oiselle de Lespinasse (1732-1776) the companion of Madame du Deffand and afterwards of d'Alembert. These latter, in their extraordinary fervour and passion, not merely contrast strongly with the generally languid and frivolous gallantry of the age, but also constitute one of its most remarkable

literary monuments. It has been said of them that they ” burn the paper,” and the expression is not exagger- ated. Madame du Deffand’s (1697-1780) own letters, many of which were written to Horace Walpole, are noteworthy in a very different way. Of lighter letters the charming correspondence of Diderot with Mademoiselle Voland deserves special mention. But the correspondence, like the memoirs of this century, defies justice to be done to it in any cursory or limited mention. In this connexion, however, it may be well to mention some of the most remarkable works of the time, the Confessions, Reveries, and Promenades d’un solitaire of Rousseau. In these works, especially in the Confessions, there is not merely exhibited passion as fervid though perhaps less unaffected than that of Mademoiselle de Lespinasse — there appear in them two literary characteristics which, if not entirely novel, were for the first time brought out deliberately by powers of the first order, were for the first time made the mainspring of literary interest, and thereby set an example which for more than a century has been persist- ently followed, and which has produced some of the finest results of modern literature. The first of these was the elaborate and unsparing analysis and display of the motives, the weaknesses and the failings of individual character. This process, which Rousseau unflinchingly performed on himself, has been followed usually in respect to fictitious characters by his successors. The other novelty was the feeling for natural beauty and the elaborate description of it, the credit of which latter must, it has been agreed by all impartial critics, be assigned rather to Rousseau than to any other writer. His influence in this direction was, however, soon taken up and continued by Bernardin de Saint- Pierre, the connecting link between Rousseau and Chateaubriand, some of whose works have been already alluded to. In particular the author of Paul et Virginie set himself to develop the example of description which Rousseau had set, and his word-paintings, though less powerful than those of his model, are more abundant, more elaborate, and animated by a more amiable spirit.

i8th-Century Philosophy. — The Anglomania which distin- guished the time was nowhere more stongly shown than in the cast and direction of its philosophical speculations. As Montes- quieu and Voltaire had imported into France a vivid theoretical admiration for the British constitution and for British theories in politics, so Voltaire, Diderot and a crowd of others popularized and continued in France the philosophical ideas of Hobbes and Locke and even Berkeley, the theological ideas of Bolingbroke, Shaftesbury and the English deists, and the physical discoveries of Newton. Descartes, Frenchman and genius as he was, and though his principles in physics and philosophy

were long clung to in the schools, was completely abandoned by the more adven- turous and progressive spirits. At no time indeed, owing to the confusion of thought and purpose to which we have already alluded, was the word philosophy used with greater looseness than at this time. Using it, as we have hitherto used it, in the sense of metaphysics, the majority of the Philosophes have very

little claim to their title. There were some who manifested, however, an aptitude for purely philosophical argument, and one who confined himself strictly thereto. Among these the most remarkable are Julien Offroy de la Mettrie (1709-1751) and Denis Diderot. La Mettrie in his works L'Homme machine, L' Homme plante, &c, applied a lively and vigorous imagination, a considerable familiarity with physics and medicine, and a brilliant but unequal style, to the task of advocating materialistic ideas on the constitution of man. Diderot, in a series of early works, Lettre sur les aveugles, Promenade d'un sceptique, Pensees philosophiques, &c, exhibited a good acquaintance with philo- sophical history and opinion, and gave sign in this direction, as in so many others, of a far-reaching intellect. As in almost all his works, however, the value of the thought is extremely unequal, while the different pieces,, always written in the hottest haste, and never duly matured or corrected, present but few specimens of finished and polished writing. Charles Bonnet (1720-1793), a Swiss of Geneva, wrote a large number of works, many of which are purely scientific. Others, however, are irfore psychological, and these, though advocating the materialistic philosophy generally in vogue, were remarkable for uniting materialism with an honest adherence to Christianity. The half mystical writer, Louis Claude de Saint-Martjn (1743-1803) also deserves notice. But the French metaphysician of the century is undoubtedly Etienne Bonnot, abbe de Condillac (1714-1780), almost the only writer of the time in France who succeeded in keeping strictly to philosophy without attempting to pursue his system to its results in ethics, politics and theology. In the Traite des sensations, the Essai sur I'origine des connaissances humaines and other works Condillac elaborated and continued the imperfect sensationalism of Locke. As his philosophical view, though perhaps more re- stricted, was far more direct, consecutive and uncompromising than that of the Englishman, so his style greatly exceeded Locke's in clearness and elegance and as a good medium of philosophical expression.

i8th-Century Theology. — To devote a section to the history of the theological literature of the 18th century in France may seem something of a contradiction; for, indeed, all or most of such literature was anti-theological. The magnificent list of names which the church

had been able to claim on her side in the 17th century was exhausted before the end of the second quarter of the 18th with Massillon, and none came to fill their place. Very rarely has orthodoxy been so badly defended as at this time. The literary championship of the church was entirely in the hands of the Jesuits, and of a few disreputable literary free- lances like Elie Freron (1719-1776) and Pierre Francois Guyot, abbe Desfontaines (1685-1745). The Jesuits were learned enough, and their principal journal, that of Trevoux, was conducted with much vigour and a great deal of erudition. But they were in the first place discredited by the moral taint which has always hung over Jesuitism , and in the second place by the persecutions of the Jansenists and the Protestants, which were attributed to their influence. But one single work on the orthodox side has pre- served the least reputation; while, on the other hand, the names of PereNonotte (1711-1793) and several of his fellows have been enshrined unenviably in the imperishable ridicule of Voltaire, one only of whose adversaries, the abbe Antoine Guenee (17 17- 1803), was able to meet him in the Lettres de quelques Juifs with something like his own weapons. It has never been at all accur- ately decided how far what may be called the scoffing school of Voltaire represents a direct revolt against (ˆeo/o«y). Christianity, and how far it was merely a kind of guerilla warfare against the clergy. It is positively certain that Voltaire was not an atheist, and that he did not approve of atheism. But his Dictionnaire philosophique, which is typical of a vast amount of contemporary and subsequent literature, con- sists of a heterogeneous assemblage of articles directed against various points of dogma and ritual and various characteristics of the sacred records. From the literary point of view, it is one of the most characteristic of all Voltaire's works, though it is perhaps not entirely his. The desultory arrangement, the light

and lively style, the extensive but not always too accurate erudition, and the somewhat captious and quibbling objections, are intensely Voltairian. But there is little seriousness about it, and certainly no kind of rancorous or deep-seated hostility. With many, however, of Voltaire's pupils and younger contem- poraries the case was altered. They were distinctively atheists and anti-supernaturalists. The atheism of Diderot, unquestion- ably the greatest of them all, has been keenly debated; but in the case of Etienne Damilaville (1723-1768), Jacques Andre Naigeon (1738-1810), Paul Henri Dietrich, baron d'Holbach, and others there is no room for doubt. By these persons a great mass of atheistic and anti-Christian literature was composed and set afloat.

The characteristic work of this school, its last word indeed, is the famous Systeme de la nature, “S* st attributed to Holbach (1723-1789), but known to be, of Nature.” m P ar t at least, the work of Diderot. In this remark- able work, which caps the climax of the metaphysical materialism or rather nihilism of the century, the atheistic position is clearly put. It made an immense sensation; and it so fluttered not merely the orthodox but the more moderate free-thinkers, that Frederick of Prussia and Voltaire, perhaps the most singular pair of defenders that orthodoxy ever had, actually set themselves to refute it. Its style and argument are very unequal, as books written in collaboration are apt to be, and especially books in which Diderot, the paragon of inequality, had a hand. But there is an almost entire absence of the hetero- geneous assemblage of anecdotes, jokes good and bad, scraps of accurate or inaccurate physical science, and other incongruous matter with which the Philosophes were wont to stuff their works; and lastly, there is in the best passages a kind of sombre grandeur which recalls the manner as well as the matter of Lucretius. It is perhaps well to repeat, in the case of so notorious a book, that this criticism is of a purely literary and formal character; but there is little doubt that the literary merits of the work considerably assisted its didactic influence. As the Revolution approached, and the victory of the Philosophe party was declared, there appeared for a brief space a group of cynical and accomplished phrase-makers presenting some simi- larity to that of which, a hundred years before, Saint-Evremond was the most prominent figure. The chief of thi# group were Nicolas Chamfort (1747-1794) on the republican side, Rivaroi. ‘ an dAntoineRivarol(i753-i8oi)onthatof theroyalists. Like the older writer to whom we have compared them, neither can be said to have produced any one work of eminence, and in this they stand distinguished from moralists like La Rochefoucauld. The floating sayings, however, which are attributed to them, or which occur here and there in their miscellaneous work, yield in no respect to those of the most famous of their predecessors in wit and a certain kind of wisdom, though they are frequently more personal than aphoristic.

i8th-Century Moralists and Politicians. — Not the least part, however, of the energy of the period in thought and writing was devoted to questions of a directly moral and political kind. With regard to morality proper the favourite doctrine of the century was what is commonly called the selfish theory, the only one indeed which was suitable to the sensationalism of Condillac and the materialism of Holbach. The pattern book of this Helvetius doctrine was the De I’ esprit of Claude Adrien Helvetius (1 7 r 5-1 771), the most amusing

book perhaps which ever pretended to the title of a solemn philosophical treatise. There is some analogy between the principles of this work and those of the Systeme de la nature. With the inconsistency — some would say with the questionable honesty— which dis- tinguished the more famous members of the Philosophe party when their disciples spoke with what they considered imprudent outspokenness, Voltaire and even Diderot attacked Helvetius as the former afterwards attacked Holbach. But whatever may be the general value of De V ‘esprit, it is full of acuteness, though Thomas. t * lat acuter >ess is as desultory and disjointed as its style. As Helvetius may be taken as the represent- ative author of the cynical school, so perhaps Alexandre Gerard Thomas (i73 2_I 7 8 S) mav be taken as representative of the

Vauvew argues.

votaries of noble sentiment to whom we have also alluded. The works of Thomas chiefly took the form of academic eloges or formal panegyrics, and they have all the defects, both in manner and substance, which are associated with that style. Of yet a third school, corresponding in form to La Rochefoucauld and La Bruyere, and possessed of some of the antique vigour of preceding centuries, was Luc de Clapiers, marquis de Vauvenargues (1715-1747). This writer, who died very young, has produced maxims and reflections of considerable mental force and literary finish. From Voltaire downwards it has been usual to compare him with Pascal, from whom he is chiefly distinguished by a striking but somewhat empty stoicism. Between the moralists, of whom we have taken these three as examples, and the politicians may be placed Rousseau, who in his novels and miscellaneous works is of the first class, in his famous Contrat social of the second. All his theories, whatever their originality and whatever their value, were made novel and influential by the force of their statement and the literary beauties of its form. Of direct and avowed political writings there were few during the century, and none of anything like the importance of the Contrat social, theoretical acceptance of the established French constitution being a point of necessity with all Frenchmen. Nevertheless it may be said that almost the whole of the voluminous writings of the Philosophes, even of those who, like Voltaire, were sincerely aristocratic and monarchic in predilection, were of more or less veiled political significance. There was one branch of political writing, moreover, which could be indulged in without much fear. Political economy and administrative theories received much attention. The earliest writer of eminence on these subjects was the great engineer Sebastien le Prestre, marquis de Vauban (1633-1707), whose Oisiveles

and Dime royale exhibit both great ability and extensive observation. A more Utopian economist of the same time was Charles Irenee Castel, abbe de Saint-Pierre (1658-1743), not to be confounded with the author of Paul et Virginie. Soon political economy in the hands of Francois Quesnay(i6o4-i774)took a regular form, and towards the middle of the century a great number of works on questions connected with it, especially that of free trade in corn, on which Ferdinand Galiani (1728-1787), Andre Morellet (1727-1819), both abbes, and above all Turgot, distinguished themselves. Of writers on legal subjects and of the legal profession, the century, though not less fertile than in other directions, produced few or none of any great importance from the literary point of view. The chief name which in this connexion is known is that of Chancellor Henri Francois d'Aguesseau (1668-17 51), at the beginning of the century, an estimable writer of the Port Royal school, who took the orthodox side in the great disputes of the time, but failed to display any great ability therein. He was, as became his profession, more remarkable as an orator than a writer, and his works contain valuable testimonies to the especially perturbed and unquiet condition of his century — a disquiet which is perhaps also its chief literary note. There were other French magistrates, such as Montesquieu, Henault (1685-1770), de Brosses (1706- 1773) and others, who made considerable mark in literature; but it was usually (except in the case of Montesquieu) in subjects not even indirectly connected with their profession. The Esprit des lois stands alone; but as an example of work barristerial in kind, famous partly for political reasons but of some real literary merit, we may mention the MSmoire for Calas written by J. B. J. Elie de Beaumont (1732-1786).

18th-century Criticism and Periodical Literature. — Wehavesaid that literary criticism assumes in this century a sufficient im- portance to be treated under a separate heading. Contributions were made to it of many different kinds and from many different points of view. Periodical literature, the chief stimulus to its production, began more and more to come into favour. Even in the 17 th century the Journal des savants, the Jesuit Journal de Trevoux, and other publications hadset the example of different kinds of it. Just before the Revolution the Gazette de France was in the hands of J. B. A. Suard (1734-1817), a man who was nothing if not a literary critic. Perhaps, however, the most

remarkable contribution of the century to criticism of the periodical kind was the Feuilles de Grimm, a circular sent for many years to the German courts by Frederic Melchior Grimm (1723-1807), the comrade of Diderot and Rousseau, and con- taining a compte rendu of the ways and works of Paris, literary and artistic as well as social. These Leaves not only include much excellent literary criticism by Diderot, but also gave occasion to the incomparable salons or accounts of the exhibition of pictures from the same hand, essays which founded the art of picture criticism, and which have hardly been surpassed since. The prize competitions of the Academy were also a considerable stimulus to literary criticism, though the prevailing taste in such compositions rather inclined to elegant themes than to careful studies of analyses. The most characteristic critic of the mid-century was the abbe Charles Batteux (1713-1780) who illustrated a tendency of the time by beginning with a treatise on Les Beaux Arts riduils d un mime principe (1746) ; reduced it and others into Principes de la litlerature (1764) and added in 1771 Les Quatres Poetiques (Aristotle, Horace, VidaandBoileau). Batteux is a very ingenious critic and his attempt to con- ciliate ” taste ” and ” the rules,” though inadequate, is interest- ing. Works on the arts in general or on special divisions of them were not wanting, as, for instance, that of Dubos before alluded to, the Essai sur la peinture of Diderot and others. Critically annotated editions of the great French writers also came into fashion, and were no longer written by mere pedants. Of these Voltaire’s edition of Corneille was the most remarkable, and his annotations, united separately under the title of Commentaire sur Corneille, form not the least important portion of his works. Even older writers, looked down upon though they were by the general taste of the day, received a share of this critical interest. In the earlier portion of the century Nicolas Lenglet-Dufresnoy (1674-1755) and Bernard de la Monnoye (1641-1728) devoted their attention to Rabelais, Regnier, Villon, Marot and others. Etienne Barbazan (1696-1770) and P. J. B. Le Grand d’Aussy (173 7-1800) gathered and brought into notice the long scattered and unknown rather than neglected fabliaux of the middle ages. Even the chansons de geste attracted the notice of the Comte de Caylus (1692-1765) and the Comte de Tressan (1705-1783). The latter, in his Bibliotheque des romans, worked up a large number of the old epics into a form suited to the taste of the century. In his hands they became lively tales of the kind suited to readers of Voltaire and Crebillon. But in this travestied form they had considerable influence both in France and abroad. By these publications attention was at least called to early French literature, and when it had been once

called, a more serious and appreciative study became merely a matter of time. The method of much of the literary criticism of the close of this period was indeed deplorable enough. Jean Francois de la Harpe (1730-1803), who though a little later in time as to most of his critical productions is perhaps its most representative figure, shows criticism in one of its worst forms. The critic specially abhorred by Sterne, who looked only at the stop-watch, was a kind of prophecy of La Harpe, who lays it down distinctly that a beauty, however beautiful, produced in spite of rules is a “monstrous beauty” and cannot be allowed. But such a writer is a natural enough expression of an expiring principle. The year after the death of La Harpe Sainte-Beuve was born.

i8th-Century Savants. — In science and general erudition the 1 8th century in France was at first much occupied with the mathematical studies for which the French genius is so peculiarly adapted, which the great discoveries of Descartes had made possible and popular, and which those of his supplanter Newton only made more popular still. Voltaire took to himself the credit, which he fairly deserves, of first introducing the Newtonian system into France, and it was soon widely popular — even ladies devoting themselves to the exposition of mathematical subjects, as in the case of Gabrielle de Breteuil, marquise du Chatelet (1706-1749) Voltaire’s ” divine Emilie.” Indeed ladies played a great part in the literary and scientific activity of the century, by actual contribution sometimes, but still more by continuing and extending the tradition of ” salons.” The duchesse du

Maine, Mesdames de Lambert, de Tencin, Geoffrin, du Deffand, Necker, and above all, the baronne d’ Holbach (whose husband, however, was here the principal personage) presided over coteries which became more and more ” philosophical.” Many of the greatest mathematicians of the age, such as de Moivre and Laplace, were French by birth, while others like Euler belonged to French-speaking races, and wrote in French. The physical sciences were also ardently cultivated, the impulse to them being given partly by the generally materialistic tendency of the age, partly by the Newtonian system, and partly also by the extended knowledge of the world provided by the circumnavi- gatory voyage of Louis Antoinede Bougainville (1 729-181 1), and other travels. P. L. de Moreau Maupertuis (1698-17 59) and C. M. de la Condamine (1701-1774) made long journeys for scientific purposes and duly recorded their experiences. The former, a mathematician and physicist of some ability but more oddity, is chiefly known to literature by the ridicule of Voltaire in the Diatribe du Docteur Akakia. Jean le Rond, called d’Alembert (1717-1783), a great mathematician and a writer of considerable though rather

academic excellence, is principally known from his connexion with and introduction to the Encyclo- pedic, of which more presently. Chemistry was also assiduously cultivated, the baron d' Holbach, among others, being a devotee thereof, and helping to advance the science to the point where, at the conclusion of the century, it was illustrated by Berthollet and Lavoisier. During all this devotion to science in its modern acceptation, the older and more literary forms of erudition were not neglected, especially by the illustrious Benedictines of the abbey of St Maur. Dom Augustin Calmet (1672-1757) the author of the well-known Dictionary of the Bible, belonged to this order, and to them also (in particular to Dom Rivet) was due the beginning of the immense Histoire litter aire dela France, a work interrupted by the Revolution and long suspended, but diligently continued since the middle of the 19th century. Of less orthodox names distinguished for erudition, Nicolas Freret (1688-1749), secretary of the Academy, is perhaps the most remarkable. But in the consideration of the science and learning in the 18th century from a literary point of view, there is one name and one book which require particular and, in the case of the«book, somewhat extended mention. The man is Georges Louis Leclerc, comte de Buffon (1717-1788), the book the Encyclopedic The immense Natural History of Buffon, though not entirely his own, is a remarkable monument Button. of the union of scientific tastes with literary ability. As has happened in many similar instances, there is in parts more literature than science to be found in it; and from the point of view of the latter, Buffon was far too careless in observa- tion and far too solicitous of perfection of style and grandiosity of view. The style of Buffon has sometimes been made the subject of the highest eulogy, and it is at its best admirable; but one still feels in it the fault of all serious French prose in this century before Rousseau — the presence, that is to say, of an artificial spirit rather than of natural variety and power. The Encyclopedie, unquestionably on the whole the most important French literary production of the century, dopiaˆ,' if we except the works of Rousseau and Voltaire, was conducted for a time by Diderot and d'Alembert, afterwards by Diderot alone. It numbered among its contributors almost every Frenchman of eminence in letters. It is often spoken of as if, under the guise of an encyclopaedia, it had been merely a plaidoyer against religion, but this is entirely erroneous. Whatever anti-ecclesiastical bent some of the articles may have, the book as a whole is simply what it professes to be, a dictionary — that is to say, not merely an historical and critical lexicon, like those of Bayle and Moreri (indeed history and biography were nominally excluded), but a dictionary of arts, sciences, trades and technical terms. Diderot himself had perhaps the greatest faculty of any man that ever lived for

the literary treatment in a workman-like manner of the most heterogeneous and in some cases rebellious subjects; and his untiring labour, not merely in writing'original articles, but in editing the contributions of others, determined the character of the whole work. There is no doubt that it had,

quite independently of any theological or political influence, an immense share in diffusing and gratifying the taste for general information.

1789-1830 — General Sketch. — The period which elapsed between the outbreak of the Revolution and the accession of Charles X. has often been considered a sterile one in point of literature. As far as mere productiveness goes, this judgment is hardly correct. No class of literature was altogether neglected during these stirring five-and-thirty years, the political events of which have so engrossed the attention of posterity that it has sometimes been necessary for historians to remind us that during the height of the Terror and the final disasters of the empire the theatres were open and the booksellers' shops pat- ronized. Journalism, parliamentary eloquence and scientific writing were especially cultivated, and the former in its modern sense may almost be said to have been created. But of the higher products of literature the period may justly be considered to have been somewhat barren. During the earlier part of it there is, with the exception of Andre Chenier, not a single name of the first or even second order of excellence. Towards the midst those of Chateaubriand (1 768-1848) and Madame ie Stael (1 766-181 7) stand almost alone; and at the close those of Courier, Beranger and Lamartine are not seconded by any others to tell of the magnificent literary burst which was to follow the publication of Cromwell. Of all departments of literature, poetry proper was worst represented during this period. Andre Chenier was silenced at its opening by the guillotine. Le Brun and Delille, favoured by an extraordinary longevity, continued to be admired and followed. It was the palmy time of descriptive poetry. Louis, marquis de Fontanes (1757-1821, who deserves rather more special notice as a critic and an official patron of literature), Castel, Boisjolin, Esmenard, Berchoux, Ricard, Martin, Gudin, Cournaud, are names which chiefly survive as those of the authors of scattered attempts to turn the Encyclopaedia into verse. Charles Julien de Chenedolle (1 769-1 833) owes his reputation rather to amiability, and to his association with men eminent in different ways, such as Rivarol and Joubert, than to any real power. He has been regarded as a precursor of Lamartine; but the resemblance is chiefly on Lamartine's weakest side; and the stress laid on him recently, as on Lamartine himself and even on Chenier, is part of a passing reaction against the school of Hugo. Even more ambitiously, Luce de Lancival, Campenon, Dumesnil and Parseval de Grand- Maison endeavoured to write epics, and succeeded rather worse than the Chapelains and Desmarets of the 17th century. The

characteristic of all this poetry was the description of everything in metaphor and paraphrase, and the careful avoidance of any- thing like directness of expression; and the historians of the Romantic movement have collected many instances of this absurdity. Lamartine will be more properly noticed in the next division. But about the same time as Lamartine, and towards the end of the present period, there appeared a poet who may be regarded as the last important echo of Malherbe. This was Casimir Delavigne (1793-1843), the author of Les Messeniennes, a writer of very great talent, and, according to the measure of J. B. Rousseau and Lebrun, no mean poet. It is usual to reckon Delavigne as transitionary between the two schools, but in strictness he must be counted with the classicists. Dramatic poetry exhibited somewhat similar characteristics. The system of tragedy writing had become purely mechanical, and every act, almost every scene and situation, had its regular and appro- priate business and language, the former of which the poet was not supposed to alter at all, and the latter only very slightly. Poinsinet, La Harpe, M.J. Chenier, Raynouard, dejouy, Briffaut, Baour-Lormian, all wrote in this style. Of these Chenier (1764- 181 1) had some of the vigour of his brother Andre, from whom he was distinguished by more popular political principles and better fortune. On the other hand, Jean Francois Ducis (1733- 1816), who passes with Englishmen as a feeble reducer of Shake- speare to classical rules, passed with his contemporaries as an introducer into French poetry of strange and revolutionary novelties. Comedy, on the other hand, fared better, as indeed

it had always fared. Fabre d'Eglantine (1755-1794) (the companion in death of Danton), Collin d'Harleville(i755-i8o6), Fra'ncois G. J. S. Andrieux (1759-1833), Picard, Alexandre Duval, and Nepomucene Lemercier (1771-1840) (the most vigorous of all as a poet and a critic of mark) were the comic authors of the period, and their works have not suffered the complete eclipse of the contemporary tragedies which in part they also wrote. If not exactly worthy successors of Moliere, they are at any rate not unworthy children of Beaumarchais. In romance writing there is again, until we come to Madame de Stael, a great want of originality and even of excellence in workmanship. The works of Madame de Genlis (1 746-1830) exhibit the tendencies of the 18th century to platitude and noble sentiment at their worst. Madame Cottin (1770-1807), Madame de Souza (1761-1836), and Madame de Krudener, exhibited some of the qualities of Madame de Lafayette and moreof thoseof Madame de Genlis. Joseph Fievee(i767-i839), in Le Dot de Suzette and other works, snowed seme power over the domestic story; but perhaps the most remarkable work in point of

originality of the time was Xavier de Maistre's (1763- 1852) Voyage autour de ma chambre, an attempt in quite a new style, which has been happily followed up by other writers. Turning to history we find comparatively little written at this period. Indeed, until quite its close, men were too much occupied in making history to have time to write it. There is, however, a considerable body of memoir writers, especially in the earlier years of the period, and some great names appear even in history proper. Many of Sismondi's (1773-1842) best works were produced during the empire. A. G. P. Brugiere, baron de Barante (1782-1866), though his best-known works date much later, belongs partially to this time. On the other hand, the production of philosophical writing, especially in what we may call applied philosophy, was considerable. The sensationalist views of Condillac were first continued as by Destutt de Tracy (1754-1836) and Laromiguiere (1756-1837) and subsequently opposed, in consequence partly of a religious and spiritualist revival, partly of the influence of foreign schools of thought, especially the German and the Scotch. The chief philosophical writers from this latter point of view were Pierre Paul Royer Collard (1763-1845), F. P. G. Maine de Biran (1776-1824), and Th6odore Simon Jouffroy (1796-1842). Their influence on literature, however, was altogether inferior to that of the re- actionist school, of whom Louis Gabriel, vicomte de Bonald (1754-1840), and Joseph de Maistre (1753-1821) were the great leaders. These latter were strongly political in their tendencies, and political philosophy received, as was natural, a large share of the attention of the time. In continuation of the work of the Philosophes, the most remarkable writer was Constantin Francois Chasseboeuf, comte de Volney (1757-1820), whose Ruines are generally known. On the other hand, others belong- ing to that school, such as Necker and Morellet, wrote from the moderate point of view against revolutionary excesses. Of the reactionists Bonald is extremely royalist, and carries out in his Legislations primitives somewhat the same patriarchal and absolutist theories as our own Filmer, but with infinitely greater genius. As Bonald is royalist and aristocratic, so Maistre is the advocate of a theocracy pure and simple, with the pope for its earthly head, and a vigorous despot- ism for its system of government. Pierre Simon Ballanche (1776-1847), often mentioned in the literary memoirs of his time, wrote among other things Essais de palinginesie sociale, good in style but vague in substance. Of theology proper there is almost necessarily little or nothing, the clergy being in the earlier period proscribed, in the latter part kept in a strict and somewhat discreditable subjection by the Empire. In moralizing literature there is one work of the very highest excellence, which, though not published till long afterwards, belongs in point of composition to this'

period. This is the Pensees of Joseph Joubert (1754-1824), the most illustrious successor of Pascal and Vauvenargues, and to be ranked perhaps above both in the literary finish of his maxims, and certainly above Vauvenargues in the breadth and depth of thought which

they exhibit. In pure literary criticism more particularly, Joubert, though exhibiting some inconsistencies due to his time, is astonishingly penetrating and suggestive. Of science and erudition the time was fruitful. At an early period of it appeared the remarkable work of Pierre Cabanis(i757-i8o8),the Rapports du physique et du morale de I'homme, a work in which physiology is treated from the extreme materialist point of view but with all the liveliness and literary excellence of the Philosophe move- ment at its best. Another physiological work of great merit at this period was the Traill de la vie et de la mort of Bichat, and the example set by these works was widely followed; while in other branches of science Laplace, Lagrange,Hauy,Berthollet, &c, produced contributions of the highest value. From the literary point of view, however, the chief interest of this time is centred in two individual names, those of Chateaubriand and Madame de Stael, and in three literary developments of a more or less novel character, which were all of the highest importance in shaping the course which French literature has taken since 1824. One of these developments was the reactionary movement of Maistre and Bonald, which in its turn largely influenced Chateaubriand, then Lamennais and Montalembert, and was later represented in French literature in different guises, chiefly by Louis Veuillot (1815-1883) and Mgr Dupanloup(i8o2-i878). The second and third, closely connected, were the immense advances made by parliamentary eloquence and by political writing, the latter of which, by the hand of Paul Louis Courier (1773-1825), contributed for the first time an undoubted master- piece to French literature. The influence of the two combined 'has since raised journalism to even a greater pitch of power in France than in any other country. It is in the development of these new openings for literature, and in the cast and complexion which they gave to its matter, that the real literary importance of the Revolutionary period consists; just as it is in the new elements which they supplied for the treatment of such subjects that the literary value of the authors of Rent and De V Allemagne mainly lies. We have already alluded to some of the beginnings of periodical and

journalistic letters in France. For some time, in the hands of Bayle, Basnage, Des Maizeaux, Jurieu, Leclerc, periodical literature consisted mainly of a series, more or less disconnected, of pamphlets, with occasional extracts from forthcoming works, critical adversaria and the like. Of a more regular kind were the often-mentioned Journal de Trlvoux and Mercure de France, and later the Annie littSraire of Freron and the like. The Correspondance of Grimrn also, as we have pointed out, bore considerable resemblance to a modern monthly review, though it was addressed to a very few persons. Of political news there was, under a despotism, naturally very little. 1789, however, saw a vast change in this respect. An enormous efflorescence of periodical literature at once took place, and a few of the numerous journals founded in that year or soon after- wards survived for a considerable time. A whole class of authors arose who pretended to be nothing more than journalists, while many writers distinguished for more solid contributions to litera- ture took part in the movement, and not a few active politicians contributed. Thus to the original staff of the Moniteur, or, as it was at first called, La Gazette Nationale, La Harpe, Lacretelle, Andrieux, Dominique Joseph Garat (1749-1833) and Pierre Ginguene (1748-1826) were attached. Among the writers of the Journal de Paris Andre Chenier had been ranked. Fontanes contributed to many royalist and moderate journals. Guizot and Morellet, representatives respectively of the 19th and the 1 8th century, shared in the Nouvelles politiques, while Bertin, Fievee and J. L. Geoffroy (1743-1814), a critic of peculiar acerbity, contributed to the Journal de I'empire, afterwards turned into the still existing Journal des debats. With Geoffroy, Francois Benoit Hoffman (1760-1828), Jean F. J. Dussault (1769-1824) and Charles F. Dorimond, abbe de Feletz (1765- 1850), constituted a quartet of critics sometimes spoken of as " the Debats four," though they were by no means all friends. Of activepoliticians Ma.TSLt(L' Ami du peuple), M.imbea.u(C ourrier de Provence), Barere (Journal des debats et des dScrets), Brissot (Patriate franqais), Hebert (Pere Duchesne), Robespierre (Difen-

Covrier.

seur de la constitution), and Tallien (La Sentinelle) were the most remarkable who had an intimate connexion with journalism. On the other hand, the type of the journalist pure and simple is Camille Desmoulins(i 759-1 794), one of the most brilliant, in a literary point of view, of the short-lived celebrities of the time. Of the same class were Pelletier, Durozoir, Loustalot, Royou. As the immediate daily interest in politics drooped, there were formed periodicals of a partly political and partly literary character. Such had been the decade

philosophique, which counted Cabanis, Chenier, and De Tracy among its contributors, and this was followed by the Revue francaise at a later period, which was in its turn succeeded by the Revue des deux mondes. On the other hand, parliamentary eloquence was even more important than journalism during the early period of the Revolu- tion. Mirabeau naturally stands at the head of orators of this class, and next to him may be ranked the well-known names of Malouet and Meunier among constitutionalists; of Robespierre, Marat and Danton, the triumvirs of the Mountain; of Maury, Cazales and the vicomte de Mirabeau, among the royalists; and above all of the Girondist speakers Barnave, Vergniaud, and Lanjuinais. The last named survived to take part in the revival of parliamentary discussion after the Restoration. But the permanent contributions to French literature of this period of voluminous eloquence are, as frequently happens in such cases, by no means large. The union of the journalist and the parlia- mentary spirit produced, however, in Paul Louis Courier a master of style. Courier spent the greater part of his life, tragically cut short, in translating the classics and studying the older writers of France, in which study he learnt thoroughly to despise the pseudo-classicism of the 18th century. It was not till he was past forty that he took to political writing, and the style of his pamphlets, and their wonderful irony and vigour, at once placed them on the level of the very best things of the kind. Along with Courier should be mentioned Benjamin Constant (1767-1830), who, though partly a romance writer and partly a philosophical author, was mainly a politician and an orator, besides being fertile in articles and pamphlets. Lamennais, like Lamartine, will best be dealt with later, and the same may be said of Beranger; but Chateaubriand and Madame de Stael must be noticed here. The former represents, in the influence which changed the literature of the 18th century into the literature of the 19th, the vague spirit of unrest and ” Welt- schmerz,” the affection for the picturesque qualities of nature, the religious spirit occasionally turning into mysticism, a nd the respect, sure to become more and more definite and appreciative, for antiquity. He gives in short the romantic and conservative element. Madame de Stael (1 766-1817) on the other hand, as became a daughter of Necker, retained a d’stae! great deal of the Philosophe character and the traditions of the 18th century, especially its liberalism, its sensibility, and its thirst for general information; to which, however, she added a cosmopolitan spirit, and a readiness to introduce into France the literary and social, as well as the political and philo- sophical, peculiarities of other countries to which the 18th century, in France at least,had been a stranger, and which Chateaubriand himself, notwithstanding his excursions into English literature, had been very far from feeling. She therefore contributed to

the positive and liberal side of the future movement. The absolute literary importance of the two was very different. Madame de Stael's early writings were of the critical kind, half aesthetic half ethical, of which the 18th century had been fond, and which their titles, Lettres sur J.J.Rousseau, De I' influ- ence des passions, De la litterature considSree dans ses rapports avec les institutions sociales, sufficiently show. Her romances, Delphine and Corinne, had immense literary influence at the time. Still more was this the case with Del' Allemagne, which practically opened up to the rising generationin France the till then unknown treasures of literature and philosophy, which during the most glorious half century of her literary history brlaad"' Germany had, sometimes on hints taken from France herself, been accumulating. The literary importance of Chateau- briand (1 768-1848) is far greater, while his literary influence

can hardly be exaggerated. Chateaubriand's literary father was Rousseau, and his voyage to America helped to develop the seeds which Rousseau had sown. In Rene and other works of the same kind, the naturalism of Rousseau received a still further development. But it was not in mere naturalism that Chateau- briand was to find his most fertile and most successful theme. It was, on the contrary, in the rehabilitation of Christianity as an inspiring force in literature. The 18th century had used against religion the method of ridicule; Chateaubriand, by genius rather than by reasoning, set up against this method that of poetry and romance. " Christianity," says he, almost in so many words, " is the most poetical of all religions, the most attractive, the most fertile in literary, artistic and social results." This theme he develops with the most splendid language, and with every conceivable advantage of style, in the Genie du Christianisme and the Martyrs. The splendour of imagination, the summonings of history and literature to supply effective and touching illustrations, analogies and incidents, the rich colouring so different from the peculiarly monotonous and grey tones of the masters of the 18th century, and the fervid admiration for nature which were Chateaubriand's main attractions and char- acteristics, could not fail to have an enormous literary influence. Indeed he has been acclaimed, with more reason than is usually found in such acclamations, as the founder of comparative and imaginative literary criticism in France if not in Europe. The Romantic school acknowledged, and with justice, its

direct indebtedness to him.

Literature since 1830. — In dealing with the last period of the history of French literature and that which was introduced by the literary revolution of 1830 and has continued, in phases of only partial change, to the present day, a slight alteration of treatment is requisite. The subdivisions of literature have lately become so numerous, and the contributions to each have reached such an immense volume, that it is impossible to give more than cursory notice, or indeed allusion, to most of them. It so happens, however, that the purely literary characteristics of this period, though of the most striking and remarkable, are confined to a few branches of literature. The character of the 19th century in France has hitherto been at least as strongly marked as that of any previous period. In the middle ages men of letters followed each other in the cultivation of certain literary forms for long centuries. The chanson de geste, the Arthurian legend, the rotnan d' aventure, the fabliau, the allegorical poem, the rough dramatic jeu, mystery and farce, served successively as moulds into which the thought and writing impulse of genera- tions of authors were successively cast, often with little attention to the suitability of form and subject. The end of the 15th century, and still more the 16th, owing to the vast extension of thought and knowledge then introduced, finally broke up the old forms, and introduced the practice of treating each subject in a manner more or less appropriate to it, and whether appro- priate or not, freely selected by the author. At the same time a vast but somewhat indiscriminate addition was made to the actual vocabulary of the language. The 1 7th and 18th centuries witnessed a process of restriction once more to certain forms and strict imitation of predecessors, combined with attention to purely arbitrary rules, the cramping and impoverishing effect of this (in Fenelon's words) being counterbalanced partly by the efforts of individual genius, and still more by the constant and steady enlargement of the range of thought, the choice of subjects, and the familiarity with other literature, both of the ancient and modern world. The literary work of the 19th century and of the great Romantic movement which began in its second quarter was to repeat on a far larger scale the work of the 16th, to break up and discard such literary forms as had become useless or hopelessly stiff, to give strength, suppleness and variety to such as were retained, to invent new ones where necessary, to enrich the language by importations, inventions and revivals,and, above all, to bring into prominence the principle of individualism. Authors and even books, rather than groups and kinds, demand principal attention. The result of this revolution is naturally most remarkable in

the belles-lettres and the kindred department of history. Poetry, not

dramatic, has been revived; prose romance and literary criticism have been brought to a perfection previously unknown; and history has produced works more various, if not more remark- able, than at any previous stage of the language. Of all these branches we shall therefore endeavour to give some detailed account. But the services done to the language were not limited to the strictly literary branches of literature. Modern French, if it lacks, as it probably does lack, the statuesque precision and elegance of prose style to which between 1650 and 1800 all else was sacrificed, has become a much more suitable instrument for the accurate and copious treatment of positive and concrete subjects. These subjects have accordingly been treated in an abundance corresponding to that manifested in other countries, though the literary importance of the treatment has perhaps proportionately declined. We cannot even attempt to indicate the innumerable directions of scientific study which this copious industry has taken, and must confine ourselves to those which come more immediately under the headings previously adopted. In philosophy proper France, like other nations, has been more remarkable for attention to the historical side of the matter than for the production of new systems; and the principal exception among her philosophical writers, Auguste Comte(i 793- 1857), besides inclining, as far as his matter went to the political and scientific rather than to the purely philosophical side (which indeed he regarded as antiquated), was not very remarkable merely as a man of letters. Victor Cousin (1792-1867), on the other hand, almost a brilliant man of letters and for a time regarded as something of a philosophical apostle preaching ” eclecticism,” betook himself latterly to biographical and other miscellaneous writing, especially on the famous French ladies of the r7th century, and is likely to be remembered chiefly in this department, though not to be forgotten in that of philosophical history and criticism. The same curious declension was observ- able in the much younger Hippolyte Adolphe Taine (1828-1893), who, beginning with philosophical studies, and always maintain- ing a strong tincture of philosophical determinism, applied himself later, first to literary history and criticism in his famous Histoire de la litterature anglaise (1864), and then to history proper in his still more famous and far more solidly based Origines de la France contemporaine (1876). To him, however, we must recur under the head of literary criticism. And not dissimilar phenomena, not so much of inconstancy to philosophy as of a tendency towards the applied rather than the pure branches of the subject, are noticeable in Edgar Quinet (1803-1875), in Charles de Remusat (1797-1875), and in Ernest Renan (1823- 1892), the first of whom began by translating Herder while the second and third devoted themselves early to scholastic philo- sophy, de Remusat dealing with

Abelard (1845) and Anselm (1856), Renan with Averroes (1852). More single-minded devotion to at least the historical side was shown by Jean Philibert Damiron (1794-1862), who published in 1842 a Cours de philosophie and many minor works at different times; but the inconstancy recurs in Jules Simon (1814-1896), who, in the earlier part of his life a professor of philosophy and a writer of authority on the Greek philosophers (especially in Histoire de V ecole d' Alexandrie, 1844-1845), began before long to take an active and, towards the close of his life-work, all but a foremost part in politics. In theology the chief name of great literary eminence in the earlier part of the century is that of Lamennais, of whom more presently, in the later, that of Renan again. But Charles Forbes de Montalembert (1810-1870), an historian with a strong theological tendency, deserves notice; and among ecclesiastics who have been orators and writers the pere Jean Baptiste Henri Lacordaire (1802-1861), a pupil of Lamennais who returned to orthodoxy but always kept to the Liberal side; the pere Celestin Joseph Felix (1810-1891), a Jesuit teacher and preacher of eminence; and the pere Didon (1840-1900), a very popular preacher and writer who, though thoroughly orthodox, did not escape collision with his superiors. On the Protestant side Athanase Coquerel (1820-1875) is the most remarkable name. Recently Paul Sabatier (b. 1858) has displayed, especially

in dealing with Saint Francis of Assisi, much power of literary and religious sympathy and a style somewhat modelled on that of Renan, but less unctuous and effeminate. There are strong philosophical tendencies, and at least a revolt against the re- ligious as well as philosophical ideas of the Encyclopedists, in the Pensies of Joubert, while the hybrid position characteristic of the 19th century is particularly noticeable in Etienne Pivert de S6nancour (1770-1846), whose principal work, Obermann (1804), had an extraordinary influence on its own and the next generation in the direction of melancholy moralizing. Thistone wasnotably taken up towards the other end of the century by Amiel (q.v.), who, however, does not strictly belong to French literature: while in Ximenes Doudon (1800-1872), author of Melanges et lettres posthumously published, we find more of a return to the attitude of Jcubert — literary criticism occupying a very large part of his reflections. Political philosophy and its kindred sciences have naturally received a large share of attention.

Towards the middle of the century there was a great develop- ment of socialist and fanciful theorizing on politics, with which the names of Claude Henri, comte de Saint-Simon (1760-1825), Charles Fourier (1772-1837), Etienne Cabet (1788-1856), and others are connected. As political economists Frederic Bastiat (1801-1850), L. G. L. Guilhaud de Lavergne (1809-1880), Louis Auguste Blanqui (1805-1881), and Michel Chevalier (1806-1879) may be noticed. In Alexis de Tocqueville (1805-1859) France produced a political observer of a remarkably acute, moderate and reflective character, and Armand Carrel (1800-1836), whose life was cut short in a duel, was a real man of letters, as well as a brilliant journalist and an honest if rather violent party politician. The name of Jean Louis Eugene Lerminier (1803- 1857) is of wide repute for legal and constitutional writings, and that of Henri, baron de Jomini (1 7 79-1 869) is still more celebrated as a military historian; while that of Francois Lenormant (1837- 1883) holds a not dissimilar position in archaeology. With the publications devoted to physical science proper we do not attempt to meddle. Philology, however, demands a brief notice. In classical studies France has till recently hardly maintained the position which might be expected of the country of Scaliger and Casaubon. She has, however, produced some considerable Orientalists, such as Champollion the younger, Burnouf , Silvestre de Sacy and Stanislas Julien. The foundation of Romance philo- logy was due, indeed, to the foreigners Wolf and Diez. But early in the century the curiosity as to the older literature of France created by Barbazan, Tressan and others continued to extend. Dominique Martin Meon (1 748-1829) published many unprinted fabliaux, gave the whole of the French Renart cycle, with the exception of Renart le contrefait, and edited the Roman de la rose. Charles Claude Fauriel (1772-1844) and Francois Raynouard (1 761-1836) dealt elaborately with Provencal poetry as well as partially with that of the trouveres; and the latter produced his comprehensive Lexique romane. These examples were followed by many other writers, who edited manuscript works and commented on them, always with zeal and sometimes with discretion. Foremost among these must be mentioned Paulin Paris (1 800-1 881) who for fifty years served the cause of old French literature with untiring energy, great literary taste, and a pleasant and facile pen. His selections from manuscripts, his Romancero jrancais, his editions of Garin le Loherain and Berte aus grans pits, and his Romans de la table ronde may especially be mentioned. Soon, too, the Benedictine Histoire litteraire, so long interrupted, was resumed under M. Paris's general management, and has proceeded nearly to the end of the 14th century. Among its contents M. Paris's dis- sertations on the later chansons de gestes and the early song writers, M. Victor le Clerc's on

the fabliaux, and M. Littre's on the romans d'aventures may be specially noticed. For some time indeed the work of French editors was chargeable with a certain lack of critical and philological accuracy. This reproach, however, was wiped off by the efforts of a band of younger scholars, chiefly pupils of the Ecole des Chartes, with MM. Gaston Paris (1839-1903) and Paul Meyer at their head. Of M. Paris in particular it may be said that no scholar in the subject has ever

combined literary and linguistic competence more admirably. TheSoci6te desAnciensTextesFrancais was formed for the purpose of publishing scholarly editions of inedited works, and a lexicon of the older tongue by M. Godefroy at last supplemented, though not quite with equal accomplishment, the admirable dictionary in which Emile Littre (1801-1881), at the cost of a life's labour, embodied the whole vocabulary of the classical French language. Meanwhile the period between the middle ages proper and the 17th century has not lacked its share of this revival of attention. To the literature between Villon and Regnier especial attention was paid by the early Romantics, and Sainte-Beuve's Tableau historique et critique de la poisie el du thedlre au seizieme siecle was one of the manifestoes of the school. Since the appearance of that work 'in 1828 editions with critical comments of the literature of this period have constantly multiplied, aided by the great fancy for tastefully produced works which exists among the richer classes in France; and there are probably now few countries in which works of old authors, whether in cheap reprints or in editions de luxe can be more readily procured.

The Romantic Movement. — It is time, however, to return to the literary revolution itself, and its more purely literary results. At the accession of Charles X. France possessed three ˆ writers, and perhaps only three, of already remarkable eminence, if we except Chateaubriand, who was already of a past generation. These three were Pierre Jean de Beranger (1780-1857), Alphonse de Lamartine (1790-1869), and Hugues Felicite Robert Lamennais (1782-1854). The first belongs definitely in manner, despite his striking originality of nuance, to the past. He has remnants of the old periphrases, the cum-brous mythological allusions, the poetical " properties " of French verse. He has also the older and somewhat narrow limitations of a French poet; foreigners are for him mere barbarians. At the same time his extraordinary lyrical faculty, his excellent wit, which makes him a descendant of Rabelais and La Fontaine, and his occasional touches of pathos made him deserve and obtain something more than successes of occasion. Beranger, moreover, was very far from being the mere improvisatore which those who cling to the inspirationist theory of

poetry would fain see in him. His studies in style and composition were persistent, and it was long before he attained the firm and brilliant manner which distinguishes him. Beranger's talent, however, was still too much a matter of individual genius to have great literary influence, and he formed no school. It was different with Lamartine, who was, nevertheless, like Beranger, a typical Frenchman. The Meditations and the Harmonies exhibit a remarkable transition between the old school and the new. In going direct to nature, in borrow- ing from her striking outlines, vivid and contrasted tints, harmony and variety of sound, the new poet showed himself an innovator of the best class. In using romantic and religious associations, and expressing them in affecting language, he was the Chateaubriand of verse. But with all this he retained some of the vices of the classical school. His versification, harmonious as it is, is monotonous, and he does not venture into the bold lyrical forms which true poetry loves. He has still the horror of the mot propre; he is always spiritualizing and idealizing, and his style and thought have a double portion of the feminine and almost flaccid softness which had come to pass for grace in French. The last of the trio, Lamennais, represents an altogether bolder and rougher genius. Strongly influenced by the Catholic reaction, Lamennais also shows the aa h°"" strongest possible influence of the revolutionary spirit. His earliest work, the Essai sur l' indifference en matibre de religion (181 7 and 181 8) was a defence of the church on curiously unecclesiastical lines. It was written in an ardent style, full of illustrations, and extremely ambitious in character. The plan was partly critical and partly constructive. The first part dis- posed of the 1 8th century; the second, adopting the theory of papal absolutism which Joseph de Maistre had already advocated, proceeded to base it on a supposed universal consent. The after history of Lamennais was perhaps not an unnatural recoil from this; but it is sufficient here to point out that in his prose,

Lamar- tine.

especially as afterwards developed in the apocalyptic Paroles dun croyant (1*39) are to be discerned many of the tendencies of the Romantic school, particularly its hardy and picturesque choice of language, and the disdain of established and accepted methods which it professed. The signs of the revolution itself were, as was natural, first given in periodical literature. The feudalist affectations of Chateaubriand and the legitimists excited a sort of aesthetic affection

for Gothicism, and Walter Scott became one of the most favourite authors in France. Soon was started the periodical La Muse francaise, in which the names of Hugo, Vigny, Deschamps and Madame de Girardin appear. Almost all the writers in this periodical were eager royalists, and for some time the battle was still fought on poli- tical grounds. There could, however, be no special connexion between classical drama and liberalism; and the liberal journal, the Globe, with no less a person than Sainte-Beuve among its contributors, declared definite war against classicism in the drama. The chief " classical " organs were the Constiiutionnel, the Journal des debats, and after a time and not exclusively, the Revue des deux mondes. Soon the question became purely literary, and the Romantic school proper was born in the famous cinacle or clique in which Hugo was chief poet, Sainte-Beuve chief critic, and Gautier, Gerard de Nerval, the brothers Emile (1701-1871) and Antony (1800-1869), Deschamps, Petrus Borel (1800-1859) and others were officers. Alfred de Vigny and Alfred de Musset stand somewhat apart, and so does Charles Nodier (1780-1844), a versatile and voluminous writer, the very variety and number of whose works have somewhat prevented the individual excellence of any of them from having justice done to it. The objects of the school, which was at first violently opposed, so much so that certain academicians actually petitioned the king to forbid the admission of any Romantic piece at the Theatre Francais, were, briefly stated, the burning of everything which had been adored, and the adoring of everything which had been burnt. They would have no unities, no arbitrary selection of subjects, no restraints on variety of versification no academically limited vocabulary, no considerations of artificial beauty, and, above all, no periphrastic expression. The mot propre, the calling of a spade a spade, was the great command- ment of Romanticism; but it must be allowed that what was taken away in periphrase was made up in adjectives. Musset who was very much of a free-lance in the contest, maintained indeed that the differentia of the Romantic was the copious use of this part of speech. All sorts of epithets were invented to distinguish the two parties, of which flamboyant and grisdtre are perhaps the most accurate and expressive pair— the former serving to denote the gorgeous tints and bold, attempts of the new school, the latter the grey colour and monotonous outlines of the old. The representation of Hernani in 1830 was the cul- mination of the struggle, and during great part of the reign of Louis Philippe almost all the younger men of letters in France were Romantics. The representation of the Lucrece of Francois Ponsard (1814-1867) in 1846 is often quoted as the herald or sign of a classical reaction. But this was only apparent, and signified if it signified anything, merely that the more juvenile excesses of the Romantics

were out of date. All the greatest men of letters of France since 1830 have been on the innovating side and all without exception, whether intentionally or not, have had their work coloured by the results of the movement, and of those which have succeeded it as developments rather than reactions Drama and Poetry since 1830. Although the immediate subject on which the battles of Classics and Romantics arose was dramatic poetry, the dramatic results of the movement have not been those of greatest value or most permanent char acter. The principal effect in the long run has been the intro- duction of a species of play called drame, as opposed to regular comedy and tragedy, admitting of much freer treatment than either of these two as previously understood in French and lending itself in some measure to the lengthy and disjointed action, the multiplicity of personages, and the absence of stock characters which characterized the English stage in its palmy days. All Victor Hugo's dramatic works are of this class and

H5

each, as it was produced or published (Cromwell, Hernani Marion de I Orme, Le Roi s' amuse, Lucrece Borgia, Marie Tudor Kuy Bias and Les Bur graves), was a literary event, and excited the most violent discussion— the author's usual plan being to prefix a prose preface of a very militant character to his work A still more melodramatic variety of drame was that chiefly represented by Alexandre Dumas (1802-1870), whose Henri III and Antony, to which may be added later La Tour de Nesle and Mademoiselle de Belleisle, were almost as much rallying points for the early Romantics as the dramas of Hugo despite their inferior literary value. At the same time Alexandre Soumet (1788-1845), in Norma, Une File de Niron, &c, and Casimir Delavigne in Marino Faliero, Louis XI, &c, maintained a somewhat closer adherence to the older models. The classical or semi-classical reaction of the last years of Louis Philippe was represented in tragedy by Ponsard (Lucrece, Agnes de Miranie, Charlotte Corday, Ulysse, and several comedies), and on the comic side, to a certain extent, by Emile Augier (1820-1889) in LAventuriere, Le Gendre de M. Poirier, Le FUs de Giboyer &c During almost the whole period Eugene Scribe (1791-1861) poured forth innumerable comedies of the vaudeville order which, without possessing much literary value, attained immense popularity. For the last half -century the realist development of Romanticism has had the upper hand in dramatic composition its principal representatives being on the one side Victorien Sardou (1831-1909), who in Nos Intimes, La Famille BenoUon Rabagas, Dora, &c, chiefly devoted himself to the satirical treatment of manners, and Alexandre Dumas fils (1824-1895), author m 1852 of the famous

Dame aux camelias, who in such pieces as Les Idees de Madame Aubray and L'Htrangere rather busied himself with morals and " problems," while his Dame aux Camillas (1852) is sometimes ranked as the first of such things m modern" style. Certain isolated authors also deserve notice, such as Joseph Autran (1813-1877), a poet and acade- mician having some resemblance to Lamartine, whose Fille d Mschyle created for him a dramatic reputation which he did not attempt to follow up, and Gabriel Legouve (b. 1807) whose Adrienne Lecouvreur was assisted to popularity by the admirable talent of Rachel. A special variety of drama of the first literary importance has also been cultivated in this century under the title of scenes or proverbes, slight dramatic sketches in which the dialogue and. style are of even more importance than the action, ihe best of all of these are those of Alfred de Musset (1810-1857) whose // faut qu'une porte soit ouverte ou fermie, On ne badin'e Pas avec V amour, &c, are models of grace and wit. Among his followers may be mentioned especially Octave Feuillet (1821- 1890). Few social dramas of the kind in modern times have attained a greater success than Le Monde ou Von s'ennuie (1868) of Edouard Pailleron (1834-1899). (See also Drama.)

In poetry proper, as in drama, Victor Hugo showed the way. In him all the Romantic characteristics were expressed and embodied—disregard of arbitrary critical rules, free choice of subject, variety and vigour of metre, splendour and sonorousness of diction, abundant " local colour," and that irrepressible individualism which is one of the chief though not perhaps the chief, of the symptoms. If the careful attention to form which is also characteristic of the movement is less apparent in him than in some of his followers, it is not because it is absent, but because the enthusiastic conviction with which he attacked every subject somewhat diverts attention from it. As with the merits so with the defects. A deficient sense of the ludicrous which characterized many of the Romantics was strongly apparent in their leader, as was also an equally representative grandiosity, and a fondness for the introduction of foreign and unfamiliar words, especially proper names which occasionally produces an effect of burlesque Victor Hugo's earliest poetical works, his chiefly royalist and political Odes, were cast in the older and accepted forms, but already displayed astonishing poetical qualities. But it was in the Ballades (for instance, the splendid Pas d'armes du roi Jean written in verses of three syllables) and the Orientates (of which may be taken for a sample the sixth section of Navarin, a perfect

Victor Hugo.

Musset.

torrent of outlandish terms poured forth in the most admirable verse, or Les Djinns, where some of the stanzas have lines of two syllables each) that the grand provocation was thrown to the believers in alexandrines, careful caesuras and strictly separated couplets. Les Feuilles d'aulomne, Les Chants du crepuscule, Les Voix intSrieures, Les Rayons et les ombres, the productions of the next twenty years, were quieter in style and tone, but no less full of poetical spirit. The Revolution of 1848, the establishment of the empire and the poet's exile brought about a fresh determination of his genius to lyrical subjects. Les ChStiments and La Ligende des siecles, the one political, the other historical, reach perhaps the high-water mark of French verse; and they were followed by the philosophical Contempla- tions, the lighter Chansons des rues et des bois, the Annee terrible, the second Ligende des siecles, and the later work to be found noticed sub nom. We have been thus particular here because the literary productiveness of Victor Hugo himself has been the measure and sample of the whole literary productiveness of France on the poetical side. At five-and-twenty he was acknowledged as a master, at seventy-five he was a master still. His poetical influence has been represented in three different schools, from which very few of the poetical writers of the century can be excluded. These few we may notice first. Alfred de Musset, a writer of great genius, felt part of the Romantic inspiration very strongly, but was on the whole unfortunately influenced by Byron, and partly out of wilfulness, partly from a natural want of persevering industry and vigour, allowed himself to be careless and even slovenly in composition. Notwithstanding this, many of his lyrics are among the finest poems in the language, and his verse, careless as it is, has extraordinary natural grace. Auguste Barbier (1805-1882) whose Iambes shows an extraordinary command of nervous and masculine versification, also comes in here; and the Breton poet, Auguste Brizeux (1803-1858), much admired by some, together with Hegesippe Moreau, an unequal writer possessing some talent, Pierre Dupont (1821-1870), one of much greater gifts, and Gustave Nadaud (1820-1893), a follower of Beranger, also deserve mention. Of the school of Lamartine rather than of Hugo are Alfred de Vigny (1790-1865) and Victor de Laprade (181 2-1887), the former a writer of little bulk and somewhat over-fastidious, but possessing one

of the most correct and elegant styles to be found in French, with a curious restrained passion and a complicated originality, the latter a meditative and philosophical poet, like Vigny an admir- able writer, but somewhat deficient in pith and substance, as well as in warmth and colour. Madame Ackermann (1813-1890) is the chief philosophical poetess of France, and this style has recently been very popular; but for actual poetical powers, Marceline Desbordes-Valmore (1786-1859) perhaps excelled her, though in a looser and more sentimental fashion. The poetical schools which more directly derive from the Romantic movement as represented by Hugo are three in number, corresponding in point of time with the first outburst of the movement, with the period of reaction already alluded to, and with the closing years of the second empire. Of the first by far the most distinguished member was Theophile Gautier (1811-1872), the most perfect poet in point of form that France has produced. When quite a boy he devoted himself to the study of 16th- century masters, and though he acknowledged the supremacy of Hugo, his own talent was of an individual order, and developed itself more or less independently. Albertus alone of his poems has much of the extravagant and grotesque character which distinguished early romantic literature. The Comidie de la mort, the Poisies diverses, and still more the Emaux et catnies, display a distinctly classical tendency — classical, that is to say, not in the party and perverted sense, but in its true acceptation. The tendency to the fantastic and horrible may be taken as best shown by Petrus Borel (1809-1859), a writer of singular power almost entirely wasted. Gerard Labrunie or de Nerval (1808-1855) adopted a manner also fantastic but more idealistic than Borel's, and distinguished himself by his Oriental travels and studies, and by his attention to popular ballads and traditions,

Gautier.

while his style has an exquisite but unaffected strangeness hardly inferior to Gautier's. This peculiar and somewhat quintessenced style is also remarkable in the Gaspard de la nuit of Louis Bertrand (1807-1841), a work of rhythmical prose almost unique in its character. One famous sonnet preserves the name of Felix Arvers (1806-1850). The two Deschamps were chiefly remarkable as translators. The next generation produced three remarkable poets, to whom may perhaps be added a fourth. Th6odorede Banville (1823-1891), adopting the principles of Gautier, and combining with them a considerable satiric faculty, composed a large amount of verse, faultless in form, delicate and exquisite in shades and colours, but so entirely neutral in moral and political tone that it has found fewer admirers than it deserved. Charles Marie Ren6 Leconte de Lisle

(1818-1894), carrying out the principle of ransacking foreign literature for subjects, went to Celtic, classical or even Oriental sources for his inspiration, and despite a science in verse not much inferior to Banville's, and a far wider range and choice of subject, diffused an air of erudition, not to say pedantry, oveE his work which disgusted some readers, and a pessimism which displeased others, but has left poetry only inferior to that of the greatest of his countrymen. Charles Baudelaire (182 j-1867) t by his choice of unpopular subjects and the terrible truth of his analysis, revolted not a few of those who, in the words of an English critic, cannot take pleasure in the representation if they do not take pleasure in the thing represented, and who thus miss his extraordinary command of the poetical appeal in sound, in imagery and in suggestion generally. Thus, by a strange coincidence, each of the three representatives of the second Romantic generation was for a time disappointed of his due fame. A fourth poet of this time, Josephin Soulary (1815-1891), produced sonnets of rare beauty and excellence. A fifth, Louis Bouilhet (1822-1869), an intimate friend of Flau- bert, pushed even farther the fancy for strange subjects, but showed powers in Melcenis and other things. In 1866 a collection of poems, entitled after an old French fashion Le Parnasse contemporain, appeared. It included contributions by many of the poets just mentioned, but the mass of the contributors were hitherto unknown to fame. A similar collection appeared in 1869, and was interrupted by the German war, but continued after it, and a third in 1876.

The first Parnasse had been projected by MM. Xavier de Ricard (b. 1843) and CatulleMendes (1841-1909) as a sort of mani- festo of a school of young poets: but its contents were, largely coloured by the inclusion among them of work by representatives of older generations — Gautier, Laprade, Leconte de Lisle, Banville, Baudelaire and others. The continuation, however, of the title in the later issues, rather than anything else, led to the formation and promulgation of the idea of a " Parnassien " or an " Impassible " school which was supposed to adopt as its watchword the motto of " Art for Art's sake," to pay especial attention to form, and also to aim at a certain objectivity. As a matter of fact the greater poets and the greater poems of the Parnasse admit of no such restrictive labelling, which can only be regarded as mischievous, though (or very mainly because) it has been continued. Another school, arising mainly in the later 'eighties and calling itself that of " Symbolism," has been supposed to indicate a reaction against Parnassianism and even against the main or Hugonic Romantic tradition generally; with a throwing back to Lamartine and perhaps Chenien This idea of successive schools (" Decadents," " Naturists," "

Sim- plists," &c.) has even been reduced to such an abswdum as the statement that " France sees a new school of poetry every fifteen years." Those who have studied literature sufficiently widely, and from a sufficient elevation, know that these syste- matisings are always more or less delusive. Parnassianism, symbolism and the other things are merely phases of the Romantic movement itself — as may be proved to demonstration by the simple process of taking, say, Hugo and Verlaine on the one hand, Delille or Escouchard Lebrun on the other, ana com- paring the two first mentioned with each other and with the older poet. The differences in the first case will be found to be

differences at most of individuality: in the other of. kind. We shall not, therefore, further refer to these dubious classifications: but specify briefly the most remarkable poets whom they concern, and all the older of whom, it may be observed, were represented in the Parnasse itself. Of these the most remarkable were Sully Prudhomme (1830-1907), Francois Coppee (1842-1908) and Paul Verlaine (1844-1896). The first (Stances et poetnes, 1865, Vaines Tendresses, 1875, Bonkeur, 1888, &c.) is a philosophical and rather pessimistic poet who has very strongly rallied the suffrages of the rather large present public who care for the embodiment of these tendencies in verse; the second (La Greve des forgerons, r86o, Les Humbles, 1872, Contes et vers, 1881-1887, &c.) a dealer with more generally popular subjects in a more sentimental manner; and the third (Sagesse, 1881, ParaUelement, 1889, Pobnes satumiens, including early work, 186 7-1 890), by far the most original and remarkable poet of the three, starting with Baudelaire and pushing farther the fancy for forbidden subjects, but treating both these and others with wonderful command of sound and image-suggestion. Verlaine in fact (he was actually well acquainted with English) endeavoured, and to a small extent succeeded in the endeavour, to communicate to French the vague suggestion of visual and audible appeal which has characterized English poetry from Blake through Coleridge. Others of the original Parnassiens who deserve mention are Albert Glatigny (1839-1873), a Bohemian poet of great talent who died young; Stephane Mallarme (1842-1898), afterwards chief of the Symbolists, also a true poet in his way, but somewhat barren, and the victim of pose and trick; Jose Maria de Heredia (1842-1903), a very exquisite practitioner of the

sonnet but with perhaps more art than matter in him; Henri Cazalis (1 840-1 909), who long afterwards, under his name of Jean Lahor, appeared as a Symbolist pessimist; A. Villiers de ITsle-Adam, another eccentric but with a spark of genius; Emmanuel des Essarts; Auguste de Chatillon (1810-1882); Leon Dierx (b. 1838) who, after producing even less than Mallarme, succeeded him as Symbolist chief; Jean Aicard (b. 1848), a southern bard of merit; and lastly Catulle Mendes himself, who has been a brilliant writer in verse and prose ever since, and whose Mouvement poetique jrancais de 1867 a 1900 (1903), an official report largely amplified so that it is in fact a history and dictionary of French poetry during the century, forms an almost unique work of reference on the subject. Among the later recruits the most specially noticeable was Armand Silvestre (1837-1901), whose verse (La Chanson des heures, 1878, Ailes d'or, 1880, La Chanson des etoiles, 1885), of an ethereal beauty, was contrasted with prose admirably written and sometimes most amusing, but " Pantagruelist," and more, in manners and morals. This declension from poetry to prose fiction was also noticeable in Guy de Maupassant, Andre Theuriet, Anatole France and even Alphonse Daudet.

Yet another flight of poets may be grouped as those specially representing the last quarter of the century and (whether Par- nassian, Symbolist or what not) the latest development of French poetry. Verlaine and Mallarme already mentioned were in a manner the leaders of these. Perhaps something of the influence of Whitman may be detected in the irregular verses of Gustave Kahn (b. 1859), Francis Viele Griffin, actually an American by birth (b. 1864), Stuart Merrill, of like origin, and Paul Fort (b. 1872). But the whole tendency of the period has been to relax the stringency of French prosody. Albert Samain (1850- 1900), a musical versifier enough; Jean Moreas (1856-1910) who began with a volume called Les Syrtes in 1884) ; Laurent Tailhade (b. 1854) and others are more or less Symbolist, and contributed to the Symbolist periodical (one of many such since the beginning of the Romantic movement which would almost require an article to themselves), the Mercure de France. An older man than many of these, M. Jean Richepin (b. 1849), made for a time considerable noise with poetical work of a colour older even than his age, and harking back somewhat to the Jeune- France and " Bousingot " type of early Romanticism — La Chanson des giteux, Les Blasphemes, &c. Other writers of note are M. Paul Deroulede (b. 1846), a violently nationalist poet;

M. Maurice Bouchor (b. 1864), who started his serious and respectable work with Le-s Symboles in 1888; while M. Henri de Regnier, born in the same year, has received very high praise for work from

Lendemains in 1886 and other volumes up to Les Jeux rusliques et divins (1897) and Les Medailles d'argile (1900). The truth, however, perhaps is that this extraordinary abundance of verse (for we have not mentioned a quarter of the names which present themselves, or a twentieth part of those who figure in M. Mendes's catalogue for the last half-century) reminds the literary historian somewhat too much of similar phenomena in other times. There is undoubtedly a great diffusion of poetical dexterity, and not perhaps a small one of poetical spirit, but it requires the settling, clarifying and distinguishing effects of time to separate the poet from the minor poet. Still more perhaps must we look to time to decide whether the vers libre as it is called — that is to say, the verse freed from the minute traditions of the elder prosody, admitting hiatus, neglecting to a greater or less extent caesura, and sometimes relying upon mere rhythm to the neglect of strict metre altogether — can hold its ground. It has as yet been practised by no poet at all approach- ing the first class, except Verlaine, and not by him in its extremer forms. And the whole history of prosody and poetry teaches us that though similar changes often come in as it were unperceived, they scarcely ever take root in the language unless a great poet adopts them. Or rather it should perhaps be said that when they are going to take root in the language a great poet always does adopt them before very long.

Prose Fiction since 1830. — Even more remarkable, because more absolutely novel, was the outburst of prose fiction which followed 1830. Madame de Lafayette, Le Sage, Marivaux, Voltaire, the Abbe Prevost, Diderot, J. J. Rousseau, Bernardin de Saint-Pierre and Fievee had all of them produced work excellent in its way, and comprising in a more or less rudimentary condition most varieties of the novel. But none of them had, in the French phrase, made a school, and at no time had prose fiction been composed in any considerable quantities. The im- mense influence which Walter Scott exercised was perhaps the direct cause of the attention paid to prose fiction; the facility, too, with which all the fancies, tastes and beliefs of the time could be embodied in such work may have had con- siderable importance. But it is difficult on any theory of cause and effect to account for the appearance in less than ten years of such a group of novelists as Hugo, Gautier, Dumas, Merimee, Balzac, George Sand, Jules Sandeau and Charles de Bernard, names to which might be added others scarcely inferior. There is hardly anything else resembling it in literature, except the great cluster of English dramatists in the beginning of the 1 7th century, and of English poets at the beginning of the 19th; and it is remarkable that the excellence of the first group was maintained by a fresh generation — Murger, About, Feuillet, Flaubert, Erckmann-

Chatrian, Droz, Daudet, Cherbuliez and Gaboriau, forming a company of diadochi not far inferior to their pre- decessors, and being themselves not unworthily succeeded almost up to the present day. The romance-writing of France during the period has taken two different directions — the first that of # the novel of incident, the second that of analysis and character. The first, now mainly deserted, was that which, as was natural when Scott was the model, was formerly most trodden; the second required the genius of George Sand and of Balzac and the more problematical talent of Beyle to attract students to it. The novels of Victor Hugo are novels of incident, with a strong infusion of purpose, and considerable but rather ideal character drawing. They are in fact lengthy prose drames rather than romances proper, and they have found no imitators. They display, however, the powers of the master at their fullest. On the other hand, Alexandre Dumas originally com- n U mas posed his novels in close imitation of Scott, and they are much less dramatic than narrative in character, so that they lend themselves to almost indefinite continuation, and there is often no particular reason why they should terminate even at the end of the score or so of volumes to which they sometimes actually extend. Of this purely narrative kind, which hardly

even attempts anything but the boldest character drawing, the best of them, such as Les Trois Mousquetaires, Vingt ans apres, La Reine Margot, are probably the best specimens extant. Dumas possesses, almost alone among novelists, the secret of writing interminable dialogue without being tedious, and of telling the story by it. Of something the same kind, but of a far lower stamp, are the novels of Eugene Sue (1804-1857). Dumas and Sue were accompanied and followed by a vast crowd of com- panions, independent or imitative. Alfred de Vigny had already attempted the historical novel in Cinq-Mars. Henri de La Touche (1785-1851) (Fragoletta) , an excellent critic who formed George Sand, but a mediocre novelist, may be mentioned: and perhaps also Roger de Beauvoir, whose real name was Eugene Auguste Roger de Bully (1806-1866) (Le Chronique de Saint Georges), and Frederic Soulie (Les Memoires du diable) (1800-1847). Paul Feval {La Fie des greves) (1817-1877) and Amedee Achard (Belle-Rose) (1814-1875) are of the same school, and some of the attempts of Jules Janin (1804-1874), more celebrated as a critic, may also be connected with it. By degrees, however, the taste for the novel

of incident, at least of an historical kind, died out till it was revived in another form, and with an admixture of domestic interest, by MM. Erckmann-Chatrian. The last and one of the most splendid instances of the old style was Le Capl- taine Fracasse, which Theophile Gautier began early and finished late as a kind of tour deforce. The last-named writer in his earlier days had modified the incident novel in many short tales, a kind of writing for which French has always been famous, and in which Gautier's sketches are masterpieces. His only other long novel, Mademoiselle de Maupin, belongs rather to the class of analysis. With Gautier, as a writer whose literary characteristics even excel his purely tale-telling powers, may be classed Prosper Merimee (1803-1870), one of the most exquisite 19th-century masters of the language. Already, however, in 1830 the tide was setting strongly in favour of novels of contemporary life and manners. These were of course susceptible of extremely various treatment. For many years Paul de Kock (1793-1871), a writer who did not trouble himself about Classics or Romantics or any such matter, continued the tradition of Marivaux, Crebillonfils, and Pigault Lebrun (1753-1835) in a series of not very moral or polished but lively and amusing sketches of life, principally of the bourgeois type. Later Charles de Bernard (1804-1850) (Gerfaut) with infinitely greater wit, elegance, propriety and literary skill, did the same thing for the higher classes of French society. But the two great masters of the novel of character and manners as opposed to that of history and incident are Honore de Balzac (1 799-1850) and Aurore Dudevant, commonly called George Sand (1804-1876). Their influence affected the entire body of novelists who succeeded them, with very few exceptions. At the head of these exceptions may be placed Jules Sandeau (1811-1883), who, after writing a certain number of novels in a less individual style, at last made for himself a special subject in a certain kind of domestic novel, where the passions set in motion are less boisterous than those usually preferred by the French novelist, and reliance is mainly placed on minute character drawing and shades of colour sober in hue but very carefully adjusted (Catherine, Mademoiselle de Penarvan, Mademoiselle de la Seigliere). In the same class of the more quiet and purely domestic novelists may be placed X. B. Saintine (1798-1865) (Picciola), Madame C. Reybaud (1802-1871) (Clementine, Le Cadet de Colobrieres) , J. T. de Saint- Germain (Pour en epingle, La Feuille de coudrier) , Madame Craven (1808-1891) (Recit d'une sasur, Fleurange). Henri Beyle (1798- 1865), who wrote under the nom de plume of Stendhal and belongs to an older generation than most of these, also stands by himself. His chief book in the line of fiction is La Chartreuse de Parme, an exceedingly powerful novel of the analytical kind, and he also composed a considerable number of critical and

miscellaneous works. Of little influence at first (though he had great power over Merimee) and never master of a perfect style, he has exercised ever increasing authority as a master of pessimist analysis. Indeed much of his work was never published till towards the close of the century. Last among the independents must be

mentioned Henry Murger (1822-1861), the painter of what is called Bohemian life, that is to say, the struggles, difficulties and amusements of students, youthful artists, and men of letters. In this peculiar style, which may perhaps be regarded as an irregular descendant of the picaroon romance, Murger has no rival; and he is also, though on no extensive scale, a poet of great pathos. But with these exceptions, the influences of the two writers we have mentioned, sometimes combined, more often separate, may be traced throughout the whole of later novel literature. George Sand began with books strongly tinged with the spirit of revolt against moral and social arrangements, and she sometimes diverged into very curious paths of pseudo- philosophy, such as was popular in the second quarter of the century. At times, too, as in Lucrezia Floriani and some other works, she did not hesitate to draw largely on her own personal adventures and experiences. But latterly she devoted herself rather to sketches of country life and manners, and to novels involving bold if not very careful sketches of character and more or less dramatic situations. She was one of the most fertile of novelists, continuing to the end of her long life to pour forth fiction at the rate of many volumes a year. Of her different styles may be mentioned as fairly characteristic, LSlia, Lucrezia Floriani, Consuelo, La Mare au diable, La Petite Fadette, Francois le champi, Mademoiselle de laQuintinie. Considering the shorter length of his life the productiveness of Balzac was almost more astonishing, especially if we consider that youaxen some of his early work was never reprinted, and that he left great stores of fragments and unfinished sketches. He is, moreover, the most remarkable example in literature of untiring work and determination to achieve success despite the greatest discouragements. His early work was worse than unsuccessful, it was positively bad. After more than a score of unsuccessful attempts, Les Chouans at last made its mark, and for twenty years from that time the astonishing productions composing the so-called Comidie humaine were poured forth successively. The sub-titles which Balzac imposed upon the different batches, Scenes de la vie parisienne, de la vie de province, de la vie inlime, &c, show, like the general title, a deliberate intention on the author's part to cover the whole ground of human, at least of French life. Such an attempt could not succeed wholly; yet the amount of success attained is astonishing. Balzac has, however, with some justice

been accused of creating the world which he described, and his personages, wonderful as is the accuracy and force with which many of the characteristics of humanity are exemplified in them, are somehow not altogether human. Since these two great novelists, many others have arisen, partly to tread in their steps, partly to strike out inde- pendent paths. Octave Feuillet (1821-1890), beginning his career by apprenticeship to Alexandre Dumas and the historical novel, soon found his way in a very different style of composition, the roman intime of fashionable life, in which, notwithstanding some grave defects, he attained much popularity and showed remarkable skill in keeping abreast of his time. The so-called realist side of Balzac was developed (but, as he himself acknow- ledged, with a double dose of intermixed if somewhat trans- formed Romanticism) by Gustave Flaubert (1821-1880), who showed culture, scholarship and a literary power over the language inferior to that of no writer of the century. No novelist of his generation has attained a higher literary rank than Flaubert. Madame Bovary and U Education sentimentale are studies of con- temporary life; in Salammbd and La Tentation de Saint Anloine erudition and antiquarian knowledge furnish the subjects for the display of the highest literary skill. Of about the same date Edmond About (1828-1885), before he abandoned novel-writing, devoted himself chiefly to sketches of abundant but not always refined wit (L'Homme d I'oreille cassSe, Le Nez d'un notaire), and sometimes to foreign scenes (Tolla, Le Roi des montagnes). Champfieury (Henri Husson, 1829-1889), a prolific critic, deserves notice for stories of the extravaganza kind. During the whole of the Second Empire one of the most popular writers was Ernest Feydeau (1821-1873), a writer of great ability, but morbid and affected in the choice and treatment of his subjects (Fanny,

Sylvie, Catherine d'Overmeire). Emile Gaboriau (1833-1873), taking up that side of Balzac's talent which devoted itself to inextricable mysteries, criminal trials, and the like, produced M. Le Coq, Le Crime d'Orcival, La Degringolade, &c; and Adolphe Belot (b. 1829) for a time endeavoured to out- Feydeau Feydeau in La Femme defeu and other works. Eugene Fromentin (1820-1876), best known as a painter, wrote a novel, Dominique, which was highly appreciated by good judges.

During the last decade of the Second Empire there arose, continuing

for varying lengths of time till nearly the end of the century, another remarkable group of novelists, most of whom are dealt with under separate headings, but who must receive combined treatment here; with the warning that even more danger than in the case of the poets is incurred by classing them in “schools.” Undoubtedly, however, the “Naturalist” tendency, starting from Balzac and continued through Flaubert, but taking quite a new direction under some of those to be mentioned, is in a manner dominant. Flaubert himself and Feuillet (an exact observer of manners but an anti-Naturalist) have already been mentioned. Victor Cherbuliez (1820-1899), a constant writer in the Revue des deux mondes on politics and other subjects, also accomplished a long series of novels from Le Comte Kostia (1863) onwards, of which the most remarkable are that just named, Le Roman d’une honnete femme (1866), and Mela Holdenis (1873). With something of Balzac and more of Feuillet, Cherbuliez mixed with his observation of society a dose of sentimental and popular romance which offended the younger critics of his day, but he had solid merits. Gustave Droz (b. 1832) devoted himself chiefly to short stories sufficiently ” free ” in subject {Monsieur, madame et bSbS, Enlre nous, &c.) but full of fancy, excellently written, and of a delicate wit in one sense if not in all. Andre Theuriet (1833-1907) began with poetry but diverged to novels, in which the scenery of France and especially of its great forests is used with much skill; Le Fils Maugars (1879) may be mentioned out of many as a specimen. L6on Cladel (1835-1892), whose most remarkable work was Les Va-nu-pieds (1874), had, as this title of itself shows, Naturalist leanings; but with a quaint Romantic tendency in prose and verse.

The Naturalists proper chiefly developed or seemed to develop one side of Balzac, but almost entirely abandoned his Romantic element. They aimed first at exact and almost photographic delineation of the accidents of modern life, and secondly at still more uncompromising non-suppression of the essential features and functions of that life which are usually suppressed. This school may be represented in chief by four novelists (really three, as two of them were brothers who wrote together till the rather early death of one of them), Emile Zola (1840-1903),

Alphonse Daudet (1840-1897), and Edmond (1822-1897) and Jules (1830-1870) de Goncourt. The first, of Italian extraction and Marseillais birth, began by work of undecided kinds and was always a critic as well as a novelist. Of this first stage Conies a Ninon (1864) and ThSrese Raquin (1867) deserve to be specified. But after 1870 Zola entered upon a huge scheme (suggested no doubt by the Comedie humaine) of tracing the fortunes in every branch, legitimate and illegitimate, and in every rank of society of a family, Les Rougon-Macquart, and carried it out in a full score of novels during more than as many years. He followed this with a shorter series on places, Paris, Rome, Lourdes, and lastly by another of strangely apocalyptic tone, Ficondite, Travail, VeritS, the last a story of the Dreyfus case, retrospective and, as it proved, prophetic. The extreme repulsiveness of much of his work, and the overdone detail of almost the whole of it, caused great prejudice against him, and will probably always prevent his being ranked among the greatest novelists; but his power is indubitable, and in passages, if not in whole books, does itself justice.

MM. de Goncourt, besides their work in Naturalist (they would have preferred to call it “Impressionist”) fiction, devoted themselves especially to study and collection in the fine arts, and produced many volumes on the historical side of these, volumes distinguished by accurate and careful research. This

quality they carried, and the elder of them after his brother’s death continued to carry, into novel- writing (Renee Mauperin, Germinie Lacerteux, Cherie, &c.) with the addition of an extra- ordinary care for peculiar and, as they called it, ” personal ” diction. On the other hand,

Alphonse Daudet (who with the other three, Flaubert to some extent, and the Russian novelist Turgenieff, formed a sort of cinacle or literary club) mixed with some Naturalism a far greater amount of fancy and wit than his companions allowed themselves or could perhaps attain; and in the Tartarin series (dealing with the extravagances of his fellow-Provencaux) added not- a little to the gaiety of Europe. His other novels (Fromont jeune et Risler aini, Jack, Le Nabob, &c), also very popular, have been variously judged, there being something strangely like plagiarism in some of them, and in others, in fact in most, an excessive use of that privilege of the novelist which consists in introducing real persons under more or less disguise. It should be observed in speaking of this group that the Goncourts, or rather the survivor of them, left an elaborate Journal disfigured by spite and bad taste, but of much importance for the appreciation of the personal side of French literature during the last half of the century.

In 1880 Zola, who had by this time formed a regular school of disciples, issued with certain of them a collection of short stories, Les Soirees de Medan, which contains one of his own best things, L'Attaque du moulin, and also the capital story, Boule de suif, by Guy de Maupassant (1850-1893), who in the same year published poems, Des vers, of very remarkable if not strictly poetical quality. Maupassant developed during his short literary career perhaps the greatest powers shown by any French novelist since Flaubert (his sponsor in both senses) in a series of longer novels (Une Vie, Bel Ami, Pierre et Jean, Fort comme la mort) and shorter stories (Monsieur Parent, Les Sceurs Rondoli, Le Horla), but they were distorted by the Naturalist pessimism and grime, and perhaps also by the brain-disease of which their author died. M. J. K. Huysmans (b. 1848), also a contributor to Les Soirees de Medan, who had begun a little earlier with Marthe (1876) and other books, gave his most characteristic work in 1884 with Au rebours and in 1891 with La-bas, stories of exaggerated and "satanic" pose, decorated with perhaps the extremest achievements of the school in mere ugliness and nastiness. Afterwards, by an obvious reaction, he returned to Catholicism. Of about the same date as these two are two other novelists of note, Julien Viaud (" Pierre Loti," b. 1850), a naval officer who embodied his experiences of foreign service with a faint dose of story and character interest, and a far larger one of elaborate description, in a series of books (AziyadS, Le Mariage de Loti, Madame Chrysantheme, &c), and M. Paul Bourget (b. 1852), an important critic as well as novelist who deflected the Naturalist current into a " psychological " channel, connecting itself higher with Stendhal, and composed in its books very popular in their

way — Cruelle Flnigme (1885), Le Disciple, Terre promise, Cosmopolis. As a contrast or comple- ment to Bourget's "psychological" novel may be taken the "ethical" novel of Edouard Rod (1857-1909) — La Vie privie de Michel Tessier (1893), Le Sens de la vie, Les Trois Cceurs. Contemporary with these as a novelist though a much older man, and occupied at different times of his life with verse and with criticism, came Anatole France (b. 1844), who in Le Crime de Silvestre Bonnard, La Rotisserie de la reine Pedauque, Le Lys rouge, and others, has made a kind of novel as different from the ordinary styles as Pierre Loti's, but of far higher appeal in its wit, its subtle fancy, and its perfect French. Ferdinand Fabre (1830-1898) and Ren6 Bazin (b. 1853) represent the union, not too common in the French novel, of orthodoxy in morals and religion with literary ability. Further must be mentioned Paul Hervieu (b. 1857), a dramatist rather than a novelist; the brothers Margueritte (Paul, b. i860, Victor, b. 1866), especially strong in short stories and passages; another pair of brothers of Belgian origin writing under the name of "J. H. Rosny" — Zolaists partly converted not to religion but to science and a sort of non-Christian virtue; the ingenious and amusing, if not exactly moral, brilliancy of Marcel Prevost (b. 1862); the

contorted but rather attractive style and the perverse sentiment of Maurice Barres (b. 1862); and, above all, the audacious and inimitable dialogue pieces of " Gyp " (Madame de Martel, b. 1850), worthy of the best times of French literature for gaiety, satire, acuteness and style, and perhaps likely, with the work of Maupassant, Pierre Loti and Anatole France, to represent the capital achievement of their particular generation to posterity.

Periodical Literature since 1830. Criticism. — One of the causes which led to this extensive composition of novels was the great spread of periodical literature in France, and the custom of including in almost all periodicals, daily, weekly or monthly, a jeuilleton or instalment of fiction. Of the contributors of these periodicals who were strictly journalists and almost political journalists only, the most remarkable after Carrel were his opponent in the fatal duel, — Emile de Girardin, Lucien A. Prevost-Paradol (1820-1870), Jean Hippolyte Carrier, called de Villemessant (1812-1879), and, above all, Louis Veuillot (1815-1883), the most violent and unscrupulous but by no means the

least gifted of his class. The same spread of periodical literature, together with the increasing interest in the literature of the past, led also to a very great development of criticism. Almost all French authors of any eminence during nearly the last century have devoted themselves more or less to criticism of literature, of the theatre, or of art. And sometimes, as in the case of Janin and Gautier, the comparatively lucrative nature of journalism, and the smaller demands which it made for labour and intellectual concentration, have diverted to feuilleton-writing abilities which might perhaps have been better employed. At the same time it must be remembered that from this devotion of men of the best talents to critical work has arisen an immense elevation of the standard of such work. Before the romantic movement in France Diderot in that country, Lessing and some of his successors in Germany, Hazlitt, Coleridge and Lamb in England, had been admirable critics and reviewers. But the theory of criticism, though these men's principles and practice had set it aside, still remained more or less what it had been for centuries. The critic was merely the administrator of certain hard and fast rules. There were certain recognized kinds of literary composition; every new book was bound to class itself under one or other of these. There were certain recognized rules for each class; and the goodness or badness of a book consisted simply in its obedience or disobedience to these rules. Even the kinds of admissible subjects and the modes of admissible treat- ment were strictly noted and numbered. This was especially the case in France and with regard to French belles-lettres, so that, as we have seen, certain classes of composition had been reduced to unimportant variations of a registered pattern. The Romantic protest against this absurdity was specially loud and completely victorious. It is said that a publisher advised the youthful Lamartine to try "to be like somebody else" if he wished to succeed. The Romantic standard of success was, on the contrary, to be as individual as possible. Victor Hugo himself composed a good deal of criticism, and in the preface to his Orientates he states the critical principles of the new school clearly. The critic, he says, has nothing to do with the subject chosen, the colours employed, the materials used. Is the work, judged by itself and with regard only to the ideal which the worker had in his mind, good or bad ? It will be seen that as a legitimate corollary of this theorem the critic becomes even more of an interpreter than of a judge. He can no longer satisfy himself or his readers by comparing the work before him with some abstract and accepted standard, and marking off its shortcomings. He has to recon- struct, more or less conjecturally, the special ideal at which each of his authors aimed, and to do this he has to study their idiosyn- crasies with the utmost care, and set them before his readers in as full and

attractive a fashion as he can manage. The first writer who thoroughly grasped this necessity and successfully dealt with it was Charles Augustin Sainte-Beuve (1804-1869), who has indeed identified his name with the method of criticism just described. Sainte-Beuve's first remarkable work (his poems and novels we may leave out of consideration) was the sketch of 16th-century literature

Sainte- Beuve.

already alluded, to, which he contributed to the Globe. But it was not till later that his style of criticism became fully developed and accentuated. During the first decade of Louis Philippe's reign his critical papers, united under the title of Critiques et portraits littiraires, show a gradual advance. During the next ten years he was mainly occupied with his studies of the writers of the Port Royal school. But it was during the last twenty years of his life, when the famous Causeries du lundi appeared weekly in the columns of the Constitutionnel and the Moniteur, that his most remarkable productions came out. Sainte-Beuve's style of criticism (which is the key to so much of French literature of the last half-century that it is necessary to dwell on it at some length), excellent and valuable as it is, lent itself to two corrup- tions. There is, in the first place, in making the careful investiga- tions into the character and circumstances of each writer which it demands, a danger of paying too much attention to the man and too little to his work, and of substituting for a critical study a mere collection of personal anecdotes and traits, especially if the author dealt with belongs to a foreign country or a past age. The other danger is that of connecting the genius and character of particular authors too much with their conditions and circum- stances, so as to regard them as merely so many products of the age. These faults, and especially the latter, have been very noticeable in many of Sainte-Beuve's successors, particularly in, perhaps, Hippolyte Taine, who, however, besides his work on English literature, did much of importance on French, and has been regarded as the first critic who did thorough honour to Balzac in his own country. A large number of other critics during the period deserve notice because, though acting more or less on the newer system of criticism, they have manifested considerable originality in its application. As far as merely critical faculty goes, and still more in the power of giving literary expression to criticism, Theophile Gautier yields to no one. His Les Grotesques, an early work dealing with Villon, the earlier " Theophile " de Viau, and other enfants terribles of French literature, has served as a model to many subsequent writers, such as Charles Monselet (1825-1888), and Charles Asselineau (1820-1874), the affectionate historian, in his

Bibliographic romantique (1872-1874), of the less famous promoters of the Romantic movement. On the other hand, Gautier's picture criticisms, and his short reviews of books, obituary notices, and other things of the kind contributed to daily papers, are in point of style among the finest of all such fugitive compositions. Jules Janin (1804-1874), chiefly a theatrical critic, excelled in light and easy journalism, but his work has neither weight of substance nor careful elaboration of manner Sufficient to give it permanent value. This sort of light critical comment has become almost a speciality of the French press, and among its numerous practitioners the names of Armand de Pontmartin (1811-1890) (an imitator and assailant of Sainte-Beuve), Arsene Houssaye, Pierangelo Fiorentino (1806-1864), may be mentioned. Edmond Scherer (18 15-1889) and Paul de Saint- Victor (1827-1881) represent different sides of Sainte-Beuve's style in literary criticism, Scherer combining with it a martinet and somewhat prudish precision, while Saint-Victor, with great powers of appreciation, is the most flowery and " prose-poetical " of French critics. In theatrical censure Francisque Sarcey (1827-1899), an acute but somewhat severe and limited judge, succeeded to the good-natured sovereignty of Janin. The criticism of the Revue des deuxmondes has played a sufficiently important part in French literature to deserve separate notice in passing. Founded in 1829, the Revue, after some vicissitudes, soon attained, under the direction of the Swiss Buloz, the character of being one of the first of European critical periodicals. Its style of criticism has, on the whole, inclined rather to the classical side — that is, to classicism as modified by, and possible after, the Romantic movement. Besides some of the authors already named, its principal critical contributors were Gustave Planche (1808-1857), an acute but somewhat truculent critic, Sairit- Rene Taillandier (1817-1879), and Emile Mont6gut (1825-1895), a man of letters whom greater leisure would have made greater, but who actually combined much and varied critical power with

an agreeable style. Lastly we must notice the important section of professorial or university critics, whose critical work has taken the form either of regular treatises or of courses of republished lectures, books somewhat academic and rhetorical in character, but often representing an amount of influence which has served largely to stir up attention to literature. The most prominent name among these is

that of Abel Villemain (1 790-1 867), who was one of the earliest critics of the literature of his own country to obtain a hearing out of it. Desire Nisard (1806-1888) was perhaps more fortunate in his dealings with Latin than with French, and in his History of the latter literature represents too much the classical tradition, but he had dignity, erudition and an excellent style. Alexandre Vinet (1707-1847), a Swiss critic of considerable eminence, Saint-Marc-Girardin(i8oi-i873), whose Cours de UiUrature dramatique is his chief work, and Eugene Geruzez (1 799-1865), the author not only of an extremely useful and well-written handbook to French literature before the Revolution, but also of other works dealing with separate portions of the subject, must also be mentioned. One remarkable critic, Ernest Hello (1818-1885), attracted during his life little attention even in France, and hardly any out of it, his work being strongly tinctured with the unpopular flavour and colour of uncom- promising ” clericalism,” and his extremely bad health keeping him out of the ordinary fraternities of literary society. It was, however, as full of idiosyncrasy as of partisanship, and is exceed- ingly interesting to those who regard criticism as mainly valuable because it gives different aspects of the same thing.

Perhaps in no branch of belles-lettres did the last quarter of the century maintain the level at which predecessors had arrived better than in criticism; though whether this fact is connected with something of decadence in the creative branches, is a question which may be better posed than resolved here. A remarkable writer whose talent, approaching genius, was spoilt by eccen- tricity and pose, and who belonged to a more modern generation, Jules Barbey d’Aurevilly (1808-1889), poet, novelist and critic, produced much of his last critical work, and corrected more, in these later days. Not only did the critical work in various ways of Renan, Taine, Scherer, Sarcey and others continue during parts of it, but a new generation, hardly in this case inferior to the old, appeared. The three chiefs of this were the already mentioned Anatole France,Emile Faguet(b. 1847), and Ferdinand Brunetiere (1849-1906), to whom some would add Jules Lemaltre (b. 1853). The last, however, though a brilliant writer, was but an ” interim ” critic, beginning with poetry and other matters, and after a time turning to yet others, while, brilliant as he was, his criticism was often ill-informed. So too Anatole France, after compiling four volumes of La Vie litteraire in his own inimitable style and with singular felicity of appreciation, also turned away. The phenomenon in both cases may be associated, though it must not be too intimately connected in the relation of cause and effect, with the fact that both were champions and practitioners of ” impressionist criticism ” — of the doctrine (unquestionably sound if not

exaggerated) that the first duty of the critic is to reproduce the effect produced on his own mind by the author. Brunetiere and Faguet, on the other hand, are partisans of the older academic style of criticism by kind and on principle. Faguet, besides regular volumes on each of the four great centuries of French literature, has produced much other work — all of it somewhat ” classical ” in tendency and frequently exhibiting something of a want of comprehension of the Romantic side. Brunetiere was still more prolific on the same side but with still greater effort after system and ” science.” In the books definitely called L Evolution des genres, in his Manuel of French literature, and in a large number of other volumes of collected essays he enforced with great learning and power of argument, if with a somewhat narrow purview and with some prejudice against writers whom he disliked, a new form of the old doctrine that the ” kind ” not the individual author or book ought to be the main subject of the critic’s attention. He did not escape the consequential danger of taking authors and books not as they are but as in relation to the kinds which they in fact con- stitute and to his general views. But he was undoubtedly at

his death the first critic of France and a worthy successor of her best.

Of others older and younger must be mentioned Paul Stapfer (b. 1840) , professor of literature, and the author of divers excellent works from Shakespeare et Vantiquiti to volumes of the first value on Montaigne and Rabelais; Paul Bourget and Edouard Rod, already noticed; Augustin Filon (b. 1841), author of much good work on English literature and an excellent book on Merimee; Alexandre Beljame (1843-1906), another eminent student of English literature, in which subject J. A. Jusserand (b. 1855), Legouis, K. A. J. Angellier (b. 1848), and others have recently distinguished themselves; Gustave Larroumet, especially an authority on Marivaux; Eugene Lintilhac (b. 1854); Georges Pellissier; Gustave Lanson, author of a compact history of French literature in French; Marcel Schwob, who had done excellent work on Villon and other subjects before his early death; Rene Doumic, a frequent writer in the Revue des deux tnondes, who collected four volumes of Etudes sur la litterature franqaise between 1895 and 1900; and the Vicomte Melchior de Vogue (b. 1848), whose interests have been more political- philosophical than strictly literary, but who has done much to familiarize the French public with that Russian literature to which Merimee had been the first to introduce them. But the body of recent critical literature in France is perhaps larger in actual proportion and of greater value when considered in relation to other kinds of literature than has been the case at any previous period.

History since 18 jo. — The remarkable development of historical studies which we have noticed as taking place under the Restora- tion was accelerated and intensified in the reigns of Charles X. and Louis Philippe. Both the scope and the method of the historian underwent a sensible alteration. For something like 1 50 years historians had been divided into two classes, those who produced elegant literary works pleasant to read, and those who produced works of laborious erudition, but not even intended for general perusal. The Vertots and Voltaires were on one side, the Mabillons and Tillemonts on another. Now, although the duty of a French historian to produce works of literary merit was not forgotten, it was recognized as part of that duty to consult original documents and impart original observation. At the same time, to the merely political events which had formerly been recognized as forming the historian's province were added the social and literary phenomena which had long been more or less neglected. Old chronicles and histories were re-read and re-edited; innumerable monographs on special subjects and periods were produced, and these latter were of immense service to romance writers at the time of the popularity of the historical novel. Not a few of the works, for instance, which were signed by Alexandre Dumas consist mainly of extracts or condensations from old chronicles, or modern monographs, ingeniously united by dialogue and varnished with a little description. History, however, had not to wait for this second-hand popularity, and its cultivators had fully sufficient literary talent to maintain its dignity. Sismondi, whom we have already noticed, continued during this period his great Histoire des Francais, and produced his even better-known Histoire des republiques italiennes au moyen dge. The brothers Thierry devoted themselves to early French history, Amedee Thierry (1 797-1873) producing a Histoire des Gaulois and other works concerning the Roman period, and Augustin Thierry (1795-1856) the well-known history of the Norman Conquest, the equally attractive Recits des temps Merovingiens and other excellent works. Philippe de S6gur (1 780-1873) gave a history of the Russian campaign of Napoleon, and some other works chiefly dealing with Russian history. The voluminous Histoire de France of Henri Martin (1810-1883) is perhaps the best and most impartial work dealing in detail with the whole subject. A. G. P. Brugiere, baron de Barante (1782-1866), after beginning with literary criticism, turned to history, and in his Histoire des dues de Bourgogne produced a work of capital importance. As was to be expected, many of the most brilliant results of this devotion to historical subjects consisted of works dealing with the French Revolution. No

[SUMMARY

series of historical events has ever perhaps received treatment at the same time from so many different points of view, and by writers of such varied literary excellence, among whom it must, however, be said that the purely royalist side is hardly at all represented. One of the earliest of these histories is that of Francois Mignet (1796-1884), a sober and judicious historian of the older school, also well known for his Histoire de Marie Stuart. About the same time was begun the brilliant if not extremely trustworthy work of Adolphe Thiers (1797-1877) on the Revolu- tion, which established the literary reputation of the future president of the French republic, and was at a later period com- pleted by the Histoire du consulat et de I 'empire. The downfall of the July monarchy and the early years of the empire witnessed the publication of several works of the first importance on this subject. Barante contributed histories of the Convention and the Directory, but the three books of greatest note were those of Lamartine, Jules Michelet (1 798-1874), and Louis Blanc (1811-1882). Lamartine's Histoire des Girondins is written from the constitutional-republican point of view, and is sometimes considered to have had much influence in producing the events of 1848. It is, perhaps, rather the work of an orator and poet than of an historian. The work of Michelet is of a more original character. Besides his history of the Revolution, Michelet wrote an extended history of France, and a very large number of smaller works on historical, political and social subjects. His imaginative powers are of the highest order, and his style stands alone in French for its strangely broken and picturesque character, its turbid abundance of striking images, and its somewhat sombre magnificence, qualities which, as may easily be supposed, found full occupation in a history of the Revolution. The work of Louis Blanc was that of a sincere but ardent republican, and is useful from this point of view, but possesses no extraordinary literary merit. The principal contributions to the history of the Revolution of the third quarter of the century were those of Quinet, Lanfrey and Taine. Edgar Quinet (1803-1875), like Louis Blanc a devotee of the republic and an exile for its sake, brought to this one of his latest works a mind and pen long trained to literary and historical studies; but La Revolution is not considered his best work. P. Lanfrey devoted himself with extraordinary patience and acuteness to the destruction of the Napoleonic legend, and the setting of the character of Napoleon I. in a new, authentic and very far from favourable light. And Taine, after distinguishing himself, as we have mentioned, in literary criticism {Histoire de la litterature anglaise), and attain- ing less success in

philosophy {De V intelligence), turned in Les Origines de la France moderne to an elaborate discussion of the Revolution, its causes, character and consequences, which excited some commotion among the more ardent devotees of the principles of ‘89. To return from this group, we must notice J. F. Michaud (1767-1839), the historian of the crusades, and Francois Pierre Guillaume Guizot (1787-1874), who, like his rival Thiers, devoted himself much to historical study. His earliest works .were literary and linguistic, but he soon turned to political history, and for the last half-century of his long life his contributions to historical literature were almost incessant and of the most various character. The most important are the histories Des Origines du gouvemement reprisentatif, De la revolution d’ Angleterre, De la civilisation en France, and latterly a Histoire de France, which he was writing at the time of his death. Among minor historians of the earlier century may be mentioned Prosper Duvergier de Hauranne (1798-1881) {Gouvemement parlementaire en France), J. J. Ampere (1800-1864) {Histoire romaine a Rome), Auguste Arthur Beugnot (1797- 1865) {Destruction du paganisme d’occident), J. O. B. de Cleron, comte d’Haussonville {La Reunion de la Lorraine & la France), Achille Tendelle de Vaulabelle (1 799-1870) {Les Deux Restaura-tions). In the last quarter of the century, under the department of history, the most remarkable names were still those of Taine and Renan, the former being distinguished for thought and matter, the latter for style. Indeed it may be here proper to remark that Renan, in the kind of elaborated semi-poetic style which has most characterized the prose of the 19th century in

all countries of Europe, takes pre-eminence among French writers even in the estimation of critics who are not enamoured of his substance and tone. But, under the influence of Taine to some extent and of a general European tendency still more, France during this period attained or recovered a considerable place for what is called ” scientific ” history — the history which while, in some cases, though not in all, not neglecting the develop- ment of style attaches itself particularly to ” the document,” on the one hand, and to philosophical arrangement on the other. The chief representative of the school was probably Albert Sorel (1842-1906) , whose various handlings of the Revolutionary period (including an excursion into partly literary criticism in the shape of an admirable monograph on Madame de Stael) have established themselves once for all. In a wider sweep Ernest Lavisse (b. 1842), who has dealt mainly with the 18th century, may hold a similar position. Of others, older and younger, the due de Broglie (1821-1901), who devoted himself also to the 18th century and especially to its secret diplomacy; Gaston Boissier (b. 1823), a

classical scholar rather than an historian proper, and one of the latest masters of the older French academic style; Thureau- Dangin (b. 1837), a student of mid 19th-century history; Henri Houssaye (b. 1848), one of the Napoleonic period; Gabriel Hanotaux (b. 1853), an historian of Richelieu and other subjects, and a practical politician, may be mentioned. A large accession has also been made to the publication of older memoirs — that important branch of French literature from almost the whole of its existence since the invention of prose.

Summary and Conclusion. — We have in these last pages given such an outline of the 19th-century literature of France as seemed convenient for the completion of what has gone before. It has been already remarked that the nearer approach is made to our own time the less is it possible to give exhaustive accounts of the individual cultivators of the different branches of literature. It may be added, perhaps, that such exhaustiveness becomes, as we advance, less and less necessary, as well as less and less possible. The individual poet of to-day may and does produce work that is in itself of greater literary value than that of the individual trouvere. As a matter of literary history his con- tribution is less remarkable because of the examples he has before him and the circumstances which he has around him. Yet we have endeavoured to draw such a sketch of French literature from the Chanson de Roland onwards that no important development and hardly any important partaker in such develop- ment should be left out. A few lines may, perhaps, be now profitably given to summing up the aspects of the whole, remembering always that, as in no case is generalization easier than in the case of the literary aspects and tendencies of periods and nations, so in no case is it apt to be more .delusive unless corrected and supported by ample information of fact and detail.

At the close of the nth century and at the beginning of the 1 2th we find the vulgar tongue in France not merely in fully organized use for literary purposes, but already employed in most of the forms of poetical writing. An immense outburst of epic and narrative verse has taken place, and lyrical poetry, not limited as in the case of the epics to the north of France, but extending from Roussillon to the Pas de Calais, completes this. The 1 2th century adds to these earliest forms the important development of the mystery, extends the subjects and varies the manner of epic verse, and begins the compositions of literary prose with the chronicles of St Denis and of Villehardouin, and the prose romances of the Arthurian cycle. All this literaure is so far connected purely with the knightly and priestly orders, though it is largely composed and still more largely dealt in by classes of men,

trouveres and jongleurs, who are not necessarily either knights or priests, and in the case of the jongleurs are certainly neither. With a possible ancestry of Romance and Teutonic cantilenae, Breton lais, and vernacular legends, the new literature has a certain pattern and model in Latin and for the most part ecclesiastical compositions. It has the sacred books and the legends of the saints for examples of narrative, the rhythm of the hymns for a guide to metre, and the ceremonies of the church for a stimulant to dramatic performance. By degrees

also, in this 12th century, forms of literature which busy them- selves with the unprivileged classes begin to be born. The fabliau takes every phase of life for its subject; the folk-song acquires elegance and does not lose raciness and truth. In the next century, the 13th, medieval literature in France arrives at its prime — a prime which lasts until the first quarter of the 14th. The early epics lose something of their savage charms, the polished literature of Provence quickly perishes. But in the provinces which speak the more prevailing tongue nothing is wanting to literary development. The language itself has shaken off all its youthful incapacities, and, though not yet well adapted for the requirements of modern life and study, is in every way equal to the demands made upon it by its own time. The dramatic germ contained in the fabliau and quickened by the mystery produces the profane drama. Ambitious works of merit in the most various kinds are published; Aucassin el Nicolelte stands side by side with the Vie de Saint Louis, the Jeu de la feuillie with Le Miracle de Thiophile, the Roman de la rose with the Roman du Renart. The earliest notes of ballads and rondeau are heard; endeavours are made with zeal, and not always without understanding, to naturalize the wisdom of the ancients in France, and in the graceful tongue that France possesses. Romance in prose and verse, drama, history, songs, satire, oratory and even erudition, are all represented and represented worthily. Meanwhile all nations of western Europe have come to France for their literary models and subjects, and the greatest writers in English, German, Italian, content themselves with adaptations of Chretien de Troyes, of Benoit de Sainte More, and of a hundred other known and unknown trouveres and fabulists. But this age does not last long. The language has been put to all the uses of which it is as yet capable; those uses in their sameness begin to pall upon reader and hearer; and

the enormous evils of the civil and religious state reflect them- selves inevitably in literature. The old forms die out or are prolonged only in half-lifeless travesties. The brilliant colouring of Froissart, and the graceful science of ballade and rondeau writers like Lescurel and Deschamps, alone maintain the literary reputation of the time. Towards the end of the 14th century the translators and political writers import many terms of art, and strain the language to uses for which it is as yet unhandy, though at the beginning of the next age Charles d'Orleans by his natural grace and the virtue of the forms he used emerges from the mass of writers. Throughout the 15th century the process.of enriching or at least increasing the vocabulary goes on, but as yet no organizing hand appears to direct the process. Villon stands alone in merit as in peculiarity. But in this time dramatic literature and the literature of the floating popular broadsheet acquire an immense extension — all or almost all the vigour of spirit being concentrated in the rough farce and rougher lampoon, while all the literary skill is engrossed by insipid rhUoriqueurs and pedants. Then comes the grand upheaval of the Renaissance and the Reformation. An immense influx of science, of thought to make the science living, of new terms to express the thought, takes place, and a band of literary workers appear of power enough to master and get into shape the turbid mass. Rabelais, Amyot, Calvin and Herberay fashion French prose; Marot, Ronsard and Regnier refashion French verse. The Pleiade introduces the drama as it is to be and the language that is to help the drama to express itself. Montaigne for the first time throws invention and originality into some other form than verse or than prose fiction. But by the end of the century the tide has receded. The work of arrange- ment has been but half done, and there are no master spirits left to complete it. At this period Malherbe and Balzac make their appearance. Unable to deal with the whole problem, they determine to deal with part of it, and to reject a portion of the riches of which they feel themselves unfit to be stewards. Balzac and his successors make of French prose an instrument faultless and admirable in precision, unequalled for the work for which it is fit, but unfit for certain portions of the work which it was once able to perform. Malherbe, seconded by Boileau, makes of French verse an instrument suited only for the purposes of the

drama of Euripides, or rather of Seneca, with or without its chorus, and for a certain weakened echo of those choruses, under the name of lyrics. No French verse of the first merit other than dramatic is written for two whole centuries. The drama soon comes to its acme, and during the succeeding time usually maintains itself at a fairly high level until the death of Voltaire. But prose lends itself to almost

everything that is required of it, and becomes constantly a more and more perfect instrument. To the highest efforts of pathos and sublimity its vocabulary and its arrangement likewise are still unsuited, though the great preachers of the 17th century do their utmost with it. But for clear exposition, smooth and agreeable narrative, sententious and pointed brevity, witty repartee, it soon proves itself to have no superior and scarcely an equal in Europe. In these directions practitioners of the highest skill apply it during the 17th century, while during the 18th its powers are shown to the utmost of their variety by Voltaire, and receive a new development at the hands of Rousseau. Yet, on the whole, it loses during this century. It becomes more and more unfit for any but trivial uses, and at last it is employed for those uses only. Then occurs the Revolution, repeating the mighty stir in men's minds which the Renaissance had given, but at first experiencing more difficulty in breaking up the ground and once more rendering it fertile. The faulty and incomplete genius of Chateaubriand and Madame de Stael gives the first evidence of a new growth, and after many years the Romantic movement completes the work. Whether the force of, that movement is now, after three-quarters of a century, spent or not, its results remain. The poetical power of French has been once more triumphantly proved, and its productiveness in all branches of literature has been renewed, while in that of prose fiction there has been almost created a new class of composition. In the process of reform, however, not a little of the finish of French prose style has been lost, and the language itself has been affected in something the same way as it was affected by the less judicious innovations of the Ronsardists. The pedantry of the Pleiade led to the preposterous compounds of Du Bartas; the passion of the Romantics for foreign tongues and for the mot propre has loaded French with foreign terms on the one hand and with argot on the other, while it is questionable whether the vers libre is really suited to the French genius. There is, therefore, room for new Malherbes and Balzacs, if the days for Balzacs and Mal- herbes had not to all appearance passed. Should they be once more forthcoming, they have the failure as well as the success of their predecessors to guide them.

Finally, we may sum up even this summary. For volume and merit taken together the product of these eight centuries of literature excels that of any European nation, though for in- dividual works of the supremest excellence they may perhaps be asked in vain. No French writer is lifted by the suffrages of other nations — the only criterion when sufficient time has elapsed — to the level of Homer, of Shakespeare, or of Dante, who reign alone. Of those of the authors of France who are indeed of the thirty but attain not to the first three

Rabelais and Moliere alone unite the general suffrage, and this fact roughly but surely points to the real excellence of the literature which these men are chosen to represent. It is great in all ways, but it is greatest on the lighter side. The house of mirth is more suited to it than the house of mourning. To the latter, indeed, the language of the unknown marvel who told Roland's death, of him who gave utterance to Camilla's wrath and despair, and of Victor Hugo, who sings how the mountain wind makes mad the lover who can- not forget, has amply, made good its title of entrance. But for one Frenchman who can write admirably in this strain there are a hundred who can tell the most admirable story, formulate the most pregnant reflection, point the acutest jest. There is thus no really great epic in French, few great tragedies, and those imperfect and in a faulty kind, little prose like Milton's or like Jeremy Taylor's, little verse (though more than is generally thought) like Shelley's or like Spenser's. But there are the most delightful short tales, both in prose and in verse, that the world has ever seen, the most polished jewelry of reflection that has

ever been wrought, songs of incomparable grace, comedies that must make men laugh as long as they are laughing animals, and above all such a body of narrative fiction, old and new, prose and verse, as no other nation can show for art and for originality, for grace of workmanship in him who fashions, and for certainty of delight to him who reads.

Bibliography. — The most elaborate book on French literature as a whole is that edited by Petit de Julleville, and composed of chapters by different authors, Histoire de la langue et de la litterature francaises (8 vols., Paris, 1 896-1899). Unfortunately these chapters, some of which are of the highest excellence, are of very unequal value: they require connexions which are not supplied, and there is throughout a neglect of minor authors. The bibliographical in- dications are, however, most valuable. For a survey in a single volume Lanson's Histoire has superseded the older but admirable manuals of Demogeot and Geruzez, which, however, are still worth consulting. Brunetiere's Manuel (translated into English) is very valuable with the cautions above given; and the large Histoire de la langue francaise depuis le seizieme siecle of Godefroy supplies copious and well-chosen extracts with much biographical information. In English there is an extensive History by H. van Laun (3 vols., 1874, &c); a Short History by Saintsbury (1882; 6th ed. continued to the end of the century,

1901) ; and a History by Professor Dowden

(1895)-

To pass to special periods — the fountain-head of the literature of the middle ages is the ponderous Histoire litteraire already re- ferred to, which, notwithstanding that it extended to 27 quarto volumes in 1906, and had occupied, with interruptions, 150 years in publication, had only reached the 14th century. Many of the monographs which it contains are the best authorities on their subjects, such as that of P. Paris on the early chansonniers, of V. Leclerc on the fabliaux, and of Littre on the romans d'aventures. For the history of literature before the nth century, the period mainly Latin, J. J. Ampere's Histoire litteraire de la France avant Charlemagne, sous Charlemagne, etjusqu'au onzieme siecle is the chief authority. Leon Gautier's Epopees francaises (5 vols., 1878-1897) contains almost everything known concerning the chansons de geste. P. Paris's Romans de la table ronde was long the main authority for this subject, but very much has been written recently in France and elsewhere. The most important of the French contributions, especially those by Gaston Paris (whose Histoire poetique de Charle- magne has been reprinted since his death), will be found in the periodical Romania, which for more than thirty years has been the chief receptacle of studies on old French literature. On the cycle of Reynard the standard work is Rothe, Les Romans de Renart. All parts of the lighter literature of old France are excellently treated by Lenient, Le Satire au moyen dge. The early theatre has been frequently treated by the brothers Parfaict {Histoire du the&tre francais), by Fabre (Les Clercs de la Bazoche), by Leroy {Etude sur les mysteres), by Aubertin {Histoire de la langue et de la litterature francaise au moyen dge). This latter book will be found a useful summary of the whole medieval period. The historical, dramatic and oratorical sections are especially full. On a smaller scale but of unsurpassed authority is G. Paris's Litterature du moyen dge translated into English.

On the 16th century an excellent handbook is that by Darmesteter and Hatzfeld ; and the recent Literature of the French Renaissance of A. Tilley (2 vols., 1904) is of high value. Sainte-Beuve's Tableau has been more than once referred to. Ebert (Entwicklungsgeschichte der franzbsisclien Tragodie vornehmlich im id'" 1 Jahrhundert) is the chief authority for dramatic matters. Essays and volumes on periods and sub-periods since 1600 are innumerable; but those who . desire thorough acquaintance with the literature of these three hundred years should read as widely as possible in all the critical work of Sainte-Beuve, of Scherer, of Faguet and Brunetiere — which may be

supplemented ad libitum from that of other critics mentioned above. The series of volumes entitled Les grands ecrivains francais, now pretty extensive, is generally very good, and Catulle Mendes's invaluable book on 19th-century poetry has been cited above. As a companion to the study of poetry E. Crepet's Poetes francais (4 vols., 1861), an anthology with introductions by Sainte-Beuve and all the best critics of the day, cannot be surpassed, but to it may be added the later Anihologie des poetes francais du XIX e siecle (1877-1879). (G. Sa.)

FRENCH POLISH, a liquid for polishing wood, made by dissolving shellac in methylated spirit. 'There are four different tints, brown, white, garnet and red, but the first named is that most extensively used. All the tints are made in the same manner, with the exception of the red, which is a mixture of the brown polish and methylated spirit with either Saunders wood or Bismarck brown, according to the strength of colour required. Some woods, and especially mahogany, need to be stained before they are polished. To stain mahogany mix some bichromate of potash in hot water according to the depth of colour required. After staining the wood the most approved method of filling the

grain is to rub in fine plaster of Paris (wet), wiping off before it " sets." After this is dry it should be oiled with linseed oil and thoroughly wiped off. The wood is then ready for the polish, which is put on with a rubber made of wadding covered with linen rag and well wetted with polish. The polishing process has to be repeated gradually, and after the work has hardened, the surface is smoothed down with fine glass-paper, a few drops of linseed oil being added until the surface is sufficiently smooth. After a day or two the surface can be cleared by using a fresh rubber with a double layer of linen, removing the top layer when it is getting hard and finishing off with the bottom layer.

FRENCH REVOLUTION, THE. Among the many revolutions which from time to time have given a new direction to the political development of nations the French Revolution stands out as at once the most dramatic in its incidents and the most momentous in its results. This exceptional character is, indeed, implied in the name by which it is known; for France has ex- perienced many revolutions both before and since that of 1789, but the name " French Revolution," or simply " the Revolution," without qualification, is applied to this one alone. The causes which led to it: the gradual decay of the institutions which France had inherited from the feudal system, the decline of the centralized monarchy, and the immediate financial necessities that

compelled the assembling of the long neglected states- general in 1789, are dealt with in the article on France: History. The successive constitutions, and the other legal changes which resulted from it, are also discussed in their general relation to the growth of the modern French polity in the article France (Law and Institutions). The present article deals with the progress of the Revolution itself from the convocation of the states-general to the coup d'etat of the 18th Brumaire which placed Napoleon Bonaparte in power.

The elections to the states-general of 1789 were held in un- favourable circumstances. The failure of the harvest of 1788 and a severe winter had caused widespread distress, opening The government was weak and despised, and its agents of the were afraid or unwilling to quell outbreaks of disorder, states- At the same time the longing for radical reform and ° eneraL the belief that it would be easy were almost universal. The cahiers or written instructions given to the deputies covered well-nigh every subject of political, social or economic interest, and demanded an amazing number of changes. Amid this com- motion the king and his ministers remained passive. They did not even determine the question whether the estates should act as separate bodies or deliberate collectively. On the 5th of May the states-general were opened by Louis in the Salle des Menus Plaisirs at Versailles. Barentin, the keeper of the seals, informed them that they were free to determine whether they would vote by orders or vote by head. Necker, as director-general of the" finances, set forth the condition of the treasury and proposed some small reforms. The Tiers Etat (Third Estate) was dis- satisfied that the question of joint or separate deliberation should have been left open. It was aware that some of the nobles and many of the inferior clergy agreed with it as to the need for comprehensive reform. Joint deliberation would ensure a majority to the reformers and therefore the abolition of privileges and the extinction of feudal rights of property. Separate de- liberation would enable the majority among the nobles and the superior clergy to limit reform. Hence it became the first object of the Tiers Etat to effect the amalgamation of the three estates. The conflict between those who desired and those who resisted amalgamation took the form of a conflict over the verification of the powers of the deputies. The Tiers Etat insisted contact that the deputies of all three estates should have their between powers verified in common as the first step towards tbe Three making them all members of one House. It resolved to hold its meetings in the Salle des Menus Plaisirs, whereas the nobles and the clergy met in smaller apartments set aside for their exclusive use. It refrained from taking any step which might have implied that it was an organized assembly, and persevered in

regarding itself as a mere crowd of individual members incapable of transacting business. Meanwhile the clergy and

the nobles began a separate verification of their powers. But a few of the. nobles and a great many of the clergy voted against this procedure. On the 7th the Tiers Etat sent deputations to exhort the other estates to union, while the clergy sent a deputa- tion to it with the proposal that each estate should name com- missioners to discuss the best' method of verifying powers. The Tiers Etat accepted the proposal and conferences were held, but without result. It then made another appeal to the clergy which was almost successful. The king interposed with a com- mand for the renewal of the conferences. They were resumed under the presidency of Barentin, but again to no purpose.

On the 10th of June- Sieves moved that the Tiers Etat should for the last time invite the First and Second Estates to join in the verification of powers and announce that, whether they did or not, the work of verifying would begin forthwith. The motion was carried by an immense majority. As there was no response, the Tiers Etat on the 12th named Bailly provisional president and commenced verification. Next day three cures of Poitou came to have their powers verified. Other clergymen followed later. When the work of verification was over, a title had to be found for the body thus created, which would no longer accept the style of the Tiers Etat. On the 15th Sieyes proposed that they should entitle themselves the Assembly of the known and verified representatives of the French nation. Mirabeau, Mounier and others proposed various appellations. But success was reserved for Legrand, an obscure deputy who proposed the simple name of National Assembly. Withdrawing his own motion, Sieyes adopted Legrand's suggestion, which was carried by 491 votes to 90. The Assembly went on to declare that it placed the debts of the crown under the safeguard of the national honour and that all existing taxes, although illegal as having been imposed without the consent of the people, should continue to be paid until the day of dissolution.

By these proceedings the Tiers Etat and a few of the clergy declared themselves the national legislature. Then and there- after the National Assembly assumed full sovereign The and constituent powers. Nobles and clergy might

Assembly. come m if they pleased, but it could do without them. The king's assent to its measures would be convenient, but not necessary. This boldness was rewarded, for on the 19th the clergy decided by a majority of one in favour of joint verifica- tion. On the same day the nobles voted an address to the king condemning the action of the Tiers Etat. Left to himself, Louis might have been too inert for resistance. But the queen and his brother, the count of Artois, with some of the ministers and courtiers, urged him to make a stand. A Seance Royale was notified for the 22nd and workmen were sent to prepare the Salle des Menus Plaisirs for the ceremony. On the 20th Bailly and the deputies proceeded to the hall and found it barred against their entrance. Thereupon they adjourned to a neighbouring tennis court, where Mounier proposed that they should swear not to separate until they had established the constitu- tion. With a solitary exception they swore and the Oath of the Tennis Court became an era in French history. As the ministers could not agree on the policy which the king should announce in the Seance Royale, it was postponed to the 23rd. The Assembly found shelter in the church of St Louis, where it was joined by the main body of the clergy and by the first of the nobles.

At the Seance Royale Louis made known his will that the Estates should deliberate apart, and declared that if they should refuse to help him he would do by his sole authority what was necessary for the happiness of his people. When he quitted the hall, some of the clergy and most of the nobles retired to their separate chambers. But the rest, together with the Tiers Etat-, remained, and Mirabeau declared that, as they had come by the will of the nation, force only should make them withdraw. " Gentlemen," said Sieyes, " you are to-day what you were yesterday." With one voice the Assembly proclaimed its adhesion to its former decrees and the inviolability of its members. In Versailles and in Paris popular feeling was clamorous for the Assembly and against. the court. During the next few days

Oath of the Tennis Court.

many of the clergy and nobles, including the archbishop of Paris and the duke of Orleans, joined the Assembly. Louis tamely accepted his defeat. He recalled Necker, who had resigned after the Seance Royale. On the 27th he wrote to those clerical and noble deputies who still held out, urging submission. By the 2nd of July the joint verification of powers was completed. The last trace of the historic States-General disappeared and the National Assembly was perfect. On the same day it claimed an absolute discretion by a decree that the mandates of the electors were not binding on its members.

Having failed in their first attempt on the Assembly, the Ccurt party resolved to try what force could do. A large number of troops,chiefly foreign regiments in the service of France, were concentrated nearParis under the command of the ot jv ec * er . marshal de Broglie. OnMirabeau's motion theAssembly voted an address to the king asking for their withdrawal. The king replied that the troops were not meant to act against the Assembly, but intimated his purpose of transferring the session to some provincial town. On the same day he dismissed Necker and ordered him to quit Versailles. These acts led to the first insurrection of Paris. The capital had long been in a dangerous condition. Bread was dear and employment was scarce. The measures taken to relieve distress had allured a multitude of needy and desperate men from the surrounding country. Among the middle class there already existed a party, consisting of men like Danton or Camille Desmoulins, which was prepared to go much further than any of the leaders of the Assembly. The rich citizens were generally fund-holders, who regarded the Assembly as the one bulwark against a public bankruptcy. The duke of Orleans, a weak and dissolute but ambitious man, had conceived the hope of supplanting his cousin on the throne. He strained his wealth and influence to recruit followers and to make mischief. The gardens of his residence, the Palais Royal, became the centre of political agitation. Ever since the elections virtual freedom of the press and freedom of speech had prevailed in Paris. Clubs were multiplied and pamphlets came forth every hour. The municipal officers who were named by the Crown had little influence with the citizens. The police were a mere handful. Of the two line regiments quartered in the capital, one was Swiss and therefore trusty; but the other, the Gardes Franchises, shared all the feelings of the populace.

On the 1 2th of July Camille Desmoulins announced the dis- missal of Necker to the crowd in the Palais Royal. Warmed by his eloquence, they sallied into the street. Part of Rioting Broglie's troops occupied the Champs Elysees and the ln Paris. Place Louis Quinze. After one or two petty encounters with the mob they were withdrawn, either because their temper was uncertain or because their commanders shunned responsi- bility. Paris was thus left to the rioters, who seized arms wherever they could find them, broke open the jails, burnt the octroi barriers and soon had every man's life and goods at their discretion. Citizens with anything to lose were driven to act for themselves. For the purpose of choosing its representatives in the states-general the Third Estate of Paris had named 300 electors. Their function once discharged, these men had no public character, but they resolved that they would hold together in order to watch over the interests of the city. After the Seance Royale the municipal authority,

conscious of its own weakness, allowed them to meet at the Hotel de Ville, where they proceeded to consider the formation of a civic guard. On the 13th, when all was anarchy in Paris, they were joined by Flesselles, Provost of the Merchants, and other municipal officers. The project of a civic guard was then adopted. The insurrection, however, ran its course unchecked. Crowds of deserters from the regular troops swelled the ranks of the insurgents. They attacked the Hotel des Invalides and carried off all the arms pan fth e which were stored there. With the same object they Bastille, assailed the Bastille. The garrison was small and July 14, disheartened, provisions were short, and after some I7S9 ‘ hours’ fighting De Launay the governor surrendered on promise of quarter. He and several of his men were, notwith- I standing, butchered by the mob before they could be brought to

New muni-

the H6tel de Ville. As all Paris was in the hands of the insurgents, the king saw the necessity of submission. On the morning of the 15th he entered the hall of the Assembly to announce that the troops would be withdrawn. Immediately afterwards he dis- missed his new ministers and recalled Necker. Thereupon the princes and courtiers most hostile to the National Assembly, the count of Artois, the prince of Conde, the duke of Bourbon and many others, feeling themselves no longer safe, quitted France. Their departure is known as the first emigration.

The capture of the Bastille was hailed throughout Europe as symbolizing the fall of absolute monarchy, and the victory of the insurgents had momentous consequences. Recognizing the 300 electors as a temporary municipal government, ipallty of the Assembly sent a deputation to confer with them at Parts and tj, e H6tel de Ville, and on a sudden impulse one of these oli’artl.* 1 deputies, Bailly, lately president of the Assembly, was chosen to be mayor of Paris. The marquis Lafayette, doubly popular as a veteran of the American War and as one of the nobles who heartily upheld the cause of the Assembly, was chosen commandant of the new civic force, thenceforwards known as the National Guard. On the 1 7th Louis himself visited Paris and gave his sanction to the new authorities. In the course of the following weeks the example of Paris was copied throughout France. All the cities and towns set up new elective authorities and organized a National Guard. At the same time the

revolution spread to the country districts. In most of the pro-Revolutloa vmces t ˆ e peasants rose and stormed and burnt the provinces, houses of the seigneurs, taking peculiar care to destroy their title-deeds. Some of the seigneurs were murdered and the rest were driven into the towns or across the frontier. Amid the universal confusion the old administrative system vanished. The intendants and sub-delegates quitted or were driven from their posts. The old courts of justice, whether royal or feudal, ceased to act. In many districts there was no more police, public works were suspended and the collection of taxes became almost impossible. The insurrection of July really ended the ancien rSgitne.

Disorder in the provinces led directly to the proceedings on the famous night of the 4th of August. While the Assembly was considering a declaration which might calm revolt, the August °’ vicomte de Noailles and the due d’Aiguillon moved that it should proclaim equality of taxation and the suppression of feudal burdens. Other deputies rose to demand the repeal of the game laws, the enfranchisement of such serfs as were still to be found in France, and the abolition of tithes and of feudal courts and to renounce all privileges, whether of classes, of cities, or of provinces. Amid indescribable enthusiasm the Assembly passed resolution after resolution embodying these changes. The resolutions were followed by decrees sometimes hastily and unskilfully drawn. In vain Sieyes remarked that in extinguishing tithes the Assembly was making a present to every landed proprietor. In vain the king, while approving most of the decrees, tendered some cautious criticisms of the rest. The majority did not, indeed, design to confiscate property wholesale. They drew a distinction between feudal claims which did and did not carry a moral claim to compensation. But they were embarrassed by the wording of their own decrees and forestalled by the violence of the people. The proceedings of the 4th of August issued in a wholesale transfer of property from one class to another without any indemnity for the losers.

The work of drafting a constitution for France had already been begun. Parties in the Assembly were numerous and ill- defined. The Extreme Right, who. desired to keep ˆ“V* 3 the government as it stood, were a mere handful. Assembly. The Right who wanted to revive, as they said, the ancient constitution,in other words, to limit the king’s power by periodic States-General of the old-fashioned sort, were more numerous and had able chiefs in Cazales and Maury, but strove in vain against the spirit of the time. The Right Centre, sometimes called the Monarchiens, were a large body and included several men of talent, notably Mounier and Malouet, as well as many

men of rank and wealth. They desired a constitution like

that of England which should reserve a large executive power to the king, while entrusting the taxing and legislative powers to a modern parliament. The Left or Constitutionals, known after- wards as the Feuillants, among whom Barnave and Charles and Alexander Lameth were conspicuous, also wished to preserve monarchy but disdained English'precedent. They were possessed with feelings then widespread, weariness of arbitrary govern- ment, hatred of ministers and courtiers, and distrust not so much of Louis as of those who surrounded him and influenced his judgment. Republicans without knowing it, they grudged every remnant of power to the Crown. The Extreme Left, still mere republican in spirit, of whom Robespierre was the most note- worthy, were few and had little power. Mirabeau's independence of judgment forbids us to place him in any party.

The first Constitutional Committee, elected on the 14th of July, had Mounier for its reporter. It was instructed to begin with drafting a Declaration of the Rights of Man. Six peciara- weeks were spent by the Assembly in discussing this tfonofthe document. The Committee then presented a report Rixhts 0/ which embodied the principle of two Chambers. This nan ' principle contradicted the extreme democratic theories so much in fashion. It also offended the self-love of most of the nobles and the clergy who were loath that a few of their number should be erected into a House of Lords. The Assembly rejected the principle of two Chambers by nearly 10 to 1. The question whether the king should have a veto on legislation was next raised. Mounier contended that he should have an absolute veto, and was supported by Mirabeau, who ve t ™ y had already described the unlimited power of a single Chamber as worse than the tyranny of Constantinople. The Left maintained that the king, as depositary of the executive, should be wholly excluded from the legislative power. Lafayette, who imagined himself to be copying the American constitution, proposed that the king should have a suspensive veto. Thinking that it would be politic to claim no more, Necker persuaded the king to intimate that he was satisfied with Lafayette's proposal. The suspensive veto was therefore adopted. As the king had no power of dissolution, it was an idle form. Mounier and his friends having resigned their places in the Constitutional Committee, it came to an end and the Assembly elected a new Committee which represented the opinions of the Left.

Soon afterwards a fresh revolt in Paris caused the king and the Assembly to migrate thither. The old causes of disorder were still working in that city. The scarcity of bread was set down to conspirators against the Revolution. Riots were frequent and persons

supposed hostile to the Assembly and the nation were murdered with impunity. The king still had counsellors who wished for his departure as a means to regaining freedom of action. At the end of September the Flanders regiment came to Versailles to reinforce the Gardes du Corps. The officers of the Gardes du Corps entertained the officers of the Flanders regiment and of the Versailles National Guard at dinner in the palace. The king, queen and dauphin visited the company. There followed a vehement outbreak of loyalty. Rumour enlarged the incident into a military plot against freedom. Those who wanted a more thorough revolution wrought up the crowd and even respectable citizens wished to have the king among them and amenable to their opinion. On f tne the 5th of October a mob which had gathered to royal assault the H6tel de Ville was diverted into a march on family*”* Versailles. Lafayette was slow to follow it and, when to S pˆ s .’ > ‘ he arrived, took insufficient precautions. At daybreak on the 6th some of the rioters made their way into the palace and stormed the apartment of the queen who escaped with difficulty. At length the National Guards arrived and the mob was quieted by the announcement that the king had resolved to go to Paris. The Assembly declared itself inseparable from the king’s person. Louis and his family reached Paris on the same evening and took up their abode in the Tuileries. A little later the Assembly established itself in the riding school of the palace. Thenceforward the king and queen were to all intents prisoners. The Assembly itself was subject to constant

intimidation. Many members of the Right gave up the struggle and emigrated, or at least withdrew from attendance, so that the Left became supreme.

Mirabeau had already taken alarm at the growing violence of the Revolution. In September he had foretold that it would not stop short of the death of both king and queen. ˆ“tbe” After tne insurrection of October he sought to com- court. municate with them through his friend the comte de

la Marck. In a remarkable correspondence he sketched a policy for the king. The abolition of privilege and the estab- lishment of a parliamentary system were, he wrote, unalterable facts which it would be madness to dispute. But a strong executive authority was essential, and a king who frankly adopted the Revolution might still be powerful. In order to rally the sound part of the nation Louis should

leave Paris, and, if neces- sary, he should prepare for a civil war; but he should never appeal to foreign powers. Neither the king nor the queen could grasp the wisdom of this advice. They distrusted Mirabeau as an unscrupulous adventurer, and were confirmed in this feeling by his demands for money. His correspondence with the court, although secret, was suspected. The politicians who envied his talents and believed him a rascal raised the cry of treason. In the Assembly Mirabeau, though sometimes successful on particular questions, never had a chance of giving effect to his policy as a whole. Whether even he could have controlled the Revolution is highly doubtful; but his letters and minutes drawn up for the king form the most striking monument of his genius (see Mirabeau and Montmorin de Saint-Herem).

Early in the year 1790 a dispute with England concerning the frontier in North America induced the Spanish government Tbe to claim the help of France under the Family Compact.

Assembly This demand led the Assembly to consider in what and tbe hands the power of concluding alliances and of making royal peace and war should be placed. Mirabeau tried to

keep the initiative for the king, subject to confirmation by the Chamber. On Barnave's motion the Assembly decreed that the legislature should have the power of war and peace and the king a merely advisory power. Mirabeau was defeated on another point of the highest consequence, the inclusion of ministers in the National Assembly. His colleagues generally adhered to the principle that the legislative and executive powers should be totally separate. The Left assumed that, if deputies could hold office, the king would have the means of corrupting the ablest and most influential. It was decreed that no deputy should be minister while sitting in the House or for two years after. Ministers excluded from the House being necessarily objects of suspicion, the Assembly was careful to allow them the least possible power. The old provinces were abolished, and France was divided anew into eighty departments. Each department was subdivided into districts, cantons and communes. Reorgaa- rpˆe ma in business of administration, even the levying France. of taxes, was entrusted to the elective local authorities. The judicature was likewise made elective. The army and the navy were so organized as to leave the king but a small share in appointing officers and to leave the officers but scanty means of maintaining discipline. Even the cases in which the sovereign might be deposed were foreseen and expressly stated. Monarchy was retained, but the monarch was regarded as a pos- sible traitor and every precaution was taken to render him harm-

less even at the cost of having no effective national government. The distrust which the Assembly felt for the actual ministers led it to undertake the business of government as well as the Executive business of reform. There were committees for all commit- the chief departments of state, a committee for the ** es °‘f? e army, a committee for the navy, another for diplomacy, another for finance. These committees sometimes asked the ministers for information, but rarely took their advice. Even Necker found the Assembly heedless of his counsels. The condition of the treasury became worse day by day. The yield of the indirect taxes fell off through the interruption of business, and the direct taxes were in large measure withheld, for want of an authority to enforce payment. With some trouble Necker

induced the Assembly to sanction first a loan of 30,000,000 livres and then a loan of 80,000,000 livres. The public having shown no eagerness to subscribe, Necker proposed that every man should be invited to make a patriotic contribution of one- fourth of his income. This expedient also failed. On the 10th of October 1789 Talleyrand, bishop of Autun, proposed Confisca- that the Assembly should take possession of the lands Hon of of the church. In November the Assembly enacted c 1 ””*” that they should be at the disposal of the nation, which prope y ‘ would provide for the maintenance of the clergy. Since the church lands were supposed to occupy one-fifth of France, the Assembly thought that it had found an inexhaustible source of public wealth. On the security of the church lands it based a paper currency (the famous assignats) . In December it ordered an issue to the amount of 400,000,000 livres. As the revenue still declined and the reforms enacted by the Assembly involved a heavy outlay, it recurred again and again to this expedient. Before its dissolution the Assembly had authorized the creation of 1,800,000,000 livres of assignats and ass ienats. the depreciation of its paper had begun. Finding that he had lost all credit with the Assembly, Necker resigned office and left France in September 1790.

Even the committees of the Assembly had far less power than the new municipal authorities throughout France. They really governed so far as there was any government. ‘ Often full of public spirit, they lacked experience and tne mim y. in a time of peculiar difficulty had no guide save their cipaiities own discretion. They opened letters, arrested suspects, aod controlled the trade in corn, and sent their National do U s * r Guards on such errands as they thought proper. The political clubs which sprang up all over the country often presumed to act as though they were public authorities (see Jacobins). The revolutionary journalists, Desmoulins in his Revolutions de France et de Brabant, Loustallot in his Revolu- tions de Paris, Marat in his

Ami du peuple, continued to feed the fire of discord. Amid this anarchy it became a practice for the National Guards of different districts to form federations, that is, to meet and swear loyalty to each other and obedience to the laws made by the National Assembly. At the suggestion of the municipality of Paris the Assembly decreed a general federation of all France, to be held on the anniversary of the fall of the Bastille. The ceremony took place in the Champ de Mars (July 14, 1790) in presence of the king, the queen, the Assembly, and an enormous concourse of spectators. It was attended by deputations from the National Guards in every part of the kingdom, from the regular regiments, and from the crews of the fleet. Talleyrand celebrated Mass, and Lafayette was the first to swear fidelity to the Assembly and the nation. In this gather- ing the provincial deputations caught the revolutionary fever of Paris. Still graver was the effect upon the regular army. It had been disaffected since the outbreak of the Revolution. The rank and file complained of their food, their lodging and their pay. The non-commissioned officers, often intelligent and hard-working, were embittered by the refusal dis- of promotion. The officers, almost all nobles, rarely affection showed much concern for their men, and were often mere courtiers and triflers. After the festival of the federation the soldiers were drawn into the political clubs, and named regimental committees to defend their interests. Not content with asking for redress of grievances, they sometimes seized the regimental chest or imprisoned their officers. In August a formidable outbreak at Nancy was only quelled with much loss of life. Desertion became more frequent than ever, and the officers, finding their position unbearable, began to emigrate. Similar causes produced an even worse effect upon the navy.

By its rough handling of the church the Assembly brought fresh trouble upon France. The suppression of tithe and the confiscation of church lands had reduced the clergy to civil con- live on whatever stipend the legislature might think fit stitution to give them. A law of February 1790 suppressed the otthe religious orders not engaged in education or in works of charity, and forbade the introduction of new ones. Monastic vows

In tbe army.

foreign powers.

were deprived of legal force and a pension was granted to the religious who were cast upon the world. These measures aroused no serious discontent; but the so-called civil constitution of the clergy went much further. Old ecclesiastical divisions were set aside. Henceforth the diocese was to be conterminous with the department, and the parish with the commune. The electors of the commune were to choose the cure, the electors of the depart- ment the bishop. Every cure was to receive at least 1200 livres (about £50) a year. Relatively modest stipends were assigned to bishops and archbishops. French citizens were forbidden to acknowledge any ecclesiastical jurisdiction outside the kingdom. The Assembly not only adopted this constitution but decreed that all beneficed ecclesiastics should swear to its observance. As the constitution implicitly abrogated the papal authority and entrusted the choice of bishops and cures to electors who often were not Catholics, most of the clergy declined to swear and lost their preferments. Their places were filled by election. Thence- forwards the clergy were divided into hostile factions, the Consti- tutionals and the Nonjurors. As the generality of Frenchmen at that time were orthodox although not zealous Catholics, the Nonjurors carried with them a large part of the laity. The Assembly was misled by its Jansenist, Protestant and Free- thinking members, natural enemies of an established church which had persecuted them to the best of its power.

In colonial affairs the Assembly acted with the same im- prudence. Eager to set an example of suppressing slavery, it took measures which prepared a terrible negro insurrec- sembiy, the ˆ on m St Domingo. With regard to foreign relations colonies, the Assembly showed itself well-meaning but indiscreet. aad It protested in good faith that it desired no conquests

and aimed only at peace. Yet it laid down maxims which involved the utmost danger of war. It held that no treaty could be binding without the national consent. As this consent had not been given to any existing treaty, they were all liable to be revised by the French government without consulting the other parties. Thus the Assembly treated the Family Compact as null and void. Similarly, when it abolished feudal tenures in France, it ignored the fact that the rights of certain German princes over lands in Alsace were guaranteed by the treaties of Westphalia. It offered them compensation in money, and when this was declined, took no heed of their pro- tests. Again, in the papal territory of Avignon a large number of the inhabitants declared for union with France. The Assembly could hardly be restrained by Mirabeau from acting upon their vote and annexing Avignon. Some time after his death it was annexed. The other states of Europe did not

admit the doctrines of the Assembly, but peace was not broken. Foreign statesmen who flattered themselves that France was sinking into anarchy and therefore into decay were content to follow their respective ambitions without the dread of French interference.

Deprived of authority and in fact a prisoner, Louis had for many months acquiesced in the decrees of the Assembly however Attempt of distasteful. But the civil constitution of the clergy Louis xvi. wounded him in his conscience as well as in his pride. to escape From the autumn of 1790 onwards he began to scheme Paris ˆ or h’ s liberation. Himself incapable of strenuous

effort, he was spurred on by Marie Antoinette, who keenly felt her own degradation and the curtailment of that royal prerogative which her son would one day inherit. The king and queen failed to measure the forces which had caused the Revolution. They ascribed all their misfortunes to the work of a malignant faction, and believed that, if they could escape from Paris, a display of force by friendly powers would enable them to restore the supremacy of the crown. But no foreign ruler, not even the emperor Leopold II., gave the king or queen any encouragement. Whatever secrecy they might observe, the adherents of the Revolution divined their wish to escape. When Louis tried to leave the Tuileries for St Cloud at Easter 1701, in order to enjoy the ministrations of a nonjuring priest, the National Guards of Paris would not let him budge. Mirabeau, who had always dissuaded the king from seeking foreign help, died on the 2nd of April. Finally the king and queen resolved to

fly to the army of the East, which the marquis de Bouille had in some measure kept under discipline. Sheltered by him they could await foreign succour or a reaction at home. On the evening of the 20th of June they escaped from the Tuileries. Louis left behind him a declaration complaining of the treatment which he had received and revoking his assent to all measures which had been laid before him while under restraint. On the following day the royal party was captured at Varennes and sent back to Paris. The king's eldest brother, the count of Provence, who had laid his plans mueh better, made his escape to Brussels and joined the Emigres.

It was no longer possible to pretend that the Revolution had been made with the free consent of the king. Some Republicans called for his deposition. Afraid to take a course which involved danger both at home and abroad, the Assembly decreed that Louis should be suspended from his office. The club of the Cordeliers (q.v.) , led by Danton, demanded not only his deposition but his trial. A petition to that effect having been exposed for signature on the altar in the Champ de Mars, a disturbance ensued and the National Guard fired on the crowd, killing a few and wounding many. This incident afterwards became known as the massacre of the Champ de Mars. On the other hand, the leaders of the Left, Barnave and the Lameths, felt that they had weakened the executive power too much. They would gladly have come to an understanding with the king and revised the constitution so as to strengthen his prerogative. They failed in both objects. Louis and still more Marie Antoinette regarded them with incurable distrust. The Constitutional Act with- out any material change was voted on the 3rd of September. On the 14th Louis swore to the Constitution,

thus regaining his nominal sovereignty. The National Assembly was dissolved on the 30th. Upon Robespierre's motion it had decreed that none of its members should be capable of sitting in the next legislature.

If we view the work of the National Assembly as a whole, we are struck by the immense demolition which it effected. No other legislature has ever destroyed so much in the „ . / same time. The old form of government, the old the work territorial divisions, the old fiscal system, the old of the judicature, the old army and navy, the old relations National of Church and State, the old law relating to property sem in land, all were shattered. Such a destruction could not have been effected without the support of popular opinion. Most of what the Assembly did had been suggested in the cahiers, and many of its decrees were anticipated by actual revolt. In its constructive work many sound maxims were embodied. It asserted the principles of civil equality and freedom of conscience, it reformed the criminal law, and laid down a just scheme of taxation. Not intelligence and public spirit but political wisdom was lacking to the National Assembly. Its members did not suspect how limited is the usefulness of general propositions in practical life. Nor did they perceive that new ideas can be applied only by degrees in an old world. The Constitution of 1 791 was impracticable and did not last a year. The civil con- stitution of the clergy was wholly mischievous. In the attempt to govern, the Assembly failed altogether. It left behind an empty treasury, an undisciplined army and navy, a people debauched by safe and successful riot.

At the elections of 1791 the party which desired to carry the Revolution further had a success out of all keeping with its numbers. This was due partly to a weariness of politics which had come over the majority of French citizens, J ej L s | a< ; ve partly to downright intimidation exercised by the Assembly. Jacobin Club and by its affiliated societies throughout the kingdom. The Legislative Assembly met on the 1st of October. It consisted of 745 members. Few were nobles, very few were clergymen, and the great body was drawn from the middle class. The members were generally young, and, since none had sat in the previous Assembly, they were wholly without ex- perience. The Right consisted of the Feuillants (q.v.). They numbered about 160, and among them were some able men, such as Matthieu Dumas and Bigot de Preamenau, but they were

guided chiefly by persons outside the House, because incapable of re-election, Barnave, Duport and the Lameths. The Left con- sisted of the Jacobins, a term which still included the party afterwards known as the Girondins or Girondists (q.v.) — so termed because several of their leaders came from the region of the Gironde in southern France. They numbered about 330. Among the extreme Left sat Cambon, Couthon, Merlin de Thionville. The Girondins could claim the most brilliant orators, Vergniaud, Guadet, Isnard. Inferior to these men in talent, Brissot de Warville, a restlesspamphleteer,exertedmore influence over the party which has sometimes gone by his name. The Left as a whole was republican, although it did not care to say so. Strong in numbers, it was reinforced by the disorderly elements in Paris and throughout France. The remainder of the House, about 250 deputies, scarcely belonged to any definite party, but voted oftenest with the Left, as the Left was the most powerful.

The Left had three objects of enmity: first, the king, the queen and the royal family; secondly, the SmigrSs; and thirdly, the clergy. The king could not like the new constitution, The < ~? urt although, if left to himself, indolence and good nature emigres, might have rendered him passive. The queen through- out had only one thought, to shake off the impotence and humiliation of the crown; and for this end she still clung to the hope of foreign succour and corresponded with Vienna. Those emigres who had assembled in arms on the territories of the electors of Mainz and Treves (Trier) and in the Austrian Netherlands had put themselves in the position of public enemies. Their chiefs were the king's brothers, who affected to consider Louis as a captive and his acts as therefore invalid. The count of Provence gave himself the airs of a regent and surrounded himself with a ministry. The SmigrSs were not, however, dangerous. They were only a few thousand strong; they had no competent leader and no money; they were unwelcome to the rulers whose hospitality they abused. The nonjuring clergy, although harassed by the local authorities, kept the respect and confidence of most Cathclics. No acts of disloyalty were proved against them, and commissioners of the National Assembly reported to its successor that their flocks only desired to be let alone. But the anti-clerical bias of the Legislative Assembly was too strong for such a policy.

The king’s ministers, named by him and excluded from the Assembly, were mostly persons of little mark. Montmorin gave up the portfolio of foreign affairs on the 31st of October and was succeeded by De Lessart. Cahier de Gerville was minister of the interior; Tarbe, minister of finance; and Bertrand de Molle- ville, minister of marine. But the only minister who influenced the course of affairs was the comte de

Narbonne, minister of war.

On the 9th of November the Assembly decreed that the SmigrSs assembled on the frontiers should be liable to the penalties of death and confiscation unless they returned to France and the? y tne Ist ° J anu ary following. Louis did not love nonjurors, his brothers, and he detested their policy, which without rendering him any service made his liberty and even his life precarious; yet, loath to condemn them to death, he vetoed the decree. On the 29th of November the Assembly decreed that every nonjuring clergyman must take within eight days the civic oath, substantially the same as the oath previously administered, on pain of losing his pension and, if any troubles broke out, of being deported. This decree Louis vetoed as a matter of conscience. In either case his resistance only served to give a weapon to his enemies in the Assembly. But foreign affairs were at this time the most critical. The armed bodies of emigres on the territory of the Empire afforded matter of com 5 – plaint to France. The persistence of the French in refusing more than a money compensation to the German princes who had claims in Alsace afforded matter of complaint to the Empire. Foreign statesmen noticed with alarm the effect of the French Revolution upon opinion in their own countries, and they resented the endeavours of French revolutionists to make converts there. Of these statesmen, the emperor Leopold was

the most intelligent. He had skilfully extricated himself from the embarrassments at home and abroad left by his predecessor Joseph. He was bound by family ties to Louis, and he was obliged, as chief of the Holy Roman Empire, to protect the border princes. On the other hand, he understood the weakness of the Habsburg monarchy. He knew that the Austrian Netherlands, where he had with difficulty restored his authority, were full of friends of the Revolution and that a French army would be wel- comed by many Belgians. He despised the weakness and the folly of the SmigrSs and excluded them from his councils. He earnestly desired to avoid a war which might endanger his sister or her husband. In August 1791 he had met Frederick William II. of Prussia at Pillnitz near Dresden, and the two monarchs had joined in a declaration that they con- tjoa of sidered the restoration of order and of monarchy in painitz. France an object of interest to all sovereigns. They further declared that they would be ready to act for this purpose in concert with the other powers. This declaration appears to have been drawn from Leopold by pressure of circumstances. He well knew that concerted action of the powers was impossible, as the English government had firmly resolved not to meddle with French affairs. After Louis had accepted the constitution, Leopold virtually withdrew his declaration. Nevertheless it was a

grave error of judgment and contributed to the approach- ing war.

In France many persons desired war for various reasons. Narbonne trusted to find in it the means of restoring a certain authority to the crown and limiting the Revolution. He con- templated a war with Austria only. The Girondins desired war in the hope that it would enable them to abolish monarchy altogether. They desired a general war because they believed that it would carry the Revolution into other countries and make it secure in France by making it universal. The extreme Left had the same objects, but it held that a war for those objects could not safely be entrusted to the king and his ministers. Victory would revive the power of the crown; defeat would be the un- doing of the Revolution. Hence Robespierre and those who thought with him desired peace. The French nation generally had never approved of the Austrian alliance, and regarded the Habsburgs as traditional enemies. The king and queen, however, who looked for help from abroad and especially from Leopold, dreaded a war with Austria and had no faith in the schemes of Narbonne. Nor was France in a condition to wage a serious war. The constitution was unworkable and the governing authorities were mutually hostile. The finances remained in disorder, and assignats of the face value of 900,000,000 livres were issued by the Legislative Assembly in less than a year. The army had been thinned by desertion and was enervated by long indiscipline. The fortresses were in bad condition and short of supplies.

In October Leopold ordered the dispersion of the emigres who had mustered in arms in the Austrian Netherlands. His example was followed by the electors of Treves and Mainz. At the same time they implored the emperor's protection, and the Austrian chancellor Kaunitz informed Noailles the French ambassador that this protection would be given if necessary. Narbonne demanded a credit of 20,000,000 livres, which the Assembly granted. He made a tour of inspection in the north of France and reported untruly to the Assembly that all was in readiness for war. On the 14th of January 1792 the diplomatic committee reported to the Assembly that the emperor should be required to give satisfactory assurances before the 10th of February. The Assembly put off the term to the ist of March. In February Leopold concluded a defensive treaty with Frederick William. But there was no mutual confidence between the sovereigns, who were at that very time pursuing opposite policies with regard to Poland. Leopold still hesitated and still hoped to avoid war. He died on the ist of March, and the imperial dignity became vacant. The hereditary dominions of Austria passed to his son Francis, afterwards the emperor Francis II., a youth of small abilities and no experience.

The real conduct of affairs fell, therefore, to the aged Kaunitz. In France Narbonne failed to carry the king or his colleagues along with him. The king took courage to dismiss

him on the 9th of March, -whereupon the assembly testified its confidence in Narbonne. De Lessart having incurred its anger by the tameness of his replies to Austrian dictation, the Assembly voted his impeachment.

The king, seeing no other course open, formed a new ministry which was chiefly Girondin. Roland became minister of the Wgr interior, Claviere of finance, De Grave of war, and

declared Lacoste of marine. Far abler and more resolute than against anv f these men was Dumouriez, the new- minister Austria. £ or f ore jg n a g a i rs . \ soldier by profession, he had been employed in the secret diplomacy of Louis XV. and had thus gained a wide knowledge of international politics. He stood aloof from parties and had no rigid principles, but held views closely resembling those of Narbonne. He wished for a war with Austria which should restore some influence to the crown and make himself the arbiter of France. The king bent to necessity, and on the 20th of April came to the Assembly with the proposal that war should be declared against Austria. It was carried by acclamation. Dumouriez intended to begin with an invasion of the Austrian Netherlands. As this would awaken English jealousy, he sent Talleyrand to London with assurances that, if victorious, the French would annex no territory.

It was designed that the French should invade the Netherlands at three points simultaneously. Lafayette was to march against Namur, Biron against Mons, and Dillon against Tournay. But the first movement disclosed the miserable state of the army. Smitten with panic, Dillon's force fled at sight of the enemy, and Dillon, after receiving a wound from one of his own soldiers, was murdered by the mob of Lille. Biron was easily routed before Mons. On hearing of these disasters Lafayette found it necessary to retreat. This shameful discomfiture quickened all the suspicion and jealousy fermenting in France. De Grave had to resign and was succeeded by Servan. The Austrian forces in the Netherlands were, however, so weak that they could not take the offensive. Austria demanded help from Prussia under the recent alliance, and the claim was admitted. Prussia

declared war against France, and the duke of Brunswick was chosen to command the allied forces, but various causes delayed action. Austrian and Prussian interests clashed in Poland. The Austrian government wished to preserve a harmless neighbour. The Prussian government desired another partition and a large tract of Polish territory. Only after long discussion was it agreed that Prussia should be free to act in Poland, while Austria might find compensation in provinces conquered from France.

A respite was thus given and something was done to improve the army. Meantime the Assembly passed three decrees: one for the deportation of nonjuring priests, another to suppress the king's Constitutional Guard, and a third for the establishment of a camp of federes near Paris. Louis consented to sacrifice his guard, but vetoed the other decrees. Roland having addressed to him an arrogant letter of remonstrance, the king with the support of Dumouriez dismissed Roland, Servan and Claviere. Dumouriez then took the ministry of war, and the other places were filled with such men as could be had. Dumouriez, who cared only for the successful prosecution of the war, urged the king to accept the decrees. As Louis was obstinate, he felt that he could do no more, resigned office on the 15th of June and imeute ot we nt to join the army of the north. Lafayette, who the 20th remained faithful to the constitution of 1791, ventured of June on a letter of remonstrance to the Assembly. It paid 1 no attention, for Lafayette could no longer sway the

people. The Jacobins tried to frighten the king into accepting the decrees and recalling his ministers. On the 20th of June the armed populace invaded the hall of the Assembly and the royal apartments in the Tuileries. For some hours the king and queen, were in the utmost peril. With passive courage Louis refrained from making any promise to the insurgents.

The failure of the insurrection encouraged a movement in favour of the king. Some twenty thousand Parisians signed a petition expressing sympathy with Louis. Addresses of like tenour poured in from the departments and the provincial cities. Lafayette himself came to Paris in the hope of rallying the

constitutional party, but the king and queen eluded his offers of assistance. They had always disliked and distrusted Lafayette and the Feuillants, and preferred to rest their hopes of deliverance on the foreigner. Lafayette returned to his troops without having effected anything. The Girondins made a last advance to Louis, offering to save the monarchy if he would accept them as ministers. His refusal united

all the Jacobins in the project of overturning the monarchy by force. The ruling spirit of this new revolution was Danton, a barrister only thirty-two years of age, who had not sat in either Assembly, although he had been the leader of the Cordeliers, an advanced republican club, and had a strong hold on the common people of Paris. Danton and his friends were assisted in their work by the fear of invasion, for the allied army was at length mustering on the frontier. The Assembly declared the country in danger. All the regular troops in or near Paris were sent to the front. Volunteers and f&diris were constantly arriving in Paris, and, although most went on to join the army, the Jacobins enlisted those who were suitable for their purpose, especially some 500 whom Barbaroux, a Girondin, had summoned from Marseilles. At the same time the National Guard was opened to the lowest class. Brunswick's famous declaration of the 25th of July, announcing that the allies would enter France to restore the royal authority and would visit the Assembly and the city of Paris with military execution if any further outrage were offered to the king, heated the republican spirit to fury. It was resolved to strike the decisive blow on the 10th of August.

On the night of the 9th a new revolutionary Commune took possession of the hotel de ville, and early on the morning of the 10th the insurgents assailed the Tuileries. As the preparations of the Jacobins had been notorious, some * ' 5£f t measures of defence had been taken. Beside a few August gentlemen in arms and a number of National Guards the palace was garrisoned by the Swiss Guard, about 950 strong. The disparity of force was not so great as to make resistance altogether hopeless. But Louis let himself be persuaded into betraying his own cause and retiring with his family under the shelter of the Assembly. The National Guards either dispersed or fraternized with the assailants. The Swiss Guard stood firm, and, possibly by accident, a fusillade began. The enemy were gaining ground when the Swiss received an order from the king to cease firing and withdraw. They were mostly shot down as they were retiring, and of those who surrendered many were murdered in cold blood next day. The king and queen spent long hours in a reporter's box while the Assembly discussed their fate and the fate of the French monarchy. Little more than a third of the deputies were present and they were almost all Jacobins. They decreed that Louis should be suspended from his office and that a convention should be summoned to give France a new constitution. An executive council was formed by recalling Roland, Claviere and Servan to office and joining with them Danton as minister of justice, Lebrun as minister of foreign affairs, and Monge as minister of marine.

When Lafayette heard of the insurrection in Paris he tried to rally his troops in defence of the constitution, but they refused to follow him. He was driven to cross the frontier Therevo' and surrender himself to the Austrians. Dumouriez lutloaary was named his successor. But the new government was Comwune still beset with danger. It had no root in law and little hold on public opinion. It could not lean on the Assembly, a mere shrunken remnant, whose days were numbered. It re- mained dependent on the power which had set it up, the revolu- tionary Commune of Paris. The Commune could therefore extort what concessions it pleased. It got the custody of the king and his family who were imprisoned in the Temple. Having obtained an indefinite power of arrest, it soon filled the prisons of Paris. As the elections to the Convention were close at hand, the Com- mune resolved to strike the public with terror by the slaughter of its prisoners. It found its opportunity in the progress of invasion. On the 19th Brunswick crossed the frontier. On the 22nd Longwy . surrendered. Verdun was invested and seemed likely to fall. On the xst of September the Commune decreed

that on the following day the tocsin should be rung, all able- bodied citizens convened in the Champs de Mars, and 60,000 volunteers enrolled for the defence of the country, TftoSep- while this assembly was in progress gangs of assassins massacres, were sent to the prisons and began a butchery which lasted four days and consumed 1400 victims. The Com- mune addressed a circular letter to the other cities of France inviting them to follow the example. A number of state prisoners awaiting trial at Orleans were ordered to Paris and on the way were murdered at Versailles. The Assembly offered a feeble resistance to these crimes. Danton can hardly be acquitted of connivance at them. Roland hinted disapproval, but did not venture more. He with many other Girondins had been marked for slaughter in the original project.

The elections to the Convention were by almost universal suffrage, but indifference or intimidation reduced the voters to a Tbe small number. Many who had sat in the National,

National and many more who had sat in the Legislative Coavea- Assembly were returned. The Convention met on the aon ' 20th of September. Like the previous assemblies,

it did not fall into well-defined parties. The success of the Jacobins in overthrowing the monarchy had ended their union. Thenceforwards the name of Jacobin was confined to the smaller and more fanatical group, while the rest came to be known as the Girondins. The Jacobins, about 100 strong, formed the Left of the Convention, afterwards known from the raised benches on which they sat as the Mountain (q.v.). The Girondins, numbering perhaps 180, formed the Right. The rest of the House, nearly 500 members, voted now on one side now on the other, until in the course of the Terror they fell under the Jacobin domination. This neutral mass is often termed the Plain, in allusion to its seats on the floor of the House. The Convention as a whole was Republican, if not on principle, from the feeling that no other form of government could be established. It decreed ” 4 /«f /0fl t ‘ le Volition of monarchy on the 21st of September. monarchy. A committee was named to draft a new constitution, which was presented and decreed in the following June, but never took effect and was superseded by a third constitution in 1795. The actual government of France was by committees of the Convention, but some months passed before it could be fully organized.

The inner history of the Convention was strange and terrible. It turned on the successive schisms in the ruling minority. Whichever side prevailed destroyed its adversaries Jac ° b,a * only to divide afresh and renew the strife until the airondlas. victors were at length so reduced that their yoke was shaken off and the mass of the Convention, hitherto benumbed by fear, resumed its freedom and the government of France. The first and most memorable of these contests was the quarrel between Jacobin and Girondin. Both parties were republican and democratic; both wished to complete the Revolu- tion; both were determined to maintain the integrity of France. But they differed in circumstances and temperament. Although the leaders on both sides were of the middle class, the Girondins represented the bourgeoisie, the Jacobins represented the populace. The Girondins desired a speedy return to law and order; the Jacobins thought that they could keep power only by violence. The Jacobins leant on the revolutionary commune and the mob of Paris; the Girondins leant on the thriving burghers of the provincial cities. Despite their smaller number the Jacobins were victors. They were the more resolute and unscrupulous. The Girondins numbered many orators, but not one man of action. The Jacobins controlled the parent club with its affiliated societies and the whole machinery of terror. The Girondins had no organized force at their disposal. The Jacobins perpetuated in a new form the old centralization of power to which France was accustomed. The Girondins addressed themselves to provincials who

had lost the power of initiative. They were termed federal- ists by their enemies and accused, unjustly enough, of wishing to dissolve the national unity.

Even in the first days of the Convention the feud broke out. The Girondins condemned the September massacres and dreaded

the Parisian populace. Barbaroux accused Robespierre of aiming at a dictatorship, and Buzot demanded a guard recruited in the departments to protect the Convention. In October Louvet reiterated the charge against Robespierre, and Barbaroux called for the dissolution of the Commune of Paris. But the Girondins gained no tangible result from this wordy warfare. For a time the question how to dispose of the king diverted the thoughts of all parties. It was approached in a political, not in a judicial spirit. The Jacobins desired the death of Louis, partly because they hated kings and deemed him a traitor, partly because they wished to envenom the Revolution, defy Europe and compromise their more temperate colleagues. The Girondins wished to spare Louis, but were afraid of incurring the reproach of royalism. At this critical moment the discovery of the famous iron chest, containing papers which showed that many public men had intrigued with the court, was disastrous for Louis. Members of the Convention were anxious to be thought severe lest they should be thought corrupt. Robespierre frankly demanded that Louis as a public enemy should be put to death without form of trial. The majority shrank from such open injustice and decreed on the 3rd of December that Louis should be tried by the Convention. A committee of twenty-one was chosen to frame the indictment against Louis, and on the nth of December he was brought to the bar for the first time to hear the charges read. Trlaland The most essential might be summed up in the state- execution ment that he had plotted against the Constitution and of Louis against the safety of the kingdom. On the 26th Louis appeared at the bar a second time, and the trial began. The advocates of Louis could plead that all his actions down to the dissolution of the National Assembly came within the amnesty then granted, and that the Constitution had proclaimed his person inviolable, while enacting for certain offences the penalty of deposition which he had already undergone. Such argu- ments were not likely to weigh with such a tribunal. The Mountain called for immediate sentence of death; the Girondins desired an appeal to the people of France. The galleries of the Convention were packed with adherents of the Jacobins, whose fury, not confined to words, struck terror into all who might incline towards mercy. In Paris unmistakable

signs announced a new insurrection, to be followed perhaps by new massacres. On the question whether Louis was guilty none ventured to give a negative vote. The motion for an appeal to the people was rejected by 424 votes to 283. The penalty of death was adopted by 361 votes against 360 in favour of other penalties or of post- poning at least the execution of the sentence. On the 21st of January 1793 Louis was beheaded in the Place de la Revolution, now. the Place de la Concorde.

Between the deposition and the death of Louis the war had run a surprising course. Accompanied by King Frederick William, Brunswick had entered France with 80,000 men, of whom more than half were Prussians, the vaimy° best soldiers in Europe. The disorder of France was such that many expected a triumphal march to Paris. But the Allies had opened the campaign late; they moved slowly; the weather broke, and sickness began to waste their ranks. Dumouriez succeeded in rousing the spirit of the French; he occupied the defiles of the forest of Argonne, thus causing the enemy to lose many valuable days, and when at last they turned his position, he retreated without loss. At Valmy on the 20th of September the two armies came in contact. The affair was only a cannonade, but the French stood firm and the advance of the Allies was stayed. Brunswick had no heart for his work; the king was ill satisfied with the Austrians, and both were alarmed by the ravages of disease among the soldiers. Within ten days after the affair of Valmy they began their retreat. Dumouriez, who still hoped to detach Prussia from Austria, left them un- molested. When the enemy had quitted France, he invaded Hainaut and defeated the Austrians at Jemappes on the 6th of November. In Belgium a large party regarded the French as deliverers. Dumouriez entered Brussels without further re- sistance, and Was soon master of the whole country. Elsewhere the French were equally successful. With a slight force Custine

assailed the electorate of Mainz. The common people were friendly, and he had no trouble in occupying the country as far as the Rhine. The king of Sardinia having shown a hostile temper, Montesquiou made an easy conquest of Savoy. At the close of 1792 the relative position of France and her enemies had been reversed. It was seen that the French were still able to wage war, and that the revolutionary spirit had permeated the adjoining countries, while the old governments of Europe, jealous of one another and uncertain of the

loyalty of their subjects, were ill qualified for resistance.

Intoxicated with these victories, the Convention abandoned itself to the fervour of propaganda and conquest. The river Scheldt had been closed to commerce by various treaties to which England and Holland, neutral powers, were parties. Without a pretence of negotiation the French government declared on the 16th of November that the Scheldt was thenceforwards open. On the 19th a decree of the Convention offered the aid of France to all nations which were striving after freedom — in other words, to the malcontents in every neighbouring state. Not long afterwards the Convention annexed Savoy, with the consent, it should be added, of many Savoyards. On the 15th of December the Convention decreed that all peoples freed by its assistance should carry out a revolution like that which had been made in France on pain of being treated as enemies. Towards Great Britain the executive council and the Convention behaved with singular folly. There, in spite of a growing anti- pathy to the Revolution, Pitt earnestly desired to maintain peace. The conquest of the Netherlands and the symptoms of a wish to annex that country made his task most difficult. But the French The first government underrated the strength of Great Britain* coaijtioa imagining that all Englishmen who desired parlia- agalnst mentary reform desired revolution, and that a few France. democratic societies represented the nation. When Monge announced the intention of attacking Great Britain on behalf of the English republicans, the British government and nation were thoroughly alarmed and roused; and when the news of the execution of Louis XVI. was received, Chauvelin, the French envoy, was ordered to quit England. France declared war against England and Holland on the 1st of February and soon afterwards against Spain. In the course of the year 1793 the Empire, the kings of Portugal and Naples and the grand- duke of Tuscany declared war against France. Thus was formed the first coalition.

France was not prepared to encounter so many enemies. Administrative confusion had been heightened by the triumph of the Jacobins. Servan was succeeded as minister of war by Pache who was incapable and dishonest. The army of Dumouriez was left in such want that it dwindled rapidly. The commissioners of the Convention plundered the Netherlands with so little remorse that the people became bitterly hostile. The attempt to enforce a revolution of the French sort on the Catholic and con- servative Belgians drove them to fury. By every unfair means the commissioners extorted the semblance of a popular vote in favour of incorporation, and France annexed the Netherlands. This was the last outrage. When a new Austrian army under the prince of Coburg entered the country, Dumouriez, who had

invaded Holland, was unable to defend Belgium. On the 18th of March he was defeated at Neerwinden, and a few days later he was driven back to the frontier. Alike on public and personal grounds Dumouriez was the enemy of the government. Trusting in his influence over the army he resolved to lead it against the Convention, and, in order to secure his rear, he negotiated with the enemy. But he could make no impression on his soldiers, and deserted to the Austrians. Events followed a similar course in the Rhine valley. There also the French wore out the goodwill at first shown to them. They summoned a convention and obtained a vote for incorporation with France. But they were unable to hold their ground on the approach of a Prussian army. By April they had lost the country with the exception of Mainz, which was invested. France thus lay open to invasion from the east and the north. The Convention decreed a levy of 300,000 men.

About the same time began the first formidable uprising against the Revolution, the War of La Vendee, the region lying to the south of the lower Loire and facing the Atlantic. Its inhabitants differed in many ways from the mass Rl*j”g- of the nation. Living far from large towns and busy Vendee. routes of commerce, they remained primitive in all their thoughts and ways. The peasants had always been on friendly terms with the gentry, and the agrarian changes made by the Revolution had not been appreciated so highly as elsewhere. The people were ardent Catholics, who venerated the nonjuring clergy and resented the measures taken against them. But they remained passive until the enforcement of the decree for the levy of 300,000 men. Caring little for the Convention and knowing nothing of events on the northern or eastern frontier, the peasants were determined not to serve and preferred to fight the Republic at home. When once they had taken up arms they found gentlemen to lead and priests to exhort, and their rebellion became Royalist and Catholic. The chiefs were drawn from widely different classes. If Bonchamps and La Roche-jacquelin were nobles, StofBet was a gamekeeper and Cathelineau a mason. As the country was favourable to guerilla warfare, and the government could not spare regular troops from the frontiers, the rebels were usually successful, and by the end of May had almost expelled the Republicans from La Vendee.

Danger without and within prompted the Convention to strengthen the executive authority. That the executive and legislative powers ought to be absolutely separate The had been an axiom throughout the Revolution. Committee Ministers had always been excluded from a seat in the ot Public legislature. But the Assemblies were suspicious of y ‘

the executive and bent on absorbing the government. They had nominated committees of their own members to control every branch of public affairs. These committees, while reducing the ministers to impotence, were themselves clumsy and in- effectual. It may be said that since the first meeting of the states-general the executive authority had been paralysed in France. The Convention in theory maintained the separation of powers. Even Danton had been forced to resign office when he was elected a member. But unity of government was restored by the formation of a central committee. In January the first Committee of General Defence was formed of members of the committees for the several departments of state. Too large and too much divided for strenuous labour, it was reduced in April to nine members and re-named the Committee of Public Safety. It deliberated in secret and had authority over the ministers; it was entrusted with the whole of the national defence and em- powered to use all the resources of the state, and it quickly became the supreme power in the republic. Under it the ministers were no more than head clerks. About the same time were instituted the deputies on mission in the provinces, who could overrule any local authority, and who corresponded regularly with the Committee. France thus returned under new forms to its traditional government: a despotic authority in Paris with all-powerful agents in the provinces. Against disaffection the government was armed with formidable weapons: the Com- mittee of General Security and the Revolutionary Tribunal. The Committee of General Security, first established in October 1792, was several times remodelled. In September 1793 the Convention decreed that its members should be nominated by the Committee of Public Safety. The Committee of General Security had unlimited powers for the prevention or discovery of crime against the state. The Revolutionary Tribunal was decreed on the 10th of March. It was an extraordinary court, destined to try all offences against the Revolution without appeal. The jury, which received wages, voted openly, so that con- demnation was almost certain. The director of the jury or public prosecutor was Fouquier Tinville. The first condemnation took place on the nth of April.

Enmity between Girondin and Jacobin grew fiercer as the perils of the Republic increased. Danton strove to unite all partisans of the Revolution in defence of the country; but the Girondins, detesting his character and fearing his ambition,

rejected all advances. The Commune of Paris and the journalists who were its mouthpieces, Hebert and Marat, aimed frankly at destroying the Girondins. In April the Girondins Giroadias. carr i e d a decree that Marat should be sent before the Revolutionary Tribunal for incendiary writings, but his acquittal showed that a Jacobin leader was above the law. In May they proposed that the Commune of Paris should be dissolved, and that the suppleants, the persons elected to fill vacancies occurring in the Convention, should assemble at Bourges, where they would be safe from that violence which might be applied to the Convention itself. Barere, who was rising into notice by the skill with which he trimmed between parties, opposed this motion, and carried a decree appointing a Committee of Twelve to watch over the safety of the Convention. Then the Commune named as commandant of the National Guard, Hanriot, a man concerned in the September massacres. It raised an insurrection on the 3rst of May. On Barere's pro- posal the Convention stooped to dissolving the Committee of Twelve. The Commune, which had hoped for the arrest of the Girondin leaders, was not satisfied. It undertook a new and more formidable outbreak on the 2nd of June. Enclosed by Hanriot's troops and thoroughly cowed, the Convention decreed the arrest of the Committee of Twelve and of twenty-two principal Girondins. They were put under confinement in their own houses. Thus the Jacobins became all-powerful.

A tremor of revolt ran through the cities of the south which chafed under the despotism of the Parisian mob. These cities had their own grievances. The Jacobin clubs menaced of˜the t ' le l' ves an< ˆ P r0 P er ti es oi all who were guilty of wealth

provinces, or of moderate opinions, while the representatives on mission deposed the municipal authorities and placed their own creatures in power. At the end of April the citizens of Marseilles closed the Jacobin club, put its chiefs on their trial and drove out the representatives on mission. In May Lyons rose. The Jacobin municipality was overturned, and Challier, their fiercest demagogue, was arrested. In June the citizens of Bordeaux declared that they would not acknowledge the authority of the Convention until the imprisoned deputies were set free. In July Toulon rebelled. But in the north the appeals of such Girondins as escaped from Paris were of no avail. Even the southern uprising proved far less dangerous than might have been expected. The peasants, who had gained more by the Revolution than any other class, held aloof from the citizens. The citizens lacked the qualities necessary for the successful conduct of civil war. Bordeaux surrendered almost without waiting to be summoned. Marseilles was taken in August and treated with great

cruelty. Lyons, where the Royalists were strong, defended itself with courage, for the trial and execution of Challier made the townsmen hopeless of pardon. Toulon, also largely Royalist, invited the English and Spanish admirals, Hood and Langara, who occupied the port and garrisoned the town. At the same time the Vendean War continued formidable. In June the insurgents took the im- portant town of Saumur, although they failed in an attempt upon Nantes. At the end of July the Republicans were still unable to make any impression upon the revolted territory.

Thus in the summer of 1793 France seemed to be failing to pieces. It was saved by the imbecility and disunion of the Disunion hostile powers. In the north the French army after oftbe the treason of Dumouriez could only attempt to cover allied t jj e frontier. The Austrians were joined by British,

powers. j) utc j 1 an d Prussian forces. Had the Allies pushed straight upon Paris, they might have ended the war. But the desire of each ally to make conquests on his own account led them to spend time and strength in sieges. When Conde and Valenciennes had been taken, the British went off to assail Dunkirk and the Prussians retired into Luxemburg. In the east the Prussians and Austrians took Mainz at the end of July, allowing the garrison to depart on condition of not serving against the Allies for a year. Then they invaded Alsace, but their mutual jealousy prevented them from going farther. Thus the summer passed away without any decisive achievement of the

coalition. Meanwhile the Committee of Public Safety, inspired by Danton, strove to rebuild the French administrative system. In July the Committee was renewed and Danton fell out; but soon afterwards it Was reinforced by two officers, Carnot, who undertook the organization of the army, and Prieur of the Cote d'Or, who undertook its equipment. Administrators of the first rank, these men renovated the warlike power of France, and enabled her to deal those crushing blows which broke up the coalition.

The Royalist and Girondin insurrections and the critical aspect of the war favoured the establishment of what is known as the reign of terror. Terrorism had prevailed more or less since the beginning of the Revolution, but it was ot ^^,f" the work of those who desired to rule, not of the nominal rulers. It had been lawless and rebellious. It ended by becoming legal and official. While Danton kept power Terrorism remained imperfect, for Danton, although unscrupulous, did not love cruelty and kept in view a return to normal government. But soon after Danton had ceased to be a member of the Com- mittee of Public

Safety Robespierre was elected, and now became the most powerful man in France. Robespierre was an acrid fanatic, and unlike Danton, who only cared to securethe practical results of the Revolution, he had a moral and religious ideal which he intended to force on the nation. All who rejected his ideal were corrupt; all who resented his ascendancy were traitors. The death of Marat, who was stabbed by Charlotte Corday (q.v.) to avenge the Girondins, gave yet another pretext for terrible measures of repression. In Paris the armed ruffians who had long preyed upon respectable citizens were organized as a revolutionary army, and other revolutionary armies were established in the provinces. Two new laws placed almost everybody at the mercy of the government. The Law of the Maximum, passed on the 17th of September, fixed the price of food and made it capital to ask for more. The Law of Suspects, passed at the same time, declared suspect every person who was of noble birth, or had held office before the Revolution, or had any connexion with an emigre, or could not produce a card of civisme granted by the local authority, which had full discretion to refuse. Any suspect might be arrested and imprisoned until the peace or sent before the Revolutionary Tribunal. An earlier law had established in every commune an elective committee of surveil- lance. These bodies, better known as revolutionary committees, were charged with the enforcement of the Law of Suspects. On the 10th of October the new constitution was suspended and the government declared revolutionary until the peace.

The spirit of those in power was shown by the massacres which followed on the surrender of Lyons in that month. In Paris the slaughter of distinguished victims began with the trial of Marie Antoinette, who was guillotined on f”^’ ” the 16th. Twenty-one Girondin deputies were next queen. brought to the bar and, with the exception of Valaze who stabbed himself, were beheaded on the last day of October, Madame Roland and other Girondins of note suffered later. In November the duke of Orleans, who had styled himself Philippe Egalit6, had sat in the Convention, and had voted for the king’s death, went to the scaffold. Bailly, Barnave and many others of note followed before the end of the year. As the bloody work went on the pretence of trial became more and more hollow, the chance of acquittal fainter and fainter. The Revolutionary Tribunal was a mere instrument of state. Knowing the slight foundation of its power the government deliberately sought to destroy all whose birth, political connexions or past career might mark them out as leaders of opposition. At the same time it took care to show that none was so obscure or so impotent as to be safe when its policy was to destroy.

The disastrous effects of the Terror were heightened by the financial

mismanagement of the Jacobins. Assignats were issued with such reckless profusion that the total for the three years of the Convention has been estimated at 7250 millions of francs. Enormous depreciation ensued and, although penalties rising to death itself were denounced against all who should refuse I to take them at par, they fell to little more than 1 % of their

nominal value. What were known as revolutionary taxes were imposed at discretion by the representatives on mission and the local authorities. A forced loan of 1000 millions was exacted from those citizens who were reputed to be prosperous. Immense supplies of all kinds were requisitioned for the armies, and were sometimes allowed to rot unused. Anarchy and state interference having combined to check the trade in necessaries, the govern- ment undertook to feed the people, and spent huge sums, especially on bread for the starving inhabitants of Paris. As no regular budget was attempted, as accounts were not kept, and as audit was unknown, the opportunities for fraud and embezzlement were endless. Even when due allowance has been made for the financial disorder which the Convention inherited from previous assemblies, and for the war which it had to wage against a formidable alliance, it cannot be acquitted of reckless and wasteful maladministration.

Notwithstanding the disorder of the time, the mass of new laws produced by the Convention was extraordinary. A new

system of weights and measures, a new currency, a tUoaary new chronological era (that of the Republic), and a new kglsla- calendar were introduced (see the section Republican <*»"• Calendar below). A new and elaborate system of

calendar education was decreed. Two drafts of a complete

civil code were made and, although neither was enacted, particular changes of great moment were decreed. Many of the new law's were stamped with the passions of the time. Such were the laws which suppressed all the remaining bodies cor- porate, even the academies, and which extinguished all manorial rights without any indemnity to the owners. Such too were the laws which took away the power of testation, placed natural children upon an absolute equality with legitimate, and gave a boundless freedom of divorce. It would be

absurd, however, to dismiss all the legislative work of the Convention as merely partisan or eccentric. Much of it was enlightened and skilful, the product of the best minds in the assembly. To compete for power or even to express an opinion on public affairs was danger- ous, and wholly to refrain from attendance might be construed as disaffection. Able men who wished to be useful without hazarding their lives took refuge in the committees where new laws were drafted and discussed. The result of their labours was often decreed as a matter of course. Whether the decree would be carried into effect was always uncertain.

The ruling faction was still divided against itself. The Commune of Paris, which had overthrown the Girondins, was jealous of the Committee of Public Safety, which meant to be supreme. Robespierre, the leading member of the committee, abhorred the chiefs of the Commune, not merely because they conflicted with his ambition but from difference of character. He was orderly and temperate, they were gross and debauched; he was a deist, they were atheists. In November the Commune fitted up Notre Dame as a temple of Reason, selected an opera girl to impersonate the goddess, and with profane ceremony installed her in the choir. All the churches in Paris were closed. Danton, when he felt power slipping from his hands, had retired from public business to his native town of Arcis-sur-Aube. When he became aware of the feud between Robespierre and the Commune, he conceived the hope of limiting the Terror and guiding the Revolution into a sane course. He returned to Paris and joined with Robespierre in carrying the law of 14 Frimaire (December 4), which gave the Committee of Public Safety absolute control over all municipal authorities. He be- came the advocate of mercy, and his friend Camille Desmoulins pleaded for the same cause in the Vieux Cordelier. Then the

oppressed nation took courage and began to demand Overthrow j r .. • . . • .-

of the pardon for the innocent and even justice upon

Paris murderers. A sharp contest ensued between the

Commune. Dantonists and the Commune, Robespierre inclining Danton- ‘ now to is s ‘ e > now *° that, for he was really a friend hits. to neither. His friend St Just, a younger and fiercer

man, resolved to destroy both. Hfebert and his followers in despair planned a new insurrection, but they were deserted by Hanriot, their

military chief. Their doom was thus

fixed. Twenty leaders of the Commune were arrested on the 17th of March 1794 and guillotined a week later. It was then Danton's turn. He had several warnings, but either through over-confidence or weariness of life he scorned to fly. On the 30th he was arrested along with his friends Desmoulins, Dela- croix, Philippeaux and Westermann. St Just read to the Convention a report on their case pre-eminent even in that day for its shameless disregard of truth, nay, of plausibility. Before the Revolutionary Tribunal Danton defended himself with such energy that St Just took means to have him silenced. Danton and his friends were executed on the 5th of April.

For a moment the conflict of parties seemed at an end. None could presume to challenge the authority of the Committee of Public Safety, and in the committee none disputed the Suprem- leadership of Robespierre. Robespierre was at last acy of free to establish the republic of virtue. On the 7th Robes- of May he persuaded the Convention to decree that the French people acknowledged the existence of a Supreme Being and the immortality of the soul. On the 4th of June he was elected president of the Convention, and from that time forward he appeared to be dictator of France. On the 8th the festival of the Supreme Being was solemnized, Robespierre acting as pontiff amid the outward deference and secret jeers of his col- leagues. But Robespierre knew what a gulf parted him from almost all his countrymen. He knew that he could be safe only by keeping power and powerful only by making the Terror more stringent. Two days after the festival his friend Couthon presented the crowning law of the Terror, known as the Law of 22 Prairial. As the Revolutionary Tribunal was said to be paralysed by forms and delays, this law abolished the defence of prisoners by counsel and the examination of witnesses. Thence- forward the impressions of judges and jurors were to decide the fate of the accused. For all offences the penalty was to be death. The leave of the Convention was no longer required for the arrest of a member. In spite of some murmurs even this law was adopted. Its effect was fearful. The Revolutionary Tribunal had hitherto pronounced 1200 death sentences. In the next six weeks it pronounced 1400. With Robespierre's approval St Just sketched at this time the plan of an ideal society in which every man should have just enough land to maintain him; in which domestic life should be regulated by law and all children over seven years should be educated by the state. Pending this regeneration of society St Just advised the rule of a dictator.

The growing ferocity of the Terror appeared more hideous as the

dangers threatening the government receded. The surrender of

Toulon in December 170 3 closed the south of France to _. „

The i?e- foreign enemies. The war in La Vendee turned against Y oiution-

the insurgents from the time when the veteran garrison ary War.

of Mainz came to reinforce the Republican army. Republi-

After a severe defeat at Cholet on the 16th of October asses”

the Royalists determined to cross the Loire and raise

Brittany and Anjou, where the Chouans, or Royalist partisans,

were already stirring. They failed in an attempt on the little

seaport of Granville and in another upon Angers. In December

they were defeated with immense loss at Le Mans and at Savenay.

The rebellion would probably have died out but for the measures

of the new Republican general Turreau, who wasted La Vendee so

horribly with his ” infernal columns ” that he drove the peasants

to take up arms once more. Yet Turreau’s crimes were almost

surpassed by Carrier, the representative on mission at Nantes,

who, finding the guillotine too slow in the destruction of his

prisoners, adopted the plan of drowning them wholesale. In

the autumn of 1793 the war against the coalition took a turn

favourable to France. The energy of Danton, the organizing

skill of Carnot, and the high spirit of the French nation, resolute

at all costs to avoid dismemberment, had well employed the

respite given by the sluggishness of the Allies. In Flanders

the English were defeated at Hondschoote (September 8) and

the Austrians at Wattignies (October 15). In the east Hoche

routed the Austrians at Weissenburg and forced them to recross

the Rhine before the end of 1793. The summer”of 17 94 saw France

victorious on all her frontiers. Jourdan won the battle of Fleurus

The 9th Thermidor.

(June 25), which decided the fate of the Belgian provinces. The Prussians were driven out of the eastern departments. Against the Spaniards and the Sardinians the French were also successful.

Under these circumstances government by terror could not endure. Robespierre was not a man of action; he knew not how to form or lead a party; he lived not with his fellows but with his own thoughts and ambitions. He was hated and feared by most of the oligarchy. They laughed at his religion, resented his puritanism, and felt themselves in daily peril. His only loyal friends in the Committee of Public Safety, Couthon and St Just, were themselves unpopular. Robespierre professed con- sideration for the deputies of the Plain, who were glad to buy safety by conforming to his will; but he could not reckon on their help in time of danger. By degrees a coalition against Robespierre was formed in the Mountain. It included old followers of Danton like Tallien, independent Jacobins like Cambon, some of the worst Terrorists like Fouche, and such a consummate time-server as Barere. In the course of July its influence began to be felt. When St Just proposed Robespierre to the committees as dictator, he found no response. On the 8th Thermidor (26th of July) Robespierre addressed the Conven- tion, deploring the invectives against himself and the Revolu- tionary Tribunal and demanding the purification of the com- mittees and the punishment of traitors. His enemies took the speech as a declaration of war and thwarted a proposal that it should be circulated in the departments. Robespierre felt his ascendancy totter. He repeated his speech with more success to the Jacobin Club. His friends determined to strike, and Hanriot ordered the National Guards to hold themselves in readiness. Robespierre’s enemies called on the Committee of Public Safety _ .. . to arrest the traitors, but the committee was divided. Robes- On the morning of the 9th Thermidor piem. ning to speak in the Convention when Tallien St Just was begin- cut him short. Robespierre and all who tried to speak in his behalf

were shouted down. The Plain was deaf to Robes- pierre's appeal. Finally the Convention decreed the arrest of Robespierre, of his brother Augustin, of Couthon and of St Just. But theCommune and the Jacobin Club were on the alert. They sounded the tocsin, mustered their partisans, and released the prisoners. The Convention outlawed Robespierre and his friends and sent out commissioners to rally the citizens. It named Barras, a deputy who had served in the royal army, to lead its forces. Had Bobespierre possessed Danton's energy, the result might have been doubtful. He did nothing himself and benumbed his followers. Without an effort Barras captured the Hotel de Ville. Robespierre, whose jaw had been shattered by a pistol shot, was left in agony for the night. On the next morning he was beheaded along with his brother, Couthon, St Just, Hanriot and seventeen more of his adherents. On the day after seventy- one members of the Commune followed them to the scaffold. Such was the revolution of the 9th Thermidor (27th of July 1 794) which ended the Reign of Terror. *

In a period of fifteen months, it has been calculated, about 17,000 persons had been executed in France under form of law. The number of those who were shot, drowned or otherwise massacred without the pretence of a trial can never be accurately known, but must be reckoned far greater. The number of persons arrested and imprisoned reached hundreds of thousands, of whom many died in their crowded and filthy jails. The names on the list of emigres at the close of the Terror were about 150,000. Of these a small proportion had borne arms against their country. The rest were either harmless fugitives from destruction or had never quitted France and had been placed on the list simply in order that they might incur the penalties of emigration. Every one of this multitude was liable to instant death if found in French territory. Their relatives were subjected to various pains and penalties. All the property of those condemned to death and of imigris was confiscated. The carnage of the Terror spread far beyond the clergy and the nobility, beyond even the middle class, for peasants and artisans were among the victims. It spread far beyond those who could conspire or rebel, for

bedridden old men and women and young boys and girls were often sacrificed. It made most havoc in the flower of the nation, since every kind of eminence marked men for death. By imbuing Frenchmen with such a mutual hatred as nothing but the arm of despotic power could control the Reign of Terror rendered political liberty impossible for many years. The rule of the Terrorists made inevitable the reign of Napoleon.

The fall of Robespierre had consequences unforeseen by his destroyers. Long kept mute by fear, the mass of the nation found a voice and demanded a total change of govern- ment. When once the reaction against Jacobin R ˆ ct !t" tyranny had begun, it was impossible tc halt. Great Terror. numbers of prisoners were set at liberty. The Com- mune of Paris was abolished and the office of commandant of the National Guard was suppressed. The Revolutionary Tribunal was reorganized, and thenceforwards condemnations were rare. The Committees of Public Safety and General Security were remodelled, in virtue of a law that one-fourth of their number should retire at the end of every month and not be re-eligible until another month had elapsed. Somewhat later the Convention declared itself to be the only centre of authority, and executive business was parcelled out among sixteen committees. Most of the representatives on mission were recalled, and many office-holders were displaced. The trial of 130 prisoners sent up from Nantes led to so many terrible disclosures that public feeling turned still more fiercely against the Jacobins'; Carrier himself was condemned and executed; and in November the Jacobin Club was closed. In December 73 members of the Convention who had been imprisoned for protesting against the violence done to the Girondins on the 2nd of June 1793 were allowed to resume their seats, and gave a decisive majority to the anti-Jacobins. Soon afterwards the law of the Maximum was repealed. A decree was passed in February 1795 severing the connexion of church and state and allowing general freedom of worship. At the beginning of March those Girondin deputies who survived came back to their places in the Convention.

But the return to normal life after the Jacobin domination was not destined to be smooth or continuous. Beside the remnant of Terrorists, such as Billaud Varennes an d p . rf/ „ sto Collot d'Herbois, who had joined in the revolt against the As- Robespierre, there were in the Convention at that time sembly three principal factions. The so-called Independents, a Jˆ r such as Barras and Merlin of Douai, who were all Jacobins, but had stood aloof from the internal conflicts of the party, hated Royalism as much as ever and desired the continu- ance of the war which was essential to their power. The Thermi- dorians, the immediate agents in Robespierre's overthrow, such as Tallien, had loudly professed Jacobinism, but wanted to make their peace with the nation. They sought for an understand- ing with the Girondins and Feuillants, and some went so far as to correspond with the exiled princes. Lastly, those members who had never been Jacobins wanted a speedy return to legal government at home and therefore wished for peace abroad. While bent on preserving the civil equality introduced

by the Revolution, many of these men were indifferent as between constitutional monarchy and a republic. The government, mainly Thermidorian, trimmed between' Moderates and Inde- pendents, and for this reason its actions were often inconsistent. The Jacobins were strong enough to carry a decree for keeping the anniversary of the execution of Louis XVI. as a national festival. They could count on the populace, because work was still scarce, food was still dear, and a multi- ˆf* ss tude of Parisians knew not where to find bread. A reaction. committee having recommended the indictment of Collot d'Herbois and three other Terrorists, there ensued the rising of the 12th Germinal (April 1). The mob forced their way into the hall of the Convention and remained there until the National Guards of the wealthy quarters drove them out. By a decree of the Convention the four accused persons were deported to Cayenne, a new mode of dealing with political offenders almost as effective as the guillotine, while less apt to excite

compassion. The National Guard was reorganized so as to exclude the lowest class. The property of persons executed since the ioth of March 1793 was restored to their families. The signs of reaction daily became more unmistakable. Wor- shippers crowded to the churches; the imigrcs returned by thousands; and Anti- Jacobin outbreaks, followed by massacre, took place in the south. The despair of the Jacobins produced a second rising in Paris on the 1st Prairial (May 20). Again the mob invaded the Convention, murdered a deputy named Feraud who attempted to shield the president, and set his head on a pike. The ultra-Jacobin members took possession and embodied their wishes in decrees. Again the hall was cleared by the National Guards, but order was restored in Paris only by employing regular troops, a new precedent in the history of the Revolution. Paris was disarmed, and several leaders of the insurrection were sentenced to death. The Revolutionary Tribunal was suppressed. Toleration was proclaimed for all priests who would declare their obedience to the laws of the state. Royalists began to count upon the restoration of young Louis the Dauphin, otherwise Louis XVII.; but his health had been ruined by persevering cruelty, and he died on the ioth of June. The Thermidorian government also endeavoured to pacify the rebels of the west. Its best adviser, Hoche, recommended an amnesty and the assurance of religious freedom. oiMiie war ˆ n these terms peace was made with the Vendeans at La Jaunaie in February and with the Chouans at La Mabilais in April. Some of the Vendean leaders

persevered in resistance until May, and even after their submission the peace was ill observed, for the Royalists hearkened to the solicitations of the princes and their advisers. In the hope of rekindling the civil war a body of Emigres sailed under cover of the British fleet and landed on the peninsula of Quiberon. They were presently hemmed in by Hoche, and all who could not make their escape to the ships were forced to surrender at discretion (July 20). Nearly 700 were executed by court-martial. Yet the spirit of revolt lingered in the west and broke out time after time. Against the coalition the Republic was gloriously success- ful. (See French Revolutionary Wars.) Inthesummerof 1794 the French invaded Spain at both ends of the Pyrenees, and at the close of the year they made good their footing in Catalonia and Navarre. By the beginning of 1795 the Rhine frontier had been won. Against the king of Sardinia alone they accom- plished little. At sea the French had sustained a severe defeat from Lord Howe, and several of their colonies had been taken by the British. But Great Britain, when the Netherlands were lost, could do'little for her allies. Even before the close of 1794 the king of Prussia retired from any active part in the war, and on the 5th of April 1795 he concluded with France the treaty of Basel, which recognized her occupation of the left bank of the Rhine. The new democratic government which the French had established in Holland purchased peace by surrendering Dutch territory to the south of that river. A treaty of peace between France and Spain followed in July. The grand duke of Tuscany had been admitted to terms in February. The coalition thus fell into ruin and France occupied a more com- manding position than in the proudest days of Louis XIV.

But this greatness was unsure so long as France remained without a stable government. A constitutional committee was c tu . named in April. It resolved that the constitution Hon of the of 1793 was impracticable and proceeded to frame year ill. a new one. The draft was submitted to the Convention ™' in June. In its final shape the constitution established

ory ' a parliamentary system of two houses: a Council of Five Hundred and a Council of Ancients, 250 in number. Members of the Five Hundred were to be at least thirty years of age, members of the Ancients at least forty. The system of indirect election was maintained but universal suffrage was abandoned. A moderate qualification was required for electors in the first degree, a higher one for electors in the second degree. When the 750 persons necessary had been elected they were to choose the Ancients out of their own body. A legislature was to last for three years, and one-third of the members were to be

renewed every year. The Ancients had a suspensory veto, but no initiative in legislation. The executive was to consist of five directors chosen by the Ancients out of a list elected by the Five Hundred. One director was to retire every year. The directors were aided by ministers for the various departments of State. These ministers did not form a council and had no general powers of government. Provision was made for the stringent control of all local authorities by the central govern- ment. Since the separation of powers was still deemed axiomatic, the directors had no voice in legislation or taxation, nor could directors or ministers sit in either house. Freedom of religion, freedom of the press, and freedom of labour were guaranteed. Armed assemblies and even public meetings of political societies were forbidden. Petitions were to be tendered only by individuals or through the public authorities. The constitution was not, however, allowed free play from the beginning. The Convention was so unpopular that, if its members had retired into private life, they would not have been safe and their work might have been undone. It was therefore decreed that two-thirds of the first legislature must be chosen out of the Convention.

When the constitution was submitted to the primary assemblies, most electors held aloof, 1,050,000 voting for and only 5,000 voting against it. On the 23rd of September it insurrec- was declared to be law. Then all the parties which tion of 13 resented the limit upon freedom of election combined Vendi- to rise in Paris. The government entrusted its defence * re ‘ to Barras; but its true man of action was young General Bonaparte, who could dispose of a few thousand regular troops and a powerful artillery. The Parisians were ill-equipped and ill-led, and on the 13th of Vendemiaire (October 5) their insur- rection was quelled almost without loss to the victors. No further resistance was possible. The Convention dissolved itself on the 26th of October.

The feeling of the nation was clearly shown in the elections. Among those who had sat in the Convention the anti- Jacobins were generally preferred. A leader of the old Right _ . was sometimes chosen by many departments at once. par ij es in Owing to this circumstance, 104 places reserved to the new members of the Convention were left unfilled. When tez ,s,a ‘ the persons elected met they had no choice but to co- opt the 104 from the Left oi the Convention. The new one-third were, as a rule, enemies of the Jacobins, but not of the Revolution. Many had been members of the Constituent or of the Legislative Assembly. When the new legislature was complete, the Jacobins had a majority, although a weak one. After the Council of the Ancients had been chosen by lot, it remained to name the directors. For its own security the Left resolved that all five must be old

members of the Convention and regicides. The per- sons chosen were Rewbell, Barras, La Revelliere Lepeaux, Carnot and Letourneur. Rewbell was an able, although unscrupulous, man of action, Barras a dissolute and shameless adventurer, La Revelliere Lepeaux the chief of a new sect, the Theophilan- thropists, and therefore a bitter foe to other religions, especially the Catholic. Severe integrity and memorable public services raised Carnot far above his colleagues, but he was not a states- man and was hampered by his past. Letourneur, a harmless insignificant person, was his admirer and follower. The division in the legislature was reproduced in the Directory. Rewbell, B arras and La Revelliere Lepeaux had a full measure of the Jacobin spirit; Carnot and Letourneur favoured a more temperate policy. With the establishment of the Directory the Revolution might seem closed. The nation only desired rest and the healing of its many wounds. Those who wished to restore Louis XVIII. and the ancien regime and those who would Character have renewed the Reign of Terror were insignificant Directory. in number. The possibility of foreign interference had vanished with the failure of the coalition. Nevertheless the four years of the Directory were a time of arbitrary government and chronic disquiet. The late atrocities had made confidence or goodwill between parties impossible. The same instinct of self-preservation which had led the members of the Convention to claim so large a part in the new legislature and the whole of

the Directory impelled them to keep their predominance. As the majority of Frenchmen wanted to be rid of them, they could achieve their purpose only by extraordinary means. They habitually disregarded the terms of the constitution, and, when the elections went against them, appealed to the sword. They resolved to prolong the war as the best expedient for prolonging their power. They were thus driven to rely upon the armies, which also desired war and were becoming less and less civic in temper. Other reasons influenced them in this direction. The finances had been so thoroughly ruined that the government could not have met its expenses without the plunder and the tribute of foreign countries. If peace were made, the armies would return home and the directors would have to face the exasperation of the rank and file who had lost their livelihood, as well as the ambition of generals who could in a moment brush them aside. Barras and Rewbell were notoriously corrupt themselves and screened corruption in others. The patronage of the directors was ill bestowed, and the general maladministra- tion heightened their unpopularity.

The contitutionai party in the legislature desired a toleration of the nonjuring clergy, the repeal of the laws against the relatives Military °^ tne ^ m ^S r ^ s t ar >d some merciful discrimination toward triumphs the emigre's themselves. The directors baffled all such under the endeavours. On the other hand, the socialist con- B , 'ij C ""rt s P' racv of Babeuf was easily quelled (see Babeuf, ' Francois N.). Little was done to improve the finances, and the assignats continued to fall in value. But the Directory was sustained by the military successes of the year 1 796. Hoche again pacified La Vendee. Bonaparte's victories in Italy more than compensated for the reverses of Jourdan and Moreau in Germany. The king of Sardinia made peace in May, ceding Nice and Savoy to the Republic and consenting to receive French garrisons in his Piedmontese fortresses. By the treaty of San Ildefonso, concluded in August, Spain became the ally of France. In October Naples made peace. In 1797 Bonaparte finished the conquest of northern Italy and forced Austria to make the treaty of Campo Formio (October), whereby the emperor ceded Lombardy and the Austrian Netherlands to the Republic in exchange for Venice and undertook to urge upon the Diet the surrender of the lands beyond the Rhine. Notwithstanding the victory of Cape St Vincent, England was brought into such extreme peril by the mutinies in the fleet that she offered to acknowledge the French conquest of the Netherlands and to restore the French colonies. The selfishness of the three directors threw away this golden opportunity. In March and April the election of a new third of the Councils had been held. It gave a majority to the constitutional party. Among the directors the lot fell on Letourneur to retire, and he was succeeded by Barthelemy, an eminent diplomatist, who allied himself with Carnot. The political disabilities imposed upon the relatives of emigre's were repealed. Priests who would declare their submission to the Republic were restored to their rights as citizens. It seemed likely that peace would be made and that moderate men would gain power.

Barras, Rewbell and La Revelliere-Lepeaux then sought help from the armies. Although Royalists formed but a petty , fraction of the majority, they raised the alarm that of "he 18th '*• was see king to restore monarchy and undo the work Fmctidor. of the Revolution. Hoche, then in command of the army of the Sambre and Meuse, visited Paris and sent troops. Bonaparte sent General Augereau, who executed the coup d'etat of the 18th Fructidor (September 4). The councils were purged, the elections in forty-nine departments were can- celled, and many deputies and other men of note were arrested. Some of them, including Barthelemy, were deported to Cayenne. Carnot made good his escape. The two vacant places in the Directory

were filled by Merlin of Douai and Francois of Neuf- chateau. Then the government frankly returned to Jacobin methods. The law against the relatives of Emigres was re- enacted, and military tribunals were established to condemn Emigres who should return to France. The nonjuring priests were again persecuted. Many hundreds were either sent to Cayenne

or imprisoned in the hulks of Re and Oleron. La Revelliere L6peaux seized the opportunity to propagate his religion. Many churches were turned into Theophilanthropic temples. The government strained its power to secure the recognition of the dScadi as the day of public worship and the non-observance of Sunday. Liberty of the press ceased. Newspapers were confiscated and journalists were deported wholesale. It was proposed to banish from France all members of the old noblesse. Although the proposal was dropped, they were all declared to be foreigners and were forced to obtain naturalization if they would enjoy the rights of other citizens. A formal bankruptcy of the stat e, the cancelling of two-thirds of the interest on the public debt, crowned the misgovernment of this disastrous time.

In the spring of 1798 not only a new third of the legislature had to be chosen, but the places of the members expelled by the revolu- tion of Fructidor had to be filled. The constitutional party had been rendered helpless, and the mass of the electors were in- different. But among the Jacobins themselves there had arisen an extreme party hostile to the directors. With the support of many who were not Jacobins but detested the government, it bade fair to gain a majority. Before the new deputies could take their seats the directors forced through the councils the law of the 22nd Floreal (May n), annulling or perverting the elections in thirty departments and excluding forty-eight deputies by name. Even this coup d'etat did not secure harmony between the executive and the legislature. In the councils the directors were loudly charged with corruption and misgovernment. The retirement of Francois of Neufchateau and the choice of Treilhard as his successor made no difference in the position of the Directory.

While France was thus inwardly convulsed, its rulers were doubly bound to husband the national strength and practise moderation towards other states. Since December 1797 a con- gress had been sitting at Rastadt to regulate the future of Germany. That it should be brought to a successful conclusion was of the utmost import for France. But the directors were driven by self-interest to new adventures abroad. Bonaparte was resolved not to sink into obscurity, and the directors were anxious to keep him as far as possible from Paris; they therefore sanctioned the expedition to Egypt which

deprived the Republic of its best army and most renowned captain. Coveting the treasures of Bern, they sent Brune to invade Switzerland and remodel its constitution; in revenge for the murder of General Duphot, they sent Berthier to invade the papal states and erect the Roman Republic; they occupied and virtually annexed Piedmont. In all these countries they organized such an effective pillage that the French became universally hateful. As the armies were far below the strength required by the policy of un- bounded conquest and rapine, the first permanent law of conscrip- tion was passed in the summer of 1798. The attempt to enforce it caused a revolt of the peasants in the Belgian departments. The priests were made responsible and some eight thousand were condemned in a mass to deportation, although much the greater part escaped by the goodwill of the people. Few soldiers were obtained by the conscription, for the government was as weak as it was tyrannical.

Under these circumstances Nelson's victory of Aboukir (1st of August), which gave the British full command of the Mediter- ranean and secluded Bonaparte in Egypt, was the signal for a second coalition. Naples, Austria, Russia and e . TurkeyjoinedGreatBritainagainst France. Ferdinand coalition. of Naples, rashly taking the offensive before his allies were ready, was defeated and forced to seek a refuge in Sicily. In January 1799 the French occupied Naples and set up the Parthenopean republic. But the consequent dispersion of their weak forces only exposed them to greater peril. At home the Directory was in a most critical position. In the elections of April 1799 a large number of Jacobins gained seats. A little later Rewbell retired. It was imperative to fill his place with a man of ability and influence. The choice fell upon Sieyes, who had kept aloof from office and retained not only his immeasur- able self-conceit but the respect of the public. SieySs felt that

the Directory was bankrupt of reputation, and he intended to be far more than a mere member of a board. He hoped to concen- trate power in his own hands, to bridle the Jacobins, and to remodel the constitution. With the help of B arras he proceeded to rid himself of the other directors. An irregularity having been discovered in Treilhard's election, he retired, and his place was taken by Gohier. Merlin of Douai and La Revelliere Lepeaux were driven to resign in June. They were succeeded by Moulin and Ducos. The three new directors were so insignificant that they could give no trouble, but for

the same reason they were of little service.

Such a government was ill fitted to cope with the dangers then gathering round France. The directors having resolved on the French offensive in Germany, the French crossed the Rhine reverses, early in March, but were defeated by the archduke The Direc Charles at Stockach on the 2 5th. The congress at Ras- ““dterf” ta(it> which had sat for fifteen months without doing anything, broke up in April and the French envoys were murdered by Austrian hussars. In Italy the allies took the offensive with an army partly Austrian, partly Russian under the command of Suvarov. After defeating Moreau at Cassano on the 27th of April, he occupied Milan and Turin. The republics established by the French in Italy were overthrown, and the French army retreating from Naples was defeated by Suvarov on the Trebbia. Thus threatened with invasion on her German and Italian frontiers, France was disabled by anarchy within. The finances were in the last distress; the anti-religious policy of the government kept many departments on the verge of revolt ; and commerce was almost suspended by the decay of roads and the increase of bandits. There was no real political freedom, yet none of the ease or security which enlightened despotism can bestow. The Terrorists lifted their heads in the Council of Five Hundred. A Law of Hostages, which was really a new Law of Suspects, and a progressive income tax showed the temper of the majority. The Jacobin Club was reopened and became once more the focus of disorder. The Jacobin press renewed the licence of Hebert and Marat. Never since the outbreak of the Revolution had the public temper been so gloomy and desponding.

In this extremity Sieyes chose as minister of police the old Terrorist Fouche, who best understood how to deal with his brethren. Fouche closed the Jacobin Club and deported a number of journalists. But like his predecessors Sieyes felt that for the revolution which he meditated he must have the help of a soldier. As his man of action he chose General Joubert, one of the most distinguished among French officers. Joubert was sent to restore the fortune of the war in Italy. At Novi on the 15th of August he encountered Suvarov. He was killed at the outset of the battle and his men were defeated. After this disaster the French held scarcely anything south of the Alps save Genoa. The Russian and Austrian governments then agreed to drive the enemy out of Switzerland and to invade France from the east. At the same time Holland was assailed by the joint forces of Great Britain and Russia. But the second coalition, like the first, was doomed to failure by the narrow views and conflicting interests of its members. The invasion of Switzerland was baffled by want of concert between Austrian? and Russians and by Massena’s victory at Zurich on the 25th and 26th of

September. In October the British and the Russians were forced to evacuate Holland. All immediate danger to France was ended, but the issue of the war was still in suspense. The directors had been forced to recall Bonaparte from Egypt. He anticipated their order and on the 9th of October landed at Frejus.

Dazzled by his victories in the East the public forgot that the' Egyptian expedition was ending in calamity. It received him with an ardour which convinced Sieyes that he was Coup (Tiiat tne indispensable soldier. Bonaparte was ready to act, of the 18th , ^ , , r . j * , . j c- ,i.

Brumaire. Dut at n,s own tlme & n d for his own ends. Since the close of the Convention affairs at home and abroad had been tending more and more surely to the establishment of a military dictatorship. Feeling his powers equal to such an

office he only hesitated about the means of attainment. At first he thought of becoming a director; finally he decided upon a partnership with Sieyes. They resolved to end the actual govern- ment by a fresh coup d'itat. Means were to be taken for removing the councils from Paris to St Cloud, where pressure could more easily be applied. Then the councils would be induced to decree a provisional government by three consuls and the appointment of a commission to revise the constitution. The pretext for this irregular proceeding was to be a vast Jacobin conspiracy. Perhaps the gravest obstacles were to be expected from the army. Of the generals, some, like Jourdan, were honest republicans; others, like Bemadotte, believed themselves capable of governing France. With perfect subtlety Bonaparte worked on the feelings of all and kept his own intentions secret.

On the morning of the i8thBrumaire (November 9) the Ancients, to whom that power belonged, decreed the transference of the councils to St Cloud. Of the directors, Sieyes and his friend Ducos had arranged to resign; Barras was cajoled and bribed into resigning; Gohier and Moulins, who were intractable, found themselves imprisoned in the Luxemburg palace and helpless. So far all had gone well. But when the councils met at St Cloud on the following day, the majority of the Five Hundred showed themselves bent on resistance, and even the Ancients gave signs of wavering. When Bonaparte addressed the Ancients, he lost his self-possession and made a deplorable figure. When he appeared among the Five Hundred, they fell upon him with such fury that he was hardly rescued by his officers. A motion to outlaw him was only baffled by the audacity of the president, his brother Lucien. At length driven to undisguised violence, he sent in his grenadiers, who turned out the deputies. Then the Ancients passed a decree which

adjourned the Councils for three months, appointed Bonaparte, Sieyes and Ducos provisional consuls, and named the Legislative Commission. Some tractable members of the Five Hundred were afterwards swept up and served to give these measures the confirmation of their House. Thus the Directory and the Councils came to their unlamented end. A shabby compound of brute force and imposture, the 18th Brumaire was nevertheless condoned, nay applauded, by the French nation. Weary of revolution, men sought no more than to be wisely and firmly governed.

Although the French Revolution seemed to contemporaries a total break in the history of France, it was really far otherwise. Its results were momentous and durable in proportion Genera i as they were the outcome of causes which had been estimate ol working long. In France there had been no historic the Revot- preparation for political freedom. The desire for such utlon – freedom was in the main confined to the upper classes. During the Revolution it was constantly baffled. No Assembly after the states-general was freely elected and none deliberated in freedom. After the Revolution Bonaparte established a mon- archy even more absolute than the monarchy of Louis XIV. But the desire for uniformity, for equality and for what may be termed civil liberty was the growth of ages, had been in many respects nurtured by the action of the crown and its ministers, and had become intense and general. Accordingly it determined the principal results of the Revolution. Uniformity of laws and institutions was enforced throughout France. The legal privileges formerly distinguishing different classes were sup- pressed. An obsolete and burthensome agrarian system was abolished. A number of large estates belonging to the crown, the clergy and the nobles were broken up and sold at nominal prices to men of the middle or lower class. The new jurisprudence encouraged the multiplication of small properties. The new fiscal system taxed men according to their means and raised no obstacle to commerce within the national boundaries. Every calling and profession was made free to all French citizens, and in the public service the principle of an open career for talent was adopted. Religious disabilities vanished, and there was well-nigh complete liberty of thought. It was because Napoleon gave a practical form to these achievements of the Revolution and ensured the public order necessary to their continuance that

the majority of Frenchmen endured so long the fearful sacrifices

which his policy exacted.

That a revolution largely inspired by generous and humane feeling should have issued in such havoc and such crimes is a paradox which astounded spectators and still perplexes the historian. Something in the cruelty of the French Revolution may be ascribed to national character. From the time when Burgundians and Armagnacs strove for dominion down to the last insurrection of Paris, civil discord in France has always been cruel. More, however, was due to the total dissolution of society which followed the meeting of the states-general. In the course of the Revolution we can discover no well-organized party, no governing mind. Mirabeau had the stuff of a great statesman, and Danton was capable of statesmanship. But these men were not followed or obeyed save by accident or for a moment. Those who seemed to govern were usually the sport of chance, often the victims of their colleagues. Neither Royalists nor Feuillants nor Girondins had the instinct of government. In the chaotic state of France all ferocious and destructive passions found ample scope. The same conditions explain the triumph of the Jacobins. Devoid of wisdom and virtue in the highest sense, they at least understood how power might be seized and kept. The Reign of Terror was the expedient of a party which knew its weakness and unpopularity. It was not necessary either to secure the lasting benefits of the Revolution or to save France from dis- memberment; for nine Frenchmen out of ten were agreed on both of these points and were ready to lay down their lives for the national cause.

In the history of the French Revolution the influence which it exerted upon the surrounding countries demands peculiar attention. The French professed to act upon principles of universal authority, and from an early date they began to seek converts outside their own limits. The effect was slight upon England, which had already secured most of the reforms desired by the French, and upon Spain, where the bulk of the people were entirely submissive to church and king. But in the Nether- lands, in western Germany and in northern Italy, countries which had attained a degree of civilization resembling that of France, where the middle and lower classes had grievances and aspirations not very different from those of the French, the effect was pro- found. Fear of revolution at home was one of the motives which led continental sovereigns to attack revolution in France. Their incoherent efforts only confirmed the Jacobin supremacy. Wherever the victorious French extended their dominion, they remodelled institutions in the French manner. Their sway proved so oppressive that the very classes which had welcomed them with most fervour soon came to long for their expulsion. But revolutionary ideas kept

their charm. ■ Under Napoleon the essential part of the changes made by the Republic was preserved in these countries also. Moreover the effacement of old boundaries, the overthrow of ancestral governments, and the invocation, however hollow, of the sovereignty of the people, awoke national feeling which had slumbered long and prepared the struggle for national union and independence in the 19th century.

See also France, sections History and Law and Institutions. For the leading figures in the Revolution see their biographies under separate headings. Particular phases, facts, and institutions of the period are also separately dealt with, e.g. Assignats, Con- vention', The National, Jacobins.

Bibliography. — The MS. authorities for the history of the French Revolution are exceedingly copious. The largest collection is in the Archives Nationales in Paris, but an immense number of documents are to be found in other collections in Paris and the provinces. The printed materials are so abundant and varied that any brief notice of them must be imperfect.

The condition of France and the state of public opinion at the beginning of the Revolution may be studied in the printed collections of Cahiers. The Cahiers were the statements of grievances drawn up for the guidance of deputies to the States-General by those who had elected them. In every bailliage and senechaussee each estate drew up its own cahier and the cahiers of the Third Estate were con- densed from separate cahiers drawn up by each parish in the district. Thus the cahiers of the Third Estate number many thousands, the greater part of which have not yet been printed. Among the collec- tions printed we may mention Les Elections et les cahiers de Paris

en 1789, by C. L. Chassin (4 vols., Paris, 1888) ; Cahiers de plaintes et doleances des paroisses de la province de Maine, by A. Bellee and V. Duchemin (4 vols., Le Mans, 1881-1893); Cahiers de doleances de 1789 dans le departement du Pas-de-Calais, by H. Loriquet (2 vols., Arras, 1891); Cahiers des paroisses et communautes du bailliage d'Autun, by A. Charmasse (Autun, 1895). New collections are printed from time to time. A more general collection of cahiers than any above named is given in vols, i.vi. of the Archives parle mentaires. The cahiers must not be read in a spirit of absolute faith, as they were influenced by certain models circulated at the time of the elections and by popular excitement, but they remain an author- ity of the utmost value and a mine of information as to old France. Reference should also be made to the works of travellers who visited France at the outbreak of the Revolution. Among these Arthur Young's Travels

in France during the years 1787, 1788 and 1789 (2 vols., Bury St Edmunds, 1792-1794) are peculiarly instructive.

For the history of the Assemblies during the Revolution a main authority is their Proces verbaux or Journals; those of the Constituent Assembly in 75 vols., those of the Legislative Assembly in 16 vols.; those of the Convention in 74 vols., and those of the Councils under the Directory in 99 vols. See also the Archives parle- mentaires edited by J. Mavidal and E. Laurent (Paris, 1867, and the following years) ; the Histoire parlementaire de la Revolution, by P. J. B. Buchez and P. C. Roux (Paris, 1838), and the Histoire de la Revolution par deux amis de la liberie (Paris, 1792-1803).

The newspapers, of which a few have been mentioned in the text, were numerous. They are useful chiefly as illustrating the ideas and passions of the time, for they give comparatively little information as to facts and that little is peculiarly inaccurate. The ablest of the Royalist journals was Mallet du Pan's Mercure de France. Pamphlets of the Revolution period number many thousands. Such pamphlets as Mounier's Nouvelles Observations sur les S.tats- Generaux de France and Sieyes's Qu'est-ce que le Tiers £.tat had a notable influence on opinion. The richest collections of Revolution pamphlets are in the Bibliotheque Nationale of Paris and in the British Museum.

The contemporary memoirs, &c, already published are numerous and fresh ones are always coming forth. A few of the best known and most useful are, for the Constituent Assembly, the memoirs of Bailly, of Ferrieres, of Malouet. The Correspondence of Mirabeau with the Count de la Marck, edited by Bacourt (3 vols., Paris, 1851), is especially valuable. Dumont's Recollections of Mirabeau and the Diary and Letters of Gouverneur Morris give the impressions of foreigners with peculiar advantages for observing. For the Legis- lative Assembly and the Convention the memoirs of Madame Roland, of Bertrand de Molleville, of Barbaroux, of Buzot, of Louvet, of Dumouriez are instructive. For the Directory the memoirs of Barras, of La Revelliere Lepeaux and of Thibaudeau deserve mention. The memoirs of Lafayette are useful. Those of Talleyrand are singularly barren, the result, no doubt, of deliberate suppression. The memoirs of the marquise de La Rochejacquelein are important for the war of La Vendee. The most notable Jacobins have seldom left memoirs, but the works of Robespierre and St Just enable us to form a clearer conception of the authors. The correspondence of the count of Mercy-Argenteau, the imperial ambassador, with Joseph II. and Kaunitz, and the correspondence of Mallet du Pan with the court of Vienna, are also instructive. But the contemporary literature of the French Revolution

requires to be read in an unusually critical spirit. At no other historical crisis have passions been more fiercely excited; at none have shameless disregard of truth and blind credulity been more common.

Among later works based on these original materials the first place belongs to general histories. In French Louis Blanc's Histoire de la Revolution (12 vols., Paris, 1 847-1862), and Michelet's Histoire de la Revolution Francaise (9 vols., Paris, 1847-1853), are the most elaborate of the older works. Michelet's book is marked by great eloquence and power. In H. Taine's Origines de la France contem poraine (Paris, 1876-1894) three volumes are devoted to the Revolution. They show exceptional talent and industry, but their value is impaired by the spirit of system and by strong prepossessions. F. A. M. Mignet's Histoire de la Revolution Frangaise (2 vols., Paris, 1861), short and devoid of literary charm, has the merits of learning and judgment and is still useful. F. A. Aulard's Histoire politique de la Revolution Frangaise (Paris, 1901) is a most valuable precis of political history, based on deep knowledge and lucidly set forth, although not free from bias. The volume on the Revolution in Lavisse and Rambaud's Histoire generate de V Europe (Paris, 1896) is the work of distinguished scholars using the latest information. In English, general histories of the Revolution are few. Carlyle's famous work, published in 1837, is more of a prose epic than a history, omitting all detail which would not heighten the imaginative effect and tinged by all the favourite ideas of the author. Some fifty years later H. M. Stephens published the first (1886) and second (1892) volumes of a History of the French Revolution. They are marked by solid learning and contain much information. Volume viii. of the Cambridge Modern History, published in 1904, contains a general survey of the Revolution.

The most notable German work is H. von Sybel's Geschichte der Revolutionszeit (5 vols., Stuttgart, 1853-1879). It is strongest in

those parts whicb relate to international affairs and foreign policy. There is an English translation.

None of the general histories of the Revolution above named is really satisfactory. The immense mass of material has not yet been thoroughly sifted; and the passions of that age still disturb the judgment of the historian. More successful have been the attempts to

treat particular aspects of the Revolution.

The foreign relations of France during the Revolution have been most ably unravelled by A. Sorel in L'Europe et la Revolution Fran- caise (8 vols., Paris, 1885-1904) carrying the story down to the settlement of Vienna. Five volumes cover the years 1 789-1 799.

The financial history of the Revolution has been traced by C. Gomel, Histoire financiere de I'Assemblee Constituante (2 vols., Paris, 1897), and R. Stourm, Les Finances de I'Ancien Regime et de la Revolution (2 vols., Paris, 1885).

The relations of Church and State are sketched in E. Pressense's L'lZglise et la Revolution Francaise (Paris, 1889).

The general legislation of the period has been discussed by Ph. Sagnac, La Legislation civile de la Revolution Francaise (Paris, 1898). The best work upon the social life of the period is the Histoire de la societe francaise sous la Revolution, by E. and J. de Goncourt (Paris, 1889). For military history see A. Duruy, L'Armee royale en 1789 (Paris, 1888) ; E. de Hauterive, L'Armee sous la Revolution, 1789ˆ-1794 (Paris, 1894) ; A. Chuquet, Les Guerres de la Revolution (Paris, 1886, &c). See also the memoirs and biographies of the distinguished soldiers of the Republic and Empire, too numerous for citation here.

Modern lives of the principal actors in the Revolution are numer- ous. Among the most important are Memoires de Mirabeau, by L. de Montigny (Paris, J834) ; Les Mirabeau, by L. de Lomenie (Paris, 1889-1891); H. L. de Lanzac de Laborie's Jean Joseph Mounier (Paris, 1889); B. Mallet's Mallei du Pan and the French Revolution (London, 1902) ; Robinet's Danton (Paris, 1889) ; Hamel's Histoire de Robespierre (Paris, 1865-1867) and Histoire de St- Just (2 vols., Brussels, i860); A. Bigeon, Sieyes (Paris, 1893); Memoirs of Carnot, by his son (2 vols., Paris, 1861-1864).

For fuller information see M. Tourneux, Les Sources biblio- graphiques de Vhistoire de la Revolution Francaise (Paris, 1898, etc.), and Bibliographie de Vhistoire de Paris pendant la Revolution (Paris, 1890, etc.). (F. C. M.)

French Republican Calendar. — Among the changes made during the Revolution was the substitution of a naw calendar, usually called the revolutionary or republican calendar, for the prevailing Gregorian system. Something of the sort had been suggested in 1785 by a certain

Riboud, and a definite scheme had been promulgated by Pierre Sylvain Marechal (1750-1803) in his Almanack des honnetes gens (1788). The objects which the advocates of a new calendar had in view were to strike a

blow at the clergy and to divorce all calculations of time from the Christian associations with which they were loaded, in short, to abolish the Christian year; and enthusiasts were already speaking of ” the first year of liberty ” and ” the first year of the republic ” when the national convention took up the matter in 1793. The business of drawing up the new calendar was en- trusted to the president of the committee of public instruction, Charles Gilbert Romme (1750-1795), who was aided in the work by the mathematicians Gaspard Monge and Joseph Louis Lagrange, the poet Fabre d’Eglantine and others. The result of their labours was submitted to the convention in September; it was accepted, and the new calendar became law on the 5th of October 1793. The new arrangement was regarded as begin- ning on the 22nd of September 1792, this day being chosen because on it the republic was proclaimed and because it was in this year the day of the autumnal equinox.

By the new calendar the year of 365 days was divided into twelve months of thirty days each, every month being divided into three periods of ten days, each of which were called decades, and the tenth, or last, day of each decade being a day of rest. It was also proposed to divide the day on the decimal system, but this arrangement was found to be highly inconvenient and it was never put into practice. Five days of the 365 still re- mained to be dealt with, and these were set aside for national festivals and holidays and were called Sans-culotlides. They were to fall at the end of the year, i.e. on the five days between the 17 th and the 21st of September inclusive, and were called the festivals of virtue, of genius, of labour, of opinion and of rewards. A similar course was adopted with regard to the extra day which occurred once in every four years, but the first of these was to fall in the year III., i.e. in 1795, and not in 1796, the leap year in the Gregorian calendar. This day was set apart for the festival of the Revolution and was to be the last of the Sans-culottides. Each period of four years was to be called a Franciade.

Some discussion took place about the nomenclature of the new divisions of time. Eventually this work was entrusted to Fabre d'Eglantine, who gave to each month a name taken from some seasonal event therein. Beginning with the new year on the 22nd of September the autumn months were Vend&miaire, the month of vintage, Brumaire, the months of fog, and Frimaire,

An II.

An III.

An IV.

An V.

An VI

An VII.

An VIII.

An IX.

1793-

1794-

1794-1795-

1 795-1 796.

1 796-1 797.

1 797-1 798.

1 798-1 799.

1 799-1 800.

1800-1801.

l Vendemiaire

22 Sept. 1793

22 Sept. 1794

23 Sept. 1795

22 Sept. 1796

22 Sept.

‘797

22 Sept. 1798

23 Sept. 1799

23 Sept. 1800

1 Brumaire .

22 Oct. ,,

22 Oct. ,,

23 Oct.

22 Oct. ,,

22 Oct.

Jl

22 Oct. „

23 Oct.

23 Oct.

1 Frimaire .

21 Nov. ,,

21 Nov. ,,

22 Nov. ,,

21 Nov. ,,

21 Nov.

21 Nov. ,,

22 Nov. ,,

22 Nov. ,,

1 Nivose

21 Dec. ,,

21 Dec. ,,

22 Dec. ,,

21 Dec. ,,

21 Dec.

21 Dec. ,,

22 Dec. „

22 Dec. „

1 Pluviose .

20 Janv. 1794

20 Janv. 1795

21 Janv. 1796

20 Janv. 1797

20 Janv.

1798

20 Janv. 1799

21 Janv. 1800

21 Janv. 1801

1 Vent6se

19 Fevr. ,,

19 Fevr. ,,

20 Fevr. ,,

19 Fevr. ,,

19 Fev.

19 Fev.

20 Fev. ,,

20 Fev. ,,

1 Germinal .

21 Mars ,,

21 Mars ,,

21 Mars ,,

21 Mars ,,

21 Mars

21 Mars ,,

22 Mars ,,

22 Mars „

1 Floreal

20 Avr. ,,

20 Avr. ,,

20 Avr. ,,

20 Avr. ,,

20 Avr.

20 Avr. ,,

21 Avr. ,,

21 Avr. „

1 Prairial

20 Mai ,,

20 Mai „

20 Mai ,,

20 Mai ,,

20 Mai

M

20 Mai ,,

21 Mai „

21 Mai ,,

1 Messidor .

I9juin

19 Juin

19 Juin

19 Juin ,,

19 Juin

19 Juin „

20 Juin „

20 Juin ,,

1 Thermidor

19 Juil.

19 Juil.

19 Juil.

19 Juil. ,,

19 Juil.

19 Juil. ,,

20 Juil. ,,

20 Juil.

1 Fructidor .

18 Aout „

18 Aout „

18 Aout „

18 AoQt ,,

18 Aout

”

18 Aout „

19 Aout „

19 Aout „

I Sans-culottides

6

17 Sept. 1794

17 Sept. 1795

22 ,, ,,

17 Sept. 1796

17 Sept. 1797

17 Sept.

1798

17 Sept. 1799

22 ,,

18 Sept. 1800

18 Sept. 1801

AnX.

An XI.

An XII.

An XIII.

An XIV.

1801-1802.

1802-1803.

1 803-1 804

1 804- 1 805.

1805.

1 Vcndemiair

e

23 Septembre 1801

23 Septembre 1802

24 Septembre

1803

23 Septembre 1804

23 Septembre 1805

1 Brumaire

23 Octobre ,,

23 Octobre „

24 Octobre

23 Octobre ,,

23 Octobre ,,

1 Frimaire .

22 Novembre ,,

22 Novembre ,,

23 Novembre

M

22 Novembre • „

22 Novembre ,,

1 Niv8se .

22 Decembre ,,

.22 Decembre „

23 Decembre

”

22 Decembre ,,

22 Decembre ,,

1 PIuvi6se .

21 Janvier 1802

21 Janvier 1803

22 Janvier

1804

21 Janvier 1805

1 Ventose .

20 Fevrier ,,

20 Fevrier , ,

21 Fevrier

20 Fevrier ,,

1 Germinal.

22 Mars „

22 Mars ,,

22 Mars

22 Mars ,,

1 Floreal .

21 Avril „

21 Avril „

21 Avril

21 Avril ,,

1 Prairial .

21 Mai ,,

21 Mai ,,

21 Mai

21 Mai ,,

1 Messidor

20 Juin „

20 Juin ,, 20 Juillet ,,

20 Juin

20 Juin „

1 Thermidor

20 Juillat „

20 Juilllet

”

20 Juillet ,,

1 Fructidor

19 Aout ,,

19 Aout „

19 Aout

..

19 Aout „

1 Sans-culottides .

6

18 Septembre 1802

18 Septembre 1803

23

18 Septembre

1804

18 Septembre 1805

the month of frost. The winter months were Nivdse, the snowy, Pluvidse, the rainy, and Venldse, the windy month; then followed the spring months, Germinal, the month of buds, Florid, the month of flowers, and Prairid, the month of meadows ; and lastly the summer months, Messidor, the month of reaping, Thermidor, the month of heat, and Fructidor, the month of fruit. To the days Fabre d’Eglantine

gave names which retained the idea of their numerical order, calling them Primedi, Duodi, &c, the last day of the ten, the day of rest, being named Decadi. The new order was soon in force in France and the new method was employed in all public documents, but it did not last many years. In September 1805 it was decided to restore the Gregorian calendar, and the republican one was officially discontinued on the 1 st of January 1806.

It will easily be seen that the connecting link between the old and the new calendars is very slight indeed and that the expression of a date in one calendar in terms of the other is a matter of some diffi- culty. A simple method of doing this, however, is afforded by the table on the preceding page, which is taken from the article by J. Dubourdieu in La Grande Encyclopedic

Thus Robespierre was executed on 10 Thermidor An II., i.e. the 28th of July 1794. The insurrection of 12 Germinal An III. took place on the 1st of April 1795. The famous 18 Brumaire An VIII. fell on the 9th of November 1799, and the coup d'etat of 18 Fructidor An V. on the 4th of September 1797.

For a complete concordance of the Gregorian and the republican calendars see Stokvis, Manuel d'histoire, tome iii. (Leiden, 1889); also G. Villain, " Le Calendrier republicain," in La Revolution Francaise for 1884-1885. (A. W. H.*)

FRENCH REVOLUTIONARY WARS (1 792-1 800), the general name for the first part of the series of French wars which went on continuously, except for some local and temporary cessations of hostilities, from the declaration of war against Britain in 1792 to the final overthrow of Napoleon in 1815. The most important of these cessations — viz. the peace of 1801-1803 — closes the " Revolutionary " and opens the " Napoleonic " era of land warfare, for which see Napoleonic Campaigns, Peninsular War and Waterloo Campaign. The naval history of the period is divided somewhat differently; the first period, treated below, is 1792-1799; for the second, 1799-1815, see Napoleonic Campaigns.

France declared war on Austria on the 20th of April 1792. But Prussia and other powers had allied themselves with Austria in view of war, and it was against a coalition and not a single power that France found herself pitted, at the moment when the " emigration," the ferment of the Revolution, and want of material and of funds had thoroughly disorganized her army. The first engagements were singularly disgraceful. Near Lille the French soldiers fled at sight of

the Austrian outposts, crying Nous sommes Irakis, and murdered their general (April 29). The commanders-in-chief of the armies that were formed became one after another ” suspects “; and before a serious action had been fought, the three armies of Rochambeau, Lafayette and Liickner had resolved themselves into two commanded by Dumouriez and Kellermann. Thus the disciplined soldiers of the Allies had apparently good reason to consider the campaign before them a military promenade. On the Rhine, a combined army of Prussians, Austrians, Hessians and emigris under the duke of Brunswick was formed for the invasion of France, flanked by two smaller armies on its right and left, all three being under 1 lie supreme command of the king of Prussia. In the Netherlands l he Austrians were to besiege Lille, and in the south the Pied- montese also took the field. The first step, taken against Brunswick’s advice, was the issue (July 25) of a proclamation \vhich, couched in terms in the last degree offensive to the French nation, generated the spirit that was afterwards to find ex- pression in the ” armed nation ” of 1793-4, and sealed the fate of Louis XVI. The duke, who was a model sovereign in his own principality, sympathized with the constitutional side of the Revolution, while as a soldier he had no confidence in the success of the enterprise. After completing its preparations in the leisurely manner of the previous generation, his army crossed the French frontier on the 19th of August. Longwy was easily captured; and the Allies slowly marched on to Verdun, which

was more indefensible even than Longwy. The commandant, Colonel Beaurepaire, shot himself in despair, and the place surrendered on the 3rd of September. Brunswick now began his march on Paris and approached the defiles of the Argonne. But Dumouriez, who had been training his raw troops at Valenciennes in constant small engagements, with the purpose of invading Belgium, now threw himself into the Argonne by a rapid and daring flank march, almost under the eyes of the Prussian advanced guard, and barred the Paris road, summoning Kellermann to his assistance from Metz. The latter moved but slowly, and before he arrived the northern part of the line of defence had been forced. Dumouriez, undaunted, changed front so as to face north, with his right wing on the Argonne and his left stretching towards Chalons, and in this position Kellermann joined him at St Menehould on the 19th of September.

Brunswick meanwhile had passed the northern defiles and had then swung round to cut off Dumouriez from Chalons. At the moment when the Prussian manoeuvre was nearly completed, Kellermann, commariding in Dumouriez’s my ‘

momentary absence, advanced his left wing and took up a posi- tion between St Menehould and Valmy. The result was the world-renowned Cannonade of Valmy (September 20, 1792). Kellermann's infantry, nearly all regulars, stood steady. The French artillery justified its reputation as the best in Europe, and eventually, with no more than a half-hearted infantry attack, the duke broke off the action and retired. This trivial engagement was the turning-point of the campaign and a land- mark in the world's history. Ten days later, without firing another shot, the invading army began its retreat. Dumouriez's pursuit was not seriously pressed; he occupied himself chiefly with a series of subtle and curious negotiations which, with the general advance of the French troops, brought about the com- plete withdrawal of the enemy from the soil of France.

Meanwhile, the French forces in the south had driven back the Piedmontese and had conquered Savoy and Nice. Another French success was the daring expedition into German}' made by Custine from Alsace. Custine captured Mainz emappes – itself on the 21st of October and penetrated as far as Frankfurt. In the north the Austrian siege of Lille had completely failed, and Dumouriez now resumed his interrupted scheme for the invasion of the Netherlands. His forward movement, made as it was late in the season, surprised the Austrians, and he disposed of enormously superior forces. On the 6th of November he won the first great victory of the war at Jemappes near Mons and, this time advancing boldly, he overran the whole country from Namur to Antwerp within a month.

Such was the prelude of what is called the " Great War " in England and the " Epopee " in France. Before going further it is necessary to summarize the special features of the French army — in leadership, discipline, tactics, organization and move- ment — which made these campaigns the archetype of modern warfare.

At the outbreak of the Revolution the French army, like other armies in Europe, was a " voluntary " long-service army, augmented to some extent in war by drafts of militia.

One of the first problems that the Constituent Assembly took upon itself to solve was the nationalization of this strictly royal and professional force, and as early as October 1789 the word _. p . " Conscription " was heard in its debates. But it was ' " c decreed nevertheless that free enlistment alone befitted /ypˆl'y 70.} a free people, and the regular army was left unaltered in form. However, a National Guard came into existence side by side with it, and the history of French army organization in the next few years is the

history of the fusion of these two elements. The first step, as regards the regular army, was the abolition of proprietary rights, the serial numbering of regiments throughout the Army, and the disbandment of the Maison du roi. The next was the promotion of deserving soldiers to fill the numerous vacancies caused by the emigration. Along with these, however, there came to the surface many incompetent leaders, favourites in the political clubs of Paris, &c, and the old strict discipline became impossible owing to the frequent intervention of the civil authorities in matters affecting it, the denunciation of generals, and especially the wild words and wild behaviour of ” Volunteer ” (embodied national guard) battalions.

When war came, it was soon found that the regulars had fallen too low in numbers and that the national guard demanded too high

pay, to admit of developing the expected field strength. Arms, discipline, training alike were wanting to the new levies, and the repulse of Brunswick was effected by manoeuvring and fighting on the old lines and chiefly with the old army. The cry of La patrie en danger, after giving, at the crisis, the highest moral support to the troops in the front, dwindled away after victory, and the French government contented itself with the half-measures that had, apparently, sufficed to avert the peril. More, when the armies went into winter quarters, the Volunteers claimed leave of absence and went home.

But in the spring of 1793, confronted by a far more serious peril, the government took strong measures. Universal liability was asserted, and passed into law. Yet even now whole classes obtained exemption and the right of substitution as usual forced the burden of service on the poorer classes, so that of the 100,000 men called on for the regular army and 200,000 for the Volunteers, only some 180,000 were actually raised. Desertion, generally regarded as the curse of professional armies, became a conspicuous vice of the defenders of the Republic, except at moments when a supreme crisis called forth supreme devotion — moments which naturally were more or less prolonged in proportion to the gravity of the situation. Thus, while it almost disappeared in the great effort of 1 793-1 794, when the armies sustained bloody reverses in distant wars of conquest, as in 1799, it promptly rose again to an alarming height.

While this unsatisfactory general levy was being made, defeats, defections and invasion in earnest came in rapid succession, and to Universal ˆ ea ‘ w ‘ t ˆ 1 *ˆ e a lmost desperate emergency, the ruthless service Committee of Public Safety sprang into existence. “The otthe ‘ e yy ‘ s to ˆ ur ” versa l- Unmarried citizens and widowers

“AmaU without children of ages from 18 to 25 are to be called up gam.” first,” and 450,000 recruits were immediately obtained by this single act. The complete amalgamation of the regular and volunteer units was decided upon. The white uniforms of the line gave place to the blue of the National Guard in all arms and services. The titles of officers were changed, and in fact every relic of the old regime, save the inherited solidity of the old regular battalions, was swept away. This rough combination of line and volunteers therefore — for the ‘ Amalgam ” was not officially begun until 1794 — must be understood when we refer to the French army of Hondschoote or of Wattignies. It contained, by reason of its universality and also because men were better off in the army than out of it — if they stayed at home they went in daily fear of denunciation and the guillotine — the best elements of the French nation. To some extent at any rate the political arrivistes had been weeded out, and though the informer, here as elsewhere, struck unseen blows, the mass of the army gradually evolved its true leaders and obeyed them. It was, therefore, an army of individual citizen-soldiers of the best type, welded by the enemy’s fire, and conscious of its own solidarity in the midst of the Revolutionary chaos.

After 1794 the system underwent but little radical change until the end of the Revolutionary period. Its regiments grew in military value month by month and attained their highest level in the great campaign of 1796. In 1795 the French forces (now all styled National Guard) consisted of 531,000 men, of whom 323,000 were infantry (100 3-battalion demi-brigades), 97,000 light infantry (30 demi-brigades), 29,000 artillery, 20,000 engineers and 59,000 cavalry. This novel army developed novel fighting methods, above all in the infantry. This arm had just received a new drill- book, as the result of a prolonged controversy (see Infantry) between the advocatesof ” lines ” and ” columns,” and this drill-book, while retaining the principle of the line, set controversy at rest by admitting battalion columns of attack, and movements at the ” quick ‘ (100-120 paces to the minute) instead of at the ” slow ” march (76). On these two prescriptions, ignoring the rest, the practical troop leaders built up the new tactics little by little, and almost un- consciously. The process of evolution cannot be stated exactly, for the officers learned to use and even to invent now one form, now another, according to ground and

circumstances. But the main stream of progress is easily distinguishable.

The earlier battles were fought more or less according to the drill-book, partly in line for fire action, partly in column for the bayonet Tactics attack. But line movements required the most accurate drill, and what was attainable after years of practice with regulars moving at the slow march was wholly impossible for new levies moving at 120 paces to the minute. When, therefore, the line marched off, it broke up into a shapeless swarm of individual firers. This was the form, if form it can be called, of the tactics of 1793 — " horde-tactics," as they have quite justly been called — and a few such experiences as that of Hondschoote sufficed to suggest the need of a remedy. This was found in keeping as many troops as possible out of the firing line. From 1794 onwards the latter becomes, thinner and thinner, and instead of the drill-book form, with half the army firing in line (practically in hordes) and the other half in support in columns, we find the rear lines becoming more and more important and numerous, till at last the fire of the leading line (skirmishers) becomes insignificant, and the decision rests with the bayonets of the closed masses in rear. Indeed, the latter often used mixed line and column formations, which enabled them not only to charge, but to fire close-order volleys — absolutely regardless of the skirmishers in front. In other words, the bravest and coolest marksmen were let

loose to do what damage they could, and the rest, massed in close order, were kept under the control of their officers and only exposed to the dissolving influence of the fight when the moment arrived to deliver, whether by fire or by shock, the decisive blow.

The cavalry underwent little change in its organization and tactics, which remained as in the drill-books founded on Frederick's practice. But except in the case of the hussars, who were chiefly j, , Alsatians, it was thoroughly disorganized by the emigra- aˆiIˆ tion or execution of the nobles who had officered it, and B -jr_2™ for long it was incapable of facing the hostile squadrons in the open. Still, its elements were good, it was fairly well trained, and mounted, and not overwhelmed with national guard drafts, and like the other arms it duly evolved and obeyed new leaders.

In artillery matters this period, 1 792-1 796, marks an important progress, due above all to Gribeauval {a. v.) and the two du Teils, Jean Pierre (1722-1794) and Jean (1733-1820) who were Napoleon's instructors. The change was chiefly in organization and equipment — the great tactical development of the arm was not to come until the

time of the Grande Armee — and may be summarized as the transition from battalion guns and reserve artillery to batteries of ” horse and field,”

The engineers, like the artillery, were a technical and non-noble corps. They escaped, therefore, most of the troubles of the Revolu- tion — indeed the artillery and engineer officers, Napoleon and Carnot amongst them, were conspicuous in the political regeneration of France — and the engineers carried on with little change the traditions of VaubanandCormontaingne(see Fortification and Siegec raft). Both these corps were, after the Revolution as before it, the best in Europe, other armies admitting their superiority and following their precepts.

In all this the army naturally outgrew its old ” linear ” organiza- tion. Temporary divisions, called for by momentary necessities, placed under selected generals and released from the detailed super- vision of the commander-in-chief, soon became, though in an irregular and haphazard fashion, permanent organisms, and by 1796 the divisional system had become practically universal. The next step, as the armies became fewer and larger, was the temporary grouping of divisions; this too in turn became permanent, and bequeathed to the military world of to-day both the army corps and the capable, self-reliant and enterprising subordinate generals, for whom the old linear organization had no room.

This subdivision of forces was intimately connected with the general method of making war adopted by the ” New French,” as their enemies called them. What astonished the Allies most of all was the number and the velocity of the Repub- _,. . . licans. These improvised armies had in fact nothing to . ® f ” delay them. Tents were unprocurable for want of money, nf’S^^rn untransportable for want of the enormous number of war tare wagons that would have been required, and also un- necessary, for the discomfort that would have caused wholesale desertion in professional armies was cheerfully borne by the men of 1 793-1 794. Supplies for armies of then unheard-of size could not be carried in convoys, and the French soon became familiar with ” living on the country.” Thus 1793 saw the birth of the modern system of war — rapidity of movement, full development of national strength, bivouacs and requisitions, and force, as against cautious manoeuvring, small professional armies, tents and full rations, and chicane. The first represented the decision-compelling spirit, the second the spirit of risking little to gain a little. Above all, the decision-compelling spirit was reinforced by the presence of the emissaries of the Committee of Public Safety, the ” representatives on

mission ” who practically controlled the guillotine. There were civil officials with the armies of the Allies too, but their chief function was not to infuse desperate energy into the military operations, but to see that the troops did not maltreat civilians. Such were the fundamental principles of the ” New French ” method of warfare, from which the warfare of to-day descends in the direct line. But it was only after a painful period of trial and error, of waste and misdirection, that it became possible for the French army to have evolved Napoleon, and for Napoleon to evolve the principles and methods of war that conformed to and profited to the utmost by the new conditions.

Those’ campaigns and battles of this army which are described in detail in the present article have been selected, some on account of their historical importance— as producing great results; others from their military interest — as typifying and illustrating the nature of the revolution undergone by the art of war in these heroic years.

Campaigns in the Netherlands

The year 1793 opened disastrously for the Republic. As a consequence of Jemappes and Valmy, France had taken the offensive both in Belgium, which had been overrun by Dumouriez’s army, and in the Rhine countries, where Custine had preached the new gospel to the sentimental and half- discontented Hessians and Mainzers. But the execution of Louis XVI. raised up a host of new and determined enemies. England, Holland, Austria, Prussia, Spain and Sardinia promptly

Afeer- winden.

formed the First Coalition. England poured out money in pro- fusion to pay and equip her Allies’ land armies, and herself began the great struggle for the command of the sea (see Naval Opera- tions, below).

In the Low Countries, while Dumouriez was beginning his proposed invasion of Holland, Prince Josias of Saxe-Coburg, the new Austrian commander on the Lower Rhine, advanced with 42,000 men from the region of Cologne, and drove in the various detachments that Dumouriez had posted to cover his right. The French general thereupon abandoned his advance into Holland, and, with what forces he could gather, turned towards the Meuse. The two armies met at Neerwinden (q.v.) on the 18th of March 179.3. Dumouriez had only a

few thousand men more than his opponent, instead of the enormous superiority he had had at Jemappes. Thus the enveloping attack could not be repeated, and in a battle on equal fronts the old generalship and the old armies had the advantage. Dumouriez was thoroughly defeated, the house of cards collapsed, and the whole of the French forces retreated in confusion to the strong line of border fortresses, created by Louis XIV. and Vauban. 1 Dumouriez, witnessing the failure of his political schemes, declared against the Republic, and after a vain attempt to induce his own army to follow his example, fled (April 5) into the Austrian lines. The leaderless Republicans streamed back to Valenciennes. There, however, they found a general. Picot (comte de) Dampierre was a regimental officer of the old army, who, in spite of his vanity and extravagance, possessed real loyalty to the new order of things, and brilliant personal courage. At the darkest hour he seized the reins without orders and without reference to seniority, and began to reconstruct the force and the spirit of the shattered army by wise administration and dithyrambic proclamations. Moreover, he withdrew it well behind Valenciennes out of reach of a second reverse. The region of Dunkirk and Cassel, the camp of La Madeleine near Lille, and Bouchain were made the rallying points of the various groups, the principal army being at the last-named. But the blow of Neerwinden had struck deep, and the army was for long incapable of service, what with the general distrust, the mis- conduct of the newer battalions, and the discontent of the old white-coated regiments that were left ragged and shoeless to the profit of the ” patriot ” corps. ” Beware of giving horses to the ‘ Hussars of Liberty,’ ” wrote Carnot, ” all these new corps are abominable.”

France was in fact defenceless, and the opportunity existed for the military promenade to Paris that the allied statesmen had imagined in 1792. But Coburg now ceased to be a purely Austrian commander, for one by one allied contingents, with instructions that varied with the political aims of the various governments, began to arrive. Moreover, he had his own views as to the political situation, fearing especially to be the cause of the queen’s death as Brunswick had been of the king’s, and negotiated for a settlement. The story of these negotiations should be read in Chuquet’s Valenciennes — it gives the key to many mysteries of the campaign and shows that though the revolutionary spirit had already passed all understanding, enlightened men such as Coburg and his chief-of-staff Mack sympathized with its first efforts and thought the constitution of 1 791 a gain to humanity. ” If you come to Paris you will find 80,000 patriots ready to die,” said the French negotiators. ” The patriots could not resist the Austrian regulars,” replied Coburg, ” but I do not propose to go to Paris. I

desire to see a stable government, with a chief, king or other, with whom we can treat." Soon, however, these personal negotiations were stopped by the emperor, and the idea of restoring ofthT order in France became little more than a pretext Allies. for a general intrigue amongst the confederate powers, each seeking to aggrandize itself at France's expense. " If you wish to deal with the French," observed Dumouriez ironically to Coburg, " talk ' constitution.' You may beat them but you cannot subdue them." And their subjugation was becoming less and less possible as the days went on and men 1 For the following operations see map in Spanish Succession War.

talked of the partition of France as a question of the moment like the partition of Poland — a pretension that even the 6migres resented.

Coburg's plan of campaign was limited to the objects acceptable to all the Allies alike. He aimed at the conquest of a first-class fortress — Lille or Valenciennes — and chiefly for this reason. War meant to the burgher of Germany and the Netherlands a special form of haute politique with which it was neither his business nor his inclination to meddle. He had no more com- punction, therefore, in selling his worst goods at the best price to the army commissaries than in doing so to his ordinary customers. It followed that, owing to the distance between Vienna and Valenciennes, and the exorbitant prices charged by carters and horse-owners, a mere concentration of Austrian troops at the latter place cost as much as a campaign, and the transport expenses rose to such a figure that Coburg's first duty was to find a strong place to serve as a market for the country- side and a depot for the supplies purchased, and to have it as near as possible to the front to save the hire of vehicles. As for the other governments which Coburg served as best he could, the object of the war was material concessions, and it would be easy to negotiate for the cession of Dunkirk and Valenciennes when the British and Austrian colours already waved there. The Allies, therefore, instead of following up their advantage over the French field army and driving forward on the open Paris road, set their faces westward, intending to capture Valenciennes, Le Quesnoy, Dunkirk and Lille one after the other.

Dampierre meanwhile grew less confident as responsibility settled upon his shoulders. Quite unable to believe that Coburg would bury himself in a maze of rivers and fortresses when he could scatter the French army to the winds D y^ by a direct advance, he was disquieted and puzzled c tenues. by the Austrian investment of Conde. This was followed by skirmishes around Valenciennes, so unfavourable to the French that their officers felt it would be madness to venture far beyond the support of the fortress guns. But the representatives on

mission ordered Dampierre, who was re- organizing his army at Bouchain, to advance and occupy Famars camp, east of Valenciennes, and soon afterwards, disregarding his protests, bade him relieve Conde at all costs. His skill, though not commensurate with his personal courage and devotion, sufficed to give him the idea of attacking Coburg on the right bank of the Scheldt while Clerfayt, with the corps covering the siege of Conde, was on the left, and then to turn against Clerfayt — in fact, to operate on interior lines — but it was far from being adequate to the task of beating either with the disheartened forces he commanded. On the 1st of May, while Clerfayt was held in check by a very vigorous demonstration, Coburg's positions west of Quievrain were attacked by Dampierre himself. The French won some local successes by force of numbers and surprise, but the Allies recovered themselves, thanks chiefly to the address and skill of Colonel Mack, and drove the Republicans in disorder to their entrenchments. Dampierre's discouragement now became desperation,and, urged on by the representatives (who, be it said, had exposed their own lives freely enough in the action), he attacked Clerfayt on the 8th at Raismes. The troops fought far better in the woods and hamlets west of the Scheldt than they had done in the plains to the east. But in the heat of the action Dampierre, becoming again the brilliant soldier that he had been before responsibility stifled him, risked and lost his life in leading a storming party, and his men retired sullenly, though this time in good order, to Valenciennes. Two days later the French gave up the open field and retired into Valenciennes. Dampierre's remains were by a vote of the Convention ordered to be deposited in the Pantheon. But he was a " ci-devant " noble, the demagogues denounced him as a traitor, and the only honour finally paid to the man who had tided over the weeks of greatest danger was the placing of his bust, in the strange company of those of Brutus and Marat, in the chamber of deputies.

Another pause followed, Coburg awaiting the British contingent under the duke of York, and the Republicans endeavouring to

assimilate the reinforcements of conscripts, for the most part " undesirables," who now arrived. Mutiny and denunciations augmented the confusion in the French camp. Plan of campaign there was none, save a resolution to stay at Valenciennes in the hope of finding an opportunity of relieving Conde and to create diversions elsewhere by expeditions from Dunkirk, Lille and Sedan. These of

course came to nothing, and before they had even started, Coburg, resuming the offensive, had stormed the lines of Famars (May 24), whereupon the French army retired to Bouchain, leaving not only Conde l but also Valenciennes to resist as best they could. The central point of the new positions about Bouchain was called Caesar's Camp. Here, surrounded by streams and marshes, the French generals thought that their troops were secure from the rush of the dreaded Austrian cavalry, and Mack himself shared their opinion.

Custine now took command of the abjectly dispirited army, the fourth change of command within two months. His first task was to institute a severe discipline, and his prestige was so great that his mere threat of death sentences for offenders pro- duced the desired effect. As to operations, he wished for a concentration of all possible forces from other parts of the frontier towards Valenciennes, even if necessary at the cost of sacrificing his own conquest of Mainz. But after he had induced the govern- ment to assent to this, the generals of the numerous other armies refused to give up their troops, and on the 17th of June the idea was abandoned in view of the growing seriousness of the Vendean insurrection (see Vendee) . Custine, therefore, could do no more than continue the work of reorganization. Military operations were few. Coburg, who had all this time succeeded in remaining concentrated, now found himself compelled to extend leftwards towards Flanders, 2 for Custine had infused some energy into the scattered groups of the Republicans in the region of Douai, Lille and Dunkirk — and during this respite the Paris Jacobins sent to the guillotine both Custine and his successor La Marliere before July was ended. Both were " ci-devant " nobles and, so far as is ascertainable, neither was guilty of anything worse than attempts to make his orders respected by, and himself popular with, the soldiers. By this time, owing to the innumerable denunciations and arrests,the confusion in the Army of the North was at its height, and no further attempt was made either to relieve Valenciennes and Conde, or to press forward from Lille and Dunkirk. Conde, starved out as Coburg desired, capitulated on the 10th of June, and the Austrians, who had done their work as soldiers, but were filled with pity for their suffering and distracted enemies, marched in with food for the women and children. Valenciennes, under the energetic General Ferrand, held out bravely until the fire of the Allies became v*/L°' intolerable, and then the civil population began to cieaaes. plot treachery, and to wear the Bourbon cockade in the open street. Ferrand and the representatives with him found themselves obliged to surrender to the duke of York, who commanded the siege corps, on the 28th of July, after rejecting the first draft of a capitulation sent in by the duke and

threatening to continue the defence to the bitter end. Impossible as this was known to be — for Valenciennes seemed to have become a royalist town — Ferrand's soldierly bearing carried the day, and honourable terms were arranged. The duke even offered to assist the garrison in repressing disorder. Shortly after this the wreck of the field army was forced to evacuate Caesar's Camp after an unimportant action (Aug. 7-8) and retired on Arras. By this they gave up the direct defence of the Paris road, but placed themselves in a " flank position " relatively to it, and secured to themselves the resources and reinforcements available in the region of Dunkirk – Lille.

1 Coburg refrained from a regular siege of Conde. He wished to gain possession of the fortress in a defensible state, intending to use it as his own depot later in the year. He therefore reduced it by famine. During the siege of Valenciennes the Allies appear to have been supplied from Mons.

2 Henceforth to the end of 1794 both armies were more or less " in cordon," the cordon possessing greater or less density at any particular moment or place, according to the immediate intentions of the respective commanders and the general military situation.

Bouchain and Cambrai, Landrecies and Le Quesnoy, were left to their own garrisons.

With this ended the second episode of the amazing campaign of 1793. Military operations were few and spasmodic, on the one side because the Allied statesmen were less concerned with the nebulous common object of restoring order in France than with their several schemes of aggrandisement, on the other owing to the almost incredible confusion of France under the regime of Danton and Marat. The third episode shows little or no change in the force and direction of the allied efforts, but a very great change in France. Thoroughly roused by disaster and now dominated by the furious and bloodthirsty energy of the terrorists, the French people and armies at last set before themselves clear and definite objects to be pursued at all costs.

Jean Nicolas Houchard, the next officer appointed to command, had been a heavy cavalry trooper in the Seven Years' War. His face bore the scars of wounds received at Minden, and ft oaC f Ua j his bravery, his stature, his bold and fierce manner, his want of education, seemed to all to betoken the ideal sans- culotte general. But he was nevertheless incapable of leading an army, and knowing this, carefully conformed to the advice of his staff officers Berthelmy and Gay-Vernon, the latter of whom, an exceptionally capable officer, had been

Custine's chief of staff and was consequently under suspicion. At one moment, indeed, operations had to be suspended altogether because his papers were seized by the civil authorities, and amongst them were all the confidential memoranda and maps required for the business of headquarters. It was the darkest hour. The Vendeans, the people of Lyons, Marseilles and Toulon, were in open and hitherto successful revolt. Valenciennes had fallen and Coburg's hussar parties pressed forward into the Somme valley. Again the Allies had the decision of the war in their own hands. Coburg,indeed,was still afraid, on Marie Antoinette's account, of forcing the Republicans to extremities, and on military grounds too he thought an advance on Paris hazardous. But, hazardous or not, it would have been attempted but for the English. The duke of York had definite orders from his government to capture Dunkirk — at present a nest of corsairs which interfered with the Channel trade, and in the future, it was hoped, a second Gibraltar — and after the fall of Valenciennes and the capture of Caesar's Camp the English and Hanoverians marched away, via Tournai and Ypres, to besiege the coast fortress. Thereupon the king of Prussia in turn called off his contingent for operations on the middle Rhine. Holland, too, though she maintained her contingent in face of Lille (where it covered Flanders), was not disposed to send it to join the imperialists in an adventure in the heart of France. Coburg, therefore, was brought to a complete standstill, and the scene of the decision was shifted to the district between Lille and the coast.

Thither came Carnot, the engineer officer who was in charge of military affairs in the Committee of Public Safety and is known to history as the " Organizer of Victory." His views of the strategy to be pursued indicate either a purely geographical idea of war, which does not square with his later principles and practice, or, as is far more likely, a profound disbelief in the capacity of the Army of the North, as it then stood, to fight a battle, and they went no further than to recommend an inroad into Flanders on the ground that no enemy would be encountered there. This, however, in the event developed into an operation of almost decisive importance, for at the moment of its inception the duke of York was already on the march. Fighting en route a very severe but successful action (Lincelles, Aug. 18) with the French troops encamped near Lille, the Anglo-Hanoverians entered the district — densely intersected with canals and morasses — around Dunkirk and Bergues on the 21st and 22nd. On the right, by way of Fumes, the British moved towards Dunkirk and invested the east front of the weak fortress, while on the left the Hanoverian field marshal v. Freytag moved via Poperinghe on Bergues. The French had a chain of outposts between Furnes and Bergues, but Freytag attacked them

resolutely, and the defenders,except a brave handful who stood

to cross bayonets, fled in all directions. The east front of Bergues was invested on the 23rd, and Freytag spread out his forces to cover the duke of York's attack on Dunkirk, his right being opposite Bergues and his centre at Bambeke, while his left covered the space between Roosbrugge and Ypres with a cordon of posts. Houchard was in despair at the bad conduct of his troops. But one young general, Jourdan, anticipating Houchard's orders, had already brought a strong force from Lille to Cassel, whence he incessantly harried Freytag's posts. Carnot encouraged the garrisons of Dunkirk and Bergues, and caused the sluices to be opened. The moral of the defenders rose rapidly. Houchard prepared to bring up every available man of the Army of the North, and only waited to make up his mind as to the direction in which his attack should be made. The Allies themselves recognized the extreme danger of their position. It was cut in half by the Great Morass, stretches of which extended even to Furnes. Neither Dunkirk nor Bergues could be completely invested owing to the inundations, and Freytag sent a message to King George III. to the effect that if Dunkirk did not surrender in a few days the expedition would be a complete failure.

As for the French, they could hardly believe their good fortune. Generals, staff officers and representatives on mission alike were eager for a swift and crushing offensive. " ' Attack' and ' attack in mass ' became the shibboleth and the catch-phrase of the camps " (Chuquet), and fortresses and armies on other parts of the frontier were imperiously called upon to supply large drafts for the Army of the North. Gay- Vernon's strategical instinct found expression in a wide-ranging movement designed to secure the absolute annihilation of the duke of York's forces. Beginning with an attack on the Dutch posts north and east of Lille, the army was then to press forward towards Furnes, the left wing holding Freytag's left wing in check, and the right swinging inwards and across the line of retreat of both allied corps. At that moment all men were daring, and the scheme was adopted with enthusiasm. On the 28th of August, consequently, the Dutch posts were attacked and driven away by the mobile forces at Lille, aided by parts of the main army from Arras. But even before they had fired their last shot the Republicans dispersed to plunder and compromised their success. Houchard and Gay- Vernon began to fear that their army would not emerge successfully from the supreme test

they were about to impose on it, and from this moment the scheme of destroying the English began to give way to the simpler and safer idea of relieving Dunkirk. The place was so ill-equipped that after a few days' siege it was in extremis, and the political importance of its preservation led not merely the civilian representatives, but even Carnot, to implore Houchard to put an end to the crisis at once. On the 30th, Cassel, instead of Ypres, was designated as the point of concentration for the " mass of attack." This surprised the representatives and Carnot as much as it surprised the subordinate generals, all of whom thought that there would still be time to make the detour through Ypres and to cut off the Allies' retreat before Dunkirk fell. But Houchard and Gay- Vernon were no longer under any illusions as to the manoeuvring power of their forces, and the government agents wisely left them to execute their own plans. Thirty-seven thousand men were left to watch Coburg and to secure Arras and Douai, and the rest, 50,000 strong, assembled at Cassel. Everything was in Houchard's favour could he but overcome the indiscipline of his own army. The duke of York was more dangerous in appearance than in reality — as the result must infallibly have shown had Houchard and Gay- Vernon possessed the courage to execute the original plan — and Freytag's covering army extended in a line of disconnected posts from Bergues to Ypres.

Against the left and centre of this feeble cordon 40,000 men

advanced in many columns on the 6th of September. A confused

outpost fight, in which the various assailing columns

°" " dissolved into excited swarms, ended, long after

nightfall, in the orderly withdrawal of the various

allied posts to Hondschoote. The French generals were occupied

the whole of next day in sorting out their troops, who had not

only completely wasted their strength against mere outposts, but had actually consumed their rations and used up their ammunition. On the 8th, the assailants, having more or less recovered themselves, advanced again. They found Wallmoden (who had succeeded Freytag, disabled on the 6th) entrenched on either side of the village of Hondschoote, the right resting on the great morass and the left on the village of Leysele. Here was the opportunity for the " attack in mass " that had been so freely discussed; but Houchard was now concerned more with the relief of Dunkirk than with the defeat of the enemy. He

sent away one division to Dunkirk, another to Bergues, and a third towards Ypres, and left himself only some 20,000 men for the battle. But Wallmoden had only 13,000 — so great was the dis- proportion between end and means in this ill-designed enterprise against Dunkirk.

Houchard despatched a column, guided by his staff officer Berthelmy, to turn the Hanoverians' left, but this column lost

HONDSCHOOTE

Ei-.»r» Wkik* >

Redrawn from a map in Fortescue's History of the British Army, by permission of Macmillan & Co., Ltd.

its way in the dense country about Loo. The centre waited motionless under the fire of the allied guns near Hondschoote. In vain the representative Delbrel implored the general to order the advance. Houchard was obstinate, and ere long the natural result followed. Though Delbrel posted himself in front of the line, conspicuous by his white horse and tricoioured sash and plume, to steady the men, the bravest left the ranks and skir- mished forward from bush to bush, and the rest sought cover. Then the allied commander ordered forward one regiment of Hessians, and these, advancing at a ceremonial slow march, and firing steady rolling volleys, scattered the Republicans before them. At this crisis Houchard uttered the fatal word " retreat," but Delbrel overwhelmed him with reproaches and stung him into renewed activity. He hurried away to urge forward the right wing while Jourdan rallied the centre and led it into the fight again. Once more Jourdan awaited in vain the order to advance, and once more the troops broke. But at last the exasperated Delbrel rose to the occasion. " You fear the responsibility," he cried to Jourdan; " well, I assume it. My authority overrides the general's and I give you the formal order to attack at once ! " Then, gently, as if to soften a rebuke, he continued, " You have forced me to speak as a superior; now I will be your aide-de-

camp," and at once hurried off to bring up the reserves and to despatch cavalry to collect the fugitives. This incident, amongst many, serves to show that the representatives on mission were no mere savage marplots, as is too generally assumed. They were often wise

and able men, brave and fearless of responsibility in camp and in action. Jourdan led on the reserves, and the men fighting in the bushes on either side of the road heard their drums to right and left. Jourdan fell wounded, but Delbrel headed a wild irregular bayonet charge which checked the Hanoverians, and Houchard himself, in his true place as a cavalry leader, came up with 500 fresh sabres and flung himself on the Allies. The Hanoverians, magnificently disciplined troops that they were, soon re-formed after the shock, but by this time the fugitives collected by Delbrel's troopers, reanimated by new hopes of victory, were returning to the front in hundreds, and a last assault on Hondschoote met with complete success.

Hondschoote was a psychological victory. Materially, it was no more than the crushing of an obstinate rearguard at enormous expense to the assailants, for the duke of York was able to withdraw while there was still time. Houchard had indeed called back the division he had sent to Bergues, and despatched it by Loo against the enemy's rear, but the movement was under- taken too late in the day to be useful. The struggle was practically a front to front battle, numbers and enthusiasm on the one side, discipline, position and steadiness on the other. Hence, though its strategical result was merely to compel the duke of York to give up an enterprise that he should never have undertaken, Hondschoote established the fact that the " New French " were determined to win, at any cost and by sheer weight and energy. It was long before they were able to meet equal numbers with confidence, and still longer before they could freely oppose a small corps to a larger one. But the nightmare of defeats and surrenders was dispelled.

The influence of Houchard on the course of the operations had been sometimes null, sometimes detrimental, and only occasionally good. The plan and its execution were the work of Berthelmy and Gay-Vernon, the victory itself was Jourdan's and, above all, Delbrel's. To these errors, forgiven to a victor, Houchard added the crowning offence of failure, in the reaction after the battle, to pursue his advantage. His enemies in Paris became more and more powerful as the campaign continued.

Having missed the great opportunity of crushing the English, Houchard turned his attention to the Dutch posts about Menin. Menin. As f ar as tne Allies were concerned Hondschoote was a mere reverse, not a disaster, and was counter- balanced in Coburg's eyes by his own capture of Le Quesnoy (Sept. n). The proximity of the main body of the French to Menin induced him to order Beaulieu's corps (hitherto at Cysoing and Unking the Dutch posts with the central group) to join

the prince of Orange there, and to ask the duke of York to do the same. But this last meant negotiation, and before anything was settled Houchard, with the army from Hondschoote and a contingent from Lille, had attacked the prince at Menin and destroyed his corps (Sept. 12-13).

After this engagement, which, though it was won by immensely superior forces, was if not an important at any rate a complete victory, Houchard went still farther inland — leaving detachments to observe York and replacing them by troops from the various camps as he passed along the cordon — in the hope of dealing with Beaulieu as he had dealt with the Dutch, and even of relieving Le Quesnoy. But in all this he failed. He had ex- pected to meet Beaulieu near Cysoing, but the Austrian general had long before gone northward to assist the prince of Orange. Thus Houchard missed his target. Worse still, one of his pro- tective detachments chanced to meet Beaulieu near Courtrai on the 15th, and was not only defeated but driven in rout from Menin. Lastly, Coburg had already captured Le Quesnoy, and had also repulsed a straggling attack of the Landrecies, Bouchain and other French garrisons on the positions of his covering army (12th). 1

1 In the course of this the column from Bouchain, 4500 strong, was caught in the open at Avesnes-le-Sec by 5 squadrons of the allied cavalry and literally annihilated.

Houchard's offensive died away completely, and he halted his army (45,000 strong excluding detachments) at Gaverelle, half-way between Douai and Arras, hoping thereby to succour Bouchain, Cambrai or Arras, whichever should prove to be Coburg's next objective. After standing still for several days, a prey to all the conflicting rumours that reached his ears, he came to the conclusion that Coburg was about to join the duke of York in a second siege of Dunkirk, and began to close on his left. But his conclusion was entirely wrong. The Allies were closing on their left inland to attack Maubeuge. Coburg drew in Beaulieu, and even persuaded the Dutch to assist, the duke of York undertaking for the moment to watch the whole of the Flanders cordon from the sea to Tournai. But this concentra- tion of force was merely nominal, for each contingent worked in the interests of its own masters, and, above all, the siege that was the object of the concentration was calculated to last four weeks, i.e. gave the French four weeks unimpeded liberty of action.

Houchard was now denounced and brought captive to Paris. Placed upon his trial, he offered a calm and reasoned defence of his conduct, but when the intolerable word " coward " was hurled at him by one of

his judges he wept with rage, pointing to the scars of his many wounds, and then, his spirit broken, sank into a lethargic indifference, in which he remained to the end. He was guillotined on the 16th of November 1793.

After Houchard's arrest, Jourdan accepted the command, though with many misgivings, for the higher ranks were filled by officers with even less experience than he had himself, equip- ment and clothing was wanting, and, perhaps more important still, the new levies, instead of filling up the depleted ranks of the line, were assembled in undisciplined and half -armed hordes at various frontier camps, under elected officers who had for the most part never undergone the least training. The field states showed a total of 104,000 men, of whom less than a third formed the operative army. But an enthusiasm equal to that of Hondschoote, and similarly demanding a plain, urgent and recognizable objective, animated it, and although Jourdan and Carnot (who was with him at Gaverelle, where the army had now reassembled) began to study the general strategic situation, the Committee brought them back to realities by ordering them to relieve Maubeuge at all costs.

The Allies disposed in all of 66,000 men around the threatened fortress, but 26,000 of these were actually employed in the siege, and the remainder, forming the covering army, extended in an enormous semicircle of posts facing gn tes. west, south and east. Thus the Republicans, as before, had two men to one at the point of contact(44,ooo against 21,000), but so formidable was the discipline and steadiness of manoeuvre of the old armies that the chances were considered as no more than " rather in favour " of the French. Not that these chances were seriously weighed before engaging. The generals might squander their energies in the council chamber on plans of sieges and expeditions, but in the field they were glad enough to seize the opportunity of a battle which they were not skilful enough to compel. It took place on the 15th and 16th of October, and though the allied right and centre held their ground, on their left the plateau of Wattignies (

in the Netherlands] FRENCH REVOLUTIONARY WARS

177

To complete the story of '93 it remains to sketch, very briefly, the principal events on the eastern and southern frontiers of France. These present, in the main, no special features, and all that it is necessary to retain of them is the fact of their existence. What this multiplication of

their tasks meant to the Committee of Public Safety and to Carnot in particular it is impossible to realize. It was not merely on the Sambre and the Scheldt, nor against one army of heterogeneous allies that the Republic had to fight for life, but against Prussians and Hessians on the Rhine, Sardinians in the Alps, Spaniards in the Pyrenees, and also (one might say, indeed, above all) against Frenchmen in Vendee, Lyons, Marseilles and Toulon.

On the Rhine, the advance of a Prussian-Hessian army, 63,000 strong, rapidly drove back Custine from the Main into the valleys of the Saar and the Lauter. An Austrian corps under Wurmser soon afterwards invaded Alsace. Here, as on the northern frontier, there was a long period of trial and error, of denunciations and indiscipline, and of wholly trivial fighting, before the Republicans recovered themselves. But in the end the ragged enthusiasts found their true leader in Lazare Hoche, and, though defeated by Brunswick at Pirmasens and Kaiserslautern, they managed to develop almost their full strength against Wurmser in Alsace. On the 26th of Decem- ber the latter, who had already undergone a series of partial reverses, was driven by main force from the lines of Weissenburg, after which Hoche advanced into the Palatinate and delivered Landau, and Pichegru moved on to recapture Mainz, which had surrendered in July. On the Spanish frontier both sides indulged in a fruitless war of posts in broken ground. The Italian campaign of 1793, equally unprofitable, will be referred to below. Far more serious than either was the insurrection of Vendee (q.v.) and the counter-revolution in the south of France, the principal incidents of which were the terrible sieges of Lyons and Toulon.

For 1 794 Carnot planned a general advance of all the northern armies, that of the North (Pichegru) from Dunkirk-Cassel by Ypres and Oudenarde on Brussels, the minor Army 0/ˆ79*5° °f tne Ardennes to Charleroi, and the Army of the Moselle (Jourdan) to Liege, while between Charleroi and Lille demonstrations were to be made against the hostile centre. He counted upon little as regards the two armies near the Meuse, but hoped to force on a decisive battle by the advance of the left wing towards Ypres. Coburg, on the other side, intended, if not forced to develop his strength on the Ypres side, to make his main effort against the French centre about Landrecies. This produced the siege of Landrecies, which need not concern us, a forward movement of the French to Menin and Courtrai which resulted in the battles of Tourcoing and Tournai, and the campaign of Fleurus, which, almost fortuit- ously, produced the long-sought decision.

The first crisis was brought about by the advance of the left wing of

the Army of the North, under Souham, to Menin-Courtrai. This advance placed Souham in the midst of the enemy's right wing, and at last stimulated the Allies into adopting the plan that Mack had advocated, in season and out of season, since before Neerwinden — that of annihilating the enemy's army. This vigorous purpose, and the leading part in its execution played by the duke of York and the British contingent, give these operations, to Englishmen at any rate, a living interest which is entirely lacking in, say, the sieges of Le Quesnoy and Landrecies. On the other side, the " New French " armies and their leaders, without losing the energy of 1793, had emerged from confusion and inexperience, and the powers of the new army and the new system had begun to mature. Thus it was a fair trial of strength between the old way and the new.

In the second week of May the left wing of the Army of the North — the centre was towards Landrecies, and the right, fused in the Army of the Ardennes-, towards Charleroi — found itself interposed at Menin-Courtrai-Lille between two hostile masses, the main body of the allied right wing about Tournai and a secondary corps at Thielt. Common-sense, therefore, dictated a converging attack for the Allies and. a series of rapid radial blows for the French. In the allied camp common-sense had first to prevail over routine, and the emperor's first orders were for a raid of the Thielt corps towards Ypres, which his advisers hoped would of itself cause the French to decamp. But the duke of York formed a very different plan, and Feld- zeugmeister Clerfayt, in command at Thielt, agreed to co- operate. Their proposal was to surround the French on the Lys with their two corps, and by the 15th the emperor had decided to use larger forces with the same object.

On that day Coburg himself, with 6000 men under Feldzeug- meister Kinsky from the central (Landrecies) group, entered Tournai and took up the general command, while Mack's another reinforcement under the archduke Charles "annihll- marched towards Orchies. Orders were promptly issued »tioa for a general offensive. Clerfayt's corps was to be paD " between Rousselaer and Menin on the 16th, and the next day to force its way across the Lys at Werwick and connect with the main army. The main army was to advance in four columns. The first three, under the duke of York, were to move off, at daylight on the 17th, by Dottignies, Leers and Lannoy respectively to the line Mouscron-Tourcoing-Mouveaux. The fourth and fifth under Kinsky and the archduke Charles were to defeat the French corps on the upper Marque, and then, leaving Lille on their left and guaranteeing themselves by a cordon system against being

Sketch of Frcuch positions about

Courtrai, Tourcoing & Lille May i6th.,i794

Rousselaer Thielt^

Emery Walker sc

cut off from Tournai (either by the troops just defeated or by the Lille garrison), to march rapidly forward towards Werwick, getting touch on their right with the duke of York and on their left with Clerfayt, and thus completing the investing circle around Souham's and Moreau's isolated divisions. Speed was enjoined on all. Picked volunteers to clear away the enemy's skirmishers, and pioneers to make good difficult places on the roads, were to precede the heads of the columns. Then came at the head of the main body the artillery with an infantry escort. All this might have been designed by the Japanese for the attack of some well-defined Russian position in the war of 1904. Outpost and skirmisher resistance was to be overpowered the instant it was offered, and the attack on the closed bodies of the enemy was to be initiated by a heavy artillery fire at the earliest possible moment. But in 1904 the Russians stood still, which was the last thing that the Revolutionary armies of 1794 would or could do. Mack's well-considered and carefully balanced

combinations failed, and doubtless helped to create the legend of his incapacity, which finds no support either in the opinion of Coburg, the representative of the old school, or in that of Scharnhorst, the founder of the new.

Souham, who commanded in the temporary absence of Pichegru, had formed his own plan. Finding himself with the major part of his forces between York and Clerfayt, he had decided to impose upon the former by means of a covering detach- ment, and to fall upon Clerfayt near Rousselaer with the bulk of his forces. This plan, based as it was on a sound calculation of time, space, strength and endurance, merits close consideration, for it contains more than a trace of the essential principles of modern strategy, yet with one vital difference, that whereas, in the present case, the factor of the enemy's independent will wrecked the scheme, Napoleon would have guaranteed to himself, before and during its development, the power of executing it in spite of the enemy. The appearance of fresh allied troops (Kinsky) on his right front at once modified these general arrangements. Divining Coburg's intentions from the arrival of the enemy near Pont-a.-Marque and at Lannoy, he ordered Bonnaud (Lille group, 27,000) to leave enough troops on the upper Marque to amuse the enemy's leftmost columns, and with every man he had left beyond this absolute minimum to attack the left flank of the columns moving towards Tourcoing, which his weak centre (12,000 men at Tourcoing, Mouscron and Roubaix) was to stop by frontal defence. No role was as yet assigned to the principal mass (50,000 under Moreau) about Courtrai. Vandamme's brigade was to extend along the Lys from Menin to Werwick and beyond, to deny as long as possible the passage to Clerfayt.

This second plan failed like the first, because the enemy's counter-will was not controlled. All along the line Coburg's advance compelled the French to fight as they were without any redistribution. But the French were sufficiently elastic to adapt themselves readily to unforeseen conditions, and on Coburg's side too the unexpected happened. When Clerfayt appeared on the Lys above Menin, he found Werwick held. This was an accident, for the battalion there was on its way to Menin, and Vandamme, who had not yet received his new orders, was still far away. But the battalion fought boldly, Clerfayt sent for his pontoons, and ere they arrived Vandamme's leading troops managed to come up on the other side. Thus it was not till 1 a.m. on the 18th that the first Austrian battalions passed the Lys.

On the front of the main allied group the " annihilation plan " was crippled at the outset by the tardiness of the arch- duke's (fifth or left) column. On this the smooth working of the whole scheme depended, for Coburg considered that he must defeat Bonnaud before carrying out his intended envelopment of the Menin-Courtrai group (the idea of " binding " the enemy by a detachment while the main scheme

proceeded had not yet arisen). The allied general, indeed, on discovering the back- wardness of the archduke, went so far as to order all the other columns to begin by swerving southward against Bonnaud, but these were already too deeply committed to the original plan to execute any new variation.

The rightmost column (Hanoverians) under von dem Bussche moved on Mouscron, overpowering the fragmentary, if energetic, resistance of the French advanced posts. Next on the left, Lieutenant Field Marshal Otto moved by Leers and Watrelos, driving away a French post at Lis (near Lannoy) on his left flank, and entered Tourcoing. But meantime a French brigade had driven von dem Bussche away from Mouscron, so that Otto felt compelled to keep troops at Leers and Watrelos to protect his rear, which seriously weakened his hold on Tourcoing. The third column, led by the duke of York, advanced from Templeuve on Lannoy, at the same time securing its left by expelling the French from Willems. Lannoy was stormed by the British Guards under Sir R. Abercromby with such vigour that the cavalry which had been sent round the village to cut off the French retreat had no time to get into position. Beyond Lannoy, the French resistance, still disjointed, became more obstinate as

the ground favoured it more, and the duke called up the Austrians from Willems to turn the right of the French position at Roubaix by way of a small valley. Once again, however, the Guards dis- lodged the enemy before the turning movement had taken effect. A third French position now appeared, at Mouvaux, and this seemed so formidable that the duke halted to rest his now weary men. The emperor himself, however, ordered the advance to be resumed, and Mouvaux too was carried by Abercromby. It was now nightfall, and the duke having attained his objective point prepared to hold it against a counter attack.

Kinsky meanwhile with the fourth column had made feints opposite Pont-a-Tressin,and had forced the passage of the Marque near Bouvines with his main body. But Bonnaud gave ground so slowly that up to 4 p.m. Kinsky had only progressed a few hundred paces from his crossing point. The fifth column, which was behind time on the 16th, did not arrive at Orchies till dawn on the 17th, and had to halt there for rest and food. Thence, moving across country in fighting formation, the archduke made his way to Pont-a-Marque. But he was unable to do more, before calling a halt, than deploy his troops on the other side of the stream.

So closed the first day’s operations. The ” annihilation plan ” had

already undergone a serious check. The archduke and Kinsky, instead of being ready for the second part of their task, had scarcely completed the first, and the same could be said of Clerfayt, while von dem Bussche had definitively failed. Only the duke of York and Otto had done their share in the centre, and they now stood at Tourcoing and Mouvaux isolated in the midst of the enemy's main body, with no hope of support from the other columns and no more than a chance of meeting Clerfayt. Coburg's entire force was, without deducting losses, no more than 53,000 for a front of 18 m., and only half of the enemy's available 80,000 men had as yet been engaged. Mack sent a staff officer, at 1 a.m., to implore the archduke to come up to Lannoy at once, but the young prince was asleep and his suite refused to wake him.

Matters did not, of course, present themselves in this light at Souham's headquarters, where the generals met in an informal council. The project of flinging Bonnaud's corps against the flank of the duke of York had not received even a beginning of execution, and the outposts, reinforced though they were from the main group, had everywhere been driven in. All the sub- ordinate leaders, moreover (except Bonnaud), sent in the most despondent reports. " Councils of war never fight " is an old maxim, justified in ninety-nine cases in a hundred. But this council determined to do so, and with all possible vigour. The scheme was practically that which Coburg's first threat had produced and his first brusque advance had inhibited. Van-damme was to hold Clerfayt, the garrison of Lille and a few outlying corps to occupy the archduke and Kinsky, and in the centre Moreau and Bonnaud, with 40,000 effectives, were to attack the Tourcoing-Mouvaux position in front and flank at dawn with all possible energy.

The first shots were fired on the Lys, where, it will be re- membered, Clerfayt's infantry had effected its crossing in the night. Vandamme, who was to defend the river, had in the evening assembled his troops (fatigued by a fourcohtg. long march) near Menin instead of pushing on at once. Thus only one of his battalions had taken part in the defence of Werwick on the 17th, and the remainder were by this chance massed on the flank of Clerfayt's subsequent line of advance. Vandamme used his advantage well.. He attacked, with perhaps 12,000 men against 21,000, the head and the middle of Clerfayt's columns as they moved on Lincelles. Clerfayt stopped at once, turned upon him and drove him towards Roncq and Menin. Still, fighting in succession, rallying and fighting again, Vandamme's regiments managed to spin out time and to commit Clerfayt deeper and deeper to a false direction till it was too late in the day to influence the battle elsewhere.

V. dem Bussche's column at Dottignies, shaken by the blow it had received the day before, did nothing, and actually retreated to the Scheldt. On the other flank, Kinsky and the archduke

Charles practically remained inactive despite repeated orders to proceed to Lannoy, Kinsky waiting for the archduke, and the latter using up his time and forces in elaborating a protective cordon all around his left and rear. Both alleged that " the troops were tired," but there was a stronger motive. It was felt that Belgium was about to be handed over to France as the price of peace, and the generals did not see the force of wasting soldiers on a lost cause. There remained the two centre columns, Otto's and the duke of York's. The orders of the emperor to the duke were that he should advance to establish communica- tion with Clerfayt at Lincelles. Having thus cut off the French Courtrai group, he was to initiate a general advance to crush it, in which all the allied columns would take part, Clerfayt, York and Otto in front, von dem Bussche on the right flank and the archduke and Kinsky in support. These airy schemes were destroyed at dawn on the 18th. Macdonald's brigade carried Tourcoing at the first rush, though Otto's guns and the volleys of the infantry checked its further progress. Malbrancq's brigade swarmed around the duke of York's entrenchments at Mouvaux, while Bonnaud's mass from the side of Lille passed the Marque and lapped round the flanks of the British posts at Roubaix and Lannoy. The duke had used up his reserves in assisting Otto, and by 8 a.m. the positions of Roubaix, Lannoy and Mouvaux were isolated from each other. But the Allies fought magnificently, and by now the Republicans were in confusion, excited to the highest pitch and therefore extremely sensitive to waves of enthusiasm or panic; and at this moment Clerfayt was nearing success, and Vandamme fighting almost back to back with Malbrancq. Otto was able to retire gradually, though with heavy losses, to Leers, before Macdonald's left column was able to storm Watrelos, or Daendels' brigade, still farther towards the Scheldt, could reach his rear. The resistance of the Austrians gave breathing space to the English, who held on to their positions till about 11.30, attacked again and again by Bonnaud, and then, not without confusion, retired to join Otto at Leers.

With the retreat of the two sorely tried columns and the suspension of Clerfayt's attack between Lincelles and Roncq, the battle of Tourcoing ended. It was a victory of which the young French generals had reason

to be proud. The main attack was vigorously conducted, and the two-to-one numerical superiority which the French possessed at the decisive point is the best testimony at once to Souham's generalship and to Yandamme's bravery. As for the Allies, those of them who took part in the battle at all, generals and soldiers, covered themselves with glory, but the inaction of two-thirds of Coburg's army was the bankruptcy declaration of the old strategical system. The Allies lost, on this day, about 4000 killed and wounded and 1500 prisoners besides 60 guns. The French loss, which was probably heavier, is not known. The duke of York defeated, Souham at once turned his attention to Clerfayt, against whom he directed all the forces he could gather after a day's " horde-tactics." The Austrian commander, however, withdrew over the river un- harmed. On the 19th he was at Rousselaer and Ingelminster, 9 or 10 m. north of Courtrai, while Coburg's forces assembled and encamped in a strong position some 3 m. west and north-west of Tournai, the Hanoverians remaining out in advance of the right on the Espierre.

Souham's victory, thanks to his geographical position, had merely given him air. The Allies, except for the loss of some 5500 men, were in no way worse off. The plan had failed, but the army as a whole had not been defeated, while the troops of the duke of York and Otto were far too well disciplined not to take their defeat as " all in the day's work." Souham was still on the Lys and midway between the two allied masses, able to strike each in turn or liable to be crushed between them in pro- portion as the opposing generals calculated time, space and endurance accurately. Souham, therefore, as early as the 19th, had decided that until Clerfayt had been pushed back to his old positions near Thielt he could not deal with the main body of the Allies on the side of Tournai, and he had left Bonnaud to hold the latter while he concentrated most of his forces

towards Courtrai. This move had the desired effect, for Clerfayt retired without a contest, and on the 21st of May Souham issued his orders for an advance on Coburg's army, which, as he knew, had meantime been reinforced. Vandamme alone was left to face Clerfayt, and this time with outposts far out, at Ingelminster and Roosebeke, so as to ensure his chief, not a few hours', but two or three days' freedom from interference.

Pichegru now returned and took up the supreme command, Souham remaining in charge of his own and Moreau's divisions. On the extreme right, from Pont-a-Tressin, only demonstrations were to be made; the centre, between Tournai. Baisieux and Estaimbourg, was to be the scene of the holding attack of Bonnaud's command, while

Souham, in con- siderably greater density, delivered the decisive attack on the allied right by St Leger and Warcoing. At Helchin a brigade was to guard the outer flank of the assailants against a movement by the Hanoverians and to keep open communication with Courtrai in case of attack from the direction of Oudenarde. The details of the allied position were insufficiently known owing to the multiplicity of their advanced posts and the intricate and densely cultivated nature of the ground. The battle of Tournai opened in the early morning of the 22nd and was long and desperately contested. The demonstration on the French extreme right was soon recognized by the defenders to be negligible, and the allied left wing thereupon closed on the centre. There Bonnaud attacked with vigour, forcing back the various advanced posts, especially on the left, where he dislodged the Allies from Nechin. The defenders of Templeuve then fell back, and the attacking swarms — a dissolved line of battle — fringed the brook beyond Templeuve, on the other side of which was the Allies' main position, and even for a moment seized Blandain. Meanwhile the French at Nechin, in concert with the main attack, pressed on towards Ramegnies.

Macdonald's and other brigades had forced the Espierre rivulet and driven von dem Bussche's Hanoverians partly over the Scheldt (they had a pontoon bridge), partly southward. The main front of the Allies was defined by the brook that flows between Templeuve and Blandain, then between Ramegnies and Pont-a-Chin and empties into the Scheldt near the last-named hamlet. On this front till close on nightfall a fierce battle raged. Pichegru's main attack was still by his left, and Pont-a-Chin was taken and retaken by French, Austrians, British and Hanoverians in turn. Between Blandain and Pont-a-Chin Bonnaud's troops more than once entered the line of defence. But the attack was definitively broken off at nightfall and the Republicans withdrew slowly towards Lannoy and Leers. They had for the first time in a fiercely contested " soldier's battle " measured their strength, regiment for regiment, against the Allies, and failed, but by so narrow a margin that henceforward the Army of the North realized its own strength and solidity. The Army of the Revolu- tion, already superior in numbers and imbued with the decision- compelling spirit, had at last achieved self-confidence.

But the actual decision was destined by a curious process of evolution to be given by Jourdan's far-distant Army of the Moselle, to which we now turn.

The Army of the Moselle had been ordered to assemble a striking force on its left wing, without prejudicing the rest of its cordon in Lorraine,

and with this striking force to operate towards Liege and Namur. Its first movement on Arlon, in April, was repulsed by a small Austrian corps under Beaulieu that guarded this region. But in the beginning of May the advance was resumed though the troops were ill-equipped and ill-fed, and requisitions had reduced the civil population to semi-starvation and sullen hostility. We quote Jourdan's instructions to his advanced guard, not merely as evidence of the trivial purpose of the march as originally planned, but still more as an illustration of the driving power that made the troops march at all, and of the new method of marching and subsisting them.

Its commander was " to keep in mind the purpose of cutting the communications between Luxemburg and Namur, and was therefore to throw out strong bodies against the enemy daily and at different points, to parry the enemy's movements by rapid

marches, to prevent any transfer of troops to Belgium, and lastly to seek an occasion for giving battle, for cutting off his convoys and for seizing his magazines." So much for the Jourdan sˆ p ur p 0se The method of achieving it is denned as oa Liege, follows. " General Hatry, in order to attain the object of these instructions, will have with him the minimum of wagons. He is to live at the expense of the enemy as much as possible, and to send back into the interior of the Republic whatever may be useful to it; he will maintain his communica- tions with Longwy, report every movement to me, and when necessary to the Committee of Public Safety and to the minister of war, maintain order and discipline, and firmly oppose every sort of pillage." How the last of these instructions was to be reconciled with the rest, Hatry was not informed. In fact, it was ignored. " I am far from believing," wrote the representa- tive on mission Gillet, " that we ought to adopt the principles of philanthropy with which we began the war."

At the moment when, on these terms, Jourdan's advance .was resumed, the general situation east of the Scheldt was as follows: The Allies' centre under Coburg had captured Landrecies, and now (May 4) lay around that place, about 65,000 strong, while the left under Kaunitz (27,000) was somewhat north of Maubeuge, with detachments south of the Sambre as far as the Meuse. Beyond these again were the detachment of Beaulieu (8000) near Arlon, and another, 9000 strong, around Trier. On the side of the French, the Army of the Moselle (41,000 effectives) was in cordon between

Saargemiind and Longwy; the Army of the Ardennes (22,000) between Beaumont and Givet; of the Army of the North, the right wing (38,000) in the area Beaumont — Maubeuge and the centre (24,000) about Guise. In the aggregate the allied field armies numbered 139,000 men, those of the French 203,000. Tactically the disproportion was sufficient to give the latter the victory, if, strategically, it could be made effective at a given time and place. But the French had mobility as a remedy for over-extension, and though their close massing on the extreme flanks left no more than equal forces opposite Coburg in the centre, the latter felt unable either to go forward or to close to one flank when on his right the storm was brewing at Menin and Tournai, and on his left Kaunitz reported the gathering of important masses of the French around Beaumont. Thus the initiative passed over to the French, but they missed their opportunity, as Coburg had missed his in 1793. Pichegru's right was ordered to march on Mons, and his left to master the navigation of the Scheldt so as to reduce the Allies to wagon- drawn supplies — the latter an objective dear to the 18th-century general; while Jourdan's task, as we know, was to conquer the Liege or Namur country without unduly stripping the cordon on the Saar and the Moselle. Jourdan's orders and original purpose were to get Beaulieu out of his way by the usual strategical tricks, and to march through the Ardennes as rapidly as possible, living on what supplies he could pick up from the enemy or the inhabitants. But he had scarcely started when Beaulieu made his existence felt by attacking a French post at Bouillon. There- upon Jourdan made the active enemy, instead of Namur, his first object.

The movement of the operative portion of the Army of the Moselle began on the 21st of May from Longwy through Arlon towards Neufchateau. Irregular fighting, sometimes with the Austrians, sometimes with the bitterly hostile inhabitants, marked its progress. Beaulieu was nowhere forced into a battle. But fortune was on Jourdan's side. The Austrians were a de- tachment of Coburg's army, not an independent force, and when threatened they retired towards Ciney, drawing Jourdan after them in the very direction in which he desired to go. On the 28th the French, after a vain detour made in the hope of forcing Beaulieu to fight — " les esclaves n'osent pas se mesurer avec des hommes libres," wrote Jourdan in disgust, — reached Ciney, and there heard that the enemy had fallen back to a strongly entrenched position on the east bank of the Meuse near Namur. Jourdan was preparing to attack them there, when considerations of quite another kind intervened to change his direction, and thereby to produce the drama of Charleroi and Fleurus — which

military historians have asserted to be the foreseen result of the initial plan.

The method of ” living on the country ” had failed lamentably in the Ardennes, and Jourdan, though he had spoken of changing his line of supply from Arlon to Carignan, then to Mezieres and so on as his march progressed, was still actually living from hand to mouth on the convoys that arrived intermittently from his original base. When he sought to take what he needed from the towns on the Meuse, he infringed on the preserves of the Army of the Ardennes. 1 The advance, therefore, came for the moment to a standstill, while Beaulieu, solicitous for the safety of Charleroi — in which fortress he had a magazine — called up the outlying troops left behind on the Moselle to rejoin him by way of Bastogne. At the same moment (29th) Jourdan received new orders from Paris — (a) to take Dinant and Charleroi and to clear the country between the Meuse and the Sambre, and (b) to attack Namur, either by assault or by regular siege. In the latter case the bulk of the forces were to form a covering army beyond the place, to demonstrate towards Nivelles, Louvain and Liege, and to serve at need as a support to the right flank of the Ardennes Army. From these orders and from the action of the enemy the campaign at last took a definite shape.

When the Army of the Moselle passed over to the left bank of the Meuse, it was greeted by the distant roar of guns towards Charleroi and by news that the Army of the Ardennes, char j ml which had already twice been defeated by Kaunitz, was for the third time deeply and unsuccessfully engaged beyond the Sambre. The resumption of the march again complicated the supply question, and it was only slowly that the army advanced towards Charleroi, sweeping the country before it and extending its right towards Namur. But at last on the 3rd of June the concentration of parts of three armies on the Sambre was effected. Jourdan took command of the united force (Army of the Sambre and Meuse) with a strong hand, the 40,000 new-comers inspired fresh courage in the beaten Ardennes troops, and in the sudden dominating enthusiasm of the moment pillaging and straggling almost ceased. Troops that had secured bread shared it with less fortunate comrades, and even the Liegois peasantry made free gifts of supplies. ” We must believe,” says the French general staff of to-day, ” that the idea symbolized by the Tricolour, around which marched ever these sansculottes, shoeless and hungry, unchained a mysterious force that preceded our columns and aided the achievement of military success.”

Friction, however, arose between Jourdan and the generals of the

Ardennes Army, to whom the representatives thought it well to give a separate mission. This detachment of 18,000 men was followed by another, of 16,000, to keep touch with Maubeuge. Deducting another 6000 for the siege of Charleroi, when this should be made, the covering army destined to fight the Imperialists dwindled to 55,000 out of 96,000 effectives. Even now, we see, the objective was not primarily the enemy's army. The Republican leaders desired to strike out beyond the Sambre, and as a preliminary to capture Charleroi. They would not, however, risk the loss of their connexion with Maubeuge before attaining the new foothold.

Meanwhile, Tourcoing and Tournai had at last convinced Coburg that Pichegru was his most threatening opponent, and he had therefore, though with many misgivings, decided to move towards his right, leaving the prince of Orange with not more than 45,000 men on the side of Maubeuge-Charleroi- Namur.

Jourdan crossed the Sambre on the 12th of June, practically unopposed. Charleroi was rapidly invested and the covering army extended in a semicircular position. For the fourth time the Allies counter-attacked successfully, and after a severe struggle the French had to abandon their positions and their siege works and to recross the Sambre (June 16). But the army was not beaten. On the contrary, it was only desirous of having its revenge for a stroke of ill-fortune, due, the soldiers said, to

1 Each of the fifteen armies on foot had been allotted certain departments as supply areas, Jourdan's being of course far away in Lorraine.

the fog and to the want of ammunition. The fierce threats of St Just (who had joined the army) to faire tomber les tUes if more energy were not shown were unnecessary, and within two days the army was advancing again. On the 18th Jourdan's columns recrossed the river and extended around Charleroi in the same positions as before. This time, having in view the weariness of his troops and their heavy losses on the 16th, the prince of Orange allowed the siege to proceed. His reasons for so doing furnish an excellent illustration of the different ideas and capacities of a professional army and a " nation in arms." " The Imperial troops," wrote General Alvintzi, " are very fatigued. We have fought nine times since the 10th of May, we have bivouacked

constantly, and made forced marches. Further, we are short of officers." All this, it need hardly be pointed out, applied equally to the French.

Charleroi, garrisoned by less than 3000 men, was intimidated into surrender (25th) when the third parallel was barely estab- lished. Thus the object of the first operations was achieved. As to the next neither Jourdan nor the representatives seem to have had anything further in view than the capture of more fortresses. But within twenty-four hours events had decided for them.

Coburg had quickly abandoned his intention of closing on his right wing, and (after the usual difficulties with his Allies on that side) had withdrawn 12,000 Austrians from the centre of his cordon opposite Pichegru, and made forced marches to join the prince of Orange. On the 24th of June he had collected 52,000 men at various points round Charleroi, and on the 25th he set out to relieve the little fortress. But he was in complete ignorance of the state of affairs at Charleroi. Signal guns were fired, but the woods drowned even the roar of the siege batteries, and at last a party under Lieutenant Radetzky made its way through the covering army and discovered that the place had fallen. The party was destroyed on its return, but Radetzky was reserved for greater things. He managed, though twice wounded, to rejoin Coburg with his bad news in the midst of the battle of Fleurus.

On the 26th Jourdan's army (now some 73,000 strong) was still posted in a semicircle of entrenched posts, 20 m. in extent, round the captured town, pending the removal of the now un- necessary pontoon bridge at Marchiennes and the selection of a shorter line of defence.

Coburg was still more widely extended. Inferior in numbers as he was, he proposed to attack on an equal front, and thus gave himself, for the attack of an entrenched position, an order of battle of three men to every two yards of front, all reserves included. The Allies were to attack in five columns, the prince of Orange from the west and north-west towards Trazegnies and Monceau wood, Quasdanovich from the north on Gosselies, Kaunitz from the north-east, the archduke Charles from the east through Fleurus, and finally Beaulieu towards Lambusart. The scheme was worked out in such minute detail and with so entire a disregard of the chance of unforeseen incidents, that once he had given the executive command to move, the Austrian general could do no more. If every detail worked out as planned, victory would be his; if accidents happened he could do nothing to redress them, and unless these righted themselves (which was improbable in the case of the stiffly organized old armies) he could

only send round the order to break off the action and retreat.

In these circumstances the battle of Fleurus is the sum rather than the product of the various fights that took place between each allied column and the French division that it met. The prince of Orange attacked at earliest dawn and gradually drove in the French left wing to Courcelles, Roux and Marchiennes, but somewhat after noon the French, under the direction for the most part of Kleber, began a series of counterstrokes which recovered the lost ground, and about 5, without waiting for Coburg's instructions, the prince retired north-westward off the battlefield. The French centre division, under Morlot, made a gradual fighting retreat on Gosselies, followed up by the Quasdanovich column and part of Kaunitz's force. No serious

impression was made on the defenders, chiefly because the brook west of Mellet was a serious obstacle to the rigid order of the Allies and had to be bridged before their guns could be got over. Kaunitz's column and Championnet's division met on the battle- field of 1690. The French were gradually driven in from the outlying villages to their main position between Heppignies and Wangenies. Here the Allies, well led and taking every advantage of ground and momentary chances, had the best of it. They pressed the French hard, necessitated the intervention of such small reserves as Jourdan had available, and only gave way to the defenders' counterstroke at the moment they received Coburg's orders for a general retreat.

On the allied left wing the fighting was closer and more severe than at any point. Beaulieu on the extreme left advanced upon Velaine and the French positions in the woods to the south in several small groups of all arms. Here were the divisions of the Army of the Ardennes, markedly inferior in discipline and endurance to the rest, and only too mindful of their four previous reverses. For six hours, more or less, they resisted the oncoming Allies, but then, in spite of the example and the despairing appeals of their young general Marceau, they broke and fled, leaving Beaulieu free to combine with the archduke Charles, who carried Fleurus after obstinate fighting, and then pressed on. towards Campinaire. Beaulieu took command of all the allied forces on this side about noon, and from then to 5 p.m. launched a series of - terrible attacks on the French (Lefebvre's division, part of the general reserve, and the remnant of Marceau's troops) above Campinaire and Lambusart. The disciplined resolution of the imperial battalions, and the enthusiasm of the French Revolutionaries, were each at their height. The Austrians came on time after time over ground that was

practically destitute of cover. Villages, farms and fields of corn caught fire. The French grew more and more excited — ” No retreat to-day!” they called out to their leaders, and finally, clamouring to be led against the enemy, they had their wish. Lefebvre seized the psychological moment when the fourth attack of the Allies had failed, and (though he did not know it) the order to retreat had come from Coburg. The losses of the unit that delivered it were small, for the charge exactly responded to the moral conditions of the moment, but the proportion of killed to wounded (55 to 81) is good evidence of the intensity of the momentary conflict.

So ended the battle. Coburg had by now learned definitely that Charleroi had surrendered, and while the issue of the battle was still doubtful — for though the prince of Orange was beaten, Beaulieu was in the full tide of success — he gave (towards 3 p.m.) the order for a general retreat. This was delivered to the various commanders between 4 and 5, and these, having their men in hand even in the heat of the engagement, were able to break off the battle without undue confusion. The French were far too exhausted to pursue them (they had lost twice as many men as the Allies), and their leader had practically no formed body at hand to follow up the victory, thanks to the extraordinary dissemination of the army.

Tourcoing, Tournay and Fleurus represent the maximum result achievable under the earlier Revolutionary system of making war, and show the men and the leaders at the highest point of combined steadiness and enthusiasm they ever reached — that is, as a ” Sans-culotte ‘•’ army. , Fleurus was also the last great victory of the French, in point of time, prior to the advent of Napoleon, and may therefore be considered as illustrating the general conditions of warfare at one of the most important points in its development.

The sequel of these battles can be told in a few words. The Austrian government had, it is said, long ago decided to evacuate the Netherlands, and Coburg retired over the Meuse, practically unpursued, while the duke of York’s forces fell back in good order, though pursued by Pichegru through Flanders. The English contingent embarked for home, the rest retired through Holland into Hanoverian territory, leaving the Dutch troops to surrender to the victors. The last phase of the pursuit reflected great glory on Pichegru, for it was conducted in midwinter through a country bare of supplies and densely intersected with dykes and meres. The crowning incident was the dramatic capture of the Dutch fleet, frozen in at the Texel, by a handful of hussars who rode over the ice and browbeat the crews of the well-armed battleships into surrender. It was many years before a

prince of Orange ruled again in the United provinces, while the Austrian whitecoats never again mounted guard in Brussels.

[1796 IN GERMANY

The Rhine campaign of 1794, waged as before chiefly by the Prussians, was not of great importance. General v. Mollendorf won a victory at Kaiserslautern on the 23rd of May, but operations thereafter became spasmodic, and were soon complicated by Coburg's retreat over the Meuse. With this event the offensive of the Allies against the French Revolution came to an inglorious end. Poland now occupied the thoughts of European statesmen, and Austria began to draw her forces on to the east. England stopped the payment of subsidies, and Prussia made the Peace of Basel on the 5th of April 1795. On the Spanish frontier the French under General Dugommier (who was killed in the last battle) were successful in almost every encounter, and Spain, too, made peace. Only the eternal enemies, France and Austria, were left face to face on the Rhine, and elsewhere, of all the Allies, Sardinia alone (see below under Italian Campaigns) continued the struggle in a half-hearted fashion.

The operations of 1795 on the Rhine present no feature of the Revolutionary Wars that other and more interesting campaigns fail to show. Austria had two armies on foot under the general command of Clerfayt, one on the upper Rhine, the other south of the Main, while Mainz was held by an army of imperial contingents. The French, Jourdan on the lower; Pichegru on the upper Rhine, had as usual superior numbers at their disposal. Jourdan combined a demonstrative frontal attack on Neuwied with an advance in force via Diisseldorf, reunited his wings beyond the river near Neuwied, and drove back the Austrians in a series of small engagements to the Main, while Pichegru passed at Mannheim and advanced towards the Neckar. But ere long both were beaten, Jourdan at Hochst and Pichegru at Mannheim, and the investment of Mainz had to be abandoned. This was followed by the invasion of the Palatinate by Clerfayt and the retreat of Jourdan to the Moselle. The position was further compromised by secret negotiations between Pichegru and the enemy for the restoration of the Bourbons. The meditated treason came to light early in the following year, and the guilty commander disappeared into the obscure ranks of the royalist secret agents till finally brought to justice in 1804.

The Campaign of 1796 in Germany The wonder of Europe now transferred itself from the drama of the French Revolution to the equally absorbing drama of a great war on the Rhine. ” Every day, for four terrible years,” wrote a German pamphleteer early in 1796, ” has surpassed the one before it in grandeur and terror, and to-day surpasses all in dizzy sublimity.” That a manoeuvre on the Lahn should possess an interest to the peoples of Europe surpassing that of the Reign of Terror is indeed hardly imaginable, but there was a good reason for the tense expectancy that prevailed everywhere. France’s policy was no longer defensive. She aimed at invading and ” revolutionizing ” the monarchies and principalities of old Europe, and to this end the campaign of 1796 was to be the great and conclusive effort. The ” liberation of the oppressed” had its part in the decision, and the glory of freeing the serf easily merged itself in the glory of defeating the serf’s masters. But a still more pressing motive for carrying the war into the enemy’s country was the fact that France and the lands she had overrun could no longer subsist her armies. The Directory frankly told its generals, when they complained that their men were starving and ragged, that they would find plenty of subsistence beyond the Rhine.

On her part, Austria, no longer fettered by allied contingents nor by the expenses of a far distant campaign, could put forth more strength than on former campaigns, and as war came nearer home and the citizen saw himself threatened by ” re- volutionizing ” and devastating armies, he ceased to hamper or to swindle the troops. Thus the duel took place on the grandest scale then known in the history of European armies. Apart from the secondary theatre of Italy, the area embraced in the struggle was a vast triangle extending from Diisseldorf to Basel and thence to Ratisbon, and Carnot sketched the outlines in accordance with the scale of the picture. He imagined nothing less than the union of the armies of the Rhine and the Riviera before the walls of Vienna. Its practicability cannot here be discussed, but it is worth contrasting the attitude of contem- poraries and of later strategical theorists towards it. The former, with their empirical knowledge of war, merely thought it impracticable with the available means, but the latter have condemned it root and branch as ” an operation on exterior lines.”

The scheme took shape only gradually. The first advance was made partly in search of food, partly to disengage the

Palatinate, which Clerfayt had conquered in 1795. ” If you have reason to believe that you would find some supplies on the Lahn, hasten thither with the greater part of your forces,” wrote the

Directory to Jourdan (Army of the Sambre-and- Meuse, 72,000) on the 29th of March. He was to move at once, before the Austrians could concentrate, and to pass the Rhine at Dtisseldorf, thereby bringing back the centre of the enemy over the river. He was, further, to take every sad ” advantage of their want of concentration to deliver Moreau. blow after blow, and to do his utmost to break them up completely. A fortnight later Moreau (Army of the Rhine- and-Moselle, 78,000) was ordered to take advantage of Jourdan’s move, which would draw most of the Austrian forces to the Mainz region, to enter the Breisgau and Suabia. ” You will attack Austria at home, and capture her magazines. You will enter a new country, the resources of which, properly handled, should suffice for the needs of the Army of the Rhine-and- Moselle.”

Jourdan, therefore, was to take upon himself the destruction of the enemy, Moreau the invasion of South Germany. The first object of both was to subsist their armies beyond the Rhine, the second to defeat the armies and terrorize the popula- tions of the empire. Under these instructions the campaign opened. Jourdan crossed at Diisseldorf and reached the Lahn, but the enemy concentrated against him very swiftly and he had to retire over the river. Still, if he had not been able to ” break them up completely,” he had at any rate drawn on himself the weight of the Austrian army, and enabled Moreau to cross at Strassburg without much difficulty.

The Austrians were now commanded by the archduke Charles, who, after all detachments had been made, disposed of some 56,000 men. At first he employed the bulk of this force against Jourdan, but on hearing of Moreau’s progress he returned to the Neckar country with 20,000 men, leaving Feldzeugmeister v. Wartensleben with’ 36,000 to observe Jourdan. In later years he admitted himself that his own force was far too small to deal with Moreau, who, he probably thought, would retire after a few manoeuvres.

But by now the two French generals were aiming at something more than alternate raids and feints. Carnot had set before them the ideal of a decisive battle as the great object. Jourdan was instructed, if the archduke turned on Tbe h . . , Moreau, to follow him up with all speed and to bring plan ˆ him to action. Moreau, too, was not retreating but advancing. The two armies, Moreau’s and the archduke’s, met in a straggling and indecisive battle at Malsch on the 9th of July, and soon afterwards Charles learned that Jourdan had recrossed the Rhine and was driving Wartensleben before him. He thereupon retired both armies from the Rhine valley into the interior, hoping that at least the French would detach large forces to besiege the river fortresses.

Disappointed of this, and compelled to face a very grave situation, he resorted to an expedient which may be described in his own words: ” to retire both armies step by step without committing himself to a battle, and to seize the first opportunity to unite them so as to throw himself with superior or at least equal strength on one of the two hostile enemies.” This is the ever-recurring idea of ” interior lines.” It was not new, for Frederick the Great had used similar means in simila,. circumstances, as had Souham at Tourcoing and even Dampierre at Valenciennes. Nor was it differentiated, as were Napoleon’s operations in this same year, by the deliberate use of a small containing force at one point to obtain relative superiority at another. A general of the 18th century did not believe in the efficacy of superior numbers — had not Frederick the Great disproved it ? — and for him operations on ” interior lines ” were simply successive blows at successive targets, the efficacy of the blow in each case being dependent chiefly on his own personal qualities and skill as a general on the field of battle. In the present case the point to be observed is not the expedient, which was dictated by the circumstances, but the courage of the young general, who, unlike Wartens- leben and the rest of his generals, unlike, too, Moreau and

Jourdan themselves, surmounted difficulties instead of lamenting them.

On the other side, Carnot, of course, foresaw this possibility. He warned the generals not to allow the enemy to ” use his forces sometimes against one, sometimes against the other, as he did in the last campaign,” and ordered them to go forward respectively into Franconia and into the country of the upper Neckar, with a view to seeking out and defeating the enemy’s army. But the plan of operations soon grew bolder. Jourdan was informed on the 21st of July that if he reached the Regnitz without meeting the enemy, or if his arrival there forced the latter to retire rapidly to the Danube, he was not to hesitate to advance to Ratisbon and even to Passau if the disorganization of the enemy admitted it, but in these contingencies he was to detach a force into Bohemia to levy contributions. ” We presume that the enemy is too weak to offer a successful resistance and will have united his forces on the Danube; we hope that our two armies will act in unison to rout him completely. Each is, in any case,

strong enough to attack by itself, and nothing is so pernicious as slowness in war." Evidently the fear that the two Austrian armies would unite against one of their as- sailants had now given place to something like disdain.

This was due in all probability to the rapidity with which Moreau was driving the archduke before him. After a brief stand on the Neckar at Cannstadt, the Austrians, only 25,000 strong, fell back to the Rauhe Alb, where they halted again, to cover their magazines at Ulm and Giinzburg, towards the end of July. Wartensleben was similarly falling back before Jourdan, though the latter, starting considerably later than Moreau, had not advanced so far. The details of the successive positions occupied by Wartensleben need not be stated; all that concerns the general development of the campaign is the fact that the hitherto independent leader of the " Lower Rhine Army '.' resented the loss of his freedom of action, and besides lamenta- tions opposed a dull passive resistance to all but the most formal orders of the prince. Many weeks passed before this was over- come sufficiently for his leader even to arrange for the contem- plated combination, and in these weeks the archduke was being driven back day by day, and the German principalities were falling away one by one as the French advanced and preached the revolutionary formula. In such circumstances as these — the general facts, if not the causes, were patent enough — it was natural that the confident Paris strategists should think chiefly of the profits of their enterprise and ignore the fears of the generals at the front. But the latter were justified in one important respect; their operating armies had seriously diminished in numbers, Jourdan disposing of not more than 45,000 and Moreau of about 50,000. The archduke had now, owing to the arrival of a few detachments from the Black Forest and elsewhere, about 34,000 men, Wartensleben almost exactly the same, and the former, for some reason which has never been fully explained but has its justification in psychological factors, suddenly turned and fought a long, severe and straggling battle above Neresheim (August n). This did not, however, give him much respite, and on the 12th and 13th he retired over the Danube. At this date Wartensleben was about Amberg, almost as far away from the other army as he had been on the Rhine, owing to the necessity of retreating round instead of through the principality of Bayreuth, which was a Prussian possession and could therefore make its neutrality respected.

Hitherto Charles had intended to unite his armies on the Danube against Moreau. His later choice of Jourdan's army as the objective of his combination grew out of circumstances and in particular out of the brilliant reconnaissance work of a cavalry brigadier of the Lower

Rhine Army, Nauendorff. This general's reports — he was working in the country south and south-east of Niirnberg, Wartensleben being at Amberg — indicated first an advance of Jourdan's army from Forchheim through Niirnberg to the south, and induced the archduke, on the 12th, to begin a concentration of his own army towards Ingolstadt. This was a purely defensive measure, but Nauendorff reported on the 13th and 14th that the main columns of the French were swinging

Neresheim.

away to the east against Wartensleben's front and inner flank, and on the 14th he boldly suggested the idea that decided the campaign. " If your Royal Highness will or can advance 12,000 men against Jourdan's rear, he is lost. We could not have a better opportunity." When this message arrived at head- quarters the archduke had already issued orders to the same effect. Lieutenant Field Marshal Count Latour, with 30,000 men, was to keep Moreau occupied — another expedient of the moment, due to the very close pressure of Moreau's advance, and the failure of the attempt to put him out of action at Neresheim. The small remainder of the army, with a few detachments gathered en route, in all about 27,000 men, began to recross the Danube on the 14th, and slowly advanced north on a broad front, its leader being now sure that at some point on his line he would encounter the French, whether they were heading for Ratisbon or Amberg. Meanwhile, the Directory had, still acting on the theory of the archduke's weakness, ordered Moreau to combine the operations with those of Bonaparte in Italian Tirol, and Jourdan to turn both flanks of his immediate opponent, and thus to prevent his joining the archduke, as well as his retreat into Bohemia. And curiously enough it was this latter, and not Moreau's move, which suggested to the archduke that his chance had come. The chance was, in fact, one dear to the 1 8th century general, catching his opponent in the act of executing a manoeuvre. So far from " exterior lines " being fatal to Jourdan, it was not until the French general began to operate against Wartensleben's inner flank that the archduke's opportunity came.

The decisive events of the campaign can be described very briefly, the ideas that directed them having been made clear. The. long thin line of the archduke wrapped itself round Jourdan's right flank near Amberg, while Wartensleben Am ˆ eT X fought him in front. The battle (August 24) was a wiirzburg. series of engagements between the various columns that met; it was a repetition in fact of Fleurus, without the intensity of fighting spirit that redeems that battle from dulness. Success followed, not upon bravery or even tactics, but upon

the pre- existing strategical conditions. At the end of the day the French retired, and next morning the archduke began another wide extension to his left, hoping to head them off. This consumed several days. In the course of it Jourdan attempted to take advantage of his opponent's dissemination to regain the direct road to Wiirzburg, but the attempt was defeated by an almost fortuitous combination of forces at the threatened point. More I effective, indeed, than this indirect pursuit was the very active hostility of the peasantry, who had suffered in Jourdan's advance and retaliated so effectually during his retreat that the army became thoroughly demoralized, both by want of food and by the strain of incessant sniping. Defeated again at Wiirzburg on the 3rd of September, Jourdan continued his retreat to the Lahn, and finally withdrew the shattered army over the Rhine, partly by Diisseldorf, partly by Neuwied. In >the last engagement on the Lahn the young and brilliant Marceau was mortally wounded. Far away in Bavaria, Moreau had meantime been driving Latour from one line of resistance to another. On re- ceiving the news of Jourdan's reverses, however, he made a rapid and successful retreat to Strassburg, evading the prince's army, which had ascended the Rhine valley to head him off, in the nick of time.

This celebrated campaign is pre-eminently strategical in its character, in that the positions and movements anterior to the battle preordained its issue. It raised the reputation of the arch- duke Charles to the highest point, and deservedly, for he wrested victory from the most desperate circumstances by the skilful and resolute employment of his one advantage. But this was only possible because Moreau and Jourdan were content to accept strategical failure without seeking to redress the balance by hard fighting. The great question of this campaign is, why did Moreau and Jourdan fail against inferior numbers, when in Italy Bonaparte with a similar army against a similar opponent won victory after victory against equal and superior forces ? The answer will not be supplied by any theory of " exterior and

interior lines." It lies far deeper. So far as it is possible to summarize it in one phrase, it lies in the fact that though the Directory meant this campaign to be the final word on the Revolutionary War, for the nation at large this final word had been said at Fleurus. The troops

were still the nation; they no longer fought for a cause and for bare existence, and Moreau and Jourdan were too closely allied in ideas and sympathies with the misplaced citizen soldiers they commanded to be able to dominate their collective will. In default of a cause, however, soldiers will fight for a man, and this brings us by a natural sequence of ideas to the war in Italy.

The War in Italy 1793-97 Hitherto we have ignored the operations on the Italian frontier, partly because they were of minor importance and partly because the conditions out of which Napoleon's first campaign arose can be best considered in connexion with that campaign itself, from which indeed the previous operations derive such light as they possess. It has been mentioned that in 1792 the French overran Savoy and Nice. In 1793 the Sardinian army and a small auxiliary corps of Austrians waged a desultory mountain warfare against the Army of the Alps about Briancon and the Army of Italy on the Var. That furious offensive on the part of the French, which signalized the year 1 793 elsewhere, was made impossible here by the counter-revolution in the cities of the Midi.

In 1 794, when this had been crushed, the intention of the French government was to take the offensive against the Austro- Sardinians. The first operation was to be the capture of Oneglia. The concentration of large forces in the lower Rhone valley had naturally infringed upon the areas told off for the provisioning of the Armies of the Alps (Kellermann) and of Italy (Dumerbion) ; indeed, the sullen population could hardly be induced to feed the troops suppressing the revolt, still less the distant frontier armies. Thus the only source of supply was the Riviera of Genoa: " Our connexion with this district is imperilled by the corsairs of Oneglia (a Sardinian town) owing to the cessation of our operations afloat. The army is living from hand to mouth," wrote the younger Robespierre in September 1793. Vessels bearing supplies from Genoa could not avoid the corsairs by taking the open sea, for there the British fleet was supreme. Carnot therefore ordered the Army of Italy to capture Oneglia, and 21,000 men (the rest of the 67,000 effectives were held back for coast defence) began operations in April. The French left moved against the enemy's positions on the main road over the Col di Tenda, the centre towards Ponte di Nava, and the right

along the Riviera. All met with success, thanks to

Massena's bold handling of the centre column. Not only was Oneglia captured, but also the Col di Tenda. Napoleon Bonaparte served in these affairs on the headquarter staff. Meantime the Army of the Alps

had possessed itself of the Little St Bernard and Mont Cenis, and the Republicans were now masters of several routes into Piedmont (May). But the Alpine roads merely led to fortresses, and both Carnot and Bonaparte — Napoleon had by now captivated the younger Robespierre and become the leading spirit in Dumerbion's army — considered that the Army of the Alps should be weakened to the profit of the Army of Italy, and that the time had come to disregard the feeble neutrality of Genoa, and to advance over the Col di Tenda. Napoleon's first suggestion for a rapid condensation of the French cordon, and an irresistible blow on the centre of the Allies

by Tenda-Coni, 1 came to nothing owing to the waste la 1794. °f t ‘ me m negotiations between the generals and the

distant Committee, and meanwhile new factors came into play. The capture of the pass of Argentera by the right wing of the Army of the Alps suggested that the main effort should be made against the barrier fortress of Demonte, but here again Napoleon proposed a concentration of effort on the primary and economy of force in the secondary objective. About the same time, in a memoir on the war in general, he laid down his most

1 Liguria was not at this period thought of, even by Napoleon, as anything more than a supply area.

Saorgio.

celebrated maxim: ” The principles of war are the same as those of a siege. Fire must be concentrated on one point, and as soon as the breach is made, the equilibrium is broken and the rest is nothing.” In the domain of tactics he was and remains the principal exponent of the art of breaking the equilibrium, and already he imagined the solution of problems of policy and strategy on the same lines. ” Austria is the great enemy; Austria crushed, Germany, Spain, Italy fall of themselves. We must not disperse, but concentrate our attack.” Napoleon argued that Austria could be effectively wounded by an offensive against Piedmont, and even more effectively by an ulterior advance from Italian soil into Germany. In pursuance of the single aim he asked for the appointment of a single commander- in-chief to hold sway from Bayonne to the Lake of Geneva, and for the rejection of all schemes for ” revolutionizing ” Italy till after the defeat of the arch-enemy.

Operations, however, did not after all take either of these forms. The younger Robespierre perished with his brother in the coup d'etat of

9th Thermidor, the advance was suspended, and Bonaparte, amongst other leading spirits of the Army of Italy, was arrested and imprisoned. Profiting by this moment, Austria increased her auxiliary corps. An Austrian general took command of the whole of the allied forces, and pronounced a threat from the region of Cairo (where the Austrians took their place on the left wing of the combined army) towards the Riviera. The French, still dependent on Genoa for supplies, had to take the offensive at once to save themselves from starvation, and the result was the expedition of Dego, planned chiefly by Napoleon, who had been released from prison and was at headquarters, though unemployed. The movement began on the 17th of September; and although the Austrian general Colloredo repulsed an attack at Dego (Sept. 21) he retreated to Acqui, and the incipient offensive of the Allies ended abruptly.

The first months of the winter of 1794-1795 were spent in re-equipping the troops, who stood in sore need after their rapid movements in the mountains. For the future operations, the enforced condensation of the army on its right wing with the object of protecting its line of supply to Genoa and the dangers of its cramped situation on the Riviera suggested a plan roughly resembling one already recommended by Napoleon, who had since the affair of Dego become convinced that the way into Italy was through the Apennines and not the Alps. The essence of this was to anticipate the enemy by a very early and rapid advance from Vado towards Carcare by the Ceva road, the only good road of which the French disposed and which they signifi- cantly called the chemin de canon.

The plan, however, came to nothing; the Committee, which now changed its personnel at fixed intervals, was in consequence wavering and non-committal, troops were withdrawn schirer for a projected invasion of Corsica, and in November and 1794 Dumerbion was replaced by Scherer, who assembled only 17,000 of his 54,000 effectives for field operations, and selected as his line of advance the Col di Tenda- Coni road. Scherer, besides being hostile to any suggestion emanating from Napoleon, was impressed with the apparent danger to his right wing concentrated in the narrow Riviera, which it was at this stage impossible to avert by a sudden and early assumption of the offensive. After a brief tenure Scherer was transferred to the Spanish frontier, but Kellermann, who now received command of the Army of Italy in addition to his own, took the same view as his predecessor — the view of the ordinary general. But not even the Scherer plan was put into execution, for spring had scarcely arrived when the prospect of renewed revolts in the south of France practically paralysed the army.

This encouraged the enemy to deliver the blow that had so long been feared. The combined forces, under Devins, — the Sar- dinians, the Austrian auxiliary corps and the newly arrived Austrian main army, — advanced together and forced the French right wing to evacuate Vado and the Genoese littoral. But at this juncture the conclusion of peace with Spain released the Pyrenees armies, and Scherer returned to the Army of Italy at the head of reinforcements. He was faced with a difficult situation,

Keller- mann.

but he had the means wherewith to meet it, as Napoleon promptly pointed out. Up to this, Napoleon said, the French commanded the mountain crest, and therefore covered Savoy and Nice, and also Oneglia, Loano and Vado, the ports of the Riviera. But now that Vado was lost the breach was made. Genoa was cut off, and the south of France was the only remaining resource for the army commissariat. Vado must therefore be retaken and the line reopened to Genoa, and to do this it was essential first to close up the over-extended cordon — and with the greatest rapidity, lest the enemy, with the shorter line to move on, should gather at the point of contact before the French — and to advance on Vado. Further, knowing (as every one knew) that the king of Sardinia was not inclined to continue the struggle indefinitely, he predicted that this ruler would make peace once the French army had established itself in his dominions, and for this the way into the interior, he asserted, was the great road Savona-Ceva. But Napoleon's mind ranged beyond the immediate future. He calculated that once the French advanced the Austrians would seek to cover Lombardy, the Piedmontese Turin, and this separa- tion, already morally accomplished, it was to be the French general's task to accentuate in fact. Next, Sardinia having been coerced into peace, the Army of Italy would expel the Austrians from Lombardy, and connect its operations with those of the French in South Germany by way of Tirol. The supply question, once the soldiers had gained the rich valley of the Po, would solve itself.

This was the essence of the first of four memoranda on this subject prepared by Napoleon in his Paris office. The second indicated the means of coercing Sardinia — first the oaao. Austrians were to be

driven or scared away towards Alessandria, then the French army would turn sharp to the left, driving the Sardinians eastward and north-eastward through Ceva, and this was to be the signal for the general invasion of Piedmont from all sides. In the third paper he framed an elaborate plan for the retaking of Vado, and in the fourth he summarized the contents of the other three. Having thus cleared his own mind as to the conditions and the solution of the problem, he did his best to secure the command for himself.

The measures recommended by Napoleon were translated into a formal and detailed order to recapture Vado. To Napoleon the miserable condition of the Army of Italy was the most urgent incentive to prompt action. In Scherer's judgment, however, the army was unfit to take the field, and therefore ex hypothesi to attack Vado, without thorough reorganization, and it was only in November that the advance was finally made. It culminated, thanks once more to the resolute Massena, in the victory of Loano (November 23-24) . But Scherer thought more of the destitution of his own army than of the fruits of success, and contented himself with resuming possession of the Riviera.

Meanwhile the Mentor whose suggestions and personality were equally repugnant to Scherer had undergone strange vicissitudes of fortune — dismissal from the headquarters' staff, expulsion from the list of general officers, and then the " whiff of grapeshot " of 13th Vendemiaire, followed shortly by his marriage with Josephine, and his nomination to command the Army of Italy. These events had neither shaken his cold resolution nor disturbed his balance.

The Army of Italy spent the winter of 1 795-1 796 as before in the narrow Riviera, while on the one side, just over the mountains, lay the Austro-Sardinians, and on the other, out of Napoleon ran g e f the coast batteries but ready to pounce on the command, supply ships, were the British frigates. On Bonaparte's left Kellermann, with no more than 18,000,. maintained a string of posts between Lake Geneva and the Argentera as before. Of the Army of Italy, 7000 watched the Tenda road and 20,000 men the coast-line. There remained for active operations some 27,000 men, ragged, famished and suffering in every way in spite of their victory of Loano. The Sardinian and Austrian auxiliaries (Colli), 25,000 men, lay between Mondovi and Ceva, a force strung out in the Alpine valleys opposed Kellermann, and the main Austrian army (commanded by Beaulieu) , in widely extended

cantonments between Acqui and Milan, numbered 27,000 field troops. Thus the short-lived concentration of all the allied forces for the battle

against Scherer had ended in a fresh separa- tion. Austria was far more concerned with Poland than with the moribund French question, and committed as few of her troops as possible to this distant and secondary theatre of war. As for Piedmont, ” peace ” was almost the universal cry, even within the army. All this scarcely affected the regimental spirit and discipline of the Austrian squadrons and battalions, which had now recovered from the defeat of Loano. But they were im- portant factors for the new general-in-chief on the Riviera, and formed the basis of his strategy.

Napoleon’s first task was far mere difficult than the writing of memoranda. He had to grasp the reins and to prepare his troops, morally and physically, for active work. It was not merely that a young general with many enemies, a political favourite of the moment, had been thrust upon the army. The army itself was in a pitiable condition. Whole companies with their officers went plundering in search of mere food, the horses had never received as much as half-rations for a year past, and even the generals were half-starved. Thousands of men were barefooted and hundreds were without arms. But in a few days he had secured an almost incredible ascendancy over the sullen, starved, half- clothed army.

” Soldiers,” he told them, ” you are famished and nearly naked. The government owes you much, but can do nothing for you. Your patience, your courage, do you honour, but give you no glory, no advantage. I will lead you into the most fertile plains of the world. There you will find great towns, rich provinces. There you will find honour, glory and riches. Soldiers of Italy, will you be wanting in courage ? ”

Such words go far, and little as he was able to supply material deficiencies — all he could do was to expel rascally contractors, sell a captured privateer for £5000 and borrow £2500 from Genoa — he cheerfully told the Directory on the 28th of March that ” the worst was over.” He augmented his army of operations to about 40,000, at the expense of the coast divisions, and set on foot also two small cavalry divisions, mounted on the half -starved horses that had survived the winter. Then he announced that the army was ready and opened the campaign.

The first plan, emanating from Paris, was that, after an expedition towards Genoa to assist in raising a loan there, the army should march against Beaulieu, previously neutralizing the Sardinians by the occupation of Ceva. When Beaulieu was beaten it was thought probable that the Piedmontese would enter into an alliance with the

French against their former comrades. A second plan, however, authorized the general to begin by subduing the Piedmontese to the extent necessary to bring about peace and alliance, and on this Napoleon acted. If the present separation of the Allies continued, he proposed to overwhelm the Sardinians first, before the Austrians could assemble from winter quarters, and then to turn on Beaulieu. If, on the other hand, the Austrians, before he could strike his blow, united with Colli, he proposed to frighten them into separating again by moving on Acqui and Alessandria. Hence Carcare, where the road from Acqui joined the "cannon-road," was the first objective of his march, and from there he could manoeuvre and widen the breach between the allied armies. His scattered left wing would assist in the attack on the Sardinians as well as it could — for the immediate attack on the Austrians its co-operation would of course have been out of the question. In any case he grudged every week spent in administrative preparation. The delay due to this, as a matter of fact, allowed a new situation to develop. Beaulieu was himself the first to move, and he moved towards Genoa instead of towards his Allies. The gap between the two allied wings was thereby widened, but it was no longer possible for the French to use it, for their plan of destroying Colli while Beaulieu was ineffective had collapsed.

In connexion with the Genoese loan, and to facilitate the move- ment of supply convoys, a small French force had been pushed forward to Voltri. Bonaparte ordered it back as soon as he arrived at the front, but the alarm was given. The Austrians

Opening

move'

meats.

broke up from winter quarters at once, and rather than lose the food supplies at Voltri, Bonaparte actually reinforced Massena at that place, and gave him orders to hold on as long as possible, cautioning him only to watch his left rear (Montenotte). But he did not abandon his purpose. Starting from the new condi- tions, he devised other means, as we shall see, for reducing Beaulieu to ineffectiveness. Meanwhile Beaulieu's plan of offensive operations, such as they were, developed.

The French advance to Voltri had not only spurred him into activity, but convinced him that the bulk of the French army lay east of Savona. He therefore made Voltri the objective of a converging | attack, not with the intention of destroying the French army but with that of " cutting its communications with Genoa," and expelling it from " the only place in the Riviera where there were sufficient ovens to bake its bread." (Beaulieu to the Aulic Council, 15 April.) The Sardinians and auxiliary Austrians were ordered to extend leftwards on Dego to close the gap that Beaulieu's advance on Genoa-Voltri opened up, which they did, though only half- heartedly and in small force, for, unlike Beaulieu, they knew that masses of the enemy were still in the western stretch of the Riviera. The rightmost of Beaulieu's own columns was on the road between Acqui and Savona with orders to seize Monte Legino as an advanced post, the others were to converge towards Voltri from the Genoa side and the mountain passes about Campofreddo and Sassello. The wings were therefore so far connected that Colli wrote to Beaulieu on this day " the enemy will never dare to place himself between our two armies." The event belied the prediction, and the proposed minor operation against granaries and bakeries became the first act of a decisive campaign.

On the night of the 9th of April the French were grouped as follows: brigades under Gamier and Macquard at the Finestre and Tenda passes, Serurier's division and Rusca's brigade east of Garessio; Augereau's division about Loano, Meynier's at Finale, Laharpe's at Savona with an outpost on the Monte Legino, and Cervoni's brigade at Voltri. Massena was in general charge of the last-named units. The cavalry was far in rear beyond Loano. Colli's army, excluding the troops in the valleys that led into Dauphine, was around Coni and Mondovi-Ceva, the latter group connecting with Beaulieu by a detachment under Provera between Millesimo and Carcare. Of Beaulieu's army, Argenteau's division, still concentrating to the front in many small bodies, extended over the area Acqui-Dego- Sassello. Vukassovich's brigade was equally extended between Ovada and the mountain-crests above Voltri, and Pittoni's division was grouped around Gavi and the Bocchetta, the two last units being destined for the attack on Voltri. Farther to the rear was Sebottendorf's division around Alessandria- Tortona.

On the afternoon of the 10th Beaulieu delivered his blow at Voltri, not, as he anticipated, against three-quarters of the French army, but against Cervoni's detachment. This, after a long frregular fight, slipped away in the night to Savona. Dis- covering his mistake next morning, Beaulieu sent back some of his battalions to join Argenteau. But there was no road by which they could do so save the detour through Acqui

and Dego, and long before they arrived Argenteau's advance on Monte Legino had forced on the crisis. On the nth (a day behind time), this general drove in the French outposts, but he soon came on three battalions under Colonel Rampon, who threw himself into some old earthworks that lay near, and said to his men, " We must win or die here, my friends." His redoubt and his men stood the trial well, and when day broke on the 1 2th Bonaparte was ready to deliver his first " Napoleon- stroke."

The principle that guided him in the subsequent operations may be called " superior numbers at the decisive point." Touch had been gained with the enemy all along the long line between the Tenda and Voltri, and he decided to concentrateswiftlyuponthe nearest enemy — Argenteau

was ordered to Mallare, picking up here and there on the way a few horsemen and guns. Massena, with 9000 men, was to send two brigades in the direction of Carcare and Altare, and with the third to swing round Argenteau's right and to head for Montenotte village in his rear. Laharpe with 7000 (it had become clear that the enemy at Voltri would not pursue their advantage) was to join Rampon, leaving only Cervoni and two battalions in Savona. Serurier and Rusca were to keep the Sardinians in front of them occupied. The far-distant brigades of Gamier and Macquard stood fast, but the cavalry drew eastward as quickly as its condition permitted. In rain and mist on the early morning of the 12th the French marched up from all quarters, while Argenteau's men waited in their cold bivouacs for light enough to resume their attack on Monte Legino. About 9 the mists cleared, and heavy fighting began, but Laharpe held the mountain, and the vigorous Massena with his nearest brigade stormed forward against Argenteau's right. A few hours later, seeing Augereau's columns heading for their line of retreat, the Austrians retired, sharply pressed, on Dego. The threatened intervention of Provera was checked by Augereau's presence at Carcare.

Montenotte was a brilliant victory, and one can imagine its effects on the but lately despondent soldiers of the Army of

,'les;

English Miles ■ – 5 ■ '■"

French. –

Austrians .?„.....©

Safrf/n;an»...;.....0

Sketch of the positions occupied on the night of April 14th.

Monte* notte.

Italy, for all imagined that Beaulieu's main body had been defeated. This was far from being the case, however, and although the French spent the night of the battle at Cairo-Carcare-Monte- notte, midway between the allied wings, only two-thirds of Argenteau's force, and none of the other divisions, had been beaten, and the heaviest fighting was to come. This became evident on the afternoon of the 13th, but meanwhile Bonaparte, eager to begin at once the subjugation of the Piedmontese (for which purpose he wanted to bring S6rurier and Rusca into play) sent only Laharpe's division and a few details of Massena's, under the latter, towards Dego. These were to protect the main attack from interference by the forces that had been engaged at Montenotte (presumed to be Beaulieu's MIUetlm0t main body), the said main attack being delivered by Augereau's division, reinforced by most of Massena's, on the positions held by Provera. The latter, only 1000 strong to Augereau's 9000, shut himself in the castle of Cossaria, which he defended a la Rampon against a series of furious assaults. Not until the morning of the 14th was his surrender secured,

after his ammunition and food had been exhausted.

Argenteau also won a day's respite on the 13th, for Laharpe

did not join Massena till late, and nothing took place opposite

Augereau'rdivlsronroˆ'sucVpartoflt as could march "at once, i Dego but a little skirmishing. During the day Bonaparte saw

Dego.

for himself that he had overrated the effects of Montenotte. Beaulieu, on the other hand, underrated them, treating it as a t mishap which was more than counterbalanced by his own success in " cutting off the French from Genoa." He began to reconstruct his line on the front Dego-Sassello, trusting to Colli to harry the French until the Voltri

troops had finished their detour through Acqui and rejoined Argenteau. This, of course, presumed that Argenteau's troops were intact and Colli 's able to move, which was not the case with either. Not until the afternoon of the 14th did Beaulieu place a few extra battalions at Argenteau's disposal " to be used only in case of extreme necessity," and order Vukassovich from the region of Sassello to " make a diversion " against the French right with two battalions.

Thus Argenteau, already shaken, was exposed to destruction. On the 14th, after Provera's surrender, Massena and Laharpe, reinforced until they had nearly a two-to-one superior- ity, stormed Dego and killed or captured 3000 of Argenteau's 5500 men, the remnant retreating in disorder to Acqui. But nothing was done towards the accomplishment of the purpose of destroying Colli on that day, save that Serurier and Rusca began to close in to meet the main body between Ceva and Millesimo. Moreover, the victory at Dego had produced its usual results on the wild fighting swarms of the Republicans, who threw themselves like hungry wolves on the little town, without pursuing the beaten enemy or even placing a single outpost on the Acqui road. In this state, during the early hours of the 15th, Vukassovich 's brigade, 1 marching up from Sassello, surprised them, and they broke and fled in an instant. The whole morning had to be spent in rallying them at Cairo, and Bonaparte had for the second time to postpone his union with Serurier and Rusca, who meanwhile, isolated from one another and from the main army, were groping forward in the mountains. A fresh assault on Dego was ordered, and after very severe fighting, Massena and Laharpe succeeded late in the evening in retaking it. Vukassovich lost heavily, but retired steadily and in order on Spigno. The killed and wounded numbered probably about 1000 French and 1500 Austrians, out of considerably less than 10,000 engaged on each side — a loss which contrasted very forcibly with those suffered in other battles of the Revolutionary Wars, and by teaching the Army of Italy to bear punishment, imbued it with self-confidence. But again success bred disorder, and there was a second orgy in the houses and streets of Dego which went on till late in the morning and paralysed the whole army.

This was perhaps the crisis of the campaign. Even now it was not certain that the Austrians had been definitively pushed aside, while it was quite clear that Beaulieu's main body was intact and Colli was still more an unknown quantity. But Napoleon's intention remained the same, to attack the Pied- montese as quickly and as heavily as possible, Beaulieu being held in check by a containing force under Massena and Laharpe. The remainder of the army, counting in now Rusca and Serurier, was to move westward towards Ceva. This

disposition, while it illustrates the Napoleonic principle of delivering a heavy blow on the selected target and warding off interference at other points, shows also the difficulty of rightly apportioning the available means between the offensive mass and the defensive system, for, as it turned out, Beaulieu was already sufficiently scared, and thought of nothing but self-defence on the line Acqui-Ovada-Bocchetta, while the French offensive mass was very weak compared with Colli's unbeaten and now fairly concentrated army about Ceva and Montezemolo.

On the afternoon of the 16th the real advance was begun by Augereau's division, reinforced by other troops. Rusca joined Augereau towards evening, and Serurier approached Ceva from the south. Colli's object was now to spin out time, and having repulsed a weak attack by Augereau, and feeling able to repeat these tactics on each successive spur of the Apennines,

1 Vukassovich had received Beaulieu's order to demonstrate with two battalions, and also appeals for help from Argenteau. He therefore brought most of his troops with him.

San Michele.

he retired in the night to a new position behind the Cursaglia.. On the 17th, reassured by the absence of fighting on the Dego side, and by the news that no enemy remained at Sassello, Bonaparte released Massena from Dego, leaving only Laharpe there, and brought him over towards the right of the main body, which thus on the evening of the 17th formed a long straggling line on both sides of Ceva, Serurier on the left, echeloned forward, Augereau, Joubert and Rusca in the centre, and Massena, partly as support, partly as flank guard, on Augereau's right rear. Serurier had been bidden to extend well out and to strive to get contact with Massena, i.e. to encircle the enemy. There was no longer any idea of waiting to besiege Ceva, although the artillery train had been ordered up from the Riviera by the " cannon-road " for eventual use there. Further, the line of supply, as an extra guarantee against interference, was changed from that of Savona-Carcare to that of Loano-Bardinetto. When this was accomplished, four clear days could be reckoned on with certainty in which to deal with Colli.

The latter, still expecting the Austrians to advance to his assistance, had established his corps (not more than 12,000 muskets in all) in the immensely strong positions of the Cursaglia, with a thin line of posts on his left stretching towards Cherasco, whence he could com-

municate, by a roundabout way, with Acqui. Opposite this position the long straggling line of the French arrived, after many delays due to the weariness of the troops, on the 19th A day of irregular fighting followed, everywhere to the advantage of the defenders. Napoleon, fighting against time, ordered a fresh attack on the 20th, and only desisted when it became evident that the army was exhausted, and, in particular, when Serurier reported frankly that without bread the soldiers would not march. The delay thus imposed, however, enabled him to clear the ” cannon-road ” of all vehicles, and to bring up the Dego detachment to replace Massena in the valley of the western Bormida, the latter coming in to the main army. Further, part at any rate of the convoy service was transferred still farther westward to the line Albenga-Garessio-Ceva. Nelson’s fleet, that had so powerfully contributed to force the French inland, was becoming less and less innocuous. If leadership and force of character could overcome internal friction, all the success he had hoped for was now within the young commander’s grasp. :

Twenty-four thousand men, for the first time with a due proportion of cavalry and artillery, were now disposed along Colli’s front and beyond his right flank. Colli, out- M numbered by two to one and threatened with en- velopment, decided once more to retreat, and the Republicans occupied the Cursaglia lines on the morning of the 21st without firing a shot. But Colli halted again at Vico, half-way to Mondovi (in order, it is said, to protect the evacuation of a small magazine he had there), and while he was in this un- favourable situation the pursuers came on with true Republican swiftness, lapped round his flanks and crushed him. A few days later (27th April), the armistice of Cherasco put an end to the campaign before the Austrians moved a single battalion to his assistance.

The interest of the campaign being above all Napoleonic, its moral must be found by discovering the ” Napoleon touch ” that differen- tiated it from other Revolutionary campaigns. A great _. deal is common to all, on both sides. The Austrians J,£ and Sardinians worked together at least as effectively as ta J£u°» e0a the Austrians, Prussians, British and Dutch in the Nether- lands. Revolutionary energy was common to the Army of Italy and to the Army of the North. Why, therefore, when the war dragged on from one campaign to another in the great plains of the Meuse and Rhine countries, did Napoleon bring about so swift a decision in these cramped valleys? The answer is to be found partly in the exigencies of the supply service, but still more in Napoleon’s own personality and the strategy born of it. The first, as we have seen, was at the end of its resources when Beaulieu placed himself across the Genoa road. Action of seme

sort was the plain alternative to starvation, and at this point Napoleon's personality intervened. He would have no quarter-rations on the Riviera, but plenty and to spare beyond the mountains. If there were many thousand soldiers who marched unarmed and shoeless in the ranks, it was towards " the Promised Land " that he led them. He looked always to the end. and

met each day as if with full expectation of attaining it before sunset. Strategical conditions and " new French " methods of war did not save Bonaparte in the two crises — the Dego rout and the sullen halt of the army at San Michele — but the personality which made the soldiers, on the way to Montenotte, march barefoot past a wagon- load of new boots.

We have said that Napoleon's strategy was the result of this per- sonal magnetism. Later critics evolved from his success the theory of " interior lines," and then accounted for it by applying the criterion they had evolved. Actually, the form in which the will to conquer found expression was in many important respects old. What, therefore, in the theory or its application was the product of Napoleon's own genius and will-power ? A comparison with Souham's campaign of Tourcoing will enable us to answer this question. To begin with, Souham found himself midway between Coburg and Cler- fayt almost by accident, and his utilization of the advantages of his position was an expedient for the given case. Napoleon, however, placed himself deliberately and by fighting his way thither, in an analogous situation at Carcare and Cairo. Military opinion of the time considered it dangerous, as indeed it was, for no theory can alter the fact that had not Napoleon made his men fight harder and march farther than usual, he would have been destroyed. The effective play of forces on interior lines depends on the two conditions that the outer enemies are not so near together as to give no time for the inner mass to defeat one before the arrival of the other, and that they are not so far apart that before one can be brought to action the other has inflicted serious damage elsewhere.

Neither condition was fully met at any time in the Montenotte campaign. On the nth Napoleon knew that the attack on Voltri had been made by a part only of the Austrian forces, yet he flung his own

masses on Montenotte. On the 13th he thought that Beaulieu's main body was at Dego and Colli's at Millesimo, and on this assumption had to exact the most extraordinary efforts from Augereau's troops at Cossaria. On the 19th and 20th he tried to exclude the risks of the Austrians' intervention, and with this the chances of a victory over them to follow his victory over Colli, by transferring the centre of gravity of his army to Ceva and Garessio, and fighting it out with Colli alone.

It was not, in fact, to gain a position on interior lines — with respect to two opponents — that Napoleon pushed his army to Carcare. Before the campaign began he hoped by using the " cannon-road " to destroy the Piedmontese before the Austrians were in existence at all as an army. But on the news from Voltri and Monte Legino he swiftly " concentrated fire, made the breach, and broke the equilibrium " at the spot where the interests and forces of the two Allies converged and diverged. The hypothesis in the first case was that the Austrians were practicaHy non-existent, and the whole object in the second was to breach the now connected front of the Allies (" strategic penetration ") and to cause them to break up into two separate systems. More, having made the breach, he had the choice (which he had not before) of attacking either the Austrians or the Sardinians, as every critic has pointed out. Indeed the Austrians offered by far the better target. But he neither wanted nor used the new alternative. His purpose was to crush Piedmont. " My enemies saw too much at once," said Napoleon. Singleness of aim and of purpose, the product of clear thinking and of " personality," was the foundation-stone of the new form of strategy.

In the course of subduing the Sardinians, Napoleon found himself placed on interior lines between two hostile masses, and another new idea, that of " relative superiority," reveals itself. Whereas Souham had been in superior force (90,000 against 70,000), Napoleon (40,000 against 50,000) was not, and yet the Army of Italy was always placed in a position of relative superiority (at first about 3 to 2 and ultimately 2 to 1) to the immediate antagonist. " The essence of strategy," said Napoleon in 1797, " is, with a weaker army, always to have more force at the crucial point than the enemy. But this art is taught neither by books nor by practice; it is a matter of tact." In this he expressed the result of his victories on his own mind rather than a preconceived formula which produced those victories. But the idea, though undefined, and the method of practice, though imperfectly worked out, were in his mind from the first. As soon as he had made the breach, he widened it by pushing out Massena and Laharpe on the one hand and Augereau on the other. This is mere common sense. But immediately afterwards, though preparing to throw all available

forces against Colli, he posted Massena and Laharpe at Dego to guard, not like Vandamme on the Lys against a real and pressing enemy, but against a possibility, and he only diminished the strength and altered the position of this containing detachment in proportion as the Austrian danger dwindled. Later in his career he defined this offensive-defensive system as ” having all possible strength at the decisive point,” and ” being nowhere vulnerable,” and the art of reconciling these two requirements, in each case as it arose, was always the principal secret of his generalship. At first his precautions (judged by events „ . . . and not by the probabilities of the moment) were excessive,

suoerlor- an< ˆ t ' le °" ens ' ve mass small. But the latter was handled 1+r by a general untroubled by multiple aims and anxieties,

and if such self-confidence was equivalent to 10,000 men on the battlefield, it was legitimate to detach 10,000 men to secure it. These 10,000 were posted 8 m. out on the dangerous

flank, not almost back to back with the main body as Vandamme had been, 1 and although this distance was but little compared to those of his later campaigns, when he employed small armies for the same purpose, it sufficed in this difficult mountain country, where the covering force enjoyed the advantage of strong positions. Of course, if Colli had been better concentrated, or if Beaulieu had been more active, the calculated proportions between covering force and main body might have proved fallacious, and the system on which Napoleon’s relative superiority rested might have broken down. But the point is that such a system, however rough its first model, had been imagined and put into practice.

This was Napoleon’s individual art of war, as raiding bakeries and cutting communications were Beaulieu’s speciality. Napoleon made the art into a science, and in our own time, with modern conditions of effective, armament and communications, it is more than possible that Moreaus and Jourdans will prove able to practise it with success. But in the old conditions it required a Napoleon. ” Strategy,” said Moltke, ” is a system of expedients.” But it was the intense personal force, as well as the genius, of Napoleon that forged these expedients into a system.

The first phase of the campaign satisfactorily settled, Napoleon was free to turn his attention to the ” arch-enemy ” to whom he was now considerably superior in numbers (35,000 to 25,000). The day after the signature of the armistice of Cherasco he began preparing for a

new advance and also for the role of arbiter of the destinies of Italy. Many whispers there were, even in his own army, as to the dangers of passing on without ” revolutionizing ” aristocratic Genoa and monarchical Piedmont, and of bringing Venice, the pope and the Italian princes into the field against the French. But Bonaparte, flushed with victory, and better informed than the malcontents of the real condi- tion of Italy, never hesitated. His first object was to drive out Beaulieu, his second to push through Tirol, and his only serious restriction the chance that the armistice with Piedmont would not result in a definitive treaty. Beaulieu had fallen back into Lombardy, and now bordered the Po right and left of Valenza. To achieve further progress, Napoleon had first to cross that river, and the point and method of crossing was the immediate problem, a problem the more difficult as Napoleon had no bridge train and could only make use of such existing bridges as he could seize intact. 2 If he crossed above Valenza, he would be confronted by one river-line after another, on one of which at least Beaulieu would probably stand to fight. But quite apart from the immediate problem, Napoleon’s intention was less to beat the Austrians than to dislodge them. He needed a foothold in Lombardy which would make him independent of, and even a menace to, Piedmont. If this were assured, he could for a few weeks entirely ignore his communications with France and strike out against Beaulieu, dethrone the king of Sardinia, or revolutionize Parma, Modena and the papal states according to circumstances.

Milan, therefore, was his objective, and Tortona-Piacenza his route thither. To give himself every chance, he had stipulated with the Piedmontese authorities for the right of pi ace _ 2 _ passing at Valenza, and he had the satisfaction of seeing Beaulieu fall into the trap and concentrate opposite that part of the river. The French meantime had moved to the region Alessandria-Tortona. Thence on the 6th of May Bonaparte, with a picked body of troops, set out for a forced march on Piacenza, and that night the advanced guard was 30 m. on the way, at Castel San Giovanni, and Laharpe’s and the cavalry divisions at Stradella, 10 m. behind them. Augereau was at Broni, Massena at Sale and Serurier near Valenza, the whole forming a rapidly extending fan, 50 m. from point to point. If the Piacenza detachment succeeded in crossing, the army was to follow rapidly in its track. If, on the other hand, Beaulieu fell

1 We have seen that after Tourcoing, taught by experience, Souham posted Vandamme’s covering force 14 or 15 m. out. But Napoleon’s disposition was in advance of experience.

2 The proposed alliance with the Sardinians came to nothing. The

kings of Sardinia had always made their alliance with either Austria or France conditional on cessions of conquered territory. But, according to Thiers, the Directory only desired to conquer the Milanese to restore it to Austria in return for the definitive cession of the Austrian Netherlands. If this be so, Napoleon's proclamations of " freedom for Italy " were, if not a mere political expedient, at any rate no more than an expression of his own desires which he was not powerful enough to enforce.

Lodi.

back to oppose the advanced guard, the Valenza divisions would take advantage of his absence to cross there. In either case, be it observed, the Austrians were to be evaded, not brought to action. On the morning of the 7th, the swift advanced guard under General Dallemagne crossed at Piacenza, 1 and, hearing of this, Bonaparte ordered every division except Serurier's thither with all possible speed. In the exultation of the moment he mocked at Beaulieu's incapacity, but the old Austrian was already on the alert. This game of manoeuvres he understood; already one of his divisions had arrived in close proximity to Dallemagne and the others were marching eastward by all available roads. It was not until the 8th that the French, after a series of partial encounters, were securely established on the left bank of the Po, and Beaulieu had given up the idea of forcing their most advanced troops to accept battle at a disadvantage. The success of the French was due less to their plan than to their mobility, which enabled them first to pass the river before the Austrians (who had actually started a day in advance of them) put in an appearance, and afterwards to be in superior numbers at each point of contact. But the episode was destined after all to culminate in a great event, which Napoleon himself indicated as the turning-point of his life. " Vendemiaire and even Monte- notte did not make me think myself a superior being. It was after Lodi that the idea came to me. . . . That first kindled the spark of boundless ambition."

The idea of a battle having been given up, Beaulieu retired to the Adda, and most of his troops were safely beyond it before the French arrived near Lodi, but he felt it necessary to leave a strong rearguard on the river opposite that place to cover the reassembly of his columns

after their scattered march. On the afternoon of the 10th of May, Bonaparte, with Dallemagne, Massena and Augereau, came up and seized the town. But 200 yds. of open ground had to be passed from the town gate to the bridge, and the bridge itself was another 250 in length. A few hundred yards beyond it stood the Austrians, 9000 strong with 14 guns. Napoleon brought up all his guns to prevent the enemy from destroying the bridge. Then sending all his cavalry to turn the enemy's right by a ford above the town, he waited two hours, employing the time in cannonading the Austrian lines, resting his advanced infantry and closing up Massena's and Augereau's divisions. Finally he gave the order to Dallemagne's 4000 grenadiers, who were drawn up under cover of the town wall, to rush the bridge. As the column, not more than thirty men broad, made its appearance, it was met by the concentrated fire of the Austrian guns, and half way across the bridge it checked, but Bonaparte himself and Massena rushed forward, the courage of the soldiers revived, and, while some jumped off the bridge and scrambled forward in the shallow water, the remainder stormed on, passed through the guns and drove back the infantry. This was, in bare outline, the astounding passage of the Bridge of Lodi. It was not till after the battle that Napoleon realized that only a rearguard was in front of him. When he launched his 4000 grenadiers he thought that on the other side there were four or five times that number of the enemy. No wonder, then, that after the event he recognized in himself the flash of genius, the courage to risk everything, and the " tact " which, independent of, and indeed contrary to all reasoned calculations, told him that the moment had come for " breaking the equilibrium." Lodi was a tactical success in the highest sense, in that the principles of his tactics rested on psychology — on the " sublime " part of the art of war as Saxe had called it long ago. The spirit pro- duced the form, and Lodi was the prototype of the Napoleonic battle — contact, manoeuvre, preparation, and finally the well- timed, massed and unhesitating assault. The absence of strate- gical results mattered little. Many months elapsed before this bold assertion of superiority ceased to decide the battles of France and Austria.

1 On entering the territory of the duke of Parma Bonaparte imposed, besides other contributions, the surrender of twenty famous pictures, and thus began a practice which for many years enriched the Louvre and only ceased with the capture of Paris in 1814.

Next day, still under the vivid tactical impressions of the Bridge of Lodi, he postponed his occupation of the Milanese and set off in pursuit of Beaulieu, but the latter was „..

now out of reach, and during the next few days the French divisions were installed at various points in the area Pavia-Milan-Pizzighetone, facing outwards in all dangerous directions, with a central reserve at Milan. Thus secured, Bonaparte turned his attention to political and military ad- ministration. This took the form of exacting from the neigh- bouring princes money, supplies and objects of art, and the once famished Army of Italy revelled in its opportunity. Now, how- ever, the Directory, suspicious of the too successful and too sanguine young general, ordered him to turn over the command in Upper Italy to Kellermann, and to take an expeditionary corps himself into the heart of the Peninsula, there to preach the Republic and the overthrow of princes. Napoleon absolutely refused, and offered his resignation. In the end (partly by bribery) he prevailed, but the incident reawakened his desire to close with Beaulieu. This indeed he could now do with a free hand, since not only had the Milanese been effectively occupied, but also the treaty with Sardinia had been ratified.

But no sooner had he resumed the advance than it was interrupted by a rising of the peasantry in his rear. The exac- tions of the French had in a few days generated sparks of dis- content which it was easy for the priests and the nobles to fan into open flames. Milan and Pavia as well as the countryside broke into insurrection, and at the latter place the mob forced the French commandant to surrender. Bonaparte acted swiftly and ruthlessly. Bringing back a small portion of the army with him, he punished Milan on the 25th, sacked and burned Binasco on the 26th, and on the evening of the latter day, while his cavalry swept the open country, he broke his way into Pavia with 1500 men and beat down all resistance. Napoleon's cruelty was never purposeless. He deported several scores of hostages to France, executed most of the mob leaders, and shot the French officer who had surrendered. In addition, he gave his 1500 men three hours' leave to pillage. Then, as swiftly as they had come, they returned to the army on the Oglio. From this river Napoleon advanced to the banks of the Mincio, where the remainder of the Italian campaign was fought out, both sides contemptuously disregarding Venetian neutrality. It centred on the fortress of Mantua, which Beaulieu, too weak to keep the field, and dislodged from the Mincio in the action of Borghetto (May 30), strongly garrisoned before retiring into Tirol. Beaulieu was soon afterwards replaced by Dagobert Siegmund, count von Wurmser (b. 1724), who brought con- siderable reinforcements from Germany.

At this point, mindful of the narrow escape he had had of losing his command, Bonaparte thought it well to begin the resettlement of Italy. The scheme for co-operating with Moreau on the Danube was indefinitely postponed, and the Army of Italy (now reinforced from

the Army of the Alps and counting 42,000 effectives) was again disposed in a protective ” zone of manoeuvre,” with a strong central reserve. Over 8000 men, however, garrisoned the fortresses of Piedmont and Lombardy, and the effective blockade of Mantua and political expeditions into the heart of the Peninsula soon used up the whole of this reserve.

Moreover, no siege artillery was available until the Austrians in the citadel of Milan capitulated, and thus it was not till the 18th of July that the first parallel was begun. Almost at the same moment Wurmser began his advance from Trent with 55,000 men to relieve Mantua.

The protective system on which his attack would fall in the first instance was now as follows: — Augereau (6000) about Legnago, Despinoy (8000) south-east of Verona, Mass6na (13,000) at Verona and Peschiera, with nintua. outposts on the Monte Baldo and at La Corona, Sauret (4500) at Salo and Gavardo. Serurier (12,000) was besieging Mantua, and the only central reserve was the cavalry (2000) under Kilmaine. The main road to Milan passed by Brescia. Sauret’s brigade, therefore, was practically a detached

post on the line of communication, and on the main defensive front less than 30,000 men were disposed at various points between La Corona and Legnago (30 m. apart) , and at a distance of 1 5 to 20 m. from Mantua. The strength of such a disposition depended on the fighting power and handiness of the troops, who in each case would be called upon to act as a rearguard to gain time. Yet the lie of the country scarcely permitted a closer grouping, unless indeed Bonaparte fell back on the old-time device of a ” circumvallation,” and shut himself up, with the supplies necessary for the calculated duration of the siege, in an impregnable ring of earthworks round Mantua. This, however, he could not have done even if he had wished, for the wave of revolt radiating from Milan had made accumulations of food impossible, and the lakes above and below the fortress, besides being extremely unhealthy, would have extended the perimeter of the circumvallation so greatly that the available forces would not suffice to man it. It was not in this, but in the absence of an

important central reserve that Bonaparte’s disposition is open to

criticism, which indeed could impugn the scheme in its entirety, as overtaxing the available resources, more easily than it could attack its details.

If Bonaparte has occasionally been criticized for his defensive measures, Wurmser's attack procedure has received almost universal condemnation, as to the justice of which it may be pointed out 1 that the object of the expedition was not to win a battle by falling on the disunited French with a well-concentrated army, but to over- power one, any one, of the corps covering the siege, and to press straight forward to the relief of Mantua, i.e. to the destruction of Bonaparte's batteries and the levelling of his trench work. The old principle that a battle was a grave event of doubtful issue was reinforced in the actual case by Beaulieu's late experiences of French Man, and as a temporary victory at one point would suffice for the purpose in hand, there was every incentive to multiply the points of contact. The soundness of Wurmser's plan was proved by the event. New ideas and new forces, undiscernible to a man of seventy-two years of age, obliterated his achievement by surpassing it, but such as it was — a limited use of force for a limited object — the venture undeniably succeeded.

The Austrians formed three corps, one (Quasdanovich, 18,000 men) marching round the west side of the Lake of Garda on Gavardo, Salo and the Brescia road, the second (under Wurmser, about 30,000) moving directly down the Adige, and the third (Davidovich, 6000) making a detour by the Brenta valley and heading for Verona by Vicenza.

1 See C. von B.-K., Geist und Stoff, pp. 449-451.

On the 29th Quasdanovich attacked Sauret at Salo, drove him towards Desenzano, and pushed on to Gavardo and thence into Brescia. Wurmser expelled Massena's advanced guard from La Corona-, and captured in succession the Monte Baldo and Rivoli posts. The Brenta column approached Verona with little or no fighting. News of this column led Napoleon early in the day to close up Despinoy, Massena and Kilmaine at Castel- nuovo, and to order Augereau from Legnago to advance on Montebello (to, m. east of Verona) against Davidovich's left rear. But after these orders had been despatched came the news of Sauret's defeat, and this moment was one of the most anxious in Napoleon's career. He could not make up his mind to give up the siege of Mantua, but he hurried Augereau back to the Mincio, and sent order after order to the officers on the lines of communi- cation to send all convoys by the Cremona instead of by the Brescia road. More, he had the baggage, the treasure and the sick set in motion at once for

Marcaria, and wrote to Serurier

a despatch which included the words ” perhaps we shall recover ourselves . . . but I must take serious measures for a retreat.” On the 30th he wrote: ” The enemy have broken through our line in three places . . . Sauret has evacuated Salo . . . and the enemy has captured Brescia. You see that our communications with Milan and Verona are cut.” The reports that came to him during the morning of the 30th enabled him to place the main body of the enemy opposite Massena, and this, without in the least alleviating the gravity of the situation, helped to make his course less doubtful. Augereau was ordered to hold the line of the Molinella, in case Davido- vich’s attack, the least-known factor, should after all prove to be serious; Massena to reconnoitre a road from Peschiera through Castiglione towards Orzinovi, and to stand fast at Castelnuovo opposite Wurmser as long as he could. Sauret and Despinoy were concentrated at Desenzano with orders on the 31st to clear the main line of retreat and to recapture Brescia. The Austrian movements were merely the continuation of those of the 29th. Quasdanovich wheeled inwards, his right finally resting on Montechiaro and his left on Salo. Wurmser drove back Massena to the west side of the Mincio. Davidovich made a slight advance.

In the late evening Bonaparte held a council of war at Rover- bella. The proceedings of this council are unknown, but it at any rate enabled Napoleon to see clearly and to act. Hitherto he had been covering the siege of Mantua with Mantua. various detachments, the defeat of any one of which might be fatal to the enterprise. Thus, when he had lost his main line of retreat, he could assemble no more than 8000 men at Desenzano to win it back. Now, however, he made up bis mind that the siege could not be continued, and bitter as the decision must have been, it gave him freedom. At this moment of crisis the instincts of the great captain came into play, and showed the way to a victory that would more than counter- balance the now inevitable failure. Serurier was ordered to spike the 140 siege guns that had been so welcome a few days before, and, after sending part of his force to Augereau, to establish himself with the rest at Marcaria on the Cremona road. The field forces were to be used on interior lines. On the 31st Sauret, Despinoy, Augereau and Kilmaine advanced westward against Quasdanovich. The first two found the Austrians at

BjncryValkcraˆ ‘

Salo and Lonato and drove them back, while with Augereau and the cavalry Bonaparte himself made a forced march on Brescia, never halting night or day till he reached the town and recovered his depots. Meantime Serurier had retired (night of July 31), Massena had gradually drawn in towards Lonato, and Wurmser's advanced guard triumphantly entered the fortress (August 1).

The Austrian general now formed the plan of crushing Bonaparte between Quasdanovich and his own main body. But meantime Quasdanovich had evacuated Brescia under the threat of Bonaparte's advance and was now fighting a long irregular action with Despinoy and Sauret about Gavardo and Salo, and Bonaparte, having missed his expected target, had brought Augereau by another severe march back to Montechiaro on the Chiese. Massena was now assembled between Lonato and Ponte San Marco, and Serurier was retiring quietly on Marcaria. Wurmser's main body, weakened by the detachment sent to Mantua, crossed the Mincio about Valeggio and Goito on the 2nd, and penetrated as far as Castiglione, whence Massena's rearguard was expelled. But a renewed advance of Quasdano- vich, ordered by Wurmser, which drove Sauret and Despinoy

back on Brescia and Lonato, in the end only placed Lonato aod stron g detachment of the Austrians within striking Hone. distance of Massena, who on the 3rd attacked it,

front to front, and by sheer fighting destroyed it, while at the same time Augereau recaptured Castiglione from Wurmser. On the 4th Sauret and Despinoy pressed back Quasdanovich beyond Salo and Gavardo. One of the Austrian columns, finding itself isolated and unable to retreat with the others, turned back to break its way through to Wurmser, and was annihilated by Massena in the neighbourhood of Lonato. On this day Augereau fought his way towards Solferino, and Wurmser, thinking rightly or wrongly that he could not now retire to the Mincio without a battle, drew up his whole force, close on 30,000 men, in the plain between Solferino and Medole. The finale may be described in very few words. Bonaparte, convinced that no more was to be feared from Quasdanovich, and seeing that Wurmser meant to fight, called in Despinoy's division to the main body and sent orders to Serurier, then far distant on the Cremona road, to march against the left flank of the Austrians. On the 5th the battle of Castiglione was fought. Closely contested in the first

hours of the frontal attack till Serurier's arrival decided the day, it ended in the retreat of the Austrians over the Mincio and into Tirol whence they had come.

Thus the new way had failed to keep back Wurmser, and the old had failed to crush Napoleon. Each was the result of its own conditions. In former wars a commander threatened as Napoleon was, would have fallen back at once to the Adda, abandoning the siege in such good time that he would have been able to bring off his siege artillery. Instead of this Bonaparte hesitated long enough to lose it, which, according to accepted canons was a waste, and held his ground, which was, by the same rules, sheer madness. But Revolutionary discipline was not firm enough to stand a retreat. Once it turned back, the army would have streamed away to Milan and perhaps to the Alps (cf. 1799), and the only alternative to com- plete dissolution therefore was fighting.

As to the manner of this fighting, even the principle of " relative superiority " failed him so long as he was endeavouring to cover the siege and again when his chief care was to protect his new line of retreat and to clear his old. In this period, viz. up to his return from Brescia on the 2nd of August, the only " mass " he collected delivered a blow in the air, while the covering detachments had to fight hard for bare existence. Once released from its trammels, the Napoleonic principle had fair play. He stood between Wurmser and Quasdanovich, ready to fight either or both. The latter was crushed, thanks to local superiority and the resolute leading of Massena, but at Castiglione Wurmser actually outnumbered his opponent till the last of Napoleon's precautionary dispositions had been given up, and Serurier brought back from the " alternative line of retreat " to the battlefield. The moral is, again, that it was not the mere fact of being on interior lines that gave Napoleon the victory, but his " tact," his fine appreciation of the chances in his favour, measured in terms of time, space, attacking force and containing power. All these factors were greatly influenced by the ground, which favoured the swarms and columns of the French and deprived the brilliant Austrian cavalry of its power to act. But of far greater importance was the mobility that Napoleon's personal

force imparted to the French. Napoleon himself rode five horses to death in three days, and Augereau's division marched from Roverbella to Brescia and back to Montechiaro, a total distance of nearly 50 m., in about thirty-six hours. This indeed was the founda- tion of his " relative superiority," for every hour saved in the time of marching meant more freedom to destroy one corps before the rest could

overwhelm the covering detachments and come to its assistance.

Wurmser's plan for the relief of Mantua, suited to its purpose, succeeded. But when he made his objective the French field army, he had to take his own army as he found it, disposed for an altogether different purpose. A properly, combined attack of convergent columns framed ab initio by a good staff officer, such as Mack, might indeed have given good results. But the success of such a plan depends principally on the assailant's original possession of the initiative, and not on the chances of his being able to win it over to his own side when operations, as here, are already in progress. When the time came to improvise such a plan, the initiative had passed over to Napoleon, and the plan was foredoomed.

By the end of the second week in August the blockade of Mantua had been resumed, without siege guns. But still under the impression of a great victory gained, Bonaparte was planning a long forward stride. He thought that by advancing past Mantua directly on Trieste and thence onwards to the Semmering he could impose a peace on the emperor. The Directory, however, which had by now focussed its attention on the German cam- paign, ordered him to pass through Tirol and to co-operate with Moreau, and this plan, Bonaparte, though protesting against an Alpine venture being made so late in the year, prepared to execute, drawing in reinforcements and collecting great quantities of supplies in boats on the Adige and Lake Garda. Wurmser was thought to have posted his main body near Trent, and to have detached one division to Bassano " to cover Trieste. " The French advanced northward on the 2nd, in three disconnected columns (precisely as Wurmser had done in the reverse direction at the end of July) — Massena (13,000) from Rivoli to Ala, Augereau (9000) from Verona by hill roads, keeping on his right rear, Vaubois (11,000) round the Lake of Garda by Riva and Tor- bole. Sahuguet's division (8000) remained before Mantua. The French divisions successfully combined and drove the enemy before them to Trent.

There, however, they missed their target. Wurmser had already drawn over the bulk of his army (22,000) into the Val Sugana, whence, with the Bassano division as his advanced guard, he intended once more to relieve Mantua, while Davidovich with 13,000 (excluding detachments) was to hold Tirol against any attempt of Bonaparte to join forces with Moreau.

Thus Austria was preparing to hazard a second (as in the event she hazarded a third and a fourth) highly trained and expensive professional army in the struggle for the preservation of a fortress, and

we must conclude that there were weighty reasons which actuated so notoriously cautious a body as the Council of War in making this unconditional venture. While Mantua stood, Napoleon, for all his energy and sanguineness, could not press forward into Friuli and Carniola, and immunity from a Republican visitation was above all else important for the Vienna statesmen, governing as they did more or less dis- contented and heterogeneous populations that had not felt the pressure of war for a century and more. The Austrians, so far as is known, desired no more than to hold their own. They no longer possessed the superiority of moral that guarantees victory to one side when both are materially equal. There was therefore nothing to be gained, commensurate with the risk involved, by fighting a battle in the open field. In Italien siegt nicht die Kavallerie was an old saying in the Austrian army, and therefore the Austrians could not hope to win a victory of the first mag- nitude. The only practicable alternative was to strengthen Mantua as opportunities offered themselves, and to prolong the passive resistance as much as possible. Napoleon's own practice in providing for secondary theatres of war was to economize forces and to delay a decision, and the fault of the Austrians, viewed from a purely military standpoint, was that they squandered, instead of economizing, their forces to gain time. If we neglect pure theory, and regard strategy as the handmaiden of statesmanship — which fundamentally it is — we

cannot condemn the Vienna authorities unless it be first proved that they grossly exaggerated the possible results of Bonaparte's threatened irruption. And if their capacity for judging the political situation be admitted, it naturally follows that their object was to preserve Mantua at all costs — which object Wurmser, though invariably defeated in action, did in fact accomplish.

When Mass6na entered Trent on the morning of the 5th of September, Napoleon became aware that the force in his front was a mere detachment, and news soon came in that Wurmser was in the Val Sugana about Primolano and at Bassano. This move he supposed to be intended to cover Trieste, being influenced by his own hopes of advancing in that direction, and underestimating the importance, to the Austrians, of preserving Mantua. He therefore informed the Directory that he could not proceed with the Tirol scheme, and spent

one more day in driving Davidovich well away from Trent. Then, leaving Vaubois to watch him, Napoleon marched Augereau and Massena, with a rapidity he scarcely ever surpassed, into the Val Sugana. Wurmser's rearguard was attacked and defeated again and again, and Wurmser himself felt compelled to stand and fight, in the hope of checking the pursuit before going forward into the plains. Half his army had already reached Montebello on the Verona road, and with the rear half he posted himself at Bassano, where on the 8th he was attacked and defeated with heavy losses. Then began a strategic pursuit or general chase, and in this the mobility of the French should have finished the work so well begun by their tactics.

But Napoleon directed the pursuers so as to cut off Wurmser from Trieste, not from Mantua. Massena followed up the Austrians to Vicenza, while Augereau hurried towards Padua, and it was not until late on the 9th that Bonaparte realized that his opponent was heading for Mantua via Legnago. On the 10th Massena crossed the Adige at Ronco, while Augereau from Padua reached Montagnana. Sahuguet from Mantua and Kilmaine from Verona joined forces at Castellaro on the nth, with orders to interpose between Wurmser and the fortress. Wurmser meantime had halted for a day at Legnago, to restore order, and had then resumed his march. It was almost too late, for in the evening, after havin g to push aside the head of Massena 's column at Cerea , he had only reached Nogara, some miles short of Castellaro, and close upon his rear was Augereau, who reached Legnago that night. On the 12th, eluding Sahuguet by a detour to the southward, he reached Mantua, with all the columns of the French, weary as most of them were, in hot pursuit. After an attempt to keep the open field, defeated in a general action on the 15th, the relieving force was merged in the garrison, now some 28,000 in all. So ended the episode of Bassano, the most brilliant feature of which as usual was the marching power of the French infantry. This time it sufficed to redeem even strategical misconceptions and misdirections. Between the 5th and the nth, besides fighting three actions, Massena had marched 100 m. and Augereau 114.

Feldzeugmeister Alvintzi was now appointed to command a new army of relief. This time the mere distribution of the troops imposed a concentric advance of separate columns, for practically the whole of the fresh forces available were in Carniola, the Military Frontier, &c, while Davidovich was still in Tirol. Alvintzi's intention was to assemble his new army (29,000) in Friuli, and to move on Bassano, which was to be occupied on the 4th of November. Meantime Davidovich (i8,oco) was to capture Trent, and the two columns were to connect by the Val Sugana. All being well, Alvintzi and Davidovich,

still separate, were then to converge on the Adige between Verona and Legnago. Wurmser was to co-operate by vigorous sorties. At this time Napoleon's protective system was as follows: Kilmaine (9000) investing Mantua, Vaubois (10,000) at Trent, and Massena (9000) at Bassano and Treviso, Augereau (9000) and Macquard (3000) at Verona and Villafranca constituting, for the first time in these operations, important mobile reserves. Hearing of Alvintzi's approach in good time, he meant first to drive back Davidovich, then with Augereau, Massena, Macquard and 3000 of Vaubois's force to fall upon Alvintzi, who, he calculated,

Caldiero.

would at this stage have reached Bassano, and finally to send back a large force through the Val Sugana to attack Davidovich. This plan practically failed.

Instead of advancing, Vaubois was driven steadily backward. By the 6th, Davidovich had fought his way almost to Roveredo, and Alvintzi had reached Bassano and was there successfully repelling the attacks of Massena and Augereau. That night Napoleon drew back to Vicenza. On the 7th Davidovich drove in Vaubois to Corona and Rivoli, and Alvintzi came within 5 m. of Vicenza. Napoleon watched carefully for an opportunity to strike out, and on the 8th massed his troops closely around the central point of Verona. On the 9th, to give himself air, he ordered Massena to join Vaubois, and to drive back Davidovich at all costs. But before this order was executed, reports came in to the effect that Davidovich had suspended his advance. The 10th and nth were spent by both sides in relative inaction, the French waiting on events and opportunities, the Austrians resting after their prolonged exertions. Then, on the afternoon of the nth, being informed that Alvintzi was approaching, Napoleon decided to attack him. On the 1 2th the advanced guard of Alvintzi's army was furiously assailed in the position of Caldiero. But the troops in rear came up rapidly, and by 4 p.m, the French were defeated all along the line and in retreat on Verona. Napoleon's situation was now indeed precarious. He was on " interior lines," it is true, but he had neither the force nor the space necessary for the delivery of rapid radial blows. Alvintzi was in superior numbers, as the battle of Caldiero had proved, and at any moment Davidovich, who had twice Vaubois's force, might advance to the attack of Rivoli. The reserves had proved insufficient, and Kilmaine had to be called up from Mantua, which was thus for the third time freed from the blockaders. Again the alternatives were retreat, in whatever order was possible to Republican armies, and beating the nearest enemy at any sacrifice. Napoleon chose the latter,

though it was not until the evening of the 14th that he actually issued the fateful order.

The Austrians, too, had selected the 15th as the date of their final advance on Verona, Davidovich from the north, Alvintzi via Zevio from the south. But Napoleon was no longer there; leaving Vaubois to hold Davidovich as best he might, and posting only 3000 men in Verona, he had collected the rest of his small army between Albaro and Ronco. His plan seems to have been to cross the Adige well in rear of the Austrians, to march north on to the Verona-Vicenza highway, and there, supplying himself from their convoys, to fight to the last. On the 15th he had written to the Directory, ” The weakness and the exhaustion of the army causes me to fear the worst. We are perhaps on the eve of losing Italy.” In this extremity of danger the troops passed the Adige in three columns near Ronco and Albaredo, and marched forward along the dikes, with deep marshes and pools on either hand. If Napoleon’s intention was to reach the dry open ground of S. Bonifacio in rear of the Austrians, it was not realized, for the Austrian army, instead of being at the gates of Verona, was still between Caldiero and S. Bonifacio, heading, as we know, for Zevio. Thus Alvintzi was able, easily and swiftly, to wheel to the south.

The battle of Areola almost defies description. The first day passed in a series of resultless encounters between the heads of the columns as they met on the dikes. In the evening Bonaparte withdrew over the Adige, expecting at every moment to be summoned to Vaubois’s aid. But Davido vich remained inactive, and on the 16th the French again crossed the river. Massena from Ronco advanced on Porcile, driving the Austrians along the causeway thither, but on the side of Areola, Alvintzi had deployed a considerable part of his forces on the edge of the marshes, within musket shot of the causeway by which Bonaparte and Augereau had to pass, along the Austrian front, to reach the bridge of Areola. In these circum- stances the second day’s battle was more murderous and no more decisive than the first, and again the French retreated to Ronco. But Davidovich again stood still, and with incredible obstinacy Bonaparte ordered a third assault for the 17th, using

Areola.

indeed more tactical expedients than before, but calculating chiefly on the fighting powers of his men and on the exhaustion of the enemy. Massena again advanced on Porcile, Robert's brigade on Areola, but the rest, under Augereau, were to pass the Alpone near its confluence with the Adige, and joining various small bodies which passed the main stream lower down, to storm forward on dry ground to Areola. The Austrians, however, themselves advanced from Areola, overwhelmed Robert's brigade on the causeway and almost reached Ronco. This was perhaps the crisis of the battle, for Augereau's force was now on the other side of the stream, and Massena, with his back to the new danger, was approaching Porcile. But the fire of a deployed regiment stopped the head of the Austrian column; Massena, turning about, cut into its flank on the dike; and Augereau, gathering force, was approaching Areola from the south. The bridge and the village were evacuated soon after- wards, and Massena and Augereau began to extend in the plain beyond. But the Austrians still sullenly resisted. It was at this moment that Bonaparte secured victory by a mere ruse, but a ruse which would have been unprofitable and ridiculous had it not been based on his fine sense of the moral conditions. Both sides were nearly fought out, and he sent a few trumpeters to the rear of the Austrian army to sound the charge. They did so, and in a few minutes the Austrians were streaming back to S. Bonifacio. This ended the drama of Areola, which more than any other episode of these wars, perhaps of any wars in modern history, centres on the personality of the hero. It is said that the French fought without spirit on the first day, and yet on the second and third Bonaparte had so thoroughly imbued them with his own will to conquer that in the end they prevailed over an enemy nearly twice their own strength.

The climax was reached just in time, for on the 17th Vaubois was completely defeated at Rivoli and withdrew to Peschiera, leaving the Verona and Mantua roads completely open to Davidovich. But on the 19th Napoleon turned upon him, and combining the forces of Vaubois, Massena and Augereau against him, drove him back to Trent. Meantime Alvintzi returned from Vicenza to San Bonifacio and Caldiero (November 21st), and Bonaparte at once stopped the pursuit of Davidovich. On the return of the French main body to Verona, Alvintzi finally withdrew, Wurmser, who had emerged from Mantua on the 23rd, was driven in again, 3nd this epilogue of the great struggle came to a feeble end because neither side was now capable of prolonging the crisis.

Alvintzi renewed his advance in January 1797 with all the forces that could be assembled for a last attempt to save Mantua. At this time 8000 men under Serurier blockaded Mantua, Massena (9000) was at

Verona, Joubert (Vaubois's successor) at Rivoli with 10,000, Augereau at Legnago with 9000. In reserve were Rey's division (4000) between Brescia and Monte- chiaro, and Victor's brigade at Goito and Castelnuovo. On the other side, Alvintzi had 9000 men under Provera at Padua, 6000 under Bayalic at Bassano, and he himself with 28,000 men stood in the Tirol about Trent. This time he intended to make his principal effort on the Rivoli side. Provera was to capture Legnago on the 9th of January, and Bayalic Verona on the 12th, while the main army was to deliver its blow against the Rivoli position on the 13th.

The first marches of this scheme were duly carried out, and several days elapsed before Napoleon was able to discern the direction of the real attack. Augereau fell back, skirmishing a little, as Provera's and Bayalic's advance developed. On the nth, when the latter was nearing Verona, Alvintzi's leading troops appeared in front of the Rivoli position. On the 1 2th Bayalic with a weak force (he had sent reinforce- ments to Alvintzi by the Val Pantena) made an unsuccessful attack on Verona, Provera, farther south, remaining inactive. On the 13th Napoleon, still in doubt, launched Massena's division against Bayalic, who was driven back to San Bonifacio; but at the same time definite news came from Joubert that Alvintzi's main army was in front of La Corona. From this point begins the decisive, though by no means the most intense or dramatic,

xi. 7 .

RIvoU.

struggle of the campaign. Once he felt sure of the situation Napoleon acted promptly. Joubert was ordered to hold on to Rivoli at all costs. Rey was brought up by a forced march to Castelnuovo, where Victor joined him, and ahead of them both Massena was hurried on to Rivoli. Napoleon himself joined Joubert on the night of the 13th. There he saw the watch-fires of the enemy in a semicircle around him, for Alvintzi, thinking that he had only to deal with one division, had begun a wide- spread enveloping attack. The horns of this attack were as yet so far distant that Napoleon, instead of extending on an equal front, only spread out a few regiments to gain an hour or two and to keep the ground for Massena and Rey, and on the morning of January 14th, with 10,000 men in hand against 26,000, he fell upon the central columns of the enemy as they advanced up the steep broken slopes of the foreground. The fighting was severe, but Bonaparte had the advantage. Massena arrived at 9 a.m., and a little later the column of Quasdanovich, which had moved along the Adige and was now attempting to gain a foothold on the plateau in rear of Joubert, was

crushed by the converging fire of Joubert's right brigade and by Massena's guns, their rout being completed by the charge of a handful of cavalry under Lasalle. The right horn of Alvintzi's attack, when at last it swung in upon Napoleon's rear, was caught between Massena and the advancing troops of Rey and annihilated, and even before this the dispirited Austrians were in full retreat. A last alarm, caused by the appearance of a French infantry regiment in their rear (this had crossed the lake in boats from Salo), com- pleted their demoralization, and though less than 2000 had been killed and wounded, some 12,000 Austrian prisoners were left in the hands of the victors. Rivoli was indeed a moral triumph. After the ordeal of Areola, the victory of the French was a fore- gone conclusion at each point of contact. Napoleon hesitated, or rather refrained from striking, so long as his information was incomplete, but he knew now from experience that his covering detachment, if well led, could not only hold its own without assistance until it had gained the necessary information, but could still give the rest of the army time to act upon it. Then, when the centre of gravity had been ascertained, the French divisions hurried thither, caught the enemy in the act of manoeu- vring and broke them up. And if that confidence in success which made all this possible needs a special illustration, it may be found in Napoleon's sending Murat's regiment over the lake to place a mere two thousand bayonets across the line of retreat of a whole army. Alvintzi's manoeuvre was faulty neither strategically in the first instance nor tactically as regards the project of enveloping Joubert on the 14th. It failed because Joubert and his men were better soldiers than his own, and because a French division could move twice as fast as an Austrian, and from these two factors a new form of war was evolved, the essence of which was that, for a given time and in a given area, a small force of the French should engage and hold a much larger force of the enemy.

The remaining operations can be very briefly summarized. Provera, still advancingon Mantua, joined hands there withWurmser, and for a time held Serurier at a disadvantage. But hearing of this, Napoleon sent back Massena from the field of Rivoli, and that general, with Augereau and Serurier, not only forced Wurmser to retire again into the fortress, but compelled Provera to lay down his arms. On the 2nd' of February 1797, after a long and honourable defence, Mantua, and with it what was left of Wurmser's army, surrendered.

The campaign of 1797, which ended the war of the First Coalition, was the brilliant sequel of these hard-won victories. Austria had decided to save Mantua at all costs, and had lost her armies in the attempt, a loss which was not compensated by the "strategic " victories of the archduke. Thus the Republican " visitation " of

Carinthia and Carniola was one swift march — politically glorious, if dangerous from a purely military standpoint — of Napoleon's army to the Semmering. The archduke, who was called thither from Germany, could do no more than fight a few rearguard actions, and make threats against Napoleon's rear, which the latter, with his usual " tact," ignored. On the Rhine, as in 1795 and 1796, the armies of the Sambre-and-Meuse (Hoche) and the Rhine-and-Moselle (Moreau) were opposed by the armies of the Lower Rhine (Werneck) and of the Upper Rhine (Latour). Moreau crossed the river near Strassburg and fought a series of minor actions. Hoche, like his predecessors, crossed at Dusseldorf and Neuwied and fought his

way to the Lahn, where for the last time in the history of these wars, there was an irregular widespread battle. But Hoche, in this his last campaign, displayed the brilliant energy of his first, and delivered the " series of incessant blows " that Carnot had urged upon Jourdan the year before. VVerneck was driven with ever-increasing losses from the lower Lahn to Wetzlar and Giessen. Thence, pressed hard by the French left wing under Championnet, he retired on the Nidda, only to find that Hoche's right had swung completely round Leobea ' lim * Nothing but the news of the armistice of Leoben saved him from envelopment and surrender. This general armistice was signed by Bonaparte, on his own authority and to the intense chagrin of the Directory and of Hoche, on the 1 8th of April, and was the basis of the peace of Campo Formio.

Napoleon in Egypt Within the scope of this article, yet far more important from its political and personal than from its general military interest, comes the expedition of Napoleon to Egypt and its sequel (see also Egypt: History; Napoleon, &c). A very brief summary must here suffice. Napoleon left Toulon on the 19th of May 1798, at the same time as his army (40,000 strong in 400 transports) embarked secretly at various ports. Nelson's fleet was completely evaded, and, capturing Malta en route, the armada reached the coast of Egypt on the 1st of July. The republicans stormed Alexandria on the 2nd. Between Embabeh and Gizeh, on the left bank of the Nile, 60,000 Mamelukes were defeated and scattered on the 21st (battle of the Pyramids), the French for the most part marching and fighting in the chequer of infantry squares that afterwards became the classical formation for

desert warfare. While his lieutenants pursued the more important groups of the enemy, Napoleon entered Cairo in triumph, and proceeded to organize Egypt as a French protectorate. Meantime Nelson, though too late to head off the expedition, had annihilated the squadron of Admiral Brueys. This blow severed the army from the home country, and destroyed all hope of reinforcements. But to eject the French already in Egypt, military invasion of that country was necessary. The first attempts at this were made in September by the Turks as overlords of Egypt. Napoleon — after suppressing a revolt in Cairo — marched into Syria to meet them, and captured El Arish and Jaffa (at the latter place the prisoners, whom he could afford neither to feed, to release, nor to guard, were shot by his order). But he was brought to a standstill (March 17-May 20) before the half-defensible fortifications of Acre, held by a Turkish garrison and animated by the leadership of Sir W. Sidney Smith (q.v.). In May, though meantime a Turkish relieving army had been severely beaten in the battle of Mount Tabor (April 16, 1799), Napoleon gave up his enterprise, and returned to Egypt, where he won a last victory in annihilating at Aboukir, with 6000 of his own men, a Turkish army l8 ; ooo strong that had landed there (July 25, 1799). With this crowning tactical success to set against the Syrian reverses, he handed over the command to Kleber and returned to France (August 22) to ride the storm in a new coup d'etat, the " 18th Brumaire." Kleber, attacked by the English and Turks, concluded the convention of El Arish (January 27, 1800), whereby he secured free transport for the army back to France. But this convention was disavowed by the British government, and Kleber prepared to hold his ground. On the 20th of March 1800 he thoroughly defeated the Turkish army at Heliopoiis and recovered Cairo, and French influence was once more in the ascendant in Egypt, when its director was murdered by a fanatic on the 14th of June, the day of Marengo. Kleber's successor, the incompetent Menou, fell an easy victim to the British expeditionary force under Sir Ralph Abercromby in 1801. The British forced their way ashore at Aboukir on the 8th of March. On the 21st, Abercromby won a decisive battle, and himself fell in the hour of victory (see Alexandria: Battle of 1801). His successor, General Hely Hutchinson, slowly followed up this advantage, and received the surrender of Cairo in July and of Alexandria in August, the debris of the French army being given free passage back to France. Meantime a mixed force of British and native troops from India, under Sir David Baird, had landed at Kosseir and marched across the desert to Cairo.

The War of the Second Coalition In the autumn of 1798, while Napoleon's Egyptian expedition was in progress, and the Directory

was endeavouring at home to reduce the importance and the predominance of the army and its leaders, the powers of Europe once more allied themselves, not now against the principles of the Republic, but against the treaty of Campo Formio. Russia, Austria, England, Turkey, Portugal, Naples and the Pope formed the Second Coalition. The war began with an advance into the Roman States by a worthless and ill-behaved Neapolitan army (commanded, much against his will, by Mack), which the French troops under Championnet destroyed with ease. Championnet then revolutionized Naples. After this unimportant prelude the curtain rose on a general European war. The Directory which now had at its command neither numbers nor enthusiasm, prepared as best it could to

Stokach.

meet the storm. Four armies, numbering only 160,000, were set on foot, in Holland (Brune, 24,000); on the Upper Rhine (Jourdan, 46,000); in Switzerland, which had been militarily occupied in 1798 (Massena, 30,000); and in upper Italy (Scherer, 60,000). In addition there was Championnet's army, now commanded by Macdonald, in southern Italy. All these forces the Directory ordered, in January and February 1799, to assume the offensive.

Jourdan, in the Constance and Schaffhausen region, had only 40,000 men against the archduke Charles's 80,000, and was soon brought to a standstill and driven back on Stokach. The archduke had won these preliminary successes with seven-eighths of his army acting as one concentrated mass. But as he had only encountered a portion of Jourdan's army, he became uneasy as to his flanks, checked his bold advance, and ordered a reconnaissance in force. This practically extended his army while Jourdan was closing his, and thus the French began the battle of Stokach (March 25) in superior numbers, and it was not until late in the day that the archduke brought up sufficient strength (60,000) to win a victory. This was a battle of the " strategic " type, a widespread straggling combat in which each side took fifteen hours to inflict a loss of 12% on the other, and which ended in Jourdan accepting defeat and drawing off, unpursued by the magnificent Austrian cavalry, though these counted five times as many sabres as the French. The French secondary army in Switzerland was in the hands of the bold'and active Massena. The forces of both sides in the Alpine region were, from a military point of view, mere flank guards to the main armies on the Rhine and the Adige. But unrest, amounting to civil war, among the Swiss and Grison peoples tempted both governments to give these flank guards considerable strength. 1

The Austrians in the Vorarlberg and Grisons were under Hotze, who had 13,000 men at Bregenz, and 7000 commanded by Auffenberg around Chur, with, between them, 5000 men at Feldkirch and a post of 1000 in the strong Massina la position of the Luziensteig nearMayenfeld. Massena’s / an< /. available force was about 20,000, and he used almost the whole of it against Auffenberg. The Rhine was crossed by his principal column near Mayenfeld, and the Luziensteig stormed (March 6), while a second column from the Zurich side descended upon Disentis and captured fts defenders. In three days, thanks to Massena's energy and the ardent attacking spirit of his men, Auffenberg's division was broken up, Oudinot meanwhile holding off Hotze by a hard-fought combat at Feldkirch (March 7). But a second attack on Feldkirch made on the 23rd by Massena with 15,000 men was repulsed and the advance of his left wing came to a standstill.

Behind Auffenberg and Hotze was Bellegarde in Tirol with some 47,000 men. Most of these were stationed north of Inns- bruck and Landeck, probably as a sort of strategic reserve to the archduke. The rest, with the assistance of the Tirolese themselves, were to ward off irruptions from Italy. Here the French offensive was entrusted to two columns, one from Massena’s command under Lecourbe, the other from the Army of Italy under Dessolle. Simultaneously with Massena, Lecourbe marched from Bellinzona with 10,000 men, by the San Bernadino pass into the Spliigen valley, and thence over the Julier pass into the upper Engadine. A small Austrian force under Major-General Loudon attacked him near Zernetz, but was after three days of rapid manceuvres and bold tactics driven back to Martinsbriick, with considerable losses, especially in prisoners. But ere long the country people flew to arms, and Lecourbe found himself between two fires, the levies occupying Zernetz and Loudon’s regulars Martinsbriick. But though he had only some 5000 of his original force left, he was not discon- certed, and, by driving back the levies into the high valleys whence they had come, and constantly threatening Loudon,

1 The assumption by later critics (Clausewitz even included) that the ” flank position ” held by these forces relatively to the main armies in Italy and Germany was their raison d’Ure is un- supported by contemporary evidence.

he was able to maintain himself and to wait for Dessolles. The latter, moving up the Valtelline, by now fought his way to the Stelvio pass,

but beyond it the defile of Tauffers (S.W. of Glurns) was entrenched by Loudon, who thus occupied a position midway between the two French columns, while his irregulars beset all the passes and ways giving access to the Vintschgau and the lower Engadine. In this situation the French should have been destroyed in detail. But as usual their speed and dash gave them the advantage in every manoeuvre and at every point of contact.

On the 25th Lecourbe and Dessolles attacked Loudon at Nauders in the Engadine and Tauffers in the Vintschgau re- Lecourbe spectively. At Nauders the French passed round and the flanks of the defence by scrambling along the high

Dessolles mountain crests adjacent, while at Tauffers the la Tirol. asS a.ila.nts, only 4500 strong, descended into a deep ravine, debouched unnoticed in the Austrians' rear, and captured 6000 men and 16 guns. The Austrian leader with a couple of companies made his way through Glurns to Nauders, and there, finding himself headed off by Lecourbe, he took to the mountains. His corps, like Auffenberg's, was annihilated.

This ended the French general offensive. Jourdan had been defeated by the archduke and forced or induced to retire over the Rhine. Massena was at a standstill before the strong position of Feldkirch, and the Austrians of Hotze were still massed at Bregenz, but the Orisons were revolutionized, two strong bodies of Austrians numbering in all about 20,000 men had been destroyed, and Lecourbe and Dessolles had advanced far into Tirol. A pause followed. The Austrians in the mountains needed time to concentrate and to recover from their astonishment. The archduke fell ill, and the Vienna war council forbade his army to advance lest Tirol should be " uncovered," though Bellegarde and Hotze still disposed of numbers equal to those of Massena and Lecourbe. Massena succeeded Jourdan in general command on the French side and promptly collected all available forces of both armies in the hilly non-Alpine country between Basel, Zurich and Schaffhausen, thereby directly barring the roads into France (Berne-Neuchatel-Pontarlier and Basel- Besancon) which the Austrians appeared to desire to conquer. The protection of Alsace and the Vosges was left to the fortresses. There was no suggestion, it would appear, that the Rhine between Basel and Schaffhausen was a flank position sufficient of itself to bar Alsace to the enemy.

It is now time to turn to events in Italy, where the Coalition intended to put forth its principal efforts. At the beginning of March the French had 80,000 men in Upper Italy and some 35,000 in the heart of the

Peninsula, the latter engaged chiefly in sup- porting newly-founded republics. Of the former, 53,000 formed the field army on the Mincio under Scherer. The Austrians, commanded by Kray, numbered in all 84,000, but detachments reduced this figure to 67,000, of whom, moreover, 15,000 had not yet arrived when operations began. They were to be joined by a Russian contingent under the celebrated Suvarov, who was to command the whole on arrival, and whose extraordinary person- ality gives the campaign its special interest. Kray himself was a resolute soldier, and when the French, obeying the general order to advance, crossed the Adige, he defeated them in a severely fought battle at Magnano near Verona (March 5), the French losing 4000 killed and wounded and 4 500 taken, out of 41 ,000. The Austrians lost some 3800 killed and wounded and 1 500 prisoners, out of 46,000 engaged. The war, however, was undertaken not to annihilate, but to evict the French, and, probably under orders from Vienna, Kray allowed the beaten enemy to depart.

Suvarov appeared with 17,000 Russians on the 4th of April. His first step was to set Russian officers to teach the Austrian troops — whose feelings can be imagined — how to attack with the bayonet, his next to order the whole army forward. The Allies broke camp on the 17th, 18th and 19th of April, and on the 20th, after a forced march of close on 30 m., they passed the Chiese. Brescia had a French garrison, but Suvarov soon cowed it into surrender by threats of a massacre, which no one doubted that he would carry into execution.

Suvarov.

At the same time, dissatisfied with the marching of the Austrian infantry, he sent the following characteristic reproof to their commander: ” The march was in the service of the Kaiser. Fair weather is for my lady’s chamber, for dandies, for sluggards. He who dares to cavil against his high duty (der Grosssprecher •wider den hohen Diensi) is, as an egoist, instantly to vacate his command. Whoever is in bad health can stay behind. The so-called reasoners (raisonneurs) do no army any good. ...” One day later, under this unrelenting pressure, the advanced posts of the Allies reached Cremona and the main body, the Oglio. The pace became slower in the following days, as many bridges had to be made, and meanwhile Moreau, Scherer’s successor, prepared with a mere 20,000 men to defend Lodi, Cassano and Lecco on the Adda. On the 26th the Russian hero attacked him all along the line. The moral supremacy had passed over to the Allies. Melas, under Suvarov’s stern orders, flung his battalions regardless of losses against the strong position of Cassano. The story of 1796 repeated itself with the roles reversed. The passage

was carried, and the French rearguard under Serurier was surrounded and captured by an inferior corps of Austrians. The Austrians (the Russians at Lecco were hardly engaged) lost 6000 men, but they took 7000 prisoners, and in all Moreau's little army lost half its numbers and retreated in many disconnected bodies to the Ticino, and thence to Alessandria. Everywhere the Italians turned against the French, mindful of the exactions of their commissaries. The strange Cossack cavalry that western Europe had never yet seen entered Milan on the 29th of April, eleven days after passing the Mincio, and next day the city received with enthusiasm the old field marshal, whose exploits against the Turks had long invested him with a halo of romance and legend. Here, for the moment, his offensive culminated. He desired to pass into Switzerland and to unite his own, the archduke's, Hotze's and Bellegarde's armies in one powerful mass. But the emperor would not permit the execution of this scheme until all the fortresses held by the enemy in Upper Italy should have been captured. In any case, Mac- donald's army in southern Italy, cut off "from France by the rapidity of Suvarov's onslaught, and now returning with all speed to join Moreau by force or evasion, had still to be dealt with.

Suvarov's mobile army, originally 90,000 strong, had now dwindled, by reason of losses and detachments for sieges, to half that number, and serious differences arose between the Vienna government and himself. If he offended the pride of the Austrian army, he was at least respected as a leader who gave it victories, but in Vienna he was regarded as a madman who had to be kept within bounds. But at last, when he was becoming thoroughly exasperated by this treatment, Macdonald came within striking distance and the active campaign re- commenced. In the second week of June, Moreau, who had retired into the Apennines about Gavi, advanced with the in- tention of drawing upon himself troops that would otherwise have been employed against Macdonald. He succeeded, for Suvarov with his usual rapidity collected 40,000 men at Aless- andria, only to learn that Macdonald with 35,000 men was coming up on the Parma road. When this news arrived, Mac- donald had already engaged an Austrian detachment at Modena and driven it back, and Suvarov found himself between Moreau and Macdonald with barely enough men under his hand to enable him to play the game of " interior lines." But at the crisis the rough energetic warrior who despised " raisonneurs," displayed generalship of the first order, and taking in hand all his scattered detachments, he manoeuvred them in the Napoleonic fashion.

On the 14th Macdonald was calculated to be between Modena, Reggio and Carpi, but his destination was uncertain. Would he continue to

hug the Apennines to join Moreau, or would he strike out northwards against Kray, who Trebbfa. with 20,000 men was besieging Mantua ? From Alessandria it is four marches to Piacenza and nine to Mantua, while from Reggio these places are four and two marches respectively. Piacenza, therefore, was the crucial point if

Macdonald continued westward, while, in the other case, nothing could save Kray but the energetic conduct of Hohenzollern's detachment, which was posted near Reggio. This latter, however, was soon forced over the Po, and Ott, advancing from Cremona to join it, found himself sharply pressed in turn. The field marshal had hoped that Ott and Hohenzollern together would be able to win him time to assemble at Parma, where he could bring on a battle whichever way the French took. But on receipt of Ott's report he was convinced that Macdonald had chosen the western route, and ordering Ott to delay the French as long as possible by stubborn rearguard actions and to put a garrison into Piacenza under a general who was to hold out " on peril of his life and honour," he collected what forces were ready to move and hurried towards Piacenza, the rest being left to watch Moreau. He arrived just in time. When after three forced marches the main body (only 26,000 strong) reached Castel San Giovanni, Ott had been driven out of Piacenza, but the two joined forces safely. Both Suvarov and Macdonald spent the 17th in closing up and deploying for battle. The respective forces were Allies 30,000, French 35,000. Suvarov believed the enemy to be only 26,000 strong, and chiefly raw Italian regiments, but his temperament would not have allowed him to stand still even had he known his inferiority. He had already issued one of his peculiar battle-orders, which began with the words, " The hostile army will be taken prisoners " and continued with directions to the Cossacks to spare the surrendered enemy. But Macdonald too was full of energy, and believed still that he could annihilate Ott before the field marshal's arrival. Thus the battle of the Trebbia (June 17-19) was fought by both sides in the spirit of the offensive. It was one of the severest struggles in the Republican wars, and it ended in Macdonald's retreat with a loss of 15,000 men — probably 6000 in the battle and 9000 killed and prisoners when and after the equilibrium was broken — for Suvarov, unlike other generals, had the necessary surplus of energy after all the demands made upon him by a great battle, to order and to direct an effective pursuit. The Allies lost about 7000. Macdonald retreated to Parma and Modena, harassed by the peasantry, and finally recrossed the Apennines and made his way

to Genoa. The battle of the Trebbia is one of the most clearly-defined examples in military history of the result of moral force — it was a matter not merely of energetic leading on the battlefield, but far more of educating the troops beforehand to meet the strain, of ingraining in the soldier the determination to win at all costs. ” It was not,” says Clausewitz, ” a case of losing the key of the position, of turning a flank or breaking a centre, of a mistimed cavalry charge or a lost battery . . . it is a pure trial of strength and expense of force, and victory is the sinking of the balance, if ever so slightly, in favour of one side. And we mean not merely physical, but even more moral forces.”

To return now to the Alpine region, where the French offensive had culminated at the end of March. Their defeated left was behind the Rhine in the northern part of Switzerland, the half- victorious centre athwart the Rhine between Mayenfeld and Chur, and their wholly victorious right far within Tirol between Glurns, Nauders and Landeck. But neither the centre nor the right could maintain itself. The forward impulse given by Suvarov spread along the whole Austrian front from left to right. Dessolles’ column (now under Loison) was forced back to Chiavenna. Bellegarde drove Lecourbe from position to position towards the Rhine during April. There Lecourbe added to the remnant of his expeditionary column the outlying bodies of Massena’s right wing, but even so he had only 8000 men against Bellegarde’s 17,000, and he was now exposed to the attack of Hotze’s 25,000 as well. The Luziensteig fell to Hotze and Chur to Bellegarde, but the defenders managed to escape from the converging Austrian columns into the valley of the Reuss. Having thus reconquered all the lost ground and forced the French into the interior of Switzerland, Bellegarde and Hotze parted company, the former marching with the greater part of his forces to join Suvarov, the latter moving to his right to reinforce the archduke. Only a chain of posts was left in the Rhine

Valley between Disentis and Feldkirch. The archduke’s opera- tions now recommenced.

Charles and Hotze stood, about the 15th of May, at opposite ends of the lake of Constance. The two together numbered about 88,000 men, but both had sent away numerous detachments to the flanks, and the main bodies dwindled to 35,000 for the archduke and 20,000 for Hotze. Massena, with 45,000 men in all, retired slowly from the Rhine to the Thur. The archduke crossed the Rhine at Stein, Hotze at Balzers, and each then cautiously felt his way towards the other. Their active opponent attempted to take advantage of their separation, and an irregular fight took place in the Thur valley (May 25), but Massena, finding Hotze close on his right flank, retired without attempting to

force a decision. On the 27th, having joined forces, the Austrians dislodged Massena from his new position on the Toss without difficulty, and this process was repeated from time to time in the next few days, until at last Massena halted in the position he had prepared for defence at Zurich. He Zurich. had still but 25,000 of his 45,000 men in hand, for he maintained numerous small detachments on his right, behind the Ziircher See and the Wallen See, and on his left towards Basel. These 25,000 occupied an entrenched position 5 m. in length; against which the Austrians, detaching as usual many posts to protect their flanks and rear, deployed only 42,000 men, of whom 8000 were sent on a wide turning movement and 8000 held in reserve 4 m. in rear of the battlefield. Thus the frontal attack was made with forces not much greater than those of the defence and it failed accordingly (June 4). But Massena, fearing perhaps to strain the loyalty of the Swiss to their French-made constitution by exposing their town to assault and sack, retired on the 5th.

He did not fall back far, for his outposts still bordered the Limmat and the Linth, while his main body stood in the valley of the Aar between Baden and Lucerne. The archduke pressed Massena as little as he had pressed Jourdan after Stokach (though in this case he had less to gain by pursuit), and awaited the arrival of a second Russian army, 30,000 strong, under Korsakov, before resuming the advance, meantime throwing out covering detachments towards Basel, where Massena had a division. Thus for two months operations, elsewhere than in Italy, were at a standstill, while Massena drew in reinforcements and organized the fractions of his forces in Alsace as a skeleton army, and the Austrians distributed arms to the peasantry of South Germany.

In the end, under pressure from Paris, it was Massena who resumed active movements. Towards the middle of August, Lecourbe, who formed a loose right wing of the French army in the Reuss valley, was reinforced to a strength of 25,000 men, and pounced upon the extended left wing of the enemy, which had stretched itself, to keep pace with Suvarov, as far westward as the St Gothard. The movement began on the 14th, and in two days the Austrians were driven back from the St Gothard and the Furka to the line of the Linth, with the loss of 8000 men and many guns. At the same time an attempt to take advantage of Massena's momentary weakness by forcing the Aar at Dottingen near its mouth failed completely (August 16-17). Only 200 men guarded the point of passage, but the Austrian engineers had neglected to make a proper examination of the river, and unlike the French, the Austrian generals had no authority to waste their expensive battalions in forcing the passage in boats. No one regarded this war as a struggle for existence, and no one but Suvarov possessed

the iron strength of character to send thousands of men to death for the realization of a diplomatic success — for ordinary men, the object of the Coalition was to upset the treaty of Campo Formio. This was the end of the archduke's campaign in Switzerland. Though he would have preferred to continue it, the Vienna government desired him to return to Germany. An Anglo-Russian expedition was about to land in Holland, 1 and the French were assembling fresh forces on the Rhine, and, with the double object of preventing an invasion of

1 For this expedition, which was repulsed by Brune in the battle of Castricum, see Fortescue's Hist, of the British Army, vol. iv., and Sachot's Brune en Hollande.

South Germany and of inducing the French to augment their forces in Alsace at the expense of those in Holland, the archduke left affairs in Switzerland to Hotze and Korsakov, and marched away with 35,000 men to join the detachment of Sztarray (20,000) that he had placed in the Black Forest before entering Switzerland. His new campaign never rose above the level of a war of posts and of manoeuvres about Mannheim and Philipps- burg. In the latter stage of it Lecourbe commanded the French and obtained a slight advantage.

Suvarov's last exploit in Italy coincided in time, but in no other respect, with the skirmish at Dottingen. Returning swiftly from the battlefield of the Trebbia, he began to drive back Moreau to the Riviera. At this point Joubert succeeded to the command on the French side, and against the advice of his generals, gave battle. Equally against the advice of his own subordinates, the field marshal accepted it, and won his last great victory at Novi on the 13th of August, Joubert being killed. This was followed by another rapid march against a new French " Army of the Alps " (Championnet) which had entered Italy by way of the Mont Cenis. But immediately after this he left all further operations in Italy to Melas with 60,000 men and himself with the Russians and an Austrian corps marched away, via Varese, for the St Gothard to combine operations against Massena with Hotze and Korsakov. It was with a heavy heart that he left the scene of his battles, in which the force of his personality had carried the old-fashioned " linear " armies for the last time to complete victory. In the early summer he had himself suggested,

eagerly and almost angrily, the concentration of his own and the archduke's armies in Switzerland with a view, not to conquering that country, but to forcing Jourdan and Massena into a grand decisive battle. But, as we have seen, the Vienna government would not release him until the last Italian fortress had been reoccupied, and when finally he received the order that a little while before he had so ardently desired, it was too late. The archduke had already left Switzerland, and he was committed to a resultless warfare in the high mountains, with an army which was a mere detachment Suvinv an d m tne hope of co-operating with two other detach- ordered to ments far away on the other side of Switzerland. As for the reasons which led to the issue of such an order, it can only be said that the bad feeling known to exist between the Austrians and Russians induced England to recom- mend, as the first essential of further operations, the separate concentration of the troops of each nationality under their own generals. Still stranger was the reason which induced the tsar to give his consent. It was alleged that the Russians would be healthier in Switzerland than the men of the southern plains! From such premises as these the Allied diplomats evolved a new plan of campaign, by which the Anglo-Russians under the duke of York were to reconquer Holland and Belgium, the Archduke Charles to operate on the Middle Rhine, Suvarov in Switzerland and Melas in Piedmont — a plan destitute of every merit but that of simplicity.

It is often said that it is the duty of a commander to resign rather than undertake an operation which he believes to be faulty. So, however, Suvarov did not understand it. In the simplicity of his loyalty to the formal order of his sovereign he prepared to carry out his instructions to the letter. Massena's command (77,000 men) was distributed, at the beginning of September, along an enormous S, from the Simplon, through the St Gothard and Glarus, and along the Linth, the Zuricher See and the Limmat to Basel. Opposite the lower point of this S, Suvarov (28,000) was about to advance. Hotze's corps (25,000 Austrians), extending from Utznach by Chur to Disentis,' formed a thin line roughly parallel to the lower curve of the S, Korsakov's Russians (30,000) were opposite the centre at Zurich, while Nauendorff with a small Austrian corps at Waldshut faced the extreme upper point. Thus the only completely safe way in which Suvarov could reach the Zurich region was by skirting the lower curve of the S, under protection of Hotze. But this detour would be long and painful, and the ardent old man preferred to cross the mountains once for all at the St Gothard, and to follow the valley of the Reuss to Altdorf and Schwyz — i.e. to strike vertically

Switzer- land.

upward to the centre of the S — and to force his way through the French cordon to Zurich, and if events, so far as concerned his own corps, belied his optimism, they at any rate justified his choice of the shortest route. For, aware of the danger gathering in his rear, Massena gathered up all his forces within reach towards his centre, leaving Lecourbe to defend the St Gothard and the Reuss valley and Soult on the Linth. On the 24th he forced the passage of the Limmat at Dietikon. On the 25th, in the second battle of Zurich, he completely Zurich. routed Korsakov, who lost 8000 killed and wounded, large numbers of prisoners and 100 guns. All along the line the Allies fell back, one corps after another, at the moment when Suvarov was approaching the foot of the St Gothard.

On the 21st the field marshal's headquarters were at Bellinzona, where he made the final preparations. Expecting to be four days en route before he could reach the nearest friendly , magazine, he took his trains with him, which inevitably ttle ˆ augmented the difficulties of the expedition. On the 24th Airolo was taken, but when the far greater task of storming the pass itself presented itself before them, even the stolid Russians were terrified, and only the passionate protests of the old man, who reproached his " children " with deserting their father in his extremity, induced them to face the danger. At last after twelve hours' fighting, the summit was reached. The same evening Suvarov pushed on to Hospenthal, while a flanking column from Disentis made its way towards Amsteg over the Crispalt. Lecourbe was threatened in rear and pressed in front, and his engineers, to hold off the Disentis column, had broken the Devil's Bridge. Discovering this, he left the road, threw his guns into the river and made his way by fords and water-meadows to Goschenen, where by a furious attack he cleared the Disentis troops off his line of retreat. His rearguard meantime held the ruined Devil's Bridge. This point and the tunnel leading to it, called the UrnerLoch, the Russians attempted to force, with the most terrible losses, battalion after battalion crowding into the tunnel and pushing the foremost ranks into the chasm left by the broken bridge. But at last a ford was discovered and the bridge, cleared by a turning movement, was repaired. More broken bridges lay beyond, but at last Suvarov joined the Disentis column near Goschenen. When Altdorf was reached, however, Suvarov found not only Lecourbe in a threatening position, but an entire absence of boats on the Lake of the Four Cantons. It was impossible (in those days the Axenstrasse did not exist) to take an army along the precipitous eastern shore, and thus passing through one trial after another, each more severe than the last, the Russians, men and horses and pack animals in an interminable single file,

ventured on the path leading over the Kinzig pass into the Muotta Thai. The passage lasted three days, the leading troops losing men and horses over the precipices, the rearguard from the fire of the enemy, now in pursuit. And at last, on arrival in the Muotta Thai, the field marshal received definite information that Korsakov's army was no longer in existence. ' Yet even so it was long before he could make up his mind to retreat, and the pursuers gathered on all sides. Fighting, sometimes severe, and never altogether ceasing, went on day after day as the Allied column, now reduced to 15,000 men, struggled on over one pass after another, but at last it reached Ilanz on the Vorder Rhine (October 8). The Archduke Charles meanwhile had, on hearing of the disaster of Zurich, brought over a corps from the Neckar, and for some time negotiations were made for a fresh combined operation against Massena. But these came to nothing, for the archduke and Suvarov could not agree, either as to their own rela- tions or as to the plan to be pursued. Practically, Suvarov's retreat from Altdorf to Ilanz closed the campaign. It was his last active service, and formed a gloomy but grand climax to the career of the greatest soldier who ever wore the Russian uniform.

Marengo and Hohenlinden The disasters of 1799 sealed the fate of the Directory, and placed Bonaparte, who returned from Egypt with the prestige of a recent victory, in his natural place as civil and military

head of France. In the course of the campaign the field strength of the French had been gradually augmented, and in spite of losses now numbered 227,0×30 at the front. These were divided into the Army of Batavia, Brune (25,000), the Army of the Rhine, Moreau (146,000), the Army of Italy, Massena (56,000), and, in addition, there were some 100,000 in garrisons and depots in France.

Most of these field armies were in a miserable condition owing to the losses and fatigues of the last campaign. The treasury was empty and credit exhausted, and worse still — for spirit and enthusiasm, as in 1794, would have remedied material de- ficiencies — the conscripts obtained under Jourdan's law of 1798 (see Conscription) came to their regiments most unwillingly. Most of them, indeed, deserted on the way to join the colours. A large draft sent to the Army of Italy arrived with 310 men instead of 10,250, and after a few such experiences, the

First Consul decided that the untrained men were to be assembled in the fortresses of the interior and afterwards sent to the active battalions in numerous small drafts, which they could more easily assimilate. Besides accomplishing the immense task of reorganizing existing forces, he created new ones, including the Consular Guard, and carried out at this moment of crisis two such far-reaching reforms as the replacement of the civilian drivers of the artillery by soldiers, and of the hired teams by horses belonging to the state, and the permanent grouping of divisions in army corps.

As early as the 25th of January 1800 the First Consul provided for the assembly of all available forces in the interior in an ” Army of Reserve.” He reserved to himself the of Reserve, command of this army, 1 which gradually came into being as the pacification of Vendee and the return of some of Brune’s troops from Holland set free the necessary nucleus troops. The conscription law was stringently re-enforced, and impassioned calls were made for volunteers (the latter, be it said, did not produce five hundred useful men). The district of Dijon, partly as being central with respect to the Rhine and Italian Armies, partly as being convenient for supply purposes, was selected as the zone of assembly. Chabran’s division was formed from some depleted corps of the Army of Italy and from the depots of those in Egypt. Chambarlhac’s, chiefly of young soldiers, lost 5% of its numbers on the way to Dijon from desertion — a loss which appeared slight and even satisfactory after the wholesale dibandade of the winter months. Lechi’s Italian legion was newly formed from Italian refugees. Boudet’s division was originally assembled from some of the southern garrison towns, but the units composing it were fre- quently changed up to the beginning of May. The cavalry was deficient in saddles, and many of its units were new formations. The Consular Guard of course was a corps d’elite, and this and two and a half infantry divisions and a cavalry brigade coming from the veteran ” Army of the West ” formed the real back- bone of the army. Most of the newer units were not even armed till they had left Dijon for the front.

Such was the first constitution of the Army of Reserve. We can scarcely imagine one which required more accurate and detailed staff work to assemble it — correspondence with the district commanders, with the adjutant-generals of the various armies, and orders to the civil authorities on the lines of march, to the troops themselves and to the arsenals and magazines. No one but Napoleon, even aided by a Berthier, could have achieved so great a task in six weeks, and the great captain, himself doing the work that nowadays is apportioned amongst a crowd of administrative staff officers, still found time to

administer France's affairs at home and abroad, and to think out a general plan of campaign that embracedMoreau's,Massena's and his own armies.

The Army of the Rhine, by far the strongest and best equipped, lay on the upper Rhine. The small and worn-out Army of Italy was watching the Alps and the Apennines from Mont Blanc to

1 He afterwards appointed Berthier to command the Army of Reserve, but himself accompanied it and directed it, using Berthier

as chief of staff.

Genoa. Between them Switzerland, secured by the victory of Zurich, offered a starting-point for a turning movement on either side — this year the advantage of the flank position was recognized and acted upon. The Army of Reserve was assembling around Dijon, within 200 m. of either theatre of war. The general plan was that the Army of Reserve should march through Switzerland to close on the right wing of the Army of the Rhine. Thus supported to whatever degree might prove to be necessary, Moreau was to force the passage of the Rhine about Schaffhausen, to push back the Austrians rapidly beyond the Lech, and then, if they took the offensive in turn, to hold them in check for ten or twelve days. During this period of guaranteed freedom the decisive movement was to be made. The Army of Reserve, augmented by one large corps of the Army of the Rhine, was to descend by the Splugen (alternatively by the St Gothard and even by Tirol) into the plains of Lombardy. Magazines were to be established at Zurich and Lucerne (not at Chur, lest the plan should become obvious from the beginning), and all likely routes reconnoitred in advance. The Army of Italy was at first

to maintain a strict defensive, then to occupy the Austrians until the entry of the Reserve Army into Italy was assured, and finally to manoeuvre to join it.

Moreau, however, owing to want of horses for his pontoon train and also because of the character of the Rhine above Basel, preferred to cross below that place, especially as in Alsace there were considerably greater supply facilities than in a country which had already been fought over and stripped bare. With the greatest reluctance Bonaparte let him have his way, and giving up the idea of using the Splugen and the St Gothard, began to turn his attention to the more westerly

passes, the St Bernard and the Simplon. It was not merely Moreau's scruples that led to this essential modification in the scheme. At the beginning of April the enemy took the offensive against Massena. On the 8th Melas's right wing dislodged the French from the Mont Cenis, and most of the troops that had then reached Dijon were shifted southward to be ready for emergencies. By the 25th Berthier reported that Massena was seriously attacked and that he might have to be supported by the shortest route. Bonaparte's resolution was already taken. He waited no longer for Moreau

(who indeed so far from volunteering assistance, actually demanded it for himself). Convinced from the paucity of newsthat Massena's army was closely pressed and probably severed from France, and feeling also that the Austrians were deeply committed to their struggle with the Army of Italy, he told Berthier to march with 40,000 men at once by way of the St Bernard unless otherwise advised. Berthier protested that he had only 25,000 effectives, and the equipment and armament was still far from complete — as indeed it remained to the end — but the troops marched, though their very means of existence were precarious from the time of leaving Geneva to the time of reaching Milan, for nothing could extort supplies and money from the sullen Swiss.

At the beginning of May the First Consul learned of the serious plight of the Army of Italy. Massena with his right wing was shut up'in_Genoa, Suchet with the left wing Napoleon's d r i ven back to the Var. Meanwhile Moreau had won ˆcampaign. a preliminary victory at Stokach, and the Army of Reserve had begun its movement to Geneva. With these data the plan of campaign took a clear shape at last — Massena to resist as long as possible; Suchet to resume the offensive, if he could do so, towards Turin; the Army of Reserve to pass the Alps and to debouch into Piedmont by Aosta; the Army of the Rhine to send a strong force into Italy by the St Gothard. The First Consul left Paris on the 6th of May. Berthier went forward to Geneva, and still farther on the route magazines were established at Villeneuve and St-Pierre. Gradually, and with immense efforts, the leading troops of the long column 1 were passed over the St Bernard, drawing their artillery on sledges, on the 15th and succeeding days. Driving away small posts of the Austrian army, the advance guard entered Aosta on

the 16th and Chatillon on the 18th and the alarm was given. Melas, committed as he was to his Riviera campaign, began to look to his right rear, but he was far from suspecting the seriousness of his opponent's purpose.

Infinitely more dangerous for the French than the small detachment that Melas opposed to them, or even the actual crossing of the pass, was the unexpected stopping power of the little fort of Bard. The advanced guard of the French appeared before it on the 19th, and after three wasted days the infantry managed to find a difficult mountain by-way and to pass round the obstacle. Ivrea was occupied on the 23rd, and Napoleon hoped to assemble the whole army there by the 27th. But except for a few guns that with infinite precautions were smuggled one by one through the streets of Bard, the whole of the artillery, as well as a detachment (under Chabran) to besiege the fort, had to be left behind. Bard sur- rendered on the 2nd of June, having delayed the infantry of the French army for four days and the artillery for a fortnight. The military situation in the last week of May, as it presented itself to the First Consul at Ivrea, was this. The Army of Italy under Massena was closely besieged in Genoa, where provisions were running short, and the population so hostile that the French general placed his field artillery to sweep the streets. But Massena was no ordinary general, and the First Consul knew that while Massena lived the garrison would resist to the last extremity. Suchet was defending Nice and the Var by vigorous minor operations. The Army of Reserve, the centre of which had reached at Ivrea the edge of the Italian plains, consisted of four weak army corps under Victor, Duhesme, Lannes and Murat. There were still to be added to this small army of 34,000 effectives, Turreau's division, which had passed over the Mont Cenis and was now in the valley of the Dora Riparia, Moncey's corps of the Army of the Rhine, which had at last been extorted from Moreau and was due to pass the St Gothard before the end of May, Chabran's division left to. besiege Bard, and a small force under Bethencourt, which was to cross the Simplon and to descend by Arona (this place proved in the event a second Bard and immobilized Bethencourt until after the decisive battle). Thus it was only the simplest part of Napoleon's task to concentrate half of his army at Ivrea, and he had yet to bring 1 Only one division of the main body used the Little St Bernard.

in the rest. The problem was to reconcile the necessity for time, which he wanted to ensure the maximum force being brought over the Alps, with the necessity for haste, in view of the impend- ing fall of Genoa and the probability that once this conquest was achieved, Melas would bring back his 100,000 men into the Milanese to deal with the Army

of Reserve. As early as the 14th of May he had informed Moncey that from Ivrea the Army of Reserve would move on Milan. On the 25th of May, in response to Berthier's request for guidance, the First Consul ordered Lannes (advanced guard) to push out on the Turin road, " in order to deceive the enemy and to obtain news of Turreau," and Duhesme's and Murat's corps to proceed along the Milan road. On the 27th, after Lannes had on the 26th defeated an Austrian column near Chivasso, the main body was already advancing on Vercelli.

Very few of Napoleon's acts of generalship have been more criticized than this resolution to march on Milan, which abandoned Genoa to its fate and gave Melas a week's leisure to assemble his scattered forces. The account of his motives J fjff a he dictated at St Helena {Nap. Correspondence, v. 30, toM " an – PP- 375"377) > ' n itself an unconvincing appeal to the rules of strategy as laid down by the theorists — which rules his own practice through- out transcended — gives, when closely examined, some at least of the necessary clues. He says in effect that by advancing directly on Turin he would have " risked a battle against equal forces without an assured line of retreat, Bard being still uncaptured." It is indeed strange to find Napoleon shrinking before equal forces of the enemy, even if we admit without comment that it was more difficult to pass Bard the second time than the first. The only incentive to go towards Turin was the chance of partial victories over the discon- nected Austrian corps that would be met in that direction, and this he deliberately set aside. Having done so, for reasons that will appear in the sequel, he could only defend it by saying in effect that he might have been defeated — which was true, but not the Napoleonic principle of war. Of the alternatives, one was to hasten to Genoa; this in Napoleon's eyes would have been playing the enemy's game, for they would have concentrated at Alessandria, facing west " in their natural position." It is equally obvious that thus the enemy would have played his game, supposing that this was to relieve Genoa, and the implication is that it was not. The third course, which Napoleon took, and in this memorandum defended, gave his army the enemy's depots at Milan, of which it unquestionably stood in sore need, and the reinforcement of Moncey's 15,000 men from the Rhine, while at the same time Moncey's route offered an " assured line of retreat " by the Simplon 2 and the St Gothard. He would in fact make for himself there a " natural position " without forfeiting the advantage of being in Melas's rear. Once possessed of Milan, Napoleon says, he could have engaged Melas with a light heart and with confidence in the greatest possible results of a victory, whether the Austrians sought to force their way back to the east by the right or the left bank of the Po, and he adds that if the

French passed on and con- centrated south of the Po there would be no danger to the Milan- St Gothard line of retreat, as this was secured by the rivers Ticino and Sesia. In this last, as we shall see, he is shielding an undeniable mistake, but considering for the moment only the movement to Milan, we are justified in assuming that his object was not the relief of Genoa, but the most thorough defeat of Melas's field army, to which end,, putting all sentiment aside, he treated the hard-pressed Massena as a " containing force " to keep Melas occupied during the strategical deployment of the Army of Reserve. In the beginning he had told Massena that he would " disengage " him, even if he had to go as far east as Trent to find a way into Italy. From the first, then, no direct relief was intended, and when, on hearing bad news from the Riviera, he altered his route to the more westerly passes, it was probably because he felt that Massena's containing power was almost exhausted, and that the passage and reassembly of the Reserve Army must be brought about in the minimum time and by the shortest way. But the object was still the defeat of Melas/and for this, as the Austrians possessed an enormous numerical superiority, the assembly of all forces, including Moncey's, was indispensable. One essential condition of this was that the points of passage used should be out of reach of the enemy. The more westerly the passes chosen, the more dangerous was the whole operation — in fact the Mont Cenis column never reached him at all — and though his expressed objections to the St Bernard line seem, as we have said, to be written after the event, to disarm his critics, there is no doubt that at the time he disliked it. It was a pis alter forced upon him by Moreau's delay and Massena's extremity, and from the moment at which he arrived at Milan he did, as a fact, abandon it altogether in favour of the St Gothard. Lastly, so strongly was he impressed with the necessity of completing the deployment of all his forces, that though he found the Austrians on the Turin side much scattered and could justifiably expect a series of rapid

2 When he made his decision he was unaware that Bethencourt had been held up at Arona.

partial victories, Napoleon let them go, and devoted his whole energy to creating for himself a " natural " position about Milan. If he sinned, at any rate he sinned handsomely, and except that he went to Milan

by Vercelli instead of by Lausanne and Domodossola ‘ (on the safe side of the mountains), his march is logistically beyond cavil.

Napoleon’s immediate purpose, then, was to reassemble the Army of Reserve in a zone of manoeuvre about Milan. This was carried out in the first days of June. Lannes at Chivasso stood ready to ward off a flank attack until the main army had filed past on the Vercelli road, then leaving a small force to com- bine with Turreau (whose column had not been able to advance into the plain) in demonstrations towards Turin, he moved off, still acting as right flank guard to the army, in the direction of Pavia. The main body meanwhile, headed by Murat, advanced on Milan by way of Vercelli and Magenta, forcing the passage of the Ticino on the 31st of May at Turbigo and Buffalora. On the same day the other divisions closed up to the Ticino, 2 and faithful to his principles Napoleon had an examination made of the little fortress of Novara, intending to occupy it as a place du moment to help in securing his zone of manoeuvre. On the morn- ing of the 2nd of June Murat occupied Milan, and in the evening of the same day the headquarters entered the great city, the Austrian detachment under Vukassovich (the flying right wing of Melas’s general cordon system in Piedmont) retiring to the Adda. Duhesme’s corps forced that river at Lodi, and pressed on with orders to organize Crema and if possible Orzinovi as temporary fortresses. Lechi’s Italians were sent towards Bergamo and Brescia. Lannes meantime had passed Vercelli, and on the evening of the 2nd his cavalry reached Pavia, where, as at Milan, immense stores of food, equipment and warlike stores were seized.

Napoleon was now safe in his ” natural ” position, and barred one of the two main lines of retreat open to the Austrians. But his ambitions went further, and he intended to cross the Po and to establish himself on the other likewise, thus establishing across the plain a complete barrage between Melas and Mantua. Here his end outranged his means, as we shall see. But he gave himself every chance that rapidity could afford him, and the moment that some sort of a ” zone of manoeuvre ” had been secured between the Ticino and the Oglio, he pushed on his main body — or rather what was left after the protective system had been provided for — to the Po. He would not wait even for his guns, which had at last emerged from the Bard defile and were ordered to come to Milan by a safe and circuitous route along the foot of the Alps.

At this point the action of the enemy began to make itself felt. Melas had not gained the successes that he had expected in Piedmont and on the Riviera, thanks to Massena’s ‘move* obstinacy and to Suchet’s

brilliant defence of the Var. meats. These operations had led him very far afield, and the protection of his over-long line of communications had caused him to weaken his large army by throwing off many detachments to watch the Alpine valleys on his right rear. One of these successfully opposed Turreau in the valley of the Dora Riparia, but another had been severely handled by Lannes at Chivasso, and a third (Vukassovich) found itself, as we know, directly in the path of the French as they moved from Ivrea to Milan, and was driven far to the eastward. He was further handicapped by the necessity of supporting Ott before Genoa and Elsnitz on the Var, and hearing of Lannes's bold advance on Chivasso and of the presence of a French column with artillery (Turreau) west of Turin, he assumed that the latter represented the main body of the Army of Reserve — in so far indeed as he believed in the existence of that army at all. 3 Next, when

1 This may be accounted for by the fact that Napoleon's mind was not yet definitively made up when his advanced guard had already begun to climb the St Bernard (12th). Napoleon's instructions for Moncey were written on the 14th. The magazines, too, had to be provided and placed before it was known whether Moreau's detach- ment would be forthcoming.

2 Six guns had by now passed Fort Bard and four of these were with Murat and Duhesme, two with Lannes.

3 It is supposed that the foreign spies at Dijon sent word to their various employers that the Army was a bogy. In fact a great part of it never entered Dijon at all, and the troops reviewed there by

Lannes moved away towards Pavia, Melas thought for a moment that fate had delivered his enemy into his hands, and began to collect such troops as were at hand at Turin with a view to cutting off the retreat of the French on Ivrea while Vukassovich held them in front. It was only when news came of Moncey's arrival in Italy and of Vukassovich's fighting retreat on Brescia that the magnitude and purpose of the French column that had penetrated by Ivrea became evident. Melas promptly decided to give up his western enterprises, and to concentrate at Alessandria, preparatory to breaking his way through the network of small columns — as the disseminated Army of Reserve still appeared to be — which threatened to bar his retreat. But orders circulated so slowly that he had to wait in Turin till the 8th of June for Elsnitz, whose retreat was, moreover, sharply followed up and made exceedingly costly by the enterprising Suchet. Ott, too, in spite of orders to give up the siege of Genoa at once and to march

with all speed to hold the Alessandria-Piacenza road, waited two days to secure the prize, and agreed (June 4) to allow Massena's army to go free and to join Suchet. And lastly, the cavalry of O'Reilly, sent on ahead from Alessandria to the Stradella defile, reached that point only to encounter the French. The barrage was complete, and it remained for Melas to break it with the mass that he was assembling, with all these misfortunes and delays, about Alessandria. His chances of doing so were anything but desperate.

On the 5th of June Murat, with his own corps and part of Duhesme's, had moved on Piacenza, and stormed the bridge-head there. Duhesme with one of his divisions pushed out on Crema and Orzinovi and also towards Pizzighetone. Moncey's leading regiments approached Milan, and Berthier thereupon sent on Victor's corps to support Murat and Lannes. Meantime the half abandoned line of operations, Ivrea-Vercelli, was briskly attacked by the Austrians, who had still detachments on the side of Turin, waiting for Elsnitz to rejoin, and the French artillery train was once more checked. On the 6th Lannes from Pavia, crossing the Po at San Cipriano, encountered and defeated a large force, (O'Reilly's column), and barred the Alessandria-Parma main road. Opposite Piacenza Murat had to spend the day in gathering material for his passage, as the pontoon bridge had been cut by the retreating garrison of the bridge-head. On the eastern border of the " zone of manoeuvre " Duhesme's various columns moved out towards Brescia and Cremona, pushing back Vukasso- vich. Meantime the last divisions of the Army of Reserve (two of Moncey's excepted) were hurried towards Lannes's point of passage, as Murat had not yet secured Piacenza. On the 7th, while Duhesme continued to push back Vukassovich and seized Cremona, Murat at last captured Piacenza, finding there immense magazines. Meantime the army, division by division, passed over, slowly owing to a sudden flood, near Belgiojoso, and Lannes's advanced guard was ordered to open communication with Murat along the main road Stradella-Piacenza. " Moments are precious " said the First Consul. He was aware that Elsnitz was retreating before Suchet, that Melas had left Turin for Alessandria, and that heavy forces of the enemy were at or east of Tortona. He knew, too, that Murat had been engaged with certain regiments recently before Genoa and (wrongly) assumed O'Reilly's column, beaten by Lannes at San Cipriano, to have come from the same quarter. Whether this meant the deliverance or the surrender of Genoa he did not yet know, but it was certain that Massena's holding action was over, and that Melas was gathering up his forces to recover his communications. Hence Napoleon's great object was concentration. " Twenty thousand men at Stradella," in his own words, was the goal of

his efforts, and with the accomplishment of this purpose the campaign enters on a new phase.

On the 8th of June, Lannes's corps was across, Victor following as quickly as the flood would allow. Murat was at Piacenza, but the road between Lannes and Murat was not known to be clear, and the First Consul made the establishment of the

Bonaparte were only conscripts and details. By the time that the veteran divisions from the west and Paris arrived, either the spies had been ejected or their news was sent off too late to be of use.

MONTEBELLO]

connexion, and the construction of a third point of passage mid- way between the other two, the principal objects of the day's work. The army now being disseminated between the Napoleon's M th Apennines, the Ticino and the Chiese, it tions. was of vlta -l importance to connect up the various

parts into a well-balanced system. But the Napoleon of 1800 solved the problem that lay at the root of his strategy, " concentrate, but be vulnerable nowhere," in a way that compares unfavourably indeed with the methods of the Napoleon of 1806. Duhesme was still absent at Cremona. Lechi was far away in the Brescia country, Bethencourt de- tained at Arona. Moncey with about 15,000 men had to cover an area of 40 m. square around Milan, which constituted the original zone of manoeuvre, and if Melas chose to break through the flimsy cordon of outposts on this side (the risk of which was the motive for detaching Moncey at all) instead of at the Stradella, it would take Moncey two days to concentrate his force on any battlefield within the area named, and even then he would be outnumbered by two to one. As for the main body at the Stradella, its position was wisely chosen, for the ground was too cramped for the deployment of the superior force that Melas might bring up, but the strategy that set before itself as an object 20,000 men at the decisive point out of 50,000 available, is, to say the least, imperfect. The most serious feature in all this was the injudicious order to Lannes to send forward his advanced guard, and to attack whatever enemy he met with on the road to Voghera. The First Consul, in fact, calculated that Melas could not assemble 20,000 men at Alessandria before the 12th of June, and he told

Lannes that if he met the Austrians towards Voghera, they could not be more than 10,000 strong. A later order betrays some anxiety as to the exactitude of these assump- tions, warns Lannes not to let himself be surprised, indicates his line of retreat, and, instead of ordering him to advance on Voghera, authorizes him to attack any corps that presented itself at Stradella. But all this came too late. Acting on the earlier order Lannes fought the battle of Montebello on the 9th. This was a very severe running fight, beginning east of beHo _ ” Casteggio and ending at Montebello, in which the French drove the Austrians from several successive positions, and which culminated in a savage fight at close quarters about Montebello itself. The singular feature of the battle is the disproportion between the losses on either side — French, 500 out of 12,000 engaged; Austrians, 2100 killed and wounded and 2100 prisoners out of 14,000. These figures are most conclusive evidence of the intensity of the French military spirit in those days. One of the two divisions (Watrin’s) was indeed a veteran organization, but the other, Chambarlhac’s, was formed of young troops and was the same that, in the march to Dijon, had congratulated itself that only 5% of its men had deserted. On the other side the soldiers fought for ” the honour of their arms ” — not even with the courage of despair, for they were ignorant of the ” strategic barrage ” set in front of them by Napoleon, and the loss of their communications had not as yet lessened their daily rations by an ounce.

Meanwhile, Napoleon had issued orders for the main body to stand fast, and for the detachments to take up their definitive covering positions. Duhesme’s corps was directed, from its eastern foray, to Piacenza, to join the main body. Moncey was to provide for the defence of the Ticino line, Lechi to form a ” flying camp ” in the region of Orzinovi-Brescia and Cremona, and another mixed brigade was to control the Austrians in Pizzighetone and in the citadel of Piacenza. On the other side of the Po, between Piacenza and Montebello, was the main body (Lannes, Murat and part of Victor’s and Duhesme’s corps), and a flank guard was stationed near Pavia, with orders to keep on the right of the army as it advanced (this is the first and only hint of any intention to go westward) and to fall back fighting should Melas come on by the left bank. One division was to be always a day’s march behind the army on the right bank, and a flotilla was to ascend the Po, to facilitate the speedy reinforce- ment of the flank guard. Farther to the north was a small column on the road Milan-Vercelli. All the protective troops,

except the division of the main body detailed as an eventual support for the flank guard, was to be found by Moncey’s corps (which had

besides to watch the Austrians in the citadel of Milan) and Chabran's and Lechi's weak commands. On this same day Bonaparte tells the Minister of War, Carnot, that Moncey has only brought half the expected reinforcements and that half of these are unreliable. As to the result of the impending contest Napoleon counts greatly upon the union of 18,000 men under Massena and Suchet to crush Melas against the " strategic barrage " of the Army of Reserve, by one or other bank of the Po, and he seems equally confident of the result in either case. If Genoa had held out three days more, he says, it would have been easy to count the number of Melas's men who escaped. The exact significance of this last notion is difficult to establish, and all that could be written about it would be merely conjectural. But it is interesting to note that, without admitting it, Napoleon felt that his " barrage " might not stand before the flood. The details of the orders of the 9th to the main body (written before the news of Montebello arrived at headquarters) tend to the closest possible concentration of the main body towards Casteggio, in view of a decisive battle on the 12th or 13th.

But another idea had begun to form itself in his mind. Still believing that Melas would attack him on the Stradella side, and hastening his preparations to meet this, he began to allow for the contingency of Melas giving up or failing in his attempt to re-establish his communication with the ^^ce * Mantovese, and retiring on Genoa, which was now in his hands and could be provisioned and reinforced by sea. On the 10th Napoleon ordered reserve ammunition to be sent

Emery WiOkcr sc

from Pavia, giving Serravalle, which is south of Novi, as its probable destination. But this was surmise, and of the facts he knew nothing. Would the enemy move east on the Stradella, north-east on the Ticino or south on Genoa? Such reports as were available indicated no important movements whatever, which happened to be true, but could hardly appear so to the French headquarters. On the nth, though he thereby forfeited the reinforcements coming up from Duhesme's corps at Cremona, Napoleon ordered the main body to advance to the Scrivia. Lapoype's division (the right flank guard), which was observing the Austrian posts towards Casale, was called to the south bank of the Po, the zone around Milan was stripped so bare of troops that there was no escort for the prisoners taken at Montebello, while information sent by Chabran (now moving up from Ivrea) as to the construction of bridges at Casale (this was a feint made by Melas on the 10th) passed unheeded. The crisis was at hand, and, clutching at the reports collected by Lapoype as to the quietude of the Austrians

toward Valenza and Casale, Bonaparte and Berthier strained every nerve to bring up more men to the

Marengo.

Voghera side in the hope of preventing the prey from slipping away to Genoa.

On the 1 2 th, consequently, the army (the ordre de bataille of which had been considerably modified on the nth) moved to the Scrivia, Lannes halting at Castelnuovo, Desaix (who had just joined the army from Egypt) at Pontecurone, Victor at Tortona with Murat's cavalry in front towards Alessandria. Lapoype's division, from the left bank of the Po, was marching in all haste to join Desaix. Moncey, Duhesme, Lechi and Chabran were absent. The latter represented almost exactly half of Berthier's command (30,000 out of 58,000), and even the concentration of 28,000 men on the Scrivia had only been obtained by practically giving up the " barrage " on the left bank of the Po. Even now the enemy showed nothing but a rearguard, and the old questions reappeared in a new and acute form. Was Melas still in Alessandria ? Was he marching on Valenza and Casale to cross the Po ? or to Acqui against Suchet, or to Genoa to base himself on the British fleet? As to the first, why had he given up his chances of fighting on one of the few cavalry battlegrounds in north Italy — the plain of Marengo — since he could not stay in Alessandria for any indefinite time ? The second question had been answered in the negative by Lapoype, but his latest information was thirty-six hours old. As for the other questions, no answer whatever was forthcoming, and the only course open was to postpone decisive measures and to send forward the cavalry, supported by infantry, to gain information.

On the 13th, therefore, Murat, Lannes and Victor advanced into the plain of Marengo, traversed it without difficulty and carrying the villages held by the Austrian rearguard, established themselves for the night within a mile of the fortress. But meanwhile Napoleon, informed we may suppose of their progress, had taken a step that was fraught with the gravest consequences. He had, as we know, no intention of forcing on a decision until his reconnaissance produced the information on which to base it, and he had therefore kept back three

divisions under Desaix at Pontecurone. But as the day wore on without incident, he began to fear that the reconnaissance would be profitless, and unwilling to give Melas any further start, he sent out these divisions right and left to find and to hold the enemy, whichever way the latter had gone. At noon Desaix with one division was despatched southward to Rivalta to head off Melas from Genoa and at 9 a.m. on the 14th, 1 Lapoype was sent back over the Po to hold the Austrians should they be advancing from Valenza towards the Ticino. Thus there remained in hand only 21,000 men when at last, in the forenoon of the 14th the whole of Melas's army, more than 40,000 strong, moved out of Alessandria, not southward nor northward, but due west into the plain of Marengo (q.v.). The extraordinary battle that followed is described elsewhere. The outline of it is simple enough. The Austrians advanced slowly and in the face of the most resolute opposition, until their attack had gathered weight, and at last they were carrying all before them, when Desaix returned from beyond Rivalta and initiated a series of counterstrokes. These were brilliantly successful, and gave the French not only local victory but the supreme self-confidence that, next day, enabled them to extort from Melas an agreement to evacuate all Lombardy as far as the Mincio. And though in this way the chief prize, Melas's army, escaped after all, Marengo was the birthday of the First Empire.

One more blow, however, was required before the Second Coalition collapsed, and it was delivered by Moreau. We have seen that he had crossed the upper Rhine and defeated Kray at Stokach. This was followed by other partial victories, and Kray then retired to Ulm, where he reassembled his forces, hitherto scattered in a long weak line from the Neckar to Schaff- hausen. Moreau continued his advance, extending his forces up to and over the Danube below Ulm, and winning several combats, Of which the most important was that of Hochstadt,

1 On the strength of a report, false as it turned out, that the Austrian rearguard had broken the bridges of the Bormida.

fought on the famous battlegrounds of 1703 and 1704, and memorable for the death of La Tour d'Auvergne, the " First Grenadier of France " (June 19). Finding himself in danger of envelopment, Kray now retired, swiftly and skilfully, across the front of the advancing French, and reached Ingolstadt in safety. Thence he retreated over the Inn, Moreau following him to the edge of that river, and an armistice put an end for the moment to further operations.

This not resulting in a treaty of peace, the war was resumed both in

Italy and in Germany. The Army of Reserve and the Army of Italy, after being fused into one, under Massena's command, were divided again into a fighting army under Brune, who opposed the Austrians (Bellegarde) on the Mincio, and a political army under Murat, which re-established French influence in the Peninsula. The former, extending on a wide front as usual, won a few strategical successes without tactical victory, the only incidents of which worth recording are the gallant fight of Dupont's division, which had become isolated during a manoeuvre, at Pozzolo on the Mincio (December 25) and the descent of a corps under Macdonald from the Grisons by way of the Spltigen, an achievement far surpassing Napoleon's and even Suvarov's exploits, in that it was made after the winter snows had set in.

In Germany the war for a moment reached the sublime. Kray had been displaced in command by the young archduke John, who ordered the denunciation of the armistice and a general advance. His plan, or that of his u a a en ~ advisers, was to cross the lower Inn, out of reach of Moreau's principal mass, and then to swing round the French flank until a complete chain was drawn across their rear. But during the development of the manoeuvre, Moreau also moved, and by rapid marching made good the time he had lost in con- centrating his over-dispersed forces. The weather was appalling, snow and rain succeeding one another until the roads were almost impassable. On the 2nd of December the Austrians were brought to a standstill, but the inherent mobility of the Revolutionary armies enabled them to surmount all difficulties, and thanks to the respite afforded him by the archduke's halt, Moreau was able to see clearly into the enemy's plans and dispositions. On the 3rd of December, while the Austrians in many disconnected columns were struggling through the dark and muddy forest paths about Hohenlinden, Moreau struck the decisive blow. While Ney and Grouchy held fast the head of the Austrian main column at Hohenlinden, Richepanse's corps was directed on its left flank. In the forest Richepanse unexpectedly met a subsidiary Austrian column which actually cut his column in two. But profiting by the momentary con- fusion he drew off that part of his forces which had passed beyond the point of contact and continued his march, striking the flank of the archduke's main column, most of which had not succeeded in deploying opposite Ney, at the village of Mattempost. First the baggage train and then the artillery park fell into his hands, and lastly he reached the rear of the troops engaged opposite Hohenlinden, whereupon the Austrian main body practically dissolved. The rear of Richepanse's corps, after disengaging itself from the Austrian column it had met in the earlier part of the day, arrived

at Mattempost in time to head off thousands of fugitives who had escaped from the carnage at Hohenlinden. The other columns of the unfortunate army were first checked and then driven back by the French divisions they met, which, moving more swiftly and fighting better in the broken ground and the woods, were able to combine two brigades against one wherever a fight developed. On this disastrous day the Austrians lost 20,000 men, 1 2,000 of them being prisoners, and 90 guns.

Marengo and Hohenlinden decided the war of the Second Coalition as Rivoli had decided that of the First, and the Revolu- tionary Wars came to an end with the armistice of Steyer (December 25, 1800) and the treaty of Luneville (February 9, 1801). But only the first act of the great drama was accom- plished. After a short respite Europe entered upon the Napoleonic Wars.

Bibliography. — By far the most important modern works are A. Chuquet's Guerres de la Resolution (11 monographs forming to- gether a complete history of the campaigns of 1792-93), and the publications of the French General Staff. The latter appear first, as a rule, in the official " Revue d'histoire " and are then republished in separate volumes, of which every year adds to the number. V. Dupuis' L'Armee du nord 1793; Coutanceau's V Armie du nord 1794; J. Colin's Education militaire de Napoleon and Campagne de 1793 en Alsace; and C. de Cugnac's Campagne de Varmee de reserve 1800 may be specially named. Among other works of importance the principal are C. von B(inder)-K(rieglstein), Geist und Stoff im Kriege (Vienna, 1896); E. Gachot's works on Massena's career (containing invaluable evidence though written in a somewhat rhetorical style) ; Ritter von Angeli, Erzherzog Karl (Vienna, 1896) ; F. N. Maude, Evolution of Modern Strategy; G. A. Furse, Marengo and Hohenlinden; C. von Clausewitz, Feldzug 1706 in Italien and Feldzug 1799 (French translations); H. Bonnal, De Rosbach d. Ulm; Krebs and Moris, Campagnes dans les Alpes (Paris, 1891-1895); Yorck von Wartenburg, Napoleon als Feldherr (English and French translations); F. Bouvier, Bonaparte en Italie 1796; Kuhl, Bona- parte's erster Feldzug; J. W. Fortescue, Hist, of the British Army, vol. iv. ; G. D. v. Scharnhorst, Ursache des Glucks der Franzosen 1 793~ I 794 (reprinted in A. Weiss's Short German Military Readings, London, 1892); E. D'Hauterive, L'ArmSe sous la Revolution; C. Rousset, Les Volontaires; Max Jahns, Das franzbsische Heer; Shad well, Mountain Warfare;

works of Colonel Camon (Guerre Napoleonienne, &c); Austrian War Office, Krieg gegen die franz. Revolution 1792-1797 (Vienna, 1905) ; Archduke Charles, Grundsdtze der Strategic (1796 campaign in Germany) , and Gesch. des Feldzuges 1799 in Deutschl. und der Schweiz; v. Zeissberg, Erzherzog Karl; the old history called Victoires et conquttes des Frangais (27 volumes, Paris, 1817-1825); M. Hartmann, Anteil der Russen am Feldzug 1799 in der Schweiz (Zurich, 1892); Danelewski-Miliutin, Der Krieg Russlands gegen Frankreich unter Paul I. (Munich, 1858) ; German General Staff, “Napoleons Feldzug 1796-1797″ (Suppl. Mil. Wochenblatt, 1 889), and Pirmasens und Kaiser slautern (” Kriegs- gesch. Einzelschriften,” 1893). (C.F. A.)

Naval Operations The naval side of the wars arising out of the French Revolution was marked by unity, and even by simplicity. France had but one serious enemy, Great Britain, and Great Britain had but one purpose, to beat down France. Other states were drawn into the strife, but it was as the allies, the enemies and at times the victims, of the two dominating powers. The field of battle was the whole expanse of the ocean and the landlocked seas. The weapons, the methods and the results were the same. When a general survey of the whole struggle is taken, its unity is manifest. The Revolution produced a profound alteration in the government of France, but none in the final purposes of its policy. To secure for France its so-called ” natural limits ” — the Rhine, the Alps, the Pyrenees and the ocean; to protect both flanks by reducing Holland on the north and Spain on the south to submission; to confirm the mighty power thus con- stituted, by the subjugation of Great Britain, were the objects of the Republic and of Napoleon, as they had been of Louis XIV. The naval war, like the war on land, is here considered in the first of its two phases — the Revolutionary (1792-99). (For the Napoleonic phase (1800-15), see Napoleonic Campaigns.)

The Revolutionary war began in April 1792. In the September of that year Admiral Truguet sailed from Toulon to co-operate with the French troops operating against the Austrians and their allies in northern Italy. In December Latouche Treville was sent with another squadron to cow the Bourbon rulers of Naples. The extreme feebleness of their opponents alone saved the French from disaster. Mutinies, which began within ten days of the storming of the Bastille (14th of July 1789), had disorganized their navy, and the effects of these disorders continued to be felt so long as the war lasted. In February 1793 war broke out with Great Britain and Holland. In March Spain was added to the list of the powers against which France declared war. Her resources at sea were wholly inadequate to meet the coalition she had provoked. The Convention did indeed order that

fifty-two ships of the line should be com- missioned in the Channel, but it was not able in fact to do more than send out a few diminutive and ill-appointed squadrons, manned by mutinous crews, which kept close to the coast. The British navy was in excellent order, but the many calls made on it for the protection of world-wide commerce and colonial

possessions caused the operations in the Channel to be somewhat languid. Lord Howe cruised in search of the enemy without being able to bring them to action. The severe blockade which in the later stages of the war kept the British fleet permanently outside of Brest was not enforced in the earlier stages. Lord Howe preferred to save his fleet from the wear and tear of perpetual cruising by maintaining his headquarters at St Helens, and keeping watch on the French ports by frigates. The French thus secured a freedom of movement which in the course of 1 794 enabled them to cover the arrival of a great convoy laden with food from America (see First or June, Battle of). This great effort was followed by a long period of languor. Its internal defects compelled the French fleet in the Channel to play a very poor part till the last days of 1796. Squadrons were indeed sent a short way to sea, but their inefficiency was conspicuously displayed when, on the 17th of June 1795, a much superior number of their line of battle ships failed to do any harm to the small force of Cornwallis, and when on the 22nd of the same month they fled in disorder before Lord Bridport at the Isle de Groix.

Operations of a more decisive character had in the meantime taken place both in the Mediterranean and in the West Indies. In April 1793 the first detachment of a British fleet, which was finally raised to a strength of 2 1 sail of the line, under the com- mand of Lord Hood, sailed for the Mediterranean. By August the admiral was off Toulon, acting in combination with a Spanish naval force. France was torn by the contentions of Jacobins and Girondins, and its dissensions led to the surrender of the great arsenal to the British admiral and his Spanish colleague Don Juan de Langara, on the 27 th of August. The allies were joined later by a contingent from Naples. But the military forces were insufficient to hold the land defences against the army collected to expel them. High ground commanding the anchorage was occupied by the besieging force, and on the 18th of December 1793 the allies retired. They carried away or destroyed thirty-three French vessels, of which thirteen were of the line. But partly through the inefficiency and partly through the ill-will of the Spaniards, who were indisposed to cripple the French, whom they considered as their only possible allies against Great Britain, the destruction was not so complete as had been intended. Twenty-five ships, of which eighteen

were of the line, were left to serve as the nucleus of an active fleet in later years. Fourteen thousand of the inhabitants fled with the allies to escape the vengeance of the victorious Jacobins. Their suffer- ings, and the ferocious massacre perpetrated on those who remained behind by the conquerors, form one of the blackest pages of the French Revolution. The Spanish fleet took no further part in the war. Lord Hood now turned to the occupa- tion of Corsica, where the intervention of the British fleet was invited by the patriotic party headed by Pascual Paoli. The French ships left at Toulon were refitted and came to sea in the spring of 1794, but Admiral Martin who commanded them did not feel justified in giving battle, and his sorties were mere demonstrations. From the 25th of January 1794 till November 1796 the British fleet in the Mediterranean was mainly occupied in and about Corsica, securing the island, watching Toulon and co-operating with the allied Austrians and Piedmontese in northern Italy. It did much to hamper the coastwise com- munications of the French. But neither Lord Hood, who went home at the end of 1794, nor his indolent successor Hotham, was able to deliver an effective blow at the Toulon squadron. The second of these officers fought two confused actions with Admiral Martin in the Gulf of Lyons on the 16th of March and the 1 2th of July 1795, but though three French ships were cut off and captured, the baffling winds and the placid disposition of Hotham united to prevent decisive results. A new spirit was introduced into the command of the British fleet when Sir John"' Jervis, afterwards Earl Saint Vincent, succeeded Hotham in November 1795.

Jervis came to the Mediterranean with a high reputation, which had been much enhanced by his recent command in the West Indies. In every war with France it was the natural policy

of the British government to seize on its enemy's colonial possessions, not only because of their intrinsic value, but because they were the headquarters of active privateers. The occupation of the little fishing stations of St Pierre and Miquelon (14th May 1793) and of Pondicherry in the East Indies (23rd Aug. 1793) were almost formal measures taken at the begriming of every war. But the French West Indian islands possessed intrinsic strength which rendered their occupation a service of difficulty and hazard. In 1793 they were torn by dissensions, the result of the revolution in the mother country. Tobago was occupied in April, and the French part of the great island of San Domingo was partially thrown into British hands by the Creoles, who were threatened by their insurgent slaves. During 1794 a lively series of operations, in which there were some marked alternations of fortune, took place in and about Martinique and Guadaloupe. The British squadron, and the contingent of troops it carried, after a first repulse, occupied them both in March and April, together with Santa Lucia. A vigorous counter-attack was carried out by the Terrorist Victor Hugues with ability and ferocity. Guadaloupe and Santa Lucia were recovered in August. Yet on the whole the British government was successful in its policy of destroying the French naval power in distant seas. The seaborne commerce of the Republic was destroyed.

The naval supremacy of Great Britain was limited, and was for a time menaced, in consequence of the advance of the French armies on land. The invasion of Holland in 1794 led to the downfall of the house of Orange, and the establishment of the Batavian Republic. War with Great Britain under French dictation followed in January 1795. In that year a British expedition under the command of Admiral Keith Elphinstone (afterwards Lord Keith) occupied the Dutch colony at the Cape (August-September) and their trading station in Malacca. The British colonial empire was again extended, and the command of the sea by its fleet confirmed. But the necessity to maintain a blockading force in the German Ocean imposed a fresh strain on its naval resources, and the hostility of Holland closed a most important route to British commerce in Europe. In 1795 Spain made peace with France

at Basel, and in September 1796 re-entered the war as her ally. The Spanish navy was most inefficient, but it required to be watched and therefore increased the heavy strain on the British fleet. At the same time the rapid advance of the French arms in Italy began to close the ports of the peninsula to Great Britain. Its ships were for a time with- drawn from the Mediterranean. Poor as it was in quality, the Spanish fleet was numerous. It was able to facilitate the move- ments of French squadrons sent to harass British commerce in the Atlantic, and a concentration of forces became necessary. It was the more important because the cherished French scheme for an attack on the heart of the British empire began to take shape. While Spain occupied one part of the British fleet to the south, and Holland another in the north, a French expedition, which was to have been aided by a Dutch expedition from the Texel, was prepared at Brest. The Dutch were confined to harbour by the vigilant blockade of Admiral Duncan, afterwards Lord Camperdown. But in December r 796 a French fleet com- manded by Admiral Morard de Galle, carying 13,000 troops under General Hoche, was allowed to sail from Brest for Ireland, by the slack managementof theblockade under Admiral Colpoys. Being ill-fitted, ill-manned and exposed to constant bad weather the French ships were scattered. Some reached their destination, Bantry Bay, only to be driven out again by north-easterly gales. The expedition finally returned after much suffering, and in fragments, to Brest. Yet the year 1797 was one of extreme trial to Great Britain. The victory of Sir John Jervis over the Spaniards near Cape Saint Vincent on the 14th of February (see Saint Vincent, Battle of) disposed of the Spanish fleet. In the autumn of the year the Dutch, having put to sea, were defeated at Camperdown by Admiral Duncan on the nth of October. Admiral Duncan had the more numerous force, sixteen ships to fifteen, and they were on the average heavier. Attacking from windward he broke through the enemy's line

and concentrated on his rear and centre. Eight line of battle- ships and two frigates were taken, but the good gunnery and steady resistance of the Dutch made the victory costly. Be- tween these two battles the British fleet was for a time menaced in its very existence by a succession of mutinies, the result of much neglect of the undoubted grievances of the sailors. The victory of Camperdown, completing what the victory of Cape SaintVincenthad begun, seemed to put GreatBritain beyond fear of invasion. But the government of the Republic was intent on renewing the attempt. The successes of Napoleon at the head of the army of Italy had reduced Austria to sign the peace of Campo Formio,on the 17th of October 1797, and he was appointed commander of the new army of invasion. It was still

thought necessary to maintain the bulk of the British fleet in European waters, within call in the ocean. The Mediterranean was left free to the French, whose squadrons cruised in the Levant, where the Republic had become possessed of the Ionian Islands by the plunder of Venice. The absence of a British force in the Mediterranean offered to the government of the French Republic an alternative to an invasion of Great Britain or Ireland, which promised to be less hazardous and equally effective. It was induced largely by the persuasion of Napoleon himself, and the wish of the politicians who were very willing to see him em- ployed at a distance. The expedition to Egypt under his command sailed on the 19th of May 1798, having for its immediate purpose the occupation of the Nile valley, and for its ultimate aim an attack on Great Britain ” from behind ” in India (see Nile, Battle of thz). The British fleet re-entered the Mediterranean to pursue and baffle Napoleon. The destruction of the French squadron at the anchorage of Aboukir on the 1st of August gave it the complete command of the sea. A second invasion of Ireland on a smaller scale was attempted and to some extent carried out, while the great attack by Egypt was in progress. One French squadron of four frigates carrying 1 1 50 soldiers under General Humbert succeeded in sailing from Rochefort on the 6th of August. On the 22nd Humbert was landed at Killala Bay, but after making a vigorous raid he was compelled to surrender at Ballinamuck on the 8th of September. Eight days after his surrender, another French squadron of one sail of the line and eight frigates carrying 3000 troops, sailed from Brest under Commodore Bompart to support Humbert. It was watched and pursued by frigates, and on the 12th of October was overtaken and destroyed by a superior British force commanded by Sir John Borlase Warren, near Tory Island. From the close of 1798 till the coup d’Uat of the 18th Brumaire (9th November) 1799, which established Napoleon as First Consul and master of France, the French navy had only one object — to reinforce and relieve the army cut off in Egypt by the battle of the Nile. The relief of the French garrison in Malta was a subordinate part of the main purpose. But the supremacy of the British navy was by this time so firmly founded that neither Egypt nor Malta could be reached except by small ships which ran the blockade. On the 25th of April, Admiral Bruix did indeed leave Brest, after baffling the blockading fleet of Lord Bridport, which was sent on a wild-goose chase to the south of Ireland by means of a despatch sent out to be captured and to deceive. Admiral Bruix succeeded in reaching Toulon, and his presence in the Mediterranean caused some disturbance. But, though his twenty-five sail of the line formed the best-manned fleet which theFrench had sent to sea during the war, and though he escaped being brought to battle, he did not venture to steer for the

eastern Mediterranean. On the 13th of August he was back at Brest, bringing with him a Spanish squadron carried off as a hostage for the fidelity of the government at Madrid to its disastrous alliance with France. On the day on which Bruix re-entered Brest, the 13th of August 1799, a combined Russian and British expedition sailed from the Downs to attack the French army of occupation in the Batavian Republic. The military operations were unsuccessful, and terminated in the withdrawal of the allies. But the naval part was well executed. Vice-admiral Mitchell forced the entrance to the Texel, and on the 30th of August received the surrender of the remainder of the

Dutch fleet — thirteen vessels in the Nieuwe Diep— the sailors having refused to fight for the republic. In spite of the failure on land, the expedition did much to confirm the naval supremacy of Great Britain by the entire suppression of the most seaman- like of the forces opposed to it.

Authorities. — Chevalier, Histoire de la marine francaise sous la premiere Ripublique (Paris, 1886) ; James's Naval History (London, 1837) ; Captain Mahan, Influence of Sea Power upon the French Revolution and the Empire (London, 1892). The French schemes of invasion are exhaustively dealt with in Captain E. Desbriere's Projets et tentatives de debarquements aux lies Britanniques (Paris, 1900, &c). (D. H.)

FRENCH WEST AFRICA (L'Afrique occidental jrancaise), the common designation of the following colonies of France: — (1) Senegal, (2) Upper Senegal and Niger, (3) Guinea, (4) the Ivory Coast, (5) Dahomey; of the territory of Mauretania, and of a large portion of the Sahara. The area is estimated at nearly 2,000,000 sq. m., of which more than half is Saharan territory. The countries thus grouped under the common designation French West Africa comprise the greater part of the continent westof theNigerdelta (which is British territory) and south of the tropic of Cancer. It embraces the upper and middle course of the Niger, the whole of the basin of the Senegal and the south-western part of the Sahara. Its most northern point on the coast is Cape Blanco, and it includes Cape Verde, the most westerly point of Africa. Along the Guinea coast the F/ench possessions are separated from one another by colonies of Great Britain and other powers, but in the interior they unite not only with one another but with the hinterlands of Algeria and the French Congo.

In physical characteristics French West Africa presents three types: (1) a dense forest region succeeding a narrow coast belt greatly broken by lagoons; (2) moderately elevated and fertile plateaus, generally below 2000 ft., such as the region enclosed in the great bend of the Niger; (3) north of the Senegal and Niger, the desert lands forming part of the Sahara (q.v.). The most elevated districts are Futa Jallon, whence rise the Senegal, Gambia and Niger, and Gon — both massifs along the south- western edge of the plateau lands, containing heights of 5000 to 6000 ft. or more. Among the chief towns are Timbuktu and Jenne on the Niger, Porto Novo in Dahomey, and St Louis and Dakar in Senegal, Dakar being an important naval and com- mercial port. The inhabitants are for the most part typical Negroes, with in Senegal and in the Sahara an admixture of Berber and Arab tribes. In the upper Senegal and Futa Jallon large numbers of the inhabitants are Fula. The total population of French West Africa is estimated at about 13,000,000. The European inhabitants number about 12,000.

The French possessions in West Africa have grown by the extension inland of coast colonies, each having an independent origin. They were first brought under one general government in 1895, when they were placed under the supervision of the governor of Senegal, whose title was altered to meet the new situation. Between that date and 1905 various changes in the areas and administrations of the different colonies were made, involving the disappearance of the protectorates and military territories known as French Sudan and dependent on Senegal. These were partly absorbed in the coast colonies, whilst the central portion became the colony of Upper Senegal and Niger. At the same time the central government was freed from the direct administration of the Senegal and Niger countries (Decrees of Oct. 1902 and Oct. 1904). Over the whole of French West Africa is a governor-general, whose headquarters are at Dakar. 1 He is assisted by a government council, composed of high functionaries, including the lieutenant-governors of all colonies under his control. The central government, like all other French colonial administrations, is responsible, not to the colonists, but to the home government, and its constitution is alterable at will by presidential decree save in matters on which the chambers

1 The organization of the new government was largely the work of E. N. Roume (b. 1858), governor-general 1902-1907, an able and energetic official, formerly director of Asian affairs at the colonial ministry.

have expressly legislated. To it is confided financial control over the colonies, responsibility for the public debt, the direction of the

departments of education and agriculture, and the carrying out of works of general utility. It alone communicates with the home authorities. Its expenses are met by the duties levied on goods and vessels entering and leaving any port of French West Africa. It may make advances to the colonies under its care, and may, in case of need, demand from them contributions to the central exchequer. The administration of justice is centralized and uniform for all French West Africa. The court of appeal sits at Dakar. There is also a uniform system of land registration adopted in 1906 and based on that in force in Australia. Subject to the limitations indicated the five colonies enjoy autonomy. The territory of Mauretania is administered by a civil commissioner under the direct control of the governor- general. The colony of Senegal is represented in the French parliament by one deputy.

Since the changes in administration effected in 1893 tne com- merce of French West Africa has shown a steady growth, the volume of external trade increasing in the ten years 1895-1904 from £3,151,094 to £6,238,091. In 1907 the value of the trade was £7,097,000; of this 53% was with France. Apart from military expenditure, about £600,000 a year, which is borne by France, French West Africa is self-supporting. The general budget for 1906 balanced at £1,356,000. There is a public debt of some £11 ,000,000, mainly incurred for works of general utility.

See Senegal, French Guinea, Ivory Coast and Dahomey. For Anglo-French boundaries east of the Niger see Sahara and Nigeria. For the constitutional connexion between the colonies and France see France : Colonies. An account of the economic situation of the colonies is given by G. Francois in Le Gouvernement general de I'Afrique occidentale francaise (Paris, 1908). Consult also the annual Report on the Trade, Agriculture, &c. of French West Africa issued by the British foreign office. A map of French West Africa by A. Meunier and E. Barralier (6 sheets on the scale 1:2,000,000) was published in Paris, 1903.

FRENTANI, one of the ancient Samnite tribes which formed an independent community on the east coast of Italy. They entered the Roman alliance after their capital, Frentrum, was taken by the Romans in 305 or 304 b.c. (Livy ix. 16. 45). This town either changed its name or perished some time after the middle of the 3rd century B.C., when it was issuing coins of its own with an Oscan legend. The town Larinum, which belonged to the same people (Pliny, Nat. Hist. iii. 103), became latinized before 200 B.C., as its coins of that epoch bear a legend — LARINOR — which cannot reasonably be treated as any- thing but Latin. Several Oscan inscriptions survive from the

neighbourhood of Vasto (anc. Histonium) , which was in the Frentane area.

On the forms of the name, and for further details see R.S.Conway, Italic Dialects, p. 206 ff and p. 212 : for the coins id. No. 195-196.

FREPPEL, CHARLES EMILE (1827-1891), French bishop and politician, was born at Oberehnheim(Obernai), Alsace, on the 1st of June 1827. He was ordained priest in 1849 and for a short time taught history at the seminary of Strassburg, where he had previously received his clerical training. In 1854 he was ap- pointed professor of theology at the Sorbonne, and became known as a successful preacher. He went to Rome in 1869, at the instance of Pius IX., to assist in the steps preparatory to the promulgation of the dogma of papal infallibility. He was con- secrated bishop of Angers in 1870. During the Franco-German war Freppel organized a body of priests to minister to the French prisoners in Germany, and penned an eloquent protest to the emperor William I. against the annexation of Alsace-Lorraine. In 1880 he was elected deputy for Brest and continued to represent it until his death. Being the only priest in the Chamber of Deputies since the death of Dupanloup, he became the chief parliamentary champion of the Church, and, though no orator, was a frequent speaker. On all ecclesiastical affairs Freppel voted with the Royalist and Catholic party, yet on questions in which French colonial prestige was involved, such as the expedi- tion to Tunis, Tong-King, Madagascar (1881, 1883-85), he supported the government of the day. He always remained a staunch Royalist and went so far as to oppose Leo XIII. ‘s policy

of conciliating the Republic. He died at Angers on the 1 2th of December 1891. Freppel’s historical and theological works form 30 vols., the best known of which are: Les Peres apostoliques et leur epoque (1859); Les Apologisles chr&tiens au 11° siecle (2 vols., i860); Saint Irenee et V eloquence chretienne dans la Gaule aux deux premiers siecles (1861); Tertullien (2 vols., 1863); Saint Cyprien et V Eglise d’ Afrique (1864); CUment d’Alexandrie (1865); Origene (2 vols., 1867).

There are interesting lives by E. Cornut (Paris, 1893) and F. Charpentier (Angers, 1904).

FRERE, SIR HENRY BARTLE EDWARD (1815-1884), British administrator, born at Clydach in Brecknockshire, on the 29th of March 181 5, was the son of Edward Frere, a member of an old east county family, and a nephew of John Hookham Frere, of Anti-Jacobin and Aristophanes fame. After leaving Haileybury, Bartle Frere was appointed a writer in the Bombay civil service in 1834, and went out to India by way of Egypt, crossing the Red Sea in an open boat from Kosseir to Mokha, and sailing thence to Bombay in an Arab dhow. Having passed his examination in the native languages, he was appointed assistant collector at Poona in 1835. There he did valuable work and was in 1842 chosen as private secretary to Sir George Arthur, governor of Bombay. Two years later he became political resident at the court of the rajah of Satara, where he did much to benefit the country by the development of its com- munications. On the rajah's death in 1848 he administered the province both before and after its formal annexation in 1849. In 1850 he was appointed chief commissioner of Sind, and took ample advantage of the opportunities afforded him of developing the province. He pensioned off the dispossessed amirs, improved the harbour at Karachi, where he also established municipal buildings, a museum and barracks, instituted fairs, multiplied roads, canals and schools.

Returning to India in 1857 after a well-earned rest, Frere was greeted at Karachi with news of the mutiny. His rule had been so successful that he felt he could answer for the internal peace of his province. He therefore sent his only European regiment to Multan, thus securing that strong fortress against the rebels, and sent further detachments to aid Sir John Lawrence in the Punjab. The 178 British soldiers who remained in Sind proved sufficient to extinguish such insignificant outbreaks as occurred. His services were fully recognized by the Indian authorities, and he received the thanks of both houses of parliament and was made K.C.B. He became a member of the viceroy's council in 1859, and was especially serviceable in financial matters. In 1862 he was appointed governor of Bombay, where he effected great improvements, such as the demolition of the old ramparts, and the erection of handsome public offices upon a portion of the space, the inauguration of the university buildings and the improvement of the harbour. He established the Deccan College at Poona, as well as a college for instructing natives in civil engineering. The prosperity — due to the American Civil War — which rendered these develop- ments possible brought in its train a speculative mania, which led eventually to the disastrous failure of the Bombay Bank (1866), an affair in which, from neglecting to exercise such means of control as he possessed, Frere incurred severe and not wholly undeserved

censure. In 1867 he returned to England, was made G.C.S.I., and received honorary degrees from Oxford and Cam- bridge; he was also appointed a member of the Indian council. In 1872 he was sent by the foreign office to Zanzibar to negotiate a treaty with the sultan, Seyyid Burghash, for the suppression of the slave traffic. In 1875 he accompanied the prince of Wales to Egypt and India. The tour was beyond expectation successful, and to Frere, from Queen Victoria downwards, came acknowledgments of the service he had rendered in piloting the expedition. He was asked by Lord Beaconsfield to choose between being made a baronet or G.C.B. He chose the former, but the queen bestowed both honours upon him. But the greatest service that Frere undertook on behalf of his country was to be attempted not in Asia, but in Africa. Sir Bartle landed at Cape Town as high commissioner

of South Africa on the 31st of March 1877. He had been chosen by Lord Carnarvon in the previous October as the statesman most capable of carrying his scheme of confederation into effect, and within two years it was hoped that he would be the first governor of the South African Dominion. He went out in harmony with the aims and enthusiasm of his chief, ” hoping to crown by one great constructive effort the work of a bright and noble life.” In this hope he was disappointed. As he stated at the close of his high commissionership, a great mistake seemed to have been made in trying to hasten what could only result from natural growth, and the state of South Africa during Frere’s tenure of office was inimical to such growth.

Discord or a policy of blind drifting seemed to be the alterna- tives presented to Frere upon his arrival at the Cape. He chose the former as the less dangerous, and the first year of his sway was marked by a Kaffir war on the one hand and by a rupture with the Cape (Molteno-Merriman) ministry on the other. The Transkei Kaffirs were subjugated early in 1878 by General Thesiger (the 2nd Lord Chelmsford) and a small force of regular and colonial troops. The constitutional difficulty was solved by Frere dismissing his obstructive cabinet and entrusting the formation of a ministry to Mr (afterwards Sir) Gordon Sprigg. Frere emerged successfully from a year of crisis, but the advantage was more than counterbalanced by the resignation of Lord Carnarvon early in 1878, at a time when Frere required the steadiest and most unflinching support. He had reached the conclusion that there was a widespread insurgent spirit pervading the natives, which had its focus and strength in the celibate military organization of Cetywayo and in the prestige which impunity for the outrages he had committed had gained for the Zulu king in the native mind. That organiza- tion and that evil prestige must be put an end to, if possible

by moral pressure, but otherwise by force. Frere reiterated these views to the colonial office, where they found a general acceptance. When, however, Frere undertook the responsibility of forwarding, in December 1878, an ultimatum to Cetywayo, the home government abruptly discovered that a native war in South Africa was inopportune and raised difficulties about reinforcements. Having entrusted to Lord Chelmsford the enforcement of the British demands, Frere's immediate responsi- bility ceased. On the nth of January 1879 the British troops crossed the Tugela, and fourteen days later the disaster of Isandhl-wana was reported; and Frere, attacked and censured in the House of Commons, was but feebly defended by the government. Lord Beaconsfield, it appears, supported Frere; the majority of the cabinet were inclined to recall him. The result was the unsatisfactory compromise by which he was censured and begged to stay on. Frere wrote an elaborate justification of his conduct, which was adversely commented on by the colonial secretary (Sir Michael Hicks Beach), who " did not see why Frere should take notice of attacks; and as to the war, all African wars had been unpopular." Frere's rejoinder was that no other sufficient answer had been made to his critics, and that he wished to place one on record. " Few may now agree with my view as to the necessity of the suppression of the Zulu rebellion. Few, I fear, in this generation. But unless my countrymen are much changed, they will some day do me justice. I shall not leave a name to be permanently dishonoured."

The Zulu trouble and the disaffection that was brewing in the Transvaal reacted upon each other in the most disastrous manner. Frere had borne no part in the actual annexation of the Transvaal, which was announced by Sir Theophilus Shepstone a few days after the high commissioner's arrival at Cape Town. The delay in giving the country a constitution afforded a pretext for agitation to the malcontent Boers, a rapidly increasing minority, while the reverse at Isandhlwana had lowered British prestige. Owing to the Kaffir and Zulu wars Sir Bartle had hitherto been unable to give his undivided attention to the state of things in the Transvaal. In April 1879 he was at last able to visit that province, and the conviction was forced upon him that the government had been unsatisfactory in many ways. The country was very unsettled. A large camp, numbering

4000 disaffected Boers, had been formed near Pretoria, and they were terrorizing the country. Frere visited them unarmed and practically

alone. Even yet all might have been well, for he won the Boers' respect and liking. On the condition that the Boers dispersed, Frere undertook to present their complaints to the British government, and to urge the fulfilment of the promises that had been made to them. They parted with mutual good feeling, and the Boers did eventually disperse — on the very day upon which Frere received the telegram announcing the government's censure. He returned to Cape Town, and his journey back was in the nature of a triumph. But bad news awaited him at Government House — on the 1st of June 1879 the prince imperial had met his death in Zululand — and a few hours later Frere heard that the government of the Transvaal and Natal, together with the high commissionership in the eastern part of South Africa, had been transferred from him to Sir Garnet Wolseley.

When Gladstone's ministry came into office in the spring of 1880, Lord Kimberley had no intention of recalling Frere. In June, however, a section of the Liberal party memorialized Gladstone to remove him, and the prime minister weakly com- plied (1st August 1880). Upon his return Frere replied to the charges relating to his conduct respecting Afghanistan as well as South Africa, previously preferred in Gladstone's Midlothian speeches, and was preparing a fuller vindication when he died at Wimbledon from the effect of a severe chill on the 29th of May 1884. He was buried in St Paul's, and in 1888 a statue of Frere upon the Thames embankment was unveiled by the prince of Wales. Frere edited the works of his uncle, Hookham Frere, and the popular story-book, Old Deccan Days, written by his daughter, Mary Frere. He was three times president of the Royal Asiatic Society.

His Life and Correspondence, by John Martineau, was published in 1895. For the South African anti-confederation view, see P. A. Molteno's Life and Times of Sir John Charles Molteno (2 vols., London 1900). See "also South Africa: History.

FRERE, JOHN HOOKHAM (1769-1846), English diplomatist and author, was born in London on the 21st of May 1769. His father, John Frere, a gentleman of agood Suffolk family, had been educated at Caius College, Cambridge, and would have been senior wrangler in 1763 but for the redoubtable competition of Paley; his mother, daughter of John Hookham, a rich London merchant, was a lady of no small culture, accustomed to amuse her leisure with verse-writing. His father's sister Eleanor, who married Sir John Fenn (1 739-1 794), the learned editor of the Paston Letters, wrote various educational works for children under the pseudonyms " Mrs Lovechild " and " Mrs Teachwell." Young Frere was sent to Eton in 1785, and there began an intimacy with Canning which greatly affected his after life. From Eton

he went to his father's college at Cambridge, and graduated B.A. in 1792 and M.A. in 1795. He entered public service in the foreign office under Lord Grenville, and sat from 1796 to 1802 as member of parliament for the close borough of West Looe in Cornwall.

From his boyhood he had been a warm admirer of Pitt, and along with Canning he entered heart and soul into the defence of his government, and contributed freely to the pages of the Anti-Jacobin, edited by Gifford. He contributed, in collabora- tion with Canning, " The Loves of the Triangles," a clever parody of Darwin's " Loves of the Plants," " The Needy Knife- Grinder " and " The Rovers." On Canning's removal to the board of trade in 1799 he succeeded him as under-secretary of state; in October 1800 he was appointed envoy extraordinary and plenipotentiary to Lisbon; and in September 1802 he was transferred to M adrid, where he remained for two years. He was recalled on account of a personal disagreement he had with the duke of Alcudia, but the ministry showed its approval of his action by a pension of £1700 a year. He was made a member of the privy council in 1805; in 1807 he was appointed pleni- potentiary at Berlin, but the mission was abandoned, and Frere was again sent to Spain in 1808 as plenipotentiary to the Central Junta. The condition of Spain rendered his position •■», very

responsible and difficult one. When Napoleon began to advance on Madrid it became a matter of supreme importance to decide whether Sir John Moore, who was then in the north of Spain, should endeavour to anticipate the occupation of the capital or merely make good his retreat, and if he did retreat whether he should do so by Portgual or by Galicia. Frere was strongly of opinion that the bolder was the better course, and he urged his views on Sir John Moore with an urgent and fearless persistency that on one occasion at least overstepped the limits of his commission. After the disastrous retreat to Corunna, the public accused Frere of having by his advice endangered the British army, and though no direct censure was passed upon his conduct by the government, he was recalled, and the marquess of Wellesley was appointed in his place.

Thus ended Frere's public life. He afterwards refused to under- take an embassy to St Petersburg, and twice declined the honour of a peerage. In 1816 he married Elizabeth Jemima, dowager countess of Erroll, and in 1820, on account of her failing health, he went with her to the Mediterranean. There he finally settled in Malta, and though he afterwards visited England more than once, the rest of his life was for the most part spent in the island of his choice. In quiet retirement he devoted himself to litera- ture, studied his favourite Greek authors,

and taught himself Hebrew and Maltese. His hospitality was well known to many an English guest, and his charities and courtesies endeared him to his Maltese neighbours. He died at the Pieta Valetta on the 7th of January 1846. Frere's literary reputation now rests entirely upon his spirited verse translations of Aristophanes, which remain in many ways unrivalled. The principles according to which he conducted his task were elucidated in an article on Mitchell's Aristophanes, which he contributed to The Quarterly Review, vol. xxiii. The translations of The Acharnians, The Knights, The Birds, and The Frogs were privately printed, and were first brought into general notice by Sir G. Cornewall Lewis in the Classical Museum for 1847. They were followed some time after by Theognis Restilutus, or the personal history of the poet Theognis, reduced from an analysis of his existing fragments. In 181 7 he published a mock-heroic Arthurian poem entitled Prospectus and Specimen of an intended National Work, by William and Robert Whistlecraft, of Stowmarket in Suffolk, Harness and Collar Makers, intended to comprise the most interest- ing particulars relating to King Arthur and his Round Table. William Tennant in Anster Fair had used the ottava rima as a vehicle for semi-burlesque poetry five years earlier, but Frere's experiment is interesting because Byron borrowed from it the measure that he brought to perfection in Don Juan.

Frere's complete works were published in 1871, with a memoir by his nephews, W. E. and Sir Bartle Frere, and reached a second edition in 1874. Compare also Gabrielle Festing, /. H. Frere and his Friends (1899).

FRERE, PIERRE EDOUARD (1819-1886), French painter, studied under Delaroche, entered the Ecole des Beaux-Arts in 1836 and exhibited first at the Salon in 1843. The marked sentimental tendency of his art makes us wonder at Ruskin's enthusiastic eulogy which finds in Frere's work " the depth of Wordsworth, the grace of Reynolds, and the holiness of Angelico." What we can admire in his work is his accomplished craftsman- ship and the intimacy and tender homeliness of his conception. Among his chief works are the two paintings, " Going to School " and " Coming from School," " The Little Glutton " (his first exhibited picture) and " L'Exercice " (Mr Astor's collection). A journey to Egypt in i860 resulted in a small series of Orientalist subjects, but the majority of Frere's paintings deal with the life of the kitchen, the workshop, the dwellings of the humble, and mainly with the pleasures and little troubles of the young, which the artist brings before us with humour and sympathy. He was one of the most popular painters of domestic genre in the middle of the 19th century.

FRERE-ORBAN, HUBERT JOSEPH WALTHER (1812-1896), Belgian statesman, was born at Liege on the 24th of April 181 2. His family name was Frere, to which on his marriage he added his wife's name of Orban. After studying law in Paris, he

practised as a barrister at Liege, took a prominent part in the Liberal movement, and in June 1847 was returned to the Chamber as member for Liege. In August of the same year he was ap- pointed minister of public works in the Rogier cabinet, and from 1848 to 1852 was minister of finance. He founded the Banque Nationale and the Caisse d'fipargne, abolished the newspaper tax, reduced the postage, and modified the customs duties as a preliminary to a decided free-trade policy. The Liberalism of the cabinet, in which Frere-Orban exercised an influence hardly inferior to that of Rogier, was, however, distasteful to Napoleon III. Frere-Orban, to facilitate the negotiations for a new commercial treaty, conceded to France a law of copyright, which proved highly unpopular in Belgium, and he resigned office, soon followed by the rest of the cabinet. His work La Mainmorte et la charite (1854-1857), published under the pseudonym of " Jean van Damme," contributed greatly to restore his party to power in 1857, when he again became minister of finance. He now embodied his free-trade principles in commercial treaties with England and France, and abolished the octroi duties and the tolls on the national roads. He resigned in 1861 on the gold question, but soon resumed office, and in 1868 succeeded Rogier as prime minister. In 1869 he defeated the attempt of France to gain control of the Luxemburg railways, but, despite this service to his country, fell from power at the elections of 1870. He returned to office in 1878 as president of the council and foreign minister. He provoked the bitter opposi- tion of the Clerical party by his law of 1879 establishing secular primary education, and in 1880 went so far as to break off diplo- matic relations with the Vatican. He next found himself at variance with the Radicals, whose leader, Janson, moved the introduction of universal suffrage. Frere-Orban, while rejecting the proposal, conceded an extension of the franchise (1883); but the hostility of the Radicals, and the discontent caused by a financial crisis, overthrew the government at the elections of 1884. Frere-Orban continued to take an active part in politics as leader of the Liberal opposition till 1894, when he failed to secure re-election. He died at Brussels on the 2nd of January 1896. Besides the work above mentioned, he published La Question monStaire (1874); La Question montlaire en Belgique in 1889; Exchange de vues entre

MM. Frere-Orban et E. deLaveleye (1890); and La Revision conslitutionnelle en Belgique et ses consequences (1894). He was also the author of numerous pamphlets, among which may be mentioned his last work, La Situation presente (1895).

FRERET, NICOLAS (1688-1749), French scholar, was born at Paris on the 15th of February 1688. His father was procureur to the parlement of Paris, and destined him to the profession of the law. His first tutors were the historian Charles Rollin and Father Desmolets (1677-1760). Amongst his early studies history, chronology and mythology held a prominent place. To please his father he studied law and began to practise at the bar; but the force of his genius soon carried him into his own path. At nineteen he was admitted to a society of learned men before whom he read memoirs on the religion of the Greeks, on the worship of Bacchus, of Ceres, of Cybele and of Apollo. He was hardly twenty-six years of age when he was admitted as pupil to the Academy of Inscriptions. One of the first memoirs which he read was a learned and critical discourse, Sur I'origine des Francs (1714). He maintained that the Franks were a league of South German tribes and not, according to the legend then almost universally received, a nation of free men deriving from Greece or Troy, who had kept their civilization intact in the heart of a barbarous country. These sensible views excited great indignation in the Abbe Vertot, who de- nounced Freret to the government as a libeller of the monarchy. A leltre de cachet was issued, and Freret was sent to the Bastille. During his three months of confinement he devoted himself to the study of the works of Xenophon, the fruit of which appeared later in his memoir on the Cyropaedia. From the time of his liberation in March 17×5 his life was uneventful. In January 1 7 16 he was received associate of the Academy of Inscriptions, and in December 1742 he was made perpetual secretary. He

worked without intermission for the interests of the Academy, not even claiming any property in his own writings, which were printed in the Recueil de I'academie des inscriptions. The list of his memoirs, many of them posthumous, occupies four columns of the Nouvelle Biographie generate. They treat of history, chronology, geography, mythology and religion. Throughout he appears as the keen, learned and original critic; examining into the comparative value of documents, distinguishing between the mythical and the historical, and separating traditions with an historical element from pure fables and legends. He rejected the extreme pretensions of the chronology of Egypt and China, and at the same time controverted the scheme of Sir Isaac Newton as too limited. He investigated the mythology not only of the Greeks, but of the Celts, the Germans, the Chinese and the

Indians. He was a vigorous opponent of the theory that the stories of mythology may be referred to historic originals. He also suggested that Greek mythology owed much to the Phoenicians and Egyptians. He was one of the first scholars of Europe to undertake the study of the Chinese language; and in this he was engaged at the time of his committal to the Bastille. He died in Paris on the 8th of March 1749.

Long after his death several works of an atheistic character were falsely attributed to him, and were long believed to be his. The most famous of these spurious works are the Examen critique des apologistes de la religion chretienne (1766), and theLettrede Thrasybule&Leucippe, printed in London about 1768. A very defective and inaccurate edition of Freret's works was published in 1796-1799. A new and complete edition was projected by Champollion-Figeac, but of this only the first volume appeared (1825). It contains a life of Freret. His manuscripts, after passing through many hands, were deposited in the library of the Institute. The best account of his works is " Examen critique des ouvrages composes par Freret " in C. A. Walckenaer's Recueil des notices, &c. (1841-1850). See also Querard's France litteraire.

FRERON, ELIE CATHERINE (1719-1776), French critic and controversialist, was born at Quimper in 1 719. He was educated by the Jesuits, and made such rapid progress in his studies that before the age of twenty he was appointed professor at the college of Louis-le-Grand. He became a contributor to the Observations sur les Merits modernes of the abbe Guyot Desfon- taines. The very fact of his collaboration with Desfontaines, one of Voltaire's bitterest enemies, was sufficient to arouse the latter's hostility, and although Freron had begun his career as one of his admirers, his attitude towards Voltaire soon changed. Freron in 1746 founded a similar journal of his own, entitled Leltres de la Comtesse de . . . It was suppressed in 1 749, but he immediately replaced it by Lettres sur quelques Scrits de ce temps, which, with the exception of a short suspension in 1752, on account of an attack on the character of Voltaire, was continued till 1754, when it was succeeded by the more ambitious Annie litteraire. His death at Paris on the 10th of March 1776 is said to have been hastened by the temporary suppression of this journal. Freron is now remembered solely for his attacks on Voltaire and the Encyclopaedists, and by the retaliations they provoked on the part of Voltaire, who, besides attacking him in epigrams, and even incidentally in some of his tragedies, directed against him a virulent satire, Le Pauvre diable, and made him the principal personage in a comedy L' Ecossaise, in which the journal of Freron is designated L'Ane litteraire. A further attack on Freron entitled Anecdotes sur Friron . . . (1760), published

anonymously, is generally attributed to Voltaire.

Freron was the author of Ode sur la bataille de Fontenoy (1745); Histoire de Marie Stuart (1742, 2 vols.); and Histoire de I ‘empire d’Allemagne, (177 1, 8 vols.). See Ch. Nisard, Les Ennemis de Voltaire (1853); Despois, Journalistes et journaux du XVIII’ siecle; Barthelemy, Les confessions de Freron: Ch. Monselet, Freron, ou I’illustre critique (1864); Freron, sa vie, souvenirs, &c.

(1876).

FRERON, LOUIS MARIE STANISLAS (1754-1802), French revolutionist, son of the preceding, was born at Paris on the 17th of August 1754. His name was, on the death of his father, attached to L’Annee litteraire, which was continued till 1790 and edited successively by the abbes G. M. Royou and J. L. Geoffroy. On the outbreak of the revolution Freron, who was a schoolfellow of Robespierre and Camille Desmoulins, established

the violent journal L’Orateur du peuple. Commissioned, along with Barras in 1793, to establish the authority of the con- vention at Marseilles and Toulon, he distinguished himself in the atrocity of his reprisals, but both afterwards joined the Thermidoriens, and Fr6ron became the leader of the jeunesse doree and of the Thermidorian reaction. He brought about the accusation of Fouquier-Tinville, and of J, B. Carrier, the deporta- tion of B. Barere, and the arrest of the last Montagnards. He made his paper the official journal of the reactionists, and being sent by the Directory on a mission of peace to Marseilles he published in 1796 Memoire historique sur la reaction royale et sur les malheurs du midi. He was elected to the council of the Five Hundred, but not allowed to take his seat. Failing as suitor for the hand of Pauline Bonaparte, one of Napoleon’s sisters, he went in 1799 as commissioner to Santo Domingo and died there in 1802. General V. M. Leclerc, who had married Pauline Bonaparte, also received a command in Santo Domingo in 1801, and died in the same year as his former rival.

FRESCO (Ital. for cool, ” fresh “), a term introduced into English, both generally (as in such phrases as al fresco, ” in the fresh air “), and more especially as a technical term for a sort of mural painting on plaster. In the latter sense the Italians distinguished painting a secco

(when the plaster had been allowed to dry) from a fresco (when it was newly laid and still wet). The nature and history of fresco-painting is dealt with in the article Painting.

FRESCOBALDI, GIROLAMO (1 583-1644), Italian musical composer, was born in 1 583 at Ferrara. Little is known of his life except that he studied music under Alessandro Milleville, and owed his first reputation to his beautiful voice. He was organist at St Peter's in Rome from 1608 to 1628. According to Baini no less than 30,000 people flocked to St Peter's on his first appearance there. On the 20th of November 1628 he went to live in Florence, becoming organist to the duke. From December 1633 to March 1643 he was again organist at St Peter's. But in the last year of his life he was organist in the parish church of San Lorenzo in Monte. He died on the 2nd of March 1 644, being buried at Rome in the Church of the Twelve Apostles. Frescobaldi also excelled as a teacher, Frohberger being the most distinguished of his pupils. Frescobaldi's compositions show the consummate art of the early Italian school, and his works for the organ more especially are full of the finest devices of fugal treatment. He also wrote numerous vocal compositions, such as canzone, motets, hymns, &c, a collection of madrigals for five voices (Antwerp, 1608) being among the earliest of his published works.

FRESENIUS, KARL REMIGIUS (1818-1897), German chemist, was born at Frankfort-on-Main on the 28th of December 1818. After spending some time in a pharmacy in his native town, he entered Bonn University in 1840, and a year later migrated to Giessen, where he acted as assistant in Liebig's laboratory, and in 1843 became assistant professor. In 1845 ne was appointed to the chair of chemistry, physics and technology at the Wies- baden Agricultural Institution, and three years later he became the first director of the chemical laboratory which he induced the Nassau government to establish at that place. Under his care this laboratory continuously increased in size and popularity, a school of pharmacy being added in 1862 (though given up in 1877) and an agricultural research laboratory in 1868. Apart from his administrative duties Fresenius occupied himself almost exclusively with analytical chemistry, and the fullness and accuracy of his text-books on that subject (of which that on qualitative analysis first appeared in 1841 and. that on quantitative in 1846) soon rendered them standard works. Many of his original papers were published in the Zeitschrift filr analytische Chemie, which he founded in 1862 and continued to edit till his death. He died suddenly at Wiesbaden on the nth of June 1897. In 1881 he handed over the directorship of the agricultural research station to his son, Remigius Heinrich Fresenius (b. 1847), who was

trained under H. Kolbe at Leipzig. Another son, Theodor Wilhelm Fresenius (b. 1856), was educated at Strassburg and occupied various positions in the Wiesbaden laboratory.

FRESHWATER, a watering place in the Isle of Wight, England, 12 m. W. by S. of Newport by rail. PopXigoi) 3306. It is a scattered township lying on the peninsula west of the river Var, which forms the western extremity of the island. The portion known as Freshwater Gate fronts the English Channel from the strip of low-lying coast interposed between the cliffs of the peninsula and those of the main part of the island. The • peninsula rises to 397 ft. in Headon Hill, and the cliffs are magnificent. The western promontory is flanked on the north by the picturesque Alum Bay, and the lofty detached rocks known as the Needles lie off it. Farringford House in the parish was for some time the home of Alfred, Lord Tennyson, who is commemorated by a tablet in All Saints' church and by a great cross on the high downs above the town. There are golf links on the downs.

FRESNEL, AUGUSTIN JEAN (1788-1827), French physicist, the son of an architect, was born at Broglie (Eure) on the 10th of May 1788. His early progress in learning was slow, and when eight years old he was still unable to read. At the age of thirteen he entered the Ecole Centrale in Caen, and at sixteen and a half the Ecole Polytechnique, where he acquitted himself with dis- tinction. Thence he went to the Ecole des Ponts et Chaussees. He served as an engineer successively in the departments of Vendee, Drome and Ille-et-Villaine; but his espousal of the cause of the Bourbons in 1814 occasioned, on Napoleon's re- accession to power, the loss of his appointment. On the second restoration he obtained a post as engineer in Paris, where much of his life from that time was spent. His researches in optics, continued until his death, appear to have been begun about the year 18 14, when he prepared a paper on the aberration of light, which, however, was not published. In 1818 he read a memoir on diffraction for which in the ensuing year he received the prize of the Academie des Sciences at Paris. He was in 1823 unani- mously elected a member of the academy, and in 1825 he became a member of the Royal Society of London, which in 1827, at the time of his last illness, awarded him the Rumford medal. In 1 819 he was nominated a commissioner of lighthouses, for which he was the first to construct compound lenses as substitutes for mirrors. He died of consumption at Ville-d'Avray, near Paris, on the 14th of July 1827.

The undulatory theory of light, first founded upon experi- mental demonstration by Thomas Young, was extended to a large class of optical phenomena, and permanently established by his brilliant

discoveries and mathematical deductions. By the use of two plane mirrors of metal, forming with each other an angle of nearly 180 , he avoided the diffraction caused in the experiment of F. M. Grimaldi (1618-1663) on interference by the employment of apertures for the transmission of the light, and was thus enabled in the most conclusive manner to account for the phenomena of interference in accordance with the undulatory theory. With D. F. J. Arago he studied the laws of the interference of polarized rays. Circularly polarized light he obtained by means of a rhomb of glass, known as ” Fresnel’s rhomb,” having obtuse angles of 126 , and acute angles of 54°. His labours in the cause of optical science received during his lifetime only scant public recognition, and some of his papers were not printed by the Academie des Sciences till many years after his decease. But, as he wrote to Young in 1824, in him ” that sensibility, or that vanity, which people call love of glory” had been blunted. ” All the compliments,” he says, ” that I have received from Arago, Laplace and Biot never gave me so much pleasure as the discovery of a theoretic truth, or the confirmation of a calculation by experiment.”

See Duleau, “Notice sur Fresnel,” Revue ency. t. xxxix. ; Arago, (Euvres completes, t. i. ; and Dr G. Peacock, Miscellaneous Works of Thomas Young, vol. i.

FRESNILLO, a town of the state of Zacatecas, Mexico, 37 m. N.W. of the city of Zacatecas on a branch of the Santiago river. Pop. (1900) 6309. It stands on a fertile plain between the Santa Cruz and Zacatecas ranges, about 7700 ft. above sea-level, has a temperate climate, and is surrounded by an agricultural district producing Indian corn and wheat. It is a clean, well-

built town, whose chief distinction is its school of mines founded in 1853. Fresnillo has large amalgam works for the reduction of silver ores. Its silver mines, located in the neighbouring Proano hill, were discovered in 1569, and were for a time among the most productive in Mexico. Since 1833, when their richest deposits were reached, the output has greatly decreased. There is a station near on the Mexican Central railway.

FRESNO, a city and the county-seat of Fresno county, Cali- fornia, U.S.A., situated in the San Joaquin valley (altitude about 300 ft.) near the geographical centre of the state. Pop. (1880) 1112; (1890) 10,818;

(1900) 12,470, of whom 3299 were foreign-born and 1279 were Asiatics; (1910 census) 24,892. The city is served by the Southern Pacific and the Atchison, Topeka & Santa Fe railways. The county is mainly a vast expanse of naturally arid plains and mountains. The valley is the scene of an extensive irrigation system, water being brought (first in 187 2-1876) from King's river, 20 m. distant; in 1905 500 sq. m. were irrigated. Fresno is in a rich farming country, producing grains and fruit, and is the only place in America where Smyrna figs have been grown with success; it is the centre of the finest raisin country of the state, and has extensive vine- yards and wine-making establishments. The city's principal manufacture is preserved (dried) fruits, particularly raisins; the va'ue of the fruits thus preserved in 1905 was $6,942,440, being 70- 5 % of the total value of the factory product in that year (89,849,001). In 1900-1905 the factory product increased 2 57 , 9%> a ra ti° of increase greater than that of any other city in the state. In the mountains, lumbering and mining are important industries; lumber is carried from Shaver in the mountains to Clovis on the plains by a V-shaped flume 42 m. long, the waste water from which is ditched for irrigation. The petroleum field of the county is one of the richest in California. Fresno is the business and shipping centre of its county and of the surrounding region. The county was organized in 1856. In 1872 the railway went through, and Fresno was laid out and incorporated. It became the county-seat in 1874 and was chartered as a city in 1885.

FRESNOY, CHARLES ALPHONSE DU (1611-1665), French painter and writer on his art, was born in Paris, son of an apothe- cary. He was destined for the medical profession, and well educated in Latin and Greek; but, having a natural propensity for the fine arts, he would not apply to his intended vocation, and was allowed to learn the rudiments of design under Perrier and Vouet. At the age of twenty-one he went off to Rome, with no resources; he drew ruins and architectural subjects. After two years thus spent he re-encountered his old fellow-student Pierre Mignard, and by his aid obtained some amelioration of his professional prospects. He studied Raphael and the antique, went in 1633 to Venice, and in 1656 returned to France. During two years he was now employed in painting altar-pieces in the chateau of Raincy, landscapes, &c. His death was caused by an attack of apoplexy followed by palsy; he expired at Villiers le Bel, near Paris. He never married. His pictorial works are few; they are correct in drawing, with something of the Caracci in design, and of Titian in colouring, but wanting fire and ex- pression, and insufficient to keep his name in any eminent repute. He is remembered now almost entirely as a writer rather than painter. His Latin poem, De arte

graphica, was written during his Italian sojourn, and embodied his observations on the art of painting; it may be termed a critical treatise on the practice of the art, with general advice to students. The precepts are sound according to the standard of his time; the poetical merits slender enough. The Latin style is formed chiefly on Lucretius and Horace. This poem was first published by Mignard, and has been translated into several languages. In 1684 it was turned into French by Roger de Piles; Dryden translated the work into English prose; and a rendering into verse by Mason followed, to which Sir Joshua Reynolds added some annotations.

FRET. (1) (From O. Eng. fretan, a word common in various forms to Teutonic languages; cf. Ger. fressen, to eat greedily), properly to devour, hence to gnaw, so used of the slow corroding

action of chemicals, water, &c, and hence, figuratively, to chafe or irritate. Possibly connected with this word, in sense of rubbing, is the use of ” fret ” for a bar on the fingerboard of a banjo, guitar, or similar musical instruments to mark the fingering. (2) (Of doubtful origin; possibly from the O. Eng. frmtive, orna- ments, but its use is paralleled by the Fr. frette, trellis or lattice), network, a term used in heraldry for an interlaced figure, but best known as applied to the decoration used by the Greeks in their temples and vases: the Greek fret consists of a series of narrow bands of different lengths, placed at right angles to one another, and of great variety of design. It is an ornament which owes its origin to woven fabrics, and is found on the ceilings of the Egyptian tombs at Benihasan, Siout and elsewhere. In Greek work it was painted on the abacus of the Doric capital and probably on the architraves of their temples ; when employed by the Romans it was generally carved; the Propylaea of the temple at Damascus and the temple at Atil being examples of the 2nd century. It was carved in large dimensions on some of the Mexican temples, as for instance on the palace at Mitla with other decorative bands, all of which would seem to have been reproductions of woven patterns, and had therefore an independent origin. It is found in China and Japan, and in the latter country when painted on lacquer is employed as a fret- diaper, the bands not being at right angles to one another but forming acute and obtuse angles. In old English writers a wider signification was given to it, as it was applied to raised patterns in plaster oh roofs or ceilings, which were not confined to the geometrical fret but extended to the modelling of flowers, leaves and fruit; in such cases the decoration was known as fret- work. In France the fret is better known as the ” meander.”

FREUDENSTADT, a town of Germany, in the kingdom of

Wurttemberg, on the right bank of the Murg, 40 m. S.W. from Stuttgart, on the railway to Hochdorf. Pop. 7000. It has a Protestant and a Roman Catholic church, some small manu- factures of cloth, furniture, knives, nails and glass, and is frequented as a climatic health resort. It was founded in 1599 by Protestant refugees from Salzburg.

FREUND, WILHELM (1806-1894), German philologist and lexicographer, was born at Kempen in the grand duchy of Posen on the 27th of January 1806. He studied at Berlin, Breslau and Halle, and was for twenty years chiefly engaged in private tuition. From 1855-1870 he was director of the Jewish school at Gleiwitz in Silesia, and subsequently retired to Breslau, where he died on the 4th of June 1894. Although chiefly known for his philological labours, Freund took an important part in the movement for the emancipation of his Prussian coreligionists, and the Judengesetz of 1847 was in great measure the result of his efforts. The work by which he is best known is his W&rter- buch der lateinischen Sprache (1834-1845), practically the basis of all Latin-English dictionaries. His Wie studiert man klassische Philologie? (6th ed., 1903) and Triennium philologicum (2nd ed., 1878-1885) are valuable aids to the classical student.

FREWEN, ACCEPTED (1588-1664), archbishop of York, was born at Northiam, in Sussex, and educated at Magdalen College, Oxford, where in 161 2 he became a fellow. In 161 7 and 162 1 the college allowed him to act as chaplain to Sir John Digby, ambassador in Spain. At Madrid he preached a sermon which pleased' Prince Charles, afterwards Charles I., and the latter on his accession appointed Frewen one of his chaplains. In 1625 he became canon of Canterbury and vice-president of Magdalen College, and in the following year he was elected president. He was vice-chancellor of the university in 1628 and 1629, and again in 1638 and 1639. It was mainly by his instrument- ality that the university plate was sent to the king at York in 1642. Two years later he was consecrated bishop of Lichfield and Coventry, and resigned his presidentship. Parliament declared his estates forfeited for treason in 1652, and Cromwell afterwards set a price on his head. The proclamations, however, designated him Stephen Frewen, and he was consequently able to escape into France. At the Restoration he reappeared in public, and in 1660 he was consecrated archbishop of York. In 1 66 1 he acted as chairman of the Savoy conference.

FREY (Old Norse, Freyr) son of Njord, one of the chief deities in the northern pantheon and the national god of the Swedes. He is the god of fruitfulness, the giver of sunshine and rain, and thus the source of all prosperity. (See Teutonic Peoples, adfin.)

FREYBURG [Freyburg an der Unstrut], a town of Germany, in Prussian Saxony, in an undulating vine-clad country on the Unstrut, 6 m. N. from Naumberg-on-the-Saale, on the railway to Artern. Pop. 3200. It has a parish church, a mixture of Gothic and Romanesque architecture, with a handsome tower. It is, however, as being the ” Mecca ” of the German gymnastic societies that Freyburg is best known. Here Friedrich Ludwig Jahn (1778-1852), the father of German gymnastic exercises, lies buried. Over his grave is built the Turnhalle, with a statue of the ” master,” while hard by it the Jahn Museum in Romanesque style, erected in 1903. Freyburg produces sparkling wine of good quality and has some other small manufactures. On a hill commanding the town is the castle of Neuenburg, built originally in 1062 by Louis the Leaper, count in Thuringia, but in its present form mainly the work of the dukes of Saxe-Weissenfels.

FREYCINET, CHARLES LOUIS DE SAULQES DE (1828-), French statesman, was born at Foix on the 14th of November 1828. He was educated at the Ecole Polytechnique, and entered the government service as a mining engineer. In 1858 he was appointed traffic manager to the Compagnie de chemins de fer du Midi, a post in which he gave proof of his remarkable talent for organization, and in 1862 returned to the engineering service (in which he attained in 1886 the rank of inspector-general). He was sent on a number of special scientific missions, among which may be mentioned one to England, on which he wrote a notable Memoir -e sur le travail des femmes et des enfants dans les manufactures de V Angleterre (1867). On the establishment of the Third Republic in September 1870, he offered his services to Gambetta, was appointed prefect of the department of Tarn-et- Garronne, and in October became chief of the military cabinet. It was mainly his powers of organization that enabled Gambetta to raise army after army to oppose the invading Germans. He showed himself a strategist of no mean order; but the policy of dictating operations to the generals in the field was not attended with happy results. The friction between him and General d’Aurelle de Paladines resulted in the loss of the ad- vantage temporarily gained at Orleans, and he was responsible for the campaign in the east, which ended in the destruction of Bourbaki’s army. In 1871 he published a defence of his admini- stration under the title of La Guerre en province pendant le siege de Paris. He entered the Senate in 1876 as a

follower of Gambetta, and in December 1877 became minister of public works in the Dufaure cabinet. He carried a great scheme for the gradual acquisition of the railways by the state and the construction of new lines at a cost of three milliards, and for the development of the canal system at a further cost of one milliard. He retained his post in the ministry of Waddington, whom he succeeded in December 1879 as president of the council and minister for foreign affairs. He passed an amnesty for the Communists, but in attempting to steer a middle course on the question of the religious associations, lost the support of Gambetta, and resigned in September 1880. In January 1882 he again became president of the council and minister for foreign affairs. His refusal to join England in the bombardment of Alexandria was the death- knell of French influence in Egypt. He attempted to compromise by occupying the Isthmus of Suez, but the vote of credit was rejected in the Chamber by 41 7 votes to 75, and the ministry resigned. He returned to office in April 1885 as foreign minister in the Brisson cabinet, and retained that post when, in January 1886, he succeeded to the premiership. He came into power with an ambitious programme of internal reform; but except that he settled the question of the exiled pretenders, his successes were won chiefly in the sphere of colonial extension. In spite of his unrivalled skill as a parliamentary tactician, he failed to keep his party together, and was defeated on 3rd December 1886. In the following year, after two unsuccessful attempts

to construct new ministries he stood for the presidency of the republic; but the radicals, to whom his opportunism was distasteful, turned the scale against him by transferring the votes to M. Sadi Carnot.

In April 1888 he became minister of war in the Floquet cabinet — the first civilian since 1848 to hold that office. His services to France in this capacity were the crowning achievement of his life, and he enjoyed the conspicuous honour of holding his office without a break for five years through as many successive administrations — those of Floquet and Tirard, his own fourth ministry (March 1890-February 1892), and the Loubet and Ribot ministries. To him were due the introduction of the three-years' service and the establishment of a general staff, a supreme council of war, and the army commands. His premier- ship was marked by heated debates on the clerical question, and it was a hostile vote on his Bill against the religious associations that caused the fall of his cabinet. He failed to clear himself entirely of complicity in the Panama scandals, and in January 1893 resigned the ministry of war. In November 1898 he once more became minister of war in the Dupuy cabinet, but resigned office on 6th May 1899. He has published, besides the works already mentioned, Traiti de mecanique rationnelle (1858); De l' 'analyse infinitesimale (i860,

revised ed., 1881); Des pentes economiques en chemin de fer (1861); Emploi des eaux d'egout en agriculture (1869); Principes de I'assainissement des villes and Traite d' assainissement industriel (1870); Essai sur la philosophie des sciences (1896); La Question d'Egypte (1905); besides some remarkable " Pensees " contributed to the Contemporain under the pseudonym of " Alceste." In 1882 he was elected a member of the Academy of Sciences, and in 1890 to the French Academy in succession to fimile Augier.

FREYCINET, LOUIS CLAUDE DESAULSES DE (1779-1842), French navigator, was born at Montelimart, Drome, on the 7th of August 1779. In 1793 he entered the French navy. After taking part in several engagements against the British, he joined in 1800, along with his brother Louis Henri Freycinet (1777- 1840), who afterwards rose to the rank of admiral, the expedition sent out under Captain Baudin in the " Naturaliste " and " Geographe " to explore the south and south-west coasts of Australia. Much of the ground already gone over by Flinders was revisited, and new names imposed by this expedition, which claimed credit for discoveries really made by the English navigator. An inlet on the coast of West Australia, in 26 S., is called Freycinet Estuary; and a cape near the extreme south- west of the same coast also bears the explorer's name. In 1805 he returned to Paris, and was entrusted by the government with the work of preparing the maps and plans of the expedition; he also completed the narrative, and the whole work appeared under the title of Voyage de decouvertes aux terres australes (Paris, 1807-1816). In 1817 he commanded the " Uranie," in which Arago and others went to Rio de Janeiro, to take a series of pendulum measurements. This was only part of a larger scheme for obtaining observations, not only in geography and ethnology, but in astronomy, terrestrial magnetism, and meteor- ology, and for the collection of specimens in natural history. On this expedition the hydrographic operations were conducted by Louis Isidore Duperry (1 786-1865) who in 1822 was appointed to the command of the " Coquille," and during the next three years carried out scientific explorations in the southern Pacific and along the coast of South America. For three years Freycinet cruised about, visiting Australia, the Marianne, Sandwich, and other Pacific islands, South America, and other places, and, notwithstanding the loss of the " Uranie " on the Falkland Islands during the return voyage, returned to France with fine collections in all departments of natural history, and with voluminous notes and drawings which form an important contribution to a knowledge of the countries visited. The results of this voyage were published under Freycinet's super- vision, with the title of Voyage autour du monde sur les corvettes " I' Uranie"

et “la Physicienne” in 18 24-1 844, in 13 quarto volumes and 4 folio volumes of fine plates and maps. Freycinet was admitted into the Academy of Sciences in 1825, and was one

of the founders of the Paris Geographical Society. He died at Freycinet, Drome, on the 18th of August 1842.

FREYIA, the sister of Frey, and the most prominent goddess in Northern mythology. Her character seems in general to have resembled that of her brother. (See Teutonic Peoples, ad fin.)

FREYTAG, GEORG WILHELM FRIEDRICH (1788-1861), German philologist, was born at Liineburg on the 19th of September 1788. After attending school he entered the univer- sity of Gottingen as a student of philology and theology; here from 181 1 to 1813 he acted as a theological tutor, but in the latter year accepted an appointment as sub-librarian at Konigsberg. In 181 5 he became a chaplain in the Prussian army, and in that capacity visited Paris. On the proclamation of peace he resigned his chaplaincy, and returned to his researches in Arabic, Persian and Turkish, studying at Paris under De Sacy. In 1819 he was appointed to the professorship of oriental languages in the new university of Bonn, and this post he continued to hold until his death on the 16th of November 1861.

Besides a compendium of Hebrew grammar (Kurzgefasste Gram- matik der hebraischen Sprache, 1835), and a treatise on Arabic versification (Darstellung der arabischen Verskunst, 1830), he edited two volumes of Arabic songs (Hamasae carmina, 1828-1852) and three of Arabic proverbs (Arabum proverbia, 1838-1843). But his principal work was the laborious and praiseworthy Lexicon Arabico- latinum (Halle, 1830-1837), an abridgment of which was published in 1837.

FREYTAG, GUSTAV (1816-1895), German novelist, was born at Kreuzburg, in Silesia, on the 13th of July 1816. After attend- ing the gymnasium at 01s, he studied philology at the universities of Breslau and Berlin, and in 1838 took the degree with a remark- able dissertation, De initiis poeseos scenicae apud Germanos. In 1839 he settled at Breslau, as Privaldocent in German language and literatuie, but devoted his principal attention to writing for the stage, and achieved considerable success with the comedy Die Brautjahrt, oder Kunz von der Rosen (1844). This was followed by a volume of

unimportant poems, In Breslau (1845) and the dramas Die Valentine (1846) and Graf Waldemar (1847). He at last attained a prominent position by his comedy, Die J ournalislen (1853), one of the best German comedies of the 19th century. In 1847 he migrated to Berlin, and in the following year took over, in conjunction with Julian Schmidt, the editorship of Die Grenzboten, a weekly journal which, founded in 1841, now became the leading organ of German and Austrian liberalism. Freytag helped to conduct it until 1861, and again from 1867 till 1870, when for a short time he edited a new periodical, Im neuen Reich. His literary fame was made universal by the publication in 1855 of his novel, Soil und Haben, which was translated into almost all the languages of Europe. It was certainly the best German novel of its day, impressive by its sturdy but unexaggerated realism, and in many parts highly humorous. Its main purpose is the recommendation of the German middle class as the soundest element in the nation, but it also has a more directly patriotic intention in the contrast which it draws between the homely virtues of the Teuton and the shiftlessness of the Pole and the rapacity of the Jew. As a Silesian, Freytag had no great love for his Slavonic neighbours, and being a native of a province which owed everything to Prussia, he was naturally an earnest champion of Prussian hegemony over Germany. His powerful advocacy of this idea in his Grenzboten gained him the friendship of the duke of Saxe- Coburg-Gotha, whose neighbour he had become, on acquiring the estate of Siebleben near Gotha. At the duke's request Freytag was attached to the staff of the crown prince of Prussia in the campaign of 1870, and was present at the battles of Worth and Sedan. Before this he had published another novel. Die verlorene Handschrifi (1864), in which he endeavoured to do for German university life what in Soil tend Haben he had done for commercial life. The hero is a young German professor, who is so wrapt up in his search for a manuscript by Tacitus that he is oblivious to an impending tragedy in his domestic life. The book was, however, less successful than its predecessor. Between 1859 and 1867 Freytag published in five volumes Bilder aus der deulschen

Vergangenheit, a most valuable work on popular lines, illustrating

the history and manners of Germany. In 1872 he began a work with a similar patriotic purpose, Die Ahnen, a series of historical romances in which he unfolds the history of a German family from the earliest times to the middle of the 19th century. The series comprises the following novels, none of which, however, reaches the level of Frey tag's earlier books. (1) Ingo und Ingra- ban (1872), (2) Das Nest der Zaunkonige (1874), (3) Die Brttder vom deutschen Hause (1875), (4) Marcus Kbnig (1876), (5) Die Geschwister (1878), and (6) in

conclusion, Aus einer kleinen Stadt (1880). Among Freytag's other works may be noticed Die Technik des Dramas (1863); an excellent biography of the Baden statesman Karl Mathy (1869); an autobiography (Erinnerungen aus meinen Leben, 1887); his Gesammelte Aufsdtze, chiefly reprinted from the Grenzboten (1888); Der Kronprinz und die deutsche Kaiserkrone; Erinnerungsbldtter (1889). He died at Wiesbaden on the 30th of April 1895.

Freytag's Gesammelte Werke were published in 22 vols, at Leipzig (1 886-1 888); his Vermischte Aufsdtze have been edited by E. Elster, 2 vols. (Leipzig, 1901-1903). On Freytag's life see, besides his autobiography mentioned above, the lives by C. Alberti (Leipzig, 1890) and F. Seiler (Leipzig, 1898).

FRIAR (from the Lat. f rater, through the Fr. frere), the English generic name for members of the mendicant religious orders. Formerly it was the title given to individual members of these orders, as Friar Laurence (in Romeo and Juliet) , but this is not now common. In England the chief orders of friars were distinguished. by the colour of their habit: thus the Franciscans or Minors were the Grey Friars; the Dominicans or Preachers were the Black Friars (from their black mantle over a white habit), and the Carmelites were the White Friars (from their white mantle over a brown habit): these, together with the Austin Friars or Hermits, formed the four great mendicant orders — Chaucer's " alle the ordres foure." Besides the four great orders of friars, the Trinitarians (q.v.), though really canons, were in England called Trinity Friars or Red Friars; the Crutched or Crossed Friars were often identified with them, but were really a distinct order; there were also a number of lesser orders of friars, many of which were suppressed by the second council of Lyons in 1274. Detailed information on these orders and on their position in England is given in separate articles. The difference between friars and monks is explained in article Monasticism. Though the usage is not accurate, friars, and also canons regular, are often spoken of as monks and included among the monastic orders.

See Fr. Cuthbert, The Friars and how they came to England, pp. 1 1-32 (1903) ; also F. A. Gasquet, English Monastic Life, pp. 234- 249 (1904), where special information on all the English friars is coveniently brought together. (E. C. B.)

FRIBOURG [Ger. Freiburg], one of the Swiss Cantons, in the western portion of the country, and taking its name from the town around which the various districts that compose it gradually gathered. Its area is 646-3 sq. m., of which 568 sq. m. are classed as "productive"

(forests covering 119 sq. m. and vineyards -8 sq. m.); it boasts of no glaciers or eternal snow. It is a hilly, not mountainous, region, the highest summits (of which the Vanil Nair, 7858 ft., is the loftiest) rising in the Gruyere district at its south-eastern extremity, the best known being probably the Moleson (6582 ft.) and the Berra (5653 ft.). But it is the heart of pastoral Switzerland, is famed for its cheese and cattle, and is the original home of the " Ranz des Vaches," the melody by which the herdsmen call their cattle home at milking time. It is watered by the Sarine or Saane river (with its tribu- taries the Singine or Sense and the Glane) that flows through the canton from north to south, and traverses its capital town. The upper course of the Broye (like the Sarine, a tributary of the Aar) and that of the Veveyse (flowing to the Lake of Geneva) are in the southern portion of the canton. A small share of the lakes of Neuchatel and of Morat belongs to the canton, wherein the largest sheet of water is the Lac Noir or Schwarzsee. A sulphur spring rises near the last-named lake, and there are other such springs in the canton at Montbarry and at Bonn, near the capital. There are about 150 m. of railways in the canton, the main line from Lausanne to Bern past Fribourg running through

it ; there are also lines from Fribourg to Morat and to Estavayer, while from Romont (on the main line) a line runs to Bulle, and in 1904 was extended to Gessenay or Saanen near the head of the Sarine or Saane valley. The population of the canton amounted in 1900 to 127,951 souls, of whom 108,440 were Romanists, 19,305 Protestants, and 167 Jews. The canton is on the linguistic frontier in Switzerland, the line of division running nearly due north and south through it, and even right through its capital. In 1900 there were 78,353 French-speaking inhabitants, and 38,738 German-speaking, the latter being found chiefly in the north-western (Morat region) and north-eastern (Singine valley) portions, as well as in the upper valley of the Jogne or Jaun in the south-east. Besides the capital, Fribourg (q.v.), the only towns of any importance are Bulle (3330 inhabitants), Chatel St Denis (2509 inhabitants), Morat (q.v.) or Murten (2263 in- habitants), Romont (2110 inhabitants), and Estavayer le Lac or Staffis am See (1636 inhabitants).

The canton is pre-eminently a pastoral and agricultural region, tobacco, cheese and timber being its chief products. Its industries are comparatively few: straw-plaiting, watch- making (Semsales), paper-making (Marly), lime-kilns, and, above all, the huge Cailler chocolate

factory at Broc. It forms part of the diocese of Lausanne and Geneva, the bishop living since 1663 at Fribourg. It is a stronghold of the Romanists, and still contains many monasteries and nunneries, such as the Carthusian monks at Valsainte, and the Cistercian nuns at La Fille Dieu and at Maigrauge. The canton is divided into 7 administrative districts, and contains 283 communes. It sends 2 members (named by the cantonal legislature) to the Federal Stdnderath, and 6 members to the Federal Nationalrath. The cantonal constitution has scarcely been altered since 1857, and is remark- able as containing none of the modern devices (referendum, initiative, proportional representation) save the right of ” initia- tive ” enjoyed by 6000 citizens to claim the revision of the cantonal constitution. The executive council of 7 members is named for 5 years by the cantonal legislature, which consists of members (holding office for 5 years) elected in the proportion of one to every 1200 (or fraction over 800) of the population.

(W. A. B. C.) FRIBOURG [Ger. Freiburg], the capital of the Swiss canton of that name. It is built almost entirely on the left bank of the Sarine, the oldest bit (the Bourg) of the town being just above the river bank, flanked by the Neuveville and Auge quarters, these last (with the Planche quarter on the right bank of the river) forming the VUle Basse. On the steeply rising ground to the west of the Bourg is the Quartier des Places, beyond which, to the west and south-west, is the still newer Perolles quarter, where are the railway station and the new University; all these (with the Bourg) constituting the VUle Haute. In 1900 the population of the town was 15,794, of whom 13,270 were Romanists and 109 Jews, while 9701 were French-speaking, and 5595 German-speaking, these last being mainly in the Ville Basse. Its linguistic history is curious. Founded as a German town, the French tongue became the official language during the greater part of the 14th and 15th centuries, but when it joined the Swiss Confederation in 1481 the German influence came to the fore, and German was the official language from 1483 to 1798, becoming thus associated with the rule of the patricians. From 1798 to 1814, and again from 1830 onwards, French prevailed, as at present, though the new University is a centre of German influence.

Fribourg is on the main line of railway from Bern (20 m.) to Lausanne (41 m.). The principal building in the town is the collegiate church of St Nicholas, of which the nave dates from the I3th-i4th centuries, while the choir was rebuilt in the 17th century. It is a fine building, remarkable in itself, as well as for its lofty, late 15th century, bell-tower (249 ft. high), with a fine peal of bells; its famous organ was built between 1824 and 1834 by Aloys Mooser (a native of the town),

has 7800 pipes, and is played daily in summer for the edification of tourists. The numerous monasteries in and around the town, its old-fashioned aspect, its steep and narrow streets, give it a most

striking appearance. One of the most conspicuous buildings in the town is the college of St Michael, while in front of the 16th century town hall is an ancient lime tree stated (but this is very doubtful) to have been planted on the day of the victory of Morat (June 22, 1476). In the Lycee is the Cantonal Museum of Fine Arts, wherein, besides many interesting objects, is the collection of paintings and statuary bequeathed to the town in 1879 by Duchess Adela Colonna (a member of the d'Affry family of Fribourg), by whom many were executed under the name of " Marcello." The deep ravine of the Sarine is crossed by a very fine suspension bridge, constructed 183 2- 1834 by M. Chaley, of Lyons, which is 167 ft. above the Sarine, has a span of 808 ft., and consists of 6 huge cables composed of 3294 strands. A loftier suspension bridge is thrown over the Gotteron stream just before it joins the Sarine: it is 590 ft. long and 246 ft. in height, and was built in 1840. About 3 m. north of the town is the great railway viaduct or girder bridge of Grandfey, con- structed in 1862 (1092 ft. in length, 249 ft. high) at a cost of 2\ million francs. Immediately above the town a vast dam (591 ft. long) was constructed across the Sarine by the engineer Ritter in 1870-1872, the fall thus obtained yielding a water- power of 2600 to 4000 horse-power, and forming a sheet of water known as the Lac de Perolles. A motive force of 600 horse- power, secured by turbines in the stream, is conveyed to the plateau of Perolles by " telodynamic " cables of 2510 ft. in length, for whose passage a tunnel has been pierced in the rock. On the Perolles plateau is the International Catholic University founded in 1889.

History. — In n 78 the foundation of the town (meant to hold in check the turbulent nobles of the neighbourhood) was com- pleted by Berchthold IV., duke of Zahringen, whose father Conrad had founded Freiburg in Breisgau in n 20, and whose son, Berchthold V., was to found Bern in 1191. The spot was chosen for purposes of military defence, and was situated in the Uecht- land or waste land between Alamannian and Burgundian territory. He granted it many privileges, modelled on the charters of Cologne and of Freiburg in Breisgau, though the oldest existing charter of the town dates from 1249. On the extinction of the male line of the Zahringen dynasty, in 12 18, their lands passed to Anna, the sister of the last duke and wife of Count Ulrich of Kyburg. That house kept Fribourg till it too became extinct, in 1264, in the male line. Anna, the heiress, married about 1273 Eberhard, count of Habsburg-Laufenburg, who sold Fribourg in 1277 for 3000 marks to his cousin Rudolf, the head of the house of

Habsburg as well as emperor. The town had to fight many a hard battle for its existence against Bern and the count of Savoy, especially between 1448 and 1452. Abandoned by the Habsburgs, and desirous of escaping from the increasing power of Bern, Fribourg in 1452 finally submitted to the count of Savoy, to whom it had become indebted for vast sums of money. Yet, despite all its difficulties, it was in the first half of the 15th century that Fribourg exported much leather and cloth to France, Italy and Venice, as many as 10,000 to jo,ooo bales of cloth being stamped with the seal of the town. When Yolande, dowager duchess of Savoy, entered into an alliance with Charles the Bold, duke of Burgundy, Fribourg joined Bern, and helped to gain the victories of Grandson and of Morat (1476).

In 1477 the town was finally freed from the rule of Savoy, while in 148 1 (with Soleure) it became a member of the Swiss Confederation, largely, it is said, through the influence of the holy man, Bruder Klaus (Niklaus von der Flue). In 1475 the town had taken Illens and Arconciel from Savoy, and in 1536 won from Vaud much territory, including Romont, Rue, Chatel St Denis, Estavayer, St Aubin (by these two conquests its dominion reached the Lake of Neuchatel), as well as Vuissens and Surpierre, which still form outlying portions (physically within the canton of Vaud) of its territory, while in 1537 it took Bulle from the bishop of Lausanne. In 1 502-1 504 the lordship of Bellegarde or Jaun was bought, while in 1555 it acquired (jointly with Bern) the lands of the last count of the Gruyere, and thus obtained the rich district of that name. From 1475 it ruled I (with Bern) the bailiwicks of Morat, Grandson, Orbe and

Echallens, just taken from Savoy, but in 1798 Morat was incorporated with (finally annexed in 1814) the canton of Fribourg, the other bailiwicks being then given to the canton of Leman (later of Vaud). In the 16th century the original democratic government gradually gave place to the oligarchy of the patrician families. Though this government caused much discontent it continued till it was overthrown on the French occupation of

1798.

From 1803 (Act of Mediation) to 1814, Fribourg was one of the six cantons of the Swiss Confederation. But, on the fall of the new regime, in 1814, the old patrician rule was partly restored, as 108 of the 144

seats in the cantonal legislature were assigned to members of the patrician families. In 1831 the Radicals gained the power and secured the adoption of a more liberal constitution. In 1846 Fribourg (where the Conservatives had regained power in 1837) joined the Sonderbund and, in 1847, sa w the Federal troops before its walls, and had to surrender to them. The Radicals now came back to power, and again revised the cantonal constitution in a liberal sense. The Catholic and Conservative party made several attempts to recover their supremacy, but their chiefs were driven into exile. In 1856 the Conservatives regained the upper hand at the general cantonal election, secured the adoption in 1857 of a new cantonal constitution, and have ever since maintained their rule, which some dub ” clerical,” while others describe it as ” anti-radical.”

Authorities. — Archives de la SocietS d’histoire du Canton de F., from 1850; F. Buomberger, Bevolkerungs- u. Vermogensstatistik in d. Stadt u. Landschaft F. um die Mitte d. iˆten Jahrhunderts (Bern, 1900); A. Daguet, Histoire de la ville et de la seigneurie de F., to 1 48 1 (Fribourg, 1889); A. Dellion, Dictionnaire historique et statistique des paroisses calholiques du C. de F. (12 vols., Fribourg, 1884-1903); Freiburger Geschichtsbldtter, from 1894; Fribourg artistique (fine plates), from 1890; E. Heyck, Geschichte der Herzoge von Zahringen (Freiburg i. Br., 1891); F. Kuenlin, Der K. Freiburg (St Gall and Bern, 1834); Memorial de F. (6 vols., 1854-1859); Recueil diplomatique du Cant, de F. (original documents) (8 vols., Fribourg, 1839-1877); F. E. Welti, Beitrdge zur Geschichte des dlteren Stadtrechtes von Freiburg im Uechtland (Bern, 1908) ; J. Zemp, L’Art de la ville de Fribourg au moyen Age (Fribourg, 1905); j. Zimmerli, Die deutsch-franzosische Sprachgrenze in d. Schiveiz (Basel and Geneva, 1895), vol. ii., pp. 72 seq.; Les Alpes fribour- geoises (Lausanne, 1908). (W. A. B. C.)

FRICTION (from Lat. fricare, to rub), in physical and mechani- cal science, the term given to the resistance which every material surface presents to the sliding of any other such surface upon it. This resistance is due to the roughness of the surfaces; the minute projections upon each enter more or less into the minute depressions on the other, and when motion occurs these rough- nesses must either be worn off, or continually lifted out of the hollows into which they have fallen, or both, the resistance to motion being in either case quite perceptible and measurable.

Friction is preferably spoken of as ” resistance ” rather than ” force,” for a reason exactly the same as that which induces us to treat stress rather as molecular resistance (to change of form) than as force, and which may be stated thus: although friction can be utilized as a

moving force at will, and is continually so used, yet it cannot be a primary moving force; it can transmit or modify motion already existing, but cannot in the first instance cause it. For this some external force, not friction, is required. The analogy with stress appears complete; the motion of the ” driving link ” of a machine is communicated to all the other parts, modified or unchanged as the case may be, by the stresses in those parts; but the actual setting in motion of the driving link itself cannot come about by stress, but must have for its production force obtained directly from the expenditure of some form of energy. It is important, however, that the use of the term ” resistance ” should not be allowed to mislead. Friction resists the motion of one surface upon another, but it may and frequently does confer the motion of the one upon the other, and in this way causes, instead of resists, the motion of the latter. This may be made more clear, perhaps, by an illustration. Suppose we have a leather strap A passing over a fixed cylindrical drum B, and let a pulling force or effort be applied to the strap. The force applied to A can act on B only at the surfaces of contact between them. There it becomes an effort tending either to move

A upon B, or to move the body B itself, according to the frictional conditions. In the absence of friction it would simply cause A to slide on B, so that we may call it an effort tending to make A slide on B. The friction is the resistance offered by the surface of B to any such motion. But the value of this resistance is not in any way a function of the effort itself, — it depends chiefly upon the pressure normal to the surfaces and the nature of the surfaces. It may therefore be either less or greater than the effort. If less, A slides over B, the rate of motion being deter- mined by the excess of the effort over the resistance (friction). But if the latter be greater no sliding can occur, i.e. A cannot, under the action of the supposed force, move upon B. The effort between the surfaces exists, however, exactly as before, — and it must now tend to cause the motion of B. But the body B is fixed, — or, in other words, we suppose its resistance to motion greater than any effort which can tend to move it, — hence no motion takes place. It must be specially noticed, however, that it is not the friction between A and B that has prevented motion, this only prevented A moving on B, — it is the force which keeps B stationary, whatever that may be, which has finally prevented any motion taking place. This can be easily seen. Suppose B not to be fixed, but to be capable of moving against some third body C (which might, e.g., contain cylindrical bearings, if B were a drum with its shaft), itself fixed, — and further, suppose the frictional resistance between B and C to be the only resistance to B’s motion. Then if this be less than the effort of A upon

B, as it of course may be, this effort will cause the motion of B. Thus friction causes motion, for had there been no frictional resistance between the surfaces of A and of B, the latter body would have remained stationary, and A only would have moved. In the case supposed, therefore, the friction between A and B is a necessary condition of B receiving any motion from the external force applied to A.

Without entering here on the mathematical treatment of the subject of friction, some general conclusions may be pointed out which have been arrived at as the results of experiment. The “laws” first enunciated by C. A. Coulomb (1781), and after- wards confirmed by A. J. Morin (1830-1834), have been found to hold good within very wide limits. These are: (1) that the fric- tion is proportional to the normal pressure between the surfaces of contact, and therefore independent of the area of those surfaces, and (2) that it is independent of the velocity with which the surfaces slide one on the other. For many practical purposes these statements are sufficiently accurate, and they do in fact sensibly represent the results of experiment for the pressures and at the velocities most commonly occurring. Assuming the correctness of these, friction is generally measured in terms simply of the total pressure between the surfaces, by multiplying it by a ” coefficient of friction ” depending on the material of the surfaces and their state as to smoothness and lubrication. But beyond certain limits the ” laws ” stated are certainly incorrect, and are to be regarded as mere practical rules, of extensive application certainly, but without any pretension to be looked at as really general laws. Both at very high and very low pressures the coefficient of friction is affected by the intensity of pressure, and, just as with velocity, it can only be regarded as independent of the intensity and proportional simply to the total load within more or less definite limits.

Coulomb pointed out long ago that the resistance of a body to be set in motion was in many cases much greater than the resistance which it offered to continued motion; and since his time writers have always distinguished the ” friction of rest,” or static friction, from the ” friction of motion,” or kinetic friction. He showed also that the value of the former depended often both upon the intensity of the pressure and upon the length of time during which contact had lasted, both of which facts quite agree with what we should expect from our know- ledge of the physical nature, already mentioned, of the causes of friction. It seems not unreasonable to expect that the influence of time upon friction should show itself in a comparison of very slow with very rapid motion, as well as in a comparison of starting (i.e. motion

after a long time of rest) with continued

motion. That the friction at the higher velocities occurring in engineering practice is much less than at common velocities has been shown by several modern experiments, such as those of Sir Douglas Galton (see Report Brit. Assoc, 1878, and Proc. Inst. Mech. Eng., 1878, 1879) on the friction between brake-blocks and wheels, and between wheels and rails. But no increase in the coefficient of friction had been detected at slow speeds, until the experiments of Prof. Fleeming Jenkin (Phil. Trans., 1877, pt. 2) showed conclusively that at extremely low velocities (the lowest measured was about 0002 ft. per second) there is a sensible increase of frictional resistance in many cases, most notably in those in which there is the most marked difference between the friction of rest and that of motion. These experi ments distinctly point to the conclusion, although without absolutely proving it, that in such cases the coefficient of kinetic friction gradually increases as the velocity becomes extremely small, and passes without discontinuity into that of static friction. (A. B. W. K.; W. E. D.)

FRIDAY (A.S. frige-dag, fr. frige, gen. of frigu, love, or the goddess of love — the Norse Frigg, — the dag, day; cf. Icelandic frjddagr, O.H. Ger. friatag, frigatag, mod. Ger. Freitag), the sixth day of the week, corresponding to the Roman Dies Veneris, the French Vendredi and Italian Venerdi. The ill-luck associated with the day undoubtedly arose from its connexion with the Crucifixion; for the ancient Scandinavian peoples regarded it as the luckiest day of the week. By the Western and Eastern Churches the Fridays throughout the year, except when Christmas falls on that day, have ever been observed as days of fast in memory of the Passion. The special day on which the Passion of Christ is annually commemorated is known as Good Friday (q.v.). According to Mahommedan tradition, Friday, which is the Moslem Sabbath, was the day on which Adam was created, entered Paradise and was expelled, and it was the day of his repentance, the day of his death, and will be the Day of Resurrection.

FRIEDBERG, the name of two towns in Germany.

1 . A small town in Upper Bavaria, with an old castle, known mainly as the scene of Moreau’s victory of the 24th of August 1796 over the Austrians.

2. Friedberg in der Wetterau, in the grand duchy of Hesse-Darmstadt, on an eminence above the Usa, 14 m. N. of Frankfort -on-Main, on the railway to Cassel and at the junction of a line to Hanau. Pop. (1905) 7702. It is a picturesque town , still surrounded by old walls and towers, and contains many medieval buildings, of which the beautiful Gothic town church (Evangelical) and the old castle are especially noteworthy. The grand-ducal palace has a beautiful garden. The schools include technical and agricultural academies and a teachers' seminary. It has manufactures of sugar, gloves and leather, and breweries. Friedberg is of Roman origin, but is first men- tioned as a town in the nth century. In 1211 it became a free imperial city, but in 1349 was pledged to the counts of Schwarz- burg, and subsequently often changed hands, eventually in 1802 passing to Hesse-Darmstadt.

See Dieffenbach, Geschichte der Stadt und Burg Friedberg (Darms.,

1857).

FRIEDEL, CHARLES (1832-1899), French chemist and miner- alogist, was born at Strassburg on the 12th of March 1832. After graduating at Strassburg University he spent a year in the counting-house of his father, a banker and merchant, and then in 1851 went to live in Paris with his maternal grandfather, Georges Louis Duvernoy (1777-1855), professor of natural history and, from 1850, of comparative anatomy, at the College de France. In 1854 he entered C. A. Wurtz's laboratory, and in 1856, at the instance of H. H. de Senarmont (1808-1862), was appointed conservator of the mineralogical collections at the Ecole des Mines. In 1871 he began to lecture in place of A. L. O. L. Des Cloizeaux (181 7-1897) at the Ecole Normale, and in 1876 he became professor of mineralogy at the Sorbonne, but on the death of Wurtz in 1884 he exchanged that position for the chair of organic chemistry. He died at Montauban on the soth of April 1899. Friedel achieved distinction both in miner-

alogy and organic chemistry. In the former he was one of the leading workers, in collaboration from 1879ˆ0 1887 with Emile Edmond Sarasin (1843-1890), at the formation of minerals by artificial means, particularly in the wet way with the aid of heat and pressure, and he succeeded in reproducing a large number of the natural compounds. In 1893, as the result of an attempt to make diamond by the action of sulphur on highly carburetted cast iron at 45o°-5oo° C. he obtained a black powder too small in quantity to be analysed but hard enough to scratch corundum. He also devoted much attention to the pyroelectric phenomena of crystals, which served as the theme of one of the two memoirs he presented for the degree of D.Sc. in 1869, and to the

deter- mination of crystallographic constants. In organic chemistry, his study of the ketones and aldehydes, begun in 1857, provided him with the subject of his other doctoral thesis. In 1862 he prepared secondary propyl alcohol, and in 1863, with James Mason Crafts (b. 1839), for many years a professor at the Massa- chusetts Institute of Technology, Boston, he obtained various organometallic compounds of silicon. A few years later further work, with Albert Ladenburg, on the same element yielded silicochloroform and led to a demonstration of the close analogy existing between the behaviour in combination of silicon and carbon. In 1871, with R. D. da Silva (b. 1837) he synthesized glycerin, starting from propylene. In 1877, with Crafts, he made the first publication of the fruitful and widely used method for synthesizing benzene homologues now generally known as the " Friedel and Crafts reaction." It was based on an accidental observation of the action of metallic aluminium on amyl chloride, and consists in bringing together a hydrocarbon and an organic chloride in presence of aluminium chloride, when the residues of the two compounds unite to form a more complex body. Friedel was associated with Wurtz in editing the latter's Diction- naire de chimie, and undertook the supervision of the supplements issued after 1884. He was the chief founder of the Revue gSnerale de chimie in 1899. His publications include a Notice sur la vie et les travaux de Wurtz (1885), Cours de chimie organique (1887) and Cours de miniralogie (1893). He acted as president of the International Congress held at Geneva in 1892 for revising the nomenclature of the fatty acid series.

See a memorial lecture by J. M. Crafts, printed in the Journal of the London Chemical Society for 1900.

FRIEDLAND, a town of Bohemia, Austria, 103 m. N.E. of Prague by rail. Pop. (1900) 6229. Besides the old town, which is still surrounded by walls, it contains three suburbs. The principal industry is the manufacture of woollen and linen cloth. Friedland is chiefly remarkable for its old castle, which occupies an imposing situation on a small hill commanding the town. A round watch-tower is said to have been built on its site as early as 1014; and the present castle dates from the 13th century. It was several times besieged in the Thirty Years' and Seven Years' Wars. In 1622 it was purchased by Wallenstein, who took from it his title of duke of Friedland. After his death it was given to Count Mathias Gallas by Ferdinand II., and since 1757 it has belonged to the Count Clam Gallas. It was magnifi- cently restored in 1868-1869.

FRIEDLAND, the name of seven towns in Germany. The most important now is that in the grand duchy of Mecklenburg- Strelitz,- on

the Miihlenteich, 35 m. N.E. of Strelitz by the railway to Neu-Brandenburg. Pop. 7000. It possesses a fine Gothic church and a gymnasium, and has manufactures of woollen and linen cloth, leather and tobacco. Friedland was founded in 1244 by the margraves John and Otto III. of Brandenburg.

FRIEDLAND, a town of Prussia, on the Alle, 27 m. S.E. of Konigsberg (pop. 3000), famous as the scene of the battle fought between the French under Napoleon and the Russians commanded by General Bennigsen, on the 14th of June 1807 (see Napoleonic Campaigns). The Russians had on the 13th driven the French cavalry outposts from Friedland to the west- ward, and Bennigsen's main body began to occupy the town in the night. The army of Napoleon was set in motion for Friedland, but it was still dispersed on its various march routes, and the

first stage of the engagement was thus, as usual, a pure " en- counter-battle." The corps of Marshal Lannes as " general advanced guard " was first engaged, in the Sortlack Wood and in front of Posthenen (2.30-3 a.m. on the 14th). Both sides now used their cavalry freely to cover the formation of lines of battle and a race between the rival squadrons for the possession of Heinnchsdorf resulted in favour of the French under Grouchy. Lannes in the meantime was fighting hard to hold Bennigsen for Napoleon feared that the Russians meant to evade him again.' Actually, by 6 a.m. Bennigsen had nearly 50,000 men across the river and forming up west of Friedland. His infantry, in two lines, with artillery, extended between the Heinnchsdorf -Friedland road and the upper bends of the river. Beyond the right of the infantry, cavalry and Cossacks extended the line to the wood N.E. of Heinnchsdorf, and small bodies of Cossacks penetrated even to Schwonau. The left wing also had some cavalry and, beyond the Alle, batteries were brought into action to cover it! A heavy and indecisive fire-fight raged in the Sortlack Wood between the Russian skirmishers and some of Lannes's troops The head of Mortier's (French and Polish) corps appeared at

English Miles

x x x ■

Enwry Walker so.

Heinnchsdorf and the Cossacks were driven out of Schwonau. Lannes held his own, and by noon, when Napoleon arrivedj 40,000 French troops were on the scene of action. His orders were brief: Ney's corps was to take the line between Posthenen and the Sortlack Wood, Lannes closing on his left, to form the centre, Mortier at Heinnchsdorf the left wing. Victor and the Guard were placed in reserve behind Posthenen. Cavalry masses were collected at Heinrichsdorf. The main attack was to be delivered against the Russian left, which Napoleon saw at once to be cramped in the narrow tongue of land between the river and the Posthenen mill-stream. Three cavalry divisions were added to the general reserve. The course of the previous operations had been such that both armies had still large de- tachments out towards Konigsberg. The afternoon was spent by the emperor in forming up the newly arrived masses, the deploy- ment being covered by an artillery bombardment. At 5 o'clock all was ready, and Ney, preceded by a heavy artillery fire rapidly earned the Sortlack Wood. The attack was pushed on toward the Alle. One of Ney's divisions (Marchand) drove part of the Russian left into the river at Sortlack. A furious charge of cavalry against Marchand's left was repulsed by the dragoon division of Latour-Maubourg. Soon the Russians were huddled together in the bends of the Alle, an easy target for the guns of Ney and of the reserve. Ney's attack indeed came eventually

to a standstill; Bennigsen's reserve cavalry charged with great effect and drove him back in disorder. As at Eylau, the approach of night seemed to preclude a decisive success, but in June and on firm ground the old mobility of the French reasserted its value. The infantry division of Dupont advanced rapidly from Posthenen, the cavalry divisions drove back the Russian squadrons into the now congested masses of foot on the river bank, and finally the artillery general Senarmont advanced a mass of _ guns to case-shot range. It was the first example of the terrible artillery preparations of modern warfare, and the Russian defence collapsed in a few minutes. Ney's exhausted infantry were able to pursue the broken regiments of Bennigsen's left into the streets of Friedland. Lannes and Mortier had all this time held the Russian centre and right on its ground, and their artillery had inflicted severe losses. When Friedland itself was seen to be on fire, the two marshals launched their infantry attack. Fresh French troops approached the battlefield. Dupont distinguished himself for the second time by fording the mill-stream and assailing the left flank of the Russian centre. This offered a stubborn resistance, but the French steadily forced the line backwards, and the battle was soon over. The losses incurred by the Russians in retreating over the river at Friedland were very heavy, many soldiers being drowned. Farther

north the still unbroken troops of the right wing drew off by the Allenburg road; the French cavalry of the left wing, though ordered to pursue, remaining, for some reason, inactive.' The losses of the victors were reckoned at 12,100 out of 86,000, or 14%, those of the Russians at 10,000 out of 46,000, or '21% (Berndt, Zahl im Kriege).

FRIEDMANN, MEIR (1831-1908), Hungarian Jewish scholar His editions of the Midrash are the standard texts. His chief editions were the Sifre (1864), the Mekhilta (1870), Pesiqla Rabbathi (1880). At the time of his death he was editing the Sifra. Friedmann, while inspired with regard for tradition, dealt with the Rabbinic texts on modern scientific methods, and ren- dered conspicuous service to the critical investigation of the Midrash and to the history of early homilies. (I A)

FRIEDRICH, JOHANN (1836-), German theologian, was born at Poxdorf in Upper Franconia on the 5th of May 1836, and was educated at Bamberg and at Munich, where in 1865 he was appointed professor extraordinary of theology. In 1869 he went to the Vatican Council as secretary to Cardinal Hohenlohe, and took an active part in opposing the dogma of papal infalli- bility, notably by supplying the opposition bishops with histori- cal and theological material. He left Rome before the council closed. " No German ecclesiastic of his age appears to have won for himself so unusual a repute as a theologian and to have held so important a position, as the trusted counsellor of the leading German cardinal at the Vatican Council. The path was fairly open before him to the highest advancement in the Church of Rome, yet he deliberately sacrificed all such hopes and placed himself in the van of a hard and doubtful struggle" (The Guardian, 1872, p. 1004). Sentence of excommunication was passed on Fnedrich in April 1871, but he refused to acknowledge it and was upheld by the Bavarian government. He continued to perform ecclesiastical functions and maintained his academic position, becoming ordinary professor in 1872. In 1882 he was transferred to the philosophical faculty as professor of history. By this time he had to some extent withdrawn from the ad- vanced position which he at first occupied in organizing the Old Catholic Church, for he was not in agreement with its abolition of enforced celibacy.

Friedrich was a prolific writer; among his chief works are: Johann Wessel (1862); Die Lehre des Johann Hus (1862); Kirchen- geschichte Deutschlands (1 867-1 869); Tagebuch wdhrend des Vatikan. Loncils gefuhrt (1871); Zur Verteidigung meines Tagebuchs (1872) • Beitrage zur Ktrchengesckichte des 18 ten Jahrh. (1876); Geschichie des Vahkan Konzils (1 877-1 886); Beitrage zur Gesch. des Jesuitenordens (iooi; ; Das Papsttum (1892) ; I. v. Dollinger (1899-1901).

FRIEDRICHRODA, a summer resort in the duchy of Saxe- Coburg-Gotha, Germany, at the north foot of the Thuringian Forest, 13 m. by rail S.W. from Gotha. Pop. 4500. It is sur- rounded by fir-clad hills and possesses numerous handsome

villa residences, a Kurhaus, sanatorium, &c. In the immediate neighbourhood is the beautiful ducal hunting seat of Reinhards-brunn, built out of the ruins of the famous Benedictine monastery founded in 1085.

FRIEDRICHSDORF, a town of Germany, in the Prussian province of Hesse-Nassau, on the southern slope of the Taunus range, 3 m. N.E. from Homburg. Pop. 1300. It has a French Reformed church, a modern school, dyeworks, weaving mills, tanneries and tobacco manufactures. Friedrichsdorf was founded in 1687 by Huguenot refugees and the inhabitants still speak French. There is a monument to Philipp Reis (1834-1874), who in i860 first constructed the telephone while a science master at the school.

FRIEDRICHSHAFEN, a town of Germany, in the kingdom of Wurttemberg, on the east shore of the Lake of Constance, at the junction of railways to Bretten and Lindau. Pop. 4600. It consists of the former imperial town of Buchhorn and the monastery and village of Hofen. The principal building is the palace, formerly the residence of the provosts of Hofen, and now the summer residence of the royal family. To the palace is attached the Evangelical parish church. The town has a hydropathic establishment and is a favourite tourist resort. Here are also the natural history and antiquarian collections of the Lake Constance Association. Buchhorn is mentioned (as Buachihorn or Puchihorn) in documents of 837 and was the seat of a powerful countship. The line of counts died out in 1089, and the place fell first to the Welfs and in 1191 to the Hohenstaufen. In 1275 it was made a free imperial city by King Rudolph I. In 1802 it lost this status and was assigned to Bavaria, and in 1810 to Wurttemberg. The monastery of Hofen was founded in 1050 as a convent of Benedictine nuns, but was changed in 1420 into a provostship of monks. It was suppressed in 1802 and in 1805 came to Wurttemberg. King Frederick I., who caused the harbour to be made, amalgamated Buchhorn and Hofen under the new name of Friedrichshafen.

FRIEDRICHSRUH, a village in the Prussian province of Schleswig-

Holstein, 15 m. S.E. of Hamburg, with a station on the main line of railway to Berlin. It gives its name to the famous country seat of the Bismarck family. The house is a plain unpretentious structure, but the park and estate, forming a portion of the famous Sachsenwald, are attractive. Close by, on a knoll, the Schneckenberg, stands the mausoleum in which the remains of Prince Otto von Bismarck were entombed on the 1 6th of March 1899.

FRIENDLY 1 SOCIETIES. These organizations, according to the comprehensive definition of the Friendly Societies Act 1896, which regulates such societies in Great Britain and Ireland, are ” societies for the purpose of providing by voluntary subscrip- tions of the members thereof , with or without the aid of donations, for the relief or maintenance of the members, their husbands, wives, children, fathers, mothers, brothers or sisters, nephews or nieces, or wards being orphans, during sickness or other infirmity, whether bodily or mental, in old age, or in widowhood, or for the relief or maintenance of the orphan children of members during minority; for insuring money to be paid on the birth of a member’s child, or on the death of a member, or for the funeral expenses of the husband, wife, or child of a member, or of the widow of a deceased member, or, as respects persons of the Jewish persuasion, for the payment of a sum of money during the period of confined mourning; for the relief or maintenance of the members when on travel in search of employment or when in distressed circumstances, or in case of shipwreck, or loss or damage of or to boats or nets; for the endowment of members or nominees of members at any age; for the insurance against fire to any amount not exceeding £15 of the tools or implements of the trade or calling of the members ” — and are limited in their contracts for assurance of annuities to £52 (previous to the 1 The word ” friend ” (O.E. freond, Ger. Freund, Dutch Vriend) is derived from an old Teutonic verb meaning to love. While used generally as the opposite to enemy, it is specially the term which connotes any degree, but particularly a high degree, of personal goodwill, affection or regard, from which the element of sexual love is absent.

Friendly Societies Act 1908 the sum was £50), and for insurance of a gross sum to £300 (previous to the act of 1908 the sum was £200). They may be described in a more popular and condensed form of words as the mutual insurance societies of the poorer classes, by which they seek to aid each other in the emergencies arising from sickness and death and other causes of distress. A phrase in the first act for the encouragement and relief of friendly societies, passed in 1793, designating them “societies of good fellowship,” indicates another useful phase of their operations.

The origin of the friendly society is, probably in all countries, the burial club. It has been the policy of every religion, if indeed it is not a common instinct of humanity, to surround the disposal of a dead body with circumstances of pomp and expenditure, often beyond the means of the surviving relatives. The appeal for help to friends and neighbours which necessarily follows is soon organized into a system of mutual aid, that falls in naturally with the religious ceremonies by which honour is done to the dead. Thus in China there are burial societies, termed ” long-life loan companies,” in almost all the towns and villages. Among the Greeks the epavoi combined the religious with the provident element (see Charity and Charities). From the Greeks the Romans derived their fraternities of a similar kind. The Teutons in like manner had their gilds. Whether the English friendly society owes its origin in the higher degree to the Roman or the Teutonic influence can hardly be determined. The utility of providing by combination for the ritual expenditure upon burial having beeri ascertained, the next step — to render mutual assist- ance in ciicumstances of distress generally — was an easy one, and we find it taken by the Greek epavoi. and by the English gilds. Another modification — that the societies should consist not so much of neighbours as of persons having the same occupation — soon arises; and this is the germ of our trade unions and our city companies in their original constitution. The interest, however, that these inquiries possess is mainly antiquarian. The legal definition of a friendly society quoted above points to an organization more complex than those of the ancient fraterni- ties and gilds, and proceeding upon different principles. It may be that the one has grown out of the other. The common element of a provision for a contingent event by a joint contribu- tion is in both; but the friendly society alone has attempted to define with precision what is the risk against which it intends to provide, and what should be the contributions of the members to meet that risk.

United Kingdom. — It would be curious to endeavour to trace how, after the suppression of the religious gilds in the 16th century, and the substitution of an organized system of relief by the poor law of Elizabeth for the more voluntary and casual means of relief that previously existed, the modern system of friendly societies grew up. The modern friendly society, particu- larly in rural districts, clings with fondness to its annual feast and procession to church, its procession of all the brethren on the occasion of the funeral of one of them, and other incidents which are almost obviously survivals of the customs of medieval gilds. The last recorded gild was in existence in 1628, and there are records of friendly societies as early as 1634 and

1639. The connecting links, however, cannot be traced. With the exception of a society in the port of Borrowstounness on the Firth of Forth, no existing friendly society is known to be able to trace back its history beyond a date late in the 17th century, and no records remain of any that might have existed in the latter half of the 16th century or the greater part of the 17th. One founded in 1666 was extant in 1850, but it has since ceased to exist. This is not so surprising as it might appear. Documents which exist in manuscript only are much less likely to have been preserved since the invention of printing than they were before; and such would be the simple rules and records of any society that might have existed during this interval — if, indeed, many of them kept records at all. On the whole, it seems probable therefore that the friendly society is a lineal descendant of the ancient gild — the idea never having wholly died out, but having been kept up from generation to generation in a succession of small and scattered societies.

At the same time, it seems probable that the friendly society of the present day owes its revival to a great extent to the Protest- ant refugees of Spitalfields, one of whose societies was founded in 1703, and has continued among descendants of the same families, whose names proclaim their Norman origin. This society has distinguished itself by the intelligence with which it has adapted its machinery to the successive modifications of the law, and it completely reconstructed its rules under the provisions of the Friendly Societies Acts 1875 and 1876.

Another is the society of Lintot, founded in London in 1708, in which the office of secretary was for more than half a century filled by persons of the name of Levesque, one of whom published a translation of its original rules. No one was to be received into the society who was not a member, or the descendant of a mem- ber, of the church of Lintot, of recognized probity, a good Pro- testant, and well-intentioned towards the queen [Anne] and faithful to the government of the country. No one was to be admitted below the age of eighteen, or who had not been received at holy communion and become member of a church. A member should not have a claim to relief during his first year's membership, but if he fell sick within the year a collection should be made for him among the members. The foreign names still borne by a large proportion of the members show that the con- nexion with descendants of the refugees is maintained.

The example of providence given by these societies was so largely followed that Rose's Act in 1793 recognized the existence of numerous societies, and provided encouragement for them in various ways, as well as relief from taxation to an extent which in those days must have been of great pecuniary value, and ex- emption from removal under the poor law. The benefits offered by tnis statute were readily accepted by the societies, and the vast number of societies which speedily became enrolled shows that Rose's Act met with a real public want. In the county of Middlesex alone nearly a thousand societies were enrolled within a very few years after the passing of the act, and the number in some other counties was almost as great. The societies then formed were nearly all of a like kind — small clubs, in which the feature of good fellowship was in the ascendant, and that of provident assurance for sickness and death merely accessory. This is indicated by one provision which occurs in many of the early enrolled rules, viz. that the number of members shall be limited to 61, 81 or 101, as the case may be. The odd 1 which occurs in these numbers probably stands for the president or secretary, or is a contrivance to ensure a clear majority. Several of these old societies are still in existence, and can point to a prosperous career based rather upon good luck than upon scientific calculation. Founded among small tradesmen or persons in the way to thrive, the claims for sickness were only made in cases where the sickness was accompanied by distress, and even the funeral allowance was not always demanded.

The societies generally not being established upon any scientific principle, those which met with this prosperity were the excep- tion to the rule; and accordingly the cry that friendly societies were failing in all quarters was as great in 18 19 as in 1869. A writer of that time speaks of the instability of friendly societies as " universal"; and the general conviction that this was so resulted in the passing of the act of 1819. It recites that " the habitual reliance of poor persons upon parochial relief, rather than upon their own industry, tends to the moral deterioration of the people and to the accumulation of heavy burthens upon parishes; and it is desirable, with a view as well to the reduction of the assessment made for the relief of the poor as to the improve- ment of the habits of the people, that encouragement should be afforded to persons desirous of making provision for themselves or their families out of the fruits of their own industry. By thtf contributions of the savings of many persons to one common fund the most effectual provision may be made for the casualties affecting all the contributors; and it is therefore desirable to afford further facilities and additional security to persons who may be willing to unite in appropriating small sums from time to time to a common fund for the

purposes aforesaid, and it is desirable to protect such persons from the effects of fraud or

miscalculation." This preamble went on to recite that the provisions of preceding acts had been found insufficient for these purposes, and great abuses had prevailed in many societies established under their authority. By this statute a friendly society was defined as " an institution, whereby it is intended to provide, by contribution, on the principle of mutual insurance, for the maintenance or assistance of the contributors thereto, their wives or children, in sickness, infancy, advanced age, widowhood or any other natural state or contingency, whereof the occurrence is susceptible of calculation by way of average." It will be seen that this act dealt exclusively with the scientific aspect of the societies, and had nothing to say to the element of good fellowship. Rules and tables were to be submitted by the persons intending to form a society to the justices, who, before confirming them, were to satisfy themselves that the con- tingencies which the society was to provide against were within the meaning of the act, and that the formation of the society would be useful and beneficial, regard being had to the existence of other societies in the same district. No tables or rules con- nected with calculation were to be confirmed by the justices until they had been approved by two persons at least, known to be professional actuaries or persons skilled in calculation, as fit and proper, according to the most correct calculation of which the nature of the case would admit. The justices in quarter sessions were also by this act authorized to publish general rules for the formation and government of friendly societies within their county. The practical effect of this statute in requiring that the societies formed under it should be established on sound principles does not appear to have been as great as might have been expected. The justices frequently accepted as " persons skilled in calculation " local schoolmasters and others who had no real knowledge of the technical difficulties of the subject, while the restrictions upon registry served only to increase the number of societies established without becoming registered.

In 1829 the law relating to friendly societies was entirely re-constructed by an act of that year, and a barrister was appointed under that act to examine the rules of societies, and ascertain that they were in conformity to law and to the provisions of the act. The barrister so appointed was John Tidd Pratt (1797- 1870); and no account of friendly societies would be complete that did not do justice to the remarkable public service rendered by this gentleman. For forty years, though he had by statute really very slight authority over the societies, his name exercised the widest influence, and the numerous

reports and publications by which he endeavoured to impress upon the public mind sound principles of management of friendly societies, and to expose those which were managed upon unsound principles, made him a terror to evil-doers. On the other hand, he lent with readiness the aid of his legal knowledge and great mental activity to assist- ing well-intentioned societies in coming within the provisions of the acts, and thus gave many excellent schemes a legal organization.

By the act of 1829, in lieu of the discretion as to whether the formation of the proposed society would be useful and beneficial, and the requirement of the actuarial certificate to the tables, it was enacted that the justices were to satisfy themselves that the tables proposed to be used might be adopted with safety to all parties ■ concerned. This provision, of course, became a dead letter and was repealed in 1834. Thenceforth, societies were free to establish themselves upon what conditions and with what rates they chose, provided only they satisfied the barrister that the rules were ” calculated to carry into effect the intention of the parties framing them,” and were ” in conformity to law.”

By an act of 1846 the barrister certifying the rules was constituted ” Registrar of Friendly Societies,” and the rules of all societies were brought together under his custody. An actuarial certificate was to be obtained before any society could be registered ” for the purpose of securing any benefit dependent on the laws of sickness and mortality.” In 1850 the acts were again repealed and consolidated with amendments. Societies were divided into two classes, ” certified ” and •” registered.” The certified societies were such as obtained a

certificate to their tables by an actuary possessing a given quali- fication, who was required to set forth the data of sickness and mortality upon which he proceeded, and the rate of interest assumed in the calculations. All other societies were to be simply registered. Very few societies were constituted of the ” certified ” class. The distinction of classes was repealed and the acts were again consolidated in 1855. Under this act, which admitted of all possible latitude to the framers of rules of societies, 21,875 societies were registered, a large number of them being lodges or courts of affiliated orders, and the act continued in force till the end of 1875.

The Friendly Societies Act 1875 and the several acts amending it are still, in effect, the law by which these societies are regulated, though in form they have been replaced by two consolidating acts, viz. the Friendly Societies Act 1896 and the Collecting Societies and Industrial Assurance Companies Act 1896. This legislation still bears the permissive and elastic character which marked the more successful of the previous acts, but it provides ampler means to members of ascertaining and remedying defects of management and of restraining fraud. The business of registry is under the control of a chief registrar, who has an assistant registrar in each of the three countries, with an actuary. An appeal to the chief registrar in the case of the refusal of an assistant registrar to register a society or an amendment of rules, and in the case of suspension or cancelling of registry, is interposed before appeal is to be made to the High Court. Registry under a particular name may be refused if in the opinion of the registrar the name is likely to deceive the members or the public as to the nature of the society or as to its identity. It is the duty of the chief registrar, among other things, to require from every society a return in proper form each year of its receipts and expenditure, funds and effects; and also once every five years a valuation of its assets and liabilities. Upon the application of a certain proportion of the members, varying according to the magnitude of the society, the chief registrar may appoint an inspector to examine into its affairs, or may call a general meeting of the members to consider and determine any matter affecting its interests. These are powers which have been used with excellent effect. Cases have occurred in which fraud has been detected and punished by this means that could not probably have been otherwise brought to light. In others a system of mismanagement has been exposed and effectually checked. The power of calling special meetings has enabled societies to remedy defects in their rules, to remove officers guilty of misconduct, &c, where the procedure prescribed by the rules was for some reason or other inapplicable. Upon an application of a like proportion of mem- bers the chief registrar may, if he finds that the funds of a society are insufficient to meet the existing claims thereon, or that the rates of contribution are insufficient to cover the benefits assured (upon which he consults his actuary), order the society to be dissolved, and direct how its funds are to be applied. Authority is given to the chief registrar to direct the expense (preliminary, incidental, &c.) of an inspection or special meeting to be defrayed by the members or officers, or former members or officers, of a society, if he does not think they should be defrayed either by the applicants or out of the society's funds. He is also empowered, with the approval of the treasury, to exempt any friendly society from the provisions of the Collecting Societies Act if

he considers it to be one to which those provisions ought not to apply. Every society regis- tered after 1895, to which these provisions do apply, is to use the words ” Collecting Society ” as the last words of its name.

The law as to the membership of infants has been altered three times. The act of 1875 allowed existing societies to continue any rule or practice of admitting children as members that was in force at its passing, and prohibited membership under sixteen years of age in any other case, except the case of a juvenile society composed wholly of members under that age. The treasury made special regulations for the registry of such juvenile societies. In 1887 the maximum age of their members was extended to twenty-one. In 1895 it was enacted that no society should have any members under one year of age, whether

authorized by an existing rule or not; and that every society should be entitled to make a rule admitting members at any age over one year, but by the Friendly Societies Act 1908 member- ship was permitted to minors under the age of one year. The Treasury, upon the enactment of 1895 coming into operation, rescinded its regulations for the registry of juvenile societies; and though it is still the practice to submit for registry societies wholly composed of persons under twenty-one, these societies in no way differ from other societies, except in the circumstances that they are obliged to seek officers and a committee of manage- ment from outside, as no member of the committee of any society can be under twenty-one years of age. In order to promote the discontinuance of this anomalous proceeding of creating societies under the Friendly Societies Act, which, by the conditions of their existence, are unable to be self-governing, the act provides an easy method of amalgamating juvenile societies and ordinary societies or branches, or of distributing the members and the funds of a juvenile society among a number of branches. The liability of schoolboys and young working lads to sickness is small, and these societies frequently accumulate funds, which, as their membership is temporary, remain unclaimed and are sometimes misapplied.

The legislation of 1875 and 1876 was the result of the labours of a royal commission of high authority, presided over by Sir Stafford Northcote (afterwards Lord Iddesleigh), which sat from i870toi874, and prosecuted an exhaustive inquiry into the organization and condition of the various classes of friendly societies. Their reports occupy more than a dozen large bluebooks. They divided registered friendly societies into 13 classes.

The first class included the affiliated societies or ” orders,” such as the

Manchester Unity of Oddfellows, the Ancient Order of Foresters, the Rechabites, Druids, &c. These societies have a central body, either situated in some large town, as in the case of the Manchester Unity, or moving from place to place, as in that of the Foresters. Under this central body, the country is (in most cases) parcelled out into districts, and these districts again consist each of a number of independent branches, called “lodges,” “courts,” “tents,” or “divisions,” having a separate fund administered by themselves, but contributing also to a fund under the control of the central body. Besides these great orders, there were smaller affiliated bodies, each having more than 1000 members; and the affiliated form of society appears to have great attraction. Indeed, in the colony of Victoria, Australia, all the existing friendly societies are of this class. The orders have their ” secrets,” but these, it may safely be said, are of a very innocent character, and merely serve the purpose of identifying a member of a distant branch by his knowledge of the ” grip,” and of the current password, &c. Indeed they are now so far from being ” secret societies ” that their meetings are attended by reporters and the debates published in the news- papers, and the Order of Foresters has passed a wise resolution expunging from its publications all affectation of mystery.

Most of the lodges existing before 1875 have converted themselves into registered branches. The requirement that for that purpose a vote of three-fourths should be necessary was altered in 1895 to a bare majority vote. The provisions as to settlement of disputes were extended in 1885 to every description of dispute between branches and the central body, and in 1895 it was provided that the forty days after which a member may apply to the court to settle a dispute where the society fails to do so, shall not begin to run until application has been made in succession to all the tribunals created by the order for the purpose. In 1 887 it was enacted that no body which had been a registered branch should be registered as a separate society except upon production of a certificate from the order that it had seceded or been expelled; and in 1895 it was further enacted that no such body should, after secession or expulsion, use any name or number implying, that it is still a branch of the order. The orders generally, especially the greater ones, have carefully supervised the valuations of their branches, and have urged and, as far as circumstances have rendered it practicable, have enforced upon the branches measures for diminishing the deficiencies which the valuations have disclosed. They have organized plans by which branches disposed to make an effort to help themselves in this matter may be assisted out of a central fund. The second class was made up of ” geneAl societies,” principally existing in London, of which the commissioners enu- merated 8 with

nearly 60,000 members, and funds amounting to a quarter of a million.

The third class included the ” county societies.” These societies have been but feebly supported by those for whose benefit they are instituted, having all exacted high rates of contribution, in order to secure financial soundness.

Class 4, ” local town societies,” is a very numerous one. Among some of the larger societies may be mentioned the ” Chelmsford Provident,” the ” Brighton and Sussex Mutual,” the ” Cannon Street, Birmingham,” the ” Birmingham General Provident.” In

this group might also be included the interesting societies which are established among the Jewish community. They differ from ordinary friendly societies partly in the nature of the benefits granted upon death, which are intended to compensate for loss of employment during the time of ceremonial seclusion enjoined by the Jewish law, which is called ” sitting shiva.” They also provide a cab for the mourners and rabbi, and a tombstone for the departed, and the same benefits as an ordinary friendly society during sickness. Some also provide a place of worship. Of these the ” Pursuers of Peace ” (enrolled in December 1797), the ” Bikhur Cholim, or Visitors of the Sick ” (April 1798), the ” Hozier Holim ” (1804), may be mentioned.

Class 5 was ” local village and country societies,” including the small public-house clubs which abound in the villages and rural districts, a large proportion of which are unregistered. Class 6 was formed of ” particular trade societies.” Class 7 was ” dividing societies.” These were before 1875 un- authorized by law, though they were very attractive to the members. Their practice is usually to start afresh every January, paying a subscription somewhat in excess of that usually charged by an ordinary friendly society, out of which a sick allowance is granted to any member who may fall sick during the year, and at Christmas the balance not so applied is divided among the members equally, with the exception of a small sum left to begin the new year with. The mischief of the system is that, as there is no accumulation of funds, the society cannot provide for prolonged sickness or old age, and must either break up altogether or exclude its sick and aged members at the very time when they most need its help. This, however, has not impaired the popularity of the societies, and

the act of 1875, framed on the sound principle that the protection of the law should not be withheld from any form of association, enables a society to be registered with a rule for dividing its funds, provided only that all existing claims upon the society are to be met before a division takes place.

Class 8, ” deposit friendly societies,” combine the characteristics of a savings bank with those of a friendly society. They were devised by the Hon. and Rev. S. Best, on the principle that a certain proportion of the sick allowance is to be raised out of a member’s separate deposit account, which, if not so used, is retained for his benefit. Their advantages are in the encouragement they offer to saving, and in meeting the selfish objection sometimes raised to friendly societies, that the man who is not sick gets nothing for his money ; their disadvantage is in their failing to meet cases of sickness so prolonged as to exhaust the whole of the member’s own deposit.

Class 9, ” collecting societies,” are so called because their contributions are received through a machinery of house-to-house collection. These were the subject of much laborious investigation and close attention on the part of the commissioners. They deal with a lower class of the community, both with respect to means and to intelligence, than that from which the members of ordinary friendly societies are drawn. The large emoluments gained by the officers and collectors, the high percentage of expenditure (often ex- ceeding half the contributions), and the excessive frequency of lapsing of insurances point to mischiefs in their management. ” The radical evil of the whole system (the commissioners remark) appears to us to lie in the employment of collectors, otherwise than under the direct supervision and control of the members, a supervision and control which we fear to be absolutely unattainable in burial societies that are not purely local.” On the other hand, it must be conceded that these societies extend the benefits of life insurance to a class which the other societies cannot reach, namely, the class that will not take the trouble to attend at an office, but must be induced to effect an insurance by a house-to-house canvasser, and be regularly visited by the collector to ensure their paying the contributions. To many such persons these societies, despite all their errors of constitution and management, have been of great benefit. The great source of these errors lies in a tendency on the part of the managers of the societies to forget that they are simply trustees, and to look upon the concern as their own personal property to be managed for their own benefit. These societies are of two kinds, local and general. For the general societies the act of 1875 made certain stringent provisions. Each member was to be furnished with a copy of the rules for one penny,

and a signed policy for the same charge. For- feiture of benefit for non-payment is not to be enforced without fourteen days' written notice. The transfer of a member from one society to another was not to be made without his written consent and notice to the society affected. No collector is to be a manager, or vote or take part at any meeting. At least one general meeting was to be held every year, of which notice must be given either by advertisement or by letter or post card to each member. The balance-sheet is to be open for inspection seven days before the meeting, and to be certified by a public accountant, not an officer of the society. Disputes could be settled by justices, or county courts, notwithstanding anything in the rules of the society to the contrary. Closely associated with the question of the management of these societies is that of the risk incurred by infant life, through the facilities offered by these societies for making insurances on the death of children. That this is a real risk is certain from the records of the assizes, and from many circumstances of suspicion; but the extent of it cannot be measured, and has probably been exaggerated.

It has never been lawful to assure more than £6 on the death of a child under five years of age, or more than £10 on the death of one under ten. Previous to the act of 1875, however, there was no machinery for ascertaining that the law was complied with, or for enforcing it. This is supplied by that act, though still somewhat imperfectly. When the bill went up to the House of Lords, an amendment was made, reducing the limit of assurance on a child under three years of age to £3, but this amendment was unfortunately disagreed with by the House of Commons.

Class 10, annuity societies, prevail in the west of England. These societies are few, and their business is diminishing. Most of them originated at the time when government subsidized friendly societies by allowing them £4: 11: 3% per annum interest. Now annuities may be purchased direct from the National Debt commissioners. These societies are more numerous, however, in Ireland.

Class it, female societies, are numerous. Many of them resemble affiliated orders at least in name, calling themselves Female Foresters, Odd Sisters, Loyal Orangewomen, Comforting Sisters and so forth. In their rules may be found such a provision as that a member shall be fined who does not " behave as becometh an Orangewoman." Many are unregistered. In the northern counties of England they are sometimes termed " life boxes," doubtless from the old custom of placing the contributions in a box. The trustees, treasurer, and committee are usually females, but very frequently the secretary is a

man, paid a small salary.

Under Class 12 the commissioners included the societies for various purposes which were authorized by the secretary of state to be registered under the Friendly Societies Act of 1855, comprising working-men's clubs, and certain specially authorized societies, as well as others that are now defined to be friendly societies. Among these purposes are assisting members in search of employment; assisting members during slack seasons of trade ; granting temporary relief to members in distressed circumstances ; purchase of coals and other necessaries to be supplied to members; relief or maintenance in case of lameness, blindness, insanity, paralysis, or bodily hurt through accidents; also, the assurance against loss by disease or death of cattle employed in trade or agriculture; relief in case of shipwreck or loss or damage to boats or nets ; and societies for social intercourse, mutual helpfulness, mental and moral improvement, rational recreation, &c, called working-men's clubs. Class 13 was composed of cattle insurance societies. These are the thirteen classes into which the commissioners divided registered friendly societies. There were 26,034 societies enrolled or certified under the various acts for friendly societies in force between 1793 and 1855; and, as we have seen, 21,875 societies registered under the act of 1855 before the 1st January 1876, when the act of 1875 came into operation. The total there- fore of societies to which a legal constitution had been given was 47,909. Of these 26,087 were presumed to be in existence when the registrar called for his annual return, but only 11,282 furnished the return required. These had 3,404,187 members, and £9,336,946 funds. Twenty-two societies returned over 10,000 members each; nine over 30,000. One society (the Royal Liver Friendly Society, Liverpool, the largest of the collecting societies) returned 682,371 members. The next in order was one of the same class, the United Assurance Society, Liverpool, with 159,957 members; but in all societies of this class the membership consists very largely of in- fants. The average of members in the 11,260 societies with less than 10,000 members each was only 171.

Such were the registered societies; but there remained behind a large body of unregistered societies. With increased knowledge of the advantages of registration, 1 and of the true principles upon which friendly societies should be established, the number of un- registered societies, in comparison with those registered, ought to become much less.

On the actuarial side it is in the highest degree essential to the interests of their members that friendly societies should be financially sound, — in other words, that they should throughout their existence

be able to meet the engagements into which they have entered with their members. For this purpose it is necessary that the members' contributions should be so fixed as to prove adequate, with proper management, to provide the benefits promised to the members. These benefits almost entirely depend upon the contingencies of health and life; that is, they take the form of payments to members when sick, of payments to members upon attaining given ages, or of payments upon members' deaths, and frequently a member is

1 These may be briefly summed up thus: — (1) power to hold land and vesting of property in trustees by mere appointment ; (2) remedy against misapplication of funds; (3) priority in bankruptcy or on death of officer; (4) transfer of stock byjdirection of chief registrar; (5) exemption from stamp duties; (6) membership of minors; (7) certificates of birth and death at reduced cost ; (8) investment with National Debt Commissioners ; (9) reduction of fines on admis- sion to copyholds; (10) discharge of mortgages by mere receipt; (11) obligation on officers to render accounts; (12) settlement of disputes; (13) insurance of funeral expenses for wives and children without insurable interest; (14) nomination at death; (15) payment without administration; (16) services of public auditors and valuers; (17) registry of documents, of which copies may be put in evidence.

assured for all these benefits, viz. a weekly payment if at any time sick before attaining a certain age, a weekly payment for the remainder of life after attaining that age, and a sum to be paid upon his death. Of course the object of the allowance in sickness is to provide a substitute for the weekly wage lost in consequence of being unable to work, and the object of the weekly payment after attaining a certain age, when the member will probably be too infirm to be able to earn a living by the exercise of his calling or occupation, is to provide him with the necessaries of life, and so enable him to be independent of poor relief. There is every reason to believe that, when a large group of persons of the same age and calling are observed, there will be found to prevail among them, taken one with another, an average number of days' sickness, as well as an average rate of mortality, in passing through each year of life, which can be very nearly predicted from the results furnished by statistics based upon observations previously made upon similarly circumstanced groups. Assuming, therefore, the necessary statistics to be attainable, the computation of suitable rates of contribution to be paid by the members of a society in return for

certain allowances during sickness, or upon attaining a certain age, or upon death, can be readily made by an actuarial expert. Accordingly, to furnish these statistics, the act of 1875, in continuation of an enactment which first appeared in a statute passed in 1829, required every registered society to make quinquennial returns of the sickness and mortality experienced by its members. By the year 1880 ten periods of five years had been completed, and at the end of each of them a number of returns had been received. Some of these had been tabulated by actuaries, the latest tabulation being of those for the five years ending 1855. There remained untabulated five complete sets of returns for the five subsequent quinquennial periods. It was resolved that these should be tabulated once for all, and it was considered that they would afford sufficient material for the construction of tables of sickness and mortality that might be adopted for the future as standard tables for friendly societies; and that it would be inexpedient to impose any longer on the societies the burden of making such returns. This requirement of the act was accordingly repealed in 1882. The result of the tabulation appeared in 1896, in a bluebook of 1367 folio pages, containing tables based upon the experience of nearly four and a half million years of life; These tables showed generally, as compared with previous observations, an increased liability to sickness. This inference has been confirmed by the observations of Mr Alfred W. Watson, actuary to the Inde- pendent Order of Oddfellows, Manchester Unity Friendly Society, on his investigation of the sickness and mortality experience of that society during the five years 1 893-1 897, which extended over 800,000 individuals, more than 3,000,000 years of life and 7,000,000 weeks of sickness.

The establishment of the National Conference of Friendly Societies by the orders and a few other societies has been of great service in obtaining improvements in the law, and in enabling the societies strongly to represent to the government and the legislature any grievance entertained by them. A complaint that membership of a shop club was made by certain employers a condition of employment, and that the rules of the club required the members to withdraw from other societies, led to the appointment of a departmental committee, who recommended that such a condition of employment should be made illegal, except in certain cases, and that in every ca=e it should be illegal to make the withdrawal from a society a condition of employment. In 1902 an act was passed based upon this recommendation.

It is an increasing practice among societies of combining together to obtain medical attendance and medicine for their members by the formation of medical associations. In 1895 trade unions were enabled

to join in such associations, and it was provided that a contributing society or union should not withdraw from an associa- tion except upon three months' notice. The working of these associations has been viewed with dissatisfaction by members of the medical profession, and it has been suggested that a board of con- ciliation should be formed consisting of representatives of the Conference of Friendly Societies and of an equal number of medical men.

The following figures are derived from returns of registered societies and branches of registered societies to the beginning of 1905 :

Number of Returns.

Number of Members.

Amount of Funds.

Ordinary Friendly Societies (classes 2 to 8, 10 and 11). Societies having Branches (class 1) . . ; Collecting Friendly Societies (class 9) .

Specially Authorized Societies (class 12) Specially Authorized Loan Societies (class 12) Medical Societies (see last paragraph) .... Cattle Insurance Societies (class 13) ....

6,938 20,819

45

75

913

122

517 95

57 7

3,132,065 2,606,029

7,448,549

26,509

236,298

75,o89

ii5,5H

324,H5

3,736

10,859

£17,042,398

23,446,330

7,862,569

317,913

318,945

628,759

771,578

62,049

7,746

773

•

29,588

13,978,790

£50,459,060

British Empire. — In many of the British colonies legislation on the subject similar to that of the mother-country has been adopted. In those forming the Commonwealth of Australia and in New Zealand the affiliated orders hold the field, there being few, if any, independent friendly societies. The state of Victoria has more than 1000 lodges with more than 100,000 members and nearly 1ˆ million pounds funds, averaging nearly £14 per member. Besides the registrar there is a government actuary for friendly societies, by whom the liabilities and accounts of all societies are valued every five years, a method which ensures uniformity in the processes of valuation. The friendly societies in the other Australasian states are not so numerous nor so wealthy,

but are in each case under the supervision of vigilant public officials. In New Zealand a friendly society was established at New Plymouth in 1841, the first year of that settlement. The formation of a society at Nelson was resolved upon by the emigrants on shipboard on their passage out, and the first meeting was held among the tall fern near the beach a few days after they landed. The societies have now a registrar, an actuary, a revising barrister and two public valuers. Investigations have been made into their sickness experience, with results which compare favourably with those of the Man- chester Unity and the registry office in the mother-country until the higher ages, when greater sickness appears to result from lower mortality. The average funds per member are £i9,ios. Nearly four-fifths are invested in the purchase or on mortgage of real estate.

In Cape Colony no society is allowed to register unless it be shown to the satisfaction of the registrar that the contributions which it proposes to charge are adequate to provide for the benefits which it undertakes to grant. The consequence is that little more than one-third of the existing societies are registered. In the Dominion of Canada, province of Ontario, extensive powers of control are given to the registrar, and societies are not admitted to registry without strict proof of their compliance with the conditions of registry imposed by the law. Very full returns of their transactions are required and published, and registry is cancelled when any of the conditions of registry cease to be observed. These conditions apply not only to societies existing in Ontario, but to foreign societies transacting business there.

In several of the West Indian Islands statutes have been passed on the model of British legislation and registrars have been appointed.

European Countries. — In foreign countries the development of friendly societies has proceeded upon different lines. Belgium has a Commission royale permanente des societes de secours mutuel. Under laws passed in 185 1 and 1894 societies are divided into two classes, recognized and not recognized. The recognized societies were in 1886 only about half as many as the unrecog- nized. There were in 1904 nearly 7000 recognized societies with 700,000 members. They enjoy the privileges of incorpora- tion, exemption from stamp duty, gratuitous announcement in the official Moniteur and may have free postage.

In France under the second empire a scheme was prepared for assisting friendly societies by granting them collective insurances under government security. The societies have the privilege of investing their funds in the Caisse des Dep&ts et Consignations,

corresponding to the English National Debt commission. The dual classification of societies in France is into those ” authorized ” and those ” approved.” By a law of the 1st of April 1898 a friendly society may be established by merely depositing a copy of its rules and list of officers with the sousprefet. Approved societies are entitled to certain state subventions for assisting in the purchase of old-age pensions and otherwise. A higher council has been established to advise on their working. In Germany a law was passed on

the 7th of April 1876 (amended on the 1st of June 1884) which prescribed for registered friendly societies many things which in England are left to the discretion of their founders; and it provided for an amount of official interference in their management that is wholly unknown here. The superintend- ing authority had a right to inspect the books of every society, whether registered or not, and to give formal notice to a society to call in arrears, exclude defaulters, pay benefits or revoke illegal resolutions. A higher authority might, in certain cases, order societies to be dissolved. These pro- visions related to voluntary societies; but it was competent for communal authorities also to order the formation of a friendly society, and to make a regulation compelling all workmen not already members of a society to join it. Since then the great series of imperial statutes has been passed, commencing in 1883 with that for sickness insurance, followed in 1884 by that for workmen’s accident insurance, extended to sickness insurance in 1885, developed in the laws relating to accident and sickness insurance of persons engaged in agricultural and forestry pursuits in 1886, of persons engaged in the building trade and of seamen and others engaged in seafaring pursuits in 1887, and crowned by the law relating to infirmity and old-age insurance in 1889. Mr H. Unger, a distinguished actuary, remarks that the whole German workman’s insurance and its executive bodies (sickness funds, trade associations, insurance institutions) are constantly endeavouring to improve the position of the workmen in a social and sanitary aspect, to the benefit of internal peace and the welfare of the German empire.

In Holland it is stated that the number of burial clubs and sickness benefit societies appears to be greater in proportion to the population than in any other country; but that the burial clubs do not rest upon a scientific basis, and have an unfavour- able influence upon infant mortality. Half the population are insured in some burial club or

other. The sick benefit societies are, as in England, some in a good and some in a bad financial condition; and legislation follows the English system of com- “pulsory publicity, combined with freedom of competition.

In Spain friendly societies have grown out of the religious gilds. They are regulated by an act of 1887. Their actuarial condition appears to be backward, but to show indications of improvement. (E. W. B.)

United States. — Under the title of fraternal societies are included in the United States what are known in England as friendly societies, having some basis of mutual help to members, mutual insurance associations and benefit associations of all kinds. There are various classes and a great variety of forms of fraternal associations. It is therefore difficult to give a concrete historical statement of their origin and growth; but, dealing with those having benefit features for the payment of certain amounts in case of sickness, accident or death, it is found that their history in the United States is practically within the last half of the 19th century. The more important of the older organizations are the Improved Order of Red Men, founded in 1 77 1 and reorganized in 1834; Ancient Order of Foresters, 1836; Ancient Order of Hibernians of America, 1836; United Ancient Order of Druids, 1839; Independent Order of Recha- bites, 1842; Independent Order of B’nai B’rith, founded in 1843; Order of the United American Mechanics, 1845; Independent Order of Free Sons of Israel, 1849; Junior Order of United American Mechanics, 1853. A very large proportion, probably more than one-half, of the societies which have secret organiza- tions pay benefits in case of sickness, accident, disability, and funeral expenses in case of death. ‘ This class of societies grew out of the English friendly societies and have masonic character- istics. The Freemasons and other secret societies, while not all having benefit features in their distinctive organizations, have auxiliary societies with such features. There is also a class of secret societies, based largely on masonic usages, that have for their principal object the payment of benefits in some form. These are the Oddfellows, the Knights of Pythias, the Knights of Honour, the Royal Arcanum and some others. Many trade unions have now adopted benefit features, especially the Typo-

graphical Union, while many subordinate unions and great publishing houses have mutual relief associations purely of a local character, and some of the more important newspapers have such mutual relief or benefit societies. The New York trade unions, taken as a whole, have paid out large sums of money in benefits where members have been out of work, or are sick, or are on strike or have died. The total paid

in one year for all these benefits was over $500,000.

It is impossible to give the membership of all the fraternal associations in the United States; but, including Oddfellows, Freemasons, purely benefit associations and all the class of the larger fraternal organizations, the membership is over 6,000,000. Among the more important, so far as membership is concerned, are the Knights of Pythias, the Oddfellows, the Modern Wood- men of America, the Ancient Order of United Workmen, Im- proved Order of Red Men, Royal Arcanum, Knights of the Maccabees, Junior Order of United American Mechanics, Foresters of America, Independent Order of Foresters, &c. These and other organizations pay out a vast amount of money every year in the various forms.

Since about the year 1870 a new form of benefit organization has come into existence. This is a life insurance based on the assessment plan, assessments being levied whenever a member dies; ˆ ssess . or, as more recently, regular assessments being made in men (advance of death, as post-mortem assessments have proved insurance. a fallacious method of securing the means of paying death benefits. There are about 200 mutual benefit insurance companies or associations in the United States conducted on the ” lodge system “; that is to say, they have regular meetings for social purposes and for general improvement, and in their work there is found the mysticism, forms and ceremonies which belong to secret societies generally. These elements have proved a very strong force in keeping this class of associations fairly intact. The ” work ” of the lodges in the initiation of members and their passing through various degrees is attractive to many people, and in small places, remote from the amusements of the city, these lodges constitute a resort where members can give play to their-various talents. In most of them the features of the Masonic ritual are prominent. The amount of insurance which a single member can carry in such associa- tions is small. In the Knights of Honour, one of the first of this class, policies ranging from $500 to $2000 are granted. In the Royal Arcanum the maximum is $3000. This form of insurance may be called co-operative, and has many elements which make the organiza- tions practising it stronger than the ordinary assessment insurance companies having no stated meetings of members. These co- operative insurance societies are organized on the federal plan — as the Knights of Honour, for instance — having local assemblies, where the lodge-room element is in force; state organizations, to which the local bodies send delegates, and the national organization, which conducts all the insurance business through its executive officers. The local societies pay a certain given amount towards the support of the state and national offices, and

while originally they paid death assessments, as called for, they now pay regular monthly assessments, in order to avoid the weakness of the post-mortem assessment. The difficulty which these organizations have in conducting the insurance business is in keeping the average age of membership at a low point, for with an increase in the average the assessments increase, and many such organizations have had great trouble to convince younger members that their assessments should be increased to make up for the heavy losses among the older members. The experience of these purely insurance associations has not been sufficient yet to demonstrate their absolute soundness or desirability, but they have enabled a large number of persons of limited means to carry insurance at a very low rate. They have not materially interfered with regular level premium insurance enterprises, for they have stimulated the people to understand the benefits of insurance, and have really been an educational force in this direction.

A modern method of benefit association is found in the railway relief departments of some of the large railway corporations. These departments are organized upon a different plan from the benefit features of labour organizations and secret societies, providing the members not only with payments on account of death, but also with assistance of definite amounts in case of sickness or accident, the railway companies con- tributing to the funds, partly from philanthropic and partly from financial motives. The principal railway companies in the United States which have established these relief departments are the Pennsylvania, the Philadelphia & Reading, the Baltimore & Ohio, the Chicago, Burlington & Quincy, and the Plant System. The relief department benefits the employes, the railways, and the public, because it is based upon the sound principle that the ” interests and welfare of labour, capital and society are common and harmonious, and can be promoted more by co-operation of effort than by antagonism and strife.”

Railway relief depart- ments.

The railway employes support one-twentieth of the entire popula- tion, and most of their associations maintain organizations to provide their members with relief and insurance. The Brotherhood of Locomotive Engineers, the Order of Railway Conductors of America, the Brotherhood of Locomotive Firemen, the Brotherhood of Railway Trainmen, the Brotherhood of Railway Trackmen, the Switchmen’s

Union, the Brotherhood of Railway Carmen, and the Order of Railway Telegraphers, all have relief and benefit features. The oldest and largest of these is the International Brotherhood of Locomotive Engineers, founded at Detroit in August 1863. Like other labour organizations of the higher class of workmen, the objects of the brotherhoods of railway employes are partly social and partly educational, but in addition to these great purposes they seek to protect their members through relief and benefit features. Of course the relief departments of the railway companies are competitors of the relief and insurance features of the railway employes orders, but both methods of providing assistance have proved successful and beneficial.

For a history of the various American organizations, see Albert C. Stevens, The Cyclopaedia of Fraternities (New York, 1899) ; Facts for Fraternalists, published by the Fraternal Monitor, Rochester, N.Y. ; for annual statements, ” The World Almanac,” ” Railway Relief Departments,” ” Brotherhood Relief and Insurance of Railway Employes,” ” Mutual Relief and Benefit Associations in the Printing Trade,” ” Benefit Features of American Trade Unions,” Bulletins Nos. 8, 17, 19 and 22 of the U.S. Department of Labour. (C. D. W.)

FRIENDS, SOCIETY OF, the name adopted by a body of Christians, who, in law and general usage, are commonly called Quakers. Though small in number, the Society occupies a position of singular interest. To the student of ecclesiastical history it is remarkable as exhibiting a form of Christianity widely divergent from the prevalent types, being a religious fellowship which has no formulated creed demanding definite subscription, and no liturgy, priesthood or outward sacrament, and which gives to women an equal place with men in church organization. The student of English constitutional history will observe the success with which Friends have, by the mere force of passive resistance, obtained, from the legislature and the courts, indulgence for all their scruples and a legal recognition of their customs. In American history they occupy an important place because of the very prominent part which they played in the colonization of New Jersey and Penn sylvania.

The history of Quakerism in England may be divided into three periods: — (1) from the first preaching of George Fox in 1647 to the Toleration Act 1689; (2) from 1689 to the evangelical movement in 1835; (3) from 1835 to the present time.

1. Period 1647-1689. — George Fox (1624-1691), the son of a weaver of Drayton-in-the-Clay (now called Fenny Drayton) in Leicestershire, was the founder of the Society. He Fox?’ began his public ministry in

1647, but there is no evidence to show that he set out to form a separate religious body. Impressed by the formalism and deadness of contemporary Christianity (of which there is much evidence in the confessions of the Puritan writers themselves) he empha- sized the importance of repentance and personal striving after the truth. When, however, his preaching attracted followers, a community began to be formed, and traces of organization and discipline may be noted in very early times. In 1652 a number of people in Westmorland and north Lancashire who had separated from the common national worship, 1 came under the influence of Fox, and it was this community (if it can be so called) at Preston Patrick which formed the nucleus of the Quaker church. For two years the movement spread rapidly throughout the north of England, and in 1654 more than sixty ministers went to Norwich, London, Bristol, the Midlands, Wales and other parts. Fox and his fellow-preachers spoke whenever opportunity offered, — sometimes in churches(declining, for the most part, to occupy the pulpit), sometimes in barns, sometimes at market crosses. The insistence on an inward spiritual experience was the great contribution made by Friends

1 At the time referred to, and during the Commonwealth, the pulpits of the cathedrals and churches were occupied by Episcopalians of the Richard Baxter type, Presbyterians, Independents and a few Baptists. It is these, and not the clergy of the Church of England, who are continually referred to by George Fox as ” priests.”

to the religious life of the time, and to thousands it came as a new revelation. There is evidence to show that the arrangement for this ” publishing of Truth” rested mainly with Fox, and that the expenses of it and of the foreign missions were borne out of a common fund. Margaret Fell (1614-1702), wife of Thomas Fell (1598-1658), vice-chancellor of the duchy of Lan- caster, and afterwards of George Fox, opened her house, Swarth- more Hall near Ulverston, to these preachers and probably contributed largely to this fund.

Their insistence on the personal aspect of religious experience made it impossible for Friends to countenance the setting apart of any man or building for the purpose of divine worship to the exclusion of all others. The operation of the Spirit was in no way limited to time, or individual or place. The great stress which they laid upon this aspect of Christian truth caused them to be charged with unbelief in the current orthodox views as to the inspiration of the Scriptures, and the person and work of Christ, a charge which they always denied. Contrary to the Puritan teaching of the time, they insisted on the possibility, in this life, of complete victory over sin. Robert Barclay,

writing some twenty years later, admits of degrees of perfection, and the possibility of a fall from it {Apology, Prop. viii.). Such teaching necessarily brought Fox and his friends into conflict with all the religious bodies of England, and they were continually engaged in strife with the Presbyterians, Independents, Baptists, Episcopalians and the wilder sectaries, such as the Ranters and the Muggletonians. The strife was often conducted on both sides with a zeal and bitterness of language which were character- istic of the period. Although there was little or no stress laid on either the joys or the terrors of a future life, the movement was not infrequently accompanied by most of those physical symptoms which usually go with vehement appeals to the conscience and emotions of a rude multitude. It was owing to these physical manifestations that the name ” Quaker ” was either first given or was regarded as appropriate when given for another reason (see Fox’s Journal concerning Justice Bennet at Derby in 1650 and Barclay’s Apology, Prop, n, § 8). The early Friends definitely asserted that those who did not know quaking and trembling were strangers to the experience of Moses, David and other saints.

Some of the earliest adherents indulged in extravagances of no measured kind. Some of them imitated the Hebrew prophets in the performance of symbolic acts of denunciation, foretelling or warning, going barefoot, or in sackcloth or undress, and, in a few cases, for brief periods, altogether naked; even women in some cases distinguished themselves by extravagance of conduct. The case of James Nayler (i6i7?-i66o), who, in spite of Fox’s grave warning, allowed Messianic homage to be paid to him, is the best known of these instances; they are to be explained partly by mental disturbance, resulting from the undue prominence of a single idea, and partly by the general religious excitement of the time and the rudeness of manners prevailing in the classes of society from which many of these individuals came. It must be remembered that at this time, and for long after, there was no definite or formal membership or system of admission to the society, and it was open to any one by attending the meetings to gain the reputation of being a Quaker.

The activity of the early Friends was not confined to England or even to the British Isles. Fox and others travelled in America and the West India Islands; another reached Jerusalem and preached against the superstition of the monks; Mary Fisher (fl. 1652-1697), ” a religious maiden,” visited Smyrna, the Morea and the court of Mahommed IV. at Adrianople; Alex- ander Parker (1628-1689) went to Africa; others made their way to Rome; two women were imprisoned by the Inquisition at Malta; two men passed into Austria and Hungary; and William Penn, George Fox and several others preached in Holland and

Germany.

It was only gradually that the Quaker community clothed itself with an organization. The beginning of this appears to be due to William Dewsbury (1621-1688) and George Fox; it was not until 1666 that a complete system of church organization

was established. The introduction of an ordered system and discipline was, naturally, viewed with some suspicion by people taught to believe that the inward light of each individual man was the only true guide for his conduct. The project met with determined opposition for about twenty years (1675-1695) from persons of considerable repute in the body. John Wilkinson and John Story of Westmorland, together with William Rogers of Bristol, raised a party against Fox concerning the management of the affairs of the society, regarding with suspicion any fixed arrangement for meetings for conducting church business, and in fact hardly finding a place for such meetings at all. They stood for the principle of Independency against the Presbyterian form of church government which Fox had recently established in the ” Monthly Meetings ” (see below). They opposed all arrangement for the orderly distribution of travelling ministers to different localities, and even for the payment of their expenses (see above); they also strongly objected to any disciplinary power being entrusted to the women’s separate meetings for business, which had become of considerable importance after the Plague (1665) and the Fire of London (1666) in consequence of the need for poor relief. They also claimed the right to meet secretly for worship in time of persecution (see below). They drew a considerable following away with them and set up a rival organization, but before long a number returned to their original leader. William Rogers set forth his views in The Christian Quaker, 1680; the story of the dissension is told, to some extent, in The Inner Life of the Religious Societies of the Commonwealth, by R. Barclay (not the ” Apologist “); the best account is given in a pamphlet entitled Micah’s Mother by John S. Rowntree.

Robert Barclay (q.v.), a descendant of an ancient Scottish family, who had received a liberal education, principally in Paris, at the Scots College, of which his uncle was rector, joined the Quakers about 1666, and William Penn (q.v.) came to them about two years later. The Quakers had always been active contro- versialists, and a great body of tracts and papers was issued by them; but hitherto these had been

of small account from a literary point of view. Now, however, a more logical and scholarly aspect was given to their literature by the writings of Barclay, especially his Apology for the True Christian Divinity published in Latin (1676) and in English (1678), and by the works of Penn, amongst which No Cross No Crown and the Maxims or Fruits of Solitude are the best known.

During the whole time between their rise and the passing of the Toleration Act 1689, the Quakers were the object of almost continuous persecution which they endured with extraordinary constancy and patience; they insisted on the duty of meeting openly in time of persecu- tion, declining to hold secret assemblies for worship as other Nonconformists were doing. The number who died in prison approached 400, and at least 100 more perished from violence and ill-usage. A petition to the first parliament of Charles II. stated that 3179 had been imprisoned; the number rose to 4500 in 1662, the Fifth Monarchy outbreak, in which Friends were in no way concerned, being largely responsible for this increase. There is no evidence to show that they were in any way con- nected with any of the plots of the Commonwealth or Restoration periods. A petition to James II. in 1685 stated that 1460 were then in prison. Under the Quaker Act of 1662 and the Con- venticle Act of 1664 a number were transported out of England, and under the last-named act and that of 1670 (the second Conventicle Act) hundreds of households were despoiled of all their goods. The penal laws under which Friends suffered may be divided chronologically into those of the Commonwealth and the Restoration periods. Under the former there were a few charges of plotting against the government. Several imprison- ments, including that of George Fox at Derby in i65o-i65i,were brought about under the Blasphemy Act of 1650, which inflicted penalties on any one who asserted himself to be very God or equal with God, a charge to which the Friends were peculiarly liable owing to their doctrine of perfection. After a royalist insurrec- tion in 1655, a proclamation was issued announcing that persons

Persecu- tion.

suspected of Roman Catholicism would be required to take an oath abjuring the papal authority and transubstantiation. The Quakers, accused as they were of being Jesuits, and refusing to take the oath, suffered under this proclamation and under the more stringent act of 1656. A considerable number were flogged under the Vagrancy Acts (39 Eliz. c. 4; 7 Jac. I. c. 4), which were strained to cover the case of itinerant Quaker preachers. They also came under the provisions of the acts of 1644, 1650 and 1656 directed against travelling on the

Lord's day. The interruption of preachers when celebrating divine service rendered the offender liable to three months' imprisonment under a statute of the first year of Mary, but Friends generally waited to speak till the service was over. 1 The Lord's Day Act 1656 also enacted penalties against any one disturbing the service, but apart from statute many Friends were imprisoned for open contempt of ministers and magistrates. At the Restoration 700 Friends, imprisoned for contempt and some minor offences, were set at liberty. After the Restoration there began a persecution of Friends and other Nonconformists as such, notwithstanding the king's Declaration of Breda which had proclaimed liberty for tender consciences as long as no disturbance of the peace was caused. Among the most common causes of imprisonment was the practice adopted by judges and magistrates of tendering to Friends (particularly when no other charge could be proved against them) the Oaths of Supremacy and Allegiance (5 Eliz. c. 1 & 7 Jac. I. c. 6). The refusal in any circumstance to take an oath led to much suffering. The Act 3 Jac. I. c. 4, passed in consequence of the Gunpowder Plot, against Roman Catholics for not attending church, was put in force against Friends, and under it enormous fines were levied. The Quaker Act 1662 and the Conventicle Acts of 1664 and 1670, designed to enforce attendance at church, and inflicting severe penalties on those attending other religious gatherings, were responsible for the most severe persecution of all. The act of 1670 gave to informers a pecuniary interest (they were to have one-third of the fine imposed) in hunting down Nonconformists who broke the law, and this and other statutes were unduly strained to secure con- victions. A somewhat similar act of 35 Eliz. c. 1., enacting even more severe penalties, had never been repealed, and was some- times put in force against Friends. The Militia Act 1663 (14 Car. II. c. 3), enacting fines against those who refused to find a man for the militia, was occasionally put in force. The refusal to pay tithes and other ecclesiastical demands led to continuous and heavy distraints, under the various laws made in that behalf. This state of things continued to some extent into the 19th century. For further information see " The Penal Laws affect- ing Early Friends in England " (from which the foregoing sum- mary is taken) by Wm. Chas. Braithwaite in The First Publishers of Truth. On the 15th of March 1672 Charles II. issued his declaration suspending the penal laws in ecclesiastical matters, and shortly afterwards, by pardon under the great seal, he released nearly 500 Quakers from prison, remitted their fines and released such of their estates as were forfeited by praemunire. It is of interest to note that, although John Bunyan was bitterly opposed to Quakers, his friends, on hearing of the petition contemplated by them, requested them to insert his name on the list,

and in this way he gained his freedom. The dissatisfaction which this exercise of the royal prerogative aroused induced the king, in the following year, to withdraw his proclamation, and, notwithstanding appeals to him, the persecution continued intermittently throughout his reign. On the accession of James II. the Quakers addressed him (see above) with some hope on account of his known friendship for William Penn, and the king not long afterwards directed a stay of proceedings in all matters pending in the exchequer against Quakers on the ground of non- attendance at the national worship. In 1687 came his declaration for liberty of conscience, and, after the Revolution of 1688, the Toleration Act 1689 put an end to the persecution of Quakers (along with other Dissenters) for non-attendance at church.

1 On the whole subject of preaching ” after the priest had done,” see Barclay’s Inner Life of the Religious Societies of the Common- wealth, ch. xii.

Period of Decline.

For many years after this they were liable to imprisonment for non-payment of tithes, and, together with other Dissenters, they remained under various civil disabilities, the gradual removal of which is part of the general history of England. In the years succeeding the Toleration Act at least twelve of their number were prosecuted (often more than once in the spiritual and other courts) for keeping school without a bishop’s licence. It is coming to be recognized that the growth of religious toleration owed much to the early Quakers who, with the exception of a few Baptists at the first, stood almost alone among Dissenters in holding their public meetings openly and regularly.

The Toleration Act was not the only law of William and Mary which benefited Quakers. The legislature has continually had regard to their refusal to take oaths, and not only the said act but also another of the same reign, and numerous others, subsequently passed, have respected the peculiar scruples of Friends (see Davis’s Digest of Legislative Enactments relating to Friends, Bristol, 1820).

2. Period i68g-i835. — From the beginning of the 18th century the zeal of the Quaker body abated. Although many ” General ” and other meetings were held in different parts of the country for the purpose of

setting forth Quakerism, the notion that the whole Christian church would be absorbed in it, and that the Quakers were, in fact, the church, gave place to the conception that they were ” a peculiar people ” to whom, more than to others, had been given an understanding of the will of God. The Quakerism of this period was largely of a traditional kind; it dwelt with increasing emphasis on the peculiarities of its dress and language; it rested much upon discipline, which developed and hardened into rigorous forms; and the correction or exclusion of its members occupied more attention than did the winning of converts.

Excluded from political and municipal life by the laws which required either the taking of an oath or joining in the Lord’s Supper according to the rites of the Established Church, exclud- ing themselves not only from the frivolous pursuits of pleasure, but from music and art in general, attaining no high average level of literary culture (though producing some men of eminence in science and medicine), the Quakers occupied themselves mainly with trade, the business of their Society, and the calls of philanthropy. From early times George Fox and many others had taken a keen interest in education, and in 1779 there was founded at Ackworth, near Pontefract, a school for boys and girls; this was followed by the reconstitution, in 1808, of a school at Sidcot in the Mendips, and in 181 1, of one in Islington Road, London; it was afterwards removed to Croydon, and, later, to Saffron Walden. Others have since been established at York and in other parts of England and Ireland. None of them are now reserved exclusively for the children of Friends.

During this period Quakerism was sketched from the outside by two very different men. Voltaire (Diclionnaire Philosophique, ” Quaker,” ” Toleration “) described the body, which attracted his curiosity, his sympathy and his sneers, with all his brilliance. Thomas Clarkson {Portraiture of Quakerism) has given an elaborate and sympathetic account of the Quakers as he knew them when he travelled amongst them from house to house on his crusade against the slave trade.

3. From 1833. — During the 18th century the doctrine of the Inward Light acquired such exclusive prominence as to bring about a tendency to disparage, or, at least, to neglect, the written word (the Scriptures) as being ” outward ” and non-essential. In the early part of the 19th century an American Friend, Elias Hicks, pressed this doctrine to its furthest limits, and, in doing so, he laid stress on ” Christ within ” in such a way as practically to take little account of the person and work of the ” outward,” i.e. the historic Christ. The result was a separation of the Society in America into two divisions which

persist to the present day (see below, ” Quakerism in America “). This led to a counter movement in England, known as the Beacon Controversy, from the name of a warning publication issued by Isaac Crewdson of Manchester in 1835, advocating views of a pronounced ” evan- gelical ” type. Much controversy ensued, and a certain number

of Friends (Beaconites as they are sometimes called) departed from the parent stock. They left behind them, however, many influential members, who may be described as a middle party, and who strove to give a more ” evangelical ” tone to Quaker doctrine. Joseph John Gurney of Norwich, a brother of Eliza- beth Fry, by means of his high social position and his various writings (some published before 1835), was the most prominent actor in this movement. Those who quitted the Society main- tained, for some little time, a separate organization of their own, but sooner or later most of them joined the Evangelical Church or the Plymouth Brethren.

Other causes have been at work modifying the Quaker society. The repeal of the Test Act, the admission of Quakers to Parlia- ment in consequence of their being allowed to affirm instead of taking the oath (1832, when Joseph Pease was elected for South Durham), the establishment of the University of London, and, more recently, the opening of the universities of Oxford and Cambridge to Nonconformists, have all had their effect upon the body. It has abandoned its peculiarities of dress and language, as well as its hostility to music and art, and it has cultivated a wider taste in literature. In fact, the number of men, either Quakers or of Quaker origin and proclivities, who occupy positions of influence in English life is large in proportion to the small body with which they are connected. During the 19th century the interests of Friends became widened and they are no longer a close community.

Doctrine. — It is not easy to state with certainty the doctrines of a body which (in England at least) has never demanded sub- scription to any creed, and whose views have undoubtedly undergone more or less definite changes. There is not now the sharp distinction which formerly existed between Friends and other non-sacerdotal evangelical bodies; these have, in theory at least, largely accepted the spiritual message of Quakerism. By their special insistence on the fact of immediate communion between God and man, Friends have been led into those views and practices which still mark them off from their fellow- Christians.

Nearly all their distinctive views (e.g. their refusal to take oaths, their testimony against war, their disuse of a professional ministry, and their recognition of women's ministry) were being put forward in England, by various individuals or sects, in the strife which raged during the intense religious excitement of the middle of the 17 th century. Nevertheless, before the rise of the Quakers, these views were nowhere found in conjunction as held by any one set of people; still less were they regarded as the outcome of any one central belief or principle. It is rath'er in their emphasis on this thought of Divine communion, in their insistence on its reasonable consequences (as it seems to them), that Friends constitute a separate community. The appoint- ment of one man to preach, to the exclusion of others, whether he feels a divine call so to do or not, is regarded as a limitation of the work of the Spirit and an undue concentration of that responsibility which ought to be shared by a wider circle. For the same reason they refuse to occupy the time of worship with an arranged programme of vocal service; they meet in silence, desiring that the service of the meeting shall depend on spiritual guidance. Thus it is left to any man or WO rshlo. woman to offer vocal prayer, to read the Scriptures, or to utter such exhortation or teaching as may seem to be called for. Of late years, in certain of their meetings on Sunday evening, it has become customary for part of the time to be occupied with set addresses for the purpose of instructing the members of the congregation, or of conveying the Quaker message to others who may be present, all their meetings for worship being freely open to the public. In a few meetings hymns are occasionally sung, very rarely as part of any arrangement, but almost always upon the request of some individual for a particular hymn appropriate to the need of the congregation. The periods of silence are regarded as times of worship equally with those occupied with vocal service, inasmuch as Friends hold that robustness of spiritual life is best promoted by earnest striving on the part of each one to know the will of God for

himself, and to be drawn into Christian fellowship with the other worshippers. The points on which special stress is laid are: — (i) the share of responsibility resting on each individual, whether called to vocal service or not, for the right spiritual atmosphere of the Meeting, and for the welfare of the congrega- tion; (2) the privilege which may be enjoyed by each worshipper of waiting upon the Lord without relying on spoken words, however helpful, or on other outward matters; (3) freedom for each individual (whether a Friend or not) to

speak, for the help of others, such message as he or she may feel called to utter; (4) a fresh sense of a divine call to deliver the message on that particular occasion, whether previous thought has been given to it or not. The idea which ought to underlie a Friends' meeting is thus set forth by Robert Barclay: " When I came into the silent assemblies of God's people, I felt a secret power among them, which touched my heart, and as I gave way unto it, I found the evil weakening in me and the good raised up " (Apology, xi. 7). In many places Friends have felt the need of bringing spiritual help to those who are unable to profit by the somewhat severe discipline of their ordinary manner of worship. To meet this need they hold (chiefly on Sunday evenings) meetings which are not professedly " Friends' meetings for worship," but which are services conducted on lines similar to those of other religious bodies, with, in some cases, a portion of time set apart for silent worship, and freedom for any one of the congregation to utter words of exhortation or prayer.

From the beginning Friends have not practised the outward ordinances of Baptism and the Lord's Supper, even in a non-sacerdotal spirit. They attach, however, supreme value to the realities of which the observances are reminders or types — on the Baptism which is more than putting away the filth of the flesh, and on the vital union with Christ which is behind any outward ceremony. Their testimony is not primarily against these outward observances; their disuse of them is due to a sense of the danger of substituting the shadow for the reality. They believe that an experience of more than 250 years gives ample warrant for the belief that Christ did not command them as a perpetual outward ordinance; on the contrary, they hold that it was alien to His method to lay down minute, outward rules for all time, but that He enunciated principles which His Church should, under the guidance of the Holy Spirit, apply to the varying needs of the day. Their contention that every event of life may be turned into a sacrament, a means of grace, is summed up in the words of Stephen Grellet: " I very much doubt whether, since the Lord by His grace brought me into the faith of His dear Son, I have ever broken bread or drunk wine, even in the ordinary course of life, without the remembrance of, and some devout feeling regarding, the broken body and the blood- shedding of my dear Lord and Saviour."

When the ministry of any man or woman has been found to be helpful to the congregation, the Monthly Meeting (see below) Ministers mav » a f ter solemn consideration, record the fact that it believes the individual to have a divine call to the ministry, and that it encourages him or her to be faithful to the gift. Such ministers are said to be " acknowledged " or " re- corded "; they are emphatically not appointed

to preach, and the fact of their acknowledgment is not regarded as conferring any special status upon them. The various Monthly Meetings appoint Elders, or some body of Friends, to give advice of encouragement or restraint as may be needed, and, generally, to take the ministry under their care.

With regard to the ministry of women, Friends hold that there is no evidence that the gifts of prophecy and teaching are confined to one sex. On the contrary, they see that a manifest blessing has rested on women's preaching, and they regard its almost universal prohibition as a relic of the seclusion of women which was customary in the countries where Christianity took its rise. The particular prohibition of Paul (1 Cor. xiv. 34, 35) they regard as due to the special circumstances of time and place.

Friends have always held that war is contrary to the precepts and spirit of the Gospel, believing that it springs from the lower

Women.

War.

Oaths.

Theology.

impulses of human nature, and not from the seed of divine life with its infinite capacity of response to the Spirit of God. Their testimony is not based primarily on any objection to the use of force in itself, or even on the fact that war involves suffering and loss of life; their root objection is based on the fact that war is both the outcome and the cause of ambition, pride, greed, hatred and everything that is opposed to the mind of Christ; and that no end to be attained can justify the use of such means. While not unaware that with this, as with all moral questions, there may be a certain borderland of practical difficulty, Friends endeavour to bring all things to the test of the Realities which, though not seen, are eternal, and to hold up the ideal, set forth by George Fox, of living in the virtue of that life and power which takes away the occasion of war.

Friends have always held that the attempt to enforce truth- speaking by means of an oath, in courts of law and elsewhere, tends to create a double standard of truth. They find Scripture warrant for this belief in Matt. v. 33-37 and James v. 12. Their testimony in this respect is the better under- stood when we bear in mind the large amount of perjury in the law courts, and profane swearing in general which prevailed at

the time when the Society took its rise. ” People swear to the end that they may speak truth; Christ would have men speak truth to the end they might not swear ” (W. Penn, A Treatise of Oaths).

With regard to the fundamental doctrines of Christianity, the belief of the Society of Friends does not essentially differ from that of other Christian bodies. At the same time their avoidance of exact definition embodied in a rigid creed, together with their disuse of the outward ordinances of Baptism and the Supper, has laid them open to considerable misunderstanding. As will have been seen, they hold an exalted view of the divinity and work of Christ as the Word become flesh and the Saviour of the world; but they have always shrunk from rigid Trinitarian definitions. They believe that the same Spirit who gave forth the Scriptures still guides men to a right understanding of them. “You profess the Holy Scriptures: but what do you witness and experience? What interest have you in them ? Can you set to your seal that they are true by the work of the same spirit in you that gave them forth in the holy ancients?” (William Penn, A Summons or Call to Chris- tendom). At certain periods this doctrine, pushed to an extreme, has led to a practical undervaluing of the Scriptures, but of late times it has enabled Friends to face fearlessly the conclusions of modern criticism, and has contributed to a largely increased interest in Bible study. During the past few years a new move- ment has been started in the shape of lecture schools, lasting for longer or shorter periods, for the purpose of studying Biblical, ecclesiastical and social subjects. In 1903 there was established at Woodbrooke, an estate at Selly Oak on the outskirts of Birmingham, a permanent settlement for men and women, for the study of these questions on modern lines. The outward beginning of this movement was the Manchester Conference of 1895, a turning-point in Quaker history. Speaking generally, it may be noted that the Society includes various shades of opinion, from that known as ” evangelical,” with a certain hesitation in receiving modern thought, to the more ” advanced ” position which finds greater freedom to consider and adopt new suggestions of scientific, religious or other thinkers. The differences, however, are seldom pressed, and rarely become acute. Apart from points of doctrine which can be more or less definitely stated (not always with unanimity) Quakerism is an atmosphere, a manner of life, a method of approaching questions, a habit and attitude of mind.

Quakerism in Scotland. — Quakerism was preached in Scotland very soon after its rise in England; but in the north and south of Scotland there existed, independently of and before this preaching, groups of persons who were dissatisfied with the national form of worship and who met together in silence for devotion. They naturally fell into this

Society. In Aberdeen the Quakers took considerable hold, and were there joined by

some persons of influence and position, especially Alexander Jaffray, sometime provost of Aberdeen, and Colonel David Barclay of Ury and his son Robert, the author of the Apology. Much light has been thrown on the history of the Quakers in Aberdeenshire by the discovery in 1826 at Ury of a MS. Diary of Jaffray, since published with elucidations (2nd ed., London,

1836).

Ireland — The father of Quakerism in Ireland was William Edmondson; his preaching began in 1653-1654. The History of the Quakers in Ireland (from 1653 to 1752), by Wight and Rutty, may be consulted. Dublin Yearly Meeting, constituted in 1670, is independent of London Yearly Meeting (see below).

America. — In July 1656 two women Quakers, Mary Fisher and Ann Austin, arrived at Boston. Under the general law against heresy their books were burnt by the hangman, they were searched for signs of witchcraft, they were imprisoned for five weeks and then sent away. During the same year eight others were sent back to England.

In 1656, 1657 and 1658 laws were passed to prevent the introduction of Quakers into Massachusetts, and it was enacted that on the first conviction one ear should be cut off, on the second the remaining ear, and that on the third conviction the tongue should be bored with a hot iron. Fines were laid upon all who entertained these people or were present at their meetings. Thereupon the Quakers, who were perhaps not without the obstinacy of which Marcus Aurelius complained in the early Christians, rushed to Massachusetts as if invited, and the result was that the general court of the colony banished them on pain of death, and four of them, three men and one woman,were hanged for refusing to depart from the jurisdiction or for obstinately returning within it. That the Quakers were, at times, irritating cannot be denied: some of them appear to have publicly mocked the institutions and the rulers of the colony and to have interrupted public worship; and a few of their men and women acted with the fanaticism and disorder which frequently charac- terized the religious controversies of the time. The particulars of the proceedings

of Governor Endecott and the magistrates of New England as given in Besse's Sufferings of the Quakers (see below) are startling to read. On the Restoration of Charles II. a memorial was presented to him by the Quakers in England stating the persecutions which their fellow-members had under- gone in New England. Even the careless Charles was moved to issue an order to the colony which effectually stopped the hanging of the Quakers for their religion, though it by no means put an end to the persecution of the body in New England.

It is notwonderful that the Quakers, persecuted and oppressed at home and in New England, should turn their eyes to the unoccupied parts of America, and cherish the hope of founding, amidst their woods, some refuge from oppression, and some likeness of a city of God upon earth. As early as 1660 George Fox was considering the question of buying land from the Indians. ' In 1671-1673 hehad visited the American plantations from Carolina to Rhode Island and had preached alike to Indians and to settlers; in 1674 a portion of New Jersey (q.v.) was sold by Lord Berkeley to John Fenwicke in trust for Edward Byllynge. Both these men were Quakers, and in 1675 Fenwicke with a large company of his co-religionists crossed the Atlantic, sailed up Delaware Bay, and landed at a fertile spot which he called Salem. Byllynge, having become embarrassed in his circum-stances, placed his interest in the land in the hands of Penn and others as trustees for his creditors; they invited buyers, and companies of Quakers in Yorkshire and London were amongst the largest purchasers. In 1677-1678 five vessels with eight hundred emigrants, chiefly Quakers, arrived in the colony (then separated from the rest of New Jersey, under the name of West New Jersey), and the town of Burlington was established. In 1677 the fundamental laws of West New Jersey were published, and recognized in a most absolute form the principles of demo- cratic equality and perfect freedom of conscience. Notwith- standing certain troubles from claims of the governor of New York and of the duke of York, the colony prospered, and in 1681 the first legislative assembly of the colony, consisting mainly of

Quakers, was held. They agreed to raise an annual sum of £200 for the expenses of their commonwealth ; they assigned their gov- ernor a salary of £20; they prohibited the sale of ardent spirits to the Indians and imprisonment for debt. (See New Jersey.) But beyond question the most interesting event in connexion with Quakerism in America is the foundation by William Penn (q.v.) of the colony of Pennsylvania, where he hoped to carry into effect the principles of his sect — to found Penn. and govern a colony without armies or military power, to reduce the Indians by justice and kindness to civiliza- tion and

Christianity, to administer justice without oaths, and to extend an equal toleration to all persons who professed a belief in God. The history of this is part of the history of America and of Pennsylvania (q.v.) in particular. The chief point of interest in the history of Friends in America during the 18th century is their effort to clear themselves of complicity in slavery and the slave trade. As early as 1671 George Fox when in Barbados counselled kind treatment of slaves and ultimate liberation of them. William Penn provided for the freedom of slaves after fourteen years' service. In 1688 the German Friends of Germantown, Philadelphia, raised the first official protest uttered by any religious body against slavery. In 1711 a law was passed in Pennsylvania prohibiting the importation of slaves, but it was rejected by the Council in England. The prominent anti-slavery workers were Ralph Sandiford, Benjamin Lay, Anthony Benezet and John Woolman. 1 By the end of the 1 8th century slavery was practically extinct among Friends, and the Society as a whole laboured for its abolition, which came about in 1865, the poet Whittier being one of the chief writers and workers in the cause. From early times up to the present day Friends have laboured for the welfare of the North American Indians. The history of the 19th century is largely one of division. Elias Hicks (q.v.), of Long Island, N.Y., propounded doctrines inconsistent with the orthodox views concerning Christ and the Scriptures, and a separation resulted in 1827- 1828 (see above). His followers are known as " Hicksites," a name not officially used by themselves, and only assented to for purposes of description under some protest. They have their own organization, being divided into seven yearly meetings numbering about 20,000 members, but these meetings form no part of the official organization which links London Yearly Meeting with other bodies of Friends on the American continent. This separation led to strong insistence on "evangelical "views (in the usual sense of the term) concerning Christ,the Atonement, imputed righteousness, the Scriptures, &c. This showed itself in the Beaconite controversy in England (see above), and in a further division in America. John Wilbur, a minister of New England, headed a party of protest against the new evangelical- ism, laying extreme stress on the " Inward Light "; the result was a further separation of "Wilburites" or "the smaller body," who, like the " Hicksites," have a separate independent organization of their own. In 1907 they were divided into seven yearly meetings (together with some smaller independent bodies, the result of extreme emphasis laid on individualism), with a membership of about 5000. Broadly speaking, the "smaller body" is characterized by a rigid adherence to old forms of dress and speech, to a disapproval of music and art, and to an insistence on the " Inward Light " which, at times, leaves but

little room for the Scriptures or the historic Christ, although with no definite or intended repudiation of them. In 1908 the number of " orthodox " yearly meetings in America, including one in Canada, was fifteen, with a total membership of about 100,000. They have, for the most part, adopted, to a greater or less degree, the " pastoral system," i.e. the appoint- ment of one man or woman in each congregation to " conduct " the meeting for worship and to carry on pastoral work. In most cases the pastor receives a salary. A few of them demand from their ministers definite subscription to a specific body of doctrine, mostly of the ordinary " evangelical " type. In the matters of

1 Woolman 's Journal and Works are remarkable. He had a vision of a political economy based not on selfishness but on love, not on desire but on self-denial.

organization, disuse of the outward ordinances (this point is subject to some slight exception, principally in Ohio) , and women's ministry, they do not differ from English Friends. The yearly meetings of Baltimore and Philadelphia have not adopted the pastoral system; the latter contains a very strong conservative element, and, contrary to the practice of London and the other " orthodox " yearly meetings, it officially regards the meetings of " the smaller body " (see above) as meetings of the Society of Friends. In 1902 the " orthodox " yearly meetings in the United States established a " Five Years' Meeting," a representa- tive body meeting once every five years to consider matters affecting the welfare of all, and to further such philanthropic and religious work as may be undertaken in common, e.g. matters concerning foreign missions, temperance and peace, and the welfare of negroes and Indians. Two yearly meetings remain outside the organization, that of Ohio on ultra-evangelical grounds, while that of Philadelphia has not taken the matter into consideration. Canada joined at the first, and having withdrawn, again joined in 1907.

See James Bowden, History of the Society of Friends in America (1 850-1 854); Allan C. and Richard H. Thomas, The History of Friends in America (4th edition, 1905); Isaac Sharpless, History of Quaker Government in Pennsylvania (1898, 1899); R. P. Hallowell, The Quaker Invasion of Massachusetts (1887), and The Pioneer Quakers (1887).

Organization and Discipline. — The duty of watching over one

another for good was insisted on by the early Friends, and has been embodied in a system of discipline. Its objects embrace

(a) admonition to those who fail in the payment of their just debts, or otherwise walk contrary to the standard of Quaker ethics, and the exclusion of obstinate or gross offenders from the body, and, as incident to this, the hearing of appeals from individuals or meetings considering themselves aggrieved;

(b) the care and maintenance of the poor and provision for the Christian education of their children, for which purpose the Society has established boarding schools in different parts of the country; (e) the amicable settlement of ” all differences about outward things,” either by the parties in controversy or by the submission of the dispute to arbitration, and the restraint of all proceedings at law between members except by leave; (d) the ” recording ” of ministers (see above); (e) the cognizance of all steps preceding marriage according to Quaker forms; (J) the registration of births, deaths and marriages and the admission of members; (g) the issuing of certificates or letters of approval granted to ministers travelling away from their homes, or to members removing from one meeting to another; and (It) the management of the property belonging to the Society. The meetings for business further concern themselves with arrange- ments for spreading the Quaker doctrine, and for carrying out various religious, philanthropic and social activities not neces- sarily confined to the Society of Friends.

The present organization of the Quaker church is essentially democratic; every person born of Quaker parents is a member, and, together with those who have been admitted on their own Periodic request, is entitled to take part in the business assemblies mee ‘ o j any meet ; n g f w hich he or she is a member. The * Society is organized as a series of subordinated meetings

which recall to the mind the Presbyterian model. The ” Preparative Meeting ” usually consists of a single congregation; next in order comes the ” Monthly Meeting,” the executive body, usually embrac- ing several Preparative Meetings called together, as its name indi- cates, monthly (in some cases less often) ; then the ” Quarterly Meeting,” embracing several Monthly Meetings; and lastly the ” Yearly Meeting,” embracing the whole of Great Britain (but not Ireland). After several yearly or ” general ” meetings had been held in different places at irregular intervals as need arose, the first of an uninterrupted series met in 1668. From that date until 1904 it was held in London. In 1905 it met in Leeds, and in 1908 in Birmingham. Its official title is

” London Yearly Meeting.” It is the legislative body of Friends in Great Britain. It considers questions of policy, and some of its sittings are conferences for the consideration of reports on religious, philanthropic, educational and social work which is carried on. Its sessions occupy a week in May of each year. Representatives are sent from each inferior to each superior meeting, but they have no precedence over others, and all Friends may attend any meeting and take part in any of which they are members. Formerly the system was double, the men and women meeting separately for their own appointed business. Of late years the meetings have been, for the most part, held jointly, with equal

liberty for all men and women to state their opinions, and to serve on all committees and other appointments. The mode of conducting these meetings is noteworthy. A secretary or ” clerk,” as he is called, acts as chairman or president; there are no formal resolu- tions; and there is no voting or applause. The clerk ascertains what he considers to be the judgment of the assembly, and records it in a minute. The permanent standing committee of the Society is known as the ” Meeting for Sufferings ” (established in 1675), which took its rise in the days when the persecution of many Friends demanded the Christian care and material help of those who were able to give it. It is composed of representatives (men and women) sent by the quarterly meetings, and of all recorded Ministers and Elders. Its work is not confined to the interests of Friends; it is sensitive to the call of oppression and distress (e.g. a famine) in all parts of the world, it frequently raises large sums of money to alleviate the same, and intervenes, often successfully, and mostly without publicity, with- those in authority who have the power to bring about an amelioration.

The offices known to the Quaker body are: (1) that of minister (the term ” office ” is not strictly applicable, see above as to ” record- ing “) ; (2) of elder, whose duty it is ” to encourage and help young ministers, and advise others as they, in the wisdom of God, see occasion “; (3) of overseer, to whom is especially entrusted that duty of Christian care for and interest in one another which Quakers recognize as obligatory in all the members of a church. In most Monthly Meetings the care of the poor is committed to the overseers. These officers hold, from time to time, meetings separate from the general assemblies of the members, but the special organization for many years known as the Meeting of Ministers and Elders, recon- stituted in 1876 as the Meeting on Ministry and Oversight, came to an end in 1906-1907.

This present form both of organization and of discipline has been reached only by a process of development. As early as 1 652-1 654 there is evidence of some slight organization for dealing with marriages, poor relief, ” disorderly walkers,” matters of arbitration, &c. The Quarterly or ” General ” meetings of the different counties seem to have been the first unions of separate congregations. In 1666 Fox established Monthly Meetings; in 1727 elders were first appointed; in 1752 overseers were added; and in 1737 the right of children of Quakers to be considered as members was fully recognized. Concerning the 18th century in general, see above.

Of late years the stringency of the Quaker discipline has been relaxed : the peculiarities of dress and language have been abandoned; marriage with a non-member or between two non- members is noWj possible at a Quaker meeting-house; arid marriage elsewhere has ceased to involve exclusion from the body. Above all, many of its members have come to ” the conviction, which is not new, but old, that the virtues which can be rewarded and the vices which can be punished by external discipline are not as a rule the virtues and the vices that make or mar the soul ” (Hatch, Bampton Lectures, 81).

A genuine vein of philanthropy has always existed in the Quaker body. In nothing has this been more conspicuous than in the matter of slavery. George Fox and William Penn „. . laboured to secure the religious teaching of slaves. As throoic early as 1676 the assembly of Barbados passed ” An Act interests to prevent the people called Quakers from bringingˆ negroes to their meetings.” On the attitude of Friends in America to slavery, see the section ” Quakerism in America ” (above). In 1783 the first petition to the House of Commons for the abolition of the slave trade and slavery went up from the Quakers ; and in the long agitation which ensued the Society took a prominent part.

In 1798 Joseph Lancaster, himself a Friend, opened his first school for the education of the poor; and the cause of unsectarian- religious education found in the Quakers steady support. They also took an active part in Sir Samuel Romilly’s efforts to ameliorate the penal code, in prison reform, with which the name of Elizabeth Fry (a Friend) is especially connected, and in the efforts to ameliorate the condition of lunatics in England (the Friends’ Retreat at York, founded in 1792, was the earliest example in England of kindly treatment of the insane). It is noteworthy that Quaker efforts for the education of the poor and philanthropy in general, though they have always been Christian in character, have not been undertaken primarily for the purpose of bringing proselytes within the body, and have not done so

to any great extent.

By means of the Adult Schools, Friends have been able to exercise a religious influence beyond the borders of their own Society. The movement began in Birmingham in 1845, in an attempt Edaca- to help the loungers at street corners; reading and iioa writing were the chief inducements offered. The schools are unsectarian in character and mainly democratic in government : the aim is to draw out what is best in men and to induce them to act for the help of their fellows. Whilst the work is essentially religious in character, a well-equipped school also caters for the social, intellectual and physical parts of a man's nature. Bible teaching is the central part of the school session : the lessons are mainly con- cerned with life's practical problems. The spirit of brotherliness which prevails is largely the secret of the success of the movement. At the end of 1909 there were in connexion with the " National Council of Adult-School Associations " 1818 " schools " for men with

a membership of about 1 13,789 ; and 402 for women with a member- ship of about 27,000. The movement, which is no longer exclusively under the control of Friends, is rapidly becoming one of the chief means of bringing about a religious fellowship among a class which the organized churches have largely failed to reach. The effect of the work upon the Society itself may be summarized thus: some addition to membership ; the creation of a sphere of usefulness for the younger and more active members ; a general stirring of interest in social questions. 1

A strong interest in Sunday schools for children preceded the Adult School movement. The earliest schools which are still existing were formed at Bristol, for boys in 1810 and for girls in the following year. Several isolated efforts were made earlier than this ; it is evident that there was a school at Lothersdale near Skipton in 18OO " for the preservation of the youth of both sexes, and for their instruction in useful learning"; and another at Nottingham. Even earlier still were the Sunday and day schools in Rossendale, Lancashire, dating from 1793. At the end of 1909 there were in connexion with the Friends' First-Day School Association 240 schools with 2722 teachers and 25,215 scholars, very few of whom were the children of Friends. Not included in these figures are classes for children of members and " attenders," which are usually held before or during a portion of the time of the morning meeting for worship; in these distinctly denominational teaching is given. Monthly organ, Teachers and

Taught.

A ” orovisional committee ” of members of the Society of Friends was formed in 1865 to deal with offers of service in foreign lands. Forelsm l! ˆ8 this developed into the Friends’ Foreign Mission

m’ssfoas Association, which now undertakes Missionary work in India (begun 1866), Madagascar (1867), Syria (1869), China (1886), Ceylon (1896). In 1909 the number of missionaries (including wives) was 113; organized churches, 194; members and adherents, 21,085; schools, 135; pupils, 7042; hospitals and dispensaries, 17; patients treated, 6865; subscriptions raised from Friends in Great Britain and Ireland, £26,689, besides £3245 received in the fields of work. Quarterly organ, Our Missions.

Statistics of Quakerism. — At the close of 1909 there were 18,686 Quakers (the number includes children) in Great Britain; and ” associates ” and habitual ” attenders ” not in membership, 8586; number of congregations regularly meeting, 390. Ireland — members, 2528; habitual attenders not in membership, 402.

The central offices and reference library of the Society of Friends are situate at Devonshire House, Bishopsgate Without, London.

Bibliography. — The writings of the early Friends are very numerous: the most noteworthy are the Journals of George Fox and of Thomas Ellwood, both autobiographies, the Apology and other works of Robert Barclay, and the works of Penn and Penington. Early in the 1 8th century William Sewel, a Dutch Quaker, wrote a history of the Society and published an English translation ; modern (small) histories have been written by T. Edmund Harvey (The Rise of the Quakers) and by Mrs Emmott (The Story of Quakerism). The Sufferings of the Quakers by Joseph Besse (1753) gives a detailed account of the persecution of the early Friends in England and America. An excellent portraiture of early Quakerism is given in William Tanner’s Lectures on Friends in Bristol and Somersetshire. The Book of Discipline in its successive printed editions from 1783 to 1906 contains the working rules of the organization, and also a compilation of testimonies borne by the Society at different periods, to important points of Christian truth, and often called forth by the special circumstances of the time. The Inner Life of the Religious Societies of the Commonwealth (London, 1876) by Robert Barclay, a descendant of the Apologist, contains much curious information about the Quakers. See also ” Quaker ” in the index to Masson’s Life of Milton. Joseph Smith’s Descriptive Catalogue of Friends’ Books (London, 1867) gives the

information which its title promises; the same author has also published a catalogue of works hostile to Quakerism. For an exposition of Quakerism on its spiritual side many of the poems by Whittier may be referred to, also Quaker Strongholds and Light Arising by Caroline E. Stephen ; The Society of Friends, its Faith and Practice, and other works by John Stephenson Rowntree, A Dynamic Faith and other works by Rufus M. Jones; Authority and the Light Within and other works by Edw. Grubb, and the series of " Swarthmore Lectures " as well as the histories above mentioned. Much valuable information will be found in John Stephenson Rowntree: His Life and Work (1908). The history of the modern forward movement may be studied in Essays and Addresses bv John Wilhelm Rowntree, and in Present Day Papers edited by him. The social life of the 18th century and the first half of the 19th is portrayed in Records of a Quaker Family, the Richardsons of Cleveland, by Mrs Boyce, and The Diaries of Edward Pease, the Father of English Railways, edited by Sir A. E. Pease. Other works which may usefully be consulted are the Journals of John Woolman, Stephen Grellet and Elizabeth Fry; also The First Publishers of Truth, a reprint of con- temporary accounts of the rise of Quakerism in various districts. The periodicals issued (not officially) in connexion with the Quaker body are The Friend (weekly), The British Friend (monthly), The

1 See A History of the Adult School Movement by J. W. Rowntree and H. B. Binns. The organ of the movement is One and All, published monthly. See also The Adult School Year Book.

Friends' Witness, The Friendly Messenger, The Friends' Fellowship Papers, The Friends' Quarterly Examiner, Journal of the Friends' Historical Society. Officially issued : The Book of Meetings and The Friends' Year Book. See also works mentioned at the close of sections on Adult Schools and on Quakerism in America, Scotland and Ireland, and elsewhere in this article ; also Fox, George.

(A. N. B.) FRIES, ELIAS MAGNUS (1794-1878), Swedish botanist, was born at Femsjo, Smaland, on the 15th of August 1794. From his father, the pastor of the church at Femsjo, he early acquired an extensive knowledge of flowering plants. In 181 1 he entered the university of Lund, where in 18 14 he was elected docent of botany and in 1824 professor. In 1834 he became professor of practical economy at Upsala, and in 1844 and 1848 he represented the university of that city in the Rigsdag. On the death of Goran Wahlenberg (1 780-1851) he was appointed professor of botany at

Upsala, where he died on the 8th of February 1878. Fries was admitted a member of the Swedish Royal Academy in 1847, and a foreign member of the Royal Society of London in 1875.

As an author on the Cryptogamia he was in the first rank. He wrote Novitiae florae Suecicae (1814 and 1823); Observationes mycologicae (1815); Flora Hollandica (1817-1818); Systema myco- logicum (1821-1829); Systema orbis vegetabilis, not completed (1825); Elenchus fungorum (1828); Lichenographia Europaea (1831); Epicrisis systematis mycologici (1838; 2nd ed., or Hymeno- mycetes Europaei, 1874); Summa vegetabilium Scandinaviae (1846); Sveriges atliga och giftiga Svampar, with coloured plates (i860) ; Monographia hymenomycetum Suecicae (1863), with the Icones hymenomycetum, vol. i. (1867), and pt. i. vol. ii. (1877).?' i,'

FRIES, JAKOB FRIEDRICH (1773-1843), German philosopher, was born at Barby, Saxony, on the 23rd of August 1773. Having studied theology in the academy of the Moravian brethren at Niesky, and philosophy at Leipzig and Jena, he travelled for some time, and in 1806 became professor of philosophy and elementary mathematics at Heidelberg. Though the progress of his psychological thought compelled him to abandon the positive theology of the Moravians, he always retained an appreciation of its spiritual or symbolic significance. His philo- sophical position with regard to his contemporaries he had already made clear in the critical work Reinhold, Fichte und Schelling (1803; reprinted in 1824 as Polemische Schriften), and in the more systematic treatises System der Philosophic als evidente Wissenschafl (1804), Wissen, Glaube und Ahnung (1805, new ed. 1905). His most important treatise, the Neue oder anthropologische Krilik der Vernunft (2nd ed., 1828-1831), was an attempt to give a new foundation of psychological analysis to the critical theory of Kant. In 181 1 appeared his System der Logik (ed. 1819 and 1837), a very instructive work, and in 1814 Julius und Evagoras, a philosophical romance. In 1816 he was invited to Jena to fill the chair of theoretical philosophy (including mathematics and physics, and philosophy proper), and entered upon a crusade against the prevailing Romanticism. In politics he was a strong Liberal and Unionist, and did much to inspire the organization of the Burschenschaft. In 1816 he had published his views in a brochure, Vom deutschen Bund und deutscher Staatsverfassung, dedicated to ” the youth of Germany,” and his influence gave a powerful impetus to the agitation which led in 1819 to the issue of the Carlsbad Decrees by the representatives of the German governments. Karl Sand, the murderer of Kotzebue, was one of his pupils; and a letter of his, found on another student, warning the lad against par- ticipation in secret societies, was twisted by the suspicious authorities into evidence of his guilt. He was condemned by the Mainz Commission; the grand-duke of Weimar was compelled to deprive him of his professorship; and he was forbidden to lecture on philosophy. The grand-duke, however, continued to pay him his stipend, and in 1824 he was recalled to Jena as professor of mathematics and physics, receiving permission also to lecture on philosophy in his own rooms to a select number of students. Finally, in 1838, the unrestricted right of lecturing was restored to him. He died on the 10th of August 1843.

The most important of the many works written during his Jena professorate are the Handbuch der praktischen Philosophie (18 17-1832), the Handbuch der psychischen Anthropologie (1820-1821, 2nd ed. 1837-1839), Die mathematische Naturphilosophie (1822),

System der Metaphysik (1824), Die Geschichte der Philosophic (1837-1840). Fries's point of view in philosophy may be described as a modified Kantianism, an attempt to reconcile the criticism of Kant and Jacobi's philosophy of belief. With Kant he regarded Kritik, or the critical investigation of the faculty of knowledge, as the essential preliminary to philosophy. But he differed from Kant both as regards the foundation for this criticism and as regards the metaphysical results yielded by it. Kant's analysis of knowledge had disclosed the a priori element as the necessary complement of the isolated a posteriori facts of experience. But it did not seem to Fries that Kant had with sufficient accuracy examined the mode in which we arrive at knowledge of this a priori element. According to him we only know these a priori principles through inner or psychical experience; they are not then to be regarded as tran- scendental factors of all experience, but as the necessary, constant elements discovered by us in our inner experience. Accordingly Fries, like the Scotch school, places psychology or analysis of con- sciousness at the foundation of philosophy, and called his criticism of knowledge an anthropological critique. A second point in which Fries differed from Kant is the view taken as to the relation between immediate and mediate cognitions. According to Fries, the under- standing is purely the faculty of proof; it is in itself void ; immediate certitude is the only source of knowledge. Reason contains principles which we cannot demonstrate, but which can be deduced, and are the proper objects of belief. In this view of reason Fries approxi- mates to Jacobi rather than to Kant. His most original idea is the graduation of knowledge into knowing, belief and presentiment. We know phenomena, how the existence of things appears to us in nature; we believe in the true nature, the eternal essence of things (the good, the true, the beautiful) ; by means of presentiment (Ahnung) the intermediary between knowledge and belief, we recognize the supra-sensible in the sensible, the being in the pheno- menon.

See E. L. Henke, /. F. Fries (1867) ; C. Grapengiesser, /. F. Fries, ein Gedenkblatt and Kant's " Kritik der Vernunft " und deren Fort- bildung durch J. F. Fries (1882); H. Strasosky, J. F. Fries als Kritiker der Kantischen Erkenntnistheorie (1891) ; articles in Ersch and Gruber's Allgemeine Encyklopddie and Allgemeine deutsche Biographie; J. E. Erdmann, Hist, of Philos. (Eng. trans., London, 1890), vol. ii. § 305.

FRIES, JOHN (c. 1764-1825), American insurgent leader, was born in

Pennsylvania of ” Dutch ” (German) descent about 1764. As an itinerant auctioneer he became well acquainted with the Germans in the S.E. part of Pennsylvania. In July 1798, during the troubles between the United States and France, Congress levied a direct tax (on dwelling-houses, lands and slaves) of $2,000,000, of which Pennsylvania was called upon to contribute $237,000. There were very few slaves in the state, and the tax was accordingly assessed upon dwelling-houses and land, the value of the houses being determined by the number and size of the windows. The inquisitorial nature of the pro- ceedings aroused strong opposition among the Germans, and many of them refused to pay. Fries, assuming leadership, organized an armed band of about sixty men, who marched about the country intimidating the assessors and encouraging the people to resist. At last the governor called out the militia (March 1799) and the leaders were arrested. Fries and two others were twice tried for treason (the second time before Samuel Chase) and were sentenced to be hanged, but they were pardoned by President Adams in April 1800, and a general amnesty was issued on 21st May. The affair is variously known as the “Fries Rebellion,” the “Hot- Water Rebellion” — because hot water was used to drive assessors from houses — , and the ” Home Tax Rebellion.” Fries died in Philadelphia in 1825.

See T. Carpenter, Two Trials of John Fries . . . Taken in Short- hand (Philadelphia, 1800) ; the second volume of McMaster’s History of the United States (New York, 1883); and W. W. H. Davis, The Fries Rebellion (Doylestown, Pa., 1899).

FRIESLAND, or Vriesland, a province of Holland, bounded S.W., W. and N. by the Zuider Zee and the North Sea, E. by Groningen and Drente, and S.E. by Overysel. It also includes the islands of Ameland and Schiermonnikoog (see Frisian Islands). Area, 1281 sq. m.; pop. (1900) 340,262. The soil of Friesland falls naturally into three divisions consisting of sea-clay in the north and north-west, of low-fen between the south-west and north-east, and of a comparatively small area of high-fen in the south-east. The clay and low-fen furnish a luxuriant meadow-land for the principal industries of the province — cattle-rearing and cheese- and butter-making. Horse-breeding has also been practised for centuries, and the breed of black

Frisian horse is well known. On the clay lands agriculture is also extensively practised. In the high-fen district peat-digging is the chief occupation. The effect of this industry, however, is to lay bare a subsoil of diluvial sand which offers little induce ment for subsequent cultivation. Despite the general productive ness of the soil, however, the social condition of Friesland ha»’ remained in a backward state

and poverty is rife in many districts The ownership of property being largely in the hands of absentee landlords, the peasantry have little interest in the land, the profits from which go to enrich other provinces. Moreover, the nature of the fertility of the meadow-lands is such as to require little manual labour, and other industrial means oi subsistence have hardly yet come into existence. This state 0/ affairs has given rise to a social-democratic outcry on account of which Friesland is sometimes regarded as the ” Ireland oi Holland.” The water system of the province comprises a few small rivers (now largely canalized) in the high lands in the east, and the vast network of canals, waterways and lakes of the whole north and west. The principal lakes are Tjeuke Meer, Sloter Meer, De Fluessen and Sneeker Meer. The tides being lowest on the north coast of the province, the scheme of the Waterstaat, the government department (dating from 1879), provides for the largest removal of superfluous surface water into the Lau- werszee. But owing to the long distance which the water must, travel from certain parts of the province, and the continual recession of the Lauwerszee, the drainage problem is a peculiarly difficult one, and floods are sometimes inevitable.

The population of the province is evenly distributed in small villages. The principal market centres are Leeuwarden, the chief towns, Sneek, Bolsward, Franeker (qq.v.), Dokkum (4053) and Heerenveen (5011). With the exception of Franeker and Heerenveen all these towns originally arose on the inlet of the Middle Sea. The seaport towns are more or less decayed; they include Stavoren (820), Hindeloopen (1030), Workum (3428), Harlingen (q.v.) and Makkum (2456).

For history see Frisians.

FRIEZE. 1. (Through the Fr. frise, and Ital. fregio, from the. Lat. Phrygium, sc. opus, Phrygian or embroidered work), a term given in architecture to the central division of the en- tablature of an order (see Order), but also applied to any oblong horizontal feature, introduced for decorative purposes and enriched with carving. The Doric frieze had a structural origin as the triglyphs suggest vertical support. The Ionic frieze was purely decorative and probably did not exist in the earliest examples, if we may judge by the copies found in the Lycian tombs carved in the rock. There is no frieze in the Caryatide portico of the Erechtheum, but in the Ionic temples its introduc- tion may have been necessitated in consequence of more height being required in the entablature to carry the beams supporting the lacunaria over the peristyle. In the frieze of the Erechtheum the figures (about 2 ft. high) were carved in white marble and affixed by clamps to a background of black Eleusinian marble. The frieze of the Choragic monument of

Lysicrates (10 in. high) was carved with figures representing the story of Dionysus and the pirates. The most remarkable frieze ever sculptured was that on the outside of the wall of the cella of the Parthenon representing the procession of the celebrants of the Panathenaic Festival. It was 40 in. in height and 525 ft. long, being carried round the whole building under the peristyle. Nearly the whole of the western frieze exists in situ; of the remainder, about half is in the British Museum, and as much as remains is either in Athens or in other museums. In some of the Roman temples, as in the temple of Antoninus and Faustina and the temple of the Sun, the frieze is elaborately carved and in later work is made convex, to which the term ” pulvinated ” is given.

2. (Probably connected with ” frizz,” to curl; there is no historical reason to connect the word with Friesland), a thick, rough woollen cloth, of very lasting quality, and with a heavy nap, forming small tufts or curls. It is largely manufactured in Ireland.

r FRIGATE (Fr. fregate, Span, and Port, fragata; the etymology of the word is obscure; it has been derived from the Late Lat.

fabricata, and the use of the Fr. bdtiment, for a vessel as well as a building is compared; another suggestion derives the word from the Gr. athpanros, unfenced or unguarded), originally a small swift, undecked vessel, propelled by oars or sails, in use on the Mediterranean. The word is thus used of the large open boats, without guns, used for war purposes by the Portuguese in the East Indies during the 16th and 17th centuries. The French first applied the term to a particular type of ships of war during the second quarter of the 18th century. The Seven Years’ War (1756-1763) marked the definite adoption of the ” frigate ” as a standard class of vessel, coming next to ships of the line, and used for cruising and scouting purposes. They were three- masted, fully rigged, fast vessels, with the main armament carried on a single deck, and additional guns on the poop and forecastle. The number of guns varied from 24 to 50, but between 30 and 40 guns was the usual amount carried. ” Frigate” continued to be used as the name for this type of ship, even after the introduction of steam and of ironclad vessels, but the class is now represented by that known as ” cruiser.”

FRIGATE-BIRD, the name commonly given by English sailors, on

account of the swiftness of its flight, its habit of cruising about near other species and of daringly pursuing them, to a large sea-bird 1 — the Fregata aquila of most ornithologists — the Fregaite of French and the Rabihorcado of Spanish mariners. It was placed by Linnaeus in the genus Pelecanus, and its assignment to the family Pelecanidae had hardly ever been doubted till Professor St George Mivart declared {Trans. Zool. Soc. x. p. 364) that, as regards the postcranial part of its axial skeleton, he could not detect sufficiently good characters to unite it with that family in the group named by Professor J. F. Brandt Steganopodes. There seems to be no ground for disputing this decision so far as separating the genus Fregata from the Pelecanidae goes, but systematists will probably pause before they proceed to abolish the Steganopodes, and the result will most likely be that the frigate-birds will be considered to form a distinct family (Fregatidae) in that group. In one very remark- able way the osteology of Fregata differs from that of all other birds known. The furcula coalesces firmly at its symphysis with the carina of the sternum, and also with the coracoids at the upper extremity of each of its rami, the anterior end of each coracoid coalescing also with the proximal end of the scapula. Thus the only articulations in the whole sternal apparatus are where the coracoids meet the sternum, and the consequence is a bony framework which would be perfectly rigid did not the flexibility of the rami of the furcula permit a limited amount of motion. That this mechanism is closely related to the faculty which the bird possesses of soaring for a considerable time in the air with scarcely a perceptible movement of the wings can hardly be doubted.

Two species of Fregata are considered to exist, though they differ in little but size and geographical distribution. The larger, F. aquila, has a wide range all round the world within the tropics and at times passes their limits. The smaller, F. minor, appears to be confined to the eastern seas, from Madagascar to the Moluccas, and southward to Australia, being particularly abun- dant in Torres Strait, — the other species, however, being found there as well. Having a spread of wing equal to a swan's and a very small body, the buoyancy of these birds is very great. It is a beautiful sight to watch one or more of them floating overhead against the deep blue sky, the long forked tail alternately opening and shutting like a pair of scissors, and the head, which is of course kept to windward, inclined from side to side, while the wings are to all appearance fixedly extended, though the breeze may be constantly varying in strength and direction. Equally fine is the contrast afforded by these birds when engaged in fishing, or, as seems more often to happen, in robbing other birds, especially boobies, as they are fishing. Then the speed of their flight is indeed

seen to advantage, as well as the marvel-

1 ” Man-of-war-bird ” is also . ometimes applied to it, and is perhaps the older name ; but it is lest distinctive, some of the larger Albatrosses being so called, and, in books at least, has generally passed out of use.

lous suddenness with which they can change their rapid course as their victim tries to escape from their attack. Before gales frigate-birds are said often to fly low, and their appearance near or over land, except at their breeding-time, is supposed to portend a hurricane. 2 Generally seen singly or in pairs, except when the prospect of prey induces them to congregate, they breed in large companies, and O. Salvin has graphically described (76m, 1864, p. 375) one of their settlements off the coast of British Honduras, which he visited in May 1862. Here they chose the highest mangrove- trees 3 on which to build their frail nests, and seemed to prefer the leeward side. The single egg laid in each nest has a white and chalky shell very like that of a cormorant’s. The nestlings are clothed in pure white down, and so thickly as to resemble puff-balls. When fledged, the beak, head, neck and belly are white, the legs and feet bluish- white, but the body is dark above. The adult females retain the white beneath, but the adult males lose it, and in both sexes at maturity the upper plumage is of a very dark chocolate brown, nearly black, with a bright metallic gloss, while the feet in the females are pink, and black in the males— the last also acquiring a bright scarlet pouch, capable of inflation, and being perceptible when on the wing. The habits of F. minor seem wholly to resemble those of F. aquila. According to J. M. Bechstein, an example of this last species was obtained at the mouth of the Weser in January 1792. (A. N.)

FRIGG, the wife of the god Odin (Woden) in northern mytho- logy. She was known also to other Teutonic peoples both on the continent (O. H. Ger. Friia, Langobardic Fred) and in Eng- land, where her name still survives in Friday (O.E. Frigedmg). She is often wrongly identified with Freyia. (See Teutonic Peoples, ad fin.)

FRIGIDARIUM, the Latin term (from frigidus, cold) applied to the open area of the Roman thermae, in which there was generally a cold swimming bath, and sometimes to the bath (see Baths) . From the description given by Aelius Spartianus (a.d. 297) it would seem that portions of the frigidarium were covered over by a ceiling formed of interlaced bars of gilt bronze, and this statement has been to a certain extent substantiated by the discovery of many tons of T-shaped iron found in the excavations under the paving of the frigidarium of the

thermae of Caracalla. Dr J. H. Middleton in The Remains of Ancient Rome (1892) points out that in the part of the enclosure walls are deep sinkings to receive the ends of the great girders. He suggests that the panels of the lattice-work ceiling were filled in with concrete made of light pumice stone.

FRIIS, JOHAN (1494-1570), Danish statesman, was born in 1494, and was educated at Odense and at Copenhagen, completing his studies abroad. Few among the ancient Danish nobility occupy so prominent a place in Danish history as Johan Friis, who exercised a decisive influence in the government of the realm during the reign of three kings. He was one of the first of the magnates to adhere to the Reformation and its promoter King Frederick I. (1523-1533), his apostasy being so richly rewarded out of the spoils of the plundered Church that his heirs had to restore property of the value of 1,000,000 kroner. Friis succeeded Claus Gjoodsen as imperial chancellor in 1532, and held that dignity till his death. During the ensuing interregnum he powerfully contributed, at the head of the nobles of Funen and Jutland, to the election of Christian III. (1533-1559), but in the course of the " Count's War " he was taken prisoner by Count Christopher, the Catholic candidate for the throne, and forced to do him homage. Subsequently by judicious bribery he contrived to escape to Germany, and from thence rejoined Christian III. He was one of the plenipotentiaries who concluded peace with Ltibeck at the congress of Hamburg, and subsequently took an active part in the great work of national reconstruction necessitated by the Reformation, acting as mediator between the Danish and the German parties who were contesting for

2 Hence another of the names — " hurricane-bird " — by which this species is occasionally known.

3 Captain Taylor, however, found their nests as well on low bushes of the same tree in the Bay of Fonseca (Ibis, 1859, pp. 150-152).

supremacy during the earlier years of Christian III. This he was able to do, as a moderate Lutheran, whose calmness and common sense contrasted advantageously with the unbridled violence of his contemporaries. As the first chancellor of the recon- structed university of Copenhagen, Friis took the keenest interest in spiritual and scientific matters, and was the first donor of a legacy to the

institution. He also enjoyed the society of learned men, especially of ” those who could talk with him concerning ancient monuments and their history.” He encour- aged Hans Svaning to complete Saxo’s history of Denmark, and Anders Vedel to translate Saxo into Danish. His generosity to poor students was well known; but he could afford to be liberal, as his share of spoliated Church property had made him one of the wealthiest men in Denmark. Under King Frederick II. (1559-1588), who understood but little of state affairs, Friis was well-nigh omnipotent. He was largely responsible for the Scandinavian Seven Years’ War (1562-70), which did so much to exacerbate the relations between Denmark and Sweden. Friis died on the 5th of December 1570, a few days before the peace of Stettin, which put an end to the exhausting and un- necessary struggle.

FRIMLEY, an urban district in the Chertsey parliamentary division of Surrey, England, 33 m. W.S.W. from London by the London & South-Western railway, and 1 m. N. of Fam- borough in Hampshire. Pop. (1901) 8409. Its healthy climate, its position in the sandy heath-district of the west of Surrey, and its proximity to Aldershot Camp have contributed to its growth as a residential township. To the east the moorland rises in the picturesque elevation of Chobham Ridges; and 3 m. N.E. is Bagshot, another village growing into a residential town, on the heath of the same name extending into Berkshire. Bisley Camp, to which in 1890 the meetings of the National Rifle Association were removed from Wimbledon, is 4 m. E. Coniferous trees and rhododendrons are characteristic products of the soil, and large nurseries are devoted to their cultivation.

FRIMONT, JOHANN MARIA PHILIPP, Count of Palota, Prince of Antrodocco (1759-1831), Austrian general, entered the Austrian cavalry as a trooper in 1776, won his commission in the War of the Bavarian Succession, and took part in the Turkish wars and in the early campaigns against the French Revolutionary armies, in which he frequently earned distinction. At Frankenthal in 1796 he won the cross of Maria Theresa. In the campaign of 1800 he distinguished himself greatly as a cavalry leader at Marengo (14th of June), and in the next year became major-general. In the war of 1805 he was again employed in Italy and won further renown by his gallantry at the battle of Caldiero. In 1809 he again saw active service in Italy in the rank of lieutenant field marshal, and in 1812 led the cavalry of Schwarzenberg’s corps in the Russian campaign. He served in the campaigns of 1813-14 in high command, and rendered conspicuous service at Brienne-La Rothiere and at Arcis-sur- Aube. In 18 15 he was commander-in-chief of the Austrians in Italy, and his army penetrated France as far as Lyons, which was entered on the nth of July. With the

army of occupation he remained in France for some years, and in 1819 he commanded at Venice. In 182 1 he led the Austrian army which was employed against the Neapolitan rebels, and by the 24th of March he had victoriously entered Naples. His reward from King Ferdinand of Naples was the title of prince of Antrodocco and a handsome sum of money, and from his own master the rank of general of cavalry. After this he commanded in North Italy, and was called upon to deal with many outbreaks of the Italian patriots. He became president of the Aulic council in 183.1, but died a few months later.

FRISCHES HAFF, a lagoon on the Baltic coast of Germany, within the provinces East and West Prussia, between Danzig and Konigsberg. It is 52 m. in length, from 4 to 12 m. broad, 332 sq. m. in area, and is separated from the Baltic by a narrow spit or bank of land. This barrier was torn open by a storm in 1 5 10, and the channel thus formed, now dredged out to a depth of 22 ft., affords a navigable passage for vessels. Into the Haff flow the Nogat, the Elbing, the Passarge, the Pregel and the

Frisching, from the last of which the name Frisches Haff probably arose.

FRISCHLIN, PHILIPP NIKODEMUS (1547-1590), German philologist and poet, was born on the 22nd of September 1547 at Balingen in Wurttemberg, where his father was parish minister. He was educated at the university of Tubingen, where in 1568 he was promoted to the chair of poetry and history. In 1575 for his comedy of Rebecca, which he read at Regensburg before the emperor Maximilian II., he was rewarded with the laureateship, and in 1577 he was made a count palatine (comes palatinus) or Pfalzgraf. In 1582 his unguarded language and reckless life made it necessary that he should leave Tubingen, and he accepted a mastership at Laibach in Carniola, which he held for about two years. Shortly after his return to the univer- sity in 1584, he was threatened with a criminal prosecution on a charge of immoral conduct, and the threat led to his withdrawal to Frankfort-on-Main in 1587. For eighteen months he taught in the Brunswick gymnasium, and he appears also to have resided occasionally at Strassburg, Marburg and Mainz. From the last-named city he wrote certain libellous letters, which led to his being arrested in March 1 590. He was imprisoned in the fortress of Hohenurach, near Reutlingen, where, on the night of the 29th of November 1590, he was killed by a fall in attempting to let himself down from the window of his cell.

Frischlin's prolific and versatile genius produced a great variety of

works, which entitle him to some rank both among poets and among scholars. In his Latin verse he often successfully imitated the classical models; his comedies are not without freshness and vivacity; and some of his versions and commentaries, particularly those on the Ceorgics and Bucolics of Virgil, though now well-nigh forgotten, were important contributions to the scholarship of his time. There is no collected edition of his works, but his Opera poetica were published twelve times between 1535 and 1636. Among those most widely known may be mentioned the Hebraeis (1590), a Latin epic based on the Scripture history of the Jews; the Elegiaca (1601), his collected lyric poetry, in twenty-two books; the Opera scenica (1604) consisting of six comedies and two tragedies (among the former, Julius Caesar redivivus, completed 1584) ; the Gram- tnatica Latina (1585) ; the versions of Callimachus and Aristo- phanes; and the commentaries on Persius and Virgil. See the monograph of D. F. Strauss (Leben und Schriften des Dichters und Philologen Frischlin, 1856).

FRISI, PAOLO (1728-1784), Italian mathematician and astronomer, was born at Milan on the 13th of April 1728. He was educated at the Barnabite monastery and afterwards at Padua. When twenty-one years of age he composed a treatise on the figure of the earth, and the reputation which he soon acquired led to his appointment by the king of Sardinia to the professorship of philosophy in the college of Casale. His friend- ship with Radicati, a man of liberal opinions, occasioned Frisi's removal by his clerical superiors to Novara, where he was compelled to do duty as a preacher. In 1753 he was elected a corresponding member of the Paris Academy of Sciences, and shortly afterwards he became professor of philosophy in the Barnabite College of St Alexander at Milan. An acrimonious attack by a young Jesuit, about this time, upon his dissertation on the figure of the earth laid the foundation of his animosity against the Jesuits, with whose enemies, including J. d'Alembert, J. A. N. Condorcet and other Encyclopedists, he later closely associated himself. In 1756 he was appointed by Leopold, grand-duke of Tuscany, to the professorship of mathematics in the university of Pisa, a post which he held for eight years. In 1757 he became an associate of the Imperial Academy of St Petersburg, and a foreign member of the Royal Society of London, and in 1758 a member of the Academy of Berlin, in 1766 of that of Stockholm, and in 1770 of the Academies of Copenhagen and of Bern. From several European crowned heads he received, at various times, marks of special distinction, and the empress Maria Theresa granted him a yearly pension of 100 sequins (£50). In 1764 he was created professor of mathematics in the palatine schools at Milan, and obtained from Pope Pius VI. release from ecclesiastical jurisdiction,

and authority to become a secular priest. In 1766 he visited France and England, and in 1768 Vienna. In 1777 he became director of a school of architecture at Milan. His knowledge of hydraulics

caused him to be frequently consulted with respect to the management of canals and other watercourses in various parts of Europe. It was through his means that lightning-conductors were first introduced into Italy for the protection of buildings. He died on the 22nd of November 1784.

His publications include: — Disquisitio mathematica in causam physicam figurae et magnitudinis terrae (Milan, 1751) ; Saggio 'della morale filosofia (Lugano, 1753); Nova electricitatis theoria (Milan, ! 755); Dissertatio de motu diurno terrae (Pisa, 1758); Dissertaliones variae (2 vols. 4to, Lucca, 1759, 1761); Del modo di regolare i fiumi e i torrenti (Lucca, 1762); Cosmographia physica et mathematica (Milan, 1774, 1775, 2 vols. 4to, his chief work); Dell' architettura, statica e idraulica (Milan, 1777) ; and other treatises.

See Verri, Memorie . . . del signor dom Paolo Frisi (Milan, 1787), 4to; Fabbroni, " Elogj d' illustri Italiani," Atti di Milano, vol. ii.; J. C. Poggendorff, Biograph. litterar. Handwbrterbuch, vol. i.

FRISIAN ISLANDS, a chain of islands, lying from 3 to 20 m. from the mainland, and stretching from the Zuider Zee E. and N. as far as Jutland, along the coasts of Holland and Germany. They are divided into three groups: — (1) The West Frisian, (2) the East Frisian, and (3) the North Frisian.

The chain of the Frisian Islands marks the outer fringe of the former continental coast-line, and is separated from the mainland by shallows, known as Wadden or Watten, answering to the maria vadosa of the Romans. Notwithstanding the protection afforded by sand-dunes and earthen embankments backed by stones and timber, the Frisian Islands are slowly but surely crumbling away under the persistent attacks of storm and flood, and the old Frisian proverb " de nich will diken mut wihen " (" who will not build dikes must go away ") still holds good. Many of the Frisian legends and folk-songs deal with the submerged villages and hamlets, which lie buried beneath the treacherous waters of the Wadden. Heinrich Heine made use of these legends in his Nordseebilder, composed during a visit to

Norderney in 1825. The Prussian and Dutch governments annually expend large sums for the protection of the islands, and in some cases the erosion on the seaward side is counterbalanced by the accretion of land on the inner side, fine sandy beaches being formed well suited for sea-bathing, which attracts many visitors in summer. The inhabitants of these islands support themselves by seafaring, pilotage, grazing of cattle and sheep, fishing and a little agri- culture, chiefly potato-growing.

The islands, though well lighted, are dangerous to navigation, and a glance at a wreck chart will show the entire chain to be densely dotted. One of the most remarkable disasters was the loss of H.M.S. ” La Lutine,” 32 guns, which was wrecked off Vlieland in October 1799, only one hand being saved, who died before reaching England. ” La Lutine,” which had been captured from the French by Admiral Duncan, was carrying a large quantity of bullion and specie, which was underwritten at Lloyd’s. The Dutch government claimed the wreck and granted one-third of the salvage to bullion-fishers. Occasional recoveries were made of small quantities which led to repeated disputes and discussions, until eventually the king of the Nether- lands ceded to Great Britain, for Lloyd’s, half the remainder of the wreck. A Dutch salvage company, which began operations in August 1857, recovered £99,893 in the course of two years, but it was estimated that some £1,175,000 are still unaccounted for. The ship’s rudder, which was recovered in 1859, has been fashioned into a chair and a table, now in the possession of Lloyd’s.

The West Frisian Islands belong to the kingdom of the Nether- lands, and embrace Texel or Tessel (71 sq. m.), Vlieland (19 sq. m.), Terschelling (41 sq. m.), Ameland (23 sq. m.), Schiermonnikoog (1 9 sq. m.) , as well as the much smaller islands of Boschplaat and Rottum, which are practi- cally uninhabited. The northern end of Texel is called Eierland, or ” island of eggs,” in reference to the large number of sea-birds’ eggs which are found there. It was joined to Texel by a sand-dike in 1629-1630, and is now undistinguishable from the main island. Texel was already separated from the mainland in the 8th century, but remained a Frisian province and countship, which once extended as far as Alkmaar in North Holland, until it came into the possession of the counts of Holland. The island was occupied

West Frisian.

Bast Frisian.

by British troops from August to December 1799. The village of Oude

Schild has a harbour. The island of Terschelling once formed a separate lordship, but was sold to the states of Holland. The principal village of West-Terschelling has a harbour. As early as the beginning of the 9th century Ameland was a lordship of the influential family of Cammingha who held immediately of the emperor, and in recognition of their independence the Amelanders were in 1369 declared to be neutral in the fighting between Holland and Friesland, while Cromwell made the same declaration in 1654 with respect to the war between England and the United Netherlands. The castle of the Camminghas in the village of Ballum remained standing till 18 10, and finally dis- appeared in 1829 after four centuries. This island is joined to the mainland of Friesland by a stone dike constructed in 1873 for the purpose of promoting the deposit of mud. The island of Schiermonnikoog has a village and a lighthouse. Rottum was once the property of the ancient abbey at Rottum, 8 m. N. of Groningen, of which there are slight remains.

With the exception of Wangeroog, which belongs to the grand duchy of Oldenburg, the East Frisian Islands belong to Prussia. They comprise Borkum (125 sq. m.), with two light- houses and connected by steamer with Emden and Leer; Memmert; Juist (21 sq. m.), with two lifeboat stations, and connected by steamer with Norddeich and Greet- siel; Norderney (5! sq. m.); Baltrum, with a lifeboat station; Langeoog (8 sq. m.), connected by steamer with the adjacent islands, and with Bensersiel on the mainland; Spiekeroog (4 sq. m.), with a tramway for conveyance to the bathing beach, and connected by steamer with Carolinenziel ; and Wangeroog (2 sq. m.), with a lighthouse and lifeboat station. All these islands are visited for sea-bathing. In the beginning of the 1 8th century Wangeroog comprised eight times its present area. Borkum and Juist are two surviving fragments of the original island of Borkum (computed at 380 sq. m.), known to Drusus as Fabaria, and to Pliny as Burchana, which was rent asunder by the sea in 1 1 70. Neuwerk and Scharhorn, situated off the mouth of the Elbe, are islands belonging to the state of Hamburg. Neuwerk, containing some marshland protected by dikes, has two lighthouses and a lifeboat station. At low water it can be reached from Duhnen by carriage.

About the year 1250 the area of the North Frisian Islands was estimated at 1065 sq. m.; by 1850 this had diminished to only 105 sq. m. This group embraces the islands of Nord- strand (17} sq. m.), which up to 1634 formed one Frisian. larger island with the adjoining Pohnshallig and Nordstrandisch-Moor; Pellworm (16J sq. m.), protected by a circle of dikes and connected by steamer with Husum on the mainland; Amrum (ioj sq. m.); F6hr (32 sq. m.); Sylt (38 sq.

m.); Rom (16 sq. m.), with several villages, the principal of which is Kirkeby; Fano (21 sq. m.); and Heligoland (| sq. m.). With the exception of Fan6, which is Danish, all these islands belong to Prussia. In the North Frisian group there are also several smaller islands called Halligen. These rise generally only a few feet above the level of the sea, and are crowned by a single house standing on an artificial mound and protected by a surrounding dike or embankment.

Bibliography. — Staring, De Bodem van Nederland (1856); Blink, Nederland en zijne Bewoners (1892); P. H. Witkamp, Aardrijkskundig Woordenboek van Nederland (1895); P. W. J. Teding van Berkhout, De Landaanwinning op de Friesche Wadden (1869); J. de Vries and T. Focken, Ostfriesland (1881); Dr D. F. Buitenrust Hettema, Fryske Bybleteek (Utrecht, 1895); Dr Eugen Traeger, Die Halligen der Nordsee (Stuttgart, 1892); also Globus, vol. lxxviii. (1900), No. 15; P. Axelsen, in Deut. Rundschau fur Geog. u. Statistik (1898); Christian Jensen, Vom Diinenstrand der Nordsee und vom Wattenmeer (Schleswig, 1901), which contains a bibliography; Oslerloh, Wangeroog und sein Seebad (Emden, 1884); Zwickert, Fiikrer durch das Nordseebad Wangeroog (Oldenburg, 1894); Nellner, Die Nordseeinsel Spiekeroog (Emden, 1884); Tongers, Die Nordseeinsel Langeoog (2nd ed., Norden, 1892); Meier, Die Nordseeinsel Borkum (10th ed., Emden, 1894); Herquet, Die Insel Borkum, &c. (Emden, 1886) ; Scherz, Die Nordseeinsel Juist (2nd ed., Norden, 1893); von Bertouch, Vor 40 Jahren: Natur und Kultur auf der Insel Nordstrand (Weimar, 1891); W. G. Black, Heligoland and the Islands of the North Sea (Glasgow, 1888).

FRISIANS (Lat. Frisii; in Med. Lat. Frisones, Frisiones, Fresones; in their own tongue Frfca, FrSsen), a people of Teutonic (Low-German) stock, who in the first century of our era were found by the Romans in occupation of the coast lands stretching from the mouth of the Scheldt to that of the Ems. They were nearly related both by speech and blood to the Saxons and Angles, and other Low German tribes, who lived to the east of the Ems and in Holstein and Schleswig. The first historical notices of the Frisians are found in the Annals of Tacitus. They were rendered (or a portion of them) tributary by Drusus, and became socii of the Roman people. In a.d. 28 the exactions of a Roman official drove them to revolt, and their subjection was henceforth nominal. They submitted again to Cn. Domitius Corbulo in the year 47, but shortly afterwards the emperor Claudius ordered the withdrawal of all

Roman troops to the left bank of the Rhine. In 58 they attempted unsuccessfully to appropriate certain districts between the Rhine and the Yssel, and in 70 they took part in the campaign of Claudius Civilis. From this time onwards their name practically disappears. As regards their geographical position Ptolemy states that they inhabited the coast above the Bructeri as far as the Ems, while Tacitus speaks of them as adjacent to the Rhine. But there is some reason for believing that the part of Holland which lies to the west of the Zuider Zee was at first inhabited by a different people, the Canninefates, a sister tribe to the Batavi. A trace of this people is perhaps preserved in the name Kennemerland or Kinnehem, formerly applied to the same district. Possibly, therefore, Tacitus's statement holds good only for the period subsequent to the revolt of Civilis, when we hear of the Cannine- fates for the last time.

In connexion with the movements of the migration period the Frisians are hardly ever mentioned, though some of them are said to have surrendered to the Roman prince Constantius about the year 293. On the other hand we hear very frequently of Saxons in the coast regions of the Netherlands. Since the Saxons (Old Saxons) of later times were an inland people, one can hardly help suspecting either that the two nations have been confused or, what is more probable, that a considerable mixture of population, whether by conquest or otherwise, had taken place. Procopius {Goth. iv. 20) speaks of the Frisians as one of the nations which inhabited Britain in his day, but we have no evidence from other sources to bear out his statement. In Anglo-Saxon poetry mention is frequently made of a Frisian king named Finn, the son of Folcwalda, who came into conflict with a certain Hnaef, a vassal of the Danish king Healfdene, about the middle of the 5th century. Hnaef was killed, but his followers subsequently slew Finn in revenge. The incident is obscure in many respects, but it is perhaps worth noting that Hnaef's chief follower, Hengest, may quite possibly be identical with the founder of the Kentish dynasty. About the year 520 the Frisians are said to have joined the Frankish prince Theod- berht in destroying a piratical expedition which had sailed up the Rhine under Chocilaicus (Hygelac), king of the Gotar. Towards the close of the century they begin to figure much more prominently in Frankish writings. There is no doubt that by this time their territories had been greatly extended in both directions. Probably some Frisians took part with the Angles and Saxons in their sea-roving expeditions, and assisted their neighbours in their invasions and subsequent conquest of England and the Scottish lowlands.

The rise of the power of the Franks and the advance of their dominion northwards brought on a collision with the Frisians, who in the 7th

century were still in possession of the whole of the sea- coast, and apparently ruled over the greater part of modern Flanders. Under the protection of the Frankish king Dagobert (622-638), the Christian missionaries Amandus (St Amand) and Eligius (St Eloi) attempted the conversion of these Flemish Frisians, and their efforts were attended with a certain measure of success; but farther north the building of a church by Dago- bert at Trajectum (Utrecht) at once aroused the fierce hostility of the heathen tribesmen of the Zuider Zee. The ” free ” Frisians could not endure this Frankish outpost on theii borders. Utrecht

was attacked and captured, and the church destroyed. The first missionary to meet with any success among the Frisians was the Englishman Wilfrid of York, who, being driven by a storm upon the coast, was hospitably received by the king, Adgild or Adgisl, and was allowed to preach Christianity in the land. Adgild appears to have admitted the overlordship of the Frankish king, Dagobert II. (675). Under his successor, however, Radbod (Frisian Redbad), an attempt was made to extirpate Chris- tianity and to free the Frisians from the Frankish subjection. He was, however, beaten by Pippin of Heristal in the battle of Dorstadt (689), and was compelled to cede West Frisia {Frisia citerior) from the Scheldt to the Zuider Zee to the conqueror. On Pippin’s death Radbod again attacked the Franks and advanced as far as Cologne, where he defeated Charles Martel, Pippin’s natural son. Eventually, however, Charles prevailed and com- pelled the Frisians to submit. Radbod died in 719, but for some years his successors struggled against the Frankish power. A final defeat was, however, inflicted upon them by Charles Martel in 734, which secured the supremacy of the Franks in the north, though it was not until the days of Charles the Great (785) that the subjection of the Frisians was completed. Meanwhile Christianity had been making its conquests in the land, mainly through the lifelong labours and preaching of the Englishman Willibrord, who came to Frisia in 692 and made Utrecht his headquarters. He was consecrated (695) at Rome archbishop of the Frisians, and on his return founded a number of bishoprics in the northern Netherlands, and continued his labours un- remittingly until his death in 739. It is an interesting fact that both Wilfrid and Willibrord appear to have found no difficulty from the first in preaching to the Frisians in their native dialect, which was so nearly allied to their own Anglo-Saxon tongue. The see of Utrecht founded by Willibrord has remained the chief see of the Northern Netherlands from his day to our own. Fries- land was likewise the scene of a portion of the missionary labours of a greater than Willibrord, the famous Boniface, the Apostle of the Germans, also an Englishman. It

was at Dokkum in Friesland that he met a martyr's death (754).

Charles the Great granted the Frisians important privileges under a code known as the Lex Frisionum, based upon the ancient laws of the country. They received the title of freemen and were allowed to choose their own podestat or imperial governor. In the Lex Frisionum three districts are clearly distinguished: West Frisia from the Zwin to the Flie; Middle Frisia from the Flie to the Lauwers; East Frisia from the Lauwers to the Weser. At the partition treaty of Verdun (843) Frisia became part of Lotharingia or Lorraine; at the treaty of Mersen (870) it was divided between the kingdoms of the East Franks (Austrasia) and the West Franks (Westrasia); in 880 the whole country was united to Austrasia; in 911 it fell under the dominion of Charles the Simple, king of the West Franks, but the districts of East Frisia asserted their independence and for a long time governed themselves after a very simple demo- cratic fashion. The history of West Frisia gradually loses itself in that of the countship of Holland and the see of Utrecht (see Holland and Utrecht).

The influence of the Frisians during the interval between the invasion of Britain and the loss of their independence must have been greater than is generally recognized. They were a sea- faring people and engaged largely in trade, especially perhaps the slave trade, their chief emporium being Wyk te Duurstede. During the period in question there is considerable archaeo- logical evidence for intercourse between the west coast of Norway and the regions south of the North Sea, and it is worth noting that this seems to have come to an end early in the 9th century. Probably it is no mere accident that the first appearance, or rather reappearance, of Scandinavian pirates in the west took place shortly after the overthrow of the Frisians. Since Radbod's dominions extended from Duerstede to Heligoland his power must have been by no means inconsiderable.

Besides the Frisians discussed above there is a people called North Frisians, who inhabit the west coast of Schleswig. At present a Frisian dialect is spoken only between Tondern and

Husum, but formerly it extended farther both to the north and south. In historical times these North Frisians were subjects of the Danish kingdom and not connected in any way with the Frisians of the empire. They are first mentioned by Saxo Grammaticus in connexion

with the exile of Knud V. Saxo recognized that they were of Frisian origin, but did not know when they had first settled in this region. Various opinions are still held with regard to the question; but it seems not unlikely that the original settlers were Frisians who had been expelled by the Franks in the 8th century. Whether the North Frisian language is entirely of Frisian origin is somewhat doubtful owing to the close relationship which Frisian bears to English. The inhabitants of the neighbouring islands, Sylt, Amrum and Fohr, who speak a kindred dialect, have apparently never regarded themselves as Frisians, and it is the view of many scholars that they are the direct descendants of the ancient Saxons.

In 1 248 William of Holland, having become emperor, restored to the Frisians in his countship their ancient liberties in reward for the assistance they had rendered him in the siege of Aachen; but in 1254 they revolted, and William lost his life in the contest which ensued. After many struggles West Friesland became completely subdued, and was henceforth virtually absorbed in the county of Holland. But the Frieslanders east of the Zuider Zee obstinately resisted repeated attempts to bring them into subjection. In the course of the 14th century the country was in a state of anarchy; petty lordships sprang into existence, the interests of the common weal were forgotten or disregarded, and the people began to be split up into factions, and these were continually carrying on petty warfare with one another. Thus the Fetkoopers (Fatmongers) of Oostergoo had endless feuds with the Schieringers (Eelfishers) of Westergoo.

This state of affairs favoured the attempts of the counts of Holland to push their conquests eastward, but the main body of the Frisians was still independent when the countship of Holland passed into the hands of Philip the Good of Burgundy. Philip laid claim to the whole country, but the people appealed to the protection of the empire, and Frederick III., in August 1457, recognized their direct dependence on the empire and called on Philip to bring forward formal proof of his rights. Philip's successor, Charles the Bold, summoned an assembly of notables at Enkhuizen in 1469, in order to secure their homage; but the conference was without result, and the duke's attention was soon absorbed by other and more important affairs. The marriage of Maximilian of Austria with the heiress of Burgundy was to be productive of a change in the fortunes of that part of Frisia which lies between the Vlie and the Lauwers. In 1498 Maxi- milian reversed the policy of his father Frederick III., and detached' this territory, known afterwards as the province of Friesland, from the empire. He gave it as a fief to Albert of Saxony, who thoroughly crushed out all resistance. In 1523 it fell with all the rest of the provinces of the Netherlands

under the strong rule of the emperor Charles, the grandson of Maximilian and Mary of Burgundy.

That part of Frisia which lies to the east of the Lauwers had a divided history. The portion which lies between the Lauwers and the Ems after some struggles for independence had, like the rest of the country, to submit itself to Charles. It became ultimately the province of the town and district of Groningen (Stadt en Landen) (see Groningen). The easternmost part between the Ems and the Weser, which had since 1454 been a county, was ruled by the descendants of Edzard Cirksena, and was attached to the empire. The last of the Cirksenas, Count Charles Edward, died in 1744 and in default of heirs male the king of Prussia took possession of the county.

The province of Friesland was one of the seven provinces which by the treaty known as the Union of Utrecht bound themselves together to resist the tyranny of Spain. From 1579 to 1795 Friesland remained one of the constituent parts of the republic of the United Provinces, but it always jealously insisted on its sovereign rights, especially against the encroachments of the predominant province of Holland. It maintained throughout the whole of the republican period a certain distinctiveness of

nationality, which was marked by the preservation of a different dialect and of a separate stadtholder. Count William Lewis of Nassau-Siegen, nephew and son-in-law of William the Silent, was chosen stadtholder, and through all the vicissitudes of the 17 th and 1 8th centuries the stadtholdership was held by one of his descendants. Frederick Henry of Orange was stadtholder of six provinces, but not of Friesland, and even during the stadt- holderless periods which followed the deaths of William II. and William III. of Orange the Frisians remained stanch to the family of Nassau-Siegen. Finally, by the revolution of 1748, William of Nassau-Siegen, stadtholder of Friesland (who, by default of heirs male of the elder line, had become William IV., prince of Orange), was made hereditary stadtholder of all the provinces. His grandson in 1815 took the title of William I., king of the Netherlands. The male line of the ” Frisian ” Nassaus came to an end with the death of Kine William III. in

1890.

Bibliography — See Tacitus, Ann. iv. 72 f., xi. 19 f., xiii. 54; Hist. iv. 15 f. ; Germ. 34; Ptolemy, Geogr. li. 11, § 11; Dio Cassius liv. 32; Eumenius, Paneg. iv. 9; the Anglo-Saxon poems, Finn, Beowulf and Widsith; Fredegarii Chronici continuatio and various German Annals;

Gesta regum Francorum; Eddius, Vita Wilfridi, cap. 25 f. ; Bede, Hist. Eccles. iv. 22, v. 9 f. ; Alcuin, Vita Wille- brordi; I. Undset, Aarbger for nordisk Oldkyndighed (1880), p. 89 ff. (cf. E. Mogk in Paul's Grundriss d. germ. Philologie ii. p. 623 ff.); Ubbo Emmius, Rerum Frisicarum historia (Leiden, 1616) ; Pirius Winsemius, Chronique van Vriesland (Franoker, 1822); C. Scotanus, Beschryvinge end Ckronyck van des Heerlichheydt van Frieslandt (1655) ; Groot Placaat en Charter-boek van Friesland (ed. Baron C. F. zu Schwarzenberg) (5 vols., Leeuwarden, 1768-1793) ; T. D. Wiarda, Ost-frieschische Gesch. (vols, i.-ix., Aurich, 1791) (vol. x., Bremen, 1817); J. Dirks, Geschiedkundig onderzoek van den Koophandel der Friezen (Utrecht, 1846); O. Klopp, Gesch. Ostfrieslands (3 vols., Hanover, 1 854-1 858); Hooft van Iddekinge, Friesland en de Friezen in de Middeleemven (Leiden, 1881); A. Telting, Het Oud- friesche Stadrecht (The Hague, 1882); P.J. Blok, Friesland im Mittelalter (Leer, 1891).

FRITH (or Fryth), JOHN (c. 1503-1533), English Reformer and Protestant martyr, was born at Westerham, Kent. He was educated at Eton and King's College, Cambridge, where Gardiner, afterwards bishop of Winchester, was his tutor. At the invita- tion of Cardinal Wolsey, after taking his degree he migrated (December 1525) to the newly founded college of St Frideswide or Cardinal College (now Christ Church) , Oxford. The sympa- thetic interest which he showed in the Reformation movement in Germany caused him to be suspected as a heretic, and led to his imprisonment for some months. Subsequently he appears to have resided chiefly at the newly founded Protestant university of Marburg, where he became acquainted with several scholars and reformers of note, especially Patrick Hamilton (q.v.). Frith's first publication was a translation of Hamilton's Places, made shortly after the martyrdom of its author; and soon afterwards the Revelation of Antichrist, a translation from the German, appeared, along with A Pistle to the Christen Reader, by " Richard Brightwell " (supposed to be Frith), and An Antithesis wherein are compared togeder Christes Actes and our Holye Father the Popes, dated " at Malborow in the lande of Hesse," 12th July 1529. His Disputacyon of Purgatorye, a treatise in three books, against Rastell, Sir T. More and Fisher (bishop of Rochester) respectively, was published at the same place in 1531. While at Marburg, Frith also assisted Tyndale, whose acquaintance he had made at Oxford (or perhaps in London) in his literary labours. In 1532 he ventured back to England, apparently on some business in connexion with the prior of Reading. Warrants for his arrest were almost imme- diately issued at the instance of SirT. More, then lord chancellor. Frith ultimately fell into the hands of the authorities at Milton Shore in Essex, as he was on the point of making

his escape to Flanders. The rigour of his imprisonment in the Tower was somewhat abated when Sir T. Audley succeeded to the chancellorship, and it was understood that both Cromwell and Cranmer were disposed to show great leniency. But the treacherous circulation of a manuscript ” lytle treatise ” on the sacraments, which Frith had written for the information of a friend, and without any view to publication, served further to excite the

hostility of his enemies. In consequence of a sermon preached before him against the ” sacramentaries,” the king ordered that Frith should be examined; he was afterwards tried and found guilty of having denied, with regard to the doctrines of purgatory and of transubstantiation, that they were necessary articles of faith. On the 23rd of June 1533 he was handed over to the secular arm, and at Smithfield on the 4th of July following he was burnt at the stake. During his captivity he wrote, besides several letters of interest, a reply to More’s letter against Frith’s ” lytle treatise”; also two tracts entitled A Mirror or Glass to know thyself, and A Mirror or Looking-glass wherein you may behold the Sacrament of Baptism.

Frith is an interesting and so far important figure in English ecclesiastical history as having been the first to maintain and defend that doctrine regarding the sacrament of Christ’s body and blood, which ultimately came to be incorporated in the English communion office. Twenty-three years after Frith’s death as a martyr to the doctrine of that office, that ” Christ’s natural body and blood are in Heaven, not here,” Cranmer, who had been one of his judges, went to the stake for the same belief. Within three years more, it had become the publicly professed faith of the entire English nation.

See A. a Wood, Athenae Oxonienses (ed. P. Bliss, 1813), I. p. 74; John Foxe, Acts and Monuments (ed. G. Townshend, 1843-1849), v. pp. 1-16 (also Index); G. Burnet, Hist, of the Reformation of the Church of England (ed. N. Pocock, 1865), i. p. 273; L. Richmond, The Fathers of the English Church, i. (1807) ; Life and Martyrdom of John Frith (London, 1824), published by the Church of England Tract Society ; Deborah Alcock, Six Heroic Men (1906).

FRITH, WILLIAM POWELL (1819-1909), English painter, was born at Aldfield, in Yorkshire, on the 9th of January 1819. His parents moved in 1826 to Harrogate, where his father became landlord of the Dragon

Inn, and it was then that the boy began his general education at a school at Knaresborough. Later he went for about two years to a school at St Margaret's, near Dover, where he was placed specially under the direction of the drawing-master, as a step towards his preparation for the pro- fession which his father had decided on as the one that he wished him to adopt. In 1835 he was entered as a student in the well- known art school kept by Henry Sass in Bloomsbury, from which he passed after two years to the Royal Academy schools. His first independent experience was gained in 1839, when he went about for some months in Lincolnshire executing several com- missions for portraits; but he soon began to attempt composi- tions, and in 1840 his first picture, " Malvolio, cross-gartered before the Countess Olivia," appeared at the Royal Academy. During the next few years he produced several notable paintings, among them " Squire Thornhill relating his town adventures to the Vicar's family," and " The Village Pastor," which established his reputation as one of the most promising of the younger men of that time. This last work was exhibited in 1845, and in the autumn of that year he was elected an Associate of the Royal Academy. His promotion to the rank of Academician followed in 1853, when he was chosen to fill the vacancy caused by Turner's death. The chief pictures painted by him during his tenure of Associateship were: " An English Merry-making in the Olden Time," " Old Woman accused of Witchcraft," " The Coming of Age," " Sancho and Don Quixote," " Hogarth before the Governor of Calais," and the "Scene from Goldsmith's ' Good-natured Man,' " which was commissioned in 1850 by Mr Sheepshanks, and bequeathed by him to the South Kensington Museum. Then came a succession of large compositions which gained for the artist an extraordinary popularity. " Life at the Seaside," better known as " Ramsgate Sands," was exhibited in 1854, and was bought by Queen Victoria; " The Derby Day," in 1858; "Claude Duval," in i860; "The Railway Station," in 1862; " The Marriage of the Prince of Wales," painted for Queen Victoria, in 1865; "The Last Sunday of Charles II.," in 1867; "The Salon d'Or," in 1871; "The Road to Ruin," a series, in 1878; a similar series, "The Race for Wealth," shown at a gallery in King Street, St James's, in 1880; " The Private View," in 1883; and " John Knox at Holyrood," in

1886. Frith also painted a considerable number of portraits of well-known people. In 1889 he became an honorary retired academician. His " Derby Day " is in the National Gallery of British Art. In his youth, in common with the men by whom he was surrounded, he had leanings towards romance, and he scored many successes as a painter of imaginative subjects. In these he proved himself to be possessed of

exceptional qualities as a colourist and manipulator, qualities that promised to earn for him a secure place among the best executants of the British School. But in his middle period he chose a fresh direction. Fascinated by the welcome which the public gave to his first attempts to illustrate the life of his own times, he undertook a considerable series of large canvases, in which he commented on the manners and morals of society as he found it. He became a pictorial preacher, a painter who moralized about the everyday incidents of modern existence; and he sacrificed some of his technical variety. There remained, however, a remarkable sense of characterization, and an acute appreciation of dramatic effect. Frith died on the 2nd of November 1909.

Frith published his Autobiography and Reminiscences in 1887, and Further Reminiscences in 1889.

FRITILLARY (Fritillaria: from Lat. fritillus, a chess-board, so called from the chequered markings on the petals), a genus of hardy bulbous plants of the natural order Liliaceae, containing about 50 species widely distributed in the northern hemisphere. The genus is represented in Britain by the fritillary or snake's head, which occurs in moist meadows in the southern half of England, especially in Oxfordshire. A much larger plant is the crown imperial (F. imperialis), a native of western Asia and well known in gardens. This grows to a height of about 3 ft., the lower part of the stoutish stem being furnished with leaves, while near the top is developed a crown of large pendant flowers surmounted by a tuft of bright green leaves like those of the lower part of the stem, only smaller. The flowers are bell-shaped, yellow or red, and in some of the forms double. The plant grows freely in good garden soil, preferring a deep well- drained loam, and is all the better for a top-dressing of manure as it approaches the flowering stage. Strong clumps of five or six roots of one kind have a very fine effect. It is a very suitable subject for the back row in mixed flower borders, or for recesses in the front part of shrubbery borders. It flowers in April or early in May. There are a few named varieties, but the most generally grown are the single and double yellow, and the single and double red,the single red having also two variegated varieties, with the leaves striped respectively with white and yellow.

" Fritillary " is also the name of a kind of butterfly.

FRITZLAR, a town of Germany, in the Prussian province of Hesse-Cassel, on the left bank of the Eder, 16 m. S.W. from Cassel, on the railway Wabern-Wildungen. Pop. (1905) 3448. It is a prettily situated old-fashioned place,with an Evangelical and two Roman Catholic

churches, one of the latter, that of St Peter, a striking medieval edifice. As early as 73 2 Boniface, the apostle of Germany, established the church of St Peter and a small Benedictine monastery at Frideslar, ” the quiet home ” or ” abode of peace.” Before long the school connected with the monastery became famous, and among its earlier scholars it numbered Sturm, abbot of Fulda, and Megingod, second bishop of Wtirzburg. When Boniface found himself unable to continue the supervision of the society himself, he entrusted the office to Wigbert of Glastonbury, who thus became the first abbot of Fritzlar. In 774 the little settlement was taken and burnt by the Saxons; but it evidently soon recovered from the blow. For a short time after 786 it was the seat of the bishopric of Buraburg, which had been founded by Boniface in 741. At the diet of Fritzlar in 919 Henry I. was elected German king. In the beginning of the 13th century the village received municipal rights; in 1232 it was captured and burned by the landgrave Conrad of Thuringia and his allies; in 1631 it was taken by William of Hesse; in 1760 it was successfully defended by General Luckner against the French; and in 176 1 it was occupied by the French and unsuccessfully bombarded by the Allies. As a principality Fritzlar continued subject to the archbishopric

of Mainz till 1802, when it was incorporated with Hesse. From 1807 to 1814 it belonged to the kingdom of Westphalia; and in 1866 passed with Hesse Cassel to Prussia.

FRIULI (in the local dialect, Furlanei), a district at the head of the Adriatic Sea, at present divided between Italy and Austria, the Italian portion being included in the province of Udine and the district of Portogruaro, and the Austrian comprising the province of Gorz and Gradiska, and the so-called Idrian district. In the north and east Friuli includes portions of the Julian and Carnic Alps, while the south is an alluvial plain richly watered by the Isonzo, the Tagliamento, and many lesser streams which, although of small volume during the dry season, come down in enormous floods after rain or thaw. The inhabitants, known as Furlanians, are mainly Italians, but they speak a dialect of their own which contains Celtic elements. The area of the country is about 3300 sq. m.; it contains about 700,000 in- habitants.

Friuli derives its name from the Roman town of Forum Julii, or Forojulium, the modern Cividale, which is said by Paulus Diaconus to have been founded by Julius Caesar. In the 2nd century B.C. the

district was subjugated by the Romans, and became part of Gallia Transpadana. During the Roman period, besides Forum Julii, its principal towns were Concordia, Aquileia and Vedinium. On the conquest of the country by the Lombards during the 6th century it was made one of their thirty-six duchies, the capital being Forum Julii or, as they called it, Civitas Austriae. It is needless to repeat the list of dukes of the Lombard line, from Gisulf (d. 611) to Hrothgaud, who fell a victim to his opposition to Charlemagne about 776; their names and exploits may be read in the Historia Lango- bardorum of Paulus Diaconus, and they were mainly occupied in struggles with the Avars and other barbarian peoples, and in resisting the pretensions of the Lombard kings. The discovery, however, of Gisulf's grave at Cividale, in 1874, is an interest- ing proof of the historian's authenticity. Charlemagne filled Hrothgaud's place with one of his own followers, and the frontier position of Friuli gave the new line of counts, dukes or margraves (for they are variously designated) the opportunity of acquiring importance by exploits against the Bulgarians, Slovenians and other hostile peoples to the east. After the death of Charle- magne Friuli shared in general in the fortunes of northern Italy. In the nth century the ducal rights over the greater part of Friuli were bestowed by the emperor Henry IV. on the patriarch of Aquileia; but towards the close of the 14th century the nobles called in the assistance of Venice, which, after defeating the archbishop, afforded a new illustration of Aesop's well-known fable, by securing possession of the country for itself. The eastern part of Friuli was held by the counts of Gorz till 1500, when on the failure of their line it was appropriated by the German king, Maximilian I., and remained in the possession of the house of Austria until the Napoleonic wars. By the peace of Campo Formio in 1797 the Venetian district also came to Austria, and on the formation of the Napoleonic kingdom of Italy in 1805 the department of Passariano was made to include the whole of Venetian and part of Austrian Friuli, and in 1809 the rest was added to the Illyrian provinces. The title of duke of Friuli was borne by Marshal Duroc. In 181 5 the whole country was recovered by the emperor of Austria, who himself assumed the ducal title and coat of arms; and it was not till 1866 that the Venetian portion was again ceded to Italy by the peace of Prague. The capital of the country is Udine, and its arms are a crowned eagle on a field azure.

See Manzano, Annali del Friuli (Udine, 1858-1879); and Com- pendia di storia friulana (Udine, 1876); Antonihi, II Friuli orientale (Milan, 1865); von Zahn, Friaulische Studien (Vienna, 1878); Pirona, Vocabolario friulino (Venice, 1869); and L. Fracaseetti, La Statistica etnografica del Friuli (Udine, 1903). (T. As.)

FROBEN [Frobenius], JOANNES (c. 1460-1527), German printer and scholar, was born at Hammelburg in Bavaria about the year 1460. After completing his university career at Basel, where he made the acquaintance of the famous printer Johannes Auerbach (1443-1513), he established a printing house in that city about 1491, and this soon attained a European

reputation for accuracy and for taste. In 1500 he married the daughter of the bookseller Wolfgang Lachner, who entered into partnership with him. He was on terms of friendship with Erasmus (q.v.), who not only had his own works printed by him, but superintended Frobenius's editions of St Jerome, St Cyprian, Tertullian, Hilary of Poitiers and St Ambrose. His Neues Testament in Greek (15 16) was used by Luther for his translation. Frobenius employed Hans Holbein to illuminate his texts. It was part of his plan to print editions of the Greek Fathers. He did not, however, live to carry out this project, but it was very creditably executed by his son Jerome and his son-in law Nikolaus Episcopius. Frobenius died in October 1527. His work in Basel made that city in the 16th century the leading centre of the German book trade. An extant letter of Erasmus, written in the year of Frobenius's death, gives an epitome of his life and an estimate of his character; and in it Erasmus mentions that his grief for the death of his friend was far more poignant than that which he had felt for the loss of his own brother, adding that " all the apostles of science ought to wear mourning." The epistle concludes with an epitaph in Greek and Latin.

FROBISHER, SIR MARTIN (c. 153 5-1 594), English navigator and explorer, fourth child of Bernard Frobisher of Altofts in the parish of Normanton, Yorkshire,was born some time between 1530 and 1540. The family came originally from North Wales. At an early age he was sent to a school in London and placed under the care of a kinsman, Sir John York, who in 1544 placed him on board a ship belonging to a small fleet of merchantmen sailing to Guinea. By 1565 he is referred to as Captain Martin Frobisher, and in 1571-1572 as being in the public service at sea off the coast of Ireland. He married in 1559. As early as 1560 or 1 561 Frobisher had formed a resolution to undertake a voyage in search of a North- West Passage to Cathay and India. The discovery of such a route was the motive of most of the Arctic voyages undertaken at that period and for long after, but Frobisher's special merit was in being the first to give to this enterprise a national character. For fifteen years he solicited in vain the necessary means to carry his project into execution, but in 1576, mainly by help of the earl of Warwick, he was put in command of an expedition consisting of two tiny barks, the " Gabriel " and " Michael," of about 20 to 25 tons each, and a pinnace of 10 tons, with an aggregate crew of 35.

He weighed anchor at Blackwall, and, after having received a good word from Queen Elizabeth at Greenwich, set sail on the 7th of June, by way of the Shetland Islands. Stormy weather was encountered in which the pinnace was lost, and some time afterwards the ” Michael ” deserted; but stoutly continuing the voyage alone, on the 28th of July the ” Gabriel ” sighted the coast of Labrador in lat. 62° 2′ N. Some days later the mouth of Frobisher Bay was reached, and a farther advance northwards being prevented by ice and contrary winds, Frobisher determined to sail westward up this passage (which he conceived to be a strait) to see ” whether he mighte carrie himself through the same into some open sea on the backe syde.” Butcher’s Island was reached on the 18th of August, and some natives being met with here, intercourse was carried on with them for some days, the result being that five of Frobisher’s men were decoyed and captured, and never more seen. After vainly trying to get back his men, Frobisher turned homewards, and reached London on the 9th of October.

Among the things which had been hastily brought away by the men was some ” black earth,” and just as it seemed as if nothing more was to come of this expedition, it was noised abroad that the apparently valueless ” black earth ” was really a lump of gold ore. It is difficult to say how this rumour arose, and whether there was any truth in it, or whether Frobisher was a party to a deception, in order to obtain means to carry out the great « idea of his life. The story, at any rate, was so far successful; the greatest enthusiasm was manifested by the court and the commercial and speculating world of the time; and next year a much more important expedition than the former was fitted out, the queen

lending the ” Aid ” from the royal navy and subscribing £1000 towards the expenses of the expedition. A Company of Cathay was established, with a charter from the crown, giving the company the sole right of sailing in every direction but the east ; Frobisher was appointed high admiral of all lands and waters that might be discovered by him. On the 26th of May 1577 the expedition, consisting, besides the “Aid,” of the ships ” Gabriel ” and ” Michael,” with boats, pinnaces and an aggregate com- plement of 120 men, including miners, refiners, &c, left Black- wall, and sailing by the north of Scotland reached Hall’s Island at the mouth of Frobisher Bay on the 17th of July. A few days later the country and the south side of

the bay was solemnly taken possession of in the queen's name. Several weeks were now spent in collecting ore, but very little was done in the way of discovery, Frobisher being specially directed by his commission to " defer the further discovery of the passage until another time." There was much parleying and some skirmishing with the natives, and earnest but futile attempts made to recover the men captured the previous year. The return was begun on the 23rd of August, and the " Aid " reached Milford Haven on the 23rd of September; the " Gabriel " and " Michael," having separated, arrived later at Bristol and Yarmouth.

Frobisher was received and thanked by the queen at Windsor. Great preparations were made and considerable expense incurred for the assaying of the great quantity of " ore " (about 200 tons) brought home. This took up much time, and led to considerable dispute among the various parties interested. Meantime the faith of the queen and others remained strong in the productive- ness of the newly discovered territory, which she herself named Meta Incognita, and it was resolved to send out a larger expedi- tion than ever, with all necessaries for the establishment of a colony of 100 men. Frobisher was again received by the queen at Greenwich, and her Majesty threw a fine chain of gold around his neck. On the 31st of May 1578 the expedition, consisting in all of fifteen vessels, left Harwich, and sailing by the English Channel on the 20th of June reached the south of Greenland, where Frobisher and some of his men managed to land. On the 2nd of July the foreland of Frobisher Bay was sighted, but stormy weather and dangerous ice prevented the rendezvous from being gained, and, besides causing the wreck of the barque " Dennis " of 100 tons, drove the fleet unwittingly up a new (Hudson) strait. After proceeding about 60 m. up this " mistaken strait," Frobisher with apparent reluctance turned back, and after many buffetings and separations the fleet at last came to anchor in Frobisher Bay. Some attempt was made at founding a settlement, and a large quantity of ore was shipped; but, as might be expected, there was much dissension and not a little discontent among so heterogeneous a company, and on the last day of August the fleet set out on its return to England, which was reached in the beginning of October. Thus ended what was little better than a fiasco, though Frobisher himself cannot be held to blame for the result; the scheme was altogether chim- erical, and the " ore " seems to have been not worth smelting.

In 1580 Frobisher was employed as captain of one of the queen's ships in preventing the designs of Spain to assist the Irish insurgents, and in the same year obtained a grant of the reversionary title of clerk of the royal navy. In 1585 he com- manded the " Primrose," as vice-admiral

to Sir F. Drake in his expedition to the West Indies, and when soon afterwards the country was threatened with invasion by the Spanish Armada, Frobisher's name was one of four mentioned by the lord high admiral in a letter to the queen of " men of the greatest ex- perience that this realm hath," and for his signal services in the " Triumph," in the dispersion of the Armada, he was knighted. He continued to cruise about in the Channel until 1590, when he was sent in command of a small fleet to the coast of Spain. In 1 50 1 he visited his native Altofts, and there married his second wife, a daughter of Lord Went worth, becoming at the same time a landed proprietor in Yorkshire and Notts. He found, how- ever, little leisure for a country life, and the following year took charge of the fleet fitted out by Sir Walter Raleigh to the Spanish coast, returning with a rich prize. In November 1594 he was

engaged with a squadron in the siege and relief of Brest, when he received a wound at Fort Crozon from which he died at Plymouth on the 22nd of November. His body was taken to London and buried at St Giles', Cripplegate. Though he appears to have been somewhat rough in his bearing, and too strict a disciplinarian to be much loved, Frobisher was undoubtedly one of the most able seamen of his time and justly takes rank among England's great naval heroes.

See Hakluyt's Voyages; the Hakluyt Society's Three Voyages of Frobisher; Rev. F. Jones's Life of Frobisher (1878); Julian Corbett, Drake and the Tudor Navy (1898).

FROCK, originally a long, loose gown with broad sleeves, more especially that worn by members of the religious orders. The word is derived from the O. Fr.froc, of somewhat obscure origin; in medieval Lat. froccus appears also zsfloccus, which, if it is the original, as Du Cange suggests (litertda mutata), would connect the word with " flock " (q.v.), properly a tuft of wool. Another suggestion refers the word to the German Rock, a coat (cf. " rochet "), which in some rare instances is found as hrock. The formal stripping off of the frock became part of the ceremony of degradation or deprivation in the case of a condemned monk; hence the expression " to unfrock " (med. Lat. defrocare, Fr. difroquer) used of the degradation of monks and of priests from holy orders. In the middle ages " frock "was also used of a long loose coat worn by men and of a coat of mail, the " frock of mail." In something of this sense the word survived into the 19th century for a coat with long skirts, now called the " frock coat." The word in now chiefly used in English for a child's or young girl's dress, of body and skirt, but is frequently used of a woman's dress. Du Cange {Glossarium, s.v. flocus) quotes an early use of the word for a woman's garment (Miracula S. Udalrici, ap. Mabillon, Acta Sanctorum

Benedict, saec. v. p. 466). Here a woman, possessed of a devil, is cured, and sends her garments to the tomb of the saint, and a dalmatic is ordered to be made out of the flocus or frocus. ” Frock ” also appears in the ” smock frock,” once the typical outer garment of the English peasant. It consists of a loose shirt of linen or other material, worn over the other clothes and hanging to about the knee; its character- istic feature is the ” smocking,” a puckered honeycomb stitching round the neck and shoulders.

FROEBEL, FRIEDRICH WILHELM AUGUST (1782-1852), German philosopher, philanthropist and educational reformer, was born at Oberweissbach, a village of the Thuringian forest, on the 21st of April 1782. Like Comenius, with whom he had much in common, he was neglected in his youth, and the re- membrance of his own early sufferings made him in after life the more eager in promoting the happiness of children. His mother he lost in his infancy, and his father, the pastor of Oberweissbach and the surrounding district, attended to his parish but not to his family. Friedrich soon had a stepmother, and neglect was succeeded by stepmotherly attention; but a maternal uncle took pity on him, and gave him a home for some years at Stadt-Ilm. Here he went to the village school, but like many thoughtful boys he passed for a dunce. Throughout life he was always seeking for hidden connexions and an underlying unity in all things. Nothing of the kind was to be perceived in the piecemeal studies of the school, and Froebel’s mind, busy as it was for itself, would not work for the masters. His half- brother was therefore thought more worthy of a university education, and Friedrich was apprenticed for two years to a forester (1797-1799).

Left to himself in the Thuringian forest, Froebel began to study nature, and without scientific instruction he obtained a profound insight into the uniformity and essential unity of nature’s laws. Years afterwards the celebrated Jahn (the ” Father Jahn ” of the German gymnasts) told a Berlin student of a queer fellow he had met, who made out all sorts of wonderful things from stones and cobwebs. This queer fellow was Froebel; and the habit of making out general truths from the observation of nature, especially from plants and trees, dated from the solitary rambles in the forest. No training could have been better suited to strengthen his inborn tendency to mysticism; and when he

left the forest at the early age of seventeen, he seems to have been

possessed by the main ideas which influenced him all his life. The conception which in him dominated all others was the unity of nature; and he longed to study natural sciences that he might find in them various applications of nature's universal laws. With great difficulty he got leave to join his elder brother at the university of Jena, and there for a year he went from lecture-room to lecture-room hoping to grasp that connexion of the sciences which had for him far more attraction than any particular science in itself. But Froebel's allowance of money was very small, and his skill in the management of money was never great, so his university career ended in an imprisonment of nine weeks for a debt of thirty shillings. He then returned home with very poor prospects, but much more intent on what he calls the course of "self-completion" (V ' ervollkommnung meines selbst) than on " getting on " in a worldly point of view. He was sent to learn farming, but was recalled in consequence of the failing health of his father. In 1802 the father died, and Froebel, now twenty years old, had to shift for himself. It was some time before he found his true vocation, and for the next three and a half years we find him at work now in one part of Germany now in another — sometimes land-surveying, sometimes acting as accountant, sometimes as private secretary; but in all this his " outer life was far removed from his inner life," and in spite of his outward circumstances he became more and more conscious that a great task lay before him for the good of humanity. The nature of the task, however, was not clear to him, and it seemed determined by accident. While studying architecture in Frankfort-on-Main, he became acquainted with the director of a model school, who had caught some of the enthusiasm of Pestalozzi. This friend saw that Froebel's true field was education, and he persuaded him to give up architecture and take a post in the model school. In this school Froebel worked for two years with remarkable success, but he then retired and undertook the education of three lads of one family. In this he could not satisfy himself, and he obtained the parents' consent to his taking the boys to Yverdon, near Neuchatel, and there forming with them a part of the celebrated institution of Pestalozzi. Thus from 1807 till 1809 Froebel was drinking in Pestalozzianism at the fountainhead, and qualifying himself to carry on the work which Pestalozzi had begun. For the science of education had to deduce from Pestalozzi's experience principles which Pestalozzi himself could not deduce. And " Froebel, the pupil of Pestalozzi, and a genius like his master, completed the reformer's system; taking the results at which Pestalozzi had arrived through the necessities of his position, Froebel developed the ideas involved in them, not by further experience but by deduction from the nature of man, and thus he attained to the conception of true human development and to the requirements of

true education ” (Schmidt’s Geschichte der Pddagogik).

Holding that man and nature, inasmuch as they proceed from the same source, must be governed by the same laws, Froebel longed for more knowledge of natural science. Even Pestalozzi seemed to him not to ” honour science in her divinity.” He therefore determined to continue the university course which had been so rudely interrupted eleven years before, and in 181 1 he began studying at Gottingen, whence he proceeded to Berlin. But again his studies were interrupted, this time by the king of Prussia’s celebrated call ” to my people.” Though not a Prussian, Froebel was heart and soul a German. He therefore responded to the call, enlisted in Liitzow’s corps, and went through the campaign of 1813. But his military ardour did not take his mind off education. ” Everywhere,” he writes, ” as far as the fatigues I underwent allowed, I carried in my thoughts my future calling as educator; yes, even in the few engagements in which I had to take part. Even in these I could gather experience for the task I proposed to myself.” Froebel’s soldiering showed him the value of discipline and united action, how the individual belongs not to himself but to the whole body, and how the whole body supports the individual.

Froebel was rewarded for his patriotism by the friendship of two men whose names will always be associated with his,

Langethal and Middendorff. These young men, ten years younger than Froebel, became attached to him in the field, and were ever afterwards his devoted followers, sacrificing all their prospects in life for the sake of carrying out his ideas.

At the peace of Fontainebleau (signed in May 1814) Froebel returned to Berlin, and became curator of the museum of mineralogy under Professor Weiss. In accepting this appoint- ment from the government he seemed to turn aside from his work as educator; but if not teaching he was learning. More and more the thought possessed him that the one thing needful for man was unity of development, perfect evolution in accordance with the laws of his being, such evolution as science discovers in the other organisms of nature. He at first intended to become a teacher of natural science, but before long wider views dawned upon him. Langethal and Middendorff were in Berlin, engaged in tuition. Froebel gave them regular instruction in his theory, and at length, counting on their support, he resolved to set about realizing his own idea of ” the new education.” This was in 1816. Three years before one of his brothers, a clergyman, had died of fever caught from the French prisoners. His widow was still living in the parsonage at Griesheim, a village on the Ilm. Froebel gave up his

post, and set out for Griesheim on foot, spending his very last groschen on the way for bread. Here he undertook the education of his orphan niece and nephews, and also of two more nephews sent him by another brother. With these he opened a school and wrote to Middendorff and Langethal to come and help in the experiment. Middendorff came at once, Langethal a year or two later, when the school had been moved to Keilhau, another of the Thuringian villages, which became the Mecca of the new faith. In Keilhau Froebel, Langethal, Middendorff and Barop, a relation of Middendorff's, all married and formed an educational community. Such zeal could not be fruitless, and the school gradually increased, though for many years its teachers, with Froebel at their head, were in the greatest straits for money and at times even for food. After fourteen years' experience he determined to start other institu- tions to work in connexion with the parent institution at Keilhau, and being offered by a private friend the use of a castle on the Wartensee, in the canton of Lucerne, he left Keilhau under the direction of Barop, and with Langethal he opened the Swiss institution. The ground, however, was very ill chosen. The Catholic clergy resisted what they considered as a Protestant invasion, and the experiment on the Wartensee and at Willisau in the same canton, to which the institution was moved in 1833, never had a fair chance. It was in vain that Middendorff at Froebel's call left his wife and family at Keilhau, and laboured for four years in Switzerland without once seeing them. The Swiss institution never flourished. But the Swiss government wished to turn to account the presence of the great educator; so young teachers were sent to Froebel for instruction, and finally Froebel moved to Burgdorf (a Bernese town of some importance, and famous from Pestalozzi's labours there thirty years earlier) to undertake the establishment of a public orphanage and also to superintend a course of teaching for schoolmasters. The elementary teachers of the canton were to spend three months every alternate year at Burgdorf, and there compare experiences, and learn of distinguished men such as Froebel and Bitzius. In his conferences with these teachers Froebel found that the schools suffered from the state of the raw material brought into them. Till the school age was reached the children were entirely neglected. Froebel's conception of harmonious development naturally led him to attach much importance to the earliest years, and his great work on The Education of Man, published as early as 1826, deals chiefly with the child up to the age of seven. At Burgdorf his thoughts were much occupied with the proper treatment of young children, and in scheming for them a graduated course of exercises, modelled on the games in which he observed them to be most interested. In his eagerness to carry out his new plans he grew impatient of official restraints; so he returned to

Keilhau, and soon afterwards opened the first Kindergarten or ” Garden of Children,” in the neighbouring village of Blankenburg (1837). Firmly convinced of the importance of

the Kindergarten for the whole human race, Froebel described his system in a weekly paper (his Sonntagsblalt) which appeared from the middle of 1837 till 1840. He also lectured in great towns; and he gave a regular course of instruction to young teachers at Blankenburg. But although the principles of the Kindergarten were gradually making their way, the first Kinder- garten was failing for want of funds. It had to be given up, and Froebel, now a widower (he had lost his wife in 1839), carried on his course for teachers first at Keilhau, and from 1848, for the last four years of his life, at or near Liebenstein, in the Thuringian forest, and in the duchy of Meiningen. It is in these last years that the man Froebel will be best known to posterity, for in 1849 he attracted within the circle of his influence a woman of great intellectual power, the baroness von Marenholtz-Biilow, who has given us in her Recollections of Friedrich Froebel the only lifelike portrait we possess.

These seemed likely to be Froebel’s most peaceful days. He married again in 1851, and having now devoted himself to the training of women as educators, he spent his time in instructing his class of young female teachers. But trouble came upon him from a quarter whence he least expected it. In the great year of revolutions (1848) Froebel had hoped to turn to account the general eagerness for improvement, and Middendorff had pre- sented an address on Kindergartens to the German parliament. Besides this, a nephew of Froebel’s, Professor Karl Froebel of Zurich, published books which were supposed to teach socialism. True, the uncle and nephew differed so widely that the ” new Froebelians ” were the enemies of ” the old,” but the distinction was overlooked, and Friedrich and Karl Froebel were regarded as the united advocates of some new thing. In the reaction which soon set in, Froebel found himself suspected of socialism and irreligion, and in 1851 the ” cultus-minister ” Von Raumer issued an edict forbidding the establishment of schools ” after Friedrich and Karl Froebel’s principles ” in Prussia. This was a heavy blow to the old man, who looked to the government of the ” Cultus-staat ” Prussia for support, and was met with denun- ciation. Whether from the worry of this new controversy, or from whatever cause, Froebel did not long survive the decree. His seventieth birthday was

celebrated with great rejoicings in. May 1852, but he died on the 21st of June, and was buried at Schweina, a village near his last abode, Marienthal, near Bad-Liebenstein.

” All education not founded on religion is unproductive.” This conviction followed naturally from Froebel’s conception of the unity of all things, a unity due to the original Unity from whom all proceed and in whom all ” live, move and have their being.” As man and nature have one origin they must be subject to the same laws. Hence Froebel, like Comenius two centuries before him, looked to the course of nature for the principles of human education. This he declares to be his fundamental belief: ” In the creation, in nature and the order of the material world, and in the progress of mankind, God has given us the true type (Urbild) of education.” As the cultivator creates nothing in the trees and plants, so the educator creates nothing in the children, — he merely superintends the development of inborn faculties. So far Froebel agrees with Pestalozzi; but in one respect he went beyond him. Pestalozzi said that the faculties were developed by exercise. Froebel added that the function of education was to develop the faculties by arousing voluntary activity. Action proceeding from inner impulse (Selbsttatigkeit) was the one thing needful.

The prominence which Froebel gave to action, his doctrine that man is primarily a doer and even a creator, and that he learns only through “self-activity,” has its importance all through education. But it was to the first stage of life that Froebel paid the greatest attention. He held with Rousseau that each age has a completeness of its own, and that the per- fection of the later stage can be attained only through the perfection of the earlier. If the infant is what he should be as an infant, and the child as a child, he will become what he should be as a boy, just as naturally as new shoots spring from the healthy plant. Every stage, then, must be cared for and tended in such a way that it may attain its own perfection. Impressed with the

immense importance of the first stage, Froebel like Pestalozzi devoted himself to the instruction of mothers. But he would not like Pestalozzi, leave the children entirely in the mother’s hands’ Pestalozzi held that the child belonged to the family; Fichte on the other hand, claimed it for society and the state! Froebel, whose mind delighted in harmonizing apparent con- tradictions, and who taught that ” all progress lay through opposites to their reconciliation,” maintained that the child belonged both to the family and to society, and he would there- fore have children spend some hours of the day in a common life and m well-organized common employments. These assemblies of children he would not call schools, for the children in

them ought not to be old enough for schooling. So he in- vented the name Kindergarten, garden of children, and called the superintendents "children's gardeners." He laid great stress on every child cultivating its own plot of ground, but this was not his reason for the choice of the name. It was rather that he thought of these institutions as enclosures in which young human plants are nurtured. In the Kindergarten the children's employment should be play. But any occupation in which children delight is play to them; and Froebel invented a series of employments, which, while they are in this sense play to the children, have nevertheless, as seen from the adult point of view, a distinct educational object. This object, as Froebel himself describes it, is "to give the children employment in agreement with their whole nature, to strengthen their bodies, to exercise their senses, to engage their awakening mind, and through their senses to bring them acquainted with nature and their fellow creatures; it is especially to guide aright the heart and the affections, and to lead them to the original ground of all life, to unity with themselves."

Froebel's own works are: Menschenerziehung ("Education of n/J 1 >' 4 l8 26), which has been translated into French and English • Pddagogik d. Kindergartens; Kleinere Schriften and Mutter- und Koseheder; collected editions have been edited by Wichard Lange (1862) and Friedrich Seidel (1883).

A. B. Hauschmann's Friedrich Frobel is a lengthy and unsatis- factory biography. An unpretentious but useful little book is t. broebel, a Biographical Sketch, by Matilda H. Kriege New York (Steiger). A very good account of Froebel's life and thoughts is given in Kar Schmidt s Geschichte d. Pddagogik, vol. iv. ; also in Adalbert Weber s Geschichte d. Volksschulp&d. u. d. Kleinkinder- erziehung (Weber carefully gives authorities). For a less favour- able account see K Strack's Geschichte. d. deutsch. Volksschulwesens. irau yon Marenholtz-Biilow published her Erinnerungen an F Frobel (translated by Mrs. Horace Mann, 1877). This lady, the chief in- terpreter of Froebel, has expounded his principles in Das Kind u sem Wesen and Die Arbeit u. die neue Erziehung. H. Courthope Bowen has written a memoir (1897) in the " Great Educators " Se /^ s – JnEngfend Miss Emily A. E. Shirreff has published Principles of Froebel s System, and a short sketch of Froebel's life. See also Dr Henry Barnard's Papers on Froebel's Kindergarten (1881); R. H Quick, Educational Reformers (1890). (R. H. Q.)

FROG, 1 a name in zoology, of somewhat wide application, strictly for an animal belonging to the family Ranidae, but also used of some other families of the order Ecaudata of the sub-class Batrachia {q.v.).

Frogs proper are typified by the common British species, Rana iemporaria, and its allies, such as the edible frog, R. esculenta, and the American bull-frog R. catesbiana. The genus Rana may be defined as firmisternal Ecaudata with cylindrical transverse processes to the sacral vertebra, teeth in the upper jaw and on the vomer, a protrusible tongue which is free and forked behind, a horizontal pupil and more or less webbed toes. It includes about 200 species, distributed over the whole world

x The word ” frog ” is in O.E. frocga or frox, cf. Dutch vorsch, Ger. Frosch; Skeat suggests a possible original source in the root meaning ‘ to jump,” ” to spring,” cf. Ger. froh, glad, joyful and

frolic. The term is also applied to the following objects: the horny part in the center of a horse’s hoof; an attachment to a belt for suspending a sword, bayonet, &c; a fastening for the front of a coat, still used in military uniforms, consisting of two buttons on opposite sides joined by ornamental looped braids; and, in rail- way construction, the point where two rails cross. These may be various^ transferred applications of the name of the animal, but the “, fr 9? ” of a horse was also called ” frush,” probably a corruption of the French name fourchette, lit. little fork. The ornamental braiding is also more probably due to ” frock,” Lat. floccus.

with the exception of the greater part of South America and Australia. Some of the species are thoroughly aquatic and have fully webbed toes, others are terrestrial, except during the breed- ing season, others are adapted for burrowing, by means of the much-enlarged and sharp-edged tubercle at the base of the inner toe, whilst not a few have the tips of the digits dilated into disks by which they are able to climb on trees. In most of the older classifications great importance was attached to these physio- logical characters, and a number of genera were established which, owing to the numerous annectent forms which have since been discovered, must be abandoned. The arboreal species were thus associated with the true tree-frogs, regardless of their internal structure. We now know that such adaptations are of comparatively small importance, and cannot be utilized for establishing groups higher than genera in a natural or phylogenetic classification. The tree-frogs, Hylidae, with which the arboreal Ranidae were formerly grouped, show in their anatomical structure a close resemblance to the toads, Bufonidae, and are therefore placed

far away from the true frogs, however great the superficial resemblance between them.

Some frogs grow to a large size. The bull-frog of the eastern United States and Canada, reaching a length of nearly 8 in. from snout to vent, long regarded as the giant of the genus, has been surpassed by the discovery of Rana guppyi (85 in.) in the Solomon Islands, and of Rana goliath (10 in.) in South Cameroon. The family Ranidae embraces a large number of genera, some of which are very remarkable. Among these may be mentioned the hairy frog of West Africa, Trichobatrachus robustus, some specimens of which have the sides of the body and of the hind limbs covered with long villosities, the function of which is unknown, and its ally Gampsosteonyx batesi, in which the last phalanx of the fingers and toes is sharp, claw-like and perforates the skin. To this family also belong the Rhacophorus of eastern Asia, arboreal frogs, some of which are remarkable for the extremely developed webs between the fingers and toes, which are believed to act as a parachute when the frog leaps from the branches of trees (flying-frog of A. R. Wallace), whilst others have been observed to make aerial nests between leaves overhang- ing water, a habit which is shared by their near allies the Chiro- mantis of tropical Africa. Dimorphognathus, from West Africa, is the unique example of a sexual dimorphism in the dentition, the males being provided with a series of large sharp teeth in the lower jaw, which in the female, as in most other members of the family, is edentulous. The curious horned frog of the Solomon Islands, Ceratobatrachus guenlheri, which can hardly be separated from the Ranidae, has teeth in the lower jaw in both sexes, whilst a few forms, such as Dendrobales and Cardioglossa, which on this account have been placed in a distinct family, have no teeth at all, as in toads. These facts militate strongly against the importance which was once attached to the dentition in the classification of the tailless batrachians.

FROG-BIT, in botany, the English name for a small floating herb known botanically as Hydrocharis Morsus-Ranae, a member of the order Hydrocharideae, a family of Monocotyledons. The plant has rosettes of roundish floating leaves, and multiplies like the strawberry plant by means of runners, at the end of which new leaf-rosettes develop. Staminate and pistillate flowers are borne on different plants; they have three small green sepals and three broadly ovate white membranous petals. The fruit, which is fleshy, is not found in Britain. The plant occurs in ponds and ditches in England and is rare in Ireland.

FROGMORE, a mansion within the royal demesne of Windsor,

England, in the Home Park, 1 m. S.E. of Windsor Castle. It was occupied by George III.'s queen, Charlotte, and later by the duchess of Kent, mother of Queen Victoria, who died here in 1 86 1. The mansion, a plain building facing a small lake, has in its grounds the mausoleum of the duchess of Kent and the royal mausoleum. The first is a circular building surrounded with Ionic columns and rising in a dome, a lower chamber within containing the tomb, while in the upper chamber is a statue of the duchess. There is also a bust of Princess Hohenlohe-Langen- berg, half-sister of Queen Victoria; and before the entrance is a

memorial erected by the queen to Lady Augusta Stanley (d. 1876), wife of Dean Stanley. The royal mausoleum, a cruciform building with a central octagonal lantern, richly adorned within with marbles and mosaics, was erected (1862-1870) by Queen Victoria over the tomb of Albert, prince consort, by whose side the queen herself was buried in 1901. There are also memorials to Princess Alice and Prince Leopold in the mausoleum. To the south of the mansion are the royal gardens and dairy.

FROHLICH, ABRAHAM EMANUEL (1796-1865), Swiss poet, was born on the 1st of February 1796 at Brugg in the canton of Aargau, where his father was a teacher. After studying theology at Zurich he became a pastor in 181 7 and returned as teacher to his native town, where he lived for ten years. He was then appointed professor of the German language and literature in the cantonal school at Aarau, which post he lost, however, in the political quarrels of 1830. He afterwards obtained the post of teacher and rector of the cantonal college, and was also appointed assistant minister at the parish church. He died at Baden in Aargau on the 1st of December 1865. His works are— 170 Fabeln (1825); Schweizerlieder (1827); Das Evangelium St Johannis, in Liedern (1830); Elegien an Wieg' und Sarg (1835); Die Epopoen; Ulrich Zwingli (1840); Ulrich von Hutten (1845); Auserlesene Psalmen und geistliche Lieder fur die Evangelisch-reformirte Kirche des Cantons Aargau (1844); Uber den Kirchengesang der Protestanten (1846); Trostlieder . (1852); Der Junge Deutsch-Michel (1846); Reimspruche aus Staat, Schule, und Kirche (1820). An edition of his collected works, in 5 vols., was published at Frauenfeld in 1853. Frohlich is best known for his two heroic poems, Ulrich Zwingli and Ulrich von Hutten, and especially for his fables, which have been ranked with those of Hagedorn, Lessing and Gellert.

See the Life by R. Fasi (Zurich, 1907).

FROHSCHAMMER, JAKOB (1821-1893), German theologian and

philosopher, was born at Iilkofen, near Regensburg, on the 6th of January 1821. Destined by his parents for the Roman Catholic priesthood, he studied theology at Munich, but felt an ever-growing attraction to philosophy. Nevertheless, after much hesitation, he took what he himself calls the most mistaken step of his life, and in 1847 entered the priesthood. His keenly logical intellect, and his impatience of authority where it clashed with his own convictions, quite unfitted him for that unquestion- ing obedience which the Church demanded. It was only after open defiance of the bishop of Regensburg that he obtained permission to continue his studies at Munich. He at first devoted himself more especially to the study of the history of dogma, and in r85o published his Beitrage zur Kirchengeschichte, which was placed on the Index Expurgatorius. But he felt that his real vocation was philosophy, and after holding for a short time an extraordinary professorship of theology, he became professor of philosophy in 1855. This appointment he owed chiefly to his work, liber den Ursprung der menschlichen Seelen (1854), in which he maintained that the human soul was not implanted by a special creative act in each case, but was the result of a secondary creative act on the part of the parents : that soul as well as body, therefore, was subject to the laws of heredity. This was supplemented in 1855 by the controversial Menschenseele und Physiologic. Undeterred by the offence which these works gave to' his ecclesiastical superiors, he published in 1858 the Einleitung in die Philosophic und Grundriss der Metaphysik, in which he assailed the doctrine of Thomas Aquinas, that philosophy was the handmaid of theology. In 1861 appeared Uber die Aufgabe der Naturphilosophie und ihr Verhdltnis zur Naturwissenschaft, which was, he declared, directed against the purely mechanical conception of the universe, and affirmed the necessity of a creative Power. In the same year he published Uber die Freiheit der Wissenschaft, in which he maintained the independence of science, whose goal was truth, against authority, and reproached the excessive respect for the latter in the Roman Church with the insignificant part played by the German Catholics in literature and philosophy. He was denounced by the pope himself in an apostolic brief of the nth of December 1862, and students of theology were forbidden to attend his lectures.

Public opinion was now keenly excited; he received an ovation from the Munich students, and the king, to whom he owed his appointment, supported him warmly. A conference of Catholic savants, held in 1863 under the presidency of Dollinger, decided that authority must be

supreme in the Church. When, however, Dollinger and his school in their turn started the Old Catholic movement, Frohschammer refused to associate himself with their cause, holding that they did not go far enough, and that their declaration of 1863 had cut the ground from under their feet. Meanwhile he had, in 1862, founded the Athendum as the organ of Liberal Catholicism. For this he wrote the first adequate account in German of the Darwinian theory of natural selection, which drew a warm letter of appreciation from Darwin himself. Excommunicated in 1871, he replied with three articles, which were reproduced in thousands as pamphlets in the chief European languages: Der Fels Petri in Rom (1873), Der Primal Petri und des Papstes (1875), and Das Chrislenthum Christi und das Christenthum des Papstes (1876). In Das neue Wissen und der neue Glaube (1873) he showed himself as vigorous an opponent of the materialism of Strauss as of the doctrine of papal infalli- bility. His later years were occupied with a series of philosophical works, of which the most important were: Die Phantasie als Grundprincip des Weltprocesses (1877), liber die Genesis der Menschheit und deren geistige Entwicklung in Religion, Sittlichkeit und Sprache (1883), and fiber die Organisation und Cultur der menschlichen Gesellschaft (1885). His system is based on the unifying principle of imagination (Phantasie), which he extends to the objective creative force of Nature, as well as to the subjec- tive mental phenomena to which the term is usually confined. He died at Bad Kreuth in the Bavarian Highlands on the 14th of June 1893.

In addition toother treatiseson theological subjects, Frohschammer was also the author of Monaden und Weltphantasie and liber die Bedeutung der Einbildungskraft in der Philosophie Kants und Spinozas (1879); Uber die Principien der Aristotelischen Philosophie und die Bedeutung der Phantasie in derselben (1881); Die Philosophie als Idealwissenschaft und System (1884); Die Philosophie des Thomas von Aquino kritisch gewurdigt (1889) ; Uber das Mysterium Magnum des Daseins (1891) ; System der Philosophie im Umriss, pt. i. (1892). His autobiography was published in A. Hinrichsen's Deutsche Denker (1888). See also F. Kirchner, Uber das Grundprincip dies Well-processes (1882), with special reference to F. ; E. Reich, Welt-anschauung und Menschenleben ; Betrachtungen uber die Philosophie J. Frohschammers (1894) ; B. Miinz, J. Frohschammer, der Philosoph der Weltphantasie (1894) and Brief e von und uber J. Frohschammer (1897); j. Friedrich, Jakob Frohschammer (1896) and Systematische und kritische Darstellung der Psychologie J. Frohschammers (1899) ; A. Attensperger, /. Frohschammers philosophisches System im Grundriss (1899).

FROISSART, JEAN (1338-1410?), French chronicler and raconteur, historian of his own times. The personal history of Froissart, the circumstances of his birth and education, the incidents of his life, must all be sought in his own verses and chronicles. He possessed in his own lifetime no such fame as that which attended the steps of Petrarch; when he died it did not occur to his successors that a chapter might well be added to his Chronicle setting forth what manner of man he was who wrote it. The village of Lestines, where he was cure, has long forgotten that a great writer ever lived there. They cannot point to any house in Valenciennes as the lodging in which he put together his notes and made history out of personal reminiscences. It is not certain when or where he died, or where he was buried. One church, it is true, doubtfully claims the honour of holding his bones. It is that of St Monegunda of Chimay. ” Gallorum sublimis honos et fama tuorum, Hie Froissarde, jaces, si modo forte jaces.”

It is fortunate, therefore, that the scattered statements in his writings may be so pieced together as to afford a tolerably connected history of his life year after year. The personality of the man, independently of his adventures, may be arrived at by the same process. It will be found that Froissart, without meaning it, has portrayed himself in clear and well-defined outline. His forefathers were jures (aldermen) of the little town of Beaumont, lying near the river Sambre, to the west of the forest of Ardennes. Early in the 14th century the castle and

seigneurie of Beaumont fell into the hands of Jean, younger son of the count of Hainaut. With this Jean, sire de Beaumont, lived a certain canon of Liege called Jean le Bel, who fortunately was not content simply to enjoy life. Instigated by his seigneur he set himself to write contemporary history, to tell ” la pure veriteit de tout li fait entierement al manire de chroniques.” With this view, he compiled two books of chronicles. And the chronicles of Jean le Bel were not the only literary monuments belonging to the castle of Beaumont. A hundred years before him Baldwin d’Avernes, the then seigneur, had caused to be written a book of chronicles or rather genealogies. It must therefore be remembered that when Froissart undertook his own chronicles he was not conceiving a new idea, but only following along familiar lines.

Some 20 m. from Beaumont stood the prosperous city of Valenciennes, possessed in the 14th century of important privileges and a flourishing trade, second only to places like Bruges or Ghent in influence, population and wealth. Beaumont, once her rival, now regarded Valenciennes as a place where the ambitious might seek for wealth or advancement, and among those who migrated thither was the father

of Foissart. He appears from a single passage in his son's verses to have been a painter of armorial bearings. There was, it may be noted, already what may be called a school of painters at Valenciennes. Among them were Jean and Colin de Valenciennes and Andre Beau-Neveu, of whom Froissart says that he had not his equal in any country.

The date generally adopted for his birth is 1338. In after years Froissart pleased himself by recalling in verse the scenes and pursuits of his childhood. These are presented in vague generalities. There is nothing to show that he was unlike any other boys, and, unfortunately, it did not occur to him that a photograph of a schoolboy's life amid bourgeois surroundings would be to posterity quite as interesting as that faithful por- traiture of courts and knights which he has drawn up in his Chronicle. As it is, we learn that he loved games of dexterity and skill rather than the sedentary amusements of chess and draughts, that he was beaten when he did not know his lessons, that with his companions he played at tournaments, and that he was always conscious — a statement which must be accepted with suspicion — that 'he was born

" Loer Dieu et servir le monde." In any case he was born in a place, as well as at a time, singu- larly adapted to fill the brain of an imaginative boy. Valenciennes was then a city extremely rich in romantic associations. Not far from its walls was the western fringe of the great forest of Ardennes, sacred to the memory of Pepin, Charlemagne, Roland and Ogier. Along the banks of the Scheldt stood, one after the other, not then in ruins, but bright with banners, the gleam of armour, and the liveries of the men at arms, castles whose seigneurs, now forgotten, were famous in their day for many a gallant feat of arms. The castle of Valenciennes itself was illustrious in the romance of Perceforest. There was born that most glorious and most luckless hero, Baldwin, first emperor of Constantinople. All the splendour of medieval life was to be seen in Froissart's native city: on the walls of the Salle le Comte glittered— perhaps painted by his father — the arms and scutcheons beneath the banners and helmets of Luxembourg, Hainaut and Avesnes; the streets were crowded with knights and soldiers, priests, artisans and merchants ; the churches were rich with stained glass, delicate tracery and precious carving; there were libraries full of richly illuminated manuscripts on which the boy could gaze with delight ; every year there was the jlte of the puy d' Amour de Valenciennes, at which he would hear the verses of the competing poets; there were festivals, masques, mummeries and moralities. And, whatever there might be elsewhere, in this happy city there was only the pomp, and not the misery, of war; the fields

without were tilled, and the harvests reaped, in security; the workman within plied his craft unmolested for good wage. But the eyes of the boy were turned upon the castle and not upon the town; it was the splendour of the knights which dazzled him, insomuch that he

regarded and continued ever afterwards to regard a prince gallant in the field, glittering of apparel, lavish of largesse, as almost a god.

Tlje moon, he says, rules the first four years of life; Mercury the next ten; Venus follows. He was fourteen when the last goddess appeared to him in person, as he tells us, after the manner of his time, and informed him that he was to love a lady, ” belle, jone, et gente.” Awaiting this happy event, he began to consider how best to earn his livelihood. They first placed him in some commercial position — impossible now to say of what kind — which he simply calls ” la marchandise.” This undoubtedly means some kind of buying and selling, not a handicraft at all. He very soon abandoned merchandise — ” car vaut mieux science qu’argens ” — and resolved on becoming a learned clerk. He then naturally began to make verses, like every other learned clerk. Quite as naturally, and still in the character of a learned clerk, he fulfilled the prophecy of Venus and fell in love. He found one day a demoiselle reading a book of romances. He did not know who she was, but stealing gently towards her, he asked her what book she was reading. It was the romance of Cleomades. He remarks the singular beauty of her blue eyes and fair hair, while she reads a page or two, and then — one would almost suspect a reminiscence of Dante —

” Adont laissames nous le lire.”

He was thus provided with that essential for soldier, knight or poet, a mistress — one for whom he could write verses. She was rich and he was poor; she was nobly born and he obscure; it was long before she would accept the devotion, even of the conventional kind which Froissart offered her, and which would in no way interfere with the practical business of her life. And in this hopeless way, the passion of the young poet remaining the same, and the coldness of the lady being unaltered, the course of this passion ran on for some time. Nor was it until the day of Froissart’s departure from his native town that she gave him an interview and spoke kindly to him, even promising, with tears in her eyes, that ” Doulce Pensee ” would assure him that she

would have no joyous day until she should see him again.

He was eighteen years of age; he had learned all that he wanted to learn; he possessed the mechanical art of verse; he had read the slender stock of classical literature accessible; he longed to see the world. He must already have acquired some distinction, because, on setting out for the court of England, he was able to take with him letters of recommendation from the king of Bohemia and the count of Hainaut to Queen Philippa, niece of the latter. He was well received by the queen, always ready to welcome her own countrymen; he wrote ballades and virelays for her and her ladies. But after a year he began to pine for another sight of ” la tres douce, simple, et quoie,” whom he loved loyally. Good Queen Philippa, perceiving his altered looks and guessing the cause, made him confess that he was in love and longed to see his mistress. She gave him his conge on the condition that he was to return. It is clear that the young clerk had already learned to ingratiate himself with princes.

The conclusion of his single love adventure is simply and unaffectedly told in his Trettie de I’espinette amoureuse. It was a passion conducted on the well-known lines of conventional love; the pair exchanged violets and roses, the lady accepted ballads; Froissart became either openly or in secret her recog- nized lover, a mere title of honour, which conferred distinction on her who bestowed it, as well as upon him who received it. But the progress of the amour was rudely interrupted by the arts of ” Malebouche,” or Calumny. The story, whatever it was, that Malebouche whispered in the ear of the lady led to a complete rupture. The damoiselle not only scornfully refused to speak to her lover or acknowledge him, but even seized him by the hair and pulled out a handful. Nor would she ever be reconciled to him again. Years afterwards, when Froissart writes the story of his one love passage, he shows that he still takes delight in the remembrance of her, loves to draw her portrait, and lingers with fondness over the thought of what she once was to him.

Perhaps to get healed of his sorrow. Froissart began those

wanderings in which the best part of his life was to be consumed. He first visited Avignon, perhaps to ask for a benefice, perhaps as the bearer of a message from the bishop of Cambray to pope or cardinal. It was in the year 1360, and in the pontificate of Innocent VI. From the papal city he seems to have gone to Paris, perhaps charged with a diplomatic mission. In 1361 he returned to England after an absence of five years. He certainly interpreted his leave of absence in a liberal spirit, and it may have been with a view of averting the displeasure of

his kind-hearted protector that he brought with him as a present a book of rhymed chronicles written by himself. He says that notwithstanding his youth, he took upon himself the task “a rimer et a, dieter ” — which can only mean to ” turn into verse ” — an account of the wars of his own time, which he carried over to England in a book ” tout compile,” — complete to date, — and presented to his noble mistress Philippa of Hainaut, who joy- fully and gently received it of him. Such a rhymed chronicle was no new thing. One Colin had already turned the battle of Crecy into verse. The queen made young Froissart one of her secretaries, and he began to serve her with ” beaux ditties et traites amoureux.”

Froissart would probably have been content to go on living at ease in this congenial atmosphere of flattery, praise and caresses, pouring out his virelays and chansons according to demand with facile monotony, but for the instigation of Queen Philippa, who seems to have suggested to him the propriety of travelling in order to get information for more rhymed chronicles. It was at her charges that Froissart made his first serious journey. He seems to have travelled a great part of the way alone, or accompanied only by his servants, for he was fain to beguile the journey by composing an imaginary conversation in verse between his horse and his hound. This may be found among his published poems, but it does not repay perusal. In Scotland he met with a favourable reception, not only from King David but from William of Douglas, and from the earls of Fife, Mar, March and others. The souvenirs of this journey are found scattered about in the chronicles. He was evidently much impressed with the Scots; he speaks of the valour of the Douglas, the Campbell, the Ramsay and the Graham; he describes the hospitality and rude life of the Highlanders; he admires the great castles of Stirling and Roxburgh and the famous abbey of Melrose. His travels in Scotland lasted for six months. Return- ing southwards he rode along the whole course of the Roman wall, a thing alone sufficient to show that he possessed the true spirit of an archaeologist; he thought that Carlisle was Carlyon, and congratulated himself on having found King Arthur’s capital; he calls Westmorland, where the common people still spoke the ancient British tongue, North Wales; he rode down the banks of the Severn, and returned to London by way of Oxford— “Fescole d’Asque-Suffort.”

In London Froissart entered into the service of King John of France as secretary, and grew daily more courtly, more in favour with princes and great ladies. He probably acquired at this period that art, in which he has probably never been sur- passed, of making people tell him all they knew. No newspaper correspondent, no American interviewer, has ever equalled this medieval collector of intelligence. From Queen

Philippa, who confided to him the tender story of her youthful and lasting love for her, great husband, down to the simplest knight — Froissart conversed with none beneath the rank of gentlemen — all united in telling this man what he wanted to know. He wanted to know everything: he liked the story of a battle from both sides and from many points of view; he wanted the details of every little cavalry skirmish, every capture of a castle, every gallant action and brave deed. And what was more remarkable, he forgot nothing. " I had," he says, " thanks to God, sense, memory, good remembrance of everything, and an intellect clear and keen to seize upon the acts which I could learn." But as yet he had not begun to write in prose.

At the age of twenty-nine, in 1366, Froissart once more left England. This time he repaired first to Brussels, whither were gathered together a great concourse of minstrels from all parts,

from the courts of the kings of Denmark, Navarre and Aragon, from those of the dukes of Lancaster, Bavaria and Brunswick. Hither came all who could " rimer et dieter." What distinction Froissart gained is not stated; but he received a gift of money, as appears from the accounts: " uni Fritsardo, dictori, qui est cum regina Angliae, dicto die, vi. mottones."

After this congress of versifiers, he made his way to Brittany, where he heard from eye-witnesses and knights who had actually fought there details of the battles of Cocherel and Auray, the Great Day of the Thirty and the heroism of Jeanne de Montfort. Windsor Herald told him something about Auray, and a French knight, one Antoine de Beaujeu, gave him the details of Cocherel. From Brittany he went southwards to Nantes, La Rochelle and Bordeaux, where he arrived a few days before the visit of Richard, afterwards second of that name. He accompanied the Black Prince to Dax, and hoped to go on with him into Spain, but was despatched to England on a mission. He next formed part of the expedition which escorted Lionel duke of Clarence to Milan, to marry the daughter of Galeazzo Visconti. Chaucer was also one of the prince's suite. At the wedding banquet Petrarch was a guest sitting among the princes.

From Milan Froissart, accepting gratefully a cotte hardie with 20 florins of gold, set out upon his travels in Italy. At Bologna, then in decadence, he met Peter king of Cyprus, from whose follower and

minister, Eustache de Conflans, he learned many interesting particulars of the king's exploits. He accompanied Peter as far as Venice, where he left him after receiving a gift of 40 ducats. With them and his cotte hardie, still lined we may hope with the 20 florins, Froissart betook himself to Rome. The city was then at its lowest point: the churches were roofless; there was no pope; there were no pilgrims; there was no splendour; and yet, says Froissart sadly,

" Ce furent jadis en Rome Li plus preu et li plus sage homme, Car par sens tons les arts passerent." It was at Rome that he learned of the death of his friend King Peter of Cyprus, and, worse still, an irreparable loss to him, that of the good Queen Philippa, of whom he writes, in grateful remembrance —

" Propices li soit Diex a l'ame!

J 'en suis bien tenus de pryer

Et ses larghesces escuyer,

Car elle me fist et crea."

Philippa dead, Froissart looked around for a new patron. Then he hastened back to his owa country and presented himself, with a new book in French, to the duchess of Brabant, from whom he received the sum of 16 francs, given in the accounts as paid uni Frissardo dictatori. The use of the word uni does not imply any meanness of position, but is simply an equivalent to the modern French sieur. Froissart may also have found a patron in Yolande de Bar, grandmother of King Rene of Anjou. In any case he received a substantial gift from some one in the shape of the benefice of Lestines, a village some three or four miles from the town of Binche. Also, in addition to his cure, he got placed upon the duke of Brabant's pension list, and was entitled to a yearly grant of grain and wine, with some small sum in money.

It is clear, from Froissart's own account of himself, that he was by no means a man who would at the age of four or five and thirty be contented to sit down at ease to discharge the duties of parish priest, to say mass, to bury the dead, to marry the villagers and to baptize the young. In those days, and in that country, it does not seem that other duties were expected. Preaching was not required, godliness of life,, piety, good works, and the graces of a modern ecclesiastic were not looked for. Therefore, when Froissart complains to himself that the taverris of Lestines got 500 francs of his money, we need not at once set him down as either a bad priest or exceptionally given to drink.

The people of the place were greatly addicted to wine; the lavcm iers de Lestines proverbially sold good wine; the Flemings were proverbially of a joyous disposition —

” Ceux de Hainaut chantent a pleines gorges.” Froissart, the parish priest of courtly manners, no doubt

drank with the rest, and listened if they sang his own, not the coarse country songs. Mostly he preferred the society of Gerard d’Obies, provost of Binche, and the little circle of knights within that town. Or — for it was not incumbent on him to be always in residence — he repaired to the court of Coudenberg, and became ” moult frere et accointe ” with the duke of Brabant. And then came Gui de Blois, one of King John’s hostages in London in the old days. He had been fighting in Prussia with the Teutonic knights, and now, a little tired of war, proposed to settle down for a time in his castle of Beaumont. This prince was a member of the great house of Chatillon. He was count of Blois, of Soissons and of Chimay. He had now, about the year 1374, an excellent reputation as a good captain. In him Froissart, who hastened to resume acquaintance, found a new patron. More than that, it was this sire de Beaumont, in emulation of his grandfather, the patron of Jean le Bel, who advised Froissart seriously to take in hand the history of his own time. Froissart was then in his thirty-sixth year. For twenty years he had been rhyming, for eighteen he had been making verses for queens and ladies. Yet during all this time he had been accumulating in his retentive brain the materials for his future work.

He began by editing, so to speak, that is, by rewriting with additions, the work of Jean le Bel; Gui de Blois, among others, supplied him with additional information. His own notes, taken from information obtained in his travels, gave him more details, and when in 1374 Gui married Marie de Namur, Froissart found in the bride’s father, Robert de Namur, one who had himself largely shared in the events which he had to relate. He, for instance, is the authority for the story of the siege of Calais and the six burgesses. Provided with these materials, Froissart remained at Lestines, or at Beaumont, arranging and writing his chronicles. During this period, too, he composed his Espinette amoureuse, and the Joli Buisson de jonesce, and his romance of Miliador. He also became chaplain to the count of Blois, and obtained a canonry of Chimay. After this appointment we hear nothing more of Lestines, which he probably resigned.

In these quiet pursuits he passed twelve years, years of which we hear nothing, probably because there was nothing to tell. In 1386 his

travels began again, when he accompanied Gui to his castle at Blois, in order to celebrate the marriage of his son Louis de Dunois with Marie de Berry. He wrote a pastourelle in honour of the event. Then he attached himself for a few days to the duke of Berry, from whom he learned certain particulars of current events, and then, becoming aware of what promised to be the most mighty feat of arms of his time, he hastened to Sluys in order to be on the spot. At this port the French were collecting an enormous fleet, and making preparations of the greatest magnitude in order to repeat the invasion of William the Con- queror. They were tired of being invaded by the English and wished to turn the tables. The talk was all of conquering the country and dividing it among the knights, as had been done by the Normans. It is not clear whether Froissart intended to go over with the invaders; but as his sympathies are ever with the side where he happens to be, he exhausts himself in admiration of this grand gathering of ships and men. ” Any one,” he says, ” who had a fever would have been cured of his malady merely by going to look at the fleet.” But the delays of the duke of Berry,’ and the arrival of bad weather, spoiled everything. There was no invasion of England. In Flanders Froissart met many knights who had fought at Rosebeque, and could tell him of the troubles which in a few years desolated that country, once so prosperous. He set himself to ascertain the history with as much accuracy as the comparison of various accounts by eye- witnesses and actors would allow. He stayed at Ghent, among those ruined merchants and mechanics, for whom, as one of the same class, he felt a sympathy never extended to English or French, perhaps quite as unfortunate, and he devotes no fewer than 300 chapters to the Flemish troubles, an amount out of all proportion to the comparative importance of the events. This portion of the chronicle was written at Valenciennes. During this residence in his birthplace his verses were crowned at the ” puys d’amour ” of Valenciennes and Tournay.

This part of his work finished, he considered what to do next. There was small chance of anything important happening in Picardy or Hainault, and he determined on making a journey to the south of France in order to learn something new. He was then fifty-one years of age, and being still, as he tells us, in his prime, ” of an age, strength, and limbs able to bear fatigue,” he set out as eager to see new places as when, 33 years before, he rode through Scotland and marvelled at the bravery of the Douglas. What he had, in addition to strength, good memory and good spirits, was a manner singularly pleasing and great

personal force of character. This he does not tell us, but it comes out abundantly in his writings; and, which he does tell us, he took a singular delight in his book. ” The more I work at it,” he says, ” the better am I pleased with it.”

On this occasion he rode first to Blois; on the way he fell in with two knights who told him of the disasters of the English army in Spain; one of them also informed him of the splendid hospitalities and generosity of Gaston Phoebus, count of Foix, on hearing of which Froissart resolved to seek him out. He avoided the English provinces of Poitou and Guienne, and rode southwards through Berry, Auvergne and Languedoc. Arrived at Foix he discovered that the count was at Orthez, whither he proceeded in company with a knight named Espaing de Lyon, who, Froissart found, had not only fought, but could describe.

The account of those few days’ ride with Espaing de Lyon is the most charming, the most graphic, and the most vivid chapter in the whole of Froissart. Every turn of the road brings with it the sight of a ruined castle, about which this knight of many memories has a tale or a reminiscence. The whole country teems with fighting stories. Froissart never tires of listening nor the good knight of telling. ” Sainte Marie! ” cries Froissart in mere rapture. ” How pleasant are your tales, and how much do they profit me while you relate them! And you shall not lose your trouble, for they shall all be set down in memory and remem- brance in the history which I am writing.” Arrived at length at Orthez, Froissart lost no time in presenting his credentials to the count of Foix. Gaston Phoebus was at this time fifty-nine years of age. His wife, from whom he was separated, was that princess, sister of Charles of Navarre, with whom Guillaume de Machault carried on his innocent and poetical amour. The story of the miserable death of his son is well known, and may be read in Froissart. But that was already a tale of the past, and the state which the count kept up was that of a monarch. To such a prince such a visitor as Froissart would be in every way welcome. Mindful no doubt of those paid clerks who were always writing verses, Froissart introduced himself as a chronicler. He could, of course, rhyme, and in proof he brought with him his romance of Meliador; but he did not present himself as a wandering poet. The count received him graciously, speedily discovered the good qualities of his guest, and often invited him to read his Meliador aloud in the evening, during which time, says Froissart, ” nobody dared to say a word, because he wished me to be heard, such great delight did he take in listening.” Very soon Froissart, from reader of a romance, became raconteur of the things he had seen and heard; the next step was that the count himself began to talk of affairs, so that the

notebook was again in requisition. There was a good deal, too, to be learned of people about the court. One knight recently returned from the East told about the Genoese occupation of Famagosta; two more had been in the fray of Otterbourne; others had been in the Spanish wars.

Leaving Gaston at length, Froissart assisted at the wedding of the old duke of Berry with the youthful Jeanne de Bourbon, and was present at the grand reception given to Isabeau of Bavaria by the Parisians. He then returned to Valenciennes, and sat down to write his fourth book. A journey undertaken at this time is characteristic of the thorough and conscientious spirit in which he composed his work; it illustrates also his restless and curious spirit. While engaged in the events of the year 1385 he became aware that his notes taken at Orthez and elsewhere on the affairs of Castile and Portugal were wanting in completeness. He left Valenciennes and hastened to Bruges, where, he felt certain, he should find some one who would help

him. There was, in fact, at this great commercial centre, a colony of Portuguese. From them he learned that a certain Portuguese knight, Dom Juan Fernand Pacheco, was at the moment in Middelburg on the point of starting for Prussia. He instantly embarked at Sluys, reached Middelburg in time to catch this knight, introduced himself, and conversed with him uninterruptedly for the space of six days, getting his information on the promise of due acknowledgment. During the next two years we learn little of his movements. He seems, however, to have had trouble with his seigneur Gui de Blois, and even to have resigned his chaplaincy. Froissart is tender with Gui's reputation, mindful of past favours and remembering how great a lord he is. Yet the truth is clear that in his declining years the once gallant Gui de Blois became a glutton and a drunkard, and allowed his affairs to fall into the greatest disorder. So much was he crippled with debt that he was obliged to sell his castle and county of Blois to the king of France. Froissart lays all the blame on evil counsellors. " He was my lord and master," he says simply, " an honourable lord and of great reputation; but he trusted too easily in those who looked for neither his . welfare nor his honour. " Although canon of Chimay and perhaps cure of Lestines as well, it would seem as if Froissart was not able to live without a patron. He next calls Robert de Namur his seigneur, and dedicates to him, in a general introduction, the whole of his chronicles. We then find him at Abbeville, trying to learn all about the negotiations pending between Charles VI. and the English. He was unsuccessful, either because he could not get at those who knew what was going on, or because the secret was too well kept. He next made his last visit to England, where, after forty years' absence, he naturally

found no one who remembered him. Here he gave King Richard a copy of his ” traites amoureux,” and got favour at court. He stayed in England some months, seeking information on all points from his friends Henry Chrystead and Richard Stury, from the dukes of York and Gloucester, and from Robert the Hermit.

On his return to France, he found preparations going on for that unlucky crusade, the end of which he describes in his Chronicle. It was headed by the count of Nevers. After him floated many a banner of knights, descendants of the crusaders, who bore the proud titles of duke of Athens, duke of Thebes, sire de Sidon, sire de Jericho. They were going to invade the sultan’s empire by way of Hungary; they were going to march south; they would reconquer the holy places. And presently we read how it all came to nothing, and how the slaughtered knights lay dead outside the city of Nikopoli. In almost the concluding words of the Chronicle the murder of Richard II. of England is described. His death ends the long and crowded Chronicle, though the pen of the writer struggles through a few more unfinished sentences.

The rest is vague tradition. He is said to have died at Chimay ; it is further said that he died in poverty so great that his relations could not even afford to carve his name upon the headstone of his tomb; not one of his friends, not even Eustache Deschamps, writes a line of regret in remembrance; the greatest historian of his age had a reputation so limited that his death was no more regarded than that of any common monk or obscure priest. We would willingly place the date of his death, where his Chronicle stops, in the year 1400; but tradition assigns the date of 1410. What date more fitting than the close of the century for one who has made that century illustrious for ever ? Among his friends were Guillaume de Machault, Eustache Deschamps, the most vigorous poet of this age of decadence, and Cuvelier, a follower of Bertrand du Guesclin. These alliances are certain. It is probable that he knew Chaucer, with whom Deschamps maintained a poetical correspondence; there is nothing to show that he ever made the acquaintance of Christine de Pisan. Froissart was more proud of his poetry than his prose. Posterity has reversed this opinion, and though a selection of his verse has been published, it would be difficult to find an admirer, or even a reader, of his poems. The selection published by Buchon in 1829 consists of the Dit dou florin, half of which is a description of the power of money; the Dibat dou cheval

et dou levrier, written during his journey in Scotland; the Dittie de la flour de la Margherite; a Dittie d' amour called L'Orlose amoureus, in which he compares himself, the imaginary lover, with a clock; the Espinette amour euse, which contains a sketch of his early life, freely and pleasantly drawn, accompanied by rondeaux and virelays; the Buisson de jonesce, in which he returns to the recollections of his own youth; and various smaller pieces. The verses are monotonous; the thoughts are not without poetical grace, but they are expressed at tedious length. It would be, however, absurd to expect in Froissart the vigour and verve possessed by none of his predecessors. The time was gone when Marie de France, Rutebceuf and Thibaut de Champagne made the 13th-century language a medium for verse of which any literature might be proud. Briefly, Froissart's poetry, unless the unpublished portion be better than that before us, is monotonous and mechanical. The chief merit it possesses is in simplicity of diction, This not infrequently produces a pleasing effect.

As for the character of his Chronicle, little need be said. There has never been any difference of opinion on the distinctive merits of this great work. It presents a vivid and faithful drawing of the things done in the 14th century. No more graphic account exists of any age. No historian has drawn so many and such faithful portraits. They are, it is true, portraits of men as they seemed to the writer, not of men as they were. Froissart was uncritical; he accepted princes by their appearance. Who, for instance, would recognize in his portrait of Gaston Phoebus de Foix the cruel voluptuary, stained with the blood of his own son, which we know him to have been? Froissart, again, had no sense of historical responsibility; he was no judge to inquire into motives and condemn actions; he was simply a chronicler. He has been accused by French authors of lacking patriotism. Yet it must be remembered that he was neither a Frenchman nor an Englishman, but a Fleming. He has been accused of insensibility to suffering. Indignation against oppression was not, however, common in the 14th century; why demand of Froissart a quality which is rare enough even in our own time? Yet there are moments when, as in describing the massacre of Limoges, he speaks with tears in his voice.

Let him be judged by his own aims. " Before I commence this book," he says, " I pray the Saviour of all the world, who created every thing out of nothing, that He will also create and put in me sense and understanding of so much worth, that this book, which I have begun, I may continue and persevere in, so that all those who shall read, see, and hear it may find in it delight and pleasance." To give delight and

pleasure, then, was his sole design.

As regards his personal character, Froissart depicts it himself for us. Such as he was in youth, he tells us, so he remained in more advanced life; rejoicing mightily in dances and carols, in hearing minstrels and poems; inclined to love all those who love dogs and hawks; pricking up his ears at the uncorking of bottles, — “Car au voire prens grand plaisir”; pleased with good cheer, gorgeous apparel and joyous society, but no common- place reveller or greedy voluptuary, — everything in Froissart was ruled by the good manners which he set before all else; and always eager to listen to tales of war and battle. As we have said above, he shows, not only by his success at courts, but also by the whole tone of his writings, that he possessed a singularly winning manner and strong personal character. He lived wholly in the present, and had no thought of the coming changes. Born when chivalrous ideas were most widely spread, but the spirit of chivalry itself, as inculcated by the best writers, in its decadence, he is penetrated with the sense of knightly honour, and ascribes to all his heroes alike those qualities which only the ideal knight possessed.

The first edition of Froissart’s Chronicles was published in Paris. It bears no date; the next editions are those of the years 1505, 1514, 1518 and 1520. The edition of Buchon, 1824, was a continuation of one commenced by Dacier. The best modern editions are those of Kervyn de Lettenhove (Brussels, 1863-1877) and Simeon Luce (Paris, 1869-1888); for bibliography see Potthast, Bibliotheca hist.

medii aevi, i. (Berlin, 1896). An abridgment was made in Latin by Belleforest, and published in 1672. An English translation was made by Bouchier, Lord Berners, and published in London, 1525. See the ” Tudor Translations ” edition of Berners (Nutt, 1901), with introduction by W. P. Ker; and the ” Globe ” edition, with introduction by G. C. Macaulay. The translation by Thomas Johnes was originally published in 1802-1805. For Froissart’s poems see Scheler’s text in K. de Lettenhove’s complete edition; Meliador has been edited by Longnon for the Societe des Anciens Textes (1895-1899). See also Madame Darmesteter (Duclaux), Froissart (1894). (W. Be.)

FROME, a market town in the Frome parliamentary division of Somersetshire, England, 107 m. W. by S. of London by the Great Western railway. Pop. of urban district (1901) 11,057. It is unevenly built on high ground above the river Frome, which is here crossed by a stone bridge of five arches. It was formerly called Frome or Froome Selwood, after the neighbouring forest of Selwood; and the country round is still richly wooded and picturesque. The parish church of St

John the Baptist, with its fine tower and spire, was built about the close of the 14th century, and, though largely restored, has a beautiful chancel, Lady chapel and baptistery. Fragments of Norman work are left; the interior is elaborately adorned with sculptures and stained glass. The market-hall, museum, school of art, and a free grammar school, founded under Edward VI., may be noted among buildings and institutions. The chief industries are brewing and art metal-working, also printing, metal-founding, and the manufacture of cloth, silk, tools and cards for wool- dressing. Dairy farming is largely practised in the neighbour- hood. Selwood forest was long a favourite haunt of brigands, and even in the 18th century gave shelter to a gang of coiners and highwaymen.

The Saxon occupation of Frome (From) is the earliest of which there is evidence, the settlement being due to the foundaˆ tion of a monastery by Aldhelm in 705. A witenagemot was held there in 934, so that Frome must already have been a place of some size. At the time of the Domesday Survey the manor was owned by King William. Local tradition asserts that Frome was a medieval borough, and the reeve of Frome is occasionally mentioned in documents after the reign of Edward I., but there is no direct evidence that Frome was a borough and no trace of any charter granted to it. It was not represented in parliament until given one member by the Reform Act of 1832. Separate representation ceased in 1885. Frome was never incorporated. A charter of Henry VII. to Edmund Leversedge, then lord of the manor, granted the right to have fairs on the 22nd of July and the 21st of September. In the 1 8th century two other fairs on the 24th of February and the 25th of November were held. Cattle fairs are now held on the last Wednesday in February and November, and a cheese fair on the last Wednesday in September. The Wednesday market is held under the charter of Henry VII. There is also a Saturday cattle market. The manufacture of woollen cloth has been established since the 15th century, Frome being the only Somer- set town in which this staple industry has flourished continuously. FROMENTIN, EUGENE (1820-1876), French painter, was born at La Rochelle in December 1820. After leaving school he studied for some years under Louis Cabat, the landscape painter. Fromentin was one of the earliest pictorial interpreters of Algeria, having been able, while quite young, to visit the land and people that suggested the subjects of most of his works, and to store his memory as well as his portfolio with the picturesque and characteristic details of North African life. In 1849 he obtained a medal of the second class. In 1852 he paid a second visit to Algeria, accompanying an archaeological mission, and then completed that minute study of the scenery of the country and of the habits of its

people which enabled him to give to his after-work the realistic accuracy that comes from intimate knowledge. In a certain sense his works are not more artistic results than contributions to ethnological science. His first great success was produced at the Salon of 1847, by the ” Gorges de la Chiffa.” Among his more important works are — ” La Place de la breche a. Constantine ” (1849); ” Enterrement

Maure ” (1853) ; ” Bateleurs negres ” and ” Audience chez un chalife ” (1859); ” Berger kabyle ” and ” Courriers arabes ” (1861); “Bivouac arabe,” ” Chasse au faucon,” ” Fauconnier arabe ” (now at Luxembourg) (1863); “Chasse au heron” (1865); ” Voleurs de nuit ” (1867); “Centaurs et arabes attaques par une lionne ” (1868); ” Halte de muletiers ” (1869); ” Le Nil ” and ” Un Souvenir d’Esneh ” (1875). Fromentin was much influenced in style by Eugene Delacroix. His works are distinguished by striking composition, great dexterity of hand- ling and brilliancy of colour. In them is given with great truth and refinement the unconscious grandeur of barbarian and animal attitudes and gestures. His later works, however, show signs of an exhausted vein and of an exhausted spirit, accompanied or caused by physical enfeeblement. But it must be observed that Fromentin’s paintings show only one side of a genius that was perhaps even more felicitously expressed in literature, though of course with less profusion. ” Dominique,” first published in the Revue des deux moiides in 1862, and dedicated to George Sand, is remarkable among the fiction of the century for delicate and imaginative observation and for emotional earnestness. Fromentin’s other literary works are — Visiles artistiques (1852); Simples Pelerinages (1856); Un £le dans le Sahara (1857); Une Annie dans le Sahel (1858); and Les Maitres d’aulrefois (1876). In 1876 he was an unsuccessful candidate for the Academy. He died suddenly at La Rochelle on the 27th of August 1876.

FROMMEL, GASTON (1862-1906), Swiss theologian, pro- fessor of theology in the university of Geneva from 1894 to 1906. An Alsatian by birth, he belonged mainly to French Switzerland, where he spent most of his life. He may best be described as continuing the spirit of Vinet (q.v.) amid the mental conditions marking the end of the 19th century. Like Vinet, he derived his philosophy of religion from a peculiarly deep experience of the Gospel of Christ as meeting the demands of the moral con- sciousness; but he developed even further than Vinet the psychological analysis of conscience and the method of

verifying every doctrine by direct reference to spiritual experience. Both made much of moral individuality or personality as the crown and criterion of reality, believing that its correlation with Christianity, both historically and philosophically, was most intimate. But while Vinet laid most stress on the liberty from human authority essential to the moral consciousness, the changed needs of the age caused Frommel to develop rather the aspect of man's dependence as a moral being upon God's spiritual initiative, " the conditional nature of his liberty." " Liberty is not the primary, but the secondary characteristic " of con- science; " before being free, it is the subject of obligation." On this depends its objectivity as a real revelation of the Divine Will. Thus he claimed that a deeper analysis carried one beyond the human subjectivity of even Kant's categorical imperative, since consciousness of obligation was " une experience imposee sous le mode de 1'absolu." By his use of imposie Frommel emphasized the priority of man's sense of obligation to his consciousness either of self or of God. Here he appealed to the current psychology of the subconscious for confirmation of his analysis, by which he claimed to transcend mere intellectualism. In his language on this fundamental point he was perhaps too jealous of admitting an ideal element as implicit in the feeling Of obligation. Still he did well in insisting on priority to self-conscious thought as a mark of metaphysical objectivity in the case of moral, no less than of physical experience. Further, he found in the Christian revelation the same characteristics as belonged to the universal revelation involved in conscience, viz. God's sovereign initiative and his living action in history. From this standpoint he argued against a purely psychological type of religion (agnoslicisme religieux; as he termed it) — a tendency to which he saw even in A. Sabatier and the symbolo- fideisme of the Paris School — as giving up a real and unifying faith. His influence on men, especially the student class, was greatly enhanced by the religious force and charm of his per- sonality. Finally, like Vinet, he was a man of letters and a penetrating critic of men and systems.

Literature. — G. Godet, Gaston Frommel (Neuchatel, 1906), a compact sketch, with full citation of sources; cf. H. Bois, in Sainte- Croix for 1906, for " L'fitudiant et le professeur." A complete edition of his writings was begun in 1907. (J. V. B.)

FRONDE, THE, the name given to a civil war in France which lasted from 1648 to 1652, and to its sequel,' the war with Spain in 1653-59. The word means a sling, and was applied to this contest from the circumstance that the windows of Cardinal Mazarin's adherents were pelted with stones by the Paris mob. Its original object was the redress of grievances, but the move- ment soon degenerated into a factional

contest among the nobles, who sought to reverse the results of Richelieu's work and to overthrow his successor Mazarin. In May 1648 a tax levied on judicial officers of the parlement of Paris was met by that body, not merely with a refusal to pay, but with a condemnation of earlier financial edicts, and even with a demand for the accept- ance of a scheme of constitutional reforms framed by a com- mittee of the parlement. This charter was somewhat influenced by contemporary events in England. But there is no real likeness between the two revolutions, the French parlement being no more representative of the people than the Inns of Court were in England. The political history of the time is dealt with in the article France: History, the present article being concerned chiefly with the military operations of what was perhaps the most costly and least necessary civil war in history.

The military record of the first or " parliamentary " Fronde is almost blank. In August 1648, strengthened by the news of Conde's victory at Lens, Mazarin suddenly arrested the leaders of the parlement, whereupon Paris broke into insurrection and barricaded the streets. The court, having no army at its immediate disposal, had to release the prisoners and to promise reforms, and fled from Paris on the night of the 22nd of October. But the signing of the peace of Westphalia set free Conde's army, and by January 1649 it was besieging Paris. The peace of Rueil was signed in March, after little blood had been shed. The Parisians, though still and always anti-cardinalist, refused to ask for Spanish aid, as proposed by their princely and noble adherents, and having no prospect of military success without such aid, submitted and received concessions. Thenceforward the Fronde becomes a story of sordid intrigues and half-hearted warfare, losing all trace of its first constitutional phase. The leaders were discontented princes and nobles — Monsieur (Gaston of Orleans, the king's uncle), the great Conde and his brother Conti, the due de Bouillon and his brother Turenne. To these must be added Gaston's daughter, Mademoiselle de Montpensier (La grande Mademoiselle), Conde's sister, Madame de Longue- ville, Madame de Chevreuse, and the astute intriguer Paul de Gondi, later Cardinal de Retz. The military operations fell into the hands of war-experienced mercenaries, led by two great, and many second-rate, generals, and of nobles to whom war was a polite pastime. The feelings of the people at large were enlisted on neither side.

This peace of Rueil lasted until the end of 1649. The princes, received at court once more, renewed their intrigues against Mazarin, who, having come to an understanding with Monsieur, Gondi and Madame de Chevreuse, suddenly arrested Conde, Conti and Longueville

(January 14, 1650). The war which followed this coup is called the "Princes' Fronde." This time it was Turenne, before and afterwards the most loyal soldier of his day, who headed the armed rebellion. Listening to the promptings of his Egeria, Madame de Longueville, he resolved to rescue her brother, his old comrade of Freiburg and Nordlingen. It was with Spanish assistance that he hoped to do so; and a powerful army of that nation assembled in Artois under the archduke Leopold, governor-general of the Spanish Netherlands. But the peasants of the country-side rose against the invaders, the royal army in Champagne was in the capable hands of Cesar de Choiseul, comte du Plessis-Praslin, who counted fifty-two years of age and thirty-six of war experience, and the little fortress of Guise successfully resisted the archduke's attack. Thereupon, however, Mazarin drew upon Plessis-Praslin's army

for reinforcements to be sent to subdue the rebellion in the south, and the royal general had to retire. Then, happily for France, the archduke decided that he had spent sufficient of the king of Spain's money and men in the French quarrel. The magnificent regular army withdrew into winter quarters, and left Turenne to deliver the princes with a motley host of Frondeurs and Lorrainers. Plessis-Praslin by force and bribery secured the surrender of Rethel on the 13th of December 1650, and Turenne, who had advanced to relieve the place, fell back hurriedly. But he was a terrible opponent, and Plessis-Praslin and Mazarin himself, who accompanied the army, had many misgivings as to the result of a lost battle. The marshal chose nevertheless to force Turenne to a decision, and the battle of Blanc-Champ (near Somme-Py) or Rethel was the consequence. Both sides were at a standstill in strong positions, Plessis-Praslin doubtful of the trustworthiness of his cavalry, Turenne too weak to attack, when a dispute for precedence arose between the Gardes franqaises and the Picardie regiment. The royal infantry had to be rearranged in order of regimental seniority, and Turenne, seeing and desiring to profit by the attendant disorder, came out of his stronghold and attacked with the greatest vigour. The battle (December 15, 1650) was severe and for a time doubt- ful, but Turenne's Frondeurs gave way in the end, and his army, as an army, ceased to exist. Turenne himself, undeceived as to the part he was playing in the drama, asked and received the young king's pardon, and meantime the court, with the maison du roi and other loyal troops, had subdued the minor risings without difficulty (March-April 1651). Conde, Conti and Longueville were released, and by April 1651

the rebellion had everywhere collapsed. Then followed a few months of hollow peace and the court returned to Paris. Mazarin, an object of hatred to all the princes, had already retired into exile. ” Le temps est un galant homme,” he remarked, “laissons le faire!” and so it proved. His absence left the field free for mutual jealousies, and for the remainder of the year anarchy reigned in France. In December 1651 Mazarin returned with a small army. The war began again, and this time Turenne and Conde were pitted against one another. After the first campaign, as we shall see, the civil war ceased, but for several other campaigns the two great soldiers were opposed to one another, Turenne as the defender of France, Conde as a Spanish invader. Their personalities alone give threads of continuity to these seven years of wearisome manoeuvres, sieges and combats, though for a right understanding of the causes which were to produce the standing armies of the age of Louis XIV. and Frederick the Great the military student should search deeply into the material and moral factors that here decided the issue.

The debut of the new Frondeurs took place in Guyenne (February-March 1652), while their Spanish ally, the archduke Leopold William, captured various northern fortresses. On the Loire, whither the centre of gravity was soon transferred, the Frondeurs were commanded by intriguers and quarrelsome lords, until Conde’s arrival from Guyenne. His bold trenchant leadership made itself felt in the action of Bleneau (7th April 1652), in which a portion of the royal army was destroyed, but fresh troops came up to oppose him, and from the skilful dispositions made by his opponents Conde felt the presence of Turenne and broke off the action. The royal army did likewise. Conde invited the commander of Turenne’s rearguard to supper, chaffed him unmercifully for allowing the prince’s men to surprise him in the morning, and by way of farewell remarked to his guest, ” Quel dommage que des braves gens comme nous se coupent la gorge pour un faquin ” — an incident and a remark that thoroughly justify the iron-handed absolutism of Louis XIV. There was no hope for France while tournaments on a large scale and at the public’s expense were fashionable amongst the grands seigneurs. After Bleneau both armies marched to Paris to negotiate with the parlement, de Retz and Mile de Montpensier, while the archduke took more fortresses in Flanders, and Charles IV., duke of Lorraine, with an army of plundering mercenaries, marched through Champagne to join Conde. As to the latter, Turenne manoeuvred past Conde and planted himself in front

of the mercenaries, and their leader, not wishing to expend his men against the old French regiments, consented to depart with a money payment and the promise of two tiny Lorraine fortresses. A few more

manoeuvres, and the royal army was able to hem in the Frondeurs in the Faubourg St Antoine (2nd July 1652) with their backs to the closed gates of Paris. The royalists attacked all along the line and won a signal victory in spite of the knightly prowess of the prince and his great lords, but at the critical moment Gaston's daughter persuaded the Parisians to open the gates and to admit Conde's army. She herself turned the guns of the Bastille on the pursuers. An insurrectional government was organized in the capital and proclaimed Monsieur lieutenant- general of the realm. Mazarin, feeling that public opinion was solidly against him, left France again, and the bourgeois of Paris, quarrelling with the princes, permitted the king to enter the city on the 2 1 st of October 1652. Mazarin returned unopposed in February 1653.

The Fronde as a civil war was now over. The whole country, wearied of anarchy and disgusted with the princes, came to look to the king's party as the party of order and settled government, and thus the Fronde prepared the way for the absolutism of Louis XIV. The general war continued in Flanders, Catalonia and Italy wherever a Spanish and a French garrison were face to face, and Conde with the wreck of his army openly and definitely entered the service of the king of Spain. The " Spanish Fronde " was almost purely a military affair and, except for a few outstanding incidents, a dull affair to boot. In 1653 France was so exhausted that neither invaders nor defenders were able to gather supplies to enable them to take the field till July. At one moment, near Peronne, Conde had Turenne at a serious disadvantage, but he could not galvanize the Spanish general Count Fuensaldana, who was more solicitous to preserve his master's soldiers than to establish Conde as mayor of the palace to the king of France, and the armies drew apart again without fighting. In 1654 the principal incident was the siege and relief of Arras. On the night of the 24th-2 5th August the lines of circumvallation drawn round that place by the prince were brilliantly stormed by Turenne's army, and Conde won equal credit for his safe withdrawal of the besieging corps under cover of a series of bold cavalry charges led by himself as usual, sword in hand. In 1655 Turenne captured the fortresses of Landrecies, Conde and St Ghislain. In 1656 the prince of Conde revenged himself for the defeat of Arras by storming Turenne's circum- vallation around Valenciennes (16th July), but Turenne drew off his forces in good order. The campaign of 1657 was uneventful, and is only to be remembered because a body of 6000 British infantry, sent by Cromwell in pursuance of his treaty of alliance with Mazarin, took part in it. The presence of the English contingent and its very definite purpose of making Dunkirk a new Calais, to be held by England for

ever, gave the next cam- paign a character of certainty and decision which is entirely wanting in the rest of the war. Dunkirk was besieged promptly and in great force, and when Don Juan of Austria and Conde appeared with the relieving army from Fumes, Turenne advanced boldly to meet him. The battle of the Dunes, fought on the 14th of June 1658, was the first real trial of strength since the battle of the Faubourg St Antoine. Successes on one wing were compromised by failure on the other, but in the end Conde drew off with heavy losses, the success of his own cavalry charges having entirely failed to make good the defeat of the Spanish right wing amongst the Dunes. Here the ” red-coats ” made their first appearance on a continental battlefield, under the leadership of Sir W. Lockhart, Cromwell’s ambassador at Paris, and astonished both armies by the stubborn fierceness of their assaults, for they were the products of a war where passions ran higher and the determination to win rested on deeper founda- tions than in the degringolade of the feudal spirit in which they now figured. Dunkirk fell, as a result of the victory, and flew the St George’s cross till Charles II. sold it to the king of France. A last desultory campaign followed in 1659 — the twenty-fifth year of the Franco-Spanish War — and the peace of the Pyrenees was signed on the 5th of November. On the 27th of January

1660 the prince asked and obtained at Aix the forgiveness of Louis XIV. The later careers of Turenne and Conde as the great generals — and obedient subjects — of their sovereign are described in the article Dutch Wars.

For the many memoirs and letters of the time see the list in G. Monod’s Bibliographic de I’histoire de France (Paris, 1888). The Lettres du cardinal Mazarin have been collected in nine volumes (Paris, 1878-1906). See P. Adolphe Cheruel, Histoire de France pendant la tninorite de Louis XIV (4 vols., 1 879-1 880), and his Histoire de France sous le ministere de Mazarin (3 vols., 1883); L. C. de Beaupoil de Sainte-Aulaire, Histoire de la Fronde (2nd ed., 2 vols., i860); ” Arvede Barine ” (Mme Charles Vincens), La Jeunesse de la grande mademoiselle (Paris, 1902) ; Due d’Aumale, Histoire des princes de Conde (Paris, 1889-1896, 7 vols.). The most interesting account of the military operations is in General Hardy de Perini’s Turenne el Conde (Batailles jrancaises, vol. iv.).

FRONTENAC ET PALLUAU, LOUIS DE BUADE, Comte de (1620—

1698), French-Canadian statesman, governor and lieu- tenant-general for the French king in La Nouvelle France (Canada), son of Henri de Buade, colonel in the regiment of Navarre, was born in the year 1620. The details of his early life are meagre, as no trace of the Frontenac papers has been discovered. The de Buades, however, were a family of distinc- tion in the principality of Beam. Antoine de Buade, seigneur de Frontenac, grandfather of the future governor of Canada, attained eminence as a councillor of state under Henri IV.; and his children were brought up with the dauphin, afterwards Louis XIII. Louis de Buade entered the army at an early age. In the year 1635 he served under the prince of Orange in Holland, and fought with credit and received many wounds during engagements in the Low Countries and in Italy. He was pro- moted to the rank of colonel in the regiment of Normandy in 1643, and three years later, after distinguishing himself at the siege of Orbitello, where he had an arm broken, he was made mar&chal de camp. His service seems to have been continuous until the conclusion of the peace of Westphalia in 1648, when he returned to his father's house in Paris and married, without the consent of her parents, Anne de la Grange-Trianon, a girl of great beauty, who later became the friend and confidante of Madame de Montpensier. The marriage was not a happy one, and after the birth of a son incompatibility of temper led to a separation, the count retiring to his estate on the Indre, where by an extravagant course of living he became hopelessly involved in debt. Little is known of his career for the next fifteen years beyond the fact that he held a high position at court; but in the year 1669, when France sent a contingent to assist the Venetians in the defence of Crete against the Turks, Frontenac was placed in command of the troops on the recommendation of Turenne. In this expedition he won military glory; but his fortune was not improved thereby.

At this period the affairs of New France claimed the attention of the French court. From the year 1665 the colony had been successfully administered by three remarkable men — Daniel de Remy de Courcelle, the governor, Jean Talon, the intendant, and the marquis de Tracy, who had been appointed lieutenant- general for the French king in America; but a difference of opinion had arisen between the governor and the intendant, and each had demanded the other's recall in the public interest. At this crisis in the administration of New France, Frontenac was appointed to succeed de Courcelle. The new governor arrived in Quebec on the 12th of September 1672. From the commencement it was evident that he was prepared to give effect to a policy of colonial expansion, and to exercise an inde- pendence of action that did not coincide with the views of the monarch or of his

minister Colbert. One of the first acts of the governor, by which he sought to establish in Canada the three estates — nobles, clergy and people — met with the disapproval of the French court, and measures were adopted to curb his ambition by increasing the power of the sovereign council and by reviving the office of intendant. Frontenac, however, was a man of dominant spirit, jealous of authority, prepared to exact obedience from all and to yield to none. In the course of events he soon became involved in quarrels with the intendant touching questions of precedence, and with the ecclesiastics, one or two

of whom ventured to criticize his proceedings. The church in Canada had been administered for many years by the religious orders; for the see of Quebec, so long contemplated, had not yet been erected. But three years after the arrival of Frontenac a former vicar apostolic, Francois Xavier de Laval de Mont- morenci, returned to Quebec as bishop, with a jurisdiction over the whole of Canada. In this redoubtable churchman the governor found a vigorous opponent who was determined to render the state subordinate to the church. P'rontenac, following in this respect in the footsteps of his predecessors, had issued trading licences which permitted the sale of intoxicants. The bishop, supported by the intendant, endeavoured to suppress this trade and sent an ambassador to France to obtain remedial action. The views of the bishop were upheld and henceforth authority was divided. Troubles ensued between the governor and the sovereign council, most of the members of which sided with the one permanent power in the colony — the bishop; while the suspicions and intrigues of the intendant, Duchesneau, were a constant source of vexation and strife. As the king and his minister had to listen to and adjudicate upon the appeals from the contending parties their patience was at last worn out, and both governor and intendant were recalled to France in the year 1682. During Frontenac's first administration many improvements had been made in the country. The defences had been strengthened, a fort was built at Cataraqui (now Kingston), Ontario, bearing the governor's name, and conditions of peace had been fairly maintained between the Iroquois on the one hand and the French and their allies, the Ottawas and the Hurons, on the other. The progress of events during the next few years proved that the recall of the governor had been ill-timed. The Iroquois were assuming a threatening attitude towards the inhabitants, and Frontenac's successor, La Barre, was quite incapable of leading an army against such cunning foes. At the end of a year La Barre was replaced by the marquis de Denonville, a man of ability and courage, who, though he showed some vigour in marching against the western

Iroquois tribes, angered rather than intimidated them, and the massacre of Lachine (5th of August 1689) must be regarded as one of the unhappy results of his administration.

The affairs of the colony were now in a critical condition; a man of experience and decision was needed to cope with the difficulties, and Louis XIV., who was not wanting in sagacity, wisely made choice of the choleric count to represent and uphold the power of France. When, therefore, on the 1 5th of October 1689, Frontenac arrived in Quebec as governor for the second time, he received an enthusiastic welcome, and confidence was at once restored in the public mind. Quebec was not long to enjoy the blessing of peace. On the 16th of October 1690 several New England ships under the command of Sir William Phipps appeared off the Island of Orleans, and an officer was sent ashore to demand the surrender of the fort. Frontenac, bold and fearless, sent a defiant answer to the hostile admiral, and handled so vigorously the forces he had collected as com- pletely to repulse the enemy, who in their hasty retreat left behind a few pieces of artillery on the Beauport shore. The prestige of the governor was greatly increased by this event, and he was prepared to follow up his advantage by an attack on Boston from the sea, but his resources were inadequate for the undertaking. New France now rejoiced in a brief respite from her enemies, and during the interval Frontenac encouraged the revival of the drama at the Chateau St-Louis and paid some attention to the social life of the colony. The Indians, however, were not yet subdued, and for two years a petty warfare was maintained. In 1696 Frontenac decided to take the field against the Iroquois, although at this time he was seventy-six years of age. On the 6th of July he left Lachine at the head of a con- siderable force for the village of the Onondagas, where he arrived a month later. In the meantime the Iroquois had abandoned their villages, and as pursuit was impracticable the army com- menced its return march on the 10th of August. The old warrior endured the fatigue of the march as well as the youngest soldier, and for his courage and prowess he received the cross of St

Louis. Frontenac died on the 28th of November 1698 at the Chateau St-Louis after a brief illness, deeply mourned by the Canadian people. The faults of the governor were those of temperament, which had been fostered by early environment. His nature was turbulent, and from his youth he had been used to command; but underlying a rough

exterior there was evidence of a kindly heart. He was fearless, resourceful and decisive, and triumphed as few men could have done over the difficulties and dangers of a most critical position.

See Count Frontenac, by W. D. Le Sueur (Toronto, 1906) ; Count Frontenac and New France under Louis XIV, by Francis Park- man (Boston, 1878); Le Comte de Frontenac, by Henri Lorin (Paris, 1895); Frontenac et ses amis, by Ernest Myrand (Quebec, 1902). (A. G. D.)

FRONTINUS, SJBXTUS JULIUS (c. a.d. 40-103), Roman soldier and author. In 70 he was city praetor, and five years later was sent into Britain to succeed Petilius Cerealis as governor of that island. He subdued the Silures, and held the other native tribes in check till he was superseded by Agricola (78). In 97 he was appointed superintendant of the aqueducts (curator aquarum) at Rome, an office only conferred upon persons of very high standing. He was also a member of the college of augurs. His chief work is De aquis urbis Romae, in two books, containing a history and description of the water-supply of Rome, including the laws relating to its use and maintenance, and other matters of importance in the history of architecture. Frontinus also wrote a theoretical treatise on military science (De re militari) which is lost. His Strategematicon libri Hi. is a collection of examples of military stratagems from Greek and Roman history, for the use of officers; a fourth book, the plan and style of which is different from the rest (more stress is laid on the moral aspects of war, e.g. discipline), is the work of another writer (best edition by G. Gundermann, 1888). Extracts from a treatise on land-surveying ascribed to Frontinus are preserved in Lachmann's Gromatici veleres (1848).

A valuable edition of the De aquis (text and translation) has been published by C. Herschel (Boston, Mass., 1899). It contains numer- ous illustrations; maps of the routes of the ancient aqueducts and the city of Rome in the time of Frontinus; a photographic reproduction of the only MS. (the Monte Cassino); several ex- planatory chapters, and a concise bibliography, in which special reference is made to P. d Tissot, jStude sur la condition des agri- mensores (1879). There is a complete edition of the works by A. Dederich (1855), and an English translation of the Strategematica by R. Scott (1816).

FRONTISPIECE (through the French, from Med. Lat. frontis- picium, a front view, frons, frontis, forehead or front, and specere, to look at; the English spelling is a mistaken adaptation to " piece "), an architectural term for the principal front of a building, but more generally applied to a richly decorated entrance doorway, if projecting

slightly only in front of the main wall, otherwise portal or porch would be a more correct term. The word, however, is more used for a decorative design or the representation of some subject connected with the sub- stance of a book and placed as the first illustrated page. A design at the end of the chapter of a book is called a tail-piece.

FRONTO, MARCUS CORNELIUS (c. a.d. 100-170), Roman grammarian, rhetorician and advocate, was born of an Italian family at Cirta in Numidia. He came to Rome in the reign of Hadrian, and soon gained such renown as an advocate and orator as to be reckoned inferior only to Cicero. He amassed a large fortune, erected magnificent buildings and purchased the famous gardens of Maecenas. Antoninus Pius, hearing of his fame, appointed him tutor to his adopted sons Marcus Aurelius and Lucius Verus. In 143 he was consul for two months, but declined the proconsulship of Asia on the ground of ill-health. His latter years were embittered by the loss of all his children except one daughter. His talents as an orator and rhetorician were greatly admired by his contemporaries, a number of whom formed themselves into a school called after him Frontoniani, whose avowed object it was to restore the ancient purity and simplicity of the Latin language in place of the exaggerations of the Greek sophistical school. However praiseworthy the inten- tion may have been, the list of authors specially recommended

does not speak well for Fronto's literary taste. The authors of the Augustan age are unduly depreciated, while Ennius, Plautus, Laberius, Sallust are held up as models of imitation. Till 1815 the only extant works ascribed (erroneously) to Fronto were two grammatical treatises, De nominum verborumque differentiis and Exempla elocutionum (the last being really by Arusianus Messius). In that year, however, Angelo Mai discovered in the Ambrosian library at Milan a palimpsest manuscript (and, later, some additional sheets of it in the Vatican), on which had been originally written some of Fronto's letters to his royal pupils and their replies. These palimpsests had originally belonged to the famous convent of St Columba at Bobbio, and had been written over by the monks with the acts of the first council of Chalcedon. The letters, together with the other fragments in the palimpsest, were published at Rome in 1823. Their contents falls far short of the writer's great reputation. The letters consist of correspondence with Antoninus Pius, Marcus Aurelius and Lucius Verus, in which the character of Fronto's pupils appears in a very favourable light, especially in the affection they both seem to have retained for their old master; and letters to friends, chiefly letters of recommendation. The collection also contains treatises on eloquence, some historical fragments, and literary trifles on such subjects as the

praise of smoke and dust, of negligence, and a dissertation on Arion. ” His style is a laborious mixture of archaisms, a motley cento, with the aid of which he conceals the poverty of his knowledge and ideas.” His chief merit consists in having preserved extracts from ancient writers which would otherwise have been lost.

The best edition of his works is by S. A. Naber (1867), with an account of the palimpsest; see also G. Boissier, ” Marc-Aurele et les lettres de F.,” in Revue des deux mondes (April 1868); R. Ellis, in Journal of Philology (1868) and Correspondence 0} Fronto and M. Aurelius (1904) ; and the full bibliography in the article by Brzoska m the new edition of Pauly’s Realencyclopadie der classischen Alter- tumswissenschaft, iv. pt. i. (1900).

FROSINONE (anc. Frusino), a town of Italy in the province of Rome, from which it is 53 m. E.S.E. by rail. Pop. (1901) town, 9530; commune, 11,029. The place is picturesquely situated on a hill of 955 ft. above sea-level, but contains no buildings of interest. Of the ancient city walls a small fragment alone is preserved, and no other traces of antiquity are visible, not even of the amphitheatre which it once possessed, for which a ticket (tessera) has been found (Th. Mommsen in Ber. d. Sach- sischen Gesellschajt d. Wissenschaften, 1849, 286). It was a Volscian, not a Hernican, town; a part of its territory was taken from it about 306-303 B.C. by the Romans and sold. The town then became a praefectura, probably with the civitas sine suffragio, and later a colony, but we hear nothing important of it. It was situated just above the Via Latina. (T. As.)

FROSSARD, CHARLES AUGUSTE (1807-1875), French general, was born on the 26th of April 1807, and entered the army from the Ecole Poly technique in 1827, being posted to the engineers. He took part in the siege of Rome in 1849 and in that of Sebastopol in 1855, after which he was promoted general of brigade. Four years later as general of division, and chief of engineers in the Italian campaign, he attracted the particular notice of the emperor Napoleon III., who made him in 1867 chief of his military household and governor to the prince imperial. He was one of the superior military authorities who in this period 1866-1870 foresaw and endeavoured to prepare for the inevitable war with Germany, and at the outbreak of war he was given by Napoleon the choice between a corps command and the post of chief engineer at headquarters. He chose the command of the II. corps. On the 6th of August 1870 he held the position of Spicheren against the Germans until the arrival of reinforcements for the latter, and the non-appearance of the other French corps compelled him to retire. After this he took part in the battles around Metz, and was involved

with his corps in the surrender of Bazaine's army. General Frossard published in 1872 a Rapport sur les operations du 2′ corps. He died at Chateau- Villain (Haute-Marne) on the 25th of August 1875.

FROST, WILLIAM EDWARD (1810-1877), English painter, was born at Wandsworth, near London, in September 18 10. About

1825, through William Etty, R.A., he was sent to a drawing school in Bloomsbury, and after several years' study there, and in the sculpture rooms at the British Museum, Frost was in 1829 admitted as a student in the schools of the Royal Academy. He won medals in all the schools, except the antique, in which he was beaten by Maclise. During those years he maintained himself by portrait-painting. He is said to have painted about this time over 300 portraits. In 1839 he obtained the gold medal of the Royal Academy for his picture of " Prometheus bound by Force and Strength." At the cartoon exhibition at Westminster Hall in 1843 he was awarded a third-class prize of £100 for his cartoon of " Una alarmed by Fauns and Satyrs." He exhibited at the Academy " Christ crowned with Thorns " (1843), " Nymphs dancing " (1844), " Sabrina " (1845), " Diana and Actaeon " (1846). In 1846 he was elected Associate of the Royal Academy. His " Nymph disarming Cupid " was ex- hibited in 1847; " Una and the Wood-Nymphs " of the same year was bought by the queen. This was the time of Frost's highest popularity, which considerably declined after 1850. His later pictures are simply repetitions of earlier motives. Among them may be named " Euphrosyne " (1848), " Wood-Nymphs " (1851)," Chastity "(1854)," II Penseroso "(1855), "The Graces" (1856), "Narcissus" (1857), "Zephyr with Aurora playing" (1858), " The Graces and Loves " (1863), " Hylas and the Nymphs " (1867). Frost was elected to full membership of the Royal Academy in December 1871. This dignity, however, he soon resigned. Frost had no high power of design, though some of his smaller and apparently less important works are not with- out grace and charm. Technically, his paintings are, in a sense, very highly finished, but they are entirely without mastery. He died on the 4th of June 1877.

FROST (a common Teutonic word, cf. Dutch, vorst, Ger. Frost, from the common Teutonic verb meaning " to freeze," Dutch, vriezcn, Ger. frieren; the Indo-European root is seen in Lat. pruina, hoar-frost, cf. prurire, to itch, burn, pruna, burning coal, Sansk. plush, to burn), in meteorology, the act, or agent of the process, of freezing; hence the

terms ” hoar-frost ” and ” white- frost ” applied to visible frozen vapourformed on exposed surfaces. A frost can only occur when the surface temperature falls below 3 2° F., the freezing-point of water; if the temperature be between 28 and 32° it is a ” light frost,” if below 28 it is a ” heavy,” ” killing ” or ” black frost “; the term ” black frost ” is also used when no hoar-frost is present. The number of degrees below freezing-point is termed ” degrees of frost.” As soon as a mass of air is cooled to its dew-point, water begins to be precipitated in the form of rain, dew, snow or hail. Hoar- frost is only formed at the immediate surface of the land if the latter be at a temperature below 32 , and this may occur even when the temperature of the air a few feet above the ground is 12°- 16° above the freezing-point. The heaviest hoar-frosts are formed under weather conditions similar to those under which the heaviest summer dews occur, namely, clear and calm nights, when there is no cloud to impede the radiation of heat from the surface of the land, which thereby becomes rapidly and completely cooled. The danger of frost is minimized when the soil is very moist, as for example after 10-12 mm. of rain; and it is a practice in America to flood fields on the receipt of a frost warning, radiation being checked by the light fog sheets which develop over moist soils, just as a cloud-layer in the upper atmosphere impedes radiation on a grand scale. A layer of smoke will also impede radiation locally, and to this end smoky fires are sometimes lit in such positions that the smoke may drift over planted ground which it is desirable to preserve from frost. Similarly, frost may occur in open country when a town, protected by its smoke-cloud above, is free of it. In a valley with fairly high and steep flanks frost sometimes occurs locally at the bottom, because the layer of air cooled by contact with the cold surface of the higher ground is heavier than that not so cooled, and therefore tends to flow or settle downwards along the slope of the land. When meteorological considerations point to a frost, an estimate Of the night temperature may be obtained by multiplying the difference between the readings of the wet

and dry bulb thermometer by 2-5 and subtracting the result from the dry bulb temperature. This rule applies when the evening air is at about 50° and 3o-i-in. pressure, the sky being clear. An instrument has been devised in Ii-ance for the pre- diction of frost. It consists of a wet bulb ana a dry bulb ther- mometer, mounted on a board on which is also a scale of lines corresponding to degrees of the dry bulb, and a pointer traversing a scale graduated according to degrees of the wet bulb. Observa- tions for the night are taken about half an hour before sunset. By means of the pointer and scale, the point may be found at which the line of the dry-bulb reading meets the pointer set to the

reading of the wet bulb. The scale is further divided by- colours so that the observed point may fall within ont of three zones, indicating certain frost, probable frost or no probability of frost.

FROSTBITE, a form of mortification (g.v.), due to the action of extreme cold in cutting off the blood-supply from the fingers, toes, nose, ears, &c. In comparatively trifling forms it occurs as ” chaps ” and ” chilblains,” but the term frostbite is usually applied only to more severe cases, where the part affected becomes in danger of gangrene. An immediate application of snow, or ice-water, will restore the circulation; the application of heat would cause inflammation. But if the mortification has gone too far for the circulation to be restored, the part will be lost, and surgical treatment may be necessary.

FROSTBURG, a town of Allegany county, Maryland, U.S.A., [i m. W. of Cumberland. Pop. (1890) 3804; (1900) 5274 (578 foreign-born and 236 negroes); (1910) 6028. It is served by the Cumberland & Pennsylvania railway and the Cumberland & Westernport electric railway. The town is about 2000 ft. above sea-level on a plateau between the Great Savage and Dans mountains, and its delightful scenery and air have made it attractive as a summer resort. It is the seat of the second state normal school, opened in 1904. Frostburg is in the midst of the coal region of the state, and is itself almost completely under- mined; it has planing mills and manufactures large quantities of fire-brick. The municipality owns and operates its water-works. Natural gas is piped to Frostburg from the West Virginia fields, 120 m. away. Frostburg was first settled in 1812; was called Mount Pleasant until about 1830, when the present name was substituted in honour of Meshech Frost, one of the town’s founders; and was incorporated in 1870.

FROTHINGHAM, OCTAVIUS BROOKS (1822-1895), American clergyman and author, was born in Boston on the 26th of November 1822, son of Nathaniel Langdon Frothingham (1793- 1870), a prominent Unitarian preacher of Boston, and through his mother’s family related to Phillips Brooks. He graduated from Harvard College in 1843 and from the Divinity School in 1846. He was pastor of the North Unitarian church of Salem, Massachusetts, in 1847-1855. From 1855 to i860 he was pastor of a new Unitarian society in Jersey City, where he gave up the Lord’s Supper, thinking that it ministered to self-satisfaction; and it was as a radical Unitarian that he became pastor of another young church in New York City in i860. Indeed in 1864 he was recognized as leader of the radicals after his reply to Dr Hedge’s address to the graduating students of the Divinity School on Anti-Supernaturalism in the Pulpit. In 1865, when he had practically

given up ” transcendentalism,” his church building was sold and his congregation began to worship in Lyric Hall under the name of the Independent Liberal Church; in 1875 they removed to the Masonic Temple, but four years later ill- health compelled Frothingham’s resignation, and the church dissolved. Paralysis threatened him and he never fully recovered his health; in 1881 he returned to Boston, where he died on the 27 th of November 1895. To this later period of his life belongs his best literary work. While he was in New York he was for a time art critic of the Tribune. Always himself on the unpopular side and an able but thoroughly fair critic of the majority, he habitually under-estimated his own worth; he was not only an anti-slavery leader when abolition was not popular even in New England, and a radical and rationalist when it was impossible for him to stay conveniently in the Unitarian Church, but he

was the first president of the National Free Religious Association (1867) and an early and ardent disciple of Darwin and Spencer. To his radical view 3 he was always faithful. It is a mistake to say that he grew more conservative in later years; but his judgment grew r.ore generous and catholic. He was a greater orator than man of letters, and his sermons in New York were delivered to large audiences, averaging one thousand at the Masonic Temple, and were printed each week; in eloquence and in the charm of his spoken word he was probably surpassed in his day by none save George William Curtis. Personally he seemed cold and distant, partly because of his impressive appear- ance, and partly because of his own modesty, which made him backward in seeking friendships.

His principal published works are: Stories from the Life of the Teacher (1863), A Child’s Book of Religion (1866), and other works of religious teaching for children; several volumes of sermons; Beliefs of Unbelievers (1876), The Cradle of the Christ: a Study in Primitive Christianity (1877), The Spirit of New Faith (1877), The Rising and the Setting Faith (1878), and other expositions of the “new faith” he preached; Life of Theodore Parker (1874), Transcendentalism in New England (1876), which is largely bio- graphical, Gerrit Smith, a Biography (1878), George Ripley (1882), in the “American Men of Letters” series, Memoir of William Henry Channing (1886), Boston Unitarianism, 1820-1850 (1890), really a biography of his father; and Recollections and Impressions,

1822-1800 (1891).

FROUDE, JAMES ANTHONY (181 8-1 894), English historian, son of R. H. Froude, archdeacon of Totnes, was born at Dartington, Devon, on the 23rd of April 1818. He. was educated at Westminster and Oriel College, Oxford, then the centre of the ecclesiastical revival. He obtained a second class and the chancellor's English essay prize, and was elected a fellow of Exeter College (1842). His elder brother, Richard Hurrell Froude (1803-1836), had been one of the leaders of the High Church movement at Oxford. Froude joined that party and helped J. H. Newman, afterwards cardinal, in his Lives of the English Saints. He was ordained deacon in 1845. By that time his religious opinions had begun to change, he grew dissatisfied with the views of the High Church party, and came under the influence of Carlyle's teaching. Signs of this change first appeared publicly in his Shadows of the Clouds, a volume containing two stories of a religious sort, which he published in 1847 under the pseudonym of " Zeta," and his complete desertion of his party was declared a year later in his Nemesis of Faith, an heretical and unpleasant book, of which the earlier part seems to be autobiographical.

On the demand of the college he resigned his fellowship at Oxford, and mainly at least supported himself by writing, contributing largely to Fraser's Magazine and the Westminster Review. The excellence of his style was soon generally re- cognized. The first two volumes of his History of England from the Fall of Wolsey to the Defeat of the Spanish Armada appeared in 1856, and the work was completed in 1870. As an historian he is chiefly remarkable for literary excellence, for the art with which he represents his conception of the past. He condemns a scientific treatment of history and disregards its philosophy. He held that its office was simply to record human actions and that it should be written as a drama. Accordingly he gives prominence to the personal element in history. His presentations of character and motives, whether truthful or not, are undeniably fine; but his doctrine that there should be " no theorizing " about history tended to narrow his survey, and consequently he sometimes, as in his remarks on the foreign policy of Elizabeth, seems to misapprehend the tendencies of a period on which he is writing.

Froude's work is often marred by prejudice and incorrect statements. He wrote with a purpose. The keynote of his History is contained in his assertion that the Reformation was " the root and source of the expansive force which has spread the Anglo-Saxon race over the globe." Hence he overpraises Henry VIII. and others who forwarded the movement, and speaks too harshly of some of its opponents. So

too, in his English in Ireland (1872-1874), which was written to show the futility of attempts to conciliate the Irish, he aggravates all

that can be said against the Irish, touches too lightly on English atrocities,and writes unjustly of the influence of Roman Catholi- cism. A strong anti-clerical prejudice is manifest in his historical work generally, and is doubtless the result of the change in his views on Church matters and his abandonment of the clerical profession. Carlyle's influence on him may be traced both in his admiration for strong rulers and strong government, which led him to write as though tyranny and brutality were excusable, and in his independent treatment of character. His rehabilita- tion of Henry VIII. was a useful protest against the idea that the king was a mere'sanguinary profligate, but his representation of him as the self-denying minister of his people's will is erroneous, and is founded on the false theory that the preambles of the acts of Henry's parliaments represented the opinions of the educated laymen of England. As an advocate he occasionally forgets that sobriety of judgment and expression become an historian. He was not a judge of evidence, and seems to have been unwilling to admit the force of any argument or the authority of any statement which militated against his case. In his Divorce of Catherine of Aragon (1891) he made an unfortunate attempt to show that certain fresh evidence on the subject, brought forward by Dr Gairdner, Dr Friedmann and others, was not inconsistent with the views which he ha'd expressed in his History nearly forty years before. He worked diligently at original manuscript authorities at Simancas, the Record Office and Hatfield House; but he used his materials carelessly, and evidently brought to his investigation of them a mind already made up as to their signifi- cance. His Life of Caesar (1879), a glorification of imperialism, betrays an imperfect acquaintance with Roman politics and the life of Cicero; and of his two pleasant books of travel, The English in the West Indies (1888) shows that he made little effort to master his subject, and Oceana (1886), the record of a tour in Australia and New Zealand, among a multitude of other blunders, notes the prosperity of the working-classes in Adelaide at the date of his visit, when, in fact, owing to a failure in the wheat- crop, hundreds were then living on charity. He was constitution- ally inaccurate, and seems to have been unable to represent the exact sense of a document which lay before him, or even to copy from it correctly. Historical scholars ridiculed his mistakes, and Freeman, the most violent of his critics, never let slip a chance of hitting at him in the Saturday Review. Froude's temperament was sensitive, and he suffered from these attacks, which were often unjust and always too savage in tone. The literary quarrel between him and Freeman excited general interest

when it blazed out in a series of articles which Freeman wrote in the Contemporary Review (1878-1879) on Froude's Short Study of Thomas Becket.

Notwithstanding its defects, Froude's History is a great achievement; it presents an important and powerful account of the Reformation period in England, and lays before us a picture of the past magnificently conceived, and painted in colours which will never lose their freshness and beauty. As with Froude's work generally, its literary merit is remarkable; it is a well-balanced and orderly narrative, coherent in design and symmetrical in execution. Though it is perhaps needlessly long, the thread of the story is never lost amid a crowd of details; every incident is made subordinate to the general idea, appears in its appropriate place, and contributes its share to the perfection of the whole. The excellence of its form is matched by the beauty of its style, for Froude was a master of English prose. The most notable characteristic of his style is its graceful simplicity; it is never affected or laboured; his sentences are short and easy, and follow one another naturally. He is always lucid. He was never in doubt as to his own meaning, and never at a loss for the most appropriate words in which to express it. Simple as his language is, it is dignified and worthy of its subject. Nowhere perhaps does his style appear to more advantage than in his four series of essays entitled Short Studies on Great Subjects(1 86 7-1 88 2) , for it is seen there unfettered by the obligations of narrative. Yet his narrative is admirably told. For the most part flowing easily along, it rises on fit occasions to splendour, picturesque beauty or pathos. Few more brilliant pieces of historical

writing exist than his description of the coronation procession of Anne Boleyn through the streets of London, few more full of picturesque power than that in which he relates how the spire of St Paul's was struck by lightning; and to have once read is to remember for ever the touching and stately words in which he compares the monks of the London Charterhouse preparing for death with the Spartans at Thermopylae. Proofs of his power in the sustained narration of stirring events are abundant; his treatment of the Pilgrimage of Grace, of the sea fight at St Helens and the repulse of the French invasion, and of the murder of Rizzio, are among the most conspicuous examples of it. Nor is he less successful when recording pathetic events, for his stories of certain martyrdoms, and of the execution of Mary queen of Scots, are told with exquisite feeling and in language of well-restrained

emotion. And his characters are alive. We may not always agree with his portraiture, but the men and women whom he saw exist for us instinct with the life with which he endows them and animated by the motives which he attributes to them. His successes must be set against his failures. At the least he wrote a great history, one which can never be disregarded by future writers on his period, be their opinions what they may; which attracts and delights a multitude of readers, and is a splendid example of literary form and grace in historical composition.

The merits of his work met with full recognition. Each instalment of his History, in common with almost everything which he wrote, was widely read, and in spite of some adverse criticisms was received with eager applause. In 1868 he was elected rector of St Andrews University, defeating Disraeli by a majority of fourteen. He was warmly welcomed in the United States, which he visited in 1872, but the lectures on Ireland which he delivered there caused much dissatisfaction. On the death of his adversary Freeman in 1892, he was appointed, on the recommendation of Lord Salisbury, to succeed him as regius professor of modern history at Oxford. Except to a few Oxford men, who considered that historical scholarship should have been held to be a necessary qualification for the office, his appointment gave general satisfaction. His lectures on Erasmus and other 16th-century subjects were largely attended. With some allowance for the purpose for which they were originally written, they present much the same characteristics as his earlier historical books. His health gave way in the summer of 1894, and he died on the 20th of October.

His long life was full of literary work. Besides his labours as an author, he was for fourteen years editor of Fraser's Magazine. He was one of Carlyle's literary executors, and brought some sharp criticism upon himself by publishing Carlyle's Re- miniscences and the Memorials of Jane Welsh Carlyle, for they exhibited the domestic life and character of his old friend in an unpleasant light. Carlyle had given the manuscripts to him, telling him that he might publish them if he thought it well to do so, and at the close of his life agreed to their publication. Froude therefore declared that in giving them to the world he was carrying out his friend's wish by enabling him to make a posthumous confession of his faults. Besides publishing these manuscripts he wrote a Life of Carlyle. His earlier study of Irish history afforded him suggestions for a historical novel entitled The Two Chiefs of Dunboy (1889). In spite of one or two stirring scenes it is a tedious book, and its personages are little more than machines for the enunciation of the author's opinions and sentiments. Though Froude had some intimate friends he was generally reserved. When he

cared to please, his manners and conversation were charming. Those who knew him well formed a high estimate of his ability in practical affairs. In 1874 Lord Carnarvon, then colonial secretary, sent Froude to South Africa to report on the best means of promoting a confederation of its colonies and states, and in 1875 he was again sent to the Cape as a member of a proposed conference to further confederation. Froude's speeches in South Africa were rather injudicious, and his mission was a failure (see South Africa: History). He was twice married. His first wife, a

daughter of Pascoe Grenfell and sister of Mrs Charles Kingsley, died in i860; his second, a daughter of John Warre, M.P. for Taunton, died in 1874.

Froude's Life, by Herbert Paul, was published in 1905.

(W. Hu.) FRUCTOSE, Laevulose, or Fruit-Sugar, a carbohydrate of the formula C 6 Hi 2 06. It is closely related to ordinary d- glucose, with which it occurs in many fruits, starches and also in honey. It is a hydrolytic product of inulin, from which it may be prepared; but it is more usual to obtain it from " invert sugar," the mixture obtained by hydrolysing cane sugar with sulphuric acid. Cane sugar then yields a syrupy mixture of glucose and fructose, which, having been freed from the acid and concentrated, is mixed with water, cooled in ice and calcium hydroxide added. The fructose is precipitated as a saccharate, which is filtered, suspended in water and decomposed by carbon dioxide. The liquid is filtered, the filtrate concentrated, and the syrup so obtained washed with cold alcohol. On cooling the fructose separates. It may be obtained as a syrup, as fine, silky needles, a white crystalline powder, or as a granular crystalline, somewhat hygroscopic mass. When anhydrous it melts at about 95° C. It is readily soluble in water and in dilute alcohol, but insoluble in absolute alcohol. It is sweeter than cane sugar and is more easily assimilated. It has been employed under the name diabetin as a sweetening agent for diabetics, since it does not increase the sugar-content of the urine; other medicinal applications are in phthisis (mixed with quassia or other bitter), and for children suffering from tuberculosis or scrofula in place of cane sugar or milk-sugar.

Chemically, fructose is an oxyketone or ketose, its structural formula being CH 2 OH-(CH-OH) r CO-CH 2 OH; this result fol- lowed from its conversion by H. Kiliani into methylbutylacetic acid. The form described above is /aew-rotatory, but it is termed rf-fructose, since it is related to d-glucose. Solutions exhibit mutarotation, fresh solutions having a specific rota- tion of -104-0°, which gradually diminishes to

-92 . It was synthesized by Emil Fischer, who found the synthetic sugar which he named a-acrose to be (d+/)-fructose, and by splitting this mixture he obtained both the d and I forms. Fructose resembles J-glucose in being fermentable by yeast (it is the one ketose which exhibits this property), and also in its power of reducing alkaline copper and silver solutions; this latter property is assigned to the readiness with which hydroxyl and ketone groups in close proximity suffer oxidation. For the structural (stereochemical) relations of fructose see Sugar.

FRUGONI, CARLO INNOCENZIO MARIA (1692-1768), Italian poet, was born at Genoa on the 21st of November 1692. He was originally destined for the church and at the age of fifteen, in opposition to his strong wishes, was shut up in a convent; but although in the following year he was induced to pronounce monastic vows, he had no liking for this life. He acquired considerable reputation as an elegant writer both of Latin and Italian prose and verse; and from 17 16 to 1724 he filled the chairs of rhetoric at Brescia, Rome, Genoa, Bologna and Modena successively, attracting by his brilliant fluency a large number of students at each university. Through Cardinal Bentivoglio he was recommended to Antonio Farnese, duke of Parma, who appointed him his poet laureate; and he remained at the court of Parma until the death of Antonio, after which he returned to Genoa. Shortly afterwards, through the inter- cession of Bentivoglio, he obtained from the pope the remission of his monastic vows, and ultimately succeeded in recovering a portion of his paternal inheritance. After the peace of Aix-la- Chapelle he returned to the court of Parma, and there devoted ,the later years of his life chiefly to poetical composition. He died on the 20th of December 1768. As a poet Frugoni was one of the best of the school of the Arcadian Academy, and his lyrics and pastorals had great facility and elegance.

His collected works were published at Parma in 10 vols, in 1799, and a more complete edition appeared at Lucca in the same year in 15 vols. A selection from his works was published at Brescia in 1782, in 4 vols.

FRUIT (through the French from the Lat. frudus; frui, to enjoy), in its widest sense, any product of the soil that can be enjoyed by man or animals; the word is so used constantly in the Bible, and extended, as a Hebraism, to offspring or progeny of man and of animals, in such

expressions as ” the fruit of the body,” ” of the womb,” ” fruit of thy cattle ” (Deut. sxviii. 4), &c, and generally to the product of any action or effort. Between this wide and frequently figurative use of the word and its application in the strict botanical sense treated below, there is a popular meaning, regarding the objects denoted by the word entirely from the standpoint of edibility, and differentiating them roughly from those other products of the soil, which, regarded similarly, are known as vegetables. In this sense ” fruit ” is applied to such seed-envelopes of plants as are edible, either raw or cooked, and are usually sweet, juicy or of a refreshing flavour. But applications of the word in this sense are apt to be loose and shifting according to the fashion of the time.

Fruit, in the botanical sense, is developed from the flower as the result of fertilization of the ovule. After fertilization various changes take place in the parts of the flower. Those more immediately concerned in the process, the anther and stigma, rapidly wither and decay, while the filaments and style often remain for some time; the floral envelopes become dry, the petals fall, and the sepals are either deciduous, or remain persistent in an altered form; the ovary becomes enlarged, forming the pericarp; and the ovules are developed as the seeds, containing the embryo-plant. The term fruit is strictly applied to the mature pistil or ovary, with the seeds in its interior; but it often includes other parts of the flower, such as the bracts and floral envelopes. Thus the fruit of the hazel and oak consists of the ovary enveloped by the bracts; that of the apple and pear, of the ovary and floral receptacle; and that of the pineapple, of the whole inflorescence. Such fruits are sometimes distin- guished as pseudocarps. In popular language, the fruit includes all those parts which exhibit a striking change as the result of fertilization. In general, the fruit is not ripened unless fertiliza- tion has been effected; but cases occur as the result of cultivation in which the fruit swells and becomes to all appearance perfect, while no seeds are produced. Thus, there are seedless oranges, grapes and pineapples. When the ovules are unfertilized, it is common to find that the ovary withers and does not come to maturity; but in the case of bananas, plantains and breadfruit, the non -development of seeds seems to* lead to a larger growth and a greater succulence of fruit.

The fruit, like the ovary, may be formed of a single carpel or of several. It may have one cell or cavity, being unilocular; or many, multilocular, &c. The number and nature of the divisions depend on the number of carpels and the extent to which their edges are folded inwards. The appearances presented by the ovary do not always remain permanent in the fruit. Great changes are observed to take

place, not merely as regards the increased size of the ovary, its softening or hardening, but also in its internal structure, owing to the suppression, additional formation or enlargement of parts. Thus, in the ash (fig. 1) an ovary with two cells, each containing an ovule attached to a central placenta, is changed into a unilocular fruit with one seed ; one ovule becomes abortive, while the other, g, gradually enlarging until the septum is pushed to one side, unites with the walls of the cell, and the placenta appears to be parietal. In the oak and hazel, an ovary with three and two cells respectively, and two ovules in each, produces a one-celled fruit with one seed. In the coco-nut, a trilocular and triovular ovary produces a one- celled, one-seeded fruit. This abortion may depend on the pressure caused by the development of certain ovules, or it may proceed from non-fertilization of all the ovules and consequent non-enlargement of the carpels. Again, by the growth of the placenta, or the folding inwards of parts of the carpels, divisions occur in the fruit which did not exist in the ovary. In Calhartocarpus Fistula a one-celled ovary is changed into a fruit having each of its seeds in a separate cell, in consequence of spurious dissepiments being produced hori- zontal from the inner wall of the ovary. In flax (Linum) by the folding inwards of the back of the carpels a five-celled ovary becomes a ten-celled fruit. In Astragalus the folding inwards of the dorsal suture converts a one-celled ovary into a two-celled fruit ; and in Oxytropis the folding of the ventral suture gives rise to a similar change. The development of cellular or pulpy matter, and the enlargement of parts not forming whorls of the flower, frequently alter the appearance of the fruit, and render it difficult to discover

its formation. In the gooseberry (fig. 29), grape, guava, tomato and pomegranate, the seeds nestle in pulp formed by the placentas. In the orange the pulpy matter surrounding the seeds is formed by succulent cells, which are produced from the inner partitioned lining of the pericarp. In the strawberry the receptacle becomes succulent, and bears the mature carpels on its convex surface (fig. 2) ; in the rose there is a fleshy hollow receptacle which bears the carpels on its concave surface (fig. 3). In the juniper the scaly bracts grow up round the seeds and become succulent, and in the fig (fig. 4) the receptacle becomes succulent and encloses an inflorescence.

The pericarp consists usually of three layers, the external, or epicarp (fig. 5, ep); the middle, or mesocarp, m; and the internal,

Fig. 2

Fig. 3.

Fig. 5. Fig. 4.

Fig. 1. — Samara or winged fruit of Ash (Fraxinus). 1, Entire, with its wing a; 2, lower portion cut transversely, to show that it consists of two cells; one of which, /, is abortive, and is reduced to a very small cavity, while the other is much enlarged and filled with a seed g.

Fig. 2. — Fruit of the Strawberry (Fragaria vesca), consisting of an enlarged succulent receptacle, bearing on its surface the small dry seed-like fruits (achenes). (After Duchartre.)

From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 3. — Fruit of the Rose cut vertically, s' , Fleshy hollowed receptacle; s, persistent sepals; fr, ripe carpels; e, stamens, withered.

Fig. 4. — Peduncle of Fig (Ficus Carica), ending in a hollow receptacle enclosing numerous male and female flowers.

Fig. 5. — Fruit of Cherry (Prunus Cerasus) in longitudinal section. ep, Epicarp; m, mesocarp; en, endocarp.

From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

or endocarp, en. These layers are well seen in such a fruit as the peach, plum or cherry, where they are separable one from the other; in them the epicarp forms what is commonly called the skin; the mesocarp, much developed, forms the flesh or pulp, and hence has sometimes been called sarcocarp; while the endocarp, hardened by the production of woody cells, forms the stone or putamen immediately covering the kernel or seed. The pulpy matter found in the interior of fruits, such as the gooseberry, grape and others, is formed from the placentas, and must not be con- founded with the sarcocarp. In some fruits, as in the nut, the three layers become blended together and are indistinguishable. In bladder senna (Colutea arborescens) the pericarp retains its leaf- like appearance, but in most cases it becomes altered both in con- sistence and in colour. Thus in the date the epicarp is the outer brownish skin, the pulpy matter is the mesocarp or sarcocarp, and the thin papery-like lining is the endocarp covering the hard seed. In the medlar the endocarp becomes of a stony hardness. In the melon the epicarp and endocarp are very thin, while the mesocarp forms the bulk of the fruit, differing in texture and taste in its ex- ternal and internal parts. The rind of the orange consists of epicarp and mesocarp, while the endocarp forms partitions in the interior, filled

with pulpy cells. The part of the pericarp attached to the peduncle is the base, and the point where- the style or stigma existed is the apex. This latter is not always the apparent apex, as in the case of the ovary; it may be lateral or even basilar. The style sometimes remains in a hardened form, rendering the fruit apiculate; at other times it falls off, leaving only traces of its existence. The presence of the style or stigma serves to distinguish certain single- seeded pericarps from seeds.

FRUIT

255

When the fruit is mature and the seeds are ripe, the carpels usually give way either at the ventral or dorsal suture or at both, _ .. and so allow the seeds to escape. The fruit in this case

ffnˆt" 06 ‘ s dehiscent. But some fruits are indehiscent, falling to s * the ground entire, and the seeds eventually reaching the soil by their decay. By dehiscence the pericarp becomes divided into different pieces, or valves, the fruit being univalvular, bivalvular or multivalvular, &c, according as there are one, two or many valves. The splitting extends the whole length of the fruit, or is

partial, the valves forming teeth at the apex, as in the order Caryo-phyllaceae (fig. 6). Sometimes the valves are detached only at certain points, and thus dehiscence takes place by pores at the apex, as in poppy (fig. 7), or at the base, as in Campanula. Indehiscent fruits are either dry, as the nut, or fleshy, as the cherry and apple. They are formed of one or several carpels. In the former case they usually contain only a single seed, Fig. 6. — Seed-vessel or capsule which may become so incorporated of Campion, opening by ten with the pericarp as to appear to teeth at the apex. The calyx c be naked, as in the grain of wheat is seen surrounding the seed- and generally in grasses. In such vessel. cases the presence of the remains

Fig. 7. — Capsule of Poppy, of style or stigma determines opening by pores p, under the their true nature, radiating peltate stigma s. Dehiscent fruits, when com-

posed of single carpels, may open by the ventral suture only, as in the paeony, hellebore, Aquilegia (fig. 28) and Caltha; by the dorsal suture only, as in magnolias and some Proteaceae, or by both together, as in the pea (fig. 8) and bean; in these cases the dehiscence is sutured. When composed of several

Fig. 6.

Fig. 7.

Fig. 8.

•/ v w

Fig. 12.

Fig. 13.

Fig. 11.

Fig. 8. — Dry dehiscent fruit. The pod (legume) of the Pea; r, the dorsal suture; b, the ventral; c, calyx; s, seeds.

From Vines' Students' Text-Book of Botany, by per- mission of Swan Sonnenschein & Co.

Fig. 9. — (1) Fruit or capsule of Meadow Saffron (Colchicum autumnale), dehiscing along the septa (septicidally) ; (2) same cut across, showing the three chambers with the seeds attached along the middle line (axile placen- tation).

Fig. 10. — Diagram to illustrate the septi- cidal dehiscence in a pentalocular capsule. The loculaments / correspond to the number of the carpels, which separate by splitting through the septa, 5.

Fig. 11. — -The seed vessel (capsule) of the Flower-de-Luce (Iris), opening in a loculicidal manner. The three valves bear the septa in the centre, and the opening takes place through the back of the loculaments. Each valve is formed by the halves of contiguous carpels.

Fig. 12. — Diagram to illustrate loculicidal dehiscence. The locula- ments /, split at the back, and the valves separate, bearing the septa s on their centres.

Fig. 13. — Diagram to illustrate septifragal dehiscence, in which the dehiscence takes place through the back of the loculaments /, and the valves separate from the septa s, which are left attached to the placentas in the centre.

united carpels, two types of dehiscence occur — a longitudinal and a transverse. In the longitudinal the separation may take place by the dissepiments throughout their length, so that the fruit is resolved into its original carpels, and each valve represents a carpel, as in rhododendron, Colchicum, &c. ; this dehiscence, in consequence of

taking place through the septum, is called septicidal (figs. 9, 10). The valves separate from their commissure, or central line of union, carrying the placentas with them, or they leave the latter in the centre, so as to form with the axis a column of a cylindrical, conical or prismatic shape. Dehiscence is loculicidal when the union between the edges of the carpels is persistent, and they dehisce by the dorsal suture, or through the back of the loculaments, as in the lily and iris (figs. 11, 12). In these cases each valve consists of a half of each of two contiguous carpels. The placentas either remain united to the axis, or they separate from it, being attached to the septa on the valves. When the outer walls of the carpels break off from the septa, leaving them attached to the central column, the dehiscence is said to be septifragal (fig. 13), and where, as in Linum catharticum and Calluna, the splitting takes place first of all in a septicidal manner, the fruit is described as septicidally septifragal; while in other cases, as in thorn apple (Datura Stramonium), where the splitting is at first loculicidal, the dehiscence is loculicidally septifragal. In all those forms the separation of the valves takes place either from above downwards or from below upwards. In

Fig. 14. Fig. 15. Fig. 17. Fig. 18.

Fig. 14. — Siliqua or seed-vessel of Wallflower (Cheiranthus Cheiri), opening by two valves, which separate from the base upwards, leaving the seeds attached to the dissepiment which is supported by the replum.

From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 15. — Capsule of an Orchid (Xylobium). v, valve.

Fig. 16. — Seed-vessel of Anagallisarvensis, opening by circum-scissile dehiscence.

From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 17. — Lomentum of Hedysarum which, when ripe, separates transversely into single-seeded portions or mericarps. Fig. 18.— Fruit of Geranium pratense, after splitting.

Saxifraga a splitting for a short distance of the ventral sutures of the carpels takes place, so that a large apical pore is formed. In the fruit of Cruciferae, as wallflower (fig. 14), the valves separate from the base of the fruit, leaving a central replum, or frame, which supports the

false septum formed by a prolongation from the parietal placentas on opposite sides of the fruit, extending between the ventral sutures of the carpels. In Orchidaceae (fig. 15) the pericarp, when ripe, separates into three valves in a loculicidal manner, but the midribs of the carpels, to which the placentas are attached, often remain adherent to the axis both at the apex and base after the valves" bearing the seeds have fallen. The other type of de- hiscence is transverse, or circumscissile, when the upper part of the united carpels falls off in the form of a lid or operculum, as in Anagallis and in henbane (Hyoscyamus) (fig. 16).

Sometimes the axis is prolonged beyond the base of the carpels, as in the mallow and castor-oil plant, the carpels being united to it throughout their length by their faces, and separating from it without opening. In the Umbeljiferae the two carpels separate from the lower part of the axis, and remain attached by their apices to a prolongation of it, called a carpophore or podocarp, which splits into two (fig. 25) and suspends them; hence the fruit is termed a cremocarp, which divides into two mericarps. The general term schizocarp is applied to all dry fruits, which break up into two or more one-seeded indehiscent menearps, as in Hedysarum (fig. 17). In the order Geraniaceae the styles remain attached to a central column, and the mericarps separate from below upwards, before dehiscing by their ventral suture (fig. 18). Carpels which separate one from another in this manner are called cocci. They are well

seen in the order Euphorbiaceae, where there are usually three such carpels, and the fruit is termed tricoccus. In many of them, as Hura crepitans, , the cocci separate with great force and -elasticity. In many leguminous plants, such as Ornithopus, Hedysarum (fig. 17), Entada, Coronilla and the gum-arabic plant {Acacia arabica), the fruit becomes a schizocarp by the formation of transverse partitions from the folding in of the sides of the pericarp, and distinct separa- tions taking place at these partitions.

Fruits are formed by one flower, or are the product of several flowers combined. In the former case they are either apocarpous, of one mature carpel or of several separate free carpels; or syn- carpous, of several carpels, more or less completely united. When the fruit is composed of the ovaries of several flowers united, it is usual to find the bracts and floral envelopes also joined with them, so as to form

one mass; hence such fruits are known as multiple, confluent or anthocarpous. The term simple is applied to fruits which are formed by the ovary of a single flower, whether they are composed of one or several carpels, and whether these carpels are separate or combined.

The object of the fruit in the economy of the plant is the protection and nursing of the developing seed and the dispersion of the ripe _. , seeds. Hence, generally, one-seeded fruits are indehiscent,

o/fnritor wn ” e f ru ‘ ts containing more than one seed open to allow seed °f tne dispersal of the seeds over as wide an area as

possible. The form, colour, structure and method of dehiscence of fruits and the form of the contained seeds are intimately associated with the means of dispersal, which fall into several categories. (1) By a mechanism residing in the fruit. Thus many fruits open suddenly when they are dry, and the seeds are ejected by the twisting or curving of the valves, or in some other way; e.g. in gorse, by the spiral curving of the valves; in Impatiens, by the twisting of the cocci ; in squirting cucumber, by the pressure exerted on the pulpy contents by the walls of the pericarp. (2) By aid of various external agencies such as water. Fruits or seeds are sometimes sufficiently buoyant to float for a long time on sea- or fresh- water; e.g. coco-nut, by means of its thick, fibrous coat (mesocarp), is carried hundreds of miles in the sea, the tough, leathery outer coat (epicarp) preventing it from becoming water- soaked. Fruits and seeds of West Indian plants are thrown up on the coasts of north-west Europe, having been carried by the Gulf Stream, and will often germinate; many are rendered buoyant by air-containing cavities, and the embryo is protected from the sea- water by the tough coat of fruit or seed. Water-lily seeds are surrounded with a spongy tissue when set free from the fruit, and float for some distance before dropping to the bottom. (3) The most general agent in the dispersal of seeds is the wind or currents of air — the fruit or seed being rendered buoyant by wing-develop- ments as in fruits of ash (fig. 1) or maple (fig. 21), seeds of pines and firs, or many members of the order Bignoniaceae; or hair- developments as in fruits of clematis, where the style forms a feathery

Fig. 20.

Fig. 21.

From Vines’ Students’ Text-Book of Botany, permission of Swan Sonnenschein & Co.

by

of Jericho, a small cruciferous plant {Anastatica hierocuntica) , where the plant dries up after developing its fruits and becomes detached from the ground ; the branches curl inwards, and the whole plant is rolled over the dry ground by the wind. The wind also aids the dispersal of the seeds in the case of fruits which open by small teeth (many Caryophyllaceae [fig. 6]) or pores (poppy [fig. 7], Campanula, &c.) ; the seeds are in these cases small and numerous, and are jerked through the pores when the capsules, which are generally borne on long, dry stems or stalks, are shaken by the wind. (4) In other cases members of the animal world aid in seed-dispersal. Fruits often bear stiff hairs or small hooks, which cling to the coat of an animal or the feathers of a bird ; such are fruits of cleavers {Galium Aparine), a common hedge-row plant, Ranunculus arvensis (fig. 20), carrot, Geum, &c, ; or the fruit or seed has an often bright-coloured, fleshy

Fig. 19. — Dry one-seeded fruit of dock {Rumex) cut vertically. ov, Pericarp formed from ovary wall; s, seed; e, endosperm; pi, embryo with radicle pointing upwards and cotyledons downwards — enlarged.

Fig. 20. — Achene of Ranunculus arvensis in longitudinal section; e, endosperm ; pi, embryo. (After Baillon, enlarged.)

From Slrasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 21. — Fruit of Common Sycamore {Acer Pseudoplatanus), dividing into two mericarps m; s, pedicel; fl, wings (nat. size).

appendage, fruits of many Compositae (dandelion, thistle, &c), which are crowned by a plumose pappus, or seeds of willow and poplar, or Asclepias (fig. 36), which bear tufts of silky hairs; to this category belong bladder-like fruits, such as bladder-senna, which are easily rolled by the wind, or cases like the so-called rose

Fig. 24.

Fig. 25.

Fig. 22. — Vertical section of a grain of wheat, showing embryo below at the base of the endosperm e; s, scutellum separating embryo from endosperm; /./, foliage leaf; p.s, sheath of plumule; p.r, primary root; s.p.r, sheath of primary root.

Fig. 23. — Fruit of Comf rey (Symphytum) surrounded by persistent

calyx, c. The style s appears to arise from the base of the carpels, enlarged.

Fig. 24. — Ovary of Foeniculum officinale with pendulous ovules, in longitudinal section. (After Berg and Schmidt, magnified.) From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 25. — Fruit of Carum Carui. A, Ovary of the flower; B, ripe fruit. The two carpels have separated so as to form two mericarps (m). Part of the septum constitutes the carpophore (a), p, Top of flower-stalk; d, disk on top of ovary; n, stigma.

From Vines' Students' Text-Book of Botany, by permission of Swan Sonnenschein & Co.

covering, which is sought by birds as food, as in stone-fruits such as plum, cherry (fig. 5), &c, where the seed is protected from injury in the mouth or stomach of the animal by the hard endocarp; or the hips of the rose (fig. 3), where the succulent scarlet ” fruit ” (the swollen receptacle) envelops a number of small dry true fruits (achenes), which cling by means of stiff hairs to the beak of the bird. Simple fruits have either a dry or succulent pericarp. The achene is a dry, one-seeded, indehiscent fruit, the pericarp of which is closely applied to the seed, but separable from it. It is solitary, forming a single fruit, as in the dock (fig. 19) and in the cashew, where it is supported on a fleshy peduncle; or aggregate, as in Ranunculus (fig. 20), where several achenes are placed on a common elevated receptacle. In the strawberry the achenes (fig. 2) are aggregated on a convex succulent receptacle. In the rose they are supported on a concave receptacle (fig. 3), and in the fig the succulent receptacle completely encloses the achenes (fig. 4). In Dorstenia the achenes are situated on a flat or slightly concave receptacle. Hence what in common language are called the seeds of the strawberry, rose and fig, are in reality ripe carpels. The styles occasionally remain attached to the achenes in the form of feathery appendages, as in Clematis. In. Compositae, the fruit is an inferior achene (cypsela), to which the pappus (modified calyx) remains adherent. Such is also the nature of the fruit in Dipsacaceae {e.g. scabious). When the pericarp is thin, and appears like a bladder surrounding the seed, the achene is termed a utricle, as in Amarantaceae. When the pericarp is extended in the form of a winged appendage, a samara or samaroid achene is produced, as in the ash (fig. 1) and common sycamore (fig. 21). In these cases there are usually two achenes united, one of which, however, as in Fraxinus (fig. 1), may be abortive. The wing sur- rounds the fruit longitudinally in the elm. When the pericarp be- comes so incorporated with the seed as to be inseparable from it, as in grains of wheat (fig. 22), maize, oats and other grasses, then the name caryopsis is given. The one-seeded portions (mericarps) of schizocarps often take the form of achenes, e.g. the mericarps of the

Forms ot fruit.

mallows or of umbellifers (figs. 24, 25). In Labiatae and Boragin- aceae (e.g. comfrey, fig. 23), where the bicarpellary ovary becomes our one-seeded portions in the fruit, the partial fruits are of the nature

of achenes or nutlets according to the texture (leathery or hard) of the pericarp.

The nut or glans is a dry one-celled indehiscent fruit with a hardened pericarp, often surrounded by bracts at the base, and,

when mature, containing only one seed. In the young state the ovary often contains two or more ovules, but only one comes to maturity. It is illus- trated by the fruits of the hazel and chestnut, which are covered by leafy bracts, in the form of a husk, and by the acorn, in which the bracts and receptacle form a cupula or cup (fig. 26). The parts of the pericarp of the nut are united so as to appear one. In common language the term nut is very vaguely applied both to fruit and seeds. The drupe is a succulent usually one-seeded indehiscent fruit, with a pericarp easily distinguishable into epicarp, mesocarp and endocarp. This term is applied to such fruits as the cherry (fig. 5), peach, plum, apricot or mango. The endocarp is usually hard, form- ing the stone (putamen) of the fruit, which encloses the kernel or seed. The mesocarp is generally pulpy and succulent, so as to be truly a sarcocarp, as in the peach, but it is sometimes of a tough texture, as in the almond, and at other times is more or less fibrous, as in the coco-nut. In the almond there are often two ovules formed, only one of which comes to perfection. In the raspberry and bramble several small drupes or drupels are aggregated so as to constitute an etaerio.

The follicle is a dry unilocular many-seeded fruit, formed from one carpel and dehiscing by the ventral suture. It is rare to meet with a solitary follicle forming the fruit. There are usually several aggregated together, either in a whorl on a shortened receptacle, as in hellebore, aconite, larkspur, columbine (figs. 27, 28) or the order Crassulaceae, or in a spiral manner on an elongated receptacle, as in Magnolia and Banksia. Occasionally, follicles dehisce by the dorsal suture, as in Magnolia grandiflora and Banksia.

The legume or pod is a dry monocarpellary unilocular many-seeded fruit, formed from one carpel* dehiscing both by the ventral and the

From Strasburger's Lehrbitch der Botanik, by permission of Gustav Fischer.

Fig. 26. — Cupule of Quercus Aegilops. cp, cupule; gl, fruit. (After Duchartre.)

Fig. 29.

Fig. 27.

Fig. 28.

Fig. 30.

Fig. 27. — Fruit of Columbine (Aquilegia), formed of five follicles.

Fig. 28. — Single follicle, showing dehiscence by the ventral suture.

Fig. 29. — Transverse section of berry of Gooseberry, showing the seeds attached to the parietal placentas and immersed in pulp, which is formed partly from the endocarp, partly from the seed-coat.

Fig. 30.— Section of the fruit of the Apple (Pyrus Malus), or pome, consisting of a fleshy covering formed by the floral receptacle and the true fruit or core with five cavities with seeds.

dorsal suture. It characterizes leguminous plants, as the bean and pea (fig. 8). In the bladder-senna it forms an inflated legume. In some Leguminosae, as Arachis, Cathartocarpus Fistula and the tamarind, the fruit musf be considered a legume, although it does not dehisce. The first of these plants produces its fruit under- ground, and is called earth-nut; the second has a partitioned legume and is schizocarpic; and both the second and third have pulpy matter surrounding the seeds. Some legumes are schizocarpic by the formation of constrictions externally. Such a form is the lomentum or lomentaceous legume of Hedysarum (fig. 17), Coronilla, Ornithopus, Entada and of some Acacias. In Medicago the legume

XL 9

I

I

wl

m

is twisted like a snail, and in Caesalpinia coriaria, or Divi-divi, it is vermiform or curved like a worm. Sometimes the number of seeds is reduced, as in Erythrina monosperma and Geoffroya superba, which are one-seeded, and in Pterocarpus and Dalbergia, which are two-seeded.

The_ berry (bacca) is a term applied generally to all fruits with seeds immersed in pulp, and includes fruits of very various origin. In Actaea

(baneberry) or Berberis

(barberry) it is derived from a .“f^fS-sv^

single free carpel; generally, how- irfn^nfHfflnWnviUHn^nV

ever, it is the product of a syn- jmMBBmSaSSBKS^

carpous ovary, which is superior, aHKnM&BUBBQBU’ as in grape or potato, or inferior, / as in gooseberry (fig. 29) or currant. II In the pomegranate there is a II peculiar baccate many-celled H inferior fruit, having a tough rind, \ enclosing two rows of carpels

In the baobab there is a multi- FlG . 3 x .-Transverse section locular syncarpous fruit, m which of the ° fruit of th M ,

%l ^are immersed m pulp. (Cucumis Melo), showing the

The pepo, another indehiscent placentas with the seeds attached syncarpous fruit, is illustrated by to thera . The three k

the fruit of the gourd melon (fig. formi the are ^

3 1) and other Cucurbitaceae It by partitions. From the centre is formed of three carpels, sui- processes pass outwards, ending mounted by the calyx; the rind in the curved placenta, is thick and fleshy, and there are

three or more seed-bearing parietal placentas, either surrounding a central cavity or prolonged inwarde into it. The fruit of the papaw resembles the pepo, but the calyx is not superior.

The hesperidium is the name given to” such indehiscent fleshy syncarpous fruits as the orange, lemon and shaddock, in which the epicarp and mesocarp form a separable rind, and the endocarp sends prolongations inwards, forming triangular divisions, to the inner angle of which the seeds are attached, pulpy cells being devel- oped around them from the wall . Both pepo and hesperidium mav be considered as modifications of the berry.

The pome (fig. 30), seen in the apple, pear, quince, medlar and hawthorn, is a fleshy indehiscent syncarpous fruit, in the formation of which the receptacle takes part. The outer succulent part is the swollen receptacle, the horny core being the true fruit developed from the usually five carpels and enclosing the seeds. In the medlar the core

(or true pericarp) is of a stony hardness, while the outer succulent covering is open at the summit. The pome somewhat resembles the fruit of the rose (fig. 3), where the succulent receptacle surrounds a number of separate achenes.

The name capsule is applied generally to all dry syncarpous fruits, which dehisce by valves. It may thus be unilocular or multil ocular, one- or many-seeded. The true valvular capsule is observed in Colchicum (fig. 9), lily and iris (fig. 11). The porose capsule is seen m the poppy (fig. 7), Antirrhinum and Campanula. In Campanula the pores occur at the base of the capsule, which becomes inverted when ripe. When the capsule opens by a lid, or by circumscissile dehiscence, it is called a pyxidium, as in pimpernel (Anagallis arvensis) (fig. 16), henbane and monkey-pot (Lecythis). The capsule assumes a screw-like form in Helicteres, and a star-like form in star- anise (Illicium anisatum). In certain instances the cells of the capsule separate from each other, and open with elasticity to scatter the seeds. This kind of capsule is met with in the sandbox tree (Hum crepitans) and other Euphorbiaceae, where the cocci, con- taining each a single seed, burst asunder with force ; and in Gerani- aceae, where the cocci, each containing, when mature, usually one seed, separate from the carpophore, become curved upwards by their adherent styles, and open by the ventral suture (fig. 18).

The siliqua is a dry syncarpous bilocular many-seeded fruit, formed from two carpels, with a false septum, dehiscing by two valves from below upwards, the valves separating from the placentas and leaving them united by the septum (fig. 32). The seeds are attached on both sides of the septum, either in one row or in two. When the fruit is long and narrow it is a siliqua (fig. 14) ; when broad and short, silicula (fig. 33). It occurs in cruciferous plants, as wall- flower, cabbage and cress. In Glaucium and Eschscholtzia (Papa- veraceae) the dissepiment is of a spongy nature. It may become- transversely constricted (lomentaceous), as in radish (Raphanus) and sea-kale, and it may be reduced, as in woad (Isatis), to a one- seeded condition.

It sometimes happens that the ovaries of two flowers unite so as to form a double fruit (syncarp). This may be seen in many species of honeysuckle. But the fruits which are now to be considered consist usually of the floral envelopes, as well as the ovaries of several flowers united into one, and are called multiple or confluent. The term anthocarpous has also been applied as indicating that the floral envelopes as well as the carpels are concerned in the formation of the fruit.

The sorosis is a succulent multiple fruit formed by the confluence

of a spike of flowers, as in the fruit of the pine-apple (fig. 34), the bread-fruit and jack-fruit. Similarly the fruit of the mulberry represents a catkin-like inflorescence.

The syconus is an anthocarpous fruit, in which the receptacle completely encloses numerous flowers and becomes succulent. The fig (fig. 4) is of this nature, and what are called its seeds are the achenes of the numerous flowers scattered over the succulent hollowed receptacle. In Dorstenia the axis is less deeply hollowed, and of a harder texture, the fruit exhibiting often very anomalous forms.

The strobilus, or cone, is a seed-bearing spike, more or less elongated, covered with scales, each of which may be regarded as representing a separate flower, and has often two seeds at its base ; the seeds are naked, no ovary being present. This fruit is seen in the cones of firs, spruces, larches and cedars, which have received the

Fig. 32.

Fig. 34.

in the plants called angiospermous ; while in gymnospermous plants, such as Coniferae and Cycadaceae, it is naked, or, in other words, has no true pericarp. It sometimes happens in Angiosperms, that the seed-vessel is ruptured at an early period of growth, so that the seeds become more or less exposed during their development ; this occurs in mignonette, where the capsule opens at the apex, and in Cuphea, where the placenta bursts through the ovary and floral envelopes, and appears as an erect process bearing the young seeds. After fertilization the ovule is greatly changed, in connexion with the formation of the embryo. In the embryo-sac of most Angiosperms (q.v.) there is a development of cellular tissue, the endosperm, more or less filling the embryo-sac. In Gymnosperms (q.v.) the endosperm is formed preparatory to fertilization. The fertilized egg enlarges and becomes multicellular, forming the embryo. The embryo-sac enlarges greatly, displacing gradually the surrounding nucellus, which eventually forms merely a thin layer around the sac, or completely disappears. The remainder of the nucellus and the integuments of the ovules form the

seed-coats. In some cases (fig. 35) a delicate inner coat or legmen can be dis- tinguished from a tougher outer coat or testa; often, however, the layers are not thus separable. The consistency of the seed-coat, its thickness, the character of its surface, &c, vary widely, the variations being often closely associated with the environment or with the means of seed-dispersal. An account of the development of the seed from the ovule will be found in the article Angiosperms. When the pericarp is dehiscent the seed-covering is of a strong and often rough character; but when the pericarp is indehiscent and encloses the seed for a long period, the outer seed-coat is thin and soft. The cells of the testa are often coloured, and have projections and appendages of various kinds. Thus in Abrus precatorius and Adenanthera pavonina it is of a bright red colour; in French beans it is beautifully mottled; in the almond it is veined; in the tulip

Fig. 32. — Honesty (Lunaria biennis), showing the septum after the carpels have fallen away.

From Strasburger's Lehrbuch der Boiar.ik, by permission of Gustav Fischer.

Fig. 33. — Silicula or pouch of shepherd's purse (Capsella), opening by two folded valves, which separate from above downwards. The partition is narrow, hence the silicula is angustiseptal.

From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 34. — Fruit of the pine-apple (Ananassa sativa), developed from a spike of numerous flowers with bracts, united so as to form a collective or anthocarpous fruit. The crown of the pine-apple, c, consists of a series of empty bracts prolonged beyond the fruit.

name of Coniferae, or cone-bearers, on this account. Cone-like fruit is also seen in most Cycadaceae. The scales of the strobilus are sometimes thick and closely united, so as to form a moreorjess angular and rounded mass, as in the cypress; while in the juniper they become fleshy, and are so incorporated as to form a globular fruit like a berry. The dry fruit of the cypress and the succulent fruit of the juniper have received the name of gattndus. In the hop the fruit is called also a strobilus, but in it the scales are thin and membranous, and the seeds are not naked but are contained in pericarps.

The same causes which produce alterations in the other parts of the flower give rise to anomalous appearances in the fruit. The carpels, in

place of bearing seeds, are sometimes changed into leaves, with lobes at their margins. Leaves are sometimes produced from the upper part of the fruit. In the genus Citrus, to which the orange and lemon belong, it is very common to meet with a separation of the carpels, so as to produce what are called horned oranges and fingered citrons. In this case a syncarpous fruit has a tendency to become apocarpous. In the orange we occasionally find a super- numerary row of carpels produced, giving rise to the appearance of small and imperfect oranges enclosed within the original one; the navel orange is of this nature. It sometimes happens that, by the union of flowers, double fruits are produced. Occasionally a double Iruit is produced, not by the incorporation of two flowers, but by the abnormal development of a second carpel in the flower.

Arrangement of Fruits.

A. True fruits — developed from the ovary alone.

1. Pericarp not fleshy or fibrous.

i. Indehiscent — not opening to allow the escape of the

seeds — generally one-seeded. Achene; caryopsis;

cypsela; nut; schizocarp. ii. Dehiscent — the pericarp splits to allow the escape

of the seeds — generally many-seeded. Follicle;

legume ; siliqua ; capsule.

2. Pericarp generally differentiated into distinct layers, one

of which is succulent or fibrous. Drupe ; berry.

B. Pseudocarps — the development extends beyond the ovary. Pome; syconus; sorosis.

The Seed. — The seed is formed from the ovule as the result of fertilization. It is contained in a seed-vessel formed from the ovary

Fig. 35. Fig. 36.

Fig. 35. — Seed of Pea (Pisum) with one cotyledon removed, c. Remaining cotyledon ; ch, chalaza-point at which the nourishing vessels enter; e, tegmen or inner coat; /, funicle or stalk; g, plumule of embryo; m, micropyle; pi, placenta; r, radicle of embryo ; t, tigellum

or stalk between root and plumule ; te, testa.

Fig. 36. — Seed of Asclepias, with a cluster of hairs arising from the edges of the micropyle.

and primrose it is rough; in the snapdragon it is marked with depressions; in cotton and Asclepias (fig. 36) it has hairs attached to it ; and in mahogany, Bignonia, and the pines and firs it is expanded in the form of wing-like appendages (fig. 37). In Collomia, Acanthodium, Cobaea scandens and other seeds, it contains spiral cells, from which, when moistened with water, the fibres uncoil in a beautiful manner ; and in flax (Linum) and others the cells are converted into mucilage. These structural peculiarities of the testa in different plants have relation to the scattering of the seed and its germination upon a suitable nidus. But in some plants the pericarps assume structures which subserve tne same purpose; this especially occurs in small pericarps enclosing single seeds, as achenes, caryopsides, &c. Thus in Compositae and valerian, the pappose limb of the calyx forms a parachute to the pericarp ; in Labiatae and some Compositae spiral cells are formed in the epicarp ; and the epicarp is prolonged as a wing in Fraxinus (fig. 1) and Acer (fig. 21).

Sometimes there is an additional covering to the seed, formed after fertilization, to which the name arillus has been given (fig. 38). This is seen in the passion-flower, where the covering arises from the placenta or extremity of the funicle at the base of the ovule and passes upwards towards the apex, leaving the micropyle uncovered. In the nutmeg and spindle tree this additional coat is formed from above downwards, constituting in the former case a laciniated scarlet covering called mace. In such instances it has been called an arillode (fig. 39). This arillode, after growing downwards, may be reflected upwards so as to cover the micropyle. The fleshy scarlet covering formed around the naked seed in the yew is by some considered of the nature of an aril. On the testa, at various points, there are produced at times other cellular bodies, to which the name of strophioles, or caruncles, has been given, the seeds being strophiolate or carunculate. These tumours may occur near the base of the seed, as in Polygala, or at the apex, as in Castor-oil plant (Ricinus) ; or they may occur in the course of the raphe, as in blood-root \Sanguinaria) and Asarabacca. The funicles of the ovules frequently attain a great length in the seed, and in some magnolias, when the fruit dehisces, they appear as long scarlet cords suspending the seeds outside. The hilum or umbilicus of the sepH Is usuallv

well marked, as a scar of varying size; in the calabar bean and in some species of Mucuna and Dolichos it extends along a large . portion of the edge of the seed ; it frequently exhibits marked colours, being black in the bean, white in many species of Phaseolus, &c. The micropyle (fig. 35, m) of the seed may be recognizable by the naked eye, as in the pea and bean tribe, Iris, &c, or it may be very minute or microscopic. It indicates the true apex of the seed, and is important as marking the point to which the root of the em- bryo is directed. At the micropyle in the bean is observed a small process of integument, which, when the young plant sprouts, is pushed up like a lid; it is called the embryotega. The chalaza (fig. 38, ch) is often of a different colour from the rest of the seed. In the orange (fig. 40) it is of a reddish-brown colour, and is easily recognized at one end of the seed when the integuments are carefully removed. In anatropal seeds the raphe forms a distinct ridge along one side of the seed (fig. 41).

The position of the seed as regards the pericarp resembles that of the ovule in the ovary, and the same terms are applied — erect, ascending, pendulous, suspended, curved, &c. These terms have no reference to the mode in which the fruit is attached to the axis. Thus the seed may be erect while the fruit itself is pendent, in the ordinary meaning of that term. The part of the seed next the axis or the ventral suture is its face, the opposite side being the back. Seeds exhibit great varieties of form. They may be flattened laterally {compressed), or from above downwards {depressed). They may be round, oval, triangular, polygonal, rolled up like a snail, as in Pkysostemon, or coiled up like a snake, as in Ophiocaryon paradoxum.

Fig. 37. Fig. 38.

Fig. 39. Fig. 40. Fig. 41.

Fig. 37. — Seed of Pine {Pinus), with a membranous appendage w to the testa, called a wing.

Fig. 38. — Young anatropal seed of the white Water-lily {Nymphaea alba), cut vertically. It is attached to the placenta by the funicle/, cellular prolongations from which form an aril a a. The vessels of the cord are prolonged to the base of the nucellus n by means of the raphe r. The base of the nucellus is indicated by the chalaza ch, while the apex is at the micropyle m. The covering of the seed is marked i. n is the nucellus or perisperm, enclosing the embryo-sac es, is which the endosperm is formed. The embryo e, with its suspensor, is contained

in the sac, the radicle pointing to the micropyle m.

Fig. 39. — Arillode a, or false aril, of the Spindle-tree {Euonymus), arising from the micropyle /.

Fig. 40. — Anatropal seed of the Orange {Citrus Aurantium) opened to show the chalaza c, which forms a brown spot at one end.

Fig. 41. — Entire anatropal seed of the Orange {Citrus Aurantium), with its rugose or wrinkled testa, and the raphe r ramifying in the thickness of the testa on one side.

The endosperm formed in the embryo-sac of angiosperms after fertilization, and found previous to it in gymnosperms, consists of cells containing nitrogenous and starchy or fatty matter, destined for the nutriment of the embryo. It occupied the whole cavity of the embryo-sac, or is formed only at certain portions of it, at the apex, as in Rhinanthus, at the base, as in Vaccinium, or in the middle, as in Veronica. As the endosperm increases in size along with the embryo-sac and the embryo, the substance of the original nucellus of the ovule is gradually absorbed. Sometimes, however, as in Musaceae, Cannaceae, Zingiberaceae, no endosperm is formed; the cells of the original nucellus, becoming filled with food-materials for the embryo, are not absorbed, but remain surrounding the embryo-sac with the embryo, and constitute the perisperm. Again, in other plants, as Nymphaeaceae (fig. 38) and Piperaceae, both endosperm and perisperm are present. It was from observations on cases such as these that old authors, imagining a resemblance betwixt the plant-ovule and the animal ovum, applied the name albumen to the outer nutrient mass or perisperm, and designated the endosperm as vitellus. The term albumen is very generally used as including all the nutrient matter stored up in the seed, but it would be advisable to discard the name as implying a definite chemical substance. There is a large class of plants in which although at first after fertilization a mass of endosperm is formed, yet, as the embryo increases in size, the nutrient matter from the endospermic cells passes out from them, and is absorbed by the cells of the embryo plant. In the mature seed, in such cases, there is no separate mass of tissue containing nutrient food-material apart from the embryo itself. Such a seed is said to be exalbuminous, as in Compositae, Cruciferae and most Leguminosae {e.g. pea, fig. 35).

Fig. 42. — The dicotyledonous

When either endosperm or perisperm or both are present the seed is

said to be albuminous.

The albumen varies much in its nature and consistence, and furnishes important characters. It may be farinaceous or mealy, consisting chiefly of cells filled with starch, as in cereal grains, where it is abundant; fleshy or cartilaginous, consisting of thicker cells which are still soft, as in the coco-nut, and which sometimes contain oil, as in the oily albumen of Croton, Ricinus and poppy; horny, when the cell-walls are slightly thickened and capable of distension, as in date and coffee; the cell-walls sometimes become greatly thickened, filling up the testa as a hard mass, as in vegetable ivory {Phytelephas) . The albumen may be uniform throughout, or it may present a mottled appear- ance, as in the nutmeg, the seeds of Anonaceae and some Palms, where it is called ruminated. ‘ This mottled appearance is due to a protrusion of a dark lamella of the integument between folded protuberances of albumen. A cavity is sometimes left in the centre which is usually filled with

fluid, as in the coco-nut. The –

relative size of the embryo and of embryo of the Pea laid open, the endosperm varies much. In c < c > The two fleshy cotyledons, Monocotyledons the embryo is or seed-lobes, which remain under usually small, and the endosperm ground when the plant_ sprouts; large, and the same is true in the r, the radicular extremity of the case of coffee and many other a , XIS whence the root arises; t, plants amongst Dicotyledons. the axls (hypocotyl) bearing the The opposite is the case in other y° un g stalk and leaves g (plum- plants, as in the Labiatae, Plum- u ‘ e)> wh , lch lle ˆ a. depression of baginaceae, &c. the cotyledons /.

The embryo consists of an axis bearing the cotyledons (fig. 42, c), or the first leaves of the plant. To that part of this axis immediately beneath the cotyledons the terms hypocotyl, caulicle or tigellum {() have been applied, and continuous backwards with it is the young root or radicle ®, the descending axis, their point of union being the collar or neck. The terminal growing bud of the axis is called the plumule or gemmule {g) , and represents the ascending axis. The radicular extremity points towards the micropyle, while the coty- ledonary extremity is pointed towards the base of the ovule or the chalaza. Hence, by ascertaining the position of the micropyle and chalaza, the two extremities of the embryo can in general be dis- covered. It is in many cases difficult to recognize the parts in an embryo; thus in Cuscuta, the embryo appears as an elongated axis without divisions; and in Caryocar the mass of the embryo is made up

by the radicular extremity and hypocotyl, in a groove of which the cotyledonary extremity lies embedded (fig. 52). In some monocotyledonous embryos, as in Orchidaceae, the embryo is a cellular mass showing no parts. In parasitic plants also which form no chlorophyll, as Orobanche, Monotropa, &c, the embryo remains without differentiation, consisting merely of a mass of cells until the ripening of the seed. When the embryo is surrounded by the endosperm on all sides except its radicular extremity it is internal (see figs. 19, 20); when lying outside the endosperm, and only coming into contact with it at certain points, it is external, as in grasses (e.g. wheat, fig. 22). When the embryo follows the direction of the axis of the seed, it is axile or axial (fig. 43) ; when it is not in the direction of the axis, it becomes abaxile or abaxial. In campylotropal seeds the embryo is curved, and in place of being embedded in endosperm, is frequently external to it, following the concavity of the seed (fig. 44), and becoming peripherical, with the chalaza situated in the curvature of the embryo, as in Caryophyllaceae.

It has been already stated that the radicle of the embryo is directed to the micropyle, and the cotyledons to the chalaza. In some cases, by the growth of the integuments, the former is turned round so as not to correspond with the apex of the nucellus, and then the embryo has the radicle directed to one side, and is called excentric, as is seen in Primulaceae, Plantaginaceae and many palms, especially the date. The position of the embryo in different kinds of seeds varies. In an orthotropal seed the embryo is inverted or antitropal, the radicle pointing to the apex of the seed, or to the part opposite the hilum. Again, in an anatropal seed the embryo is erect or homotropal (fig. 43), the radicle being directed to the base of the seed. In curved or campylotropal seeds the embryo is folded so that its radicular and cotyledonary extremities are approximated, and it becomes amphitropal (fig. 44). In this instance the seed may be exalbuminous, and the embryo may be folded on itself; or albuminous, the embryo surrounding more or less completely the endosperm and being peripherical. According to the mode in which the seed is attached to the pericarp, the radicle may be directed upwards or downwards, or laterally, as regards the ovary. In an orthotropal seed attached to the base of the pericarp it is superior, as also in a suspended anatropal seed. In other anatropal seeds the radicle is inferior. When the seed is horizontal as regards the pericarp, the radicle is either centrifugal, when it points to the outer wall of the ovary; or centripetal, when it points to the axis or inner wall of the ovary. These characters are of value for purposes of classification, as they are often constant in large groups of genera.

Plants in which there are two cotyledons produced in the embryo are dicotyledonous. The two cotyledons thus formed are opposite to each other (figs. 42 and 45), but are not always of the same size. Thus, in Abronia and other members of the order Nyctaginaceae, one of them is smaller than the other (often very small), and in Carapa guianensis there appears to be only one, in consequence ot the intimate union which takes place between the two. The union between the cotyledonary leaves may continue after the young plant begins to germinate. Such embryos have been called pseudomono-cotyledonous. The texture of the cotyledons varies. They may be thick, as in the pea (fig. 42), exhibiting no traces of venation, with their flat internal surfaces in contact, and their backs more or less convex; or they may be in the form of thin and delicate laminae, flattened on both sides, and having distinct venation, as in Ricinus, Jatropha, Euonymus, &c. The cotyledons usually form the greater part of the mature embryo, and this is remarkably well seen in such exalbuminous seeds as the bean and pea.

Cotyledons are usually entire and sessile. But they occasionally become lobed, as in the walnut and the lime; or petiolate, as in Geranium molle; or auriculate, as in the ash. Like leaves in the

In those plants in which there is only a single cotyledon in the embryo, hence called monocotyledonous, the embryo usually has a cylindrical form more or less rounded at the extremities, or elongated and fusiform, often oblique. The axis is usually very short com- pared with the cotyledon, which in general encloses the plumule by its lower portion, and exhibits on one side a small slit which indi- cates the union of the edges of the vaginal or sheathing portion of the leaf (fig. 50). In grasses, by the enlargement of the embryo in a particular direction, the endosperm is pushed on one side, and thus the embryo comes to lie outside at the base of the endosperm (figs. 22, 51). The lamina of the cotyledon is not developed. Upon the side of the embryo next the endosperm and enveloping it is a large shield-shaped body, termed the scutettum. This is an outgrowth from the base of the cotyledon, enveloping more or less the cotyledon

Fig. 47.

Fig. 44.

Fig. 45.

Fig. 48.

Fig. 43. — Seed of Pansy {Viola tricolor) cut vertically. The em- bryo pi is axial, in the midst of fleshy endosperm al. The seed is anatropal, and the embryo is homotropal; the cotyledons co point to the base of the nucellus or chalaza ch, while the radicle, or the other extremity of the embryo, points to the micropyle, close to the hilum h. The hilum or base of the seed, and the chalaza or base of the nucellus are united by means of the raphe r.

Fig. 44. — Seed of the Red Campion (Lychnis), cut vertically, showing the peripherical embryo, with its two cotyledons and its radicle. The embryo is curved round the albumen, so that its cotyledons and radicle both come near the hilum (amphitropal) .

Fig. 45. — Mature dicotyledonous embryo of the Almond, with one of the cotyledons removed, r, Radicle; /, young stem or caulicle; c, one of the cotyledons left; i, line of insertion of the cotyledon which has been removed; g, plumule.

Fig. 46. — Exalbuminous seed of Wallflower (Cheiranthus) cut vertically. The radicle r is folded on the edges of the cotyledons c which are accumbent.

Fig. 47. — Transverse section of the seed of the Wallflower (Cheir- anthus), showing the radicle r folded on the edges of the accumbent cotyledons c.

Fig. 48. — Transverse section of the seed ot the Dame's Violet (Hesperis). The radicle r is folded on the back of the cotyledons c, which are said to be incumbent.

bud, cotyledons may be either applied directly to each other, or may be folded in various ways. In geranium the cotyledons are twisted and doubled; in convolvulus they are Gorrugated; and in the potato and in Bunias, they are spiral, — the same terms being applied as to the foliage leaves. The radicle and cotyledons are either straight or variously curved. Thus, in some cruciferous plants, as the wallflower, the cotyledons are applied by their faces, and the radicle (figs. 46, 47) is folded on their edges, so as to be lateral; the cotyledons are here accumbent. In others, as Hesperis, the cotyledons (fig. 48) are applied to each other by their faces, and the radicle, r, is folded on their back, so as to be dorsal, and the cotyledons are incumbent. Again, the cotyledons are con- duplicate when the radicle is dorsal, and enclosed

between their folds. In other divisions the radicle is folded in a spiral manner, and the cotyledons follow the same course.

In many gymnosperms more than two cotyledons are present, and they are arranged in a whorl. This occurs in Coniferae, especi- ally in the pine, fir (fig. 49), spruce and larch, in which six, nine, twelve and even fifteen have been observed. They are linear, and resemble in their form and mode of development the clustered or fasciculated leaves of the larch. Plants having numerous coty- ledons are termed polycotyledonous. In species of Streptocarpus the cotyledons are permanent, and act the part of leaves. One of them is frequently largely developed, while the other is small or abortive.

Fig. 49.

Fig. 50.

Fig. 51.

Fig. 52.

Fig. 49. — Polycotyledonous embryo of the Pine (Pinus) beginning to sprout, t, Hypocotyl ; r, radicle. The cotyledons c are numerous. Within the cotyledons the primordial leaves are seen, constituting the plumule or first bud of the plant.

Fig. 50. — Embryo of a species of Arrow-grass (Triglochin) , showing a uniform conical mass, with a slit s near the lower part. The cotyledon c envelops the young bud, which protrudes at the slit during germination. The radicle is developed from the lower part of the axis r.

Fig. 51. — Grain of Wheat (Triticum) germinating, showing (b) the cotyledon and © the rootlets surrounded by their sheaths (coleorrhizae) .

Fig. 52. — Embryo of Caryocar. t, Thick hypocotyl, forming nearly the whole mass, becoming narrowed and curved at its extremity, and applied to the groove i. In the figure this narrowed portion is slightly separated from the groove; c, two rudimentary cotyledons.

and plumule, in some cases, as in maize, completely investing it; in other cases, as in rice, merely sending small prolongations over its anterior face at the apex. By others this scutellum is considered as the true cotyledon, and the sheathing structure covering the plumule is regarded as a ligule or axillary stipule (see Grasses). In many aquatic

monocotyledons (e.g. Potamogeton, Ruppia and others) there is a much-developed hypocotyl, which forms the greater part of the embryo and acts as a store of nutriment in germination; these are known as macropodous embryos. A similar case is that of Caryocar among Dicotyledons, where the swollen hypocotyl occupies most of the embryo (fig. 52). In some grasses, as oats and rice, a projection of cellular tissue is seen upon the side of the embryo opposite to the scutellum, that is, on the anterior side. This has been termed the epiblast. It is very large in rice. This by some was considered the rudimentary second cotyledon; but is now generally regarded as an outgrowth of the sheath of the true cotyledon. (A. B. R.)

FRUIT AND FLOWER FARMING. The different sorts of fruits and flowers are dealt with in articles under their own headings, to which reference may be made; and these give the substantial facts as to their cultivation. See also the article Horticulture.

Great Britain

The extent of the fruit industry may be gathered from the figures for the acreage of land under cultivation in orchards and small fruit plantations. The Board of Agriculture returns concerning the orchard areas of Great Britain showed a continuous expansion year by year from 199,178 acres in 1888 to 234,660 acres in 1901, as will be learnt from Table I. There was, it is true, an exception in 1892, but the decline in that year is ex- plained by the circumstance that since 1891 the agricultural returns have been collected only from holdings of more than one acre, whereas they were previously obtained from all holdings of a quarter of an acre or more. As there are many holdings of less than an acre in extent upon which fruit is grown, and as fruit is largely raised also in suburban and other gardens which

do not come into the returns, it may be taken for granted that the actual extent of land devoted to fruit culture exceeds that which is indicated by the official figures. In the Board of Agriculture returns up to June 1908, 308,000 acres are stated to be devoted to fruit cultivation of all kinds in Great Britain.

Table I. — Extent of Orchards in Great Britain in each Year, 1887 to 1 901.

Year.

Acres.

Year.

Acres.

Year.

Acres.

1887 1888 1889 1890 1891

202,234 199.178 199,897 202,305 209,996

1892

1 893 1894

1895 1896

208,950 211,664 214,187 218,428 221,254

1897 1898 1899 1900 1901

224,116 226,059 228,603 232,129 234,660

Table II. shows that the expansion of the orchard area of Great Britain is mainly confined to England, for it has slightly de- creased in Wales and Scotland. The acreage officially returned as under orchards is that of arable or grass land which is also

Table II. — Areas under Orchards in England, Wales and Scotland —

Acres.

Year.

England.

Wales.

Scotland.

Great Britain.

1896 1897 1898

1899 1900 1901 1908

215,642 218,261 220,220 222,712 226,164 228,580 244.430

3677 3707 3690 3666 3695 3767 3577

1935 2148 2149 2225 2270

2313 2290

221,254 224,116 226,059 228,603 232,129 234,660 250,297

used for fruit trees of any kind. Conditions of soil and climate determine the irregular distribution of orchards in Great Britain. The dozen counties which possess the largest extent of orchard land all lie in the south or west of the island. According to the returns for 1908 (excluding small fruit areas) they were the following: —

County.

Acres.

County.

Acres.

County.

Acres.

Kent . Devon Hereford Somerset

32,751 27,200 28,316 ‘25,279

Worcester . Gloucester . Cornwall Middlesex .

23,653 20,424

5,415

5,30o

Salop . Dorset . Monmouth Wilts . .

4685 4464

39H

3630

Leaving out of consideration the county of Kent, which grows a greater variety of fruit than any of the others, the counties of Devon,

Hereford, Somerset, Worcester and Gloucester have an aggregate orchard area of 1 24,872 acres. These five counties of the west and south-west of England— constituting in one continuous area what is essentially the cider country of Great Britain— embrace therefore rather less than half of the entire orchard area of the island, while Salop, Monmouth and Wilts have about 300 less than they had a few years ago. Five English counties have less than 1000 acres each of orchards, namely, the county of London, and the northern counties of Cumberland^ Westmorland, Northumberland and Durham. Rutland has just over 100 acres. The largest orchard areas in Wales are in the two counties adjoining Hereford— Brecon with 1136 acres and Radnor with 727 acres; at the other extreme is Anglesey, with a decreasing orchard area of only 2 2 acres. Of the Scottish counties, Lanark takes the lead with 1285 acres, Perth, Stirling and Haddington following with 684 and 129 acres respectively. Ayr and Midlothian are the only other counties possessing 100 acres or more of orchards, whilst Kincardine, Orkney and Shetland return no orchard area, and Banff, Bute, Kinross, Nairn, Peebles, Sutherland and Wigtown return less than 10 acres each. It may be added that in 1908 Jersey returned 1090 acres of orchards, Guernsey, &c, 144 acres, and the Isle of Man, 121 acres; the two last-named places showing a decline as compared with eight years previously.

Outside the cider counties proper of England, the counties in which orchards for commercial fruit-growing have increased considerably in recent years include Berks, Buckingham, Cambridge, Essex, Lincoln, Middlesex, Monmouth, Norfolk,

Oxford, Salop, Sussex, Warwick and Wilts. Apples are the principal fruit grown in the western and south-western counties, pears also being fairly common. In parts of Gloucestershire,' however, and in the Evesham and Pershore districts of Worcester- shire, plum orchards exist. Plums are almost as largely grown as apples in Cambridgeshire. Large quantities of apples, plums, damsons, cherries, and a fair quantity of pears are grown for the market in Kent, whilst apples, plums and pears predominate in Middlesex. In many counties damsons are cultivated around fruit plantations to shelter the latter from the wind.

Of small fruit (currants,gooseberries,strawberries, raspberries, &c.) no return was made of the acreage previous to 1888, in which year it was given as 36,724 acres for Great Britain. ' In 1889 it rose to 41,933 acres.

Later figures are shown in Table III. It will be observed that, owing to corrections made in the enumeration in 1897, a consider- Table III. — Areas of Small Fruit in Great Britain.

Year.

Acres.

Year.

Acres.

Year.

Acres.

1890 189 1 1892 1893

46,234

58704 62,148

65,487

1894

1895 1896 1897

68,415

74,547 76,245 69,792

1898 1899 1900 1901

69.753 71,526 73,780 74,999

able reduction in the area is recorded for that year, and pre- sumably the error then discovered existed in all the preceding returns. The returns for 1907 gave the acreage of small fruit as 82,175 acres, and in 1908 at 84,880 acres— an area more than double that of 1889.

There has undoubtedly been a considerable expansion, rather than a contraction, of small fruit plantations since 1896. The acreage of small fruit in Great Britain is about one-third that of the orchards. As may be seen in Table IV. , it is mainly confined to England, though Scotland has over 4000 more acres of small

Table IV.— Areas under Small Fruit in England, Wales and Scotland — Acres.

Year.

England.

Wales.

Scotland.

Great Britain.

1898

63,438

1044

5271

69,753

1899

64,867

1 106

5553

71,526

1900

66,749

1 109

5922

73,78o

1901

67,828

1092

6079

74,999

1908

75,750

1200

7930

84,880

fruit than of orchards. About one-third of the area of small fruit in England belongs to Kent alone, that county having returned 24, 1 3 7 acres in 1 908. Cambridge now ranks next with 6878 acres, followed by Norfolk with 5876 acres, Worcestershire with 4852 acres, Middlesex with 4163 acres, Hants with 3320 acres and Essex with 2150 acres. It should be remarked that between 1900 and 1908 Cambridgeshire had almost doubled its area of small fruits, from 3740 to 6878 acres; whilst both Norfolk and Worcestershire in 1908 had larger areas devoted to small fruits than Middlesex — in which county there had been a decrease of about 400 acres during the same period. The largest county area of small fruit in Wales is 806 acres in Denbighshire, and in Scotland 2791 acres in Perthshire, 2259 acres in Lanarkshire, followed by 412 acres in Forfarshire. The only counties in Great Britain which make no return under the head of small fruit are Orkney and Shetland; and Sutherland only gives i\ acres. It is hardly necessary to say that consider- able areas of small fruit, in kitchen gardens and elsewhere, find no place in the official returns, which, however, include small fruit grown between and under orchard trees.

Gooseberries are largely grown in most small fruit districts. Currants are less widely cultivated, but the red currant is more extensively grown than the black, the latter having suffered seriously from the ravages of the black currant mite. Kent is the great centre for raspberries and for strawberries, though, in addition, the latter fruit is largely grown in Cambridgeshire (2411 acres), Hampshire (2327 acres), Norfolk (2067 acres) and Worcestershire (1273 acres). Essex, Lincolnshire, Cheshire,

Cornwall and Middlesex each has more than 500 acres devoted to strawberry cultivation.

The following statement from returns for 1908 shows the area under different kinds of fruit in 1907 and 1908 in Great Britain, and also whether there had been an increase or decrease:

1907.

1908.

Increase or Decrease.

Small Fruit —

Acres.

Acres.

Acres.

Strawberries Raspberries Currants and Goose-

27,827 8,878

28,815 9.323

+ 988 + 445

berries Other kinds .

Orchards —

25,590 19,880

26,241 20,501

+ 651 + 621

82,175

84,880

+2705

Apples …. Pears …. Cherries ….

172,643

8,911

12,027

172,751

9,604

11,868

+ 108 + 693 – 159

Plums …. Other kinds .

14,901 41,694

15.683 40,391

+ 782 -1303

250,176

250,297

+ 121

It appears from the Board of Agriculture returns that 27,433 acres of small fruit was grown in orchards, so that the total extent of land under fruit cultivation in Great Britain at the end of 1908 was about 308,000 acres.

There are no official returns as to the acreage devoted to orchard cultivation in Ireland. The figures relating to small fruit, moreover, extend back only to 1899, when the area under this head was returned as 4809 acres, which became 4359 acres in 1900 and 4877 acres in 1901. In most parts of the country there are districts favourable to the culture of small fruits, such as strawberries, raspberries, gooseberries and currants, and of top fruits, such as apples, pears, plums and damsons. The only localities largely identified with fruit culture as an industry are the Drogheda district and the Armagh district. In the former all the kinds named are grown except strawberries, the speciality being raspberries, which are marketed in Dublin, Belfast and Liverpool. In the Armagh district, again, all the kinds named are grown, but in this case strawberries are the speciality, the markets utilized being Richhill, Belfast, and those in Scotland. In the Drogheda district the grower bears the cost of picking, packing and shipping, but he cannot estimate his net returns until his fruit is on the market.

Around Armagh the Scottish system prevails — that is, the fruit is sold while growing, the buyer being responsible for the picking and marketing.

The amount of fruit imported into the United Kingdom has such an important bearing on the possibilities of the industry that the following figures also may be useful:

The quantities of apples, pears, plums, cherries and grapes imported in the raw condition into the United Kingdom in each year, 1892 to 1901, are shown in Table V. Previous to 1892 apples only were separatelyenumerated. Upto i899inclusivethequantities were given in bushels, but in 1900 a change was made to hundred- weights. This renders the quantities in that and subsequent years not directly comparable with those in earlier years, but the com- parison of the values, which are also given in the table, continues to hold good. The figures for 1908 have been added to show the increase that had taken place. In some years the value of imported apples exceeds the aggregate value of the pears, plums, cherries and grapes imported. The extreme values for apples shown in the table are £844,000 in 1893 and £2,079,000 in 1908. Grapes rank next to apples in point of value, and over the seventeen years the amount ranged between £394,000 in 1892 and £728,000 in 1908. On the average, the annual outlay on imported pears is slightly in excess of that on plums. The extremes shown are £167,000 in 1895 and £5i5,oooin 1908. In the case of plums, the smallest outlay tabulated is £166,000 >n 1895, whilst the largest is £498,000 in 1897. The amounts expended upon imported cherries varied between £96,000 in 1895 and £308,000 in 1900. In 1900 apricots and peaches, im- ported raw, previously included with raw plums, were for the first time separately enumerated, the import into the United Kingdom for that year amounting to 13,689 cwt., valued at £25,846; in 1901 the quantity was 13,463 cwt. and the value £32,350. The latter

rose in 1908 to £60,000. In 1900, also, currants, gooseberries and strawberries, hitherto included in unenumerated raw fruit, were likewise for the first time separately returned. Of raw currants the import was 64,462 cwt., valued at £87,170 (1908, £121,850); of raw gooseberries 26,045 cwt., valued at £14,626 (1908, £25,520); and of raw strawberries, 52,225 cwt., valued at £85,949. In 1907 only 44,000 cwt. of strawberries were imported. In 1901 the quantities and values were respectively — currants, 70,402 cwt.,

Table V. — Imports of Raw Apples, Pears, Plums, Cherries and Grapes into the United Kingdom, i8q2 to 1901. Quantities in Thousands of

Bushels (thousands of cwt. in 1900 and iqoi). Values in Thousands of Pounds Sterling.

Year.

Quantities.

Apples.

Pears.

Plums.

Cherries.

Grapes.

1892

4515

637

413

217

762

1893

3460

915

777

346

979

1894

4969

1310

777

3ii

833

1895

3292

407

401

196

865

1896

6177

483

560

219

883

1897

4200

1052

1044

312

994

1898

3459

492

922

402

1 136

1899

3861

572

558

281

1158

1900

2129 1

477 ‘

423 1

243 1

593 1

1901

1830′

349 1

264 1

213 1

680 l

Values.

j 892

1354

297

200

135

394

1893

844

347

332

195

530

1894

1389

411

302

167

470

1895

960

167

166

96

487

1896

1582

207

242

106

443

1897

1187

378

498

178

495

1898

1 108

222

435

231

55°

1899

1 186

266

294

154

588

1900

1225

367

393

308

595

1901

1 183

296

244

214

695

1908

2079

515

428

235

728

Apples .

• • £2,079,703

Grapes.

728,026

Pears .

• • 515.914

Cherries

• • 235,523

1 Thousands of cwts.

£75 > 308; gooseberries, 21,735 cwt., £11,420; strawberries, 38,604 cwt., £51,290. Up to 1899 the imports of tomatoes were included amongst unenumerated raw vegetables, so that the quantity was not separately ascertainable. For 1900 the import of tomatoes was 833,032 cwt., valued at £79 2 ,339. which is equivalent to a fraction under 2jd. per lb. For 1901 the quantity was 793,991 cwt., and the value £734,051 ; for 1906, there were 1.124,700 cwt., valued at £953.475; for 1907, 1,135,499 cwt., valued at £1,020,805; and for 1908, 1,160,283 cwt., valued at £955,983.

In 1908 the outlay of the United Kingdom upon imported raw fruits, such as can easily be produced at home, was £4,195,654, made up as follows :

Plums £428,966

Currants . . . 121,852 Apricots and peaches 60,141 Gooseberries . . 25,529 In addition about £280,000 was spent upon ” unenumerated ” raw fruit, and £560,000 on nuts other than almonds ” used as fruit,” which would include walnuts and filberts, both produced at home. It is certain, therefore, that the expenditure on imported fruits, such as are grown within the limits of the United Kingdom, exceeds four millions sterling per annum. The remainder of the outlay on imported fruit in 1908, amounting to over £5,000,000, was made up of £2,269,651 for oranges, £471,713 for lemons, £1,769,249 for bananas, and £560,301 for almond-nuts; these cannot be grown on an industrial scale in the British Isles.

It may be interesting to note the source of some of these imported fruits. . The United States and Canada send most of the apples, the quantity for 1907 being 1,413,000 cwt. and 1,588,000 cwt. respectively, while Australia contributes 280,000 cwt. Plums come chiefly from France (200,000 cwt.), followed with 38,000 cwt. from Germany and 28,000 cwt. from the Netherlands. Pears are imported chiefly from France (204,000 cwt.) and Belgium (176,000); but the Netherlands send 52,000 cwt., and the United States 24,000 cwt. The great bulk of imported tomatoes comes from the Canary Islands, the quantity in 1907 being 604,692 cwt. The Channel Islands also sent 223,800 cwt., France 115,500 cwt., Spain 169,000 cwt., and Portugal a long way behind with 11,700 cwt. Most of the strawberries imported come from France (33,800 cwt.) and the Netherlands (10,300 cwt.).

Fruit-growing in Kent. — Kent is by far the largest fruit-growing county in England. For centuries that county has been famous ‘ for its fruit, and appears to have been the centre for the distribu- tion of trees

and grafts throughout the country. The cultivation

of fruit land upon farms in many parts of Kent has always been an important feature in its agriculture. An excellent description of this noteworthy characteristic of Kentish farming is contained in a comprehensive paper on the agriculture of Kent by Mr Charles Whitehead, 1 whose remarks, with various additions and modifications, are here reproduced.

Where the conditions are favourable, especially in East and Mid Kent, there is a considerable acreage of fruit land attached to each farm, planted with cherry, apple, pear, plum and damson trees, and with bush fruits, or soft fruits as they are sometimes called, including gooseberries, currants, raspberries, either with or without standard trees, and strawberries, and filberts and cob-nuts in Mid Kent. This acreage has largely increased, and will no doubt con- tinue to increase, as, on the whole, fruit-growing has been profitable and has materially benefited those fortunate enough to have fruit land on their farms. There are also cultivators who grow nothing but fruit. These are principally in the district of East Kent, between Rochester and Canterbury, and in the district of Mid Kent near London, and they manage their fruit land, as a rule, better than farmers, as they give their undivided attention to it and have more technical knowledge. But there has been great improvement of late in the management of fruit land, especially of cherry and apple orchards, the grass of which is fed off by animals having corn or cake, or the land is well manured. Apple trees are grease-banded and sprayed systematically by advanced fruit-growers to prevent or check the attacks of destructive insects. Far more attention is being paid to the selection of varieties of apples and pears having colour, size, flavour, keeping qualities, and other attributes to meet the tastes of the public, and to compete with the beautiful fruit that comes from the (Jnited States and Canada.

Of the various kinds of apples at present grown in Kent mention should be made of Mr Gladstone, Beauty of Bath, Devonshire Quarrenden, Lady Sudely, Yellow Ingestre and Worcester Pearmain. These are dessert apples ready to pick in August and September, and are not stored. For storing, King of the Pippins, Cox’s Orange Pippin (the best dessert apple in existence), Cox’s Pomona, Duchess, Favourite, Gascoyne’s Scarlet Seedling, Court Pendu Plat.Baumann’s Red Reinette, Allington Pippin, Duke of Devonshire and Blenheim

Orange. Among kitchen apples for selling straight from the trees the most usually planted are Lord Grosvenor, Lord Suffield, Keswick Codlin, Early Julian, Eclinville Seedling, Pott's Seedling, Early Rivers, Grenadier, Golden Spire, Stirling Castle and Domino. For storing, the cooking sorts favoured now are Stone's or Loddington, Warner's King, Wellington, Lord Derby, Queen Caroline, Tower of Glamis, Winter Queening, Lucombe's Seedling, Bismarck, Bramley's Seedling, Golden Noble and Lane's Prince Albert. Almost all these will flourish equally as standards, pyramids and bushes. Among pears are Hessle, Clapp's Favourite, William's Bon Chretien, Beurre de Capiaumont, Fertility, Beurre Riche, Chissel, Beurre Clairgeau, Louise Bonne of Jersey, Doyenne du Cornice and Vicar of Winkfield. Among plums, Rivers's Early Prolific, Tsar, Belgian Purple, Black Diamond, Kentish Bush Plum, Pond's Seedling, Magnum Bonum and Victoria are mainly cultivated. The damson known as Farleigh Prolific, or Crittenden's, is most extensively grown throughout the county, and usually yields large crops, which make good prices. As a case in point, purchasers were offering to contract for quantities of this damson at £20 per ton in May of 1899, as the prospects of the yield were unsatisfactory. On the other hand, in one year recently when the crop was abnormally abundant, some of the fruit barely paid the expenses of sending to market. The varieties of cherries most frequently grown are Governor Wood, Knight's Early Black, FrogmoreBlackheart, Black Eagle, Waterloo, Amberheart, Bigarreau, Napoleon Bigarreau and Turk. A variety of cherry known as the Kentish cherry, of a light red colour and fine subacid flavour, is much grown in Kent for drying and cooking purposes. • Another cherry, similar in colour and quality, which comes rather late, known as the Flemish, is also extensively cultivated, as well as the very dark red large Morello, used for making cherry brandy. These three varieties are grown extensively as pyramids, and the last-named also on walls and sides of buildings. Sometimes the cherry crop is sold by auction to dealers, who pick, pack and consign the fruit to market. Large prices are often made, as much as £80 per acre being not uncommon. The crop on a large cherry orchard in Mid Kent has been sold for more than £100 per acre.

Where old standard trees have been long neglected and have become overgrown by mosses and lichens, the attempts made to improve them seldom succeed. The introduction of bush fruit trees dwarfed by grafting on the Paradise stock has been of much advantage to fruit cultivators, as they come into bearing in two or three years, and are more easily cultivated, pruned, sprayed and picked than standards. Many plantations of these bush trees have been formed in Kent of

apples, pears and plums. Half standards and pyramids have also been planted of these fruits, as well as of cherries. Bushes of gooseberries and currants, and clumps or stools of raspberry canes, have been planted to a great extent in many parts of the East and Mid divisions of Kent, but not much in the Weald, where apples are

1 Jour. Roy. Agric. Soc, 1899.

principally grown. Sometimes fruit bushes are put in alternate rows with bush or standard trees of apple, pear, plum or damson, or they are planted by themselves. The distances apart for planting are generally for cherry and apple trees on grass 30 ft. by 30 ft.; for standard apples and pear trees from 20 ft. to 24 ft. upon arable land, with bush fruit, as gooseberries and currants, under them. These are set 6 ft. by 6 ft. apart, and 5 ft. by 2 ft. for raspberries, and strawberries 2 ft. 6 in. to 3 ft. by 1 ft. 6 in. to I ft. 3 in. apart. On some fruit farms bush or dwarf trees — apples, pears, plums — are planted alone, at distances varying from 8 ft. to 10 ft. apart, giving from 485 to 680 bush trees per acre, nothing being grown between them except perhaps strawberries or vegetables during the first two or three years, ft is believed that this is the best way of ensuring fruit of high quality and colour. Another arrangement consists in putting standard apple or pear trees 30 ft. apart (48 trees per acre), and setting bush trees of apples or pears 15 ft. apart between them; these latter come quickly into bearing, and are removed when the standards are fully grown. Occasionally gooseberry or currant bushes, or raspberry canes or strawberry plants, are set between the bush trees, and taken away directly they interfere with the growth of these. Half standard apple or plum trees are set triangularly 15 ft. apart, and strawberry plants at a distance of l| ft. from plant to plant and 2 J ft. from row to row. Or currant or gooseberry bushes are set between the half standards, and strawberry plants between these.

These systems involve high farming. The manures used are London manure, where hops are not grown, and bone meal, super- phosphate, rags, shoddy, wool-waste, fish refuse, nitrate of soda, kainit and sulphate of ammonia. Where hops are grown the London manure is wanted for them. -Fruit plantations are always dug by hand with the Kent spud. Fruit land is never ploughed, as in the United States and Canada. The soil is levelled down with the ” Canterbury ” hoe, and then the plantations are kept free from weeds with. the ordinary draw or “plate” hoe. The best fruit farmers spray fruit trees regularly in the early spring, and continue until the blossoms come out, with quassia and soft soap and paraffin emulsions, and a very few with Paris green only, where there is no under fruit, in order to prevent and check the

constant attacks of the various caterpillars and other insect pests. This is a costly and laborious process, but it pays well, as a rule. The fallacy that fruit trees on grass land require no manure, and that the grass may be allowed to grow up to their trunks without any harm, is exploding, and many fruit farmers are well manuring their grass orchards and removing the grass for some distance round the stems, particularly where the trees are young.

Strawberries are produced in enormous quantities in the northern part of the Mid Kent district round the Crays, and from thence to Orpington; also near Sandwich, and to some extent near Maidstone. Raspberry canes have been extensively put in during the last few years, and in some seasons yield good profits. There is a very great and growing demand for all soft fruits for jam-making, and prices are fairly good, taking an average of years, notwithstanding the heavy importations from France, Belgium, Holland, Spain and Italy. The extraordinary increase in the national demand for jam and other fruit preserves has been of great benefit to Kent fruit producers. The cheapness of duty-free sugar, as compared with sugar paying duty in the United States and other large fruit-producing countries, afforded one of the very few advantages possessed by British cultivators, but the reimposition of the sugar duty in the United Kingdom in 1901 has modified the position in this respect. Jam factories were established in several parts of Kent about 1889 or 1890, but most of them collapsed either from want of capital or from bad management. There are still a few remaining, principally in connexion with large fruit farms. One of these is at Swanley, whose energetic owners farm nearly 2000 acres of fruit land in Kent. The fruit grown by them that will not make satisfactory prices in a fresh raw state is made into jam, or if time presses it is first made into pulp, and kept until the opportunity comes for making it into jam. In this factory there are fifteen steam-jacketed vats in one row, and six others for candied peel. A season's output on a recent occasion comprised about 3500 tons of jam, 850 tons of candied peel and 750 gross (108,000 bottles) of bottled fruit. A great deal of the fruit preserved is purchased, whilst much of that grown on the farms is sold. A strigging machine is employed, which does as much work as fifty women in taking currants off their strigs or stalks. Black currant pulp is stored in casks till winter, when there is time to convert it into jam. Strawberries cannot be pulped to advantage, but it is otherwise with raspberries, the pulp of which is largely made. Apricots for jam are obtained chiefly from France and Spain. There is another nourishing factory near Sittingbourne worked on the same lines. It is very advantageous to fruit farmers to have jam factories in connexion with their farms or to have them near, as they can

thoroughly grade their fruit, and send only the best to market, thus ensuring a high reputation for its quality. Carriage is saved, which is a serious charge, though railway rates from Kent to the great manufacturing towns and to Scotland are very much less proportionally than those to London, and consequently Kent growers send increasing quantities to these distant markets, where prices are better, not being so directly interfered with by imported fruit, which generally finds its way to London.

Kentish fruit-growers are becoming more particular in picking,

grading, packing and storing fruit, as well as in marketing it. A larger quantity of fruit is now carefully stored, and sent to selected markets as it ripens, or when there is an ascertained demand, as it is found that if it is consigned to market direct from the trees there must frequently be forced sales and competition with foreign fruit that is fully matured and in good order. It was customary formerly for Kentish growers to consign all their fruit to the London markets; now a good deal of it is sent to Manchester, Birmingham, Liverpool, Sheffield, Newcastle and other large cities. Some is sent even to Edinburgh and Glasgow. Many large growers send no fruit to London now. It is by no means uncommon for growers to sell their fruit crops on the trees or bushes by auction or private treaty, or to contract to supply a stipulated quantity of specified fruit, say of currants, raspberries or strawberries, to jam manufacturers. There is a considerable quantity of fruit, such as grapes, peaches, nectarines, grown under glass, and this kind of culture tends to increase.

Filberts and cob-nutsare a special product of Kent, in the neighbourhood of Maidstone principally, and upon the Ragstone soils, certain conditions of soil and situation being essential for their profitable production. A part of the filbert and cob-nut crop is picked green in September, as they do well for dessert, though their kernels are not large or firm, and it pays to sell them green, as they weigh more heavily. One grower in Mid Kent has 100 acres of nuts, and has grown 100 tons in a good year. The average price of late years has been about 5d. per lb, which would make the gross return of the 100 acres amount to £4660. Kentish filberts have long been pro- verbial for their excellence. Cobs are larger and look better for dessert, though their flavour is not so fine. They are better croppers, and are now usually planted. This cultivation is not much extending, as it is very long

before the trees" come into full bearing. The London market is supplied entirely with these nuts from Kent, and there is some demand in America for them. Filbert and cob trees are most closely pruned. All the year's growth is cut away except the very finest young wood, which the trained eye of the tree-cutter sees at a glance is blossom-bearing. The trees are kept from 5! to 7 ft. high upon stems from 1 1 to 2 ft. high, and are trained so as to form a cup of from 7 to 8 ft. in diameter.

There seems no reason to expect any decrease in the acreage of fruit land in Kent, and if the improvement in the selection of varieties and in the general management continues it will yet pay. A hundred years ago every one was grubbing fruit land in order that hops might be planted, and for this many acres of splendid cherry orchards were sacrificed. Now the disposition is to grub hop plants and substitute apples, plums, or small fruit or cherry trees.

Fruit-growing in other Districts. — The large fruit plantations in the vicinity of London are to be found mostly in the valley of the Thames, around such centres as Brentford, Isleworth, Twickenham, Heston, Hounslow, Cranford and Southall. All varieties of orchard trees, but mostly apples, pears, and plums and small fruit, are grown in these districts, the nearness of which to the metropolitan fruit market at Covent Garden is of course an advantage. Some of the orchards are old, and are not managed on modern principles. They contain, moreover, varieties of fruit many of which are out of date and would not be employed in establishing new plantations. In the better-managed grounds the antiquated varieties have been removed, and their places taken by newer and more approved types. In addition to apples, pears, plums, damsons, cherries and quinces as top fruit, currants, gooseberries and raspberries are grown as bottom fruit. Strawberries are extensively grown in some of the localities, and in favourable seasons outdoor tomatoes are ripened and marketed.

Fruit is extensively grown in Cambridgeshire and adjacentcounties in the east of England. A leading centre is Cottenham, where the Lower Greensand crops out and furnishes one of the best of soils for fruit-culture. In Cottenham about a thousand acres are devoted to fruit, and nearly the same acreage to asparagus, which is, however, giving place to fruit. Currants, gooseberries and strawberries are the most largely grown, apples, plums and raspberries following. Of varieties of plums the Victoria is first in favour, and then Rivers's Early Prolific, Tsar and Gisborne. London is the chief market, as it receives about half the fruit sent away, whilst a considerable quantity goes to Manchester, and some is sent to a neighbouring jam factory at Histon, where also a

moderate acreage of fruit is grown. Another fruit-growing centre in Cambridgeshire is at Willing- ham, where — besides plums, gooseberries and raspberries — outdoor tomatoes are a feature. Greengages are largely grown near Cam- bridge. Wisbech is the centre of an extensive fruit district, situated partly in Cambridgeshire and partly in Norfolk. Goose- berries, strawberries and raspberries are largely grown, and as many as 80 tons of the first-named fruit have been sent away from Wisbech station in a single day. In the fruit-growing localities of Huntingdon- shire apples, plums and gooseberries are the most extensively grown, but pears, greengages, cherries, currants, strawberries and raspberries are also cultivated. As illustrating variations in price, it may be mentioned that about the year 1880 the lowest price for gooseberries was £10 per ton, whereas it has since been down to £4. Huntingdon- shire fruit is sent chiefly to Yorkshire, Scotland and South Wales, but railway freights are high.

Essex affords a good example of successful fruit-farming at Tiptree Heath, near Kelvedon, where under one management about 260

acres out of a total of 360 are under fruit. The soil, a stiff loam, grows strawberries to perfection, and 165 acres are allotted to this fruit. The other principal crops are 43 acres of raspberries and 30 acres of black currants, besides which there are small areas of red currants, gooseberries, plums, damsons, greengages, cherries, apples, quinces and blackberries. The variety of strawberry known as the Small Scarlet is a speciality here, and it occupies 55 acres, as it makes the best of jam. The Paxton, Royal Sovereign and Noble varieties are also grown. Strawberries stand for six or seven years on this farm, and begin to yield well when two years old. A jam factory is worked in conjunction with the fruit farm. Pulp is not made except when there is a glut of fruit. Perishable fruit intended for whole-fruit preserves is never held over after it is gathered. The picking of strawberries begins at 4 A.M., and the first lot is made into jam by 6 a.m.

Hampshire, like Cambridgeshire and Norfolk, are the only counties in which the area of small fruit exceeds that of orchards. The returns for 1908 show that Hampshire had 3320 acres of small fruit to 2236 acres of orchards; Cambridge had 6878 acres of small fruit to 5221 of orchards; and Norfolk had 5876 acres of small fruit against 5188 acres of orchards. Compared with twenty years previously, the acreage of small fruit had trebled. This is largely due in Hamp- shire to the extension of strawberry culture in the Southampton district, where the industry is in the hands of many small growers, few of whom cultivate more than 20 acres each. Sarisbury and Botley are the leading parishes in which the business is carried on. Most of the strawberry

holdings are from half an acre to 5 acres in extent, a few are from 5 to 10 acres, fewer still from 10 to 20 acres and only half-a-dozen over that limit. Runners from one-year plants are used for planting, being found more fruitful than those from older plants. Peat-moss manure from London stables is much used, but artificial manures are also employed with good results. Shortly after, flowering the plants are bedded down with straw at the rate of about 25 cwt. per acre. Picking begins some ten days earlier than in Kent, at a date between 1st June and 15th June. The first week's gathering is sent mostly to London, but subsequently the greater part of the fruit goes to the Midlands and to Scotland and Ireland.

In recent years fruit-growing has much increased in South Worcestershire, in the vicinity of Evesham and Pershore. Hand- lights are freely used in the market gardens of this district for the protection of cucumbers and vegetable marrows, besides which tomatoes are extensively grown out of doors. At one time the egg plum and the Worcester damson were the chief fruit crops, apples and cherries ranking next, pears being grown to only a moderate extent. According to the 1908 returns, however, apples come first, plums second, pears third and cherries fourth. In a prolific season a single tree of the Damascene or Worcester damson will yield from 400 to 500 lb of fruit. There is a tendency to grow plum trees in the bush shape, as they are less liable than standards to injury from wind. The manures used include soot, fish guano, blood manure and phosphates — basic slag amongst the last-named. In the Pershore district, where there is a jam factory, plums are the chief tree fruit, whilst most of the orchard apples and pears are grown for cider and perry. Gooseberries are a feature, as are also strawberries, red and black currants and a few white, but raspberries are little grown. The soil, a strong or medium loam of fair depth, resting on clay, is so well adapted to plums that trees live for fifty years. In order to check the ravages of the winter moth, plum and apple trees are grease- banded at the beginning of October and again at the end of March. The trees are also sprayed when necessary with insecticidal solutions. Pruning is done in the autumn. An approved distance apart at which to grow plum trees is 12 ft. by 12 ft. In the Earl of Coventry's fruit plantation, 40 acres in extent, at Croome Court, plums and apples are planted alternately, the bottom fruit being black currants, which are less liable to injury from birds than are red currants or gooseberries. Details concerning the methods of cultivation of fruit and flowers in various parts of England, the varieties commonly grown, the expenditure involved, and allied matters, will be found in Mr W. E. Bear's papers in the Journal of the Royal Agricultural Society in 1898 and 1899.

Apart- altogether from market gardening and commercial fruit-growing, it must be borne in mind that an enormous business is done in the raising of young fruit-trees every year. Hundreds of thousands of apples, pears, plums, cherries, peaches, nectarines and apricots are budded or grafted each year on suitable stocks. They are trained in various ways, and are usually fit for sale the third year. These young trees replace old ones in private and commercial gardens, and are also used to establish new plantations in different parts of the kingdom.

The Woburn Experimental Fruit Farm. — The establishment in 1894 of the experimental fruit farm at Ridgmont, near Woburn, Beds, has exercised a healthy influence upon the progress and development of fruit-farming in England. The farm was founded and carried on by the public-spirited enterprise of the Duke of Bedford and Mr Spencer U. Pickering, the latter acting as director. The main object of the experimental station was ” to ascertain facts relative to the culture of fruit, and to increase our knowledge of, and to improve our practice in, this industry.” The farm is 20 acres in extent, and occupies a field which up to June 1894 had been used as

arable land for the ordinary rotation of farm crops. The soil is a sandy loam 9 or 10 in. deep, resting on a bed of Oxford Clay. Although it contains a large proportion of sand, the land would generally be termed very heavy, and the water often used to stand on it in places for weeks together in a wet season. The tillage to which the ground was subjected for the purposes of the fruit farm much improved its character, and in dry weather it presents as good a tilth as could be desired. Chemical analyses of the soil from different parts of the field show such wide differences that it is admitted to be by no means an ideal one for experimental purposes. Without entering upon further details, it may be useful to give a summary of the chief results obtained.

Apples have been grown and treated in a variety of ways, but of the different methods of treatment careless planting, coupled with subsequent neglect, has given the most adverse results, the crop of fruit being not 5 % of that from trees grown normally. Of the separate deleterious items constituting total neglect, by far the most effective was the growth of weeds on the surface ; careless planting, absence of manure, and the omission of trenching all had com- paratively little influence on the results. A set of trees that had been carelessly planted

and neglected, but subsequently tended in the early part of 1896, were in the autumn of that year only 10% behind their normally-treated neighbours, thus demonstrating that the response to proper attention is prompt. The growth of grass around young apple trees produced a very striking effect, the injury being much greater than that due to weeds. It is possible, however, that in wet years the ill-effects of both grass and weeds would be less than in dry seasons. Nevertheless, the grass-grown trees, after five years, were scarcely bigger than when planted, and' the actual increase in weight which they showed during that time was about eighteen times smaller than in the case of similar trees in tilled ground. It is believed that one of the main causes of the ill-effects is the large increase in the evaporation of water from the soil which is known to be produced by grass, the trees being thereby made to suffer from drought, with constant deprivation of other nourishment as well. That grass growing round young apple trees is deleterious was a circumstance known to many horticulturists, but the extent to which it interferes with the development of the trees had never before beenrealized. Thousandsof pounds are annually thrown away in Eng- land through want of knowledge of this fact. Yet trees will flourish in grass under certain conditions. Whether the dominant factor is the age (or size) of the tree has been investigated by grassing over trees which have hitherto been in the open ground, and the results appear to indicate that the grass is as deleterious to the older trees as it was to the younger ones. Again, it appears to have been demon- strated that young apple trees, at all events in certain soils, require but little or no manure in the early stages of their' existence, so that in this case also large sums must be annually wasted upon manurial dressings which produce no effects. The experiments have dealt with dwarf trees of Bramley, Cox and Potts, six trees of each variety constituting one investigation. Some of the experi- ments were repeated with Stirling Castle, and others with standard trees of Bramley, Cox and Lane's Prince Albert. All were planted in 1 894-1 895, the dwarfs being then three years old and the standards four. In each experiment the " normal " treatment is altered in some one particular, this normal treatment consisting of planting the trees carefully in trenched ground, and subsequently keeping the surface clean; cutting back after planting, pruning moderately in autumn, and shortening the growths when it appeared necessary in summer; giving in autumn a dressing of mixed mineral manures, and in February one of nitrate of soda, this dressing being probably equivalent to one of 12 tons of dung per acre. In the experiments on branch treatment, the bad effects of omitting to cut the trees back on planting, or to prune them subsequently, is evident chiefly in the straggling and bad shape of the resulting trees, but such trees also are not so vigoious as they

should be. The quantity of fruit borne, however, is in excess of the average. The check on the vigour and growth of a tree by cutting or injuring its rodts is in marked contrast with the effects of a similar interference with the branches. Trees which had been root-pruned each year were in 1898 little more than half as big as the normal trees, whilst those root-pruned every second year were about two-thirds as big as the normal. The crops borne by these trees were nevertheless heavy in proportion to the size of the trees. Such frequent root-pruning is not, of course, a practice which should be adopted. It was found that trees which had been carefully lifted every other year and replanted at once experienced no ill-effects from the operation ; but in a case where the trees after being lifted had been left in a shed for three days before replanting — which would reproduce to a certain extent the conditions experienced when trees are sent out from a nursery — material injury was suffered, these trees after four years being 28 % smaller than similar ones which had not been replanted. Sets of trees planted respectively in November, January and March have, on the whole, shown nothing in favour of any of these different times for planting purposes. Some doubt is thrown on the accepted view that there is a tendency, at any rate with young apple and pear trees, to fruit in alternate seasons.

Strawberries of eighty-five different varieties have been experimented «-ith, each variety being represented in 1900 by plants of five different ages, from one to five years. In 1896 and 1898 the

crops of fruit were about twice as heavy as in 1897 and 1899, but it has not been found possible to correlate these variations with the meteorological recordsof the several seasons. Taking the average of all the varieties, the relative weights of crop per plant, when these are compared with the two-year-old plants in the same season, are, for the five ages of one to five years, 31, 100, 122, 121 and 134, apparently showing that the bearing power increases rapidly up to two years, less rapidly up to three years, after which age it remains practically constant. The relative average size of the berries shows a deterioration with the age of the plant. The comparative sizes from plants of one to five years old were 115, 100, 96, 91 and 82 respectively. If the money value of the crop is taken to be directly dependent on its total weight, and also on the size of the fruits, the relative values of the crop for the different ages would be 34, 100, 117, III and no, so that, on the Ridgmont ground, strawberry plants could be profit- ably retained up to five years and probably longer. As regards what may be termed the order of merit of different varieties of strawberries, it appears that even small differences in position and treatment cause large variations, not only in the features of the crop generally, but also

in the relative behaviour of the different varieties. The relative cropping power of the varieties under apparently similar conditions may often be expressed by a number five or tenfold as great in one case as in the other. A comparison of the relative behaviour of the same varieties in different seasons is attended by similar variations. The varying sensitiveness of different varieties of strawberry plants to small and undefinable differences in circumstances is indeed one of the most important facts brought to light in the experiments.

Fruit Culture in Ireland. — The following figures have been kindly supplied by the Irish Board of Agriculture, and deal with the acreage under fruit culture in Ireland up to the end of the year 1907.

1 . Orchard Fruit — Statute Acres.

Apples 5829

Pears 224

Plums 223

Damsons 138

Other kinds 129

Total . . 6543

2. Small Fruit —

Currants, black . , , . . . 234

Currants, red and white …. 159

Gooseberries 1 . . 675

Raspberries 374

Strawberries 1 . 994

Mixed fruit I . 2470

Total . . 4906

It therefore appears that while Ireland grows only about one- thirty-third the quantity of apples that England does, it is nevertheless nearly 5000 acres ahead of Scotland and about 2000 acres ahead of Wales. It grows 41 times fewer pears than England, but still is ahead of

Scotland and a long way ahead of Wales in this fruit. There are 70 times fewer plums grown in Ireland than in England, and about the same in Scotland, while Wales does very little indeed. In small fruit Ireland is a long way behind Scotland in the culture of strawberries and raspberries, although with currants and goose- berries it is very close. Considering the climate, and the fact that there are, according to the latest available returns, over 62,000 holdings above I acre but not exceeding 5 acres (having a total of 224,000 acres), it is possible fruit culture may become more prevalent than it has been in the past.

The Flower-growing Industry. — During the last two or three decades of the 19th century a very marked increase in flower production occurred in England. Notably was this the case in the neighbourhood of London, where, within a radius of 15 or 20 m., the, fruit crops, which had largely taken the place of garden vegetables, were themselves ousted in turn to satisfy the increasing demand for land for flower cultivation. No flower has entered more largely into the development of the industry than the narcissus or daffodil, of which there are now some 600 varieties. Comparatively few of these, however, are grown for market purposes, although all are charming from the amateur point of view. On some flower farms a dozen or more acres are devoted to narcissi alone, the production of bulbs for sale, as well as of flowers for market being the object of the growers.

In the London district the country in the Thames valley west of the metropolis is as largely occupied by flower farms as it is by fruit farms — in fact, the cultivation of flowers is commonly associated with that of fruit. In the vicinity of Richmond narcissi are extensively grown, as they also are more to the west in the Long Ditton district, and likewise around Twickenham, Isle worth, Hounslow, Feltham and Hampton. Roses come more into evidence in the neighbourhood of Hounslow, Cranford,

Hillingdon and Uxbridge, and in some gardens daffodils and roses occupy alternate rows. In this district also such flowers as herbaceous paeonies, Spanish irises, German irises, Christmas roses, lilies of the valley, chrysanthemums, foxgloves, holly- hocks, wallflowers, carnations, &c, are extensively grown in many market gardens. South of London is the Mitcham country, long noted for its production of lavender. The incessant growth of the lavender plant upon the same land, however, has led to the decline of this industry, which has been

largely transferred to districts in the counties of Bedford, Essex and Hertford. At Mitcham, nevertheless, mixed flowers are very largely grown for the supply of the metropolis, and one farm alone has nearly ioo acres under flowers and glass-houses. Chrysanthemums, asters, Iceland poppies, gaillardias, pansies, bedding calceolarias, zonal pelargoniums and other plants are cultivated in immense quantities. At Swanky and Eynsford, in Kent, flowers are extensively cultivated in association with fruit and vegetables. Narcissi, chrysanthemums, violets, carnations, campanulas, roses, pansies, irises, sweet peas, and many other flowers are here raised, and disposed of in the form both of cut flowers and of plants.

The Scilly Isles are important as providing the main source of supply of narcissi to the English markets in the early months of the year. This trade arose almost by accident, for it was about the year 1865 that a box of narcissi sent to Covent Garden Market, London, realized £1; and the knowledge of this fact getting abroad, the farmers of the isles began collecting wild bulbs from the fields in order to cultivate them and increase their stocks. Some ten years, however, elapsed before the industry promised to become remunerative. In 1885 a Bulb and Flower Association was established to promote the industrial growth of flowers. The exports of flowers in that year reached 65 tons, and they steadily increased until 1893, when they amounted to 450 tons. A slight decline followed, but in 1896 the quantity exported was no less than 514 tons. This would represent upwards of 3ˆ million bunches of flowers, chiefly narcissi and anemones. Rather more than 500 acres are devoted to flower- growing in the isles, by far the greater part of this area being assigned to narcissi, whilst anemones, gladioli, marguerites, arum lilies, Spanish irises, pinks and wallflowers are cultivated on a much smaller scale. The great advantage enjoyed by the Scilly flower-growers is earliness of production, due to climatic causes; the soil, moreover, is well suited to flower culture and there is an abundance of sunshine. The long journey to London is somewhat of a drawback, in regard to both time and freight, but the earliness of the flowers more than compensates for this. Open-air narcissi are usually ready at the beginning of January, and the supply is maintained in different varieties up to the middle or end of May. The narcissus bulbs are usually planted in October, 4 in. by 3 in. apart for the smaller sorts and 6 in. by 4 to 6 in. for the larger. A compost of farmyard manure, seaweed, earth and road scrapings is the usual dressing, but nitrate of soda, guano and bones are also occasionally employed. A better plan, perhaps, is to manure heavily the previous crop, frequently potatoes, no direct manuring then being needed for the bulbs, these not being left in the ground more than two or three years. The expenses of

cultivation are heavy, the cost of bulbs alone — of which it requires nearly a quarter of a million of the smaller varieties, or half as many of the largest, to plant an acre— being considerable. The polyanthus varieties of narcissus are likely to continue the most remunerative to the flower-growers of Scilly, as they flourish better in these isles than on the mainland.

In the district around the Wash, in the vicinity of such towns as Wisbech, Spalding and Boston, the industrial culture of bulbs and flowers underwe-it great expansion in the period between 1880 and 1909. At Wisbech one concern alone has a farm of some 900 acres, devoted chiefly to flowers and fruit, the soil being a deep fine alluvium. Roses are grown here, one field containing upwards of 100,000 trees. Nearly 20 acres are devoted to narcissi, which are grown for the bulbs and also, together with tulips, for cut flowers. Carnations are cultivated

both in the field and in pots. Cut flowers are sent out in large quantities, neatly and effectively packed, the parcel post being mainly employed as a means of distribution. In the neighbour- hood of Spalding crocuses and snowdrops are less extensively grown than used to be the case. On one farm, however, upwards of 20 acres are devoted to narcissi alone, whilst gladioli, lilies and irises are grown on a smaller scale. Around Boston narcissi are also extensively grown for the market, both bulbs and cut blooms being sold. The bulbs are planted 3 in. apart in rows, the latter being 9 in. apart, and are allowed to stand from two to four years.

The imports of fresh flowers into the United Kingdom were not separately shown prior to 1900. In that year, however, their value amounted to £200,585, in 1901 to £225,011, in 1906 to £233,884, in 1907 to £233,641, and in 1908 to £229,802, so that the trade showed a fairly steady condition. From the monthly totals quoted in Table VI. it would appear that the trade sinks to its minimum

Table VI. — Values of Fresh Flowers imported into the United Kingdom.

Month.

1906.

1907.

1908.

January ….

£31.035

£i8,545

£29,180

February .

34,647

25,541

3o,54i

March

50,232

42,611

35,i85

April . .

30,809

50,418

42,681

May .

22,980

21,767

23,129

June . .

17,641

18.358

16,904

July . –

3.386

4.509

3,467

August.

1,646

1,539

1, 08 1

September.

852

736

953

October .

4,481

3,180

4,504

November.

I7.S°6

15,763

15,097

December .

18,669

30,674

27,080

Total . . .

£233,884

£233.641

£229,802

, , .

dimensions in the four months July to October inclusive, and that after September the business continually expands up to April, subsequent to which contraction again sets in. About one-half of the trade belongs practically to the three months of February, March and April.

Hothouse Culture of Fruit and Flowers. — The cultivation of fruit and flowers under glass has increased enormously since about the year 1880, especially in the neighbourhood of London, where large sums of money have been sunk in the erection and equipment of hothouses. In the parish of Cheshunt, Herts, alone there are upwards of 130 acres covered with glass, and between that place on the north and London on the south extensive areas of land are similarly utilized. In Middlesex, in the north, in the districts of Edmonton, Enfield, Ponders End and Finchley, and in the west from Isleworth to Hampton, Feltham, Hillingdon, Sipson and "Uxbridge, many crops are now cultivated under glass. At Erith, Swanley, and other places in Kent, as also at Worthing, in Sussex, glass-house culture has much extended. A careful estimate puts the area of industrial hothouses in England at about 1200 acres, but it is probably much more than this. Most of the greenhouses are fixtures, but in some parts of the kingdom structures that move on rails and wheels are used, to enable the ground to be prepared in the open for one crop while another is maturing under glass. The leading products are grapes, tomatoes and cucumbers, the last- named two being true fruits from the botanist's point of view, though commercially included with vegetables. To these may be added on the same ground dwarf or French beans, and runner or climbing beans. Peaches, nectarines and strawberries are largely grown under glass, and, in private hothouses — from which the produce is used mainly for household consumption, and which are not taken into consideration here — pineapples, figs and other fruit. Conservative estimates indicate the average annual yield of hothouse grapes to be about 12 tons per acre and of tomatoes 20 tons. The greater part of the space in the hot- houses is assigned to fruit, but whilst some houses are devoted exclusively to flowers, in others,

where fruit is the main object, flowers are forced in considerable quantities in winter and early spring. The flowers grown under glass include tulips, hyacinths, primulas, cyclamens, spiraeas, mignonettes, fuchsias,

calceolarias, roses, chrysanthemums, daffodils, arum lilies or callas, liliums, azaleas, eucharises, camellias, stephanotis, tuberoses, bouvardias, gardenias, heaths or ericas, poinsettias, lilies of the valley , zonal pelargoniums,tuberotis and fibrous rooted begonias, and m iny others. There is an increasing demand for foliage hothouse plants, such as ferns, palms, crotons, aspidistras, araucarias, dracaenas, India-rubber plants, aralias, grevilleas, &c. Berried plants like solanums and aucubas also find a ready sale, while the ornamental kinds of asparagus such as sprengeri and plumosus nanus, are ever in demand for trailing decorations, as well as myrsiphyilum. Special mention must be made of the winter or perpetual flowering carnations which are now grown by hundreds of thousands in all parts of the kingdom for decorative work during the winter season. The converse of forcing plants into early blossom is adopted with such an im- portant crop as lily of the valley. During the summer season the crowns are placed in refrigerators with about 2 degrees of frost, and quantities are taken out as required every week and trans- ferred to the greenhouse to develop. Tomatoes are grown largely in houses exclusively occupied by them, in which case two and sometimes three crops can be gathered in the year. In the Channel Islands, where potatoes grown under glass are lifted in April and May, in order to secure the high prices of the early markets, tomato seedlings are planted out from boxes into the ground as quickly as the potatoes are removed, the tomato planter working only a few rows behind the potato digger. The trade in imported tomatoes is so considerable that home growers are well justified in their endeavours to meet the demand more fully with native produce, whether raised under glass or in the open. Tomatoes were not separately enumerated in the imports previous to 1900. It has already been stated that in 1900 the raw tomatoes imported amounted to 833,032 cwt., valued at £792,339, and in 1901 to 793,991 cwt., valued at £734>°5 I – From the monthly quantities given in Table VII.,

Table VII. — Quantities of Tomatoes imported into the United Kingdom.

Month.

January February March . April . May . June July . August. September October November December

Total Value

1906.

61,940

58,187 106,458 103,273

67,933

62,906

238,362

180,046

114,860

52,678

4L5I3

36,316

1,124,472

£953,475

1907.

56,022

58,289

98,028

109,057

114,041

144,379

150,907

102,600

101,198

67,860

66,522

66,591

1,135,494

£i,i35,499

1908.

73,409 69,350 86,928

74,917 88,901

127,793 171,978

124,757 119,224

75,722 74,292 73,012

1,160,283

£1,160,283

it would appear that the imports are largest in June, July and August, about one-half of the year's total arriving during those three months. It is too early in June and July for home-grown outdoor tomatoes to enter into competition with the imported product, but home-grown hothouse tomatoes should be qualified to challenge this trade.

An important feature of modern flower growing is the pro- duction and cultivation of what are known as" hardy herbaceous perennials." Some 2000 or 3000 different species and varieties of these are now raised in special nurseries, and during the spring, summer and autumn seasons magnificent displays are to be seen not only in the markets but at the exhibitions in London and at the great provincial shows held throughout the kingdom. The production of many of these perennials is so easy that amateurs in several instances have taken it up as a business hobby; and in some cases, chiefly through advertising in the horticultural press, very lucrative concerns have been established.

Ornamental flowering trees and shrubs constitute another

feature of modern gardening. These are grown and imported by thousands chiefly for their sprays of blossom or foliage, and for planting in large or small gardens, public parks, &c, for landscape effect. Indeed there is scarcely an easily grown plant from the northern or southern temperate zones that does not now find a place in the nursery or garden, provided it is sufficiently attractive to sell for its flowers, foliage or appearance.

Conditions of the Fruit and Flower growing Industries. — As regards open-air fruit-growing, the outlook fcr new ventures is perhaps brighter than in the hothouse industry, not — as Mr Bear has pointed out — because the area of fruit land in England is too small, but because the level of efficiency, from the selection of varieties to the packing and marketing of the produce, is very much lower in the former than in the latter branch of enterprise. In other words, whereas the practice of the majority of hothouse nurserymen is so skilled, so up-to-date, and so entirely under high pressure that a new competitor, however well trained, will find it difficult to rise above mediocrity, the converse is true of open- air fruit-growers. Many, and an increasing proportion, of the latter are thoroughly efficient in all branches of their business, and are in possession of plantations of the best market varieties of fruit, well cultivated, pruned and otherwise managed. But the extent of fruit plantations completely up to the mark in relation to varieties and treatment of trees and bushes, and in connexion with which the packing and marketing of the produce are equally .satisfactory, is small in proportion to the total fruit area of the country. Information concerning the best treatment of fruit trees has spread widely in recent years, and old planta- tions, as a rule, suffer from the neglect or errors of the past, however skilful their present holders may be. Although the majority of professional market fruit-growers may be well up to the standard in skill, there are numerous contributors to the fruit supply who are either ignorant of the best methods of cultivation and marketing or careless in their application. The bad condition of the great majority of farm orchards is notorious, and many landowners, farmers and amateur gardeners who have planted fruit on a more or less extensive scale have mismanaged their undertakings. For these reasons new growers of open-air fruit for market have opportunities of succeeding by means of superiority to the majority of those with whom they will compete, provided that they possess the requisite knowledge, energy and capital. It has been asserted on sound authority that there is no chance of success for fruit-growers except in districts favourable as regards soil, climate and nearness to a railway or a good market; and, even under these

conditions, only for men who have had experience in the industry and are prepared to devote their unremitting attention to it. Most important is it to a beginner that he should ascertain the varieties of fruit that flourish best in his particular district. Certain kinds seem to do well or fairly well in all parts of the country; others, whilst heavy croppers in some localities, are often unsatisfactory in others.

As has been intimated, there is probably in England less room for expansion of fruit culture under glass than in the open. The large increase of glass-houses in modern times appears to have brought the supply of hothouse produce, even at greatly reduced prices, at least up to the level of the demand; and as most nurserymen continue to extend their expanse of glass, the prospect for new competitors is not a bright one. Moreover, the vast scale upon which some of the growers conduct the hothouse industry puts small producers at a great disadvantage, not only because the extensive producers can grow grapes and other fruit more economically than small growers — with the possible exception of those who do all or nearly all their own work — but also, and still more, because the former have greater advantages in transporting and marketing their fruit. There has, in recent years, been a much greater fall in the prices of hothouse than of open-air fruit, especially under the existing system of distribution, which involves the payment by consumers of 50 to 100 % more in prices than growers receive. The best openings for new nurseries are probably not where they are now to be found in large groups, and especially not in the neighbourhood

of London, but in suitable spots near the great centres of popula- tion in the Midlands and the North, or big towns elsewhere not already well supplied with nurseries. By such a selection of a locality the beginner may build up a retail trade in hothouse fruit, or at least a trade with local fruiterers and grocers, thus avoiding railway charges and salesmen's commissions to a great extent, though it may often be advantageous to send certain kinds of produce to a distant market. Above all, a man who has no knowledge of the hothouse industry should avoid embarking his capital in it, trusting himself in the hands of a foreman, as experience shows that such a venture usually leads to disaster. Some years of training in different nurseries are desirable for any young man who is desirous of becoming a grower of hothouse fruits or flowers.

There can be no doubt that flower-growing is greatly extending in England, and that competition among home growers is be- coming more severe. Foreign supplies of flowers have increased, but not nearly as greatly in proportion as home supplies, and it seems clear that home growers have gained ground in relation to their foreign rivals, except with respect to flowers for the growth of whichforeignershaveextraordinarynaturaladvantages. There seems some danger of the home culture of the narcissus being over-done, and the florists' chrysanthemum appears to be produced in excess of the demand. Again, in the production of violets the warm and sunny South of France has an advantage not possessed by England, whilst Holland, likewise for climatic reasons, maintains her hold upon the hyacinth and tulip trade. Whether the production of flowers as a whole is gaining ground upon the demand or not is a difficult question to answer. It is true that the prices of flowers have fallen generally; but produc- tion, at any rate under glass, has been cheapened, and if a fair profit can be obtained, the fall in prices, without which the existing consumption of flowers would be impossible, does not necessarily imply over-production. There is some difference of opinion among growers upon this point; but nearly all agree that profits are now so small that production on a large scale is necessary to piovide a fair income. Industrial flower-growing affords such a wide scope for the exercise of superior skill, industry and alertness, that it is not surprising to find some who are engaged in it doing remarkably well to all appearance, while others are struggling on and hardly paying their way. That a man with only a little capital, starting in a small way, has many disadvantages is certain; also, that his chance of saving money and extending his business quickly is much smaller than it was. To the casual looker-on, who knows nothing of the drudgery of the industry, flower-growing seems a delightful method of getting a living. That it is an entrancing pursuit there is no doubt ; but it is equally true that it is a very arduous one, requiring careful forethought, ceaseless attention and abundant energy. Fortunately for those who might be tempted, without any knowledge of the industry, to embark capital in it, flower-growing, if at all comprehensive in scope, so obviously requires a varied and extensive technical knowledge, combined with good commercial ability, that any one can see that a thorough training is necessary to a man who intends to adopt it as a business, especially if hothouse flowers are to be produced.

The market for fruit, and more especially for flowers, is a fickle one, and there is nearly always some uncertainty as to the course of prices. The perishable nature of soft fruit and cut flowers renders the markets very sensitive to anything in the nature of a glut, the occurrence of

which is usually attended with disastrous results to producers. Foreign competition, moreover, has constantly to be faced, and it is likely to increase rather than diminish. French growers have a great advantage over the open-air cultivators of England, for the climate enables them to get their produce into the markets early in the season, when the highest prices are obtainable. The geographical advantage which France enjoys in being so near to England is, however, considerably discounted by the increasing facilities for cold storage in transit, both by rail and sea. The develop- ment of such facilities permits of the retail sale in England of luscious fruit as fresh and attractive as when it was gathered beneath the sunny skies of California. In the case of flowers, fashion is an element not to be ignored. Flowers much in request in one season may meet with very little demand in another, and it is difficult

for the producer to anticipate the changes which caprice may dictate. Even for the same kind of flower the requirements are very uncertain, and the white blossom which is all the rage in one season may be discarded in favour of one of another colour in the next. The sale of fresh flowers for church decoration at Christmas and Easter has reached enormous dimensions. The irregularity in the date of the festival, however, causes some inconvenience to growers. If it falls very early the great bulk of suitable flowers may not be sufficiently forward for sale, whilst a late Easter may find the season too far advanced. The trade in cut flowers, therefore, is generally attended by uncertainty, and often by anxiety. (W. Fr. ; J. Ws.)

United States

In the United States horticulture and market gardening have now assumed immense proportions. In a country of over 3,000,000 sq. m., stretching from the Atlantic to the Pacific on the one hand, and from the Gulf of Mexico to the great northern lakes and the Dominion of Canada on the other, a great variation of climatic conditions is not unnatural. From a horticultural point of view there are practically two well-defined regions: (1) that to the east of the Rocky Mountains across to the Atlantic, where the climate is more like that of eastern Asia than of western Europe so far as rainfall, temperature and seasonable conditions are concerned; (2) that to the west of the Rockies, known as the Pacific coast region, where the climate is somewhat similar to that of western Europe. It may be added that in the northern states — in Washington, Montana, North Dakota, Minnesota, Wisconsin, &c. — the winters are often very severe, while the southern states practically enjoy a temperature somewhat similar to that of the Riviera. Indeed the range of temperature between the

extreme northern states and the extreme southern may vary as much as 1 20° F. The great aim of American gardeners, therefore, has been to find out or to produce the kinds of fruits, flowers and vegetables that are likely to flourish in different parts of this immense country.

Fruit Culture. — There is probably no country in the world where so many different kinds of fruit can be grown with ad- vantage to the nation as in the United States. In the temperate regions apples, pears and plums are largely grown, and orchards of these are chiefly to be found in the states of New York, Massachusetts, Pennsylvania, Michigan, Missouri, Colorado, and also in northern Texas, Arkansas and N. California. To these may be added cranberries and quinces, which are chiefly grown in the New England states. The quinces are not a crop of first-rate' importance, but as much as 800,000 bushels of cranberries are grown each year. The peach orchards are assuming great proportions, and are chiefly to be found in Georgia and Texas, while grapes are grown throughout the Republic from east to west in all favourable localities. Oranges, lemons and citrons are more or less extensively grown in Florida and California, and in these regions what are known as Japanese or " Kelsey " plums (forms of Prunus triflora) are also grown as marketable crops. Pomegranates are not yet largely grown, but it is possible their culture will develop in southern Texas and Louisiana, where the climate is tempered by the waters of the Gulf of Mexico. Tomatoes are grown in most parts of the country so easily that there is frequently a glut; while the strawberry region extends from Florida to Virginia, Pennsylvania and other states — thus securing a natural succession from south to north for the various great market centres.

Of the fruits mentioned apples are undoubtedly the most important. Not only are the American people themselves supplied with fresh fruit, but immense quantities are exported to Europe — Great Britain alone absorbing as much as 1,430,000 cwt. in 1908. The varieties originally grown were of course those taken- or introduced from Europe by the early settlers. Since the middle of the 19th century great changes have been brought about, and the varieties mostly cultivated now are distinctly American. They have been raised by crossing and intercrossing the most suitable European forms with others since imported from Russia. In the extreme northern states indeed, where it is essential to have apple trees that will stand the severest winters, the Russian varieties crossed with the berry crab of eastern Europe {Pyrus baccata) have produced

a race eminently suited to that particular region. The individual fruits are not very large, but the trees are remarkably hardy. Farther south larger fruited varieties are grown, and among these may be noted Baldwins, Newton pippins, Spitzenbergs and Rhode Island greening. Apple orchards are numerous in the State of New York, where it is estimated that over 100,000 acres are devoted to them. In the hilly regions of Missouri, Arkansas and Colorado there are also great plantations of apples. The trees, however, are grown on different principles from those in New York State. In the latter state apple trees with ordinary care live to more than 100 years of age and produce great crops; in the other states, however, an apple tree is said to be middle- aged at 20, decrepit at 30 and practically useless at 40 years of age. They possess the advantage, however, of bearing early and heavily.

Until the introduction of the cold-storage system, about the year 1880, America could hardly be regarded as a commercial fruit-growing country. Since then, however, owing to the great improvements made in railway refrigerating vans and storage houses, immense quantities of fruit can be despatched in good condition to any part of the world; or they can be kept at home in safety until such time as the markets of Chicago, New York, Boston, Baltimore, Philadelphia, &c, are considered favourable for their reception.

Apple trees are planted at distances varying from 25 ft. to 30 ft. apart in the middle western states, to 40 ft. to 50 ft. apart in New York State. Here and there, however, in some of the very best orchards the trees are planted 60 ft. apart every way. Each tree thus has a chance to develop to its utmost limits, and as air and light reach it better, a far larger fruit-bearing surface is secured. Actual experience has shown that trees planted at 60 ft. apart — about 28 to the acre — produce more fruit by 43 bushels than trees at 30 ft. apart — i.e. about 48 to the acre.

Until recent years pruning as known to English and French gardeners was practically unknown. There was indeed no great necessity for it, as the trees, not being cramped for space, threw their branches outwards and upwards, and thus rarely become overcrowded. When practised, however, the operation could scarcely be called pruning; lopping or trimming would be more accurate descriptions.

Apple orchards are not immune from insect pests and fungoid diseases, and an enormous business is now done in spraying machines

and various insecticides. It pays to spray the trees, and figures have been given to show that orchards that have been sprayed four times have produced an average income of £211 per acre against £103 per acre from unsprayed orchards.

The spring frosts are also troublesome, and in the Colorado and other orchards the process known as ” smudging ” is now adopted to save the crops. This consists in placing 20 or 30, or even more, iron or tin pots to an acre, each pot containing wooden chips soaked in tar (or pitch) mixed with kerosene. Whenever the thermometer shows 3 or 4 degrees of frost the smudge-pots are lighted. A dense white smoke then arises and is diffused throughout the orchards, enveloping the blossoming heads of the trees in a dense cloud. This prevents the frost from killing the tender pistils in the blossoms, and when several smudge-pots are alight at the same time the temperature of the orchard is raised two or three degrees. This work has generally to be done between 3 and 5 a.m., and the growers naturally have an anxious time until all danger is over. The failure to attend to smudging, even on one occasion, may result in the loss of the entire crop of plums, apples or pears.

Next to apples perhaps peaches are the most important fruit crop. The industry is chiefly carried on in Georgia, Texas and S. Carolina, and on a smaller scale in some of the adjoining states. Peaches thus flourish in regions that are quite un- suitable for apples or pears. In many orchards in Georgia, where over 3,000,000 acres have been planted, there are as many as 100,000 peach trees; while some of the large fruit companies grow as many as 365,000. In one place in West Virginia there is, however, a peach orchard containing 175,000 trees, and in Missouri another company has 3 sq. m. devoted

to peach culture. As a rule the crops do well. Sometimes, however, a disease known as the ” yellows ” makes sad havoc amongst them, and scarcely a fruit is picked in an orchard which early in the season gave promise of a magnificent crop.

Plums are an important crop in many states. Besides the European varieties and those that have been raised by crossing with American forms, there is now a growing trade done in Japanese plums. The largest of these is popularly known as ” Kelseys,” named after John Kelsey, who raised the first fruit in 1876 from trees brought to California in 1870. Sometimes the fruits are 3 in. in diameter, and like most of the Japanese varieties are more heart-shaped and pointed than plums of European origin. One apparent drawback to the Kelsey plum is its irregularity in ripening. It has been known in some years to

be quite ripe in June, while in others the fruits are still green in October.

Pears are much grown in such states as Massachusetts, New York, Pennsylvania, Missouri and California; while bush fruits like currants, gooseberries and raspberries find large spaces devoted in most of the middle and northern states. Naturally a good deal of crossing and intercrossing has taken place amongst the European and American forms of these fruits, but so far as gooseberries are concerned no great advance seems to have been made in securing varieties capable of resisting the devastating gooseberry mildew.

Other fruits of more or less commercial value are oranges, lemons and citrons, chiefly in Florida. Lemons are practically a necessity to the American people, owing to the heat of the summers, when cool and refreshing drinks with an agreeable acidulous taste are in great demand. The pomelo (grape-fruit) is a kind of lemon with a thicker rind and a more acid flavour. At one time its culture was confined to Florida, but of recent years it has found its way into Calif ornian orchards. Notwith- standing the prevailing mildness of the climate in both California and Florida, the crops of oranges, lemons, citrons, &c, are sometimes severely injured by frosts when in blossom.

Other fruits likely to be heard of in the future are the kaki or persimmon, the loquat, which is already grown in Louisiana, as well as the pomegranate.

Great aid and encouragement are given by the government to the progress of American fruit-growing, and by the experiments that are being constantly carried out and tabulated at Cornell University and by the U.S.A. department of agriculture.

Flower Culture. — So far as flowers are concerned there appears to be little difference between the kinds of plants grown in the United States and in England, France, Belgium, Germany, Holland, &c. Indeed there is a great interchange of new varieties of plants between Europe and America, and modifications in systems of culture are being gradually introduced from one side of the Atlantic to the other. The building of greenhouses for commercial purposes is perhaps on a somewhat different scale from that in England, but there are probably no extensive areas of glass such as are to be seen north of London from Enfield Highway to Broxburne. Hot water apparatus differs merely in detail, although most of the boilers used resemble those on the continent of Europe rather than inEngland. Great business is done in bulbs — mostly imported from Holland — stove and greenhouse

plants, hardy perennials, orchids, ferns of the ” fancy ” and ” dagger ” types of Nephrolepis, and incarnations and roses. Amongst the latter thousands of such varieties as Beauty, Liberty, Killarney, Richmond and Bride are grown, and realize good prices as a rule in the markets. Carnations of the winter-flowering or ” perpetual ” type have long been grown in America, and enormous prices have been given for individual plants on certain occasions, rivalling the fancy prices paid in England for certain orchids. The American system of carnation-growing has quite captivated English cultivators, and new varieties are being constantly raised in both countries. Chrysanthemums are another great feature of American florists, and sometimes during the winter season a speculative grower will send a living specimen to one of the London exhibitions in the hope of booking large orders for cuttings of it later on. Sweet

peas, dahlias, lilies of the valley, arum lilies and indeed every flower that is popular in England is equally popular in America, and consequently is largely grown.

Vegetables. — So far as these are concerned, potatoes, cabbages, cauliflowers, beans of all kinds, cucumbers, tomatoes (already referred to under fruits), musk-melons, lettuces, radishes, endives, carrots, &c. ; are naturally grown in great quantities, not only in the open air, but also under glass. The French system of intensive cultivation as practised on hot beds of manure round Paris is practi- cally unknown at present. In the southern states there would be no necessity to practise it, but in the northern ones it is likely to attract attention. (J. Ws.)

FRUMENTIUS (c. 300-c. 360), the founder of the Abyssinian church, traditionally identified in Abyssinian literature with Abba Salama or Father of Peace (but see Ethiopia), was a native of Phoenicia. According to the 4th-century historian Rufinus (x. 9), who gives Aedesius himself as his authority, a certain Tyrian, Meropius, accompanied by his kinsmen Fru- mentius and Aedesius, set out on an expedition to ” India,” but fell into the hands of Ethiopians on the shore of the Red Sea and, with his ship’s crew, was put to death. The two young men were taken to the king at Axum, where they were well treated and in time obtained great influence. With the help of Christian merchants who visited the country Frumentiusgave Christianity a firm footing, which was strengthened when in 326 he

was consecrated bishop by Athanasius of Alexandria, who in his Epistola ad Constantinum mentions the consecration, and gives some details of the history of Frumentius's mission. Later witnesses speak of his fidelity to the homoousian during the Arian controversies. Aedesius returned to Tyre, where he was ordained presbyter.

FRUNDSBERG, GEORG VON (1473-1528), German soldier, was born at Mindelheim on the 24th of September 1473. He fought for the German king Maximilian I. against the Swiss in 1499, and in the same year was among the imperial troops sent to assist Ludovico Sforza, duke of Milan, against the French. Still serving Maximilian, he took part in 1504 in the war over the succession to the duchy of Bavaria-Landshut, and after- wards fought in the Netherlands. Convinced of the necessity of a native body of trained infantry Frundsberg assisted Maxi- milian to organize the Landsknechte (q.v.), and subsequently at the head of bands of these formidable troops he was of great service to the Empire and the Habsburgs. In 1 509 he shared in the war against Venice, winning fame for himself and his men; and after a short visit to Germany returned to Italy, where in 1513 and 1514 he gained fresh laurels by his enterprises against the Venetians and the French. Peace being made, he returned to Germany, and at the head of the infantry of the Swabian league assisted to drive Ulrich of Wurttemberg from his duchy in 1519. At the diet of Worms in 1 521 he spoke words of encouragement to Luther, and when the struggle between France and the Empire was renewed he took part in the invasion of Picardy, and then proceeding to Italy brought the greater part of Lombardy under the influence of Charles V. through his victory at Bicocca in April 1522. He was partly responsible for the great victory over the French at Paviain February 152 5, and, returning to Germany, he assisted to suppress the Peasant revolt, using on this occasion, however, diplomacy as well as force. When the war in Italy was renewed Frundsberg raised an army at his own expense, and skilfully surmounting many difficulties, joined the constable de Bourbon near Piacenza and marched towards Rome. Before he reached the city, however, his unpaid troops showed signs of mutiny, and their leader, stricken with illness and unable to pacify them, gave up his command. Returning to Germany, he died at Mindelheim on the 20th of August 1528. He was a capable and chivalrous soldier, and a. devoted servant of the Habsburgs. His son Caspar (1 500-1 536) and his grandson Georg (d. 1586) were both soldiers of some distinction. With the latter's death the family became extinct.

See Adam Reissner, Historia Herrn Georgs und Herrn Kaspars von Frundsberg (Frankfort, 1568). A German translation of this work was published at Frankfort in 1572. F. W. Barthold, Georg von Frundsberg

(Hamburg, 1833); J. Heilmann, Kriegsgeschichte von Bayern, Franken, Pfalz und Schwaben (Munich, 1868).

FRUSTUM (Latin for a ” piece broken off “), a term in geo- metry for the part of a solid figure, such as a cone or pyramid, cut off by a plane parallel to the base, or lying between two parallel planes; and hence in architecture a name given to the drum of a column.

FRUYTIERS, PHILIP (1627-1666), Flemish painter and engraver, was a pupil of the Jesuits' college at Antwerp in 1627, and entered the Antwerp gild of painters without a fee in 1631. He is described in the register of that institution as ” illuminator, painter and engraver.” The current account of his life is ” that he worked exclusively in water colours, yet was so remarkable in this branch of his art for arrangement, drawing, and especially for force and clearness of colour, as to excite the admiration of Rubens, whom he portrayed with all his family.” The truth is that he was an artist of the most versatile talents, as may be judged from the fact that in 1646 he executed an Assumption with figures of life size, and four smaller pictures in oil, for the church of St Jacques at Antwerp, for which he received the considerable sum of n 50 florins. Unhappily no undoubted production of his hand has been preserved. All that we can point to with certainty is a series of etched plates, chiefly por- traits, which are acknowledged to have been powerfully and skilfully handled. If, however, we search the portfolios of art collections on the European continent, we sometimes stumble upon miniatures on vellum, drawn with great talent and coloured with extraordinary brilliancy. In form they quite recall the works of Rubens, and these, it may be, are the work of Philip Fruytiers.

FRY, the name of a well-known English Quaker family, originally living in Wiltshire. About the middle of the 18th century Joseph Fry (1728-1787), a doctor, settled in Bristol, where he acquired a large practice, but eventually abandoned medicine for commerce. He became interested in china-making, soap-boiling and type-founding businesses in Bristol, and in a chemical works at Battersea, all of which ventures proved very profitable. The type-founding business was subsequently re- moved to London and conducted by his son Edmund. Joseph Fry, however, is best remembered as the founder of the great Bristol firm of J. S. Fry & Sons, chocolate manufacturers. He purchased the chocolate-making patent of William Church- man and on it laid the foundations of the present large business. After his death the Bristol chocolate factory was carried on with increasing success by his widow and by his son, Joseph Storrs Fry(i767-i835).

In 1795 a new and larger factory was built in Union Street, Bristol, which still forms the centre of the firm's premises, and in 1798 a Watt's steam-engine was purchased and the cocoa- beans ground by steam. On the death of Joseph Storrs Fry his three sons, Joseph (1 795-1879), Francis, and Richard (1807-1878) became partners in the firm, the control being mainly in the hands of Francis Fry (1803-1886). Francis Fry was in every way a remarkable character. The development of the business to its modern enormous proportion was chiefly his work, but this did not exhaust his activities. He took a principal part in the introduction of railways to the west of England, and in 1852 drew up a scheme for a general English railway parcel service. He was an ardent bibliographer, taking a special interest in early English Bibles, of which he made in the course of a long life a large and striking collection, and of the most celebrated of which he published facsimiles with bibliographical notes. Francis Fry died in 1886, and his son Francis J. Fry and nephew Joseph Storrs Fry carried on the business, which in 1896 was for family reasons converted into a private limited company, Joseph Storrs Fry being chairman and all the directors members of the Fry family.

FRY, SIR EDWARD (1827-), English judge, second son of Joseph Fry (1795-1879), was born at Bristol on the 4th of November 1827, and educated at University College, London, and London University. He was called to the bar in 1854 and was made a Q.C. in 1869, practising in the rolls court and becoming recognized as a leading equity lawyer. In 1877 he was raised to the bench and knighted. As chancery judge, he will be

remembered for his careful interpretations and elucidations of the Judicature Acts, then first coming into operation. In 1883 he was made a lord justice of appeal, but resigned in 1892; and subsequently his knowledge of equity and talents for arbitration were utilized by the British government from time to time in various special directions, particularly as chairman of many commissions. He was also one of the British representatives at the Paris North Sea Inquiry Commission (1905), and was appointed a member of the Hague Permanent Arbitration Court. He wrote A Treatise on the Specific Performance of Public Contracts (London, 1858, and many subsequent editions).

FRY, ELIZABETH (1780-1845), English philanthropist,' and, after Howard, the chief promoter of prison reform in' Europe, was born in

Norwich on the 21st of May 1780. Her father, John Gurney, afterwards of Earlham Hall, a wealthy merchant and banker, represented an old family which for some generations had belonged to the Society of Friends. While still a girl she gave many indications of the benevolence of disposition,clearness and independence of j udgment, and strength of purpose, for which she was afterwards so distinguished; but it was not until after she had entered her eighteenth year that her religion assumed a decided character, and that she was induced, under the preach- ing of the American Quaker, William Savery, to become an earnest and enthusiastic though never fanatical " Friend." In August 1800 she became the wife of Joseph Fry, a London merchant.

Amidincreasing family cares she was unwearied in her attention to the poor and the neglected of her neighbourhood; and in i8nshewasacknowledged by her co-religionists as a " minister," an honour and responsibility for which she was undoubtedly qualified, not only by vigour of intelligence and warmth of heart, but also by an altogether unusual faculty of clear, fluent and persuasive speech. Although she had made several visits to Newgate prison as early as February 1813, it was not until nearly four years afterwards that the great public work of her life may be said to have begun. The association for the Improve- ment of the Female Prisoners in Newgate was formed in April 181 7. Its aim was the much-needed establishment of some of what are now regarded as the first principles of prison discipline, such as entire separation of the sexes, classification of criminals, female supervision for the women, and adequate provision for their religious and secular instruction, as also for their useful employment. The ameliorations effected by this association, and largely by the personal exertions of Mrs Fry, soon became obvious, and led to a rapid extension of similar methods to other places. In 1818 she, along with her brother, visited the prisons of Scotland and the north of England; and the publication (18 19) of the notes of this tour, as also the cordial recognition of the value of her work by the House of Commons committee on the prisons of the metropolis, led to a great increase of her correspondence, which now extended to Italy, Denmark and Russia, as well as to all parts of the United Kingdom. Through a visit to Ireland, which she made in 1827, she was led to direct her attention to other houses of detention besides prisons; and her observations resulted in many important improvements in the British hospital system, and in the treatment of the insane. In 1838 she visited France, and besides conferring with many of the leading prison officials, she personally visited most of the houses of detention in Paris, as well as in Rouen, Caen and some other

places. In the following year she obtained an official permission to visit all the prisons in that country; and her tour, which extended from Boulogne and Abbeville to Toulouse and Marseilles, resulted in a report which was presented to the minister of the interior and the prefect of police. Before returning to England she had included Geneva, Zurich, Stuttgart and Frankfort-on-Main in her inspection. The summer of 1840 found her travelling through Belgium, Holland and Prussia on the sam° mission; and in 1841 she also visited Copenhagen. In 1842, through failing health, Mrs Fry was compelled to forgo her plans for a still more widely extended activity, but had the satisfaction of hearing from almost every quarter of Europe that the authorities were giving increased practical effect to her suggestion*. In 1844 she was seized with a lingering illness, of

which she died on the 12th of October 1845. She was survived by a numerous family, the youngest of whom was born in 1822.

Two interesting volumes of Memoirs, with Extracts from her Journals and Letters, edited by two of her daughters, were published in 1847. See also Elizabeth Fry, by G. King Lewis (1910).

FRYXELL, ANDERS (1 795-1881), Swedish historian, was born at Hesselskog, Dalsland, Sweden, on the 7th of February 1795. He was educated at Upsala, took holy orders in 1820, was made a doctor of philosophy in 1821, and in 1823 began to publish the great work of his life, the Stories from Swedish History. He did not bring this labour to a close until, fifty-six years later, he published the forty-sixth and crowning volume of his vast enterprise. Fryxell, as a historian, appealed to every class by the picturesqueness of his style and the breadth of his research; he had the gift of awakening to an extraordinary degree the national sense in his readers. In 1824 he published his Swedish Grammar, which was long without a rival. In 1833 he received the title of professor, and in 1835 he was appointed to the incumbency of Sunne, in the diocese of Karlstad, where he resided for the remainder of his life. In 1840 he was elected to the Swedish Academy in succession to the poet Wallin (1779- 1839). In 1847 Fryxell received from his bishop permission to withdraw from all the services of the Church, that he might devote himself without interruption to historical investigation. Among his numerous minor writings are prominent his Characteristics of Sweden between 159?. and 1600 (1830), his Origins of the* In- accuracy with which the History of Sweden in Catholic Times has been Treated (1847), and his Contributions to the Literary History of Sweden. It is now beginning to be seen that the abundant labours of Fryxell were rather of a popular than of a scientific order, and although their influence during his

lifetime was unbounded, it is only fair to later and exacter historians to admit that they threaten to become obsolete in more than one direction. On the 21st of March 1881 Anders Fryxell died at Stockholm, and in 1884 his daughter Eva Fryxell (born 1829) published from his MS. an interesting History of My History, which was really a literary autobiography and displays the persistency and tirelessness of his industry. (E. G.)

FUAD PASHA (181 5-1 869), Turkish statesman, was the son of the distinguished poet Kecheji-zade Izzet Molla. He was educated at the medical school and was at first an army surgeon. About 1836 he entered the civil service as an official of the foreign ministry. He became secretary of the embassy in London; was employed on special missions in the principalities and at St Petersburg (1848), and was sent to Egypt as special commissioner in 1851. In that year he became minister for foreign affairs, a post to which he was appointed also on four subsequent occasions and which he held at the time of his death. During the Crimean War he commanded the troops on the Greek frontier and distinguished himself by his bravery. He was Turkish delegate at the Paris conference of 1856; was charged with a mission to Syria in i860; grand vizier in i860 and 1861, and also minister of war. He accompanied the sultan Abd-ul-Aziz on his journey to Egypt and Europe, when the freedom of the city of London was conferred on him. He died at Nice (whither he had been ordered for his health) in 1869. Fuad was renowned for his boldness and promptness of decision, as well as for his ready wit and his many bons mots. Generally regarded as the partisan of a pro-English policy, he rendered most valuable service to his country by his able management of the foreign relations of Turkey, and not least by his efficacious settlement of affairs in Syria after the massacres of i860.

FUCHOW, Fu-chau, Foochow, a city of China, capital of the province of Fu-kien, and one of the principal ports open to foreign commerce. In the local dialect it is called Hokchiu. It is situated on the river Min, about 35 m. from the sea, in 26° 5′ N. and 119 ° 20′ E., 140 m. N. of Amoy and 280 S. of Hang-chow. The city proper, lying nearly 3 m. from the north bank of the river, is surrounded by a wall about 30 ft. high and 12 ft. thick, which makes a circuit of upwards of 5m. and ispierced I by seven gateways surrounded by tall fantastic watch-towers.

The whole district between the city and the river, the island of Nantai, and the southern banks of the Min are occupied by extensive suburbs; and the river itself bears a large floating population. Communication from bank to bank is afforded by a long stone bridge supported by forty solid stone piers in its northern section and by nine in its southern. The most remark- able establishment of Fuchow is the arsenal situated about 3 m. down the stream at Pagoda Island, where the sea-going vessels usually anchor. It was founded in 1867, and is conducted under the direction of French engineers according to European methods. In 1870 it employed about 1000 workmen besides fifty European superintendents, and between that date and 1880 it turned out about 20 or 30 small gunboats. In 1884 it was partially destroyed by the French fleet, and for a number of years the workshops and machinery were allowed to stand idle and go to decay. On the 1st of August 1895 an attack was made on the English mission near the city of Ku-chang, 120 m. west of Fuchow, on which occasion nine missionaries, of whom eight were ladies, were massacred. The port was opened to European commerce in 1842; and in 1853 the firm of Russell and Co. shipped the first cargoes of tea from Fuchow to Europe and America. The total trade in foreign vessels in 1876 was imports to the value of £1,531,617, and exports to the value of £3,330,489. In 1904 the imports amounted to £1,440,351, and the exports to £1,034,436. The number of vessels that entered in 1876 was 275, and of these 211 were British, 27 German, 11 Danish and 9 American. While in 1904 480 vessels entered the port, 216 of which were British. A large trade is carried on by the native merchants in timber, paper, woollen and cotton goods, oranges and olives; but the foreign houses mainly confine themselves to opium and tea. Commercial intercourse with Australia and New Zealand is on the increase. The principal imports, besides opium, are shirtings, T-cloths, lead and tin, medicines, rice, tobacco, and beans and peas. Two steamboat lines afford regular communication with Hong- Kong twice a month. The town is the seat of several important missions, of which the first was founded in 1 846. That supported by the American board had in 1876 issued 1,3000,000 copies of Chinese books and tracts.

FUCHS, JOHANN NEPOMUK VON (1774-1856), German chemist and mineralogist, was born at Mattenzell, near Brennberg in the Bavarian Forest, on the 15th of May 1774. In 1807 he became professor of chemistry and mineralogy at the university of Landshut, and in 1823 conservator of the mineralogical collections at Munich, where he was appointed professor of mineralogy three years later, on the removal thither of the university of Landshut. He retired in 1852, was ennobled by the king of Bavaria in 1854, and died at Munich on the

5th of March 1856. His name is chiefly known for his mineralogical observations and for his work on soluble glass.

His collected works, including ffber den Einfluss der Chemie und Mineralogie (1824), Die Naturgeschickte des Mineralreichs (1842), Vber die Theorien der Erde (1844), were published at Munich in 1856.

FUCHS, LEONHARD (1 501-1566), German physician and botanist, was born at Wembdingen in Bavaria on the 17th of January 1501. He attended school at Heilbronn and Erfurt, and in 1521 graduated at the university of Ingolstadt. About the same time he espoused the doctrines of the Reformation. Having in 1524 received his diploma as doctor of medicine, he practised for two years in Munich. He became in 1526 professor of medicine at Ingolstadt, and in 1528 physician to the margrave of Anspach. In Anspach he was the means of saving the lives of many during the epidemic locally known as the ” English sweating-sickness.” By the duke of Wurttemberg he was, in 1535, appointed to the professorship of medicine at the university of Tubingen, a post held by him till his death on the 10th of May 1566. Fuchs was an advocate of the Galenic school of medicine, and published several Latin translations of treatises by its founder and by Hippocrates. But his most important publica- tion was De histor ia stirpium commentarii insignes (Basel, 1542), a work illustrated with more than five hundred excellent outline illustrations, including figures of the common foxglove and of

another species of the genus Digitalis, which was so named by him.

FUCHSIA, so named by Plumier in honour of the botanist Leonhard Fuchs, a genus of plants of the natural order Onagraceae, characterized by entire, usually opposite leaves, pendent flowers, a funnel-shaped, brightly coloured, quadripartite, deciduous calyx, 4 petals, alternating with the calycine segments, 8, rarely 10, exserted stamens, a long filiform style, an inferior ovary, and fruit, a fleshy ovoid many-seeded berry. All the members of the genus, with the exception of the New Zealand species, F. excorticata, F, Colensoi and F. procumbens, are natives of Central and South America — occurring in the interior of forests or in damp and shady mountainous situations. The various species differ not a little in size as well as in other characters; some, as F. verrucosa, being dwarf shrubs; others, as F. arbo- rescens and F. apetala, attaining a height of 12 to 16 ft., and having stems several inches in diameter. Plumier, in his Nova plan- tarum Americanarum genera (p. 14, tab. 14, Paris, 1703), gave a description of a species of fuchsia, the first known, under the name of

Fuchsia triphylla, Hore coccineo, and a somewhat con- ventional outline figure of the same plant was

published at Amster- dam in 1757 by Bur-

mann. In the Histoire

des plantes mSdicinales

of the South American

traveller Feuillee (p. 64,

pi. xlvii.), written in

1 709-1 7 1 1, and pub- lished by him with his

Journal, Paris, 1725,

the name Thilco is

applied to a species of

fuchsia from Chile,

which is described,

though not evidently

so figured, as having

a pentamerous calyx.

The F. coccinea of Aiton

(fig.) (see J. D Hooker,

in Journal Linnean Soc,

Botany, vol. x. p. 458,

1867), the first species

of fuchsia cultivated in

England, where it was

long confined to the

greenhouse, was brought

from South America by

Captain Firth in 1788 and placed in Kew Gardens.

of

Fuchsia coccinea. 1, Flower cut open after removal sepals; 2, fruit; 3, floral diagram.

Of this species Mr Lee, a nurseryman at Hammersmith, soon afterwards obtained an example, and procured from it by means of cuttings several hundred plants, which he sold at a guinea each. In 1823 F. macrostemma and F. gracilis, and during the next two or three years several other species, were intro- duced into England; but it was not until about 1837, or soon after florists had acquired F. fulgens, that varieties of interest began to make their appearance. The numerous hybrid forms now existing are the result chiefly of the intercrossing of that or other long-flowered with globose- flowered plants. F. Venus-victrix, raised by Mr Gulliver, gardener to the Rev. S. Marriott of Horsemonden, Kent, and sold in 1822 to Messrs Cripps, was the earliest white-sepalled fuchsia. The first fuchsia with a white corolla was produced about 1853 by Mr Storey. In some varieties the blossoms are variegated, and in others they are double. There appears to be very little limit to the number of forms to be obtained by careful cultivation and selection. To hybridize, the flower as soon as it opens is emasculated, and it is then fertilized with pollen from some different flower.

Ripe seed is sown either in autumn or about February or March in light, rich, well-drained mould, and is thinly covered with

sandy soil and watered. A temperature of 70° to 75° Fahr. has been found suitable for raising. The seedlings are pricked off into shallow pots or pans, and when 3 in. in height are transferred to 3-in. pots, and are then treated the same as plants from cuttings. Fuchsias may be grafted as readily as camellias, preferably by the splice or whip method, the apex of a young shoot being employed as a scion; but the easiest and most usual method of propagation is by cuttings. The most expeditious way to procure these is to put plants in heat in January, and to take their shoots when 3 in. in length. For summer flowering in England they are best made about the end of August, and should be selected from the shortest-jointed young wood. They root readily in a compost of loam and silver-sand if kept close and sprinkled for a short time. In from two to three weeks they may be put into 3-in. pots containing a compost of equal parts of rich loam, silver-sand and leaf-mould. They are subsequently moved from the frame or bed. first to a warm and shady, and then to a more airy part of the greenhouse. In January a little artificial heat may be given, to be gradually increased as the days lengthen. The side-shoots are generally pruned when they have made three or four joints, and for bushy plants the leader is stopped soon after the first potting. Care is taken to keep the plants as near the glass as possible, and shaded from bright sunshine, also to provide them plentifully with water, except at the time of shifting, when the roots should be tolerably dry. For the second potting a suitable soil is a mixture of well-rotted cow-dung or old hotbed mould with leaf-mould and sandy peat, and to promote drainage a little peat-moss may be placed immediately over the crocks in the lower part of the pot. Weak liquid manure greatly promotes the advance of the plants, and should be regularly supplied twice or thrice a week during the flowering season. After this, water is gradually withheld from them, and they may be placed in the open air to ripen their wood. Among the more hardy or half-hardy plants for inside borders are varieties of the Chilean species, F. macrostemma (or F. magellanica) , a shrub 6 to 1 2 ft. high with a scarlet calyx, such as F. m. globosa, F. m. gracilis; one of the most graceful and hardy of these, a hybrid F. riccartoni, was raised at Riccarton, near Edinburgh, in 1830. For inside culture may be mentioned F. boliviano, (Bolivia), 2 to 4 ft. high, with rich crimson flowers with a trumpet-shaped tube; F. corymbiflora (Peru), 4 to 6 ft. high, with scarlet flowers nearly 2 in. long in long terminal clusters; F. fulgens (Mexico), 4 to 6 ft., with drooping apical clusters of scarlet flowers; F. microphylla (Central America), with small leaves and small scarlet funnel-shaped flowers,

the petals deep red ; F. procumbens (New Zealand), a pretty little creeper, the small flowers of which are succeeded by oval magenta-crimson berries which remain on for months; and F. splendcns (Mexico), 6 ft. high, with very showy scarlet and green flowers. But these cannot compare in beauty or freedom of blossom with the numerous varieties raised by gardeners. The nectar of fuchsia flowers has been shown to contain nearly 78% of cane sugar, the remainder being fruit sugar. The berries of some fuchsias are subacid or sweet and edible. From certain species a dye is obtainable. The so-called ” native fuchsias ” of southern and eastern Australia are plants of the genus Correa, natural order Rutaceae.

FUCHSINE, or Magenta, a red dyestuff consisting of a mixture of the hydrochlorides or acetates of pararosaniline and rosaniline. It was obtained in 1856 by J. Natanson (Ann., 1856, 98, p. 297) by the action of ethylene chloride on aniline, and by A. W. Hofmann in 1858 from aniline and carbon tetrachloride. It is prepared by oxidizing ” aniline for red ” (a mixture of aniline and ortho-and para-toluidine) with arsenic acid (H. Medlock, Dingier’ s Poly. Jour., i860, 158, p. 146); by heating aniline for red with nitrobenzene, concentrated hydrochloric acid and iron (Coupier, Ber., 1873, 6, p. 423) ; or by condensing formalde- . hyde with aniline and ortho-toluidine and oxidizing the mixture. It forms small crystals, showing a brilliant green reflex, and is soluble in water and alcohol with formation of a deep red solution. It dyes silk, wool and leather direct, and cotton after mordanting with tannin and tartar emetic (see Dyeing). An aqueous solu-

tion of fuchsine is decolorized on the addition of sulphurous acid, the easily soluble fuchsine sulphurous acid being formed. This solution is frequently used as a test reagent for the detection of aldehydes, giving, in most cases, a red coloration on the addition of a small quantity of the aldehyde.

The constitution of the fuchsine bases (pararosaniline and ros- aniline) was determined by E. and O. Fischer in 1878 {Ann., 1878, 194, p. 242) ; A. W. Hofmann having previously shown that oxi- dation of pure aniline alone or of pure toluidine yielded no fuchsine, whilst oxidation of a mixture of aniline and para-toluidine gave rise to the fine red dyestuff para-fuchsine (pararosaniline hydro- chloride)

$$CH_3\text{-}C_6H_4NH_2 + 2C_6H_5NH_2 + 3O = HO\text{-}C(C_6H_4NH_2)_3 + 2H_2O.$$

Colour base (pararosaniline). $HO\text{-}C(C_6H_4NH_2)_3\text{-}HCl = H_2O\text{-}KH$

2 N-C6H 4)2C : C 6 H 4 : NH 2 C1.

Pararosaniline hydrochloride. A. Rosenstiehl (Jahres., 1869, p. 693) found also that different ros- anilines were obtained according to whether ortho- or para-toluidine was oxidized with aniline, and he gave the name rosaniline to the one obtained from aniline and ortho-toluidine, reserving the term pararosaniline for the other. E. and O. Fischer showed that these compounds were derivatives of triphenylmethane and tolyldi- phenylmethane respectively. Pararosaniline was reduced to the corresponding leuco compound (paraleucaniline), from which by diazotization and boiling with alcohol, the parent hydrocarbon was obtained

(H 2 N-C5H4) 2 C:C 6 H 4 :NH 2 Clˆ HC(C6H4NH 2 -HCl) 3 ˆ HC(C 6 H4N 2 Cl3) Pararosaniline hydrochloride. Paraleucaniline.

->HC(C 6 H 6) 3 . Triphenylmethane. The reverse series of operations was also carried out by the Fischers, triphenylmethane being nitrated, and the nitro compound then reduced to triaminotriphenylmethane or paraleucaniline, which on careful oxidation is converted into the dyestuff. A similar series of reactions was carried out with rosaniline, which was shown to be the corresponding derivative of tolyldiphenylmethane.

The free pararosaniline, Ci 9 Hi 9 N 3 0, and rosaniline, C 20 H 2 iN 3 O, may be obtained by precipitating solutions of their salts with a caustic alkali, colourless precipitates being obtained, which crystal- lize from hot water in the form of needles or plates. The position of the amino groups in pararosaniline was determined by the work of H. Caro and C. Graebe {Ber., 1878, n, p. 1348) and of E. and O. Fischer {Ber., 1880, 13, p. 2204) as follows: Nitrous acid converts pararosaniline into aurin, which when superheated with water yields para-dioxybenzophenone. As the hydroxyl groups in aurin corre- spond to the amino groups in pararosaniline, two of these in the latter compound must be in the para position. The third is also in the para position; for if benzaldehyde be condensed with aniline, condensation occurs in the para position, for the compound formed may be converted into para-dioxybenzophenone, C6H 6 CHO-}C6H 5 CH(C 6 H4NH 2) 2 ->C 6 H5CH 2

->CO(C 6 H 4 OH) 2 ; but if para-nitrobenzaldehyde be used in the above reaction and the resulting nitro compound N0 2 -C 6 H4-CH(C 6 H4NH 2) 2 be reduced, then pararosaniline is the final product, and consequently the third amino group occupies the para position. Many derivatives of para- rosaniline and rosaniline are known, in which the

hydrogen atoms of the amino groups are replaced by alkyl groups; this has the effect of producing a blue or violet shade, which becomes deeper as the number of groups increases (see Dyeing).

FUCINO, LAGO DI [Lat. Lams Fucinus], a lake bed of the Abruzzi, Italy, in the province of Aquila, 2 m. E. of the town of Avezzano. The lake was 37 m. in circumference and 65 ft. deep. From the lack of an outlet, the level of the lake was subject to great variations, often fraught with disastrous consequences. As early as a.d. 52 the emperor Claudius, realizing a project of Julius Caesar, constructed a tunnel 35 m. long, with 40 shafts at intervals, by which the surplus waters found an outlet to the Liris (or Garigliano). No less than 30,000 workmen were em- ployed for eleven years in driving this tunnel. In the following reign the tunnel was allowed to fall into disrepair, but was repaired by Trajan. When, however, it finally went out of use is uncertain. The various attempts made to reopen it from 1 240 onwards were unsuccessful. By 1852 the lake had gradually risen until it was 30 ft. above its original level, and had become a source of danger to the surrounding countryside. A company undertook to drain it on condition of becoming proprietors of the site when dry; in 1854, however, the rights and privileges were purchased by Prince Giulio Torlonia (d. 1886), the great Roman banker, who carried on the work at his own expense until, in 1876, the lake was finally drained at the cost of some £1 , 700,000. The

reclaimed area is 12J m. long, 7 m. broad, and is cultivated by families from the Torlonia estates. The outlet by which it was drained is 4 m. long and 24 sq. yds. in section.

See A. Brisse and L. de Rotron, Le Dessechement du lac Fucin, execute par S. E. le Prince A. Torlonia (Rome, 1876). (T. As.)

FUEL (O. Fr. feuaile, popular Lat. focalia, from focus, hearth, fire), a term applicable to all substances that can be usefully employed for the production of heat by combustion. Any element or combination of elements susceptible of oxidation may under appropriate conditions be made to burn; but only those that ignite at a moderate initial temperature and burn with com- parative rapidity, and, what is

practically of more importance, are obtainable in quantity at moderate prices, can fairly be regarded as fuels. The elementary substances that can be so classed are primarily hydrogen, carbon and sulphur, while others finding more special applications are silicon, phosphorus, and the more readily oxidizable metals, such as iron, manganese, aluminium and magnesium. More important, however, than the elements are the carbohydrates or compounds of carbon, oxygen and hydrogen, which form the bulk of the natural fuels, wood, peat and coal, as well as of their liquid and gaseous derivatives — coal-gas, coal-tar, pitch, oil, &c, which have high values as fuel. Carbon in the elementary form has its nearest representative in the carbonized fuels, charcoal from wood and coke from coal.

Solid. Fuels. Wood may be considered as having the following average composition when in the air-dried state: Carbon, 39-6; hydro- gen, 4-8; oxygen, 34-8; ash, i-o; water, 20%. When it is freshly felled, the water may be from 18 to 50 % . Air-dried or even green wood ignites readily when a con- siderable surface is exposed to the kindling flame, but in large masses with regular or smooth surfaces it is often difficult to get it to burn. When previously torrefied or scorched by heating to a temperature of about 200°, at which incipient charring is set up, it is exceedingly inflammable. The ends of imperfectly charred boughs from the charcoal heaps in this condition are used in Paris and other large towns in France for kindling purposes, under the name of fumerons. The inflammability, however, varies with the density, — the so-called hard woods, oak, beech and maple, taking fire less readily than the softer, and, more especially, the coniferous varieties rich in resin. The calorific power of absolutely dry woods may as an average be taken at about 4000 units, and when air-dried, i.e. containing 25% of water, at 2800 to 3000 units. Their evaporative values, i.e. the quantities of water evaporated by unit weight, are 3-68 and 4-44.

Wood being essentially a flaming fuel is admirably adapted for use with heat-receiving surfaces of large extent, such as loco- motive and marine boilers, and is also very clean in use. The absence of all cohesion in the cinders or unburnt carbonized residue causes a large amount of ignited particles to be projected from the chimney, when a rapid draught is used, unless special spark-catchers of wire gauze or some analogous contrivance are used. When burnt in open fireplaces the volatile products given off in the apartment on the first heating have an acrid penetrat- ing odour, which is, however, very generally considered to be agreeable. Owing to the large amount of water present, no very high temperatures can be obtained by the direct combustion of wood, and to produce these for metallurgical purposes

it is necessary to convert it previously either into charcoal or into inflammable gas.

Peat includes a great number of substances of very unequal fuel value, the most recently formed spongy light brown kind approximating in composition to wood, while the dense pitchy brown compact substance, obtained from the bottom of bogs of ancient formation, may be compared with lignite or even in some instances with coal. Unlike wood, how- ever, it contains incombustible matter in variable but large quantity, from 5 to 15 % or even more. Much of this, when the amount is large, is often due to sand mechanically intermixed; when air-dried the proportion of water is from 8 to 20%. When these constituents are deducted the average composition may

Peat

Lignite.

be stated to be — carbon, 52 to 66; hydrogen, 4-7 to 7-4; oxygen, 28 to 39; and nitrogen, r-5 to 3%. Average air-dried peat may be taken as having a calorific value of 3000 to 3500 units, and when dried at ioo° C, and with a minimum of ash (4 to 5 %), at about 5200 units, or from a quarter to one-third more than that of an equal weight of wood. The lighter and more spongy varieties of peat when air-dried are exceedingly inflammable, firing at a temperature of 200 C; the denser pulpy kinds ignite less readily when in the natural state, and often require a still higher tempera- ture when prepared by pulping and compression or partial carbonization. Most kinds burn with a red smoky flame, develop- ing a very strong odour, which, however, has its admirers in the same way that wood smoke has. This arises from the destructive distillation of imperfectly carbonized organic matter. The ash, like that of wood, is light and powdery, except when much sand is present, when it is of a denser character.

Peat is principally found in high latitudes, on exposed high tablelands and treeless areas in more temperate climates, and in the valleys of slow-flowing rivers, — as in Ireland, the west of Scotland, the tableland of Bavaria, the North German plain, and parts of the valleys of the Somme, Oise and a few other rivers in northern France. A principal objection to its use is its extreme bulk, which for equal evaporative effect is from 8 to 18 times that of coal. Various methods have been proposed, and adopted more or less successfully, for the purpose of increasing the density of raw peat by compression, either with or without pulping; the latter process gives the heaviest products, but the improvement is scarcely sufficient to compensate for the cost.

Lignite or brown coal is of intermediate character between peat and coal proper. The best kinds are undistinguishable in quality from free-burning coals, and the lowest earthy kinds are not equal to average peat. When freshly raised, the proportion of water may be from 45 to 50% and even more, which is reduced from 28 to 20% by exposure to dry air. Most varieties, however, when fully dried, break up into powder, which considerably diminishes their utility as fuel, as they cannot be consolidated by coking. Lignite dust may, however, be compacted into serviceable blocks for burning, by pressure in machines similar to those used for brick-making, either in the wet state as raised from the mines or when kiln- dried at 200° C. This method was adopted to a very large extent in Prussian Saxony. The calorific value varies between 3500 and 5000 units, and the evaporative factor from 2-16 when freshly raised to 5-84 for the best kinds of lignite when perfectly dried.

Of the other natural Juels, apart from coal (q.v.), the most important is so-called vegetable refuse, such as cotton stalks, brushwood, straw, and the woody residue of sugar-cane after the extraction of the saccharine juice known as Other megasse or cane trash. These are extensively used in tueis. countries where wood and coal are scarce, usually for providing steam in the manufactures where they arise, e.g. straw for thrashing, cotton stalks for ploughing, irrigating, or working presses, and cane trash for boiling down sugar or driving the cane mill. According to J. Head (Proc. Inst, of Civil En- gineers, vol. xlviii. p. 75), the evaporative values of r lb of these different articles when burnt in a tubular boiler are — coal, 8 lb ; dry peat, 4 lb; dry wood, 3-58- 3-52 lb; cotton stalks or megasse, 3-2-2-7 lb; straw, 2-46-2-30 lb. Owing to the siliceous nature of the ash of sraw, it is desirable to have a means of clearing the grate bars from slags and clinkers at short intervals, and to use a steam jet to clear the tubes from similar deposits.

The common fuel of India and Egypt is derived from the dung of camels and oxen, moulded into thin cakes, and dried in the sun. It has a very low heating power, and in burning gives off acrid ammoniacal smoke and vapour.

Somewhat similar are the tan cakes made from spent tanners' bark, which are used to some extent in eastern France and in. Germany. They are made by moulding the spent bark into cakes, which are then slowly dried by exposure to the air. Their effect is about equivalent to 80 and 30% of equal weights of wood and coal respectively.

SOLID]

Sulphur, phosphorus and silicon, the other principal com- bustible elements, are only of limited application as fuels. The first is used in the liquidation of sulphur-bearing rocks. The ore is piled into large heaps, which are ignited at the bottom, a certain proportion, from one-fourth to one-third, of the sulphur content being sacrificed, in order to raise the mass to a sufficient temperature to allow the remainder to melt and run down to the collecting basin. Another applica- tion is in the so-called ” pyritic smelting,” where ores of copper (q.v.) containing iron pyrites, FeS_2 , are smelted with appropriate fluxes in a hot blast, without preliminary roasting, the sulphur and iron of the pyrites giving sufficient heat by oxidation to liquefy both slag and metal. Phosphorus, which is of value from its low igniting point, receives its only application in the manufacture of lucifer matches. The high temperature produced by burning phosphorus is in part due to the product of combustion (phosphoric acid) being solid, and therefore there is less heat absorbed than would be the case with a gaseous product. The same effect is observed in a still more striking manner with silicon, which in the only special case of its application to the production of heat, namely, in the Bessemer process of steel-making, gives rise to an enormous increase of temperature in the metal, sufficient indeed to keep the iron melted. The absolute calorific value of silicon is lower than that of carbon, but the product of combustion (silica) being non- volatile at all furnace temperatures, the whole of the heat developed is available for heating the molten iron, instead of a considerable part being consumed in the work of volatilization, as is the case with carbonic oxide, which burns to waste in the air.

Assay and Valuation of Carbonaceous Fuels. — The utility or value of a fuel depends upon two principal factors, namely, its calorific power and its calorific intensity or pyrometric effect, that Calorific , Si tne sens ible temperature of the products of combustion. power. j ne g rst Q f tn ese is constant for any particular product of combustion independently of the method by which the burning is effected, whether by oxygen, air or a reducible metallic oxide. It is most conveniently determined in the laboratory by measuring the heat evolved during the combustion of a given weight of the fuel. The method of Lewis Thompson is one of the most useful. The calorimeter consists of a copper cylinder in which a weighed quantity of coal intimately mixed with 10-12 parts of a mixture of 3 parts of potassium chlorate and 1 of potassium nitrate is deflagrated under a copper case

like a diving-bell, placed at the bottom of a deep glass jar filled with a known weight of water. The mixture is fired by a fuse of lamp-cotton previously soaked in a nitre solution and dried. The gases produced by the combustion rising through the water are cooled, with a corresponding increase of temperature in the latter, so that the difference between the temperature observed before and after the experiment measures the heat evolved. The instrument is so constructed that 30 grains (2 grammes) of coal are burnt in 29,010 grains of water, or in the proportion of I to 937, these numbers being selected that the observed rise of temperature in Fahrenheit degrees corresponds to the required evaporative value in pounds, subject only to a correction for the amount of heat absorbed by the mass of the instrument, for which a special coefficient is required and must be experimentally determined. The ordinary bomb calorimeter is also used. An approximate method is based upon the reduction of lead oxide by the carbon and hydrogen of the coal, the amount of lead reduced affording a measure of the oxygen expended, whence the heating power may be calculated, I part of pure carbon being capable of producing 34J times its weight of lead. The operation is performed by mixing the weighed sample with a large excess of litharge in a crucible, and exposing it to a bright red heat for a short time. After cooling, the crucible is broken and the reduced button of lead is cleaned and weighed. The results obtained by this method are less accurate with coals containing much disposable hydrogen and iron pyrites than with those approxi- mating to anthracite, as the heat equivalent of the hydrogen in excess of that required to form water with the oxygen of the coal is calculated as carbon, while it is really about four times as great. Sulphur in iron pyrites also acts as a reducing agent upon litharge, and increases the apparent effect in a similar manner.

The evaporative power of a coal found by the above methods, and also by calculating the separate calorific factors of the com- ponents as determined by the chemical analysis, is always consider- ably above that obtained by actual combustion under a steam boiler, as in the latter case numerous sources of loss, such as imperfect combustion of gases, loss of unburnt coal in cinders, &c, come into play, which cannot be allowed for in laboratory experiments. It is usual, therefore, to determine the value of a coal by the combustion

of a weighed quantity in the furnace of a boiler, and measuring the amount of water evaporated by the heat developed.

In a research upon the heating power and other properties of coal for naval use, carried out by the German admiralty, the results tabulated

below were obtained with coals form different localities.

The heats of combustion of elements and compounds will be found in most of the larger works on physical and chemical constants;

Slag left in Grate.

Ashes in Ashpit.

Soot in Flues.

Water eva- porated by 1 lb of Coal

Westphalian gas coals .

Do. bituminous coals

Do. dry coals Silesian coals . Welsh steam coals Newcastle coals

o-33-6-42

0-98-9-10 1-93-5-70 0-92-1-30 1-20-4-07 1-92

2-83- 6-53 1-97- 9-63 4-37-10-63

3-15- 3-5o

4-07

2-57

0-32-0-46

0-24-0-88

0-24-0-48

0-24-0-30

0-32

0-35

6-60-7-45 lb

7-30-8-66

7-03-8-51 6-73-7-10

a convenient series is given in the Annuaire du Bureau des Longitudes, appearing in alternate years. The following figures for the principal fuel elements are taken from the issue for 1908; they are expressed in gramme ” calories ” or heat units, signifying the weight of water in grammes that can be raised I ° C. in temperature by the combustion of 1 gramme of the substance, when it is oxidized to the condition shown in the second column :

Element.

Product of Combustion.

Calories.

Hydrogen .

\ Water, H 2 0, condensed to liquid \ „ as vapour

34,500 29,650

Carbon — .

Diamond

Carbon dioxide, CO2 .

7,868

Graphite .

M ,, ...

7,900

Amorphous .

,, J, ...

8,133

Silicon-

Amorphous .

Silicon dioxide, Si0 2 .

6,414

Crystallized .

,, ,, ...

6,570

Phosphorus

Phosphoric pentoxide, P2O5

5.958

Sulphur

J Sulphur dioxide, S0 2 , gaseous .

2,165

The results may also be expressed in terms of the atomic equivalent of the combustible by multiplying the above values by the atomic weight of the substance, 12 for carbon, 28 for silicon, &c.

In all fuels containing hydrogen the calorific value as found by the calorimeter is higher than that obtainable under working con- ditions by an amount equal to the latent heat of volatilization of water which reappears as heat when the vapour is condensed, though under ordinary conditions of use the vapour passes away un- condensed. This gives rise to the distinction of higher and lower calorific values for such substances, the latter being those generally used in practice. The differences for the more important compound gaseous fuels are as follows: —

Calorific Value.

Higher. Lower.

. 11,920 11,500

. 11,880 11,120

. 13,240 11,910

CO . 2,440 2,440

Acetylene, C 2 H 2 . Ethylene, C 2 H 4 . Methane, CH 4 Carbon

monoxide,

The calorific intensity or pyrometric effect of any particular fuel depends upon so many variable elements that it cannot be determined except by actual experiment. The older method was to multiply the weight of the products of combustion ^* ,or ™ ; by their specific neats, but this gave untrustworthy _ ens y ‘ results as a rule, on account of two circumstances — the great increase in specific heat at high temperatures in compound gases such as water and carbon dioxide, and their instability when heated to 1800° or 2000 . At such temperatures dissociation to a notable extent takes place, especially with the latter substance, which is also readily reduced to carbon monoxide when brought in contact with carbon at a red heat — a change which is attended with a large heat absorption. This effect is higher with soft kinds of carbon, such as charcoal or soft coke, than with dense coke, gas retort carbon or graphite. These latter substances, therefore, are used when an intense local heat is required, as for example, in the Deville furnace, to which air is supplied under pressure. Such a method is, however, only of very special application, the ordinary method being to supply air to the fire in excess of that required to burn the fuel to prevent the reduction of the carbon dioxide. _ The volume of flame, however, is increased by inert gas, and there is a proportionate diminution of the heating effect. Under the most favourable con- ditions, when the air employed has been previously raised to a high temperature and pressure, the highest attainable flame temperature from carbonaceous fuel seems to be about 2 100 “-2300° C. ; this is realized in the bright spots or ” eyes ” of the tuyeres of blast furnaces. Very much higher temperatures may be reached when the products of combustion are not volatile, and the operation can be effected by using the fuel and oxidizing agent in the proportions exactly

required for perfect combustion and intimately mixed. These conditions are met in the ” Thermit ” process of Goldschmidt, where finely divided aluminium is oxidized by the oxide of some similar metal, such as iron, manganese or chromium, the reaction being started by a primer of magnesium and barium peroxide. The reaction is so rapidly effected that there is an enormous rise in temperature, estimated to be 5400° F. (3000 C), which is sufficient to melt the most

refractory metals, such as chromium. The slag consists of alumina which crystallizes in the forms of corundum and ruby, and is utilized as an abrasive under the name of corubin.

The chemical examination includes the determination of (1) moisture, (2) ash, (3) coke, (4) volatile matter, (5) fixed carbon in coke, (6) sulphur, (7) chlorine, (8) phosphorus. Moisture is deter- mined by noting the loss in weight when a sample is heated at 100° for about one hour. The ash is determined by heating a sample in a muffle furnace until all the combustible matter has been burnt off. The ash, which generally contains silica, oxides of the alkaline earths, ferric oxide (which gives the ash a red colour), sulphur, &c, is analysed by the ordinary gravimetric methods. The determination of coke is very important on account of the conclusions concerning the nature of the coal which it permits to be drawn. A sample is finely powdered and placed in a covered porcelain crucible, which is surrounded by an outer one, the space between them being packed with small coke. The crucibles are heated in a wind furnace for 1 to I i hours, then allowed to cool, the inner crucible removed, and the coke weighed. The coke may be (1) pulverulent, (2) slightly fritted, (3) spongy and swelled, (4) compact. Pulverulent cokes indicate a non-caking bituminous coal, rich in oxygen if the amount be below 60%, but if the amount be very much less it generally indicates a lignite; if the amount be above 80% it indi- cates an anthracite containing little oxygen or hydrogen. A fritted coke indicates a slightly coking coal, while the spongy appearance points to a highly coking coal which has been partly fused in the furnace. A compact coke is yielded by good coking coals, and is usually large in amount. The volatile matters are determined as the loss of weight on coking less the amount of moisture. The ” fixed carbon” is the carbon retained in the coke, which contains in addition the ash already determined. The fixed carbon is therefore the differ- ence between the coke and the ash, and may be determined from these figures; or it may be determined directly by burning off the coke in a muffle and noting the loss in weight. Sulphur may be present as (1) organic sulphur, (2) as iron pyrites or other sulphides, (3) as the sulphates of calcium, aluminium and other metals; but the amount is generally so small that only the total sulphur is determined. This is effected by heating a mixture of the fuel with lime and sodium carbonate in a porcelain dish to redness in a muffle until all the carbonaceous matter has been burnt off. The residue, which contains the sulphur as calcium sulphate, is trans- ferred to a beaker containing water to which a little bromine has been added. Hydrochloric acid is carefully added, the liquid filtered and the residue washed. To the filtrate ammonia is added, and then barium chloride, which

precipitates the sulphur as barium sulphate. Sulphur existing in the form of sulphates may be removed by washing a sample with boiling water and determining the sulphuric acid in the solution. The washed sample is then fused in the usual way to determine the proportion of sulphur existing as iron pyrites. The distinction between sulphur present as sulphate and sulphide is of importance in the examination of coals intended for iron smelting, as the sulphates of the earthy metals are reduced by the gases of the furnace to sulphides, which pass into the slag without affecting the quality of the iron produced, while the sulphur of the metallic sulphides in the ash acts prejudicially upon the metal. Coals for gas-making should contain little sulphur, as the gases produced in the combustion are noxious and have very corrosive properties. Chlorine is rarely determined, but when present in quantity it corrodes copper and brass boiler tubes, with which conse- quently chlorine-bearing coals cannot be used. The element is determined by fusing with soda lime in a muffle, dissolving the residue in water and precipitating with silver nitrate. Phosphorus is determined in the ash by fusing it with a mixture of sodium and potassium carbonates, extracting the residue with hydrochloric acid, and twice evaporating to dryness with the same acid. The residue is dissolved in hydrochloric acid, a few drops of ferric chloride added, and then ammonia in excess. The precipitate of ferric phosphate is then treated as in the ordinary estimation of phosphates. If it be necessary to determine the absolute amount of carbon and hydrogen in a fuel, the dried sample is treated with copper oxide as in the ordinary estimation of these elements in organic compounds. (H. B.)

Liquid Fuel.

Vegetable oil is not used for fuel except for laboratory pur- poses, partly because its constituent parts are less adaptable for combustion under the conditions necessary for steam-raising, but chiefly because of the commercial difficulty of producing it with sufficient economy to compete with mineral fuel either solid or liquid.

The use of petroleum as fuel had long been recognized as a

scientific possibility, and some attempts had been made to adopt it in practice upon a commercial scale, but the insufficiency, and still more the irregularity, of the supplies prevented it from coming into practical use to any important extent until about 1898, when discoveries of oil specially adapted by chemical composition for fuel purposes changed the aspect of the situation; These discoveries of special oil were made first in Borneo and later in Texas, and experience in treating the oils from both localities has shown that

while not less adapted to produce kerosene or illuminating oil, they are better adapted to produce fuel oil than either the Russian or the Pennsylvanian products. Texas oil did not hold its place in the market for long, because the influx of water into the wells lowered their yield, but dis- coveries of fuel oil in Mexico have come later and will help to maintain the balance of the world's supply, although this is still a mere fraction of the assured supply of coal.

With regard to the chemical properties of petroleum, it is not necessary to say more in the present place than that the lighter and more volatile constituents, known commercially as naphtha and benzene, must be removed by distillation in order to leave a residue composed principally of hydrocarbons which, while containing the necessary carbon for combustion, shall be suffi- ciently free from volatile qualities to avoid premature ignition and consequent danger of explosion. Attempts have been made to use crude oil for fuel purposes, and these have had some success in the neighbourhood of the oil wells and under boilers of unusually good ventilation both as regards their chimneys and the surroundings of their stokeholds; but for reasons both of commerce and of safety it is not desirable to use crude oil where some distillation is possible. The more complete the process of distillation, and the consequent removal of the volatile constituents, the higher the flash-point, and the more turgid and viscous is the fuel resulting; and if the process is carried to an extreme, the residue or fuel becomes difficult to ignite by the ordinary process of spraying or atomizing mechanically at the moment immediately preceding combustion. The proportions which have been found to work efficiently in practice are as follows: —

Carbon ….. 88-oo %

Hydrogen 1075 %

Oxygen …. ■ 1-25 %

Total . . 100

The standards of safety for liquid fuel as determined by flash-point are not yet finally settled, and are changing from time to time. The British admiralty require a flash-point of 270 F., and to this high standard, and the consequent viscosity of the fuel used by vessels in the British fleet, may partly be attributed the low rate of combustion that was at first found possible in them. The German admiralty have fixed a flash-point of 187 F., and have used oil of this standard with perfect safety, and at the same time with much higher measure of evaporative duty

than has been attained in British war-vessels. In the British mercantile marine Lloyd's Register has permitted fuel with a flash- point as low as 150° F. as a minimum, and no harm has resulted. The British Board of Trade, the department of the government which controls the safety of passenger vessels, has fixed a higher standard upon the basis of a minimum of 185 . In the case of locomotives the flash-point as a standard of safety is of less importance than in the case of stationary or marine boilers, because the storage is more open, and the ventilation, both of the storage tanks and the boilers during combustion, much more perfect than in any other class of steam-boilers.

The process of refining by distillation is also necessary to reduce two impurities which greatly retard storage and com- bustion, i.e. water and sulphur. Water is found in all crude petroleum as it issues from the wells, and sulphur exists in important quantities in oil from the Texas wells. Its removal was at first found very expensive, but there no longer exists difficulty in this respect, and large quantities of petroleum fuel practically free from sulphur are now regularly exported from Texas to New York and to Europe.

Water mixed with fuel is in intimate mechanical relation, and frequently so remains in considerable quantities even after the process of distillation. It is in fact so thoroughly mixed as to form an emulsion. The effect of feeding such a mixture into a furnace is extremely injurious, because the water must be decom- posed chemically into its constituents, hydrogen and oxygen, thus absorbing a large quantity of heat which would otherwise be utilized for evaporation. Water also directly delays com- bustion by producing from the jet a long, dull, red flame instead of a short bright, white flame, and the process of combustion, which should take place by vaporization of the oil near the furnace mouth, is postponed and transferred to the upper part of the combustion-box, the tubes, and even the base of the chimney, producing loss of heat and injury to the boiler structure. The most effective means of ridding the fuel of this dangerous impurity is by heat and settlement. The coefficients of expansion of water and oil by heat are substantially different, and a moderate rise of temperature therefore separates the particles and precipitates the water, which is easily drawn off — leaving the oil available for use. The heating and

precipitation are usually performed upon a patented system of settling tanks and heating apparatus known as the Flannery-Boyd system, which has proved itself indispensable for the successful use at sea of petroleum fuel containing any large proportion of water.

The laboratory and mechanical use of petroleum for fuel has already been referred to, but it was not until the year 1870 that petroleum was applied upon a wider and commercial P f°f re ˆf scale. In the course of distillation of Russian crude fuel. petroleum for the production of kerosene or lamp oil,

large quantities of refuse were produced — known by the Russian name of astatki — and these were found an incum- brance and useless for any commercial purpose. To a Russian oil-refiner gifted with mechanical instinct and the genius for invention occurred the idea of utilizing the waste product as fuel by spraying or atomizing it with steam, so that, the thick and sluggish fluid being broken up into particles, the air necessary for combustion could have free access to it. The earliest apparatus for this purpose was a simple piece of gas-tube, into which the thick oil was fed; by another connexion steam at high pressure was ad- mitted to an inner and smaller tube, and, the end of the tube nearest to the furnace being open, the pressure of the steam blew the oil into the furnace, and by its velocity broke it up into spray. The ap- paratus worked with success from the first. Ex- perience pointed out the proper proportionate sizes for the inlets of steam and oil, the proper pressure for the steam, and the propor- tionate sizes for the orifices of admission to the fur- naces, as well as the sizes of

air-openings and best arrangements of fire-bricks in the furnaces themselves; and what had been a waste product now became a by-product of great value. Practically all the steam power in South Russia, both for factories and navigation of the inland seas and rivers, is now raised from astatki fuel.

In the Far East, including Burma and parts of China and Japan, the use of liquid fuel spread rapidly during the years iSoq, 1000 and 1001, owing entirely to the development of the Borneo oil-fields by the enterprise of Sir Marcus Samuel and the large British corporation known as the Shell Jransport and Trading Company, of which he is the head. This corporation

has since amalgamated with the Royal Dutch Petroleum Com- pany controlling the extensive wells in Dutch Borneo, and together they supply large quantities of liquid fuel for use in the Far East. In the United States of America liquid fuel is not only used for practically the

whole of the manufacturing and locomotive purposes of the state of Texas, but factories in New York, and a still larger number in California, are now discarding the use of coal and adopting petroleum, because it is more economical in its consumption and also more easily handled in transit, and saves nearly all the labour of stoking. So far the supplies for China and Japan have been exported from Borneo, but the discoveries of new oil-fields in California, of a character specially adapted for- fuel, have encouraged the belief that it may be possible to supply Chile and Peru and other South American countries, where coal is extremely expensive, with Californian fuel; and it has also found its way across the Pacific to Japan. There are believed to be large deposits in West Africa, but in the meantime the only sources of supply to those parts of Africa where manufacture is progressing, i.e. South Africa and Egypt, are the oil-fields of Borneo and Texas, from which the import has well begun, from Texas to Alexandria via the Mediterranean, and from Borneo to Cape Town via Singapore.

In England, notwithstanding the fact that there exist the finest coal-fields in the world, there has been a surprising develop- ment of the use of petroleum as fuel. The Great Eastern railway adapted 1 20 locomotive engines to its use, and these ran with regularity and success both on express passenger and goods trains until the increase in price due to short supply compelled a return to coal fuel. The London, Brighton & South Coast railway also began the adaptation of some of their locomotive engines, but discontinued the use of liquid fuel from the same cause. Several large firms of contractors and cement manu- facturers, chiefly on the banks of the Thames, made the same adaptations which proved mechanically successful, but were not continued when the price of liquid fuel increased with the increased demand.

The chief factors of economy are the greater calorific value

c c

_,*,...

rSi

aZ

r >

O

Fig. 1. — Holden Burner.

of oil than coal (about 16 lb of water per lb of oil fuel evaporated from a temperature of 212° F.), not only in laboratory practice, but in actual use on a large scale, and the saving of labour both in transit from the source of supply to the place of use and in the act of stoking the furnaces. The use of cranes, hand labour with shovels, wagons and locomotives, EC f° 1 “°’^/ horses and carts, is unavoidable for the transit of /„ e /. coal; and labour to trim the coal, to stoke it when under combustion, and to handle the residual ashes, are all indispensable to steam-raising by coal. On the other hand, a system of pipes and pumps, and a limited quantity of skilled

labour to manage them, is all that is necessary for the transit and combustion of petroleum fuel; and it is certain that even in England will be found places which, from topographical and other circumstances, will use petroleum more economically than coal as fuel for manufacturing purposes under reasonable conditions of price for the fuel.

The theoretical calorific value of oil fuel is more nearly realized in practice than the theoretical calorific value of coal, because the facilities for complete combustion, due to the artificial admixture of the air by the atomizing process, are greater in

eil

1

X

‘^- JL~T- r T’l I

Blllks

SiliiFˆ

riveted and tested, so as to form a storage tank. From this tank a feed-pipe is led to a burner of the combined steam-and-oi! type already indicated, and this burner is so arranged ii QU id as to enter a short distance inside the furnace fuel la mouth. The ordinary fire-bars are covered with a thin loco- layer of coal, which starts the ignition in the first motives. place, and the whole apparatus is ready for work. The burner best adapted for locomotive practice is the Holden Burner (fig. 1), which was used on the Great Eastern railway. The steam-pipe is connected at A, the oil-pipe at B, and the hand- wheels C and D are for the adjustment of the internal orifices according to the rate of com-bustion required. The nozzle E is directed towards the furnace, and the external ring FF, supplied by the small pipe G and the by pass valve H, projects a series of steam jets into the furnace, independent of the injections of atomized fuel, and so induces an artificial inrush of air for the promotion of combustion. This type of burner has also been tried on stationary boilers and on board ship. It works well, although the great con sumption of steam by the supplementary ring is a difficulty at sea, where the water lost by the consumption of steam cannot easily be made up.

Although the application of the new fuel for land and locomotive boilers has already been large, the practice at sea has

2M

been far more extensive. The reason

Liquid fuel at sea.

Sttam—

3

Fig. 2. — Rusden and Eeles Burner, the case of oil than coal, and for this reason, among others, the practical evaporative results are proportionately higher with liquid fuel. In some cases the work done in a steam-engine by 2 tons of coal has been performed by 1 ton of oil fuel, but in others the proportions have been as 3 to 2, and these latter can be safely relied on in practice as a minimum. This saving, combined with the savings of labour and transit already explained, will in the near future make the use of liquid fuel compulsory, except in places so near to coal-fields that the cost of coal becomes

sufficiently low to counterbalance the savings in weight of fuel consumed and in labour in handling it. In some locomotives on the Great Eastern railway the consumption of oil and coal for the same development of horse-power was as 17 lb oil is to 35 lb coal; all, however, did not realize so high a result.

The mechanical apparatus for applying petroleum to steam- raising in locomotives is very simple. The space in the tender usually occupied by coal is closed up by steel-plating closely

is chiefly to be found in the fact that although the sources of supply are at a dis- tance from Great Britain, yet they are in countries to whose neighbourhood British steamships regularly trade, and in which British naval squadrons are regularly stationed, so that the advantages of adopting liquid fuel have been more immediate and the economy more direct. The certainty of continuous supply of the fuel and the wide distribution of storage stations have so altered the conditions that the general adoption of the new fuel for marine purposes becomes a matter of urgency for the statesman, the merchant and the engineer. None of these can afford to neglect the new conditions, lest they be noted and acted upon by their competitors. Storage for supply now exists at a number of sea ports: London, Barrow, Southampton, Amsterdam, Copen- hagen, New Orleans, Savannah, New York, Philadelphia, Singapore, Hong Kong, Madras, Colombo, Suez, Hamburg, Port Arthur, Rangoon, Calcutta, Bombay, Alexandria, Bangkok, Saigon, Penang, Batavia, Surabaya, Amoy, Swatow, Fuchow, Shanghai, Hankow, Sydney, Melbourne, Adelaide, Zanzibar, Mombasa, Yokohama, Kobe and Nagasaki; also in South African and South American ports.

The British admiralty have undertaken experiments with liquid fuel at sea, and at the same time investigations of the

>i Air Pipe

‘**”? TPiece Co Air Pipe ” WfAirCoSeunduu3f , tpe\ ■fFiUviy Pipe rhtftflraX Odfial-

Oil fUei \

FuvuieprSofd $»r*fmo Tanks

=flfe

ri AtrPipe-ˆ

■r ■ nuingPtpeis

*” Sluice yaire\ \ 1 “Delirerrtbafl cofferdam SoundlnaPit > e\) > ˆ

Tftu Butkhetbd fitted wOK Cgj*f* frofi Sparrina oeloh*

Hat Box Suctions— _ Pump Roorrv-

r/tis BuUitiead fitted iruh mod sparring)

H

IT

ˆ Tlifsetulk

wiintwod spa/ring

Oil Fuel

WArftpt

TFSuiiccKUre

Fig. 3. — Storage of Liquid Fuel on Oil-carrying Steamers (Flannery-Boyd System).

LIQUID]

FUEL

279

possibility of supply from sources within the regions of the British empire. There is an enormous supply of shale under the north-eastern counties of England, but no oil that can be pumped —still less oil with a pressure above it so as to ” gush ” like the wells in America— and the only sources of liquid supply under the British flag appear to be in Burma and Trinidad. The Borneo

t=- ., ...

;&g$gfi&M%2£& L

‘”■/***&/■ f- -ˆ“j&JbO

ˆ*ˆ__ ” :

<ˆtj

Fig. 4. — Installation on ss. ” Trocas.”

fields are not under British control, although developed entirely by British capital. The Italian admiralty have fitted several large warships with boiler apparatus to burn petroleum. The German admiralty are regularly using liquid fuel on the China station. The Dutch navy have fitted coal fuel and liquid fuel furnaces in combination, so that the smaller powers required

Fig. 5. — Details of Furnace, Meyer System.

may be developed by coal alone, and the larger powers by- supplementing coal fuel with oil fuel. The speeds of some vessels of the destroyer type have by this means been accelerated nearly two knots.

The questions which govern the use of fuel in warships are more largely those of strategy and fighting efficiency than

economy of evaporation. Indeed, the cost of construct- Advan- j n g an(j ma j n taining in fighting efficiency a modern wa”h°ps. warship is so great that the utmost use strategically

must be obtained from the vessel, and in this compari- son the cost of fuel is relatively so small an item that its increase

B’i

1

IS

a

%&

i-ij’TtWfffai

a

a

Fig. 6. — Details of Exterior Elongation of Furnace, Meyer System. or decrease may be considered almost a negligible quantity.

The desideratum in a warship is to obtain the greatest fighting

efficiency based on the thickest armour, the heaviest and most numerous guns, the highest maximum speed, and, last and not least, the greatest range of effective action based upon the maximum supplies of fuel, provisions and other consumable stores that the ship can carry. Now, if by changing the type of fuel it be possible to reduce its weight by 30% , and to abolish the stokers, who are usually more than half the ship's company, the weight saved will be represented not merely by the fuel, but by the consumable stores otherwise necessary for the stokers. Conversely, the radius of effective action of the ship will be doubled as regards consumable stores if the crew be halved, and will be increased by 50% if the same weight of fuel be carried in the form of liquid instead of coal. In space the gain by using oil fuel is still greater, and 36 cubic feet of oil as stored are equal in practical calorific value to 67 cubic feet of coal according to the allowance usual for ship's bunkering. On the other hand, coal has been relied upon, when placed in the side bunkers of unarmoured ships, as a protection against shot and shell, and this advantage, if it really exists, could not be claimed in regard to liquid fuel.

Recent experiments in coaling warships at sea have not been very successful, as the least bad weather has prevented the safe transmission of coal bags from the collier to the ship. The same difficulty does not exist for oil fuel, which has been pumped through flexible tubing from one ship to the other even in comparatively rough weather. Smokelessness, so important a feature of sea strategy, has not always been attained by liquid fuel, but where the combustion is complete, by reason of suitable furnace arrangements and careful management, there is no smoke. The great drawback, however, to the use of liquid fuel in fast small vessels is the confined space allotted to the boilers, such confinement being unavoidable in view of the high power con- centrated in a small hull. The British ad- miralty's experiments, however, have gone far to solve the problem, and the quantity of oil which can be consumed by forced draught in confined boilers now more nearly equals the quantity of coal consumed under similar con- ditions. All recent vessels built for the British navy are so constructed that the spaces between their double bottoms are oil-tight and capable of storing liquid fuel in the tanks so formed. Most recent battle- ships and cruisers have also liquid fuel furnace fittings, and in 19 10 it already appeared probable that the use of oil fuel in war- ships would rapidly develop.

In view of recent accusations of insufficiency of coal storage in foreign naval depots, by reason of the allegation that coal so stored quickly

perishes, it is interesting to note that liquid fuel may be stored in tanks for an indefinite time without any deterioration whatever.

In the case of merchant steamers large progress has also been made. The Shell Transport and Trading Company have twenty- one vessels successfully navigating in all parts of the Advan- world and using liquid fuel. The Hamburg-American tages in Steamship Company have four large vessels similarly merchant fitted for oil fuel, which, however, differ in furnace s ps ‘ arrangements, as will be hereafter described, although using coal when the fluctuation of the market renders that the more economical fuel. One of the large American transatlantic lines is adopting liquid fuel, and French, German, Danish and American mercantile vessels are also beginning to use it in considerable amounts.

In the case of very large passenger steamers, such as those of 20 knots and upwards in the Atlantic trade, the saving in cost of fuel is trifling compared with the advantage arising from the greater weight and space available for freight. Adopting a basis of 3 to 2 as between coal consumption and oil consumption, there is an increase of 1000 tons of dead weight cargo in even a

~f £ ? ‘i 7-— Furnace on ss Ferdinand Laeisz.” A, it is proposed to do away with this ring ot brickwork as being useless; B, it is proposed to fill this space up, thus continuing lining 01 iurnace to combustion chamber, and also to fit protection bricks in way of saddle plate.

SB Suffty tank.

[LIQUID

ships, whilst considerable additional speed is obtainable. The cost of the installa- tion, however, is very considerable, as it includes not only burners and pipes for the furnaces, but also the construction of oil-tight tanks, with pumps and numerous valves and pipe connexions.

Fig. 2 shows a burner of Rusden and Eeles’ patent as generally used on board ships’ for the purpose of injecting the oil. A is a movable cap holding the packing B, which renders the annular spindle M oil and steam tight. E is the outer casing contain- ing the steam jacket from which the steam, after being fed through the steam-supply pipe G, passes into the annular space sur- rounding the spindle P. It will be

seen that if the spindle P be travelled inwards by turning the handle N, the orifice at the nozzle RR will be opened so as to allow the steam to flow out radially. If at the same time the annular spindle M be drawn inwards by revolving the handle L, the oil which passes through the supply pipe F will also have emission at RR, and, coming in contact with the outflowing steam, will be

Momble G003M*Xa

TMain Boiler Suppiv lank an eacA side or 3/Up

Fig. 8.— Fuel Tanks, &c, of ss.

Murex.”

medium-sized Atlantic steamer, and a collateral gain of about ioo.ooo cub. ft. of measurement cargo, by reason of the ordinary bunkers being left quite free, and the oil being stored in the double bottom spaces hitherto unutilized except for the purpose of water ballast. The cleanliness and saving of time from bunkering by the use of oil fuel is also an important factor in passenger

pulverized and sprayed into the furnace. Fig. 3 is a profile and plan of a steamer adapted for carrying oil in bulk, and showing all the storage arrangements for handling liquid fuel. Fig. 4 shows the interior arrangement of the boiler furnace of the steamship Irocas. A is broken fire-brick resting on the ordinary nre-bars, B is a brick bridge, C a casing of fire-brick intended to protect the riveted seam immediately above it from the direct

Fig. 9. — Furnace Gear of ss. ” Murex. ”

Fig. 10. — Section through Furnace of ss. ” Murex.”

impact of the flame, and D is a lining of fire-brick at the back of the combustion-box, also intended to protect the plating from the direct impact of the petroleum flame. The arrangement of the furnace on the Meyer system is shown in fig. 5, where E is an annular pro- jection built at the mouth of the furnace, and BB are spiral passages for heating the air before it passes into the furnace. Fig. 6 shows the rings

CC and details of the casting which forms the projection or exterior elongation of the furnace. The brickwork arrangement adopted for the double-ended boilers on the Hamburg-American Steamship Company's " Ferdinand Laeisz " is represented in fig. 7. The whole furnace is lined with fire-brick, and the burner is mounted upon a circular disk plate which covers the mouth of the furnace. The oil is injected not by steam pulverization, but by pressure due to a steam-pump. The oil is heated to about 6o° C. before entering the pump, and further heated to 90 C. after leaving the pump. It

is then filtered, and passes to the furnace injector C at about 30- lb pressure; and its passage through this in- jector and the spiral pass- ages of which it consists pulverizes the oil into spray, in which form it readily ignites on reaching the interior of the furnace. The injector is on the Korting principle, that is, it atomizes by fracture of the liquid oil arising from its own mo- mentum under pressure. The advantage of this system as compared with the steam-jet system is the saving of fresh water, the ... abstraction of which is so

injurious to the boiler by the formation of scale.

The general arrangement of the fuel tanks and filling pipes on the ss. " Murex " is shown in fig. 8; and fig. 9 represents the furnace gear of the same vessel, A being the steam-pipe, B the oil-pipe, C the injector, D the swivel upon which the. injector is hung so that it may be swung clear of the furnace, E the fire-door, and F the handle for adjusting the injector. In fig. 10, which represents a section of the furnace, H is a fire-brick pier and K a fire-brick baffling bridge.

It is found in practice that to leave out the fire-bars ordinarily used for coal produces a better result with liquid fuel than the alternative system of keeping them in place and protecting them by a layer of broken fire-brick.

Boilers fitted upon all the above systems have been run for thousands of miles without trouble. In new construction it is desirable to give larger combustion chambers and longer and narrower boiler tubes than in the case of boilers intended for the combustion of coal alone. (p_ p *)

Gaseous Fuel.

Strictly speaking, much, and sometimes even most, of the heating effected by solid or liquid fuel is actually performed by the gases given off during the combustion. We speak, however, of gaseous fuel only in

those cases where we supply a combustible gas from the outset, or where we produce from ordinary solid (or liquid) fuel in one place a stream of combustible gas which is burned in another place, more or less distant from that where it has been generated.

The various descriptions of gaseous fuel employed in practice may be classified under the following heads: I. Natural Gas.

II. Combustible Gases obtained as by-products in various

technical operations.

III. Coal Gas (Illuminating Gas).

IV. Combustible Gases obtained by the partial combustion of

coal, &c.

I. Natural Gas. — From time immemorial it has been known that in some parts of the Caucasus and of China large quantities of gases issue from the soil, sometimes under water, which can be lighted and burn with a luminous flame. The “eternal fires ” of Baku belong to this class. In coal-mines frequently similar streams of gas issue from the coal ; these are called ” blowers,” and when they are of somewhat regular occurrence are sometimes conducted away in pipes and used for underground lighting. As a regular source of heating power, however, natural gas is employed only in some parts of the United States, especially in Pennsylvania, Kansas. Ohio and West Virginia, where it always occurs in the neighbourhood of coal and petroleum fields. The first public mention of it was made in 1775, but it was

not till 1821 that it was turned to use at Fredonia, N.Y. In Pennsylvania natural gas was discovered in 1859, but at first very little use was made of it. Its industrial employment dates only from 1874, and became of great importance about ten years later. Nobody ever doubted that the gas found in these localities was an accumulation of many ages and that, being tapped by thousands of bore-holes, it must rapidly come to an end. This assumption was strengthened by the fact that the ” gas-wells,” which at first gave out the gas at a pressure of 700 or 800, sometimes even of 1400 lb per sq. in., gradually showed a more and more diminishing pressure and many of them ceased to work altogether. About the year 1890 the belief was fairly general that the stock of natural gas would soon be entirely exhausted. Indeed, the value of the annual production of natural gas in the United States, computed as its equivalent of coal, was then estimated at twenty-one million dollars, in 1895 at twelve

millions, in 1899 at eleven and a half millions. But the output rose again to a value of twenty-seven millions in 1901, and to fifty million dollars in 1907. Mostly the gas, derived from upwards of 10,000 gas-wells, is now artificially compressed to a pressure of 300 or 400 lb per sq. in. by means of steam- power or gas motors, fed by the gas itself, and is conveyed over great distances in iron pipes, from 9 or 10 to 36 in. in diameter. In 1904 nearly 30,000 m. of pipe lines were in operation. In 1907 the quantity of natural gas consumed in the United States (nearly half of which was in Pennsylvania) was 400,000 million cub. ft., or nearly 3 cub. m. Canada (Ontario) also produces some natural gas, reaching a maximum of about $746,000 in

1907.

The principal constituent of natural gas is always methane, CH_4, of which it contains from 68-4 to 94-0 % by volume. Those gases which contain less methane contain all the more hydrogen, viz. 2-9 to 29-8%. There is also some ethylene, ethane and carbon monoxide, rarely exceeding 2 or 3%. The quantity of incombustible gases — oxygen, carbon dioxide, nitrogen — ranges from mere traces to about 5 %. The density is from 0-45 to 0-55. The heating power of 1000 cub. ft. of natural gas is equal to from 80 to 120 lb, on the average 100 lb, of good coal, but it is really worth much more than this proportion would indicate, as it burns completely, without smoke or ashes, and without requiring any manual labour. It is employed for all domestic and for most industrial purposes.

The origin of natural gas is not properly understood, even now. The most natural assumption is, of course, that its forma- tion is connected with that of the petroleum always found in the same neighbourhood, the latter principally consisting of the higher-boiling aliphatic hydrocarbons of the methane series. But whence do they both come ? Some bring them into con- nexion with the formation of coal, others with the decomposition of animal remains, others with that of diatomaceae, &c, and even an inorganic origin of both petroleum and natural gas has been assumed by chemists of the rank of D. I. Mendeleeff and H. Moissan.

IT Gases obtained as By-products. — There are two important cases in which gaseous by-products are utilized as fuel; both are intimately connected with the manufacture of iron, but in a very different way, and the gases are of very different composition.

(a) Blast-furnace Gases. — The gases issuing from the mouths of blast-furnaces (see Iron and Steel) were first utilized in 1837 by Faber du

Faur, at Wasseralfingen. Their use became more extensive after i860, and practically universal after 1870. The volume of gas given off per ton of iron made is about 158,000 cub. ft. Its percentage composition by volume is:

Carbon monoxide Hydrogen Methane . Carbon dioxide Nitrogen Steam

21-6 to 29-0,

6-3,

o-8,

12, 60, 12.

1-8

o-i

6

51 5

mostly about 26 %

> > n 3/o

„ 0-5%

„ 9-5%

„ 56 %

.. 5 %

100%

There is always a large amount of mechanically suspended

flue-dust in this gas. It is practically equal to a poor producer- gas (see below), and is everywhere used, first for heating the blast in Cowper stoves or similar apparatus, and secondly for raising all the steam

required for the operation of the blast-furnace, that is, for driving the blowing-engines, hoisting the materials, &c. Where the iron ore is roasted previously to being fed into the furnace, this can also be done by this gas, but in some cases the waste in using it is so great that there is not enough left for the last purpose. The calorific power of this gas per cubic foot is from 80 to 120 B.Th.U.

Since about 1900 a great advance has been made in this field. Instead of burning the blast-furnace gas under steam boilers and employing the steam for producing mechanical energy, the gas is directly burned in gas-motors on the explosion principle. Thus upwards of three times the mechanical energy is obtained in comparison with the indirect way through the steam boiler. After all the power required for the operations of the blast- furnace has been supplied, there is a surplus of from 10 to 20 h.p. for each ton of pig-iron made, which may be applied to any other purpose.

(b) Coke-oven Cases. — Where the coking of coal is performed in the old beehive ovens or similar apparatus the gas issuing at the mouth of the ovens is lost. The attempts at utilizing the gases in such cases have not been very successful. It is quite different where coke is manufactured in the same way as illumin- ating gas, viz. by the destructive dis- tillation of coal in closed apparatus (retorts), heated from the outside. This industry, which is described in detail in G. Lunge's Coal-Tar and Ammonia (4th ed., 1909), origin- ated in France, but has spread far more in Germany, where more than half of the coke produced is made by it; in the United Kingdom and the United States its progress has been much slower, but there also it has long been recognized as the only proper method. The output of coke is

increased by about 15% in comparison with the beehive ovens, as the heat required for the process of distillation is not produced by burning part of the poal itself (as in the beehive ovens), but by burning part of the gas. The quality of the coke for iron- making is quite as good as that of beehive coke, although it differs from it in appearance. Moreover, the gases can be made to yield their ammonia, their tar, and even their benzene vapours, the value of which products sometimes exceeds that of the coke itself. And after all this there is still an excess of gas available for any other purpose.

As the principle of distilling the coal is just the same, whether the object is the manufacture of coal gas proper or of coke as the main product, although there is much difference in the details of the manufacture, it follows that the quality of the gas is very similar in both cases, so far as its heating value is concerned. Of course this

heating value is less where the benzene has been extracted from coke-oven gas, since this compound is the richest heat-producer in the gas. This is, however, of minor importance in the present case, as there is only about 1% benzene in these gases.

The composition of coke-oven gases, after the extraction of the ammonia and tar, is about 53% hydrogen, 36% methane, 6% carbon monoxide, 2ˆ ethylene and benzene, 0-5% sul- phuretted hydrogen, 1-5% carbon dioxide, 1 % nitrogen.

III. Coal Gas (Illuminating Gas). — Although ordinary coal gas is primarily manufactured for illuminating purposes, it is also extensively used for cooking, frequently also for heating domestic rooms, baths, &c, and to some extent also for industrial opera- tions on a small scale, where cleanliness and exact regulation of the work are of particular importance. In chemical laboratories it is preferred to every other kind of fuel wherever it is available. The manufacture of coal gas being described elsewhere in this work (see Gas, § Manufacture), we need here only point out that

it is obtained by heating bituminous coal in fireclay retorts and purifying the products of this destructive distillation by cooling, washing and other operations. The residual gas, the ordinary composition of which is given in the table below, amounts to about 10,000 cub. ft. for a ton of coal, and represents about 21 % of its original heating value, 56-5% being left in the coke, 5-5% in the tar and 17% being lost. As we must deduct from the coke that quantity which is required for the heating of the retorts, and which, even when good gas producers are employed, amounts to 12% of the weight of the coal, or 10% of its heat value, the total loss of heat rises to 27 %. Taking, further, into account the cost of labour, the wear and tear, and the capital interest on the plant, coal gas must always be an expensive fuel in comparison with coal itself, and cannot be thought of as a general substitute for the latter. But in many cases the greater expense of the coal gas is more than compensated by its easy distribution, the facility and cleanliness of its application, the general freedom from the mechanical loss, unavoidable in the case of coal fires, the prevention of black smoke and so forth. The following table shows the average composition of coal gas by volume and weight, together with the heat developed by its single constituents, the latter being expressed in kilogram- calories per cub. metre (0-252 kilogram-calories = 1 British heat unit; 1 cub. metre = 35-3 cub. ft; therefore 0-1123 calories per cub. metre = 1 British heat unit per cub. foot).

Constituents.

Volume per cent.

Weight per cent.

Heat-value per Cubic

Metre Calories.

Heat-value per Quantity contained in 1 Cub. Met.

Heat-value per cent, of Total.

Hydrogen, H 2 Methane, CH 4 . Carbon monoxide, CO Benzene vapour, Cslie Ethylene, C 2 H4 . Carbon dioxide, CO2 . Nitrogen, N 2

Total .

47

34

9

1-2

3-8 2-5 2-5

7-4 42-8 199

7-4 8-4 8-6 5-5

2,582

8,524

3.043

33.815

13,960

1213

2898

273

405

530

22-8

54-5 5-1 77 9-9

IOO-O

100-0

5319

IOO-O

One cubic metre of such gas weighs 568 grammes. Rich gas, or gas made by the destructive distillation of certain bituminous schists, of oil, &c, contains much more of the heavy hydrocarbons, and its heat-value is therefore much higher than the above. The carburetted water gas, very generally made in America, and sometimes employed in England for mixing with coal gas, is of varying composition; its heat-value is generally rather less than that of coal gas (see below).

IV. Combustible Gases produced by the Partial Combustion of Coal, &°c. — These form by far the most important kind of gaseous fuel. When coal is submitted to destructive distillation to produce the illuminating gas described in the preceding para- graph, only a comparatively small proportion of the heating value of the coal (say, a sixth or at most a fifth part) is obtained in the shape of gaseous fuel, by far the greater proportion remain- ing behind in the shape of coke.

An entirely different class of gaseous fuels comprises those produced by the incomplete combustion of the total carbon contained in the raw material, where the result is a mixture of gases which, being capable of combining with more oxygen, can be burnt and employed for heating purposes. Apart from some descriptions of waste gases belonging to this class (of which the most notable are those from blast-furnaces), we must distinguish two ways of producing such gaseous fuels entirely different in principle, though sometimes combined in one operation. The incomplete combustion of carbon may be brought about by means of atmospheric oxygen, by means of water, or by a simultaneous combination of these two actions. In the first case the chemical reaction is

$C + 0 = CO$ (a);

the nitrogen accompanying the oxygen in the atmospheric air necessarily remains mixed with carbon monoxide, and the result- ing gases, which always contain some carbon dioxide, some

products of the destructive distillation of the coal, &c, are known as producer gas or Siemens gas. In the second case the chemical reaction is mainly

$C + H_2 = CO + H_2$ . . .(b);

that is to say, the carbon is converted into monoxide and the hydrogen is set free. As both of these substances can combine with oxygen, and as there is no atmospheric nitrogen to deal with, the resulting gas (water gas) is, apart from a few impurities, entirely combustible. Another kind of water gas is formed by

the reaction

$C + 2H_2O = CO_2 = 2H_2$ . . . (c),

but this reaction, which converts all the carbon into the incom- bustible form of CO_2, is considered as an unwelcome, although never entirely avoidable, concomitant of (b).

The reaction by which water gas is produced being endothermic (as we shall see) ,this gas cannot be obtained except by introducing the balance of energy in another manner. This might be done by heating the apparatus from without, but as this method would be uneconomical, the process is carried out by alternating the endothermic production of water gas with the exothermic combustion of carbon by atmospheric air. Pure water gas is not, therefore, made by a continuous process, but alternates with the production of other gases, combustible or not. But instead of constantly interrupting the process in this way, a continuous operation may be secured by simultaneously carrying on both the reactions (a) and (b) in such proportions that the heat generated by (a) at least equals the heat absorbed by (b). For this purpose the apparatus is fed at the same time with atmo- spheric air and with a certain quantity of steam, preferably in a superheated state. Gaseous mixtures of this kind have been made, more or less intentionally, for a long time past. One of the best known of them, intended less for the purpose of serving as ordinary fuel than for that of driving machinery, is the Dowson gas. ‘\~..

An advantage common to all kinds of gaseous fuel, which indeed forms the principal reason why it is intentionally pro- duced from solid fuel, in spite of inevitable losses in the course of the operation, is

the following. The combustion of solid fuel (coal, &c.) cannot be carried on with the theoretically necessary quantity of atmospheric air, but requires a considerable excess of the latter, at least 50%, sometimes 100% and mere. This is best seen from the analyses of smoke gases. If all the oxygen of the air were converted into C0 2 and H 2 0, the amount of C0 2 in the smoke gases should be in the case of pure carbon nearly 21 volumes , as carbon dioxide occupies the same volume as oxygen; while ordinary coal, where the hydrogen takes up a certain quantity of oxygen as well, should show about 18-5 C0 2 . But the best smoke gases of steam boilers show only 12 or 13%, much more frequently only io%C0 2 , and gases from reverberatory furnaces often show less than 5%. This means that the volume of the smoke gases escaping into the air is from 1 1 to 2 times (in the case, of high-temperature operations often 4 times) greater than the theoretical minimum; and as these gases always carry off a considerable quantity of heat, the loss of heat is all the greater the less complete is the utilization of the oxygen and the higher the temperature of the operation. This explains why, in the case of the best-constructed steam- boiler fires provided with beat economizers, where the smoke gases are deprived of most of their heat, the proportion of the heat value of the fuel actually utilized may rise to 70 or even 75 , while in some metallurgical operations, in glass-making and similar cases, it may be below 5.

One way of overcoming this difficulty to a certain extent is to reduce the solid fuel to a very fine powder, which can be intimately mixed with the air so that the consumption of the latter is only very slightly in excess of the theoretical quantity; but this process, which has been only recently introduced on a somewhat extended scale, involves much additional expense and trouble, and cannot as yet be considered a real success. Generally, too, it is far less easily applied than gaseous fuel. The latter can be readily and intimately mixed with the exact quantity of air that is required and distributed in any suitable way, and

much of the waste heat can be utilized for a preliminary heating of the air and the gas to be burned by means of ” recuperators.”

We shall now describe the principal classes of gaseous fuel, produced by the partial combustion of coal.

A. Producer Gas, Siemens Gas. — As we have seen above, this gas is made by the incomplete combustion of fuel. The materials generally employed for its production are anthracite, coke or other fuels which are not liable to cake during the operation, and thus stop the draught

or otherwise disturb the process, but by special measures also bituminous coal, lignite, peat and other fuel may be utilized for gas producers. The fuel is arranged in a deep layer, generally from 4 ft. up to 10 ft., and the air is introduced from below, either by natural draught or by means of a blast, and either by a grate or only by a slit in the wall of the " gas producer." Even if the primary action taking place at the entrance of the air consisted in the complete combustion of the carbon to dioxide, $C0_2$, the latter, in rising through the high column of incandescent fuel, must be reduced to monoxide: $C0_2 + C = 2CO$. But as the temperature in the producer rises rather high, and as in ordinary circumstances the action of oxygen on carbon above 1000° C. consists almost entirely in the direct formation of CO, we may regard this compound as primarily formed in the hotter parts of the gas-producer. It is true that ordinary producer gas always contains more or less $C0_2$, but this may be formed higher up by air entering through leakages in the apparatus. If we ignore the hydrogen contained in the fuel, the theoretical composition of producer gas would be 33′ 3% CO and 66-7% N, both by volume and weight. Its weight per cubic metre is 1-251 grammes, and its heat value 1013 calories per cubic metre, or less than one-fifth of the heat-value of coal gas. Practically, however, producer gas contains a small percentage of gases, increasing its heat-value, like hydrogen, methane, &c, but on the other hand it is never free from carbon dioxide to the extent of from 2 to 8%. Its heat-value may therefore range between 800 and 1100 calories per cubic metre. Even when taking as the basis of our calculation a theoretical gas 01 33′ 3% CO, we find that there is a great loss of heat-value in the manufacture of this gas. Thermochemistry teaches us that the reaction $C + O$ develops 29-5% of the heat produced by the complete oxidation of C to $C0_2$, thus leaving only 70-5% for the stage $CO + 0 = C0_2$. If, therefore, the gas given off in the producer is allowed to cool down to ordinary temperature, nearly 30% of the heat-value of the coal is lost by radiation. If, however, the gas producer is built in close proximity to the place where the combustion takes place, so that the gas does not lose very much of its heat, the loss is correspondingly less. Even then there is no reason why this mode of burning the fuel, i.e. first with " primary air " in the producer ($C + O = CO$), then with "secondary air" in the furnace ($CO + 0 = C0_2$), should be preferred to the direct complete burning of the fuel on a grate, unless the above-mentioned advantage is secured, viz. reduction of the smoke gases to a minimum by confining the supply of air as nearly as possible to that required for the formation of $C0_2$, which is only possible by producing an intimate mixture of the producer gas with the secondary air. The advantage in question is not very great where the heat of the smoke

gases can be very fully utilized, e.g. in well-constructed steam boilers, salt-pans and the like, and as a matter of fact gas producers have not found much use in such cases. But a very great advantage is attained in high-temperature operations, where the smoke gases escape very hot, and where it is on that account all- important to confine their quantity to a minimum.

It is precisely in these cases that another requirement frequently comes in, viz. the production at a given point of a higher temperature than is easily attained by ordinary fires. Gas-firing lends itself very well to this end, as it is easily combined with a pre- liminary heating up of the air, and even of the gas itself, by means of " recuperators." The original and best-known form of these, due to Siemens Brothers, consists of two brick chambers filled with loosely stacked fire-bricks in such manner that any gases passed through the chambers must seek their way through the interstices left between the bricks, by which means a thorough

interchange of temperature takes place. The smoke gases, instead of escaping directly into the atmosphere, are made to pass through one of these chambers, giving up part of their heat to the brickwork. After a certain time the draught is changed by means of valves, the smoke gases are passed through another chamber, and the cold air intended to feed the com- bustion is made to pass through the first chamber, where it takes up heat from the white-hot bricks, and is thus heated up to a bright red heat until the chamber is cooled down too far, when the draughts are again reversed. Sometimes the producer gas itself is heated up in this manner (especially when it has been cooled down by travelling a long distance) ; in that case four recuperator chambers must be provided instead of two, Another class of recuperators is not founded on the alternating system, but acts continuously; the smoke gases travel always in the same direction in ilues contiguous to other flues or pipes in which the air flows in the opposite direction, an interchange of heat taking place through the walls of the flues or pipes. Here the surface of contact must be made very large if a good effect is to be produced. In both cases not merely is a saving effected of all the calories which are abstracted by the cold air from the recuperator, but as less fuel has to be burned to get a given effect, the quantity of smoke gas is reduced. For details and other producer

gases, see Gas, II. For Fuel and Power.

Gas-firing in the manner just described can be brought about by very simple means, viz. by lowering the fire-grate of an ordinary fire-place to at least 4 ft. below the fire-bridge, and by introducing the air partly below the grate and partly behind the fire-place, at or near the point where the greatest heat is required. Usually, however, more elaborate apparatus is employed, some of which we shall describe below. Gas-firing has now become universal in some of the most important industries and nearly so in others. The present extension of steel-making and other branches of metallurgy is intimately connected with this system, as is the modern method of glass- making, of heating coal gas retorts and so forth.

The composition of producer gas differs considerably, princi- pally according to the material from which it is made. Analyses of ordinary producer gas (not such as falls under the heading of “semi-water gas,” see sub C) by volume show 22 to 33% CO, 1 to 7% $C0_2$, 0-5 to 2% H_2, 0-5 to 3% hydrocarbons, and 64 to 68% N_2.

B. Water Gas. — The reaction of steam on highly heated carbonaceous matter was first observed by Felice Fontana in 1780. This was four years before Henry Cavendish isolated hydrogen from water, and thirteen years before William Murdoch made illuminating gas by the distillation of coal, so that it was no wonder that Fontana’s laboratory work was soon forgotten. Nor had the use of carburetted water gas, as introduced by Donovan in 1830 for illuminating purposes, more than a very short life. More important is the fact that during nine years the illumination of the town of Narbonne was carried on by incandescent platinum wire, heated by water gas, where also internally heated generators were for the first time regularly employed. The Narbonne process was abandoned in 1865, and for some time no real progress was made in this field in Europe. But in America, T. S. C. Lowe, Strong,Tessie du Motay and others took up the matter, the first permanent success being obtained by the introduction (1873) of Lowe’s system at Phoenixville, Pa. In the United States the abundance of anthracite, as well as of petroleum naphtha, adapted for carburetting the gas, secures a great commercial advantage to this kind of illuminant over coal gas, so that now three-fourths of all American gas-works employ carburetted water gas. In Europe the progress of this industry was naturally much less rapid, but here also since 1882, when the apparatus of Lowe and Dwight was introduced in the town of Essen, great improvements have been worked out, principally by E. Blass, and by these improvements water gas obtained a firm footing also for certain heating purposes. The American process

for making carburetted water gas, as an auxiliary to ordinary coal gas, was first introduced by the London Gas Light and Coke Company on a large scale in 1890.

Water gas in its original state is called ” blue gas,” because it burns with a blue, non-luminous flame, which produces a very high temperature. According to the equation $C H 2 = C0 H 2$, this gas consists theoretically of equal volumes of carbon monoxide and hydrogen. We shall presently see why it is impossible to avoid the presence of a little carbon dioxide and other gases, but we shall for the moment treat of water gas as if it were composed according to the above equation. The reaction $C + H 2 0 = CO + H 2$ is endothermic, that is, its thermal value is negative. One gram-molecule of carbon produces 97 great calories (1 great calorie or kilogram-calorie = 1000 gram- calories) when burning to $C0 2$, and this is of course the maximum effect obtainable from this source. If the same gram-molecule of carbon is used for making water gas, that is, $CO + H 2$, the heat produced by the combustion of the product is 68-4 + 57-6 = 126 great calories, an apparent surplus of 29 calories, which cannot be got out of nothing. This is made evident by another consideration. In the above reaction C is not burned to $C0 2$, but to CO, a reaction which produces 28-6 calories per gram-molecule. But as the oxygen is furnished from water, which must first be decomposed by the expenditure of energy, we must introduce this amount, 68-5 calories in the case of liquid water, or 57-6 calories in the case of steam, as a negative quantity, and the difference, viz. + 28-6- 57-6 = 29 great calories, represents the amount of heat to be expended from another source in order to bring about the reaction of one gram-molecule of carbon on one gram-molecule of $H 2$ in the shape of steam. This explains why steam directed upon incandescent coal will produce water gas only for a very short time: even a large mass of coal will quickly be cooled down so much that at first a gas of different composition is formed and soon the process will cease altogether. We can avoid this result by carrying on the process in a retort heated from without by an ordinary coal fire, and all the early water gas apparatus was constructed in this way; but such a method is very uneconomical, and was long ago replaced by a process first patented by J. and T. N. Kirkham in 1854, and very much improved by successive inventors. This process consists in conducting the operation in an .upright brick shaft, charged with anthracite, coke or other suitable fuel. This shaft resembles an ordinary gas producer, but it differs in being worked, not in a continuous manner, which, as shown above, would be impossible, but by alternately blowing air and steam through the coal for periods of a few minutes each. During the first phase, when carbon is burned

by atmospheric oxygen, and thereby heat is produced, this heat, or rather that part of it which is not carried away by radiation and by the products of combustion on leaving the apparatus, is employed in raising the temperature of the remaining mass of fuel, and is thus available for the second phase, in which the reaction (b) $C + H_2 = CO + H_2$ goes on with the abstraction of a corresponding amount of heat from the incandescent fuel, so that the latter rapidly cools down, and the process must be reversed by blowing in air and so forth. The formation of exactly equal volumes of carbon monoxide and hydrogen goes on only at temperatures over 1200° C, that is, for a very few minutes. Even at 1100° C. a little CO_2 can be proved to exist in the gas, and at 900 its proportion becomes too high to allow the process to go on. About‘650 C. the CO has fallen to a minimum, and the reaction is now essentially © $C + 2H_2O = CO_2 + 2H_2$; soon after the temperature of the mass will have fallen to such a low point that” the steam passes through it without any perceptible action. The gas produced by reaction © contains only two-thirds of combustible matter, and is on that account less valuable than proper water gas formed by reaction (b) ; moreover, it requires the generation of twice the amount of steam, and its presence is all the less desirable since it must soon lead to a total cessation of the process. In ordinary circumstances it is evident that the more steam is blown in during a unit of time, the sooner reaction (c) will set in; on the other hand, the more heat has been accumulated in the producer the longer can the blowing-in of steam be continued.

The process of making water gas consequently comprises

two alternating operations, viz. first ” blowing-up ” by means of a current of air, by which the heat of the mass of fuel is raised to about 1200 C; and, secondly ” steaming,” by injecting a current of (preferably superheated) steam until the temperature of the fuel had fallen to about ooo° C, and too much carbon dioxide appears in the product. During the steaming the gas is carried off by a special conduit into a scrubber, where the dust mechanically carried away in the current is washed out, and the gas is at the same time cooled down nearly to the ordinary temperature. It is generally stored in a gas-holder, from which it is conducted away as required. It is never quite free from nitrogen, as the producer at the beginning of steaming

contains much of this gas, together with CO or C0 2 . The proportion of hydrogen may exceed 50%, in consequence of reaction © setting in at the close of the steaming. Ordinary ” blue ” water gas, if, as usual, made from coke or anthracite, contains 48-52% H 2 , 40-41% CO, 1-5% C0 2 , 4-5% N 2 , and traces of hydro- carbons, especially methane. If made from bituminous coal, it contains more of the latter. If ” carburetted ” (a process which increases its volume 50% and more) by the vapours from superheated petroleum naphtha, the proportion of CO ranges about 25%, with about as much methane, and from 10 to 15% of ” illuminants ” (heavy hydrocarbons). The latter, of course, greatly enhance the fuel- value of the gas. Pure water gas would possess the following fuel-value per cubic metre:

05 cub. met. H 2 = 1291 calories 05 „ „ CO = 252f

2813

Ordinary “blue” water gas has a fuel-value of at least 2500 calories. Carburetted water gas, which varies very much in its percentage of hydrocarbons, sometimes reaches nearly the heat-value of coal gas, but such gas is only in exceptional cases used for heating purposes.

We must now turn to the ” blowing-up ” stage of the process. Until recently it was assumed that during this stage the combus- tion of carbon cannot be carried on beyond the formation of carbon monoxide, for as the gas-producer must necessarily contain a deep layer of fuel (generally about 6 to 10 ft.), any C0 2 formed at first would be reduced to CO; and it was further assumed that hardly any C0 2 would be formed from the outset, as the temperature of the apparatus is too high for this reaction to take place. But as the combustion of C to CO produces only about 30% of the heat produced when C is burned into C0 2 , the quantity of fuel consumed for ” blowing-up ” is very large, and in fact considerably exceeds that consumed in “steaming.” There is, of course, a further loss by radiation and minor sources, and the result is that 1 kilogram of carbon yields only about 1 • 2 cub. met. of water gas. Each period of blowing-up generally occupies from 8 to 12 minutes, that of steaming only 4 or 5 minutes. This low yield of water gas until quite recently appeared to be unavoidable, and the only question seemed to be whether and to what extent the gas formed during blowing-up, which is in fact identical with ordinary producer gas (Siemens gas), could be utilized. In America, where the water gas is mostly employed for illuminating purposes, at least part of the blowing- up gas is utilized for heating the apparatus in which the naphtha is volatilized and the vapours are ” fixed ” by superheating. This process, however, never

utilizes anything like the whole of the blowing-up gas, nor can this be effected by raising and superheating the steam necessary for the second operation; indeed, the employment of this gas for raising steam is not very easy, owing to the irregularities of and constant interruptions in the supply. In some systems the gas made during the blowing- up stage is passed through chambers, loosely filled with bricks, like Siemens recuperators, where it is burned by ” secondary ” air: the heat thus imparted to the brickwork is utilized by passing through the recuperator, and thus superheating, the steam required for the next steaming operation. In many cases, principally where no carburetting is practised, the blowing-up gas is simply burned at the mouth of the producer, and is thus altogether lost; and in no case can it be utilized without great

waste. A very important improvement in this respect was effected by C. Dellwik and E. Fleischer. They found that the view that it is unavoidable to burn the carbon to monoxide during the blowing-up holds good only for the pressure of blast formerly applied. This did not much exceed that which is required for overcoming the frictional resistance within the producer. If, however, the pressure is considerably increased, and the height of the column of fuel reduced, both of these conditions being strictly regulated in accordance with the result desired, it is easy to attain a combustion of the carbon to dioxide, with only traces of monoxide, in spite of the high temperature. Evidently the excess of oxygen coming into contact with each particle of carbon in a given unit of time produces other conditions of chemical equilibrium than those existing at lower pressures. At any rate, experience has shown that by this process, in which the full heat-value of carbon is utilized during the blowing-up stage, the time of heating-up can be reduced from 10 to i| or 2 minutes, and the steaming can be prolonged from 4 or 5 to 8 or 10 minutes, with the result that twice the quantity of water gas is obtained, viz. upwards of 2 cub. metres from 1 kilogram of carbon.

The application of water gas as a fuel mainly depends upon the high temperatures which it is possible to attain by its aid, and these are principally due to the circumstance that it forms a much smaller flame than coal gas, not to speak of Siemens gas, which contains at most 33% of combustible matter against 90% or more in water gas. The latter circumstance also allows the gas to be conducted and distributed in pipes of moderate dimensions. Its application, apart from its use as an illuminant (with which we are not concerned here), was formerly retarded by its high cost in comparison with Siemens gas and other sources of heat, but as this state of affairs has been changed by the modern improvements, its use is rapidly extending, especially

for metallurgical purposes.

C. Mixed Gas (Semi-Water Gas). — This class is sometimes called Dowson gas, irrespective of its method of production, although it was made and extensively used a long time before J. E. Dowson constructed his apparatus for generating such a gas principally for driving gas-engines. By a combination of the processes for generating Siemens gas and water gas, it is produced by injecting into a gas-producer at the same time a certain quantity of air and a corresponding quantity of steam, the latter never exceeding the amount which can be decomposed by the heat-absorbing reaction, $C + H_2 = CO + H_2$, at the ex- pense of the heat generated by the action of the air in the reaction $C + 0 = CO$. Such gas used to be frequently obtained in an accidental way by introducing liquid water or steam into an ordinary gas-producer for the purpose of facilitating its working by avoiding an excessive temperature, such as might cause the rapid destruction of the brickwork and the fusion of the ashes of the fuel into troublesome cakes. It was soon found that by proceeding in this way a certain advantage could be gained in regard to the consumption of fuel, as the heat abstracted by the steam from the brickwork and the fuel itself was usefully employed for decomposing water, its energy thus reappearing in the shape of a combustible gas. It is hardly necessary to mention explicitly that the total heat obtained by any such process from a given quantity of carbon (or hydrogen) can in no case exceed that which is generated by direct combustion; some inventors, however, whether inadvertently or intentionally, have actually represented this to be possible, in manifest violation of the law of the conservation of energy.

Roughly speaking, this gas may be said to be produced by the combination of the reactions, described sub A and B, to the joint reaction: $2C + 0 + H_2 = 2CO$-|-H_2. The decomposition of H_2 (applied in theshapeof steam) absorbs 57-6 gram calories, the formation of 2C0 produces 59 gram calories; hence there is a small positive excess of 1 -4 calories at disposal. This in reality would not be sufficient to cover the loss by radiation, &c; hence rather more free oxygen (i.e. atmospheric air) must be employed than is represented by the above equation. All this free oxygen is, of course, accompanied by nearly four times its volume of nitrogen.

The mixed gas thus obtained differs very much in composition, but is

always much richer in hydrogen (of which it contains sometimes as much as 20%) and poorer in carbon monoxide (sometimes down to 20%) than Siemens gas ; generally it contains more of C0 2 than the latter. The proportion of nitrogen is always less, about 50%. It is therefore a more concentrated fuel than Siemens gas, and better adapted to the driving of gas- engines. It scarcely costs more to make than ordinary Siemens gas, except where the steam is generated and superheated in special apparatus, as is done in the Dowson • producer, which, on the other hand, yields a correspondingly better gas. As is natural, its properties are some way between those of Siemens gas and of water gas; but they approach more nearly the former, both as to costs and as to fuel-value, and also as to the temperatures reached in combustion. This is easily understood if we consider that gas of just the same description can be obtained by mixing one volume of real water gas with the four volumes of Siemens gas made during the blowing-up stage — an operation which is certainly too expensive for practical use.

A modification of this gas is the Mond gas, which is made, according to Mond's patent, by means of such an excess of steam that most of the nitrogen of the coke is converted into ammonia (Grouven's reaction). Of course much of this steam passes on undecomposed, and the quantity of the gas is greatly increased by the reaction C-r-2H 2 = C02 + 2H2; hence the fuel-value of this gas is less than that of semi-watei gas made in other ways. Against this loss must be set the gain of ammonia which is recovered by means of an arrangement of coolers and scrubbers, and, except at very low prices of ammonia, the profit thus made is probably more than sufficient to cover the extra cost. But as the process requires very large and expensive plant, and its profits would vanish in the case of the value of ammonia becoming much lower (a result which would very probably follow if it were somewhat generally introduced), it cannot be expected to sup- plant the other descriptions of gaseous fuel to more than a limited extent.

Semi- water gas is especially adapted for the purpose of driving gas-engines on the explosive principle (gas-motors). Ordinary producer-gas is too poor for this purpose in respect of heating power; moreover, owing to the prevalence of carbon monoxide, it does not light quickly enough. These defects are sufficiently overcome in semi-water gas by the larger proportion of hydrogen contained in it. For the purpose in question the gas should be purified from tar and ashes, and should also be cooled down before entering the gas-engine. The Dowson apparatus and others are constructed on this principle.

Air Gas. — By forcing air over or through volatile inflammable liquids

a gaseous mixture can be obtained which burns with a bright flame and which can be used for illumination. Its employ- ment for heating purposes is quite exceptional, e.g. in chemical laboratories, and we abstain, therefore, from describing any of the numerous appliances, some of them bearing very fanciful names, which have been devised for its manufacture. (G. L.)

FUENTE OVEJUNA [Fuenteovejuna], a town of Spain, in the province of Cordova; near the sources of the river Guadiato, and on the Fuente del Arco-Belmez-Cordova railway. Pop. (1900) 11,777. Fuente Ovejuna is built on a hill, in a well- irrigated district, which, besides producing an abundance of wheat, wine, fruit and honey, also contains argentiferous lead mines and stone quarries. Cattle-breeding is an important local industry, and leather, preserved meat, soap and flour are manufactured. The parish church formerly belonged to the knights of Calatrava (c. 1 163-1486).

FUENTERRABIA (formerly sometimes written Fontarabia; Lat. Fons Rapidus), a town of northern Spain, in the province of Guipuzcoa; on the San Sebastian-Bayonne railway; near the Bay of Biscay and on the French frontier. Pop. (1870) about 750; (1900) 4345. Fuenterrabia stands on the slope of a hill on the left bank of the river Bidassoa, and near the point where its estuary begins. Towards the close of the 19th century the town became popular as a summer resort for visitors from the interior of Spain, and, in consequence, its appearance under-

went many changes and much of its early prosperity returned. Hotels and villas were built in the new part of the town that sprang up outside the picturesque walled fortress, and there is quite a contrast between the part inside the heavy, half-ruined ramparts, with its narrow, steep streets and curious gable-roofed houses, its fine old church and castle and its massive town hall, and the new suburbs and fishermen's quarter facing the estuary of the Bidassoa. Many industries flourish on the outskirts of the town, including rope and net manufactures, flour mills, saw mills, mining railways, paper mills.

Fuenterrabia formerly possessed considerable strategic im- portance, and it has frequently been taken and retaken in wars between France and Spain. The rout of Charlemagne in 778, which has been associated with Fontarabia, by Milton (Paradise Lost, i. 587), is generally understood to have taken place not here but at Roncesvalles (q.v.), which is nearly 40 m. E.S.E. Unsuccessful attempts to seize Fuenterrabia were made by the French troops in r476 and again in 1503. In a subsequent campaign (1521) these were more successful, but the fortress was retaken in 1524. The prince of Conde sustained a

severe repulse under its walls in 1638, and it was on this occasion that the town received from Philip IV. the rank of city (muy noble, muy leal, y muy valerosa ciudad, ” most noble, most loyal, and most valiant city”), a privilege which involved some measure of autonomy. After a severe siege, Fuenterrabia surrendered to the duke of Berwick and his French troops in 1719; and -in 1794 it again fell into the hands of the French, who so dismantled it that it has never since been reckoned by the Spaniards among their fortified places. It was by the ford opposite Fuenterrabia that the duke of Wellington, on the 8th of October 18 13, successfully forced a passage into France in the face of an opposing army commanded by Marshal Soult. Severe fighting also took place here during the Carlist War in 1837.

FUERO, a Spanish term, derived from the Latin forum. The Castilian use of the word in the sense of a right, privilege or charter is most probably to be traced to the Roman conventus juridici, otherwise known as jurisdictiones or fora, which in Pliny’s time were already numerous in the Iberian peninsula. In each of these provincial fora the Roman magistrate, as is well known, was accustomed to pay all possible deference to the previously established common law of the district; and it was the privilege of every free subject to demand that he should be judged in accordance with the customs and usages of his proper forum. This was especially true in the case of the inhabitants of those towns which were in possession of the jus italicum. It is not, indeed, demonstrable, but there are many presumptions, besides some fragments of direct evidence, which make it more than probable that the old administrative arrangements both of the provinces and of the towns, but especially of the latter, remained practically undisturbed at the period of the Gothic occupation of Spain. 1 The Theodosian Code and the Breviary of Alaric alike seem to imply a continuance of the municipal system which had been established by the Romans; nor does the later Lex Visigothorum, though avowedly designed in some points to supersede the Roman law, appear to have contemplated any marked interference with the former fora, which were still to a large extent left to be regulated in the administration of justice by unwritten, immemorial, local custom. Little is known of the condition of the subject populations of the peninsula during the Arab occupation; but we are informed that the Christians were, sometimes at least, judged according to their own laws in separate tribunals presided over by Christian judges; 2 and the mere fact of the preservation of the name alcalde, an official whose functions corresponded so closely to those of the judex or defensor civitatis, is fitted to suggest that the old municipal fora, if much impaired, were not even then in all cases wholly destroyed. At all events when the

word forum 3 begins to appear for the first time in documents of the 10th century in the sense of a liberty or

1 The nature of the evidence may be gathered from Savigny, Gesch. d. rom. Rechts. See especially i. pp. 154, 259 seq.

2 Compare Lembke u. Schafer, Geschichte von Spanien, i. 314 ; ii. 1 17.

3 Or rather forus. See Ducange, s.v .

privilege, it is generally implied that the thing so named is nothing new. The earliest extant written fuero is probably that which was granted to the province and town of Leon by Alphonso V. in 1020. It emanated from the king in a general council of the kingdom of Leon and Castile, and consisted of two separate parts; in the first 19 chapters were contained a series of statutes which were to be valid for the kingdom at large, while the rest of the document was simply a municipal charter. 1 But in neither portion does it in any sense mark a new legislative departure, unless in so far as it marks the beginning of the era of written charters for towns. The ” fuero general ” does not profess to supersede the consuetudines anliquorum jurium or Chindaswint’s codification of these in the Lex Visigothorum; the ” fuero municipal ” is really for the most part but a resuscitation of usages formerly established, a recognition and definition of liberties and privileges that had long before been conceded or taken for granted. The right of the burgesses to self-government and self-taxation is acknowledged and confirmed, they, on the other hand, being held bound to a constitutional obedience and subjection to the sovereign, particularly to the payment of definite imperial taxes, and the rendering of a certain amount of military service (as the ancient municipia had been). Almost contemporaneous with this fuero of Leon was that granted to Najera (Naxera) by Sancho el Mayor of Navarre (ob. 1035), and confirmed, in 1076, by Alphonso VI. 2 Traces of others of perhaps even an earlier date are occasionally to be met with. In the fuero of Cardena, for example, granted by Ferdinand I. in 1039, reference is made to a previous forum Burgense (Burgos), which, however, has not been preserved, if, indeed, jt ever had been reduced to writing at all. The phraseology of that of Sepulveda (1076) in like manner points back to an indefinitely remote antiquity. 3 Among the later fueros of the nth century, the most important are those of Jaca

(1064) and of Logrono (1095). The former of these, which was distinguished by the unusual largeness of its concessions, and by the careful minuteness of its details, rapidly extended to many places in the neighbourhood, while the latter charter was given also to Miranda by Alphonso VI. , and was further extended in 1181 by Sancho el Sabio of Navarre to Vitoria, thus constituting one of the earliest written fora of the ” Provincias Vascongadas.” In the course of the 12th and 13th centuries the number of such documents increased very rapidly; that of Toledo especially, granted to the Mozarabic population in 1101, but greatly enlarged and extended by Alphonso VII. (n 18) and succeeding sovereigns, was used as a basis for many other Castilian fueros. Latterly the word fuero came to be used in Castile in a wider sense than before, as mean- ing a general code of laws; thus about the time of Saint Ferdi- nand the old Lex Visigothorum, then translated for the first time into the vernacular, was called the Fuero Juzgo, a name which was soon retranslated into the barbarous Latin of the period as Forum Judicum; 4 and among the compilations of Alphonso the Learned in like manner were an Espejo de Fueros and also the Fuero de las leyes, better known perhaps as the Fuero Real. The famous code known as the Ordenamiento Real de Alcald, or Fuero Viejo de Castilla, dates from a still later period. As the power of the Spanish crown was gradually concentrated and consolidated, royal pragmaticas began to take the place of constitutional laws;

1 Cap. xx. begins: ” Constituimus etiam ut Legionensis civitas, quae depopulata fuit a Sarracenis in diebus patris mei Veremundi regis, repopulatur per hos foros subscripts.”

2 ” Mando et concedo et confirmo ut ista civitas cum sua plebe et cum omnibus suis pertinentiis sub tali lege et sub tali foro maneat per saecula cuncta. Amen. Isti sunt fueros quae habuerunt in Naxera in diebus Sanctii regis et Gartiani regis.”

3 ” Ego Aldefonsus rex et uxor mea Agnes confirmamus ad Septem-publica suo foro quod habuit in tempore antiquo de avolo meo et in tempore comitum Ferrando Gonzalez et comite Garcia Ferdinandez et comite Domno Santio.”

4 This Latin is later even than that of Ferdinand, whose words are : ” Statuo et mando quod Liber Judicum, quo ego misi Cordubam, translatetur in vulgarem et vocetur forum de Corduba . . . et quod per saecula cuncta sit pro foro et nullus sit ausus istud forum alitor appellare nisi forum de Corduba, et jubeo et mando quod omnis morator et populator . . . veniet ad judicium et ad forum de Corduba.”

the local fueros of the various districts slowly yielded before the superior force of imperialism; and only those of Navarre and the Basque provinces (see Basques) have had sufficient vitality to enable them to survive to comparatively modern times. While actually owning the lordship of the Castilian crown since about the middle of the 14th century, these provinces rigidly insisted upon compliance with their consuetudinary law, and especially with that which provided that the sefior, before assuming the govern- ment, should personally appear before the assembly and swear to maintain the ancient constitutions. Each of the provinces mentioned had distinct sets of fueros, codified at different periods, and varying considerably as to details; the main features, how- ever, were the same in all. Their rights, after having been re- cognized by successive Spanish sovereigns from Ferdinand the Catholic to Ferdinand VII., were, at the death of the latter in 1833, set aside by the government of Castanos. The result was a civil war, which terminated in a renewed acknowledgment of the fueros by Isabel II. (1839). The provisional government of 1868 also promised to respect them, and similar pledges were given by the governments which succeeded. In consequence, however, of the Carlist rising of 1873-1876, the Basque fueros were finally extinguished in 1876. The history of the Foraes of the Portu- guese towns, and of the Fors du Beam, is precisely analogous to that of the fueros of Castile.

Among the numerous works that more or less expressly deal with this subject, that of Marina (Ensayo historico-critico sobre la antigua legislation y principales cuerpos legales de los reynos de Leon y Castilla) still continues to hold a high place. Reference may also be made to Colmeiro's Curso de derecho politico segun la historia de Leon y de Castilla (Madrid, 1873); to Schafer's Geschichte von Spanien, ii. 418-428, iii. 293 seq.; and to Hallam's Middle Ages, c. iv.

FUERTEVENTURA, an island in the Atlantic Ocean, forming part of the Spanish archipelago of the Canary Islands {q.v.). Pop. (1900) 11,669; area 665 sq. m. Fuerteventura lies between Lanzarote and Grand Canary. It has a length of 52 m., and an average width of 1 2 m. Though less mountainous than the other islands, its aspect is barren. There are only two springs of fresh water, and these are confined to one valley. Lava streams and other signs of volcanic action abound, but there has been no igneous activity since the Spaniards took possession. At each extremity of the island are high mountains, which send off branches along the coast so as to enclose a large arid plain. The highest peak reaches 2500 ft. In external appearance, climate and productions, Fuerteventura greatly resembles Lanzarote. An interval of three years without rain has been known. Oliva (pop.

1900, 2464) is the largest town. A smaller place in the centre of the island named Betancuria (586) is the administrative capital. Cabras (1000) on the eastern coast is the chief port. Dromedaries are bred here.

FUGGER, the name of a famous German family of merchants and bankers. The founder of the family was Johann Fugger, a weaver at Graben, near Augsburg, whose son, Johann, settled in Augsburg probably in 1367. The younger Johann added the business of a merchant to that of a weaver, and through his marriage with Clara Widolph became a citizen of Augsburg. After a successful career he died in 1408, leaving two sons, Andreas and Jakob, who greatly extended the business which they inherited from their father. Andreas, called the "rich Fugger," had several sons, among them being Lukas, who was very prominent in the municipal politics of Augsburg and who was very wealthy until he was ruined by the repudiation by the town of Louvain of a great debt owing to him, and Jakob, who was granted the right to bear arms in 1452, and who founded the family of Fugger vom Reh — so called from the first arms of the Fuggers, a roe (Reh) or on a field azure — which became extinct on the death of his great-grandson, Ulrich, in 1583. Johann Fugger's son, Jakob, died in 1469, and three of his seven sons, Ulrich (1441-1510), Georg (1453-1506) and Jakob (1459-1525), men of great resource and industry, inherited the family business and added enormously to the family wealth. In 1473 Ulrich obtained from the emperor Frederick III. the right to bear arms for himself and his brothers, and about the same time he began

to act as the banker of the Habsburgs, a connexion destined to bring fame and fortune to his house. Under the lead of Jakob, who had been trained for business in Venice, the Fuggers were interested in silver mines in Tirol and copper mines in Hungary, while their trade in spices, wool and silk extended to almost all parts of Europe. Their wealth enabled them to make large loans to the German king, Maximilian I., who pledged to them the county of Kirchberg, the lordship of Weissenhorn and other lands, and bestowed various privileges upon them. Jakob built the castle of Fuggerau in Tirol, and erected the Fuggerei at Augsburg, a collection of 106 dwellings, which were let at low rents to poor people and which still exist. Jakob Fugger and his two nephews, Ulrich (d. 1525) and Hieronymus (d. 1536), the sons of Ulrich, died without direct heirs, and the family

was continued by Georg's sons, Raimund (1489-1535) and Anton (1493-1560), under whom the Fuggers attained the summit of their wealth and influence.

Jakob Fugger's florins had contributed largely to the election of Charles V. to the imperial throne in 1519, and his nephews and heirs maintained close and friendly relations with the great emperor. In addition to lending him large sums of money, they farmed his valuable quicksilver mines at Almaden, his silver mines at Guadalcanal, the great estates of the military orders which had passed into his hands, and other parts of his revenue as king of Spain; receiving in return several tokens of the emperor's favour. In 1530 Raimund and Anton were granted the imperial dignity of counts of Kirchberg and Weissenhorn, and obtained full possession of these mortgaged properties; in 1534 they were given the right of coining money; and in 1541 received rights of jurisdiction over their lands. During the diet of Augsburg in 1530 Charles V. was the guest of Anton Fugger at his house in the Weinmarkt, and the story relates how the merchant astonished the emperor by lighting a fire of cinnamon with an imperial bond for money due to him. This incident forms the subject of a picture by Carl Becker which is in the National Gallery at Berlin. Continuing their mercantile career, the Fuggers brought the new world within the sphere of their operations, and also carried on an extensive and lucrative business in farming indulgences. Moreover, both brothers found time to acquire landed property, and were munificent patrons of literature and art. When Anton died he is said to have been worth 6,000,000 florins, besides a vast amount of property in Europe, Asia and America; and before this time the total wealth of the family had been estimated at 63,000,000 florins. The Fuggers were devotedly attached to the Roman Catholic Church, which benefited from their liberality. Jakob had been made a count palatine (Pfalzgraf) and had received other marks of favour from Pope Leo X., and several members of the family had entered the church; one, Raimund's son, Sigmund, becoming bishop of Regensburg.

In addition to the bishop, three of Raimund Fugger's sons attained some degree of celebrity. Johann Jakob (1516-1575), was the author of W ahrhaftigen Beschreibung des osterreichischen und habsburgischen Nahmens, which was largely used by S. von Bircken in his 5 piegel der Ehren des Erzhauses Osterreich (Nurem- berg, 1668) , and of a Geheim Ernbuch des Fuggerischen Geschlechtes. He was also a patron of art, and a distinguished counsellor of Duke Albert IV. of Bavaria. After the death of his son Kon- stantin, in 1627, this branch of the family was divided into three lines, which became extinct in 1738, 1795 and 1846 respectively. Another of Raimund's sons was

Ulrich (1526-1584), who, after serving Pope Paul III. at Rome, became a Protestant. Hated on this account by the other members of his family, he took refuge in the Rhenish Palatinate; . greatly interested in the Greek classics, he occupied himself in collecting valuable manuscripts, which he bequeathed to the university of Heidelberg. Raimund's other son was Georg (d. 1579), who inherited the countships of Kirchberg and Weissenhorn, and founded a branch of the family which still exists, its present head being Georg, Count Fugger of Kirchberg and Weissenhorn (b. 1850).

Anton Fugger left three sons, Marcus (15 29-1 597), Johann (d. 1598) and Jakob (d. 1598), all of whom left male issue.

Marcus was the author of a book on horse-breeding, Wie und wo man ein Gesttit von guten edeln Kriegsrossen aujrichten soil (1578), and of a German translation of the Historia ecclesiastica of Nicephorus Callistus. He founded the Nordendorf branch of the family, which became extinct on the death of his grandson, Nicolaus,- in 1676. Another grandson of Marcus was Franz Fugger (161 2-1664), who served under Wallenstein during the Thirty Years' War, and was afterwards governor of Ingolstadt. He was killed at the battle of St Gotthard on the 1st of August

1664.

Johann Fugger had three sons, Christoph (d. 1615) and Marcus (d. 1614), who founded the families of Fugger-Glbtt and Fugger-Kirchheim respectively, and Jakob, bishop of Constance from 1604 until his death in 1626. Christoph's son, Otto Hein- rich (1592-1644), was a soldier of some distinction and a knight of the order of the Golden Fleece. He was one of the most active of the Bavarian generals during the Thirty Years' War, and acted as governor of Augsburg, where his rule aroused much discontent. The family of Kirchheim died out in 1672. That of Glott was divided into several branches by the sons of Otto Heinrich and of his brother Johann Ernst (d. 1628). These lines, however, have gradually become extinct except the eldest line, represented in 1909 by Karl Ernst, Count Fugger of Glott (b. 1859). Anton Fugger's third son Jakob, the founder of the family of Wellenburg, had two sons who left issue, but in 1777 the possessions of this branch of the family were again united by Anselm Joseph (d. 1793), Count Fugger of Babenhausen. In 1803 Anselm's son, Anselm Maria (d. 1821), was made a prince of the Holy Roman. Empire, the title of Prince Fugger of Baben- hausen being borne by his direct descendant Karl (b. 1861). On the fall of the empire in 1806 the lands of the Fuggers, which were held directly of the empire, were

mediatized under Bavaria and Wiirttemberg. The heads of the three existing branches of the Fuggers are all hereditary members of the Bavarian Upper House.

Augsburg has many interesting mementoes of the Fuggers, including the family burial-chapel in the church of St Anna; the Fugger chapel in the church of St Ulrich and St Afra; the Fuggerhaus, still in the possession of one branch of the family; and a statue of Johann Jakob Fugger.

In 1593 a collection of portraits of the Fuggers, engraved by Dominique Custos of Antwerp, was issued at Augsburg. Editions with 127 portraits appeared in 1618 and 1620, the former accom- panied by a genealogy in Latin, the latter by one in German. Another edition of this Pinacotheca Fuggerorum, published at Vienna in 1754, includes 139 portraits. See Chronik der Familie Fugger vom JaJire 15QQ, edited by C. Meyer (Munich, 1902) ; A. Geiger, Jakob Fugger, 1459-1525 (Regensburg, 1895); A. Schulte, Die Fugger in Rom, 1495-1523 (Leipzig, 1904) ; R. Ehrenberg, Das Zeitalter der Fugger (Jena, 1896); K. Habler, Die Geschichte der Fuggerschen Handlung in Spanien (Weimar, 1897); A. Stauber, Das Haus Fugger (Augs- burg, 1900); and M. Jansen, Die Anfdnge der Fugger (Leipzig,

1907).

FUGITIVE SLAVE LAWS, a term applied in the United States to the Statutes passed by Congress in 1793 and 1850 to provide for the return of negro slaves who escaped from one state into another or into a public territory. A fugitive slave clause was inserted in the Articles of Confederation of the New England Confederation of 1643, providing for the return of the fugitive upon the certificate of one magistrate in the jurisdiction out of which the said servant fled — no trial by jury being provided for. This seems to have been the only instance of an inter- colonial provision for the return of fugitive slaves; there were, indeed, not infrequent escapes by slaves from one colony to another, but it was not until after the growth of anti-slavery sentiment and the acquisition of western territory, that it became necessary to adopt a uniform method for the return of fugitive slaves. Such provision was made in the Ordinance of 1787 (for the Northwest Territory), which in Article VI. provided that in the case of ” any person escaping into the same [the Northwest Territory] from whom labor or service is lawfully claimed in any one of the original states, such fugitive may be lawfully reclaimed and conveyed to the person claiming his or her labor or service as aforesaid.” An agreement of the sort was

necessary to persuade the slave-holding states to union, and in the Federal Constitution, Article IV., Section II., it is provided that ” no person held to service or labor in one state, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labour may be due.”

The first specific legislation on the subject was enacted on the 12th of February 1793, and like the Ordinance for the Northwest Territory and the section of the Constitution quoted above, did not contain the word ” slave “; by its provisions any Federal district or circuit judge or any state magistrate was authorized to decide finally and without a jury trial the status of an alleged fugitive. The measure soon met with strong opposition in the northern states, and Personal Liberty Laws were passed to hamper officials in the execution of the law; Indiana in 1824 and Con- necticut in 1828 providing jury trial for fugitives who appealed from an original decision against them. In 1840 New York and Vermont extended the right of trial by jury to fugitives and provided them with attorneys. As early as the first decade of the 19th century individual dissatisfaction with the law of 1793 had taken the form of systematic assistance rendered to negroes escaping from the South to Canada or New England — the so-called ” Underground Railroad.” 1 The decision of the Supreme Court of the United States in the case of Prigg v. Pennsylvania in 1842 (16 Peters 539), that state authorities could not be forced to act in fugitive slave cases, but that national authorities must carry out the national law, was followed by legislation in Massachusetts (1843), Vermont (1843), Pennsylvania (1847) and Rhode Island (1848), forbidding state officials to help enforce the law and refusing the use of state gaols for fugitive slaves. The demand from the South for more effective Federal legislation was voiced in the second fugitive slave law, drafted by Senator J. M. Mason of Virginia, and enacted on the 1 8th of September 1 8 50 as a part of the Compromise Measures of that year. Special commissioners were to have concurrent jurisdiction with the U.S. circuit and district courts and the inferior courts of Territories in enforcing the law; fugitives could not testify in their own behalf; no trial by jury was provided;

1 The precise amount of organization in the Underground Railroad cannot be definitely ascertained because of the exaggerated use of the

figure of railroading in the documents of the ” presidents ” of the road, Robert Purvis and Levi Coffin, and of its many ” con- ductors,” and their discussion of the ” packages ” and ” freight ” shipped by them. The system reached from Kentucky and Virginia across Ohio, and from Maryland across Pennsylvania and New York, to New England and Canada, and as early as 1817 a group of anti-slavery men in southern Ohio had helped to Canada as many as 1000 slaves. The Quakers of Pennsylvania possibly began the work of the mysterious Underground Railroad ; the best known of them was Thomas Garrett (1789- 1 871), a native of Pennsylvania, who, in 1822, removed to Wilmington, Delaware, where he was convicted in 1848 on four counts under the Fugitive Slave Law and was fined $8000; he is said to have helped 2700 slaves to freedom. The most picturesque figure of the Underground Railroad was Harriet Tubman (c. 1820), called by her friend, John Brown, ” General ” Tubman, and by her fellow negroes ” Moses.” She made about a score of trips into the South, bringing out with her 300 negroes altogether. At one time a reward of $40,000 was offered for her capture. She was a mystic, with remarkable clairvoyant powers, and did great service as a nurse, a spy and a scout in the Civil War. Levi Coffin (1798-1877), a native of North Carolina (whose cousin, Vestal Coffin, had established before 1819 a “station ” of the Underground near what is now Guilford College, North Caro- lina), in 1826 settled in Wayne County, Ohio; his home at New Garden (now Fountain City) was the meeting point of three ” lines ” from Kentucky; and in 1847 he removed to Cincinnati, where his labours in bringing slaves out of the South were even more successful. It has been argued that the Underground Railroad delayed the final decision of the slavery question, inasmuch as it was a ” safety valve “; for, without it, the more intelligent and capable of the negro slaves would, it is asserted, have become the leaders of in- surrections in the South, and would not have been removed from the places where they could have done most damage. Consult William Still, The Underground Railroad (Philadelphia, i872),acollec- tion of anecdotes by a negro agent of the Pennsylvania Anti-Slavery Society, and of the Philadelphia branch of the Railroad; and the important and scholarly work of Wilbur H. Siebert, The Underground Railroad from Slavery to Freedom (New York, i~

xi. 10

penalties were imposed upon marshals who refused to enforce the law or from whom a fugitive should escape, and upon individuals who aided negroes to escape; the marshal might raise a posse comitatus; a fee of $10 was paid to the commissioner when his decision favoured the claimant and only $5 when it favoured the fugitive: and both the

fact of the escape and the identity of the fugitive were to be determined on purely ex parte testimony. The severity of this measure led to gross abuses and defeated its purpose; the number of abolitionists increased, the operations of the Underground Railroad became more efficient, and new Personal Liberty Laws were enacted in Vermont (1850), Con- necticut (1854), Rhode Island (1854), Massachusetts (1855), Michigan (1855), Maine (1855 and 1857), Kansas (1858) and Wisconsin (1858). These Personal Liberty Laws forbade justices and judges to take cognizance of claims, extended the habeas corpus act and the privilege of jury trial to fugitives, and punished false testimony severely. The supreme court of Wisconsin went so far (1859) as to declare the Fugitive Slave Law unconstitutional. These state laws were one of the grievances officially referred to by South Carolina (in Dec. i860) as justifying her secession from the Union. Attempts to carry into effect the law of 1850 aroused much bitterness. The arrests of Sims and of Shadrach in Boston in 1851; of "Jerry" M'Henry* in Syracuse, New York, in the same year; of Anthony Burns in 1854, in Boston; and of the two Garner families in 1856, in Cincinnati, with other cases arising under the Fugitive Slave Law of 1850, probably had as much to do with bringing on the Civil War as did the controversy over slavery in the Territories.

With the beginning of the Civil War the legal status of the slave was changed by his master's being in arms. General B. F. Butler, in May 1861, declared negro slaves contraband of war. A confiscation bill was passed in August 1861 discharging from his service or labour any slave employed in aiding or promoting any insurrection against the government of the United States. By an act of the 17th of July 1862 any slave of a disloyal master who was in territory occupied by northern troops was declared ipso facto free. But for some time the Fugitive Slave Law was considered still to hold in the case of fugitives from masters in the border states who were loyal to the Union government, and it was not until the 28th of June 1864 that the Act of 1850 was repealed.

See J. F. Rhodes, History of the United States from the Compromise of 1850, vols. i. and ii. (New York, 1893); and M. G. M'Dougall, Fugitive Slaves, 1619-1865 (Boston, 1891).

FUGLEMAN (from the Ger. Fliigelmann, the man on the Fliigel or wing), properly a military term for a soldier who is selected to act as " guide," and posted generally on the flanks with the duty of directing the march in the required line, or of giving the time, &c, to the remainder of the unit, which conforms to his movements, in any military exercise. The word is then applied to a ringleader or one who

takes the lead in any move- ment or concerted movement.

FUGUE (Lat. fuga, flight), in music, the mutual “pursuit ” of voices or parts. It was, up to the end of the 16th century, if not later, the name applied to two art-forms. (A) Fuga ligata was the exact reproduction by one or more voices of the statement of a leading part. The reproducing voice {comes) was seldom if ever written out, for all differences between it and the dux were rigidly systematic; e.g. it was an exact inversion, or exactly twice as slow, or to be sung backwards, &c. &c. Hence, a rule or canon was given, often in enigmatic form, by which the comes was deduced from the dux: and so the term canon became the appropriate name for the form itself, and is still retained. (B) A composition in which the canonic style was cultivated without canonic restriction was, in the 16th century, called fuga ricercata or simply a ricercare, a term which is still used by Bach as a title for the fugues in Das musikalische Opfer.

The whole conception of fugue, rightly understood, is one of the most important in music, and the reasons why some con- trapuntal compositions are called fugues, while others are not, are so trivial, technically as well as aesthetically, that we have

preferred to treat the subject separately under the general heading of Contrapuntal Forms, reserving only technical terms for definition here.

(i.) If in the beginning or ” exposition ” the material with which the opening voice accompanies the answer is faithfully reproduced as the accompaniment to subsequent entries of the subject, it is called a counter subject (see Counterpoint, under sub-heading Double Counterpoint) . Obviously the process may be carried further, the first countersubject going on to a second when the subject enters in the third part and so on. The term is also applied to new subjects appearing later in the fugue in combina- tion (immediate or destined) with the original subject. Cherubini, holding the doctrine that a fugue cannot have more than one subject, insists on applying the term to the less prominent of the subjects of what are commonly called double fugues, i.e. fugues which begin with two parts and two subjects simultan- eously, and so also with triple and quadruple fugues.

(ii.) Episodes are passages separating the entries of the subject. 1 Episodes are usually developed from the material of the subject and countersubjects; they are very rarely independent, but then conspicuously so.

(iii.) Stretto, the overlapping of subject and answer, is a resource the possibilities of which may be exemplified by the setting of the words omnes generationes in Bach's Magnificat (see Bach).

(iv.) The distinction between real and tonal fugue, which is still sometimes treated as a thing of great historical and technical importance, is really a mere detail resulting from the fact that a violent oscillation between the keys of tonic and dominant is no part of the function of a fugal exposition, so that the answer is (especially in its first notes and in points that tend to shift the key) not so much a transposition of the subject to the key of the dominant as an adaptation of it from the tonic part to the dominant part of the scale, or vice versa; in short, the answer is as far as possible on the dominant, not in the dominant. The modifications this principle produces in the answer (which have been happily described as resembling " fore-shortening ") are the only distinctive marks of tonal fugue; and the text-books are half filled with the attempt to reduce them from matters of ear to rules of thumb, which rules, however, have the merit (unusual in those of the academic fugue) of being founded on observation of the practice of great masters. But the same principle as often as not produces answers that are exact trans-positions of the subject; and so the only kind of real fugue {i.e. fugue with an exact answer) that could rightly be contrasted with tonal fugue would be that in which the answer ought to be tonal but is not. It must be admitted that tonal answers are rare in the modal music of the 16th century, though their melodic principles are of yet earlier date; still, though tonal fugue does not become usual until well on in the 17th century, the idea that it is a separate species is manifestly absurd, unless the term simply means " fugue in modern tonality or key," whatever the answer may be.

The term " answer " is usually reserved for those entries of the subject that are placed in what may be called the " comple- mentary " position of the scale, whether they are " tonally " modified or not. Thus the order of entries in the exposition of the first fugue of the Wohltemp. Klav. is subject, answer, answer, subject; a departure from the usual rule according to which subject and answer are strictly alternate in the exposition.

In conclusion we may remind the reader of the most accurate as well

as the most vivid description ever given of the essentials of a fugue, in the famous lines in Paradise Lost, book xi. ” His volant touch, Instinct through all proportions, low and high, Fled and pursued transverse the resonant fugue.”

It is hard to realize that this description of organ-music was written in no classical period of instrumental polyphony, but just half-way between the death of Frescobaldi and the birth ‘An episode occurring during the exposition is sometimes called codetta, a distinction the uselessness of which at once appears on an analysis of Bach’s 2nd fugue in the Wohltemp. Klav. (the term codetta is more correctly applied to notes filling in a gap between subject and its first answer, but such a gap is rare in good examples).

of Bach. Every word is a definition, both retrospective and prophetic; and in “transverse” we see all that Sir Frederick Gore Ouseley expresses in his popular distinction between the “perpendicular” or homophonic style in which harmony is built up in chords, and the ” horizontal ” or polyphonic style in which it is woven in threads of independent melody. (D. F. T.)

FtJHRICH, JOSEPH VON (1800-1876), Austrian painter, was born at Kratzau in Bohemia on the 9th of February 1800. Deeply impressed as a boy by rude pictures adorning the wayside chapels of his native country, his first attempt at composition was a sketch of the Nativity for the festival of Christmas in his father’s house. He lived to see the day when, becoming celebrated as a composer of scriptural episodes, his sacred subjects were transferred in numberless repetitions to the roadside churches of the Austrian state, where humble peasants thus learnt to admire modern art reviving the models of earlier ages. Fiihrich has been fairly described as a ” Nazarene,” a romantic religious artist whose pencil did more than any other to restore the old spirit of Diirer and give new shape to countless incidents of the gospel and scriptural legends. Without the power of Cornelius or the grace of Overbeck, he composed with great skill, especially in outline. His mastery of distribution, form, movement and expression was considerable. In its peculiar way his drapery was perfectly cast. Essentially creative as a landscape draughtsman, he had still no feeling for colour; and when he produced monumental pictures he was not nearly so successful as when designing subjects for woodcuts. Fuhrich’s fame extended far beyond the walls of the Austrian capital, and his illustrations to Tieck’s Genofeva, the Lord’s Prayer, the Triumph of Christ, the Road to Bethlehem, the Succession of Christ according to Thomas a Kempis, the Prodigal Son, and the verses of the Psalter, became well known. His Prodigal Son, especially, is

remarkable for the fancy with which the spirit of evil is embodied in a figure constantly recurring, and like that of Mephistopheles exhibiting temptation in a human yet demoniacal shape. Fiihrich became a pupil at the Academy of Prague in 1816. His first inspiration was derived from the prints of Diirer and the Faust of Cornelius, and the first fruit of this turn of study was the Genofeva series. In 1826 he went to Rome, where he added three frescoes to those executed by Cornelius and Overbeck in the Palazzo Massimi. His subjects were taken from the life of Tasso, and are almost solitary examples of his talent in this class of composition. In 1831 he finished the Triumph of Christ now in the Raczynski palace at Berlin. In 1834 he was made custos and in 1841 professor of composition in the Academy of Vienna. After this he completed the monu- mental pictures of the church of St Nepomuk, and in 1854-1861 the vast series of wall paintings which cover the inside of the Lerchenfeld church at Vienna. In 1872 he was pensioned and made a knight of the order of Franz Joseph ; 1875 is the date of his illustrations to the Psalms. He died on the 13th of March 1876. His autobiography was published in 1875, and a memoir by his son Lucas in 1886.

FUJI (Fuji-san, Fujiyama, Fusiyama), a celebrated mountain of Japan, standing W.S.W. of Tokyo, its base being about 70 m. by rail from that city. It rises to a height of 12,395 ft- an d its southern slopes reach the shore of Suruga Bay. It is a cone of beautifully simple form, the more striking to view because it stands isolated; but its summit is not conical, being broken by a crater some 2000 ft. in diameter, for Fuji is a quiescent volcano. Small outbursts of steam are still to be observed at some points. An eruption is recorded so lately as the first decade of the 18th century. The mountain is the resort of great numbers of pilgrims (see also Japan).

FU-KIEN (formerly Min), a south-eastern province of China, bounded N. by the province of Cheh-kiang, S. by that of Kwang- tung, W. by that of Kiang-si and E. by the sea. It occupies an area of 53,480 sq. m. and its population is estimated at 20,000,000. The provincial capital is Fuchow Fu, and it is divided into eleven prefectures, besides that ruled over by the prefect of the capital city. Fu-kien is generally mountainous, being overspread by the Nan-shan ranges, which run a general course of N.E. and S.W.

The principal river is the Min, which is formed by the junction, in the

neighbourhood of the city of Yen-p'ing Fu, of three rivers, namely, the Nui-si, which takes its rise in the mountains on the western frontier in the prefecture of Kien-ning Fu, the Fuh-tun Ki, the source of which is found in the district of Kwang-tsih in the north-west of the province, and the Ta-shi-ki (Shao Ki), which rises in the mountains in the western district of Ning-hwa. From Yen-p'ing Fu the river takes a south-easterly course, and after passing along the south face of the city of Fuchow Fu, empties itself into the sea about 30 m. below that town. Its upper course is narrow and rocky and abounds in rapids, but as it approaches Fuchow Fu the channel widens and the current becomes slow and even. Its depth is very irregular, and it is navigable only by native boats of a small class. Two other rivers flow into the sea near Amoy, neither of which, however, is navigable for any distance from its mouth owing to the shallows and rapids with which they abound. Thirty-five miles inland from Amoy stands the city of Chang Chow, famous for the bridge which there spans the Kin-lung river. This bridge is 800 ft. long, and consists of granite monoliths stretching from one abutment to another. The soil of the province is, as its name, " Happy Establishment," indicates, very productive, and the scenery is of a rich and varied character. Most of the hills are covered with verdure, and the less rugged are laid out in terraces. The principal products of the province are tea, of which the best kind is that known as Bohea, which takes its name, by a mispronunciation, from the Wu-e Mountains, in the prefecture of Kien-ning Fu, where it is grown ; grains of various kinds, oranges, plantins, lichis, bamboo, ginger, gold, silver, lead, tin, iron, salt (both marine and rock), deers' horns, beeswax, sugar, fish, birds' nests, medicine, paper, cloth, timber, &c. Fu-kien has three open ports, Fuchow Fu opened in 1842, Amoy opened to trade in the same year and Funing. The latter port was only opened to foreign trade in 1898, but in 1904 it imported and exported goods to the value of £7668 and £278,160 respectively.

FUKUI, a town of Japan in the province of Echizen, Nippon, near the west coast, 20 m. N. by E. of Wakasa Bay. It lies in a volcanic district much exposed to earthquakes, and suffered severely during the disturbances of 1891-1892, when a chasm over 40 m. long was opened across the Neo valley from Fukui to Kaiabira. But Fukui subsequently revived, and is now in a flourishing condition, with several local industries, especially the manufacture of paper, and an increasing population exceeding 50,000. Fukui has railway communication. There are ruins of a castle of the Daimios of Echizen.

FUKUOKA, a town on the north-west coast of the island of Kiushiu, Japan, in the province of Chikuzen, 90 m. N.N.E. of Nagasaki by rail. Pop. about 72,000. With Hakata, on the opposite side of a small coast

stream, it forms a large centre of population, with an increasing export trade and several local industries. Of these the most important is silk-weaving, and Hakata especially is noted for its durable silk fabrics. Fukuoka was formerly the residence of the powerful daimio of Chikuzen, and played a conspicuous part in the medieval history of Japan; the renowned temple of Yeiyas in the district was destroyed by fire during the revolution of 1868. There are several other places of this name in Japan, the most important being Fukuoka in the province of Mutsu, North Nippon, a railway station on the main line from Tokyo to Aimori Ura Bay. Pop. about 5000.

FULA (Fulbe, Fellatah or Peuls), a numerous and powerful African people, spread over an immense region from Senegal nearly to Darf ur. Strictly they have no country of their own, and nowhere form the whole of the population, though nearly always the dominant native race. They are most numerous in Upper Senegal and in the countries under French sway immediately south of Senegambia, notably Futa Jallon. Farther east they rule, subject to the control of the French, Segu and Massena, countries on both banks of the upper Niger, to the south-west of Timbuktu. The districts within the great bend of the Niger have a large Fula population. East of that river Sokoto and its tributary emirates are ruled by Fula princes, subject to the control of the British Nigerian administration. Fula are settled

in Bornu, Bagirmi, Wadai and the upper Nile Valley, 1 but have no political power in those countries. Their most southerly emirate is Adamawa, the country on both sides of the upper Benue. In this vast region of distribution the Fula populations are most dense towards the west and north, most scattered towards the east and south. Originally herdsmen in the western and central Sudan, they extended their sway east of the Niger, under the leadership of Othman Dan Fodio, during the early years of the 19th century, and having subdued the Hausa states, founded the empire of Sokoto with the vassal emirates of Kano, Gando, Nupe, Adamawa, &c.

The question of the ethnic affinities of the Fula has given rise to an enormous amount of speculation, but the most reasonable theory is that they are a mixture of Berber and Negro. This is now the most generally accepted theory. Certainly there is no reason to connect them with the ancient Egyptians. In the district of Senegal known as Fuladugu or ” Fula Land,” where the purest types of the race are found, the people are of a reddish brown or light chestnut colour, with oval faces, ringlety or even smooth hair, never woolly, straight and even aquiline noses, delicately shaped lips and regular features quite differentiating them from the Negro type. Like most conquering races

the Fula are, however, not of uniform physique, in many districts approximating to the local type. They nevertheless maintain throughout their widespread territory a certain national solid- arity, thanks to common speech, traditions and usages. The ruling caste of the Fula differs widely in character from the herdsmen of the western Sudan. The latter are peaceable, inoffensive and abstemious. They are mainly monogamous, and by rigidly abstaining from foreign marriages have preserved racial purity. The ruling caste in Nigeria, on the other hand, despise their pastoral brethren, and through generations of polygamy with the conquered tribes have become more Negroid in type, black, burly and coarse featured. Love of luxury, pomp and finery is their chief characteristic. Taken as a m hole, the Fula race is distinguished by great intelligence, frankntss of disposition and strength of character. As soldiers they are renowned almost exclusively as cavalry; and the race has produced several leaders possessed of much strategical skill. Besides the ordinary Negro weapons, they use iron spears with leatherbound handles and swords. They are generally excellent rulers, stern but patient and just. The Nigerian emirs acquired, however, an evil reputation during the r9th century as slave raiders. They have long been devout Mahommedans, and mosques and schools exist in almost all their towns. Tradition says that of old every Fula boy and girl was a scholar; but during the decadence of their power towards the close of the 19th century education was not highly valued. Power seems to have somewhat spoilt this virile race, but such authorities as Sir Frederick Lugard believe them still capable of a great future.

The Fula language has as yet found no place in any African linguistic family. In its rudiments it is akin to the Hamito- Semitic group. It possesses two grammatical genders, not masculine and feminine, but the human and the non-human; the adjective agrees in assonance with its noun, and euphony plays a great part in verbal and nominal inflections. In some ways resembling the Negro dialects, it betrays non-Negroid influencesin the use of suffixes. The name of the people has many variations. Fulbe or Fula (sing. Pullo, Peul) is the Mandingan name, Follani the Hausa, Fellatah the Kanuri, Fullan the Arab, and Fulde on the Benue. Like the name Abate, ” white,” given them in Kororofa, all these seem to refer to their light reddish hue. .

See F. Ratzel, History of Mankind (English ed., London, 1896- “1898) ; Sir F. Lugard, ” Northern Nigeria,” in Geographical Journal (July 1904); Grimal de Guirodon, Les Puis (1887); E. A. Bracken- bury, A Short Vocabulary of the Fuiani Language (Zungeru, 1907) ; the articles Nigeria and Sokoto and authorities there cited.

1 Sir Wm. Wallace in a report on Northern Nigeria (" Colonial Office " series, No. 551, 1907) calls attention to the exodus " of thousands of Fuiani of all sorts, but mostly Mellawa, from the French Middle Niger," and states that the majority of the emigrants are settling in the Nile yalley.

FULCHER (or Foucher) OF CHARTRES (1058-c. 1130), French chronicler, was a priest who was present at the council of Clermont in 1095, and accompanied Robert II., duke of Normandy, on the first crusade in 1096. Having spent some time in Italy and taken part in the fighting on the way to the Holy Land, he became chaplain to Baldwin, who was chosen king of Jerusalem in 1100, and lived with Baldwin at Edessa and then at Jerusalem. He accompanied this king on several warlike expeditions, but won more lasting fame by writing his Historic, Hierosolymitana or Gesta Francorum Jerusalem expugnantium, one of the most trustworthy sources for the history of the first crusade. In its final form it is divided into three books, and covers the period between the council of Clermont and 1 1 27, and the author only gives details of events which he himself had witnessed. It was used by William of Tyre. Fulcher died after n 27, probably at Jerusalem. He has been confused with Foucher of Mongervillier (d. n 71), abbot of St-Pere-en- Vallee at Chartres, and also with another person of the same name who distinguished himself at the siege of Antioch in

1098.

The Historia, but in an incomplete form, was first published by J. Bongars in the Gesta Dei per Francos (Hanover, 161 1). The best edition is in tome iii. of the Recueil des historiens des croisades, Historiens occidentaux (Paris, 1866); and there is a French translation in tome xxiv. of Guizot's Collection des memoires relatifs d. Vhistoire de France (Paris, 1823-1835).

See H. von Sybel, Geschichte des ersten Kreuzzuges (Leipzig, 1881) ; and A. Molinier, Les Sources de Vhistoire de France, tome ii. (Paris,

1902).

FULDA, a town and episcopal see of Germany, in the Prussian province of Hesse-Nassau, between the Rhon and the Vogel- Gebirge, 69 m. N.E. from Frankfort-on-Main on the railway to Bebra. Although

irregularly built the town is pleasantly situated, and contains two fine squares, on one of which stands a fine statue of St Boniface. The present cathedral was built at the beginning of the 18th century on the model of St Peter's at Rome, but it has an ancient crypt, which contains the bones of St Boniface and was restored in 1892. Opposite the cathedral is the former monastery of St Michael, now the episcopal palace. The Michaelskirche, attached to it, is a small round church built, in imitation of the Holy Sepulchre, in 822 and restored in 1853. Of other buildings may be mentioned the Library, with upwards of 80,000 printed books and many valuable MSS., the stately palace with its gardens and orangery, the former Benedictine nunnery (founded 1625, and now used as a seminary), and the Minorite friary (1 238) now used as a furniture warehouse. Among the secular buildings are the fine Schloss, the Bibliothek, the town hall and the post office. There are several schools, a hospital founded in the 13th century, and some new artillery barracks. Many industries are carried on in Fulda. These include weaving and dyeing, the manufacture of linen, plush and other textiles and brewing. There are also railway works in the town. A large trade is done in cattle and grain, many markets being held here. Fine views are obtained from several hills in the neighbourhood, among these being the Frauenberg, the Petersberg and the Kalvarienberg.

Fulda owes its existence to its famous abbey. It became a town in 1208, and during the middle ages there were many struggles between the abbots and the townsfolk. During the Peasants' War it was captured by the rebels and during the Seven Years' War by the Hanoverians. It came finally into the possession of Prussia in 1866. From 1734 to 1804 Fulda was the seat of a university, and latterly many assemblies of German bishops have been held in the town.

The great Benedictine abbey of Fulda occupies the place in the ecclesiastical history of Germany which Monte Cassino holds in Italy, St Gall in South Germany, Corvey in Saxony, Tours in France and Iona in Scotland. Founded in 744 at the instiga- tion of St Boniface by his pupil Sturm, who was the first abbot, it became the centre of a great missionary work. It was liberally endowed with land by the princes of the Carolingian house and others, and soon became one of the most famous and wealthy establishments of its kind. About 968 the pope declared that

its abbot was primate of all the abbots in Germany and Gaul, and later he became a prince of the Empire. Fulda was specially famous for its school, which was the centre of the theological learning of the early middle ages. Among the teachers here were Alcuin, Hrabanus Maurus,

who was abbot from 822 to 842, and Walafrid Strabo. Early in the 10th century the monastery was reformed by introducing monks from Scotland, who were responsible for restoring in its old strictness the Benedictine rule. Later the abbey lost some of its lands and also its high position, and some time before the Reformation the days of its glory were over. Johann von Henneberg, who was abbot from 1529 to 1 54 1, showed some sympathy with the teaching of the re- formers, but the Counter-Reformation made great progress here under Abbot Balthasar von Dernbach. Gustavus Adolphus gave the abbey as a principality to William, landgrave of Hesse, but William's rule only lasted for ten years. In 1752 the abbot was raised to the rank of a bishop, and Fulda ranked as a prince- bishopric. This was secularized in 1802, and in quick succession it belonged to the prince of Orange, the king of France and the grand-duchy of Frankfort. In 1816 the greater part of the principality was ceded by Prussia to Hesse-Cassel, a smaller portion being united with Bavaria. Sharing the fate of Hesse-Cassel, this larger portion was annexed by Prussia in 1866. In 1829 a new bishopric was founded at Fulda.

For the town see A. Hartmann, Zeitgeschichte'von Fulda (Fulda, 1895); J- Schneider, Fuhrer durch die Stadt Fulda (Fulda, 1899); and Shronik von Fulda und dessen Umgebungen (1839). For the history of the abbey see Gegenbaur, Das Kloster Fulda im Karolinger Zeitalter (Fulda, 1871-1874) ; Arndt, Geschichte des Hochstifts Fulda (Fulda, i860) ; and the Fuldaer Geschichtsbldtter (1902 fol.).

FULGENTIUS, FABIUS PLANCIADES, Latin grammarian, a native of Africa, flourished in the first half of the 6th (or the last part of the 5th) century a.d. He is to be distinguished from Fulgentius, bishop of Ruspe (468-533), to whom he was probably related, and also from the bishop's pupil and biographer, Fulgentius Ferrandus. Four extant works are attributed to him. (1) Mythologiarum libri iii., dedicated to a certain Catus, a presbyter of Carthage, containing 75 myths briefly told, and then explained in the mystical and allegorical manner of the Stoics and Neoplatonists. For this purpose the author generally invokes the aid of etymologies which, borrowed from the philosophers, are highly absurd. As a Christian, Fulgentius sometimes (but less frequently than might have been expected) quotes the Bible by the side of the philosophers, to give a Christian colouring to the moral lesson. (2) Expositio Vergilianae continentiae (continentia = contents), a sort of appendix to (1), dedicated to Catus. The poet himself appears to the author and explains the twelve books of the Aeneid as a picture of human life. The three words arma (= virtus), vir (= sapientia),;£nmws (= princeps) in the first line represent respectively substantia corporalis, sensualis, ornans. Book i.

symbolizes the birth and early childhood of man (the shipwreck of Aeneas denotes the peril of birth), book vi. the plunge into the depths of wisdom. (3) Expositio sermonum antiquorum, explanations of 63 rare and obsolete words, supported by quotations (sometimes from authors and works that never existed) . It is much inferior to the similar work of Nonius, with which it is often edited. (4) Liber absque litteris de aetatibus mundi et hominis. In the MS. heading of this work, the name of the author is given as Fabius Claudius Gordianus Fulgentius (Claudius is the name of the father, and Gordianus that of the grandfather of the bishop, to whom some attribute the work). The title Absque litteris indicates that one letter of the alphabet is wholly omitted in each successive book (A in bk. i., B in bk. ii.). Only 14 books are preserved. The matter is chiefly taken from sacred history. In addition to these, Fulgentius speaks of early poetical attempts after the manner of Anacreon, and of a work called Physiologus, dealing with medical questions, and including a discussion of the mystical signification of the numbers 7 and 9. Fulgentius is a representative of the so-called late African style, taking for his models Apuleius, Tertullian and Martianus Capella. His language is bombastic, affected and incorrect, while the lengthy and elaborate periods make it difficult to understand his meaning.

See the edition of the four works by R. Helm (1898, Teubner series); also M. Zink, Der Mytholog Fulgentius (1867); E. Jung- mann, ” De Fulgentii aetate et scriptis,” in Acta Societatis Philologae Lipsiensis, i. (1871); A; Ebert, Allgemeine Geschichte der Litt. des Mittelalters, i. ; article ” Fulgentius ” by C. F. Bohr in Ersch and Gruber’s Allgemeine Encyklopadie; Teuffel-Schwabe, History of Roman Literature (Eng. trans.).

FULGINIAE (mod. Foligno), an ancient town of Umbria, Italy, on the later line of the Via Flaminia, 15 m. S. of Nuceria. It appears to have been of comparatively late origin, inasmuch as it had no city walls, but, in imperial times especially, owing to its position on the new line of the Via Flaminia, it must have increased in importance as being the point of departure of roads to Perusia and to Picenum over the pass of Plestia. It appears to have had an amphitheatre, and three bridges over the Topino are attributed to the Roman period. Three miles to the N. lies the independent community of Forum Flaminii, the site of which is marked by the church of S. Giovanni Profiamma, at or near which the newer line of the Via Flaminia rejoined the older. It was no

doubt founded by the builder of the road, C. Flaminius, consul in 220 b.c. (See Foligno and Flaminia, Via.) (T. As.) ‘

FULGURITE (from Lat. fulgur, lightning), in petrology, the name given to rocks which have been fused on the surface by lightning, and to the characteristic holes in rocks formed by the same agency. When lightning strikes the naked surfaces of rocks, the sudden rise of temperature may produce a certain amount of fusion, especially when the rocks are dry and the electricity is not readily conducted away. Instances of this have been observed on Ararat and on several mountains in the Alps, Pyrenees, &c. A thin glassy crust, resembling a coat of varnish, is formed; its thickness is usually not more than one-eighth of an inch, and it may be colourless, white or yellow. When examined under the microscope, it usually shows no crystalliza- tion, and contains minute bubbles due to the expansion of air or other gases in the fused pellicle. Occasionally small microliths may appear, but this is uncommon because so thin a film would cool with extreme rapidity. The minerals of the rock beneath are in some cases partly fused, but the more refractory often appear quite unaffected. The glass has arisen from the melting of the most fusible ingredients alone.

Another type of fulgurite is commonest in dry sands and takes the shape of vertical tubes which may be nearly half an inch in diameter. Generally they are elliptical in cross section, or flattened by the pressure exerted by the surrounding sand on the fulgurite at a time when it was still very hot and plastic. These tubes are often vertical and may run downwards for several feet through the sand, branching and lessening as they descend. Tubular perforations in hard rocks have been noted also, but these are short and probably follow original cracks. The glassy material contains grains of sand and many small round or elliptical cavities, the long axes of which are radial. Minerals like felspar and mica are fused more readily than quartz, but anafysis shows that some fulgurite glasses are very rich in silica, which perhaps was dissolved in the glass rather than simply fused. The central cavity of the tube and the bubbles in its walls point to the expansion of the gases (air, water, &c.) in the sand by sudden and extreme heating. Very fine threads of glass project from the surface of the tube as if fused droplets had been projected outwards with con-siderable force. Where the quartz grains have been greatly heated but not melted they become white and semi-opaque, but where they are in contact with the glass they usually show partial solution. Occasionally crystallization has begun before the glass solidified, and small microliths, the nature of which is undeterminable, occur in streams and wisps in the clear hyaline matrix. (J. S. F.)

FULHAM, a western metropolitan borough of London, England, bounded N.W. by Hammersmith, N.E. by Kensington, E. by Chelsea, and S.E., S. and S.W. by the river Thames. Pop. (1001) 137,289. The principal thoroughfares are Fulham Palace Road running S. from Hammersmith, Fulham Road and King's Road, W. from Chelsea, coverging and leading to

Putney Bridge over the Thames; North End Road between Hammersmith and Fulham Roads; Lillie Road between South Kensington and Fulham Palace Road; and Wandsworth Bridge Road leading S. from New King's Road to Wandsworth Bridge. In the north Fulham includes the residential district known as West Kensington, and farther south that of Walham Green. The manor house or palace of the bishops of London stands in grounds, beautifully planted and surrounded by a moat, believed to be a Danish work, near the river west of Putney Bridge. Its oldest portion is the picturesque western quadrangle, built by Bishop Fitzjames (1506-1522). The parish church of All Saints, between the bridge and the grounds, was erected in 1881 from designs by Sir Arthur Blomfield. The fine old monu- ments from the former building, dating from the 16th to the 1 8th centuries, are mostly preserved, and in the churchyard are the memorials of several bishops of London and of Theodore Hook (1841). The public recreation grounds include the embankment and gardens between the river and the palace grounds, and there are also two well-known enclosures used for sports within the borough. Of these Hurlingham Park is the headquarters of the Hurlingham Polo Club and a fashionable resort; and Queen's Club, West Kensington, has tennis and other courts for the use of members, and is also the scene of important football matches, and of the athletic meetings between Oxford and Cambridge Universities, and those between the English and American Universities held in England. In Seagrave Road is the Western fever hospital. The parliamentary borough of Fulham returns one member. The borough council consists of a mayor, 6 aldermen and 36 councillors. Area, 1 703-5 acres.

Fulham, or in its earliest form Fullanham, is uncertainly stated to signify " the place " either " of fowls " or " of dirt." The manor is said to have been given to Bishop Erkenwald about the year 691 for himself and his successors in the see of London, and Holinshed relates that the Bishop of London was lodging in his manor place in 1141 when Geoffrey de Mandeville, riding out from the Tower of London, took him prisoner. At the Commonwealth the manor was temporarily out of the bishops' hands, being sold to Colonel Edmund Harvey. There is no record of the first erection of a parish church, but the first known rector was appointed in 1242, and a church probably existed a

century before this. The earliest part of the church demolished in 1881, however, did not date farther back than the 15th century. In 879 Danish invaders, sailing up the Thames, wintered at Fulham and Hammersmith. Near the former wooden Putney Bridge, built in 1729 and replaced in 1886, the earl of Essex threw a bridge of boats across the river in 1642 in order to march his army in pursuit of Charles I., who thereupon fell back on Oxford. Margravine Road recalls the existence of Bradenburg House, a riverside mansion built by Sir Nicholas Crispe in the time of Charles I., used as the head- quarters of General Fairfax in 1647 during the civil wars, and occupied in 1792 by the margrave of Bradenburg- Anspach and Bayreuth and his wife, and in 1820 by Caroline, consort of George IV.

FULK, king of Jerusalem (b. 1092), was the son of Fulk IV., count of Anjou, and his wife Bertrada (who ultimately deserted her husband and became the mistress of Philip I. of France). He became count of Anjou in n 09, and considerably added to the prestige of his house. In particular he showed himself a doughty opponent to Henry I. of England, against whom he continually supported Louis VI. of France, until in n 27 Henry won him over by betrothing his daughter Matilda to Fulk's son Geoffrey Plantagenet. Already in 11 20 Fulk had visited the Holy Land, and become a close friend of the Templars. On his return he assigned to the. order of the Templars an annual sub- sidy, while he also maintained two knights in the Holy Land for a year. In n 28 he was preparing to return to the East, when he received an embassy from Baldwin II., king of Jerusalem, who had no male heir to succeed him, offering his daughter Melisinda in marriage, with the right of eventual succession to the kingdom. Fulk readily accepted the offer; and in n 29 he came and was married to Melisinda, receiving the towns of

Acre and Tyre as her dower. In 113 1, at the age of thirty-nine, he became king of Jerusalem. His reign is not marked by any considerable events: the kingdom which had reached its zenith under Baldwin II., and did not begin to decline till the capture of Edessa in the reign of Baldwin III., was quietly prosperous under his rule. In the beginning of his reign he had to act as regent of Antioch, and to provide a husband, Raymund of Poitou, for the infant heiress Constance. But the great problem with which he had to deal was the progress of the atabeg Zengi of Mosul. In 1 137 he was beaten near Barin, and escaping into the fort was surrounded and forced to

capitulate. A little later, however, he greatly improved his position by strengthening his alliance with the vizier of Damascus, who also had to fear the progress of Zengi (1140); and in this way he was able to capture the fort of Banias, to the N. of Lake Tiberias. Fulk also strengthened the kingdom on the south; while his butler, Paganus, planted the fortress of Krak to the south of the Dead Sea, and helped to give the kingdom an access towards the Red Sea, he himself constructed Blanche Garde and other forts on the S.W. to overawe the garrison of Ascalon, which was still held by the Mahommedans, and to clear the road towards Egypt. Twice in Fulk's reign the eastern emperor, John Comnenus, appeared in northern Syria (1137 and 1142); but his coming did not affect the king, who was able to decline politely a visit which the emperor proposed to make to Jerusalem. In 1143 he died, leaving two sons, who both became kings, as Baldwin III. and Amalric I.

Fulk continued the tradition of good statesmanship and sound churchmanship which Baldwin I. and Baldwin II. had begun. William of Tyre speaks of him as a fine soldier, an able politician, and a good son of the church, and only blames him for partiality to his friends, and a forgetfulness of names and faces, which placed him at a disadvantage and made him too dependent on his immediate intimates. Little, perhaps, need be made of these censures: the real fault of Fulk was his neglect to envisage the needs of the northern principalities, and to head a combined resistance to the rising power of Zengi of

Mosul.

His reign in Jerusalem is narrated by R. Rohricht (Geschichte des Konigreichs Jerusalem, Innsbruck, 1898), and has been made the subject of a monograph by G. Dodu {De Fulconis Hierosolymitani regno, Paris, 1894). (E – Br -)

FULK (d . 900) , archbishop of Reims, and partisan of Charles the Simple in his struggle with Odo, count of Paris, was elected to the see as archbishop in 883 upon the death of Hinsmar. In 887 he was engaged in a struggle with the Normans who invaded his territories. Upon the deposition of Charles the Fat he sided with Charles the Simple in his contest for the West Frankish dominions against Count Odo of Paris, and crowned him king in his own metropolitan church at Reims after most of the nobles had gone over to Odo (893). Upon the death of Odo he succeeded in having Charles recognized as king by a majority of the West Frankish nobility. In 892 he obtained special privileges for his province from Pope Formosus, who promised that

thereafter, when the archbishopric became vacant, the revenues should not be enjoyed by anyone while the vacancy existed, but should be reserved for the new incum- bent, provided the election took place within the canonical limit of three months. From 898 until his death he held the office of chancellor, which for some time afterwards was regularly filled by the archbishop of Reims. In his efforts to keep the wealthy abbeys and benefices of the church out of the hands of the nobles, he incurred the hatred of Baldwin, count of Flanders, who secured his assassination ■ on the 17th of June goo, a crime which the weak Carolingian monarch left

unpunished.

Fulk left some letters, which are collected in Migne, Patrologia Latina, vol. cxxxi. 11-14.

FULKE, WILLIAM (1538-1589), Puritan divine, was born in London and educated at Cambridge. After studying law for six years, he became a fellow at St John's College, Cambridge, in 1 564. He took a leading part in the "vestiarian" controversy, and persuaded 'he college to discard the surplice. In consequence

he was expelled from St. John's for a time, but in 1 567 he became Hebrew lecturer and preacher there. After standing unsuccess- fully for the headship of the college in 1569, he became chaplain to the earl of Leicester, and received from him the livings of Warley, in Essex, and Dennington in Suffolk. In 1578 he was elected master of Pembroke Hall, Cambridge. As a Puritan controversialist he was remarkably active; in 1580 the bishop of Ely appointed him to defend puritanism against the Roman Catholics, Thomas Watson, ex-bishop of Lincoln (1513-1584), and John Feckenham, formerly abbot of Westminster, and in 1 581 he was one of the disputants with the Jesuit, Edmund Campion, while in 1582 he was among the clergy selected by the privy council to argue against any papist. His numerous polemical writings include A Defense of the sincere true Translations, of the holie Scriptures into the English tong (London, 1583), and confutations of Thomas Staple- ton (1535-1598), Cardinal Allen and other Roman Catholic con troversialists.

FULK NERRA (c. 970-1040), count of Anjou, eldest son of Count Geoffrey I., " Grisegonelle " (Grey Tunic) and Adela of Vermandois, was born about 970 and succeeded his father in the countship of Anjou on the 21st of July 987. He was success- ful in repelling the attacks of the count of Rennes and laying the foundations of the conquest of Touraine (see Anjou). In this connexion he built a great

number of strong castles, which has led in modern times to his being called “the great builder.” He also founded several religious houses, among them the abbeys of Beaulieu, near Loches (c 1007), of Saint-Nicholas at Angers (1020) and of Ronceray at Angers (1028), and, in order to expiate his crimes of violence, made three pilgrimages to the Holy Land (in 1002-1003, c. 1008 and in 1039). On his return from the third of these journeys he died at Metz in Lorraine on the 21st of June 1040: By his first marriage, with Elizabeth, daughter of Bouchard le Venerable, count of Vendome, he had a daughter, Adela, who married Boon of Nevers and transmitted to her children the countship of Vendome. Elizabeth having died in 1000, Fulk married Hildegarde of Lorraine, by whom he had a son, Geoffrey Martel (q.v.), and a daughter Ermengarde, who married Geoffrey, count of Gatinais, and was the mother of Geoffrey ” le Barbu ” (the Bearded) and of Fulk ” le Rechin ” (see Anjou).

See Louis Halphen, Le Comte a” Anjou au XI e siecle (Paris, 1906). The biography of Fulk Nerra by Alexandre de Salies, Histoire de Foulques Nerra (Angers, 1874) is confused and uncritical. A very summary biography is given by Celestin Port, Dictionnaire historique, geographique et biographique de Maine-et-Loire (3 vols., Paris-Angers, 1874-1878), vol. ii. pp. 189-192, and there is also a sketch in Kate Norgate, England under the Angevin Kings (2 vols., London, 1887), vol. i. ch. iii. (L. H.*)

FULLEBORN, GEORG GUSTAV (1769-1803), German philo- sopher, philologist and miscellaneous writer, was born at Glogau, Silesia, on the 2nd of March 1769, and died at Breslau on the 6th of February 1803. He was educated at the University of Halle, and was made doctor of philosophy in recognition of his thesis De Xenophane, Zenone et Gorgia. He took diaconal orders in 1791, but almost immediately became professor of classics at Breslau. His philosophical works include annotations to Garve’s translation of the Politics of Aristotle (1799-1800), and a large share in’ the Beitrage zur Geschichte der Philosophic (published in twelve parts between 1791 and 1799), in which he collaborated with Forberg, Reinhold and Niethammer. In philology he wrote Encyclopaedia philologica sive primae lineae Isagoges in antiquorum studia (1798; 2nd ed., 1805); Kurse Theorie des lateinischen Stils (1793); Leitfaden der Rhelorik (1802); and an annotated edition of the Satires of Persius. Under the pseudonym ” Edelwald Justus ” he published several collections of popular tales — Bunte Blatter (1795); Kleine Schriften zur Unterhaltung (1798); Nebenstunden (1799). After his death were published Taschenbuch fur Brunnengdsle (1806) and Kanzelreden (1807). He was a frequent contributor to the press, where his writings

were very popular.

See Schummel, Geddchtnisrede (1 803V and Garve und Fiilleborn; Meusel, Gelehrtes Teutschland, vol. ii.

FULLER, ANDREW (1754-1815), English Baptist divine, was born on the 6th of February 1754, at Wicken in Cambridgeshire. In his boyhood and youth he worked on his father's farm. In his seventeenth year he became a member of the Baptist church at Soham, and his gifts as an exhorter met with so much approval that, in the spring of 1775, he was called and ordained as pastor of that congregation. In 1782 he removed to Kettering in Northamptonshire, where he became friendly with some of the most eminent ministers of the denomination. Before leaving Soham he had written the substance of a treatise in which he had sought to counteract the prevailing Baptist hyper-Calvinism which, " admitting nothing spiritually good to be the duty of the unregenerate, and nothing to be addressed to them in a way of exhortation excepting what related to external obedience," had long perplexed his own mind. This work he published, under the title The Gospel worthy of all Acceptation, soon after his settlement in Kettering; and although it immedi- ately involved him in a somewhat bitter controversy which lasted for nearly twenty years, it was ultimately successful in consider- ably modifying the views prevalent among English dissenters. In 1793 he published a treatise, The Calvinistic and Socinian systems examined and compared as to their moral tendency, in which he rebutted the accusation of antinomianism levelled by the Socinians against those who over-emphasized the doctrines of free grace. This work, along with another against Deism, entitled The Gospel its own Witness, is regarded as the production on which his reputation as a theologian mainly rests. Fuller also published an admirable Memoir of the Rev. Samuel Pearce, of Birmingham, and a volume of Expository Lectures in Genesis, besides a considerable number of smaller pieces, chiefly sermons and pamphlets, which were issued in a collected form after his death. He was a man of forceful character, more prominent on the practical side of religion than on the devotional, and accord- ingly not pre-eminently successful in his local ministry. His great work was done in connexion with the Baptist Missionary Society, formed at Kettering in 1792, of which he was secretary until his death on the 7th of May 181 5. Both Princeton and Yale, U.S.A., conferred on him the degree of D. D., but he never used it.

Several editions of his collected works have appeared, and a Memoir, principally compiled from his own papers, was published about a year after his decease by Dr Ryland, his most intimate friend and coadjutor in the affairs of the Baptist mission. There is also a biography by the Rev. J. W. Morris (1816); and his son prefixed a memoir to an edition of his chief works in Bohn's Standard Library (1852).

FULLER, GEORGE (1822-1884), American figure and portrait painter, was born at Deerfield, Massachusetts, in 1822. At the age of twenty he entered the studio of the sculptor H. K. Brown, at Albany, New York, where he drew from the cast and modelled heads. Having attained some proficiency he went about the country painting portraits, settling at length in Boston, where he studied the works of the earlier Americans, Stuart, Copley and Allston. After three years in that city, and twelve in New York, where in 1857 he was elected a member of the National Academy of Design, he went to Europe for a brief visit and for study. During all this time his work had received little recognition and practically no financial encouragement, and on his return he settled on the family farm at Deerfield, where he continued to work in his own way with no thought of the outside world. In

a lawyer and politician of some eminence, was born at Cambridge-port, Massachusetts, on the 23rd of May 1810. Her education was conducted by her father, who, she states, made the mistake of thinking to " gain time by bringing forward the intellect as early as possible," the consequence being " a premature develop- ment of brain that made her a youthful prodigy by day, and by night a victim of spectral illusions, nightmare and somnambul- ism." At six years she began to read Latin, and at a very early age she had selected as her favourite authors Shakespeare, Cervantes and Moliere. Soon the great amount, of study exacted of her ceased to be a burden, and reading became a habit and a passion. Haviag made herself familiar with the masterpieces of French, Italian and Spanish literature, she in 1833 began the study of German, and within the year had read some of the masterpieces of Goethe, Korner, Novalis and Schiller.

After her father's death in 1835 she went to Boston to teach languages, and in 1837 she was chosen principal teacher in the Green Street school, Providence, Rhode Island, where she remained till 1839. From this year until 1844 she stayed at different places in the immediate neighbourhood of Boston, forming an intimate acquaintance with the colonists of Brook Farm, and numbering among her closest friends R. W. Emerson, Nathaniel Hawthorne and W. H. Channing. In 1839 she published a translation of Eckermann's Conversations with Goethe, which was followed in 1842 by a

translation of the corre- spondence between Karoline von Giinderode and Bettina von Arnim, entitled Giinderode. Aided by R. W. Emerson and George Ripley, she in 1840 started The Dial, a poetical and philosophical magazine representing the opinions and aims of the New England Transcendentalists. This journal she con- tinued to edit for two years, and while in Boston she also con- ducted conversation classes for ladies in which philosophical and social subjects were discussed with a somewhat over-accentuated earnestness. These meetings may be regarded as perhaps the beginning of the modern movement in behalf of women's rights. R. W. Emerson, who had met her as early as 1836, thus describes her appearance: " She was then twenty-six years old. She had a face and frame that would indicate fulness and tenacity of life. She was rather under the middle height; her complexion was fair, with strong fair hair. She was then, as always, carefully and becomingly dressed, and of ladylike self-possession. For the rest her appearance had nothing prepossessing. Her extreme plainness, a trick of incessantly opening and shutting her eyelids, the nasal tone of her voice, all repelled; and I said to myself we shall never get far." On better acquaintance this unprepossessing exterior seemed, however, to melt away, and her inordinate self-esteem to be lost in the depth and universality of her sympathy. She possessed an almost irresistible power of winning the intel- lectual and moral confidence of those with whom she came in contact, and " applied herself to her companion as the sponge applies itself to water." She obtained from each the best they had to give. It was indeed more as a conversationalist than as a writer that she earned the title of the Priestess of Transcend- entalism. It was her intimate friends who admired her most. Smart and pungent though she is as a writer, the apparent originality of her views depends more on eccentricity than either intellectual depth or imaginative vigour. In 1844 she removed to New York at the desire of Horace Greeley to write literary

i8]6, however, he yjas forced hy pressm?, needs, to depose oi \ critidsm lot The Tribune, atv&m \%\b she published a seVecuon

from her articles on contemporary authors in Europe and America, under the title Papers on Literature and Art. The same year she paid a visit to Europe, passing some time in England and France, and finally taking up her residence in Italy. There she was married in December 1847 to the marquis Giovanni Angelo Ossoli, a friend of Mazzini. During 1848-1849 she was present with her husband in Rome, and when the city was besieged she, at the request of Mazzini, took charge of one of the two hospitals while her husband fought on the walls. In May 1850, along with her husband and infant son, she embarked at Leghorn for America, but when they had all but reached their

destination the vessel was wrecked on Fire

his work, and he sent some pictures to a dealer in Boston, where he met with immediate success, financial and artistic, and for the remaining eight years of his life he never lacked patrons. He died in Boston on the 21st of March 1884. He was a poetic painter, and a dreamer of delicate fancies and quaint, intangible phases of nature, his canvases being usually enveloped in a brown mist that renders the outlines vague. Among his noteworthy canvases are: ” The Turkey Pasture,” ” Romany Girl,” ” And she was a Witch,” ” Nydia,” ” Winifred Dysart ” and ” The Quadroon.”

FULLER, MARGARET, Marchioness Ossoli (1810-1850), American authoress, eldest child of Timothy Fuller (1778-1835),

Island beach on the 16th of June, and the Ossolis were among the passengers who perished.

Life Without and Life Within (Boston, i860) is a collection of essays, poems, &c, supplementary to her Collected Works, printed in 1855. See the Autobiography of Margaret Fuller Ossoli, with additional memoirs by J. F. Clarke, R. W. Emerson and W. H. Channing (2 vols., Boston, 1852) ; also Margaret Fuller (Marchesa Ossoli), by Julia Ward Howe (1883), in the ” Eminent Women ” series; Margaret Fuller Ossoli (Boston, 1884), by Thomas Went- worth Higginson in the ” American Men of Letters ” series, which is based largely on unedited material ; and The Love Letters of Margaret Fuller, 1845-1846 (London and New York, 1903), with an intro- duction by Julia Ward Howe.

FULLER, MELVILLE WESTON (1833-1910), American jurist, chief justice of the Supreme Court of the United States, was born at Augusta, Maine, on the 1 ith of February 1833. After graduat- ing at Bowdoin College in 1853 he spent a year at the Harvard Law School, and in 1855 began the practice of law at Augusta, where he was an associate-editor of a Democratic paper, The Age, and served in the city council and as city attorney. In 1856 he removed to Chicago, Illinois, where he continued to practise until 1888, rising to a high position at the bar of the Northwest. For some years he was active in Democratic politics, being a member of the Illinois Constitutional Convention in 1862 and of the State House of Representatives from 1863 to 1865. He was a delegate to various National conventions of his party, and in

that of 1876 placed Thomas A. Hendricks in nomination for the presidency. In 1888, by President Cleveland's appointment, he succeeded Morrison R. Waite as chief-justice of the Supreme Court of the United States. In 1899 he was appointed by President McKinley a member of the arbitration commission at Paris to "settle the Venezuela-British Guiana boundary dispute.

FULLER, THOMAS (1608-1661), English divine and historian, eldest son of Thomas Fuller, rector of Aldwincle St Peter's, Northamptonshire, was born at his father's rectory and was baptized on the 19th of June 1608. Dr John Davenant, bishop of Salisbury, was his uncle and godfather. According to Aubrey, Fuller was " a boy of pregnant wit." At thirteen he was admitted to Queens' College, Cambridge, then presided over by Dr John Davenant. His cousin, Edward Davenant, was a tutor in the same college. He was apt and quick in study; and in Lent 1624-1625 he became B.A. and in July 1628 M.A. Being over- looked in an election of fellows of his college, he was removed by Bishop Davenant to Sidney Sussex College, November 1628. In 1630 he received from Corpus Christi College the curacy of St Benet's, Cambridge.

t Fuller's quaint and humorous oratory soon attracted attention. He published in 163 1 a poem on the subject of David and Bathsheba, entitled David's Hainous Sinne, Hearlie Repentance, Heavie Punishment. In June of the same year his uncle gave him a prebend in Salisbury, where his father, who died in the following year, held a canonry. The rectory of Broadwindsor, Dorset- shire, then in the diocese of Bristol, was his next preferment (1634); and on the nth of June 1635 he proceeded B.D. At Broadwindsor he compiled The Historie of the Holy Wane (1639), a history of the crusades, and The Holy State and the Prophane State (1642). This work describes the holy state as existing in the family and in public life, gives rules of conduct, model " characters " for the various professions and profane bio- graphies. It was perhaps the most popular of all his writings. He was in 1640 elected proctor for Bristol in the memorable convocation of Canterbury, which assembled with the Short Parliament. On the sudden dissolution of the latter he joined those who urged that convocation should likewise dissolve as usual. That opinion was overruled ; and the assembly continued to sit by virtue of a royal writ. Fuller has left in his Church History a valuable account of the proceedings of this synod, for sitting in which he was fined £200, which, however, was never exacted. His first published volume of sermons appeared in 1 640 under the title of Joseph's pany-coloured Coat, which contains many of his quaint utterances and odd conceits. His grosser mannerisms of style, derived from the divines of the

former

generation, disappeared for the most part in his subsequent discourses.

About 1640 he had married Eleanor, daughter of Hugh Grove of Chisenbury, Wiltshire. She died in 1641. Their eldest child, John, baptized at Broadwindsor by his father, 6th June 1641, was afterwards of Sidney Sussex College, edited the Worthies of England, 1662, and became rector of Great Wakering, Essex, where he died in 1687.

At Broadwindsor, early in the year 1641, Thomas Fuller, his curate Henry Sanders, the church wardens, and others, nine persons altogether, certified that their parish, represented by 242 grown-up male persons, had taken the Protestation ordered by the speaker of the Long Parliament. Fuller was not formally dispossessed of his living and prebend on the triumph of the Presbyterian party, but he relinquished both preferments about this time. For a short time he preached with success at the Inns of Court, and thence removed, at the invitation of the master of the Savoy (Dr Balcanqual) and the brotherhood of that foundation, to be lecturer at their chapel of St Mary Savoy. Some of the best discourses of the witty preacher were delivered at the Savoy to audiences which extended into the chapel-yard. In one he set forth with searching and truthful minuteness the hindrances to. peace, and urged the signing of petitions to the king at Oxford, and to the parliament, to continue their care in advancing an accommodation. In his A ppeal of Injured Innocence Fuller says that he was once deputed to carry a petition to the king at Oxford. This has been identified with a petition entrusted to Sir Edward Wardour, clerk of the pells, Dr Dukeson, ” Dr Fuller,” and four or five others from the city of Westminster and the parishes contiguous to the Savoy. A pass was granted by the House of Lords, on the 2nd of January 1643, for an equipage of two coaches, four or six horses and eight or ten attendants. On the arrival of the deputation at Uxbridge, on the 4th of January, officers of the Parliamentary army stopped the coaches and searched the gentlemen; and they found upon the latter ” two scandalous books arraigning the proceedings of the House,” and letters with ciphers to Lord Viscount Falkland and the Lord Spencer. Ultimately a joint order of both Houses remanded the party; and Fuller and his friends suffered a brief imprisonment. The Westminster Petition, notwithstanding, reached the king’s hands; and it was published with the royal reply (see J. E. Bailey, Life of Thomas Fuller, pp. 245 et seq.). When it was expected, three months later, that a favourable result would attend the negotiations at Oxford, Fuller preached a sermon at Westminster Abbey, on the 27th of March 1643,

on the anniversary of Charles I.‘s accession, on the text, ” Yea, let him take all, so my Lord the King return in peace.” On Wednesday, the 26th of July, he preached on church reformation, satirizing the religious reformers, and maintaining that only the Supreme Power could initiate reforms.

He was now obliged to leave London, and in August 1643 he joined the king at Oxford. He lived in a hired chamber at Lincoln College for 17 weeks. Thence he put forth a witty and effective reply to John Saltmarsh, who had attacked his views on ecclesiastical reform. Fuller subsequently published by royal request a sermon preached on the 10th of May 1644, at St Mary’s, Oxford, before the king and Prince Charles, called Jacob’s Vow.

The spirit of Fuller’s preaching, always characterized by calm- ness and moderation, gave offence to the high royalists, who charged him with lukewarmness in their cause. To silence unjust censures he became chaplain to the regiment of Sir Ralph Hopton. For the first five years of the war, as he said, when excusing the non-appearance of his Church History, ” I had little list or leisure to write, fearing to be made a history, and shifting daily for my safety. All that time I could not live to study, who did only study to live.” After the defeat of Hopton at Cheriton Down, Fuller retreated to Basing House. He took an active part in its defence, and his life with the troops caused him to be afterwards regarded as one of ” the great cavalier parsons.” In his marches with his regiment round about Oxford and in the west, he devoted much time to the collection of details,

from churches, old buildings, and the conversation of ancient gossips, for his Church-History and Worthies of England. He compiled in 1645 a small volume of prayers and meditations, — the Good Thoughts in Bad Times, — which, set up and printed in the besieged city of Exeter, whither he had retired, was called by himself ” the first fruits of Exeter press.” It was inscribed to Lady Dalkeith, governess to the infant princess, Henrietta Anne (b. 1644), to whose household he was attached as chaplain. The corporation gave him the Bodleian lectureship on the 21st of March 1645/6, and he held it until the 17th of June following, soon after the surrender of the city to the parliament. The Fear of losing the Old Light (1646) was his farewell discourse to his Exeter friends. Under the Articles of Surrender Fuller made his composition with the government at London, his

“delinquency” being that he had been present in the king’s garrisons. In Andronicus, or the Unfortunate Politician (1646) , partly authentic and partly fictitious, he satirized the leaders of the Revolution; and for the comfort of sufferers by the war he issued (1647) a second devotional manual, entitled Good Thoughts in Worse Times, abounding in fervent aspirations, and drawing moral lessons in beautfful language out of the events of his life or the circumstances of the time. In grief over his losses, which included his library and manuscripts (his ” upper and nether millstone “), and over the calamities of the country, he wrote his work on the Cause and Cure of a Wounded Conscience (1647). It was prepared at Boughton House in his native county, where he and his son were entertained by Edward Lord Montagu, who had been one of his contemporaries at the university and had taken the side of the parliament.

For the next few years of his life Fuller was mainly dependent upon his dealings with booksellers, of whom he asserted that none had ever lost by him. He made considerable progress in an English translation from the MS. of the Annates of his friend Archbishop Ussber. Amongst his benefactors it is curious to find Sir John Dan vers of Chelsea, the regicide. Fuller in 1647 began to preach at St Clement’s, Eastcheap, and elsewhere in the capacity of lecturer. While at St Clement’s he was suspended; but speedily recovering his freedom, he preached wherever he was invited. At Chelsea, where also he occasionally officiated, he covertly preached a sermon on the death of Charles I., but he did not break with his Roundhead patrons. James Hay, 2nd earl of Carlisle, made him his chaplain, and presented him in 1648 or 1649 to the curacy of Waltham Abbey. His possession of the living was in jeopardy on the appointment of Cromwell’s ” Tryers “; but he evaded their inquisitorial ques- tions by his ready wit. He was not disturbed at Waltham in 1655, when the Protector’s edict prohibited the adherents of the late king from preaching. Lionel, 3rd earl of Middlesex, who lived at Copt Hall, near Waltham, gave him what remained of the books of the lord treasurer his father; and through the good offices of the marchioness of Hertford, part of his own pillaged library was restored to him. Fuller was thus able to prosecute his literary labours, producing successively his descrip- tive geography of the Holy Land, called A Pisgah-Sight of Palestine (1650), and his Church-History of Britain (1655), from the birth of Jesus Christ until the year 1648. With the Church- History was printed The History of the University of Cambridge since the Conquest and The History of Waltham Abbey. These works were furthered in no slight degree by his connexion with Sion College, London, where he had a chamber, as well for the convenience of the press as of his city lectureships. The

Church-History was angrily attacked by Dr P. Heylyn, who, in the spirit of High-Churchmanship, wished, as he said, to vindicate the truth, the church and the injured clergy. About 1652 Fuller married his second wife, Mary Roper, youngest sister of Thomas, Viscount Baltinglass, by whom -he had several children. At the Oxford Act of 1657, Robert South, who was Terrae ilius, lampooned Fuller, whom he described in this Oratio as living in London, ever scribbling and each year bringing forth new folia like a tree. At length, continues South, the Church-History came forth with its 166 dedications to wealthy and noble friends; and with this huge volume under one arm, and his wife (said to

be little of stature) on the other, he ran up and down the streets of London, seeking at the houses of his patrons invitations to dinner, to be repaid by his dull jests at table.

His last and best patron was George Berkeley, 1st Earl Berkeley (1628-1698), of Cranford House, Middlesex, whose chaplain he was, and who gave him Cranford rectory (1658). To this noble- man Fuller's reply to Heylyn's Examen Historicum, called The Appeal of Injured Innocence (1659), was inscribed. At the end of the Appeal is an epistle " to my loving friend Dr Peter Heylyn," conceived in the admirable Christian spirit which characterized all Fuller's dealings with controversialists. " Why should Peter," he asked, " fall out with Thomas, both being disciples to the same Lord and Master ? I assure you, sir, whatever you conceive to the contrary, I am cordial to the cause of the English Church, and my hoary hairs will go down to the grave in sorrow for her sufferings."

In An Alarum to the Counties of England and Wales (1660) Fuller argued for a free and full parliament — free from force, as he expressed it, as well as from abjurations or previous engagements. Mixt Contemplations in Better Times (1660), dedicated to Lady Monk, tendered advice in the spirit of its motto, "Let your moderation be known to all men: the Lord is at hand." There is good reason to suppose that Fuller was at the Hague immediately before the Restoration, in the retinue of Lord Berkeley, one of the commissioners of the House of Lords, whose last service to his friend was to interest himself in obtaining him a bishopric. A Panegyrick to His Majesty on his Happy Return was the last of Fuller's verse-efforts. On the 2nd of August, by royal letters, he was admitted D.D. at Cam- bridge. He resumed his lectures at the Savoy, where Samuel Pepys heard him preach; but he preferred his conversation or his books to his sermons. Fuller's last promotion was that of chaplain in extraordinary to Charles II. In the summer of 1661 he visited the west in connexion

with the business of his prebend, which had been restored to him. On Sunday, the 1 2th of August, while preaching at the Savoy, he was seized with typhus fever, and died at his new lodgings in Covent Garden on the 16th of August. He was buried in Cranford church, where a mural tablet was afterwards set up on the north side of the chancel, with an epitaph which contains a conceit worthy of his own pen, to the effect that while he was endeavouring (viz. in The Worthies) to give immortality to others, he himself attained it.

Fuller's wit and vivacious good-humour made him a favourite with men of both sides, and his sense of humour kept him from extremes. Probably Heylyn and South had some excuse for their attitude towards his very moderate politics. " By his particular temper and management," said Echard {Hist, of England, iii. 71), "he weathered the late great storm with more success than many other great men." He was known as " a perfect walking library." The strength of his memory was proverbial, and some amusing anecdotes are connected with it.

His writings were the product of a highly original mind. He had a fertile imagination and a happy faculty of illustration. Antithetic and axiomatic sentences abound in his pages, embody- ing literally the wisdom of the many in the wit of one. He was " quaint," and something more. " Wit," said Coleridge, in a well-known eulogy, " was the stuff and substance of Fuller's intellect. It was the element, the earthen base, the material which he worked in; and this very circumstance has defrauded him of his due praise for the practical wisdom of the thoughts, for the beauty and variety of the truths, into which he shaped the stuff. Fuller was incomparably the most sensible, the least prejudiced, great man of an age that boasted a galaxy of great men" {Literary Remains, vol. ii. (1836), pp. 389-390). This opinion was formed after the perusal of the Church-History. That work and The History of the Worthies of England are unquestionably Fuller's greatest efforts. They embody the collections of an entire life; and since his day they have been the delight of many readers. The Holy State has taken rank amongst the best books of " characters." Charles Lamb made some selections from Fuller, and had a profound admiration for the " golden works " of the " dear, fine, silly old angel." Since

Lamb's time, mainly through the appreciative criticisms of S. T.

Coleridge, Robert Southey and others, Fuller's works have received much attention.

There is an elaborate account of the life and writings of Fuller by William Oldys in the Biographia Britannica, vol. iii. (1750), based on Fuller's own works and the anonymous Life of . . . Dr Thomas Fuller (1661 ; reprinted in a volume of selections by A. L. J. Gosset, 1893). The completest account of him is The Life of Thomas Fuller, with Notices of his Books, his Kinsmen and his Friends (1874), by J. E. Bailey, who gives a detailed bibliography (pp. 713-762) of his works. The Worthies of England was reprinted by John Nichols (181 1) and by P. A. Nuttall (1840). His Collected Sermons were edited by J. E. Bailey and W. E. A. Axon in 1891. Fuller's quaint wit lends itself to selection, and there are several modern volumes of extracts from his works.

FULLER, WILLIAM (1670-c. 1717), English impostor, was born at Milton in Kent on the 20th of September 1670. His paternity is doubtful, but he was related to the family of Herbert. After 1688 he served James II. 's queen, Mary of Modena, and the Jacobites, seeking at the same time to gain favour with William III.; and after associating with Titus Oates, being imprisoned for debt and pretending to reveal Jacobite plots, the House of Commons in 1692 declared he was an " imposter, cheat and false accuser." Having stood in the pillory he was again imprisoned until 1695, when he was released; and at this time he took the opportunity to revive the old and familiar story that Mary of Modena was not the mother of the prince of Wales. In 1701 he published his autobiographical Life of William Fuller and some Original Letters of the late King James. Unable to prove the assertions made in his writings he was put in the pillory, whipped and fined. He died, probably in prison, about 1 717. Fuller's other writings are Mr William Fuller's trip to Bridewell, with a full account of his barbarous usage in the pillory; The sincere and hearty confession of Mr William Fuller (1704); and An humble appeal to the •impartial judgment of all parties in Great Britain (17 16).

He must be distinguished from William Fuller (1608-1675), dean of St Patrick's (1660), bishop of Limerick (1663), and bishop of Lincoln (1667), the friend of Samuel Pepys; and also from William Fuller (c. 1 580-1659), dean of Ely and later dean of Durham.

FULLER'S EARTH (Ger. Walkererde, Fr. terre & foulon, argile smectique) — so named from its use by fullers as an absorbent of the grease and oil of cloth, — a clay-like substance, which from its variability is somewhat difficult to define. In colour it is most often

greenish, olive-green or greenish-grey; on weathering it changes to a brown tint or it may bleach. As a rule it falls to pieces when placed in water and is not markedly plastic; when dry it adheres strongly to the tongue; since, however, these properties are possessed by many clays that do not exhibit detergent qualities, the only test of value lies in the capacity to absorb grease or clarify oil. Fuller's earth has a specific gravity of 1-7-2-4, and a shining streak; it is usually unctuous to the touch. Microscopically, it consists of minute irregular-shaped particles of a mineral that appears to be the result of a chloritic or talcose alteration of a felspar. The small size of most of the grains, less than -07 mm., makes their determination almost impossible. Chemical analysis shows that the peculiar properties of this earth are due to its physical rather than its chemical nature.

The following analyses of the weathered and unweathered con- dition of the earth from Nutfield, Surrey, represent the composition of one of the best known varieties: —

Yellow Earth (dried at 100° C).

Blue Earth (dried at ioo° C).

Insoluble residue Fe 2 3 .... A1 2 3 .... CaO .... MgO .... P 2 O s .... SO, ... NaCl .... K 2 . . . . HjO (combined) .

69-96 2-48 3-46 5-87 1-41 0-27 0-05 005 0-74

15-57

99-86

Insoluble residue —

Si0 2 . . .

62-81

Al 2 O s . . .

3-46

Fe 2 3 . . .

130

CaO . . .

i‘53

MgO . . .

0-86

69-96

Insoluble residue

■ 76-13

Insoluble residue —

Fe 2 3 . . .

2-41

Si0 2 . . .

59-37

A1 2 S ….

1-77

A1 2 3 . . .

10-05

CaO ….

• 4-3 1

Fe 2 3 .

3-86

MgO . . . P 2 6 ….

• 1-05

CaO …

1-86

0-14

MgO . . .

1-04

so 3 . . . .

0-07

NaCl ….

0-14

76-18

K 2 . . . .

. 0-84

H 2 (combined).

• 13-19

100-05

(Analysis by P. G. Sanford, Geol. Mag., 1889, 6, pp. 456, 526.)

Of other published analyses, not a few show a lower silica content (44 %> 5°)i along with a higher proportion of alumina (11, 23 %).

Fuller's earth may occur on any geological horizon ; at Nutfield in Surrey, England, it is in the Cretaceous formations; at Midford near Bath it is of Jurassic age; at Bala, North Wales, it occurs in Ordovician strata; in Saxony it appears to be the decomposition product of a diabasic rock. In America it is found in California in rocks ranging from Cretaceous to Pleistocene age; in S. Dakota, Custer county and elsewhere a yellow, gritty earth of Jurassic age is worked; in Florida and Georgia occurs a brittle, whitish earth of Oligocene age. Other deposits are worked in Arkansas, Texas, Colorado, Massachusetts and South Carolina.

Fuller's earth is either mined or dug in the open according to local circumstances. It is then dried in the sun or by artificial heat and transported in small lumps in sacks. In other cases it is ground to a fine powder after being dried; or it is first roughly ground and made into a slurry with water, which is allowed to carry off the finer from the coarser particles and deposit them in a creamy state in suitable tanks. After consolidation this fine material is dried artificially on

drying floors, broken into lumps, and packed for transport. The use of fuller's earth for cleansing wool and cloth has greatly decreased, but the demand for the material is as great or greater than it ever was. It is now used very largely in the filtration of mineral oils, and also for decolour- izing certain vegetable oils. It is employed in the formation of certain soaps and cleansing preparations.

The term " Fuller's Earth " has a special significance in geology, for it was applied by W. Smith in 1799 to certain clays in the neighbourhood of Bath, and the use of the expression is still retained by English geologists, either in this form or in the generalized " Fullonian." The Fullonian lies at the base of the Great Oolite or Bathonian series, but its palaeontological characters place it between that series and the underlying Inferior Oolite. The zonal fossils are Perisphinctes arbusligerus and Macrocephalus subcontractus with Ostrea acuminata, Khynchonella concinna and Goniomya angulifera. The formation is in part the equivalent of the " Vesulien " of J. Marcou (Vesoul in Haute-Saone). In Dorsetshire and Somersetshire, where it is best developed, it is represented by an Upper Fuller's Earth Clay, the Fuller's Earth Rock (an impersistent earthy limestone, usually fossiliferous), and the Lower Fuller's Earth Clay. Com- mercial fuller's earth has been obtained only from the Upper Clay. In eastern Gloucestershire and northern Oxfordshire the Fuller's Earth passes downwards without break into the Inferior Oolite; northward it dies out about Chipping Norton in Oxfordshire and passes laterally into the Stonesfield Slates series; in the midland counties it may perhaps be represented by the " Upper Estuarine Series." In parts of Dorsetshire the clays have been used for brickmaking and the limestone (rock) for local buildings.

See H. B. Woodward, "Jurassic Rocks of Great Britain," vol. iv. (1894), Mem. Geol. Survey (London). [J. A. H.]

FULLERTON, LADY GEORGIANA CHARLOTTE (1812-1885), English novelist and philanthropist, youngest daughter of the 1st Earl Granville, was born at Tixall Hall in Staffordshire on the 23rd of September 1812. In 1833 she married Alexander George Fullerton, then an Irish officer in the guards. After living in Paris for some eight years she and her husband accom- 1 panied Lord Granville to Cannes and thence to Rome. In 1843

her husband entered the Roman Catholic church, and in the following year Lady GeorgianaFullerton published her first novel, Ellen Middleton, which attracted W. E. Gladstone's attention in the English Review. In 1846 she entered the Roman Catholic church. The death of her only son in 1854 plunged her in grief, and she continued to wear mourning until the end of her life. In 1856 she became one of the third order of St Francis, and thenceforward devoted herself to charitable work. In conjunc- tion with Miss Taylor she founded the religious community known as " The Poor Servants of the Mother of God Incarnate," and she also took an active part in bringing to England the sisters of St Vincent of Paul. Her philanthropic work is described in Mrs Augustus Craven's work Lady Georgiana Fullerton, sa vie et ses auvres (Paris, 1888), which was translated into English by Henry James Coleridge. She died at Bournemouth on the 19th of January 1885. Among her other novels were Grantley Manor (1847), Lady Bird (1852), and Too Strange not to be True (1864).

FULMAR, from the Gaelic Fulmaire, the Fulmarus glacialis of modern ornithologists, one of the largest of the petrels (Procel- lariidae) of the northern hemisphere, being about the size of the common gull (Larus canus) and not unlike it in general coloration, except that its primaries are grey instead of black. This bird, which ranges over the North Atlantic, is seldom seen on the European side below lat. 53 N., but on the American side comes habitually to lat. 4S°oreven lower. In the Pacific it is represented by a scarcely separable form, F. glupischa. It has been commonly believed to have two breeding-places in the British Islands, namely, St Kilda and South Barra; but, according to Robert Gray {Birds of the West of Scotland, p. 490), it has abandoned the latter since 1844, though still breeding in Skye. Northward it established itself about 1838 on Myggenaes Holm, one of the Faeroes, while it has several stations off the coast of Iceland and Spitsbergen, as well as at Bear Island. Its range towards the pole seems to be only bounded by open water, and it is the con- stant attendant upon all who are employed in the whale and seal fisheries, showing the greatest boldness in approaching boats and ships, and feeding on the offal obtained from them. By British seamen it is commonly called the "molly mawk" 1 (corrupted fromAf allemuck) , and is extremely well known to them, its flight, as it skims over the waves, first with a few beats of the wings and then gliding for a long way, being very peculiar. It only visits the land to deposit its single white egg, which is laid on a rocky ledge, where a shallow nest is made in the turf and lined with a little dried grass. Many of its breeding-places are a most valuable property to those who live near them and take the eggs and young, which, from the nature of the locality, are only to be had at a

hazardous risk of life. In St Kilda a large number of the young are killed in one week of August, the only time when, by the custom of the community, they are allowed to be taken. These, after the oil is extracted from them, serve the islanders with food for the winter. The oil has been chemically analysed and found to be a fish-oil, and to possess nearly all the qualities of that obtained from the liver of the cod, with a lighter specific gravity. It, however, has an extremely strong scent, which is said by those who have visited St Kilda to pervade every thing and person on the island, and is certainly retained by an egg or skin of the bird for many years. Whenever a live example is seized in the hand it ejects a considerable quantity of this oil from its mouth.

FULMINIC ACID, HCNO or H 2 C 2 N 2 2 , an organic acid isomeric with cyanic and cyanuric acids; its salts, termed fulminates, are very explosive and are much employed as de- tonators. The free acid, which is obtained by treating the salts with acids, is an oily liquid smelling like prussic acid; it is very explosive, and the vapour is poisonous to about the same degree as that of prussic acid, The first fulminate prepared was the “fulminating silver “of L. G. Brugnatelli, who foundin 1798 that if silver be dissolved in nitric acid and the solution added to spirits of wine, a white, highly explosive powder was obtained. This substance is to be distinguished from the black ” fulminating

1 A name misapplied in the southern hemisphere to Diomedea melanophrys, one of the albatrosses.

silver” obtained by C. L. Berthollet in 1788 by acting with ammonia on precipitated silver oxide. The next salt to be obtained was the mercuric salt, which was prepared in 1799 by Edward Charles Howard, who substituted mercury for silver in Brugnatelli’s process. A similar method is that of J. von Liebig (1823), who heated a mixture of alcohol, nitric acid and mercuric nitrate; the salt is largely manufactured by processes closely resembling the last. A laboratory method is to mix solutions of sodium nitromethane, CH 2 : NO(ONa), and mercuric chloride, a yellow basic salt being formed at the same time. Mercuric fulminate is less explosive than the silver salt, and forms white needles (with jH 2 0) which are tolerably soluble in water. The use of mercuric fulminate as a detonator dates from about 1814, when the explosive cap was invented. It is still the commonest detonator, but it is now usually mixed with other substances; the British service uses for percussion caps 6 parts of fulminate, 6 of potassium chlorate and 4 of antimony sulphide, and for time fuses 4 parts of fulminate, 6 of potassium chlorate and 4 of antimony

sulphide, the mixture being damped with a shellac varnish; for use in blasting, a home office order of 1897 prescribes a mixture of 4 parts of fulminate and 1 of potassium chlorate. In 1900 Bielefeldt found that a fulminate placed on top of an aromatic nitro compound, such as trinitrotoluene, formed a useful detonator; this discovery has been especially taken advantage of in Germany, in which country detonators of this nature are being largely employed. Tetranitromethylaniline (tetryl) has also been employed (Brit. Pat. 13340 of 1905). It has been proposed to replace fulminate by silver azoimide (Wohler & Matter, Brit. Pat. 4468 of 1908), and by lead azoimide (Hyronimus, Brit. Pat. 1819 of 1908).

The constitution of fulminic acid has been investigated by many experimenters, but apparently without definitive results. The researches of Liebig (1823), Liebig and Gay-Lussac (1824), and of Liebig again in 1838 showed the acid to be isomeric with cyanic acid, and probably (HCNO)2, since it gave mixed and acid salts. Kekule, in 1858, concluded that it was nitroacetonitrile, Nˆ-CHˆCN, a view opposed by Steiner (1883), E. Divers and M. Kawakita (1884), R. Scholl (1890), and by J. U. Nef (1894), who proposed the formulae :

C:N-OH _ˆN:CH CH : N-O C . N . 0H

C : N-OH, Steiner,

˚C-OH, Divers,

CH : N-O,

Scholl,

Nef.

The formulae of Kekule, Divers and Armstrong have been discarded, and it remains to be shown whether Nef's carbonyloxime formula (or the bimolecular formula of Steiner) or Scholl's glyoxime peroxide formula is correct. There is some doubt as to the molecular formula of fulminic acid. The existence of double salts, and the observations of L. Wohler and K. Theodorovits (Ber., 1905, 38, p. 345), that only compounds containing two carbon atoms yielded fulminates, points to (HCNO) 2 ; on the other hand, Wohler (loc. cit. p. 1351) found that cryoscopic and electric conductivity measurements showed sodium fulminate to be NaCNO. Nef based his formula, which involves bivalent carbon, on many reactions; in particular, that silver fulminate with hydrochloric acid gave salts of formylchlorid- oxime, which with water gave hydroxylamine and formic acid, thus

C : NO OAgˆHC<ˆ, OAg HC<;5 >H -ˆ H -C0 2 H+H 2 N-OH,

and also on the production from sodium nitromethane and mer- curic chloride, thus CH 2 :NO-Ohg->H 2 0+C : NOhg (hg = £Hg). H. Wieland and F. C. Palazzo (1907) support this formula, finding that methyl nitrolic acid, N0 2 -CH : N-OH, yielded under certain con- ditions fulminic acid, and vice versa (Palazzo, 1907). M.Z.Jowitsch- itsch (Ann., 1906, 347, p. 233) inclines to Scholl's formula; he found that the synthetic silver salt of glyoxime peroxide resembled silver fulminate in yielding hydroxylamine with hydrochloric acid, but differed in being less explosive, and in being soluble in nitric acid. H. Wieland and his collaborators regard " glyoxime peroxide " as an oxide of furazane (q.v.), and have shown that a close relationship exists between the nitrile oxides, furoxane, and fulminic acid (see Ann. Rep., London Chem. Soc, 196*9, p. 84). Fulminuric acid, (HCNO)3, obtained by Liebig by boiling mercuric fulminate with water, was synthesized in 1905 by C. Ulpiani and L. Bernardini (Gazette, iii. 35, p. 7), who regard it as N0 2 -CH(CN)-CO-NH 2 . It deflagrates at 145°, and forms a characteristic cuprammonium salt.

The early history of mercuric fulminate and a critical account of its application as a detonator is given in The Rise and Progress of the British Explosives Industry (International Congress of Applied Chemistry, 1909). The manufacture and modern aspects are treated in Oscar Guttmann, The Manufacture of Explosives, and Manu- facture of Explosives, Twenty Years' Progress (1909).

3°°

FULTON, R.— FUMAROLE

FULTON, ROBERT (1765-1815), American engineer, was born in 1765 in Little Britain (now Fulton, Lancaster county), Pa. His parents were Irish, and so poor that they could afford him only a very scanty education. At an early age he was bound apprentice to a jeweller in Philadelphia, but subsequently adopted portrait and landscape painting as his profession. In his twenty-second year, with the object of studying with his countryman, Benjamin West, he went to England, and there became acquainted with the duke of Bridgewater, Earl Stanhope and James Watt. Partly by their influence he was led to devote his attention to engineering, especially in connexion with canal construction; he obtained an English patent in 1794 for super- seding canal locks by inclined planes, and in 1796 he published a Treatise on the Improvement of Canal Navigation. He then took up his residence in Paris, where he projected the first panorama ever exhibited in that

city, and constructed a submarine boat, the ” Nautilus,” which was tried in Brest harbour in 1801 before a commission appointed by Napoleon I., and by the aid of which he was enabled to blow up a small vessel with a torpedo. It was at, Paris also in 1803 that he first succeeded in propelling a boat by steam-power, thus realizing a design which he had conceived ten years previously. Returning to America he continued his experiments with submarine explosives, but failed to convince either the English, French or United States govern- ments of the adequacy of his methods. With steam navigation he had more success. In association with Robert R. Livingston (q.v.), who in 1798 had been granted the exclusive right to navigate the waters of New York state with steam-vessels, he constructed the ” Clermont,” which, engined by Boulton & Watt of Birmingham, began to ply on the Hudson between New York and Albany in 1807. The privilege obtained by Livingston in 1 798 was granted jointly to Fulton and Living- ston in 1803, and by an act passed in 1808 the monopoly was secured to them and their associates for a period depending on the number of steamers constructed, but limited to a maximum of thirty years. In 1814-1815, on behalf of the United States government, he constructed the ” Fulton,” a vessel of 38 tons with central paddle-wheels, which was the first steam warship. He died at New York on the 24th of February 181 5. Among Fulton’s inventions were machines for spinning flax, for making ropes, and for sawing and polishing marble.

See C. D. Colden, Life of Robert Fulton (New York, 1817) ; Robert H. Thurston, History of the Growth of the Steam-Engine (New York, 1878); George H. Preble, Chronological History of Steam. Navigation (Philadelphia, 1883) ; and Mrs A. C. Sutcliffe, Robert Fulton and the Clermont (New York, 1909).

FULTON, a city and the county-seat of Callaway county, Missouri, U.S.A., 25 m. N.E. of Jefferson City. Pop. (1890) 4314; (1900) 4883 (1167 negroes); (1910) 5228. It is served by the Chicago & Alton railway. The city has an important stock market and manufactures fire-brick and pottery. At Fulton are the Westminster College (Presbyterian, founded in 1853), the Synodical College for Young Women (Pres., founded in 1871), the William Woods College for Girls (Christian Church, 1890), and the Missouri school for the deaf (1851). Here, too, is a state hospital for the insane (1847), the first institution of the kind in Missouri. The place was laid out as a town in 1825 and named Volney, but in honour of Robert Fulton the present name was adopted a little later. Fulton was incorporated in 1859.

FULTON, a city of Oswego county, New York, U.S.A., on the right

bank of the Oswego river, about 10 m. S. by E. of Oswego. Pop. (1900) 5281; (1905, state census) 8847; (i9 10) 10,480. Fulton is served by the Delaware, Lackawanna & Western, the New York Central & Hudson River, and the New York, Ontario & Western railways, by electric railway to Oswego and Syracuse and by the Oswego Canal. The city has a Carnegie library. Ample water-power is furnished by the Oswego river, which here flows in a series of rapids, and the manufactures are many in kind. On the 3rd of July 1756, on an island (afterward called Battle Island) 4 m. N. of the present city of Fulton, a British force of about 300 under Captain John Bradstreet (1711-1774) defeated an attacking force of French and Indians (numbering

about 700) under De Villiers. Soon after this, Bradstreet built a fort within the present limits of Fulton. The first civilian settler came in 1793, and the first survey (which included only a part of the subsequent village) was made in 181 5. Fulton was incorporated as a village in 1835, and in April 1902 was combined with the village of Oswego Falls (pop. in 1900, 2925) and was chartered as a city.

FUM, or Funj Hwang, one of the four symbolical creatures which in Chinese mythology are believed to keep watch and ward over the Celestial Empire. It was begotten by fire, was born in the Hill of the Sun's Halo, and its body bears inscribed on it the five cardinal virtues. It has the breast of a goose, the hind- quarters of a stag, a snake's neck, a fish's tail, a fowl's forehead, a duck's down, the marks of a dragon, the back of a tortoise, the face of a swallow, the beak of a cock, is about six cubits high, and perches only on the woo-tung tree. The appearance of Fum heralds an age of universal virtue. Its figure is that which is embroidered on the dresses of some mandarins.

FUMARIC AND MALEIC ACIDS, two isomeric unsaturated acids of composition $C_4H_4O_4$. Fumaric acid is found in fumitory {Fumaria officinalis), in various fungi (Agaricus piperatus, &c), and in Iceland moss. It is obtained by heating malic acid alone to 150° C, or by heating it with hydrochloric acid (V. Dessaignes, Jahresb., 1856, p. 463) or with a large quantity of hydrobromic acids (A. Kekule, Ann., 1864, 130, p. 21). It may also be obtained by boiling monobromsuccinic acid with water; by the action of dichloracetic acid and water on silver malonate (T. Komnenos, Ann., 1883, 218, p. 169); by the cyanide synthesis from acetylene di-iodide; and by heating maleic acid to 210° C. (Z. Skraup, Monats. f. Chemie, 1891, 12, p. 112). It crystallizes in small prisms or needles, and is practically insoluble in cold water. It sublimes to some extent at about 200° C, being partially con- verted into maleic anhydride and water, the

reaction becoming practically quantitative if dehydrating agents be used. Reducing agents (zinc and caustic alkali, hydriodic acid, sodium amalgam, &c.) convert it into succinic acid. Bromine converts it into dibromsuccinic acid. Potassium permanganate oxidizes it to racemic acid (A. Kekule and R. Anschutz, Ber., 1881, 14, p. 713). By long-continued heating with caustic soda at ioo° C. it is converted into inactive malic acid.

Maleic acid is obtained by distilling malic or fumaric acids; by heating fumaric acid with acetyl chloride to 100° C; or by the hydrolysis of trichlorphenomalic acid (j3-trichloraceto- acrylic acid) [A. Kekule, Ann., 1884, 223, p. 185]. It crystallizes in monoclinic prisms, which are easily soluble in water, melt at 130° C, and boil at 160° C, decomposing into water and maleic anhydride. When heated with concentrated hydrobromic or hydriodic acids, it is converted into fumaric acid. It yields an anilide; oxidation converts it into mesotartaric acid. Maleic anhydride is obtained by distilling fumaric acid with phosphorus pentoxide. It forms triclinic crystals which melt at 6o° C. and boil at 196 C.

Both acids are readily esterified by the action of alkyl halides on their silver salts, and the maleic ester is readily transformed into the fumaric ester by warming with iodine, the same result being obtained by esterification of maleic acid in alcoholic solution by means of hydrochloric acid. Both acids yield acetylene by the electrolysis of aqueous solutions of their alkali salts, and on reduction both yield succinic acid, whilst by the addition of hydrobromic acid they both yield monobromsuccinic acid (R. Fittig,ˆlw«., 1877, I 88, p. 98). From these results it follows that the two acids are structurally identical, and the isomerism has consequently to be explained on other grounds. This was accomplished by W. Wislicenus [" Uber die raumliche Anordnung der Atome," &c, Trans, of the Saxon Acad, of Sciences (Math. Phys. Section), 1887, p. 14] by an extension of the van't Hoff hypothesis (see Stereo-Isomerism): The formulae of the acids are written thus :

HC-C0 2 H …. HC-C0 2 H _, . ˆ

HC-CO.H Malelcacid – HCO'C-H Fumancacd.

These account for maleic acid readily yielding an anhydride, whereas fumaric acid does not, and for the behaviour of the acids towards bromine, fumaric acid yielding ordinary dibromsuccinic acid, and maleic acid the isomeric isodibromsuccinic acid.

FUMAROLE, a vent from which volcanic vapours issue, named indirectly from the Lat. fumariolum, a smoke-hole.

The vapours from fumaroles were studied first by R. W. Bunsen, on his visit to Iceland, and afterwards by H. Sainte-Claire Deville and other chemists and geologists in France, who examined the vapours from Santorin, Etna, &c. The hottest vapours issue from dry fumaroles, at temperatures of at least 500 C, and consist chiefly of anhydrous chlorides, notably sodium chloride. The acid fumaroles yield vapours of lower temperature (300° to 400°) containing much water vapour, with hydrogen chloride and sulphur dioxide. The alkaline fumaroles are still cooler, though above ioo°, and evolve ammonium chloride with other vapours. Cold fumaroles, below 100°, discharge principally aqueous vapour, with carbon dioxide, and perhaps hydrogen sulphide. The fumaroles of Mont Pele in Martinique during the eruption of 1902 were examined by A. Lacroix, and the vapours analysed by H. Moissan, who found that they consisted chiefly of water vapour, with hydrogen chloride, sulphur, carbon dioxide, carbon monoxide, methane, hydrogen, nitrogen, oxygen and argon. These vapours issued at a temperature of about 400 . Armand Gautier has pointed out that these gases are practically of the same composition as those which he obtained on heating granite and certain other rocks. (See Volcano).

FUMIGATION (from Lat. fumigare, to smoke), the process of producing smoke or fumes, as by burning sulphur, frankin- cense, tobacco, &c, whether as a ceremony of incantation, or for perfuming a room, or for purposes of disinfection or destruc- tion of vermin. In medicine the term has been used of the ex- posure of the body, or a portion of it, to fumes such as those of nitre, sal-ammoniac, mercury, &c; fumigation, by the injection of tobacco smoke into the great bowel, was a recognized procedure in the 18th century for the resuscitation of the apparently drowned. ” Fumigated ” or ” fumed ” oak is oak which has been darkened by exposure to ammonia vapour.

FUMITORY, in botany, the popular name for the British species of Fumaria, a genus of small, branched, often climbing annual herbs with much-divided leaves and racemes of small flowers. The flowers are tubular with a spurred base, and in the British species are pink to purplish in colour. They are weeds of cultivation growing in fields and waste places. F. capreolata climbs by means of twisting petioles. In past times fumitory was in esteem for its reputed cholagogue and

other medicinal properties; and in England, boiled in water, milk or whey, it was used as a cosmetic. The root of the allied species {Corydalis cava or tuberosa) is known as radix aristolochia, and has been used medicinally for various cutaneous and other disorders, in doses of 10 to 30 grains. Some eleven alkaloids have been isolated from it. The herbage of Fumaria officinalis and F. racemosa is used in China under the name of Tsze-hwa-ti-ting as an applica- tion for glandular swellings, carbuncles and abscesses, and was formerly valued in jaundice, and in cases of accidental swallowing of the beard of grain (see F. Porter Smith, Contrib. towards the Mat. Medica . . . of China, p. 99, 187 1). The name fumitory, Latin fumus terrae, has been supposed to be derived from the fact that its juice irritates the eyes like smoke (see Fuchs, De historia stirpium, p. 338, 1542); but The Grete Herball, cap. clxix., 1529, fol., following the De simplici medicina of Platearius, fo. xciii. (see in Nicolai Praepositi dispensatorium ad aromatarios, 1536), says: “It is called Fumus terre fume or smoke of the erthe bycause it is engendred of a cours fumosyte rysynge frome the erthe in grete quantyte lyke smoke: this grosse or cours fumosyte of the erthe wyndeth and wryeth out: and by work- ynge of the ayre and sonne it turneth into this herbe. ”

FUNCHAL, the capital of the Portuguese archipelago of the Madeiras; on the south coast of Madeira, in 32° 37′ N. and 16 54′ W. Pop. (1900) 20,850. Funchal is the see of a bishop, in the archiepiscopal province of Lisbon; it is also the admini- strative centre of the archipelago, and the residence of the governor and foreign consuls. The city has an attractive appearance from the sea. Its whitewashed houses, in their gardens full of tropical plants, are built along the curving shore of Funchal Bay, and on the lower slopes of .an amphitheatre of mountains, which form a background 4000 ft. high. Numerous country houses (quintas), with terraced gardens, vineyards and

sugar-cane plantations occupy the surrounding heights. Three mountain streams traverse the city through deep channels, which in summer are dry, owing to the diversion of the water for irrigation. A small fort, on an isolated rock off shore, guards the entrance to the bay, and a larger and more powerfully armed fort crowns an eminence inland. The chief buildings include the cathedral, Anglican and Presbyterian churches, hospitals, opera-house, museum and casino. There are small public gardens and a meteorological observatory. In the steep and narrow streets, which are lighted by electricity, wheeled traffic is impossible; sledges drawn by oxen, and other primitive conveyances are used instead (see Madeira) . In winter the fine climate and scenery attract numerous invalids and other visitors, for whose accommodation there are good hotels; many foreigners

engaged in the coal and wine trades also reside here permanently. The majority of these belong to the British community, which was first established here in the 18th century. Funchal is the headquarters of Madeiran industry and commerce (see Madeira) . It has no docks and no facilities for landing passengers or goods; vessels are obliged to anchor in the roadstead, which, however, is sheltered from every wind except the south. Funchal is connected by cable with Carcavellos (for Lisbon), Porthcurnow (for Falmouth, England) and St Vincent in the Cape Verde Islands (for Pernambuco, Brazil).

FUNCTION, 1 in mathematics, a variable number the value of which depends upon the values of one or more other variable numbers. The theory of functions is conveniently divided into (I.) Functions of Real Variables, wherein real, and only real, numbers are involved, and (II.) Functions of Complex Variables, wherein complex or imaginary numbers are involved.

I. Functions of Real Variables 1. Historical. — The word function, defined in the above sense, was introduced by Leibnitz in a short note of date 1694 con- cerning the construction of what we now call an ” envelope ” (Leibnizens mathematische Schriften, edited by C. I. Gerhardt, Bd. v. p. 306), and was there used to denote a variable length related in a defined way to a variable point of a curve. In 1698 James Bernoulli used the word in a special sense in connexion with some isoperimetric problems (Joh. Bernoulli, Opera, t. i. p. 255). He said that when it is a question of selecting from an infinite set of like curves that one which best fulfils some function, then of two curves whose intersection determines the thing sought one is always the ” line of the function ” (Linea functionis) . In 17 18 John Bernoulli {Opera, t. ii. p. 241) defined a ” function of a variable magnitude ” as a quantity made up in any way of this variable magnitude and constants; and in 1730 {Opera, t. iii. p. 174) he noted a distinction between ” algebraic ” and ” tran- scendental ” functions. By the latter he meant integrals of algebraic functions. The notation/(#) for a function of a variable x was introduced by Leonhard Euler in 1734 {Comm. Acad. Petropol. t. vii. p. 186), in connexion with the theorem of the interchange of the order of differentiations. The notion of functionality or functional relation of two magnitudes was thus of geometrical origin; but a function soon came to be regarded as an analytical expression, not necessarily an algebraic expres- sion, containing the variable or variables. Thus we may have rational integral algebraic functions such as ax 2 + bx + c, or rational algebraic functions which are not integral, such as a i x n +a,x n ‘ x + . . . +a„ , b l x m b 2 x m -*...+bl n

or irrational algebraic functions, such as V x, or, more generally the algebraic functions that are determined implicitly by an algebraic equation, as, for instance, f» (x,y) +f„_i (x,y) + ... +/o = o

1 The word ” function ” (from Lat. fungi, to perform) has many uses, with the fundamental sense of an activity special or proper to an office, business or profession, or to an organ cf an animal 01 plant, the definite work for which the organ is an apparatus. From the use of the word, as in the Italian funzione, for a ceremony of the Roman Church, ” function ” is often employed for a public ceremony of any kind, and loosely of a social entertainment or gathering.

where f v (x,y), . . . mean homogeneous expressions in x and y having constant coefficients, and having the degrees indicated by the suffixes, and / is a constant. Or again we may have trigonometrical functions, such as sin x and tan **, or inverse trigonometrical functions, such as sin _1 x, or exponential functions, such as e x and a 1 , or logarithmic functions, such as log x and log (i+ˆ). We may have these functional symbols combined in various ways, and thus there arises a great number of functions. Further we may have functions of more than one variable, as, for instance, the expression xyftx** + y 2), in which both x and y are regarded as variable. Such functions were introduced into analysis somewhat unsystematically as the need for them arose, and the later developments of analysis led to the introduction of other classes of functions.

| 2. Graphic Representation. — In the case of a function of one variable x, any value of x and the corresponding value y of the function can be the co-ordinates of a point in a plane. To any value of * there corresponds a point JV on the axis of *, in accord- ance with the rule that x is the abscissa of N. The corresponding value of y determines a point P in accordance with the rule that x is the abscissa and y the ordinate of P. The ordinate y gives the value of the function which corresponds to that value of the variable * which is specified by N; and it may be described as ” the value of the function at N.” Since there is a one-to-one correspondence of the points N and the numbers x, we may also describe the ordinate as ” the value of the function at *.” In simple cases the aggregate of the points P which are determined by any particular function (of one variable) is a curve, called the ” graph of the function ” (see § 14). In like manner a function of two

variables defines a surface.

3. The Variable. — Graphic methods of representation, such as those just described, enabled mathematicians to deal with irrational values of functions and variables at the time when there was no theory of irrational numbers other than Euclid's theory of incommensurables. In that theory an irrational number was the ratio of two incommensurable geometric magnitudes. In the modern theory of number irrational numbers are defined in a purely arithmetical manner, independent of the measurement of any quantities or magnitudes, whether geometric or of any other kind. The definition is effected by means of the system of ordinal numbers (see Number). When this formal system is established, the theory of measurement may be founded upon it; and, in particular, the co-ordinates of a point are defined as numbers (not lengths), which are assigned in accordance with a rule. This rule involves the measurement of lengths. The theory of functions can be developed without any reference to graphs, or co-ordinates or lengths. The process by which analysis has been freed from any consideration of measurable quantities has been called the " arithmetization of analysis." In the theory so developed, the variable upon which a function depends is always to be regarded as a number, and the corresponding value of the function is also a number. Any reference to points or co- ordinates is to be regarded as a picturesque mode of expression, pointing to a possible application of the theory to geometry. The development of " arithmetized analysis " in the 19th century is associated with the name of Karl Weierstrass.

All possible values of a variable are numbers. In what follows we shall confine our attention to the case where the numbers are real. When complex numbers are introduced, instead of real ones, the theory of functions receives a wide extension, which is accompanied by appropriate limitations (see below, II. Functions of Complex Variables). The set of all real numbers forms a continuum. In fact the notion of a one- dimensional continuum first becomes precise in virtue of the establishment of the system of real numbers.

4. Domain of a Variable. — Theory of Aggregates. — The notion of a " variable " is that of a number to which we may assign at pleasure any one of the values that belong to some chosen set, or aggregate, of numbers; and this set, or aggregate, is called the " domain of the variable." This domain may be an " interval," that is to say it may consist of two terminal numbers, all the numbers between them and no others. When this is

the case the number is said to be " continuously variable." When the

domain consists of all real numbers, the variable is said to be ” unrestricted.” A domain which consists of all the real numbers which exceed some fixed number may be described as an “interval unlimited towards the right”; similarly we may have an interval ” unlimited towards the left.”

In more complicated cases we must have some rule or process for assigning the aggregate of numbers which constitute the domain of a variable. The methods of definition of particular types of aggre- gates, and the theorems relating to them, form a branch of analysis called the ” theory of aggregates” (Mengenlehre, Theorie.des ensembles, Theory of sets of points). The notion of an ” aggregate ” in general underlies the system of ordinal numbers. An aggregate is said to be ” infinite ” when it is possible to effect a one-to-one correspond- ence of all its elements to some of its elements. For example, we may make all the integers correspond to the even integers, by making I correspond to 2, 2 to 4, and generally n to 2w. The aggregate of positive integers is an infinite aggregate. The aggregates of all rational numbers and of all real numbers and of points on a line are other examples of infinite aggregates. An aggregate whose elements are real numbers is said to ” extend to infinite values ” if, after any number N, however great, is specified, it is possible to find in the aggregate numbers which exceed N in absolute value. Such an aggregate is always infinite. The ” neighbourhood of a number (or point) a for a positive number h ” is the aggregate of all numbers (or points) x for which the absolute value of x — a denoted by I x— a\, does not exceed h.

5. General Notion of Functionality.- — A function of one variable was for a long time commonly regarded as the ordinate of a curve; and the two notions (1) that which is determined by a curve supposed drawn, and (2) that which is determined by an analytical expression supposed written down, were not for a long time clearly distinguished. It was for this reason that Fourier’s discovery that a single analytical expression is capable of representing (in different parts of an interval) what would in his time have been called different functions so profoundly struck mathematicians (§ 23). The analysts who, in the middle of the 19th century, occupied themselves with the theory of the convergence of Fourier’s series were led to impose a restriction on the character of a function in order that it should admit of such representation, and thus the door was opened for the introduction of the general notion of functional dependence. This notion may be expressed as follows: We have a variable number, y, and another variable number, x, a domain of the variable x, and a rule for assigning one or more definite values to y when x is any point in the domain; then y- is said to be a ” function ” of the variable *, and x is

called the ” argument ” of the function. According to this notion a function is, as it were, an indefinitely extended table, like a table of logarithms; to each point in the domain of the argument there correspond values for the function, but it remains arbitrary what values the function is to have at any such point.

For the specification of any particular function two things are requisite: (1) a statement of the values of the variable, or of the aggregate of points, to which values of the function are to be made to correspond, i.e. of the “domain of the argument “; (2) a rule for assigning the value or values of the function that correspond to any point in this domain. We may refer to the second of these two essentials as ” the rule of calculation.” The relation of functions to analytical expressions may then be stated in the form that the rule of calculation is: ” Give the function the value of the expression at any point at which the expression has a determinate value,” or again more generally, ” Give the function the value of the expression at all points of a definite aggregate included in the domain of the argument.” The former of these is the rule of those among the earlier analysts who regarded an analytical expression and a function as the same thing, and their usage may be retained without causing confusion and with the advantage of brevity, the analytical expres- sion serving to specify the domain of the argument as well as the rule of calculation, e.g. we may speak of ” the function l/x.” This function is defined by the analytical expression ijx at all points except the point x = o. But in complicated cases separate state- ments of the domain of the argument and the rule of calculation cannot be dispensed with. In general, when the rule of calculation is determined as above by an analytical expression at any aggregate of points, the function is said to be ” represented ” by the expression at those points.

When the rule of calculation assigns a single definite value for a function at each point in the domain of the argument the function is ” uniform ” or ” one-valued.” In what follows it is to be under- stood that all the functions considered are one- valued, and the values

assigned by the rule of calculation real. In the most important cases the domain of the argument of a function of one variable is an interval, with the possible exception of isolated points.

6. Limits. — Let fix) be a function of a variable number x; and let a be

a point such that there are points of the domain of the argument x in the neighbourhood of a for any number h, however small. If there is a number L which has the property that, after any positive number e, however small, has been specified, it is possible to find a positive number h, so that I L —f(x) I < e for all points x of the domain (other than a) for which \x— a\

It is a fundamental theorem that, when this condition is satisfied, there exists a perfectly definite number L which is the limit of /(*) at the point a as defined above. The limit of f(x) at the point a is denoted by Lt x ~ a J{x), or by lim I=a /(x).

If fix) is a function of one variable x in a domain which extends to infinite values, and if, after e has been specified, it is possible to find a number N, so that | /(*') —fix) | < e for all values of x and x' which are in the domain and exceed N, then there is a number L which has the property that \f(x)—L\

The principle common to the above definitions and theorems is called, after P. du Bois Reymond, ” the general principle of con- vergence to a limit.”

It must be understood that the phrase ” x = ” does not mean that x takes some particular value which is infinite. There is no such value. The phrase always refers to a limiting process in which, as the process is carried out, the variable number x increases without limit; it may, as in the above example of a sequence, increase by taking successively the values of all the integral numbers; in other cases it may increase by taking the values that belong to any domain which ” extends to infinite values.”

A very important type of limits is furnished by infinite series. When a sequence of numbers ui, u 2 ,...u n , ... is given, we may form a new sequence si, Si, . . .s n , . . .from it by the rules si = ui, 5 2 = «i+«2, ... s„ = tti+W2+ ••• +u„, or by the equivalent rules Si = u, s„— ,s„_i — u n {n =2, 3,. . .). If the new sequence has a limit at » = », this limit is called the “sum of the infinite series” «i+«2+..-i and the series is said to be “convergent” (see Series).

A function which has not a limit at a point a may be such that, if a certain aggregate of points is chosen out of the domain of the argument, and the points x in the neighbourhood of a are restricted to belong to this aggregate, then the function has a limit at a. For example, sin(i/.v) has limit zero at o if x is restricted to the aggregate i/w, 1/2*-, . . . i/n-ir, ... or to the aggregate i/2tt, 2 1st, . . . n!_{n*--

i)ir, . . . , but if x takes all values in the neighbour- hood of o, sin (i/x) has not a limit at o. Again, there may be a limit at a if the points x in the neighbourhood of a are restricted by the condition that x— a is positive; then we have a “limit on the right ” at a; similarly we may have a ” limit on the left ” at a point. Any such limit is described as a ” limit for a restricted domain.” The limits on the left and on the right are denoted by fia — o) and/(a + o).

The limit L of f(x) at a stands in no necessary relation to the value of f(x) at a. If the point a is in the domain of the argument, the value of fix) at a is assigned by the rule of calculation, and may be different from L. In case /(a) = L the limit is said to be ” attained.” If the point a is not in the domain of the argument, there is no value for fix) at a. In the case where fix) is defined for all points in an interval containing a, except the point a, and has a limit L at a, we may arbitrarily annex the point a to the domain of the argument and assign to /(a) the value L; the function may then be said to be ” extrinsically defined.” The so-called ” indeterminate forms ” (see Infinitesimal Calculus) are examples.

7. Superior and Inferior Limits; Infinities. — The value of a function at every point in the domain of its argument is finite, since, by definition, the value can be assigned, but this does not necessarily imply that there is a number N which exceeds all the values (or is less than all the values). It may happen that, however great a number N we take, there are among the values of the function numbers which exceed N (or are less than-iV).

If a number can be found which is greater than every value of the function, then either (o) there is one value of the function

which exceeds all the others, or (jS) there is a number 5 which exceeds every value of the function but is such that, hovvever small a positive number e we take, there are values of the function which exceed S – e. In the case (a) the function has a greatest value; in case (/3) the function has a ” superior limit ” S, and then there must be a point a which has the property that there are points of the domain of the argument, in the neighbourhood of a for any h, at which the values of the function differ from S by less than e. Thus S is the limit of the function at a, either for the domain of the argument or for some more restricted domain. If a is in the domain of the argument, and if, after omission of a, there is a superior limit 5 which is in this way the limit of the function at a, if further /(a) = S, then S is the greatest value of the function: in this case the greatest value is a limit (at any rate for a restricted domain) which is attained; it may be called a ”

superior limit which is attained.” In like manner we may have a ” smallest value ” or an ” inferior limit,” and a smallest value may be an “inferior limit which is attained.”

All that has been said here may be adapted to the description of greatest values, superior limits, &c, of a function in a restricted domain contained in the domain of the argument. In particular, the domain of the argument may contain an interval; and therein the function may have a superior limit, or an inferior limit, which is attained. Such a limit is a maximum value or a minimum value of the function.

Again, if, after any number N, however great, has been specified, it is possible to find points of the domain of the argument at which the value of the function exceeds N, the values of the function are said to have an ” infinite superior limit,” and then there must be a point a which has the property that there are points of the domain, in the neighbourhood of a for any h, at which the value of the function exceeds N. If the point a is in the domain of the argument the function is said to ” tend to become infinite “at o; it has of course a finite value at a. If the point a is not in the domain of the argu ment the function is said to “become infinite” at a; it has of course no value at a. In like manner we may have a (negatively) infinite inferior limit. Again, after any number N, however great, has been specified and a number h found, so that all the values of the function, at points in the neighbourhood of a for h, exceed N in absolute value, all these values may have the same sign ; the function is then said to become, or to tend to become, determinately (positively or negatively) infinite ” ; otherwise it is said to become or to tend to become, ” indeterminately infinite.”

All the infinities that occur in the theory of functions are of the nature of variable finite numbers, with the single exception of the infinity of an infinite aggregate. The latter is described as an ” actual infinity,” the former as ” improper infinities.” There is no “actual infinitely small” corresponding to the actual infinity. The only ” infinitely small ” is zero. All ” infinite values ” are of the nature of superior and inferior limits which are not attained.

8. Increasing and Decreasing Functions. — A function /(x) of one variable x, defined in the interval between a and b, is ” increasing throughout the interval ” if, whenever x and %’ are two numbers in the interval and x’>x, then fix’) > /() **; the function “never decreases throughout the interval ” if, x’ and x being as before, fix’)** >/(). Similarly for decreasing functions, and for functions which never increase throughout an interval. A function which either never increases or never diminishes throughout an interval is said to be ” monotonous throughout ” the interval. If we take in the above definition b >a, the definition may apply to a function under the restriction that x’ is not b and x is not a; such a function is ” monotonous within ” the interval. In this case we have the theorem that the function (if it never decreases) has a limit on the left at b and a limit on the right at a, and these are the superior and inferior limits of its values at all points within the interval (the ends excluded) ; the like holds mutatis mutandis if the function never increases. If the function is monotonous throughout the interval, fib) is the greatest (or least) value of fix) in the interval; and if fib) is the limit of /(*) on the left at b, such a greatest (or least) value is an example of a superior (or inferior) limit which is attained. In these cases the function tends continually to its limit.

These theorems and definitions can be extended, with obvious modifications, to the cases of a domain which is not an interval, or extends to infinite values. By means of them we arrive at sufficient, but not necessary, criteria for the existence of a limit; and these are frequently easier to apply than the general principle of conver- gence to a limit (§ 6), of which principle they are particular cases. For example, the function represented by x log (1/*) continually

diminishes when i/e>x>o and x diminishes towards zero, and it never becomes negative. It therefore has a limit on the right at x = o.

This limit is zero. The function represented by x sin (i/x) does not continually diminish towards zero as * diminishes towards zero, but is sometimes greater than zero and sometimes less than zero in any neighbourhood of x = o, however small. Nevertheless, the function has the limit zero at x =o.

9. Continuity of Functions. — A function f(x) of one variable x is said to be continuous at a point a if (1) f(x) is defined in an interval containing a; (2) f(x) has a limit at a; (3) f(a) is equal to this limit. The limit in question must be a limit for continuous variation, not for a restricted domain. If f(x) has a limit on the left at a and /(a) is equal to this limit, the function may be said to be ” continuous to the left ” at a; similarly the function may be ” continuous to the right ” at a.

A function is said to be ” continuous throughout an interval ” when it is continuous at every point of the interval. This implies continuity to the right at the smaller end-value and continuity to the left at the greater end- value. When these conditions at the ends are not satisfied the function is said to be continuous ” within ” the interval. By a ” continuous function ” of one variable we always mean a function which is continuous through- out an interval.

The principal properties of a continuous function are:

1. The function is practically constant throughout sufficiently small intervals. This means that, after any point a of the interval has been chosen, and any positive number e, however small, has been specified, it is possible to find a number h, so that the difference between any two values of the function in the interval between a — h and a+h is less than e. There is an obvious modification if a is an end-point of the interval.

2. The continuity of the function is ” uniform.” This means that the number h which corresponds to any e as in (1) may be the same at all points of the interval, or, in other words, that the numbers h which correspond to e for different values of a have a positive inferior limit.

3. The function has a greatest value and a least value in the interval, and these are superior and inferior limits which are attained.

4. There is at least one point of the interval at which the function takes any value between its greatest and least values in the interval.

5. If the interval is unlimited towards the right (or towards the left), the function has a limit at 00 (or at — »).

10. Discontinuity of Functions. — The discontinuities of a function of one variable, defined in an interval with the possible exception of isolated points, may be classified as follows:

(1) The function may become infinite, or tend to become infinite, at a point.

(2) The function may be undefined at a point.

(3) The function may have a limit on the left and a limit on the right at the same point; these may be different from each other, and at least one of them must be different from the value of the function at the point.

(4) The function may have no limit at a point, or no limit on the left, or no limit on the right, at a point.

In case a function /(x), defined as above, has no limit at a point a, there are four limiting values which come into consideration. Whatever positive number h we take, the values of the function at points between a and a--h (a excluded) have a superior limit (or a greatest value), and an inferior limit (or a least value) ; further, as h decreases, the former never increases and the latter never decreases ; accordingly each of them tends to a limit. We have in this way two limits on the right — the inferior limit of the superior limits in diminishing neighbourhoods, and the superior limit of the infer ior lim its in diminishing neighbourhoods. These are denoted by /(a-|-o) and /(q-t-o) , and they are called the ” limits of ind efiniten ess ” on the right. Similar limits on the left are denoted by /(a — o) and /(a — o) . Unless /(x) becomes, or tends to become, infinite at a, all these must exist, any two of them may be equal, and at least one of them must be different from /(a), if /(a) exists. If the first two are equal there is a limit on the right denoted by /(a + o) ; if the second two are equal, there is a limit on the left denoted by /(a — o). In case the function becomes, or tends to become, infinite at a, one or more of these limits is infinite in the sense explained in § 7; and now it is to be noted that, e.g. the superior limit of the inferior limits in diminishing neighbourhoods on the right of o may be negatively infinite; this happens if, after any number N, however great, has been specified, it is possible to find a positive number h, so that all the values of the function in the interval between a and a--h (a excluded) are less than — N; in such a case f(x) tends to become negatively infinite when x decreases towards o; other modes of tending to infinite limits may be described in similar terms.

11. Oscillation of Functions. — The d ifferen ce betwee n the greatest and least of the numbers f(a), /(a+o), /(a+o),/(a-o), f(a-o), when they are all finite, is called the ” oscillation ” or ” fluctuation ” of the function/ˆ) at the point a. This difference is the limit for h = o of the difference between the superior and inferior limits of the values of the function at points in the interval between a-h and a--h. The corresponding difference for points in a finite interval is called the ” oscillation of the function in the interval.” When any of the four limits of indefiniteness is infinite the oscillation is infinite in the sense explained in § 7.

For the further classification of functions we divide the domain of the argument into partial intervals by. means of points between the end-points. Suppose that the domain is the interval between a and b. Let intermediate points xi, x 2 . . . xˆ-i, be taken so that b>x n -i>x n -2 ■ . >Xi>a. We may devise a rule by which, as n increases indefinitely, all the differences b — *«_i, x„_i — x„_ 2 , . • . #1 — a tend to zero as a limit. The interval is then said to be divided into ” indefinitely small partial intervals.”

A function defined in an interval with the possible exception of isolated points may be such that the interval can be divided into a set of finite partial intervals within each of which the function is monotonous (§ 8). When this is the case the sum of the oscillations of the function in those partial intervals is finite, provided the function does not tend to become infinite. Further, in such a case the sum of the oscillations will remain below a fixed number for any mode of dividing the interval into indefinitely small partial intervals. A class of functions may be defined by the condition that the sum of the oscillations has this property, and such functions are said to have ” restricted oscillation.” Sometimes the phrase ” limited fluctuation ” is used. It can be proved that any function with restricted oscillation is capable of being expressed as the sum of two monotonous functions, of which one never increases and the other never diminishes throughout the interval. Such a function has a limit on the right and a limit on the left at every point of the interval. This class of functions includes all those which have a finite number of maxima and minima in a finite-interval, and some which have an infinite number. It is to be noted that the class does not include all continuous functions.

12. Differentiable Function. — The idea of the differentiation of a continuous function is that of a process for measuring the rate of growth; the increment of the function is compared with the increment of the variable. If f{x) is defined in an interval containing the point a, and a-k and a+k are points of the interval, the expression

f(a+h)-f(a) (1)

h represents a function of h, which we may call (h), defined at all points of an interval for h between -k and k except the point o. Thus the four limits <£(+o), < />(+o), (— o) exist, and two or more of them may be equal. When the first two are equal either of them is the ” progressive differential coefficient ” of f(x) at the point a; when the last two are equal either of them is the ” regressive differential coefficient ” of f(x) at a; when all four are equal the function is said to be ” differentiable ” at a, and either of them is the ” differential coefficient ” of f(x) at a, or the ” first derived function ” of f(x) at a. It is denoted by

—; — orby/’(x). In this case 4>{h) has a definite limit at h = o,

or is determinately infinite at h = o (§ 7) . The four limits here in question are called, after Dini, the ” four derivates ” of f(x) at a. In accordance with the notation for derived functions they may be denoted by

A function which has a finite differential coefficient at all points of an interval is continuous throughout the interval, but if the differential coefficient becomes infinite at a point of the interval the function may or may not be continuous throughout the interval ; on the other hand a function may be continuous without being differentiable. This result, comparable in importance, from the point of view of the general theory of functions, with the discovery of Fourier’s theorem, is due to G. F. B. Riemann; but the failure of an attempt made by Ampere to prove that every continuous function must be differentiable may be regarded as the first step in the theory. Examples of analytical expressions which represent continuous functions that are not differentiable have been given by Riemann, Weierstrass, Darboux and Dini (see § 24). _ The most important theorem in regard to differentiable functions is the ” theorem of intermediatevalue.” (See Infinitesimal Calculus.)

FUNCTION

305

13. Analytic Function. — If /(x) and its first n differential coefficients, denoted by /’(), /”(), • • •/(“) (*), are continuous in the interval between a and a+k, then

/(<*+*) =/(o) +hf{a) +jj"{a) + ...

where R n may have various forms, some of which are given in the article Infinitesimal Calculus. This result is known as ” Taylor’s theorem.”

When Talyor’s theorem leads to a representation of the function by means of an infinite series, the function is said to be “analytic” (cf. § 21).

14. Ordinary Function. — The idea of a curve representing a continuous function in an interval is that of a line which has the following properties: (1) the co-ordinates of a point of the curve are a value * of the argument and the corresponding value y of the function; (2) at every point the curve has a definite tangent;

(3) the interval can be divided into a finite number of partial intervals within each of which the function is monotonous;

(4) the property of monotony within partial intervals is retained after interchange of the axes of co-ordinates x and y. According to condition (2) y is a continuous and differentiable function of x, but this condition does not include conditions (3) and (4) : there are continuous partially monotonous functions which are not differentiable, there are continuous differentiable functions which are not monotonous in any interval however small; and there are continuous, differentiable and monotonous functions which do not satisfy condition (4) (cf. § 24). A function which can be represented by a curve, in the sense explained above, is said to be ” ordinary,” and the curve is the graph of the function (§2). All analytic functions are ordinary, but not all ordinary functions are analytic.

15. Integrable Function. — The idea of integration is twofold. We may seek the function which has a given function as its differential coefficient, or we may generalize the question of finding the area of a curve. The first inquiry leads directly to the indefinite integral, the second directly to the definite integral. Following the second method we define ” the definite integral of the function f{x) through the interval between a and b ” to be the limit of the sum

»

2/(x’ r)(Xr~ Xr-l)

1

when the interval is divided into ultimately indefinitely small partial intervals by points Xi, x 2 , . . . x„_i. Here x’ r denotes any point in the

rth partial interval, x is put for a, and x n for b. It can be shown that the limit in question is finite and inde- pendent of the mode of division into partial intervals, and of the choice of the points such as x'„ provided (1) the function is defined for all points of the interval, and does not tend to become infinite at any of them; (2) for any one mode of division of the interval into ultimately indefinitely small partial intervals, the sum of the products of the oscillation of the function in each partial interval and the difference of the end-values of that partial interval has limit zero when n is increased indefinitely. When these conditions are satisfied the function is said to be " integrable " in the interval. The numbers a and b which limit the interval are usually called the " lower and upper limits." We shall call them the " nearer and further end-values." The above definition of integration was introduced by Riemann in his memoir on trigonometric series (1854). A still more general definition has been given by Lebesgue. As the more general definition cannot be made intelligible without the introduction of some rather recondite notions belonging to the theory of aggregates, we shall, in what follows, adhere to Riemann's definition.

We have the following theorems: —

1. Any continuous function is integrable.

2. Any function with restricted oscillation is integrable.

3. A discontinuous function is integrable if it does not tend to become infinite, and if the points at which the oscillation of the function exceeds a given number a, however small, can be enclosed

in partial intervals the sum of whose breadths can be diminished indefinitely.

These partial intervals must be a set chosen out of some complete set obtained by the process used in the definition of integration.

4. The sum or product of two integrable functions is integrable.

As regards integrable functions we have the following theorems :

1. If 5 and / are the superior and inferior limits (or greatest and

n> least values) of f(x) in the interval between a and b, I f(x)dx is

intermediate between S(b — a) and I(b — a).

2. The integral is a continuous function of each of the end-values.

3. If the further end- value b is variable, and if J f(x)dx = F(x),

then if f{x) is continuous at b, F{x) is differentiable at b, and F'(b) = f(b).

4. In case f(x) is continuous throughout the interval F{x) is continuous and differentiable throughout the interval, and F'(x) = f(x) throughout the interval.

5. In case/'(x) is continuous throughout the interval between a and b,

fj'(x)dx = f(b)-f(a).

6. In case/(x) is discontinuous at one or more points of the interval between a and b, in which it is integrable,

I"

f{x)dx

is a function of x, of which the four derivates at any point of the interval are equal to the limits of indefiniteness of f(x) at the point. 7. It may be that there exist functions which are differentiable throughout an interval in which their differential coefficients are not integrable; if, however, F(x) is a function whose differential coefficient, F'(x), is integrable in an interval, then

F{x) = j / ? '(x)Jx + const.,

where a is a fixed point, and x a variable point, of the interval. Similarly, if any one of the four derivates of a function is integrable in an interval, all are integrable, and the integral of either differs from the original function by a constant only.

The theorems (4), (6), (7) show that there is some discrepancy between the indefinite integral considered as the function which has a given function as its differential coefficient, and as a definite integral with a variable end-value.

We have also two theorems concerning the integral of the product of two integrable functions /(x) and cj > (x); these are known as " the first and second theorems of the mean." The first theorem of the mean is that, if <) > {x) is one-signed throughout the interval between a and b, there is a number M intermediate between the superior and

inferior limits, or greatest and least values, of f{x) in the interval, which has the property expressed by the equation

M((x)dx = Cf(x)

The second theorem of the mean is that, if f(x) is monotonous throughout the interval, there is a number £ between a and b which has the property expressed by the equation

£f(x)$(x)dx = f(a)ˆ(x)dx + f(b)fˆ

(See Fourier's Series.)

16. Improper Definite Integrals. — We may extend the idea of integration to cases of functions which are not defined at some point, or which tend to become infinite in the neighbourhood of some point, and to cases where the domain of the argument extends to infinite values. If c is a point in the interval between a and b at which f(x) is not defined, we impose a restriction on the points x' r of the definition: none of them is to be the point c.

This comes to the same thing as defining J j(x)dx to be

Lt j 'f(x)dx + Lt\ ,f(x)dx,

(I)

where, to fix ideas, b is taken > a, and e and e are positive. The same definition applies to the case where /(x) becomes infinite, or tends to become infinite, at c, provided both the limits exist. This definition may be otherwise expressed by saying that a partial interval containing the point c is omitted from the interval of integration, and a limit taken by diminishing the breadth of this partial interval indefinitely; in this form it applies to the cases where c is a or b.

Again, when the interval of integration is unlimited to the right, or extends to positively infinite values, we have as a definition

C f(x)dx = Lt f h f(x)dx,

provided this limit exists. Similar definitions apply to I f(.x)dx, and to | f{x)dx.

All such definite integrals as the above are said to be ” improper.”

/’ “‘sin x ——dx is improper in two ways. It means o *

Lt Lt f^LUx,

in which the positive number e is first diminished indefinitely, and the positive number h is afterwards increased indefinitely.

The ” theorems of the mean ” (§ 1 5) require modification when the integrals are improper (see Fourier’s Series).

When the improper definite integral of a function which becomes, or tends to become, infinite, exists, the integral is said to be ” convergent.” If /(*) tends to become infinite at a point c in the interval between a and b, and the expression (1) does not exist, then the expression \f(x)dx, which has no value, is called a ” divergent integral,” and it may happen that there is a definite value for

Lt j jpf(x)dx+ £ +(>f(x)dx j

provided that e and e are connected by some definite relation, and both, remaining positive, tend to limit zero. The value of the above limit is then called a ” principal value ” of the divergent integral. Cauchy’s principal value is obtained by making k—e, i.e. by taking the omitted interval so that the infinity is at its middle point. A divergent integral which has one or more principal values is sometimes described as ” semi-convergent.”

17. Domain of a Set of Variables. — The numerical continuum of n dimensions (C„) is the aggregate that is arrived at by attribut- ing simultaneous values to each of » variables xi, x 2 , . . . x n , these values being any real numbers. The elements of such an aggregate are called ” points,” and the numbers x\, x 2 , . . . x n the ” co-ordinates ” of a point. Denoting in general the points (xi, x 2 , . . . Xn) and (x\, x’ 2 . . . x’ n) by x and x’, the sum of the differences | x x — x\ | + \x 2 — x’ 2 \ + . . ■ + I x n —x’ n | may be denoted by \x— x’\ and called the “difference of the two points.” We can in various ways choose out of the continuum an aggregate of points, which may be an infinite aggregate, and any such aggregate can be the ” domain ” of a ” variable point.” The domain is said to ” extend to an infinite distance ” if, after any number N, however great, has been specified, it is possible to find in the domain points of which one or more co-ordinates exceed N in absolute value. The ” neighbourhood ” of a point a for a (positive) number h is the aggregate constituted of all the points *, which are such that the ” difference ” denoted by \x — a\

The definition of a continuum in C„ leaves open the question of the number of dimensions of the continuum, and a further explana- tion is necessary in order to define arithmetically what is meant by a ” homogeneous part ” H n of C„. Such a part would correspond to an interval in C\, or to an area bounded by a simple closed contour- in Ct \ and, besides being perfect and connected, it would have the following properties: (1) There are points of C„, which are not points of H n ; these form a complementary aggregate H’ n . (2) There are points ” within ” H n ; this means that for any such point there is a neighbourhood consisting exclusively of points of H n . (3) The points of H n which do not lie ” within ” H„ are limiting points of H’ n ; they are not points of H’ n , but the neighbourhood of any such point for any number h, however small, contains points within TI n and points of //’„: the aggregate of these points is called the

“.boundary ” of H n – (4) When any two points a, b within H n are taken, it is possible to find a number e and a corresponding number m, and to choose points x’, x”, . . . x(m >, so that the neighbourhood of a for e contains x’, and consists exclusively of points within H n , and similarly for x’ and x”, x” and x”’, . . .x 1 ” 1 ‘ and b. Condition (3) would exclude such an aggregate as that of the points within and upon two circles external to each other and a line joining a point on one to a point on the other, and condition (4) would exclude such an aggregate as that of the points within and upon two circles which touch externally.

18. Functions of Several Variables. — A function of several variables differs from a function of one variable in that the argument of the function consists of a set of variables, or is a variable point in a C„ when there are n variables. The function is definable by means of the domain of the argument and the rule of calculation. In the most important cases the domain of the argument is a homogeneous part H n of C„ with the possible exception of isolated points, and the rule of calculation is that the value of the function in any assigned part of the domain of the argument is that value which is assumed at the point by an assigned analytical expression. The limit of a function at a point a is defined in the same way as in the case of a function of one variable.

We take a positive fraction e and consider the neighbourhood of a for h, and from this neighbourhood we exclude the point a, and we also exclude any point which is not in the domain of the argument. Then we take x and x’ to be any two of the retained points in the neighbourhood. The function/ has a limit at a if for any positive c, however small, there is a corresponding h which has the property that I f{x’) —f{x) 1 < e, whatever points x, x' in the neighbourhood of a

for h we take (a excluded). For example, when there are two variables Xi, x 2 , and both are unrestricted, the domain of the argu- ment is represented by a plane, and the values of the function are correlated with the points of the plane. The function has a limit at a point a, if we can mark out on the plane a region containing the point a within it, and such that the difference of the values of the function which correspond to any two points of the region (neither of the points being a) can be made as small as we please in absolute value by contracting all the linear dimensions of the region sufficiently. When the domain of the argument of a function of n variables extends to an infinite distance, there is a " limit at an infinite distance " if, after any number c, however small, has been specified, a number N can be found which is such that \}{x') —fix) \

19. Differentiation and Integration. — The definition of partial differentiation of a function of several variables presents no difficulty. The most important theorems concerning differ- entiable functions are the ” theorem of the total differential,” the theorem of the interchangeability of the order of partial differentiations, and the extension of Taylor’s theorem (see Infinitesimal Calculus).

With a view to the establishment of the notion of integration through a domain, we must define the ” extent ” of the domain. Take first a domain consisting of the point a and all the points x for which \x-a\< %h, where h is a chosen positive number; the extent of this domain is h n ,n being the number of variables; such a domain may be described as " square," and the number h may be called its " breadth "; it is a homogeneous part of the

numerical continuum of n dimensions, and its boundary consists of all the points for which \x— a\ — \h. Now the points of any domain, which does not extend to an infinite distance, may be assigned to a finite number m of square domains of finite breadths, so that every point of the domain is either within one of these square domains or on its boundary, and so that no point is within two of the square domains; also we may devise a rule by which, as the number m increases indefinitely, the breadths of all the square domains are diminished indefinitely. When this process is applied to a homogeneous part, H, of the numerical continuum C„, then, at any stage of the process, there will be some square domains of which all the points belong to H, and there will generally be others of which

some, but not all, of the points belong to H. As the number m is increased indefinitely the sums of the extents of both these categories of square domains will tend to definite limits, which cannot be negative; when the second of these limits is zero the domain H is said to be ” measurable,” and the first of these limits is its ” extent “; it is independent of the rule adopted for constructing the square* domains and contracting their breadths. The notion thus intro- duced may be adapted by suitable modifications to continua of lower dimensions in C n .

The integral of a function /(*) through a measurable domain H, which is a homogeneous part of the numerical continuum of n dimensions, is defined in just the same way as the integral through an interval, the extent of a square domain taking the place of the difference of the end-values of a partial interval ; and the condition of integrability takes the same form as in the simple case. In par- ticular, the condition is satisfied when the function is continuous throughout the domain. The definition of an integral through a domain may be adapted to any domain of measurable extent. The extensions to “improper” definite integrals may be made in the same way as for a function of one variable; in the particular case of a function which tends to become infinite at a point in the domain of integration, the point is enclosed in a partial domain which is omitted from the integration, and a limit is taken when the extent of the omitted partial domain is diminished indefinitely; a divergent integral may have different (principal) values for different modes of contracting the extent of the omitted partial domain. In applica- tions to mathematical physics great importance attaches to con- vergent integrals and to principal values of divergent integrals. For example, any component of magnetic force at a point within a magnet, and the corresponding component of magnetic induction at the same point are expressed by different principal values of the same divergent integral. Delicate questions arise as to the possibility of representing the integral of a function of n variables through a domain H„, as a repeated integral, of evaluating it by successive integrations with respect to the variables one at a time and of inter- changing the order of such integrations. These questions have been discussed very completely by C. Jordan, and we may quote the result that all the transformations in question are valid when the function is continuous throughout the domain.

20. Representation of Functions in General. — We have seen that the notion of a function is wider than the notion of an analytical expression, and that the same function may be ” represented ” by one expression in one part of the domain of the argument and by some other expression in another part of the domain (§5). Thus there arises

the general problem of the representation of functions. The function may be given by specifying the domain of the argument and the rule of calcula- tion, or else the function may have to be determined in accord- ance with certain conditions; for example, it may have to satisfy in a prescribed domain an assigned differential equation. In either case the problem is to determine, when possible, a single analytical expression which shall have the same value as the function at all points in the domain of the argument. For the representation of most functions for which the problem can be solved recourse must be had to limiting processes. Thus we may utilize infinite series, or infinite products, or definite in- tegrals; or again we may represent a function of one variable as the limit of an expression containing two variables in a domain in which one variable remains constant and another varies. An example of this process is afforded by the expression Lt v -<» xyl{x % y+i), which represents a function of * vanishing at x = o and at all other values of * having the value of i/x. The method of series falls under this more general process (cf. § 6). When the terms «i, «j, ... of a series are functions of a variable

x, the sum s n of the first n terms of the series is a function of x and n; and, when the series is convergent, its sum, which is Lt n = oos„, can represent a function of x. In most cases the series converges for some values of x and not for others, and the values for which it converges form the ” domain of convergence.” The sum of the series represents a function in this domain.

The apparently more general method of representation of a function of one variable as the limit of a function of two variables has been shown by R. Baire to be identical in scope with the method of series, and it has been developed by him so as to give a very complete account of the possibility of representing functions by analytical expressions. For example, he has shown that Riemann’s totally discontinuous function, which is equal to I when x is rational and to o when x is irrational, can be represented by an analytical expression. An infinite process of a different kind has been adapted to the problem of the representation of a continuous function by T. Broden. He begins with a function having a graph in the form of a regular polygon, and interpolates additional angular points in an ordered sequence without limit. The representation of a function by means of an infinite product falls clearly under Baire’s method, while the representation by means of a definite integral is analogous to Broden’s method. As an example of these two latter processes we may cite the Gamma function [r(jc)] defined for positive values of x by the definite integral

JT e-‘F-Ht, or by the infinite product

Ltn,

n*/x(i+x)(i+ix) .. (1 +-§_).

The second of these expressions avails for the representation of the function at all points at which x is not a negative integer.

21. Power Series. — Taylor's theorem leads in certain cases to a representation of a function by an infinite series. We have under certain conditions (§ 13)

/(*) -/(a) +S~ '&=£i>>(a) +R„ ;

and this becomes J

/(*)=/(a)+sJ*rf£ft'>fa),

provided that (a) a positive number k can be found so that at all points in the interval between a and a-k (except these points) f(x) has continuous differential coefficients of all finite orders, and at a has progressive differential coefficients of all finite orders; (fi) Cauchy's form of the remainder R n , viz.

(^j"(i-0) n – 1 ./ u, |a+0(s-a)}, has the limit zero when n in- creases indefinitely, for all values of 6 between o and 1, and for all values of * in the interval between a and a+k, except possibly a+k. When these conditions are satisfied, the series (1) repre- sents the function at all points of the interval between a and a+k, except possibly a+k, and the function is " analytic " (§ 13) in this domain. Obvious modifications admit of extension to an interval between a and a— k, or between a — k and a+k. When a series of the form (1) represents a function it is called " the Taylor's series for the function."

Taylor's series is a power series, i.e. a series of the form 2 a n (x — a)".

n—

As regards power series we have the following theorems :

1. If the power series converges at any point except a there is a number k which has the property that the series converges absolutely in the interval between a — k and a+k, with the possible exception of one or both end-points.

2. The power series represents a continuous function in its domain of

convergence (the end-points may have to be excluded).

3. This function is analytic in the domain, and the power series representing it is the Taylor's series for the function.

The theory of power series has been developed chiefly from the point of view of the theory of functions of complex variables.

22. Uniform Convergence. — We shall suppose that the domain of convergence of an infinite series of functions is an interval with the possible exception of isolated points. Let f(x) be the s.um of the series at any point x of the domain, and f„(x) the sum of the first n+i terms. The condition of convergence at a point a is that, after any positive number e, however small, has been specified, it must be possible to find a number n so that \fm{a)— f p (a)\

» = °° . The convergence is said to be " uniform " in an interval if, after specification of «, the same number n suffices at all points of the interval to make \f(x)-f m (x) | < e for all values of m which exceed n. The numbers n corresponding to any e, however small, are all finite, but, when e is less than some fixed finite number, they may have an infinite superior limit (§7); when this is the case there must be at least one point, a, of the interval which has the property that, whatever number N we take, e can be taken so small that, at some point in the neigh- bourhood of a, n must be taken > N to make \f{x) —f m (x) \ < e when m>n; then the series does not converge uniformly in the neighbourhood of a. The distinction may be otherwise expressed thus : Choose a first and e afterwards, then the number n is finite; choose « first and allow a to vary, then the number n becomes a function of a, which may tend to become infinite, or may remain belcw a fixed number; if such a fixed number exists, however small e may be, the convergence is uniform.

For example, the series sin x — f sin 2x--\ sin 3X — . . .is conver- gent for all real values of x, and, when 7r>x> — tt its sum is J x; but, when x is but a little less than t, the number of terms which must be taken in order to bring the sum at all near to the value of \x is very large, and this number tends to increase indefinitely as x approaches ir. This series does not converge uniformly in the neighbourhood of x=ir. Another example is afforded by the series

* TIX (tt~\~T. y)x

„=o n*x> + i ~~ (n + i) 2 × 2 + i ‘ ofwh A cn the remainder after n terms

is nx/(n 2 × 2 + i)-. If we- put x = i/ra, for any value of n, however great, the remainder is i; and the number of terms required to be taken to make the remainder tend to zero depends upon the value of x when x is near to zero — it must, in fact, be large compared with I /x. The series does not converge uniformly in the neighbourhood of x = o.

As regards series whose terms represent continuous functions we have the following theorems:

(1) If the series converges uniformly in an interval it represents a function which is continuous throughout the interval.

(2) If the series represents a function which is discontinuous in an interval it cannot converge uniformly in the interval.

(3) A series which does not converge uniformly in an interval may nevertheless represent a function which is continuous throughout the interval.

(4) A power series converges uniformly in any interval con- tained within its domain of convergence, the end-points being excluded.

(5) If 2 f r (x)=f(x) converges uniformly in the interval

r=0

between a and b

ˆKx)dx= r lJ Jr {x)dx,

or a series which converges unformly may be integrated term by term.

(6) If 2 /’ r{x) converges uniformly in an interval, then

r-0

2 fr(x) converges in the interval, and represents a continuous

r-0

differentiable function, 4>{x); in fact we have

or a series can be differentiated term by term if the series of derived

functions converges uniformly.

A series whose terms represent functions which are not con- tinuous throughout an interval may converge uniformly in the interval. If 2 fr(x), = f(x), is such a series, and if all the

r-0

functions f r (x) have limits at c, then f(x) has a limit at a, which is 2 Ltfr(x). A similar theorem holds for limits on the left

r = x = a

or pn the right.

23. Fourier's Series. — An extensive class of functions admit of being represented by series of the form

. y / n-n-X , , . nirx\ .. .

ao + n f l [a* cos— +&„ sin— J , (1.)

and the rule for determining the coefficients a n , b n of such a series, in order that it may represent a given function f(x) in

. «7TX,

sin — ax.

the interval between – c and c, was given by Fourier, viz. we have

^ = Tcfj^ dx ' ^ = lfj(x) C0S ^dx, b n =\fj(x)

The interval between – c and c may be called the " periodic interval," and we may replace it by any other interval, e.g. that between o and 1, without any restriction of generality. When this is done the sum of the series takes the form

J-l r=n 2 f{z)cos{2rir(z-x)}dz, r = —n

and this is

»=«Jo sini(z-x)irj ***■ V 1 -'

Fourier's theorem is that, if the periodic interval can be divided into a finite number of partial intervals within each of which the function is ordinary (§ 14), the series represents the function within each of those

partial intervals. In Fourier's time a function of this character was regarded as completely arbitrary. By a discussion of the integral (ii.) based on the Second Theorem of the Mean (§ 15) it can be shown that, if /(x) has restricted oscilla- tion in the interval (§ 11), the sum of the series is equal to i\J(x+o) + /(*— °)1 at any point x within the interval, and that it is equal to i {/(o)/(i-o)j at each end of the interval. (See the article Fourier's Series.) It therefore represents the function at any point of the periodic interval at which the function is continuous (except possibly the end-points), and has a definite value at each point of discontinuity. The condition of restricted oscillation includes all the functions contemplated in the statement of the theorem and some others. Further, it can be shown that, in any partial interval throughout which /(x) is continuous, the series converges uniformly, and that no series of the form (i), with co- efficients other than those determined by Fourier's rule, can represent thefunction at all points, except points of discontinuity, in the same periodic interval. The result can be extended to a function /(x) which tends to become infinite at a finite number of points a of the interval, provided (1) /(x) tends to become determinately infinite at each of the points o, (2) the improper definite integral of f(x) through the interval is convergent, (3)/(x) has not an infinite number of discontinuities or of maxima or minima in the interval.

24. Representation of Continuous Functions by Series. — If the series for }{x) formed by Fourier's rule converges at the point a of the periodic interval, and if f(x) is continuous at a, the sum of the series is f(a) ; but it has been proved by P. du Bois Reymond that the function may be continuous at a, and yet the series formed by Fourier's rule may be divergent at a. Thus some continuous functions do not admit of representation by Fourier's series. All continuous functions, however, admit of being represented with arbitrarily close approximation in either of two forms, which may be described as " terminated Fourier's series " and " terminated power series," according to the two following theorems:

(1) If f(x) is continuous throughout the interval between o and 2tt, and if any positive number e however small is specified, it is possible to find an integer n, so that the difference between the value of f(x) and the sum of the first n terms of the series for/(x), formed by Fourier's rule with periodic interval from o to 27r, shall be less than e at all points of the interval. This result can be extended to a function which is continuous in any given interval.

(2) If f(x) is continuous throughout an interval, and any positive number e however small is specified, it is possible to find an integer n

and a polynomial in x of the nth. degree, so that the difference between the value of f(x) and the value of the polynomial shall be less than e at all points of the interval.

Again it can be proved that, if f(x) is continuous throughout a given interval, polynomials in x of finite degrees can be found, so as to form an infinite series of polynomials whose sum is equal to f(x) at all points of the interval. Methods of representation of continuous functions by infinite series of rational fractional functions have also been devised.

Particular interest attaches to continuous functions which are not differentiable. Weierstrass gave as an example the function represented by the series 2 a" cos (6"xir), where o is positive and less

than unity, and & is an odd integer exceeding (i + |ir)/a. It can be shown that this series is uniformly convergent in every interval,

and that the continuous function /(x) represented by it has the property that there is, in the neighbourhood of any point x , an infinite aggregate of points x', having x as a limiting point, for which {f(x')—f{xt,)\l(x' — X(,) tends to become infinite with one sign when x' — Xo approaches zero through positive values, and infinite with the opposite sign when x' — x e approaches zero through negative values. Accordingly the function is not differentiable at any point. The definite integral of such a function /(x) through the interval between a fixed point and a variable point x, is a continuous differentiable function Fix), for which F'(x) = f(x); and, if fix) is one-signed throughout any interval F{x) is monotonous throughout that interval, but yet F(x) cdnnot be represented by a curve. In any interval, however small, the tangent would have to take the same direction for infinitely many points, and yet there is no interval in which the tangent has everywhere the same direction. Further, it can be shown that all functions which are everywhere continuous and nowhere differentiable are capable of representation by series of the form 2a„4 > »(x), where 2a„ is an absolutely convergent series of numbers, and < £,,(x) is an analytic function whose absolute value never exceeds unity.

25. Calculations with Divergent Series. — When the series described in (1) and (2) of § 24 diverge, they may, nevertheless, be used for the

approximate numerical calculation of the values of the function, provided the calculation is not carried beyond a certain number of terms. Expansions in series which have the property of representing a function approximately when the expansion is not carried too far are called " asymptotic expan- sions." Sometimes they are called "semi-convergent series"; but this term is avoided in the best modern usage, because it is often used to describe series whose convergence depends upon the order of the terms, such as the series 1 5+J. . .

In general, let /o(x)+/i(x)-f- . . . be a series of functions which does not converge in a certain domain. It may happen that, if any number e, however small, is first specified, a number n can after- wards be found so that, at a point a of the domain, the value /(a) of a certain function /(x) is connected with the sum of the first n + i

terms of the series by the relation \f(a) — 2/ r (a)|

r-0

also happen that, if any number N, however great, is specified, a number n'(>n) can be found so that, for all values of m which exceed

»', I 2/ r (a)l>N. The divergent series /o(x) +/, (x) -f . . . is then an

r-0

asymptotic expansion for the function /(x) in the domain.

The best known example of an asymptotic expansion is Stirling's formula for n\ when n is large, viz.

w!=V(2*-)}»" + 2e- n+(" 12 », where 8 is some number lying between o and I. This formula is included in the asymptotic expansion for the Gamma function. We have in fact

log |r(x)i = (x-J) log x-x + i log 2t+cs(x), where o(x) is the function defined by the definite integral

as(x) = f {(1 e')- l t 1 * i }r i e"dt.

The multiplier of e~ lx under the sign of integration can be expanded in the power series

2! 4! £+ 6! f •■•' where Bi, B2,. . . are " Bernoulli's numbers " given by the formula

B„ = 2.2ot! (27r)-°- m S (r- 2 ™).

When the series is integrated term by term, the right-hand member of the equation for a(x) takes the form

Bj_ I_B 1 i_ , B,*i*_

1.2 × 3.4 × 3 5.6 X 5

This series is divergent ; but, if it is stopped at any term, the difference between the sum of the series so terminated and the value of a(x) is less than the last of the retained terms. Stirling's formula is obtained by retaining the first term only. Other well-known examples of asymptotic expansions are afforded by the descending series for Bessel's functions. Methods of obtaining such expansions for the solutions of linear differential equations of the second order were investigated by G. G. Stokes (Math, and Phys. Papers, vol. ii. p. 329), and a general theory of asymptotic expansions has been developed by H. Poincare. A still more general theory of divergent series, and of the conditions in which they can be used, as above, for the purposes of approximate calculation has been worked out by E. Borel. The great merit of asymptotic expansions is that they admit of addition, subtraction, multiplication and division, term by term, in the same way as absolutely convergent series, and they admit also of integration term by term; that is to say, the results of such operations are

asymptotic expansions for the sum, difference, product, quotient, or integral, as the case may be.

26. Interchange of the Order of Limiting Operations. — When we require to perform any limiting operation upon a function which is itself represented by the result of a limiting process, the question of the possibility of interchanging the order of the two processes always arises. In the more elementary problems of analysis it generally happens that such an interchange is possible; but in general it is not possible. In other words, the performance of the two processes in different orders may lead to two different results; or the performance of them in one of the two orders may lead to no result. The fact that the interchange is possible under suitable restrictions for a particular class of operations is a theorem to be proved.

Among examples of such interchanges we have the differentiation and integration of an infinite series term by term (§ 22), and the differentiation and integration of a definite integral with respect to a parameter by performing the like processes upon the subject of integration (§ 19). As a last example we may take the limit of the sum of an infinite series of functions at a point in the domain of

convergence. Suppose that the series 2/ r (x) represents a function

(fx) in an interval containing a point a, and that each of the functions / r (x) has a limit at a. If we first put x — a, and then sum the series, we have the value f(a) ; if we first sum the series for any x, and afterwards take the limit of the sum at x = a, we have the limit of f(x) at a; if we first replace each function f T (x) by its limit at a, and then sum the series, we may arrive at a value different from either of the foregoing. If the function /(x) is continuous at a, the first and second results a"re equal; if the functions f r {x) are all continuous at «, the first and third results are equal; if the series is uniformly convergent, the second and third results are equal. This last case is an example of the interchange of the order of two limiting opera- tions, and a sufficient, though not always a necessary, condition, for the validity of such an interchange will usually be found in some suitable extension of the notion of uniform convergence.

Authorities. — Among the more important treatises and memoirs connected with the subject are: R. Baire, Fonctions discontinues (Paris, 1905) ; 0. Biermann, Analytische Functionen (Leipzig, 1887) ; E. Borel, Theorie des fonctions (Paris, 1898) (containing an intro- ductory account of the Theory of Aggregates), and Series divergentes (Paris, 1901), also Fonctions de variables reelles (Paris, 1905); T. J. I'A. Bromwich, Introduction to the Theory of Infinite Series (London, 1908) ; H. S. Carslaw, Introduction to the Theory of Fourier's Series and Integrals (London, 1906) ; U. Dini, Functionen e. reellen Grosse (Leipzig, 1892), and Serie di Fourier (Pisa, 1880); A. Genocchi u. G. Peano, Diff.- u. Int.-Rechnung (Leipzig, 1899) ; J. Harkness and F. Morley, Introduction to the Theory of Analytic Functions (London, 1898) ; A. Harnack, Diff. and Int. Calculus (London, 1 891) ; E. W. Hobson, The Theory of Functions of a real Variable and the Theory of Fourier's Series (Cambridge, 1907); C. Jordan, Cours d 'analyse (Paris, 1893-1896); L. Kronecker, Theorie d. einfachen u. vielfachen Integrate (Leipzig, 1894); H. Lebesgue, Leqons sur t'integralion (Paris, 1904) ; M. Pasch, Biff.- u. Int.Rechnung (Leipzig, 1882); E. Picard, Traite d' analyse (Paris, 1891); O. Stolz, Allgemeine Arithmetik (Leipzig, 1885), and Diff. u. Int.- Rechnung (Leipzig, 1893-1899); J. Tannery, Theorie des fonctions (Paris, 1886); W. H. and G. C. Young, The Theory of Sets of Points (Cambridge, 1906) ; Broden," Stetige Functionen e. reellen Verander- lichen," Crelle, Bd. cxviii.; G. Cantor, A series of memoirs on the " Theory of Aggregates " and on " Trigonometric series " in Acta Math. tt. ii., vii., and Math. Ann. Bde. iv.xxiii. ; Darboux, "Fonctions discontinues," Ann. Sci. Ecole normale sup. (2), t. iv. ;

Dedekind, Was sind u. was sollen d. Zahlen? (Brunswick, 1887), and Stetigkeit u. irrationale Zahlen (Brunswick, 1872); Dirichlet, “Convergence des series trigonometriques,” Crelle,ˆ Bd. iv. ; P. Du Bois Reymond, Allgemeine Functionentheorie (Tubingen, 1882), and many memoirs in Crelle and in Math. Ann.; Heine, ” Functionenlehre,” Crelle, Bd. lxxiv. ; j. Pierpont, The Theory of Functions of a real Variable (Boston, 1905); F. Klein, “Allgemeine Functionsbegriff,” Math. Ann. Bd. xxii. ; W. F. Osgood, ” On Uniform Convergence,” Amer. J. of Math. vol. xix. ; Pincherle, ” Funzioni analitichc secondo Weierstrass,” Giom. di mat. t. xviii.; Pringsheim, ” Bedingungen d. Taylorschen Lehrsatzes,” Math. Ann. Bd. xliv. ; Riemann, ” Trigonometrische Reihe,” Ges. Werke (Leipzig, 1876); Schoenflies, ” Entwickelung d. Lehre v. d. Punktmannigfaltigkeiten,” Jahresber. d. deutschen Math. Vereinigung, Bd. viii. ; Study, Memoir on “Functions with Restricted Oscillation,” Math. Ann. Bd. xlvii.; Weierstrass, Memoir on ” Continuous Functions that are not Differ- entiable,” Ges. math. Werke, Bd. ii. p. 71 (Berlin, 1895), and on the ” Representation of Arbitrary Functions,” ibid. Bd. iii. p. I ; W. H. Young, ” On Uniform and Non-uniform Convergence,” Proc. London Math. Soc. (Ser. 2) t. 6. Further information and very full references will be found in the articles by Pringsheim, Schoenflies and Voss in the Encyclopddie der math. Wissenschaften, Bde. i., ii. (Leipzig, 1898, 1899). (A. E. H. L.)

II.-Functions of Complex Variables

In the preceding section the doctrine of functionality is dis- cussed with respect to real quantities; in this section the theory when complex or imaginary quantities are involved receives treatment. The following abstract explains the arrangement of the subject matter: (§ i), Complex numbers, states what a complex number is; (§ 2), Plotting of simple expressions involving complex numbers, illustrates the meaning in some simple cases, introducing the notion of conformal representation and proving that an algebraic equation has complex, if not real, roots; (§ 3), Limiting operations, defines certain simple functions of a complex variable which are obtained by passing to a limit, in particular the exponential function, and the generalized logarithm, here denoted by X(z) ; (§4), Functions of a complex variable in general, after explaining briefly what is to be understood by a region of the complex plane and by a path, and expounding a logical principle of some importance, gives the accepted definition of a function of a complex variable, establishes the existence of a

complex integral, and proves Cauchy's theorem relating thereto; (§5), Applications, considers the differentiation and integration of series of functions of a complex variable, proves Laurent's theorem, and establishes the expansion of a function of a complex variable as a power series, leading, in (§ 6), Singular points, to a definition of the region of existence and singular points of a function of a complex variable, and thence, in (§ 7), Monogenic Functions, to what the writer believes to be the simplest definition of a function of a complex variable, that of Weierstrass; (§ 8)* Some elementary properties of single valued functions, first discusses the meaning of a pole, proves that a single valued function with only poles is rational, gives Mittag-Leffler's theorem, and Weier- strass's theorem for the primary factors of an integral function, stating generalized forms for these, leading to the theorem of (§ 9) , The construction of a monogenic function with a given region of existence, with which is connected (§10), Expression of a monogenic function by rational functions in a given region, of which the method is applied in (§ n) , Expression of (i-z) _l 6y polynomials, to a definite example, used here to obtain (§ 12), An expansion of an arbitrary function by means of a series of polynomials, over a star region, also obtained in the original manner of Mittag- Leffler; (§ 13) , Application of Cauchy 's theorem to the determination of definite integrals, gives two examples of this method; (§ 14), Doubly Periodic Functions, is introduced at this stage as furnish- ing an excellent example of the preceding principles. The reader who wishes to approach the matter from the point of view of Integral Calculus should first consult the section (§ 20) below, dealing with Elliptic Integrals; (§ 15), Potential Functions, Conformal representation in general, gives a sketch of the con- nexion of the theory of potential functions with the theory of conformal representation, enunciating the Schwarz-Christoffel theorem for the representation of a polygon, with the application to the case of an equilateral triangle; (§ 16), Multiple-valued Functions, Algebraic Functions, deals for the most part with algebraic functions, proving the residue theorem, and establishing that an algebraic function has a definite Order; (§ 17), Integrals of Algebraic Functions, enunciating Abel's theorem; (§ 18), Indelerminateness of Algebraic Integrals, deals with the periods associated with an algebraic integral, establishing that for an elliptic integral the number of these is two; (§ 19), Reversion of an algebraic integral, mentions a problem considered below in detail for an elliptic integral; (§ 20), Elliptic Integrals, considers the algebraic reduction of any elliptic integral to one of three standard forms, and proves that the function obtained by reversion is single- valued; (§ 21), Modular Functions, gives a statement of some of the more elementary properties of some

functions of great importance, with a definition of Automorphic Functions, and a hint of the connexion with the theory of linear differential equations; (§ 22), A property of integral functions, deduced from the theory of modular functions, proves that there cannot be more than one value not assumed by an integral function, and gives the basis of the well-known expression of the modulus of the elliptic functions in terms of the ratio of the

periods; (§ 23), Geometrical applications of Elliptic Functions, shows that any plane curve of deficiency unity can be expressed by elliptic functions, and gives a geometrical proof of the addition theorem for the function ty(u); (§ 24), Integrals of Algebraic Functions in connexion with the theory of plane curves, discusses the generalization to curves of any deficiency; (§ 25), Monogenic Functions of several independent variables, describes briefly the beginnings of this theory, with a mention of some fundamental theorems: (§ 26), Multiply-Periodic Functions and the Theory of Surfaces, attempts to show the nature of some problems now being actively pursued.

Beside the brevity necessarily attaching to the account here given of advanced parts of the subject, some of the more ele- mentary results are stated only, without proof, as, for instance: the monogeneity of an algebraic function, no reference being made, moreover, to the cases of differential equations whose integrals are monogenic; that a function possessing an algebraic addition theorem is necessarily an elliptic function (or a particular case of such) ; that any area can be conformally represented on a half plane, a theorem requiring further much more detailed consideration of the meaning of area than we have given; while the character and properties, including the connectivity, of a Riemann surface have not been referred to. The theta functions are referred to only once, and the principles of the theory of Abelian Functions have been illustrated only by the develop- ments given for elliptic functions.

§ r. Complex Numbers. — Complex numbers are numbers of the form x--iy, where *,' y are ordinary real numbers, and i is a symbol imagined capable of combination with itself and the ordinary real numbers, by way of addition, subtraction, multi- plication and division, according to the ordinary commutative, associative and distributive laws; the symbol i is further such that i 2 =-i.

Taking in a plane two rectangular axes Ox, Oy, we assume that every point of the plane is definitely associated with two real numbers x, y (its co-ordinates) and conversely; thus any point of the plane is

associated with a single complex number; in particular, for every point of the axis Ox, for which y = 0, the associated number is an ordinary real number; the complex numbers thus include the real numbers. The axis Ox is often called the real axis, and the axis Oy the imaginary axis. If P be the point associated with the complex variable z = x--iy, the distance OP be called r, and the positive angle less than 2w between Ox and OP be called 0, we may write z = r(cos 0-H sin 0); then r is called the modulus or absolute value of z and often denoted by | z | and is called the phase or amplitude of z, and often denoted by ph (z) ; strictly the phase is ambiguous by additive multiples of 2r. If z' — x'--iy' be represented by P', the complex argument z'--z is represented by a point P" obtained by drawing from P' a line equal to and parallel to OP; the geo- metrical representation involves for its validity certain properties of the plane; as, for instance, the equation z'+z = z+z involves the possibility of constructing a parallelogram (with OP'asdiagonal). It is important constantly to bear in mind, what is capable of easy algebraic proof (and geometrically is Euclid's proposition III. 7), that the modulus of a sum or difference of two complex numbers is generally less than (and is never greater than) the sum of their moduli, and is greater than (or equal to) the difference of their moduli ; the former statement thus holds for the sum of any number of complex numbers. We shall write E(i0) for cos 0+j sin 0; it is at once verified that E(ia). E(»/3) «= E[i(a+/3)], so that the phase of a product of complex quantities is obtained by addition of their respective phases.

§ 2. Plotting and Properties of Simple Expressions involving a Complex Number. — If we put f = (z— i)j{z--i), and, putting f = £-(»!?, take a new plane upon which £, rj are rectangu lar co-ordinates, the equations £ =(x 2 +y i i)l[x 2 +(y+i) i \, tj= — 2xyj[x iJ r{y-i) i \ will determine, corresponding to any point of the first plane, a point of the second plane. There is the one exception of z=— i, that is, x = o, y= — 1, of which the corresponding point is at infinity. It can now be easily proved that as z describes the real axis in its plane the point f describes once a circle of radius unity, with centre at f = o, and that there is a definite correspondence of point to point between points in the z-plane which are above the real axis and points of the f -plane which are interior to this circle; in particular z=* corresponds to f = 0.

Moreover, f being a rational function of z, both { and i\ are con- tinuous differentiable functions of x and y, save when f is infinite;

dx’ dx 2 ~ t dy , -~ ‘

writing f =/(*, y) =/(z -,y, y), the fact that this is really independent of y leads at once to df/dx+idf/dy = o, and hence to

dx dy’ dy so that £ is not any arbitrary function of x,y, and when £ is known i; is determinate save for an additive constant. Also, in virtue of these equations, if f, f be the values of f corresponding to two near values of z, say z and V, the ratio (f’f)/(’) has I definite lmtt when z = z independent of the ultimate phase of z’z this limit being therefore equal to dtfdx, that is, dtldx+idr>ldx. Geo metrically this fact is interpreted by saying that if two curves in the

*ffiˆ n V n iw! eCt * a , t , a P ° int P ‘ at which both the differential co- efficients di/dx, d v /dx are not zero, and P’, P» be two points near

l°L° n k eS A C ˆ Ve A» esp L eCtiv , e l y ‘ and the corresponding points of the f-plane be Q, Q’, Q”, then (i) the ratios PP’/PP’, Q0700′ are ultimately equalˆ (2) the angle P’PP” is equal to Q’QQ” , (i) the rotation from PP’ to PP” is in the same sense as from 00′ to 00″ it being understood that the axes of f, , in the one plane are related as are the axes of x y. Thus any diagram of the z-plane becomes a diagram of the f-plane with the same angles; the magnification, however, which is equal to [(g \ (||) ‘] * var ies from point to point. Conversely, it appears subsequently that the expression ot any copy of a diagram (say, a map) which preserves angles requires the intervention of the complex variable. t-qunes

As another illustration consider the case when £ is a polynomial

H being an arbitrary real positive number, it can be shown that a radius K can be found such for every \z\ > R we have I f I > H • consider the lower hmit of | f | for | z [, y for | z | < R, there is a point (, y) say (x„, 3-0) at which [f is least, say equal to p, and therefore within a circle in the f-plane whose centre is the origin, of radius p there are no points f representing values corresponding to I z I < R.' sin,, J°t / Ue ° f r c °. rres Ponding to (*„, y„), and the expres-

R°? /i+TJ? near , z o = ˆo+ˆo, in terms of z-Zo, be A(z-zo)-»-f Btz-z ,i +..., where A is not zero, to two points near to (* , y„),

say (**„ yO or z, and z 2 = z„ + (Zl z„) (cosˆ+t sin?;) , will corre spond two points near to f e , say f,, and 2f -f’i, situated so that r„ is between them. One of these** must be within ‘the circle (°) \Ve infer then that p = o, and have proved that every polynomial in

Va A , eS t f ? r S ° me 7 a l Ue of 2 ‘ and can therefore be written as a product of factors of the form z-a, where a denotes a complex

of U c n o b m P .ex T n h u S m P b r e°rr itl0n ˆ ˆ t0 “™« ˆ im P™« § 3. Limiting Operations.— In order that a complex number f-H-»? may have a limit it is necessary and sufficient that each ot £ and 77 has a limit. Thus an infinite series w +iv 1 +w 2 + whose terms are complex numbers, is convergent if the real series formed by taking the real parts of its terms and that formed by the imaginary terms are both convergent The series is also convergent if the real series formed by the moduli of its terms is convergent; in that case the series is said to be absolutely convergent, and it can be shown that its sum is unaltered by taking the terms in any other order. Generally the necessary and sufficient condition of convergence is that for a given real positive e, a number m exists such that for every n>m, and every positive p, the batch of terms »„+«<«+,+ ■ ■ ■ +w n+p is less than e in absolute value. If the terms depend upon a complex variable z, the convergence is called uniform tor a range of values of z, when the inequality holds, for the same e and m, for all the points z of this range.

The infinite series of most importance are those of which the genera term is a n z\ wherein a „ is a constant, and z is regarded as variable, «=o, 12, 3,... Such a series is called a power series If a real and positive number M exists such that for z = z„ and every n, [a„zf\ ‘for which, ‘<|z„T To every power series there belongs then a circle of convergence within which it converges absolutely and uniformly; the function of z represented by ,t is thus continuous within the circle (thfe be ng the result of a general property of uniformly convergent series ot continuous functions); the sum for an interior point lis, however continuous with the sum for a point z„ on the circumference as z approaches to z provided the series converges for z = z„, as can be shown without much difficulty. Within a common cfrcle of convergence two power series 2a„z», Z6„z« can be multiplied together

W a rd ‘ n f !°, the ° rdmary rule ‘ this bein S a consequence of a thlorem for absolutely convergent series. If r, be less than the radiusTf convergence of a series 2a„a» and for | z | =n, the sum of theories

be in absolute value less than a real positive quantity M, it can be shown that or \z\ = fl every term is also less than M in absolute value, namely, \a n \ < Mr,- If in every arbitrarily small neighbourhood of 2-0 there be a point for which two converging

power series 2a„z», 26„z" agree in value, then the series are identical, or a n = b n ■ thus also if 2a„z" vanish at z = o there is a circle of finite radius about z = o as centre within which no other points are found for which the sum of the series is zero. Considering a power series /(z) = 2

wri?e ay frˆ er VA e , ar T nged 4 aCC ?ˆ d i 1 ng: to , powers of *• Thus we may 2 A„/» t S wherein the continuous series on the right reduces to Ax

for l = o; thus the ratio on the left has a definite limit when t = o equal namely to A, or XnaMˆ. In other words, the original series may legitimately be differentiated at any interior point z„ of its circle u C ° nV «nf/ en ˆ- Repeating this process we find/(z„+i) =2/»/(»)(z)/ni, where /<")(z„) is the nth differential coefficient. Repeating for this power series, in /, the argument applied about 2 = for l a „z» we infer that for the series /(z) every point which reduces it to zero is an isolated point, and of such points only a finite number lie within a circle which is within the circle of convergence of f(z).

Perhaps the simplest possible power series'ise* = exp (z) = i+ z U 2 \ + 2/3 ,-7\v . of which the radius of convergence is infinite Bv multiplication we have exp (z).exp (s i) =exp (z+z*). In particular

functions are re ‘ a Z = X+iy ‘ 6XP (Z) =eXp (X) exp (* > >• Now the

U = sin y, V = l-cos y, Ui = y-sin y, XrˆT'r" 1 " 003 y ‘ U 2 = b 3 3+sin y, V 2 = Ayˆ-§y2 + i_ cos y all vanish for y = o, and the differential coefficient of any one after the first is the. preceding one; as a function (of a real variable) is increasing when its differential coefficient is positive, we infer for y positive that each of these functions is positive; proceeding to a limit we hence infer that s

cosy=i-!y2+s , j> 4 -...) sinyˆy-ly'+Thy 5 -...,

for positive, and henpe for all values of y. We thus have exp (iy) =

SS ™ + JiT ˆ f eX Pˆ =6XP , (f } – (C0S y+i sin ? >• In other words, the modulus of exp (z) is exp (*) and the phase is y. Hence also

exp (z+27ri)=exp () **[cos (y +2-)** H sin (y+2*)],

7nA C l.r CXpre !u by – a ˆ nj l t – hat , exp & has the period a«, and hence also the period akm, where k is an arbitrary integer From the fact that the constantly increasing function exp (z) can

periods” y X = °’ ^ at ° nCe pr ° Ve that exp (z) has no other

r J ak il g j n Q th 5 p ! a “5 °f f a n infinite strip lying between the lines llZn y * Plotting the function f = exp (z) upon a new plane, it follows at once from what has been said that every complex value of f arises when a takes in turn all positions in this strip, and that no value arises twice over. The equation f = exp (z) thus defines z regarded as depending upon f with only an additive arnbigultv 2£«, where * is an integer. We write z = X(f) ; when f is real this becomes the logarithm of f; in general X(f ■ =log |f| + f 2 « + 2*«, where * is an integer; and when f describls a closed circuit surrounding the origin the phase of f increases by ar, or k increases by unity. Differentiating the series for { we have rff/dz=7, so

rfzwV-A gar On ,f d I Pe 1 dm f Up ° n -J< is also differentiable, with it*~£ ° n . the other hand, considerthe series f-l-i(f-l) 2 + rˆTl'i-T'v' ˆ•S ° nver - g f when f = 2 and hence converges for ii~ W ' lts differential coefficient is, however, I (t I) + (f T I)’- • v – that is, (1 -J-f – i)-i. Wherefore if 0(f) denote this series, for If- 1 < 1, the difference X(f)-0(f), regarded [as a ake'Z v 1* an d'». has vanishing .differential coeffiffentsl if we take the value of X(f) which vanishes when f=i we infer thence thatfor|f-i|

that it is impossible for”f while subject to I f-i I

fee” tha°t Mf7?=X(f?V5g. the h6lP ° f infinite SerfeS ‘ ˆiliSig the

The function X(f) is required to define f when f and a are complex

numbers; this is defined as exp [oX(f)J, that is as 2 o»[X(f)]”/»!.

rl n Jt iS r\!. in J ege -, r the arnbi g ui ty of X(f) is immaterial here, since exp [aX(f)-f 2 £a«] =exp [aX(f)] ; when a is of the form ilq where 3 is a positive integer, there are 5 values possible for f”«, of

*the form exp [l X (f)] exp (2ˆ) , with *=o, i,... 2 -i, all other*

values of k leading to one of these; the gth power of any one of

rommnn f e %’ S f; ˆˆ a =ˆ/?-. where p, s are integers without common factor, q being positive, we have fW« = ffifa)p The definition of the symbol f is thus a generalization of the ordinary derinition of a power, when the numbers are real. As an example, ™J 1 required to find the meaning of i<; the number i is of modulus unity and phase }»; thus X(») =iˆ r + 2 kir) ; thus

*i> =e*P (-i»— 2*x)=exp (-W exp (-2*x), is always real, but has an infinite number of values.*

The function exp (z) is used also to define a generalized form of | definite finite real value, attached to every interior or boundary

*the cosine and sine functions when z is complex ; we write, namely, cos z = ˆ[exp (*z) + exp (-«)] and sinz= -i»'[exp (iz)-exp (-iz)]. It will be found that these obey the ordinary relations holding when z is real, except that their moduli are not inferior to unity. For example, cos i = 1+1/21 + 1/4!+. . .is obviously greater than unity. §4. Of Functions of a Complex Variable in General. — We have in what precedes shown how to generalize the ordinary rational, algebraic and logarithmic functions, and considered more general cases, of functions expressible by power series in z. With the suggestions furnished by these cases we can frame a general definition. So far our use of the plane upon which z is represented has been only illustrative, the results being capable of analytical statement. In what follows this representation is vital to the mode of expression we adopt; as then the properties of numbers cannot be ultimately based upon spatial intuitions, it is necessary to indicate what are the geometrical ideas requiring elucidation.*

Consider a square of side a, to whose perimeter is attached a definite direction of description, which we take to be counter- clockwise ; another square, also of side a, may be added to this, so that there is a side common; this common side being erased we have a composite region with a definite direction of perimeter; to this a third square of the same size may be attached, so that there is a side common to it and one of the former squares, and this common side may be erased. If this process be continued any number of times we obtain a region of the plane bounded by one or more polygonal closed lines, no two of which intersect ; and at each portion of the perimeter there is a definite direction of descrip- tion, which is such that the region is on the left of the describing point. Similarly we may construct a region by piecing together triangles, so that every consecutive two have a side in common, it being understood that there is assigned an upper limit for the greatest side of a triangle, and a lower limit for the smallest angle". In the former method, each square may be divided into four others by lines through its centre parallel to its sides; in the latter method each triangle may be divided into four others by lines joining the middle points of its sides; this halves the sides and preserves the angles. When we speak of a region of the plane in general, unless the contrary is

stated, we shall suppose it capable of being generated in this latter way by means of a finite number of triangles, there being an upper limit to the length of a side of the triangle and a lower limit to the size of an angle of the triangle. We shall also require to speak of a path in the plane ; this is to be understood as capable of arising as a limit of a polygonal path of finite length, there being a definite direction or sense of description at every point of the path, which therefore never meets itself. From this the meaning of a closed path is clear. The boundary points of a region form one or more closed paths, but, in general, it is only in a limiting sense that the interior points of a closed path are a region.

There is a logical principle also which must be referred to. We frequently have cases where, about every, interior or boundary, point zo of a certain region a circle can be put, say of radiusˆ, such that for all points z of the region which are interior to this circle, for which, that is, | z-z |

We prove these statements (A), (B) in reverse order. To prove (B) let a region for which the property (z,z) holds for all points z and some point z of the region, be called suitable: if each of the triangles of which the region is built up be suitable, what is desired is proved ; if not let an unsuitable triangle be subdivided into four, as before explained; if one of these subdivisions is unsuitable let it be again subdivided; and so on. Either the process terminates and then what is required is proved; or else we obtain an indefinitely con- tinued sequence of unsuitable triangles, each contained in the preceding, which converge to a point, say f ; after a certain stage all these will be interior to the proper region of f ; this, however, is contrary to the supposition that they are all unsuitable.

We now make some applications of this result (B). Suppose a

point of the region, say f(x,y). It may have a finite upper limit H for the region, so that no point (x,y) exists for which f(x,y) > H, but points (x,y) exist for which f(x,y) > H-e, however small t may be ; if not we say that its upper limit is infinite. There is then at least one point of the region such that, for points of the region within a circle about this point, the upper limit of]'{x,y) is H, however small the radius of the circle be taken; for if not we can put about every point of the region a circle within which the upper limit of }{x,y) is less than H; then by the result (B) above the region consists of a finite number of sub-regions within each of which the upper limit is less than H ; this is inconsistent with the hypothesis that the upper limit for the whole region is H. A similar statement holds for the lower limit. A case of such a function f(x,y) is the radius r of the neighbourhood proper to any point z , spoken of above. We can hence prove the statement (A) above.

Suppose the property {z,z a) extensive, and, if possible, that the lower limit of mis zero. Let then f be a point such that the lower limit of n is zero for points z within a circle about f however small ; let r be the radius of the neighbourhood proper to f ; take z so that I So — f !<£»■; the property (z,z), being extensive, holds within a circle, centre z , of radius r— jz — f|, which is greater than I zo — f I , and increases to r as |z — f | diminishes; this being true for all points z near f, the lower limit of n> is not zero for the neighbourhood of f, contrary to what was supposed. This proves (A). Also, as is here shown that rˆr— | Zo — f |, may similarly be shown thatrsˆo — I Zo — ? I • Thus r differs arbitrarily little from r when | z — fl is sufficiently small; that is, r varies continu- ously with z . Next suppose the function f(x,y), which has a definite finite value at every point of the region considered, to be continuous but not necessarily real, so that about every point Zo, within or upon the boundary of the region, 17 being an arbitrary real positive quantity assigned beforehand, a circle is possible, so that for all points z of the region interior to this circle, we have \f(x,y) — /(»o,yo)l ‘,/), we have | /(‘,/) -f(x,y) |

Take now any path in the region, whose extreme points are z , z, and let z \, . . . z„_i be intermediate points of the path, in order; denote the continuous function f(x,y) by/(z), and let f, denote any quantity such that | / r -/(zr) I ˆ !/(zr+i) -/(«,) |i consider the sum

(zi-z)fo + (z 2 -Zi)/i+ . . . + (z-z„-i)/„_i. By the definition of a path we can suppose, n being large enough, that the intermediate points Zi, . . . z„_i are so taken that if z,-, z i+1 be any two points intermediate, in order, to z r and z f+ i, we have |z;n— Zi] <|z,i — Zr|; we can thus suppose | Zi — Zo | , | Z2 — Z1 |, .. . I z — z„_i I all to converge constantly to zero. This being so, we can show that the sum above has a definite limit. For this it is sufficient, as in the case of an integral of a function of one real variable, to prove this to be so when the convergence is obtained by taking new points of division intermediate to the former ones. If, however, Zri, Zr2, ... z r m-i be intermediate in order to z r and z r i, and |/r,.—/(zr,i) I <"| /(zr,i+i) -/(sr,») |, the difference between 2(z r+ i-z r)/, and

2((Zr,l— Z r)/ r ,0 + (Zr,2— Zr,l)/r,l+ • • • + (Zr+1 — Zr,m~l)fr,m-l}t

which is equal to

22(z r , i+ l-Zr,,)(fr,i/r),

is, when |z r+l — z r \ is small enough, to ensure | /(zr+i) — /(z,) | < r,, less in absolute value than

22rj2|z r ,i + i — Z r ,i I , which, if S be the upper limit of the perimeter of the polygon from which the path is generated, is < 2?;S, and is therefore arbitrarily small.

The limit in question is called y f(z)dz. In particular when

/(z) = l, it is obvious from the definition that its value is z— Zo; when /(z)=z, by taking f r = h(z r +i-z r), it is equally clear that its value is i(z 2 — zo 2); these results will be applied immediately.

Suppose now that to every interior and boundary point z e of a certain region there belong two definite finite numbers /(z), F(z), such that, whatever real positive quantity ij may be, a real positive number e exists for which the condition /(z)-/(z„) _ F(zo)

-Zo

<7J,

which we describe as the condition (z,z), is satisfied for every point z, within or upon the boundary of the region, satisfying the limitation |s-z j< €. Then /(zo) is called a differentiable function of the complex variable z over this region, its differential coefficient being F(zo). The function /(z) is thus a continuous function of the real

FUNCTION

3*3

variables xq, y , where zo=%+ *yo. over the region; it will appear that F(zo) is also continuous and in fact also a differentiable function

Of Zo.

Supposing 7j to be retained the same for all points z of the region, and ffo to be the upper limit of the possible values of e for the point Zo, it is to be presumed that tro will vary with Zo, and it is not obvious as yet that the lower limit of the values of

Hence it can be proved that, for a differentiable function /(z),

the integral j z f{z)dz has the same value by whatever path within

the region we pass from Zi to z. This we prove by showing that when taken round a closed path in the region the integral ff(z)dz vanishes. Consider first a triangle over which the condition (z, zo) holds, for some position of zo and every position of z, within or upon the boundary of the triangle.

Then as

/(z)=/(zo) + (z-Zo)F(zo)+7j0(z-zo), where|0|

Jf(z)dz = [/(zo) — ZoF (zo)]fdz +F (zo)/z (a/71-) ba, where a is the least angle of the triangle, and hence a(a--b-{-c) <2a(b+c) <4irA/a; the integral ff(z)dz round the perimeter of the triangle is thus<47rr;A/a. Now consider any region made up of triangles, as before explained, in each of which the condition (z, Zo) holds, as in the triangle just taken. The integral ff(z)dz round the boundary of the region is equal to the sum of the values of the integral round the component triangles, and thus less in absolute value than 4jn)K/a, where K is the whole area of the region, and a is the smallest angle of the component triangles. However small i\ be taken, such a division of the region into a finite number of component triangles has been shown possible; the integral round the perimeter of the region is thus arbitrarily small. Thus it is actually zero, which it was desired to prove. Two remarks should be added: (1) The theorem is proved only on condition that the closed path of integration belongs to the region at every point of which the con- ditions are satisfied. (2) The theorem, though proved only when the region consists of triangles, holds also when the boundary points of the region consist of one or more closed paths, no two of which meet.

Hence we can deduce the remarkable result that the value of /(z) at any interior point of a region is expressible in terms of the value of /(z) at the boundary points. For consider in the original region the function /(z)/(z — zo), where z is an interior point: this satisfies the same conditions as /(z) except in the immediate neighbourhood of Zo. Taking out then from the original region a small regular polygonal region with Zo as centre, the theorem holds for the remain- ing portion. Proceeding to the limit when the polygon becomes a

circle, it appears that the integral I -3SE2 round the boundary of

the original region is equal to the same integral taken counter- clockwise round a small circle having Zo as centre; on this circle, however, if z — Zo — rE(i9), dzj(z — za) =idS, and /(z) differs arbitrarily little from /(zo) if r is sufficiently small; the value of the integral round this circle is therefore, ultimately, when r vanishes, equal to

2«/(zo). Hence f(zo) =—■[,_ , where this integral is round the

boundary of the original region. From this it appears that

. /(z)-/(z) _ I fdtf(t) 2iriJ

FM-lim."^-

of z, having for its differential coefficient the function f(x, y), which is therefore also a differentiable function of z at interior points.

(3) Hence if the series uo(z) +«i(z) + . . . to 00 be uniformly convergent over a region, its terms being differentiable functions of z, then its sum S(z) is a differentiable function of z, whose differential

coefficient, given by — . J . '■J . 2 , is obtainable by differentiating the

series. This theorem, unlike (1), does not hold for functions of a real variable.

(4) If the region of definition of a differentiable function /(z) include the region bounded by two concentric circles of radii r, R, with centre at the origin, and z be an interior point of this region,

clockwise round the two circumferences respectively ; putting in the first (Z-Zo) _1 = 2 Zo n lt n+1 , and in the second (i-z)- 1 =- 2 r/zo" +I ,

\dt, taken round

('-zo) 2

also round the boundary of the original region. This form shows, however, that F(zo) is a continuous, finite, differentiable function of Zo over the whole interior of the original region.

§ 5. Applications. — The previous results have manifold appli- cations.

(1) If an infinite series of differentiable functions of z be uniformly convergent along a certain path lying with the region of definition of the functions, so that S(z) =Wo(z)+«i(z) + . . . + Un-i(z) +R»(z), where [R„(z) i

(S(z)

J BO J SO J2O JzO J ZO

wherein, in absolute value, I R n (z)dz

J' a . path. Thus the series may be integrated, and the resulting series

is also uniformly convergent.

(2) If f(x, y) be definite, finite and continuous at every point of a region, and over any closed path in the region//(*, y)dz=o, then

,, . r ff{t)dt 1 ff(t)dt ,

ˆ Zo) = 2~7i)ˆiˆzl~2ˆi)j=ˆ' where the integrals are both counter-

rences respec the second

we find /(zo) = 2 A„Zo n , wherein A„ = —. I -rldl, taken round any

— oa 27TV t" +l J

circle, centre the origin, of radius intermediate between r and R. Particular cases are: (a) when the region of definition of the function includes the whole interior of the outer circle; then we may take r = o, the coefficients A„ for which »

power series 2 A„z n . In other words, about every interior point c of

o the region of definition a differentiable function of z is expressible by a power series in z — c; a very important result.

(iS) If the region of definition, though not including the origin, extends to within arbitrary nearness of this on all sides, and at the same time the product z m f(z) has a finite limit when \z\ diminishes to zero, all the coefficients An for which n<—m vanish, and we have

/(so) = A_ m z " ! A_ ro iZo m+1 + . . . +A_ 1 z

§ 6. Singular Points. — The region of existence of a differentiable function of z is an unclosed aggregate of points, each of which is an interior point of a neighbourhood consisting wholly of points of the aggregate, at every point of which the function is definite and finite and possesses a unique finite differential coefficient. Every point of the plane, not belonging to the aggregate, which is a limiting point of points of the aggregate, such, that is, that points of the aggregate lie in every neighbour- hood of this, is called a singular point of the function.

About every interior point z of the region of existence the function may be represented by a power series in z— Zo, and the series con- verges and represents the function over any circle centre at Zo which contains no singular point in its interior. This has been proved above. And it can be similarly proved, putting z = i/J", that if the region of existence of the function contains all points of the plane for which | z | > R, then the function is representable for all such points by a power series in z -1 or f ;

in such case we say that the region of existence of the function contains the point z = 00 . A series in z -1 has a finite limit when \z\ = co ; a series in z cannot remain finite for all points z for which |z[> R; for if, for lz| = Ri the sum of a power series 2o„z" in z is in absolute value less than M, we have |a„|

« = 0 « = o

where m = n\, and the series 2 z m l{m--\)(m--2) where m = a",

» = 1 a being a positive integer, although in the last case the series actually converges for every point of the circle of convergence \z\ = 1. If z be a point interior to the circle of convergence of a series representing the function, the series may be rearranged in powers of z— Zo; as Zo approaches to a singular point of the function, lying on the circle of convergence, the radii of convergence of these derived series in z — Zo diminish to zero; when, however, a circle can be put about zo, not containing any singular point of the function, but containing points outside the circle of convergence of the original series, then the series in z — Zo gives the value of the function for these external points. If the function be supposed to be given only for the interior of the original circle, by the original power series, the series in z— Zo converging beyond the original circle gives what is known as an analytical continuation of the function. It appears from what has

been proved that the value of the function at all points of its region of existence can be obtained from its value, supposed given by a series in one original circle, by a succession of such processes of analytical continuation.

§ 7. Monogenic Functions. — This suggests an entirely different way of formulating the fundamental parts of the theory of functions of a complex variable, which appears to be preferable to that so far followed here.

Starting with a convergent power series, say in powers of z, this series can be arranged in powers of z— Zo, about any point Zo interior to its circle of convergence, and the new series converges certainly for |z— zo I

§ 8. Some Elementary Properties of Single Valued Functions. — A pole is a singular point of the function /(z) which is not a singularity of the function i//(z); this latter function is therefore, by the definition, capable of representation about this point, Zo, by a series [/(z)] -1 = 2a„(z— z) n . If herein a is not zero we can hence derive a representation for/(z) as a

power series about z , contrary to the hypothesis that z is a singular point for this function. Hence a = o; suppose also fli = o, a 2 =o, . . . a m _i = o, but a m ±o. Then [/(z)] _1 = (z— z) m [a m +a m+1 (z— z)+ . . .], and hence (z— z) m /(z) =a^'+2b„(z— z) n , namely, the expression of /(z) about z=z contains a finite number of negative powers of z— z and a (finite or) infinite number of positive powers. Thus a pole is always an isolated singularity.

The integral ff{z)dz taken by a closed circuit about the pole not containing any other singularity is at once seen to be 2«Ai, where Ai is the coefficient of {z — zn)~ l in the expansion of /(z) at the pole; this coefficient has therefore a certain uniqueness, and it is called the residue of /(z) at the pole. Considering a region in which there are no other singularities than poles, all these being interior points,

the integral — ■ I f{z)dz round the boundary of this region is equal to

the sum of the residues at the included poles, a very important result. Any singular point of a function which is not a pole is called an essential singularity; if it be isolated the function is capable, in the neighbourhood of this point, of approaching arbitrarily near to any assigned value. For, the point being isolated, the function can be represented, in its neighbourhood, as we have proved, by a series

2 a„(z— zo)";itthuscannot remain finite in the immediate neighbour- hood of the point. The point is necessarily an isolated essential singularity also of the function |/(z) —A} _1 , for if this were expressible by a power series about the point, so would also the function /(z) be; as (/(«)— A} 1 approaches infinity, so does /(z) approach the arbitrary value A. Similar remarks apply to the point z = 00 , the function being regarded as a function of f — z~ l . In the neighbour hood of an essential singularity, which is a limiting point also of poles, the function clearly becomes infinite. For an essential singu- larity which is not isolated the same result does not necessarily hold.

A single valued function is said to be an integral function when it has no singular points except z = 00 . Such is, for instance, an integral polynomial, which has z = 00 for a pole, and the functions exp (z) which has z = 00 as an essential singularity. A function which has no singular points for finite values of z other than poles is called a meromorphic function. If it also have a pole at z = oo it is a rational function; for then, if Oi, . . . a„ be its finite poles, of orders nti, wz 2 , • • • m s , the product (z —

r—

is capable of a form 2 b,z r , but z~ m 2 bj? remains finite for

r-0 r_0

z = co. Therefore b T+ i = b r+2 = ... =0, and /(z) is a rational function.

If for a single valued function F(z) every singular point in the finite part of the plane is isolated there can only be a finite number of these in any finite part of the plane, and they can be taken to be 01, o 2 , a 3 , . . . with | oi|?|aj|^|o s | . . . and limit

|a„| = cc. About a, the function is expressible as 2 A„(z — a a) n ;

1 – 00

let /,(z) = 2 A"(z — a,) n be the sum of the negative powers in this

expansion. Assuming z = o not to be a singular point, let /,(z) be expanded in powers of z, in the form 2 C n z", and n, be chosen so

H8-1 „ "-0

that F,(z) =/.(z) – 2 C„z" = 2 C„z"is, for \z

1 P-8

value than the general term t, of a fore-agreed convergent series of real positive terms. Then the series #(z) = 2 F„(z) converges uni-

formly in any finite region of the plane, other than at the points a„ and is expressible about any point by a power series, and near a«, {z)—f,(z) is expressible by a power series in z—a„. Thus F(z) — (z) is an integral function. In particular when all the finite singularities of F(z) are poles, F(z) is hereby expressed as the sum of an integral function and a series of rational functions. The condition |F 8 (z)|

satisfied by a series 2G„(z) where G,(z) =/ s (z) — 2 C„z n and j- 8

An example of the theorem is the function ir cot irz— z _1 for which, taking at first only half the poles, f 8 {z) = i/(z — s) ; in this case the series 2F„(z) where ¥,{z) = {z — s)~ l +s~ l is uniformly convergent; thus x cot tz— z -1 — 2 [(z — i) -1 +5 -1], where s = o is excluded froti

— 00

the summation, is an integral function. It can be proved that this integral function vanishes.

Considering an integral function /(z), if there be no finite positions of z for which this function vanishes, the function X[/(z)] is at once seen to be an integral function, 0(z), or/(z) =exp [<£(z)l ; if however great R may be there be only a finite number of values of z for which /(z) vanishes, say z = Oi, . . .a m , then it is at once seen that /(z) = exp [4>(z)]. {z — a l) hl ...(z—a m) h m, where {z) is an integral function, and hi,. ■ -h m are positive integers. If, however, /(z) vanish for z = a\ , a 2> . . .where |ai|^|a 2 |^. . . and limit |o„| = oo, and if for simplicity we assume that z — o is not a zero and all the zeros ai, 02,. . . are of the first order, we find, by applying the preceding theorem to

the function J^ d -§^, that /(z) = exp [0(z)] 5 ((1 -z/a„) exp4>„(z)),

J\ Z) aZ K_l

where

of the form 0»(«) =^;J^2 •

■+i

The number s may be the

same for all values of n, or it may increase indefinitely with n; it is sufficient in any case to take s = n. In particular for the function

FUNCTION

*3*5*

we have

: = n

I (-1)

exp

*= o is excluded from the product. ‘ ‘ ‘ * ‘ 1 exp*

©!■_

Or again we have

H) !■

where n

—^-^c, § j (i+-) r(x) M=1 (\ n)

where C is a constant, and T(x) is a function expressible when x is

/oo e-'t'^dt.

There exist interesting investigations as to the connexion of the value of s above, the law of increase of the modulus of the integral function /(z), and the law of increase of the coefficients in the series /(z) — Za n z" as n increases (see the bibliography below under Integral Functions). It can be shown, moreover, that an integral function actually assumes every finite complex value, save, in exceptional cases, one value at most. For instance, the function exp (z) assumes every finite value except zero (see below under § 21, Modular Functions).

The two theorems given above, the one, known as Mittag- Leffler's theorem, relating to the expression as a sum of simpler functions of a function whose singular points have the point 2 = oo as their only limiting point, the other, Weierstrass's factor theorem, giving the expression of an integral function as a product of factors each with only one zero in the finite part of the plane, may be respectively generalized as follows: —

I. If a\, a 2 , a 3 , . . . be an infinite series of isolated points having the points of the aggregate © as their limiting points, so that in any neighbourhood of a point of © there exists an infinite number of the points a it a 2 , . . ., and with every point a% there be associated a polynomial in (z-fli)- 1 , say gi\ then there exists a single valued function whose region of existence excludes only the points (a) and the points ©, having in a point a; a pole whereat the expansion consists of the terms g,, together with a power series in z-ai\ the function is expressible as an infinite series of terms g;-7i, where 7, is also a rational function.

II. With a similar aggregate (a), with limiting points ©, suppose with every point a; there is associated a positive integer r». Then there exists a single valued function whose region of existence excludes only the points ©, vanishing to order n at the point a;, but not elsewhere, expressible in the form

where with every point a n is associated a proper point c n of ©, and

tin being a properly chosen positive integer.

If it should happen that the points © determine a path dividing the plane into separated regions, as, for instance, if a„ = R(l-»-^ 1) exp (i>V2.»), when© consists of the points of the circle [z| = R, the product expression above denotes different monogenic functions in the different regions, not continuable into one another.

§ 9. Construction of a Monogenic Function with a given Region of Existence. — A series of isolated points interior to a given region can be constructed in infinitely many ways whose limiting points are the boundary points of the region, or are boundary points of the region of such denseness that one of them is found in the neighbourhood of every point of the boundary, however small. Then the application of the last enunciated theorem gives rise to a function having no singularities in the interior of the region, but having a singularity in a boundary point in every small neighbourhood of every boundary point; this function has the given region as region of existence.

§ 10. Expression of a Monogenic Function by means of Rational Functions in a given Region. — Suppose that we have a region R of the plane, as previously explained, for all the interior or boundary points of which 2 is finite, and let its boundary points, consisting of one or more closed polygonal paths, no two of which have a point in common, be called C .' Further suppose that all the points of this region, including the boundary points, are interior points of another region R, whose boundary is denoted by C. Let z be restricted to be within or upon the boundary of C ; let a, b, ... be finite points upon C or outside R. Then when b is near enough to a, the fraction (a-b)l(z-b) is arbitrarily small for all positions of 2; say 2— -r |

the rational function of the complex variable t,

in which n is a positive integer, is not infinite at t = a, but has a pole at t = b. By taking n large enough, the value of this function, for all positions z of t belonging to Ro, differs as little as may be desired from (t-a)- 1 . By taking a sum of terms such as

'«.!£[<£»■] I-

we can thus build a rational function differing, in value, in Ro, as little as may be desired from a given rational function f=XA p (t-a)~p,

and differing, outside R or upon the boundary of R, from /, in the fact that while / is infinite at l = a, F is infinite only at t = b. By a succession of steps of this kind we thus have the theorem that, given a rational function of t whose poles are outside R or upon the boundary of R, and an arbitrary

point c outside R or upon the boundary of R, which can be reached by a finite continuous path outside R from all the poles of the rational function, we can build another rational function differing in R arbitrarily little from the former, whose poles are all at the point c.

Now any monogenic function f(t) whose region of definition includes C and the interior of R can be represented at all points z in Ro by

/(«)■

'- -f"

2«J

where the path of integration is C.

' f(t)dt t-z' This integral is the limit of a

£_ " s /fo)fc + i-

where the points U are upon C ; and the proof we have given of the existence of the limit shows that the sum S converges to /(z) uni- formly in regard to z, when z is in Ro, so that we can suppose, when the subdivision of C into intervals tt + i – ti has been carried sufficiently far, that

|S-/(z)i < 6, for all points z of Ro, where e is arbitrary and agreed upon beforehand. The function S is, however, a rational function of z with poles upon C, that is external to Ro. We can thus find a rational function differing arbitrarily little from S, and therefore arbitrarily little from /(z), for all points z of Ro, with poles at arbitrary positions outside Ro which can be reached by finite continuous curves lying outside R from the points of C.

In particular, to take the simplest case, if C , C be simple closed polygons, and T be a path to which C approximates by taking the number of sides of C continually greater, we can find a rational function differing arbitrarily little from/(z) for all points of Ro whose poles are at one finite point c external to V. By a transformation of the form t-c = r- 1 , with the appropriate change in the rational function, we can suppose this point c to be at infinity, in which case the rational function becomes a polynomial. Suppose ti, i 2 , . . . to be an indefinitely continued sequence of real positive numbers, converging to zero, and P r to be the polynomial such that, within Co, I Pr~/(z) I < <»; then the infinite series of polynomials

Pl(8) + |P 3 (z) – P 2 (Z)1. . . ,

whose sum to n terms is P n (z), converges for all finite values of z and represents /(z) within Co.

When C consists of a series of disconnected polygons, some of which may include others, and, by increasing indefinitely the number of sides of the polygons C, the points C become the boundary points r of a region, we can suppose the poles of the rational function, constructed to approximate to/ (z) within Ro, to be at points of r. A series of rational functions of the form

. Hi(z) + {H 2 (z)-H,(z)) + (H 3 (z)-H 2 (z)! + . . / then, as before, represents /(z) within Ro. And Ro may be taken to coincide as nearly as desired with the interior of the region bounded by r.

§ 11. Expression of (1-z)- 1 by means of Polynomials. Appli- cations. — We pursue the ideas just cursorily explained in some further detail.

Let c be an arbitrary real positive quantity; putting the com- plex variable f = £-)-»), enclose the points f = l, f = I + c by means of (i.) the straight lines 7j = ±0, from {=1 to £ — I + e, (ii.) a semi- circle convex to f = o of equation (£-i) 2 + 7j 2 = a 2 , (iii.) a semicircle concave to f = o of equation (tri-c) i --tf = a?. The quantities c and a are to remain fixed. Take a positive integer r so that

— (- I is less than unity, and put

ci = 1 + c/r, c% = 1 + 2c/r, . . . c r = 1 + c ;

316

if n lt th, .

FUNCTION

, n, be positive integers, the rational function

is finite at ? = i, and has a pole of order m at f = ci; function

the rational

i

f = C2, where it 1

is thus finite except for f = C2, where it has a pole of order tti« 2 ; finally, writing

the rational function

U = (l-f)- 1 (l-»l)(l-X 2)“l(l-K3)»l»2 . . . (l- r)“l»2 • • • _i*

has a pole only at f = I +c, of order niih . . ■ n r .

The difference (i-rt _1 -U is of the form (i-f) _1 P, where P, of the form

i-(i-Pi)(i-ps) ■ • ■ (i-pt), in which there are equalities among pi, fit, . . . Pk, is of the form

2pi-2pi(32 + 2piP2p3~ • • • I

therefore, if | n | = |p. 1, we have

I P|

U-f l < a'

and hence

I (l-f)- 1 U| 1 {(l+

(l+

o-“i/(i-(T nl)

Wi

cr”3

+M1M2 . . . Mr_lO- n r)-l)

«in2 Ml . . . « r _;

|(-f) -1 -U|<0 1 [eXp ((T n l+»iO“2+»l« 2 0““3+ .

and therefore less than

a-^exp (i+ff 2 “ . . . +

^(r^r)- 1]

Now put

*constructed with an arbitrary aggregate of reaj positive numbers «i, *2, <3, . . . with zero as their limit, converges uniformly and represents (1-z) -1 for the whole region considered.*

§ 12. Expansion of a Monogenic Function in Polynomials, over a Star Region. — Now consider any monogenic function /(z) of which the origin is not a singular point; joining the origin to any singular point by a straight line, let the part of this straight line, produced beyond the singular point, lying between the singular point and z = 00 , be regarded as a barrier in the plane, the portion of this straight line from the origin to the singular point being erased. Consider next any finite region of the plane, whose boundary points constitute a path of integration, in a sense previously explained, of which every point is at a finite distance greater than zero from each of the barriers before explained ; we suppose this region to be such that any line joining the origin to a boundary point, when produced, does not meet the boundary again. For every point x in this region R we can then write

and therefore less than t.

The rational function U, with a pole at f = l+c, differs therefore from (1-f) -1 , for all points outside the closed region put about f=i, f=l-f-e, by a quantity numerically less than t. So long as a remains the same, r and a will remain the same, and a less value of « will require at most an increase of the numbers rai, « 2 , . . . n, ; but if a be taken smaller it may be necessary to increase r, and with this the complexity of the function U.

c+i-r f_ c+z '

thereby the points f = o, 1, i+c become the points z = o, 1, 00, the function (1-z) -1 being given by (1 -z)~ 1 =c(c + i) _1 (l-f) _1 + (c + I)~ I ; the function U becomes a rational function of z with a pole only at

z = x, that is, it becomes a polynomial in z, say H — , where H

is also a polynomial in z, and

the lines 1)= =*=a become the two circles expressed, if z — x+iy, by (3 +c)2+3 , 2=± c i£±l2 %

the points (v = o, f = I-a), (tj = o, £=l+c+a) become respectively the points (y = o, x = c(i-a)/(c+a),(y = o, x — -c(\ +c+a)/o), whose limiting positions for a = o are respectively (y = o, x = i), (y=o, x= — 00). The circle (x+c)'+/ = c(c+i)y/(i can be written

where p = |e(e + l)/a; its ordinate y, for a given value of x, can therefore be supposed arbitrarily small by taking a sufficiently small. We have thus proved the following result ; taking in the plane of z any finite region of which every interior and boundary point is at a finite distance, however short, from the points of the real axis for which i^ac^oo, we can take a

quantity a, and hence, with an arbitrary c, determine a number r; then corresponding to an arbi- trary «, we can determine a polynomial P„ such that, for all points interior to the region, we have

|(i-z- 1)-p.| < '.;

thus the series of polynomials

Pi + (P2-Pi) + (P3-P 2) + ...,

■»/! S

*wlfera/fc") represents a monogenic branch of the function, in case it be nbf ev£fywhere single valued, and / is on the boundary of the region. Describe now another region R lying entirely within R, and let * be restricted to be within R or upon its boundary; then for any point t on the boundary of R, the points z of the plane for which zt' 1 is real and positive and equal to or greater than 1 , being points for which |z| = |/| or|z| > |/|, are without the region Ro, and not infinitely near to its boundary points. Taking then an arbitrary real positive e we can determine a polynomial in xt~ l , say P(xl~ 1), such that for all points x in R we have*

*l(i-*r 1)- , P(*/ 1)| < <;*

the form of this polynomial may be taken the same for all points / on the boundary of R, and hence, if E be a proper variable quantity of modulus not greater than e,

| 2 «y(*) – j^f(t)P(xn\ = I jjf(t)E jpoM,

where L is the length of the path of integration, the boundary of R, and M is a real positive quantity such that upon this boundary |r 1 /(<)|

POr 1) = c„ + cixt- l + . . . + c m x m t- m , and

±jt-VW=

this gives

|/(x) – {coiMi + CiiiiX + ... + C m ii m X m] I 5«LM/2ir, where the quantities Mo, pi, ps, • ■ . are the coefficients in the ex- pansion of f{x) about the origin.

If then an arbitrary finite region be constructed of the kind explained, excluding the barriers joining the singular points of f(x) to x = 00, it is possible, corresponding to an arbitrary real positive number

l/W-QW I <"■

'Hence as before, within this region /(x) can be represented by a series of polynomials, converging uniformly; when f{x) is not a single valued function the series represents one branch of the function. The same result can be obtained withour. the use of Cauchy'a integral. We explain briefly the character of the proof. If a monogenic function of t, (t) be capable of expression as a power series in t-x about a point x, for \t-x\ ^p, and for all points of this circle | <£(/) I ^{x)\m we have (p+w)' i <(|)", we have

|0(n + ")(.r).z"l <£ (^

<

(m+

w)i v* ; i i -~ pM _j. n ^ 2 y y^j pM2 B '

and therefore

where

n=o

nl

L <- S –

, 2" p«2"

£ 2

Now draw barriers as before, directed from the origin, joining the singular point of (z) to z = oo, take a finite region excluding all these barriers, let p be a quantity less than the radii of convergence of all the power series developments of (z) about interior points of this region, so chosen moreover that no circle of radius p with centre at an interior point of the region includes any singular point of^i(z), let g be such that | (z) |

region, choose the positive integer n so that- I x I < \p ; then take the

points ai=x/n, a 2 = 2x/», a 3 = 3*/ra, . . . a n =x; it is supposed that the region is so taken that, whatever x may be, all these are interior points of the region. Then by what has been said, replacing *, z respectively by o and x/n, we have

FUNCTION

3i7

x, =0

m 1 (ftfa+Ai) (o)

Xi!

©*■

with lanKg/p^"",

provided (m+mii + i)^<(|)™i +1 ; in fact for M=2n 2n_2 it is sufficient to take mi=n in ; by another application of the same inequality, replacing x, z respectively by 01 and x\n, we have

*M(a,)=2 — , ^ +Pm-

*» = where | jS>|

provided (p+m, + l)*<(i)™2 + i; we take ot 2 = w 2 -- 2 , supposing f i<2n 2 "‘. So long as X 2 ^ mj^ra 2 "^ and m<2w 2 " 4 we have /i + X 2 <2n 2 " 2 , and we can use the previous inequality to substitute here for 0* + V(ai). When this is done we find

4>0*)(oj) ‘

n i 4>in+\ + * 2)(o)

a 2 = ^i=0

Xi!X 2 !

©’

2 +/V

- =

©’

+«,

where | flul^g/p^^, the numbers m\,m% being respectively « 2 ” and n 2 ”” 2 .

Applying then the original inequality to 4>M(oj) =0^"^ + */«), and then using the series just obtained, we find a series for ^’(

ˆ *” < >(o) /r\ *

~” K —

Al=0 * 2 =0 Am =

where fc = Xi+X 2 + ...+X„, K = Xi! X 2 !. . . X„!,jKi = n 2n , m 2 =n 2 “- 2 ,. . ., m„ = n 2 , I e| <2g/2 m „.

By this formula (x) is represented, with any required degree of accuracy, by a polynomial, within the region in question; and thence can be expressed as before by a series of polynomials con- verging uniformly (and absolutely) within this region.

§ 13. Application of Cauchy’s Theorem to the Determination of Definite Integrals. — Some reference must be made to a method whereby real definite integrals may frequently be evaluated by use of the theorem of the vanishing of the integral of a function of a complex variable round a contour within which the function is single valued and non singular.

We are to evaluate an integral I f(x)dx ; we form a closed contour

of which the portion of the real axis from x = a to x = b forms a part, and consider the integral ff(z)dz round this contour, supposing that the value of this integral can be determined along the curve forming the completion of the contour. The contour being supposed such that, within it, /(z) is a single valued and finite function of the complex variable z save at a finite number of isolated interior points, the contour integral is equal to the sum of the values of Jf(z)dz taken round these points. Two instances will suffice to explain the

method. (1) The integral f °° ˆJ? *

stood to mean the limit when e, f ,

dx is convergent if it be under . all vanish of the sum of the

/.

}”•-« tan *

dx,

P

tan x

dx.

j;

§ir-<7

tan x

■dx, .

‘ x J Jir-t-e x Ji” + i x

*Now draw a contour consisting in part of the whole of the positive and negative real axis from x = -nir to x= +w, where n is a positive integer, broken by semicircles of small radius whose centres are the points x= ± \ir, x= ±|r, . . . , the contour containing also the lines x = nw and x=-nir for values of y between o and nw tan a, where a is a small fixed angle, the contour being completed by the portion of a semicircle of radius nir sec a which lies in the upper half of the plane and is terminated at the points *= = ±nir, y = nw tan a. Round*

this contour the

integral I •

tan z

dz has the value zero. The contri-

butions to this contour integral arising from the semicircles of centres -%(2s-i)tt, -f|(2i-i)?r, supposed of the same radius, are at once seen to have a sum which ultimately vanishes when the radius of the semicircles diminishes to zero. The part of the contour lying on

the real axis gives what is meant by 2

r

tan x

■dx. The contri-

bution to the contour integral from the two straight portions at x= ±n?r is

r wr tan a . , /t a n iy tan iy

zir--iy M?r(iy; where i tan iy, =[exp (y)-exp (-y)]/[exp (y)+exp (y)], is

a real quantity which is numerically less than unity, so that the contri bution in question is numerically less than

f:

f:

dy

nW+y 2 ‘

that is than 2a.

Finally, for the remaining part of the contour, for which, with R = nx sec o, we have z = R(cos 6+i sin 0) =RE(i0), we have

exp(-R sin 9)EQ’R cos 0) – exp(R sin 9)E(-t R cos 0) exp(-R sin0)E(iR cos 0) +exp(R sin 0)E(-» R cos 0) ‘

when n and therefore R is very large, the limit of this contribution to the contour integral is thus

dz .,„ .

— =td8,ttanz

-/:

d6=-(w-2a).

Making n very large the result obtained for the whole contour is

„ /”°° tan x, , ,

2 I OX-(jr-2a)-2oe = 0,

Jo x v ‘ ‘

where e is numerically less than unity. Now supposing a to diminish to zero we finally obtain

x 2

(2) For another case, to illustrate a different point, we may take the integral

f:

fi

I+i

dz,

wherein a is real quantity such that o) , terminated at the points x = R cos /3, y= ±R sin 0. We suppose a and both zero, and that the phase of_2 is zero for rcosaˆxˆRcos /S, y = rsin a = Rsin/3. Then on rcos aˆxˆRcos 0, y=-r sin a, the phase of z will be 21, and z"' 1 will be equal to x a ~ l exp [2iri(a-l)], where x is real and positive. The two straight portions of the contour will thus together give a contribution

, ... /"R cos r x"'

[i-exp (2«o)l I — ,-■■

1 ˆ "Jrcosa. l+x

It can easily be shown that if the limit of zf(z) for z = o is zero, the integral ff(z)dz taken round an arc, of given angle, of a small circle enclosing the origin is ultimately zero when the radius of the circle diminishes to zero, and if the limit of zf(z) for z = °o is zero, the same integral taken round an arc, of given angle, of a large circle whose centre is the origin is ultimately zero when the radius of the circle increases indefinitely; in our case with /(z) =z a_1 /(l+ z)i we have z /(z) — z°/ (i+z), which, for o

■dx.

[i-exp (2iria

"Jo i+x

dx.

Within the contour /(z) is single valued, and has a pole at z = i; at this point the phase of z is x and z"~ l is exp [w(a-l)] or – exp(iVa); this is then the residue of /(z) at z = -1 ; we thus have

that is

[i-exp (27TMI)] J

— p dx =-2wiexp (iira), ■dx= ir cosec (air).

i-f-x

§ 14. Doubly Periodic Functions. — An excellent illustration of the preceding principles is furnished by the theory of single valued functions having in the finite part of the plane no singularities but poles, which have two periods.

Before passing to this it may be convenient to make here a few remarks as to the periodicity of (single valued) monogenic functions. To say that /(z) is periodic is to say that there exists a constant w such that for every point z of the interior of the region of existence of /(z) we have/(z+o>) =/ (z). This involves, considering all existing periods u = p+icr, that there exists a lower limit of p 2 + 5. Hence, if j be sny real quantity, since the range (g, . . . g) contains only a finite number of intervals of length e, and there cannot be two periods a> = p-ia- such that m«ˆp<(m + i)«, Keˆ

If beside a the functions have a period w' which is not a real multiple of co, consider all existing periods of the form p.w--vo>' wherein n, v are real, and of these those for which oˆ/i = i, o

3i8

FUNCTION

as before there is a least value for v, actually occurring in one or more periods, say in the period ft' =p.ou+vou' ; now take, if mw+ko' be a period, iˆN'vo+k', where N' is an integer, and o5=>'0 ; thence p.a+vu' =p.a + N'(ft' — Mow) +cV] ; take then m — NVe = NXo+X', where N is an integer an< J Xo is as above, and oc=X'X'w/&>', and hence a period X'w+i/'u', wherein X'cr', equations which, since u'/w is not real, always give finite values for m and v.

It thus appears that if a single valued monogenic function of z be periodic, either all its periods are real multiples of one of them, and then all are of the form Ma, where ft is a period and M is an integer, or else, if the function have two periods whose ratio is not real, then all its periods are expressible in the form NQ-f-N'Q', where ft, ft' are periods, and N, N' are integers. In the former case, putting f = 2jriz/£2, and the function /(z) =

Taking the case when the single valued monogenic function has two periods £», u' whose ratio is not real, we can form a network of parallelograms covering the plane of z whose angular points are the points c--mu--m'

We consider only functions for whicn these are poles. Of these there cannot be an infinite number in the primary parallelogram, since then those of these poles which are sufficiently near to one of the necessarily existing limiting points of the poles would be arbitrarily near to one another, contrary to the character of a pole. Supposing the constant c used in

naming the comers of the parallelo- grams so chosen that no pole falls on the perimeter of a parallelogram,

it is clear that the integral

*s?//w**

'a round the perimeter of the

if X denote the generalized logarithm, -«(X[/(zo+a>')]-X[/(z)]), that is, since /(zo+w') =/(zo), gives 2«Na>, where N is an integer; similarly the result of the, integration along the other two opposite sides is of the form 2«'N'«', where N' is an integer. The integral, however, is equal to 2iri times the sum of the residues of zf(z)lf{z) at the poles interior to the parallelogram. For a zero, of order m, of /(a) at z = a, the contribution to this sum is 2-aima, for a pole of order n at z = b the contribution is -2winb; we thus infer that 2raa-2M£ = Nu+N'

We pass now to the construction of a function having two arbitrary periods co, o>' of unreal ratio, which has a single pole of the second order in any one of its parallelograms.

For this consider first the network of parallelograms whose corners are the points ft = mu-{-m'o>' , where m, m' take all positive and negative integer values; putting a small circle about each corner of this network, let P be a point outside all these circles ; this will be interior to a parallelogram whose corners in order may be denoted by zo, ao+w, Zo+m+u', Zo+w'; we shall denote Zo, Zo+o> by Ao, Bo; this parallelogram IIo is surrounded by eight other parallelograms, forming with IIo a larger parallelogram Hi, of which one side, for instance, contains the points Zo-w-u', ao-'"", Zo-w'-f-to, Zo-a/-t-2to, which we shall denote by Ai, Bi, C,, Dj. This parallelogram Hi is surrounded by sixteen of the original parallelograms, forming with IIi a still larger parallelogram n 2 of which one side, for instance, contains the points z — 201 — 2u', Zo-oj— 2w', z — 2w', Zo+co— 2a>', z -f-2o?-2ar', Z0+3W— 2a', which we shall denote by A 2 , B 2 , C 2 , D 2 , E 2 , F 2 . And so on. Now consider the sum of the inverse cubes of the distances of the point P from the corners of all the original parallelograms. The sum will contain the terms

I , I \ , / I , I

^"PAJ 4 " VPAf+FBl+PC?) + VPA| +

i + .-.-H

m)

FAg" 7 ~PBj}" r ---" r PES and three other sets of terms, each infinite in number, formed in a similar way. If the perpendiculars from P to the sides AoB , AiBiCi, A 2 B 2 C 2 D 2 E 2 , and so on, be p, p--q, p+2q and so on, the sum So is at most equal to

■1. 3

P> + (P+ q y

+7

I+... +

2»4-I

+ .

primary parallelogram vanishes; for the elements of the integral corresponding to two such opposite perimeter 'points as a, z+w (or as z, z +w') are mutually destructive. This integral is, however, equal to the sum of the residues of f(z) at the poles interior to the parallelogram. Which sum is therefore zero. There cannot there- fore be such a function having only one pole of the first order in any parallelogram ; we shall see that there can be such a function with two poles only in any parallelogram, each of the first order, with residues whose sum is zero, and that there can be such a function with one pole of the second order, having an expansion near this pole of the form (z-a) _2 f(power series in z-a).

Considering next the function (z)=[f{,z)]~ 1 ^j~, it is easily seen

that an ordinary point of f(z) is an ordinary point of <#>(z), that a zero of order m for/(z) in the neighbourhood of which /(z) has a form, (z-a) m multiplied by a power series, is a pole of cj>(z) of residue m, and that a pole of /(a) of order n is a pole of <£(z) of residue n; manifestly <£(z) has the two periods of /(z). We thus infer, since the sum of the residues of 4>(z) is zero, that for the function /(z), the sum of the orders of its vanishing at points belonging to one parallelo gram, Sot, is equal to the sum of the orders of its poles, 2m ; which is briefly expressed by saying that the number of its zeros is equal to the number of its poles. Applying this theorem to the function /(z)-A, where A is an arbitrary constant, we have the result, that the function /(z) assumes the value A in one of the parallelograms as many times as it becomes infinite. Thus, by what is proved above, every conceivable complex value does arise as a value for the doubly periodic function /(z) in any one of its parallelograms, and in fact at least twice. The number of times it arises is called the order of the function ; the result suggests a property of rational functions.

Consider further the integral I zyj4dz, where /'(a) =~xr. taken

round the perimeter of the primary parallelogram ; the contribution to this arising from two opposite perimeter points such as a and z+w

(P+2q)^---^(p+nqy

of which the general term is ultimately, when n is large, in a ratio of equality with 2q~ 3 n~~ 2 , so that the series S is convergent, as we know the sum 2W" 2 to be; this assumes that p=t=o; if P be on A0B0 the proof for the convergence of So-i/PAg is the same. Taking the three other sums analogous to So we thus reach the result that the series

where ft is mw+m'oi', and m, m' are to take all positive and negative integer values, and z is any point outside small circles described with the points ft as centres, is absolutely convergent. Its sum is therefore independent of the order of its terms. By the nature of the proof, which holds for all positions of a outside the small circles spoken of, the series is also clearly uniformly convergent outside these circles. Each term of the series being a monogenic function of a, the series may therefore be differentiated and integrated outside these circles, and represents a monogenic function. It is clearly periodic with the periods w, w'; for 0(z +w) is the same sum as (z). Consider now the function

/<■>-?£{*<«>?!*•

is of the form-

-ft

■dz, which, as z increases from zo to Zo+«', gives,

where, for the subject of integration, the area of uniform convergence clearly includes the point z = o; this gives

wherein 2′ is a sum excluding the term for which m = o and m' — o. Hence /(z+w)-/(z) and /(z-j-w')-/(a) are both independent of a. Noticing, however, that, by its form, /(z) is an even function of z, and putting a=-jw, a=-|w' respectively, we infer that also /(z) has the two periods o> and w'. In the primary parallelogram n , however, /(a) is only infinite at a = o in the neighbourhood of which its expansion is of the form z~ 2 + (power series in a). Thus /(z) is such a doubly periodic function as was to be constructed, having in any parallelogram of periods only one pole, of the second order.

It can be shown that any single valued meromorphic function of z with (a and u>' as periods can be expressed rationally in terms of /(z) and 0(z), and that [0(z)] 2 is of the form 4 [/(z)] 3 +A/(a)+B ! where A, B are constants.

FUNCTION

3*9

To prove the last of these results, we write, for |z| < | Q|,

I_2Z 3f

{z-ay

and hence, if S'ii"" 2 " = = o, we have, for sufficiently small z greater than zero,

/(z)=2-*+3 < 7 ! .aM-5

(z) =-22 _3 +6cr 2 .Z + 20(7sZ 3 + ■ ■ ■ ;

using these series we find that the function

F(z) = [, a/, and can only be infinite when either /(z) or {z) is infinite; this follows from its form in /(z) and (z) ; thus in one parallelogram of periods it can be infinite only when z = o; we have proved, however, that it is not infinite, but, on the contrary, vanishes, when z = o. Being, therefore, never infinite for finite values of z it is a constant, and therefore necessarily always zero. Putting therefore f{z) = f and (z) = d£/dz we see that

2pi (4r 3 -6o

Historically it was in the discussion of integrals such as

Jd{ (4f 3 -6oo-2. f-HOo-sH, regarded as a branch of Integral Calculus, that the doubly periodic functions arose. As in the familiar case

- C f

J^d-n-%,

where f = sin z, it has proved finally to be simpler to regard f as a function of z. We shall come to the other point of view below, under § 20, Elliptic Integrals.

To prove that any doubly periodic function F(z) with periods co, u', having poles at the points z = ai, . . . z = a m of a parallelo- gram, these being, for simplicity of explanation, supposed to be all of the first order, is rationally expressible in terms of <£(z) and/(z), and we proceed as follows: —

Consider the expression

AlV . (r.l)m+l?(f,l)m-8

- *w -(r-A 1)(r-A 2)...(r-A m)*

*where A, =f(a,), f is an abbreviation for /(z) and ij for (z), and (f,!)m, (f,i)m-2, denote integral polynomials in f, of respective orders m and m-2, so that there are 2m unspecified, homogeneously entering, constants in the numerator. It is supposed that no one of the points Oi, . . . o m is one of the pointsmw+m'w' where f(z) =00 . The function *(z) is a monogenic function of z with the periods w, w', becoming infinite (and having singularities) only when (1) f = 00 or (2) one of the factors f-A, is zero. In a period parallelogram including z = o the first arises only for z = o; since for f = 00 , 7; is in a finite ratio to f 3 / 2 ; the function *(z)"for f = oo is not infinite provided the coefficient of f m in (f,l) m is not zero; thus *(z) is regular about z = o. When f — A, = o, that is /(z)=/(a„), we have 2= *=a, +mu-{-m'ai', and no other values of z, m and m' being integers; suppose the unspecified coefficients in the numerator so taken that the numerator vanished to the first order in each of the m points — 01, — 02, . . . — o m ; that is, if 0(a,) = B„ and therefore {-a,) =-B„ so that we have the m relations (A„i) m B a (A„i) m _ 2 = o; then the function #(z) will only have the m poles 01, . . . a m . De noting further the m zeros of F(z) by a/, . . . a m ' , putting /(a/) =A,', (a,') = B,', suppose the coefficients of the numerator of *(z) to satisfy the further m-l conditions*

*(A.',i))b +B.'(A.',i),»-s = o for j = i, 2, . . . (m-i). The ratios of the 2m coefficients in the numerator of *(z) can always be chosen so that the m-^-(m-i) linear conditions are all satisfied. Consider then the ratio*

F(z)/(z):*

it is a doubly periodic function with no singularity other than the

one pole a m '. It is therefore a constant, the numerator of $(z)

vanishing spontaneously in a m '. We have

F(z)=A#(z),

where A is a constant; by which F(z) is expressed rationally in terms of / (z) and (z), as was desired.

When z = o is a pole of F(z), say of order r, the other poles, each of the first order, being ai, . . . a m , similar reasoning can be applied to a function

*(r.i) > +i)(r.o**

(f-A,) . . . (f-A m)' where h, k are such that the greater of 2h-2m, 2k+ $-2tn is equal to r; .the case where some of the poles a u . . . a m are multiple is to be met by introducing corresponding multiple factors in the de- nominator and taking a corresponding numerator. We give a solution of the general problem below, of a different form.

One important application of the result is the theorem that the

functions /(z+/), {z) and (t). It can in fact be shown, by reasoning analogous to that given above, that

/fr+o+/«+/w -[$£$]'*

This shows that if F(z) be any single valued monogenic function which is doubly periodic and of meromorphic character, then F(z-H) is an algebraic function of F(z) and F(/). Conversely any single valued monogenic function of meromorphic character, F(z), which is such that F(z-N) is an algebraic function of F(z) and F(/), can be shown to be a doubly periodic function, or a function obtained from such by degeneration (in virtue of special relations connecting the fundamental constants).

The functions /(z), {z) above are usually denoted by $(z), %'{z) ; further the fundamental differential equation is usually written

*(5|3'z) > =4($z)'-rf$z-g 3 , and the roots of the cubic on the right are denoted by e it e 2 , e 3 ; for the odd function, *jS'z, we have, for the congruent arguments -icoand iu, $'(i35'(*«) = '■!}'(!<). and hence $'(«) =0; hence we can take «! = S J$ (§«) , « 2 = Sfi(J«-;-|co'), « 3 = $(i«/). It can then be proved that [${z)-ei][ty(.z+lw)-ei] = (ei-ei) (ei-e 3), with similar equations for the other half periods. Consider more particu- larly the function SJ5-ei; like $(z) it has a pole of the second order at z = o, its expansion in its neighbourhood being of the form z~ 2 (l-eiZ 2 Az 4 4-. . .) ; having no other pole, it has therefore either two zeros, or a double zero in a period parallelogram (u>, u'). In fact near its zero \a its expansion is (x-ia)ty(iai)%(z-iw) i ty"(iw) + . . . ; we have seen that $'(i M) =0; thus it has a zero of the second order wherever- it vanishes. Thus it appears that*

the square root [$(z) — ei], *if we attach a definite sign to it for some particular value of z, is a single valued function of z; for it can at most have two values, and the only small circuits in the plane which could lead to an interchange of these values are those about either a pole or a zero, neither of which, as we have seen, has this effect; the function is therefore single valued for any circuit. Denoting the function, for a moment, by /i(z), we have /i(z+oi) = ±/i(z), fi(z+o>') = ±/i(z) ; it can be seen by considerations of continuity that the right sign in either of these equations does not vary with z; not both these signs can be positive, since the function has only one pole, of the first order, in a parallelogram (a>, w'); from the expansion of fi(z) about z = o, namely z- J (i — ieiz 2 + .. .), it follows that /i(z) is an odd function, and hence /i(— io)'= – /i(i«'>* which is not zero since [/i(l'")] 2 = «3— ei, so that we have/i(z-|-u') = — /i(z); an equation /i(z+ and 201′ it has poles at z = o, z = «' each of the first order, and zeros of the first order at z = ˆw, z = \o>--u>' ; it is thus a doubly periodic function of the second order with two different poles of the first order in its parallelogram (u, 2a'). We may similarly consider the functions / 2 (z) = [«(z)-e 2]l, h(z) = [«P(z)-e,]i ; they give*

/ 2 (z-U+a/)=/ 2 (z), Mz+o,) = -M), /«(*+«') = -/»«. _ Ji(z+u') =f 3 z, /s(z-t-w) = -jfs(z), f,(z+u+u') = -/»(«). Taking « = z(e!-e 3)J, with a definite determination of the constant {fi\— ez)i, it is usual, taking the preliminary signs so that for z = o each of z/i(z), z/ 2 (z), zf 3 (z) is equal to +1, to put*

k 2 = (er-e 3)/(ei-e 3), K = Jw(ei-es)}, iK' = |«'(gi-e 3)i ; thus sn(w) is an odd doubly periodic function of the second order with the periods 4K, 2iK, having poles of the first order at u — iK', tt = 2K+1K', and zeros of the first order at w = o, U — 2K; similarly cn(w), dn (w)are even doubly periodic functions whose periods can be written down, and sn 2 («)-}-cn 2 (tt) = 1, fe 2 sn 2 («)+dn 2 (M) = 1 ; if x = sn(w) we at once find, from the relations given here, that

g = [(i- 2)(l-fcV)]-J;*

if we put x — sin we have

g = [l- 2 sin 2]-,*

*and if we call <£the amplitude of w, we may write <#> = am(«), * = sin. am(«), which explains the origin of the notation sn(w). Similarly cn(tt) is an abbreviation of cos. am(«), and dn(w) of A am(w), where A(<£) meant (1-k 2 sin 2)h. The addition equation for each of the functions / i(z),/ 2 (z),/ s (z) is very simple, being*

W+t) -i [dz +di) lo &/(z) -f(t) ~ f{z)-f(i) — where /i'(z) means dfi{z)/dz, which is equal to -/ 2 (z)./ 3 (z), and /Hz)

3 20

FUNCTION

means [/(z)] 2 . This may be verified directly by showing, if R denote the right side of the equation, that dR/dz = dK/dt; this will require the use of the differential equation

[jyw] = [/;(Z) +ei – ei][fi(z) + ei -e 3], and in fact we find*

*(£ – S) ^ w +/o)i =t i*hm = (£ – D lo ^ [/(«wwi •*

hence it will follow that R is a function of z+t, and R is at once seen to reduce to /(z) when t = o. From this the addition equation for each of the functions sn(a), cn(a), dn(u) can be deduced at once; if Si, ci, di, s 2 , Co, d 2 denote respectively sn(«i), cn(«i), dn(tti), sn(w 2), cn(«2), dn(« 2), they can be put into the forms

snOi+« 2) = (sic 2 d 2 +S2Cidi)/D,

cn(ui+th) = (c 1 c 2 -s 1 s 2 did 2)/D,

dn(ui+u 2) ~ (d 1 d 2 ^ 2 SiS 2 CiC 2)/D, where D = i& 2 SiS;>.

The introduction of the function /i(z) is equivalent to the intro- duction of the function $(z; co, 2co') constructed from the periods co, 2u' as was $(z) from co and co'; denoting this function by $1(2) and its differential coefficient by 5)3'i(z), we have in fact

1 1{Z> °%(

'45(2)=$l(2)+^ 1 (z + W ,).-*.(«'),

as a consideration of the poles and expansion near z — o will show.

A function having w, co for periods, with poles at two arbitrary points a, b and zeros at a', b', where a'+b' =a+b save for an expres- sion njw-f-m'co', in which m, m' are integers, is a constant multiple of

l$t z -H<*'+&')H5[a'-i(<*'6')]} / mz-i(a&)HH<*-i(a+&)l} :

if the expansion of this function near 2 = be X(8-a)- 1 -r-M+2j*»(z-<»)' , i

periods, we obtain, since the sum of the residues A is zero, a doubly periodic function without poles, that is, a constant; this gives the expression of F(2) referred to. The indefinite integral JF(z)dz can then be expressed in terms of z, functions 'iJS(z-o) and their differential coefficients, functions f(z-a) and functions log a{z-a).

§ 15. Potential Functions. Conformal Representation in General. — Consider a circle of radius a lying within the region of existence of a single valued monogenic function, u--iv, of the complex variable z, = x+ty, the origin z = o being the centre of this circle. If z=r~E.(i+i sin0) be an internal point of this circle we have

the expansion near z =

X(z

b is

-by

+M+2 (-l)>„(2-6)»

as we see by remarking that if z'6 = (z-o) the function has the same value at z and z'; hence the differential equation satisfied by the function is easily calculated in terms of the coefficients in the expansions.

From the function 5p(z) we can obtain another function, termed the Zeta-f unction ; it is usually denoted by f(z), and defined by

f(*)-

*■/:[?- **w]**- r U + 5 + £)'*

for which as before we have equations

f(z + w) = f(z) + 2iriij, f(2 + co') = f(z) + 2«y, where 2tj, 2t' are certain constants, which in this case do not both vanish, since else f(z) would be a doubly periodic function with only one pole of the first order. By considering the integral

/f(z)PC0 From f (2) by means of the equation

'-?-« P jj:[f«-i]-.[-n{(x-J)«pg + ^)],

we determine an integral function cr(z), termed the Sigma-function, having a zero of the first order at each of the points s = il; it can be seen to satisfy the equations

cr(2 + co) _ , .._,_ , t I,

' = -exp [27ri))(z + Jco)],

-exp [2irir;'(z + 5«')]. . + a m = a\ + a' 2 + . .

*, + ^ = j_.r(u ± iY)^*

*2m J t-z ralue of the function a i(id) ; this is the same „ ± *, ± f (U + *y) [i(rM)E(a > - t -0)] , g u ^ w ~2-wJ i + {rlay-2{rla)cos{0-4 >)*

where U-WV is the value of the function at a point of the cir- cumference and t = a'E(id); this is the same as

If in the above formula we replace z by the external point (a 2 ®E{i) the corresponding contour integral will vanish, so that

also

(V + iV)l(r/aY-(r/a)E(ie-i

Ufq'-r'j

a{z) ~ "* r l """" v " ' "■"-"•

By means of these equations, if Oi-f-a 2 | +a' m , it is readily shown that

The functions f(z), %{z) may be used to write any meromorphic doubly periodic function F(z) as a sum of terms having each only one pole; for if in the expansion of F(z) near a pole z = o the terms With negative powers of z-a be

A 1 (z-a)- 1 A 2 (z-o)-' . . . +A m+i (z-a)-<"W-», then the difference

F(z)-A,f(z-a)-A 2 < P;z-o)- ... + ^2f , (-i)»<|$<— i>(z – a)

ction

M= 2TJV

xde,

4-r 2 ~2 ar cos (0-0) and a corresponding formula for v in terms of V. If O be the centre of the circle, Q be the interior point z, P the point aE(id) of the circumference, and co the angle which QP makes with OQ produced, this integral is at once found to be the same as

u=ljVdo,-±jVd8,

of which the second part does not depend upon the position of z, and the equivalence of the integrals holds for every arc of integration.

Conversely, let U be any continuous real function on the circum- ference, Uo being the value of it at a point P of the circumference, and describe a small circle with centre at P cutting the given circle in A and B,_so that for all points P of the arc AP B we have|U-U | <«, where e is a given small real quantity. Describe a further circle, centre P within the former, cutting the given circle in A' and B', and let Q be restricted to lie in the small space bounded by the arc A'P B' and this second circle; then for all positions of P upon the greater arc AB of the original circle QP 2 is greater than a definite finite quantity which is not zero, say QP 2 > D 2 . Consider now the integral

,_ J_ f n (a 2 -r 2)

u 2tvJ u a 2 +r 2 -2cvcos(which we evaluate as the sum of two, respectively along the small arc AP„B and the greater arc AB. It is easy to

verify that, for the whole circumference,

-73— r;d0, = ” fvdu~ C\5d0, ;(0-0) ttJ 2wJ

U,

2vrJ

Uo-

V+r 2 Hence we can write

■2orcos(0-0)

de

\s

Uocico— — I Uoi

-Uo

2wjA

APoB

(U-Uo)cfo-

2-wp

AP B

(U-

U„)

£J>-u.><9

(a 2 -r 2)

de.

will not be infinite at z = a. Adding to this a sum of further terms of the same form, one for each of the poles in a parallelogram of

*If the finite angle between QA and QB be called * and the finite angle AOB be called 6, the sum of the first two components is numerically less than*

£(*+e).

If the greatest value of 1 (U-U)t on the greater arc AB be called H, the last component is numerically less than

of which, when the circle, of centre P , passing through A'B' is sufficiently small, the factor a 2 -r 2 is arbitrarily small. Thus it appears that u' is a function of the position of Q whose limit, when Q, interior to the original circle, approaches indefinitely near to P 0(is U . From the form

*'=- fvdw~ fvde,

since the inclination of QP to a fixed direction is, when Q varies, P remaining fixed, a solution of the differential equation

where z, =x+iy, is the point Q, we infer that u' is a differentiable

FUNCTION

321

function satisfying this equation; indeed, when r

=J

U-

(a 2 -r 2)

where

a 2: -r~2arcos(

■if 4

= a x , +a l x+b i y+a 2 (x' i

ˆte

1+2- cos(

COS2(

-<*>)+

On

2vJ

-if

VdO, a, = U cos 20 ,,,

y-) + 2b 2 xy + . . .

, 1 fXJ sin

> 6 2 = – I — zr

-]

d0

UsinS

< #,

< #.

In this series the terms of order n are sums, with real coefficients, of the various integral polynomials of dimension n which satisfy the equation dV/dx 2 + dV/dy 2 ; the series is thus the real part of a power series in z, and is capable of differentiation and integration within its region of convergence.

Conversely we may suppose a function, P, defined for the interior of a finite region R of the plane of the real variables x, y, capable of expression about any interior point Xo, yo of this region by a power series in x-x , y-y

d'PidP 2

dx 2 + dy-~

■ o,

we then call it a monogenic potential function. From this, save for an additive constant, there is defined another potential function by means of the equation

o-r'G?*-^)-

The functions P, Q, being given by a finite number of power series, will be single valued in Ro, and P-HQ will be a monogenic function of z within Ro- In drawing this inference it is supposed that the region Ro is such that every

closed path drawn in it is capable of being deformed continuously to a point lying within R , that is, is simply connected.

Suppose in particular, c being any point interior to Ro, that P approaches continuously, as z approaches to the boundary of R, to the value log r, where r is the distance of c to the points of the perimeter of R. Then the function of z expressed by

*r=(z-c)exp(P*Q) will be developable by a power series in (z-Zo) about every point z interior to Ro, and will vanish at z = c; while on the boundary of R it will be of constant modulus unity. Thus if it be plotted upon a plane of f the boundary of R will become a circle of radius unity with centre at f = o, this latter point corresponding to z = e. A closed path within Ro, passing once round z = c, will lead to a closed path passing once about f = 0. Thus every point of the interior of R will give rise to one point of the interior of the circle. The con- verse is also true, but is more difficult to prove; in fact, the differ- ential coefficient dˆ/dz does not vanish for any point interior to R. This being assumed, we obtain a conformal representation of the interior of the region R upon the interior of a circle, in which the arbitrary interior point c of R corresponds to the centre of the circle, and, by utilizing the arbitrary constant arising in determining the function Q, an arbitrary point of the boundary of R corresponds to an arbitrary point of the circumference of the circle.*

There thus arises the problem of the determination of a real mono- genic potential function, single valued and finite within a given arbitrary region, with an assigned continuous value at all points of the boundary of the region. When the region is circular this

problem is solved by the integral- j Vdoi I Vd6 previously

given. When the region is bounded by the outermost portions of the circumferences of two overlapping circles, it can hence be proved that the problem also has a solution; more generally, con- sider a finite simply connected region, whose boundary we suppose to consist of a single closed path in the sense previously explained, ABCD; joining A to C by two non-intersecting paths AEC, AFC lying within the region, so that the original region may be supposed to be generated by the overlapping regions AECD, CPAB, of which the common part is AECF ; suppose now the problem of determining a single valued finite monogenic potential function for the region AECD with a given continuous boundary value can be solved, and also the same problem for the region CFAB ; then it can be shown that the same problem can be solved for the original area. Taking indeed the values assigned for the original perimeter ABCD, assume arbitrarily values for the path AEC, continuous with one another and with the values at A and C ;

then determine the potential function for the interior of AECD; this will prescribe values for the path CFA which will be continuous at A and C with the values originally

Xi. 11.

proposed for ABC ; we can then determine a function for the interior of CFAB with the boundary values so prescribed. This in its turn will give values for the path AEC, so that we can determine a new function for the - interior of AECD. With the values which this assumes along CFA we can then again determine a new function for the interior of CFAB. And so on. It can be shown that these functions, so alternately determined, have a limit representing such a potential function as is desired for the interior of the original region ABCD. There cannot be two functions with the given perimeter values, since their difference would be a monogenic potential function with boundary value zero, which can easily be shown to be everywhere zero. At least two other methods have been proposed for the solution of the same problem.

A particular case of the problem is that of the conformal repre- sentation of the interior of a closed polygon upon the upper half of the plane of a complex variable t. It can be shown without much difficulty that if a, b, c, . . . be real values of t, and a, 0, 7, ... be n real numbers, whose sum is w-2, the integral z=f(l-a,y- 1 (t-b)fi-K . ,dt, as t describes the real axis, describes in the plane of z a polygon of » sides with internal angles equal to car, /Sx, . . ., and, a proper sign being given to the integral, points of the upper half of the plane of t give rise to interior points of the polygon. Herein the points o, b, . . . of the real axis give rise to the corners of the polygon ; the condition 2a = «-2 ensures merely that the point t = co does not correspond to a corner; if this condition be not regarded, an additional corner and side is introduced in the polygon. Conversely it can be shown that the conformal representation of a polygon upon the half plane can be effected in this way ; for a polygon of given position of more than three sides it is necessary for this to determine the positions of all but three of a, b, c, . . . ; three of them may always be supposed to be at arbitrary positions, such as t = o, /=l, i = oo.

As an illustration consider in the plane of z, =x+iy, the portion of the imaginary axis from the origin to z = ih, where h is positive and less than unity; let C be this point z = ih; let BA be of length unity along the positive real axis, B being the origin and A the point z= I ; let DE be of length unity along the negative real axis, D being also the origin and E the point z=-i; Jet EFA be a semicircle of radius unity, F being the point z = i. If we put f = [(z 2 +h 2)/(i+h 2 z°-)}*, with f=i when z = i, the function is single valued within the semicircle, in the plane of z, which is slit along the

imaginary axis from the origin to z = ih; if we plot the value of f upon another plane, as z describes the continuous curve ABCDE, f will describe the real axis from f = 1 to f = -1, the point C giving f = 0, and the points B, D giving the points f = = ±h. Near z = o

or r+ /* = -z*I^ + ...;

the expansion of f is f-A=z 2 — jr + – • •>

2h

in either case an increase of |x in the phase of z gives an increase of tr in the phase of f-A or f+ft. Near z = ih the expansion of f is f =(z-ih)\2ih-l(l-h 4)] 2 +. . ., and an increase of 2ir in the phase of z-ih also leads to an increase of n in the phase of f. Then as z describes the semicircle EFA, f also describes a semicircle of radius unity, the point z — i becoming f = i. There is thus a conformal representation of the interior of the slit semicircle in the z-plane, upon the interior of the whole semicircle in the f-plane, the function

z = [(f ! -^)/(i-AT)] i

being single valued in the latter semicircle. By means of a trans- formation / = (f+i) 2 /(f-i) 2 , the semicircle in the plane of f can further be conformably represented upon the upper half of the whole plane of t.

As another illustration we may take the conformal representation of an equilateral triangle upon a half plane. Taking the elliptic function *P(m) for which $' 2 («) =4 i $ 3 («)-4, so that, withe = exp (fjrt), we have d = 1 , e 2 = e 2 , e s = c, the half periods may be taken to be if 00 * 1 . f °° dt j

Ji 2(f 3 -l)» Je 3 2(< 3 -l)i

drawing the equilateral triangle whose vertices are 0, of argument O, A of argument a, and B of argument os+ca' = e 2 u, and the equi lateral triangle whose angular points are O, B and C, of argument w', let E, of argument i(2w+co'), and D, of argument i(a+2a>'), be the centroids of these triangles respectively, and let BE, OE, AE cut OA, AB, BO in K, L, H respectively, and BD, OD, CD cut OC, BC, OB in F, G, H respectively; then if u = %--iri be any point of the interior of the triangle OEH and v = e«o = e({-«ij) be any point of the interior of the triangle OHD, the points respectively of the ten triangles OEK, EKA, EAL, ELB, EBH, DHB, DBG, DGC, DCF, DFO are at once seen to be given by -&>, a^-eu, w-c 2 d, w +a)')'" ! , which is the con jugate complex of 2(u{-moi--m'toi)~ 3 , arises in the infinite sum which expresses $'(w)> namely as -2(w+,ua>-r-

M'«>0~ 3 , where fi = m-m', y.' = -m', it follows that $'(«) is real; in a similar way we prove that %'{u) is pure imaginary when u is pure imaginary, and that '{u) ='{tu) =$'(e 2 «), as also that for v = m a , $'_(») is the conjugate complex of %'{u. Hence it follows that the variable

- = $*$'(«)

II

322

FUNCTION

takes each real value once as u passes along the perimeter of the triangle ODE, being as can be shown respectively oo , I, o, — I at O, D, H, E, and takes every complex value of imaginary part positive once in the interior of this triangle. This leads to

in accordance with the general theory.

It can be deduced that r = / 2 represents the triangle ODH on the upper half plane of t, and f = (i— t -1)^ represents similarly the triangle OBD.

§ 1 6. Multiple valued Functions. Algebraic Functions. — The explanations and definitions of a monogenic function hitherto given have been framed for the most part with a view to single valued functions. But starting from a power series, say in z—c, which represents a single value at all points of its circle of convergence, suppose that, by means of a derived series in z — c,' where c' is interior to the circle of convergence, we can continue the function beyond this, and then by means of a series derived from the first derived series we can make a further continuation, and so on; it may well be that when, after a closed circuit, we again consider points in the first circle of convergence, the value represented may not agree with the original value. One example is the case tf>, for which two values exist for any value of z; another is the generalized logarithm X(z), for which there is an infinite number of values. In such cases, as before, the region of existence of the function consists of all points which can be reached by such continuations with power series, and the singular points, which are the limiting points of the point-aggregate constituting the region of existence, are those points in whose neighbourhood the radii of convergence of derived series have zero for limit. In this description the point z=oo does not occupy an exceptional position, a power series in z — c being transformed to a series in i/z when z is near enough to c by means olz — c=c(i—cz~ l)[i — (i—cz~ l)]~ i , and a series in i/z to a series in z—c, when z is near enough to c, by

means of l = K I+t r) ”’

The commonest case of the occurrence of multiple valued functions is that in which the function s satisfies an algebraic equation f(s,z) — fos n +pis*~ l + ■ ■ ■ +pn=o, wherein p , pi, . . . p n are integral polynomials in z. Assuming f(s,z) incapable of being written as a product of polynomials rational in s and z, and excepting values of z for which the polynomial coefficient of s n vanishes, as also the values of z for which beside f(s,z) =0 we have also df(s,z)/ds — o, and also in general the point z = oo , the roots of this equation about any point z = c are given by n power series in z—c. About a finite point z = c for which the equation df(s,z)/ds = o is satisfied by one or more of the roots 5 of f(s,z) =o, the n roots break up into a certain number of cycles, the r roots of a cycle being given by a set of power series in a radical (z— c)7 r , these series of the cycle being obtainable from one another by replacing (z — c) 1 /’ by w(z — r) l / r , where a, equal to exp {2vihlr), is one of the rth roots of unity. Putting then z— c = P we may say that the r roots of a cycle are given by a single power series in t, an increase of 2?r in the phase of t giving an increase of 2«” in the phase of z — c. This single series in t, giving the values of s belonging to one cycle in the neighbourhood of z = c when the phase of z—c varies through 2irr, is to be looked upon as defining a single place among the aggregate of values of z and s which satisfy /(s,z) = o; two such places may be at the same point [z = c, s = d) without coinciding, the corresponding power series for the neighbouring points being different. Thus for an ordinary value of z, z = c, there are n places for which the neighbouring values of 5 are given by n power series in z—c; for a value of z for which df(s,z)/ds = o there are less than n places. Similar remarks hold for the neighbourhood of z = oo ; there may be n places whose neighbourhood is given by » power series in z -1 or fewer, one of these being associated with a series in t, where t = (z~ l YI T ; the sum of the values of r which thus arise is always n. In general, then, we may say, with t of one of the forms (z — c), (z — e)V, z -1 , (z _1) 1 / r > that the neighbourhood of any place (c,d) for which f(c,d) =0 is given by a pair of expressions z = c + P(0, s = d+Q(t), where P(/) is a (particular case of a) power series vanishing for t = o, and Q(/) is a power series vanishing for / = o, and t vanishes at (c,d), the expression z—c being replaced by z -1 when c is infinite, and similarly the expression s — dby s~ l when d is infinite. The last case arises when we consider the finite values of z for which the polynomial coefficient of s” vanishes. Of such a pair of expressions we may obtain a continuation by writing / = 4> + Xir-f-Xjr’f • • •, where r is a new variable and Xi is not zero; in particular for an ordinary finite place this equation simply becomes t = k--r. It can be shown that all the pairs of power series z = c-- P(/), s = d-- Q(t) which are necessary to represent all pairs of values of z, s satisfying the

equation /(s,z) = o can be obtained from one

of them by this process of continuation, a faet which we express by saying that the equation f(s,z) = o defines a monogenic algebraic construct. With less accuracy we may say that an irreducible algebraic equation f(s,z) = o determines a single monogenic function s of z.

Any rational function of z and s, where f(s,z) = o, may be considered in the neighbourhood of any place (c,d) by substituting therein z = c--R{t), s = d + Q(t); the result is necessarily of the form t m H(t), where H(<) is a power series in t not vanishing for i — o and m is an integer. If this integer is positive, the function is said to vanish to order m at the place; if this integer is negative, = — /i, the function is infinite to order /j. at the place. More generally, if A be an arbitrary constant, and, near (c,d), R(s,z)—A is of the form t m H(t), where m is positive, we say that R(s,z) becomes m times equal to A at the place; if R(.s,z) is infinite of order yu at the place, so also is R(s,z) — A. It can be shown that the sum of the values of m at all the places, including the places z = oo , where R(s,z) vanishes, which we call the number of zeros of R(s,z) on the algebraic construct, is finite, and equal to the sum of the values of m where R (s,z) is infinite, and more generally equal to the sum of the values of m where R(s,z) = A; this we express by saying that a rational function R(s,z) takes any value (including oo) the same number of times on the algebraic construct; this number is called the order of the rational function.

That the total number of zeros of R (s,z) is finite is at once obvious, these values being obtainable by rational elimination of s between f(s,z)—o, R(s,z) = 0. That the number is equal to the total number of infinities is best deduced by means of a theorem which is also of more general utility. Let R(s,z) be any rational function of s, z, which are connected by/(.s,z) = o; about any place (c,d) for which z = e + P(t), s =

R(,,z)g

in powers of t and pick out the coefficient of tr 1 . There is only a finite number of places of this kind. The theorem is that the sum of these coefficients of tr 1 is zero. This we express by

[R ('>3i]r-i- –

The theorem holds for the case n = \, that is, for rational functions of one variable z; in that case, about any finite point we have z-c = t, and about z = °o we have z~ i = t, and therefore dz/dt = -t~~ 2 ; in that case, then, the theorem is that in any rational function of z,

s (zV(i^+-+(z^r) +Pz*+Qz-+...+R,

the sum SAi of the sum of the residues at the finite poles is equal to the coefficient of i/z in the expansion, in ascending powers of l/z, about z = « ; an obvious result. In general, if for a finite place of the algebraic construct associated with/(s,z) = o, whose neighbour- hood is given by z = c+F,s = d--Q(t), there be a coefficient of tr 1 in R(s,z)dzfdt, this will be r times the coefficient of tr* in R(s,z) or R[d--Q{t), c--f], namely will be the coefficient of J _r in the sum of the r series obtainable from _R[d+Q(t), c +f] by replacing t by to/, where w is an rth root of unity ; thus the sum of the coefficients of tr 1 in R(s, z)dz/dt for all the places which arise for z — c, and the corre- sponding values of s, is equal to the coefficient of {z— c)~ l in R(ii,z) + R(s2>z)+ • • • +R(s«> 2)i where si, . . . s n are the n values of s for a value of z near to z = c; this latter sum 2R(s;, z) is, however, a rational function of z only. Similarly, near z = oo , for a place given by z~ l = r, s = d+Q(t), or s" 1 = Q(t), the coefficient of f-MnRfa, z)dz/dt is equal to — r times the coefficient of V in R[d--Q{t), t~ r], that is equal to the negative coefficient of z~ l in the sum of the r series R[d+Q(o>t), tr r], so that, as before, the sum of the coefficients of t~ l in R(s,z)dz/dt at the various places which arise for z = oo is equal to the negative coefficient of z 1 in the same rational function of z, 2R(s,,z). Thus, from the corresponding theorem for rational functions of one variable, the general theorem now being proved is seen to follow.

Apply this theorem now to the rational function of 5 and 0, i dR(s,z) , R(s,z) dz ' at a zero of R(s,z) near which R(s,z) = P*H(<), we have i dR(s, z) dz d {

^= #MR(',«)]}.

R(s,z) dz

where X denotes the generalized logarithmic function, that is equal t° mtr iJ r power series in t;

similarly at a place for which R(s, z) =£tK(/) ; the theorem

f i

_R(s,z) dz dt\t- 1 ° thus gives Sot =2ju, or, in words, the total number of zeros of R(x, z) on the algebraic construct is equal to the total number of its poles. The same is therefore true of the function R(s, z)— A, where A is an arbitrary constant ; thus the number in question, being equal to the number of poles of R(s,z) — A, is equal also to the number of times that R(s,z) = A on the algebraic construct.

FUNCTION

We have seen above that all single valued doubly periodic mero- morphic functions, with the same periods, are rational functions of two variables 5, 2 connected by an equation of the form s 2 = 4z 3 + Az+B. Taking account of the relation connecting these variables s, z with the argument of the doubly periodic functions (which was above denoted by z), it can then easily be seen that the theorem now proved is a generalization of the theorem proved previously establishing for a doubly periodic function a definite order. There exists a general- ization of another theorem also proved above for doubly periodic functions, namely, that the sum of the values of the argument in one parallelogram of periods for which a doubly periodic function takes a given value is independent of that value; this generalization, known as Abel's Theorem, is given § 17 below.

§ 17. Integrals of Algebraic Functions. — In treatises on Integral Calculus it is proved that if R(z) denote any rational function, an indefinite integral JR(z)dz can be evaluated in terms of rational and logarithmic functions, including the inverse trigono- metrical functions. In generalization of this it was long ago discovered that if s 2 = az>--bz+c and R{s,z) be any rational function of s, z any integral JR(s,z) dz can be evaluated in terms of rational functions of s, 2 and logarithms of such functions; the simplest case is fsˆdz or f(az 2 +bz+c)~*dz. More generally if f(s. z) =0 be such a relation connecting s, z that when 6 is an appropriate rational function of s and z both s and z are rationally expressible, in virtue of f(s,z)=o in terms of 6, the integral JR{s,z)dz is reducible to a form/H(0)d0, where H(0) is rational in 9, and can therefore also be evaluated by rational functions and logarithms of rational functions of s and z. It was natural to inquire whether a similar theorem holds for integrals fR(s,z)dz wherein s 2 is a cubic polynomial in z. The answer is in the negative. For instance, no one of the three integrals fdz f zdz r dz J s 1 J s ' J (z-c)s can be expressed by rational and logarithms of rational functions of s and z; but it can be shown that every integral JR(s,z)dz can be expressed by means of integrals of these three types together with rational and logarithms of rational functions of 5 and 2 (see below under § 20, Elliptic Integrals). A similar theorem is true when s 2 = quartic polynomial in z; in fact when s 2 = A(z-a)(z-b)(z-c)(z-d), putting y = s(z-a)~ i , x = (z-a)~\ we obtain y 2 = cubic polynomial in x. Much less is the theorem true when the fundamental relation f(s,z) =0 is of more general type. There exists then, however, a very general theorem, known as Abel's Theorem, which may be enunciated as follows: Beside the rational function R(s, z) occurring in the integral fR(s,z)dz, consider another rational function H(s,z); let (

R(s, z) dz is equal to the sum of the coefficients of t~ l in the

expansions of the function

R , ,dz / H(s. z)-

where X denotes the generalized logarithmic function, at the various places where the expansion of R(s,z)dz/dt contains negative powers of /. This fact may be obtained at once from the equation

j-, r R(S, Z)~ =0,

l(s,z)-iji dtj t- 1

wherein ji is a constant. (For illustrations see below, under § 20, Elliptic Integrals.)

§ 18. Indeterminateness of Algebraic Integrals. — The theorem

that the integral I x J{z)dz is independent of the path from a to

z, holds only on the hypothesis that any two such paths are equivalent, that is, taken together from the complete boundary of a region of the plane within which /(z) is finite and single valued, besides being differentiable. Suppose that these con- ditions fail only at a finite number of isolated points in the finite part of the plane. Then any path from a to 2 is equivalent, in the sense explained, to any other path together with closed

paths beginning and ending at the arbitrary point a each enclosing one or more of the exceptional points, these closed paths being chosen, when/(z) is not a single valued function, so that the final value of f(z) at a is equal to its initial value. It is necessary for the statement that this condition may be capable of being satisfied.

For instance, the integral j z _i dz is liable to an additive indeter- minateness equal to the value obtained by a closed path about z = o, which is equal to 2iri ; if we put u = J z~ 1 dz and consider z as a

function of u, then we must regard this function as unaffected by the addition of 2iri to its argument «; we know in fact that z = exp (w) and is a single valued function of u, with the period 2ttj.

Or again the integral j (1 -r-z 2) _1 (fe is liable to an additive indeter-

j minateness equal to the value obtained by a closed path about

either of the points z= ±j; thus if we put «= j (1 +z 2) -1 dz, the

function z of u is periodic with period x, this being the function

tan («). Next we take the integral u— 1 (l-z 2)~bdz, agreeing that

*the upper and lower limits refer not only to definite values of z, but to definite values of z each associated with a definite determination of the sign of the associated radical (i-z 2)~i. We suppose i+z, 1-2 each to have phase zero for z = o; then a single closed circuit of z=-l will lead back to z = o with (l-z 2)J=-i; the additive indeterminateness of the integral, obtained by a closed path which restores the initial value of the subject of integration, may be obtained by a closed circuit containing both the points = *= I in its interior; this -gives, since the integral taken about a vanishing circle whose centre is either of the points z = ± 1 has ultimately the value zero, the sum*

f-‘ dz , f° dz . f 1 dz , f° dz

Jo jr^ji^)^ (i 2 2 }i +j _ (l _ 22)i -i-j 1 (l _ z!)i .

where, in each case, (1-z 2)! is real and positive; that is, it gives

f- dz -4J0 (i-z 2)i

or 2x. Thus the additive indeterminateness of the integral is of the form 2kir, where k is an integer, and the function z of «, which is sin (w), has 2ir for period. Take now the case

(z) dz

B

:)•

-J2

[m

20) ■ > !{(?- a){z-b){z-c)(z-d)'

adopting a definite determination for the phase of each of the factors z-a, z-b, z-c, z-d at the arbitrary point Zo, and supposing the upper limit to refer, not only to a definite value of z, but also to a definite determination of the radical under the sign of integration. From Zo describe a closed loop about the point z = a, consisting, suppose, of a straight path from Zo to a, followed by a vanishing circle whose centre is at a, completed by the straight path from a to Zo. Let similar loops be imagined for each of the points 6, c, d, no two of these having a point in common. Let A denote the value obtained by the positive circuit of the first loop ; this will be in fact

equal to twice the integral taken from z along the straight path to a; for the contribution due to the vanishing circle is ultimately zero, and the effect of the circuit of this circle is to change the sign of the subject of integration. After the circuit about a, we arrive back at Zo with the subject of integration changed in sign; let B, C, D denote the values of the integral taken by the loops en- closing respectively b, c and d when in each case the initial deter- mination of the subject of integration is that adopted in calculating A. If then we take a circuit from Zo enclosing both a and b but not either c or d, the value obtained will be A-B, and on returning to Zo the subject of integration will have its initial value. It appears thus that the integral is Subject to an additive indeterminateness equal to any one of the six differences such as A-B. Of these there are only two linearly independent; for clearly only A-B, A-C, A-D are linearly independent, and in fact, as we see by taking a closed circuit enclosing all of a, b, c, d, we have A-B + C-D=o; for there is no other point in the plane beside a, b, c, d about which the subject of integration suffers a change of sign, and a circuit enclosing all of a, b, c, d may by putting z = i/f be reduced to a circuit about f = about which the value of the integral is zero. The general value of the integral for any position of z and the associ- ated sign of the radical, when we start with a definite determination of the subject of integration, is thus seen to be of the form «o+w(A-B)+w(A-C). where m and n are integers. The value of A-B is independent of the position of z , being obtainable by a single closed positive circuitaboutaand fronly ; it is thus equal to twice the integral taken once from a to 6, with a proper initial determination of the radical under the sign of integration. Similar remarks to the above apply to any integral/ H(z)ds, in which H(z) is an algebraic function of z; in any such case H(z) is a rational function of z and a quantity j connected therewith by an irreducible rational algebraic

equation f(s, z) =0. Such an integral /K(z, s)dz is called an Abelian

Integral.

§ 19. Reversion of an Algebraic Integral. — In a limited number of

cases the equation u — f/H (z)dz, in which H (a) is an algebraic function

of z, defines z as a single valued function of u. Several cases of this have been mentioned in the previous section; from what was previously proved under § 14, Doubly Periodic Functions, it appears that it is necessary for this that the integral should have at most two linearly independent additive

constants of indeterminateness; for instance, for an integral

M = pj(z-a) (z-b) (z-c) (s-d) (z-e) {z-f)]-ldz,

there are three such constants, of the form A — B, A — C, A — D, which are not connected by any linear equation with integral co- efficients, and z is not a singie valued function of u.

§ 20. Elliptic Integrals. — An integral of the form fR(z,s)ds, where 5 denotes the square root of a quartic polynomial in z, which may reduce to a cubic polynomial, and R denotes a rational function of 3 and s, is called an elliptic integral. _

To each value of z belong two values of s, of opposite sign; start- ing, for some particular value of z, with a definite one of these two values, the sign to be attached to s for any other value of z will be determined by the path of integration for z. When z is in the neigh- bourhood of any finite value z for which the radical s is not zero, if we put z~zrj=t, we can find s — s = a power series in t, say s ~ Sls + Q(t) ; when z is in the neighbourhood of a value, a, for which 5 vanishes, if we put z = a+/ 2 , we shall obtain s = tQ(t), where Q(7) is a power series in / ; when z is very large and s" is a quartic polynomial in z, if we put z^^l, we shall find s 1 = Z'Q(0; when z is very large and s- is a cubic polynomial in z, if we put z~ l = t 2 , we shall find s~ l = tHJ(t). By means of substitutions of these forms the character of the integral f\(z,s)dz mav be investigated for any position of z; inain case it takesaform/lHr*" + Kr m + 1 + . . . + P^ 1 + R+S« + – ■ r W involving only a finite number of negative powers of (in the subject of integration. Consider first the particular case fs^dz; it is easily seen that neither for any finite nor for infinite values of z can negative powers of t enter; the integral is everywhere finite, and is said to be of the first kind; it can, moreover, be shown without difficulty that no integral /K(z, s)dz, save a constant multiple of fs'^dz, has this property. Consider next, :- being of the form aoz'f 4aiZ 3 + . . ., wherein a may be zero, the integral f(a„z +2a 1 z)s~ 1 dz; for any finite value of z this integral is easily proved to be everywhere finite; but for infinite value's of z its value is of the form . \t~ l +Q(t), where O(') is a power series; denoting by \ ! a a particular square root of o when a-, is not zero, the integral becomes infinite for z = x> for both rigns of s, the value of A being + V a or — V c according as s is

' a^.z- \l J r~z- l + . . .) or is the negative of this; hence the integral

"'/(-

-2(liZ

+ V

the former sign of s, its infinite term being 2V ac.t~ l or 2-Vao-z, Inn does not become infinite for z infinite for the other sign of s. When (! = o the signs of s for s = =o are not separated, being obtained one from the other by a circuit of z about an infinitely large circle, and the form obtained represents an integral becoming infinite as before for z = x , its infinite part being 2V a-^.t' 1 or 2V Uj.V z. Similarly if z be any finite value of z which is not a root of the polynomial ftz) to which 5- is equal, and s denotes a particular one of the deter- minations of s for z = z , the integral

H

C.v HCz-zolTfa)

+ •

I

t (z-so)—i ' (z-z e)M "'

wherein /'(z) = df(s),'dz, becomes infinite for z = z , s = s , but not for r = z , s— —s , its infinite term in the former case being the negative of 25? is— Zo)- For no other finite or infinite value of z is the integral infinite. If z=0 be a root of f(z'), in which case the corresponding value of 5 is zero, the integral

becomes infinite for z=0, its infinite part being, if z— 0=/ 2 , equal to — [/'(fl)l'r 1 : and this integral is not elsewhere infinite. In each of these cases, of the integrals Ji, J 2 , J 3, the subject of integration has been chosen so that when the integral is written near its point of infinity in the form J{Ai~ 2 + Bt- 1 + Q(l)]dt, the coefficient B is zero, so that the infinity is of algebraic kind, and so that, when there are two signs distinguishable for the critical value of z, the integral becomes infinite tor only one of these. An integral having only algebraic infinities, for finite or infinite values of z, is called an integral of the second kind, and it appears that such an integral can be formed with only one such infinity, that is, for an infinity arming onlv for one particular, and arbitrary, pair of values (5, z) -ttislving the equation s 1 =f(z), this infinity being of the first order. A funcli'011 having an algebraic infinity of the rath order («t> 1), only for one sign of i when these signs are separable, at (1) z = x ,

d

(4z)

1-3-1 J3, as we easily see. If then we have any elliptic integral

having algebraic infinities we can, by subtraction from it of an appropriate sum of constant multiples of Ji, J 2 , J 3 and their differ- ential coefficients just written down, obtain, as the result, an integral without algebraic infinities. But, in fact, if J, J 1 denote any two of the three integrals Ji, J2, J3, there exists an equation AJ + BJ' + Cfs'^dz — rational function of s, z, where A,B,C are properly chosen constants. For the rational function

s+Sp

- — -+2V00

z — Zo

is at once found to become infinite for (z , s), not for (z , — So), its infinite part for the first point being 25/ (z — z), and to become infinite for z infinitely large, and one sign of 5 only when these are separable, its infinite part there being 2zV a or 2VaivZ when

j^+zVao-Ji+j2 + (aoz2+20iZo) j 7 = 0;

and there exists the analogous equation

+zVao-Ji+J 3 + M 2 +2a 1 0)j'~=O.

(3) z~a, is given respectively by (s-

'dz

M 4)'

z-0 Consider now the integral

P

C fs + si, . 1 \dz

this is at once found to be infinite, for finite values of z, only for (zo.Sc), its infinite part being log (z — Zo), and for z = cc, for one sign of s only when these are separable, its infinite part being —log /,

that is —log z when ao^ * ar >d ~\°S O 3 ') when a = o. And, if ftp) =0, the integral

is infinite at z = 0, 5 = with an infinite part log t, that" is log (z— 9)*, is not infinite for any other finite value of z, and is infinite like P for z = x .

An integral possessing such logarithmic infinities is said to be of the third kind.

Hence it appears that any elliptic integral, by subtraction from it of an appropriate sum formed with constant multiples of the

(d \ m ~ l s-t-\ Ji

with constant multiples of integrals such as P or Pi, with constant

multiples of the integral u =fs~ 1 dz, and with rational functions,

can be reduced to an integral H becoming infinite only for z = °° ,

for one sign of s only when these are separable, its infinite part being

of the form A log t, that is, A log z or A log (z 5). Such an integral

H —JR{z,s)dz does not exist, however, as we at once find by writing

R(z,s) = P (z) + iQ (z) , where P(z), Q(z) are rational functions of z,

and examining the forms possible for these in order that the integral

may have only the specified infinity. An analogous theorem holds

for'rational functions of z and s; there exists no rational function

which is finite for finite values of z and is infinite only for z = co

for one sign of s and to the first order only; but there exists a

rational function infinite in all to the first order for each of two or

more pairs (z, s), however they may be situated, or infinite to the

second order for an arbitrary pair (z,s) ; and any rational function

may be formed by a sum of constant multiples of functions such as

5" ~r So , . s , .

- — - + zVao or – — 3 + zVao

and their differential coefficients.

The consideration of elliptic integrals is therefore reducible to that of the three 4

fdz . f / a z 2 +2aiz , \ n s + s °, 1 \ dz

respectively of the first, second and third kind. Now the equation

5 2 = o z 4 + . . . =

y = 2s(z-e)^[a (e-4>)(e-t)(8-x)]- I , I / I , 1 ,

J«.

s at once reduced to the form y 1 = 4x !

say; and these equations in terms of x and y. It elliptic integrals

Of these consider the first

-y

! = 4(x— ei){x~ei{x — e t),

enable us to express s and z rationally is therefore sufficient to consider three

T _ f E!^: putting

-si

■/:

*'y+yo dx_*

X — Xo 2y

) y'

value for x. f

large,

but a we put

where the limits involve not only for the radical y. When x is very 2/ 3 (1 — jg 2 ' 4 — ig3» 6) _ « . we have

definite sign x- i = P,y~ 1 =

FUNCTION

*whereby a definite power series in u, valid for sufficiently small value of u, is found for t, and hence a definite power series for x, of the form * = - +A&w 2 +... Let this expression be valid for o< | «| < R, and the function defined thereby, which has a pole of the second order for «=o, be denoted by *<»• . , In the ra nge in question it is single valued and satisfies the differential equation*

*[0'(«)?=4[0(«)] 3 -&«(«)-g3; in terms of it we can write * = <#>(«), v = – '(u), and, '(«) being an odd Junction, the sign attached to y in the original integral for z = oo is immaterial. Now for any two values u, v in the range in question consider the function*

'Vf at °" ce seen – from the differential equation, to be such that db/du = dF,dv; it is therefore a function of u+v; supposing |«+»|

By repetition of this equation we infer that if «,, . . . u n be any argu- ments each of which is in absolute value less than R, whosesumisal=o in absolute value less than R, then 0(«,+ . . . +„„) j s a rational function of the in functions 0(«„), «'(«,); and hence, if |«|

«« > "«[♦©■ ♦'©]•

where H is some rational function of the arguments 0(«/»), «'(«/»)■ In fact, however, so long as |a/»|

*H |_* W ' *' W J is singIe vaIued and without singularities other than poles so long as |w|g 2 0(a)~g 8 . This equation has therefore one solution which is a single valued mono genic function with no singularities other than poles for any finite part of the plane, having in particular for « = o, a pole of the second ?l Jlu nd ,- t a e me . th ° d adopted for obtaining this near «=o shows that the differential equation has no other such solution. This however is not the only solution which is a single valued mero- morphic function al! the functions 0(m + «), wherein a is arbitrary being such. Taking now any range of values of «, from u=o and putting for any value of u, -(«), y= -<#,'(„), so that y' = AX 3 — g 1 x—g z , we clearly have*

*r")d *.*

J i.x,v)y '

*conversely if xo = , yo= /strong>'(«o) and f. ,be any values satisfying ",,« 7&«7 g3 ' ™ hlch are sufficiently near respectively to * , yt while v is defined by ' ' -""*

-Uo

then f, 77 are respectively 0(w) and 0'(»); for this equation leads to an expansion for Z~x in terms of w = « , and only one such ex pansion, and this is obtained by the same work as would be necessary to expand

integral J ^^ — increases indefinitely, it is only by a path of infinite

length that the integral can so increase. We infer therefore that if (i,ri) be any point, where v l = ^ 3 -g^-g 3l and w be defined by

v= p") dx

then £ = 0(w) and tj= – '(v). Thus this equation determines (£ v) without ambiguity. In particular the additive indeterminatenesses of the integral obtained by closed circuits of the point of integration a-e periods of the function 0(«) ; by considerations advanced above

it appears that these periods are sums of integral multiples of two which may be taken to be

J '1 y J', j'

these quantities cannot therefore have a real ratio, for else being periods of a monogenic function, they would, as we have previously seen be each integral multiples of another period; there would then be a closed path for (x,y), starting from an arbitrary point (xo,yo), other than one enclosing two of the points (e„o), (e . o) (e,,o), <°°. ° °), which leads back to the initial point (x y) which is impossible. On the whole, therefore, it appears that the function ! agrees with the function $(«) previously discussed, and the discussion of the elliptic integrals can be continued in the manner given under § 14, Doubly Periodic Functions.

§ 21. Modular Functions.— One result of the previous theory is the remarkable fact that if

„_, C dx , f dx

«=2| , CO —2 I —

J'i y' J'i y

where f=4(x-ei)(x-ei){x- ei), then we have

- = (h<»)-*+2'[K»i + h)u+m' u '*[nu> +m' a ']->\, and a

similar equation for e 3 , where the summation refers to all integer values of m and m' other than the one pair m = o m =0. This, with similar results, has led to the consideration of functions of the complex ratio w'/w.

(J^l ea %,°- see t fe lt the series for $(«), «r«+2'[(«+iii»+«V)»- (niio +m co) 2],_is unaffected by replacing co, co' by two quantities a, fi' equal respectively to *co+ S co'. p'u+qW, where p, q,p',q> are any integers for which ypq'-p>q= ± i; further it can be proved that all substitutions with integer coefficients n^p^+g^' C = *',,+,, v wherein pq />'? = I , can be built up by repetitions of the two par ticular substitutions (Q= -co', a' = co), (a = co, a' = co+co'). Consider the function of the ratio co'/co expressed by consider

. . A—«P(J»')/¥(i»);

it is at once seen from the properties of the function $(«) that bv the two particular substitutions referred to we obtain the corre- sponding substitutions for h expressed by

h' = i/h, h' = i-h; thus by all the integer substitutions a = pco +gco', Q> = p> a+g > a > ; n

h 1 1 ^ iK^l^UU^r ?, Cai \°,?' y ^ a – ke ° ne 0f ^e «« values equationln'e, /(°' {h ~ l)lh ' which are th e roots of an

(1-9+9')' (i-ft+ff)'

„, . , e\i-ey ~ h\i-hy">

the function of r, =»'/«, expressed by the right side, is thus unaltered by every one of the substitutions T ' = ^±^T w herein

P ' If P " I'-T inte S ers having pq' p'q = i. If the imaginary part t0 " iPs'-p'q)/KP+q P y+qV],i S alio positive ; suppose a to be positive; it can be shown that the upper half of the mfinite plane of the complex variable r can be divided into reg ons all bounded by arcs of circles (or straight lines), no two of these regions overlapping, such that any substitution of the kind under T^fT' T {P 9')/^^ leads from an arbitrary po™ of one of these regions, to a point r' of another; taking r = P +Z one of these regions may be taken to be that for which -|< p " >b together with the points for which p is negative on the curves limiting this region; then every other region is obtained from this so-called fundamental region by one and only one of the substitutions r=p' 2 'r)(p+ ?1), and hence by a definfte combina tion of the substitutions r' = -i/ T , r' = 1 + T . Upon the infinite

half plane of t, the function considered above, ”””“re nan

is a single valued monogenic function, whose only essential singularities are the points r’ = (P’+q’r)/(p+qr) for which r = ” namdy those for which t’ is any real rational value; the real axis s thus a line oyer which the function 2 ® cannot be continued having an essential singularity in every arc of it, however short; in the fulda” mental region, z{r) has thus only the single essential singularity r = p+tv, where thj Lotion f{i) has thus

*the “okne fnt a n VI ° U • ’” ˆ 6ry °, ther ° f the ° Th e division of in the case of * “S ” 8 ‘? ana, °S 0U . s to th e division of the plane,*

“™ of doubly periodic functions, into parallelograms; in that and finL cons f ld e red ° n ‘y functions without essential singularities, twt f 1 0t n 6 re .g lon s the function assumed every complex value twice, at least. Putting, as another function of r, T® = z®h® – 1],*

ˆ a \ be – Sh ° W ! 1 that , J W =0 ˆ r = exp (|„-), th J at J® = I for r = i, Hk-e ,A el “A ValueS ° f T “?”, the boundary of the fundamental region like z{t) it has an essential singularity for r =p +i

326

FUNCTION

theory of linear differential equations it is important to consider the inverse function r(J) ; this is infinitely many valued, having a cycle of three values for circulation of J about J=o (the circuit of this point leading to a linear substitution for t of period 3, such as t’ = -(i +t) 1), having a cycle of two values about J = l (the circuit leading to a linear substitution for r of period 2, such as t’= — r _1), and having a cycle of infinitely many values about J =00 (the circuit leading to a linear substitution for r which is not periodic, such as t’ = i-t). These are the only singularities for the function t(J). Each of the functions

UW]», UW iJ». |_ -(i)«’)J ‘ beside many others (see below), is a single valued function of t, and is expressible without ambiguity in terms of the single valued function of t,

‘W-«p(it).» ‘(t

*[i-exp (2*V«t)],*

2/m=-

= exp I — ■ I 2 (-1)™ exp [(3OT 2 +ot)iVt].

It should be remarked, however, that 17(1-) is not unaltered by all the substitutions we have considered ; in fact

'K-t- 1) = (-ir)Jij(T),)j(i +t) =exp(I i 2 *jt)ij(t).

The aggregate of the substitutions t' = (p' +q'r)/(p+qr), wherein £, g, p' , q' are integers with pq'p'q = i, represents a Group; the function J ®, unaltered by all these substitutions, is called a Modular Function. More generally any function unaltered by all the sub stitutions of a group of linear substitutions of its variable is called an Automorphic Function. A rational function, of its variable h, of this character, is the function (i-fe-f /t 2) 3 /i~ 2 (i-/z)~ 2 presenting itself incidentally above; and there are other rational functions with a similar property, the group of substitutions belonging to any one of these being, what is a very curious fact, associable with that of the rotations of one of the regular solids, about an axis through its centre, which bring the solid into coincidence with itself. Other automorphic functions are the double periodic functions already discussed; these, as we have seen, enable us to solve the algebraic equation y 2 = 4× 3 -g2£-g3 (and in fact many other algebraic equa- tions, see below, under § 23, Geometrical Applications of Elliptic Functions) in terms of single valued functions x = ˆ(m), y=-¥'(«)• A similar utility, of a more extended kind, belongs to automorphic functions in general; but it can be shown that such functions necessarily have an infinite number of essential singularities except for the simplest cases.

The modular function J(t) considered above, unaltered by the group of linear substitutions t' = (p' +g'r) ' \p--qr) , where p, q, p' , q' are integers with pq'-p'q = i, may be taken as the independent variable x of a differential equation of the third order, of the form

s'''._3 A'V- i-«- 1 i-ff.a

5' 2\S'/ 2{x-lf 2X 2

x =

2(X-l) 2 ' 2X 2 ' 2#(x-l) '

where s' = ds'dx, &c, of which the dependent variable 5 is equal to r. A differential equation of this form is satisfied by the quotient of

two independent integrals' of the linear differential equation of the second order satisfied by the hypergeometric functions. If the solution of the differential equation for 5 be written s(a,0,y,x), we have in fact t = .s(j, \, o, J). If we introduce also the function of t given by

g$(W) + $(i«)

WW) -(*«)'*

we similarly have t = s(o, o, o, X) ; this function X is a single valued function of t, which is also a modular function, being unaltered by a group of integral substitutions also of the form r' = (p' + q'r) / (p + qr) , with pq'-p'q = 1 , but with the restriction that p' and q are even integers, and therefore p and q' are odd integers. This group is thus a subgroup of the general modular group, and is in fact of the kind called a self con jugate subgroup. As in the general case this subgroup is associated with a subdivision of the plane into regions of which any one is obtained from a particular region, called the fundamental region, by a particular one of the substitutions of the subgroup. This fundamental region, putting r=p-iri, (p-i) 2 +ff 2 >i, and is built up of six of the regions which arose for the general modular group associated with J(t). Within this fundamental region, X takes every complex value just once, except the values X = o, I , co , which arise only at the angular points t=o, t = oo,t=-i and the equivalent point t — 1 ; these angular' points are essential singularities for the function X®. For X(t) as for J®, the region of existence is the upper half plane of t, there being an essential singu- larity in every length of the real axis, however short.

If, beside the plane of t, we take a plane to represent the values of X, the function r = s(o, o, o, X) being considered thereon, the values of t belonging to the interior of the fundamental region of the T-plane considered above, will require the consideration of the whole of the X-plane taken once with the exception of the portions of the real axis lying between -co and o and between I and +00, the two sides of the first portion corresponding to the circumferences of the

T-plane expressed by (p+ˆy+ˆ — i, (p-J) 2 + 1 , correspond to the lines of the T-plane expressed by p= = t i. The line for which X is real, positive and less than unity corresponds to the imaginary axis of the T-plane, lying in the interior of the funda- mental region. All the values of t =s(o, o, o, X) may then be derived from those belonging to the fundamental region of the T-plane by making X describe a proper succession of circuits about the points X=o, X = i;

any such circuit subjects r to a linear substitution of the subgroup of t considered, and corresponds to a change of r from a point of the fundamental region to a corresponding point of one of the other regions.

§ 22. A Property of Integral Functions deduced from the Theory of Modular Functions. — Consider now the function exp(z), for finite values of z; for such values of z, exp (z) never vanishes, and it is impossible to assign a closed circuit for z in the finite part of the plane of z which will make the functibn \ = exp(z) pass through a closed succession of values in the plane of X having \ = o in its interior; the function .$[0,0,0, exp (z)], however z vary in the finite part of the plane, will therefore never be subjected to those linear substitutions imposed upon i(o,o,o,X) by a circuit of X about X = o; more generally, if (z) be an integral function of z, never becoming either zero or unity for finite values of z, the function \ = (z)], will be single valued for all finite values of z; it will moreover remain finite, and be monogenic. In other words, s[o,o,o,4>(z)] is also an integral function — whose imaginary part, moreover, by the property of 5(0,0,0, X), remains positive for all finite values of z. In that case, however, exp{is[o,o,o,4>(z)]} would also be an integral function of z with modulus less than unity for all finite values of z. If, however, we describe a circle of radius R in the z plane, and consider the greatest value of the modulus of an integral function upon this circle, this certainly increases indefinitely as R increases. We can infer therefore that an integral function (z)) takes every other value for some definite value of z; or, an integral function for which both the equations 4>{z) =A,(j>(z) =B are unsatisfied by definite values of z,does not exist, A and B being arbitrary constants.

A similar theorem can be proved in regard to the values assumed by the function (z) for points z of modulus greater than R, however great R may be, also with the help of modular functions. In general terms it may be stated that it is a very exceptional thing for an integral function not to assume every complex value an infinite number of times.

Another application of modular functions is to prove that the function s(o, 0, t, X) is a single valued function of t=s(o, o, o, X); for, putting t' = {t-i)j{t +i), the values of r' which correspond to the singular points X = o, i,cc of s(a, 0,y, X), though infinite in number, all lie on the circumference of the circle |t'| = I, within which therefore

°°
.

s{a, 0, 7, x) is expressible in a form S a n T ,n .

n, =0 monogenic function of X which is single valued save for circuits of the points X =0, I, 00 , is a single valued function of t = s(o, o, o, X). Identifying X with the square of the modulus in Legendre's form of the elliptical integral, we have t=jK'/K, where

v r dt v ,_r if

joV[i-/ 2][i-w 2 r JoV[i-mi-(i-x)/T

X)]*, which have only X = o, I

More generally any

V[i-/ 2][i-W 2]' functions such as X*, (1 -X)*, [X(i -a;j\ wmcn nave only A = o, I, 00 as singular points, were expressed by Jacobi as power series in q = ei" r , and therefore, at least for a limited range of values of t, as single valued functions of t; it follows by the theorem given that any product of a root of X and a root of I-X is a single valued function of t. More generally the differential equation

x(l – x ^ +[y – {a+f3+l)x] a%'

a0y = o

may be solved by expressing both the independent and dependent variables as single valued functions of a single variable t, the expression for the independent variable being x — \(t). x

§23. Geometrical Applications of Elliptic Functions. — Consider any irreducible algebraic equation rational in x,y,f{x,y) =0, of such a form that the equation represents a plane curve of order n with \n{n-$) double points; taking upon this curve »-3 arbitrary fixed points, draw through these and the double points the most general curve of order n – 2 ; this will intersect

FUNCTION

327

/in n(«— 2)— w(«— 3) — («— 3)=3 other points, and will contain homogeneously at least i(n— 1)«— §»(«— 3) — (»— 3)=3 arbitrary constants, and so will be of the formX<£+Xii+X202+ ... =0, wherein X3, X4, . . . are in general zero. Put now £ = i/#, ij = <&/<£ and eliminate x,y between these equations and f(x,y) =0,

so obtaining a rational irreducible equation F(|,rj) =0, representing a further plane curve. To any point (x,y) of f will then correspond a definite point (|,rj) of F.

For a general position of (x,y) upon / the equations

i(\/)/(,y) = .y)/*(*.y). »(',/)/*('./; = M,y)l(x,y)<*

subject to j(x',y') =0, will have the same number of solutions (x',y') ; if their only solution is x'=x, y'=y, then to any position (£,ij) of F will conversely correspond only one position (x,y) of /. If these equations have another solution beside (x,y), then any curve X0+Xi4>i+\22 = o which passes (through the double points of / and) through the n— 2 points of / constituted by the fixed n — 3 points and a point (o,yo), will necessarily pass through a further point, say (xo',yo), and will have only one further intersection with /; such a curve, with the »— 2 assigned points, beside the double points, of/, will be of the form M'/'/'i , /'i • • • = °> where 2, ; 3 , . . . are generally zero; considering the curves i-H^i=o, for variable /, one of these passes through a further arbitrary point of/, by choosing t properly, and conversely an arbitrary value of t determines a single further point of /; the co-ordinates of the points of f are thus rational functions of a parameter t, which is itself expressible ration- ally by the co-ordinates of the point; it can be shown algebraically that such a curve has not i(n—^)n but \{n— $)n + l double points. We may therefore assume that to every point of F corresponds only one point of/, and there is a birational transformation between these curves; the coefficients in this transformation will involve rationally the co-ordinates of the n— 3 fixed points taken upon /, that is, at the least, by taking these to be consecutive points, will involve the co-ordinates of one point of f, and will not be rational in the coefficients of / unless we can specify a point of / whose co- ordinates are rational in these. The curve F is intersected by a straight line a(+bri-{-c = o in as many points as the number of unspecified intersections of/ with a +bi+c

Such a cubic curve has at least one point of inflection Y, and if a variable line YPQ be drawn through Y to cut the curve again in P and Q, the locus of a point R such that YR is the harmonic mean of YP and YQ, is easily proved to be a straight line. Take now a triangle of reference for homogeneous co-ordinates XYZ, of which this straight line is Y=o, and the inflexional tangent at Y is Z=o; the equation of the cubic curve will then be of the form

Z Y 2 = aX 3 + JX 2 Z +cXZ 2 + dZ 3 ; by putting X equal to XX

+mZ, that is, choosing a suitable line through Y to be X = o, and choosing X properly, this is reduced to the form

ZY 2 = 4 X3-g 2 XZ 2 -g 3 Z3, of which a representation is given, valid for every point, in terms of the elliptic functions »#(», $'(«). by taking X = Z!B(a), Y=Z$'(m). The value of u belonging to any point is definite save for sums of integral multiples of the periods of the elliptic functions, being given by

_ /"(*> ZdX-XdZ

"~Jc«o. zy ;

where (00) denotes the point of inflection.

It thus appears that the co-ordinates of any point of a plane curve, /, of order n with \{n— 3)n double points are expressible as elliptic functions, there being, save for periods, a definite value of the argument u belonging to every point of the curve. It can then be shown that if a variable curve, , of order m be drawn, passing through the double points of the curve, the values of the argument u at the remaining intersections of with /, have a sum which is unaffected by variation of the coefficients of <£, save for additive aggregates of the periods. In virtue of the birational transformation this theorem can be deduced from the theorem that if any straight line cut the cubic y 2 = 4× 3 — giX— gs, in points («i), (w 2), (ui), the sum «i +«2+tt3 is zero, or a period; or the general theorem is a corollary from Abel's theorem proved under § 17, Integrals of Algebraic Functions. To prove the result directly for the cubic we remark that the variation of one of the intersections {x,y) of the cubic with the straight line y = mx-\-n, due to a variation hm, bn in m and n, is obtained by differentiation of the equation for the three abscissae, namely the equation

F(x) =4× 3 —gix—g 3 — (mx+ny = o, and is thus given by

dx_ x&m + in y ~ 2 V{x) • and the sum of three such fractions as that on the right for the three roots of F(*)=o is zero; hence «i+M2-t-M 3 is independent of the straight line considered ; if in particular this become the inflexional tangent each of Mi, «2, Us vanishes. It may be remarked in passing

that zi+X2+2a = 4»» 2 , and hence is i{(yi — yi)/(xi — tfa)! 2 ; so that we have another proof of the addition equation for the function 55(«). From this theorem for the cubic curve many of its geometrical properties, as for example those of its inflections, the properties of

inscribed polygons, of the three kinds of corresponding points, and the theory of residuation, are at once obvious. And similar results hold for the curve of order n with i{n—ˆ)n double points.

§ 24. Integrals of Algebraic Functions in Connexion with the Theory of Plane Curves. — The developments which have been explained in connexion with elliptic functions may enable the reader to appreciate the vastly more extensive theory similarly arising for any algebraical irrationality, f(x,y) = 0.

The algebraical integrals fR(x,y)dx associated with this may as before be divided into those of the first kind, which have no infinities, those of the second kind, possessing only algebraical infinities, and those of the third kind, for which logarithmic infinities enter. Here there is a certain number, p, greater than unity, of linearly independent integrals of the first kind; and this number p is un- altered by any birational transformation of the fundamental equation f(x,y) = o; a rational function can be constructed with poles of the_ first order at p--i arbitrary positions (x,y), satisfying f(x,y) = o, but not with a fewer number unless their positions are chosen properly, a property we found for the case p = 1 ; and p is the number of linearly independent curves of order n— 3 passing through the double points of the curve of order n expressed by f(x,y) = 0. Again any integral of the second kind can be expressed as a sum of p integrals of this kind, with poles of the first order at arbitrary positions, together with rational functions and integrals of the first kind; and an integral of the second kind can be found with one pole of the first order of arbitrary position, and an integral of the third kind with two logarithmic infinities, also of arbitrary position ; the corresponding properties for p = 1 are proved above.

There is, however, a difference of essential kind in regard to the inversion of integrals of the first kind; if u = JR(x,y)dx be such an integral, it can be shown, in common with all algebraic integrals associated with f(x,y) = 0, to have 2p linearly independent additive constants of indeterminateness ; the upper limit of the integral cannot therefore, as we have shown, be a single valued function of the value of the integral. The corresponding theorem, if fRi(x,y)dx denote one of the integrals of the first kind, is that the p equations

fRi(xi,yi)dxi + . . . + fRi(xp,y p)dx p = «;, determine the rational symmetric functions of the p positions (tfi.yi), • • • (x p ,y p) as single valued functions of the p variables, «i, . . . u v . It is thus necessary to enter into the theory of functions of several independent variables.; and the equation /(x,y) = o is thus not, in this way,

capable of solution by single valued functions of one variable. That solution in fact is to be sought with the help of automorphic functions, which, however, as has been remarked, have, for p > 1, an infinite number of essential singularities.

§ 25. Monogenic Functions of Several Independent Variables. — A monogenic function of several independent complex variables Mi, ... m p is to be regarded as given by an aggregate of power series all obtainable by continuation from any one of them in a manner analogous to that before explained in the case of one independent variable. The singular points, defined as the limiting points of the range over which such continuation is possible, may either be poles, or polar points of indelermination, or essential singularities.

A pole is a point (w y\ • • • « (°') in the neighbourhood of which the function is expressible as a quotient of converging power series in

Ui-U

— «<°>:

*of these the denominator series D must vanish at(« j, . . . u p), since else the fraction is expressible as a power series and the point is not a singular point, but the numerator series N must not also vanish at (*y\ . . . «®),orif itdoes.it must be possible to write D = V ~>o, N = MN , where M is a converging power series vanishing at ,a\ , . . ■«'), and No is a converging power series, in (u\~tt x ,. ..u p —u^), not so vanishing. A polar point of indetermination is a point about which the function can be expressed as a quotient of two converging power series, both of which vanish at the point. As in such a simple case as (Ax+By)l (ax+by), about x = o, y = o, it can be proved that then the function can be made to approach to any arbitrarily assigned value by*

makingthe variables Mi,. . .« p approach to M \ , . . .u p by a proper path. It is the necessary existence of such polar points of in-determination, which in case p > 2 are not merely isolated points, which renders the theory essentially more difficult than that of functions of one variable. An essential singularity is any which does not come under one of the two former descriptions and includes very various possibilities. A point at infinity in this theory is one for which' any one of the variables «i, . . . u P is indefinitely great; such points are brought under the preceding definitions by means

of the convention that for u . = oo , the difference Ui-u . is to be understood to stand for u t . This being so,'a single valued function of «i, . . . Up without essential singularities for infinite or finite values of the variables can be shown, by induction, to be, as in the case of p — I , necessarily a rational function of the variables. A function having no singularities for finite values of all the variables is as before called an integral function; it is expressible by a power series converging for all finite values of the variables; a single valued function having for finite values of the variables no singularities other than poles or polar points of indetermination is called a meromorphic function ; as for p = I such a function can be expressed as a quotient of two integral functions having no common zero point other than the points of indetermination of the function ; but the proof of this theorem is difficult.

The single valued functions which occur, as explained above, in the inversion of algebraic integrals of the first kind, for p>i, are meromorphic. They must also be periodic, unaffected that is when the variables u u . . . u p are simultaneously increased each by a proper constant, these being the additive constants of indeterminateness for the p integrals JRi(x,y)dx arising when (x,y) makes a closed circuit, the same for each integral. The theory of such single valued meromorphic periodic functions is simpler than that of meromorphic functions of several variables in general, as it is sufficient to consider only finite values of the variables; it is the natural extension of the theory of doubly periodic functions previously discussed. It can be shown to reduce, though the proof of this requires considerable developments of which we cannot speak, to the theory of a single integral function of ui, . . . Up, called the Theta Function. This is expressible as a series of positive and negative integral powers of quantities exp (ci«i), exp (c 2 k 2), . . . exp (c v u p), wherein C\, . . . c v are proper constants; for p = i this theta function is essentially the same as that above given under a different form (see § 14, Doubly Periodic Functions), the function a(u). In the case of p — i, all meromorphic functions periodic with the same two periods have been shown to be rational functions of two of them connected by a single algebraic equation ; in the same way all meromorphic functions of p variables, periodic with the same sets of simultaneous periods, 2p sets in all, can be shown to be expressible rationally in terms of p-- 1 such periodic functions connected by a single algebraic equation. Let Xi, . . . x p , y denote £+1 such functions; then each of the partial derivatives dxi/du/ will equally be a meromorphic function of the same periods, and so expressible rationally in terms

of X\, . . . x v ,y; thus there will exist p equations of the form

dxi = Ridui + . . . + K p dup, and hence p equations of the form

dui = Hi,idxi-- . . . --Wi,pdx p , wherein Hi, ,- are rationa functions of Xi, . . . x p , y, these being con- nectedbyafundamentalalgebraic(rational)equation,say/(ˆi,. . . x p ,y) = 0. This then is the generalized form of the corresponding equation for /> = i.*

§ 26. Multiply-Periodic Functions and the Theory of Surfaces. — ■ The theory of algebraic integrals fR(x,y)dx, wherein x,y are connected by a rational equation f(x,y)=o, has developed concurrently with the theory of algebraic curves; in particular the existence of the number p invariant by all birational trans- formations is one result of an extensive theory in which curves capable of birational correspondence are regarded as equivalent; this point of view has made possible a general theory of what might otherwise have remained a collection of isolated theorems. In recent years developments have been made which point to a similar unity of conception as possible for surfaces, or indeed for algebraic constructs of any number of dimensions. These develop- ments have been in two directions, at first followed independently, but now happily brought into the most intimate connexion. On the analytical side, E. Picard has considered the possibility of classify- ing integrals of the {ormf(Rds+Sdy), belonging to a surface f(x,y,z) = 0, wherein R and S are rational functions of x, y, z, according as they are (1) everywhere finite, (2) have poles, which then lie along curves upon the surface, or (3) have logarithmic infinities, also then lying along curves, and has brought the theory to a high degree of perfection. On the geometrical side A. Clebsrh and M. Noether, and more recently the Italian school, have considered the geometrical characteristics of a surface which are unaltered by bi- rational transformation. It was first remarked that for surfaces of order n there are associated surfaces of order n-4, having properties in relation thereto analogous to those of curves of order M-3 for a plane curve of order n\ if such a surface f(x,y,z) =0 have a double curve with triple points triple also for the surface, and tp(x,y,z) =0 be a surface of order n-4 passing through the double curve, the double integral

ˆ d x dy dfldz

is everywhere finite; and, the most general everywhere finite integral of this form remains invariant in a birational transformation of the surface /, the theorem being capable of generalization to

algebraic constructs of any number of dimensions. The number ot linearly independent surfaces of order n-4, possessing the requisite particularity in regard to the singular lines and points of the surface, is thus a number invariant by birational transformation, and the equality of these numbers for two surfaces is a necessary con- dition of their being capable of such transformation. The number of surfaces of order m having the assigned particularity in regard to the singular points and lines of the fundamental surface can be given by a formula for a surface of given singularity ; but the value of this formula for m = n~\ is not in all cases equal to the actual number of surfaces of order 72-4 with the assigned particularity, and for a cone (or ruled surface) is in fact negative, being the negative of the deficiency of the plane section of the cone. Nevertheless this number for m—n-4 is also found to be invariant for birational transformation. This number, now denoted by p a , is then a second invariant of birational transformation. The former number, of actual surfaces of order n-4 with the assigned particularity in regard to the singularities of the surface, is now denoted by pg. The difference pg-pa, which is never negative, is a most important characteristic of a surface. When it is zero, as in the case of the general surface of order n, and in a vast number of other ordinary cases, the surface is called regular.

On a plane algebraical curve we may consider linear series of sets of points, obtained by the intersection with it of curves X0+Xii-|- . . .=0, wherein X, Xi, . . . are variable coefficients; such a series consists of the sets of points where a rational function of given poles, belonging to the construct f(x,y) =0, has constant values. And we may consider series of sets of points determined by variable curves whose coefficients are algebraical functions, not necessarily rational functions, of parameters. Similarly on a surface we may consider linear systems of curves, obtained by the intersection with, the given surface of variable surfaces X0-j-Xi0i+ . . . =0, and may consider algebraic systems, of which the individual curve is given by variable surfaces whose coefficients are algebraical, not necessarily rational, functions of parameters. Of a linear series upon a plane curve there are two numbers manifestly invariant in birational transformation, the order, which is the number of points forming a set of the series, and the dimension, which is the number of para- meters Xi/X,X 2 /X, . . . entering linearly in the equation of the series. The series is complete when it is not contained in a series of the same order but of higher dimension. So for a linear system of curves upon a surface, we have three invariants for birational transforma- tion ; the order,

being in the number of variable intersections of two curves of the system, the dimension, being the number of linear parameters Xi/X, X 2 /X, ... in the equation for the system, and the deficiency of the individual curves of the system. Upon any curve of the linear system the other curves of the system define a linear series, called the characteristic series; but even when the linear system is complete, that is, not contained in another linear system of the same order and higher dimension, it does not follow that the characteristic series is complete ; it may be contained in a series whose dimension is greater by pg-pa than its own dimension. When this is so it can be shown that the linear system of curves is contained in an algebraic system whose dimension is greater by p g -pa than the dimension of the linear system. The extra p = p g pa variable para meters so entering may be regarded as the independent co-ordinates of an algebraic construct f{y,x u . . . x p)=o; this construct has the property that its co-ordinates are single valued meromorphic functions of p variables, which are periodic, possessing 2p systems of periods ; the p variables are expressible in the forms u i =fR l (x,y)dxi+ . . . +R P (x,y)dxp,

wherein Rj{x,y) denotes a rational function of Xi, . . . x P and y. The original surface has correspondingly p integrals of the form J(Rdx-\Sdy), wherein R, S are rational in x, y, z, which are every- where finite ; and it can be shown that it has no other such integrals. From this point of view, then, the number p, —pg-pa is, for a sur- face, analogous to the deficiency of a plane curve ; another analogy arises in the comparison of the theorems : for a plane curve of zero deficiency there exists no algebraic series of sets of points which does not consist of sets belonging to a linear series; for a surface for which pg-p a = o there exists no algebraic system of curves not contained in a linear system.

But whereas for a plane curve of deficiency zero, the co-ordinates of the points of the curve are rational functions of a single parameter, it is not necessarily the case that for a surface having pg-pa = the co-ordinates of the points are rational functions of two parameters; it is necessary that p t — p a = o, but this is not sufficient. For sur- faces, beside the p g linearly independent surfaces of order n-4 having a definite particularity at the singularities of the surface, it is useful to consider surfaces of order k(n~4), also having each a definite particularity at the singularities, the number of these, not containing the original surface as component, which are linearly independent, is denoted by Pi. It can then be stated that a sufficient condition for a surface to be rational consists of the two conditions pa = o, P 2 = o. More generally it becomes a problem to classify surfaces according to the values of the various numbers which are

invariant under birational transformation, and to determine for each the simplest form of surface to which it is birationally equivalent. Thus, for example, the hyperelliptic surface discussed by Humbert,

of which the co-ordinates are meromorphic functions of two variables of the simplest kind, with four sets of periods, is characterized by Pa = 1 i pa = —1; or again, any surface possessing a linear system of curves of which the order exceeds twice the deficiency of the in- dividual curves diminished by two, is reducible by birational trans- formation to a ruled surface or is a rational surface. But beyond the general statement that much progress has already been made in this direction, of great interest to the student of the theory of functions, nothing further can be added here.

Bibliography. — The learner will find a lucid introduction to the theory in E. Goursat, Cours d'analyse mathematique, t. ii. (Paris, 1905), or, with much greater detail, in A. R. Forsyth, Theory of Functions of a Complex Variable (2nd ed., Cambridge, 1900); for logical rigour in the more difficult theorems, he should consult W. F. Osgood, Lehrbuch der Functionentheorie, Bd. i. (Leipzig, 1906-1907) ; for greater precision in regard to the necessary quasi-geometrical axioms, beside the indications attempted here, he should consult W. H. Young, The Theory of Sets of Points (Cambridge, 1906), chs. viii.xiii., and C. Jordan, Cours d'analyse, t. i. (Paris, 1893), chs. i., ii. ; a comprehensive account of the Theory of Functions of Real Variables is by E. W. Hobson (Cambridge, 1907). Of the theory regarded as based after Weicrstrass upon the theory of power series, there is J. Harkness and F. Morley, Introduction to the Theory of Analytic Functions (London, 1898), an elementary treatise; for the theory of the convergence of series there is also T. J. I'A. Bromwich, An Introduction to the Theory of Infinite Series (London, 1908) ; but the student should consult the collected works of Weier strass (Berlin, 1894 ff.), and the writings of Mittag-Leffler intheearly volumes of the Acta mathematica; earlier expositions of the theory of functions on the basis of power series are in C. Meray, Lecons nouvelles sur I'analyse infinite simale (Paris, 1894), and in Lagrange's books on the Theory of Functions. An account of the theory of potential in its applications to the present theory is found in most treatises; in particular consult E. Picard, Tratte d'analyse, t. ii. (Paris, 1893). For elliptic functions there is an introductory book,

P. Appell and E. Lacour, Principes de la theoriedes fonctions elliptiques el applications (Paris, 1897), beside the treatises of G. H. Halphen, Traite des fonctions elliptiques et de leurs applications (three parts, Paris, 1886 ff.), and J. Tannery et J. Molk, Elements de la theorie des fonctions elliptiques (Paris, 1893 ff.); a book, A. G. Greenhill, The Applications of Elliptic Functions (London, 1892), shows how the functions enter in problems of many kinds. For modular functions there is an extensive treatise, F. Klein and R. Fricke, Theorie der elliptischen Modidfunctionen (Leipzig, 1890) ; see also the most interesting smaller volume, F. Klein, tJber das Ikosaeder (Leipzig, 1884) (also obtainable in English). For the theory of Riemann's surface, and algebraic integrals, an interesting intro- duction is P. Appeil and E. Goursat, Theorie des fonctions algebriques et de leurs integrates; for Abelian functions see also H. Stahl, Theorie der AbeVschen Functionen (Leipzig, 1896), and H. F. Baker, An Introduction to the Theory of Multiply Periodic Functions (Cambridge, 1907), and H. F. Baker, Abel's Theorem and the Allied Theory, in- cluding the Theory of the Thela Functions (Cambridge, 1897); for theta functions of one variable a standard work is C. G. Jacobi, Fundamenta nova, &c. (Konigsberg, 1828) ; for the general theory of theta functions, consult W. Wirtinger, Untersuchungen uber Theta- Functionen (Leipzig, 1895). For a history of the theory of algebraic functions consult A. Brill and M. Noether, Die Entwicklung der Theorie der algebraischen Functionen in dlterer und neuerer Zeit, Bericht der deutschen Malhematiker-V ereinigung (1894); and for a special theory of algebraic functions, K. Hensel and G. Landsberg, Theorie der algebraischen Function u.s.w. (Leipzig, 1902). The student will, of course, consult also Riemann's and Weierstrass's Ges. Werke. For the applications to geometry in general an im- portant contribution, of permanent value, is E. Picard and G. Simart, Theorie des fonctions algebriques de deux variables independantes (Paris, 1897-1906). This work contains, as Note v. t. ii. p. 485, a valuable summary by MM. Castelnuovo and Enriques, Sur quelques resullats nouveaux dans la theorie des surfaces algebriques, containing many references to the numerous memoirs to be found, for the most part, in the transactions of scientific societies and the mathematical journals of Italy.

Beside the books above enumerated there exists an unlimited number of individual memoirs, often of permanent importance and only imperfectly, or too elaborately, reproduced in the pages of the volumes in which the student will find references to them. The German Encyclopaedia of Mathematics, and the Royal Society's Reference Catalogue of Current Scientific Literature, Pure

Mathematics, published yearly, should also be consulted. (H. F. Ba.)

FUNDY, BAY OF, an inlet of the North Atlantic, separating New Brunswick from Nova Scotia. It is 145 m. long and 48 m. wide at the mouth, but gradually narrows towards the head, where it divides into Chignecto Bay to the north, which sub- divides into Shepody Bay and Cumberland Basin (the French Beaubassin), and Minas Channel, leading into Minas Basin, to the east and south. Off its western shore opens Passamaquoddy Bay, a magnificent sheet of deep water with good anchorage,

receiving the waters of the St Croix river and forming part of the boundary between New Brunswick and the state of Maine, The Bay of Fundy is remarkable for the great rise and fall of the tide, which at the head of the bay has been known to reach 62 ft. In Passamaquoddy Bay the rise and fall is about 25 ft., which gradually increases toward the narrow upper reaches. At spring tides the water in the Bay of Fundy is 19 ft. higher than it is in Bay Verte, in Northumberland Strait, only 15 m. distant. Though the bay is deep, navigation is rendered dangerous by the violence and rapidity of the tide, and in summer by frequent fogs. At low tide, at such points as Moncton or Amherst, only an expanse of red mud can be seen, and the tide rushes in a bore or crest from 3 to 6 ft. in height. Large areas of fertile marshes are situated at the head of the bay, and the remains of a submerged forest show that the land has subsided in the latest geological period at least 40 ft. The bay receives the waters of the St Croix and St John rivers, and has numerous harbours, of which the chief are St Andrews (on Passamaquoddy Bay) and St John in New Brunswick, and Digby and Annapolis (on an inlet known as Annapolis Basin) in Nova Scotia. It was first explored by the Sieur de Monts (d. c. 1628) in 1604 and named by him La Baye Francaise.

FUNERAL RITES, the ceremonies associated with different methods of disposing of the dead. (See also Burial and Burial Acts; Cemetery; and Cremation.) In general we have little record, except in their tombs, of races which, in a past measured not merely by hundreds but by thousands of years, occupied the earth; and exploration of these often furnishes our only clue to the religions, opinions, customs, institutions and arts of long vanished societies. In the case of the great culture folks of antiquity, the Babylonians, Egyptians, Hindus, Persians, Greeks and Romans, we have, besides their monuments, the evidence of their literatures, and so can know nearly as much of their rites as we do of our own. The rites of modern savages not only help us to interpret prehistoric monuments, but

explain peculiarities in our own rituals and in those of the culture folks of the past of which the significance was lost or buried under etiological myths. We must not then confine ourselves to the rites of a few leading races, neglecting their less fortunate brethren who have never achieved civilization. It is better to try to classify the rites of all races alike according as they embody certain leading conceptions of death, certain fears, hopes, beliefs entertained about the dead, about their future, and their relations with the living.

The main ideas, then, underlying funeral rites may roughly be enumerated as follows:

1. The pollution or taboo attaching to a corpse.

2. Mourning.

3. The continued life of the dead as evinced in the housing and equipment of the dead, in the furnishing of food for them, and in the orientation and posture assigned to the body.

4. Communion with the dead in a funeral feast and otherwise.

5. Sacrifice for the dead and expiation of their sins.

6. Death witchery.

7. Protection of the dead from ghouls.

8. Fear of ghosts.

1. A dead body is unclean, and the uncleanness extends to things and persons which touch it. Hence the Jewish law (Num. v. 2) enacted that " whoever is unclean by the dead shall be put outside the camp, that they defile not the camp in the midst whereof the Lord dwells." Such persons were unclean until the even, and might not eat of the holy things unless they bathed their flesh in water. A high priest might on no account "go in to any dead body" (Lev. xxi. 11). Why a corpse is so widely tabooed is not certain; but it is natural to see one reason in the corruption which in warm climates soon sets in. The common experience that where one has died another is likely to do so may also have contributed, though, of course, there was no scientific idea of infection. The old Persian scriptures are full of this taboo. He who has touched a corpse is " powerless in mind, tongue and hand " {Zend Avesta in Sacred Books of the East, pt. i. p. 120), and the paralysis is inflicted by the innumerable drugs or evil spirits which invest a corpse. Fire and earth, being alike creations of the

good and pure god

33°

FUNERAL RITES

Ahuramazda, a body must not be burned or buried; and so the ancient Persians and their descendants the Parsees build Dakmas or " towers of silence " on hill-tops far from human habitations. Inside these the corpses are laid on a flagged terrace which drains into a central pit. Twice a year the bones, picked clean by dogs and birds of prey, are collected in the pit, and when it is full another tower is built. In ancient times perhaps the bodies of the magi or priests alone were exposed at such expense; the common folk were covered with wax and laid in the earth, the wax saving the earth from pollution. In Rome and Greece the corpse was buried by night, lest it should pollute the sunlight ; and a trough of water was set at the door of the house of death that men might purify themselves when they came out, before mixing in general society. Priests and magistrates in Rome might not meet or look on a corpse, for they were thereby rendered unclean and incapable of fulfilling their official duties without undergoing troublesome rites of purification. At a Roman funeral, when the remains had been laid in the tomb, all present were sprinkled with lustral water from a branch of olive or laurel called aspergillum; and when they had gone home they were asperged afresh and stepped over a fire. The house was also swept out with a broom, probably lest the ghost of the dead should be lying about the floor. Many races, to avoid pollution, destroy the house and property of the deceased. Thus the Navahos pull down the hut in which he died, leaving its ruins on the ground; but if it be an expensive hut, a shanty is extemporized alongside, into which the dying man is transferred before death. No one will use the timbers of a hut so ruined. A burial custom of the Solomon Islands, noted by R. H. Codrington (The Melanesians, p. 255), may be dictated by the same scruple. There " the mourners having hung up a dead man's arms on his house make great lamentations; all remains afterwards untouched, the house goes to ruin, mantled, as time goes on, with the vines of the growing yams, a picturesque and indeed, perhaps, a touching sight; for these things are not set up that they may in a ghostly manner accompany their former owner." H.Oldenberg (Religion des Veda, p. 426) describes how Hindus shave themselves and cut off their nails after a death, at the same time that they wash, renew the hearth fire, and furnish themselves with new vessels. For the hair and nails may harbour pollution, just as the medieval Greeks believed that evil spirits could lurk in a man's beard (Leo Allatius, De opinionibus

quorundam Graecorum). The dead man's body is shorn and the nails cut for a kindred reason; for it must be purified as much as can be before it is burned as an offering on the pyre and before he enters on a new sphere of existence.

2. We are accustomed to regard mourning costume as primarily an outward sign of our grief. Originally, however, the special garb seems to have been intended to warn the general public that persons so attired were unclean. In ancient Rome mourners stayed at home and avoided all feasts and amusements; laying aside gold, purple and jewels, they wore black dresses called lugubria or even skins. They cut neither hair nor beard, nor lighted fire. Under the emperors women began to wear white. On the west coast of Africa negroes wear white, on the Gold Coast red. The Chinese wear hemp, which is cheap, for mourning dress must as a rule be destroyed when the season of grief is past to get rid of the taboo. Among the Aruntas of Australia the wives of a dead man smear themselves with white pipe-clay until the last ceremonies are finished, sometimes adding ashes — this not to conceal themselves from the ghost (which may partly be the aim of some mourning costumes), but to show the ghost that they are duly sorrowing for their loss. These widows must not talk except on their hands for a whole year. " Among the Maoris," says Frazer (Golden Bough, i. 323), " anyone who had handled a corpse, helped to convey it to the grave, or touched a dead man's bones; was cut off from all intercourse and almost all communication with mankind. He could not enter any house, or come into contact with any person or thing, without utterly bedevilling them. He might not even touch food with his hands, which had become so frightfully tabooed or unclean as to be quite useless. Food would be set for him on the ground,

and he would then sit or kneel down, and, with his hands carefully held behind his back, would gnaw at it as best he could." Often a degraded outcast was kept in a village to feed mourners. Such a taboo is strictly similar to those which surround a sacred chief or his property, a menstruous woman or a homicide, rendering them dangerous to themselves and to all who approach them.

3. Primitive folk cannot conceive of a man's soul surviving apart from his body, nor of another life as differing from this, and the dead must continue to enjoy what they had here. Accordingly the Patagonians kill horses at the grave that the dead may ride to Alhuemapu, or country of the dead. After a year they collect a chief's bones, arrange them, tie them together and dress them in his best garments with beads and feathers. Then they lay him with his

weapons in a square pit, round which dead horses are placed set upright on their feet by stakes. As late as 1781 in Poland F. Casimir's horse was slain and buried with him. In the Caucasus a Christian lady's jewels are buried with her. The Hindus used to burn a man's widow on his pyre, because he could not do without her; and St Boniface commends the self-sacrifice of the Wend widows who in his day burned themselves alive on their husbands' pyres.

The tumuli met with all over the north of Europe (in the Orkneys alone 2000 remain) are regular houses of the dead, models of those they occupied in life. The greater the dignity of the deceased, the loftier was his barrow. Silbury hill is 170 ft. high; the tomb of Alyattes, father of Croesus, was a fourth of a league round; the Pyramids are still the largest buildings in existence; at Oberea in Tahiti is a barrow 267 ft. long, 87 wide and 44 high. Some Eskimo just leave a dead man's body in his house, and shut it up, often leaving by his side a dog's head to guide him on his last journey, along with his tools and kayak. The Sea Dyaks set a chief adrift in his war canoe with his weapons. So in Norse story Hake " was laid wounded on a ship with the dead men and arms; the ship was taken out to sea and set on fire." The Viking was regularly buried in his ship or boat under a great mound. He sailed after death to Valhalla. In the ship was laid a stone as anchor and the tools, clothes, weapons and treasures of the dead. The Egyptians, whose land was the gift of the river Nile, equally believed that the dead crossed over water, and fashioned the hearse in the form of a boat. Hence perhaps was derived the Greek myth of Charon and the Styx, and the custom, which still survives in parts of Europe, of placing a coin in the mouth of the dead with which to pay the ferryman. The Egyptians placed in the tomb books of a kind to guide the dead to the next world. The Copts in a later age did the same, and to this custom we owe the recovery in Egypt of much ancient literature. The Armenians till lately buried with a priest his missal or gospel.

In Egyptian entombments of the XHth to the XI Vth dynasties were added above the sepulchres what Professor Petrie terms soul- houses, viz. small models of houses furnished with couch and table, &c, for the use of the ka or double whenever it might wish to come above ground and partake of meats and drinks. They recall, in point of size, the hut-urns of the Etruscans, but the latter had another use, for they contain incinerated remains. Etruscan tombs, like those of Egypt and Asia Minor, were made to resemble the dwelling-houses of the living, and furnished with coffered ceilings, panelled walls, couches, stools, easy chairs with footstools attached, all hewn out of the living rock (Dennis, Cities and Cemeteries of Etruria, vol i. p. lxx.).

Of the old Peruvian mummies in the Kircherian Museum at Rome, several are of women with babies in their arms, whence it is evident that a mother had her suckling buried with her; it would console her in the next world and could hardly survive her in this. The practice of burying ornaments, tools and weapons with the dead characterizes the inhumations of the Quaternary epoch, as if in that dim and remote age death was already regarded as the portal of another life closely resembling this. The cups, tools, weapons, ornaments and other articles deposited with the dead are often carefully broken or turned upside down and inside out; for the soul or manes of objects is ‘ liberated by such fracture or inversion and so passes into the

dead man’s use and possession. For the same reason where the dead are burned, their properties are committed to the flames. The ghost of the warrior has a ghostly sword and buckler to fight with and a ghostly cup to drink from, and he is also nourished by the impalpable odour and reek of the animal victims sacrificed . over his grave. Instead of valuable objects cheap images and models are often substituted; and why not, if the mere ghosts of the things are all that the wraith can enjoy? Thus Marco Polo (ii. 76) describes how in the land of Kinsay (Hang-chau) ” the friends and relations make a great mourning for the deceased, and clothe themselves in hempen garments, and follow the corpse, playing on a variety of instruments and singing hymns to their idols. And when they come to the burning place they take representations of things cut out of parchment, such as caparisoned horses, male and female slaves, camels, armour, suits of cloth of gold (and money), in great quantities, and these things they put on the fire along with the corpse so that they are all burned with it. And they tell you that the dead man shall have all these slaves and animals of which the effigies are burned, alive in flesh and blood, and the money in gold, at his disposal in the next world; and that the instruments which they have caused to be played at his funeral, and the idol hymns that have been chaunted shall also be produced again to welcome him in the next world.” The manufacture of such paper simu- lacra for consumption at funerals is still an important industry in Chinese cities. The ancient Egyptians, assured that a man’s ka or double shall revivify his body, took pains to guard the flesh from corruption, steeping the corpse in natron and stuffing it with spices. A body so prepared is called a mummy {q.v.), and the custom was already of a hoary antiquity in 3200 B.C., when the oldest dated mummy we have was made. The bowels, removed in the

process, were placed in jars over the corpse in the tomb, together with writing tablets, books, musical instruments, &c, of the dead. Cemeteries also remain full of mummies of crocodiles, cats, fish, cows and other sacred animals. The Greeks settled in Egypt learned to mummify their dead, but the custom was abhorrent to the Jews, although the Christian belief in the resurrection of the flesh must have been formed to a large extent under Egyptian influence. Half the superiority of the Jewish to other ancient religions lay in this, that it prescribed no funeral rites other than the simplest inhumation.

The dead all over the world and from remote antiquity have been laid not anyhow in the earth, but with the feet and face towards the region in which their future will be spent; the Samoans and Fijians towards the far west whither their souls have preceded them ; the Guarayos with head turned eastwards because their god Tamoi has in that quarter " his happy hunting grounds where the dead will meet again " (Tylor, Prim. Cult. ii. 422). The legend is that Christ was buried with His head to the west, and the church follows the custom, more ancient than itself, of laying the dead looking to the East, because that is the attitude of prayer, and because at the last trump they will hurry eastwards. So in Eusebius (Hist. Eccl. 430. 19) a martyr explains to his pagan judge that the heavenly Jerusalem, the fatherland of the pious, lay exactly in the east at the rising place of the sun. Where the body is laid out straight it is difficult to discern the presence of any other idea than that it is at rest. In Scandinavian barrows, e.g. in the one opened at Goldhavn in 1830, the skeletons have been found seated on a low stone bench round the wall of the grave chamber facing its opening, which always looks south or east, never north. Here the dead were continuing the drinking bouts they enjoyed on earth.

The Peruvians mummified their dead and placed them jointed and huddled up with knees to chin, looking toward the sunset, with the hands held before the face. In the oldest prehistoric tombs along the Nile the bodies are doubled up in the same position. It would seem as if in these and numerous other similar cases the dead were deliberately given in their graves the attitude of a foetus in the womb, and, as Dr Budge remarks (Egyptian Ideas of the Future Life, London, 1899, p. 162), " we may perhaps be justified in seeing in this custom the symbol of a hope that, as the child is born from this position into the

world, so might the deceased be born into the life beyond the grave." The late Quaternary skeletons of the Men tone cave were laid in a layer of ferrugineous earth specially laid down for them, and have

contracted a red colour therefrom. Many other prehistoric skeletons found in Italy have a reddish colour, perhaps for the same reason, or because, as often to-day, the bones were stripped of flesh and painted. Ambrose relates that the skeletons of the martyrs Gervasius and Protasius, which he found and deposited a.d. 386 under the altar of his new basilica in Milan, were mirae magnitudinis ut prisca aetas ferebat, and were also coloured red. He imagined the red to be the remains of the martyrs' blood ! Hie sanguis clamat coloris indicio. Salomon Reinach has rightly divined that what Ambrose really hit upon was a prehistoric tomb. Red earth was probably chosen as a medium in which to lay a corpse because demons flee from red. Sacred trees and stones are painted red, and for the most solemn of their rites savages bedaub themselves with red clay. It is a favourite taboo colour.

4. A feast is an essential feature of every primitive funeral, and in the Irish " wake " it still survives. A dead man's soul or double has to be fed at the tomb itself, perhaps to keep it from prowling about the homes of the survivors in search of victuals; and such food must also be supplied to the dead at stated intervals for months or years. Many races leave a narrow passage or tube open down to the cavity in which the corpse lies, and through it pour down drinks for the dead. Traces of such tubes are visible in the prehistoric tombs of the British Isles. However, such provision of food is not properly a funeral feast unless the survivors participate. In the Eastern churches and in Russia the departed are thus fed on the ninth, twelfth and fortieth days from death. " Ye appease the shades of the dead with wine and meals," was the charge levelled at the Catholics by the 4th-century Manichaeans, and it has hardly ceased to be true even now after the lapse of sixteen centuries. The funeral feast proper, however, is either a meal of communion with or in the dead, which accompanies interment, or a banquet off the flesh of victims slain in atonement of the dead man's sins. Some anthropologists see in the common meal held at the grave " the pledge and witness of the unity of the kin, the chief means, if not of making, at least of repairing and renewing it." l The flesh provided at these banquets is occasionally that of the dead man himself; Herodotus and Strabo in antiquity relate this of several half-civilized races in the East and West, and a similar story is told by Marco Polo of certain Tatars. Nor among modern savages are funeral feasts off the flesh of the dead unknown, and they seem to be intended to effect and renew a sacramental union or kinship of the living with the dead. The Uaupes in the Amazons incinerate a corpse a month after death, pound up the ashes, and mix them with their fermented drink. They believe that the virtues of the dead will

thus be passed on to his survivors. The life of the tribe is kept inside the tribe and not lost. Such cannibal sacraments, however, are rare, and, except in a very few cases, the evidence for them weak. The slaying and eating of animal victims, however, at the tomb is universal and bears several meanings, separately or all at once. The animals may be slain in order that their ghosts may accompany the deceased in his new life. This significance we have already dwelt upon. Or it is believed that the shade feeds upon them, as the shades came up from Hades and lapped up out of a trench the blood of the animals slain by Ulysses. The survivors by eating the flesh of a victim, whose blood and soul the dead thus consume, sacramentally confirm the mystic tie of blood kinship with the dead. Or lastly, the victim may be offered for the sins of the dead. His sins are even supposed to be transferred into it and eaten by the priest. Such expiatory sacrifices of animals for the dead survive in the Christian churches of Armenia, Syria and of the East generally. Their vicarious character is emphasized in the prayers which accompany them, but the popular under- standing of them probably combines all the meanings above enumerated. It has been suggested by Robertson Smith (Religion of the Semites, 336) that the world-wide customs of

1 E. S. Hartland, Legend of Perseus (1895), ii. 278.

tearing the hair, rending the garments, and cutting and wounding the body were originally intended to establish a life-bond between the dead and the living. The survivors, he argues, in leaving portions of their hair and garments, and yet more by causing their own blood to stream over the corpse from self-inflicted wounds, by cutting off a finger and throwing it into the grave, leave what is eminently their own with the dead, so drawing closer their tie with him. Conversely, many savages daub them- selves with the blood and other effluences of their dead kinsmen, and explain their custom by saying that in this way a portion of the dead is incorporated in themselves. Often the survivors, especially the widows, attach the bones or part of them to their persons and wear them, or at least keep them in their houses. The retention of the locks of the deceased and of parts of his dress is equally common. There is also another side to such customs. Having in their possession bits of the dead, and being so far in communion with him, the survivors are surer of his friendship. They have ensured themselves against ghosts who are apt to be by nature envious and mischievous. But whatever their original significance, the tearing of cheeks and hair and garments and cutting with knives are mostly

expressions of real sorrow, and, as Robertson Smith remarks, of deprecation and supplication to an angry god or spirit. It must not be supposed that the savage or ancient man feels less than ourselves the poignancy of loss.

6. Death-witchery has close parallels in the witch and heretic hunts of the Christians, but, happily for us, only flourishes to-day among savages. Sixty % of the deaths which occur in West Africa are, according to Miss Mary Kingsley — a credible witness — believed to be due to witchcraft and sorcery. The blacks regard old age or effusion of blood as the sole legitimate causes of death. All ordinary 1 diseases are in their opinion due to private magic on the part of neighbours, just as a widespread epidemic marks the active hatred " of some great outraged nature spirit, not of a mere human dabbler in devils." 1 Similarly in Christian countries an epidemic is set down to the wrath of a God offended by the presence of Jews, Arians and other heretics. The duty of an African witch-doctor is to find out who bewitched the deceased, just as it was of an inquisitor to discover the heretic. Every African post-mortem accordingly involves the murder of the person or persons who bewitched the dead man and caused him to die. The death-rate by these means is nearly doubled; but, since the use of poison against an obnoxious neighbour is common, the right person is occasionally executed. It is also well for neighbours not to quarrel, for, if they do and one of them dies of smallpox, the other is likely to be slain as a witch, and his lungs, liver and spleen impaled on a pole at the entrance of the village. It is the same case with the Australian blacks: " no such thing as natural death is realized by the native; a man who dies has of necessity been killed by some other man, or perhaps even by a woman, and sooner or later that man or woman will be attacked. In the normal condition of the tribe every death meant the killing of another individual." 2

7. Lastly, a primitive interment guards against the double risk of the ghost haunting the living and of ghouls or vampires taking possession of the corpse. The latter end is likely to be achieved if the body is cremated, for then there is no nidus to harbour the demon; but whether, in the remote antiquity to which belong many barrows containing incinerated remains, this motive worked, cannot be ascertained. The Indo-European race seems to have cremated at an early epoch, perhaps before the several races of East and West separated. In Christian funeral rites many prayers are for the protection of the body from violation by vampires, and it would seem as if such a motive dictated the architectural solidity of some ancient tombs. Christian graves were for protection regularly sealed with the cross; and the following is a characteristic prayer from the old

Armenian rite for the burial of a layman:

1 Mary Kingsley, West African Studies (1901), p. 178.

2 B. Spencer and F. J. Gillen, The Native Tribes of Central Australia (1899), p. 48.

" Preserve, Almighty Lord, this man's spirit with all saints and with all lovers of Thy holy name. And do Thou seal and guard the sepulchre of Thy servant, Thou who shuttest up the depths and sealest them with Thy almighty right hand … so let the seal of Thy Lordship abide unmoved upon this man's dwelling-place and upon the shrine which guards Thy servant. And let not any filthy and unclean devil dare to approach him, such as assail the body and souls of the heathenˆ who possess not the birth of the holy font, and have not the dread seal laid upon their graves." '

A terrible and revolting picture of the superstitious belief in ghouls which violate Christian tombs is given by Leo Allatius (who held it) in his tract De opinionibus quorundam Graecorum (Paris, 1646). It was probably the fear of such demonic assaults on the dead that inspired the insanitary custom of burying the dead under the floors of churches, and as near as possible to the altar. In the Greek Church this practice was happily forbidden by the code of Justinian as well as by the older law in the case of churches consecrated with Encaenia and deposition of relics. In the Armenian Church the same rule holds, and Ephrem Syrus in his testament particularly forbade his body to be laid within a church. Such prohibitions, however, are a witness to the tendency in question.

The custom of lighting candles round a dead body and watching at its side all night was originally due to the belief that a corpse, like a person asleep, is specially liable to the assaults of demons. The practice of tolling a bell at death must have had a similar origin, for it was a common medieval belief that the sound of a consecrated bell drives off the demons which when a man dies gather near in the air to waylay his fleeting soul. For a like reason the consecrated bread of the Eucharist was often buried with believers, and St Basil is said to have specially consecrated a Host to be placed in his coffin.

8. Some of the rites described under the previous heads may be really inspired by the fear of the dead haunting the living, but it must be kept in mind that the taboo attaching to a dead body is one thing and fear of a ghost another. A corpse is buried or burned, or scaffolded on a tree, a tower or a house-top, in order to get it out of the way

and shield society from the dangerous infection of its taboo; but ghosts qud ghosts need not be feared and a kinsman's ghost usually is not. On the contrary, it is fed and consoled with everything it needs, is asked not to go away but to stay, is in a thousand ways assured of the sorrow and sympathy of the survivors. Even if the body be eaten, it is merely to keep the soul of the deceased inside the circle of kinsmen, and Strabo asserts that the ancient Irish and Massagetae regarded it as a high honour to be so consumed by relatives. In Santa Cruz in Melanesia they keep the bones for arrow heads and store a skull in a box and set food before it " saying that this is the man himself " (R. H. Codrington, The Melanesians, p. 264), or the skull and jaw bone are kept and "are called mangite, which are saka, hot with spiritual power, and by means of which the help of the lio'a, the powerful ghost of the man whose relics these are, can be obtained " (ibid. p. 262). Here we have the savage analogue to Christian relics. So the Australian natives make pointing sticks out of the small bones of the arm, with which to bewitch enemies.

We may conclude then that in the most primitive societies, where blood-kinship is the only social tie and root of social custom it is the' shades, not of kinsmen, but of strangers, who as such are enemies, that are dangerous and uncanny. In more developed societies, however, all ghosts alike are held to be so; and if a ghost walks it is because its body has not been properly interred or because its owner was a malefactor. Still, even allowing for this, it remains true that for a friendly ghost the proper place is the grave and not the homes of the living, and accordingly the Aruntas with cries of Wah ! Wah ! with wearing of fantastic head-dresses, wild dancing and beating of the air with hands and weapons " drive the spirit away from the old camp which it is supposed to haunt," and which has been set fire to, and hunt it at a run into the grave prepared, and there stamp it down into the earth. " The loud shouting of the men and women shows him that they do not wish to be frightened by him in his present state, and that they will be angry with him if he does not rest."

(Spencer and Gillen, Native Tribes of Central Australia, p. 508). In Mesopotamia cemeteries have been discovered where the sepulchral jars were set upside down, clearly by way of hindering the ghosts from escaping into the upper world. In the Dublin museum we see specimens of ancient Celtic tombs showing the same peculiarity. For a like reason perhaps the name of the dead must among the Aruntas

not be uttered, nor the grave approached, by certain classes of kinsmen. The same repugnance to naming the dead exists all over the world, and leads survivors who share the dead man's name to adopt another, at least for a time. If the dead man's name was that of a plant, tree, animal or stream, that too is changed. Here is a potent cause of linguistic change, that also renders any historical tradition impossible. The survivors seem to fear that the ghost will come when he hears his name called ; but it also hangs together with the taboo which hedges round the dead as it does kings, chieftains and priests.

Authorities.— B. Spencer and F. J. Gillen, The Native Tribes of Central Australia (London, 1899); F. B. Jevons, Introduction to History of Religion (London, 1896); E. S. Hartland, The Legend of Perseus, vol. ii. ; J. G. Frazer, The Golden Bough (London, 1900); L. VV. Faraday, " Custom and Belief in the Icelandic Sagas," in Folk-lore, vol. xvii. No. 4; E. B. Tylor, Primitive Culture (London, 1903); E. A. W. Budge, The Mummy (Cambridge, 1893); C. Royer, " Les Rites funeraires aux epoques prehistoriques," Revue d'anthro-pologie (1876); Forrer, Uber die Totenbestattung bei den Pfahlbauern (Ausland, 1885); J. Lubbock, Origin of Civilization (London, 1875) and Prehistoric Times (London, 1865) ; L. A. Muratori, " De antiquis Christianorum sepulchris," A need. Graeca (Padua, 1709); Onaphr. Panvinius, De ritu sepeliendi mortuos apud veteres Christianos, re- printed in Volbeding's Thesaurus (Leipzig, 1 841). (F. C. C.)

FUNGI (pi. of Lat. fungus, a mushroom), the botanical name covering in the broad sense all the lower cellular Cryptogams devoid of chlorophyll, which arise from spores, and the thallus of which is either unicellular or composed of branched or un- branched tubes or cell-filaments (hyphae) with apical growth, or of more or less complex wefted sheets or tissue-like masses of such (mycelium). The latter may in certain cases attain large dimensions, and even undergo cell-divisions in their interior, resulting in the development of true tissues. The spores, which may be uni- or multi-cellular, are either abstricted free from the ends of hyphae (acrogenous), or formed from segments in their course (chlamydospores) or from protoplasm in their interior (endogenous). The want of chlorophyll restricts their mode of life — which is rarely aquatic — since they are therefore unable to decompose the carbon dioxide of the atmosphere, and renders them dependent on other plants or (rarely) animals for their carbonaceous food-materials. These they obtain usually in the form of carbohydrates from the dead remains of other organisms, or in this or other forms from the living cells of their hosts; in the former case they are termed saprophytes, in the latter

parasites. While some moulds (Penicillium, Aspergillus) can utilize almost any organic food-materials, other fungi are more restricted in their choice — e.g. insect-parasites, horn- and feather – destroying fungi and parasites generally. It was formerly the custom to include with the Fungi the Schizomycetes or Bacteria, and the Myxomycetes or Mycetozoa; but the peculiar mode of growth and division, the cilia, spores and other peculiarities of the former, and the emission of naked amoeboid masses of protoplasm, which creep and fuse to streaming Plas- modia, with special modes of nutrition and spore-formation of the latter, have led to their separation as groups of organisms independent of the true Fungi. On the other hand, lichens, previously regarded as autonomous plants, are now known to be dual organisms — fungi symbiotic with algae.

The number of species in 1889 was estimated by Saccardo at about 32,000, but of these 8500 were so-called Fungi impcrfecti — i.e. forms of which we only know certain stages, such as conidia, pyenidia, &c, and which there are reasons for regarding as merely the corresponding stages of higher forms. Saccardo also included about 400 species of Myxomycetes and 650 of Schizomycetes. Allowing for these and for the cases, undoubtedly not few, where one and the same fungus has been described under different names, we obtain Schroeter's estimate (in 1892) of 20,000 species.

In illustration of the very different estimates that have been made, however, may be mentioned that of De Bary in 1872 of 150,000 species, and that of Cooke in 1895 of 40,000, and Massee in 1899 of over 50,000 species, the fact being that no sufficient data are as yet to hand for any accurate census. As regards their geographical distribution, fungi, like flowering plants, have no doubt their centres of origin and of dispersal; but we must not forget that every exchange of wood, wheat, fruits, plants, animals, or other commodities involves transmission of fungi from one country to another; while the migrations of birds and other animals, currents of air and water, and so forth, are particu- larly efficacious in transmitting these minute organisms. Against this, of course, it may be argued that parasitic forms can only go where their hosts grow, as is proved to be the case by records concerning the introduction of Puccinia malvacearum, Perono- spora viticola, Hemileia vastatrix, &c. Some fungi — e.g. moulds and yeasts — appear to be distributed all over the earth. That the north temperate regions appear richest in fungi may be due only to the fact that North America and Europe have been much more thoroughly investigated than other countries; it is certain that the tropics are the home of very numerous species. Again, the accuracy of the statement that the fleshy Agaricini,

Polyporei, Pezizae, &c, are relatively rarer in the tropics may depend on the fact that they are more difficult to collect and remit for identification than the abundantly recorded woody and coriaceous forms of these regions. When we remember that many parts of the world are practically unexplored as regards fungi, and that new species are constantly being dis- covered in the United States, Australia and northern Europe — the best explored of all — it is clear that no very accurate census of fungi can as yet be made, and no generalizations of value as to their geographical distribution are possible. 1

The existence of fossil fungi is undoubted, though very few of the identifications can be relied on as regards species or genera. They extend back beyond the Carboniferous, where they occur as hyphae, &c, preserved in the fossil woods, but the best speci- mens are probably those in amber and in siliceous petrifactions of more recent origin.

Organs. — Individual hyphae or their branches often exhibit specializations of form. In many Basidiomycetes minute branches arise below the septa; their tips curve over the outside of the latter, and fuse with the cell above just beyond it, forming a clamp-con- nexion. Many parasitic hyphae put out minute lateral branches, which pierce the cell- wall of the host and form a peg-like (Tricho- sphaeria), sessile (Cystopus), or stalked (Hemileia), knot-like, or a

hf B

Fig. 1. — 1, Peronospora parasitica (De Bary). Mycelium with haustoria (h); 2, Erysiphe; A and B, mycelium (m), with haustoria (h). (After De Bary.)

more or less branched (Peronospora) or coiled(Pro/

themselves to it, then another branch shoots out from the tuft and repeats the process, like a strawberry-runner. Appressoria are also formed by some parasitic fungi, as a minute flattening of the tip of a very short branch (Erysiphe) , or the swollen end of any hypha which comes in contact with the surface of the host (Piptocephalis, Syncephalis) , haustoria piercing in each case the cell- wall below. In Bolrytis the appressoria assume the form of dense tassels of short branches. In Arthrobotrys side-branches of the mycelium sling them-

selves around the host (Tylenchus) much as tendrils round a support. Many fungi (Phallus, Agaricus, Fumago, &c.) when strongly growing put out ribbon-like or cylindrical cords, or sheet-like mycelial plates of numerous parallel hyphae, all growing together equally, and fusing by anastomoses, and in this way extend long distances in the soil, or over the surfaces of leaves, branches, &c. These mycelial strands may be white and tender, or the outer hyphae may be hard and black, and very often the resemblance of the subterranean forms to a root is so marked that they are termed rhizomorphs. The outermost hyphae may even put forth thinner hyphae, radiating into the soil like root-hairs, and the convergent tips may be closely appressed and so divided by septa as to resemble the root-apex of a higher plant (Armillaria mellea).

Sclerotia. — Fungi, like other plants, are often found to store up large quantities of reserve materials (oil, glycogen, carbohydrates, &c.) in special parts of their vegetative tissues, where they lie accumulated between a period of active assimilation and one of renewed activity, forming reserves to be consumed particularly during the formation of large fructifications. These reserve stores may be packed away in single hyphae or in swollen cells, but the hyphae containing them are often gathered into thick cords or mycelial strands {Phallus, mushroom, &c), or flattened and anastomosing ribbons and plates, often containing several kinds of hyphae (Merulius lacrymans). In other cases the strands undergo differentiation into an outer layer with blackened, hardened cell-walls and a core of ordinary hyphae, and are then termed rhizomorphs (Armillaria mellea), capable not only of extending the fungus in the soil, like roots, but also of lying dormant, protected by the outer casing. Such aggregations of hyphae frequently become knotted up into dense masses of interwoven and closely packed hyphae, varying in s'ze from that of a pin's head or a pea (Peziza, Coprinus) to that of a man's fist or head, and weighing 10 to 25 lb or more (Polyporus Mylittae, P. tumulosus, Lentinus Woermanni, P. Sapurema, &c). The interwoven hyphae fuse and branch copiously, filling up all interstices. They also undergo cutting up by numerous septa into short cells, and these often divide again in all planes, so that a pseudoparenchyma results, the walls of which may be thickened and swollen internally, or hardened and black on the exterior. In many cases the swollen cell-walls serve as reserves, and sometimes the substance is so thickly deposited in strata as to obliterate the lumen, and the hyphae become nodular (Polyporus sacer, P. rhinoceros, Lentinus Woermanni). The various sclerotia, if kept moist, give rise to the fructifications of the fungi concerned, much as a potato tuber

does to a potato plant, and in the same way the reserve materials are consumed. They are principally Polyporei, Agaricini, Pezizae; none are known among the Phycomycetes, Uredineae or Ustilagineae. The functions of mycelial strands, rhizomorphs and sclerotia are not only to collect and store materials, but also to extend the fungus, and in many cases similar strands act as organs of attack. The same functions of storage in advance of fructification are also exercised by the stromata so common in Ascomycetes.

Tissue Differentiations. — The simpler mycelia consist of hyphae ' all alike and thin-walled, or merely differing in the diameter of the branches of various orders, or in their relations to the environment, some plunging into the substratum like roots, others remaining on its surface, and others (aerial hyphae) rising into the air. Such hyphae may be multicellular, or they may consist of simple tubes with numerous nuclei and no septa (Phycomycetes), and are then non-cellular. In the more complex tissue-bodies of higher fungi, however, we find considerable differences in the various layers or strands of hyphae.

An epidermis-like or cortical protective outer layer is very common, and is usually characterized by the close septation of the densely interwoven hyphae and the thickening and dark colour of their outer walls (sclerotia, Xylaria, &c). Fibre-like hyphae with the lumen almost obliterated by the thick walls occur in mycelial cords (Merulius). Latex-tubes abound in the tissues of Lactarius, Stereum, Mycena, Fistulina, filled with white or coloured milky fluids, and Istvanffvi has shown that similar tubes with fluid or oily contents are widely spread in other Hymehomycetes. Some- times fatty oil or watery sap is found in swollen hyphal ends, or such tubes contain coloured sap. Cystidia and paraphyses may be also classed here. In Merulius lacrymans Hartig has observed thin-walled hyphae with large lumina, the septa of which are per- forated like those of sieve-tubes.

As regards its composition, the cell-wall of fungi exhibits varia- tions of the same kind as those met with in higher plants. While the fundamental constituent is a cellulose in many Mucorini and other Phycomycetes, in others bodies like pectose, callose, &c, commonly occur, and Wisselingh's researches show that chitin, a gluco-proteid common in animals, forms the main constituent in

many cases, and is probably deposited directly as such, though, like the other substances, it may be mixed with cellulose. As in other cell-walls, so here the older membranes may be altered by deposits of

various substances, such as resin, calcium oxalate, colouring matters; or more profoundly altered throughout, or in definite layers, by lignification, suberization (Trametes, Daedalea), or swelling to a gelatinous mucilage (Tremella, Gymnosporangium) , while cutinization of the outer layers is common. One of the most striking alterations of cell-walls is that termed carbonization, in which the substance gradually turns black, hard and brittle, as if charred — e.g. Xylaria, Ustulina, some sclerotia. At the other extreme the cell-walls of many lichen-fungi are soft and colourless, but turn blue in iodine, as does starch. The young cell-wall is always tenuous and flexible, and may remain so throughout, but in many cases thickenings and structural differentiations, as well as the changes referred to above, alter the primary wall considerably. Such thickening may be localized, and pits (e.g. Uredospores, septa of Basidiomycetes), spirals, reticulations, rings, &c. (capillitium fibres of Podaxon, Colostoma, Battarrea), occur as in the vessels of higher plants, while sculptured networks, pittings and so forth are as common on fungus-spores as they are on pollen grains.

Cell- Contents. — The cells of fungi, in addition to protoplasm, nuclei and sap-vacuoles, like other vegetable cells, contain formed and amorphous bodies of various kinds. Among those directly visible to the microscope are oil drops, often coloured (Uredineae) crystals of calcium oxalate (Phallus, Russula), proteid crystals (Mucor, Pilobolus, &c.) and resin (Polyporei). The oidia of Ery- sipheae contain fibrosin bodies and the hyphae of Saprolegnieae cellulin bodies, but starch apparently never occurs. Invisible to the microscope, but rendered visible by reagents, are glycogen, Mucor, Ascomycetes, yeast, &c. In addition to these cell-contents we have good indirect evidence of the existence of large series of other bodies, such as proteids, carbohydrates, organic acids, alkaloids, enzymes, &c. These must not be confounded with the numerous substances obtained by chemical analysis of masses of the fungus, as there is often no proof of the manner of occurrence of such bodies, though we may conclude with a good show of probability that some of them also exist preformed in the living cell. Such are sugars (glucose, mannite, &c), acids (acetic, citric and a whole series of lichen-acids), ethereal oils and resinous bodies, often combined with the intense colours of fungi and lichens, and a number of powerful alkaloid poisons, such as muscarin (Amanita), ergotin (Claviceps), &c.

Among the enzymes already extracted from fungi are invertases (yeasts, moulds, &c), which split cane-sugar and other complex sugars with hydrolysis into simpler sugars such as dextrose and levulose; diastases, which convert starches into sugars (Aspergillus,

&c.) ; cytases, which dissolve cellulose similarly (Botrytis, &c.) ; peptases, using the term as a general one for all enzymes which convert proteids into peptones and other bodies (Penicillium, &c.) ; lipases, which break up fatty oils (Empusa, Phycomyces, &c.) ; oxydases, which bring about the oxidations and changes of colour observed in Boletus, and zymase, extracted by Buchner from yeast, which brings about the conversion of sugar into alcohol and carbon-dioxide. That such enzymes are formed in the protoplasm is evident from the behaviour of hyphae, which have been observed to pierce cell-membranes, the chitinous coats of insects, artificial collodion films and layers of wax, &c. That a fungus can secrete more than one enzyme, according to the materials its hyphae have to attack, has been shown by the extraction of diastase, inulase, trehalase, invertase, maltase, rafnnase, malizitase, emulsin, trypsin and lipase from Aspergillus by Bourquelot, and similar events occur in other fungi. The same fact is indicated by the wide range of organic substances which can be utilized by Penicillium and other moulds, and by the behaviour of parasitic fungi which destroy various cell-contents and tissues. Many of the coloured pigments of fungi are fixed in the cell-walls or excreted to the out- side (Peziza aeruginosa). Matruchot has used them for staining the living protoplasm of other fungi by growing the two together. Striking instances of coloured mycelia are afforded by Corticium sanguineum, blood -red; Elaphomyces Leveillei, yellow – green ; Chlorosplenium aeruginosum, verdigris green; and the Dematei, brown or black.

Nuclei. — Although many fungi have been regarded as devoid of nuclei, and all have not as yet been proved to contain them, the numerous investigations of recent years have revealed them in the cells of all forms thoroughly examined, and we are justified in concluding that the nucleus is as essential to the cell of a fungus as to that of other organisms. The hyphae of many contain numerous, even hundreds of nuclei (Phycomycetes) ; those of others have several (Aspergillus) in each segment, or only two (Exoascus) or one (Erysiphe) in each cell. Even the isoIated_ cells of the yeast plant have each one nucleus. As a rule the nuclei of the mycelium are very minute (1-5-2 n in Phycomyces), but those of many asci and spores are large and easily rendered visible. As with other plants, so in fungi the essential process of fertilization consists in the fusion of two nuclei, but owing to the absence of well-marked sexual organs from many fungi, a peculiar interest attaches to certain nuclear fusions in the vegetative cells or in young spores of many forms. Thus in Ustilagineae the chlamydospores, and in Uredineae

the teleutospores, each contain two nuclei when young, which fuse as the spores mature. In young asci a similar fusion of two nuclei occurs, and also in basidia, in each case the nucleus of the ascus or of the basidium resulting from the fusion subsequently giving rise by division to the nuclei of the ascospores and basidio- spores respectively. The significance of these fusions will be dis- cussed under the various groups. Nuclear division is usually accompanied by all the essential features of karyokinesis.

Spores. — No agreement has ever been arrived at regarding the consistent use of the term spore. This is apparently owing to the facts that too much has been attempted in the definition, and that differences arise according as we aim at a morphological or a physio- logical definition. Physiologically, any cell or group of cells sepa- rated off from a hypha or unicellular fungus, and capable of itself growing out — germinating — to reproduce the fungus, is a spore ; but it is evident that so wide a definition does not exclude the ordinary vegetative cells of sprouting fungi, such as yeasts, or small sclerotium like cell-aggregates of forms like Coniothecium. Morphologically considered, spores are marked by peculiarities of form, size, colour, place of origin, definiteness in number, mode of preparation, and so forth, such that they can be distinguished more or less sharply from the hyphae which produce them. The only physiological peculiarity exhibited in common by all spores is that they germinate and initiate the production of a new fungus-plant. Whether a spore results from the sexual union of two similar gametes (zygospore) or from the fertilization of an egg-cell by the protoplasm of a male organ (oospore) ; or is developed asexually as a motile (zoospore) or a quiescent body cut off from a hypha (conidium) or developed along its course (oidium or chlamydospore) , or in its protoplasm (endospore), are matters of importance which have their uses in the classification and terminology of spores, though in many respects they are largely of academic interest.

Klebs has attempted to divide spores into three categories as follows: (i) kinospores, arising by relatively simple cell-divisions and subserving rapid dissemination and propagation, e.g. zoospores, conidia, endogonidia, stylospores, &c. ; (2) paulospores, due to simple rearrangement of cell-contents, and subserving the persistence of the fungus through periods of exigency, e.g. gemmae, chlamydo- spores, resting-cells, cysts, &c. ; (3) carpospores, produced by a more

or less complex formative process, often in special fructifica- tions, and subserving either or both multiplication and persistence, e.g. zygospores, oospores, brand-spores, aecidiospores, ascospores, basidiospores, &c. Little or nothing is gained by these definitions, however, which are especially physiological. In practice these various kinds of spores of fungi receive further special names in the

separate groups, and names, more- over, which will appear, to those unacquainted with the history, to have been given without any consistency or regard to general principles; nevertheless, for ordi- nary purposes these names are far more useful in most cases, owing to their descriptive character, than the proposed new names, which have been only partially accepted. Sporophores. — In some of the simpler fungi the spores are not borne on or in hyphae which can be distinguished from the vege- tative parts or mycelium, but in the vast majority of cases the sporogenous hyphae either ascend free into the air or radiate into the surrounding water as distinct branches, or are grouped into special columns, cushions, layers or complex masses obviously different in colour, consistency, shape and other characters from the parts which gather up and assimilate the food- materials. The term " receptacle " sometimes applied to these spore- bearing hyphae is better replaced by sporo- phore. The sporophore is obsolete when the spore-bearing hyphae are not sharply distinct from the mycelium, simple when the con- stituent hyphae are isolated, and compound when the latter are conjoined. The chief distinctive characters of the _ sporogenous hyphae are their orientation, usually vertical; their limited apical growth; their peculiar branching, form, colour, contents, con- sistency; and their spore-production. According to the characters of the last, we might theoretically divide them into conidiophores, sporangiophores, gametophores, oidiophores, &c. ; but since the two latter rarely occur, and more than one kind of spore or spore-case may occur on a sporophore, it is impossible to carry such a scheme fully into practice.

Fig. 2. — Peronospora para- sitica (DeBary). Conidiophore with conidia.

A simple sporophore may be merely a single short hypha, the end of which stops growing and becomes cut off as a conidium by the formation of a. septum, which then splits and allows the conidium to fall. More generally the hypha below the septum grows forwards again, and repeats this process several times before the terminal conidium falls, and so a chain of conidia results, the oldest of which terminates the series (Erysiphe) ; when the primary branch has thus formed a basipetal series, branches may arise from below and again

repeat this process, thus forming a tuft (Penictilium). Or the primary hypha may first swell at its apex, and put forth a series of short peg-like branches {sterigmata) from the increased surface thus provided, each of which develops a similar basipetal chain of conidia {Aspergillus), and various combinations of these processes result in the development of numerous varieties of exquisitely branched sporophores of this type {Boirytis, Botryosporium, Verticittium, &c).

A second type is developed as follows: the primary hypha forms a septum below its apex as before, and the terminal conidium, thus abstricted, puts out a branch at its apex, which starts as a mere point and rapidly swells to a second conidium; this repeats the process, and so on, so that we now have a chain of conidia developed in acropetal succession, the oldest being below, and, as in Penicittium, &c, branches put forth lower down may repeat the process (Hormodendron). In all these cases we may speak of simple conidiophores. The simple sporophore does not necessarily terminate in conidia, however. In Mucor, for example, the end of the primary hypha swells into a spheroidal head (sporangium), the protoplasm of which

Fig. 3. — Cystopus candidus.

A. a, Conidia. os, Oosphere.

b, Conidiophores. _ an, Antheridium.

c, Conidium emitting zoo- C. Formation of zoospores by

spores. oospores.

d, Free zoospore. z, Free zoospores. (After De B.og, Oogonium. Bary.)

undergoes segmentation into more or less numerous globular masses, each of which secretes an enveloping cell-wall and becomes a spore (endospore), and branched systems of sporangia may arise as before (Thamnidium). Such may be termed sporangiophores. In Sporodinia the branches give rise also to short branches, which meet and fuse their contents to form zygospores. In Peronospora, Saprolegnia, &c, the ends of the branches swell up into sporangia, which develop zoospores in their interior (zoosporangia) , or their contents become oospheres, which may be fertilized by the contents of other branches (antheridia) and so form egg-cases (oogonia). Since in such cases the sporophore bears sexual cells, they may be conveniently termed gametophores.

Compound sporophores arise when any of the branched or un-branched types of spore-bearing hyphae described above ascend into the air in consort, and are more or less crowded into definite layers, cushions, columns or other complex masses. The same laws apply to the individual hyphae and their branches as to simple sporophores, and as long as the conidia, sporangia, gametes, &c, are borne on their external surfaces, it is quite consistent to speak of these as compound sporophores, &c, in the sense described, how- ever complex they may become. Among the simplest cases are the sheet-like aggregates of sporogenous hyphae in Puccinia, Uro- myces, &c, or of basidia in Exobasidium, Corticium, &c, or of asci in Exoascus, Ascocorticium, &c. In the former, where the layer is small, it is often termed a sorus, but where, as in the latter, the sporo- genous layer is extensive, and spread out more or less sheet-like on the supporting tissues, it is more frequently termed a hymenium. Another simple case is that of the columnar aggregates of sporo- genous hyphae in forms like Stilbum, Coremium, &c. These lead

us to cases where the main mass of the sporophore forms a supporting .tissue of closely crowded or interwoven hyphae, the sporogenous terminal parts of the hyphae being found at the periphery or apical regions only. Here we have the cushion-like type (stroma) of Nectria and many Pyrenomycetes, the clavate " receptacle " of Clovaria, &c, passing into the complex forms met with in Sparassis, Xylaria, Polyporei, and Agaricini, &c. In these cases the compound sporophore is often termed the hymenophore, and its various parts demand special names (pileus, stipes, gills, pores, &c.) to denote peculiarities of distribution of the hymenium over the surface.

Other series of modifications arise in which the tissues correspond- ing to the stroma invest the sporogenous hyphal ends, and thus enclose the spores, asci, basidia, &c, in a cavity. In the simplest case the stroma, after bearing its crop of conidia or oidia, develops ascogenous branches in the loosened meshes of its interior (e.g. Onygena). Another simple case is where the plane or slightly convex surface of the stroma rises at its margins and overgrows the sporo- genous hyphal ends, so that the spores, asci, &c, come to lie in the depression of a cavity — e.g. Solenia, Cyphella — and even simpler cases are met with in Mortierella, where the zygospore is invested by the overgrowth of a dense mat of closely branching hyphae, and in

Cymnoascus, where a loose mat of similarly barren hyphae covers in the tufts of asci as they develop.

In such examples as the above we may regard the hymenium (Solenia, Cyphella), zygospores, or asci as truly invested by later growth, but in the vast majority of cases the processes which result in the enclosure of the spores, asci, &c, in a " fructification " are much more involved, inasmuch as the latter is developed in the interior of hyphal tissues, which are by no means obviously homo- logous with a stroma. Thus in Penicillium, Eurotium, Erysiphe, &c, hyphal ends which are the initials of ascogenous branches, are invested by closely packed branches at an early stage of develop- ment, and the asci develop inside what has by that time become a complete investment. Whether a true sexual process precedes these processes or not does not affect the present question, the point being that the resulting spheroidal " fructification " (cleisto- carp, perithecium) has a definite wall of its own not directly com- parable with a stroma. In other cases (Hypomyces, Nectria) the perithecia arise on an already mature stroma, while yet more numer- ous examples can be given (Poronia, Hypoxylon, Claviceps, &c.) where the perithecia originate below the surface of a stroma formed long before. Similarly with the various types of conidial or oidial " fructifications," termed pycnidia, spermogonia, aecidia, &c. In the simplest of these cases — e.g. Fumago — a single mycelial cell divides by septa in all three planes until a more or less solid clump results. Then a hollow appears in the centre owing to the more rapid extension of the outer parts, and into this hollow the cells lining it put forth short sporogenous branches, from the tips of which the spores (stylospores, conidia, spermatia) are abstricted. In a similar way are developed the pycnidia of Cicinnobolus, Pleospora, Cucurbitaria, Leptosphaeria and others. In other cases (Diplodia, Aecidium, &c.) conidial or oidial " fructifications " arise by a number of hyphae interweaving themselves into a knot, as if they were forming a sclerotium. The outer parts of the mass then differentiate as a wall or investment, and the interior becomes a hollow, into which hyphal ends grow and abstrict the spores. Much more complicated are the processes in a large series of " fructifications," where the mycelium first develops a densely packed mass of hyphae, all alike, in which labyrinths of cavities subsequently form by separation of hyphae in the previously homogeneous mass, and the hymenium covers the walls of these cavities and passages as with a lining layer. Meanwhile differences in consistency appear in various strata, and a dense outer protective layer (peridium), soft gelatinous layers, and so on are formed, the whole eventually attaining great complexity — e.g. puff-balls, earth-

stars and various Phalloideae.

*Spore-Distribution. — Ordinary conidia and similarly abstricted dry spores are so minute, light and numerous that their dispersal is ensured by any current of air or water, and we also know that rats and other burrowing animals often carry them on their fur; similarly with birds, insects, slugs, worms, &c, on claws, feathers, proboscides, &c, or merely adherent to the slimy body. In addition to these accidental modes of dispersal, however, there is a series of interesting adaptations on the part of the fungus itself. Passing over the locomotor activity of zoospores (Pythium, Peronospora, Saprolegnia) we often find spores held under tension in sporangia (Pilobolus) or in asci (Peziza) until ripe, and then forcibly shot out by the sudden rupture of the sporangial wall under the pressure of liquid behind — mechanism comparable to that of a pop-gun, if we suppose air replaced by watery sap. Even a single conidium, held tense to the last moment by the elastic cell-wall, may be thus shot forward by a spurt of liquid under pressure in the hypha abstrict- ing it (e.g. Empusa), and similarly with basidiospores (Coprinus, Agaricus, &c). A more complicated case is illustrated by Sphaero-bolus, where the entire mass of spores, enclosed in its own peridium, is suddenly shot up into the air like a bomb from a mortar by the elastic retroversion of a peculiar layer which, up to the last moment, surrounded the bomb, and then suddenly splits above, turns inside out, and drives the former as a projectile from a gun. Gelatinous or mucilaginous degenerations of cell*walls are frequently em- ployed in the interests of spore dispersal. The mucilage surrounding*

endospores of Mucor, conidia of Empusa, &c, serves to gum the spore to animals. Such gums are formed abundantly in pycnidia, and, absorbing water, swell and carry out the spores in long tendrils, which emerge for days and dry as they reach the air, the glued spores gradually being set free by rain, wind, &c. In oidial chains (Sclero-tinia) a minute double wedge of wall-substance arises in the middle lamella between each pair of contiguous oidia, and by its enlargement splits the separating lamella. These disjunctors serve as points of application for the elastic push of the swelling spore-ends, and as the connecting outer lamella of cell-wall suddenly gives way, the spores are jerked asunder. In many cases the slimy masses of spermatia (Uredineae), conidia (Claviceps), basidiospores (Phallus, Coprinus), &c, emit more or less powerful odours, which attract flies or other insects, and it has been shown that bees carry trie fragrant oidia of Sclerotinia to the stigma of Vaccinium and infect it, and that flies carry away the foetid spores of Phallus, just as pollen is dispersed by such insects. Whether the strong odour of

trimethylamine evolved by the spores of Tillelia attracts insects is not known.

The recent observations and exceedingly ingenious experiments of Falck have shown that the sporophores of the Basidiomycetes — especially the large sporophores of such forms as Boletus, Polyporus — contain quantities of reserve combustible material which are burnt up by the active metabolism occurring when the fruit-body is ripe. By this means the temperature of the sporophore is raised and the difference between it and the surrounding air may be one of several degrees. As a result convection currents are produced in the air which are sufficient to catch the basidiospores in their fall and carry them, away from the regions of comparative atmospheric stillness near the ground, to the upper air where more powerful air-currents can bring about their wide distribution.

Classification. — It has been accepted for some time now that the majority of the fungi proper fall into three main groups, the Phycomycetes, Ascomycetes and Basidiomycetes, the Schizomycetes and Myxomycetes (Mycetozoa) being considered as independent groups not coming under the true fungi.

The chief schemes of classification put forward in detail have been those of P. A. Saccardo (1882-1892), of Oskar Brefeld and Von Tavel (1892), of P. E. L. Van Tieghem (1893) and of J. Schroeter (1892). The scheme of Brefeld, which was based on the view that the Ascomycetes and Basidiomycetes were com- pletely asexual and that these two groups had been derived from one division (Zygomycetes) of the Phycomycetes, has been very widely accepted. The recent work of the last twelve years has shown, however, that the two higher groups of fungi exhibit distinct sexuality, of either a normal or reduced type, and has also rendered very doubtful the view of the origin of these two groups from the Phycomycetes. The real difficulty of classifica- tion of the fungi lies in the polyphyletic nature of the group. There is very little doubt that the primitive fungi have been derived by degradation from the lower algae. It appears, however, that such a degradation has occurred not only once in evolution but on several occasions, so that we have in the Phycomycetes not a series of naturally related forms, but groups which have arisen perfectly independently of one another from various groups of the algae. It is also possible in the absence of satisfactory intermediate forms that the Ascomycetes and Basidiomycetes have also been derived from the algae indepen- dently of the Phycomycetes, and perhaps of one another.

A natural classification on these lines would obviously be very complicated, so that in the present state of our knowledge it will be best to retain the three main groups mentioned above, bearing in mind that the Phycomycetes especially are far from being a natural group. The following gives a tabular survey of the scheme adopted in the present article:

A. Phycomycetes. Alga-like fungi with unicellular thallus and well-marked sexual organs.

Class I. — Oomycetes. Mycelium usually well developed, but sometimes poor or absent. Sexual reproduction by oogonia and antheridia; asexual reproduction by zoospores or conidia.

1. Monoblepharidineae. Mycelium present, antheridia with

antherozoids, oogonium with single oosphere: Mono- blepharidaceae.

2. Peronosporineae. Mycelium present; antheridia but no

antherozoids; oogonia with one or more oospheres: Peronosporaceae, Sapi olegniaceae.

3. Chytridineae. Mycelium poorly developed or absent;

oogonia and antheridia (without antherozoids) known in some cases; zoospores common: Chytridiaceae. An- cylistaceae.

Class II. — Zygomycetes. Mycelium well developed; sexual re-production by zygospores; asexual reproduction by sporangia and conidia.

i. Mucorineae. Sexual reproduction as above, asexual by sporangia or conidia or both: Mucoraceae. Mortierel- laceae, Chaetocladiaceae, Piptocephalidaceae. 2. Entomophthorineae. Sexual reproduction typical but with sometimes inequality of the fusing gametes (game- tangia ?) : Entomophthoraceae. B. Higher Fungi. Fungi with segmental thallus; sexual reproduction sometimes with typical antheridia and oogonia (ascogonia) but usually much reduced.

Class I. — Ustilaginales. Forms with septate thallus, and re-

production by chlamydospores which on germination produce sporidia ; sexuality doubtful. Class II. — Ascomycetes. Thallus septate; spores developed in special type of sporangium, the ascus, the number of spores being usually eight. Sexual reproduction sometimes typical, usually reduced.

Exoascineae, Saccharomycetineae, Perisporinea, Disco- mycetes, Pyrenomycetes, Tuberineae, Laboulbeniineae. Class III. — Basidiales. Thallus septate. Conidia (basidio- spores) borne in fours on a special conidiophore, the basidium. Sexual reproduction always much reduced.

1. Uredineae. Life-history in some cases very complex and

with well-marked sexual process and alternation of genera- tions, in others much reduced ; basidium (promycelium) derived usually from a thick-walled spore (teleutospore).

2. Basidiomycetes. Life-history always very simple, no well-

marked alternation of generations; basidium borne directly on the mycelium.

(A) Protobasidiomycetes. Basidia septate.

Auriculariaceae, Pilacreaceae, Tremellinaceae.

(B) Autobasidiomycetes. Basidia non-septate.

Hymenomycetes, Gasteromycetes.

A. Phycomycetes. — Most of the recent work of importance in this group deals with the cytology of sexual reproduction and of spore-formation, and the effect of external conditions on the production of reproductive organs.

Monoblepharidaceae consists of a very small group of aquatic forms living on fallen twigs in ponds and ditches. Only one genus, Monoblepharis, can certainly be placed here, though a somewhat similar genus. Myrioblepharis , with a peculiar multiciliate zoospore like that of Vaucheria, is provisionally placed in the same group. Monoblepharis was first described by Cornu in 1871, but from that time until 1895 when Roland Thaxter described several species from America the genus was completely lost sight of. Monoblepharis has oogonia with single oospheres and' antheridia developing a few amoeboid uniciliate antherozoids ; these creep to the opening of the

oogonium and then swim in. The resemblance between this genus and Oedogonium among the algae is very striking, as is also that of Myrioblepharis and Vaucheria.

Peronosporaceae are a group of endophytic parasites — about 100 species — of great importance as comprising the agents of " damping off " disease (Pythium), vine-mildew (Plasmopara) , potato disease (Phytophthora), onion-mildew (Peronospora). Pythium is a semi-aquatic form attacking seedlings which are too plentifully supplied with water; its hyphae penetrate the cell-walls and rapidly destroy the watery tissues of the living plant ; then the fungus lives in the dead remains. When the free ends of the hyphae emerge again into the air they swell up into spherical bodies which may either fall off and behave as conidia, each putting out a germ-tube and infecting the host ; or the germ-tube itself swells up into a zoosporangium which develops a number of zoospores. In the rotting tissues branches of the older mycelium similarly swell up and form antheridia and oogonia (fig. 4). The contents of the antheridium are not set free, but that organ penetrates the oogonium by means of a narrow outgrowth, the fertilizing tube, and a male nucleus then passes over into the single oosphere, which at first multinucleate becomes uni- nucleate before fertilization. Pythium is of interest as illustrating the dependence of zoospore-formation on conditions and the in-determinate nature of conidia. The other genera are more purely parasitic; the mycelium usually sends haustoria into the cells of the host and puts out branched, aerial conidiophores through the stomata, the branches of which abstrict numerous " conidia " ; these either germinate directly or their contents break up into zoospores (fig. 5). The development of the " conidia " as true conidial spores or as zoosporangia may occur in one and the same species (Cystopus candidus, Phytophthora infestans) as in Pythium described above; in other cases the direct conidial germination is characteristic of genera — e.g. Peronospora; while others emit zoospores — e.g. Plasmopara, &c. In Cystopus (Albugo) the "conidia " are abstricted in basipetal chain-like series from the ends of hyphae which come to the surface in tufts and break through the epidermis as white pustules- Each " conidium " contains numerous nuclei and is really a zoosporangium, as after dispersal it breaks up into a number of zoospores. The Peronosporaceae reproduce themselves sexually by means of antheridia and oogonia as described in Pythium.

In Cystopus Bliti the oosphere contains numerous nuclei, and all the male nuclei from the antheridium pass into it, the male and female nuclei then fusing in pairs. We thus have a process of "multiple fertilization"; the oosphere really represents a large

From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 4. — Fertilization of the Peronosporeae. After Wager.

1 , Peronospora parasitica. Young

multinucleate oogonium (og) and antheridium (an).

2, Albugo Candida. Oogonium

with the central uninucleate oosphere and the fertilizing

tube (a) of the antheridium which introduces the male nucleus. The same. Fertilized egg- cell (0) surrounded by the periplasm (p).

number of undifferentiated gametes and has been termed a coeno-gamete. Between Cystopus Bliti on the one hand and Pythium de Baryanum on the other a number of cytologically intermediate forms are known. The oospore on germination usually gives origin

F & /y

Fig. 5.— Phytophthora infestans. Fungus of Potato Disease.

A, B, Section of Leaf of Potato with sporangiophores of Phy-tophthora infestans passing through the stomata D, on the under surface of the leaf.

E, Sporangia.

F, G, H, J, Further development

of the sporangia. K, Germination of the zoospores

formed in the sporangia. L, M, N, Fertilization of the oogonium and development of the oospore in Peronospora. to a zoosporangium, but may form directly a germ tube which infects the host.

Saprolegniaceae are aquatic forms found growing usually on dead insects lying in water but occasionally on living fish (e.g. the salmon disease associated with Saprolegnia ferax). The chief genera are

Saprolegnia, Achlya, Pythiopsis, Dictyuchus, Aplanes. Motile zoospores which escape from the zoosporangium are present except in Aplanes. The sexual reproduction shows all transitions between forms which are normally sexual, like the Peronosporaceae, to forms in which no antheridium is developed and the oospheres develop partheno- genetically. The oogonia, unlike the Peronosporaceae, contain more than one oosphere. Klebs has shown that the development of zoosporangia or of oogonia and pollinodia respectively in Saprolegnia is dependent on the external conditions; so long as a continued stream of suitable food-material is ensured the mycelium grows on without forming reproductive organs, but directly the supplies of nitrogenous and carbonaceous food fall below a certain degree of concentration sporangia are developed. Further reduction of the supplies of food effects the formation of oogonia. This explains the sequence of events in the case of a Saprolegnia-mycelium radiating from a dead fly in water. Those parts nearest the fly and best supplied develop barren hyphae only; in a zone at the periphery, where the products of putrefaction dissolved in the water form a dilute but easily accessible supply, the zoosporangia are developed in abundance; oogonia, however, are only formed in the depths of this radiating mycelium, where the supplies of available food materials are least abundant.

Chytridineae. — These parasitic and minute, chiefly aquatic, forms may be looked upon as degenerate Oomycetes, since a sexual process and feeble unicellular mycelium occur in some; or they may be regarded as series of primitive forms leading up to higher members. There is no means of deciding the question. They are usually included in Oomycetes, but their simple structure, minute size, usually uniciliate zoospores, and their negative characters would justify their retention as a separate group. It contains less than 200 species, chiefly parasitic on or in algae and other water-plants or animals, of various kinds, or in other fungi, seedlings, pollen and higher plants. They are often devoid of hyphae, or put forth fine protoplasmic filaments into the cells of their hosts. After absorbing the cell-contents of the latter, which it does in a few hours or days, the fungus puts out a sporangium, the contents of which break up into numerous minute swarm-spores, usually one-ciliate, rarely two-ciliate. Any one of these soon comes to rest on a host-cell, and either pierces it and empties its contents into its cavity, where the further development occurs (Olpidium) , or merely sends in delicate protoplasmic filaments (Rhizophydium) or a short hyphal tube of, at most, two or three cells, which acts as a haustonum, the further development taking place outside the cell-wall of the host

(Chytridium). In some cases resting spores are formed inside the host (Chytridium), and give rise to zoosporangia on germina- tion. In a few species a sexual process is described, consisting in the conjugation of similar cells {Zygochytrium) or the union of two dissimilar ones (Polyphagus). In the development of dis- tinct antheridial and oogonial cells the allied Ancylistineae show close alliances to Pythium and the Oomycetes. On the other hand, the uniciliate zoospores of Polyphagus have slightly amoeboid movements, and in this and the pseudopodium-like nature of the protoplasmic processes, such forms suggest resemblances to the Myxomycetes. Opinions differ as to whether the Chytridineae are de- graded or primitive forms, and the group still needs critical revision. Many new forms will doubtless be discovered, as they are rarely collected on account of their minuteness. Some forms cause damping off of seedlings — e.g. Olpidium Brassicae; others discoloured spots and even tumour-like swellings — e.g. Synchytium Scabiosae, S. Succisae, Urophlyctis, &c, on higher plants. Analogies have been pointed out between Chytridiaceae and unicellular algae, such as Chlorosphaeraceae, Protococcaceae, " Palmellaceae," &c, some of which are parasitic, and suggestions may be entertained as to possible origin from such algae.

The Zygomycetes, of which about 200 species are described, are especially important from a theoretical standpoint, since they fur- nished the series whence Brefeld derived the vast majority of the fungi. They are characterized especially by the zygospores, but the asexual organs (sporangia) exhibit interesting series of changes, beginning with the typical sporangium of Mucor containing numerous endospores, passing to cases where, as in Thamnidium, these are accompanied with more numerous small sporangia (sporangioles) containing few spores, and thence to Chaetocladium and Piptocephalis, where the sporangioles form but one spore and fall and germinate as a whole; that is to say, the monosporous sporangium has become a conidium, and Brefeld regarded these and similar series of changes as explaining the relation of ascus to conidium in higher fungi. According to his view, the ascus is in effect the sporangium with several spores, the conidium the sporangiole with but one spore, and that not loose but fused with the sporangiole wall. On this basis, with other interesting morphological comparisons, Brefeld erected his hypothesis, now untenable, that the Ascomycetes and Basidiomycetes diverge from the Zygomycetes, the former having particularly specialized the ascus (sporangial) mode of reproduction, the latter having specialized the conidial (indehiscent one-spored sporangiole) mode. In addition to sporangia

and the conidial spores referred to, some Mucorini show a peculiar mode of vegetative reproduction by means of gemmae or chlamydospores — i.e. short segments of the hyphae become stored with fatty reserves and act as spores. The gemmae formed on submerged Mucors may bud like

a yeast, and even bring about alcoholic fermentation in a saccharine solution.

The segments of the hyphae in this group usually contain several nuclei. At the time of sporangial formation the protoplasm with numerous nuclei streams into the swollen end of the sporangiophore and there becomes cut off by a cell-wall to form the sporangium. The protoplasm then becomes cut up by a series of clefts into a number of smaller and smaller pieces which are unicellular in Pilobolus, multicellular in Sporodinia. These then become sur- rounded by a cell-wall and form the spores. This mode of spore- formation is totally different from that in the ascus; hence one of the difficulties of the acceptance of Brefeld's view of the homology of ascus and sporangium. The cytology of zygospore-formation is not known in detail; the so-called gametes which fuse are multi- nucleate and are no doubt of the nature of game- tangia. The fate of these nuclei is doubtful, prob- ably they fuse in pairs (fig. 6).

Blakeslee has lately made some very import- ant observations of the Zygomycetes. It is well known that while in some forms, e.g. Spordinia, zygospores are easily ob- tained, in others, e.g. most species of Mucor, they are very erratic in their appearance. This has now been explained by Blakeslee, who finds that the Mucorinae can be divided into two groups, termed homothallic and heterothallic respectively. In the first group zygo- spores can arise by the union of branches from the same mycelium and so can be produced by the growth from a single spore ; this group includes Spor- dinia grandis, Spinellus fusiger, some species of Mucor, &c. The majority of forms, however, fall into the heterothallic group, in which the asso- ciation of branches from two mycelia different in nature is necessary for the formation of zygospores. These structures cannot then be produced from the product of a single spore nor even from the thalli derived from any two spores. The two kinds of thalli Blakeslee considers to have a differentiation of the nature of sex and

From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 6. — Mucor Mucedo. Different stages in the formation and

germina- tion of the zygospore. (After Brefeld, 1-4. 5 from v. Tavel, Pilze.)

5.

Two conjugating branches in contact. Septation of the conjugating cells (a)

from the suspensors (b). More advanced stage, the conjugat- ing cells (a) are still distinct from one another ; the warty thickenings of their walls have commenced to form. Ripe zygospore (6) between the sus- pensors (a). Germinating zygospore with a germ- tube bearing a sporangium, he distinguishes them as (+) and (—) forms; the former being usually distinguished by a somewhat greater luxuriance of growth.

The classification of the Mucorini depends on the prevalence and characters of the conidia, and of the sporangia and zygospores — e.g. the presence or absence of a columella in the former, the formation of an investment round the latter. Most genera are saprophytes, but some — Chaetocladium, Piptocephalis — are parasites on other Mucorini, and one or two are associated casually with the rotting of tomatoes and other fruits, bulbs, &c, the fleshy parts of which are rapidly destroyed if once the hyphae gain entrance. Even more important is the question of mycosis in man and • other animals, referred to species of Mucor, and investigated by Lucet and Co- stantin. Klebs has concluded that transpiration is the important factor in determining the formation of sporangia, while zygote- development depends on totally different conditions; these results have been called in question by Falck.

The Entomophthoraceae contain three genera, Empusa, Ento- mophthora and Basidiobolus. The two first genera consist of forms which are parasitic on insects. Empusa Muscae causes the well- known epidemic in house-flies during the autumn ; the dead, affected flies are often found attached to the window surrounded by a white halo of conidia. B. ranarum is found in the alimentary canal of the frog and growing on its excrement. In these three genera the conidia are cast off with a jerk somewhat in the same way as the sporangium of Pilobolus,

B. Higher Fungi. — Now that Bref eld's view of the origin of these

forms from the Zygomycetes has been overthrown, the relationship of the higher and lower forms of fungi is left in obscurity. The term Eumycetes is sometimes applied to this group to distinguish them from the Phycomycetes, but as the same name is also applied to the fungi as a whole to differentiate them from the Mycetozoa and Bacteria, the term had best be dropped. The Higher Fungi fall into three groups: the Usti- laginales, of doubtful position, and the two very sharply marked groups Basidiales and Ascomycetes.

I. Usiilaginales. — This includes two families Ustilaginaceae (smuts) and Tilletiaceae (bunts). The bunts and smuts which damage our grain and fodder plants comprise about 400 species of internal parasites, found in all countries on herbaceous plants, and especially on Monocotyledons. They are remarkable for their dark spores developed in gall-like excrescences on the leaves, stems, &c, or in the fruits of the host. The discovery of the yeast-conidia of these fungi, and their thorough investigation by Brefeld, have thrown new lights on the group, as also have the results elucidating the nature of the ordinary dark spores — smuts, bunt, &c— which by their mode of origin and development are chlamydospores. When the latter germinate a slender " promycelium " is put out; in Ustilago and its allies this is transversely septate, and bears lateral conidia (sporidia) ; in Tilletia and its allies non-septate, and bears a terminal tuft of conidia (sporidia) (fig. 7). Brefeld regarded the promycelium as a kind of basidium, bearing lateral or terminal

conidia (comparable to basidio- spores), but since the number of basidiospores is not fixed, and the j basidium has not yet assumed very definite morphological characters, Brefeld termed the group Hemi- basidii, and regarded them as a half- way stage in the evolution of the true Basidiomycetes from Phyco- mycetes, the Tilletia type leading to the true basidium (Autobasidium), the Ustilago type to the proto- basidium, with lateral spores ; but this view is based on very poor evidence, so that it is best to place these forms as a separate group, the Ustilaginales. The yeast-conidia, which bud off from the conidia or their resulting mycelium when sown in nutrient solutions, are developed in succes- sive crops by budding exactly as in the yeast plant, but they cannot ferment sugar solutions. It is the rapid spread of these yeast-conidia in manure and soil waters which makes it so difficult to get rid of smuts, &c, in the fields, and they, like the ordinary conidia, readily infect the seedling wheat, oats, barley or other cereals. Infection in these cases occurs in the seedling at the place where root and shoot meet, and the infecting hypha having entered the plant goes on living in it and growing up with it as if it had no parasitic action at all. When the

flowers form, however, the mycelium sends hyphae into the young ovaries and rapidly replaces the stores of sugar and starch, &c, which would have gone to make the grain, by the soot-like mass of spores so well known as smut, &c. These spores adhere to the grain, and unless destroyed, by " steeping " or other treatment, are sown with it, and again produce sporidia and yeast-conidia which infect the seedlings. In other species the infection occurs through the style of the flower, but the fungus after reaching the ovule develops no further during that year but remains dormant in the embryo of the seed. On germination, however, the fungus behaves in the same way as one which has entered in the seedling stage. The cytology of these forms is very little known; Dangeard states that there is a fusion of two nuclei in the chlamydospore, but this requires confirmation. Apart from this observation there is no other trace of sexuality in the group.

II. Ascomycetes. — This, except in the case of a few of the simpler forms, is a very sharply marked group characterized by a special type of sporangium, the ascus. In the development of the ascus we find two nuclei at the base which fuse together to form the single nucleus of the young ascus. The single nucleus divides by three successive divisions to form eight nuclei lying free in the protoplasm of the ascus. Then by a special method, described first by Harper, a mass of protoplasm is cut out round each nucleus; thus eight uninucleate ascospores are formed by free-cell formation. The protoplasm remaining over is termed epiplasm and often contains glycogen (fig. 8). In some cases nuclear division is carried further befcre spore-formation occurs, and the number of spores is then 16,

From Vine's Students' Text Book of Botany, by permission of Swan Sonnen- schein & Cc.

Fig. 7. — Germinating rest- ing-gonidia. A, of Ustilago rcceptaculorum; B, of Tilletia Caries.

sp, The gonidium.

The promycelium.

The sporidia: in B the

sporidia have coalesced

in pairs at v.

pm, d,

32 and 64, &c. ; in a few cases the number of spores is less than eight by abortion of some of the eight nuclei. The ascus is thus one of the most sharply characterized structures among the fungi.

In some forms we find definite male and female sexual organs (Sphaerotheca, Pyronema, &c), in others the antheridium is abortive or absent, but the ascogonium (oogonium) is still present and the female nuclei fuse in pairs (Lachnea stercorea, Humaria granulata, Asco- bolus furfuraceus) ; while in other forms ascogonium and antheridium are both absent and fusion occurs between vegetative nuclei (Humaria rutilans, and probably the majority of other forms). In other cases the sexual fusion is apparently absent altogether, as in Exoascus. In the first case (fig. 9) we have a true sexual process, while in the second and third cases we have a reduced sexual process in which the fusion of other nuclei has replaced the fusion of the normal male and female nuclei. It is to be noted that all the forms exhibit the fusion of nuclei in the ascus, so that those with the normal or reduced sexual process described above have two nuclear fusions in their life- history. The advantage or signifi- cance of the second (ascus) fusion is not clearly understood.

The group of the Hemiasci was founded by Brefeld to include forms which were supposed to be a connect ing link between Phycomycetes and Ascomycetes. As mentioned before, the connexion between these two groups is very doubtful, and the de- rivation of the ascus from an ordinary sporangium of the Zygomycetes cannot be accepted. The majority of the forms which were formerly included in this group have been shown to be either true Phycomycetes (like A scoidea) or true Ascomycetes (like Thelebolus). Eremascus and Dipodascus, which are often placed among the Hemiasci, possibly do not belong to the Ascomycetes series at all.

Exoascaceae are a small group of doubtful extent here used to include Exoascus, Taphrina, Ascorticium and Endomyces. The

an

From Strasburger's Lehrbv-ch der Botanik, by permission of Gustav Fischer.

Fig. 8. — Development of the

Ascus. A-C, Pyronema confluens. (After Harper.) Young ascus of Bou- diera with eight spores. (After Claussen.)

D,

From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 9. — Sphaerotheca Castagnei. Fertilization and Development of the Perithecium. (After Harper.)

3,

Oogonium (eg) with the an-

theridial branch (az) applied

to its surface. Separation of antheridium

(an). Passage of the antheridial

nucleus towards that of the

oogonium. Union of the nuclei.

5, Fertilized oogonium sur-

rounded by two layers of hyphae derived from the stalk-cell (st).

6, The multicellular ascogonium

derived by division from the oogonium; the terminal cell with the two nuclei (as) gives rise to the ascus.

mycelium is very much reduced in extent. The asci are borne directly on the mycelium and are therefore fully exposed, being devoid from the beginning of any investment. The Taphrineae, which include Exoascus and Taphrina, are important parasites — • e.g. pocket-plums and witches' brooms on birches, &c, are due to their action (fig. 10). Exoascus and Ascorticium present interesting parallels to Exobasidium and Corticium among the Basidiomycetes. Saccharomycetaceae include the well-known yeasts which belong mainly to the genus Saccharomyces. They are characterized by their unicellular nature, their power of rapid budding, their capacity for fermenting various sugars, and their power of forming endogenous

spores. The sporangium with its endogenous spores has been compared with an ascus, and on these grounds the group is placed

among the Ascomycetes — a very doubtful association. The group has attained an importance of late even beyond that to which it was brought by Pasteur's researches on alcoholic fermentation, chiefly owing to the exact results of the investigations of Hansen, who first applied the methods of pure cultures to the study of these organisms, and showed that many of the inconsistencies hitherto

existing in the literature were

coexistence

wvpra !

in the

From Strasburger's Lehrbuch der Botamk, by permission of Gustav Fischer.

due to the

cultures of several species races of yeasts morphologically almost indistinguishable, but physiologically very different. About fifty species of Saccharo- myces are described more or less completely, but since many of these cannot be distinguished by the microscope, and some have been found to develop physiological races or varieties under special conditions of growth, the limits are still far too ill-defined for complete botanical treatment of the genus. A typical yeast is able to develop new cells by budding when sub- merged in a saccharine solution, and to ferment the sugar — i.e. so to break up its molecules that, . apart from small quantities used Frum. f or ;t s own substance, masses of

*Fig. io. — Taphrina Transverse section through the Jt' ut of *kn"proˆ7rtion"to"the epidermis of an infected plum. mass of yeast used become Four ripe asci, a u*

st, Stalk-cells of the asci. budding process as the forma-

m, Filaments of the mycelium t i on f CO nidia. Under other cut transversely. conditions, of which the tempera –

cut, Cuticle. _ ture j s an important one, the

ep, Epidermis. nucleus in the yeast-cell divides,

and each daughter-nucleus again, and four spores are formed in the

mother cell, a process obviously com- parable to the typical development of ascospores in an ascus. Under yet other conditions the quiescent yeast-cells floating on the surface of the fermented liquor grow out into elongated sausage-shaped or cylindrical cells and branching cell-series, which mat together into mycelium-like veils. At the bottom of the fermented liquor the cells often obtain fatty contents and thick walls, and behave as resting cells (chlamydospores) . The characters employed by experts for determining a species of yeast are the sum of its peculiarities as regards form and size: the shapes, colours, consistency, &c, of the colonies grown on certain definite media; the optimum tem- perature for spore-formation, and for the development of the ' veils "; and the behaviour as regards the various sugars.

The following summary of some of the principal characteristics of half-a-dozen species will serve to show how such peculiarities can be utilized for systematic purposes:

and others have shown that a ferment (zymase) can be extracted from yeast-cells which causes sugar to break up into carbon dioxide and alcohol. It has since been shown by Buchner and Albert that yeast-cells which have been killed by alcohol and ether, or with acetone, still retain the enzyme. Such material is far more active than the zymase obtained originally by Buchner from the expressed juice of yeast-cells. Thus alcoholic fermentation is brought into line with the other fermentations.

Schizosaccharomyces includes a few species in which the cells do not " bud " but become elongated and then divide transversely. In the formation of sporangia two cells fuse together by means of outgrowths, in a manner very similar to that of Spirogyra ; sometimes, however, the wall between two cells merely breaks down. The fused cell becomes a sporangium, and in it eight spores are developed. In certain cases single cells develop parthenogenetically, without fusion, each cell producing, however, only four spores. In Zygo- saccharomyces described by Barker (1901) we have a form of the usual sprouting type, but here again there is a fusion of two cells to form a sporangium.

Cytology. — The study of the nucleus of yeast-cells is rendered difficult by the presence of other deeply staining granules termed by Guillermond metachromatic granules. These have often been mis- taken for nuclei and have to be carefully distinguished by differential stains. In the process of budding the nucleus divides apparently by a process of direct division. In the formation of spores the nucleus of

the cell divides, the protoplasm collects round the nuclei to form the spores by free-cell formation; the protoplasm (epiplasm) not used in this process becomes disorganized. A fusion of nuclei was originally described by Jansens and Leblanc, but it was observed neither by Wager nor Guillermond and is probably absent. In Schizosaccharomyces and Zygosaccharomyces^ however, we have a fusion of nuclei in connexion with the conjugation of cells which precedes sporangium-formation. The theory may be put forward that the ordinary forms have been derived from sexual forms like Schizosaccharomyces and Zygosaccharomyces by a loss of sexuality, the sporangium being formed parthenogenetically without any nuclear fusion. This suggests a possible relationship to Eremascus, which can only doubtfully be placed in the Ascomycetes {vide supra).

Carpoascomycetes. — The other divisions of the Ascomycetes may be distinguished as Carpoascomycetes because they do not bear the asci free on the mycelium but enclosed in definite fruit bodies or ascocarps. The ascocarps can be distinguished into two portions, a mass of sterile or vegetative hyphae forming the main mass of the fruit body, and surrounding the fertile ascogenous hyphae which bear at their ends the asci. When the ascogonium (female organ) is present the ascogenous hyphae arise from it, with or without its previous fusion with an antheridium. In other cases the ascogenous hyphae arise directly from the vegetative hyphae. In connexion with this condition of reduction a fusion of nuclei has been observed in Humaria rutilans and is probably of frequent occurrence. The asci may be derived from the terminal cell of the branches of the ascogenous hyphae, but usually they are derived from the pen-ultimate cell, the tip curving over to form the so-called crozier. By this means the ascus cell is brought uppermost, and after the fusion of the two nuclei it develops enormously and produces the ascospores. The ascospores escape from the asci in various ways, sometimes by a special ejaculation-mechanism. The Ascomycetes, at least the Carpoascomycetes, exhibit a well-marked alternation of sexual and asexual generations. The ordinary mycelium is the gametophyte since it bears the ascogonia and' antheridia when present; the

Species.

Optimum Temperature for

Characters of

Sugars Fermented and Products, &c.

Spores.

Veils.

Fermentation.

Cells.

Spores.

5. cereviseae I. . . . S. Pastorianus I. . S. ellipsoideus .

S. anomalus

S. Ludwigii

S. metnbranaefaciens .

30° 27°-5°

25°

28°- 3 i° 30°-3i° 30°

20°-28° 26°-28°

33°-34° ? ?

?

High Low Low

High

?

High

Rounded Rounded Rounded

Elliptical

Elongated

Elongated

Globoid Globoid Globoid

Hat-shaped

Globoid

Globoid

(Inverts maltose and sac-] charose and form alcohol (4-6 vol. %.

{ Ditto, and evolves a fra- (grant ether.

Will not invert maltose. S Inverts neither maltose nor I saccharose.

Two questions of great theoretical importance have been raised over and over again in connexion with yeasts, namely, (1) the morphological one as to whether yeasts are merely degraded forms of higher fungi, as would seem implied by their tendency to form elongated, hypha-like cells in the veils, and their development of "ascospores" as well as by the wide occurrence of yeast-like " sprouting forms " in other fungi (e.g. Mucor, Exoasci, Ustilagineae, higher Ascomycetes and Basidiomycetes) ; and (2) the question a.k co the physiological nature and meaning of fermentation. With regard to the first question no satisfactory proof has as yet been given that Saccharomycetes are derivable by culture from any higher form, the recent statements to that effect not having been confirmed. At the same time there are strong grounds for insisting on the resemblances between Endomyces, a hyphal fungus bearing yeast-like asci, and such a form as Soccharomyces anomalus. Con- cerning the second question, the recent investigations of Buchner

ascogenous hyphae with their asci represent the sporophyte since they are derived from the fertilized ascogonium. The matter is complicated by the apogamous transition from gametophyte to sporophyte in the absence of the ascogonium ; also by the fact that there are normally two fusions in the life-history as mentioned earlier. If there are two fusions one would expect two reductions, and Harper has suggested that the division of the nuclei into eight in the ascus, instead of into four spores as in most reduction pro- cesses, is associated with a double reduction process in the ascus. Miss Fraser in Humaria rutilans finds two reductions: a normal synaptic reduction in the first nuclear division of the ascus, and a peculiar reduction division termed brachymeiosis in the third ascus division.

Various types of ascocarp are characteristic of the different divisions of the Carpoascomycetes: the cleistothecium, apothecium and perithecium.

Perisporineee. — This includes two chief families, Erysiphaceae and Perisporiaceae. They are characterized by an ascocarp without any opening to the exterior, the ascospores being set free by the decay or rupture of the ascocarp wall; such a fruit-body is termed a cleisiethecium (cleistocarp). The Erysiphaceae are a sharply marked group of forms which live as parasites. They form a super- ficial mycelium on the surface of the plant, the hyphae not usually penetrating the tissues but merely sending haustoria into the epi- dermal cells. Only in rare cases is the mycelium intercellular. Owing to their appearance they go by the popular name of mildews. Sphaerotheca Humuli is the well known hop-mildew, Sphaerolheca Mors-Uvae is the gooseberry mildew, the recent advent of which has led to special legislation in Great Britain to prevent its spreading, as when rampant it makes the culture of gooseberries impossible. Erysiphe, Uncinula and Phyllactinia are other well-known genera. The form of the fruit body, the difference and the nature of special outgrowths upon it — the appendages — are characteristic of the various genera. Besides peritheca the members of the Erysiphaceae possess conidia borne in simple chains. De Bary brought forward very strong evidence for the origin of the ascocarp in Sphaerotheca and Erysiphe by a sexual process, but Harper in 1895 was the first to prove conclusively, by the observation of the nuclear fusion, that there was a definite fertilization in Sphaerotheca Humuli by the fusion of a male (antheridial) nucleus with a female, ascogonial (oogonial) nucleus. Since then Harper has shown that the same process occurs in Erysiphe and Phyllactinia.

The Perisporiaceae are saprophytic forms, the two chief genera being Aspergillus and Penicillium. The blue-green mould P. crustaceum and the green mould A. herbariorium (— Eurotium herbariorum) are extraordinarily widely distributed, moulds being found on almost any food-material which is exposed to the air. They have characteristic conidiophores bearing numerous conidia, and also cleistothecia which are spherical in form and yellowish in colour. The latter arise from the crown of a spirally coiled archicarp (bearing an ascogonium at its end) and a straight antheridium. Vegetative hyphae then grow up and surround these and enclose them in a continuous sheath of plectenchyma (fig. 11). It has lately been shown by Fraser and Chambers that in Eurotium both

Fig. II. — Development of Eurotium repens. (After De Bary.)

Small portion of mycelium with conidiophore ©, and young archicarp (as).

B, The spiral archicarp (as), with the antheridium (p).

D, The same, beginning to be surrounded by the hyphae forming the perithecium wall.

D, The perithecium.

E, F, Sections of young

thecia. ■w. Parietal cells. /, Pseudo-parenchyma. as, Ascogonium. G, An ascus. H, An ascospore.

pen-

ascogonium and antheridium contain a number of nuclei (i.e. are coenogametes), but that the antheridium disorganizes without passing its contents into the ascogonium. There is apparently a reduced sexual process by the fusion of the ascogonial (female) nuclei in pairs. Aspergillus Oryzae plays an important part in saccharifying the starch of rice, maize, &c, by means of the abundant diastase it secretes, and, in symbiosis with a yeast which ferments the sugar formed, has long been used by the Japanese for the pre- paration of the alcoholic liquor sake. The process has now been successfully introduced into European commerce.

Disccmycetes. — Used in its widest sense this includes the Hysteriaceae, Phacidiaceae, Helvellaceae, &c. The group is

characterized in general by the possession of an ascocarp which, though usually a completely closed structure during the earlier stages of development, at maturity opens out to form a bowl or saucer-shaped organ, thus completely exposing the layer of asci which forms the hymenium. Such an ascocarp goes by the name of apothecium. Owing to the shape of the fruit-body many of these forms are known as cup-fungi, the cup or apothecium often attaining a large size, sometimes several inches across (fig. 12). Functional male and female organs have been shown to exist in Pyronema and Boudiera; in Lachnea stercorea both ascogonia and antheridia are present, but the antheridium is non-functional, the ascogonial (female) nuclei fusing in pairs; this is also the case in Humaria granulata and Ascobolus furfur- aceus, where the antheridium is entirely absent. In H. rutilans, however, both sexual organs are absent and the ascogenous hyphae arise apogamously from the ordinary hyphae of the my- celial. In all these cases thee

From Strasburger's Lehr- buch der Botanik, by permis- sion of Gustav Fischer.

Fig. 12. — Pezizaaur- antiaca. (After Kromb- holz, nat. size.)

Fig. 13. — Ascobolus furfuraceus. Diagrammatic section of the fruc- tification. (After Janczewski.)

m, Mycelium. c, Archicarp. /, Pollinodium. s, Ascogenous filaments. a, Asci.

r, p, The sterile tissue from which the paraphyses h spring.

ascogonium and antheridium contain numerous nuclei; they are to be looked upon as gametangia in which there is no differentiation of gametes, and since they act as single gametes they are termed coenogametes. In some forms as in Ascobolus the ascogonium is multicellular, the various cells communicating by pores in the transverse walls (fig. 13).

In the Helvellaceae there is no apothecium but a large irregular fruit body which at maturity bears the asci on its surface. The development is only slightly known, but there is some evidence for believing that the fruit-body is closed in its very early stages.

The genus Peziza (in its widest sense) may be taken as the type of the group. Most of them grow on living plants or on dead vegetable remains, very often on fallen wood ; a number, however, are found

growing on earth which is rich in humus. The genus Sclero- tinia may be mentioned here; a number of forms have been investigated by Woronin. The conidia are fragrant and are carried by bees to the stigma of the bilberry; here they germinate with the pollen and the hyphae pass with the pollen tubes down the style; the former infect the ovules and produce sclerotia, therein re- ducing the fruits to a mum- mified condition. From the sclerotia later the apothecium develops. One species, S. heteroica, is heteroecious ; the

From Strasburger's Lehrbuch der Botanik, by permission of Gustav Fischer.

Fig. 14. — Perithecium of Podo- spora fimiseda in longitudinal section After v. Tavel. s, Asci. a, Paraphyses. e, Periphyses. m, Mycelial hyphae.

ascospores infecting the leaves of Vaccinium uliginosum, while the conidia which then arise infect only Ledum palustre. This is the only case of heteroecism known in the vegetable kingdom outside the Uredineae.

Pyrenomycetes. — This is an extraordinarily large and varied group of forms which mostly live parasitically or saprophytically on vegetable tissue, but a few are parasitic on insect-larvae. The group

is characterized by a special type of ascocarp, the perithecium. This is typically of a flask-shaped form opening with a small pore at the top. The asci live at the bottom often mixed with paraphyses, while the upper " neck " of the flask is lined with special hyphae, the periphyses, which aid in the ejection of the spores (fig. 14). The simpler forms bear the perithecia directly on the mycelium, but the more highly developed forms often bear them on a special mycelial development— the stroma, which is often of large size and special shape and colour, and of dense consistence. The cytological details of development of the perithecia are not well known ; most of them appear to develop their ascogenous hyphae in an apogamous way without any connexion with an ascogonium. Besides the special ascocarps, accessory reproductive organs are known in the majority of cases in the form of conidia.

Tuberineae. — These are a small group of fungi including the well-known truffles. They are found living saprophytically (in part

parasitically) underground in forests. The asci are developed in the large dense fruit bodies (cleistothecia) and the spores escape by the decay of the wall. The fruit-body is of complicated structure, but its early stages of development are not known. Many of the fruit-bodies have a pleasant flavour and are eaten under the name of truffles (Tuber brumale and other species). The exact life-history of the truffle is not known.

Laboulbeniineae are a group of about 150 species of fungi found on insects, especially beetles, and principally known from the re- searches of Thaxter in America. The plant is a small, dark brown, erect structure (receptacle) of a few cells, and I- 10 mm. high, attached to the insect by the lowermost end (foot), and easily mistaken for a hair or similar appendage of the insect. The receptacle ends above in appendages, each consisting of one or a few cells, some of which are the male organs, others the female organs, and others again may be barren hairs. The male organ (antheridium) consists of a few cells, the terminal one of which either abstricts from its end, or emits from its interior the non-motile spermatia, reminding us of those of the Florideae. The female organ is essentially a flask-shaped structure; the neck of the flask growing out as the trichogyne, and the belly composed of an axial_ carpogenic cell surrounded by invest- ing cells, and with one cell (trichophoric) between it and the tricho- gyne. These three elements — trichogyne, trichophoric cell, and carpogenic cell — are regarded as the procarp. The spermatia have been shown by Thaxter to fuse with the trichogyne, after which the axial cell below (carpogenic cell) undergoes divisions, and ultimately forms asci containing ascospores, while cells investing this form a perithecium, the whole structure reminding us essentially of the fructification of a Pyrenomycete. Many modifications in details

occur, and the plants may be

dioecious. No injury is done to

the infested insects. It has lately

been shown that there is a fusion

of nuclei in connexion with ascus

formation, so that there Can be

no doubt of the position of this

extraordinary group of plants

fiyj R-f ; / l?3y£/.iW-Sl among the Ascomycetes. The

*feaL .&t:4 \SS>5s?KB*f various cells of these organisms*

W &M U'Jf \<0£QMi are connected by large pits

I" "J f.>;« V'4 Vv-fr-J&CJ which are traversed by thick

protoplasmic threads connecting one cell with the next. In this point and in their method ot fertilization theLaboulbeniineae suggest a possible relationship of Ascomycetes and the Red Algae.

Basidiales. — This very large group of plants is characterized by the possession of a special type of conidiophore — the bas- idium, which gives its name to the group. The basidium is a unicellular or multicellular structure from which four bas- idiospores arise as outgrowths; it starts asabinucleatestructure, but soon, like the ascus, becomes uninucleate by the fusion of the two nuclei. Then two successive nuclear divisions occur resulting in the formation of four nuclei which later migrate respectively into the four basidiospores (fig. 15). The Basidiales are further characterized by the complete loss of normal sexuality, but at some time or other in the life-history there takes place an association of two nuclei in a cell; the two nuclei are derived from separate cells or possibly in some cases are sister nuclei of the same cell. The two nuclei when once associated are termed " conjugate " nuclei, and they always divide at the same t'me, a half of each passing into each cell. Thisconjugate condition is finally brought to a close by the nuclear fusion in the basidium. Between the nuclear association and the nuclear fusion in the basidium many thousands of cell generations may be intercalated.

From Strasburger's Lehrbuch der Boianik by permission of Gustav Fischer.

Fig. 15-

C

Armillaria mellea. (After Ruhland.) Young basidium with the two

primary nuclei. After fusion of the two nuclei.

Hypholoma appendiculatum. A basidium before the four nucleiderived from the second- ary nucleus of the basidium have

passed into the four basidiospores. D, Passage of a nucleus through the sterigma into the basidio- spore.

This nuclear association of equivalent nuclei apparently represents a reduced sexual process (like the fusion of female nuclei in Humana granulata and of vegetative nuclei in H. rutilans, among the Asco-mycetes) in which, however, the actual fusion (normally, in a sexual process, occurring immediately after association) is delayed until the formation of the basidium. During the tetrad division in the basidium nuclear reduction occurs. There is thus in all the Basidiales an alternation of generations, obscured, however, by the apogamous transition from the gametophyte to sporophyte. The sporophyre may be considered to begin at the stage of nuclear association and end with the nuclear reduction in the basidium.

Uredineae. — This is a large group of about 2000 forms. They are all intercellular parasites living mostly on the leaves of higher plants. Owing to the presence of oily globules of an orange-yellow or rusty-red colour in their hyphae and spores they are termed Rust-Fungi. They are distinguished from the other fungi and the rest of the Basidiales by the great variety of the spores and the great elaboration of the life-history to be found in many cases. Five different kinds of spores may be present — teleutospores, sporidia (= basidiospores), aecidiospores, spermatia and uredospores (fig. 16). The teleutospore, with the sporidia which arise from it, is always present, and the division into genera is based chiefly on

Fig. 16. — Puccinia graminis,

A, Mass of teleutospores (t) on a

leaf of couch-grass. e, Epidermis ruptured. b, Sub-epidermal fibres. (After

De Bary.)

B, Part of vertical

through leaf of

section Berberis

jam, with a, aecidium fruits, p, peridium, and sp, spermogonia. (After Sachs.) C, Mass of uredospores (ur), with one teleutospore (t). Sub-hymenial hyphae. (After De Bary.)

sh

lts i characters. The teleutospore puts forth on germination a four-celled structure, the promycelium or basidium, and this bears later four sporidia or basidiospores, one on each cell. When the sporidia infect a plant the mycelium so produced gives origin to aecidiospores and spermatia ; the aecidiospores on infection produce a mycelium which bears uredospores and later teleutospores. This is the life-history of the most complicated forms, of the so-called eu forms. In the opsis forms the uredospores are absent, the mycelium from the aecidiospores producing directly the teleutospores. In brachy and hemi the aecidiospores are absent, the mycelium from the sporidia giving origin directly to the uredospores; the former possess spermatia, in the latter they are absent. In lepto and micro forms both aecidiospores and uredospores are absent, the sporidia producing a mycelium which gives rise directly to teleutospores; in the lepto forms the teleutospores can germinate directly, in the micro forms only after a period of rest. We have thus a series showing a progres- sive reduction in the complexity of the life-history, the lepto and micro forms having a life-history like that of the Basidiomycetes. 1 he eu and opsis forms may exhibit the remarkable phenomenon of heteroecism, i.e. the dependence of the fungus on two distinct host-plants for the completion of the life-history. Heteroecism 1S j er /, common in tnis group and is now known in over one hundred and fifty species. In all cases of heteroecism the sporidia infect one host leading to the production of aecidiospores and spermatia (if present), while the aecidiospores are only able to infect another

host on which the uredospores (if present) and the teleutospores are developed. A few examples are appended :

Species.	*Teleutospores on*	*Aecidiospores on*
Coleosporium Senecionis	*Pinus*	*Senecio*

Melampsora Rostrupi

Populus

Mecurialis

Pucciniastrum Goeppertiana

Vaccinium

Abies

Gymnosporangium Sabinae

Juniperus

Pyrus

Uromyces Pisi

Pisum, &c.

Euphorbia

Puccinia graminis

Triticum, &c.

Berberis

P. dispersa

Secede, &c.

Anchusa

P. coronata

A grostis

Rhamnus

P. Ari-Phalaridis

Phalaris

Arum

P. Caricis

Carex

Urtica

Cronartium Ribicola

Ribes

Pinus

Chrysomyxa Rhododendri

Rhododendron

Picea

S»Ij

Some of the Uredineae also exhibit the peculiarity of the development of biologic forms within a single morphological species, sometimes termed specialization of parasitism; this will be dealt with later under the section Physiology.

Cytology of Uredineae. — The study of the nuclear behaviour of the cells of the Uredineae has thrown great light on the question of sexuality. This group like the rest of the Basidiales exhibits an

association of nuclei at some point in its life-history, but unlike the case of the Basidio- mycetes the point of association in the Uredineae is very well defined in all those forms which possess aecidiospores. We find thus that in the eu and opsis forms the association of nuclei takes place at the base of the aecidium which produces the aecidiospores. There we find an association of nuclei either by the fusion of two similar cells as described by Christmann or by the migration of the nucleus of a vegetative cell into a special cell of the aecidium. After this association the nuclei continue in the conjugate condition so that the aecidiospores, the uredo- spore-bearing mycelium, the uredospores and the young teleutospores all contain two paired nuclei in their cells (fig. 17). Before the teleutospore reaches maturity the nuclei fuse, and the uninucleate condition then continues again until aeci- dium formation. In the hemi, brachy, micro and lepto forms, which possess no aecidium, we find that the association takes place at various points in the ordinary mycelium but always before the formation of the uredospores in the hemi and

brachy forms, and before the formation of teleutospores in micro and lepto form. Whether the association of nuclei in the ordinary mycelium takes place by the migration of a nucleus from one cell to another or whether two daughter nuclei become conjugate in one cell, is not yet clear. The most reasonable interpretation of the spermatia is that they are abortive male cells. They have never been found to cause in- characters of conidia; the large

From Strasburger's Lehrbuch der Botanik. bv permission of Gustav Fischer.

Fig. 17. — Phragmidium Vio- laceum. (After Blackman.)

B,

Portion of a young aecidium.

Sterile cell.

Fertile cells; at (h the passage of a nucleus from the adjoining cell is seen.

Formation of the first spore- mother-cell (sm), from the basal cell (a) of one of the rows of spores.

C, A further stage in which

from smi the first aecidio- spore (a) and the intercalary cell (z) have arisen. sm^, The second spore-mother-cell.

D, Ripe aecidiospore.

fection, and they have not the _

size of their nuclei, the reduction of their cytoplasm and the absence of reserve material and their thin cell wall all point to their being male gametes. Although in the forms without aecidia the two generations are not sharply marked off from one another, we may look up the generation with single nuclei in the cells as the gametophyte and that with conjugate nuclei as the sporophyte. The subjoined diagram will indicate the relationship of the forms.

Basidiomycetes. — This group is characterized by its greatly reduced life-history as compared with that of the eu forms among the Ure- dineae. All the forms have the same life-history as the lepto forms of that group, so that there is no longer any trace of sexual organs.

There is also a further reduction in that the basidium is not derived

from a teleutospore but is borne directly on the mycelium. Formerly, before the relationship of promycelium and basidium were understood, the Uredineae were considered as quite independent of the Basidiomycetes. Later, however, these Uredineae were placed as a mere subdivision of the Basidiomycetes. Although the Uredineae clearly lead on to the Basidiomycetes, yet owing to their retaining in many cases definite traces of sexual organs they are clearly a more primitive group. Their marked parasitic habit also separates them off, so that they are best included with the Basidiomycetes in a larger cohort which may

be called Basidi- ales. Most of Basidiomycetes are characterized by the large sporo- phore on which the basidia with its basidiospores are borne.

It must be clearly borne in mind that though the Basidiomy- cetes show no traces of differ- entiated sexual organs yet, like the micro and lepto forms of the Ure- dineae, they still show (in the association of nuclei and later fusion of nuclei in the bas- idium), a reduced

Sporophyte

with conjugate'

nuclei

Gametophyte with single nuclei

mycelium uredospores _ˆ

mycelium

uectospon

mycelium

spermatia 4

fm.le 'cells' <»'»"""» (of aecidium)

From Annals of Botany, by permission of the Clarendon Press.

Fig. 18.

fertilization which denotes their derivation, through the Uredineae, from more typically sexual forms. No one has yet made out in any form the exact way in which the association of nuclei takes place in the group. The mycelium is always found to contain conjugate nuclei before the formation of basidia, but the point at which the conjugate condition arises seems very variable. Miss Nichols finds that it occurs very soon after the germination of the spore in Coprinus, but no fusion of cells or migration of nuclei was to be observed.

Protobasidiomycetes. — This, by far the smaller division of Basidiomycetes, includes those forms which have a septate basidium. There are three families — Auriculariaceae, Pilacreaceae and Tremellinaceae.

mm

y=&a

Fig. 19

A, The. young plant.

B, The mature plant, [plant.

C, Longitudinal section of mature p, The pileus. g, The gills.

■*Amanita muscaria.*

a, The annulus, or remnant of

velum partiale. v, Remains of volva or velum

universale. s, The stalk.

The first named contains a small number of forms with the basidium divided like the promycelium of the Uredineae. They are characterized by their gelatinous consistence and large size of their sporophore. Hirneola (Auricularia) Auricula- Judae is the well-known Jew's Ear, so named from the resemblance of the sporophore to a human ear.

The Pilacreaceae are a family found by Brefeld to contain the genus Pilacre. P. Petersii has a transversely divided basidium as in Auriculariaceae, but the basidia are surrounded with a peridium-like sheath. The Tremellinaceae are characterized by the possession of basidia which are divided by two vertical walls at right angles to one

another. From each of the four segments in the case of Tremella a long outgrowth arises which reaches to the surface of the hymenium

W.G.S. S S

Fig. 20. — Agaricus mucidus. Portion of hymenium. s, Sporidia; st, sterigmata; g, sterile cells; c, cystidium, with oper- culum o.

and bears the basidiospores. In Dacryomyces only two outgrowths and two spores are produced.

Autobasidiomycetes. — In this by far the larger division of the Basidiomycetes the basidia are undivided and the four basidiospores are borne on short sterigmata nearly always at the apex of the basidium. The group may be divided into two main divisions, Hymenomycetes and Gasteromycetes.

Hymenomycetes are a very large group containing over n,ooo species, most of which live in soil rich in humus or on fallen wood or stems, a few only being parasites. In the simplest forms (e.g. Exobasidium) the basidia are borne directlv on the ordinary mycelium, but in the majority of cases the basidia are found de- veloped in layers (hymenium) on special sporophores of char- acteristic form in the various groups. In these sporophores (such as the well-known toadstools and mushrooms where the ordinary vegetative mycelium is underground) we have structures specially developed for bearing the basidiospores and protecting them from rain, &c, and for the distribution of the spores — see earlier part of article on distribution of spores (figs. 19 and 20). The underground

mycelium in many cases spreads wider and wider each year, often in a circular manner, and the sporophores springing from it appear in the form of a ring — the so- called fairy rings. Ar- millaria melleus and Polyporus annosus are examples of parasitic forms which attack and destroy living trees, while Merulius lacry- mans is the well- known ” dry rot ” fungus.

Gasteromycetes are

characterized by having closed sporophores or fruit-bodies which only , , , , „ °P en after the spores are

ripe and then often merely by a small pore. The fruit-bodies are of very various shapes, showing a differentiation into an outer peridium and an innci spore-bearing mass, the gleba. The gleba is usually differentiated into a number of chambers which are lined directly by the hymenium (basidial layer), or else the chambers contain an interwoven mass of hyphae, the branches of which bear the basidia by the breaking down of the inner tissues the spores often come to he asˆ a loose powdery mass in the interior of the hollow fruit- body, mixed sometimes with a capillitium. The best-known genera are Bovtsta, Lycoperdon (puff-ball) Scleroderma, Geaster (earth-star q.v.). In the last-named genus the peridium is double and the outer layer becomes ruptured and spreads out in the form of star-shaped pieces; the inner layer, however, merely opens at the apex bv a small pore.

The most complex members of the Gasteromycetes belong to the Phallotdeae, which is sometimes placed as a distinct division of the Autobasidiomycetes. Phallus impudicus, the stink-horn, is occasion- ‘ ally found growing in woods in Britain. The fruit-body before it ruptures may reach the size of a hen’s egg and is white in colour: from this there grows out a hollow cylindrical structure which can be distinguished at the distance of several yards by its disgusting odour. It is highly poisonous.

Physiology— The physiology of the fungi comes under the head of that of plants generally, and the works of Pfeffer, Sachs, Vines, Darwin and Klebs may be consulted for details. But we may refer generally here to certain phenomena peculiar to these plants, the life-actions of which are restricted and specialized by their peculiar dependence on organic supplies of carbon and nitrogen, so that most fungi resemble the colourless cells of higher plants in their nutrition. Like these they require water, small but indispensable quantities of salts of potassium, magnesium, sulphur and phosphorus, and supplies of carbonaceous and nitrogenous materials in different stages of complexity in the different cases. Like these, also, they respire oxygen, and are independent of light; and their various powers of growth, secretion, and general metabolism, irritability, and response to external factors show similar specific variations in both cases. It is quite a mistake to suppose that, apart from the chlorophyll function, the physiology of the fungus-cell is fundamentally different _ from that of ordinary plant-cells. Nevertheless, certain biological phenomena.in fungi are especially pronounced! and of these the following require particular notice.

Parasahsm.— Some fungi, though able to live as saprophytes

occasionally enter the body of living plants, and are thus termed

facultative parasites. The occasion may be a wound (e.g. Nectria Vasyscypha, &c), or the enfeeblement of ihe tissues of the host or mvigoration of the fungus, the mycelium of which then become strong enough to overcome the host's resistance (Botrytis). Many fungi, however, cannot complete their life-history apart from the host-plant. Such obligate parasites may be epiphytic (Erysipheae) the mycelium remaining on the outside and at most merely sending haustoria into the epidermal cells, or endophytic (Uredineae Ustilagineae, &c), when the mycelium is entirely inside the organs of the host. An epiphytic fungus is not necessarily a parasite however, as many saprophytes (moulds, &c.) germinate and develop a loose mycelium on living leaves, but only enter and destroy the tissues after the leaf has fallen; in some cases, however these saprophytic epiphytes can do harm by intercepting light and air from the leaf (Fumago, &c), and such cases make it difficult to draw the line between saprophytism and parasitism. Endophytic parasites may be intracellular, when the fungus or its mycelium plunges into the cells and destroys their contents directly {Olpidium Lagenidium, Sclerotinia, &c), but they are far more frequently intercellular, at any rate while young, the mycelium growing in the lacunae between the cells (Peronospora, Uredineae) into which it may send short (Cystopus), or long and branched (Peronospora Lalotheca) haustoria, or it extends in the middle lamella (Ustilago) or even m the solid substance of the cell-wall (Botrytis). No sharp lines can be drawn, however, since many mycelia are intercellular at first and subsequently become intracellular (Ustilagineae), and the various stages doubtless depend on the degrees of resistance which the host tissues are able to offer. Similar gradations are observed '" ., rect effect of the P ar asite on the host, which may be local (Hemileia) when the mycelium never extends far from the point of infection or general (Phytophthora) when it runs throughout the ?n "r"- V est ˆ uctlve P ar a site s rapidly ruin the whole plant-body (Fythium), whereas restrained parasites only tax the host slightly and ill effects may not be visible for a long time, or only when the fungus is epidemic (Rhytisma). A parasite may be restricted during a. long incubation-period, however, and rampant and destructive later (Ustilago). The latter fact, as well as the extraordinary fastidiousness, so to speak, of parasites in their choice of hosts or of organs for attack, point to reactions on the part of the host-plant as well as capacities on that of the parasite, which may be partly explained in the light of what we now know regarding enzymes and chemotropism. Some parasites attack many hosts and almost any*

tissue or organ (Botrytis cinerea), others are restricted to one family (Cystopus candidus) or genus (Phytophthora infestans) or even species (Pucciniastrum Padi), and it is customary to speak of root-parasites, leaf parasites, &c., in expression of the fact that a given parasite occurs only on such organs— e.g. Dematophora necatrix on roots, Calyptospora Goeppertiana on stems, Ustilago Scabiosae in anthers, Uaviceps purpurea in ovaries, &c. Associated with these relations are the specializations which parasites show in regard to the age of the host. Many parasites can enter a seedling, but are unable to attack the same host when older— e.g. Pythium Phyto phthora omnivora. '

Chemotropism— Taken in conjunction with Pfeffer's beautiful discovery that certain chemicals exert a distinct attractive influence on fungus hyphae (chemotropism), and the results of Miyoshi's experimental application of it, the phenomena of enzyme-secretion throw considerable light on the processes of infection and parasitism of fungi. Pfeffer showed that certain substances in definite concentrations cause the tips of hyphae to turn towards them: other substances, though not innutritious, repel them, as also do nutritious bodies if too highly concentrated. Marshall Ward showed that the hyphae o Botrytis pierce the cell-walls of a lily by secreting a cytase and dissolving a hole through the membrane. Miyoshi then demonstrated that if Botrytis is sown in a lamella of gelatine, and this lamella is superposed on another similar one to which a chemotrooic substance is added the tips of the hyphae at once turn from the former and enter the latter. If a thin cellulose membrane is interposed between the lamellae, the hyphae nevertheless turn chemotropically from the one lamella to the other and pierce the cellulose membrane in the process The hyphae will also dissolve their way through.a lamella of collodion, paraffin, parchment paper, elder-pith or even cork or the wing of a fly, to do which it must excrete very different enzymes. If the membrane is of some impermeable substance, like gold leaf , the hyphae cannot dissolve its way through but the tip finds the most minute pore and traverses the barrier by means of it, as it does a stoma on a leaf. We may hence conclude that a parasitic hyphae pierces some plants or their stomata and refuses to enter others, because in the former case there are chemotropically attractive substances present which are absent from the latter, or are there replaced by repellent poisonous or protective substances such as enzymes or antitoxins.

Specialization of Parasitism.— The careful investigations of recent

*conrentT tl™ *Y m ^^ groups of fun si we cannot be content to*

distinguish as units morphologically different species but we are compelled to go deeper and analyse further the species It has been snown especia ly in the Uredineae and Erysiphaceae that many forms which can hardly be distinguished morphologically, or which cannot be differentiated at all by structural characters, are not really homogeneous but consist of a number of forms which are

sharply distinguishable by their infecting power. Eriksson found, for example, that the well-known species Puccinia graminis could be split up into a number of forms which though morphologically similar were physiologically distinct. He found that the species really consisted of six distinct races, each having a more or less narrow range of grasses on which it can live. The six races he named P. graminis Secalis, Tritici, Avenae, Airae, Agrostis, Poae. The first named will grow on rye and barley but not on wheat or oat. The form Tritici is the least sharply marked and will grow on wheat, barley, rye and oat but not on the other grasses. The form Avenae will grow on oat and many grasses but not on the other three cereals mentioned. The last three forms grow only on the genera Aira, Agrostis and Poa respectively. All these forms have of course their aecidium-stage on the barberry. The terms biologic forms, biological species, physiological species, physiological races, specialized forms have all been applied to these; perhaps the term biologic forms is the most satisfactory. A similar specialization has been observed by Marshall Ward in the Puccinia parasitic on species of Bromus, and by Neger, Marchal and especially Salmon in the Erysiphaceae. In the last-named family the single morphological species Erysiphe graminis is found growing on the cereals, barley, oat, wheat, rye and a number of wild grasses (such as Poa, Bromus, Dactylis). On each of these host-plants the fungus has become specialized so that the form on barley cannot infect the other three cereals or the wild grasses and so on. Just as the uredospores and aecidiospores both show these specialized characters in the case of Puccinia graminis so we find that both the conidia and ascospores of E. graminis show this phenomenon. Salmon has further shown in investigating the relation of E. graminis to various species of the genus, Bromus, that certain species may act as " bridging species," enabling the transfer of a biologic form to a host-plant which it cannot normally infect. Thus the biologic form on B. racemosus cannot infect B. commutatus. If, however, conidia from B. racemosus are sown on B. hordaceus, the conidia which develop on that plant are now able to infect B.

commutatus; thus B. hordaceus acts as a bridging species. Salmon also found that injury of a leaf by mechanical means, by heat, by anaesthetics, &c, would affect the immunity of the plant and allow infection by conidia which was not able to enter a normal leaf. The effect of the abnormal conditions is probably to stop the production of, or weaken or destroy the protective enzymes or antitoxins, the presence of which normally confers immunity on the leaf.

Symbiosis. — The remarkable case of life in common first observed in lichens, where a fungus and an alga unite to form a compound organism — the lichen — totally different from either, has now been proved to be universal in these plants, and lichens are in all cases merely algae enmeshed in the interwoven hyphae of fungi (see Lichens). This dualism, where the one constituent (alga) furnishes carbohydrates, and the other (fungus) ensures a supply of mineral matters, shade and moisture, has been termed symbiosis. Since then numerous other cases of symbiosis have been demonstrated. Many trees are found to have their smaller roots invaded by fungi and deformed by their action, but so far from these being injurious, experiments go to show that this mycorhiza (fungus-root) is necessary for the well-being of the tree. This is also the case with numerous other plants of moors and woodlands — e.g. Ericaceae, Pyrolaceae, Gentianaceae, Orchidaceae, ferns, &c. Recent experiments have shown that the difficulties of getting orchid seeds to germinate are due to the absence of the necessary fungus, which must be in readiness to infect the young seedling immediately it emerges from the seed. The well-known failures with rhododendrons, heaths, &c, in ordinary garden soils are also explained by the need of the fungus-infected peat for their roots. The role of the fungus appears to be to supply materials from the leaf-mould around, in forms which ordinary root-hairs are incapable of providing for the plant; in return the latter supports the fungus at slight expense from its abundant stores of reserve materials. Numerous other cases of symbiosis have been discovered among the fungi of fer- mentation, of which those between Aspergillus and yeast in sake manufacture, and between yeasts and bacteria in kephir and in the ginger-beer plant are best worked out. For cases of symbiosis see Bacteriology.

Authorities. — General: Engler and Prantl, Die natiirlichen Pflanzenfamilien, i. Teil (1892 onwards); Zopf, Die Pilze (Breslau, 1890); De Bary, Comparative Morphology of Fungi, &c. (Oxford, 1887); von Tafel, Vergleichende Morphologie der Pilze (Jena, 1892); Brefeld, Unters. aus dem Gesamtgebiete der Mykologie, Heft i. 13 (1872-1905); Lotsy, Vortrdge iiber botanische Stammesgeschichle (Jena, 1907). Distribution, &c. : Cooke, Introduction to the Study of

Fungi (London, 1895); Felix in Zeitschr. d. deutsch. geologisch. Gesellsch. "(1894-1896) ; Staub, Sitzungsber. d. hot. Sec. d. Kgl. ungarischen naturwiss. Gesellsch. zu Budapest (1897). Anatomy, &c: Bommer, " Sclerotes et cordons myceliens," Mem. de V Acad. Roy. de Belg. (1894); Mangin, " Observ. sur la membrane des mucorinees," Journ. de Bot. (1899); Zimmermann, Die Morph. und Physiolcgie des Pflanzenzellkernes (Jena, 1896); Wisselingh, " Microchem. Unters. iiber die Zellwande d. Fungi," Pringsh. Jahrb. B. 31, p. 619 (1898); Istvanffvi, "Unters. iiber die phys. Anat. der Pilze," Prings. Jahrb. (1896). Spore Distribution: Fuiton, ' Dispersal of the Spores of Fungi by Insects," Ann. Bot. (1889); Falck, "Die Sporenverbreitung bei den Basidiomyceten," Beitr.

zur Biol. d. Pflanzen, ix. (1904). Spores and Sporophores: Zopf, Die Pilze; also the works of von Tafel and Brefeld. Classification: van Tieghem, Journ. de bot. p. 77 (1893), and the works of Brefeld, Engler and Prantl, von Tafel, Saccardo and Lotsy already cited, Oomycetes: Wager, " On the Fertilization of Peronospora parasitica," Ann. Bot. vol. xiv. (1900); Stevens, "The Compound Oosphere of Albugo Bliti," Bot. Gaz. vol. 28 (1899); " Gametogenesis and Fertilization in Albugo," ibid. vol. 32 (1901); Miyake, " The Fertilization of Pythium de Baryanum," Ann. of Bot. vol. xv. (1901); Trow, "On Fertilization in the Saprolegnieae," Ann. of Bot. vol. xviii. (1904) ; Thaxter, " New and Peculiar Aquatic Fungi," Bot. Gaz. vol. 20 (1895); Lagerheim, "Unters. iiber die Monoblepharideae," Bih. Svenska Vet. A'kad. Handlingar, 25. Afd. iii. (1900); Woronin, " Beitrag zur Kenntnis der Monobiepharideen," Mem. de V Acad. Imp. d. Sc. de St-Petersbourg, 8 ser. vol. 16 (1902). Zygomycetes: Harper, " Cell-division in Sporangia and Asci," Ann. Bot. vol. xiii. (1899); Klebs, Die Bedingungen der Fortpflanzung, &c. (Jena, 1896), and " Zur Physiologie der Fortpflanzung " Prings. Jahr. (1898 and 1899), " Uber Sporodinia grandis," Bot. Zeit. (1902) ; Falck, " Die Bedingungen der Zygotenbildung bei Sporodinia grandis," Cohn's Beitr. z. Biol. d. Pflanzen, Bd. .8 (1902); Gruber " Verhalten der Zellkerne in den Zygosporen von Sporodinia grandis," Ber. d. deutschen bot. Ges. Bd. 19 (1901); Blakeslee, " Sexual Reproduction in the Mucorineae," Proc. Am. Acad. (1904) ; " Zygospore germination in the Mucorineae," Annates mycologici (1906). Ustilagineae : Plowright, British Uredineae and Ustilagineae (London, 1889) ; Massee, British Fungi (Phycomycetes and Ustilagineae) (London, 1891); Brefeld, Unters. aus dem Gesamtgeb. der Mykol. Hefte xi. and xii. ; and Falck, " Die Bluten- infektion bei den Brandpilzen," ibid. Heft xiii. 1905; Dangeard, " La Reproduction sexuelle des Ustilaginees," C.R., Oct.

9, 1893; Maire, " Recherches cytologiques et taxonomiques sur les Basidio- myceten," Annexe au Bull, de la Soc. Mycol. de France (1902). Saccharomycetaceae: Jorgensen, The Micro-organisms of Fermenta- tion (1899); Barker, Ann. of Bot. vol. xiv. (1901); "On Spore- formation among the Saccharomycetes," Journ. of the Fed. Institute of Brewing, vol. 8 (1902) ; Guillermond, Recherches cytologiques sur les levures (Paris, 1902) ; Hansen, Centralbl. f. Bakt. u. Para- sitenp. Abt. ii. Bd. 12 (1904). Exoascaceae: Giesenhagen, " Ta- phrina, Exoascus, Magnusiella " (complete literature given), Bot. Zeit. Bd. 7 (1901). Erysiphaceae: Harper, " Die Entwicklung des Perithecium bei Sphaerotheca castagnei," Ber. d. deut bot Ges. (1896); " Sexual Reproduction and the Organization of the Nucleus in certain Mildews," Publ. Carnegie Institution (Washington, 1906) ; Blackman & Fraser, " Fertilization in Sphaerotheca," Ann. of Bot. (1905). Perisporiaceae: Brefeld, Untersuchungen aus dem Gesamtgeb. der Mykol. Heft 10 (1891); Fraser and Chamber, Annates mycologici (1907). Discomycetes: Harper, " Uber das Verhalten der Kerne bei Ascomyceten," Jahr. f. wiss. Bot. Bd. 29 (1890); "Sexual Repro- duction in Pyronema confluens," Ann. of Bot. 14 (1900); Claussen, " Zur Entw. der Ascomyceten," Boudiera, Bot. Zeit. Bd. 63 (1905); Dangeard, " Sur le Pyronema confluens," Le Botaniste, 9 serie (1903) (and numerous papers in same journal earlier and later) ; Ramlow, " Zur Entwick. von Thelebolus slercoren," Bot. Zeit. (1906) ; Woronin, " Uber die Sclerotienkrankheit der Vaccineen Beeren," Mem. de VAcad. Imp. des Sciences de St-Petersbourg, 7 serie, 36 (1888); Dittrich, " Zur Entwickelungsgeschichte der Helvellineen," Cohn's Beitr. z. Biol. d. Pflanzen (1892). Pyrenomycetes: Fisch, " Beitr. z. Entwickelungsgeschichte einiger Ascomyceten," Bot. Zeit. (1882); Frank, "Uber einige neue u. weniger bekannte Pflanz- krankh.," Landui. Jahrb. Bd. 12 (1883); Ward, " Onygena equina, a horn-destroying fungus," Phil. Trans, vol. 191 (1899); Dawson, "On the Biology of Poroniapunctata," Ann. of Bot. 14 (1900). Tuberineae: Buchholtz, " Zur Morphologie u. Systematik der Fungi hypogaei," Ann. Mycol. Bd. I (1903); Fischer in Engler and Prantl, Die natiirlichen Pflanzenfamilien (1896). Laboulbeniineae : Thaxter, " Monograph of the Laboul- beniaceae," Mem. Amer. Acad, of Arts and Sciences, vol. 12 (1895). Uredineae: Eriksson and Henning, Die Getreideroste (Stockholm, 1896); Eriksson, Botan. Gaz. vol. 25 (1896); "On the Vegetative Life of some Uredineae," Ann. of Bot. (1905); Klebahn, Die wirt- wechselnden Rostpilze (Berlin, 1904); Sapin-Trouffy, "Recherches histologiques sur la famille des Uredinees," Le Botaniste (1896-1897) ; Blackman, " On the Fertilization, Alternation of Generations and General Cytology of the

Uredineae," Ann. of Bot. vol. 18 (1904); Blackman and Fraser, " Further Studies on the Sexuality of Ure- dineae," Ann. of Bot. vol. 20 (1906); Christman, "Sexual Repro- duction of Rusts," Ann. of Bot. vol. 20 (1906); Ward, "The Brooms and their Rust Fungus," Ann. of Bot. vol. 15 (1901). Basidiomycetes : Dangeard, " La Reprod. sexuelle des Basidio- mycetes," Le Botaniste (1894 an d 1900); Maire, "Recherches cytologiques et taxonomiques sur les Basidiomycetes," Annexe du Bull, de la Soc. Mycol. de France (1902); Moller, " Protobasidio- myceten," Schimper's Mitt, aus den Tropen, Heft 8 (Jena, 1895); Nichols, " The Nature and Origin of the Binucleated Cells in certain Basidiomycetes," Trans. Wisconsin Acad, of Sciences, vol. 15 (1905); Wager, "The Sexuality of the Fungi," Ann. of Bot. 13 (1899); Woronin, " Exobasidium Vaccinii," Verh. Naturf. Ges. zu Freiburg, Bd. 4 (1867). Fermentation: Buchner, " Gahrungohne Hefe- zellen," Bot. Zeit. Bd. 18 (1898) ; Albert, Cent.f. Bakt. Bd. 17 (1901);

Green, The Soluble Ferments and Fermentation (Cambridge, 1899). Parasitism: " On some Relations between Host and Parasite," Proc. Roy. Soc. vol. 47 (1890); " A Lily Disease," Ann. of Botany, vol. 2 (1888); Eriksson & Hennings, Die Getreideroste {viae supra);

Ward, " On the Question of Predisposition and Immunity in Plants, Proc. Cambridge Phil. Soc. vol. II (1902); also Annals of Bot. vol. 16 (1902) and vol. 19 (1905); Neger, " Beitr. z. Biol. d. Erysipheen " Flora, Bde. 88 and 90 (1901-1902) ; Salmon, " Cultural Experiments with ' Biologic Forms ' of the Erysiphaceae," Phil. Trans. (1904) ; " On Erysiphe graminis and its adaptative parasitism within the genus, Bromus," Ann. Mycol. vol. 11 (1904), also Ann. of Bot. vol. 19 (1905). Symbiosis: Ward, " The Ginger-Beer Plant," Phil. Trans. Roy. Soc. (1892); " Symbiosis," Ann. of Bot. 13 (1899); Shalk, " Der Sinn der Mykorrhizenbildung," Jahrb. f. iviss. Bot. Bd. 34 (1900); Bernard, "On some Different Cases of Germination," Gardener's Chronicle (1900) ; Pierce, Publ. Univ. California (1900). (H. M. W.; V. H. B.)

FUNJ (Funniyeh, Fung, Fungha), a very mixed negroid race, occupying parts of Sennar and the hilly country to the south between the White and Blue Niles. They traditionally come from west of the White Nile and are affiliated by some to the Kordofan Nubas, by others, more justifiably, to the negro Shilluks. These Funj, who

became the dominant race in Sennar in the 15th century, almost everywhere assimilated the speech, religion and habits of the Arabs settled in that region. Until the 19th century they were one of the most powerful of African peoples in the eastern Sudan. About the end of the 15th century they overthrew the kingdom of Aloa, between the two Niles, and conquered the neighbouring peoples of the Sudan, Nubia and even Kordofan. The Funj had mixed much with the Arabs before their conquests, and had been converted to Islam. But they were still in many ways savages, for James Bruce (who traversed the district in 1772) says that their most famous king, Malek-el-Gahman, preferred human liver to any other food, and the Belgian traveller E. Pruyssenaere (1826-1864) found them still performing pagan rites on their sacred Mount Gula. Ernst Marno declared that as late as 1870 the most southern branch of the race, the Boruns, a non-Arabic speaking tribe, were cannibals. The Funj kings were content with levying tribute on their neighbours, and in this loose way Shendi, Berber and Dongola were once tributary. The Arab viziers gradually absorbed all power, the Funj sovereignty becoming nominal; and in 182 1 the Egyptians easily destroyed the Funj domination. To-day the Funj are few, and represent no real type. They are a bright, hospitable folk. Many of them are skilful surgeons and go far afield in their work. The fellahin, indeed, call surgeons " Senaari " (men of Sennar). See further Sennar and Sudan (Anglo-Egyptian).

FUNKIA, in botany, a genus of rather handsome, hardy, herbaceous plants belonging to the natural order Liliaceae, and natives of China and Japan. They are tuberous, with broadly ovate or heart-shaped leaves and racemes of white or pale lilac, drooping, funnel-shaped flowers. They are useful for the borders of a shrubbery, the lawn or rock-work, or may be grown in pots for the greenhouse. The plants are propagated by dividing the crowns in autumn or when growth begins in spring.

FUNNEL (through an 0. Fr. founil, found in Breton, from Lat. infundibulum, that through which anything is poured, from f under e, to pour), a vessel shaped like a cone having a small tube at the apex through which powder, liquid, &c, may be easily passed into another vessel with a small opening. The term is used in metal-casting of the hole through which the metal is poured into a mould, and in anatomy and zoology of an infundibulum or funnel-shaped organ. The word is thus used generally of any shaft or passage to convey light, air or smoke, as of the chimney of an engine or a steam-boat, or the flue of an ordinary chimney. It is also used of a shaft or channel in rocks, and in the decoying of wild-fowl is applied to the cone-shaped

passage leading from a pond and covered with a net, a " funnel-net," into which the birds are decoyed.

FUR (connected with O. Fr. forre, a sheath or case; so " an outer covering "), the name specially given to the covering of the skin in certain animals which are natives of the colder climates, lying alongside of another and longer covering, called

the overhair. The fur differs from the overhair, in that it is soft, silky, curly, downy and barbed lengthwise, while the overhair is straight, smooth and comparatively rigid. These properties of fur constitute its essential value for felting purposes, and mark its difference from wool and silk; the first, after some slight preparation by the aid of hot water, readily unites its fibres into a strong and compact mass; the others can best be managed by spinning and weaving.

On the living animal the overhair keeps the fur filaments apart, prevents their tendency to felt, and protects them from injury — thus securing to the animal an immunity from cold and storm; while, as a matter of fact, this very overhair, though of an humbler name, is most generally the beauty and pride of the pelt, and marks its chief value with the furrier. We arrive thus at two distinct and opposite uses and values of fur. Re- garded as useful for felt it is denominated staple fur, while with respect to its use with and on the pelt it is called fancy fur.

History. — The manufacture of fur into a felt is of comparatively modern origin, while the use of fur pelts as a covering for the body, for the couch, or for the tent is coeval with the earliest history of all northern tribes and nations. Their use was not simply a barbarous expedient to defend man from the rigours of an arctic winter; woven wool alone cannot, in its most perfect form, accomplish this. The pelt or skin is requisite to keep out the piercing wind and driving storm, while the fur and overhair ward off the cold; and " furs " are as much a necessity to-day among more' northern peoples as they ever were in the days of barbarism. With them the providing of this necessary covering became the first purpose of their toil; subsequently it grew into an object of barter and traffic, at first among themselves, and afterwards with their neighbours of more temperate climes; and with the latter it naturally became an article of fashion, of ornament and of luxury. This, in brief, has been the history of its use in China, Tatary, Russia, Siberia and North America, and at present the employment of fancy furs among civilized nations has grown to be more extensive than at any former

period. The supply of this demand in earlier times led to such severe competition as to terminate in tribal pillages and even national wars; and in modern times it has led to commercial ventures on the part of individuals and companies, the account of which, told in its plainest form, reads like the pages of romance. Furs have constituted the price of redemption for royal captives, the gifts of emperors and kings, and the peculiar badge of state functionaries. At the present day they vie with precious gems and gold as ornaments and garniture for wealth and fashion; but by their abundance, and the cheapness of some varieties, they have recently come within the reach of men of moderate incomes. The history of furs can be read in Marco Polo, as he grows eloquent with the description of the rich skins of the khan of Tatary; in the early fathers of the church, who lament their introduction into Rome and Byzantium as an evidence of barbaric and debasing luxury; in the political history of Russia, stretching out a powerful arm over Siberia to secure her rich treasures; in the story of the French occupation of Canada, and the ascent of the St Lawrence to Lake Superior, and the subsequent contest to retain possession against England; in the history of early settlements of New England, New York and Virginia; in Irving's Astoria; in the records of the Hudson's Bay Company; and in the annals of the fairs held at Nizhniy Novgorod and Leipzig. Here it may suffice to give some account of the present condition of the trade in fancy furs. The collection of skins is now chiefly a matter of private enterprise. Few, if any, monopolies exist.

Natural Supplies. — We are dependent upon the Carnivora, Rodentia, Ungulata and Marsupialia for our supplies of furs, the first two classes being by far of the greatest importance. The Carnivora include bears, wolverines, wolves, raccoons, foxes, sables, martens, skunks, kolinskis, fitch, fishers, ermines, cats, sea otters, fur seals, hair seals, lions, tigers, leopards, lynxes, jackals, &c. The Rodentia include beavers, nutrias, musk-rats or musquash, marmots, hamsters, chinchillas, hares, rabbits, squirrels, &c. The Ungulata include Persian, Astrachan,Crimean,

Chinese and Tibet lambs, mouflon, guanaco, goats, ponies, &c. The Marsupialia include opossums, wallabies and kangaroos. These, of course, could be subdivided, but for general purposes of the fur trade the above is deemed sufficient.

The question frequently arises, not only for those interested in the production of fur apparel, but for those who derive so much comfort and pleasure from its use, whether the supply of fur-bearing animals is likely to be exhausted. Although it is a fact that the demand is ever increasing, and that some of the rarer animals are decreasing in numbers, yet on the other hand some kinds of furs are occasionally neglected through vagaries of fashion, which give nature an opportunity to replenish their source. These respites are, however, becoming fewer every day, and what were formerly the most neglected kinds of furs are becoming more and more sought after. The supply of some of the most valuable, such as sable, silver and natural black fox, sea otter and ermine, which are all taken from animals of a more or less shy nature, does very gradually decrease with persistent hunting and the encroachment of man upon the districts where they live, but the climate of these vast regions is so cold and inhospitable that the probabilities of man ever permanently inhabiting them in numbers sufficient to scare away or exter- minate the fur-bearing wild animals is unlikely. Besides these there are many useful, though commonplace, fur-bearing animals like mink, musquash, skunk, raccoon, opossum, hamster, rabbit, hares and moles, that thrive by depredations upon cultivated land. Some of these are reared upon extensive wild farms. In addition there are domestic fur-bearing animals, such as Persian, Astrachan and Chinese lambs, and goats, easily bred and available.

With regard to the rearing of the Persian lamb, there is a prevalent idea that the skins of the unborn lamb are frequently used; this, however, is a mistake. A few such skins have been taken, but they are too delicate to be of any service. The youngest, known as " broadtails," are killed when a few days old, but for the well-developed curly fur, the lambs must be six or seven weeks old. During these weeks their bodies are covered with leather so that the fur may develop in close, light and clean curls. The experiment has been tried of rearing rare, wild, fur-bearing animals in captivity, and although climatic conditions and food have been precisely as in their natural environment, the fur has been poor in quality and bad in colour, totally unlike that taken from animals in the wild state. The sensation of fear or the re- striction of movement and the obtaining of food without exertion evidently prevent the normal development of the creature.

In mountainous districts in the more temperate zones some good supplies are found. Chinchillas and nutrias are obtained from South America, whence come also civet cats, jaguars, ocelots and pumas. Opossums and wallabies, good useful furs, come from Australia and

New Zealand. • The martens, foxes and otters imported from southern Europe and southern Asia, are very mixed in quality, and the majority are poor compared with those of Canada and the north.

Certain characteristics in the skin reveal to the expert from what section of territory they come, but in classifying them it is considered sufficient to mention territories only.

Some of the poorer sorts of furs, such as hamster, marmot, Chinese goats and lambs, Tatar ponies, weasels, kaluga, various monkeys, antelopes, foxes, otters, jackals and others from the warmer zones, which until recently were neglected on account of their inferior quality of colour, by the better class of the trade, are now being deftly dressed or dyed in Europe and America, and good effects are produced, although the lack of quality when compared with the better furs from colder climates which possess full top hair, close underwool and supple leathers, is readily manifest. It is only the pressure of increasing demand that makes marketable hard pelts with harsh brittle hair of nondescript hue, and these would, naturally, be the last to attract the notice of dealers.

As it is impossible that we shall ever discover any new fur- bearing animals other than those we know, it behoves responsible authorities to enforce close seasons and restrictions, as to the

sex and age, in the killing for the purpose of equalizing the numbers of the catches. As evidence of indiscriminate slaughter the case of the American buffaloes may be cited. At one time thousands of buffalo skins were obtainable and provided material for most useful coats and rugs for rough wear in cold regions, but to-day only a herd or so of the animals remain, and in captivity.

The majority of animals taken for their fur are trapped or snared, the gun being avoided as much as possible in order that the coat may be quite undamaged. Many weary hours are spent in setting baits, traps and wires, and, frequently, when the hunter retraces his steps to collect the quarry it is only to find it gone, devoured by some large animal that has visited his traps before him. After the skins have been carefully removed — the sooner after death the better for the subsequent condition of the fur — they are lightly tacked out, pelt outwards, and, without being exposed to the sun or close contact with a fire, allowed to dry in a hut or shady place where there is some warmth or movement of air. With the exception of sealskins, which are pickled in brine, all raw skins come to the various trade markets simply dried like this.

Quality and Colour. — The best fur is obtained by killing animals when the winter is at its height and the colder the season the better its quality and colour. Fur skins taken out of season are indifferent, and the hair is liable to shed itself freely; a good furrier will, however, reject such faulty specimens in the manufacturing. The finest furs are obtained from the Arctic and northern regions, and the lower the latitude the less full and silky the fur, till, at the torrid zone, fur gives place to harsh hair without any underwool. The finest and closest wools are possessed by the amphibious Carnivora and Rodentia, viz. seals, otters, beavers, nutrias and musquash, the beauty of which is not seen until after the stiff water or top hairs are pulled out or otherwise removed. In this class of animal the underneath wool of the belly is thicker than that of the back, while the opposite is true of those found on the land. The sea otter, one of the richest and rarest of furs, especially for men's wear, is an exception to this unhairing process, which it does not require, the hair being of the same length as the wool, silky and bright, quite the reverse of the case of other aquatic animals.

Of sealskins there are two distinct classes, the fur seals and the hair seals. The latter have no growth of fur under the stiff top hair and are killed, with few exceptions (generally of the marbled seals), on account of the oil and leather they yield. The best fur seals are found off the Alaska coast and down as far south as San Francisco.

It is found that in densely wooded districts furs are darker in colour than in exposed regions, and that the quality of wool and hair is softer and more silky than those from bare tractsof country, where nature exacts from its creatures greater efforts to secure food, thereby developing stronger limbs and a consequently coarser body covering.

As regards density of colour the skunk or black marten has the blackest fur, and some cats of the domestic kind, specially reared for their fur, are nearly black. Black bears have occasion- ally very black coats, but the majority have a brownish under- wool. The natural black fox is a member of the silver fox family and is very rare, the skins bringing a high price. Most silver foxes have dark necks and in some the dark shade runs a quarter, half-way, or three-quarters, or even the whole length of the skin, but it is rather of a brownish hue. Some Russian sables are of a very dense bluish brown almost a black, which is the origin undoubtedly of the term " sables," while some, from one district in particular, have a quantity of silver hairs, evenly interspersed in the fur, a peculiarity which has nothing to do with age. The best sea otters have very dark coats which are

highly esteemed, a few with silver hairs in parts; where these are equally and evenly spread the skins are very valuable. Otters and beavers that run dark in the hair or wool are more valuable than the paler ones, the wools of which are frequently touched with a chemical to produce a golden shade. This is also done I with nutrias after unhairing. The darker sorts of mink,

musquash, raccoon and wolverine are more valuable than the paler skins.

Collective Supplies and Sales. — There are ten large American and Canadian companies with extensive systems for gathering the annual hauls of skins from the far-scattered trappers. These are the Hudson's Bay Co., Russian Fur Co., Alaska Commercial > Co., North American Commercial Co., Russian Sealskin Co., Harmony Fur Co., Royal Greenland Fur Co., American Fur Co., Missouri Co. and Pacific Co. Most of the raw skins are forwarded to about half-a-dozen brokers in London, who roughly sort them in convenient lots, issuing catalogues to the traders of the world, and after due time for examination of the goods by intending purchasers, the lots are sold by public auction. The principal sales of general furs are held in London in January and March, smaller offerings being made in June and October; while the bulk of fur sealskins is sold separately in December. The Hudson's Bay Co.'s sales take place before the others, and, as no reserves are placed on any lot, the results are taken as exactly indicating current values. While many buyers from America and Russia are personally in attendance at the sales, many more arc represented by London and Leipzig agents who buy for them upon commission. In addition to the fur skins coming from North America vast numbers from Russia, Siberia, China, Japan, Australia and South America are offered during the same periods at public auction. Fairs are also held in Siberia, Russia and Germany for the distribution of fur skins as follows: —

January: Frankfort-on-the- Small collection of pro- Oder vincial produce, such as otter, fox, fitch and marten.

February: Irbit, Siberia . . General Russian furs.

Easter: Leipzig, Germany General furs.

August : Nizhniy Novgorod, Persian lamb and general Russia furs.

August: Kiakhta, Siberia . Chinese furs and ermine.

December: Ishim, Siberia . Chiefly squirrels.

Of course there are many transactions, generally in the cheaper and coarser kinds of furs, used only in central Europe, Russia and Asia which in no way interest the London market, and there are many direct consignments of skins from collectors in America and Russia to London, New York and Leipzig merchants. But the bulk of the fine furs of the world is sold at the large public trade auction sales in London. The chief exceptions are the Persian and Astrachan lambs, which are bought at the Russian fairs, and are dressed and dyed in Leipzig, and the ermine and Russian squirrels, which are dressed and manufactured into linings either in Russia or Germany before offered for sale to the wholesale merchants or manufacturers.

The annual collection of fur skins varies considerably in quantity according to the demand and to the good or bad climatic conditions of the season; and it is impossible to give a complete record, as many skins are used in the country of their origin or exported direct to merchants. But a fairly exact statement of the numbers sold in the great public trade auction sales in London during the year 1905-1906 is herewith set out.

Year ending 31st of March iqo6. Total Number

of Skins.

Badger 28,634

Badger, Japanese 6,026

Bear 18, 576

Beaver 80,514

Cat, Civet 157,915

Cat, House 126,703

,, Wild 32,253

Chinchilla (La Pla-ta), known also as Bastard . 43,578

,, Peruvian finest 5,603

Deer, Chinese • . 124,355

Ermine 40,641

Fisher 5,949

Fitch 77,578

Fox, Blue 1,893

,, Cross 10,276

,, Grey 59,56i

,, Japanese 81,429

,, Kit 4,023

,, Red 158,961

,, Silver 2,510

,, . White . 27,463

Goats, Chinese

Hares

Kangaroo

Kid, Chinese linings and skins equal to .

Kolinsky

Lamb, Mongolian linings and skins equal to

„ Slink ,, ,, ,,

„ Tibet

Leopard

Lynx

Marmot, linings and skins equal to .

Marten, Baum

,, Japanese

,, Stone

Mink, Canadian and American .

,, Japanese

Mouflon

Musk-rat or Musquash, Brown .

Black .

Nutria

261,190

41,256

7,H5

5,080,047

114,251 214,072 167,372 794,130

3,574

88,822

1,600,600

4,573 16,461

12,939

299,254

360,373

23,594

5,126,339

41,788

82,474

Opossum, American 902,0155

,, Australian 4,161,685

Otter, River 21,235

,, Sea 522

Raccoon 310,712

Sable, Canadian and American 97,282

,, Japanese 556

,, Russian 26,399

Seals, Fur 77,000

-■ , Hair 31,943

Skunk 1,068,408

Squirrel . _ 194,596

,, • Linings each averaging 126 skins. . 1,982,736

Tiger 392

Wallaby 60,956

Wolf. _ 56,642

Wolverine 1,726

Wombat . . . 193,625

A brief account of the different qualities of the pelts, with some general remarks as to their customary uses, follows. The prices quoted are subject to constant fluctuation and represent purely trade prices for bulk, and it should be explained that the very great variations are due to different sizes, qualities and colours, and moreover are only first cost, before skins are dressed and prepared. These preparations are in some cases expensive, and there is generally a considerable percentage of waste. The prices cannot be taken as a guide to the wholesale price of a single and finished skin, but simply as relative value.

The fullest and darkest skins of each kind are the most valu- able, and, in cases of bluish grey or white, the fuller, clearer and brighter

are the more expensive. A few albinos are found in every species, but whatever their value to a museum, they are of little commercial importance. Some odd lots of skins arrive designated simply as " sundries," so no classification is possible, and this will account for the absence of a few names of skins of which the imports are insignificant in quantity, or are received direct by the wholesale merchants.

Names, Qualities and Uses of Pelts. 1

Astrachan. — See Lambs, below.

Badger. — Size 2 X 1 ft. American sorts have coarse thick under-wool of a pale fawn or stone colour with a growth of longer black and white hairs, 3 or 4 in. long; a very durable but clumsy fur. The best skins are exported to France, Spain and Italy, and used for carriage rugs and military purposes. Asiatic, including Japanese, skins are more woolly. Russian and Prussian kinds are coarser and darker, and used mostly for brush trade. Value 6d. to 19s.

Bear; Australian. — See Wombat, below.

Bear, Black. — Size 6X3 ft. Fine dark brown underwool with bright black and flowing top hair 4 in. long. Cubs are nearly as long in the hair although only about half the size and not only softer and better, but have the advantage of being very much lighter in pelt. Widely distributed in North America, the best come from Canada, are costly and are used for military caps, boas, muffs, trimmings, carriage rugs and coachmen's capes, and the fur wears exceedingly well. Value 17s. 6d. to 86s. Those from East India and warm climates are harsh, poor and only fit for floor rugs.

Bear, Brown. — Size 6X3 ft. Similar in quality to the black, but far more limited in number; the colours range from light yellow to a rich dark brown. The best come from Hudson Bay territory and are valuable. Used for muffs, trimmings, boas, and carriage

1 The measurements given are from nose to root of tail of average large sizes after the dressing process, which has a shrinking tendency. The depths of fur quoted are the greatest, but there are plenty of good useful skins possessing a lesser depth.

rugs. Inferior sorts, almost grizzly in effect and some very pale, are found in Europe and Asia and are mostly used locally. In India there is a species called Isabelline bear, which was formerly imported to Great Britain, but does not now arrive in any quantity worth mentioning. Value ios. 6d. to 60s., Isabelline sort 10s. fid. to 78s.

Bear, Grizzly. — Size 8X4 ft. Coarse hair, heavy pelt, mostly dark yellowish and brown colours, only found in western fiarts of United States, Russia and Siberia. Used as carriage rugs and floor rugs, most durable for latter purpose and of fine effect. They are about half the value of brown bear. Value 15s. to 54s. Bear, Isabelline. — See Bear, Brown, above. Bear, White. — Size 10X5 ft. The largest of all bears. Short close hair except on flanks, colour white to yellow. An inhabitant of the Arctic circle, best from Greenland. Used for floor rugs, very durable ; and very white specimens are valuable. Value 20s. to 520s. Beaver. Size 3X2 ft. The largest of rodents, it possesses a close underwool of bluish-brown hue, nearly an inch in depth, with coarse, bright, black or reddish-brown top hair, 3 in. long. Found widely in North America. After being unhaired the darkest wools are the most valuable, although many people prefer the bright, lighter brown tones. Used for collars, cuffs, boas, muffs, trimmings, coat linings and carriage aprons, and is of a most durable nature, in addition to having a rich and good appearance. Value ios. to 39s. 6d.

Broadtail. — See Lambs, below.

Caracal. — A small lynx from India, the fur very poor, seldom imported.

Caracul. — See Goats and Lambs, below.

Cat, Civet. — Size 9X4J in., short, thick and dark underwool with silky black top hair with irregular and unique white markings. It is similar to skunk, but is much lighter in weight, softer and less full, without any disagreeable odour. Used for coat linings it is very warm and durable. A few come from China, but the fur is yellowish-grey, slightly spotted and worth little. Value is. id. to is. 1 id.

Cat, House, &c. — 18X9 i n -> mostly black and dark brown, imported from Holland, Bavaria, America and Russia, where they are reared for their coats. The best, from Holland, are used for coat linings. Although in colour, weight and warmth they are excellent, the fur is apt to become loose and to fall off with friction of wear. The black are known as genet, although the true genet is a spotted

wild cat. Wild sorts of the tabby order are coarser, and not so good and silky in effect as when domestically reared. Value of the black sorts 2d. to 3s. Wild 9d. to 14s. Some small wild cats, very poor flat fur of a pale fawn colour with yellow spots, are imported from Australia and used for linings. Value 5§d. to is. id.

Cheetah. — Size of a small leopard and similar in colour, but has black spots in lieu of rings. Only a few are now imported, which are used for mats. Value 2s. 6d. to 1 8s.

Chinchilla, Peruvian and Bolivian. — Size 12X7 in., fur 1 to 1 j in. deep. Delicate blue-grey with black shadings, one of nature's most beautiful productions, though not a durable one. Used for ladies' coats, stoles, muffs, hats and trimmings. Yearly becoming scarcer and most costly. Value 8s. 6d. to 56s. 8d.

Chinchilla, La Plata, incorrectly named and known in the trade as " bastard chinchilla," size 9X4 in., in a similar species, but owing to lower altitudes and warmer climatic conditions of habitation is smaller, with shorter and less beautiful fur, the underwool colour being darker and the top colour less pure. Used exactly as the better kind, and the picked skins are most effective. As with the best sort it is not serviceable for constant wear. Value 4s. 2d. to 27s. 6d.

Chinchillone. — Size 13X8 in., obtained also from South America. Fur is longer and weaker and poorer and yellower than chinchilla. Probably a crossbred animal, very limited importation. Value 3s. 6d. to 16s. 8d.

Deer, Chinese and East Indian. — Small, light, pelted skins, the majority of which are used for mats. Reindeer and other varieties are of little interest for use other than trophy mats. Thousands are taken for the leather trade. Value of Chinese is. 2d. to is. 6d. each.

Dog. — The only dcgs that are used in the fur trade in civilized countries are those imported from China, which are heavy and coarse, and only used in the cheaper trade, chiefly for rugs. Value 6d. to is.

Dog Wolf.— See Wolf, below.

Ermine. — Sizei2X2ˆ in. Underwool short and even, with a shade longer top hair. Pelt light and close in texture, and durable. In the height of winter the colour is pure white with exception of the tip of tail, which is quite black. Supplies are obtained from Siberia and America. Best are from Ishim in Siberia. Used for cloak linings,

stoles, muffs and trimmings, also for embellishment of British state, parliamentary and legal robes. When this fur is symmetrically spotted with black lamb pieces it is styled miniver, in which form it is used at the grand coronation functions of British sovereigns. Value is. 3d. to 8s. 6d.

Fisher. — Size 30X12 in., tail 12 to 18 in. long, the largest of the martens; has a dark shaded deep underwool with fine, glossy, dark and strong top hair 2 in. or more long. Best obtained from British America. The tails are almost black and make up most handsomely

into trimmings, muffs, &c. Tails worked separately in these forms are as rich and fine and more durable than any other fur suitable for a like purpose. The fur of the skin itself is something like a dark silky raccoon, but is not as attractive as the tails. Value 12s. to 46s. Fitch. — Size 12X3 in., of the marten species, also known as the pole cat. Yellow underwool \ in. deep, black top hair, 1 J to if in. long, very fine and open in growth, and not close as in martens. Largest skins come from Denmark, Holland and Germany. The Russian are smaller, but more silky and, as now dyed, make a cheap and fair substitute for sable. They are excellent for linings of ladies' coats, being of light weight and fairly strong in the pelt. English mayors' and civic officials' robes are frequently trimmed with this fur in lieu of sable. Value of the German variety 2s. to 5s. 6d. and of the Russian 7d. to is. 4d.

Fox, Blue. — Size 24X8 in. Underwool thick and long. Top hair fine and not so plentiful as in other foxes. Found in Alaska, Hudson Bay territory, Archangel and Greenland. Although called blue, the colour is a slaty or drab tone. Those from Archangel are more silky and of a smoky bluish colour and are the most valuable. These are scarce and consequently dear. The white foxes that are dyed smoke and celestial blue are brilliant and totally unlike the browner shades of this fox. Value 34s. to 195s.

Fox, Common. — The variation of size and quality is considerable, and the colour is anything from grey to red. In Great Britain the animal is now only regarded for the sport it provides. On the European continent, however, some hundreds of thousands of skins, principally German, Russian and Norwegian, are sold annually, for home use, and for dyeing and exportation, chiefly to the United States. The qualities do not compare with those species found in North America and the Arctic circle. The Asiatic, African and South American varieties are, with the exception of those taken in the mountains, poorly furred and usually brittle and therefore of no

great service. No commercial value can be quoted.

Fox, Cross. — Size 20X7 in., are about as large as the silver and generally have a pale yellowish or orange tone with some silvery points and a darkish cross marking on the shoulders. Some are very similar to the pale red fox from the North-West of America and a few are exceptionally large. The darkest and best come from Labrador and Hudson Bay, and the ordinary sorts from the north- west of the United States and, as with silver and other kinds, the quality is inferior when taken from warmer latitudes. Value ios. 6d. to 60s.

Fox, Grey. — Size 27X10 in. Has a close dark drab underwool with yellowish grizzly, grey, regular and coarse top hair. The majority used for the trade come from Virginia and the southern and western parts of the United States. Those from the west are larger than the average, with more fur of a brighter tone. The fur is fairly serviceable for carriage rugs, the leather being stout, but its harshness of quality and nondescript colour does not contribute to make it a favourite. Value gd. to 4s. 9d.

Fox, Japanese. — See Fox, Red, and Raccoon, below. Fox, Kit. — Size 20X6 in. The underwool is short and soft, as is also the top hair, which is of very pale grey mixed with some yellowish-white hair. It is the smallest of foxes, and is found in Canada and the northern section of the United States. It is similar in colour and quality to the prairie fox and to many kinds from the warmer zones, such as from Turkey, eastern Asia and elsewhere. Value is. 3d. to 5s. 6d.

Fox, Red. — Size 24X8 in., though a few kinds are much larger. The underwool is long and soft and the hair plentiful and strong. It is found widely in the northern parts of America and in smaller numbers south of the United States, also in China, Japan and Australia. The colours vary from pale yellowish to a dark red, some being very brilliant. Those of Kamschatka are rich and fine in quality. Farther north, especially near the sea, the fur is coarse. Where the best coloured skins are not used for carriage rugs they are extensively dyed, and badger and other white hairs are inserted to resemble silver fox. They are also dyed a sable colour. The skins, being the strongest of foxes', both in the fur and pelt, are serviceable. The preparations in imitation of the natural black and silver sorts are very good and attractive. Value is. to 41s.

Fox, Silver. Size 30X10 in. Underwool close and fine. Top hair black to silvery, 3 in. long. The fur upon the necks usually runs dark, almost black, and in some cases the fur is black halfway down the

length of the skin, in rarer cases three-quarters of the length and, in the most exceptional instances, the whole length, and when this is the case they are known as " Natural Black Foxes " and fetch enormous prices. The even silvery sorts are highly esteemed, and the fur is one of the most effective and precious. The finest are taken in Labrador. The farther south they are found, the poorer and coarser the fur. The brush has invariablv a white tip. Value £1 to £320.

Fox, White. — Size 20X7 in. Animals of this species are generally small in size and inhabit the extreme northern sections of Hudson Bay, Newfoundland, Greenland, Labrador and Siberia. The Canadian are silky in nature and inclined to a creamy colour, while the Siberian are more woolly and rather whiter. Those taken in central Asia near or in Chinese territory are poorer and yellowish. The underwool in all sorts is generally of a bluish-grey tone, but the top hair in the depth of winter is usually full enough in quantity to

hide any such variation. Those skins in which the underwool is quite white are rare and much more expensive. In summer speci- mens of this species, as with other white furred animals, have slightly discoloured coats. The skins that are not perfectly white are dyed jet black, dark or light smoke, violet-blue, blue-grey, and also in imitation of the drab shades of the natural blue. Value 1 8s. to 66s. Genet. — Size 10X4 ' n – The genet proper is a small white spotted cat found in Europe, but the quantity is too small to be of commercial interest. The name has been adopted for the black cats used so much in the trade. (See Cats, above.) Value is. to 6s. 6d.

Goats. — Size varies greatly. The European, Arabian and East Indian kinds are seldom used for rugs, the skins are chiefly dressed as leather for books and furniture, and the kids for boots and gloves, and the finer wool and hair are woven into various materials. Many from Russia are dyed black for floor and carriage rugs ; the hair is brittle, with poor underwool and not very durable ; the cost, however, is small. The Chinese export thousands of similar skins in black, grey and white, usually ready dressed and made into rugs of two skins each. A great many are dyed black and brown, in imitation of bear, and are used largely in the western parts of the United States and Canada for sleigh and carriage rugs. Many are used for their leather. Thousands of the kids are also dyed black and worked into cross-shaped pieces, in which shape they are largely exported to

Germany, France, Great Britain and America, and sold by the retail as caracal, kid or caracul. The grey ones are in good demand for motor coats. The word caracul has been adopted from the Turkish and signifies black-eared. See also Lambs, caracul. Value of Chinese white 3s. 6d. to 6s. 6d. ; grey, 4s. to 6s. o.d.

The Angora from the heights of central Asia Minor has curly, fleecy, silky, white wool, 4 to 7 in. long. The fur is not used in Great Britain, as formerly, and the greater quantity, known as mohair, is now imported for purposes of weaving. This species of goat was some years since introduced into Cape Colony, but its wool is not so good as the Asiatic breed. Good business, however, is done with the product, but chiefly for leather. Value 4s. to 12s. 6d.

The Mongolian goat has a very soft silk underwool, and after the long top hair is removed it is dressed and imported and erroneously named mouflon. The colour is a light fawn, but it is so pale that it lends itself to be dyed any colour. It was popular some years since in the cheaper trade, but it is not now much seen in England. Value 2s. to 6s.

The Tibet goat is similar to the Angora in the fineness of its wool, and many are used in the making of cashmere shawls. The Tibet lamb so largely imported and used for children's wear is often mis-called Tibet goat. Value 3s. to 7s. 6d.

Guanaco. — Size 30X15 in. Is a species of goat found in Pata- gonia and other parts of South America. It has a very long neck and exceedingly soft woolly fur of a light reddish-fawn colour with very white flanks. It is usually imported in small quantities, native dressed, and ready made into rugs. The dressing is hard and brittle. If the skins are dressed in Europe they afford a very com- fortable rug, though a very marked one in effect. They have a similar wool to the vicuna, but coarser and redder; both are largely used in South America. Value is. to 4s. 6d.

Hamster. — Size 8X31 in. A destructive rodent, is found in great numbers in Russia and Germany. The fur is very flat and poor, of a yellowish pale brown with a little marking of black. Being of a light weight it is used for linings. Value 3d. to is.

Hare. — Size 24X9 in. The common hare of Europe does not much interest the furrier, the fur being chiefly used by makers of hatters' felt. The white hares, however, of Russia, Siberia and other regions in the Arctic circle are very largely used in the cheaper trade of

Europe, America and the British colonies. The fur is of the whitest when killed in winter, and that upon the flanks of the animal is verv much longer than that upon its back. The flanks are usually cut off and made into muffs and stoles. The hair is, however, brittle and is not at all durable. This fur is dyed jet black and various shades of brown and grey, and manufactured into articles for the small drapers and for exportation. The North American hares are also dyed black and brown and used in the same way. Value of white 2d. to 5d.

Jackal. — Size 2 to 3 ft. long. Is found in India and north and south Africa. Indian are light brown and reddish, those from the Cape are dark grey and rather silvery. Few are imported. Fur generally poor and harsh, only suitable for carriage rugs. Value is. to 3s. 6d.

Jaguar. — Size 7 to 10 ft. long. Is found in Mexico and British Honduras. The markings are an irregular ring formation with a spot in the centre. Leopards have rings only and cheetahs solid spots. Suitable only for hearthrugs. Supply very limited. Value 5s. to 45s.

Kaluga. — See Souslik, below.

Kangaroo. — The sizes vary considerably, some being huge, others quite small. The larger varieties, viz. the red and the great, do not usually interest furriers, the fur being harsh and poor without underwool. They are tanned for the leather trade. The sorts used for carriage aprons, coat linings and the outside of motor coats include: blue kangaroo, bush kangaroo, bridled kangaroo, wallaroo, yellow kangaroo, rock wallaby, swamp wallaby and short-tailed wallaby. Many of the swamp sort are dyed to imitate skunk and

look well. Generally the colours are yellowish or brown. Some are dark brown as in the swamp, which being strong are suitable for motor coats. The rock wallabies are soft and woolly and often of a pretty bluish tone, and make moderately useful carriage rugs and perambulator aprons. The redder and browner sorts are also good for rugsˆas they are thick in the pelt. On the European continent many 01 these are dyed. The best of the lighter weights are fre- quently insufficiently strong in the hair to stand the friction of wear in a coat lining. Value, kangaroo gd. to 3s., wallaby ijd. to 5s. 3d., wallaroo is. to 5s. 6d.

Kids. — See Goats, above.

Kolinsky. — Size 12X2I in. Is one of the marten tribe. The underwool is short and rather weak, but regular, as is also the top hair; the

colour is usually yellow. They have been successfully dyed and used as a substitute for sable. They are found in Siberia, Amoor, China and Japan, but the best are from Siberia. They are light in weight and therefore suitable for linings of coats. The tails are used for artists' " sable " brushes. The fur has often been designated as red or Tatar sable. Value is. 6d. to 4s. 6d.

Lambs. — The sorts that primarily interest the fur trade in Europe and America are those from south Russia, Persia and Afghanistan, which are included under the following wholesale or retail commercial terms: Persian lamb, broadtail, astrachan, Shiraz, Bokharan and caracul lamb. With the public the general term astrachan is an old one, embracing all the above curly sorts ; the flatter kinds, as broad- tail and caracul lamb, have always been named separately. The Persian lambs, size 18X9 in,. f are the finest and the best of them. When dressed and dyed they should have regular, close and bright curl, varying from a small to a very large one, and if of equal size, regularity, tightness and brightness, the value is comparatively a matter of fancy. Those that are dull and loose, or very coarse and flat in the curl, are of far less market value.

All the above enumerated lambs are naturally a rusty black or brown, and with very few exceptions are dyed a jet black. Lustre, however, cannot be imparted unless the wool was originally of a silky nature. Broadtails, size 10X5 in., are the very young of the Persian sheep, and are killed before the wool has time to develop beyond the flat wavy state which can be best compared to a piece of moire silk. They are naturally exceedingly light in weight, and those that are of an even pattern, possessing a lustrous sheen, are costly. There is, notwithstanding, a great demand for these from the fashionable world, as not only are they very effective, but being so flat in the wool the figure of the wearer can be shown as perfectly as in a garment made of silk. It cannot be regarded as an economical fur, as the pelt is too delicate to resist hard wear.

Persian Lamb price 12s. 6d. to 25s. Broadtail ,, 10s. ,, 35s.

Astrachan, Shiraz and Bokharan lambs, size 22 by 9 in., are of a coarser, looser curl, and chiefly used for coat linings, while the Persians are used for outside of garments, collars, cuffs, stoles, muffs, hats and trimmings and gloves. The so-called caracul lambs, size 12X6 in., are the very young of the astrachan sheep, and the pick of them are almost as effective as broadtails, although less fine in the texture. See also remarks as to caracul kid under Goats, above.

Astrachan price is. to 5s. 6d.

Caracul Lamb ,, 2s. 6d ,, ips. 6d.

Shiraz ,, 4s. 6d ,, 10s.

Bokharan „ is. 6d ,, 3s. 6d.

Grey lambs, size 24 X 10 in., are obtained from the Crimea and known in the trade as " crimmers." They are of a similar nature to the caracul lambs, but looser in curl, ranging from a very light to a dark grey. The best are the pale bluish greys, and are chiefly used for ladies' coats, stoles, muffs and hats. Price 2s. to 6s. Mongolian lambs, size 24X15 in., are of a short wavy loose curl, creamy white colour, and are usually exported from China dressed, the majority being ready-made into cross-shaped coats or linings. They are used principally for linings of good evening wraps for ladies. Price Is. to 2s. 6d. Slink lambs come from South America and China. The former are very small and generally those that are stillborn. They have a particularly thin pelt with very close wool of minute curl. The China sorts are much larger. The smallest are used for glove linings and the others for opera cloak linings. Price Is. to 6s. 6d.

Leopard. — Size 3 to 6 ft. long. There are several kinds, the chief being the snow or ounce, Chinese, Bengal, Persian, East Indian and African. The first variety inhabit the Himalayas and are beautifully covered with a deep soft fur quite long compared to the flat harsh hair of the Bengal sort. The colours are pale orange and white with very dark markings, a strong contrast making a fine effect. Most artists prize these skins above all others. The Chinese are of a medium orange brown colour, but full in fur. The East Indian are less full and not so dark. The Bengal are dark and medium in colour, short and hard hair, but useful for floor rugs, as they do not hold the dust like the fuller and softer hair of the kinds previously named. They are also used for drummers' aprons and saddle cloths in the Indian army. The African are small with pale lemon colour grounds very closely marked with black spots on the skin, the strong contrast making a pleasing effect. Occasionally, where something very marked is wanted, skating jackets and carriage aprons are made

from the softest and flattest of skins, but usually they are made into settee covers, floor rugs and foot muffs. Value 2s. to 40s.

Lion. — Size 5 to 6 ft. long. These skins are found in Africa, Arabia and part of India, and are every year becoming scarcer. They are only used for floor rugs, and the males are more highly esteemed on account of the set-off of the mane. Value, lions' £10 to £100; lionesses' £5 to £25.

Lynx. — Size 45X20 in. The underwool is thinner than fox, but the top hair is fine, silky and flowing, 4 in. long, of a pale grey, slightly mottled with fine streaks and dark spots. The fur upon the flanks is longer and white with very pronounced markings of dark spots, and this part of the skin is generally worked separately from the rest and is very effective for gown trimmings. Where the colour is of a sandy and reddish hue the value is far less than where it is of a bluish tone. They inhabit North America as far south as California, also Norway and Sweden. Those from the Hudson Bay district and Sweden are the best and are very similar. Those taken in Central Asia are mostly used locally. For attire the skins manu- factured in Europe are generally dyed black or brown, in which state it has a similar appearance to dyed fox, but having less thick underwool' and finer hair flows freely. The finest skins when dyed black are used very largely in America in place of the dyed black fox so fashionable for mourning wear in Great Britain and France. The British Hussar busbies are made of the dark brown lynx, and it is the free silky easy movement of the fur with the least disturbance in the atmosphere that gives it such a pleasing effect. It is used for rugs in its natural state and also in Turkey as trimmings for garments. Value 13s. 6d. to 56s.

Lynx Cat or Bay Lynx. — Is about half the size and depth of fur of a lynx proper, and inhabits the central United States. It is a flat and reddish fur compared to the lynx and is suitable for cheap carriage aprons. A few come from Canada and are of better quality. Value 5s. to 15s.

Marmot. — Size 18X12 in. Isarodentandisfoundinconsiderable numbers in the south of Prussia. The fur is a yellowish brown and rather harsh and brittle and has no underwool. Since, however, the value of all good furs has advanced, dyers and manufacturers have made very successful efforts with this fur. The Viennese have been particularly successful, and their method has been to dye the skins a good brown and then not put in the dark stripes, which exist in sable and mink, until the garment or article is finished, thus obtaining as perfectly symmetrical effects as if the articles were made of small skins instead of large ones. Marmots are also found in North America, Canada and China; the best, however, come from Russia. It

should always be a cheap fur, having so few good qualities to recommend it. Value o,d. to 2s. 6d. Marten, American. — See Sable, below.

Marten, Baum. — Size 16X5 in. Is sometimes called the pine marten, and is found in quantity in the wooded and mountainous districts of Russia, Norway, Germany and Switzerland. It possesses a thick underwool with strong top hair, and ranges from a pale to a dark bluish brown. The best, from Norway, are very durable and of good appearance and an excellent substitute for American sable. The tails when split into two or three, with small strips of narrow tape so as to separate the otherwise dense fur, formerly made very handsome sets of trimmings, ties and muffs, and the probabilities are, as with other fashions, such use will have its period of revival. Value 6s. to 85s.

Marten, Black. — See Skunk, below.

Marten, Japanese. — Size 16X5 in. Is of a woolly nature with rather coarse top hair and quite yellow in colour. It is dyed for the cheap trade for boas and muffs, but it is not an attractive fur at the best of times. It lacks a silky, bright and fresh appearance, and therefore is unlikely to be in great demand, except where economy is an object. Value 6s. 6d. to 18s. 6d.

Marten, Stone. — Size and quality similar to the baum; the colour, however, of the underwool is a stony white and the top hair is very dark, almost black. They live in rocky and stony districts. Skins of a pale bluish tone are generally used in their natural state for stoles, boas and muffs, but the less clear coloured skins are dyed in beautiful shades similar in density to the dark and valuable sables from Russia, and are the most effective skins that can be purchased at a reasonable price. The tails have also been worked, in the manner explained with regard to the baum marten, as sets of trimmings and in other forms. Stone martens are found in Russia, Bosnia, Turkey, Greece, Germany, the Alps and France. The Bosnian and the French are the best in colour. The Asiatic sorts are less woolly, but being silky are useful when dyed. There are many from Afghanistan and India which are too poor to interest the European markets. Value 7s. 6d. to 26s.

Mink. — Size 16X5 in. Is of the amphibious class and is found throughout North America and in Russia, China and Japan. The underwool is short, close and even, as is also the top hair, which is very strong. The best skins are very dark and are obtained from Nova Scotia. In the central states of America the colour is a good

brown, but in the north-west and south-west the fur is coarse and generally pale. It is very durable for linings, and is an economical substitute for sable for coats, capes, boas and trimmings, Values have greatly increased, and the fur possessing good qualities as to colour and durability will doubtless always be in good request.

The Russian species is dark but flat and poor in quality, and the Chinese and Japanese are so pale that they are invariably dyed. These, however, are of very inferior nature. Value of American 3s. 3d. to 40s., Japanese 3d. to 2s. 3d.

Mole. — Size 3iX2j in. Moles are plentiful in the British Isles and Europe, and owing to their lovely velvety coats of exquisite blue shade and to the dearness of other furs are much in demand. Though'the fur is cheap in itself, the expense of dressing and working up these little skins is considerable, and they possess the unique charm of an exceptional colour with little weight of pelt ; the quality of resistance to friction is, however, so slight as to make them expensive in wear. The best are the dark blue from the Fen district of Cambridgeshire in England. Value Jd. to 2d.

Mongolian Lambs. — See Lambs, above.

Monkey, Black. — Size 18X10 in. Among the species of monkeys only one interests to any extent the fur trade, and that is the black monkey taken on the west coast of Africa (Colobus satanas). The hair is very long, very black and bright with no underwool, and the white pelt of the jase of the hair, by reason of the great contrast of colour, is very noticeable. The skins were in 1850 very fashionable in England for stoles, muffs and trimmings, and in America also as recently as 1890. They are now mostly bought for Germany and the continent. Value 6d. to is. 6d.

Mouflon. — Size 30X15 in. Is a sheep found in Russia and Corsica and now very little in demand, and but few are imported into Great Britain. Many Mongolian goats with the long hairs pulled out are sold as mouflon. Value 4s. to 10s. 6d.

Musk-Ox. — Size 6X3 ft. These animals have a dense coat of fine, long brown wool, with very long dark brown hair on the head, flanks and tail, and, in the centre, a peculiar pale oval marking. There is no other fur that is so thick, and it is eminently suitable for sleighing rugs, for which purpose it is highly prized in Canada. The musk-ox inhabits the north part of Greenland and part of Canada, but in very limited numbers. Value 10s. to 130s.

Musquash or Musk-Rat, Brown and Black Russian. — Size 12X8 in. A very prolific rodent of the amphibious class obtained from Canada and the United States, similar in habit to the English vole, with a fairly thick and even brown underwool and rather strong top dark hair of medium density. It is a very useful fur for men's coat linings and ladies' driving or motoring coats, being warm, durable and not too heavy. If the colour were less motley and the joins between the skins could be made less noticeable, it would be largely in demand for stoles, ties and muffs. As it is, this fur is only used for these smaller articles for the cheaper trade. It has, however, of later years been " unhaired," the underwool clipped very even and then dyed seal colour, in which way very useful and attractive garments are supplied at less than half the cost of the cheaper sealskins. They do not wear as well, however, as the pelt and the wool are not of a strength comparable to those of sealskin. With care, however, such a garment lasts sufficiently long to warrant the present outlay. Value 5jd. to is. 9d.

There is a so-called black variety found in Delaware and New Jersey, but the number is very small compared to the brown species. They are excellent for men's coat linings and the outside of ladies' coats, for stoles, muffs, collars and cuffs. Value lod. to 3s. 7

The Russian musquash is very small, 7X4 in., and is limited in numbers compared to the brown. Only a few thousands are imported to London. It is of a very pretty silvery-blue shade of even wool with very little silky top hair, having silvery-white sides and altogether a very marked effect. The odour, however, even after dressing is rather pungent of musk, which is generally an objection. Value 4s. to 6s. 6d.

Nutria. — Size 20X12 in. Is a rodent known in natural history as the coypu, about half the size of a beaver, and when unhaired has not more than half, generally less, the depth of fur, which is also not so close. Formerly the fur was only used for hatters' felt, but with the rise in prices of furs these skins have been more carefully removed and — with improved dressing, unhairing and silvering processes — the best provides a very effective and suitable fur for ladies' coats, capes, stoles, muffs, hats and gloves, while the lower qualities make very useful, light-weighted and inexpensive linings for men's or women's driving coats. It is also dyed sealskin colour, but its woolly nature renders it less effective than the more silky musquash. They are obtained from the northern part of South America. Value is. 6d. to 6s. 6d.

Ocelot. — Size 36X13 in. Is of the nature of a leopard and prettily marked with stripes and oblong spots. Only a few are now imported from South America for carriage aprons or mats. The numbers are very limited. Value is. to 2s. 6d.

Opossum, American. — Size 18X10 in. Is a marsupial, a class with this exception not met with out of Australia. The underwool is of a very close frizzy nature, and nearly white, with long bluish grey mixed with some black top hair. It is only found in the central sections of the United States. About 1870 in England it was dyed dark brown or black and used for boas, muffs and trimmings, but until recently has been neglected on the continent. With, however, recent experiments in brown and skunk coloured dyes, it bids fair to become a popular fur. Value 2|d. to 5s. 6d.

Opossum, Australian. — Size 16X8 in. Is a totally different nature of fur to the American. Although it has wool and top hair,

the latter is so sparse and fine that the coat may be considered as one of close even wool. The colour varies according to the district of origin, from a blue grey to yellow with reddish tones. Those from the neighbourhood of Sydney are light clear blue, while those from Victoria are dark iron grey and stronger in the wool. These animals are most prolific and evidently increasing in numbers. Their fur is pretty, warm and as yet inexpensive, and is useful for rugs, coat linings, stoles, muffs, trimmings and perambulator aprons. The worst coloured ones are frequently dyed black and brown. The most pleasing natural grey come from Adelaide. The reddest ire the cheapest. Value 3|d. to 3s. 6d.

Opossum, Ringtailed. — Size 7 X4 in. Has a very short close and Jark grey wool, some being almost black. There are but a few thousands imported, and being so flat they are only of use for coat linings, but they are very warm and light in weight. Value 6d. to lod.

Opossum, Tasmanian (grey and black). — Size 20X10 in. Is of a similar description, but darker and stronger in the wool and larger. Besides these there are some very rich brown skins which were formerly in such request in Europe, especially Russia, that undue killing occurred until 1899, when the government stopped for a time the taking of any of this class. They are excellent for carriage

aprons, being not only very light in weight and warm, but handsome. Value 2s. 6d. to 8s. 6d.

Otter, River. — The size varies considerably, as does the under- wool and the top hair, according to the country of origin. There are few rivers in the world where they do not live. But it is in the colder northern regions that they are found in the greatest numbers and with the best fur or underwool, the top hair, which, with the exception of the scarce and very rich dark brown specimens they have in common with most aquatic animals, is pulled out before the skins are manufactured. Most of the best river otter comes from Canada and the United States and averages 36 X 18 in. in size. Skins from Germany and China are smaller, and shorter in the wool. The colours of the under wools of river otters vary, some being very dark, others almost yellow. Both as a fur and as a pelt it is extremely strong, but owing to its short and close wool it is usually made up for the linings, collars and cuffs of men's coats. A large number of sk.ins, after unhairing, is dyed seal colour and used in America. Those from hot climates are very poor in quality. Value 28s. to 1 18s. Otter, Sea. — Size 50X25 in. Possesses one of the most beautiful of coats. Unlike other aquatic animals the skin undergoes no process of unhairing, the fur being of a rich dense silky wool with the softest and shortest of water hairs. The colours vary from pale grey brown to a rich black, and many have even or uneven sprinkling of white or silvery-white hairs. The blacker the wool and the more regular the silver points, the more valuable the skin. Sea otters are, un-fortunately, decreasing in numbers, while the demand is increasing. The fur is most highly esteemed in Russia and China ; in the latter country it is used to trim mandarins' state robes. In Europe and America it is much used for collar, long facings and cuffs of a gentle-man's coat; such a set may cost from £200 to £600, and in all prob-ability will soon cost more. Taking into consideration the size, it is not so costly as the natural black fox, or the darkest Russian sable, which is now the most expensive of all. The smaller and young sea otters of a grey or brown colour are of small value compared to the large dark and silvery ones. Value £10 to £220. A single skin has been known to fetch £400. Ounce. — See Leopard, above. Persian Lambs. — See Lambs, above.

Platypus. — Size 12X8 in. One of the most singular of fur- bearing animals, being the link between bird and beast. It has fur similar to otter, is of aquatic habits, being web-footed with spurs of a cock and the bill of a duck. The skins are not obtained in any numbers, but being brought over by travellers as curiosities and used for muffs, collars and cuffs, &c, they are included here for reference. Value 2s.

to 3s. 6d.

Pony or Tatar Foal. — Size 36X20 in. These skins are of comparatively recent importation to the civilized world. They are obtained from the young of the numerous herds of wild horses that roam over the plains of Turkestan. The coat is usually a shade of brown, sometimes greyish, fairly bright and with a suggestion of waviness. Useful for motor coats. Value 3s. to 10s. 6d.

Puma. — Size 4IX3 ft. Is a native of South America, similar to a lion in habits and colour of coat. The hair and pelt is, however, of less strength, and only a few are now used for floor rugs. Value 5s. to 10s.

Raccoon. — Size 20X12 in. Is an animal varying considerably in size and in quality and colour of fur, according to the part of North America in which it is found. In common parlance, it may 6e described as a species of wild dog with close affinity to the bear.' The underwool is 1 to ij in. deep, pale brown, with long top hairs of a dark and silvery-grey mixture of a grizzly type, the best having a bluish tone and the cheapest a yellowish or reddish-brown. A limited number of very dark and black sorts exist and are highly valued for trimmings. The very finest skins are chiefly used for stoles and muffs, and the general run for coachmen's capes and carriage rugs, which are very handsome when the tails, which are marked with rings of dark and light fur alternately, are left on. Raccoons are used in enormous quantities in Canada for men's

coats, the fur outside. The poorer qualities are extensively bought and made up in a similar way for Austria- Hungary and Germany. These make excellent linings for coats or footsacks for open driving in very cold climates. The worst coloured skins are dyed black or brown and are used for British military busbies, or caps, stoles, boas, muffs and coachmen's capes. The best skins come from the northern parts of the United States. A smaller and poorer species inhabits South America, and a very few are found in the north of India, but these do not interest the European trade. From Japan a similar animal is obtained in smaller quantities with very good but longer fur, of yellowish motley light-brown shades. It is more often imported and sold as Japanese fox, but its resemblance to the fur of the American raccoon is so marked as to surely identify it. When dyed dark blue or skunk colour it is good-looking and is sold widely in Europe. Raccoon skins are also frequently unhaired, and if the underwool is of good quality the effect is similar to beaver. It is the most useful fur for use in America or Russia, having a full quantity

of fur which will retain heat. Value iod. to 26s.

Sable, American and Canadian. — Size 17X5 in. The skins are sold in the trade sale as martens, but as there are many that are of a very dark colour and the majority are almost as silky as the Russian sable, the retail trade has for generations back applied the term of sable to this fur. The prevailing colour is a medium brown, and many are quite yellow. The dyeing of these very pale skins has been for so long well executed that it has been possible to make very good useful and effective articles of them at a moderate price compared to Russian sable. The finest skins are found in the East Main and the Esquimaux Bay, in the Hudson's Bay Company's districts, and the poorest in Alaska. They are not found very far south of the northern boundary of the United States. The best skins are excellent in quality, colour and effect, and wear well. Value 27s. 3d. to 290s.

Sable, Chinese and Japanese. — Size 14X45 in. These are similar to the Amur skins previously referred to, but of much poorer quality and generally only suitable for linings. The very palest skins are dyed and made by the Chinese into mandarins' coats, in which form they are found in the London trade sales, but being overdressed they are inclined to be loose in the hair and the colour of the dye is not good. The Japanese kind are imported raw, but are few in numbers, very pale and require dyeing. Value 15s. to 150s.

Sable, Russian. — Size 15X5 in. These skins belong to a species of marten, very similar to the European and American, but much more silky in the nature of their fur. They have long been known as " sables," doubtless owing to the density of colour to which many of them attain, and they have always been held in the highest esteem by connoisseurs as possessing a combination of rare qualities. The underwool is close, fine and very soft, the top hair is regular, fine, silky and flowing, varying from l| to 2| in. in depth. In colour they range from a pale stony or yellowish shade to a rich dark brown, almost black with a bluish tone. The pelts are exceedingly fine and close in texture and, although of little weight, are very durable, and articles made of them produce a, sensation of warmth immediately they are put upon the body.

The Yakutsk, Okhotsk and Kamschatka sorts are good, the last being the largest and fullest furred, but of less density of colour than the others. Many from other districts are pale or yellowish brown, and those from Saghalien are poor in quality. The most valuable are the darkest from Yakutsk in Siberia, particularly those that have silvery hairs evenly distributed over the skin. These however are exceedingly

scarce, and when a number are required to match for a large garment, considerable time may be necessary to collect them. This class of skin is the most expensive fur in the world, reckoning values by a square foot unit.

The Amur skins are paler, but often of a pretty bluish stony tone with many frequently interspersed silvery hairs. The quality too is lower, that is, the fur is not so close or deep, but they are very effective, particularly for close-fitting garments, as they possess the least appearance of bulk. The paler skins from all districts in Siberia are now cleverly coloured or " topped," that is, just the tips of the hair are stained dark, and it is only an expert who can detect them from perfectly natural shades. If this colouring process is properly executed it remains fairly fast. Notwithstanding the reported rights of the Russian imperial authorities over some regions with respect to these and other valuable fur-bearing animals, there are in addition to the numbers regularly sent to the trade auction sales in London many good parcels of raw skins to be easily bought direct, provided price is not the first consideration. Value 25s". to 980s.

Seal, Fur. — Sizes range from 24X 15 in. to 55X25 in., the width being taken at the widest part of the skin after preparation. The centre of the skin between the fins is very narrow and the skins taper at each end, particularly at the tail. The very small pups are of a beautiful quality, but too tiny to make into garments, and, as the aim of a good furrier is to avoid all lateral or cross seams, skins are selected that are the length of the garment that is to be made. The most useful skins for coats are the large pups 42 in. long, and the quality is very good and uniform. The largest skins, known in the trade as " wigs," which range up to 8 ft. in length, are uneven and weak in the fur, and hunters do not seek to obtain them. The supply of the best sort is chiefly from the North Pacific, viz. Pribilof

Islands, Alaska, north-west coast of America, Copper Island of the Aleutian group near to Kamschatka, Robben Island and Japan. Other kinds are taken from the South Pacific and South Atlantic Oceans, around Cape Horn, the Falkland Islands up to Lobos Islands at the entrance of the La Plata river, off the Cape of Good Hope and Crozet Isles. With, however, the exception of the pick of the Lobos Island seals the fur of the southern sea seals is very poor and only suitable for the cheapest market. Formerly many skins were obtained from

New Zealand and Australia, but. the importation is now small and the quality not good. The preparation of seal skin occupies a longer time than any other fur skin, but its fine rich effect when finished and its many properties of warmth and durability well repay it. Value 10s. to 232.3.

Seal, Hair. — There are several varieties of these seals in the seas stretching north from Scotland, around Newfoundland, Greenland and the north-west coast of America, and they are far more numerous than fur seals. Generally they have coarse rigid hair and none possess any underwool. They are taken principally for the oil and leather they yield. Some of the better haired sorts are dyed black and brown and used for men's motor coats when quite a waterproof garment is wanted, and they are used also for this quality in China. The young of the Greenland seals are called whitecoats on account of the early growth being of a yellowish white colour; the hair is J to 1 in. long, and at this early stage of their life is soft compared to that of the older seals. These fur skins are dyed black or dark brown and are used for military caps and hearth-rugs. Value 2s. to 15s. There are fewer hair seals in the southern than in the northern seas. Sheep. — Vary much in size and in quality of wool. Many of the domestic kind in central and northern Europe and Canada are used for drivers' and peasants' coat linings, &c. In Great Britain many coats of the home-reared sheep, having wools two and a half to five inches long, are dyed various colours and used as floor rugs. Skins with very short wool are dyed black and used for military saddle- cloths. The bulk, however, is used in the wool trade. The Hun- garian peasants are very fond of their natural brown sheep coats, the leather side of which is not lined, but embellished by a very close fancy embroidery, worked upon the leather itself; these garments are reversible, the fur being worn inside when the weather is cold. Chinese sheep are largely used for cheap rugs. Value of English sheep from 3s. to 10s.

Skunk or Black Marten. — Size 15X8 in. The underwool is full and fairly close with glossy, flowing top hair about 2J in. long. The majority have two stripes of white hair, extending the whole length of the skin, but these are cut out by the manufacturing furrier and sold to the dealers in pieces for exportation. The animals are found widely spread throughout' North and South America. The skins which are of the greatest interest to the European trade are those from North America, the South American species being small, coarse and generally brown. The best skins come from Ohio and New York. If it were not for its disagreeable odour, skunk would be worth much more than the usual market value, as it is naturally the blackest fur,

silky in appearance and most durable. The improved dressing processes have to a large extent removed the naturally pungent scent. The fur is excellent for stoles, boas, collars, cuffs, muffs and trimmings. Value is. 6d. to us.

Souslik. — Size 7 in.X2j. Is a small rodent found in the south of Russia and also in parts of America. It has very short hair and is a poor fur even for the cheapest linings, which is the only use to which the skin could be put. It is known as kaluga when imported in ready-made linings from Russia where the skins are dressed and worked in an inferior way. Value id. to 3d.

Squirrel. — Size 10X5 in. This measurement refers to the Russian and Siberian sorts, which are the only kind imported for the fur. The numerous other species are too poor in their coats to attract notice from fur dealers. The back of the Russian squirrel has an even close fur varying from a clear bluish-grey to a reddish- brown, the bellies in the former being of a flat quality and white, in the latter yellowish. The backs are worked into linings separately, as are the bellies or " locks." The pelts, although very light, are tough and durable, hence their good reputation for linings for ladies' walking or driving coats. The best skins also provide excellent material for coats, capes, stoles, ties, collars, cuffs, gloves, muffs, hoods and light-weight carriage aprons. The tails are dark and verv small, and when required for ends of boas three or four are made as one. Value per skin from 2 id. to is. id.

Tibet Lamb. — Size 27 X 13 in. These pretty animals have a long, very fine, silky and curly fleece of a creamy white. The majority are consigned to the trade auction sales in London ready dressed and worked into cross-shaped coats, and the remainder, a fourth of the total, come as dressed skins. They are excellent for trimmings of evening mantles and for children's ties, muffs and perambulator aprons. The fur is too long and bulky for linings. Value per skin from 4s. 6d. to 8s. 6d.

Tiger.— Size varies considerably, largest about 10 ft. from nose ˆ? L – r00t A. of tai1 ' T 'g crs are found throughout India, Turkestan, China, Mongolia and the East Indies. The coats of the Bengal kind are short and of a dark orange brown with black stripes, those from east or further India are similar in colour, but longer in the hair, while those from north of the Himalayas and the mountains of China are not only huge in size, but have a very long soft hair of delicate

orange brown with very white flanks, and marked generally with the blackest of stripes. The last are of a noble appearance and exceedingly scarce. They all make handsome floor rugs.

Value of the Indian . . from £3 to £15.

,, ,, Chinese . . . ,, £10 to £65. Vicuna is a species of long-necked sheep native to South America, bearing some resemblance to the guanaco, but the fur is shorter, closer and much finer. The colour is a pale golden-brown and the fur is held in great repute in South America for carriage rugs. The supply is evidently small as the prices are high. There is scarcely a commercial quotation in London, few coming in except from private sources. 2s. 6d. to 5s. 6d. may be considered as the average value.

Wallaby. — See Kangaroo, above. Wallaroo. — See Kangaroo, above.

Wolf. — Size 50X25 in. Is closely allied to the dog tribe and, like the jackals, is found through a wide range of the world, — North and South America, Europe and Asia. Good supplies are available from North America and Siberia and a very few from China. The best are the fuil furred ones of a very pale bluish-grey with fine flowing black top hair, which are obtained from the Hudson Bay district. Those from the United States and Asia are harsher in quality and browner.- A few black American specimens come into the market, but usually the quality is poor compared to the lighter furred animal. The Siberian is smaller than the North American and the Russian still smaller. Besides the wolf proper a large number of prairie or dog wolves from America and Asia are used for cheaper rugs. In size they are less than half that of a large wolf and are of a motley sandy colour. Numbers of the Russian are retained for home use. The finest wolves are very light weighted and most suitable for carriage aprons, in fact, ideal for the purpose, though lacking the strength of some other furs.

Wolves . . . value 2s. 6d. to 64s.

Dog wolves ,, is. to 2s. 6d.

Wolverine. — Size 16X18 in. Is native to America, Siberia, Russia and Scandinavia and generally partakes of the nature of a bear. The underwool is full and thick with strong and bright top hair about 2 1 in. long. The colour is of two or three shades of brown in one skin, the centre being an oval dark saddle, edged as it were with quite a

pale tone and merging to a darker one towards the flanks. This peculiar character alone stamps it as a distinguished fur, in addition to which it has the excellent advantage of being the most durable fur for carriage aprons, as well as the richest in colour. It is not prolific, added to which it is very difficult to match a number of skins in quality as well as colour. Hence it is an expensive fur, but its excellent qualities make it valuable. The darkest of the least coarse skins are worth the most. Prices from 6s. to 37s.

Wombat, Koala or Australian Bear. — Size 20X12 in. Has light grey or brown close thick wool half an inch deep without any top hair, with a rather thick spongy pelt. It is quite inexpensive and only suitable for cheap rough coats, carriage rugs, perambulator aprons and linings for footbags. The coats are largely used in western America and Canada. Value 3d. to Is. 8Jd.

Preparing and Dressing. — A furrier or skin merchant must possess a good eye for colour to be successful, the difference in value on this subtle matter solely (in the rarer precious sorts, especially sables, natural black, silver and blue fox, sea otters, chinchillas, fine mink, &c.) being so considerable that not only a practised but an intuitive sense of colour is necessary to accur- ately determine the exact merits of every skin. In addition to this a knowledge is required of what the condition of a pelt should be; a good judge knows by experience whether a skin will turn out soft and strong, after dressing, and whether the hair is in the best condition of strength and beauty. The dressing of the pelt or skin that is to be preserved for fur is totally different to the making of leather; in the latter tannic acid is used, but never should be with a fur skin, as is so often done by natives of districts where a regular fur trade is not carried on. The results of applying tannic acid are to harden the pelt and discolour and weaken the fur. The best methods for dressing fur skins are those of a tawer or currier, the aim being to retain all the natural oil in the pelt, in order to preserve the natural colour of the fur, and to render the pelt as supple as possible. Generally the skins are placed in an alkali bath, then by hand with a blunt wooden instrument the moisture of the pelt is worked out and it is drawn carefully to and fro over a straight, dull-edged knife to remove any superfluous flesh and unevenness. Special grease is then rubbed in and the skin placed in a machine which softly and continuously beats in the softening mixture, after which it is put into a slowly revolving drum, fitted with wooden paddles, partly filled with various kinds of fine hard sawdust according to the nature of the furs dealt with. This process with a moderate degree of heat thoroughly cleans it of external greasy matter,

and all that is necessary before manufacturing is to gently tap the fur upon a leather cushion stuffed with horsehair with smooth canes of a flexibility suited to the strength of the fur. After dressing most skins alter in shape and decrease in size.

With regard to the merits of European dressing, it may be fairly taken that English, German and French dressers have specialities of excellence. In England, for instance, the dressing of sables, martens, foxes, otters, seals, bears, lions, tigers and leopards is first rate; while with skunk, mink, musquash, chinchillas, beavers, lambs and squirrels, the Germans show better results, particularly in the last. The pelt after the German dressing is dry, soft and white, which is due to a finishing process where meal is used, thus they compare favourably with the moister and consequently heavier English finish. In France they do well with cheaper skins, such as musquash, rabbit and hare, which they dye in addition to dressing. Russian dressing is seldom reliable; not only is there an unpleasant odour, but in damp weather the pelts often become clammy, which is due to the saline matter in the dressing mixture. Chinese dressing is white and supple, but contains much powder, which is disagree- able and difficult to get rid of, and in many instances the skin is rendered so thin that the roots of the fur are weakened, which means that it is liable to shed itself freely, when subject to ordinary friction in handling or wearing. American and Canadian dressing is gradually improving, but hitherto their results have been inferior to the older European methods.

In the case of seal and beaver skins the process is a much more difficult one, as the water or hard top hairs have to be removed by hand after the pelt has been carefully rendered moist and warm. With seal skins the process is longer than with any other fur preparation and the series of processes engage many specialists, each man being constantly kept upon one section of the work. The skins arrive simply salted. After being purchased at the auction sales they are washed, then stretched upon a hoop, when all blubber and unnecessary flesh is removed, and the pelt is reduced to an equal thickness, but not so thin as it is finally rendered. Subsequently the hard top hairs are taken out as in the case of otters and beavers and the whole thoroughly cleaned in the revolving drums. The close

underwool, which is of a slightly wavy nature and mostly of a pale drab colour, is then dyed by repeated applications of a rich dark brown colour, one coat after another, each being allowed to thoroughly dry before the next is put on, till the effect is almost a lustrous black on the top. The whole is again put through the cleaning process and evenly reduced in thickness by revolving emery wheels, and eventually finished off in the palest buff colour.

The English dye for seals is to-day undoubtedly the best; its constituents are more or less of a trade secret, but the principal ingredients comprise gall nuts, copper dust, camphor and antimony, and it would appear after years of careful watching that the atmosphere and particularly the water of London are partly responsible for good and lasting results. The Paris dyers do excellent work in this direction, but the colour is not so durable, probably owing to a less pure water. In America of late, strides have been made in seal dyeing, but preference is still given to London work. In Paris, too, they obtain beautiful results in the " topping " or colouring Russian sables and the Germans are particularly successful in dyeing Persian lambs black and foxes in all blue, grey, black and smoke colours and in the insertion of white hairs in imitation of the real silver fox. Small quantities of good beaver are dyed in Russia occasionally, and white hairs put in so well that an effect similar to sea otter is obtained.

The process of inserting white hairs is called in the trade " pointing," and is either done by stitching them in with a needle or by adhesive caoutchouc.

The Viennese are successful in dyeing marmot well, and their cleverness in colouring it with a series of stripes to represent the natural markings of sable which has been done after the garments have been made, so as to obtain symmetry of lines, has secured for them a large trade among the dealers of cheap furs in England and the continent.

Manufacturing Methods and Specialities. — In the olden times

the Skinners' Company of the city of London was an association of furriers and skin dressers established under royal charter granted by Edward III. At that period the chief concern of the body was to prevent buyers from being imposed upon by sellers who were much given to offering old furs as new; a century later the Skinners' Company received other charters empowering them to inspect not only warehouses and open markets, but workrooms. In 1667 they

were given power to scrutinize the preparing of rabbit or cony wool for the wool trade and the registration of the then customary seven years' apprenticeship. To-day all these privileges and powers are in abeyance, and the interest that they took in the fur trade has been gradually transferred to the leather-dressing craft.

The work done by English furriers was generally good, but since about 1865 has considerably improved on account of the influx of German workmen, who have long been celebrated for excellent fur work, being in their own country obliged to satisfy officially appointed experts and to obtain a certificate of capacity before they can be there employed. The French influence upon the trade has been, and still is, primarily one of style and combination of colour, bad judgment in which will mar the beauty of the most valuable furs. It is a recognized law among high-class furriers that furs should be simply arranged, that is, that an article should consist of one fur or of two furs of a suitable contrast, to which lace may be in some cases added with advantage. As illustrative of this, it may be explained that any brown tone of fur such as sable, marten, mink, black marten, beaver, nutria, &c, will go well upon black or very dark-brown furs, while those of a white or grey nature, such as ermine, white lamb, chinchilla, blue fox, silver fox, opossum, grey squirrel, grey lamb, will set well upon seal or black furs, as Persian lamb, broadtail, astrachan, caracul lamb, &c. White is also permissible upon some light browns and greys, but brown motley colours and greys should never be in contrast. One neutralizes the other and the effect is bad. The qualities, too have to be considered— the fulness of one, the flatness of the other, or the coarseness or fineness of the furs. The introduction of a third fur in the same garment or indiscriminate selection of colours of silk linings, braids, buttons, &c, often spoils an otherwise good article.

With regard to the natural colours of furs, the browns that command the highest prices are those that are of a bluish rather than a reddish tendency. With greys it is those that are bluish, not yellow, and with white those that are purest, and with black the most dense, that are most esteemed and that are the rarest. Perhaps for ingenuity and the latest methods of manipulating skins in the manufacturing of furs the Americans lead the way, but as fur cutters are more or less of a roving and cosmopolitan character the larger fur businesses in London, Berlin, Vienna, St Petersburg, Paris and New York are guided by the same thorough and comparatively advanced principles.

During the period just mentioned the tailors' methods of scientific pattern cutting have been adopted by the leading furriers in place of

the old chance methods of fur cutters, so that to-day a fur garment may be as accurately and gracefully fitted as plush or velvet, and with all good houses a material pattern is fitted and approved before the skins are cut.

Through the advent of German and American fur sewing- machines since about 1890 fur work has been done bstter and cheaper. There are, however, certain parts of a garment, such as the putting in of sleeves and placing on of collars, &c, that can only be sewn by hand. For straight seams the machines are excellent, making as neat a seam as is found in glove work, unless, of course, the pelts are especially heavy, such as bears and sheep rugs.

A very great feature of German and Russian work is the fur linings called rotondes, sacques or plates, which are made for their home use and exportation chiefly to Great Britain, America and France.

In Weissenfels, near Leipzig, the dressing of Russian grey squirrel and the making it into linings is a gigantic industry, and is the principal support of the place. After the dressing process the backs of the squirrels are made up separately from the under

and thinner white and grey parts, the first being known as squirrel-back and the other as squirrel-lock linings. A few linings are made from entire skins and others are made from the quite white pieces, which in some instances are spotted with the black ear tips of the animals to resemble ermine. The smaller and uneven pieces of heads and legs are made up into linings, so there is absolutely no waste. Similar work is done in Russia on almost as extensive a scale, but neither the dressing nor the work is so good as the German.

The majority of heads, gills or throats, sides or ffanks, paws and pieces of skins cut up in the fur workshops of Great Britain, America and France, weighing many tons, are chiefly exported to Leipzig, and made up in neighbouring countries and Greece, where labour can be obtained at an alarmingly low rate. Al- though the sewing, which is necessarily done by hand, the sections being of so unequal and tortuous a character, is rather roughly executed, the matching of colours and qualities is excellent. The enormous quantities of pieces admit of good selection and where odd colours prevail in a lining it is dyed. Many squirrel- lock linings are dyed blue and brown and used

for the outside of cheap garments. They are of little weight, warm and effective, but not of great durability.

The principal linings are as follows: Sable sides, sable heads and paws, sable gills, mink sides, heads and gills, marten sides, heads and gills, Persian lamb pieces and paws, caracul lamb pieces or paws, musquash sides and heads, nutria sides, genet pieces, raccoon sides or flanks, fox sides, kolinski whole skins, and small rodents as kaluga and hamster. The white stripes cut out of skunks are made into rugs.

Another great source of inexpensive furs is China, and for many years past enormous quantities of dressed furs, many of which are made up in the form of linings and Chinese loose- shaped garments, have been imported by England, Germany and France for the lower class of business; the garments are only regarded as so much fur and are reworked. With, however, the exception of the best white Tibet lambs, the majority of Chinese furs can only be regarded as inferior material. While the work is often cleverly done as to matching and manipulation of the pelt which is very soft, there are great objections in the odour and the brittleness or weakness of the fur. One of the most remarkable results of the European intervention in the Boxer rising in China (1900) was the absurd price paid for so-called " loot " of furs, particularly in mandarins' coats of dyed and natural fox skins and pieces, and natural ermine, poor in quality and yellowish in colour; from three to ten times their value was paid for them when at the same time huge parcels of similar quality were warehoused in the London docks, because pure' asers could not be found for them.

With regard to Japanese furs, there is little to commend them. The best are a species of raccoon usually sold as fox, and, being of close long quality of fur, they are serviceable for boas, collars, muffs and carriage aprons. The sables, martens, minks and otters are poor in quality, and all of a very yellow colour and they are generally dyed for the cheap trade. A small number of very pretty guanaco and vicuna carriage rugs are imported into Europe, and many come through travellers and private sources, but generally they are so badly dressed that they are quite brittle upon the leather side. Similar remarks are ap- plicable to opossum rugs made in Australia. From South Africa a quantity of jackal, hyena, fox, leopard and sheep karosses, i.e. a peculiarly shaped rug or covering used by native chiefs, is privately brought over. The skins are invariably tanned and beautifully sewn, the furs are generally flat in quality and not very strong in the hair, and are retained' more as curiosities than for use as a warm covering.

*Hatters' Furs and Cloths and Shawls. — The hat trade is largely interested in the fur piece trade, the best felt hats being made from beaver and musquash wool and the cheaper sorts from nutria, hare and rabbit wools. For weaving, the most valuable pieces are mohair taken from the angora and vicuna. They are limited in quantity and costly, and the trade depends upon various sorts of other sheep and goat wools for the bulk of its productions**

Frauds and Imitations. — The opportunities for cheating in the fur trade are very considerable, and most serious frauds have been perpetrated in the selling of sables that have been coloured or " topped "; that is, just the tips of the hairs stained dark to represent more expensive skins. It is only by years of experience that some of these colourings can be detected. Where the skins are heavily dyed it is comparatively easy to see the difference between a natural and a dyed colour, as the underwool and top hair become almost alike and the leather is also dark, whereas in natural skins the base of the underwool is much paler than the top, or of a different colour, and the leather is white unless finished in a pale reddish tone as is sometimes the case when mahogany sawdust is used in the final cleaning. As has been explained, sable is a term applied for centuries past to the darker sorts of the Russian Siberian martens, and for years past the same term has been bestowed by the retail trade upon the American and Canadian martens. The baum and stone martens caught in France, the north of Turkey and Norway are of the same family, but coarser in underwool and the top hair is less in quantity and not so silky. The kolinski, or as it is sometimes styled Tatar sable, is the animal, the tail of which supplies hair for artists' brushes; This is also of the marten species and has been frequently offered, when dyed dark, as have baum and stone martens, as Russian sables. Hares, too, are dyed a sable colour and advertised as sable. The fur, apart from a clumsy appearance, is so brittle, however, as to be of scarcely any service whatever.

Among the principal imitations of other furs is musquash, out of which the top hair has been pulled and the undergrowth of wool clipped and dyed exactly the same colour as is used for seal, which is then offered as seal or red river seal. Its durability, however, is far less than that of seal. Rabbit is prepared and dyed and frequently offered as " electric sealskin." Nutria also is prepared to represent sealskin, and in its natural colour, after the long hairs are plucked out, it is sold as otter or beaver. The wool is, however, poor compared to the otter and beaver, and the pelt thin and in no way comparable to them in strength. White hares are frequently sold as white fox, but the fur is weak, brittle and exceedingly poor compared

to fox and possesses no thick underwool. Foxes, too, and badger are dyed a brownish black, and white hairs inserted to imitate silver fox, but the white hairs are too coarse and the colour too dense to mislead any one who knows the real article. But if sold upon its own merits, pointed fox is a durable fur.

Garments made of sealskin pieces and Persian lamb pieces are frequently sold as if they were made of solid skins, the term " pieces " being simply suppressed. The London Chamber of Commerce have issued to the British trade a notice that any misleading term in advertising and all attempts at deception are illegal, and offenders are liable under the Merchandise Marks Act 1887.

The most usual misnaming of manufactured furs is as follow: — Musquash, pulled and dyed . Sold as seal. Nutria, pulled and dyed . . Sold as seal. Nutria, pulled and natural . Sold as beaver. Rabbit, sheared and dyed . Sold as seal or electric seal. Otter, pulled and dyed. . . Sold as seal.

Marmot, dyed Sold as mink or sable.

Fitch, dyed Sold as sable.

Rabbit, dyed Sold as sable or French sable.

Hare, dyed Sold as sable, or fox, or lynx.

Musquash, dyed .... Sold as mink or sable.

Wallaby, dyed Sold as skunk.

White Rabbit Sold as ermine.

White Rabbit, dyed . . . Sold as chinchilla. White Hare, dyed or natural . Sold as fox foxaline, and*

other similar names.

Goat, dyed Sold as bear, leopard, &c.

Dyed manufactured articles of all kinds. ..... Sold as " natural."

White hairs inserted in foxes

and sables Sold as real or natural furs.

Kids _ Sold as lamb or broadtails.

American sable Sold as real Russian sable.

Mink Sold as sable.

T'n: Preservation of Furs. — For many years raw sealskins

have been preserved in cold storage, but it is only within a recent period, owing to the difficulty there was in obtaining the necessary perfectly dry atmosphere, that dressed and made- up furs have been preserved by freezing. Furs kept in such a con- dition are not only immune from the ravages of the larvae of moth, but all the natural oils in the pelt and fur are conserved, so that its colour and life are prolonged, and the natural deteriora- tion is arrested. Sunlight has a tendency to bleach furs and to encourage the development of moth eggs, therefore continued exposure is to be avoided. When furs are wetted by rain they should be well shaken and allowed to dry in a current of air without exposure to sun or open fire.

Where a freezing store for furs is not accessible, furs should be well shaken and afterwards packed in linen and kept in a per- fectly cool dry place, and examined in the summer at periods of not less than five weeks. Naphthalene and the usual malodorous powders are not only very disagreeable, but quite useless. Any chemical that is strong enough to destroy the life in a moth egg would also be sufficiently potent to injure the fur itself. In England moth life is practically continuous all the year round, that is, as regards those moths that attack furs, though the destructive element exists to a far greater extent during spring and summer.

Comparative Durability of Various Furs and Weight of Unlined

Skins per Square Foot. The following estimates of durability refer to the use of fur when made up " hair outside " in garments or stoles, not as a lining. The durability of fur used as linings, which is affected by other conditions, is set forth separately. Otter, with its water hairs removed, the strongest of furs for external use, is, in this table, taken as the standard at ioo and other furs marked accordingly : — The Precious Furs.

Sable

Seal

Fox, Silver or Black

„ White

Ermine

Chinchilla

Sea-otter (for stoles or collars)

Points of Durability.

60

75 40 20 25 15 100

] Weight in oz. per sq. ft.

2i

3

3

3

ii

ii

4i

The Less Valuable Furs.

Sable " topped," i.e. top hairs coloured ,, tinted, i.e. fur all coloured.

Baum Marten, natural

,, ,, tinted

Stone Marten

Nutria

Musquash, natural

,, water hairs removed, sheared

and seal finished .

Skunk

Mink

Lynx, natural

,, tinted black

Marmot, tinted

Fox, tinted black

,, ,, blue

Opossum

Otter (with water hairs) ....

,, (water hairs removed) Beaver (water hairs cut level with fur)

,, (water hairs removed) .

Moleskin

Persian Lamb

Grey ,,

Broadtail

Caracul Kid

,, Lamb

Squirrel

Hare

Rabbit

Points of Durability.

55 50 65 45 40

27 37

33 70 70

25 20 10

25 20

37 100

95 90

85

• 7

65 30 15 10

15

25

5

5

Weight

in oz. per

sq. ft.

2i

*2**

2i 3i

31

3|

2f

3i

2f 2}

3 3 3 3

4

1 6

4

•3 j- 5

01 6

if 3i 3i

2!

3i

31

if

1!

2i

Quantities of Fur needed, in Square Feet.

The " Paris Model " figure is the basis of these estimates for ladies' garments, the standard measurements being height 5 ft. 6 in., waist 23 in., bust 38 in.

Sq. Ft. (approximate). Straight stole \ length (just below the waist line) . 2! Straight stole f length (just below the knee) . . 3! Stole, broad enough at the neck to cover the top of

arm J length 5

The same, full length (to hem of skirt) 6

Eton jacket, without collar 13

Plain cape, 15 in. long 6 J

Deep cape, 30 in. long 15

Full cape with broad stole front, | length . . .15

Inverness cape (to knee) 25

Double-breasted, straight, semi-fitting coat, covering

hips 16

Double-breasted sacque jacket, 36 in. long, full sleeves 20

Same, 30 in. long 18

Same, 22 in. long 15

Long, full, shawl cape with points at back and front,

well below knee 15

Shorter shawl cape 16

Motoring or driving coat, f length 22

Motoring or driving coat, full length 27

Weight and Durability of Furs for Men's Coat Linings.

Otter with the water hairs removed, the strongest fur suited for linings, is here taken as the standard.

Otter (the water hairs removed) Beaver ,, ,,

Mink

Sealskin

Raccoon

Persian lamb or astrachan .

Sable . .

Musquash

Nutria .

Grey Opossum

Wallaby

Squirrel

Hamster

Rabbit

Points of Durability.

90 90

75 75 70

65 55 40 40 30 30 15 10

_ Weight in oz. per sq. ft.

-its

OIB -> 1 5

ore

31

3

4i 3i

2i

3i

31 3

3f if

ii

2i

Durability and Weight of Linings for Ladies' Coats or Wraps.

Sable gills, the strongest fur suited for ladies' linings, is taken as the standard.

Points of Durability.

Sable gills Sable . . . Sable paws . Ermine Squirrel back Squirrel heads Squirrel lock . Hamster . Rabbit . .

100

85 64

57 50

36 21

Weight

in oz. per

sq. ft.

2i

If II If

2i lT 3 6 Ii 2i

Durability and Weight of Motoring Furs made up with Fur outside. Otter with the water hairs, the strongest fur suited for motoring garments, is taken as the standard.

1 Stout, old-fashioned boxcloth is almost the only cloth that (after a soft, heavy lining has been added to it) affords even two-

Points of Durability.

Weight

in oz. per

sq. ft.

Otter (with water hairs) ....

" Hair Sealskin " (tinted) with water hairs (a special variety of seal) .

Russian Pony

100 80

75 65 35

4 3

3i

4l

2f

thirds as much protection against cold as does fur. It weighs 4ˆ73 oz. per sq. ft. more than the heaviest of coat-furs, and is so rigid as to be uncomfortable, while the subtileness of fur makes it ” kind ” to the body.

FURAZANES— FURFURANE

357

Durability and Weight of Furs for Rugs and Foot-sacks.

Wolverine

Bear (black or brown natural) Bear (tinted black) .

Beaver

Raccoon

Opossum

Wolf

jackal

Australian Bear …. Goat

Points of Durability.

94 88 88

77

6i

50 27 16

ii

Weight

in oz. per

sq. ft.

o

7

71

4

41

3

61

4i

*6 4**

Wolverine, the strongest fur suited for rugs and foot-sacks, is taken as the standard.

For a rug about 20 to 25 sq. ft. of fur are needed, for a foot-sack 14L (W. S. P.)

FURAZANES (furo — a.a' — diazoles), organic compounds obtained by heating the glyoximes (dioximes of ortho-diketones) with alkalis or ammonia. Dimethylfurazane is prepared by heating dimethylglyoxime with excess of ammonia for six hours at 165° C. (L. Wolff, Ber., 1895, 28, p. 70). It is a liquid (at ordinary temperature) which boils at 156 C. (744 mm.). Potassium permanganate oxidizes it first to methylfurazane- carboxylic acid and then to furazanedicarboxylic acid. Methyl- ethylfurazane and diphenylfurazane are also known. By warming oxyfurazane acetic acid with excess of potassium per- manganate to 100° C. oxyfurazanecarboxylic acid is obtained (A. Hantzsch and J. Urbahn, Ber., 1895, 28, p. 764). It crys- tallizes in prisms, which melt at 175 C. Furazanecarboxylic acid is prepared by the action of a large excess of potassium permanganate on a hot solution of furazanepropionic acid. It melts at 107 C, and dissolves in caustic soda, with a deep yellow colour and formation of nitrosocyanacetic acid (L. Wolff and P. F. Ganz, Ber., 1891, 24, p. 1167). Furoxane is an oxide of furazane, considered by H. Wieland to be identical with glyoxime peroxide; Kekule's dibromnitroacetonitrile is dibrom- furoxane.

The formulae of the compounds above mentioned are:

HC:N

>0

HC:N Furazane.

*CH,C:N^*

CH 3 C:INK Dimethyl furazane.

HO. N-

N-O-N "^ Furoxane.

HOsC-ONˆ

Furazane- carboxylic acid.

FURETIERE, ANTOINE (1619-1688), French scholar and miscellaneous writer, was born in Paris on the 28th of December 1619. He first studied law, and practised for a time as an advocate, but eventually took orders and after various prefer- ments became abbe of Chalivoy in the diocese of Bourges in 1662. In his leisure moments he devoted himself to letters, and in virtue of his satires — Nouvelle Allegorique, ou histoire des derniers troubles arrives au royaume d 'eloquence (1658); Voyage de Mercure (1653) — he was admitted a member of the French Academy in 1662. That learned body had long promised a complete dictionary of the French tongue; and when they heard that Furetiere was on the point of issuing a work of a similar nature, they interfered, alleging that he had purloined from their stores, and that they possessed the exclusive privilege of publishing such a book. After much bitter recrimination on both sides the offender was expelled in 1685; but for this act of injustice he took a severe revenge in his satire, Couches de l' academic (Amsterdam, 1687). His Diclionnaire universel was posthumously published in 1690 (Rotterdam, 2 vols.). It was afterwards revised and improved by the Protestant jurist, Henri Basnage de Beauval (1656-1710), who published his edition (3 vols.) in 1701; and it was only superseded by the compilation known as the Diclionnaire de Trivoax (Paris, 3 vols., 1704; 7th ed., 8 vols., 1771), which was in fact little more than a reimpression of Basnage's edition. Furetiere is perhaps even better known as the author of Le Roman bourgeois (1666). It cast ridicule on the fashionable romances of Mile de Scud6ry and of La Calprenede, and is of interest as descriptive of the

everyday life of his times. There is no element of burlesque, as in Scarron's Roman comique, but the author contents himself with stringing together a number of episodes .and portraits, obviously drawn from life, without much attempt at sequence. The book was edited in 1854 by Edward Fournier and Charles Asselineau and by P. Jannet.

The Fureteriana, which appeared in Paris eight years after Furetiere's death, which took place on the 14th of May 1688, is a collection of but little value.

FURFOOZ, a village some 10 m. from Dinant in the Ardennes, Belgium. Three caves containing prehistoric remains were here excavated in 1872. Of these the Trow de Frontal is the most famous. In it were found human skeletons with brachycephalic skulls, associated with animal bones, those of the reindeer being particularly plentiful. Among the skeletons was discovered an oval vase of pottery. The Furfooz type of mankind is believed to date from the close of the Quaternary age. G. de Mortillet dates the type in the Robenhausen epoch of the Neolithic period. His theory is that the bones are those of men of that period buried in what had been a cave-dwelling of the Madelenian epoch.

FURFURANE, or Furane, C4H4O, a colourless liquid boiling at 3 2 C, found in the distillation products of pine wood. It was first synthetically prepared by H. Limpricht {Ann., 1873, 165, p. 281) by distilling barium mucate. with soda lime, pyro- mucic acid C 4 H 3 0-C02H being formed, which, on further loss of carbon dioxide, yielded furfurane. A. Henniger (Ann. chim. phys., 1886 [2], 7, p. 220), by distilling erthyrite with formic acid, obtained a dihydrofurfurane

■*C4He(OH)4 + 2H 2 C02 = C4H 6 0 + CO + C02 + 4H s O, which, on treatment with phosphorus pentachloride, yielded furfurane. Furfurane is insoluble in water and possesses a characteristic smell. It does not react with sodium or with phenylhydrazine, but yields dye-stuffs with isatin and phenan- threnequinone. It reacts violently with hydrochloric acid, producing a brown amorphous substance. Methyl and phenyl derivatives have been prepared by C. Paal (Ber., 1884, 17, p. 915). Paal prepared acetonyl acetophenone by condensing sodium acetoacetate with phenacylbromide, and this substance on dehydration yields aa'-phenylmethylfurfurane, the acetonyl acetophenone probably reacting in the tautomeric " enolic " form, CH 3 -CO-CHNa-COOR + C 6 H 6 -CO-CH 2 Br =*

CH s -C0-CH(CH 2 C0C 6 H 6)-C00R. This ester readily hydrolyses, and the acid formed yields acetonyl acetophenone (by loss of carbon dioxide), which then on de- hydration yields the furfurane derivative, thus

CH 3 -CC-C 6 H s = H 2 0 + CH 3 -C < 5^! "ff [> C.C6H J .

L. Knorr (Ber., 1889, 22, p. 158) obtained diacetosuccinic ester by condensing sodium acetoacetate with iodine, and by de- hydrating the ester he prepared aa'dimethylfurfurane /3/3' dicarboxylic acid (carbopyrotritaric acid), which on distillation yields aa'-dimethylfurfurane as a liquid boiling at 94° C. Paal also obtained this compound by using monochloracetone in the place of phenacylbromide. By the distillation of mucic acid or isosaccharic acid, furfurane-a-carboxylic acid (pyromucic acid), C 4 H 3 0-C0 2 H, is obtained; it crystallizes in needles or leaflets', and melts at 134 C.

Furfur ol (furol), C 4 H 3 0-CH0, is the aldehyde of pyromucic acid, and is formed on distilling bran, sugar, wood and most carbohydrates with dilute sulphuric acid, or by distilling the pentoses with hydrochloric acid. It is a colourless liquid which boils at 162 C, and is moderately soluble in water; it turns brown on exposure to air and has a characteristic aromatic smell. It shows all the usual properties of an aldehyde, forming a bisulphite compound, an oxime and a hydrazone; whilst it can be reduced to the corresponding furfuryl alcohol by means of sodium amalgam, and oxidized to pyromucic acid by means of silver oxide. It also shows all the condensation re- actions of benzaldehyde (q.v.); condensing with aldehydes and ketones in the presence of caustic soda to form more complex aldehydes and ketones with unsaturated side chains,

such as furfuracrolein, C4H 3 OCH:CH-CHO, and furfuracetone, C4H 3 OCH:CH-COCH :! . With alcoholic potassium cyanide it changes to furoin, C 4 H 3 0-CHOH-CO-C4H 3 0, which can be oxidized to furil, C 4 H 3 0-CO-CO-C4H 3 0, whilst alcoholic potash converts it into furfuryl alcohol. With fatty acids and acid anhydrides it gives the " Perkin " reaction (see Cinnamic Acid). Furfurol is shown to have its aldehydic group in the a position, by conversion into furfurpropionic acid, C 4 H 3 0-CH2-CH 2 -C0 2 H, which on oxidation by bromine water and subsequent reduction of the oxidized product is converted into w-pimelic acid, H0 2 C(CH 2) 5 C0 2 H. Furfurol in minute quantities can be detected by the red colour it forms with a solution of aniline acetate.

Furfurane-aa'dicarboxylic acid or dehydromucic acid, C|H 2 0(C0 2 H)2, is formed when mucic acid is heated with hydro chloric acid at ioo° C. On being heated, it loses carbon dioxide and gives pyromucic

acid. By digesting acetoacetic ester with sodium succinate and acetic anhydride, methronic acid, C 8 H 8 05, is obtained ; for the constitution of this acid, see L. Knorr, Ber., 1889, 22, p. 152, and R. Fittig, Ann., 1889, 250, p. 166.

Di- and tetrahydrofurfurane compounds are also known (see A. Lipp, Ber., 1889, 22, p. 1196; W. H. Perkin, junr. Journ. Chem. Soc, 1890, 57, p. 944; and S. Ruhemann, ibid., 1896, 69, p. 1383).

FURIES (Lat. Furiae, also called Dirae), in Roman mythology an adaptation of the Greek Erinyes (q.v.), with whom they are generally identical. A special aspect of them in Virgil is that of agents employed by the higher gods to stir up mischief, strife and hatred upon earth. Mention may here be made of an old Italian deity Furina (or Furrina), whose worship fell early into disuse, and who was almost forgotten in the time of Varro. By the mythologists of Cicero's time the name was connected with the verb furere and the noun furia, which in the plural (not being used in the singular in this sense) was accepted as the equivalent of the Greek Erinyes. But it is more probably related to furvus, fuscus, and signifies one of the spirits of dark- ness, who watched over men's lives and haunted their abodes. This goddess had her own special priest, a grove across the Tiber where Gaius Gracchus was slain, and a festival on the 25th of July. Authorities differ as to the existence of more than one goddess called Furina, and their identity with the Forinae mentioned in two inscriptions found at Rome {C.I.L. vi. 422 and 10,200).

FURLONG (from the O. Eng. Jurlang, i.e. " furrow-long "), a measure of length, originally the length of a furrow in the " common field " system. As the field in this system was generally taken to be a square, 10 acres in extent, and as the acre varied in different districts and at different times, the " furlong " also varied. The side of a square containing 10 statute acres is 220 yds. or 40 poles, which was the usually accepted length of the furlong. This is also the length of Jth of the statute mile. " Furlong " was as early as the 9th century used to translate the Latin stadium, 5th of the Roman mile.

FURNACE, a contrivance for the production and utilization of heat by the combustion of fuel. The word is common to all the Romance tongues, appearing in more or less modified forms of the Latin fornax. But in all those languages the word has a more extended meaning than in English, as it covers every variety of heating apparatus; while here, in addition to furnaces proper, we distinguish other varieties as ovens, stoves and kilns. The first of these, in the form Ofen, is used in German as a general term like the French four;

but in English it has been restricted to those apparatus in which only a moderate temperature, usually below a red heat, is produced in a close chamber. Our bakers' ovens, hot-air ovens or stoves, annealing ovens for glass or metal, &c, would all be called fours in French and Ofen in German, in common with furnaces of all kinds. Stove, an equivalent of oven, is from the German Stube, i.e. a heated room, and is commonly so understood; but is also applied to open fire-places, which appears to be somewhat of a departure from the original signification.

Furnaces are constructed according to many different patterns with varying degrees of complexity in arrangement; but all may be considered as combining three essential parts, namely,

the fire-place in which the fuel is consumed, the heated chamber, laboratory, hearth or working bed, as it is variously called, where the heat is applied to the special work for which the furnace is designed, and the apparatus for producing rapid combustion by the supply of air under pressure to the fire. In the simplest cases the functions of two or more of these parts may be combined into one, as in the smith's forge, where the fire-place and heating chamber are united, the iron being placed among the coals, only the air for burning being supplied under pressure from a blowing engine by a second special contrivance, the tuyere, tuiron, twyer or blast-pipe; but in the more refined modern furnaces, where great economy of fuel is an object, the different functions are distributed over separate and distinct apparatus, the fuel being converted into gas in one, dried in another, and heated in a third, before arriving at the point of combustion in the working chamber of the furnace proper.

Furnaces may be classified according as the products of com- bustion are employed (1) only for heating purposes, or (2) both for heating and bringing about some chemical change. The furnaces employed for steam-raising or for heating buildings are invariably of the first type (see Boiler and Heating), while those employed in metallurgy are generally of the second. The essential difference in construction is that in the first class the substances heated do not come into contact with either the fuel or the furnace gases, whereas in the second they do. Metallurgical furnaces of the first class are termed crucible, muffle or retort furnaces, and of the second shaft and reverberatory furnaces. The following is a detailed subdivision : —

(1) Fuel and substance in contact.

(a) Height of furnace greater than diameter = shaft furnaces.

(a) No blast = kilns.

(/3) With blast = blast furnaces. (6) Height not much greater than diameter = hearth furnaces.

(2) Substance heated by products of combustion = reverberatory

furnaces.

(a) Charge not melted = roasting or calcining furnaces.

(b) Charge melted = melting furnaces.

(3) Substance is not directly heated by the fuel or by the products

of combustion. (a) Heating chamber fixed and forming part of furnace =

muffle furnaces. (6) Crucible furnaces.

(c) Retort furnaces.

Another classification may be based upon the nature of the heating agent, according as it is coal (or some similar combustible) oil, gas or electricity. In this article the general principles of metallurgical furnaces will be treated; the subject of gas- and oil-heated furnaces is treated in the article Fuel, and of the electric furnace in the article Electrometallurgy. For special furnaces reference should be made to the articles on the industry concerned, e.g. Glass, Gas, § Manufacture, &c.

Shaft, Blast and Hearth Furnaces. — The blast furnace in its simplest form is among the oldest, if not the oldest, of metal- lurgical contrivances. In the old copper-smelting district of Arabia Petraea, clay blast-pipes dating back to the earlier dynasties of ancient. Egypt have been found buried in slag heaps; and in India the native smiths and iron-workers continue to use furnaces of similar types. These, when reduced to their most simple expression, are mere basin-shaped hollows in the ground, containing ignited charcoal and the substances to be heated, the fire being urged by a blast of air blown in through one or more nozzles from a bellows at or near the top. They are essentially the same as the smith's forge. This class of furnace is usually known as an open fire or hearth, and is represented in a more advanced stage of development by the Catalan, German and Walloon forges formerly used in the production of malleable iron.

Fig. 1 represents a Catalan forge. The cavity in the ground is represented by a pit of square or rectangular section lined with brick or stone of a kind not readily acted on by heat, about i§ or 2 ft. deep, usually somewhat larger above than below, with a tuyere or blast-pipe of copper penetrating one of the walls near the top, with a considerable downward inclination, so that the air meets the fuel some way down. In iron-smelting the ore is laid in a heap upon the fuel (charcoal) filling up the hearth, and is gradually brought to the metallic state by the reducing action of the carbon monoxide formed at the tuyere. The metal sinks through the ignited fuel, forming, in the hearth, a spongy mass or ball, which is lifted out by the smelters at the end of each operation, and carried to the forge hammer. The earthy matters form a fusible glass or slag melt, and

Fig. I. — Elevation of Catalan Forge.

collect at the lowest point of the tiearcn, wnence they are removed by opening a hole pierced through the front wall at the bottom. The active portion of such a furnace is essentially that above the blast-pipe, the function of the lower part being merely the collection of the reduced metal ; the fire may therefore be regarded as burning in an unconfined space, with the waste of a large amount of its heating power. By continuing the walls of the hearth above the

tuyere, into a shaft or stack either of the same or some other section, we obtain a furnace of increased capacity, but with no greater power of consuming fuel, in which the material to be treated can be heated up gradually by loading it into the stack, alternately with layers of fuel, the charge descend- ing regularly to the point of com- bustion, and absorbing a pro- portion of the heat of the flame that went to waste in the open fire. This principle is capable of very wide extension, the blast furnace being mainly limited in height by the strength the column of materials or " burden " has to resist crushing, under the weight due to the head adopted, and the power of the blowing engine to supply blast of sufficient density to overcome the resistance of the closely packed materials to the free passage of the spent gases. The consuming power of the furnace or the rate at which it can burn the fuel supplied is measured by the number of tuyeres and their section.

The development of blast furnaces is practically the develop- ment of

iron-smelting. The profile has been very much varied at different times. The earliest examples were square or rect- angular in horizontal section, but the general tendency of modern practice is to substitute round sections, their construction being facilitated by the use of specially moulded bricks which have entirely superseded the sandstone blocks formerly used. The vertical section, on the other hand, is subject to considerable variation according to the work to which the furnace is applied. Where the operation is simply one of fusion, as in the iron- founder's cupola, in which there is no very great change in volume in the materials on their descent to the tuyeres, the stack is nearly or quite straight-sided; but when, as is the case with the smelting of iron ores with limestone flux, a large proportion of volatile matter has to be removed in the process, a wall of varying inclination is used, so that the body of the furnace is formed of two dissimilar truncated cones, joined by their bases, the lower one passing downwards into a short, nearly cylindrical, position. For further consideration of this subject see Iron and Steel.

Hearth furnaces are employed in certain metallurgical opera- tions, e.g. in the air-reduction process for smelting lead ores. The principle is essentially that of the Catalan forge. Such furnaces are very wasteful, and have little to recommend them (see Schnabel, Metallurgy, 1905, vol. i. p. 409).

Reverberatory Furnaces. — Blast furnaces are, from the intimate contact between the burden to be smelted and the fuel, the least wasteful of heat; but their use supposes the possibility of obtain- ing fuel of good quality and free from sulphur or other substances likely to deteriorate the metal produced. In all cases, therefore, where it is desired to do the work out of contact with the solid fuel, the operation of burning or heat-producing must be per- formed in a special fire-place or combustion chamber, the body of flame and heated gas being afterwards made to act upon the surface of the material exposed in a broad thin layer in the working bed or laboratory of the furnace by reverberation from the low vaulted roof covering the bed. Such furnaces are known by the general name of reverberatory or reverbatory furnaces, also as air or wind furnaces, to distinguish them from those worked with compressed air or blast.

Originally the term cupola was used for the reverberatory furnace, but in the course of time it has changed its meaning, and is now given to a small blast furnace such as that used by iron-founders — reverberatory smelting furnaces in the same trade being called air furnaces.

Figs. 2, 3 and 4 represent a reverberatory furnace such as is used for the fusion of copper ores for regulus, and may be taken as gener-

ally representing its class. The fire-place A is divided from the working bed B by a low wall C known as the fire bridge, and at the opposite end there is sometimes, though not invariably, a second bridge of less height called the flue bridge D. A short diagonal flue

Fig. 2. — Longitudinal section of Reverberatory Furnace.

or up-take E conveys the current of spent flame to the chimney F, which is of square section, diminishing by steps at two or three different heights, and provided at the top with a covering plate or

Fig. 3. — Reverberatory Furnace (horizontal section).

damper G, which may be raised or lowered by a chain reaching to the ground, and serves for regulating the speed of the exhaust gases, and thereby the draught of air through the fire. Where several

Fig. 4. — Reverberatory Furnace (elevation at flue end).

furnaces are connected with the same chimney stack, the damper takes the form of a sliding plate in the mouth of the connecting flue, so that the draught in one may be modified without affecting the others. The fire bridge is partially protected against the intense

heat of the body of flame issuing through the fire arch by a passage to which the air has free access. The material to be melted is introduced into the furnace from the hoppers HH through the charging holes in the roof When melted the products separate on the bed (which is made of closely packed sand or other infusible substances), according to their density; the lighter earthy matters forming an upper layer of slag are drawn out by the slag hole K at the flue end into an iron wagon or bogie, while the metal subsides to the bottom of the bed, and at the termination of the operation is run out by the tap hole L into moulds or granulated into water. The opposite opening M is the working door, through which the tool for stirring the charge is introduced. It is covered by a plate suspended to a lever, similar to that seen in the end elevation (fig. 4) in front of the slag hole.

According to the purposes to which they are applied, rever- beratory furnaces may be classed into two groups, namely, fusion or melting furnaces, and calcining or wasting furnaces, also called calciners. The former have a very extended application in many branches of industry, being used by both founders and smelters in the fusion of metals; in the concentration of poor metallic compounds by fusion into regulus; in the reduction of lead and tin ores; for refining copper and silver; and for making malleable iron by the puddling processes and welding. Calcining furnaces have a less extended application, being chiefly employed in the conversion of metallic sulphides into oxides by continued exposure to the action of air at a temperature far below that of fusion, or into chlorides by roasting with common salt. As some of these substances (for example, lead sulphide and copper pyrites) are readily fusible when first heated, but become more refractory as part of the sulphur is dissipated and oxygen takes its place, it is important that the heat should be very carefully regulated at first, otherwise the mass may become clotted or fritted together, and the oxidizing effect of the air soon ceases unless the fritted masses be broken small again. This is generally done by making the bed of the furnace very long in proportion to its breadth and to the fire-grate area, which may be the more easily done as a not inconsiderable amount of heat is given out during the oxidation of the ore — such increased length being often obtained by placing two or even three working beds one above the other, and allowing the flame to pass over them in order from below upwards. Such calciners are used especially in roasting zinc blende into zinc oxide, and in the conversion of copper sulphides into chlorides in the wet extraction process. In some processes of lead-smelting, where the minerals treated contain sand, the long calciner is provided with a melting bottom close to the fire-place, so that the desulphurized ore leaves the furnace as a glassy slag or silicate, which is subsequently reduced to the metallic state by fusion with fluxes in blast furnaces. Reverberatory furnaces play an important part in the manu- facture of sodium carbonate; descriptions and illustrations are given in the article Alkali Manufacture.

Muffle, Crucible and Retort Furnaces. — A third class of furnaces is so arranged that the work is done by indirect heating; that is, the material under treatment, whether subjected to calcina- tion, fusion or any other process, is not brought in contact either with fuel or flame, but is raised to the proper temperature by exposure in a chamber heated externally by the products of combustion. These are known as muffle or chamber furnaces; and by supposing the crucibles or retorts to represent similar chambers of only temporary

duration, the ordinary pot melting air furnaces, and those for the reduction of zinc ores or the manufacture of coal gas, may be included in the same category. These are almost invariably air furnaces, though sometimes air under pressure is used, as, for example, in the combustion of small antbracitic coal, where a current of air from a fan-blower is sometimes blown under the grate to promote combustion. Types of muffle furnaces are figured in the article Annealing, Hardening and Tempering.

Furnace Materials. — The materials used in the construction of furnaces are divisible into two classes, namely, ordinary and refractory or fire-resisting. The former are used principally as casing, walls, pillars or other supporting parts of the structure, and includes ordinary red or yellow bricks, clay-slate, granite and most building stones; the latter are reserved for the parts

immediately in contact with the fuel and flame, such as the lining of the fire-place, the arches, roof and flues, the lower part if not the whole of the chimney lining in reverberatory furnaces, and the whole of the internal walls of blast furnaces. Among such substances are fireclay and firebricks, certain sandstones, silica in the form of ganister, and Dinas stone and bricks, ferric oxide and alumina, carbon (as coke and graphite), magnesia, lime and chromium oxide — their relative importance being indicated by their order, the last two or three indeed being only of limited use.

The most essential point in good fireclays, or in the bricks or other objects made from them, is the power of resisting fusion at the highest heat to which they may be exposed. This supposes them to be free from metallic oxides forming easily fusible compounds with silica, such as lime or iron, the presence of the former even in comparatively small proportion being very detrimental. As clays they must be sufficiently plastic to be readily moulded, but at the same time possess sufficient stiffness not to contract too strongly in drying, whereby the objects produced would be liable to be warped or cracked before firing. In most cases, however, the latter tendency is guarded against, in making up the paste for moulding, by adding to the fresh clay a certain proportion of burnt material of the same kind, such as old bricks or potsherds, ground to a coarse powder. Coke dust or graphite is used for the same purpose in crucible making (see Firebrick).

The most ‘ highly valued fireclays are derived from the Coal Measures. Among the chief localities are the neighbourhood of Stourbridge in Worcestershire and Stannington near Sheffield, which

supply most of the materials for crucibles used in steel and brass melting, and the pots for glass houses; Newcastle-on-Tyne and Glenboig near Glasgow, where heavy blast furnace and other firebricks, gas retorts, &c, are made in large quantities. Coarse-grained but very strong firebricks are also made of the waste of china clay works.

In Belgium the clay raised at Andenne is very largely used for making retorts for zinc furnaces. The principal French fireclays are derived from the Tertiary strata in the south, and more nearly resemble porcelain clays than those of the Coal Measures. They give wares of remarkably fine texture and surface, combined with high refractory character.

In Germany, Ips and Passau on the Danube, and Gross Almerode in Hesse, are the best known localities producing fireclay goods, the crucibles from the last-mentioned place, known as Hessian crucibles, going all over the world. These, though not showing a great resist-ance to extreme heat, are very slightly affected by sudden alterna-tions in heating, as they may be plunged cold into a strongly heated furnace without cracking, a treatment to which French and Stour-bridge pots cannot be subjected with safety.

Plumbago or graphite is largely used in the production of crucibles, not in the pure state but in admixture with fireclay; the proportion of the former varies with the quality from 25 to nearly 50 %. These are the most enduring of all crucibles, the best lasting out 70 or 80 meltings in brass foundries, about 50 with bronze, and 8 to 10 in steel-melting.

Silica is used in furnace-building in the forms of sand, ganister, a finely ground sandstone from the Coal Measures of Yorkshire, and the analogous substance known as Dinas clay, which is really nearly pure silica, containing at most about 2\ % of bases. Dinas clay is found at various places in the Vale of Neath in South Wales, in the form of a loose disintegrated sandstone, which is crushed between rollers, mixed with about 1 % of lime, and moulded into bricks that are fired in kilns at a very high temperature. These bricks are specially used for the roof, fire arches, and other parts subjected to intense heat in reverbera- tory steel-melting furnaces, and, although infusible under ordinary conditions, are often fairly melted by the heat without fluxing or corrosion after a certain amount of exposure. Ganister, a slightly plastic siliceous sand, is similarly used for the lining of Bessemer steel converters; it is found in the neighbourhood of Sheffield.

Alumina as a refractory material is chiefly used in the form of bauxite, but its applications are somewhat special. It has been found to stand well for the linings of rotatory puddling furnaces, where, under long-continued heating, it changes into a substance as hard and infusible as natural emery. In the

Paris Exhibition of 1878 bricks very hard and dense in character, said to be of pure alumina, were exhibited by Muller & Co. of Paris, as well as bricks of magnesia, the latter being specially remarkable for their great weight. They are intended for use at the extreme temperatures obtainable in steel furnaces, or for the melting of platinum before the oxy-hydrogen blowpipe. For the latter purpose, however, lime is generally used; but as this substance has only small stability, it is usually bedded in a casing of firebrick. Oxide of chromium and chrome iron ore have been proposed as refractory crucible materials. The former may be used as a bed for melting platinum in the same way as lime or magnesia, without affecting the quality of the metal.

Ferric oxide, though not strictly infusible, is largely used as a protecting lining for furnaces in which malleable iron is made, a portion of the ore being reduced and recovered in the process. In an oxidizing atmosphere it is indifferent to silica, and therefore siliceous bricks containing a considerable proportion of ferric oxide, when used in flues of boilers, brewers' coppers, &c. and similar situations, are perfectly fire-resisting so long as the heated gas contains a large proportion of unconsumed air. The red firebricks known as Windsor bricks, which are practically similar in composition to soft red sandstone, are of this character. The electric furnace has led to the discovery of several important materials, which have been employed as furnace linings. Carborundum (q.v.) was applied by Engels in 1899, firebricks being washed with, carborundum paste and then baked. Siloxicon, a compound of carbon, silicon and oxygen, formed from carbon and silica in the electric furnace, was patented by E. G. Acheson in 1903. It is very refractory, and is applied by mixing with water and some bond, such as sodium silicate or gas-tar. An amorphous, soft silicon carbide, also formed in the electric furnace, was patented by B. Talbot in 1899. For basic linings, magnesia crystallized in the electric furnace is being extensively used, replacing dolomite to some extent (see E. Kilburn Scott, " Refractory Materials for Furnace Linings," Faraday Soc, 1906, p. 289). «

Furnace Construction. — In the construction of furnaces provision has to be made for the unequal expansion of the different parts under the effect of heat. This is especially necessary in the case of rever- beratory furnaces, which are essentially weak structures, and therefore require to be bound together by complicated systems of tie rods and uprights or buck staves. The latter are very commonly made of old flat bottom rails, laid with the flat of the flange against the wall. Puddling furnaces are usually entirely cased with iron plates, and blast furnaces with hoops round each course of the stack, or in those of thinner constructions the firebrick work is entirely enclosed in a wrought iron casing or jacket. Such parts as may be subjected to extreme heat and the fretting action of molten material, as the tuyere and slag breasts of blast furnaces, and the fire bridges and bed plates of reverberatory furnaces, are often made in cast iron with double walls, a current of water or air being kept circulating through the intermediate space. In this way the metal, owing to its high conductivity and low specific heat as compared to that of water, is kept at a temperature far below its melting point if the water is renewed quickly enough. It is of course necessary in such cases that the circulation shall be perfectly free, in order to prevent the accumulation of steam under pressure in the interior of the casting. This method has received considerable extension, notably in furnace-smelting of iron ores containing manganese, where the entire hearth is often completely water-cased, and in some lead furnaces where no firebrick lining is used, the lower part of the furnace stack being a mere double iron box cooled by water suf- ficiently to keep a coating of slag adhering to the inner shell which prevents the metal from being acted upon.

Mechanical Furnaces. — The introduction and withdrawal of the charges in fusion furnaces is effected by gravitation, the solid masses of raw ore, fuel and flux being thrown in at the top, and flowing out of the furnace at the taphole or slag run at the bottom. Vertical kilns, such as those used for burning limestone, are worked in a similar manner — the raw stone going in at the top, and the burnt product falling through holes in the bottom when allowed to do so. With reverberatory calciners, however, where the work is done upon a horizontal bed, a considerable amount of hand labour is expended in raking out the charge when finished, and in drawing slags from fusion furnaces; and more particularly in the puddling process of refining iron the amount of manual exertion required is very much greater. To diminish the item of expenditure on this head, various kinds of mechanical furnaces have been adopted, all of which can be classified under three heads of gravitating furnaces, mechanical

stirrers and revolving furnaces.

r. In gravitating furnaces the bed is laid at a slope just within the

angle of repose of the charge, which is introduced at the upper end, and is pushed down the slope by fresh material, when necessary, in the contrary direction to the flame which enters at the lower end, Gerstenhofer's pyrites burner is a furnace of this class. It has a tall vertical chamber heated from below, and traversed by numerous narrow horizontal cross bars at different heights. The ore in fine powder is fed in at the top, through a hopper, in a regular thin stream, by a pair of rollers, and in falling lodges on the flats of the bars, forming a talus upon each of the height corresponding to the angle of rest of the material, which is, however, at short intervals removed to lower levels by the arrival of fresh ore from above. In this way a very large surface is exposed to the heat, and the ore, if containing sufficient sulphur to maintain the combustion, is perfectly burned when it arrives at the bottom ; if, however, it is imperfectly sized or damp, or if it contains much earthy matter, the result is not very satisfactory. There are many other furnaces in which the same principle is utilized.

2. Mechanical stirrers constitute a second division of mechanical furnaces, in which the labour of rabbling or stirring the charges is performed by combinations of levers and wheel-work taking motion from a rotating shaft, and more or less perfectly imitating the action of hand labour. They are almost entirely confined to puddling furnaces.

3. Revolving furnaces, the third and most important division of mechanical furnaces, are of two kinds. The first of these resemble an ordinary reverberatory furnace by having a flat bed which, however, has the form of a circular disk mounted on a central shaft, and receives a slow movement of rotation from a water-wheel or other motor, so that every part of the surface is brought successively under the action of the fire, the charge being stirred and ultimately removed by passing under a series of fixed scraper arms placed above the surface at various points. Brunton's calciner, used in the " burn- ing " of the-pyritic minerals associated with tin ore, is a familiar example of this type. The hearth may either rotate on an inclined axis, so that the path of its surface is oblique to that of the flame, or the working part may be a hollow cylinder, between the fireplace and flue, with its axis horizontal or nearly so, whose inner surface represents the working bed, mounted upon friction rollers, and receiving motion from a special steam-engine by means of a

central belt of spur gearing. Furnaces of the second kind were first used in alkali works for the conversion of sulphate into carbonate of sodium in the process known as black ash fusion, but have since been applied to other processes. As calciners they are used in tin mines and for the chlorination of silver ores. Mechanical furnaces are figured in the article Alkali Manufacture.

Use of Heated Air. — The calorific intensity of fuel is found to be very considerably enhanced, if the combustion be effected with air previously heated to any temperature between that of boiling water and a dull red heat, the same effect being observed both with solid and gaseous fuel. The latter, especially when brought to the burning point at a high temperature, produces a heat that can be resisted by the most refractory substances only, such as silica, alumina and magnesia. This is attained in the regenerative furnace of Siemens, detailed consideration of which belongs more properly to the subject of iron.

Fxonomy of Waste Heat. — In every system of artificial heating, the amount of heat usefully applied is but a small proportion of that developed by combustion. Even under the most advantageous application, that of evaporation of water in a steam boiler where the gases of the fire have to travel through a great length of flues bounded by thin iron surfaces of great heat-absorbing capacity, the tem- perature of the current at the chimney is generally much above that required to maintain an active draught in the fireplace; and other tubes containing water, often in considerable numbers, forming the so-called fuel economizers, may often be interposed between the boiler and the chimney with marked advantage as regards saving of fuel. In reverberatory and air furnaces used in the different operations of iron manufacture, where an extremely high temperature has to be maintained in spaces of comparatively small extent, such as the beds of puddling, welding and steel-melting furnaces, the temperature of the exhaust gases is exceedingly high, and if allowed to pass directly into the chimney they appear as a great body of flame at the top. It is now general to save a portion of this heat by passing the flame through flues of steam boilers, air-heating appara- tus, or both — so that the steam required for the necessary operations of the forge and heated blast for the furnace itself may be obtained without further expenditure of fuel. The most perfect method of utilizing the waste heat hitherto applied is that of the Siemens re- 1 generator, in which the spent gases are made to travel through ‘ chambers, known as regenerators or recuperators of heat, containing a quantity of thin firebricks piled into a cellular mass so as to offer a very large heat-absorbing surface, whereby

their temperature is very considerably reduced, and they arriveiat the chimney at a heat not exceeding 300 or 400 degrees. As soon as the bricks have become red hot, the current is diverted to an adjacent chamber or pair of chambers, and the acquired heat is removed by a current of cool , gas or air passing towards the furnace, where it arrives at a tem- ‘ perature sufficiently high to ensure trie greatest possible heating effect in combustion.

In iron-smelting blast furnaces the waste gases are of considerable fuel value, and may render important services if properly applied. Owing to the conditions of the work, which require the maintenance of a sensibly reducing atmosphere, they contain a very notable proportion of carbonic oxide, and are drawn off by large wrought iron tubes near the top of the furnace and conveyed by branch pipes to the different boilers and air-heating apparatus, which are now entirely heated by the combustion of such gases, or mixed with air and exploded in gas engines. Formerly they were allowed to burn to waste at the mouth of a short chimney place above the furnace top, forming a huge body of flame, which was one of the most striking features of the Black Country landscape at night.

Laboratory and Portable Furnaces. — Small air-furnaces with hot plates or sand bath flues were formerly much employed in chemical laboratories, as well as small blast furnaces for crucibles heated with charcoal or coke. The use of such furnaces has very considerably diminished, owing to the general introduction of coal-gas for heating purposes in laboratories, which has been rendered possible by the invention of the Bunsen burner, in which the mixture of air and gas giving the least luminous but most powerfully heating flame is effected automatically by the effluent gas. These burners, or modifications of them, have also been applied to muffle furnaces, which are convenient when only a few assays have to be made — the furnace being a mere clay shell and soon brought to a working temperature; but the fuel is too expensive to allow of their being used habitually or on a large scale. Petroleum, or rather the heavy oils obtained in tar refineries, having an equal or superior heating power to coal-gas, may also be used in laboratories for producing high temperatures. The oil is introduced in a thin stream upon a series of inclined and channelled bars, where it is almost immediately volatilized and burnt by air flowing in through parallel orifices. Furnaces of this kind may be used for melting cast iron or bronze in

small quantities, and were employed by H. Sainte Claire Deville in experiments in the metallurgy of the platinum group of metals.

Sefstrom's blast furnace, used in Sweden for the assay of iron ores, is a convenient form of portable furnace applied to melting in crucibles. It consists of a sheet-iron cylinder about 8 or 9 in. in diameter, within which is fixed one of smaller size lined with fire- clay. The space between the two cylinders serves as a heater and distributor for the blast, which is introduced through the nozzle at the bottom, and enters the furnace through a series of several small tuyeres arranged round the inner lining. Charcoal is the fuel used, and the crucibles stand upon the bottom of the clay lining. When a large body of fuel is required, the cylinder can be lengthened by an iron hoop which fits over the top ring. Deville's portable blast furnace is very similar in principle to the above, but the body of the furnace is formed of a single cast iron cylinder lined with fireclay, closed below by a cast iron plate perforated by a ring of small holes — a hemispherical basin below forming the air-heating chamber.

FURNEAUX, TOBIAS (1735-1781), English navigator, was born at Swilly near Plymouth on the 21st of August 1735. He entered the royal navy, and was employed on the French and African coasts and in the West Indies during the latter part of the Seven Years' War (1760-1763). He served as second lieutenant of the " Dolphin " under Captain Samuel Wallis on the latter's voyage round the globe (August 1766-May 1768); was made a commander in November 17 71; and commanded the " Ad- venture " which accompanied Captain Cook (in the " Resolu- tion ") in Cook's second voyage. On this expedition Furneaux was twice separated from his leader (February 8-May 19, 1773; October 22, 1773-July 14, 1774, the date of his return to England). On the former occasion he explored a great part of the south and east coasts of Tasmania, and made the earliest British chart of the same. Most of his names here survive; Cook, visiting this shore-line on his third voyage, confirmed Furneaux's account and delineation of it (with certain minor criticisms and emendations), and named after him the islands in Banks Straits, opening into Bass's Straits, and the group now known as the Low Archipelago. After the " Adventure " was finally separated from the " Resolution " off New Zealand in October 1773, Furneaux returned home alone, bringing with him Omai of Ulaietea. This first South Sea Islander seen in the British Isles returned to his home with Cook in 1776-1777. Furneaux was made a captain in 1775, and commanded the " Syren " in the British attack of the 28th of June 1776 upon Charleston, South Carolina. His successful efforts to introduce domestic animals and potatoes into the South Sea Islands are worthy

of note. He died at Swilly on the 19th of September

1781.

See Hawkesworth's Narrative of Wallis' Voyage; Captain Cook's Narrative of his Second Voyage; also T. Furneaux's life by Rev. Henry Furneaux in the Dictionary of National Biography.

FURNES (Flem. Veurne), an old-fashioned little town amid the dunes near the coast in West Flanders, Belgium, about 26 m. S.W. of Bruges. Pop. (1904) 6099. It is the centre of a considerable area extending to the French frontier, and its market is an important one for the disposal of corn, stock, hops and dairy produce. During the Norman raids Furnes was destroyed, and the present town was built by Baldwin Bras de Fer, first count of Flanders, about the year 870. At the height of the prosperity of the Flemish communes in the 14th century there were dependent on the barony of Furnes not fewer than fifty-two rich villages, but these have all disappeared, partly no doubt as the consequence of repeated French invasions down to the end of the 18th century, but chiefly through the encroach- ment of the sea followed by the accumulation of sand along the whole of this portion of the coast. Furnes contains many curious old houses and the church of St Walburga, which is a fine survival of the 13th century with some older portions. The old church and buildings, grouped round the Grand Place, which is the scene of the weekly market, present a quaint picture which is perhaps not to be equalled in the country. Near Furnes on the seashore is the fashionable bathing place called La Panne. Furnes one day a year becomes a centre of attraction to all the people of Flanders. This is the last Sunday in July, when the fete of Calvary and the Crucifixion is celebrated. Of all popular festivities in Belgium this is the nearest approach to the old Passion Play. The whole story of Christ is told with great precision by-means of succeeding groups which typify the different phases of the subject. The people of Furnes pose as Roman soldiers or Jewish priests, as the apostles or mere spectators, while the women put on long black veils so that they may figure in the procession as the just women.

FURNESS, HORACE HOWARD (1833-), American Shakespearian scholar, was born in Philadelphia on the 2nd of November 1833, being the son of William Henry Furness (1802- 1896) minister of the First Unitarian church in that city, a powerful preacher and writer. He graduated at Harvard in 1854, and was admitted to the bar in 1859, but soon devoted himself to the study of Shakespeare. He accumulated a collection of illustrative material of great richness

and extent, and brought out in 1871 the first volume of a new Variorum edition, designed to represent and summarize the conclusions of the best authorities in all languages — textual, critical and annotative. The volumes appeared as follows: Romeo and Juliet (1871); Macbeth (1873) (revised edition, 1903); Hamlet (2 vols., 1877); King Lear (1880); Othello (1886); The Merchant of Venice (1888); As You Like It (1890); The Tempest (1892); A Midsummer Night's Dream (1895); The Winter's Tale (1898); Much Ado about Nothing (1899); Twelfth Night (1901); Love's Labour's Lost (1904). The edition has been generally accepted as a thorough and scholarly piece of work; its chief fault is that, beginning with Othello (1886), the editor used the First Folio text as his basis, while in others he makes the text of the Cambridge (Globe) editors his foundation. His wife, Helen Kate Furness (1837- 1883), compiled A Concordance to the Poems ofShakespeare(i8j2). FURNESS, a district of Lancashire, England, separated from the major portion of the county by Morecambe Bay. It is bounded S.E. by this inlet of the Irish Sea, S.W. by the sea, W. by the Duddon estuary and Cumberland, and N. and E. by Westmorland. Its area is about 250 sq. m. It forms the greater part of the North Lonsdale parliamentary division of Lancashire, and contains the parliamentary borough of Barrow-in-Furness. The surface is almost entirely hilly. The northern half is included in the celebrated Lake District, and contains such eminences as the Old Man of Coniston and Wetherlam. Apart from the Duddon, which forms part of the western boundary, the principal rivers are the Leven and Crake, flowing southward into a common estuary in Morecambe Bay. The Leven drains Windermere and the Crake Coniston Lake. The usage of the term " Lake District," however, tends to limit the name of Furness in common thought to the district south of the Lakes, where several of the place-names are suffixed with that of the district, as Barrow-in- Farness, Dalton-in-Furness, Broughton-in-Furness. Betweea

the Duddon and Morecambe Bay lies Walney Island, 8 m. in length, and in the shallow strait between it and the mainland are several smaller islands. That part of Furness which forms a peninsula between the Leven estuary and Morecambe Bay, and the Duddon estuary, is rich in hematite iron ore, which has been worked from very early times. It was known and smelted by British and Romans, and by the monks of Furness Abbey and Conishead Priory, both in the district. It was owing to the existence of this ore that the town of

Barrow grew up in the 19th century; at first as a port from which the ore was exported to South Wales, while later furnaces were established on the spot, and acquired additional importance on the introduction of the Bessemer process, which requires a non-phosphoric ore such as is found here. The hematite is also worked at Ulverston, Askam, Dalton and elsewhere, but the furnaces now depend in part upon ore imported from Spain. The supposed extension of the ore under the sands of the Duddon estuary led to the construction of a sea wall to facilitate the working. The district is served by the main line of the Furness railway, from Carnforth (junction with the London & North-Western railway), passing the pleasant watering-place of Grange, and approximately following the coast by Ulverston, Dalton and Barrow, with branches to Lake Side, Windermere, and to Coniston.

Apart from its industrial importance and scenic attractions, Furness has an especial interest on account of its famous abbey. The ruins of this, beautifully situated in a wooded Abbey. valley, are extensive, and mainly of fine transitional Norman and Early English date, acquiring additional picturesqueness from the warm colour of the red sandstone of which they are built. The abbey of Furness, otherwise Furdenesia or the further nese (promontory), which was dedicated to St Mary, was founded in 11 27 by a small body of monks belonging to the Benedictine order of Savigny. In 11 24 they had settled at Tulketh, near Preston, but migrated in n 27 to Furness under the auspices of Stephen, count of Boulogne, afterwards king, at that time lord of the liberty of Furness. In 1 148 the brotherhood joined the Cistercian order. Stephen granted to the monks the lordship of Furness, and his charter was confirmed by Henry I., Henry II. and subsequent kings. The abbot's power throughout the lordship was almost absolute; he had a market and fair at Dalton, was free from service to the county and wapentake, and held a sheriff's tourn. By a succes- sion of gifts the abbey became one of the richest in England and was the largest Cistercian foundation in the kingdom. At the Dissolution its revenues amounted to between £750 and £800 a year, exclusive of meadows, pastures, fisheries, mines, mills and salt works, and the wealth of the monks enabled them to practise a regal hospitality. The abbot was one of the twenty Cistercian abbots summoned to the parliament of 1264, but was not cited after 1330, as he did not hold of the king in capite per baroniam. The abbey founded several offshoot houses, one of the most important being Rushen Abbey in the Isle of Man. In

1535 the royal commissioners visited the abbey and reported four of its inmates, including the abbot, for incontinence. In

1536 the abbot was charged with complicity in the Pilgrimage of Grace, and on the 7th of April 1537, under compulsion, surrendered the abbey to the king. A few monks were granted pensions, and the abbot was endowed with the profits of the rectory of Dalton, valued at £33, 6s. 8d. per annum. In 1540 the estates and revenues were annexed by act of parliament to the Duchy of Lancaster. About James I.'s reign the site and territories were alienated to the Prestons of Preston-Patrick, from whom they descended to the dukes of Devonshire.

Conishead Priory, near Ulverston, an Augustinian foundation of the reign of Henry II., has left no remains, but of the priory of Cartmel (1188) the fine church is still in use. It is a cruciform structure of transitional Norman and later dates, its central tower having the upper storey set diagonally upon the lower. The chancel contains some superb Jacobean carved oak screens, with stalls of earlier date.

FURNISS, HARRY (1854-), British caricaturist and illustrator, was born at Wexford, Ireland, of English and Scottish

parents. He was educated in Dublin, and in his schooldays edited a Schoolboy's Punch in close imitation of the original. He came to London when he was nineteen, and began to draw for the illustrated papers, being for some years a regular contribu- tor to the Illustrated London News. His first drawing in Punch appeared in 1880, and he joined its staff in 1884. He illustrated Lucy's " Diary of Toby, M.P.," in Punch, where his political caricatures became a popular feature. Among his other successes were a series of " Puzzle Heads," and his annual " Royal Academy guy'd." In Royal Academy Antics (1890) he published a volume of caricatures of the work of leading artists. He resigned from the staff of Punch in 1894, produced for a short time a weekly comic paper Lika J oho, and in 1898 began a humorous monthly, Fair Game; but these were short-lived. Among the numerous books he illustrated were James Payn's Talk of the Town, Lewis Carroll's Sylvie and Bruno, Gilbert a Beckett's Comic Blackslone, G. E. Farrow's Wallypug Book, and his own novel, Poverty Bay (1905). Our Joe, his great Fight (1903), was a collection of original cartoons. His volume of reminiscences, Confessions of a Caricaturist (1901), was followed by Harry Furniss at Home (1904) . In 1905 he published How to draw in Pen and Ink, and produced the first number of Harry Furniss's Christmas Annual.

FURNITURE (from " furnish," Fr. fournir), a general term of obscure origin, used to describe the chattels and fittings re- quired to adapt houses and other buildings for use. Wood, ivory, precious stones,

bronze, silver and gold have been used from the most ancient times in the construction or for the decoration of furniture. The kinds of objects required for furniture have varied according to the changes of manners and customs, as well as with reference to the materials at the com- mand of the workman, in different climates and countries. Of really ancient furniture there are very few surviving examples, partly by reason of the perishable materials of which it was usually constructed; and partly because, however great may have been the splendour of Egypt, however consummate the taste of Greece, however luxurious the life of Rome, the number of household appliances was very limited. The chair, the couch, the table, the bed, were virtually the entire furniture of early peoples, whatever the degree of their civilization, and so they remained until the close of what are known in European history as the middle ages. During the long empire-strewn centuries which intervened between the lapse of Egypt and the obliteration of Babylon, the extinction of Greece and the dismemberment of Rome and the great awakening of the Renaissance, household comfort developed but little. The Ptolemies were as well lodged as the Plantagenets, and peoples who spent their lives in the open air, going to bed in the early hours of darkness, and rising as soon as it was light, needed but little household furniture.

Indoor life and the growth of sedentary habits exercised a powerful influence upon the development of furniture. From being splendid, or at least massive, and exceedingly sparse and costly, it gradually became light, plentiful and cheap. In the ancient civilizations, as in the periods when our own was slowly growing, household plenishings, save in the rudest and most elementary forms, were the privilege of the great — no person of mean degree could have obtained, or would have dared to use if he could, what is now the commonest object in every house, the chair (q.v.). Sparse examples of the furniture of Egypt, Nineveh, Greece and Rome are to be found in museums; but our chief sources of information are mural and sepulchral paintings and sculptures. The Egyptians used wooden furniture carved and gilded, covered with splendid textiles, and supported upon the legs of wild animals; they employed chests and coffers as receptacles for clothes, valuables and small objects generally. Wild animals and beasts of the chase were carved upon the furniture of Nineveh also; the lion, the bull and the ram were especially characteristic. The Assyrians were magnificent in their household appointments; their tables and couches were inlaid with ivory and precious metals. Cedar and ebony were much used by these great Eastern peoples, and it is probable that they were familiar with rosewood, walnut and teak. Solomon's

bed was of cedar of Lebanon. Greek furniture was essentially Oriental in form; the more sumptuous varieties were of bronze, damascened with gold and silver. The Romans employed Greek artists and workmen and absorbed or adapted many of their mobiliary fashions, especially in chairs and couches. The Roman tables were of splendid marbles or rare woods. In the later ages of the empire, in Rome and afterwards in Constantinople, gold and silver were plentifully used in furniture; such indeed was the abundance of these precious metals that even cooking utensils and common domestic vessels were made of them.

The architectural features so prominent in much of the medieval furniture begin in these Byzantine and late Roman thrones and other seats. These features became paramount as Pointed architecture became general in Europe, and scarcely less so during the Renaissance. Most of the medieval furniture, chests, seats, trays, &c, of Italian make were richly gilt and painted. In northern Europe carved oak was more generally used. State seats in feudal halls were benches with ends carved in tracery, backs panelled or hung with cloths (called cloths of estate), and canopies projecting above. Bedsteads were square frames, the testers of panelled wood, resting on carved posts. Chests of oak carved with panels of tracery, or of Italian cypress (when they could be imported), were used to hold and to carry clothes, tapestries, &c, to distant castles and manor houses; for house furniture, owing to its scarcity and cost, had to be moved from place to place. Copes and other ecclesiastical vestments were kept in chests with ornamental lock plates and iron hinges. The splendour of most feudal houses depended on pictorial tapestries which could be packed and carried from place to place. Wardrobes were rooms fitted for the reception of dresses, as well as for spices and other valuable stores. Ex- cellent carving in relief was executed on caskets, which were of wood or of ivory, with painting and gilding, and decorated with delicate hinge and lock metal-work. The general subjects of sculpture were taken from legends of the saints or from metrical romances. Renaissance art made a great change in architecture, and this change was exemplified in furniture. Cabinets (q.v.) and panelling took the outlines of palaces and temples. In Florence, Rome, Venice, Milan and other capitals of Italy, sumptuous cabinets, tables, chairs, chests, &c, were made to the orders of the native princes. Vasari (Lives of Painters) speaks of scientific diagrams and mathematical problems illustrated in costly materials,

by the best artists of the day, on furniture made for the Medici family. The great extent of the rule of Charles V. helped to give a uniform training to artists from various countries resorting to Italy, so that cabinets, &c, which were made in vast numbers in Spain, Flanders and Germany, can hardly be distinguished from those executed in Italy. Francis I. and Henry VIII. encouraged the revived arts in their respective dominions. Pietra dura, or inlay of hard pebbles, agate, lapis lazuli, and other stones, ivory carved and inlaid, carved and gilt wood, marquetry or veneering with thin woods, tortoiseshelf, brass, &c, were used in making sumptuous furniture during the first period of the Renaissance. Subjects of carving or relief were generally drawn from the theological and cardinal virtues, from classical mythology, from the seasons, months, &c. Carved altarpieces and woodwork in churches partook of the change in style.

The great period of furniture in almost every country was, however, unquestionably the 18th century. That century saw many extravagances in this, as in other forms of art, but on the whole it saw the richest floraison of taste, and the widest sense of invention. This is the more remarkable since the furniture of the 17th century has often been criticized as heavy and coarse. The criticism is only partly justified. Throughout the first three- quarters of the period between the accession of James I. and that of Queen Anne, massiveness and solidity were the dis- tinguishing characteristics of all work. Towards the reign of James II., however, there came in one of the most pleasing and elegant styles ever known in England. Nearly a generation before then Boulle was developing in France the splendid and palatial method of inlay which, although he did not invent it,

is inseparably associated with his name. We owe it perhaps to the fact that France, as the neighbour of Italy, was touched more immediately by the Renaissance than England that the reign of heaviness came earlier to an end in that country than on the other side of the Channel. But there is a heaviness which is pleasing as well as one which is forbidding, and much of the furniture made in England any time after the middle of the 17th century was highly attractive. If English furniture of the Stuart period be not sought after to the same extent as that of a hundred years later, it is yet highly prized and exceedingly decorative. Angularity it often still possessed, but generally speaking its elegance of form and richness of upholstering lent it an attraction which not long before had been entirely lacking. Alike in France and in England, the most attractive achievements of the cabinetmaker belong to the 18th century —

English Queen Anne and 'early Georgian work is universally charming; the regency and the reigns of Louis XV. and XVI. formed a period of the greatest artistic splendour. The inspiration of much of the work of the great English school was derived from France, although the gropings after the Chinese taste and the earlier Gothic manner were mainly indigenous. The French styles of the century, which began with excessive flamboyance, closed before the Revolution with a chaste perfection of detail which is perhaps more delightful than anything that has ever been done in furniture. In the achievements of Riesener, David Rontgen, Gouthiere, Oeben and Rousseau de la Rottiere we have the high- water mark' of craftsmanship. The marquetry of the period, although not always beautiful in itself, was executed with extraordinary smoothness and finish; the mounts of gilded bronze, which were the leading characteristic of most of the work of the century, were finished with a minute delicacy of touch which was until then unknown, and has never been rivalled since. If the periods of Francis I. and Henry II., of Louis XIV. and the regency produced much that was sumptuous and even elegant, that of Louis XVI., while men's minds were as yet undisturbed by violent political convulsions, stands out as, on the whole, the one consummate era in the annals of furniture. Times of great achievement are almost invariably followed directly by those in which no tall thistles grow and in which every little shrub is magnified to the dimensions of a forest tree; and the so-called " empire style " which had begun even while the last monarch of the ancien rSgime still reigned, lacked alike the grace- ful conception and the superb execution of the preceding style. Heavy and usually uninspired, it was nurtured in tragedy and perished amid disaster. Yet it is a profoundly interesting style, both by reason of the classical roots from which it sprang and the attempt, which it finally reflected, to establish new ideas in every department of life. Founded upon the wreck of a lingering feudalism it reached back to Rome and Greece, and even to Egypt. If it is rarely charming, it is often impressive by its severity. Mahogany, satinwood and other rich timbers were characteristic of the style of the end of the 18th century; rosewood was most commonly employed for the choicer work of the beginning of the 19th. Bronze mounts were in high favour, although their artistic character varied materially.

Previously to the middle of the 18th century the only cabinet- maker who gained sufficient personal distinction to have had his name preserved was Andre Charles Boulle; beginning with that period France and England produced many, men whose renown is hardly less than that of artists in other media. With Chippendale there arose

a marvellously brilliant school of English cabinetmakers, in which the most outstanding names are those of Sheraton, Heppelwhite, Shearer and the Adams. But if the school was splendid it was lamentably short-lived, and the 19th ‘ century produced no single name in the least worthy to be placed beside these giants. Whether, in an age of machinery, much room is left for fine individual execution may be doubted, and the manufacture of furniture now, to a great extent, takes place in large factories both in England and on the con- tinent. Owing to the necessary subdivision of labour in these establishments, each piece of furniture passes through numerous distinct workshops. The master and a few artificers formerly

FURNITURE

Plate I.

vm

Fig. i. — Venetian Folding Chair of

carved and gilt walnut, leather

back and seat; about 1530,

Fig. 8.— Carved Mahogany Chair in the sJvle of Chippendale; 2nd half of iSih Ci’nhiry.

*f ~~^*

|

i

• 1

1

1 1

*«***•• 1 j*

9

■ *i 1 ::*

■

i

FKJ. 2. — Oak Arm-chair. English, 1 7th century.

Fig. 3. — Arm-chair, solid seat, cane back; about 1660.

FtG. 6.— Cai

ved Walnut Chairs. English, t The arm-chair is inlaid.

1 8th century.

Fig. 7. — Walnut Chair; about 1710,

R

1 ■&■ f 1 ■tolif

|

*HpHp'^*

^•w

1

In

i^il

FIG. 9. — Carved Mahogany Arm-chair, in the style of Chippendale, with ribbon pattern.

FlG. 10. — Carved and Inlaid Mahogany Chair, in the style of Heppiewhite; late iSlh century.

Fig. 11. — Mahogany Chair in the style of Sheraton; about 1780.

FlG. j3. — Painted and gilt Arm-chair with cane seat, in the style of Adam; about 1700.

Fig. 13, — Arm-chair of carved and gilt wood with stuffed back, seat and arms. French, Louis XV. style.

.. _ ^B

FlG. 14. — Mahogany Arm-chair, Empire style, early iotfi century, said to have belonged to the Bonaparte family.

Fig. is— Painted and gilt Beech Chair. English, about 1800.

Plate II.

FURNITURE

Fig. i. — Front of Oak Coffer with wrought iron bands. 'French, 2nd half of 13th century

FlG. 2. — English Oak Chest, dated 1637.

Fig. 3. — Italian (Florentine) Coffer of Wood with gilt arabesque stucco ornament, about 1480.

Fig, 4. — Italian " Cassone" or Marriage Coffer, 13th century. Carved and gilt wood with painted front and ends.

k '

r ■ill

*IBJIfP »***< *w ^**

FiG. 5. — Walnut Table with expanding leaves. Swiss, 17th century.

Fig. 6. — Oak C.ate-Legged Table. English, 17th century.

on

Fig. 7.— Writing Table. French, end of Louis XV. period. FiG. 8.— Painted Satin- Wood Tables, in the style of Sheraton,

Riesener marquetry, ormolu mounts and Sevres plaques. about 1790.

VOL. I ! . (The above are in the Victoria and Albert Museum, except Fig. S, which were in the Bethnal Green Exhibition, 1892.)

FURNITURE

Plate III.

I. CARVKD OAK SIDEBOARD. English, 17th century. Victoria and Albert Museum.

2. CARVED OAK COURT CUPBOARD. English, early 17th century. Victoria and Albert Museum.

3. EBONY CARVED CABI- NET. The interior decorated with inlaid

ivory and coloured woods ; French or Dutch, middle of 17th century. Victoria and Albert Museum.

4. VENEERED CHEST OF DRAWERS. About 1690. Lent to Bethnai Green Exhibition by Sir Spencer Ponsonby- Fane, G.C.B.

EBONY ARMOIRE. With tortoise-shell panels inlaid with brass and other metals, and ormolu mountings. Designed y B e r a i n , and executed by Andre Boulle. French, Louis XIV. period. Victoria and Albert Museum.

GLASS-FRONTED BOOKCASE, AND CABINET. Of

mahogany- In the style of Sheraton, about 1790. Lent to the Bethnai Green Exhibition by the late Vincent]'. Rob- inson, CLE.

Plate IV.

FURNITURE

COMMODE OF PINE. With mar- quetry of brass, ebony, tortoise-shell, mother-of-pearl, ivory, and green- stained bone. "Boulle" work with designs in the style of Berain. French, late period of Louis XIV.

COMMODE. With panels of Japanese lacquer and ormolu mountings, in the style of Caffieri. French, Louis XV. period.

3. TABLE OF KING AND TULIP WOODS. With ormolu mountings. Louis XV. period.

4. ESCRITOIRE A TOILETTE. For- merly belonging to Marie Antoinette. Of tulip and sycamore woods inlaid with other coloured woods, ormolu mounts. Louis XV. period.

. FOUR-POST BED- STEAD. Of oak inlaid with bog-oak and holly, from the " Inlaid Room " at Sizergh Castle, West- morland. Latter half of sixteenth century.

6. CARVED AND GILT BEDSTEAD. With blue silk damask cover- i n g s and hangings. French, late 1 8 th century. Louis XVI. period.

1/

4

1 1 I^JII i

*#- B(*M*

ill

■ *s4u ^*

'Uk.IC

■ *' *M ,f Jm*

MyjB

\i&MiAmmi$Mk^*

M&S

gss^Jl

from the Victoria aad Albert Museum, S. Kensington.

FURNITURE

Plate V.

Photo, Mansdt&Co.

THE "BUREAU DU ROI," MADE FOR LOUIS XV., NOW IN THE LOUVRE. For description, see Desk.

superintended each piece of work, which, therefore, was never far removed from the designer's eye. Though accomplished artists are retained by the manufacturers of London, Paris and other capitals, there can no longer be the same relation between the designer and his work. Many operations in these modern factories are carried on by machinery. This, though an economy of labour, entails loss of artistic effect. The chisel and the knife are no longer in such cases guided and controlled by the sensitive touch of the human hand.

A decided, if not always intelligent, effort to devise a new style in furniture began during the last few years of the 19th century, which gained the name of " Part nouveau." Its pioneers professed to be free from all old traditions and to seek inspiration from nature alone. Happily nature is less forbidding than many of these interpretations

of it, and much of the " new art " is a remarkable exemplification of the impossibility of altogether ignoring traditional forms. The style was not long in degenerat- ing into extreme extravagance. Perhaps the most striking con- sequence of this effort has been, especially in England, the revival of the use of oak. Lightly polished, or waxed, the cheap foreign oaks often produce very agreeable results, especially when there is applied to them a simple inlay of boxwood and stained holly, or a modern form of pewter. The simplicity of these English forms is in remarkable contrast to the tortured and ungainly outlines of continental seekers after a conscious and unpleasing " originality."

Until a very recent period the most famous collections of historic furniture were to be found in such French museums as the Louvre, Cluny and the Garde Meuble. Now, however, they are rivalled, if not surpassed, by the magnificent collections of the Victoria and Albert Museum at South Kensington, and the Wallace collection at Hertford House, London. The latter, in conjunction with the Jones bequest at South Kensington, forms the finest of all gatherings of French furniture of the great periods, notwithstanding that in the Bureau du Roi the Louvre possesses the most magnificent individual example in existence. In America there are a number of admirable collections repre- sentative of the graceful and homely " colonial furniture " made in England and the United States during the Queen Anne and Georgian periods.

See also the separate articles in this work on particular forms of furniture. The literature of the subject has become very extensive, and it is needless to multiply here the references to books. Perrot and Chipiez, in their great Histoire de I' art dans Vantiquite (1882 et seq.). deal with ancient times, and A. de Champeaux, in Le Meuble (1885), with the middle ages and later period; English furniture is admirably treated by Percy Macquoid in his History of English Furniture (1905); and Lady Dilke's French Furniture in the iSth Century (1901), and Luke Vincent Lockwood's Colonial Furniture in America (1901), should also be consulted. (J. P.-B.)

FURNIVALL, FREDERICK JAMES (1825-1910), English philologist and editor, was born at Egham, Surrey, on the 4th of February 1825, the son of a surgeon. He was called to the bar in 1849, but his attention was soon diverted to philological studies and social problems. He gave Frederick Denison Maurice valuable assistance in the Christian Socialist movement, and was one of the founders of the Working Men's College. For half a century he indefatigably promoted the study of early English literature, partly by his own work as

editor, and still more efficaciously by the agency of the numerous learned societies of which he was both founder and director, especially the Early English Text Society (1864), which has been of inestimable service in promoting the study of early and middle English. He also established and conducted the Chaucer, Ballad, New Shakespeare and Wyclif Societies, and at a later period societies for the special study of Browning and Shelley. He edited texts for the Early English Text Society, for the Roxburghe Club and the Rolls Series; but his most important labours were devoted to Chaucer, whose study he as an editor greatly assisted by his " Six-Text " edition of the Canterbury Tales, and other publications of the Chaucer Society. He was the honorary secretary of the Philological Society, and was one of the original promoters of the Oxford New English Dictionary. He cc-operated

with its first editor, Herbert Coleridge, and after his death was for some time principal editor during the preliminary period of the collection of material. The completion of his half-century of labour was acknowledged in 1900 by a handsome testimonial, including the preparation by his friends of a volume of philo- logical essays specially dedicated to him, An English Miscellany (Oxford, 1901), and a considerable donation to the Early English Text Society. Dr Furnivall was always an enthusiastic oarsman, and till the end kept up his interest in rowing; with John Beesley in 1845 he introduced the new type of narrow sculling boat, and in 1886 started races on the Thames for sculling fours and sculling eights. He died on the 2nd of July 1910.

FURSE, CHARLES WELLINGTON (1868-1904), English painter, born at Staines, the son of the Rev. C. W. Furse, arch- deacon of Westminster, was descended collaterally from Sir Joshua Reynolds, and in his short span of life achieved such rare excellence as a portrait and figure painter that he forms an important link in the chain of British portraiture which extends from the time when Van Dyck was called to the court of Charles I. to our own day. His talent was precocious; at the age of seven he gave indications of it in a number of drawings illustrating Scott's novels. He entered the Slade school in 1884, winning the Slade scholarship in the following year, and completed his educa- tion at Julian's atelier in Paris. Hard worker as he was, his activity was frequently interrupted by spells of illness, for he had developed signs of consumption when he was still attending the Slade school. An important canvas called " Cain" was his first contribution (1888) to the Royal Academy, to the associateship of which he was elected in the year of his death. For some years before he had been a staunch supporter of the New

English Art Club, to the exhibitions of which he was a regular contributor. He was married in October 1900 to Katherine, daughter of John Addington Symonds. His fondness for sport and of an open-air life found expression in his art and introduced a new, fresh and vigorous note into portraiture. There is never a suggestion of the studio or of the fatiguing pose in his portraits. The sitters appear unconscious of being painted, and are generally seen in the pursuit of their favourite outdoor sport or pastime, in the full enjoyment of life. Such are the " Diana of the Uplands," the " Lord Roberts " and " The Return from the Ride " at the Tate Gallery; the four children in the " Cubbing with the York and Ainsty," " The Lilac Gown," " Mr and Mrs Oliver Fishing " and the portrait of Lord Charles Beresford. Most of these pictures, and indeed nearly all the work completed in the few years of Furse's activity, show a pronounced decorative tendency.) His sense of space, composition and decorative design can best be judged by his admirable mural decorations for Liverpool town hall, executed between 1899 and 1902. A memorial exhibi- tion of Furse's paintings and sketches was held at the Burlington Fine Arts Club in 1906.

FURST, JULIUS (1 805-1 873), German Orientalist, was born of Jewish parents at Zerkowo in Posen, on the 12th of May 1805. He studied philosophy and philology at Berlin, and oriental literature at Posen, Breslau and Halle. In 1857 he was appointed to a lectureship at the university of Leipzig, and he was promoted to a professorship in 1864, which he held until his death at Leipzig on the 9th of February 1873. Among his writings may be mentioned Lehrgebdude der aramdischen Idiome (Leipzig, 1835) ; Librorum sacrorwm Vetcris Testamenti concordanliae Hebraicae alqueChaldaicae(Leipzig,i83-j-i&4o);Hebrdischesundchaldaisches Worterbuch (1851, English translation by S. Davidson 1867); Kultur und Liter aturgeschichte der Juden in Asien (1849). Fiirst also edited a valuable Bibliotheca Judaica (Leipzig, 1849-1863), and was the author of some other works of minor importance. From 1840 to 1851 he was editor of Der Orient, a journal devoted to the language, literature, history and antiquities of the Jews. FURSTENBERG, the name of two noble houses of Germany. 1. The more important is in possession of a mediatized princi- pality in the district of the Black Forest and the Upper Danube, which comprises the countship of Heiligenberg, about 7 m. to the N. of the Lake of Constance, the landgraviates of Stiihlingen and Baar, and the lordships of Jungnau, Trochtelfingen, Hausen

and Moskirch or Messkirch. The territory is discontinuous; and as it lies partly in Baden, partly in Wurttemberg, and partly in the Prussian province of Sigmaringen, the head of the family is an hereditary member of the first chamber of Baden and of the chamber of peers in Wurttemberg and in Prussia. The relations of the principality with Baden are defined by the treaty of May 1825, and its relations with Wurttemberg by the royal declaration of 1839. The Stammort or ancestral seat of the family is Fiirstenberg in the Black Forest, about 13 m. N. of Schaffhausen, b"ut the principal residence of the present repre- sentatives of the main line is at Donaueschingen.

The family of Fiirstenberg claims descent from a certain Count Unruoch, a contemporary of Charlemagne, but their authentic pedigree is only traceable to Egino II., count of Urach, who died before 1136. In 1218 his successors inherited the possessions of the house of Zahringen in the Baar district of the Black Forest, where they built the town and castle of Fiirstenberg. Of the two sons of Egino V. of Urach, Conrad, the elder, inherited the Breisgau and founded the line of the counts of Freiburg, while the younger, Heinrich (1215-1284), received the territories lying in the Kinzigthal and Baar, and from 1250 onward styled himself first lord, then count, of Fiirstenberg. His territories were subsequently divided among several branches of his descendants, though temporarily re-united under Count Friedrich III., whose wife, Anna, heiress of the last count of Wardenberg, brought him the countship of Heiligenberg and lordships of Jungnau'and Trochtelfingen in 1534. On Friedrich's death (1559) his territories were divided between his two sons, Joachim and Christof I. Of these the former founded the line of Heiligenberg, the latter that of Kinzigthal. The Kinzigthal branch was again subdivided in the 17th century between the two sons of Christof II. (d. 1614), the elder, Wratislaw II. (d. 1642), founding the line of Mosskirch, the younger, Friedrich Rudolf (d. 1655), that of Stiihlingen. The Heiligenberg branch received an accession of dignity by the elevation of Count Hermann Egon (d. 1674) to the rank of prince of the Empire in 1664, but his line became extinct with the death of his son Prince Anton Egon, favourite of King Augustus the Strong and regent of Saxony, in 17 16. The heads of both the Mosskirch and Stiihlingen lines .were now raised to the dignity of princes of the Empire (17 16). The Mosskirch branch died out with Prince Karl Friedrich (d. 1744); the territories of the Stiihlingen branch had been divided on the death of Count Prosper Ferdinand (1662-1704) between his two sons, Joseph Wilhelm Ernst

(1699-1762) and Ludwig August Egon (1705-17 59) . The first of these was created prince of the Empire on the 10th of December 17 16, and founded the princely line of the Swabian Fiirstenbergs; in 1772 he obtained from the emperor Francis I. for all his legitimate sons and their descend- ants the right to bear, instead of the style of landgrave, that of prince, which had so far been confined to the reigning head of the family. Ludwig, on the other hand, founded the family of the landgraves of Fiirstenberg, who, since their territories lay in Austria and Moravia, were known as the " cadet line in Austria." The princely line became extinct with the death of Karl Joachim in 1804, and the inheritance passed to the Bohemian branch of the Austrian cadet line in the person of Karl Egon II. (see below). Two years later the principality was mediatized.

In 1909 there were two branches of the princely house of Fiirstenberg: (1) the main branch, that of Fiirstenberg-Donaue-schingen, the head of which was Prince Maximilian Egon (b. 1863), who succeeded his cousin Karl Egon III. in 1896; (2) that of Fiirstenberg-Konigshof, in Bohemia, the head of which was Prince Emil Egon (b. 1876), chamberlain and secretary of legation to the Austro-Hungarian embassy in London (1907). The cadet line of the landgraves of Fiirstenberg is now extinct, its last representative having been the landgrave Joseph Frie- drich Ernst of Fiirstenberg-Weitra (1860-1896), son of the landgrave Ernst (1816-1889) by a morganatic marriage. He was not recognized as ebenburlig by the family. The landgraves of Fiirstenberg were in 1909 represented only by the landgravines

Theresa (b. 1839) and Gabrielle (b. 1844), daughters of the landgrave Johann Egon (1802-1879).

From the days of Heinrich of Urach, a relative and notable supporter of Rudolph of Habsburg, the Fiirstenbergs have played a stirring part in German history as statesmen, ecclesi- astics and notably soldiers. There was a popular saying that " the emperor fights no great battle but a Fiirstenberg falls." In the Heiligenberg line the following may be more particularly noticed.

Franz Egon (1625-1682), bishop of Strassburg, was the elder son of Egon VII., count of Fiirstenberg (1588-1635), who served with distinction as a Bavarian general in the Thirty Years' War. He began life as a soldier in the imperial service, but on the elevation of his friend Maximilian Henry of Bavaria to the electorate of Cologne in 1650, he went to his court and embraced the ecclesiastical career. He soon gained a complete ascendancy over the weak-minded

elector, and, with his brother William Egon (see below), was mainly instrumental in making him the tool of the aggressive policy of Louis XIV. of France. Ecclesi- astical preferments were heaped upon him. As a child he had been appointed to a canonry of Cologne; to these he added others at Strassburg, Liege, Hildesheim and Spires; he became also suffragan bishop and dean of Cologne and provost of Hildes- heim, and in 1663 bishop of Strassburg. Later he was also prince-abbot of Liiders and Murbach and abbot of Stablo and Malmedy. On the conclusion of a treaty between the emperor and the elector of Cologne, on the nth of May 1674, Franz was deprived of all his preferments in Germany, and was compelled to take refuge in France. He was, however, amnestied with his brother William by a special article of the treaty of Nijmwegen (1679), whereupon he returned to Cologne. After the French occupation of Strassburg (1681) he took up his residence there and died on the 1st of April 1682.

His brother William Egon (1629-1704), bishop of Strassburg, began his career as a soldier in the French service. He went to the court of the elector of Cologne at the same time as Franz Egon, whose zeal for the cause of Louis XIV. of France he shared. In 1672 the intrigues of the two Fiirstenbergs had resulted in a treaty of offensive alliance between the French monarchy and the electorate of Cologne, and, the brothers being regarded by the Imperialists as the main cause of this disaster, William was seized by imperial soldiers in the monastery of St Pantaleon at Cologne, hurried off to Vienna and there tried for his life. He was saved by the intervention of the papal nuncio, but was kept in prison till the signature of the treaty of Nijmwegen (1679). As a reward for his services Louis XIV. appointed him bishop of Strassburg in succession to his brother in 1682, in 1686 obtained for him from Pope Innocent XL the cardinal's hat, and in 1688 succeeded in obtaining his election as coadjutor-archbishop of Cologne and successor to the elector Maximilian Henry. At the instance of the emperor, however, the pope interposed his veto; the canons followed the papal lead, and, the progress of the Allies against Louis XIV. depriving him of all prospect of success, William Egon retired to France. Here he took up his abode at his abbey of St Germain des Pres near Paris, where he died on the 10th of April 1704.

In the Stiihlingen line the most notable was Karl Egon (1 796-1 854), prince of Fiirstenberg, the son of Prince Karl Alois of Fiirstenberg, a general in the Austrian service, who was killed at the battle of Loptingen on the 25th of March 1799. In 1804 he inherited the Swabian principality of Fiirstenberg and all the possessions of the

family except the Moravian estates. He studied at Freiburg and Wiirzburg, and in 18 15 accompanied Prince Schwarzenberg to Paris as staff -officer. In 181 7 he came of age, and in the following year married the princess Amalie of Baden. By the mediatization of his principality in 1806 the greater part of his vast estates had fallen under the sovereignty of the grand-duke of Baden, and Prince Fiirstenberg took a conspicuous part in the upper house of the grand-duchy. In politics he distinguished himself by a liberalism rare in a great German noble, carrying through by his personal influence with his peers the abolition of tithes and feudal dues and stanchly

advocating the freedom of the press. He was not less distin- guished by his large charities: among other foundations he established a hospital at Donaueschingen. For the industrial development of the country, too, he did much, and proved himself also a notable patron of the arts. His palace of Donaueschingen, with its collections of paintings, engravings and coins, was a centre of culture, where poets, painters and musicians met with princely entertainment. He died on the 14th of September 1869, and was succeeded by his son Karl Egon II. (1820-1892), with the death of whose son, Karl Egon III., in 1896, the title and estates passed to Prince Maximilian Egon, head of the cadet line of Fiirstenberg-Piirglitz.

See Munch, Gesch. des Hauses und des Landes Fiirstenberg, 4 vols. (Aix-la-Chapelle, 1829-1847); S. Riezler, Gesch. des fiirstlichen Hauses Fiirstenberg bis 1507 (Tubingen, 1883); Fiirstenbergisches Urkundenbuch, edited by S. Riezler and F. L. Baumann, vols, i.-vii. (Tubingen, 1877-1891), continued 5. tit. Mitteilungen aus dem fiirstlich. Furstenbergischem Archiv by Baumann and G. Tumbiilt, 2 vols. (ib. 1899-1902); Stokvis, Manuel d'histoire (Leiden, 1890-1893) ; Almanack de Gotha; Allgemeine deutscke Biographie.

2. The second Fiirstenberg family has its possessions in Westphalia and the country of the Rhine, and takes its name from the castle of Fiirstenberg on the Ruhr. The two most remarkable men whom it has produced are Franz Friedrich Wilhelm, freiherr von Fiirstenberg, and Franz Egon, count von Furstenberg-Stammheim. The former (1728-1810) became ultimately vicar-general of the prince-bishop of Miinster, and effected a great number of important reforms in the administra- tion of the country, besides doing much for its educational and industrial development. The latter (1797-1859) was

an enthusiastic patron of art, who zealously advocated the completion of the Cologne cathedral, and erected the beautiful church of St Apollinaris near Remagen on the Rhine. He was a member of the Prussian Upper House in 1849, collaborated in founding the Preussisches Wochenblatt, and was an ardent defender of Catholic interests. His son, Count Gisbert von Furstenberg- Stammheim (b. 1836), was in 1909 head of the Rhenish line of the house of Fiirstenberg.

FURSTENWALDE, a town of Germany, in the Prussian province of Brandenburg, on the right bank of the Spree, and on the railway from Berlin to Frankfort-on-Oder, 28 m. E. of the former city. Pop. (1905) 20,498. Its beautiful cathedral church contains several old monuments. The industries are important, including, besides brewing and malting, manufactures of starch, vinegar, electric lamps and gas-fittings, stoves, &c, iron-founding and wool-weaving. Fiirstenwalde is one of the oldest towns of Brandenburg. From 1385 it was the seat of the bishop of Lebus, whose bishopric was incorporated with the electorate of Brunswick in 1595.

FURTH, a manufacturing town of Germany, in the kingdom of Bavaria, at the confluence of the Pegnitz with the Regnitz, 5 m. N.W. from Nuremberg by rail, at the junction of lines to Hof and Wiirzburg. Pop. (1885) 35,455; (1905) 60,638. It is a modern town in appearance, with broad streets and palatial business houses. Of its four Evangelical churches, the old St Michaeliskirche is a handsome structure; but its chief edifices are the new town hall, with a tower 175 ft. high and the magnificent synagogue. The Jews have also a high school, which enjoys a great reputation. There are besides a classical, a wood-carving and an agricultural school and a library. Fiirth is the seat of several important industries; particularly, the production of chromolithographs and picture-books, the manufacture of mirrors and mirror-frames, bronze and gold-leaf wares, pencils, toys, haberdashery, optical instruments, silver work, turnery, chicory, machinery, fancy boxes and cases, and an extensive trade is carried on in these goods as also in hops, metals, wool, groceries and coal. A large annual fair is held at Michaelmas and lasts for eleven days. The earliest railway in Germany was that between Nuremberg and Fiirth (opened on the 7th of December 1835).

Fiirth was founded, according to tradition, by Charlemagne, who erected a chapel there. It was for a time a Vogtei (advocate- ship) under the burgraves of Nuremberg, but about 13 14 it was

bequeathed to the see of Bamberg, and in 1806 it came into the possession of Bavaria. In 1632 Gustavus Adolphus besieged it in vain, and in 1634 it was pillaged and burnt by the Croats. It owes its rise to prosperity to the tolerance it meted out to the Jews, who found here an asylum from the oppression under which they suffered in Nuremberg. See Fronmiiller, Chronik der Stadt Fiirth (1887).

FURTW ANGLER, ADOLF (1853-1907), German archaeologist, was born at Freiburg im Breisgau, and was educated there, at Leipzig and at Munich, where he was a pupil of H. Brunn, whose comparative method in art-criticism he much developed. He took part in the excavations at Olympia in 1878, became an assistant in the Berlin Museum in 1880, and professor at Berlin (1884) and later at Munich. His latest excavation work was at Aegina. He was a prolific writer, with a prodigious knowledge and memory, and a most ingenious and confident critic; and his work not only dominated the field of archaeological criticism but also raised its standing both at home and abroad. Among his numerous publications the most important were a volume on the bronzes found at Olympia, vast works on ancient gems and Greek vases, and the invaluable Masterpieces of Greek Sculpture (English translation by Eugenie Strong). He died at Athens on the 10th of October 1907.

FURZE, Gorse or Whin; botanical name Ulex (Ger. Stechginster, Fr. ajonc), a genus of thorny papilionaceous shrubs, of few species, confined to west and central Europe and north-west Africa. Common furze, U. europaeus, is found on heaths and commons in western Europe from Denmark to Italy and Greece, and in the Canaries and Azores, and is abundant in nearly all parts of the British Isles. It grows to a height of 2-6 ft. ; it has hairy stems, and the smaller branches end each in a spine; the leaves, sometimes lanceolate on the lowermost branches, are mostly represented by spines from 2 to 6 lines long, and branching at their base; and the flowers, about three-quarters of an inch in length, have a shaggy, yellowish-olive calyx, with two small ovate bracts at its base, and appear in early spring and late autumn. They are yellow and sweet-scented and visited by bees. The pods are few-seeded; their crackling as they burst may often be heard in hot weather. This species comprises the varieties vulgaris, or U. europaeus proper, which has spreading branches, and strong, many-ridged spines, and strictus (Irish furze), with erect branches, and slender 4-edged spines. The other British species of furze is U. nanus, dwarf furze, a native of Belgium, Spain and the west of France; it is a procumbent plant, less hairy than U. europaeus, with smaller and more orange-coloured flowers, which spring from the primary spines, and have a nearly smooth calyx,

with minute basal bracts. Furze, or gorse, is sometimes employed for fences.

Notwithstanding its formidable spines, the young shoots yield a palatable and nutritious winter forage for horses and cattle. To fit it for this purpose it must be chopped and bruised to destroy the spines. This is sometimes done in a primitive and laborious way by laying the gorse upon a block of wood and beating it with a mallet, flat at one end and armed with crossed knife-edges at the other, by the alternate use of which it is bruised and chopped. There are now a variety of machines by which this is done rapidly and efficiently, and which are in use where this kind of forage is used to any extent. The agri- cultural value of this plant has often been over-rated by theoreti- cal writers. In the case of very poor, dry soils it does, however, yield much valuable food at a season when green forage is not otherwise to be had. It is on this account of importance to dairymen; and to them it has this further recommendation, that cows fed upon it give much rich milk, which is free from any unpleasant flavour. To turn it to good account, it must be sown in drills, kept clean by hoeing, and treated as a regular green crop. If sown in March, on land fitly pre- pared and afterwards duly cared for, it is ready for use in the autumn of the following year. A succession of cuttings of proper age is obtained for several years from the same field. It is cut by a short stout scythe, and must be brought from the field daily; for when put in a heap after being

chopped and bruised it heats rapidly. It is given to horses and cows in combination with chopped hay or straw. An acre will produce about 2000 faggots of green two-year-old gorse, weighing 20 lb each.

This plant is invaluable in mountain sheep-walks. The rounded form of the furze bushes that are met with in such situations shows how diligently the annual growth, as far as it is accessible, is nibbled by the sheep. The food and shelter afforded to them in snowstorms by clusters of such bushes is of such importance that the wonder is our sheep farmers do not bestow more pains to have it in adequate quantity. Young plants of whin are so kept down by the sheep that they can seldom attain to a profitable size unless protected by a fence for a few years. In various parts of England it is cut for fuel. The ashes contain a large proportion of alkali, and are a good manure, especially for peaty land.

FUSARO, LA60, a lake of Campania, Italy, 5 m. W. of Baia, and 1 m. S. of the acropolis of Cumae. It is the ancient Acherusia palus, separated from the sea on the W. by a line of sandhills. It may have been the harbour of Cumae in early antiquity. In the 1st century a.d. an artificial outlet was dug for it at its S. end, with a tunnel, lined with opus reticulatum and brick, under the hill of Torregaveta. This hill is covered with the remains of a large villa, which is almost certainly that of Servilius Vatia, described by Seneca {Epist. 55). There are remains of other villas on the shores of the lake. Oyster cultivation is

carried on there.

See J. Beloch, Campanien (2nd ed., Breslau, 1890), 188. (T. As.)

FUSELI, HENRY (1741-1825), English painter and writer on art, of German-Swiss family, was born at Zurich in Switzerland on the 7th of February 1741; he himself asserted in 1745, but this appears to have been a mere whim. He was the second child in a family of eighteen. His father was John Caspar Fiissli, of some note as a painter of portraits and landscapes, and author of Lives of the Helvetic Painters. This parent destined his son for the church, and with this view sent him to the Caroline college of his native town, where he received an excellent classical education. One of his schoolmates there was Lavater, with whom he formed an intimate friendship.

After taking orders in 1761 Fuseli was obliged to leave his country for a while in consequence of having aided Lavater to expose an unjust magistrate, whose family was still powerful enough to make its vengeance felt. He first travelled through Germany, and then, in 1 765, visited England, where he supported himself for some time by miscellaneous writing: there was a sort of project of promoting through his means a regular literary communication between England and Germany. He became in course of time acquainted with Sir Joshua Reynolds, to whom he showed his drawings. By Sir Joshua's advice he then devoted himself wholly to art. In 1770 he made an art-pilgrimage to Italy, where he remained till 1778, changing his name from Fiissli to Fuseli, as more Italian-sounding. Early in 1779 he returned to England, taking Zurich on his way. He found a commission awaiting him from Alderman Boydell, who was then organizing his celebrated Shakespeare gallery. Fuseli painted a number of pieces for this patron, and about this time published an English edition of Lavater's work on physiognomy. He like- wise gave Cowper some valuable assistance in preparing the translation of

Homer. In 1788 Fuseli married Miss Sophia Rawlins (who it appears was originally one of his models, and who proved an affectionate wife), and he soon after became an associate of the Royal Academy. Two years later he was pro- moted to the grade of Academician. In 1799 he exhibited a series of paintings from subjects furnished by the works of Milton, with a view to forming a Milton gallery corresponding to Boydell's Shakespeare gallery. The number of the Milton paintings was forty-seven, many of them v6ry large; they were executed at intervals within nine years. This exhibition, which closed in 1800, proved a failure as regards profit. In 1799 also he was appointed professor of painting to the Academy. Four years afterwards he was chosen keeper, and resigned his pro- fessorship; but he resumed it in 1810, and continued to hold

both offices till his death. In 1805 he brought out an edition of Pilkington's Lives of the Painters, which, however, did not add much to his reputation. Canova, when on his visit to England, was much taken with Fuseli's works, and on returning to Rome in 1817 caused him to be elected a member of the first class in the Academy of St Luke. Fuseli, after a life of uninterrupted good health, died at Putney Hill on the 16th of April 1825, at the advanced age of eighty-four, and was buried in the crypt of St Paul's cathedral. He was comparatively rich at his death, though his professional gains had always appeared to be meagre. As a painter, Fuseli had a daring invention, was original, fertile in resource, and ever aspiring after the highest forms of excellence. His mind was capable of grasping and realizing the loftiest conceptions, which, however, he often spoiled on the canvas by exaggerating the due proportions of the parts, and throwing his figures into attitudes of fantastic and over-strained contortion. He delighted to select from the region of the super- natural, and pitched everything upon an ideal scale, believing a certain amount of exaggeration necessary in the higher branches of historical painting. " Damn Nature! she always puts me out," was his characteristic exclamation. In this theory he was confirmed by the study of Michelangelo's works and the marble statues of the Monte Cavallo, which, when at Rome, he used often to contemplate in the evening, relieved against a murky sky or illuminated by lightning. But this idea was by him carried out to an excess, not only in the forms, but also in the attitudes of his figures; and the violent and intemperate action which he often displays destroys the grand effect which many of his pieces would otherwise produce. A striking illustration of this occurs in his famous picture of " Hamlet breaking from his Attendants to follow the Ghost": Hamlet, it has been said, looks as though he would burst his clothes with convulsive cramps in

all his muscles. This intemperance is the grand defect of nearly all Fuseli's compositions. On the other hand, his paintings are never either languid or cold. His figures are full of life and earnestness, and seem to have an object in view which they follow with rigid intensity. Like Rubens he excelled in the art of setting his figures in motion. Though the lofty and terrible was his proper sphere, Fuseli had a fine perception of the ludicrous. The grotesque humour of his fairy scenes, especially those taken from A Midsummer-Night's Dream, is in its way not less remarkable than the poetic power of his more ambitious works. As a colourist Fuseli has but small claims to distinction. He scorned to set a palette as most artists do; he merely dashed his tints recklessly over it. Not unfrequently he used his paints in the form of a dry powder, which he rubbed up with his pencil with oil, or turpentine, or gold size, regardless of the quantity, and depending for accident on the general effect. This reckless- ness may perhaps be explained by the fact that he did not paint in oil till he was twenty-five years of age. Despite these draw- backs he possessed the elements of a great painter.

Fuseli painted more than 200 pictures, but he exhibited only a minority of them. His earliest painting represented " Joseph interpreting the Dreams of the Baker and Butler"; the first to excite particular attention was the " Nightmare," exhibited in 1782. He produced only two portraits. His sketches or designs numbered about 800; they have admirable qualities of invention and design, and are frequently superior to his paintings. His general powers of mind were large. He was a thorough master of French, Italian, English and German, and could write in all these tongues with equal facility and vigour, though he preferred German as the vehicle of his thoughts. His writings contain passages of the best art-criticism that English literature can show. The principal work is his series of Lectures in the Royal Academy, twelve in number, commenced in 1801.

Many interesting anecdotes of Fuseli, and his relations to con- temporary artists, are given in his Life by John Knowles, who also edited his works in 3 vols. 8vo, London, 1831. (W. M. R.)

FUSEL OIL (from the Ger. Fusel, bad spirits), the name applied to the volatile oily liquids, of a nauseous fiery taste and smell, which are obtained in the rectification of spirituous liquors made by the fermentation of grain, potatoes, the marc of grapes, and

other material, and which, as they are of higher boiling point than ethyl alcohol, occur in largest quantity in the last portions of the distillate. Besides ethyl or ordinary alcohol, and amyl alcohol, which are present in them all, there have been found in fusel oil several other bodies of the C„H 2n+ i-OH series, also certain ethers, and members of the C„H 2n+ i-C0 2 H series of fatty acids. Normal propyl alcohol is contained in the fusel oil of the marc brandy of the south of France, and isoprimary butyl alcohol in that of beet-root molasses. The chief constituent of the fusel oil procured in the manufacture of alcohol from potatoes and grain, usually known as fusel oil and potato-spirit, is isoprimary amyl alcohol, or isobutylcarbinol. Ordinary fusel oil yields also an isomeric amyl alcohol (active amyl alcohol) boiling at about 128°. Variable quantities of fusel oil, less or greater according to the stage of ripening, exist in commercial spirits (see Spirits).

Fusel oil and its chief constituent, amyl alcohol, are direct nerve poisons. In small doses it causes only thirst and headache, with furred tongue and some excitement. In large doses it is a convulsent poison. Impure beverages induce all the graver neurotic and visceral disorders in alcoholism; and, like fusel oil, furfurol and the essence of absinthe, are convulsent poisons. Pure ethyl alcohol intoxication, indeed, is rarely seen, being modified in the case of spirits by the higher alcohols contained in fusel oil. According to Rabuteau the toxic properties of the higher alcohols increase with their molecular weight and boiling point. Richet considers that the fusel oil contained in spirits constitutes the chief danger in the consumption of alcoholic beverages. The expert can immediately detect the peculiarly virulent characters of the mixed intoxication due to the consump- tion of spirits containing a large percentage of fusel oil.

FUSIBLE METAL, a term applied to certain alloys, generally composed of bismuth, lead and tin, which possess the property of melting at comparatively low temperatures. Newton's fusible metal (named after Sir Isaac Newton) contains 50 parts of bismuth, 31-25 of lead and 18-75 of tin; that of Jean Darcet (1725-1801), 50 parts of bismuth with 25 each of lead and tin; and that of Valentin Rose the elder, 50 of bismuth with 28-1 of lead and 24-1 of tin. These melt between 91 and 95° C. The addition of cadmium gives still greater fusibility; in Wood's metal, for instance, which is Darcet's metal with half the tin replaced by cadmium, the melting point is lowered to 66°-7i° C; while another described by Lipowitz and containing 15 parts of bismuth, 8 of lead, 4 of tin and 3 of cadmium, softens at about 55 and is completely liquid a little above 6o°. By the addition of mercury to Darcet's metal the melting point may be

reduced so low as 45°. These fusible metals have the peculiarity of ex- panding as they cool; Rose's metal, for instance, remains pasty for a considerable range of temperature below its fusing point, contracts somewhat rapidly from 8o° to 55 , expands from 55° to 35 , and contracts again from 35 to o°. For this reason they may be used for taking casts of anatomical specimens or making cliches from wood-blocks, the expansion on cooling securing sharp impressions. By suitable modification in the proportions of the components, a series of alloys can be made which melt at various temperatures above the boiling point of water; for example, with 8 parts of bismuth, 8 of lead and 3 of tin the melting point is 123°, and with 8 of bismuth, 30 of lead and 24 of tin it is 172°. With tin and lead only in equal proportions it is 241 . Such alloys are used for making the fusible plugs inserted in the furnace-crowns of steam boilers, as a safeguard in the event of the water-level being allowed to fall too low. When this happens the plug being no longer covered with water is heated to such a temperature that it melts and allows the contents of the boiler to escape into the furnace. In automatic fire-sprinklers the orifices of the pipes are closed with fusible metal, which melts and liberates the water when, owing to an outbreak of fire in the room, the temperature rises above a predetermined limit.

FUSILIER, originally (in French about 1670, in English about 1680) the name of a'soldier armed with a light flintlock musket called the fusil; now a regimental designation. Various forms of flintlock small arms had been used in warfare since the middle

of the 16th century. At the time of the English civil war (1 642-1652) the term " firelock " was usually employed to distinguish these weapons from the more common matchlock musket. The special value of the firelock in armies of the 17 th century lay in the fact that the artillery of the time used open powder barrels for the service of the guns, making it unsafe to allow lighted matches in the muskets of the escort. Further, a military escort was required, not only for the protection, but also for the surveillance of the artillerymen of those days. Companies of " firelocks " were therefore organized for these duties, and out of these companies grew the " fusiliers " who were employed in the same way in the wars of Louis XIV. In the latter part of the Thirty Years' War (1643) fusiliers were simply mounted troops armed with the fusil, as carabiniers were with the carbine. But the escort companies of artillery came to be known by the name shortly afterwards, and the regiment of French Royal Fusiliers, organized in 1 671 by Vauban, was considered the model for Europe. The general adoption of the flintlock musket and the suppression of the pike in the armies of Europe put an end to the original special

duties of fusiliers, and they were subse- quently employed to a large extent in light infantry work, perhaps on account of the greater individual aptitude for detached duties naturally shown by soldiers who had never been restricted to a fixed and unchangeable place in the line of battle. The senior fusilier regiment in the British service, the (7th) Royal Fusiliers (City of London Regiment), was formed on the French model in 1685; the 5th foot (now Northumberland Fusiliers), senior to the 7th in the army, was not at that time a fusilier regiment. The distinctive head-dress of fusiliers in the British service is a fur cap, generally resembling, but smaller than and different in details from, that of the Foot Guards.

In Germany the name " fusilier " is borne by certain infantry regiments and by one battalion in each grenadier regiment.

FUSION, the term generally applied to the melting of a solid substance, or the change of state of aggregation from the solid to the liquid. The term " liquefaction " is frequently employed in the same sense, but is often restricted to the condensation of a gas or vapour. The converse process of freezing or solidifica- tion, the change from the liquid to the solid state, is subject to the same laws, and must be considered together with fusion. The solution of a solid in a foreign liquid, and the deposition or crystallization of a solid from a solution, are so closely related to the fusion of a pure substance, that it will also be necessary to consider some of the analogies which they present.

1. General Phenomena. — There are two chief varieties of the process of fusion, namely, crystalline and amorphous, which are in many ways distinct, although it is possible to find intermediate cases which partake of the characteristics of both. The melting of ice may be taken as a typical case of crystalline fusion. The passage from rigid solid to mobile liquid occurs at a definite surface without any intermediate stage or plastic condition. The change takes place at a definite temperature, the fusing or freezing point (abbreviated F.P.), and requires the addition of a definite quantity of heat to the solid, which is called the latent heat of fusion. There is also in general a considerable- change of volume during fusion, which amounts in the case of ice to a contraction of 9 % . Typical cases of amorphous solidifica- tion arethose of silica, glass, plastic sulphur, pitch, alcohol and many organic liquids. In this type the liquid gradually become more and more viscous as the temperature falls, and ultimately attains the rigidity characteristic of a solid, without any definite freezing point or latent heat. The condition of the substance remains uniform throughout, if its temperature is uniform; there is*

no separation into the two distinct phases of solid and liquid, and there is no sudden change of volume at any temperature.

A change or transition from one crystalline form to anothei may occur in the solid state with evolution or absorption o f heat at a definite temperature, and is analogous to the change from solid to liquid, but usually takes place more sldwly owing to the small molecular mobility of the solid state. Thus rhombic sulphur when heated passes slowly at 95-6° C. into the

monosymmetric form which melts at 1 20 , but if heated rapidly the rhombic form melts at 114- 5- The two forms, rhombic and monosymmetric, can exist in equilibrium at 95-6°, the transition point at which they have the same vapour pressure. Similarly a solid solution of carbon in iron, when cooled slowly, passes at about 700 C, with considerable evolution of heat, into the form of " pearlite," which is soft when cold, but if rapidly chilled the carbon remains in solution and the steel is very hard (see also Alloys).

In the case of crystalline fusion it is necessary to distinguish two cases, the homogeneous and the heterogeneous. In the first case the composition of the solid and liquid phases are the same, and the temperature remains constant during the whole process of fusion. In the second case the solid and liquid phases differ in composition; that of the liquid phase changes continuously, and the temperature does not remain constant during the fusion. The first case comprises the fusion of pure substances, and that of eutectics, or cryohydrates; the second is the general case of an alloy or a solution. These have been very fully studied and their phenomena greatly elucidated in recent years.

There is also a sub-variety of amorphous fusion, which may be styled colloid or gelatinous, and may be illustrated by the behaviour of solutions of water in gelatin. Many of these jellies melt at a fairly definite temperature on heating, and coagulate or set at a definite temperature on cooling. But in some cases the process is not reversible, and there is generally marked hysteresis, the temperature of setting and other phenomena depending on the rate of cooling. This case has not yet been fully worked out; but it appears probable that in many cases the jelly possesses a spongy framework of solid, holding liquid in its meshes or interstices. It might be regarded as a

case of " heterogeneous " amorphous fusion, in which the liquid separates into two phases of different composition, one of which solidifies before the other. The two phases cannot, as a rule, be distinguished optically, but it is generally possible to squeeze out some of the liquid phase when the jelly has set, which proves that the substance is not really homogeneous. In very complicated mixtures, such as acid lavas or slags containing a large proportion of silica, amorphous and crystalline solidification may occur together. In this case the crystals separate first during the process of cooling, the mother liquor increases gradually in viscosity, and finally sets as an amorphous ground-mass or matrix, in which crystals of different kinds and sizes, formed at different stages of the cooling, remain embedded. The formation of crystals in an amorphous solid after it has set is also of frequent occurrence. It is termed devitrification, but is a very slow process unless the solid is in a plastic state.

2. Homogeneous Crystalline Fusion. — The fusion of a solid of this type is characterized most clearly by the perfect constancy of temperature during the process. In fact, the law of constant temperature, which is generally stated as the first of the so-called " laws of fusion," does not strictly apply except to this case. The constancy of the F.P. of "a pure substance is so characteristic that change of the F.P. is often one of the most convenient tests of the presence of foreign material. In the case of substances like ice, which melt at a low temperature and are easily obtained in large quantities in a state of purity, the point of fusion may be very accurately determined by observing the temperature of an intimate mixture of the solid and liquid while slowly melting as it absorbs heat from surrounding bodies. But in the majority of cases it is more convenient to observe the freezing point as the liquid is cooled. By this method it is possible to ensure perfect uniformity of temperature throughout the mass by stirring the liquid continuously during the process of freezing,' whereas it is difficult to ensure uniformity of temperature in melting a solid, however gradually the heat is supplied, unless the solid can be mixed with the liquid. It is also possible to observe the F.P. in other ways, as by noting the temperature at the moment of the breaking of a wire, of the stoppage of a stirrer, or of the maximum rate of change of volume, but these methods are generally less certain in their indications than the

point of greatest constancy of temperature in the case of homogeneous crystalline solids.

Mercury . Potassium . Sodium Tin. . . Bismuth . Cadmium . Lead Zinc

Fusing Points of Common Metals

-38-8 62-5 95-6 231-9 269-2 320-7

327-7 419-0

Antimony

Aluminium

Silver

Gold

Copper .

Nickel

Palladium

Platinum

630°

655°

962°

1064

1082°

1427

1 535° 1710°

The above table contains some of the most recent values of fusing points of metals determined (except the first three and the last three) with platinum thermometers. The last three values are those obtained by extrapolation with platinum- rhodium and platinum-iridium couples. (See Harker, Proc. Roy. Soc. A 76, p. 235, 1905.) Some doubt has recently been raised with regard to the value for platinum, which is much lower than that previously accepted, namely 1775°.

3. Superjusion, Super saturation. — It is generally possible to cool a liquid several degrees below its normal freezing point without a separation of crystals, especially if it is protected from agitation,

which would assist the molecules to rearrange themselves. A liquid in this state is said to be " undercooled " or " superfused." The phenomenon is even more familiar in the case of solutions (e.g. sodium sulphate or acetate) which may remain in the " metastable " condition for an indefinite time if protected from dust, &c. The introduction into the liquid under this condition of the smallest fragment of the crystal, with respect to which the solution is supersaturated, will pro- duce immediate crystallization, which will continue until the temperature is raised to the saturation point by the liberation of the latent heat of fusion. The constancy of temperature at the normal freezing point is due to the equilibrium of exchange existing between the liquid and solid. Unless both solid and liquid are present, there is no condition of equilibrium, and the temperature is indeterminate.

It has been shown by H. A. Miers (Jour. Chent. Soc, 1906, 89, p. 413) that for a supersaturated solution in metastable equili- brium there is an inferior limit of temperature, at which it passes into the " labile " state, i.e. spontaneous crystallization occurs throughout the mass in a fine shower. This seems to be analogous to the fine misty condensation which occurs in a supersaturated vapour in the absence of nuclei (see Vaporization) when the supersaturation exceeds a certain limit.

4. Effect of Pressure on the F.P. — The effect of pressure on the fusing-point depends on the change of volume during fusion. Sub- stances which expand on freezing, like ice, have their freezing points lowered by increase of pressure; substances which expand op fusing, like wax, have their melting points raised by pressure. In each case the effect of pressure is to retard increase of volume. This effect was first predicted by James Thomson on the analogy of the effect of pressure on the boiling point, and was numerically verified by Lord Kelvin in the case of ice, and later by Bunsen in the case of paraffin and spermaceti. The equation by which the change of the F.P. is calculated may be proved by a simple applica- tion of the Carnot cycle, exactly as in the case of vapour and liquid. (See Thermodynamics.) If L be the latent heat of fusion in mechanical units, v' the volume of unit mass of the solid, and v" that of the liquid, the work done in an elementary Carnot cycle of range dd will be dp(v" — v'), if dp is the increase of pressure required to produce a change dd in the F.P. Since the ratio of the work- difference or cycle-area to the heat-transferred L must be equal to dBJB, we have the relation

de/dp = e(v"~v')!L. (1)

The sign of dd, the change of the F.P., is the same as that of the change of volume (v" — v'). Since the change of volume seldom exceeds o-i c.c. per gramme, the change of the F.P. per atmosphere is so small that it is not as a rule necessary to take account of variations of atmospheric pressure in observing a freezing point. A variation of 1 cm. in the height of the barometer would correspond to a change of -oooi ° C. only in the F.P. of ice. This is far beyond the limits of accuracy of most observations. Although the effect of pressure is so small, it produces, as is well known, remarkable results in the motion of glaciers, the moulding and regelation of ice, and many other phenomena. It has also been employed to explain the apparent inversion of the order of crystallization in rocks like granite, in which the arrangement of the crystals indicates that the quartz matrix solidified subsequently to the crystals of

felspar, mica or hornblende embedded in it, although the quartz has a higher melting point. It is contended that under enormous

Pressure the freezing points of the more fusible constituents might e raised above that of the quartz, if the latter is less affected by pressure. Thus Bunsen found the F.P. of paraffin wax 1-4° C. below that of spermaceti at atmospheric pressure. At 100 atmo- spheres the two melted at the same temperature. At higher pressures the paraffin would solidify first. The effect of pressure on the silicates, however, is much smaller, and it is not so easy to explain a change of several hundred degrees in the F.P. It seems more likely in this particular case that the order of crystallization depends on the action of superheated water or steam at high temperatures and pressures, which is well known to exert a highly solvent and metamorphic action on silicates.

5. Variation of Latent Heat. — C. C. Person in 1847 endeavoured to show by the application of the first law of thermodynamics that the increase of the latent heat per degree should be equal to the difference (s"—s') between the specific heats of the liquid and solid. If, for instance, water at o° C. were first frozen and then cooled to — t" C, the heat abstracted per gramme would be (L'+s't) calories. But if the water were first cooled to — i°C.,and then frozen at— t" C, by abstracting heat L", the heat abstracted would be L"--s"t. Assuming that the heat abstracted should be the same in the two cases, we evidently obtain L' —L" = (s" — s')t. This theory has been

approximately verified by Petterson, by observing the freezing of a liquid cooled below its normal F.P. {Jour. Chetn. Soc. 24, p. 151). But his method does not represent the true variation of the latent heat with temperature, since the freezing, in the case of a superfused liquid, really takes place at the normal freezing point. A quantity of heat s"t is abstracted in cooling to —t, {L'—s"t) in raising to 0° and freezing at 0°, and s't in cooling the ice to —t. The latent heat L" at —t does not really enter into the experiment. In order to make the liquid freeze at a different temperature, it is necessary to subject it to pressure, and the effect of the pressure on the latent heat cannot be neglected. The entropy of a liquid " at its F.P. reckoned from any convenient zero fa in the solid state may be represented by the expression

"-fa=fs'd0le+LI&. (2)

Since 6d(f>"ld8 = s", we obtain by differentiation the relation

dLlde=s>.-s'+Lld, (3)

which is exactly similar to the equation for the specific heat of a vapour maintained in the saturated condition. If we suppose that the specific heats s' and s" of the solid and liquid at equilibrium pressure are nearly the same as those ordinarily observed at con- stant pressure, the relation (3) differs from that of Person only by the addition of the term L/6. Since s" is greater than s' in all cases hitherto investigated, and Ljd is necessarily positive, it is clear that the latent heat of fusion must increase with rise of temperature, or diminish with fall of temperature. It is possible to imagine the F.P. so lowered by pressure (positive or negative) that the latent heat should vanish, in which case we should probably obtain a continuous passage from the liquid to the solid state similar to that which occurs in the case of amorphous substances. According to equation (3), the rate of change of the latent heat of water is approximately o-8o calorie per degree at o° C. (as compared with 0-50, Person), if we assume s" = l, and ^'=0-5. Putting (s" — s') =0-5 in equation (2), we find L — o at — 160 C. approximately, but no stress can be laid on this estimate, as the variation of (s"—s') is so uncertain.

6. Freezing of Solutions and Alloys. — The phenomena of freezing of heterogeneous crystalline mixtures may be illustrated by the case of aqueous solutions and of metallic solutions or alloys, which have been most widely studied. The usual effect of an impurity, such as salt or sugar in solution in water, is to lower the freezing point, so that no crystallization occurs until the temperature has fallen below

the normal F.P. of the pure solvent, the depression of F.P. being nearly proportional to the concentration of the solution. When freezing begins, the solvent generally separates out from the solution in the pure state. This separation of the solvent involves an increase in the strength of the remaining solution, so that the temperature does not remain constant during the freezing, but continues to fall as more of the solvent is separated. There is a perfectly definite relation between temperature and concentration at each stage of the process, which may be represented in the form of a curve as AC in fig. 1, called the freezing point curve. The equilibrium temperature, at tfie surface of contact between the solid and liquid, depends only on the composition of the liquid phase and not at all on the quantity of solid present. The abscissa of the F.P. curve represents the composition of that portion of the original solution which remains liquid at any temperature. If instead of starting with a dilute solution we start with a strong solution represented by a point N, and cool it as shown by the

fitnvmtaqr at Huhxtant B in HoliUian*

Fig. i.— F.P. or Solubility Curve : simple case.

vertical line ND, a point D is generally reached at which the solution becomes " saturated." The dissolved substance or " solute " then separates out as the solution is further cooled, and the concentration diminishes with fall of temperature in a definite relation, as indicated by the curve CB, which is called the solubility curve. Though often called by different names, the two curves AC and CB are essentially of a similar nature. To take the case of an aqueous solution of salt as an example, along CB the solution is satur- ated with respect to salt, along AC the solution is saturated with respect to ice. When the point C is reached along either curve, the solution is saturated with respect to both salt and ice. The concentration cannot vary further, and the temperature remains constant, while the salt and ice crystallize out together, maintaining the exact proportions in which they exist in the solution. The resulting solid was termed a cryohydrate by F. Guthrie, but it is really an intimate mixture of two kinds of crystals, and not a chemical compound or hydrate containing the constituents in chemically equivalent proportions. The lowest temperature attainable by means of a freezing mixture is the temperature of the F.P. of the corre- sponding cryohydrate. In a mixture of salt and ice with the least trace of water a saturated brine is quickly formed, which dissolves the ice and falls rapidly in temperature, owing to the absorption of the latent heat of fusion. So long as both ice and salt are present, if the mixture is well stirred,

the solution must necessarily become saturated with respect to both ice and salt, and this can only occur at the cryohydric temperature, at which the two curves of solubility intersect.

The curves in fig. 1 also illustrate the simplest type of freezing point curve in the case of alloys of two metals A and B which do not form mixed crystals or chemical compounds. The alloy corresponding to the cryohydrate, possessing the lowest melting point, is called the eutectic alloy, as it is most easily cast and worked. It generally possesses a very fine-grained structure, and is not a chemical compound. (See Alloys.)

To obtain a complete F.P. curve even for a binary alloy is a laborious and complicated process, but the information contained . in such a curve is often very valuable. It is necessary to operate with a number of different alloys of suitably chosen composition, and to observe the freezing points of each separately. Each alloy should also be analysed after the process if there is any risk of its composition having been altered by oxidation or otherwise. The freezing points are generally best determined by observing the gradual cooling of a considerable mass, which is well stirred so long as it remains liquid. The curve of cooling may most conveniently be recorded, either photo- graphically, using a thermocouple and galvanometer, as in the method of Sir 1 W. Roberts-Austen, or with pen and ink, if a platinum thermometer is avail- able, according to the method put in practice by C. T. Heycock and F. H. Neville. A typical set of curves obtained in this manner is shown in fig. 2. When the pure metal A in cooling reaches its F.P. the temperature suddenly becomes stationary, and remains accurately constant for a considerable period. Often it falls slightly below the F.P. owing to super- fusion, but rises to the F.P. and remains constant as soon as freezing begins. The second curve shows the cooling of A with 10% of another metal B added. The freezing begins at a lower temperature with the separation of pure A. The temperature

Time Stole.. MttuittJ.

Fig. 2. — Cooling Curves of Alloys : typical case.

no longer remains constant during freezing, but falls more and more rapidly as the proportion of B in the liquid increases. When the

eutectic temperature is reached there is a second F.P. or arrest at which the whole of the remaining liquid solidifies. With 20% of B the first F.P. is further lowered, and the tempera- ture falls faster. The eutectic F.P. is of longer duration, but still at the same temperature. For an alloy of the composition of the eutectic itself there is no arrest until the eutectic tempera- ture is reached, at which the whole solidifies without change of temperature. There is a great advantage in recording these curves automatically, as the primary arrest is often very slight, and difficult to observe in any other way.

7. Change of Solubility with Temperature. — The lowering of the F.P. of a solution with increase of concentration, as shown by the F.P. or solubility curves, may be explained and calculated by equation (1) in terms of the osmotic pressure of the dissolved sub- stance by analogy with the effect of mechanical pressure. It is possible in salt solutions to strain out the salt mechanically by a suitable filter or " semi-permeable membrane," which permits the water to pass, but retains the salt. To separate 1 gramme of salt requires the performance of work PV against the osmotic pressure P, where V is the corresponding diminution in the volume of the solution. In dilute solutions, to which alone the following calculation can be applied, the volume V is the reciprocal of the concentration C of the solution in grammes per unit volume, and the osmotic pressure P is equal to that of an equal number of mole- cules of gas in the same space, and may be deduced from the usual equation of a gas,

P = R$/VM = R8C/M, (4)

where M is the molecular weight of the salt in solution, 8 the absolute temperature, and R a constant which has the value 8-32 joules, or nearly 2 calories, per degree C. It is necessary to consider two cases, corresponding to the curves CB and AB in fig, 1, in which the solution is saturated with respect to salt and water respectively. To facilitate description we take the case of a salt dissolved in water, but similar results apply to solutions in other liquids and alloys of metals.

(a) If unit mass of salt is separated in the solid state from a satur- ated solution of salt (curve CB) by forcing out through a semi-permeable membrane against the osmotic pressure P the corre- sponding volume of water V in which it is dissolved, the heat evolved is the latent heat of saturated solution of the salt Q together with the work done PV. Writing (Q+PV) for L, and V for (»'-»') in equation (1), and substituting P for p, we obtain

Q+PV=VBdP/dS, (5)

which is equivalent to equation (1), and may be established by similar reasoning. Substituting for P and V in terms of C from equation (4), if Q is measured in calories, it = 2, and we obtain

*QC=2d*dC/dO, (6)*

which may be integrated, assuming Q constant, with the result

2log e C"IC^QId'-Qle", (7)

where C , C" are the concentrations of the saturated solution corresponding to the temperatures 8′ and 8". This equation may be employed to calculate the latent heat of solution Q from two observations of the solubility. It follows from these equations that Q is of the same sign as dC/d8, that is to say, the solubility increases with rise of temperature if heat is absorbed in the formation of the saturated solution, which is the usual case. If, on the other hand, heat is liberated on solution, as in the case of caustic potash or sulphate of calcium, the solubility diminishes with rise of temperature. (6) In the case of a solution saturated with respect to ice (curve AC) , if one gramme of water having a volume v is separated by freezing, we obtain a precisely similar equation to (5), but with L the latent heat of fusion of water instead of Q, and v instead of V. If the solution is dilute, we may neglect the external work Pv in comparison with L, and also the heat of dilution, and may write P/t for dP/dd, where I is the depression of the F.P. below that of the pure solvent. Substituting for P in terms of V from equation (4), we obtain

t = 26 2 vlLVM=28 2 wlLWM, (8)

where W is the weight of water and w that of salt in a given volume of solution. If M grammes of salt are dissolved in 100 of water, w = M and W=ioo. The depression of the F.P. in this case is called by van t' Hoff the " Molecular Depression of the F.P." and is given by the simple formula

t = -Q28 2 /L. (9) .

Equation (8) may be used to calculate L or M, if either is known, from _ observations of t, 8 and w/W. The results obtained are sufficiently approximate to be of use in many cases in spite of the rather liberal assumptions and approximations effected in the course of the reasoning. In any case the equations give a simple theoretical

basis with which to compare experimental data in order to estimate the order of error involved in the assumptions. We may thus estimate the variation of the osmotic pressure from the value given by the gaseous equation, as the concentration of the

solution or the molecular dissociation changes. The most un- certain factor in the formula is the molecular weight M, since the molecule in solution may be quite different from that denoted by the chemical formula of the solid. In many cases the molecule of a metal in dilute solution in another metal is either monatomic, or forms a compound molecule with the solvent containing one atom of the dissolved metal, in which case the molecular depression is given by putting the atomic weight for M. In other cases, as Cu, Hg, Zn, in solution in cadmium, the depression of the F.P. per atom, according to Heycock and Neville, is only half as great, which would imply a diatomic molecule. Similarly As and Au in Cd appear to be triatomic, and Sn in Pb tetratomic. Intermediate cases may occur in which different molecules exist together in equilibrium in proportions which vary according to the temperature and concentration. The most familiar case is that of an electrolyte, in which the molecule of the dissolved substance is partly dissociated into ions. In such cases the degree of dissociation may be estimated by observing the depression of the F.P., but the results obtained cannot always be reconciled with those deduced by other methods, such as measurement of electrical conductivity, and there are many difficulties which await satisfactory interpretation.

Exactly similar relations to (8) and (9) apply to changes of boiling point or vapour pressure produced by substances in solution (see Vaporization), the laws of which are very closely connected with the corresponding phenomena of fusion; but the consideration of the vapour phase may generally be omitted in dealing with the fusion of mixtures where the vapour pressure of either constituent is small.

8. Hydrates. — The simple case of a freezing point curve, illustrated in fig. 1, is generally modified by the occurrence of compounds of a character analogous to hydrates of soluble salts, in which the dissolved substance combines with one or more molecules of the solvent. These hydrates may exist as compound molecules in the solution, but their composition cannot be demonstrated unless they can be separated in the solid state. Corresponding to each crystalline hydrate there is gener- ally a separate branch of the solubility curve along which the crystals of the hydrate are in equilibrium with the saturated solution. At any given temperature the hydrate possessing the least solubility is the most stable. If two are present in contact

with the same solution, the more soluble will dissolve, and the less soluble will be formed at its expense until the conversion is complete. The two hydrates cannot be in equilibrium with the same solution except at the temperature at which their solu- bilities are equal, i.e. at the point where the corresponding curves of solubility intersect. This temperature is called the " Transi- tion Point." In the case of ZnS0 4 , as shown in fig. 3, the hepta- hydrate, with seven molecules of water, is the least soluble hydrate at ordinary tern- peratures, and is generally deposited from saturated solutions. Above 39 C, however, the hexahydrate, with six molecules, is less soluble, and a rapid conver- sion of the hepta- into the hexahydrate occurs if the former is heated above the transition point. The solu- bility of the hexahydrate is greater than that of the heptahydrate below 39°, but increases more slowly with rise of temperature. At about 8o° C. the hexahydrate gives place to the monohydrate, which dissolves in water with evolution of heat, and diminishes in solubility with rise of temperature. Intermediate hydrates exist, but they are more soluble, and cannot be readily isolated. Both the mono- and hexahydrates are capable of existing in equilibrium with saturated solutions at temperatures far below their transition points, provided that the less soluble hydrate is not present in the crystalline form. The solubility curves can therefore be traced, as in fig. 3, over an extended range of tem- perature. The equilibrium of each hydrate with the solvent, considered separately, would present a diagram of two branches similar to fig. 1, but as a rule only a small portion of each curve can be realized, and the complete solubility curve, as experi- mentally determined, is composed of a number of separate pieces corresponding to the ranges of minimum solubility of different hydrates. Failure to recognize this, coupled with the

amva

*V 1/^*

nn^o

**mtjL.*

- 1 y¥ 14,0

*1 *4*

p'/'f?>-

Av~~

ur~~.

*, (I 10 SO SO 40 50 et tirammts efSdHantodiinlOOGivunmea otSatutiw**

Fig. 3. — Solubility Curves of Hydrates.

fact that in strong and viscous solutions the state of equilibrium is but slowly attained, is the probable explanation of the remark- able discrepancies existing in many recorded data of solubility. Transition Points of Hydrates. Na 2 CrO 4 -10H 2 O. . 19-9° NaBr-2H 2 . . .50-7° NajSO.-lOHjO . . 32-4° MnCl 2 -4H 2 . . .57-8° Na 2 CO 3 -10H 2 O . .35-1° Na 3 P0 4 -12H 2 . . 73'4° Na 2 S20 3 -5H 2 . . 48-0° Ba(OH) s -8H 4 . . 77'9°

The transition points of the hydrates given in the above list Richards, Proc. Amer. Acad., 1899, 34, p. 277) afford well- fiiarked constant temperatures which can be utilized as fixed points for experimental purposes.

9. formation of Mixed Crystals. — An important exception to the general type already described, in which the addition of a dissolved substance lowers the F.P. of the solvent, is presented by the formation of mixed crystals, or " solid solutions," in which the solvent and solute occur mixed in varying proportions. This isomorphous replacement of one substance by another, in the same crystal with little or no change of form, has long been known and studied in the case of minerals and salts, but the relations between composition and melting-point have seldom been investigated, and much still remains obscure. In this case the process of freezing does not necessitate the performance of work of separation of the constituents of the solution, the F.P. is not necessarily depressed, and the effect cannot be calculated by the usual formula for dilute solutions. One of the simplest types of F.P. curve which may result from the occurrence of mixed crystals is illustrated by the case of

alloys of gold and silver, or gold and platinum, in which the F.P. curve is nearly a straight line joining the freezing-points of the constituents. The equilibrium between the solid and liquid, in both of which the two metals are capable of mixing in all proportions, bears in this case an obvious and close analogy to the equilibrium between a mixed liquid (e.g. alcohol and water) and its vapour. In the latter case, as is well known, the vapour will contain a larger proportion of the more volatile constituent. Similarly in the case of the formation of mixed crystals, the liquid should contain a larger proportion of the more fusible constituent than the solid with which it is in equilibrium. The composition of the crystals which are being deposited at any moment will, therefore, necessarily change as solidification proceeds, following the change in the composition of the liquid, and the temperature will fall until the last portions of the liquid to solidify will consist chiefly of the more fusible constituent, at the F.P. of which the solidification will be complete. If, however, as seems to be frequently the case, the composition of the solid and liquid phases do not greatly differ from each other, the greater part of the solidification will occur within a comparatively small range of temperature, and the initial F.P. of the alloy will be well marked. It is possible in this case to draw a second curve representing the composition of the solid phase which is in equilibrium with the liquid at any temperature. This curve will not represent the average composition of the crystals, but that of the outer coating only which is in equilibrium with the liquid at the moment. H. W. B. Roozeboom (Zeit. Phys. Chem. xxx. p. 385) has attempted to classify some of the possible cases which may occur in the formation of mixed crystals on the basis of J. W. Gibbs's thermodynamic potential, the general properties of which may be qualitatively deduced from a consideration of observed phenomena. But although this method may enable us to classify different types, and even to predict results in a qualitative manner, it does not admit of numerical calculation similar to equation (8), as the Gibbs's function itself is of a purely abstract nature and its form is unknown. There is no doubt that the formation of mixed crystals may explain many apparent anomalies in the study of F.P. curves. The whole subject has been most fruitful of results in recent years, and appears full of promise for the future.

For further details in this particular branch the reader may consult a report by Neville {Brit. Assoc. Rep., 1900), which contains numerous references to original papers by Roberts-Austen, Le Chatelier, Roozeboom and others. For the properties of solutions see Solu- tion. (H. L. C.)

FUSSEN, a town of Germany, in the kingdom of Bavaria, at the foot

of the Alps (Tirol), on the Lech, 2500 ft. above the sea, with a branch line to Oberdorf on the railway to Augsburg. Pop. 4000. It has six Roman Catholic churches, a Franciscan monas- tery and a castle. Rope-making is an important industry. The castle, lying on a rocky eminence, is remarkable for the peace signed here on the 22nd of April 1745 between the elector Maximilian III., Joseph of Bavaria and Maria Theresa. Two miles to the S.E., immediately on the Austrian frontier, romanti- cally situated on a rock overlooking the Schwanensee, is the magnificent castle of Hohenschwangau, and a little to the north, on the site of an old castle, that ofNeuschwanstein, built by Louis II. of Bavaria.

See H. Feistle, Fiissen und Umgebung (1898).

FUST, JOHANN (7-1466), early German printer, belonged to a rich and respectable burgher family of Mainz, which is known to have flourished from 1423, and to have held many civil and religious offices. The name was always written Fust, but in 1506 Johann Schoffer, in dedicating the German translation of Livy to the emperor Maximilian, called his grandfather Faust, and thenceforward the family assumed this name, and the Fausts of Aschaffenburg, an old and quite distinct family, placed Johann Fust in their pedigree. Johann's brother Jacob, a goldsmith, was one of the burgomasters in 1462, when Mainz was stormed and sacked by the troops of Count Adolf of Nassau, on which occasion he seems to have perished (see a document, dated May 8, 1463, published by Wyss in Quartalbl. des hist. Vereins fiir Hessen, 1879, p. 24). There is no evidence that, as is commonly asserted, Johann Fust was a goldsmith, but he appears to have been a money-lender or banker. On account of his connexion with Gutenberg (q.v.), he has been represented by some as the inventor of printing, and the instructor as well as the partner of Gutenberg, by others as his patron and benefactor, who saw the value of his discovery and supplied him with means to carry it out, whereas others paint him as a greedy and crafty speculator, who took advantage of Gutenberg's necessity and robbed him of the fruits of his invention. However this may be, the Helmasperger document of November 6, 1455, shows that Fust advanced money to Gutenberg (apparently 800 guilders in 1450, and another 800 in 1452) for carrying on his work, and that Fust, in 1455, brought a suit against Gutenberg to recover the money he had lent, claiming 2020 (more correctly 2026) guilders for principal and interest. It appears that he had not paid in the 300 guilders a year which he had undertaken to furnish for expenses, wages, &c, and, according to Gutenberg, had said that he had no intention of claiming interest. . The suit was apparently decided in Fust's favour, November 6, 1455, in the

refectory of the Barefooted Friars of Mainz, when Fust made oath that he himself had borrowed 1550 guilders and given them to Gutenberg. There is no evidence that Fust, as is usually supposed, removed the portion of the printing materials covered by his mortgage to his own house, and carried on printing there with the aid of Peter Schoffer, of Gernsheim (who is known to have been a scriptor at Paris in 1449), to whom, probably about 145 s, 1 he gave his only daughter Dyna or Christina in marriage. Their first publication was the Psalter, August 14, 1457, a folio of 350 pages, the first printed book with a complete date, and remarkable for the beauty of the large initials printed each in two colours, red and blue, from types made in two pieces. 2 The Psalter was reprinted with the same types, 1459 (August 29), 1490, 1502 (Schoffer's last publication) and 1516. Fust and Schoffer's other works are given below. 3 In 1464 Adolf

1 This date is uncertain ; some place the marriage in 1453 or soon after, others about 1464. It is probable that Fust alluded to this relationship when he spoke of Schoffer as pueri mei in the colophons of Cicero's De officiis of 1465 and 1466.

2 This method was patented in England by Solomon Henry in 1780, and by Sir William Congreve in 1819.

3 (3) Durandus, Rationale divinorum officiorum (1459), folio, 160 leaves; (4) the Clementine Constitutions, with the gloss of Johannes Andreae (1460), 51 leaves; (5) Biblia Sacra Latina (1462), folio, 2 vols., 242 and 239 leaves, 48 lines to a full page; (6) the Sixth Book of Decretals, with Andreae's gloss, 17th December 1465, folio, 141 leaves; (7) Cicero, De officiis (1465). 4to, 88 leaves, the first

of Nassau appointed for the parish of St Quintin three Baumeisters (master-builders) who were to choose twelve chief parishioners as assistants for life. One of the first of these " Vervaren," who were named on May-day 1464, was Johannes Fust, and in 1467 Adam von Hochheim was chosen instead of " the late " (selig) Johannes Fust. Fust is said to have gone to Paris in 1466 and to have died of the plague, which raged there in August and September. He certainly was in Paris on the 4th of July, when he gave Louis de Lavernade of the province of Forez, then chancellor of the duke of Bourbon and first president of the parliament of Toulouse, a copy of his second

edition of Cicero, as appears from a note in Lavernade's own hand at the end of the book, which is now in the library of Geneva. But nothing further is known than that on the 30th of October, probably in 1471, an annual mass was instituted for him by Peter Schoffer, Conrad Henlif (for Henekes, or Henckis, Schoffer's partner ? who married Fust's widow about 1468 J) and Johann Fust (the son), in the abbey-church of St Victor of Paris, where he was buried; and that Peter Schoffer founded a similar memorial service for Fust in 1473 in the church of the Dominicans at Mainz (Bockenheimer, Gesch. der Stadt Mainz, iv. 1 5).

Fust was formerly often confused with the famous magician Dr Johann Faust, who, though an historical figure, had nothing to do with him (see Faust).

See further the articles Gutenberg and Typography. (J. H. H.)
FUSTEL DE COULANGES, NUMA DENIS (1830-1889), French historian, was born in Paris on the 18th of March 1830, of Breton descent. After studying at the ficole Normale Superieure he was sent to the French school at Athens in 1853, directed some excavations in Chios, and wrote an historical account of the island. After his return he filled various educational offices, and took his doctor's degree with two theses, Quid Vestae cullus in institutes veterum privatis publicisque valuerit and Polybe, ou la Gr'ece conquise par les Romains (1858). In these works his distinctive qualities were already revealed. His minute knowledge of the language of the Greek and Roman institutions, coupled with his low estimate of the conclusions of contemporary scholars, led him to go direct to the original texts, which he read without political or religious bias. When, however, he had succeeded in extracting from the sources a general idea that seemed to him clear and simple, he attached himself to it as if to the truth itself, employing dialectic of the most penetrating, subtle and even paradoxical character in his deduction of the logical consequences. From i860 to 1870 he was professor of history at the faculty of letters at Strassburg, where he had a brilliant career as a teacher, but never yielded to the influence exercised by the German universities in the field of classical and Germanic antiquities.

It was at Strassburg that he published his remarkable volume La Cite antique (1864), in which he showed forcibly the part played by religion in the political and social evolution of Greece and Rome. Although his making religion the sole factor of this evolution was a perversion of the historical facts, the book was so consistent throughout, so full of ingenious ideas, and written in so striking a style, that it ranks as one of the masterpieces of the French language

in the 19th century. By this literary merit Fustel set little store, but he clung tenaciously to his

edition of a Latin classic and the first book containing Greek characters, while in the colophon Fust for the first time calls Schoffer " puerum suum "; (8) the same, 4th February 1466; (9) Grammatica rhytmica (1466), foiio, 11 leaves. They also printed in 1461-1462 several papal bulls, proclamations of Adolf of Nassau, &c. Nothing is known to have appeared for three years after the storming and capture of Mainz in 1462.

1 Some confusion in the history of the Fust family has arisen since the publication of Bernard's Orig. de Vimprimerie (1853)1 On p. 262, vol. i. he gave an extract from the correspondence between Oberlin and Bodmann (now preserved in the Paris Nat. Library), from which it would appear that Peter Schoffer was the son-in-law, not of Johann Fust, but of a brother of his, Conrad Fust. Of the latter, however, no other trace has been found, and he is no doubt a fiction of F. J. Bodmann, who, partly basing himself on the " Conrad " (Henlif, or Henckis) mentioned above, added the rest to gratify Oberlin (see Wyss in Quartalblatter des hist. Vereins fur Hessen, 1879, p. 17).

theories. When he revised the book in 1875, his modifications were very slight, and it is conceivable that, had he recast it, as he often expressed the desire to do in the last years of his life, he would not have abandoned any part of his fundamental thesis. The work is now largely superseded.

Fustel de Coulanges was the most conscientious of men, the most systematic and uncompromising of historians. Appointed to a lectureship at the ficole Normale Superieure in February 1870, to a professorship at the Paris faculty of letters in 1875, and to the chair of medieval history created for him at the Sorbonne in 1878, he applied himself to the study of the political institutions of ancient France. The invasion of France by the German armies during the war of 1870-71 attracted his attention to the Germanic invasions under the Roman Empire. Pursuing the theory of J. B. Dubos, but singularly transforming it, he maintained that those invasions were not marked by the violent and destructive character usually attributed to them; that the penetration of the German barbarians into Gaul was a slow process; that the Germans submitted to the imperial administration ; that the political institutions of theMerovingians had their origins in the Roman laws at least as much as, if not more than, in German usages; and, consequently, that there was no conquest of Gaul by the

Germans. This thesis he sustained brilliantly in his Histoire des institutions poliliques de I'ancienne France, the first volume of which appeared in 1874. It was the author's original intention to complete this work in four volumes, but as the first volume was keenly attacked in Germany as well as in France, Fustel was forced in self-defence to recast the book entirely. With admirable conscientiousness he re-examined all the texts and wrote a number of dissertations, of which, though several (e.g. those on the Germanic mark and on the allodium and beneficium) were models of learning and sagacity, all were dominated by his general idea and characterized by a total disregard for the results of such historical disciplines as diplomatic. From this crucible issued an entirely new work, less well arranged than the original, but richy in facts and critical comments. The first volume was expanded into three volumes, La Gaule romaine (1891), L'Invasion germanique el la fin de l'empire(i&gi)a.nd La Monarchie franque(i&&&) , followed by three other volumes, L' Alien et le domaine rural pendant Vtpoque merovingienne (1880), Les Origines du systeme fSodal: le binSfice et le patronat . . . (1890) and Les Transformations de la royautS pendant I'epoque carolingienne (1892). Thus, in six volumes, he had carried the work no farther than the Carolingian period. The result of this enormous labour, albeit worthy of a great historian, clearly showed that the author lacked all sense of historical proportion. He was a diligent seeker after the truth, and was perfectly sincere when he informed a critic of the exact number of " truths " he had discovered, and when he remarked to one of his pupils a few days before his death, " Rest assured that what I have written in my book is the truth." Such superb self-confidence can accomplish much, and it undoubtedly helped to form Fustel's talent and to give to his style that admirable concision which subjugates even when it fails to convince; but a student instinctively distrusts an historian who settles the most controverted problems with such impassioned assurance. The dissertations not embodied in his great work were collected by himself and (after his death) by his pupil, Camille Jullian, and published as volumes of miscellanies: Recherches sur quelques problemes d' histoire (1885), dealing with the Roman colonate, the land system in Normandy, the Germanic mark, and the judiciary organization in the kingdom of the Franks; Nouvelles recherches sur quelques problemes d'histoire (1891); and Questions historiques (1893), which contains his paper on Chios and his thesis on Polybius.

His life was devoted almost entirely to his teaching and his books. In 1875 he was elected member of the Academie des Sciences Morales,

and in 1880 reluctantly accepted the post of director of the ficole Normale. Without intervening personally in French politics, he took a keen interest in the questions of administration and social reorganization arising from the fall of the imperialist regime and the disasters of the war. He wished

the institutions of the present to approximate more closely to those of the past, and devised for the new French constitution a body of reforms which reflected the opinions he had formed upon the democracy at Rome and in ancient France. But these were dreams which did not hold him long, and he would have been scandalized had he known that his name was subsequently used as the emblem of a political and religious party. He died at Massy (Seine-et-Oise) on the 1 2th of September 1880. Through- out his historical career — at the Ecole Normale and the Sorbonne and in his lectures delivered to the empress Eugenie — his sole aim was to ascertain the truth, and in the defence of truth his polemics against what he imagined to be the blindness and insincerity of his critics sometimes assumed a character of harsh- ness and injustice. But, in France at least, these critics were the first to render justice to his learning, his talents and his disinterestedness.

See Paul Guiraud, Fustel de Coulanges (1896) ; H. d'Arbois de Jubainville, Deux Manures d'Scrire Vhistoire: critique de Bossuet, d'Augustin Thierry et de Fustel de Coulanges (1896); and Gabriel Monod, Portraits et souvenirs (1897). (C. B.)*

FUSTIAN, a term which includes a variety of heavy woven cotton fabrics, chiefly prepared for men's wear. It embraces plain twilled cloth called jean, and cut fabrics similar to velvet, known as velveteen, moleskin, corduroy, &c. The term was once applied to a coarse cloth made of cotton and flax; now, fustians are usually of cotton and dyed various colours. In the reign of Edward III. the name was given to a woollen fabric. The name is said to be derived from El-Fustat, a suburb of Cairo, where it was first made; and certainly a kind of cloth has long been known under that name. In a petition to parliament, temp. Philip and Mary, " fustian of Naples " is mentioned. In the 13th and 14th centuries priests' robes and women's dresses were made of fustian, but though dresses are still made from some kinds the chief use is for labourers' clothes.

FUSTIC (Fr. fustoc, from Arab, fustuq, Gr. ino-ratcri, pistachio) Yellow Wood or Old Fustic, a dye-stuff consisting of the wood of Chlorophora lincloria, a large tree of the natural order Moraceae, growing in the West Indies and tropical America. Fustic occurs in commerce in blocks, which are brown without, and of a brownish-yellow within. It is sometimes employed for inlaid work. The dye-stuff termed young fustic or Zante fustic, and also Venetian sumach, is the wood of Rhus cotinus (fustet, or smoke tree), a southern European and Asiatic shrub of the natural order Anacardiaceae, called by Gerarde " red sumach," and apparently the " coccygia " and " cotinus " of Pliny {Nat. Hist. xiii. 41, xvi. 30). Its colouring matter is fisetin, Ci6Hi O 6 , which was synthesized by S. von Kostanecki (Ber., 1904, 37, p. 384). (See Dyeing.)

FUTURES, a term used in the produce markets for purchases or sales of commodities to be completed at a future date, as opposed to cash or " spot " transactions, which are settled immediately. See Market, and (for a detailed discussion of the question as affecting cotton) Cotton: MarketingandSupply.

FUX, JOHANN JOSEPH (1660-1741), Austrian musician, was born at Hirtenfeld (Styria) in 1660. Of his youth and early training nothing is known. In 1696 he was organist at one of the principal churches of Vienna, and in 1698 was appointed by the emperor Leopold I. as his " imperial court-composer," with a salary of about £6 a month. At the court of Leopold and of his successors Joseph I. and Charles VI., Fux remained for the rest of his life. To his various court dignities that of organist at St Stephen's cathedral was added in 1704. He married the daughter of the government secretary Schnitzbaum. As a proof of the high favour in which he was held by the art-loving Charles VI., it is told that at the coronation of that emperor as king of Bohemia in 1723 an opera, La Constanza e la Fortezza, especially composed by Fux for the occasion, was given at Prague in an open-air theatre. Fux at the time was suffering from gout, but the emperor had him carried in a litter all the way from Vienna, and gave him a seat in the imperial box. Fux died at Vienna on the 13th of February 1741. His life, although passed in the great world, was eventless, and his only

troubles arose from the intrigues of his Italian rivals at court. Of the numerous operas which Fux wrote it is unnecessary to speak. They do not essentially differ from the style of the Italian opera seria of the time. Of greater importance are his sacred compositions, psalms, motets, oratorios and masses, the celebrated Missa Canonica amongst the latter. It is an all but unparalleled lour de force of

learned musicianship, being written entirely in that most difficult of contrapuntal devices — the canon. As a contrapuntist and musical scholar generally, Fux was unsurpassed by any of his contemporaries, and his great theoretical work, the Gradus ad Parnassum, long remained by far the most thorough treatment of counter- point and its various developments. The title of the original Latin edition is Gradus ad Parnassum sive manuductio ad compositionem musicae regularem, methoda nova ac certa nondum ante tarn exacta ordine in lucem edita, elaborata a Joanne Josepho Fux (Vienna, 1715). It was translated into most European languages during the 18th century, and is still studied by musicians interested in the history of their art. The expenses of the publication were defrayed by the emperor Charles VI.

Fux's biography was published by Ludwig von Kochel (Vienna, 1871). It is based on minute original research and contains, amongst other valuable materials, a complete catalogue of the composer's numerous works.

FUZE or Fuse, an appliance for firing explosives in blasting operations, military shells, &c. (see Blasting and Ammunition, § Shell). The spelling is not governed by authority, but modern convenience has dictated the adoption of the " z " by military engineers as a general rule, in order to distinguish this sense from that of melting by heat (see below). The word, according to the New English Dictionary, is one of the forms in which the Lat. fusus, spindle, has been adapted through Romanic into English, the ordinary fuze taking the shape of a spindle-like tube. Similarly the term "fusee" (Fr. fusee, spindle full of tow, Late La.t. fusata) is applied to a coned spindle sometimes used in the wheel train of watches and spring clocks to equalize the action of the mainspring (see Watch) ; and the application of the same term to a special kind of match may also be due to its resemblance to a spindle. Again, in heraldry, another form, " fusil," derived through the French from a Late Lat. diminutive (fusillus or fusellus) of this same fusus, is used of a bearing, an elongated lozenge. According to other etymological authorities, however (see Skeat, Etym. Diet., 1.898), " fuze " or " fuse," and " fusee " in the sense of match, are all forms derived through the Fr. fusil, from Late La.t.focile, steel for striking fire from a flint, from Lat. focus, hearth. The Fr. fusil and English " fusil " were thus transferred to the " firelock," i.e. the light musket of the 17th century (see Fusilier).

In electrical engineering a " fuse " (always so spelled) is a safety device, commonly consisting of a strip or wire of easily fusible metal,

which melts and thus interrupts the circuit of which it forms part, whenever that circuit, through some accident or derangement, is caused to carry a current larger than that for which it is intended. In this sense the word must be con- nected with fusus, the past participle of Lat. fundere, to pour, whence comes the verb " fuse," to melt by heat, often used figuratively in the sense of blend, mix.

FYNE, LOCH, an inlet of the sea, Argyllshire, Scotland. From the head, 6 m. above Inveraray, to the mouth on the Sound of Bute, it has a south-westerly and then southerly trend and is 44 m. long, its width varying from \ m. to 6 m. It receives the Fyne, Shira, Aray and many other streams, and, on the western side, gives off Lochs Shira, Gair, Gilp (with Ardrishaig, the Grinan Canal and Lochgilphead) and East Tarbert (withTarbert village). The glens debouching on the lake are Fyne, Shira, Aray, Kinglas and Hell's Glen. The coast generally is picturesque and in many parts well wooded. All vessels using the Crinan Canal navigate the loch to and from Ardrishaig, and there are daily excursions during the season, as far up as Inveraray. There are ferries at St Catherine's and Otter, and piers at Tarbert, Ardrishaig, Kilmory, Crarae, Furnace, Inveraray, Strachur and elsewhere. The industries comprise granite quarrying at Furnace

and Crarae, distilling at Ardrishaig, gunpowder-making at Furnace and Kilfinan, and, above all, fishing. Haddock, whiting and codling are taken, and the famous " Loch Fyne herrings " command the highest price in the market.

FYRD. the name given to the English army, or militia, during the Anglo-Saxon period (see Army, 60). It is first mentioned in the Anglo-Saxon Chronicle under the date 605. The ealdorman, or sheriff, of the shire was probably charged with the duty of calling out and leading the fyrd, which appears always to have retained a local character, as during the time of the Danish invasions we read of the fyrd of Kent, of Somerset and of Devon. As attendance at the fyrd was included in the trinoda necessitas it was compulsory on all holders of land; but that it was not confined to them is shown by the following extract from the laws of Ine, king of the West Saxons, dated about 690, which prescribes the penalty for the serious offence of neglecting the fyrd: " If a gesithcund man owning land neglect the fyrd, let him pay 120 shillings, and forfeit his land; one not owning land 60 shillings; aceorlish man 30 shillings as fyrdwite." The fyrd

was gradually superseded by the gathering of the thegns and their retainers, but it was occasionally called out for defensive purposes even after the Norman Conquest.

FYT, JOHANNES (1609-1661), Belgian animal painter, was born at Antwerp and christened on the 19th of August 1609. He was registered apprentice to Hans van den Berghe in 162 1. Professionally van den Berghe was a restorer of old pictures rather than a painter of new ones. At twenty Johannes Fyt entered the gild of St Luke as a master, and from that time till his death in 1661 he produced a vast number of pictures in which the bold facility of Snyders is united to the powerful effects of Rembrandt, and harmonies of gorgeous tone are not less conspicuous than freedom of touch and a true semblance of nature. There never was such a master of technical processes as Fyt m thejrenderiug of animal life in its most varied forms. He may have been less correct in outline, less bold in action than Snyders, but he was much more skilful and more true in the reproduction of the coat of deer, dogs, greyhounds, hares and monkeys, whilst in realizing the plumage of peacocks, woodcocks, ducks, hawks, and cocks and hens, he had not his equal, nor was any artist even of the Dutch school more effective in relieving his compositions with accessories of tinted cloth, porcelain ware, vases and fruit. He was not clever at figures, and he sometimes trusted for these to the co-operation of Cor- nelius Schut or Willeborts, whilst his architectural backgrounds were sometimes executed by Quellyn. " Silenus amongst Fruit and Flowers," in the Harrach collection at Vienna, " Diana and her Nymphs with the Produce of the Chase," in the Belvedere at Vienna, and " Dead Game and Fruit in front of a Triumphal Arch," belonging to Baron von Rothschild at Vienna, are specimens of the co-operation respectively of Schut, Willeborts and Quellyn. They are also Fyt's masterpieces. The earliest dated work of the master is a cat grabbing at a piece of dead poultry near a hare and birds, belonging to Baron Cetto at Munich, and executed in 1644. The latest is a " Dead Snipe

with Ducks," of 1660, sold with the Jager collection at Cologne in 1 87 1. Great power is shown in the bear and boar hunts at Munich and Ravensworth castle. A " Hunted Roedeer with Dogs in the Water," in the Berlin. Museum, has some of the life and more of the roughness of Snyders, but lacks variety of tint and finish. A splendid specimen is the Page and Parrot near a table covered with game, guarded by a dog staring at a monkey, in the Wallace collection. With the needle and the brush Fyt was equally clever. He etched 16 plates, and those repre- senting dogs are of their kind unique.

FYZABAD, or Faizabad, a city, district and division of British India in the United Provinces. The city stands on the left bank of the river Gogra, 78 m. by rail E. of Lucknow. Pop. (1901) 75,085. To the E, of Fyzabad, and now forming a suburb, is the ancient site of Ajodhya (q.v.). Fyzabad was founded about 1730 by Sa'adat Ali Khan, the first nawab wazir of Oudh, who built a hunting-lodge here. It received its present name in the reign of his successor; and Shuja-ud-daula, the third nawab, laid out a large town and fortified it, and here he was buried. It was afterwards the residence of the Begums of Oudh, famous in connexion with the impeachment of Warren Hastings. When the court of Oudh was removed to Lucknow in 1775 all the leading merchants and bankers abandoned the place. At the census of 1869 Fyzabad contained only 37,804 inhabitants; but it is now again advancing in prosperity and population. On the outbreak of the Mutiny in 1857, the canton- ment contained two regiments of infantry, a squadron of cavalry, and a light field battery of artillery — all natives. Owing to their threatening demeanour after the Meerut massacre, many of the European women and children were sheltered by one of the great landholders of Oudh, and others were sent to less disturbed parts of the country. The troops rose, as was antici- pated, and although they at first permitted their officers to take boats and proceed towards Dinapur, a message was afterwards sent to a rebel force lower down the river to intercept the fugitives. Of four boats, one, having passed the rebels unnoticed, succeeded in reaching Dinapur safely. Of those in the other three boats, one alone escaped. Fyzabad is now a station for European as well as for native troops. It is the headquarters of a brigade in the 8th division of the northern army. There is a government college. Sugar-refining and trade in agricultural produce are important.

The District of Fyzabad, lying between the two great rivers Gogra and Gumti, has an area of 1740 sq. m. It is entirely alluvial and well wooded, and has a good climate. Pop. (1901) i» 22 5,374, an increase of -7% in the decade. The district is traversed throughout its length by the Oudh and Rohilkhand railway from Lucknow to Benares, with a branch to Allahabad. Tanda, with a population in 1901 of 19,853, has the largest production of cotton goods in Oudh.

The Division of Fyzabad has an area of 12,113 sq. m., and comprises the six districts of Fyzabad, Gonda, Bahraich, Sultanpur, Partabgarh andBara Banki. Pop. (1901) 6,855,991, an increase of 2 % in the decade.

GˆGABBRO

GThe form of this letter which is familiar to us is an invention of the Romans, who had previously converted the third symbol of the alphabet into a representative of a £-sound (see C) . Throughout the whole of Roman history C remained as the symbol for G in the abbreviations C and Cn. for the proper names Gaius and Gnaeus. According to Plutarch (Roman Questions, 54, 59) the symbol for G was invented by Spurius Carvilius Ruga about 293 B.C. This probably means that he was the first person to spell his cognomen RVGA instead of RVCA. G came to occupy the seventh place in the Roman alphabet which had earlier been taken by Z, because between 450 B.C. and 350 B.C. the z-sounds of Latin passed into r, names like Papisius and Fusius in that period becoming Papirius and Furius (see Z), so that the letters had become superfluous. According to the late writer Martianus Capella z was removed from the alphabet by the censor Appius Claudius Caecus in 3 1 2 B.C. To Claudius the insertion of G into the alphabet is also sometimes ascribed.

In the earliest form the difference from C is very slight, the lower lip of the crescent merely rising up in a straight line Gj but Q and Q are found also in republican times. In the earliest Roman inscription which was found in the Forum in 1899 the form is ˆ written from right to left, but the hollow at the bottom lip of the crescent is an accidental pit in the stone and not a diacritical mark. The unvoiced sound in this inscription is represented by K. The use of the new form was not firmly established till after the middle of the 3rd century B.C.

In the Latin alphabet the sound was always the voiced stop (as in gig) in classical times. Later, before e, g passed into a sound like the English y, so that words begin indifferently with g orj; hence from the Lat. generum (accusative) and Ianuarium we have in Ital. genero and Gennajo, Fr. gendre and Janvier. In the ancient Umbrian dialect g had made this change between vowels before the Christian era, the inhabitant of Iguvium (the modern Gubbio) being in the later form of his native speech luvins, Lat. Iguvinus. In most cases in Mid. Eng. also g passed into a y sound; hence the old prefix ge of the past participle appears only as y in yclept and the like. But ng and gg took a different course, the g becoming an affricate dz (dzh), as in singe, ridge, sedge, which in English before 1500 were senge, rigge, segge, and in Scotch are still pronounced sing, rig, seg. The affricate in words like gaol is of French origin (geole), from a Late Lat. gabiola, out of caveola, a diminutive of the Lat. cavea.

The composite origin of English makes it impossible to lay down rules for the pronunciation of English g; thus there are in the language five words Gill, three of which have the g hard, while two have it soft: viz. (1) gill of a fish, (2) gill, a ravine, both of which are Norse, and (3) Gill, the surname, which is mostly Gaelic = White; and (4) gill a liquid measure, from O. Fr. gelle, Late Lat. gella in the same sense, and (5) Gill, a girl's name, shortened from Gillian, Juliana (see Skeat's Etymo- logical Dictionary) . No one of these words is of native origin; otherwise the initial g would have changed to y, as in Eng. yeil from the O. Eng. gellan, giellan. (P. Gi.)

GABBRO, in petrology, a group of plutonic basic rocks, noncrystalline and usually rather coarse-grained, consisting essentially of a basic plagioclase felspar and one or more ferro-magnesian minerals (such as augite, hornblende, hypersthene and olivine). The name was given originally in north Italy to certain coarsely crystalline dark green rocks, some of which are true gabbros, while others are serpentines. The gabbros are the plutonic or deep-seated representatives of the dolerites, basalts and diabases (also of some varieties of andesite) with which they agree closely in mineral composition, but not in minute structure. Of their minerals felspar is usually the most abundant, and is principally labradorite and bytownite, though anorthite occurs in some, while oligoclase and orthoclase have been found in others.

The felspar is sometimes very clear and fresh, its crystals being for the most part short and broad, with rather irregular or rounded outlines. Albite twinning is very frequent, but in these rocks it is often accompanied by pericline twinning by which the broad or narrow albite plates are cut transversely by many thin, bright and dark bars as seen in polarized light. Equally characteristic of the gabbros is the alteration of the felspars to cloudy, semi-opaque masses of saussurite. These are compact, tough, devoid of cleavage, and have a waxy lustre and usually a greenish-white colour. When this substance can be resolved by the microscope it proves to consist usually of zoisite or epidote, with garnet and albite, but mixed with it are also chlorite, amphibole, serpentine, prehnite, sericite and other minerals. The augite is usually brown, but greenish, violet and colourless varieties may occur. Hypersthene, when present, is often strik- ingly pleochroic in colours varying from pink to bright green. It weathers readily to platy-pseudomorphs of bastite which are soft and yield low polarization colours. The olivine is colourless in itself, but in most cases is altered to green or yellow serpentine, often with bands of dark magnetite granules along its cleavages and cracks. Hornblende when primary is often brown, and may surround augite

or be perthitically intergrown with if; original green hornblende probably occurs also, though it is more frequently secondary. Dark-brown biotite, although by no means an important constituent of these rocks, occurs in many of them. Quartz is rare, but is occasionally seen intergrown with felspar as micropegmatite. Among the accessory minerals may be mentioned apatite, magnetite, ilmenite, picotite and garnet.

A peculiar feature, repeated so constantly in many of the minerals of these rocks as to be almost typical of them, is the occurrence of small black or dark brown enclosures often regularly arranged parallel to certain crystallographic planes. Reflection of light from the surfaces of these minute enclosures produces a shimmering or Schiller. In augite or hypersthene the effect is that the surface of the mineral has a bronzy sub-metallic appear- ance, and polished plates seen at a definite angle yield a bright coppery-red reflection, but polished sections of the felspars may exhibit a brilliant play of colours, as is well seen in the Labrador spar, which is used as an ornamental or semi-precious stone. In olivine the black enclosures are not thin laminae, but branching growths resembling pieces of moss. The phenomenon is known as " schillerization " ; its origin has been much discussed, some holding that it is secondary, while others regard these enclosures as original.

In many gabbros there is a tendency to a centric arrangement of the minerals, the first crystallized forming nuclei around which the others grow. Thus magnetite, apatite and picotite, with olivine, may be enclosed in augite, hornblende, and hypersthene, sometimes with a later growth of biotite, while the felspars occupy the interspaces between the clusters of ferromagnesian minerals. In some cases there are borders around olivine con- sisting of fibrous hornblende or tremolite and rhombic pyroxene (kelyphitic or ocellar structures); spinels and garnet may occur in this zone, and as it is developed most frequently where olivine is in contact with felspar it may be due to a chemical resorption at a late stage in the solidification of the rock. In some gabbros and norites reaction rims of fibrous hornblende are found around both hypersthene and diallage where these are in contact with felspar. Typical orbicular structure such as characterizes some granites and diorites is rare in the gabbros, though it has been observed in a few instances in Norway, California, &c.

In a very large number of the rocks of this group the plagioclase felspar has crystallized in large measure before the pyroxene, and is enveloped by it in ophitic manner exactly as occurs in the diabases.

When these rocks become fine-grained they pass gradually into ophitic diabase and dolerite; only very rarely does olivine enclose

felspar in this way. A fluxion structure or flow banding also can be observed in some of the rocks of this series, and is characterized by the occurrence of parallel sinuous bands of dark colour, rich in ferromagnesian minerals, and of lighter shades in which felspars predominate.

These basic holocrystalline rocks form a large and numerous class which can be subdivided into many groups according to their mineral composition ; if we take it that typical gabbro consists of plagioclase and augites or diallage, norite of plagioclase and hypersthene, and troctolite of plagioclase and olivine, we must add to these olivine-gabbro and olivine- norite in which that mineral occurs in addition to those enumerated above. Hornblende-gabbros are distinctly rare, except when the hornblende has been developed from pyroxene by pressure and shearing, but many rocks may be described as hornblende- or biotite-beanng gabbro and norite, when they contain these ingredients in addition to the normal minerals plagioclase, augite and hypersthene. We may recognize also quartz-gabbro and quartz-norite (containing primary quartz or micropegmatite) and orthoclase-gabbro (with a little orthoclase). The name eucrite has been given to gabbros in which the felspar is mainly anorthite ; many of them also contain hypersthene or enstatite and olivine, while allivalites are anorthite-olivine rocks in which the two minerals occur in nearly equal proportions; harrisites have preponderating olivine, anorthite felspar and a little pyroxene. In areas of gabbro there are often masses consisting nearly entirely of a single mineral, for example, felspar rocks (anorthosites) , augite or hornblende rocks (pyroxenites and hornblendites) and olivine rocks (dunites or peri- dotites). Segregations of iron ores, such as ilmenite, usually with pyroxene – or olivine, occur in association with some gabbro and anorthosite masses.

Some gabbros are exceedingly coarse-grained and consist of individual crystals several inches in length; such a type often form dikes or veins in serpentine or gabbro, and may be called gabbro-pegmatite. Very fine-grained gabbros, on the other hand, have been distinguished as beerbachites. Still more common is the occurrence of sheared, foliated or schistose forms of gabbro. In these the minerals

have a parallel arrangement, the felspars are often broken down by pressure into a mosaic of irregular grains, while greenish fibrous or bladed amphibole takes the place of pyroxene and olivine. The diallage may be present as rounded or oval crystals around which the crushed felspar has flowed (augen-gabbro) ; or the whole rock may have a well-foliated structure (hornblende-schists and amphibolites). Very often a mass of normal gabbro with typical igneous character passes at its margins or along localized zones into foliated rocks of this kind, and every transition can be found between the different types. Some authors believe that the development of saussurite from felspar is also dependent on pressure rather than on weathering, and an analogous change may affect the olivine, replacing it by talc, chlorite, actinolite and garnet. Rocks showing changes of the latter type have been described from Switzerland under the name allalinites.

Rocks of the gabbro group, though perhaps not so common nor occurring in so great masses as granites, are exceedingly widespread. In Great Britain, for example, there are areas of gabbro in Shetland, Aberdeenshire, and other parts of the Highlands, Ayrshire, the Lizard (Cornwall), Carrock Fell (Cumberland) and St David's (Wales). Most of these occur along with troctolites, norites, ser- pentine and peridotite. In Skyean interesting group of fresh olivine- gabbros is found in the Cuillin Hills; here also peridotites occur and there are sills and dikes of olivine-dolerite, while a great series of basaltic lavas and ash beds marks the site of volcanic outbursts in early Tertiary time. In this case it is clearly seen that the gabbros are the deep-seated and slowly crystallized representatives of the basalts which were poured out at the surfaces, and the dolerites which consolidated in fissures. The older gabbros of Britain, such as those of the Lizard, Aberdeenshire and Ayrshire, are often more or less foliated and show a tendency to pass into hornblende-schists and amphibolites. In Germany gabbros are well known in the Harz Mountains, Saxony, the Odenwald and the Black Forest. Many outcrops of similar rocks have been traced in the northern zones of the Alps, often with serpentine and hornblende-schist. They occupy considerable tracts of country in Norway and Sweden, as for instance in the vicinity of Bergen. The Pyrenees, Ligurian Alps, Dauphineand Tuscany are other European localities for gabbro. In Canada great portions of the eastern portion of the Dominion are formed of gabbros, norite, anorthosite and allied rock types. In the United States gabbros and norites occur near Baltimore and near Peekskill on the Hudson river. As a rule each of these occurrences contains a diversity of petrographical types, which appear also in

certain of the others; but there is often a well-marked individu- ality about the rocks of the various districts in which gabbros are found.

From an economic standpoint gabbros are not of great importance. They are used locally for building and for road-metal, but are too dark in colour, too tough and difficult to dress, to be popular as building stones, and, though occasionally polished, are not to be compared for beauty with the serpentines and the granites. Segre- gations of iron ores are found in connexion with many of them

(Norway and Sweden) and are sometimes mined as sources of the metal.

Chemically the gabbros are typical rocks of the basic subdivision and show the characters of that group in the clearest way. They have low silica, much iron and magnesia, and the abundance of lime distinguishes them in a marked fashion from both the granites and the peridotites. A few analyses of well-known gabbros are cited here.

Si0 2

Ti0 2

Ab 2 3

FeO

Fe 2 3

MgO

CaO

Na 2

K 2

H 2

I. . II. .

III. .

IV. .

49-63 49-90

45-73 46-24

1-75

16-18 16-04

22-10 29-85

12-03 3-51

2-12

1-92

7-8i

0-71 1-30

5-38 10-08

ii-i6

2-41

9-33 14-48

9-26 16-24

1-89 1-69

2-54 1-98

o-8i o-55 o-34

0-18

o-55

1-46 4-38

I. Gabbro, Radanthal, Harzburg; II. Gabbro, Penig, Saxony; III. Troctolite, Coverack, Cornwall; IV. Anorthosite, mouth of the Seine river, Bad Vermilion lake, Ontario, Canada. (J. S. F.)

GABEL, KRISTOFFER (1617-1673), Danish statesman, was born at Gluckstadt, on the 6th of January 161 7. His father, Wulbern, originally a landscape painter and subsequently recorder of Gliickstadt, was killed at the siege of that fortress by the Imperialists

in 1628. Kristoffer is first heard of in 1639, as overseer and accountant at the court of Duke Frederick. When the duke ascended the Danish throne as Frederick III., Gabel followed him to Copenhagen as his private secretary and man of business. Gabel, who veiled under a mysterious reticence considerable financial ability and uncommon shrewdness, had great influence over the irresolute king. During the brief interval between King Charles X. 's first and second attack upon Denmark, Gabel was employed in several secret missions to Sweden; and he took a part in the intrigues which resulted in the autocratic revolution of 1660 (see Denmark: History). His services on this occasion have certainly been exaggerated; but if not the originator of the revolution, he was certainly the chief inter- mediary between Frederick III. and the conjoined Estates in the mysterious conspiracy which established absolutism in Denmark. His activity on this occasion won the king's lifelong gratitude. He was enriched, ennobled, and in 1 664 made governor of Copenhagen. From this year must be dated his open and official influence and power, and from 1660 to 1670 he was the most considerable personage at court, and very largely employed in financial and diplomatic affairs. When Frederick III. died, in February 1670, Gabel's power was at an end. The new ruler, Christian V., hated him, and accusations against him poured in from every quarter. When, on the 18th of April 1670, he was dismissed, nobody sympathized with the man who had grown wealthy at a time when other people found it hard to live. He died on the 13th of October 1673.

See Carl Frederik Bricka, Dansk. Biograf. Lex. art " Gabel " (Copenhagen, 1887, &c.) ; Danmarks Riges Historie (Copenhagen, 1 897-1005), vol. v.

GABELENTZ, HANS CONON VON DER (1807-1874), German linguist and ethnologist, born at Altenburg on the 13 th of October 1807, was the only son of Hans Karl Leopold von der Gabelentz, chancellor and privy-councillor of the duchy of Altenburg. From 1821 to 1825 he attended the gymnasium of his native town, where he had Matthiae (the eminent Greek scholar) for teacher, and Hermann Brockhaus and Julius Lobe for schoolfellows. Here, in addition to ordinary school-work, he carried on the private study of Arabic and Chinese; and the latter language continued especially to engage his attention during his undergraduate course, from 1825 to 1828, at the universities of Leipzig and Gottingen. In 1830 he entered the public service of the duchy of Altenburg, where he attained to the rank of privy-councillor in 1843. Four years later he was chosen to fill the post of Landmarschall in the grand-duchy of

Weimar, and in 1848 he attended the Frankfort parliament, and repre- sented the Saxon duchies on the commission for drafting an imperial constitution for Germany. In November of the same year he became president of the Altenburg ministry, but he resigned office in the following August. From 1851 to 1868 he was president of the second chamber of the duchy of Altenburg; but in the latter year he withdrew entirely from public life, that he

might give undivided attention to his learned researches. He died on his estate of Lemnitz, in Saxe-Weimar, on the 3rd of September 1874.

In the course of his life he is said to have learned no fewer than eighty languages, thirty of which he spoke with fluency and elegance. But he was less remarkable for his power of acquisition than for the higher talent which enabled him >to turn his know- ledge to the genuine advancement of linguistic science. Im- mediately after quitting the university, he followed up his Chinese researches by a study of the Finno-Ugrian languages, which resulted in the publication of his Elements de la gramtnaire mandchoue in 1832. In 1837 he became one of the promoters, and a joint-editor, of the Zeitschrift filr die Kunde des Morgen- landes, and through this medium he gave to the world his Versuch einer mordwinischen Grammatik and other valuable con- tributions. His Grundziigeder syrjUnischen Grammatik appeared in 1 841. In conjunction with his old school friend, Julius Lobe, he brought out a complete edition, with translation, glossary and grammar, of Ulfilas's Gothic version of the Bible (1 843-1846) ; and from 1847 he began to contribute to the Zeitschrift der deutschen morgenlandischen Gesellschaft the fruits of his researches into the languages of the Swahilis, the Samoyedes, the Hazaras, the Aimaks, the Formosans and other widely-separated tribes. The Beitrdge zur Sprachenkunde (1852) contain Dyak, Dakota, and Kiriri grammars; to these were added in 1857 a Grammatik u.W orterbuch derKassiasprache, and in 1 860 a treatise in universal grammar (Uber das Passivum). In 1864 he edited the Manchu translations of the Chinese Sse-shu, Shu-king and Shi-king, along with a dictionary; and in 1873 he completed the work which constitutes his most important contribution to philology, Die melanesischen Sprachen nach ihrem grammatischen Bau und ihrer V erwa-ndschaft unter sich und mil den malaiisch-poly- nesischen Sprachen untersucht (1860-1873). It treats of the

language of the Fiji Islands, New Hebrides, Loyalty Islands, New Caledonia, &c, and shows their radical affinity with the Polynesian class. He^also contributed most of the linguistic articles in Pierer's Conversations-Lexicon.

GABELLE (French, from the Med. Lat. gabulum, gablum, a tax, for the origin of which see Gavelkind), a term which, in France, was originally applied to taxes on all commodities, but was gradually limited to the tax on salt. In process of time it became one of the most hated and most grossly unequal taxes in the country, but, though condemned by all supporters of reform, it was not abolished until 1790. First imposed in 1286, in the reign of Philip IV., as a temporary expedient, it was made a permanent tax by Charles V. Repressive as a state monopoly, it was made doubly so from the fact that the government obliged every individual above the age of eight years to purchase weekly a minimum amount of salt at a fixed price. When first instituted, it was levied uniformly on all the provinces in France, but for the greater part of its history the price varied in different provinces. There were five distinct groups of provinces, classified as follows:

(a) the Pays de grandes gabelles, in which the tax was heaviest;

(b) the Pays de petiles gabelles, which paid a tax of about half the rate of the former; (c) the Pays de salines, in which the tax was levied .on the salt extracted from the salt marshes; (d) the Pays redimes, which had purchased redemption in 1549; and (e) the Pays exempts, which had stipulated for exemption on entering into union with the kingdom of France. Greniers d sel (dating from 1342) were established in each province, and to these all salt had to be taken by the producer on penalty of confiscation. The grenier fixed the price which it paid for the salt and then sold it to retail dealers at a higher rate.

See J. J. Clamag6ran, Histoire de I'impSt en France (1876); A. Gasquet, Precis des institutions politiques de I'ancienne France (1885) ; Necker, Compte rendu (1781).

GABERDINE, or Gabardine, any long, loose over-garment, reaching to the feet and girt round the waist. It was, when made of coarse material, commonly worn in the middle ages by pilgrims, beggars and almsmen. The Jews, conservatively attached to the loose and flowing garments of the East, continued to wear the long upper garment to which the name " gaberdine " could

be applied, long after it had ceased to be a common form as worn by non-Jews, and to this day in some parts of Europe, e.g. in Poland, it is still worn, while the tendency to wear the frock- coat very long and loose is a marked characteristic of the race. The fact that in the middle ages the Jews were forbidden to engage in handicrafts also, no doubt, tended to stereotype a form of dress unfitted for manual labour. The idea of the " gaberdine " being enforced by law upon the Jews as a distinctive garment is probably due to Shakespeare's use in the Merchant of Venice, I.iii. 113. The mark that the Jews were obliged to wear generally on the outer garment was the badge. This was first enforced by the fourth Lateran Council of 1215. The " badge " (Lat. rota; Fr. rouelle, wheel) took generally the shape of a circle of cloth worn on the breast. It varied in colour at different times. In France it was of yellow, later of red and white; in England it took the form of two bands or stripes, first of white, then of yellow. In Edward I. 's reign it was made in the shape of the Tables of the Law (see the Jewish Encyclopedia, s.v. " Costume " and " Badge "). The derivation of the word is obscure. It apparently occurs first in 0. Fr. in the forms gauverdine, gal- vardine, and thence into Ital. as gavardina, and Span, gabardina, a form which has influenced the English word. The New English Dictionary suggests a connexion with the O.H. Ger. wallevart, pilgrimage. Skeat (Etym. Diet., 1898) refers it to Span, gaban, coat, cloak; cabana, hut, cabin.

GABES, a town of Tunisia, at the head of the gulf of the same name, and 70 m. by sea S.W. of Sfax. It occupies the site of the Tacape of the Romans and consists of an open port and European quarter and several small Arab towns built in an oasis of date palms. This oasis is copiously watered by a stream called the Wad Gabes. The European quarter is situated on the right bank of the Wad near its mouth, anc? adjacent are the Arab towns of Jara and Menzel. The houses of the native towns are built largely of dressed stones and broken columns from the ruins of Tacape. Gabes is the military headquarters for southern Tunisia. The population of the oasis is about 20,000, including some 1 500 Europeans. There is a considerable export trade in dates.

Gabes lies at the head 1 Of the shat country of Tunisia and is intimately connected with the scheme of Commandant Roudaire to create a Saharan sea by making a channel from the Mediter- ranean to these shats (large salt lakes below the level of the sea) . Roudaire proposed to cut a canal through the belt of high ground between Gabes and the shats, and fixed on Wad Melah, a spot 10 m. N. of Gabes, for the sea' end of the channel (see Sahara). The company formed to execute his project became simply an agricultural concern

and by the sinking of artesian wells created an oasis of olive and palm trees.

The Gulf of Gabes, the Syrtis Minor of the ancients, is a semi-circular shallow indentation of the Mediterranean, about 50 m. across from the Kerkenna Islands, opposite Sfax on its northern shore, to Jerba Island, which lies at its southern end. The waters of the gulf abound in fish and sponge.

GABII, an ancient city of Latium, between 12 and 13 m. E. of Rome, on the Via Praenestina, which was in early times known as the Via Gabina. The part played by it in the story of the expulsion of the Tarquins is well known; but its importance in the earliest history of Rome rests upon other evidence — the continuance of certain ancient usages which imply a period of hostility between the two cities, such as the adoption of the cinctus Gabinus by the consul when war was to be declared. We hear of a treaty of alliance with Rome in the time of Tar- quinius Superbus, the original text of which,written on a bullock's skin, was said by Dionysius of Halicarnassus to be still extant in his day. Its subsequent history is obscure, and we only hear of it again in the 1st century B.C. as a small and insignificant place, though its desolation is no doubt exaggerated by the poets. From inscriptions we learn that from the time of Augustus or Tiberius onwards it enjoyed a municipal organization. Its baths were well known, and Hadrian, who was responsible for much of the renewed prosperity of the small towns of Latium, appears to have been a very liberal patron, building a senate-house (Curia

Aelia Augusta) and an aqueduct. After the 3rd century Gabii practically disappears from history, though its bishops continue to be mentioned in ecclesiastical documents till the close of the 9th. The primitive city occupied the eastern bank of the lake, the citadel being now marked by the ruins of the medieval fortress of Castiglione, while the Roman town extended farther to the south. The most conspicuous relic of the latter is a ruined temple, generally attributed to Juno, which had six columns in the front and six on each side. The plan is interesting, but the style of architecture was apparently mixed. To the east of the temple lay the Forum, where excavations were made by Gavin Hamilton in 1792. All the objects found were placed in the Villa Borghese, but many of them were carried off to Paris by Napoleon, and still remain in the Louvre. The statues and

busts are especially numerous and interesting; besides the deities Venus, Diana, Nemesis, &c, they comprise Agrippa, Tiberius, Germanicus, Caligula, Claudius, Nero, Trajan and Plotina, Hadrian and Sabina, M. Aurelius, Septimius Severus, Geta, Gordianus Pius and others. The inscriptions relate mainly to local and municipal matters.

See E. Q. Visconti, Monumenti Gabini delta Villa Pinciana (Rome, 1797, and Milan, 1835); T. Ashby in Papers of the British School at Rome, i. 180 seq. ; G. Pinza in Bull. Com. (1903), 321 seq. (T. As.)

GABINIUS, AULUS, Roman statesman and general, and supporter of Pompey, a prominent figure in the later days of the Roman republic. In 67 B.C., when tribune of the people, he brought forward the famous law (Lex Gabinia) conferring upon Pompey the command in the war against the Mediterranean pirates, with extensive powers which gave him absolute control over that sea and the coasts for 50 m. inland. By two other measures of Gabinius loans of money to foreign ambassadors in Rome were made non- actionable (as a check on the corruption of the senate) and the senate was ordered to give audience to foreign envoys on certain fixed days (1st of Feb.-ist of March). In 61 Gabinius, then praetor, endeavoured to win the public favour by providing games on a scale of unusual splendour, and in 58 managed to secure the consulship, not without suspicion of bribery. During his term of office he aided Publius Clodius in bringing about the exile of Cicero. In 57 Gabinius went as proconsul to Syria. On his arrival he reinstated Hyrcanus in the high-priesthood at Jerusalem, suppressed revolts, intro- duced important changes in the government of Judaea, and rebuilt several towns. During his absence in Egypt, whither he had been sent by Pompey, without the consent of the senate, to restore Ptolemy Auletes to his kingdom, Syria had been devastated by robbers, and Alexander, son of Aristobulus, had again taken up arms with the object of depriving Hyrcanus of the high-priesthood. With some difficulty Gabinius restored order, and in 54 handed over the province to his successor, M. Licinius Crassus. The knights, who as farmers of the taxes had suffered heavy losses during the disturbances in Syria, were greatly embittered against Gabinius, and, when he appeared in the senate to give an account of his governorship, he was brought to trial on three counts, all involving a capital offence. On the charge of majestas (high treason) incurred by having left his province for Egypt without the consent of the senate and in defiance of the Sibylline books, he was acquitted; it is said that the judges were bribed, and even Cicero, who had recently attacked Gabinius with the utmost virulence, was persuaded by Pompey to say as little as he could in his evidence to

damage his former enemy. On the second charge, that of repetundae (extortion during the administration of his province), with especial reference to the 10,000 talents paid by Ptolemy for his restoration, he was found guilty, in spite of evidence offered on his behalf by Pompey arid witnesses from Alexandria and the eloquence of Cicero, who had been induced to plead his cause. Nothing but Cicero's wish to do a favour to Pompey could have induced him to take up what must have been a distasteful task; indeed, it is hinted that the half-heartedness of the defence materially contributed to Gabinius's condemnation. The third charge, that of ambitus (illegalities committed during his canvass for the consulship),

was consequently dropped; Gabinius went into exile, and his property was confiscated. After the outbreak of the civil war, he was recalled by Caesar in 49, and entered his service, but took no active part against his old patron Pompey. After the battle of Pharsalus, he was commissioned to transport some recently levied troops to Illyricum. On his way thither by land, he was attacked by the Dalmatians and with difficulty made his way to Salonae (Dalmatia). Here he bravely defended himself against the attacks of the Pompeian commander, Marcus Octavius, but in a few months died of illness (48 or the be- ginning of 47).

See Dio Cassius xxxvi. 23-36, xxxviii. 13. 30, xxxix. 55-63; Plutarch, Pompey, 25. 48; Josephus, Antiq. xiv. 4-6; Appian, Illyrica, 12, Bell. Civ. ii. 24. 59; Cicero, ad Alt. vi. 2, ad Q. Fratrem, ii. 13, Post reditum in senatu, 4-8, Pro lege Manilia, 17, 18, 19; exhaustive article by Bahr in Ersch and Gruber's Allgemeine Encyclopddie ; and monograph by G. Stdcchi, Aulo Gabinio e i suoi processi (1892).

GABION (a French word derived through Ital. gabbione, gabbia, from Lat. cavea, a cage), a cylindrical basket without top or bottom, used in revetting fortifications and for numerous other purposes of military engineering. The gabion is filled with earth when in position. The ordinary brushwood gabion in the British service has a diameter of 2 ft. and a height of 2 ft. 9 in. There are several forms of gabion in use, the best known being the Willesden paper band gabion and the Jones iron or steel band gabion.

GABLE; in architecture, the upper portion of a wall from the level of the eaves or gutter to the ridge of the roof. The word is a southern English form of the Scottish gavel, or of an O. Fr. word gable or jable, bpth ultimately derived from O. Norwegian gafl. In other Teutonic languages, similar words, such as Ger. Gabel and Dutch

gaff el, mean " fork," cf. Lat. gabalus, gallows, which is Teutonic in origin; " gable " is represented by such forms as Ger. Giebel and Dutch gevel. According to the New. English Dictionary the primary meaning of all these words is probably " top " or " head," cf. Gr. Ke

Gabled Towers, in architecture, are those towers which are finished with gables instead of parapets, as at Sompting, Sussex. Many of the German Romanesque towers are gabled.

GABLER, GEORG ANDREAS (1786-1853), German Hegelian philosopher, son of J. P. Gabler (below), was born on the 30th of July 1786, at Altdorf in Bavaria. In 1804 he accompanied his father to Jena, where he completed his studies in philosophy and law, and became an enthusiastic disciple of Hegel. After holding various educational appointments, he was in 182 1 appointed rector of the Bayreuth gymnasium, and in 1830 general superintendent of schools. In 1835 he succeeded Hegel in the Berlin chair. He died at Teplitz on the 13th of September 1853. His works include Lehrbuch d. philos. Propadeutik (1st vol., Erlangen, 1827), a popular exposition of the Hegelian system; De verae philosophiae erga religionem Christianam pietate (Berlin, 1836), and Die Hegel'sche Philosophie (ib., 1843), a defence of the Hegelian philosophy against Trendelenburg.

GABLER, JOHANN PHILIPP (1753-1826), German Protestant theologian of the school of J. J. Griesbach and J. G. Eichhorn, was born at Frankfort-on-Main on the 4th of June 1753. In 1772 he entered the university of Jena as a theological student. In 1776 he was on the point of abandoning theological pursuits, when the arrival of Griesbach inspired him with new ardour. After having been ˆsuccessively Repetent in Gottingen and teacher in the public schools of Dortmund (Westphalia) and Altdorf (Bavaria) , he was, in 1 7 8 5 , appointed second professor of theology in the university of Altdorf, whence he was translated to a chair in Jena in 1804, where he succeeded Griesbach in 1812. Here he died on the 17th of February 1826. At Altdorf Gabler published (1791-1793) a new edition, with introduction and notes, of Eichhorn's Urgeschichte; this was followed, two years afterwards, by a supplement entitled Neuer Versuch iiber die mosaische Schopfungsgeschichte. He was also the author of many essays which were characterized by much critical acumen, and which had considerable influence on the course of German thought on theological and Biblical questions. From 1798 to

1800 he was editor of the Neuestes theologisches Journal, first conjointly with H. K.A. Hanlein (1762-1829), C. F. von Ammon (1766-1850) and H. E. G. Paulus, and afterwards unassisted; from r8oi to 1804 of the Journal fur theologische Litteratur; and from 1805 to 181 1 of the Journal fur auserlesene theologische Litteratur.

Some of his essays were published by his sons (2 vols., 1831) ; and a memoir appeared in 1827 by W. Schroter.

GABLETS (diminutive of "gable"), in architecture, triangular terminations to buttresses, much in use in the Early English and Decorated periods, after which the buttresses generally terminated in pinnacles. The Early English gablets are generally plain, and very sharp in pitch. In the Decorated period they are often enriched with panelling and crockets. They are sometimes finished with small crosses, but of tener with finials. GABLONZ (Czech, Jablonec), a town of Bohemia, Austria, 94 m. N.E. of Prague by rail. Pop. (1900) 21,086, mostly German. It is the chief seat of the glass pearl and imitation jewelry manufacture, and has also an important textile industry, and produces large quantities of hardware, papier mache and other paper goods.

GABORIAU, EMILE (1833-1873), French novelist, was born at Saujon (Charente Inferieure) on the gth of November 1833. He became secretary to Paul Feval, and, after publishing some novels and miscellaneous writings, found his real gift in L' Affaire Lerouge (1866), a detective novel which was published in the Pays and at once made his reputation. The story was produced on the stage in 1872. A long series of novels dealing with the annals of the police court followed, and proved very popular. Among them are: Le Crime d'Orcival (1867), Monsieur Lecoq (1869), La Vie infernale (1870), Les Esclaves de Paris (1869), L Argent des autres (1874). Gaboriau died in Paris on the 28th of September 1873.

GABRIEL (Heb. Syrm, man of God), in the Bible, the heavenly messenger (see Angel) sent to Daniel to explain the vision of the ram and the he-goat, and to communicate the pre- diction of the Seventy Weeks (Dan. viii. 16, ix. 21). He was also employed to announce the birth of John the Baptist to Zacharias, and that of the Messiah to the Virgin Mary (Luke i. 19, 26). Because he stood in the divine presence (see Luke i. 19; Rev. viii. 2; and cf. Tobit xii. 15), both Jewish and Christian writers generally speak of him as an archangel. In the Book of Enoch " the four great archangels" are Michael, Uriel, Suriel or Raphael, and Gabriel, who is set over " all the powers " and shares the work of intercession. His name frequently occurs in the Jewish

literature of the later post-Biblical period. Thus, according to the Targum Pseudo-Jonathan, he was the man who showed the way to Joseph (Gen. xxxvii. 15); and in Deut. xxxiv. 6 it is affirmed that he, along with Michael, Uriel, Jophiel, Jephephiah and the Metatron, buried the body of Moses. In the Targum on 2 Chron. xxxii. 21 he is named as the angel who destroyed the host of Sennacherib; and in similar writings of a still later period he is spoken of as the spirit who presides over fire, thunder, the ripening of the fruits of the earth and similar processes. In the

Koran great prominence is given to his function as the medium of divine revelation, and, according to the Mahommedan inter- preters, he it is who is referred to by the appellations " Holy Spirit " and " Spirit of Truth." He is specially commemorated in the calendars of the Greek, Coptic and Armenian churches. GABRIEL HOUNDS, a spectral pack supposed in the North of England to foretell death by their yelping at night. The legend is that they are the souls of unbaptized children wandering through the air till the day of judgment. They are also some- times called Gabriel or Gabble Ratchet. A very prosaic ex- planation of this nocturnal noise is given by J. C. Atkinson in his Cleveland Glossary (1868). " This," he writes, " is the name for a yelping sound heard at night, more or less resembling the cry of hounds or yelping of dogs, probably due to large flocks of wild geese which chance to be flying by night."

See further Joseph Lucas, Studies in Nidderdale (1882), pp. I56-I57-

GABRIELI, GIOVANNI (1557-1612?), Italian musical com- poser, was born at Venice in 1557, and was a pupil of his uncle Andrea, a distinguished musician of the contrapuntal school and organist of St Mark's. He succeeded Claudio Merulo as first organist of the same church in 1585, and died at Venice either in 1612 or 1613. He was remarkable for his compositions for several choirs, writing frequently for 12 or 16 voices, and is important as an early experimenter in chromatic harmony. It was probably for this reason that he made a special point of combining voices with instruments, being thus one of the founders of choral and orchestral composition. Among his pupils was Heinrich Schiitz; and the church of St Mark, from the time of the Gabrielis onwards down to that of Lotti, became one of the most important musical schools in Europe. ., See also Winterfeld, Johann Gabrieli und seine Zeit (1834).

GABUN, a district on the west coast of Africa, one of the colonies forming French Congo (q.v.). It derives its designation from the settlements on the Gabun river or Rio de Gabao. The Gabun, in

reality an estuary of the sea, lies immediately north of the equator. At the entrance, between Cape Joinville or Santa Clara on the N. and Cape Pahgara or Sandy Point on the S., it has a width of about 10 m. It maintains a breadth of some 7 m. for a distance of 40 m. inland, when it contracts into what is known as the Rio Olambo, which is not more than 2 or 3 m. from bank to bank. Several rivers, of which the Komo is the chief, discharge their waters into the estuary. The Gabun was discovered by Portuguese navigators towards the close of the 1 5th century, and was named from its fanciful resemblance to a gabao or cabin. On the small island of Konike, which lies about the centre of the estuary, scanty remains of a Portuguese fort have been discovered. The three principal tribes in the Gabun are the Mpongwe, the Fang and the Bakalai.

GACE BRULifi (d. c. 1220), French trouvere, was a native of Champagne. It has generally been asserted that he taught Thibaut of Champagne the art of verse, an assumption which is based on a statement in the Chroniques de Saint-Denis : " Si fist entre lui [Thibaut] et Gace Brule les plus belles chancons et les plus delitables et melodieuses qui onque fussent oies." This has been taken as evidence of collaboration between the two poets. The passage will bea-r the interpretation that with those of Gace the songs of Thibaut were the best hitherto known. Paulin Paris, in the Histoire UtUraire de la France (vol. xxiii.), quotes a number of facts that fix an earlier date for Gace's songs. Gace is the author of the earliest known jeu parti. The inter- locutors are Gace and a count of Brittany who is identified with Geoffrey of Brittany, son of Henry II. of England. Gace appears to have been banished from Champagne and to have found refuge in Brittany. A deed dated 1 2 1 2 attests a contract between Gatho Brusle (Gace Brule) and the Templars for a piece of land in Dreux. It seems most probable that Gace died before 1 2 20, at the latest in 1225.

See Gedeon Busken Huet, Chansons de Gace Brule, edited for the Societe des anciens textes francais (1902), with an exhaustive introduction. Dante quotes a song by Gace, Ire d'amor qui en mon cuer repaire, which he attributes erroneously to Thibaut of Navarre (De vulgari eloquentia, p. 151, ed. P. Rajna, Florence, 1895).

GACHARD, LOUIS PROSPER (1800-1885), Belgian man of letters, was born in Paris on the 12th of March 1800. He entered the

administration of the royal archives in 1826, and was ap- pointed director-general, a post which he held for fifty-five years. During this long period he reorganized the service, added to the records by copies taken in other European collections, travelled for purposes of study, and carried on a wide correspondence with other keepers of records, and with historical scholars. He also edited and published many valuable collections of state papers; a full list of his various publications was printed in the Annuaire de I'acad&mie royale de Belgique by Ch. Piot in 1888, pp. 220-236. It includes 246 entries. He was the author of several historical writings, of which the best known are Don Carlos et Philippe II (1867), JEtudes et notices historiques con- cernant I'histoire des Pays-Bas (1863), Histoire de la Belgique au commencement du XVIII' siecle (1880), Histoire politique el diplomatique de P. P. Rubens (1877), all published at Brussels. His chief editorial works are the Actes des Stats giniraux des Pays-Bas 1576-1585 (Brussels, 1861-1866), Collection de docu- ments inedils concernant I'histoire de la Belgique (Brussels, 1833-1835), and the Relations des ambassadeurs Vinitiens sur Charles V et Philippe II (Brussels, 1855). Gachard died in Brussels on the 24th of December 1885.

GAD, in the Bible. 1. A prophet or rather a " seer " (cp. 1 Sam. ix. 9), who was a companion of David from his early days. He is first mentioned in 1 Sam. xxii. 5 as having warned David to take refuge in Judah, and appears again in 2 Sam. xxiv. n seq. to make known Yahweh's displeasure at the numbering of the people. Together with Nathan he is represented in post-exilic tradition as assisting to organize the musical service of the temple (2Chron.xxix. 25), and like Nathan and Samuel he is said to have written an account of David's deeds (1 Chron. xxix. 20); a history of David in accordance with later tradition and upon the lines of later prophetic ideas is far from improbable.

2. Son of Jacob, by Zilpah, Leah's maid; a tribe of Israel

(Gen. xxx. 11). The name is that of the god of "luck" or

fortune, mentioned in Isa. lxv. n (R.V. nig.), and in several

names of places, e.g. Baal-Gad (josh. xl. 17, xii. 7), and

possibly also in Dibon-Gad, Migdol-Gad and Nahal-Gad. 1

There is another etymology in Gen. xlix. 19, where the name

is played on: " Gad, a plundering troop (g&dild}&hal\ plunder him

(yegudennu) , but he shall plunder at their heels." There are no traditions of the personal history of Gad. One of the earliest references to the name is the statement on the inscription of Mesha, king of Moab (about 850 B.C.), that the " men of Gad " had occupied Ataroth (E. of Dead Sea) from of old, and that the king of Israel had fortified the city. This is in the district ascribed to Reuben, with which tribe the fortunes of Gad were very closely connected. In Numbers xxxii. 34 sqq,,the cities of Gad appear to lie chiefly to the south of Heshbon; in Joshua xiii. 24-28 they lie almost wholly to the north; while other texts present discrepancies which are not easily reconciled with either passage. Possibly some cities were common to both Reuben and Gad, and perhaps others more than once changed hands. That Gad, at one time at least, held territory as far south as Pisgah and Nebo would follow from Deut. xxxiii. 21, if the rendering of the Targums be accepted, " and he looked out the first part for himself, because there was the portion of the buried law-giver."

It is certain, however, that, at a late period, this tribe was localized chiefly in Gilead, in the district which now goes by the name of Jebel Jil'ad. The traditions encircling this district point, it would seem, to the tribe having been of Aramaean origin (see the story of Jacob) ; at all events its position was extremely exposed, and its population at the best must have been a mixed one.

Its richness and fertility made it a prey to the marauding nomads

of the desert; but the allusion in the Blessing of Jacob gives the tribe a character for bravery, and David's men of Gad (1 Chron. xii. 8) were famous in tradition. Although rarely mentioned by name (the geographical term Gilead is usual), the history of Gad enters into the lives of Jephthah and Saul, and in the wars of Ammon and Moab it must have played some part. It followed

1 See G. B. Gray, Heb. Proper Names, pp. 1134 seq. t 145.

Jeroboam in the great revolt against the house of David, and its later fortunes until 734 B.C. (1 Chron. v. 26) would be those of the northern kingdom.

See, for a critical discussion of the data, H. W. Hogg, Ency. Bib. cols. 1579 sqq.; also Gilead; Manasseh; Reuben.

GADAG, or Garag, a town of British India, in the Dharwar district of Bombay, 43 m. E. of Dharwar town. Pop. (1901) 30,652. It is an important railway junction on the Southern Mahratta system, with a growing trade in raw cotton, and also in the weaving of cotton and silk. There are factories for ginning and pressing cotton, and a spinning mill. The town contains remains of a number of temples, some of which exhibit fine carving, while inscriptions in them indicate the existence of Gadag as early as the 10th century.

GADARA, an ancient town of the Syrian Decapolis, the capital of Peraea, and the political centre of the small district of Gadaris. It was a Greek city, probably entirely non-Syrian in origin. The earliest recorded event in its history is its capture by Antiochus III. of Syria in 218 B.C.; how long it may have existed before this date is unknown. About twenty years later it was besieged for ten months by Alexander Jannaeus. It was restored by Pompey, and in ˆo B.C. was presented by Augustus to Herod the Great; on Herod's death it was reunited to Syria. The coins of the place bear Greek legends, and such inscriptions as have been found on its site are Greek. Its governing and wealthy classes were probably Greek, the common people being Hellenized- and Judaized Aramaeans. The community was Hellenistically organized, and though dependent on Syria and acknowledging the supremacy of Rome it was governed by a democratic senate and managed its own internal affairs. In the Jewish war it surrendered to Vespasian, but in the Byzantine period

it again flourished and was the seat of a bishop. It was renowned for its hot sulphur baths; the springs still exist and show the remains of bath-houses. The temperature of the springs is 1 io° F. This town was the birthplace of Meleager the anthologist. There is a confusion in the narrative of the healing of the demoniac between the very similar names Gadara, Gerasa and Gergesa; but the probabilities, both textual and geographical, are in favour of the reading of Mark (Gerasenes, ch. v. 1, revised version) ; and that the miracle has nothing to do with Gadara, but took place at Kersa, on the eastern shore of the Sea of Galilee. Gadara is now represented by Umm Kais, a group of ruins about 6 m. S.E. of the Sea of Galilee, and 1194 ft. above the sea-level. There are very fine tombs with carved sarcophagi in the neighbourhood. There are the remains of two theatres and (probably) a temple, and many heaps of carved stones, represent- ing ancient buildings of various kinds. The walls are, or were, traceable for a circuit of 2 m., and there are also the remains of a street of columns. The natives are rapidly destroying the ruins by quarrying building material out of them. (R.A. S. M.)

G ADDI, Four painters of the early Florentine school — father, son and two grandsons — bore this name.

1. Gaddo Gaddi was, according to Vasari, an intimate friend of Cimabue, and afterwards of Giotto. The dates of birth and death have been given as 1239 and about i3i2;these are probably too early; he may have been born towards 1260, and may have died in or about 1333- He was a painter and mosaicist, is said to have executed the great mosaic inside the portal of the cathedral of Florence, representing the coronation of the Virgin, and may with more certainty be credited with the mosaics inside the portico of the basilica of S. Maria Maggiore, Rome, relating to the legend of the foundation of that church ; their date is probably 1308. In the original cathedral of St Peter in Rome he also executed the mosaics of the choir, and those of the front repre- senting on a colossal scale God the Father, with many other figures; likewise an altarpiece in the church of S. Maria Novella, Florence; these works no longer exist. It is ordinarily held that no picture (as distinct from mosaics) by Gaddo Gaddi is now extant. Messrs Crowe & Cavalcaselle, however, consider that the mosaics of S. Maria Maggiore bear so strong a resemblance in style to four of the frescoes in the upper church of Assisi, representing incidents' in the life of St Francis (frescoes 2, 3, 4

and especially 5, which shows Francis stripping himself, and protected by the bishop), that those frescoes likewise may, with considerable confidence, be ascribed to Gaddi. Some other extant mosaics are attributed to him, but without full authentication. This artist laid the foundation of a very large fortune, which continued increasing, and placed his progeny in a highly distin- guished worldly position.

2. Taddeo Gaddi (about 1300-1366, or later), son of Gaddo, was born in Florence, and is usually said to have been one of Giotto's most industrious assistants for a period of 24 years. This can hardly be other than an exaggeration; it is probable that he began painting on his own account towards 1330, when Giotto went to Naples. Taddeo also traded as a merchant, and had a branch establishment in Venice. He was a painter, mosaicist and architect. He executed in fresco, in the Baroncelli (now Giugni) chapel, in the Florentine church of S. Croce, the " Virgin and Child between Four Prophets," on the funeral monument at the entrance, and on the walls various incidents in the legend of the Virgin, from the expulsion of Joachim from the Temple up to the Nativity. In the subject of the " Presentation of the Virgin in the Temple " are the two heads traditionally accepted as portraits of Gaddo Gaddi and Andrea Tafi; they, at any rate, are not likely to be portraits of those artists from the life. On the ceiling of the same chapel are the " Eight Virtues." In the museum of Berlin is an altarpiece by Taddeo, the " Virgin and Child," and some other subjects, dated 1334; in the Naples gallery, a triptych, dated 1336, of the " Virgin enthroned along with Four Saints," the " Baptism of Jesus," and his " Deposition from the Cross "; in the sacristy of S. Pietro a Megognano, near Poggibonsi, an altarpiece dated 1355, the " Virgin and Child enthroned amid Angels." A series of paintings, partly from the life of St Francis, which Taddeo executed for the presses in S. Croce, are now divided between the Florentine Academy and the Berlin Museum; the compositions are taken from or founded on Giotto, to whom, indeed, the Berlin authorities have ascribed their examples. Taddeo also painted some frescoes still extant in Pisa, besides many in S. Croce and other Florentine buildings, which have perished. He deservedly ranks as one of the most eminent successors of Giotto; it may be said that he continued working up the material furnished by that great painter, with comparatively feeble inspiration of his own. His figures are vehement in action, long and slender in form; his execution rapid and somewhat conventional. To Taddeo are generally ascribed the celebrated frescoes — those of the ceiling and left or western wall —

in the Cappella degli Spagnuoli, in the church of S. Maria Novella, Florence; this is, however, open to con siderable doubt, although it may perhaps be conceded that the designs for the ceiling were furnished by Taddeo. Dubious also are the three pictures ascribed to him in the National Gallery, London. In mosaic he has left some work in the baptistery of Florence. As an architect he supplied in 1336 the plans for the present Ponte Vecchio, and those for the original (not the present) Ponte S. Trinita; in 1337 he was engaged on the church of Or San Michele; and he carried on after Giotto's death the work of the unrivalled Campanile.

3. Agnolo Gaddi, born in Florence, was the son of Taddeo; the date of his birth has been given as 1326, but possibly 1350 is nearer the mark. He was a painter and mosaicist, trained by his father, and a merchant as well; in middle age he settled down to commercial life in Venice, and he added greatly to the family wealth. He died in Florence in October 1396. His paintings show much early promise, hardly sustained as he advanced in life. One of the earliest, at S. Jacopo tra' Fossi, Florence, represents the " Resurrection of Lazarus." Another probably youthful performance is the series of frescoes of the Pieve di' Prato — legends of the Virgin and of her Sacred Girdle, bestowed upon St Thomas, and brought to Prato in the nth century by Michele dei Dagomari; the "Marriage of Mary" is one of the best of this series, the later compositions in which have suffered much by renewals. In S. Croce he painted, in eight frescoes, the legend of the Cross, beginning with the archangel Michael giving Seth a branch from the tree of knowledge, and ending

with the emperor Heraclius carrying the Cross as he enters Jerusalem; in this picture is a portrait of the painter himself. Agnolo composed his subjects better than Taddeo; he had more dignity and individuality in the figures, and was a clear and bold colourist; the general effect is laudably decorative, but the drawing is poor, and the works show best from a distance. Various other productions of this master exist, and many have perished. Cennino Cennini, the author of the celebrated treatise on painting, was one of his pupils.

4. Giovanni Gaddi, brother of Agnolo, was also a painter of promise. He died young in 1383.

Vasari, and Crowe and Cavelcaselle can be consulted as to the Gaddi. Other notices appear here and there — such as La Cappella de' Rinuccini in S. Croce di Firenze, by G. Ajazzi (1845). (W.M.R.)

GADE, NIELS WILHELM (1817-1890), Danish composer, was born

at Copenhagen, on the 22nd of February 1817, his father being a musical instrument maker. He was intended for his father's trade, but his passion for a musician's career, made evident by the ease and skill with which he learnt to play upon a number of instruments, was not to be denied. Though he became proficient on the violin under Wexschall, and in the elements of theory under Weyse and Berggreen, he was to a great extent self-taught. His opportunities of hearing and playing in the great masterpieces were many, since he was a member of the court band. In 1840 his Aladdin and his overture of Ossian attracted attention, and in 1841 his Nachkldnge aus Ossian overture gained the local musical society's prize, the judges being Spohr and Schneider. This work also attracted the notice of the king, who gave the composer a stipend which enabled him to go to Leipzig and Italy. In 1844 Gade conducted the Gewand-haus concerts in Leipzig during Mendelssohn's absence, and on the latter's death became chief conductor. In 1848, on the outbreak of the Holstein War, he returned to Copenhagen, where he was appointed organist and conductor of the Musik-Verein. In 1852 he married a daughter of the composer J. P. E. Hartmann. He became court conductor in 1861, and was pensioned by the government in 1876 — the year in which he visited Birmingham to conduct his Crusaders. This work, and the Friihlingsfantasie, the Erlkbnigs Tochter, Fruhlingsbotschaft and Psyche (written for Birmingham in 1882) have enjoyed a wide popularity. Indeed, they represent the strength and the weakness of Gade's musical ability quite as well as any of his eight symphonies (the best of which are the first and fourth, while the fifth has an obbligato pianoforte part). Gade was distinctly a romanticist, but his music is highly polished and beautifully finished, lyrical rather than dramatic and effective. Much of the pianoforte music, Aquarellen, Spring Flowers, for instance, enjoyed a considerable vogue, as did the Novelletten trio; but Gade's opera Mariotla has not been heard outside the Copenhagen opera house. He died at Copenhagen on the 21st of December 1890.

GADOLINIUM (symbol Gd., atomic weight 157-3), one of the rare earth metals (see Erbium). The element was discovered in 1880 in the mineral samarskite by C. Marignac (Comples rendus, 1880, 90, p. 899; Ann. chim. phys., 1880 [5] 20, p. 535). G. Urbain (Comptes rendus, 1905, 140, p. 583) separates the metal by crystallizing the double nitrate of nickel and gadolinium. The salts show absorption bands in the ultra-violet. The oxide GdsOs is colourless (Lecoq de Boisbaudran).

GADSDEN, CHRISTOPHER (1724-1805), American patriot, was born in Charleston, South Carolina, in 1724. His father, Thomas

Gadsden, was for a time the king's collector for the port of Charleston. Christopher went to school near Bristol, in England, returned to America in 1741, was afterwards employed in a counting house in Philadelphia, and became a merchant and planter at Charleston. In 1759 he was captain of an artillery company in an expedition against the Cherokees. He was a member of the South Carolina legislature almost continuously from 1760 to 1780, and represented his province in the Stamp Act Congress of 1765 and in the Continental Congress in 1774- 1776. In February 1776 he was placed in command of all the military forces of South Carolina, and in October of the same

year was commissioned a brigadier-general and was taken into the Continental service: but on account of a dispute arising out of a conflict between state and Federal authority resigned his command in 1777. He was lieutenant-governor of his state in 1 780, when Charleston was surrendered to the British. For about three months following this event he was held as a prisoner on parole within the limits of Charleston; then, because of his influence in deterring others from exchanging their paroles for the privileges of British subjects, he was seized, taken to St Augustine, Florida, and there, because he would not give another parole to those who had violated the former agreement affecting him, he was confined for forty-two weeks in a dungeon. In 1782 Gadsden was again elected a member of his state legislature; he was also elected governor, but declined to serve on the ground that he was too old and infirm; in 1788 he was a member of the convention which ratified for South Carolina the Federal con- stitution; and in 1790 he was a member of the convention which framed the new state constitution. He died in Charleston on the 28th of August 1805. From the time that Governor Thomas Boone, in 1762, pronounced his election to the legislature improper, and dissolved the House in consequence, Gadsden was hostile to the British administration. He was an ardent leader of the opposition to the Stamp Act, advocating even then a separation of the colonies from the mother country; and in the Continental Congress of 1774 he discussed the situation on the basis of inalienable rights and liberties, and urged an im- mediate attack on General Thomas Gage, that he might be defeated before receiving reinforcements.

GADSDEN, JAMES (1788-1858), American soldier and diplo- mat,

was born at Charleston, S.C., on the 15th of May 1788, the grandson of Christopher Gadsden. He graduated at Yale in 1806, became a merchant in his native city, and in the war of 181 2 served in the regular U.S. Army as a lieutenant of engineers. In 1818 he served against the Seminoles, with the rank of captain, as aide on the staff of Gen. Andrew Jackson. In October 1820 he became inspector-general of the Southern Division, with the rank of colonel, and as such assisted in the occupation and the establishment of posts in Florida after its acquisition. From August 1821 to March 1822 he was adjutant-general, but, his appointment not being confirmed by the Senate, he left the army and became a planter in Florida. He served in the Territorial legislature, and as Federal commissioner superintended in 1823 the removal of the Seminole Indians to South Florida. In 1832 he negotiated with the Seminoles a treaty which provided for their removal within three years to lands in what is now the state of Oklahoma; but the Seminoles refused to move, hostilities again broke out, and in the second Seminole War Gadsden was quartermaster-general of the Florida Volunteers from February to April 1836. Returning to South Carolina he became a rice planter, and was president of the South Carolina railway. In 1853 President Franklin Pierce appointed him minister to Mexico, with which country he negotiated the so-called " Gadsden treaty " (signed the 30th of December 1853), which gave to the United States freedom of transit for mails, merchandise and troops across the Isthmus of Tehuantepec, and provided for a readjustment of the boundary established by the treaty of Guadalupe Hidalgo, the United States acquiring 45,535 sq. m. of land, since known as the " Gadsden Purchase," in what is now New Mexico and Arizona. In addition, Article XI. of the treaty of Guadalupe Hidalgo, which bound the United States to prevent incursions of Indians from the United States into Mexico, and to restore Mexican prisoners captured by such Indians, was abrogated, and for these considerations the United States paid to Mexico the sum of $10,000,000. Ratifications of the treaty, slightly modified by the Senate, were exchanged on the 30th of June 1854; before this, however, Gadsden had retired from his post. The boundary line between Mexico and the " Gadsden Purchase " was marked by joint commissions ap- pointed in 1855 and 1891, the second commission publishing its report in 1899. Gadsden died at Charleston, South Carolina, on the 25th of December 1858. An elder brother, Christopher Edwards Gadsden (1785-

1852), was Protestant Episcopal bishop of South Carolina in

1839-1852.

GADWALL, a word of obscure origin, 1 the common English name of the duck, called by Linnaeus Anas strepera, but con- sidered by many modern ornithologists to require removal from the genus Anas to that of Chaulelasmus or Ctenorhynchus, of either of which it is almost the sole species. Its geographical distribution is almost identical with that of the common wild duck or mallard (see Duck), since it is found over the greater part of the northern hemisphere; but, save in India, where it is one of the most abundant species of duck during the cold weather, it is hardly anywhere so numerous, and both in the eastern parts of the United States and in the British Islands it is rather rare than otherwise. Its habits also, so far as they have been observed, greatly resemble those of the wild duck; but its appearance on the water is very different, its small head, flat back, elongated form and elevated stern rendering it recognizable by the fowler even at . such a distance as hinders him from seeing its very distinct plumage. In coloration the two sexes appear almost equally sombre; but on closer inspection the drake exhibits a pencilled grey coloration and upper wing-coverts of a deep chestnut, which are almost wanting in his soberly clad partner. She closely resembles the female of the mallard in colour, but has, like her own male, some of the secondary quills of a pure white, presenting a patch of that colour which forms one of the most readily perceived distinctive characters of the species. The gadwall is a bird of some interest in England, since it is one of the few that have been induced, by the protection afforded them in certain localities, to resume the indigenous position they once filled, but had, through the draining and reclaiming of marshy lands, long since abandoned. In regard to the present species, this fact was due to the efforts of Andrew Fountaine, on whose property, in West Norfolk and its immediate neighbourhood, the gadwall, from 1850, annually bred in increasing numbers. It has been always esteemed one of the best of wild fowl for the table. (A. N.)

GAEKWAR, or Guicowar, the family name of the Mahratta rulers of Baroda (q.v.) in western India, which has been con- verted by the English into a dynastic title. It is derived from the vernacular word for the cow, but it is a mistake to suppose that the family are of the cowherd caste ; they belong to the upper class of Mahrattas proper, sometimes claiming a Rajput origin. The dynasty was founded by a succession of three warriors, Damaji I., Pilaji and Damaji II., who established Mahratta supremacy throughout Gujarat during the first half of the 1 8th century. The present style of the ruler is Maharaja Gaekwar of Baroda.

GAETA (anc. Caietae Portus), a seaport and episcopal see of Campania, Italy, in the province of Caserta, from which it is 53 m.

W.N.W. by rail via Sparanise. Pop. (1901) 5528. It occupies a lower projecting point of the promontory which forms the S.W. extremity of the Bay of Gaeta. The tomb of Munatius Plancus, on the summit of the promontory (see Caietae Portus), is now a naval signal station, and lies in the centre of the exten- sive earthworks of the modern fortifications. The harbour is well sheltered except on the E., but has little commercial im- portance, being mainly a naval station. To the N.W. is the suburb of Elena (formerly Borgo di Gaeta). Pop. (1901) 10,369. Above the town is a castle erected by the Angevin kings, and strengthened at various periods. The cathedral of St Erasmus (S. Elmo), consecrated in 1106, has a fine campanile begun in

1 The New English Dictionary has nothing to say. Webster gives the etymology gad well = go about well. Dr R G. Latham suggested that it was taken from the syllables quedul, of the Lat. querquedula, a teal. The spelling " gadwall " seems to be first found in Willughby in 1676, and has been generally adopted by later writers; but Merrett, in 1667, has " gaddel " (Pinax rerum naturalium Britanni- carum, p. 180), saying that it was so called by bird-dealers. The synonym " gray," given by Willughby and Ray, is doubtless derived from the general colour of the species, and has its analogue in the Icelandic Grdond, applied almost indifferently, or with some dis- tinguishing epithet, to the female of any of the freshwater ducks, and especially to both sexes of the present, in which, as stated in the text, there is comparatively little conspicuous difference of plumage in drake and duck.

860 and completed in 1279, and a nave and four aisles; the interior has, however, been modernized. Opposite the door of the cathedral is a candelabrum with interesting sculptures of the end of the 13th century, consisting of 48 panels in bas-relief, with 24 representations from the life of Christ, and 24 of the life of St Erasmus (A. Venturi, Storia dell' arte Italiana, iii. Milan, 1904, 642 seq.). The cathedral possesses three fine Exultet rolls, with miniatures dating from the nth to the begin- ningof the 13th century. Behind the high altar is the banner sent by Pope Pius V. to Don John of Austria, the victor of Lepanto. The constable of Bourbon, who fell in the sack of Rome of 1527, is buried here. The other churches are of minor interest; close to that of La Trinita. is the Montagna Spaccata, where a vertical fissure from 6 to 15 ft. wide runs right down to the sea-level. Over the chasm is a chapel del Crocefisso, the mountain having split, it is

said, at the death of Christ.

During the break-up of the Roman empire, Gaeta, like Amalfi and Naples, would seem to have established itself as a practically independent port and to have carried on a thriving trade with the Levant. Its history, however, is obscure until, in 823, it appears as a lordship ruled by hereditary hypati or consuls. In 844 the town fell into the hands of the Arabs, but four years later they were driven out with help supplied by Pope Leo IV. In 875 the town was in the hands of Pope John VIII., who gave it to the count of Capua as a fief of the Holy See, which had long claimed jurisdiction over it. In 877, however, the hypatus John (Ioannes) II. succeeded in recovering the lordship, which he established as a duchy under the suzerainty of the East Roman emperors. In the nth century the duchy fell into the hands of the Norman counts of Aversa, afterwards princes of Capua, and in 1 135 it was definitively annexed to his kingdom by Roger of Sicily. The town, however, had its own coinage as late as 1229.

In military history the town has played a conspicuous part. Its fortifications were strengthened in the 15th century. On the 30th of September 1707 it was stormed, after a three months' siege, by the Austrians under Daun; and on the 6th of August 1734 it was taken, after a siege of four months, by French, Spanish and Sardinian troops under the future King Charles of Naples. The fortifications were again strengthened; and in 1799 it was temporarily occupied by the French. On the 18th of July 1806 it was captured, after an heroic defence, by the French under Massena; and on the 18th of July 1815 it capitu- lated, after a three months' siege, to the Austrians. In November 1848 Pope Pius IX., after his flight in disguise from Rome, found a refuge at Gaeta, where he remained till the 4th of Sep- tember 1849. Finally, in i860, it was the scene of the last stand of Francis II. of Naples against the forces of United Italy. Shut up in the fortress with 12,000 men, after Garibaldi's occupation of Naples, the king, inspired by the heroic example of Queen Maria, offered a stubborn resistance, and it was not till the 13th of February 1861 that, the withdrawal of the French fleet having made bombardment from the sea possible, he was forced to capitulate.

See G. B. Federici, Degli antichi duchi, consoli ipati della cittct di Gaeta (Naples, 1791); Onorato Gaetani d' Aragona, Mem. stor. della cittd di Gaeta (Milan, 1879); C. Ravizza, II Golfo di Gaeta (Novara, 1876). (T. As.)

GAETANI, or Caetani, the name of the oldest of the Roman princely families which played a great part in the history of the city and of

the papacy. The Gaetani are of Longobard origin, and the founder of the house is said to be one Dominus Con- stantinus Cagetanus, who flourished in the 10th century, but the family had no great importance until the election of Benedetto Gaetani to the papacy as Boniface VIII. in 1 294, when they at once became the most notable in the city. The pope conferred on them the fiefs of Sermoneta, Bassiano, Ninfa and San Donato (1 297-1300) , and the marquisate of Ancona in 1300, while Charles II. of Anjou created the pope's brother count of Caserta. Giordano Loffredo Gaetani by his marriage with Giovanna dell' Aquila, heiress of the counts of Fondi and Traetto, in 1297 added the name of Aquila to his own, and his grandson Giacomo acquired the lordships of Piedimonte and Gioia. The Gaetani

proved brave warriors and formed a bodyguard to protect Boniface VIII. from his many foes. During the 14th and 15th centuries their feuds with the Colonna caused frequent disturb- ances in Rome and the Campagna, sometimes amounting to civil war. They also played an important role as Neapolitan nobles. In 1 500 Alexander VI., in his attempt to crush the great Roman feudal nobility, confiscated the Gaetani fiefs and gave them to his daughter Lucrezia Borgia (q.v.) ; but they afterwards regained them.

At present there are two lines of Gaetani: (1) Gaetani, princes of Teano and dukes of Sermoneta, founded by Giacobel'o Gaetani, whose grandson, Guglielmo Gaetani, was granted the duchy of Sermoneta by Pius III. in 1503, the marquisate of Cisterna being conferred on the family by Sixtus V. in 1585. In 1642, Francesco, the 7th duke of Sermoneta, acquired by marriage the county of Caserta, which was exchanged for the principality of Teano in 1750. The present head of the house, Onorato Gaetani, 14th duke of Sermoneta, 4th prince of Teano, duke of San Marco, marquis of Cisterna, &c, is a senator of the kingdom of Italy, and was minister for foreign affairs for a short time. (2) Gaetani dell' Aquila d' Aragona, princes of Piedimonte, and dukes of Laurenzana, founded by Onorato Gaetani dell' Aquila, count of Fondi, Traetto, Alife and Morcone, lord of Piedimonte and Gioia, in 1454. The additional surname of Aragona was assumed after the marriage of Onorato Gaetani, duke of Traetto (d. 1529), with Lucrezia of Aragon, natural daughter of King Ferdinand I. of Naples. The duchy of Lauren- zana, in the kingdom of Naples, was acquired by Alfonso Gaetani by his marriage in 1606 with Giulia di Ruggiero, duchess of Laurenzana. The lordship of Piedimonte was raised to a principality

in 1715. The present (1908) head of the house is Nicola Gaetani dell' Aquila d' Aragona (b. 1857), 7th prince of Piedimonte and 12 th duke of Laurenzana.

See A. von Reumont, Geschichte der Stadt Rom (Berlin, 1868) ; F. Gregorovius, Geschichte der Stadt Rom (Stuttgart, 1872); Almanack de Gotha (1907 and 1908).

GAETULIA, an ancient district in northern Africa, which in the usage of Roman writers comprised the wandering tribes of the southern slopes of Mount Aures and the Atlas, as far as the Atlantic, and the oases in the northern part of the Sahara. They were always distinguished from the Negro people to the south, and beyond doubt belonged to the same Berber race which formed the basis of the population of Numidia and Mauretania (q.v.). The tribes to be found there at the present day are probably of the same race, and retain the same wandering habits; and it is possible that they still bear in certain places the name of their Gaetulian ancestors (see Vivien St Martin, Le Nord de I'Afrique, 1863). A few only seem to have mingled with the Negroes of the Sahara, if we may thus interpret Ptolemy's allusion to Melano-Gaetuli (4. 6. 5.). They were noted for the rearing of horses, and according to Strabo had 100,000 foals in a single year.- They were clad in skins, lived on flesh and milk, and the only manufacture connected with their name is that of the purple dye which became famous from the time of Augustus onwards, and was made from the purple fish found on the coast, apparently both in the Syrtes and on the Atlantic.

We first hear of this people in the Jugurthine War (111-106 B.C.), when, as Sallust tells us, they did not even know the name of Rome. They took part with Jugurtha against Rome; but when we next hear of them they are in alliance with Caesar against Juba I. (Bell. Afr. 32). In 25 B.C. Augustus seems to have given a part of Gaetulia to Juba II., together with his kingdom of Mauretania, doubtless with the object of /controlling the turbulent tribes; but the Gaetulians rose and massacred the Roman residents, and it was not till a severe defeat had been inflicted on them by Lentulus Cossus (who thus acquired the surname Gaetulicus) in a.d. 6 that they submitted to the king. After Mauretania became a Roman province in a.d. 40, the Roman governors made frequent expeditions into the Gaetulian territory to the south, and the official view seems to be expressed by Pliny (v. 4. 30) when he says that all Gaetulia as far as the Niger and the Ethiopian frontier was reckoned as subject to the

Empire. How far this represents the fact is not clear; but inscriptions prove that Gaetulians served in the auxiliary troops of the empire, and it may be assumed that the country passed within the sphere of Roman influence, though hardly within the pale of Roman civilization.

For bibliography see Africa, Roman.

GAGE, LYMAN JUDSON (1836-), American financier, was born at De Ruyter, Madison county, New York, on the 28th of June 1836. He was educated at an academy at Rome, New York, where at the age of seventeen he became a bank clerk. In 1855 he removed to Chicago, served for three years as book- keeper in a planing-mill, and in 1858 entered the banking house of the Merchant's Loan and Trust Company, of which he was cashier in 1861-1868. Afterwards he became successively assistant cashier (1868), vice-president (1882), and president (1891) of the First National Bank of Chicago, one of the strongest financial institutions in the middle west. He was chosen in 1892 president of the board of directors of the World's Columbian Exposition, the successful financing of which was due more to him than to any other man. In politics he was originally a Re- publican, and was a delegate to the national convention of the party in 1880, and chairman of its finance committee. In 1884, however, he supported Grover Cleveland for the presidency, and came to be looked upon as a Democrat. In 1892 President Cleveland, after his second election, offered Gage the post of secretary of the treasury, but the offer was declined. In the " free-silver " campaign of 1896 Gage laboured effectively for the election of William McKinley, and from March 1897 until January 1902 he was secretary of the treasury in the cabinets successively of Presidents McKinley and Roosevelt. From April 1902 until 1906 he was president of the United States Trust Company in New York City. His administration of the treasury department, through a more than ordinarily trying period, was marked by a conservative policy, looking toward the strengthening of the gold standard, the securing of greater flexibility in the currency, and a more perfect adjustment of the relations between the government and the National banks.

GAGE, THOMAS (1721-1787), British general and governor of Massachusetts, second son of the first Viscount Gage, was born in 1 7 2 1 . He entered the army in 1 74 1 and saw service in Flanders

and in the campaign of Culloden, becoming lieutenant-colonel in the 44th foot in March 1751. In 1754 he served in America, and he took part in the following year in General Braddock's disastrous expedition. In 1758 he became colonel of a new regiment, and served in Amherst's operations against Montreal. He was made governor of Montreal, and promoted major-general in 1 761, and in 1763 succeeded Amherst in the command of the British forces in America; in 1770 he was made a lieutenant- general. In 1774 he was appointed governor of Massachusetts, and in that capacity was entrusted with carrying into effect the Boston Port Act. The difficulties which surrounded him in the execution of his office at this time of the gravest unrest culmin- ated in 1775, and the action of the 19th of April at Lexington initiated the American War of Independence. After the battle of Bunker Hill, Gage was superseded by General (Sir William) Howe, and returned to England. He became general in 1782, and died on the 2nd of April 1787.

GAGE, a pledge, something deposited as security for the performance of an agreement, and liable to be forfeited on failure to carry it out. The word also appears in " engage," and is taken from the O. Fr., as are " wage," payment for services, and " wager," bet, stake, from the collateral O. Fr. waige. These two words are from the Low Lat. wadiare, vadiare, to pledge, vadium, classical Lat. vas, vadis, but may be from the old Teutonic cognate base seen in Gothic wadi, a pledge (cf. Ger. wetten, to wager); this Teutonic base'is seen in Eng. "wed," to marry, i.e. to engage by a pledge (cf. Goth, gawadjon, to betrothe). A particular form of giving a " gage " or pledge was that of throwing down a glove or gauntlet as a challenge to a judicial combat, the glove being the " pledge " that the parties would

appear on the field; hence the common phrase " to throw down

the gage of defiance " for any challenge (see Glove and Wager).

GAGERN, HANS CHRISTOPH ERNST, Baron von (1766- 1852), German statesman and political writer, was born at Kleinniedesheim, near Worms, on the 25th of January 1766. After studying law at the universities of Leipzig and Gottingen, he entered the service of the prince of Nassau- Weilburg, whom in 1 791 he represented at the imperial diet. He was afterwards appointed the prince's envoy at Paris, where he remained till the decree of Napoleon, forbidding all persons born on the left side of the Rhine to serve any other state than France, compelled him to resign his office (181 1). He then retired to Vienna, and in 181 2 he took part in the attempt to excite a second insurrection against Napoleon in Tirol. On the failure of

this attempt he left Austria and joined the headquarters of the Prussian army (1813), and became a member of the board of administration for north Germany. In 1 8 1 4 he was appointed administrator of the Orange principalities; and, when the prince of Orange became king of the Netherlands, Baron Gagern became his prime minister. In 181 5 he represented him at the congress of Vienna, and suc- ceeded in obtaining for the Netherlands a considerable augmenta- tion of territory. From 1816 to 1818 he was Luxemburg envoy at the German diet, but was recalled, at the instance of Metter- nich, owing to his too independent advocacy of state constitutions. In 1820 he retired with a pension to his estate at Hornau, near Hochst, in Hesse-Darmstadt; but as a member of the first chamber of the states of the grand-duchy he continued to take an active share in the promotion of measures for the welfare of his country. He retired from public life in 1848, and died at Hornau on the 22nd of October 1852. Baron von Gagern wrote a history of the German nation (Vienna, 1813; 2nd ed., 2 vols., Frankfort, 1825-1826), and several other books on subjects connected with history and social and political science. Of most permanent value, however, is his autobiography, Mein Anteil an der Politik, 5 vols. (Stuttgart and Leipzig, 1823-1845). Of Hans Christoph von Gagern's sons three attained con- siderable eminence: —

Friedrich Balduin, Freiherr von Gagern (1794-1848), the eldest, was born at Weilburg on the 24th of October 1794. He entered the university of Gottingen, but soon left, and, taking service in the Austrian army, took part in the Russian campaign of 1812, and fought in the following year at Dresden, Kulm and Leipzig. He then entered the Dutch service, took part in the campaigns of 181 5, and, after studying another year at Heidel- berg, was member for Luxemburg of the military commission of the German federal diet (1824, 1825). In 1830 and 1831 he took part in the Dutch campaign in Belgium, and in 1844, after being promoted to the rank of general, was sent on an important mission to the Dutch East Indies to inquire into the state of their military defences. In 1847 he was appointed governor at the Hague, and commandant in South Holland. In the spring of 1848 he was in Germany, and on the outbreak of the revolu- tionary troubles he accepted the invitation of the government of Baden to take the command against the insurgent " free companies " (Freischaaren). At Kandern, on the 20th of April, he made a vain effort to persuade the leaders to submit, and was about to order his troops to attack when he was mortally wounded by the bullets of the insurgents. His Life, in 3 vols. (Heidelberg and Leipzig, 1856-1857), was written by his brother Heinrich von

Gagern.

Heinrich Wilhelm August, Freiherr von Gagern (1790- 1880), the third son, was born at Bayreuth on the 20th of August 1799, educated at the military academy at Munich, and, as an officer in the service of the duke of Nassau, fought at Waterloo. Leaving the service after the war, he studied jurisprudence at , Heidelberg, Gottingen and Jena, and in 1819 went for a while to Geneva to complete his studies. In 182 1 he began his official career as a lawyer in the grand-duchy of Hesse, and in 1832 was elected to the second chamber. Already at the universities he had proclaimed his Liberal sympathies as a member of the Burschenschaft, and he now threw himself into open opposition to the unconstitutional spirit of the Hessian government, an attitude which led to his dismissal from the state service in 1833. • Henceforth he lived in comparative retirement, cultivating a

farm rented by his father at Monsheim, and occasionally pub- lishing criticisms of public affairs, until the February revolution of 1848 and its echoes in Germany recalled him to active political life. For a short while he was at the head of the new Hessian administration; but his ambition was to share in the creation of a united Germany. At the Heidelberg meeting and the preliminary convention (Vorparlament) of Frankfort he deeply impressed the assemblies with the breadth and moderation of his views; with the result that when the German national parliament met (May 18), he was elected its first president. His influence was at first paramount, both with the Unionist party and with the more moderate elements of the Left, and it was he who was mainly instrumental in imposing the principle of a united empire with a common parliament, and in carrying the election of the Archduke John as regent. With the growing split between the Great Germans (Grossdeutschen) , who wished the new empire to include the Austrian provinces, and the Little Germans (Kleindeutschen) , who realized that German unity could only be attained by excluding them, his position was shaken. On the 15th of December, when Schmerling and the Austrian members had left the cabinet, Gagern became head of the imperial ministry, and on the 18th he introduced a programme (known as the Gagernsche Programm) according to which Austria was to be excluded from the new federal state, but bound to it by a treaty of union. After a severe struggle this proposal was accepted; but the academic discussion on

the constitution continued for weary months, and on the 20th of May, realizing the hopelessness of coming to terms with the ultra-democrats, Gagern and his friends resigned. Later on he attempted to influence the Prussian Northern Union in the direction of the national policy, and he took part in the sessions of the Erfurt parliament; but, soon realizing the hopelessness of any good results from the vacillating policy of Prussia, he retired from the contest, and, as a major in the service of the Schleswig- Holstein government, took part in the Danish War of 1850. After the war he retired into private life at Heidelberg. In 1862, misled by the constitutional tendency of Austrian politics, he publicly declared in favour of the Great German party. In 1864 he went as Hessian envoy to Vienna, retiring in 1872 when the post was abolished. He died at Darmstadt on the 22nd of May 1880.

Maximilian, Freiherr von Gagern (1810-1889), the youngest son, was born at Weilburg on the 26th of March 1810. Up to 1848 he was a government official in Nassau; in that year he became a member of the German national parliament and under- secretary of state for foreign affairs. Throughout the revolu- tionary years he supported his brother's policy, became a member of the Erfurt parliament, and, after the collapse of the national movement, returned to the service of the duchy of Nassau. In 1855 he turned Roman Catholic and entered the Austrian service as court and ministerial councillor in the department of foreign affairs. In 187 1 he retired, and in 1881 was nominated a life member of the Upper Chamber (Herrenhaus). He died at Vienna on the 17th of October 1889.

See Allgemeine deutsche Biographie, Band viii. p. 301, &c. (1878) and Band xlix. p. 654 (1904).

GAHANBAR, festivals of the ancient Avesta calendar cele- brated by the Parsees at six seasons of the year which correspond with the six periods of creation: (1) Maidhyozaremaya (mid spring), (2) Maidhyashema (midsummer), (3) Paitishahya (season of corn), (4) Ayathrema (season of flocks), (5) Maidhyarya (winter solstice), (6) Hamaspathmaedha (festival of sacrifices).

GAIGNIERES, FRANCOIS ROGER DE (1642-1715), French genealogist, antiquary and collector, was the son of Aime de Gaignieres, secretary to the governor of Burgundy, and was born on the 30th of December 1642. He became ecuyer (esquire) to Louis Joseph, duke of Guise, and afterwards to Louis Joseph's aunt, Marie of Guise, by whom in 1679 he was appointed governor of her principality of Joinville. At an early age he began to make a

collection of original materials for history generally, and, in particular, for that of the French church and court. He brought together a large collection of original letters and other

documents, together with portraits and prints, and had cbpies made of a great number of the most curious antiquarian objects, such as seals, tombstones, stained glass, miniatures and tapestry. In 17 1 1 he presented the whole of his collections to the king. The bulk of them is preserved in the Bibliotheque Nationale at Paris, and a certain number in the Bodleian library at Oxford.

See G. Duplessis, Roger de Gaignieres (Paris, 1870); L. Delisle, Cabinet des manuscrits, t. i. pp. 335-356; H. Bouchot, Les Portraits aux crayon des XVI' el XVII' siecles (Paris, 1884); Ch. de Grandmaison, Gaignieres, ses correspondants et ses collections de portraits (Niort, 1892).

GAIL, JEAN BAPTISTE (1755-1829), French hellenist, was born in Paris on the 4th of July 1755. In 1791 he was appointed deputy, and in 1792 titular professor at the College de France. During the Revolution he quietly performed his professional duties, taking no part in politics, although he possessed the faculty of ingratiating himself with those in authority. In 1815 he was appointed by the king keeper of Greek MSS. in the royal library over the heads of the candidates proposed by the other conservators, an appointment which made him many enemies. Gail imagined that there was an organized conspiracy to belittle his learning and professional success, and there was a standing quarrel between him and his literary opponents, the most dis- tinguished of whom was P. L. Courier. He died on the 5th of February 1829. Without being a great Greek scholar, Gail was a man of unwearied industry, whose whole life was devoted to his favourite studies, and he deserves, every credit for having rescued Greek from the neglect into which it had fallen during the troublous times in which he lived. The list of Gail's published works filled 500 quarto pages of the introduction to his edition of Xenophon. The best of these is his edition of Theocritus (1828). He also wrote a number of elementary educational works, based on the principles of the school of Port Royal. His communica- tions to the Academie des Inscriptions being coldly received and seldom accorded the honour of print, he inserted them in a vast compilatibn in 24 volumes, which he called Le Philologue, con- taining a mass of ill-digested notes on Greek grammar, geography, archaeology, and various authors.

See " Notice historique sur la vie et les ouvrages de J. B. G.," in

Mem. de V Acad, des Inscriptions, ix. ; the articles in Biographie universelle (by A. Pillon) and Ersch and Gruber's Allgemeine Encyclo- padie (by C. F. Bahr) ; a list of his works will be found in J. M. Querard, La France litteraire (1829), including the contents of the volumes of Le Philologue.

GAILLAC, a town of south-western France, capital of an arrondissement in the department of Tarn, on the right bank of the Tarn, 15 m. W. of Albi on the railway from that city to Toulouse. Pop. (1906) town, 5388; commune, 7535. The churches of St Michel and St Pierre, both dating from the 13th and 14th centuries, have little architectural importance. There are some interesting houses, one of which, the Maison Yversen, of the Renaissance, is remarkable for the rich carving of its doors. The public institutions include the sub-prefecture, a tribunal of first instance, and a communal college. Its industries include the manufacture of lime and wooden shoes, while dyeing, wood- sawing and flour-milling are also carried en; it has a consider- able trade in grain, flour, vegetables, dried plams, anise, coriander, &c, and in wine, the white and red wines of the arrondissement having a high reputation. Gaillac grew up round the B enedictine abbey of St Michel, founded in the 10th century.

GAILLARD, GABRIEL HENRI (1726-1806), French historian, was born at Ostel, Picardy, in 1726. He was educated for the bar, but after finishing his studies adopted a literary career, ultimately devoting his chief attention to history. He was already a member of the Academy of Inscriptions and Belles- lettres (1760), when, after the publication of the three first ' volumes of his Hisioire de la rivaliU de la France et d'Angleterre, he was elected to the French Academy (1771); and when Napoleon created the Institute he was admitted into its third class (Academie fransaise) in 1803. For forty years he was the intimate friend of Malesherbes, whose life (1805) he wrote. He died at St Firmin, near Chantilly, on the 13th of February 1806. Gaillard is painstaking and impartial in his statement of facts,

and his style is correct and elegant, but the unity of his narrative is somewhat destroyed by digressions, and by his method of treating war, politics, civil administration, and ecclesiastical affairs under separate heads. His most important work is his Histoire de la rimaliti de la France et de I' Angleterre (in u vols., 1771-1777); and among

his other works may be mentioned Essai de rhitorique francaise, a I'usage des jeunes demoiselles (1745), often reprinted, and in 1822 with a life of the author; Histoire de Marie de Bourgogne (1757); Histoire de Francois I' T (7 vols., 1776-177 9); Histoire des grandes querelles entre CharlesV, et Francois I" (2 vols., 1777); Histoire de Charlemagne (2 vols., 1782); Histoire de la rivalitS de la France et de I'Espagne (8 vols., 1801); Dictionnaire historique (6 vols., 1789-1804), making part of the Encyclopidie methodique; and Milanges littiraires, con- taining eloges on Charles V., Henry IV., Descartes, Corneille, La Fontaine, Malesherbes and others.

GAINESVILLE, a city and the county-seat of Alachua county, Florida, U.S.A., about 70 m. S.W. of Jacksonville. Pop. (1890) 2790; (1900) 3633, of whom 1803 were negroes; (1905) 5413; (1910) 6183. Gainesville is served by the Atlantic Coast Line, the Seaboard Air Line, and the Tampa & Jacksonville railways, and is an important railway junction. It is the seat of the University of the State of Florida, established at Lake City in 1905 and removed to Gainesville in 1906. The university in- cludes a school of language and literature, a general scientific school, a school of agriculture, a technological school, a school of pedagogy, a normal school, and an agricultural experiment station. In 1908 the university had 15 instructors and 103 students. The Florida Winter Bible Conference and Chautauqua is held here. Gainesville is well known as a winter resort, and its climate is especially beneficial to persons affected by pulmonary troubles. In the neighbourhood are the Alachua Sink, Payne's Prairie, Newman's Lake, the Devil's Mill Hopper and other objects of interest. The surrounding country produces Sea Island cotton, melons, citrus and other fruits, vegetables and naval stores. About 1 5 m. W. of the city there is a rich phosphate mining district. The city has bottling works, and manufactures fertilizers, lumber, coffins, ice, &c. The municipality owns and operates the water-works; the water-supply comes from a spring 2 m. from the city, and the water closely resembles that of the Poland Springs in Maine. Gainesville is in the midst of the famous Seminole country. The first settlement was made here about 1850; and Gainesville, named in honour of General E. P. Gaines, was incorporated as a town in 1869, and was chartered as a city in 1907.

GAINESVILLE, a city and the county-seat of Cooke county, Texas, U.S.A., about 6 m. S. of the Red river, and about 60 m. N. of Fort Worth. Pop. (1890) 6594; (1900) 7874 (1201 negroes and 269 foreign-born); (1910) 7624. The city is served by the Gulf, Colorado & Santa F6, and the Missouri, Kansas & Texas railways, and by an interurban electric railway. Gaines- ville is a trading centre and

market for the surrounding country, in which cotton, grains, garden truck, fruit and alfalfa are grown and live-stock is raised; and a wholesale distributing point for the neighbouring region in Texas and Oklahoma. The city has cotton-compresses and cotton-gins, and among its manu- factures are cotton-seed oil, flour, cement blocks, pressed bricks, canned goods, foundry products, waggon-beds and creamery products. Gainesville was settled about 1851, was incorporated in 1873, and was chartered as a city in 1879; it was named in honour of General Edmund Pendleton Gaines (1777-1849), who served with distinction in the War of 181 2, becoming a brigadier-general in March 1814 and receiving the brevet of major-general and the thanks of Congress for his defence of Fort Erie in August 1814. Gaines took a prominent part in the operations against the Seminoles in Florida in 181 7 (when he was in command of the Southern Military District) and in 1836 and during the Mexican War commanded the department of the South-West, with headquarters at New Orleans.

GAINSBOROUGH, THOMAS (1727-1788), English painter, one of the greatest masters of the English school in portraiture, and only less so in landscape, was born at Sudbury, Suffolk, in

the spring of 1727. His father, who carried on the business of a woollen crape-maker in that town, was of a respectable character and family, and was noted for his skill in fencing; his mother excelled in flower-painting, and encouraged her son in the use of the pencil. There were nine children of the marriage, two of the painter's brothers being of a very ingenious turn.

At ten years old, Gainsborough " had sketched every fine tree and picturesque cottage near Sudbury," and at fourteen, having filled his task-books with caricatures of his schoolmaster, and sketched the portrait of a man whom he had detected on the watch for robbing his father's orchard, he was allowed to follow the bent of his genius in London, with some instruction in etching from Gravelot, and under such advantages as Hayman, the historical painter, and the academy in St Martin's Lane could afford. Three years of study in the metropolis, where he did some modelling and a few landscapes, were succeeded by two years in the country. Here he fell in love with Margaret Burr, a young lady of many charms, including an annuity of £200, married her after painting her portrait, and a short courtship, and, at the age of twenty, became a householder in Ipswich, his rent being £6 a year. The annuity was reported to come from Margaret's real (not her putative) father, who was one of the exiled Stuart princes or else the duke of Bedford. She was sister of a

young man employed by Gainsborough's father as a traveller. At Ipswich, Gainsborough tells us, he was " chiefly in the face-way " ; his sitters were not so numerous as to prevent him from often rambling with his friend Joshua Kirby (president of the Society of Artists) on the banks of the Orwell, from painting many landscapes with an attention to details which his later works never exhibited, or from joining a musical club and entertaining himself and his fellow-townsmen by giving concerts. As he advanced in years he became ambitious of advancing in reputa- tion. Bath was then the general resort of wealth and fashion, and to that city, towards the close of the year 1759, he removed with his wife and two daughters, the only issue of their marriage. His studio in the circus was soon thronged with visitors; he gradually raised his price for a half-length portrait from 5 to 40 guineas, and for a whole-length from 8 to 100 guineas; and he rapidly developed beyond the comparatively plain and hum-drum quality of his Ipswich paintings. Among his sitters at this period were the authors Sterne and Richardson, and the actors Quin, Henderson and Garrick. Meanwhile he contributed both portraits and landscapes to the annual exhibitions in London. He indulged his taste for music by learning to play the viol-di-gamba, the harp, the hautboy, the violoncello. His house harboured Italian, German, French and English musicians. He haunted the green-room of Palmer's theatre, and painted gratuitously the portraits of many of the actors: he constantly gave away his sketches and landscapes. In the summer of 1774, having already attained a position of great prosperity, he took his departure for London, and fixed his residence at Schomberg House, Pall Mall, a noble mansion still standing, for a part of which the artist paid £300 a year.

Gainsborough had not been many months in London ere he received a summons to the palace, and to the end of his career he divided with West the favour of the court, and with Reynolds the favour of the town. Sheridan, Burke, Johnson, Franklin, Canning, Lady Mary Wortley Montagu, Mrs Siddons, Clive, Blackstohe, Hurd, were among the number of those who sat to him. But in London as in Bath his landscapes were exhibited, were commended, and were year after year returned to him, " till they stood," says Sir William Beechey, " ranged in long lines from his hall to his 'painting-room." Gainsborough was a member of the Royal Academy, one of the original 36 elected in 1768; but in 1784, being dissatisfied with the position assigned on the exhibition walls to his portrait of the three princesses, he withdrew that and his other pictures, and he never afterwards exhibited there. Even before this he had taken no part in the business of the Institution. After seceding he got up an exhibi-

tion in his own house, not successfully. In February 1788, while witnessing the trial of Warren Hastings, he felt an extraordinary chill at the back of his neck; this was the beginning of a cancer

(or, as some say, a malignant wen) which proved fatal on the 2nd of August of the same year. He lies buried at Kew.

Gainsborough was tall, fair and handsome, generous, impulsive to the point of capriciousness, easily irritated, not of bookish likings, a lively talker, good at repartee. He was a most thorough embodiment of the artistic temperament; delighting in nature and " the look of things," insatiable in working, fond of music and the theatre hardly less than of painting — a warm, rich person- ality, to whom severe principle was perhaps as foreign as de- liberate wrong-doing. The property which he left at his death was not large. One of his daughters, Mary, had married the musician Fischer contrary to his wishes, and was subject to fits of mental aberration. The other daughter, Margaret, died unmarried. Mrs Gainsborough, an extremely sweet-tempered woman, sur- vived her husband ten years. There is a pretty anecdote that Gainsborough, if he ever had a tiff with her, would write a pacify- ing note, confiding it to his dog Fox, who delivered it to the lady's pet spaniel Tristram. The note was worded as in the person of Fox to Tristram, and Mrs Gainsborough replied in the best of humours, as from Tristram to Fox.

Gainsborough and Reynolds rank side by side as the greatest portrait-painters of the English school. They were at variance; but Gainsborough on his death-bed sought and obtained a re- conciliation. It is difficult to say which stands the higher of the two, although Reynolds may claim to have worked with a nearer approach to even and demonstrable excellence. In grace, spirit, and lightness of insight and of touch, Gainsborough is peculiarly eminent. His handling was slight for the most part, and somewhat arbitrary, but in a high degree masterly; and his landscapes and rustic compositions are not less gifted than his portraits. Among his finest works are portraits of " Lady Ligonier," " Georgiana, duchess of Devonshire," " Master Buttall (the Blue Boy)," now in Grosvenor House, " Mrs Sheridan and Mrs Tickell," " Orpin, the parish clerk " (National Gallery), " the Hon. Mrs Graham " (Scottish National Gallery), his own portrait (Royal Academy), " Mrs Siddons " (National Gallery); also" the Cottage Door,"" the Market Cart," "

the Return from Harvest," " the Woodman and his Dog in a Storm " (destroyed by fire), and " Waggon and Horses passing a Brook " (National Gallery — this was a favourite with its painter) . He made a vast number of drawings and sketches.

A few observations may be added: (1) as to individual works by Gainsborough, and (2) as to his general characteristics as a painter.

Two of his first portraits, executed when he was settled at Ipswich, were separate likenesses of Mr and Mrs Hingeston. His first great hit was made at Bath with a portrait of Lord Nugent. With a likeness of Mr Poyntz, 1762, we find a decided advance in artistic type, and his style became fixed towards 1768. The date of the "Blue Boy" is somewhat uncertain: most accounts name 1779, but perhaps 1770 is nearer the mark. This point is not without interest for dilettanti; because it is said that Gainsborough painted the picture with a view to confut- ing a dictum of Reynolds, to the effect that blue was a colour unsuitable for the main light of a work. But, if the picture was produced before 1778, the date of Reynolds's dictum, this long-cherished and often-repeated tradition must be given up. A full-length of the duke of Norfolk was perhaps the latest work to which Gainsborough set his hand. His portrait of Elizabeth, duchess of Devonshire, famous for its long disappearance, has aroused much controversy; whether this painting, produced not long after Gainsborough had settled in London, and termed the Duchess of Devonshire," does really represent that lady, is by no means certain. It was mysteriously stolen in 1876 in London immediately after it had been purchased by Messrs Agnew at the Wynn Ellis sale at a huge price, and a long time elapsed before it was retraced. The picture was taken to New York, and eventually to Chicago; and in April 1001, through the agency of a man named Pat Sheedy, it was given up to the American detectives working for Messrs Agnew; it was then sold to Mr Pierpont Morgan.

Gainsborough's total output of paintings exceeded 300,

including 220 portraits: he also etched at least 18 plates, and 3 in aquatint. At the date of his death 56 paintings remained on hand: these, along with 148 drawings, were then exhibited. In his earlier days he made a practice of copying works by Vandyck (the object of his more special admiration), Titian, Rubens, Teniers, Hobbema, Claude and some others, but not in a spirit of servile reproduction.

Gainsborough was pre-eminent in that very essential ele- ment of portraiture— truthful likeness. In process of time he advanced in the

rendering of immediate expression, while he somewhat receded in general character. He always made his sitters look pleasant, and, after a while, distinguished. Unity of impression is one of the most marked qualities in his work; he seems to have seen his subject as an integer, and he wrought at the various parts of it together, every touch, (and very wilful some of his touches look) tending towards the foreseen result. He painted with arrowy speed, more especially in his later years. For portraits he used at times brushes upon sticks 6 ft. long; there was but little light in his painting-room, and he often worked in the evenings. He kept his landscape work distinct from his portraiture, not ever adding to the latter a fully realized landscape background; his views he never signed or dateˆhis likenesses only once or twice. His skies are constantly cloudy, the country represented is rough and broken; the scenes are of a pastoral kind, with an effect generally of coming rain, or else of calm sun-setting. The prevalent feeling of his landscapes is- somewhat sad, and to children, whether in subject- groups or in portraits, he mostly lent an expression rather plain- tive than mirthful. It should be acknowledged that, whether in portraiture or in landscape, the painter's mannerisms of execution increased in process of time — patchings of the brush, tufty foliage, &c; some of his portraits are hurried and flimsy, with a minimum of solid content, though not other than artistic in feeling. Here are a few of his axioms:—" What makes the difference between man and man is real performance, and not genius or conception." "I don't think it would be more ridiculous for a person to put his nose close to the canvas and say the colours smelt offensive than to say how rough the paint lies, for one is just as material as the other with regard to hurting the effect and drawing of a picture." " The eye is the only perspective-master needed by a landscape-painter."

Authorities. — In 1788 Philip Thicknesse, Lieutenant-Governor of Landguard Fort, Ipswich, who had been active in promoting the artist's fortunes at starting, published A Sketch of the Life and Paintings of Thomas Gainsborough. He had quarrelled with the painter at Bath, partly because the latter had undertaken to do a portrait of him as a gift, and then neglected the work, and finally, in a huff, bundled it off only half done. The crucial question here is whether or not Gainsborough was reasonably pledged to perform any such gratuitous work, and this point has been contested. Thick- nesse's book is in part adverse to Gainsborough, and more particu- larly so to his wife. Reynolds's " Lecture " on Gainsborough, replete with critical insight, should never be lost sight of as a leading document. In 1856 a heedfully compiled Life of Thomas Cains-

borough was brought out by T. W. Fulcher. This was the first substantial work about him subsequent to Allan Cunningham's lively account (1829) in his Lives of the Painters. Of late years a great deal has been written, mainly but not by any means exclusively from the critical or technical point of view: — Sir Walter Armstrong (two works, 1896 and 1898); Mrs Arthur Bell (1902); Sir W. M. Conway, Artistic Development of Reynolds and Gainsborough (1886) ; Lord Ronald Sutherland Gower (1903); G. M. Brock-Arnold (1881). G. Pauli has brought out an illustrated work in Germany (1904) under the title Gainsborough. (W. M. R.)

GAINSBOROUGH, a market town in the W. Lindsey or Gainsborough parliamentary division of Lincolnshire, England; on the right (E.) bank of the Trent. Pop. of urban district (1901) 17,660. It is served by the Lincoln-Doncaster joint line , of the Great Northern and Great Eastern railways, by which it is 16 m. N.W. of Lincoln, and by the Great Central railway. The parish church of All Saints is classic of the 18th century, excepting the Perpendicular tower. The two other parish churches are modern. The Old Hall, of the 15th century, en-larged in the 16th, is a picturesque building, forming three sides of a quadrangle, partially timber-framed, but having a beautiful oriel window and other parts of stone. There is also

a Tudor tower of brick. A literary and scientific institute occupy-part of the building. Gainsborough possesses a grammar school (founded in 1589 by a charter of Queen Elizabeth) and other schools, town-hall, county court-house, Albert Hall and Church of England Institute. There is a large carrying trade by water on the Trent and neighbouring canals. Shipbuilding and iron- founding are carried on, and there are manufactures of linseed cake, and agricultural and other machinery.

Gainsborough (Gegnesburh) was probably inhabited by the Saxons on account of the fishing in the Trent. The Saxon Chronicle states that in 1013 the Danish king Sweyn landed here and subjugated the inhabitants. Gainsborough, though not a chartered borough, was probably one by prescription, for mention is made of burghal tenure in 1280. The privilege of the return of writs was conferred on the lord of the manor, Aymer de Valence, earl of Pembroke, in 1323, and confirmed to Ralph de Percy in 1383. Mention is made in 1204 of a Wednesday market, but there is no extant grant before 1258,

*when Henry III. granted a Tuesday market to William de Valence, earl of Pembroke, who also obtained from Edward I. in 1 29 1 licence for an annual fair on All Saints' Day, and the seven preceding and eight following days. In 1*43 Henry III. granted to John Talbot licence for a yearly fair on the eve, day and morrow of St James the Apostle. Queen Elizabeth in 1392 granted to Thomas Lord Burgh two fairs, to begin on Easter Monday and on the 9th of October, each lasting three days. Charles I. in 163 5-1636 extended the duration of each to nine days. The Tuesday market is still held, and the fair days are Tuesday and Wednesday in Easter-week, and the Tuesday and Wednesday after the 20th of October.*

See Adam Stark, History and Antiquities of Gainsburgh (London,

1843)-

GAIRDNER, JAMES (1828-), English historian, son of John Gairdner, M.D., was born in Edinburgh on the 22nd of March 1828. Educated in his native city, he entered the Public Record Office in London in 1846, becoming assistant keeper of the public records (1859-1893). Gairdner's valuable and pains- taking contributions to English history relate chiefly to the reigns of Richard III., Henry VII. and Henry VIII. For the " Rolls Series " he edited Letters and Papers illustrative of the Reigns of Richard III . and Henry VII. (London, 1861-1863), and Memorials of Henry VII. (London, 1858); and he succeeded J. S. Brewer in editing the Letters and Papers, foreign and domestic, of the reign of Henry VIII. (London, 1862-1905). He brought out the best edition of the Paston Letters (London, 1872-1875, and again 1896), for which he wrote a valuable introduction; and for the Camden Society he edited the Histori- cal collections of a Citizen of London (London, 1876), and Three 15th-century Chronicles (London, 1880). His other works include excellent monographs on Richard III. (London, 1878, new and enlarged edition, Cambridge, 1898), and on Henry VII. (London, 1889, and subsequently); The Houses of Lancaster and York (London, 1874, and other editions); The English Church in the i6lk century (London, 1902); Lollardy and the Reformation in England (1908); and contributions to the Encyclopaedia Britannica, the Dictionary of National Biography, the Cambridge Modern History, and the English Historical Review. Gairdner received the honorary degree of LL.D. from the university of Edinburgh in 1897, and was made a C.B. in 1900.

GAIRLOCH (Gaelic gearr, short), a sea loch, village and parish in the west of the county of Ross and Cromarty, Scotland. Pop. of

parish (1901) 3797. The parish covers a large district on the coast, and stretches inland beyond the farther banks of Loch Maree, the whole of which lies within its bounds. It also includes the islands of Dry and Horisdale in the loch, and Ewe in Loch Ewe, and occupies a total area of 200,646 acres. The place and loch must not be confounded with Gareloch in Dumbartonshire. Formerly an appanage of the earldom of Ross, Gairloch has belonged to the Mackenzies since the end of the 1 5th century. Flowerdale, an 18th-century house in the pretty little glen of the same name, lying close to the village, is the chief seat of the Gairloch branch of the clan Mackenzie. William

Ross (1762-1790), the Gaelic poet, who was schoolmaster of Gairloch, of which his mother was a native, was buried in the old kirkyard, where a monument commemorates him.

GAISERIC, or Genseric (c. 390-477), king of the Vandals, was a son of King Godegisel (d. 406), and was born about 390. Though lame and only of moderate stature, he won renown as a warrior, and became king on the death of his brother Gonderic in 428. In 428 or 429 he led a great host of Vandals from Spain into Roman Africa, and took possession of Mauretania. This step is said to have been taken at the instigation of Boniface, the Roman general in Africa; if true, Boniface soon repented of his action, and was found resisting the Vandals and defending Hippo Regius against them. At the end of fourteen months Gaiseric raised the siege of Hippo; but Boniface was forced to fly to Italy, and the city afterwards fell into the hands of the Vandals. Having pillaged and conquered almost the whole of Roman Africa, the Vandal king concluded a treaty with the emperor Valentinian III. in 435, by which he was allowed to retain his conquests; this peace, however, did not last long, and in October 439 he captured Carthage, which he made the capital of his kingdom. According to some authorities Gaiseric at this time first actually assumed the title of king. In religious matters he was an Arian, and persecuted the members of the orthodox church in Africa, although his religious policy varied with his relations to the Roman empire. Turning his attention in another direction he built a fleet, and the ravages of the Vandals soon made them known and feared along the shores of the Medi- terranean. " Let us make," said Gaiseric, " for the dwellings of the men with whom God is angry," and he left the conduct of his marauding ships to wind and wave. In 455, however, he led an expedition to Rome, stormed the city, which for fourteen days his troops were permitted to plunder, and then returned to Africa laden with spoil. He also carried with him many captives, including the empress Eudoxia, who is said to have invited the

Vandals into Italy. The Romans made two attempts to avenge themselves, one by the Western emperor, Majorianus, in 460, and the other by the Eastern emperor, Leo I., eight years later; but both enterprises failed, owing principally to the genius of Gaiseric. Continuing his course on the sea the king brought Sicily, Sardinia, Corsica and the Balearic Islands under his rule, and even extended his conquests into Thrace, Egypt and Asia Minor. Having made peace with the eastern emperor Zeno in 476, he died on the 25th of January 477. Gaiseric was a cruel and cunning man, possessing great military talents and superior mental gifts. Though the effect of his victories was' afterwards neutralized by the successes of Belisarius, his name long remained the glory of the Vandals. The name Gaiseric is said to be derived from gais, a javelin, and reiks, a king.

See Vandals; also T. Hodgkin, Italy and her Invaders, vol. ii. (London, 1892); E. Gibbon, Decline and Fall of the Roman Empire (ed. J. B. Bury, 1896-1900) ; L. Schmidt, Geschichte der Vandalen (Leipzig, 1901); and F. Martroye, Genseric; La Conqutte vandale en Afrique (Paris, 1907).

GAISFORD, THOMAS (1779-1855), English classical scholar, was born at Iford, Wiltshire, on the 22nd of December 1779. Proceeding to Oxford in 1797, he became successively student and tutor of Christ Church, and was in 181 1 appointed regius professor, of Greek in the university. Taking orders, he held (1815-1847) the college living of Westwell, in Oxfordshire, and other ecclesiastical preferments simultaneously with his professor- ship. From 1831 until his death on the 2nd of June 1855, he was dean of Christ Church. As curator of the Bodleian and principal delegate of the University Press he was instrumental in securing the co-operation of distinguished European scholars as collators, notably Bekker and Dindorf. Among his numerous contributions to Greek literature may be mentioned, Hephaes- tion's Encheiridion (1810); Poetae Graeci minores (1814-1820); Stobaeus' Florilegium (1822); Herodotus, with variorum notes (1824); Suidas' Lexicon (1834); Etymologicon magnum (1848)^ Eusebius's Praeparatio (1843) and Demonstrate, evangelica (1852). In 1856 the Gaisford prizes, for Greek composition, were I founded at Oxford to perpetuate his memory.

GAIUS, a celebrated Roman jurist. Of his personal history very little

is known. It is impossible to discover even his full name, Gaius orCaius being merely the personal name(praenomen) so common in Rome. From internal evidence in his works it may be gathered that he flourished in the reigns of the emperors Hadrian, Antoninus Pius, Marcus Aurelius and Commodus. His works were thus composed between the years 130 and 180, at the time when the Roman empire was most prosperous, and its government the best. Most probably Gaius lived in some provincial town, and hence we find no contemporary notices of his life or works. After his death, however, his writings were recognized as of great authority, and the emperor Valentinian named him, along with Papinian, Ulpian, Modestinus and Paulus, as one of the five jurists whose opinions were to be followed by judicial officers in deciding cases. The works of these jurists accordingly became most important sources of Roman law.

Besides the Institutes, which are a complete exposition of the elements of Roman law, Gaius was the author of a treatise on the Edicts of the Magistrates, of Commentaries on the Twelve Tables, and on the important Lex Papia Poppaea, and several other works. His interest in the antiquities of Roman law is apparent, and for this reason his work is most valuable to the historian of early institutions. In the disputes between the two schools of Roman jurists he generally attached himself to that of the Sabinians, who were said to be followers of Ateius Capito, of whose life we have some account in the Annals of Tacitus, and to advocate a strict adherence as far as possible to ancient rules, and to resist innovation. Many quotations from the works of Gaius occur in the Digest of Justinian, and so acquired a permanent place in the system of Roman law; while a com- parison of the Institutes of Justinian with those of Gaius shows that the whole method and arrangement of the later work were copied from that of the earlier, and very numerous passages are word for word the same. Probably, for the greater part of the period of three centuries which elapsed between Gaius and Justinian, the Institutes of the former had been the familiar text- book of all students of Roman law.

Unfortunately the work was lost to modern scholars, until, in 1816, a manuscript was discovered by B. G. Niebuhr in the chapter library of Verona, in which certain of the works of St Jerome were written over some earlier writings, which proved to be the lost work of Gaius. The greater part of the palimpsest has, however, been deciphered and the text is now fairly complete. This discovery has thrown a flood of light on portions of the history of Roman law which had previously been most obscure. Much of the historical information given by Gaius is wanting in the compilations of Justinian, and, in particular, the

account of the ancient forms of procedure in actions. In these forms can be traced " survivals " from the most primitive times, which provide the science of comparative law with valuable illustrations, which may explain the strange forms of legal procedure found in other early systems. Another circumstance which renders the work of Gaius more interesting to the historical student than that of Justinian, is that Gaius lived at a time when actions were tried by the system of formulae, or formal directions given by the praetor before whom the case first came, to the judex to whom he referred it. Without a knowledge of the terms of these formulae it is impossible to solve the most interesting question in the his- tory of Roman law, and show how the rigid rules peculiar to the ancient law of Rome were modified by what has been called the equitable jurisdiction of the praetors, and made applicable to new conditions, and brought into harmony with the notions and the needs of a more developed society. It is clear from evidence of Gaius that this result was obtained, not by an independent set of courts administering, as in England previous to the Judicature Acts, a system different from that of the ordinary courts, but by the manipulation of the formulae. In the time of Justinian the work was complete, and the formulary system had disappeared. The Institutes of Gaius are divided into four books — the first treating of persons and the differences of the status they may occupy in the eye of the law; the second'of things, and the modes in which rights over them may be acquired, including the

law relating to wills; the third of intestate succession and of obligations; the fourth of actions and their forms.

There are several carefully prepared editions of the Institutes, starting from that of Goschen (1820), down to that of Studemund and Kriiger (1900). The most complete English edition is that of E. Poste, which includes beside the text an English translation and copious commentary (1885). A comparison of the early forms of actions mentioned by Gaius with those used by other primitive societies will be found in Sir H. Maine's Early Institutions, cap. 9. For further information see M. Glasson, £tude sur Gaius et sur le jus respondendi; also Roman Law.

GAIUS CAESAR (a.d. 12-41), surnamed Caligula, Roman emperor from 37-41, youngest son of Germanicus and Agrippina the elder, was born on the 31st of August a.d. 12. He was brought up in his father's camp on the Rhine among the soldiers, and received the name Caligula from the caligae, or foot-soldiers' boots, which he used to wear. He also accompanied his father to Syria, and after his death returned to Rome. In 32 he was summoned by Tiberius to

Capreae, and by skilful flattery managed to escape the fate of his relatives. After the murder of Tiberius by Naevius Sertorius Macro, the prefect of the praetorian guards, which was probably due to his instigation, Caligula ascended the throne amidst the rejoicings of the people. The senate conferred the imperial power upon him alone, although Tiberius Gemellus, the grandson of the preceding emperor, had been designated as his co-heir. He entered on his first consulship in July 37. For the first eight months of his reign he did not disappoint the popular expectation; but after his recovery from a severe illness his true character showed itself. His extravagance, cruelty and profligacy can hardly be explained except on the assumption that he was out of his mind. According to Pelham, much of his conduct was due to the atmosphere in which he was brought up, and the ideas of sovereignty instilled into him, which led him to pose as a monarch of the Graeco-oriental type. To fill his ex- hausted treasury he put to death his wealthy subjects and confiscated their property; even the poor fell victims to his thirst for blood. He bestowed the priesthood and a consulship upon his horse Incitatus, and demanded that sacrifice should be offered to himself. He openly declared that he wished the whole Roman people had only one head, that he might cut it off at a single stroke. In 39 he set out with an army to Gaul, nominally to punish the Germans for having invaded Roman territory, but in reality to get money by plunder and confiscation. Before leaving, he led his troops to the coast opposite Britain, and ordered them to pick up shells on the seashore, to be dedicated to the gods at Rome as the spoils of ocean. On his return he entered Rome with an ovation (a minor form of triumph), temples were built, statues erected in his honour, and a special priesthood instituted to attend to his worship. The people were ground down by new forms of taxation and every kind of extortion, but on the whole Rome was free from internal disturbances during his reign; some insignificant conspiracies were discovered and rendered abortive. A personal insult to Cassius Chaerea, tribune of a praetorian cohort, led to Caligula's assassination on the 24th of January 41.

See Suetonius, Caligula; Tacitus, Annals, vi. 20 ff. ; Dio Cassius lix. ; see also S. Baring Gould, The Tragedy of the Caesars (3rd ed., 1802) ; H. F. Pelham in Quarterly Review (April, 1905) ; H. Willrich, Beitrdge znr alten Geschichte (1903) ; H. Schiller, Geschichte der romischen Kaiserzeit, i. pt. I ; J. B. Bury, Student's Hist, of the Roman Empire (1893); Merivale, History of the Romans under the Empire, ch. 48; H. Furneaux's Annals of Tacitus, ii. (introduction). Mention may also be made of the famous pamphlet by L. Quidde, Caligula. Eine Studie iiber romischen Cdsnrenwahnsinn and an

anonymous supplement, 1st Caligula mit unserer Zeit vergleichbar f (both 1894) ; and a reply, Fin-de-Siicle-Geschichtsschreibung, by G. Sommerfeldt (1895).

GALAGO, the Senegal name of the long-tailed African representatives of the lemur-like Primates, which has been adopted as their technical designation. Till recently the galagos have been included in the family Lemuridae; but this is restricted to the lemurs of Madagascar, and they are now classed with the lorises and pottos in the family Nydicebidae, of which they form the section Galaginae, characterized by the great elongation of the upper portion of the feet (tarsus) and the power of folding the large ears. Throughout the greater part of Africa south of the

Sahara galagos are widely distributed in the wooded districts, from Senegambia in the west to Abyssinia in the east, and as far south as Natal. They pass the day in sleep, but are very active at night, feeding on fruits, insects and small birds. When they descend to the ground they sit upright, and move about by jumping with their hind-legs like jerboas. They are pretty little animals, varying from the size of a small cat to less than that of a rat, with large eyes and ears, soft woolly fur and long tails. There are several species, of which G. crasslcau&atus from Mozambique is the largest; together with G. garnetti of Natal, G. agisymbanus of Zanzibar, and G. monteiroi of Angola, this represents the subgenus Otolemur. The typical group includes G. senegalensis (or galago) of Senegal, G. alleni of West and Central Africa, and G. moholi of South Africa; while G. demidoffi of West and Central Africa' and G. anomurus of French Congoland represent the subgenus Hemigalago. (R. L.)*

GALANGAL, formerly written " galingale," and sometimes " garingal," rhizoma galangae (Arab. Kholinjan , 1 Ger. Galgant wurzel; Fr. Racine de Galanga), a drug, now obsolete, with an aromatic taste like that of mingled ginger and pepper. Lesser galangal root, radix galangae minoris, the ordinary galangal of commerce, is the dried rhizome of Alpinia officinarum, a plant of the natural order Zingiberaceae, growing in the Chinese island of Hainan, where it is cultivated, and probably also in the woods of the southern provinces of China. The plant is closely allied to Alpinia calcarata, the rhizome of which is sold in the bazaars of some parts of India as a sort of galangal. Its stems attain a length of about 4 ft.,

and its leaves are slender, lanceolate and light-green, and have a hot taste; the flowers are white with red veins, and in simple racemes; the roots form dense masses, sometimes more than a foot in diameter; and the rhizomes grow horizontally, and are -J in. or less in thickness. Galangal seems to have been unknown to the ancient Greeks and Romans, and to have been first introduced into Europe by Arabian physicians. It is mentioned in the writings of Ibn Khurdadbah, an Arabian geographer who flourished in the latter half of the 9th century, and " gallengar " (gallingale or galangal) is one of the ingredients in an Anglo-Saxon receipt for a " wen salve " (see O. Cockayne, Saxon Leechdoms, vol. iii. p. 13). In the middle ages, as at present in Livonia, Esthonia and central Russia, galangal was in esteem in Europe both as a medicine and a spice, and in China it is still employed as a therapeutic agent. Its chief consumption is in Russia, where it is used as a cattle-medicine, and as a flavouring for liqueurs.

GALAPAGOS ISLANDS, an archipelago of five larger and ten smaller islands in the Pacific Ocean, exactly under the equator. The nearest island to the South American coast lies 580 m. W. of Ecuador, to which country they belong. The name is derived from galdpago, a tortoise, on account of the giant species, the characteristic feature of the fauna. The islands were discovered early in the 16th century by Spaniards, who gave them their present name. They were then uninhabited. The English names of the individual islands were probably given by buccaneers, for whom the group formed a convenient retreat.

The larger members of the group, several of which attain an elevation of 2000 to 2500 ft., are Albemarle or Isabela (100 m. long, 28 m. in extreme breadth, with an area of 1650 sq. m. and an extreme elevation of 5000 ft.), Narborough or Fernandina, Indefatigable or Santa Cruz, Chatham or San Cristobal, James or San Salvador, and Charles or Santa Maria. The total land area is estimated at about 2870 sq. m. (about that of the West Riding of Yorkshire). The extraordinary number of craters, a few of which are reported still to be active, gives evidence that the archipelago is the result of volcanic action. The number of main craters may be about twenty-five, but there are very many small eruptive cones on the flanks of the old volcanoes. There is a convict settlement on Chatham with

1 Apparently derived from the Chinese Kau-liang-Kiang, i.e. Kau-liang ginger, the term applied by the Chinese to galangal, after the prefecture Kau-chau fu in Canton province, formerly called Kau-

liang (see F. Porter Smith, Contrib. to the Materia Medica . . . of China, p. 9, 1871).

some 300 inhabitants living in low thatched or iron-roofed huts, under the supervision of a police commissioner and other officials of Ecuador, by which country the group was annexed in 1832, when General Villamil founded Floreana on Charles Island, naming it in honour of Juan Jose Flores, president of Ecuador. A governor has been appointed since 1885, some importance being foreseen for the islands in connexion with the cutting of the Panama canal, as the group lies on the route to Australia opened up by that scheme. Charles Island, the most valuable of the group, is cultivated by a small colony. On many of the islets numerous tropical fruits are found growing wild, but they are no doubt escapes from cultivation, just as the large herds of wild cattle, horses, donkeys, pigs, goats and dogs— the last large and fierce — which occur abundantly on most of the islands have escaped from domestication.

The shores of the larger islands are fringed in some parts with a dense barrier of mangroves, backed by an often impenetrable thicket of tropical undergrowth, which, as the ridges are ascended, give place to taller trees and deep green bushes which are covered with orchids and trailing moss {orchilla), and from which creepers hang down interlacing the vegetation. But generally the low grounds are parched and rocky, presenting only a few thickets of Peruvian cactus and stunted shrubs, and a most uninviting shore. The contrast between this low zone and the upper zone of rich vegetation (above about 800 ft.) is curiously marked. From July to November the clouds hang low on the mountains, and give moisture to -the upper zone, while the climate of the lower is dry. Rain in the lower zone is scanty, and from May to January does not occur. The porous soil absorbs the moisture, and fresh water is scarce. Though the islands are under the equator, the climate is not intensely hot, as it is tempered by cold currents from the Antarctic sea, which, having followed the coast of Peru as far as Cape Blanco, bear off to the N.W. towards and through the Galapagos. The mean temperature of the lower zone is about 71 F., that of the upper from 66° to 62 .

The Galapagos Islands are of some commercial importance to Ecuador, on account of the guano and the orchilla moss found on them and exported to Europe. Except on Charles Island, where settlement has existed longest, little or no influence of the presence of man is evident in the group; still, the running wild of dogs and cats, and, as regards the vegetation, especially goats, must in a comparatively short period greatly modify the biological conditions

of the islands.

The origin and development of these conditions, in islands so distinctly oceanic as the Galapagos, have given its chief import- ance to this archipelago since it was visited by Darwin in the " Beagle." The Galapagos archipelago possesses a rare ad- vantage from its isolated situation, and from the fact that its history has never been interfered with by any aborigines of the human race. Of the seven species of giant tortoises known to science (although at the discovery of the islands there were probably fifteen) all are indigenous, and each is confined to its own islet. There also occurs a peculiar genus of lizards with two species, the one marine, the other terrestrial. The majority of the birds are of endemic species peculiar to different islets, while more than half belong to peculiar genera. More than half of the flora is unknown elsewhere.

Since i860 several visits have been paid to the group by scientific investigators — by Dr Habel in 1868; Messrs Baur and Adams, and the naturalists of the " Albatross," between 1888 and 1891 ; and in 1897-1898 by Mr Charles Harris, whose journey was specially under- taken at the instance of the Hon. Walter Rothschild. Very com- plete collections have therefore, as a result of these expeditions, been brought together; but their examination does not materially change the facts upon which the conclusions arrived at by Darwin, from the evidence of the birds and plants, were based ; though he " no doubt would have paid more attention to [the evidence afforded by Land-tortoises], if he had been in possession of facts with which we are acquainted now " (Giinther). His conclusions were that the group " has never been nearer the mainland than it is now, nor have its members been at any time closer together "; and that the char- acter of the flora and fauna is the result of species straggling over from America, at long intervals of time, to the different islets, where in their isolation they have gradually varied in different degrees and ways from their ancestors. Equally indecisive is the further

exploration as to evidence for the opinion held by other naturalists that the endemic species of the different islands have resulted from subsidences, through volcanic action, which have reduced one large island mass into a number of islets, wherein the separated species became differentiated during their isolation. The presence of these giant reptiles on the group is the chief fact on which a former land

connexion with the continent of America may be sustained. ” Nearly all authorities agree that it is not probable that they have crossed the wide sea between the Galapagos Islands and the American continent, although, while they are helpless, and quite unable to swim, they can float on the water. If their ancestors had been carried out to sea once or twice by a flood and safely drifted as far as the Galapagos Islands ” (Wallace), ” they must have been numerous on the continent ” (Rothschild and Hartert). No remains, and of course no living species, of these tortoises are known to exist or have existed on the mainland. Rothschild and Hartert think ” it is more natural to assume the disappearance of a great stock of animals, the remains of which have survived, . . . than to assume the dis- appearance in comparatively recent times {i.e. in the Eocene period or later) of enormous land masses.” Past elevations of land, how- ever (and doubtless equally great subsidences) have taken place in South America since the Eocene, and the conclusion that extensive areas of land have subsided in the Indian Ocean has long been based on a somewhat similar distribution of giant tortoises in the Mascarene region.

Authorities. — Darwin, Voyage of the ” Beagle ” ; O. Salvin, ” On the Avifauna of the Galapagos Archipelago,” Trans. Zool. Soc. part ix. (1876); Sclater and Salvin, “Characters of New Species collected by Dr Habel in the Galapagos Islands,” Proc. Zool. Soc. London, 1870, pp. 322-327; A. R. Wallace, Geographical Dis- tribution of Animals (New York, 1876); Theodor Wolf, Kin Besuch der Galapagos Inseln (Heidelberg, 1879); and paper in Geographical Journal, vi. 560 (1895); W. L. and P. L. Sclater, The Geography of Mammals (London, 1899); Ridgway, “Birds of the Galapagos Archipelago,” Proc. U.S. Nat. Mus. vol. xix. pp. 459-670 (1897); Baur, ” New Observations on the Origin of the Galapagos Islands,” Amer. Nat. (1897), pp. 661-680, 864-896; A. Agassiz, ” The Galapagos Islands,” Bull. Mus. Comp. Zool. vol. xxiii. pp. 56-75; A. Giinther, Proc. Linn. Soc. (London (President’s Address), October 1898), pp. 14-29 (with bibliography from 1875 to 1898 on gigantic land- tortoises); Rothschild and Hartert, ” Review of the Ornithology of the Galapagos Islands,” Novitates zoologicae, vi. pp. 85-205; B. L. Robinson, ” Flora of the Galapagos Islands,” Proc. Amer. Acad, of Arts and Sciences, xxxviii. (1902).

GALASHIELS, a municipal and police burgh of Selkirkshire, Scotland. Pop. (1891) 17,367; (1901) 13,61 5. It is situated on Gala Water, within a short distance of its junction with the Tweed. 335 m. S.S.E. of Edinburgh by the North British railway. The town stretches for more than 2 m. along both banks of the river, the mills

and factories occupying the valley by the stream, the villas and better-class houses the high-lying ground on either side. The principal structures include the municipal buildings, corn exchange, library, public hall, and the market cross. The town is under the control of a provost, bailies and council, and, along with Hawick and Selkirk, forms the Hawick (or Border) group of parliamentary burghs. The woollen manufactures, dating from the close of the 16th century, are the most important in Scotland, though now mainly confined to the weav- ing of tweeds. Other leading industries are hosiery, tanning (with the largest yards in Scotland), dyeing, iron and brass found- ing, engineering and boot-making. Originally a village built for the accommodation of pilgrims to Melrose Abbey (4 m. E. by S.), it became, early in the 1 5th century, an occasional residence of the Douglases, who were then keepers of Ettrick Forest, and whose peel- tower was not demolished till 1814. Galashiels was created into a burgh of barony in 1599. The Catrail or Picts' Work begins near the town and passes immediately to the west. Cloven- fords, 35 m. W., is noted for the Tweed vineries, which are heated by 5 m. of water- pipes, and supply the London market throughout the winter. Two miles farther W. by S. is Ashestiel, where Sir Walter Scott resided from 1804 to 181 2, where he wrote his most famous poems and began Waverley, and which he left for Abbots- ford.

GALATIA. I. In the strict sense (Galatia Proper, Roman Gallograecia) this is the name applied by Greek-speaking peoples to a large inland district of Asia Minor since its occupation by Gaulish tribes in the 3rd century B.C. Bounded on the N. by Bithynia and Paphlagonia, W. by Phrygia, S. by Lycaonia and Cappadocia, E. by Pontus, it included the greater part of the modern vilayet of Angora, stretching from Pessinus eastwards to

Tavium and from the Paphlagonian hills N. of Ancyra southwards to the N. end of the salt lake Tatta (but probably including the plains W. of the lake during the greater part of its history), — a rough oblong about 200 m. long and 100 (to 130) broad.

Galatia is part of the great central plateau of Asia Minor, here ranging from 2000 to 3000 ft. above sea-level, and falls geographic- ally into two parts separated by the Halys (Kizil Irmak), — a small eastern district lying chiefly in the basin of the Delije Irmak, the principal affluent of the Halys, and a large western region drained almost entirely by the Sangarius (Sakaria) and its tributaries. On the N. side Galatia consists of a series of plains with fairly fertile soil, lying between bare hills. But the greater part is a dreary stretch of barren, undulating uplands, intersected by tiny streams and passing

gradually into the vast level waste of treeless (anc. Axylon) plain that runs S. to Lycaonia; these uplands are little cultivated and only afford extensive pasturage for large flocks of sheep and goats. Cities are few and far apart, and the climate is one of extremes of heat and cold. The general condition and aspect of the country was much the same in ancient as in modern times.

The Gaulish invaders appeared in Asia Minor in 278-277 B.C. They numbered 20,000, of which only one-half were fighting men, the rest being doubtless women and children; and not long after their arrival we find them divided into three tribes, Trocmi, Tolistobogii and Tectosages, each of which claimed a separate sphere of operations. They had split off from the army which invaded Greece under Brennus in 279 B.C., and, marching into Thrace under Leonnorius and Lutarius, crossed over to Asia at the invitation of Nicomedes I. of Bithynia, who required help in his struggle against his brother. For about 46 years they were the scourge of the western half of Asia Minor, ravaging the country, as allies of one or other of the warring princes, without any serious check, until Attalus I., king of Pergamum (241-197), inflicted several severe defeats upon them, and about 232 B.C. forced them to settle permanently in the region to which they gave their name. Probably they already occupied parts of Galatia, but definite limits were now fixed and their right to the district was formally recognized. The tribes were settled where they after- wards remained, the Tectosages round Ancyra, the Tolistobogii round Pessinus, and the Trocmi round Tavium. The constitution of the Galatian state is described by Strabo: conformably to Gaulish custom, each tribe was divided into four cantons (Gr. rerpapxtn'), each governed by a chief ("tetrarch") of its own with a judge under him, whose powers were unlimited except in cases of murder, which were tried before a council of 300 drawn from the twelve cantons and meeting at a holy place called Drynemeton. But the power of the Gauls was not yet broken. They proved a formidable foe to the Romans in their wars with Antiochus, and after Attalus' death their raids into W. Asia Minor forced Rome in 189 B.C. to send an expedition against them under Cn. Manlius Vulso, who taught them a severe lesson. Henceforward their military power declined and they fell at times under Pontic ascendancy, from which they were finally freed by the Mithradatic wars, in which they heartily supported Rome. In the settlement of 64 B.C. Galatia became a client-state of the empire, the old constitution disappeared, and three chiefs (wrongly styled " tetrarchs ") were appointed, one for each tribe. But this arrangement soon gave way before the ambition of one of these tetrarchs, Deiotarus, the contemporary of Cicero and Caesar, who

made himself master of the other two tetrarchies and was finally recognized by the Romans as king of Galatia. On the death of the third king Amyntas in 25 B.C., Galatia was incorpor- ated by Augustus in the Roman empire, and few of the provinces were more enthusiastically loyal.

‘ The population of Galatia was not entirely Gallic. Before the arrival of the Gauls, western Galatia up to the Halys was in- habited by Phrygians, and eastern Galatia by Cappadocians and other native races. This native population remained, and constituted the majority; of the inhabitants of the rural parts and almost the sole inhabitants of the towns. They were left in possession of two-thirds of the land (cf. Caesar, B.G. i. 31) on condition of paying part of the produce to their new lords, who

took the other third, and agriculture and commerce with all the arts and crafts of peaceful life remained entirely in their hands. They were henceforth ranked as ” Galatians ” by the outside world equally with their overlords, and it was from their numbers that the ” Galatian ” slaves who figure in the markets of the ancient world were drawn. The conquerors, who were few in number, formed a small military aristocracy, living not in the towns, but in fortified villages, where the chiefs in their castles kept up a barbaric state, surrounded by their tribesmen. With the decline of their warlike vigour they began gradually to mix with the natives and to adopt at least their religion: the amalgamation was accelerated under Roman influence and ultimately became as complete as that of the Normans with the Saxons in England, but they gave to the mixed race a distinctive tone and spirit, and long retained their national characteristics and social customs, as well as their language (which continued in use, side by side with Greek, in the 4th century after Christ). In the 1st century, when St Paul made his missionary journeys, even the towns Ancyra, Pessinus and Tavium (where Gauls were few) were not Hellenized, though Greek, the language of government and trade, was spoken there; while the rural population was unaffected by Greek civilization. Hellenic ways and modes of thought begin to appear in the towns only in the later 2nd century. In the rustic parts a knowledge of Greek begins to spread in the 3rd century; but only in the 4th and 5th centuries, after the transference of the centre of government first to Nicomedia and then to Constantinople placed Galatia on the highway of imperial communication, was Hellenism in

its Christian form gradually diffused over the country. (See also Ancyra; Pessinus; Gordium.)

II. The Roman province of Galatia, constituted 25 B.C., included the greater part of the country ruled by Amyntas, viz. Galatia Proper, part of Phrygia towards Pisidia (Apollonia, Antioch and Iconium), Pisidia, part of Lycaonia (including Lystra and Derbe) and Isauria. For nearly 100 years it was the frontier province, and the changes in its boundaries are an epitome of the stages of Roman advance to the Euphrates, one client-state after another being annexed: Paphlagonia in 6-5 B.C.; Sebastopolis, 3-2 B.C.; Amasia, a.d. 1-2; Comana, A.d. 34-35, — together forming Pontus Galaticus, — the Pontic kingdom of Polemon, a.d. 64, under the name Pontus Polemoniacus. In a.d. 70 Cappadocia (a procuratorial province since a.d. 17) with Armenia Minor became the centre of the forward movement and Galatia lost its importance, being merged with Cappadocia in a vast double governorship until a.d. 114 (probably) , when Trajan separated the two parts, making Galatia an inferior province of diminished size, while Cappadocia with Armenia Minor and Pontus became a great consular military province, charged with the defence of the frontier. Under Diocletian's reorganization Galatia was divided, about 295, into two parts and the name retained for the northern (now nearly identical with the Galatia of Deiotarus); and about 390 this province, amplified by the addition of a few towns in the west, was divided into Galatia Prima and Secunda or Salutaris, the division indicating the renewed importance of Galatia in the Byzantine empire. . After suffering from Persian and Arabic raids, Galatia was conquered by the Seljuk Turks in the nth century and passed to the Ottoman Turks in the middle of the 14th.

The question whether the " Churches of Galatia," to which St Paul addressed his Epistle, were situated in the northern or southern part of the province has been much discussed, and in England Prof. Sir W. M. Ramsay has been the principal advocate of the adoption of the South-Galatian theory, which maintains that they were the churches planted in Derbe, Lystra, Iconium and Antioch (see Galatians). In the present writer's opinion this is supported by the study of the historical and geographical facts. 1

Authorities. — Van Gelder, De Gallis in Graecia et Asia (1888); Staehelin, Gesch. d. kleinasiat. Galater (1897); Perrot, De Galatia

1 In the unsettled state of this controversy, weight naturally attaches to the opinion of experts on either side; and the above statement, while opposed to the view taken in the following article on the

epistle, must be taken on its merits. — Ed. E.B.

prov. Rom. (1867) ; Sir W. M. Ramsay, Histor. Geogr. (1890), St Paid (1898), and Introd. to Histor. Commentary on Galatians (1899). For antiquities generally, Perrot, Explor. archeol. de la Galatie (1862); K. Humann and O. Puchstein, Reisen in Kleinasien (1890) ; Koerte, Athen. Milteilungen (1897); Anderson and Crowfoot, Joum. of Hellenic Studies (1899) ; and Anderson, Map of Asia Minor (London, Murray, 1903). (J. G. C. A.)

GALATIANS, EPISTLE TO THE, one of the books of the New Testament. This early Christian scripture is one of the books militant in the world's literature. Its usefulness to Luther in his propaganda was no accident in its history; it originated in a controversy, and the varying views of the momentous struggle depicted in Gal. ii. and Acts xv. have naturally determined, from time to time, the conception of the epistle's aim and date. Details of the long critical discussion of this problem cannot be given here. (See Paul.) It must suffice to say that to the present writer the identification of Gal. ii. 1-10 with Acts xi. 28 f. and not with Acts xv. appears quite untenable, while a fair exegesis of Acts xvi. 1-6 implies a distinction between such towns as Lystra, Derbe and Iconium on the one hand and the Galatian xˆpa with Phrygia upon the other. 2 A further visit to the latter country is mentioned, upon this view, in Acts xviii. 23. The Christians to whom the epistle was addressed were thus inhabitants, for the most part (iv. 8) of pagan birth, belonging to the northern section of the province, perhaps mainly in its south-western district adjoining Bithynia and the province of Asia. The scanty allusions to this mission in Acts cannot be taken as any objection to the theory. Nor is there any valid geographical difficulty. The country was quite accessible from Antioch. Least of all does the historical evidence at our disposal justify the inference that the civilization of north Galatia, during the 1st century a.d., was Romano-Gallic rather than Hellenic; for, as the coins and inscriptions indicate, the Anatolian culture which predominated throughout the province did not exclude the infusion either of Greek religious conceptions or of the Greek language. The degree of elementary Greek culture needful for the understanding of Galatians cannot be shown to have been foreign to the in- habitants of north Galatia. So far as any trustworthy evidence is available, such Hellenic notions as are presupposed in this epistle might well have been intelligible to the Galatians of the northern provinces. Still less does the acquaintance with Roman jurisprudence in iii. 15-iv. 2 imply, as Halmel contends (liber rbm. Recht im Galaterbrief, 1895), not merely that Paul must have acquired such knowledge in Italy but that he wrote the epistle there. A popular acquaintance with the

outstanding features of Roman law was widely diffused by this time in Asia Minor.

The epistle can hardly have been written therefore until after the period described in Acts xviii. 22, but the terminus ad quern is more difficult to fix. 3 The composition may be placed (cf. the present writer's Historical New Testament, pp. 124 f. for details) either during the earlier part of Paul's residence at Ephesus (Acts xix. 1, 10, so most editors and scholars), or on his way from Ephesus to Corinth, or at Corinth itself (so Lightfoot, Bleek, Salmon).

The epistle was not written until Paul had visited Thessalonica,

2 The historical and geographical facts concerning Galatia, which lead other writers to support the south Galatian theory, are stated in the preceding article on Galatia; and the question is still a matter of controversy, the division of opinion being to some extent dependent on whether it is approached from the point of view of the archaeologist or the Biblical critic. The ablest re-statements of the north Galatian theory, in the light of recent pleas for south Galatia as the destination of this epistle, may be found by the English reader in P. W. Schmiedel's exhaustive article in Encycl. Biblica (1592-1616) and Prof. G. H. Gilbert's Student's Life of Paul (1902), pp. 260-272. Schmiedel's arguments are mainly directed against Sir W. M. Ramsay, but a recent Roman Catholic scholar, Dr A. Steinmann, takes a wider survey in a pamphlet on the north Galatian side of the controversy (Die A bfassungszeit des Galaterbrief es, Miinster, i. W., 1906), carrying forward the points already urged by Sieffert and Zockler amongst others, and especially refuting his fellow- churchman, Prof. Valentine Weber.

3 The tendency among adherents of the south Galatian theory is to put the epistle as early as possible, making it contemporaneous with, if not prior to, 1 Thessalonians. So Douglass Round in The Date of St Paul's Epistle to the Galatians (1906).

but the Galatian churches owed their origin to a mission of Paul undertaken some time before he crossed from Asia to Europe. When he composed this letter, he had visited the churches twice. On the former of these visits (iv. 13 to irporepov), though broken down by illness (2 Cor. xii. 7-9 ?) he had been enthusi- astically welcomed, and the immediate result of his mission was an outburst of religious fervour (iii. 1-5, iv. 14 f.). The local Christians made a most

promising start (v. 7) . But they failed to maintain their ardour. On his second visit (iv. 13, i. 7, v. 21) the apostle found in many of them a disheartening slackness, due to discord and incipient legalism. His plain-speaking gave offence in some quarters (iv. 16), though it was not wholly ineffective. Otherwise, this second visit is left in the shadow. 1 So far as it was accompanied by warnings, these were evidently general rather than elicited by any definite and imminent peril to the churches. Not long afterwards, however, some judaizing opponents of the apostle (note the contemptuous anonymity of the rices in i. 7, as in Col. ii. 4 f.), headed by one prominent and influential individual (v. 10), made their appearance among the Galatians, promulgating a " gospel " which meant fidelity to, not freedom from, the Law (i. 6-10). Arguing from the Old Testament, they represented Paul's gospel as an imperfect creed which required to be supplemented by legal exactitude, 2 including ritual observance (iv. 10) and even circumcision, 3 while at the same time they sought to undermine his authority 4 by pointing out that it was derived from the apostles at Jerusalem and therefore that his teaching must be open to the checks and tests of that orthodox primitive standard which they themselves claimed to embody. The sole valid charter to Messianic privileges was observance of the Mosaic law, which remained obligatory upon pagan converts (iii. 6-9, 16).

When the news of this relapse reached Paul, matters had evidently not yet gone too far. Only a few had been circum- cised. It was not too late to arrest the Galatians on their down- ward plane, and the apostle, unable or unwilling to re-visit them, despatched this epistle. How or when the information came to him, we do not know. But the gravity of the situation renders it unlikely that he would delay for any length of time in writing to counteract the intrigues of his opponents; to judge from allusions like those in i. 6 (raxtus and iitTaridtcrde — the lapse still in progress), we may conclude that the interval between the reception of the news and the composition of the letter must have been comparatively brief.

After a short introduction 5 (i. 1-5), instead of giving his usual word of commendation, he plunges into a personal and historical vindication 6 of his apostolic independence, which, developed negatively and positively, forms the first of the three main

1 It is not quite clear whether traces of the Judaistic agitation were already found by Paul on this visit (so especially Holsten, Lipsius, Sieffert, Pfleiderer, Weiss and Weizsacker) or whether they are to be dated subsequent to his departure (so Philippi, Renan and Hofmann,

among others). The tone of surprise which marks the opening of the epistle tells in favour of the latter theory. Paul seems to have been taken aback by the news of the Galatians' defection.

2 Apparently they were clever enough to keep the Galatians in ignorance that the entire law would require to be obeyed (v. 3).

3 The critical dubiety about ov&i in ii. 5 (cf. Zahn's excursus and Prof. Lake in Expositor, March 1906, p. 236 f.) throws a slight doubt on the interpretation of ii. 3, but it is clear that the agitators had quoted Paul's practice as an authoritative sanction of the rite.

1 This depreciation is voiced in their catch-word ol SoKovvres (" those of repute," ii. 6), while other echoes of their talk can be overheard in such phrases as " we are Abraham's seed " (iii. 16), " sinners of Gentiles " (ii. 15) and " Jerusalem which is our mother " (iv. 26), as well as in their charges against Paul of " seeking to please men " (i. 10) and " preaching circumcision " (v. 11).

6 Not only is the address " to the churches of Galatia " unusually bare, but Paul associates no one with himself, either because he was on a journey or because, as the attacked party, he desired to concentrate attention upon his personal commission. Yet the i)m«s of i. 8 indicates colleagues like Silas and Timothy.

Cf. Hausrath's History of the N.T. Times (iii. pp. 181-199), with the fine remarks, on vi. 17, that " Paul stands before us like an ancient general who bares his breast before his mutinous legions, and shows them the scars of the wounds that proclaim him not unworthy to be called Imperator."

sections in the epistle (i. 6— ii. 21). In the closing passage he drifts over from an account of this interview with Peter into a sort of monologue upon the incompatibility of the Mosaic law with the Christian gospel (ii. 15-21), 7 and this starts him afresh upon a trenchant expostulation and appeal (iii.i-v. 12) regarding the alternatives of law and spirit. Faith dominates this section; faith in its historical career and as the vantage-ground of Christianity. The much-vaunted law is shown to be merely a provisional episode 8 culminating in the gospel (iii. 7-28) as a message of filial confidence and freedom (iii. 29-iv. n). The genuine " sons of Abraham " are not legalistic Jewish Christians but those who simply possess faith in Jesus Christ. A passionate outburst then follows (iv. 12 f.), and, harping still on Abraham, the apostle essays, with fresh rabbinic dialectic, to establish Christi- anity over legalism as the free and

final religion for men, applying this to the moral situation of the Galatians themselves (v. 1-12). This conception of freedom then leads him to define the moral responsibilities of the faith (v. 13-vi. 10), in order to prevent misconception and to enforce the claims of the gospel upon the individual and social life of the Galatians. The epilogue (vi. n-21) reiterates, in a handful of abrupt, emphatic sentences, the main points of the epistle.

The allusion in vi. n (Mere mjAi/cois v/juv ypan/xacnv 'eypa\j/a rfj env X^tpO is to the large bold size 9 of the letters in Paul's handwriting, but the object and scope of the reference are matters of dispute. It is " a sensational heading " (Findlay), but it may either refer 10 to the whole epistle (so Augustine, Chrysostom, &c, followed by Zahn) or, as most hold (with Jerome) to the postscript (vi. 1 1-18) . Paul commonly dictated his letters. His use of the autograph here may have been to prevent any suspicion of a forgery or to mark the personal emphasis of his message. In any case it is assumed that the Galatians knew his handwriting. It is unlikely that he inserted this postscript from a feeling of ironical playfulness, to make the Galatians realize that, after the sternness of the early chapters, he was now treating them like children, " playfully hinting that surely the large letters will touch their hearts " (so Deissmann, Bible-Studies (1901), 346 f.).

The earliest allusion to the epistle 11 is the notice of its inclusion in Marcion's canon, but almost verbal echoes of iii. 10-13 are to be heard in Justin Martyr's Dial, xciv.-xcv. ; it was certainly known to Polycarp, and as the 2nd century advances the evidence of its popularity multiplies on all sides, from Ptolemaeus and the Ophites to Irenaeus and the Muratorian canon (cf. Gregory's Canon and Text of N.T., 1907, pp. 201-203). It is no longer necessary for serious criticism to refute the objections to its authenticity raised during the 19th century in certain quarters; 12 as Macaulay said of the authenticity of Caesar's commentaries, " to doubt on that subject is the mere rage of scepticism."

7 Cf. T. H. Green's Works, iii. 186 f. Verses 15-17 are the indirect abstract of the speech's argument, but in verses 18-21 the apostle, carried away by the thought and barrier of the moment as he dictates to his amanuensis, forgets the original situation.

8 Thus Paul reverses the ordinary rabbinic doctrine which taught (cf. Kiddushim, 30, b) that the law was given as the divine remedy for the evil yezer of man. So far from being a remedy, he argues, it is an aggravation.

9 According to Plutarch, Cato the elder wrote histories for the use of his. son, ISiy. x«P' xal iieyaXois ypkniiaaiv (cf. Field's Notes on Translation of the New Testament, p. 191). If the point of Gal. vi. 1 1 lies in the size of the letters, Paul cannot have contem- plated copies of the epistle being made. He must have assumed that the autograph would reach all the local churches (cf. 2 Thess. iii. 17, with E. A. Abbott, Johannine Grammar, pp. 530-532).

10 For iypaij/a., the epistolary aorist, at the close of a letter, cf. Xen. Anab. i. 9. 25, Thuc. i. 129. 3, Ezra iv. 14 (LXX) and Lucian, Dial. Meretr. x.

' u Hermann Schulze's attempt to bring out the filiation of the later N.T. literature to Galatians {Die Urspriinglichkeit des Galater- briefes, Leipzig, 1903) involves repeated exaggerations of the literary evidence.

12 Cf. especially J. Gloe's Die jiingste Kritik des Galaterbriefes (Leipzig, 1890) and Baljon's reply to Steck and Loman (Exeg.- kritische verhandeling over den Brief van P. aan de Gal., 1889). The English reader may consult Schmiedel's article (already referred to) and Dr R. J. Knowling's The Testimony of St Paul to Christ (1905), 28 f.

Even the problems of its integrity are quite secondary. Marcion (cf. Tert. Adv. Marc. 2-4) removed what he judged to be some interpolations, but van Manen's attempt to prove that Marcion's text is more original than the canonical (Theolog. Tijdsckrift, 1887, 400 f. 451 f.) has won no support (cf. C. Clemen's refutation in Die Einheitlichkeit der paulin. Briefe, 1894, pp. 100 f. and Zahn's Geschichle d. N. T. lichen Kanons, ii. 409 f.), and little or no weight attaches to the attempts made (e.g. by J. A. Cramer) to disentangle a Pauline nucleus from later accretions. Even D. Volter, who applies this method to the other Pauline epistles, admits that Galatians, whether authentic or not, is substantially a literary unity (Paulus und seine Briefe, 1905, pp. 229-285). The frequent roughnesses of the traditional text suggest, however,that here and there marginal glosses may have crept in. Thus iv. 25a (to yap Siva opos eariv kv tjj 'ApafiLa) probably represents the explanatory and prosaic gloss of a later editor, as many scholars have seen from Bentley (Opuscula philologica, 1781, pp. 533 f.) to H. A. Schott, J. A. Cramer, J. M. S.

Baljon and C. Holsten. The general style of the epistle is vigorous and unpre- meditated, " one continuous rush, a veritable torrent of genuine and inimitable Paulinism, like a mountain stream in full flood, such as may often have been seen by his Galatians " (J. Macgregor) . But there is a certain rhythmical balance, especially in the first chapter (cf. J. Weiss, Beitrdge zur paulin. Rhetorik, 1897, 8 f.); here as elsewhere the rush and flow of feeling carry with them some care for rhetorical form, in the shape of antitheses, such as a pupil of the schools might more or less unconsciously retain. 1 All through, the letter shows the breaks and pauses of a mind in direct contact with some personal crisis. Hurried, unconnected sentences, rather than sustained argument, are its most characteristic features. 2 The trenchant re- monstrances and fiery outbursts make it indeed " read like a dithyramb from beginning to end."

Bibliography. — Of more modern editions in English, the most competent are those of C. J. Ellicott (4th ed., 1867, strong in linguistic and grammatical material), Prof. Eadie (Edinburgh, 1869), J. B. Lightfoot (nth ed., 1892), Dean Alford (3rd ed., 1862) and F. Rendall (Expositor's Greek Testament, 1903) on the Greek text; Dr Sanday (in Ellicott's Commentary, 1879), Dr Jas. Macgregor (Edinburgh, 1879), B. Jowett (3rd ed., 1894), Huxtable (Pulpit Comment., 1885), Dr Agar Beet (London, 1885, &c), Dr W. F. Adeney (Century Bible), Dr E. H. Perowne (Cambridge Bible, 1890) and Dr James Drummond (Internat. Handbooks to N.T., 1899) also comment on the English text. The editions of Lightfoot and Jowett are especially valuable for their subsidiary essays, and Sir W. M. Ramsay's Historical Commentary on Galatians (1899) contains archaeological and historical material which is often illuminating. The French editions are few and minor, those by A. Sardinoux (Valence, 1837) and E. Reuss (1878) being adequate, however. In Germany the two most up-to-date editions are by F. Sieffert (in Meyer's Comment., 1899) and Th. Zahn (2nd ed., 1907); these supersede most of the earlier works, but H. A. Schott (1834), A. Wieseler (Gottingen, 1859), G. B. Winer (4th ed., 1859), J. C. K. von Hofmann (2nd ed., 1872), Philippi (1884), R. A. Lipsius (2nd ed., Hand.Commentar, 1892), and Zockler (2nd ed., 1894) may still be consulted with advantage, while Hilgenfeld's commentary (1852) discusses acutely the historical problems of the epistle from the standpoint of Baur's criticism. The works of A. Schlatter (2nd ed., 1894) and W. Bousset (in Die Schriften des N.T., 2nd ed., 1907) are more popular in character. F. Windischmann (Mayence, 1843), F. X. Reithmayr (1865), A. Schafer (Munster, 1890) and F. Cornely (1892, also in Cursus scripturae sacrae, 1907) are the most satis

factory modern editors, from the Roman Catholic church, but it should not be forgotten that the 16th century produced the Literalis expositio of Cajetan (Rome, 1529) and the similar work of Pierre Barahona (Salamanca, 1590), no less than the epoch-making edition of Luther (Latin, 1519, &c. ; German, 1525 f. ; English, 1575 f.). After Calvin and Grotius, H. E. G. Paulus (Des Apostel P. Lehrbriefe an die Gal. u. Rbnier Christen, 1831) was perhaps the most independent interpreter. For the patristic editions, see the introductory sections in Zahn and Lightfoot. The religious thought of the epistle

1 Compare the minute analysis of the whole epistle in F. Blass, Die Rhythmen der asianischen und romischen Kunstprosa (1905), pp. 43-53, 204-216, where, however, this feature is exaggerated into unreality. The comic trimeter in Philipp. hi. 1 (iftol piv ou/c oKvnpov, (i)uv &' aatj>a\ks) may well be, like that in I Cor. xv. 33, a reminiscence of Menander.

2 This affects even the vocabulary which has also " einen gewissen vulgaren Zug " (Nageli, Der Wortschatz des Apostels Paulus, 1905, pp. 78-79)-

is admirably expounded from different standpoints by C. Holsten (Das Evangelium Paulus, Teil I., i., 1880), A. B. Bruce (St Paul's Conception of Christianity, 1894, pp. 49-70) and Prof. G. G. Findlay (Expositor's Bible). On the historical aspects, Zimmer (Galat. und Apostelgeschichte, 1882) and M. Thomas (Melanges d'histoire et de litt. religieu.se, Paris, 1899, pp. 1-195) are excellent; E. H. Askwith's essay (Epistle to the Galatians, its Destination and Dale, 1899) advocates ingeniously the south Galatian theory, and W. S. Wood (Studies in St Paul's Epistle to the Galatians, 1887) criticizes Lightfoot. General studies of the epistle will be found in all biographies of Paul and histories of the apostolic age, as well as in works like Sabatier's The Apostle Paul (pp. 187 f.) y B. W. Bacon's Story of St Paul (pp. 116 f.), Dr R. D. Shaw's The Pauline Epistles (2nd ed., pp. 60 f.), R. Mariano, // Cristianesimo nei primi secoli (1902), i. pp. in f., and Volkmar's Paulus vom Damaskus bis zum Galaterbrief (1887), to which may be added a series of papers by Haupt in Deutsche Evang.-Bldtter (1904), 1-16, 89-108, 161-183, 238-259, and an earlier set by Hilgenfeld in the Zeitschrift filr wiss. Theologie (" Zur Vor- geschichte des Gal." i860, pp. 206 f., 1866, pp. 301 f., 1884, pp. 303 f.). Other monographs and essays have been noted in the course of this article. See further under Paul. (j. Ml.)

GALATINA, a town of Apulia, Italy, in the province of Lecce, from

which it is 14 m. S. by rail, 233 ft. above sea-level. Pop. (1901) 12,917 (town); 14,086 (commune). It is chiefly remark- able for the fine Gothic church of St Caterina, built in 1390 by Raimondello del Balzo Orsini, count of Soleto, with a fine portal and rose-window. The interior contains frescoes by Francesco d' Arezzo (1435). The apse contains the fine mausoleum of the son of the founder (d. 1454), a canopy supported by four columns, with his statue beneath it.

GALATZ (Galatii), a city of Rumania, capital of the depart- ment of Covurlui; on the left bank of the river Danube, 90 m. W. by N. of its mouth at Sulina. Pop. (1900) 62,678, including 12,000 Jews. The Danube is joined by the Sereth 3 m. S.W. of Galatz, and by the Pruth 10 m. E. Galatz is built on a slight eminence among the marshes which line the intervening shore and form, beside the western bank of the Pruth, the shallow mere called Lake Bratych (Bratesul), more than 50 sq. m. in extent. With the disappearance, towards the close of the 19th century, of most of its older quarters in which the crooked, ill- paved streets and insanitary houses were liable to be flooded every year, the city improved rapidly. Embankments and fine quays were constructed along the Danube; electric tramways were opened in the main streets, which were lighted by gas or electricity, and pure water was supplied. The higher, or north- western part of the city, which is the more open and comfortable, contains many of the chief buildings. These include the pre- fecture, consulate, prison, barracks, civil and military hospitals and the offices of the international commission for the control of the Danube (q.v.). The bishop of the lower Danube resides at Galatz. There are many Orthodox Greek, Roman Catholic and other churches; the most interesting being the cathedral, and St Mary's church, in which is the tomb of the famous Cossack chief, Mazeppa (1644-1709). said to have been rifled of its contents by the Russians. Galatz is a naval station, and the headquarters of the III. army corps, protected by a line of fortifications which extends for 45 m. E. to Focshani and is known as the Sereth line. But the main importance of the city is commercial. Galatz is the chief Moldavian port of entry, approached by three waterways, the Danube, Sereth and Pruth, down which there is a continual volume of traffic, except in mid winter; and by the railways which intersect all the richest portions of the country. Textiles, machinery, and coal make up the bulk of imports. Besides a large trade in petroleum and salt, Galatz ranks first among Rumanian cities in its export of timber, and second to Braila in its export of grain. It possesses many saw-mills, paste-mills, flour-mills, roperies, chemical works and petroleum refineries; manufacturing

also metal ware, wire, nails, soap and candles. Vessels of 2500 tons 'can discharge at the quays, but cargoes consigned to Galatz are often transhipped into lighters at Sulina. The shipping trade is largely in foreign hands, the principal owners being British.

GALAXY, properly the Milky Way, from the Greek name 6 ya\al-Las, sc. kvkKos, from7aXa, milk, cf. theLat. via lactea (see Star) . The word is more generally employed in its figurative or

transferred sense, to describe a gathering of brilliant or distin-guished persons or objects.

GALBA, SERVIUS SULPICIUS, Roman general and orator. He served under Lucius Aemilius Paulus in the third Macedonian War. As praetor in 151 B.C. in farther Spain he made himself infamous by the treacherous murder of a number of Lusitanians, with their wives and children, after inducing them to surrender by the promise of grants of land. For this in 149 he was brought to trial, but secured an acquittal by bribery and by holding up his little children before the people to gain their sympathy. He was consul in 144, and must have been alive in 138. He was an eloquent speaker, noted for his violent gesticulations, and ; in Cicero's opinion, was the first of the Roman orators. His speeches, however, were almost forgotten in Cicero's time.

Livy xlv. 35; Appian, Hisp. 58-60; Cicero, De orat. i. 53, iii. 7; Brutus 21.

GALBA, SERVIUS SULPICIUS, Roman emperor (June a.d. 68 to January 69), born near Terracina, on the 24th of December 5 b.c. He came of a noble family and was a man of great wealth, but unconnected either by birth or by adoption with the first six Caesars. In his early years he was regarded as a youth of remarkable abilities, and it is said that both Augustus and Tiberius prophesied his future eminence (Tacitus, Annals, vi. 20; Suetonius, Galba, 4). Praetor in 20, and consul in ^^, he acquired a well-merited reputation in the provinces of Gaul, Germany, Africa and Spain by his military capability, strictness and impartiality. On the death of Caligula, he refused the invitation of his friends to make a bid for empire, and loyally served Claudius. For the first half of Nero's reign he lived in retire- ment, till, in 61, the emperor bestowed on him the province of

Hispania Tarraconensis. In the spring of 68 Galba was informed of Nero's intention to put him to death, and of the insurrection of Julius Vindex in Gaul. He was at first inclined to follow the example of Vindex, but the defeat and suicide of the latter renewed his hesitation. The news that Nymphidius Sabinus, the praefect of the praetorians, had declared in his favour revived Galba's spirits. Hitherto, he had only dared to call himself the legate of the senate and Roman people; after the murder of Nero, he assumed the title of Caesar, and marched straight for Rome. At first he was welcomed by the senate and the party of order, but he was never popular with the soldiers or the people. He incurred the hatred of the praetorians by scornfully refusing to pay them the reward promised in his name, and disgusted the mob by his meanness and dislike of pomp and display. His advanced age had destroyed his energy, and he was entirely in the hands of favourites. An outbreak amongst the legions of Germany, who demanded that the senate should choose another emperor, first made him aware of his own unpopularity and the general discontent. In order to check the rising storm, he adopted as his coadjutor and successor L. Calpurnius Piso Frugi Licinianus, a man in every way worthy of the honour. His choice was wise and patriotic; but the populace regarded it as a sign of fear, and the praetorians were indignant, because the usual donative was not forthcoming. M. Salvius Otho, formerly governor of Lusitania, and one of Galba's earliest supporters, disappointed at not being chosen instead of Piso, entered into communication with the discontented praetorians, and was adopted by them as their emperor. Galba, who at once set out to meet the rebels — he was so feeble that he had to be carried in a litter — was met by a troop of cavalry and butchered near the Lacus Curtius. During the later period of his provincial administration he was indolent and apathetic, but this was due either to a desire not to attract the notice of Nero or to the growing infirmities of age. Tacitus rightly says that all would have pronounced him worthy of empire if he had never been emperor (" omnium consensu capax imperii nisi imperasset ").

See his life by Plutarch and Suetonius ; Tacitus, Histories, i. 7-49 ; Dio Cassius lxiii. 23-lxiv. 6; B. W. Henderson, Civil War and Rebellion in the Roman Empire, A.D. 6g-yo (1908) ;W. A. Spooner, On the Characters of Galba, Otho and Vitellius in Introd. to his edition (1891) of the Histories of Tacitus.

GALBANUM (Heb. Helbendh; Gr. xa\|3dw;), a gum-resin, the product of Ferula galbaniHua, indigenous to Persia, and perhaps

also of other umbelliferous plants. It occurs usually in hard or soft,

irregular, more or less translucent and shining lumps, or occasionally in separate tears, of a light-brown, yellowish or greenish-yellow colour, and has a disagreeable, bitter taste, a peculiar, somewhat musky odour, and a specific gravity of 1-212. It contains about 8% of terpene; about 65% of a resin which contains sulphur; about 20% of gum; and a very small quantity of the colourless crystalline substance umbelliferone, C9H6O3. Galbanum is one of the oldest of drugs. In Exodus xxx. 34 it is mentioned as a sweet spice, to be used in the making of a perfume for the tabernacle. Hippocrates employed it in medicine, and Pliny (Nat. Hist. xxiv. 13) ascribes to it extra- ordinary curative powers, concluding his account of it with the assertion that " the very touch of it mixed with oil of spondylium is sufficient to kill a serpent." The drug is occasionally given in modern medicine, in doses of from five to fifteen grains. It has the actions common to substances containing a resin and a volatile oil. Its use in medicine is, however, obsolescent.

GALCHAS, the name given to the highland tribes of Ferghana, Kohistan and Wakhan. These Aryans of the Pamir and Hindu Kush, kinsmen of the Tajiks, are identified with the Calcienses populi of the lay Jesuit Benedict Goes, who crossed the Pamir in 1603 and described them as " of light hair and beard like the Belgians." The word " Galcha," which has been explained as meaning " the hungry raven who has withdrawn to the mountains," in allusion to the retreat of this branch of the Tajik family to the mountains to escape the Tatar hordes, is probably simply the Persian galcha, " clown " or " rustic," in reference to their uncouth manners. The Galchas conform physically to what has been called the " Alpine or Celtic European race," so much so that French anthropologists have termed them " those belated Savoyards of Kohistan." D'Ujfalvy describes them as tall, brown or bronzed and even white, with ruddy cheeks, black, chestnut, sometimes red hair, brown, blue or grey eyes, never oblique, well-shaped, slightly curved nose, thin lips, oval face and round head. Thus it seems reasonable to hold that the Galchas represent the most eastern extension of the Alpine race through Armenia and the Bakhtiari uplands into central Asia. The Galchas for the most part profess Sunnite Mahommedanism.

See Robert Shaw, " On the Galtchah Languages," in Journ. As. Soc. Bengal, xlv. (1876), and xlvi. (1877); Major J. Biddulph, Tribes of the Hindoo-Kocsh (Calcutta, 1880); Hon. Mountstuart Elphin- stone, An Account of the Kingdom of Caubul (1815); Bull, de la societe d 'anthropologic de Paris (1887); Charles Eugene D'Ujfalvy de Mezoe-Koevesd, Les Aryens (1896), and in Revue d 'anthropo- logic (1879), and Bull, de la soc. de geogr. (June 1878) ; W. Z. Ripley, Races of

Europe (New York, 1899).

GALE, THEOPHILUS (1628-1678), English nonconformist divine, was born in 1628 at Kingsteignton, in Devonshire, where his father was vicar. In 1647 he was entered at Magdalen College, Oxford, where he took his B.A. degree in 1649, an< i M.A. in 1652. In 1650 he was made fellow and tutor of his college. He remained some years at Oxford, discharging actively the duties of tutor, and was in 1657 appointed as preacher in Winchester cathedral. In 1662 he refused to submit to the Act of Uniformity, and was ejected. He became tutor to the sons of Lord Wharton, whom he accompanied to the Protestant college of Caen, in Normandy, returning to England in 1665. The latter portion of his life he passed in London as assistant to John Rowe, an Independent minister who had charge of an important church in Holborn; Gale succeeded Rowe in 1677, and died in the following year. His principal work, The Court of the Gentiles, which appeared in parts in 1669, 167 1 and 1676, is a strange storehouse of miscel- laneous philosophical learning. It resembles the Intellectual System of Ralph Cudworth, though much inferior to that work both in general construction and in fundamental idea. Gale's endeavour (based on a hint of Grotius in De veritate, i. 16) is to prove that the whole philosophy of the Gentiles is a distorted or mangled reproduction of Biblical truths. Just as Cudworth referred the Democritean doctrine of atoms to Moses as the original author, so Gale tries to show that the various systems of Greek thought may be traced back to Biblical sources. Like so many of the learned works of the 17th century, the Court of the

Gentiles is chaotic and unsystematic, while its erudition is rendered almost valueless by the complete absence of any critical discrimination.

His other writings are: A True Idea of Jansenism (1669); Theo- phil, or a Discourse of the Saint's Amitie with God in Christ (1671); Anatomie of Infidelitie (1672); Idea theologiae (1673); Philosophia generalis (1676).

GALE, THOMAS (? 163 6-1 70 2), English classical scholar and antiquarian, was born at Scruton, Yorkshire. He was educated at Westminster school and Trinity College, Cambridge, of which he became a fellow. In 1666 he was appointed regius professor of Greek

at Cambridge, in 1672 high master of St Paul's school, in 1676 prebendary of St Paul's, in 1677 a fellow of the Royal Society, and in 1697 dean of York. He died at York on the 7th (or 8th) of April 1702. He published a collection, Opuscula mythologica, ethica, et physica, and editions of several Greek and Latin authors, but his fame rests chiefly on his collection of old works bearing on Early English history, entitled Historiae Anglicanae scriptores and Historiae Britannicae, Saxonicae, A nglo-Danicae scriptores X V. He was the author of the inscrip- tion on the London Monument in which the Roman Catholics were accused of having originated the great fire.

See J. E. B. Mayor, Cambridge in the Time of Queen Anne, 448-450.

GALE. 1. (A word of obscure origin; possibly derived from Dan. gal, mad or furious, sometimes applied to wind, in the sense of boisterous) a wind of considerable power, considerably stronger than a breeze, but not severe enough to be called a storm. In nautical language it is usually combined with some qualifying word, as " half a gale," a " stiff gale." In poetical and figurative language " gale " is often used in a pleasant sense, as in " favour- ing gale" ; in America, it is used in a slang sense for boisterous or excited behaviour.

2. The payment of rent, customs or duty at regular intervals; a " hanging gale " is an arrear of rent left over after each suc- cessive " gale " or rent day. The term survives in the Forest of Dean, for leases granted to the " free miners " of the forest, granted by the " gaveller " or agent of the crown, and the term is also applied to the royalty paid to the crown, and to the area , mined. The word is a contracted form of the O. Eng. gafol, which survives in " gavel," in gavelkind (q.v.), and in the name of the office mentioned above. The root from which these words derive is that of " give." Through Latinized forms it appears in gabelle (q.v.).

3. The popular name of a plant, also known as the sweet gale or gaul, sweet willow, bog or Dutch myrtle. The Old English form of the word is gagel. It is a small, twiggy, resinous fragrant shrub found on bogs and moors in the British Islands, and widely distributed in the north temperate zone. It has narrow, short- stalked leaves and inconspicuous, apetalous, unisexual flowers borne in short spikes. The small drupe-like fruit is attached to the persistent bracts. The leaves are used as tea and as a country medicine. John Gerard {Herball, p. 1228) describes it as sweet willow or gaule, and refers to its use in beer or ale. The genus Myrica is the type of a small, but widely distributed order, Myricaceae, which is placed among the

apetalous families of Dicotyledons, and is perhaps most nearly allied to the willow family. Myrica cerifera is the candleberry, wax-myrtle or wax- tree (q.v.).

GALEN, CHRISTOPH BERNHARD, Freiherr von (1606- 1678), prince bishop of Munster, belonged to a noble West- phalian family, and was born on the 12th of October 1606. Reduced to poverty through the loss of his paternal inheritance, he took holy orders; but this did not prevent him from fighting on the side of the emperor Ferdinand III. during the concluding stages of the Thirty Years' War. In 1 650 he succeeded Ferdinand of Bavaria, archbishop of Cologne, as bishop of Munster. After restoring some degree of peace and prosperity in his principality, Galen had to contend with a formidable insurrection on the part of the citizens of Munster; but at length this was crushed, and the bellicose bishop, who maintained a strong army, became an important personage in Europe. In 1664 he was chosen one of the directors of the imperial army raised to fight the Turk;

and after the peace which followed the Christian victory at St Gotthard in August 1664, he aided the English king Charles II. in his war with the Dutch, until the intervention of Louis XIV. and Frederick William I. of Brandenburg compelled him to make a disadvantageous peace in 1666. When Galen again attacked Holland six years later he was in alliance with Louis, but he soon deserted his new friend, and fought for the emperor Leopold I. against France. Afterwards in conjunction with Brandenburg and Denmark he attacked Charles XI. of Sweden, and conquered the duchy of Bremen. He died at Ahaus on the 19th of September 1678. Galen showed himself anxious to reform the church, but his chief energies were directed to increasing his power and prestige.

See K. Tucking, Geschichte des Stifls Munster unter C. B. von Galen (Munster, 1865) ; P. Corstiens, Bernard van Galen, Vorst- Bisschop van Munster (Rotterdam, 1872) ; A. Hiising, Furstbischof C. B. von Galen (Munster, 1887) ; and C. Brinkmann in the English Historical Review, vol. xxi. (1906). There is in the British Museum a poem printed in 1666, entitled Letter to the bishop of Munster containing a Panegyrick of his heroick achievements in heroick verse.

GALEN (or Galentjs), CLAUDIUS, called Gallien by Chaucer and other writers of the middle ages, the most celebrated of ancient medical writers, was born at Pergamus, in Mysia, about a.d. 130. His father Nicon, from whom he received his early education, is described as remarkable both for excellence of natural disposition

and for mental culture; his mother, on the other hand-, appears to have been a second Xanthippe. In 146 Galen began the study of medicine, and in about his twentieth year he left Pergamus for Smyrna, in order to place himself under the instruction of the anatomist and physician Pelops, and of the peripatetic philosopher Albinus. He subsequently visited other cities, and in 158 returned from Alexandria to Pergamus. A few years later he went for the first time to Rome. There he healed Eudemus, a celebrated peripatetic philosopher, and other persons of distinction; and ere long, by his learning and un- paralleled success as a physician, earned for himself the titles of " Paradoxologus," the wonder-speaker, and " Paradoxopoeus," the wonder-worker, thereby incurring the jealousy and envy of his fellow-practitioners. Leaving Rome in 168, he repaired to his native city, whence he was soon sent for to Aquileia, in Venetia, by the emperors Lucius Verus and Marcus Aurelius. In 170 he returned to Rome with the latter, who, on departing thence to conduct the war on the Danube, having with difficulty been persuaded to dispense with his personal attendance, appointed him medical guardian of his son Commodus. In Rome Galen remained for some years, greatly extending his reputation as a physician, and writing some of his most important treatises. It would appear that he eventually betook himself to Pergamus, after spending some time at the island of Lemnos, where he learned the method of preparing a certain popular medicine, the " terra lemnia " or " sigillata." Whether he ever revisited Rome is uncertain, as also are the time and place of his death. According to Suidas, he died at the age of seventy, or in the year 200, in the reign of Septimius Severus. If, however, we are to trust the testimony of Abul-faraj, his decease took place in Sicily, when he was in his eightieth year. Galen was one of the most versatile and accomplished writers of his age. He composed, it is said, nearly 500 treatises on various subjects, including logic, ethics and grammar. Of the published works attributed to him, 83 are recognized as genuine, 19 are of doubtful authenticity, 45 are confessedly spurious, 19 are fragments^ and 15 are notes on the writings of Hippocrates.

Galen, who in his youth was carefully trained in the Stoic philosophy, was an unusually prolific writer on logic. Of the numerous commentaries and original treatises, a catalogue of which is given in his work De propriis libris, one only has come down to us, the treatise on Fallacies in dictione (Hepi toiv Kara rrp> Xe^ty ao(j>ur^a.T

GALENA

syllogism, and the remarkable passage quoted by Minoides Minas from a Greek commentator on the Analytics, referring the fourth figure to Galen, clearly shows that the addition did not, as generally supposed, rest on a new principle, but was merely an amplification or alteration of the indirect moods of the first figure already noted by Theophrastus and the earlier Peripatetics. In 1 844 Minas published a work, avowedly from a MS. with the superscription Galenus, entitled Takrjvov eiaayoiyr) 8t.akeKTt.KTi. Of this work, which contains no direct intimation of a fourth figure, and which in general exhibits an astonishing mixture of the Aristotelian and Stoic logic, Prantl speaks with the bitterest contempt. He shows demonstratively that it cannot be regarded as a writing of Galen's, and ascribes it to some one or other of the later Greek logicians. A full summary of its contents will be found in the 1st vol. of the Geschichteder Logik (pp. 591-610), and a notice of the logical theories of the true Galen in the same work,

PP- 559-577-

There have been numerous issues of the whole or parts of Galen's works, among the editors or illustrators of which may be mentioned Jo. Bapt. Opizo, N. Leonicenus, L. Fuchs, A. Lacuna, Ant. Musa Brassavolus, Aug. Gadaldinus, Conrad Gesner, Sylvius, Cornarius, Joannes Montanus, Joannes Caius, Thoma's Linacre, Theodore Goulston, Caspar Hoffman, Rene Chattier, Haller and Kiihn. Of Latin translations Choulant mentions one in the 15th and twenty-two in the following century. The Greek text was edited at Venice, in I5 2 5. 5. vols. fol. ; at Basel, in 1538, 5 vols. fol. ; at Paris, with Latin version by Rene Chartier, in 1639, and in 1679, 13 vols, fol.; and at Leipzig, inl82l-i833, by C. G. Kiihn, considered to be the best, 20 vols. 8vo. An epitome in English of the works of Hippocrates and Galen, by J. R. Coxe, was published at Philadelphia in 1846. A new edition of Galen's smaller works by J. Marquardt, Iwan M tiller and G. Helmreich was published in three volumes at Leipzig in 1 884-1 909.

Further details as to the life and an account of the anatomical and medical knowledge of Galen will be found in the historical articles under the headings of Anatomy and Medicine. See also Rene Chartier's Life, in his edition of Galen's works; N. F. J. Eloy, Dictionnaire historique de la medecine, s.v. " Galien," torn. i. (1778); F. Adams's " Commentary " in his Medical Works of Paulus Aegineta (London and Aberdeen, 1834) ; J. Kidd, " A Cursory Analysis of the Works of Galen, so far as they relate to Anatomy and Physiology," Trans. Provincial Med. and Surg. Assoc, vi., 1837, pp.

299-336; C. V. Daremberg, Exposition des connaissances de Galien sur Vana- tomie, la physiologie el la pathologie du systime nerveux (These pour le Doctorat en Medecine) (Paris, 1841); J. R. Gasquet, "The Practical Medicine of Galen and his Time," The British and Foreign Medico-Chirurgical Rev., vol. xi., 1867, pp. 472-488; and Ilberg, " Die Schriften des Claudius Galenos," Rheinisches Museum fiir Philologie, 1889, 1892 and 1896.

GALENA, a city and the county-seat of Jo Daviess county, Illinois, U.S.A., in the N.W. part of the state, on the Galena (formerly the Fever) river, near its junction with the Mississippi, about 165 m. W.N.W. of Chicago. Pop. (1900) 5005, of whom 918 were foreign-born; (19 10) 4835. It is served by the Chicago, Burlington & Quincy, the Chicago & North- Western and the Illinois Central railways; the Galena river has been made navigable by government locks at the mouth of the river, but the river traffic is unimportant. The city is built on rocky limestone bluffs, which rise rather abruptly on each side of the river, and a number of the parallel streets, of different levels, are connected by flights of steps. In Grant Park there is a statue of General U. S. Grant, who was a resident of Galena at the outbreak of the Civil War. In the vicinity there are the most important deposits of zinc and lead in the state, and the city derives its name from the deposits of sulphide of lead (galena), which >were the first worked about here; below the galena is a zone of zinc carbonate (or smithsonite) ores, which was the main zone worked between i860 and 1890; still lower is a zone of blende, or zinc sulphide, now the principal source of the mineral wealth of the region. The production of zinc is increasing, but that of lead is unimportant. The principal manufactures are mining pumps and machinery, flour, woollen goods, lumber and furniture. Water power is afforded by the river. Galena was originally a trading post, called by the French." La Pointe " and by the English " Fever River," the river having been named after le Fevre, a French trader who settled near its mouth. In 1826 Galena was laid out as a town and received its present name; it was incorporated in 1835 and was reincorporated in 1882. In 1838 a theatre was

opened, one of whose proprietors was Joseph Jefferson, the father of the celebrated actor of that name.

GALENA, a city of Cherokee county, Kansas, U.S.A., in the extreme S.E. part of the state, on Short Creek and near Spring river. Pop. (1890) 2496; (1900) 10,155, of whom 580 were negroes and 251

were foreign-born; (1905) 6449; (1910) 6096. It is situated at the intersection of the Missouri, Kansas & Texas, and the Kansas City, Fort Scott & Memphis (" Frisco System ") railways, in the midst of a lead and zinc region, extremely valuable deposits of these metals having been discovered in 1877. Smelters and foundries are its principal manufacturing establish- ments. Water power in abundance is furnished by the Spring river. After the discovery of the ore deposits two rival companies founded Galena and Empire City (pop. in 1905, 982), the former S. of Short Creek and the latter N. of it. Galena was incorporated in 1877, and in 1907 Empire City was annexed to it.

GALENA, an important ore of lead, consisting of lead sulphide (PbS). The mineral was mentioned by Pliny under this name, and it is sometimes now known as lead-glance (Ger. Bleiglanz). It crystallizes in the cubic system, and well-developed crystals are of common occurrence; the usual form is the cube or the cubo-octahedron (fig.). An important character, and one by which the mineral may always be recognized, is the perfect cubical cleavage, on which the lustre is brilliant and metallic. The colour of the mineral and of its streak is lead-grey; it is opaque; the hardness is 2ˆ and the specific gravity 7-5. Twinned crystals are not common, but the presence of polysynthetic twinning is sometimes shown by fine striations running diagonally or obliquely across the cleavage surfaces. Large masses with a coarse or fine granular structure are of common occurrence; the fractured surfaces of such masses present a spangled appearance owing to the numerous bright cleavages.

The formula PbS corresponds with lead 86 '6 and sulphur I 3"4%- The mineral nearly always contains a small amount of silver, and sometimes antimony, arsenic, copper, gold, selenium, &c. Argentiferous galena is an important source of silver; this metal is present in amounts rarely exceeding 1 , and often less than 0-03 (equivalent to iof ounces per ton). Since argentite (Ag 2 S) is isomorphous with galena, it is probable that the silver isomorphously replaces lead, but it is to be noted that native silver has been detected as an enclosure in galena.

Galena is of wide distribution, and occurs usually in metal- liferous veins traversing crystalline rocks, clay-slates and lime- stones, and also as pockets in limestones. It is often associated with blende and pyrites, and with calcite, fluorspar, quartz, barytes, chalybite and pearlspar as gangue minerals; in the upper oxidized parts of the deposits, cerussite and anglesite occur as alteration products. The mineral has occasionally been observed as a recent formation

replacing organic matter; such as wood; and it is sometimes found in beds of coal. . As small concretionary nodules, it occurs disseminated through sand- stone at Kommern in the Eifel. In the lead-mining districts of Derbyshire and the north of England the ore occurs as veins and flats in the Carboniferous Limestone series, whilst in Cornwall the veins traverse clay-slates. In the Upper Mississippi lead region of Missouri, Illinois, Iowa and Wisconsin the ore fills large cavities or chambers in limestone.

Galena is met with at all places where lead is mined; of localities which have yielded finely crystallized specimens the following may be selected for mention: Derbyshire, Alston in Cumberland, Laxey in the Isle of Man (where crystals measuring almost a foot across have been found), Neudorf in the Harz, Rossie in New York and Joplin in Missouri. Good crystals have also been obtained as a furnace product.

Coarsely grained galena is used for glazing pottery, and is then known as " potters' ore " or alquifoux.

The galena group includes several other cubic minerals, such as argentite (q.v.). Mention may also be made here of clausthalite

(lead selenide, PbSe) and altaite (lead telluride, PbTe), which, with their lead-grey colour and perfect cubic cleavage, closely resemble galena in appearance; these species are named after the localities at which they were originally found, namely, Klausthal in the Harz and the Altai mountains in Asiatic Russia. Altaite is of interest as being one of the tellurides found associated with gold. (L. J. S.)

GALEOPITHECUS, the scientific designation of the Colugo (q.v.) or Cobego, commonly known as the flying-lemur, and alone representing the family Galeopithecidae. Much uncertainty has prevailed among naturalists as to the systematic position of this animal, or rather these animals (for there are two species); and while some have referred it to the lemurs, others have placed it with the bats, and others again among the Inseclivora, as the representative of a special subordinal group, the Dermoptera. Dr H. C. Chapman, who has made a special study of the creature, writes, however, as follows: " It appears, at least in the judg- ment of the author, that Galeopithecus cannot be regarded as being either a

lemur, or insectivore, or bat, but that it stands alone, the sole representative of an ancient group, Galeopithecidae, as Hyrax does of Hyracoidea. While 'Galeopithecus is but re- motely related to the Lemuroidea and Insectivora, it is so closely related to Chiroptera, more particularly in regard to the structure of its patagium, brain, alimentary canal, genito-urinal apparatus,

Feet of Philippine Colugo, or Flying-Lemur {Galeopithecus philippinensis).

&c, that there can be but little doubt that the Chiroptera are the descendants of Galeopithecus, or, more probably, that both are the descendants of a Galeopilhscus-\ike ancestor." Without going quite so far as this, it may be definitely admitted that the colugo is entitled to represent an order by itself, the characters of which will be as follows: Herbivorous, climbing, unguiculate mammals, provided with a very extensive flying-membrane, and having the dental formula i. - f , c. J, p. §,».$, total 34. The lower incisors are directed forwards and have a comb-like structure of their crowns, while the outermost of these teeth and the canines are double-rooted, being in these respects, taken together, quite unlike those of all other mammals; the cheek-teeth have numerous sharp cusps; and there is the normal replacement of milk-molars by premolars. In the skull the orbit is surrounded by bone, and the tympanic has a bulla and an ossified external meatus. The ulna and fibula are to some extent inclined back- wards; the carpus has a scapho-lunar; and the feet are five-toed. The hemispheres of the brain are short and but slightly convoluted; the stomach is simple; there is a large caecum; the testes are received into inguinal pouches; the uterus is two-horned; the placenta is discoidal; and there are two pairs of pectoral teats. A single offspring is produced at a birth.*

It will be obvious that if other representatives of iheDermoptera were discovered, some of these features might apply only to the family Galeopithecidae.

There are two species, Galeopithecus volans, ranging from Burma, Siam and the Malay Peninsula to Borneo, Sumatra and Java, and G. philippinensis of the Philippine group. The former, which is nearly 2 ft. in total length, is distinguished by its larger upper incisors, shorter ears and smaller skull. In both species not only are the long and slender limbs connected by a

broad integumentary expansion extending outwards from the sides of the neck and body, but there is also a web between the fingers and

toes as far as the base of the claws (fig.) ; and the hind-limbs are further connected by a similar expansion passing outwards along the back of the feet to the base of the claws, and, inwardly, involving the long tail to the tip, forming a true interfemoral membrane, as in bats. Besides differing from bats altogether in the form of the anterior limbs and of the double- rooted outer incisors and canines, Galeopithecus contrasts strongly with that order in the presence of a large sacculated caecum, and in the great length of the colon, which is so remarkably short in Chiroptera. From the lemurs, on the other hand, the form of the brain, the character of the teeth, the structure of the skull, and the deciduate discoidal placenta at once separate the group. (R. L.)*

GALERIUS [Galerius Valerius Maximianus], Roman emperor from a.d. 305 to 311, was born near Sardica in Thrace. He originally followed his father's occupation, that of a herds- man, whence his surname of Armentarius (Lat. armentum, herd). He served with distinction as a soldier under Aurelian and Probus, and in 293 was designated Caesar along with Constantius Chlorus, receiving in marriage Diocletian's daughter Valeria, and at the same time being entrusted with the care of the Illyrian provinces. In 296, at the beginning of the Persian War, he was removed from the Danube to the Euphrates; his first campaign ended in a crushing defeat, near Callinicum, but in 297, advancing through the mountains of Armenia, he gained a decisive victory over Narses (q.v.) and compelled him to make peace. In 305, on the abdication of Diocletian and Maximianus, he at once assumed the title of Augustus, with Constantius his former colleague, and having procured the promotion to the rank of Caesar of Flavius Valerius Severus, a faithful servant, and Daia (Maximinus), his nephew, he hoped on the death of Constantius to become sole master of the Roman world. This scheme, however, was defeated by the sudden elevation of Constantine at Eboracum (York) on the death of his father, and by the action of Maximianus and Maxentius in Italy. After an unsuccessful invasion of Italy in 307 he elevated his friend Licinius to the rank of Augustus, and, moderating his ambition, devoted the few remaining years of his life " to the enjoyment of pleasure and to the execution of some works of public utility." It was at the instance of Galerius that the first of the celebrated edicts of persecution against the Christians was published, on the 24th of February 303, and this policy of repression was maintained by him until the appearance of the general edict of toleration (311), issued in'his own name and in those of Licinius and Constantine. He died in May 311 a.d.

See Zosimus ii. 8-1 r; Zonaras xii. 31-34; Eutropius ix. 24, x. 1.

GALESBURG, a city and the county-seat of Knox county, Illinois, U.S.A., in the N.W. part of the state, 163 m. S.W. of Chicago. Pop. (1890) 15,264; (1900) 18,607; of whom 3602 were foreign-born ; (census, 1910) 22,089. It is served by the Atchison, Topeka & Santa Fe, and the Chicago, Burlington & Quincy railways. Knox College (non-sectarian and coeduca- tional), which was chartered here in 1837 as the " Knox Manual Labor College " (the present name was adopted in 1857), was opened in 1841, and had in 1907-1908, 31 instructors and 628 students,' of whom more than half were in the Conservatory of Music, a department of the college, and 79 were in the Academy. Lombard College (coeducational; Universalist), which was chartered as the " Illinois Liberal Institute "in 185 1, was known as Lombard University (in honour of Benjamin Lombard, a benefactor) from 1855 to 1899; it includes a College of Liberal Arts, the Ryder Divinity School (1881), and departments of music and domestic science, and in 1907-1908 had 18 instructors and 1 17 students. Here also are Corpus Christi College (Roman Catholic), St Joseph's Academy (Roman Catholic) and Brown's Business College (1874). There is a public library, founded in 1874. The industries consist mainly of the construction and repairing of steam railway cars (in the shops of the Chicago, Bur- lington & Quincy railway) and the manufacture of foundry and machine-shop products, vitrified brick, agricultural implements

and machinery. The total value of the factory product in 1905 was $2,217,772, being 52-9% more than in 1900. Galesburg was named in honour of the Rev. George Washington Gale (1789- 1862), a prominent Presbyterian preacher, who in 1827-1834 had founded the Oneida Manual Labor Institute at Whitestown, Oneida county, New York. Desiring to establish a college in the Mississippi Valley to supply " an evangelical and able ministry " to " spread the Gospel throughout the world," and also wishing to counteract the influence of pro-slavery men in Illinois, he interested a number of people in the project, formed a society for colonization, and in 1836 led the first settlers to Galesburg, the " Mesopotamia in the West." Knox College was founded to fulfil his educational purpose. Galesburg was an important " station " of the Underground Railroad, one of the conditions of membership in the " Presbyterian Church of Galesburg " (the name of Mr Gale's society) being opposition to slavery,; and in

1855 this caused the church to withdraw from the Presbytery. Galesburg was chartered as a city in 1 8 5 7 . On the 7 th of October 1858 one of the famous Lincoln-Douglas debates was held in the grounds of Knox College.

GALGACUS, or perhaps rather Calgacus, a Caledonian chief who led the tribes of North Britain against the invading Roman army under Cn. Julius Agricola about a.d. 85 and was defeated at the battle of Mons Graupius (Tac. Agric. 29). The name recurs much later, in Adamnan's Life of Columba, in the name of a wood near Londonderry, Daire-Calgaich or Roboretum Calgachi, " the wood of Calgacus ": it may be Celtic and denote " the man with the sword."

GALIANI, FERDINANDO (1728-1787), Italian economist, was born at Chieti on the 2nd of December 1728. He was carefully educated by his uncle Monsignor C. Galiani at Naples and Rome with a view to entering the Church. Galiani gave early promise of distinction as an economist, and even more as a wit. At the age of twenty-two, after he had taken orders, he had produced two works by which his name became widely known far beyond the bounds of his own Naples. The one, his Trattato delta moneta, in which he shows himself a strong supporter of the mercantile school, deals with many aspects of the question of exchange, but always with a special reference to the state of confusion then presented by the whole monetary system of the Neapolitan government. The other, Raccolta in Morte del Boia, established his fame as a humorist, and was highly popular in Italian literary circles at the end of the 18th century. In this volume Galiani parodied with exquisite felicity, in a series of discourses on the death of the public hangman, the styles of the most pompous and pedantic Neapolitan writers of the day. Galiani's political knowledge and social qualities now pointed him out to the discriminating eye of King Charles, afterwards Charles III. of Spain, and his liberal minister Tanucci, and he was appointed in 1759 secretary to the Neapolitan embassy at Paris. This post he held for ten years, when he returned to Naples and was made a councillor of the tribunal of commerce, and in 1777, minister of the royal domains. His economic reputation was made by a book written in French and published in Paris, namely, his Dialogues sur le commerce des bles. This work, by its light and pleasing style, and the vivacious wit with which it abounded, delighted Voltaire, who spoke of it as a book in the pro- duction of which Plato and Moliere might have been combined ! The author, says Pecchio, treated his arid subject as Fontenelle did the vortices of Descartes, or Algarotti the Newtonian system of the world. The question at issue was that of the freedom of the corn trade, then much agitated, and, in particular,

the policy of the royal edict of 1764, which permitted the exportation of grain so long as the price had not arrived at a certain height. The general principle he maintains is that the best system in regard to this trade is to have no system — countries differently circum- stanced requiring, according to him, different modes of treatment. He fell, however, into some of the most serious errors of the mercantilists — holding, as indeed did also Voltaire and even Verri, that one country cannot gain without another losing, and in his earlier treatise going so far as to defend the action of govern- ments in debasing the currency. Until his death at Naples on the

30th of October 1787, Galiani kept up with his old Parisian friends a correspondence, which was published in 1818.

See L' Abate Galiani, by Alberto Marghieri (1878), and his corre- spondence with Tanucci in Viesseux's L'Archivio storico (Florence,

1878). .,

GALICIA (Ger. Galizien; Pol. Halicz), a crownland of Austria, bounded E. and N. by Russia, S. by Bukovina and Hungary, and W. by Austrian and Prussian Silesia. It has an area of 30,299 sq. m., and is the largest Austrian province. It comprises the old kingdoms of Galicia and Lodomeria, the duchies of Auschwitz and Zator, and the grand duchy of Cracow.

Galicia lies on the northern slopes of the Carpathians, which with their offshoots cover about a third of the whole area of the country. The surface gradually sinks down by undulating terraces to the valleys of the Vistula, and Dniester. To the N. and E. of these rivers Galicia forms a continuation of the great plains of Russia, intersected only by a few hills, which descend from the plateaus of Poland and Podolia, and which attain in some places an altitude of 1300 to 1500 ft. The Carpathians, which, extend- ing in the form of an arc, form the boundary between Galicia and Hungary, are divided into the West and the East Beskides, which are separated by the northern ramifications of the massif of the Tatra. The highest peaks are the Babia G6ra (5650 ft.), the Wolowiec (6773 ft.) and the Cserna Gora (6505 ft.). The principal passes are those of Zdjar over the Tatra, and of Dukla, Vereczke Kbrosmezo or Delatyn in the East Beskides. The river Vistula, which becomes navigable at Cracow, and forms afterwards the north-western frontier of Galicia, receives the Sola, the Skawa, the Raba, the Dunajec with its affluents the Poprad and the Biala, the Wisloka, the San and the Bug. The Dniester, which rises in the Carpathians, within the territory of Galicia, becomes

navigable at Sambor, and receives on the right the Stryj, the Swica, the Lomnica and the Bystrzyca, and on the left the Lipa, the Strypa, the Sereth and the Zbrucz, the boundary river towards Russia. The Pruth, which also rises in the Carpathians, within the territory of Galicia, traverses its south-eastern corner and receives the Czeremosz, the boundary river towards Bukovina. There are few lakes in the country except mountain tarns; but considerable morasses exist about the Upper Dneister, the Vistula and the San, while the ponds or dams in the Podolian valleys are estimated to cover an area of over 200 sq. m. The most frequented mineral springs are the alkaline springs at Szczawnica and Krynica, the sulphur springs at Krzesowice, Szklo and Lubian, and the iodine springs at Iwonicz.

Exposed to the cold northern and north-eastern winds, and shut out by the Carpathians from the warm southerly winds, Galicia has the severest climate in Austria. It has long winters, with an abundant snowfall, short and wet springs, hot summers and long and steady autumns. The mean annual temperature at Lemberg is 46-2° F., and at Tarnopol only 43 F. % .-..'■'

Of the total area 48-45% is occupied by arable land, 11-16% by meadows, 9-19% by pastures, 1-39% by gardens and 25-76% by forests. The soil is generally fertile, but agriculture is still backward. The principal products are barley, oats, rye, wheat, maize and leguminous plants. Galicia has the largest area under potatoes and legumes in the whole of Austria, and hemp, flax, tobacco and hops are of considerable importance. The principal mineral products are salt, coal and petroleum. Salt is extracted at Wieliczka, Bochnia, Bolechow, Dolina, Kalusz and Kosow. Coals are found in the Cracow district at Jawprzno, at Siersza near Trzebinia and at Dabrowa. Some of the richest petroleum fields in Europe are spread in the region of the Carpathians, and are worked at Boryslaw and Schodnica near Drohobycz, Bobrka 'and Potok near Krosno, Sloboda-Runguiska near Kolomea, &c. Great quantities of ozocerite are also extracted in the petroli- ferous region of the Carpathians. Other mineral products, are zinc, extracted at Trzebionka and Wodna in the Cracow region, amounting to 40% of the total zinc production in Austria, iron ore, marble and various stones for construction. The sulphur mines of Swoszowice near Cracow, which had been worked since 1598, were abandoned in 1884.

4-02

GALICIA

The manufacturing industries of Galicia are not highly developed. The first place is occupied by the distiller'es, whose output amounts to nearly 40% of the total production of spirits in Austria. Then follow the petroleum refineries and kindred industries, saw-mills and the fabrication of various wood articles, paper and milling. The sugar factory at Tlumacz and the tobacco factory at Winniki are amongst the largest establishments of their kind in Austria. Cloth manufacture is concentrated at Biala, while the weaving of linen and of woollens is pursued as a household industry, the former in the Carpathian region, the latter in eastern Galicia. The commerce, which is mainly in the hands of the Jews, is very active, and the transit trade to Russia and to the East is also of considerable importance. Galicia had in 1900 a population of 7,295,538, which is equivalent to 241 inhabitants per sq. m. The two principal nationalities are the Poles (45%) and the Ruthenians (42%), the former predominating in the west and in the big towns, and the latter in the east. The Poles who inhabit the Carpathians are distinguished as Goralians (from gdry, mountain) , and those of the lower regions as Mazures and Cracoviaks. The Ruthenian highlanders bear the name of Huzulians. The Poles are mostly Roman Catholics, the Ruthenians are Greek Catholics, and there are over 770,000 Jews, and about 2500 Armenians, who are Catholics and stand under the jurisdiction of an Armenian archbishop at Lemberg.

The Roman Catholic Church has an archbishop, at Lemberg, and.three bishops, at Cracow, at Przemysl and at Tarnow, and the Greek Catholic Church is represented by an archbishop, at Lemberg, and two bishops, at Przemysl and at Stanislau. At the head of the educational institutions stand the two universities of Lemberg and Cracow, and the Polish academy of science at Cracow.

The local Diet is composed of 151 members, including the 3 archbishops, the 5 bishops, and the 2 rectors of the universities, and Galicia sends 78 deputies to the Reichsrat at Vienna. For administrative purposes, the province is divided into 78 districts and 2 autonomous municipalities — Lemberg (pop. 159,618), the capital, and Cracow (91,310). Other principal towns are: Przemysl (46,439), Kolomea (34,188), Tarnow (31,548), Tarnopol (30,368), Stanislau (29,628), Stryj (23,673), Jaroslau (22,614), Drohobycz (19,146), Podg6rze (18,142), Brody (17,360), Sambor (17,027), Neusandec (is,724),Rzesz6w(i4,7i4),Zloczow(i2,209), Grodek (11,845), Porodenka (11,615), Buczacz (11,504), Sniatyn (11,498), Brzezany (11,244), Kuty (11,127), Boryslaw (10,671), Chrzanow (10,170), Jaworow (10,09c?), Bochnia (10,049) an d Biala (8265).

Galicia (or Halicz) took its rise, along with the neighbouring principality of Lodomeria (or Vladimir), in the course of the 12th century — the seat of the ruling dynasty being Halicz or Halitch. Disputes between the Galician and Lodomerian houses led to the interference of the king of Hungary, Bela III., who in 1190 assumed the title of king, and appointed his son Andreas lieutenant of the kingdom. Polish assistance, however, enabled Vladimir, the former possessor, to expel Andreas, and in 1198 Roman, prince of Lodomeria, made himself master of Galicia also. On his death in 1205 the struggle between Poland and Hungary for supremacy in the country was resumed; but in 121 5 it was arranged that Daniel (1 205-1 264), son of Roman, should be invested with Lodomeria, and Coloman, son of the Hungarian king, with Galicia. Coloman, however, was expelled by Mstislav of Novgorod; and in his turn Andreas, Mstislav's nominee, was expelled by Daniel of Lodomeria, a powerful prince, who by a flexible policy succeeded in maintaining his position. Though in 1235 he had recognized the overlordship of Hungary, yet, when he found himself hard pressed by the Mongolian general Batu, he called in the assistance of Innocent IV., and accepted the crown of Galicia from the hands of a papal legate; and again, when Innocent disappointed his expectation, he returned to his former connexion with the Greek Church. On the extinction of his line in 1340 Casimir III. of Poland incorporated Galicia and Lemberg; on Casimir's death in 1370 Louis the Great of Hungary, in accord- ance with previous treaties, became king of Poland, Galicia and

Lodomeria; and in 1382, by the marriage of Louis's daughter with Ladislaus II., Galicia, which he had regarded as part of his Hungarian rather than of his Polish possessions, became de- finitively assigned to Poland. On the first partition of Poland, in 1772, the kingdom of Galicia and Lodomeria came to Austria, and to this was added the district of New or West Galicia in 1795; but at the peace of Vienna in 1809 West Galicia and Cracow were surrendered to the grand-duchy of Warsaw, and in 1810 part of East Galicia, including Tarnopol, was made over to Russia. This latter portion was recovered by Austria at the peace of Paris (1814), and the former came back on the suppression of the independent republic of Cracow in 1846. After the introduction of the constitution of February 1861, Galicia gained a larger degree of autonomy than any other province in the Austrian empire.

See Die osterreichisch-ungarische Monarchic in Wort und Bild, vol. 19 (Wien, 1885-1902, 24 vols.); Die Lander Osterreich-Ungarns in Wort und Bild, vol. 10 (Wien, 1881-1886, 15 vols.). Remarkable

sketches of Galician life are to be found in the works of the German novelist Sacher-Masoch (1835-1895).

GALICIA (the ancient Gallaecia or Callaecia, KaXXai/cia or KaXeuKia) , a captaincy-general, and formerly a kingdom, count-ship and province, in the north-western angle of Spain; hounded on the N. by the Bay of Biscay, E. by Leon and Asturias, S. by Portugal, and W. by the Atlantic Ocean. Pop. (1900) 1,980,515; area, 11,254 S Q- m. In 1833 Galicia was divided for adminis- trative purposes into the provinces of Corunna, Lugo, Orense and Pontevedra.

Galicia is traversed by mountain ranges, sometimes regarded as a continuation of the Cantabrian chain; and its surface is further broken in the east by the westernmost ridges of that system, which, running in a south-westerly direction, rise above the basin of the Mifio. The high land north of the headwaters of the Mifio forms the sole connecting link between the Cantabrians properly so-called and the mountains of central and western Galicia. The average elevation of the province is considerable, and the maximum height (6593 ft.) is reached in the Pefia Trevinca on the eastern border of Orense.

The principal river is the Mifio (Portuguese Minko; Lat. Minius; so named, it is said, from the minium or vermilion found in its bed). Rising near Mondofiedo, within 25 m. of the northern coast, the Mifio enters the Atlantic near the port of Guardia, after a course of 170 m. S. and S.W. Its lower reaches are navigable by small vessels. Of its numerous affluents the most important is the Sil, which rises among the lofty mountains between Leon and Asturias. Among other rivers having a westerly direction may be mentioned the Tambre, the Ulla and the Lerez or Ler, which falls into the Atlantic by estuaries or rias called respectively Ria de Muros y Noya, Ria de Arosa and Ria de Pontevedra. The rivers of the northern versant, such as the Nera, are, like those of Asturias, for the most part short, rapid and subject to violent floods.

The coast-line of Galicia, extending to about 240 m., is every- where bold and deeply indented, presenting a large number of secure harbours, and in this respect forming a marked contrast to the neighbouring province. The Eo, which bounds Galicia on the east, has a deep estuary, the Rivadeo or Ribadeo, which offers a' safe and commodious anchorage. Vivero Bay and the Ria del Barquero y Vares are of a similar character; while the harbour of Ferrol ranks among the best in Europe, and is the chief naval station on the northern coast of Spain. On the opposite side of Betanzos Bay (the fieyas \ifiriv or Partus Magnus of the ancients) is the great port of

Corunna or Corufia. The principal port on the western coast is that formed by the deep and sheltered bay of Vigo, but there are also good roadsteads at Corcubion under Cape Finisterre, at Marin and at Carril.

The climate of the Galician coast is mild and equable, but the interior, owing to the great elevation (the town of Lugo is 1 500 ft. above sea-level) , has a wide range of temperature. The rainfall is exceptionally large, and snow lies on some of the loftier elevations for a considerable portion of the year. The soil is on the whole fertile, and the produce very varied. A considerable quantity of

timber is grown on the high lands, and the rich valley pastures support large herds of cattle, while the abundance of oaks and chestnuts favours the rearing of swine. In the lowland districts good crops of maize, wheat, barley, oats and rye, as well as of turnips and potatoes, are obtained. The fruit also is of excellent quality and in great variety, although the culture of the vine is limited to some of the warmer valleys in the southern districts. The dehesas or moorlands abound in game, and fish are plentiful in all the streams. The mineral resources of the province, which are considerable, were known to some extent to the ancients. Strabo (c. 63 b.c.-a.d. 21) speaks of its gold and tin, and Pliny (a.d. 23-79) mentions the gemma Gallaica, a precious stone. Galicia is also remarkable for the number of its sulphur and other warm springs, the most important of which are those at Lugo, and those from which Orense is said to take its name (Aquae urentes).

Ethnologically the Galicians (Gallegos) are allied to the Portuguese, whom they resemble in dialect, in appearance and in habits more than the other inhabitants of the peninsula. The men are well known all over Spain and Portugal as hardy, honest and industrious, but for the most part somewhat unskilled, labourers; indeed the word Gallego has come to be almost a synonym in Madrid for a " hewer of wood and drawer of water." It is also used as a term of abuse, meaning " boor." Agriculture engages the greater part of the resident population, both male and female; other industries, except the fisheries, are little developed. The largest town in Galicia is Corunna (pop. 1900, 43,971); Santiago de Compostela is the ancient capital and an archi- episcopal see; Lugo, Tuy, Mondonedo and Orense are bishoprics.

Gallaecia, the country of the Galacci, Callaici or Gallaici, seems to have been very imperfectly known to the earlier geographers. According to Eratosthenes (276-196 B.C.) the entire population of the peninsula were at one time called Galatae. The region properly called by their name, bounded on the south by the Douro and on the east by the Navia, was first entered by the Roman legions under Decius Junius Brutus in 137-136 B.C. (Livy lv., lvi., Epit.) ; but the final subjugation cannot be placed earlier than the time of Augustus (31 b.c.-a.d. 14). On the partition of Spain, which followed the successful invasions of the Suevi, Alans and Vandals, Gallaecia fell to the lot of the first named (a.d. 411). After an independent subsistence of nearly 200 years, the Suevian kingdom was annexed to the Visigothic dominions under Leovigild in 585. In 734 it was occupied by the Moors, who in turn were driven out hy Alphonso I. of Asturias, in 739. During the 9th and 10th centuries it was the subject of dispute between more than one count of Galicia and the suzerain, and its coasts were repeatedly ravaged by the Normans. When Ferdinand I. divided his kingdom among his sons in 1063, Galicia was the portion allotted to Garcia, the youngest of the three. In 1072 it was forcibly reannexed by Garcia's brother Alphonso VI. of Castile and thenceforward it remained an integral part of the kingdom of Castile or of Leon. The honorary title of count of Galicia has frequently been borne by younger sons of the Spanish sovereign.

See Annette B. Meakin, Galicia, the Switzerland of Spain (London,

1909).

GALIGNANI, GIOVANNI ANTONIO (1752-1821), newspaper publisher, was born at Brescia, Italy, in 1752. After living some time in London, he went to Paris, where he started in 1800 an English library, and in 1808 a monthly publication, the Repertory of English Literature. In 1814 he began to publish, in Paris, Galignani's Messenger, a daily paper printed in English. At his death in 182 1 the paper was carried on by his two sons, Jean- Antoine (1796-1873) and Guillaume (1798-1882). Under their management it enjoyed a high reputation. Its policy was to promote good feeling between England and France. The brothers established and endowed hospitals at Corbeil and at Neuilly- sur-Seine. In recognition of their generosity the city of Corbeil erected a monument in their honour. In 1884 the Galignani family disposed of their interest in Galignani's Messenger, and from that date until 1904, when it was discontinued, the paper appeared under the title of the Daily Messenger.

GALILEE (Heb. Wi, "border" or "ring," Gr. TaXiXaia), a Roman

province of Palestine north of Samaria, bounded S. by Samaria and the Carmel range, E. by the Jordan, N. by the Leontes (Litani), and W. by the Mediterranean and part of Phoenicia. Its maximum extent was about 60 m. north to south and 30 east to west. The name in the Hebrew Scriptures hardly had a definite territorial significance. It literally means a ring or circuit, and, like analogous words in English, could be applied to various districts. Thus Joshua (xiii. 2) and Joel (iii, 4) refer to the Geliloth (" borders, coast ") of the Philistines or of Palestine; Joshua again (xxii. 10, n) and Ezekiel (xlvii. 8) mention the Jordan valley plain as the " Geliloth of Jordan " in " the Eastern Gelilah." In its more restricted connotation, denoting the district to which it is usually applied or a part thereof, it is found in Joshua xx. 7, xxi. 32, 1 Chr. vi. 76, as the place where was situated the town of Kadesh; and in 1 Kings ix. 11, the district of " worthless " cities given by Solomon to Hiram. In Isa. ix. 1 we find the full name of the district, Galil ha-Goyim, literally " the ring, circuit or border of the foreigners " — referring to the Phoenicians, Syrians and Aramaeans, by whose country the province was on three sides surrounded. In 1 Kings xv. 29 it is specified as one of the districts whose population was deported by Tiglath-Pileser. Throughout the Old Testament history, how- ever, Galilee as a whole cannot be said to have a history; the unit of territorial subdivision was tribal rather than provincial, and though. such important events as those associated with the names of Barak, Gideon, Gilboa, Armageddon, took place within its borders, yet these belong rather to the histories of Issachar, Zebulon, Asher or Naphtali, whose territories together almost correspond with Galilee, than to the province itself.

After the Jewish return from exile the population confined itself to Judaea, and Galilee was left in the possession of the mixed multitude of successors established there by the Assyrians. When it once more came into Israelite hands is uncertain; it is generally supposed that its reconquest was due to John Hyrcanus. Before very long it developed a nationalism and patriotism as intense as that of Judaea itself, notwithstanding the contempt with which the metropolitans of Jerusalem looked down upon the Galilean provincials. Stock proverbial sayings such as " Out of Galilee cometh no prophet " (though Deborah, Jonah, Elisha, and probably Hosea, were Galileans) were apparently common. Provincialism of speech (Matt. xxvi. 73) distinguished the Galileans; it appears that they confused the gutturals in pronunciation.

Under the Roman domination Galilee was made a tetrarchate governed by members of the Herod family. Herod the Great was

tetrarch of Galilee in 47 B.C.; in 4 B.C. he was succeeded by his son Antipas. Galilee was the land of Christ's boyhood and the chief centre of His active work, and in His various ministries here some of His chief discourses were uttered (as the Sermon on the Mount, Matt, v.) and some of His chief miracles performed. After the destruction of Jerusalem the Judaean Rabbinic schools took refuge in the Galilee they had heretofore despised. No ancient remains of Jewish synagogues exist except those that have been identified in some of the ancient Galilean towns, such as Tell Hum (Talhum), Kerazeh, Kefr Bir'im, and elsewhere. One of the chief centres of Rabbinism was Safed, still a sacred city of the Jews and largely inhabited by members of that faith. Near here is Meirun, a place much revered by the Jews as containing the tombs of Hillel, Shammai and Simon ben Yohai; a yearly festival in honour of these rabbis is here celebrated. At Tiberias also are the tombs of distinguished Jewish teachers, including Maimonides.

The province was subdivided into two parts, Upper and Lower Galilee, the two being divided by a ridge running west to east, which prolonged would cut the Jordan about midway between Huleh and the Sea of Galilee. Lower Galilee includes the plains of Buttauf and Esdraelon.

The whole of Galilee presents country more or less disturbed by volcanic action. In the lower division the hills are all tilted up towards the east, and broad streams of lava have flowed Lower over the plateau above the sea of Galilee. In this district QaWee, the highest hills are only about 1800 ft. above the sea. The 1 ridge of Nazareth rises north of the great plain of Esdraelon, and

north of this again is the fertile basin of the Buttauf, separated from the sea-coast plains by low hills. East of the Buttauf extends the basaltic plateau called Sahel el Ahma (" the inaccessible plain "), rising 1700 ft. above the Sea of Galilee. North of the Buttauf is a confused hill country, the spurs falling towards a broad valley which lies at the foot of the mountains of Upper Galilee. This broad valley, running westwards to the coast, is perhaps the old boundary of Zebulun — the valley of Jiphthah-el (josh, xix, 14). The great plain of Esdraelon is of triangular form, bounded by Gilboa on the east and by the ridge which runs to Carmel on the west. It is 14 m. long from Jenin to the Nazareth hills, and its southern border is about 20

m. long. It rises 200 ft. above the sea, the hills on both sides being some 1500 ft. higher. The whole drainage is collected by the Kishon, which runs through a narrow gorge at the north-west corner of the plain, descending beside the ridge of Carmel to the sea. The broad valley of Jezreel on the east, descending towards the Jordan valley, forms the gate by which Palestine is entered from beyond Jordan. Mount Tabor stands isolated in the plain at the north-east corner, and rather farther south the conical hill called Nebi Dul.it rises between Tabor and Gilboa. The whole of Lower Galilee is well watered. The Kishon is fed by springs from near Tabor and from a copious stream from the west side of the plain of Esdraelon. North-west of Nazareth is Wadi el Melek, an open valley full of springs. The river Belus, just south of Acre, rising in the sea-coast marshes, drains the whole valley above identified with Jiphthah-el. On the east the broad valley of Jezreel is full of magnificent springs, many of which are thermal. The plains of Esdraelon, and the Buttauf, and the plateau of el-Ahma are all remarkable for the rich basaltic soil which covers them, in which corn, cotton, maize, sesame, tobacco, millet and various kinds of vegetable are grown, while indigo and sugar-cane were cultivated in former times. The Nazareth hills and Gilboa are bare and white, but west of Nazareth is a fine oak wood, and another thick wood spreads over the northern slopes of Tabor. The hills west of the great plain are partly of bare white chalk, partly covered with dense thickets. The mountains north of the Buttauf are rugged and covered with scrub, except near the villages, where fine olive groves exist. The principal places of importance in Lower Galilee are Nazareth (10,000 inhabit- ants), Sepphoris (now Seffuria), a large village standing above the Buttauf on the spurs of the southern hills, and Jenin (En Gannim), a flourishing village, with a palm garden (3000 inhabitants). The ancient capital, Jezreel (Zerin), is now a miserable village on a pre- cipitous spur of Gilboa; north of this are the small mud hamlets, Solam (Shunem), EndOr (Endor), Nein (Nain); on the west side of the plain is the ruin of Lejjun (the Legio of the 4th century, which was then a place of importance). In the hills north of the Buttauf is Jefat, situated on a steep hill-top, and representing the Jotapata defended by Josephus. Kcfr Kenna, now a flourishing Christian village at the foot of the Nazareth hills, south of the Buttauf, is one of the sites identified with Cana of Galilee, and the ruin Kana, on the north side of the same plain, represents the site pointed out to the pilgrims of the 12th and 13th centuries.

The mountains are tilted up towards the Sea of Galilee, and the drainage of the district is towards the north-west. On the south the

Uooer rocky range of Jebel Jarmuk rises to nearly 4000 ft. above

Gaitfee. tne sea; on tne east a narrow ridge 2800 ft. high forms the watershed, with steep eastern slopes falling towards Jordan. Immediately west of the watershed are two small plateaus covered with basaltic debris, near el-Jish and Kades.. On the west are rugged mountains with deep intricate valleys.' The main drains of the country are — first, Wadi el 'Ayun, rising north of Jebel Jarmuk, and running north-west as an open valley; and secondly, Wadi el Ahjar, a rugged precipitous gorge running north to join the Leontes. The district is well provided with springs throughout, and the valleys are full of water in the spring-time. Though rocky and difficult, Upper Galilee is not barren the soil of the plateaus is rich, and the vine flourishes in the higher hills, especially in the neighbourhood of Kefr Bir'im. The principal town is Safed, perched on a white mountain 2700 ft. above the sea. It has a population of about 9000, including Jews, Christians and Moslems.

Josephus gives a good description of the Galilee of his time in Wars, iii. 3.2: " The Galileans are inured to war from their infancy, and have been always very numerous; nor hath the country been ever destitute of men of courage or wanted a numerous set of them; for their soil is universally rich and fruit- ful, and full of plantations of trees of all sorts, insomuch that it invites the most slothful to take pains in its cultivation. . . . Moreover, the cities lie here very thick, and the very many villages there are here are everywhere full of people." Though the population is diminished and the cities ruinous, the country is still remarkable for fertility, thanks to the copiousness of its water-supply draining from the Lebanon mountains.

The principal products of the country are corn, wine, oil and soap (from the olives) , with every species of pulse and gourd.

The antiquities of Galilee include dolmens and rude stone

monuments, rock-cut tombs, and wine-presses, with numerous remains of Byzantine monasteries and fine churches of the time of the crusades. There are also remains of Greek architecture in various places; but the most interesting buildings are the ancient synagogues, of which some eleven examples are now known. They are rectangular, with the door to the south, and two rows of columns forming aisles east and west. The architecture is a peculiar and debased imitation of classic style, attributed by architects to the 2nd century a.d. In Kefr Bir'im there were remains of two synagogues, but early in the 20th century one of them was completely destroyed

by a local stone-mason. At Irbid, above Tiberias, is another synagogue of rather different character. Traces of synagogues have also been found on Carmel, and at Tireh, west of Nazareth. It is curious to find the representation of various animals in relief on the lintels of these buildings. Hebrew inscriptions also occur, and the carved work of the cornices and capitals is rich though debased. In the 1 2th century Galilee was the outpost of the Christian kingdom of Jerusalem, and its borders were strongly protected by fortresses, the magnificent remains of which still crown the most important strategical points. Toron (mod. Tibnln) was built in 1 104, the first fortress erected by the crusaders, and standing on the summit of the mountains of Upper Galilee. Beauvoir (Kaukab el-Hawa, built in 1182) stood on a precipice above Jordan south-west of the Sea of Galilee, and guarded the advance by. the valley of Jezreel; and about the same time Chateau Neuf (Hunin) was erected above the Huleh lake. Belfort (esh Shukif), on the north bank of the Leontes, the finest and most important, dates somewhat earlier; and Montfort (Kalat el Kurn) stood on a narrow spur north-east of Acre, completing the chain of frontier fortresses. The town of Banias, with its castle, formed also a strong outpost against Damascus, and was the scene, in common with the other strongholds, of many desperate encounters between Moslems and Christians. Lower Galilee was the last remaining portion of the Holy Land held by the Chris- tians. In 1 2 50 the knights of the Teutonic order owned lands ex- tending round Acre as far east as the Sea of Galilee, and including Safed. These possessions were lost in 1291, on the fall of Acre. The population of Galilee is mixed. In Lower Galilee the peasants are principally Moslem, with a sprinkling of Greek Ch ristians round Nazareth, which is a Christian town . In Upper Galilee, however, there is a mixture of Jews and Maronites, Druses and Moslems (natives or Algerine settlers), while the slopes above the Jordan are inhabited by wandering Arabs. The Jews are engaged in trade, and the Christians, Druses and Mos- lems in agriculture; and the Arabs are an entirely pastoral people. (C. R. C; R. A. S. M.)

GALILEE, an architectural term sometimes given to a porch or chapel which formed the entrance to a church. This is the case at Durham and Ely cathedrals, and in Lincoln cathedral the name is sometimes given to the south-west porch. The name is said to be derived from the scriptural expression " Galilee of the Gentiles " (Matt. iv. 15). Galilees are supposed to have been used sometimes as courts of law, but they probably served chiefly for penitents not yet admitted to the body of the church. The Galilee would also appear to have been the vestibule of an abbey church where women were allowed to see the

monks to whom they were related, or from which they could hear divine service. The foundation of what is considered to have been a Galilee exists at the west end of Fountains Abbey. Sometimes also corpses were placed there before interment.

GALILEE, SEA OF, a lake in Palestine consisting of an expansion of the Jordan, on the latitude of Mt. Carmel. It is 13 m. long, 8 m. broad, 64 sq. m. in area, 680 ft. below the level of the Mediterranean, and, according to Merrill and Barrois (who have corrected the excessive depth said to have been found by Lortet at the northern end), 150 ft. in maximum depth. It is pear-shaped, the narrow end pointing southward. ' In the Hebrew Scriptures it is called the Sea of Chinnereth or Chinneroth (prob- ably derived from a town of the same name mentioned in Joshua xi. 2 and elsewhere; the etymology that connects it with lias, " a harp," is very doubtful.) In Josephus and the book of

Maccabees it is named Gennesar; while in the Gospels it is usually called Sea of Galilee, though once it is called Lake of Gennesaret (Luke v. 1) and twice Sea of Tiberias (John vi. 1, xxi. 1). The modern Arabic name is Bahr Tubariya, which is often rendered " Lake of Tiberias." Pliny refers to it as the Lake of Taricheae.

Like the Dead Sea it is a " rift " lake, being part of the great fault that formed the Jordan-Araba depression. Deposits show that originally it formed part of the great inland sea that filled this depression in Pleistocene times. The district on each side of the lake has a number of hot springs, at least one of which is beneath the sea itself, and has always shown indications of volcanic and other subterranean disturbances. It is especially liable to earthquakes. The water of the sea, though slightly brackish and not very clear, is generally used for drinking. The shores are for the greater part formed of fine gravel; some yards from the shore the bed is uniformly covered with fine greyish mud. The temperature in summer is tropical, but after noon falls about io° F. owing to strong north-west winds. This range of temperature affects the water to a depth of about 40 ft.; below that depth the water is uniformly about 50° F. The sea is set deep in hills which rise on the east side to a height of about 2000 ft. Sudden and violent storms (such as are described in Matt. viii. 23, xiv. 22, and the parallel passages) are often pro- duced by the changes of temperature in the air resulting from these

great differences of level.

The Sea of Galilee is best seen from the top of the western precipices. It presents a desolate appearance. On the north the hills rise gradually from the shore, which is fringed with oleander bushes and indented with small bays. The ground is here covered with black basalt. On the west the plateau known as Sahel el-Ahma terminates in precipices 1 700 ft. above the lake, and over these the black rocky tops called " the Horns of Hattin " are conspicuous objects. On the south is a broad valley through which the Jordan flows. On the east are furrowed and rugged slopes, rising to the great plateau of the Jaulan (Gaulonitis). The Jordan enters the lake through a narrow gorge between lower hills. A marshy plain, 2} in. long and 1ˆ broad, called el-Batihah, exists immediately east of the Jordan inlet. There is also on the west side of the lake a small ilain called el-Ghuweir, formed by the junction of three large valleys, t measures 3Jt m. along the shore, and is 1 m. wide. This plain, naturally fertile, but now almost uncultivated, is supposed to be the plain of Gennesareth, described by Josephus (B. J. Hi. 10, 8). On the east the hills approach in one place within 40 ft. of the water, but there is generally a width of about J of a mile from the hills to the beach. On the west the flat ground at the foot of the hills has an average width of about 200 yds. A few scattered palms dot the western shores, and a palm grove is to be found near Kefr Harib on the south-east. The hot baths south of Tiberias include seven springs, the largest of which has a temperature of 137° F. In these springs a distinct rise in temperature was observed in 1837, when Tiberias and Safed were destroyed by an earthquake. The plain of Gennesareth, with its environs, is the best-watered part of the lake- basin. North of this plain are the five springs of et-Tabighah, the largest of which was enclosed about a century ago in an octagonal reservoir by 'AH, son of Dhahr el-Amir, and the water led off by an aqueduct 52 ft. above the lake. The Tabighah springs, though abundant, are warm and brackish. At the north end of the plain is 'Ain et-Tineh (" spring of the fig-tree "), also a brackish spring with a good stream; south of the plain is 'Ain el-Bardeh (" the cold spring "), which is sweet, but scarcely lower in temperature than the others. One of the most important springs is 'Ain el-Madaw- wera (" the round spring "), situated I m. from the south end of the plain and half a mile from the shore. The water rises in a circular well 32 ft. in diameter, and is clear and sweet, with a temperature of 73 ° F. The bottom is of loose sand, and the fish called coracinus by Josephus (B.J. iii. 10, 8) is here found (see below). Dr Tristram was the first explorer to identify this fish, and on account of its presence suggested the identification

of the " round spring " with the fountain of Capharnaum, which, according to Josephus, watered the plain of Gennesareth. There is, however, a difficulty in this identification; there are no ruins at 'Ain el-Madawwera.

Fauna and Flora. — For half the year the hillsides are bare and steppe-like, but in spring are clothed with a subtropical vegetation. Oleanders flourish round the lake, and the large papyrus grows at 'Ain et-Tin as well as at the mouth of the Jordan. The lake swarms with fish, which are caught with nets by a gild of fishermen, whose boats are the only representatives of the many ships and boats which plied on the lake as late as the 10th century. Fishing was a lucrative industry at an early date, and the Jews ascribed the laws regulating it to Joshua. The fish, which were classed as clean and unclean, the good and bad of the parable (Matt. xiii. 47, 48), belong to the genera Chromis, Barius, Capoeta, Discognathus, Nemachilus,

i

Blennius and Clarias; and there is a great affinity between them and the fish of the East African lakes and streams. There are eight species of Chromis, most of which hatch their eggs and raise their young in the buccal cavities of the males. The Chromis simonis is popularly supposed to be the fish from which Peter took the piece of money (Matt. xvii. 27). Clarias macracanthus (Arab. Burbur) is the coracinus of Josephus. It was found by Lortet in the springs of 'Ain el-Madawwera, 'Ain et-TInehand "Ainet-Tabighah,onthelake shore where muddy, and in Lake Huleh. It is a scaleless, snake-like fish, often nearly 5 ft. long, which resembles the C. anguillaris of Egypt. From the absence of scales it was held by the Jews to be unclean, and some commentators suppose it to be the serpent of Matt. vii. 10 and Luke xi. 11. Large numbers of grebes — great crested, eared, and little,— gulls and pelicans frequent the Take. On its shores are tortoises, mud-turtles, crayfish and innumerable sand-hoppers; and at varying depths in the lake several species of Melania, Melanopsis, Neritina, Corbicula and Unio have been found.

Antiquities. — The principal sites of interest round the lake may be enumerated from north to west and from south to east. Kerazeh, the undoubted site of Chorazin, stands on a rocky spur goo ft. above the lake, 2 m. north of the shore. Foundations and scattered stones cover the slopes and the flat valley below. On the west is a rugged gorge. In the middle of the ruins are the scattered remains of a synagogue of richly ornamental style built of black basalt. A small spring occurs on the north. Tell Hum (as the name is generally spelt, though

Tathum would probably be preferable for several reasons) is an important ruin on the shore, south of the last-mentioned site. The remains consist of founda- tions and piles of stones (in spring concealed by gigantic thistles) extending about half a mile along the shore. The foundations of a fine synagogue, measuring 75 ft. by 57, and built in white limestone, have been excavated. A conspicuous building has been erected close to the water, from the fragments of the Tell Hum synagogue. Since the 4th century Tell Hum has been pointed out by all the Christian writers of importance as the site of Capernaum. Some modern geographers question this identification, but without sufficient reason (see Capernaum). Minyeh is a ruined site at the north end of the plain of Gen- nesareth, 25 m. from the last, and close to the shore. There are extensive ruins on flat ground, consisting of mounds and foundations. Masonry of well-dressed stones has also been here discovered in course of excavation. Near the ruins are remains of an old khan, which appears to have been built in the middle ages. This is another suggested identification for Capernaum; but all the remains belong to the Arab period. Between Tell IJum and Minyeh is Tell 'Oreimeh, the site of a forgotten Amorite city.

South of the supposed plain of Gennesareth is Mejdel, commonly supposed to represent the New Testament town of Magdala. A few lotus trees and some rock-cut tombs are here found beside a miserable mud hamlet on the hill slope, with a modern tomb- house (kubbeh). Passing beneath rugged cliffs a recess in the hills is next reached, where stands Tubariya, the ancient Tiberias or Rakkath, containing 3000 inhabitants, more than half of whom are Jews. The walls, flanked with round towers, but partly destroyed by the earthquake of 1837, were built by Dhahr el-Amir, as was the court-house. The two mosques, now partly ruinous, were erected by his sons. There are remains of a Crusaders' church, and the tomb of the celebrated Maimonides is shown in the town, while Rabbi Aqiba and Rabbi Meir lie buried outside. The ruins of the ancient city, including granite columns and traces of a sea-wall with towers, stretch southwards a mile beyond the modern town. An aqueduct in the cliff once brought water a distance of 9 m. from the south.

Kerak, at the south end of the lake, is an important site on a peninsula surrounded by the water of the lake, by the Jordan, and by a broad water ditch, while on the north-west a narrow neck of land remains. The plateau thus enclosed is partly artificial, and banked up 50 or 60 ft. above the water. A ruined citadel remains on the north-west, and on the east was a bridge over the Jordan; broken pottery and fragments of sculptured stone strew the site. The ruin of

Kerak answers to the descrip- tion given by Josephus of the city of Taricheae, which lay 30 stadia from Tiberias, the hot baths being between the two cities. Taricheae was situated, as is Kerak, on the shore below the cliffs, and partly surrounded by water, while before the city was a

plain (the Ghor) . Pliny further informs us that Taricheae was at the south end of the Sea of Galilee. Sinn en-Nabreh, a ruin on a spur of the hills close to the last-mentioned site, represents the ancient Sennabris, where Vespasian (Josephus, B.J. iii. 9, 7) fixed his camp, advancing from Scythopolis (Beisen) on Taricheae and Tiberias. Sennabris was 30 stadia from Tiberias, or about the distance of the ruin now existing.

The eastern shores of the Sea of Galilee have been less fully explored than the western, and the sites are not so perfectly recovered. The site of Hippos, one of the cities of Decapolis, is fixed by Clermont-Ganneau at Khurbet Susieh. Kalat el-Hosn (" castle of the stronghold ") is a ruin on a rocky spur opposite Tiberias. Two large ruined buildings remain, with traces of an old street and fallen columns and capitals. A strong wall once surrounded the town; a narrow neck of land exists on the east where the rock has been scarped. Rugged valleys enclose the site on the north and south; broken sarcophagi and rock-cut tombs are found beneath the ruin. This site is not identified; the suggestion that it is Gamala is doubtful, and not borne out by Josephus {War, iv. 1, 1), who says Gamala was over against Taricheae. Kersa, an insignificant ruin north of the last, is thought to represent the Gerasa or Gergesa of the 4th century, situated east of the lake; and the projecting spur of hill south of this ruin is conjectured to be the place where the swine " ran violently down a steep place" (Matt. viii. 32).

(C. R. C; C. W. W.; R. A. S. M.) GALILEO GALILEI (1564-1642), Italian astronomer and experimental philosopher, was born at Pisa on the 15th of February 1564. His father, Vincenzio, was an impoverished descendant of a noble Florentine house, which had exchanged the surname of Bonajuti for that of Galilei, on the election, in 1343, of one of its members, Tommaso de' Bonajuti, to the college of the twelve Buonupmini. The family, which was nineteen times represented in the signoria, and in 1445 gave a gonfalonier to Florence, flourished with the republic and declined

with its fall. Vincenzio Galilei was a man of better parts than fortune. He was a competent mathematician, wrote with considerable ability on the theory and practice of music, and was especially distinguished amongst his contemporaries for the grace and skill of his perform- ance upon the lute. By his wife, Giulia Ammannati of Pescia, he had three sons and four daughters.

From his earliest childhood Galileo, the eldest of the family, was remarkable for intellectual aptitude as well as for mechanical invention. His favourite pastime was the construction of original and ingenious toy-machines; but his application to literary studies was equally conspicuous. In the monastery of Vallom- brosa, near Florence, where his education was principally con- ducted, he not only made himself acquainted with the best Latin authors, but acquired a fair command of the Greek tongue, thus laying the foundation of his brilliant and elegant style. From one of the monks he also received instruction in logic; but the subtleties of the scholastic science were thoroughly distasteful to him. A document published by F. Selmi in 1864 proves that he was at this time so far attracted towards a religious life as to have joined the novitiate ; but his father, who had other designs for him, seized the opportunity of an attack of ophthalmia to withdraw him permanently from the care of the monks. Having had personal experience of the unremunerative character both of music and of mathematics, he desired that his son should apply himself to the cultivation of medicine, and, not without some straining of his slender resources, placed him, before he had completed his eighteenth year, at the university of Pisa. He accordingly matriculated there on the 5th of November 1581, and immediately entered upon attendance at the lectures of the, celebrated physician and botanist, Andrea Cesalpino.

The natural gifts of the young student seemed at this time equally ready to develop in any direction towards which choice or hazard might incline them. In musical skill and invention he already vied with the best professors of the art in Italy; his personal taste would have led him to choose painting as his profession, and one of the most eminent artists of his day, Lodovico Cigoli, owned that to his judgment and counsel he was

mainly indebted for the success of his works. In 1581, while watching a lamp set swinging in the cathedral of Pisa, he observed that, whatever the range of its oscillations, they were invariably executed in equal times. The experimental verification of this fact led him to the important discovery of the isochronism of the pendulum. He at first applied the new principle to pulse- measurement, and

more than fifty years later turned it to account in the construction of an astronomical clock. Up to this time he was entirely ignorant of mathematics, his father having carefully held him aloof from a study which he rightly apprehended would lead to his total alienation from that of medicine; Accident, however, frustrated this purpose. A lesson in geometry, given by Ostilio Ricci to the pages of the grand-ducal court, chanced, tradition avers, to have Galileo for an unseen listener; his attention was riveted, his dormant genius was roused, and he threw all his energies into the new pursuit thus unexpectedly presented to him. With Ricci's assistance, he rapidly mastered the elements of the science, and eventually extorted his father's reluctant permission to exchange Hippocrates and Galen for Euclid and Archimedes. In 1585 he was withdrawn from the university, through lack of means, before he had taken a degree, and returned to Florence, where his family habitually resided. We next hear of him as lecturing before the Florentine Academy on the site and dimensions of Dante's Inferno; and he shortly afterwards published an essay descriptive of his invention of the hydrostatic balance, which rapidly made his name known throughout Italy. His first patron was the Marchese Guidubaldo del Monte of Pesaro, a man equally eminent in science, and influential through family connexions. At the Marchese's request he wrote, in 1388, a treatise on the centre of gravity in solids, which obtained for him, together with the title of " the Archimedes of his time," the honourable though not lucrative post of mathematical lecturer at the Pisan university. During the ensuing two years (1589-1591) he carried on that remarkable series of experiments by which he established the first principles of dynamics and earned the undying hostility of bigoted Aristo- telians. From the leaning tower of Pisa he afforded to all the professors and students of the university ocular demonstration of the falsehood of the Peripatetic dictum that heavy bodies fall with velocities proportional to their weights, and with unanswer- able logic demolished all the time-honoured maxims of the schools regarding the motion of projectiles, and elemental weight or levity. But while he convinced, he failed to conciliate his adversaries. The keen sarcasm of his polished rhetoric was not calculated to soothe the susceptibilities of men already smarting under the deprivation of their most cherished illusions. He seems, in addition, to have compromised his position with the grand- ducal family by the imprudent candour with which he condemned a machine for clearing the port of Leghorn, invented by Giovanni de' Medici, an illegitimate son of Cosmo I. Princely favour being withdrawn, private rancour was free to show itself. He was publicly hissed at his lecture, and found it prudent to resign his professorship and withdraw to Florence

in 1591. Through the death of his father in July of that year family cares and responsibilities devolved upon him, and thus his nomination to the chair of mathematics at the university of Padua, secured by the influence of the Marchese Guidubaldo with the Venetian senate, was welcome both as affording a relief from pecuniary embarrassment and as opening a field for scientific distinction.

His residence at Padua, which extended over a period of eighteen years, from 1592 to 1610, was a course of uninterrupted prosperity. His appointment was three times renewed, on each occasion with the expressions of the highest esteem on the part of the governing body, and his yearly salary was progressively raised from 180 to 1000 florins. His lectures were attended by persons of the highest distinction from all parts of Europe, and such was the charm of his demonstrations that a hall capable of containing 2000 people had eventually to be assigned for the accommodation of the overflowing audiences which they attracted. His invention of the proportional compass or sector— an implement still used in geometrical drawing — dates from 1597; and about the sam? time he constructed the first thermometer, consisting of a bulb

and tube filled with air and water, and terminating in a vessel of water. In this instrument the results of varying atmospheric pressure were not distinguishable from the expansive and con- tractive effects of heat and cold, and it became an efficient measure of temperature only when Rinieri, in 1646, introduced the improvement of hermetically sealing the liquid in glass. The substitution, in 1670, of mercury for water completed the modern thermometer.

Galileo seems, at an early period of his life, to have adopted the Copernican theory of the solar system, and was deterred from avowing his opinions— as is proved by his letter to Kepler of August 4, 1597 — by the fear of ridicule rather than of persecu- tion. The appearance, in September 1604, of a new star in the constellation Serpentarius afforded him indeed an opportunity, of which he eagerly availed himself, for making an onslaught upon the Aristotelian axiom of the incorruptibility of the heavens; but he continued to conform his public teachings in the main to Ptolemaic principles, until the discovery of a novel and potent implement of research in the shape of the telescope (q.v.) placed at his command

startling and hitherto unsuspected evidence as to the constitution and mutual relations of the heavenly bodies. Galileo was not the original inventor of the telescope. 1 That honour must be assigned to Johannes Lippershey, an obscure optician of Middleburg, who, on the 2nd of October 1608, petitioned the states-general of the Low Countries for exclusive rights in the manufacture of an instrument for increasing the apparent size of remote objects. A rumour of the new invention, which reached Venice in June 1609, sufficed to set Galileo on the track; and after one night's profound meditation on the principles of refraction, he succeeded in producing a telescope of threefold magnifying power. Upon this first attempt he rapidly improved, until he attained to a power of thirty-two, and his instruments, of which he manufactured hundreds with his own hands, were soon in request in every part of Europe. Two lenses only — a plano- convex and a plano-concave — were needed for the composition of each, and this simple principle is that still employed in the con- struction of opera-glasses. Galileo's direction of his new instru- ment to the heavens formed an era in the history of astronomy. Discoveries followed upon it with astounding rapidity and in bewildering variety. The Sidereus Nuncius, published at Venice early in 1610, contained the first-fruits of the new mode of investigation, which were sufficient to excite learned amazement on both sides of the Alps. The mountainous configuration of the moon's surface was there first described, and the so-called " phosphorescence " of the dark portion of our satellite attributed to its true cause — namely, illumination by sunlight reflected from the earth. 2 All the time-worn fables and conjectures regarding the composition of the Milky Way were at once dis- sipated by the simple statement that to the eye, reinforced by the telescope, it appeared as a congeries of lesser stars, while the great nebulae were equally declared to be resolvable into similar elements. But the discovery which was at once perceived to be most important in itself, and most revolutionary in its effects, was that of Jupiter's satellites, first seen by Galileo on the 7th of January 1610, and by him named Sidera Medicea, in honour of the grand-duke of Tuscany, Cosmo II., who had been his pupil, and was about to become his employer. An illustration is, with the general run of mankind, more powerful to convince than an argument; and the cogency of the visible plea for the Coper- nican theory offered by the miniature system, then first disclosed to view, was recognizable in the triumph of its advocates as well as in the increased acrimony of its opponents.

In September 16 10 Galileo finally abandoned Padua for Florence. His researches with the telescope had been rewarded

1 The word telescope, from rrfKt, far, cKortiv, to view, was invented by Demiscianus, an eminent Greek scholar, at the request of Prince Cesi, president of the Lyncean Academy. It was used by Galileo as early as 1612, but was not introduced into England until much later. In 1655 the word telescope was inserted and explained in Bagwell's Mysteries of Astronomy, trunk or cylinder being the terms until then ordinarily employed.

2 Leonardo da Vinci, more than a hundred years earlier, had come to the same conclusion.

by the Venetian senate with the appointment for life to his professorship, at an unprecedentedly high salary. His discovery of the " Medicean Stars " was acknowledged by his nomination (July 12, 1610) as philosopher and mathematician extraordinary to the grand-duke of Tuscany. The emoluments of this office, which involved no duties save that of continuing his scientific labours, were fixed at 1000 scudi; and it was the desire of increased leisure, rather than the promptings of local patriotism, which induced him to accept an offer the original suggestion of which had indeed come from himself. Before the close of 1610 the memorable cycle of discoveries begun in the previous year was completed by the observation of the ansated or, as it appeared to Galileo, triple form of Saturn (the ring-formation was first recognized by Christiaan Huygens in 1655), of the phases of Venus, and of the spots upon the sun. As regards sun-spots, however, Johann Fabricius of Osteel in Friesland can claim priority of publication, if not of actual detection. In the spring of 161 1 Galileo visited Rome, and exhibited in the gardens of the Quirinal Palace the telescopic wonders of the heavens to the most eminent personages at the pontifical court. Encouraged by the flattering reception accorded to him, he ventured, in his Letters on the Solar Spots, printed at Rome in 1613, to take up a more decided position towards that doctrine on the establishment of which, as he avowed in a letter to Belisario Vinta, secretary to the grand-duke, " all his life and being henceforward depended." Even in the time of Copernicus some well-meaning persons, especially those of the reformed persuasion, had suspected a discrepancy between the new view of the solar system and certain passages of Scripture — a suspicion strengthened by the anti- Christian inferences drawn from it by Giordano Brunc; but the question was never formally debated until Galileo's brilliant disclosures, enhanced by his formidable dialectic and enthusiastic zeal, irresistibly challenged for it the attention of the authorities. Although he had no desire to raise the theological issue, it must be admitted that, the discussion once set on foot, he threw himself into it with characteristic impetuosity, and thus helped

to precipitate a decision which it was his interest to avert. In December 1613 a Benedictine monk named Benedetto Castelli, at that time professor of mathematics at the university of Pisa, wrote to inform Galileo of a recent discussion at the grand- ducal table, in which he had been called upon to defend the Copernican doctrine against theological objections. This task Castelli, who was a steady friend and disciple of the Tuscan astronomer, seems to have discharged with moderation and success. Galileo's answer, written, as he said himself, currenle calamo, was an exposition of a formal theory as to the relations of physical science to Holy Writ, still further developed in an elaborate apology addressed by him in the following year (1614) to Christina of Lorraine, dowager grand-duchess of Tuscany. Not satisfied with explaining adverse texts, he met his opponents with unwise audacity on their own ground, and endeavoured to produce scriptural confirmation of a system which seemed to the ignorant many an incredible paradox, and to the scientific few a beautiful but daring innovation. The rising agitation on the subject, fomented for their own purposes by the rabid Aristotelians of the schools, was heightened rather than allayed by these manifestoes, and on the fourth Sunday of the following Advent found a voice in the pulpit of Santa Maria Novella. Padre Caccini's denunciation of the new astronomy was indeed disavowed and strongly condemned by his superiors; nevertheless, on the 5th of February 1615, another Dominican monk named Lorini laid Galileo's letter to Castelli before the Inquisition.

Cardinal Robert Bellarmin was at that time by far the most influential member of the Sacred College. He was a man of vast learning and upright piety, but, although personally friendly to Galileo, there is no doubt that he saw in his scientific teachings a danger to religion. The year 161 5 seems to have been a period of suspense. Galileo received, as the result of a conference between Cardinals Bellarmin and Del Monte, a semi-official warning to , avoid theology, and limit himself to physical reasoning. " Write freely," he was told by Monsignor Dini, " but keep outside the

sacristy." Unfortunately, he had already committed himself to dangerous ground. In December he repaired personally to Rome, full of confidence that the weight of his arguments and the vivacity of his eloquence could not fail to convert the entire pontifical court to his views. He was cordially received, and eagerly listened to, but his imprudent ardour served but to injure his cause. On the 24th of February 1616 the consulting theologians of the Holy Office characterized the two propositions— that the sun is immovable in the centre of the world, and that the earth has a diurnal motion of rotation — the first as " absurd in philosophy, and formally heretical, because expressly contrary to Holy Scripture," and the second as " open to the same censure in philosophy, and at least erroneous as to faith." Two days later Galileo was, by command of the pope (Paul V.), summoned to the palace of Cardinal Bellarmin, and there officially ad- monished not thenceforward to " hold, teach or defend " the condemned doctrine. This injunction he promised to obey. On the 5th of March the Congregation of the Index issued a decree reiterating, with the omission of the word " heretical," the censure of the theologians, suspending, usque corrigatur, the great work of Copernicus, De revolutionibus orbium coelestium, and absolutely prohibiting a treatise by a Carmelite monk named Foscarini, which treated the same subject from a theological point of view. At the same time it was given to be understood that the new theory of the solar system might be held ex hypolhesi, and the trivial verbal alterations introduced into the Polish astonomer's book in 1620, when the work of revision was completed by Cardinal Gaetani, confirmed this interpretation. This edict, it is essential to observe, the responsibility for which rests with a disciplinary congregation in no sense representing the church, was never confirmed by the pope, and was virtually repealed in 1757 under Benedict XIV.

Galileo returned to Florence three months later, not ill-pleased, as his letters testify, with the result of his visit to Rome. He brought with him, for the refutation of calumnious reports circulated by his enemies, a written certificate from Cardinal Bellarmin, to the effect that no abjuration had been required of or penance imposed upon him. During a prolonged audience he had received from the pope assurances of private esteem and personal protection; and he trusted to his dialectical ingenuity to find the means of presenting his scientific convictions under the trans- parent veil of an hypothesis.

Although a sincere Catholic, he seems to have laid but little stress on the secret admonition of the Holy Office, which his sanguine temperament encouraged him gradually to dismiss from his mind. He preserved no written memorandum of its terms, and it was represented to him, accord- ing to his own deposition in 1633, solely by Cardinal Bellarmin's certificate, in which, for obvious reasons, it was glossed over rather than expressly recorded. For seven years, nevertheless, during which he led a life of studious retirement in the Villa Segni at Bellosguardo, near Florence, he maintained an almost unbroken silence. At the end of that time he appeared in public with his Saggiatore, a polemical treatise written in reply to the Libra astronomica of Padre Grassi (under the pseudonym of Lotario Sarsi), the Jesuit astronomer of the Collegio Romano. The subject in debate was the nature of comets, the conspicuous appearance of three of which bodies in the year 16.18 furnished the occasion of the controversy. Galileo's views, although erroneous, since he held comets to be mere atmospheric emana- tions reflecting sunlight after the e'vanescent fashion of a halo or a rainbow, were expressed with such triumphant vigour, and embellished with such telling sarcasms, that his opponent did not venture upon a reply. The Saggiatore was printed at Rome in October 1623 by the Academy of the Lincei, of which Galileo was, a member, with a dedication to the new pope, Urban VIII., and notwithstanding some passages containing a covert defence of Copernican opinions, was received with acclamation by ecclesi- astical, no less than by scientific authorities.

Everything seemed now to promise a close of unbroken prosperity to Galileo's career. Maffeo Barberini, his warmest friend and admirer in the Sacred College, was, by the election of the 8th of August 1623, seated on the pontifical throne; and the

marked distinction with which he was received on his visit of congratulation to Rome in 1624 encouraged him to hope for the realization of his utmost wishes. He received every mark of private favour. The pope admitted him to six long audiences in the course of two months, wrote an enthusiastic letter to the grand-duke praising the great astronomer, not only for his distinguished learning, but also for his exemplary piety, and granted a pension to his son Vincenzio, which was afterwards transferred to himself, and paid, with some irregularities, to the end of his life. But on the subject of the decree of 1616, the revocation of which Galileo had hoped to obtain through his personal influence, he found him inexorable. Yet there seemed reason to expect that it would at least be interpreted.in a liberal spirit, and Galileo's friends encouraged his imprudent confidence by eagerly retailing to him every papal utterance which it

was possible to construe in a favourable sense. To Cardinal Hohen-zollern, Urban was reported to have said that the theory of the earth's motion had not been and could not be condemned as heretical, but only as rash; and in 1630 the brilliant Dominican monk Tommaso Campanella wrote to Galileo that the pope had expressed to him in conversation his disapproval of the prohi- bitory decree. Thus, in the full anticipation of added renown, and without any misgiving as to ulterior consequences, Galileo set himself, on his return to Florence, to complete his famous but ill-starred work, the Dialogo dei due massimi sistemi del mondo. Finished in 1630, it was not until January 1632 that it emerged from the presses of Landini at Florence. The book was originally intended to appear in Rome, but unexpected obstacles interposed. The Lincean Academy collapsed with the death of Prince Federigo Cesi, its founder and president; an outbreak of plague impeded communication between the various Italian cities; and the imprimatur was finally extorted, rather than accorded, under the pressure of private friendship and powerful interest. A tumult of applause from every part of Europe followed its publication; and it would be difficult to find in any language a book in which animation and elegance of style are so happily combined with strength and clearness of scientific exposition. Three interlocutors, named respectively Salviati, Sagredo, and Simplicio, take part in the four dialogues of which the work is composed. The first-named expounds the views of the author; the second is an eager and intelligent listener; the third represents a well-meaning but obtuse Peripatetic, whom the others treat at times with undisguised contempt. Salviati and Sagredo took their names from two of Galileo's early friends, the former a learned Florentine, the latter a distinguished Venetian gentleman; Simplicio ostensibly derived his from the Cilician commentator of Aristotle, but the choice was doubtless instigated by a sarcastic regard to the double meaning of the word. There were not wanting those who insinuated that Galileo intended to depict the pope himself in the guise of the simpleton of the party; and the charge, though preposterous in itself, was supported by certain imprudences of expression, which Urban was not per- mitted to ignore.

It was at once evident that the whole tenor of this remarkable work was in flagrant contradiction with the edict passed sixteen years before its publication, as well as with the author's personal pledge of conformity to it. The ironical submission with which it opened, and the assumed indetermination with which it closed, were hardly intended to mask the vigorous assertion of Coper- nican principles which formed its substance. It is a singular circumstance, however,

that the argument upon which Galileo mainly relied as furnishing a physical demonstration of the truth of the new theory rested on a misconception. The ebb and flow of the tides were, he asserted, a visible proof of the terrestrial double movement, since they resulted from inequalities in the absolute velocities through space of the various parts of the earth's surface, due to its rotation. To this notion, which took its rise in a confusion of thought, he attached capital importance, and he treated with scorn Kepler's suggestion that a certain occult attraction of the moon was in some way concerned in the phenomenon. The theological censures which the book did not fail to incur were not slow in making themselves felt. Towards

the end of August the sale was prohibited; on the 1st of October the author was cited to Rome by the Inquisition. He pleaded his age, now close upon seventy years, his infirm health, and the obstacles to travel caused by quarantine regulations; but the pope was sternly indignant at what he held to be his ingratitude and insubordination, and no excuse was admitted. At length, on the 13th of February 1633, he arrived at the residence of Niccolini, the Tuscan ambassador to the pontifical court, and there abode in retirement for two months. From the 12th to the 30th of April he was detained in the palace of the Inquisition, where he occupied the best apartments and was treated with unexampled indulgence. On the 30th he was restored to the hospitality of Niccolini, his warm partisan. The accusation against him was that he had written in contravention of the decree of 1616, and in defiance of the command of the Holy Office communicated to him by Cardinal Bellarmin; and his defence consisted mainly in a disavowal of his opinions, and an appeal to his good intentions. On the 21st of June he was finally examined under menace of torture; but he continued to maintain his assertion that after its condemnation by the Congregation of the Index, he had never held the Copernican theory. Since the publication of the documents relating to this memorable trial, there can no longer be any doubt, not only that the threat of torture was not carried into execution, but that it was never intended that it should be. On the 22nd of June, in the church of Santa Maria sopra Minerva, Galileo read his recantation, and received his sentence. He was condemned, as " vehemently suspected of heresy," to incarceration at the pleasure of the tribunal, and by way of penance was enjoined to recite once a week for three years the seven penitential psalms. This

sentence was signed by seven cardinals, but did not receive the customary papal ratification. The legend according to which Galileo, rising from his knees after repeating the formula of abjuration, stamped on the ground, and exclaimed, " Eppur si muove!" is, as may readily be supposed, entirely apocryphal. Its earliest ascertained appearance is in the Abbe Irailh's Querelles UMraires (vol. iii. p. 40, 1761).

Galileo remained in the custody of the Inquisition from the 21st to the 24th of June, on which day he was relegated to the Villa Medici on the Trinita de' Monti. Thence, on the 6th of July, he was permitted to depart for Siena, where he spent several months in the house of the archbishop, Ascanio Piccolomini, one of his numerous and trusty friends. It was not until December that his earnest desire of returning to Florence was realized, and the remaining eight years of his life were spent in his villa at Arcetri called " II Giojello," in the strict seclusion which was the prescribed condition of his comparative freedom. Domestic afflictions combined with numerous and painful infirmities to embitter his old age. His sister-in-law and her whole family, who came to live with him on his return from Rome, perished shortly afterwards of the plague; and on the 2nd of April 1634 died, to the inexpressible grief of her father, his eldest and best- beloved daughter, a nun in the convent of San Matteo at Arcetri. Galileo was never married; but by a Venetian woman named Marina Gamba he had three children — a son who married and left descendants, and two daughters who took the veil at an early age. His prodigious mental activity continued undiminished to the last. In 1636 he completed his Dialoghi delle nuove scienze, in which he recapitulated the results of his early experiments and mature meditations on the principles of mechanics. This in many respects his most valuable work was printed by the Elzevirs at Leiden in 1638, and excited admiration equally uni- versal and more lasting than that accorded to his astronomical treatises. His last telescopic discovery — that of the moon's diurnal and month'y librations — was made in 1637, only a few months before his eyes were for ever closed in hopeless blindness. It was in this condition that Milton found him when he visited him at Arcetri in 1 638. But the fire of his genius was not even yet extinct. He continued his scientific correspondence with unbroken interest and undiminished logical acumen; he thought out the application of the pendulum to the regulation of clock- work, which Huygens successfully realized fifteen years later;

and he was engaged in dictating to his disciples, Viviani and Torricelli, his latest ideas on the theory of impact when he was seized

with the slow fever which in two months brought him to the grave. On the 8th of January 1642 he closed his long life of triumph and humiliation, which just spanned the interval between the death of Michelangelo and the birth of Isaac Newton. The direct services which Galileo rendered to astronomy are virtually summed up in his telescopic discoveries. To the theo- retical perfection of the science he contributed little or nothing. He pointed out indeed that the so-called " third motion," intro- duced by Copernicus to account for the constant parallelism of the earth's axis, was a superfluous complication. But he substi- tuted the equally unnecessary hypothesis of a magnetic attrac- tion, and failed to perceive that the phenomenon to be explained was, in relation to absolute space, not a movement but the absence of movement. The circumstance, however, which most seriously detracts from his scientific reputation is his neglect of the discoveries made during his lifetime by the greatest of his contemporaries. Kepler's first and second laws were published in 1600, and his third ten years later. By these momentous inductions the geometrical theory of the solar system was perfected, and a hitherto unimagined symmetry was perceived to regulate the mutual relations of its members. But by Galileo they were passed over in silence. In his Dialogo dei massimi sistemi, printed not less than thirteen years after the last of the three laws had been given to the world, the epicycles by which Copernicus, adhering to the ancient postulate of uniform circular motion, had endeavoured to reduce to theory the irregularities of the planetary movements, were neither expressly adopted nor expressly rejected; and the conclusion seems inevitable that this grave defection from the cause of progress was due to his perhaps unconscious reluctance to accept discoveries which he had not originated. His name is nevertheless justly associated with that vast extension of the bounds of the visible universe which has rendered modern astronomy the most sublime of sciences, and his telescopic observations are a standing monument to his sagacity and acumen.

With the sure instinct of genius, he seized the characteristic features of the phenomena presented to his attention, and his inferences, except when distorted by polemical exigencies, have been strikingly confirmed by modern investigations. Of his two capital errors, regarding respectively the theory of the tides and the nature of comets, the first was insidiously recommended to him by his passionate desire to find a physical confirmation of the earth's double motion; the second was adopted for the purpose of rebutting an anti-Copernican argumentfoundedonthe planetary analogies of those erratic subjects of the sun. Within two years of their first

discovery, he had constructed approximately accurate tables of the revolutions of Jupiter's satellites, and he proposed their frequent eclipses as a means of determining longitudes, not only on land, but at sea. This method, on which he laid great stress, and for the facilitation of which he invented a binocular glass, and devised some skilful mechanical contrivances, was offered by him in 1616 to the Spanish government, and afterwards to that of Tuscany, but in each case unsuccessfully; and the close of his life was occupied with prolonged but fruitless negotia- tions on the same subject with the states-general of Holland. The idea; though ingenious, has been found of little practical utility at sea.

A series of careful observations made him acquainted with the principal appearances revealed by modern instruments in the solar spots. He pointed out that they were limited to a certain defined zone on the sun's surface; he noted the faculae with which they are associated, the penumbra by which they are bordered, their slight proper motions and their rapid changes of form. He inferred from the regularity of their general movements the rotation of the sun on its axis in a period of little less than a month; , and he grounded on the varying nature of the paths seemingly traversed by them a plausible, though inconclusive, argument in favour of the earth's annual revolution. Twice in the year, he observed, they seem to travel across the solar disk in straight lines; at other times, in curves. These appearances he

referred with great acutenesstothe slight inclination of the sun's axis of rotation to the plane of the ecliptic. Thus, when the earth finds herself in the plane of the sun's equator, which occurs at two opposite points of her orbit, the spots, travelling in circles parallel with that plane, necessarily appear to describe right lines; but when the earth is above or below the equatorial level, the paths of the spots open out into curves turned downwards or upwards, according to the direction in which they are seen. But the explanation of this phenomenon is equally consistent with the geocentric as with the heliocentric theory of the solar system. The idea of a universal force of gravitation seems to have hovered on the borders of this great man's mind, without ever fully entering it. He perceived the analogy between the power which holds the moon in the neighbourhood of the earth, and compels Jupiter's satellites to circulate round their primary, and the attraction exercised by the earth on bodies at its

surface; 1 but he failed to conceive the combination of central force with tangential velocity, and was disposed to connect the revolutions of the planets with the axial rotation of the sun. This notion, it is plain, tended rather towards Descartes's theory of vortices than towards Newton's theory of gravitation. More valid instances of the anticipation of modern discoveries may be found in his prevision that a small annual parallax would eventually be found for some of the fixed stars, and that extra-Saturnian planets would at some future time be ascertained to exist, and in his conviction that light travels with a measurable, although, in relation to terrestrial distances, infinite velocity.

The invention of the microscope, attributed to Galileo by his first biographer, Vincenzio Viviani, does not in truth belong to him. Such an instrument was made as early as 1 590 by Zacharias Jansen of Middleburg; and although Galileo discovered, in 1610, a means of adapting his telescope to the examination of minute objects, he did not become acquainted with the compound microscope until 1624 when he saw one of Drebbel's instru- ments in Rome, and, with characteristic ingenuity, immedi- ately introduced some material improvements into its construction.

The most substantial, if not the most brilliant part of his work consisted undoubtedly in his contributions towards the establish- ment of mechanics as a science. Some valuable but isolated facts and theorems had been previously discovered and proved, but it was he who first clearly grasped the idea of force as a mechanical agent, and extended to the external world the conception of the invariability of the relation between cause and effect. From the time of Archimedes there had existed a science of equilibrium, but the science of motion began with Galileo. It is not too much to say that the final triumph of the Copernican system was due in larger measure to his labours in this department than to his direct arguments in its favour. The problem of the heavens is essentially a mechanical one; and without the mechanical conceptions of the dependence of motion upon force which Galileo familiarized to men's minds, that problem might have remained a sealed book even to the intelligence of Newton. The interdependence of motion and force was not indeed formulated into definite laws by Galileo, but his writings on dynamics are everywhere suggestive of those laws, and his solutions of dynamical problems involve their recognition. The extra- ordinary advances made by him in this branch of knowledge were owing to his happy method of applying mathematical analysis to physical problems. As a pure mathematician he was, it is true, surpassed in profundity by more than one among his pupils and

contemporaries; and in the wider imaginative grasp of abstract geometrical principles he cannot- be compared with Fermat, Descartes or Pascal, to say nothing of Newton or Leibnitz. Still, even in the region of pure mathematics, his

1 The passage is sufficiently remarkable to deserve quotation in the original: — " Le parti delta Terra harino tal propensione al centro di essa, che quando ella cangiasse luogo, le dette parti, benche lontane dal globo nel tempo delle mutazioni di esso, lo seguirebbero per tutto ; esempio di cio sia il seguito perpetuo delle Medicee, ancorche separate continuamente da Giove. L'istesso si deve dire della Luna, obbligata a seguir la Terra." — Dialogo dei massimi sistemi, Giornata terza, p. 351 of Albert's edition.

powerful and original mind left notable traces of its working. He studied the properties of the cycloid, and attempted the problem of its quadrature; and in the " infinitesimals," which he was one of the first to introduce into geometrical demonstrations, was contained the fruitful germ of the differential calculus. But the method which was peculiarly his, and which still forms the open road to discoveries in natural science, consisted in the combination of experiment with calculation — in the transforma- tion of the concrete into the abstract, and the assiduous com- parison of results. The first-fruits of the new system of investiga- tion was his determination of the laws of falling bodies. Conceiv- ing that the simplest principle is the most likely to be true, he assumed as a postulate that bodies falling freely towards the earth descend with a uniformly accelerated motion, and deduced thence that the velocities acquired are in the direct, and the spaces traversed in the duplicate ratio of the times, counted from the beginning of motion; finally, he proved, by observing the times of descent of bodies falling down inclined planes, that the postu- lated law was the true law. Even here, he was obliged to take for granted that the velocities acquired in descending from the same height along planes of every inclination are equal; and it was not until shortly before his death that he found the mathematical demonstration of this not very obvious principle.

The first law of motion — that which expresses the principle of inertia — is virtually contained in the idea of uniformly accelerated velocity. The recognition of the second — that of the independence of different motions — must be added to form the true theory of projectiles. This was due to Galileo. Up to his time it was universally held in the schools that the motion of a body should cease with the impulse communicated to it, but for the " reaction of the medium " helping it forward. Galileo showed, on the contrary, that the nature

of motion once impressed is to continue indefinitely in a uniform direction, and that the effect of the medium is a retarding, not an impelling one. Another commonly received axiom was that no body could be affected by more than one movement at one time, and it was thus supposed that a cannon ball, or other projectile, moves forward in a right line until its first impulse is exhausted, when it falls vertically to the ground. In the fourth of Galileo's dialogues on mechanics, he demonstrated that the path described by a projectile, being the result of the combination of a uniform transverse motion with a uniformly accelerated vertical motion, must, apart from the resistance of the air, be a parabola. The establishment of the principle of the composition of motions formed a conclusive answer to the most formidable of the arguments used against the rotation of the earth, and we find it accordingly triumphantly brought forward by Galileo in the second of his dialogues on the systems of the world. It was urged by anti-Copernicans that a body flung upward or cast downward would, if the earth were in motion, be left behind by the rapid translation of the point from which it started; Galileo proved on the contrary that the reception of a fresh impulse in no way interfered with the move- ment already impressed, and that the rotation of the earth was insensible, because shared equally by all bodies at its surface. His theory of the inclined plane, combined with his satisfactory definition of " momentum," led him towards the third law of motion. We find Newton's theorem, that " action and reaction are equal and opposite," stated with approximate precision in his treatise Della scienza meccanica, which contains the substance of lectures delivered during his professorship at Padua; and the same principle is involved in the axiom enunciated in the third of his mechanical dialogues, that " the propensity of a body to fall is equal to the least resistance which suffices to support it." The problems of percussion, however, received no definitive solution until after his death.

His services were as conspicuous in the statical as in the kinetical division of mechanics. He gave the first satisfactory demonstration of equilibrium on an inclined plane, reducing it to the level by a sound and ingenious train of reasoning; while, by establishing the theory of " virtual velocities," he laid down the fundamental principle which, in the opinion of Lagrange, con- tains the general expression of the laws of equilibrium. He

studied with attention the still obscure subject of molecular cohesion, and little has been added to what he ascertained on the question of transverse strains and the strength of beams, first brought by him within the scope of mechanical theory. In his Discorso intorno alle cose che stanno su I'acqua, published in 161 2 , he used the principle of virtual velocities to demonstrate the more important theorems of hydrostatics, deducing from it the equilibrium of fluid in a siphon, and proved against the Aristo- telians that the floating of solid bodies in a liquid depends not upon their form, but upon their specific gravities relative to such liquid.

In order to form an adequate estimate of the stride made by Galileo in natural philosophy, it would be necessary to enumerate the confused and erroneous opinions prevailing on all such subjects in his time. His best eulogium, it has been truly said, consists in the fallacies which he exposed. The scholastic distinctions between corruptible and incorruptible substances, between absolute gravity and absolute levity, between natural and violent motions, if they did not wholly disappear from scientific phraseology, ceased thenceforward to hold the place of honour in the controversies of the learned. Discarding these obscure and misleading notions, Galileo taught that gravity and levity are relative terms, and that all bodies are heavy, even those which, like the air, are invisible; that motion is the result of force, instantaneous or continuous; that weight is a continuous force, attracting towards the centre of the earth; that, in a vacuum, all bodies would fall with equal velocities; that the " inertia of matter " implies the continuance of motion, as well as the permanence of rest; and that the substance of the heavenly bodies is equally " corruptible " with that of the earth. These simple elementary ideas were eminently capable of development and investigation, and were not only true but the prelude to further truth; while those they superseded defied inquiry by their vagueness and obscurity. Galileo was a man born in due time. He was superior to his contemporaries, but not isolated amongst them. He represented and intensified a growing tendency of the age in which he lived. It was beginning to be suspected that from Aristotle an appeal lay to nature, and some were found who no longer treated the ipse dixit of the Stagirite as the final authority in matters of science. A vigorous but ineffectual warfare had already been waged, against the blind traditions of the schools by Ramus and Telesius, by Patricius and Campanella, and the revolution which Galileo completed had been prepared by his predecessors. Nevertheless, the task which he so effectually accomplished demanded the highest and rarest quality of genius. He struck out for himself the happy middle path between the

a priori and the empirical systems, and exemplified with brilliant success the method by which experimental science has wrested from nature so many of her secrets. His mind was eminently practical. He concerned himself above all with what fell within the range of exact inquiry, and left to others the larger but less fruitful speculations which can never be brought to the direct test of experiment. Thus, while far-reaching but hasty generalizations have had their day and been forgotten, his work has proved permanent, because he made sure of its foundations. His keen intuition of truth, his vigour and yet sobriety of argu- ment, his fertility of illustration and acuteness of sarcasm, made him irresistible to his antagonists; and the evanescent triumphs of scornful controversy have given place to the sedate applause of a long-lived posterity.

The first complete edition of Galileo's writings was published at Florence (1842-1856), in 16 8vo vols., under the supervision of Signor Eugenio Albert. Besides the works already enumerated, it contained the Sermones de motu gravium composed at Pisa between 1589 and 1591 ; his letters to his friends, with many of their replies, as well as several of the essays of his scientific opponents; his laudatory comments on the Orlando Furioso, and depreciatory notes on the Gerusalemme Liberata, some stanzas and sonnets of no great merit, together with the sketch of a comedy ; finally, a reprint of Viviani's Life, with valuable notes and corrections. The original documents from the archives of the Inquisition, relating to the events of 1616 and 1633, recovered from Paris in 1846 by the efforts of Count Rossi, and now in the Vatican Library, were to a limited extent made public by Monsignor Marino-Marini in 1850, and more unreservedly by M. Henri de 1'Epinois, in an essay entitled

Galilee, son prods, sa condemnation, published in 1867 in the Revue des questions historiques. He was followed by M. Karl von Gebler, who, in an able and exhaustive but somewhat prejudiced work, Galileo Galilei und die rbmische Curie (Stuttgart, 1876), sought to impeach the authenticity of a document of prime importance in the trial of 1633. He was victoriously answered by Signor Domenico Berti, in // Processo originate di Galileo Galilei (Rome, 1876), and by M. de l'Epinois, with Les pieces du prods de Galilee (Rome, Paris, 1877). The touching letters of Galileo's eldest daughter, Sister Maria Celeste, to her father were printed in 1864 by Professor Carlo Arduini, in a publication entitled La Primogenita di Galileo Galilei.

The issue of a " national edition " of the Works of Galileo, in 20 large volumes, was begun at Florence in 1890. It includes a mass of previously inedited correspondence and other documents, • collected

by the indefatigable director, Professor Antonio Favaro, among whose numerous publications on Galilean subjects may be mentioned: Galileo e lo studio di Padova (2 vols., 1883); Scampoli Galileani (12 series, 1886-1897); Nuovi Studii Galileani (1891); Galileo Galilei e Suor Maria Celeste (1891). See also Th. Henri Martin's Galilee, les droits de la science et la methode des sciences physiques (1868); Private Life of Galileo (by Mrs Olney, 1870); J. J. Fahie's Galileo; his Life and Work (1903) ; Galilee et Marius, by J. A. C. Oudemans and J. Bosscha (1903). The relations of Galileo to the Church are temperately and ably discussed by F, R. Wegg-Prosser in Galileo and his Judges (1889), and in two articles published in the American Catholic Quarterly for April and July I9°i- (A. M. C.)

GALION, a city of Crawford County, Ohio, U.S.A., about 75 m. S.W. of Cleveland. Pop. (1890) 6326; (1900) 7282 (703 foreign- born); (1910) 7214. It is served by the Cleveland, Cincinnati, Chicago & St Louis, and the Erie railways, and by an interurban electric railway. The city is about 1165 ft. above sea level, and has extensive railway shops (of the Erie railway) and manu- factories of brick and tile machinery, carriages and wagons, and grain and seed cleaners. The municipality owns and operates its electric-lighting plant. Galion was laid out as a town in 1831, was incorporated as a borough in 1840, and was chartered as a city in 1878.

GALL, FRANZ JOSEPH (1758-1828), anatomist, physiologist, and founder of phrenology (?.».), was born 'at Tiefenbrunn near Pforzheim, Baden, on the 9th of March 1758. After completing the usual literary course at Baden and Bruchsal, he began the study of medicine under J. Hermann (1 738-1800) at Strassburg, whence, attracted by the names of Gerhard van Swieten (1700- 1772) and Maximilian Stoll (1742-1788), he removed to Vienna in 1 781. Having received his diploma, he began to practise as a physician there in 1785; but his energies were mainly devoted to the scientific investigation of problems which had occupied his attention from boyhood. At a comparatively early period he formed the generalization that in the human subject at least a powerful memory is invariably associated with prominent eyes; and further observation enabled him, as he thought, also to define the external characteristics indicative of special talents for painting, music and the mechanical arts. Following out these researches, he gradually reached the strong conviction, not only that the talents and dispositions of men are dependent upon the functions of the brain, but also that they may be inferred with perfect exactitude and precision from the external appear- ances of the skull. Gall's first appearance as an author was made in 1791, when he published the

first two chapters of a (never completed) work entitled Philosophisch-medicinische Unlersuchungen iiber Natur u. Kunst im kranken u. gesunden Zustande des Menschen. The first public notice of his inquiries in cranioscopy, however, was in the form of a letter addressed to a friend, which appeared in C. M. Wieland's Deutscher Mercur in 1798; but two years previously he had begun to give private courses of phrenological lectures in Vienna, where his doctrines soon attracted general attention, and met with increasing success until, in 1802, they were interdicted by the government as being dangerous to religion. This step on the part of the authorities had the effect of greatly stimulating public curiosity and increasing Gall's celebrity.

In March 1805 he finally left Vienna in company with his friend and associate J. C. Spurzheim, and made a tour through Germany, in the course of which he lectured in Berlin, Dresden, Magdeburg and several of the university towns. His expositions, which he knew how to make popular and attractive, were much

resorted to by the public, and excited .considerable controversy in the scientific world. He had almost reached the zenith of his fame when, in 1807, he repaired to Paris and established himself there as a medical practitioner, at the same time continuing his activity as a lecturer and writer. In 1808 appeared his Introduc- tion au cours de physiologie du cerveau, which was followed in 1809 by the Recherches sur le systeme nerveux en gSneral, et sur celui du cerveau en particulier (originally laid before the Institute of France in March 1808), and in 1810 by the first instalment of the Anatomie et physiologie du systeme nerveux en g&ntral, et du cerveau en particulier, avec des observations sur la possibility de reconnaitre plusieurs dispositions intellectuelles et morales de I'homme et des animaux par la configuration de leurs tites. The Recherches and the first two volumes of the Anatomie bear the conjoint names of Gall and Spurzheim. The latter work was completed in 1819, and appeared in a second edition of six volumes in 1822-1825. In 1811 he replied to a charge of Spinozism or atheism, which had been strongly urged against him, by a treatise entitled Des dispositions innSes de Vdme et de I'esprit, which he afterwards incorporated with his greater work. In 1819 he became a naturalized French subject, but his efforts two years afterwards to obtain admission to the Academy of Sciences, although supported by E. Geoffroy Saint-

Hilaire, were unsuccessful. In 1823 he visited London with the intention of giving a series of phrenological lectures, but his reception was not what he had anticipated, and he speedily abandoned his plans. He continued to lecture and practise in Paris until the beginning of 1828, when he was disabled by an apoplectic seizure. His death took place at Montrouge near Paris, on the 22nd of August 1828.

GALL (a word common to many Teutonic languages, cf. Dutch gal, and Ger. Galle; the Indo-European root appears in Gr. x°M- an d Lat. fel; possibly connected with " yellow," with reference to the colour of bile), the secretion of the liver known as " bile," the term being also used of the pear-shaped diverticulum of the bile-duct, which forms a reservoir for the bile, more generally known as the " gall-bladder " (see Liver). From the extreme bitterness of the secretion, " gall," like the Lat. fel, is used for anything extremely bitter, whether actually or metaphorically. From the idea that the gall-bladder was the dominating organ of a bitter, sharp temperament, " gall " was formerly used in English for such a spirit, and also for one very-ready to resent injuries. It thus survives in American slang, with the meaning " impudence " or " assurance."

" Gall," meaning a sore or painful swelling, especially on a horse, may be the same word, derived from an early use of the word as meaning " poison." On the other hand, in Romanic languages, the Fr. galle, Sp. agalla, a wind-gall or puffy distension of the synovial bursa on the fetlock joint of a horse, is derived from the Lat. galla, oak-apple, from which comes the English " gall," meaning an excrescence on trees caused by certain insects. (See Galls.)

GALLABAT, or Galabat, called by the Abyssfnians Matemma (Metemma), a town of the Anglo-Egyptian Sudan, in 13° N. 36 12′ E. It is built, at the foot of a steep slope, on the left bank of a tributary of the Atbara called the Khor Abnaheir, which forms here the Sudan-Abyssinian frontier. Gallabat lies 90 m. W. by N. of Gondar, the capital of Amhara, and being on the main route from Sennar to Abyssinia, is a trade centre of some import- ance. Pop. about 3000. The majority of the buildings are grass tukls. Slaves, beeswax, coffee, cotton and hides were formerly the chief articles of commerce. The slave market was closed about 1874. Being on the frontier line, the possession of the town was for long a matter of dispute between the Sudanese, and later the Egyptians, on the one hand and the Abyssinians on the other: About 1870 the Egyptians garrisoned the town, which in 1886 was attacked by the dervishes and sacked. From Gallabat a dervish raiding party penetrated to

Gondar, which they looted. In revenge an Abyssinian army under King John attacked the dervishes close to Gallabat in March 1889. The dervishes suffered very severely, but King John being killed by a stray bullet, the Abyssinians retired (see Egypt: Military Operations,

1885-1896). In December 1898 an Anglo-Egyptian force entered Gallabat. The Abyssinians then held the fort, but as the result of frontier arrangement the town was definitely included in the Sudan, though Abyssinia takes half the customs revenue. Since 1899 the trade of the place has revived, coffee and live stock being the most important items.

The town and district form a small ethnographical island, having been peopled in the 18th century by a colony of Takruri from Darfur, who, finding the spot a convenient resting-place for their fellow-pilgrims on their way to Mecca and back, obtained permission from the negus of Abyssinia to make a permanent settlement. They are an industrious agricultural race, and cultivate cotton with considerable success. They also collect honey in large quantities. The Takruri possess jagged throwing knives, which are said to have been brought from their original home in the Upper Congo regions.

GALLAIT, LOUIS (1810-1887), Belgian painter, was born at Tournay, in Hainaut, Belgium, on the 9th of May 1810. He first studied in his native town under Hennequin. In 1832 his first picture, " Tribute to Caesar," won a prize at the exhibition at Ghent. He then went to Antwerp to prosecute his studies under Mathieu Ignace Van Biee, and in the following year exhibited at the Brussels Salon " Christ Healing the Blind." This picture was purchased by subscription and placed in the cathedral at Tournay. Gallait next went to Paris, whence he sent to the Belgian Salons "job on the Dunghill," "Montaigne Visiting Tasso in Prison"; and, in 1841, " The Abdication of Charles V.," in the Brussels Gallery. This was hailed as a triumph, and gained for the painter a European reputation. Official invitations then caused him to settle at Brussels, where he died on the 20th of November 1887. Among his greater works may be named: " The Last Honours paid to Counts Egmont and Horn by the Corporations of the Town of Brussels," now at Tournay; "The Death of Egmont," in the Berlin gallery; the " Coronation of Baudouin, Emperor of Constantinople," painted for Versailles; " The Temptation of St Anthony," in the palace at Brussels; " The Siege of Antioch," " Art and Liberty," a " Portrait of M. B. Dumortier " and " The Plague at Tournay," all in the Brussels gallery. " A Gipsy Woman and her Children " was painted in 1852. " M. Gallait has all the gifts that may be acquired by work, taste, judgment and

determination," wrote Theophile Gautier; his art is that of a man of tact, a skilled painter, happy in his dramatic treatment but superficial. No doubt, this Walloon artist, following the example of the Flemings of the Renaissance and the treatment of Belgian classical painters and the French Romantic school, sincerely aimed at truth; unfortunately, misled by contemporary taste, he could not conceive of it excepting as dressed in senti- mentality. As an artist employed by the State he exercised considerable influence, and for a long period he was the leader of public taste in Brussels.

See Teichlin, Louis Gallait und die Malerei in Deutschland (1853) ; J. Dujardin, V Art flamand (1899); C. Lemonnier, Histoire des beaux-arts en Belgique (1881).

GALLAND, ANTOINE (1646-1715), French Orientalist and archaeologist, the first European translator of the Arabian Nights, was born on the 4th of April 1646 at Rollot, in the department of Somme. The completion of his school education at Noyon was followed by a brief apprenticeship to a trade, from which, however, he soon escaped, to pursue his linguistic studies at Paris. After having been employed for some time in making a catalogue of the Oriental manuscripts at the Sor- bonne, he was, in 1670, attached to the French embassy at Con- stantinople; and in 1673 he travelled in Syria and the Levant, where he copied a great number of inscriptions, and sketched, and in some cases removed historical monuments. After a brief visit to France, where his collection of ancient coins attracted some attention, Galland returned to the Levant in 1676; and in 1679 he undertook a third voyage, being commissioned by the French East India Company to collect for the cabinet of Colbert; on the expiration of this commission he was instructed by the government to continue his researches, and had the title of

" antiquary to the king " conferred upon him. During his pro- longed residences abroad he acquired a thorough knowledge of the Arabic, Turkish and Persian languages and literatures, which, on his final return to France, enabled him to render valuable assist- ance to Thevenot, the keeper of the royal library, and to Barthelemy d'Herbelot. After their deaths he lived for some time at Caen under the roof of Nicolas Foucault (1643-1721), the intendant of Caen, himself no mean archaeologist; and there he began the publication

(12 vols., 1704-1717) of Les mille et une nulls, which excited immense interest during the time of its appearance, and is still the standard French translation. It had no pretensions to verbal accuracy, and the coarseness of the language was modified to suit European taste, but the narrative was adequately rendered. In 1 701 Galland had been admitted into the Academy of Inscriptions, and in 1 709 he was appointed to the chair of Arabic in the College de France. He continued to discharge the dufies of this post until his death, which took place on the 17th of February 171 5.

Besides a number of archaeological works, especially in the department of numismatics, he published a compilation from the Arabic, Persian and Turkish, entitled Paroles remarquables , bons mots et maximes des orientaux (1694), and a translation from an Arabic manuscript, De I'origine et du progres du cafe (1699). The former of these works appeared in an English translation in 1795. His Contes et fables indiennes de Bidpa'i et de Lokman was published (1724) after his death. Among his numerous unpublished manuscripts are a translation of the Koran and a Histoire generate des empereurs turcs. His Journal was published by M. Charles Schefer in 1881.

GALLARATE, a town of Lombardy, Italy, in the province of Milan, from which it is 25 m. N.W. by rail. Pop. (1901) 12,002. The town is of medieval origin. It is remarkable mainly for its textile factories. It is the junction of railways to Varese, Laveno and Arona (for the Simplon). Six miles to the W. are the electric works of Vizzola, the largest in Europe, where 23,000 h.p. are derived from the river Ticino.

GALLARS [in Lat. Gallasius], NICOLAS DES (c. 1520- c. 1580), Calvinistic divine, first appears as author of a Defensio of William Farel, published at Geneva in 1545, followed (1545- 1549) by translations into French of three tracts by Calvin. In 1 551 he was admitted burgess of Geneva, and in 1553 made pastor of a country church in the neighbourhood. In 1557 he was sent to minister to the Protestants at Paris; his conductor, Nicolas du Rousseau, having prohibited .books in his possession, was executed at Dijon; des Gallars, having nothing suspicious about him, continued his journey. On the revival of the Strangers' church in London (1560), he, being then minister at Geneva, came to London to organize the French branch; and in 1 561 he published La Forme de police eccMsiaslique institute A Londres en V Eglise des Francois. In the same year he assisted Beza at the colloquy of Poissy. He became minister to the Pro- testants at Orleans in 1564; presided at the synod of Paris in 1565; was driven out of Orleans with other Protestants in 1568; and

in 1571 was chaplain to Jeanne d'Albret, queen of Navarre. Calvin held him in high esteem, employing him as amanuensis, and as editor as well as translator of several of his exegetical and polemical works. He himself wrote a, commentary on Exodus (1560); edited an annotated French Bible (1562) and New Testament (1562); and published tracts against Arians (1565-1566). His main work was his edition of Irenaeus (1570) with prefatory letter to Grindal, then bishop of London, and giving, for the first time, some fragments of the Greek text. His collaboration with Beza in the Histoire des Eglises Rejormies du royaume de France (1580) is doubted by Bayle.

See Bayle, Dictionnaire hist, et crit.; Jean Senebier, Hist. lilteraire de Geneve (1786) ; Nouvelle Biog. gen. (1857), (A. Go.)*

GALLAS, MATTHIAS, Count or Campo, Duke of Lucera

(1 584-1647), Austrian soldier, first saw service in Flanders, and in Savoy with the Spaniards, and subsequently joined the forces of the Catholic League as captain. On the general outbreak of hostilities in Germany, Gallas, as colonel , of an infantry regiment, distinguished himself, especially at the battle of Stadt- lohn (1623). In 1630 he was serving as General-Feldwachtmeister under Collalto in Italy, and was mainly instrumental in the capture of Mantua. Made count of the Empire for this service,

he returned to Germany for the campaign against Gustavus Adolphus. In command of a corps of Wallenstein's army, he covered Bohemia against the Swedes in 1631-1632, and served at the Alte Veste near Nuremberg, and at Liitzen. Further good service against Bernhard of Saxe- Weimar commended General Gallas to the notice of the emperor, who made him lieutenant- general in his own army. He was one of the chief conspirators against Wallenstein, and after the tragedy of Eger was appointed to the command of the army which Wallenstein had formed and led. At the great battle of Nordlingen (23rd of August 1634) in which the army of Sweden was almost annihilated, Gallas commanded the victorious Imperialists. His next command was in Lorraine, but even the Moselle valley had suffered so much from the ravages of war that his army perished of want. Still more was this the case in northern Germany, where Gallas commanded against the Swedish general Baner in 1637 and 1638. At first driving the Swedes before him, in the end he made a complete failure of the campaign, lost his command, and was subject to much ridicule. It was, however, rather the indiscipline of his men (the baneful legacy of Wallenstein's methods) than his own faults which brought about his disastrous retreat across North Germany, and at a

moment of crisis he was recalled to endeavour to stop Torstenson's victorious advance, only to be shut up in Magdeburg, whence he escaped with the barest remnant of his forces. Once more relieved of his command, he was again recalled to make head against the Swedes in 1645 (after their victory at Jankow). Before long, old and warworn, he resigned his command, and died in 1647 at Vienna. His army had earned for itself the reputation of being the most cruel and rapacious force even in the Thirty Years' War, and his Merode Briider have survived in the word marauder. Like many other generals of that period, he had acquired much wealth and great territorial possessions (the latter mostly his share of Wallenstein's estates). He was the founder of the Austrian family of Clam-Gallas, which furnished many distinguished soldiers to the Imperial army.

GALLAS, or more correctly Gaixa, a powerful Hamitic people of eastern Africa, scattered over the wide region which extends for about 1000 m. from the central parts of Abyssinia to the neighbourhood of the river Sabaki in British East Africa. The name " Galla " or " Gala " appears to be an Abyssinian nickname, unknown to the people, who call themselves Urn' Orma, " sons of men " or " sons of Orma," an eponymous hero. In Shoa (Abyssinia) the word is connected with the river Gala in Guragie, on the banks of which a great battle is said to have been fought between the Galla and the Abyssinians. Arnaud d'Abbadie says that the Abyssinian Moslems recount that, when summoned by the Prophet's messenger to adopt Islam, the chief of the Galla said " No," — in Arabic kdl (or gal) la, — and the Prophet on hearing this said, " Then let their very name imply their denial of the Faith." Of all Hamitic peoples the Galla are the most numerous. Dr J. Ludwig Krapf estimated them (c. i860) at from six to eight millions; later authorities put them at not much over three millions. Individual tribes are said to be able to bring 20,000 to 30,000 horsemen into the field.

Hardly anything is definitely known as to the origin and early home of the race, but it appears to have occupied the southern part of its present territory since the 16th century. According to Hiob Ludplf and James Bruce, the Galla invaders first crossed the Abyssinian frontiers in the year 1537. The Galla of Gojam (a district along the northern side of the river Abai) tell how their savage forefathers came from the south-east from a country on the other side of a bahr (lake or river), and the Yejju and Raia Galla also point towards the east and commemorate the passage of a bahr. Among the southern Galla tradition appears to be mainly concerned with the expulsion of the race from the country now occupied by the Somali. Their original home was possibly in the district east of Victoria Nyanza, for the

tribes near Mount Kenya are stated to go on periodical pilgrimages tc the mountain, making offerings to it as if to their mother. A theory has been advanced that the great exodus which it seems certain took place among the peoples throughout eastern Africa during the 15th century was caused by some great eruption of Kenya

and other volcanoes of equatorial Africa. As a geographical term Galla-land is now used mainly to denote the south-central regions of the Abyssinian empire, the country in which the Galla are numerically strongest. There is no sharp dividing line be- tween the territory occupied respectively by the Galla and by the Somali.

In any case the Galla must be regarded as members of that vast eastern Hamitic family which includes their neighbours, the Somali, the Afars (Danakil) and the Abyssinians. As in all the eastern Hamites, there is a perceptible strain of Negro blood in the Galla, who are, however, described by Sir Frederick Lugard as " a wonderfully handsome race, with high foreheads, brown skins, and soft wavy hair quite different from the wool of the Bantus." As a rule their features are quite European. Their colour is dark brown, but many of the northern Galla are of a coffee and milk tint. The finest men are to be found among the Limmu and Gudru on the river Abai.

The Galla are for the most part still in the nomadic and pastoral stage, though in Abyssinia they have some agricultural settlements. Their dwellings, circles of rough stones roofed with grasses, are generally built under trees. Their wealth consists chiefly in cattle and horses. Among the southern tribes it is said that about seven or eight head of cattle are kept for every man, woman and child ; and among the northern tribes, as neither man nor woman ever thinks of going any distance on foot, the number of horses is very large. The ordinary food consists of flesh, blood, milk, butter and honey, the last being considered of so much importance by the southern Galla that a rude system of bee-keeping is in vogue, and the husband who fails to furnish his wife with a sufficient supply of honey may be excluded from all conjugal rights. In the south monogamy is the rule, but in the north the number of a man's wives is limited only by his wishes and his wealth. Marriage-fcrms are numerous, that of bride-capture being common. Each tribe has its own chief, who enjoys the strange privilege of being the only merchant for his people, but in all public concerns must take the advice of the fathers of families

assembled in council. The greater proportion of the tribes are still pagan, worshipping a supreme god Waka, and the subordinate god and goddess Oglieh and Atetieh, whose favour is secured by sacrifices of oxen and sheep. With a strange liberality of sentiment, they say that at a certain time of the year Waka leaves them and goes to attend to the wants of their enemies the Somali, whom also he has created. Some tribes, and notably the Wollo Galla, have been converted to Mahommedanism and are very bigoted adherents of the Prophet. In the north, where the Galla are under Abyssinian rule, a kind of superficial Christian- ization has taken place, to the extent at least that the people are familiar with the names of Maremma or Mary, Balawold or Jesus, Girgis or St George, &c. ; but to all practical intents paganism is still in force. The serpent is a special object of worship, the northern Galla believing that he is the author of the human race. There is a belief in were-wolves (buda), and the northern Galla have sorcerers who terrorize the people. Though cruel in war, all Galla respect their pledged word. They are armed with a lance, a two-edged knife, and a shield of buffalo or rhinoceros hide. A considerable number find employment in the Abyssinian armies.

Among the more important tribes in the south (the name in each instance being compounded with Galla) are the Ramatta, the Kukatta, the Baole, the Aurova, the Wadjole, the Hani, the Arrar and the Kanigo Galla; the Borani, a very powerful tribe, may be considered to mark the division between north and south; and in the north we find the Amoro, the Jarso, the Toolama, the Wollo, the Ambassil, the Aijjo, and the Azobo Galla.

See C. T. Beke, " On the Origin of the Gallas," in Trans, of Brit. Assoc. (1847); J. Ludwig Krapf, Travels in Eastern Africa (i860); and Vocabulary of the Galla Language (London, 1842) ; Arnaud dAbbadie, Douze Ans dans la Haute-£thiopie (1868) ; Ph. Paulitschke, Ethnographie Nord-Ost-Afrikas; Die geistige Kultur der Dan'akil, Galla u. Somdl (Berlin, 1896); P. M. de Salviac, Les Galla (Paris,

1901).

GALLATIN, ALBERT (1761-1849), American statesman, was born in Geneva (Switzerland) on the 29th of January 1761. The Gallatins were both an old and a noble family. They are first heard of in Savoy in the year 1258, and more, than two centuries later they went to Geneva (1510), united with Calvin in his opposition to Rome, and associated their fortunes with those of the little Swiss city. Here they remained, and with one or two other great families governed Geneva,

and sent forth many representatives to seek their fortune and win distinction in the service of foreign princes, both as soldiers and ministers. On the eve of the French Revolution the Gallatins were still in Geneva, occupying the same position which they had held for two hundred years. (Albert Gallatin's father died in 1765, his mother five

years later, and his only sister in 1777. Although left an orphan at nine, he was by no means lonely or unprotected. His grand- parents, a large circle of near relatives and Mile Catherine Pictet (d. 179s), an intimate friend of his mother, cared for him during his boyhood. He was thoroughly educated at the schools of Geneva, and graduated with honour from the college or academy there in 1779. His grandmother then wished him to enter the army of the landgrave of Hesse, but he declined to serve " a tyrant," and a year later slipped away from Geneva and embarked for the United States. A competent fortune, good prospects, social position, and a strong family connexion were all thrown aside in order to tempt fate in the New World. His relatives very properly opposed his course, but they nevertheless did all in their power to smooth his way, and continued to treat him kindly. In after life he himself admitted the justice of their opinions. The temper of the times, a vague discontent with the established order of things, and some political enthusiasm imbibed from the writings of Rousseau, are the best reasons which can now be assigned for Gallatin's desertion of home and friends.

In July 1780 Gallatin and his friend Henri Serre (d. 1784) landed in Massachusetts. They brought with them youth, hope and courage, as well as a little money, and at once entered into business The times, however, were unfavourable. The great convulsion of the Revolution was drawing to a close, and every- thing was in an unsettled condition The young Genevans failed in business, passed a severe winter in the wilds of Maine, and returned to Boston penniless. Gallatin tried to earn a living by teaching French in Harvard College, apparently not without success, but the cold and rigid civilization of New England repelled him, and he made his way to the South. In the backwoods of Pennsylvania and Virginia there seemed to be better chances for a young adventurer. Gallatin engaged in land speculations, and tried to lay the foundation of his fortune in a frontier farm. In 1789 he married Sophie Allegre, and every prospect seemed to be brightening. But clouds soon gathered again. After only a few months of wedlock his wife died, and Gallatin was once more alone. The solitary and desolate frontier life became now more dreary than ever; he flung himself into politics the only outside resource open to him, and his long, and eventful public career began.

The constitution of 1787 was then before the public, and Gallatin, with his dislike of strong government still upon him, threw himself into opposition and became one of the founders of the Anti-Federalist, or, as it was afterwards called, the Republican party. He was a member of the Pennsylvania Con- stitutional Convention of 1 789-1 790, and of the Pennsylvania Assembly in 1790, 1791, and 1792, and rose with surprising rapidity, despite his foreign birth and his inability to speak English with correctness or fluency. He was helped of course by his sound education; but the true cause of his success lay in his strong sense, untiring industry, courage, clear-sightedness and great intellectual force. In 1793 he was chosen United States senator from Pennsylvania by the votes of both political parties. No higher tribute was ever paid to character and ability than that conveyed by this election. But the staunch Federalists of the senate, who had begun to draw the party lines rather sharply, found the presence of the young Genevan highly distasteful. They disliked his French origin, and suspected him to be a man of levelling principles His seat was contested on account of a technical flaw in regard to the duration of his citizenship, and in February 1794, almost three months after the beginning of the session, the senate annulled the election and sent him back to Pennsylvania with all the glory of political martyrdom.

The leading part which Gallatin had taken in the " Whisky Insurrection " in Western Pennsylvania had, without doubt, been an efficient cause in his rejection by the senate. He in- tended fully to restrain within legal bounds the opposition which the excise on domestic spirits had provoked, but he made the serious mistake of not allowing sufficiently for the character of the backwoods population When legal resistance developed into insurrection, Gallatin did his best to retrieve his error and

prevent open war. At Redstone Old Fort (Brownsville) on the 29th of August 1794, before the " Committee of Sixty " who were appointed to represent the disaffected people, he opposed with vigorous eloquence the use of force against the government, and refused to be intimidated by an excited band of riflemen who happened to be in the vicinity and represented the radical element. He effectively checked the excitement, and when a month later an overwhelming Federal force began moving upon the western counties, the insurrection collapsed without bloodshed. Of all the men who took

part in the opposition to the excise, Gallatin alone came out with credit. He was at once elected to the national house of representatives, and took his seat in December 1795. There, by sheer force of ability and industry, he wrested from all competitors the leadership of the Republicans, and be- came the most dangerous opponent whom the Federalists had ever encountered in congress. Inflamed with a hatred of France just then rising to the dignity of a party principle, they found in Gallatin an enemy who was both by origin and opinion peculiarly obnoxious to them. They attacked him unsparingly, but in vain. His perfect command of temper, his moderation of speech and action, in a bitterly personal age, never failed, and were his most effective weapons; but he made his power felt in other ways. His clear mind and industrious habits drew him to questions of finance. He became the financier of his party, preached unceasingly his cardinal doctrines of simplicity and economy, and was an effective critic of the measures of government. Cool and temperate, Gallatin, when following his own theories, was usually in the right, although accused by his followers of trimming. Thus, in regard to the Jay treaty, he defended the constitutional right of the house to consider the treaty, but he did not urge rejection in this specific case. On the other hand, when following a purely party policy he generally erred. He resisted the navy, the mainspring of Washington's foreign policy; he opposed commer- cial treaties and diplomatic intercourse in a similar fashion. On these points he was grievously wrong, and on all he changed his views after a good deal of bitter experience.

The greatest period of Gallatin's career in congress was in 1798, after the publication of the famous X.Y.Z. despatches. The insults of Talleyrand, and his shameless attempts to extort bribes from the American commissioners, roused the deep anger of the people against France. The Federalists swept all before them, and the members of the opposition either retired from Philadelphia or went over to the government. Alone and single- handed, Gallatin carried on the fight in congress. The Federalists bore down on him unmercifully, and even attempted (1798) a constitutional amendment in regard to citizenship, partly, it appears, in order to drive him from office. Still he held on, making a national struggle in the national legislature, and relying very little upon the rights of States so eagerly grasped by Jefferson and Madison. But even then the tide was turning. The strong measures of the Federalists shocked the country; the leaders of the dominant party quarrelled fiercely among themselves; and the Republicans carried the elections of 1800ˆ In the exciting contest for the presidency in the house of representa- tives between Jefferson

and Burr, it was Gallatin who led the Republicans.

When, after this contest, Jefferson became president (1 801), there were two men whose commanding abilities marked them for the first places in the cabinet. James Madison became secretary of state, and Albert Gallatin secretary of the treasury. Wise, prudent and conservative, Gallatin made few changes in Hamilton's arrangements, and for twelve years administered the national finances with the greatest skill. He and Jefferson were both imbued with the idea that government could be carried on upon a priori principles resting on the assumed perfectness of human nature, and the chief burden of carrying out this theory fell upon Gallatin. His guiding principles were still simplicity of administration and speedy extinction of all debt, and every- thing bent to these objects. Fighting or bribing the Barbary pirates was a mere question of expense. It was cheaper to seize Louisiana than to await the settlement of doubtful points. Commercial warfare was to be avoided because of the cost.

All wars were bad, but if they could not be evaded it was less extravagant to be ready than to rush to arms unprepared. Amid many difficulties, and thwarted even by Jefferson himself in the matter of the navy, Gallatin pushed on; and after six years the public debt was decreased (in spite of the Louisiana purchase) by $14,260,000, a large surplus was on hand, a com- prehensive and beneficent scheme of internal improvements was ready for execution, and the promised land seemed in sight. Then came the stress of war in Europe, a wretched neutrality at home, fierce outbreaks of human passions, and the fair structure of government by a priori theories based on the goodness of un- oppressed humanity came to the ground. Gallatin was thrown helplessly back upon the rejected Federalist doctrine of govern- ment according to circumstances. He uttered no vain regrets, but the position was a trying one. The sworn foe of strong government, he was compelled, in pursuance of Jefferson's policy, to put into execution the Embargo and other radical and stringent measures. He did his best, but all was in vain. Commercial warfare failed, the Embargo was repealed, and Jefferson, having entangled foreign relations and brought the country to the verge of civil war, retired to private life, leaving to his successor Madison, and to Gallatin, the task of extricating the nation from its difficulties. From 1809 the new administra- tion, drifting steadily towards war, struggled on from one abortive and exasperating negotiation to another. It was a period of sore trial to Gallatin. The peace policy had failed, and nothing else replaced it. He had lost his hold upon Pennsylvania and his support in the house, while a cabal in the senate, bitterly and personally hostile to the

treasury, crippled the administration and reduced every government measure to mere inanity. At last, however, in June 1812, congress on Madison's recommenda- tion declared war against England.

Gallatin never wasted time in futile complaints. His cherished schemes were shattered. War and extravagant expenditure had come, and he believed both to be fatal to the prosperity and progress of America. He therefore put the finances in the best order he could, and set himself to mitigate the evil effects of the war by obtaining an early peace. With this end in view he grasped eagerly at the proffered mediation of Russia, and without resigning the treasury sailed for Europe in May 18 13.

Russian mediation proved barren, but Gallatin persevered, catching at every opportunity for negotiation. In the midst of his labours came the news that the senate had refused to confirm his appointment as peace commissioner. He still toiled on unofficially until, the objection of the senate having been met by the appoint- ment of a new secretary of the treasury, his second nomination was approved, and he was able to proceed with direct negotiations. The English and American commissioners finally met at Ghent, and in the tedious and irritating discussions which ensued Gallatin took the leading part. His great difficulty lay in manag- ing his colleagues, who were, especially Henry Clay and John Quincy Adams, able men of strong wills and jarring tempers. He succeeded in preserving harmony, and thus established his own reputation as an able diplomatist. Peace was his reward; on the 24th of December 1814 the treaty was signed; and after visiting Geneva for the first time since his boyhood, and assisting in negotiating a commercial convention (1815) with England by which all discriminating duties were abolished, Gallatin in July 1815 returned to America.

While still in Europe he had been asked by Madison to become minister to France; this appointment he accepted in January 1816, and adhered to his acceptance in spite of his being asked in April 1816 to serve once more as secretary of the treasury. He remained in France for the next seven years. He passed his time in thoroughly congenial society, seeing everybody of note or merit in Europe. He did not neglect the duties of his official position, but strove assiduously and with his wonted patience to settle the commercial relations of his adopted country with the nations of Europe, and in 18 18 assisted Richard Rush, then United States minister in London, in negotiating a commercial convention with Great Britain to take the place of that negotiated in 1815.

In June 1823 he returned to the United States, where he found himself plunged at once into the bitter struggle then in progress for the presidency. His favourite candidate was his personal friend William H. Crawford, whom he regarded as the true heir and representative of the old Jeffersonian principles. With these feelings he consented in May 1824 to stand for the vice- presidency on the Crawford ticket. But Gallatin had come home to new scenes and new actors, and he did not fully appreciate the situation. The contest was bitter, personal, factious and full of intrigue. Martin Van Buren, then in the Crawford interest, came to the conclusion that the candidate for the second place, by his foreign origin, weakened the ticket, and in October Gallatin retired from the contest. The election, undecided by the popular vote, was thrown into the house, and resulted in the choice of John Quincy Adams, who in 1826 drew Gallatin from his retirement and sent him as minister to England to conduct another complicated and arduous negotiation. Gallatin worked at his new task with his usual industry, tact and patience, but the results were meagre, although an open breach on the delicate question of the north-east boundary of the United States was avoided by referring it to the arbitration of the king of the Netherlands. In November 1827 he once more returned to the United States and bade farewell to public life.

Taking up his residence in New York, he was in 1832-1839 president of the National Bank (afterwards the Gallatin Bank) of New York, but his duties were light, and he devoted himself chiefly to the congenial pursuits of science and literature. In both fields he displayed much talent, and by writing his Synopsis of the Indian Tribes within the United States East of the Rocky Mountains and in the British and Russian Possessions in North America (1836), and by founding the American Ethnological Society of New York in 1842, he earned the title of " Father of American Ethnology." He continued, of course, to interest himself in public affairs, although no longer an active participant, and in all financial questions, especially in regard to the bank charter, the resumption of specie payments, and the panic of 183 7, he exerted a powerful influence. The rise of the slavery question touched him nearly. Gallatin had always been a consistent opponent of slavery; he felt keenly, therefore, the attempts of the South to extend the slave power and confirm its existence, and the remnant of his strength was devoted in his last days to writing and distributing two able pamphlets against the war with Mexico.

Almost his last public act was a speech, on the 24th of April 1844, in New York City, against the annexation of Texas; and in his eighty-fourth year he confronted a howling New York mob with the same cool, unflinching courage which he had displayed half a century before when he faced the armed frontiersmen of Redstone Old Fort. During the winter of 1848- 1840 his health failed, and on the 12th of August 1849, at the home of his daughter in Astoria, Long Island, he passed peace- fully away.

Gallatin was twice married. His second wife, whom he married in November 1793, was Miss Hannah Nicholson, of New York, the daughter of Com. James Nicholson (1737-1804), an American naval officer, commander-in-chief of the navy from 1777 until August 1781, when with his ship the " Virginia," he was taken by the British " Iris " and " General Monk." By her he had three children, two sons and a daughter, who all survived him. In personal appearance he was above middle height, with strongly-marked features, indicating great strength of intellect and character. He was reserved and very reticent, cold in manner and not sympathetic. There was, too, a certain Calvinistic austerity about him. But he was much beloved by his family. He was never a popular man, nor did he ever have a strong personal following or many attached friends. He stood; with Jefferson and Madison, at the head of his party, and won his place by force of character, courage, application and in- tellectual power. His eminent and manifold services to his adopted country, his great abilities and upright character, assure him a high position in the history of the United States.

The Writings of Albert Gallatin, edited by Henry Adams, were published at Philadelphia, in three volumes, in 1879. With these

volumes was published an excellent biography, The Life of Albert Gallatin, also by Henry Adams; another good biography is John Austin Stevens's Albert Gallatin (Boston, 1884) in the " American Statesmen " series. (H. C. L.)

GALLAUDET, THOMAS HOPKINS (1787-1851), American educator of the deaf and dumb, was born in Philadelphia, Pennsylvania, of French Huguenot ancestry, on the 10th of December 1787. He graduated at Yale in 1805, where he was a tutor from 1808 to 1810. Subsequently he studied theology at Andover, and was licensed to preach in 1814, but having determined to abandon the ministry and devote his life to the education of deaf mutes, he visited Europe in 1815-1816, and studied the methods of the abbe Sicard in Paris, and of Thomas Braidwood (171 5-1806) and his successor Joseph

Watson (1765-1829) in Great Britain. Returning to the United States in 1816, he established at Hartford, Connecticut, with the aid of Laurent Clerc (1785-1869), a deaf mute assistant of the abbe Sicard, a school for deaf mutes, in support of which Congress, largely through the influence of Henry Clay, made a land grant, and which Gallaudet presided over with great success until ill-health compelled him to retire in 1830. It was the first institution of the sort in the United States, and served as a model for institutions which were subsequently established. He died at Hartford, Connecticut, on the 5th of September 1851.

There are three accounts of his life, one by Henry Barnard, Life, Character and Services of the Rev. Thomas H. Gallaudet (Hartford, 1852); another by Herman Humphrey (Hartford, 1858), and a third (and the best one) by his son Edward Miner Gallaudet (1888).

His son, Thomas Gallaudet (1822-1902), after graduating at Trinity College in 1842, entered the Protestant Episcopal ministry, settled in New York City, and there in 1852 organized St Anne's Episcopal church, where he conducted services for deaf mutes. In 1872 he organized and became general manager of tbe Church mission to deaf mutes, and in 1885 founded the Gallaudet home for deaf mutes, particularly the aged, at Wappingers Falls, near Poughkeepsie, New York.

Another son, Edward Miner Gallaudet (b. 1837), was born at Hartford, Connecticut, on the 3rd of February 1837, and graduated at Trinity College in 1856. After teaching for a year in the institution for deaf mutes founded by his father at Hartford, he removed with his mother,Sophia Fowler Gallaudet (1 798-1877), to Washington, D.C., where at the request of Amos Kendall (1780-1869), its founder, he organized and took charge of the Columbia Institution for the deaf and dumb, which received support from the government, and of which he became president. This institution was the first to furnish actual collegiate educa- tion for deaf mutes (in 1864 it acquired the right to grant degrees), and was successful from the start. The Gallaudet College (founded in 1864 as the National Deaf Mute College and renamed in 1893 in honour of Thomas H. Gallaudet) and the Kendall School are separate departments of this institution, under independent faculties (each headed by Gallaudet), but under the management of one board of directors.

GALLE, or Point de Galle, a town and port of Ceylon on the south-west coast. It was made a municipality in 1865, and divided into the five districts of the Fort, Callowelle, Galopiadde, Hirimbure and

Cumbalwalla. The fort, which is more than a mile in circumference, overlooks the whole harbour, but is commanded by a range of hills. Within its enclosure are not only several government buildings, but an old church erected by the Dutch East India Company, a mosque, a Wesleyan chapel, a hospital, and a considerable number of houses occupied by Europeans. The old Dutch building known as the queen's house, or governor's residence, which dated from 1687, was in such a dilapidated state that it was sold by the governor, Sir William Gregory, in 1873. Elsewhere there are few buildings of individual note, but the general style of domestic architecture is pleasant and com- fortable, though not pretentious. One of the most delightful features of the place is the profusion of trees, even within the town, and along the edge of the shore — suriyas, palms, coco-nut trees and bread-fruit trees. The ramparts towards the sea furnish fine promenades. In the harbour deep water is found close to the shore, and the outer roads are spacious; but the south-west

monsoon renders entrance difficult, and not unfrequently drives vessels from their moorings.

The opening of the Suez Canal in 1869, and the construction of a breakwater at Colombo, leading to the transfer of the mail and most of the commercial steamers to the capital of the island, seriously diminished the prosperity of Galle. Although a few steamers still call to coal and take in some cargo, yet the loss of the Peninsular and Oriental and other steamer agencies reduced the port to a subordinate position; nor has the extension of the railway from Colombo, and beyond Galle to Matara, very much improved matters. The tea-planting industry has, however, spread to the neighbourhood, and a great deal is done in digging plumbago and in growing grass for the distillation of citronella oil. The export trade is chiefly represented by coco-nut oil, plumbago, coir yarn, fibre, rope and tea. In the import trade cotton goods are the chief item. Both the export and import trade for the district, however, now chiefly passes through Colombo. Pop. (1901) 37,165.

Galle is mentioned by none of the Greek or Latin geographers, unless the identification with Ptolemy's Avium Promontorium or Cape of Birds be a correct one. It is hardly noticed in the native chronicles before 1267, and Ibn Batuta, in the middle of the 14th century, distinctly states that Kali — that is, Galle — was a small town. It

was not till the period of Portuguese occupation that it rose to importance. When the Dutch succeeded the Portuguese they strengthened the fortifications, which had been vigorously defended against their admiral, Kosten; and under their rule the place had the rank of a commandancy. In the marriage treaty of the infanta of Portugal with Charles II. of England it was agreed that if the Portuguese recovered Ceylon they were to hand over Galle to the English ; but as the Portuguese did not recover Ceylon the town was left to fall into English hands at the conquest of the island from the Dutch in 1796. The name Galle is derived from the Sinhalese galla, equivalent to "rock"; but the Portuguese and Dutch settlers, being better fighters than philologists, connected it with the Latin gallus, a cock, and the image of a cock was carved as a symbol of the town in the front of the old government house.

GALLENGA, ANTONIO CARLO NAPOLEONE (1810-1895), Italian author and patriot, born at Parma on the 4th of November 1810, was the eldest son of a Piedmontese of good family, who served for ten years in the French army under Massena and Napoleon. He had finished his education at the university of Parma, when the French Revolution of 1830 caused a ferment in Italy. He sympathized with the movement, and within a few months was successively a conspirator, a state prisoner, a combatant and a fugitive. For the next five years he lived a wandering life in France, Spain and Africa. In August 1836 he embarked for New York, and three years later he proceeded to England, where he supported himself as a translator and teacher of languages. His first book, Italy; General Views of its History and Literature, which appeared in 1841, was well received, but was not successful financially. On the outbreak of the Italian revolution in 1848 he at once put himself in com- munication with the insurgents. He filled the post of Charge d'Affaires for Piedmont at Frankfort in 1848-1849, and for the next few years he travelled incessantly between Italy and England, working for the liberation of his country. In 1854, through Cavour's influence, he was elected a deputy to the Italian parliament. He retained his seat until 1864, passing the summer in England and fulfilling his parliamentary duties at Turin in the winter. On the outbreak of the Austro-French War of 1859 he proceeded to Lombardy as war correspondent of The Tintes. The campaign was so brief that the fighting was over before he arrived, but his connexion with The Times endured for twenty years. He was a forcible and picturesque writer, with, a com- mand of English remarkable for an Italian. He materially helped to establish that friendly feeling towards Italy which became traditional in England. In 1859 Gallenga purchased the Falls, at Llandogo on

the Wye, as a residence, and thither he retired in 1885. He died at this house on the 17th of December 1895. He was twice married. Among his chief works are an Historical Memoir of Fra Dolcino and his Times (1853) ; a History of Piedmont (3 vols., 1855; Italian translation, 1856); Country Life in Piedmont (1858) ; The Invasion of Denmark (2 vols., 1864) ; The Pearl of the Antilles [travels in Cuba] (1873); Italy Revisited XI. 14

(2 vols., 1875); Two Years of the Eastern Question (2 vols., 1877); The Pope [Pius IX.] and the King [Victor Emmanuel] (2 vols., 1879); South America (1880); A Summer Tour in Russia (1882); Iberian Reminiscences (2 vols., 1883); Episodes of my Second Life (1884); Italy, Present and Future (2 vols., 1887). Gallenga's earlier publications appeared under the pseudonym of Luigi Mariotti.

GALLERY (through Ital. galleria, from Med. Lat. galeria, of which the origin is unknown), 1 a covered passage or space outside a main wall, sometimes used as a verandah if on the ground floor, and as a balcony if on an upper floor and supported by columns, piers or corbels; similarly the upper seats in a theatre or a church, on either side as in many 17th-century churches, or across the west end under the organ. The word is also used of an internal passage primarily provided to place various rooms in communication with one another; but if of narrow width this is usually called a corridor or passage. When of sufficient width the gallery is utilized to exhibit pictures and other art treasures. In the 16th century the picture gallery formed the largest room or hall in English mansions, with wainscoted walls and a richly decorated plaster ceiling; the principal examples are those of Audley End, Essex (226 ft. by 34 ft.); Hardwick, Derbyshire (166 ft. by 22 ft.); Hatfield, Hert- fordshire (163 ft. by 19 ft. 6 in.); Aston Hall, near Birmingham (136 ft. by 18 ft.); Haddon Hall, Derbyshire (116 ft. by 17 ft.); and Montacute in Somersetshire (189 ft. by 22 ft.). Hence the' application of the term to art museums (the National Gallery, &c.) and also to smaller rooms with top-light in which temporary exhibitions are held.

GALLEY (derived through the O. Fr. galee, galie, from the Med. Lat. galea , Ital. galea, Port, gale, of uncertain origin ; from the Med. Lat. variant form galera are derived the Mod. Fr. galere, Span, and Ital. galera), a long single or half decked vessel of war, with low free-board, propelled primarily by oars or sweeps; but also having masts for sails. The word is used generally of the ancient war vessels of Greece and Rome of various types, whose chief propelling power was the oar or sweep, but its more specific application is to the medieval war vessel which survived in the navies of the Mediterranean sea-

powers after the general adoption of the larger many-decked ship of war, propelled solely by sail- power. Lepanto (1571) was the last great naval battle in which the galley played the principal part. The "galleass" or " galliass " (Med. Lat. galeasea, Ital. galeazza, an augmented form of galea) was a larger and heavier form of galley; it usually carried three masts and had at bow and stern a castellated structure. The " galliot " (O. Fr. galiot, Span, and Port, galeota, Ital. galeotta, a diminutive of galea) was a small light type of galley. The " galleon " (formerly in English " galloon," Fr. galion, derived from the Med. Lat. galio, galionis, a derivative of galea) was a sailing ship of war and trade, shorter than the galley and standing high out of the water with several decks, chiefly used by the Spaniards during the 16th century in the carrying of treasure from America. The number of oars or sweeps varied, the larger galley having twenty-five on each side; the galleass as many as thirty- two, each being worked by several men. This labour was from the earliest times often performed by slaves or prisoners of war. It became the custom among the Mediter- ranean-powers to sentence condemned criminals to row in the war galleys of the state. Traces of this in France can be found as early as 1532, but the first legislative enactment is in the Ordon- nance d'Orlians of 1561. In 1564 Charles IX. forbade the sentencing of prisoners to the galleys for less than ten years. The galley-slaves were branded with the letters Gal. At the end of the reign of Louis XIV. the use of the galley for war purposes had practically ceased, but the corps of the galleys was not incorporated with the navy till 1748. The headquarters of the ! galleys and of the convict rowers (galSriens) was at Marseilles. The. majority of these latter were brought to Toulon, the others were sent to Rochefort and Brest, where they were used for work

1 Du Cange, Glossariwm, s.v. "Galeria," suggests an origin from galera, a galley, on the analogy of " nave," from navis, the galley being a long and narrow ship ; but, he adds, alii alia opinantur,

in the arsenal. At Toulon the convicts remained (in chains) on the galleys, which were moored as hulks in the harbour. Shore prisons were, however, provided for them, known as bagnes, baths, a name given to such penal establishments first by the Italians (bagno) , and said to have been derived from the prison at Constantinople situated

close by or attached to the great baths there. The name galirien was still given to all convicts, though the galleys had been abandoned, and it was not till the French Revolution that the hated name with all it signified was changed to for cat. In Spain galera is still used for a criminal condemned to penal servitude.

A vivid account of the life of galley-slaves in France is given in Jean Marteilhes's Memoirs of a Protestant, translated by Oliver Goldsmith (new edition, 1895), which describes the experiences of one of the Huguenots who suffered after the revocation of the edict of Nantes.

GALLIA CISALPINA (Lat. Cis, on this side, i.e. of the Alps), in ancient geography, that portion of northern Italy north of Liguria and Umbria and south of the Alps, which was inhabited by various Celtic and other peoples, of whom the Celts were in continual hostility to Rome. In early times it was bounded on the S. by Liguria and the Aesis, in Caesar's time by Liguria and the Rubicon. After the Second Punic War (203 b,c.) these tribes were severely punished by the Roman generals for the assistance they had rendered to Hannibal. Sulla divided the district into two parts; the region between the Aesis and the Rubicon was made directly subject to the government at Rome, while the northern portion was put under a distinct authority, probably similar to the usual transmarine commands (see Mommsen, Hist, of Rome, Eng. trans., bk. iv. c. 10).

For the early Celtic and other peoples and the later history of the district see Italy (ancient), and Rome: History, Ancient.

GALLIC ACID, trioxybenzoicacid(HO) 3 (3.4.s.)C 6 H2C0 2 H-H 2 0, the acidum gallicum of pharmacy, a substance discovered by K. W. Scheele; it occurs in the leaves of the bearberry, in pome- granate root-bark, in tea, in gall-nuts to the extent of about 3 %, and in other vegetable productions. It may be prepared by keep- ing moist and exposed to the air for from four to six weeks, at a temperature of 20° to 25° C, a paste of powdered gall-nuts and water, and removing from time to time the mould which forms on its surface; the paste is then boiled with water, the hot solution filtered, allowed to cool, the separated gallic acid drained, and purified by dissolving in boiling water, recrystallization at about 2 7 C, and washing of the crystals with ice-cold water. The production of the acid appears to be due to the presence in the galls of a ferment. Gallic acid is most readily obtained by boiling the tannin procured from oak-galls by means of alcohol and ether with weak solution of acids. It may also be produced by heating an aqueous solution of di-iodosalicylic acid with excess of alkaline carbonate, by acting on dibromosalicylic acid

*with moist silver oxide, and by other methods. It crystallizes in white or pale fawn-coloured acicular prisms or silky needles, and is soluble in alcohol and ether, and in 100 parts of cold and 3 of boiling water; it is without odour and has an astringent and an acid taste and reaction. It melts at about 200 C, and at 210 to 215° it is resolved into carbon dioxide and pyrogallol, C 6 H 3 (OH)3. With ferric salts its solution gives a deep blue colour, and with ferrous salts, after exposure to the air, an in- soluble, blue-black, ferroso-ferric gallate. Bases of the alkali metals give with it four series of salts; these are stable except in alkaline solutions, in which they absorb oxygen and turn brown. Solution of calcium bicarbonate becomes with gallic acid, on exposure to the air, of a dark blue colour. Unlike tannic acid, gallic acid does not precipitate albumen or salts of the alkaloids, or, except when mixed with gum, gelatin. Salts of gold and silver are reduced by it, slowly in cold, instantaneously in warnr solutions, hence its employment in photography. With phos- phorus oxychloride at 120° C. gallic acid yields tannic acid, and with concentrated sulphuric acid at ioo°, rufigallicacid, ChHsOs, an anthracene derivative. Oxidizing agents, such as arsenic acid, convert it into ellagic acid, C14H8O9+H2O, probably a fluorene derivative, a substance which occurs in gall-nuts, in the external membrane of the episperm of the walnut, and prob^*

ably in many plants, and composes the " bezoar stones " found in the intestines of Persian wild goats. Medicinally, gallic acid has been, and is still, largely used as an astringent, styptic and haemostatic. Gallic acid, however, does not coagulate albumen and therefore possesses no local astringent action. So far is it from being an haemostatic that, if perfused through living blood-vessels, it actually dilates them. Its rapid neutraliza- tion in the intestine renders it equally devoid of any remote actions.

GALLICANISM, the collective name for various theories maintaining that the church and king of France had ecclesiastical rights of their own, independent and exclusive of the jurisdiction of the pope. Gallicanism had two distinct sides, a constitutional and a dogmatic, though both were generally held together, the second serving as the logical basis of the first. And neither is intelligible, except in relation to the rival theory of Ultra- montanism (q.v.). Dogmatic Gallicanism was concerned with the question of ecclesiastical government. It maintained that the church's infallible authority was committed to pope and bishops jointly. The pope decided in the first instance, but his judgments must be tacitly or expressly confirmed by the bishops before they had the force of law. This ancient theory survived much longer in France than in other Catholic countries. Hence the name of

Gallican is loosely given to all its modern up- holders, whether of French nationality or not. Constitutional Gallicanism dealt with the relation of church and state in France. It began in the 13th century, as a protest against the theocratic pretensions of the medieval popes. They claimed that they, as vicars of Christ, had the right to interfere in the temporal conˆ cerns of princes, and even to depose sovereigns of whom they disapproved. Gallicanism answered that kings held their power directly of God; hence their temporal concerns lay altogether outside the jurisdiction of the pope. During the troubles of the Reformation era, when the papal deposing power threatened to become a reality, the Gallican theory became of great importance. It was elaborated, and connected with dogmatic Gallicanism, by the famous theologian, Edmond Richer (1559-1631), and finally incorporated by Bossuet in a solemn Declaration of the French Clergy, made in 1682. This document lays down: (1) that the temporal sovereignty of kings is independent of the pope; (2) that a general council is above the pope; (3) that the ancient liberties of the Gallican Church are sacred; (4) that the infallible teaching authority of the church belongs to pope and bishops jointly. This declaration led to a violent quarrel with Rome,, and was officially withdrawn in 1693, though its doctrines con- tinued to be largely held. They were asserted in an extreme form in the Civil Constitution of the Clergy (i79o),|jwhich almost severed connexion between France and the papacy. In 1802 Napoleon contented himself by embodying Bossuet's declaration textually in a statute. Long before his time, however, the issue had been narrowed down to determining exactly how far the pope should be allowed to interfere in French ecclesiastical affairs. Down to the repeal of the Concordat in 1905 all French govern- ments continued to uphold two of the ancient ' ' Gallican Liberties." The secular courts took cognizance of ecclesiastical affairs when- ever the law of the land was alleged to have been broken; and papal bulls were not allowed to be published without the leave of the state. (See also Febronianism.) (St. C.)

GALLIENI, JOSEPH SIMON (1840-), French soldier and

colonial administrator, was born at Saint-Beat, in the department of Haute-Garonne, on the 24th of April 1849. He left the military academy of Saint-Cyr in July 1870 as a second lieutenant in the Marines, becoming lieutenant in 1873 and captain in 1878. He saw service in the Franco-German War, and between 1877 and 1881 took an important part in the explorations and military expeditions by which the French dominion was extended in the basin of the upper Niger. He rendered a particularly valuable service by obtaining, in March 1881, a treaty from Ahmadu, almany of Segu, giving the

French exclusive rights of commerce on the upper Niger. For this he received the gold medal of the. Societe de Geographie. From 1883 to 1886 Gallieni was stationed in Martinique. On the 24th of June 1886 he attained the rank

of lieutenant-colonel, and on the 20th of December was nominated governor of Upper Senegal. He obtained several successes against Ahmadu in 1887, and compelled Samory to agree to a treaty by which he abandoned the left bank of the Niger (see Senegal: History). In connexion with his service in West Africa, Gallieni published two works — Mission d' exploration du Haut-Niger, 1879-1881 (Paris, 1885), and Deux Campagnes au Sudan francais (Paris, 1891) — which, besides possessing great narrative interest, give information of considerable value in regard to the resources and topography of the country. In 1888 Gallieni was made an officer of the Legion of Honour. In 1891 he attained the rank of colonel, and from 1893 to 1895 he served in Tongking, command- ing the second military division of the territory. In 1899 he published his experiences in Trois Colonnes au Tonkin. In 1896 Madagascar was made a French colony, and Gallieni was ap- pointed resident-general (a title changed in 1897 to governor- general) and commander-in-chief. Under the weak administra- tion of his predecessor a widespread revolt had broken out against the French. By a vigorous military system Gallieni succeeded in completing the subjugation of the island. He also turned his attention to the destruction of the political supremacy of the Hovas and the restoration of the autonomy of the other tribes. The execution of the queen's uncle, Rat'simamanga, and of Rainandrianampandry, the minister of the interior, in October 1896, and the exile of Queen Ranavalo III. herself in 1897, on the charge of fomenting rebellion, broke up the Hova hegemony, and made an end of Hova intrigues against French rule. The task of government was one of considerable difficulty. The application of the French customs and other like measures, disastrous to British and American trade, were matters for which Gallieni was not wholly responsible. His policy was directed to the development of the economic resources of the island and was conciliatory towards the non-French European population. He also secured for the Protestants religious liberty. In 1899 he published a Rapport d'ensemble sur la situation g&ne'rale de Mada- gascar. In 1905, when he resigned the governorship, Madagascar enjoyed peace and a considerable measure of prosperity. In 1906 General Gallieni

was appointed to command the XIV. army corps and military government of Lyons. He reviewed the results of his Madagascar administration in a book entitled Neuf Ans a Madagascar (Paris, 1908).

GALLIENUS, PUBLIUS LICINIUS EGNATIUS, Roman emperor from a.d. 260 to 268, son of the emperor Valerian, was born about 218. From 253 to 260 he reigned conjointly with his father, during which time he gave proof of military ability and bravery. But when his father was taken prisoner by Shapur I. of Persia, in 260, Gallienus made no effort to obtain his release, or to with- stand the incursions of the invaders who threatened the empire from all sides. He occupied part of his time in dabbling in literature, science and various trifling arts, but gave himself up chiefly to excess and debauchery. He deprived the senators of their military and provincial commands, which were transferred to equites. During his reign the empire was ravaged by a fearful pestilence; and the chief cities of Greece were sacked by the Goths, who descended on the Greek coast with a fleet of five hundred. His generals rebelled against him in almost every province of the empire, and this period of Roman history came to be called the reign of the Thirty Tyrants. Nevertheless, these usurpers probably saved the empire at the time, by main- taining order and repelling the attacks of the barbarians. Gallienus was killed at Mediolanum by his own soldiers while besieging Aureolus, who was proclaimed emperor by the Illyrian legions. His sons Valerianus and Saloninus predeceased him.

Life by Trebellius Pollio in Script. Hist. Aug. ; on coins see articles in Numism. Zeit. (1908) and Riv. ital. d. num. (1908).

GALLIFFET, GASTON ALEXANDRE AUGUSTE, Marquis de, Prince de Martignes (1830-1909), French general, was born in Paris on the 23rd of January 1830. He entered the army in 1848, was commissioned as sub-lieutenant in 1853, and served with distinction at the siege of Sevastopol in 1855, in the Italian campaign of 1859, and in Algeria in i860, after which for a time he served on the personal staff of the emperor Napoleon III. He

displayed great gallantry as a captain at the siege and storm of Puebla, in Mexico, in 1863, when he was severely wounded, When he returned to France to recover from his wounds he was entrusted with the task of presenting the captured standards and colours to the emperor, and was promoted chef d'escadrons. He went again to Algeria in 1864, took part in expeditions against the Arabs, returned to Mexico as lieutenant-colonel, and, after winning further

distinction, became in 1867 colonel of the 3rd Chasseurs d'Afrique. In the Franco-German War of 1870-71 he commanded this regiment in the army of the Rhine, until promoted to be general of brigade on the 30th of August. At the battle of Sedan he led the brigade of Chasseurs d'Afrique in the heroic charge of General Margueritte's cavalry division, which extorted the admiration of the old king of Prussia. Made prisoner of war at the capitulation, he returned to France during the siege of Paris by the French army of Versailles, and com- manded a brigade against the Communists. In the suppression of the Commune he did his duty rigorously and inflexibly, and on that ground earned a reputation for severity, which, throughout his later career, and in all his efforts to improve the French army, made him the object of unceasing attacks in the press and the chamber of deputies. In 1872 he took command of the Batna subdivision of Algeria, and commanded an expedition against El Golea, surmounting great difficulties in a rapid march across the desert, and inflicting severe chastisement on the revolted tribes. On the general reorganization of the army he commanded the 31st infantry brigade. Promoted general of division in 1875, he successively commanded the 15th infantry division at Dijon, the IX. army corps at Tours, and in 1882 the XII. army corps at Limoges. In 1885 he became a member of the Conseil Sup6rieur de la Guerre. He conducted the cavalry manceuvres in successive years, and attained a European reputation on all cavalry questions, and, indeed, as an army commander. Decorated with the grand cross of the Legion of Honour in 1887, he received the military medal for his able conduct of the autumn manceuvres in 1891, and after again commanding at the manceuvres of 1894 he retired from the active list. Afterwards he took an important part in French politics, as war minister (22nd of June 1899 to 29th of May 1900) in M. Waldeck-Rousseau's cabinet, and distinguished himself by the firmness with which he dealt with cases of unrest in the army, but he then retired into private life, and died on the 8th of July 1909.

GALLIO, JUNIUS ANNAEUS (originally Lucius Annaeus Novatus), son of the rhetorician L. Annaeus Seneca and the elder brother of L. Annaeus Seneca the philosopher, was born at Corduba (Cordova) about the beginning of the Christian era. At Rome he was adopted by L. Junius Gallio, a rhetorician of some repute, from whom he took the name of Junius Gallio. His brother Seneca, who dedicated to him the treatises De Ira and De Vita Beata, speaks of the charm of his disposition, also alluded to by the poet Statius (Silvae, ii. 7, 3 2) . It is probable that he was banished to Corsica with his brother, and that both returned together to Rome when Agrippina selected Seneca

to be tutor to Nero. Towards the close of the reign of Claudius, Gallio was proconsul of the newly constituted senatorial province of Achaea, but seems to have been compelled by ill-health to resign the post within a few years. During his tenure of office (in 53) he dismissed the charge brought by the Jews against the apostle Paul (Acts xviii.). His behaviour on this occasion (" But Gallio cared for none of these things ") shows the impartial attitude of the Roman officials towards Christianity in its early days. He survived his brother Seneca, but was subsequently put to death by order of Nero (in 65) or committed suicide.

Tacitus, Annals, xv. 73; Dio Cassius lx. 35, Ixii. 25; Sir W. M. Ramsay, St Paul the Traveller, pp. 257-261 ; art. in Hastings' Diet, of the Bible (H. Cowan). An interesting reconstruction is given by Anatole France in Sur la pierre blanche.

GALLIPOLI (anc. Callipolis) , a seaport town and episcopal see of Apulia, Italy, in the province of Lecce, 31 m. S. by W. of it by rail, 46 ft. above sea-level. Pop. (1901) town, 10,399; com- mune, 13,459. It is situated on a rocky island in the Gulf of Taranto, but is united to the mainland by a bridge, protected by

a castle constructed by Charles I. of Anjou. The other fortifica- tions have been removed. The handsome cathedral dates from 1629. The town was once famous for its exports of olive-oil, which was stored, until it clarified, in cisterns cut in the rock. This still continues, but to a less extent; the export of wine, however, is increasing, and fruit is also exported.

The ancient Callipolis was obviously of Greek origin, as its name (" beautiful city ") shows. It is hardly mentioned in ancient times. Pliny tells us that in his time it was known as Anxa. It lay a little off the road from Tarentum to Hydruntum, but was reached by a branch from Aletium (the site is marked by the modern church of S. Maria della Lizza), among the ruins of which many Messapian inscriptions, but no Latin ones, have been found. (T. As.)

GALLIPOLI (Turk. Gelibolu, anc. KaAAuroXis) , a seaport and city of European Turkey, in the vilayet of Adrianople; at the north-western extremity of the Dardanelles, on a narrow peninsula 132 m. W.S.W. of Constantinople, arid 90 m. S. of Adrianople, in 40° 24′ N.

and 26° 40′ 30″ E. Pop. (1905) about 25,000. Nearly opposite is Lapsaki on the Asiatic side of the channel, which is here about 2 m. wide. Gallipoli has an unattractive appear- ance; its streets are narrow and dirty, and many of its houses are built of wood, although there are a few better structures, occupied by the foreign residents and the richer class of Turkish citizens. The only noteworthy buildings are the large, crowded and well-furnished bazaars with leaden domes. There are several mosques, none of them remarkable, and many interesting Roman and Byzantine remains, especially a magazine of the emperor Justinian (483-565), a square castle and tower attributed to Bayezid I. (1389-1403), and some tumuli on the south, popularly called the tombs of the Thracian kings. The lighthouse, built on a cliff, has a fine appearance as seen from the Dardanelles. Gallipoli is the seat of a Greek bishop. It hastwogoodharbours, and is the principal station for the Turkish fleet. From its position as the key of the Dardanelles, it was occupied by the allied French and British armies in 1854. Then the isthmus a few miles north. of the town, between it and Bulair> was fortified with strong earthworks by English and French engineers, mainly on the lines of the old works constructed in 1357. These fortifica- tions were renewed and enlarged in January 1878, on the Russians threatening to take possession of Constantinople. The peninsula thus isolated by the fortified positions has the Gulf of Saros on the N.W., and extends some 50 m. S.W. The guns of Gallipoli command the Dardanelles just before the strait joins the Sea of Marmora. The town itself is not very strongly fortified, the principal fortifications being farther down the Dardanelles, where the passage is narrower.

The district (sanjak) of Gallipoli is exceedingly fertile and well adapted for agriculture. It has about 100,000 inhabitants, and comprises four kazas (cantons), namely, (1) Maitos, noted for its excellent cotton; (2) Keshan, lying inland north of Gallipoli,

and bran are manufactured in the district. Live stock, principally sheep, pass through Gallipoli in transit to Constantinople and Smyrna. Cheese, sardines, goats' skins and sheepskins are also exported. The imports include woollen and cotton fabrics from Italy, Germany, France and Great Britain, and hardware from Germany and Austria. These goods are imported through Constantinople. Cordage is chiefly obtained from Servia. Other imports are fuel, iron and groceries.

The Macedonian city of Callipolis was founded in the 5th century B.C. At an early date it became a Christian bishopric, and in the middle ages developed into a great commercial city, with a

population estimated at 100,000. It was fortified by the East Roman emperors owing to its commanding strategic position and its valuable trade with Greece and Italy. In n 90 the armies of the Third Crusade, under the emperor Frederick I. (Barbarossa), embarked here for Asia Minor. After the capture of Constantinople by the Latins in 1204, Gallipoli passed into the power of Venice. In 1294 the Genoese defeated a Venetian force in the neighbourhood. A body of Catalans, under Roger Florus, established themselves here in 1306, and after the death of their leader massacred almost all the citizens; they were vainly besieged by the allied troops of Venice and the Empire, and with- drew in 1307, after dismantling the fortifications. About the middle of the 14th century the Turks invaded Europe, and Galli- poli was the first city to fall into their power. The Venetians under Pietro Loredano defeated the Turks here in 1416.

GALLIPOLIS, a city and the county-seat of Gallia county, Ohio, U. S. A., on the Ohio river, about 125 m. E. by S. of Cincinnati. Pop. (1S90) 4498; (1900) 5432 (852 negroes); (1910) 5560. It is served by the kan-wlia & Michigan (Ohio Central Lines) and the Hocking Valley railways, and (at Gallipolis Ferry, West Virginia, across the Ohio) by the Baltimore & Ohio railway. The city is built on a level site several feet above the river's high-water mark. It has a United States marine hospital and a state hospital for epileptics. Among the city's manufactures are lumber, furniture, iron, stoves, flour and brooms. The muni- cipality owns and operates its waterworks. Gallipolis was settled in 1790 by colonists from France, who had received worthless deeds to lands in Ohio from the Scioto Land Company, founded by Col. William Duer (1 747-1 799) and others in 1787 and officially organized in 1789 as the Compagnie du Scioto in Paris by Joel Barlow, the agent of Duer and his associates abroad, William Playfair, an Englishman, and six Frenchmen. This company had arranged with the Ohio Company in 1787 for the use of about 4,000,000 acres, N. of the Ohio and E. of the Scioto, on which the Ohio Company had secured an option only. The dishonesty of those who conducted the sales in France, the unbusinesslike methods of Barlow, and the failure of Duer and his associates to meet their contract with the Ohio Company, caused the collapse of the Scioto Company early in 1790, and two subsequent attempts to revive it failed. Meanwhile about

noted for its cattle-market, and producing grain, linseed and 1 50,000 acres had been sold to prospective settlers in France, and

canary seed; (3) Myriofyto; and (4) Sharkeui or Shar-Koi (Peristeri) on the coast of the Sea of Marmora. Copper ore and petroleum are

worked at Sharkeui, and the neighbourhood formerly produced wine that was highly esteemed and largely exported to France for blending. Heavy taxation, however, amounting to 55% of the value of the wine, broke the spirit of the viticulturists, most of whom uprooted their vines and replanted their lands with mulberry trees, making sericulture their occupation.

There are no important industrial establishments in Gallipoli itself, except steam flour-mills and a sardine factory. The line of railway between Adrianople and the Aegean Sea has been prejudicial to the transit trade of Gallipoli, and several attempts have heen made to obtain concessions for the construction of a railway that would connect this port with the Turkish railway system. Steamers to and from Constantinople call regularly. In 1904 the total value of the exports was £80,000. Wheat and maize are exported to the Aegean islands and to Turkish ports on the mainland; barley, oats and linseed to Great Britain; canary seed chiefly to Australia ; beans to France and Spain. Semolina

in October 1790 the French immigrants, who had been detained for two months at Alexandria, Virginia, arrived on the site of Gallipolis, where rude huts had been built for them. This land, however, fell within the limits of the tract bought outright by the Ohio Company, which sold it to the Scioto Company, and to which it reverted on the failure of the Scioto Company to pay. In 1794 William Bradford, attorney-general of the United States, decided that all rights in the 4,000,000 acres, on which the Ohio Company had secured an option for the Scioto Company, were legally vested in the Ohio Company. In 1795 the Ohio Company sold to the French settlers for $1-25 an acre the land they occupied and adjacent improved lots, and the United States government granted to them 24,000 acres in the southern part of what is now Scioto County in 1795; little of this land (still known as the " French Grant "), however, was ever occupied by them. Gallipolis was incorporated as a village in 1842, and was first chartered as a city in 1865.

See Theodore T. Belote, The Scioto Speculation and the French. Settlement at Gallipolis (Cincinnati, 1907), series 2, vol. iii. No. 3 of the University Studies of the University of Cincinnati.

GALLITZIN, DEMETRIUS AUGUSTINE (1770-1840), American

Roman Catholic priest, called " The Apostle of the Alleghanies," was born at the Hague on the 22nd of December 1770. His name is a form of Golitsuin (q.v.), the Russian family from which he came. His father, Dimitri Alexeievich Gallitzin (1735-1803), Russian ambassador to Holland, was an intimate friend of Voltaire and a follower of Diderot; so, too, for many years was his mother, Countess Adelheid Amalie vcn Schmettau (1748-1806), until a severe illness in 1786 led her back' to the Roman Catholic church, in which she had been reared. At the age of seventeen he too became a member of that church. His father had planned for him a diplomatic or military career, and in 1792 he was aide-de-camp to the commander of the Austrian troops in Brabant; but, after the assassination of the king of Sweden, he, like all other foreigners, was dismissed from the service. He then set out to complete his education by travel, and on the 28th of October 1792 arrived in Baltimore, Maryland, where he finally decided to enter the priesthood. He was ordained priest in March 1795, being the first Roman Catholic priest ordained in America, and then worked in the mission at Port Tobacco, Maryland, whence he was soon transferred to the Conewago district. His impulsive objection to some of Bishop Carroll's instructions was sharply rebuked, and he was recalled to Baltimore. But in 1 796 he removed to Taneytown, Maryland, and in both Maryland and Pennsylvania worked with such mis- directed zeal and autocratic manners that he was again reproved by his bishop in 1798. In the Alleghanies, in 1799, he planned a settlement in what is now Cambria county, Pennsylvania, and bought up much land which he gave or sold at low prices to Catholic immigrants, spending $150,000 or more in the purchase of some 20,000 acres in a spot singularly ill suited for such an enterprise. In 1808, after his father's death, he was disinherited by the emperor Alexander I. of Russia " by reason of your Catholic faith and your ecclesiastical profession "; and although his sister Anne repeatedly promised him his half of the valuable estate and sent him money from time to time, after her death her brother received little or nothing from the estate. The priest, who after his father's death had in 1809 discarded the name of Augustine Smith, under which he had been naturalized, and had taken his real name, was soon deeply in debt. No small part was a loan from Charles Carroll, and when Gallitzin was suggested for the see of Philadelphia in 1814, Bishop Carroll gave as an objec- tion Gallitzin's " great load of debt rashly, though for excellent and charitable purposes, contracted." In 1815 Gallitzin was sug- gested for the bishopric of Bardstown, Kentucky, and in 1827 for the proposed see of Pittsburg, and he refused the bishopric of Cincinnati. He died at Loretto, the settlement he had founded in Cambria

county, on tne 6th of May 1840. Among his parishioners Gallitzin was a great power for good. His part in building up the Roman Catholic Church in western Pennsylvania cannot be estimated; but it is said that at his death there were 10,000 members of his church in the district where forty years before he had found a scant dozen. One of the villages he founded bears his name. Among his controversial pamphlets are: A Defence of Catholic Principles (1816), Letter to a Protestant Friend on the Holy Scriptures (1820), Appeal to the Protestant Public (1834), and Six Letters of Advice (1834), in reply to attacks on the Catholic Church by a Presbyterian synod.

See Sarah M. Brownson, Life of D. A. Gallitzin, Prince and Priest (New York, 1873); a brief summary of his life by A. A. Lambing in American Catholic Records (Pittsburg, Pennsylvania, October 1886, pp. 58-68) ; and a good bibliography by Thomas C. Middleton in The Gallitzin Memorandum Booh, in American Catholic Historical Society of Philadelphia, Records, vol. 4, pp. 32 sqq.

GALLIUM (symbol Ga; atomic weight 69-9), one of the metallic chemical elements. It was discovered in 1875 through its spectrum, in a specimen of zinc blende by Lecoq de Boisbaudran (Comples rendus, 1875, 81, p. 493, and following years). The chief chemical and physical properties of gallium had been predicted many years before by D. Mendeleeff (c. 1869) from a consideration of the properties of aluminium, indium and zinc (see Element). The metal is obtained from zinc blende (which only contains it in very small quantity) by dissolving the mineral in an acid, and

precipitating the gallium by metallic zinc. The precipitate is dissolved in hydrochloric acid and foreign metals are removed by sulphuretted hydrogen; the residual liquid being then fraction- ally precipitated by sodium carbonate, which throws out the gallium before the zinc. This precipitate is converted into gallium sulphate and finally into a pure specimen of the oxide, from which the metal is obtained by the electrolysis of an alkaline solution. Gallium crystallizes in greyish-white octahedra which melt at 30- 15° C. to a silvery-white liquid. It is very hard and but slightly malleable and flexible, although in thin plates it may be bent several times without breaking. The specific gravity Of the solidformis 5-956 (24-5° C.), of the liquid 6-069, whilst the specific heats of the two varieties are, for the solid form 0-079 (12-23° C.) and for the liquid 0-082 (106-119°) [M. Berthelot, Comples rendus, 1878, 86, p. 786]. It is not appreciably volatilized at a red heat. Chlorine acts on it readily in the cold, bromine not so easily,and iodine only when the mixture is heated. The atomic weight of gallium has been determined by Lecoq de

Boisbaudran by ignition of gallium ammonium alum, and also by L. Meyer and K. Seubert.

Gallium oxide Ga 2 Os is obtained when the nitrate is heated, or by solution of the metal in nitric acid and ignition of the nitrate. It forms a white friable mass which after ignition is insoluble in acids. On heating to redness in a stream of hydrogen it forms a bluish mass which is probably a lower oxide of composition GaO. Gallium forms colourless salts, which in neutral dilute aqueous solutions are converted on heating into basic salts. The gallium salts are pre- cipitated by alkaline carbonates and by barium carbonate, but not by sulphuretted hydrogen unless in acetic acid solution. Potassium ferrocyanide gives a precipitate even in very dilute solution. In neutral solutions, zinc gives a precipitate of gallium oxide. By heating gallium in a regulated stream of chlorine the dichloride GaCl 2 is obtained as a crystalline mass, which melts at 164 C. and readily decomposes on exposure to moist air. The trichloride GaCU is similarly formed when the metal is heated in a rapid stream of chlorine, and may be purified by distillation in an atmosphere of nitrogen. It forms very deliquescent long white needles melting at 75‘5 C. and boiling at 2 1 5-220 °C. The bromide, iodide and sulphate are known, as is also gallium ammonium alum. Gallium is best detected by means of its spark spectrum, which gives two violet lines of wave length 4171 and 4031.

GALLON, an English measure of capacity, usually of liquids, but also used as a dry measure for corn. A gallon contains four quarts. The word was adapted from an O. Norm. Fr. galon, Central Fr. jalon, and was Latinized as galo and galona. It appears to be connected with the modern French jale, a bowl, but the ultimate origin is unknown; it has been referred without much plausibility to Gr. yavXds, a milk pail. The British imperial gallon of four quarts contains 277-274 cub. in. The old English wine gallon of 231 cub. in. capacity is the standard gallon of the United States.

GALLOWAY, JOSEPH (1731-1803), American lawyer and politician, one of the most prominent of the Loyalists, was born in West River, Anne Arundel county, Maryland, in 1731. He early removed to Philadelphia, where he acquired a high standing as a lawyer. From 1756 until 1774 (except in 1764) he was one of the most influential members of the Pennsylvania Assembly, over which he presided in 1766-1773. During this period, with his friend Benjamin Franklin, he led the opposition to the Pro- prietary government, and in 1764 and 1765 attempted to secure a royal charter for the province. With the approach of the crisis in the

relations between Great Britain and the American colonies he adopted a conservative course, and, while recognizing the justice of many of the colonial complaints, discouraged radical action and advocated a compromise. As a member of the First Continental Congress, he introduced (28th September 1774) a " Plan of a Proposed Union between Great Britain, and the Colonies," and it is for this chiefly that he is remembered. It provided for a president-general appointed by the crown, who should have supreme executive authority over all the colonies, and for a grand council, elected triennially by the several pro- vincial assemblies, and to have such " rights, liberties and privileges as are held and exercised by and in the House of Commons of Great Britain "; the president-general and grand council were to be " an inferior distinct branch of the British legislature, united and incorporated with it." The assent of the

grand council and of the British parliament was to be " requisite to the validity of all . . . general acts or statutes," except that " in time of War, all bills for granting aid to the crown, prepared by the grand council and approved by the president-general, shall be valid and passed into a law, without the assent of the British parliament." The individual colonies, however, were to retain control over their strictly internal affairs. The measure was debated at length, was advocated by such influential members as John Jay and James Duane of New York and Edward Rutledge of South Carolina, and was eventually defeated only by the vote of six colonies to five. Galloway declined a second election to Congress in 1775, joined the British army at New Brunswick, New Jersey (December 1776), advised the British to attack Philadelphia by the Delaware, and during the British occupation of Philadelphia (1 777-1 778) was superintendent of the port, of prohibited articles, and of police of the city. In October 1778 he went to England, where he remained until his death at Watford, Hertfordshire, on the 29th of August 1803. After he left America his life was attainted, and his property, valued at £40,000, was confiscated by the Pennsylvania Assembly, a loss for which he received a partial recompense in the form of a small parliamentary pension. He was one of the clearest thinkers and ablest political writers among the American Loyalists, and, according to Prof. Tyler, " shared with Thomas Hutchinson the supreme place among American statesmen opposed to the Revolution."

Among his pamphlets are A Candid Examination of the Mutual

Claims of Great Britain and the Colonies (1775); Historical and Political Reflections on the Rise and Progress of the American Rebellion (1780); Cool Thoughts on the Consequences to Great Britain of American Independence (1780); and The Claim of the American Loyalists Reviewed and Maintained upon Incontrovertible Principles of Law and Justice (1788).

See Thomas Balch (Ed.), The Examination of Joseph Galloway by a Committee of the House of Commons (Philadelphia, 1855) > Ernest H. Baldwin, Joseph Galloway, the Loyalist Politician (New Haven, 1903) ; and M. C. Tyler, Literary History of the American Revolution (2 vols., New York, 1897).

GALLOWAY, THOMAS (1796-1851), Scottish mathematician, was born at Symington, Lanarkshire, on the 26th of February 1796. In 181 2 he entered the university of Edinburgh, where he distinguished himself specially in mathematics. In 1823 he was appointed one of the teachers of mathematics at the military college of Sandhurst, and in 1833 he was appointed actuary to the Amicable Life Assurance Office, the oldest institution of that kind in London; in which situation he remained till his death on the 1 st of November 1851. Galloway was a voluminous, though, for the most part, an anonymous writer. His most interesting paper is " On the Proper Motion of the Solar System," and was published in the Phil. Trans., 1847. He contributed largely to the seventh edition of the Encyclopaedia Britannica, and also wrote several scientific papers for the Edinburgh Review and various scientific journals. His Encyclopaedia article, " Prob- ability," was published separately.

See Transactions of th-e Royal Astronomical Society (1852).

GALLOWAY, a district in the south-west of Scotland, com- prising the counties of Kirkcudbright and Wigtown. It was the Novantia of the Romans, and till the end of the 12th cen- tury included Carrick, now the southern division of Ayrshire. Though the designation has not been adopted civilly, its use historically and locally has been long established. Thus the Bruces were lords of Galloway, and the title of earl of Galloway (created 1623) is now held by a branch of the Stewarts. Galloway also gives its name to a famous indigenous breed of black hornless cattle. See Kirkcudbrightshire and Wigtownshire.

GALLOWS 1 (a common Teutonic word — cf. Goth, galga, O.-H. Ger. galgo, Mod. Ger. Galgen, A.S. galzan, &c— of uncertain

1 The word " gallows " is the plural of a word (galwe, galowe,

gallow) which, according to the New English Dictionary, was occasionally used as late as the 17th century, though from the 13th century on- wards the plural form was more usual. Caxton speaks both of " a gallows," and, in the older form, of " a pair of gallows," this referring probably to the two upright posts. From the 16th century Onwards

gallows " has been consistently treated as a singular form, a new plural, " gallowses," having come into use. " The latter, though

origin), the apparatus for executing the sentence of death by hanging. It usually consists of two upright posts and a cross- beam, but sometimes of a single upright with a beam projecting from the top. The Roman gallows was the cross, and in the older translations of the Bible " gallows " was used for the cross on which Christ suffered (so galga in Ulfilas's Gothic Testament). 2 Another form of gallows in the middle ages was that of which the famous example at Montfaucon near Paris was the type. This was a square structure formed of columns of masonry connected in each tier with cross- pieces of wood, and with pits beneath, into which the bodies fell after disarticulation by exposure tc the weather.

According to actual usage the condemned man stands on a platform or drop (introduced in England in 1760), the rope hangs from the cross-beam, and tjie noose at its end is placed round his neck. He is hanged by the falling of the drop, the knot in the noose being so adjusted that the spinal cord is broken by the fall and death instantaneous. In old times the process was far less merciful; sometimes the condemned man stood in a cart, which was drawn away from under him; sometimes he had to mount a ladder, from which he was thrust by the hangman. Until 1832 malefactors in England were sometimes hanged by being drawn up from the platform by a heavy weight at the other end of the rope. Death in these cases was by strangulation. At the present time executions in the United Kingdom are private, the gallows being erected in a chamber or enclosed space set apart for the purpose inside the gaol.

The word " gibbet," the Fr. gibet, gallows, which appears in the first instance to have meant a crooked stick, 3 was originally used in English synonymously with gallows, as it sometimes still is. Its later and more special application, however, was to the upright posts with a projecting arm on which the bodies of criminals were suspended after their execution. These gibbets were erected in conspicuous spots, on the tops of hills (Gallows Hill is still a common name) or near frequented roads. The bodies, smeared with pitch to prevent too

rapid decomposition, hung in chains as a warning to evildoers. From the gruesome custom comes the common use of the word " to gibbet " for any holding up to public infamy or contempt.

GALLS. In animals galls occur mostly on or under the skin of living mammals and birds, and are produced by Acaridea, and by dipterous insects of the genus Oestrus. Signor Moriggia 4 has described and figured a horny excrescence, nearly 8 in. in length, from the back of the human hand, which was caused by Acarus domesticus. What are commonly known as galls are vegetable excrescences, and, according to the definition of Lacaze-Duthiers, comprise " all abnormal vegetable productions developed on plants by the action of animals, more particularly by insects, whatever may be their form, bulk or situation." For the larvae of their makers the galls provide shelter and sustenance. The exciting cause of the hypertrophy, in the case of the typical galls, appears to be a minute quantity of some irritating fluid, or virus, secreted by the female insect, and deposited with her egg in the puncture made by her ovipositor in the cortical or f oliaceous parts of plants. This virus causes the rapid enlargement and subdivision of the cells affected by it, so as to form the tissues of the gall. Oval or larval irritation also, without doubt, plays an important part in the formation of many galls. Though, as Lacaze-Duthiers remarks, a certain relation is necessary between the " stimulus " and the " supporter of the stimulus," as evidenced by the limita- tion in the majority of cases of each species of gall-insect to some one vegetable structure, still it must be the quality of the irritant

not strictly obsolete, is now seldom used ; the formation is felt to be somewhat uncouth, so that the use of the word in the plural in commonly evaded " (New Eng. Diet. s.v. " Gallows "). 2 In Med. Lat. " gallows " was translated by furia and patibulum, both words applied in classical Latin to a fork-shaped instrument of punishment fastened on the neck of slaves and criminals. Furia, in feudal law, was the right granted to tenants having major juris- diction to erect a gallows within the limits of their fief.

3 Cf. Wace, Roman de Rou, iii. 8349 :

" Et il a le gibet saisi

Qui a son destre braz pendi."

4 Quoted in Zoological Record, iv. (1867), p. 192.

of the tissues, rather than the specific peculiarities or the part of the plant affected, that principally determines the nature of the gall. Thus the characteristics of the currant-gall of Spatkegaster baccarum, L., which occurs alike on the leaves and on the flower-stalks of the oak, are obviously due to the act of ovi- position, and not to the functions of the parts producing it; the bright red galls of the saw-fly Nematus gallicola are found oh four different species of willow, Salix fragilis, S. alba, S. caprea and S. cinerea; 1 and the galls of a Cynipid, Biorhiza aptera, usually developed on the rootlets of the oak, have been procured also from the deodar. 2 Often the gall bears no visible resemblance to the structures out of which it is developed; commonly, however, outside the larval chamber, or gall proper, and giving to the gall its distinctive form, are to be detected certain more or less modified special organs of the plant. The gall of Cecidomyia strobilina, formed from willow-buds, is makily a rosette of leaves the stalks of which have had their growth arrested. The small, smooth, seed-shaped gall of the American Cynips seminator, Harris, according to W. F. Bassett, 3 is the petiole, and its ter- minal tuft of woolly hairs the enormously developed pubescence of the young oak-leaf. The moss-like covering of the "bedeguars" of the wild rose, the galls of a Cynfpid, Khodites rosae, represents leaves which have been developed with scarcely any parenchyma between their fibro-vascular bundles; and the " artichoke-galls " or " oak-strobile," produced by Aphilothrix gemmae, L., which insect arrests the development of the acorn, consists of a cupule to which more or less modified leaf-scales are attached, with a peduncular, oviform, inner gall. 4 E. Newman held the view that many oak-galls are pseudobalani or false acorns: " to produce an acorn has been the intention of the oak, but the gall-fly has frustrated the attempt." Their formation from buds which normally would have yielded leaves and shoots is explained by Parfitt as the outcome of an effort at fructification induced by oviposition, such as has been found to result in several plants from injury by insect-agency or otherwise. 6 Galls vary remarkably in size and shape according to the species of their makers. The polythalamous gall of Aphilothrix radicis, found on the roots of old oak-trees, may attain the size of a man's fist; the galls of another Cynipid, Andricus occultus, Tschek, 6 which occurs on the male flowers of Quercus sessiliflora, is 2 millimetres, or

barely a line, in length. Many galls are brightly coloured, as, for instance, the oak-leaf hairy galls of Spathegaster tricolor, which are of a crimson hue, more or less diffused according to exposure to light. The variety of forms of galls is very great. Some are like urns or cups, others lenticular. The " knoppern " galls of Cynips polycera, Gir., are cones having the broad, slightly convex upper surface surrounded with a toothed ridge. Of the Ceylonese galls, " some are as symmetrical as a composite flower when in bud, others smooth and spherical like a berry; some protected by long spines, others clothed with yellow wool formed of long cellular hairs, others with regularly tufted hairs." 7 The characters of galls are constant, and as a rule exceedingly diagnostic, even when, as in the case of ten different gall-gnats of an American willow, Salix humilis, it is difficult or impossible to tell the full- grown insects that produce them from one another. In degree of complexity of internal structure galls differ considerably. Some are monothalamous, and contain but one larva of the gall- maker, whilst others are many-celled and numerously inhabited. The largest class are the unilocular, or simple, external galls, divided by Lacaze-Duthiers into those with and those without a superficial protective layer or rind, and composed of hard, or spongy, or cellular tissue. In a common gall-nut that authority distinguished seven constituent portions: an. epidermis; a subdermic cellular tissue; a spongy and a hard layer, composing

1 P. Cameron, Scottish Naturalist, ii. pp. 11-15.

2 Entomologist, vii. p. 47.

3 See in Proc. Entom. Soc. of London for the Year 1873, p. xvi.

4 See A. Muller, Gardener's Chronicle (1871), pp. 1162 and 1518; and E. A. Fitch, Entomologist, xi. p. 129.

*' Entomologist, vi. pp. 275-278, 339-340. * Verhandl. d. zoolog.-bot. Ges. in Wien, xxi. p. 799. 7 Darwin, Variations of Animals and Plants under Domestication, ii. p. 282.*

the parenchyma proper; vessels which, without forming »' complete investment, underlie the parenchyma; a hard pro- tective layer; and lastly, within that, an alimentary central mass inhabited by the growing larva. 8

Galls are formed by insects of several orders. Among the Hymenoptera are the gall- wasps {Cynips and its allies), which infect the various species of oak. They are small insects, having straight

antennae, and a compressed, usually very short abdomen with the second or second and third segments greatly developed, and the rest imbricated, and concealing the partially coiled ovipositor. The transformations from the larval state are completed within the gall, out of which the imago, or perfect insect, tunnels its way, — usually in autumn, though sometimes, as has been observed of some individuals of Cynips Kollari, after hibernation.

Among the commoner of the galls of the Cynipidae are the "oak-apple" or "oak-sponge" of Andricus terminalis, Fab.; the " currant " or " berry galls " of Spathegaster baccarum, L., above mentioned; and the " oak-spangles " of Neuroterus lenlicularis, 3 Oliv., generally reputed to be fungoid growths, until the discovery of their true nature by Frederick Smith, 10 and the succulent " cherry-galls " of Dryophanla scutellaris, Oliv. The " marble " or " Devonshire woody galls " of oak-buds, which often destroy the leading shoots of young trees, are pro- duced by Cynips Kollari, 11 already alluded to. They were first introduced into Devonshire about the year 1847, had become common near Birmingham by 1866, and two or three years later were observed in several parts of Scotland. 12 They contain about 17% of tannin. 13 On account of their regular form they have been used, threaded on wire, for making ornamental baskets. The large purplish Mecca or Bussorah galls, 14 produced on a species of oak by Cynips insana, Westw., have been regarded by many writers as the Dead Sea fruit, mad-apples (mala insana), or apples of Sodom (poma sodomitica), alluded to by Josephus and others, which, however, are stated by E. Robinson (Bibl. Researches in Palestine, vol. i. pp. 522-524, 3rd ed., 1867) to be the singular fruit called by the Arabs ' Gsher, produced by the Asclepias gigantea or procera of botanists. What in California are known as " flea seeds " are oak-galls made by a species of Cynips; in August they become detached from the leaves that bear them, and are caused to jump by the spasmodic movements of the grub within the thin-walled gall-cavity. 15

Common gall-nuts, nut-galls, or oak-galls, the Aleppo, Turkey, or Levant galls of commerce (Ger. Gallapfel, levantische, Gallen; Fr. noix de Galle), are produced on Quercus in- fecloria, a variety of Q. Lusitanica, Webb, by Cynips (Diplolepis, Latr.) linctoria, L., or ,C. gallae tinctoriae Oliv. Aleppo galls (gallae halepenses) are brittle, hard, spherical bodies, -f-f in. ilj diameter, ridged and warty on the upper half, and light brown to dark greyish-yellow within. What are termed " blue," " black, "or" green "galls contain the insect; the inferior "white" galls, which are lighter coloured, and not so compact, heavy or astringent, are gathered after its escape (see fig.

1.). Less valued are the galls of Tripoli (Taraplus or Tarabulus, whence the name " Tarablous galls "). The most esteemed Syrian galls, according to Pereira, are those of Mosul on the Tigris. Other varieties of nut-galls, besides the above-mentioned, are employed in Europe for various purposes. Commercial gall-nuts have yielded on analysis from 26 (H. Davy) to 77 (Buchner) % of tannin (see

8 " Recherches pour servir a l'histoire des galles," Ann. des sci. nat. xix. pp. 293 sqq.

9 According to Dr Adler, alternation of generations takes place between N. lenlicularis and Spathegaster baccarum (see E. A. Ormerod, Entomologist, xi. p. 34).

10 See Westwood, Introd. to the Mod. Classif. of Insects, ii. (1840)

P- 130-

11 For figures and descriptions of insect and gall, see Entomologist, iv. p. 17, vii. p. 241, ix. p. 53, xi. p. 131.

12 Scottish Naturalist, i. (1871) p. 116, &c.

13 Vinen, Journ. de pharm. et de chim. xxx. (1856) p. 290; " English Ink-Galls," Pharm. Journ. 2nd ser. iv. p. 520.

14 See Pereira, Materia Medica, vol. ii. pt. i. p. 347; Pharm. Journ- 1st ser. vol. viii. pp. 422-424.

15 See R. H. Stretch and C. D. Gibbes, Proc. California Acad. of Sciences, iv. pp. 265 and 266.

Vinen, loc. cii.), with gallic and ellagic acids, ligneous fibre, water, and minute quantities of proteids, chlorophyll,, resin, free sugar and, in the cells around the inner shelly chamber, calcium oxalate. Oak-galls are mentioned by Theophrastus, Dioscorides (i. 146), and other ancient writers, including Pliny (Nat. Hist. xvi. 9, 10, xxiv. 5), according to whom they may be produced " in a single night." Their insect origin appears to have been entirely unsuspected until within comparatively recent times, though Pliny, indeed, makes the observation that a kind of gnat is

Fig. 1. — a, Aleppo "blue" gall; b, ditto in section, showing central cavity for grub; c, Aleppo "white" gall, perforated by insect; d, the same in section (natural size).

produced in certain excrescences on oak leaves. Bacon describes oak-apples as " an exudation of plants joined with putrefaction." Pomet 1 thought that gall-nuts were the fruit of the oak, and a similar opinion obtains among the modern Chinese, who apply to them the term Mu-shih-tsze, or " fruits for the foodless." 2 Hippocrates administered gall-nuts for their astringent properties, and Pliny (Nat. Hist. xxiv. 5) recommends them as a remedy in affections of the gums and uvula, ulcerations of the mouth and some dozen more complaints. In British pharmacy gall-nuts are used in the preparation of the two astringent ointments unguentum gallae and unguenlum gallae cum opio, and of the Hnctura gallae, and also as a source of tannin and of gallic acid (q.v.). They have from very early times been. resorted to as a means of staining the hair of a dark colour, and they are trie base of the tattooing dye of the Somali Women. 3

The gall-making Hymenoptera include, besides the Cynipidae proper, certain species of the genus Eurytoma (Isosoma, Walsh) and family Chalcididae, e.g. E.hordei, the "joint-worm" of the United States, which produces galls on the stalks of wheat; 4 also various members of the family Tentkredinidae, or saw-flies. The larvae of the latter usually vacate their galls, to spin their cocoons in the earth, or, as in the case of A thalia abdominalis, Klg., of the clematis, may emerge from their shelter to feed for some days on the leaves of the gall-bearing plant.

The dipterous gall-formers include the gall-midges, or gall- gnats (Cecidomyidae) , minute slender-bodied insects, with bodies usually covered with long hairs, and the wings folded over the back. Some of them build cocoons within their galls, others descend to the ground or become pupae. The true willow-galls are the work either of these or of saw-flies. Their galls are to be met with on a great variety of plants of widely distinct genera, e.g. the ash, maple, horn-beam, oak, 5 grape-vine, 6 alder, goose- berry, blackberry, pine, juniper, thistle, fennel, meadowsweet, 7

1 A Complete History 0} Drugs (translation), p. 169 (London, 1748).

2 F. Porter Smith, Contrib. towards the Mat. Medica . . . of China, p. 100 (1871).

3 R. F. Burton, First Footsteps in E. Africa, p. 178 (1856).

4 A. S. Packard, jun., Guide to the Study of Insects, p. 205 (Salem,

1870).

5 On the Cecidomyids of Quercus Cerris, see Fitch, Entomologist, xi. p. 14.

6 See, on Cecidomyia oenephila, Von Haimhoffen, Verhandl. d. zoolog.-bot. Ges. in Wien, xxv. pp. 801-810.

'See Entomologist's Month. Mag. iv. (1868) p. 233; and for figure and description, Entomologist, xi. p. 13.

common cabbage and cereals. In the northern United States, in May, " legions of these delicate minute flies fill the air at twilight, hovering over wheat-fields and shrubbery. A strong north-west wind, at such times, is of incalculable value to the farmer." 8 Other gall-making dipterous flies are members of the family Trypetidae, which disfigure the seed-heads of plants, and of the family Mycetophilidae, such as the species Sciara tilicola," Low, the cause of the oblong or rounded green and red galls of the young shoots and leaves of the lime.

Galls are formed also by hemipterous and homopterous insects of the families Tingidae, Psyllidae, Coccidae and Aphidae. Coccus pinicorticis causes the growth of patches of white flocculent and downy matter on the smooth bark of young trees of the white pine in America. 10 The galls of examples of the last family are common objects on lime-leaves, and on the petioles of the poplar. An American Aphid of the genus Pemphigus pro- duces black, ragged, leathery and cut-shaped excrescences on the young branches of the hickory.

The Chinese galls of commerce (Woo-pei-tsze) are stated to be prbduced by Aphis Chinensis, Bell, on Rhus semialata, Murr. (R. Bucki-amela, Roxb.), an Anacardiaceous tree indigenous to N. India, China and Japan. They are hollow, brittle, irregularly pyriform, tuberculated or branched vesicles, with thin walls, covered externally with a grey down, and internally with a white chalk-like matter, and insect-remains (see fig. 2). The escape of the insect takes place on the spontaneous bursting of the walls of the vesicle, probably when, after viviparous (thelytokous) reproduction for several generations, male winged insects are developed. The galls are gathered before the frosts set in, and are exposed to steam to kill the insects. 11

Chinese galls examined by Viedt 12 yielded 72 % of tannin, and less mucilage than, Aleppo galls. Several other varieties of galls are produced by Aphides on species of Pistacia.

M. J. Lichtenstein has established the fact that from the egg of the Aphis of Pistachio galls, Anopleura lentisci, is hatched an apterous insect (the gall-founder), which gives birth to young Aphides (emigrants), and that these, having acquired wings, fly to the roots of certain grasses (Bromus sterilis and Hordeum vulgare), and by budding underground give rise to several generations of apterous insects, whence finally comes a winged brood (the pupi- fera). These last issuing from the ground fly to the Pistachio, and on it deposit their pupae. From the pupae, again, are developed sexual individuals, the females of which lay fecundated eggs pro- ductive of gall-founders, thus recommencing the biological cycle (see Compt. rend., Nov. 18, 1878, p. 782, quoted in Ann. and Mag. Nat. Hist., 1879, p. 174).

Of other insects which have been recognized as gall-makers

FlG. 2.— a, Chinese gall (abt.' \ natural size); b, ditto broken, showing thin- walled cavity ; c, Japanese gall (natural size).

there are, among the Coleoptera, certain Curculionids (gall- weevils), and species of the exotic Sagridae and Lamiadae,n.iid a»

8 A. S. Packard, jun., Our Common Insects, p. 203 (Salem, U.S. 1873). On the Hessian fly, Cecidomyia destructor, Say, the May brood of which produces swellings immediately above the joints of barley attacked by it, see Asa Fitch, The Hessian Fly (Albany, 1847), reprinted from Trans. New York State Agric. Soc. vol. vi.

9 J. Winnertz, Beitrag zu einer Monographie der Sciarinen, p. 164 (Vienna, 1867).

10 Asa Fitch, First and Second Rep. on the Noxious . . . Insects of the State of New York, p. 167 (Albany, 1856).

11 See E. Doubleday, Pharm. Journ. 1st ser, vol. vii. p. 3 10 : an d> Pereira, ib. vol. iii. p. 377.

12 Dingier' s Polyt. Journ. ccxvi. p. 453.

American beetle, Saperda inornata (Cerambycidae), which forms the pseudo-galls of Salix longifolia and Populus angulata, or cottonwood. Among the Lepidoptera are gall-forming species belonging to the Tineidae, Aegeriidae, Tortricidae and Pterophoridae. The larva of a New Zealand moth, Morova subfasciata, Walk. {Cacoecia gallicolens) , of the family Drepanulidae, causes the stem of a creeping plant, on the pith of which it apparently subsists, to swell up into a fusiform gall. 1

Mite-galls, or acarocecidia, are abnormal growths of the leaves of plants, produced by microscopic Acaridea of the genus Phytoptus (gall-mites), and consist of little tufts of hairs, or of thickened portions of the leaves, usually most hypertrophied on the upper surface, so that the lower is drawn up into the interior, producing a bursiform cavity. Mite-galls occur on the sycamore, pear, plum, ash, alder, vine, mulberry and many other plants; and formerly, e.g. the gall known as Erineum quercinum, on the leaves of Quercus Cerris, were taken for cryptogamic structures. The lime-leaf " nail-galls " of Phytoptus tiliae closely resemble the " trumpet-galls " formed on American vines by a species of Cecidomyia? Certain minute Nematoid worms, as Anguillula scandens, which infests the ears of wheat, also give rise to galls.

Besides the larva of the gall-maker, or the householder, galls usually contain inquilines or lodgers, the larvae of what are termed guest-flies or cuckoo-flies. Thus the galls of Cynips and its allies are inhabited by members of other cynipideous genera, as Synergus, Amblynotus and Synophrus; and the pine-cone-like gall of Salix strobiloides, as Walsh has shown, 2 is made by a. large species of Cecidomyia, which inhabits the heart of the mass, the numerous smaller cecidomyidous larvae in its outer part being mere inquilines. In many instances the lodgers are not of the same order of insects as the gall-makers. Some saw-flies, for example, are inquilinous in the galls of gall-gnats and some gall-gnats in the galls of saw-flies. Again, galls may afford harbour to insects which are not essentially gall-feeders, as in the case of the Curculio beetle Conotrachelius nenuphar, Hbst., of which one brood eats the fleshy part of the plum and peach, and another lives in the " black knot " of the plum-tree, regarded by Walsh as probably a true cecidomyidous gall. The same authority {loc, cit. p. 550) mentions a willow-gall which provides no less than sixteen insec.ts with food and protection; these are preyed upon by about eight others, so that alltogether some twenty-four insects, representing eight orders, are dependent for their existence on what to the common observer appears to be nothing but " an unmeaning mass of leaves." Among the numerous insects parasitic on

the inhabitants of galls are hymenopterous flies of the family Proctotrypidae, and of the family Chalcididae, e.g. Callimome regius, the larva of which preys on the larvae of both Cynips glutinosa and its lodger Synergus facialis. The oak-apple often contains the larvae of Braconidae and Ichneumonidae, which Von Schlechtendal {loc. sup. cit. p. 33) considers to be parasites not on the owner of the gall, A ndricus terminalis, but on inquilinous Tortricidae. Birds are to be included among the enemies of gall-insects. Oak-galls, for example, are broken open by the titmouse in order to obtain the grub within, and the " button-galls " of Neuroterus numis- matis, Oliv., are eaten by pheasants.

A great variety of deformations and growths produced by insects and mites as well as by fungi have been described. They are in some cases very slight, and in others form remarkably large and definite structures. The whole are now included under the term Cecidia; a prefix gives the name of the organism to which the attacks are due, e.g. Phytoptocecidia are the galls formed by Phytoptid mites. Simple galls are those that arise when only one member of a plant is involved ; compound galls

1 For figure aiid description see Zoology of the " Erebus " and " Terror," ii. pp. 46, 47 (1844-1875).

1 On the mite-galls and their makers, see F. Low, " Beitrage zur Naturgesch. der Gallmilben {Phytoptus, Duj.)," Verhandl. d. zoolog.-bot. Ges. in Wien, xxiv. (1874), pp. 2-16, with plate; and " Uber Milbengallen (Acarocecidien) der Wiener-Gegend," ib. pp. 495-508; Andrew Murray, Economic Entomology, Aptera, pp. 331-374 (1876); aaaf'. A. W. Thomas, Altere und neue Beobachtungert uber Phytopto- Cecidien (Halle, 1877).

are the result of attacks on buds. Amongst the most remark- able galls recently discovered we may mention those found on Eucalyptus, Casuarina and other trees and plants in Australia. They are remarkable for their variety, and are due to small scale-insects of the peculiar sub-family Brachyscelinae. As regards the mode of production of galls, the most important distinction is between galls that result from the introduction of an egg, or other matter, into the interior of the plant, and those that are due to an agent acting externally, the gall in the latter case frequently growing in such a manner as ultimately to enclose its producers. The form and nature of the gall are the result of the powers of growth possessed by the plant. It has long been known, and is now generally recognized, that a gall can only be produced when the tissue of a plant is interfered

with during, or prior to, the actual development of the tissue. Little more than this is known. The power that gall-producers possess of influencing by direct interference the growth of the cells of the plant that affords them the means of subsistence is an art that appears to be widely spread among animals, but is at the same time one of which we have little knowledge. The views of Adler as to the alternation of generations of numerous gall-flies have been fully confirmed, it having been ascertained by direct observation that the galls and the insects produced from them in one generation are entirely different from the next generation; and it has also been rendered certain that frequently one of the alternate generations is parthenogenetic, no males being produced. It is supposed that these remarkable phenomena have gradually been evoked by difference in the nutrition of the alternating generations. When two different generations are produced in one year on the same kind of tree it is clear the properties of the sap and tissues of the tree must be diverse so that the two genera- tions are adapted to different conditions. In some cases the alternating generations are produced on different species of trees, and even on different parts of the two species.

On galls and their makers and inhabitants see further — J. T. C. Ratzeburg, Die Forst-Insecten, Teil iii. pp. 53 seq. (Berlin, 1844); T. W. Harris, Insects injurious to Vegetation (Boston, U.S., 2nd ed., 1852); C. L. Koch, Die Pflanzenlduse Aphiden (Nuremberg, 1854); T. Hartig, Die Familien der Blattwespen und Holzwespen (Berlin, i860); Walsh, " On the Insects, Coleopterous, Hymenopterous and Dipterous, inhabiting the Galls of certain species of Willow," Proc. Ent. Soc. Philadelphia, iii. (1863-1864), pp. 543-644, and vi. (1866- 1867), pp. 223-288; T. A. Marshall, " On some British Cynipidae," Ent. Month. Mag. iv. pp. 6-8, &c. ; H.. W. Kidd and Albert Miiller, "A List of Gall-bearing British Plants," ib. v. pp. 118 and 216; G. L. Mayr, Die mitteleuropdischen Eichengallen in Wort und Bild (Vienna, 1870-1871), and the translation of that work, with notes, in the Entomologist, vols. vii. seq.; also, by the same author, "Die Einmiethler der mitteleuropaischen Eichengallen," Verhandl. d. zoolog.-bot. Ges. in Wien, xxii. pp. 669-726; and " Die eu'ropaischen Torymiden," ib. xxiv. pp. 53-142 (abstracted in Cistula entomologica, i., London, 1869-1876); F. Low, " Beitrage zur Kenntnis dei Gallmucken," ib. pp. 143-162, and 321-328; J. E. von Bergenstamm and P. Low, "Synopsis Cecidomyidarum," ib. xxvi. pp. 1-104; Perris, Ann. Soc. Entom. de France, 4th ser. vol. x. pp. 176-185; R. Osten-Sacken, " On the North American Cecidomyidae," Smith- sonian Miscellaneous Collections, vol. vi. (1867), p. 173 ; E. L. Taschen- berg, Entomologie filr Gartner und

*Gartenfreunde (Leipzig, 1 871); J. W. H. Traill, " Scottish Galls," Scottish Naturalist, i. (1871), pp. 123, &C; Albert Miiller, " British Gall Insects," The Entomologist' 's Annual for 1872, pp. 1-22; B. Altum, Forstzoologie, iii." Insecten," pp. 250 seq. (Berlin, 1874) ; J. H. Kaltenbach, Die Pftanzenfeinde aus der Classe der Insecten (Stuttgart, 1874) ; A. d'Arbois de Jubainville and T. Vesque, Les Maladies des plantes cultivees, pp. 98-105 (Paris, 1878). * (F. H. B.)*

GALLUPPI, PASQUALE (17 70-1846), Italian philosopher, was born on the 2nd of April 1770 at Tropea, in Calabria. He was of good family, and after studying at the university of Naples he entered the public service, and was for many years employed in the office of the administration of finances. At the age of sixty, having become widely known by his writings on philosophy, he was called to the chair of logic and metaphysics in the univer- sity of Naples, which he held till his death in November 1846. His most important works are: Letter e filosofiche (1827), in which he traces his philosophical development; Elementi di filosofia (1832); Saggio filosofico sulla critica della conoscenza (1819- 1832); SulV analisi e sulla sintesi (1807); Lezioni di logica t di. tnetafisica (1832-1836); Filosofia della volontd (1832-18,42,

incomplete); Storia delta filosofia (i., 1842); Considerazioni filosofiche sull' idealismo trascendentale (1841), a memoir on the system of Fichte.

On his philosophical views see L. Ferri, Essai sur Vhistoire de la philosophic en Italie au XIX' siicle, i. (1869) ; V. Botta in Ueber- weg's Hist, of Philosophy, ii. app. 2; G. Barzellotti, " Philosophy in Italy," in Mind, iii. (1878); V. Lastrucci, Pasquale Galluppt. Studio critico (Florence, 1 890).

GALLUS, CORNELIUS (c. 70-26 B.C.), Roman poet, orator and politician, was born of humble parents at Forum Julii {Frejus) in Gaul. At an early age he removed to Rome, where he was taught by the same master, as Virgil and Varius Rufus. Virgil, who dedicated one of his eclogues (x.) to him, was in great measure indebted to the influence of Gallus for the restoration of his estate. In political life Gallus espoused the cause of Octavi- anus, and as a reward for his services was made praef ect of Egypt (Suetonius, Augustus, 66). His

conduct in this position after- wards brought him into disgrace with the emperor, and having been deprived of his estates and sentenced to banishment, he put an end to his life (Dio Cassius liii. 23). Gallus enjoyed a high reputation among his contemporaries as a man of intellect, and Ovid {Tristia, iv. 10) considered him the first of the elegiac poets of Rome. He wrote four books of elegies chiefly on his mistress Lycoris (a poetical name for Cytheris, a notorious actress), in which he took for his model Euphorion of Chalcis (q.v.) ; he also translated some of this author's works into Latin. Nothing by him has survived; the fragments of the four poems attributed to him (first published by Aldus Manutius in 1590 and printed in A. Riese's Anthologia Latina, 1869) are generally

regarded as a forgery.

See C. Volker, De C. Galli vita el scriptis (1840-1844) ; A. Nicolas, De la vie et des ouvrages de C. Gallus (1851), an exhaustive monograph. An inscription found at Philae (published 1896) records the Egyptian exploits; see M. Schanz, Geschichte der romischen Litteratur, and Plessis, Poesie latine (1909).

GALLUS, GAIUS AELIUS, praefect of Egypt 26-24 B.C. By order of Augustus he undertook an expedition to Arabia Felix, with disastrous results. The troops suffered greatly from disease, heat, want of water and the obstinate resistance of the in- habitants. The treachery of a foreign guide also added to his difficulties. After six months Gallus was obliged to return to Alexandria, having lost the greater part of his force. He was a friend of the geographer Strabo, who gives an account of the expedition (xvi. pp. 780-782; see also Dio Cassius liii. 29; Pliny, Nat. Hist. vi. 32; C. Merivale, Hist, of the Romans under the Empire, ch. 34; H. Kriiger, Der Feldzug des A. G. nach dem glucklichen Arabien, 1862). He has been identified with the Aelius Gallus frequently quoted by Galen, whose remedies are stated to have been used with success in an Arabian expedition.

GALLUS, GAIUS CESTIUS, governor of Syria during the reign of Nero. When the Jews in Jerusalem, stirred to revolt by the outrages of the Roman procurators, had seized the fortress of Masada and treacherously murdered the garrison of the palace of Herod, Gallus set out from Antioch to restore order. On the 1 7th of November a.d. 66 he arrived before Jerusalem. Having gained possession of the northern suburb, he attacked the temple mount; but, after five days' fighting, just when (according to Josephus) success was within his grasp, he unaccountably with- drew his forces. During his retreat he was closely pursued by the Jews and surrounded in a ravine, and

only succeeded in making good his escape to Antioch by sacrificing the greater part of his army and a large amount of war material. Soon after his return Gallus died (before the spring of 67) , and was succeeded in the governorship by Licinius Mucianus, the prosecution of the war being entrusted to Vespasian.

See Tacitus, Hist. v. 10, 13; Suetonius, Vespasian, 4; Josephus, Bell. Jud. ii. 14-20; E. Schiirer, Hist, of the Jewish People, div. i. vol. ii. p. 212 (Eng. tr., 1890).

*GALLUS, GAIUS SULPICIUS, Roman general, statesman and orator. Under Lucius Aemilius Paulus, his intimate friend, he commanded the 2nd legion in the campaign against Perseus, king of Macedonia, and gained great reputation for having pre- dicted an eclipse of the moon on the night before the battle of Pydna (1*8 B.C.). On his return from Macedonia he was elected*

consul (166), and in the same year reduced the Ligurians to submission. In 164 he was sent as ambassador to Greece and Asia, where he held a meeting at Sardis to investigate the charges brought against Eumenes of Pergamum by the representatives of various cities of Asia Minor. Gallus was a man of great learn- ing, an excellent Greek scholar, and in his later years devoted himself to the study of astronomy, on which subject he is quoted as an authority by Pliny.

See Livy xliv. 37, Epit. 46 ; Polybius xxxi. 9, 10 ; Cicero, Brutus, 20, De officiis, i. 6, De senectute, 14; Pliny, Nat. Hist. ii. 9.

GALOIS, EVARISTE (1811-1832), French mathematician, was born on the 25th of October 181 1, and killed in a duel on the 31st of May 1 83 2 . An obituary notice by his friend Auguste Chevalier appeared in the Revue encyclopidique (1832); and his collected works are published, Journal de Liouvtile (1846), pp. 381-444, about fifty of ˆhese pages being occupied by researches on the resolubility of algebraic equations by radicals. This branch of algebra he notably enriched, and to him is also due the notion of a group of substitutions (see Equation: Theory of Equations; also Groups, Theory of).

His collected works, with an introduction by C. F. Picard, were published in 1897 at Paris.

GALSTON, a police burgh and manufacturing town of Ayrshire, Scotland. Pop. (1901) 4876. It is situated on the Irvine, 5 m. E. by S. of Kilmarnock, with a station on the Glasgow & South- Western

railway. The manufactures include blankets, lace, muslin, hosiery and paper-millboard, and coal is worked in the vicinity. About 1 m. to the north, amid the " bonnie woods and braes," is Loudoun Castle, a seat of the earl of Loudoun.

GALT, SIR ALEXANDER TILLOCH (1817-1893), Canadian statesman, was the youngest son of John Gait the author. Born in London on the 6th of September 1817, he emigrated to Canada in 1835, and settled in Sherbrooke, in the province of Quebec, where he entered the service of the British American Land Com- pany, of which he rose to be chief commissioner. Later he was one of the contractors for extending the Grand Trunk railway westward from Toronto. He entered public life in 1849 as Liberal member for the county of Sherbrooke, but opposed the chief measure of his party, the Rebellion Losses Bill, and in the same year signed a manifesto in favour of union with the United States, believing that in no other way could Protestant and Anglo- Saxon ascendancy over the Roman Catholic French majority in his native province be maintained. In the same year he retired from parliament but re-entered it in 1853, and was till 1872 the chief representative of the English-speaking Protestants of Quebec province. On the fall of the Brown-Dorion administra- tion in 1858 he was called on to form a ministry, but declined the task, and became finance minister under Sir John Macdonald and Sir George Cartier on condition that the federation of the British North American provinces should become a part of their programme. From 1858 to 1862 and 1864 to 1867 he was finance minister, and did much to reduce the somewhat chaotic finances of Canada into order. To him are due the introduction of the decimal system of currency and the adoption of a system of protection to Canadian manufactures. To his diplomacy was due the coalition in 1864 between Macdonald, Brown and Cartier, which carried the federation of the British North American provinces, and throughout the three years of negotiation which followed his was one of the chief influences. He became finance minister in the first Dominion ministry, but suddenly and mysteriously resigned on the 4th of November 1867. After his retirement he gave to the administration of Sir John Macdonald a support which grew more and more fitful, and advocated independence as the final destiny of Canada. In 1871 he was again offered the ministry of finance on condition of abandoning these views, but declined. In 1877 he was the Canadian nominee on the Anglo-American fisheries commission at Halifax, and rendered brilliant service. In 1880 he was appointed Canadian high commissioner to Great Britain, but retired in 1883 in favour of Sir Charles Tupper. During this period he advocated

imperial federation. He was Canadian delegate at the Paris Monetary Conference of 1881, and to the International Exhibition of Fisheries in 1883. From this date till his death on the 19th of

September 1893 he lived in retirement. No Canadian statesman has had sounder or more abundant ideas, but a certain intellectual fickleness made him always a somewhat untrustworthy colleague in political life. (W. L. G.)

GALT, JOHN (1779-1839), Scottish novelist, was born at Irvine, Ayrshire, on the 2nd of May 1779. He received his early education at Irvine and Greenock, and read largely from one of the public libraries while serving as a clerk in a mercantile office. In 1804 he went to settle in London, where he published anony- mously a poem on the Battle of Largs. After unsuccessful attempts to succeed in business Gait entered at Lincoln's Inn, but was never called to the bar. He obtained a commission from a British firm to go abroad to find out whether the Berlin and Milan decrees could be evaded. He met Byron and Sir John Hobhouse at Gibraltar, travelled with Byron to Malta, and met him again at Athens. He was afterwards employed by the Glasgow merchant Kirkman Finlay on sirmlar business at Gibraltar, and in 1814 visited France and Holland. His early works are the Life and Administration of Wolsey, Voyages and Travels, Letters from the Levant, the Life of Benjamin West, Historical Pictures and The Wandering Jew; and he induced Colburn to publish a periodical containing dramatic pieces rejected by London managers. These were afterwards edited by Gait as the New British Theatre, which included some plays of his own. He first showed his real power as a writer of fiction in The Ayrshire Legatees, which appeared in Blackwood's Magazine in 1820. This was followed in 182 1 by his masterpiece — The Annals of the Parish; and, at short intervals, Sir Andrew Wylie, The Entail, The Steam-Boat and The Provost were published. These humorous studies of Scottish character are all in his happiest manner. His next works were Ringan Gilhaize (1823), a story of the Covenanters; The Spaewife (1823), which relates to the times of James I. of Scotland; Rolhelan (1824), a novel founded on the reign of Edward III.; The Omen (1825), which was favourably criticized by Sir Walter Scott; and The Last of the Lairds, another picture of Scottish life.

In 1826 he went to America as secretary to the Canada Land

Company. He carried out extensive schemes of colonization, and opened up a road through what was then forest country between Lakes Huron and Erie. In 1827 he founded Guelph in upper Canada, passing on his way the township of Gait on the Grand river, named after him by the Hon. William Dixon. But all this work proved financially unprofitable to Gait. In 1829 he returned to England commercially a ruined man, and devoted himself with great- ardour to literary pursuits, of which the first fruit was Lawrie Todd — one of his best novels. Then came Southennan, a tale of Scottish life in the times of Queen Mary. In 1830 he was appointed editor of the Courier newspaper — a post he soon relinquished. His untiring industry was seen in the publication, in rapid succession, of a Life of Byron, Lives of the Players, Bogle Corbet, Stanley Buxton, The Member, The Radical, Eben Erskine, The Stolen Child, his Autobiography, and a col- lection of tales entitled Stories of the Study. In 1834 appeared his Literary Life and Miscellanies, dedicated by permission to William IV., who sent the author a present of £200. As soon as this work was published Gait retired to Greenock, where he continued his literary labours till his death on the nth of April

1839-

Gait, like almost all voluminous writers, was exceedingly unequal. His masterpieces are The Ayrshire Legatees, The Annals of the Parish, Sir Andrew Wylie, The Entail, The Provost and Lawrie Todd. The Ayrshire Legatees gives, in the form of a number of exceedingly diverting letters, the adventures of the Rev. Dr Pringle and his family in London. The letters are made the excuse for endless tea-parties and meetings of kirk-session in the rural parish of Garnock. The Annals of the Parish are told by the Rev. Micah Balwhidder, Gait's finest character. This work (which, be it remembered, existed in MS. before Waverley was published) is a splendid picture of the old-fashioned Scottish pastor and the life of a country parish; and, in rich humour, genuine pathos and truth to nature it is unsurpassed even by Scott. It is a fine specimen of the homely graces of the Scottish

dialect, and preserves much vigorous Doric phraseology fast pass- ing out of use even in country districts. In this novel Mr Gait used, for the first time, the term " Utilitarian," which afterwards became so intimately associated with the doctrines of John Stuart Mill and Bentham (see Annals of the Parish, chap, xxxv., and a note by Mill in Utilitarianism, chap. ii.). In Sir Andrew Wylie the hero entered London as a poor lad, but achieved re- markable success by his

shrewd business qualities. The character is somewhat exaggerated, but excessively amusing. The Entail was read thrice by Byron and Scott, and is the best of Gait's longer novels. Leddy Grippy is a wonderful creation, and was considered by Byron equal to any female character in literature since Shakespeare's time. The Provost, in which Provost Pawkie tells his own story, portrays inimitably the jobbery, bickerings and self-seeking of municipal dignitaries in a quaint Scottish burgh. In Lawrie Todd Gait, by giving us the Scot in America, accomplished a feat which Sir Walter never attempted. This novel exhibits more variety of style and a greater love of nature than his other books. The life of a settler is depicted with unerring pencil, and with an enthusiasm and imaginative power much more poetical than any of the author's professed poems.

The best of Gait's novels were reprinted in Blackwood's Standard Novels, to volume i. of which his friend Dr Moir prefixed a memoir.

GALT, a town in Waterloo county, Ontario, Canada, 23 m. N.N.W. of Hamilton, on the Grand river and on the Grand Trunk and Canadian Pacific railways. Pop. (1881) 5187; (1901) 7866. It is named after John Gait, the author. It has excellent water privileges which furnish power for flour-mills and for manu- factures of edge tools, castings, machinery, paper and other industries.

GALTON, SIR FRANCIS (1822-), English anthropologist, son of S. T. Galton, of Duddeston, Warwickshire, was born on the 16th of February 1822. His grandfather was the poet-naturalist Erasmus Darwin, and Charles Darwin was his cousin. After attending King Edward VI. 's grammar school, Birmingham, he studied at Birmingham hospital, and afterwards at King's College, London, with the intention of making medicine his pro- fession; but after taking his degree at Trinity College, Cambridge, in 1843 he changed his mind. The years 1845-1846 he spent in travelling in the Sudan, and in 1850 he made an exploration, with Dr John Anderson, of Damaraland and the Ovampo country in south-west Africa, starting from Walfisch Bay. These tracts had practically never been traversed before, and on the appearance of the published account of his journey and experiences under the title of Narrative of an Explorer in Tropical South Africa (1853) Galton was awarded the gold medal of the Royal Geographical Society. His Art of Travel; or, Shifts and Contrivances in Wild Countries was first published in 1853. In i860 he visited the north of Spain, and published the fruits of his observations of the country and the people in the first of a series of volumes, which he edited, entitled Vacation Tourists. He then turned to meteor- ology, the result of his investigations appearing in

Meteoro- graphica, published in 1863. This work was the first serious attempt to chart the weather on an extensive scale, and in it also the author first established the existence and theory of anti-cyclones. Galton was a member of the meteorological committee (1868), and of the Meteorological Council which succeeded it, for over thirty years. But his name is most closely associated with studies in anthropology and especially in heredity. In 1869 appeared his Hereditary Genius, its Laws and Consequences, a work which excited much interest in scientific and medical circles. This was followed by English Men of Science, their Nature and Nurture, published in 1874; Inquiries into Human Faculty and its Develop-ment, issued in 1883; Life-History Album (1884); Record of ' Family Faculties (1884) (tabular forms and directions for enter- ing data, with a preface); and Natural Inheritance (1889). The idea that systematic efforts should be made to improve the breed of mankind by checking the birth-rate of the unfit and further- ing the productivity of the fit was first put forward by him in 1865; he mooted it again in 1884, using the term " eugenics " for the first time in Human Faculty, and in 1904 he endowed a research fellowship in the university of London for the promotion of

knowledge of that subject; which was defined as "the study of agencies under social control that may improve or impair the racial qualities of future generations, either physically or men- tally." Gal ton was the author of memoirs on various an- thropometric subjects; he originated the process of composite portraiture, and paid much attention to finger-prints and their employment for the identification of criminals, his publications on this subject including Finger Prints (1892), Decipherment of Blurred Finger Prints (1893) an d Finger Print Directories (1895). From the Royal Society, of which he was elected a fellow in i860, he received a royal medal in 1886 and the Darwin medal in 1902, and honorary degrees were bestowed on him by Oxford (1894) and Cambridge (1895). In 1908 he published Memories of My Life, and in 1909 he received a knighthood.

GALUPPI, BALDASSARE (1706-1785), Italian musical com- poser, was born on the 18th of October 1706 on the island of Burano near Venice, from which he was often known by the nickname of Buranello. His father, a barber, and violinist at the local theatre, was his first teacher. His first opera, composed at the age of sixteen, being hissed off the stage, he determined to study seriously, and

entered the Conservatorio degli Incurabili at Venicefas a pupil of Antonio Lotti. After successfully producing two operas in collaboration with a fellow-pupil, G. B. Pescetti, in 1728 and 1729, he entered upon a busy career as a composer of operas for Venetian theatres, writing sometimes as many as five in a year. He visited London in 1741, and arranged a pasticcio, Alexander in Persia, for the Haymarket. Burney considered his influence on English music to have been very powerful. In 1740 he became vice-maestro di cappella at St Mark's and maestro in 1762. In 1749 he began writing comic operas to libretti by Goldoni, which enjoyed an enormous popularity. He was invited to Russia by Catherine II. in 1766, where his operas made a favourable impression, and his influence was also felt in Russian church music. He returned to Venice in 1768, where he had held the post of director of the Conservatorio degli Incurabili since 1762. He died on the 3rd of January 1785.

Galuppi's best works are his comic operas, of which II Filosofo di Campagna (1754), known in England as The Guardian Trick' d (Dublin, 1762) was the most popular. His melody is attractive rather than original, but his workmanship in harmony and orchestration is generally superior to that of his contemporaries. He seems to have been the first to extend the concerted finales of Leo and Logroscino into a chain of several separate movements, working up to a climax, but in this respect he is much inferior to Sarti and Mozart.

Browning's poem, " A Toccata of Galuppi," does not refer to any known composition, but more probably to an imaginary extemporization on the harpsichord, such as was of frequent occurrence in the musical gatherings of Galuppi's day.

See also Alfred Wotquerme, Baldassare Galuppi, itude bibliographique sur ses ceuvres dramatiques (Brussels, 1902). Many of his autograph scores are in the library of the Brussels conservatoire.

(E. J. D.)

GALVANI, LUIGI (1 737-1 798), Italian physiologist, after whom galvanism received its name, was born at Bologna on the 9th of September 1737. It was his wish in early life to enter the hurch, but by his parents he was educated for a medical career. At the university of Bologna, in which city he practised, he was in 1762 appointed public lecturer in anatomy, and soon gained repute as a skilled though not eloquent teacher, and, chiefly from his researches on the organs of hearing and genito-urinary tract of birds, as a comparative anatomist. His celebrated theory of animal electricity he

enunciated in a treatise, " De viribus electricitatis in motu musculari commentariusj" published in the 7 th volume of the memoirs of the Institute of Sciences at Bologna in 1 79 1, and separately at Modena in the following year, and elsewhere subsequently. The statement has frequently been repeated that, in 1786, Galvani had noticed that the leg of a skinned frog, on being accidentally touched by a scalpel which had lain near an electrical machine, was thrown into violent convulsions; and that it was thus that his attention was first directed to the relations of animal functions to electricity. From

documents in the possession of the Institute of Bologna, however, it appears that twenty years previous to the publication of his Commentary Galvani Was already engaged in investigations as to the action of electricity upon the muscles of frogs. The observation that the suspension of. certain of these animals on an iron railing by copper hooks caused twitching in the muscles of their legs led him to the invention of his metallic arc, the first experiment with which is described in the third part of the Commentary, with the date September 20, 1786. The arc he constructed of two different metals, which, placed in contact the one with a frog's nerve and the other with a muscle, caused contraction of the latter. In Galvani's view the motions of the muscle were the result of the union, by means of the metallic arc, of its exterior or negative electrical charge with positive electricity which proceeded along the nerve from its inner substance. Volta, on the other hand, attributed them solely to the effect of electricity having its source in the junction of the two dissimilar metals of the arc, and regarded the nerve and muscle simply as conductors. On Galvani's refusal, from religious scruples, to take the oath of allegiance to the Cisalpine republic in 1797, he was removed from his professorship. Deprived thus of the means of livelihood, he retired to the house of his brother Giacomo, where he soon fell into a feverish decline. The republican government, in consideration of his great scientific fame, eventu- ally, but too late, determined to reinstate him in his chair, and he died at Bologna on the 4th of December 1798.

A quarto edition of his works was published at Bologna in 1841—1842, by the Academy of Sciences of the Institute of that city, under the title Opere edite ed inedite del professore Luigi Galvani.

GALVANIZED IRON, sheet iron having its surface covered with a thin coating of zinc. In spite of the name, galvanic action has often no part in the production of galvanized iron, which is prepared by dipping the iron, properly cleaned and pickled in acid, in a bath of molten zinc. The hotter the zinc the thinner the coating, but as a high

temperature of the bath is attended with certain objections, it is a common practice to use a moderate temperature and clear off the excess of zinc by passing the plates between rollers. In Norwood and Rogers's process a thin coating of tin is applied to the iron before it is dipped in the zinc, by putting the plates between layers of granulated tin in a wooden tank containing a dilute solution of stannous chloride, when tin is deposited on them by galvanic action. In " cold galvanizing " the zinc is deposited electrolytically from a bath, preferably kept neutral or slightly acid, containing a 10% solution of crystallizedzincsulphate, ZnS0 4 7H 2 0. The resulting surface is usually duller and less lustrous than that obtained by the use of molten zinc. Another method of forming a coating of zinc, known as " sherardizing," was invented by Sherard Cowper Coles, who found that metals embedded in zinc dust (a product obtained in zinc manufacture and consisting of metallic zinc mixed with a certain amount of zinc oxide) and heated to temperatures well below the melting point of zinc, become coated with a layer of that metal. In carrying out the process the articles are placed in an air-tight vessel with the zinc dust, which must be dry, and subjected to a heat of 250-330° C, the time for which the heating is continued depending on the thickness of the deposit required and varying from one-half to several hours. If an air-tight receptacle is not available, a small percentage of powdered carbon is added to the zinc-dust, to prevent increase in the amount of oxide, which, if present in excess, tends to make the deposit dull.

Galvanized iron by its zinc' surface is protected from corrosion by the weather, though the protection is not very efficient in the presence of acid or sulphurous fumes, and accordingly it is extensively employed for roofing, especially in the form of corrugated sheets. The iron wire used for wire-netting, tele- graphic purposes, &c, is commonly galvanized, as also are bolts, huts, chains and other fittings on ships.

GALVANOMETER, an instrument for detecting or measuring electric currents. The term is generally applied to instruments which indicate electric current in scale divisions or arbitrary units, as opposed to instruments called amperemeters (q.v.), which show directly on a dial the value of the current in amperes.

Movable needle galvano- meter.

Galvanometers may be divided into direct current and alternating current instruments, according as they are intended to measure one or other of these two classes of currents (see Electro- kinetics).

Direct Current Galvanometers.— The principle on which one type of direct current galvanometer, called a movable needle galvano meter, depends for its action is that a small magnet when suspended in the centre of a coil of wire tends to set its magnetic axis in the direction of the magnetic field of the coil at that point due to the current passing through it. In the other type, or movable coil galvanometer, the coil is suspended and the magnet fixed; hence the coil tends to set itself with its axis parallel to the lines of force of the magnet. The movable system must be constrained in some way to take up and retain a definite position when no current is passing by means which are called the " control."

In its simple and original form the movable needle galvanometer consisted of a horizontal magnetic needle suspended within a coil of insulated wire by silk fibres or pivoted on a point like a compass needle. The direction of such a needle is con- trolled by the direction of the terrestrial magnetic force within the coil. If the needle is so placed that its axis is parallel to the plane of the coil, then when an electric cur- rent passes through the coil it is deflected and places itself at an angle to the axis of the coil determined by the strength of the current and of the controlling field. In the early forms of movable needle galvanometer the needle was either a comparatively large magnet several inches in length, or else a smaller magnet was employed carrying a long pointer which moved over a scale of degrees so as to indicate the deflexion. A method of measuring the deflexion by means of a mirror scale and telescope was introduced by K. F. Gauss and W. Weber. The magnet had a mirror attached to it, and a telescope having cross wires in the focus was used to observe the scale divisions of a fixed scale seen reflected in the mirror. Lord Kelvin (Professor W. Thomson) made the important f ror _ improvement of reducing the size of the needle and attacb-

*Dietere"" * ng ' l t0 t ^ le b 30 ^ °f a ve ry small mirror, the two being suspended by a single fibre of cocoon silk. The mirror was made of silvered microscopic glass about \ in. in diameter, and the magnetic needle or needles consisted of short fragments of watchspring cemented to its back. A ray of light being thrown on the mirror from a lamp the deflexions of the needle were observed by watching the movements of a spot of light reflected from it upon a fixed scale. This form of mirror galvanometer was first devised in connexion with submarine cable signalling, but soon became an indispensable*

instrument in the physical laboratory.

In course of time both the original form of single needle galvano-meter and mirror galvanometer were improved by introducing the astatic principle and weakening the external controlling s . s magnetic field. If two magnetic needles of equal size and

me(ers°" nioment are attached rigidly to one stem parallel to each other but with poles placed in opposite directions an astatic system results; that is, if the needles are so suspended as to be free to move in a horizontal plane, and if they are made exactly equal in magnetic strength, the system will have no directive power. If one needle is slightly weaker than the other, the suspended system will set itself with some axis parallel to the lines of force of a field in which it is placed. In a form of astatic needle galvano- meter devised by Professor A. Broca of Paris, the pair of magnetized needles are suspended vertically and parallel to each other with poles in opposite directions. The upper poles are included in one coil and the lower poles within another coil, so connected that the current circulates in the right direction in each coil to displace the pairs of poles in the same direction. By this mode of arrangement a greater magnetic moment can be secured, together with more perfect astaticity and freedom from disturbance by external fields. The earth's magnetic field can be weakened by means of a controlling magnet arranged to create in the space in the interior of the galvano- meter coils an extremely feeble controlling magnetic field. In instruments having a coil for each needle and designed so that the current in both coils passes so as to turn both needles in the same direction, the controlling magnet is so adjusted that the normal position of the needles is with the magfaetic axis parallel to the plane of the coil. An astatic magnetic system used in conjunction with a mirror galvanometer gives a highly sensitive form of instrument (fig. 1); it is, however, easily disturbed by stray magnetic fields caused by neighbouring magnets or currents through conductors, and therefore is not suitable for use in many places.

This fact led to the introduction of the movable coil galvanometer which was first devised by Lord Kelvin as a telegraphic signalling M hi instrument but subsequently modified by A. dArsonval movable and others into a laboratory galvanometer (fig. 2). In this mlvano- ' nstrument a permanent magnet, generally of the horse- meter ' shoe shape, is employed to create a strong magnetic field, in which a light movable coil is suspended. The suspension is bifilar, consisting of two fine wires which are connected to the ends of the coil and serve to lead the current in and out. If such a coil is placed with its plane

parallel to the lines of force of the permanent magnet, then when a current is passing through it it displaces itself

in the field, so as to set with its axis more nearly parallel to the lines of force of the field. The movable coil may carry a pointer or a mirror; in the latter form it is well represented by several much used laboratory instruments. The movable coil galvanometer has the great advantage that it is not easily disturbed by the magnetic fields caused by neighbouring magnets or electric currents, and thus is especially useful in the electrical workshop and factory.

In the practical construction of the suspended needle fixed coil galvanometer great care must be taken with the insulation of the wire of the coil. This wire is generally silk-covered, consiruc- wound on a frame, the whole being thoroughly saturated tioB gad with paraffin wax. In some cases two wires are wound use- on in parallel, constituting a " differential galvanometer." When properly adjusted this instrument can be used for the exact comparison of electric currents by a null method, because if an electric current is passed through one wire and creates certain deflexions of the needle, the current which annuls this deflexion when passed through the other wire must be equal to the first current. In the con- struction of a movable coil galvanometer, it is usual to intensify the magnetic field by inserting a fixed soft iron core in the interior of the movablˆcoil. If the current to be measured is too large to be passed entirely through the galvanometer, a portion is allowed to flow through a circuit connecting the two terminals of the instrument. This circuit is called a shunt and is generally arranged so as to take 0-9, 0-99, or 0-999 of the total current, leaving o-i, o-oi or o-ooi to flow through the galvanometer. W. E. Ayrton and T. Mather have designed a universal shunt box or resistance which can be applied to any galvanometer and by which a known fraction of any current can be sent through the galvanometer when we know its resistance (see Jour. Inst. Elec. Eng. Lond., 1894, 23. P- .3I4)- A galvanometer can be calibrated, or the meaning of its deflexion determined, by passing through it an electric current of known value and observing the deflexion of the needle or coil.. The known current can be provided in the following manner: — a single secondary cell of any kind can have its electromotive force measured by the potentiometer (q.v.), and compared with that of a standard voltaic cell. If the secondary cell is connected with the galvanometer through a known high resistance R, and if the galvanometer is shunted, that is, has its terminals connected by another resistance S, then if the resistance of the galvanometer itself is denoted by G,

Fig. I. — Kelvin Astatic Mirror Gal- vanometer. Elliott square pattern.

Fig. 2. — Movable Coil Galvanometer.

the whole resistance of the shunted galvanometer and high resistance

CS has a value represented by R + q , g , and therefore the current

through the galvanometer produced by an electromotive force E of the cell is represented by . ., .

SE R(G-i-S) + GS- Suppose this current produces a deflexion of the needle of coil or spot of light equal to X scale divisions, we can then alter the value of the resistances R and S, and sp determine the relation between the deflexion and the current. By the sensitiveness of the

galvanometer is meant the deflexion produced by a known electro- motive force put upon its terminals or a known current sent through it. It is usual to specify the sensitiveness of a mirror galvanometer by requiring a certain deflexion, measured in millimetres, of a spot of light thrown on the scale placed at one metre from the mirror, when an electromotive force of one-millionth of a volt (microvolt) is applied to the terminals of the galvanometer ; it may be otherwise expressed by stating the deflexion produced under the same con- ditions when a current of one microampere is passed through the coil. In modern mirror galvanometers a deflexion of I mm. of the spot of light upon a scale at i metre distance can be produced by a current as small as one hundred millionth (io- 8) or even one ten thousand millionth (io- 10) of an ampere. It is easy to produce considerable sensitiveness in the galvanometer, but for practical purposes it must always be controlled by the condition that the zero remains fixed, that is to say, the galvanometer needle or coil must come back to exactly the same position when no current is passing through the instrument. Other important qualifications of a galvanometer ˆre its time-period and its dead-beatness. For certain purposes the needle or coil should return as quickly as possible to the zero position and with either no, or very few, oscilla- tions. If the latter condition is fulfilled the galvanometer is said to be "dead-beat." On the other hand, for some purposes the galvanometer is required with the opposite quality, that is to say, there must be as

little retardation as possible to the needle or coil when set in motion under an impulsive blow. Such a galvanometer is called " ballistic." The quality of a galvanometer in this respect is best estimated by taking the logarithmic decrement of the oscilla- tions when the movable system is set swinging. This last term is defined as the logarithm of the ratio of one swing to the next succeed- ing swing, and a galvanometer of which the logarithmic decrement is large, is said to be highly damped. For many purposes, such as for resistance measurement, it is desirable to have a galvanometer which is highly damped; this result can be obtained by affixing to the needles either light pieces of mica, when it is a movable needle galvanometer, or by winding the coil on a silver frame when it is a movable coil galvanometer. On the other hand, for the comparison of capacities of condensers and for other purposes, a galvanometer is required which is as little damped as possible, and for this purpose the coil must have the smallest possible frictional resistance to its motion through the air. In this case the moment of inertia of the movable system must be decreased or the control strengthened.

The Einthoven string galvanometer is another form of sensitive instrument for the measurement of small direct currents. It consists of a fine wire or silvered quartz fibre stretched in a strong magnetic field. When a current passes through the wire it is displaced across the field and the displacement is observed with a microscope.

For the measurement of large currents a " tangent galvanometer " is employed (fig. 3). Two fixed circular coils are placed apart at a _ . distance equal to the radius of either coil, so that a

laageat curren t passing through them creates in the central galvano- re g[on between them a nearly uniform magnetic field. me er. ^ ^ e centre Q f tne co ;i s j s suspended a small magnetic needle the length of which should not be greater than j^ the radius of either coil. The normal position of the needle is at right angles to the line joining the centre of the coils. If a current is passed through the coils, the needle will be deflected, and the tangent of the angle of its deflexion will be nearly proportional to the current passing through the coil, provided that the controlling field is uniform in strength and direction, and that the length of the magnetic needle is so short that the space in which it rotates is a practically uniform magnetic field.

Alternating Current Galvanometers. — For the detection of small alternating currents a magnetic needle or movable coil galvanometer is of no utility. We Fig. 3. — Helmholtz Tan- can, however, construct an instrument gent Galvanometer. suitable for the purpose by

suspending within a coil of insulated wire a small needle of soft iron placed with its axis at an angle of 45 to the axis of the coil. When an alternating current passes through the coil the soft iron needle tends to set itself in the direction of the axis of the coil, and if it is suspended by a quartz fibre or metallic wire so as to afford a control, it can become a metrical instrument. Another arrangement, devised by J. A. Fleming in 1 887, consists of a silver or copper disk suspended within a coil, the plane of the disk being held at 45 to that of the coil. When an alternating current is passed through the coil, induced currents are set up in the disk and the mutual action causes the disk to endeavour to set itself so that these currents are a minimum. This metal disk galvano- meter has been_ made sufficiently sensitive to detect the feeble oscillatory electric currents set up in the receiving wire of a wireless telegraph apparatus. The Duddell thermal ammeter is another very sensitive form of alternating current galvanometer. In it the current to be detected or measured is passed through a high resist-

ance wire or strip of metal leaf mounted on glass, over which is suspended a closed loop of bismuth and antimony, forming a thermo-electric couple. This loop is suspended by a quartz fibre in a strong magnetic field, and one junction of the couple is held just over the resistance wire and as near it as possible without touching. When an alternating current passes through the resistance it creates heat which in turn acts on the thermo- junction and generates a continu-ous current in the loop, thus deflecting it in the magnetic field. The sensitiveness of such a thermal ammeter can be made sufficiently great to detect a current of a few microamperes.

References. — J. A. Fleming, A Handbook for the Electrical Laboratory and Testing Room, vol. i. (London, 1901); W. E. Ayrton, T. Mather and W. E. Sumpner, " On Galvanometers," Proc. Pliys. Soc. London (1890), 10, 393; H. R. Kempe, A Handbook of Electrical Testing (London, 1906); A. Gray, Absolute Measurements in Elec- tricity and Magnetism, vol. ii. part ii. (London, 1893). Useful information is also contained in the catalogues of all the principal electrical instrument makers — Messrs. Elliott Bros., Nalder, The Cambridge Scientific Instrument Company, Pitkin, Hartmann and Braun, Queen and others. (J. A. F.)

GALVESTON, a city and port of entry and the county-seat of Galveston county, Texas, U.S.A., on the Gulf of Mexico, near the N.E. extremity of Galveston Island and at the entrance to Galveston Bay. It is about 48 m. S.E. of Houston and 310 m. W. of New Orleans. Pop. (1890) 29,084; (1900) 37,789, (6339 were foreign-

born and 8291 negroes); (1910) 36,981; lahd area (1906) 7-8 sq. m. It is served by the Galveston, Houston & Henderson, the Galveston, Harrisburg & San Antonio, the Gulf, Colorado & Santa Fe, the Trinity & Brazos Valley, the International & Great Northern, and the Missouri, Kansas & Texas railways, and by numerous steamship lines to Gulf ports in the United States and Mexico, and to Cuba, South America, Europe and the Atlantic ports of the United States. Galveston Island is a low, sandy strip of land about 28 m. long and ij to 3jj m. wide, lying from 2 to 3 m. off the mainland. The city, which extends across the island from Gulf to Bay, faces and has its harbour on the latter. The island was connected with the mainland before the 1900 storm by a road bridge and several railway bridges, which, a short distance W. of the city, crossed the narrow strip of water separating the West Bay from . Galveston Bay proper; the bridge least harmed (a single-track railway bridge) was repaired immediately and was for a time the city's only connexion with the mainland, but in 1908 bonds were issued for building a concrete causeway, accommodating four railway tracks, one interurban car track, and a roadway for vehicles and pedestrians. An enormous sea-wall (completed in 1904 at a cost of $2,091,000) was constructed on the eastern and Gulf sides of the city, about 5 m. long, 17 ft. above mean low tide (i-S ft. above the high-water mark of the storm of 1900 and 7-5 ft. above the previous high-water mark, that of September 1875), 16 ft. wide at the base and 5 ft. at the top, weighing 20 tons to the lineal foot, and with a granite rip-rap apron extending out 27 ft. on the Gulf side. The entire grade of the city was raised from 1 to 1 5 ft. above the old level. Between the sea-wall and the sea there is a splendid beach, the entire length of which is nearly 30 m. Among the principal buildings are the city hall, the court-house, the masonic temple, the Federal custom-house and post-office, the Y.M.C.A. building and the public library. The United States government maintains a marine hospital, a live-saving station, an immigrant landing station, and the state and the Federal government separate quarantine stations. In addition to the Ball public high school, Galveston is the seat of St Mary's University (1854), the Sacred Heart and Ursuline academies, and the Cathedral school, all under Roman Catholic control.

The government of the municipality was long vested in a council of ward aldermen, controlled by a " machine," which was proved corrupt in 1894 by an investigation undertaken at the personal expense of the mayor; it gave place in 1895 to a city council of aldermen at large, which by 1901 had proved its inefficiency especially in the crisis following the storm of the preceding year.

Government then seemed a business question and was practically undertaken by the city's commercial experts, the Deepwater commission, whose previous aim had been harbour improvement, and who now drew up a charter providing for government by a board of five appointed by the governor of the state. A compromise measure making three members appointees

of the governor and two elected by the voters of the city was in force for a time but was declared unconstitutional. A third charter was adopted providing for five commissioners, chosen by the people, dividing among themselves the posts of mayor- president and commissioners of finance and revenue, of water- works and sewerage, of streets and public property, and of police and fire protection, each commissioner being held individually responsible for the management of his department. These are business departments carefully systematized by their heads. The legislative power is vested in the commission as a whole, over whose meetings the mayor-president presides; he has a vote like every other commissioner, and has no veto power. The success of this commission government has been remarkable: in 1901-1908 the city, without issuing bonds except for grade raising, paid off a large debt, raised the salaries of city employees, paid its running expenses in cash, planned and began public improvements and sanitary reforms, and did much for the abolition of gambling and the regulation of other vice. The Galveston Plan and similar schemes of government have been adopted in many other American cities.

Galveston's manufactories, the products of which in 1900 were valued at $5,016,360, a decrease of 12-4% from 1800 (value of products under " factory system," $3,675,323 in 1900; $2,996,654 in 1905, a decrease of 18-5%), include cotton-seed oil refineries, flour and feed mills, lumber mills, wooden-ware factories, breweries, cement works, creosoting works, ship-yards and ice factories. There are extensive cotton warehouses, coal and grain elevators, and large wholesale supply depots. The Gulf Fisheries Company has its fleet's headquarters and large packing-houses at Galveston. It is as a commercial port that Galveston is chiefly important. In 1907 it was the second port in the United States in the value of its exports (domestic and foreign, $196,627,382, or 10-22% of the total), being surpassed only by New York City; and was the first of the Gulf ports (having 45-43% of the total value), New Orleans being second with

$164,998,540. Galveston's imports in 1907 were valued at $7,669,458. Galveston is the greatest cotton-exporting port in the Union, its exports of cotton in 1907 being valued at $163,564,445. Other exports of great value are cotton seed pro- ducts (oil and cake, $10,188,594 in 1907), Indian corn ($3,457,279 in 1907), wheat ($9,443,901 in 1906), lumber and flour. The electric lighting and water-supply systems are owned and operated by the municipality.

The harbour of Galveston seems to have been named about 1782 by Spanish explorers in honour either of Jose de Galvez, Marquis of Sonora, or his nephew Bernardo, governor of Louisiana; and in the early days of the 19th century was the principal rendezvous of a powerful band of buccaneers and pirates, of whom, for many years, the notorious Jean Lafitte was chief. After much difficulty these were finally dispersed about 1820 by the United States authorities, and in 1837 the first settlement from the United States was made on the site of the present city. The town was incorporated by the legislature of the Republic of Texas in 1839. On the 8th of October 1862 the city was taken by a Federal naval force under Commander William B. Renshaw (1816-1863). After a sharp engagement a Confederate force under General John B. Magruder (1810-1871) retook the city on the 1st of January 1863, one of the Federal ships, the " Harriet Lane," falling into Confederate hands, and another, the "West-field," being blown up with Commander Renshaw on board. Thereafter Galveston remained in Confederate hands, although rigidly blockaded by the Federal navy, until the close of the war. On the 8th of September 1900 the city was seriously damaged by a West Indian hurricane, which, blowing steadily for eighteen hours, reached a velocity of 135 m. an hour. The waters of the Gulf were piled up in enormous waves that swept across a large part of the city, destroying or badly damaging more than 8000 buildings, entailing a loss of about 5000 lives, and a property loss estimated at about $17,000,000. Liberal contributions came from all over the country, and the state partially remitted the city's taxes for 17 years. The city was rapidly rebuilt on a more substantial plan.

GALWAY, a county in the west of Ireland, in the province of Connaught, bounded N. by Mayo and Roscommon; E. by Roscommon, King's County and Tipperary; S. by Clare and Galway Bay; and W. by the Atlantic Ocean. The area is 1,519,699 acres or about 2375 sq. m., the county being second in size to Cork among the Irish counties.

The county is naturally divided by Lough Corrib into two great divisions. The eastern, which comprehends all the county except the

four western baronies, rests on a limestone base, and is, generally speaking, a level champaign country, but contains large quantities of wet bog. Its southern portion is partly a continuation of the Golden Vale of Limerick, celebrated for its fertility, and partly occupied by the Slievebaughty Mountains. The northern portion of the division contains rich pasture and tillage ground, beautifully diversified with hill and dale. Some of the intermediate country is comparatively uncultivated, but forms excellent pasturage for sheep. The western division of the county has a substratum of granite, and is barren, rugged and mountainous. It is divided into the three districts of Connemara, Jar-Connaught and Joyce's Country; the name of Connemara is, however, often applied to the whole district. Its highest mountains are the grand and picturesque group of Bunnabeola, or the Twelve Bens or Pins, which occupy a space of about 25 sq. m., the highest elevation being 2695 ft. Much of this district is a gently sloping plain, from 100 to 300 ft. above sea-level. Joyce's Country, farther north, is an elevated tract, with flat-topped hills 1300 to 2000 ft. high, and deep narrow valleys lying between them.

Galway possesses the advantage of a very extended line of sea-coast, indented by numerous harbours, which, however, are rarely used except by a few coasting and fishing vessels. At the boundary with the county Mayo in the north is Killary Harbour which separates the two counties. The first bay on the western coast capable of accommodating large ships is Ballynakill, sheltered by Freaghillaun or Heath Island. Next in succession is Cleggan Bay. Off these inlets lie the islands of Inishbofin and Inishark, with others. Streamstown is a narrow inlet, within which are the inhabited islands of Omey, Inishturk and Turbot. Ardbear harbour is divided into two inlets, the northern terminat- ing at the town of Clifden, with excellent anchorage; the southern inlet has also good anchorage within the bar, and has a good salmon fishery. Mannin Bay, though large, is much exposed and little frequented by shipping. From Slyne Head the coast turns eastward to Roundstone Bay, which has its entrance protected by the islands of Inishnee and Inishlacken. Next in order is Bertraghboy Bay, studded with islets and rocks, but deep and sheltered. Kilkieran Bay, the largest on this coast, has a most productive kelp shore of nearly 100 m.; its mouth is but 3 m. broad. Between Gorumna Island and the mainland is Greatman's Bay and close to it Costello Bay, the most eastern of those in Connemara. The whole of the coast from Greatman's Bay eastward is comprehended in the Bay of Galway, the entrance of which is protected by the three limestone islands of Aran, Inishmore (or Aranmore) , Inishmann and

Inisheer.

The rivers are few, and, except the Shannon, of small size. The' Suck, which forms the eastern boundary of the county, rises in Roscommon, and passing by Ballinasloe, unites with the Shannon at Shannonbridge. The Shannon forms the south-eastern boundary of the county, and passing Shannon Harbour, Banagher, Meelick and Portumna, swells into the great expanse of water called Lough Derg, which skirts the county as far as the village of Mount Shannon. The Claregalway flows southward through the centre of the county, and enters Lough Corrib some 4 m. above the town of Galway. The Ballynahinch, considered one of the best salmon-fishing rivers in Connaught, rises in the Twelve Pins, passes through Ballynahinch Lake, and after a short but rapid course falls into Bertraghboy Bay. Lakes are numerous. Lough Corrib extends from Galway town northwards over 30,000 acres, with a shore of 50 m. in extent. The lake is studded with many islands, some of them thickly inhabited. The district west of Lough Corrib contains a vast number of lakes, about twenty-five of them more than a mile in length. Lough Rea, by the town of the

same name, is more remarkable for scenic beauty than for extent. ■■ *Besides these perennial lakes, there are several low tracts, called turloughs, which are covered with water during a great part of the year. Loughs Mask and Corrib are connected by a salmonladder, and contain large trout. Galway, with the Screab Waters, drain- ing into Camus Bay, a branch of Kilkieran Bay, with Recess and the Ballynahinch waters, are the best fishing centres. On account of its scenic beauty, both coastal and inland, together with its facilities for sport, county Galway is frequented by summer visitors. Though for long the remoter parts were difficult of access, as in the case of Donegal, Mayo, Clare and the western counties generally, the Galway and Clif den railway assisted private enterprise to open up the country. The western mountains, broken by deep landlocked and island-sheltered bays, as well as by the innumerable small loughs of the Connemara districts, afford scenes varying from gentle slopes occasionally well wooded along the water's edge to wild, bare moorlands among the heights, while the summits are usually bold and rocky cones. Several small fishing villages have acquired the dignity of water- ing-places from the erection of hotels, which have also been planted in previously untenanted situations of high scenic*

attractions; among these may be mentioned Leenane at the head of Killary harbour, Renvyle House at its entrance, Letter- frack on Ballynakill Bay, Streamstown and Clifden, and Cashel on Bertraghboy Bay. Inland are Recess, near Lough Derryclare, and Ballynahinch, on the lough of that name, both on the railway, at the foot of the Twelve Pins.

Geology. — The east of this county lies in the Carboniferous Lime stone plain, with domes of Old Red Sandstone rising near Dunmore and Mount Bellew. As Galway town is neared, the grey rock appears freely on the surface, and Lough Corrib spreads itself over almost level land. Its west branches, however, run up into " Dal- radian " hills, which rise abruptly on the threshold of Connemara. A broad mass of ice-worn gneiss and granite lies between Lough Corrib and Galway Bay, cut off so sharply at the sea as to suggest the presence of an east-and-west line of fracture. The Twelve Bens owe their supremacy to the quartzites, which are here well bedded and associated with limestone and mica-schist. Silurian conglomerates and sandstones, with andesitic lavas, overlie the Dalradians, with marked unconformity, south of Leenane and round Lough Nafooey. The surfaces of the hard rocks admirably record the action of ice throughout the county. There is black Carboniferous marble at Menlough near Galway ; and the well-known " Connemara Marble " is a banded serpentinous crystalline limestone in the Dalradians at Recess, Ballynahinch and Streamstown. Compact red granite is worked at Shantallow, and the region west of Galway contains many handsome porphyritic red varieties.

Climate and Industries. — The climate is mild and healthy but variable, and \iolent winds from the west are not uncommon. Frost or snow seldom remains long on the western coast, and cattle of every description continue unhoused during the winter. The eastern part of the county produces the best wheat. Oats are fre- quently sown after potatoes in moorish soils less adapted for wheat. The flat shores of the bays afford large supplies of seaweed for manure. Limestone, gravel and marl are to be had in most other parts. When a sufficient quantity of manure for potatoes cannot be had, the usual practice is to pare and burn the surface. ' In many places on the seashore fine early potatoes are raised in deep sea-sand manured with seaweed, and the crop is succeeded by barley. Those parts of the eastern district less fitted for grain are employed in pasturage. Heathy sheep-walks occupy a very large tract between Monivea and Galway. . An extensive range from Athenry, stretching to Galway Bay at Kinvarra, is also chiefly occupied by sheep. Over half the total acreage of the county is pasture-land, and cattle, sheep, pigs

and poultry are extensively reared. The proportion of tillage to pasturage is roughly as one to four; and owing to the nature of the country fully one-third of the total area is quite barren.

Manufactures are not carried on beyond the demand caused .by the domestic consumption of the people. Coarse friezes, flannels and blankets are made in all parts and sold largely in Galway and Loughrea. Connemara has been long celebrated for its hand-knit woollen stockings. Coarse linen, of a narrow breadth, called handle linen, is also made for home consumption. There is a linen- weaving factory at Oughterard. The manufacture of kelp, formerly a great source of profit on the western shores, is still carried on to some extent. Feathers and sea-fowls' eggs are brought in great quantities from the islands of Aran, the produce of the puffins and other sea-fowl that frequent the cliffs. Fishing affords occupation to many of the inhabitants, the industry having as its centres the ports of Galway and Clifden.

The Midland Great Western main line enters the county at Ballinasloe, and runs by Athenry to Galway, with an extension to Oughterard (Lough Corrib) and Clifden. The Great Southern &

Western line from Sligo to Li mer ick traverses the county from N. to S., by way of Tuam, Athenry and Gort.

Population and Administration.— The population of county Galway (211,227 i n x 8()i; 192,549 in 1901) decreased by more than half in the last seventy years of the 19th century, and the decrease continues, as emigration is heavy. About 97% of the population are Roman Catholics, and a somewhat less percentage are rural. The Erse tongue is maintained by many in this remote county. The chief towns are Galway (pop. 13,426), Tuam (3012), Ballinasloe (4904) and Loughrea (2815), with the smaller towns of .Portumna, Gort, Clifden, Athenry, Headfcrd, Oughterard and Eyrecourt. The county is divided into four parliamentary divisions (returning one member each); north, south, east and Connemara, while the town of Galway returns one member. There are eighteen baronies. Assizes are held at Galway, quarter-sessions at Galway, Ballinasloe, Clifden, Gort, Loughrea, Oughterard, Portumna and Tuam. The county comprises parts of the Protestant dioceses of Tuam and of Killaloe; and of the Roman Catholic dioceses of Elphin, Galway, Clonfert and Killaloe.

History. — The history of county Galway is exceedingly obscure, and nearly every one of its striking physical features carries its legend with it. For centuries local septs struggled together for mastery

undeterred by outside influence. The wreck of part of the Spanish Armada on this coast in 1588 left survivors whose influence is still to be traced. The formation of Galway into a county was effected about 1579 by Sir Henry Sydney, lord deputy of Ireland. In the county at Aughrim (q.v.) the decisive battle of the English Revolution was fought in 1691. Among the antiquities are several round towers. The only perfect one is at Kilmacduagh, a very fine example 112 ft. high, leaning con- siderably out of the perpendicular. Raths or encampments are numerous and several cromlechs are to be seen in good preserva- tion. The ruins of monastic buildings are also numerous. That of Knockmoy, about 6 m. from Tuam, said to have been founded in 1 1 80 by Cathal O'Connor, was adorned with rude fresco paintings, still discernible, which were considered valuable as being the best authentic representations existing of ancient Irish costumes. Ancient castles and square towers of the Anglo- Norman settlers are frequently met with; some have been kept in repair, but the greater number are in ruins. The castle of Tuam, built in 1 161 by Roderick O'Connor, king of Ireland, at the period of the English invasion, is said to have been the first building of this description of stone and mortar in Ireland. The remains of a round castle, a form of building very uncommon in the military architecture of the country, are to be seen between Gort and Kilmacduagh. The extraordinary cyclopean and monastic ruins on the Aran Islands (q.v.) must be mentioned; and the town of Galway, Athenry, and the neighbourhood of Ballinasloe all show interesting remains. The small church of Clonfert, in the south of the county, with a fine Romanesque doorway, is a cathedral, the diocese of which was united with Kilfenora, Kilmacduagh and Killaloe in 1833.

GALWAY, a seaport, parliamentary borough and the county town of county Galway, Ireland, on the north shore of Galway Bay, and on the main line of the Midland Great Western railway. Pop. of urban district (1901) 13,426. Some of the streets are very narrow, and contain curious specimens of old buildings, chiefly in antique Spanish style, being square, with a central court, and a gateway opening into the street. The most note- worthy of these is the pile known as Lynch's Castle. This residence takes its name from the family of whom James Lynch Fitzstephen, mayor of Galway in 1493, was a member; whose severity as a magistrate is exemplified in the story that he executed his own son, and thus gave origin (according to one of sevetal theories) to the familiar term of Lynch law. The principal streets are broad and contain good shops. St Nicholas church is a fine cruciform building founded in 1320, and containing monu- ments, and a bell, one of a peal, which appears to have been

brought from Cavron in France, but how this happened is not known. The church was made collegiate in 1484, and Edward VI. created the Royal College of Galway in connexion with it;

but the old college buildings no longer serve this purpose, and the church ceased to be collegiate in 1840. There are remains of a Franciscan friary founded in 1206. St Augustine's church (Roman Catholic) is modern (1859). The town is the seat of a Roman Catholic diocese. There are grammar, model and industrial schools, the first with exhibitions to Trinity College, Dublin; but the principal educational establishment is University College, a quadrangular building in Tudor Gothic style, of grey limestone. It was founded as Queen's College, with other colleges of the same name at Belfast and Cork, under an act of 1845, and its name was changed when it was granted a new charter pursuant to the Irish Universities Act 1908. The harbour comprises an extensive line of quays, and is connected for inland navigation with Lough Corrib. The shipping trade is considerable, but as a trans-Atlantic port Galway was exploited unsuccessfully. The fisheries, both sea and salmon, are im- portant. The chief exports are wool, agricultural produce and black marble, which is polished in local mills. Other industrial establishments include corn-mills, iron-foundries, distilleries, and brush and bag factories. The borough, which returned two members to parliament until 1885, now returns one.

Galway is divided into the old and new towns, while a suburb known as the Claddagh is inhabited by fishermen. This is a curious collection of small cottages, where communal govern- ment by a locally elected mayor long prevailed, together with peculiar laws and customs, strictly exclusive inter-marriage, and a high moral and religious standard. Specimens of the distinc- tive Claddagh ring, for example, were worn and treasured as venerated heirlooms. These customs, with the distinctive dress of the women, died out but slowly, and even to-day their vestiges remain.

The environs of Galway are pleasant, with several handsome residences. The most interesting point in the vicinity is Roscam, with its round tower, ruined church and other remains. Salthill, with golf links, is a waterside residential suburb.

Little is known of the history of Galway until after the arrival of the

English, at which time it was under the protection of O'Flaherty, who possessed the adjoining district to the west. On the extinction of the native dynasty of the O'Connor's, the town fell into the hands of the De Burgos, the head of a branch of which, under the name of M'William Eighter, long governed it by magistrates of his own appointment. After it had been secured by walls, which began to be built about 12 70 and are still in part traceable, it became the residence of a number of enterprising settlers, through whom it attained a position of much commercial celebrity. Of these settlers the principal families, fourteen in number, were known as the tribes of Galway. They were of Norman, Saxon or Welsh descent, and became so exclusive in their relationships that dispensations were frequently requisite for the canonical legality of marriages among them. The town rapidly increased from this period in wealth and commercial rank, far surpassing in this respect the rival city of Limerick. Richard II. granted it a charter of incorporation with liberal privileges, which was confirmed by his successor. It had the right of coinage by act of parliament, but there is no evidence to show that it exercised the privilege. Another charter, granted in 1545, extended the jurisdiction of the port to the islands of Aran, permitted the exportation of all kinds of goods except linens and woollens, and confirmed all the former privileges. Large numbers of Cromwell's soldiers are said to have settled in the town; and there are many traces of Spanish blood among the population. Its municipal privileges were extended by a charter from James I., whereby the town, and a district of two miles round in every direction, were formed into a distinct county, with exclusive jurisdiction and a right of choosing its own magistrates. During the civil wars of 1641 the town took part with the Irish, and was surrendered to the Parliamentary forces under Sir Charles Coote; after which the ancient inhabitants were mostly driven out, and their property was given to adventurers and soldiers, chiefly from England. On the accession of James II. the old inhabitants entertained sanguine hopes of recovering their former rights. But the successes of King William soon put an end to their ex-

pectations; and the town, after undergoing another siege, again capitulated to the force brought against it by General Ginkell.

GAMA, VASCO DA (c. 1460-1524), Portuguese navigator and discoverer of the sea-route to India, was born at Sines, a small seaport in the province of Alemtejo. Of da Gama's early history little is known. His descent, according to the Nobiliario of Antonio de Lima, was derived from a noble family which is mentioned in the year 1166; but the line cannot be traced without interruption farther

back than the year 1280, to one Alvaro da Gama, from whom was descended Estevao da Gama, civil governor of Sines, whose third son Vasco was born prob- ably about the year 1460. In that year died Prince Henry the Navigator, to whose intelligence and foresight must be traced back all the fame that Portugal gained on the seas in the 1 5th and 16th centuries. Explorers sent out at his instigation discovered the Azores and unknown regions on the African coast, whence continually came reports of a great monarch, " who lived east of Benin, 350 leagues in the interior, and who held both temporal and spiritual dominion over all the neighbouring kings," a story which tallied so remarkably with the accounts of "Prester John " which had been brought to the Peninsula by Abyssinian priests, that John II. of Portugal steadfastly resolved that both by sea and by land the attempt should be made to reach the country of this potentate. For this purpose Pedro de Covilham and Affonso de Payva were despatched eastward by land; while Bartholomeu Diaz (q.v.), in command of two vessels, was sent Westward by sea-' (see Abyssinia, 14). That there was in truth an ocean highway to the East was proved by Diaz, who returned in December 1488 with the report that when sailing southward he was carried far to the east by a succession of fierce storms, past — as he discovered only on his return voyage — what he ascertained to be the southern extremity of the African continent. The condition of John's health and concerns of state, however, prevented the fitting out of the intended expedition; and it was not till nine years later, when Emanuel I. had succeeded to the throne, that the preparations for this great voyage Were completed — hastened, doubtless, by Columbus's discovery of America in the meanwhile.

For the supreme command of this expedition the king selected Vasco da Gama, who had in his youth fought in the wars against Castile, and in his riper years gained distinction as an intrepid mariner. The fleet, consisting of four vessels specially built for this mission, sailed down the Tagus on the 9th of July 1497, after prayers and confession made by the officers and crews in a small chapel on the site where now stands the church of S. Maria de Belem (see Lisbon), afterwards built to commemorate the event. Four months later the flotilla cast anchor in St Helena Bay, South Africa, rounded the Cape in safety, and in the beginning of the next year reached Malindi, on the east coast of Africa. Thence, steering eastward, under the direction of a pilot obtained from Indian merchants met with at this port, da Gama arrived at Calicut, on the Malabar coast, on the 20th May 1498, and set up, according to the custom of his country, a marble pillar as a mark of conquest and a proof of his

discovery of India. His reception by the zamorin, or Hindu ruler of Calicut, would have in all probability been favourable enough, had it not been for the jealousy of the Mahommedan traders who, fearing for their gains, so incited the Hindus against the new-comers that da Gama was unable to establish a Portuguese factory. Having seen enough of India to assure him of its great resources, he returned to Portugal in September 1499. The king received him with every mark of distinction, granted him the use of the prefix Dom, thus elevating him to the rank of an untitled noble, and conferred on him pensions and other property. In prosecution of "da Gama's discoveries another fleet of thirteen ships was immediately sent out to India under Pedro Alvares Cabral, who, in sailing too far westward, by accident discovered Brazil, and on reaching his destination established a factory at Calicut. The natives, again instigated by the Mahommedan merchants, rose up in arms and murdered all whom Cabral had left behind. To avenge this outrage a powerful armament of ten ships was fitted out at Lisbon, the command of which was at first given to

*Cabral, but was afterwards transferred to da Gama, who received the title admiral of India (January 1 502) . A few weeks later the fleet sailed, and on reaching Calicut da Gama immediately bombarded the town, treating its inhabitants with a savagery too horrible to describe. From Calicut he proceeded in November to Cochin, " doing all the harm he could on the way to all that he • found at sea," and having made favourable trading terms with it and with other towns on the coast, he returned to Lisbon in September 1503, with richly laden ships. He and his ca*ptains were welcomed with great rejoicings and he received additional privileges and revenues.*

Soon after his return da Gama retired to his residence in Evora, possibly from pique at not obtaining so high rewards as he expected, but more probably in order to enjoy the wealth and position which he had acquired; for he was now one of the richest men in the kingdom. He had married, probably in 1500, a lady of good family, named Catherina de Ataide, by whom he had six sons. According to Correa, he continued to advise King Emanuel I. on matters connected with India and maritime policy up to 1505, and there are extant twelve documents dated 1507- 1522 which prove that he continued to enjoy the royal favour. The most important of these is a grant dated December 1519 by which Vasco da Gama was created count of

Vidigueira, with the extraordinary privileges of civil and criminal jurisdiction and ecclesiastical patronage. During this time the Portuguese conquests increased in the East, and were presided over by successive viceroys. The fifth of these was so unfortunate that da Gama was recalled from his seclusion by Emanuel's successor, John III., and nominated viceroy of India, an honour which in April 1524 he left Lisbon to assume. Arriving at Goa during September of the same year, he immediately set himself to correct with vigour the many abuses which had crept in under the rule of his predecessors. He was not destined, however, to prosecute far the reforms he had inaugurated, for, on the Christmas-eve following his arrival, he died at Cochin after a short illness, and was buried in the Franciscan monastery there. In 1 538 his body was conveyed to Portugal and entombed in the town of Vidigueira. In 1880 what were supposed on insufficient evidence to have been his remains were transferred to the church of Santa Maria de Belem. His voyage had the immediate result of enriching Portugal, and raising her to one of the foremost places among the nations of Europe, and eventually the far greater one of bringing to pass the colonization of the East by opening its commerce to the Western world.

Bibliography. — Vasco da Gama's First Voyage, by Dr E. Ravenstein (London, Hakluyt Society, 1898), is a translation with notes, &c, of the anonymous Roteiro (Journal or Itinerary), written by one of Vasco da Gama's subordinates who sailed on hoard the "S. Raphael," which was commanded by the admiral's brother Paulo da Gama. This is the most important of the original authorities; five accounts of the voyage in letters contemporary with it are appended to the Hakluyt Society's translation. See also J. de Barros, Decadas da India (Lisbon, 1778-1788, written c. 1540); F. L. de Castanheda, Historia do descobrimenlo da India (Coimbra, 1 55 1, largely based on the Roteiro); The Three Voyages of Vasco da Gama and his Viceroyalty, by Gaspar Correa (Hakluyt Society, 1869), chiefly valuable for the events of 1524; The Lusiads of Camoens, the central incident in which is Vasco da Gama's first voyage; Calcoen {i.e. Calicut), a Dutch Narrative of the Second Voyage of Vasco da Gama, written by some unknown seaman of the expedition, printed at Antwerp about 1504, reprinted in fac- simile, with introduction and translation, by J. Ph. Berjeau (London, 1874) ; Thome Lopes, narrative (1502) in vol. i. of Ramusio.

GAMALIEL f>'teO- This name, which in Old Testament times figures only as that of a prince of the tribe of Manasseh (vide Num. i. 10, &c), was hereditary among the descendants of Hillel. Six persons bearing the name are known. •

1. Gamaliel I., a grandson of Hillel, and like him designated Ha-Zaqen (the Elder), by which is apparently indicated that he was numbered among the Sanhedrin, the high council of Jerusalem. According to the tradition of the schools of Palestine Gamaliel succeeded his grandfather and his father (of the latter nothing is known but his name, Simeon) as Nasi, or president of the Sanhedrin. Even if this tradition does not correspond with historic fact, it is at any rate certain that Gamaliel took a leading

position in the Sanhedrin, and enjoyed the highest repute as an authority on the subject of knowledge of the Law and in the interpretation of the Scriptures. He was the first to whose name was prefixed the title Rabban (Master, Teacher). It is related in the Acts of the Apostles (v. 34 et seq.) that his voice was uplifted in the Sanhedrin in favour of the disciples of Jesus who were threatened with death, and on this occasion he is designated as a Pharisee and as being " had in reputation among all the people " (vofM)5iSa(TKaXos rt/uos ■ko.vti ti$ \acf). In the Mishna (Gittin iv. 1-3) he is spoken of as the author of certain legal ordinances affecting the welfare of the community (the expression in the original is " tiqqun ha-'oldm," i.e. improvement of the world) and regulating certain questions as to conjugal rights. In the tradition was also preserved the text of the epistles regarding the insertion of the intercalary month, which he sent to the inhabitants of Galilee and the Darom (i.e. southern Palestine) and to the Jews of the Dispersion (Sanhedrin 116 and elsewhere). He figures in two anecdotes as the religious adviser of the king and queen, i.e. Agrippa I. and his wife Cypris (Pesahim 88 b). His function, as a teacher is proved by the fact that the Apostle Paul boasts of having sat at the feet of Gamaliel (Acts. xxii. 3). Of his teaching, beyond the saying preserved in Aboth i. 16, which enjoins the duty of study and of scrupulous- ness in the observance of religious ordinances, only a very remarkable characterization of the different natures of the scholars remains (Aboth di R. Nathan, ch. xl.). His renown in later days is summed up in the words (Mishna, end of Sotah) : " When Rabban Gamaliel the Elder died, regard for the Torab (the study of the Law) ceased, and purity and piety died." As Gamaliel I. is the only Jewish scribe whose name is mentioned in the New Testament he became a subject of Christian legend, and a monk of the 12th century (Hermann the Premonstra- tensian) relates how he met Jews in Worms studying Gamaliel's commentary on the Old Testament, thereby most probably meaning the Talmud.

2. Gamaliel II., the son of Simon ben Gamaliel, one of Jerusalem's foremost men in the war against the Romans (vide Josephus, Bellum

Jud. iv. 3, 9, Vita 38), and grandson of Gamaliel I. To distinguish him from the latter he is also called Gamaliel of Jabneh. In Jabneh (Jamnia), where during the siege of Jerusalem the scribes of the school of Hillel had taken refuge by permission of Vespasian, a new centre of Judaism arose under the leadership of the aged Johanan ben Zakkai, a school whose members inherited the authority of the Sanhedrin of Jerusalem. Gamaliel II. became Johanan ben Zakkai's successor, and rendered immense service in the strengthening and reintegration of Judaism, which had been deprived of its former basis by the destruction of the Temple and by the entire loss of its political autonomy. He put an end to the division which had arisen between the spiritual leaders of Palestinian Judaism by the separation of the scribes into the two schools called respectively after Hillel and Shammai, and took care to enforce his own authority as the president of the chief legal assembly of Judaism with energy and often with severity. He did this, as he himself said, not for his own Honour nor for that of his family, but in order that disunion should not prevail in Israel. Gamaliel's position was recognized by the Roman government also. Towards the end of Domitian's reign (c a. d. 95) he went to Rome in company with the most prominent members of the school of Jabneh, in order to avert a danger threatening the Jews from the action of the terrible emperor. Many interesting particulars have been given regarding the journey of these learned men to Rome and their sojourn there. The impression made by the capital of the world upon Gamaliel and his companions was an overpowering one, and they wept when they thought of Jerusalem in ruins. In Rome, as at home, Gamaliel often had occasion to defend Judaism in polemical discussions with pagans, and also with professed Christians. In an anecdote regarding a suit which Gamaliel was prosecuting before a Christian judge, a converted Jew, he appeals to the Gospel and to the words of Jesus in Matt, v. 17 (Shabbath 116 a, b). Gamaliel devoted special attention to the regulation of the rite of prayer, which after the

cessation of sacrificial worship had become all-important. He gave the principal prayer, consisting of eighteen benedictions, its final revision, and declared it every Israelite's duty to recite it three times daily. He was on friendly terms with many who were not Jews, and was so warmly devoted to his slave Tabi that when the latter died he mourned for him as for a beloved member of his own family. He loved discussing the sense of single portions of the Bible with other

scholars, and made many fine expositions of the text. With the words of Deut. xiii. 18 he associated the lesson: " So long as thou thyself art merciful, God will also be merciful to thee." Gamaliel died before the insurrections under Trajan had brought fresh unrest into Palestine. At his funeral obsequies the celebrated proselyte Aquila (Akylas Onkelos), reviving an ancient custom, burned costly materials to the value of seventy minae. Gamaliel himself had given directions that his body was to be wrapped in the simplest possible shroud. By this he wished to check the extravagance which had become associated with arrangements for the disposal of the dead, and his end was attained; for his example became the rule, and it also became the custom to commemorate him in the words of consolation addressed to the mourners (Kethub. 8 b). Gamaliel's son, Simon, long after his father's death, and after the persecutions under Hadrian, inherited his office, which thenceforward his descendants handed on from father to son.

3. Gamaliel III., son of Jehuda I. the redactor of the Mishna, and his successor as Nasi (patriarch). The redaction of the Mishna was completed under him, and some of his sayings are incorporated therein (Abothii. 2-4). One of these runs as follows: " Beware of those in power, for they permit men to approach them only for their own uses; they behave as friends when it is for their advantage, but they do not stand by a man when he is in need. " Evidently this was directed against the self-seeking of the Roman government. Gamaliel III. lived during the first half of the 3rd century.

4. Gamaliel IV., grandson of the above, patriarch in the latter half of the 3rd century: about him very little is known.

5. Gamaliel V., son and successor of the patriarch Hillel II.: beyond his name nothing is known of him. He lived in the latter half of the 4th century. He is the patriarch Gamaliel whom Jerome mentions in his letter to Pamachius, written in 393.

6. Gamaliel VI., grandson of the above, the last of the patriarchs, died in 425. With him expired the office, which had already been robbed of its privileges by a decree of the emperors Honorius and Theodosius II. (dated the 17th of October 415). Gamaliel VI. was also a physician, and a celebrated remedy of his is mentioned by his contemporary Marcellus (De Medicamentis, liber 21). (W. Ba.)

GAMBETTA, LEON (1838-1882), French statesman, was born at Cahors on the 2nd of April 1838. His father, a Genoese, who had established himself as a grocer and had married a French- woman

named Massabie, is said to have been his son's prototype in vigour and fluency of speech. In his sixteenth year young Gambetta lost by an accident the sight of his left eye, which eventually had to be removed. Notwithstanding this privation, he highly distinguished himself at the public school of Cahors, and in 1857 proceeded to Paris to study law. His southern vehemence gave him great influence among the students of the Quartier Latin, and he was soon known as an inveterate enemy of the imperial government. He was called to the bar in 1859, but, although contributing to a Liberal review, edited by Challemel Lacour, did not make much way until, on the 17th of November 1868, he was selected to defend the journalist Delescluze, prosecuted for having promoted the erection of a monument to the representative Baudin, who was killed in resisting the coup d'etat of 1851. Gambetta seized his opportunity and assailed both the coup d'etat and the government with an eloquence of invective which made him immediately famous.

In May 1869 he was returned to the Assembly, both by the first circumscription of Paris and by Marseilles, defeating Hippolyte Carnot for the former constituency and Thiers and Lesseps for the latter. He elected to sit for Marseilles, and lost no oppor- tunity of attacking the Empire in the Assembly. He was at first

opposed to the war with Germany, but when satisfied that it had been forced upon France he did not, like some of his colleagues, refuse to vote supplies, but took the patriotic line of supporting the flag. When the news of the disaster at Sedan reached Paris, Gambetta called for strong measures. He himself proclaimed the fall of the emperor at the corps Ugislatij, and the establishment of a republic at the h6tel de ville. He was one of the first members of the new government of national defence, becoming minister of the interior. He advised his colleagues to leave Paris and conduct the government from some provincial city. This advice was rejected from dread of another revolution in Paris, and a delegation to organize resistance in the provinces was despatched to Tours, but when this was seen to be inefficient Gambetta himself (7th October) quitted Paris in a balloon, and upon arriving at Tours took the supreme direction of affairs as minister of the interior and of war. Aided by M. de Freycinet, then a young officer of engineers, as his assistant secretary of war, he displayed prodigies of energy and intelligence. He speedily organized an army, which might possibly have effected the relief of Paris if Metz had held out, but the surrender of Bazaine brought the army of the crown prince into the field, and success was impossible. After the defeats of the French near Orleans early in December the seat of government had to be transferred to Bordeaux,

and when Paris surrendered at the end of January, Gambetta, though resisting and protesting, was compelled to submit to. the capitulation concluded with Prince Bismarck. He immediately resigned his office. Elected by nine departments to the National Assembly meeting at Bordeaux (on the 1st of March 1871) he chose to sit for Strassburg, which by the terms of the treaty about to be submitted to the Assembly for ratification was to be ceded to Prussia, and when the treaty was adopted he resigned in protest and retired to Spain.

He returned to France in June, was elected by three depart- ments in July, and commenced an agitation for the definitive establishment of the Republic. On the 5th of November 187 1 he established a journal, La Republique francaise, which soon became the most influential in France. His orations at public meetings were more effective than those delivered in the Assembly, especially that made at Bordeaux on his return, and that at Grenoble on the 26th of November 1872, in which he spoke of political power having passed to les nouvelles couches sociales. When Thiers, however, fell from power in May 1873, and a Royalist was placed at the head of the government in the person of Marshal MacMahon, Gambetta gave proof of his statesmanship by unceasingly urging his friends to a moderate course, and by his tact and parliamentary dexterity, no less than by his eloquence, he was mainly instrumental in the voting of the constitution in February 1875. This policy he continued during the early days of the now consolidated Republic, and gave it the appropriate name of " opportunism." It was not until the 4th of May 1877, when the peril from reactionary intrigues was notorious, and the clerical party had begun a campaign for the restoration of the temporal power of the pope, that he delivered his famous speech denouncing " clericalism " as " the enemy." On the 16th of May Marshal MacMahon, in order to support the clerical reactionaries, perpetrated his parliamentary coup d'etat, and on the 1 5th of August Gambetta, in a speech at Lille, gave him the alternative se soumettre ou se dimettre. He then under- took a political campaign to rouse the republican party through- out France, which culminated in a speech at Romans (September 18, 1878) formulating its programme. MacMahon, equally unwilling to resign or to provoke civil war, had no choice but to dismiss his advisers and form a moderate republican ministry under the premiership of Dufaure.

When the resignation of the Dufaure cabinet brought about the abdication of Marshal MacMahon, Gambetta declined to become a candidate for the presidency, but gave his support to Grevy; nor did he attempt to form a ministry, but accepted the office of president of. the chamber of deputies (January 1879). This position, which he

filled with much ability, did not pre- vent his occasionally descending from the presidential chair to make speeches, one of which, advocating an amnesty to the

communards, was especially memorable. Although he really directed the policy of the various ministries, he evidently thought that the time was not ripe for asserting openly his own claims to direct the policy of the Republic, and seemed inclined to observe a neutral attitude as far as possible; but events hurried him on, and early in 1881 he placed himself at the head of a movement for restoring scrutin de liste, or the system by which deputies are returned by the entire department which they represent, so that each elector votes for several representatives at once, in place of scrutin d'arrondissement, the system of small constituencies, giving one member to each district and one vote' to each elector. A bill to re-establish scrutin de liste was passed by the Assembly on 19th May 1881, but rejected by the Senate on the 19th of June.

But this personal rebuff could not alter the fact that in the country his was the name which was on the lips of the voters at the election. His supporters were in a large majority, and on the reassembling of the chamber, the Ferry cabinet quickly resigned. Gambetta was unwillingly entrusted by Grevy on the 14th of November 1881 with the formation of a ministry — known as Le Grand Ministere. He now experienced the Nemesis of his over-cautious system of abstinence from office for fear of com- promising his popularity. Every one suspected him of aiming at a dictatorship; attacks, not the less formidable for their injustice, were directed against him from all sides, and his cabinet fell on the 26th of January 1882, after an existence of only sixty-six days. Had he remained in office his declarations leave no doubt that he would have cultivated the British alliance and co- operated with Great Britain in Egypt; and when the Freycinet administration, which succeeded, shrank from that enterprise only to see it undertaken with signal success by England alone, Gambetta's foresight was quickly justified. His fortunes were presenting a most interesting problem when, on the 31st of December 1882, at his house in Ville d'Avray, near Sevres, he died by a shot from a revolver which accidentally went off. Then all France awoke to a sense of her obligation to him, and his public funeral on the 6th of January 1883 evoked one of the most overwhelming displays of national sentiment ever witnessed on a similar occasion.

Gambetta rendered France three inestimable services: by preserving her self-respect through the gallantry of the resistance he organized during the German War, by his tact in persuading extreme partisans to accept a moderate Republic, and by his energy in overcoming the usurpation attempted by the advisers of Marshal MacMahon. His death, at the early age of forty-four, cut short a career which had given promise of still greater things, for he had real statesmanship in his conceptions of the future of his country, and he had an eloquence which would have been potent in the education of his supporters. The romance of his life was his connexion with Leonie Leon (d. 1906), the full details of which were not known to the public till her death. This lady, with whom Gambetta fell in love in 187 1, was the daughter of a French artillery officer. She became his mistress, and the liaison lasted till he died. Gambetta himself constantly urged her to marry him during this period, but she always refused, fearing to compromise his career; she remained, however, his confidante and intimate adviser in all his political plans. It is understood that at last she had just consented to become his wife, and the date of the marriage had been fixed, when the accident which caused his death occurred in her presence. Contradictory accounts have indeed been given as to this fatal episode, but that it was accidental, and not suicide, is certain. On Gambetta the influence of Leonie was absorbing, both as lover and as politician, and the correspondence which has been published shows how much he depended upon her. But in various matters of detail the serious student of political history must be cautious in accepting her later recollections, some of which have been embodied in the writings of M. Francis Laur, such as that an actual interview took place in 1878 between Gambetta and Bismarck. That Gambetta after 1875 felt strongly that the relations between France and Germany might be improved, and that he made it his object, by travelling incognito, to become better acquainted with Germany

and the adjoining states, may be accepted, but M. Laur appears to have exaggerated the extent to which any actual negotiations took place. On the other hand, the increased knowledge of Gambetta's attitude towards European politics which later information has supplied confirms the view that in him France lost prematurely a master mind, whom she could ill spare. In April 1905 a monument by Dalou to his memory at Bordeaux was unveiled by President Loubet.

Gambetta's Discours et plaidoyers politiques were published by J. Reinach in n vols. (Paris, 1881-1886); his Depiches, circulaires, decrets … in 2 vols. (Paris, 1886-1891). Many biographies have

appeared. The principal are J. Reinach, Leon Gambetta (1884), Gambetta orateur (1884) and Le Ministere Gambetta, histoire et doctrine (1884); Neucastel, Gambetta, sa vie, et ses idees politiques (1885); J. Hanlon, Gambetta (London, 1881); Dr Laborde, Leon Gambetta biographie psychologique (1898); P. B. Gheusi, Gambetta, Life and Letters (Eng. trans, by V. M. Montagu, 1910). See also G. Hanotaux, Histoire de la France contemporaine (1903, &c). F. Laur's Le Cosur de Gambetta (1907, Eng. trans., 1908) contains the correspondence with Leonie Leon ; see also his articles on " Gambetta and Bismarck " in The Times of August 17 and 19, 1907, with the correspondence arising from them. (H. Ch.)

GAMBIA, an important river of West Africa, and the only river of Africa navigable by ocean-going boats at all seasons for over 200 m. from its mouth. It rises in about n° 25′ N. and 12 15′ W., within 150 m. of the sea on the north-eastern escarp- ment of the Futa Jallon highlands, the massif where also rise the head-streams of the Senegal and some of the Niger tributaries, besides the Rio Grande and many other rivers flowing direct to the Gulf of Guinea. The Gambia, especially in its lower course, is very serpentine, and although the distance from the source to the mouth of the river is little more than 300 m. in a direct line, the total length of the stream is about 1000 m. It flows first N.N.E., receiving many left-hand tributaries, but about 12 35′ N. takes a sharp bend N.W. and maintains this direction until it leaves the fertile and hilly region of Bondu. The descent to the lower district is marked by the Barraconda rapids, formed by a ledge of rock stretching across the river. Between 30 and 50 m. above the falls the Gambia is joined by two considerable affluents, the Nieriko from the north and the Kuluntu or Grey river from the south. From the Barraconda rapids to the Atlantic the Gambia has a course of about 350 m. Throughout this distance the waters are tidal, and the river is navigable all the year round by boats drawing 6 ft. of water. At Yarbatenda, a few miles below Barraconda, the river has a breadth, even at the dry season, of over 300 ft., with a depth of 13 to 20 ft. From the falls to McCarthy's Island, a distance of 200 m., the river valley, which here presents a park-like appearance, is enclosed by low rocky hills of volcanic character. For 50 m. below the island, where the stream is about 800 yds. wide, the banks of the river are steep and thickly wooded. They then become low and are fringed with mangrove swamps. From Devil's Point, a sharp promontory on the north bank— up to which place the water is salt — the river widens considerably and enters the Atlantic, in about 13 1° N. and 165° W., by a broad estuary. Near the mouth of the river on the south side is (St Mary's Island (3! m.

long by i| broad), and opposite on the north bank is Barra Point, the river being here contracted to 2 \ m. Eighteen miles lower down the distance from shore to shore is 27 m. There is a sand-bar at the entrance to the river, but at the lowest state of the tide there are 26 ft. of water over the bar. The Gambia is in flood from November to June, when the Barraconda rapids are navigable by small boats. Above the rapids the stream is navigable for 160 m. Politically the Gambia is divided between Great Britain and France — Britain possessing both banks of the river up to, but not includ- ing, Yarbatenda.

The Gambia was one of the rivers passed by Hanno the Carthaginian in his famous voyage along the west coast of Africa. It was known to Ptolemy and the Arabian geographers, and was at one time supposed to be a mouth of the Nile, and, later (18th century), a branch of the Niger. It was possibly visited by Genoese navigators in 1291, and was certainly dis- covered by the Portuguese c. 1446, but was first explored for any distance from its mouth (1455) bythe Venetian Alvise Cadamosto

(q.v.), who published an account of his travels at Vicenza in 1507 (La Prima Navigazione per I'Oceano alle terre de' Negri della Bassa Ethiopia) . Afterwards the Gambia became a starting-place for explorers of the interior, among them Mungo Park, who began both his journeys (1795 and 1805) from this river. It was not until 1818 that the sources of the Gambia were reached, the discovery being made by a Frenchman, Gaspard Mollien,who had travelled by way of the Senegal and Bondu. The middle course of the river was explored in 1851 by R. G. MacDonnell, then governor of the Gambia colony, and in 1881 Dr V. S. Gouldsbury also navigated its middle course. No native craft of any kind was seen above Barraconda. The more correct name of the river is Gambra, and it is so called in old books of travel.

See Mungo Park's Travels (London, 1799); G. Mollien, Travels . . . to the Sources of the Senegal and Gambia . . ., edited by T. E. Bowdich (London, 1820) ; the account of Dr Gouldsbury 's journey in the Blue Book C 3065 (1881) ; also under the country heading below.

GAMBIA, the most northerly of the British West African

dependencies. It consists of a stretch of land on both sides of the lower Gambia. The colony, with the protectorate dependent upon it, has an area of about 4000 sq. m. and a population officially estimated (1907) at 163,000. The colony proper (including St Mary's Island, British Kommbo, the Ceded Mile, McCarthy's Island and other islets) has an area of about 69 sq. m. The protectorate consists of a strip of land extending ten kilometres (about 6 m.) on each side of the river to a distance of about 200 m. in a direct line from the sea. The land outside these limits is French. Within the protectorate are various petty kingdoms, such as Barra, to the north of the Gambia, and Kommbo, to the south. The breadth of the colony near the coast is somewhat greater than it is higher up. T ne greatest breadth is 39 m.

Physical Features, Fauna and Flora. — The colony, as its name implies, derives its character and value from the river Gambia (q.v.), which is navigable throughout and beyond the limits of the colony, while large ocean-going ships can always cross the bar at its mouth and enter the port of Bathurst. Away from the swamps by the river banks, the country' is largely " bush." The region above McCarthy's Island is hilly. Much of the land is cleared for cultivation. The fauna includes lions, leopards, several kinds of deer, monkeys, bush-cow and wild boar. Hippopotami are found in the upper part of the river, and crocodiles abound in the creeks. The birds most common are bush-fowl, bustards, guinea-fowl, quail, pigeon and sand-grouse. Bees are very numerous in parts of the country. The flora resembles that of West Africa generally, the mangrove being common. Mahogany and rosewood (Pterocarpus erinaceus) trees are found, though not in large numbers, and the rubber-vine and oil-palm are also comparatively scarce. There are many varieties of fern. The cassava (manioca) and indigo plants are indigenous.

Climate. — The climate during the dry season (November-June) is the best on the British West African coast, and the Gambia is then considered fairly healthy. Measures for the extermination of the malarial mosquito are carried on with good effect. The mean temperature at Bathurst is 77 F., the shade minimum being 56 and the solar maximum 165°. Up river the variation in temperature is even greater than at Bathurst, from 50 in the morning to 100 – 104 at 3 p.m. being common at McCarthy's Isle. The average rainfall is about 50 in. a year, but save for showers in May and June there is rarely any rain except between July and October. The first instance of rain in December in twenty-six years was recorded in 1906. The dry east wind known as the harmattan blows inter- mittently from December to March.

Inhabitants. — The inhabitants, who are both thrifty and industrious, are almost entirely of Negro or Negroid race, the chief tribes represented being the Mandingo (q.v.), the Jolof and the Jola. Numbers of Fula (q.v.) are also settled in the country. Fully four-fifths of the natives are Mahommedans. The few European residents are officials, traders or missionaries.

Towns and Trade. — Bathurst, pop. about 8000, the chief town of the colony, in 13 24′ N., 16° 36′ W., is built on St Mary's Island, which lies at the mouth of the river near its south bank and is connected with the mainland by a bridge across Oyster Creek. It was founded in 1816 and is named after the 3rd earl Bathurst, secretary of state for the colonies from 181 2 to 1827. Bathurst is a fairly well-built town, the chief material employed being red sandstone. It lies about 12 to 14 ft. above the level of the river. The principal buildings face the sea, and include Government House, barracks, a well-appointed hospital,

founded by Sir R. G. MacDonnell (administrator, 1847-1852), and various churches. The market-place is shaded by a fine avenue of bombax and other wide-spreading trees. There are no other towns of any size in the Gambia. A trading station called Georgetown is situated on McCarthy's Island, so named after Sir Charles McCarthy, the governor of Sierra Leone, who in 1824 was captured and beheaded by the Ashanti at the battle of Essamako. Albreda, a small port on the north bank of the river, of some historic interest (see below), is in the Barra district.

Products. — Ground-nuts (Arachis hypogaea), rubber, beeswax, palm kernels, rice, cotton, and millet are the chief productions. Millet and rice are the staple food of the people. The curing of hides, the catching and drying of fish, boat-building, and especially the weaving of cotton into cloths called " pagns," afford employment to a considerable number of persons. Formerly the principal ex- ports, besides slaves, were gold-dust, wax and hides, the gold being obtained from the Futa Jallon district farther inland. Between 1830 anil 1840 from 1500 to 2000 oz. of gold were exported annually, but shipments ceased soon afterwards, though small quantities of gold-dust can still be obtained from native goldsmiths. The export of hides received a severe check in 1 892-1 893 through the death of nearly all the cattle, but after an interval of seven or eight years the industry gradually revived. The value of hides exported in- creased from £520 in 1902 to £9615 in 1907. The collection of rubber was started about 1880, but the trade has not assumed large pro-portions. In 1907 the value of the rubber exported was £4602. The

export of wax, valued at £37,000 in 1843, had dwindled in 1907 to £2325. The cultivation of the ground-nut, first exported in 1830, assumed importance by 1837, and by 1850 had become the chief industry of the colony. In 1907 the value of the nuts was £256,685, over \ of the total exports (exclusive of specie). Nearly the whole male population is engaged in the industry for eight months of the year. Planted in June, after the early rains, the crop is reaped in October or November and exported to Europe (f to Marseilles) for the extraction of its oil, which is usually sold as olive oil. A feature of the industry is the appearance at the beginning of the planting season of thousands of men from a distance, " strange farmers," as they are called, who are housed and fed and given farms to cultivate. In return they have to give half the produce to the landlords. As soon as he has sold his nuts, the "strange farmer " goes off, often not returning for years.

Apart from the cultivation of the ground-nut, the agricultural resources of the country are undeveloped. Large herds of cattle are kept by the Fula, and in cattle rich natives usually invest their wealth. Land can be hired for 2d. an acre per annum for twenty- one years. All land lying vacant or unused, or to which the occupier is unable to produce any title, is vested in the crown. A botanical station was opened in 1894, and the cultivation of American and Egyptian cotton was taken in hand in 1902. The experiment proved discouraging. Great difficulty was experienced in getting farmers to grow cotton for export, as unless carried on on highly scientific lines its cultivation is not so profitable as that of theground- nut. The principal imports, of which over § come from Great Britain or British colonies, are cotton goods, kola-nuts (from Sierra Leone), tobacco, rice, sugar and spirits. In the ten years 1898 to 1907 the average annual value of the exports was £301,000, of the imports £316,000. There are no mines in the colony, nor any apparent mineral wealth, except ridges of ironstone in the regions above McCarthy's Island. Bathurst is in telegraphic communication with Europe and the rest of Africa. There are no railways in the colony, but it is traversed by well-made roads of a uniform width of 18 ft. The Liverpool mail steamers call at the port every fortnight. A government steamer runs regularly from Bathurst to McCarthy's Island, and a smaller boat plies on the upper river. The shipping trade is chiefly British ; French and German tonnage coming next.

Surrounded on all sides, save seawards, by French territory, the colony largely depends, economically, upon France, to which country most of the exports go. A considerable entrep6t trade is also done with the neighbouring French colonies. The extent of French

ihfluence is indicated by the fact that the five-franc piece, locally known as a dollar, is largely circulated throughout the protectorate, and is accepted as legal tender, although the currency in the colony proper is the English coinage.

Administration, Revenue, &c. — The Gambia is administered by a governor, assisted by an executive and a legislative council. On the last-named body nominated unofficial members have seats. The colony is self-supporting and has no public debt. The revenue, which in 1906 for the first time exceeded £60,000, is mainly derived from customs. A company of the West African Frontier Force is maintained. Travelling commissioners visit the five districts into which, for administrative purposes, the protectorate is divided, and in which the native form of government prevails. From the native law-courts appeal can be made to the supreme court at Bathurst. There is also at Bathurst a Mahommedan court, established in 1906, for the trial of cases involving the civil status of Moslems.

Primary schools are maintained by the various religious denominations, and receive grants from government. The Wesleyans have

also a secondary and a technical school. There is a privately supported school for Mahommedans at Bathurst. The Anglicans, Wesleyans and Roman Catholics have numerous converts.

History. — Of the early history of the Gambia district there is scant mention. At what period the stone circles and pillars (apparently of a " Draidical " character) , whose ruins are found at several places along the upper Gambia, were erected is not known. Those at Lamin Koto, on the right bank of the river opposite McCarthy's Island, are still in good preservation, and are an object of veneration to the Mahommedans (see Geog. Journ. vol. xii., 1898). The country appears to have formed part, successively, of the states of Ghana, Melle and Songhoi. The relations, political and commercial, of the natives were all with the north and east; consequently no large town was founded on the banks of the river, nor any trade carried on (before the coming of the white man) by vessels sailing the ocean About the nth century the district came under Mahommpdan influence.

The Portuguese visited the Gambia in the 15th century, and in the

beginning of the 16th century were trading in the lower river. Embassies were sent from the Portuguese stations in- land to Melle to open up trade with the interior, but about the middle of the century this trade — apparently mostly in gold and slaves — declined. At the end of the century the river was known as the resort of banished men and fugitives from Portugal and Spain. It was on the initiative of Portuguese living in England that Queen Elizabeth, in 1588, granted a patent to " certain merchants of Exeter and others of the west parts and of London for a trade to the river of Senega and Gambra in Guinea." This company was granted a monopoly of trade for ten years. Its operations led to no permanent settlement in the Gambia. In 1618 James I. granted a charter to another company named " The Company of Adventurers of London trading into Africa," and formed at the instigation of Sir Robert Rich, afterwards earl of Warwick, for trade with the Gambia and the Gold Coast. This company sought to open up trade with Timbuktu, then believed to be a great mart for gold, which reached the lower Gambia in considerable quantities. With this object George Thompson (a merchant who had traded with Barbary) was sent out in the " Catherine," and ascended the Gambia in his ship to Kassan, a Portuguese trading town, thence continuing his journey in small boats. In his absence the " Catherine " was seized and the crew murdered by Portuguese and half-castes, and Thompson himself was later on murdered by natives. Two years afterwards Richard Jobson, another agent of the Company of Adventurers, advanced beyond the falls of Barraconda; and he was followed, about forty years later, by Vermuyden, a Dutch merchant, who on his return to Europe asserted that he had reached a country full of gold.

The Company of Adventurers had built a fort near the mouth of the Gambia. This was superseded in 1664 by a fort built by Captain (afterwards Admiral Sir Robert) Holmes on a small island 20 m. from the mouth of the river and named Fort James, in honour of the duke of York (James II.). This fort was built expressly to defend the British trade against the Dutch, and from that time the British remained in permanent occupation of one or more ports on the river. In 1723 Captain Bartholomew Stibbs was sent out by the Royal African Company, which had succeeded the earlier companies, to verify Vermuyden's reports of gold. He proceeded 60 m. above the falls, but the land of gold was not found. The French now became rivals for the trade of the Gambia, but the treaty of Versailles in 1783 assigned the trade in the river to Britain, reserving, however, Albreda for French trade, while it assigned the Senegal to France, with the reservation of the right of the British to trade at Portendic

for gum. This arrangement remained in force till 1857, when an exchange of possessions was effected and the lower Gambia became a purely British river. In the period between the signing of the treaty of Versailles and 1885 the small territories which form the colony proper were acquired by purchase or cession from native kings. St Mary's Isle was acquired in 1806; McCarthy's Isle was bought in 1823; the Ceded. Mile was granted by the king of Barra in 1826;. and British Kommbo between 1840 and 1855. During

this period the colony had gone through an economic crisis by the abolition of the slave trade (1807), which had been since 1662 its chief financial support. The beginning of a return to pro- sperity came in 1816 when some British traders, obliged to leave Senegal on the restoration of that country to France after the Napoleonic wars, founded a settlement on St Mary's Isle. From that year the existing colony, as distinct from trading on the river, dates. The Gambia witnessed many administrative changes. When the slave trade was abolished, the settlement was placed under the jurisdiction of the governor of Sierra Leone, and was formally annexed to Sierra Leone on the dissolution of the Royal African Company (1822). It so remained until 1843, when the Gambia was made an independent colony, its first governor being Henry Frowd Seagram. Afterwards (1866) the Gambia became a portion of the officially styled " West African Settle- ments." In i883 it was again made a separate government, administered as a crown colony. Between the years last mentioned — 1866-1888 — the colony had suffered from the retro- grade policy adopted by parliament in respect to the West African Settlements (vide Report of the Select Committee of 1865). In 1870 negotiations were opened between France and Great Britain on the basis of a mutual exchange of territories in West Africa. Suspended owing to the outbreak of the Franco-Prussian War the negotiations were resumed in 1876. " Definite proposals were at that time formulated by which the Gambia was to be exchanged for all posts by France between the Rio Pongas (Pongo river, French Guinea) and the Gabun. This would have been a comprehensive and intelligible arrangement, but so strong a feeling in opposition to any cession of British territory was manifested in parliament, and by various mercantile bodies, that the government of the day was unable to press the scheme." l Nothing was done, however, to secure for the Gambia a suitable hinterland, and in 1877 the 4th earl of Carnarvon (then colonial secretary) warned British traders that they proceeded beyond McCarthy's Isle at their own risk. Meantime the French from Senegal pushed their frontier close to the British settlements, so that when the boundaries were settled by the agreement of the 10th of

August 1889 with France, Great Britain was able to secure only a ten-kilometre strip on either side of the river. This document fixed the frontier of the British protectorate inland at a radius of 10 m. from the centre of the town of Yarbatenda; which town is situated at the limit of navigability of the Gambia from the sea. By Art. 5 of the Anglo-French convention of the 8th of April 1904, Yarbatenda was ceded to France, with the object of giving that country a port on the river accessible to sea-going merchantmen.

Since 1871 the colony had been self-supporting, but on the acquirement of the protectorate it was decided, in order to balance increasing expenditure, to impose a " hut tax " on the natives. This was done in 1895. The tax, which averages 4s. per annum for a family, met with no opposition.

In 1892 a slave-raiding chief, named Fodi Kabba, had to be forcibly expelled from British territory. In 1894 another slave- raider, Fodi Silah, gave much trouble to the protectorate. An expedition under Captain E. H. (afterwards admiral) Gamble succeeded in routing him, and Fodi Silah took refuge in French territory, where he died. During the expedition Captain Gamble was led into an ambush, and in this engagement lost 15 killed and 47 wounded. In 1900 trouble again arose through the agency of Fodi Kabba, who had fixed his residence at Medina, in French territory. Two travelling commissioners (Mr F. C. Sitwell and Mr Silva) were murdered in June of that year, at a place called Suankandi, and a punitive expedition was sent out under Colonel H. E. Brake. Suankandi was captured and, the French co-operating, Medina was also captured, Fodi Kabba being killed on the 23rd of March 1901.

The people of the protectorate are in general peaceful and contented, and slave trading is a thing of the past. Provision was moreover made by an ordinance of 1906 for the extinction of slavery itself throughout the protectorate, it being enacted that

1 Extract from a despatch of Lord Salisbury to the British ambassador to France, dated 30th of March 1892.

henceforth all children born of slaves were free from birth, and j that ail slaves became free on the death of their master. _ |

See the Annual Reports on the colony published by the colonial

office, London, which give the latest official information; C. P. Lucas's Historical Geography of the British Colonies, vol. iii., West Africa (2nd ed., Oxford, 1900) (this book contains valuable bibliographical notes) ; and The Gambia Colony and Protectorate, an official handbook (with map and considerable historical information), by F. B. Archer, treasurer of the colony (London, 1906). Early accounts of the country will be found in vol. ii. of Thomas Astley's New General Collection of Voyages and Travels (London, 1 745-1 747). See also Major W. Gray and Surgeon Dochard, Travels in Western Africa in 1818-1821, from the River Gambia . . . to the River Niger (London, 1829). The Mora has been the subject of a special study, A. Rancon, La Flore utile dubassinde la Gambie (Bordeaux, 1895). Most of the books mentioned under Gold Coast also deal with the Gambia. GAMBIER, JAMES GAMBIER, Bakon (1756-1833), English admiral, was born on the 13th of October 1756 at the Bahamas, of which his father, John Gambier, was at that time lieutenant- governor. He entered the navy in 1767 as a midshipman on board the " Yarmouth," under the command of his uncle; and, his family interest obtaining for him rapid promotion, he was raised in 1778 to the rank cf post-captain, and appointed to the " Raleigh," a fine 32-gun frigate. At the peace of 1783 he was placed on half-pay; but, on the outbreak of the war of the Fiench Revolution, he was appointed to the command of the 74-gun ship " Defence," under Lord Howe; and in her he had ' an honourable share in the battle on the 1st of June 1794. In recognition of his services on this occasion, Captain Gambier received the gold medal, and was made a colonel of marines; the following year he was advanced to the rank of rear-admiral, and appointed one of the lords of the admiralty. In this office he continued for six years, till, in February 1801, he, a vice-admiral of 1799, hoisted his flag on board the " Neptune," of 98 guns, as third in command of the Channel Fleet under Admiral Corn- wallis, where, however, he remained for but a year, when he was appointed governor of Newfoundland and commander-in-chief of the ships on that station. In May 1804 he returned to the admiralty, and with a short intermission in 1806, continued there during the naval administration of Lord Melville, of his uncle, Lord Barham, and of Lord Mulgrave. In November 1805 he was raised to the rank of admiral; and in the summer of 1807, whilst still a lord of the admiralty, he was appointed to the command of the fleet ordered to the Baltic, which, in concert with the army under Lord Cathcart, reduced Copenhagen, and enforced the surrender of the Danish navy, consisting of nineteen ships of the line, besides frigates, sloops, gunboats, and naval stores. This service was considered by the

government as worthy of special acknowledgment; the naval and military commanders, officers, seamen and soldiers received the thanks of both Houses of Parliament, and Admiral Gambier was rewarded with a peerage. In the spring of the following year he gave up his seat at the admiralty on being appointed to the command of the Channel Fleet; and in that capacity he witnessed the partial, and pre- vented the total, destruction of the French fleet in Basque Roads, on the 1 2th of April 1809. It is in connexion with this event, which might have been as memorable in the history of the British navy as it is in the life of Lord Dundonald (see Dundonald), that Lord Gambier's name is now best known. A court-martial, assembled by order of a friendly admiralty, and presided over by a warm partisan, " most honourably acquitted " him on the charge " that, on the 12th of April, the enemy's ships being then on fire, and the signal having been made that they could be destroyed, he did, for a considerable time, neglect or delay taking effectual measures for destroying them "; but this decision was in reality nothing more than a party statement of the fact that a commander-in-chief, a supporter of the government, is not to be condemned or broken for not being a person of brilliant genius 6r dauntless resolution. No one now doubts that the French fleet should have been reduced to ashes, and might have been, had Lord Gambier had the talents, the energy, or the experience of many of his juniors. He continued to hold the command of the Channel Fleet for the full period of three years, at the end of which time — in 1811 — he was superseded. In 1814 he acted in a civil capacity as chief commissioner for negotiating a treaty of peace

with the United States; for his exertions in which business he was honoured with the Grand Cross of the Bath. In 1830 he was raised to the high rank of admiral of the fleet, and he died on the 19th of April 1833.

Lord Gambier was a man of earnest, almost morbid, religious principle, and of undoubted courage; but the administration of the admiralty has seldom given rise to such flagrant scandals as during the time when he was a member of it; and through the whole war the self-esteem of the navy suffered no such wound as during Lord Gambier's command in the Bay of Biscay.

The so-called Memorials, Personal and Historical, of Admiral Lord Gambier, by Lady Chatterton (1861), has no historical value. The life of Lord Gambier is to be read in Marshall's Royal Naval Biography, in Ralfe's Naval Biography, in Lord Dundonald's Auto-biography of a Seaman, in the Minutes of the Courts-Martial and in

the general history of the period.

GAMBIER, a village of College township, Knox county, Ohio, U.S.A., on the Kokosing river, 5 m. E. of Mount Vernon. Pop. (1900) 751; (1910) 537. It is served by the Cleveland, Akron & Columbus railway. The village is finely situated, and is the seat of Kenyon College and its theological seminary, Bexley Hall (Protestant Episcopal), and of Harcourt Place boarding school for girls (1889), also Protestant Episcopal. The college was in- corporated in r824 as the " Theological Seminary of the Protes- tant Episcopal Church in the Diocese of Ohio"; but in 1891 " Kenyon College," the name by which the institution has always been known, became the official title. Its first exercises were held at Worthington, Ohio, in the home of Philander Chase (1775- 1852), first Protestant Episcopal bishop in the North-west Territory, by whose efforts the funds for its endowment had been raised in England in 1823-1824, the chief donors being Lords Kenyon and Gambier. The first permanent building, " Old Kenyon " (still standing, and used as a dormitory), was erected on Gambier Hill in 1827 in the midst of a forest. In 1907-1908 the theological seminary had 18 students and the collegiate department 119.

Some account of the founding of the college may be found in Bishop Chase's Reminiscences; an Autobiography, comprising a History of the Principal Events in the Author's Life to 1847 (2 vols., New York, 1848). GAMBOGE (from Camboja, a name of the district whence it is obtained), a gum-resin procured from Garcinia Hanburii, a dioecious tree with leathery, laurel-like leaves, small yellow flowers, and usually square-shaped and four-seeded fruit, a member of the natural order Guttiferae, and indigenous to Cambodia and parts of Siam and of the south of Cochin China, formerly comprised in Cambojan territory. The juice, which when hardened constitutes gamboge, is contained in the bark of the tree, chiefly in numerous ducts in its middle layer, and from this it is procured by making incisions, bamboo joints being placed to receive it as it exudes. Gamboge occurs in commerce in cylindrical pieces, known as pipe or roll gamboge, and also, usually of inferior quality, in cakes or amorphous masses. It is of a dirty orange externally; is hard and brittle, breaks with a conchoidal and reddish-yellow, glistening fracture, and affords a brilliant yellow powder; is odourless, and has a taste at first slight, but subsequently acrid; forms with water an emulsion; and consists of from 20 to 25 % of gum soluble in water, and from 70 to 75% of a resin. Its commonest adulterants are rice-flour and pulverized bark.

Gamboge (Cambogia) is a drastic hydragogue cathartic, caus- ing much griping and irritation of the intestine. A small quantity is absorbed, adding a yellow ingredient to the urine and acting as a mild diuretic. Its irritant action on the skin may cause the formation of pustules. It is less active only than croton oil and elaterium, and may be given in doses of half to two grains, combined with some sedative such as hyoscyamus, in apoplexy and in extreme cases of dropsy. Gamboge is used as a pigment, and as a colouring matter for varnishes. It appears to have been first brought into Europe by merchants from the East at the close of the 16th century.

GAMBRINUS, a mythical Flemish king who is credited with the first brewing of beer. His name is usually derived from that of Jan Primus, i.e. Jan (John) I., the victorious duke of Brabant, from 1261 to 1294, who was president of the Brussels gild of*

brewers; his portrait with a foaming glass of ale in his hand had the place of honour in the gild-hall, and this led in time, it is suggested, to the myth of the beer-king who is usually repre- sented outside a barrel with a tankard in his hand.

GAME, a word which in its primary and widest significance means any amusement or sport, often combined in the early examples with " glee," " play," " joy " or " solace." It is a common Teutonic word, in O. Eng. gamen, in O.H.G. gaman, but only appears in modern usage outside English in Dan. gammen and Swed. gamman. The ulterior derivation is obscure, but philologists have identified it with the Goth, gaman, companion or companionship; if this be so, it is compounded of the prefix ga-, with, and the root seen in " man." Apart from its primary and general meaning the word has two specific applications, first to a contest played as a recreation or as an exhibition of skill, in accordance with rules and regulations; and, secondly, to those wild animals which are the objects of the chase, and their flesh as used for food, distinguished as such from meat, fish and poultry, and from the flesh of deer, to which the name " venison " is given. For " game," from the legal aspect, and the laws relating to its pursuit and capture see Game Laws. The athletic contests of the ancient Greeks (ayuives) and the public shows (ludi) of the arena and amphitheatre of the ancient Romans are treated below (Games, Classical); the various forms of modern games, indoor and outdoor, whether of skill, strength or chance, are dealt

with under their specific titles. A special use ("gaming" or "gambling") restricts the term to the playing of games for money, or to betting and wagering on the results of events, as in horse-racing, &c. (see Gaming and Wagering). " Gamble," " gambler " and " gambling " appear very late in English. The earliest quotations in the New English Dictionary for the three words are dated 1775, 1747 and 1784 respectively. They were first regarded as cant or slang words, and implied a reproach, either as referring to cheats or sharpers, or to those who played recklessly for extravagant stakes. The form of the words is obscure, but is supposed to represent a local variation gammle of the M.E. gamenian. From this word must, of course, be dis- tinguished " gambol," to sport, frisk, which, as the older forms (gambald, gambaud) show, is from the Fr. gambade, leap, jump, of a horse, It. gambado, gamba, leg (Mod. Fr. jambe).

GAME LAWS. This title in English law is applied to the statutes which regulate the right to pursue and take or kill certain kinds of wild animals (see above). The existence of these statutes is due to the rules of the common law as to the nature of property, and the interest of the Norman sovereigns and of feudal superiors in the pleasures of sport or the chase. The substantial basis of the law of property is physical possession of things and the power to deal with them as we see fit. By the common law wild animals are regarded as res nullius, and as not being the subject of private property until reduced into possession by being killed or captured. A bird in the hand is owned: a bird in the bush is not. Even bees do not become property until hived. " Though a swarm lights in my tree," says Bracton, " I have no more property therein than I have in the birds which make their nests thereon." If reclaimed or confined they become property. If they escape, the rights of the owner continue only while he is in pursuit of the fugitive, i.e. no other person can in the meantime establish a right of property against him by capturing the animal. A swarm of bees " which fly out of my hive are mine so long as I can keep them in sight and have power to pursue them." But the right of recapture does not entitle the owner to follow his animals on to the lands of another, and the only case in which any right to follow wild animals on to the lands of others is now expressly recognized is when deer or hares are hunted with hounds or greyhounds. This recognition merely excepts such pursuit from the law as to criminal game tres- pass, and fox-hunters and those who course hares or hunt stags are civilly liable for trespass if they pass over land without the consent of the occupier {Paul v. Summerhayes . 1878, 4 Q.B.D. 9). It is a maxim of the common law that things in which no one can claim any property belong to the crown by its

prerogative: this rule has been applied to wild animals, and in particular to

deer and what is now called " game." The crown rights may pass to a subject by grant or equivalent prescription. In the course of time the exclusive right to take game, &c, on lands came to be regarded as incidental to the ownership or occupation of the lands. This is described as the right to game ratione soli. In certain districts of England which are crown forests or chases or legal parks, or subject to rights of free warren, the right to take deer and game is not in the owner or occupier of the soil, but is in the crown by prerogative, or ratione privilegii in the grantee of the rights of chase, park or free warren, which are anterior to and superior to those of the owner or occupier of the lands over which the privilege has been granted. In all cases where these special rights do not exist, the right to take or kill wild animals is treated as a profit incidental to the ownership or occupation of the land on which they are found, and there is no public right to take them on private land or even on a highway; nor is there any method known to the law by which the public at large or an undefined body of persons can lawfully acquire the right to take wild animals in alieno solo.

In the nature of things the right to take wild animals is valuable as to deer and the animals usually described as game, and not as to those which are merely noxious as vermin, or simply valueless, as small birds. Upon the rules of the common law there has been grafted much legislation which up till the end of the 1 8th century was framed for the preservation of deer and game for the recreation and amusement of persons of fortune, and to prevent persons of inferior rank from squandering in the pursuit of game time which their station in life required to be more profitably employed. These enactments included the rigorous code known as the Laws of the Forest (see Forest Laws), as well as what are usually called the Game LawsT

In England the older statutes relating to game were all repealed early in the 19th century. From the time of Richard II. (1389) to 1831, no person might kill game unless qualified by estate or social standing, a qualification raised from a 40s. freehold in 1389 to an interest of £100 a year in freehold or £150 in long leaseholds (1673). In 1831 this qualification by estate was abolished as to England. But in Scotland the right to hunt is theoretically reserved to persons who have in heritage that unknown quantity a " plough-gate of land " (Scots Act 1621, c. 31); and in Ireland qualifications by estate are made necessary for killing game and keeping sporting dogs (Irish Act 1698, 8 Will. III. c. 8). In England the game laws proper consist of

the Night Poaching Acts of 1828 and 1844, the Game Act of 1831, the Poaching Prevention Act 1862, and the Ground Game Acts of 1880 and 1906. From the fact that the right of landowners over wild animals on their land does not amount to ownership it follows that they cannot prosecute any one for stealing live wild animals: and that apart from the game laws the only remedy against poachers is by civil action for trespass. As between trespasser and landowner the law is peculiar (Blades v. Higgs, 1865, n H.L.C. 621). If A starts and kills a hare on B's land the dead hare belongs to B (ratione soli) and not to A, though he has taken the hare by his own efforts (per industriam). But if A hunts the hare from B's land on to C's land and there kills it, the dead hare belongs to A and not to B or C. It is not B's because it was not taken on his land, and it is not C's because it was not started on his land. In other words the right of each owner is limited to animals both started and killed on his own land, and in the case of conflicting claims to the animal taken (made ratione soli) the captor can make title (per industriam) against both landowners. If he is a trespasser he is liable to civil or criminal proceedings by both landowners, but the game is his unless forfeited under a statute. Another peculiar result of the law is that where trespassers {e.g. poachers) kill and carry off game or rabbits as part of one continuous transaction they are not guilty of theft, but only of game trespass (R. v. Townley, 1871, L.R. 1 C.C.R. 315), but it is theft for a trespasser to pick up and carry off a pheasant killed by the owner of the land on his own land or even a pheasant killed by an independent gang of poachers. The young of wild animals belong (propter impotentiam) to the owner of the land until they are able to fly or run away. This right does not extend to the

eggs of wild birds. But the owner can reduce the eggs into possession by taking them up and setting them under hens or in enclosures. And if this is done persons who take them are thieves and not merely poachers. A game farm, like a decoy for wild water-fowl, is treated as a trade or business; but a game preserve in which full-grown animals fly or run wild is subject to the ordinary incidents of the law as to animals ferae naturae.

The classification of wild animals for purposes of sport in England is as follows : —

1. Beasts of forest are hart and hind (red deer), boar, wolf and all

beasts of venery.

2. Beasts of chase and park are buck and doe (fallow deer), fox, marten and roe, or all beasts of venery and hunting.

3. Beasts of (free) warren are roe, hare, rabbit, partridge, pheasant, woodcock, quail, rail and heron.

4. Game, as defined by the Night Poaching Act of 1828 and the Game Act of 1831, is pheasant, partridge, black game, red grouse, bustard and hare. In France game (gibier) includes everything eatable that runs or flies.

5. Wild fowl not in any of the previous lists which are nevertheless prized for sport, e.g. duck, snipe, plovers, &c.

6. Wild birds not falling within class 4 are more or less protected against destruction by the Wild Birds Protection Acts, which were, however, passed with quite other objects than the game laws.

As regards class I no subject without special authority of the crown may kill within a forest or its purlieus or on adjacent high- ways, rivers or enclosures. The right to the animals in a forest does not depend on ownership of the land but on the royal prerogative as to the animals, i.e. it exists not ratione soli but ratione privilegii: and this right is not in any way altered by the Game Act 1 831. A chase is a forest in the hands of a subject and a legal park (which is an enclosed chase) is created by crown grant or by prescription founded on a lost grant. The rights of the grantee are in substance the same as those of the crown in a forest, and do not depend on ownership of the soil. In 'the case of a free warren the grantee usually but not necessarily owns some or all of the soil over which the right of warren runs. The right of free warren depends on crown grant or prescription founded on lost grant, and involves a right of property over beasts and fowl of warren on all lands within the franchise. As will appear from the list above, some game birds are not fowl of warren, e.g. black game and red grouse {Duke of Devonshire v. Lodge, 1827, 7 B. & C. 39). Free warren is quite different from ordinary warrens, in which hares or rabbits are bred by the owner of the soil for sport or profit. Ground game in such warrens is protected under the Larceny Act 1861, s. 17, as well as by the game laws. In manors, of which none have been created since 1290, the lord by his franchise had the sporting rights over the manor, but at the present time this right is restricted to the commons and wastes of the manor, the freehold whereof is in him, and does not extend to enclosed

freeholds nor as a general rule to enclosed copy- holds, unless at the time of enclosure the sporting rights were reserved to him by the Enclosure Act or award {Sowerby v. Smith, 1873, L.R. 8 C.P. 514). In other words his rights exist ratione soli and not ratione privilegii. The Game Act 1 83 1 gives lords of manors and privileged persons certain rights as to appointing gamekeepers with special powers to protect game within the district over which their rights extend (ss. 13, 14, 15, 16). The game laws in no way cut down the special privileges as to forest, park, chase or free warren (1831, s. 9), and confirm the sporting right of lords of manors on the wastes of the manor (1831, s. 10). As to all lands not affected by these rights, the right to kill or take game on the land is presumably in the occupier. On letting land the owner may, subject to the qualifications hereinafter stated, reserve to himself the right to kill or take " game " or rabbits or other wild animals concurrently with or in exclusion of the tenant. Where the exclusive right is in the landlord the tenant is not only liable to forfeiture or damages for breaches of covenants in the lease, but is also liable to penalties on summary conviction if without the lessor's authority he pursues, kills or takes any " game " upon the land or gives permission to

others to do so (1831, s. 12). In effect he is

made criminally liable for gametrespassonlands in his own occupation, so far as relates to game, but is not so liable if he takes rabbits, snipe, woodcock, quails or rails.

The net effect of the common law and the game laws is to give the occupier of lands and the owner of sporting rights over them the following remedies against persons who infringe their right to kill or take wild animals on the land. A stranger who enters on the land of another to take any wild animals is liable to the occupier for trespass on the land and for the animals started and killed on the land by the trespasser. He is also criminally liable for game trespass if he has entered on the land to search for or in pursuit of " game " or woodcock, snipe, quail, landrails or rabbits. If the trespass is in the daytime (whether on lands of the subject or in royal forests, &c), the penalty on conviction may not

exceed 40s., unless five or more persons go together, in which case the maximum penalty is £5. If a single offender refuses his name or address or gives a false address to the occupier or to the owner of the sporting rights or his representatives, or refuses to leave the land, he may be arrested by them, and is liable to a penalty not exeeeding £5, and if five or more concerned together in game trespass have a gun

with them and use violence, intimidation or menace, to prevent the approach of persons entitled to take their names or order them off the land, they incur a further penalty up to £5.

If the trespass is in search or pursuit of game or rabbits in the night-time, the maximum penalty on a first conviction is imprisonment with hard labour for not over three months ; on a second, imprisonment, &c, for not over six months, and the offender may be put under sureties not to offend again for a year after a first conviction or for two years after a second conviction. For a first or second offence the conviction is summary, subject to appeal to quarter sessions, but for a third offence the offender is tried on indictment and is liable to penal servitude (3-7 years) or imprisonment with hard labour (2 years). The offenders may be arrested by the owner or occupier of the land or their servants, and if the offenders assault or offer violence by firearms or offensive weapons they are liable to be indicted and on conviction punished to the same extent as in the last offence. In 1844 the above penalties were extended to persons found by night on highways in search or pursuit of game. If three or more trespass together on land by night to take or destroy game or rabbits, and any of them is armed with firearms, bludgeon or other offensive weapon, they are liable to be indicted and on conviction sentenced to penal servitude (3-14 years) or imprisonment with hard labour (2 years). By " day " time is meant from the beginning of the first hour before sunrise to the end of the first hour after sunset, and by " night " from the end of the first hour after sunset to the beginning of the first hour before sunrise (act of 1828, s. 12 ; act of 1831, s. 34). The time is reckoned by local and not by Greenwich time.

The penalties for night poaching are severe, but encounters between the owners of sporting rights and armed gangs of poachers have often been attended by homicide. It is to be observed that it is illegal and severely punishable to set traps or loaded spring guns for poachers (Offences against the Person Act 1861, s. 31), whereby any grievous bodily harm is intended or may be caused even to a trespasser, so that the incursions of poachers can be prevented only by personal attendance on the scene of their activities; and it is to be observed also that the provisions of the Game Laws above stated are, so far as concerns private land, left to be enforced by private enterprise without the interference of the police, with the result that in some districts there are scenes of private nocturnal war. Even in the Night Poaching Act 1844, which applies to highways, the arrest of offenders is made by owners, occupiers or their game- keepers. The police were not given any direct authority as to poachers until the

Poaching Prevention Act 1862, under which a constable is empowered ” on any highway, street or public place, to search any person whom he may have good cause to suspect of coming from any land where he shall have been unlawfully in search or pursuit of ‘ game,’ or any persons aiding or abetting such person, and having in his possession any game unlawfully obtained, or any gun, part of gun, or nets or engines used for the killing or taking game ; and also to stop and search any cart or other conveyance in or upon which such constable or peace officer shall have good cause to suspect that any such game, or any such article or thing, is being carried by such person.” If any such thing be found the constable is to detain it, and apply fora summons against the offender, summon- ing him to appear before a petty sessional court, on conviction before which he may be fined not more than £5, and forfeits the game, guns, &c, found in his possession. In this act ” game ” includes woodcock, snipe and rabbits, and the eggs of game birds other than bustards ; and the act applies to poaching either by night or by day. I n all cases of summary conviction for poaching an appeal lies to quarter sessions. In all cases of poaching the game, &c, taken may be forfeited by the court which tries the poacher.

Close Time. — On certain days, and within periods known as ” close time,” it is illegal to kill deer or game. The present close times are as follows : —

Hare . . . . Red deer (male) . Fallow deer . Roe deer Pheasant

Partridge

Black game .

Red grouse .

Ptarmigan

Bustard (wild turkey) .

England.

Feb.

None None None None I to Sept. 30

Feb. 1 to Aug. 31

Dec. 10 to Aug. 20 2 Dec. 10 to Aug. 12

None March I to Sept. I

Ireland.

April 2 1 to Aug. 11 1 Jan. I to June 9 Sept. 29 to June 10

None Feb. 1 to Sept. 30

(1845)

Feb. 1 to Aug. 31

(1899)

Dec. 10 to Aug. 20 Dec. 10 to Aug. 12 Dec. 10 to Aug. 20 Jan. 10 to Sept. 1

Scotland.

Feb.

Nqne None None None 1 to Sept. 30

Feb. 1 to Aug. 31

Dec. 10 to Aug. 20

Dec. 10 to Aug. 12

Dec. 10 to Aug. 12

None

1 Unless varied by order of lord-lieutenant. 2 Except in Devon, Somerset and New Forest, where to Sept. I.

In England and Ireland the winged game above named and hares may not be killed on Sundays or Christmas Day. It is illegal to sell or expose for sale hares or leverets in March, April, May, June and July. It is illegal throughout the United Kingdom to buy or sell winged game birds after ten days from the beginning of the close season as fixed by the English law (1831, s. 4; i860, s. 13). This prohibition applies to the sale of live game, British or foreign, and to

the sale of British dead game. It is illegal to lay poison for game or rabbits except in rabbit holes, and it is illegal to kill game by firearms at night. Wild birds not within the list above given but of interest for sport are protected by close times fixed under the Wild Birds Protection Acts, which may vary in each county of each kingdom.

Licences. — Besides the restrictions on the right to take or kill' game which arise out of the law as to ownership or occupation of the lands on which it is found, there are further restrictions imposed by the laws of excise. From the time of Richard II. (1389) until 1831 the right of persons other than gamekeepers properly deputed by the lord of a manor to take game was made to depend on the social • rank of the person, or on the amount of his interest in land, which ranged from a 40s. freehold (in 1389) to £100 a year (1671). These restrictions were abolished in 1831, and the right to kill game was made conditional on the possession of a game certificate, now called a game licence in Great Britain (act of 1831, ss. 6, 23). By s. 4 of the Game Licences Act i860 " any person, before he shall in Great Britain take, kill or pursue, or aid or assist in any manner in the taking, killing or pursuing, by any means whatever, or use any dog, gun, net or other engine for the purpose of taking, killing or pursuing any game, or any woodcock, snipe, quail, landrail, or any coney, or any deer, shall take out a proper licence to kill game under this act" — subject to a penalty of £20. There are certain exceptions and exemptions as to royal personages, royal gamekeepers, and with reference to taking woodcock or snipe by nets or springes, by coursing or hunting hares or deer, or killing deer, rabbits or hares (Hares Acts 1848, Game Licences Act i860) in certain enclosed lands by the owners or occupiers. A licence is not required for beaters and assistants who go out with holders of a game licence. The licence is granted by the Inland Revenue Department. The issue is regu- lated by the Game Licences Act i860 as amended by the Customs and Inland Revenue Act 1883. The licences now in use are of four kinds : — Those taken out after 31st July —

To expire on the next 31st July £3 o o

To expire on the next 31st October . . . .200 Those taken out after 1st November —

To expire on the next 31st July 200

Those taken out for any continuous period of four- teen days specified in the licence 100

In the case of gamekeepers in Great Britain for whom the employer pays the duty on male servants, the annual licence fee is £2, but the licence extends only to lands on which the employer has a right to kill game. A licence granted to a person in his own right and not as gamekeeper or servant is effective throughout the United Kingdom. The game licence does not authorize trespass on the lands of others in search of game nor the shooting of game, &c, at night, and is forfeited on a conviction of game trespass (1831, s. 30; i860, s. 11). Persons who have game licences need not have a gun licence, but the possession of a gun licence does not qualify the holder to kill game or even rabbits.

The sale of game when killed is also subject to statutory regulation. Gamekeepers may not sell game except under the authority of their employer (1831, ss. 17, 25). Persons who hold a full game licence may sell game, but only to persons who hold a licence to deal in game. These licences are annual (expiring on the 1st of July), andare granted in London by justices of the peace, and in the rest of England by the council of the borough or urban or rural district in which the dealer seeks to carry on business (P831, s. 18; 1893, c. 73, s. 27), and a notice of the existence of the licence must be posted on the licensed premises. A licence must be taken out for each shop. The following persons are disqualified for holding the licence : inn-keepers, persons holding licences to sell intoxicants, owners, guards or drivers of mail-carts, stagecoaches or public conveyances, carriers and higglers (1831, s. 18). This enactment interferes with the grant of game licences to large stores which also have licences to sell beer. The licensed dealer may buy British game only from persons who are lawfully entitled to sell game. Conviction of an offence under the Game Act 1831 avoids the licence (s. 22). The local licence must also be supplemented by an excise licence for which a fee of £2 is charged. Licensed dealers in game are prohibited from selling game killed in the United Kingdom from the tenth day after the beginning of close time to the end of that period. The provisions above stated under the act of 1831 applied only to England, but were in i860 extended to the rest of the United Kingdom, and were in 1893 applied to dealers in game imported from abroad. The main effect of the system of licences is to prevent the disposal of game by poachers rather than to benefit the revenue.

Deer. — Deer are not included within the definition of game in any of the English game laws. Deer-stealing was very seriously punished by the old law, and under an act of 9 George I. c. 22,

known as the Waltham Black Act, passed because of the

depredations of disguised deer-stealers in Epping Forest, it was under certain circumstances made a capital offence. At present offences with reference to deer are included in the Larceny Act 1861. It is a felony to hunt or kill deer in enclosures in forests, chases or purlieus, or in enclosed land where deer is usually kept, or after a previous con- viction to hunt or kill deer in the open parts of a forest, &c, and certain minor provisions are made as to arrest by foresters, forfeiture of venison unlawfully possessed and for unlawfully setting traps for deer. These enactments do not prevent a man from killing on his own land deer which have strayed there (Threlkeld v. Smith, 1901, 2 K.B. 531). In Scotland the unlawful killing of deer is punished as theft.

Eggs. — The owner or occupier of land has no property in the eggs of wild birds found on his lands unless he takes them up. But under s. 24 of the Game Act 1831 a penalty of 5s. per egg is incurred by persons who unlawfully {i.e. without being, or having licence from, the person entitled to kill the game) and wilfully take from the nest or destroy in the nest the eggs of any game bird, or of a swan, wild duck, teal or widgeon. Similar provisions exist in Ireland under an act of 1698, and by the Poaching Prevention Act 1862 (United Kingdom) power is given to constables to search persons suspected of poaching and to take from them the eggs of pheasants, partridges, grouse or black game. And the Wild Birds Protection Acts deal with the eggs of all wild birds except game and swans.

Damage to Crops by Game. — Where an occupier of lands has not the right to kill game or rabbits he runs the risk of suffering damage by the depredations of the protected animals, which he may not kill without incurring a liability to summary conviction or for breach of the conditions on which he holds the land. At common law the owner of land who has reserved to himself the sporting rights, and his sporting tenants, must use the reserved rights reasonably. They are liable for any damage wilfully or unnecessarily done to the crops, &c, of the occupier, such as trampling down standing crops or breaking hedges or fences. They are not directly liable to the occupier for damage done to the crops by game bred on the land or frequenting it in the ordinary course of nature ; but are not entitled to turn down game or rabbits on the land. And if game or rabbits are for the purposes of sport imported or artificially raised on land, the person who breeds or brings them there is liable for the damage done to the crops of adjoining owners or occupiers {Farrer v. Nelson, 1885, 15 Q.B.D. 258; Birkbeck v. Paget, 31 Beav. 403; Hilton v. Green, 1862, 2 F. & F. 821).

Recent legislation has greatly increased the rights of the occupiers of

land as against the owners of sporting rights over it. As regards hares and rabbits the occupier's rights are regulated by the Ground Game Act 1880 (which is expressed to be made " in the interests of good husbandry and for the better security of capital and labour invested in the cultivation of the soil "). By that act the occupier of land as incident to and inseparable from his occupation has the right to kill and take hares and rabbits on the land. The right is indefeasible and cannot be divested by contract with the owner or landlord or even by letting the occupier's sporting rights to another. But where apart from the act the right to kill game on the land, is vested in a person other than the occupier, such person has a right concurrent with the statutory right of the occupier to take hares and rabbits on the land. The act does not extend to common lands nor to lands over which rights of grazing or pasturage for not more than nine months in the year exist. Consequently over such lands exclusive rights of killing ground game still continue, and the law appears not to apply in cases where a special right of killing or taking ground game vested before the 7th of September 1880 in any person (other than the landlord) by statute, charter or franchise (s. 5). The mode of exercise of the occupier's right is subject to certain limitations. The ground game is only to be taken by him or by persons whom he has duly authorized in writing, who must be members of his family or his servants or bona fide employed by him for reward to take ground game. The written authority must be produced on demand to persons having concurrent rights to take and kill the ground game (s. 1 (1) (c)). Firearms may not be used by night, nor may poison be used, nor may spring traps be set except in rabbit holes (s. 6) ; nor may ground game be killed on days or seasons or by methods prohibited by statute in 1880 (s. 10).

In the case of moorland and unenclosed lands (which are not arable and do not consist of small detached portions of less than 25 acres) the occupier may between the 1st of September and the 31st of March kill and take ground game; but between the 1st of September and the 10th of December firearms may not be used (1880, s. 1 (3) ; 1906, s. 2). In the case of such lands the occupiers and the owners of the sporting rights may between the 1st of Sep- tember and the 10th of December make and enforce for their joint benefit agreements for taking the ground game. The Agricultural Holdings Act 1906 (operating from 1909) deals, inter alia, with damage to crops by deer and winged game, but does not apply to damage by hares or rabbits. The tenant of agricultural land is entitled to compensation for damage to his crops exceeding is. per acre over the area affected if caused by game, " the right to kill or take which is vested neither

in him nor in any one claiming under him other than the landlord and which the tenant has not permission in writing to kill " (s. 2). The right of the tenant is indefeasible and cannot be

contracted away. Disputes as to amount are to be settled by arbitration ; but claims to be effectual must be made as to growing crops before reaping, raising or feeding off, and as to cut crops before carrying. In the case of contracts of tenancy created before the 1st of January 1909, allowances are to be made if by their terms com- pensation for damage by game is stipulated for, or an allowance of an agreed amount for damage by game was expressly made in fixing the rent. The compensation is payable by the landlord subject to his right to be indemnified in cases where the sporting rights are not vested in him.

Sporting Rights. — Sporting rights (i.e. rights of fowling or of shooting, or of taking or killing game or rabbits, or of fishing), when severed from the occupation of land, are subject toincomeorproperty tax, and to assessment for the purpose of local rates (Rating Act 1874) ; and in valuing land whether for rates or taxes the value of the sporting rights is now an important and often the chief item of value in beneficial occupation of the land. Where the sporting rights are the landlord's, the rate thereon is paid in the first instance by the tenant and deducted from his rent. Where the sporting right is reserved and let, the rating authority may rate either the landlord or the sporting tenant as occupier of the right. The Ground Game Acts have not affected the liability to assessment of concurrent rights of killing hares and rabbits reserved by a landlord, or of a concurrent right granted by the occupier (Ryde (2nd ed.), 385-387). The owner- ship of sporting rights severed from the ownership or occupation of the land over which they are exercisable is not an interest in land giving the electoral franchise or a claim for compensation if the land is taken under the Lands Clauses Consolidation Acts.

Scotland. — By the law of Scotland all men have right and privilege of game on their own estates as a real right incident thereto, which does not pass by an agricultural lease except by express words, or in the case of ground game by the act of 1880. The landlord is liable to the tenant for damage done to the surface of the lands in exercise of his right to the game and also for extraordinary damage by over- preserving or over-stocking. Under an act of 1877 he was liable for

excessive damage done by rabbits or game reserved to or retained under a lease granted after the 1st of January 1878, or reserved by presumption of common law; this act from 1909 on- wards is superseded by the provisions of the Agricultural Holdings Act 1906. Night poaching is punished by the same act as in England, and day poaching by an act of 1832 and the act of 1882. Until 1887 poaching by night under arms was a capital offence. The definition of game in Scotland for purposes of night poaching is the same as in England. The provisions of the act of 1832 as to game trespass by day apply also to deer, roe, rabbits, woodcock, snipe, rails and wild duck; but in other respects closely resemble those of the English act of 1831.

Offences against the game laws are not triable by justices of the peace, but only in the sheriff court. ' The close time for game birds in Scotland is the same as in England, so far as dealing in them is concerned, but differs slightly as to killing. Black game may not be killed between the 10th of December and the 25th of August, nor ptarmigan between the 10th of December and the 20th of August. There is no close time for red, fallow or roe deer, or rabbits. By an old Scots act of 1621 (omitted from the recent wholesale repeal of such acts) no one may lawfully kill game in Scotland who does not own a plough-gate of land except on the land of a person so qualified. Ireland. — The common law as to game is the same for Ireland as for England. The game laws of Ireland are contained partly in acts passed prior to the union (1698, 1707, 1787 and 1797), partly in acts limited to Ireland, and as to the rest in acts common to the whole United Kingdom.

Under the act of 1698 no one may kill game in Ireland who has not a freehold worth £40 a year or £1000 net personality, and elaborate provisions are made by that and later acts against the keeping of sporting dogs by persons not qualified by estate to kill game. British officers and soldiers in Ireland appear to have been much addicted to poaching, and their activities were restrained by enactments of 1698 and 1707.

Night poaching in Ireland is dealt with by an act of 1826. Trespass on lands in pursuit of game to which the landlord or lessor has by reservation exclusive right is summarily punishable under an act of 1864, which includes in the definition of game, woodcock, snipe, quails, landrails, wild duck, widgeon and teal. Under the Land Act 1881 the landlord of a statutory holding may at the commencement of the term subject to the Ground Game Acts retain and exercise the exclusive right of taking " game " as above defined.

A game licence is not required for taking or killing rabbits. But in other respects the law as to game licences, dog licences and licences to deal in game is the same as in Great Britain. .

British Possessions Abroad. — The English game laws have not been carried to any colony as part of the personal law of the colonists, nor have they been extended to them by imperial or colonial legisla- tion. But the legislatures of many colonies have passed acts to preserve or protect native or imported wild animals, and in some of these statutes the protected animals are described as game. These statutes are free from feudal prepossessions as to sporting rights, and are framed rather on the lines of the Wild Birds Protection Acts than on the English game laws, but in some possessions, e.g. Quebec, sporting leases by the crown are recognized. The acts since 1895

Greek.

are indicated in the annual summary of colonial legislation furnished in the Journal of the Society of Comparative Legislation.

See also Oke's Game Laws, 4th ed., by Willis Bund (1897) ; Warry, Game Laws of England (1897) ; Marchant and Watkins, Wild Birds Protection Act (1897). (W. F. C.)

GAMES, CLASSICAL. 1. Public Games. — The public games of Greece (aySives) and Rome (Ludi) consisted in athletic contests and spectacles of various kinds, generally connected with and forming part of a religious observance. Probably no institution exercised a greater influence in moulding the national character, and producing that unique type of physical and intellectual beauty which we see reflected in Greek art and literature, than the public contests of Greece (see Athlete; Athletic Sports). For them each youth was trained in the gymnasium, they were the central mart whither poet, artist and merchant each brought his wares, and the common ground of union for every member of the Hellenic race. It is to Greece, then, that we must look for the earliest form and the fullest development of ancient games. The shows of the Roman circus and amphitheatre were at best a shadow, and in the later days of the empire a travesty, of the Olympia and Pythia, and require only a cursory notice.

The earliest games of which we have any record are those at the funeral of Patroclus, which form the subject of the twenty- third Iliad. They are noteworthy as showing that Greek games were in their origin clearly connected with religion; either, as here, a part of the funeral rites, or else instituted in honour of a god, or as a thank-

offering for a victory gained or a calamity averted, or in expiation of some crime. Each of the great contests was held near some shrine or sacred place and is associated with some deity or mythical hero. It was not before the 4th century that this honour was paid to a living man (see Plutarch, Lysander, 18). The games of the Iliad and those of the Odyssey at the court of Alcinous are also of interest as showing at what an early date the distinctive forms of Greek athletics — boxing, wrestling, putting the weight, the foot and the chariot race — were determined.

The Olympian games were the earliest, and to the last they remained the most celebrated of the four national festivals. Olympia was a naturally enclosed spot in the rich plain of Elis, bounded on the N. by the rocky heights of Cronion, and on the S. and W. by the Alpheus and its tributary the Cladeus. There was the grove of Altis, in which were ranged the statues of the victorious athletes, and the temple of Olympian Zeus with the chryselephantine statue of the god, the masterpiece of Pheidias. There Heracles (so ran the legend which Pindar has introduced in one of his finest odes), when he had conquered Elis and slain its king Augeas, consecrated a temenos and instituted games in honour of his victory. A later legend, which probably embodies historical fact, tells how, when Greece was torn by dissensions and ravaged by pestilence, Iphitus inquired of the oracle for help, and was bidden restore the games which had fallen into desuetude; and there was in the time of Pausanias, suspended in the temple of Hera at Olympia, a bronze disk whereon were inscribed, with the regulations of the games, the names of Iphitus and Lycurgus. From this we may safely infer that the games were a primitive observance of the Eleians and Pisans, and first acquired their celebrity from the powerful concurrence of Sparta. The sacred armistice, or cessation of all hostilities, during the month in which the games were held, is also credited to Iphitus.

In 776 B.C. the Eleians engraved the name of their countryman Coroebus as victor in the foot race, and thenceforward we have an almost unbroken list of the victors in each succeeding Olympiad or fourth recurrent year. For the next fifty years no names occur but those of Eleians or their next neighbours. After 720 B c we find Corinthians and Megareans, and later still Athenians and extra-Peloponnesians. Thus what at first was nothing more than a village feast became a bond of union for all the branches of the Doric race, and grew in time to be the high festival to which every Greek gathered, from the mountain fastnesses of Thessaly to the remotest colonies of Cyrene and Marseilles. It survived even the extinction of Greek liberty, and had nearly completed twelve centuries when it was

abolished by the decree of the

Christian emperor Theodosius, in the tenth year of his reign. The last Olympian victor was a Romanized Armenian named Varastad.

Let us attempt to call up the scene which Olympia in its palmy days must have presented as the great festival approached. Heralds had proclaimed throughout Greece the " truce of God." So religiously was this observed that the Spartans chose to risk the liberties of Greece, when the Persians were at the gates of Pylae, rather than march during the holy days. Those white tents which stand out against the sombre grey of the olive groves belong to the Hellanodicae, or ten judges of the games, chosen one for each tribe of the Eleians. They have been here already ten months, receiving instruction in their duties. All, too, or most of the athletes must have arrived, for they have been undergoing the indispensable training in the gymnasium of the Altis. But along the " holy road " from the town of Elis there are crowding a motley throng. Conspicuous in the long train of pleasure-seekers are the dewpoi or sacred deputies, clad in their robes of office, and bearing with them in their carriages of state offerings to the shrine of the god. Nor is there any lack of distinguished visitors. It may be Alcibiades, who, they say, has entered no less than seven chariots; or Gorgias, who has written a famous «r/5ei£is for the occasion; or the sophist Hippias, who boasts that all he bears about him, from the sandals on his feet to the dithyrambs he carries in his hand, are his own manu- facture; or Aetion, who will exhibit his picture of the Marriage of Alexander and Roxana — the picture which gained him no less a prize than the daughter of the Hellanodices Praxonides; or, in an earlier age, the poet-laureate of the Olympians, Pindar him- self. One feature of the medieval tournament and the modern racecourse is wanting. Women might indeed compete and win prizes as the owners of teams, but all except the priestesses of Demeter were forbidden, matrons on pain of death, to enter the enclosure.

At daybreak the athletes presented themselves in the Bouleu- terium, where the presidents were sitting, and proved by witnesses that they were of pure Hellenic descent, and had no stain, religious or civil, on their character. Laying their hands on the bleeding victim, they swore that they had duly qualified them- selves by ten months' continuous training in the gymnasium, and that they would use no

fraud or guile in the sacred contests. Thence they proceeded to the stadium, where they stripped to the skin and anointed themselves. A herald proclaimed, " Let the runners put their feet to the line," and called on the spectators to challenge any disqualified by blood or character. If no objection was made, they were started by the note of the trumpet, running in heats of four, ranged in the places assigned them by lot. The presidents seated near the goal adjudged the victory. The foot-race was only one of twenty-four Olympian contests which Pausanias enumerates, though we must not suppose that these were all exhibited at any one festival. Till the 77 th Olympiad all was concluded in one day, but afterwards the feast was extended to five.

The order of the games is for the most part a matter of conjecture, but, roughly speaking, the historical order of their institution was followed. We will now describe in this order the most important.

(1) The Foot-race. — For the first 13 Olympiads the Spopos, or single lap of the stadium, which was 200 yds. long, was the only contest. The SmuXos, in which the course was traversed twice, was added in the 14th Olympiad, and in the 15th the SoXtxos, or long race, of 7, 12 or, according to the highest computation, 24 laps, about 2§ m. in length. We are told that the Spartan Ladas, after winning this race, dropped down dead at the goal. There was also, for a short time, a race in heavy armour, which Plato highly commends as a preparation for active service. (2) Wrestling was introduced in the 18th Olympiad. The importance attached to this exercise is shown by the very word palaestra, and Plutarch calls it the most artistic and cunning of athletic games. The practice differed little from that of modern times, save that the wrestler's limbs were anointed with oil and sprinkled with sand. The third throw, which decided the victory, passed into a proverb, and strug- gling on the ground, such as we see in the famous statue at Florence, was not allowed, at least at the Olympia. (3) In the same year was introduced theirivTalDXov (pentathlon), a combination of the five games enumerated in the well-known pentameter ascribed to Simonides : — &\jua, iro&oiKelijv, hiuKOv, Hkovtcl, ttAXt;!'.

Only the first of these calls for any comment. The only leap practised seems to have been the long jump. The leapers increased their momentum by means of dXrrjpes or dumb-bells, which they swung in the act of leaping and dropped as they " took off." The take-off may have been slightly raised, and some commentators with very little warrant have stated that spring-boards were used. The record jump with which Phayllus of Croton is credited, 55 ft., is incredible with or without a spring-board. It is disputed whether a victory in all five

contests, or in three at least, was required to win the 7re>'Ta.0X<»'. (4) The rules for boxing were not unlike those of the modern ring (see Pugilism), and the chief difference was in the use of the caestus. This in Greek times consisted of leather thongs bound round the boxer's fists and wrists ; and the weighting with lead or iron or metal studs, which made the caestus more like a " knuckle-duster " than a boxing-glove, was a later Roman development. The death of an antagonist, unless proved to be accidental, not only disqualified for a prize but was severely punished. The use of ear-guards and the comic allusions to broken ears, not noses, suggest that the Greek boxer did not hit out straight from the shoulder, but fought windmill fashion, like the modern rustic. In the pancratium, a combination of wrestling and boxing, the use of the caestus, and even of the clenched fist, was disallowed. (5) The chariot-race had its origin in the 23rd Olympiad. Of the hippodrome, or racecourse, no traces remain, but from the description of Pausanias we may infer that the dimen- sions were approximately 1600 ft. by 400. Down the centre there ran a bank of earth, and at each end of this bank was a turning-post round which the chariots had to pass. " To shun the goal with rapid wheels " required both nerve and skill, and the charioteer played a more important part in the race than even the modern jockey. Pausanias tells us that horses would shy as they passed the fatal spots. The places of the chariots were determined by lot, and there were elaborate arrangements for giving all a fair start. The number of chariots that- might appear on the course at once is uncertain. Pindar (Pyth. v. 46) praises Arcesilaus of Cyrene for having brought off his chariot uninjured in a contest where no fewer than forty took part. The large outlay involved excluded all but rich competitors, and even kings and tyrants eagerly contested the palm. Thus in the list of victors we find the names of Cylon, the would-be tyrant of Athens, Pausanias the Spartan king, Archelaus of Macedon, Gelon and Hiero of Syracuse, and Theron of Agrigentum. . Chariot-races with mules, with mares, with two horses in place of four, were successively introduced, but none of these present any special interest. Races on horseback date from the 33rd Olympiad. As the course was the same, success must have depended on skill as much as on swiftness. Lastly, there were athletic contests of the same description for boys, and a competition of heralds and trumpeters, introduced in the 93rd Olympiad.

The prizes were at first, as in the Homeric times, of some intrinsic value, but after the 6th Olympiad the only prize for each contest was a garland of wild olive, which was cut with a golden sickle from the kallistephanos, the sacred tree brought by Hercules ” from the dark

fountains of Ister in the land of the Hyperboreans, to be a shelter common to all men and a crown of noble deeds " (Pindar, 01. iii. 18). Greek writers from Herodotus to Plutarch dwell with complacency on the magnanimity of a people who cared for nothing (but honour and were content to struggle for a corruptible crown,- But though the Greek games present in this respect a favourable contrast to the greed and gambling of the modern racecourse, yet to represent men like Milon and Damoxenus as actuated by pure love of glory is a pleasing fiction of the moralists. The successful athlete received in addition to the immediate honours very substantial rewards. A herald proclaimed his name, his parentage and his country; the Hellanodicae took from a table of ivory and gold the olive crown and placed it on his head, and in his hand a branch of palm; as he marched in the sacred revel to the temple of Zeus, his friends and admirers showered in his path flowers and costly gifts, singing the old song of Archilochus, rijireWa KaWiviKe, and his name was .canonized in the Greek calendar. Fresh honours and rewards awaited him on his return home. If he was an Athenian he received, according to the law of Solon, 500 drachmae, and free rations for life in the Prytaneum ; if a Spartan, he had as his prerogative the post of honour in battle. Poets like Pindar, Simonides and Euripides sung his praises, and sculptors like Pheidias and Praxiteles were engaged by the state to carve his statue. We even read of a breach in the town walls being made to admit him, as if the common road were not good enough for such a hero; and there are well-attested instances of altars being built and sacrifices offered to a successful athlete. No wonder then that an Olympian prize was regarded as the crown of human happiness. Cicero, with a Roman's contempt for Greek frivolity, observes with a sneer that an Olympian victor receives more honours than a triumphant general at Rome, and tells the story of the Rhodian Diagoras, who, having himself won the prize at Olympia, and seen his two sons crowned on the same day, was addressed by a Laconian in these words: — " Die, Diagoras, for thou hast nothing short of divinity to desire." Alcibiades, when setting forth his services to the state, puts first his victory at Olympia, and the prestige he had won for Athens by his magnificent display. But perhaps the most remarkable evidence of the exaggerated value which the Greeks attached to athletic prowess is a casual expression which Thucydides employs when describing the

enthusiastic reception of Brasidas at Scione. The state, he says, voted

him a crown of gold, and the multitude flocked round him and decked him with garlands, as though he were an athlete.

The Pythian games originated in a local festival held at Delphi, anciently called Pytho, in honour of the Pythian Apollo, and were limited to musical competitions. The date at which they became a Panhellenic ayuv (so Demosthenes calls them) cannot be determined, but the Pythiads as a chronological era date from 527 B.C., by which time music had been added to all the Panhellenic contests. Now, too, these were held at the end of every fourth year; previously there had been an interval of eight years. The Amphictyones presided and the prize was a chaplet of laurel.

The Nemean games were biennial and date from 516 B.C. They were by origin an Argive festival in honour of Nemean Zeus, but in historical times were open to all Greece and provided the established round of contests, except that no mention is made of a chariot-race. A wreath of wild celery was the prize.

The Isthmian games, held on the Isthmus of Corinth in the first and third year of each Olympiad, date, according to Eusebius, from 523 B.C. They are variously reported to have been founded by Poseidon or Sisyphus in honour of Melicertes, or by Theseus to celebrate his victory over the robbers Sinis and Sciron. Their early importance is attested by the law of Solon which bestowed a reward of 100 drachmae on every Athenian who gained a victory. The festival was managed by the Corinthians; and after the city was destroyed by Mummius (146 B.C.) the presidency passed to the Sicyonians until Julius Caesar rebuilt Corinth (46 B.C.). They probably continued to exist till Christianity became the religion of the Roman empire. The Athenians were closely connected with the festival, and had the privilege of proedria, the foremost seat at the games, while the Eleans were absolutely excluded from participation. The games included gymnastic, equestrian and musical contests, differing little from those of the other great festivals, and the prize was a crown made at one time of parsley (more probably wild celery), at a later period of pine. The importance of the Isthmian games in later times is shown by the fact that Flamininus chose the occasion for proclaiming the liberation of Greece, 196 B.C. That at a later anniversary (a.d. 67) Nero repeated the proclamation of Flamininus, and coupled with it the announcement of his own infamous victory at Olympia, shows alike the hollowness of the first gift and the degradation which had befallen the Greek games, the last faint relic of Greek nationality.

The Ludi Publici of the Romans included feasts and theatrical exhibitions as well as the public games with which alone we are concerned. As in Greece, they were intimately connected with religion. At the beginning of each civil year it was the duty of the consuls to vow to the gods games for the safety of the commonwealth, and the expenses were defrayed by the treasury. Thus, at no cost to themselves, the Roman public were enabled to indulge at the same time their religious feelings and their love of amusement. Their taste for games naturally grew till it became a passion, and under the empire games were looked upon by the mob as one of the two necessaries of life. The aediles who succeeded to this duty of the consuls were expected to supplement the state allowance from their private purse. Political adven- turers were not slow to discover so ready a road to popularity, and what at first had been exclusively a state charge devolved upon men of wealth and ambition. A victory over some barbarian horde or the death of a relation served as the pretext for a magnificent display. But the worst extravagance of private citizens was eclipsed by the reckless prodigality of the Caesars, who squandered the revenues of whole provinces in catering for the mob of idle sightseers on whose favour their throne de- pended. But though public games played as important a part in Roman as in Greek history, and must be studied by the Roman historian as an integral factor in social and political life, yet, regarded solely as exhibitions, they are comparatively devoid of interest, and we sympathize with Pliny, who asks his friend how

Roman,

any man of sense can go day after day to view the same dreary round of fights and races.

It is easy to explain the different feelings which the games of Greece and of Rome excite. The Greeks at their best were actors, the Romans from first to last were spectators. It is true that even in Greek games the professional element played a large and ever-increasing part. As early as the 6th century B.C. Xenophanes complains that the wrestler's strength is preferred to the wisdom of the philosopher, and Euripides, in a well-known fragment, holds up to scorn the brawny swaggering athlete. But what in Greece was a perversion and acknowledged to be such, the Romans not only practised but held up as their ideal. No Greek, however high in birth, was ashamed to compete in person for the Olympic crown. The Roman, though little inferior in gymnastic exercises, kept strictly to

the privacy of the palaestra; and for a patrician to appear in public as a charioteer is stigmatized by the satirist as a mark of shameless effrontery.

Roman games are generally classified as fixed, extraordinary and votive; but they may be more conveniently grouped accord- ing to the place where they were held, viz. the circus or the amphitheatre.

For the Roman world the circus was at once a political club, a fashionable lounge, a rendezvous of gallantry, a betting ring, and a playground for the million. Juvenal, speaking loosely, says that in his day it held the whole of Rome; but there is no reason to doubt the precise statement of P. Victor, that in the Circus Maximus there were seats for 350,000 spectators.

Of the various Ludi Circenses it may be enough here to give a short account of the most important, the Ludi Magni or Maximi.

Initiated according to legend by Tarquinius Priscus, the Ludi Magni were originally a votive feast to Capitoline Jupiter, promised by the general when he took the field, and performed on his return from the annual campaign. They thus presented the appearance of a military spectacle, or rather a review of the whole burgess force,' which marched in solemn procession from the capitol to the forum and thence to the circus, which lay between the Palatine and Aven- tine. First came the sons of patricians mounted on horseback, next the rest of the burghers ranged according to their military classes, after them the athletes, naked save for the girdle round their loins, then the company of dancers with the harp and flute players, next the priestly colleges bearing censers and other sacred instruments, and lastly the simulacra of the gods, carried aloft on their shoulders or drawn in cars. The games themselves were four- fold: — (1) the chariot race; (2) the ludus Troiae; (3) the military review; and (4) gymnastic contests. Of these only the first two call for any comment. (1) The chariot employed in the circus was the two-wheeled war car, at first drawn by two, afterwards by four, and more rarely by three horses. Originally only two chariots started for the prize, but under Caligula we read of as many as twenty-four heats run in the day, each of four chariots. The distance traversed was fourteen times the length of the circus or nearly 5 m. The charioteers were apparently from the first professionals, though the stigma under which the gladiator lay never attached to their calling. Indeed a successful driver may compare in popularity and fortune with a modern jockey. The drivers were divided into companies distinguished by the colours of their tunics, whence arose the faction of the circus which assumed such

importance under the later emperors. In republican times there were two factions, the white and the red; two more, the green and the blue, were added under the empire, and for a short time in Domitian's reign there were also the gold and the purple. Even in Juvenal's day party spirit ran so high that a defeat of the green was looked upon as a second Cannae. After the seat of empire had been transferred to Constantinople these factions of the circus were made the basis of political cabals, and frequently resulted in sanguinary tumults, such as the famous Nika revolt (a.d. 532), in which 30,000 citizens lost their lives. (2) The Ludus Troiae was a sham-fight on horseback in which the actors were patrician youths. A spirited description of it will be found in the 5th Aeneid. (See also Circus.)

The two exhibitions we shall next notice, though occasionally given in the circus, belong more properly to the amphitheatre. Venatio was the baiting of wild animals who were pitted either with one another or with men— captives, criminals or trained hunters called bestiarii. The first certain instance on record of this amuse- ment is in 186 B.C., when M. Fulvius exhibited lions and tigers in the arena. The taste for these brutalizing spectacles grew apace, and the most distant provinces were ransacked by generals and proconsuls to supply the arena with rare animals — giraffes, tigers and crocodiles. Sulla provided for a single show 100 lions, and Pompey 600 lions, besides elephants, which were matched with Gaetulian hunters. Julius Caesar enjoys the doubtful honour of inventing the bull-fight. At the inauguration of the Colosseum 5000 wild and 4000 tame beasts were killed, and to commemorate

Trajan's Dacian victories there was a butchery of 11,000 beasts. The naumachia was a sea-fight, either in the arena, which was flooded for the occasion by a system of pipes and sluices, or on an artificial lake. The rival fleets were manned by prisoners of war or criminals, who often fought till one side was exterminated. In the sea-fight on Lake Fucinus, arranged by the emperor Claudius, 100 ships and 19,000 men were engaged.

But the special exhibition of the amphitheatre was the munus gladiatorium, which dates from the funeral games of Marcus and Decimus Brutus, given in honour of their father, 264 B.C. It was probably borrowed from Etruria, and a refinement on the common savage custom of slaughtering slaves or captives on the grave of a

warrior or chieftain. Nothing so clearly brings before us the vein of coarseness and inhumanity which runs through the otherwise noble character of the Roman, as his passion for gladiatorial shows. We can fancy how Pericles, or even Alcibiades, would have loathed a spectacle that Augustus tolerated and Trajan patronized. Only after the conquest of Greece we hear of their introduction into Athens, and they were then admitted rather out of compliment to the conquerors than from any love of the sport. In spite of numerous prohibitions from Constantine downwards, they continued to flourish even as late as St Augustine. To a Christian martyr, if we may credit the story told by Theodoret and Cassiodorus, belongs the honour of their final abolition. In the year 404 Telemachus, a monk who had travelled from the East on this sacred mission, rushed into the arena and endeavoured to separate the combatants. He was instantly despatched by the praetor's orders; but Honorius, on hearing the report, issued an edict abolishing the games, which were never afterwards revived. (See Gladiators.)

Of the other Roman games the briefest description must suffice. The Ludi Apollinares were established in 212 B.C., and were annual after 211 B.C.; mainly theatrical performances. The Megalenses were in honour of the great goddess, Cybele; instituted 204 B.C., and from 191 B.C. celebrated annually. A procession of Galli, or priests of Cybele, was a leading feature. Under the empire the festival assumed a more orgiastic character. Four of Terence's plays were produced at these games. The Ludi Saeculares were celebrated at the beginning or end of each saeculum, a period variously interpreted by the Romans themselves as 100 or no years. The celebration by Augustus in 17 B.C. is famous by reason of the Ode composed by Horace for the occasion. They were solemnized by the emperor Philip a.d. 248 to commemorate the millennium of the city.

2. Private Games. — These may be classified as outdoor and indoor games. There is naturally all the world over a much closer resemblance between the pursuits and amusements of children than of adults. Homer's children built castles in the sand, and Greek and Roman children alike had their dolls, their hoops, their skipping-ropes, their hobby-horses, their kites, their knuckle-bones and played at hopscotch, the tug-of-war, pitch and toss, blind-man's buff, hide and seek, and kiss in the ring or at closely analogous games. Games of ball were popular in Greece from the days of Nausicaa, and at Rome there were five distinct kinds of ball and more ways of playing with them. For particulars the dictionary of antiquities must be consulted. It is strange that we can find in classical literature no analogy to cricket, tennis, golf or polo, and though the follis

resembled our football, it was played with the hand and arm, not with the leg. Cock-fighting was popular both at Athens and Rome, and quails were kept and put to various tests to prove their pluck.

Under indoor games we may distinguish games of chance and games of skill, though in some of them the two elements are combined. Tesserae, shaped and marked with pips like modern dice, were evolved from the tali, knuckle-bones with only four flat sides. The old Roman threw a hazard and called a main, just as did Charles Fox, and the vice of gambling was lashed by Juvenal no less vigorously than by Pope. The Latin name for a dice-box has survived in the fritillary butterfly and flower. '

The primitive game of guessing the number of fingers simultaneously held up by the player and his opponent is still popular in Italy where it is known as " morra." The proverbial phrase for an honest man was quicum in tenebris mices, one you would trust to play at morra in the dark.

Athena found the suitors of Penelope seated on cowhides and playing at irtoooi, some kind of draughts. The invention of the game was ascribed to Palamedes. In its earliest form it was played on a board with five lines and with five pieces. Later we find eleven lines, and a further development was the division of the board into squares, as in the game of ■koKhs (cities). In the

Roman latrunculi (soldiers), the men were distinguished as common soldiers and " rovers," the equivalent of crowned pieces. Duodecim scripta, as the name implies, was played on a board with twelve double lines and approximated very closely to our backgammon. There were fifteen pieces on each side, and the moves were determined by a throw of the dice; " blots " might be taken, and the object of the player was to clear off all his own then. Lastly must be mentioned the Cottabus (q.v.), a game peculiar to the Greeks, and with them the usual accompaniment of a wine party. In its simplest form each guest threw what was left in his cup into a metal basin, and the success of the throw, determined partly by the sound of the wine in falling, was reckoned a divina- tion of love. For the various elaborations of the game (in Sicily we read of Cottabus houses), Athenaeus and Pollux must be con- sulted.

Bibliography. — Daremberg et Saglio, Dictionnaire des an- tiquites grecques et romaines, articles " Agon," " Athleta," " Circus," "Ludi," " Olympia," " Spiele " ; Curtius and Adler, Olympia (5 vols., 1890, &c); Hachtmann, Olympia und seine Festspiele; Blumner, Home Life

of the Ancient Greeks; J P. Mahaffy, Old Greek Education; P. Gardner and F. B. Jevons, Manual of Greek Antiquities; E. N. Gardiner, Greek Athletic Sports (1910); Becker- Marquardt, Handbuch der romischen Altertilmer (5 vols.). (F. S.)

GAMING AND WAGERING. It is somewhat difficult exactly to define or adequately to distinguish these terms of allied meaning. The word " game " (q.v.) is applicable to most pastimes and many sports, irrespective of their lawful or unlawful character. " Gaming " is now always associated with the staking of money or money's worth on the result of a game of pure chance, or mixed skill and chance; and " gambling " has the same meaning, with a suggestion that the stakes are excessive or the practice otherwise reprehensible, while " wager " and " wagering " are applied to money hazarded on any contingency in which the person wagering has no interest at risk other than the amount at stake. " Betting " is usually restricted to wagers on events connected with sports or games, and " lottery " applies to speculation to obtain prizes by lot or chance.

At English common law no games were unlawful and no penalties were incurred by gambling, nor by keeping gaming- houses, unless by reason of disorder they became a public nuisance. From very early times, however, the English statute law has attempted to exercise control over the sports, pastimes and amusements of the lieges. Several points of view have been taken: (1) their competition with military exercises and training; (2) their attraction to workmen and servants, as drawing them from work to play; (3) their interference with the observance of Sunday; (4) their combination with betting or gambling as causing impoverishment and dishonesty in children, servants and other unwary persons; (5) the use of fraud or deceit in connexion with them. The legislation has assumed several forms: (1) declaring certain games unlawful either absolutely or if accompanied by staking or betting money or money's worth on the event of the game; (2) declaring the keeping of establishments for betting, gaming or lotteries illegal, or prohibiting the use of streets or public places for such purposes; (3) prohibiting the enforcement in courts of justice of gambling contracts.

The earliest English legislation against games was passed in the interests of archery and other manly sports which were believed to render the lieges more fit for service in war. A statute g ames of Richard II. (1388) directed servants and labourers i aw ful'aad to have bows and arrows and to use them on Sundays ua i aw f u i, and holidays, and to cease from playing football, quoits, dice, putting the stone, kails and other such importune games. A more drastic statute

was passed in 1409 (n Hen. IV. c. 4) and penalties were imposed in 1477 (17 Edw. IV. c. 3) on persons allowing unlawful games to be played on their premises. These acts were superseded in 1541 (33 Hen. VIII. c. 9) by a statute passed on the petition of the bowyers, fletchers (flechiers), stringers and arrowhead makers of the realm. This act (still partly in force) is entitled an " act for maintenance of archery and debarring of unlawful games " ; and it recites that, since the last statutes (of 3 & 6 Hen. VIII.) " divers and many subtil inventative and crafty persons have found and daily find many and sundry new and crafty games and plays, as legating in the fields, slide-thrift, otherwise called shove-groat, as well within the city of London as elsewhere in many other and divers parts of this realm, keeping houses, plays and alleys for the maintenance thereof, by reason whereof archery is sore decayed, and daily is like to be more minished, and divers

bowyers and fletchers, for lack of work, gone and inhabit themselves in Scotland and other places out of this realm, there working and teaching their science, to the puissance of the same, to the great comfort of strangers and detriment of this realm." Accordingly penalties are imposed on all persons keeping houses for unlawful games, and all persons resorting thereto (s. 8). The games specified are dicing, table (backgammon) or carding, or any game prohibited by any statute theretofore made or any unlawful new game then or thereafter invented or to be invented. It is further provided that " no manner of artificer or craftsman of any handicraft or occupation, husband- man, apprentice, labourer, servant at husbandry, journeyman or servant of artificer, mariners, fishermen, watermen, or any serving man, shall play at the tables, tennis, dice, cards, bowls, clash, coyting, logating or any other unlawful game out of Christmas under the pain of xxs. to be forfeit for every time; and in Christmas to play at any of the said games in their masters' houses or in their masters' presence; and also that no manner of person shall at any time play at any bowl or bowls in open places out of his garden or orchard " (s. n). The social evils of gambling (impoverishment, crime, neglect of divine service) are incidentally alluded to in the preamble, but only in connexion with the main purpose of the statute — the maintenance of archery. No distinction is made between games of skill and games of chance, and no reference is made to play- ing for money or money's worth. The Book of Sports of James I. (1617), republished by Charles I. (1633), was

aimed at encouraging certain sports on Sundays and holidays; but with the growth of Puritanism the royal efforts failed. The Sunday Observance Act 1625 prohibits the meeting of people out of their own parishes on the Lord's Day for any sports or pastimes whatsoever. It has been attempted to enforce this act against Sunday football. The act goes on to prohibit any bear-baiting, bull-baiting, interludes, common plays or other unlawful exercises or plays on Sunday by parishioners within their own parishes. According to Blackstone (iv. Comm. c. 13) the principal ground of complaint leading to legislation in the 18th century was " gambling in high life." He collects the statutes made with this view, but only those still in force need have been mentioned.

The first act directed against gambling as distinct from playing games was that ot 1665 (16 Car. II. c. 7) " against deceitful, dis- orderly and excessive gaming " which deals with games both of skill and chance at which people cheat, or play otherwise than with ready money, or lose more than £100 on credit. In 1698 (13 Will. III. c. 23) legislation was passed against lotteries, therein described as " mischievous and unlawful games." This act was amended in 1 7 10 (9 Anne c. 6), and in the same year was passed a statute which is the beginning of the modern legislation against gambling (9 Anne c. 19). It includes within its scope money won by " gaming or playing " at cards, &c, and money won by " betting " on the sides or hands of those who game at any of the forbidden games. But it refers to tennis and bowls as well as to games with cards and dice.

The following list of lawful games, sports and exercises is given in Oliphant on Horses, &c. (6th ed.) : horse-races, steeplechases, trotting matches, coursing matches, foot-races, boat-races, regattas, rowing matches, golf, wrestling matches, cricket, tennis, fives, rackets, bowls, skittles, quoits, curling, putting the stone, football, and presumably every bona-fide variety, e.g. croquet, knurr and spell, hockey or any similar games. Cock-fighting is said to have been unlawful at common law, and that and other modes of setting animals to fight are offences against the Prevention of Cruelty to Animals Acts. The following are also lawful games; whist and other lawful games at cards, backgammon, bagatelle, billiards, chess, draughts and dominoes. But to allow persons to play for money at these games or at skittles or " skittle pool " or " puff and dart " on licensed premises is gaming within the Licensing Act 1872. The earlier acts declared unlawful the following games of skill: foot- ball, quoits, putting the stone, kails, tennis, bowls, clash or kails, or cloyshcayls, logating, half bowl, slide-thrift or shove-groat and backgammon. Backgammon and other games in 1739 played with

backgammon tables were treated as lawful in that year. Horse-racing, long under restriction, being mentioned in the act of 1665 and many 18th-century acts, was fully legalized in 1840 (3 & 4 Vict. c. 35). The act of 1541, so far as it declared any game of mere skill unlawful, was repealed by the Gaming Act 1845. Billiards is legal in private houses or clubs and in public places duly licensed. The following games have been declared by the statutes or the judges to be unlawful, whether played in public or in private, unless played in a royal palace where the sovereign is residing: ace of hearts, pharaoh (faro), basset and hazard (1738), passage, and every game then invented or to be invented with dice or with any other instru- ment, engine or device in the nature of dice having one or mere figures or numbers thereon (1739), roulet or roly-poly (1744), and all lotteries (except Art Union lotteries), rouge el noir, baccarat-banque (1884), chemin defer (1895), and all games at cards which are not games of mere skill. The definition of unlawful game does not in- clude whist played for a prize not subscribed to by the players, but it does include playing cards for money in licensed premises; even in the private room of the licensee or with private friends during closing hours.

The first attack on lotteries was in 1698, against lotteries " by dice, lots, cards, balls or any other numbers or figures or in any other

way whatsoever." An act of 1 721 prohibited lotteries which under the name of sales distributed prizes in money, advowsons, land, jewels, &c, by lots, tickets, numbers or figures. Acts of 1722, 1733 and 1823 prohibited any sale of tickets, receipts, chances or numbers in foreign lotteries. The games of cards already referred to as un-lawful were in 1738 declared to be " games or lotteries by cards or dice," and in 1802 the definition of lottery was extended to include " little-goes and any game or lottery not authorized by parliament, drawn by dice, lots, cards, balls, or by numbers or figures or by any other way, contrivance or device whatsoever." This wide definition reaches raffles and sweepstakes on races. The advertisement of foreign or illegal lotteries is forbidden by acts of 1836 and 1844. In 1846 art unions were exempted from the scope of the Lottery Acts. Attempts have been made to suppress the sale in England of foreign lottery tickets, but the task is difficult, as the post-office distributes the advertisements, although, under the Revenue Act 1898, the Customs treat as prohibited goods advertisements or notices as to foreign lotteries. More success has been obtained in putting down various devices by newspapers and shopkeepers to attract customers by instituting " missing word competitions " and " racing coupon competitions "; by automatic machines which give speculative

chances in addition to the article obtained for the coin inserted ; by distribution of prizes by lot or chance to customers ; by holding sweepstakes at public-houses, by putting coins in sweet- meats to tempt street urchins by cupidity to indigestion; or by gratuitous distribution of medals giving a chance of a prize from a newspaper. An absolutely gratuitous distribution of chances seems not to be within the acts, but a commercial distribution is, even if individuals who benefit do not pay for their chance.

As already stated, the keeping of a gaming-house was at common law punishable only if a public nuisance were created. The act of 1541 imposes penalties on persons maintaining houses for unlawful games. Originally licences could be obtained for such houses, but these were abolished in 1555 (2 & 3 Phil, and Mar.). In 1698 lotteries were declared public nuisances, and in 1802 the same measure was meted out to lotteries known as little-goes. Special penalties are provided for those who set up lotteries or any unlawful game with cards or dice, &c. (1738, 1739, 1744). 1ˆ1751 inhabitants of a parish were enabled to insist on the prosecution of gaming- houses. The act of 1802 imposed severe penalties on persons publicly or privately keeping places for any lottery. This statute hits at the deliberate or habitual use of a place for the prohibited purpose, and does not touch isolated or incidental uses on a single occasion, e.g. at a bazaar or show; but under an act of 1823 the sale of lottery tickets is in itself an offence. The Gaming Act 1845 facilitates the search of suspected gaming-houses and the proof that they are such. It provides that, to prove any house to be a common gaming-house, it " shall be sufficient to show that it is kept or used for playing therein at any unlawful game, and that a bank is kept there by one or more of the players exclusively of the others, or that the chances of any game played therein are not alike favourable to all the players, including among the players the banker or other person by whom the game is managed, or against whom the other players stake, play or bet." Gambling, it will be noticed, is still in this definition connected with some kind of game. The act also provides that proof that the gaming was for money shall not be required, and that the presence of cards, dice and other instruments of gaming shall be prima-facie evidence that the house was used as a common gaming-house. The most recent statute dealing with gaming- houses is of 1854, which provides summary remedies against the keeper and makes further provisions to facilitate conviction. It may be added that the Gaming Act 1845 makes winning money by cheating at any game or wager punishable in the same way as obtaining money by false pretences. At the present time proceedings for keeping gaming-houses in the sense in

which that word is com- monly understood are comparatively rare, and are usually against foreigners. The statutes hit both public and private gaming-houses (see the Park Club case, Jenks v. Turpin, 1884, 13 Q.B/D. 505, the leading case on unlawful games). The proprietor and the person who keeps the bank at an unlawful game are both within the statute : the players are not, but the act of Henry VIII. is so far alive that they can be put under recognizance not to frequent gaming-houses. Under the Licensing Act 1872 penalties are incurred by licensed victuallers who suffer any gaming or unlawful game to be played on their premises. A single instance of playing an unlawful game for money in a private house is not within the statutes (R. v. Davies. 1897, 2Q.B 199).

In England, so far as the general public is concerned, gaming at cards is to a large extent superseded by betting on sports and pas-times, or speculation by means of lotteries or like devices. The legislation against betting eo nomine began in 1853. In the Betting Act 1853 it is described as a kind of gaming of late sprung up to the injury and demoralization of improvident persons by the opening of places called betting houses and offices, and the receiving of money in advance by the owners or occupiers or their agents on promises to pay money on events or horse races and like contingencies. This act strikes at ready money betting as distinguished from betting on credit (" on the nod "). It was avowedly framed to hit houses open to all and sundry as distinguished from private betting clubs such as Tattersall's. The act seeks to punish persons who keep a house,

office, room or other place for the purpose {inter alia) of any person betting with persons " resorting thereto " or of receiving deposits in consideration of bets on contingencies relating to horse-races or other races, fights, games, sports or exercises. The act especially excepts persons who receive or hold prizes or stakes to be paid to the winner of a race or lawful sport, game or exercise, or to the owner of a horse engaged in a race (s. 6). Besides the penalties incurred by keeping such places, the keeper is liable to repay to depositors the sums deposited (s. 5).

By the Licensing Act 1 872 penalties are incurred by licensed persons who allow their houses to be used in contravention of the Betting Act 1 853. There has been a great deal of litigation as to the meaning and scope of this enactment, and a keen contest between the police

and the Anti-gambling League (which has been very active in the matter) and the betting confraternity, in which much ingenuity has been shown by the votaries of sport in devising means for evading the terms of the enactment. The consequent crop of legal decisions shows a considerable divergence of judicial opinion. The House of Lords has held that the Tattersall's enclosure or betting ring on a racecourse is not a " place " within the statute; and members of a bona-fide club who bet with each other in the club are not subject to the penalties of the act. But the word " place " has been held to include a public-house bar, an archway, a small plot of waste ground, and a bookmaker's stand, and even a bookmaker's big umbrella, and it is difficult to extract from the judges any clear indication of the nature of the " places " to which the act applies. The act is construed as applying only to ready-money betting, i.e. when the stake is deposited with the bookmaker, and only to places used for betting with persons physically resorting thereto; so that bets by letter, telegram or telephone do not fall within its penalties. The arm of the law has been found long enough to punish as thieves " welshers," who receive and make off with deposits on bets which they never mean to pay if they lose. The act of 1853 makes it an offence to publish advertisements showing that a house is kept for betting. It was supplemented in 1874 by an act imposing penalties on persons advertising as to betting. But this has been read as applying to bets falling within the act of 1853, and it does not prohibit the publication of betting news or sporting tips in news- papers. A few newspapers do not publish these aids to ruin, and in some public libraries the betting news is obliterated, as it attracts crowds of undesirable readers. The act of 1853 has been to a great extent effectual against betting houses, and has driven some of them to Holland and other places. But it has been deemed ex- pedient to legislate against betting in the streets, which has been found too attractive to the British workman.

By the Metropolitan Streets Acts 1867 any three or more persons assembled together in any part of any street in the city of London _ or county of London for the purpose of betting and

betUav deemed to be obstructing the street, may be arrested without warrant by a constable and fined a sum not ex- ceeding £5. The Vagrancy Act 1873 (36 & 37 Vict. c. 38) provides that " Every person playing or betting by way of wagering or gaming on any street, road, highway or other open and public place, or in any open place to which the public have, or are permitted to have, access, at or with any table or instrument of gaming, or any coin, card, token or other article used as an instrument or means of gaming, at any

game or pretended game of chance, shall be deemed a rogue and vagabond." This act amended a prior act of 1868, passed to repress the practice of playing pitch and toss in the streets, which had become a public nuisance in the colliery districts. The powers of making by-laws for the peace, order and good government of their districts, possessed by municipal boroughs — and since 1888 by county councils — and extended in 1899 to the new London boroughs, have in certain cases been exercised by making by-laws forbidding any person to " frequent or use any street or other public place, on behalf either of himself or any other person, for the purpose of bookmaking, or betting, or wagering, or agreeing to bet or wager with any person, or paying, or receiving or settling bets." This and similar by-laws have been held valid, but were found inadequate, and by the Street Betting Act 1906 (6 Edw. VII. c. 43), passed by the efforts of the late Lord Davey, it is made an offence for any person to frequent or loiter in a street or public place on behalf of himself or of any other person for the purpose of bookmaking or betting or wagering or agreeing to bet or wager or paying or receiving or settling bets. The punishment for a first offence is fine up to £10, for a second fine up to £20, and the punishment is still higher in the case of a third or subsequent offence, or where the accused while committing the offence has any betting transaction with a person under the age of sixteen. The act does not apply to ground used for a course for horse-racing or adjacent thereto on days on which races take place; but the expression public place includes a public park, garden or sea-beach, and any unenclosed ground to which the public for the time have unrestricted access, and enclosed places other than public parks or gardens to which the public have a restricted right of access with or without payment, if the owners or persons controlling the place exhibit conspicuously a notice prohibiting betting therein. A constable may arrest without warrant persons offending and seize all books, papers, cards and other articles relating to betting found in their possession, and these articles may be forfeited on conviction. Besides the above provision against betting with infants the Betting

Wagering.

and Loans (Infants) Act 1892, passed at the instance of the late Lord Herschell, makes it a misdemeanour to send, with a view to profit, to any one known by the sender to be an infant, a document inviting him to enter into a betting or wagering transaction. The act is intended to protect lads at school and college from temptation by bookmakers.

We must now turn from the public law with respect to gaming to the

treatment of bets and wagers from the point of view of their obligation on the individuals who lose them. A wager may be defined as " a promise to give money or money's worth upon the determination or ascertainment of an uncertain event " (Anson, Law of Contract, 1 ith ed., p. 206). The event may be uncertain because it has not happened or because its happening is not ascertained; but to make the bargain a wager the determination of the event must be the sole condition of the bargain. According to the view taken in England of the common law, bets or wagers were legally enforceable, subject to certain rules dictated by considerations of public policy, e.g. that they did not lead to immorality or breach of the peace, or expose a third person to ridicule. 1 The courts were constantly called upon to enforce wagers and constantly exercised their ingenuity to discover excuses for refusing. A writer on the law of contracts 2 discovers here the origin of that principle of " public policy " which plays so important a part in English law. Wager- ing contracts were rejected because the contingencies on which they depended tended to create interests hostile to the common weal. A bet on the life of the emperor Napoleon was declared void because it gave one of the parties an interest in keeping the king's enemy alive, and also because it gave the other an interest in compassing his death by unlawful means. A bet as to the amount of the hop-duty was held to be against public policy, because it tended to expose the condition of the king's revenue to all the world. A bet between two hackney coachmen, as to which of them should be selected by a gentleman for a particular journey, was void because it tended to expose the customer to their importunities. When no such subtlety could be invented, the law, however reluctantly, was compelled to enforce the fulfilment of a wager. Actions on wagers were not favoured by the judges; and though a judge could not refuse to try such an action, he could, and often did, postpone it until after the decision of more important cases.

Parliament gradually intervened to confine the common law within narrower limits, both in commercial and non-commercial wagers, and both by general and temporary enactments. An example of the latter was 7 Anne c. 16 (1710), avoiding all wagers and securities relating to the then war with France. The earliest general enactment was 16 Car. II. c. 7 (1665), prohibiting the recovery of a sum exceeding £100 lost in games or pastimes, or in betting on the sides or hands of the players, and avoiding securities for money so lost. 9 Anne c. 19 avoided securities for such wagers for any amount, even in the hands of bona-fide holders for value without notice, and enabled the loser of £10 or upwards to sue for and recover the

money he had lost within three months of the loss. Contracts of insurance by way of gaming and wagering were declared void, in the case of marine risks in 1746, and in the case of other risks in 1774. It was not until 1845 that a general rule was made excluding wagers from the courts. Section 18 of the Gaming Act 1845 (passed after a parliamentary inquiry in 1844 as to gaming) enacted " that all contracts or agreements, whether by parole or in writing, by way of gaming or wagering shall be null and void, and that no suit shall be brought or main- tained in any court of law or equity for recovering any sum of money or valuable thing alleged to be won upon any wager, or which shall have been deposited in the hands of any person to abide the event on which any wager shall have been made; provided always that this enactment shall not be deemed to apply to any subscription or contribution, or agreement to subscribe or contribute, for or towards any plate, prize or sum of money to be awarded to the winner or winners of any lawful game, sport, pastime or exercise."

The construction put on this enactment enabled turf commission

1 Leake on Contracts (4th ed.), p. 529.

2 Pollock, Contracts (7th ed.), p. 313.

agents to recover from their principals bets made and paid for them. But the Gaming Act 1892 rendered null and void any promise, express or implied, to repay to any person any sum of money paid by him under, or in respect of, any contract or agree- ment rendered null and void by the Gaming Act 1845, or to pay any sum of money by way of commission, fee, reward, or other- wise in respect of any such contract or agreement, or of any services in relation thereto or in connexion therewith, and provided that no action should be brought or maintained to recover any such sum. By the combined effect of these two enactments the recovery by the winner from the loser or stake- holder of bets or of stakes on games falling within s. 18 of the Gaming Act 1845 is absolutely barred; but persons who have deposited money to abide the event of a wager are not debarred from crying off and recovering their stake before the event is decided, or even after the decision of the event and before the stake is paid over to the winner; ' and a man who pays a bet for a friend, or a turf commission agent or other agent who pays a bet for a

principal, has now no legal means of recovering the money, unless some actual deceit was used to induce him to pay in ignor- ance that it was a bet. But a person who has received a bet on account of another can still, it would seem, be compelled to pay it over, and the business of a betting man is treated as so far lawful that income-tax is charged on its profits, and actions between parties in such a business for the taking of partnership accounts have been entertained.

The effect of these enactments on speculative dealings in shares or other commodities calls for special consideration. It seems to be correct to define a wagering contract as one in which two persons, having opposite opinions touching the issue of an event (past or future) , of which they are uncertain, mutually agree that on the determination of the event one shall win, and the other shall pay over a sum of money, or other stake, neither party having any other interest in the event than the sum or stake to be won or lost. This definition does not- strike at contracts in " futures," under which the contractors are bound to give or take delivery at a date fixed of commodities not in existence at the date of the contract. Nor are such contracts rendered void because they are entered into for purposes of speculation; in fact, their legality is expressly recognized by the Sale of Goods Act 1893. Contracts of insurance are void if made by way of gaming or wagering on events in which the assured has no interest present or prospective whether the matter be life or fire risks (1774) or maritime risks (Marine Insurance Act 1906). An act known as Sir John Barnard's Act (7 Geo. II. c. 8, entitled " An act to prevent the infamous practice of stock jobbing ") prohibited contracts for liberty to accept or refuse any public stocks or securities and wagers relating to public stocks, but this act was repealed in i860, and contracts to buy or sell stocks and shares are not now void because entered into by way of speculation and not for purposes of investment. The only limita- tion on such contracts is that contained in Leeman's Act (30 & 31 Vict. c. 29) as to contracts for the sale of shares in joint- stock banking companies. But a transaction in any commodity, though in form commercial, falls within the Gaming Acts if in substance the transaction is a mere wager on the price of the commodity at a date fixed by the contract. It does not matter whether the dealing is in stocks or in cotton, nor whether it is entered into on the Stock Exchange, or on any produce exchange, or elsewhere; nor is it conclusive in favour of the validity of the bargain that it purports to bind the parties to take or deliver the article dealt in. The courts are entitled to examine into the true nature of the transaction; and where the substantial intention of the

parties is merely to gamble in differences, to make what is called " a time bargain," the fact that it is carried out by a series of contracts, regular and valid in form, will not be sufficient to exclude the application of the Gaming Acts.

In very many cases transactions with " outside stockbrokers " or

" bucket shops " have been held to be mere wagers, although the

contracts purported to give " put " or "call" options to demand

delivery or acceptance of the stocks dealt with; and the cover

1 Burge v. Ashby, 1900, 1 Q.B. 744.

deposited by the " client " has been treated as a mere security for performance of the bargain, and recoverable if sued for in time, i.e. before it is used for the purpose for which it is deposited. There was not up to 1909 any authoritative decision as to the application of the Gaming Act 1892 to transactions on the London Stock Exchange through a stockbroker who is a member of " the House "; but the same principle appears to be applicable where the facts of the particular deal clearly indicate that the intention was to make a mere time bargain, or to pay or receive differences only. The form, however, of all bargains on the Stock Exchange is calculated and intended to preclude people from setting up a gaming act defence: as each contract entitles the holder to call for delivery or acceptance of the stock named therein. In the event of the bankruptcy of a person involved in speculations, the bankruptcy officials exclude from proof against the estate all claims founded on any dealing in the nature of a wager; and on the same principle the bankrupt's trustee can- not recover sums won by the bankrupt by gaming transactions, but unexhausted " cover " on uncompleted transactions may be recovered back.

Besides the enactments which prevent the recovery of bets or wagers by action there has also been a good deal of legislation dealing with securities given in respect of " gambling debts." The earliest (1665) dealt with persons playing debts. at games otherwise than for ready money and losing £100 or more on credit, and not only prohibited the winner from recovering the overplus but subjected him to penalties for winning it. An act of 1710 (9 Anne c. 19) declared utterly void all notes, bills, bonds, judgments, mortgages or other securities where the consideration is for money or valuable security

won by gaming at cards, stocks or other games, or by betting on the sides or hands of the gamesters, or for reimbursing money knowingly advanced for such gaming or betting. This act draws a distinc- tion between gaming and other bets or wagers. Under this act the securities were void even in the hands of innocent transferees. In 1841 the law was altered, declaring such securities not void but made upon an " illegal " consideration. The effect of the change is to enable an innocent transferee for value, of a bill, note or cheque, to recover on a security worthless in the hands of the original taker (see s. 30 of the Bills of Exchange Act 1882), but to put on him the burden of proving that he is a bona fide holder for value. In the case of a negotiable security given for a wager not within the acts of 1710 or 1841 (e.g. a bet on a contested election), but within the act of 1845, a third person holding it would be presumed to be a holder for value and on the person prima facie liable under the security falls the burden of proving that no consideration was given for it. It has been decided after considerable divergence of judicial opinion that an action will not lie in England in favour of the drawee against the drawer of a cheque drawn at Algiers on an English bank, partly for losses at baccarat, and partly for money borrowed to continue playing the game. The ground of decision was in substance that the Gaming Acts of 1845 an d 1892 as the lex fori prohibit the English courts from enforcing gaming debts wherever incurred (Moulis v. Owen, 1907, 1 K.B. 746).

Scotland. — A Scots act of 1621 c. 14 (said still to be in force) forbids playing at cards or dice in any common house of hostelry, and directs that sums over 100 marks won on any one day at carding or dicing or at wagers on horse races should be at once sent to the treasurer of the kirk session. The Lottery Acts, except that of 1698, apply to Scotland; and the Betting House Act 1853 was extended to Scotland in 1874. The Street Betting Act 1906 extends to Scot- land, and gaming houses can be suppressed under the Burgh Police Act 1892, and street betting, lotteries or gaming under that of 1903. The Scots courts refuse to try actions on wagers, as being spon- siones ludicrae, unbecoming the dignity of the courts. 9 Anne c. 19 and 5 & 6 Will. IV. c. 41 extend to Scotland, but the weight of judicial opinion is that the Gaming Act 1845 does not.

Ireland. — The British Acts against lotteries were extended to Ireland in 1780, and the general law as to gaming is the same in both countries.

British Possessions. — Certain of the earlier imperial acts are in force in British possessions, e.g. the act of 9 Anne c. 19, which is in

force in Ontario subject to amendments made in 1902. In the Straits Settlements, Jamaica and British Guiana there are ordin- ances directed against gambling and lotteries, and particularly

against forms of gambling introduced by the Chinese. Under these ordinances the money paid for a lottery ticket is recoverable by law. In the Transvaal betting houses were suppressed by proclamation (No. 33) soon after the annexation. An invention known in France as the pari mutuel, and in Australia as the totalizator, is allowed to be used on race-courses in most of the states (but not in New South Wales). In Queensland, South Australia, Tasmania and Western Australia the state levies a duty on the takings of the machine. In Tasmania the balance of the money retained by the stewards of the course less the tax must be applied solely for improv- ing the course or promoting horse-racing. In Victoria under an act of 1901 the promoters of sports may by advertisement duly posted make betting on the ground illegal.

Egypt. — By law No. 10 of 1905 all lotteries are prohibited with certain exceptions, and it is made illegal to hawk the tickets or offer them for sale or to bring illegal lotteries in any way to the notice of the public. The authorized lotteries are those for charitable purposes, e.g. those of the benevolent societies of the various foreign communities.

United States. — In the United States many of the states make gaming a penal offence when the bet is upon an election, or a horse race, or a game of hazard. Betting contracts and securities given upon a bet are often made void, and this may destroy a gaming note in the hands of an innocent purchaser for value. The subject lies outside of the province of the federal government. By the legislation of some states the loser may recover his money if he sue within a limited time, as he might have done in England under 9 Anne c. 19.

Authorities. — Brandt on Games (1872); Oliphant, Law of Horses, &c. (6th ed. by Lloyd, 1908) ; Schwabe on the Stock Ex- change (1905); Melsheimer on the Stock Exchange (4th ed., 1905); Coldridge and Hawksford, The Law of Gambling (1895) ; Stutfield, Betting (3rd ed., 1901). (W. F. C.)

GAMUT (from the Greek letter gamma, used as a musical symbol, and ut, the first syllable of the medieval hymn Sanctus Johannes), a term in music used to mean generally the whole compass or range of notes possessed by an instrument or voice. Historically, however, the sense has developed from its stricter musical meaning of a scale (the recognized musical scale of any period), originating in the medieval "great scale," of which the invention has usually been ascribed to Guido of Arezzo (q.v.) in the nth century. The whole question is somewhat obscure, but, in the evolution of musical notation out of the classical alpha- betical system, the invention of the medieval gamut is more properly assigned to Hucbald (d. 930). In his system of scales the semitone was always between the 2nd and 3rd of a tetrachord,

as G, A, b B, C, so the \ B and # F of the second octave were in false relation to the b B and \ F of the first two tetrachords. To

this scale of four notes, G, A, b B, C, were subsequently added a note below and a note above, which made the hexachord with the semitone between the 3rd and 4th both up and down, as

F, G, A, b B, C, D. It was at a much later date that the 7th, our leading note, was admitted into a key, and for this the first two letters of the last line of the above-named hymn, " Sanctus Johannes," would have been used, save for the notion that as the note Mi was at a semitone below Fa, the same vowel should be heard at a semitone below the upper Ut, and the syllable Si was substituted for Sa. Long afterwards the syllable Ut was replaced by Do in Italy, but it is still retained in France; and in these two countries, with whatever others employ their nomenclature, the original Ut and the substituted Do stand for the sound defined by the letter C in English and German termin- ology. The literal musical alphabet thus accords with the

,. , . A B C DEFG T _

syllabic: La ˆ Ut or Do, Re, Mi, Fa, Sol. ˆ Germany

a remnant of Greek use survives. A was originally followed in the scale by the semitone above, as the classical Mese was followed by Paramese, and this note, namely bB, is still called B in German, English \ B (French and Italian Si) being repre- sented by the letter H. The gamut which, whenever instituted, did not pass out of use until the 19th century, regarded the hexachord and not the octachord, employed both letters and syllables, made the former

invariable while changing the latter according to key relationship, and acknowledged only the three keys of G, C and F; it took its name from having the Greek letter gamma with Ut for its lowest keynote, though the Latin letters with the corresponding syllables were applied to all the

GANDAK, a river of northern India. It rises in the Nepal- Himalayas, flows south-west until it reaches British territory, where it forms the boundary between the United Provinces and Bengal for a considerable portion of its course, and falls into the Ganges opposite Patna. It is a snow-fed stream, and the surrounding country in the plains, lying at a lower level than its banks, is endangered by its floods. The river is accordingly enclosed by protective embankments.

The Little Gandak rises in the Nepal hills, enters Gorakhpur district about 8 m. west of the Gandak, and joins the Gogra just within the Saran district of Bengal.

The Burhi (or old) Gandak also rises in the Nepal hills, and follows a course roughly parallel to and east of that of the Gandak, of which it represents an old channel, passing Muzaffarpur, and joining the Ganges nearly opposite to Moughjr. Its principal tributary is the Baghmati, which rises in the hills N. of Kath- mandu, flows in a southerly direction through Tirhut, and joins the Burhi Gandak close to Rusera.

GANDAMAK, a village of Afghanistan, 35 m. from Jalalabad on the road to Kabul. On the retreat from Kabul of General Elphinstone's army in 1842, a hill near Gandamak was the scene . of the massacre of the last survivors of the force, twenty officers and forty-five British soldiers. It is also notable for the treaty of Gandamak, which was signed herein 1879 with Yakub Khan. (See Afghanistan.)

GANDERSHEIM, a town of Germany in the duchy of Bruns- wick, in the deep valley of the Gande, 48m. S.W. of Brunswick, on the railway Boissum-Holzminden. Pop. (1905) 2847. It has two Protestant churches of which the convent church (Stiftskirche) contains the tombs of famous abbesses, a palace (now used as law courts) and the famous abbey (now occupied by provincial government offices). There are manufactures of linen, cigars, beet-root sugar and beer.

The abbey of Gandersheim was founded by Duke Ludolf of Saxony, who removed- here in 856 the nuns who had been shortly before established at Brunshausen. His own daughter Hathumoda was the

first abbess, who was succeeded on her death by her sister Gerberga. Under Gerberga's government Louis III. granted a privilege, by which the office of abbess was to continue in the ducal family of Saxony as long as any member was found competent and willing to accept the same. Otto III. gave the abbey a market, a right of toll and a mint; and after the bishop of Hildesheim and the archbishop of Mainz had long contested with each other about its supervision, Pope Innocent III. declared it altogether independent of both. The abbey was ultimately recognized as holding directly of the Empire, and the abbess had a vote in the imperial diet. The conventual estates were of great extent, and among the feudatories who could be summoned to the court of the abbess were the elector of Hanover and the king of Prussia. Protestantism was introduced in 1 568, and Magdalena, the last Roman Catholic abbess, died in 1589; but Protestant abbesses were appointed to the foundation, and continued to enjoy their imperial privileges till 1803, when Gandersheim was incorporated with Brunswick. The last abbess, Augusta Dorothea of Brunswick, was a princess of the ducal house, and kept her rank till her death. The memory of Gandersheim will long be preserved by its literary memorials. Hroswitha, the famous Latin poet, was a member of the sisterhood in the 9th century; and the rhyming chronicle of Eberhard of Gandersheim ranks as in all probability the earliest historical work composed in low German.

The Chronicle, which contains an account of the first period of the monastery, is edited by L. Wieland in the Monumenta Germ, historica (1877), and has been the object of a special study by Paul Hasse (Gottingen, 1872). See also " Agii vita Hathumodae abbatissae Gandershemensis primae," in J. G. von Eckhart's Veterum monu- mentorum quaternio (Leipzig, 1720) ; and Hase, Mittelalterliche Baudenkmaler Niedersachsens (1870).

GANDHARVA, in Hindu mythology, the term used to denote (1) in the Rig- Veda usually a minor deity; (2) in later writings a class of divine beings. As a unity Gandharva has no special attributes but many duties, and is in close relation with the great gods. Thus he is director of the sun's horses; he is guardian of

soma, the sacred liquor, and therefore is regarded as the heavenly physician, soma being a panacea. He is servant of Agni the god of light and of Varuna the divine judge. He is omnipresent: in the

heavens, in the air and in the waters. He is the keeper of heaven's secrets and acts as messenger between gods and men. He is gorgeously clothed and carries shining weapons. For wife he has the spirit of the clouds and waters, Apsaras, and by her became father of the first mortals, Yama and Yami. He is the tutelary deity of women and presides over marriage ceremonies. In their collective capacity the Gandharva share the duties allotted to the single deity. They live in the house of Indra and with their wives, the Apsaras, beguile the time by singing, acting and dancing. Sometimes they are represented as numbering twelve, sometimes twenty-seven, or they are innumerable. In Hindu law a Gandharva marriage is one contracted by mutual consent and without formality.

GANDIA, a seaport of eastern Spain, in the province of Valencia; on the Gandia-Alcoy and Alcira-Denia railways. Pop. (1900) 10,026. Gandia is on the left bank of the river Alcoy or Serpis, which waters one of the richest and most populous plains of Valencia and enters the Mediterranean Sea at the small harbour of Gandia {El Grao), 3 m. N.E. The chief ancient buildings of Gandia are the Gothic church, the college, founded by San Francisco de Borgia, director-general of the order of Jesus (1510-1572), and the palace of the dukes of Gandia — a title held in the 15th and 16th centuries by members of the princely house of Borgia or Borja. A Jesuit convent, the theatre, schools and the palace of the dukes of Osuna, are modern. Besides its manu- factures of leather, silk, velvet and ribbons, Gandia has a thriving export trade in fruit, and imports coal, guano, timber and flour. In 1904, 400 vessels, of 200,000 tons, entered the harbour.

6AND0, a sultanate of British West Africa, included in the protectorate of Nigeria, situated on the left bank of the Niger above Borgu. The sultanate was established, c. i8i9,onthedeath of Othman Dan Fodio, the founder of the Fula empire, and its area and importance varied considerably during the 19th century, several of the Fula emirates being regarded as tributaries, while Gando itself was more or less dependent on Sokoto. Gando in the middle of the century included both banks of the Niger at least as far N.W. as Say. The districts outside the British protectorate now belong to France. Since 1884 Gando has been in treaty relations with the British, and in 1903 the part assigned to the British sphere by agreement with France came definitely under the control of the administration in Nigeria. Gando now forms the sub-province of the double province of Sokoto. The emir was appointed under British authority after the conquest of Sokoto in 1903. Since that date the province has been organized for administration on the same system as the rest of the pro- tectorate of Northern Nigeria. Provincial and native courts of

justice have been established, roads have been opened, the slave trade has been abolished, and the country assessed under the new scheme for taxation. British garrisons are stationed at Jegga and Ambrusa. The chief town is Gando, situated on the Sokoto, the first considerable affluent of the Niger from the east, about 60 m. S.W. of the town of Sokoto.

GANESA, or Ganesh, in Hindu mythology, the god of wisdom and prudence, always represented with an elephant's head possibly to indicate his sagacity. He is the son of Siva and Parvati. He is among the most popular of Indian deities, and almost every act, religious or social, in a Hindu's life begins with an invocation to him, as do most books. He typifies not the wisdom of knowledge but that worldly wisdom which results in financial success, and thus he is particularly the god of the Hindu shopkeeper. In his divine aspect Ganesa is ruler over the hosts of heaven, the spirits which come and go to do Indra's will.

GANGES (Ganga), a great river of northern India, formed by the drainage of the southern ranges of the Himalayas. This mighty stream, which in its lower course supplies the river system of Bengal, rises in the Garhwal state, and falls into the Bay of Bengal after a course of 1 500 m. It issues, under the name of the Bhagirathi, from an ice cave at the foot of a Himalayan snow-bed near Gangotri, 10,300 ft. above the level of the sea.

During its passage through the southern spurs of the Himalayas it receives the Jahnavi from the north-west, and subsequently the Alaknanda, after which the united stream takes the name of the Ganges. Deo Prayag, their point of junction, is a celebrated place of pilgrimage, as is also Gangotri, the source of the parent stream. At Sukhi it pierces through the Himalayas, and turns south-west to Hardwar, also a place of great sanctity. It proceeds by a tortuous course through the districts of Dehra Dun, Saharanpur, Muzaff-arnagar, Bulandshahr and Farukhabad, in which last district it receives the Ramganga. Thus far the Ganges has been little more than a series of broad shoals, long deep pools and rapids, except, of course, during the melting of the snows and throughout the rainy season. At Allahabad, however, it receives the Jumna, a mighty sister stream, which takes its rise also in the Himalayas to the west of the sources of the Ganges. The combined river winds eastwards by south-east through the United Provinces, receiving the Gumti and the Gogra. The point of junction with both the Gumti and the Gogra has more or less pretension to sanctity. But the tongue of land at Allahabad, where the Jumna and the Ganges join, is the true Prayag,

the place of pilgrimage, to which hundreds of thousands of devout Hindus repair to wash away their sins in the sacred river. It is here that the great festival called the Magh mela is held.

Shortly after passing the holy city of Benares the Ganges enters Behar, and after receiving an important tributary, the Sone from the south, passes Patna, and obtains another accession to its volume from the Gandak, which rises in Nepal. Farther to the east it receives the Kusi, and then, skirting the Rajmahal hills, turns sharply to the southward, passing near the site of the ruined city of Gaur. By this time it has approached to within 240 m., as the crow flies, from the sea. About 20 m. farther on it begins to branch out over the level country, and this spot marks the commencement of the delta, 220 m. in a straight line, or 300 by the windings of the river, from the Bay of Bengal. The main channel takes the name of the Padma or Padda, and proceeds in a south-easterly direction, past Pabna to Goalanda, above which it is joined by the Jamuna or main stream of the Brahmaputra. The vast confluence of waters rushes towards the sea, receiving further additions from the hill country on the east, and forming a broad estuary known under the name of the Meghna, which enters the Bay of Bengal near Noakhali. This estuary, however, is only the largest and most easterly of a great number of mouths or channels. The most westerly is the Hugh, which receives the waters of a number of distributary channels that start from the parent Ganges above Murshidabad. Between the Hugh on the west and the Meghna on the east lies the delta. The upper angle of it consists of rich and fertile districts, such as Murshi- dabad, Nadia, Jessore and the 24 Parganas. But towards its southern base, resting on the sea, the country sinks into a series of great swamps, intercepted by a network of innumerable channels. This wild waste is known as the Sundarbans, from the sundari tree, which grows in abundance in the seaboard tracts.

The most important channel of the Ganges for commerce is the Hugh, on which stands Calcutta, about 90 m. from the mouth. Beyond this city the navigation is conducted by native craft, — the modern facilities for traffic by rail and the increasing shoals in the river having put an end to the previous steamer communication, which plied until about i860 as high up as Allahabad. Below Calcutta important boat routes through the delta connect the Hugh with the eastern branches of the river, for both native craft and steamers.

The Ganges is essentially a river of great cities : Calcutta, Monghyr, Patna, Benares and Allahabad all lie on its course below its junction with the Jumna; and the ancient capitals, Agra and Delhi, are on the

Jumna, higher up. The catchment basin of the Ganges is bounded on the N. by a length of about 700 m. of the Himalayan range, on the S. by the Vindhya mountains, and on the E. by the ranges which separate Bengal from Burma. The vast river basin thus enclosed embraces 432,480 sq. rn. According to the latest calculations, the length of the main stream of the Ganges is 1540 m., or with its longest affluent, 1680; breadth at true entrance into the sea, 20 m. ; breadth of channel in dry season, ij to 2| m. ; depth in dry season, 30 ft.; flood discharge, 1,800,000 cub. ft. per second; ordinary discharge, 207,000 cub. ft.; longest duration of flood, about 40 days. The average fall from Allahabad to Benares is 6 in. per mile ; from Benares to Calcutta, between 4 and 5 in. ; from Calcutta to the sea, I to 2 in. Great changes take place from time to time in the river-bed, which alter the face of the country. Ex- tensive islands are thrown up, and attach themselves to the mainland, while the river deserts its old bed and seeks a new channel, it may be many miles off. Such changes are so rapid and on so vast a scale, and the corroding power of the current on the bank so irresistible, that in Lower Bengal it is considered perilous to build any structure of a large or permanent character on its margin. Many decayed or ruined cities attest the changes in the river-bed in ancient times; and within our own times the main channel which formerly passed Rajmahal has turned away from it, and left the town high and dry, 7 m. from the bank.

The Ganges is crossed by six railway bridges on its course as far as Benares; and another, at Sara in Eastern Bengal, has been sanctioned.

The UpperGanges Canal and the Lower Ganges Canal are the two principal systems of perennial irrigation in the United Pro- vinces. The Ganges canal was opened by Lord Dalhousie in 1854, and irrigates 978,000 acres. The Lower Ganges canal, an extension of the original canal, has been in operation since 1878 and irrigates 830,000 acres. The two c-anals, together with the eastern Jumna, command the greater portion of the Doab lying between the Ganges and the Jumna, above Allahabad. Navigation in either is insignificant. (T. H. H.)*

GANGOTRI, a celebrated place of Hindu pilgrimage, among the Himalaya Mountains. It is situated in the native state of Garhwal in

the United Provinces, on the Bhagirathi, the chief head-stream of the Ganges, which is here not above 1 5 or zo yds. broad, with a moderate current, and not in general above 3 ft. deep. The course of the river runs N. by E.; and on the bank near Gangotri there is a small temple about 20 ft. high, in which are images representing Ganga, Bhagirathi and other figures of mythology. It dates from the early part of the 18th century. The bed of the river adjoining the temple is divided off by the Brahmans into three basins, where the pilgrims bathe. One of these portions is dedicated to Brahma, another to Vishnu and the third to Siva. The pilgrimage to Gangotri is considered efficacious in washing away the sins of the devotee, and ensuring him eternal happiness in the world to come. The water taken from this sacred spot is exported by pilgrims to India and sold at a high price. The elevation of the temple above the sea is 10,319 ft.

GANGPUR, a tributary state of Orissa, Bengal, included until 1905 among the Chota Nagpur States. It is bounded N. by Ranchi district, E. by the Singhbhum district, S. by Sambalpur and Bamra, and W. by Raigarh in the Central Provinces. The country is for the most part an undulating plain, broken by detached ranges of hills, one of which, the Mahavira range, possesses a very remarkable appearance, springing abruptly from the plain in an irregular wall of tilted and disrupted rock, with two flanking peaks. The rivers are the lb and the Brahmani, formed here by the union of the Sankh and the South Koel, both navigable by canoes. The lb was formerly famous on account of diamonds found in its bed, and its sands are still washed for gold. One of the largest coalfields in India extends into the state, and iron ore is also found. Jungle products — lac, silk cocoons, catechu and resin, which are exported; wild animals — bisons, buffaloes, tigers, leopards, hyenas, wolves, jackals, wild dogs and many sorts of deer. Area, 2492 sq. m.; pop. (1901) 238,896; estimated revenue, £16,000.

GANGRENE (from Gr. ya.yypai.va, an eating sore, from ypalveiv, to gnaw), a synonym in medicine for mortification (q.v.) , or a local death in the animal body due to interruption of the circulation by various causes.

GANILH, CHARLES (1758-1836), French economist and politician, was born at Allanche in Cantal on the 6th of January 1758. He was educated for the profession of law and practised as avocat. During the troubled period which culminated in the taking of the Bastille on the 14th of July 1789, he came pro- minently forward in public affairs, and was one of the seven members of the permanent

Committee of Public Safety which sat at the hotel de ville. He was imprisoned during the Reign of Terror, and was only released by the counter-revolution of the 9th Thermidor. During the first consulate he was called to the tribunate, but was excluded in 1802. In 1815 he was elected deputy for Cantal, and finally left the Chamber on its dissolution in 1823. He died in 1836. Ganilh is best known as the most vigorous defender of the mercantile school in opposition to the views of Adam Smith and the English economists.

His works, though interesting from the clearness and precision with which these peculiar opinions are presented, do not now possess much value for the student of political economy. He wrote Essai politique sur le revenue des peuples de I'antiquite, du moyen Age, &c. (1808); Des systemes d'economie politique (1809); Theorie d'economie politique (1815) ; Dictionnaire analytique de Viconomie politique

(1826).

GANJAM, a district of British India, in the extreme north-east of the Madras Presidency. It has an area of 8372 sq. m. Much of the district is exceedingly mountainous and rocky, but is interspersed with open valleys and fertile plains. Pleasant

groves of trees in the plains give to the scenery a greener appearance than is usually met with in the districts to the south. The mountainous tract known as the Maliyas, or chain of the Eastern Ghats, has an average height of about 2000 ft. — its principal peaks being Singharaj (4976 ft.), Mahendragiri (4923) and Devagiri (4535). The hilly region forms the agency of Ganjam, with an area of 3483 sq. m. and a population (in 1901) of 321,114, mostly wild backward tribes, incapable of being governed under ordinary conditions and therefore ruled by an agent of the governor with special powers. The chief rivers are the Rushikuly a , the Vamsadhara and the Languliya. The sea and river fisheries afford a livelihood to a considerable section of the population. The hilly region abounds in forests consisting principally of sal, with satin-wood, ebony and sandal-wood in smaller quantities. Ganjam formed part of the ancient kingdom of Kalinga. Its early history is involved in obscurity, and it was not till after the Gajapati dynasty ascended the throne of Orissa that this tract became even nominally a part of their dominions. Owing to the nature of the country the rising Mahommedan power was long kept at bay; and it was not till nearly a century after the first invasion of Orissa that a Mahommedan governor was sent to govern the Chicacole Circars, which included

the present district of Ganjam. In 1 7 53 Chicacole, with the Northern Circars, were made over to the French by Salabat Jang for the maintenance of his French auxiliaries. In 1759 Masulipatam was taken by an English force sent from Bengal, and the French were compelled to abandon Ganjam and their other factories in the north. In 1765 the Northern Circars (including Ganjam) were granted to the English by imperial firman, and in August 1768 an English factory was founded at Ganjam, protected by a fort. The present district of Ganjam was constituted in 1802. In the earlier years of British rule considerable difficulty was experienced in the administration of the district; and on more than one occasion the refractory large landholders had to be coerced by means of regular troops. In 1816 Ganjam was overrun by the Pindaris; and in 1836 occurred the Gumsur campaign, when the British first came into contact with the aboriginal Kondhs, the suppression of whose practice of human sacrifice was successfully accomplished. A petty rising of a section of theKondhs occurred in 1865, which was, however, suppressed without the aid of regular troops.

In 1901 the pop. of the district was 2,010,256, showing an increase of 20 % in the decade. There are two systems of govern- ment irrigation: (1) the Rushikulya project, and (2) the Ganjam minor rivers system. The principal crops are rice, other food grains, pulse, oil seeds and a little sugar-cane and cotton. Salt is evaporated, as a government monopoly, along the coast. Sugar is refined, according to German methods, at Aska, where rum also is produced. A considerable trade is conducted at the ports of Gopalpur and Calingapatam, which are only open roadsteads. The district is traversed throughout by the East Coast railway (Bengal-Nagpur system), which was opened from Calcutta to Madras in 1900. There are colleges at Berhampore and Parlaki- medi. The headquarters station is Berhampore; the town of Ganjam occupied this position till 1815, when it was found unhealthy, and its importance has since declined.

GANNAL, JEAN NICOLAS (1791-1852), French chemist, was born at Sarre-Louis on the 28th of July 1 79 1 . In 1 808 he entered the medical department of the French army, and witnessed the retreat from Moscow in 181 2. After the downfall of the empire he worked at the Ecole Polytechnique in Paris and subsequently at the Faculty of Sciences as assistant to L. J. Thenard. His contributions to technical chemistry included a method of refining borax, the introduction of elastic rollers formed of gelatin and sugar for use in printing, and processes for manu- facturing glue and gelatin, lint, white lead, &c. The Institute awarded him a Montyon prize in 1827

for his advocacy of chlorine as a remedy in pulmonary phthisis, and again in 1835 for his discovery of the efficacy of solutions of aluminium acetate and chloride for preserving anatomical preparations. In the latter part of his life he turned his attention to embalmment, his method depending on the injection of solutions of aluminium salts into the arteries. He died at Paris in January 1852. His sob

GANNET

Felix, born in 1829, also devoted himself to the question of the disposal of the dead, among his publications being Mort reelle et tnort apparente (1868), Inhumation et cremation (1876), and Les Cimetieres (1885), a work on the history and law of burial, of which only one volume appeared.

GANNET (O.E. ganot) or Solan Goose, j the Pelecanus bassanus of Linnaeus and the Sula bassana of modern ornithologists, a large sea-fowl long known as a numerous visitor, for the purpose of breeding, to the Bass Rock at the entrance of the Firth of

Forth, and to certain other islands off the coast of Britain, of which four are in Scottish waters— namely, Ailsa Craig, at the mouth of the Firth of Clyde; the group known collectively as St Kilda; Suleskerry, some 40 m. north-east of the Butt of Lewis; and the Stack and Skerry, about the same distance westward of Stromness: It appears also to have two stations off the coast of

'The phrase ganotes bceS (gannet's bath), a periphrasis for the sea, occurs in the Anglo-Saxon Chronicle, in reference to events which took place a.d. 975, as pointed out by Prof. Cunningham, whose learned treatise on this bird (Ibis, 1866, p. 1) nearly exhausts all that can be said of its history and habits. A few pages further on (p. 13) this writer remarks: — " The name gannet is intimately connected with our modern English gander, both words being modifications of the ancient British ' gan r or ' gans,' which is the same word as the modern German ' Gans,' which in its turn corresponds with the old Highˆ German ' Kans,' the Greek X V", the Latin anser, and the Sanskrit 'hansa,' all of which possess the same signification, viz. a goose. The origin of the names solan or soland, sulan, sula and haf-sula, which are evidently all closely related, is not so obvious.

Martin [Voy. St Kilda] informs us that ‘ some imagine that the word solan comes from the Irish souler, corrupted and adapted to the Scottish language, qui oculis irretortis e longinquo respiciat praedam.’ The earlier writers in general derive the word from the Latin solea, iu consequence of the bird’s supposed habit of hatching its egg with its foot; and in a note intercalated into Ray’s description of the solan goose in the edition of his Itineraries published by the Ray Society, and edited by Dr Lankester, we are told, though no authority for the statement is given, that ‘ the gannet, Sula alba, should be written solent goose, i.e. a channel goose.’ ” Hereon an editorial note remarks that this last statement appears to have been a suggestion of Yarrell’s, and that it seems at least as possible that the ” Solent” took its name from the bird.

Ireland, the Skellig Islands and the Stags of Broadhaven, and it resorts besides to Lundy Island in the Bristol Channel— its only English breeding-place. Farther to the northward its settle- ments are Myggenaes, the most westerly of the Faeroes, and various small islands off the coast of Iceland, of which the Vestmannaeyjar, the Reykjanes Fuglasker and Grimsey are the chief. On the western side of the Atlantic it appears to have but five stations, one in the Bay of Fundy, and four rocks in the Gulf of St Lawrence. On all these seventeen places the bird arrives about the end of March or in April and departs in autumn when its young are ready to fly; but even during the breeding- season many of the adults may be seen on their fishing excursions at a vast distance from their home, while at other times of the year their range is greater still, for they not only frequent the North Sea and the English Channel, but stray to the Baltic, and in winter, extend their flight to the Madeiras, while the members of the species of American birth traverse the ocean from the shores of Greenland to the Gulf of Mexico.

Apparently as bulky as a goose, and with longer wings and tail, the gannet weighs considerably less. The plumage of the adult is white, tinged on the head and neck with buff, while the outer edge and principal quills of the wings are black, and some bare spaces round the eyes and on the throat reveal a dark blue skin. The first plumage of the young is of a deep brown above, but paler beneath, and each feather is tipped with a triangular white spot. The nest is a shallow depression, either on the ground itself or on a pile of turf, grass and seaweed— which last is often conveyed from a great distance. The single egg it contains has a white shell of the same chalky character as a cormorant’s. The young are hatched blind and naked, but the slate-coloured skin, with which their body is covered is soon clothed with white down, replaced in due time by true feathers of the dark

colour already mentioned. The mature plumage is believed not to be attained for some three years. Towards the end of summer the majority of gannets, both old and young, leave the neighbourhood of their breeding-place, and, betaking themselves to the open sea, follow the shoals of herrings and other fishes (the presence of which they are most useful in indicating to fishermen) to a great distance from land. Their prey is almost invariably captured by plunging upon it from a height, and a company of gannets fishing presents a curious and interesting spectacle. Flying in a line, each bird, when it comes over the shoal, closes its wings and dashes perpendicularly into the waves, whence it emerges after a few seconds, and, shaking the water from its feathers, mounts in a wide curve, and orderly takes its place in the rear of the string, to repeat is headlong plunge so soon as it again finds itself above' its prey. 2

Structurally the gannet presents many points worthy of note, such as its closed nostrils, its aborted tongue, and its toes all connected by a web— characters which it possesses in common with most of the other members of the group of birds (Stegano- podes) to which it belongs. But more remarkable still is the system of subcutaneous air-cells, some of large size, pervading almost the whole surface of the body, communicating with the lungs, and capable of being inflated or emptied at the will of the bird. This peculiarity has attracted the attention of several writers— Montagu, Sir R. Owen (Proc. Zool. Soc, i8«, p. 00) and Macgillivray. 6 ' P V "

In the southern hemisphere the gannet is represented by two nearly allied but somewhat smaller forms— one, Sula capensis inhabiting the coast of South Africa, and the other, S. serrator, the Australian seas. Both much resemble the northern bird, but

2 The large number of gannets, and the vast quantity of fish they take, has been frequently animadverted upon, but the computations on this last point are perhaps fallacious. It seems to be certain that in former days fishes, and herrings in particular, were at least as plentiful as now, if not more so, notwithstanding that gannets were more numerous. Those frequenting the Bass were reckonpd by Macgillivray at 20,000 in 1831, while in 1869 they were computed at 12 000 showing a decrease of two-fifths in 38 years. On Ailsa in 1 869 there were supposed to be as many as on the Bass, but their number was estimated at 10,000 in 1877 (Report on the Herring fisheries of Scotland, 1878, pp. xxv. and 171),— being a diminution of one-sixth in eight years, or nearly twice as great as on the Bass

the former seems to have a permanently black tail, and the latter a tail the four middle feathers of which are blackish-brown with white shafts.

Apparently inseparable from the gannets generically are the smaller birds well known to sailors as boobies, from the extra- ordinary stupidity they commonly display. They differ, how- ever, in having no median stripe of bare skin down the front of the throat; they almost invariably breed upon trees and are inhabitants of warmer climates. One of them, S. cyanops, when adult has much of the aspect of a gannet, but S. piscator is readily distinguishable by its red legs, and 5. leucogaster by its upper plumage and neck of deep brown. These three are widely distributed within the tropics, and are in some places exceedingly abundant. The fourth, 5. variegata, which seems to preserve throughout its life the spotted suit characteristic of the immature S. bassana, has a much more limited range, being as yet only known from the coast of Peru, where it is one of the birds which contribute to the formation of guano. (A. N.)

GANODONTA (so named from the presence of bands of enamel on the teeth) , a group of specialized North American Lower and Middle Eocene mammals of uncertain affinity. The group includes Hemiganus, Psittacotherium and Conoryctes from the Puerco, Calamodon and Hemiganus from the Wasatch, and Stylinodon from the Bridger Eocene. With the exception of Conoryctes, in which it is longer, the skull is short and suggests affinity to the sloths, as does what little is known of the limb- bones. The dentition, too, is of a type which might well be considered ancestral to that of the Edentata. For instance, the molars when first developed have tritubercular summits, but these soon become worn away, leaving tall columnar crowns, with a subcircular surface of dentine exposed at the summit of each. Moreover, while the earlier types have a comparatively full series of teeth, all of which are rooted and invested with enamel, in the later forms the incisors are lost, the cheek-teeth never develop roots but grow continuously throughout life. These and other features induced Dr J. L. Wortman to regard the Ganodonta as an ancestral suborder of Edentata; but this view is not accepted by Prof. W. B. Scott. Teeth provision- ally assigned to Calamodon have been obtained from the Lower Tertiary deposits of Switzerland.

See J. L. Wortman, " The Ganodonta and their Relationship to the Edentata," Bull. Amer. Mus. vol. ix. p. 59 (1897); W. B. Scott, "

Mammalia of the Santa Cruz Beds, Edentata," Rep. Princeton Exped. to Patagonia, vol. v. (1903-1904). (R. L.)*

GANS, EDUARD (1 797-1839), German jurist, was born at Berlin on the 22nd of March 1797, of prosperous Jewish parents. He studied law first at Berlin, then at Gottingen, and finally at Heidelberg, where he attended Hegel's lectures, and became thoroughly imbued with the principles of the Hegelian philosophy. In 1820, after taking his doctor's degree, he returned to Berlin as lecturer on la. In 1825 he turned Christian, and the following year was appointed extraordinary, and in 1828 ordinary, professor in the Berlin faculty of law. At this period the historical school of jurisprudence was coming to the front, and Gans, predisposed owing to his Hegelian tendencies to treat law historically, applied the method to one special branch — the right of succession. His great work, Erbrecht in weltgeschichtlicher Entwickli >g (1824, 1825, 1829 and 1835), is of permanent value, not om." for its extensive survey of facts, but for the admirable manner in which the general theory of the slow evolution of legal principles is presented. In 1830, and again in 1835, Gans visited Paris, and formed an intimate acquaintance with the leaders of literary culture and criticism there. The liberality of his views, especially on political matters, drew upon Gans the displeasure of the Prussian government, and his course of lectures on the history of the last fifty years (published as Vorlesungen iiber d. Geschichte d. letzten fiinfzig Jahre, Leipzig, 1833-1834) was prohibited. He died at Berlin on the sth of May 1839. In addition to the works above mentioned, there may be noted the treatise on the funda- mental laws of property (liber die Grundlage des Besitzes, Berlin, 1829), a portion of a systematic work on the Roman civil, law (System des romischen Civil-Rechts, 1827), and a collection of his miscellaneous writings (Vermischle Schriflen, 1832). Gans edited*

the Philosophie der Geschichte in Hegel's Werke, and contributed an admirable preface.

See Revue des deux mondes (Dec. 1839).

GANSBACHER, JOHANN BAPTIST (1778-1844), Austrian musical composer, was born in 1778 at Sterzing in Tirol. His father, a schoolmaster and teacher of music, undertook his son's early education, which the boy continued under various masters till 1802, when he became the pupil of the celebrated Abbe G. J. Vogler. To his connexion with this artist and with his fellow- pupils, more perhaps than to his own merits, Gansbacher's permanent place in the history of music is due; for it was during his second stay with Vogler, then

(1810) living at Darmstadt, that he became acquainted with Weber and Meyerbeer, and the close friendship which sprang up among the three young musicians, and was dissolved by death only, has become cele- brated in the history of their art. But Gansbacher was himself by no means without merit. He creditably filled the responsible and difficult post of director of the music at St Stephen's cathedral, Vienna, from 1823 till his death (July 13, 1844); and his compositions show high gifts and accomplishment. They consist chiefly of church music, 17 masses, besides litanies, motets, offertories, &c, being amongst the number. He also wrote several sonatas, a symphony, and one or two minor com- positions of a dramatic kind.

GANT&, a cloth made from cotton or tow warp and jute weft. It is largely used for bags for sugar and similar material, and has the appearance of a fine hessian cloth.

GANYMEDE, in Greek mythology, son of Tros, king of Dardania, and Callirrhoe. He was the most beautiful of mortals, and was carried off by the gods (in the later story by Zeus himself, or by Zeus in the form of an eagle) to Olympus to serve as cup- bearer (Apollodorus hi. 12; Virgil, Aeneid, v. 254; Ovid, Metam. x. 255). By way of compensation, Zeus presented his father with a team of immortal horses (or a golden vine). Ganymede was afterwards regarded as the genius of the fountains of the Nile, the life-giving and fertilizing river, and identified by astronomers with the Aquarius of the zodiac. Thus the divinity that distributed drink to the gods in heaven became the genius who presided over the due supply of water on earth. When pederasty became common in Greece, an attempt was made to justify it and invest it with dignity by referring to the rape of the beautiful boy by Zeus; in Crete, where the love of boys was reduced to a system, Minos, the primitive ruler and law-giver, was said to have been the ravisher of Ganymede. Thus the name which once denoted the good genius who bestowed the precious gift of water upon man was adopted to this use in vulgar Latin under the form Catamitus. Ganymede being carried off by the eagle was the subject of a bronze group by the Athenian sculptor Leochares, imitated in a marble statuette in the Vatican. E. Veckenstedt (Ganymedes, Libau, 1881) endeavours to prove that Ganymede is the genius of intoxicating drink (fikdv, mead, for which he postulates a form firjSos), whose original home was Phrygia.

See article by P. Weizsacker in Roscher's Lexikon der Mythologie. In the article Greek Art, fig. 53 (PI. I.) gives an illustration of Ganymede borne aloft by an eagle.

GAO, Gao-Gao, or Garo, a town of French West Africa, in the Upper Senegal and Niger colony, on the left bank of the Niger, 400 m. by river below Timbuktu. Pop. about 5000. The present town dates from the French occupation in 1900; of the ancient city there are scanty ruins, the chief being a truncated pyramid, the remains of the tomb (16th century) of Mahommed Askia, the Songhoi conqueror, and those of the great mosque. According to tradition a city stood on this spot in very ancient times and its inhabitants are said to have had intercourse with the Egyptians. It is known, however, that the city of which the French settlement is the successor was founded by the Songhoi, probably in the 7th or 8th century, and became the capital of their empire. Garo (Ga-rho) appears to have been the correct name of the Songhoi city, though it was also known as Gogo and Kuku (Kaougha) – 1 In the 1 2th century Idrisi describes Kuku as

1 There was another city called Kaoka or Gaoga east of Lake Chad in the country now known as Bagirmi. It was the seat of the

a populous un walled town devoted to commerce and industry; it is possible, however, that Idrisi is referring not to Gao but to another town somewhat to the south — at that period the middle course of the Niger had many prosperous towns along its banks. In the 14th century Gao was conquered by the king of Melle, and its great mosque was built (c. 1325) by the Melle sovereign Kunkur Musa on his return from a pilgrimage to Mecca. In the 15th century the Songhoi regained power and Gao attained its greatest prosperity in the reign of Askia. It did not enjoy the commercial importance of Jenne nor the intellectual supremacy of Timbuktu, but was the political centre of the western Sudan for a long period. On the break up of the Songhoi power the city declined in importance. It became subject in 1590 to the Ruma of Timbuktu, from whom it was wrested in 1770 by the Tuareg, the last named surrendering possession to the French. The first European to reach Gao was Mungo Park (1805) ; he was followed in 1851 by Heinrich Barth, and in 1896 by the French naval lieutenant Hourst. Gao is now the headquarters of a mili- tary district. A caravan route leads from it to Kano and Bornu. From Gao upwards the Niger is navigable for over 1000 m.

See Timbuktu. For the Gao region of the Niger see an article by F. Dubois in L' Afrigue francaise (January 1909).

GAOL, or Jail, a prison (q.v.). The two forms of the word are due to the parallel dual forms in Old Central and Norman French respectively, jaiole or jaole, and gaiole or gayolle. The common origin is the med. Lat. gabiola, a diminutive formed from cavea, a hollow, a den, from which the English " cave " is derived. The form " gaol " still commonly survives in English, and is in official usage, e.g. " gaol-delivery," but the common pronuncia- tion of both words, ""jail," shows the real surviving word.

GAON (Heb. for " Excellency," plural Geonim), the title given to the heads of the two Jewish academies in Babylonia, Sura and Pumbeditha. Though the name is far older, it is chiefly applied to Rabbis who lived between the close of the Talmud and the transference of the centre of Judaism from Asia to Europe — i.e. from the end of the 6th to the middle of the nth century a.d. The Geonim were required to do homage to the Exilarchs (see Exilarch) but were otherwise independent. They exercised wide authority and were appealed to in settle- ment of the social and religious affairs of the diaspora. To them must be assigned the arrangement of the main lines of the present Synagogue liturgy. Their chief literary activity took the form of Answers to Questions — a form which was extensively used in later centuries. The most noted of the Geonim, who will be found treated under their respective names, were Ahai, Amram, Semach, Saadiah, Sherira and Hai. Hai Gaon died in 1038, closing the period of the Geonim after an activity of four and a half centuries.

A full list of the Geonim is given in tabular form in the Jewish Encyclopaedia, vol. v. p. 571. (I. A.)

GAP, the capital of the French department of the Hautes Alpes. Pop. (1906) town, 6888; commune, 10,823. It is built at a height of 2418 ft. on the right bank of the Luye (an affluent of the Durance), in an agreeable position, and is dominated afar by snowy peaks on the N.E. The little city has the look of a Provencal town, being white. The 17th-century cathedral church has been entirely reconstructed (1866-1905). In the prefecture is the tomb of the constable de Lesdiguieres (154.3- 1626), dating from about 1613, and due to a Lorraine sculptor, Jacob Richier. The same building contains various scientific and archaeological collections, as well as the very rich archives, which include many MSS. from the monastery of Durbon, &c. There are a few small manufactories of purely local importance. Gap is connected by railway with Briancon (51! m.) and with Grenoble (855 m.), while from the railway junction of Veynes- (i6| m. W. of Gap) it is 1 22 m. by rail to Marseilles. The episcopal

Bulala dynasty, an offshoot of the royal family of Kanem, whose rule in the 15th century extended from the Shari to Darfur. The existence of the state was first mentioned by Leo Africanus. To the Bornuese it was known as Bulala or Kuka Bulala, a name which persists as that of a district in French Congo (see Bornu). The similarity of the name Gaoga to that of the Songhoi capital has given rise to much confusion.

see of Gap, now in the ecclesiastical province of Aix en Provence, is first certainly mentioned in the 6th century, and in 1791 was enlarged by the annexation of that of Embrun (then suppressed).

Gap is the Vapincum of the Romans, and was founded by Augustus about 14 B.C. It long formed part of Provence, but in 1232 most of the region passed by marriage to the dauphins of Viennois. The town itself, however, remained under the rule of the bishops until 1512, when it was annexed to the crown of France. The bishops continued to bear the title of count of Gap until the Revolution. The town was sacked by the Huguenots in 1567 and 1577, and by the duke of Savoy in 1692. It was the birthplace of the reformer Guillaume Farel (1489- 1565), who first preached his doctrines there about 1561-1562, but then took refuge in Switzerland.

See J. Roman, Histoire de la ville de Gap (Gap, 1892).

(W. A. B. C.)

GAPAN, a town of the province of Nueva Ecija, Luzon, Philippine Islands, 3 m. E. of San Isidro, the capital. Pop. (1903) 11,278. It is situated in a rich rice-growing region, and extensive forests in its vicinity contain fine hardwoods. Its climate is comparatively cool and healthy. The principal native dialects spoken are Tagalog and Pampangan. Gapan is the oldest town of the province.

GARARISH (Kararish), a semi-nomadic tribe of Semitic origin, dwelling along the right bank of the Nile from Wadi Haifa to Merawi. Many members of the tribe are agriculturists, others act as guides or transport drivers. They declare themselves kinsfolk of the Ababda, but they are more Arab than Beja.

GARASHANIN, ILIYA (1812-1874), Servian statesman, was the son of a Servian peasant, who made money by exporting cattle and pigs to Austria and by his intelligence and wealth attained to a certain influence in the country. He wanted to give his son as good an education as possible, and therefore sent him to Hungary to learn

first in a Greek and then in a German school. Highly gifted, and having passed through a regular although somewhat short school training, the young Iliya very quickly came to the front. In 1836 Prince Milosh appointed him a colonel and commander of the then just organized regular army of Servia. In 1842 he was called to the position of assistant to the home minister, and from that time until his retirement from public life in 1867 he was repeatedly minister of home affairs, dis- tinguishing himself by the energy and justice of his administration. But he rendered far greater services to his country as minister for foreign affairs. He was the first Servian statesman who had a political programme, and who worked to replace the Russian pro- tectorate over Servia by the joint protectorate of all the great powers of Europe. As minister for foreign affairs in 1853 he was decidedly opposed to Servia joining Russia in war against Turkey and the western powers. His anti-Russian views resulted in Prince Menshikov, while on his mission in Constantinople, 1853, peremptorily demanding from the prince of Servia (Alexander Karageorgevich) his dismissal. But although dismissed, his personal influence in the country secured the neutrality of Servia during the Crimean War. He enjoyed esteem in France, and it was due to him that France proposed to the peace conference of Paris (1856) that the old constitution, granted to Servia by Turkey as suzerain and Russia as protector in 1839, should be replaced by a more modern and liberal constitution, framed by a European international commission. But the agreement of the powers was not secured. Garashanin induced Prince Alexander Karageorgevich to convoke a national assembly, which had not been called to meet for ten years. The assembly was convoked for St Andrew's Day 1858, but its first act was to dethrone Prince Alexander and to recall the old Prince Milosh Obrenovich. When after the death of his father Milosh (in i860) Prince Michael ascended the throne, he entrusted the premiership and foreign affairs to Iliya Garashanin. The result of their policy was that Servia was given a new, although somewhat conservative, con- stitution, and that she obtained, without war, the evacuation of all the fortresses garrisoned by the Turkish troops on the Servian territory, including the fortress of Belgrade (1867). Garashanin was preparing a general rising of the Balkan nations

against the Turkish rule, and had entered into confidential arrangements with the Rumanians, Bosnians, Albanians, Bulgarians and Greeks, and more especially with Montenegro. But the execution

of his plans was frustrated by his sudden resignation (at the end of 1867), and more especially by the assassination of Prince Michael a few months later (the 10th of June 1 868). Although he was a Conservative in politics, and as such often in conflict with the leader of the Liberal movement, Yovan Ristich, he certainly was one of the ablest statesmen whom Servia had in the 19th century. (C. Mi.)

GARAT, DOMINIQUE JOSEPH (1 749-1833), French writer and politician, was born at Bayonne on the 8th of September 1 749. After receiving a good education under the direction of a relation who was a cure, and having been an advocate at Bor- deaux, he came to Paris, where he obtained introductions to the most distinguished writers of the time, and became a contributor to the Encyclopedic methodique and the Mercure de France. He gained considerable reputation by an eloge on Michel de L'Hopital in 1 778, and was afterwards three times crowned by the Academy for eloges on Suger, Montausier and Fontenelle. In 1785 he was named professor of history at the Lycee, where his lectures enjoyed an equal popularity with those of G. F. Laharpe on literature. Being chosen a deputy to the states-general in 1789, he rendered important service to the popular cause by his narrative of the proceedings of the Assembly contributed to the Journal de Paris. Possessing strongly optimist views, a mild and irresolute character, and indefinite and changeable con- victions, he played a somewhat undignified part in the great political events of the time, and became a pliant tool in carrying out the designs of others. Danton had him named minister of justice in 1792, and in this capacity had entrusted to him what he called the commission ajfreuse of communicating to Louis XVI. his sentence of death. In 1 793 he became minister of the interior. In this capacity he proved himself quite inefficient. Though himself uncorrupt, he winked at the most scandalous corruption in his subordinates, and in spite of the admirably organized detective service, which kept him accurately informed of every movement in the capital, he entirely failed to maintain order, which might easily have been done by a moderate display of firmness. At last, disgusted with the excesses which he had been unable to control, he resigned (August 15, 1793). On the 2nd of October he was arrested for Girondist sympathies but soon released, and he escaped further molestation owing to the friendship of B arras and, more especially, of Robespierre, whose literary amour-propre he had been careful to flatter. On the 9th Thermidor, however, he took sides against Robespierre, and on the 1 2th of September 1 794 he was named by the Convention as a member of the executive committee of public instruction. In 1 798 he was appointed ambassador to Naples, and in

the following year he became a. member, then president, of the Council of the Ancients. After the revolution of the 18th Brumaire he was chosen a senator by Napoleon and created a count. During the Hundred Days he was a member of the chamber of representa- tives. In 1 803 he was chosen a member of the Institute of France, but after the restoration of Louis XVIII. his name was, in 1816, deleted from the list of members. After the revolution of 1830 he was named a member of the new Academy of Moral and Political Science. He died at Ustaritz near Bayonne, April 25, 1833. His writings are characterized by elegance, grace and variety of style, and by the highest kind of rhetorical eloquence ; but his grasp of his subject is superficial, and as his criticisms have no root in fixed and philosophical principles they are not unfrequently whimsical and inconsistent. He must not be confounded with his elder brother Dominique (1735-1799), who was also a deputy to the states-general.

The works of Garat include, besides those already mentioned, Considerations sur la Revolution Francaise (Paris, 1792) ; Memoires sur la Revolution, ou expose de ma conduite (1795); Memoires sur la vie de M. Suard, sur ses ecrits, et sur le XVIII s siecle (1820); eloges on Joubert, Kleber and Desaix; several notices of distin- guished persons; and a large number of articles in periodicals. Valuable materials for the history of Garat's tenure of the ministry, notably the police reports of Dutard, are given in W. A. Schmidt's Tableaux de la Revolution Francaise (3 vols., Leipzig, 1867-1870).

GARAT, PIERRE-JEAN (1764-1823), French singer, nephew of Dominique Joseph Garat, was born in Bordeaux on the 25th of April 1764. Gifted with a voice of exceptional timbre and compass he devoted himself, from an early age, to the cultivation of his musical talents. On account of his manifesting a distaste for the legal profession, for which his father wished him to study, he was deprived of his allowance, but through the patronage of a friend he obtained the office of secretary to Comte d'Artois, and was afterwards engaged to give musical lessons to the queen of France. At the beginning of the Revolution he accompanied Rode to England, where the two musicians appeared together in concerts. He returned to Paris in 1 794. After the Revolution he became a professional singer, and on account of a song which he had composed in reference to the misfortunes of the royal family he was thrown into prison. On regaining his liberty he went to Hamburg, where he at once achieved extraordinary success; and by his subsequent appearances in Paris, and his visits to Italy, Spain, Germany and Russia, he made for himself a reputation as a singer unequalled by any other of his own

time. He was a keen partisan of Gluck in opposition. to Handel. On the institution of the Conservatoire de Musique he became its professor of singing. He also composed a number of songs, many of which have considerable merit. Herlied on the 1st of March 1823 in Paris.

GARAY, JANOS (1812-1853), Hungarian poet and author, was born on the 10th of October 1812, at Szegszard, in the county of Tolna. From 1823 to 1828 he studied at Fiinfkirchen, and subsequently, in 1829, at the university of Pest. In 1834 he brought out an heroic poem, in hexameters, under the title Csatdr. After this he issued in quick succession various historical dramas, among which the most successful were Arbocz, Orszdgh Ilona and Bdthori Erzsebet, — the first two published at Pest in 1837 and the last in 1840. Garay was an energetic journalist, and in 1838 he removed to Pressburg, where he edited the political journal Hirnok (Herald). He returned to Pest in 1839, when he was elected a corresponding member of the Hungarian Academy of Sciences. In 1842 he was admitted into the Kisfaludy Society, of which he became second secretary. Garay enriched Hungarian literature with numerous lyrical poems, ballads and tales. The first collection of his poems was published at Pest in 1843; and his prose tales appeared in 1845, under the title of Tollrajzok (Sketches with the Pen). His historical ballads and legends, styled Arpddok (Pest, 1847, 2nd ed. 1848), showed him to be a master in the art of ballad-writing. Some of his lyrical poems also are excellent, as, for example, Balatoni Kagyldk (Shells from the Balaton Lake) (Pest, 1848). His legend Bosnydk Zsdfia (Pest, 1847), an d his poetical romance Frangepdn KrislofnS (Christopher Frangepan's Wife) (Pest, 1846), gained the prize of the Kisfaludy Society. His last and most famous work was an historical poem in twelve cantos, with the title Szent Ldszld (Saint Ladislaus) (Eger, 1852, 2nded., Pest, 1853, 3rd ed. 1863). Garay was professor of Hungarian language and literature to the university of Pest in 1848-1849. After about four years' illness he died on the 5th of November 1853, in great want. A collective edition of his poems was published at Pest the year after his death by F. Ney (2nd ed. i860), and several of his poems were translated by Kertbeny.

See Garay Jdnos Osszes koltemenyei (2nd ed., Pest, i860); and Dichtungen von Johann Garay (2nd ed., Vienna, 1856).

GARBLE (a word derived from the Arab, gharbala, to sift, and related to ghirbal, a sieve; the Arabic words are of foreign origin, probably from the Lat. cribrum, a sieve), originally a medieval commercial term in the Mediterranean ports, meaning to sort out, or

to sift merchandize, such as corn, spices, &c, in order to separate what was good from the refuse or waste; hence to select the best of anything for retention. Similarly a " garbler " was an official who was appointed to sort out, or test the work of those who had already sorted, the spices or drugs offered for sale in the London markets. In this original sense the word is now obsolete, but by inversion, or rather perversion, "garble" now means to sort out or select, chiefly from books or other literary works, or from public speeches, some portion which twists, muti- lates, or renders ineffective the meaning of the author or speaker.

GARCAO, PEDRO ANTONIO JOAQUIM CORREA (1724- 1772), Portuguese lyric poet, was the son of Philippe Correa da Serra, a fidalgo of the royal house who held an important post in the foreign office; his mother was of French descent. The poet's health was frail, and after going through a Jesuit school in Lisbon and learning English, French and Italian at home, he proceeded in 1742 to the university of Coimbra with a view to a legal career. He took his degree in 1748, and two years later was created a knight of the Order of Christ. In 1751 his marriage with D. Maria Salema brought him a rich dower which enabled him to live in ease and cultivate letters; but in later years a law-suit reduced him to poverty. From 1760 to 1762 he edited the Lisbon Gazette. In 1756, in conjunction with Cruz e Silva and others, Garcao founded the Arcadia Lusitana to reform the prevailing bad taste in literature, identified with Seicentismo, which delighted in conceits, windy words and rhetorical phrases. The Arcadia fulfilled its mission to some extent, but it lacked creative power, became dogmatic, and ultimately died of inanition. Garcao was the chief contributor to its proceedings, bearing the name of " Corydon Erimantheo," and his orations and dis- sertations, with many of his lyrics, were pronounced and read at its meetings. He lived much in the society of the English residents in Lisbon, and he is supposed to have conceived a passion for an English married lady which completely absorbed him and contributed to his ruin. In the midst of his literary activity and growing fame, he was arrested on the night of the 9th of April 1 771, and committed to prison by Pombal, whose displeasure he had incurred by his independence of character. The immediate cause of his incarceration would appear to have been his connexion with a love intrigue between a young friend of his and the daughter of a Colonel Elsden, but he was never brought to trial, and the matter must remain in

doubt. After much solicitation, his wife obtained from the king an order for her husband's release on the 10th of November 1772, but it came too late, Broken by infirmities and the hardships of prison life, Garcao expired that very day in the Limoeiro, at the age of forty-seven.

Taking Horace as his model, and aided by sound judgment, scholarship and wide reading, Garcao set out to raise and purify the standard of poetical taste, and his verses are characterized by a classical simplicity of form and expression. His sonnets ad sodales show a charming personality; his vigorous and elegant odes and epistles are sententious in tone and reveal an inspired poet and a man chastened by suffering. His two comedies in hendecasyllableS; the Thcalro Novo (played in January 1766) and the Assemblea, are excellent satires on the social life of the capital; and in the Cantata de Dido, included in the latter piece, the spirit of Greek art is allied to perfection of form, making this composition perhaps the gem of Portuguese 18th century poetry.

Garcao wrote little and spent much time on the labor limae. His works were published posthumously in 1778, and the most com- plete and accessible edition is that of J. A. de Azevedo Castro (Rome, An English version of the Cantata de Dido appeared in the

Academy (January 19th, 1895). See Innocencio da Silva, Diccionario bibliographico Portugues, vol. vi. pp. 386-393, and vol. xvii. pp. 182- 184; also Dr Theophilo Braga, A Arcadia Lusitana (Oporto, 1899).

(E. PR.)

GARCIA (DEL POPOLO VICENTO), MANOEL (1775-1832), Spanish singer and composer, was born in Seville on the 22nd of January 1775. He became a chorister at the cathedral of Seville, and studied music under the best masters of that city. At seventeen he made his debut on the stage at Cadiz, in an operetta, in which were included songs of his own composition. Soon after- wards he appeared at Madrid in the twofold capacity of singer and composer. His reputation being established, he proceeded to Paris, where he appeared for the first time, in 1808, in Paer's opera Criselda. Here also he was received with great applause, his style of singing being especially appreciated. This he further improved by careful study of the Italian method in Italy itself, where he continued his successes. His opera 77 Calif di Bagdad was favourably received at Naples in 181 2, but his chief successes were again due to his perfection as a

vocalist. His opera La Morte di Tasso was produced in 1821 in Paris, where it was

followed in 1823 by his II Fazzoletto. In 1824 he went to London, and thence proceeded to America (1825) with a company of artistes, amongst whom were his son Manoel and his daughter Maria, better known under her subsequent name of Malibran. In New York was produced his opera La Figlia dell' aria in 1827. He extended his artistic tour as far as Mexico, and was on the point of returning to Europe in order to retire from public life when he was robbed of his well-earned wealth by brigands on his way to Vera Cruz. Settled again in Paris in 1829, he soon retired from the stage, and devoted himself exclusively to teaching. He died in Paris on the 2nd of June 1832. His method of teaching was famous, and some of the most celebrated singers of the early part of the century were amongst his pupils. He also wrote an excellent book on the art of singing called Metodo di canto, of which the essence was subsequently incorporated by his son Manoel in his admirable TraitS complct de I'art du chant (1847). His operas have not survived their day. He wrote nearly forty in all, but with the exception of those quoted, and El Pacta calculisla, produced when he was thirty, none are remarkable. Besides the children already mentioned, his daughter Paulina, Madame Viardot (1821-1910), worthily continued the tradition for the best singing with which his name' had become associated.

His son, Manoel Garcia (181515-1906), who celebrated his hundredth birthday in London on the 17th of March 1905, was born at Madrid, and after his father's death devoted himself to teaching. – He was a professor at the Paris Conservatoire from 1830 to 1848, from that time to 1895 was a professor at the Royal Academy of Music in London. He became famous for his invention of the laryngoscope about 1850, apart from his position as the greatest representative of the old " bel canto " style of singing.

GARCfA DE LA HUERTA, VICENTE ANTONIO (1734-1787), Spanish dramatist, was born at Zafra on the 9th of March 1734, and was educated at Salamanca. At Madrid he soon attracted attention by his literary arrogance and handsome person; and at an early age became chief of the National Library, a post from which he was dismissed owing to the intrigues of his numerous enemies. The publication of his unsatisfactory collection of Spanish plays entitled Theatro Hespanol (1785-1786) exposed him to severe censures, which appear to have affected his reason. He died at Madrid on the 12th of March 1787, without carrying into effect his avowed intention of reviving the national drama. His Agamemnon vengado

derives from Sophocles, his Jaire is translated from Voltaire, and even his once famous Raquel, though Spanish in subject, is classic in form.

GARCfA DE PAREDES, DIEGO (1466-1534), Spanish soldier and duellist, was a native of Trujillo in Estremadura, Spain. He never commanded an army or rose to the position of a general, but he was a notable figure in the wars of the end of the 1 5th and beginning of the 16th century, when personal prowess had still a considerable share in deciding the result of actions. His native town and its district, which lie between Talavera and Madrid, produced many of the most noted conquistador es of America, including the Pizarro family. Diego himself served in his youth in the war of Granada. His strength, daring and activity fitted him to shine in operations largely composed of night marches, escalades, surprises and hand-to-hand combats. The main scene of his achievements was in Italy, and he betook himself to it — on his own showing — not in search of glory, but because he had killed a relation of his own, Ruy Sanchez de Vargas, in a street fight arising out of a quarrel about a horse. He fled to Rome, then under the rule of the Borgias. Diego was a distant relation to the cardinal of Santa Cruz (Carvajal), a favourite with Pope Alexander VI., who was in conflict with the barons of the Romagna and took Diego into his service. He remained a soldier of the pope till he killed a man in a personal quarrel and found it necessary to pass over to the enemy. Now he became acquainted with the Colonnas, who appreciated his services. The wars between Ferdinand V. of Aragon (the Catholic king) and Louis XII. gave him a more creditable opening. The Spanish general Gonsalvo de Cordoba, who knew his value, employed him and trusted him; and he took part in all the wars of Italy on the

frontier of Navarre, and once against the Turks on the Danube, till 1530. His countrymen made him the hero of many Miinchausen-like stories of personal prowess. It was said that he held a bridge single-handed against 200 Frenchmen, that he stopped the wheel of a water-mill, and so forth. In the " Brief Summary " of his life and deeds attributed to him, and printed at the end of the Chronicle of the Great Captain, published in 1584 at Alcala de Henares, he lays no claim to having done more than was open to a very athletic man. He was killed at Bologna in J 534 by a fall while engaged in a jumping-match with some of the younger officers of the army. His

body was carried to his native town Trujillo, and buried in the church of Santa Maria Mayor in 1545.

GARCfA GUTIERREZ, ANTONIO (1812-1884), Spanish dramatist, was born at Chiclana (Cadiz) on the 5th of July 181 2, and studied medicine in his native town. In 1832 he removed to Madrid, and earned a scanty living by translating plays of Scribe and the elder Dumas; despairing of success, he was on the point of enlisting when he suddenly sprang into fame as the author of El Trovador, which was played for the first time on the 1st of March 1836. Garcia Gutierrez never surpassed this first effort, which placed him among the leaders of the romantic movement in Spain, and which became known all over Europe through Verdi's music. His next great success was Simon Bocanegra (1843), but, as his plays were not lucrative, he emigrated to Spanish America, working as a journalist in Cuba and Mexico till 1850, when he returned to Spain. The best works of his later period are a zarzuela entitled El Grumete (1853), La Venganza catalana (1864) and Juan Lorenzo (1865). He became head of the archaeological museum at Madrid, and died there on the 6th of August 1884. His Poesias (1840) and another volume of lyrics, entitled Luz y tinieblas (1842), are unimportant; but the brilliant versification of his plays, and his power of analysing femini %3 emotions, give him a foremost place among the Spanish dramatists of the 19th century.

GARD, a department in the south of France, consisting of part of the old province of Languedoc. Pop. (1906) 421,166. Area 2270 sq. m. It is bounded N. by the departments of Lozere and Ardeche, E. by the Rhone, which separates it from Vaucluse and Bouches-du-Rhone, S. by the Mediterranean, S.W. by Herault and W. by Aveyron. Gard is divided into three sharply-defined regions. Its north-western districts are occupied by the range of the Cevennes, which on the frontier of Lozere attain a height of 5120 ft. The whole of this region is celebrated for its fruitful valleys, its gorges, its beautiful streams, its pastures, and the chestnut, mulberry and other fruit trees with which the mountains are often clothed to their summits. The Garrigues, a dry, hilly region of limestone, which lends itself to the cultivation of cereals, the vine and olive, stretches from the foot of the Cevennes over the centre of the department, covering about half its area. The southern portion, which extends to the sea, and was probably at one time covered by it, is a low plain with numerous lakes and marshes. Though unhealthy, it is prosperous, and comprises the best arable land and vineyards in Gard.

Besides the Rhone, which bounds the department on the E., and the

Ardeche, the lower course of which forms part of its boundary on the N., the principal rivers are the Ceze, Gard, Vidourle and Herault. The most northern of these is the Ceze, which rises in the Cevennes, and after a course of about 50 m. in an E.S.E. direction falls into the Rhone above Roquemaure. The Gard, or Gardon, from which the department takes its name, is also an affluent of the Rhone, and, rising in the Cevennes from several sources, traverses the centre of the department, having a length of about 60 m. In the upper part of its course it flows through a succession of deep mountain gorges, and from the melting of the snows on the Cevennes is subject to inundations, which often cause great damage. Its waters not infrequently rise 18 or 20 ft. in a few hours, and its bed is sometimes increased in width to nearly a mile. Near Remoulins it is crossed by a celebrated Roman aqueduct — the Pont du Gard (see Aqueduct). The Vidourle flows in a S.S.E. direction from its source near Le Vigan, and after a course of about 50 m. falls into the sea. Below

Sommieres it forms the western boundary of the department. The Herault has its source and part of its course in the west of Gard. The Canal de Beaucaire extends from the Rhone at Beaucaire to Aigues-Mortes, which communicates with the Mediterranean at Grau-du-Roi by means of the Grand- Roubine canal.

The climate is warm in the south-east, colder in the north- west ; it is rather changeable, and rain-storms are common. The cold and violent north-west wind known as the mistral is its worst drawback. Les Fumades (near Allegre) and Euzet h?ve mineral springs. The chief grain crops are wheat and oats. Rye, barley and potatoes are also grown. Gard is famed for its cattle, its breed of small horses, and its sheep, the wool of which is of a very fine quality. In the rearing of silk- worms it ranks first among French departments. The principal fruit trees are the olive, mulberry and chestnut. The vine is extensively cultivated and yields excellent red and white wines. The department is rich in minerals, and the mines of coal, iron, lignite, asphalt, zinc, lead and copper, which are for the most part situated in the neighbourhoods of Alais and La Grand'Combe, constitute one of the chief sources of its wealth. Great quantities of salt are obtained from the salt marshes along the coast. The quarries of building and other stone employ a considerable number of work men. The fisheries are productive. The manufactures are exten- sive, and include those of silk, of which Alais is the chief centre, cotton and woollen fabrics, hosiery, ironware, hats (Anduze), liquorice, gloves, paper, leather, earthenware and glass. There are also breweries and distilleries, and important metallurgical works, the chief of which are those of Besseges. The exports of Gard include coal, lignite, coke,

asphalt, building-stone, iron, steel, silk, hosiery, wine, olives, grapes and truffles.

The department is served by the Paris-Lyon railway. It is divided into the arrondissements of Nimes, Alais, Uzes and Le Vigan, with 40 cantons and 351 communes. The chief town is Nimes, which is the seat of a bishopric of the province of Avignon and of a court of appeal. Gard belongs to the 15th military region, which has its headquarters at Marseilles, and to the academie (educational division) of Montpellier. Nimes, Alais, Uzes, Aigues-Mortes, Beaucaire,Saint-Gilles, Besseges,La Grand'- Combe and Villeneuve-les-Avignon are the principal places. Opposite the manufacturing town of Pont-St-Esprit the Rhone is crossed by a fine medieval bridge more than 1000 yds. long built by the Pontiff brethren. Le Vigan, an ancient town with several old houses, carries on silk-spinning.

GARDA, LAKE OF (the Locus Benacus of the Romans), the most easterly and the most extensive of the great Lombard lakes, being only surpassed in the Alpine region by those of Geneva and Constance. Save the extreme northern extremity (Riva, which was secured from Venice by Tirol in 1517), the whole lake is Italian, being divided between the provinces of Verona and Brescia. Its broad basin orographically represents the southern portion of the valley of the Adige, though that river now flows through a narrow trench which is separated from the lake by the long narrow ridge of the Monte Baldo (7277 ft.). Nowadays the lake is fed by the Sarca, that flows in at its north end from the glaciers of the Adamello, while at the southern extremity of the lake the Mincio flows out, on its way to join the Po. The area of the lake is about 143 sq. m., its length is32i m., its greatest breadth is about 10 m., the height of its surface above sea-level is 216 ft. and the greatest depth yet measured is 1916 ft. Its upper or northern end is narrow, but between Garda (E.) and Salo (W.) the lake expands gradually into a nearly circular basin, which at the southern extremity is divided into two parts by the long low promontory of Sermione, that projects from the southern shore between Peschiera and Desenzano. Owing to this con- formation the lake is much exposed to sudden and violent winds, which Virgil alludes to in his well-known line (Georg. ii. line 160): fluctibus et fremihl assurgens, Benace, marino. The most dangerous of these winds is the Borea or Suer , that sweeps down from the north as through a funnel. In the southern portion of the lake the Vinessa, an E.S.E. wind, is most dreaded. The Ora is a regular wind coming from the east which, on reaching the

lake, blows from S. to N. The steep grey limestone crags of Monte Baldo, on the eastern side of the lake, contrast strongly with the rich vegetation on the western and southern shores. The portion of the western shore that extends from Gargnano to Said is the most sheltered and warmest part of the region, so that not merely does it resemble one continuous garden (producing lemons, figs, mulberries, olives, &c), but is frequented in winter, and has been given the name of the Riviera Benacense. The lovely promontory of Sermione, at the southern end of the lake, has also an extremely luxuriant vegetation, while it contains many remains of buildings of Roman and later date, having been the Sirmio of Catullus, who resided here and celebrated its beauties in many of his poems. In 1827 a boat with paddles set in motion by horses was put on the lake, but the first steamer dates only from 1844. At the south end of the lake, E. and W. respectively of the promontory of Sermione, are the towns of Peschiera (141 m. by rail from Verona on the east) and of Desenzano (175 m. by rail from Brescia on the west), which are 8$ m. distant from each other. On the west shore of the lake are Salo, Toscolano, Gargnano and Limone, while the rugged east shore can boast only of Bardolino and Garda. At the northern tip of the lake, and in Tirol, is Riva, the most considerable town on the lake, and 15! m. by rail from the Mori station on the main Brenner line. (W.A.B.C.)

GARDANE, CLAUDE MATTHIEU, Count (1766-18 18), French general and diplomatist, was born on the 30th of January 1766. He entered the army and rose rapidly during the revolu- tionary wars, becoming captain in 1793. In May 1799 he distinguished himself by saving a division of the French army which was about to be crushed by the Russians at the battle of Bassignana, and was named at once brigadier-general by Moreau. He incurred Napoleon's displeasure for an omission of duty shortly before the battle of Marengo (June 14th, 1800), but in 1805 was appointed to be aide-de-camp of the emperor. His chief distinction, however, was to be won in the diplomatic sphere. In the spring of 1807, when Russia and Prussia were at war with France, and the emperor Alexander I. of Russia was also engaged in hostilities with Persia, the court of Teheran sent a mission to the French emperor, then at the castle of Finkenstein in the east of Prussia, with a view to the conclusion of a Franco-Persian alliance. This was signed on the 4th of May 1807, at that castle; and Napoleon designed Gardane as special envoy for the cement- ing of that alliance. The secret instructions which he drew up for Gardane, and signed on the 30th of May, are of interest as showing the strong oriental trend of the emperor's policy. France was to guarantee the

integrity of Persia, to recognize that Georgia (then being invaded by the Russians) belonged to the shah, and was to make all possible efforts for restoring that territory to him. She was also to furnish to the shah arms, officers and workmen, in the number and to the amount demanded by him. Napoleon on his side required Persia to declare war against Great Britain, to expel all Britons from her territory, and to come to an understanding with the Afghans with a view to a joint Franco-Perso-Afghan invasion of India. Gardane, whose family was well known in the Levant, had a long and dangerous journey overland, but was cordially received at Teheran in December 1807. The conclusion of the Franco- Russian treaty at Tilsit in July 1807 rendered the mission abortive. Persia longed only for help against Russia and had no desire, when all hope of that was past, to attack India. The shah, however, promised to expel Britons and to grant to France a commercial treaty. For a time French influence completely replaced that of England at Teheran, and the mission of Sir John Malcolm to that court was not allowed to proceed. Finally, however, Gardane saw that nothing much was to be hoped for in the changed situation of European affairs, and abruptly left the country (April 1809). This conduct was not wholly approved by Napoleon, but he named him count and in 1810 attached him to Massena's army in Portugal. There, during the disastrous retreat from Santarem to Almeida, he suffered a check which brought him into disfavour. The rest of his career calls for no notice. He died'in 1818. The report which he sent to Cham-

pagny (dated April 23rd, 1809) on the state of Persia and the prospects of a successful invasion of India is of great interest. He admitted the difficulties of this enterprise, but thought that a force of picked French troops, aided by Persians and Afghans; might under favourable conditions penetrate into India by way of Kandahar, or through Sind, especially if the British were dis- tracted by maritime attacks from Mauritius.

See Count Alfred de Gardane, Mission du general Gardane en Perse (Paris, 1865); and P. A. L. de Driault, La Politique orientale de Napoleon: Sebastiani et Gardane (Paris, 1904). (J. Hl. R.)

GARDELEGEN, a town of Germany, in Prussian Saxony, on the right bank of the Milde, 20 m. W. from Stendal, on the main line of railway Berlin-Hanover. Pop. (1905) 8193. It has a Roman Catholic and three Evangelical churches, a hospital, founded ini285,anda high-grade school. There are considerable manufactures, notably agricultural machinery and buttons, and its beer has a great repute. Gardelegen was founded in the 10th century, and was for a long time

the seat of a line of counts. It suffered considerably in the Thirty Years' War, and in 1775 was burned by the French. On the neighbouring heath Margrave Louis I. of Brandenburg gained, in 1343, a victory over Otto the Mild of Brunswick.

GARDEN (from 0. Fr. gardin, mod. Fr. jardin; this, like our words " garth," a paddock attached to a building, and " yard," comes from a Teutonic word for an enclosure which appears in Gothic as gards and O. H. Ger. gart, cf. Dutch gaarde and Ger. garteri), the ground enclosed and cultivated for the growth of fruit, flowers or vegetables (see Horticulture). The word is also used for grounds laid out ornamentally, used as places of public entertainment. Such were the famous Ranelagh and Vauxhall Gardens in London ; it is similarly used in zoologi- cal gardens, and as a name in towns for squares, terraces or streets. From the fact that Epicurus (q.v.) taught in the gardens at Athens, the disciples of his school of philosophy were known as ol curd t&v nrrKuv (so Diog. Laertius x. 10) ; and Cicero (De finibus v. 1. 3, and elsewhere) speaks of the Horti Epicuri. Thus as the " Academy " refers to the Platonic and the " Porch " (orod) to the Stoic school, so the " Garden " is the name given to the Epicurean school of philosophy. Apollodorus was known as KrjTorbpavvos, the tyrant of the garden.

GARDENIA, in botany, a genus of the natural order Rubiaceae, containing about sixty species of evergreen trees and shrubs, natives of the warmer parts of the old world. Several are grown in stoves or greenhouses for their handsome, sweet-scented white flowers. Thfc flowers are developed singly at the end of a branch or in the leaf-axils, and are funnel- or salver-shaped with a long tube. The double forms of Gardenia florida (a native of China) and G. radicans (a native of Japan) are amongst the most beautiful and highly perfumed of any in cultivation. Gardenias are grown chiefly for cut flowers, and are readily propagated by cuttings. They require plenty of heat and moisture in the grow- ing season, and must be kept free from insects such as the mealy bug, green fly, red spider and scale-insect.

GARDINER, JAMES (1688-1745), Scottish soldier, was born at Carriden in Linlithgowshire, on the 1 ith of January 1688. At the age of fourteen he entered a Scottish regiment in the Dutch service, and was afterwards present at the battle of Ramillies, where he was wounded. He subsequently served in different cavalry regiments, and in 1730 was advanced to the rank of lieutenant-colonel, and in 1 743 to that of colonel. He fell at the battle of Prestonpans, the 21st of September 1745. The circumstances of his death are described in Sir Walter Scott's Waverley. In his early years he was distinguished

for his recklessness and profligacy, but in 17 19 a supernatural vision, as he regarded it, led to his conversion, and from that time he lived a life of great devoutness and of thorough consistency with his Christian profession. Dr Alexander Carlyle of Inveresk, author of an autobiography, says that he was " very osten- tatious " about his conversion — speaks of him as weak, and plainly thinks there was a great deal of delusion in Col. Gardiner's account of his sins.

His life was written by Dr Philip Doddridge and has been often reprinted.

GARDINER, SAMUEL RAWSON (1829-1902), English historian, son of Rawson Boddam Gardiner, was born near Alresford, Hants, on the 4th of March 1829. He was educated at Winchester and Christ Church, Oxford, where he obtained a first class in literae humaniores. He was subsequently elected to fellowships at All Souls (1884) and Merton (1892). For some years he was professor of modern history at King's College, London, and devoted his life to historical work. He is the historian of the Puritan revolution, and has written its history in a series of volumes, originally published under different titles, beginning with the accession of James I.; the seventeenth (the third volume of the History of the Commonwealth and Protectorate) appeared in 1901. This was completed in two volumes by C. H. Firth as The Last Years of the Protectorate (1909). The series is History of England from the Accession of James I. to the Outbreak of the Civil War, 1603-1642 (10 vols.); History of the Great Civil War, 1642-1640 (4 vols.) ; and History of the Commonwealth and Protectorate, 1640-1660. His treatment is exhaustive and philosophical, taking in, along with political and constitutional history, the changes in religion, thought and sentiment during his period, their causes and their tendencies. Of the original authorities on which his work is founded many of great value exist only in manuscript, and his researches in public and private collections of manuscripts at home, and in the archives of Simancas, Venice, Rome, Brussels and Paris, were inde- fatigable and fruitful. His accuracy is universally acknowledged. He was perhaps drawn to thˆ Puritan period by the fact of his descent from Cromwell and Ireton, but he has certainly written of it with no other purpose than to set forth the truth. In his judgments of men and their actions he is unbiassed, and his appreciations of character exhibit a remarkable fineness of perception and a broad sympathy. Among many proofs of

these qualities it will be enough to refer to what he says of the characters of James I., Bacon, Laud, Strafford and Cromwell. On consti- tutional matters he writes with an insight to be attained only by the study of political philosophy, discussing in a masterly fashion the dreams of idealists and the schemes of government proposed by statesmen. Throughout his work he gives a promi- nent place to everything which illustrates human progress in moral and religious, as well as political conceptions, and specially to the rise and development of the idea of religious toleration, finding his authorities not only in the words and actions of men of mark, but in the writings of more or less obscure pamphleteers, whose essays indicate currents in the tide of public opinion. His record of the relations between England and other states proves his thorough knowledge of contemporary European history, and is rendered specially valuable by his researches among manuscript sources which have enabled him to expound for the first time some intricate pieces of diplomacy.

Gardiner's work is long and minute; the fifty-seven years which it covers are a period of exceptional importance in many directions, and the actions and characters of the principal persons in it demand careful analysis. He is perhaps apt to attach an exaggerated importance to some of the authorities which he was the first to bring to light, to see a general tendency in what may only be the expression of an individual eccentricity, to rely too much on ambassadors' reports which may have been written for some special end, to enter too fully into the details of diplomatic correspondence. In any case the length of his work is not the result of verbiage or repetitions. His style is clear, absolutely unadorned, and somewhat lacking in force; he appeals con- stantly to the intellect rather than to the emotions, and is seldom picturesque, though in describing a few famous scenes, such as the execution of Charles I., he writes with pathos and dignity. The minuteness of his narrative detracts from its interest; though his arrangement is generally good, here and there the reader finds the thread of a subject broken by the intrusion of incidents not immediately connected with it, and does not pick it up again without an effort. And Gardiner has the defects of his supreme qualities, of his fairness and critical ability as a judge of character; his work lacks enthusiasm, and leaves the reader cold and un- moved. Yet, apart from its sterling excellence, it is not without

beauties, for it is marked by loftiness of thought, a love of purity and truth, and refinement in taste and feeling. He wrote other books, mostly on the same period, but his great history is that by which his name will live. It is a worthy result of a life of unre- mitting labour, a splendid monument of historical scholarship. His position as an

historian was formally acknowledged: in 1862 he was given a civil list pension of £150 per annum, " in recogni- tion of his valuable contributions to the history of England "; he was honorary D.C.L. of Oxford, LL.D. of Edinburgh, and Ph.D. of Gottingen, and honorary student of Christ Church, Oxford; and in 1894 he declined the appointment of regius professor of modern history at Oxford, lest its duties should interfere with the accomplishment of his history. He died on the 24th of February 1902.

Among the more noteworthy of Gardiner's separate works are: Prince Charles and the Spanish Marriage (2 vols., London, 1869); Constitutional Documents of the Puritan Revolution, 1625-1660 (1st ed., Oxford, 1889; 2nd ed., Oxford, 1899) ; Oliver Cromwell (London, 1901); What Gunpowder Plot was (London, 1897); Outline of English History (1st ed., London, 1887; 2nd ed., London, 1896); and Student's History of England (2 vols., 1st ed., London, 1890-1891; 2nd ed., London, 1891-1892). He edited collections of papers for the Camden Society, and from 1891 was editor of the English Historical Review. (W. Hu.)

GARDINER, STEPHEN (c. 1493-1555), English bishop and lord chancellor, was a native of Bury St Edmunds. The date of his birth as commonly given, 1483, seems to be about ten years too early, and surmises which have passed current that he was some one's illegitimate child are of no authority. His father is now known to have been John Gardiner, a substantial cloth merchant of the town where he was born (see his will, printed in Proceedings of the Suffolk Archaeological Institute, i. 329),. who took care to give him a good education. In 1511 he, being then a lad, met Erasmus at Paris (Nichols's Epistles of Erasmus, ii. 12, 13). But he had probably already been to Cambridge, where he studied at Trinity Hall and greatly distinguished him- self in the classics, especially in Greek. He afterwards devoted himself to the canon and civil law, in which subjects he attained so great a proficiency that no one could dispute his pre-eminence. He received the degree of doctor of civil law in 1 520, and of canon law in the following year.

Ere long his abilities attracted the notice of Cardinal Wolsey, who made him his secretary, and in this capacity he is said to have been with him at More Park in Hertfordshire, when the conclusion of the celebrated treaty of the More brought Henry VIII. and the French ambassadors thither. It is stated, and with great probability, that this was the occasion on which he was first introduced to the king's notice, but he does not appear to have been actively engaged in Henry's service till three years later. In that of Wolsey be

undoubtedly acquired a very intimate know- ledge of foreign politics, and in 1527 he and Sir Thomas More were named commissioners on the part of England in arranging a treaty with the French ambassadors for the support of an army in Italy against the emperor. That year he accompanied Wolsey on his important diplomatic mission to France, the splendour and magnificence of which are so graphically described by Cavendish. Among the imposing train who went with the cardinal — including, as it did, several noblemen and privy councillors — Gardiner alone seems to have been acquainted with the real heart of the matter which made this embassy a thing of such peculiar moment. Henry was then particularly anxious to cement his alliance with Francis I., and gain his co-operation as far as possible in the object on which he had secretly set his heart — a divorce from Catherine of Aragon. In the course of his progress through France he received orders from Henry to send back his secretary Gardiner, or, as he was called at court, Master Stevens, for fresh instructions; to which he was obliged to reply that he positively could not spare him as he was the only instrument he had in advancing the king's " secret matter." Next year Gardiner, still in the service of Wolsey, was sent by him to Italy along with Edward Fox, provost of King's College, Cambridge, to promote the same business with the pope. His despatches on this occasion are still extant, and whatever we may think of the cause on which he was engaged, they certainly give a wonderful impression of the

zeal and ability with which he discharged his functions. Here his perfect familiarity with the canon law gave him a great advantage. He was instructed to procure from the pope a decretal com- mission, laying down principles of law by which Wolsey and Campeggio might hear and determine the cause without appeal. The demand, though supported by plausible pretexts, was not only unusual but clearly inadmissible. Clement VII. was then at Orvieto, and had just recently escaped from captivity at St Angelo at the hands of the imperialists. But fear of offending the emperor could not have induced him to refuse a really legitimate request from a king like Henry. He naturally referred the question to the cardinals about him; with whom Gardiner held long arguments, enforced, it would seem, by not a little browbeating of the College. What was to be thought, he said, of a spiritual guide, who either could not or would not show the wanderer his way ? The king and lords of England would be driven to think that God had taken away from the Holy See the key of

knowledge, and that pontifical laws which were not clear to the pope himself might as well be committed to the flames.

This ingenious pleading, however, did not serve, and he was obliged to be content with a general commission for Campeggio and Wolsey to try the cause in England. This, as Wolsey saw, was quite inadequate for the purpose in view; and he again instructed Gardiner, while thanking the pope for the commission actually granted, to press him once more by very urgent pleas, to send the desired decretal on, even if the latter was only to be shown to the king and himself and then destroyed. Otherwise, he wrote, he would lose his credit with the king, who might even be tempted to throw off his allegiance to Rome altogether. At last the pope — to his own bitter regret afterwards — gave what was desired on the express conditions named, that Campeggio was to show it to the king and Wolsey and no one else, and then destroy it, the two legates holding their court under the general commission. After obtaining this Gardiner returned home; but early in the following year, 1529, when proceedings were delayed on information of the brief in Spain, he was sent once more to Rome. This time, however, his efforts were unavailing. The pope would make no further concessions, and would not even promise not to revoke the cause to Rome, as he did very shortly after.

Gardiner's services, however, were fully appreciated. He was appointed the king's secretary. He had been already some years archdeacon of Taunton, and the archdeaconry of Norfolk was added to it in March 1529, which two years later he resigned for that of Leicester. In 1 530 he was sent to Cambridge to procure the decision of the university as to the unlawfulness of marriage with a deceased brother's wife, in accordance with the new plan devised for settling the question without the pope's intervention. In this he succeeded, though not without a good deal of artifice, more creditable to his ingenuity than to his virtue. In November 1 53 1 the king rewarded him for his services with the bishopric of Winchester, vacant by Wolsey's death. The promotion was unexpected, and was accompanied by expressions from the king which made it still more honourable, as showing that if he had been in some things too subservient, it was from no abject, self- seeking policy of his own. Gardiner had, in fact, ere this remon- strated boldly with his sovereign on some points, and Henry now reminded him of the fact. " I have often squared with you, Gardiner," he said familiarly, " but I love you never the worse, as the bishopric I give will convince you." In 1532, nevertheless, he excited some displeasure in the king by the part he took in the preparation of the famous " Answer of the

Ordinaries " to the complaints brought against them in the House of Commons. On this subject he wrote a very manly letter to the king in his own defence.

His next important action was not so creditable; for he was, not exactly, as is often said, one of Cranmer's assessors, but, according to Cranmer's own expression, " assistant " to him as counsel for the king, when the archbishop, in the absence of Queen Catherine, pronounced her marriage with Henry null and void on the 23rd of May 1533. Immediately afterwards he was Bent over to Marseilles, where an interview between the pope and

Francis I. took place in September, of which event Henry stood in great suspicion, as Francis was ostensibly his most cordial ally, and had hitherto maintained the justice of his cause in the matter of the divorce. It was at this interview that Bonner intimated the appeal of Henry VIII. to a general council in case the pope should venture to proceed to sentence against him. This appeal, and also one on behalf of Cranmer presented with it, were of Gardiner's drawing up. In 1535 he and other bishops were called upon to vindicate the king's new title of " Supreme Head of the Church of England." The result was his celebrated treatise De vera obedientia, the ablest, certainly, of all the vindications of royal supremacy. In the same year he had an unpleasant dispute with Cranmer about the visitation of his diocese. He was also employed to answer the pope's brief threatening to deprive Henry of his kingdom.

During the next few years he was engaged in various embassies in France and Germany. He was indeed so much abroad that he had little influence upon the king's councils. But in 1539 he took part in the enactment of the severe statute of the Six Articles, which led to the resignation of Bishops Latimer and Shaxton and the persecution of the Protestant party. In 1 540, on the death of Cromwell, earl of Essex, he was elected chancellor of the university of Cambridge. A few years later he attempted, in concert with others, to fasten a charge of heresy upon Archbishop Cranmer in connexion with the Act of the Six Articles; and but for the personal – intervention of the king he would probably have succeeded. He was, in fact, though he had supported the royal supremacy, a thorough opponent of the Reformation in a doctrinal point of view, and it was suspected that he even repented his advocacy of the royal supremacy. He certainly had not approved of Henry's general treatment of the church, especially during the ascendancy of Cromwell, and he was frequently visited with storms of royal indignation, which he schooled himself to bear with patience. In 1544 a relation of his own, named German

Gardiner, whom he employed as his secretary, was put to death for treason in reference to the king's supremacy, and his enemies insinuated to the king that he himself was of his secretary's way of thinking. But in truth the king had need of him quite as much as he had of Cranmer; for it was Gardiner, who even under royal supremacy, was anxious to prove that England had not fallen away from the faith, while Cranmer's authority as primate was necessary to upholding that supremacy. Thus Gardiner and the archbishop maintained opposite sides of the king's church policy; and though Gardiner was encouraged by the king to put up articles against the arch- bishop himself for heresy, the archbishop could always rely on the king's protection in the end. Heresy was gaining ground in high places, especially after the king's marriage with Catherine Parr; and there seems to be some truth in the story that the queen herself was nearly committed for it at one time, when Gardiner, with the king's approbation, censured some of her expressions in conversation. In fact, just after her marriage, four men of the Court were condemned at Windsor and three of them were burned. The fourth, who was the musician Marbeck, was pardoned by Gardiner's procurement.

Great as Gardiner's influence had been with Henry VIII., his name was omitted at the last in the king's will, though Henry was believed to have intended making him one of his executors. Under Edward VI. he was completely opposed to the policy of the dominant party both in ecclesiastical and in civil matters. The religious changes he objected to both on principle and on the ground of their being moved during the king's minority, and he resisted Cranmer's project of a general visitation. His re- monstrances, however, were met by his own committal to the Fleet, and the visitation of his diocese was held during his imprisonment. Though soon afterwards released, it was not long before he was called before the council, and, refusing to give them satisfaction on some points, was thrown into the Tower, where he continued during the whole remainder of the reign, a period slightly over five years. During this time he in vain demanded his liberty, and to be called before parliament as a peer of the realm. His bishopric was t?ken from him and given to Dr

Poynet, a chaplain of Cranmer's who had not long before been made bishop of Rochester. At the accession of Queen Mary, the duke of Norfolk and other state prisoners of high rank were in the Tower along with him; but the queen, on her first entry into London, set

them all at liberty. Gardiner was restored to his bishopric and appointed lord chancellor, and he set the crown on the queen's head at her coronation. He also opened her first parliament and for some time was her leading councillor.

He was now called upon, in advanced life, to undo not a little of the work in which he had been instrumental in his earlier years — to vindicate the legitimacy of the queen's birth and the lawfulness of her mother's marriage, to restore the old religion, and to recant what he himself had written touching the royal supremacy. It is said that he wrote a formal Palinodia or retractation of his book De vera obedientia, but it does not seem to be now extant; and the reference is probably to his sermon on Advent Sunday 1554, after Cardinal Pole had absolved the kingdom from schism. As chancellor he had the onerous task of negotiating the queen's marriage treaty with Philip, to which he shared the general repugnance, though he could not oppose her will. In executing it, however, he took care to make the terms as advantageous for England as possible, with express provision that the Spaniards should in nowise be allowed to interfere in the government of the country. After the coming of Cardinal Pole, and the reconcilia- tion of the realm to the see of Rome, he still remained in high favour. How far he was responsible for the persecutions which afterwards arose is a debated question. He no doubt approved of the act, which passed the House of Lords while he presided there as chancellor, for the revival of the heresy laws. Neither is there any doubt that he sat in judgment on Bishop Hooper, and on several other preachers whom he condemned, not exactly to the flames, but to be degraded from the priesthood. The natural consequence of this, indeed, was that when they declined, even as laymen, to be reconciled to the Church, they were handed over to the secular power to be burned. Gardiner, however, undoubtedly did his best to persuade them to save themselves by a course which he conscientiously followed himself; nor does it appear that, when placed on a commission along with a number of other bishops to administer a severe law, he could very well have acted otherwise than he did. In his own diocese no victim of the persecution is known to have suffered till after his death; and, much as he was already maligned by opponents, there are strong evidences that his natural disposition was humane and generous. In May 1553 he went over to Calais as one of the English commissioners to promote peace with France; but their efforts were ineffectual. In October 1555 he again opened parlia- ment as lord chancellor, but towards the end of the month he fell ill and grew rapidly worse till the 12th of November, when he died over sixty years of age.

Perhaps no celebrated character of that age has been the subject of so much ill-merited abuse at the hands of popular historians. That his virtue was not equal to every trial must be admitted, but that he was anything like the morose and narrow- minded bigot he is commonly represented there is nothing whatever to show. He has been called ambitious, turbulent, crafty, abject, vindictive, bloodthirsty and a good many other things besides, not quite in keeping with each other; in addition to which it is roundly asserted by Bishop Burnet that he was despised alike by Henry and by Mary, both of whom made use of him as a tool. How such a mean and abject character submitted to remain five years in prison rather than change his principles is not very clearly explained; and as to his being despised, we have seen already that neither Henry nor Mary considered him by any means despicable. The truth is, there is not a single divine or statesman of that day whose course throughout was so thoroughly consistent. He was no friend to the Reformation, it is true, but he was at least a conscientious opponent. In doctrine he adhered to the old faith from first to last, while as a question of church policy, the only matter for consideration with him was whether the new laws and ordinances were constitutionally justifiable.

His merits as a theologian it is unnecessary to discuss; it is as a statesman and a lawyer that he stands conspicuous. But his

learning even in divinity was far from commonplace. The part that he was allowed to take in the drawing up of doctrinal formularies in Henry VIII. 's time is not clear; but at a later date he was the author of various tracts in defence of the Real Presence against Cranmer, some of which, being written in prison, were published abroad under a feigned name. Controversial writings also passed between him and Bucer, with whom he had several interviews in Germany, when he was there as Henry VIII. 's ambassador.

He was a friend of learning in every form, and took great interest especially in promoting the study of Greek at Cambridge. He was, however, opposed to the new method of pronouncing the language introduced by Sir John Cheke, and wrote letters to him and Sir Thomas Smith upon the subject, m which, according to Ascham, his opponents showed themselves the better critics, but he the superior genius. In his own household he loved to take in young university men of promise; and many whom he thus encouraged became distinguished in after life as bishops, ambassadors and secretaries of state. His house, indeed, was spoken of by Leland as the seat of eloquence and the special abode of the muses.

He lies buried in his own cathedral at Winchester, where his effigy is still to be seen. (J- Ga.)

GARDINER, a city of Kennebec county, Maine, U.S.A., at the confluence of Cobbosseecontee river with the Kennebec, 6 m. below Augusta. Pop. (1890) 5491; (1900) 5501 (537 foreign- born); (1910) 5311. It is served by the Maine Central railway. The site of the city is only a few feet above sea-level, and the Kennebec is navigable for large vessels to this point; the water of the Cobbosseecontee, falling about 130 ft. in a mile, furnishes the city with good power for its manufactures (chiefly paper, machine-shop products, and shoes). The city exports considerable quantities of lumber and ice. Gardiner was founded in 1760 by Dr Sylvester Gardiner (1707-1786), and for a time the settlement was called Gardinerston; in 1779, when it was incorporated as a town, the founder being then a Tory, it was renamed Pittston. But in 1803, when that part of Pittston which lay on the W. bank of the Kennebec was incorporated as a separate town and new life was given to it by the grandson of the founder, the present name was adopted. Gardiner was chartered as a city in 1849. The town of Pittston, on the E. bank of the Kennebec, had a population of n 77 in 1900.

GARDNER, PERCY (1846-), English classical archaeo- logist, was born in London, and was educated at the City of London school and Christ's College, Cambridge (fellow, 1872). He was Disney professor of archaeology at Cambridge from 1880 to 1887, and was then appointed professor of classical archaeo- logy at Oxford, where he had a stimulating influence on the study of ancient, and particularly Greek, art. He also became promi- nent as an historical critic on Biblical subjects. Among his works are: Types of Greek Coins (1883): A Numismatic Commentary on Pausanias (with F. Imhoof-Blumer, 1887); New Chapters in Greek History (1892), an account of excavations in Greece and Aisa Minor; Manual of Greek Antiquities (with F. B. Jevons, 2nd ed. 1898); Grammar of Greek Art (1905); Exploratio Evangelica (1899), on the origin of Christian belief; A Historic View of .the New Testament (1901); Growth of Christianity (1907). His brother, Ernest Arthur Gardner (1862-), educated at the City of London school and Caius College, Cambridge (fellow, 1885), is also well known as an archaeologist. From 1887 to 1895 he was director of the British School of Archaeology at Athens, and later became professor of archaeology at University College, London. His publications include: Introduction to Greek Epigraphy (1887); Ancient Athens (1902); Handbook of Greek Sculpture (1905); Six Greek Sculptors (1910). He was elected first Public Orator of London University in 1910.

GARDNER, a township of Worcester county, Massachusetts, U.S.A. Pop. (1890) 8424; (1900) 10,813, of whom 3449 were foreign-born; (1910 census) 14,699. The township is traversed by the Boston & Maine railway. It has an area of 21-4 sq. m. of hill country, well watered with streams. and ponds, and includes the villages of Gardner (15 m. by rail W. of Fitchburg), South

Gardner and West Gardner. In the township are the state colony for the insane, the Henry Heywood memorial hospital, and the Levi Heywood memorial library (opened in 1886), a memorial to Levi Heywood (1800-1882), a prominent local manufacturer of chairs, who invented various kinds of chair- making machinery. By far the principal industry of the township (dating from 1805) is the manufacture of chairs, the township having in 1905 the largest chair factory in the world; among the other manufactures are toys, baby-carriages, silver-ware and oil stoves. In 1905 the total factory product of the township was valued at $5,019,019, the furniture product alone amounting to $4,267,064, or 85-2% of the total. Gardner, formed from parts of Ashburnham, Templeton.Westminster and Winchenden, was incorporated in 1785, and was named in honour of Col. Thomas Gardner (1724-1775)ˆ patriot leader of Massachusetts, who was mortally wounded in the battle of Bunker Hill.

See W. D. Herrick, History of the Town of Gardner (Gardner, 1878), covering the years 1 785-1 878.

GARE-FOWL 1 (Icelandic, Geirjugl; Gaelic, Gearbkul), the anglicized form of the Hebridean name of a large sea-bird now considered extinct, formerly a visitor to certain remote Scottish islands, the Great Auk of most English book-writers, and the

ˆwood. ˆ_>_—■ ■£”-“•

Gare-Fowl, or Great Auk.

Alca impennis of Linnaeus. In size it was hardly less than a tame goose, and in appearance it much resembled its smaller and surviving relative the razor-bill {Alca lorda); but the glossy black of its head was varied by a large patch of white occupying nearly all the space between the eye and the bill, in place of the razor-bill’s thin white line, while the bill itself bore eight or more deep transverse grooves

instead of the smaller number and the ivory-like mark possessed by the species last named. Otherwise the coloration was similar in both, and there is satisfactory evidence that the gare-fowl's winter-plumage differed from that of the breeding-season just as is ordinarily the case in other members of the family Alcidae to which it belongs. The most striking characteristic of the gare-fowl, however, was the com- paratively abortive condition of its wings, the distal portions of

1 The name first appears, and in this form, in the Account of Hirta (St Kilda) and Rona, &c, by the lord register, Sir George M'Kenzie, of Tarbat, printed by Pinkerton in his Collection of Voyages and Travels (iii. p. 730), and then in Sibbald's Scotia illustrata (1684). Martin soon after, in his Voyage to St Kilda, spelt it " Gairfowl." Sir R. Owen adopted the form " garfowl," without, as would seem, any precedent authority.

which, though the bird was just about twice the linear dimensions of the razor-bill, were almost exactly of the same size as in that species — proving, if more direct evidence were wanting, its inability to fly.

The most prevalent misconception concerning the gare-fowl is one which has been repeated so often, and in books of such generally good repute and wide dispersal, that a successful refutation seems almost hopeless. This is the notion that it was a bird possessing a very high northern range, and consequently to be looked for by Arctic explorers. How this error arose would take too long to tell, but the fact remains indisputable that, setting aside general assertions resting on no evidence worthy of attention, there is but a single record deserving any credit at all of a single example of the species having been observed within the Arctic Circle, and this, according to Prof. Reinhardt, who had the best means of ascertaining the truth, is open to grave doubt. 2 It is clear that the older ornithologists let their imagination get the better of their knowledge or their judgment, and their statements have been blindly repeated by most of their successors. Another error which, if not so widely spread, is at least as serious, since Sir R. Owen unhappily gave it countenance, is that this bird " has not been specially hunted down like the dodo and dinornis, but by degrees has become more scarce." If any reliance can be placed upon the testimony of former observers, the first part of this statement is absolutely untrue. Of the dodo all we know is that it flourished in Mauritius, its only abode, at the time the island was discovered, and that some 200 years later it had ceased to exist — the mode of its extinction being open to conjecture, and a strong suspicion existing that though indirectly due to man's acts it was

accomplished by his thoughtless agents (Phil. Trans., 1869, p. 354). The extinction of the Dinornis lies beyond the range of recorded history. Supposing it even to have taken place at the very latest period as yet suggested — and there is much to be urged in favour of such a supposition — little but oral tradition remains to tell us how its extirpation was effected. That it existed after New Zealand was inhabited by man is indeed certain, and there is nothing extraordinary in the proved fact that the early settlers (of whatever race they were) killed and ate moas. But evidence that the whole population of those birds was done to death by man, however likely it may seem, is wholly wanting. The contrary is the case with the gare-fowl. In Iceland there is the testimony of a score of witnesses, taken down from their lips by one of the most careful naturalists who ever lived, John Wolley, that the latest survivors of the species were caught and killed by expeditions expressly organized with the view of supplying the demands of caterers to the various museums of Europe. In like manner the fact is incontestable that its breeding-stations in the western part of the Atlantic were for three centuries regularly visited and devastated with the combined objects of furnishing food or bait to the fishermen from very early days, and its final extinction, according to Sir Richard Bonny- castle (Newfoundland in 1842, i. p. 232), was owing to " the ruth- less trade in its eggs and skin." There is no doubt that one of the chief stations of this species in Icelandic waters disappeared through volcanic action, and that the destruction of the old Geirfuglasker drove some at least of the birds which frequented it to a rock nearer the mainland, where they were exposed to danger from which they had in their former abode been comparatively free; yet on this rock (Eldey = fire-island) they were " specially hunted down " whenever opportunity offered, until the stock there was wholly extirpated in 1844.

A third misapprehension is that entertained by John Gould in his Birds of Great Britain, where he says that " formerly this bird was plentiful in all the northern parts of the British Islands, particularly the Orkneys and the Hebrides. At the commence- ment of the 19th century, however, its fate appears to have been sealed; for though it doubtless existed, and probably bred, up to the year 1830, its numbers annually diminished until they became so few that the species could not hold its own." Now of the

2 The specimen is in the Museum of Copenhagen ; the doubt lies as to the locality where it was obtained, whether at Disco, which is within, or at the Fiskernas, which is without, the Arctic Circle.

Orkneys, we know that George Low, who died in 1795, says in his posthumously-published Fauna Orcadensis that he could not find it was ever seen there; and on Bullock's visit in 181 2 he was told, says Montagu (Orn. Diet. App.), that one male only had made its appearance for a long time. This bird he saw and unsuccessfully hunted, but it was killed soon after his departure, while its mate had been killed just before his arrival, and none have been seen there since. As to the Hebrides, St Kilda is the only locality recorded for it, and the last example known to have been obtained there, or in its neighbourhood, was that given to Fleming (Edinb. Phil. Journ. x. p. 96) in 1821 or 1822, having been some time before captured by Mr Maclellan of Glass. That the gare-fowl was not plentiful in either group of islands is sufficiently obvious, as also is the impossibility of its continuing to breed " up to the year 1830."

But mistakes like these are not confined to British authors. As on the death of an ancient hero myths gathered round his memory as quickly as clouds round the setting sun, so have stories, probable as well as impossible, accumulated over the true history of this species, and it behoves the conscientious naturalist to exercise more than common caution in sifting the truth from the large mass of error. Americans have asserted that the specimen which belonged to Audubon (now at Vassar College) was obtained by him on the banks of Newfoundland, though there is Macgillivray's distinct statement (Brit. Birds, v. p. 359) that Audubon pro- cured it in London. The account given by Degland (Orn. Europ. ii. p. 529) in 1849, and repeated in the last edition of his work by M. Gerbe, of its extinction in Orkney, is so manifestly absurd that it deserves to be quoted in full: " II se trouvait en assez grand nombre il y a une quinzaine d'annees aux Orcades; mais le ministre presby terien dans le Mainland, en off rant une forte prime aux personnes qui lui apportaient cet oiseau, a ete cause de sa destruction sur ces iles." The same author claims the species as a visitor to the shores of France on the testimony of Hardy (Annuaire normand, 1841, p. 298), which he grievously misquotes both in his own work and in another place (Naumannia, 1855, p. 423), thereby misleading an anonymous English writer (Nat. Hist. Rev., 1865, p. 475) and numerous German readers.

John Milne in 1875 visited Funk Island, one of the former resorts of the gare-fowl, or " penguin," as it was there called, in the Newfoundland seas, a place where bones had before been obtained by Stuvitz, and natural mummies so lately as 1863 and 1864.

Landing on this rock at the risk of his life, he brought off a rich cargo of its remains, belonging to no fewer than fifty birds, some of them in size exceeding any that had before been known. His collection was subsequently dispersed, most of the specimens finding their way into various public museums.

A literature by no means inconsiderable has grown up respecting the gare-fowl.. Neglecting works of general bearing, few of which are without many inaccuracies, the following treatises may be especially mentioned: — J. J. S. Steenstrup, " Et Bidrag til Geir- fuglens Naturhistorie og saerligt til Kundskaben om dens tidligere Udbredningskreds," Naturh. Foren. Vidensk. Meddelelser (Copen-hagen, 1855), p. 33; E. Charlton, "On the Great Auk," Trans. Tyneside Nat. Field Club, iv. p. in; " Abstract of Mr J. Wolley's Researches in Iceland respecting the Gare-fowl," Ibis (1861), p. 374; W Preyer, " fiber Plautus impennis," Journ. filr 'Orn. (1862), pp. II0 . 337); K. E. von Baer, " Uber das Aussterben der Tierarten in

Fhysiologischer und nicht physiologischer Hinsicht," Bull, de Acad. Imp. de St-Petersb. vi. p. 513; R. Owen, " Description of the Skeleton of the Great Auk," Trans. Zool. Soc. v. p. 317; " The Gare-fowl and its Historians," Nat. Hist. Rev. v. p. 467; J. H. Gurney, jun., " On the Great Auk," Zoologist (2nd ser.), pp. 1442, 1639; H. Reeks, " Great Auk in Newfoundland," &c, op. cit. p. 1854; V. Fatio, " Sur l'Alca impennis," Bull. Soc. Orn. Suisse, ii. pp. 1, 80, 147; "On existing Remains of the Gare-fowl," Ibis (1870), p. 256; j. Milne, " Relics of the Great Auk," Field (27th of March, 3rd and 10th of April 1875). Lastly, reference cannot be omitted to the happy exercise of poetic fancy with which Charles Kingsley was enabled to introduce the chief facts of the gare-fowl's extinction (derived from one of the above-named papers) into his charming Water Babies. (A. N.)

GARFIELD, JAMES ABRAM (1831-1881), twentieth president of the United States, was born on the 19th of November 1831 in a log cabin in the little frontier town of Orange, Cuyahoga county, Ohio. His early years were spent in the performance

of such labour as fell to the lot of every farmer's son in the new states, and in the acquisition of such education as could be had in the district schools held for a few weeks each winter. But life on a farm was not to his liking, and at sixteen he left home and set off to make a living in some other way. A book of stories of adventure on the sea, which he read over and over again when a boy, had filled him with a longing for a seafaring life. He decided, therefore, to

become a sailor, and, in 1848, tramping across the country to Cleveland, Ohio, he sought employment from the captain of a lake schooner. But the captain drove him from the deck, and, wandering on in search of work, he fell in with a canal boatman who engaged him. During some months young Garfield served as bowsman, deck-hand and driver of a canal boat. An attack of the ague sent him home, and on recovery, having resolved to attend a high school and fit himself to become a teacher, he passed the next four years in a hard struggle with poverty and in an earnest effort to secure an educa- tion, studying for a short time in the Geauga Seminary atChester, Ohio. He worked as a teacher, a carpenter and a farmer; studied for a time at the Western Reserve Eclectic Institute at Hiram, Ohio, which afterward became Hiram College, and finally entered Williams College. On graduation, in 1856, Garfield became professor of ancient languages and literature in the Eclectic Institute at Hiram, and within a year had risen to the presidency of the institution.

Soon afterwards he entered political life. In the early days of the Republican party, when the shameful scenes of the Kansas struggle were exciting the whole country, and during the cam- paigns of 1857 and 1858, he became known as an effective speaker and ardent anti-slavery man. His reward for his services was election in 1859 to the Ohio Senate as the member from Portage and Summit counties. When the " cotton states " seceded, Garfield appeared as a warm supporter of vigorous measures. He was one of the six Ohio senators who voted against the proposed amendment to the Federal Constitution (Feb. 28th, 1861) forbidding any constitutional amendment which should give Congress the power to abolish or interfere with slavery in any state; he upheld the right of the government to coerce seceded states; defended the " Million War Bill " appropriating a million dollars for the state's military expenses; and when the call came for 75,000 troops, he moved that Ohio furnish 20,000 soldiers and three millions of dollars as her share. He had just been admitted to the bar, but on the outbreak of war he at once offered his services to the governor, and became lieutenant-colonel and then colonel of the 42nd Ohio Volunteers, recruited largely from among his former students. He served in Kentucky, was promoted to the rank of brigadier-general of volunteers early in 1862; took part in the second day's fighting at the battle of Shiloh, served as chief of staff under Rosecrans in the Army of the Cumberland in 1863, fought at Chickamauga, and was made a major-general of volunteers for gallantry in that battle. In 1862 he was elected a member of Congress from the Ashtabula district of Ohio, and, resigning his military commission, took his seat in the

House of Representatives in December 1863. In Congress he joined the radical wing of the Republican party, advocated the confiscation of Confederate property, . approved and defended the Wade-Davis manifesto denouncing the tameness of Lincoln, and was soon recognized as a hard worker and ready speaker. Capacity for work brought him places on important committees — he was chairman suc- cessively of the committee on military affairs, the committee on banking and currency, and the committee on appropriations, — and his ability as a speaker enabled him to achieve distinction on the floor of the House and to rise to leadership. Between 1863 and 1873 Garfield delivered speeches of importance on " The Constitutional Amendment to abolish Slavery," " The Freedman's Bureau," "The Reconstruction of the Rebel States," " The Public Debt and Specie Payments," " Reconstruction," " The Currency," " Taxation of United States Bonds," " Enforc- ing the 14th Amendment," " National Aid to Education," and " the Right to Originate Revenue Bills." The year 1874 was one of disaster to the Republican party. The greenback

issue, the troubles growing out of reconstruction in the South, the Credit Mobilier and the " Salary Grab," disgusted thousands of independent voters and sent a wave of Democracy over the country. Garfield himself was accused of corruption in con- nexion with the Credit Mobilier scandal, but the charge was never proved. A Republican convention in his district demanded his resignation, and re-election seemed impossible; but he defended himself in two pamphlets, " Increase of Salaries " and " Review of the Transactions of the Credit Mobilier Com- pany," made a village-to-village canvass, and was victorious. In 1876 Garfield for the eighth time was chosen to represent his district; and afterwards as one of the two representatives of the Republicans in the House, he was a member of the Electoral Commission which decided the dispute regarding the presidential election of 1876. When, in 1877, James G. Blaine was made a senator from Maine, the leadership of the House of Repre- sentatives passed to Garfield, and he became the Republican candidate for speaker. But the Democrats had a majority in the House, and he was defeated. Hayes, the new president, having chosen John Sherman to be his secretary of the treasury, an effort was made to send Garfield to the United States Senate in Sherman's place. But the president needed his services in the House, and he was not elected to the Senate until

1880.

The time had now come (1880) when the Republican party must nominate a candidate for the presidency. General Grant had served two terms (1869-1877), and the unwritten law of custom condemned his being given another. But the " bosses " of the Republican party in three great States — New York, Pennsylvania and Illinois — were determined that he should be renominated. These men and their followers were known as the " stalwarts." Opposed to them were two other factions, one supporting James G. Blaine, of Maine, and the other John Sherman, of Ohio. When the convention met and the balloting began, the contest along these factional lines started in earnest. For eight-and-twenty ballots no change of any consequence was noticeable. Though votes were often cast for ten names, there were but two real candidates before the convention, Grant and Blaine. That the partisans of neither would yield in favour of the other was certain. That the choice therefore rested with the supporters of the minor candidates was manifest, and with the cry " Anything to beat Grant! " an effort was made to find some man on whom the opposition could unite. Such a man was Garfield. His long term of service in the House, his leader- ship of his party on its floor, his candidacy for the speakership, and his recent election to the United States Senate, marked him out as the available man. Between the casting of the first and the thirty-third ballot, Garfield, who was the leader of Sherman's adherents in the convention, had sometimes received one or two votes and at other times none. On the thirty-fourth he received seventeen, on the next fifty, and on the next almost the entire vote hitherto cast for Blaine and Sherman, and was declared nominated. During the campaign Garfield was subject to violent personal abuse; the fact that he was alleged to have received $329 from the Credit Mobilier as a dividend on stock led his opponents to raise the campaign cry of " 329," and this number was placarded in the streets of the cities and printed in flaring type in partisan newspapers. The forged " Morey letter," in which he was made to appear as opposed to the ex- clusion of the Chinese, was widely circulated and injured his candidacy in the West. That the charges against Garfield were not generally credited, however, is shown by the fact that he received 214 electoral votes to his opponent's 155. He was inaugurated on the 4th of March 1881.

Unfortunately, the new president was unequal to the task of composing the differences in his party. For his secretary of state he chose James G. Blaine, the bitterest political enemy of Senator Roscoe Conkling (q.v.) the leader of the New York " stalwarts." Without consulting the New York senators, Garfield appointed

William H. Robertson, another political enemy of Conkling's, to the desirable post of Collector of the Port of New York, and thereby destroyed all prospects of party harmony. On the 2nd of

July, while on his way to attend the commencement exercises at Williams College, the new president was shot in a Washington railway station by a disappointed office-seeker named Charles J. Guiteau, whose mind had no doubt been somewhat influenced by the abuse lavished upon the president by his party opponents; and on the 19th of September 1881, he died at Elberon, New Jersey, whither he had been removed on the 6th. He was buried in Cleveland, Ohio, where in 1890 a monument was erected by popular subscription to his memory.

In 1858 Garfield had married Miss Lucretia Rudolph, by whom he had seven children. His son, Harry Augustus Garfield (b. 1863) graduated at Williams College in 1885, practised law in Cleveland, Ohio, in 1888-1903, was professor of politics at Princeton University in 1903-1908, and in 1908 became president of Williams College. Another son, James Rudolph Garfield (b. 1865), also graduated at Williams College in 1885 and practised law in Cleveland; he was a Republican member of the Ohio Senate in 1896-1899, was commissioner of corporations, Depart- ment of Commerce and Labour, in 1903-1907, attracting wide attention by his reports on certain large industrial organizations, and was secretary of the interior (1907-1909) in the cabinet of President Roosevelt.

President Garfield's writings, edited by Burke A. Hinsdale, were published at Boston, in two volumes, in 1882. (J. B. McM.)

GAR-FISH, the name given to a genus of fishes (Belone) found in nearly all the temperate and tropical seas, and readily recog- nized by their long, slender, compressed and silvery body, and by their jaws being produced into a long, pointed, bony and sharply- toothed beak. About fifty species are known from different parts of the globe, some attaining to a length of 4 or 5 ft. One species is common on the British coasts, and is well known by the names of "long-nose," "green-bone," &c. The last name is given to those fishes on account of the peculiar green colour of their bones, which deters many people from eating them, although their flesh is well flavoured and perfectly wholesome. The skipper (Scomberesox) and half -beak {Hemirhamphus) , in which the lower jaw only is prolonged, are fishes nearly akin to the gar-pikes.

GARGANEY 1 (North-Italian, Garganello), or Summer-Teal, the Anas querquedula and A. circia of Linnaeus (who made, as did Willughby and Ray, two species out of one), and the type of Stephens's genus Querquedula. This bird is one of the smallest of the Anatidae, and has gained its common English name from being almost exclusively a summer-visitant to England where nowadays it only regularly resorts to breed in some of the East- Norfolk Broads, though possibly at one time it was found at the same season throughout the great Fen-district. Slightly larger than the common teal (A . crecca) , the male is readily distinguished therefrom by its peculiarly-coloured head, the sides of which are nutmeg-brown, closely freckled with short whitish streaks, while a conspicuous white curved line descends backwards from the eyes. The upper wing-coverts are bluish grey, the scapulars black with a white shaft-stripe, and the wing-spot {speculum) greyish green bordered above and below by white. The female closely resembles the hen teal, but possesses no wing-spot. In Ireland or Scotland the garganey is very rare, and though it is recorded from Iceland, more satisfactory evidence of its occurrence there is needed. It has not a high northern range, and its appearance in Norway and Sweden is casual. Though it breeds in many parts of Europe, in none can it be said to be common; but it ranges far to the eastward in Asia — even to Formosa, according to Swinhoe — and yearly visits India in winter in enormous numbers. Those that breed in Norfolk arrive somewhat late in spring and make their nests in the vast "reed-beds which border the Broads — a situation rarely or never chosen by the teal. The labyrinth or bony enlargement of the trachea in the male garganey differs in form from that described in any other drake, being more oval and placed nearly in the

1 The word was introduced by Willughby from Gesner (On., lib. iii. p. 127), but, though generally adopted by authors, seems never to have become other than a book-name in English, the bird being in-variably known in the parts of this island where it is indigenous as " summer-teal."

median line of the windpipe, instead of on one side, as is usually the case.

GARGANO, MONTE (anc. Garganus Mons), a massive mountainous peninsula projecting E. from the N. coast of Apulia, Italy, and

belonging geologically to the opposite Dalmatian coast; it was indeed separated from the rest of Italy by an arm of the sea as late as the Tertiary period. The highest point (Monte Calvo) is 3465 ft. above sea-level. The oak forests for which it was renowned in Roman times have entirely disappeared.

GARGOYLE, or Gurgoyle (from the Fr. gargouille, originally the throat or gullet, cf. Lat. gurgulio, gula, and similar words derived from root gar, to swallow, the word representing the gurgling sound of water; Ital. doccia di grande; Ger. Ausguss), in architecture, the carved termination to a spout which conveys away the water from the gutters. Gargoyles are mostly grotesque figures. The term is applied more especially to medieval work, but throughout all ages some means of throwing the water off the roofe, when not conveyed in gutters, has been adopted, and in Egypt there are gargoyles to eject the water used in the washing of the sacred vessels which would seem to have been done on the flat roofs of the temples. In Greek temples the water from the roof passed through the mouths of lions whose heads were carved or modelled in the marble or terra-cotta cymatium of the cornice. At Pompeii large numbers of terra-cotta gargoyles have been found which were modelled in the shape of various animals.

GARHWAL, or Gurwal. 1. A district of British India, in the Kumaon division of the United Provinces. It has an area of 5629 sq. m., and consists almost entirely of rugged mountain ranges running in all directions, and separated by narrow valleys which in some cases become deep gorges or ravines. The only level portion of the district is a narrow strip of waterless forest between the southern slopes of the hills and the fertile plains of Rohilkhand. The highest mountains are in the north, the principal peaks being Nanda Devi (25,661 ft.), Kamet (25,413), Trisul (23,382), Badrinath (23,210), Dunagiri (23,181) and Kedarnath (22,853). The Alaknanda, one of the main sources of the Ganges, receives with its affluents the whole drainage of the district. At Devaprayag the Alaknanda joins the Bhagirathi, and thenceforward the united streams bear the name of the Ganges. Cultivation is principally confined to the immediate vicinity of the rivers, which are employed for purposes of irriga- tion. Garhwal originally consisted of 52 petty chieftainships, each chief with his own independent fortress (garh). Nearly 500 years ago, one of these chiefs, Ajai Pal, reduced all the minor principalities under his own sway, and founded the Garhwal kingdom. He and his ancestors ruled over Garhwal and the adjacent state of Tehri, in an uninterrupted line till 1803, when the Gurkhas invaded Kumaon and Garhwal, driving the Garhwal chief into the plains. For twelve years the

Gurkhas ruled the country with a rod of iron, until a series of encroachments by them on British territory led to the war with Nepal in 1814. At the termination of the campaign, Garhwal and Kumaon were converted into British districts, while the Tehri principality was restored to a son of the former chief. Since annexation, Garhwal has rapidly advanced in material prosperity. Pop. (1901) 420,900. Two battalions of the Indian army (the 39th Garhwal Rifles) are recruited in the district, which also contains the military cantonment of Lansdowne. Grain and coarse cloth are exported, and salt, borax, live stock and wool are imported, the trade with Tibet being considerable. The administrative headquarters are at the village of Pauri, but Srinagar is the largest place. This is an important mart, as is also Kotdwara, the terminus of a branch of the Oudh and Rohilkhand railway from Najibabad.

2. A native state, also known as Tehri, after its capital; area 4180 sq. m.; pop. (1901) 268,885. It adjoins the district mentioned above, and its topographical features are similar. It contains the sources of both the Ganges and the Jumna, which are visited by thousands of Hindu pilgrims. The gross revenue is about £28,000, of which nearly half is derived from forests. No tribute is paid to the British government.

GARIBALDI, GIUSEPPE (1807-1882), Italian patriot, was born at Nice on the 4th of July 1807. As a youth he fled from home to escape a clerical education, but afterwards joined his father in the coasting trade. After joining the " Giovine Italia " he entered the Sardinian navy, and, with a number of companions on board the frigate " Euridice," plotted to seize the vessel and occupy the arsenal of Genoa at the moment when Mazzini's Savoy expedition should enter Piedmont. The plot being discovered, Garibaldi fled, but was condemned to death by default on the 3rd of June 1834. Escaping to South America in 1836, he was given letters of marque by the state of Rio Grande do Sul, which had revolted against Brazil. After a series of victorious engagements he was taken prisoner and subjected to severe torture, which dislocated his limbs. Regaining liberty, he renewed the war against Brazil, and took Porto Allegro. During the campaign he met his wife, Anita, who became his inseparable companion and mother of three children, Anita, Ricciotti and Menotti. Passing into the service of Uruguay, he was sent to Corrientes with a small flotilla to oppose Rosas's forces, but was overtaken by Admiral Brown, against whose fleet he fought for three days. When his ammunition was exhausted he burned his ships and escaped. Returning to Montevideo, he formed the Italian Legion, with which he won the battles of Cerro and Sant' Antonio in the spring of

1846, and assured the freedom of Uruguay. Refusing all honours and recompense, he prepared to return to Italy upon receiving news of the incipient revolutionary movement. In October 1847 he wrote to Pius IX., offering his services to the Church, whose cause he for a moment believed to be that of national liberty.

Landing at Nice on the 24th of June 1848, he placed his sword at the disposal of Charles Albert, and, after various difficulties with the Piedmontese war office, formed a volunteer army 3000 strong, but shortly after taking the field was obliged, by the defeat of Custozza, to flee to Switzerland. Proceeding thence to Rome, he was entrusted by the Roman republic with the defence of San Pancrazio against the French, where he gained the victory of the 30th of April 1849, remaining all day in the saddle, although wounded in the side at the beginning of the fight. From the 3rd of May until the 30th of May he was continuously engaged against the Bourbon troops at Palestrina, Velletri and elsewhere, dispersing an army of 20,000 men with 3000 volunteers. After the fall of Rome he left the city at the head of 4000 volunteers, with the idea of joining the defenders of Venice, and started on that wonderful retreat through central Italy pursued by the armies of France, Austria, Spain and Naples. By his consummate generalship and the matchless endurance of his men the pursuers were evaded and San Marino reached, though with a sadly diminished force. Garibaldi and a few followers, including his devoted wife Anita, after vainly attempting to reach Venice, where the tricolor still floated, took refuge in the pine forests of Ravenna; the Austrians were seeking him in all directions, and most of his legionaries were captured and shot. Anita died near Comacchio, and he himself fled across the peninsula, being assisted by all classes of the people, to Tuscany, whence he escaped to Piedmont and ultimately to America. At New York, in order to earn a living, he became first a chandler, and afterwards a trading skipper, returning to Italy in 1854 with a small fortune, and purchasing the island of Caprera, on which he built the house thenceforth his home. On the outbreak of war in 1859 he was placed in command of the Alpine infantry, defeating the Austrians at Casale on the 8th of May, crossing the Ticino on the 23rd of May, and, after a series of victorious fights, liberating Alpine territory as far as the frontier of Tirol. When about to enter Austrian territory proper his advance was, however, checked by the armistice of Villafranca.

Returning to Como to wed the countess Raimondi, by whom he had been aided during the campaign, he was apprised, immediately after the wedding, of certain circumstances which caused him at once to abandon that lady and to start for central Italy. Forbidden to invade

the Romagna, he returned in- dignantly to Caprera, where with Crispi and Bertani he planned the invasion of Sicily. Assured by Sir James Hudson of the

sympathy of England, he began active preparations for the expedition to Marsala. At the last moment he hesitated, but Crispi succeeded in persuading him to sail from Genoa on the 5th of May i860 with two vessels carrying a volunteer corps of 1070 strong. Calling at Talamone to embark arms and money, he reached Marsala on the nth of May, and landed under the protection of the British vessels " Intrepid " and " Argus." On the 1 2th of May the dictatorship of Garibaldi was proclaimed at Salemi, on the 1 5th of May the Neapolitan troops were routed at Calatafimi, on the 25th of May Palermo was taken, and on the 6th of June 20,000 Neapolitan regulars, supported by nine frigates and protected by two forts, were compelled to capitulate. Once established at Palermo, Garibaldi organized an army to liberate Naples and march upon Rome, a plan opposed by the emissaries of Cavour, who desired the immediate annexation of Sicily to the Italian kingdom. Expelling Lafarina and driving out Depretis, who represented Cavour, Garibaldi routed the Neapolitans at Milazzo on the 20th of July. Messina fell on the 20th of July, but Garibaldi, instead of crossing to Calabria, secretly departed for Aranci Bay in Sardinia, where Bertani was fitting out an expedition against the papal states. Cavour, however, obliged the expedition to sail for Palermo. Returning to Messina, Garibaldi found a letter from Victor Emmanuel II. dissuading him from invading the kingdom of Naples. Garibaldi replied asking " permission to disobey." Next day he crossed the Strait, won the battle of Reggio on the 21st of August, accepted the capitulation of 9000 Neapolitan troops at San Giovanni and of 11,000 more at Soveria. The march upon Naples became a triumphal progress, which the wiles of Francesco II. were powerless to arrest. On the 7th of September Garibaldi entered Naples, while Francesco fled to Gaeta. On the 1st of October he routed the remnant of the Bourbon army 40,000 strong on the Volturno. Meanwhile the Italian troops had occupied the Marches, Umbria and the Abruzzi, a battalion of Bersaglieri reaching the Volturno in time to take part in the battle. Their presence put an end to the plan for the invasion of the papal states, and Garibaldi unwillingly issued a decree for the plebiscite which was to sanction the incorporation of the Two Sicilies in the Italian realm. On the 7th of November Garibaldi accompanied Victor

Emmanuel during his solemn entry into Naples, and on the morrow returned to Caprera, after disbanding his volunteers and recommending their enrolment in the regular army.

Indignation at the cession of Nice to France and at the neglect of his followers by the Italian government induced him to return to political life. Elected deputy in 1861, his anger against Cavour found violent expression. Bixio attempted to reconcile them, but the publication by Cialdini of a letter against Garibaldi provoked a hostility which, but for the intervention of the king, would have led-to a duel between Cialdini and Garibaldi. Return- ing to Caprera, Garibaldi awaited events. Cavour's successor, Ricasoli, enrolled the Garibaldians in the regular army; Rattazzi, who succeeded Ricasoli, urged Garibaldi to undertake an ex- pedition in aid of the Hungarians, but Garibaldi, finding his followers ill-disposed towards the idea, decided to turn his arms against Rome. On the 29th of June 1862 he landed at Palermo and gathered an army under the banner " Roma o morte." Rattazzi, frightened at the prospect of an attack upon Rome, proclaimed a state of siege in Sicily, sent the fleet to Messina, and instructed Cialdini to oppose Garibaldi. Circumventing the Italian troops, Garibaldi entered Catania, crossed to Melito with 3000 men on the 25th of August, but was taken prisoner and wounded by Cialdini's forces at Aspromonte on the 27th of August. Liberated by an amnesty, Garibaldi returned once more to Caprera amidst general sympathy.

In the spring of 1864 he went to London, where he was accorded an enthusiastic reception and given the freedom of the city. From England he returned again to Caprera. On the outbreak of war in 1866 he assumed command of a volunteer army and, after the defeat of the Italian troops at Custozza, took the offensive in order to cover Brescia. On the 3rd of July he defeated the Austrians at Monte Saello, on the 7th at Lodrone, on the roth at

Darso, on the 16th at Condino, on the 19th at Ampola, on the 2 1 st at Bezzecca, but, when on the point of attacking Trent, he was ordered by General Lamarmora to retire. His famous reply " Obbedisco " (" I obey ") has often been cited as a classical example of military obedience to a command destructive of a successful leader's hopes, but documents now published (cf. Corriere della sera, 9th of August 1906) prove beyond doubt that Garibaldi had for some days known that the order to evacuate the Trentino would shortly reach him. The order arrived on the 9th of August, whereas Crispi had been sent as early as the 16th of July to warn Garibaldi that, owing to Prussian opposition, Austria would not cede the Trentino to

Italy, and that the evacuation was inevitable. Hence Garibaldi's laconic reply. From the Trentino he returned to Caprera to mature his designs against Rome, which had been evacuated by the French in pursuance of the Franco-Italian convention of the 15th of September 1864. Gathering volunteers in the autumn of 1867, he prepared to enter papal territory, but was arrested at Sinalunga by the Italian government and conducted to Caprera. Eluding the surveillance of the Italian cruisers, he returned to Florence, and, with the complicity of the second Rattazzi cabinet, entered Roman territory at Passo Corese on the 23rd of October. Two days later he took Monterotondo, but on the 2nd of November his forces were dispersed at Mentana by French and papal troops. Recrossing the Italian frontier, he was arrested at Figline and taken back to Caprera, where he eked out his slender resources by writing several romances. In 1870 he formed a fresh volunteer corps and went to the aid of France, defeating the German troops at Chatillon, Autun and Dijon. Elected a member of the Versailles assembly, he resigned his mandate in anger at French insults, and withdrew to Caprera until, in 1874, he was elected deputy for Rome. Popular enthusiasm induced the Conservative Minghetti cabinet to' propose that a sum of £40,000 with an annual pension of £2000 be conferred upon him as a recompense for his services, but the proposal, though adopted by parliament (27th May 1875), was indignantly refused by Garibaldi. Uponthe advent of the Left to power, however, he accepted both gift and pension, and worked energetically upon the scheme for the Tiber embankment to prevent the flooding of Rome. At the same time he succeeded in obtaining the annulment of his marriage with the countess Raimondi (with whom he had never lived) and contracted another marriage with the mother of his children, Clelia and Manlio. In 1880 he went to Milan for the inauguration of the Mentana monument, and in 1882 visited Naples and Palermo, but was prevented by illness from being present at the 600th anniversary of the Sicilian Vespers. On the 2nd of June 1882 his death at Caprera plunged Italy into mourning.

See Garibaldi, Epistolario, ed. E. E. Ximenes (2 vols., Milan, 1885), and Memorie autografiche (nth ed., Florence, 1902; Eng. translation by A. Werner, with supplement by J. W. Mario in vol. iii. of 1888 ed.); Giuseppe Guerzoni, Garibaldi (2 vols., Florence, 1882); Jessie White Mario, Garibaldi e i suoi tempi (Milan, 1884) ; G. M. Trevelyan, Garibaldi's Defence of the Roman Republic (London, 1907), which contains an excellent sketch of Garibaldi's early career, of the events leading up to the proclamation of the Roman Republic, and a picturesque, detailed and authoritative account of

the defence of Rome and of Garibaldi's flight, with a very full bibliography; also Trevelyan's Garibaldi and the Thousand (1909). (H. W. S.)

GARIN LE LOHERAIN, French epic hero. The 12th century chanson de geste of Garin le Loherain is one of the fiercest and most sanguinary narratives left by the trouveres. This local cycle of Lorraine, which is completed by Hervis de Metz, Girbers de Metz, Anseis, fils de Girbert and Yon, is obviously based on history, and the failure absolutely to identify the events recorded does not deprive the poems of their value as a picture of the savage feudal wars of the nth and 1 2th centuries. The episodes are evolved naturally and the usual devices adopted by the trouveres to reconcile their inconsistencies are absent. Neverthe- less no satisfactory historical explanation of the story has yet been offered. It has been suggested by a recent critic (F. Settegast, Quellcnstudien zur gallo-romanischen Epik, 1904) that these poems resume historical traditions going back to the Vandal irruption of 408 and the battle fought by the Romans and the West Goths against the Huns in 451. The cycle relates

three wars against hosts of heathen invaders. In the first of these Charles Martel and his faithful vassal Hervis of Metz fight by an extraordinary anachronism against the Vandals, who have destroyed Reims and besieged other cities. They are defeated in a great battle near Troyes. In the second Hervis is besieged in Metz by the " Hongres." He sends first for help to Pippin, who defers his assistance by the advice of the traitor Hardre. Hervis then transfers his allegiance to Anseis of Cologne, by whose help the invaders are repulsed, though Hervis himself is slain. In the third Thierry, king of Moriane 1 sends to Pippin for help against four Saracen kings. He is delivered by a Frankish host, but falls in the battle. Hervis of Metz was the son of a citizen to whom the duke of Lorraine had married his daughter Aelis, and his sons Garin and Begue are the heroes of the chanson which gives its name to the cycle. The dying king Thierry had desired that his daughter Blanchefleur should marry Garin, but when Garin prefers his suit at the court of Pippin, Fromont of Bordeaux puts himself forward as his rival and Hardre, Fromont's father, is slain by Garin. The rest of the poem is taken up with the war that ensues between the Lorrainers and the men of Bordeaux. They finally submit their differences to the king, only to begin their disputes once more. Blanchefleur becomes the wife of Pippin, while

Garin remains her faithful servant. One of the most famous passages of the poem is the assassination of Begue by a nephew of Fromont, and Garin, after laying waste his enemy's territory, is himself slain. The remaining songs con- tinue the feud between the two families. According to Paulin Paris, the family of Bordeaux represents the early dukes of Aquitaine, the last of whom, Waifar (745-768) was dispossessed and slain by Pippin the Short, king of the Franks; but the trouveres had in mind no doubt the wars which marked the end of the Carolingian dynasty.

See Li Romans de Garin le Loherain, ed. P. Paris (Paris, 1833); Hist. litt. de la France, vol. xxii. (1852); J. M. Ludlow, Popular Epics of the Middle Ages (London and Cambridge, 1865); F. Lot, Htudes d'histoire dn moyen age (Paris, 1896) ; F. Settegast, Quellen- studien zur gallo-romanischen Epik (Leipzig, 1904). A complete edition of the cycle was undertaken by E. Stengel, the first volume of which, Hervis de ilies(Gesellschaft fiir roman. Lit., Dresden), appeared in 1903.

GARLAND, JOHN (fl. 1202-1252), Latin grammarian, known as Johannes Garlandius, or, more commonly, Johannes de Garlandia, was born in England, though most of his life was spent in France. John Bale in his Cataiogus, and John Pits, following Bale, placed him among the writers of the nth century. The main facts of his life, however, are stated in a long poem De triumphis ecclesiae contained in Cotton MS. Claudius A x in the British Museum, and edited by Thomas Wright for the Roxburghe Club in 1856. Garland narrates the history of his time from the point of view of the victories gained by the church over heretics at home and infidels abroad. He studied at Oxford under a certain John of London, whom it is difficult to distinguish from others of the same name; but he must have been in Paris in or before 1202, for he mentions as one of his teachers Alain de Lisle, who died in that year or the next. Garland was one of the pro fessors chosen in 1229 for the new university of Toulouse, and remained in the south during the Albigensian crusade, of which he gives a detailed account in books iv.-vi. In 1232 or 1233 the hatred of the people made further residence in Toulouse unsafe for the professors of the university, who had been installed by the Catholic party. Garland was one of the first to fly, and the rest of his life was spent in Paris, where he finished his poem in 1252. Garland's grammatical works were much used in England, and were often printed by Richard Pynson and Wynkyn de Worde. He was also a voluminous Latin poet. Works on mathematics and music have also been assigned to him, but the ascription may have arisen from confusion of his works with those of Gerlandus, a canon of Besancon

in the 12th century. The treatise on alchemy, Compendium alchimiae, often printed under his name, was by a 1 4th-century writer named Martin Ortolan, or Lortholain.

The best known of his poems beside the " De Triumphis

1 i.e. Maurienne, now a district and diocese (St Jean de Maurienne) of Savoy.

Ecclesiae " is " Epithalamium beatae Mariae Virginis/'contained in the same MS. Among his other works are his " Dictionarius," a Latin vocabulary, printed by T. Wright in the Library 0} National Antiquities (vol. i., 1857); Compendium totius grammatices . . ., printed at Deventer, 1489; two metrical treatises, entitled Synonyma and Equivoca, frequently printed at the close of the 15th century.

For further bibliographical information see the British Museum catalogue; J. A. Fabncius, Bibliotheca Latina mediae et infimae aetatis . . ., vol. iii. (1754); G. Brunet, Manuel du libraire, &c. See also Histoire litt. de la France, vols, viii., xxi., xxiii. and xxx. ; the prefaces to the editions by T. Wright mentioned above; P. Meyer, La Chanson de la croisade contre les Albigeois, vol. ii. pp. xxi-xxiii. (Paris, 1875) ; Dr A. Scheler, Lexicographic latine du XII' et du XIII' siecles (Leipzig, 1867) ; the article by C. L. Kingsford in the Diet. Nat. Biog., giving a list also of the works on alchemy, mathematics and music, rightly or wrongly ascribed to him; J. E. Sandys, Hist, of Class. Schol. i. (1906) 549. (E. G.)

GARLIC (O. Eng. gdrledc, i.e. "spear-leek"; Gr. OKopobov; Lat. allium; Ital. aglio; Fr. ail; Ger. Knoblauch), Allium sativum, a bulbous perennial plant of the natural order Liliaceae, indigenous apparently to south-west Siberia. It has long, narrow, flat, obscurely keeled leaves, a deciduous spathe, and a globose umbel of whitish flowers, among which are small bulbils. The bulb, which is the only part eaten, has membranous scales, in the axils of which are 10 or 12 cloves, or smaller bulbs. From these new bulbs can be procured by planting out in February or March. The bulbs are best preserved hung in a dry place. If of fair size, twenty of them weigh about 1 lb. To prevent the plant from running to leaf, Pliny (Nat. Hist. xix. 34) advises to bend the stalk downward and cover with earth; seeding, he observes, may be prevented by twisting the stalk.

Garlic is cultivated in the same manner as the shallot (q.v.). It is. stated to have been grown in England before the year 1548. The percentage composition of the bulbs is given by E. Solly (Trans. Hort.

Soc. Lond., new ser., iii. p. 60) as water 84-09, organic matter 13-38, and inorganic matter 1-53 — that of the leaves being water 87-14, organic matter 11-27 and inorganic matter 1-59. The bulb has a strong and characteristic odour and an acrid taste, and yields an offensively smelling oil, essence of garlic, identical with allyl sulphide (C 3 H 5) 2 S (see Hofmann and Cahours, Journ. Chem. Soc. x. p. 320). This, when garlic has been eaten, is evolved by the excretory organs, the activity of which it promotes. From the earliest times garlic has been used as an article of diet. It formed part of the food of the Israelites in Egypt (Numb. xi. 5) and of the labourers employed by Cheops in the construction of his pyi&fillijjaad is still grown in Egypt, where, however, the Syrian Is the kind most esteemed (see Rawlinson's Herodotus, ii. 125). It was largely consumed by the ancient Greek and Roman soldiers, sailors and rural classes (cf. Virg. Eel. ii. n), and, as Pliny tells us (N.H. xix. 32), by the African peasantry. Galen eulogizes it as the rustic's theriac (see F. Adams's Paulus Aegineta, p. 99), and Alexander Neckam, a writer of the 12th century (see Wright's edition of his works, p. 473, 1863), recommends it as a palliative of the heat of the sun in field labour. " The people in places where the simoon is frequent," says Mountstuart Elphinstone (An Account of the Kingdom of Caubul, p. 140, 1815), " eat garlic, and rub their lips and noses with it, when they go out in the heat of the summer, to prevent their suffering by the simoon." " dura messorum ilia," exclaims Horace (Epod. iii.), as he records his detestation of the popular esculent, to smell of which was accounted a sign of vulgarity (cf. Shakespeare, Coriol. iv. 6, and Meas. for Meas. iii. 2). In England garlic is seldom used except as a seasoning, but in the southern countries of Europe it is a common ingredient in dishes, and is largely consumed by the agricultural population. • Garlic was placed by the ancient Greeks on the piles of stones at cross-roads, as a supper for Hecate (Theophrastus, Characters, Aeuridaifiovlas) ; and according to Pliny garlic and onions were invocated as deities by the Egyptians at the taking of oaths. The inhabitants of Pelusium in lower Egypt, who worshipped the onion, are said to have held both it and garlic in aversion as food. Garlic possesses stimulant and stomachic properties, and was of old, as still sometimes now, employed as a medicinal remedy.

GARNET

469

Pliny (N.H. xx. 23) gives an exceedingly long list of complaints in which it was considered beneficial. Dr T. Sydenham valued it as an

application in confluent smallpox, and, says Cullen {Mat. Med. ii. p. 174, 1789), found some dropsies cured by it alone. In the United States the bulb is given in doses of 3-2 drachms in cases of bronchiectasis and phthisis pulmonalis. Garlic may also be prescribed as an extract consisting of the inspissated juice, in doses of 5-10 grains, and as the syrupus allii aceticus, in doses of 1-4 drachms. This last preparation has recently been much extolled in the treatment of pulmonary tuberculosis or phthisis.

The wild " crow garlic " and " field garlic " of Britain are the species Allium vineale and A. oleraceum respectively.

GARNET, or Garnett, HENRY (1555-1606), English Jesuit, son of Brian Garnett, a schoolmaster at Nottingham, was edu- cated at Winchester and afterwards studied law in London. Having become a Roman Catholic, he went to Italy, joined the Society of Jesus in 1575, and acquired under Bellarmine and others a reputation for varied learning. In 1586 he joined the mission in England, becoming superior of the province on the imprisonment of William Weston in the following year. In the dispute between the Jesuits and the secular clergy known as the " Wisbech Stirs " (1595-1596) he zealously supported Weston in his resistance to any compromise with the civil government. His antagonism to the secular clergy was also shown later, when in 1603 he, with other Jesuits, was the means of betraying to the government the " Bye Plot," contrived by William Watson, a secular priest. In 1 598 he was professed of the four vows.

Garnet supervised the Jesuit mission for eighteen years with conspicuous success. His life was one of concealment and dis- guises; a price was put on his head; but he was fearless and indefatigable in carrying on his propaganda and in ministering to the scattered Catholics, even in their prisons. The result was that he gained many converts, while the number of Jesuits in England increased during his tenure of office from three to forty. It is, however, in connexion with the Gunpowder Plot that he is best remembered. His part in this, for which he suffered death, needs discussion in greater detail.

In 1602 Garnet received briefs from Pope Clement VIII. directing that no person unfavourable to the Catholic religion should be allowed to succeed to the throne. About the same time he was consulted by Catesby, Tresham and Winter, all afterwards involved in the Gunpowder Plot, on the subject of the mission to be sent to Spain to induce Philip III. to invade England. Accord- ing to his own statement he disapproved, but he gave Winter a recommendation to Father Creswell, an influential person at Madrid. Moreover, in May

1605 he gave introductions to Guy Fawk.es when he went to Flanders, and to Sir Edmund Baynham when he went to Rome (see Gunpowder Plot). The prepara- tions for the plot had now been actively going forward since the beginning of 1604, and on the 9th of June 1605 Garnet was asked by Catesby whether it was lawful to enter upon any undertaking which should involve the destruction of the innocent together with the guilty, to which Garnet answered in the affirmative, giving as an illustration the fate of persons besieged in a town in time of war. Afterwards, feeling alarmed, according to his own accounts, he admonished Catesby against intending the death of " not only innocents but friends and necessary persons for a commonwealth," and showed him a letter from the pope forbidding rebellion. According to Sir Everard Digby, however, Garnet, when asked the meaning of the brief, replied " that they were not (meaning the priests) to undertake or procure stirs, but yet they would not hinder any, neither was it the pope's mind they should, that should be undertaken for Catholic good. . . . This answer, with Mr Catesby's proceedings with him and me", gave me absolute belief that the matter in general was approved, though every particular was not known." Both men were en- deavouring to exculpate themselves, and therefore both state- ments are subject to suspicion. A few days later, according to Garnet, the Jesuit, Oswald Tesemond, known as Greenway, informed him of the whole plot " by way of confession," when, as he declares, he expressed horror at the design and urged Green-

way to do his utmost to prevent its execution. Subsequently, after his trial, Garnet said he " could not certainly affirm " that Greenway intended to relate the matter to him in confession.

Garnet's conduct in now keeping the plot a secret has been a matter of considerable controversy not only between Roman Catholics and Protestants, but amongst Roman Catholic writers themselves. Father Martin del Rio, a Jesuit, writing in 1600, discusses the exact case of the revelation of a plot in confession. Almost all the learned doctors, he says, declare that the confessor may reveal it, but he adds, " the contrary opinion is the safer and better doctrine, and more consistent with religion and with the reverence due to the holy rite of confession." According to Bellarmine, Garnet's zealous friend and defender, " If the person confessing be concealed, it is lawful for a priest to break the seal of confession in order to avert a great calamity "; but he justifies Garnet's silence by insisting that it was not lawful to disclose a treasonable secret to a heretical king. According to Garnet's own opinion a priest cognizant of treason against the state " is bound to find all lawful means to discover it

salvo sigillo confessionis." In this connexion it is worth pointing out that Garnet had not thought it his duty to disclose the treasonable intrigue with the king of Spain in 1602, though there was no pretence in this case that he was restricted by the seal of confession, and his inactivity now tells greatly in his disfavour; for, allowing even that he was bound by confessional secrecy from taking action on Greenway's information, he had still Catesby's earlier revelations to act upon. He appears to have taken no steps whatever to prevent the crime, beyond writing to Rome in vague terms that " he feared some particular desperate courses," which aroused no suspicions in that quarter. At the same time he wrote to Father Parsons on the 4th of September that " as far as he could now see the minds of the Catholics were quieted."

His movements immediately prior to the attempt were certainly suspicious. In September, shortly before the expected meeting of parliament on the 3rd of October, Garnet organized a pilgrimage to St Winifred's Well in Flintshire, which started from Gothurst (now Gayhurst), Sir Everard Digby's house in Buckinghamshire, included Rokewood, and stopped at the houses of John Grant and Robert Winter, three others of the conspirators. During the pilgrimage Garnet asked for the prayers of the company " for some good success for the Catholic cause at the beginning of parliament." After his return he went on the 29th of October to Coughton in Warwickshire, near which place it had been settled the conspirators were to assemble after the explosion. On the 6th of November, Bates, Catesby's servant and one of the conspirators, brought him a letter with the news of the failure of the plot and desiring advice. On the 30th Garnet addressed a letter to the government in which he protested his innocence with the most solemn oaths, " as one who hopeth for everlasting salvation."

It was not till the 4th of December, however, that Garnet and Greenway were, by the confession of Bates, implicated in the plot; and on the same day Garnet removed from Coughton to Hindlip Hall, near Worcester, a house furnished with cleverly- contrived hiding-places for the use of the proscribed priests. Here he remained some time in concealment in company with another priest, Oldcorne alias Hall, but at last on the 30th of January 1606, unable to bear the close confinement any longer, they surrendered and were taken up to London, being well treated during the journey by Salisbury's express orders. He was examined by the council on the 13th of February and frequently questioned during the following days, but refused to incriminate himself, and a threat to inflict torture had no effect upon his resolution. Subsequently Garnet and Oldcorne having been placed

in adjoining rooms and enabled to communicate with one another, their conversations were overheard on several separate occasions and considerable information obtained. Garnet at first denied all speech with Oldcorne, but subsequently on the 8th of March confessed his connexion with the plot. He was tried at the Guildhall on the 28th.

Garnet was clearly guilty of misprision of treason, i.e. of having concealed his knowledge of the crime, an offence which exposed

him to perpetual imprisonment and forfeiture of his property; for the law of England took no account of religious scruples or professional etiquette when they permit the execution of a preventable crime. Strangely enough, however, the government passed over the incriminating conversation with Greenway, and relied entirely on the strong circumstantial evidence to support the charge of high treason against the prisoner. The trial was not conducted in a manner which would be permitted in more modern days. The rules of evidence which now govern the pro- cedure in criminal cases did not then exist, and Garnet's trial, like many others, was influenced by the political situation, the case against him being supported by general political accusations against the Jesuits as a body, and with evidence of their com- plicity in former plots against the government. The prisoner himself deeply prejudiced his cause by his numerous false state- ments, and still more by his adherence to the doctrine of equivoca- tion. Garnet, it is true, claimed to limit the justification of equivocation to cases " of necessary defence from injustice and wrong or of the obtaining some good of great importance when there is no danger of harm to others," and he could justify his conduct in lying to the council by their own conduct towards him, which included treacherous eavesdropping and fraud, and also threats of torture. Moreover, the attempt of the counsel for the crown to force the prisoner to incriminate himself was opposed to the whole spirit and tradition of the law of England. He was declared guilty, and it is probable, in spite of the irregularity and unjudicial character of his trial, that substantial justice was done by his conviction. His execution took place on the 3rd of May 1606, Garnet acknowledging himself justly condemned for his concealment of the plot, but maintaining to the last that he had never approved it. The king, who had shown him favour throughout and who had forbidden his being tortured, directed that he should be hanged till he was quite dead

and that the usual frightful cruelties should be omitted.

Soon after his death the story of the miracle of "Garnet's Straw" was circulated all over Europe, according to which a blood-stained straw from the scene of execution which came into the hands of one John Wilkinson, a young and fervent Roman Catholic, who was present, developed Garnet's likeness. In consequence of the credence which the story obtained, Archbishop Bancroft was commissioned by the privy council to discover and punish the impostors. Garnet's name was included in the list of the 353 Roman Catholic martyrs sent to Rome from England in 1880, and in the 2nd appendix of the Menology of England and Wales compiled by order of the cardinal archbishop and the bishops of the province of Westminster by R. Stanton in 1887, where he is styled " a martyr whosecauseisdeferredforfutureinvestigation." The passage in Macbeth (Act n. Scene iii.) on equivocators no doubt refers especially to Garnet. His aliases were Farmer, Marchant, Whalley,Darcey Meaze,Phillips,Humphreys, Roberts, Fulgeham, Allen. Garnet was the author of a letter on the Martyrdom of Godfrey Maurice, alias John Jones, in Diego Yepres's Historia particular de la persecucion de Inglaterra(x 599) ; a Treatise of Schism, a MS. treatise in reply to A Protestant Dialogue between a Gentleman and a Physician; a translation of the Stemma Christi with supplements (1622); a treatise on the Rosary; a Treatise of Christian Renovation or Birth (1616).

Authorities. — Of the great number of works embodying the controversy on the question of Garnet's guilt the following may be mentioned, in order of date: A True and Perfect Relation of the whole Proceedings against . . . Garnet a Jesuit and his Confederates (1606, repr. 1679), the official account, but incomplete and inaccurate ; Apologia pro Henrico Garneto (1610), by the Jesuit L'Heureux, under the pseudonym Endaemon-Joannes, and Dr Robert Abbot's reply, Antilogia versus Apologiam Eudaemon- Joannes, in which the whole subject is well treated; Henry More, Hist. Provinciae Angli- canae Societatis (1660); D. Jardine, Gunpowder Plot (1857); J. Morris, S. J., Condition of the Catholics under James I. (1872), con- taining Father Gerard's narrative; J. H. Pollen, Father Henry Garnet and the Gunpowder Plot (1888); S. R. Gardiner, What Gun-powder Plot was (1897), in reply to John Gerard, S.J., What was the Gunpowder Plot? (1897); J. Gerard, Contributions towards a Life of Father Henry Garnet (1898). See also State Trials II., and Cal. of State Papers Bom., (1603-1610). The original documents are pre-served in the Gunpowder Plot Book at the Record Office.

GARNET, a name applied to a group of closely-related minerals, many of which are used as gem-stones. The name probably comes from the Lat. granaticus, a stone so named from its resemblance to the pulp of the pomegranate in colour, or to its seeds in shape; or possibly from granum, " cochineal," in allusion to the colour of the stone. The garnet was included, with other red stones, by Theophrastus, under the name of a.vdpa.%, while the common garnet seems to have been his avdpa.Ki.ov. Pliny groups several stones, including garnet, under the term carbun- culus. The modern carbuncle is a deep red garnet (almandine) cut en cabochon, or with a smooth convex surface, frequently hollowed out at the back, in consequence of the depth of colour, and sometimes enlivened with a foil (see Almandine). The Hebrew word nophek, translated avdpal; in the Septuagint, seems to have been the garnet or carbuncle, whilst barekelh (crp.a.paySoi of the Septuagint), though also rendered " carbuncle," was prob- ably either beryl or, in the opinion of Professor Flinders Petrie, rock-crystal. Garnets were used as beads in ancient Egypt. Though not extensively employed by the Greeks as a material for engraved gems, it was much used for this purpose by the Romans of the Empire. Flat polished slabs of garnet are found inlaid in mosaic work in Anglo-Saxon and Merovingian jewelry, the material used being almandine, or " precious garnet."

Garnets vary considerably in chemical composition, but the variation is limited within a certain range. All are orthosilicates, conformable to the general formula R"3R'" 2 (Si0 4)3, where R" = Ca, Mg, Fe, Mn, and R'" = Al, Fe, Cr. Although there are many kinds of garnet they may be reduced to the following six types, which may occur intermixed isomorphously: —

1. Calcium-aluminium garnet (Grossularite), Ca 3 Al 2 Si 3 Oi2.

2. Calcium-ferric garnet (Andradite), Ca3Fe 2 Si 3 0i 2 .

3. Calcium-chromium garnet {Vvarovite), Ca 3 Cr 2 Si 3 Oi 2 .

4. Magnesium-aluminium garnet (Pyrope), Mg 3 Al 2 Si 3 0i2.

5. Ferrous-aluminium garnet (Almandine), Fe 3 Al 2 Si 3 Oi 2 .

6. Manganous-aluminium garnet (Spessartine) , Mn 3 Al 2 Si 3 Oi2. These are frequently called respectively : — (1) Lime-alumina garnet ;

(2) lime-iron garnet; (3) lime-chrome garnet; (4) magnesia-alumina garnet ; (5) iron-alumina garnet ; (6) manganese-alumina garnet.

The types are usually modified by isomorphous replacement of some of their elements.

All garnets crystallize in the cubic system, usually in rhombic dodecahedra or in icositetrahedra, or in a combination of the two forms (see fig.). Octahedra and cubes are rare, but the six-faced octahedron occurs in some of the com- binations. Cleavage obtains parallel to the dodecahedron, but is imperfect. The hardness varies according to com- position from 6- 5 to 7 • 5, and the specific gravity in like manner has a wide range, varying from 3-4 in the calcium-aluminium garnets to 4-3 in the ferrous- aluminium species. Sir Arthur H. Church found that many garnets when fused yielded a product of lower density than the original mineral. The

colour is typically red, but may be brown, yellow, green or even black, while some garnets are colourless. Being cubic the garnets are normally singly refracting, but anomalies frequently occur, leading some authorities to doubt whether the mineral is really cubic. The refractive power of garnet is high, so that in micro- scopic sections, viewed by transmitted light, the mineral stands out in relief.

Garnets are very widely distributed, occurring in crystalline schists, gneiss, granite, metamorphic limestone, serpentine, and occasionally in volcanic rocks. With omphacite and smaragdite, garnet forms the peculiar rock called eclogite. The garnets used for industrial purposes are usually found loose in detrital deposits, weathered from the parent rock, though in some important workings the rock is quarried. The garnets employed as gem-stones are described under their respective headings (see Almandine, Cinna- mon Stone, Demantoid and Pyrope). Most of the minerals noticed in this article are of scientific rather than commercial interest.

Grossularite or " gooseberry-stone," is typically a brownish-green garnet from Siberia, known also as wiluite (a name applied also to vesuvianite, q.v.), from the river Wilui where it occurs. It is related to hessonite, or cinnamon-stone. A Mexican variety occurs in rose-

pink dodecahedra. Romanzovite is a brown garnet, of grossularia-type, from Finland, taking its name from Count Romanzov. Andra-dite was named by J. D. Dana after B. J. d'Andrada e Silva, who

described, in 1800, one of its varieties allochroite, a Norwegian garnet, so named from its variable colour. This species includes most of the common garnet occurring in granular and compact masses, sometimes forming garnet rock. To andradite may be referred melanite, a black garnet well known from the volcanic tuffs near Rome, used occasionally in the 18th century for mourning jewelry. Another black garnet, in small crystals from the Pyrenees, is called pyreneite. Under andradite may also be placed topazolite, a honey-yellow garnet, rather like topaz, from Piedmont; colo- phonite, a brown resin-like garnet, with which certain kinds of idocrase have been confused; aplome, a green garnet from Saxony and Siberia; and jelletite, a green Swiss garnet named after" the Rev. J. H. Jellet. Here also may be placed the green Siberian mineral termed demantoid (? •».), sometimes improperly called olivine by jewellers. Uvarovite, named after a Russian minister, Count S. S. Uvarov, is a rare green garnet from Siberia and Canada, but though of fine colour is never found in crystals large enough for gem-stones. Spessartite, or spessartine, named after Spessart, a German locality, is a fine aurora-red garnet, cut for jewelry when sufficiently clear, and rather resembling cinnamon-stone. It is found in Ceylon, and notably in the mica-mines in Amelia county, Virginia, United States. A beautiful rose-red garnet, forming a fine gem-stone, occurs in gravels in Macon county, N.C., and has been described by W. E. Hidden and Dr J. H. Pratt under the name of rhodolite. It seems related to both almandine and pyrope, and shows the absorption-spectrum of almandine. The Bohemian garnets largely used in jewelry belong to the species pyrope (q.v.).

Garnets are not only cut as gems, but are used for the bearings of pivots in watches, and are in much request for abrasive purposes. Garnet paper is largely used, especially in America, in place of sand-paper for smoothing woodwork and for scouring leather in the boot-trade. As an abrasive agent it is worked at several localities in the United States, especially in New York State, along the borders of the Adirondacks, where it occurs in limestone and in gneiss. Much of the garnet used as an abrasive is coarse almandine. Common garnet, where abundant, has sometimes been used as a fluxing agent in metallurgical operations. Garnet has been formed artificially, and is known as a furnace-product.

It may be noted that the name of white garnet has been given to the mineral leucite, which occurs, like garnet, crystallized in icosi-tetrahedra. (F.W.R.)*

GARNETT, RICHARD (1835-1906), English librarian and author,

son of the learned philologist Rev. Richard Garnett (1789-1850), priest-vicar of Lichfield cathedral and afterwards keeper of printed books at the British Museum, who came of a Yorkshire family, was born at Lichfield on the 27th of February 1835. His father was really the pioneer of modern philological research in England; his articles in the Quarterly Review (1835, 1836) on English lexicography and dialects, and on the Celtic question, and his essays in the Transactions of the Philological Society (reprinted 1859), were invaluable to the later study of the English language. The son, who thus owed much to his parentage, was educated at home and at a private school, and in 1 85 1, just after his father's death, entered the British Museum as an assistant in the library-. In 1875 he rose to be superintendent of the reading-room, and from 1890 to 1899, when he retired, he was keeper of the printed books. In 1883 he was given the degree of LL.D. at Edinburgh, an honour repeated by other universities, and in 1895 he was made a C.B.

His long connexion with the British Museum library, and the value of his services there, made him a well-known figure in the literary world, and he published much original work in both prose and verse. His chief publications in book-form were: in verse. Primula (1858), lo in Egypt (1859), Idylls and Epigrams (1869, republished in 1892 as A Chaplet from the Greek Anthology), The Queen and other Poems (1902), Collected Poems (1893); in prose, biographies of Carlyle (1887), Emerson (1887), Milton (1890), Edward Gibbon Wakefield (1898); a volume of re- markably original and fanciful tales, The Twilight of the Gods (1888); a tragedy, Iphigenia in Delphi (1890); A Short History of Italian Literature (1898); Essays in Librarianship and Biblio- phily (1899); Essays of an Ex-librarian (1901). He was an extensive contributor to the Encyclopaedia Britannica and the Dictionary of National Biography, editor of the International Library of Famous Literature, and co-editor, with E. Gosse, of the elaborate English Literature: an illustrated Record. So multi- farious was his output, however, in contributions to reviews, &c,

and as translator or editor, that this list represents only a small part of his published work. He was a member of numerous learned literary societies, British and foreign. His facility as an expositor, and his gift for lucid and acute generalization, together with his eminence as a bibliophile, gave his work an authority which was universally recognized, though it sometimes suffered from his relying too much on his memory and his power of generalizing — remarkable as both usually were — in cases requiring greater precision of statement in matters of detail. But as an interpreter,

whether of biography or belles leltres, who brought an unusually wide range of book-learning, in its best sense, interestingly and comprehensibly before a large public, and at the same time acceptably to the canons of careful scholarship, Dr Garnett's writing was always characterized by clearness, common sense and sympathetic appreciation. His official career at the British Museum marked an epoch in the manage- ment of the library, in the history of which his place is second only to that of Panizzi. Besides introducing the " sliding press " in 1887 he was responsible for reviving the publication of the general catalogue, the printing of which, interrupted in 1841, was resumed under him in 1880, and gradually completed. The anti- podes of a Dryasdust, his human interest in books made him an ideal librarian, and his courtesy and helpfulness were outstanding features in a personality of singular charm. The whole bookish world looked on him as a friend. Among his " hobbies " was a study of astrology, to which, without associating his name with it in public, he devoted prolonged inquiry. Under the pseudonym of " A. G. Trent " he published in 1880 an article (in the Uni- versity Magazine) on " The Soul and the Stars " — quoted in Wilde and Dodson's Natal Astrology. He satisfied himself that there was more truth in the old astrology than modern criticism supposed, and he had intended to publish a further monograph on the subject, but the intention was frustrated by the ill-health which led up to his death on the 13 th of April 1906. He married (1863) an Irish wife, Olivia Narney Singleton (d. 1903), and had a family of six children; his son Edward (b. 1868) being a well- known literary man, whose wife translated Turgeneff's works into English. (H. Ch.)

GARNIER, CLEMENT JOSEPH (1813-1881), French econo- mist, was born at Beuil (Alpes maritimes) on the 3rd of October 1813. Coming to Paris he studied at the Ecole de Commerce, of which he eventually became secretary and finally a professor. In 1842 he founded with Gilbert-Urbain Guillaumin (1801-1864) the Societe d'Economie politique, becoming its secretary, a post which he held till his death; and in 1846 he organized the Association pour la Liberte des fichanges. He also helped to establish and edited for many years the Journal des economistes and the Annuaire de Veconomie politique. Of the school of laissezfaire, he was engaged during his whole life in the advance- ment of the science of political economy, and in the improve- ment of French commercial education. In 1873 he became a member of the Institute, and in 1876 a senator for the depart- ment in which he was born. He died at Paris on the 25th of September 1881. Of his writings, the following are the more important: Traits d'Sconomie politique (1845), Richard Cobden el la

Ligue (1846), Traiti des finances (1862), and Principes du population (1857).

GARNIER, GERMAIN, Marquis (1754-1821), French poli- tician and economist, was born at Auxerre on the 8th of November 1754. He was educated for the law, and obtained when young the office of procureur to the Chatelet in Paris. On the calling of the states-general he was elected as one of the deputes suppliants of the city of Paris, and in 1791 administrator of the department of Paris. After the 10th of August 1792 he withdrew to the Pays de Vaud, and did not return to France till 1795. In public life, however, he seems to have been singularly fortunate. In 1797 he was on the list of candidates for the Directory; in 1800 he was prefect of Seine-et-Oise; and in 1804 he was made senator and in r8o8 a count. After the Restoration he obtained a peerage, and on the return of Louis XVIII. , after the Hundred Days, he became minister of state and member of privy council, and in 1817 was created a marquis. He died at Paris on the 4th of

October 1821. At court he was, when young, noted for his facile power of writing society verse, but his literary reputation depends rather on his later works on political economy, especially his admirable translation, with notes and introduction, of Smith's Wealth of Nations (1805) and his Histoire de la monnaie (2 vols., 1819), which contains much sound and well-arranged material. His Abrege des principes de I'econ. polit. (1796) is a very clear and instructive manual. The valuable Description geographique, physique, el politique du departement de Seine-et-Oise (1802) was drawn up from his instructions. Other works are De la propriete (1792) and Histoire des banques d'escomple (1806).

GARNIER, JEAN LOUIS CHARLES (1825-1898), French architect, was born in Paris on the 6th of November 1825. He was educated in a primary school, and it was intended that he should pursue his father's craft, that of a wheelwright. His mother, however, having heard that with a little previous study he might enter an architect's office and eventually become a measuring surveyor (verificaleur) , and earn as much as six francs a day, and foreseeing that in consequence of his delicate health he would be unfit to work at the forge, sent him to learn drawing and mathematics at the Petite ficole de Dessin, in the rue de Medecine, the cradle of so many of the great artists of France. His progress was such as to justify his being sent first into an architect's office and then to the well-known atelier of Lebas, where he began his studies in preparation for the examination of the Ecole des Beaux Arts, which he passed in 1842, at the age of seventeen. Shortly after his admission it became necessary that he should support himself, and accordingly he worked during the day in various architects' offices, among them in that of M. Viollet-le-Duc, and confined his studies for the ficole to the evening. In 1848 he carried off, at the early age of twenty-three, the Grand Prix de Rome, and with his comrades in sculpture, engraving and music, set off for the Villa de Medicis. His principal works were the measured drawings of the Forum of Trajan and the temple of Vesta in Rome, and the temple of Serapis at Pozzuoli. In the fifth year of his travelling student- ship he went to Athens and measured the temple at Aegina, subsequently working out a complete restoration of it, with its polychromatic decoration, which was published as a monograph in 1877. The elaborate set of drawings which he was com- missioned by the due de Luynes to make of the tombs of the house of Anjou were not published, owing to the death of his patron; and since Garnier's death they have been given to the library of the Ecole des Beaux Arts, along with other drawings he made in Italy. On his return to Paris in 1853 he was appointed surveyor to one or two government buildings, with a very moderate salary, so that the commission given him by M. Victor Baltard to make two water-colour drawings of the Hotel de Ville, to be placed in the album presented to Queen Victoria in 1855, on the' occasion of her visit to Paris, proved very acceptable. These two drawings are now in the library at Windsor.

In i860 came, at last, Garnier's chance: a competition was announced for a design for a new imperial academy of music, and out of 163 competitors Gamier was one of five selected for a second competition, in which, by unanimous vote, he carried off the first prize, and the execution of the design was placed in his hands. Begun

in 1861, but delayed in its completion by the Franco-German War, it was not till 1875 that the structure of the present Grand Opera House of Paris was finished, at a 'cost of about 3 5 ,000,000 francs (£1 ,420,000) . During the war the build- ing was utilized as the municipal storehouse of provisions. The staircase and the magnificent hall are the finest portion of the interior, and alike in conception and realization have never been approached. Of Garnier's other works, the most remarkable are the Casino at Monte Carlo, the Bischoffsheim villa at Bordighera, the Hotel du Cercle de la Librairie in Paris; and, among tombs, those of the musicians Bizet, Offenbach, Masse and Duprato. In 1874 he was elected a member of the Institute of France, and after passing through the grades of chevalier, officer and com- mander of the Legion of Honour, received in 1895 the rank of grand officer, a high distinction that had never before been granted to an architect. Charles Garnier's reputation was not

confined to France; it was recognized by all the countries of Europe, and in England he received, in 1886, the royal gold medal of the Royal Institute of Architects, given by Queen Victoria. Besides his monograph on the temple of Aegina, he wrote several works, of which Le Nouvel Opera de Paris is the most valuable. For the International Exhibition of 1889 he designed the buildings illustrating the " History of the House " in all periods, and a work on this subject was afterwards published by him in conjunction with M. Ammann. Not the least of his claims to the gratitude of his country were the services which he rendered on the various art juries appointed by the state, the Institute of France, and the ficole des Beaux-Arts, services which in France are rendered in an honorary capacity. Gamier died on the 3rd of August 1898. (R. P. S.)

GARNIER, MARIE JOSEPH FRANCOIS [Francis] (1839- 1873), French officer and explorer, was born at St Etienne on the 25th of July 1839. He entered the navy, and after voyaging in Brazilian waters and the Pacific he obtained a post on the staff of Admiral Charner, who from i860 to 1862 was campaign- ing in Cochin-China. After some time spent in France he returned to the East, and in 1862 he was appointed inspector of the natives in Cochin-China, and entrusted with the administra- tion of Cho-lon, a suburb of Saigon. It was at his suggestion that the marquis de Chasseloup-Laubat determined to send a mission to explore the valley of the Mekong, but as Gamier was not considered old enough to be put in command, the chief authority was entrusted to Captain Doudart de Lagree. In the course of the expedition — to quote the words of Sir Roderick Murchison addressed to the youthful traveller when, in 1870, he was presented with the Victoria Medal of the Royal

Geographical Society of London — from Kratie in Cambodia to Shanghai 5392 m. were traversed, and of these 3625 m., chiefly of country unknown to European geography, were surveyed with care, and the positions fixed by astronomical observations, nearly the whole of the observations being taken by Gamier himself. Volunteering to lead a detachment to Talifu, the capital of Sultan Suleiman, the sovereign of the Mahommedan rebels in Yunnan, he success- fully carried out the more than adventurous enterprise. When shortly afterwards Lagree died, Gamier naturally assumed the command of the expedition, and he conducted it in safety to the Yang-tsze-Kiang, and thus to the Chinese coast. On his return to France he was received with enthusiasm. The preparation of his narrative was interrupted by the Franco-German War, and during the siege of Paris he served as principal staff officer to the admiral in command of the eighth " sector." His experiences during the siege were published anonymously in the f euilleton of Le Temps, and appeared separately as Le Siege de Paris, journal d'un officier de marine (1871). Returning to Cochin-China he found the political circumstances of the country unfavourable to further exploration, and accordingly he went to China, and in 1873 followed the upper course of the Yang-tsze-Kiang to the waterfalls. He was next commissioned by Admiral Dupre, governor of Cochin-China, to found a French protectorate or a new colony in Tongking. On the 20th of November 1873 he took Hanoi, the capital of Tongking, and on the 21st of December he was slain in fight with the Black Flags. His chief fame rests on the fact that he originated the idea of exploring the Mekong, and carried out the larger portion of the work.

The narrative of the principal expedition appeared in 1873, as Voyage d' exploration en Indo-Chine effectue pendant les annees 1866, 1867 et 1868, publie sous la direction de M. Francis Gamier, avec le concours de M. Delaporte et de MM. Joubert et Thorel (2 vols.). An account of the Yang-tsze-Kiang from Garnier's pen is given in the Bulletin de la Soc. de Geog. (1874). His Chronique royale du Cambodje, was reprinted from the Journal Asialique in 1872. See Ocean Highways (1874) for a memoir by Colonel Yule; and Hugh Clifford, Further India, in the Story of Exploration series (1904).

GARNIER, ROBERT (c. 1545-C.1600), French tragic poet, was born at Ferte Bernard (Le Maine) in 1545. He published his first work while still a law-student at Toulouse, where he won a prize (1565) in the jeux floraux. It was a collection of lyrical pieces, now lost, entitled Plaintes amoureuses de Robert Gamier (1565). After some practice at the Parisian bar, he became

consciller du roi au siege presidial et senechaussee of Le Maine, his native district, and later lieutenant-general criminel. His friend Lacroix du Maine says that he enjoyed a great reputation as an orator. He was a distinguished magistrate, of considerable weight in his native province, who gave his leisure to literature, and whose merits as a poet were fully recognized by his own generation. He died at Le Mans probably in 1599 or 1600.

In his early plays he was a close follower of the school of dramatists who were inspired by the study of Seneca. In these productions there is little that is strictly dramatic except the form. A tragedy was a series of rhetorical speeches relieved by a lyric chorus. His pieces in this manner are Porcie (published 1568, acted at the hotel de Bourgogne in 1573), Cornelie and Hippolyte (both acted in 1573 and printed in 1574)- In Porcie the deaths of Cassius, Brutus and Portia are each the subject of an eloquent recital, but the action is confined to the death of the nurse, who alone is allowed to die on the stage. His next group of tragedies — Marc-Antoine (1578), La Troade (1579). Antigone (acted and printed 1580) — shows an advance on the theatre of Etienne Jodelle and Jacques Grevin, and on his own early plays, in so much that the rhetorical element is accompanied by abund- ance of action, though this is accomplished by the plan of joining together two virtually independent pieces in the same way.

In 1582 and 1583 he produced his two masterpieces Brada- mante and Les Juives. In Bradamante, which alone of his plays has no chorus, he cut himself adrift from Senecan models, and sought his subject in Ariosto, the result being what came to be known later as a tragi-comedy. The dramatic and romantic story becomes a real drama in Garnier's hands, though even there the lovers, Bradamante and Roger, never meet on the stage. The contest in the mind of Roger supplies a genuine dramatic interest in the manner of Corneille. Les Juives is the pathetic story of the barbarous vengeance of Nebuchadnezzar on the Jewish king Zedekiah and his children. The Jewish women lamenting the fate of their children take a principal part in this tragedy, which, although almost entirely elegiac in conception, is singularly well designed, and gains unity by the personality of the prophet. M. Faguet says that of all French tragedies of the 16th and 17th centuries it is, with Athalie, the best constructed with regard to the requirements of the stage. Actual

representa- tion is continually in the mind of the author; his drama is, in fact, visually conceived.

Gamier must be regarded as the greatest French tragic poet of his century and the precursor of the great achievements of the next.

The best edition of his works is by Wendelin Foerster (Heilbronn, 4 vols., 1 882-1883). A detailed criticism of his works is to be found in £mile Faguet, La Tragedie francaise au XVI e Steele (1883, pp.

183-307).

GARNIER-PAGES, ETIENNE JOSEPH LOUIS (1801-1841), French politician, was born at Marseilles on the 27th of December 1 801. Soon after his birth his father Jean Francois Gamier, a naval surgeon, died, and his mother married Simon Pages, a college professor, by whom she had a son. The boys were brought up together, and took the double name Garnier-Pages. Etienne found employment first in a commercial house in Marseilles, and then irtan insurance office in Paris. In 1825 he began to study law, and made some mark as an advocate. A keen opponent of the Restoration, he joined various democratic societies, notably the Aide-toi, le del t'aidera, an organization for purifying the elections. He took part in the revolution of July 1830; became secretary of the Aide-toi, le del t'aidera, whose propaganda he brought into line with his anti-monarchical ideas; and in 1831 was sent from Isere to the chamber of deputies. He was con- cerned in the preparation of the Compte rendu of 1832, and advocated universal suffrage. He was an eloquent speaker, and his sound knowledge of business and finance gave him a marked influence among all parties in the chamber. He died in Paris on the 23rd of June 1841.

His half-brother, Louis Antoine Garnier-Pages (1803- 1878), fought on the barricades during the revolution of July 1830, and after Etienne's death was elected to the chamber of

deputies (1842). He was a keen promoter of reform, and was a leading spirit in the affair of the reform banquet fixed for the 22nd of February 1848. He was a member of the provisional government of 1848, and was named mayor of Paris. On the 5th of March 1848 he was made minister of finance, and incurred great unpopularity by the imposition of additional taxes. He was a member of the Constituent Assembly and of the Executive Commission. Under the Empire he was conspicuous in the republican opposition and opposed the war with Prussia, and after the fall of Napoleon III. became a

member of the Govern- ment of National Defence. Unsuccessful at the elections for the National Assembly (the 8th of February 1871), he retired into private life, and died in Paris on the 31st of October 1878. He wrote Histoire de la revolution de 1848 (1860-1862); Histoire de la commission executive (1869-1872); and L 'Opposition etl 'empire

(1872).

GARNISH, a word meaning to fit out, equip, furnish, now particularly used of decoration or ornament. It is formed from the 0. Fr. garnisant or guarnissant, participle of gamir, guarnir, to furnish, equip. This is of Teutonic origin, the base being represented in O. Eng. warnian, to take warning, beware, and Ger. warnen, to warn, Eng. warn; the original sense would be to guard against, fortify, hence equip or fit out. The meaning of " warn " is seen in the law term " garnishee," a person who owes money to or holds money belonging to another and is " warned " by order of the court not to pay it to his immediate creditor but to a third' person who has obtained final judgment against that creditor. (See Attachment; Execution; Bankruptcy.)

GARO HILLS, a district of British India, in the hills division of Eastern Bengal and Assam. It takes its name from the Garos, a tribe of doubtful ethnical affinities and peculiar customs, by whom it is almost entirely inhabited. The Garos are probably a section of the great Bodo tribe, which at one time occupied a large part of Assam. According to the census of 1901 they numbered 128,117. In the 1 8th century they are mentioned as being frequently in conflict with the inhabitants of the plains below their hills, and in 1790 the British government first tried to reduce them. No permanent success was achieved. In 1852 raids by the Garos were followed by a blockade of the hills, but in 1856 they were again in revolt. Again a repressive expedition was despatched in 1861, but in 1866 there was a further raid. A British officer was now posted among the hills; this step was effective; in 1869 the district was constituted, and though in 1871 an outrage was committed against a native on the survey staff, there was little opposition when an expedition was sent in 187 2-1873 to bring the whole district into submission, and there were thereafter no further disturbances.

The district consists of the last spurs of the Assam hills, which here run down almost to the bank of the Brahmaputra, where that river debouches upon the plain of Bengal and takes its great sweep to the south. The administrative headquarters are at Tura. The area of the

district is 3140 sq. m. In 1901 the population was 138,274, showing an increase of 14% in the decade. The American missionaries maintain a small training school for teachers. The public buildings at Tura were entirely destroyed by the earthquake of June 12, 1897, and the roads in the district were greatly damaged by subsidence and fissures. Coal in large quantities and petroleum are known to exist. The chief exports are cotton, timber and forest products. Trade is small, though the natives, according to their own standard, are prosperous. They are fair agriculturists. Communications within the district are by cart-roads, bridle-paths and native tracks.

GARONNE (Lat. Garumna), a river of south-western France, rising in the Maladetta group of the Pyrenees, and flowing in a wide curve to the Atlantic Ocean. It is formed by two torrents, one of which has a subterranean course of 25 m., disappearing in the sink known as the Trou du Taureau (" bull's hole ") and reappearing at the Goueil de Joueou. After a course of 30 m. in Spanish territory, during which it flows through the fine gorge called the Vallee d'Aran, the Garonne enters France in the department of Haute Garonne through the narrow defile of the

Pont du Roi, and at once becomes navigable for rafts. At Montrejeau it receives on the left the Neste, and encountering at this point the vast plateau of Lannemezan is forced to turn abruptly east, flowing in a wide curve to Toulouse. At Saint Martory it gives off the irrigation canal of that name. At this point the Garonne enters a fertile plain, and supplies the motive power to several mills. It is joined on the right by various streams fed by the snows of the Pyrenees. Such are the Salat, at whose confluence river navigation proper begins, and the Arize andtheAriege (both names signifying " river"). From Toulouse the Garonne flows to the north-west, now skirting the northern border of the plateau of Lannemezan which here drains into it, the principal streams being the Save, the Gers and the Bai'se. On its right hand the Garonne is swelled by its two chief tributaries, the Tarn, near Moissac, and the Lot, below Agen; farther down it is joined by the Drot (or Dropt), and on the left by the Ciron. Between Toulouse and Castets, 33ˆ m. above Bordeaux, and the highest point to which ordinary spring-tides ascend, the river is accompanied at a distance of from a 5 to 3 m. by the so-called " lateral canal " of the Garonne, constructed in 1838-1856. This canal is about 120 m. long, or 133 m. including its branches, one of which

runs off at right angles to Montauban on the Tarn. From Toulouse to Agen the main canal follows the right bank of the Garonne, crossing the Tarn on an aqueduct at Moissac, while another magnificent aqueduct of twenty-three arches carries it at Agen from the right to the left bank of the river. It has a fall of 420 ft. and over fifty locks, and is navigable for vessels having the maximum dimensions of 985 ft. length, 19 ft. breadth and 65 ft. draught. The carrying trade upon it is chiefly in agricultural produce and provisions, building materials, wood and industrial products. At Toulouse the canal connects with the Canal du Midi, which runs to the Mediterranean. After passing Castets the Garonne begins to widen out considerably, and from being 160 yds. broad at Agen increases to about 650 yds. at Bordeaux, its great commercial port. From here it flows with ever increasing width between two flat shores to the Bee d'Ambes (155 m.), where, after a course of 357 m., it unites with the Dordogne to form the vast estuary known as the Gironde. The triangular peninsula lying between these two great tidal rivers is called Entre-deux-mers (" between two seas ") and is famous for its wines. The drainage area of the Garonne is nearly 33,000 sq. m. Floods are of common occurrence, and descend very suddenly. The most disastrous occurred in 1875, 1856 and in 1770, when the flood level at Castets attained the record height of 42J ft. above low-water mark.

GARRET (from the O. Fr. garile, modern gutrite, a watch- tower, connected ultimately with " guard " and " ward "), properly a small look-out tower built on a wall, and hence the name given to a room on the top storey of a building, the sloping ceiling of which is formed by the roof.

GARRETT, JOAO BAPTISTA DA SILVA LEITAO DE ALMEIDA, Visconde de Almeida-Garrett (1 799-1854), perhaps the greatest Portuguese poet since Camoens, was of Irish descent. Born in Oporto, his parents moved to the Quinta do Castello at Gaya when he was five years old. The French invasion of Portugal drove the family to the Azores, and Garrett made his first studies at Angra, beginning to versify at an early age under the influence of his uncle, a poet of the school of Bocage. Going to the university of Coimbra in 1816, he soon earned notoriety by the precocity of his talents and his fervent Liberalism, and there he gained his first oratorical and literary successes. His tragedy Lucrecia was played there in February iSiq, and during this period he also wrote Merope as well as a great part of Calo, all these plays belonging to the so-called classical school. Leaving Coimbra with a law degree, he pro- ceeded to Lisbon, and on the nth of November 1822 married D. Luiza Midosi; but the alliance proved unhappy and a formal separation took place in 1839.

The reactionary movement against the Radical revolution of 1820 reached its height in 1823, and Garrett had to leave Portugal by order of the Absolutist ministry then in power, and went to England. He became acquainted with the masterpieces of

the English and German romantic movements during his stay abroad.

Imbued with the spirit of nationality, he wrote in 1824 at Havre the poem " Camoes," which destroyed the influence of the worn-out classical and Arcadian rhymers, and in the following year composed the patriotic poem " D. Branca," or " The Conquest of the Algarve." He was permitted to return to Portugal in 1826, and thereupon devoted himself to journalism. With the publication of Porluguez, he raised the tone of the press, exhibiting an elevation of ideas and moderation of language then unknown in political controversy, and he introduced the " feuilleton." But his defence of Liberal principles brought him three months' imprisonment, and when D. Miguel was proclaimed absolute king on the 3rd of May 1828, Garrett .had again to leave the country. In London, where he sought refuge, he continued his adhesion to romanticism by publishing Adozinda and Bernal- Francez, expansions of old folk-poems, which met with the warmest praise from Southey and were translated by Adamson. He spent the next three years in and about Birmingham, Warwick and London, engaged in writing poetry and political pamphlets, and by these and by his periodicals he did much to unite the Portuguese emigres and to keep up their spirit amid their sufferings in a foreign land. Learning that an expedition was being organized in France for the liberation of Portugal, Garrett raised funds and joined the forces under D. Pedro as a volunteer. Sailing in February 1832, he disembarked at Terceira, whence he passed to S. Miguel, then the seat of the Liberal government. Here he became a co-operator with the statesman Mousinho da Silveira, and assisted him in drafting those laws which were to revolutionize the whole framework of Portuguese society, this important work being done far from books and without pecuniary reward. In his spare time he wrote some of the beautiful lyrics afterwards collected into Flores sent Fructo. He took part in the expedition that landed at the Mindello on the 8th of July 1832, and in the occupation of Oporto. Early in the siege he sketched out, under the influence of Walter Scott, the historical romance Arco de Sant' Anna, descriptive of the city in the reign of D. Pedro I.; and, in addition, he organized the Home and Foreign offices under the marquis of Palmella, drafted many important royal decrees, and prepared the criminal and commercial codes. In the following November he was de- spatched as secretary to the marquis on a diplomatic mission to foreign courts, which involved him in

much personal hardship. In the next year the capture of Lisbon enabled him to return home, and he was charged to prepare a scheme for the reform of public instruction.

In 1834-1835 he served as consul-general and charge d'affaires at Brussels, representing Portugal with distinction under most difficult circumstances, for which he received no thanks and little pay. When he got back, the government employed him to draw up a proposal for the construction of a national theatre and for a conservatoire of dramatic art, of which he became the head. He instituted prizes for the best plays, himself revising nearly all that were produced, and a school of dramatists and actors arose under his influence. To give them models, he proceeded to write a series of prose dramas, choosing his subjects from Portuguese history. He began in 1838 with the Ajito de Gil Vicente, considering that the first step towards the re- creation of the Portuguese drama was to revive the memory of its founder, and he followed this up in 1842 by the Alfageme de Saniarem, dealing with the Holy Constable, and in 1843 by Frei Luiz de Sousa, one of the few great tragedies of the 19th century, a work as intensely national as The Lusiads. The story, which in part is historically true, and has the merit of being simple, like the action, is briefly as follows. D. Joao de Portugal, who was supposed to have died at the battle of Alcacer, returns, years afterwards, to find his wife married to Manoel de Sousa and the mother of a daughter by him, named Maria. Thereupon the pair separate and enter religion, and Manoel becomes the famous chronicler, Frei Luiz de Sousa (q.v.). The characters live and move, especially Telmo, the old servant, who would never believe in the death of his former master D. Joao, and the consumptive

child Maria, who helps Telmo to create the atmosphere of impending disaster; while the episodes, particularly those of the return of D. Joao and the death of Maria, are full of power, and the language is Portuguese of the best.

Entering parliament in 1837, Garrett soon made his mark as an orator. In that year he delivered many notable discourses in defence of liberal ideas. He also brought in a literary copyright bill, which, when it became law in 1851, served as a precedent for similar legislation in England and Prussia. In 1840 he made his famous speech known as Porto Pyreu, in which he skilfully turned the well-

known anecdote of the " mad Athenian " against his opponents. While attending with assiduity to his duties as a deputy, he wrote, about this time, the drama D. Filippa de Vilhena, founded on an incident in the revolution of 1640, for representation by the pupils of the conservatoire, and the session of 1841 saw another of his oratorical triumphs in his speech against the law of tithes. In July 1843 an excursion to Santarem resulted in his prose masterpiece Viagens na minha terra, at once a novel and a miscellany of literary, political and philosophic criticism, written without plan or method, easy, jovial and epigrammatic. He took no part in the civil war that followed the revolution of Maria da Fonte, but continued his literary labours, producing in 1848 the comedy A Sobrinha do Marquez, dealing with the times of Pombal, and in 1849 an historical memoir on Mousinho da Silveira. He spent much of the year 1850 in finishing his Romanceiro, a collection of folk- poetry of which he was the first to perceive the value; and in June 1 8 5 1 he was created a viscount. In the following December he drew up the additional act to the constitutional charter, and his draft was approved by the ministers at a cabinet meeting in his house. Further, he initiated the Conselho Ultramarino; and the Law of the Misericordias, with its preamble, published in 1852, was entirely from his pen. In the same year he became for a short time minister of foreign affairs. In 1853 he brought out Folhas Cahidas, a collection of short poems ablaze with passion and exquisite in form, of which his friend Herculano said: " if Camoens had written love verses at Garrett's age, he could not have equalled him." His final literary work was a novel, Helena, which he left unfinished, and on the 10th of February 1854 he made his last notable speech in the House. He died on the 9th of December 1854, and on the 3rd of May 1903 his re- mains were translated to the national pantheon, the Jeronymos at Belem, where they rest near to those of Camoens. As poet, novelist, journalist, orator and dramatist, he deserves the remark of Rebello da Silva: " Garrett was not a man of letters only but an entire literature in himself."

Besides his strong religious faith, Garrett was endowed with a deep sensibility, a creative imagination, rare taste and a singular capacity for sympathy. Thus, though a learned man and an able jurist, he was bound to be first and always an artist. His artistic temperament explains his many-sided activity, his expansive kindliness, his seductive charm, especially for women, his patriot- ism, his aristocratic pretensions, his huge vanity and dandyism, and the ingenuousness that absolves him from many faults in an irregular life. From his rich artistic nature sprang his profound, sincere, sensual and melancholy lyrics, the variety and perfection of his

scenic creations, the splendour of his eloquence, the truth of his comic vein, the elegance of his lighter compositions. Two books stand out in bold relief from among his writings: Folhas Cahidas, and that tragedy of fatality and pity, Fret Luiz de Sousa, with its gallery of noble figures incarnating the truest realism in an almost perfect prose form. The complete collection of his works comprises twenty-four volumes and there are several editions.

Authorities. — Gomes de Amorim, Garrett, memorias biographicas (3 vols., Lisbon, 1881-1888); D. Romero Ortiz, La Litteratura Portuguesa en el siglo XIX (Madrid, 1869), pp. 165-221 ; Dr Theophilo Braga, Garrett e o romantismo (Oporto, 1904), and Garrett e os dramas romanticos (Oporto, 1905), with a full bibliography; Innocencio da Silva, Diccionario bibliographico Portuguez, vol. iii. pp. 309-316, and vol. x. pp. 180-185. See Revue encyclopedique Larousse, No. 284, for a bibliography of the foreign translations of Garrett. Frei Luiz de Sousa was translated by Edgar Prestage under the title Brother Luiz de Sousa (London, 1909). (E. Pr.)

GARRETTING, properly Galletting, a term in architecture for the process in which the " gallets " or small splinters of stone are inserted in the joints of coarse masonry to protect the mortar joints; they are stuck in while the mortar is wet.

GARRICK, DAVID (1717-1779), English actor and theatrical manager, was descended from a good French Protestant family named Garric or Garrique of Bordeaux, which had settled in England on the revocation of the Edict of Nantes. His father, Captain Peter Garrick, who had married Arabella Clough, the daughter of a vicar choral of Lichfield cathedral, was on a re- cruiting expedition when his famous third son was born at Here- ford on the 19th of February 1717. Captain Garrick, who had made his home at Lichfield, where he had a large family, in 1731 rejoined his regiment at Gibraltar. This kept him absent from home for many years, during which letters were written to him by " little Davy," acquainting him with the doings at Lichfield. When the boy was about eleven years old he paid a short visit to Lisbon where his uncle David had settled as a wine merchant. On his father's return from Gibraltar, David, who had previously been educated at the grammar school of Lichfield, was, largely by the advice of Gilbert Walmesley, registrar of the ecclesiastical court, sent with his brother George to the "academy" at Edial. just opened in June or July 1736 by Samuel Johnson, the senior by seven years of David, who was then nineteen. This seminary was, however, closed in about six months, and on the 2nd

of March 1736/7 both Johnson and Garrick left Lichfield for London — Johnson, as he afterwards said, " with twopence halfpenny in his pocket," and Garrick " with three-halfpence in his." Johnson, whose chief asset was the MS. tragedy of Irene, was at first the host of his former pupil, who, however, before the end of the year took up his residence at Rochester with John Colson (afterwards Lucasian professor at Cambridge). Captain Garrick died about a month after David's arrival in London. Soon afterwards, his uncle, the wine merchant at Lisbon, having left David a sum of £1000, he and his brother entered into partnership as wine merchants in London and Lichfield, David taking up the London business. The concern was not prosperous —though Samuel Foote's assertion that he had known Garrick with three quarts of vinegar in the cellar calling himself a wine merchant need not be taken literally — and before the end of 1741 he had spent nearly half of his capital.

His passion for the stage completely engrossed him ; he tried his hand both at dramatic criticism and at dramatic authorship. His first dramatic piece, Lethe, or Aesop in the Shades, which he was thirty-seven years later to read from a splendidly bound transcript to King George III. and Queen Charlotte, was played at Drury Lane on the 15th of April 1740; and he became a well- known frequenter of theatrical circles. His first appearance on the stage was made in March 1741, incognito, as harlequin at Goodman's Fields, Yates, who was ill, having allowed him to take his place during a few scenes of the pantomime entitled Harlequin Student, or The Fall of Pantomime with the Restoration of the Drama. Garrick subsequently accompanied a party of players from the same theatre to Ipswich, where he played his first part as an actor under the name of Lyddal, in the character of Aboan (in Southerne's Oroonoko). His success in this and other parts determined his future career. On the 19th of October 1741 he made his appearance at Goodman's Fields as Richard III. and gained the most enthusiastic applause. Among the audience was Macklin, whose performance of Shylock, early in the same year, had pointed the way along which Garrick was so rapidly to pass in triumph. On the morrow the latter wrote to his brother at Lichfield, proposing to make arrangements for his withdrawal from the partnership, which, after much distressful complaint on the part of his family, met by him with the utmost consideration, were ultimately carried into effect. Meanwhile, each night had added to his popularity on the stage. The town, as Gray (who, like Horace Walpole, at first held out against the furore) declared, was " horn-mad " about him. Before his Richard had exhausted its original effect, he won new applause as Aboan, and soon afterwards as Lear

and as Pierre in Otway's Venice Preserved, as well as in several comic characters (including that of Bayes).

Glover (" Leonidas ") attended every performance; the duke of Argyll, Lords Cobham and Lyttelton, Pitt, and several other members of parliament testified their admiration. Within the first six months of his theatrical career he acted in eighteen characters of all kinds, and from the 2nd of December he appeared in his own name. Pope went to see him three times during his first performances, and pronounced that " that young man never had his equal as an actor, and he will never have a rival." Before next spring he had supped with " the great Mr Murray, counsellor," and was engaged to do so with Mr Pope through Murray's introduction, while he was dining with Halifax, Sand- wich and Chesterfield. " There was a dozen dukes of a night at Goodman's Fields," writes Horace Walpole. Garrick's farce of The Lying Valet, in which he performed the part of Sharp, was at this time brought out with so much success that he ventured to send a copy to his brother.

His fortune was now made, and while the managers of Covent Garden and Drury Lane resorted to the law to make Giffard, the manager of Goodman's Fields, close his little theatre, Garrick was engaged by Fleetwood for Drury Lane for the season of 1 742. In June of that year he went over to Dublin, where he found the same homage paid to his talents as he had received from his own countrymen. He was accompanied by Margaret (Peg) Woffing- ton, of whom he had been for some time a fervent admirer. (His claim to the authorship of the song to Lovely Peggy is still sub judice. There remains some obscurity as to the end of their liaison.) From September 1742 to April 1745 he played at Drury Lane, after which he again went over to Dublin. Here he remained during the whole season, as joint-manager with Sheridan, in the direction and profits of the Theatre Royal in Smock Alley. In 1 746-1 747 he fulfilled a short engagement with Rich at Covent Garden, his last series of performances under a management not his own. With the close of that season Fleet- wood's patent for the management of Drury Lane expired, and Garrick, in conjunction with Lacy, purchased the property of the theatre, together with the renewal of the patent; contributing £8000 as two-thirds of the purchase-money. In September 1747 it was opened with a strong company of actors, Johnson's prologue being spoken by Garrick, while the epilogue,

written by him, was spoken by Mrs Woffington. The negotiations involved Garrick in a bitter quarrel with Macklin, who appears to have had a real grievance in the matter. Garrick took no part himself till his performance of Archer in the Beaux' Stratagem, a month after the opening. For a time at least " the drama's patrons " were content with the higher entertainment furnished them; in the end Garrick had to " please " them, like most other managers, by gratifying their love of show. Garrick was surrounded by many players of eminence, and he had the art, as he was told by Mrs Clive, " of contradicting the proverb that one cannot make bricks without straw, by doing what is infinitely more difficult, making actors and actresses without genius." He had to en- counter very serious opposition from the old actors whom he had distanced, and with the younger actors and actresses he was involved in frequent quarrels. But to none of them or their fellows did he, so far as it appears, show that jealousy of real merit from which so many great actors have been unable to remain free. For the present he was able to hold his own against all competition. The naturalness of his acting fascinated those who, like Partridge in Tom Jones, listened to nature's voice, and justified the preference of more conscious critics. To be " pleased with nature " was, as Churchill wrote, in the Rosciad (1761), 1 to be pleased with Garrick. For the stately declamation, the sonorous, and beyond a doubt impressive, chant of Quin and his fellows, Garrick substituted rapid changes of passion and humour in both voice and gesture, which held his audiences spellbound. " It seemed," wrote Richard Cumberland, " as if a whole century had been stepped over in the passage of a single scene; old things were done away, and a new order at once brought forward,

1 In the subsequent Apology addressed to the Critical Reviewers, Churchill revenged himself for the slight which he supposed Garrick to have put upon him, by some spiteful lines, which, however, Garrick requited by good-humoured kindness.

bright and luminous, and clearly destined to dispel the barbarisms of a tasteless age, too long superstitiously devoted to the illusions of imposing declamation." Garrick's French descent and his education may have contributed to give him the vivacity and versatility which distinguished him as an actor; and nature had given him an eye, if not a stature, to command, and a mimic power of wonderful variety. The list of his characters in tragedy, comedy and farce is large, and would be extraordinary for a modern actor of high rank; it includes not less than seventeen Shakespearian parts. As a manager, though he committed some grievous blunders, he did good service to the theatre and signally advanced the popularity of Shakespeare's plays,

of which not less than twenty-four were produced at Drury Lane under his management. Many of these were not pure Shakespeare; and he is credited with the addition of a dying speech to the text of Macbeth. On the other hand, Tate Wilkinson says that Garrick's production of Hamlet in 1773 was well received at Drury Lane even by the galleries, " though without their favourite acquaint- ances the gravediggers." Among his published adaptations are an opera, The Fairies (from Midsummer Night's Dream) (1755); an opera The Tempest (1756); Catherine and Petruchio (1758); Florizel and Perdita (1762). But not every generation has the same notions of the way in which Shakespeare is best honoured. Few sins of omission can be charged against Garrick as a manager, but he refused Home's Douglas, and made the wrong choice between False Delicacy and The Good Natur'd Man. For the rest, he purified the stage of much of its grossness, and introduced a relative correctness of costume and decoration unknown before. To the study of English dramatic literature he rendered an important service by bequeathing his then unrivalled collection of plays to the British Museum.

After escaping from the chains of his passion for the beautiful but reckless Mrs Woffington, Garrick had in 1749 married Mademoiselle Violette (Eva Maria Veigel), a German lady who had attracted admiration at Florence or at Vienna as a dancer, and had come to England early in 1746, where her modest grace and the rumours which surrounded her created a. furore, and where she found enthusiastic patrons in the earl and countess of Burling- ton. Garrick, who called her " the best of women and wives," lived most happily with her in his villa at Hampton, acquired by him in 1754, whither he was glad to escape from his house in Southampton Street. To this period belongs Garrick's quarrel with Barry, the only actor who even temporarily rivalled him in the favour of the public. In 1763 Garrick and his wife visited Paris, where they were cordially received and made the acquaint- ance of Diderot and others at the house of the baron d'Holbach. It was about this time that Grimm extolled Garrick as the first and only actor who came up to the demands of his imagination; and it was in a reply to a pamphlet occasioned by Garrick's visit that Diderot first gave expression to the views expounded in his Parodoxe sur le comSdien. After some months spent in Italy, where Garrick fell seriously ill, they returned to Paris in the autumn of 1764 and made more friends, reaching London in April 1765. Their union was childless, and Mrs Garrick survived her husband until 1822. Her portrait by Hogarth is at Windsor Castle.

Garrick practically ceased to act in 1 766, but he continued the

management of Drury Lane, and in 1769 organized the Shakespeare celebrations at Stratford-on-Avon, an undertaking which ended in dismal failure, though he composed an " Ode upon dedicating a building and erecting a Statue to Shakespeare " on the occasion. (See, inter'alia, Garrick's Vagary, or England Run Mad; with particulars 0} the Stratford Jubilee, 1769.) Of his best supporters on the stage, Mrs Cibber, with whom he had been reconciled, died in 1766, and Mrs (Kitty) Clive retired in 1769; but Garrick contrived to maintain the success of his theatre. He sold his share in the property in 1776 for £35,000, and took leave of the stage by playing a round of his favourite characters — Hamlet, Lear, Richard and Benedick, among Shakespearian parts; Lusignan in Zara, Aaron Hill's adaptation of Voltaire's Zaire; and Kitely in his own adaptation of Ben Jonson's Every Man in his Humour; Archer in Farquhar's Beaux' Stratagem;

Abel Drugger in Ben Jonson's Alchemist; Sir John Brute in Vanbrugh's Provoked Wife; Leon in Fletcher's Rule a Wife and have a Wife. He ended the series, as Tate Wilkinson says, " in full glory " with " the youthful Don Felix " in Mrs Centlivre's Wonder on the ioth of June 1776. He died in London on the 20th of January 1779. He was buried in Westminster Abbey at the foot of Shakespeare's statue with imposing solemnities. An elegy on his death was published by William Tasker, poet and physiognomist, in the same year.

In person, Garrick was a little below middle height; in his later years he seems to have inclined to stoutness. The extra- ordinary mobility of his whole person, and his power of as it were transforming himself at will, are attested by many anecdotes and descriptions, but the piercing power of his eye must have been his most irresistible feature.

Johnson, of whose various and often merely churlish remarks on Garrick and his doings many are scattered through the pages of Boswell, spoke warmly of the elegance and sprightliness of his friend's conversation, as well as of his liberality and kindness of heart ; while to the great actor's art he paid the exquisite tribute of describing Garrick's sudden death as having " eclipsed the gaiety of nations, and impoverished the public stock of harmless pleasure." But the most discriminating character of Garrick, slightly tinged with satire, is that drawn by Goldsmith in his poem of Retaliation. Beyond a doubt he was not without a certain moral timidity contrasting

strangely with his eager temperament and alertness of intellect; but, though he was not cast in a heroic mould, he must have been one of the most amiable of men. Garrick was often happy in his epigrams and occasional verse, including his numerous prologues and epilogues. He had the good taste to recognize, and the spirit to make public his recognition of, the excellence of Gray's odes at a time when they were either ridiculed or neglected. His dramatic pieces, The Lying Valet, adapted from Motteux's Novelty Lethe (1740), The Guardian, Linco's Travels (1767), Miss in her Teens (1747), Irish Widow, &c, and his alterations and adaptations of old plays, which together fill four volumes, evinced his knowledge of stage effect and his appreciation of lively dialogue and action; but he cannot be said to have added one new or original character to the drama. He was joint author with Colman of The Clan- destine Marriage (1766), in which he is said to have written his famous part of Lord Ogleby. The excellent farce, High Life below Stairs, appears to have been wrongly attributed to Garrick, and to be by James Townley. His Dramatic Works (1798) fill three, his Poetic (1735) two volumes.

Garrick's Private Correspondence (published in 1 831-183 2 with a short memoir by Boaden, in 2 vols. 4to), which includes his extensive Foreign Correspondence with distinguished French men and women, and the notices of him in the memoirs of Cumberland, Hannah More and Madame D'Arblay, and above all in Boswell's Life of Johnson, bear testimony to his many attractive qualities as a companion and to his fidelity as a friend. Bibliography. — A collection of imprinted Garrick letters is in the Forster library at South Kensington. A list of publications of all kinds for and against Garrick will be found in R. Lowe's Biblio- graphical History of English Theatrical Literature (1887). The earlier biographies of Garrick are by Arthur Murphy (2 vols., 1801) and by the bookseller Tom Davies (2 vols., 4th ed., 1805), the latter a work of some merit, but occasionally inaccurate and confused as to dates; and a searching if not altogether sympathetic survey of his verses is furnished by Joseph Knight's valuable Life (1894). A memoir of Garrick is included in a volume of French Memoirs of Mile Clairon and others, published by Levain (H. L. Cain) at Paris in 1846; and an Italian Biografia di Davide Garrick was published by C. Blasis at Milan in 1840. Mr Percy Fitzgerald's Life (2 vols., 1868; new edition, 1899) is full and spirited, and has been reprinted, with additions, among Sir Theodore Martin's Monographs (1906). A delightful essay on Garrick appeared in the Quarterly Review (July 186.8)1 directing attention to the admirable criticisms of Garrick's acting in 1775 in the letters of G. C. Lichtenberg {Verm. Schriften, iii., Gottingen, 1801). See also for a

very valuable survey of Garrick's labours as an actor, with a bibliography, C. Gaehde, David Garrick als Shakespeare-Darsteller , &c. (Berlin, 1904). Mrs Parsons' Garrick, and his Circle and Some unpublished Correspondence of David Garrick, ed. G. P. Baker (Boston, Mass., 1907), are interesting additions to the literature of the subject. There is also a Life by James Smyth, David Garrick (1887). T. W. Robertson's play David Garrick, first

acted by Sothern, and later associated with Sir Charles Wyndham, is of course mere fiction.

As to the portraits of Garrick, see W. T. Lawrence in The Connoisseur (April 1905). That by Gainsborough at Stratford-on-Avon was preferred by Mrs Garrick to all others. Several remain from the hand of Hogarth, including the famous picture of Garrick as Richard III. The portraits by Reynolds include the celebrated '" Garrick between Tragedy and Comedy." Zoffany's are portraits in character. Roubiliac's statue of Shakespeare, for which Garrick sat, and for which he paid the sculptor three hundred guineas, was originally placed in a small temple at Hampton, and is now in the entrance hall at the British Museum. (R. Ca. ; A. W. W.)

GARRISON, WILLIAM LLOYD (1805-1879), the American anti-slavery leader, was born in Newburyport, Massachusetts, U.S.A., on the ioth of December 1805. His parents were from the British province of New Brunswick. The father, Abijah, a sea-captain, went away from home when William was a child, and it is not known whether he died at sea or on land. The mother, whose maiden name was Lloyd, is said to have been a woman of high character, charming in person and eminent for piety. She died in 1823. William had a taste for books, and made the most of his limited opportunities. His mother first set him to learn the trade of a shoemaker, first at Newburyport, and then, after 181 5, at Baltimore, Maryland, and, when she found that this did not suit him, let him try his hand at cabinet-making (at Haverhill, Mass.). But this pleased him no better. In October 1818, when he was in his fourteenth year, he was made more than content by being indentured to Ephraim W. Allen, proprietor of the Newburyport Herald, to learn the trade of a printer. He soon became an expert compositor, and after a time began to write anonymously for the Herald. His communications won the commendation of the editor, who had not at first the slightest suspicion that he was the author. He also wrote for other papers with equal success. A series of political essays, written by him for the Salem Gazette, was copied by a prominent Philadelphia journal, the editor of which attributed them to the Hon. Timothy Pickering, a

distinguished statesman of Massa- chusetts. His skill as a printer won for him the position of fore- man, while his ability as a writer was so marked that the editor of the Herald, when temporarily called away from his post, left the paper in his charge.

The printing-office was for him, what it has been for many another poor boy, no mean substitute for the academy and for the college. He was full of enthusiasm for liberty; the struggle of the Greeks to throw off the Turkish yoke enlisted his warmest sympathy, and at one time he seriously thought of entering the West Point Academy and fitting himself for a soldier's career. His apprenticeship ended in 1826, when he began the publication of a new paper (actually the old one under a new name), the Free Press, in his native place. The paper, whose motto was " Our Country, our Whole Country, and nothing but our Country," was full of spirit and intellectual force, but Newburyport was a sleepy place and the enterprise failed. Garrison then went to Boston, where, after working for a time as a journeyman printer, he became the editor of the National Philanthropist, the first journal established in America to promote the cause of total abstinence from intoxicating liquors. His work in this paper was highly appreciated by the friends of temperance, but a change in the proprietorship led to his withdrawal before the end of the year. In 1828 he was induced to establish the Journal of the Times at Bennington, Vermont, to support the re-election of John Quincy Adams to the presidency of the United States. The new paper, though attractive in many ways, and full of force and fire, was too far ahead of public sentiment on moral questions to win a large support. In Boston he had met Benjamin Lundy (q.v.) , who had for years been preaching the abolition of slavery. Garrison had been deeply moved by Lundy's appeals, and after going to Vermont he showed the deepest interest in the slavery question. Lundy was then publishing in Baltimore a small monthly paper, entitled The Genius of Universal Emancipation, and he resolved to go to Bennington and invite Garrison to join him in the editor- ship. With this object in view he walked from Boston to Bennington, through the frost and snow of a New England winter, a distance of 125 m. His mission was successful. Garrison was

deeply impressed by the good Quaker's zeal and devotion, and he resolved to join him and devote himself thereafter to the work of abolishing slavery.

In pursuance of this plan he went to Baltimore in the autumn of 1829, and thenceforth the Genius was published weekly, under the joint editorship of the two men. It was understood, however, that Garrison would do most of the editorial work, while Lundy would spend most of his time in lecturing and procuring subscribers. On one point the two editors differed radically, Lundy being the advocate of gradual and Garrison of immediate emancipation. The former was possessed with the idea that the negroes, on being emancipated, must be colonized somewhere beyond the limits of the United States; the latter held that they should be emancipated on the soil of the country, with all the rights of freemen. In view of this difference it was agreed that each should speak on his own individual responsibility in the paper, appending his initial to each of his articles for the information of the reader. It deserves mention here that Garrison was then in utter ignorance of the change previously wrought in the opinions of English abolitionists by Elizabeth Heyrick's pamphlet in favour of immediate, in distinction from gradual emancipation. The sinfulness of slavery being admitted, the duty of immediate emancipation to his clear ethical instinct was perfectly manifest. He saw that it would be idle to expose and denounce the evils of slavery, while responsibility for the system was placed upon former generations, and the duty of abolishing it transferred to an indefinite future. His demand for immediate emancipation fell like a tocsin upon the ears of slaveholders. For general talk about the evils of slavery they cared little, but this assertion that every slave was entitled to instant freedom filled them with alarm and roused them to anger, for they saw that, if the conscience of the nation were to respond to the proposition, the system must inevitably fall. The Genius, now that it had become a vehicle for this dangerous doctrine, was a paper to be feared and intensely hated. Baltimore was then one of the centres of the domestic slave trade, and upon this traffic Garrison heaped the strongest denunciations. A vessel owned in Newburyport having taken a cargo of slaves from Baltimore to New Orleans, he characterized the transaction as an act of "domestic piracy," and avowed his purpose to "cover with thick infamy " those engaged therein. He was thereupon prosecuted for libel by the owner of the vessel, fined $50, mulcted in costs, and, in default of payment, committed to gaol. His imprisonment created much excitement, and in some quarters, in spite of the pro-slavery spirit of the time, was a subject of indignant comment in public as well as private. The excitement was fed by the publication of two or three striking sonnets, instinct with the spirit of liberty, which Garrison inscribed on the walls of his cell. One of these, Freedom of Mind, is remarkable

for freshness of thought and terseness of expression.

John G. Whittier, the Quaker poet, interceded with Henry Clay to pay Garrison's fine and thus release him from prison. To the credit of the slaveholding statesman it must be said that he responded favourably, but before he had time for the requisite preliminaries Arthur Tappan, a philanthropic merchant of New York, contributed the necessary sum and set the prisoner free after an incarceration of seven weeks. The partnership between Garrison and Lundy was then dissolved by mutual consent, and the former resolved to establish a paper of his own, in which, upon his sole responsibility, he could advocate the doctrine of immediate emancipation and oppose the scheme of African colonization. He was sure, after his experiences at Baltimore, that a movement against slavery resting upon any less radical foundation than this would be ineffectual. He first proposed to establish his paper at Washington, in the midst of slavery, but on returning to New England and observing the state of public opinion there, he came to the conclusion that little could be done at the South while the non-slaveholding North was lending her influence, through political, commercial, religious and social channels, for the sustenance of slavery. He determined, therefore, to publish his paper in Boston, and, having issued his prospectus, set himself to the task of awakening an interest in the subject by

means of lectures in some of the principal cities and towns of the North. It was an up-hill work. Contempt for the negro and indifference to his wrongs were almost universal. In Boston, then a great cotton mart, he tried in vain to procure a church or vestry for the delivery of his lectures, and thereupon announced in one of the daily journals that if some suitable place was not promptly offered he would speak on the common. A body of infidels under the leadership of Abner Kneeland (17 74-1844), who had previously been in turn a Baptist minister and the editor of a Universalist magazine, proffered him the use of their small hall ; and, no other place being accessible, he accepted it gratefully, and delivered therein (in October 1830) three lectures, in which he unfolded his principles and plans. He visited privately many of the leading citizens of the city, statesmen, divines and merchants, and besought them to take the lead in a national movement against slavery; but they all with one consent made excuse, some of them listening to his plea with manifest im- patience. He was disappointed, but not disheartened. His conviction of the righteousness of his cause, of the evils and dangers of slavery, and of the absolute necessity of the contem- plated movement, was intensified by opposition, and he resolved to go forward, trusting in God for success.

On the 1 st of January 1831, without a dollar of capital, and without a single subscriber, he and his partner Isaac Knapp (1804-1843) issued the first number of the Liberator, avowing their " determination to print it as long as they could subsist on bread and water, or their hands obtain employment." Its motto was, " Our country is the world — our countrymen are mankind "; and the editor, in his address to the public, uttered the words which have become memorable as embodying the whole purpose and spirit of his life: " I am in earnest — I will not equivocate — I will not excuse — I will not retreat a single inch — and I will be heard." Help came but slowly. For many months Garrison and his brave partner, who died long before the end of the conflict, made their bed on the floor of the room, " dark, un- furnished and mean," in which they printed their paper, and where Mayor Harrison Gray Otis of Boston, in compliance with the request of Governor Robert Y. Hayne of South Carolina, " ferreted them out " in " an obscure hole," " their only visible auxiliary a negro boy." But the paper founded under such inauspicious circumstances exerted a mighty influence, and lived to record not onlyT'resident Lincoln's proclamation of emancipa- tion, but the adoption of an amendment to the constitution of the United States for ever prohibiting slavery. It was the beginning and the nucleus of an agitation that eventually pervaded and filled every part of the country. Other newspapers were after- wards established upon the same principles; anti-slavery societies, founded upon the doctrine of immediate emancipation, sprang up on every hand; the agitation was carried into political parties, into the press, and into legislative and ecclesiastical assemblies; until in 1861 the Southern states, taking alarm from the election of a president known to be at heart opposed to slavery though pledged to enforce all the constitutional safe- guards of the system, seceded from the Union and set up a separate government.

Garrison sought the abolition of slavery by moral means alone. He knew that the national government had no power over the system in any state, though it could abolish it at the national capital, and prohibit it in the territories. He thought it should bring its moral influence to bear in favour of abolition; but neither he nor his associates ever asked Congress to exercise any unconstitutional power. His idea was to combine the moral influence of the North, and pour it through every open channel upon the South. To this end he made his appeal to the Northern churches and pulpits, beseeching them to bring the power of Christianity to bear against the slave system, and to advocate the rights of the slaves to immediate and unconditional freedom. He was a man of peace, hating war not less

than he did slavery; but he warned his countrymen that if they refused to abolish slavery by moral power a retributive war must sooner or later ensue. The conflict was irrepressible. Slavery must be over- thrown, if not by peaceful means, then in blood. The first society

organized under Garrison's auspices, and in accordance with his principles, was the New England Anti-Slavery Society, which adopted its constitution in January 1832. In the spring of this year Garrison issued his Thoughts on African Colonization, in which he showed by ample citations from official documents that the American Colonization Society was organized in the interest of slavery, and that in offering itself to the people of the North as a practical remedy for that system it was guilty of deception. His book, aided by others taking substantially the same view, smote the society with a paralysis from which it never recovered. Agents of the American Colonization Society in England having succeeded in deceiving leading Abolitionists there as to its character and tendency, Garrison was deputed by the New England Anti-Slavery Society to visit England for the purpose of counteracting their influence. He went in the spring of 1833, when he was but twenty-seven years of age, and was received with great cordiality by British Abolitionists, some of whom had heard of his bold assaults upon American slavery, and had seen a few numbers of the Liberator. The struggle for emancipation in the West Indies was then at the point of culmination; the leaders of the cause, from all parts of the kingdom, were assembled in London, and Garrison was at once admitted to their councils and treated with distinguished consideration. He took home with him a " protest " against the American Colonization Society, signed by Wilberforce, Zachary Macaulay, Samuel Gurney, William Evans, S. Lushington, T.Fowell Buxton, James Cropper, Daniel O'Connell and others, in which they declared their de- liberate judgment that " its precepts were delusive," and " its real effects of the most dangerous nature." He also received assurances of the cordial sympathy of British Abolitionists with him in his efforts to abolish American slavery. He gained a hearing before a large popular assembly in London, and won the confidence of those whom he addressed byhisevident earnestness, sincerity and ability.

Garrison's visit to England enraged the pro-slavery people and press of the United States at the outset, and when he re- turned home in

September with the " protest " against the Colonization Society, and announced that he had engaged the services of George Thompson as a lecturer against American slavery, there were fresh outbursts of rage on every hand. The American Anti-Slavery Society was organized in December of that year (1833), putting forth a masterly declaration of its principles and purposes from the pen of Garrison. This added fresh fuel to the public excitement, and when Thompson came over in the next spring, the hostility to the cause began to mani- fest itself in mobs organized to suppress the discussion of the slavery question. Now began what Harriet Martineau called " the martyr age in America." In the autumn of 1835 Thompson was compelled, in order to save his life, to embark secretly for England. Just before his departure the announcement that he would address the Woman's Anti-Slavery Society of Boston created " a mob of gentlemen of property and standing," from which, if he had been present, he could hardly have escaped with his life. The whole city was in an uproar. Garrison, almost denuded of his clothing, was dragged through the streets with a rope by infuriated men. He was rescued with great difficulty, and consigned to the gaol for safety, until he could be secretly removed from the city.

Anti-slavery societies were greatly multiplied throughout the North, and many men of influence, both in the church and in the state, were won to the cause. Garrison, true to his original purpose, never faltered or turned back. The Abolitionists of the United States were a united body until 1830-1840, when divisions sprang up among them. Garrison countenanced the activity of women in the cause, even to the extent of allowing- them to vote and speak in the anti-slavery societies, and appointing them as lecturing agents; moreover, he believed in the political equality of the sexes, to which a strong party was opposed upon social and religious grounds. Then there were some who thought Garrison dealt too severely with the churches and pulpits for their complicity with slavery, and who accused him of a want of religious orthodoxy; indeed, according to the

standards of his time he was decidedly heterodox, though he had an intensely religious nature and was far from being an infidel, as he was often charged with being. He was, moreover, not only a non-resistant but also an opponent of all political systems based on force. " As to the governments of this world," he said, " whatever their titles or forms we shall endeavour to prove that in their essential elements, as at present administered, they are all anti-Christ; that they can never by human wisdom be brought into conformity with the will of God; that they cannot be maintained except by naval and military power to carry them into effect; that all their penal

enactments, being a dead letter without any army to carry them into effect, are virtually written in human blood; and that the followers of Jesus should instinctively shun their stations of honor, power, and emolument — at the same time ‘ submitting to every ordinance of man for the Lord’s sake’ and offering no physical resistance to any of their mandates, however unjustortyrannical.” These views were very distasteful to many, who, moreover, felt that Garrison greatly injured abolitionism by causing it to be associated in men’s minds with these unpopular views on other subjects. The dissentients from his opinions determined to form an anti-slavery political party, while he believed in working by moral rather than political party instrumentalities. These differences led to the organization of a new National Anti- Slavery Society in 1840, and to the formation of the ” Liberty Party ” (q.v.) in politics. (See Birney, James G.) The two societies sent their delegates to the World’s Anti-Slavery Con-vention in London in 1840, and Garrison refused to take his seat in that body, because the women delegates from the United States were excluded. The discussions of the next few years served to make clearer than before the practical workings of the constitution of the United States as a shield and support of slavery; and Garrison, after a long and painful reflection, came to the conclusion that its pro-slavery clauses were immoral, and that it was therefore wrong to take an oath for its support. The Southern states had greatly enlarged representation in Congress on account of their slaves, and the national government was constitutionally bound to assist in the capture of fugitive slaves, and to suppress every attempt on their part to gain their free- dom by force. In view of these provisions, Garrison, adopting a bold scriptural figure of speech, denounced the constitution as ” a covenant with death and an agreement with hell,” and chose as his motto, ” No union with slaveholders.”

One class of Abolitionists sought to evade the difficulty by strained interpretations of the clauses referred to, while others, admitting that they were immoral, felt themselves obliged, notwithstanding, to support the constitution in order. to avoid what they thought would be still greater evils. The American Anti-Slavery Society, of which Garrison was the president from 1843 to the day of emancipation, was during all this period the nucleus of an intense and powerful moral agitation, which was greatly valued by many of the most faithful workers in the field of politics, who respected Garrison for his fidelity to his convictions. On the other hand, he always had the highest respect for every earnest and faithful opponent of slavery, however far their special views might differ. When in 1861 the Southern states seceded from the Union and took up arms against it,

he saw clearly that slavery would perish in the struggle, that the constitution would be purged of its pro-slavery clauses, and that the Union henceforth would rest upon the sure foundations of liberty, justice and equality to all men. He therefore ceased from that hour to advocate disunion, and devoted himself to the task of preparing the way for and hastening on the inevitable event. His services at this period were recognized and honoured by President Lincoln and others in authority, and the whole country knew that the agitation which made the abolition of slavery feasible and necessary was largely due to his uncompro- mising spirit and indomitable courage.

In 1865 at the close of the war, he declared that, slavery being abolished, his career as an abolitionist was ended. He counselled a dissolution of the American Anti-Slavery Society, insisting that it had become functus officiis, and that whatever needed

to be done for the protection of the freedmen could best be accomplished by new associations formed for that purpose. The Liberator was discontinued at the end of the same year, after an existence of thirty-five years. He visited England for the second time in 1846, and again in 1867, when he was received with distinguished honours, public as well as private. In 1877, when he was there for the last time, he declined every form of public recognition. He died in New York on the 24th of May 1879, in the seventy-fourth year of his age, and was buried in Boston, after a most impressive funeral service, four days later. In 1843 a small volume of his Sonnets and other Poems was published, and in 1852 appeared a volume of Selections from his Writings and Speeches. His wife, Helen Eliza Benson, died in 1876. Four sons and one daughter survived them.

Garrison's son, William Lloyd Garrison (1838-1909), was a prominent advocate of the single tax, free trade, woman's suffrage, and of the repeal of the Chinese Exclusion Act, and an opponent of imperialism; another son, Wendell Phillips Garrison (1840-1907), was literary editor of the New York Nation from 1865 to 1906.

The above article, with certain modifications, reproduces the account given in the 9th edition of this work by Oliver Johnson (reprinted from his Garrison: an Outline of his Life, New York, 1879). The writer (1809-1889) was a prominent Abolitionist, editor, and an intimate friend of Garrison; he edited the Liberator during Garrison's

absence in England in 1833, and later was an editor or an associate editor of various journals, including, after the Civil War, the New York Tribune and the New York Evening Post. He also published an excellent brief biography in William Lloyd Garrison and his Times (Boston, 1880).

The great authority on the life of Garrison is the thorough and candid work of his sons, W. P. and F. J. Garrison, William Lloyd Garrison 1&05-1879: The Story of his Life told by his Children (4 vols., New York, 1885-1889), which is indispensable for the student of the anti-slavery struggle in America. Goldwin Smith's The Moral Crusader: a Biographical Essay on William Lloyd Garrison (New York, 1892) is a brilliant sketch.

GARRISON, originally a term for stores or supplies, also a defence or protection, now confined in meaning to a body of troops stationed in a town or fortress for the purpose of defence. In form the word is derived from O. Fr. garison, modern guerison, from guirir, to furnish with stores, to preserve, but in its later meaning it has been confused with the Fr. garnison, the regular word for troops stationed for purposes of defence. In English " garnison " was used till the 16th century, when " gar- rison " took its place. In the British army " garrison troops," especially " garrison artillery," are troops trained and employed for garrison work as distinct from field operations.

GARROTE (Spanish for " cudgel "), an appliance used in Spain and Portugal for the execution of criminals condemned to death. The criminal is conducted to the place of execution (which is public) on horseback or in a cart, wearing a black tunic, and is attended by a procession of priests, &c. He is seated on a scaffold fastened to an upright post by an iron collar (the garrote), and a knob worked by a screw or lever dislocates his spinal column, or a small blade severs the spinal column at the base of the brain. (See Capital Punishment.) Originally a stout cord or bandage was tied round the neck of the criminal, who was seated in a chair fixed to a post. Between the cord and the neck a stick was inserted (hence the name) and twisted till strangulation ensued.

" Garrotting " is the name given in England to a form of robbery with violence which became rather common in the winter of 1862-1863. The thief came up behind his victim, threw a cord over his head, and tightened it nearly to strangula- tion point, while robbing him. An act of 1863, imposing the penalty of flogging in addition to penal servitude for this offence, nad the effect of stopping garrotting almost entirely. At any rate, the practice was checked; and, though the

opponents of any sort of flogging refuse to admit that this was due to the penalty, that view has always been taken by the English judges who had experience of such cases.

6ARRUCHA, a seaport of south-eastern Spain, in the province of Almeria; on the Mediterranean Sea and on the right bank of the river Antas. Pop. (1900) 4461. The harbour of Garrucha,

which is defended by an ancient castle, affords shelter to large ships, and is the natural outlet for the commerce of a thriving agricultural and mining district. Despite its small size and the want of railway communication, Garrucha has thus a consider- able trade in lead, silver, copper, iron, esparto grass, fruit, &c. Besides sea-going ships, many small coasters enter in ballast, and clear with valuable cargoes. In 1902, 135 vessels of 390,000 tons entered the harbour, the majority being British or Spanish; and in the same year the value of the exports reached £478,000, and that of the imports £128,000. Both imports and exports trebled their value in the ten years 1892-1902.

GARSTON, a seaport in the Widnes parliamentary division of Lancashire, England, on the Mersey, 6 m. S.E. of Liverpool. Pop. (1891) 13,444; (1901) 17,289. The docks, belonging to the London & North Western railway company, employ most of the working population. There is about a mile of quayage, with special machinery for the shipping of coal, which forms the chief article of export.

GARTH, SIR SAMUEL (1661-1719), English physician and poet, was born of a good Yorkshire family in 1661. He entered Peterhouse, Cambridge, in 1676, graduating B.A. in 1679 and M.A. in 1684. He took his M.D. and became a member of the Collegeof Physicians in 1 69 1. In 1697 he delivered the Harveian oration, in which he advocated a scheme dating from some ten years back for providing dispensaries for the relief of the sick poor, as a protection against the greed of the apothecaries. In 1699 he published a mock-heroic poem, The Dispensary, in six cantos, which had an instant success, passing through three editions within a year. In this he ridiculed the apothecaries and their allies among the physicians. The poem has little interest at the present day, except as a proof that the heroic couplet was written with smoothness and polish before the days of Pope. Garth was a member of the Kit-Kat Club, and became the leading physician of the Whigs, as Radcliffe was of the Tories. In 17 14 he was knighted by George I. and he died on the 18th of January 1 7 19. He wrote little besides his best-known work The Dispen- sary and Claremont, a moral espistle in verse. He made a Latin oration

(1700) in praise of Dryden and translated the Life of Otho in the fifth volume of Dryden's Plutarch. In 1 7 1 7 he edited a translation of Ovid's Metamorphoses, himself supplying the fourteenth and part of the fifteenth book.

GARTOK, a trade-market of Tibet, situated on the bank of the Indus on the road between Shigatse and Leh, to the east of Simla. In accordance with the Tibet treaty of 1904, Gartok, together with Yatung and Gyantse, was thrown open to British trade. On the return of the column from Lhasa in that year Gartok was visited by a party under Captain Ryder, who found only a few dozen people in winter quarters, their houses being in the midst of a bare plain. In summer, however, all the trade between Tibet and Ladakh passes through this place.

GARY, a city of Lake county, Indiana, U.S.A., at the southern end of Lake Michigan, about 25 m. S.E. of Chicago, 111. Pop. (1910 census) 16,802. Gary is served by the Baltimore & Ohio, the Lake Shore & Michigan Southern, the Michigan Central, the Pennsylvania, the Wabash, and (for freight only) the Chicago, Lake Shore & Eastern, and the Indiana Harbor Belt railways, and by several steamship lines plying the Great Lakes. There are about 21 sq. m. within the municipal limits, but the city lies chiefly within a tract of about 8000 acres composed at the time of its settlement mainly of sand dunes and swamps inter- sected from east to west by the Grand Calumet and the Little Calumet rivers, small streams respectively about 1 and 3 m. S. of the lake shore. In 1906 the United States Steel Corporation bought this tract to establish on it a great industrial community, ■as direct water connexion with the Lake Superior ore region was possible, and it was comparatively accessible to West Virginia coal and Michigan limestone, with unusual railroad facilities. The Steel Corporation began the actual building of the town in June 1906, the first step being the installation of an elaborate system of sewers, and of mains and conduits, for the distribution I of water, gas and electricity . The water-supply is taken from the I lake at a point 2 m. offshore by means of a tunnel. These public

utilities the Steel Corporation controls, and it has built about 500 dwellings, two hotels, a bank, and its own plant. A small patch of land, now within the limits of the city, has been from the beginning

in the hands of private owners, but the remainder of the lots (except those already sold) are owned by the Steel Corporation, and are sold under certain restrictions intended to prevent real estate speculation, to guarantee bona fide improve- ment of the propert}', and to restrict the sale of intoxicating drinks. Between the Grand Calumet river (which has been dredged out into a canal) and the lake lies the plant of the Steel Corporation, covering about 1200 acres. All the machinery in this great plant is driven by electricity from generators whose motive power is supplied by the combustion of gases from the blast furnaces. From the same sources is also supplied the electricity for lighting the city. The rail mill is operated by three-phase induction motors of from 2000 to 6000 horse-power capacity. The city was chartered in 1906 and was named in honour of Elbert Henry Gary (b. 1846), chairman of the board of directors and chairman of the finance committee of the United States Steel Corporation.

GAS, a general term for one of the three states of aggregation of matter; also more specifically applied to coal-gas, the gaseous product formed in the destructive distillation of coal or other carbonaceous matter (see below, section Gas Manufacture; for gas engines see the separate heading Gas Engine).

The Gaseous State. — Matter is studied under three physical phases — solids, liquids and gases, the latter two being sometimes grouped as " fluids." The study of the physical properties of fluids in general constitutes the science of hydromechanics, and their applications in the arts is termed hydraulics; the special science dealing with the physical properties of gases is named pneumatics.

The gaseous fluid with which we have chiefly to do is our atmosphere. Though practically invisible, it appeals in its properties to other of our senses, so that the evidences of its presence are manifold. Thus we feel it in its motion as wind, and observe the dynamical effects of this motion in the quiver of the leaf or the motion of a sailing ship. It offers resistance to the passage of bodies through it, destroying their motion and transforming their energy — as is betrayed to our hearing in the whiz of the rifle bullet, to our sight in the flash of the meteor.

The practically obvious distinction between solids and fluids may be stated in dynamical language thus: — solids can sustain a longitudinal pressure without being supported by a lateral pressure; fluids cannot. Hence any region of space enclosed by a rigid boundary can be easily filled with a fluid, which then takes the form

of the bounding surface at every point of it. But here we distinguish between fluids according as they are gases or liquids. The gas will always completely fill the region, however small the quantity put in. Remove any portion and the re- mainder will expand so as to fill the whole space again. On the other hand, it requires a definite quantity of liquid to fill the region. Remove any portion and a part of the space will be left unoccupied by liquid. Part of the liquid surface is then otherwise conditioned than by the form of the wall or bounding surface of the region; and if the portion of the wall not in con- tact with the liquid is removed the form and quantity of the liquid are in no way affected. Hence a liquid can be kept in an open vessel; a gas cannot so be. To quote the differentia of Sir Oliver Lodge: " A solid has volume and shape; a liquid has volume, but no shape; a gas has neither volume nor shape." It is necessary to distinguish between a gas and a " vapour." The latter possesses the physical property stated above which distinguishes a gas from a fluid, but it differs from a gas by being readily condensible to a liquid, either by lowering the temperature or moderately increasing the pressure. The study of the effects of pressure and temperature on many gases led to the introduction of the term " permanent gases " to denote gases which were apparently not liquefiable. The list included hydrogen, nitrogen and oxygen; but with improved methods these gases have been liquefied and even solidified, thus rendering the term meaningless (see Liquid Gases). The term " perfect gas " is applied to an

xi. 16

imaginary substance in which there is no frictional retardation of molecular motion; or, in other words, the time during which any molecule is influenced by other molecules is infinitesimally small compared with the time during which it traverses its mean free path. It serves as a means of research, more particularly in mathematical investigations, the simple laws thus deduced being subsequently modified by introducing assumptions in order to co-ordinate actual experiences.

The gaseous state was well known to the ancients; for in- stance, in Greek cosmology, " air " (irvevna) was one of the funda- mental elements. The alchemists used such terms as spiritus, flatus, halitus, aura, emanatio nubila, &c, words implying a " wind " or " breath." The word " gas " was invented by J. B. van Helmont in his Ortus medicinae, posthumously published in 1648, in the course of his description of the gas now known as carbon dioxide. He found that charcoal on burning yielded a " spirit," which he named spiritus sylvestris on account of its supposed untamable nature (" Gas

*sylvestre sive incoercibile, quod in corpus cogi non potest visibile “) ; and he invented the word ” gas ” in the expression: “… this spirit, hitherto unknown, … I call by a new name gas ” (” hunc spiritum, incognitum hactenus, novo nomine gas voco”). The word was suggested by the Gr. x < *os, chaos, for he also writes: " I have called this spirit gas, it being scarcely distinguishable from the Chaos of the ancients " (" halitum ilium Gas vocavi, non longe a Chao veterum secretum "). The view that the word was suggested by the Dutch geest, spirit, is consequently erroneous. Until the end of the 18th century the word " air," qualified by certain adjectives, was in common use for most of the gases known — a custom due in considerable measure to the important part which common air played in chemical and physical investigations. The study of gases may be divided into two main branches: the physical and the chemical. The former investigates essen- tially general properties, such as the weight and density, the relation between pressure, volume and temperature (piezometric and thermometric properties), calorimetric properties, diffusion, viscosity, electrical and thermal conductivity, &c, and generally properties independent of composition. These subjects are discussed in the articles Density; Thermometry; Calori- metry; Diffusion; Conduction of Heat; and Condensa- tion of Gases. The latter has for its province the preparation, collection and identification of gases, and the volume relations in which they combine; in general it deals with specific pro- perties. The historical development of the chemistry of gases — pneumatic chemistry — is treated in the article Chemistry; the technical analysis of gaseous mixtures is treated below under Gas A naly sis. Connecting the experimental study of the physical and chemical properties is the immense theoretical edifice termed the kinetic theory of gases. This subject, which is dis- cussed in the article Molecule, has for its purpose (1) the deriva- tion of a physical structure of a gas which will agree with the experimental observations of the diverse physical properties, and (2) a correlation of the physical properties and chemical composition.*

Gas Analysis. — The term ” gas analysis ” is given to that branch of analytical chemistry which has for its object the quantitative determination of the components of a gaseous mixture. The chief applications are found in the analysis of flue gases (in which much information is gained as to the complete- ness and efficiency of combustion), and of coal gas (where it is necessary to have a product of a definite composition within certain limits). There are, in addition, many other branches of chemical technology in which the methods ar6 employed. In general, volumetric methods are used, i.e.

a component is absorbed by a suitable reagent and the diminution in volume noted, or it is absorbed in water and the amount determined by titration with a standard solution. Exact analysis is difficult and tedious, and consequently the laboratory methods are not employed in technology, where time is an important factor and moderate accuracy is all that is necessary. In this article an outline of the technical practice will be given.

The apparatus consists of (1) a measuring vessel, and (2) a

u

series of absorption pipettes. A convenient form of measuring vessel is that devised by W Hempel. It consists of two vertical tubes provided with feet and connected at the bottom by flexible rubber tubing. One tube, called the " measuring tube," is provided with a capillary stopcock at the top and graduated downwards; the other tube, called the " level tube," is plain and open. To use the apparatus, the measuring tube is completely filled with water by pouring water into both tubes, rdsing the level tube until water overflows at the stopcock, which is then turned. The test gas is brought to the stopcock, by means of a fine tube which has been previously filled with water or in which the air has been displaced by running the gas through. By opening the stopcock and lowering the level tube any desired quantity of the gas can be aspirated over. In cases where a large quantity of gas, i.e. sufficient for several tests, is to be collected, the measuring tube is replaced by a large bottle. The volume of the gas in the measuring tube is determined by bringing the water in both tubes to the same level, and reading the graduation on the tube, avoiding parallax and the other errors associated with recording the coincidence of a graduation with a

Fig.

(By permission of Messrs Baird & Tatlock.)

I. Fig. 2.

meniscus. The temperature and atmospheric pressure are simul- taneously noted. If the tests be carried out rapidly, the tem- perature and pressure may be assumed to be constant, and any diminution in volume due to the absorption of a constituent may be readily

expressed as a percentage. If, however, the tem- perature and pressure vary, the volumes are reduced to o° and 760 mm. by means of the formula Vo = V(P— />)/(i + 00366ˆ)760, in which V is the observed volume, P the barometric pressure, p the vapour tension of water at the temperature t of the experi ment. This reduction is facilitated by the use of tables.

Some common forms of absorption pipettes are shown in figs. 1 and 2. The simpler form consists of two bulbs connected at the bottom by a wide tube. The lower bulb is provided with a smaller bulb bearing a capillary through which the gas is led to the apparatus, the higher bulb has a wider outlet tube. The arrangement is mounted vertically on a stand. Sometimes the small bulb on the left is omitted. The form of the pipette varies with the nature of the absorbing material. For solutions which remain permanent in air the two-bulbed form suffices; in other cases a composite pipette (fig. 2) is employed, in which the absorbent is protected by a second pipette containing water. In the case of solid reagents, e.g. phosphorus, the absorbing bulb has a tubulure at the bottom. To use a pipette, the absorbing liquid is brought to the outlet of the capillary by tilting or by squeezing a rubber ball fixed to the wide end, and the liquid is maintained there by closing with a clip. The capillary is con- nected with the measuring tube by a fine tube previously filled with water. The clip is removed, the stopcock opened, and the level tube of the measuring apparatus raised, so that the gas passes into the first bulb. There it is allowed' to remain, the pipette being shaken from time to time. It is then run back into the measuring tube by lowering the level tube, the stopcock is closed, and the volume noted. The operation is repeated until there is no further absorption.*

The choice of absorbents and the order in which the gases are to be estimated is strictly limited. Confining ourselves to cases where titration methods are not employed, the general order is as follows: carbon dioxide, olefines, oxygen, carbon monoxide, hydrogen, methane and nitrogen (by difference). This scheme is particularly applicable to coal-gas Carbon dioxide is absorbed by a potash solution containing one part of potash to between two and three of water; the stronger solution absorbs about 40 volumes of the gas. The olefines — ethylene, &c. — are generally absorbed by a very strong sulphuric acid prepared by adding sulphur trioxide to sulphuric acid to form a mixture which solidifies when slightly cooled. Bromine water is also employed. Oxygen is absorbed by stick phosphorus contained in a tubulated pipette filled with water. The temperature must be above 18 ; and the absorption is prevented by ammonia, olefines, alcohol, and some other substances. An alkaline solution of

pyrogallol is also used; this solution rapidly absorbs oxygen, becoming black in colour, and it is necessary to prepare the solution immediately before use. Carbon monoxide is absorbed by a solution of cuprous chloride in hydrochloric acid or, better, in ammonia. When small in amount, it is better to estimate as carbon dioxide by burning with oxygen and absorbing in potash; when large in amount, the bulk is absorbed in ammoniacal cuprous chloride and the residue burned. Hydrogen may be estimated by absorption by heated palladium contained in a capillary through which the gas is passed, or by exploding (under reduced pressure) with an excess of oxygen, and measuring the diminution in volume, 'two-thirds of which is the volume of hydrogen. The explosion method is unsatisfactory when the gas is contained over water, and is improved by using mercury. Methane cannot be burnt in this way even when there is much hydrogen present, and several other methods have been pro- posed, such as mixing with air and aspirating over copper oxide heated to redness, or mixing with oxygen and burning in a platinum tube heated to redness, the carbon dioxide formed being estimated by absorption in potash . Gases soluble in water, . such as ammonia, hydrochloric acid, sulphuretted hydrogen, sulphur dioxide, &c, are estimated by passing a known volume of the gas through water and titrating the solution with a standard solution. Many types of absorption vessel are in use, and the standard solutions are generally such that 1 c.c. of the solution corresponds to 1 c.c. of the gas under normal conditions.

Many forms of composite gas-apparatus are in use. One of the commonest is the Orsat shown in fig. 3. The gas is measured in the graduated cylinder on the right, which is surrounded by a water jacket and provided with a levelling bottle. At the top it is connected by a capillary tube bent at right angles to a series of absorbing vessels, the connexion being effected by stopcocks. These vessels consist of two vertical cylinders joined at the bottom by a short tube. The cylinder in direct communication with the capillary is filled with glass tubes so as to expose a larger surface of the absorbing solution to the gas. The other cylinder is open to the air and serves to hold the liquid ejected from the absorbing cylin- der. Any number of bulbs can be attached to the horizontal capillary; in the form illustrated there are four, the last being a hydrogen pipette in which the palladium is heated in a horizontal tube by a spirit lamp. At the end of the horizontal tube there is a three- way cock connecting with the air

JT"! ,

(By permission of Messrs Baird & Tatlock.)

Fig. 3.

or an aspirator. To use the apparatus, the measuring tube is completely filled with water by raising the levelling bottle. The absorbing vessels are then about half filled with the absorbents, and, by opening the cocks and aspirating, the liquid is brought so as

Historical.

completely to fill the bulbs nearer the capillary. The cocks are then closed. By opening the three-way cock to the supply of the test gas and lowering the levelling bottle, any desired amount can be drawn into the measuring tube. The absorption is effected by opening the cock of an absorbing vessel and raising the level- ling bottle. The same order of absorption and general directions pertaining to the use of Hempel pipettes have to be adopted.

Although the earliest attempts at gas analysis were made by Scheele, Priestley, Cavendish, Lavoisier, Dalton, Gay-Lussac and others, the methods were first systematized by R. Bunsen, who began his researches in 1 838. He embodied his results in his classical Gasometrische Methoden (1857, second edition 1877), a work trans- lated into English by H. Roscoe. Clemens Winkler contributed two works, Anleitung zur chemischen Vntersuchung der Industriegase (1876-1877) and Lehrbuch der technischen Gasanalyse (2nd ed., 1892), both of which are very valuable for the commercial applications of the methods. W. Hempel's researches are given in his Neue Methode zur Analyse der Gase (1880) and Gasanalytische Methoden (1890, 3rd ed. 1900).

Gas Manufacture

1. Illuminating Gas. — The first practical application of gas distilled from coal as an illuminating agent is generally as- cribed to William Murdoch, who betweeh the years of 1792 and 1802 demonstrated the possibility of making gas from coal and using it as a lighting agent on a large scale. Prior to 1691, however, Dr John Clayton, dean of Kildare, filled bladders with inflammable gas obtained by the distillation of coal, and showed that on pricking the bladders and applying a light to the escaping gas it burnt with a luminous flame,

and in 1726 Stephen Hales published the fact that by the distillation of 158 grains of Newcastle coal, 180 cub. in. of inflammable air would be obtained. Jean Pierre Minckelers, professor of natural philosophy in the university of Louvain, and later of chemistry and physics at Maestricht, made experiments on distilling gas from coal with the view of obtaining a permanent gas sufficiently light for filling balloons, and in 1785 experimentally lighted his lecture room with gas so obtained as a demonstration to his students, but no commercial application was made of the fact. Lord Dun- donald, in 1787, whilst distilling coal for the production of tar and oil, noticed the formation of inflammable gas, and even used it for lighting the hall of Culross Abbey. It is clear from these facts that, prior to Murdoch's experiments, it was known that illuminating gas could be obtained by the destructive distillation of coal, but the experiments which he began at Redruth in 1792, and which culminated in the lighting of Messrs Boulton, Watt & Co.'s engine works at Soho, near Birmingham, in 1802, un- doubtedly demonstrated the practical possibility of making the gas on a large scale, and burning it in such a way as to make coal-gas the most important of the artificial illuminants. An im- pression exists in Cornwall, where Murdoch's early experiments were made, that it was a millwright named Hornblower who first suggested the process of making gas to Murdoch, but, as has been shown, the fact that illuminating gas could be obtained from coal by distillation was known a century before Murdoch made his experiments, and the most that can be claimed for him is that he made the first successful application of it on a practical scale.

In 1799 a Frenchman named Philippe Lebon took out a patent in Paris for making an illuminating gas from wood, and gave an exhibition of it in 1802, which excited a con- siderable amount of attention on the European continent. It was seen by a German, F.A. Winsor, who made Lebon an offer for his secret process for Germany. This offer was, however, declined, and Winsor returned to Frankfort determined to find out how the gas could be made. Having quickly succeeded in discovering this, he in 1803 exhibited before the reigning duke of Brunswick a series of experiments with lighting gas made from wood and from coal. Looking upon London as a promising field for enterprise, he came over to England, and at the commencement of 1S04 took the Lyceum theatre, where he gave demonstrations

of his process. He then proceeded to float a company, and in 1807 the first public street gas lighting took place in Pall Mall, whilst in 1809 he applied to parliament to incorporate the National Heat and

Light Company with a capital of half a million sterling. This application was opposed by Murdoch on the ground of his priority in invention, and the bill was thrown out, but coming to parliament for a second time in 1810, Winsor succeeded in getting it passed in a very much curtailed form, and, a charter being granted later in 181 2, the company was called the Chartered Gas Light and Coke Company, and was the direct forerunner of the present London Gas Light and Coke Company. During this period Frederick C. Accum (1 760-1838), Dr W. Henry and S. Clegg did so much by their writings and by the improvements they introduced in the manufacture, distribution and burning of coal gas, that their names have become inseparably connected with the subject.

In 1813 Westminster Bridge, and in the following year the streets of Westminster, were lighted with gas, and in 1816 it b.ecame common in London. After this so rapid was Tbe the progress of this new mode of illumination that in growth the course of a few years it was adopted by all the of gas principal towns in the United Kingdom for lighting u xkttng. streets as well as shops and public edifices. In private houses it found its way more slowly, partly from an apprehension of danger attending its use, and partly from the discomfort which was experienced in many cases through the gas being distributed without purification, and to the careless and imperfect manner in which the service pipes were first fitted. It was during the last four decades of the 19th century that the greatest advance was made, this period having been marked not only by many improvements in the manufacture of illuminating gas, but by a complete revolution in the methods of utilizing it for the pro- duction of light. In 1875 the London Argand, giving a duty of 3 • 2 candles illuminating power per cubic foot of ordinary 1 6 candle gas, was looked upon as the most perfect burner of the day, and little hope was entertained that any burner capable of universal adoption would surpass it in its power of developing light from the combustion of coal gas; but the close of the century found the incandescent mantle and the atmospheric burner yielding six times the light that was given by the Argand for the consumption of an equal volume of gas, and to-day, by supplying gas at an increased pressure, a light of ten times the power may be obtained. Since the advent of the incandescent mantle, the efficiency of which is dependent upon the heating power of the gas more than on its illuminating power, the manu- facture of coal gas has undergone considerable modifications.

Coal, the raw material from which the gas is produced by a process of destructive distillation, varies very widely in composition (see Coal), and it is only the class of coals rich in hydrogen, known as

*bituminous coal, that can with advantage be T' oa s u * utilized in gas manufacture. Coals of this character are ˆjJSJJjT obtained in England from the Newcastle and Durham field , *'*

South Yorkshire, Derbyshire and Barnsley districts, and an idea of their ultimate composition may be derived from the following table :-

Carbon.

Hydrogen.

Sulphur.

Nitrogen.

Oxygen.

Ash.

Moisture.

Newcastle gas coal . Durham gas coal South Yorkshire silkstone Derbyshire silkstone Barnsley gas coal

82-16

84-34 80-46 76-96 75-64

4-83 5-30 5-09

5-˚4

4.94

I -00

o-73

1-66

2-39

2-84

1-23

1-73 1-67 1-77 1-65

6-82 4-29 6-79 6-92

7-25

3-20 2-42

3-3°

3-28 4-28

0-76 1-14 1-03

3-64 3-40

Our knowledge of the composition of coal is limited to the total amount of carbon, hydrogen, nitrogen, oxygen and foreign materials which it contains; and at present we know practically but little of the way in which these bodies are combined. This being so, the ordinary analysis of a coal affords but little indication of its value for gas-making purposes, which can only be really satisfactorily arrived at by extended use on a practical scale. Bituminous coal, however, may be looked upon as containing carbon and also simple hydrocarbons, such as some of the higher members of the paraffin series, and likewise organic bodies containing carbon, hydrogen, nitrogen, oxygen and sulphur.

On submitting a complex substance of this character to destructive distillation, it will be found that the yield and quality of the products will vary very considerably with the temperature existing in the retorts, with the size of the charge of coal used, with its distribution

Destruc- tive dis- tillation of coal.

in the retort, with the length of time the distillation has been going on, and with an infinity of other factors of a more or less complex nature. If bituminous coal is distilled at a low tempera- ture, the tar is found to contain considerable quantities of light paraffin oils; and there is no doubt that paraffin hydrocarbons are present in the original coal. These paraffins, under the influence of heat, split up into simpler members of the same series and into olefines; and if we

imagine the action in its simplest form, we should have the gases, as they were evolved, consisting of (say) ethane and ethylene. These have now to pass down the heated retort on their way to the ascension pipe, and the contact with the heated sides of the retort, and the baking from the radiant beat in the retort, set up an infinity of changes. Ethane, when heated to this degree, splits up into ethylene and hydrogen, whilst ethylene decomposes to methane and acetylene, and the acetylene at once polymerizes to benzene, styrolene, retene, &c. A portion also condenses, and at the same time loses some hydrogen, becoming naphthalene; and the compounds so formed by interactions amongst themselves build up the remainder of the hydrocarbons present in the coal tar, whilst the organic substances containing oxygen in the coal break down, and cause the formation of the phenols in the tar.

There is very little doubt that the general course of the decompositions follows these lines; but any such simple explanation of the actions taking place is rendered impossible by the fact that, instead of the breaking-down of the hydrocarbons being completed in the coal, and only secondary reactions taking place in the retort, in practice the hydrocarbons to a great extent leave the coal as the vapours of condensible hydrocarbons, and the breaking down of these to such simple gaseous compounds as ethylene is proceeding in the retort at the same time as the breaking up of the ethylene already formed into acetylene and methane, and the polymerization of the former into higher compounds. Starting with a solid hydrocarbon of definite composition, it would be theoretically possible to decompose it entirely into carbon, hydrogen, ethylene and methane, and, by rapidly removing these from the heating zone before any secondary actions took place, to prevent formation of tar. But any such ideal is hopeless in practice, as the coal is not a definite compound, and it is impossible to subject it to a fixed temperature.

If the retorts are at a temperature of iooo" C. when the charge of coal is put in, the temperature of the distillation will vary from about 800° C. close to the walls, to about 400 C. in the centre of Bttect 0/ t jj e coa j . a ' n(j ; n tne same way, in the space above the coal, tempera- tne p ro d uc t s which come in contact with the sides of the Trt retort are heated to 1000° C, whilst the gas near the coal

retort. . g p ro t, a bly heated to only 600° C. Moreover, the gases

and vapours in the retort are subjected to a period of heating which varies widely with the distance from the mouth of the retort of the coal that is undergoing carbonization. The gas developed by the coal

near the mouth of the retort is quickly washed out into the ascension pipe by the push of the gas behind, and the period for which it has been exposed to the radiant heat from the walls of the -etort is practically nil ; whilst the gas evolved in the portion of the etort farthest from the mouthpiece has only its own rate of evolution to drive it forward, and has to traverse the longest run possible in the retort, exposed during the whole of that period to radiant heat and to contact with the highly heated surface of the retort itself. Hence we find that the tar is formed of two distinct sets of products, the first due to incomplete decomposition and the second to secondary reactions due to the products of the decomposition being kept too long in the zone of heat.

Of the first class, the light paraffin oils and pitch may be taken as examples; whilst benzene, naphthalene and retort carbon represent the second. The formation of the second class of bodies is a great loss to the gas manufacturer, as, with the exception of the trace of benzene carried with the gas as vapour, these products are not only useless in the gas, but one of them, naphthalene, is a serious trouble, because any trace carried forward by the gas condenses with sudden changes of temperature, and causes obstructions in the service pipes, whilst their presence in the tar means the loss of a very large proportion of the illuminating constituents of the gas. Moreover, these secondary products cannot be successfully reduced, by further heating, to simpler hydrocarbons of any high illuminating value, and such bodies as naphthalene and anthracene have so great a stability that, when once formed, they resist any efforts again to decompose them by heat, short of the temperature which breaks them up into methane, carbon and hydrogen.

The ammonia is derived from the nitrogen present in the coal combining with hydrogen during destructive distillation, the nitrogen becoming distributed amongst all three classes of products. The following table will give an approximate idea of the proportions which go to each : —

Per cent.

Nitrogen as ammonia I4‘5°

,, as cyanogen …… 1-56

„ free in gas and combined in tar . . 35-26 „ remaining in coke 48-68

ioo-oo

The effect produced by alteration in the temperature of the retort upon the composition of both gas and tar is very marked. As the temperature is raised, the yield of gas from a given weight of coal increases; but with the increase of volume there is a marked decrease in the illuminating value of the gas evolved. Lewis T. Wright found, in a series of experiments, that, when four portions of the same coal were distilled at temperatures ranging from a dull red heat to the highest temperature attainable in an iron retort, he obtained the following results as to yield and illuminating power : —

Temperature.

Cubic ft. of Gas per ton.

Illuminating Power, Candles.

Total Candles per ton.

1. Dull red …

2. Hotter ….

3- .. ….

4. Bright orange

8,250

9.693 10,821 12,006

20-5 17-8 16-7 156

33-950

34-5IO

36-140 37-460

‘Composition of the Gas.

1.

Per cent.

2.

Per cent.

4-

Per cent.

Hydrogen

Marsh gas .... Olefines .... Carbon monoxide . Nitrogen ....

38-09 42-72

7-55 8-72 2-92

43-77 34-50

5-83 12-50

3-40

48-02

30-70

4-51 1396

2-8l

ioo-oo

ioo-oo

ioo-oo

The gas analysis of No. 3 was lost, but the illuminating power shows that it was intermediate in composition between Nos. 2 and 4. From this it will be seen that, with the increase of temperature, the hydrocarbons — the olefines and marsh gas series— gradually break up, depositing carbon in the crown of the retort, and liberating hydrogen, the percentage of which steadily increases with the rise of temperature.

The tar formed is affected to an even greater extent than the gas by alterations in the temperature at which the destructive distillation takes place. The lower the temperature, the smaller will be the volume of gas produced, and the lighter the specific gravity of the tar, whilst with increase of temperature, the volume of gas rapidly rises, and so does the specific gravity of the tar. Working with a caking coal Wright obtained the following results : —

Yield of Gas per ton, Cub. ft.

Specific Gravity of Tar.

6,600

7,200

8,900

10,162

11,700

1-086

I-I20

1-140

I-I54

1-206

Analysis of the tar showed that the increase of the specific gravity was due to the increase in the quantity of pitch, which rose from 28-89 to 64-08% in the residuals; whilst the ammonia, naphtha and light oils steadily fell in quantity, the creosote and anthracene oils doing the same, but to a smaller extent. Naphthalene also begins to show in quantity in the tar as soon as the yield of gas reaches 10,000 cub. ft. per ton of coal carbonized.

In spite of these variations, however, the products in their main characteristics will remain the same. They may be divided into — (a) Solids, such as the coke and retort carbon ; (6) liquids, consisting of the tar and ammoniacal liquor; and © gases, consisting of the unpurified coal gas. The proportions in which the' products are approximately obtained from a ton of gas coal have been given as follows : —

10,000 cub. ft. of gas 10 gallons of tar Gas liquor 1 . Coke ....

= 380 lb = 17-0 per cent.

= 115 .. = 5-1

= 177 „ = 7-9

= 1568 ,, =70-0 ,,

2240 IOO-O

The chief solid residue, coke, is not absolutely pure carbon, as it contains the mineral non-volatile constituents which remain behind as ash when the original coal is burnt, and which, to a great extent, existed in the sap that filled the cells of the * 0/ ™ plant from which the coal was formed. The retort carbon P ro ° ucU – formed as a dense deposit on the crown of the retort by the action of the high temperature on the hydrocarbons is, however, carbon in a very pure form, and, on account of its density, is largely used for electrical purposes.

1 Liquor condensed from gas alone, without wash water.

MANUFACTURE]

GAS

485

The liquid products of the destructive distillation of coal are tar and ammoniacal liquor. Tar derived from ordinary bituminous liquid coa ‘ i s a black, somewhat viscid liquid, varying in specific products, gravity from i-l to 1-2. The ultimate composition of tar made in the London Gas Works is approximately as follows: —

Carbon 77-53

Hydrogen 6-33

Nitrogen 1-03

Sulphur 061

Oxygen 14-50

100-00

These elements in tar are built up into an enormous number of compounds (see Coal Tar), and its value as a by-product may be gathered from the fact that on fractional distillation it yields — (1) benzene and its homologues, from which aniline, the source of most of the coal-tar colours, can be derived; (2) carbolic acid, from which picric acid, used as a dye, a powerful explosive, and to give the bitter flavour to some kinds of beer, is made, also many most valuable

disinfectants; (3) naphthalene, used for disinfecting, and also as the " Albo-carbon " employed in an enriching burner for gas; (4) pitch, extensively used in path-making, from which such bodies as anthracene and saccharin can be extracted.

The second liquid product of the destructive distillation of coal is the ammoniacal or gas liquor, which consists of water containing ammonia salts in solution, partly condensed from the hot gas, and partly added to wash the gas in the scrubbers. It contains, as its principal constituents, ammonia, partly combined with carbonic acid and sulphuretted hydrogen to form compounds which are decomposed on boiling, with evolution of ammonia gas, and partly combined with stronger acids tc form compounds which require to be acted upon by a strong alkali before the ammonia contained in them can be liberated. The ammonia in the first class of compounds is technically spoken of as " free "; that present in the latter as " fixed." The following analysis by L. T. Wright will give an idea of the relative quantities in which these compounds exist in the liquor: —

Grammes per litre.

f Ammonium sulphide 3-03

Free -J Ammonium carbonate 39 – l6

[Ammonium chloride 14-23

(Ammonium thiocyanate .... l-8o Ammonium sulphate 0-19

Ammonium thiosulphate .... 2-8o Ammonium ferrocyanide 0-41
From a scientific point of view, the term " free " is absolutely incorrect, and in using it the fact must be clearly borne in mind that in this case it merely stands for ammonia, which can be liberated on simply boiling the liquor.

The gas which is obtained by the destructive distillation of coal, and which we employ as our chief illuminant, is not a definite com- a pound, but a mechanical mixture of several gases, some

oroducts °^ wn ' cn are reduced to the lowest limit, in order to ' develop as fully as possible the light-giving properties of the most important constituents of the gas. The following analysis gives a fair idea of the composition of an average sample of gas made from coal, purified but without enrichment: —

Hydrogen 52-22

Unsaturated hydrocarbons . 3-47 Saturated hydrocarbons . 34-76

Carbon monoxide . . . 4-23 Carbon dioxide o-6o

Nitrogen 4-23

Oxygen 0-49

ioo-oo

These constituents may be divided into — (a) light-yielding hydrocarbons, (ft) combustible diluents and © impurities. The hydrocarbons, upon which the luminosity of the flame entirely depends, are divided in the analysis into two groups, saturated and unsaturated, according to their behaviour with a solution of bromine in potassium bromide, which has the power of absorbing those termed

unsaturated," but does not affect in diffused daylight the gaseous members of the " saturated " series of hydrocarbons. They may be separated in a similar way by concentrated sulphuric acid, which has the same absorbent effect on the one class, and not on the other. The chief unsaturated hydrocarbons present in coal gas are: ethylene, C2H4, butylene, C4H 8 , acetylene, C 2 H 2 , benzene, QH 6 , and naphtha- lene, CicH 8 ,and the saturated hydrocarbons consist chieflyof methane, CHi, and ethane, C 2 H6.

The light-giving power of coal gas is undoubtedly entirely due to the hydrocarbons. The idea held up to about 1890 was that the illuminating value depended upon the amount of ethylene present. This, however, is manifestly incorrect, as, if it were true, 4% of ethylene mixed with 96% of a combustible diluent such as hydrogen should give 16- to 17-candle gas, whereas a mixture of 10% of ethylene and 90% of hydrogen is devoid of luminosity. In 1876

M.P.E.Berthelot came to the conclusion that the illuminating value of the Paris coal gas was almost entirely due to benzene vapour. But here again another mistaken idea arose, owing to a faulty method of estimating the benzene, and there is no doubt that methane is one of the most important of the hydrocarbons present, when the gas is burnt in such a way as to evolve from it the proper illuminating power, whilst the benzene vapour, small as the quantity is, comes next in importance and the ethylene last. It is the combined action of the hydrocarbons which gives the effect, not any one of them acting alone.

The series of operations connected with the manufacture and

distribution of coal gas embraces the processes of distillation, condensation, exhaustion, wet purification by washing and scrubbing, dry purification, measuring, storing and distribution to the mains whence the consumer's supply is drawn.

The chojce of a site f or a gas works is necessarily governed by local circumstances; but it is a necessity that there should be a ready means of transport available, and for this reason the works ,,.. . „ should be built upon the banks of a navigable river or t,,,,,t s canal, and should have a convenient railway siding. By this means coal may be delivered direct to the store or retort- house, and in the same way residual products may be removed. The fact that considerable area is required and that the works do not improve the neighbourhood are important conditions, and although economy of space should be considered, arrangements should be such as to allow of extension. In the case of a works whose daily make of gas exceeds four to five million cub. ft., it is usual to divide the works into units, there being an efficiency limit to the size of apparatus employed. Under these conditions the gas is dealt with in separate streams, which mix when the holder is reached. From the accompanying ground plan of a works (fig. 4)*

River.

Fig. 4. — Plan of Works.

it will be possible to gain an idea of the order in which the operations in gas manufacture are carried out and the arrangement of the plant. The retorts in which the coal is carbonized are almost universally made of fire-clay, and in all but small country works the old single-ended retort, which was about 9 ft. in length, has given Retorts way to a more economical construction known asdoubles, double-ended, or " through " retorts. These are from 18 to 22 ft. long, and as it is found inconvenient to produce this length in one piece, they are manufactured in three sections, the jointing together of which demands great care. The two outer pieces are swelled at one end to take an iron mouthpiece. The cross sections generally employed for retorts are known as " D-shaped," " oval " and " round " (fig. 5). The " D " form is mostly adopted owing to its power of retaining its shape after long exposure to heat, and the large amount of heating surface it presents at its base. The life of this retort is about thirty working months. A cast iron mouthpiece and lid is bolted to the exterior end of each retort, the mouthpiece carrying a socket end to receive the ascension pipe, through which the gas passes on leaving the retort. The retorts are heated exter- nally and are set in an arch,

the construction depending upon the number of retorts, which varies from three to twelve. The arch and its retorts is termed a bed or setting, and a row of beds constitutes a bench. It is

usual to have a separate furnace for each setting, the retorts resting upon walls built transversely in the furnace.

The heating of the retorts is carried out either by the " direct firing " or by the " regenerative " system, the latter affording

D

\

Fig. 5. — Cross Section of Retorts.

marked advantages over the former method, which is now becoming extinct. In the regenerative system of firing, a mixture of carbon monoxide and nitrogen is produced by passing air through incandescent gas coke in a generator placed below the bench of retorts, and the heating value of the gases so produced is increased in most cases by the admixture of a small proportion of steam with the primary air supply, the steam being decomposed by contact with the red-hot coke in the generator into water gas, a mixture of carbon monoxide and hydrogen (see Fuel: Gaseous). The gases so formed vary in proportion with the temperature of the generator and the amount of steam, but generally contain 32 to 38% of combustible gas, the remainder being the residual nitrogen of the air and carbon dioxide. These gases enter the combustion chamber around the retorts at a high temperature, and are there supplied with sufficient air to complete their combustion, this secondary air supply being heated by the hot products of combustion on their way to the exit flue. This method of firing results in the saving of about one-third the weight of coke used in the old form of furnace per ton of coal carbonized, and enables higher temperatures to be obtained, the heat being also more equally distributed.

There are a great number of methods of applying the regenerative principle which vary only in detail. Fig. 6 gives an idea of the general arrangement. The furnace A is built of fire-brick, coke is charged at

the top through the iron door B, and near the bottom are placed fire bars C, upon which the fuel lies. The primary air necessary for the partial combustion of the coke to " producer " gas enters between these bars. The gases are conducted from the furnace to the combustion chamber £ through the nostrils D D, and the secondary air is

Fig. 6. — Regenerative Setting.

admitted at the inlet F a little above, this air having been already heated by traversing the setting. Complete combustion takes place at this point with the production of intense heat, the gases on rising are baffled in order to circulate them in every direction round the retorts, and upon arriving at the top of the setting they are conducted down a hollow chamber communicating with the main flue and shaft. The amount of draft which is necessary to carry out the circulation of the gases and to draw in the adequate amount of air is regulated by dampers placed in the main flue. By analysis of the " producer " and " spent " gases this amount can be readily gauged.

Retorts are set in either the horizontal, inclined or vertical position, and the advantages of the one over the other is a question upon which almost every gas engineer has his own views.

The introduction of labour-saving appliances into gas works has rendered the difficult work of charging and discharging horizontal Ch rtrintr retorts comparatively simple. Formerly it was the

***& * practice to carry out such operations entirely by hand, *" men charging the retorts either by means of shovel or*

drawing, hand-scoop, and the coke produced being withdrawn with hand rakes. Now, however, only the smaller gas works adhere to this system, and this work is done by machinery driven by either compressed air, hydraulic or electric power. In the first two cases a scoop, filled with coal from an overhead hopper carried by the travelling machine, is made to enter the retort and is turned over; the operation is then repeated, but this time the scoop is turned over in the opposite direction, the coal thus assuming such a position that as much of its under surface as possible is exposed to the heated side of the retort. With " through " retorts charging machines feed the retorts at both ends, the scoop, which has a capacity of about 1 \ cwt. , entering and discharging its contents twice at each end, so that the total charge is about 6 cwt., which is allowed from four to six hours to distil off according to the quality of the gas required. The machines charge simultaneously at each end, so that the lids of the

retorts may be shut immediately the coal enters. The charging machines travel on lines in front of the retort bench, and the power is transmitted by connexions made with flexible hose. A device of more recent introduction is an electrically-driven charging machine, in which the centrifugal force created by a fly-wheel revolving at high speed is applied to drive coal into the retort. If the velocity is sufficiently high the coal may be carried the whole length of a 20-ft. retort, the coal following banking up until an even layer is formed throughout the length of the retort.

For the purpose of discharging the coke from the retort either compressed air or hydraulic machinery is employed, a rake being made to enter the retort and withdraw the coke on returning. With this method it is necessary that the rake should enter and discharge several times before the retort is clear, and thus the use of a telescopic ram worked by hydraulic power, which pushes the coke before it and discharges it at the other end, is an advantage. As much as one-third on each ton of coal carbonized is saved by the use of machinery in the retort-house. Taking into account the original cost of such machines, and the unavoidable wear and tear upon the retorts brought about by using labour-saving appliances, and the fact that the coke-dust is very detrimental to the machinery, it is clear that the suggestion of setting the retorts at an incline in order to facilitate the work presented great inducements to the gas manager. The object aimed at in thus setting retorts is to allow gravity to play the part of charging and discharging the coal and coke, the retorts being inclined at an angle to suit the slip of the class of coal used; this angle is between 28° and 34°. The coal, previously elevated to hoppers, is dropped into the feeding chambers, which are so arranged that they can travel from end to end of the retort- house and feed the coal into the retorts. When the retort is to be charged, an iron stop or barrier is placed in the lower mouthpiece, and the door closed. The shoot is placed in the upper mouthpiece, and the stop or door, which retains the coal in the chamber, is re- leased ; the coal is then discharged into the retort, and rushing down the incline, is arrested by the barrier, and banks up, forming a continuous backing to the coal following. By experience with the class of coal used and the adjustment of the stops in the shoot, the charge can be run into the retort to form an even layer of any desired depth. For the withdrawal of the residual coke at the end of the carbonization, the lower mouthpiece door is opened, the barrier removed and the coke in the lower part of the retort is " tickled " or gently stirred with an iron rod to overcome a slight adhesion to the retort; the entire mass then readily discharges itself. Guides are placed in front of the retort to

direct its course to the coke hoppers or conveyer below, and to prevent scattering of the hot material. This system shows a greater economy in the cost of carbonizing the coal, but the large outlay and the wear and tear of the mechanical appliances involved have so far prevented its very general adoption.

The vertical retort was one of the first forms experimented with by Murdoch, but owing to the difficulty of withdrawing the coke, the low illuminating power of the gas made in it, and the damage to the retort itself, due to the swelling of the charge during distil- lation, it was quickly abandoned. About the beginning of the 20th century, however, the experiments of Messrs Settle and Padfield at Exeter, Messrs Woodall and Duckham at Bournemouth, and Dr Bueb in Germany showed such encouraging results that the idea of the vertical retort again came to the front, and several systems were proposed and tried. The cause of the failure of Murdoch's original vertical retort was undoubtedly that it was completely filled with coal during charging, with the result that the gas liberated from the lower portions of the retort had to pass through a deep bed of red-hot coke, which, by over-baldng the gas, destroyed the illuminating hydrocarbons. There is no doubt that the question of rapidly removing the gas, as soon as it is properly formed, from the influence of the nighly-heated walls of the retort and residual coke, is one of the most important in gas manufacture.

In the case of horizontal retorts the space between the top of the coal and the retort is of necessity considerable in order to permit the introduction of the scoop and rake; the gas has therefore a free channel to travel along, but has too much contact with the highly heated surface of the retort before it leaves the mouthpiece. In the case of inclined retorts this disadvantage is somewhat reduced, but with vertical retorts the ideal conditions can be more nearly approached. The heating as well as the illuminating value of the gas per unit volume is lowered by over-baking, and Dr Bueb gives the following figures as to the heating value of gas obtained from the same coal but by different methods of carbonization : —

Vertical Retorts, 604 British thermal units per cub. ft. Inclined ,, 584 ,, ,,

Horizontal ,, 570 ,, ,, ,,

Of the existing forms of vertical retort it remains a matter to be decided whether the coal should be charged in bulk to the retort or whether it should be introduced in small quantities at regular and

short intervals; by this latter means (the characteristic feature of the Settle-Padfield process) a continuous layer of coal is in process of carbonization on the top, whilst the gas escapes without contact with the mass of red-hot coke, a considerable increase in volume and value in the gas and a much denser coke being the result.

From the retort the gas passes by the ascension pipe to the hydraulic main (fig. 7). This is a long reservoir placed in a horizontal position and supported by columns upon the top of the „ .

retort stack, and through it is maintained a slow but y . rau constant flow of water, the level of which is kept uniform. ma,n – The ascension pipe dips about 2 in. into the liquid, and so makes a seal that allows of any retort being charged singly without the risk of the gas produced from the other retorts in the bench escaping

Fig.

7. — Hydraulic Main.

through the open retort. Coal gas, being a mixture of gases and vapours of liquids having very varying boiling points, must necessarily undergo physical changes when the temperature is lowered Vapours of liquids of high boiling point will be condensed more quickly than those having lower boiling points, but condensation of each vapour will take place in a definite ratio with the decrease of temperature, the rate being dependent upon the boiling point of the liquid from which it is formed. The result is that from the time the gaseous mixture leaves the retort it begins to deposit condensation products owing to the decrease in temperature. Condensation takes place in the ascension pipe, in the arch piece leading tc the hydraulic main, and to a still greater extent in the hydraulic main itself where the gas has to pass through water.

Ascension pipes give trouble unless they are frequently cleared by an instrument called an ” auger,” whilst the arch pipe is fitted with hand holes through which it may be easily cleared in case of stoppage. The most soluble of the constituents of crude coal gas is ammonia, 780 volumes of which are soluble in one volume of water at normal tempera- ture and pressure, and the water in the hydraulic

main absorbs a considerable quan- tity of this compound from the gas and helps to form the ammoniacal liquor, whilst, although the liquor is well agitated by the gas bubbling through it, a partial separation of tar from liquor is effected by gravitation. The liquor is run off at a constant rate from the hydraulic main to the store tank, and the gas passes from the top of the hydraulic main to the foul main.

The gas as it leaves the hydraulic main is still at a temperature of from 130 to 150 F., and should now be reduced as nearly as Coadensa- possible to the temperature of the surrounding atmosphere. tlon. ˆne operation of efficient condensing is net by any means as

simple as might be supposed. The tar and liquor when con- densed have a dissolving action on various valuable light-giving con- stituents of the gas, which in the ordinary way would not be deposited by the lowering of temperature, and for this reason the heavy tar, and especially that produced in the hydraulic main, should come in contact with the gas as little as possible, and condensation should take place slowly.

The main difficulty which the condenser ought to overcome and upon which its efficiency should depend is the removal of naphtha- lene; this compound, which is present in the gas, condenses on cooling to a solid which crystallizes out in the form of white flakes, and the trouble caused by pipe stoppages in the works as well as in the district supplied is very considerable. The higher the heat of carbonization the more naphthalene appears to be produced, and gas managers of to-day find the removal of naphthalene from the gas a difficult problem to solve. It was for some time debated as to whether naphthalene added materially to the illuminating value of the gas, and whether an endeavour should be made to carry it to the point of combustion ; but it is now acknowledged that it is a troublesome impurity, and that the sooner it is extracted the better. Gas leaves the retorts saturated with naphthalene, and its capacity for holding that impurity seems to be augmented by the presence of water vapour. The condenser, by effecting the condensation of water vapour, also brings about the deposition of solid naphthalene, apart from that which naturally condenses owing to reduction of temperature.

Condensers are cither air-cooled or water-cooled, or both. In the former case the gas traverses pipes exposed to the atmosphere and so placed that the resulting products of condensation may be collected at the lowest point. Water is a more efficient cooling medium than

air, owing to its high specific heat, and the degree of cooling may be more easily regulated by its use. In water-cooled condensers it is usual to arrange that the water passes through a large number of small pipes contained in a larger one through which the gas flows, and as it constantly happened that condenser pipes became choked by naphthalene, the so-called reversible condenser, in which the stream of gas may be altered from time to time and the walls of the pipes cleaned by pumping tar over them, is a decided advance.

The solubility of naphthalene by various oils has led some engineers to put in naphthalene washers, in which gas is brought into contact with a heavy tar oil or certain fractions distilled from it, the latter being previously mixed with some volatile hydrocarbon to replace in the gas those illuminating vapours which the oil dissolves out; and by fractional distillation of the washing oil the naphthalene and volatile hydrocarbons are afterwards recovered.

The exhauster is practically a rotary gas pump which serves the purpose of drawing the gas from the hydraulic main through the Exhauster, condensers, and then forcing it through the purifying vessels to the holder. Moreover, by putting the retorts under a slight vacuum, the amount of gas produced is increased by about 12%, and is of better quality, owing to its leaving the

heated retort more quickly. A horizontal compound steam-engine is usually employed to drive the exhauster.

At this point in the manufacturing process the gas has already undergone some important changes in its composition, but there yet remain impurities which must be removed, these being ammonia, sulphuretted hydrogen, carbon disulphide and carbon dioxide. Ammonia is of considerable marketable value, and even in places where the local Gas Act does not prescribe that it shall be removed, it is extracted. Sulphuretted hydrogen is a noxious impurity, and its complete removal from the gas is usually imposed by parlia- ment. As nearly as possible all the carbon dioxide is extracted, but most gas companies are now exempt from having to purify the gas from sulphur compounds other than sulphuretted hydrogen. Cyanogen compounds also are present in the gas, and in large works, where the total quantity is sufficient, their extraction is effected for the production of either prussiate or cyanide of soda.

Atkinson Butterfield gives the composition of the gas at this point to be about

per cent, by vol. Hydrogen . . . from 42 to 53

Methane . . . „ 32 ,, 39

Carbon monoxide „ 3 ,, 10

Hydrocarbons —

Gases . . . ,, 2-5 „ 4-5 Light condensable

vapours . . ,, 0-5 ,, 1-2 Carbon dioxide. . ,, i-i ,, 1-8

Nitrogen . . . ,, I-o ,, 5-0 Sulphuretted hydrogen ,, i-o „ 2-0 Ammonia . . . ,, 0-5 ,, 0-95 Cyanogen . . . ,, 0-05 ,, 0-12 Carbon disulphide . ,, 0-02 ,, 0-035 Naphthalene . . ,, 0-005 « 0-015

It happens that ammonia, being a strong base, will effect the extraction of a certain proportion of such compounds as sulphuretted hydrogen, carbon dioxide a»d hydrocyanic acid, and the Washers. gas is now washed with water and ammoniacal liquor. The process is termed washing or scrubbing, and is carried out in various forms of apparatus, the efficiency of which is dependent upon the amount of contact the apparatus allows between the finely divided gas and water in a unit area and the facility with which it may be cleared out. The ” Livesey ” washer, a well-known type, is a rectangular cast iron vessel. The gas enters in the centre, and to make its escape again it has to pass into long wrought iron inverted troughs through perforations one-twentieth of an inch in diameter. A constant flow of liquor is regulated through the washer, and the gas, in order to pass through the perforations, drives the liquor up into the troughs. The liquor foams up owing to agitation by the finely divided streams of gas, and is brought into close contact with it. Two or three of these washers are connected in series according to the quantity of gas to be dealt with.

The final washing for ammonia is effected in an apparatus termed a ” scrubber,” which is a cylindrical tower packed with boards. Jin, thick by II in. broad, placed on end and close together; scrubbers. water is caused to flow down over the surface of these boards, the object being to break up the gas as much as possible and bring it into close contact with the water. In this wet purifying apparatus the gas is almost wholly freed from ammonia and from part of the sulphuretted hydrogen, whilst carbon dioxide and carbon disulphide are also partially extracted.

The final purification is carried out in rectangular vessels, known as

" dry purifiers " (fig. 8). Internally, each purifier is filled with ranges of wooden trays or sieves A, made in the form of Purifiers. grids (fig. 9), and covered with the purifying material B to a depth of about 6 in., the number of tiers and size of purifier boxes being proportional to the quantity of gas to be purified. The gas

Fig. 8. — Purifier.

enters at the bottom by the pipe C, the inlet being protected from any falling material by the cover D ; it forces its way upwards through all the trays until, reaching the lid or cover E,it descends by the exit tube F, which leads to the next purifier. The edges of the lid dip into an external water seal or lute G, whereby the gas is prevented from escaping.

Fig. 9. — Purifier Grid.

When the gas had to be purified from carbon disulphide as well as from sulphuretted hydrogen, slaked lime was employed for the removal of carbon dioxide and the greater quantity of the sulphur compounds, whilst a catch box or purifier of oxide of iron served to remove the last traces of sulphuretted hydrogen. Not fewer than four lime purifiers were employed, and as the one which was first

in the series became exhausted, i.e. \ began to show signs of allowing " carbon dioxide to pass through it unabsorbed, it was filled with fresh slaked lime and made the last of the series, the one which was second becoming first, and this procedure went on continuously. This operation was necessitated by the fact that carbon dioxide has the power of breaking up the sulphur compounds formed by the lime, so that until all carbon dioxide is absorbed with the formation of calcium carbonate, the withdrawal of sulphuretted hydrogen cannot proceed, whilst since it is calcium sulphide formed by the absorption of sulphuretted hydrogen by the slaked lime that absorbs the vapour of carbon disulphide, purification from the latter can only be accomplished after the necessary calcium sulphide has been formed. The foul gas leaving the scrubbers contains, as a general average, 30 grains of sulphuretted hydrogen, 40 grains of carbon disulphide and 200 grains of carbon dioxide per 100 cub. ft. On entering the first purifier, which contains calcium thiocarbonate and other com-

binations of calcium and sulphur in small quantity, the sulphuretted hydrogen and disulphide vapour have practically no action upon the material, but the carbon dioxide immediately attacks the calcrum thiocarbonate, forming calcium carbonate with the production of carbon disulphide vapour, which is carried over with the gas into the second box. In the connexion between the first and the second box the gas is found to contain 500 grains of sulphuretted hydrogen and 80 grains of carbon disulphide per 100 cub. ft., but no trace of carbon dioxide. In the second box the formation of calcium thio-carbonate takes place by the action of carbon disulphide upon the calcium sulphide with the liberation of sulphuretted hydrogen, which is carried over to the third purifier. The gas in the connecting pipe between the second and third purifier will be found to contain 400 grains of sulphuretted hydrogen and 20 grains of carbon di- sulphide. The contents of the third box, being mostly composed of slaked lime, take up sulphuretted hydrogen forming calcium sulphide, and practically remove the remaining impurities, the outlet gas show- ing 20 grains of sulphuretted hydrogen and 8 grains of carbon di-sulphide per 100 cub. ft., whilst the catch box of oxide of iron then removes all traces of sulphuretted hydrogen. It will be noticed that in the earlier stages the quantity of sulphur impurities is actually increased between the purifiers — in fact, the greater amount of sulpiiiding procures the ready removal of the carbon disulphide, — but it is the carbon dioxide in the gas that is the disturbing element, inasmuch as it decomposes the combinations of sulphur and calcium ; consequently it is a paramount object in this system to prevent this latter impurity finding its way through the first box of the series. The finding of any traces of carbon dioxide in the gas between the first two boxes is generally the signal for a new clean purifier being put into action, and the first one shut off, emptied and recharged with fresh lime, the impregnated material being sometimes sold for dressing certain soils.

The action of oxide of iron, which has now partly replaced the lime purification, depends on its power of combining with sulphuretted hydrogen to form sulphide of iron. Such is the affinity of the oxide for this impurity that it may contain from 50 to 60 % by weight of free sulphur after revivification and still remain active. Upon re-moving the material from the vessel and exposing it to the atmo-sphere the sulphide of iron undergoes a revivifying process, the oxygen of the air displacing the sulphur from the sulphide as free sulphur, and with moisture converting the iron into hydrated oxide of iron. This revivification can be carried on a number of times until the material when dry contains about 50 % of free sulphur and even

occasionally 60% and over; it is then sold to manufacturers of sulphuric acid to be used in the sulphur kilns instead of pyrites (see Sulphuric Acid).

Apart from the by-products coke, coke-breeze, tar and retort carbon, which are sold direct, gas companies are now in many cases preparing from their spent purifying material pure chemical products which are in great demand. The most important of these is sulphate of ammonia, which is used for agricultural purposes as a manure, and is obtained by passing ammonia into sulphuric acid and crystallizing out the ammonium sulphate produced. To do this, saturated ammoniacal liquor is decomposed by. lime in the presence of steam, and the freed ammonia is passed into strong sulphuric acid, the saturated solution of ammonium sulphate being carefully crystallized. The market value of the salt varies, but an average figure is £12 per ton, whilst the average yield is about 24 ft of salt per ton of coal carbonized. In large works the sulphuric acid is usually manufactured on the spot from the spent oxide, so that the sulphuretted hydrogen, which in the gas is considered an undesirable impurity, plays a valuable part in the manufacture of.an important by-product.

Cyanogen compounds are extracted either direct from the gas, from the spent oxide or from ammoniacal liquor, and some large gas works now produce sodium cyanide, this being one of the latest developments in the gas chemical industry.

The purified gas now passes to a gasholder (sometimes known as a gasometer), which may be either single lift, i.e. a simple bell inverted in a tank of water, or may be constructed on the r telescopic principle, in which case much ground space is as ° ‘ saved, as a holder of much greater capacity can be contained in the same-sized tank. The tank for the gasholder is usually made by

Fig. 10. — Gasholder. ■

excavating a circular reservoir somewhat larger in diameter than the proposed holder. A banking is allowed to remain in the centre, as shown in fig. 10, which is known as the ” dumpling,” this arrangement not only saving work and water, but acting as a support for the king post of a trussed holder when the holder is empty. The tank must be water-tight, and the precaution necessary to be taken in order to ensure this is dependent upon the nature of the soil; it is usual, however, for the tanks to be lined with concrete. Where the conditions of soil are very bad, steel tanks are built above ground, but the cost of these is much greater. The holder is made of sheet iron riveted together, the thickness depending upon the size of the holder. The telescopic form consists of two or more lifts which slide in one another, and may be described as a single lift holder encircled by other cylinders of slightly larger diameter, but of about the same length. Fig. 10 shows the general construction. Gas on entering at A causes the top lift to rise; the bottom of this lift being turned up all round to form a cup, whilst the top of the next lift is turned down to form a so-called grip, the two interlock (see fig. 11), forming what is known as the hydraulic cup. Under these conditions the cup will necessarily be filled with water, and a seal will be formed, preventing the escape of gas. A guide framing is built round the holder, and guide rollers are fixed at various intervals round the grips of each lift, whilst at the bottom of the cup guide rollers are also fixed (fig. 11). In the year 1892 the largest existing gasholder was built at the East Greenwich works of the South Metropolitan Gas Company; it has six lifts, its diameter is 293 ft., and when filled with gas stands 180 ft. high. The capacity for gas is 12 million cub. ft.

The governor consists usually of a bell float- ing in a cast iron tank partially filled with water, and is in fact a small gas- „„„„„.„ holder,

from the centre of which is uovernor – suspended a conical valve controlling the gas inlet and closing it as the bell fills. Any deviation in pressure will cause the floating bell to be lifted or lowered, and the size of the inlet will be decreased or increased, thus regulating the flow.

The fact that coal gas of an illuminating power of from 14 to 16 candles can be made from the ordinary gas coal at a fairly low rate, while every candle power added to the gas increases the cost in an enormous and rapidly growing ratio, has, from the earliest days of

Fig. 11. — Cup and Grip.

Enrich- ment by tar.

the gas industry, caused the attention of inventors to be turned to the enrichment of coal gas. Formerly cannel coal was used for Enrich- producing a very rich gas which could be mixed with the meat. ordinary gas, thereby enriching it, but as the supply

became limited and the price prohibitive, other methods were from time to time advocated to replace its use in the enrich- ment of illuminating gas. These may be classified as follows : —

1. Enriching the gas by vapours and permanent gases obtained by decomposing the tar formed at the same time as the gas.

2. Mixing with the coal gas oil gas, obtained by decomposing crude oils by heat.

3. The carburetting of low-power gas by impregnating it with the vapours of volatile hydrocarbons.

4. Mixing the coal gas with water gas, which has been highly carburetted by passing it with the vapours of various hydrocarbons through superheaters in order to give permanency to the hydro- carbon gases.

Very many attempts have been made to utilize tar for the production and enrichment of gas, and to do this two methods may be adopted :

— (a) Condensing the tar in the ordinary way, and afterwards using the whole or portions of it for cracking into a permanent gas.

(b) Cracking the tar vapours before condensation by passing the gas and vapours through superheaters.

If the first method be adopted, the trouble which presents itself is that the tar contains a high percentage of pitch, which tends rapidly to choke and clog up all the pipes. A partly successful attempt to make use of certain portions of the liquid products of distillation of coal before condensation by the second method was the Dinsmore process, in which the coal gas and vapours which, if allowed to cool, would form tar, were made to pass through a heated chamber, and a certain proportion of otherwise condensible hydrocarbons was thus converted into permanent gases. Even with a poor class of coal it was claimed that 9800 cub. ft. of 20- to 21-candle gas could be made by this process, whereas by the ordinary process 9000 cub. ft. of 15-candle gas would have been produced. This process, although strongly advocated by the gas engineer who experimented with it, was never a commercial success. The final solution of the question of enrichment of gas by hydrocarbons de- rived from tar may be arrived at by a process which prevents the formation of part of the tar during the carbonization of the coal, or by the process devised by C. B. Tully and now in use at Truro, in which tar is injected into the incandescent fuel in a water-gas gener- ator and enriches the water gas with methane and other hydro- carbons, the resulting pitch and carbon being filtered off by the column of coke tnrough which the gas passes.

The earliest attempts at enrichment by oil gas consisted in spray- ing oil upon the red hot mass in the retort during carbonization; . but experience soon showed that this was not an econo-

” mical method of working, and that it was far better to m f. decompose the liquid hydrocarbon in the presence of the

oil gas. diluents which are to mingle with it and act as its carrier, since, if this were done, a higher temperature could be employed and more of the heavier portions of the oil converted into gas, with- out at the same time breaking down the gaseous hydrocarbons too much. In carburetting poor coal gas with hydrocarbons from mineral oil it must be borne in mind that, as coal is undergoing distillation, a rich gas is given off in the earlier stages, but towards the end of the operation the gas is very poor in illuminants, the methane disappearing with the other Hydrocarbons, and the increase in

hydrogen being very marked. Lewis T. Wright employed a coal requiring six hours for its distillation, and took samples of the gas at different periods of the time. On analysis these yielded the following results: —

Time after beginning Distillation.

Enrich- ment by volatile hydro- carbons.

10

minutes.

i hour 30 minutes.

3 hours 25 minutes.

5 hours 35 minutes.

Sulphuretted hydrogen Carbon dioxide ....

Hydrogen

Carbon monoxide . Saturated hydrocarbons Unsaturated ,, Nitrogen

1-30

2-21

20- IO

6-19

57-38 10-62

2-20

1-42 2-09

38-33 5-66

44-03 5-98

2-47

0-49

1-49

52-68

6-21

33-54 3-04 2-55

O-II

1-50 67-12

6-12

22-58

1-79 0-78

This may be regarded as a fair example of the. changes which take place in the quality of the gas during the distillation of the coal. In carburetting such a gas by injecting mineral oil into the retort, many of the products of the decomposition of the oil being vapours, it would be wasteful to do so for the first two hours, as a rich gas is being given off which has not the power of carrying in suspension a much larger quantity of hydrocarbon vapours without being supersaturated with them. Consequently, to make it carry any further quantity in a condition not easily deposited, the oil would have to be completely decomposed into permanent gases, and the temperature necessary to do this would seriously affect the quality of the gas given off by the coal. When, however, the distillation

has gone on for three hours, the rich portions of coal have distilled off and the temperature of the retort has reached its highest point, and this is the best time to feed in the oil.

Undoubtedly the best process which has been proposed for the production of oil gas to be used in the enrichment of coal gas is the " Young " or " Peebles " process, which depends on the principle of washing the oil gas retorted at a moderate temperature by means of oil which is afterwards to undergo decomposition, because in this way it is freed from all condensible vapours, and only permanent gases are allowed to escape to the purifiers. In the course of this treatment considerable quantities of the ethylenes and other fixed gases are also absorbed, but no loss takes place, as these are again driven out by the heat in the subsequent retorting. The gas ob- tained by the Young process, when tested by itself in the burners most suited for its combustion, gives on the photometer an illumin- ating value averaging from 50 to 60 candle-power, but it is claimed, and quite

correctly, that the enriching power of the gas is consider- ably greater. This is accounted for by the fact that it is impossible to construct a burner which will do justice to a gas of such illu- minating power.

The fundamental objections to oil gas for the enrichment of coal gas are, first, that its manufacture is a slow process, requiring as much plant and space for retox'ting as coal gas; and, secondly, that although on a small scale it can be made to mix perfectly with coal gas and water gas, great difficulties are found in doing this on the large scale, because in spite of the fact that theoretically gases of such widely different specific gravities ought to form a perfect mixture by diffusion, layering of the gas is very apt to take place in the holder, and thus there is an increased liability to wide variations in the illuminating value of the gas sent out.

The wonderful carburetting power of benzol vapour is well known, a large proportion of the total illuminating power of coal gas being due to the presence of a minute trace of its vapour carried in suspension. For many years the price of benzol has been falling, owing to the large quantities produced in the coke ovens, and at its present price it is by far the cheapest enriching material that can be obtained. Hence at many gas-works where it is found necessary to do so it is used in various forms of carburettor, in which it is volatilized and its vapour used for enriching coal gas up to the requisite illuminating power.

One of the most generally adopted methods of enrichment now is by means of carburetted water gas mixed with poor coal gas. When steam acts upon carbon at a high temperature the Ear i ctt . resultant action may be looked upon as giving a mixture meni ˆ„ of equal volumes of hydrogen and carbon monoxide, both . of which are inflammable but non-luminous gases. This ca ™" re ea water gas is then carburetted, i.e. rendered luminous by wa e s s " passing it through chambers in which oils are decomposed by heat, the mixture being made so as to give an illuminating value of 22 to 25 candles. This, mixed with the poor coal gas, brings up its illuminating value to the required limit. Coke or anthracite is heated to incandescence by an air blast in a generator lined with fire-brick, and the heated products of combustion as they leave the generator and enter the superheaters are supplied with more air, which causes the combustion of carbon monoxide present in the producer gas and heats up the fire-brick baffles with which the super- heater is filled. When the necessary temperature of the fuel and superheater has been reached, the air blast is cut off, and steam is blown through the

generator, forming water gas, which meets the enriching oil at the top of the first superheater, called the carburettor, and carries the vapours with it through the main superheaters, where the fixing of the hydrocarbons takes place. The chief advan- tage of this apparatus is that a low temperature can be used for fixing owing to the enormous surface for super- heating, and thus to a great extent the deposition of carbon is avoided. This form of apparatus has been very generally adopted in Great Britain as well as in America, and practically all carburetted water-gas plants are founded upon the same set of actions. Important factors in the use of car- buretted water gas for enrichment are that it can be made with enormous rapidity and with a mini- mum of labour; and not only is the requisite increase in illuminating power secured, but the volume of the enriched gas is increased by the bulk of carburetted water gas added, which in ordinary English practice amounts to from 25 to 50%. The public at first strongly opposed its introduction on the ground of the poisonous properties of the carbon monoxide, which is present in it to the extent of about 28 to 30%. Still when this comes to be diluted with 60 to 75 % of ordinary coal gas, containing as a rule only 4 to 6% of carbon monoxide, the per- centage of poisonous monoxide in the mixture falls to below 16%, which experience has shown to be a fairly safe limit.

A rise in the price of oil suitable for carburetting has caused the gas industry to consider other methods by which the volume of gas obtainable from coal can be increased by admixture with blue or non- luminous water gas. In Germany, at several important gas-works, non-luminous water gas is passed into the foul main or through

the retorts in the desired proportion, and the mixture-of water gas and coal gas is then carburetted to the required extent by benzol vapour, a process which at the present price of oil and benzol is distinctly more economical than the use of carburetted water gas. In 1896 Karl Dellwik introduced a modification in the process of making water gas which entirely altered the whole aspect of the industry. In all the attempts to make water gas, up to that date, the incandescence of the fuel had been obtained by " blowing " so deep a bed of fuel that carbon monoxide and the residual nitrogen of the air

formed the chief products, this mixture being known as " producer " gas. In the Dellwik process, however, the main point is the adjustment of the air supplied to the fuel in the generator in such a way that carbon dioxide is formed instead of carbon monoxide. Under these conditions producer gas ceases to exist as a by-product, and the gases of the blow consist merely of the incombustible products of com- plete combustion, carbon dioxide and nitrogen, the result being that more than three times the heat is developed for the combustion of the same amount of fuel, and nearly double the quantity of water gas can be made per pound of fuel than was before possible. The runs or times of steaming can also be con- tinued for longer periods. The possibility of making from 60,000 to 70,000 cub. ft. of water gas per ton of coke used in the Dellwik generator as against 34,000 to 45,000 cub. ft. per ton made by previous processes reduces the price of water gas to about 3jd. per thousand, so that the economic value of using

it in admixture with coal gas and then enriching the mixture by any cheap carburetting process is manifest. The universal adoption of the incandescent mantle for lighting purposes has made it evident that the illuminating value of the gas is a secondary consideration, and the whole tendency now is to do away with enrichment and produce a gas of low-candle power but good heating power at a cheap rate for fuel purposes and incandescent lighting. (See also Lighting: Gas.) (V. B. L.)

2. Gas for Fuel and Power.— The first gas-producers, which were built by Faber du Faur at Wasseralfingen in 1836 and by C. G. C. Bischof at Magdesprung (both in Germany), con- sisted of simple perpendicular shafts of masonry contracted at the top and the bottom, with or without a grate for the coal. Such producers, frequently strengthened by a wrought iron casing, are even now used to a great extent. Some- times the purpose of a gas-producer is attained in a very simple manner by lowering the grate of an ordinary fireplace so much that a layer of coal 4 or 5 ft. deep is maintained in the fire. The effect of this arrangement is that the great body of coal reaches a higher temperature than in an ordinary fireplace, and this, together with the reduction of the carbon dioxide formed immediately above the grate by the red-hot coal in the upper part of the furnace, leads to the formation of carbon monox- ide which later on, on the spot where the greatest heat is re- quired, is burned into dioxide by admitting fresh air, preferably pre-heated. This simple and inexpensive arrangement has the further advantage that the producer-gas is utilized immediately after its formation, without being allowed to cool down. But it is not very well adapted

to large furnaces, and especially not to those cases where all the space round the furnace is required for manipulating heavy, white-hot masses of iron, or for similar purposes. In these cases the producers are arranged outside the iron-works, glass-works, &c, in an open yard where all the manipulations of feeding them with coal, of stoking, and of re- moving the ashes are performed without interfering with the work inside. But care must always be taken to place the producers at such a low level that the gas has an upward tendency, in order to facilitate its passage to the furnace where it is to be burned. This purpose can be further promoted by various means. The gas-producers constructed by Messrs Siemens Brothers, from 1856 onwards, were provided with a kind of brick chimney; on the top of this there was a horizontal iron tube, continued into an iron down-draught, and only from this the underground flues were started which sent the gas into the single furnaces. This arrangement, by which the gas was cooled down by the action of the air, acted as a gas-siphon for drawing the

gas out of the producer, but it has various drawbacks and has been abandoned in all modern constructions. Where the " natural draught " is not sufficient, it is aided either by blowing air under the grate or else by suction at the other end. We shall now describe a few of th e very l arge number of gas-

Fig. 12. ‘ — Siemens Producer (Sectional Elevation).

producers constructed, selecting some of the most widely applied in practice.

The Siemens Producer in its original shape, of which hundreds have been erected and many may be still at work, is shown in fig. 12. A is the charging-

hole; B, the inclined front ˆ iB,.. . <"» ˆr

wall, consisting of a cast iron plate with fire-brick lining; C, the equally in- clined “step-grate”; D, a damper by which the pro- ducer may be isolated in case of repairs; E, a water- pipe, by which the cinders at the bottom may be quenched before taking away; the steam here formed rises into the pro- ducer where it forms some " semi- water gas " (see Fuel: Caseous). Openings like that shown at G serve for introducing a poker in order to clean the brick- work from adhering slags.

H is the gas flue; I, the perpendicularly ascending shaft, 10 or 12 ft.

high; J J, the horizontal iron tube; K, the descending branch mentioned above, for producing a certain amount of suction by means of the gas-siphon thus formed. In the horizontal branch JJ much

Liirmann's Producer.

Figs. 14 and 15. — Liegel's Producer, of the tar and flue-dust is also condensed, which is of importance where bituminous coal is employed for firing.

1 Figs. 12, 13, 14, 15, 16, 18, 19, 20, 21 of this article are from Lunge's Coal-tar and Ammonia, by permission of Friedr. Vieweg u. Sohn.

This as well as most other descriptions of gas-producers, is not adapted to being worked with such coal as softens in the heat and

where it is to be used. The retort E is charged with ordinary bituminous coal which is submitted to destructive distillation by the heat communicated through the flues » 2 «2, and is thus converted into coke. The gases formed during this process pass into the upper portion of V and get mixed with the producer- gas formed in the lower portion. From time to time, as the level of the coke in V goes down, some of the freshly formed coke in E is

Fig. 16. — Taylors Producer.

forms cakes, impenetrable to the air and impeding the regular sinking of the charge in the producer. The fuel employed should be non-bituminous coal, anthracite or coke, or at least so much of these materials should be mixed with ordinary coai that no semi-solid cakes of the kind just described are formed. Where it is unavoidable to work with coal softening in the fire, Liirmann's producer may be employed, which is shown in fig 13. V shows a gas- producer of the ordinary kind, which during regular work is filled with the coke formed in the horizontal retort E. ' The door b serves for removing the slags and ashes from the bottom of V, as far as they do not fall through the grate. The hot producer-gas formed in V is passed round the retort E in the flues ni tit, and ultimately goes away through K to the furnace

Fig. 17. — Dowson Gas Plant.

pushed into V, whereby the level of the coke in V should assume the shape shown by the dotted line I . . . m. If the level became

Fig. 18.— Mond Gas Plant.

Fig. 19.— Mond Gas Plant.

too low, such as is shown by the dotted line x . . . y, the working of the producer would be wrong, as in this case the layer of coke at the front side would be too low, and carbon dioxide would be formed in lieu of monoxide.

Figs. 14 and 15 show Liegel's producer, the special object of which is to deal with any fuel (coal or coke) giving a tough, pasty slag on combustion. Such slags act very prejudicially by impeding the up-draught of the air and the sinking of the fuel ; nor can they

Fig. 20. — Blass' Gas Plant.

be removed by falling through a grate, like ordinary coal-ashes. To obviate these drawbacks the producer A is kept at a greater heat than is otherwise usual, the air required for feeding the producer being pre-heated in the channels e, e. The inside shape of the pro- ducer is such that the upper, less hot portion cannot get stopped, as it widens out towards the bottom; the lower, hotter portion, where the ashes are already fluxed, is contracted to a slit o, through which the air ascends. The grate b retains any small pieces of fuel, but allows the liquid cinder to pass through. The lateral flues c, c prevent the brickwork from being melted.

One of the best-known gas-producers for working with com- pressed air from below is Taylor's, shown in fig. 16. A is the feeding-hopper, on the same principle as is used in blast- furnaces. L is the producer-shaft, with an iron casing B and peep-

holes Bi to B 4 , passing through the brick lining M. F is the con- tracted part, leading to the closed ash-pit, accessible through the doors D. An injector I, worked by means of the steam-pipe J, forces

air through K into F. The circular grate G can be turned round K by means of the crank E from the outside. Thio is done, without interfering with the blast, in order to keep the fuel at the proper level in L, according to the indications of the burning zone, as shown through the peep-holes Bj to B 4 . The ashes collecting at the bottom are from time to time removed by the doors D. As the steam, introduced by J, is decomposed in the producer, we here obtain a " semi- water gas," with about 27 % CO and 12 % H 2 .

*Fig. 17 shows the Dowson gas-producer, together with the arrangements for purifying the gas for the purpose of working a gas engine, a is a vertical steam boiler, heated by a central shaft filled with coke, with superheating tubes b passing through the central shaft, c is the steam-pipe, carrying the dry steam into the air-injector d. This mixture of steam and air enters into the gas-producer e below the fire-grate /. g is the feeding-hopper for the anthracite which is usually employed in this kind of pro- ducer, h, h are cooling-pipes for the gas where most of the undecomposed steam (say 10% of the whole employed in d) is condensed. * is a hydraulic box with water seal; _;, a coke-scrubber; k, a filter; I, a saw- dust-scrubber; m, inlet of gas-holder; n, gas- holder; 0, outlet of same; p, a valve with weighted lever to regulate the admission of steam to the gas-producer; q, the weight which actuates the lever automatically by the rise or fall of the bell of the gas-holder. In practical work about f lb of steam is decomposed for each pound of anthracite consumed, and no more than 5% of carbon dioxide is found in the resulting gas. The latter has an average calorific power of 1732 calories per cubic metre, or 161 B.T.U. per cubic foot, at 0° and 760 mm.*

The Mond plant is shown in figs. 18 and 19. The gases produced in the generators G are passed through pipes r into washers W, in which water is kept in violent motion by means of paddle-wheels. The spray of water removes the dust and part of the tar and ammonia from the gases, much steam being produced at the same time. This water is withdrawn from time to time and worked for the ammonia it contains. The gases, escaping from W at a temperature of about 100° C, and containing much steam, pass though g and a into a tower, fed with an acid-absorbing liquid, coming from the tank s, which is spread into many drops by the brick filling of the tower. This liquid is a strong solution of ammonium sulphate, containing about 2 5% free sul phuric acid which absorbs nearly all the ammonia from the gases, without dissolving much of the tarry substances. Most of the liquor arriving at the bottom, after mechani- cally separating the tar, is pumped back into j, but a portion is always withdrawn and worked for ammonium sulphate. When escaping from the acid tower, the gas

con- tains about 0-013% NH 3 , and has a tem- perature of about 80° C. and is saturated ■with aqueous vapour. It is passed through c into a second tower B, filled with blocks of wood, where it meets with a stream of comparatively cold water. At the bottom of this the water runs away, its temperature being 78° C. ; at the top the gas passes away through d into the dis- tributing main. The hot water from B, freed from tar, is pumped into a third tower C, through which cold air is forced by means of a Root's blower by the pipe w. This air, after being heated to 76 C, and saturated with steam in the tower C, passes through / into the generator G. The water in C leaves this tower cold enough to be used in the scrubber B. Thus two-thirds of the steam originally employed in the generator is reintroduced into it, leaving only one- third to be supplied by the exhaust steam of the steam-engine. The gas-generators G have a rectangular section, 6X12 ft., several of them being erected in series. The introduction of the air and the removal of the ashes takes place at the narrower ends. The bottom is formed by a water-tank and the ashes are quenched here. The air enters just above the water-level, at a pressure of 4 in. The

Mond gas in the dry state contains 15% carbon dioxide, 10% monoxide, 23% hydrogen, 3% hydrocarbons, 49% nitrogen. The yield of ammonium sulphate is 75 lb from a ton of coal (slack with 11-5% ashes and 55% fixed carbon).

One of the best plants for the generation of water-gas is that constructed by E. Blass (fig. 20). Steam eaters through the valve V at D into the generator, filled with coke, and passes away at the bottom through A. The pressure of the gas should not be such that it could get into the pipe conveying the air- blast, by which an explosive mixture would be formed. This is prevented by the water-cooled damper S, which always closes the air-blast when the gas-pipe is open and vice versa. Below the entry W of the air-blast there is a throttle valve d which is closed as soon as the damper S opens the gas canal ; thus a second security against the production of a mixture of air and gas is afforded. The water- cooled ring channel K protects the bottom outlet of the generator and causes the cinders to solidify, so that they can be easily removed. But sometimes no such cooling is effected, in which case the cinders run away in the liquid form. Below K the fuel is lying in a conical heap, leaving the ring channel A free. During the period of hot- blowing (heating-up) S is turned so that the air-blast communicates with the generator; d and G are

open; g (the damper connected with the scrubber) and V are closed. During the period of gas- making G and d are closed, S now closes the air-blast and connects the generator with the scrubber; V is opened, and the gas passes from the scrubber into the gas-holder, the inlet w being under a pressure of 4 in. All these various changes in the opening of the valves and dampers are automatically performed in the proper order by means of a hand-wheel H, the shaft m resting on the standards t and shaft v. This hand-wheel has merely to be turned one way for starting the hot-blowing, and the opposite way for gas-making, to open and shut all the connexions, without any mistake being possible on the part of the attendant. The feeding-hopper E is so arranged that, when the cone e 2 opens, e\ is shut, and vice versa, thus no more gas can escape, on feeding fresh coke into the generator, than that which is contained in E. G is the pipe through which the blowing-up gas (Siemens gas) is carried away, either into the oiˆn air (where it is at once burned) or into a pre-heater for the blast, or into some place where it can be utilized as fuel. This gas, which is made for 10 or 11 minutes, contains from 23 to 32% carbon monoxide, 7 to 1-5% carbon dioxide, 2 to 3 % hydrogen, a little methane, 64 to 66% nitrogen, and has a heating value of 950 calories per cub. metre. The water-gas itself is made for 7 minutes, and has an

average composition of 3-3 % carbon dioxide, 44% carbon monoxide, 0-4% methane, 48-6% hydrogen, 3‘7% nitrogen, and a heating value of 2970 calories per cub. metre. I kilogram coke yields 1-13 cub. metre water-gas and 3-13 Siemens gas. 100 parts coke (of 7000 calories) furnish 42 % of their heat value as water-gas and 42 % as Siemens gas. Lastly we give a section of the Dellwik-Fleischer gas-producer (fig. 21). The feeding-hoppers A are alternately charged every half-hour, so that the layer of fuel in the generator always remains 4 ft. deep. B is the chimney-damper, C the grate, D the door for removing the slags, E the ash-door, F the inlet of the air-blast, G the upper, G the lower outlet for the water-gas which is removed alternately at top and bottom by means of an outside valve, steam being always admitted at the opposite end. The blowing- up generally lasts if minutes, the gas-making 8 or 10 minutes. The Dellwik-Fleischer, air-blast works under a pressure of 8 or 9 in. below the grate, or 4 to 4! in. above the coke. The blowing-up gas contains 17 or 18 % carbon dioxide and 1-5% oxygen, with mere traces of carbon monoxide. The water-gas shows 4 to 5% carbon dioxide, 40% carbon monoxide, o-8 % methane, 48 to 51 % hydrogen, 4 or 5% nitrogen. About 2-5 cub. metres is obtained per kilogram of best coke.

See Mills and Rowan, Fuel and its Application (London, 1889); Samuel S. Wyer, Producer-Gas and Gas-Producers, published by the Engineering and Mining Journal (New York) ; F. Fischer, Chemische Technologie der Brennstoffe (1897-1901) ; Gasformige Heizstoffe, in Stohmann and Kerl's Handbuch der technischen Chemie, 4th edition, iii. 642 et seq. (G. L.)

GASCOIGNE, GEORGE (c. 1535-1577), English poet, eldest son of Sir John Gascoigne of Cardington, Bedfordshire, was born probably between 1530 and 1535. He was educated at Trinity College, Cambridge, and on leaving the university is supposed to

1

Fig. 21 Producer.

have joined the Middle Temple. He became a member of Gray's Inn in 1555. He has been identified without much show of evidence with a lawyer named Gastone who was in prison in 1 548 under very discreditable circumstances. There is no doubt that his escapades were notorious, and that he was imprisoned for debt. George Whetstone says that Sir John Gascoigne disinherited his son on account of his follies, but by his own account he was obliged to sell his patrimony to pay the debts contracted at court. He v/as M.P. for Bedford in 1557-1558 and 1 558-1 559, but when he presented himself in 1 572 for election at Midhurst he was refused on the charges of being " a defamed person and noted for manslaughter," " a common Rymer and a deviser of slaunderous Pasquelles," " a notorious ruffianne," an atheist and constantly in debt. His poems, with the exception of some commendatory verses, were not published before 1572, but they were probably circulated in MS. before that date. He tells us that his friends at Gray's Inn importuned him to write on Latin themes set by them, and there two of his plays were acted. He repaired his fortunes by marrying the wealthy widow of William Breton, thus becoming step-father to the poet, Nicholas Breton. In 1568 an inquiry into the disposition of William Breton's property with a view to the protection of the children's rights was instituted before the lord mayor, but the matter was probably settled in a friendly manner, for Gascoigne continued to hold the Walthamstow estate, which he had from his wife, until his death. He sailed as a soldier of fortune to the Low Countries in 1572, and was driven by stress of weather to Brill, which luckily for him had just fallen into the hands of the Dutch. He obtained a captain's commission, and took an active part in the campaigns of the next two years, during which he acquired a profound dislike of the Dutch,

and a great admiration for William of Orange, who had personally intervened on his behalf in a quarrel with his colonel, and secured him against the suspicion caused by his clandestine visits to a lady at the Hague. Taken prisoner after the evacuation of Valkenburg by the English troops, he was sent to England in the autumn of 1574. He dedicated to Lord Grey of Wilton the story of his adventures, " The Fruites of Warres " (printed in the edition of 1575) and " Gascoigne's Voyage into Hollande." In 1575 he had a share in devising the masques, published in the next year as The Princely Pleasures at the Courte at Kenelwerth, which celebrated the queen's visit to the Earl of Leicester. At Wood- stock in 1575 he delivered a prose speech before Elizabeth, and presented her with the Pleasant Tale of Hemetes the H eremite 1 in four languages. Most of his works were actually published during the last years of his life, after his return from the wars. He died at Bernack, near Stamford, where he. was the guest of George Whetstone, on the 7th of October 1577. George Whet- stone wrote a long dull poem in honour of his friend, entitled " A Remembrance of the wel-imployed life and godly end of George Gaskoigne, Esquire."

His theory of metrical composition is explained in a short critical treatise, " Certayne Notes of Instruction concerning the making of verse or ryme in English, written at the request of Master Edouardo Donati," 2 prefixed to his Posies (1575). He acknowledged Chaucer as his master, and differed from the earlier poets of the school of Surrey and Wyatt chiefly in the added, smoothness and sweetness of his verse. His poems were published in 1572 during his absence in Holland, surreptitiously, according to his own account, but it seems probable that the " editor " who supplied the running comment was none other than Gascoigne himself. A hundrelh Sundrie Floures bound up in one small Posie. Gathered partely (by translation) in the fyne outlandish Gardens of Euripides, Ovid, Petrafke, Ariosto and others; and partely by Invention out of our owne fruitfull Orchardes in Englande, Y elding Sundrie Savours of tragical, comical and moral discourse, bothe pleasaunt and profitable, to the ■well-smelling

1 Printed in 1579 in a pamphlet called The Paradoxe, the author of which, Abraham Fleming, does not mention Gascoigne's name.

2 Reprinted in vol. ii. of J. Haslewood's Ancient Critical Essays 1811-1815), and in Gregory Smith's Elizabethan Critical Essays

1904).

noses of learned Readers, was followed in 1575 by an authorized edition, The Posies of G. G. Esquire . . . (not dated).

Gascoigne had an adventurous and original mind, and was a pioneer in more than one direction. In 1576 he published The Steele Glas, sometimes called the earliest regular English satire. Although this poem is Elizabethan in form and manner, it is written in the spirit of Piers Plowman. Gascoigne begins with a comparison between the sister arts of Satire and Poetry, and under a comparison between the old-fashioned " glas of trustie Steele," and the new-fangled crystal mirrors which he takes as a symbol of the " Italianate " corruption of the time, he attacks the amusements of the governing classes, the evils of absentee landlordism, the corruption of the clergy, and pleads for the restoration of the feudal ideal. 1

His dramatic work belongs to the period of his residence at Gray's Inn, both Jocasta (of which Acts i. and iv. were contributed by Francis Kinwelmersh) and Supposes being played there in 1566. Jocasta was said by J. P. Collier (Hist, of Dram. Poetry iii. 8) to be the " first known attempt to introduce a Greek play upon the English stage," but it turns out that Gascoigne was only very indirectly acquainted with Euripides. His play is a literal version of Lodovico Dolce's Giocasta, which was derived probably from the Phoenissae in the Latin translation of R. Winter. Supposes, 2 a version of Ariosto's / Suppositi, is notable as an early and excellent adaptation of Italian comedy, and moreover, as " the earliest play in English prose acted in public or private." Udal's Ralph Roister Doister had been inspired directly by Latin comedy; Gammer Gurton's Needle was a purely native product; but Supposes is the first example of the ac-climatization of the Italian models that were to exercise so prolonged an influence on the English stage. A third play of Gascoigne's, The Glasse of Government (published in 1575), is a school drama of the " Prodigal Son " type, familiar on the continent at the time, but rare in England. It is defined by Mr C. H. Herford as an attempt " to connect Terentian situation with a Christian moral in a picture of school life," and it may be assumed that Gascoigne was familiar with the didactic drama of university life in vogue on the continent. The scene is laid at Antwerp, and the two prodigals meet with retribution in Geneva and Heidelberg respectively.

The Spoyle of Antwerpe, written by an eyewitness of the sack of the city in 1576, has sometimes been attributed to Gascoigne, but although a George Gascoigne was employed in that year to carry

letters for Walsingham, internal evidence is against Gascoigne's authorship. A curious editorial preface by Gascoigne to Sir Humphrey Gilbert's Discourse of a Discoverie for a new Passage to Calaia. (1576) has led to the assertion that Gascoigne printed the tract against its author's wish, but it is likely that he was really serving Gilbert, who desired the publication, but dared not avow it. The Wyll of the Devill . . . (reprinted for private circulation by Dr F. J. Furnivall, 1871), an anti-popish tract, once attributed, on slender evidence, to Gascoigne, is almost certainly by another hand.

Gascoigne's works not already mentioned include: " G. G. in commendation of the noble Arte of Venerie," prefixed to The Noble Art of Venerie or Hunting (1575); The Complaynle of Phylomene, bound up with The Steele Glas (1576) ; The Droomme of Doomes-day (!576), a prose compilation from various authors, especially from the De contemplu mundi sive de miseria humanae conditionis of Popelnnocent III., printed with varying titles, earliest ed. (1470?); A Delicate Diet for daintie mouthde droonkardes . ... (1576), a free version of St Augustine's De ebrietate. The Posies (1572) included Supposes, Jocasta, A Discourse of the Adventures of Master F[erdi-nando] J\eronimi], in imitation of an Italian novella, a partly auto-

1 " Againe I see, within my glasse of Steele

But foure estates, to serve each country soyle, The King, the Knight, the Pesant, and the Priest. The King should care for al the subjects still, The Knight should fight, for to defend the same, The Pesant, he shoulde labor for their ease, And Priests shuld pray, for them and for themselves." —

(Arber's ed. p. 57.) s The influence of this play on the Shakespearian Taming of the Shrew is dealt with by Prof. A. H. Tolman in Shakespeare's Part in the Taming of the Shrew (Pub. of the Mod. Lang. Assoc, vol. v. No. 4, pp. 215, 216, 1890).

biographical Don Bartholomew of Bath, and miscellaneous poems. Real personages, some of whom were well known at court, were sup-posed to be concealed under fictitious names in The Adventures of Master F. J., and the poem caused considerable scandal, so that the names are disguised in the second edition. A more comprehensive collection, The Whole Workes of G. G. . . . appeared in 1587. In 1 868-1 870 The Complete Poems of G. G. . . . were edited for the Roxburghe Library by Mr W. C. Hazlitt. In his English Reprints Prof. E. Arber included Certayne Notes of Instruction, The Steele Glas and the Complaynt of Philomene. The Steele Glas was also edited for the

Library of English Literature, by Henry Morley, vol. i. p. 184 (1889). A new edition, The Works of George Gascoigne (The Cambridge English Classics, 1907, &c.) is edited by Dr J.W. Cunliffe. See also The Life and Writings of George Gascoigne, by Prof. Felix E. Schelling (Publications of the Univ. of Pennsylvania series in Philology, vol. ii. No. 4 [1894]) ; C. H. Herford, Studies in the Literary Relations of England and Germany in the Sixteenth Century, pp. 149- 164 (1886); C. H. Herford, " Gascoigne's Glasse of Government," in Englische Studien, vol. ix. (Halle, 1877, &c).

GASCOIGtfE, SIR WILLIAM (c. 1350-1419), chief justice of England in the reign of Henry IV. Both history and tradition testify to the fact that he was one of the great lawyers who in times of doubt and danger have asserted the principle that the head of the state is subject to law, and that the traditional practice of public officers, or the expressed voice of the nation in parliament, and not the will of the monarch or any part of the legislature, must guide the tribunals of the country. He was a descendant of an ancient Yorkshire family. The date of his birth is uncertain, but it appears from the year-books that he practised as an advocate in the reigns of Edward III. and Richard II. On the banishment of Henry of Lancaster Gascoigne was appointed one of his attorneys, and soon after Henry's accession to the throne was made chief justice of the court of king's bench. After the suppression of the rising in the north in 1405, Henry eagerly pressed the chief justice to pronounce sentence upon Scrope, the archbishop of York, and the earl marshal Thomas Mowbray, who had been implicated in the revolt. This he absolutely refused to do, asserting the right of the prisoners to be tried by their peers. Although both were afterwards executed, the chief justice had no part in the transaction. It has been very much doubted, however, whether Gascoigne could have displayed such independence of action without prompt punishment or removal from office following. The oft-told tale of his committing the prince of Wales to prison must also be regarded as un- authentic, though it is both picturesque and characteristic. The judge had directed the punishment of one of the prince's riotous companions, and the prince, who was present and enraged at the sentence, struck or grossly insulted the judge. Gascoigne immediately committed him to prison, using firm and forcible language, which brought him to a more reasonable mood, and secured his voluntary obedience to the sentence. The kingis said to have approved of the act, but there appears to be good ground for the supposition that Gascoigne was removed from his post or resigned soon after the accession of Henry V. He died in 1419, and was buried in the parish church of Harewood in Yorkshire. Some

biographies of the judge have stated that he died in 141 2, but this is clearly disproved by Foss in his Lives of the Judges; and although it is clear that Gascoigne did not hold office long under Henry V. , it is not absolutely impossible that the scene in the fifth act of the second part of Shakespeare's Henry IV. has some historical basis, and that the judge's resignation was voluntary. GASCONY (Wasconia), an old province in the S.W. of France. It takes its name from the Vascones, a Spanish tribe which in 580 and 587 crossed the Pyrenees and invaded the district known to the Romans as Novempopulana or Aquitania tertia. Basque, the national language of the Vascones, took root only in a few of the high valleys of the Pyrenees, such as Soule and Labourd; in the plains Latin dialects prevailed, Gascon being a Romance language. In the 7th century the name of Vasconia was sub- stituted for that of Novempopulana. The Vascones readily recognized the sovereignty of the Merovingian kings. In 602 they consented to be governed by a duke called Genialis, but in reality they remained independent. They even appointed national dukes, against whom Charlemagne had to fight at the beginning of his reign. Finally Duke Lupus II. made his

submission in 819, and the Carolingians were able to establish Frankish dukes in the country. Three of these are known: Seguin (Sighivinus), William (Guillaume),and Arnaud (Arnaldus). They were at the same time counts of Bordeaux, and succumbed to the Normans. After the death of Arnaud in 864 the history of Gascony falls into the profoundest obscurity. The lists of the 10th-century dukes prepared by ancient and modern historians can only be established by means of hypotheses based in many cases on spurious documents (e.g. the charter of Alaon), and little confidence can be placed in them. During this troubled period Gascony was from time to time attached to one or other of the other Vascon states which had been formed on the southern slope of the Pyrenees, but in the reign of Hugh Capet it was considered as forming part of France, from which it has never been separated. Disputed in the nth century by the counts of Poitiers, who were also dukes of Aquitaine, and by the counts of Armagnac, the duchy finally passed to the house of Poitiers in 1073, when the title of duke of Gascony was merged in that of duke of Aqui- taine and disappeared. In the feudal period Gascony comprised a great number of countships (including Armagnac, Bigorre, Fezensac, Gaure and Pardiac), viscountships (including Beam, Lomagne, Dax, Juliac, Soule, Marsan, Tartas, Labourd and

Maremne), and seigneuries (e.g. Albret, &c). From the ecclesi- astical point of view, it corresponded nearly to the archbishopric of Auch.

From about 1073 to 1137 Gascony was governed by the dukes of Aquitaine and counts of Poitiers, one of whom, William IX., gave the first charter of privileges to the town of Bayonne; but the duchy was weakened by the increasing independence of its great feudatories, especially the viscounts of Beam and the counts of Armagnac. In 1137, the year of her father's death, Eleanor, the daughter and heiress of Duke William X., married the king of France, Louis VIL, and with the rest of Aquitaine Gascony passed under his direct rule. In 1 1 5 1 , however, this marriage was annulled, and almost at once Eleanor married Henry of Anjou, who three years later became king of England as Henry II. Thus was the house of Plantagenet introduced into Gascony and a fresh bone of contention was thrown between the kings of England and of France. Having established himself in the duchy by force of arms, Henry handed it over to his son Richard, against whom many of the great Gascon lords revolted, and from Richard it passed to his brother John. The crusade against the Albigenses was carried into Gascony, and this warfare gave a new impetus to the process of disintegration which was already at work in the duchy. King John and his successor Henry III. were weak; the neighbouring counts of Toulouse were powerful and aggressive; and the house of Beam was growing in strength. Gascony served Henry III. as headquarters during his two short and disastrous wars (1230 and 1242) with Louis IX., and in 1259 he did homage for it to this king; his son, Edward I., lost and then regained the duchy.

During the Hundred Years' War Gascony was obviously a battle-field for the torces of England and of France. The French seized the duchy, but, aided by the rivalry between the powerful houses of Foix and Armagnac, Edward III. was able to recover it, and by the treaty of Bretigny in 1360 John II. recognized the absolute sovereignty of England therein. Handed over as a principality by Edward to his son, the Black Prince, it was used by its new ruler as a base during his expedition into Spain, in which he received substantial help from the Gascon nobles. The renewal of the war between England and France, which took place in 1369, was due in part to a dispute over the sovereignty of Gascony, and during its course the position of the English was seriously weakened, the whole of the duchy save a few towns and fortresses being lost; but the victories of Henry V. in northern France postponed for a time the total expulsion of the foreigner. This was reserved for the final stage of the war and was one result of the efforts of Joan of Arc, the year 1451 witnessing the

capture of Bayonne and the final retreat of the English troops from the duchy. During this time the inhabitants ef Gascony suffered severely from the ravages of both parties, and the nobles ruled or misruled without restraint.

The French kings, especially Louis XL, managed to restore the royal authority in the duchy, although this was not really accomplished until the close of the 1 5th century when the house of Armagnac was overthrown. It was by means of administrative measures that these kings attained their object. Gascony was governed on the same lines as other parts of France and from the time of Henry IV., who was prince of Beam, and who united his hereditary lands with the crown, its history differs very slightly from that of the rest of the country. The Renaissance inspired the foundation of educational institutions and the Reformation was largely accepted in Beam, but not in other parts of Gascony. The wars of religion swept over the land, which was the scene of some of the military exploits of Henry IV., and Louis XIV. made some slight changes in its government. As may be surmised the boundaries of Gascony varied from time to time, but just before the outbreak of the Revolution they were the Atlantic Ocean, Guienne, Languedoc and the Pyrenees, and from east to west the duchy at its greatest extent measured 170 m.

At the end of the ancien rSgime Gascony was united with Guienne to form a great military government. After the division of France into departments, Gascony, together with Beam, French Navarre and the Basque country, formed the depart- ments of Basses-Pyrenees, Landes, Hautes-Pyrenees and Gers. Parts of Gascony also now form arrondissements and cantons of the departments of Lot-et-Garonne, Haute-Garonne, Ariege and Tarn-et-Garonne.

See Arnaud Oihˆnart, Notitia ulriusque Vasconiae, tarn Ibericae quam Aquitanicae (1637) ; L'AbM Monlezun, Histoire de la Gascogne (1846-1850), comprising a number of useful but uncritically edited documents; and Jean de Jaurgain, La Vasconie, etude historique et critique sur les origines . . . du duchi. de Gascogne . . . et des grands fiefs du duche de Gascogne (1898-1902), a learned and ingenious work, but characterized by unbridled genealogical fancy. This last work was rectified by Ferdinand Lot in his Htudes sur le r'egne de Hugues Capet (1903; see especially appendix x.). See also Barrau-Dihigo, " La Gascogne, "a bibliography of manuscript sources and of orinted works published in the Revue de synthase historique (1903). ' (C B.)*

GAS ENGINE. A gas engine is a heat engine in which the work- ing

fluid is atmospheric air and the fuel an inflammable gas. It differs from a hot-air or a steam engine in that the heat is given to the working fluid by combustion within the motive power cylinder. In most gas engines — in fact, in all those at present on the market — the working fluid and the fuel that supplies it with heat are mixed with each other before the combustion of the fuel. The fuel — which in the steam and in most hot-air engines is burned in a separate furnace — is, in the gas engine, introduced directly to the motor cylinder and burned there; it is, indeed, part of the working fluid. A gas engine, therefore, is an internal combustion engine using gaseous fuel.

The commercial history of the gas engine dates from 1876, when Dr N. A. Otto patented the well-known engine now in extensive use, but long before that year inventors had been at work, attempting to utilize gas for producing motive power. The first proposal made in Great Britain is found in Street's Patent No. 1983 of 1 794, where an explosion engine is suggested, the explosion to be caused by vaporizing spirits of turpentine on a heated metal surface, mixing the vapour with air in a cylinder, firing the mixture, and driving a piston by the explosion produced. Most of the early engines were suggested by the fact that a mixture of an inflammable gas and atmospheric air gives an explosion when ignited — that is, produces pressure which can be applied in a cylinder to propel a piston. Lebon, in France, proposed a gas engine in which the gas and air were raised to a pressure above that of the atmosphere before use in the cylinder, but he did not appear to be clear in his ideas.

Some interesting particulars of early experiments are given in a paper read at the Cambridge Philosophical Society in 1820 entitled, " On the Application of Hydrogen Gas to produce a Moving Power in Machinery, with a description of an Engine which is moved by the pressure of the Atmosphere upon a Vacuum caused by Ex- plosions of Hydrogen Gas and Atmospheric Air." In that paper the Rev. W. Cecil describes an engine of his invention constructed to operate on the explosion vacuum method. This engine was stated to run with perfect regularity at 60 revolutions per minute, consum- ing 17.6 cub. ft. of hydrogen gas per hour. The hydrogen explosion, however, does not seem to have been noiseless, because Mr Cecil states that in building a larger engine "... to remedy the noise which is occasioned by the explosion, the lower end of the cylinder A, B, C, D may be buried in a well or it may be enclosed in a large air-tight vessel." Mr Cecil also mentions previous experiments at

Cambridge by Prof. Farish, who exhibited at his lectures on mechanics an engine actuated by the explosion of a mixture of gas and air within a cylinder, the explosion taking place from atmospheric pressure. Prof. Farish is also stated to have operated an engine by gunpowder. These engines of Farish and Cecil appear to be the very earliest in actual operation in the world.

Samuel Brown, in patents dated 1823 and 1826, proposed to fill a closed chamber with a gas flame, and so expel the air; then he condensed the flame by injecting water, and operated an air engine by exhausting into the partial vacuum so obtained. The idea was evidently suggested by Watt's condensing steam engine, flame being employed instead of steam to obtain a vacuum. Brown's engine is said to have been actually employed to pump water, drive a boat on the Thames, and propel a road carriage. L. W. Wright in 1833 described an explosion engine working at atmospheric pressure and exploding on both sides of the piston. The cylinder is shown as water-jacketed. In William Barnett's engine of 1838 two great advances were made. The engine was so constructed that the mix- ture of gas and air was compressed to a considerable extent in the motor cylinder before ignition. The method of igniting the com- pressed charge was also effective. The problem of transferring a flame to the interior of a cylinder when the pressure is much in excess of that of the external air was solved by means of a hollow plug cock having a gas jet burning within the hollow. In one position the hollow was opened to the atmosphere, and a gas jet issuing within it was lit by an external flame, so that it burned within the hollow. The plug was then quickly rotated, so that it closed to the external air and opened to the engine cylinder; the flame continued to burn with the air contained in the cock, until the compressed inflammable mixture rushed into the space from the cylinder and ignited at the flame. This mode of ignition is in essentials the one adopted by Otto about thirty years later. To Barnett belongs the credit of being the first to realize clearly the great idea of compression before explosion in gas engines, and to show one way of carrying ou t the idea in practice. Barnett appears to have constructed an engine, but he attained no commercial success. Several attempts to produce gas engines were made between 1838 and i860, but they were all failures. Several valuable ideas were published in 1855. Drake, an American, de- scribed a mode of igniting a combustible gaseous mixture by raising a thimble-shaped piece of metal to incandescence. In 1857 Barsanti and Matteucci proposed a free-piston engine, in which the explosion propelled a free piston against the atmosphere, and the work was

done on the return stroke by the atmospheric pressure, a partial vacuum being produced under the piston. The engine never came into commercial use, although the fundamental idea was good.

Previous to i860 the gas engine was entirely in the experimental stage, and in spite of many attempts no practical success was attained. E. Lenoir, whose patent is dated i860, was the inventor of the first gas engine that was brought into general use. The piston, moving forward for a portion of its stroke by the energy stored in the fly-wheel, drew into the cylinder a charge of gas and air at the ordinary atmospheric pressure. At about half stroke the valves closed, and an explosion, caused by an electric spark, propelled the piston to the end of its stroke. On the return stroke the burnt gases were discharged, just as a steam engine exhausts. These operations were repeated on both sides of the piston, and the engine was thus double-acting. Four hundred of these engines were said to be at work in Paris in 1865, and the Reading Iron Works Company Limited built and sold one hundred of them in Great Britain. They were quiet, and smooth in running; the gas con- sumption, however, was excessive, amounting to about 100 cub. ft. per indicated horse-power per hour. The electrical ignition also gave trouble. Hugon improved on the engine in 1865 by the introduction of a flame ignition, but no real commercial success was attained till 1867, when Otto and Langen exhibited their free- piston engine in the Paris Exhibition of that year. This engine was identical in principle with the Barsanti and Matteucci, but Otto succeeded where those inventors failed. He worked out the engine in a very perfect manner, used flame ignition, and designed a practical clutch, which allowed the piston free movement in one direction but engaged with the fly-wheel shaft when moved in the other; it consisted of rollers and wedge-shaped pockets — the same clutch, in fact, as has since been so much used in free-wheel bicycles. This engine consumed about 40 cub. ft. of gas per brake horse-power per hour — less than half as much as the Lenoir. Several thousands were made and sold, but its strange appearance and unmechanical operation raised many objections. Several inventors meanwhile again advocated compression of the gaseous mixture before ignition, among them being Schmidt, a German, and Million, a Frenchman, both in 1861.

To a Frenchman, Alph. Beau de Rochas, belongs the credit of proposing, with perfect clearness, the cycle of operations now widely used in compression gas engines. In a pamphlet published in Paris in 1862, he stated that to obtain economy with an explosion engine four conditions are requisite: (1) The greatest possible cylinder volume with the least possible cooling surface; (2) the greatest

possible rapidity of explosion; (3) the greatest possible expansion ; and (4) the greatest possible pressure at the beginning of the expansion. The sole arrangement capable of satisfying

these conditions he stated would be found in an engine operating as follows: (1) Suction during an entire outstroke of the piston; (2) compression during the following instroke; (3) ignition at the dead point, and expansion during the third stroke ; (4) forcing out of the burnt gases from the cylinder on the fourth and last return stroke. Beau de Rochas thus exactly contemplated, in theory at least, the engine produced by Dr Otto fourteen years later. He did not, however, put his engine into practice, and probably had no idea of the practical difficulties to be overcome before realizing his conception in iron and steel. To Dr Otto belongs the honour of independently inventing the same cycle, now correctly known as the Otto cycle, and at the same time overcoming all practical difficulties and making the gas engine of world-wide application. This he did in 1876, and his type of engine very rapidly surpassed all others, so that now the Otto-cycle engine is manufactured over the whole world by hundreds of makers. In 1876 Dr Otto used low compression, only about 30 lb per sq. in. above atmosphere. Year by year compression was increased and greater power and economy were obtained, and at present compressions of more than 100 lb per sq. in. are commonly used with most satisfactory results.

The history of the subject since 1876 is one of gradual improve- ment in detail of construction, enabling higher compressions to be used with safety, and of gradual but accelerating increase in dimensions and power. In the same period light and heavy oil engines have been developed, mostly using the Otto cycle (see Oil Engine).

Gas engines may be divided, so far as concerns their working process, into three well-defined types: —

(1) Engines igniting at constant volume, but without previous compression.

(2) Engines igniting at constant pressure, with previous compression.

(3) Engines igniting at constant volume, with previous compression.

For practical purposes engines of the first type may be dis- regarded. Gas engines without compression are now considered to be much too wasteful of gas to be of commercial importance. Those of the second type have never reached the stage of extended commercial

application; they are scientifically interesting, however, and may take an important place in the future develop- ment of the gas engine. The expectations of Sir William Siemens with regard to them have not been realized, although he spent many years in experiments. Of other engineers who also devoted much thought and work to this second type may be mentioned Brayton (1872); Foulis (1878); Crowe (1883); Hargreaves (1888); Clerk (1889); and Diesel (1892). Diesel's engines are proving successful as oil engines but have not been introduced as gas engines.

The working cycles of the three types are as follows : —

First Type. — Four operations.

(a) Charging the cylinder with explosive mixture at atmo- spheric pressure. (6) Exploding the charge.

(c) Expanding after explosion.

(d) Expelling the burnt gases. Second Type. — Five operations.

(a) Charging the pump cylinder with gas and air mixture at

atmospheric pressure. (6) Compressing the charge into an intermediate receiver, (c) Admitting the charge to the motor cylinder, in a state of

flame, at the pressure of compression. id) Expanding after admission.

(e) Expelling the burnt gases. Third Type. — Five operations.

(a) Charging the cylinder with gas and air mixture at atmo-

spheric pressure.

(b) Compressing the charge into a combustion space.

(c) Exploding the charge.

(d) Expanding after explosion.

(e) Expelling the burnt gases.

In all these types the heating of the working fluid is accomplished by the rapid method of combustion within the cylinder, and for the cooling necessary in all heat engines is substituted the complete

rejection of the working fluid with the heat it contains, and its replacement by a fresh portion taken from the atmosphere at atmospheric temperature. This is the reason why those cycles can be repeated with almost indefinite rapidity, while the old hot-air engines had to run slowly in order to give time for the working fluid to heat or cool through metal surfaces.

Four-cycle Engines. — Otto-cycle engines belong to the third type, being explosion engines in which the combustible mixture

is compressed previous to explosion. Fig. i is a side elevation, fig. 2 is a sectional plan, and fig. 3 is an end elevation of an engine built about 1892 by Messrs Crossley of Manchester, who were the original makers of Otto engines in Great Britain. In external appearance it somewhat resembles a modern high-pressure

Fig. 1. — Side Elevation of Otto Cycle Engine.

steam engine, of which the working parts are exceedingly strong. In its motor and only cylinder, which is horizontal and open- ended, works a long trunk piston, the front end of which carries the crosshead pin. The crank shaft is heavy, and the fly-wheel large, considerable stored energy being required to carry the piston through the negative part of the cycle. The cylinder is considerably longer than the stroke, so that the piston when full in leaves a space into which it does not enter. This is the com- bustion space, in which the charge is first compressed and then burned. On the forward stroke, the piston A (fig. 2) takes into the cylinder a charge of mixed gas and air at atmospheric pressure, which is compressed by a backward stroke into the space Z at the end of the cylinder. The compressed charge is then ignited, and so the charge is exploded with the production of a high pressure. The piston now makes a forward stroke under the pressure of the explosion, and on its return, after the exhaust valve is opened, discharges the products of combustion. The engine is then ready to go through the same cycle of operations. It thus takes four strokes or two revolutions of the shaft to complete the Otto cycle, the cylinder being used alternately as a pump and a motor, and the engine, when working at full load, thus gives one impulse for every two revolutions. The valves, which are all of the conical-seated lift type, are four in number — charge inlet valve, gas inlet valve, igniting valve, and exhaust valve. The igniting valve is

usually termed the timing valve, because it determines the time of the explosion. Since the valves have each to act once in every two revolutions, they cannot be operated by cams or eccentrics placed directly on the crank shaft. The valve shaft D is driven at half the rate of revolution of the crank shaft C by means of the skew or worm gear E, one wheel of which is mounted on the crank shaft and the other on the valve shaft. Ignition is accom- plished by means of a metal tube heated to incandescence by a Bunsen burner. At the proper moment the ignition or timing valve is opened, and the mixed gas and air under pressure being admitted to the interior of the tube, the inflammable gases come into con- tact with the incandescent metal surface and ignite; the flame at once spreads back to the cylinder and fires its contents, thus producing the motive explosion.

The working parts are as follows : — A the piston, B the connecting rod, C the crank shaft, D the side or valve shaft, E the skew gearing,

F the exhaust valve, G the exhaust valve lever, H the exhaust valve cam, I the charge inlet valve, J the charge inlet valve lever, K the charging valve cam, L the gas inlet valve, M the gas valve cam, N lever and link operating gas valve, O igniting or timing valve, P timing valve cam, Q timing valve lever or tumbler, R igniting tube, S governor, T water jacket and cylinder, U Bunsen burner for heating ignition tube. On the first forward or charging stroke the charge of gas and air is admitted by the inlet valve I, which is operated by the lever J from the cam K, on the valve shaft D. The gas supply is admitted to the inlet valve I by the lift valve L, which is also operated by the lever and link N from the cam M, controlled, however, by the centrifugal governor S. The governor operates either to admit gas wholly, or to cut it off com- pletely, so that the variation in power is obtained by varying the number of the explosions.

Since the engine shown in figs. I to 3 was built further modifications have been made, principally in the direction of dispensing with or diminishing port space, that is, so arranging the ports that the compression space is not broken up into several separate chambers. In this way the cooling surface in contact with the intensely hot gases is reduced to a minimum. This is especially im- portant when high compressions are used, as then the compression space being small, the port spaces form a large proportion of the total space. For maximum economy it is necessary to get rid of port space altogether; this is done by making the lift valves open directly into the compression space. _ This arrangement can be readily made in small- and medium-sized engines, but in the larger engines it becomes necessary to provide ports, so as to allow the valves to be more easily

removed for cleaning.

The construction of pressure gas plant in 1878 by J. E. Dowson for the production of inflammable gas from anthracite and coke by the action of air mixed with steam, soon led to the develop- ment of larger and larger Otto cycle engines. The gas obtained consisted of a mixture of carbon monoxide, hydrogen, nitrogen and some carbon dioxide and oxygen, having a lower heating value of about 150 British thermal units per cubic foot. With this gas these engines used about 1 ft of anthracite per b.h.p. per hour.

From the pressure producer sprang the suction producer first placed on the market in practical form by M. Benier of Paris in 1894, but then presenting many difficulties which were not re- moved till about nine years later when Dowson and others placed effective suction plants in use in considerable numbers. Such suction plants are now built by all. the leading gas engine constructors for powers varying from 10 to 500 i.h.p.

Dr Ludwig Mond and Crossley Bros, also attacked the problem of the bituminous fuel producer, of which many examples are now at work for powers as large as 2000 i.h.p. In 1895 B. H.

Fig. 2. — Plan of Otto Cycle Engine.

Thwaite demonstrated that the so-called waste gas from blast furnaces could be used in gas engines, and this undoubtedly led to the design and construction of the very large gas engines now becoming common both in Europe and in America. It appears from Thwaite's experiments that the surplus gas from the blast furnaces of Great Britain is capable of supplying at least three-quarters of a million horse-power continuously day

and night, and it is calculated that in America nearly three million horse-power is available from this source. Thwaite's system was put into operation in 1895 at the Glasgow Iron Works, and it was also successfully applied near Barrow-in-Furness. For many reasons the system did not take immediate root in England, but in 1898 the Societe Cockerill of Seraing near Liege applied an engine designed by Delamere-Deboutteville to utilize blast furnace gas. This engine indicated 213 h.p. running at 105 revolutions per minute. This was followed in 1899 by an engine giving 600 b.h.p. at 90 revolutions

per minute used for driving a blowing cylinder for a blast furnace. It had a single cylinder of 51-2 in. diameter and a piston stroke of 55-1 in. About 1900 the Gasmotoren Fabrik Deutz built an Otto cycle engine of 1000 b.h.p. having four cylinders each 33 in. diameter and 39'3 in. stroke, speed 135 revolutions per minute. It was coupled direct to a dynamo. Crossley Bros. Ltd. took up the

Fig. 3. — End Elevation of Otto Cycle Engine.

large gas engine at an early date, and a 400 h.p. engine by them was at work at Brunner, Mond & Co.'s works, Winnington, in 1900; it had two cylinders of 26 in. diameter and 36 in. stroke, and it ran at 1 50 revolutions per minute.

Gas engines operating on the Otto cycle are usually of the single acting open cylinder type up to about 200 b.h.p., but for the larger engines closed cylinders of the double acting type are used. The engine then closely resembles a double acting steam engine. It has a cylinder cover with packing box of a special type, and, in addition to the water jacket surrounding the cylinder and combustion spaces, the piston and piston rod are hollow and cooling water is forced through them by a pump. Such a double acting cylinder gives two succeeding power impulses and then two charging strokes so that one revolution of the crank shaft is occupied in charging and compression, while the succeeding revolution gets two power impulses. For still larger engines two such double acting cylinders are arranged in tandem, so that one piston rod runs through two pistons and connects to a slide in front and to one crank pin by a connecting rod. Such an engine gives two power impulses for every revolution of the crank shaft. The greatest power developed in one double acting cylinder is claimed by Ehrhardt and Sehmer for a cylinder of 451 in. diameter by 511 in. stroke, which at 94 revolutions per minute gives 1 100 i. h.p.

Two-Cycle Engine. — While the Otto or four-cycle engine was developing as above described, inventors were hard at work on the two-cycle engine. In Britain this work fell mostly upon Clerk, Robson and Atkinson, while on the continent of Europe the most persevering and determined worker was Koerting.

Dugald Clerk began work on the gas engine at the end of 1876. His first patent was dated 1877 and dealt with an engine of the air pressure vacuum type. His next patent was No. 3045 of 1878, and the engine there described was exhibited at the Royal Agricultural Show at Kilburn, London, 1879. In it a pump compressed a mixture of air and gas into a reservoir, from which it entered the motor

cylinder during the first part of its stroke. After cut-off ignition was caused by a platinum igniter, the piston was driven forward, and exhausting was performed on the return stroke. This engine gave three b.h.p., and it was the first compression explosion engine ever run giving one impulse for each revolution of the crank shaft. It had difficulties, however, which prevented it from reaching the market.

The particular type of engine now widely known as operating on the Clerk cycle was patented in 1881 (Brit. Pat. No. 1089). One of the earliest of these engines was set up at Lord Kelvin's laboratory at the Glasgow university and used for the purpose of driving a Siemens dynamo and supplying his house with electric light. The engine was first ex- hibited in the Paris Electrical Exhibition of 1881 and the London Smoke Abatement Ex- hibition of the same year. In this engine the charge was not compressed by a separate pump. A pumping cylinder, it is true, was used, but its function was to act merely as a displacer to take in a mixture of gas and air and transfer it to the motor cylinder at as low a pressure as possible, in such a way that the entering charge displaced the exhaust gases through ports which were opened by the over- running of the piston. The motor piston thus timed and controlled the exhaust discharge, and gave a power impulse for every revolution of the crank. Engines of the Clerk type were built largely by Messrs Sterne & Co. of Glasgow, the Clerk Gas Engine Co. of Philadelphia, U.S.A., the Campbell Gas Engine Co., and a modification was made and sold in consider- able numbers by the Stockport Company. The lapsing of the Otto patent, however, in 1876 caused engineers to neglect the two cycle for a time, although a little later it was introduced for small engines in an ingenious and simple modification known as the Day engine. This two-cycle engine later became very popular, especially for motor launch work. The Clerk cycle is now much in use for large gas engines up to about 2000 horse as modified by Messrs Koerting of Hanover.

The Clerk cycle engine, as built in 1881, is shown in sectional plan at fig. 4. The engine contains two cylinders — a power cylinder A and a displacer cylinder B. The function of the displacer cylinder is to take in a combustible charge of gas and air and transfer it to the power cylinder, displacing as it enters the exhaust gases of the previous explosion. A compression space G is formed at the end of the motor cylinder A. It is of conical shape and communicates with the displacer cylinder B by means of a large automatic lift valve which opens into the compression space from a chamber communicating by a pipe with the displacer cylinder. At the out- end of the motor cylinder are placed V-shaped ports E which open to the

atmosphere by an exhaust pipe. The outward travel of the motor piston C causes it to overrun these ports, as seen in fig. 4, and allows the pressure in the cylinder to fall to atmosphere. The action of the engine is as follows: — The displacer piston D on its forward movement draws in its charge of gas and air, and it is so timed with reference to the motor piston C that it has returned a small portion of its stroke just when the motor piston overruns the exhaust ports. The overrunning of the exhaust ports at once causes the pressure in the cylinder to fall to atmosphere, and then the pressure in the displacer overcomes the pressure in the motor cylinder and opens

the lift valve, when the charge flows in to the motor cylinder through the conical compression space and displaces the exhaust gases through the ports E, while it fills up the cylinder A with the inflammable charge. The exhaust gases are sufficiently displaced and the fresh charge introduced into the cylinder by the time the motor piston has opened the exhaust ports E on the out-stroke and closed them on the return stroke. The two cylinders are so propor-

two impulses per revolution. Messrs Mather & Piatt build a Koerting engine of a modified type in England; an engine of their construction with a power cylinder of about 29 in. and 405 in. stroke gives 700 b.h.pi

Fig. 5 shows in longitudinal section the power and pump cylinders of a Mather & Piatt Koerting engine on the Clerk cycle; the power cylinder section is shown above that of the pump cylinders, but it is to be understood that both cylinders are in the same horizontal plane as in the Clerk engine shown at fig. 4. The Koerting engine, however, is double acting, whereas the Clerk engine was single acting. The power cylinder A has a power piston A 1 and compression spaces A 2 A 3 . At the centre of the cylinders are exhaust ports E which open to the atmosphere and are overrun by the piston A 1 at both ends of the stroke. A 4 and A 6 are inlet valves for gas and air. The single acting pump cylinders BB 1 supply the air required for the charge, and the double acting gas cylinder CC 1 supplies the gas. Both gas and air are led from these cylinders by separate passages to the inlet valves A 4 A 6 . The air pump pistons are lettered B 2 B 3 and the gas pump piston C 2 . The main crank D connects as usual to the piston rod of the power piston A 1 , and the pump crank F to the trunk air pump piston B 2 which drives the other air pump piston B 3 and the gas

pump piston C 2 by a piston rod passing through all three. The gas mixture is not made until the inlet valves A 4 A 6 are reached, so that no explosive mixture exists until it is formed within the cylinder A. The air is- first introduced into the power cylinder to discharge some of the hot gases, and when the gas is also admitted the con- tents of the cylinder are cooled to some extent. The action of the engine is exactly as described with regard to the Clerk cycle, and the arrangement of the two cranks at about right angles to each other is also similar. The exhaust is discharged through the ports E, and the incoming charge fills the cylinder in the same way as in the Clerk engine.

Another large continental gas engine, known as the Oechelhauser, operates on a modified Clerk cycle and is shown in sectional plan at fig. 6. The motor cylinder A has two pistons AlA 2 , A 1 being operated by a centre and A 2 by two outside cranks, side rods, and cross head; the pistons A 1 A 2 thus move in opposite directions and give an effective stroke of double that due to one crank. B is the air and gas pump dealing with air on one side of its piston and gas. on the other. A chamber C opens to an air reservoir supplied from the pump and to the power cylinder by ports C 1 ; a similar chamber D opens to a gas reservoir supplied from the pump and to the power cylinder by ports D 1 . The exhaust ports E are provided at the other end of the cylinderˆ When the front piston overruns the exhaust ports E the pressure within the power cylinder falls to atmosphere; the back piston then opens the air ports C 1 and air under slight pressure flows in, to be followed a little later by gas under slight pressure from the gas ports D>. In this way the power cylinder A is charged with gas and air mixture at each stroke, and when the pistons AW approach each other the charge is compressed into the space between and then ignited by the electric spark. The pistons are then forced apart and perform their power stroke. The Oechel- hauser engine, which is built in Great Britain by Messrs Beardmore

Fig. 4. — Sectional Plan of Clerk Cycle Engine, 1 881

tioned that the exhaust gases are expelled as completely as possible and replaced by fresh explosive mixture without any material part of this mixture escaping with the exhaust. Unless the proportions are carefully made such an escape is possible. The relative operations of the motor piston C and the displacer piston D are secured by advancing the crank of the displacer about a right angle compared to the motor crank. The motor piston on its in-stroke compresses the mixed charge into the conical space G; and, when compression is complete, the mixture is ignited by the slide valve F. This produces

the power explosion which forces the piston forward until the exhaust ports are opened again. By this cycle of opera- tions one power impulse is given for every revolution of the crank. The motor cylinder is surrounded by a water jacket in the usual manner, but it is unnecessary to water-jacket the displacer, as the gases are never hot.

Robson also invented two-cycle engines. His first patent was taken out in 1877 (No. 2334). The engines described in his patents of 1 879-1880 were of the two-cycle type, and in them no second cylinder was used. The front end of the motor cylinder was enclosed by a cover and packing box, and was used as a pump to force gas and air into a reservoir at a few lb above atmosphere. The motor piston was arranged to overrun ports in the side of the cylinder, but the exhaust discharge was not timed in that way. A separate lift valve controlled the overrun ports and determined when the ex- haust should be discharged. When the exhaust was discharged at the end of the stroke the pressure from the gas and air reservoir was

admitted by a lift valve to the cylinder to displace the remaining

exhaust gases and fill the cylinder with charge. This mixture was

compressed into a space at the end of the cylinder and ignited by

means of a flame ignition device. Robson's engine was built in

considerable numbers by Messrs Tangye of Birmingham, the first

exhibited by them at Bingley Hall at the end of 1880. The modern

Dav engine closely resembles the Robson engine

so far as its broad Operations are concerned. Atkinson's work on the gas engine was begun

in 1878, his first patent being No. 3212 of 1879.

The engine described in that patent somewhat

resembled the 1878 engine of Clerk as exhibited at

Kilburn. Atkinson was ingenious and persever- ing in the invention of two-cycle engines. Two

of his engines were made in considerable numbers.

The first was known as the " Differential "

engine, exhibited at the Inventions Exhibition,

London, in 1885. A later engine produced by

him was called the " Cycle " engine, and it

proved to be the most economical of all the

motors tested at the Society of Arts trials of

motors for electric lighting in 1888-1889.

Atkinson joined Crossley Bros., and many of his

ingenious contrivances are now at work on the

well-known engines of that firm. p 3 ._ Lon g itudinal 5ˆ0,, of Two-Cycle Engine (Koerting-Clerk), new type, by

Four-cycle engines now practically mono- Messrs Mather & Piatt, Ltd.

polize the field of the smaller internal com

bastion engines, and very large engines are also constructed on this plan. The two-cycle, or Clerk cycle engines, how- ever, compete strongly with the four-cycle for large gas engines using blast furnace gas. Koerting engines on the Clerk cycle are now built giving 1000 i.h.p. per double acting motor cylinder, and one power cylinder on this method gives

of Glasgow, has attained considerable success in driving blowing pumps for blast furnaces, in producing electric light, and in driving iron rolling mills.

Large gas engines are undoubtedly making great progress, as will be seen from the following interesting particulars prepared in 1908 by Mr R. E. Mathot of Brussels giving the numbers and horse power of large gas engines which had then been recently manufactured in Europe: —

Messrs Crossley Brothers, Limited, 57 motors, with an aggregate of 23,660 h.p.; Messrs Ehrhardt & Sehmer, 59 motors, total .69,790 h.p. ; the Otto Gasmotoren Fabrik, 82, total 47,400 h.p. ; Gebriider Koerting, 198, total 165,760 h.p.; Societe Alsacienne, 55, total 23,410 h.p.; Societe John Cockerill, 148, total 102,925 h.p.; Societe Suisse, Winterthur, 67, total 8620 h.p.; Vereinigte Maschinen-

~— s — » —

Fig. 6. — Arrangement of Oechelhauser Gas Engine.

fabriken, Augsburg and Niirnberg, 215, total 256, 240 h.p. The mean power of each gas engine made by Messrs Ehrhardt & Sehmer and the Augsburg and Niirnberg companies is in each case 1200 h.p. It is stated that in one factory there are gas engines representing a total output of 35,000 h.p. These European large gas engines thus give nearly 575,000 h.p. between them.

The installation of large gas engines has made considerable progress in America. Mr E. L. Adams estimated that 350,000 h.p. was at work or in construction in the United States in 1908. The first large engines were installed at the works of the Lackawanna Steel Co., Buffalo, New York. They were of the Koerting-Clerk type, and were built by the De La Vergne Co. of New York. They included 16 blowing engines, each of 2000 h.p., and 8 engines of 1000 h.p. each, driving dynamos to produce electric light. This large power plant was started in 1902. The Westinghouse Co. of Pittsburg have also built large engines, several of which are in operation at the various works of the Carnegie Steel Co. These Westinghouse engines are of the horizontal twin tandem type, having two cranks and four double-acting cylinders in each unit, the cylinders being 38 in. in diameter and the stroke 54 in. The Snow Steam Pump Co. have built similar horizontal tandem engines with cylinders of 42 in. diameter and 54 in. stroke. The English West- inghouse Co. have also designed large gas engines, and they ex- hibited a very interesting vertical multiple cylinder gas engine hav- ing four cranks and eight single- acting cylinders, four pairs, in tandem, at the Franco-British Exhibition of 1908; it gave 750 h.p., and the pistons were not watered.

Over two million horse-power of the smaller gas engines are now at work in the world, and certainly above one million horse- power of petrol motors.

The application of large gas engines to marine work, the compounding of the gas engine, and many other matters are

Capitaine of Frankfort-on-Main used for towing purposes in

been displaced by electrical ignition of both high and low tension

types; all large gas engines are ignited electrically and generally

by more than one igniter per cylinder.

The governing of large gas engines, too, is now effected so as

to keep up continuity of impulses by the method either of> throttling the charge inlet or by varying the point of admission of gas alone or air and gas mixed.

It may be said, indeed, without exaggera- tion, that the whole world is now alive to the possibilities of the internal-combustion motor, and that progress will be more and more rapid. This motor has almost fulfilled the expectations of those engineers who have devoted a large part of their lives to its study and advancement. They are look- ing forward now to the completion of the work begun so many years ago, and expect, at no distant date, to find the internal-com- bustion motor competing with the steam

engine even in its latest form, the steam turbine, on sea as

vigorously as it does at present on land.

Thermal Efficiency of Four-Cycle Engines. — The Otto and Clerk type engines are usually designated respectively four-cycle and two-cycle, because in the Otto type four strokes are necessary to complete the power-producing cycle of the engine and in the Clerk engine two strokes complete the cycle.

Indicated thermal efficiency may be defined as the proportion of the total heat of combustion which appears as work done by the explosion and expansion upon the piston. Brake thermal efficiency may be defined as the proportion of the total heat of combustion which appears as work given out by the engine available for over-coming external resistances; that is, brake thermal efficiency is the effective efficiency of the engine for doing work. In the early gas engines the indicated thermal efficiency was only 16%, as shown by tests of Otto engines from about 1877 to 1882, but now indicated thermal efficiencies of from 35 % to 37 % are often obtained. Some experimenters claim even higher efficiencies, but even 37 % is higher than ordinary best practice of 1909. Table I. has. been prepared tq show this advance. It shows, in addition to indicated thermal

Table I. — Indicated and Brake Thermal Efficiency of Four- Cycle Engines from

1882 to 1908.

No.

Mechanical Efficiency.

Names of Experimenters.

Year.

Dimensions of Engine.

Indicated

Thermal

Efficiency.

Brake Thermal Efficiency.

Type of Engine.

Per cent.

Diam. Stroke.

Per cent.

Per cent.

1

87-6

Slaby

1882

675″ X 13-7″ 8-5 X14″*

16

14

Deutz

2

84-2

Thurston

1884

17

. ‘4-3

Crossley

3

86-1

Society of Arts

1888

9-5″ X18′

22

18-9

Crossley

4

80-9

Society of Arts

1888

*9-02*Xi4**

21

17

Griffin (6-cycle)

87-3

Kennedy

1888

7-5′ X15

21

18-3

Beck (6-cycle)

82-0

Capper Robinson

1892

%■$′ X18″

22-8

17-4

Crossley

7

870

1898

10″ X18″

287

25

National

8

83

Humphrey

1900

26 X36'*

31

257

Crossley

9

817

Witz

1900

51-2" X55-I3"

28

22-9

Cockerill

10

85-5

Inst. Civil. Eng.

1905

14" X22'

35 l

299

National

11

771

Burstall

1907

16″ X24′

41-5 2

32

Premier

12

87-5

Hopkinson

1908

u-5″ X21″

36-8

32-2

Crossley

*being strenuously pursued, has built several vessels which the vessel is driven by gas engines operated by means of suction gas-producers con- suming anthracite. Messrs Thornycroft and Messrs Beardmore in Great Britain have adopted the Capitaine designs, and both firms have applied them to sea-going vessels, Thorny- croft to a gas launch which has been tested in the Solent, and Beardmore to an old gunboat, the *‘Rattler.” The ” Rattler ” was fitted with five-cylinder Otto cycle engines and suction gas-producers giving 500 i.h.p.; and has sailed some 1500 m. under gas power only. There are many difficulties to be overcome before large light and sufficiently slow-moving gas engines can be installed on board ship, but progress is being made, and without doubt all difficulties will be ultimately surmounted and gas power successfully applied to ships for both large and small power. The flame and incandescent tube methods of ignition have*

efficiency, the brake thermal efficiency and the mechanical efficiency, together with other particulars such as engine dimensions, types and names of experimenters. It will be seen that brake thermal efficiency has also increased from 14% to 32%; that is, practically one-third of the whole heat of combustion is obtained by these engines in effective work available for all motive power purposes.

Thermal Efficiency of Two-Cycle Engines. — It has been found that two-cycle engines present greater practical difficulties in regard to obtaining high indicated and brake thermal efficiencies, but the thermodynamic considerations are not affected by the practical difficulties. As shown by Table II., these engines improved in indicated thermal efficiency from the value of 16-4% attained in 1884 to 38% in 1903, while the brake thermal efficiency rose in the same period from 14% to 29%. The numbers in Table II. are not so well established as those in Table I. The four-cycle engines have been so far subjected to much more rigid and authoritative tests than those of the two-cycle. It is interesting to see from the table

'The value 35% is deduced by the author from the Inst.C.E. Committee's values.

2 This value is, in the author's view, too high ; probably due to indicator error.

that the mechanical efficiency of the early Clerk engines was 84 %, while in the later large engines of the same type it has fallen to 75 %. Standards of Thermal Efficiency. — To set up an absolute standard of thermal efficiency it is necessary to know in a complete manner the physical and chemical properties and occurrences in a gaseous explosion. A great deal of attention has been devoted to gaseous explosions by experimenters in England and on the continent of Europe, and much knowledge has been obtained from the work of Mallard and Le Chatelier, Clerk, Langen, Petavel, Hopkinson and Bairstow and Alexander. From these and other experiments it is

Eossible to measure approximately the internal energy or the specific eats of the gases of combustion at very high temperatures, such as 2000 C. ; and to advance the knowledge on the subject a com- mittee of the British Association was formed at Leicester in 1907. Recognizing, in 1882, that it was impossible to base any standard cycle of efficiency upon the then existing knowledge of gaseous explosions Dugald Clerk proposed what is called the air standard. This standard has been used for many years, and it was officially adopted by a committee of the Institution of Civil Engineers ap- pointed in 1903, this committee's two reports, dated March 1905 and December 1905, definitely adopting the air-standard cycle as the standard of efficiency for internal combustion engines. This standard

assumes that the working fluid is air, that its specific heat is constant throughout the range of -temperature, and that the

Table II. — Indicated and Brake Thermal Efficiency of Two-cycle Engines from

1884 to 1908.

Dimensions

Indicated

Brake

Mechanical

Name of

Year.

of Motor

Thermal

Thermal

Type of Engine.

Efficiency.

Experimenter.

Cylinders.

Efficiency.

Efficiency.

Per cent.

Diam. Stroke.

Per cent.

Per cent.

Garrett

1884

9′ X 20′

16-4

14 •

Clerk-Sterne

Stockport Co.

1884

II-2

Andrews & Co.

83

Clerk ….

1887

9″ X 15′

20-2

16-9

Clerk-Tangye

Atkinson .

1885

7i’

15

Atkinson

75

Meyer

1903

261”X(2”X37r)

38

29

Oechelhauser

75

Mather & Piatt .

1907

306

23

Koerting

value of the ratio between the specific heat at constant volume and constant pressure is 1-4. The air-standard efficiency for different cycles will be found fully discussed in the report of that committee, but space here only allows of a short discussion of the various cycles using compression previous to ignition.

For such engines there are three symmetrical thermodynamic cycles, and each cycle has the maximum thermal efficiency possible for the conditions assumed. The three types may be denned as cycles of (1) constant temperature, (2) constant pressure, and (3) constant volume.

The term constant temperature indicates that the supply of heat is added at constant temperature. In this cycle adiabatic compres- sion is assumed to raise the temperature of the working fluid from the lowest to the highest point. The fluid then expands at constant temperature, so that the whole of the heat is added at a constant temperature, which is the highest temperature of the cycle. The heat supply is stopped at a certain period, and then the fluid adia- batically expands until the temperature falls to the lowest tempera- ture. A compression operation then takes place at the lowest temperature, so that the necessary heat is discharged by isothermal compression at the lower temperature. It will be recognized that this is the Carnot cycle, and the efficiency E is the maximum possible

between the temperature limits in accordance with the well-known second law of thermo-dy namics. This efficiency is E = (T — T'J'/T = I — T'/T, where T is the absolute temperature at which heat is sup- plied and T 1 the absolute temperature at which heat is discharged.

It is obvious that the temperatures before and after compression are here the same as the lower and the higher temperatures, so that if / be the temperature before compression and t c the temperature after compression, then E = I — tll c . This equation in effect says that thermal efficiency operating on the Carnot cycle depends upon the temperatures before and after compression.

The constant pressure cycle is so called because heat is added to the working fluid at constant pressure. In this cycle adiabatic compression raises the pressure — not the temperature— from the lower to the higher limit. At the higher limit of pressure, heat is added while the working fluid expands at a constant pressure. The temperature thus increases in proportion to increase of volume. When the heat supply ceases, adiabatic expansion proceeds and reduces the pressure of the working fluid from the higher to the lower point. Again here we are dealing with pressure and not temperature. The heat in this case is discharged from the cycle at the lower pressure but at diminishing temperature. It can be shown in this case also that E= =i—t/t c , that is, that although the maximum temperature of the working fluid is higher than the temperature of compression and the temperature at the end of adiabatic expansion is higher than the lower temperature, yet the proportion of heat convertible into work is determined here also by the ratio of the temperatures before and after compression.

The constant volume cycle is so called because the heat required is added to the working fluid at constant volume. In this cycle

adiabatic compression raises the pressure and temperature of the working fluid through a certain range; the heat supply is added while the volume remains constant, that is, the volume to which the fluid is diminished by compression. Adiabatic expansion re- duces the pressure and temperature of the working fluid until the volume is the same as the original volume before compression, and the necessary heat is discharged from the cycle at constant volume during falling temperature. Here also it can be shown that the thermal efficiency depends on the ratio between the temperature before compression and the temperature after compression. It is as before E = 1 —t/t e . Where t is the temperature and v the volume before compression, and

t c the temperature and v c the volume after

—) = r, so that E may be written

and if v c /v = i/r, the compression ratio, then

Thus in all three symmetrical cycles of constant temperature, constant pressure and constant volume the thermal efficiency

depends only on the ratio of the maximum volume before com- pression to the volume after com- pression; and, given this ratio, called i/r, which does not depend in any way upon temperature determinations but only upon the construction and valve-setting of the engine, we have a means of settling the ideal efficiency proper for the particular engine. Any desired ideal efficiency may be obtained from any of the cycles by selecting a suitable compres- sion ratio. Table III., giving the theoretical thermal efficiency for these three symmetrical cycles of constant temperature, pressure and volume, extends from a compression ratio of J to xiuth. Such compression ratios as

Table III. — Theoretical Thermal Efficiency for the Three Symmetrical Cycles of Constant Temperature, Pressure and Volume.

0-55

o-6i

0-70 0-85

i/f E I . . . .

i 0-246 A • • • •

i 0-36 jsV . . . .

i 0-43 ri b ....

i 0-48

100 are, of course, not used in practice. The ordinary value in constant volume engines ranges from Jth to ˆth. In the Diesel engine, which is a constant pressure engine, the ratio is usually jˆth. As the value of i/r increases beyond certain limits, the effective power for given cylinder dimensions diminishes, because the temperature of compression is rapidly approaching the maximum temperature possible by explosion; thus a compression of iioth raises the

temperature of air from 17° C. to about 1600° C, and as 2000° C. is the highest available explosion temperature for ordinary purposes, it follows that a very small amount of work would be possible from an engine using such compressions, apart from other mechanical considerations. It has long been recognized that constant pressure and constant volume engines have the same thermal efficiency for similar range of compression temperature, but Prof. H. L. Callendar first pointed out the interesting fact that a Carnot cycle engine is equally dependent upon the ratio of the temperature before and after compression, and that its efficiency for a given compression ratio is the same as the efficiencies proper for constant pressure and constant volume engines. Prof. Callendar demonstrated this at a meeting of the Institution of Civil Engineers Committee on thermal standards in 1904. The work of this com- mittee, together with Clerk's investigations, prove that in modern gas-engines up to to 50 h.p. it may be taken that the best result possible in practice is given by multiplying the air-standard value by -7. For instance, an engine with a compression ratio of one-third has an air-standard efficiency of 0-36, and the actual indicated efficiency of a well-designed engine should be -36 multiplied by -7 = 0-25. _ If, however, the compression ratio be raised to one-fifth, then the air-standard value -48 multiplied by -7 gives -336. The ideal efficiency of the real working fluid can be proved to be about 20 % short of the air-standard values given. (D. C.)

GASKELL, ELIZABETH CLEGHORN (1810-1865), English novelist and biographer, was born on the 29th of September 1810 in Lindsay Row, Chelsea, London, since destroyed to make way for Cheyne Walk. Her father, William Stevenson (1 772-1829), came from Berwick-on-Tweed, and had been successively Uni- tarian minister, farmer, boarding-house keeper for students at Edinburgh, editor of the Scots Magazine, and contributor to the

Edinburgh Review, before he received the post of Keeper of the Records to the Treasury, which he held until his death. His first wife, Elizabeth Holland, was Mrs GaskelPs mother. She was a Holland of Sandlebridge, Knutsford, Cheshire, in which county the family name had long been and is still of great account. Mrs Stevenson died a month after her daughter was born, and the babe was carried into Cheshire to Knutsford to be adopted by her aunt, Mrs Lumb. Thus her childhood was spent in the pleasant environment that she has

idealized in Cranford. At fifteen years of age she went to a boarding-school at Stratford-on-Avon, kept by Miss Byerley, where she remained until her seventeenth year. Then came occasional visits to London to see her father and his second wife, and after her father's death in 1829 to her uncle, Swinton Holland. Two winters seem to have been spent in Newcastle-on-Tyne in the family of William Turner, a Unitarian minister, and a third in Edinburgh. On the 30th of August 1832 she was married in the parish church of Knutsford to William Gaskell, minister of the Unitarian chapel in Cross Street, Man- chester, and the author of many treatises and sermons in support of his own religious denomination. Mr Gaskell held the chair of English history and literature in Manchester New College.

Henceforth MrsGaskell'slifebelongedto Manchester. Sheand her husband lived first in Dover Street, then in Rumford Street, and finally in 1850 at 84 Plymouth Grove. Her literary life began with poetry. She and her husband aspired to emulate George Crabbe and write the annals of the Manchester poor. One poetic " Sketch," which appeared in Blackwood's Magazine for January 1837, seems to have been the only outcome of this ambition. Henceforth, while in perfect union in all else, husband and wife were to go their separate literary ways, Mrs Gaskell to become a successful novelist, whose books were to live side by side with those of greater masters, Mr Gaskell to be a distinguished Unitarian divine, whose sermons, lectures and hymns are now all but forgotten. In her earlier married life Mrs Gaskell was mainly occupied with domestic duties — she had seven children — and philanthropic work among the poor. Her first published prose effort was probably a letter that she addressed to William Howitt on hearing that he contemplated a volume entitled Visits to Remarkable Places. She then told the legend of Clopton Hall, Warwickshire, as she had heard it in schooldays, and Howitt incorporated the letter in that book, which was published in 1840. Serious authorship, however, does not seem tohavebeen commenced until four or five years later. In 1844 Mr and Mrs Gaskell visited North Wales, where their only son " Willie " died of scarlet fever at the age of ten months, and it was, it is said, to distract Mrs Gaskell from her sorrow that her husband suggested a long work of fiction, and Mary Barton was begun. There were earlier short stories in Howitt' s Journal, where " LibbieMarsh'sThree Eras" and "The Sexton's Hero" appeared in 1847. But it was M ary Barton : A Tale oj Manchester Life that laid the foundation of Mrs Gaskell's literary career. It was completed in 1847 and offered to a publisher who returned it unread. It was then sent to Chapman & Hall, who retained the manuscript for a year without reading it or communicating with the

author. A reminder, however, led to its being sought for, considered and accepted, the publishers agreeing to pay the author £100 for the copyright. It was published anonymously in two volumes in 1848. This story had a wide popularity, and its author secured first the praise and then the friendship of Carlyle, Landor and Dickens. Dickens indeed asked her in 1850 to become a contributor to his new magazine Household Words, and here the whole of Cranford appeared at intervals from December 1851 to May 1853, exclusive of One sketch, reprinted in the " World's Classics " edition (1907), that was published in All the Year Round for November 1863. Earlier than this, indeed, for the very first number of Household Words she had written "Lizzie Leigh." Mrs Gaskell's second book, however, was The Moorland Cottage, a dainty little volume that appeared at Christmas 1850 with illustrations by Birket Foster. In the Christmas number of Household Words for 1853 appeared " The Squire's Story," reprinted in Lizzie Leigh and other Tales in 1865. In 18ˆ3 appeared another long novel, Ruth, and the incomparable

Cranford. This last — now the most popular of her books — is an idyll of village life, largely inspired by girlish memories of Knutsford and its people. In Ruth, which first appeared in three volumes, Mrs Gaskell turned to a delicate treatment of a girl's betrayal and her subsequent rescue. Once more we are intro- duced to Knutsford, thinly disguised, and to the little Unitarian chapel in that town where the author had worshipped in early years. In 1855 North and South was published. It had previously appeared serially in Household Words. Then came — in 1857— the Life of Charlotte Bronte, in two volumes. Miss Bronte, who had enjoyed the friendship of Mrs Gaskell and had exchanged visits, died in March 1855. Two years earlier she had begged her publishers to postpone the issue of her own novel Villette in order that her friend's Ruth should not suffer. This biography, by its vivid presentation of the sad, melancholy and indeed tragic story of the three Bronte sisters, greatly widened the interest in their writings and gave its author a considerable place among English biographers. But much matter was contained in the first and second editions that was withdrawn from the third. Certain statements made by the writer as to the school of Charlotte Bronte's infancy, an identification of the "Lowood" of Jane Eyre with the existing school, and the acceptance of the story of Bramwell Bronte's ruin having been caused by the woman in whose house he had lived as tutor, brought threats of libel actions. Apologies were published, and the third edition of the book was modified, as Mrs Gaskell declares, by " another hand." The book in any case remains one of the best biographies in the language. An introduction by Mrs Gaskell

to the then popular novel, Mabel Vaughan, was also included in her work of this year 1857, but no further book was published by her until 1859, when, under the title of Round the Sofa, she collected many of hercontributionstoperiodicalliterature. R0undtheSofaa.ppea.1ed in two volumes, the first containing only " My Lady Ludlow," the second five short stories. These stories reappeared the same year in one volume as My Lady Ludlow and other Tales. In the next year i860 appeared yet another volume of short stories, entitled Right at Last and other Tales. The title story had appeared two years earlier in Household Words as " The Sin of a Father." In 1862 Mrs Gaskell wrote a preface to a little book by Colonel Vecchj, translated from the Italian — Garibaldi and Caprera, and in 1863 she published her last long novel, Sylvia's Lovers, dedicated " to My dear Husband by her who best knows his Value." After this we have — in 1863 — a one-volume story, A Dark Night's Work, and in the same year Cousin Phyllis and other Tales appeared. Reprinted short stories from All the Year Round, Cornhill Magazine, and other publications, tend to lengthen the number of books published by Mrs Gaskell during her lifetime. The Grey Woman and other Tales appeared in 1865. Mrs Gaskell died on the 12th of November 186s at Holyburn, Alton, Hampshire, in a house she had just purchased with the profits of her writings as a present for her husband. She was buried in the little graveyard of the Knutsford Unitarian church. Her unfinished novel Wives and Daughters was published in two volumes in 1866. •?

Mrs Gaskell has enjoyed an ever gaining popularity since her death. Cranford has been published in a hundred forms and with many illustrators. It is unanimously accepted as a classic. Scarcely less recognition is awarded to the Life of Charlotte Bronte, which is in every library. The many volumes of novelsand stories seemed of less secure permanence until the falling in of their copyrights revealed the fact that a dozen publishers thought them worth reprinting. The most complete editions, however, are the " Knutsford Edition," edited with introductions. by A.W Ward, in eight volumes (Smith, Elder), and the " World's Classics " edition, edited by Clement Shorter, in 10 volumes (Henry Froude, 1908).

There is no biography of Mrs Gaskell, she having forbidden the publication of any of her letters. See, however, the biographical introduction to the " Knutsford " Mary Barton by A. W. Ward; the Letters of Charles Dickens; Women Writers, by C. J. Hamilton, second series; H. B. Stowe's Life and Letters, edited by Annie Fields; Autobiography of Mrs Fletcher; Mrs Gaskell and Knutsford, by G. A. Payne; Cranford, with a preface by Anne Thackeray Ritchie;

Ecrivains modernes de VAngleterre, by £mile Montegut. (C. K. S.)

GASSENDI

5°3

GASSENDI 1 [Gassend], PIERRE (1592-1655), French philo- sopher, scientist and mathematician, was born of poor parents at Champtercier, near Digne, in Provence, on the 2 2nd of January 1592. At a very early age he gave indications of remarkable mental powers and was sent to the college at Digne.. He showed particular aptitude for languages and mathematics, and it is said that at the age of sixteen he was invited to lecture on rhetoric at the college. Soon afterwards he entered the university of Aix, to study philosophy under P. Fesaye. In 161 2 he was called to the college of Digne to lecture on theology. Four years later he received the degree of doctor of theology at Avignon, and in 161 7 he took holy orders. In the same year he was called to the chair of philosophy at Aix, and seems gradually to have withdrawn from theology. He lectured principally on the Aristotelian philosophy, conforming as far as possible to the orthodox methods. At the same time, however, he followed with interest the discoveries of Galileo and Kepler, and became more and more dissatisfied with the Peripatetic system. It was the period of revolt against the Aristotelianism of the schools, and Gassendi shared to the full the empirical tendencies of the age. He, too, began to draw up objections to the Aristotelian philosophy, but did not at first venture to publish them. In 1624, however, after he had left Aix for a canonry at Grenoble, he printed the first part of his Exercitationes paradoxicae adversus Aristoteleos. A fragment of the second book was published later at La Haye (1659), but the remaining five were never composed, Gassendi apparently thinking that after the Discus- siones Peripateticae of Francesco Patrizzi little field was left for his labours.

After 1628 Gassendi travelled in Flanders and Holland. During this time he wrote, at the instance of Mersenne, his examination of the mystical philosophy of Robert Fludd (Epis- tolica dissertatio in qua praecipua principia philosophiae Ro. Fluddi dekgunlur, 163 1), an essay on parhelia (Epistola de parheliis), and some valuable observations on the transit of Mercury which had been foretold by Kepler. He returned to France in 1631, and two years later became provost of the cathedral church at Digne. Some years were then spent in travelling through Provence with the duke of AngoulSme, governor of the department. The only literary work of this period is the Life of Peiresc, which has been frequently reprinted, and was translated into

English. In 1642 he was engaged by Mersenne in controversy with Descartes. His objections to the fundamental propositions of Descartes were published in 1642; they appear as the fifth in the series contained in the works of Descartes. In these objections Gassendi's tendency towards the empirical school of speculation appears more pronounced than in any of his other writings. In 1645 he accepted the chair cf mathematics in the College Royal at Paris, and lectured for many years with great success. In addition to controversial writings on physical questions, there appeared during this period the first of the works by which he is known in the history of philosophy. In 1647 he published the treatise De vita, moribus, el doctrina Epicuri libri octo. The work was well received, and two years later appeared his commentary on the tenth book of Diogenes Laertius, De vita, moribus, et placitis Epicuri, seu Animadversiones in X. librum Diog. Laer. (Lyons, 1649; last edition, 1675). 1° the same year the more important Syntagma philosophiae Epicuri (Lyons, 1649; Amsterdam, 1684) was published.

In 1648 ill-health compelled him to give up his lectures at the College Royal. He travelled in the south of France, spending nearly two years at Toulon, the climate of which suited him. In 1653 he returned to Paris and resumed his literary work, publishing in that year lives of Copernicus and Tycho Brahe. The disease from which he suffered, lung complaint, had, how- ever, established a firm hold on him. His strength gradually failed, and he died at Paris on the 24th of October 1655. A

1 It was formerly thought that Gassendi was really the genitive of the Latin form Gassendus. C. Guttler, however, holds that it is a modernized form of the O. Fr. Gassendy (see paper quoted in bibliography).

bronze statue of him was erected by subscription at Digne in

1852.

His collected works, of which the most important is the Syn- tagma philosophicum {Opera, i. and ii.), were published in 1658 by Montmort (6 vols., Lyons). Another edition, also in 6 folio volumes, was published by N. Averanius in 1727. The first two are occupied entirely with his Syntagma philosophicum; the third contains his critical writings on Epicurus, Aristotle, Descartes, Fludd and Lord Herbert, with some occasional pieces on certain problems of physics; the fourth, his Inslitulio astronomica, and his Commentarii de rebus celestibus; the fifth, his commentary on the tenth book of Diogenes

Laertius, the biographies of Epicurus, N. C. F. de Peiresc, Tycho Brahe, Copernicus, Georg von Peuerbach, and Regiomontanus, with some tracts on the value of ancient money, on the Roman calendar, and on the theory of music, to all which is appended a large and prolix piece entitled Notitia ecclesiae Diniensis; the sixth volume contains his correspondence. The Lives, especially those of Copernicus, Tycho and Peiresc, have been justly admired. That of Peiresc has been repeatedly printed; it has also been translated into English. Gassendi was one of the first after the revival of letters who treated the literature of philosophy in a lively way. His writings of this kind, though too laudatory and somewhat diffuse, have great merit; they abound in those anecdotal details, natural yet not obvious reflections, and vivacious turns of thought, which made Gibbon style him, with some extravagance certainly, though it was true enough up to Gassendi's time — " le meilleur philosophe des litterateurs, et le meilleur litterateur des philosophes."

Gassendi holds an honourable place in the history of physical science. He certainly added little to the stock of human knowledge, but the clearness of his exposition and the manner in which he, like Baccn, urged the importance of experimental research, were of inestimable service to the cause of science. To what extent any place can be assigned him in the history of philosophy is more doubt- ful. The Exercitationes on the whole seem to have excited more attention than they deserved. They contain little or nothing beyond what had been already advanced against Aristotle. The first book expounds clearly, and with much vigour, the evil effects of the blind acceptance of the Aristotelian dicta on physical and philo- sophical study ; but, as is the case with so many of the anti-Aristo- telian works of this period, the objections show the usual ignorance of Aristotle's own writings. The second book, which contains the review of Aristotle's dialectic or logic, is throughout Ramist in tone and method. The objections to Descartes — one of which at least, through Descartes's statement of it in the appendix of objections in the Meditationes has become famous — have no speculative value, and in general are the outcome of the crudest empiricism. His labours on Epicurus have a certain historical value, but the want of consistency inherent in the philosophical system raised on Epicurean- ism is such as to deprive it of genuine worth. Along with strong expressions of empiricism we find him holding doctrines absolutely irreconcilable with empiricism in any form. For while he maintains constantly his favourite maxim " that there is nothing in the intellect which has not been in the senses " {nihil in intellectu quod non prius fuerit in sensu), while he contends that tiie imaginative faculty {phantasia) is

the counterpart of sense — that, as it has to do with material images, it is itself, like sense, material, and essentially the same both in men and brutes; he at the same time admits that the intellect, which he affirms to be immaterial and immortal — the most characteristic distinction of humanity — attains notions and truths of which no effort of sensation or imagination can give us the slightest apprehension {Op. ii. 383). He instances the capacity of forming "general notions"; the very conception of universality itself {ib. 384)1 to which he says brutes, who partake as truly as men in the faculty called phantasia, never attain ; the notion of God, whom he says we may imagine to be corporeal, but understand to be incorporeal ; and lastly, the reflex action by which the mind makes its own phenomena and operations the objects of attention.

The Syntagma philosophicum, in fact, is one of those eclectic systems which unite, or rather place in juxtaposition, irreconcilable dogmas from various schools of thought. It is divided, according to the usual fashion of the Epicureans, into logic (which, with Gassendi as with Epicurus, is truly canonic), physics and ethics. The logic, which contains at least one praiseworthy portion, a sketch of the history of the science, is divided into theory of right apprehension {bene imaginari), theory of right judgment {bene proponere), theory of right inference {bene colligere), theory of right method {bene ordinate). The first part contains the specially empirical positions which Gassendi afterwards neglects or leaves out of account. The senses, the sole source of knowledge, are supposed to yield us immediately cognition of individual things ; phantasy (which Gassendi

takes to be material in nature) reproduces these ideas; understanding compares these ideas, which are particular, and frames general ideas. Nevertheless, he at the same time admits that the senses yield knowledge— not of things — but of qualities only, and holds that we arrive at the idea of thing or substance by induction. He holds that the true method of research is the analytic, rising from lower to higher notions; yet he sees clearly, and admits, that inductive reasoning, as conceived by Bacon, rests on a general proposition not itself proved by induction. He ought to hold, and in disputing with Descartes he did apparently hold, that the evidence of the senses is the only convincing evidence ; yet he maintains, and from his special mathematical training it was natural he should maintain, that the evidence of reason is absolutely satisfactory. The

whole doctrine of judgment, syllogism and method is a mixture of Aristotelian and Ramist notions.

In the second part of the Syntagma, the physics, there is more that deserves attention; but here, too, appears in the most glaring manner the inner contradiction between Gassendi's fundamental principles. While approving of the Epicurean physics, he rejects altogether the Epicurean negation of God and particular providence. He states the various proofs for the existence of an immaterial, infinite, supreme Being, asserts that this Being is the author of the visible universe, and strongly defends the doctrine of the fore- knowledge and particular providence of God. At the same time he holds, in opposition to Epicureanism, the doctrine of an immaterial rational soul, endowed with immortality and capable of free deter- mination. It is altogether impossible to assent to the supposition of Lange {Gesch. des Materialismus, 3rd ed., i. 233), that all this portion of Gassendi's system contains nothing of his own opinions, but is introduced solely from motives of self-defence. The positive exposition of atomism has much that is attractive, but the hypothesis of the calor vitalis (vital heat), a species of anima mundi (world-soul) which is introduced as physical explanation of physical phenomena, does not seem to throw much light on the special problems which it is invoked to solve. Nor is his theory of the weight essential to atoms as being due to an inner force impelling them to motion in any way reconcilable with his general doctrine of mechanical causes.

In the third part, the ethics, over and above the discussion on freedom, which on the whole is indefinite, there is little beyond a milder statement of the Epicurean moral code. The final end of life is happiness, and happiness is harmony of soul and body (tranquillilas animi et indolentia corporis). Probably, Gassendi thinks, perfect happiness is not attainable in this life, but it may be in the life to come.

The Syntagma is thus an essentially unsystematic work, and clearly exhibits the main characteristics of Gassendi's genius. He was critical rather than constructive, widely read and trained thoroughly both in languages and in science, but deficient in specu- lative power and original force. Even in the department of natural science he shows the same inability steadfastly to retain principles and to work from them; he wavers between the systems of Brahe and Copernicus. That his revival of Epicureanism had an important influence on the general thinking of the 17th century may be ad- mitted ; that it has any real importance in the history of philosophy cannot be granted.

Authorities. — Gassendi's life is given by Sorbiere in the first collected edition of the works, by Bugerel, Vie de Gassendi (1737; 2nd ed., 1770), and by Damiron, Memoire sur Gassendi (1839). An abridgment of his philosophy was given by his friend, the celebrated traveller, Bernier (Abr6g6 de la philosophie de Gassendi, 8 vols., 1678; 2nd ed., 7 vols., 1684). The most complete surveys of his work are those of G. S. Brett (Philosophy of Gassendi, London, 1908), Buhle (Geschichte der neuern Philosophie, iii. 1, 87-222), Damiron (Me'moires pour servir & I'histoire de philosophie au X VII" siecle) , and P.F.Thomas (La Philosophie de Gassendi, Paris, 1889). See also Ritter, Geschichte der Philosophie, x. 543-571 ; Feuerbach, Gesch. d. neu. Phil, von Bacon bis Spinoza, 127-150; F. X. Kiefl, P. Gassendis Erkenntnis- theorie und seine Stellung zum Materialismus (1893) and " Gassendi's Skepticismus " in Philos. Jahrb. vi. (1893); C. Guttler, " Gassend oder Gassendi?" in Archiv f. Gesch. d. Philos. x. (1897), pp. 238- 242. (R.Ad.;X.)

GASTEIN, in the duchy of Salzburg, Austria, a side valley of the Pongau or Upper Salzach, about 25 m. long and i\ m. broad, renowned for its mineral springs. It has an elevation of between 3000 and 3500 ft. Behind it, to the S., tower the mountains Mallnitz or Nassfeld-Tauern (7907 ft.) and Ankogel (10,673 ft.), and from the right and left of these mountains two smaller ranges run northwards forming its two side walls. The river Ache traverses the valley, and near Wildbad-Gastein forms two magnificent waterfalls, the upper, the Kesselfall (196 ft.), and the lower, the Barenfall (296 ft.). Near these falls is the Schleierfall (250 ft.), formed by the stream which drains the Bockhart-see. The valley is also traversed by the so-called Tauern railway (opened up to Wildbad-Gastein in September 1905), which goes to Mallnitz, piercing the Tauern range by a

tunnel 9260 yds. in length. The principal villages of the vaBey are Hof-Gastein, Wildbad-Gastein and Bockstein.

Hof-Gastein, pop. (1900) 840, the capital of the valley, is also a watering-place, the thermal waters being conveyed here from Wildbad-Gastein by a conduit 5 m. long, constructed in 1828 by the emperor Francis I. of Austria. Hof-Gastein was, after Salzburg, the richest place in the duchy, owing to its gold and silver mines, which were already worked during the Roman period. During the 16th century these mines were yielding annually 11 80 lb of gold and 9500 ib of silver, but since the 17 th century, they have been much neglected and many of them are now covered by glaciers.

Wildbad-Gastein, commonly called Bad-Gastein, one of the most celebrated watering-places in Europe, is picturesquely situated in the narrow valley of the Gasteiner Ache, at an altitude of 3480 ft. The thermal springs, which issue from the granite mountains, have a temperature of 77°-i20° F., and yield about 880,000 gallons of water daily. The water contains only 0-3S to 1000 of mineral ingredients and is used for bathing purposes. The springs are resorted to in cases of , nervous affections, senile and general debility, skin diseases, gout and rheumatism. Wildbad-Gastein is annually visited by over 8500 guests. The springs were known as early as the 7th century, but first came into fame by a successful visit paid to them by Duke Frederick of Austria in 1436. Gastein was a favourite resort of William I. of Prussia and of the Austrian imperial family, and' it was here that, on the 14th of August 1865, was signed the agreement known as the Gastein Convention, which by dividing the administration of the conquered provinces of Schleswig and Holstein between Austria and Prussia postponed for a while the outbreak of war between the two powers. It was also here (August-September 1879) that Prince Bismarck negotiated with Count Julius Andrassy the Austro-German treaty, which resulted in the formation of the Triple Alliance.

See Proll, Gastein, Its Springs and Climate (Vienna, 5th ed.,

1893)-

GASTRIC ULCER (ulcer of the stomach), a disease of much gravity, commonest in females, and especially in anaemic domestic servants. It is connected in many instances with impairment of the circulation in the stomach and the formation of a clot in a small blood-vessel (thrombosis). It may be due to an impoverished state of the blood (anaemia) , but it may also arise from disease of the blood-vessels, the result of long-continued indigestion and gastric catarrh.

When clotting takes place in a blood-vessel the nutrition of that limited area of the stomach is cut off, and the patch under- goes digestion by the unresisted action of the gastric juices, an ulcer being formed. The ulcer is usually of the size of a silver threepence or sixpence, round or oval, and, eating deeply, is apt to make a hole right through the coats of the stomach. Its usual site is upon the posterior wall of the upper curvature, near to the pyloric orifice. It may undergo a healing process at any stage, in which case it may leave but little trace of its existence; while, on the other hand, it may in the course of cicatrizing produce such an amount of contraction as to lead to stricture of the pylorus, or to a peculiar hour-glass

deformity of the stomach Perforation is in most cases quickly fatal, unless previously the stomach has become adherent to some neighbouring organ, by which the dangerous effects of this occurrence may be averted, or unless the condition has been promptly recognized and an operation has been quickly done. Usually there is but one ulcer, but sometimes there are several ulcers.*

The symptoms of ulcer of the stomach are often indefinite and obscure, and in some cases the diagnosis has been first made on the occurrence of a fatal perforation. First among the symptoms is pain, which is present at all times, but is markedly increased after food. The pain is situated either at the lower end of the breast-bone or about the middle of the back. Sometimes it is felt in the sides. It is often extremely severe, and is usually accompanied with localized tenderness and also with a sense of oppression, and by an inability to wear tight clothing. The pain is due to the movements of the stomach set up by the presence

of the food, as well as to the irritation of the inflamed nerve filaments in the floor of the ulcer. Vomiting is a usual symptom. It occurs either soon after the food is swallowed or at a later period, and generally relieves the pain and discomfort. Vomiting of blood (haematemesis) is a frequent and important symptom. The blood may show itself in the form of a brown or coffee-like mixture, or as pure blood of dark colour and containing clots. It comes from some vessel or vessels which the ulcerative process has ruptured. Blood is also found mixed with the discharges from the bowels, rendering them dark or tarry-looking. The general condition of the patient with gastric ulcer is, as a rule, that of extreme ill-health, with pallor, emaciation and debility. The tongue is red, and there is usually constipation. In most of the cases the disease is chronic, lasting for months or years; and in those cases where the ulcers are large or multiple, in- complete healing may take place, relapses occurring from time to time. But the ulcers may give rise to no marked symptoms, and there have been instances where fatal perforation suddenly took place, and where post-mortem examination revealed the existence of long-standing ulcers which had given rise to no suggestive symptoms. While gastric ulcer is to be regarded as dangerous, its termination, in the great majority of cases, is in recovery. It frequently, however, leaves the stomach in a delicate condition, necessitating the utmost care as regards diet. Occasionally

the disease proves fatal by sudden haemorrhage, but a fatal result is more frequently due to perforation and the escape of the contents of the stomach into the peritoneal cavity, in which case death usually occurs in from twelve to forty-eight hours, either from shock or from peritonitis. Should the stomach become adherent to another organ, and fatal perforation be thus prevented, chronic " indigestion " may persist, owing to interference with the natural movements of the stomach. Stricture of the pylorus and consequent dilatation of the stomach may be caused by the cicatrization of an ulcer.

The patient should at once be sent to bed and kept there, and allowed for a while nothing stronger than milk and water or milk and lime water. But if bleeding has recently taken place no food whatever should be allowed by the stomach, and the feeding should be by nutrient enemata. As the symptoms quiet down, eggs may be given beaten up with milk, and later, bread and milk and home-made broths and soups. Thus the diet advances to chicken and vegetables rubbed through a sieve, to custard pudding and bread and butter. As regards medicines, iron is the most useful, but no pills of any sort should be given. Under the influence of rest and diet most gastric ulcers get well. The presence of healthy-looking scars upon the surface of the stomach, which are constantly found in operating upon the interior of the abdomen, or as revealed in post-mortem examinations, are evidence of the truth of this statement. It is unlikely that under the treatment just described perforation of the stomach will take place, and if the surgeon is called in to assist he will probably advise that operation is inadvisable. Moreover, he knows that if he should open the abdomen to search for an ulcer of the stomach he might fail to find it; more than that, his search might also be in vain if he opened the stomach itself and examined the interior. Serious haemorrhages, however, may make it necessary that a prompt and thorough search should be made in order that the surgeon may endeavour to locate the ulcer, and, having found it, secure the damaged vessel and save the patient from death by bleeding.

Perforation of a gastric ulcer having taken place, the septic germs, which were harmless whilst in the stomach, escape with the rest of the contents of the stomach into the general peritoneal cavity. The immediate effects of this leakage are sudden and severe pain in the upper part of the abdomen and a great shock to the system (collapse). The muscles of the abdominal wall become hard and resisting, and as peritonitis appears and the intestines are distended with gas, the abdomen is distended and becomes greatly increased in size and ceases to move, the respiratory movements being short and

quick. At first, most likely, the temperature drops below normal, and the pulse quickens. Later, the temperature rises. If nothing is

done, death from the septic poisoning of peritonitis is almost certain.

The treatment of ruptured gastric ulcer demands immediate operation. An incision should be made in the upper part of the middle line of the abdomen, and the perforation should be looked for. There is not, as a rule, much difficulty in finding it, as there are generally deposits of lymph near the spot, and other signs of local inflammation; moreover, the contents of the stomach may be seen escaping from the opening. The ulcer is to be closed by running a " purse-string " suture in the healthy tissue around it, and the place is then buried in the stomach by picking up small folds of the stomach-wall above and below it and fixing them together by suturing. This being done, the surface of the stomach, and the neighbouring viscera which have been soiled by the leakage, are wiped clean and the abdominal wound is closed, provision being made for efficient drainage. A large proportion of cases of perforated gastric ulcer thus treated recover. (E. O.)*

GASTRITIS (Gr. yaarrip, stomach), an inflammatory affection of the stomach, of which the condition of catarrh, or irritation of its mucous membrane, is the most frequent and most readily recognized. This may exist in an acute or a chronic form, and depends upon some condition, either local or general, which pro- duces a congested state of the circulation in the walls of the stomach (see Digestive Organs: Pathology).

Acute Gastritis may arise from various causes. The most intense forms of inflammation of the stomach are the toxic conditions which follow the swallowing of corrosive poisons, such as strong mineral acids of alkalis which may extensively destroy the mucous membrane. Other non-corrosive poisons cause acute degeneration of the stomach wall (see Poisons). Acute inflammatory conditions may be secondary to zymotic diseases such as diphtheria, pyaemia, typhus fever and others. Gastritis is also caused by the ingestion of food which has begun to decompose, or may result from eating unsuitable articles which themselves remain undigested and so excite acute catarrhal conditions. These give rise to the symptoms well known as characterizing an acute " bilious attack," consisting in loss of appetite, sickness or nausea, and headache, frontal or occipital, often accompanied with giddiness. The tongue is furred, the breath foetid, and there is pain or discomfort in the region of the stomach, with sour eructations, and frequently vomiting, first of food and then

of bilious matter. An attack of this kind tends to subside in a few days, especially if the exciting cause be removed. Sometimes, however, the symptoms recur with such frequency as to lead to the more serious chronic form of the disease.

The treatment bears reference, in the first place, to any known source of irritation, which, if it exist, may be expelled by an emetic or purgative (except in cases due to poisoning). This, however, is seldom necessary, since vomiting is usually present. For the relief of sickness and pain the sucking of ice and counter- irritation over the region of the stomach are of service. Further, remedies which exercise a soothing effect upon an irritable mucous membrane, such as bismuth or weak alkaline fluids, and along with these the use of a light milk diet, are usually sufficient to remove the symptoms.

Chronic Gastric Catarrh may result from the acute or may arise independently. It is not infrequently connected with antecedent disease in other organs, such as the lungs, heart, liver or kidneys, and it is especially common in persons addicted to alcoholic excess. In this form the texture of the stomach is more altered than in the acute form, except in the toxic and febrile forms above referred to. It is permanently in a state of congestion, and its mucous membrane and muscular coat undergo thickening and other changes, which markedly affect the function of digestion. The symptoms are those of dyspepsia in an aggravated form (see Dyspepsia), of which discomfort and pain after food, with distension and frequently vomiting, are the chief; and the treatment must be conducted in reference to the causes giving rise to it. The careful regulation of the diet, alike as to the amount, the quality, and the intervals between meals, demands special attention. Feeding on artificially soured milk may in

many cases be useful. Lavage or washing out of the stomach with weak alkaline solutions has been used with marked success in the treatment of chronic gastritis. Of medicinal agents, bismuth, arsenic; nux vomica, and the mineral acids are all of acknow- ledged efficacy, as are also preparations of pepsin.

GASTROPODA, the second of the five classes of animals constituting the phylum Mollusca. For a discussion of the re- lationship of the Gastropoda to the remaining classes of the phylum, see Mollusca.

The Gastropoda are mainly characterized by a loss of symmetry, produced by torsion of the visceral sac. This torsion may be resolved into two successive movements. The first is a ventral flexure in the antero-posterior or sagittal plane; the result of this is to approximate the two ends of the alimentary canal. In develop- ment, the openings of the mantle-cavity and the anus are always originally posterior; later they are brought forward ventrally. During this first movement flexure is also produced by the coiling of the visceral sac and shell ; primitively the latter was bowl-shaped ; but the ventral flexure, which brings together the two extremities of the digestive tube, gives the visceral sac the outline of a more or less acute cone. The shell necessarily takes this form also, and then becomes coiled in a dorsal or anterior plane — that is to say, it becomes exogastric. This condition may be seen in embryonic Patellidae, Fissurellidae and Trochidae (fig. I, A), and agrees with the method of coiling of a mollusc without lateral torsion, such as Nautilus. But ultimately the coil becomes ventral or endogastric, in consequence of the second torsion movement then apparent.

pac

A. B. C.

From Lankester's Treatise on Zoology.

Fig. i. — Three stages in the development of Trochus, during the process of torsion. (After Robert.)

A, Nearly symmetrical larva /, Foot.

(veliger). op, Operculum.

B, A stage I i hours later than A. pac, Pallial cavity.

C, A stage 3j hours later than B. ve, Velum.

The shell is represented as fixed, while the head and foot rotate from left to right. In reality the head and foot are fixed and the shell rotates from right to left.

The second movement is a lateral torsion of the visceral mass, the foot remaining a fixed point; this torsion occurs in a plane approximately at right angles to that of the first movement, and carries the pallial aperture and the anus from behind forwards. If, at this moment, the animal were placed with mouth and ventral surface turned towards the observer, this torsion carries the circumanal

complex in a clockwise direction (along the right side in dextral forms) through 180° as compared with its primitive condition. The (primitively) right-hand organs of the complex thus become left-hand, and vice versa. The visceral commissure, while still surrounding the digestive tract, becomes looped; its right half, with its proper ganglion, passes to the left side over the dorsal face of the alimentary canal (whence the name supra-intestinal), while the left half passes below towards the right side, thus originating the name infra-intestinal given to this half and to its ganglion. Next, the shell, the coil of which was at first exogastric, being also included in this rotation through 180°, exhibits an endogastric coiling (fig. I, B, C). This, however, is not generally retained in one plane, and the spire projects, little by little, on the side which was originally left, but finally becomes right (in dextral forms, with a clockwise direction, if viewed from the side of the spire; but counter-clockwise in sinistral forms). Finally, the original symmetry of the circumanal complex vanishes; the anus leaves the centre of the pallial cavity and passes towards the right side (left side in sinistral forms) ; the organs of this side become atrophied and disappear. The essential feature of the asymmetry of Gastropoda is the atrophy or disappearance of the primitively left half of the circumanal complex (the right half ia sinistral forms), including the gill, the auricle, the osphradium, the hypobranchial gland and the kidney.

In dextral Gastropods the only structure found on the topographically right side of the rectum is the genital duct. But this is not part of the primitive complex. It is absent in the most primitive and symmetrical forms, such as Haliotis and Pleurotomaria. Origin- ally the gonads opened into the kidneys. In the most primitive existing Gastropods the gonad opens into the right kidney {Patellidae, Trochidae, Fissurellidae) . The gonaduct, therefore, is derived from

the topographically right kidney. The transformation has been actually shown to take place in the development of Paludina. In a dextral Gastropod the shell is coiled in a right-handed spiral from apex to mouth, and the spiral also projects to the right of the median plane of the animal.

When the shell is sinistral the asymmetry of the organs is usually reversed, and there is a complete situs inversus viscerum, the direction of the spiral of the shell corresponding to the position of the organs of the . body. Triforis, Physa, Clausilia are ” examples of sinistral Gastropods, but reversal also occurs as an individual variation among forms normally dex- tral. But there are forms in which the involution is ” hypertrophic,”

that is to say, the turns of the spire pv„„ T ,„t™.„ >_ t. ,- 11 projecting but slightly, the spire, F ^^^ Tre.t,se on Zoology. after flattening out gradually, finally , Fl , G – 2 -— F °“F stages in the becomes re-entrant and transformed development of a Gastropod into a false umbilicus; at the same * ho ™ng the process of body time that part which corresponds to torslon – (Mter . R °bert.) the umbilicus of forms with a normal A > Embryo without flexure, coil projects and constitutes a false B > Embryo with ventral flex- spire; the coil thus appears to be ure °f the intestine. sinistral, although the asymmetry c , Embryo with ventral flex- remains dextral, and the coil of the ure a «d exogastric shell, operculum (always the opposite to D > Embryo with lateral tor-

sion and an endogastric

shell. Anus. Foot. Mouth.

that of the shell) sinistral (e.g. Lanistes among Streptoneura, Lima-cinidae among Opisthobranchia). The °> same, mutatis mutandis, may occur /> in sinistral shells. “i>

The problem of the causes of the P a < Mantle, torsion of the Gastropod body has P ac < Pallial cavity, been much discussed. E. R. Lan- ve > Velum, kester in the ninth edition of this

work attributed it to the pressure of the shell and visceral hump towards the right side. He referred also to the nautiloid shell of the larva falling to one side. But these are two distinct processes. In the larva a nautiloid shell is developed which is coiled exo- gastrically, that is, dorsally, and the pallial cavity is posterior or ventral (fig. 2, C) : the larva therefore resembles Nautilus in the relations of body and shell. The shell then rotates towards the left side through 180°, so that it becomes ventral or endogastric (fig. 2, D). The pallial cavity, with its organs, is by this torsion moved up the right side of the larva to the dorsal surface, and thus the left organs become right and vice versa. In the subsequent growth of

Fig. 3. — Sketch of a model designed so as to show the effect of torsion or rotation of the visceral hump in Streptoneurous Gastro-poda.

A,

Unrotated ancestral condi- tion.

B, Quarter-rotation.

C, Complete semi-rotation(the

limit).

an, Anus.

In, rn, Primarily left nephridium and primarily right neph- ridium. Primarily left (subsequently the sub-intestinal) visceral ganglion.

rvg, Primarily right (subsequently

Ivg

the sub-intestinal) visceral

ganglion.

Cerebral ganglion.

Pleural ganglion. pedg, Pedal ganglion. abg, Abdominal ganglion.

Buccal mass.

Wooden arc representing the base-line of the wall of the visceral hump. Pins fastening the elastic cord (representing the vis- ceral nerve loop) to W

cerg

Pk:

bucc, W,

the shell the spire comes to project on the right side, which was originally the left. Neither the rotation of the shell as a whole nor its helicoid spiral coiling is the immediate cause of the torsion of the body in the individual, for the direction of the torsion is indicated in the segmentation of the ovum, in which there is a complete

reversal of the cleavage planes in sinistral as compared with dextral forms. The facts, however, strongly suggest that the original cause of

the torsion was the weight of the exogastric shell and visceral hump, which in an animal creeping on its ventral surface necessarily fell over to one side. It is not certain that the projection of the spire to the originally left side of the shell has anything to do with the falling over of the shell to that side. The facts do not support such a suggestion. In the larva there is no projection at the time the torsion takes place. In some forms the coiling disappears in the adult, leaving the shell simply conical as in Patellidae, Fissurellidae, &c, and in some cases the shell is coiled in one plane, e.g. Planorbis. In all these cases the torsion and asymmetry of the body are unaffected. The characteristic torsion attains its maximum effect among the majority of the Streptoneura. It is followed _ in some specialized Heteropoda and in the Euthyneufa by a torsion in the opposite direction, or detorsion, which brings the anus farther back and untwists the visceral commissure (see Euthyneura, below). This conclusion has shown that the Euthyneura do not represent an archaic form of Gastropoda, but are themselves derived from streptoneurous forms. The difference between the two sub-classes has been shown to be slight; certain of the more archaic Tectibranchia (Actaeon) and Pulmonata (Chilina) still have the visceral commissure long and not untwisted. The fact that all the Euthyneura are herma- phrodite is not a fundamental difference ; several Streptoneura are so, likewise Valvata, Oncidiopsis, Marsenina, Odostomia, Bathysciadium, Entoconcha.

Classification. — The class Gastropoda is subdivided as follows : Sub-class I. Streptoneura. Order 1. Aspidobranchia.

Sub-order I. Docoglossa. ,, 2. Rhipidoglossa.

Order 2. Pectinibranchia.

Sub-order 1. Taenioglossa. Tribe I. Platypoda. ,, 2. Heteropoda. Sub-order 2. Stenoglossa. Tribe 1. Rachiglossa. ,, 2. Toxiglossa. Sub-class II. Euthyneura.

Order 1. Opisthobranchia.

Sub-order 1. Tectibranchia. Tribe 1. Bullomorpha. ,, 2. Aplysiomorpha. ,, 3. Pleurobranchomorpha. Sub-order 2. Nudibranchia Tribe I

Order 1. Aspidobranchia. — These are the most primitive Gastro- pods, retaining to a great degree the original symmetry of the

d

Tritoniomorpha. Doridomorpha. Eolidomorpha. Elysiomorpha.

Order 2. Pulmonata.

Sub-order I. Basommatophora. ,, 2. Stylommatophora. Tribe 1. Holognatha. ,, 2. Agnatha. ,, 3. Elasmognatha. ,, 4. Ditremata.

Sub-Class I. — Streptoneura

In this division the torsion of the visceral mass and visceral commissure is at its maximum, the latter being twisted into a figure of eight. The right half of the commissure with its ganglion is supra-intestinal, the left half with its ganglion infra-intestinal. In some cases each pleural ganglion is connected with the opposite branch of the visceral commissure by anastomosis with the pallial nerve, a condition which is called dialyneury; or there may be a direct connective from the pleural ganglion to the visceral ganglion of the opposite side, which is called zygoneury. The head bears only one pair of tentacles. The radular teeth are of several different kinds in each transverse row. The heart is usually posterior to the branchia (proso-branchiate). The sexes are usually separate.

The old division into Zygobranchia and Azygobranchia must be abandoned, for the Azygobranchiate Rhipidoglossa have much greater affinity to the Zygobranchiate. Haliotidae and Fissurellidae than to the Azygobranchia in general. This is shown by the labial commissure and pedal cords of the nervous system, by the opening of the gonad into the right kidney, and by other points. Further, the Pleurotomariidae have been discovered to possess two branchiae. The sub-class is now divided into two orders: the Aspidobranchia in which the branchia or ctenidium is bipectinate and attached only at its base, and the Pectini- branchia in which the ctenidium is monopectinate and attached to the mantle throughout its length.

Fig. 4. — The Common Limpet (Patella vulgata) in its shell, seen from the pedal surface. (Lankester.)

special pallial growths, com- parable with those of Pleuro- phyllidia).

The branchial efferent vessel.

Factor of the branchial ad- vehent vessel.

Interspaces between the mus- cular bundles of the root of the foot, causing the separate areae seen in fig. 5, c.

x, y, The median antero-posterior axis.

a, Cephalic tentacle.

b, Plantar surface of the foot.

c, Free edge of the shell.

d, The branchia) efferent vessel

carrying aerated blood to the auricle, and here interrupting the circlet of gill lamellae.

e, Margin of the mantle-skirt. /, Gill lamellae (not ctenidia, but

organs of the pallial complex, having two kidneys, in some cases two branchiae, and two auricles. The gonad has no accessory organs and except in Neri- tidae no duct, but discharges into the right kidney.

Forms adapted to terres- trial life and to aerial re- spiration occur in various divisions of Gastropods, and do not constitute a single homogeneous group. _ Thus the Helicinidae, which are terrestrial, are now placed among the Aspidobranchia. In these there are neither branchia nor osphradium, and the pallial chamber which retains its large open- ing serves as a lung. De- generation of the shell occurs in some members of the order. It is largely covered by the mantle in

some Fissurellidae, is en- FlG 5 ._ Dorsa l surface of the tirely internal in PuPilta Umpet remove d f rom its shell and de- and absent in Titiscanndae. • £ d of its black pi g mented ep i the .

The common limpet is a fj the internal | rgans &T i seen

specially . interesting and throu h the transparent body-wall abundant example of the /T „„if„„ < .„„ -, more primitive Aspido branchia. The foot of the c limpet is a nearly circular disk of muscular tissue; in front, projecting from and e

(Lankester.)

Muscular bundles forming the root of the foot, and adherent to the shell.

Free mantle-skirt. [same,

raised abovˆitT are'the head «"», Tentaculiferous margin of the — Smaller (left) nephndium.

Larger (right) nephridium. Pericardium. [cardium.

*and neck (figs. 4, 13). The *: visceral hump forms a low *• conical dome above the sub- y circular foot, and standing “-> out all round the base of this n ‘ dome so as completely to %ni > overlap the head and foot, ecr < is the circular mantle-skirt. The depth of free mantle-*

Fibrous septum, behind the peri- Liver. Intestine. Anterior area of the mantle-skirt

over-hanging the head (cephalic

hood).

skirt is greatest in front, where the head and neck are covered in by it. Upon the surface of the Visceral dome, and extending

5 o8

GASTROPODA

to the edge of the free mantle-skirt, is the conical shell. When the shell is taken away (best effected by immersion in hot water) the surface of the visceral dome is found to be covered by a black-coloured epithelium, which may be removed, enabling the _ B observer to note the posi-

m “\ / J tion of some organs hying

below the transparent in- tegument (fig. 5). The muscular columns © at- taching the foot to the shell form a ring incom- plete in front, external to which is the free mantle- skirt. The limits of the large area formed by the flap over the head and neck (.ecr) can be traced,

- *i ^* anc *. we note tne ana l*

„ . papilla showing through

r ig. 6.— -Anterior portion of the same and opening on the right Limpet, with the overhanging cephalic shoulder, so to speak, of hood removed. (Lankester.) the animal into the large

a, Cephalic tentacle. anterior region of the

6, Foot. sub-pallial space. Close

c, Muscular substance forming the root

of the foot.

d, The capito-pedal organs of Lankester

(= rudimentary ctenidia).

e, Mantle-skirt.

/, Papilla of the larger nephridium.

g. Anus.

h, Papilla of the smaller nephridium.

», Smaller nephridium.

**, Larger nephridium.*

/, Pericardium.

m, Cut edge of the mantle-skirt.

n, Liver.

p, Snout.

to this the small renal organ (i, mediad) and the larger renal organ (k, to the right and posteriorly) are seen, also the peri- cardium (/) and a coil of the intestine (int) em- bedded in the compact liver.

On cutting away the anterior part of the mantle-skirt so as to expose the sub-pallial chamber in the region of the neck, we find the

. , «i me nctK., we linu me

right and left renal papillae (discovered by Lankester in 1867) on either side of the anal papilla (fig. 6), but no gills. If a similar examination be made of the allied genus Fissurella (fig. 17, d), we find right and left of the two renal apertures a right and left gill-plume or ctenidium, which here as in Haliotis and Pleurotomaria retain their original paired condition. In Patella no such plumes exist, but right and left of the neck are seen a pair of minute oblong yellow bodies (fig. 6, d), which were originally described by Lankester as orifices possibly connected with the evacuation of the generative Products. On account of their position they were termed

by him the " capito-pedal orifices," being placed near the junction of head and foot. J. W. Spengel has, however, in a most ingenious way shown that these bodies are the representatives of the typical pair of ctenidia, here reduced to a mere rudiment. Near to each rudimentary ctenidium Spengel has discovered an olfactory patch or osphradium (consisting of modified epithelium) and an olfactory nerve-ganglion (fig. 8). It will be remembered that, according to Spengel, the Osphradium of mollusca is definitely and intimately related to the gill-plume or ctenidium, being always placed near the

*base of that organ ; fur- ther, Spengel has shown that the nerve-supply of this olfactory organ is always derived from the visceral loop. Accord- ingly, the nerve-supply affords a means of test- ing the conclusion that we have in Lankester's capito-pedal bodies the rudimentary ctenidia. The accompanying dia- grams (figs. 9, 10) of the nervous systems of Patella and of Haliotis, as determined by iewed Spengel, show the iden- tity in the origin of the nerves passing from the visceral loop to Spengel's olfactory ganglion of the Limpet, and that of the *u • 11 1 „ ,. . , ,„ nerves which pass from*

the visceral loop of Haliotis to the olfactory patch or osphradium which lies in immediate relation on the right and on the left side to the right and left gill-plumes (ctenidia) respectively. The same diagrams serve to demonstrate the streptoneurous condition of the visceral loop in Aspidobranchia.

Thus then, we find that the limpet possesses a symmetrically disposed pair of ctenidia in a rudimentary condition, and justifies Vts position among Aspidobranchia. At the same time it possesses

Fig. 7. — The same specimen »i C w C u from the left front, so as to show the sub- anal tract (J) of the larger nephridium, by which it communicates with the peri- cardium. 0, Mouth; other letters as in fig. 6.

[STREPTONEimA

a totally distinct series of functional gills, which are not derived from the modification of the typical molluscan ctenidium. Thesegills are in the form of delicate lamellae (fig. 4, /), which form a series extending completely round the inner face of the depending mantle-

f d IG ' i? – l ' Se , ctlon ln a P lan e vertical to the surface of the neck ot patella ˆthrough a, the rudimentary ctenidium (Lankester's organ), and b, the olfactory epithelium (osphradium); c, the*

olfactory (osphradial) ganglion. (After Spengel.)

B, Surface view of a rudimentary ctenidium of Patella excised and viewed as a transparent object. (Lankester.)

skirt. This circlet of gill-lamellae led Cuvier to class the limpets as Cyclobranchiata, and, by erroneous identification of them with the series of metamencally repeated ctenidia of Chiton, to associate the latter mollusc with the former. The gill-lamellae of Patella are processes of the mantle comparable with the plait-like folds often observed on the roof of the branchial chamber in other Gastropoda (e.g. Bucctnum and Haliotis). They are termed pallial gills. The only other mol- luscs in which they are exactly repre- sented are the curious Opisthobranchs Phyllidia and Pleurophyllidia (fig. 55). In these, as in Patella, the typical ctenidia are aborted, and the branchial function is assumed by close-set lamelliform pro- cesses arranged in a series beneath the mantle-skirt on either side of the foot. In fig. 4, d, the large branchial vein of Patella bringing blood from the gill-series to the heart is seen ; where it crosses the series of lamellae there is a short interval devoid of lamellae.

The heart in Patella consists of a single auricle (not two as in Haliotis and Fissurella) and a ventricle; the former receives the blood from the branchial vein, the latter distributes it through a large aorta which soon leads into irregular blood-lacunae.

The existence of two renal organs in Patella, and their relation to the peri- cardium (a portion of the coelom), is important. Each renal organ is a sac = > ”»ucu, lined with glandular epithelium (ciliated ganglia are omitted, cell, with concretions) communicating (After Spengel.) with the exterior by its papilla, and by ce, Cerebral ganglia, a narrow passage with the pericardium, c’e. Cerebral commissure. 1 he connexion with the pericardium of pi, Pleural ganglion, the smaller of the two renal organs was pe, Pedal ganglion, demonstrated by Lankester in 1867, at a p’e, Pedal nerve time when the fact that the renal organ s,s’, Nerves (right and of the Mollusca, as a rule, opens into the ‘

pericardium, and is therefore a typical o, nephridium, was not known. Subsequent investigations carried on under the direc- tion of the same naturalist have shown that the larger as well as the smaller renal sac is in communication with the pericardium. The walls of the renal sacs are deeply plaited and thrown into ridges. Below the surface these walls are excavated with blood-vessels, so that the sac is practically a series of blood-vessels covered with renal epithelium,

and forming

Fig. 9. — Nervous sys- tem of Patella; the vis- ceral loop is lightly shaded; the buccal

left) to the mantle. Olfactory ganglion, connected by nerve to the streptoneur- ous visceral loop.

STREPT0NEURA1

a meshwork within a space communicating with the exterior. The larger renal sac (remarkably enough, that which is aborted in other

GASTROPODA

509

Fig. 10. — Nervous system of Hali shaded ; the buccal ganglia are ce. Cerebral ganglion. pl.pe, Thefusedpleuraland pedal

ganglia. pe. The right pedal nerve. ce.pl, The cerebro-pleural con- nective, [tive. ce.pe, The cerebro-pedal connec-

olis ; the visceral loop is lightly omitted. (After Spengel.)

s, s', Right and" left mantle nerves. [of same.

ab, Abdominal ganglion or site 0, 0, Right and left olfactory ganglia and osphradia re- ceiving nerve from vis- ceral loop.

Anisopleura) extends between the liver and the integument of the visceral dome very widely. It also bends round the liver as shown

kta-f

Fig. 11. — Nervous system of Fissurella. (From Gegenbaur, after Jhering.) pi, Pallial nerve. p. Pedal nerve.

A , Abdominal ganglia in the strep-

toneurous visceral commissure, with supra- and sub-intestine ganglion on each side.

B, Buccal ganglia.

C, C, Cerebral ganglia. es, Cerebral commissure.

0, Otocysts attached to the cere- bro-pedal connectives.

in fig. 12, and forms a large sac on half of the upper surface of the muscular mass of the foot. Here it lies close upon the genital body (ovary or testis), and in such intimate relationship with it that,, when ripe, the gonad bursts into the renal sac, and its products are carried to the exterior by the papilla on the right side of the anus

Fig. 13. — Diagram of a vertical of a Limpet. Letters as in figs. (Lankester.)

q, Intestine in transverse sec- tion. r, Lingual sac (radular sac). rd, Radula.

s, Lamellated stomach. t, Salivary gland. u, Duct of same. v, Buccal cavity w, Gonad.

antero-postero median section 6, 7, with following additions.

br.a, Branchial advehent vessel (artery).

br.v, Branchial efferent vessel (vein).

bv, Blood-vessel.

odm, Muscles and cartilage of the odontophore.

cor, Heart within the pericar- dium.

(Robin, Dall). This fact led Cuvier erroneously to the belief that a duct existed leading from the gonad to this papilla. The position of the gonad, best seen in the diagrammatic section (fig. 13), is_, as in other Aspidobranchia, devoid of a special duct communicating with the exterior. This condition, probably an archaic one, dis- tinguishes the Aspidobranchia from other Gastropoda.

The digestive tract of Patella offers some interesting features. The odontophore is powerfully developed ; the radular sac is extra-ordinarily long, lying coiled in a space between the mass of the liver and the muscular foot. The radula has 160 rows of teeth with twelve teeth in each row. Two pairs of salivary ducts, each leading from a salivary gland, open into the buccal chamber. The oesophagus leads into a remarkable stomach, plaited like the manyplies of a sheep, and after this the intestine takes a very large number of turns em-bedded in the yellow liver, until at last it passes between the two renal sacs to the anal papilla. A curious ridge (spiral ? valve)

bs.i

Fig. 1 2. — Diagram of the two renal organs (nephridia), to show their relation to the rectum and to the pericardium. (Lankester.) /, Papilla of the larger neph-

ridium. g, Anal papilla with rectum lead- ing from it. h, Papilla of the smaller neph- ridium, which is only repre- sented by dotted outlines. /, Pericardium indicated by a dotted outline — at its right side are seen the two reno- pericardial pores. ff, The sub-anal tract of the large nephridium given off near its papilla and seen through the unshaded smaller nephri- dium. ks.a. Anterior superior lobe of

the large nephridium. ks.l, Left lobe of same. ks.f>, Posterior lobe of same. ks.i, Inferior sub-visceral lobe of same.

Fig. 14. — Vertical section in a plane running right and left through the anterior part of the visceral hump of Patella to show the two renal organs and their openings into the pericardium. (J . T. Cunningham.) o, Large or external or right /, Manyplies.

ab,

renal organ. Narrow process of the same

running below the intestine

and leading by k into the

pericardium. Small or median renal organ. Pericardium. Rectum. Liver.

Epithelium of the dorsal sur- face.

h, Renal epithelium lining the renal sacs.

i, Aperture connecting the small sac with the peri- cardium.

k, Aperture connecting the large sac with the pericardium.

which secretes a slimy cord is found upon the inner wall of the intestine. The general structure of the Molluscan intestine has not been sufficiently investigated to render any comparison of this structure of Patella with that of other Mollusca possible. The eyes of the limpet deserve mention as examples of the most primitive kind of eye in the Molluscan series. They are found one on each cephalic tentacle, and are simply minute open pits or depressions of the

epidermis, the epidermic cells lining them being pigmented and connected with nerves (compare fig. 14, art. Cephalopoda).

GASTROPODA

[STREPTONEURA

The limpet breeds upon the southern English coast in the early part of April, but its development has not been followed. It has simply been traced as far as the formation of a diblastula which acquires a ciliated band, and becomes a nearly spherical trochosphere. It is probable that the limpet takes several years to attain full growth, and during that period it frequents the same spot, which becomes gradually sunk below the surrounding surface, especially if the rock be carbonate of lime. At low tide the limpet (being a strictly intertidal organism) is exposed to the air, and (according to trustworthy observers) quits its attachment and walks away in search of food (minute encrusting algae), and then once more returns to the identical spot, not an inch in diameter, which belongs, as it were, to it. Several million limpets — -twelve million in Berwickshire alone — are annually used on the east coast of Britain as bait.

Sub-order I. Docoglossa. — Nervous system without dialyneury. Eyes are open invaginations without crystalline lens. Two osphradia

C resent but no hypobranchial glands nor operculum. Teeth of radula eam-like, and at most three marginal teeth on each side. Heart has only a single auricle, neither heart nor pericardium traversed by rectum. Shell conical without spire.

Fam. I. — Acmaeidae. A single bipectinate ctenidium on left side. Acmaea, without pallial branchiae, British. Scurria, with pallial branchiae in a circle beneath the mantle. Fam. 2. — Tryblidiidae. Muscle scar divided into numerous

impressions. Tryblidium, Silurian. Fam. 3. — Patellidae. No ctenidia but pallial branchiae in a circle between mantle and foot. Patella, pallial branchiae forming a complete circle, no epipodial tentacles, British. Ancistro- mesus, radula with median central tooth. Nacella, epipodial tentacles present. Helcion, circlet of branchiae interrupted anteriorly, British. Fam. 4. — Lepetidae. Neither ctenidia nor pallial branchiae.

Lepeta, without eyes. Pilidium. Propilidium. Fam. 5. — Bathysciadidae. Hermaphrodite; head with append- age on right side ; radula without central tooth. Bathysciadium, abyssal. Sub-order 2.

Rhipidoglossa. — Aspidobrancliia with a pallio- visceral anastomosis (dialyneurous) ; eye-vesicle closed, with crystalline lens; ctenidia, osphradia and hypobranchial glands paired or single. Radula with very numerous marginal teeth ar- ranged like the rays of a fan. Heart with two auricles; ventricle traversed by the rectum, except in the Helicinidae. An epipodial ridge on each side of the foot and cephalic expansions between the tentacles often present.

Fam. 1. — Pleurotomariidae. Shell spiral; mantle and shell with an anterior fissure; two ctenidia; a horny operculum. Pleuro- tomaria, epipodium without tentacles. Genus includes several hundred extinct species ranging from the Silurian to the Ter- tiary. Five living species from the Antilles, Japan and the Moluccas. Moluccan species is 19 cm. in height. Fam. 2. — Bellerophontidae. 300 species, all fossil, from Cambrian

to Trias. Fam. 3. — Euomplialidae. Also extinct, from Cambrian to Creta- ceous. Fam. 4. — Haliotidae. Spire of shell much reduced; two bi- pectinate ctenidia, the right being the smaller; no operculum. Haliolis. Fam. 5. — Velainiellidae, an extinct family from the Eocene.

Fig. 15. — Halio tistuberculata. d. Foot; i, tentacular processes of the mantle. (From Owen, after Cuvier.)

Fam. 6. — Fissurellidae. Shell conical; slit or hole in anterior part of mantle; two symmetrical ctenidia; no operculum. Emarginula, mantle and shell with a slit, British. Scutum, mantle split anteriorly and reflected over shell, which has no slit. Punctvrella, mantle and shell with a foramen in front of the apex, British. Fissurella, mantle and shell perforated at apex, British.

Fam. 7 .—Cocculinidae. Shell conical, symmetrical, without slit or perforation. Cocctdina, abyssal.

Fam. 8. — Trochidae. Shell spirally coiled; a single ctenidium; eyes perforated; a horny operculum; lobes between the

tentacles. Trochus, shell umbilicated, spire pointed and pro- minent, British. Monodonta, no jaws, spire not prominent, no umbilicus, columella toothed. Gibbtda, with jaws, three pairs of epipodial cirri without pigment spots at their bases, British. Margarita, five to seven pairs of epipodial cirri with a pigment spot at base of each. Fam. 9. — StomatelHdae. Spire of shell much reduced; a single ctenidium. Stomatella, foot truncated posteriorly, an oper-

Fig. 16. — Scutum, seen . from the pedal surface. (Lankester.) o, Mouth. T, Cephalic tentacle. br, One of the two symmetrical gills placed on the neck.

Fig. 17. — Dorsal aspect of a specimen of Fissurella from which the shell has been re- moved, whilst the anterior area of the mantle-skirt has been longitudinally slit and its sides reflected. (Lankester.)

a, Cephalic tentacle.

b, Foot. [plume.

d, Left (archaic right) gill- –

e, Reflected mantle-flap.

fi, The fissure or hole in the mantle-flap traversed by the longitudinal incision.

/, Right (archaic left) nephri- dium's aperture. ,

g, Anus.

h, Left (archaic right) aper- ture of nephridium.

**, Snout.*

culum present, no epipodial tentacles. Gena, foot elongated posteriorly, no operculum.

Fam. 10. — Delphinulidae. Shell spirally coiled; operculum horny; intertentacular lobes absent. Delphinula.

Fam. 11. — Liotiidae, shell globular, margin of aperture thickened. Liotia.

Fam. 12.- — Cyclostrematidae. Shell flattened, umbilicated; foot anteriorly truncated with angles produced into lobes. Cyclo- strema. Teinostoma.

Fam. 13. — Trochonematidae. All extinct, Cambrian to Cretaceous.

Fam. 14. — Turbinidae. Shell spirally coiled; epipodial tentacles present; operculum thick and calcareous. Turbo. Astralium. Molleria. Cyclonema.

Fam. 15. — Phasianellidae. Shell not nacreous, without um- bilicus,

with prominent spire and polished surface. Phasia- nella.

Fam 1 . 16. — Umboniidae. Shell flattened, not umbilicated, gener- ally smooth; operculum horny. Umbonium. Isanda.

Fam. 17. — Neritopsidae. Shell semi-globular, with short spire; operculum calcareous, not spiral. Neritopsis. Naticepsis, ex- tinct.

Fam. 18. — Macluritidae. Extinct, Cambrian and Silurian.

Fam. 19. — Neritidae. Shell with very low spire, without um- bilicus, internal partitions frequently absorbed; . a single ctenidium ; a cephalic penis present. Nerita, marine. Neri- tina, freshwater, British. Septaria, shell boat-shaped.

Fam. 20. — Titiscaniidae, Without shell and operculum, but with pallial cavity and ctenidium. Titiscania, Pacific.

Fam. 21. — Helicinidae. No ctenidium, but a pulmonary cavity; heart with a single auricle, not traversed by the rectum. Heli cina. Eutrochatella. Stoastoma. Bourceria.

Fam. 22. — Hydrocenidae. No ctenidium, but a pulmonary cavity; operculum with an apophysis. Hydrocena, Dalmatia.

Fam. 23. — Proserpinidae. No operculum. Proserpina, Central America.

Order 2.- Pectinibranchia. — In this order there is no longer any trace of bilateral symmetry in the circulatory, respiratory and excretory organs, the topographically right half of the pallial com- plex having completely disappeared, except the right kidney, which is

represented by the genital duct. There is usually a penis in the male. The ctenidium is monopectinate and attached to the mantle along

Fig. 18. — Animal and shell of Pyrula laevigata. (From Owen.)

d, The foot, expanded as in crawling. h, The mantle-skirt reflected over the sides of the shell.

a, Siphon.

b, Head-tentacles. C, Head, the letter placed near the right eye,

movement. The " introvert " in these Gastropods is not the pharynx as in the Chaetopod worms, but a prae-oral structure, its apical limit being formed by the true lips and jaws, whilst the apical limit of the Chaetopod's introvert is formed by the jaws placed at the junction of pharynx and oesophagus, so that the Chaetopod's introvert is part of the stomo- daeum or fore-gut, Whilst that of the Gastropod is external to the alimentary canal altogether, being in front of the mouth, not behind it, as is the Chaetopod's. Further, the Gastronod's introvert is pleurembolic (and therefore acrec- bolic), and is limited both in eversion and in introversion; it cannot be completely everted owing to the muscular bands (fig. 19, G), nor can it be fully introverted owing to the bands (fig. 19, F) which tie the axial pharynx to the adjacent wall of the apical part of the intro- vert. As in all such intro- and e-versible organs, eversion of the Gastropod proboscis is effected by pressure communicated by the muscular body-wall to the liquid contents (blood) of the body-space, accompanied by the relaxation of the muscles which directly pull upon either the sides or the apex of the tubular organ. The inversion of the proboscis is effected directly by the contraction of these muscles. In various members of the Pectini- branchia the mouth-bearing cylinder is in- troversible (i.e. is a proboscis)— with rare exceptions these forms have a siphonate

its whole length, except in Adeorbis and Valvata; in the latter alone it is bipectinate. There is a single well-developed, often pectinated osphradium. The eye is always a closed vesicle, and the internal cornea is extensive. In the radula there is a single central tooth or none.

The former classification into Holochlamyda, Pneumochlamyda and Siphonochlamyda has been abandoned, as it was founded on adaptive characters not always indicative of true affinities. The order is now divided into two sub-orders: the Taenioglossa, in which there are three teeth on each side of the median tooth of the radula, and the Stenoglossa, in which there is only one tooth on each side of the median tooth. In the latter a pallial siphon, a well- developed proboscis and an unpaired oesophageal gland are always present, in the former they are usually absent. The siphon is an incompletely tubular outgrowth of the mantle margin on the left side, contained in a corresponding outgrowth of the edge of the shell-mouth, and serving to conduct water to the respiratory cavity.

The condition usually spoken of as a " proboscis appears to be derived from the condition of a simple rostrum (having the mouth at its extremity) by the process of incomplete introversion of that simple rostrum. There is no reason in the actual significance of the word why the term " proboscis " should be applied to an alter- nately introversible and eversible tube connected with an animal's body, and yet such is a very customary use of the term. The intro- versible tube may be completely closed, as in the " proboscis " of Nemertine worms, or it may have a passage in it leading into a non-eversible oesophagus, as in the present case, and in the case of the eversible pharynx of the predatory Chaetopod worms. The diagrams here introduced (fig. 19) are intended to show certain important distinctions which obtain amongst the various " intro- verts," or intro-and e-versible tubes so frequently met with in animal bodies. Supposing the tube to be completely introverted and to commence its eversion, we then find that eversion may take place, either by a forward movement of the side of the tube near its at- tached base, as in the proboscis of the Nemertine worms, the pharynx of Chaetopods and the eye-tentacle of Gastropods, or by a forward movement of the inverted apex of the tube, as in the proboscis of the Rhabdocoel Planarians, and in that of Gastropods here under consideration. The former case we call " pleurecbolic " (fig. 19, A, B, C, H, I, K), the latter " acrecbolic " tubes or introverts (fig. 19, D, E, F, G). It is clear that, if we start from the condition of full eversion of the tube and watch the process of introversion, we shall find that the pleurecbolic variety is introverted by the apex of the tube sinking inwards; it may be called acrembolic, whilst conversely the acrecbolic tubes are pleurembolic. Further, it is obvious enough that the process either of introversion or of eversion of the tube may be arrested at any point, by the development of fibres connecting the wall of the introverted tube with the wall of the body, or with an axial structure such as the oesophagus; pn the other hand, the range of movement of the tubular introvert may be unlimited or complete. The acrembolic proboscis or frontal introvert of the Nemertine worms has a complete range. So has the acrembolic pharynx of Chaetopods, if we consider the organ as ter- minating at that point where the jaws are placed and the oesophagus commences. So too the acrembolic eye-tentacle of the snail has a complete range of movement, and also the pleurembolic proboscis of the Rhabdocoel prostoma. The introverted rostrum of the Pectini- branch Gastropods presents in contrast to these a limited range of

A

rf w

k

f

rf

A

f

alA

Fig. 19. — Diagrams explanatory of the nature of so-called proboscides or " introverts." (Lankester.)

A, Simple introvert completely introverted.

B, The same, partially everted by eversion of the sides, as in the Nemertine proboscis and Gastropod eye-tentacle = pleurecbolic.

C, The same, fully everted.

D, E, A similar simple introvert in course of eversidn by the for- ward movement, not of its sides, but of its apex, as in the probos- cidean Rhabdocoels = acrecbolic.

F, Acrecbolic (= pleurembolic) introvert, formed by the snout of the proboscidiferous Gastropod, al, alimentary canal; d, the true mouth. The introvert is not a simple one with complete range both in eversion and introversion, but is arrested in introversion by the fibrous bands at c, and similarly in eversion by the fibrous bands at 6.*

G, The acrecbolic snout of a proboscidiferous Gastropod, arrested short of complete eversion by the fibrous band b.

H, The acrembolic (= pleurecbolic) pharynx of a Chaetopod fully introverted, al, alimentary canal; at d, the jaws; at a, the mouth; therefore a to d is stomodaeum, whereas in the Gastropod (F) a to d is inverted body-surface.

I, Partial eversion of H. K, Complete eversion of H.

mantle-skirt. On the other hand, many which have a siphonate mantle-skirt are not provided with an introversible mouth-bearing

cylinder, but have a simple non-introversible rostrum, as it has been termed, which is also the condition presented by the mouth-bearing region in nearly all other Gastropoda. One of the best examples of the introversible mouth-cylinder or proboscis which can be found is that of the common whelk (Buccinum undatum) and its immediate allies. In fig. 23 the proboscis is seen in an everted state; it is only so carried when feeding, being withdrawn when the animal is at rest. Probably its use is to enable

Fig. 20. — Male of Littorina'litioralis, Lin., removed from its shell; the mantle-skirt cut along its right line of attachment and thrown over to the left side of the animal so as to expose the organs on its inner face. a, Anus.

Intestine.

Nephridium (kidney).

Aperture of the nephridium.

Heart.

Ctenidium (gill-plume). pbr, Parabranchia (= the osphradium or olfactory patch).

Glandular lamellae of the inner face of the mantle-skirt.

Adrectal (purpuriparous) gland.

Testis.

Vas deferens.

Penis. mc, Columella muscle (muscular pro- cess grasping the shell). v, Stomach. k. Liver.

N.B. — Note the simple snout or rostrum not introverted as a " pro- boscis."

», r, r' c, br.

t,

vd,

p >

Fig. 21. — Nervous system of Paludina as a type of the streptoneurous con- dition. (From Gegen- baur, after Jhering.)

B, Buccal (suboeso-

phageal) gan- glion.

C, Cerebral gan-

glion.

Co, Pleural ganglion.

P, Pedal ganglion with otocyst at- , tached. Pedal nerve. Abdominal gan- glion at the ex- tremity of the twisted visceral " loop."

Sp, Supra intestinal visceral gan glion on the course , of the right visceral cord. Sub- intestinal ganglion on the course of the left visceral cord.

X

sb.

the animal to introduce its rasping and licking apparatus into very narrow apertures for the purposes of feeding, e.g. into a small hole bored in the shell of another mollusc.

The very large assemblage of forms coming under this order com- prises the most highly developed predaceous sea-snails, numerous vegetarian species, a considerable number of freshwater and some terrestrial forms. The partial dissection of a male specimen of the common periwinkle, Littorina littoralis, drawn in fig. 20, will serve to exhibit the disposition of viscera which prevails in the group. The branchial chamber formed by the mantle-skirt overhanging the head has been exposed by cutting along a line extending back- ward from the letters vd to the base of the columella muscle mc, and the whole roof of the chamber thus detached from the right side of the animal's neck has been thrown over to the left, showing the organs which lie upon the roof. No opening into the_ body-cavity has been made; the organs which lie in the coiled visceral hump show through its transparent walls. The head is seen in front resting on the foot and

carrying a median non-retractile snout or rostrum, and a pair of cephalic tentacles at the base of each of which is an eye. In many Gastropoda the eyes are not thus sessile but raised upon special eye-tentacles (figs. 25, 56). To the right of the head is seen the muscular penis p, close to the termination of the vas deferens (spermatic duct) vd. The testis / occupies a median position in the coiled visceral mass. Behind the penis on the same side is the hook-like columella muscle, a development of the retractor muscle of the foot, which clings to the spiral column or columella of

the shell (see fig. 33). This columella muscle is the same thing as the muscles adhering to the shell in Patella, and the posterior adductor of Lamellibranchs.

The surface of the neck is covered by integument forming the floor of the branchial cavity. It has not been cut into. Of the organs lying on the reflected mantle-skirt, that which in the natural state lay nearest to the vas deferens on the right side of the median line of the roof of the branchial chamber is the rectum V , ending in the anus a. It can be traced back to the intestine i near the surface of the visceral hump, and it is found that the apex of the coil formed by the hump is occupied by the liver h and the stomach f . Pharynx and oesophagus are concealed in the head. The enlarged glandular structure of the walls of the rectum is frequent in the Pectini- branchia, as is also though not universal the gland marked y, next to the rectum. It is the adrectal gland, and in the genera Murex aiid Purpura secretes a colourless liquid which turns purple upon exposure to the atmosphere, and was used by the ancients as a dye. Near this and less advanced into the branchial chamber is the single renal organ or nephridium r with its opening to the exterior r'. Internally this glandular sac presents a second slit or aperture which leads into the pericardium (as is now found to be the case in all Mollusca). The heart c lying in the pericardium is seen in close proximity to the renal organ, and consists of a single auricle receiv- ing blood from the gill, and of a single ventricle which pumps it through the body by an anterior and posterior aorta. The surface x of the mantle between the rectum and the gill-plume is thrown into folds which in many sea-snails (whelks or Buccinidae, &c.) are very strongly developed. The whole of this surface appears to be active in the secretion of a mucous-like substance. The single gill-plume br lies to the left of the median line in natural position. It corre- sponds to the right of the two primitive ctenidia in the untwisted archaic condition of the molluscan body, and does not project freely into the branchial cavity, but its axis is attached (by concrescence) to the mantle-skirt (roof of the branchial chamber). It is rare for the gill-plume of a

*Pectinibranch Gastropod to stand out freely as a plume, but occasionally this more archaic condition is exhibited as in Valvata (fig. 30). Next beyond (to the left of) the gill-plume we find the so-called parabranchia, which is here simple, but some- times lamellated as in Purpura (fig. 22). This organ has, without reason, been supposed to represent the second ctenidium of the typical mollusc, which it cannot do on account of its position. It should be to the right of the anus were this the case. Spengel showed that the parabranchia of Gastropods is the typical olfactory organ or osphradium in a highly developed condition. The minute struc- ture of the epithelium which clothes it, as well as the origin of the nerve which is distributed to the para- branchia, proves it to be the same organ which is found universally in molluscs at /ˆy^^J^^^*

the base of each gill-plume, and tests the 11 \V(X\ ” tyJP), indrawn current of water by the sense of \N-w-S— JNˆL. va

*smell. The nerve to this organ is given "“““yn * “5 > *

off from the superior (original right, see » VS— ‘I / \ˆ a fig. 3) visceral ganglion.

The figures which are given here of various Pectinibranchia are in most cases sufficiently explained by the references attached to them. As an excellent general type of the nervous system, attention may be directed to that of Paludina drawn in fig. 21. On the whole the

fanglia are strongly individualized in the F IG – 22 – Female of ‘ectinibranchia, nerve-cell tissue being Purpura laptllus removed concentrated in the ganglia and absent from its shell ; the mantle- from the cords. At the same time, the sk , lrt ,. cut along its junction of the visceral loop above the l eft hne of attachment intestine prevents in all Streptoneura the and thrown over to the shortening of the visceral loop, and it is right side of the animal rare to find a fusion of the visceral so as to expose the organs ganglia with either pleural, pedal or on its inner face, cerebral — a fusion which can and does take place where the visceral loop is not above but below the intestine, e.g. in the Euthyneura (fig. 48), Cephalopoda and Lamellibranchia. As contrasted with the Aspidobranchia, we find that in the Pectinibranchia the pedal nerves are distinctly nerves given off from the pedal ganglia, rather than cord-like nerve- tracts containing both nerve-cells or ganglionic elements and nerve-fibres. Yet in some Pectinibranchia (Paludina) a ladder-like arrangement of the two

pedal nerves and their lateral branches has been detected. The histology of the nervous system of Mollusca has yet to be seriously inquired into.

The alimentary canal of the Pectinibranchia presents little diversity of character, except in so far as the buccal region is concerned. Salivary glands are present, and in some carnivorous forms (Dolium) these secrete free sulphuric acid (as much as 2 % is present in the secretion), which assists the animal in boring holes by means of its

a, vg,

br,

Anus.

Vagina.

Adrectal purpuri- parous gland.

Aperture of the neph- ridium (kidney).

Ctenidium (branchial lume).

br', Parabranchia (= the

comb-like dium or organ).

osphra- olfactory

STREPTONEURA]

GASTROPODA

*5*3*

rasping tongue through the shells of other molluscs upon which it preys. A crop-like dilatation of the gut and a recurved intestine, embedded in the compact yellowish-brown liver, the ducts of which open into it, form the rest of the digestive tract and occupy a large bulk of the visceral hump. The buccal region presents a pair of shelly jaws placed laterally upon the lips, and a wide range of variation in the form of the denticles of the lingual ribbon or radula.

Well-developed glandular invaginations occur in different positions on the foot in Pectinibranchia. The most important of these opens by the ventral pedal pore, situated in the median line in the anterior

half of the foot. This organ is probably homologous with the by sso-genous gland of Lamellibranchs. The aperture, which was formerly supposed to be an aquiferous pore, leads into an extensive and often ramified cavity surrounded by glandular tubules. The gland has been found in both sub-orders of the Pectinibranchia, in Cyclostoma and Cypraea among the Taenioglossa, in Hemifusus, Cassis, Nassa, Murex, Fasciolariidae, Turbinellidae, Olividae, Marginellidae and Conidae among the Stenoglossa. It was discovered by J. T. Cunning-ham that in Buccinum the egg-capsules are formed by this pedal gland and not by any accessory organ of the generative system. Such horny egg-capsules doubtless have the same origin in all other species in which they occur, e.g. Fusus, Pyrida, Purpura, Murex, Nassa, Trophon, Voluta, &c. The float of the pelagic Janthina, to which the egg-capsules are attached, probably is also formed by the secretion of the pedal gland.

Other glands opening on or near the foot are: (i) The supra- pedal gland opening in the middle line between the snout and the anterior border of the foot. It is most commonly found in sessile

shell-sac or shell-gland is well marked at this stage, and the pharynx is seen as a new ingrowth (the stomodaeum), about to fuse with and open into the primitively invaginated arch-enteron (fig. 26, F).

In other Pectinibranchia (and such variations are representative for all Mollusca, and not characteristic only of Pectinibranchia) we find that there is a very unequal division of the egg-cell at the com-mencement of embryonic development, as in Nassa. Consequently

Fig.

to show the proboscis or buccal state of eversion.

e, Everted buccal introvert (pro- boscis).

/, Foot.

g, Operculum.

h, Penis.

»', Under surface of the mantle- skirt forming the roof of the sub-pallial chamber, to show a, the pore usually said

the orifice of a gland; b, median

23. — A, Triton variegatum, introvert (e) in a

a, Siphonal notch of the shell

occupied by the siphonal fold of the mantle-skirt (Siphonochlamyda).

b, Edge of the mantle-skirt rest-

ing on the shell.

c, Cephalic eye.

d, Cephalic tentacle. B, Sole of the foot of Pyrula

to be " aquiferous " but probably line of foot.

forms and in terrestrial genera such as Cyclostoma ; (2) the anterior pedal gland opening into the anterior groove of the foot, generally present in -aquatic species; (3) dorsal posterior mucous glands in certain Cyclostomatidae.

The foot of the Pectinibranchia, unlike the simple muscular disk of the Isopleura and Aspidobranchia, is very often divided into lobes, a fore, middle and hind lobe (pro-, meso- and meta-podium, see figs. 24 and 25). Very usually, but not universally, the meta- podium carries an operculum. The division of the foot into lobes is a simple case of that much greater elaboration or breaking up into processes and regions which it undergoes in the class Cephalopoda. Even among some Gastropoda (viz. the Opisthobranchia) we find the lobation of the foot still further carried out by the development of lateral lobes, the parapodia, whilst there are many Pectini- branchia, on the other hand, in which the foot has a simple oblong form without any trace of lobes.

The development of the Pectinibranchia has been followed in several examples, e.g. Paludina, Purpura, Nassa, Vermetus, Neritina. As in other Molluscan groups, we find a wide variation in the early process of the formation of the first embryonic cells, and their arrangement as a diblastula, dependent on the greater or less amount of food-yolk which is present in the egg-cell when it commences its embryonic changes. In fig. 26 the early stages of Paludina vivipara are represented. There is but very little food-material in the egg of this Pectinibranch, and consequently the diblastula forms by invagination; the blastopore or orifice of invagination coincides with the anus, and never closes entirely. A well-marked trocho- sphere is

formed by the development of an equatorial ciliated band ; and subsequently, by the disproportionate growth of the lower hemisphere, the trochosphere becomes a vehger. The primitive

XI. 17

Fig. 24. — Animal and shell of Phorus exutus.

a, Snout (not introversible). d, Pro- and meso-podium ; to the right

b, Cephalic tentacles. of this is seen the metapodium

c, Right eye. bearing the sculptured operculum.

there is, strictly speaking, no invagination (emboly), but an over-growth (epiboly) of the smaller cells to enclose the larger. The general features of this process and of the relation of the blastopore to mouth and anus have been explained in treating of the develop-ment of Mollusca generally. In such cases the blastopore may entirely close, and both mouth and anus develop as new ingrowths (stomodaeum and proctodaeum), whilst, according to the observa-tions of N. Bobretzky, the closed blastopore may coincide in position with the mouth in some instances (Nassa, &c), instead of with the anus. But in these epibolic forms, just as in the embolic Paludina, the embryo proceeds to develop its ciliated band and shell- gland, passing through the earlier condition of a trochosphere to that of the veliger. In the veliger stage many Pectinibranchia (Purpura, Nassa, &c.) exhibit, in the dorsal region behind the head, a contractile area of the body-wall. This acts as a larval heart, but ceases to pulsate after a time. Similar rhythmically contractile

Fig. 25. — Animal and shell of Rostellaria rectirostris. (From Owen.) Snout or rostrum. /, Operculum.

Cephalic tentacle. h' , Prolonged siphonal notch of the

Eye. shell occupied by the siphon,

Propodium and mesopodium. or trough-like process of the

Metapodium. mantle-skirt.

areas are found on the foot of the embryo Pulmonate Umax and on the yolk-sac (distended foot-surface) of the Cephalopod Lolieo. The preconchylian invagination or shell-gland is formed in the embryo behind the velum, on the surface opposite the blastopore. It is

surrounded by a ridge of cells which gradually extends over the visceral sac and secretes the shell. In forms which are naked in the adult state, the shell falls off soon after the reduction of the velum, but in Cenia, Runcina and Vaginula the shell-gland and shell are not developed, and the young animal when hatched has already the naked form of the adult.

One further feature of the development of the Pectinibranchia deserves special mention. Many Gastropoda deposit their eggs, after fertilization, enclosed in capsules; others, as Paludina, are viviparous; others, again, as. the Zygobranchia, agree with the Lamellibranch Conchifera (the bivalves) in having simple exits for the ova without glandular walls, and therefore discharge their eggs unenclosed in capsules freely into the sea-water; such unencapsuled eggs are merely enclosed each in its own delicate chorion. When

Fig. 26. — Developmentof the River-Snail, Paludina, vivipara. (After Lankester, 17.)

ic, Directive corpuscle (outcast cell). ae, Arch-enteron or cavity lined by

the enteric cell-layer or endo-

derm. bl, Blastopore.

vr, Velum or circlet of ciliated cells. dv. Velar area or cephalic dome. sm. Site of the as yet unformed

mouth.

pi,

m, an

Foot.

;, Rudiments of the skeleto-trophic tissues. The pedicle of invagination, the future rectum. I, The primitive shell-sac or shell-gland.

Mouth. Anus.

A, Diblastula phase (optical section).

B, The diblastula has become a trochosphere by the development of the ciliated ring vr (optical section).

C, Side view of the trochosphere with commencing formation of the foot.

D, Further advanced trochosphere (optical section).

E, The trochosphere passing to the veliger stage, dorsal view showing the formation of the primitive shell-sac.

F, Side view of the same, showing foot, shell-sac (shgl), velum {vr), mouth and anus.

N.B.- — In this development the blastopore is not elongated; it persists as the anus. The mouth and stomodaeum form independently of the blastopore.

egg-capsules are formed they are often of large size, have tough walls, and in each capsule are several eggs floating in a viscid fluid. In some cases all the eggs in a capsule develop; in other cases one egg only in a capsule (Neritina), or a small proportion {Purpura, Buccinum), advance in development; the rest are arrested either after the first process of cell-division (cleavage) or before that process. The arrested embryos or eggs are then swallowed and digested by those in the same capsule which have advanced in development. This is clearly the same process in essence as that of the formation of a vitellogenous gland from part of the primitive ovary, or of the feeding of an ovarian egg by the absorption of neighbouring potential

eggs ; but here the period at which the sacrifice of one egg to another takes place is somewhat late. What it is that determines the arrest of some eggs and the progressive development of others in the same capsule is at present unknown.

In the tribe of Pectinibranchia called Heteropoda the foot takes the form of a swimming organ. The nervous system and sense organs are highly developed. The odontophore also is remarkably developed, its lateral teeth being mobile, and it serves as an efficient organ for attacking the other pelagic forms on which the Hetero- poda prey. The sexes are distinct, as in all Streptoneura ; and genital ducts and accessory glands and pouches are present, as in all Pectinibranchia.

The Heteropoda exhibit a series of modi- fications in the form and proportions of the visceral mass and foot, leading from a condition readily comparable with that of a typical Pectinibranch such as Rostellaria, with the three regions of the foot strongly marked and a coiled visceral hump of the usual proportions, up to a condition in which the whole body is of a tapering cylindrical shape, the foot a plate-like vertical fin, and the visceral hump almost completely atrophied. Three steps of this modification may be

Fig. 27. — Oxygyrus Keraudrenii.

(From Owen.)

a,

Mouth and odontophore.

»i

Dorsal surface overhung by

b,

Cephalic tentacles.

the mantle-skirt; the letter

c,

Eye.

is close to the salivary gland.

d,

Propodium (B) and meso-

0,

Rectum and anus.

podium.

P,

Liver.

e,

Metapodium.

2,

Renal organ (nephridium).

f,

Operculum.

s,

Ventricle.

h,

Mantle-chamber.

u,

The otocyst attached to the

i,

Ctenidium (gill-plume).

cerebral ganglion.

k,

Retractor muscle of foot.

w

Testis.

I,

Optic tentacle.

X,

Auricle of the heart.

m

, Stomach.

y,

Vesicle on genital duct.

2,

Penis.

distinguished as three families: — Atlantidae, Carinariidae and Pterotrachaeidae. They are true Pectinibranchia which have taken to a pelagic life, and the peculiarities of structure which they exhibit are strictly adaptations consequent upon their changed mode of life. Such adaptations are the transparency and colourlessness of the tissues, and the modifications of the foot, which still shows in Atlanta the form common in Pectinibranchia (compare fig. 27 and fig. 24). The cylindrical body of Pterotrachaea is paralleled by the slug-like forms of Euthyneura. J. W. Spengel has shown that the visceral loop of the Heteropoda is streptoneurous. Special to the Heteropoda is the high elaboration of the lingual ribbon, and, as an agreement with some of the opisthobranchiate Euthyneura, but as a difference from the Pectinibranchia, we find the otocysts closely attached to the cerebral ganglia. This is, however, less of a difference than it was at one time supposed to be, for it has been shown by H. Lacaze-Duthiers, and also by F. Leydig, that the otocysts of Pectinibranchia even when lying close upon the pedal ganglion (as in fig. 21) yet receive their special nerve (which can sometimes be readily isolated) from the cerebral ganglion (see fig. 11). Accordingly the difference is one of position of the otocyst and not of its nerve-supply. The Heteropoda are further remarkable for the high development of their cephalic eyes, and for the typical character of their osphradium (Spengel's olfactory organ). This is a groove, the edges of which are raised and ciliated, lying near the branchial plume in the genera which possess that organ, whilst in Firoloida, which has no branchial plume, the osphradium occupies a corresponding position. Beneath the ciliated groove is placed an elongated ganglion (olfactory ganglion) connected by a nerve to the supra-intestinal (therefore the primitively dextral) ganglion of the long

STREPTONEURA]

GASTROPODA

5 1 5

-this

visceral nerve-loop, the strands of which cross one another- being characteristic of Streptoneura (Spengel).

The Heteropoda belong to the " pelagic fauna " occurring near the surface in the Mediterranean and great oceans in company with the Pteropoda, the Siphonophorous Hydrozoa, Salpae, Leptocephali, and other specially-modified transparent swimming representatives

Lanistes, shell

o,

b,

c,

d,

d',

e,

/.

Fig. 28. — Carinaria mediterranea. (From Owen.) A, The animal. B, The shell removed. C, D, Two views of the shell of Cardiopoda. Mouth and odontophore. Cephalic tentacles. Eye.

The fin-like mesopodium. Its sucker. Metapodium. Salivary glands.

h,

Border of the mantle-flap, u,

Cerebral ganglion.

i,

Ctenidium (gill-plume). v,

Pleural and pedal ganglion

m

Stomach. w,

Testis.

n,

Intestine. x.

Visceral ganglion.

0,

Anus. y,

Vesicula seminalis.

P,

Liver. [ventricle. z,

Penis.

t.

Aorta, springing from the

of various groups of the animal kingdom. In development they pass through the typical trochosphere and veliger stages provided with boat-like shell.

Sub-order 1. — Taenioglossa. Radula with a median tooth and three teeth on each side of it. Formula 3:1:3.

Tribe 1. — Platypoda. Normal Taenioglossa of creeping habit. The foot is flattened ventraily, at all events in its anterior part (Strombidae). Otocysts situated close to the pedal nerve-centres. Accessory organs are rarely found on the genital ducts, but occur in Paludina, Cyclostotna, Naticidae, Calyptraeidae, &c. Mandibles usually present. This is the largest group of Mollusca, including nearly sixty families, some of which are insufficiently known from the anatomical point of view.

Fam. 1. — Paludinidae. Pedal centres in the form of ganglionated cords; kidney provided with a ureter; viviparous; fluviatile. Paludina. Neothauma, from Lake Tanganyika. Tylopoma, extinct, Tertiary.

No ctenidium, pallial cavity trans- aperture of shell circular; terrestrial,

Fam. 2. — Cyclophoridae. formed into a lung;

phibious. Ampullaria, shell dextral, coiled, sinistral, spire short or obsolete. Meladomus. Fam. 4. — Littorinidae. Oesophageal pouches present; pedal nerve-centres concentrated; a pedal penis near the right tentacle. Littorina, shell not umbilicated, littoral habit. Lacuna, foot with two posterior appendages, marine, entirely aquatic. Cremnoccnchus, entirely aerial, Indian. Risella, Tectarius. Fam. 5. — Fossaridae. Head with two lobes in some Rhipidoglossa. Fossaria. Fam. 6. — Purpurinidae, extinct. Fam. 7. — Planaxidae. Shell with pointed spire; a short pallial siphon. Planaxis. Fam. 8. — Cyclostomatidae. Pallial cavity transformed into a lung; pedal centres concentrated ; a deep pedal groove. Cyclostoma, shell turbinated, operculum calcareous, British. Omphalotropis. Fam. 9. — Aciculidae. Pallial cavity transformed into a lung; oper- culum horny; shell narrow and elongated. Acicula. Fam. 10. — Valvatidae. Ctenidium bi- pectinate, free; hermaphrodite; fluviatile. Valvata, British. Fam. 11. — Rissoidae. Epipodial fila- , ments present ; one or two pallial " tentacles. Rissoa. Rissoina. Stiva. Fam. 12. — Litiopidae. An epipodium bearing three pairs of tentacles and an operculigerous lobe with two appendages; inhabitants of the Sargasso weed. Litiopa. Fam. 13. — Adeorbiidae. Mantle with two posterior appendages ; ctenidium large and capable of protrusion from pallial cavity. Adeorbis, British. Fam. 14. — Jeffreysiidae. Head with two long labial palps; shell ovoid; operculum horny, semicircular, carinated. Jeffreysia. Fam. iˆ.—Homalogyridae. Shell flattened ; no cephalic tentacles.

Homalogyra, British. Ammoniceras. Fam. 16. — Skeneidae. Shell depressed, with rounded aperture;

cephalic tentacles long. Skenea, British. Fam. 17. — Choristidae. Shell spiral; four cephalic tentacles;

eyes absent ; two pedal appendagesˆ Choristes. Fam. 18. — Assimineidae. Eyes at free extremities of tentacles.

Assiminea, estuarine, British. Fam. 19. — Truncatellidae. Snout very long, bilobed ; foot short.

Truncatella. Fam. 20. — Hydrobiidae. Shell with distant from right tentacle, generally appendiculated; brackish water or fluviatile. Hydrobia, British. Baik- alia, from Lake Baikal. Pomatiopsis. Bithynella. Lithoglyphus. Spekia, viviparous, from Lake Tanganyika. Tanganyicia. Limnotrochus, from Lake Tanganyika. Chytra. Littorinida. Bithynia, British, fluvia- tile. Stenothyra. Fam. 21. — Melaniidae. Spire of shell somewhat elongated ; mantle-border

fringed ; viviparous ; fluviatile. Melania. Faunus. Paludontus. Bythoceras,

prominent spire ; penis

Fig. 30.-

oc,

pr,

Fig. 29. — Pterotrachea mutica seen from the right side (After Keferstein.) Pouch for reception of the v, Stomach snout when retracted. i,

Pericardium. n,

Pharynx. br,

Cephalic eye. w,

Cerebral ganglion. Pleuro-pedal ganglion. Foot (mesopodium).

Pomatias, shell turriculated. Diplommatina. Hybocystis. CyClo- phorus, shell umbilicated, with a short spire and horny oper- culum. Cyclosurus, shell uncoiled. Dermatocera, foot with a horn-shaped protuberance at its posterior end. Spiraculum. Fam. 3. — Ampullariidae. To the left of the ctenidium a pul- monary sac, separated from it by an incomplete septum, am-

Intestine.

So-called nucleus.

Branchial plume (ctenidium).

Osphradium. mt, Foot (metapodium). 3, Caudal appendage.

Melanopsis. Nassopsis.

from Lake Tanganyika. Fam. 22. — Typhobiidae. Foot wide;

shell turriculated, with carinated

whorls, the carinae tuberculated or

spiny. Typhobia. Bathanalia, from

Lake Tanganyika. Fam. 23. — Pleur oceridae. Like

Melaniidae, but mantle-border not

Valvata cristata, Mull.

o, Mouth.

op. Operculum.

br, Ctenidium (branchial plume).

x, Filiform appendage (? rudimentary- cteni- dium). The freely projecting

fringed and reproduction oviparous, ctenidium of typical form

Pleurocera. Anculotus. Fam. 24. — Pseudomelaniidae. All ex-

tinct. Fam. 25. Fam. 26.

not having its axis fused to the roof of the branchial chamber is the notable character of this genus.

-Subulitidae. All extinct. Nerineidae. All extinct. Fam. 27. — Cerithiidae. Shell with numerous tuberculated whorls ; aperture canaliculated anteriorly; short pallial siphon. Ceri thium. Bittium. Potamides. Triforis. Laeocochlis. Ceri- thiopsis. Fam. 28. — Modulidae. Shell with short spire; no siphon. Modulus.

5 i6

GASTROPODA

[STREPTONEURA

Fam. 29. — Vermetidae. Animal fixed by the shell, the last whorls of which are not in contact with each other; foot small; two anterior pedal tentacles. Vermetus. Siliquaria. Fam. 30—Caecidae. Shell almost completely uncoiled, in one

plane, with internal septa. Caecum, British. Fam. 31. — Turritellidae. Shell very long; head large; foot

broad. Turritella, British. Mesalia. Mathilda. Fam. 32. — Struthiolariidae. Shell conical; aperture slightly

canaliculated ; siphon slightly developed. Struthiolaria. Fam. 33. — Chenopodidae. Shell elongated; aperture expanded;

siphon very short. Chenopus, British. Ala,ri a, Spinigera, Diartema, extinct. Fam. 34. — Slrombidae. Foot narrow, com- pressed, without sole. Strombus. Pteroceras. Rostellaria. Terebel- lum. Fam. 35. — Xenophori- dae. Foot trans- versely divided into two parts. Xeno- phorus. Eotrochus, Silurian. Fam. 36. — Capulidae. Shell conical, not Fig. 31.— Shell of Crucibulum, seen coiled.but slightly in-

from below so as to show the inner whorl curved posteriorly ;

b, concealed by the cap-like outer whorl a. . a tongue-shaped pro-

r jection between snout

and foot. Capulus. Thyca, parasitic on asterids. Plalyceras, extinct. Fam. 37. — Hipponycidae. Shell conical ; foot secreting a ventral

calcareous plate; animal fixed. Hipponyx. Mitrularia. Fam. 38. — Calyptraeidae. Shell with short spire; lateral cervical lobes present; accessory genital glands. Calyptraea, British. Crepidula. Crucibulum. Fam. 39. — Naricidae. Foot divided into two, posterior half bearing the operculum; a wide epipodial velum; shell tur- binated. Narica. Fam. ˆo.—Naticidae. Foot large, with aquiferous system;

Cropodium reflected over head; eyes degenerate; burrowing abit. Natica, British. Amaura. Sigaretus. Fam. 41. — Lamellariidae. Shell thin, more or less covered by the mantle; no operculum. LameUaria. Velutina. Marsenina, Oncidiopsis, hermaphrodite. Fam. 42. — Trichotropidae. Shell with short spire, carinate and

pointed. Trichotropis. Fam. 43.— Seguenziidae. Shell trochiform, with canaliculated

aperture and twisted columella. Seguenzia, abyssal. Fam. nˆ.— Janthinidae. Shell thin; operculum absent; ten- tacles bifid ; foot secretes a float ; pelagic. Janthina. Recluzia. Fam. 45. — Cypraeidae. Shell inrolled, solid, polished, aperture very narrow in adult; short siphon; anus posterior; os- phradium with three lobes ; mantle reflected over shell. Cypraea. Pustularia. Ovula. Pedicularia, attached to corals. Erato. Fam. 46. — Tritonidae. Shell turriculated and siphonated, thick, each whorl with varices; foot broad and truncated anteriorly;

pallial siphon well developed ; proboscis present. Triton. Per- sona.

Ranella. Fam. 47. — Columbel- linidae. All extinct. Fam. 48. — Cassididae. Shell ventricose, with elongated aperture, and short spire ; pro- boscis and siphon long ;operculum with marginal nucleus. Cassis. Cassidaria. Oniscia. Fam.49 — Oocorythidae. Shell globular and ventricose; aperture oval and canaliculated ; operculum spiral. Oocorys, abyssal. Fam. 50. — Doliidae. Shell ventricose, with short spire, and wide aperture; no varices and no operculum; foot very broad, with projecting anterior angles; siphon long. Dolium. Pyrula. Fam. 51. — Solariidae. Solarium. Torinia. Fluxina. Fam. 52— Scalariidae. Shell turriculated, with elongated spire; proboscis short; siphon rudimentary. Scalaria. Eglisia. Crossea. Aclis. The three following families have neither radula nor jaws, and are therefore called Aglossa. They have a well-developed proboscis which is used as a suctorial organ ; some are abyssal, but the majority are either commensals or parasites of Echinoderms.

Fig. 32. — Animal and shell of Ovula.

b, Cephalic tentacles. ˆ

d, Foot.

h. Mantle-skirt, which is naturally carried in a reflected condition so as to cover the sides of the shell.

Fam. 53— Pyramidellidae. Summit of spire hcterostrophic ; a projection, the mentum, between head and foot; operculum present. Pyramidella. Turbonilla. Odostomia, British. Myxa.

Fam. 54. — Eulimidae. Visceral mass still coiled spirally; shell thin and shining. Eulima, foot well developed, with an operculum, animal usually free, but some live in the digestive cavity of Holo- thurians. Mucronalia, foot re- duced, but still operculate, eyes fjresent, animal fixed by its very ong proboscis which is deeply buried in the tissues of an Echino- derm, no pseudopallium. Stylifer, the operculum is lost, animal fixed by a large proboscis which forms a pseudopallium covering the whole shell except the extremity of the spire, parasitic on all groups of Echinoderms. Entosiphon, visceral mass still coiled; shell much re- duced, proboscis very long forming a pseudopallium which covers the whole body and projects beyond in the form of a siphon, foot and nervous system present, eyes, branchia and anus absent, para- site in the Holothurian Deima Fig. 33. — Section of the blakei in the Indian Ocean. shell of Triton, Cuv. (From

Fam. 55. — Entoconchidae. No shell ; Owen.) visceral mass not

coiled; no a, Apex, sensory organs, nervous system, c, Siphonal notch of the branchia or anus; body reduced mouth of the shell, to a more or less tubular sac; ac to pc, Mouth of the shell, hermaphrodite and viviparous; w , w , Whorls of the shell. parasitic in Holothunans ; larvae s, s, Sutures are veligers, with shell and oper- ‘ Occupying the axis, and culum. Entocolax, mouth at free exposed by the section, is extremity, animal fixed by aboral see n the “columella” or orifice of pseudopa hum, Pacific. S pi ra l pillar. The upper hntoconcha, body elongated and whorls of the shell are seen tubular, animal fixed by the oral to be divided into separate extremity, protandric herma- chambers by the forma- pnrodite, parasitic in testes of tion of successively formed Holothunans causing their abor- ” septa.” tion. Enteroxenos, no pseudo- pallium and no intestine, hermaphrodite, larvae with operculum.

Tribe 2.— Heteropoda. Pelagic Taenioglossa with Foot large and laterally compressed to form a fin.

Fam. 1. Atlantidae. Visceral sac and shell coiled in one plane; foot divided transversely into two parts, posterior part bearing an operculum, anterior part forming a fin provided with a sucker. Atlanta. Oxy gyrus.

Fam. 2. — Carinariidae. Visceral sac and shell small in proportion to the rest of the body, which cannot be withdrawn into the shell ; foot elongated, fin-shaped, with sucker, but without operculum. Carinaria. Cardiopoda.

Fam. ˆ.—Pterotrachaeidae. Visceral sac very much reduced; without shell or mantle; anus posterior; foot provided with sucker in male only. Pterotrachaea. Firoloida. Pterosoma.

Sub-order 2.— Stenoglossa. Radula narrow with one lateral tooth on each side, and one median tooth or none.

Tribe I . — Rachiglossa. Radula with a median tooth and a single

Fig. 34.— Female Janthina, with egg-float (a) attached to the foot; b, egg-capsules; c, ctenidium (gill-plume); d, cephalic tentacles.

tooth on each side of it. Formula 1 : 1 : 1. Rudimentary jaws present.

- Fam. 1. — Turbinellidae. Shell solid, piriform, with thick folded columella; lateral teeth of radula bicuspidate. Turbinella. Cynodonta. Fulgur. Hemifusus. Tudicla. Strepsidura. Fam. 2. — Fasciolariidae. Shell elongated, with long siphon; lateral teeth of

radula multicuspidate. Fasciolaria. Fusus. Clavella. Latirus. Fam. 3. — Mitridae. Shell fusiform and solid, aperture elongated, columella folded; no operculum; eyes on sides of tentacles. Mitra. Turricula. Cylindromitra. Imbricaria. Fam. 4. — Buccinidae. Foot large and broad; eyes at base of

tentacles ; operculum Jiorny. Buccinum. Chrysodomus. Liotnesus. Cominella. Tritonidea. Pisania. Euthria. Phos. Dipsacus. Fam. 5- — Nassidae. Foot broad, with two slender posterior appendages; operculum unguiculate. Nassa, marine, British. Canidia, fluviatile. Bullia. Fam. 6. — Muricidae. Shell with moderately long spire and canal, ornamented with ribs, often spiny; foot truncated anteriorly. Murex, British. Trophon, British. Typhis. Urosalpinx. Lachesis. Fam. 7. — Purpuridae. Shell thick, with short spire, last whorl large and canal short; aperture wide; operculum horny. Purpura, British. Rapana. Monoceros. Sistrum. Con- cholepas. Fam. 8. — Haiiidae. Shell ventricose, thin and smooth, with wide

aperture; foot large and thick, without operculum. Halia. Fam. 9. — Cancellariidat. Shell ovoid, with short spire and folded columella; foot small, no operculum; siphon short. Can- cellaria. Fam. 10. — Columbellidae. Spire of shell prominent, aperture narrow, canal very short, columella crenelated; foot large. Columbella. Fam. 11. — CoraUiophilidae. Shell irregular; radula absent; foot and siphon short; sedentary animals, living in corals. Coralliopkila. Rhizochilus. Leptoconchus. Magilus. Rapa. Fam. 12. — Volutidae. Head much flattened and wide, with eyes on sides; foot broad; siphon with internal appendages. Valuta. Guivillea. Cymba. Fam. 13. — -Olividae. Foot with anterior transverse groove; a posterior pallial tentacle; generally burrowing. Olivia. Olivella. Ancillaria. Agaronia. Fam. 14. — Marginellidae. Foot very large; mantle reflected over

shell. Marginella. Pseudomarginella. Fam. 15. — Harpidae. Foot very large; without operculum; shell with short spire and longitudinal ribs; siphon long. Harpa. Tribe 2. — Toxiglossa. No jaws. No median tooth in radula. Formula: 1:0:1. Poison-gland present whose duct traverses the nerve-collar. Fam. 1. — Pleurolomatidae. Shell fusiform, with elongated spire; margin of shell and mantle notched. Pleurotoma. Clavatula. Mangilia. Bela. Fusionella. Pontiothauma.

Fam. 2. — Terebridae. Shell turriculated, with numerous whorls; aperture and operculum Oval; eyes at summits of tentacles; siphon long. Terebra. Fam. 3. — Conidae. Shell conical, with very short spire, and narrow aperture with parallel borders; operculum unguiform. Conus.

In those Euthyneura in which the shell is entirely absent in the adult, it is, except in the three genera Cenia, Runcina and Vaginula, developed in the larva and then falls off. In other cases (Tectibranchs) the reduced shell is enclosed by upgrowths of the edge of the mantle and becomes internal, as in many Cephalopods. A few Euthyneura in which the shell is not much reduced retain an operculum in the adult state, e.g. Actaeon, Limacina, and the marine Pulmonate, Amphibola. The detorted visceral commissure shows a tendency to the concentration of all its elements round the oesophagus, so that except in the Bullomorpha and in Aplysia the whole nervous system is aggre- gated in the cephalic region, either dorsally or ventrally. The

Sub-Class II. — Euthyneura

The most important general character of the Euthyneura is the absence of torsion in the visceral commissure, and the more posterior position of the anus and pallial organs. Compara- tive anatomy and embryology prove that this condition is due, not as formerly supposed to a difference in the relations of the visceral commissure which prevented it from being included in the torsion of the visceral hump, but to an actual detorsion which has taken place in evolution and is repeated to a great extent in individual development. In several of the more primitive forms the same torsion occurs as in Streptoneura, viz. in Actaeon and Limacina among Opisthobranchia, and Chilina among Pulmonata. Actaeon is prosobranchiate, the visceral commissure is twisted in Actaeon and Chilina, and even slightly still in Bulla and Scaphander; in Actaeon and Limacina the osphradium is to the left, innervated by the supra-intestinal ganglion. But in the other members of the sub-class the detorsion of the visceral mass has carried back the anus and circumanal complex from the anterior dorsal region to the right side, as in Bulla and Aplysia, or even to the posterior end of the body, as in Philine,Oncidium, Doris, &c. Different degrees of the same process of detorsion are, as we have seen, exhibited by the Heteropoda among the Strepto- neura, and both in them and in the Euthyneura the detorsion is associated with degeneration of the shell. Where the modifica- tion is carried to its extreme degree, not only the shell but the pallral cavity, ctenidium and visceral hump disappear, and the

body acquires a simple elongated form and a secondary external symmetry, as in Pterolrachaea and in Doris, Eolis, and other Nudibranchia. These facts afford strong support to the hypo- thesis that the weight of the shell is the original cause of the torsion of the dorsal visceral mass in Gastropods. But this hypothesis leaves the elevation of the visceral mass and the exogastric coiling of the shell in the ancestral form unexplained.

Fig. 35. — Acera bullata. A single row of teeth of the Radula. (Formula, x.l.x.)

radula has a number of uniform teeth on each side of the median tooth in each transverse row. The head in most cases bears two pairs of tentacles. All the Euthyneura are hermaphrodite. In the most primitive condition the genital duct is single throughout its length and has a single external aperture; it is therefore said to be monaulic. The hermaphrodite aperture is on the right side near the opening of the pallial cavity, and a ciliated groove conducts the spermatozoa to the penis, which is situated more anteriorly. This is the condition in the Bullo- morpha, the Aplysiomorpha, and in one Pulmonate, Pythia. In some cases while the original aperture remains undivided, the seminal groove is closed and so converted into a canal. This is the modification found in Cavolinia longirostris among the Bullomorpha, and in all the Auriculidae except Pythia. A further degree of modification occurs when the male duct takes its origin from the hermaphrodite duct above the external opening, so that there are two distinct apertures, one male and one female, the latter being the original opening. The genital duct is now said to be diaulic, as in Valvata, Oncidiopsis, Actaeon, and Lobiger among the Bullomorpha, in the Pleurobranchidae, in the Nudibranchia, except the Doridomorpha and most of the Elysiomorpha, and in the Pulmonata. Originally in this condition the female aperture is at some distance from the male, as in the Basommatophora and in other cases; but in some forms the female aperture itself has shifted and come to be contiguous with the male opening and penis as in the Stylom- matophora. In all these cases the female duct bears a bursa copulatrix or receptaculum seminis. In some forms this recept- acle acquires a separate external opening remaining connected with the oviduct internally. There are thus two female openings, one for copulation, the other for oviposition, as well as a male opening. The genital duct is now trifurcated or triaulic, a condition which is confined to certain Nudibranchs, viz. the Doridomorpha and most of the Elysiomorpha.

The Pteropoda, formerly regarded as a distinct class of the Mollusca,

were interpreted by E. R. Lankester as a branch of the Cephalopoda, chiefly on account of the protrusible sucker- bearing processes at the anterior end of Pneumonoderma. These he considered to be homologous with the arms of Cephalopods. He fully recognized, however, the similarity of Pteropods to Gastropods in their general asymmetry and in the torsion of the visceral mass in Limacinidae. It is now understood that they are Euthyneurous Gastropods adapted to natatory locomotion and pelagic life. The sucker-bearing processes of Pneumono« derma are outgrowths of the proboscis. The fins of Pteropods are now interpreted as the expanded lateral margins of the foot, termed parapodia, not homologous with the siphonof Cephalopods which is formed from epipodia. The Thecosomatous Pteropoda are allied to Bulla, the Gymnosomatous forms to Aplysia. The Euthyneura comprises two orders, Opisthobranchia and Pul-monata.

Order I. — Opisthobranchia. Marine Euthyneura, the more archaic forms of which have a relatively large foot and a small visceral hump, from the base of which projects on the right side a short mantle-skirt. The anus is placed in such forms far back beyond the mantle-skirt. In front of the anus, and only partially covered

Fig. 36.

A, Veliger-larva of an Opisthobranch (Polycera). f, Foot; op. operculum; mn, anal papilla; ry, dry, two portions- of unabsorbed nutritive yolk on either side of the intestine. The right otocyst is seen at the root of the foot.

B, Trochosphere of an Opisthobranch (Pleurobranchidium) showing — shgr, the shell-gland or primitive shell-sac ; v , the cilia of the velum; ph., the commencing stomodaeum or oral invagination; ot, the left otocyst ; pg, red-coloured pigment spot.

C, Diblastula of an Opisthobranch (Polycera) with elongated blastopore oi.

(All from Lankester.)

by the mantle-skirt, is the ctenidium with its free end turned back-

wards. The heart lies in front of, instead of to the side of, the attachment of the ctenidium— hence Opisthobranchia as opposed to " Prosobranchia," which correspond to the Streptoneura. A shell is possessed in the adult state by but few Opisthobranchia, but all pass through a veliger larval stage with a nautiloid shell (fig. 36). Many Opisthobranchia have by a process of atrophy lost the typical

ctenidium and the mantle- $:" I". ■» skirt, and have developed*

other organs in their place. As in some Pectinibranchia, the free margin of the mantle-skirt is frequently reflected over • the shell when a shell exists; and, as in some Pectinibranchia, broad lateral outgrowths

the natural size, a transparent pisciform pelagic Opisthobranch. The internal organs are shown as seen by transmitted light. (After W. Keferstein.) o, Mouth.

b, Radular sac.

c, Oesophagus.

d, Stomach. c'. Intestine. /', Anus.

g' , g", g'", The four lobes of the liver. The heart (auricle and ventricle). The renal sac (nephridium). The ciliated communication of the renal sac with the pericardium. m, The external opening of the renal sac. n, The cerebral ganglion. o, The cephalic tentacles. /, The genital pore. The ovo-testes.

The parasitic hydromedusa Mnestra, usually found attached in this position by the aboral pole of its umbrella.

g, h, I,

v,

y.

be thrown over the shell or naked dorsal surface of the body.

The variety of special developments of structure accompanying the atrophy of typical organs in the Opisthobranchia and general degeneration of organization is very great. The members of the order present the same wide range of superficial appear- ance as do the Pectini- branchiate Streptoneura, forms carrying well-de- veloped

spiral shells and large mantle-skirts being included in the group, together with flattened or cylindrical slug-like forms. But in respect of the sub- stitution of other parts for and

deed, were it not for their retention of the characteristic odontophore we should have little or no indication that such forms as Phyllirho'e and Limapontia really belong to the Mollusca at all. The interesting little Rhodope veranyii, which has no odontophore, has been associated by systematists both with these simplified Opisthobranchs and with Rhabdocoel Planarians.

In many respects the sea-hare (Aplysia), of which several species are known (some occurring on the English coast), serves as a convenient example of the fullest development of the organization characteristic of Opisthobranchia. The woodcut (fig. 38) gives a faithful representation of the great mobility of the various parts of the body. The head is well marked and joined to the body by a somewhat constricted neck. It carries two pairs of cephalic tentacles and a pair of sessile eyes. The visceral hump is low and not drawn out into a spire. The foot is long, carrying the oblong visceral mass upon it, and projecting (as metapodium) a little beyond it(/). Laterally the foot gives rise to a pair of mobile fleshy lobes, the parapodia (ep), which can be thrown up so as to cover in the dorsal surface of the animal. Such parapodia are common, though by no means universal, among Opisthobranchia. The torsion of the visceral hump is not carried out very fully, the consequence being that the anus has a posterior position a little to the right of the median line above the metapodium, whilst the branchial chamber formed by the overhanging mantle-skirt faces the right side of the body instead of lying well to the front as in Streptoneura and as in Pulmonate Euthyneura. The gill-plume.which in Aplysia is the typicalMolluscan ctenidium, is seen in fig. 39 projecting from the branchial sub-pallial space.

the mantle-skirt and for. the gill which the more degenerate Opisthobranchia exhibit, this order stands alone. Some Opisthobranchia are striking examples of de- generation (some Nudibranchia), having none of those regions or processes of the body developed which distinguish the archaic Mollusca from such flatworms as the Dendrocoel Planarians. In-

Fig. 38. — Three views of Aplysia sp., in various conditions of expansion and retraction. (After Cuvier.)

I, Anterior cephalic tentacles.

P, Posterior cephalic tentacles.

e, Eyes.

/, Metapodium.

ep, Epipodium.

g, Gill-plume (ctenidium).

m , Mantle-flap reflected over the thin oval shell.

OS, s. Orifice formed by the un- closed border of the reflected mantle-skirt, allowing the shell to show.

pe, The spermatic groove.

The relation of the delicate shell to the mantle is peculiar, since it occupies an oval area upon the visceral hump, the extent of which is indicated in fig. 38, C, but may be better understood by a glance at the figures of the allied genus Umbrella (fig. 40), in which the margin of the mantle-skirt coincides, just as it does in the limpet, with the margin of the shell. But in Aplysia the mantle is reflected over the edge of the shell, and grows over its upper surface so as to completely enclose it, excepting at the small central area 5 where the naked shell is exposed. This enclosure of the shell is a permanent development of the arrangement seen in many Streptoneura (e.g. Pyrula, Ovula, see figs. 18 and 32), where the border of the mantle can be, and usually is, drawn over the shell, though it is withdrawn (as it cannot be in Aplysia) when they are irritated. From the fact that Aplysia commences its life as a free-swimming veliger with a nautiloid shell not enclosed in any way by the border of the mantle, it is clear that the enclosure of the shell in the adult is a secondary process. Accordingly, the shell of Aplysia must not be confounded with a primitive shell in its shell-sac, such as we find realized in the shells of Chiton and in the plugs which form in the remarkable transitory " shell-sac " or " shell-gland " of Molluscan embryos (see figs. 26, 60). Aplysia, like other Mollusca, develops a primitive shell-sac in its trochosphere stage of development, which disappears and is succeeded by a nautiloid shell (fig. 36). This forms the nucleus of the adult shell, and, as the animal grows, becomes enclosed by a reflection of the mantle-skirt. When the shell of an A plysia enclosed in its mantle is pushed well to the left, the sub-pallial space is fully exposed as in fig. 39, and the various apertures of the body are seen.

EUTHYNEURA1

Posteriorly we have the anus, in front of this the lobate gill-plume between the two (hence corresponding in position to that of the Fectimbranchia) we have the aperture of the renal organ. In front near the anterior attachment of the gill-plume, is the osphradium , – a (olfactory organ) dis-

-”’^ v -”’ covered by J. W.

Spengel, yellowish in colour, in the typical position, and overlying an olfactory ganglion with typical nerve-con- nexion (see fig. 43). To the right of Spengel’s osphradium is the open- ing of a peculiar gland which has, when dis- sected out, the form of a bunch of grapes; its secretion is said to be poisonous. On the under side of the free edge of the mantle are situated the numerous small cutaneous glands which, in the large Aplysia camelus (not in other species), form the purple secretion which was known to „ the ancients. In front

f . tI(f- .39- — Aplysia leporina {camelus, of the osphradium is Luv.) with epipodia and mantle reflected the single genital pore, away from the mid-line. (Lankester.)

a, Anterior cephalic tentacle.

b, Posterior cephalic tentacle; between a

the aperture of the com- mon or hermaphrodite duct. From this point there passes forward to the right side of the head a groove — the spermatic groove — – down which the sper- matic fluid passes. In other Euthyneura this groove may close up

and b, the eyes.

c, Right epipodium.

d, Left epipodium.

e, Hinder part of visceral hump.

fp, Posterior extremity of the foot. uuwu wnicn tne

fa, Anterior part of the foot underlying the ma tic fluid passes

head. other Eii + hvru > nra

g, The ctenidium (branchial plume). ° — j — -~

*h, The mantle-skirt tightly spread over the and *° rrn a canal. At*

horny shell and pushed with it towards H s termination by the

the left side. side of the head is the

The spermatic groove. muscular introverted

The common genital pore (male and P enis – In the hinder

female). part of the foot (riot

Orifice of the grape-shaped (supposed shown in any of the

poisonous) gland. diagrams) is the open-

The osphradium (olfactory organ of i ng ? f a Iar S e mucus-

Spengel). forming gland very

ˆ ■■’■’ ‘ ‘ ” often found in the

Molluscan foot.

With regard to in- ternal organization we may commence with t / , . ,. . , the disposition of the

Wn n r ?ˆ? (n -£P hndlum) > the external opening of which has already been noted. The position of this opening and other features of the renal organ were determined by J. T. Cunningham. f l,;iw ,S c f °” s ‘ derable ˆuncertainty with respect to the names of n hˆCnU °/ ^^” a – There are two forms which are very common in the Gulf of Naples. One is quite black in colour, and measures when

*2. *,*

/■

m,

n,

0,

P,

Spengel). Outline of part of the renal sac (neph-

ndium) below the surface. External aperture of the nephridium. Anus.

Fig 40.— Umbrella medilerranea. a, mouth; 6, cephalic tentacle- k Kill (ctemdium). The free edge of the mantle is Ln ˆt Mow OwenT gm (compare with Aplysia, fig. 3 J). (From

outstretched 8 or 9 in. in length The other is light brown and some-what smaller, its length usually not exceedinf 7 in. The first is flaccid and sluggish m its movements, and has not much power of contraction ; its epipodial lobes are enormously developed and extend far forward along the body ;,t gives out when handled an abundance of purple liquid, which is derived from cutaneous glands situated

519

on the under side of the free edge of the mantle. According to F blochmann it is identical with A. camelus of Cuvier. The other species is A. depilans; it is firm to the touch, and contracts forcibly when irritated ; the secretion of the mantle-glands is not abundant and is milky white in appearance. The kidney has similar relations in both species, and is identical with the organ spoken of by many authors as the triangular gland. Its superficial extent is seen when the folds covering the shell are cut away and the shell removed • the external surface forms a triangle with its base bordering the peri-cardium, and its apex directed posteriorly and reaching to the left-hand posterior corner of the shell-chamber. The dorsal surface of the kidney extends to the left beyond the shell-chamber beneath the skin in the space between the shell-chamber and the left parapodium. When the animal is turned on its left-hand side and the mantle-chamber widely opened, the gill being turned over to the left, a part ot the kidney is seen beneath the skin between the attachment ot the gill and the right parapodium (fig. 39). On examination this is round to be the under surface of the posterior limb of the gland, the upper surface of which has just been described as lying beneath the shell. In the posterior third of this portion, close tc that edge which is adjacent to the base of the gill, is the external opening (fig: 39, 0).

When the pericardium is cut open from above in an animal otherwise entire, the anterior face of the kidney is seen forming the posterior wall of the pericardial chamber; on the deep edge of this face, a little to the left of the attachment of the auricle to the floor of the pericardium, is seen a depression ; this depression con- tains the opening from the pericardium into the kidney.

To complete the account of the relations of the organ: the right anterior corner can be seen superficially in the wall of the mantle-chamber above the gill. Thus the base of the gill passes in a slant- ing direction across the right-hand side of the kidney, the posterior end being dorsal to the apex of the gland, and the anterior end ventral to the right-hand corner.

As so great a part of the whole surface of the kidney lies adjacent to external surfaces of the body, the remaining part which faces the_ internal organs is small; it consists of the left part of the under surface; it is level with the floor of the pericardium, and lies over the globular mass formed by the liver and convoluted intestine

ihus the renal organ of Aplysia is shown to conform to the Molluscan type. The heart lying within the adjacent pericardium has the usual form, a single auricle and ventricle. The vascular system is not extensive, the arteries soon ending in the well-marked spongy tissue which builds up the muscular foot, parapodia, and dorsal body-wall.

The alimentary canal commences with the usual buccal mass; the lips are car- tilaginous, but not armed with horny jaws, though these are common in other Opisthobranchs; the lingual ribbon is multidenticulate, and a pair of salivary glands pour in their secretion. The oeso- phagus expands into a curious gizzard, which is armed internally with large horny processes, some broad and thick, others spinous, fitted to act as crushing instruments. From this we pass to a stomach and a coil of intestine embedded in the lobes of a voluminous liver; a caecum of large size is given off near the commencement of the intestine. The liver opens by two ducts into the digestive tract Tfr" . ,. . accessory giandi

lhe generative organs he close to the ducts of Aplysia. coil of intestine and liver, a little to the kester) left side. When dissected out they ap- ; vn t P «t; =

M rrprXˆveˆrgln or" golal f' Hermaphrodite due,

*tlnf%°^°trTl V te f t r ' VˆcXs = alfs land – Fr S m (S it e p fi a g s-se 4 s 2) a coVmo? oThˆrm" k '°^ ° f ****»- phrodite duct which very soon becomes tTˆTrniohfoSre entwined in the spire of a gland— the d ,Z nerma P hrodlte*

p ss t 'p»tiT»„ d 'rt'r,„„i • liSF ita

mg by means of a longish duct into a ' Genital oore the common duct, and then we reach ' ˆ enltal P ore " the pore (fig. 39, k). Here

*the female apparatus terminates. But when the male secretion of the ovo-testis is active, the seminal fluid passes from the genital pore along the spermatic groove (fig. o) to the penis, and is by the aid of that eversible muscular organ intro- i,, *.. ge L nrtal p ? re of a second aplysia, whence it passes*

iwJnt f i e 1 f matheca . .there to await the activity of the female element of the ovo-testis of this second Aplysia. After an interval

Fig. 41. — Gonad, and accessory glands and (Lan-

of some days — possibly weeks — the ova of the second Aplysia commence to descend the hermaphrodite duct; they become en-

Fig. 42. — Follicles of the hermaphrodite gonads of Euthyneurous Gastropods. A, of Helix; B, of Eolis; a, ova; b, developing spermatozoa; c, common efferent duct.

closed in a viscid secretion at the point where the albuminiparous gland opens into the duct intertwined with it; and on reaching the point where the spermathecal duct debouches they are impregnated by the spermatozoa which escape now from the spermatheca and meet the ova.

The development of Aplysia from the egg presents many points of interest from pj the point of view of comparative embry-

ology, but in relation to the morphology of the Opisthobranchia it is sufficient to point to the occurrence of a trochosphere and a veliger stage (fig. 36), and of a shell-gland or primitive shell-sac (fig. 36, shgr), which is succeeded by a nautiloid shell.

In the nervous system of Aplysia the (\ 1 I' great ganglion-pairs are well developed and

distinct. The euthyneurous visceral loop is long, and presents only one ganglion (in Aplysia camelus, but two distinct ganglia joined to one another in Aplysia nybrida of the English coast), placed at its extreme limit, representing both the right and left visceral ganglia and the third or abdominal ganglion, which are so often separately

present. The diagram (fig. 43) shows the nerve connecting this abdomino-visceral ganglion with the olfactory ganglion of Spengel. It is also seen to be connected with a more remote ganglion — the genital. Such special irregularities in the develop- ment of ganglia upon the visceral loop, and on one or more of the main nerves connected with it, are very frequent. Our figure of the nervous system of Aplysia does not give the small pair of buccal ganglia which are, as in all glossophorous

Pi G . a Nervous Molluscs, present upon the nerves passing*

system ol Aplysia, as from the cerebral region to the odontophore. For a comparison of various Opistho- branchs, Aplysia will be found to present a convenient starting-point. It is one of the more typical Opisthobranchs, that is to say, it belongs to the section Tecti- branchia, but other members of the sub- order, namely, Bulla and Actaeon (figs. 44 and 45), are less abnormal than Aplysia in regard to their shells and the form of the ab. s'p, AbdomfnaYgan- visceral hump. They have naked spirally glion which re- twisted shells which may be concealed from presents also the view in the living animal by the expansion supra-intestinal and reflection of the parapodia, but are not ganglion of Strep- enclosed by the mantle, whilst Actaeon is toneura and gives remarkable for possessing an operculum off the nerve to like that of so many Streptoneura. the osphradium The great development of the parapodia (olfactory organ) seen in Aplysia is usual in Tectibranchiate 0, and another to Opisthobranchs. The whole surface of the an unlettered so- body becomes greatly modified in those called " genital " Nudibranchiate forms which have lost, not ganglion. The only the shell, but also the ctenidium. Many buccal nerves of these have peculiar processes developed

and ganglia are on the dorsal surface (fig. 4°. A. B), or omitted. retain purely negative characters (fig. 46,

D). The chief modification of internal organization presented by these forms, as compared with Aplysia, is found in the condition of the alimentary canal. The liver is no longer a compact organ opening by a pair of ducts into the median

%

H'-i

type of the long- looped Euthyneurous condition. The un- twisted visceral loop is lightly shaded. (After Spengel.) ce, Cerebral ganglion.

pi. Pleural ganglion. pe, Pedal ganglion.

digestive tract, but we find very numerous hepatic diverticula on a shortened axial tract (fig. 47). These diverticula extend usually one into each of the dorsal papillae or " cerata " when these are present. They are not merely digestive glands, but are sufficiently wide to act as receptacles of food, and in them the digestion of food proceeds just as in the axial portion of the canal. A precisely similar modification

ˆFig. 44. — Bulla vexillum (Chemnitz), as seen crawling, d, oral hood (compare with Tethys, fig. 46, B), possibly a continuation of theepipodia; b, b', cephalic tentacles. (From Owen.)

of the liver or great digestive gland is found in the scorpions, where the axial portion of the digestive canal is short and straight, and the lateral ducts sufficiently wide to admit food into the ramifications of the gland there to be digested ; whilst in the spiders the gland is reduced to a series of simple caeca.

The typical character is retained by the heart, pericardium, and the communicating nephridium or renal organ in all Opisthobranchs. An interesting example of this is furnished by the fish-like trans- parent Ph.yllirh.oe (fig. 37), in which it is possible most satisfactorily to study in the living animal, by means of the microscope, the course of the blood-stream, and also the reno-pericardial communication. In many of the Nudibranchiate Opisthobranchs the nervous system presents a concentration of the ganglia (fig. 48), contrasting greatly with what we have seen in Aplysia. Not only are the pleural ganglia fused to the cerebral, but also the visceral to these (see in further illustration the condition attained by the Pulmonate Limnaeus, fig. 59), and the visceral loop is astonishingly short and insignificant (fig. 48, «')• That the parts are rightly thus identified is probable from J. W. Spengel's observation of the osphradium and its nerve-supply in these forms; the nerve to that organ, which is placed somewhat anteriorly — on the dorsal surface — being given off from the hinder part (visceral) of the right compound ganglion — the fellow to that marked A in fig. 48. The Eolid-like Nudibranchs, amongst other specialities of structure, possess (in some cases at any rate) apertures at the apices of the " cerata " or dorsal papillae, which lead from the exterior into the hepatic caeca. Some amongst them (Tergipes, Eolis) are also remarkable for possessing peculiarly modified cells placed in sacs (cnidosacs) at the apices of these same papillae, which resemble the " thread-cells " of the Coelentera. According to T. S. Wright and J. H. Grosvenor these nematocysts are

derived from the hydroids on which the animals feed.

The development of many Opisthobranchia has been examined- — e.g. Aplysia, Pleurobranchidium, Elysia, Polycera, Doris, Tergipes. All pass through trochosphere and veliger stages, and in all a nautiloid or boat-like shell is developed, preceded by a well-marked " shell-gland " (see fig. 36). The transition from the free-swimming veliger larva with its nautiloid shell (fig. 36) to the adult form has not been properly observed, and many interesting points as to the true nature of folds (whether parapodia or mantle or velum) have yet to be cleared up by a knowledge of such development in forms like Tethys, Doris, Phyllidia, &c. As in other Molluscan groups, we find even in closely-allied genera

(for instance, in Aplysia and Pleura- shell 6 , ‘ ra i hood ;

of food-material by which the egg-shell is encumbered. Some form their diblastula by emboly, others by epiboly; and in the later history of the further development of the enclosed cells (arch- enteron) very marked variations occur in closely-allied forms, due to the influence of a greater or less abundance of food-material mixed with the protoplasm of the egg.

Sub-order 1. — Tectibranchia. Opisthobranchs provided in the adult state with a shell and a mantle, except Runcina, Pleuro- branchaea, Cymbuliidae, and some Aplysiomorpha. There is a ctenidium, except in some Thecosomata and Gymnosomata, and an osphradium.

*Tribe 1. — Bullomorpha. The shell is usually well developed, except in Runcina and Cymbuliidae, and may be external or internal No operculum, except in Actaeonidae and Limacinidae. The pallial cavity is always well developed, and contains the ctenidium, at least in part; ctenidium, except in Lophocercidae, of folded type. w; *»’*

Fig. 45. — Actaeon. h,

With

EUTHYNEURA]

GASTROPODA

521

the exception of the Aplustridae, Lophocercidae and Thecosomata, the head is devoid of tentacles, and its dorsal surface forms a digging

Fig. 46.

A, Eolis papulosa (Lin.), dorsal view.

, b, Posterior and anterior cephalic tentacles,

B, Tethys leporina, dorsal view

a, The cephalic hood.

b, Cephalic tentacles.

c, Neck.

d, Genital pore

c, The dorsar'cerata. 1

e, Anus. /, Large cerata. g , Smaller cerata. Margin of the foot.

C, Doris (Actinocydus) tuberculatus (Cuv.), seen from the pedal surface.

m, Mouth. /, Sole of the foot.

b, Margin of the head. sp, The mantle-like epipodium.

D, E, Dorsal and lateral view of Elysia (Aclaeon) viridis. ep, epipodial outgrowths. (After Keferstein.)

disk or shield. The edges of the foot form parapodia, often trans-formed into fins. Posteriorly the mantle forms a large pallia! lobe

long, except in Runcina, Lobiger and Thecosomata. Herma- phrodite genital aperture, connected with the penis by a ciliated groove, except in Aclaeon, Lobiger and Cavolinia longirostris, in which the spermiduct is a closed tube. Animals either swim or burrow.

Fam. 1. — Aclaeonidae. Cephalic shield bifid posteriorly ; margins

of foot slightly developed ; genital duct diaulic ; visceral com-missure streptoneur-

ous; shell thick, with

prominent spire and

elongated aperture; a

horny operculum.

Aclaeon, British. Soli-

dula. Tornatellaea, ex- tinct. Adelaclaeon.

Bullina. Bullinula. Fam. 2. — Ringiculidae.

Cephalic disk enlarged

anteriorly, forming an

open tube posteriorly;

shell external, thick,

with prominent spire;

no operculum. Ringi-

cula. Pugnus. Fam. 3. — Tornatinidae.

Margins of foot not

prominent; no radula;

shell external, with

inconspicuous spire.

Tornatina, British. Re-

tusa. Volvula. Fam. 4. — Scaphandridae.

Cephalic ‘ shield short,

truncated posteriorly ;

eyes deeply embedded;

three calcareous stom- achal plates; shell ex- ternal, with reduced

Fig. 47. — Enteric Canal

of Eolis papiUosa. (From

Gegenbaur, after Alder and

Hancock.)

ph. Pharynx.

m, Midgut, with its hepatic appendages h, all of which are not figured.

e, Hind gut.

an, Anus.

Fig. 48. — Central Nervous System of Fiona (one of the Nudibranchia), showing a tend- ency to fusion of the great ganglia. (From Gegenbaur, after Bergh.)

A , Cerebral, pleural and visceral

ganglia united.

B, Pedal ganglion.

C, Buccal ganglion.

D, Oesophageal ganglion con-

nected with, the buccal.

a, Nerve to superior cephalic

tentacle.

b, Nerves to inferior cephalic

tentacles.

c, Nerve to generative organs.

d, Pedal nerve.

e, Pedal commissure.

e', Visceral loop or commis- sure (?).

Fig. 49. — Cavolinia tridentata, Forsk. from the Mediterranean, magnified two diameters. (From Owen.) Mouth.

Pair of cephalic tentacles. Pteropodial lobes of the foot. Median web connecting these. Processes of the mantle-skirt re- flected over the

surface of the shell.

The shell enclosing the visceral hump. The median spine of the shell.

a,

b,

C,C,

d,

e,e,

h.

under the pallial aperture. Stomach generally provided with chitinous or calcified masticatory plates. Visceral commissure fairly

spire. Scaphander,

British. Atys. Smaragdinella. Cylichna, British. Amphisphyra, British. Fam. 5. — Bullidae. Margins of foot well developed ; eyes super- ficial; three chitinous stomachal plates; shell external, with reduced spire. Bulla, British. Haminea, British. Fam. 6. — Aceratidae. Cephalic shield continuous with neck; twelve to fourteen stomachal plates; a posterior pallial fila- ment passing through a notch in shell. Acera, British. Cylin- drobulla. Volutetta. Fam. 7. — Aplustridae. Foot very broad; cephalic shield with four tentacles; shell external, thin, without prominent spire. Apluslrum. Hydatina. Micromelo. Fam. 8. — Philintdae. Cephalic shield broad, thick and simple; shell wholly internal, thin, spire much reduced, aperture very large. Philine, British. Cryptophthalmus. Chelinodura. Phanerophthalmus. Colpodaspis, British. Colobocephalus. Fam. 9. — Doridiidae. Cephalic shield ending posteriorly in a median point; shell internal, largely membranous; no radula or stomachal plates. Doridium. Navarchus. Fam. 10. — Gastropleridae. Cephalic shield pointed behind ; . shell internal, chiefly^ membranous, with calcified nucleus, nautiloid; parapodia forming fins. Gastropteron. Fam. 11. — Runcinidae. Cephalic shield continuous with dorsal integument; no shell; ctenidium projecting from mantle cavity. Runcina. Fam. 12. — Lophocercidae. Shell external, globular or ovoid ; foot elongated, parapodia separate from ventral surface; genital duct diaulic. Lobiger. Lopho- cercus. The next three families form the group formerly known as Theco- somatous Pteropods. They are all pelagic, the foot being entirely transformed into a pair of anterior fins; eyes

are absent, and the nerve centres are concentrated on the ven- tral side of the oesophagus.

Fam. 13. — Limacinidae. Dextral animals, with shell coiled pseudo-sinistrally ; operculum with sinistral spiral; pallial cavity dorsal. Limacina, British. Peraclis, ctenidium present. Fam. 14. — Cymbuliidae. Adult without shell; a sub-epithelial pseudoconch formed by connective tissue; pallial cavity ventral. Cymbulia. Cymbuliopsis. Gleba. Desmopterus. Fam. 15. — Cavoliniidae. Shell not coiled, symmetrical; pallial

cavity ventral. Cavolinia. Clio. Cuvierina. Tribe 2. — Aplvsiomorpha. Shell more or less internal, much reduced or absent. Head bears two pairs of tentacles. Parapodia separate from ventral surface, and generally transformed into

Fig. 50. — Shell of Cavolinia tridentata, seen from the side. /, Postero-dorsal surface.

, Antero-ventral surface.

, Median dorsal spine, t, Mouth of the shell.

swimming lobes. Visceral commissure much shortened, except in Aplysia. Genital duct monaulic; hermaphrodite duct connected with penis by a ciliated groove. Animals either swim or crawl.

Fam. i. — Aplysiidae. Shell partly or wholly internal, or absent ;

foot long, with well-developed ventral surface. Aplysia.

Dolabella. Dolabrifer. Aplysiella. Phyllaplysia. Not-

archus.

The next six families include the animals formerly known as

Gymnosomatous Pteropods, characterized by the absence of mantle

and shell, the reduction of the ventral surface of the foot, and the

parapodial fins at the anterior end of the body. They are all pelagic.

Fam. 2.—Pneumonodermatidae. Pharynx evaginable, with

suckers. Pneumonoderma. Dexiobranchaea. Spongiobranchaea.

Schizobrachium.

Fam. 3. — Clionopsidae. No buccal appendages or suckers; a

very long evaginable proboscis ;

a quadriradiate terminal bran-

chia. Clionopsis'.

Fam. 4. — Nalobranchaeidae. Pos- . .. ,, _

terior branchia triradiate. Nolo- «A \ A i !C

branchaea.

Fam. 5. — Thliptodontidae. Head

very large, not marked off from

the body; neither branchia nor

suckers; fins situated near the

middle of the body. Thliptodon.

Fam. 6. — Clionidae. No branchia

Fig. 51. — Embryo of Cavolinia tridentata. (From Balfour, after Fol.) a, Anus.

/, Median portion of the foot. pn, Pteropodial lobe of the foot. h, Heart. i, Intestine. m. Mouth. ot, Otocyst. q, Shell, r, Nephridium. s. Oesophagus.

a, Sac containing nutritive yolk. mb, Mantle-skirt. me; Sub-pallial chamber. Kn, Contractile sinus.

anterior tentacles form a frontal veil; mantle contains spicules. Pleurobranckus. Berthella. Haliotinella. Oscanius, British. Oscaniella. Oscaniopsis. Pleurobranchaea. Sub-order 2. — Nudibranchia. Shell absent in the adult; no ctenidium or

osphradium. Body generally slug-like, and externally symmetrical. Visceral mass not marked off from the foot, except in Hedylidae. Dorsal respiratory appendages frequently present. Visceral commissure reduced; nervous system concentrated on dorsal side of oesophagus. Marine; generally carnivorous, and brightly coloured, affording many instances of protective resem- blance.

Tribe 1. — Tritoniomorpha. Liver wholly or partially contained in the visceral mass. Anus lateral, on the right side. _ Usually two rows of ramified dorsal appendages. Genital duct diaulic; male and female apertures contiguous.

Fam. 1. — Tritoniidae. Anterior tentacles form a frontal veil;

foot rather broad. Tritonia, British. Marionia. Fam. 2. — Scyllaeidae. No anterior tentacles; dorsal appendages broad and f oliaceous ; foot very narrow ; stomach with horny plates. Scyllaea, pelagic. Fam. 3. — Phyllirhoidae. No anterior tentacles, and no dorsal appendages; body laterally compressed, transparent; pelagic. Phyllirhoe. Fam. 4. — Tethyidae. Head broad, surrounded by a funnel-shaped velum or hood; no radula; dorsal appendages f oliaceous. Tethys. Melibe. Fam. 5. — JDendronotidae. Anterior tentacles forming a scalloped frontal veil; dorsal appendages and tentacles similarly ramified. Dendronotus. Campaspe. Fam. 6. — Bornellidae. Dorsum furnished on either side with papillae, at the base of which are ramified appendages. Bornella. Fam. 7. — Lpmanotidae. Body flattened, the two dorsal borders

prominent and foliaceous. Lomanotus, British. Tribe 2. — Doridomorpha. Body externally symmetrical; anus median, posterior, and generally dorsal, surrounded by ramified pallial appendages, constituting a secondary branchia. Liver not ramified in the integuments. Genital duct triaulic. Spicules present in the mantle.

Fam. 1. — Polyceratidae. A more or less prominent frontal

Fig. 52. — Styliola acicula, Rang. sp. enlarged. (From Owen.)

C, C, The wing-like lobes of the foot.

d, Median fold of same.

e, Copulatory organ.

h, Pointed extremity of the

shell, i, Anterior margin of the n, Stomach. [shell.

0, Liver. u, Hermaphrodite gonad.

of any kind ; a short evaginable pharynx, bearing paired conical buccal appendages or " cephalocones." Clione. Paraclione. Fowlerina. Fam. 7. — Halopsychidae. No branchia; two long and branched

buccal appendages. Halopsyche. Tribe 3. — Pleurobranchomorpha. Two pairs of tentacles. Foot without parapodia; no pallial cavity, but always a single ctenidium situated on the right side between mantle and foot. Genital duct diaulic, without open seminal groove; male and female apertures contiguous. Visceral commissure short, tendency to concentration of all ganglia in dorsal side of oesophagus.

Fam. I. — Tylodinidae. Shell external and conical; anterior tentacles form a frontal veil; Ctenidium extending only over right side ; a distinct osphradium. Tylodina. Fam. 2. — Umbrellidae. Shell external, conical, much flattened; anterior tentacles very small, and situated with the mouth in a notch of the foot below the head; ctenidium very large. Umbrella. Fam. 3. — Pleurobranchidae. Shell covered by mantle, or absent;

Fig. 53. — Halopsyche gaudichaudii, Soul. (From Owen.) Much enlarged; the body-wall removed. a, The mouth.

c, The pteropodial lobes of the foot. /, The centrally-placed hind-foot.

d, I, e, Three pairs of tentacle-like

processes placed at the sides of the mouth, and developed (in all probability) from the fore-foot.

0', Anus.

y, Genital pore.

k, Retractor muscles.

and p, The liver.

u, v, w, Genitalia.

Fig. 54. — Ancula cristata, one of the pygobranchiate Opis-thobranchs (dorsal view). (From Gegen- baur, after Alder and

Hancock.) a, Anus.

br, Secondary branchia surrounding the anus. /, Cephalic tentacles.

External to the branchia are seen ten club-like processes of the dorsal wall, these are the " cerata " which are character- istically developed in another sub-order of Opisthobranchs.

veil ; branchiae non-retractile. Euplocamus. Polycera, British. Thecacera, British. Aegirus, British. Plocamopherus. Palio. Crimora. Triopa, British. Triopella. Fam. 2.—Goniodorididae. Mantle-border projecting; frontal veil reduced, and often covered by the anterior border of the

EUTHYNEURA)

GASTROPODA

523

mantle. Goniodoris, British. Acanthodoris, British. Idalia, British. Ancula, British. Doriduncul us. Lamellidoris. An- cylodoris, the only fresh-water Nudibranch, from Lake Baikal. Fam. 3. — Heterodorididae. No branchia. Heterodoris. Fam. 4. — Dorididae. Mantle oval, covering the head and the greater part of the body; anterior tentacles, ill-developed; branchiae generally retractile. Doris, British. Hexabranchus. Chromodoris. Fam. 5. — Doridopsidae. Pharynx suctorial ; noradula; branchia! rosette on the dorsal surface, above the mantle-border. Doridopsis. Fam. 6. — Corambidae. Anus and branchia posterior, below the

mantle-border. Corambe. Fam. 7. — Phyllidiidae. Pharynx suctorial; branchiae surround- ing the body, between the mantle and foot. Phyttidia. Fryeria. The last three families constitute the sub-tribe Porostomata, characterized by the reduction of the buccal mass, which is modified into a suctorial apparatus.

Tribe 3. — Eolidomorpha (Cladohepatica). The whole of the liver contained in the integuments and tegumentary papillae. Genital duct diaulic; male and female apertures contiguous. The anus is antero-lateral, except in the Proctonotidae, in which it is median. Tegumentary papillae not ramified, and containing cnidosacs with nematocysts.

Fam. 1. — Eolididae. Dorsal papillae spindle-shaped or club- shaped. Eolis, British. Facelina, British. Tergipes, British. Gonieolis.

Cuthona. Embletonia. Galvina. Calma. Hero. Fam. 2. — Glaucidae. Body furnished with three pairs of lateral lobes, bearing the tegumentary papillae; foot very narrow; pelagic. Glaucus. Fam. 3. — Hedylidae. Body elongated; visceral mass marked off from foot posteriorly ; dorsal appendages absent, or reduced to a single pair ; spicules in the integument. Hedyle. Fam. 4. — Pseudovermidae. Head without tentacles; body

elongated ; anus on right side. Pseudovermis. Fam. 5. — Proctonotidae. Anus posterior, median; anterior tentacles, atrophied; foot broad. Janus, British. Proclo- notus, British. Fam. 6. — Dotenidae. Bases of the rhinophores surrounded by a sheath; dorsal papillae tuberculated and club-shaped, in a single row on either side of the dorsum ; no cnidosacs. Doto, British. Gellina. Heromorpha. Fam. 7. — Fionidae. Dorsal papillae with a membranous ex- pansion; male and female apertures at some distance from each other; pelagic. Fiona. Fam. 8. — Pleurophyllidae. Anterior tentacles in the form of a digging shield; mantle without appendages, but respiratory papillae beneath the mantle-border. Pleurophyllidia. Fam. g.—Dermatobranchidae. Like the last, but wholly without

branchiae. Dermatobra.nchus. Tribe 4. — ElySIOMORPHA. Liver ramifies in integuments and ex- tends into dorsal papillae, but there are no cnidosacs. Genital duct always triaulic, and male and female apertures distant from each other. No mandibles, and radula uniserial. Never more than one pair of tentacles, and these are absent in Alderia and some species of Limapontia.

Fam. 1. — Hermaeidae. Foot narrow; dorsal papillae linear or

fusiform, in several series. Hermaea, British. Stiliger. Al- deria, British. Fam. 2. — Phyllo- branchidae. Foot broad; dorsal papillae flattened and folia- ceous. Phyllobranchus. Cyerce. Fam. 3. — Plakobran- chidae. Body de- pressed, without dorsal papillae, but with two very large lateral ex pansions, with dorsal plications. Plako-*

branchus. Fam. 4. — Elysiidae. Body elongated, with lateral expansions ;

tentacles large ; foot narrow. Elys i-a, British. Tridachia. Fam. 5. — Limapontiidae. No lateral expansions, and no dorsal papillae; body planariform ; anus Limapontia, British. Actaeonia,

Fig. 55. — Dorsal and Ventral View of Pleurophyllidia lineata

(Otto), one of the Eolidomorph Nudibranchs. (After Keferstein.) b, The mouth.

/, The lamelliform sub-pallial gills, which (as in Patella) replace the typical Molluscan ctenidium.

Tectibranchiate Opisthobranchia by adaptation to a terrestrial life. The ctenidium is atrophied, and the edge of the mantle-skirt is fused to the dorsal integument by concrescence, except at one point which forms the aperture of the mantle-chamber, thus converted into a nearly closed sac. Air is admitted to this sac for respiratory and hydrostatic purposes, and it thus becomes a lung. An operculum is present only in A mphibola ; a contrast being thus afforded with the operculate pulmonate Streptoneura (Cyclostoma, &c), which differ in other essential features of structure from the Pulmonata. The Pulmonata are, like the other Euthyneura, hermaphrodite, with elaborately developed copulatory organs and accessory glands. Like other Euthyneura, they have very numerous small denticles on the lingual ribbon. In aquatic Pulmonata the osphradium is retained.

In some Pulmonata (snails) the foot is extended at right angles to the visceral hump, which rises from it in the form of a coil as in Streptoneura; in others the visceral hump is not elevated, but is extended with the foot, and the shell is small or absent (slugs).

Pulmonata are widely distinguished from a small number of Streptoneura at one time associated with them on account of their mantle-chamber being converted, as in Pulmonata, into a lung, and the ctenidium or branchial plume aborted. The terrestrial Strepto-neura (represented in England by the common genus Cyclostoma)

dorsal, median and posterior. British. Cenia.

Order 2 (of the Euthyneura). — Pulmonata. Euthyneurous Gastropoda, probably derived from ancestral forms similar to the

Fig. 56. — A Series of Stylommatophorous Pulmonata, showing transitional forms between snail and slug.

A, Helix pomatia. (From Keferstein.)

B, Helicophanta brevipes. (From Keferstein, after Pfeiffer.)

C, Testacella haliotidea. (From Keferstein.)

D, Arion ater, the great black slug. (From Keferstein.)

o, Shell in A, B, C, shell-sac (closed) in D; b, orifice leading into the subpallial chamber (lung).

have a twisted visceral nerve-loop, an operculum on the foot, a complex rhipidoglossate or taenio-glossate radula, and are of distinct sexes. The Pulmonata have a straight visceral nerve-loop, usually no operculum even in the embryo, and a multidenticulate radula, the teeth being equi-formal; and they are hermaphrodite. Some Pulmonata (Limnaea, &c.) live in fresh waters although breathing air. The remarkable discovery has been made that in deep lakes such Limnaei do not breathe air, but admit water to the lung-sac and live at the bottom. The lung-sac serves undoubtedly as a hydrostatic apparatus in the aquatic Pulmonata, as well as assisting respiration.

The same general range of body-form is Fig. 57. — Ancylus shown in Pulmonata as in the Heteropoda fluviatilis, a patelli- and in the Opisthobranchia; at one extreme form aquatic Pul- we have snails with coiled visceral hump, at monate. the other cylindrical or flattened slugs (see fig. 56). Limpet-like forms are also found (fig. 57, Ancylus). The foot is always simple, with its flat crawling surface extending from end to end, but in the embryo Limnaea it shows a bilobed char- acter, which leads on to the condition characteristic of Pteropoda.

The adaptation of the Pulmonata to terrestrial life has entailed little modification of the internal organization. In one genus (Planorbis) the plasma of the blood is coloured red by haemoglobin, this being the only instance of the presence of this body in the blood of Glossophorous Mollusca, though it occurs in corpuscles in the blood of the bivalves Area and Solen (Lankester).

The generative apparatus of the snail (Helix) may serve as an example of the hermaphrodite apparatus common to the Pulmonata and Opisthobranchia (fig. 58). From the ovo-testis, which lies near the apex of the visceral coil, a common herma- phrodite duct ve proceeds, which receives the duct of the compact white albuminiparous gland, Ed, and then becomes much enlarged, the additional width being due to the development of glandular folds, which are regarded as forming a uterus u. Where these folds cease the common duct splits into two portions, a male and a female. The male duct vd becomes fleshy and muscular near its termination at the genital pore, forming the penis p. Attached to it is a diverticulum fl, in which the spermatozoa which have descended from the ovo-testis are stored and modelled into sperm ropes or spermatophores. The female por- tion of the duct is more complex. Soon after quitting the uterus it is joined by a long duct leading from a glandular sac, the spermatheca (Rf). In this duct and sac the spermatophores received in copulation from another snail are lodged. In Helix hortensis the sperma- theca is simple. In other species of Helix a second duct (as large in Helix Fig. 58.— Hermaphrodite aspersa as the chief one) is given off Reproductive Apparatus of from ˆ e spermathecal duct, and in the – - •- ■ r — – ■ • natural state is closely adherent to the

wall of the uterus. This second duct has normally no spermathecal gland at its termination, which is simple and r . blunt. But in rare cases in Helix

Ed, Albuminiparous gland, aspersa a second spermatheca is found u, Uterine dilatation of at the end of this second duct. Tracing the hermaphrodite the widening female duct onwards we duct. now come to the openings of the

Digitate accessory digitate accessory glands d, d, which glands on the female probably assist in the formation of the duct. egg-capsule. Close to them is the re-

Calciferous gland or ma rkable dart-sac ps, a thick-walled dart-sac on the female sa Ci ; n the lumen of which a crystalline duct. four-fluted rod or dart consisting of

Spermatheca or recep- carbonate of lime is found. It is sup- tacle of the sperm in posed to act in some way as a stimulant copulation, opening , r n copulation, but possibly has to do into the female duct. w ; t h the calcareous covering of the egg-capsule. Other Pulmonata

exhibit variations of secondary importance in the details of this hermaphrodite ap- paratus.

The nervous system of Helix is not favourable as an example on account of the fusion of the ganglia to form an almost uniform ring of nervous matter around the oesophagus. The pond-snail (Limnaeus) furnishes, on the other hand, a very beautiful case of distinct ganglia and connecting cords (fig. 59). The demonstration which it affords of the ex- treme shortening of the Euthyneurous visceral nerve-loop is most instructive and valuable for comparison with and explanation of the condition of the nervous centres in Cephalopoda, as also of some Opisthobranchia. The figure (fig.' 59) is sufficiently described in the letterpress attached to it ; the pair of buccal ganglia joined by the connectives to the cerebrals are, as in most of our figures, omitted. Here we need only further draw attention to the osphra- dium, discovered by Lacaze-Duthiers, and shown by Spengel to agree in its innervation with that organ in all other Gastropoda. On account of the shortness of the visceral loop and the proximity of the right visceral ganglion to the oesophageal nerve-ring, the nerve to the osphradium and olfactory ganglion is very long. The position of the osphradium corresponds more or less closely with that of the vanished right ctenidium, with which it is normally associated. In Helix and Limax the osphradium has not been described, and possibly its discovery might clear up the doubts which have been raised as to the nature of the mantle-chamber of those genera. In Planorbis, which is sinistral (as are a few other genera or exceptional varieties of various Anisopleurous Gastropods), instead of being dextral, the osphradium is on the left side, and receives its nerve from the left visceral ganglion, the whole series of unilateral organs being reversed. This is, as

the Garden Snail (Helix hor- tensis).

r, Ovo-testis. .

ve, Hermaphrodite duct.

d,

ps.

Rf,

vd,

p,

fl,

Male duct ferens). Penis. Flagellum.

(vas de-

might be expected, what is found to be the case in all " reversed " Gastropods.

The shell of the Pulmonata, though always light and delicate, is in many cases a well-developed spiral " house," into which the creature can withdraw itself; and, although the foot possesses no operculum, yet in Helix the aperture of the shell is closed in the winter by a complete lid, the " hybernaculum," more or less calcareous in nature, which is secreted by the foot. In Claustiia a peculiar modification of this lid exists permanently in the adult, attached by an elastic stalk to the mouth of the shell, and known as the " clausilium." In Limnaeus the permanent shell is preceded in the embryo by a well- marked shell-gland or primitive shell-sac (fig. 60), at one time sup- posed to be the developing anus, but shown by Lankester to be identical with the " shell-gland " discovered by him in other Mol- lusca (Pisidium, Pleurobranchidium, Neritina, &c). As in other Gastropoda Anisopleura, this shell-sac may abnormally develop a plug of chitinous matter, but normally it flattens out and dis- appears, whilst the cap-like rudiment of the permanent shell is shed out from the dome-like surface of the visceral hump, in the centre of which the shell-sac existed for a brief period.

In Clausilia, according to the observations of C. Gegenbaur, the primitive shell-sac does not flatten out and disappear, but takes the form of a flattened closed sac. Within this closed sac a plate of cal- careous matter is developed, and after a time the upper wall of the sac disappears, and the calcareous plate continues to grow as the nucleus of the permanent shell. In the slug Testacella (fig. 56, C) the shell-plate never attains a large size, though naked. In other slugs, namely, Limax and Arion, the shell-sac remains permanently closed over the shell-plate, which in the latter genus consists of a granular mass of carbonate of lime. The permanence of the primi- tive shell-sac in these slugs is a point of considerable interest. It is clear enough that the sac is of a different origin from that of Aplysia (described in- the section treating of Opisthobranchia), being primi- tive instead of secondary. It seems probable that it is identical with one of the open sacs in which each shell-plate of a Chiton is formed, and the series of plate-like imbrications which are placed behind the single shell-sac on the dorsum of the curious slug, Plectro- phorus,

suggest the possibility of the formation of a series of shell- sacs on the back of that animal similar to those which we find in Chiton. Whether the closed primitive shell-sac of the slugs (and with it the transient embryonic shell-gland of all other Mollusca) is precisely the same thing as the closed sac in which the calcareous pen or shell of the Cephalopod- Sepia and its allies is formed, is a further question which we shall con- pe

sider when dealing with the Cephalopoda. It is important here to note that Clausilia furnishes us with an exceptional instance of the continuity of the shell or secreted pro- duct of the primitive shell – sac with the adult shell. In most other Mollusca (Aniso- pleurous Gastropods, Pteropods and Con- chifera) there is a want of such continuity ; the primitive shell-sac contributes no factor to the permanent shell,

or only a very minute Fig. 59. — Nervous System of the Pond- knob – like particle Snail, Limnaeus stagnalis, as a type of the (Neritina and Palu- short-looped euthyneurous condition. The dina). It flattens out short visceral" loop " with its three ganglia and disappears before is lightly-shaded, the work of forming ce , Cerebral ganglion, the permanent shell pe, Pedal ganglion, commences. And just pl t Pleural ganglion, as there is a break a b, Abdominal ganglion, at this stage, so (as sp, Visceral ganglion of the left side; op- observed by A. Krohn posite to it is the visceral ganglion of in Marsenia^Echino- the right side, which gives off the long spira) there may be a nerve to the olfactory ganglion and break at a later stage, osphradium o.

the nautiloid shell In Planorbis and in A uricula (Pulmonata, formed on the larva allied to Limnaeus) the olfactory organ is being cast, and a new on the left side and receives its nerve frorr shell of a different form the left visceral t ganglion. (After Spengel.) being formed afresh on

the surface of the visceral hump. It is, then, in this sense that w may speak of primary, secondary and tertiary shells in Mollusca recognizing the fact that they may be merely phases fused by con- tinuity of growth so as to form but one shell, or that in other cases they may be presented to us as separate individual things, in virtue of the non-development of the later phases, or in virtue of sudden changes in the activity of the mantle-surface causing the shedding

EUTHYNEURA]

GASTROPODA

or disappearance of one phase of shell-formation before a later one is entered upon.

The development of the aquatic Pulmonata from the egg offers considerable facilities for study, and that of Limnaeus has been elucidated by E. R. Lankester, whilst H. Rabl has with remarkable skill applied the method of sections to the study of the minute embryos of Planorbis. The chief features in the development of Limnaeus are exhibited in fig. 60. There is not a very large amount of food-material present in the egg of this snail, and accordingly the cells resulting from division are not so unequal as in many other cases. The four cells first formed are of equal size, and then four smaller cells are formed by division of these four so as to lie at one end" of the first four (the pole corresponding to that at which the " directive corpuscles " are extruded and remain). The smaller cells now divide and spread over the four larger cells; at the same time a space — the cleavage cavity or blastocoel — forms in the centre of the mulberry-like mass. Then the large cells recommence the process of division and sink into the hollow of the sphere, leaving an elongated groove, the blastopore, on the surface. The invaginated cells (derived from the division of the four big celts) form the endoderm or arch-enteron ; the outer cells are the ectoderm. _ The blastopore now closes along the middle part of its course, which coincides

Fig. 60. — Embryo of Limnaeus stagnalis, at a stage when the Trochosphere is developing foot and shell-gland and becoming a Veliger, seen as a transparent object under slight pressure. (Lankester.)

ph.

V, V,

««.

re.

sh, pi,

Pharynx (stomodaeal in- vagination).

The ciliated band -marking out the velum.

Cerebral nerve-ganglion.

Stiebel's canal (left side), tge, probably an evanescent embryonic nephridium.

The primitive shell-sac or shell-gland.

The rectal peduncle or pedicle of invagination; its /,

attachment to the ecto- derm is coincident with the hindmost extremity of the elongated blastopore of fig. 3, C.

Mesoblastic (skeletotrophic and muscular) cells invest- ing gs, the bilobed arch- enteron or lateral vesicles of invaginated endoderm, whichwifi develop into liver.

The foot.

One end of the blastopore

area becomes strongly emarginated and can be traced through the more mature embryos to the cephalic lobes or labial processes of the adult Limnaeus (fig. 61).

The increase of the visceral dome, its spiral twisting, and the gradual closure of the space overhung by the mantle-skirt so as to

in position with the future " foot

becomes nearly closed, and an ingrowth of ectoderm takes place around it to form the stomodaeum or fore-gut and mouth. The other extreme end closes, but the invaginated endoderm cells remain in continuity with this extremity of the blastopore, and form the " rectal peduncle " or " pedicle of invagination " of Lankester, although the endoderm cells retain no contact with the middle region of the now closed-up blastopore. The anal opening forms at a late period by a very short ingrowth or proctodaeum coinciding with the blind termination of the rectal peduncle (fig. 60, pi).

The body-cavity and the muscular, fibrous and vascular tissues are traced partly to two symmetrically disposed " mesoblasts," which bud off from the invaginated arch-enteron, partly to cells derived from the ectoderm, which at a very early stage is connected by long processes with the invaginated endoderm. The external form of the embryo goes through the same changes as in other Gastropods, and is not, as was held previously to Lankester's obser- vations, exceptional. When the middle and hinder regions of the blastopore are closing in, an equatorial ridge of ciliated cells is formed,

converting the embryo into a typical trochosphere.

The foot now protrudes below the mouth, and the post-oral hemisphere of the trochosphere grows more rapidly then the anterior or velar area. The young foot shows a bilobed form. Within the velar area the eyes and the cephalic tentacles commence to rise up, and on the surface of the post-oral region is formed a cap-like shell and an encircling ridge, which gradually increases in prominence and becomes the freely depending mantle-skirt. The outline of the velar

Fig. 61. — A, B, C. Three views of Limnaeus stagnalis, in order to show the persistence of the larval velar area v, as the circum-oral lobes of the adult, m, Mouth ; /, foot ; v, velar area, the margin v corre- sponding with the ciliated band which demarcates the velar area or velum of the embryo Gastropod (see fig. 4, D, E, F, H, I, »). (Original.)

convert it into a lung-sac with a small contractile aperture, belong to stages in the development later than any represented in our figures.

We may now revert briefly to the internal organization at a period when the trochosphere is beginning to show a prominent foot growing out from the area where the mid-region of the elongated blastopore was situated, and having therefore at one end of it the mouth and at the other the anus. Fig. 60 represents such an embryo under slight compression as seen by transmitted light. The ciliated band of the left side of the velar area is indicated by a line extending from t to »; the foot / is seen between the pharynx ph and the pedicle of invagination pi. The mass of the arch-enteron or in- vaginated endodermal sac has taken on a bilobed form, and its cells are swollen (gs and tge). This bilobed sac becomes entirely the liver in the adult ; the intestine and stomach are formed from the pedicle of invagination, whilst the pharynx, oesophagus and crop form from the stomodaeal invagination ph. To the right (in the figure) of the rectal peduncle is seen the deeply invaginated shell-gland ss, with a secretion sh protruding from it. The shell-gland is destined in Limnaeus to become very rapidly stretched out, and to disappear. Farther up, within the velar area, the rudiments of the cerebral nerve-ganglion ng are seen separating from the ectoderm. A remark- able cord of cells having a position just below the integument occurs on each side of the head. In the figure the cord of the left side is seen, marked re. This paired organ consists of a string of cells which are perforated by a duct opening to the exterior and ending internally in a flame-cell. Such cannulated cells are characteristic of the neph- ridia of many worms, and the organs thus formed in the embryo Limnaeus are embryonic

nephridia. The most important fact about them is that they disappear, and are in no way connected with the typical nephridium of the adult. In reference to their first observer they were formerly called " Stiebel's canals." Other Pulmonata possess, when embryos, Stiebel's canals in a more fully developed state, for instance, the common slug Limax. Here too they dis- appear during embryonic life. Similar larval nephridia occur in other Gastropoda. In the marine Streptoneura they are ectodermic projections which ultimately fall off; in the Opisthobranchs they are closed pouches; in Paludina and Bithynia they are canals as in Pulmonata.

Marine Pulmonata. — Whilst the Pulmonata are essentially a terrestrial and fresh- water group, there is one genus of slug-like

, Fig. 62. — Oncidium tonganum, a littoral Pulmonate, found on the shores of the Indian and Pacific Oceans (Mauritius, Japan).

Pulmonates which frequent the sea-coast (Oncidium, fig. 62). Karl Semper has shown that these slugs have, in addition to the usual pair of cephalic eyes, a number of eyes developed upon the dorsal integument. These dorsal eyes are very perfect in elaboration, possessing lens, retinal nerve-end cells, retinal pigment and optic nerve. Curiously enough, however, they differ from the cephalic Molluscan eye in the fact that, as in the vertebrate eye, the filaments of the optic nerve penetrate the retina, and are connected with the

$2f>

GASTROTRICHA

surfaces of the nerve-end cells nearer the lens instead of with the opposite end. The significance of this arrangement is not known, but it is important to note, as shown by V. Henson, S. J. Hickson and others, that in the bivalves Pecten and Spondylus, which also have eyes upon. the mantle quite distinct from typical cephalic eyes, there is the same relationship as in Oncidiidae of the optic nerve to the retinal cells. In both Oncidiidae and Pecten the pallial eyes have probably been developed by the modification of tentacles, such as coexist in an unmodified form with the eyes. The Oncidiidae are, according to K. Semper, pursued as food by the leaping fish Periofh- thalmus, and the dorsal eyes are of especial value to them in aiding them to escape from this enemy.

Sub-order i. — Basommatophora. Pulmonata with an external shell. The head bears a single pair of contractile but not invaginable

tentacles, at the base of which are the eyes. Penis at some distance from the female aperture, except in Amphibola and Siphonaria. All have an osphradium, except the Auriculidae, which are terres- trial, and it is situated outside the pallial cavity in those forms in which water is not admitted into the lung. There is a veliger stage in development, but the velum is reduced.

Fam. i. — Auriculidae. Terrestrial and usually littoral; genital duct monaulic, the penis being connected with the aperture by an open or closed groove; shell with a prominent spire, the internal partitions often absorbed and the aperture denticulated. Auricula. Cassidula. Alexia. Melatnpus. Carychium, terrestrial, British. Scarabus. Leuconia, British. Blauneria. Pedipes. Fam. 2. — Otinidae. Shell with short spire, and wide oval aperture;

tentacles short. Otina, British. Camptonyx, terrestrial. Fam. 3. — Amphibolidae. Shell spirally coiled; head broad, without prominent tentacles; foot short, operculated; marine. Amphibola. Fam. .— Siphonariidae. Visceral mass and shell conical; ten- tacles atrophied; head expanded; genital apertures con- tiguous; marine animals, with an aquatic pallial cavity con- taining secondary branchial laminae. Siphonaria. Fam. 5. — Gadiniidae. Visceral mass and shell conical; head flattened; pallial cavity aquatic, but without a branchia; genital apertures separated. Gadinia. Fam. 6. — Chilinidae. Shell ovoid, with short spire, wide aperture and folded columella; inferior pallial lobe thick; visceral commissure still twisted. Chilina. Fam. 7. — Limnaeidae. Shell thin, dextral, with prominent spire ,and oval aperture; no inferior pallial lobe. Limnaea, British. Amphipeplea, British. Fam. 8. — Pompholygidae. Shell dextral, hyperstrophic, animal

sinistral. Pompholyx. Choanomphalus. Fam. 9. — Planorbidae. Visceral mass and shell sinistral ; inferior pallial lobe very prominent, and transformed into a branchia. Planorbis, British. Bulinus. Miratesta. Fam. 10. — Ancylidae. Shell conical, not spiral; inferior pallial lobe transformed into a branchia. Ancylus, British. Latia, Grundlachia. _ .

Fam. 11. — Physidae. Visceral mass and shell sinistrally coiled; shell thin, with narrow aperture ; no inferior pallial lobe. Physa, British. Aplexa, British. Sub-order 2. — Stylommatophora. Pulmonata with two pairs of tentacles, except Janelltdae and Vertigo; these tentacles are in- vaginable, and the eyes are borne on the summits of the posterior pair. Male and female genital apertures open into a common vesti- bule, except in Vaginulidae and Oncidiidae. Except in

Oncidium, there is no longer a veliger stage in development.

Tribe 1. — Holognatha. Jaw simple, without a superior ap- pendage. Fam. 1. — Selenitidae. Radula with elongated and pointed teeth, like those of the Agnatha; a jaw present. Plutonia. Trigo- nochlamys. Fam. 2. — Zonitidae. Shell external, smooth, heliciform or flattened; radula with pointed marginal teeth. Zonites, British. Ariophanta. Orpiella. Vitrina. Helicarion. Fam. 3. — Limacidae. Shell internal. Limax, British. Parma- cella. Urocyclus. Parmarion. Amalia. Agriolimax. Mesolimax. Monochroma. Paralimax. Metalimax. Fam. 4. — Philomycidae. No shell; mantle covers the whole

surface of the body ; radula with squarish teeth. Philomycus. Fam. $. —Ostracolethidae. Shell largely chitinous, not spiral, its calcareous apex projecting through a small hole in the mantle. Ostracolelhe. Fam. 6. — Arionidae. Shell internal, or absent; mantle restricted to the anterior and middle part of the body; radula with squarish teeth. Avion, British. Geomalacus. Ariolimax. Ana- denus. Fam. T.— Helicidae. Shell with medium spire, external or partly covered by the mantle; genital aperture below the right pos- terior tentacle; genital apparatus generally provided with a aart-sac and multifid vesicles. Helix, British. Bulimus. Hemphillia. Berendtia. Cochlostyla. Rhodea. Fam. %.—Endodontidae. Shell external, spiral, generally orna- mented with ribs; borders of aperture thin and not reflected; radula with square teeth; genital ducts without accessory

organs. Endodonla. Punctum. Sphyradium. Laoma. Pyra- midula. Fam. 9. — Orthalicidae. Shell external, ovoid, the last whorl swollen, aperture oval with a simple border; radular teeth in oblique rows. Orthalicus. Fam. 10. — Bulimulidae. Jaw formed of folds imbricated exter- nally and meeting at an acute angle near the base. Bulimulus. Peltella. Amphibulimus. Fam. 11. — Cylindrellidae. Shell turriculated, with numerous

whorls, the last more or less detached. Cylindrella. Fam. 12. — - Pupidae. Shell external, with elongated spire and numerous whorls, aperture generally narrow; male, genital duct without multifid vesicles. Pupa, British. Eucalodium. Vertigo, British. Buliminus, British. Clausilia, British. Balea. Zospeum. Megaspira. Strophia. Anostoma. Fam. 13. — Stenogyridae. Shell elongated, with a more or less obtuse summit; aperture with a simple border. Achatina. Stenogyra. Ferussacia, British. Cionella. Caecilianella. Azeca. Opeas. Fam. 14. — Helicteridae. Shell bulimoid, dextral or sinistral; radular teeth, expanded at their extremities and multicuspidate. Helicter. Tornatellina. Tribe 2. — Agnatha. No jaws; teeth narrow

and pointed; carnivorous.

Fam. 1. — Oleacinidae. Shell oval, elongated, with narrow aperture; neck very long; labial palps prominent. Oleacina (Glandina). Streptostyla. Fam. 2. — Testacellidae. Shell globular or auriform, external or partly covered by the mantle. Streptaxis. Gibbulina. Aerope. lihylida. Daudebardia. Testacella. Chlamydophorus. Schizoglossa. Fam. 3. — Rathouisiidae. No shell, a carinated mantle covering the whole body; male and female apertures distant, the female near the anus. Rathouisia. Atopos. Tribe 3. — Elasmognatha. Jaw with a well-developed dorsal appendage.

Fam. 1. — Succineidae. Anterior tentacles much reduced; male and female apertures contiguous but distinct; shell thin, spiral, with short'spire. Succinea, British. Homalonyx. Hya- limax. Neohyalimax. Fam. 2. — Janellidae. Limaciform, with internal rounded shell ; mantle very small and triangular; pulmonary chamber with tracheae; no anterior tentacles. Janetta. Aneitella. Aneitea. Triboniophorus. Tribe 4. — Ditremata. Male and female apertures distant. Fam. I. — Vaginulidae. No shell; limaciform; terrestrial; female aperture on right side in middle of body ; anus posterior. Vaginula. Fam- 2. — Oncidiidae. No shell; limaciform; littoral; female aperture posterior, near anus; a reduced pulmonary cavity with a distinct aperture. Oncidium. Oncidiella, British. Peronia. Authorities. — L. Boutan, " La Cause principale de l'asymetrie des mollusques gasteropodes," Arch, de zool. exper. (3), vii. (1899); A. Lang, " Versuch einer Erklarung der Asymmetrie der Gastro- poder," Vierteljahrsschr. naturforsch. Gesellschaft, Zurich, 36 (1892); A. Robert, " Recherches sur le deVeloppement des Troques," Arch, de zool. expir. (3), x. (1903); P. Pelseneer, " Report on the Ptero- poda," Zool. " Challenger " Expedit. pts. lviii., lxv., lxvi. (1887, 1888); P. Pelseneer, " Protobranches aeViens et Pulmonis branchi- feres," Arch, de biol. xiv. (1895) ; W. A. Herdman, " On the Structure and Functions of the Cerata or Dorsal Papillae in some Nudi- branchiate Mollusca," Quart. Journ. Mic. Sci. (1892) : J. T. Cunning- ham, " On the Structure and Relations of the Kidney in Aplysia," Mitt. Zool. Stat. Neapel, iv. (1883) ; Bohmig, " Zur feineren Anatomie von Rhodope veranyi, KoIIiker," Zeitschr.f. wiss. Zool. vol. lvi. (1893). Treatises. — S. P. Woodward, Manual of the Mollusca (2nd ed., with appendix, London, 1869); E. Forbes and S. Hanley, History of British Mollusca (4 vols., London, 1853); Alder and Hancock, Monograph of British Nudibranchiale Mollusca (London, Roy. Society, 1845); P. Pelseneer, Mollusca. Treatise on Zool., edited by E. Ray Lankester, pt. v. (1906) ; E. Ray Lankester, " Mollusca," in 9th ed. of this Encyclopaedia, to which this article is

much in- debted. (J T. C.)

GASTROTRICHA, a small group of fairly uniform animals which live among Rotifers and Protozoa at the bottom of ponds and marshes, hiding amongst the recesses of the algae and sphagnum and other fresh-water plants and eating organic debris and Infusoria. They are of minute size varying from one- sixtieth to one-three-hundredth of an inch, and they move by means of long cilia. Two ventral bands composed of regular transverse rows of cilia are usually found. The head bears some especially large cilia. The cuticle which covers the body is here and there raised into overlapping scales which may be prolonged into bristles. An enlarged, frontal scale may cover the head, and a row of scales separates the ventral ciliated areas from one

So

another, whilst two series of alternating rows cover the back and side. The body, otherwise circular in section, is slightly flattened ventrally. The mouth is anterior and slightly ventral; it leads into a protrusible pharynx armed with recurved teeth that can be

everted. This leads to a muscular Mr oesophagus with a triradiate lumen,

v #ˆ- which acts as a sucking pump and Vfcd ends in a funnel-valve projecting into the stomach. The last named is oval and formed of four rows of large cells; it is separated by a sphincter from the rectum, which opens posteriorly and dorsally. The nitrogenous excretory appara- tus consists of a coiled tube on each side of the stomach; internally the tubes end in large flame-cells, and externally by small pores which lie on the edges of the ventral row of scales. A cerebral ganglion rests on the oesophagus and supplies the cephalic cilia and hairs; it is con- tinued some way back as two dorsal nerve trunks. The sense organs are the hairs and bristles and in some species eyes. The muscles are simple and unstriated and for the most part run longitudinally.

The two ovaries lie at the level of the juncture of the stomach and rectum. The eggs become very large, sometimes half the length of the mother; they are laid amongst water weeds. The male reproductive system is but little known, a small gland lying between the ovaries

has been thought to be a testis, and if it be, the Gastrotricha are herma- phrodite.

Zelinka classifies the group as fol- lows : —

Sub-order 1 . — Euichthydina with a forked tail.

(i.) Fam. Ichthydidae, without bristles. Genera : Ichthydium, Lepido- dertna.

(ii.) Fam. Chaetonotidae, with bristles. Genera : Chaetonotus ,

Chaetura.

Sub-order 2. — ApODINa, tail not Dasydytes, Gossea,

From Zeilschrift fur Wissen- schult Zoologie, vol. x!ix. p. 209, by permission of Wilhelm Engel- mann.

Chaetonotus maximus, Ehrb., ventral side. (After Zelinka.) Bo, Bristles surrounding

the mouth. ds, Dorsal bristles. kCi, Posterior lateral cilia. Ke, Cuticular dome.

Oral cavity.

Lateral sensory hairs.

Cuticular plates.

Dorsal bristle of the basal part. Sch, Plates. Se. Lateral bristles.

Point of union of cili-

Mr, IT, PI, Sa,

Vb,

vCi vS,

ated tract. Anterior group of cilia, forked. Genera: Ventral bristles of the Stylochaeta. ba3al part. The genus Aspidiophorus recently

described by Voigt seems in some respects intermediate between Lepidoderma and Chaetonotus. Zelinkia and Philosyrtis are two slightly aberrant forms described by Giard from certain

diatomaceous sands. Altogether there must be some forty to fifty described species.

The group is an isolated one and shows no clear affinities with any of the great phyla. Those that are usually dwelt on are treated with the Rotifers and Nematoda and Turbellaria.

Literature.— A. C. Stokes, The Microscope (Detroit, 1887-1888) ; C. Zelinka, Zeitschr. iviss. Zool. xlix., 1890, p. 209; M. Voigt, Forschber. Plon. Th. ix., 1904, p. I ; A. Giard, C. R. Soc. Biol. lvi. pp. 1061 and 1063; E. Daday, Termes. Fuzeteh. xxiv. p. I ; F. Zschokke, Denk. Schweiz. Ges. xxxvii. p. 109; S. Hlava, Zool. Anz. xxviii., 1905, p. 331. (A. E. S.)

GATAKER, THOMAS (1574-1654), English divine, was born in London in September 1574, and educated at St John's College, Cambridge. From 1601 to 161 1 he held the appointment .of preacher to the society of Lincoln's Inn, which he resigned on accepting the rectory of Rotherhithe. In 1642 he was chosen a member of the assembly of divines at Westminster, and annotated for that assembly the books of Isaiah, Jeremiah and Lamenta- tions. He disapproved of the introduction of the Covenant, and declared himself in favour of episcopacy. He was one of the forty-seven London clergymen who disapproved of the

trial of Charles I. He was married four times, and died in July

l6 54-

His principal works, besides some volumes of sermons are — On the Nature and Use of Lots (1619), a curious treatise which led to his being accused of favouring games of chance; Dissertatio de stylo Novi Testamenti (1648); Cinnus, sive Adversaria miscellanea, in quibus Sacrae Scripturae primo, deinde aliorum scriptorum, locis aliquant multis lux redditur (1651), to which was afterwards sub-joined Adversaria Posthuma; and his edition of Marcus Antoninus (1652), which, according to Hallam, is the " earliest edition of any classical writer published in England with original annotations," and, for the period at which it was written, possesses remarkable merit. His collected works were published at Utrecht in 1698.

6ATCHINA, a town of Russia, in the government of St Peters- burg, 29 m. by rail S. of the city of St Petersburg, in 59 "34′ N. and 30 6′ E. Pop. (i860) 9184; (1897) 14,735. It is situated in a flat, well-wooded, and partly marshy district, and on the south side of the

town are two lakes. Among its more important buildings are the imperial palace, which was founded in 1770 by Prince Orlov, and constructed according to the plans of the Italian architect Rinaldi; a military orphanage, founded in 1803; and a school for horticulture. Among the few industrial establishments is a porcelain factory. At Gatchina an alliance was concluded between Russia and Sweden on the 29th of October

1799.

GATE, an opening into any enclosure for entrance or exit, capable of being closed by a barrier at will. The word is of wide application, embracing not only the defensive entrance ways into a fortified place, with which this article mainly deals, or the imposing architectural features which form the main entrances to palaces, colleges, monastic buildings, &c, but also the common five-barred barrier which closes an opening into a field. The most general distinction that can be made between " door " and " gate " is that of size, the greater entrance into a court contain- ing other buildings being the " gate," the smaller entrances opening directly into the particular buildings the " doors," or that of construction, the whole entrance way being a " gate " or gateway, the barrier which closes it a " door." A further dis- tinction is drawn by applying " door " to the solid barriers or " valves " of wood, metal, &c, made in panels and fitted to a framework, and " gate " to an openwork structure, whether of metal or wood (see further Door and Metal- work). The ultimate origin of the word is obscure; the early forms appear with a palatalized initial letter, still surviving in such dialectical forms as " yate," or in Scots " yett." It is probably connected with the root of " get," in the sense either of " means of access " or of " holding," " receptacle "; cf. Dutch gat, hole. There maybe a connexion, however, with " gate," now usually spelled " gait," a manner of walking, 1 but originally a way, passage; cf. Ger. Gasse, narrow street, lane.

The entrance through the enclosing walls of a city or fortifica- tion has been from the earliest times a place of the utmost importance, considered architecturally, socially or from the point of view of the military engineer. In the East the " gate " was and still is in many Mahommedan countries the central place of civic life. Here was the seat of justice and of audience, the most important market-place, the spot where men gathered to receive and exchange news. The references in the Bible to the gates of the city in all these varied aspects are innumerable (cf. Gen. xix. r; Deut. xxv. 7; Ruth iv. 152 Sam. xix. 8; 2 Kings vii. 1). Later the seat of justice and of government is transferred to the gate of the palace of the king (cf.

Dan. ii. 49. and Esther ii. 19), and this use is preserved to-day in the official title of the seat of govern- ment of the Turkish empire at Constantinople, the " Sublime Porte," a translation of the Turkish Bab Ally (bab, gate, and aliy, high). A full account with many modern instances of Eastern customs will be found in Sir Charles Warren's article " Gate " in

1 The spelling " gait " is confined to this meaning — the only literary one surviving. In the form " gate " it appears dialectally in this sense and in such particular meanings as a right to run cattle on common or private ground or as a passage way in mines. The prin- cipal survival is in names of streets in the north and midlands of England and in Scotland, e.g. Briggate at Leeds, Wheeler Gate and Castle Gate at Nottingham, Gallow Tree Gate at Leicester, and Canongate and Cowgate at Edinburgh.

Hastings's Diet, of Bible. For the " pylon," the typical gate of Egyptian architecture, see Architecture.

The gates into a walled town or other fortified place were necessarily in early times the chief points on which the attack concentrated, and the features, common throughout the ages, of flanking or surmounting towers and of galleries over the entrance way, are found in the Assyrian gate at Khorsabad (cf. 2 Chron. xxvi. 9; 2 Sam. xviii. 24). With the coming of peaceful times to a city or the removal of the fear of sudden attack, the gateways would take a form adapted more for ready exit and entrance than for defence, though the possibility of defending them was not forgotten. Such city gates often had separate openings for entrance and exit, and again for foot passengers and for vehicles. The Gallo-Roman gate at Autun has four entrances, two just wide enough to admit carriages, and two narrow alleys for foot passengers. A fine example of a Roman city gate, dating from the time of Constantine, is at Treves. It is four storeys high, with ornamental windows, and decorated with columns on each storey. The two outer wings project beyond the central part, the two entrance ways are 14 ft. wide, and could be closed by doors and a portcullis. The chambers in the storeys above were used for the purposes of civil administration. In more modern times city gateways have often followed the type of the Roman triumphal arch, with a single wide opening and purely ornamental superstructure. On the other hand, the defensive gate formed by an archway entering as it

were through a tower has been constantly followed as a type of entrance to buildings of an entirely peaceful character. A fine example of such a gateway, originally built for defence, is at Battle Abbey; this was built by Abbot Retlynge in 1338, when Edward III. granted a licence to fortify and crenellate the abbey. Such gateways are typical of Tudor palaces, as at St James's or at Hampton Court, and are the most common form in the colleges of Oxford and Cambridge. The Tom Gate at Christ Church, Oxford, with its surmounted domed bell tower, or the cupola resting on columns at Queen's College, Oxford, are further examples of the gate architecturally considered.

The changes the fortified gateway has undergone in construction and the varying relative importance it has held in the scheme of defence follow the lines of development taken by the history of Fortification and Siegecraft (?.».). The following is a short sketch of the main stages in its history. A good example of the Roman fortified city gate still remains at Pompeii. Here there is one passage way for vehicles, 14 ft. wide; this is open to the sky. The two footways on either side are arched, with openings in the centre on to the central way. The doors of the gate are on the city side, but a portcullis {cataracta) closed it on the country side. The gateways of the Roman permanent camps (castra stativa) were four in number, the porta praetoria and Decumana at either end, with principalis dextra and sinistra on the side (see also Camp). At Pevensey (Anderida) a small postern on the north side of the Roman walls was laid bare in 1 906-1907, in which the passage curves in the thickness of the wall, and from a width admitting two men abreast narrows so that one alone could block it. Flanking towers or bastions guarded the main entrances, while in front were built outworks, of palisades, &c, to protect it; these were known as pro- casira or anlemuralia, and the entrances to these were placed so that they could be flanked from the main walls.

In the defence of a fortified place the gate had not only to be protected from sudden surprise, but also had to undergo pro- tracted attacks concentrated upon it during a siege. Thus until the coming of gunpowder, the ingenuity of military engineers was exhausted in accumulating the most complicated defences round the gateways, and the strength of a fortified place could be estimated by the fewness of its gates. Viollet-le-Duc (Diet, de I'areh. du moyen age, s.v. Porte) takes the Narbonne and Aude gates (E. and W.) of Carcassonne as typical instances of this complication. The following brief account of the Narbonne Gate (fig. 1), one of the principal parts of the work on the fortifica- tions begun by Philip the Bold in 1285, will give some idea of the varied means of defence, which may

be found individually if

not always in such collective abundance in the fortified gateways of the middle ages. Two massive towers flanked the actual entrance and were linked across by an iron chain; over the entrance (E) was a machicolation, further added to in time of war by a hoarding of timber; and an outer portcullis fell in front of the heavy iron-lined doors. On to the passage way between the first and second doors opened a square machicolation (G) from which the defenders in the upper chambers of the gate could attack an enemy that had succeeded in breaking through the first entrance or had been trapped by the falling of the first portcullis. Another machicolation (I) opened from the roof in front of the second portcullis and second door. So much for the gate itself; but before an attack could reach that point, the following defences had to be passed: an immense circular barbican (A) protected the entrance across the moat and through the outer enceinte of the city. This entrance was flanked by a masked return of the wall ©, while palisades (P) still further hampered the assailant in his passage across the " lists " to the foot of the gate towers. Here sappers would find themselves exposed to a fire from the loopholes and from the machicolated hoardings above them, while the projecting horns with which

The City

The Ditch

Fig. 1. — Plan of the Narbonne Gate of the city of Carcassonne.

the face of the towers terminated forced them to uncover them- selves to a flanking fire from the indents in the main curtain on either side of the towers.

The later history of the gateway is merged in that of modern fortification. The more elaborate the gate defences the greater was the inducement for the besieger to attack the walls, and improvements in methods of siegecraft ultimately compelled the defender to develop the enceinte from its medieval form of a ring wall with flanking towers to the 17th century form of bastions, curtains, tenailles and ravelins, all intimately connected in one general scheme of defence. By Vauban's time there is little to distinguish the position and defences of the gateways from the rest of the fortifications surrounding a town. A road from the country usually entered one of the ravelins, sinking into the glacis, crossing the ditch of the ravelin and piercing the parapet almost at right

angles to its proper direction (see fig. 2, which also shows a typical arrangement of minor communications such as ramps and staircases). From the interior of the ravelin it passed across the main ditch to a gate in the curtain of the enceinte. The road was in fact artificially made to wind in such a way that it was kept under fire from the defences throughout, while the part of it inside the works was bent so as to place a covering mass between the enemy's fire and troops using the road for a sortie. Thus the gate itself was merely a barrier against a coup de main and to keep out unauthorized persons. In conditions precluding the making of a breach in the walls, i.e. in surprises and assaults de vive force, the gateway and accompanying drawbridge continue to play their part in the 16th, 17th and 18th centuries, but they seldom or never appear as the objectives of a siege en regie. In Vauban's works, and those of most other engineers, there was generally a postern giving access to the floor of the main ditch, in the centre of the curtain escarp. The gates of Vauban's and later fortresses are strong heavy wooden

doors, and the gateways more or less ornamental archways, exactly as in many private mansions of castellar form. In modern fortresses the gate of a detached fort or an enceinte de surete is intended purely as a defence against an unexpected rush. The usual method is to have two gates, the outer one a lattice or portcullis of iron bars and the inner one a plate of half- inch steel armour, backed by wood and loopholed. The defenders of the gate can by this arrangement fire from the inner loopholes through the outer gate upon the approaches, and also keep the enemy under fire whilst he is trying to force the outer gate

Fig. 2. — Plan of Gate Arrangements of an 18th Century Fortress.

itself. The ditches are crossed either by drawbridges or by ramps leading the road down to the floor of the ditch.

The " gate " as a barrier to be removed and as an entrance to be passed is of constant occurrence in figurative language and in symbolical usage. The gates of the temple of Janus {q.v.) at Rome stood open in war and closed in peace. The pylon of ancient Egypt had a symbolical meaning in the Book of the Dead, and religious significance attaches to the torii, one of the outward signs of the Shinto religion in Japan, the Buddhist toran, and to the Chinese pai-

loo, the honorific gateways erected to ancestors. The gates of heaven and hell, the gates of death and darkness, the wide and narrow gates that lead to destruction and life (Matt. vii. 13 and 14), are familiar metaphorical phrases in the Bible. In Greek and Roman legend dreams pass through gates of transparent horn if true, if deceptive and false through opaque gates of ivory (Horn. Od. xix. 560 sq.; Virg; Aen. vL 893). (C. We.)

GATEHOUSE. In the second half of the 16th century in England the entrance gateway, which formed part of the principal front of the earlier feudal castles, became a detached feature attached to the mansions only by a wall enclosing the entrance court. The gatehouse then constituted a structure of some importance, and included sometimes many rooms as at Stanway Hall, Gloucestershire, where it measures 44 ft. by 22 ft. and has three storeys; at Westwood, Worcestershire, it had a frontage of 54 ft. with two storeys; and at Burton Agnes, Yorkshire, it was still larger and was flanked by great octagonal towers at the angles and had three storeys. At a later period smaller accommodation was provided so that it virtually became a lodge, but being designed to harmonize with the mansion it presented sometimes a monumental structure. On the continent of Europe the gatehouse forms a much more important building, as it formed part of the town fortifications, where it sometimes defended the passage of a bridge across the stream or moat. There are numerous examples in France and Germany.

GATES, HORATIO (1728-1806), American general, was born at Maldon in Essex, England, in 1728. He entered the English # anny at an early age, and was rapidly promoted. He accom- panied General Braddock in his disastrous expedition against Fort Duquesne in 1755, and was severely wounded in the battle of July 9;. and he saw other active service in the Seven Years' War. After the peace of 1763 he purchased an estate in Virginia,

where he lived till the outbreak of the War of Independence in 1775, when he was named by Congress adjutant-general. In 1776 he was appointed to command the troops which had lately retreated from Canada, and in August 1777, as a result of a successful intrigue, was appointed to supersede General Philip Schuyler in Command of the Northern Department. In the two battles of Saratoga (q.v.) his army defeated General Burgoyne, who, on the 17th of October, was forced to surrender his whole army. This success was, however, largely due to the previous manoeuvres of Schuyler and to Gates's subordinate officers. The intrigues of the Conway Cabal to have Washington superseded by Gates completely failed, but Gates was president for a

time of the Board of War, and in 1780 was placed in chief command in the South. He was totally defeated at Camden, S.C., by Cornwallis on the 17th of August 1780, and in December was superseded by Greene, though an investigation into his conduct terminated in acquittal (1782). He then retired to his Virginian estate, whence he removed to New York in 1790, after emancipat- ing his slaves and providing for those who needed assistance. He died in New York on the 10th of April 1806.

GATESHEAD, a municipal, county and parliamentary borough of Durham, England; on the S. bank of the Tyne opposite Newcastle, and on the North Eastern railway. Pop. (1801) 85,692; (igoi) 109,888. Though one of the largest towns in the county, neither its streets nor its public buildings, except perhaps its ecclesiastical buildings, have much claim to architectural beauty. The parish church of St Mary is an ancient cruciform edifice surmounted by a lofty tower; but extensive restoration was necessitated by a fire in 1854 which destroyed a considerable part of the town. The town-hall, public library and mechanic's institute are noteworthy buildings. Education is provided by a grammar school, a large day school for girls, and technical and art schools. There is a service of steam trams in the principal streets, and three fine bridges connect the town with Newcastle-upon-Tyne. There are large iron works (including foundries and factories for engines, boilers, chains and cables), shipbuilding yards, glass manufactories, chemical, soap and candle works, brick and tile works, breweries and tanneries. The town also contains a depot of the North Eastern railway, with large stores and locomotive works. Exten- sive coal mines exist in the vicinity; and at Gateshead Fell are large quarries for grindstones, which are much esteemed and are exported to all parts of the world. Large gas-works of the Newcastle and Gateshead Gas Company are also situated in the borough. The parliamentary borough returns one member. The corporation consists of a mayor, 9 aldermen, and 27 councillors. Area, 3132 acres.

Gateshead (Gateshewed) probably grew up during late Saxon times, the mention of the church there in which Bishop Walcher was murdered in 1080 being the first evidence of settlement. The borough probably obtained its charter during the following century, for Hugh de Puiset, bishop of Durham (1153-1195), confirmed to his burgesses similar rights to those of the burgesses of Newcastle, freedom of toll within the palatinate and other privileges. The bishop had a park here in r348, and in 1438 Bishop Nevill appointed a keeper of the " tower." The position of the town led to a struggle with Newcastle over both fishing and trading rights. An inquisition of

1322 declared that the water of the Tyne was divided into three parts: the northern, belonging to Northumberland; the southern to Durham; and the central, common to all. At another inquisition held in 1336 the men of Gateshead claimed liberty of trading and fishing along the coast of Durham, and freedom to sell their fish where they would. In 1552, on the temporary extinction of the diocese of Durham, Gateshead was attached to Newcastle, but in 1554 was regranted to Bishop Tunstall. As compensation the bishop granted to Newcastle, at a nominal rent, the Gateshead salt-meadows, with rights of way to the High Street, thus abolishing the toll previously paid to the bishop. During the next century Bishop Tunstall's successors incorporated nearly all the various trades of Gateshead, and Cromwell continued this policy. The town government during this period was by

the bishop's bailiff, and the holders of the burgages composed the juries of the bishop's courts leet and baron. No charter of incorporation is extant, but in 1563 contests were carried on under the name of the bailiffs, burgesses and commonalty, and a list of borough accounts exists for 1696. The bishop appointed the last borough bailiff in 1681, and though the inhabitants in 1772 petitioned for a bailiff the town remained under a steward and grassmen until the 19th century. As part of the palatinate of Durham, Gateshead was not represented in parliament until 1 83 2 . At the inquisition of 1 336 the burgesses claimed an annual fair on St Peter's Day, and depositions in 1577 mention a borough market held on Tuesday and Friday, but these were apparently extinct in Camden's day, and no grant of them is extant. The medieval trade seems to have centred round the fisheries and the neighbouring coal' mines which are mentioned in 1364 and also by Leland.

GATH, one of the five chief cities of the Philistines. It is frequently mentioned in the historical books of the Old Testament, and from Amos vi. 2 we conclude that, like Ashdod, it fell to Sargon in 711. Its site appears to have been known in the 4th century, but the name is now lost. Eusebius (in the Onomasticon) places it near the road from Eleutheropolis (Beit Jibrin) to Diospolis (Ludd) about five Roman miles from the former. The Roman road between these two towns is still traceable, and its milestones remain in places. East of the road at the required distance rises a white cliff, almost isolated, 300 ft. high and full of caves. On the top is the little mud village of Tell es-

Safi (" the shining mound "), and beside the village is the mound which marks the site of the Crusaders' castle of Blanchegarde (Alba Custodia), built in 1144. Tell es-Safi was known by its present name as far back as the 12th century; but it appears not improbable that the strong site here existing represents the ancient Gath. The cliff stands on the south side of the mouth of the Valley of Elah, and Gath appears to have been near this valley (1 Sam. xvii. 2, 52). This identification is not certain, but it is at least much more probable than the theory which makes Gath, Eleutheropolis, and Beit Jibrin one and the same place. The site was partially excavated by the Palestine Exploration Fund in 1899, and remains extending in date back to the early Canaanite period were discovered.

GATLING, RICHARD JORDAN (1818-1903), American in- ventor, was born in Hertford county, North Carolina, on the 1 2th of September 1818. He was the son of a well-to-do planter and slave-owner, from whom he inherited a genius for mechanical invention and whom he assisted in the construction and perfecting of machines for sowing cotton seeds, and for thinning the plants. He was well educated and was successively a school teacher and a merchant, spending all his spare time in developing new inven- tions. In 1839 he perfected a practical screw propeller for steam- boats, only .to find that a patent had been granted to John Ericsson for a similar invention a few months earlier. He estab- lished himself in St Louis, Missouri, and taking the cotton- sowing machine as a basis he adapted it for sowing rice, wheat and other grains, and established factories for its manufacture. The introduction of these machines did much to revolutionize the agricultural system in the country. Becoming interested in the study of medicine through an attack of smallpox, he completed a course at the Ohio Medical College, taking his M.D. degree in 1850. In the same year he invented a hemp-breaking machine, and in 1857 a steam plough. At the outbreak of the Civil War he was living in Indianapolis, and devoted himself at once to the perfect- ing of fire-arms. In 1861 he conceived the idea of the rapid fire machine-gun which is associated with his name. By 1862 he had succeeded in perfecting a gun that would discharge 350 shots per minute; but the war was practically over before the Federal authorities consented to its official adoption. From that time, however, the success of the invention was assured, and within ten years it had been adopted by almost every civilized nation. Gatling died in New York City on the 26th of February

1903.

GATTY, MARGARET (1809-1873), English writer, daughter of the

Rev. Alexander Scott (1768-1840), chaplain to Lord Nelson,

was born at Burnham, Essex, in 1809. She early began to draw and to etch on copper, being a regular visitor to the print-room of the British Museum from the age of ten. She also illuminated on vellum, copying the old strawberry borders and designing initials. In 1839 Margaret Scott married the Rev. Alfred Gatty, D.D., vicar of Ecclesfield near Sheffield, subdean of York cathedral, and the author of various works both secular and re- ligious. In 1842 she published in association with her husband a life of her father; but her first independent work was The Fairy Godmother and other Tales, which appeared in 1851. This was followed in 1855 by the first of five volumes of Parables from Nature, the last being published in 1871. It was under the nom de plume of Aunt Judy, as a pleasant and instructive writer for children, that Mrs Gatty was most widely known. Before start- ing Aunt Judy's Magazine in May 1866, she had brought out Aunt Judy's Tales (1858) and Aunt Judy's Letters (1862), and among the other children's books which she subsequently published were Aunt Judy's Song Book for Children and The Mother's Book of Poetry. " Aunt Judy " was the nickname given by her daughter Juliana Horatia Ewing (q.v.) . The editor of the magazine was on the friendliest terms with her young corre- spondents and subscribers, and her success was largely due to the sympathy which enabled her to look at things from the child's point of view. Besides other excellences her children's books are specially characterized by wholesomeness of sentiment and cheerful humour. Her miscellaneous writings include, in addition to several volumes of tales, The Old Folks from Home, an account of a holiday ramble in Ireland; The Travels and Adventures of Br Wolff the Missionary (1861), an autobiography edited by her; British Sea Weeds (1862); Waifs and Strays of Natural History (1871); A Book of Emblems and The Book of Sun- Dials (1872). She died at Ecclesfield vicarage on the 4th of October 1873.

GAU, JOHN (c. 1495-? 1553), Scottish translator, was born at Perth towards the close of the 15th century. He was educated in St Salvator's College at St Andrews. He appears to have been in residence at Malmo in 1533, perhaps as chaplain to the Scots community there. In that year John Hochstraten, the exiled Antwerp printer, issued a book by Gau entitled: The Richt vay to the Kingdome of Heuine, of which the chief interest is that it is the first Scottish book written on the side of the Reformers. It is a translation of Christiern Pedersen's Den rettevey till Hiemmerigis Rige (Antwerp, 1531), for the most part direct, but showing intimate knowledge in places of the German edition of Urbanus Rhegius. Only one copy of

Gau's text is extant, in the library of Britwell Court, Bucks. It has been assumed that. all the copies were shipped from Malmo to Scotland, and that the cargo was intercepted by the Scottish officers on the look out for the heretical works which were printed abroad in large numbers. This may explain the silence of all the historians of the Reformed Church — Knox, Calderwood and Spottiswood. Gau married in 1536 a Malmo citizen's daughter, bearing the Christian name Birgitta. She died in 1551, and he in or about 1553.

The first reference to the Richt Vay appeared in Chalmers's Caledonia, ii. 616. Chalmers, who was the owner of the unique volume before it passed into the Britwell Court collection, considered it to be an original work. David Laing printed extracts for the Bannatyne Club (Miscellany, iii., 1855). The evidence that the book is a translation was first given by Sonnenstein Wendt in a paper " Om Reformatorerna i Malmo," in Rordam's Ny Kirke- historiske Samlinger, ii. (Copenhagen, i860). A complete edition was edited by A. F. Mitchell for the Scottish Text Society (1888). See also Lonmer's Patrick Hamilton.

GAUDEN, JOHN (1605-1662), English bishop and writer, reputed author of the Eikon Basilike, was born in 1605 at May- land, Essex, where his father was vicar of the parish. Educated at Bury St Edmunds school and at St John's College, Cambridge, he took his M.A. degree in 1625/6. He married Elizabeth, daughter of Sir William Russell of Chippenham, Cambridgeshire, and was tutor at Oxford to two of his wife's brothers. He seems, to have remained at Oxford until 1630, when he became vicar of Chippenham. His sympathies were at first with the parlia- mentary party. He was chaplain to Robert Rich, second earl of Warwick, and preached before the House of Commons in 1640.

In 1 64 1 he was appointed to the rural deanery of Booking. Apparently his views changed as the revolutionary tendency of the Presbyterian party became more pronounced, for in 1648/9 he addressed to Lord Fairfax A Religious and Loyal Pro- testation . . . against the proceedings of the parliament. Under the Commonwealth he faced both ways, keeping his ecclesiastical- preferment, but publishing from time to time pamphlets on behalf of the Church of England. At the Restoration he was made bishop of Exeter. He immediately began to complain to Hyde, earl of Clarendon, of the

poverty of the see, and based claims for a better benefice on a certain secret service, which he explained on the 20th of January 1661 to be the sole invention of the Eikon Basilike, The Pourtraicture of his sacred Majestie in his Solitudes and Sufferings put forth within a few hours after the execution of Charles I. as written by the king himself. To which Clarendon replied that he had been before acquainted with the secret and had often wished he had remained ignorant of it. Gauden was advanced in 1662, not as he had wished to the see of Winchester, but to Worcester. He died on the 23rd of May of the same year.

The evidence in favour of Gauden's authorship rests chiefly on his own assertions and those of his wife (who after his death sent to her son John a narrative of the claim) , and on the fact that it was admitted by Clarendon, who sould have had means of being acquainted with the truth. Gauden's letters on the subject are printed in the appendix to vol. iii. of the Clarendon Papers. The argument is that Gauden had prepared the book to inspire sympathy with the king by a representation of his pious and forgiving disposition, and so to rouse public opinion against his execution. In 1693 further correspondence between Gauden, Clarendon, the duke of York, and Sir Edward Nicholas was published by Mr Arthur North, who had found them among the papers of his sister-in-law, a daughter-in-law of Bishop Gauden; but doubt has been thrown on the authenticity of these papers. Gauden stated that he had begun the book in 1647 and was entirely responsible for it. But it is contended that the work was in existence at Naseby, 1 and testimony to Charles's authorship is brought forward from various witnesses who had seen Charles himself occupied with it at various times during his imprisonment. It is stated that the MS. was delivered by one of the king's agents to Edward Symmons, rector of Raine, near Booking, and that it was in the handwriting of Oudart, Sir Edward Nicholas's secretary. The internal evidence has, as is usual in such cases, been brought forward as a conclusive argument in favour of both contentions. Doubt was thrown on Charles's authorship in Milton's Eikonok-lastes (1649), which was followed almost immediately by a royalist answer, The Princely Pelican. Royall Resolves — Extracted from his Majesty's Divine Meditations, with satisfactory reasons . . . that his Sacred Person was the only Author of them (1649). The history of the whole controversy, which has been several times renewed, was dealt with in Christopher Wordsworth's tracts in a most exhaustive way. He eloquently advocated Charles's authorship. Since he wrote in 1829, some further evidence has been forthcoming in favour of the Naseby copy. A correspond- ence relating to the French translation

of the work has also come to light among the papers of Sir Edward Nicholas. None of the letters show any doubt that King Charles was the author. S. R. Gardiner {Hist, of the Great Civil War, iv. 325) regards Mr Doble's articles in the Academy (May and June 1883) as finally disposing of Charles's claim to the authorship, but this is by no means the attitude of other recent writers. If Gauden was the author, he may have incorporated papers, &c, by Charles, who may have corrected the work and thus been joint-author. This theory would reconcile the conflicting evidence, that of those who saw Charles writing parts and read the MS. before publication, and the deliberate statements of Gauden.

See also, the article by Richard Hooper in the Diet. Nat. Biog. ; Christopher Wordsworth, Who wrote Eikon Basilike? two letters addressed to the archbishop of Canterbury (1824), and King Charles the First, the Author of Icon Basilike (1828); H. J. Todd, A Letter

1 See a note in Archbishop Tenison's handwriting in his copy of the Eikon Basilike preserved at Lambeth Palace, and quoted in Almack's Bibliography, p. 15.

to the Archbishop of Canterbury concerning Eikon Basilike (1825); Bishop Gauden, The Author of the Icon Basilike (1829); W. G. Broughton, A Letter to a Friend (1826), Additional Reasons . . . (1829), supporting the contention in favour of Dr Gauden; Mr E. J. L. Scott's introduction to his reprint (1880) of the original edition; articles in the Academy, May and June 1883, by Mr C. E. Doble ; another reprint edited by Mr Edward Almack for the King's Classics (1904) ; and Edward Almack, Bibliography of the King's Book (1896). This last book contains a summary of the arguments on either side, a full bibliography of works on the subject, and facsimiles of the title pages, with full descriptions of the various extant copies.

GAUDICHAUD-BEAUPRfi, CHARLES (1789-1854), French botanist, was born at Angouleme on the 4th of September 1789. He studied pharmacy first in the shop of a brother-in-law at Cognac, and then under P. J. Robiquet at Paris, where from R. L. Desfontaines and L. C. Richard he acquired a knowledge of botany. In April 1810 he was appointed dispenser in the military marine, and from July 1811 to the end of 1814 he served at Antwerp. In 1817 he joined the corvette " Uranie " as pharmaceutical botanist to the circumpolar expedition com- manded by D. de Freycinet. The wreck of the vessel on the Falkland Isles, at the close of 1819, deprived him of more than half the botanical collections he had made in various parts of the world.

In 1830-1833 he visited Chile, Peru and Brazil, and in 1836-1837 he acted as botanist to " La Bonite " during its circumnavigation of the globe. His theory accounting for the growth of plants by the supposed coalescence of elementary " phytons " involved him, during the latter years of his life, in much controversy with his fellow-botanists, more especially C. F. B. de Mirbel. He died in Paris on the 16th of January 1854. Besides accounts of his voyages round the world, Gaudichaud- Beaupr6 wrote " Lettres sur l'organographie et la physiologie," Arch, de botanique, ii., 1883; " Recherches g<5nerales sur l'organo- graphie," &c. (prize essay, 1835), Mem. de I'AcadSmie des Sciences, t. viii. and kindred treatises, with memoirs on the potato-blight, the multiplication of bulbous plants, the increase in diameter of dicoty- ledonous plants, and other subjects; and Refutation de toutes les objections contre les nouveaux principes physiologiques (1852).

GAUDRY, JEAN ALBERT (1827-1908), French geologist and palaeontologist, was born at St Germain-en-Laye on the 16th of September 1827, and was educated at the college, Stanislas. At the age of twenty-five he made explorations in Cyprus and Greece, residing in the latter country from 1855 to i860. He then investigated the rich deposit of fossil vertebrata at Pikermi and brought to light a remarkable mammalian fauna, Miocene in age, and intermediate in its forms between European, Asiatic and African types. He also published an account of the geology of the island of Cyprus (Mim. Soc. Giol. de France, 1862). In 1853, while still in Cyprus, he was appointed assistant to A. d'Orbigny, who was the first to hold the chair of palaeontology in the museum of natural history at Paris. In 1872 he succeeded to this important post; in 1882 he was elected member of the Academy of Sciences; and in 1900 he presided over the meetings of the eighth International Congress of Geology then held in Paris. He died on the 27th of November 1908. He is distin- guished for his researches on fossil mammalia, and for the support which his studies have rendered to the theory of evolution.

Publications. — Animaux fossiles et geologie de VAttique (2 vols., 1862-1867); Cours de paleontologie (1873); Animaux fossiles du Mont Leberon (1873); Les Enchainements du monde animal dans les temps geologiques (Mammifbres Tertiaires, 1878 ; Fossiles primaires, 1883; Fossiles secondaires, 1890); Essai de paleon- tologie philosophique (1896). Brief memoir with portrait in GeoU Mag. (1903), p. 49. (H. B. W.)

GAUDY, an adjective meaning showy, very bright, gay, especially

with a sense of tasteless or vulgar extravagance, of colour or ornament. The accurate origin of the various senses which this word and the substantive " gaud " have taken are somewhat difficult to trace. They are all ultimately to be referred to the Lat. gaudere, to rejoice, gaudium, joy, some of them directly, others to the French derivative gaudir, to rejoice, and O.Fr. gaudie. .As a noun, in the sense of rejoicing or feast, " gaudy " is still used of a commemoration dinner at a college at the university of Oxford. " Gaud," meaning generally a toy, a gay adornment, a piece of showy jewelry, is more specifically applied to larger and more decorative beads in a rosary.

GAUERMANN, FRIEDRICH (1807-1862), Austrian painter, son of the landscape painter Jacob Gauermann (1773-1843), was born at Wiesenbach near Gutenstein in Lower Austria on the 20th of September 1807. It was the intention of his father that he should devote himself to agriculture, but the example of an elder brother, who, however, died early, fostered his inclina- tion towards art. Under his father's direction he began studies rn landscape, and he also diligently copied the works of the chief masters in animal painting which were contained in the academy and court library of Vienna. In the summer he made art tours in the districts of Styria, Tirol and Salzburg. Two animal pieces which he exhibited at the Vienna Exhibition of 1824 were regarded as remarkable productions for his years, and led to his receiving commissions in 1825 and 1826 from Prince Metternich and Caraman, the French ambassador. His reputation was greatly increased by his picture " The Storm," exhibited in 1829, and from that time his works were much sought after and obtained correspondingly high prices. His " Field Labourer " was regarded by many as the most noteworthy picture in the Vienna exhibition of 1834, and his numerous animal pieces have entitled him to a place in the first rank of painters of that class of subjects. The peculiarity of his pictures is the representation of human and animal figures in connexion with appropriate landscapes and in characteristic situations so as to manifest nature as a living whole, and he particularly excels in depicting the free life of animals in wild mountain scenery. Along with great mastery of the technicalities of his art, his works exhibit patient and keen observation, free and correct handling of details, and bold and clear colouring. He died at Vienna on the 7th of July 1862.

Many of his pictures have been engraved, and after his death a selection of fifty-three of his works was prepared for this purpose by the Austrian Kunslverein (Art Union).

GAUGE, or Gage (Med. Lat. gauja, jaugia, Fr. jauge, perhaps connected with Fr. jale, a bowl, galon, gallon), a standard of measurement, and also the name given to various instruments and appliances by which measurement is effected. The word seems to have been primarily used in connexion with the process of ascertaining the contents of wine casks; the name gauger is still applied to certain custom-house officials in the United States, and in Scotland it means an exciseman. Thence it was extended to other measurements, and used of the instruments used in making them or of the standards to which they were referred. In the mechanical arts gauges are employed in great variety to enable the workmen to ascertain whether the object he is making is of the proper dimensions (see Tool), and similar gauges of various forms are employed to ascertain and to specify the sizes of manufactured articles such as wire and screws. A rain gauge is an apparatus for measuring the amount of the rainfall at any locality, and a wind gauge indicates the pressure and force of the wind. The boilers of steam engines are provided with a water gauge and a steam or pressure gauge. The purpose of the former is to enable the attendant to see whether or not there is a sufficient quantity of water in the boiler. It consists of two cocks or taps communicating with the interior, one being placed at the lowest point to which it is permissible for the water to fall, and the other at the point above which it should not rise ; a glass tube connects the two cocks, and when they are both open the water in this stands at the same level as in the boiler. The steam gauge shows the pressure of the steam in the boiler. One of the commonest forms, known as the Bourdon gauge, depends on the fact that a curved tube tends to straighten itself if the pressure within it is greater than that outside it. This gauge therefore consists of a curved or coiled tube of elastic material, and preferably of elliptic section, connected with the boiler and arranged with a multiplying gear so that its bending or unbending actuates a pointer moving over a graduated scale. If the pressure within the tube is less than that outside it, the tube tends to bend or coil itself up further; with a pointer arranged as before, the gauge then becomes a vacuum gauge, indicating how far the pressure in the vessel to which it is attached is below that of the atmosphere. In railway engineering the gauge of a line is the distance between the two rails (see Railway). In nautical

language, a ship is said to have the weather gage when she is to windward of another, and similarly the lee gage when to leeward of

another; in this sense the word is usually spelt " gage," a spelling which prevails in America for all senses.*

GAUHATI, a town of British India, in the Kamrup district of Eastern Bengal and Assam, mainly on the left or south, but partly on the right bank of the Brahmaputra. Pop. (1001) 14,244. It is beautifully situated, with an amphitheatre of wooded hills to the south, but is not very healthy. There are many -evidences, such as ancient earthworks and tanks, of its historical importance. During the 17th century it was taken and retaken by Mahommedans and Ahoms eight times in fifty years, but in 1681 it became the residence of the Ahom governor of lower Assam, and in 1786 the capital of the Ahom raja. On the cession of Assam to the British in 1826 it was made the seat of the British administration of Assam, and so continued till 1874, when the headquarters were removed to Shillong in the Khasi hills, 67 m. distant, with which Gauhati is connected by an excellent cart-road. Two much-frequented places of Hindu pilgrimage are situated in the immediate vicinity, the temple of Kamakhya on a hill 2 m. west of the town, and the rocky island of Umananda in the mid-channel of the Brahma- putra. Gauhati is still the headquarters of the district and of the Brahmaputra Valley division, though no longer a military cantonment. It is the river terminus of a section of the Assam- Bengal railway. There are a second-grade college, a government high school, a law class and a training school for masters. Gauhati is an important centre of river trade, and the largest seat of commerce in Assam. Cotton-ginning, flour-milling, and an export trade in mustard seed, cotton, silk and forest produce are carried on. Gauhati suffered very severely from the earth- quake of the 1 2th of June 1897.

GAUL, GILBERT WILLIAM (1855-), American artist, was born in Jersey City, New Jersey, on the 31st of March 1855. He was a pupil of J. G. Brown and L. E. Wilmarth, and he became a painter of military pictures, portraying incidents of the American Civil War. He was elected an associate of the National Academy of Design in 1880, and in 1882 a full academician, and in the latter year became a member of the Society of American Artists. His important works include: " Charging the Battery," " News from Home," " Cold Comfort on the Outpost," " Silenced," "On the Look-out," and " Guerillas returning from a Raid."

GAUL, the modern form of the Roman Gallia, the name of the two chief districts known to the Romans as inhabited by Celtic-speaking peoples, (a) Gallia Cisalpina (or Citerior, " Hither "), i.e. north Italy between Alps and Apennines and (6) the far more important GaUia

Transalpina (or Ulterior, "Further"), usually called Gallia (Gaul) simply, the land bounded by the Alps, the Mediterranean, the Pyrenees, the Atlantic, the Rhine, i.e. modern France and Belgium with parts of Holland, Germany and Switzerland. The Greek form of Gallia was Taharia, but Galatia in Latin denoted another Celtic region in central Asia Minor, sometimes styled Gallograecia.

(a) Gallia Cisalpina was mainly conquered by Rome by 222 B.C.; later it adopted Roman civilization; about 42 B.C. it was united with Italy and its subsequent history is merged in that of the peninsula. Its chief distinctions are that during the later Republic and earlier Empire it yielded excellent soldiers, and thus much aided the success of Caesar against Pompey and of Octavian against Antony, and that it gave Rome the poet Virgil (by origin a Celt) , the historian Livy , the lyrist Catullus, Cornelius Nepos, the elder and the younger Pliny and other distinguished writers. 1

(b) Gaul proper first enters ancient history when the Greek colony of Massilia was founded (?600 B.C.). Roman armies began to enter it about 218 B.C. In 121 B.C. the coast from

1 When Cisalpine Gaul became completely Romanized, it was often known as " Gallia Togata," while the Province was dis- tinguished as " Gallia Bracata " (bracae, incorrectly braccae, " trousers "), from the long trousers worn by the inhabitants, and the rest of Gaul as " Gallia Comata," from the inhabitants wearing their hair long.

Montpellier to the Pyrenees (i.e. all that was not Massiliot) with its port of Narbo (mod. Narbonne) and its trade route by Toulouse to the Atlantic, was formed into the province of Gallia Narbonensis and Narbo itself into a Roman municipality. Commercial motives prompted the step, and Roman traders and land specu- lators speedily flocked in. Gradually the province was extended north of Massilia, up the Rhone, while the Greek town itself became weak and dependent on Rome.

It is not, however, until the middle of the ist century B.C. that we have any detailed knowledge of pre- Roman Gaul. The earliest account is that contained in the Commentaries of Julius Caesar. According to this authority, Gaul was at that time divided among three peoples, more or less distinct from one another, the Aquitani,

the Gauls, who called themselves Celts, and the Belgae. The first of these extended from the Pyrenees to the Garumna (Garonne); the second, from that river to the Sequana (Seine) and its chief tributary the Matrona (Marne), reaching eastward presumably as far as the Rhenus (Rhine); and the third, from this bounding line to the mouth of the last-named river, thus bordering on the Germans. By implication Caesar recognizes as a fourth division the province of Gallia Narbonensis. By far the greater part of the country was a plain watered by numerous rivers, the chief of which have already been mentioned, with the exception of its great central stream, the Liger or Ligeris (Loire) . Its principal mountain ranges were Cebennaor Gebenna (Cevennes) in the south, and Jura, with its continuation Vosegus or Vogesus (Vosges), in the east. The tribes inhabiting Gaul in Caesar's time, and belonging to one or other of the three races distinguished by him, were numerous. Prominent among them, and dwelling in the division occupied by the Celts, were the Helvetii, the Sequani and the Aedui, in the basins of the Rhodanus and its tributary the Arar (Saone), who, he says, were reckoned the three most powerful nations in all Gaul; the Arverni in the mountains of Cebenna; the Senones and Carnutes in the basin of the Liger; the Veneti and other Armorican tribes between the mouths of the Liger and Sequana. The Nervii, Bellovaci, Suessiones, Remi, Morini, Menapii and Aduatuci were Belgic tribes; the Tarbelli and others were Aquitani; while the Allobroges inhabited the north of the Provincia, having been conquered in 121 B.C. The ethnological divisions thus set forth by Caesar have been much discussed (see Celt, and articles on the chief tribes).

The Gallic Wars (58-51) of Caesar (q.v.) added all the rest, of Gaul, north-west of the CeVennes, to the Rhine and the Ocean, and in 49 also annexed Massilia. All Gaul was now Roman territory. Now the second period of her history opens; it remained for Roman territory to become romanized.

Caesar had no time to organize his conquest; this work was left to Augustus. As settled by him, and in part perhaps also by his successor Tiberius, it fell into the following five adminis- trative areas.

(i) Narbonensis, that is, the land between Alps, sea and Cevennes, extending up the Rhone to Vienne, was as Augustus found it, distinct in many ways from the rest of Gaul. By nature it is a sun-steeped southern region, the home of the vine and olive, of the minstrelsy of the Provencal and the exuberance of Tartarin, distinct from the colder and more sober north. By history it had already (in the time

of Augustus) been Roman for from 80 to 100 years and was familiar with Roman ways. It was ready to be Italianized and it was civilized enough to need no garrison. Accordingly, it was henceforward governed by a proconsul (appointed by the senate) and freed from the burden of troops, while its local government was assimilated to that of Italy. The old Celtic tribes were broken up: instead, municipalities of Roman citizens were founded to rule their territories. Thus the Allobroges now disappear and the colonia of Vienna takes their place: the Volcae vanish and we find Nemausus (Nimes). Thus thrown into Italian fashion, the province took rapidly to Italian ways. By a.d. 70 it was " Italia verius quam provincia " (Pliny). The Gauls obviously had a natural bias towards the Italian civilization, and there soon became no difference between Italy and southern Gaul. But though educa-

tion spread, the results were somewhat disappointing. Trade flourished; the corporations of bargemen and the like on the Rhone made money; the many towns grew rich and could afford splendid public buildings. But no great writer and no great ad- ministrator came from Narbonensis; itinerant lecturers and jour- nalists alone were produced in plenty, and at times minor poets, (ii.iv.) Across the Cevennes lay Caesar's conquests, Atlantic in climate, new to Roman ways. The whole area, often col lectively styled " Gallia Comata," often " Tres Provinciae," was divided into three provinces, each under a legatus pro praetore appointed by the emperor, with a common capital at Lugudunuin (Lyons). The three provinces were: Aquitania, reaching from the Pyrenees almost to the Loire; Lugudunensis, the land between Loire and Seine, reaching from Brittany in the west to Lyons in the south-east; and Belgica in the north. The boundaries, it will be observed, were wholly artificial. Here also it was found possible to dispense with garrisons, not because the provinces were as peaceful as Narbonensis, but because the Rhine army was close at hand. As befitted an unromanized region, the local government was unlike that of Italy or Narbon- ensis. Roman municipalities were not indeed unknown, but very few: the local authorities were the magistrates of the old tribal districts. Local autonomy was here carried to an extreme. But the policy succeeded. The Gauls of the Three Provinces, or some of them, revolted in a.d. 21 under Florus and Sacrovir, in 68 under Vindex, and in 70 under Classicus and Tutor (see Civilis, Claudius). But all five leaders were romanized nobles, with Roman names and Roman citizenship, and their risings were directed rather against the Roman government than the Roman empire. In general, the Gauls of these provinces accepted Roman civilization more or less rapidly, and in

due course became hardly distinguishable from the Italian. In particular, they eagerly accepted the worship of " Augustus and Rome," devised by the first emperor as a bond of state religion connecting the provinces with Rome. Each August, despite the heat, representatives from the 60 (or 64) tribes of Gallia Comata met at Lyons, elected a priest, " sacerdos ad aram Augusti et Romae," and held games. The post of representative, and still more that of priest, was eagerly coveted and provided a scope for the ambitions which despotism usually crushes. It agrees with the vigorous development of this worship that the Three Provinces, though romanized, retained their own local feeling. Even in the 3rd century the cult of Celtic deities (Hercules Magusanus, Deusoniensis, &c.) were revived, the Celtic leuga reintroduced instead of the Roman mile on official milestones, and a brief effort made to establish an independent, though romanized, Gaul under Postumus and his short-lived successors (a.d. 259-273). Not only was the area too large and strong to lose its individu- ality: it was also too rural and too far from the Mediterranean to be romanized as fully and quickly as Narbonensis. It is even probable that Celtic was spoken in forest districts into the 4th century A.D. Town life, however, grew. The chefs-lieux of the tribes became practically, though not officially, municipalities, and many of these towns reached considerable size and magnifi- cence of public buildings. But they attest their tribal relations by their appellations, which are commonly drawn from the name of the tribe and not of the town itself. Thus the capitals of the Remi and- Parish' were actually Durocortorum and Lutetia: the appellations in use were Remis or Remus, Parisiis or Parisius — these forms being indeclinable nouns formed from a sort of locative of the tribe names. Literature also flourished. In the latest empire Ausonius, Symmachus, Apollinaris, Sidonius and other Gaulish writers, chiefly of Gallia Comata, kept alive the classical literary tradition, not only for Gaul but for the world. ■' (v.) The fifth division of Gaul was the Rhenish military frontier. Augustus had planned the conquest of Germany up to the Elbe. His plans were foiled by the courage of Arminius and the inability of the Roman exchequer to pay a larger army. Instead, his successor Tiberius organized the Rhine frontier in two military districts. The northern one was the valley of the Meuse and that of the Rhine to a point just south of Bonn: the southern was the rest of the Rhine valley to Switzerland. Each

district was garrisoned at first by four, later by fewer legions, which

were disposed at various times in some of the following fortresses: Vetera (Xanten), Novaesium (Neuss), Bonne (Bonn), Moguntiacum (Mainz), Argentorate (Strassburg) and Vindonissa (Windisch in Switzerland). At first the districts were purely military, were called, after the garrisons, " exercitus Germanicus superior" (south) and "inferior" (north). Later one or two municipalities were founded — Colonia Agrippinensis at Cologne (a.d. 51), Colonia Augusta Treverorum at Trier (date uncertain), Colonia Ulpia Traiana outside Vetera — and about 80-90 A.d. the two " Exercitus " were turned into the two provinces of Upper and Lower Germany. The armies in these districts formed the defence of Gaul against German invaders. They also helped to keep Gaul itself in order and their presence explains why the four provinces of Gaul proper contained no troops.

These provincial divisions were modified by Diocletian but without seriously affecting the life of Gaul. The whole country, indeed, continued Roman and fairly safe from barbarian invasions till after 400. In 407 a multitude of Franks, Vandals, &c, burst over Gaul: Roman rule practically ceased and the three kingdoms of the Visigoths, Burgundians and Franks began to form. There were still a Roman general and Roman troops when Attila was defeated in the campi Catalaunici in a.d. 451, but the general, Aetius, was " the last of the Romans," and in 486 Clovis the Frank ended the last vestige of Roman rule in Gaul.

For Roman antiquities in Gaul see, beside articles on the modern towns (Arles, Nimes, Orange, &c), Bibracte, Alesia, Itius Portus, Aqueduct, Architecture, Amphitheatre, &c; for religion see Druidism; for the famous schools of Autun, Lyons, Toulouse, Nimes, Vienne, Marseilles and Narbonne, see J. E. Sandys, History of Classical Scholarship (ed. 1906-1908), i. pp. 247-250; for the Roman provinces, Th. Mommsen, Provinces of the Roman Empire (trans. 1886), vol. i. chap. iii. See also Desjardins, Geo-

fraphie historique et administrative de la Gaule romaine (Paris, 1877) ; "ustel de Coulanges, Histoire des institutions politiques de I'ancienne France (Paris, 1877); for Caesar's campaigns, article Caesar, Julius, and works quoted; for coins, art. Numismatics and articles in the Numismatische Zeitschrift and Revue numismatique (e.g. Blanchet, 1907, pp. 461 foil.). (F.J. H.)

GAULT, in geology, one of the members of the Lower Creta- ceous System. The name is still employed provincially in parts of England for a stiff blue clay of any kind; by the earlier writers it was sometimes spelt " Gait " or " Golt."

The formation now known as Gault in England has been variously designated " Blue Marie," " Brick Earth," " Golt Brick Earth " and " Oak-tree-soil." In certain parts of the south of England the Gault appears as a well-marked deposit of clay, lying between two sandy formations; the one above came to be known as the " Upper Greensand," the one below being the " Lower Greensand " (see Greensand). Since the typical clayey Gault is continually taking on a sandy facies as it is traced both horizontally and vertically; and since the fossils of the Upper Greensand and Gault are inseparably related, it has been proposed by A. J. Jukes-Browne that these two series of beds should be regarded as the arenaceous and argillaceous phases of a single formation, to which he has given the name " Selbornian " (from the village of Selborne where the beds are well developed). Lithologically, then, the Selbornian includes the blue and grey clays and marls of the Gault proper; the glauconitic sands of the Upper Greensand, and their local equivalent, the " malm," " malm rock " or " firestone," which in places passes into the micaceous sandstone containing sponge spicules and globules of silica, the counterpart of the rock called " gaize " on the same horizon in northern France. In Yorkshire, Lincolnshire and parts of Norfolk the Selbornian is represented by the Red Chalk. The malm is a ferruginous siliceous rock, the silica being mainly in the colloidal condition in the form of globules and sponge spicules; some quartz grains, mica and glauconite are usually present along with from 2 to 25 % of calcareous matter. Chert-bands and nodules are common in the Upper Greensand of certain districts; and calcareous concretions, locally recognized as cowstones (Lyme Regis), doggers or buhrstones, are not infrequent.

The principal divisions of the Selbornian stage with their characteristic zonal fossils are as follows : —

Warminster Beds Peclen asper and Cardiaster fossarius. Upper Gault Devizes Beds or Merstham Beds with Schloen-

bachia rostralus. (Hoplites lautus. Lower Gault < H. interruptus.

\Acanthoceras mammillatum. The Gault (with Upper Greensand) crops out all round the Wealden area; it extends beneath the London basin and reappears from beneath the northern scarp of the Chalk along the foot of the Chiltern Hills to near Tring. In the south of England the Gault clay is fairly constant in the lower part, with the Greensand above; the clay, however, passes into sand as it is followed westward and, as already pointed out, the clay and sand appear to pass into a red chalk towards the north-east. The Gault

overlaps the Lower Green- sand towards the east, where it rests upon the old Paleozoic axis; it also overlaps the same formation towards the west about Frome, and thence passes unconformably across the Portlandian beds, Kime- ridge Clay, Corallian beds and Oxford Clay; in south Dorsetshire it rests upon the Wealden Series. The Gault (with Upper Greensand) passes on to the Jurassic and Rhaetic rocks near Axmouth, and over- steps farther westward, in the Haldon Hills, on to the Permian. A large outlier occurs on the Blackdown Hills of Devonshire. Good localities for fossils are Folkestone— where many of the shells are preserved with their original pearly nacre, — Burnham, Merstham, Isle of Wight, the Blackdown and Haldon Hills, Warminster, Hunstanton and Speeton, Black Venn near Lyme Regis, and Devizes (malmstone and gaize). The beds are well developed in the vale of Wardour, and in the Isle of Wight; the Gault forms the so-called " blue slipper " at Ventnor which has been the cause of the landslip or undercliff.

The Gault of north France is very similar to that in the south of England, but the French term Albien includes only a portion of the Selbornian formation. The Gault of north-west Germany embraces beds that would be classed as Albien and Aptien by French authors; it comprises the " Flammenmergel " — a pale siliceous marl shot with flame-shaped darker patches — a clay with Belemnites minimus, and the "' Gargasmergel " (Aptian). In the Diester and Teutoberger Wald, and in the region of Halberstadt, the clays and marls are replaced by sandstones, the so-called Gault-Quader . Continental writers usually place the Gault or Albian at the summit of the Lower Cretaceous; while with English geologists the practice is to commence the Upper Cretaceous with this formation. In addition to the fossils already noticed, the following may be men- tioned: Acanthoceras Desmoceras Beaudanti, Hoplites splendens, Hamites, Scaphites, Turrilites, Aporrhais retusa, Trigonia aliforme, also Ichthyosaurus and Ornithocheirus (Pterodactyl). From the clays, bricks and tiles are made at Burham, Barnwell, Dunton Green, Arlesey, Hitchin, &c. The cherts in the Greensand portion are used for road metal, and in the Blackdown Hills, for scythe stones; hearthstone is obtained about Merstham ; phosphatic nodules occur at several horizons.

See Cretaceous System; Albian; Aptian; also A. J. Jukes- Browne, " The Gault and Upper Greensand of England," vol. i., Critacequs Rocks of Britain; Mem. Geol. Survey, 1900.

GAUNTLET (a diminutive of the Fr. gant, glove), a large form of glove, and especially the steel-plated glove of medieval armour. To " run the gauntlet," i.e. to run between two rows of men who, armed

with sticks, rope-ends or other weapons, beat and strike at the person so running, was formerly a punish- ment for military and naval offences. It was abolished in the Prussian army by Scharnhorst. As a method of torturing prisoners, it was employed among the North American Indians. " Gauntlet " (earlier " gantlet ") in this expression is a corruption of " gantlope," from a Swedish gatlope, from gala, lane, and lopp, a course (cf. Ger. gassenlaufen, to run the gauntlet). According to the New English Dictionary the word became familiar in England at the time of the Thirty Years' War.

GAUR, or Lakhnauti, a ruined city of British India, in Malda district of Eastern Bengal and Assam. The ruins are situated about 8 m. to the south of English Bazar, the civil station of the district of Malda, and on the eastern bank of the Bhagirathi, an old channel of the Ganges. It is said to have been founded by Lakshman, and its most ancient name was Lakshmanavati, corrupted into Lakhnauti. Its known history begins with its conquest in a.d. 1198 by the Mahommedans, who retained it as the chief seat of their power in Bengal for more than three centuries. When the Afghan kings of Bengal established their independence, they transferred their seat of government (about 1350) to Pandua (q.v.), also in Malda district, and to build their new capital they plundered Gaur of every monument that could be removed. When Pandua was in its turn deserted (a.d. 1453), Gaur once more became the capital under the

name of Jannatabad ; it remained so as long as the Mahommedan kings retained their independence. In a.d. 1564 Sulaiman Kirani, a Pathan adventurer, abandoned it for Tanda, a place somewhat nearer the Ganges. Gaur was sacked by Sher Shah in 1539, and was occupied by Akbar's general in 1575, when Daud Shah, the last of the Afghan dynasty, refused to pay homage to the Mogul emperor. This occupation was followed by an outbreak of the plague, which completed the downfall of the city, and since then it has been little better than a heap of ruins, almost overgrown with jungle.

The city in its prime measured 7J m. from north to south, with a breadth of 1 to 2 m. With suburbs it covered an area of 20 to 30 sq. m., and in the 16th century the Portuguese historian Faria y Sousa described it as containing 1,200,000 inhabitants. The ramparts of this walled city, which was surrounded by extensive suburbs, still exist; they were works of vast labour, and were on the average about

40 ft. high, and 180 to 200 ft. thick at the base. The facing of masonry and the buildings with which they were covered have now disappeared, and the embankments themselves are overgrown with dense jungle. The western side of the city was washed by the Ganges, and within the space enclosed by these embankments and the river stood the city of Gaur proper, with the fort containing the palace in its south-west corner. Radiating north, south and east from the city, other embankments are to be traced running through the suburbs and extending in certain directions for 30 or 40 m. Surrounding the palace is an inner embankment of similar construction to that which surrounds the city, and even more overgrown with jungle. A deep moat protects it on the outside. To the north of the outer enbankment lies the Sagar Dighi, a great reservoir, 1600 yds. by 800 yds., dating from a.d. 1126.

Fergusson in his History of Eastern Architecture thus describes the general architectural style of Gaur: — " It is neither like that of Delhi nor Jaunpore, nor any other style, but one purely local and not without considerable merit in itself; its principal characteristic being heavy short pillars of stone supporting pointed arches and vaults in brick — whereas at Jaunpore, for instance, light pillars carried horizontal architraves and flat ceilings." Owing to the lightness of the small, thin bricks, which were chiefly used in the making of Gaur, its buildings have not well withstood the ravages of time and the weather; while much of its enamelled work has been removed for the ornamenta- tion of the surrounding cities of more modern origin. Moreover, the ruins long served as a quarry for the builders of neighbouring towns and villages, till in 1 900 steps were taken for their preserva-' tion by the government. The finest ruin in Gaur is that of the Great Golden Mosque, also called Bara Darwaza, or twelve- doored (1526). An arched corridor running along the whole front of the original building is the principal portion now standing. There are eleven arches on either side of the corridor and one at each end of it, from which the mosque probably obtained its name. These arches are surmounted by eleven domes in fair preservation; the mosque had originally thirty-three.

The Small Golden or Eunuch's mosque, in the ancient suburb of Firozpur, has fine carving, and is faced with stone fairly well preserved. The Tantipara mosque (1475-1480) has beautiful moulding in brick, and the Lotan mosque of the same period is unique in retaining its glazed tiles. The citadel, of the Mahommedan period, was strongly fortified with a rampart and entered through a magnificent gateway called the Dakhil Darwaza (?i45g-i474). At the south-east corner was a palace, surrounded by a wall of brick 66 ft.

high, of which a part is standing. Near by were the royal tombs. Within the citadel is the Kadam Rasu' mosque (153°), which is still used, and closfe outside is a tall tower called the Firoz Minar (perhaps signifying " tower of victory "). There are a number of Mahommedan buildings on the banks of the Sagar Dighi, including, notably, the tomb of the saint Makhdum Shaikh Akhi Siraj (d. 1357), and in the neighbourhood is a burning ghat, traditionally the only one allowed to the use of the Hindus by their Mahommedan conquerors, and still greatly venerated and frequented by them.

Many inscriptions of historical importance have been found in the ruins.

See M. Martin (Buchanan Hamilton), Eastern India, vol. iii. (1831) ; G. H. Ravenshaw, Gaur (1878) ; James Fergusson, History of Indian and Eastern Architecture (1876); Reports of the Archaeological Surveyor, Bengal Circle (1900-1904).

GAUR. the native name of the wild ox, Bos (Bibos) gaurus, of India, miscalled bison by sportsmen. The gaur, which extends into Burma and the Malay Peninsula, where it is known as seladang, is the typical representative of an Indo-Malay group of wild cattle characterized by the presence of a ridge on the withers, the compressed horns, and the white legs. The gaur, which reaches a height of nearly 6 ft. at the shoulder, is specially characterized by the forward curve and great elevation of the ridge between the horns. The general colour is blackish-grev. Hill-forests are the resort of this species.

GAUSS, KARL FRIEDRICH (1777-1855), German mathe- matician, was born of humble parents at Brunswick on the 30th of April 1777, and was indebted for a liberal education to the notice which his talents procured him from the reigning duke. His name became widely known by the publication, in his twenty-fifth year (1801), of the Disquisitiones arithmelicae. In 1807 he was appointed director of the Gottingen observatory, an office which he retained to his death: it is said that he never slept away from under the roof of his observatory, except on one occasion, when he accepted an invitation from Baron von Humboldt. to attend a meeting of natural philosophers at Berlin. In 1809 he published at Hamburg his Theoria motus corporum coelestium, a work which gave a powerful impulse to the true methods of astronomical observation; and his astronomical workings, observations, calculations of orbits of planets and comets, &c, are very numerous and valuable. He continued his labours in the theory of numbers and other analytical

subjects, and communicated a long series of memoirs to the Royal Society of Sciences (Konigliche Gesellschaft der Wissenschaften) at Gottingen. His first memoir on the theory of magnetism, Intensitas vis magneticae terrestris ad mensuram absolutam revocata, was published in 1833, and he shortly afterwards proceeded, in conjunction with Wilhelm Weber, to invent new apparatus for observing the earth's magnetism and its changes; the instruments devised by them were the declination instrument and the bifilar magnetometer. With Weber's assistance he erected in 1833 at Gottingen a magnetic observatory free from iron (as Humboldt and F. J. D. Arago had previously done on a smaller scale), where he made magnetic observations, and from this same observatory he sent telegraphic signals to the neighbour- ing town, thus showing the practicability of an electromagnetic telegraph. He further instituted an association (Magnetischer Verein), composed at first almost entirely of Germans, whose continuous observations on fixed term-days extended from Holland to Sicily. The volumes of their publication, Resultate aus den Beobachtungen des magnetischen Vereins, extend from 1836 to 1839; and in those for 1838 and 1839 are contained the two important memoirs by Gauss, Allgemeine Theorie des Erd- magnetismus, and the Allgemeine Lehrsdtze — on the theory of forces attracting according to the inverse square of the distance. The instruments and methods thus due to him are substantially those employed in the magnetic observatories throughout the world. ' He co-operated in the Danish and Hanoverian measure- ments of an arc and trigonometrical operations (1 821-1848), and wrote (1843, 1846) the two memoirs Tiber Gegenstdnde der hoheren Geoddsie. Connected with observations in general we have (181 2-1826) the memoir Theoria combinalionis observa- lionum erroribus minimis obnoxia, with a second part and a supplement. Another memoir of applied mathematics is the Dioptrische Unlersuchungen (1840). Gauss was well versed in general literature and the chief languages of modern Europe, and was a member of nearly all the leading scientific societies in Europe. He died at Gottingen on the 23rd of February 1855. The centenary of his birth was celebrated (1877) at his native place, Brunswick.

Gauss's collected works were published by the Royal Society of Gottingen, in 7 vols. 4to (Gott., 1 863-1 871), edited by E. J.Schering

— (i) the Disquisitiones arithmeticae, (2) Theory of Numbers, (3) Analysis, (4) Geometry and Method of Least Squares, (5) Mathematical Physics, (6) Astronomy, and (7) the Theoria motus corporum coelestium. Additional volumes have since been published, Funda- tnente der Geometrie usw. (1900), and Geodalische Nachtrage zu Band iv. (1903). They include, besides his various works and memoirs, notices by him of many of these, and of works of other authors in the Gottingen gelehrte Anzeigen, and a considerable amount of previously unpublished matter, Nachlass. Of the memoirs in pure mathematics, comprised for the most part in vols, ii., iii. and iv. (but to these must be added those on Attractions in vol. v.), it may be safely said there is not one which has not signally contributed to the progress of the branch of mathematics to which it belongs, or which would not require to be carefully analysed in a history of the subject. Running through these volumes in order, we have in the second the memoir, Summatio quarundam serierum singularium, the memoirs on the theory of biquadratic residues, in which the notion of complex numbers of the form a + bi was first introduced into the theory of numbers; and included in the Nachlass are some valuable tables. That for the conversion of a fraction into decimals (giving the complete period for all the prime numbers up to 997) is a speci- men of the extraordinary love which Gauss had for long arithmetical calculations; and the amount of work gone through in the construc- tion of the table of the number of the classes of binary quadratic forms must also have been tremendous. In vol. iii. we have memoirs relating to the proof of the theorem that every numerical equation has a real or imaginary root, the memoir on. the Hyper geometric Series, that on Interpolation, and the memoir Determinatio attrac- tions — in which a planetary mass is considered as distributed over its orbit according to the time in which each portion of the orbit is described, and the question (having an implied reference to the theory of secular perturbations) is to find the attraction of such a ring. In the solution the value of an elliptic function is found by means of the arithmetico-geometrical mean. The Nachlass contains further re- searches on this subject, and also researches (unfortunately very fragmentary) on the lemniscate-function, &c, showing that Gauss was, even before 1800, in possession of many of the discoveries which have made the names of N. H. Abel and K. G. J. Jacobi illustrious. In vol. iv. we have the memoir Allgemeine Auflosung, on the graphical representation of one surface upon another, and the Disquisitiones generates circa superficies curvas. (An account of the treatment of surfaces which he originated in this paper will be found in the article Surface.) And in vol. v. we have a memoir On the Attraction of Homogeneous

Ellipsoids, and the already mentioned memoir Allge- meine Lehrsatze, on the theory of forces attracting according to the inverse square of the distance. (A. Ca.)

GAUSSEN, FRANCOIS SAMUEL ROBERT LOUIS (1790- 1863), Swiss Protestant divine, was born at Geneva on the 25th of August 1790. His father, Georg Markus Gaussen, a member of the council of two hundred, was descended from an old Languedoc family which had been scattered at the time of the religious persecutions in France. At the close of his university career at Geneva, Louis was in 1 81 6 appointed pastor of the Swiss Reformed Church at Satigny near Geneva, where he formed intimate rela- tions with J. E. Cellerier, who had preceded him in the pastorate, and also with the members of the dissenting congregation at Bourg-de-Four, which, together with the Eglise du temoignage, had been formed under the influence of the preaching of James and Robert Haldane in 18 17. The Swiss revival was distasteful to the pastors of Geneva (Venirable Compagnie des Pasteur s) , and on the 7 th of May 181 7 they passed an ordinance hostile to it. ' As a protest against this ordinance, in 1819 Gaussen published in conjunction with Cellerier a French translation of the Second Helvetic Confession, with a preface expounding the views he had reached upon the nature, use and necessity of confessions of faith; and in 1830, for having discarded the official catechism of his church as being insufficiently explicit on the divinity of Christ, original sin and the doctrines of grace, he was censured and suspended by his ecclesiastical superiors. In the following year he took part in the formation of a Societe Evangilique {Evangelische Gesellschafl). When this society contemplated, among other objects, the establishment of a new theological college, he was finally deprived of his charge. After some time devoted to travel in Italy and England, he returned to Geneva and ministered to an independent congregation until 1834, when he joined Merle d'Aubign6 as professor of systematic theology in the college which he had helped to found. This post he continued to occupy until 1857, when he retired from the active duties of the chair. He died at Les Grottes, Geneva, on the 18th of June

1863.

His best-known work, entitled La Thiopneustie ou pleine inspiration des saintes Scritures, an elaborate defence of the doctrine of " plenary inspiration," was originally published in Paris in 1840, and rapidly gained a wide popularity in France, as also, through translations, in England and America. It was followed in i860 by a supplementary treatise on the canon (Le Canon des saintes Scritures

au double point de vue de la science el de lafoi) , which, though also popular, has hardly been so widely read.

See the article in Herzog-Hauck, Realencyklopddie (1899).

GAUTIER, EMILE THEODORE LEON (1832-1897), French literary historian, was born at Havre on the 8th of August 1832. He was educated at the Ecole des Chartes, and became succes- sively keeper of the archives of the department of Haute-Marne and of the imperial archives at Paris under the empire. In 1871 he became professor of palaeography at the Ecole des Chartes. He was elected member of the Academy of Inscriptions in 1887, and became chief of the historical section of the national archives in 1893. Leon Gautier rendered great services to the study of early French literature, the most important of his numerous works on medieval subjects being a critical text (Tours, 1872) with translation and introduction of the Chanson de Roland, and Les fipopees francaises (3 vols., 1866-1867; 2nd ed., 5 vols., 1878- 1897, including a Bibliographie des chansons de geste). He died in Paris on the 25th of August 1897.

GAUTIER, THEOPHILE (1811-1872), French poet and miscellaneous writer, was born at Tarbes on the 31st of August 18 1 1. He was educated at the grammar school of that town, and afterwards at the College Charlemagne in Paris, but was almost as much in the studios. He very early devoted himself to the study of the older French literature, especially that of the 16th and the early part of the 17th century. This study qualified him well to take part in the Romantic movement, and enabled him to astonish Sainte-Beuve by the phraseology and style of some literary essays which, when barely eighteen years old, he put into the critic's hands. In consequence of this introduction he at once came under the influence of the great Romantic cinacle, to which, as to Victor Hugo in particular, he was also introduced by his gifted but ill-starred schoolmate Gerard de Nerval. With Gerard, Petrus Borel, Corot, and many other less known painters and poets whose personalities he has delightfully sketched in the articles collected under the titles of Histoire du Romantisme, &c, he formed a minor romantic clique who were distinguished for a time by the most extravagant eccentricity. A flaming crimson waistcoat and a great mass of waving hair were the outward signs which qualified Gautier for a chief rank among the enthusi- astic devotees who attended the rehearsals of Hernani with red tickets marked " Hierro," performed mocking dances round fee bust of Racine, and were at all times ready to exchange word or blow with the perruques and grisdtres of the classical party. In Gautier's case these freaks were not inconsistent with real genius and real

devotion to sound ideals of literature. He began (like Thackeray, to whom he presents in other ways some striking points of resemblance) as an artist, but soon found that his true powers lay in another direction.

His first considerable poem, Albertus (1830), displayed a good deal of the extravagant character which accompanied rather than marked the movement, but also gave evidence of uncommon command both of language and imagery, and in particular of a descriptive power hardly to be excelled. The promise thus given was more than fulfilled in his subsequent poetry, which, in consequence of its small bulk, may well be noticed at once and by anticipation. The Comidie de la mort, which appeared soon after (1832), is one of the most remarkable of French poems, and "though never widely read has received the suffrage of every competent reader. Minor poems of various dates, published in 1840, display an almost unequalled command over poetical form, ■an advance even over A Iberlus in vigour, wealth and appropriate- ness of diction, and abundance of the special poetical essence. All these good gifts reached their climax in the Emaux et catntes, first published in 1856, and again, with additions, just before the poet's death in 1872. These poems are in their own way such as

cannot be surpassed. Gautier's poetical work contains in little an expression of his literary peculiarities. There are, in addition to the peculiarities of style and diction already notice'd, an extra- ordinary feeling and affection for beauty in art and nature, and a strange indifference to anything beyond this range, which has doubtless injured the popularity of his work.

But it was not, after all, as a poet that Gautier was to achieve either profit or fame. For the theatre, he had but little gift, and his dramatic efforts (if we except certain masques or ballets in which his exuberant and graceful fancy came into play) are by far his weakest. It was otherwise with his prose fiction. His first novel of any size, and in many respects his most remarkable work, was Mademoiselle de Maupin (1835). Unfortunately this book, while it establishes his literary reputation on an imperish- able basis, was unfitted by its subject, and in parts by its treat- ment, for general perusal, and created, even in France, a prejudice against its author which he was very far from really deserving. During the years from 1833 onwards,

his fertility in novels and tales was very great. Les Jeunes-France (1833), which may rank as a sort of prose Albertus in some ways, displays the follies of the youthful Romantics in a vein of humorous and at the same time half-pathetic satire. Fortunio (1838) perhaps belongs to the same class. Jettatura, written somewhat later, is less extravagant and more pathetic. A crowd of minor tales display the highest literary qualities, and rank with Merimee's at the head of all contemporary works of the class. First of all must be mentioned the ghost-story of La Morte amoureuse, a gem of the most perfect workmanship. For many years Gautier continued to write novels. La Belle Jenny (1864) is a not very successful attempt to draw on his English experience, but the earlier Mililona (1847) is a most charming picture of Spanish life. In Spirite (1866) he endeavoured to enlist the fancy of the day for supernatural manifestations, and a Roman de la momie (1856) is a learned study of ancient Egyptian ways. His most remarkable effort in this kind, towards the end of his life, was Le Capitaine Fracasse (1863) , a novel, partly of the picaresque school, partly of that which Dumas was to make popular, projected nearly thirty years earlier, and before Dumas himself had taken to the style. This book contains some of the finest instances of his literary power.

Yet neither in poems nor in novels did the main occupation of Gautier as a literary man consist. He was early drawn to the more lucrative task of feuilleton-writing, and for more than thirty years he was among the most expert and successful practitioners of this art. Soon after the publication of Made- moiselle de Maupin, in which he had not been too polite to journalism, he became irrevocably a journalist. He was actually the editor of L Artiste for a time: but his chief newspaper connexions were with La Presse from 1836 to 1854 and with the Moniteur later. His work was mainly theatrical and art criticism. The rest of his life was spent either at Paris or in travels of considerable extent to Spain, the Netherlands, Italy, Turkey, England, Algeria and Russia, all undertaken with a more or less definite purpose of book-making. Having absolutely no political opinions, he had no difficulty in accepting the Second Empire, and received from it considerable favours, in return for which, however, he in no way prostituted his pen, but remained a literary man pure and simple. He died on the 23rd of December

1872.

Accounts of his travels, criticisms of the theatrical and literary works of the day, obituary notices of his contemporaries and, above all, art criticism occupied him in turn. It has sometimes been deplored that

this engagement in journalism should have diverted Gautier from the performance of more capital work in literature. Perhaps, however, this regret springs from a certain misconception. Gautier's power was literary power pure and simple, and it is as evident in his slightest sketches and criticisms as in £maux el camees or La Morte amoureuse. On the other hand, his weakness, if he had a weakness, lay in his almost total in- difference to the matters which usually supply subjects for art and therefore for literature. He has thus been accused of " lack of ideas " by those who have not cleared their own minds of cant ; and in the recent set-back of the critical current against form and

in favour of " philosophic " treatment, comment upon him has sometimes been unfavourable. But this injustice will, beyond all question, be redressed again. He was neither immoral, irreligious nor unduly subservient to despotism, but morals, religion and politics (to which we may add science and material progress) were matters of no interest to him. He was to all intents a humanist, as the word was understood in the 15th century. But he was a humorist as well, and this combination, joined to his singularly kindly and genial nature, saved him from some dangers and depravations as well as some absurdities to which the humanist temper is exposed. As time goes on it may be predicted that, though Gautier may not be widely read, yet his writings will never cease to be full of indescribable charm and of very definite instruction to men of letters. Besides those of his works which have been already cited, we may notice Une Larme du diable (1839), a charming mixture of humour and tender- ness; Les Grotesques (1844), a volume of early criticisms on some oddities of 17th-century literature; Caprices et zigzags (1845), miscellanies dealing in part with English life; Voyage en Espagne (1845), Constantinople (1854), Voyage en Russie (1866), brilliant volumes of travel; MSnagerie intime (1869) and Tableaux de siege (1872), his two latest works, which display his incomparable style in its quietest but not least happy form.

There is no complete edition of Gautier's works, and the vicomte Spoelberch de Lovenjoul's Histoire des eeuvres de Theophile Gautier (1887) shows how formidable such an undertaking would be. But since his death numerous further collections of articles have been made: Fusains et eaux-fortes and Tableaux a la plume (1880); L'Orient (2 vols., 1881); Les Vacances du lundi (new ed., 1888); La Nature chez elle (new ed., 1891). In 1879 his son-in-law, E. Bergerat, who had married his younger daughter Estelle (the elder, Mme Judith Gautier — herself a writer of distinction — was at one time Mme Catulle Mendes), issued a biography, Thiophile Gautier,

which has been often reprinted. With it should be compared Maxtme du Camp's volume in the Grands Ecrivains francais (1890) and the numerous references in the Journal des Goncourt. Critical eulogies, from Sainte-Beuve (repeatedly in the Causeries) and Baudelaire (two articles in V Art romantique) downwards, are numerous. The chief of the decriers is £mile Faguet in his Etudes litleraires sur le XIX' Steele. In 1902 and 1903 there appeared two respectable academic Uoges by H. Menal and H. Potez. (G. Sa.)

GAUTIER D' ARRAS, French trouvere, flourished in the second half of the 12th century. Nothing is known of his biography except what may be gleaned from his works. He dedicated his romance of £racle to Theobald V., count of Blois (d. 1191); among his other patrons were Marie, countess of Champagne, daughter of Louis VII. and Eleanor of Guienne and Baldwin IV., count of Hainaut. Eracle, the hero of which becomes emperor of Constantinople as Heraclius, is purely a roman d'aventwes and enjoyed great popularity. His second romance, Ille et Galeron, dedicated to Beatrix, the second wife of Frederick Barbarossa, treats of a similar situation to that outlined in the lay of " Eliduc " by Marie de France.

See the CEuvres de Gautier a" Arras, ed. E. Loseth (2 vols., Paris, 1890); Hist. litt. de la France, vol. xxii. (1852); A. Dinaux, Les Trouveres (1833-1843), vol. iii.

GAUZE, a light, transparent fabric, originally of silk, and now sometimes made of linen or cotton, woven in an open manner with very fine yarn. It is said to have been originally made at Gaza in Palestine, whence the name. Some of the gauzes from eastern Asia were brocaded with flowers of gold or silver. In the weaving of gauze the warp threads, in addition to being crossed as in plain weaving, are twisted in pairs from left to right and from right to left alternately, after each shot of weft, thereby keeping the weft threads at equal distances apart, and retaining them in their parallel position. The textures are woven either plain, striped or figured; and the material receives ..many designations, according to its appearance and the purposes to which it is devoted. A thin cotton fabric, woven in the same way, is known as leno, to distinguish it from muslin made by plain weaving. Silk gauze was a prominent and extensive industry in the west of Scotland during the second half of the 1 8th century, but on the introduction of cotton- weaving it greatly declined. In addition to its use for dress purposes silk gauze is much employed for bolting or sifting flour and other finely ground substances. The term gauze is_ applied generally

to transparent fabrics of whatever fibre made, and to the fine- woven wire-cloth used in safety-lamps, sieves, window-blinds, &c.

GAVARNI, the name by which Sulpice Guillaume Chevalier (1801-1866), French caricaturist, is known. He is said to have taken the nom de plume from the place where he made his first published sketch. He was born in Paris of poor parents, and started in life as a workman in an engine-building factory. At the same time he attended the free school of drawing. In his first attempts to turn his abilities to some account he met with many disappointments, but was at last entrusted with the drawing of some illustrations for a journal of fashion. Gavarni was then thirty-four years of age. His sharp and witty pencil gave to these generally commonplace and unartistic figures a life-likeness and an expression which soon won for him a name in fashionable circles. Gradually he gave greater attention to this more congenial work, and finally ceased working as an engineer to become the director of the journal Les Gens du monde. His ambition rising in proportion to his success, Gavarni from this time followed the real bent of his inclination, and began a series of lithographed sketches, in which he portrayed the most striking characteristics, foibles and vices of the various classes of French society. The letterpress explanations attached to his drawings were always short, but were forcible and highly humorous, if sometimes trivial, and were admirably adapted to the particular subjects. The different stages through which Gavarni's talent passed, always elevating and refining itself, are well worth being noted. At first he confined himself to the study of Parisian manners, more especially those of the Parisian youth. To this vein belong Les Lorettes, Les Actrices, Les Coulisses, Les Fashionables, Les Genlilshommes bourgeois, Les Artistes, Les Debardeurs, Clichy, Les Eludiants de Paris, Les Baliverneries parisiennes, Les Plaisirschampetres, Les Bals masque's, Le Carnaval, Les Souvenir's du carnaval, Les Souvenirs du bal Chicard, La Vie desjeunes hommes, Les Patois de Paris. He had now ceased to be director of Les Gens du monde ; but he was engaged as ordinary caricaturist of Le Charivari, and, whilst making the fortune of the paper, he made his own. His name was exceedingly popular, and his illustrations for books were eagerly sought for by publishers. Le Juif errant, by Eugene Sue (1843, 4 vols. 8vo), the French translation of Hoffman's tales (1843, 8vo), the first collective edition of Balzac's works (Paris, Houssiaux, 1850, 20 vols. 8vo), Le Diable a Paris (1844-1846, 2 vols. 4to), Les Franciiis peinls par eux-memes (1840-1843, 9 vols. 8vo), the collection of

Physiologies published by Aubert in 38 vols. i8mo (1840-1842), — all owed a great part of their success at the time, and are still sought for, on account of the clever and telling sketches contributed by Gavarni. A single frontispiece or vignette was sometimes enough to secure the sale of a new book. Always desiring to enlarge the field of his observations, Gavarni soon abandoned his once favourite topics. He no longer limited himself to such types as the lorelte and the Parisian student, or to the description of the noisy and popular pleasures of the capital, but turned his mirror to the grotesque sides of family life and of humanity at large. Les Enfanls terribles, Les Parents terribles, Les Fourberies des femmes, La Politique des femmes, Les Maris venges, Les Nuances du sentiment, Les Rexes, Les Pelits Jeux de societe, Les Pelits Malheurs du bonheur, Les Impressions de menage, Les Interjections, Les Traductions en langue vulgaire, Les Propos de Thomas Vireloque, &c, were composed at this time, ana are his most elevated productions. But whilst showing the same power of irony as his former works, enhanced by a deeper insight into human nature, they generally bear the stamp of a bitter and even sometimes gloomy philosophy. . This tendency was still more strengthened by a visit to England in 1849. He returned from London deeply impressed with the scenes of misery and degradation which he had observed among the lower classes of that city. In the midst of the cheerful atmosphere of Paris he had been struck chiefly by the ridiculous aspects of vulgarity and vice, and he had laughed at them. But the debasement of human nature which he saw in London appears to have affected him so forcibly that from that time the cheerful caricaturist never laughed or made others laugh again. What he had

witnessed there became the almost exclusive subject of his drawings, as powerful, as impressive as ever, but better calculated to be appreciated by cultivated minds than by the public, which had in former years granted him so wide a popularity. Most of these last compositions appeared in the weekly paper L'lllustra- tion. In 1857 he published in one volume the series entitled Masques et visages (1 vol. i2mo), and in i860, about two years after his death, his last artistic work, Les Douze Mois (1 vol. fol.), was given to the world. Gavarni was much engaged, during the last period of his life, in scientific pursuits, and this fact must perhaps be connected with the great change which then took place in his manner as an artist. He sent several communications to the Academie des Sciences, and till his death on the 23rd of November 1866 he was eagerly interested in the question of aerial navigation. It is said that he made experiments on a large scale with a view to find the means of directing balloons;

but it seems that he was not so successful in this line as his fellow-artist, the caricaturist and photographer, Nadar.

Gavarni's CEuvres choisies were edited in 1845 (4 vols. 4to) with letterpress by J. Janin, Th. Gautier and Balzac, followed in 1850 by two other volumes named Perles et parures; and some essays in prose and in verse written by him were collected by one of his biographers, Ch. Yriarte, and published in 1869. See also E. and J. de Goncourt, Gavarni, Vhomme et Vosuvre (1873, 8vo). J. Claretie has also devoted to the great French caricaturist a curious and interesting essay. A catalogue raisonne of Gavarni's works was published by J. Armelhault and E. Bocher (Paris, 1873, 8vo).

GAVAZZI, ALESSANDRO (1 809-1 889), Italian preacher and patriot, was born at Bologna on the 21st of March 1809. He at first became a monk (1825), and attached himself to the Barnabites at Naples, where he afterwards (1829) acted as professor of rhetoric. In 1840, having already expressed liberal views, he was removed to Rome to fill a subordinate position. Leaving his own country after the capture of Rome by the French, he carried on a vigorous campaign against priests and Jesuits in England, Scotland and North America, partly by means of a periodical, the Gavazzi Free Word. While in England he gradually went over (1855) to the Evangelical church, and became head and organizer of the Italian Protestants in London. Returning to Italy in i860, he served as army-chaplain with Garibaldi. In 1870 he became head of the Free Church (Chiesa libera) of Italy, united the scattered Congregations into the "Unione delle Chiese libere in Italia," and in 1875 founded in Rome the theological college of the Free Church, in which he himself taught dogmatics, apologetics and polemics. He died in Rome on the 9th of January 1889.

Amongst his publications are No Union with Rome (1871); The Priest nr Absolution (1877) ; My Recollections of the Last Four Popes, &c, in answer to Cardinal Wiseman (1858); Orations, 2 decades

(1851).

GAVELKIND, 1 a peculiar system of tenure associated chiefly with the county of Kent, but found also in other parts of England. In Kent all land is presumed to be holden by this tenure until the contrary is proved, but some lands have been disgavelled by particular statutes. It is more correctly described as socage tenure, subject to the custom of gavelkind. The chief peculiari- ties of the custom are the following.

(1) A tenant can alienate his lands by feoffment at fifteen years of age. (2) There is no escheat on attainder for felony, or as it is expressed in the old rhyme —

" The father to the bough, The son to the plough."

(3) Generally the tenant could always dispose of his lands by will. (4) In case of intestacy the estate descends not to the eldest son but to all the sons (or, in the case of deceased sons, their representatives) in equal shares. "Every son is as great a "gentleman as the eldest son is." It is to this remarkable peculi- arity that gavelkind no doubt owes its local popularity. Though 1 This word is generally taken to represent in O. Eng. gafolgecynd, from gafol, payment, tribute, and gecynd, species, kind, and origin- ally to have meant tenure by payment of rent or non-military ser- vices, cf . gafol-land, and thence to have been applied to the particular custom attached to such tenure in Kent. Gafol apparently is derived from the Teutonic root seen in " to give ' ; the Med. Lat. gabulum, gablum gives the Fr. gabelle, tax.

females claiming in their own right are postponed to males, yet by representation they may inherit together with them.

(5) A wife is dowable of one-half, instead of one-third of the land.

(6) A widower may be tenant by courtesy, without having had any issue, of one-half, but only so long as he remains unmarried. An act of 18 , 1 , for commuting manorial rights in respect of lands of copyhold and customary tenure, contained a clause specially exempting from the operation of the act " the custom of gavelkind as the same now exists and prevails in the county of Kent." Gavelkind is one of the most interesting examples of the customary law of England; it was, previous to the Conquest, the general custom of the realm, but was then superseded by the feudal law of primogeniture. Its survival in this instance in one part of the country is regarded as a concession extorted from the Conqueror by the superior bravery of the men of Kent. Irish gavelkind- was a species of tribal succession, by which the land, instead of being divided at the death of the holder amongst his sons, was thrown again into the common stock, and redivided among the surviving members of the sept. The equal division amongst children of an inheritance in land is of common occur- rence outside the United Kingdom and is discussed under Suc-

cession.

See Inheritance; Tenure. Also Robinson, On Gavelkind; Digby, History of the Law of Real Property; Pollock and Maitland, History of English Law ; Challis, Real Property.

GAVESTON, PIERS (d. 13 12), earl of Cornwall, favourite of the English king Edward II., was the son of a Gascon knight, and was brought up at the court of Edward I. as companion to his son, the future king. Strong, talented and ambitious, Gaveston gained great influence over young Edward, and early in 1307 he was banished from England by the king; but he returned after the death of Edward I. a few months later, and at once became the chief adviser of Edward II. Made earl of Cornwall, he received both lands and money from the king, and added to his wealth and position by marrying Edward's niece, Margaret, daughter of Gilbert de Clare, earl of Gloucester (d. 1295). He was regent of the kingdom during the king's short absence in France in 1308, and took a very prominent part at Edward's coronation in February of this year. These proceedings aroused the anger and jealousy of the barons, and their wrath was diminished neither by Gaveston's superior skill at the tournament, nor by his haughty and arrogant behaviour to themselves. They demanded his banishment; and the king, forced to assent, sent his favourite to Ireland as lieutenant, where he remained for about a year. Returning to England in July 1309, Edward persuaded some of the barons to sanction this proceeding; but as Gaveston was more insolent than ever the old jealousies soon broke out afresh. In 13 n the king was forced to agree to the election of the " ordainers," and the ordinances they drew up provided inter alia for the perpetual banishment of his favourite. Gaveston then retired to Flanders, but returned secretly to England at the end of 1311. Soon he was publicly restored by Edward, and the barons had taken up arms. Deserted by the king he surrendered to Aymer de Valence, earl of Pembroke (d. 1324), at Scarborough in May 1312, and was taken to Deddington in Oxfordshire, where he was seized by Guy de Beauchamp, earl of Warwick (d. 1315). Conveyed to Warwick castle he was beheaded on Blacklow Hill near Warwick on the 19th of June 1312. Gaveston, whose body was buried in 1315 at King's Langley, left an only daughter.

See W. Stubbs, Constitutional History, vol. ii. (Oxford, 1896); and Chronicles of the Reigns of Edward I. and Edward II., edited by W. Stubbs. Rolls series (London, 1 882-1 883).

GAVOTTE (a French word adopted from the Provencal gavolo),

properly the dance of the Gavots or natives of Gap, a district in the Upper Alps, in the old province of Dauphine. It is "a dance of a brisk and lively character, somewhat resembling the minuet, but quicker and less stately (see Dance); hence also the use of this name for a corresponding form of musical composition.

GAWAIN (Fr. Walwain {Brut), Gauvain, Gaugain; Lat. Walganus, Walwanus; Dut6h, Walwein, Welsh, Gwalchmei) , son of King Loth of Orkney, and nephew to Arthur on his

mother's side, the most famous hero of Arthurian romance. The first mention of his name is in a passage of William of Malmes- bury, recording the discovery of his tomb in the province of Ros in Wales. He is there described as " Walwen qui fuit hand degener Arturis ex sorore nepos." Here he is said to have reigned over Galloway; and there is certainly some connexion, the character of which is now not easy to determine, between the two. In the later Historia of Goeffrey of Monmouth, and its French translation by Wace, Gawain plays an important and " pseudo-historic " role. On the receipt by Arthur of the insulting message of the Roman emperor, demanding tribute, it is he who is despatched as ambassador to the enemy's camp, where his arrogant and insulting behaviour brings about the outbreak of hostilities. On receipt of the tidings of Mordred's treachery, Gawain accompanies Arthur to England, and is slain in the battle which ensues on their landing. Wace, however, evidently knew more of Gawain than he has included in his translation, for he speaks of him as

Li quens Walwains

Qui tant fu preudom de ses mains (11. 9057-58).

and later on says

Prous fu et de mult grant mesure,

D'orgoil et de forfait n'ot qure

Plus vaut faire qu'il ne dist

Et plus doner qu'il ne pramist (10. 106-109).

The English Arthurian poems regard him as the type and model of chivalrous courtesy, " the fine father of nurture," and as Pro- fessor Maynadier has well remarked, " previous to the appearance of Malory's compilation it was Gawain rather than Arthur, who was the

typical English hero." It is thus rather surprising to find that in the earliest preserved MSS. of Arthurian romance, i.e. in the poems of Chretien de Troyes, Gawain, though generally placed first in the list of knights, is by no means the hero par excellence. The latter part of the Perceval is indeed devoted to the recital of his adventures at the Chastel Merveilleus, but of none of Chretien's poems is he the protagonist. The anonymous author of the Chevalier & I'epee indeed makes this apparent neglect of Gawain a ground of reproach against Chretien. At the same time the majority of the short episodic poems connected with the cycle have Gawain for their hero. In the earlier form of the prose romances, e.g. in the Merlin proper, Gawain is a dominant personality, his feats rivalling in importance those ascribed to Arthur, but in the later forms such as the Merlin continuations, the Tristan, and the final Lancelot compilation, his character and position have undergone a complete change, he is represented as cruel, cowardly and treacherous, and of indifferent moral character. Most unfortunately our English version of the romances, Malory's Morte Arthur, being derived from these later forms (though his treatment of Gawain is by no means uniformly consistent), this unfavourable aspect is that under which the hero has become known to the modern reader. Tennyson, who only knew the Arthurian story through the medium of Malory, has, by exaggeration, largely contributed to this misunderstanding. Morris, in The Defence of Guinevere, speaks of " gloomy Gawain "; perhaps the most absurdly misleading epithet which could possibly have been applied to the " gay, gratious, and gude " knight of early English tradition.

The truth appears to be that Gawain, the Celtic and mythic origin of whose character was frankly admitted by the late M. Gaston Paris, belongs to the very earliest stage of Arthurian tradition, long antedating the crystallization of such tradition into literary form. He was certainly known in Italy at a very early date; Professor Rajna has found the names of Arthur and Gawain in charters of the early 12th century, the bearers of those names being then grown to manhood; and Gawain is figured in the architrave of the north doorway of Modena cathedral, a 1 2th- century building. Recent discoveries have made it practically certain that there existed, prior to the extant romances, a collec- tion of short episodic poems, devoted to the glorification of Arthur's famous nephew and his immediate kin (his brother Ghaeris, or Gareth, and his son Guinglain), the authorship of which was attributed to a Welshman, Bleheris; fragments of this

collection have been preserved to us alike in the first continuation of Chretien de Troyes Perceval, due to Wauchier de Denain, and in our vernacular Gawain poems. Among these " Bleheris " poems was one dealing with Gawain's adventures at the Grail castle, where the Grail is represented as non-Christian, and present s features strongly reminiscent of the ancient Nature mysteries. There is good ground for believing that as Grail quester and winner, Gawain preceded alike Perceval and Galahad, and that the solution of the mysterious Grail problem is to be sought rather in the tales connected with the older hero than in those devoted to the glorification of the younger knights. The explana- tion of the very perplexing changes which the character of Gawain has undergone appears to lie in a misunderstanding of the original sources of that character. Whether or no Gawain was a sun-hero, and he certainly possessed some of the features — we are constantly told how his strength waxed with the waxing of the sun till noontide, and then gradually decreased; he owned a steed known by a definite name le Gringalet; and a light-giving sword, Escalibur (which, as a rule, is represented as belonging to Gawain, not to Arthur) — all traits of a sun-hero — he certainly has much in common with the primitive Irish hero Cuchullin. The famous head-cutting challenge, so admirably told in Syr Gawayne and the Grene Knighte, was originally connected with the Irish champion. Nor was the lady of Gawain's love a mortal maiden, but the queen of the other- world. In Irish tradition the' other- world is often represented as an island, inhabited by women only; and it is this " Isle of Maidens " that Gawain visits in Diu Crone; returning therefrom dowered with the gift of eternal youth. The Chastel Merveilleus adventure, related at length by Chretien and Wolfram is undoubtedly such an " other-world " story. It seems probable that it was this connexion which won for Gawain the title of the " Maidens' Knight," a title for which no satis- factory explanation is ever given. When the source of the name was forgotten its meaning was not unnaturally misinterpreted, and gained for Gawain the reputation of a facile morality, which was exaggerated by the pious compilers of the later Grail romances into persistent and aggravated wrong-doing; at the same time it is to be noted that Gawain is never like Tristan and Lancelot, the hero of an illicit connexion maintained under circumstances of falsehood and treachery. Gawain, however, belonged to the pre-Christian stage of Grail tradition, and it is not surprising that writers, bent on spiritual edification, found him somewhat of a stumbling-block. Chaucer, when he spoke of Gawain coming " again out of faerie," spoke better than he knew; the home

of that very gallant and courteous knight is indeed Fairy-land, and the true Gawain-tradition is informed with fairy glamour and grace.

See Syr Gawayne, the English poems relative to that hero, edited by Sir Frederick Madden for the Bannatyne Club, 1839 (out of print and difficult to procure) ; Histoire litteraire de la France, vol. xxx. ; introduction "and summary of episodic " Gawain " poems by Gaston Paris; The Legend of Sir Gawain, by Jessie L. Weston, Grimm Library, vol. vii. ; The Legend of Sir Perceval, by Jessie L. Weston, Grimm Library, vol. xvii. ; " Sir Gawain and the Green Knight," " Sir Gawain at the Grail Castle " and " Sir Gawain and the Lady of Lys," vols, i., vi and vii. of Arthurian Romances (Nutt).

GAWLER, a town of Gawler county,. South Australia, on the Para river, 24! m. by rail N.E. of Adelaide. It is one of the most thriving places in the colony, being the centre of a large wheat- growing district; it has also engineering works, foundries, flour- mills, breweries and saw-mills, while gold, silver, copper and lead are found in the neighbouring bills. The inhabitants of the town and its extensive suburbs number about 7000; though the population of the town itself in 1901 was 1996.

GAY, JOHN (1685-1732), English poet, was baptized on the 16th of September 1685 at Barnstaple, where his family had long been settled. He was educated at the grammar school of the town under Robert Luck, who had published some Latin and English poems. On leaving school he was apprenticed to a silk, mercer in London, but being weary, according to Dr Johnson, " of either the restraint or the servility of his occupation," he soon returned to Barnstaple, where he spent some time with his uncle, the Rev. John Hanmer, the Nonconformist minister of the

town. He then returned to London, and though no details are available for his biography until the publication of Wine in 1708, the account he gives in Rural Sports (1713), of years wasted in attending on courtiers who were profuse in promises never kept, may account for his occupations. Among his early literary friends were Aaron Hill and Eustace Budgell. In The Present Stale of Wit (1711) Gay attempted to give an account of " all our periodical papers, whether monthly, weekly or diurnal." He especially praised the Taller and the Spectator, and Swift, who knew nothing of the authorship of the pamphlet, suspected it to be inspired by Steele and Addison. To Lintot's Miscellany (1712) Gay contributed " An Epistle to Bernard Lintot," con- taining some lines in praise of Pope, and a version of the story of Arachne from the sixth book of the

Metamorphoses of Ovid. In the same year he was received into the household of the duchess of Monmouth as secretary, a connexion which was, however, broken before June 17 14.

The dedication of his Rural Sports (17 13) to Pope was the beginning of a lasting friendship. Gay could have no pretensions to rivalry with Pope, who seems never to have tired of helping his friend. In 17 13 he produced a comedy, The Wife of Bath, which was acted only three nights, and The Fan, one of his least successful poems; and in 17 14 The Shepherd's Week, a series of six pastorals drawn from English rustic life. Pope had urged him to undertake this last task in order to ridicule the Arcadian pastorals of Ambrose Philips, who had been praised by the Guardian, to the neglect of Pope's claims as the first pastoral writer of the age and the true English Theocritus. Gay's pastorals completely achieved this object, but his ludicrous pictures of the English swains and their loves were found to be abundantly entertaining on their own account. Gay had just been appointed secretary to the British ambassador to the court of Hanover through the influence of Jonathan Swift, when the death of Queen Anne three months later put an end to all his hopes of official employment. In 1715, probably with some help from Pope, he produced What d'ye call it ? a dramatic skit on contemporary tragedy, with special reference to Otway's Venice Preserved. It left the public so ignorant of its real meaning that Lewis Theobald and Benjamin Griffin (1680-1740) published a Complete Key to what d'ye call it by way of explanation. In 17 16 appeared his Trivia, or the Art of Walking the Streets of London, a poem in three books, for which he acknowledged having received several hints from Swift. It contains graphic and humorous descriptions of the London of that period. In January 1717 he produced the comedy of Three Hours after Marriage, which was grossly indecent without being amusing, and was a complete failure. There is no doubt that in this piece he had assistance from Pope and Arbuthnot, but they were glad enough to have it assumed that Gay was the sole author.

Gay had numerous patrons, and in 1720 he published Poems on Several Occasions by subscription, realizing £1000 or more. In that year James Craggs, the secretary of state, presented him with some South Sea stock. Gay, disregarding the prudent advice of Pope and other of his friends, invested his all in South Sea stock, and, holding on to the end, he lost everything. The shock is said to have made him dangerously ill. As a matter of fact Gay had always been a spoilt child, who expected everything to be done for him. His friends did not fail him at this juncture. He had patrons in William Pulteney, afterwards earl of Bath, in the third earl of Burlington, who

constantly entertained him at Chiswick or at Burlington House, and in the third earl of Queensberry. He was a frequent visitor with Pope, and received unvarying kindness from Congreve and Arbuthnot. In 1724 he produced a tragedy called The Captives. In 1727 he wrote for Prince William, afterwards duke of Cumberland, his famous Fifty-one Fables in Verse, for which he naturally hoped to gain some preferment, although he has much to say in them of the servility of courtiers and the vanity of court honours. He was offered the situation of gentleman-usher to the Princess Louisa, who was still a child. He refused this offer, which all his friends seem to have regarded, for no very obvious reason, as an indignity. I As the Fables were written for the amusement of one royal child,

there would appear to have been a measure of reason in giving him a sinecure in the service of another. His friends thought him unjustly neglected by the court, but he had already received (1722) a sinecure as lottery commissioner with a salary of £150 a year, and from 1722 to 1729 he had lodgings in the palace at Whitehall. He had never rendered any special services to the court.

He certainly did nothing to conciliate the favour of the govern- ment by his next production, the Beggars' Opera, a lyrical drama produced on the 29th of January 1728 by Rich, in which Sir Robert Walpole was caricatured. This famous piece, which was said to have made " Rich gay and Gay rich," was an innova- tion in many respects, and for a time it drove Italian opera off the English stage. Under cover of the thieves and highwaymen who figured in it was disguised a satire on society, for Gay made it plain that in describing the moral code of his characters he had in mind the corruptions of the governing class. Part of the success of the Beggars' Opera may have been due to the acting of Lavinia Fenton, afterwards duchess of Bolton, in the part of Polly. Peachum. The play ran for sixty-two nights, though the representations, four of which were " benefits " of the author, were not, as has sometimes been stated, consecutive. Swift is said to have suggested the subject, and Pope and Arbuthnot were constantly consulted while the work was in progress, but Gay must be regarded as the sole author. He wrote a sequel, Polly, the representation of which was forbidden by the lord chamberlain, no doubt through the influence of Walpole. This act of " oppression " caused no loss to Gay. It proved an excellent advertisement for Polly, which was published by sub- scription in 1 729, and brought its author more

than £1000. The duchess of Queensberry was dismissed from court for enlisting subscribers in the palace. The duke of Queensberry gave him a home, and the duchess continued her affectionate patronage until Gay's death, which took place on the 4th of December 1732. He was buried in Westminster Abbey. The epitaph on his tomb is by Pope, and is followed by Gay's own mocking couplet: —

" Life is a jest, and all things show it, 1 thought so once, and now I know it."

Acis and Galatea, an English pastoral opera, the music of which was written by Handel, was produced at the Haymarket in 1 732. The profits of his posthumous opera of Achilles (1 733), and a new volume of Fables (1738) went to his two sisters, who inherited from him a fortune of £6000. He left two other pieces, The Distressed Wife (1743), a comedy, and The Rehearsal at Goatham (1754), a farce. The Fables, slight as they may appear, cost him more labour than any of his other works. The narratives are in nearly every case original, and are told in clear and lively verse. The moral which rounds off each little story is never strained.- They are masterpieces in their kind, and the very numerous editions of them prove their popularity. They have been translated into Latin, French and Italian, Urdu and Bengali.

See his Poetical Works (1893) ' n tne Muses' Library, with an introduction by Mr John Underhill; also Samuel Johnson's Lives of the Poets, John Gay s Singspiele (1898), edited by G. Sarrazin (Englische Textbibliothek II.); and an article by Austin Dobson in vol. 21 of the Dictionary of National Biography; Gay's Chair (1820), edited by Henry Lee, a fellow-townsman, contained a biographical sketch by his nephew, the Rev. Joseph Bailer.

GAY, MARIE FRAN5OISE SOPHIE (1776-1852), French author, was born in Paris on the 1st of July 1776. Madame Gay was the daughter of M. Nichault de la Valette and of Francesca Peretti, an Italian lady. In 17.93 she was married to M. Liottier, an exchange broker, but she was divorced from him in 1799, and shortly afterwards was married to M. Gay, receiver-general of the department of the Roer or Ruhr. This union brought her into intimate relations with many distinguished personages; and her salon came to be frequented by all the distinguished litterateurs, musicians, actors and painters of the time, whom she attracted by her beauty, her vivacity and her many amiable qualities. Her first literary production was a letter written in 1802 to the Journal de Paris, in defence of

Madame de Stael's novel, Delphine; and in the same year she published anonymously her first novel Laure d'Estell. Lionie de Montbreuse, which appeared in 1813, is considered by Sainte- Beuve her best work; but Anatole (1815), the romance of a deaf-mute, has perhaps a higher reputation. Among her other works, Salons cilebres (2 vols., 1837) may be especially mentioned. Madame Gay wrote several comedies and opera libretti which met with considerable success. She was also an accomplished musician, and composed both the words and music of a number of songs. She died in Paris on the 5th of March 1852. For an account of her daughter, Delphine Gay, Madame de Girardin, see Girardin.

See her own Souvenirs d'une vieille femme (1834); also Thebphile Gautier, Portraits contemporains; and Sainte-Beuve, Causeries du lundi, vol. vi.

GAY, WALTER (1856-), American artist, was born at Hingham, Massachusetts, on the 22nd of January 1856. In 1876 he became a pupil of Leon Bonnat in Paris. He received an honourable mention in the Salon of 1885; a gold medal in 1888, and similar awards at Vienna (1894), Antwerp (1895), Berlin (1896) and Munich (1897). He became an officer of the Legion of Honour and a member of the Society of Secession, Munich. Works by him are in the Luxembourg, the Tate Gallery (London), and the Boston and Metropolitan (New York) Museums of Art. His compositions are mainly figure subjects portraying French peasant life.

GAYA, a city and district of British India, in the Patna division of Bengal. The city is situated 85 m. S. of Patna by rail. Pop. (1901) 71,288. It consists of two distinct parts, adjoining each other; the part containing the residences of the priests is Gaya proper; and the other, which is the business quarter, is called Sahibganj. The civil offices and residences of the European inhabitants are situated here. Gaya derives its sanctity from incidents in the life of Buddha. But a local legend also exists concerning a pagan monster of great sanctity, named Gaya, who by long penance had become holy, so that all who saw or touched him were saved from perdition. Yama, the lord of hell, appealed to the gods, who induced Gaya to lie down in order that his body might be a place of sacrifice; and once down, Yama placed a large stone on him to keep him there. The tricked demon struggled violently, and, in order to pacify him, Vishnu promised that the gods should take up their permanent residence in him, and that any one who made a pilgrimage to the spot where he lay should be delivered from the terrors of the Hindu place of torment. This may possibly be a Brahmanic rendering of Buddha's life and work. There

are forty-five sacred spots (of which the temple of Vishnupada is the chief) in and around the city, and these are visited by thousands of pilgrims annually. During the Mutiny the large store of treasure here was conveyed safely to Calcutta by Mr A. Money. The city contains a government high school and an hospital, with a Lady Elgin branch for women.

The District of Gaya comprises an area of 4712 sq. m. Generally speaking, it consists of a level plain, with a ridge of prettily wooded hills along the southern boundary, whence the country falls with a gentle slope towards the Ganges. Rocky hills occasionally occur, either detached or in groups, the loftiest being- Maher hill about 12 m. S.E. of Gaya city, with an elevation of 1620 ft. above sea-level. The eastern part of the district is highly cultivated; the portions to the north and west are less fertile; while in the south the country is thinly peopled and consists of hills, the jungles on which are full of wild animals. The principal river is the Son, which marks the boundary between Gaya and Shahabad, navigable by small boats throughout the year, and by craft of 20-tons burden in the rainy season. Other rivers are the Punpun, Phalgu and Jamuna. Two branches of the Son canal system, the eastern main canal and the Patna canal, intersect the district. In 1901 the population was 2,059,933, showing a decrease of 3 % in the decade. Among the higher castes there is an unusually large proportion of Brahmans, a circumstance due to the number of sacred places which the district contains. The Gayawals, or priests in charge of the holy

places, are held in high esteem by the pilgrims ; but they are not pure Brahmans, and are looked down upon by those who are. They live an idle and dissolute life, but are very wealthy, from contributions extorted from the pilgrims. Buddh Gaya, about 6 m. S. of Gaya city, is one of the holiest sites of Buddhism, as containing the tree under which Sakyamuni attained enlighten- ment. In addition to many ruins and sculptures, there is a temple restored by the government in 1881. Another place of religious interest is a temple of great antiquity, which crowns the highest peak of the Barabar hills, and at which a religious fair is held each September, attended by 10,000 to 20,0000 pilgrims. At the foot of the hill are numerous rock caves excavated about 200 B.C. The opium poppy is largely cultivated. There are a number of lac factories. Manufactures consist of common brass utensils, black stone ornaments, pottery, tussur-silk

and cotton cloth. Formerly paper-making was an important manufac- ture in the district, but it has entirely died out. The chief exports are food grains, oil seeds, indigo, crude opium (sent to Patna for manufacture), saltpetre, sugar, blankets, brass utensils, &c. The imports are salt, piece goods, cotton, timber, bamboos, tobacco, lac, iron, spices and fruits. The district is traversed by four branches of the East Indian railway. In 1901 it suffered severely from the plague.

See District Gazetteer (1906) ; Sir A. Cunningham, Mahabodhi

(1892).

GAYAL, a domesticated ox allied to the Gaur, but dis- tinguished, among other features, by the more conical and straighter horns, and the straight line between them. Gayal are kept by the natives of the hill-districts of Assam and parts of Tenasserim and Upper Burma. Although it has received a distinct name, Bos (Bibos) frontalis, there can be little doubt that the gayal is merely a domesticated breed of the gaur, many gayal-skulls showing characters approximating to those of the gaur.

GAYANGOS Y ARCE, PASCUAL DE (1800-1897), Spanish scholar and Orientalist, was born at Seville on the 21st of June 1809. At the age of thirteen he was sent to be educated at Pont-le-Voy near Blois, and in 1828 began the study of Arabic under Silvestre de Sacy. After a visit to England, where he married, he obtained a post in the Spanish treasury, and was transferred to the foreign office as translator in 1833. In 1836 he returned to England, wrote extensively in English periodicals, and translated Almakkari's History of the Mahommedan Dynasties in Spain (1840-1843) for the Royal Asiatic Society. In England he also made the acquaintance of Ticknor, to whom he was very serviceable. In 1843 he returned to Spain as professor of Arabic at the university of Madrid, which post he held until 1881, when he was made director of public instruction. This office he re- signed upon being elected senator for the district of Huelva. His latter years were spent in cataloguing the Spanish manu- scripts in the British Museum; he had previously continued Bergenroth's catalogue of the manuscripts relating to England in the Simancas archives. His best-known original work is his dissertation on Spanish romances of chivalry in Rivadeneyra's Biblioteca de autores espanoles. He died in London on the 4th of October 1897.

GAYARRE, CHARLES ETIENNE ARTHUR (1805-1895), American historian, was born in New Orleans, Louisiana, on the 9th of January 1805. After studying at the College d'Orleans he began, in

1826, to study law in Philadelphia, and three years later was admitted to the bar. In 1830 he was elected a member of the House of Representatives of Louisiana, in 1831 was appointed deputy attorney-general of his state, in 1833 became presiding judge of the city court of New Orleans, and in 1834 was elected as a Jackson Democrat to the United States Senate. On account of ill-health, however, he immediately resigned without taking his seat, and for the next eight years travelled in Europe and collected historical material from the French and the Spanish archives: In 1844-1845 and in 1856-1857 he was again a member of the state House of Representatives, and from 1845 to 1853 was secretary of state of Louisiana. He supported the Southern Confederacy during the Civil War, in which he lost a large fortune,

and after its close lived chiefly by his pen. He died in New Orleans on the nth of February 1895. He is best known as the historian of Louisiana. He wrote Histoire de la Louisiane (1847) ; Romance of the History of Louisiana (1848); Louisiana; Us Colonial History and Romance (1851), reprinted in A History of Louisiana; History of Louisiana: the Spanish Domination (1854); Philip II. of Spain (1866); and A History of Louisiana (4 vols., 1866), the last being a republication and continuation of his earlier works in this field, the whole comprehending the history of Louisiana from its earliest discovery to 1861. He wrote also several dramas and romances, the best of the latter being Fernando de Lemos (1872).

GAY-LUSSAC, JOSEPH LOUIS (1778-1850), French chemist and physicist, was born at St Leonard, in the department of Haute Vienne, on the 6th of December 1778. He was the elder son of Antoine Gay, procureur du roi and judge at Pont-de- Noblac, who assumed the name Lussac from a small property he had in the neighbourhood of St Leonard. Young Gay-Lussac received his early education at home under the direction of the abb6 Bourdieux and other masters, and in 1 794 was sent to Paris to prepare for the Ecole Polytechnique, into which he was admitted at thejend of 1 797 after a brilliant examination. Three years later he was transferred to the Ecole des Ponts et Chaussees, and shortly afterwards was assigned to C. L. Berthollet, who wanted an able student to help in his researches. The new assistant scarcely came up to expectations in respect of confirming certain theoretical views of his master's by the experiments set him to that end, and appears to have stated the discrepancy without reserve; but Berthollet nevertheless quickly recognized the ability displayed, and showed his appreciation not only by desiring to be Gay-Lussac's " father in science," but also by making him in 1 807 an original member of theSociete d'Arcueil. In

1802 he was appointed demonstrator to A. F. Fourcroy at the Ecole Poly- technique, where subsequently (1809) he became professor of chemistry, and from 1808 to 1832 he was professor of physics at the Sorbonne, a post which he only resigned for the chair of chemistry at the Jardin des Plantes. In 1831 he was elected to represent Haute Vienne in the chamber of deputies, and in 1839 he entered the chamber of peers. He died in Paris on the gth of May 1850.

Gay-Lussac's earlier researches were mostly physical in character and referred mainly to the properties of gases, vapour- tensions, hygrometry, capillarity, &c. In his first memoir {Ann. de Chimie, 1802) he showed that different gases are dilated in the same proportion when heated from 0° to ioo° C. Apparently he did not know of Dalton's experiments on the same point, which indeed were far from accurate; but in a note he explained that " le cit. Charles avait remarque depuis 15 ans la meme propriete dans ces gaz; mais n'ayant jamais publie ses resultats, c'est par le plus grand hasard que je les ai connus." In con- sequence of his candour in thus rescuing from oblivion the observation which his fellow-citizen did not think worth publish- ing, his name is sometimes dissociated from this law, which instead is known as that of Charles. In 1804 he had an opportunity of prosecuting his researches on air in somewhat unusual condi- tions, for the French Academy, desirous of securing some observa- tions on the force of terrestrial magnetism at great elevations above the earth, through Berthollet and J. E. Chaptal obtained the use of the balloon which had been employed in Egypt, and entrusted the task to him and J. B. Biot. In their first ascent from the garden of the Conservatoire des Arts on the 24th of August 1804 an altitude of 4000 metres (about 13,000 ft.) was attained. But this elevation was not considered sufficient by Gay-Lussac, who therefore made a second ascent by himself oh the 16th of September, when the balloon rose 7016 metres (about 23,000 ft.) above sea-level. At this height, with the thermometer marking 9! degrees below freezing, he remained for a considerable time, making observations not only on magnetism, but also on the temperature and humidity of the air, and collecting several samples of air at different heights. The magnetic observations, though imperfect, led him to the con- clusion that the magnetic effect at all attainable elevations above

the earth's surface remains constant; and on analysing the samples of air he could find no difference of composition at different heights.

(For an account of both ascents see Journ. de phys. for 1804.) On the 1st of October in the same year, in conjunction with Alexander von Humboldt, he read a paper on eudiometric analysis (Ann. de Chim., 1805), which contained the germ of his most important generalization, the authors noting that when oxygen and hydrogen combine together by volume, it is in the proportion of one volume of the former to two volumes of the latter. But his law of combination by volumes was not enunciated in its general form until after his return from a scientific journey through Switzerland, Italy and Germany, on which with Humboldt he started from Paris in March 1805. This journey was interrupted in the spring of 1806 by the news of the death of M. J. Brisson, and Gay-Lussac hurried back to Paris in the hope, which was gratified, that he would be elected to the seat thus vacated in the Academy. In 1807 an account of the magnetic observations made during the tour with Humboldt was published in the first volume of the MSmoires d'Arcueil, and the second volume, published in 1809, contained the important memoir on gaseous combination (read to the Societ6 Philo- mathique on the last day of 1808), in which he pointed out that gases combining with each other in volume do so in the simplest proportions — 1 to 1, 1 to 2, 1 to 3 — and that the volume of the compound formed bears a simple ratio to that of the constituents.

About this time Gay-Lussac's work, although he by no means entirely abandoned physical questions, became of a more chemical character; and in three instances it brought him into direct rivalry with Sir Humphry Davy. In the first case Davy's preparation of potassium and sodium by the electric current spurred on Gay-Lussac and his collaborator L. J. Thenard, who had no battery at their disposal, to search for a chemical method of obtaining those metals, and by the action of red-hot iron on fused potash — a method of which Davy admitted the advantages — they succeeded in 1808 in preparing potassium, going on to make a full study of its properties and to use it, as Davy also did, for the reduction of boron from boracic acid in 1809. The second concerned the nature of " oxymuriatic acid " (chlorine). While admitting the possibility that it was an elementary body, after many experiments they finally declared it to be a compound (Mem. d'Arcueil, 1809). Davy, on the other hand, could see no reason to suppose it contained oxygen, as they surmised, and ultimately they had to accept his view of its elementary character. The third case roused most feeling of all. Davy, passing through Paris on his way to Italy at the end of 1813, obtained a few fragments of iodine, which had been discovered by Bernard Courtois (1777-1838) in 1811, and after a brief examination by the aid of his limited

portable laboratory perceived its analogy to chlorine and inferred it to be an element. Gay-Lussac, it is said, was nettled at the idea of a foreigner making such a dis- covery in Paris, and vigorously took up the study of the new substance, the result being the elaborate" Memoire surl'iode," which appeared in the Ann. de chim. in 1814. He too saw its resemblance to chlorine, and was obliged to agree with Davy's opinion as to its simple nature, though not without some hesita- tion, due doubtless to his previous declaration about chlorine. Davy on his side seems to have felt that the French chemist was competing with him, not altogether fairly, in trying to appropriate the honour of discovering the character of the substance and of its compound, hydriodic acid.

In 1810 he published a paper which contains some classic experiments on fermentation, a subject to which he returned in a second paper published in 1815. At the same time he was working with Thenard at the improvement of the methods of organic analysis, and by combustion with oxidizing agents,' first potassium chlorate and subsequently copper oxide, he determined the composition of a number of organic substances. But his last great piece of pure research was on prussic acid. In a note published in 181 1 he described the physical properties of this acid, but he said nothing about its chemical composition till 181 5, when he described cyanogen as a compound radicle, prussic acid as a compound of that radicle with hydrogen alone,

and the prussiates (cyanides) as compounds of the radicle with metals. The proof that prussic acid contains hydrogen but no oxygen was a most important support to the hydrogen-acid theory, and completed the downfall of Lavoisier's oxygen theory; while the isolation of cyanogen was of equal importance for the subsequent era of compound radicles in organic chemistry.

After this research Gay-Lussac's attention began to be dis- tracted from purely scientific investigation. He had now secured a leading if not the foremost place among the chemists of the French capital, and the demand for his services as adviser in technical problems and matters of practical interest made great inroads on his available time. He had been a member of the consultative committee on arts and manufactures since 1805; he was attached to the "administration des poudres et salpetres " in 1818, and in 1829 he received the lucrative post of assayer to the mint. In these new fields he displayed the powers so con- spicuous in his scientific inquiries, and he was now to introduce and establish scientific accuracy where previously there had been merely practical approximations. His

services to industry in- cluded his improvements in the processes for the manufacture of sulphuric acid (1818) and oxalic acid (1829); methods of estimating the amount of real alkali in potash and soda by the volume of standard acid required for neutralization, and for estimating the available chlorine in bleaching powder by a solution of arsenious acid; directions for the use of the centesimal alcoholometer published in 1824 and specially commended by the Institute; and the elaboration of a method of assaying silver by a standard solution of common salt, a volume on which was published in 1833. Among his research work of this period may be mentioned the improvements in organic analysis and the investigation of fulminic acid made with the help of Liebig, who gained the privilege of admission to his private laboratory in

1823-1824.

Gay-Lussac was patient, persevering, accurate to punctilious- ness, perhaps a little cold and reserved, and not unaware of his great ability. But he was also bold and energetic, not only in his work but also in support and defence of his friends. His early childish adventures, as told by Arago, herald the fearless aeronaut and the undaunted investigator of volcanic eruptions (Vesuvius was in full eruption when he visited it during his tour in 1805); and the endurance he exhibited under the labora- tory accidents that befell him shows the power of will with which he would face the prospect of becoming blind and useless for the prosecution of the science which was his very life, and of which he was one of the most distinguished ornaments. Only at the very end, when the disease from which he was suffering left him no hope, did he complain with some bitterness of the hardship of leaving this world where the many discoveries being made pointed to yet greater discoveries to come.

The most complete list of Gay-Lussac's papers is contained in the Royal Society's Catalogue of Scientific Papers, which enumerates 148, exclusive of others written jointly with Humboldt, Thenard, Welter and Liebig. Many of them were published in the Annates de chimie, which after it changed its title to Annates de chimie el physique he edited, with Arago, up to nearly the end of his life; but some are to be found in the Mimoires d'Arcueil and the Comptes rendus, and in the Recherches physiques et chimiques, published with Thenard in 181 1.

GAZA, THEODORUS (c. 1400-1475), one of the Greek scholars who were the leaders of the revival of learning in the 1 5th century, was born at Thessalonica. On the capture of his native city by the Turks

in 1430 he fled to Italy. During a three years' residence in Mantua he rapidly acquired a competent knowledge of Latin under the teaching of Vittorino da Feltre, supporting himself meanwhile by giving lessons in Greek, and by copying manuscripts of the ancient classics. 1 In 1447 he became professor of Greek in the newly founded university of Ferrara, to which students in great numbers from all parts of Italy were soon attracted by his fame as a teacher. He had taken some part in the councils which were held in Siena (1423), Ferrara (1438), and Florence (1439), with the object of bringing about a reconciliation between 1 According to Voigt, Gaza came to Italy some ten years later from Constantinople, where he had been a teacher or held some clerical office.

the Greek and Latin Churches; and in 1450, at the invitation of Pope Nicholas V., he went to Rome, where he was for some years employed by his patron in making Latin translations from Aristotle and other Greek authors. After the death of Nicholas (1455), being unable to make a living at Rome, Gaza removed to Naples, where he enjoyed the patronage of Alphonso the Magnanimous for two years (1456-1458). Shortly afterwards he was appointed by Cardinal Bessarion to a benefice in Calabria, where the later years of his life were spent, and where he died about 1475. Gaza stood high in the opinion of most of his learned contemporaries, but still higher in that of the scholars of the succeeding generation. His Greek grammar (in four books), written in Greek, first printed at Venice in 1495, and afterwards partially translated by Erasmus in 1521, although in many respects defective, especially in its syntax, was for a long time the leading text-book. His translations into Latin were very numerous, including the Problemala, De partibus animalium and De generatione animalium of Aristotle; the Historia plantarum of Theophrastus; the Problemata of Alexander Aphrodisias; the De instruendis aciebus of Aelian; the De composilione verborum of Dionysius of Halicarnassus; and some of the Homilies of John Chrysostom. He also turned into Greek Cicero's De senectute and Somnium Scipionis — with much success, in the opinion of Erasmus; with more elegance than exactitude, according to the colder judgment of modern scholars. He was the author also of two small treatises entitled De mensibus and De origine Turcarum.

See G. Voigt, Die Wiederbelebung des klassischen Altertums (1893), and article by C. F. Bahr in Ersch and Gruber's Allgemeine

Encyklopddie. For a complete list of his works, see Fabricius, Bibliotheca Graeca (ed. Harles), x.

GAZA (or 'Azzah, mod. Ghuzzeh), the most southerly of the five princely Philistine cities, situated near the sea, at the point where the old trade routes from Egypt, Arabia and Petra to Syria met. It was always a strong border fortress and a place of commercial importance, in many respects the southern counterpart of Damascus. The earliest notice of it is in the Tell el-Amarna tablets, in a letter from the local governor, who then held it for Egypt, with which country it always stood in close connexion. It never passed for long into Israelite hands, though subject for a while to Hezekiah of Judah; from him it passed to Assyria. In Amos i. 6 the city is denounced for giving up Hebrew slaves to Edom. To Herodotus (iii. 5) the place seemed as important as Sardis. The city withstood Alexander the Great for five months (332 B.C.), and in 96 B.C. was razed to the ground by Alexander Jannaeus. It was rebuilt by Aulus Ga'oinius, 57 B.C., but on a new site; the old site was remembered and spoken of as "Old" or "Desert Gaza": compare Acts viii. 26. In the 2nd and 3rd centuries Gaza was a thriving Greek city, with good schools and famous temples, especially one to the local god Marna {i.e. " Lord " or " Our Lord "). A statue of this god has been found near Gaza; it much resembles the Greek representation of Zeus. The struggle with Christianity here was long and intense. Egyptian monks gradually won over the country folk, and in 402, under the influence of Theodosius and Porphyry the local bishop, the Marneion was destroyed and the cross made politically supreme. In the 5th and 6th centuries Gaza was held in high repute as a place of learning. But after it passed into Moslem hands (635) it gradually lost all save commercial importance, and even the Crusaders did little to revive its old military glory. It finally was captured by the Moslems in 1244. Napoleon captured it in 1799.

The modern town (pop. 16,000) is divided into four quarters, one of which is built on a low hill. A magnificent grove of verv ancient olives forms an avenue 4 m. long to the north. There are many lofty minarets in various parts of the town, and a fine mosque built of ancient materials. A 12th century church towards the south side of the hill has alsc been converted into a mosque. On the east is shown the tomb of Samson (an erroneous tradition dating back to the middle ages) . The ancient walls are now covered up beneath green mounds of rubbish. The water-supply is from wells sunk through the sandy soil to

the rock; of these there are more than twenty — an unusual number

for a Syrian town. The land for the 3 m. between Gaza and the sea consists principally of sand dunes. There is no natural harbour, but traces of ruins near the shore mark the site of the old Maiuma Gazae or Port of Gaza, now called el Mineh, which in the 5th century was a separate town and episcopal see, under the title Constantia or Limena Gaza. Hashem, an ancestor of Mahomet, lies buried in the town. On the east are remains of a race-course, the corners marked by granite shafts with Greek inscriptions on them. To the south is a remarkable hill, quite isolated and bare, with a small mosque and a grave- yard. It is called el Muntar, " the watch tower," and is supposed to be the mountain "before (or facing) Hebron," to which Samson carried the gates of Gaza (Judg. xvi. 3). The bazaars of Gaza are considered good. An extensive pottery exists in the town, and black earthenware peculiar to the place is manu- factured there. The climate is dry and comparatively healthy, but the summer temperature often exceeds no Fahr. The surrounding country is partly cornland, partly waste, and is inhabited by wandering Arabs. The prosperity of Ghuzzeh has partially revived through the growing trade in barley, of which the average annual export to Great Britain for 1897-1899 was over 30,000 tons. The dress of the people is Egyptian rather than Syrian. Gaza is an episcopal see both of the Greek and the Armenian church. The Church Missionary Society maintains a mission, with schools for both sexes, and a hospital.

GAZALAND, a district of Portuguese East Africa, extending north from the Komati or Manhissa river, Delagoa Bay, to the Pungwe river. It is a well- watered, fertile country. Gazaland is one of the chief recruiting grounds for negro labour in the Transvaal gold mines. The country derives its name from a Swazi chief named Gaza, a contemporary of Chaka, the Zulu king. Refugees from various clans oppressed by Dingaan (Chaka's successor) were welded into one tribe by Gaza's son Manikusa, who took the name of Sotshangana, his followers being known generally as Matshangana. A section of them was called Maviti or Landeens (i.e. couriers), a designation which persists as a tribal name. Between 1833 and 1836 Manikusa made himself master of the country as far north as the Zambezi and captured the Portuguese posts at Delagoa Bay, Inhambane, Sofala and Sena, killing nearly all the inhabitants. The Portu- guese reoccupied their posts, but held them with great difficulty, while in the interior the Matshangana continued their ravages unchecked, depopulating large regions. Manikusa died about i860, and his son Umzila, receiving some help from the Portuguese at Delagoa Bay in a struggle against a brother for the chieftain- ship, ceded to them the territory south of the Manhissa river. North of that

stream as far as the Zambezi and inland to the continental plateau Umzila established himself in independence, a position he maintained till his death (c. 1884). His chief rival was a Goanese named Gouveia, who came to Africa about 1850. Having obtained possession of a prazo in the Gorongoza district, he ruled there as a feudal lord while acknowledging himself a Portuguese subject. Gouveia recovered from the Mat- shangana and other troublers of the peace much of the country in the Zambezi valley, and was appointed by the Portuguese captain-general of a large region. From 1868 onward the country began to be better known. Probably the first European to penetrate any distance inland from the Sofala coast since the Portuguese gold-seekers of the 16th century was St Vincent W. Erskine, who explored the region between the Limpopo and Pungwe (1868-1875). Portugal's hold on the coast had been more firmly established at the time of Umzila's death, and Gungunyana, his successor, was claimed as a vassal, while efforts were made to open up the interior. This led in 1 890-1 891 to collisions on the borderland of the plateau with the newly established British South Africa Company, and to the arrest by the company's agents of Gouveia, who was, however, set at liberty and returned to Mozambique via Cape Town. An offer made by Gungunyana (1891) to come under British protection was not accepted. In 1892 Gouveia was killed in a war with a native chief. Gungunyana maintained his independence until

1895, when he was captured by a Portuguese force and exiled, first to Lisbon and afterwards to Angola, where he died in 1906. With the capture of Gungunyana opposition to Portuguese rule largely ceased.

In flora, fauna and commerce Gazaland resembles the neigh- bouring regions of Portuguese East Africa, (q.v.).

See G. McCall Theal, History of South Africa since 1795, vol. v. (London, 1908).

GAZEBO (usually explained as a comic Latinism, for " I will gaze "; the New English Dictionary suggests a possible oriental origin now lost), a term used in the 18th century for a structure on the outer wall of a garden, having an upper storey with windows on each side so as to overlook the road. Similar build- ings are found in Holland on the borders of the canals, which in some cases form very

picturesque features.

GAZETTE, a name given to news-sheets or newspapers having an abstract of current events (see Newspapers). The London Gazette is the title of the English official organ for announcements by the government, and is published every Tuesday and Friday. It contains all proclamations, orders of council, promotions and appointments to commissions in the army and navy, all appoint- ments to offices of state, and such other orders, rules and regula- tions as are directed by act of parliament to be published therein. It also contains notices of proceedings in bankruptcy, dissolutions of partnership, &c. By the Documentary Evidence Act 1868 the production of a copy of the Gazette is prima facie evidence of royal proclamations and government orders and regulations. Similar gazettes are also published in Edinburgh and Dublin. Most countries (the United States excepted) have official journals containing information more or less similar to that of the London Gazette, as the French Journal officiel, the German Deulscher Reichs-und Kgl. Preuss. Staats-Anzeiger, &c. The word " gazet- teer " was originally applied to one who wrote for " gazettes," but is now only used for a geographical dictionary arranged on an alphabetical plan.

GEAR (connected with " garb," properly elegance, fashion, especially of dress, and with " gar," to cause to do, only found in Scottish and northern dialects;' the root of the word is seen in the Old Teut. garwjan, to make ready), an outfit, applied to the wearing apparel of a person, or to the harness and trappings of a horse or any draft animal, as riding-gear, hunting-gear, &c; also to household goods or stuff. The phrase " out of gear," though now connected with the mechanical application of the word, was originally used to signify " out of harness " or con- dition, not ready to work, not fit. The word is also used of apparatus generally, and especially of the parts collectively in a machine by which motion is transmitted from one part to another by a series of cog-wheels, continuous bands, &c. It is used in a special sense in reference to a bicycle, meaning the diameter of an imaginary wheel, the circumference of which is equal to the distance accomplished by one revolution of the pedals (see Bicycle).

GEBER. The name Geber has long been used to designate the author of a number of Latin treatises on alchemy, entitled Summa perfectionis magislerii, De investigation perfectionis, De inventione verilatis, Liber fornacum, Testamentum Geberi Regis Indiae and Alchemia Geberi, and these writings were generally regarded as translations from the Arabic originals of Abu Abdallah Jaber ben

Hayyam (Haiyan) ben Abdallah al-Kufi, who is supposed to have lived in the 8th or 9th century of the Christian era. About him , however, there is considerable uncertainty. According to the Kitab-al-Fihrist (10th century), which gives his name as above, the authorities disagree, some asserting him to have been a writer on philosophy and rhetoric, and others claiming for him the first place among the adepts of his time in the art of making gold and silver. The writer of the Kitab-al-Fihrist says he had been assured that Jaber only wrote one book and even that he never existed at all, but these statements he scouts as ridiculous, and expressing the conviction that Jaber really did exist, and that his works were numerous and important, goes on to quote the titles of some 500 treatises attributed to him. He is said to have resided most frequently at Kufa, where he prepared the " elixir," but,*

XI. i&

according to others, he never spent long in one place, having reason to keep his whereabouts unknown. His patron or master is variously given as Ja'far ben Yahya, and as Ja'far es-Sadiq; in the Arabic Book of Royalty, professedly written by him, he addresses the last-named as his master. In addition to these details the Fihrist mentions a tradition that he originally came from Khorasan. Another story given by d'Herbelot (Biblio- theque orientale, s.v. " Giaber ") makes him a native of Harran in Mesopotamia and a Sabaean. Leo Africanus, who in 1526 gave an account of the Alchemists of Fez in Africa (see the English translation of his Africae descriptio by John Pory, A Geographical History of Africa, London, 1600, p. 155), states that their principal authority was Geber, a Greek who had apostatized to Mahommedanism and lived a century after Mahomet. In Albertus Magnus the name Geber occurs only once and then with the epithet " of Seville "; doubtless the reference is to the Arabian Jabir ben Aflah, who lived in that city in the nth century, and wrote an astronomy in 9 books which is of import- ance in the history of trigonometry.

The great puzzle connected with the name Geber lies in the character of the writings attributed to him, their style and matter differentiating them strongly from those of even the best authors of the later alchemical period, and making it difficult to account for their existence at all. The researches of M. P. E. Berthelot threw a great deal of light on this question. Taking the six treatises enumerated above he concluded, after critical examina- tion, that the two last may be disregarded as of later date than the others, and that the De investigatione perfectionis, the De in- ventione and the

Liber fornacum are merely extracts from or summaries of the Summa perfectionis with later additions. The Summa he therefore regarded as representative of the work of the Latin Geber, and study of it convinced him that it contains no indication of an Arabic origin, either in its method, which is conspicuous for clearness of reasoning and logical co-ordination of material, or in its facts, or in the words and persons quoted. Without going so far as to deny that some words and phrases may be taken from the writings of the Arabian Jaber, he was disposed to hold that it is the original work of some unknown Latin author, who wrote it in the second half of the 13th century and put it under the patronage of the venerated name of Geber. The MS. of this work in the Bibliotheque Nationale at Paris dates from about the year 1300. Berthelot further investigated Arabic MSS. existing in the Paris library and in the university of Leiden, and containing works attributed to Jaber, and had translations made of six treatises — two, of which he gives the titles as Livre de la royauii and Petit Livre de la misiricorde, — from Paris, and four — Livre des balances, Livre de la misericorde, Livre de la concentration and Livre de la mercure orientale — from Leiden. Berthelot was not prepared to assert that these treatises were actually written by Jaber, but he held it certain that they are works written in Arabic between the 9th and 12th centuries, at a period anterior to the relations of the Latins with the Arabs. In style these treatises are entirely different from the Summa of Geber. Their language is vague and allegorical, full of allusions and pious Mussulman invocations; the author continually announces that he is about to speak without mystery or reserve, but all the same never gives any precise details of the secrets he professes to reveal. He holds the doctrine that everything endowed with an apparent quality possesses an opposite occult quality in much the same terms as it is found in Latin writers of the middle ages, but he makes no allusion to the theory of the" generation of the metals by sulphur and mercury, a theory generally attributed to Geber, who also added arsenic to the list. Again he fully accepts the influence of the stars on the production of the metals, whereas the Latin Geber disputes it, and in general the chemical knowledge of the two is on a different plane. Here again the inference is that the Latin treatises printed from the 15th century onwards as the work of Geber are not authentic, regarded as translations of the Arabic author Jaber, always supposing that the Arabic MSS. transcribed and translated for Berthelot are really, as they profess to be, the work of Jaber, and as representative of his opinions and attainments.

But while Berthelot thus deprived the world of what were long regarded as genuine Latin versions of Jaber's works, he also gave it something in their place, for among the Paris MSS. he found a mutilated treatise, hitherto unpublished, entitled Liber de Septuaginta (Johannis) , translalus a Magistro Renaldo Cremonensi, which he considered the only known Latin work that can be regarded as a translation from the Arabic Jaber. The latter states in the Arabic works referred to above that under that title he collected 70 of the 500 little treatises or tracts of which he was the author, and the titles of those tracts enumerated in the Kitab-al-Fihrist as forming the chapters of the Liber de Septua- ginta correspond in general with those of the Latin work, which further is written in a style similar to that of the Arabic Jaber and contains the same doctrines. Hence Berthelot felt justified in assigning it to Jaber, although no Arabic original is known.

The evidence collected by Berthelot has animportantbearingon the history of chemistry. Most of the chemical knowledge attri- buted to the Arabs has been attributed to them on the strength of the reputed Latin writings of Geber. If, therefore, these are original works rather than translations, and contain facts and doctrines which are not to be found in the Arabian Jaber, it follows that, on the one hand,the chemical knowledge of the Arabs has been overestimated and, on the other, that more progress was made in the middle ages than has generally been supposed.

See M. P. E. Borthelot's works on the history of alchemy and especially his Chimie au moyen Age (3 vols., Paris, 1893), the third volume of which contains a French translation of Jaber's works together with the Arabic text.

GEBHARD TRUCHSESS VON WALDBURG (1 547-1601), elector and archbishop of Cologne, was the second son of William, count of Waldburg, and nephew of Otto, cardinal bishop of Augsburg (1514-1573). Belonging thus to an old and dis- tinguished Swabian family, he was born on the 10th of November 1 547, and after studying at the universities of Ingolstadt, Perugia, Louvain and elsewhere began his ecclesiastical career at Augs- burg. Subsequently he held other positions at Strassburg, Cologne and Augsburg, and in December 1577 was chosen elector of Cologne after a spirited contest. Gebhard is chiefly noted for his conversion to the reformed doctrines, and for his marriage with Agnes, countess of Mansfeld, which was connected with this step. After living in concubinage with Agnes he decided, perhaps under compulsion, to marry her, doubtless intending at the same time to resign his see. Other counsels, however,

prevailed. Instigated by some Protestant supporters he declared he would retain the electorate, and in December 1 582 he formally announced his conversion to the reformed faith. The marriage with Agnes was celebrated in the following February, and Gebhard remained in possession of the see. This affair created a great stir in Germany, and the clause concerning ecclesiastical reservation in the religious peace of Augsburg was interpreted in one way by his friends, and in another way by his foes; the former holding that he could retain his office, the latter that he must resign. Anticipating events Gebhard had collected some troops, and had taken measures to convert his subjects to Protestantism. In April 1 583 he was deposed and excommunicated by Pope Gregory XIII.; a Bavarian prince, Ernest, bishop of Liege, Freising and Hildesheim, was chosen elector, and war broke out between the rivals. The cautious Lutheran princes of Germany, especially Augustus I., elector of Saxony, were not enthusiastic in support of Gebhard, whose friendly relations with the Calvinists were not to their liking; and although Henry of Navarre, afterwards Henry IV. of France, tried to form a coalition to aid the deposed elector, the only assistance which he obtained came from John Casimir, administrator of the Palatinate of the Rhine. The inhabi tants of the electorate were about equally divided on the question, and Ernest, supported by Spanish troops, was too strong for Gebhard. John Casimir, who acted as commander-in-chief, returned to the Palatinate in October 1583, and early in the following year Gebhard was driven from Bonn and took refuge in the Nether- lands. The electorate was soon completely in the possession of Ernest, and the defeat of Gebhard was a serious blow to Protes- tantism, and marks a stage in the history of the Reformation. Living in the Netherlands he became very intimate with Eliza-

beth's envoy, Robert Dudley, earl of Leicester, but he failed to get assistance for renewing the war either from the English queen or in any other quarter. In 1 589 Gebhard took up his residence at Strassburg, where he had held the office of dean of the cathedral since 1574. Before his arrival some trouble had arisen in the chapter owing to the fact that three excommunicated canons persisted in retaining their offices. He joined this party, which was strongly supported in the city, took part in a double election to the bishopric in 1592, and in spite of some opposition retained his office until his death at Strassburg on the 31st of May 1601. Gebhard was a drunken and licentious man, who owes his promi- nence rather to his surroundings than to his abilities.

See M. Lossen, Der kolnische Krieg (Gotha, 1882), and the article on Gebhard in band viii. of the Allgemeine deutsche Biographie (Leipzig,

1878) ; J. H. Hennes, Der Katnpf um das Erzstift Koln (Cologne, 1878) ; L. Ennen, Geschichte der Stadt Koln (Cologne, 1863- 1880); and Nuntiaturberichte aus Deutschland. Der Kampf um Koln, edited by J. Hansen (Berlin, 1892).

GEBWEILER (Fr. Guebwiller), a town of Germany in the imperial province of Alsace-Lorraine, at the foot of the Vosges, on the Lauch, 13 m. S. of Colmar, on the railway Bollweiler- Lautenbach. Pop. (1905) 13,259. Among the principal buildings are the Roman Catholic church of St Leodgar, dating from the 1 2th century, the Evangelical church, the synagogue, the town- house, and the old Dominican convent now used as a market and concert hall. The chief industries are spinning and dyeing, and the manufacture of cloth and of machinery ; quarrying is carried on and the town is celebrated for its white wines.

Gebweiler is mentioned as early as 774. It belonged to the religious foundation of Murbach, and in 1 7 59 the abbots chose it for their residence. In 1789, at the outbreak of the Revolution, the monastic buildings were laid in ruins, and, though the archives were rescued and removed to Colmar, the library perished.

GECKO, 1 the common name applied to all the species of the Geckones, one of the three sub-orders of the Lacertilia. The geckoes are small creatures, seldom exceeding 8 in. in length including the tail. With the head considerably flattened, the body shojt and thick, the legs not high enough to prevent the body dragging somewhat on the ground,the eyes large and almost destitute of eyelids, and the tail short and in some cases nearly as thick as the body, the geckoes altogether lack the litheness and grace characteristic of most lizards. Their colours also are dull,

*»

Leaf-tailed Gecko (Gymnodactylus platurus) of Australia.

and to the weird and forbidding aspect thus produced the general prejudice against those creatures in the countries where they occur, which has led to their being classed with toads and snakes, is no doubt to be attributed. Their bite was supposed to be venomous, and their saliva to produce painful cutaneous eruptions; even their touch was thought sufficient to convey a dangerous taint. It is needless to say that in this instance the popular mind was misled by appearances. The geckoes are not only harmless, but are exceedingly useful creatures, feeding on insects, which, owing to the great width of their oesophagus, they are enabled to swallow whole, and in pursuit of which they do not hesitate to enter human dwellings, where they are often killed on 1 The Malay name ge-koq imitates the animal's cry.

Lower Surface of the Toe of (a) Gecko, (i) Hemidactylus — enlarged.

suspicion. The structure of the toes in these lizards forms one of their most characteristic anatomical features.

Most geckoes have adhesive digits and toes, by means of which they are enabled not only to climb absolutely smooth and vertical surfaces, for instance a window-pane, but to run along a white-washed ceiling, back downwards. The adhesion is not produced by sticky matter but by numerous transverse lamellae, each of which is further beset with tiny hair-like excrescences. The arrangement of the lamellae and pads differs much in the various genera and is used for classificactory purposes. Those which live on sandy ground have narrow digits without the adhesive apparatus. Most species have sharp, curved claws, often

retractile between some of the lamellae or into a special sheath. The tail is very brittle and can be quickly regener- ated; it varies much in size and shape; the most extra- ordinary is that of the leaf- tailed gecko. Ptychozoon homalocephalon of the Malay countries has membranous ex- pansions on the sides of the head, body, limbs and tail, which look like parachutes, but more probably they aid in conceal- ing the creature when it is closely pressed to the similarly

coloured bark of a tree. Most geckoes are dull coloured, yellow to brown, and they soon change colour from lighter to dark tints. They are insectivorous and chiefly nocturnal, but are fond of basking in the sun, motionless on the bark of a tree, or on a rock the colour of which is then imitated to a nicety. Some species are more or less transparent.

Geckoes, of which about 270 species are known, subdivided into about 50 genera, are cosmopolitan within the warmer zones, including New Zealand, and even the remotest volcanic islands. This wide distribution is due partly to the great age of the suborder (although fossils are unknown), partly to their being able to exist for several months without food so that, concealed in hollow trunks of trees, they may float about for a very long time. Ships, also, act as distributors. In south Europe occur only Hemidactylus lurcicus, Tarentola mauritanica (Platydactylus facelanus) and Phyllodactylus europaeus.

GED, WILLIAM (1690-1749), the inventor of stereotyping, was born at Edinburgh in 1690. In 1725 he patented his in- vention, developed from the simple process of soldering together loose types of Van der Mey. Ged, although he succeeded in obtaining a cast in similar metal, of a type page, could not persuade Edinburgh printers to take up his invention, and finally entered into partnership with a London stationer named Jenner and Thomas James, a typefounder. The partnership, however, turned out very ill; and Ged, broken-hearted at his want of success due to trade jealousy and the compositors' dislike of the innovation, died in poverty on the 19th of October 1749. Two prayer-books for the university of Cambridge and an edition of Sallust were printed from his stereotype plates. In his time the best type was imported from Holland, and Ged's daughter reports that he had repeated offers from the Dutch which, from patriotic motives, he refused. His sons tried to carry out his patent, and it was eventually perfected by Andrew Wilson.

GEDDES, ALEXANDER (1737-1802), Scottish Roman Catholic theologian, was born in Rathven, Banffshire, on the 14th of September 1737. He was trained at the Roman Catholic seminary at Scalan and at the Scottish College in Paris, where he studied biblical philology, school divinity and modern languages. In 1764 he officiated as a priest in Dundee, but in May 1765 accepted an invitation to live with the earl of Traquair; where, with abundance of leisure and the free use of an adequate library, he made further progress in his favourite biblical studies. After a second visit to Paris, which was employed by him in reading and making extracts from

rare books and manuscripts,

he was appointed in 1769 priest of Auchinhalrig and Preshome in his native county. The freedom with which he fraternized with his Protestant neighbours called forth the rebuke of his bishop (George Hay), and ultimately, for hunting and for occasionally attending the parish church of Cullen, where one of his friends was minister, he was deprived of his charge and forbidden the exercise of ecclesiastical functions within the diocese. This happened in 1779; and in 1780 he went with his friend Lord Traquair to London, where he spent the rest of his life. Before leaving Scotland he had received the honorary degree of LL.D. from the university of Aberdeen, and had been made an honorary member of the Society of Antiquaries, in the institution of which he had taken a very active part. In London Geddes soon received an appointment in connexion with the chapel of the imperial ambassador, and was also helped by Lord Petre in his scheme for a new Catholic version of the Bible. In 1786, supported also by such scholars as Benjamin Kennicott and Robert Lowth, Geddes published a Prospectus of a new Translation of the Holy Bible, a considerable quarto volume, in which the defects of previous translations were fully pointed out, and the means indicated by which these might be removed. It was well received, and led to the publication in 1788 of Pro posals for Printing, with a specimen, and in 1790 of a General Answer to Queries, Counsels and Criticisms. The first volume of the translation itself, which was entitled The Holy Bible . . . faithfully translated from corrected Texts of the Originals, with various Readings, explanatory Notes and critical Remarks, appeared in 1792, and was the signal for a storm of hostility on the part of both Catholics and Protestants. It was obvious enough — no small offence in the eyes of some — that as a critic Geddes had identified himself with C. F. Houbigant (1686-1783), Kennicott and J. D. Michaelis, but others did not hesitate to stigmatize him as the would-be " corrector of the Holy Ghost." Three of the vicars-apostolic almost immediately warned all the faithful against the " use and reception " of his translation, on the ostensible ground that it had not been examined and ap- proved by due ecclesiastical authority; and by his own bishop (Douglas) he was in 1793 suspended from the exercise of his orders in the London district. The second volume of the transla- tion, completing the historical books, published in 1797, found no more friendly reception; but this circumstance did not dis- courage him from giving forth in 1800 the volume of Critical Remarks on the Hebrew Scriptures, which presented in a some- what brusque manner the then novel and startling views of Eichhorn and his school on the primitive

history and early records of mankind.

Geddes was engaged on a critical translation of the Psalms (published in 1807) when he was seized with an illness of which he died on the 26th of February 1802. Athough under ecclesi- astical censures, he had never swerved from a consistent pro- fession of faith as a Catholic; and on his death-bed he duly received the last rites of his communion.

Besides pamphlets on the Catholic and slavery questions, as well as several fugitive jeux d'esprit, and a number of unsigned articles in the Analytical Review, Geddes also published a free metrical version of Select Satires of Horace (1779), and a verbal rendering of the First Book of the Iliad of Homer (1792). The Memoirs of his life and writings by his friend John Mason Good appeared in 1803.

GEDDES, ANDREW (1783-1844), British painter, was born at Edinburgh. After receiving a good education in the high school and in the university of that city, he was for five years in the excise office, in which his father held the post of deputy auditor. After the death of his father, who had opposed his desire to become an artist, he came to London and entered the Royal Academy schools. His first contribution to the exhibitions of the Royal Academy, a " St John in the Wilderness," appeared at Somerset House in 1806, and from that year onwards Geddes was a fairly constant exhibitor of figure-subjects and portraits. His well-known portrait of Wilkie, with whom he was on terms of intimacy, was at the Royal Academy in 1816. He alternated for some years between London and Edinburgh, with some excursions on the Continent, but in 1831 settled in London, and was elected associate of the Royal Academy in 1832; and he

died in London of consumption in 1844. A very able executant, a good colourist, and a close student of character, he made his chief success as a portrait-painter, but he produced occasional figure subjects and landscapes, and executed some admirable copies of the old masters as well. He was also a good etcher. His portrait of his mother, and a portrait study, called " Summer," are in the National Gallery of Scotland, and his portrait- of Sir Walter Scott is in the Scottish National Portrait Gallery.

See Art in Scotland: its Origin and Progress, by Robert Brydall

(1889) ; The Scottish School of Painting, by William D. McKay, R.S.A. (1906).

GEDDES, JAMES LORRAINE (1827-1887), American soldier and writer, was born in Edinburgh, Scotland, on the 19th of March 1827. In his boyhood he was taken to Canada, but in 1843 he returned to Scotland; then studied at Calcutta in the military academy, entered the army, and after distinguishing himself in the Punjab campaign, returned to Canada, whence in 1857 he removed to Vinton, Iowa. In the American Civil War he served in the Federal army first as lieutenant-colonel and after February 1862 as colonel of volunteers, taking part in the fighting at Shiloh, Vicksburg and Corinth. He was captured at Shiloh and was imprisoned for a time at Madison, Ga., and in Libby prison, Richmond, Va., and in 1865 was brevetted brigadier-general of volunteers. He was principal of the College for the Blind at Vinton after the war, and until his death was connected with the Iowa College of Agriculture at Ames, being military instructor and cashier in 1870-1882, acting president in 1876-1877, librarian in 1877-187S, vice- president and professor of military tactics in 1880-1882, and treasurer in 1884-1887. He died at Ames on the 21st _ of February 1887. He wrote a number of war songs, including " The Soldiers' Battle Prayer " and " The Stars and Stripes."

GEDDES, SIR WILLIAM DUGUID (1828-1900), Scottish scholar and educationist, was born in Aberdeenshire. He was educated at Elgin academy and university and King's College, Aberdeen, and after having held various scholastic posts he was appointed in i860 professor of Greek and in 1885 principal of the (united) university of Aberdeen. He was knighted in 1892. He died in Aberdeen on the 9th of February 1900. It is chiefly as a teacher that Geddes will be remembered, and in his enthusi- astic and successful efforts to raise the standard of Greek at the Scottish universities he has been compared with the humanists of the Renaissance. Amongst other works he was the author of A Greek Grammar (1855; 17th edition, 1883; new and revised edition, 1893); a meritorious edition of the Phaedo of Plato (2nd ed., 1885); and The Problem of the Homeric Poems (1878), in which, while supporting Grote's view that the Iliad consisted of an original Achilleis with insertions or additions by later hands, he maintains that these insertions are due to the author of the Odyssey.

GEDYMIN (d. 1342), grand-duke of Lithuania, was supposed by the earlier chroniclers to have been the servant of Witen, prince of Lithuania, but more probably he was Witen's younger brother and

the son of Lutuwer, another Lithuanian prince. Gedymin inherited a vast domain, comprising Lithuania proper, Samogitia, Red Russia, Polotsk and Minsk; but these possessions were environed by powerful and greedy foes, the most dangerous of them being the Teutonic Knights and the Livonian knights of the Sword. The systematic raiding of Lithuania by the knights under the pretext of converting it had long since united all the Lithuanian tribes against the common enemy; but Gedymin aimed at establishing a dynasty which should make Lithuania not merely secure but mighty, and for this purpose he entered into direct diplomatic negotiations with the Holy See. At the end of 1322 he sent letters to Pope John XXII. soliciting his protection against the persecution of the knights, informing him of the privileges already granted to the Dominicans and the Franciscans in Lithuania for the preaching of God's Word, and desiring that legates should be sent to receive him also into the bosom of the church. On receiving a favourable reply from the Holy See, Gedymin Issued circular letters, dated 25th of January 1325, to the principal Hanse towns, offering a free access into his

domains to men of every order and profession from nobles and knights to tillers of the soil. The immigrants were to choose their own settlements and be governed by their own laws. Priests and monks were also invited to come and build churches at Vilna and Novogrodek. Similar letters were sent to the Wendish or Baltic cities, and to the bishops and landowners of Livonia and Esthonia. In short Gedymin, recognizing the superiority of western civilization, anticipated Ivan the Terrible and Peter the Great by throwing open the semi-savage Russian lands to influences of culture.

In October 1323 representatives of the archbishop of Riga, the bishop of Dorpat, the king of Denmark, the Dominican and Franciscan orders, and the Grand Master of the Teutonic Order assembled at Vilna, when Gedymin confirmed his promises and undertook to be baptized as soon as the papal legates arrived. A compact was then signed at Vilna, " in the name of the whole Christian World," between Gedymin and the delegates, confirm- ing the promised privileges. But the christianizing of Lithuania was by no means to the liking of the Teutonic Knights, and they used every effort to nullify Gedymin's far-reaching design. This, unfortunately, it was easy to do. Gedymin's chief object was to save Lithuania from destruction at the hands of the Germans. But he was still a pagan reigning over semi-pagan lands; he was equally bound to his pagan kinsmen in Samogitia, to his orthodox subjects in Red Russia, and to his Catholic allies in Masovia. His policy, therefore, was necessarily tentative and ambiguous, and might very readily be misinterpreted.

Thus his raid upon Dobrzyn, the latest acquisition of the knights on Polish soil, speedily gave them a ready weapon against him. The Prussian bishops, who were devoted to the knights, at a synod at Elbing questioned the authority of Gedymin's letters and denounced him as an enemy of the faith; his orthodox subjects reproached him with leaning towards the Latin heresy; while the pagan Lithuanians accused him of abandoning the ancient gods. Gedymin disentangled himself from his difficulties by repudiating his former promises; by refusing to receive the papal legates who arrived at Riga in September 1323 ; and by dismissing the Franciscans from his territories. These apparently retrogres- sive measures simply amounted to a statesmanlike recognition of the fact that the pagan element was still the strongest force in Lithuania, and could not yet be dispensed with in the coming struggle for nationality. At the same time Gedymin through his ambassadors privately informed the papal legates at Riga that his difficult position compelled him for a time to postpone his steadfast resolve of being baptized, and the legates showed their confidence in him by forbidding the neighbouring states to war against Lithuania for the next four years, besides ratifying the treaty made between Gedymin and the archbishop of Riga. Nevertheless in 1325 the Order, disregarding the censures of the church, resumed the war with Gedymin, who had in the meantime improved his position by an alliance with Wladislaus Lokietek, king of Poland, whose son Casimir now married Gedymin's daughter Aldona.

While on his guard against his northern foes, Gedymin from 1316 to 1340 was aggrandizing himself at the expense of the numerous Russian principalities in the south and east, whose incessant conflicts with each other wrought the ruin of them all. Here Gedymin's triumphal progress was irresistible; but the various stages of it are impossible to follow, the sources of its history being few and conflicting, and the date of every salient event exceedingly doubtful. One of his most important territorial accretions, the principality of Halicz- Vladimir, was obtained by the marriage of his son Lubart with the daughter of the Haliczian prince; the other, Kiev, apparently by conquest. Gedymin also secured an alliance with the grand-duchy of Muscovy by marrying his daughter, Anastasia, to the grand- duke Simeon. But he was strong enough to counterpoise the influence of Muscovy in northern Russia, and assisted the re- public of Pskov, which acknowledged his overlordship, to break away from Great Novgorod. His internal administration bears all the marks of a wise ruler. He protected the Catholic as well as the orthodox clergy, encouraging them both to civilize his

subjects; he raised the Lithuanian army to the highest state of efficiency then attainable; defended his borders with a chain of strong fortresses; and built numerous towns including Vilna, the capital (c. 1321). Gedymin died in the winter of 1342 of a wound received at the siege of Wielowa. He was married three times, and left seven sons and six daughters.

See Teodor Narbutt, History of the Lithuanian nation (Pol.) (Vilna, 1835); Antoni Prochaska, On the Genuineness of the Letters of Gedymin (Pol.) (Cracow, 1895); Vladimir Bonifatovich Antonovich, Monograph concerning the History of Western and South-western Russia (Rus.) (Kiev, 1885). (R. N. B.)

GEE, THOMAS (1815-1898), Welsh Nonconformist preacher and journalist, was born at Denbigh on the 24th of January 1815. At the age of fourteen he went into his father's printing office, but continued to attend the grammar school in the afternoons. In 1837 he went to London to improve his knowledge of printing, and on his return to Wales in the following year ardently threw himself into literary, educational and religious work. Among his publications were the well-known quarterly magazine Y Trae- thodydd (" The Essayist "), Gwyddoniadur Cymreig (" Encyclo- paedia Cambrensis "), and Dr Silvan Evans's English-Welsh Dictionary (1868), but his greatest achievement in this field was the newspaper Baner Cymru (" The Banner of Wales "), founded in 1857 and amalgamated with Yr Amserau ("The Times") two years later. This paper soon became an oracle in Wales, and played a great part in stirring up the nationalist movement in the principality. In educational matters he waged a long and successful struggle on behalf of undenominational schools and for the establishment of the intermediate school system. He was an enthusiastic advocate of church disestablishment, and had a historic newspaper duel with Dr John Owen (afterwards bishop of St David's) on this question. The Eisteddfod found in him a thorough friend and a wise counsellor. His commanding presence, mastery of diction, and resonant voice made him an effective platform speaker. He was ordained to the Calvinistic Methodist ministry at Bala in 1847, and gave his time and talents ungrudgingly to Sunday school and temperance work. Through- out his life he believed in the itinerant unpaid ministry rather than in the settled pastorate. He died on the 28th of September 1898, arid his funeral was the most imposing ever seen in North Wales.

6EEL, JACOB (1789-1862), Dutch scholar and critic, was born at Amsterdam on the 12th of November 1789. In 1823 he was appointed sub-librarian, and in 1833 chief librarian and honorary professor at Leiden, where he died on the 1 ith of November 1862. Geel materially contributed to the development of classical studies in Holland. He was the author of editions of Theocritus (1820), of the Vatican fragments of Polybius (1829), of the 'OXi.'jt7riaMSS. in the Leiden library, wrote a history of the Greek sophists, and translated various German works into Dutch.

GEELONG, a seaport of Grant county, Victoria, Australia, situated on an extensive land-locked arm of Port Phillip known as Corio Bay, 45 m. by rail S.W. of Melbourne. Pop. of the city proper (1901) 12,399; with the adjacent boroughs of Geelong West, and Newton-and-Chilwell, 23,311. Geelong slopes to the bay on the north and to the Barwon river on the south, and its position in this respect, as well as the shelter it obtains from the Bellarine hills, renders it one of the healthiest towns in Victoria. As a manufacturing centre it is of considerable importance. The first woollen mill in the colony was established here, and the tweeds, cloths and other woollen fabrics of the town are noted throughout Australia. There are extensive tanneries, flour-mills and salt works, while at Fyansford, 3 m. distant, there are important cement works and paper-mills. The extensive vine- yards in the neighbourhood of the town were destroyed under the Phylloxera Act, but replanting subsequently revived this industry. Corio Bay, a safe and commodious harbour, is entered by two channels across its bar, one of which has a depth of 23 1 ft. There is extensive quayage, and the largest wool ships are able to load alongside the wharves, which are connected by rail with

all parts of the colony. The facilities given for shipping wool direct to England from this port have caused a very extensive wool'broking trade to grow up in the town. The country surrounding Geelong is agricultural, but there are large limestone quarries east of the town, and in the Otway Forest, 23 m. distant, coal is worked. Geelong was incorporated in 1849.

GEESTEMtfNDE, a seaport town of Germany, in the Prussian province of Hanover, on the right bank of the Weser, at the mouth of the Geeste, which separates it from Bremerhaven, 32 m. N. from Bremen by rail. Pop. (1905) 23,625. The interest of the place is purely naval and commercial, its origin dating no farther back than 1857, when the construction of the harbour was begun. The great basin, which can accommodate large sea-going vessels, was completed in 1863, the petroleum basin was opened in 1874, and

additional wharves have been constructed for the reception of vessels engaged in the fishing industry. The fish market of Geestemunde is the most important in Germany, and the auction hall practically determines the price of fish throughout the empire. The whole port is protected by powerful fortifications. Among the industrial establishments of the town are shipbuilding yards, foundries, engineering works and saw-mills.

GEFFCKEN, FRIEDRICH HEINRICH (1830-1806), German diplomatist and jurist, was born on the 9th of December 1830 at Hamburg, of which city his father was senator. After studying law at Bonn, Gottingen and Berlin, he was attached in 1854 to the Prussian legation at Paris. For ten years (i8s6r-i866) he was the diplomatic representative of Hamburg in Berlin first as charge d'affaires, and afterwards as ministers-resident, being afterwards transferred in a like capacity to London. Appointed in 1872 professor of constitutional history and public law in the reorganized university of Strassburg, Geffcken became in 1880 a member of the council of state of Alsace-Lorraine. Of too nervous a temperament to withstand the strain of the responsibilities of his position, he retired from public service in 1882, and lived henceforth mostly at Munich, where he died, suffocated by an accidental escape of gas into his bedchamber, on the 1st of May 1896. Geffcken was a man of great erudition and wide knowledge and of remarkable legal acumen, and from these qualities pro- ceeded the personal influence he possessed. He was moreover a clear writer and made his mark as an essayist. He was one of the most trusted advisers of the Prussian crown prince, Frederick William (afterwards the emperor Frederick), and it was he (it is said, at Bismarck's suggestion) who drew up the draft of the New German federal constitution, which was submitted to the. crown prince's headquarters at Versailles during the war of 1870-71. It was also Geffcken who assisted in framing the famous docu- ment which the emperor Frederick, on his accession to the throne in 1888, addressed to the chancellor. This memoran- dum gave umbrage, and on the publication by Geffcken in the Deutsche Rundschau (Oct. 1888) of extracts from the emperor Frederick's private diary during the war of 1870ˆ71, he was, at Bismarck's instance, prosecuted for high treason. The Reichs- gericht (supreme court), however, quashed the indictment, and Geffcken was liberated after being under arrest for three months. Publications of various kinds proceeded from his pen. Among these are Zur Geschichte des orientalischen Krieges 1853-1856 (Berlin, 1881); Frankreich, Russland und der Dreibund (Berlin, 1894); and Staat und Kirche (1875), English translation by E. F. Fairfax (1877). His writings on English history have been

translated by S. J. Macmullan and published as The British Empire, with essays on Prince Albert, Palmerston, Beaconsfield, Gladstone, and reform of the House of Lords (1889).

GEFFROY, MATHIEU AUGUSTE (1820-1895), French historian, was born in Paris. After studying at the Ecole Normale Superieure he held history professorships at various lycees. His French thesis for the doctorate of letters, Etude sur les pamphlets politiques et religieux de Milton (1848), showed that he was attracted towards foreign history, a study for which he soon qualified himself by mastering the Germanic and Scandinavian languages. In 185 1 he published a Histoire des Slats scandinaves, which is especially valuable for clear arrange- ment and for the trustworthiness of its facts. Later, a long

6tay in Sweden furnished him with valuable documents for a political and social history of Sweden and France at the end of the 1 8th century. In 1864 and 1865 he published in the Revue des deux mondes a series of articles on Gustavus III. and the French court, which were republished in book form in 1867. To the second volume he appended a critical study on Marie Antoinette- et Louis XVI apocryphes, in which he proved, by evidence drawn from documents in the private archives of the emperor of Austria, that the letters published by Feuillet de Conches (Louis XVI, Marie Antoinette et Madame Elisabeth, 1864-1873) and Hunolstein (Corresp. inSdite de Marie Antoinette, 1864) are forgeries. With the collaboration of Alfred von Arneth, director of the imperial archives at Vienna, he edited the Correspondance secrete entre Marie-TUrhse et le comte de Mercy- Argenteau (3 vols., 1874), the first account based on trust-worthy documents of Marie Antoinette's character, private conduct and policy. The Franco-German War drew Geffroy's attention to the origins of Germany, and his Rome et les Barbares: etude sur la Germanic de Tacite (1874) set forth some of the results of German scholarship. He was then appointed to superintend the opening of the French school of archaeology at Rome, and drew up two useful reports (1877 and 1884) on its origin and early work. But his personal tastes always led him back to the study of modern history. When the Paris archives of foreign affairs were thrown open to students, it was decided to publish a collec- tion of the instructions given to French ambassadors since 1648 (Recueil des instructions donnees aux ambassadeurs et tninistres de France depuis le traite de

Westphalie), and Geffroy was com- missioned to edit the volumes dealing with Sweden (vol.ii., 1885) and Denmark (vol. xiii., 1895). In the interval he wrote Madame de Maintenon d'apres sa correspondance aulhentique (2 vols., 1887), in which he displayed his penetrating critical faculty in discriminating between authentic documents and the additions and corrections of arrangers like La Beaumelle and Lavallee. His last works were an Essai sur la formation des collections d'antiques de la Suede and Des institutions et des mceurs du paganisme scandinave: I'Islande avant le Christianisme, both published posthumously. He died at Bievre on the 16th of August 1895.

GEFLE, a seaport of Sweden on an inlet of the Gulf of Bothnia, chief town of the district (Ian) of Gefleborg, 112 m. N.N.W. of Stockholm by rail. Pop. (1900) 29,522. It is the chief port of the district of Kopparberg, with its iron and other mines and forests. The exports consist principally of timber and wood- pulp, iron and steel. The harbour, which has two entrances about 20 ft. deep, is usually ice-bound in mid-winter. Large vessels generally load in the roads at Graberg, 6 m. distant. There are slips and shipbuilding yards, and a manufacture of sail-cloth. The town is an important industrial centre, having tobacco and leather factories, electrical and other mechanical works, and breweries. At Skutskar at the mouth of the Dal river are wood-pulp and saw mills, dealing with the large quantities of timber floated down the river; and there are large wood-yards in the suburb of Bomhus. Gefle was almost destroyed by fire in 1869, but was rebuilt in good style, and has the ad- vantage of a beautiful situation. The principal buildings are' a castle, founded by King John III. (1568-T592), but rebuilt later, a council-house erected by Gustavus III., who held a diet here in 1792, an exchange, and schools of commerce and navigation.

GEGENBAUR, CARL (1826-1903), German anatomist, was born on the 21st of August 1826 at Wurzburg, the university of which he entered as a student in 1845. After taking his degree in 185 1 he spent some time in travelling in Italy and Sicily, before returning to Wurzburg as Privatdocent in 1854. In 1855 he was appointed extraordinary professor of anatomy at Jenaˆ where after 1865 his fellow- worker, Ernst Haeckel, was professor of zoology, and in 1858 he became the ordinary professor. In 1873 he was appointed to Heidelberg, where he was professor of anatomy and director of the Anatomical Institute until his retirement in 1901. He died at Heidelberg on the 14th of June 1903. The work by which perhaps he is best known is his Grundriss der vergleichenden Anatomie (Leipzig, 1874; 2nd

edition, 1878). This was translated into English by W. F. Jeffrey Bell (Elements of Comparative Anatomy, 1878), with additions by E. Ray Lankester. While recognizing the import- ance of comparative embryology in the study of descent, Gegen- baur laid stress on the higher value of comparative anatomy as the basis of the study of homologies, i.e. of the relations between corresponding parts in different animals, as, for example, the arm of man, the foreleg, of the horse and the wing of a fowl. A distinctive piece of work was effected by him in 187 1 in supple- menting the evidence adduced by Huxley in refutation of the theory of the origin of the skull from expanded vertebrae, which, formulated independently by Goethe and Oken, had been championed by Owen. Huxley demonstrated that the skull is built up of cartilaginous pieces; Gegenbaur showed that " in the lowest (gristly) fishes, where hints of the original vertebrae might be most expected, the skull is an unsegmented gristly brain-box, and that in higher forms the vertebral nature of the skull cannot be maintained, since many of the bones, notably those along the top of the skull, arise in the skin." Other publica- tions by Gegenbaur include a Text-book of Human Anatomy (Leipzig, 1883, new ed. 1903), the Epiglottis (1892) and Com- parative Anatomy of the Vertebrates in relation to the Invertebrates (Leipzig, 2 vols., ˆ98-1901). In 1875 he founded the Morpho- logisches Jahrbuch, which he edited for many years. In 1901 he published a short autobiography under the title Erlebtes und Erstrebtes.

See Furbringgr in Heidelberger Professoren aus dem jgten Jahr- kundert (Heidelberg, 1903).

GEGENSCHEIN (Ger. gegen, opposite, and schein, shine), an extremely faint luminescence of the sky, seen opposite the direc- tion of the sun. Germany was the country in which it was first discovered and described. The English rendering " counter- glow " is also given to it. Its faintness is such that it can be seen only by a practised eye under favourable conditions. It is invisible during the greater part of June, July, December and January, owing to its being then blotted out by the superior light of the Milky Way. It is also invisible during moonlight and near the horizon, and the neighbourhood of a bright star or planet may interfere with its recognition. When none of these unfavourable conditions supervene it may be seen at nearly any time when the air is clear and the depression of the sun below the horizon more than 20°ˆ (See Zodiacal Light.)

GEIBEL, EMANUEL (r8r 5-1884), German poet, was born at Liibeck on the 17th of October 1815, the son of a pastor in the city. He was originally intended for his father's profession, and studied at Bonn

and Berlin, but his real interests lay not in theology but in classical and romance philology. In 1838 he accepted a tutorship at Athens, where he remained until 1840. In the same year he brought out, in conjunction with his friend Ernst Curtius, a volume of translations from the Greek. His first poems, Zeitstimmen, appeared in 1841; a tragedy, Kbnig Roderick, followed in 1843. In the same year he received, a pension from the king of Prussia, which he retained until his invitation to Munich by the king of Bavaria in 1851 as honorary professor at the university. In the interim he had produced Kbnig Sigurds Braulfakrt (1846), an epic, and Juniuslieder (1848, 33rd ed. i9or), lyrics in a more spirited and manlier style than his early poems. A volume of Neue Gedichte, published at Munich in 1857, and principally consisting of poems on classical subjects, denoted a further considerable advance in objectivity, and the series was worthily closed by the Spatherbstbldtter, pub- lished in 1877. He had quitted Munich in 1869 and returned to Liibeck, where he died on the 6th of April 1884. His works further include two tragedies, Brunhild(i8s&, 5th ed. 1890), and Sophonisbe (1869), and translations of French and Spanish popular poetry. Beginning as a member of the group of political poets who heralded the revolution of 1848, Geibel was also the chief poet to welcome the establishment of the Empire in 1871. His strength lay not, however, in his political songs but in his purely lyric poetry, such as the fine cycle Ada and his still popular love-songs. He may be regarded as the leading representative of German lyric poetry between 1848 and 1870.

Geibel's Gesammelte Werke were published in 8 vols. (1883, 4th ed. 1906) ; his Gedichte have gone through about 130 editions. An excel- lent selection in one volume appeared in 1904. For biography and criticism, see K. Goedeke, E. Geibel (1869) ; W. Scherer's address on Geibel (1884); K. T. Gaedertz, Geibel-Denkwurdigkeiten (1886); C. C. T. Litzmann, E. Geibel, aus Erinnerungen, Briefen und Tage- buchern (1887), and biographies by C. Leimbach (2nd ed., 1894), and K. T. Gaedertz (1897).

GEIGE (O. Fr. gigue, gige; 0. Ital. and Span, giga; Prov. gigua; O. Dutch gighe), in modern German the violin ; in medieval German the name applied to the first stringed instruments played with a bow, in contradistinction to those whose strings were plucked by fingers or plectrum such as the cithara, rotta and fidula, the first of these terms having been very generally used to designate various instruments

whose strings were plucked. The name gige in Germany, of which the origin is uncertain, 1 and its derivatives in other languages, were in the middle ages applied to rebecs having fingerboards. As the first bowed instruments in Europe were, as far as we know, those of the rebab type, both boat-shaped and pear-shaped, it seems probable that the name clung to them long after the bow had been applied to other stringed instruments derived from the cithara, such as the fiddle (videl) or vielle. In the romances of the 1 2th and 13th centuries the gtge is frequently mentioned, and generally associated with the rotta. Early in the 16th century we find definite information concerning the Geige in the works of Sebastian Virdung (1511), Hans Judenkunig (1523), Martin Agricola (1532), Hans Gerle (iS33); and from the instruments depicted, of two distinct types and many varieties, it would appear that the principal idea attached to the name was still that of the bow used to vibrate the strings. Virdung qualifies the word Geige with Klein (small) and Gross (large), which do not represent two sizes of the same instrument but widely different types, also recognized by Agricola, who names three or four sizes of each, discant, alto, tenor and bass. Virdung's Klein Geige is none other than the rebec with two C-shaped soundholes and a raised fingerboard cut in one piece with the vaulted back and having a separate flat soundboard glued over it, a change rendered necessary by the arched bridge. Agricola's Klein Geige with three strings was of a totally different construction, having ribs and wide incurvations but no bridge; there was a rose soundhole near the tailpiece and two C-shaped holes in the shoulders. Agricola (Musica inslrumenlalis) distinctly mentions three kinds of Geigen with three, four and five strings. From him we learn that only one position was as yet used on these instruments, one or two higher notes being occasionally obtained by sliding the little finger along. A century later Agricola's Geige was regarded as antir quated by Praetorius, who reproduces one of the bridgeless ones with five strings, a rose and two C-shaped soundholes, and calls it an old fiddle; under Geige he gives the violins. (K. S.)

GEIGER,- ABRAHAM (1810-1874), Jewish theologian and orientalist, was born at Frankfort-on-Main on the 24th of May 1 8 10, and educated at the universities of Heidelberg and Bonn. As a student he distinguished himself in philosophy and in philo- logy, and at the close of his course wrote on the relations of Judaism and Mahommedanism a prize essay which was after- wards published in 1833 under the title Was hat Mohammed aus dem Judentum aufgenommen? (English trans. Judaism and Islam, Madras, 1898). In November 1832 he went to Wiesbaden as rabbi of the synagogue,

and became in 1835 one of the most

1 The words gige, gigen, geic appear suddenly in the M. H. German of the 12th century, and thence passed apparently into the Romance languages, though some would reverse the process {e.g. VVeigand, Deutsches Wbrterbuch). An elaborate argument in the Deutsches Wbrterbuch of J. and W. Grimm (Leipzig, 1897) connects the word with an ancient common Teut. root gag — meaning to sway to and fro, as preserved in numerous forms: e. g. M.H.G gagen, gugen, '• to sway to and fro " (gugen, gagen, the rocking of a cradle), the Swabian gigen, gagen, in the same sense, the Tirolese gaiggern, to sway, doubt, or the old Norse geiga, to go astray or crooked. The reference is to the swaying motion of the violin bow. The English "jig " is derived from gige through the O. Fr. gigue (in the sense of a stringed instrument); the modern French gigue (a dance) is the English '.' jig " re-imported (Hatzfeld and Darmesteter, Dictionnaire). This opens up another possibility, of the origin of the name of the instrument in the dance which it accompanied. (W. A. P.)

active promoters of the Zeitschrift fur jiidische Theologie (1835-1839 and 1842-1847). From 1838 to 1863 he lived in Breslau, where he organized the reform movement in Judaism and wrote some of his most important works, including Lehr- und Lesebuch zur Sprache der Mischna (1845), Studien from Maimonides (1850), translation into German of the poems of Juda ha-Levi (1851), and Urschrijt und Ubersetzungen der Bibel in ihrer Abhangigkeit von der innern Entwickelung des Judentums (1857). The last- named work attracted little attention at the time, but now enjoys a great reputation as a new departure in the methods of studying the records of Judaism. The Urschrijt has moreover been recognized as one of the most original contributions to biblical science. In 1863 Geiger became head of the synagogue of his native town, and in 1870 he removed to Berlin, where, in addition to his duties as chief rabbi, he took the principal charge of the newly established seminary for Jewish science. The Urschrijt was followed by a more exhaustive handling of one of its topics in Die Sadducaer und Pharisaer (1863), and by a more thorough application of its leading principles in an elaborate history of Judaism {Das Judentum und seine Geschichte) in 1865— 187 1. Geiger also contributed frequently on Hebrew, Samaritan and Syriac subjects to theZeitschrijt derdeutschen morgenlandischen Gesellschajt, and from 1862 until his death (on the 23rd of October 1874) he was editor of a periodical entitled Jiidische Zeilschrijt jiir. Wissenschajt und Leben. He also published a Jewish prayer- book {I sraelitisches Gebetbuch) and a variety of minor monographs on historical and literary subjects connected with

the fortunes of his people. (I. A.)

An Allgemeine Einleitung and five volumes of Nachgelassene Schrijten were edited in 1875 by his son Ludwig Geiger (b. 1848), who in 1880 became extraordinary professor in the university of Berlin. Ludwig Geiger published a large number of biographical and literary works and made a special study of German humanism. He edited the Goethe- J ahrbuch from 1880, Vierteljahrsschriji jiir Kultur und Litteratur der Renaissance (1885-1886), Zeitschr. jiir die Gesch. der Juden im Deutschland (1886-1891), Zeitschr. jiir vergleichende Litteratur geschichte und Renaissance-Litteratur (1887-1891). Among his works are Johann Reuchlin, sein Leben und seine Werke (Leipzig, 187 1); and Johann Reuchlin 's Brief – wechsel (Tubingen, 1875); Renaissance und Humanismus in Italien und Deutschland (1882, 2nd ed. 1901); Gesch. des geistigen Lebens der preussischen Hauptstadt (1892-1894) ; Berlin's geistiges Leben (1894-1896). : •

See also J. Derenbourg in Jud. Zeilschrijt, xi. 299-308; E. Schrieber, Abraham Geiger als Rejormator des Judentums (1880), art. (with portrait) in Jewish Encyclopedia.

Abraham Geiger's nephew Lazarus Geiger (1820-1870), philosopher and philologist, born at Frankfort-on-Main, was destined to commerce, but soon gave himself up to scholarship and studied at Marburg, Bonn and Heidelberg. From 1861 till his sudden death in 1870 he was professor in the Jewish high school at Frankfort. His chief aim was to prove that the evolution of human reason is closely bound up with that of language. He further maintained that the origin of the Indo- . Germanic language is to be sought not in Asia but in central Germany. He was a convinced opponent of rationalism in religion. His chief work was his Ursprung und Entwickelung der menfch- lichen Sprache und Vernunjl (vol. i., Stuttgart, 1868), the principal results of which appeared in a more popular form as Der Ursprung der Sprache (Stuttgart, i869andi878). The second volume of the former was published in an incomplete form (1872, 2nd ed. 1899) after his death by his brother Alfred Geiger, who also published a ; number of his scattered papers as Zur Entwickelung der Mensch- heit (1871, 2nd ed. 1878; Eng. trans. D. Asher, Hist, oj the Development oj the Human Race, Lond., 1880).

See L. A. Rosenthal, Laz. Geiger: seine Lehre vom Ursprung d. Sprache und Vernunjl und sein Leben (Stuttgart, 1883); E. Peschier, L. Geiger, sein Leben und Denken (1871); J. Keller, L. Geiger und d. Kritik d. Vernunjl (Wertheim, 1883) and Der Ursprung d. Ver- nunjt

(Heidelberg, 1884).

GEIJER, ERIK GUSTAF (1 783-1847), Swedish historian, was born at Ransater in Varmland, on the 12th of January 1783, of a : family that had immigrated from Austria in the 1 7th century.

He was educated at the university of Upsala, where in_i8o3 he carried off the Swedish Academy's great prize for his Areminne ofver Sten Sture den dldre. He graduated in 1806, and in 1810 returned from a year's residence in England to become docent in his university. Soon afterwards he accepted a post in the public record office at Stockholm, where, with some friends, he founded the " Gothic Society," to whose organ Idiina he contributed a number of prose essays and the songs Manhem, Vikingen, D.en siste kdmpen, Den siste skalden, Odalbonden, Kolargossen, which he set to music. About the same time he issued a volume of hymns, of which several are inserted in the Swedish Psalter.

Geijer's lyric muse was soon after silenced by his call to be assistant to Erik Michael Fant, professor of history at Upsala, whom he succeeded ini8i7. In 1 8 24 he was elected a member of the Swedish Academy. A single volume of a great projected work, Svea Rikes Hdfdcr, itself a masterly critical examination of the sources of Sweden's legendary history, appeared in 1825. Geijer's researches in its preparation had severely strained his health, and he went the same year on a tour through Denmark and part of Germany, his impressions from which are recorded in his Minnen. In 1832-1836 he published three volumes of his Svenska folkets historia (Eng. trans, by J. H. Turner, 1845), a clear view of the political and social development of Sweden down to 1654. The acute critical insight, just thought, and finished historical art of these incomplete works of Geijer entitle him to the first place among Swedish historians. His chief other historical and political writings are his Teckning of Sveriges tillstand 1718-1772 (Stockholm, 1838), and Feodalism och republikanism, ett bidrag till Samhdllsfbrfaltningens historia (1 844) , which led to a controversy with the historian Anders Fryxell regarding the part played in history by the Swedish aristocracy. Geijer also edited, with the aid of J. H. Schroder, a continuation of Fant's Scriptores rerum svecicarum tnedii aevi (1818-1828), and, by himself, Thomas Thorild's Samlade skrifter (1819-1825), and Konung Gustaf III.'s efterlemnade Papper (4 vols., 1843-1846).

Geijer's academic lectures, of which the last three, published in 1845 under the title Om var lids inre samhallsforhallanden, i synnerhel med afseende pa Fdderneslandet, involved him in another controversy with Fryxell, but exercised a great influence over his students, who especially testified to their attachment after the failure of a prosecution against him for heresy. A riumber of his extempore lectures, recovered from notes, were published in 1856. He also wrote a life of Charles XIV. (Stockholm, 1844). Failing health forced Geijer to resign his chair in 1846, after which he removed to Stockholm for the purpose of completing his Svenska folkets historia, and died there on the 23rd of April 1847. His Samlade skrifter (13 vols., i84o-i855;newed., 1873-1877) include a large number of philosophical and political essays contributed to reviews, particularly to Litter aturbladei (1838-1830), a periodi- cal edited by himself, which attracted great attention in its day by its pronounced liberal views on public questions, a striking contrast to those he had defended in 1828-1830, when, as again in 1840-1841, he represented Upsala University in the Swedish diet. His poems were collected and published as Skaldestycken (Upsala, 1835 and 1878).

Geijer's style is strong and manly. His genius bursts out in sudden flashes that light up the dark corners of history. A few strokes, and a personality stands before us instinct with life. His language is at once the scholar's and the poet's; with his profoundest thought there beats in unison the warmest, the noblest, the most patriotic heart. Geijer came to the writing of history fresh from researches in the whole field of Scandinavian antiquity, researches whose first-fruits are garnered in numerous articles in Iduna, and his masterly treatise Om den gamla nordiskq folkvisan, prefixed to the collection of Svenska folkvisor which he . editedwith A. A. Afzelius (3 vols. ,1814-1816). The development of freedom is the idea that' gives unity to all his historical writings.

For Geijer's biography, see his own Minnen (1834), which contains copious extracts from his letters and diaries; B. E. Malmstrom, Minnestal ofver E. G. Geijer, addressed to the Upsala students (June 6, 1848), and printed among his Tal och esthetiska afhandlingar (1868), and Grunddragen af Svenska vitterhelens hafder (1866-1868);

and S. A. Hollander, Minne afE.G. Geijer (Orebro, 1 869). See also lives of Geijer by J. Hellstenius (Stockholm, 1876) and J. Niekson (Odense, 1902).

GEIKIE, SIR ARCHIBALD (1835-), Scottish geologist, was born at

Edinburgh on the 28th of December 1835. ■ He was educated at the high school and university of Edinburgh, and in 1855 was appointed an assistant on the Geological Survey. Wielding the pen with no less facility than the hammer,- lie inaugurated his long list of works with The Story of a Boulder; or, Gleanings from the Note-Book of a Geologist (1858). . His ability at once attracted the notice of his chief, Sir Roderick Murchison, with whom he formed a lifelong friendship, and whose biographer he subsequently became. With Murchison some of his earliest work was done on the complicated regions of the- Highland schists; and the small geological map of Scotland published in 1862. was their joint work: a larger map was issued by Geikie in 1892. In 1863 he published an important essay " On the Pheno- mena of the Glacial Drift of Scotland," Trans. Geol. Soc. Glasgow, in which the effects of ice action in that country were for the first time clearly and connectedly delineated. In 1865 appeared Geikie's Scenery of Scotland (3rd edition, 1901), which was, he claimed, " the first attempt to elucidate in some detail the history of the topography of a country." In the same year he was elected F.R. S. At this time the Edinburgh school of geologists — prominent among them Sir Andrew Ramsay, with his Physical Geology and Geography of Great Britain — were maintaining the supreme importance of denudation in the configuration of land-surfaces, and particularly the erosion of valleys by the action of running water. Geikie's book, based on extensive personal knowledge of the country, was an able contribution to the doctrines of the Edinburgh school, of which he himself soon- began to rank as one of the leaders.

In 1867, when a separate branch of the Geological Survey was established for Scotland, he was appointed director. Ob the foundation of the Murchison professorship of geology and mineralogy at the university of Edinburgh in 1871, he became the first occupant of the chair. These two appointments he continued to hold till 1881, when he succeeded Sir Andrew Ramsay in the joint offices of director-general of the Geological Survey of the United Kingdom and director of the' museum of practical geology, London, from which he retired in February 1 90 1. A feature of his tenure of office was the impetus given to microscopic petrography, a branch of geology to which he had devoted special study, by a splendid collection of sections of British rocks. Later he wrote two important and interesting Survey Memoirs, The Geology of Central and Western Fife and Kinross (1900), and The Geology of Eastern Fife (1902).

From the outset of his career, when he started to investigate the geology of Skye and other of the Western Isles, he took a keen

interest in volcanic geology, and in 1871 he brought before the Geological Society of London an outline of the Tertiary volcanic history of Britain. Many difficult problems, however, remained to be solved. Here he was greatly aided by his extensive travels, not only throughout Europe, but in western America. While the canyons of the Colorado confirmed his long-standing views on erosion, the eruptive regions of Wyoming, Montana and Utah supplied him with valuable data in explanation of volcanic phenomena. The results of his further researches were given in an elaborate and charmingly written essay on " The History of Vol- canic Action during the Tertiary Period in the British Isles," Trans. Roy, Soc. Edin., (1888). His mature views on volcanic geology were given to the world in his presidential addresses to the Geological Society in 1891 and 1892.. and afterwards embodied in his great work on The, Ancient Volcanoes of Great Britain (1897). Other results of his travels are collected in his Geological Sketches at Home and Abroad (1882).

His experience as a field geologist resulted in an admirable text-book, Outlines of Field Geology (5th edition, 1900). After editing and practically re-writing Jukes's Student's Manual of Geology in r872, he published in 1882. a Text-Book and in 1886 a Class-Book of geology, which have taken rank as standard works of theirkind. A fourth edition of his Text-Book, intwovols., was

issued in 1903. His writings are marked in a high degree by charm of style and power of vivid description. His literary ability has given him peculiar qualifications as a writer of scientific bio- graphy, and the Memoir of Edward Forbes (with G. Wilson) and those of his old chiefs, SirR. I. Murchison (2 vols., 1875) and Sir l nd "wCrombie Ramsay (1805), are models of what such works should be. His Founders of Geology consists of the inaugural course of Lectures (founded by Mrs G. H. Williams) at Johns Hopkins University, Baltimore, delivered in 1897. In 1897 he issued an admirable Geological Map of England and Wales, with Descriptive Notes. In 1898 he delivered the Romanes Lectures and his address was published under the title of Types of Scenery and their Influence on Literature. The study of geography owes its improved position in Great Britain largely to his efforts Among his works on this subject is The Teaching of Geography (1887). His Scottish Reminiscences (1904) and Landscape in History and other Essays (1905) are charmingly written and full of instruction. He was foreign secretary of the Royal Society from 1890 to 1894, joint secretary from 1903 to 1908, president . in 1909, president of the Geological Society in 1891 and 1892 and president of the British Association, 1892. He received the honour of knighthood in 1891.

GEIKIE, JAMES (1839-), Scottish geologist, younger brother of Sir Archibald Geikie, was born at Edinburgh on the 23rd of August 1839. He was educated at the high school and university of Edinburgh. He served on the Geological Survey from 1861 until 1882, when he succeeded his brother as Murchi- son professor of geology and mineralogy at the university of Edinburgh. He took as his special subject of investigation the origin of surface-features, and the part played in their formation by glacial action. His views are embodied in his chief work, The Great Ice Age and its Relation to the Antiquity of Man (1874- 3rd ed., 1894). H« was elected F.R.S. in 1875. James Geikie became the leader of the school that upholds the all- important action of land-ice, as against those geologists who assign chief importance to the work of pack-ice and icebergs. Continuing this line of investigation in his Prehistoric Europe (1 88 1) , he maintained the hypothesis of five inter-Glacial periods in Great Britain, and argued that the palaeolithic deposits of the Pleistocene period were not post- but inter- or pre-Glacial His Fragments of Earth Lore: Sketches and Addresses, Geological and Geographical (1893) and Earth Sculpture (1898) are mainly concerned with the same subject. His Outlines of Geology (1886) , a standard text-book of its subject, reached its third edition in 1896; and in 1905 he published an important manual on Structural and Field Geology. In 1887 he displayed another side of his activity in a volume of Songs and Lyrics by H. Heine and other German Poets, done into English Verse. From 1888 he was honorary editor of the Scottish Geographical Magazine

GEIKIE, WALTER (1795-1837), Scottish painter, was born at Edinburgh on the 9th of November 1795. In his second year he was attacked by a nervous fever by which he permanently lost the faculty of hearing, but through the careful attention of his father he was enabled to obtain a good education. Before he had the advantage of the instruction of a master he had attained con- siderable proficiency in sketching both figures and landscapes from nature, and in 181 2 he was admitted into the drawing academy of the board of Scottish manufactures. He first exhibited in 181 5, and was elected an associate of the Royal Scottish Academy in 1831, and a fellow in 1834. He died on the 1st of August 1837, and was interred in the Greyfriars churchyard Edinburgh. Owing to his want of feeling for colour, Geikie was not a successful painter in oils, but he sketched in India ink with great truth and humour the scenes and characters of Scottish lower-class life in his native city. A series of etchings which' exhibit very high excellence were published by him in 1829-183 1 and a collection of eighty-one of these was republished posthu-

mously in 1 84 1, with a biographical introduction by Sir Thomas Dick Lauder, Bart.

GEILER (or Geyler) VON KAISERSBERG, JOHANN (1445- 1510), " the German Savonarola," one of the greatest of the popular preachers of the 15 th century, was born at Schaffhausen

on the 16th of March 1445, but from 1448 passed his childhood and youth at Kaisersberg in Upper Alsace, from which place his current designation is derived. In 1460 he entered the university of Freiburg m Baden, where, after graduation, he lectured for some time on the Sententiae of Peter Lombard, the commentaries of Alexander of Hales, and several of the works of Aristotle A living interest in theological subjects, awakened by the study of John Oerson, led him in 1471 to the university of Basel, a centre of attraction to some of the most earnest spirits of the time Made a doctor of theology in 1475, he received a professorship at Freiburg in the following year; but his tastes, no less than the spirit of the age, began to incline him more strongly to the vocation ot a preacher, while his fervour and eloquence soon led to his receiving numerous invitations to the larger towns. Ultimately he accepted in 1478 a call to the cathedral of Strassburg, where he continued to work with few interruptions until within a short time of his death on the 10th of March 1510. The beautiful pulpit erected for him in 1481 in the nave of the cathedral, when the chapel of St Lawrence had proved too small, "still bears witness to the popularity he enjoyed as a preacher in the im- mediate ˆsphere of his labours, and the testimonies of Sebastian Urant, Beatus Rhenanus, Johann Reuchlin, Melanchthon and others show how great had been the influence of his personal character. His sermons-bold, incisive, denunciatory, abounding in quaint illustrations and based on texts by no means confined to the Bible,— taken down as he spoke them, and circulated (sometimes without his knowledge or consent), by his friends, told perceptibly on the German thought as well as oh the German speech of his time.

Among the many volumes published under his name only two appear to have had the benefit of his revision, namely; DerSeelel Parodies vm warenund volkomnen Tugenden, and that entitledˆ trrtg Schaf. Of the rest, probably the best-known is a series of lectures on his friend Seb. Brant's work, Das Narrenschiff or the Navuula or Speculum fatuorum, of which an edition was published at Strassburg*

in 1511 under the following title :-Naviculasive

cfflw W n V 2″ Am ™ on < Geyler's Leben, Lehren und Predigten &); r r feˆ Reformateur catholique a la fin du XV' Steele, J. G. deK , (Pans, 1876 ; R. Cruel, Gesch. £r deutschen

Predict, op. 538-576 (1879); P/dTLˆi, Grifeˆˆ K I) ; 1 . M. Lindsay, History of tSe Reformation,

Schriften :U vols ,188 , y , a tfle Keformati

vi. 427. Kawerau in Herzog-Hauck, Realencyklopddie,

GEINITZ, HANS BRUNO (1814-1900), German geologist, was born at Altenburg, the capital of the duchy of Saxe-Altenbure on the 16th of October 1814. He was educated at the uni- versities of Berlin and Jena, and gained the foundations of his geological knowledge under F. A. Quenstedt. In 1837 he took the degree of Ph.D. with a thesis on the Muschelkalk of Thuringia In 1850 he became professor of geology and mineralogy in the Royal Polytechnic School at Dresden, and in 1857 he was made director of the Royal Mineralogical and Geological Museum- he held these posts until 1894. He was distinguished for his researches on the Carboniferous and Cretaceous rocks and fossils of Saxony, and in particular for those relating to the fauna and flora of the Permian or Dyas formation. He described also the graptohtes of the local Silurian strata; and the flora of the Coal-formation of Altai and Nebraska. From 1863 to 1878 he was one of the editors of the Neues Jahrbuch. He was awarded the Murchison medal by the Geological Society of London in 1878 He died at Dresden on the 28th of January 1900. His son Franz Etjgen Geinitz (b. 1854), professor of geology in the university of Rostock, became distinguished for researches on the geology of Saxony, Mecklenburg, &c.

Rˆ?' peinitz's publications were Das Quadersandsteingebirge oder f/ wS; f m P euts . M ˆd (1849-1850); Die Versteinlrunien der Stemkohlenformahon : in Sachsen 1855); Dyas, oder die Zeihstein-

f Sa7hsen a87?-i87 5 ? "" (l86j – l862) < Das Elbthalgebfgein GEISHA (a Chino-Japanese word meaning " person of pleasing accomplishments "), strictly the name of the professional dancing and singing girls of Japan. The word is, however, often loosely used for the girls and women inhabiting Shin Yoshiwara, the prostitutes' quarter of Tokyo. The training of the true Geisha*

or singing girl, which includes lessons in dancing, begins often as early as her seventh year. Her apprenticeship over, she contracts with her employer for a number of years, and is seldom able to reach independence except by marriage. There is a capitation fee of two yen per month on the actual singing girls, and of one yen on the apprentices.

See Jukichi Inouye, Sketches of Tokyo Life.

GEISLINGEN, a town of Germany in the kingdom of Wurttem- berg, on the Thierbach, 38 m. by rail E.S.E. of Stuttgart. Pop. (1905) 7050. It has shops for the carving and turning of bone, ivory, wood and horn, besides iron-works, machinery factories, glass-works, brewing and bleaching works, &c. The church of St Mary contains wood-carving by Jorg Syrlin the Younger. Above the town lie the ruins of the castle of Helfenstein, which was destroyed in 1552. Having been for a few years in the possession of Bavaria, the town passed to Wurttemberg in 1810.

See Weitbrecht, Wanderungen durch Geislingen und seine Utnge- bung (Stuttgart, 1896).

GEISSLER, HEINRICH (1814-1879), German physicist, was born at the village of Igelshieb in Saxe-Meiningen on the 26th of May 1814 and was educated as a glass-blower. In 1854 he settled at Bonn, where he speedily gained a high reputation for his skill and ingenuity of conception in the fabrication of chemical and physical apparatus. With Julius Pliicker, in 1852, he as- certained the maximum density of water to be at 3-8° C. He also determined the coefficient of expansion for ice between -24° and 7 , and for water freezing at o°. In 1869, in con junction with H. P. J. Vogelsang, he proved the existence of liquid carbon dioxide in cavities in quartz and topaz, and later he obtained amorphous' from ordinary phosphorus by means of the electric current. He is best known as the inventor of the sealed glass tubes which bear his name, by means of which are exhibited the phenomena accompanying the discharge of electri- city through highly rarefied vapours and gases. Among other apparatus contrived by him were a vaporimeter, mercury air- pump, balances, normal thermometer, and areometer. From the university of Bonn, on the occasion of its jubilee in 1868, he received the honorary degree of doctor of philosophy. He died at Bonn on the 24th of January 1879.

See A. W. Hofmann, Ber. d. dent. diem. Ges. p. 148 (1879).

GELA, a city of Sicily, generally and almost certainly identified with the modern Terranova (q.v.). It was founded by Cretan and Rhodian colonists in 688 B.C., and itself founded Acragas (see Agrigentum) in 582 B.C. It also had a treasure-house at Olympia. The town took its name from the river to the east (Thucydides vi. 2), which in turn was so called from its winter frost (yi\a in the Sicel dialect; cf. Lat. gelidus). The Rhodian settlers called it Lindioi (see Lindus). Gela enjoyed its greatest prosperity under Hippocrates (498-491 B.C.), whose dominion extended over a considerable part of the island. Gelon, who seized the tyranny on his death, became master of Syracuse in 485 B.C., and transferred his capital thither with half the in- habitants of Gela, leaving his brother Hiero to rule over the rest. Its prosperity returned, however, after the expulsion of Thrasy-bulus in 466 B.C., 1 but in 405 it was besieged by the Carthaginians and abandoned by Dionysius' order, after his failure (perhaps due to treachery) to drive the besiegers away (E. A. Freeman, Hist, of Sic. iii. 562 seq.). The inhabitants later returned and rebuilt the town, but it never regained its position . In 311 B.C. Agathocles put to death 5000 of its inhabitants; and finally, after its destruction by the Mamertines about 281 B.C., Phintias of Agrigentum transferred the remainder to the new town of Phintias (now Licata, q.v.). It seems that in Roman times they still kept the name of Gelenses or Geloi in their new abode (Th. Mommsen in C.I.L. x., Berlin, 1883, p. 737). (T. As.)

GELADA, the Abyssinian name of a large species of baboon, differing from the members of the genus Papio (see Baboon) by the nostrils being situated some distance above the extremity of the muzzle, and hence made the type of a separate genus, under the name of Thetopithecus gelada. In the heavy mantle of long brown hair covering the fore-quarters of the old males, 1 Aeschylus died there in 456 B.C.

with the exception of the bare chest, which is reddish flesh-colour, the gelada recalls the Arabian baboon {Papio hamadryas), and from this common feature it has been proposed to place the two species in the same genus. The gelada inhabits the mountains of Abyssinia, where, like other baboons, it descends in droves to pillage cultivated lands. A second species, or race, Theropithecus obscurus, distinguished by its darker hairs and the presence of a bare flesh-coloured ring round each eye, inhabits the eastern confines of Abyssinia. (R. L.)*

GELASIUS, the name of two popes.

Gelasius I., pope from 492 to 496, was the successor of Felix III. He confirmed the estrangement between the Eastern and Western churches by insisting on the removal of the name of Acacius, bishop of Constantinople, from the diptychs. He is the author of De duabus in Christo naturis adversus Eutychen et Nestorium. A great number of his letters has also come down to us. His name has been attached to a Liber Sacratnentoru'm anterior to that of St Gregory, but he can have composed only certain parts of it. As to the so-called Decretum Gelasii de libris recipiendis et non recipiendis, it also is a compilation of documents , anterior to Gelasius, and it is difficult to determine Gelasius's contributions to it. At all events, as we know it, it is of Roman origin, and 6th-century or later. (L. D.)*

Gelasius II. (Giovanni Coniulo), pope from the 24th of January n 18 to the 29th of January 11 19, was born at Gaeta of an illustrious family. He became a monk of Monte Cassino, was taken to Rome by Urban II., and made chancellor and cardinal-deacon of Sta Maria in Cosmedin. Shortly after his unanimous election to succeed Paschal II. he was seized by Cencius Frangipane, a partisan of the emperor Henry V., but freed by a general uprising of the Romans in his behalf. The emperor drove Gelasius from Rome in March, pronounced his election null and void, and set up Burdinus, archbishop of Braga, as antipope under the name of Gregory VIII. Gelasius fled to Gaeta, where he was ordained priest on the 9th of March and on the following day received episcopal consecration. He at once excommunicated Henry and the antipope and, under Norman protection, was able to return to Rome in July; but the dis- turbances of the imperialist party, especially of the Frangipani, who attacked the pope while celebrating mass in the church of St Prassede, compelled Gelasius to go once more into exile. He set out for France, consecrating the cathedral of Pisa on the way, and arrived at Marseilles in October. He was received with great enthusiasm at Avignon, Montpellier and other cities, held a synod at Vienne in January 1119, and was planning to hold a general council to settle the investiture contest when he died at Cluny. His successor was Calixtus II.

His letters are in J. P. Migne, Patrol. Lat. vol. 163. The original life by Pandulf is in J. M. Watterich, Pontiff Roman, vitae (Leipzig, 1862), and there is an important digest of his bulls and official acts in Jaffe-Wattenbach, Regesta pontif. Roman. (1885-1888):

See J. Langen, Geschichte der romischen Kirche von Gregor Vlllbis

Innocenz III. (Bonn, 1893); F. Gregorovius, Rome in the Middle Ages, vol. 4, trans, by Mrs G. W. Hamilton (London, 1896); A. Wagner, Die unteritalischen Normannen und das Papsttiim, 1086-1150 (Breslau, 1885); W. von Giesebrecht, Geschichte der deutschen Kaiserzeit, Bd. iii. (Brunswick, 1890); G. Richter, Annalen der deutschen Geschichte im Mittelalter, iii. (Halle, 1898); H. H. Milman, Latin Christianity, vol. 4 (London, 1899). (C. H. Ha.)

GELATI, a Georgian monastery in Russian Transcaucasia, in the government of Kutais, n m. E. of the town of Kutais, standing on a rocky spur (705 ft. above sea-level) in the valley of the Rion. It was founded in 1109 by the Georgian king David the Renovator. The principal church, a sandstone cathedral, dates from the end of the preceding century, and contains the royal crown of the former Georgian.kingdom of Imeretia, besides ancient MSS., ecclesiological furniture, and frfesco portraits of the kings of Imeretia. Here also, in a separate chapel, is the tomb of David the Renovator (1089-1125) and part of the iron gate of the town of Ganja (now Elisavetpol), which that monarch brought away as a trophy of his capture of the place.

GELATIN, or Gelatine, the substance which passes into I solution when " collagen," the ground substance of bone, I cartilage and white fibrous tissue, is treated with bpiling water

or dilute acids. It is especially characterized by its property of forming a jelly at ordinary temperature, becoming liquid when heated, and resolidifying to a jelly on cooling. The word is derived from the Fr. gelatine, and Ital. gelatina, from the Lat. gelata, that which is frozen, congealed or stiff. It is, therefore, in origin cognate with " jelly," which came through the Fr. gelee from the same Latin original.

The " collagen," obtained from tendons and connective tissues, also occurs in the cornea and sclerotic coat of the eye, and in fish scales. Cartilage was considered to be composed of a substance chondrigen, which gave chondrin or cartilage-glue on boiling with water. Recent researches make it probable that cartilage contains (i) chondromucoid, (2) chondroitin-sulphuric acid, (3) collagen, (4) an albumoid present in old but not in young cartilage; whilst chondrin is a mixture of gelatin and mucin. " Bone collagen," or " ossein,"

constitutes, with calcium salts, the ground substance of bones. Gelatin consists of two substances, glutin and chondrin; the former is the main con- stituent of skin-gelatin, the latter of bone-gelatin.

True gelatigenous tissue occurs in all mature vertebrates, with the single exception, according to E. F. I. Hoppe-Seyler, of the Amphioxus lanceolatus. Gelatigenous tissue was discovered by Hoppe-Seyler in the cephalopods Octopus and Sepiola, but in an extension of his experiments to other invertebrates, as cockr chafers and Anodon and Unio, no such tissue could be detected. Neither glutin nor chondrin occurs ready formed in the animal kingdom, but they separate when the tissues are boiled, with water. A similar substance, vegetable gelatin, is obtained from certain mosses.

Pure gelatin is an amorphous, brittle, nearly transparent substance, faintly yellow, tasteless and inodorous, neutral in reaction and unaltered by exposure to dry air. Its com- position is in round numbers C = 5o, H = 7, N = i8, 0=25%; sulphur is also present in an amount varying from 0-25 to

Nothing is known with any certainty as to its chemical con- stitution, or of the mode in which it is formed from albuminoids. It exhibits in a general way a connexion with that large and im- portant class of animal substances called proteids, being, like them, amorphous, soluble in acids and alkalis, and giving in solution a left-handed rotation of the plane of polarization. Nevertheless, the ordinary well-recognized reactions for proteids are but faintly observed in the case of gelatin, and the only substances which at once and freely precipitate it from solution are mercuric chloride, strong alcohol and tannic acid.

Although gelatin in a dry state is unalterable by exposure to air, its solution exhibits, like all the proteids, a remarkable tendency to putrefaction; but a characteristic feature of this process in the case of gelatin is that the solution assumes a transient acid reaction. The ultimate products of this decomposition are the same as are produced by prolonged boiling with acid. It has been found that oxalic acid, over and above the action common to all dilute acids of preventing the solidification of gelatin solutions, has the further property of preventing in a large measure this tendency to putrefy when the gelatin is treated with hot solutions of this acid, and then freed from adhering acid by means of calcium carbonate. Gelatin so treated has been called metagelatin.

In spite of the marked tendency of gelatin solutions to develop

ferment-organisms and undergo putrefaction, the stability of the substance in the dry state is such that it has even been used, and with some success, as a means of preserving perishable foods. The process, invented by Dr Campbell Morfit, consists in impregnating the foods with gelatin, and then drying them till about 10% or less of water is present. Milk gelatinized in this way is superior in several respects to the products of the ordinary condensation process, more especially in the retention of a much larger proportion of albuminoids.

Gelatin has a marked affinity for water, abstracting it from admixture with alcohol, for example. Solid gelatin steeped for some hours in wa.ter absorbs a certain amount and swells up, in which condition a gentle heat serves to convert it into a liquid; or this may be readily produced by the addition of a trace of alkali or mineral acid, or by strong acetic acid. In the last case, however, or if we use the mineral acids in a more concentrated form, the solution obtained has lost its power of solidifying, though not that of acting as a glue. This property is utilized in the preparation of liquid glue (see Glue). By prolonged boiling of strong aqueous solutions at a high, or of weak solutions at a lower temperature, the characteristic properties of gelatin are impaired and ultimately destroyed. After this treatment it acts less powerfully as a glue, loses its tendency to solidify, and becomes increasingly soluble in

cold water; nevertheless the solutions yield on precipitation with alcohol a substance identical in composition with gelatin.

By prolonged boiling in contact with hydrolytic agents, such as sulphuric acid or caustic alkali, it yields quantities of leucin and glycocoll (so-called " sugar of gelatin," this being the method by which glycocoll was first prepared), but no tyrosin. In this last respect it differs from the great body of proteids, the characteristic solid products of the decomposition of which are leucin and tyrosin.

Gelatin occurs in commerce in varying degrees of purity; the purer form obtained from skins and bones (to which this article is restricted) is named gelatin; a preparation of great purity is " patent isinglass," while isinglass (q.v.) itself is a fish-gelatin; less pure forms constitute glue (q.v.), while a dilute aqueous solution appears in commerce as size {q.v.). The manufacture follows much the same lines as that of glue; but it is essential that the raw materials must be carefully selected, and in view of the consumption of most of the gelatin in the kitchen — for soups, jellies, &c. — great care, must be taken to ensure purity and cleanliness.

In the manufacture of bone-gelatin the sorted bones are de- greased as in the case of glue manufacture, and then transferred to vats containing a dilute hydrochloric acid, by which means most of the mineral matter is dissolved out, and the bones become flexible. Instead of hydrochloric acid some French makers use phosphoric acid. After being well washed with water to remove all traces of hydrochloric acid, the bones are bleached by leading in sulphur dioxide. They are now transferred to the extractors, and heated by steam, care being taken that the temperature does not exceed 85° C. The digestion is repeated, and the runnings are clarified, concentrated, re-bleached and jellied as with glue. Skin-gelatin is manufactured in the same way as skin-glue. After steeping in lime pits the selected skins are digested three times; the first and second runnings are worked up for gelatin, while the third are filtered for " size."

Vegetable gelatin is manufactured from a seaweed, genus Lamin- aria; from the tengusa, an American seaweed, and from Irish moss. The Laminaria is first extracted with water, and the residue with sodium Carbonate; the filtrate is acidified with hydrochloric acid and the precipitated alginic acid washed and bleached. It is then dissolved in an alkali, the solution concentrated, and cooled down by running over horizontal glass plates. Flexible colourless sheets resembling animal gelatin are thus obtained. In America the weed is simply boiled with water, the solution filtered, and cooled to a thick jelly. Irish moss is treated in the same way. Both tengusa and Irish moss yield a gelatin suitable for most purposes; tengusa gelatin clarifies liquids in the same way as isinglass, and forms a harder and firmer jelly than ordinary gelatin.

Applications of Gelatin.— First and foremost is the use of gelatin as a food-stuff — in jellies, soups, &c. Referring to the articles Glue, Isinglass and Size for the special applications of these forms of gelatin, we here enumerate the more important uses of ordinary gelatin. In photography it is employed in carbon-processes, its use depending on the fact that when treated with potassium bi- chromate and exposed to light, it is oxidized to insoluble com- pounds; it plays a part in many other processes. A solution of gelatin containing readily crystallized salts — alum, nitre, &c. — solidifies with the formation of pretty designs; this is the basis of the so-called " crystalline glass ' used for purposes of ornament- ation. It is also used for coating pills to prevent them adhering together and to make them tasteless. Compounded with various mineral salts, the carbonates and phosphates of calcium, magnesium and aluminium, it yields a valuable ivory substitute. It also plays a part in the

manufacture of artificial leather, of India inks, and of artificial silk (the Vanduara Company processes).

GELDERLAND, Gelders, or Guelders, formerly a duchy of the Empire, on the lower Rhine and the Yssel, bounded by Friesland, Westphalia, Brabant, Holland and the Zuider Zee; part of which has become the province of Holland, dealt with separately below. The territory of the later duchy of Gelderland was inhabited at the beginning of the Christian era by the Teutonic tribes of the Sicambri and the Batavi, and later, during the period of the decline of the Roman empire, by the Chamavi and other Frank peoples. It formed part of the Caroling kingdom of Austrasia, and was divided into pagi or gauen, ruled by official counts (comiles-graven). In 843, by the treaty of Verdun, it became part of Lotharingia (Lorraine), and in 879 was annexed to the kingdom of East Francia (Germany) by the treaty of Meerssen. The nucleus of the later county and duchy was the gau or district surrounding the town of Gelder or Gelre, lying between the Meuse and the Niers, and since 17 15 included in Rhenish Prussia. The early history is involved in much obscurity. There were ia

the nth century a number of counts ruling in various parts of what was afterwards known as Gelderland. Towards the close of that century Gerard of Wassenburg, who besides the county of Gelre ruled over portions of Hamalant and Teisterbant, acquired a dominant position amongst his neighbours. He is generally reckoned as the first hereditary count of Gelderland (d. 1117/8). His son, Gerard II. — the Long — (d. 1131), married Irmin- gardis, daughter and heiress of Otto, count of Zutphen, and their son, Henry I. (d. n 82), inherited both countships. His successors Otto I. (1 182-1207) and Gerard III. (1207-1229) were lovers of peace and strong supporters of the Hohenstaufen emperors, through whose favour they were able to increase their territories by acquisitions in the districts of Veluwe and Betuwe. He acted as guardian to his nephew Floris IV. of Holland during his minority. Otto II., the Lame (1229-1271), fortified several towns and bestowed privileges upon them for the purpose of encouraging trade. He became a person of so much importance that he was urged to be a candidate for the dignity of emperor. He preferred to support the claims of his cousin, William II. of Holland. In return for the loan of a considerable sum of money William gave to him the city of Nijmwegen in pledge. His son Reinald

I. (d. 1326) married Irmingardis, heiress of Limburg, and in right of his wife laid claim to the duchy against Adolf of Berg, who had sold his rights to John I. of Brabant. War followed, and on the 5th of June 1288 Reinald, who meantime had also sold his rights to the count of Luxemburg, was defeated and taken prisoner at the battle of Woeringen. In this battle the count of Luxemburg was slain, and Reinald had to surrender his claims as the price of his defeat to John of Brabant. In 13 10, in return for his support, Reinald received from the emperor Henry VII. for all his territories privilegium de non evocando, i.e. the exemption of his subjects from the liability to be sued before any court outside his jurisdiction. In 13 17 he was made a prince of the Empire. A wound received at the battle of Woeringen had affected his brain, and an insurrection against him was in 1316 headed by his son Reinald, who assumed the government under the title of " Son of the Count." Reinald I. was finally in 1320 immured in prison, where he died in 1326.

Reinald II., the Black (1326-1343), was one of the foremost princes in the Netherlands of his day. He married (1) Sophia, heiress of Mechlin, and (2) in 1331 Eleanor, sister of Edward III. of England. By purchase or conquest he added considerably to his territories. He did much to improve the condition of the country, to foster trade, to promote the prosperity of the towns, and to maintain order and security in his lands by wise laws and firm administration. In 1338 the title of duke was bestowed upon him by the emperor Louis the Bavarian, who at the same time granted to him the fief of East Friesland. He died in 1343, leaving three daughters by his first marriage, and two sons, Reinald and Edward, both minors, by Eleanor of England. His elder son was ten years of age, and succeeded to the duchy under the guardianship of his mother Eleanor. Declared of age two years later, the youthful Reinald III. found himself involved in many difficulties through the struggles between the rival factions named after the two noble families of Bronkhorst and Hekeren. What was the quarrel between them, and what the causes they represented, cannot now be ascertained with certainty. There is good reason, however, to believe that they were the counterparts of the contemporary Cod and Hook parties in Holland, and of the Schieringers and Vetkoopers in Friesland. In Gelderland the quarrel between them was converted into a dynastic struggle, the Hekeren recognizing Duke Reinald, while the Bronkhorsten set up his younger brother Edward. At the battle of Tie! (1361) Reinald was defeated and taken prisoner, and Edward held the duchv till 137 1. He was a good and successful ruler, and his death by an arrow wound, after a brilliant victory over the duke of

Brabant near Baesweller (August 1371), was a loss to his country. He was in his thirty-fifth year and left no heirs. Reinald was now taken from the prison in which he had been confined to reign once more, but his health was broken and he died childless three years afterwards. The war of factions again broke out, the half-sisters of Reinald III. and Edward both

claiming the inheritance; the elder, Matilda (Machteld), in her own right, the younger Maria on behalf of her seven-year-old boy William of Jiilich, as the only male representative of the family; The Hekeren supported Matilda, the Bronkhorsten William of Jiilich. The war of succession lasted till 1379, and ended in William's favour, the emperor Wenceslas (Wenzel) recognizing him as duke four years later.

Duke William was able, restless and adventurous, an ideal knight of the palmy days of chivalry. He took part in no less than five crusades with the Teutonic order against the heathen Lithuanians and Prussians. In 1393 he inherited the duchy of Jiilich, and died in 1402. He was succeeded by his brother, Reinald IV. (d. 1423), in the united sovereignty of Gelderland, Zutphen and Jiilich, who, in accordance with a promise made before his accession, ceded the town of Emmerich to Duke Adolf of Cleves. He took the part of his brother-in-law, John of Arkel, against William VI. of Holland, and in a war of several years' duration was not successful in preventing the Arkel territory being incorporated in Holland. On his death without legitimate issue, Gelderland passed to the young Arnold of Egmont, grand- son of his sister Johanna, who had married John, lord of Arkel, their daughter Maria (d 141 5) being the wife of John, count of Egmont (d. 1451). Arnold was recognized as duke in 1424 by the emperor Sigismund, but in the following year the emperor revoked his decision and bestowed the duchy upon Adolf of Berg. Arnold in retaliation laid claim to the duchy of Jiilich, which had likewise been granted to Adolf by Sigismund, and a war followed in which the cities and nobles of Gelderland stood by Arnold; it ended in Arnold retaining Gelderland and Zutphen, and Gerardˆ the son of Adolf (d. 1437), being acknowledged as duke of Jiilich. To gain the support of the estates of Gelderland in this war of succession, Arnold had been compelled to make many concessions limiting the ducal prerogatives, and granting large powers to a council consisting of representatives of the nobles and the four chief cities, and his extravagance and exactions led to continual conflicts, in which the prince was compelled to yield to the de- mands of his subjects. In his later years a conspiracy was formed against him, headed by his wife, the violent and ambitious Catherine of Cleves, and his son Adolf. Arnold was at

first successful and Adolf had to go into exile; but he returned, and in 1465, having taken his father prisoner by treachery, interned him in the castle of Buren. Charles the Bold of Burgundy now seized the opportunity to intervene. In 147 1 he forced Adolf to release his father, who sold the reversion of the duchy to the duke of Burgundy for 92,000 golden gulden. On the 23rd of February 1473 Arnold died, and Charles of Burgundy became duke of Gelderland. His succession was not unopposed. Nijmwegen offered an heroic resistance and only fell after a long siege. After Charles's death in 1477 Adolf was released from the captivity in which he had been held, and placed himself at the head of a party in the powerful city of Ghent, which sought to settle the disputed succession by forcing a match between him and Mary, the heiress of Burgundy. On the 29th of June 1477, however, he was killed at the siege of Tournai; and Mary gave her hand to Maximilian of Austria, afterwards emperor. Catherine, Adolf's sister, made an attempt to assert the rights of his son Charles to the duchy, but by 1483 Maximilian had crushed all opposition and estab- lished himself as duke of Gelderland.

Charles of Egmont, however, did not surrender his claims, but with the aid of the French collected an army, and in the course of 1492 and 1493 succeeded in reconquering his inheritance. The efforts of Maximilian to recover the country were vain, and the successive governors of the Netherlands, Philip the Fair and his sister Margaret, fared no better. In 1507 Charles of Egmont invaded Holland and Brabant, captured Harderwijk and Bommel in 1511, threatened Amsterdam in 1512, and took Groningeh. It was, undoubtedly, a great and heroic achievement for the ruler of a petty state like Gelderland thus to assert and maintain his independence for a long period against the overwhelming power of the house of Austria. It was not till 1528 that the emperor Charles V. could force him to accept the compromise of the treaty of Gorichen, by which he received Gelderland and Zutphen for

life as fiefs of the Empire. In 1534 the duke, who was childless, attempted to transfer the reversion of Gelderland to France, but this project was violently resisted by the estates of the duchy, and Charles was compelled by them in 1 538 to appoint as his successor William V. — the Rich — of Cleves (d. 1592). Charles died the same year, and William, with the aid of the French, succeeded in maintaining his position in Gelderland for several years. The Habsburg power

was, however, in the end too great for him, and he was forced to cede the duchy to Charles V. by the treaty of Venloo, signed on the 7th of September 1543.

Gelderland was now definitely amalgamated with the Habsburg dominions in the Netherlands, until the revolt of the Low Countries led to its partition. In 1579 the northern and greater part, comprising the three " quarters " of Nijmwegen, Arnhem and Zutphen, joined the Union of Utrecht and became the province of Gelderland in the Dutch republic. Only the quarter of Roermonde remained subject to the crown of Spain, and was called Spanish Gelderland. By the treaty of Utrecht (17 15) this was ceded to Prussia with the exception of Venloo, which fell to the United Provinces, and Roermonde, which, with the remaining Spanish Netherlands, passed to Austria. Of this,, part was ceded to France at the peace of Basel in 1795, and the whole by the treaty of Luneville in 1801, when it received the name of the department of the Roer. By the peace of Paris of 18T4 the bulk of Gelderland was incorporated in the United Netherlands, the remainder falling to Prussia, where it forms the circle of Dusseldorf.

The rise of the towns in Gelderland began in the 13th century, river commerce and markets being the chief cause of their prosperity, but they never attained to the importance of the larger cities in Holland and Utrecht, much less to that of the great Flemish municipalities. They differed also from the Flemish cities in the nature of their privileges and immunities, as they did not possess the rights of communes, but only those of " free cities " of the Rhenish type. The power of the feudal lord over them was much greater. The states of Gelderland first became a considerable power in the land during the reign of Arnold of Egmont (1423-1473). Their claim to large privileges and a considerable share in the government of the county were formu- lated in a document drawn up at Nijmwegen in April 1436. These the duke had to concede, and to agree further to the appoint- ment of a council to assist him in his administration. From this time the absolute authority of the sovereign in Gelderland was broken. The states consisted of two members — the nobility and the towns. The towns were divided into four separate districts or " quarters " named after the chief town in each — Nijmwegen, Arnhem, Zutphen and Roermonde. In the time of the republic, as has been stated above, the province of Gelderland comprised the three first-named " quarters " only. The three quarters had each of them_ peculiar rights and customs, and their representa- tives met together in a separate assembly before taking part in the diet (landdag) of the states. The nobility possessed great influence in Gelderland and

retained it in the time of the republic. (G. E.)

GELDERLAND (Guelders), a province of Holland, bounded S. by Rhenish Prussia and North Brabant, W. by Utrecht and South Holland, N. by the Zuider Zee, N.E. by Overysel, and S.E. by the Prussian province of Westphalia. It has an area of 1906 sq. m. and a pop. (1900) of 566,549. Historically it was part of the duchy of Gelderland, which is treated separately above.

The main portion of Gelderland north of the Rhine and the Old Ysel forms as it were an extension of the province of Overysel, being composed of diluvial sand and gravel, covered with sombre heaths and patches of fen. South of this line, however, the soil consists of fertile river-clay. The northern portion is divided by the New (or Gelders) Ysel into two distinct regionsˆ namely, the Veluwe (" bad land ") on the west, and the former countship of Zutphen on the east. In this last division the ground slopes downwards from south-east to north-west (i3r to 26 ft.) and is intersected by several fertilizing streams which flow in the same direction to join the Ysel. The extreme eastern corner is occupied by older Tertiary loam, which is used for making bricks, and

upon this and the river-banks are the most fertile spots, woods, cultivated land, pastures, towns and villages. The highlands of the Veluwe lying west of the Ysel really extend as far as the Crooked Rhine and the Vecht in the province of Utrecht, but are slightly detached from the Utrecht hills by the so-called Gelders valley, which forms the boundary between the two provinces. This valley extends from the Rhine along the Grift, the Luntersche Beek, and the Eem to the Zuider Zee, and would still offer an outlet in this direction to the Rhine at high water if it were not for the river dikes. The two main ridges of the Veluwe hills (1 64 and 360 ft.) extend from the neighbourhood of Arnhem north to Harderwyk and north-east to Hattem. In the south they stretch themselves along the banks of the Rhine, forming a strip of picturesque river scenery made up of the varied elements of sandhills and trees, clay-lands and pastures. A large number of country-houses and villas are to be found here, and the river-side villages of Dieren, Velp and Renkum. All over the Veluwe are heaths, scantily cultivated, with fields of rye and buckwheat, cattle of inferior quality, and sheep, and a sparse population. There is also a considerable cultivation of wood, especially of fir and cppse, while tobacco plantations are found at Nykerk and Wagehingen.

The southern division of the province presents a very different

aspect, and contains many old towns and villages. It is watered by the three large rivers, the Rhine, the Waal and the Maas, and has a level clay soil, varied only by isolated hills and a sandy, wooded stretch between Nijmwegen and the southern border. The region enclosed between the Rhine and the Waal and watered by the Linge is called the Betuwe (" good land "), and gave its name to the Germanic tribe of Batavians, who are some- times wrongly regarded as the parent stock of the Dutch people. There is here a denser population, occupied in the cultivation of wheat, beetroot and fruit, the breeding of excellent cattle, shipping and industrial pursuits. The principal centres of population, such as Zutphen, Arnhem (the chief town of the province) , Nijmwegen and Tiel, lie along the large rivers. Smaller, but of equal antiquity, are the riverside towns of Doesburg, which is strongly fortified; Wageningen, with the State agri- cultural schools; Doetinchem, with a bridge over the Old Ysel which is mentioned as early as the 14th century; Zalt-Bommel, with an old church (1304), and a railway bridge over the Waal; and Kuilenburg, with a fine railway bridge (1 863-1 868) over the Rhine. Five m. S. of Zalt-Bommel, on the Maas, is the medieval castle of Ammerzode or Ammersooi, also called Amelroy during the French occupation in 1674. It is in an excellent state of preservation and has been restored in modern times. The first authentic record of the castle is its possession by John de Herlar of the noble family of Loo at the end of the 13th century. In 1480 it passed by marriage to the powerful lords van Arkel, and was partly destroyed by fire at the end of the 16th century. The chapel dates from the 15th century, and the keep from 1564. Among the family portraits are works by Albert Diifer. Zetten, on the railway between Nijmwegen and Tiel, is famous for the charitable institutions founded here by the preacher Otto Gerhard Heldring (d. r876). They comprise a penitentiary (1849) for women; an educational home (1858) for girls; a theological training college (1864); and a Magdalen hospital. Nykerk, Harderwyk and Elburg are fishing towns on the Zuider Zee. Apeldoorn is situated on the edge of the sand-grounds. Heerenberg on the south-eastern border is remarkable for its ancient castle near the seat of the powerful lords van den Bergh. Other ancient and historical towns bordering on the Prussian frontier are Zevenaar, which was for long the cause of dispute between the houses of Cleves and Gelder and was finally attached to the kingdom of the Netherlands in 1816; Breedevoort, once the seat of a lordship of the same name belonging to the counts van Loon or Lohn, who built a castle here in the beginning of the 13th century which was destroyed in 1646— the lordship was presented to Prince William III. in 1697; Winterswyk, now an important railway junction, and of growing industrial im- portance;

and Borkeloo, or Borkulo, the seat of an ancient lordship dating from the first half of the 12th century, which

finally came into the possession of Prince William V. of Orange Nassau in 1777. The castle was formerly of importance.

Gelderland is intersected by the main railway lines, which are largely supplemented by steam-tram railways. Steam- tramways connect Arnhem and Zutphen,Wageningen, Nijmwegen, Velp, Doetinchem (by way of Dieren and Doesburg), whence there are various lines to Emmerich and Gendringen on the Prussian borders. Groenlo and Lichtenvorde, Borkulo and Deventer are also connected.

GELDERN, a town of Germany, in Rhenish Prussia, on the Niers, 28 m. N. W. of Dusseldorf, at the junction of railways to Wesel and Cologne. Pop. (1905) 6551. It has an Evangelical and two Roman Catholic churches and a town hall with a fine council chamber. Its industries include the manufacture of buttons, shoes, cigars and soap. The town dates from about 1 100 and was early an important fortified place; until 1371 it was the residence of the counts and dukes of Gelderland. Having passed to Spain, its fortifications were strengthened by Philip II., but they were razed by Frederick the Great, the town having been in the possession of Prussia since 1703.

See Nettesheim, Geschichte der Stadt und des Amies Geldern (Crefeld, 1863); Henrichs, Beitrage zur innern Geschichte der Stadt Geldern (Geldern, 1893); and Real, Chronik der Stadt und Umgegend von Geldern (Geldern, 1897).

6ELL, SIR WILLIAM (1777-1836), English classical archaeo- logist, was born at Hopton in Derbyshire. He was educated at Jesus College, Cambridge, and subsequently elected a fellow of Emmanuel College (B.A. 1798, M.A. 1804). About 1800 he was sent on a diplomatic mission to the Ionian islands, and on his return in 1803 he was knighted. He went with Princess (after- wards Queen) Caroline to Italy in 1814 as one of her chamber- lains, and gave evidence in her favour at the trial in 1820 (see G. P. Clerici, A Queen of Indiscretions, Eng. trans., London, 1907). He died at Naples on the 4th of February 1836. His numerous drawings of classical ruins and localities, executed with great detail and exactness, are preserved in the British Museum. Gell was a thorough dilettante, fond of society

and possessed of little real scholarship. None the less his topographical works became recognized text-books at a time when Greece and even Italy were but superficially known to English travellers. He was a fellow of the Royal Society and the Society of Antiquaries, and a member of the Institute of France and the Berlin Academy.

His best-known work is Pompeiana; the Topography, Edifices and Ornaments of Pompeii (1817-1832), in the first part of which he was assisted by J. P. Gandy. It was followed in 1834 by the Topography of Rome and its Vicinity (new ed. by E. H. Bunbury,. 1896). He wrote also Topography of Troy and its Vicinity (1804); Geography and Antiquities of Ithaca (1807); Itinerary of Greece, with a Commentary on Pausanias and Strabo (1810, enlarged ed. 1827); Itinerary of the Morea (1816; republished as Narrative of a Journey in the Morea, 1823). All these works have been superseded by later publications.

GELLERT, CHRISTIAN FURCHTEGOTT (1715-1769), German poet, was born at Hainichen in the Saxon Erzgebirge on the 4th of July 1715. After attending the famous school of St Afra in Meissen, he entered Leipzig University in 1734 as a student of theology, and on completing his studies in 1739 was for two years a private tutor. Returning to Leipzig in 1741 he contributed to the Bremer Beitrage, a periodical founded by former disciples of Johann Christoph Gottsched, who had revolted from the pedantry of his school. Owing to shyness and weak health Gellert gave up all idea of entering the ministry, and, establishing himself in 1745 as privatdocent in philosophy at the university of Leipzig, lectured on poetry, rhetoric and literary style with much success. In 1 7 5 1 he was appointed extraordinary professor of philosophy, a post which he held until his death at Leipzig on the 13th of December 1769.

The esteem and veneration in which Gellert was held by the students, and indeed by persons in all classes of society, was unbounded, and yet due perhaps less to his unrivalled popularity as a lecturer and writer than to his personal character. He was the noblest and most amiable of men, generous, tender-hearted and of unaffected piety and humility. He wrote in order to

raise the religious and moral character of the people, and to this end employed language which> though at times prolix, was always correct and clear. He thus became one of the most popular German authors, and some of his poems enjoyed a celebrity out of proportion to their literary value. This is more particularly true of his Fabeln und Erzdhlungen (1 746-1 748) and of his Geistliche Oden und

Lieder (1757). The fables, for which he took La Fontaine as his model, are simple and didactic. The " spiritual songs," though in force and dignity they cannot compare with the older church hymns, were received by Catholics and Protestants with equal favour. Some of them were set to music by Beethoven. Gellert wrote a few comedies: Die Betschwester (1745), Die kranke Frau (1748), Das Los in der Lotterie (1748), and Die zdrtlichen Schwestern (1748), the last of which was much admired. His novel Die schwedische Grdfin von G. (1746), a weak imitation of Richardson's Pamela, is remarkable as being the first German attempt at a psychological novel. Gellert's Briefe (letters) were regarded at the time as models of good style.

See Gellert's Sdmtliche Schriften (first edition, 10 vols., Leipzig, 1769-1774; last edition, Berlin, 1867). Sdmtliche Fabeln und Erzdh-lungen have been often published separately, the latest edition in 1896. A selection of Gellert's poetry (with an excellent introduction) will be found in F. Muncker, Die Bremer Beitrage (Stuttgart, 1899). A translation by J. A. Murke, Gellert's Fables and other Poems (London, 1 851). For a further account of Gellert's life and work see lives by J. A. Cramer (Leipzig, 1774), H. Doring (Greiz, 1833), and H. O. Nietschmann (2nd ed., Halle, 1901); also Gellerts Tagebuch aus dem Jahre 1761 (2nd ed., Leipzig, 1863) and Gellerts Briefwechsel mil Demoiselle Lucius (Leipzig, 1823).

GELLERT, or Killhart, in Welsh traditional history, the dog of Llewellyn, prince of Wales. The dog, a greyhound, was left to guard the cradle in which the infant heir slept. A wolf enters, and is about to attack the child, when Gellert flies at him. In the struggle the cradle is upset and the infant falls underneath. Gellert kills the wolf, but when Prince Llewellyn arrives and sees the empty cradle and blood all around, he does not for the moment notice the wolf, but thinks Gellert has killed the baby. He at once stabs him, but almost instantly finds his son safe under the cradle and realizes the dog's bravery. Gellert is supposed to have been buried near the village of Beddgelert (" grave of Gellert "), Snowdon, where his tomb is still pointed out to visitors. The date of the incident is traditionally given as 1 205. The incident has given rise to a Welsh proverb, " I repent as much as the man who slew his greyhound." The whole story is, however, only the Welsh version of a tale long before current in Europe, which .is traced to the Indian Panchatantra and perhaps as far back as 200 B.C.

See W. A. Clouston, Popular Tales and Fictions (1887); D. E. Jenkins, Beddgelert, its Facts, Fairies and Folklore (Portmadoc,

1899)-

GELLIUS, AULUS (c. a.d. 130-180), Latin author and gram- marian, probably born at Rome. He studied grammar and rhetoric at Rome and philosophy at Athens, after which he returned to Rome, where he held a judicial office. His teachers and friends included many distinguished men — Sulpicius Apollinaris, Herodes Atticus and Fronto. His only work, the Nodes Atticae, takes its name from having been begun during the long nights of a winter which he spent in Attica. He after- wards continued it at Rome. It is compiled out of an Adversaria, or commonplace book, in which he had jotted down everything of unusual interest that he heard in conversation or read in books, and it comprises notes on grammar, geometry, philosophy, history and almost every other branch of knowledge. The work, which is utterly devoid of sequence or arrangement, is divided into twenty books. All these have come down to us except the eighth, of which nothing remains but the index. The Nodes Atticae is valuable for the insight it affords into the nature of the society and pursuits of those times, and for the numerous excerpts it contains from the works of lost ancient authors.

Editio princeps (Rome, 1469); the best editions are those of Gronovius (1706) and M. Hertz (1883-1885; editio minor, 1886, revised by C. Hosius, 1903, with bibliography). There is a trans- lation in English by W. Beloe (1795), and in French by various hands (1896). See Sandys, Hist. Class. Schol. i. (1906), 210.

GELLIVARA [Gellivare], a mining town of Sweden in the district (Ian) of Norrbotten, 815 m. N. by E. of Stockholm by rail. It lies in the well-nigh uninhabited region of Swedish Lapland, 43 m. N. of the Arctic Circle. It owes its importance to the iron mines in the mountain Malmberget 4.5 m. to the north, rising to 2024 ft. above sea-level (830 ft. above Gellivara town). During the dark winter months work proceeds by the aid of electric light. In 1864 the mines were acquired by an English company, but abandoned in 1867. In 1884 another English company took them up and completed a provisional railway from Malmberget to Lulea at the head of the Gulf of Bothnia (127 m. S.S.E.), besides executing a considerable portion of the preliminary works for the continuation of the line on the Norwegian side from Ofoten Fjord upwards (see Narvik). But this company, after extracting some 150,000 tons of ore in 1888- 1889,

went into liquidation in the latter year. Two years later the mines passed into the hands of a Swedish company, and the railway was acquired by the Swedish Government. The output of ore was insignificant until 1892, when it stood at 178,000 tons; but in 1902 it amounted to 1,074,000 tons. Three miles S.W. rises the hill Gellivara Dundret (2700 ft.), from which the sun is visible at midnight from June 5 to July n. The population of the parish (about 6500 sq. m.) in 1900 was 11,745; tne greater part of the population being congregated at the town of Gellivara and at Malmberget.

GELNHAUSEN, a town of Germany, in the Prussian province of Hesse-Nassau, on the Kinzig, 27 m. E.N.E. of Frankfort-on- Main, on the railway to Bebra. Pop. 4500. It is romantically situated on the slope of a vine-clad hill, and is still surrounded by ancient walls and towers. On an island in the river are the ivy-covered ruins of the imperial palace which Frederick I. (Barbarossa) built before n 70, and which was destroyed by the Swedes during the Thirty Years' War. It has an interesting and beautiful church (the Marien Kirche), with four spires (of which that on the transept is curiously crooked), built in the 13th century, and restored in 1876-1879; also several other ancient buildings, notably the town-hall, the Furstenhof (now administrative offices), and the Hexenthurm. India-rubber goods are manufactured, and wine is made. Gelnhausen became an imperial town in 1 169, and diets of the Empire were frequently held within its walls. In 1634 and 1635 it suffered severely from the Swedes. In 1803 the town became the property of Hesse- Cassel, and in 1866 passed to Prussia.

GELO, son of Deinomenes, tyrant of Gela and Syracuse. On the death of Hippocrates, tyrant of Gela (491 B.C.), Gelo, who had been his commander of cavalry, succeeded him; and in 485, his aid having been invoked by the Gamori (the oligarchical landed proprietors) of Syracuse who had been driven out by the populace, he seized the opportunity of making himself despot. From this time Gelo paid little attention to Gela, and devoted himself to the aggrandizement of Syracuse, which attained extraordinary wealth and influence. When the Greeks solicited his aid against Xerxes, he refused it, since they would not give him command of the allied forces (Herodotus vii. 171). In the same year the Carthaginians invaded Sicily, but were totally defeated at Himera, the result of the victory being that Gelo became lord of all Sicily. After he had thus established his power, he made a show of resigning it; but his proposal was rejected by the multitude, and he reigned without opposition till his death (478). He was honoured as a hero, and his memory was held in such respect that when all the brazen statues of tyrants were condemned to be

sold in the time of Timoleon (1 50 years later) an exemption was made in favour of the statue of Gelo.

Herodotus vii. ; Diod. Sic. xi. 20-38 ; see also Sicily : History, and Syracuse; for his coins see Numismatics: Sicily.

• GELSEMIUM, a drug consisting of the root of Gelsemium nitidum, a clinging shrub of the natural order Loganiaceae, having a milky juice, opposite, lanceolate shining leaves, and axillary clusters of from one to five large, funnel-shaped, very fragrant yellow flowers, whose perfume has been compared with that of the wallflower. The fruit is composed of two separable jointed

pods, containing numerous flat-winged seeds. The stem often runs underground for a considerable distance, and indiscriminately with the root it is used in medicine. The plant is a native of the United States, growing on rich clay soil by the side of streams near the coast, from Virginia to the south of Florida. In the United States it is commonly known as the wild, yellow or Carolina jessamine, although in no way related to the true jessamines, which belong to the order Oleaceae. It was first described in 1640 by John Parkinson, who grew it in his garden from seed sent by Tradescant from Virginia; at the present time it is but rarely seen, even in botanical gardens, in Great Britian.

The drug contains a volatile oil and two potent alkaloids, gelseminine and gelsemine. Gelseminme is a yellowish, bitter substance, readily soluble in ether and alcohol. It is not em- ployed therapeutically. Gelsemine has the formula CuHi 9 N02, and is a colourless, odourless, intensely bitter solid, which is insoluble in water, but readily forms a soluble hydrochloride.

Gelsemium nitidum, half natural size; flower, nat. size.

The dose of this salt is from ˆth to ˆ

The drug is essentially a nerve poison. It has no action on the skin and no marked action on the alimentary or circulatory systems. Its action on the cerebrum is slight, consciousness being retained even after toxic doses, but there may be headache and giddiness. The drug rapidly causes failure of vision, diplopia, ptosis or falling of the upper eyelid, dilatation of the pupil, and a lowering of the intra-ocular tension. This last action is doubtful. The symptoms appear to be due to a paralysis of the motor cells that control the internal and external ocular muscles. The most marked action of the drug is upon

the anterior cornua of grey matter in the spinal cord. It can be shown by a process of experimental exclusion that to an arrest of function of these cells is due the paralysis of all the voluntary muscles of the body that follows the administration of gelsemium or gelse- mine. Just before death the sensory part of the spinal cord is also paralysed, general anaesthesia resulting. The drug kills by its action on the respiratory centre in the medulla oblongata. Shortly after the administration of even a moderate dose the respiration is slowed and is ultimately arrested, this being the cause of death. In cases of poisoning the essential treatment is artificial respiration, which may be aided by the subcutaneous exhibition of strychnine.

Though the drug is still widely used, the rational indications for its employment are singularly rare and uncertain. The con- ditions in which it is most frequently employed are convulsions, bronchitis, severe and purposeless coughing, myalgia or muscular pain, neuralgia and various vague forms of pain.

GELSENKIRCHEN, a town of Germany in the Prussian province of Westphalia, 27 m. W. of Dortmund on the railway Duisburg-Hamm. Pop. (1905) 147,037. It has coal mines, iron furnaces, steel and boiler works, and soap, glass and chemical factories. In 1903 various neighbouring industrial townships were incorporated with the town.

GEM (Lat. gemma, a bud, — from the root gen, meaning ” to produce,” — or precious stone; in the latter sense the Greek term is ˆij < £os), a word applied in a wide sense to certain minerals which, by reason of their brilliancy, hardness and rarity, are valued for personal decoration; it is extended to include pearl. In a restricted sense the term is applied only to precious stones after they have been cut and polished as jewels, whilst in their raw state the minerals are conveniently called " gem-stones." Some- times, again, the term " gem " is used in a yet narrower sense, being restricted to engraved stones, like seals and cameos.

The subject is treated here in two sections: (1) Mineralogy and general properties; (2) Gems in Art, i.e. engraved gems, such as seals and cameos. The artificial products which simulate natural gem- stones in properties and chemical composition are treated in the separate article Gem, Artificial.

1. Mineralogy and General Properties The gem-stones form a small conventional group of minerals, including principally the diamond, ruby, sapphire, emerald and opal. Other stones of less value — such as topaz, spinel, chryso- beryl, chrysolite, zircon and tourmaline — are sometimes called " fancy stones." Many minerals still less prized, yet often used as ornamental stones, — like moonstone, rock-crystal and agate, — occasionally pass under the name of " semi-precious stones," but this is rather a vague term and may include the stones of the preceding group. The classification of gem-stones is, indeed, to some extent a matter of fashion.

Descriptions of the several gem-stones will be found under their respective headings, and the present article gives only a brief review of the general characters of the group.

A high degree of hardness is an essential property of a gem- stone, for however beautiful and brilliant a mineral may be it is useless to the jeweller if it lack sufficient hardness to withstand the abrasion to which articles of personal decoration are necessarily subjected. Even if not definitely scratched, the polished stone becomes dull by wear. Imitations in paste may be extremely brilliant, but being comparatively soft they soon lose lustre when rubbed. In the article Minera- logy it is explained that the varying degrees of hardness are registered on a definite scale. The exceptional hardness of the diamond gives it a supreme position in this scale, and to it the arbitrary value of 10 has been assigned. The corundum gem- stones (ruby and sapphire), though greatly inferior in hardness to the diamond, come next, with the value of 9; and it is notable that the sapphire is usually rather harder than ruby. Then follows the topaz, which, with spinel and chrysoberyl, has a hardness of 8; whilst quartz falls a degree lower. Most gem- stones are harder than quartz, though precious opal, turquoise, moonstone and sphene are inferior to it in hardness. Those stones which are softer than quartz have been called by jewellers demiˆdures. To test the hardness of a cut stone, one of its sharp edges may be drawn, with firm pressure, across the smooth surface of a piece of quartz; if it leave a scratch its hardness must be above 7. The stone is then applied in like manner to a fragment of topaz, preferably a cleavage-piece, and if it fail to leave a distinct scratch its hardness is between 7 and 8, whereas if the topaz be scratched it is above 8. An expert may obtain a fair idea of hardness by gently passing the stone over a fine steel file, and observing the feel of the stone and the grating sound which it emits. If a stone be scratched by a steel knife its hardness is below 6. The degree of hardness of a precious stone is soon ascertained by the lapidary when cutting it.

Gem-stones differ markedly among themselves in density or specific weight; and although this is a character which does not directly afiect their value for ornamental purposes, it furnishes by its constancy an important means of distinguishing one stone

Hardness.

from another. Moreover, it is a character very easily determined and can be applied to cut stones without injury. The relative weightiness of a stone is called its specific gravity, and is often abbreviated as S.G. The number given in gl^viiy the description of a mineral as S.G. shows how many times the stone is heavier than an equal bulk of the standard with which it is compared, the standard being distilled water at 4° C. If, for example, the S.G. of diamond is said to be 3-5 it means that a diamond weighs 3! times as much as a mass of water of the same bulk. The various methods of determining specific gravity are described under Density. The readiest method of testing precious stones, especially when cut, is to use dense liquids. Suppose it be required to determine whether a yellow stone be true topaz or false topaz (quartz), it is merely necessary to drop the stone into a liquid made up to the specific gravity of about 3; and since topaz has S.G. of 3-5 it sinks in. this medium, but as quartz has S.G. of only 2-65 it floats. The densest gem- stone is zircon, which may have S.G. as high as 4-7, whilst the lowest is opal with S.G. 2-2. Amber, it is true, is lighter still, being scarcely denser than water, but this substance can hardly be called a gem.

Although the great majority of precious stones occur crystal- lized, the characteristic form is destroyed in cutting. The crystal-forms of the several stones are noticed under their respective headings, and the subject is discussed &y gtal Ua fully under Crystallography. A few substances cleavage. used as ornamental stones — like opal, turquoise, obsidian and amber — are amorphous or without crystalline form; whilst others, like the various stones of the chalcedony- group, display no obvious crystal-characters, but are seen under the microscope to possess a crystalline structure. Gem-stones are frequently found in gravels or other detrital deposits, where they occur as rolled crystals or fragments of crystals, and in many cases have been reduced to the form of pebbles. By the disintegration of the rock which formed the original matrix, its constituent minerals were set free, and whilst many of them were worn away by long-continued attrition, the gem-stones survived by virtue of their superior hardness.*

Many crystallized gem-stones exhibit cleavage, or a tendency to split

in definite directions. The lapidary recognizes a " grain " in the stone. When the cleavage is perfect, as in topaz, it may render the working of the stone difficult, and produce incipient cracks in the cut gem. Flaws due to the cleavage planes are called " feathers." The octahedral cleavage of the diamond is taken advantage of in dressing the stone before cutting it. The cutting of gem-stones is explained under Lapidary.

The beauty and consequent value of gems depend mainly on their colour. Some stones, it is true, are valued for entire absence of colour, as diamonds of pure " water." Certain kinds of sapphire and topaz, too, are " water clear," as also is pure rock-crystal; but in most stones colour is a prime element of attraction. The colour, however, is not generally an essential property of the mineral, but is due to the presence of foreign pigmentary matter, often in very small proportion and in some cases eluding determination. Thus, corundum when pure is colourless, but the presence of traces of certain mineral sub- stances imparts to it not only the red of ruby and the blue of sapphire, but almost every other colour. The tinctorial matter may be distributed either uniformly throughout the stone or in regular zones, or in quite irregular patches. A tourmaline, for instance, may be red at one end of a prismatic crystal and green at the other extremity, or the colour may be so disposed that in transverse section the centre will be red and the outer zone green. A beryl may be yellow and green in the same crystal. Sapphire, again, is often parti-coloured, one portion of the stone being blue and other portions white or yellow; and the skilful lapidary, in cutting the stone, will take advantage of the blue portion. The character of the pigment is in many cases not definitely known. It by no means follows that the material capable of imparting a certain tint to glass is identical with that which naturally colours a stone of the same tint ; thus a glass of sapphire-blue may be obtained by the use of cobalt, yet cobalt

Colour.

Retrac- tion.

has not been detected in the sapphire. Probably the most common mineral pigments are compounds of iron, manganese, copper and chromium. If the colour of the stone be discharged by heat, an organic pigment is presumably present. Some ornamental stones

change their colour, or even lose it, on exposure to sunlight and air: such is the case with rose-quartz, chrysoprase and certain kinds of topaz and turquoise. Exposure to heat alters the colour of some stones so readily that the change is taken advantage of commercially; thus, sherry-yellow topaz may be rendered pink, smoky and amethystine quartz may become yellow, and coloured zircons may be decolorized, so as to resemble diamonds.

The colours of some gem-stones are greatly affected by radio-activity, and Prof. F. Bordas has found this to be particularly the case with sapphire. From his experiments he believes that yellow corundum, or oriental topaz, may have been formed from blue corundum under the influence of radioactive substances present in the soil in which the sapphire was embedded. Different shades of colour may be presented by different stones of the same species; and it was formerly the custom of lapidaries to regard the darker stones as masculine and the paler as feminine, a full blue sapphire, for instance, being called a " male sapphire " and a delicate blue stone a " female sapphire." It is notable that some stones appear to change colour by candle-light and by most other artificial means of illumination; some amethysts thus become inky, and certain sapphires acquire a murky tint, whilst others become amethystine. For an example of a remark- able change of this character, see Alexandrite.

As the optical properties of minerals are fully explained under Crystallography, little need be said here on this subject. The brilliancy of a cut stone depends on the amount of light reflected from its faces; and in the form known as the " brilliant " the gem is socut that much of the incident light, after entering the stone and suffering refraction, is totally reflected from the facets at the back. The amount of light which is thus returned to the eye of the observer will be greater as the angle of total reflection, or critical angle, is smaller, but this angle will be small if the refractive power of the stone is great, so that the brilliancy directly depends on the re-fractivity. The diamond has the highest refractive index of any gem-stone (2-42). Jargoon, or zircon, has also a high index (mean 1-95), and sphene, which is occasionally cut as a gem, is likewise very notable in this respect. The index of refraction generally bears a relation to the specific gravity of the stone, the heaviest gems having the highest indices, though a few minerals offer exceptions. The refractive index, which is thus a very important character in the scientific discrimination of gem-stones, may be conveniently determined, within certain limits, by means of the refractometer devised by Dr G. F. Herbert Smith. This instrument is an improved

form of the total reflectojneter, in which the refractive power of a given substance is determined by the method of total reflection. It may be used for indices ranging from 1-300 to 1-775, and may be applied to faceted stones without removal from their settings.

The play of prismatic colours exhibited by a cut stone, often known as its " fire," is due to the decomposition of the white light which enters the stone, and is returned, by internal reflection, after resolution intoits coloured components. This decomposition depends on the dispersive power of the substance. The exceptional beauty of the fiery flashes in the diamond is due to its high dispersion, in other words, to the difference between the refractive indices for the red rays and the violet rays at the extremities of the spectrum. The peculiar lustre exhibited by the diamond is called adamantine, and is shared to some extent by certain other stones which have a high refractive index and high dispersion, such as zircon.

The use of the spectroscope may be valuable in discriminating between certain precious stones. It was shown by Sir A. H. Spectro-Church that almandine garnet and zircon when simply atopic viewed through this instrument give, under proper charm conditions, characteristic absorption spectra, due to

"""" the light reflected from the stone having penetrated to some extent into the substance of the mineral and suffered

Disper- sion,

absorption. It is sometimes useful to examine the behaviour of a stone under the action of the Rontgen rays.

A very useful means of discriminating between certain stones is found in their dichroism, or, to use a more general term, pleochroism. Neither amorphous minerals, like opal, nor minerals crystallizing in the cubic system, like ism.™' spinel and garnet, possess this property; but coloured minerals which are doubly refracting may show different colours, when properly examined, in different directions. Occasionally this is so marked as to be detected by the naked eye, as in iolite or dichroite, but usually the stone needs to be examined with such an instrument as Haidinger's dichroscope (see Crystallo- graphy). It must be remembered that in the direction of an optic axis the two images will be of the same colour in all positions of the instrument, and it is therefore necessary before reachirg a definite conclusion to turn the stone about and examine it in various directions. The use of the dichroscope is so simple that it

can be applied by any one to the examination of a cut stone, but there are other means of determining the nature of a stone by its optical properties available to the mineralogist and more suitably discussed under Crystallography.

In chemical composition the gem-stones present great variety. Diamond is composed of only a single element; ruby, sapphire and the quartz-group are oxides; spinel and chryso- beryl may be regarded as aluminates; turquoise and Chemical beryllonite are phosphates; and a great number of t/J^.' ornamental stones are silicates of greater or less complexity, such as emerald, topaz, chrysolite, garnet, zircon, tourmaline, kunzite, sphene and benitoite. In the examination of a cut stone chemical tests are not available, since they usually involve the partial destruction of the mineral. The artificial production of certain gems by chemical processes which yield products identical in composition and physical properties with the natural stones, is described in the article Gem, Artificial.

Doublets and triplets are composite stone, sometimes prepared for fraudulent purposes. In a doublet a slab of real gem-stone covers the face of a paste, whilst in a triplet the paste is both faced and backed by a slice of genuine stone. By the action of a suitable solvent, such as chloroform or in some cases even hot water, the cement uniting the pieces gives way and the compound character of the structure is detected.

Before the chemical composition of gem-stones was understood, their classification remained vague and unscientific. As the ancients depended almost entirely on the eye, the colour of the stone naturally became the chief factor in classification. A variety of stones agreeing roughly in colour would be grouped together under a common name, widely as they might differ in other respects. Thus the emerald, the peridot, green fluorspar, malachite, and certain kinds of quartz and jade seem to have been united under the general name of

Descriptions of precious stones by ancient writers generally are too vague for exact diagnosis. The principal classical authorities are Theophrastus and the elder Pliny. Stones were formerly held in esteem not only for their beauty and y"^* rarity but for the medicinal and magical powers with which they were reputed to be endowed. Up to comparatively recent years the toadstone, for example, was worn not for beauty but for sake of occult virtue; and even at the present day certain stones, like jade, are valued for a similar reason. Prof. • W. Ridgeway has suggested that jewelry took its origin not, as cften supposed, in an innate love of personal decoration, but rather in the

belief that the objects used possessed magical virtue. Small stones peculiar in colour or shape, especially those with natural perforations, are usually valued by uncivilized peoples

as amulets. The Orphic poem Ai0«a, reputed to be of very early though unknown date, is rich in allusions to the virtues of many of the gem-stones. Many of the medical and other virtues of precious stones were evidently attributed to them on the well- known doctrine of signatures. Thus, the blood-red colour of a fine jasper suggested that the stone would be useful in haemor- rhage; a green jasper would bring fertility to the soil; and the purple wine-colour of amethyst pointed to its value as a pre- ventive of intoxication. Many of the superstitions came down to modern times, and even at the present day the belief in " lucky stones " is by no means extinct.

Bibliography. — The most comprehensive work on gem-stones is Professor Max Bauer's Edelsteinkunde (1896), translated, with additions, by L. J. Spencer under the title Precious Stones (1904). Less detailed are Professor P. Groth's Grundriss der Edelsteinkunde (1887) and Professor C. Doelter's Edelsteinkunde (1893). Sir A. H. Church's Precious Stones (1905), intended as a guide to the collections in the Victoria and Albert Museum, is a convenient introduction: and Professor H. A. Miers's Cantor Lectures at the Society of Arts on Precious Stones (1896) may be studied with advantage. For American stones, the valuable work of Dr G. F. Kunz, The Gems and Precious Stones of N. America, is a standard authority; and the Annual Reports of this writer and others, published by the Geological Survey of the United States in the Mineral Resources, form a repertory of valuable information on precious stones in general. The articles in The Mineral Industry (founded by R. P. Rothwell) should also be consulted. See likewise O. C. Farrington, Gems and Gem Minerals (Chicago, 1903). For optical characters reference should be made to G. F. H. Smith, The Herbert Smith Refractometer (London, 1907) ; L. Claremont, The Gem-Cutter's Craft (London, 1906); W. Goodchild, Precious Stones (London, 1908). (F. W. R.)*

2. Gems in Art

In art, the word Gem is the general term for precious stones

when engraved with designs, whether adapted for sealing(o-0pa7ts, sigillum, intaglio), or mainly for artistic effect (imagines ectypae, cameo). They exist in a very large number of undoubtedly genuine old examples, extending from the mists of Babylonian antiquity to the decline of Roman civilization, and again starting with a new, but less original impulse on the revival of art. Apart from workmanship they possess the charms of colour deep, rich, and varied, of material unequalled for its endurance, and of scarcity, which in many instances has been enhanced by the remoteness of the lands whence they came or the fortuity of their occurrence. These qualities united within the small compass of a gem were precisely such as were required in a seal as a thing of constant use, so inalienable in its possession as to become naturally a personal ornament and an attractive medium of artistic skill, no less than the centre of traditions or of religious and legendary associations. As regards the nations of classical antiquity, all seals are classed as gems, though in many cases the material is not such as would strictly come under that heading, and precious stones in the modern sense are hardly known to occur. On the other hand it must not be supposed that gems engraved in intaglio were necessarily employed as seals. At all periods many intaglios are found which could not have been so employed without great difficulty. In Greece and Rome, within historic times, gems were worn engraved with designs to show

that the bearer was an adherent of a particular worship, the follower of a certain philosopher, or the attached subject of an emperor. However, speaking generally, the intaglio engraving is a means to an end, namely, a seal-impression, while an engraving in relief is complete in itself.

Methods of Engraving (see also under Lapidary). — In gem-engraving the principal modern implement is a wheel or minute copper disk, driven in the manner of a lathe, and moistened with olive oil mixed with emery or diamond dust. There is no clear proof of the use among the ancients of a wheel mounted lathe- wise, but we have abundant indications of drilling with a revolving tool, which might be either a tubular drill making a ring-like depression, a pointed tool making a cup-like sinking, or a small wheel with a cutting edge, making a boat-shaped depression.

We have one sepulchral monument from Philadelphia show- ing the tool of an intaglio engraver (Sa.KTv\oKoi\oyvos; see Alhenische Mitteilungen des Arch. Inst. xv. p. 333). Un-

fortunately the relief is incomplete, and the published illustra- tion inadequate. It would seem, however, that a revolving tool was supported by a kind of mandrel, and actuated in primitive fashion by a bow. An alternative plan of working was to use a splinter of diamond set in a handle and applied like a graver. Both systems are clearly indicated by Pliny, who in one passage (H.N. xxxvii. 60) states that diamond splinters are sought out by gem engravers and set in iron, and so easily hollow out stones of any degree of hardness; while elsewhere (H.N. xxxvii. 200) he speaks of the special efficacy of the fervor terebrarum, the vehement action of drills. A third method is also indicated by Pliny (ibid.)- when he speaks of the use of a blunted tool, which must have been moistened and supplied with emery of Naxos.

A four-sided pendant of the Hellenistic period published by Furtwangler (Antike Gemmen, Gesch. p. 400) shows clearly the successive stages of the operation. On side a the subject is slightly sketched in with the diamond point. On side b the deepest parts of the figure have also been roughly scooped out with the wheel. On sides c and d the wheel work is fairly com- plete, but the finer internal work has not been begun.

After the design had been completed the stone must have received a final polish on its surface, to obliterate any erroneous strokes of the first sketch; but this process was not carried as far as in modern work. It is a popular error to suppose that a high degree of internal polish is a proof of antiquity. If the interior of the design has a high degree of polish it may be either ancient or modern, or it may be an ancient stone repolished in modern times. If it has a matt surface uniformly produced by intention, it is probably modern. If the design is slightly dimmed and worn or scratched the stone may be antique, but is not necessarily so, since modern engravers have observed this peculiarity, and have imitated it with a success which, were there no other grounds of suspicion, might escape detection.

History. — It has been a subject of controversy whether the first infancy of the art was passed in Egypt or in Babylonia, but it seems highly probable that it was developed in Babylonia, whence at any rate the oldest examples of engraved gems at present known are obtained. It does not necessarily follow, however, that Egypt was therefore a pupil. It may well be that the art was developed independently in the two countries, although certain points of possible contact in respect of the forms employed will be described below in the section dealing with primitive Egypt.

Babylonia. — At a very remote period the cylindrical form of stone was introduced and became the approved shape, while the technical skill of the artist was still slight, and the traces of the tools employed (drill and pencil point) were still unconcealed.

The cylinder was suspended by a string and used as a seal. Impressions of cylinders are frequent on contract tablets. If one of the parties cannot use a seal he makes a nail-mark in lieu thereof, as is recorded in the document.

But from a time that was still comparatively early the en- gravers could work with considerable skill in the hard stone. In particular a cylinder may be quoted in the de Clercq Collection bearing the name of Sargon I. of Agade, who is placed about 3500 B.C. The cylinder is engraved with the king's name and titles and two symmetrically disposed renderings of Izdubar, with a vase of flowing water giving drink to a bull. The whole is treated in a conventionalized style that indicates long traditions. An important early cylinder in the British Museum is inscribed with the name of a viceroy of Ur-Gur, king of Ur (about 2500 B.C.). The engraving shows Ur-Gur being led into the presence of Sin, the moon-god.

The cylinder seal was adopted by the Assyrians, and so was carried on continuously till the time of the Persian conquest of Babylon (538 B.C.). Meanwhile, as an alternative form the conoidal seal, rounded at the top and having a flat base for the intaglio, came into use beside the cylinder.

In style the Assyrians carried on the Babylonian tradition, but with no freedom of design. Subjects and treatment became rigidly conventional. After the Persian conquest the victors adopted the-cylinder

GEMS

Plate I.

4 •! t

II

“TO

. w VJ

a< 1

ra

if

w

Syiv.:

*n**

*xifciJ**

iil

*v^*

.A ‘■’>■

w’f-

CT

1^3LiiaK

[•■.\;..-:-;^5fr ,-i.TO

u*^^ ^

^ ^ 3

sipped by two Assyrian kings, and

1-5.— OR1KVTAL.

1. Babylonian (late Sumci tan) Cviinder of a Viceroy of Ur-Gur (or Ur-Engur),

2iOO B.C.

2. Assyrian Cylinder. Woman adoring Goddess.

3. Assyrian Cviinder. Assiir worshipped by

divine Attendants.

4. Persian Sea) of Darius (500 B.C.). Lion Hunt.

5. Graeco- Persian Scarabaeoid. Boar Hunt.

&-IS-— CRETAN AND MYCENAEAN INTAGLIOS.

6. Cretan Symbols.

7. Man and Bui!. Crete.

8. Lions and Column. laiysus. Q. Daemon. Crete.

10. Lioness and Deer.

II- 13. Three-sided Stone. Peiopoooesus.

14. Man and Bull. Crete.

15. Bui! and Palm. lalysus-

X6-18.— GEMS OF THE ISLANDS.

16. Goddess on Waves. Birds.

17. Lion and Goat.

18. Heracles and Nereus.

19— PHOENICIAN SEAL, inscribed.

20-36.— GRAECO PHOENICIAN SCARABS FROM THARROS.

20. King, enthroned.

21. Bes with Antelope and Hound.

22. Bes with Lions.

23. Warrior.

24. Egyptian Device.

25. Besand Goats.

26. Hawk of Horus.

XI. 562.

All tˆe above are In the British Museum.

Plate II.

GEMS

‘ ˆ ti ˆ ‘ s –

•> ˆ r vˆ¥ sM vAˆ e$J’ fey ˆe %, ˆˆ> ˆˆ vV- ?c£ ;*

**wˆ w 1 i*

65 ” 66

27-34.— KARLY GREEK SCARABS AND SCARABAEOIDS.

*27. Piuto and Persephone. (New York.**

sH. Boreas and Oreithyia. (New York.)

29. Youth and Dog.

30. Archer feeling Arrow Tip. (Lord Southcsk.)

31. Satyr and Wine Cup. $2. An her and Dog.

33. Satyr with Wineskin.

34. Athena with Gorgon Spoils.

35-44 -FINT.ST GREEK SCARABS AND SCARABAEOIUS.

35. Head of Young Warrior.

3,U. Lyre Hayer. (Corkerell Coll.)

37 Crane, wiih Deer's Antler.

38. Head of Eos.

39- Lyre Player. (Woodbouse Coll.

40. Lyre Pi aver, signed by Syries.

41. Stork and Grasshopper, signed li

42. Flying Crane, signed by De\amei

43. Flying Goose.

44. Lion and Slag.

45-54. — ETRUSCAN SCARABS.

45. Achilles in Retirement.

46. Victory.

47. Capaneus struck bv the Bolt

48. Heracles,

4Q Capaneus. struck by the Boit.

50. Achilles.

ii. Heraciesand Cycnus.

5. FWirs.*

S3- Heraties and the Lion.

54, Machaon bandaging Phiioctetes.

1 B.M.)

Dexamcnos. {St. Petersburg.) (Si. Petersburg.)

55-57- -GREEk GEMS.

=;S- Girl with Scroll and Evre. so. Girl with Water-Jar.

57. Head of Aristippus — Deities.

58-61.— SIGNED GEMS.

58. Aselepius of Aulas. ˆ9. Cttharist of Aliion. 60. Medusa of Solon.
01. Heracles of Gnaios.

02-70.— ROMAN GEMS.

t>2. Portrait.

63. Head of Trajan Decius.

64. Ares and Aphrodite.

65. Jupiter of Heliopoiis.

66. Artemis of Ephesus.

67. So-called Psyche.

68. So-called Psyche.

69. Minerva with Mask, Stamp for the Eye Balsam of Herophiius.

70. Helios.

71-72.- CHRISTIAN GEMS.

71. Crucifixion.

72. Good Shepherd. Jonah.

73-76— EIGHTEENTH CENTURY GEMS

73. Achilles of Pampbilus, copied from the antique.

74. Eros and Psyche, by Pichler.

75. Heart of Athena.

76 Athena, from Tuwnley Bust by Marchant.

form of the conquered, and continued to use it. A Persian cylinder seal of Darius (probably about 500 B.C.) in the British Museum shows the king in his chariot, transfixing a lion with his arrows, in a palm wood. Above is the winged emblem of the Persian deity Ahuramazda. The inscription gives the name and titles of Darius in the Persian, Scythic and Babylonian languages. The style is accurate and minute. The idea of the lion hunt is borrowed from the Assyrian monuments, but the engraver has been careful to make the necessary changes of costume and treatment. The cylinder was, as might be anticipated, imitated to a certain extent by peoples of the Eastern world in touch with Babylonia. It occurs in Armenia, Media and Elam. It has been found in Crete {British School Annual, viii. p. 77) and is frequent in the early Cypriote deposits. In some instances it has been found unfinished and therefore must be supposed to be of local manufacture. Sometimes a direct imitation of cuneiform characters occurs on the Cypriote cylinders. The same form was also employed by the Phoenicians (about the 8th century- 7th century B.C.). By the Greeks and Etruscans it was used, but only rarely, and by way of exception.

Egypt. — We must go back to the remotest periods for the origin of intaglio engraving in Egypt. Recent discoveries of tombs of the earliest dynasties at Abydos and Nagada have thrown much light on the early stages of Egyptian art, and have revealed the remarkable fact that in Egypt (as in Babylonia) the cylinder was the earliest form used for the purpose of a seal. The cylinders that have been found are comparatively few in number; but a large number of jar-stoppings of clay are pre- served on which cylinder designs have been rolled off while the clay was still soft. Such early incised cylinders as are extant are made either of hard wood or (as in an instance in the British Museum) of stone. The identity of form has been thought to indicate a connexion with Babylonia, but none can be traced in the designs of the respective cylinders.

The Egyptians of the earliest dynasties had an admirable command of hard stones, as shown by their beads and stone vases, but with the exception of the cylinders quoted they are not known to have applied their skill to the production of intaglios. At this early period the scarab (or beetle) was still unknown as a gem-form. It was only about the time of the 4th dynasty that the scarab (q.v.) was first introduced, and gradually took the place of the cylinder as the prevailing shape. The Scarabaeus sacer (Egyptian, Kheperer) , rolling its eggs in a ball of mud, became the accepted emblem of the sun-god, and so the form had an amuletic value. Scarabs of obsidian and crystal date back to the 4th dynasty. Others, coarse ' and uninscribed, belong to the beginning of the first Theban empire. After the 18th dynasty they are counted by thousands. While the beetle form was naturalistically treated, the flat surface underneath was well adapted to receive a hieroglyphic sign. The scarabs, however, are by no means the only product of the art. We have also figures of all kinds in the round and in intaglio — statuettes, figures of animals and of deities, and sacred emblems such as the ankh (or crux ansata) and the eye. Among interesting variations from the scarab form is the oblong intaglio of green jasper in the Louvre {Gazette arch., 1878, p. 41) with a design on both sides. It represents on the obverse Tethmosis (Thothmes) II. (1800 B.C.) slaying a lion, and identified by his cartouche. On the reverse we have the same king drawing his bow against his enemies from a war chariot. The scarabs of Egypt though uninteresting in themselves, considered as examples of engraving, have this accidental importance in the history Of art, that they furnished the Phoenicians with a model which they were able to improve as regards the intaglio by a more free spirit of design, gathered partly from Egypt and partly from Assyria. The scarab thus improved exercised a lasting influence on the later history, since, as will be seen below, it was adopted and modified both by Greeks and Etruscans.

Engraved Gems in the Bible. — While the Phoenicians have left actual specimens to show with what skill they could adopt the systems of gem-engraving prevailing at their time in Egypt and Assyria, the Israelites, on the other hand, have left records to

prove, if not their skill, at least the estimation in which they held engraved gems. " The sin of Judah is written with a pen of iron and with the point of a diamond " (Jerem. xvii. 1). To pledge his word Judah gave Tamar his signet, with its cord for suspension, and staff (Gen. xxxviii. 18); whence if this passage be compared with the frequent use of " seal " in a metaphorical sense in the Bible, and with the usage of the Babylonians of carrying a seal with – an emblem

engraved on it recorded by Herodotus, it may be concluded that among the Israelites also every man of mark at least wore a signet. Their acquaintance with the use of seals in Egypt and Assyria is seen in the statement that Pharaoh gave Joseph his signet ring as a badge of investiture (Gen. xli. 42), and that the stone which closed the den of lions was sealed by Darius with his own signet and with the signet of his lords (Daniel vi. 17). Then as to the stones which were most prized, Ezekiel (xxviii. 13), speaking of the prince of Tyre, mentions " the sardius, the topaz and the diamond, the beryl, the onyx, and the jasper, the sapphire, the emerald and the carbuncle," stones which again occur in that most memorable of records, the description of the breastplate of the high priest

Fig. 1. — Jewish High Priest's Breastplate.

(Exodus xxviii. 16-21, and xxxix. 8-14). Twelve stones grouped in four rows, each with three specimens, may be arranged on a square, so as to have the rows placed either verti- cally or horizontally. If they are to cover the whole square, then, unless the gold mounts supplied the necessary compensation, they must be cut in an oblong form, and if the names engraved on them are to run lengthwise, as is the manner of Assyrian cylinders, then the stones, to be legible, must be grouped in four horizontal rows of three each. There is in fact no reason to suppose that the gems of the breastplate were in any other form than that of cylinders such as abounded to the knowledge of the Israelites, with this possibility, however, that they may have been cut lengthways into half-cylinders like a fragmentary one of sard in the British Museum, which has been mounted in bronze, and, as a remarkable exception, has been set with three small precious stones now missing. It could not have been a seal, because of this setting, and because the inscription is not reversed. The names of the twelve tribes, not their standards, as has been thought, may have been engraved in this fashion, just as on the two onyx stones in the preceding verses (Exodus xxviii. 9-1 1), where there can be no question but that actual names were incised. On these two stones the order of the names was according to primogeniture, and this, it is likely, would apply to the breastplate also. The accompanying diagram will show how the stones, supposing them to have been cylinders or half-cylinders, may have been arranged consistently with th-

descriptions of the Septuagint. In the arrangement of Josephus (iii. 7. 5) the jasper is made to change places with the sapphire, the amethyst with the agate, and the onyx with the beryl, while our version differs partly in the order and partly in the names of the stones; but probably in all these accounts the names had in some cases other meanings than those which they now carry. It must be remembered that we have two series of equivalents, namely, the Hebrew compared with the Septuagint, and the Greek words of the Septuagint compared with the modern names, which in many cases, though derived from the Greek, have changed their applications. From the fact that to each tribe was assigned a stone of different colour, it may be taken that in each case the colour was one which belonged prescriptively to the tribe and was symbolic, as in Assyria, where the seven planets appropriated each a special colour [see Brandis in Hermes, 1867, p. 259 seq., and de Saulcy, Revue archtologique, 1869, ii. p. 91; and compare Revelation xxi. 12, 13, where the twelve gates, which have the names of the twelve tribes written upon them, are grouped in four threes, and 19, 20, where the twelve precious stones of the walls are given]. The precious stones which occur among the cylinders of the British Museum are sard, emerald, lapis lazuli (sapphire of the ancients), agate, onyx, jasper and rock crystal.

Gem-Engraving in Greek Lands. — We must now turn to the his- tory of gem-engraving in Greek lands. The excavations in Crete in the first years of the 20th century revealed a previously unknown culture, which lasted on the lowest computation for more than two thousand years, and was only interrupted by the national upheavals which preceded the opening of Greek history proper. (See Crete; Archaeology; and Aegean Civilization.) Through- out the whole period the products of the gem-engraver occupy an important place among the surviving remains. It must suffice, however, in this place to indicate the chief groups of stones.

The earliest engraved stones of Minoan Crete are three-sided prism seals, made of a soft steatite, native in S.E. Crete {Journ. of Hellenic Studies, xvii. p. 3 28) . These are incised with pictorial signs evidently belonging to a rudimentary hieroglyphic system, and are dated before 3000 B.C. At a period placed by A. J. Evans between 2800 and 2200 the method was fully systematized and employed on the signets, as well as on tablets and other materials. This development of the hieroglyphic system was accompanied by an increasing power of working in hard material, and cornelian and chalcedony superseded soft steatite {Journ. of Hell. Studies, xvii. p. 334).

Towards 2000 B.C. a highly developed linear form began to supersede the pictorial signs. It is abundant on the tablets, but the gems thus inscribed are comparatively rare. The linear form in turn died out some six hundred years later.

The signs of the pictorial script incised on the gems are re-presentations of objects, expressed with precision, but giving little scope for the higher side of the gem-engraver's art. Simultaneously, however, with the use of the script, a high degree of skill was acquired by the engravers in rendering animal and human forms. Scenes occur of ritual observance, hunting, animal life, and strange compounded forms of demons. The excavations did not yield a large number of original gems of this class, but a great number of clay sealings from such signets were discovered. That they were synchronous with the use of the forms of script described above is proved by the fact that in the palace at Cnossus deposits were found, both in the linear and the hieroglyphic script, sealed with these signets, the seal impressions being again endorsed in the script (Brit. School Annual, xi. pp. 56, 62). For a remarkable group of sealings found at Zakro see Journ. of Hell. Studies, xxii. pll. 6-10. The finest naturalistic engravings are placed towards the close of the " Mid-Minoan " and beginning of the " Late-Minoan " periods (about 2200-1800 B.C.). During the progress of the "Late- Minoan " period the subjects tended to assume a more formal and heraldic character. The forms of stones in favour were the disk convex on each side (lenticular or lentoid stones), and during the " Mid-Minoan " period, elaborate signets in the form of modern fob-seals. Apart from the use of intaglios for sealing,

Fig. 2. — Lenticular Rock- Crystalfrotnlalysus. (Brit. Mus.)

the excavations have shown that the Cretan lapidaries were largely employed in the working of gems for purposes of decora- tion. Fragments of lapis lazuli and crystal for inlaying (the crystals having coloured designs on their lower surfaces) were found in the throne room at Cnossus; the royal gaming-board, also from the palace at Cnossus, had inlaid crystal disks and plaques. The workshop of a lapidary, with unfinished works in marble, steatite, jasper and beryl, was also found within the precincts of the palace (Brit. School Annual, vii. pp. 20, 77). Examples were also found of work in relief, substantially antici- pating the art of cameo-cutting.

The area over which the Cretan influence extended was wide. Its manifestations in Greek lands proper, first revealed by Schliemann's excavation of the royal tombs of Mycenae, ran parallel with and

outlasted the later periods of the Cretan culture to which it stood in close relation (see Aegean Civilization). Its gems and intaglio works in gold are known to us from the finds at Mycenae, and at analogous sites, such as Menidi, Vaphio and Ialysus. They have much in common with the finer class of Cretan stones already described. The engraved gems fall principally into two groups in respect of form, namely, the lenticular (or lentoid) stones already mentioned, and (more rarely) glandular stones, so called from their resemblance to a glans or sling bolt. A Cretan fresco shows a figure wearing an agate lenticular stone suspended from the left wrist. The finer specimens of the Aegean gems are engraved with the wheel and the point in hard stones, such as chalcedony, amethyst, sard, rock-crystal and haematite. A lapidary's workshop similar to that at Cnossus has been found at Mycenae, with a store of unused gems, and an unfinished lenticular stone (Ephemeris Archaiologike, 1897, p. 121). The characteristic of the Aegean engraver is the free expression of living forms. His subjects are figures of animals, men and demons in combat, and heraldic compositions recalling the Gate of Lions at Mycenae. It was almost inevitable that the scarab should be found in the Cretan and Aegean deposits, but in such cases we have the Egyptian scarab directly imported, and not, as at a later period, non-Egyptian adaptations of the form. The cylinder also (except in Cyprus, the border- land between east and west) only occurs as an importation, and not as a currently manufactured shape.

The " Island Gems." — The Aegean culture was swept away probably by that dimly seen upheaval which separated Mycenaean from historical Greece, and which is com- monly known as the Dorian invasion. One of the few facts which indicate a certain continuity of tradition in later Greece is this, that we again find the same characteristic forms, the glandular and lenticular stones, in the cemeteries, of Melos and elsewhere. It is only recently that archaeologists have learnt to distinguish between the later lenticular and glandular stones " of the Greek Islands," as they are commonly called, and those of the Aegean age. Engravings of the later class are worked in soft materials only, such as steatite. They have not the power of expressing action peculiar to the Aegean artist. In general, the continuity of tradition between the gems of the Mycenaean and the historical periods is in respect of shape rather than of art. The subjects are for the most part decorative forms (the Gryphon, the winged Sphinx, the winged horse, &c.) in course of development into characters of Greek myth.

The Phoenicians and the Greeks. — About the end of the 8th and beginning of the 7th century B.C. the Phoenicians began to exercise a

powerful influence as intermediaries between Egypt and Assyria and the Mediterranean. Porcelain and other

Fig. 3. — Lenticular Sard from Ialysus. (Brit. Mus.)

imitations of Egyptian ornaments, and especially of Egyptian scarabs, are found in great numbers on such sites as Amathus in Cyprus, Camirus in Rhodes, in Etruria, and at Tharros in Sardinia. The Egyptian hieroglyphics are imitated with mistakes, the figures introduced are stiff and formal, the animals as a rule heraldic. The scarab form, which in Egypt had had its sacred significance, was now become nothing more than a convenient shape for an object of jewelry or for the reverse side of a stone. It was adopted from the Phoenicians both by Greeks and Etruscans. By the Greeks, with whom we are at present con- cerned, its use was occasional, and about 500 B.C. it was super- seded by the scarabaeoid. Under this name two forms, some- what similar but independent in origin, are usually grouped without sufficient discrimination. The scarabaeoid proper is a simplification of the scarab, effected by the omission of all details of the beetle. But many of the stones known as scarabaeoids, with a flat and oval base and a convex back, are in respect of their form probably of North Syrian origin (so Furtwangler). The earliest examples of archaic Greek gem-engraving (other than the later " Island gems " already described) are works of Ionian art. They show a desire, only limited by imperfect power of expression, to represent the human figure, though the particular theme may be a god or other mythical personages. By the beginning of the 5th century the engravers had reached the

Fig. 4. — Victory. Fig. 5. — Citharist. Early Greek Scarab. Early Greek Scara- (Brit. Mus.) baeoid. (Brit. Mus.)

Fig. 6.— Head of Eos. (Brit. Mus.)

point of full development, and the scarabaeoids of the time embody its results. As an example of fine scarabaeoids the Woodhouse intaglio of a seated citharist (fig. 5; Cat. of Gems in Brit. Mus. No. 555) may be quoted as perhaps the very finest example of Greek gem-engraving that has come down to us. It would stand early in the 5th century B.C., a date which would also suit the head of Eos from Ithome in Messenia (fig. 6). The number, however, of fine

scarabaeoids known to us has been considerably increased in recent years. They are marked by a broad and simple treatment, which attains a large effect without excessive minuteness or laboured detail. In these respects the style has something in common with the reliefs of the 5th century. Literary History. — The literary references to the early gem- engravers are no longer of the same importance as before in view of the fuller knowledge we possess as to the quality of early gem- engraving, but it is necessary that they should be taken into account.

The records of gem-engravers in Greece begin in the island of Samos, where Mnesarchus, the father of the philosopher Pytha- goras, earned by his art more of praise than of wealth. " Not to carry the image of a god on your seal," was a saying of Pytha- goras; and, whatever his reason for it may have been, it is interesting to observe him founding a maxim on his father's profession of gem-engraving (Diogenes Laert. viii. 1, 17). From Samos also came Theodoras, who made for Polycrates the seal of emerald (Herodotus iii. 41), which, according to the curious story, was cast in vain into the deep sea on purpose to be lost. That the design on it was a lyre, as is stated in one authority, is unlikely, at least if we accept Benndorf 's ingenious interpretation of Pliny (Nat. Hist, xxxiv. 83). He has suggested that the portrait statue of Theodorus made by himself was in all proba- bility a figure holding in one hand a graving tool, and in the other, not, as previously supposed, a quadriga so diminutive that a fly could cover it with its wings, but a scarab with the engraving

of a quadriga on its face (Zeitschrift fur die dsterreich. Gymnasien, I 873, pp. 401-411), whence it is not unreasonable to conclude that this scarab in fact represented the famous seal of Polycrates. Shortly after 600 B.C. there was a law of Solon's forbidding en- gravers to retain impressions of the seals they made, and this date would fall in roundly with that of Theodorus and Mnesarchus, as if there had in fact been at that time a special activity and unusual skill. That the use of seals had been general long before, in Cretan and Mycenaean times, we have seen above, and it is singular to find, as Pliny points out (xxxiii. 4), no direct mention of seals in Homer, not even in the passage (Iliad, vi. 168) where Bellerophon himself carries the tablets on which were written the orders against his life. From the time of Theodorus to that of Pyrgoteles in the 4th century B.C. is a long blank as to names, but not altogether as to gems, the production of which may be judged to have been carried on assiduously from the constant necessity of seals for every variety of purpose. The references to them in Aristophanes, for example, and the lists of them in the ancient inventories of treasures in the Parthenon and the

Asclepieion at Athens confirm this frequent usage during the period in question. The mention of a public seal for authenti- cating state documents also becomes frequent in the inscriptions. In the reign of Alexander the Great we meet the name of Pyr- goteles, of whom Pliny records that he was no doubt the most famous engraver of his time, and that Alexander decreed that Pyrgoteles alone should engrave his portrait. Nothing else is known of Pyrgoteles. A portrait of Alexander in the British Museum (No. 2307), purporting to be signed by him, is palpably modern.

From literary sources we also learn the names of the engravers Apollonides, Chronius and Dioscorides, but the date of the last-mentioned only is certain. He is said to have made an excellent portrait of Augustus, which was used as a seal by that emperor in the latter part of his reign and also by his successors. In- scriptions on extant gems make it probable that Dioscorides was a native of Aegeae in Cilicia, and that three sons, Hyllos, Hero- philus and Eutyches, followed their father's occupation. We have also a few scattered notices of amateurs and collectors of gems, but it will be seen that for the whole period of classical antiquity the literary notices give little aid, and we must return to the gems.

Early Inscribed Gems. — Various early gems are inscribed with proper names, which may be supposed to indicate either the artist or the owner of the gem. In some cases there is no ambiguity, e.g. on a scarab is inscribed, " I am the seal of Thersis. Do not open me "; and a scarabaeoid (fig. 7) is inscribed, " Syries made me." But when we have the name alone, the general principle on which we must distinguish be- tween owner and artist is that the name of the owner is naturally meant to be con- spicuous (as in a gem in the British Museum inscribed in large letters with the name of Isagor[as]), while the name of an artist is naturally inconspicuous and subordinate to the design.

The early engravers known to us by their signatures are: Syries, who was author of the modified scarab in the British Museum, mentioned above, with a satyr's head in place of the beetle, and a citharist on the base — a work of the middle of the 6th century; Semon, who engraved a black jasper scarab now at Berlin, with a nude woman kneeling at a fountain filling her pitcher, of the close of the 6th century; Epimenes, who was the Suthor of an admirable chalcedony scarabaeoid of a nude youth restraining a spirited horse — formerly in the Tyszkiewicz Collection, and of about the beginning of the 5th century. But better known to us than any of these artists is the 5th-century engraver, Dexamenus of Chios, of whose work four examples

1 survive, viz.: —

1 For Nos. 1-4 see Furtwangler, pi. 14; for Nos. 2-4 see Evans, Rev. archiologigue, xxxii. (1898) pi. 8.

Fig. 7 — Scara- baeoid by Syries. (Brit. Mus.)

i. A chalcedony scarabaeoid from Greece, in the Fitzwilliam Museum at Cambridge, with a lady at her toilet, attended by her maid. Inscribed AEEAMENOS, and with the name of the lady, MIKH2.

2. An agate with a stork standing on one leg, inscribed AEEAMENOS simply.

3. A chalcedony with the figure of a stork flying, and inscribed in two lines, the letters carefully disposed above each other, AEEAMENOS EIIOIE XIOS.

4. A gem, apparently by the same Dexamenus, is a cornelian formerly belonging to Admiral Soteriades in Athens, and sub- sequently in the collection of Dr Arthur Evans. It has a portrait head, bearded and inscribed AEEAMENOS EIIOIE.

The design of a stork flying occurs on an agate scarab in the British Museum, from the oldCracherode Collection, and therefore beyond all suspicion of having been copied from the more recently discovered Kertch gem.

For the period immediately following that early prime to which the gems above de- scribed belong, our materials are less copious. Some of the finest examples are derived from the Greek tombs in the Crimea and South Russia. Reckoned among the best of the Crimean gems, and that is equivalent to saying among the best of all gems, are the follow- ing: (1) a burnt scarabaeoid with an eagle carrying off a hare; (2) a gem with scarab border and the figure of a youth seated playing on the trigonon, very much resembling the Woodhouse intaglio (both engraved, Compte rendu, 1871, pi. vi. figs. 16, 17). In these, and in almost all Greek gems belonging to this period of excellence, the material is of indifferent quality, consisting of agate, chalcedony or cor- nelian, just as in the older specimens. Brilliant colour and translucency are as yet not a necessary element, and accordingly the design is worked out solely with a view to its own

artistic merit. The scarab tends to die out. The scarabaeoid in its turn is abandoned for the simple ring stone. The subjects chosen take by degrees a different character. Aphrodite (nude),

Fig. 8.— Greek Sard. 5th Cent. B.C. (Brit. Mus.)

Fig. 9.— Amethyst Pendant. (Brit. Mus.)

Eros, children and women tend to replace the older and severer themes. The motives of 4th-century sculpture appear by degrees on the gems.

Etruscan Gems. — At this point it is convenient to discuss the gem-engraving of the Etruscans, which came into being towards the close of the archaic period of Greek art. In the early Etruscan deposits, such as that of the Polledrara tomb in the British Museum (towards 600 B.C.), we find nothing except Phoenician imports of porcelain or stone scarabs, both strongly Egyptian in character. During the 6th century a few of the semi-Egyptian stones of Sardinia make their appearance. But in the. latter part of the century these oriental products tend to die out, and we have in their place the native works of Etruscan artists. These engrav-' ings stand in the closest relation to Greek works of the close of ' the 6th century and many imported Greek scarabs also occur. The Etruscan scarab has its beetle form more minutely engraved than that of the Greeks. It is further distinguished in the better examples, alike from the Greek and the Egyptian form, by a- small border of a sort of petal ornament round the lower edge of the beetle. Like the earlier Greek scarabs it has*

the cable border round the design, but the border continued in use in Etruria when it had been abandoned in Greece. The scarabaeoid form does not occur in Etruscan deposits. Etruscan engraving begins when Greek art was approaching maturity, with studies, sometimes stiff and cramped, of the heroic nude form. Some of the Greek deities such as Athena and Hermes occur, together with the winged personages of Greek mythology. To the heroic types the names of Greek legend are attached, with modifications of form, such as TTTE for Tydeus, and KAIINE for Capaneus. Sometimes the names are appropriate and some- times they are assigned at random. The subjects include certain favourite incidents in the Trojan and Theban cycles {e.g. the death of Capaneus) ; myths of Heracles ; athletes, horsemen, a few scenes of daily life. Certain schemes of composition are frequent. In particular, a figure too large for the field, standing and bending over, is made to serve for many types. The engrav- ing of the finer Etruscan gems is minute and precise, marked with

elegance and command of the material. Its fault is its want of original inspiration. Special mention must be made of a very numerous group of cornelian scarabs, roughly engraved for the most part with cup-shaped sinkings (whence they are known as gems a globolo tondo) roughly joined together by furrows. Not- withstanding their apparent rudeness, these gems are shown, by the conditions in which they are found, to be comparatively late works of the 4th century. Furtwangler ingeniously suggests that the rough execution was intended to emphasize the shining surfaces of the cup-sinkings, rather than to produce any particular intaglio subject. (For an elaborate classification of the Etruscan scarabs see Furtwangler, Geschichte, p. 170.)

The Cameos. — After the beginning of the regal period, in the 4th century B.C., the introduction of more splendid materials from the East was turned to good account by the development of the cameo, i.e. of gem-carving in relief (for the origin of the word see Cameo). But in its simpler forms the principle of the cameo necessarily dates from the beginning of the art. Thus a lion in rock-crystal was found in the very early royal tomb of Nagada (de Morgan, Recherches, Tombeau de Negadah, p. 193). The Egyptian scarab, on its rounded side, had been naturalisti- cally carved in relief in beetle form. Steatite engravings in relief (notably the harvest festival vase from Hagia Triada) were found in the Cretan deposits. Subjects are found carved in the round in hard stone in Mycenaean graves. When we come to historical Greece and to Etruria the cameo of later times is anticipated by various attempts to modify the traditional form of the scarab. An example in cornelian was found at Orvieto in 1874 in a tomb along with vases dating from the beginning of the 5th century B.C., and it will be seen from the engraving of this gem {Arch. Zeit., 1877, pi. xi. fig. 3) that, while the design on the face is in intaglio, the half-length figure of a Gorgon on the back is engraved in relief. Compare a cornelian fragment, apparently cut from the back of a scarabaeoid, now in the British Museum. As further examples of the same rare form of cameo, the following gems in the British Museum may be mentioned: — ■ (1) a cornelian cut from back of a scarabaeoid, with head of Gorgon surrounded by wings; (2) cornelian scarabaeoid: Gorgon running to left ; on face of the gem an intaglio of Thetis giving armour to Achilles; (3) steatite scarabaeoid, already mentioned, signed by Syries, head of a satyr, full face, with intaglio of citharist. There is, however, no evidence at present available to show that the cameo proper had been introduced in Greece before the time of Alexander. The earliest examples found in known conditions are derived from Crimean tombs of the middle of

the 3rd century B.C.

Among the most splendid of ancient cameos are those at St Petersburg and Vienna, each representing a monarch of the Diadochi and his consort (Furtwangler, pi. 53). There is much controversy as to the persons represented, but the cameos are probably works of the 3rd century.

The materials which ancient artists used for cutting into cameos were chiefly those siliceous minerals which, under a variety of names, present various strata or bands of two or more distinct colours. The minerals, under different names, are

essentially the chalcedonic variety of quartz, and the differences of colour they present are due to the presence of variable pro- portions of iron and other foreign ingredients. These banded stones, when cut parallel to the layers of different colours, and when only two coloured bands — white and black, or sometimes white and black and brown — are present, are known a» onyxes; but when they have with the onyx bands layers of cornelian or sard, they are termed sardonyxes. The sardonyx, which was the favourite stone of ancient cameo-engravers, and the material in which their masterpieces were cut, was procured from India, and the increased intercourse with the East after the death of Alexander the Great had a marked influence on the development of the art.

Akin in their nature to the great regal cameos, which from the nature of the case are cut on a nearly plane surface, are the cups and vases cut out of a homogeneous stone and therefore capable of being worked in the round. A few examples of such works survive. The most famous are the Farnese Tazza and the cup of the Ptolemies. The Tazza, which is now in the National Museum at Naples, was bought by Lorenzo de' Medici from Pope Paul II. in 1471. It is a large shallow bowl of sardonyx, 8 in. in diameter On its exterior surface is a Gorgoneion upon an aegis; in the interior is an allegorical design, relating to the Nile flood. The cup of the Ptolemies, formerly known as the cup of St Denis, is preserved in the Cabinet des Medailles of the French Bibliotheque Nationale. It is a cup 4.3 in. high and si in. in diameter, carved out of oriental sardonyx, and richly decorated with Dionysiac emblems and attributes in relief.

The Cameo in the Roman Empire. — During the 1st century of the empire the engraver's art alike in cameo and in intaglio was at a high degree of excellence. The artist in cameo took full advantage of his rich opportunities in the way of sumptuous materials, and of the requirements of an imperial court. The two most famous examples of this art which have come down to the present day are the Great Agate of the Sainte Chapelle in the Bibliotheque Nationale, Paris, and the Augustus Cameo in the Vienna Collection. The former was pledged among other valuables in 1244 by Baldwin II. of Constantinople to Saint Louis. It is mentioned in 1344 as " Le Camahieu," having been sent in that year to Rome for the inspection of Pope Clement VI. It is a sardonyx of five layers of ir- regular shape, like all classical gems, measuring 12 in. by 105 in. It repre- sents on its upper part the deified members of the Julian house. The centre is occupied with the reception of Germanicus on his return from his great German campaign by the em- peror Tiberius and his mother Livia. The lower division is filled with a group of captives in attitudes expressive of woe and deep dejection. The Vienna gem {Gemma auguslea), an onyx of two layers measuring 8f in. by 75, is a work of still greater artistic interest. The upper portion is occupied with an allegorical representation of the coronation of Augustus, the emperor being represented as Jupiter with Livia as the god- dess Roma at his side. In the composition deities of Earth and Sea, and several members of the family of Augustus, are introduced; on the exergue or lower portion are Roman soldiers preparing a trophy, barbarian captives and female figures. This gem was in the 15th century at the abbey of St Sernin at Toulouse. According to tradition it had been placed there by Charlemagne. It came into the possession of the emperor Rudolph II. in the 16th century for the enormous sum of 12,000 gold ducats. The principal cameo in the collection of the British Museum was acquired at the final dispersion of the Marlborough Collection in 1899. It is a sardonyx measuring 8| in. by 6 in., and appears to represent a Roman emperor and empress in the forms of Serapis and Isis. Here also, in imperial times as in the Hellenistic period, side by side with the great cameos, we meet with works carved out in the round. Noted examples of such

Fig. 10. — Actaeon. Frag- ment of Sardonyx Cameo. (Brit. Mus.) –

work are the Brunswick vase (at Brunswick), with the subject of Triptolemus; the Berlin vase with the lustration of a new-born imperial prince; and the Waddesdon vase in theBritish Museum, with a vine in relief set in a rich enamelled Renaissance mount. Hardly less precious than the cameos in sardonyx were the imitations carved out of coloured glass The material was not costly, but its extreme

fragility made the work of extreme difficulty. Examples of such work are the Barberini or Portland vase, deposited in the British Museum, with scenes supposed to be connected with the story of Peleus and Thetis; and the " vase of blue glass " from Pompeii, in the museum at Naples (see Mau and Kelsey, p. 408). The world's great cameos, which are hardly more than a dozen in number, have not been found by excavation. They remained as precious objects in imperial and ecclesiastical treasuries and passed thence to the royal and national collections of modern Europe.

The Intaglio in the Roman Empire. — The art of engraving in intaglio was also at a high level of excellence in the beginning of the Roman empire. This is to be inferred alike from the admir- able portraits of the 1st century A.D., and from the number of signed gems bearing Roman artists' names, such as Aulua, Gnaius and the like, which could hardiy belong to any other period. It is impossible, however, to found any argument upon the artists' signatures without taking into account the intricate questions of authenticity which are discussed in the following section.

Signed Gems. — The number of gems which have, or purport to have, the name ot the artist inscribed upon them is very large. A great many of the supposed signatures are modern forgeries, dating from the period between 1724 (when the book of Stosch, Gemmae antiquae caelatae, scalptorum nominibus insignitae, first drew general attention to the subject) and 1833, when the multitude of forged signatures (about 1800 in number) in trie col- lection of Prince Poniatowski made the whole pursuit ridiculous. It is known, however, that forged signatures were current before 1724 (see Stosch, p. xxi.), and in the period immediately following they were very numerous. Thus Laurence Natter {Methode de graver en p'.erres fines (1754), p. xxx.) confesses that, whenever desired, he made copies. For example, he copied a Venus (Brit. Mus. No. 2296), converting the figure into a Danae and affixing the name of Aulos which he found on the Venus. Cf. Mariette, Traite (1750), i. p. 101.

The question which of the multitude of supposed signatures can be accepted as genuine has been a subject of prolonged and intricate controversy. In the period immediately following the Poniatowski forgeries the extreme height of scepticism is repre- sented by Koehler, who only acknowledged five gems (Koehler, iii. p. 206) as having genuine signatures. In recent years the subject has been principally dealt with by Furtwangler, whose conclusion is to admit a considerable number of gems rejected by his predecessors.

It must suffice here to point out a few general principles. In the first place a certain number of gems recently discovered have inscriptions which are undoubtedly genuine and which record the names of the engravers. The form of the signature may be a nominative with a verb, a nominative without a verb or a genitive. The artists in this class are Syries, Dexamenus, Epimenes and Semon, mentioned above, and a few others. Another group of gems which must be accepted consists of stones whose known history goes back to a peiiod at which a forged inscription was impossible. Thus a bust of Athena in the Berlin Collection, signed by Eutyches, was seen by Cyriac of Ancona in 1445. A glass cameo signed by Herophilus, son of Dioscorides, now at Vienna, was, in the 17th century, in the monastery of Echternach, where it had probably been from old times. The portrait of Julia, daughter of Titus, by Euodos (now in the Biblio- theque Nationale) was formerly a part of a reliquary presented to the abbey of St Denis by Charles the Bold. Another group of undoubtedly genuine signatures occurs on cameos (in stone and paste) which have the inscriptions in relief, and therefore as part of the original design. Such are the works of Athenion, and of Quintus, son of Alexas.

For the great majority of signed gems which do not fall into these categories the reader must refer to the discussions of Furtwangler and others (see Bibliography below). It must suffice to say that Furtwangler arrives at the result that we have in all genuine signatures of at least fifty ancient gem-engravers.

Gem- Engraving in the Later Empire. — In the following centuries the art of intaglio engraving, which was still at a high degree of perfection in the first century of the Roman empire, became more mechanical. The designs have a very characteristic ap- pearance, due to the method of production with rough and hasty strokes of the wheel only. A collection of gems found in England, such as that in the possession of the corporation of Bath, shows the feeble character in particular of the gems current in the provinces. Except in portraiture, and in grylli or conceits, in which various things are combined into one, often with much skill, the subjects were as a rule only variations or adaptations of old types handed down from the Greeks. When new and distinctly Roman subjects occur, such as the finding of the head on the Capitol, or Faustulus,- or the she-wolf with the twins, both the stones and the workmanship are poor. In such

cases, where the design stirs a genuine national interest, it may happen that very little of artistic rendering will be acceptable rather than otherwise, and much more is this true when the design is a symbol of some article of faith, as in the early Christian gems. There both the art and the material are at what may be called the lowest level. The usual subjects on the early Christian gems are the fish, anchor, ship, dove, the good shepherd, and, according to

Fig. ii. — Chris- tian Gem. The Good Shepherd. (Brit. Mus.)

Fig. 12. — Gnostic Gem. (Brit. Mus.)

13. — Sassanian (Brit. Mus.)

Clemens, the lyre. Under the Gnostics, however, with whom there was more of speculation than of faith, symbolism was developed to an extent which no art could realize without the aid of writing. A gem was to them a talisman more or less elaborate with long, but for the most part quite unintelligible, engraved formulae. The difficulty is to make out how the stones were carried; many specimens exist, but none show signs of mounting. . The materials are usually haematite or jasper. As regards the designs, it is clear that Egyptian sources have been most drawn upon. But the symbolism is also largely associated with Mithraic worship. The name Abraxas, or more correctly Abrasax, which, from its frequency on these gems, has led to their being called also " Abraxas gems," is, when the Greek letters of which it is composed are treated as Greek numerals, equal to 365, the number of days in a year, and the same is the case with MEI9PAS.

More interesting, from the occasionally forcible portraiture and the splendour. of some of the jacinths employed, are the Sassanian gems, which as a class may be said to represent the last stage of true gem-engraving in ancient times.

The art of cameo-engraving, which, as we have seen, attained its greatest splendour at the beginning of the empire, followed on the whole a similar course. It waned in the early part of the- 3rd century after the death of the emperor Severus, but under ■ the first Christian emperor Constantine it enjoyed a brief period of revival. Fine cameo portraits of Constantine are extant; and it was during or shortly after his reign that Christian Scripture subjects began to appear on cameos. That class of subjects constituted the staple of such work — generally rude and artistically debased — as continued to be cultivated under the

Byzantine empire down to nearly the epoch of the Renaissance. From the Byzantine period downward one peculiarty of gem- engraving becomes noticeable. Cameo-work as compared with intaglios in classical times was rare and infrequent, but now and onwards the opposite is the case, intaglio-sinking having almost died outy and cameos being chiefly produced. Commercial intercourse with the East still secured for the engravers a supply of magnificent sardonyxes, although blood-stone and other non-banded stones were very commonly used for works in relief. Cameos during the long dark ages were used chiefly for the decora- tion of reliquaries and other altar furniture, and as such their designs were purely ecclesiastical or scriptural. To this period also belongs the class of complimentary or motto cameos, which, containing only inscriptions and an ornamental border, executed in nicolo stones, were used as personal gifts and adornments.

In medieval times antique cameos were held in peculiar venera- tion on account of the belief, then universal, in their potency as medicinal charms. This power was supposed to be derived from their origin, of which two theories, equally satisfactory, were current. By the one they were held to be the work of the children of Israel during their sojourn in the wilderness (hence the name Pierres d' Israel), while the other theory held them to be direct products of nature, the engraved figures pointing to the peculiar virtue lodged in them. Interpreters less mystically inclined found Biblical interpretations for the subjects. Thus the cameo of the Sainte Chapelle was supposed to represent the triumph of Joseph in Egypt. A cameo with Poseidon, Athena and her serpent was Adam and Eve.

The revival of the glyptic arts in western Europe dates from the pontificate of the Venetian Paul II. (1464-1471), himself an ardent lover and collector of gems, to which passion, indeed, it is gravely affirmed he was a martyr, having died of a cold caught by the multiplicity of gems exposed on his fingers. The cameos of the early part of the 16th century rival in beauty of execution the finest classical works, and, indeed, many of them pass in the cabinets of collectors for genuine antiques, which they closely imitated. The Oriental sardonyx was not available for the purposes of the Renaissance artists, who were conse- quently obliged to content themselves with the colder German agate onyx. The scarcity of worthy materials led them to use the backs of ancient cameos, or to improve on classical works of inferior value executed on good material, and probably to this cause must also be assigned the development of shell cameos, which are rarely found, of an older period.

Among the means of distinguishing antique cameos frcm cinquecento work, the kind of stone is one of the best tests, the classical artists having used only rich and warm-tinted Oriental stones, which further are frequently drilled through their dia- meter with a minute hole, from having been used by their original Oriental possessors in the form of beads. The cinquecento artists also, as a rule, worked their subjects in high relief, and resorted to undercutting, no case of which is found in the flat low work of classical times. The projecting portions of antique work exhibit a dull chalky appearance, which, however, fabricators learned to imitate in various ways, one of which was by cramming the gizzards of turkey fowls with the gems. Another index of an- tiquity is found in the different methods of working adopted in classical and Renaissance times. The tools employed by the Renaissance engraver were the drill and the wheel, while the ancient artist also employed the diamond point. The gem-engraver's art again during the 1 8th century revived under an even greater amount of encouragement from men of wealth and rank. In this last period the names of engravers who

succeeded best in imitating classical designs were Natter, Pichler (fig. 14), and the Englishmen Marchant (fig. 15) and Burch. Compared with Greek gems, it will be seen that what

Fig. 14. — Muse, by Pichler. (Brit. Mus.)

Fig. 15. — Nereid and Sea-bull by Marchant. (Brit. Mus.)

at first sight is attractive as refined and delicate is after all an exaggerated minuteness of execution, entirely devoid of the ancient spirit. The success with which modern engravers imposed on collectors is recorded in many instances, of which one may be

taken as an instructive type. In the Biblio- theque Nationale is a gem (Chabouillet's cata- logue, No. 2337), famil- iarly known as the signet of Michelangelo, the subject being a Bacchanalian scene. So much did he admire it, the story says, that he copied from it one of the groups in his paintings in the Sistine chapel. The gem, however, is evidently in this part of it a mere copy from Michelangelo's group, and therefore a subsequent production, probably by da Pescia.

In our own day the engraving of cameos has practically ceased to be pursued as an art. Roman manufacturers cut stones in large

quantities to be used as shirt-studs and for setting in finger- rings; and in Rome and Paris an extensive trade is carried on in the cutting of shell cameos, which are largely imported into England and mounted as brooches by Birmingham jewelry manufacturers. The principal shell used is the large bull's- mouth shell (Cassis rufa), found in East Indian seas, which has a sard-like underlayer. The black helmet (Cassis tuberosa) of the West Indian seas, the horned helmet (C. cornuta) of Mada- gascar, and the pinky queen's conch (Strombus gigas) of the West Indies are also employed. The famous potter Josiah Wedgwood introduced a method of making imitations of cameos in pottery by producing white figures on a coloured ground, this constituting the peculiarity of what is now known as Wedgwood ware.

Gem Collectors. — The habit of gem-collecting is recorded first in the instance of Ismenias, a musician of Cyprus, who appears to have lived in the 4th century B.C. But though individual collectors are not again mentioned till the time of Mithradates, whose cabinet was carried off to Rome by Pompey, still it is to be inferred that they existed, if not pretty generally, yet in such places as Cyrene, where the passion for gems was so great that the thriftiest person owned one worth 10 minas, and where, according to Aelian (Var. hist. xii. 30), the skill in engraving was astonishing. The first cabinet (dactyliotheca) in Rome was that of Scaurus, a stepson of Sulla. Caesar is said to have formed six cabinets for public exhibition, and from the time of Augustus all men of refinement were supposed to be judges both of the art and of the quality of the stones.

In the middle ages the chief collections were incorporated in works of art in the church treasuries. The first collector of modern times was, as already mentioned, Pope Paul II., who was followed by a long succession of princely and noble collectors such as Lorenzo de' Medici and the great earl of Arundel. The col- lection of the latter passed into the hands of the dukes of Marl- borough and thence into the possession of Mr David Bromilow. The collection was finally dispersed by auction in June 1899.

In modern times the principal collections are contained in state museums. The cabinets of Vienna and of the Bibliotheque Nationale are incomparably rich in the historic cameos. Those of the British Museum and of Berlin are the strongest in their range over the whole field of the gem-engraver's art. • Bibliography. — For the fullest general account of the subject (with especial attention to the gems of classical antiquity) see A. Furtwangler, Die anliken Gemmen, Geschichte der Steinschneiderkunsl im klassischen Allertum, in 3 vols

(1900). See also E. Babelon, La Gravure en pierres fines, camees et intailles (1894); A. H. Smith, " Gemma " and " Sculptura," in the 3rd edition of Smith's Diet, of Antiquities; J. H. Middleton, The Engraved Gems of Classical Times (1891). Much curious information is in the works of C. W. King: Handbook of Engraved Gems (1866); Antique Gems (1866); The Natural History, Ancient and Modern, of Precious Stones and Gems, and of the Precious Metals (1865) ; Antique Gems and Rings (2 vols.,

1872).

Special Periods: — Babylonia, &c. — Menant, " Les Pierres gravees de la haute Asie," Recherches sur la glyptique orientate (1883-1886).

Egypt. — For the early cylinder sealings, &c, see Petrie, "Royal Tombs of the First Dynasty " (Egypt Explor. Fund, XVIIIth Memoir), p. 24; pis. 12, figs. 3 to 7, and pis. 18-29; Amelineau, " Nouvelles Fouilles d'Abydos, 1897-1898," Compte rendu, pp. 78, 423; pi. 25, figs. 1-3.

The Bible. — Petrie, " Stones (Precious)," in Hastings' Diet, of the Bible.

Phoenician. — See M. A. Levy, Siegel und Gemmen, with three plates of gems having Phoenician, Aramaic, old Hebrew and other inscriptions (Breslau, 1869) ; and, on the same subject, De Vogue, in the Revue archeologique, 2nd series (1868), xvii. p. 432, pis. 14-16.

Crete. — Articles by A. J. Evans in Journal of Hellenic Studies, xiv., xvii., xxi., and in Annual of British School at Athens, vi. and onwards.

Classical Gems. — See Furtwangler, op. cit.

Gnostic Gems. — Cabrol, Diet, d'archeologie chretienne, s.v. " Abrasax."

For the controversy as to gems with artists' signatures, see Koehler, Abhandlung uber die geschnittenen Steine, mil denˆNamen der Kiinstler; Koehler's collected works, ed. Stephani, vol. iii. (1851); Stephani, Notes to Koehler as above; also Uber einige angebliche Steinschneider des Alterthums (St Petersburg, 1851); Brunn, Geschichte der griechischen Kiinstler, ii. (1859), pp. 442-637; Furtwangler, Jahrbuch d. k. deutsch. arch. Inst. iii. (1888), pp. 105, !93> 2 97; iv. (1889), p. 46, and Geschichte, passim.

For the history of the Poniatowski gems, see Reinach, Pierres gravees, p. 151.

Catalogues. — The chief catalogues dealing with modern public collections are: Berlin, A. Furtwangler, Beschreibung der geschnittenen Steine im Anliquarium (1896); British Museum, A. H. Smith, A Catalogue of Engraved Gems in the British Museum (Dept. of Greek and Roman Antiquities) (1888); Paris, Bibliotheque Nationale, Chabouillet, Catalogue . . . des camees et pierres gravees de la Bibliotheque Imperiale (1858); E. Babelon, Catalogue des camees . . . de la Bibliotheque Nationale (1897).

Modern Engraving. — Vasari vii. p. 113 (ed. Siena, 1792); continued by Mariette, Traite des pierres gravees (1750), i. p. 105. The older books on gems are very numerous, but those of present-day importance are not many. Faber, Illustrium imagines . . . apud Fulvium Ursinum (Antwerp, 1606) ; Stosch, Gemmae antiquae caelatae, scalptorum nominibus insignitae (Amsterdam, 1724); Winckelmann, Description des pierres gravees du feu Baron de Stosch (1760); Krause, Pyrgoteles, oder die edlen Steine der Alten (1856); a convenient reissue of Stosch, and seven others of the older works, by S. Reinach, Pierres gravees, &c. . . . reunies et reeditees, avec un texte nouveau (1895).

Pastes. — The principal collection of glass and sulphur pastes from gems was that issued by James Tassie of Glasgow, with A Descriptive Catalogue of a General Collection of . . . Engraved Gems . . . arranged and described by R. E. Raspe (the author of Baron Munchausen) (1791). (A. S. M. ; A. H. Sm.)

GEM, ARTIFICIAL. The term ” Artificial Gems ” does not mean imitations of real gems, but the actual formation by arti- ficial means of the real precious stone, so that the product is identical, chemically, physically and optically, with the one found in nature. For instance, in chemical composition the lustrous diamond is nothing but crystallized carbon. Could we take black amorphous carbon in the form of charcoal or lamp- black and dissolve it in a liquid, and by the slow evaporation of that liquid allow the dissolved carbon to separate out, it would probably crystallize in the transparent form of diamond. This would be a true synthesis of diamond, and the product would be just as much entitled to the name as the choicest products of Kimberley or Golconda. But this is a very different thing from the imitation diamond so common in shop windows. Here the chemist has only succeeded in making a paste or glass having limpidity’ and a somewhat high refractivity, but wanting

the hardness and " fire " of the real stone.

The Diamond. — Within recent years chemists have actually succeeded in making the real diamond by artificial means, and although the largest yet made is not more than one-fiftieth of an inch across, the process itself and the train of reasoning leading up to such an achievement are sufficiently interesting tfl warrant a somewhat full description. Attempts to make diamonds artificially have been numerous, but, with the sole exception of those of Henri Moissan, all have resulted in failure. The nearest approach to success was attained by J. B. Hannay in 1880 and R. S. Marsden in 1881; but their results have not been verified by others who have tried to repeat them, and the probability is that what was then thought to be diamond was in reality carborundum or carbide of silicon.

Attempts have been made by two methods to make carbon crystallize in the transparent form. One is to crystallize it slowly from a solution in which it has been dissolved. The difficulty is to find a solvent. Many organic and some inorganic bodies hold carbon so loosely combined that it can be separated out under the influence of chemical action, heat or electricity, but invariably the carbon assumes the black amorphous form. The other method is to try to fuse the carbon by fierce heat, when from analogy it is argued that on cooling it will solidify to a clear limpid crystal. The progress of science in other directions has now made it pretty certain that the true mode of making diamond artificially is by a combination of these two methods. Until recently it was assumed that carbon was non-volatile at any attainable temperature, but it is how known that at a tempera- ture of about 3600 C. it volatilizes readily, passing without liquefy#ig directly from the solid to the gaseous state. Very few bodies act in this manner, the great majority when heated at atmospheric pressure to a sufficient temperature passing through the intermediate condition of liquidity. Some few, however, which when heated at atmospheric pressure do not liquefy, when heated at higher pressures in closed vessels obey the common rule and first become liquid and then volatilize. Sir James Dewar found the critical pressure of carbon to be about 15 tons on the sq. in. ; that is to say, if heated to its critical temperature (3600 C), and at the same time subjected to a pressure of 15 tons to the sq. in., it will assume the liquid form. Enormous as such pressures and temperatures may

appear to be, they have been exceeded in some of Sir Andrew Noble's and Sir F. Abel's re- searches; in their investigations on the gases from gunpowder and cordite fired in closed steel chambers, these chemists ob- tained pressures as great as 95 tons to the sq. in., and temperatures as high as 4000° C. Here then, if the observations are correct, we have sufficient temperature and enough pressure to liquefy carbon; and, were there only sufficient time for these to act on the carbon, there is little doubt that the artificial formation of diamonds would soon pass from the microscopic stage to a scale more likely to satisfy the requirements of science, if not those of personal adornment.

It has long been known that the metal iron in a molten state dissolves carbon and deposits it on cooling as black opaque graphite. Moissan carried out a laborious and systematic series of experiments on the solubility of carbon in iron and other metals, and came to the conclusion that whereas at ordinary pressures the carbon separates from the solidifying iron in the form of graphite, if the pressure be greatly increased the carbon on separation will form liquid drops, which on solidifying will assume the crystalline shape and become true diamond. Many other metals dissolve carbon, but molten iron has been found to be the best.solvent. The quantity entering into solution increases with the temperature of the metal. But temperature alone is not enough ; pressure must be superadded. Here Moissan ingeniously made use of a property which molten iron possesses in common with some few other liquids — water, for instance — of increasing in volume in the act of passing from the liquid to the solid state. Pure iron is mixed with carbon obtained from the calcination of sugar, and the whole is rapidly heated in a carbon crucible in an electric furnace, using a current of 700 amperes and 40 volts. The iron melts like wax and saturates itself with carbon. After a few minutes' heating to a temperature above 4000 C. — a tempera- ture at which the lime furnace begins to melt and the iron volatilizes in clouds — the dazzling, fiery crucible is lifted out and plunged beneath the surface of cold water, where it is held till it sinks below a red heat. The sudden cooling solidifies the outer skin of mplten metal and holds the inner liquid mass in an iron grip. The expansion of the inner liquid on solidifying produces ■ enormous pressure, and under this stress the dissolved carbon separates out in a hard, transparent, dense form — in fact, as diamond. The succeeding operations are long and tedious. The metallic ingot is attacked with hot aqua regia till no iron is left undissolved. The bulky residue consists chiefly of graphite, together with translucent flakes of chestnut-coloured carbon, hard black opaque carbon of a density of from 3-0 to 3-5,

black

diamonds — carbonado, in fact — and a small quantity of trans- parent colourless diamonds showing crystalline structure. Besides these there may be corundum and carbide of silicon, arising from impurities in the materials employed. Heating with strong sulphuric acid, with hydrofluoric acid, with nitric acid and potassium chlorate, and fusing with potassium fluoride — operations repeated over and over again — at last eliminate the graphite and impurities and leave the true diamond untouched. The precious residue on microscopic examination shows many pieces of black diamond, and other colourless transparent pieces, some amorphous, others crystalline. Although many fragments of crystals are seen, the writer has scarcely ever met with a complete crystal. All appear broken up, as if, on being liberated from the intense pressure under which they were formed, they burst asunder. Direct evidence of this phenomenon has been seen. A very fine piece of diamond, prepared in the way just described and carefully mounted on a microscopic slide, exploded during the night and covered the slide with fragments. This bursting paroxysm is not unknown at the Kimberley mines.

Sir William Crookes in 1906 communicated to the Royal Society a paper on a new formation of diamond. Sir Andrew Noble has shown that in the explosion of cordite in closed steel cylinders pressures of over 50 tons to the sq. in. and a temperature probably reaching 54°°° were obtained. Here then we have conditions favourable for the liquefaction of carbon, and if the time of explosion were sufficient to allow the reactions to take place we should expect to get liquid carbon solidified in the crystalline state. Experiment proved the truth of these anticipa- tions. Working with specially prepared explosive containing a little excess of carbon Sir Andrew Noble collected the residue left in the steel cylinder. This residue was submitted by Sir William Crookes to the lengthy operations already described in the account of H. Moissan's fused iron experiment. Finally, minute crystals were obtained which showed octahedral planes with dark boundaries due to high refracting index. The position and angles of their faces, and cleavages, the absence of bi- refringence, and their high refractive index all showed that the crystals were true diamond.

The artificial diamonds, so far, have not been larger than microscopic specimens, and none has measured more than about half a millimetre across. That, however, is quite enough to show the correctness of the train of reasoning leading up to the achieve- ment, and there is no reason to doubt that, working on a larger scale, larger diamonds will result. Diamonds so made burn in the air when

heated to a high temperature, with formation of carbonic acid; and in lustre, crystalline form, optical properties, density and hardness, they are identical with the natural stone.

It having been shown that diamond is formed by the separation of carbon from molten iron under pressure, it became of interest to see if in some large metallurgical operations similar conditions might not prevail. A special form of steel is made at some large establishments by cooling the molten metal under intense hydraulic pressure. In some samples of the steel so made Professor Rosel, of the university of Bern, has found microscopic diamonds. The higher the temperature at which the steel has been melted the more diamonds it contains, and it has even been suggested that the hardness of steel in some measure may be due to' the carbon distributed throughout its mass being in this adamantine form. The largest artificial diamond yet formed was found in a block of steel and slag from a furnace in Luxem bourg; it is clear and crystalline, and measures about one-fiftieth of an inch across.*

A striking confirmation of the theory that natural diamonds have been produced from their solution in masses of molten iron, the metal from which has gradually oxidized and been washed away under cycles of atmospheric influences, is afforded by the occurrence of diamonds in a meteorite. On a broad open plain in Arizona, over an area of about 5 m. in diameter,lie scattered thousands of masses of metallic iron, the fragments varying in weight from half a ton to a fraction of an ounce. There is little doubt that these fragments formed part of a meteoric shower, although no record exists as to when the fall took place.

Near the centre, where most of the fragments have been found, is a crater with raised edges, three-quarters of a mile in diameter and 600 ft. deep, bearing just the appearance which would be produced had a mighty mass of iron — a falling star — struck the ground, scattered it in all directions, and buried itself deeply under the surface, fragments eroded from the surface forming the pieces now met with. Altogether ten tons of this iron have been collected, and specimens of the Canyon Diablo meteorite are in most collectors' cabinets. Dr A. E. Foote, a mineralogist, when cutting a section of this meteorite, found the tools injured by something vastly harder than metallic iron, and an emery wheel used for grinding it was

ruined. He attacked the specimen chemically, and soon afterwards announced to the scientific world that the Canyon Diablo meteorite contained diamonds, both black and transparent. This startling discovery was subsequently verified by Professors C. Friedel and H. Moissan, and also by Sir W. Crookes.

The Ruby. — It is evident that of the other precious stones only the most prized are worth producing artificially. Apart from their inferior hardness and colour, the demand for what are known as " semi-precious stones " would not pay for the necessarily great expenses of the factory. Moreover, were it to be known that they were being produced artificially the demand — never very great — would almost cease. The only other gems, therefore, which need be mentioned in connexion with their artificial formation are those of the corundum or sapphire class, which include all the most highly prized gems, rivalling, and sometimes exceeding, the diamond in value. Here a remarkable and little-known fact deserves notice. Excepting the diamond and sapphire, each of the precious stones — the emerald, the topaz and amethystˆpossesses a more noble, a harder, and more highly-prized counterpart of itself, alike in colour, but superior in brilliancy and hardness; still more strange, the precious stone to which its special name is usually attached is the variety the least prized. The ruby itself might almost be included in the same category. The true ruby consists of the earth alumina, in a clear, crystalline form, having a minute quantity of the element chromium as the colouring matter. It is often called the " Oriental Ruby," or red sapphire, and when of a paler colour, the " Pink Sapphire." But the ruby as met with in jewellers' shops of inferior standing is usually no true ruby, but a " spinel ruby " or " balas ruby," sometimes very beautiful in colour, but softer than the Oriental ruby, and different in chemical composition, consisting essentially of alumina and magnesia and a little silica, with the colouring matter chromium. The colourless basis of the true Oriental precious stones being taken as crystallized alumina or white sapphire, when the colouring matter is red the stone is called ruby, when blue sapphire, when green Oriental emerald, when orange-yellow Oriental topaz, and when violet Oriental amethyst. Clear, colourless crystals are known as white sapphire, and are very valuable. It is evident, therefore, that whosoever succeeds in making artificially clear crystals of white sapphire has the power, by introducing appropriate colouring matter, to make the Oriental ruby, sapphire, emerald, topaz and amethyst. All of these stones, even when of small size, are costly and readily saleable, while when they are of fine quality and large size they are highly prized, a ruby of

fine colour, and free from flaws, a few carats in weight, being of more value than a diamond of the same weight.

This being the case, it is not surprising that repeated attempts have been made to effect the crystallization of alumina. This is not a matter of difficulty, but unfortunately the crystals generally form thin plates, of good colour, but too thin to be useful as gems. In 1837 M. A. A. Gaudin made true rubies, of microscopic size, by fusing alum in a carbon crucible at a very high temperature, and adding a little chromium as colouring matter. In 1847 J. J. Ebelmen produced the white sapphire and rose-coloured spinel by fusing the constituents at a high temperature in boracic acid. Shortly afterwards he produced the ruby by employing borax as the solvent. The boracic acid was found to be too volatile to allow the alumina to crystallize,

but the use of borax made the necessary difference. But it was not till about the year 1877 that E. Fremy and C. Feil first published a method whereby it was possible to produce a crys- tallized alumina from which small stones could be cut. They first formed lead aluminate by the fusion together of lead oxide and alumina. This was kept in a state of fusion in a fireclay crucible (in the composition of which silica enters largely). Under the influence of the high temperature the silica of the crucible gradually decomposes the lead aluminate, forming lead silicate, which remains in the liquid state, and alumina, which crystallizes as white sapphire. By the admixture of 2 or 3% of a chromium compound with original materials the resulting white sapphire became ruby. More recently Edmond Fremy and A. Verneuil obtained artificial rubies by reacting at a red heat with barium fluoride on amorphous alumina containing a small quantity of chromium. The rubies obtained in this manner are thus described by Fremy and Verneuil: " Their crystalline form is regular; their lustre is adamantine; they present the beautiful colour of the ruby; they are perfectly transparent, have the hardness of the ruby, and easily scratch topaz. They resemble the natural ruby in becoming dark when heated, resuming their rose-colour on cooling." Des Cloizeaux says of them that " under the microscope some of the crystals show bubbles. In converging polarized light the coloured rings and the negative black cross are of a remarkable regularity."

Other experimentalists have attacked the problem in other directions. Besides those already mentioned, L. Eisner, H. H. De Senarmont, Sainte-Claire Deville, and H Caron and H. Debray have succeeded with more or less success in producing rubies. The general plan adopted has been to form a mixture of salts fusible at a red heat, forming a liquid in which alumina will dissolve. Alumina is now

added till the fused mass will take up no more, and the crucible is left in the furnace for a long time, sometimes extending over weeks. The solvent slowly volatilizes, and the alumina is deposited in crystals, coloured by whatever colouring oxide has been added.

Mention has been made above of a stone frequently substituted for the true ruby, called the " spinel " or " balas " ruby. The spinel and ruby occur together in nature, stones from Burma being as often spinel as true Oriental ruby. In the artificial production of the ruby it sometimes happens that spinel crystal- lizes out when true Oriental ruby is expected. The fusion bath is so arranged that only red-coloured alumina shall crystallize out, but it is difficult to have all the materials of such purity as to ■ensure the complete absence of silica and magnesia. In this case, when these impurities have accumulated to a certain point they unite with the alumina, and spinel then separates, as it crystallizes more easily than ruby. When all the magnesia and silica have been eliminated in this way the bath resumes its deposition of crystalline ruby. Rubies of fine colour and of considerable size have been shown in London, made on the Continent by a secret process. The writer has seen several cut stones so made weighing over a carat each, the uncut crystals measuring half an inch along a crystal edge, and weighing over 70 grains, and a clear plate of ruby cut from a single crystal weighing over 10 grains. Ruby has been made by Sir W. Roberts-Austen as a by-product in the production of metallic chromium. Oxide of chromium and aluminium powder are intimately mixed together in a refractory crucible, and the mixture is ignited at the upper part. The aluminium and chromium oxide react with evolution of so much heat that the reduced chromium is melted. Such is the intensity of the reaction that the resulting alumina is also completely fused, floating as a liquid on the molten chromium. Sometimes the alumina takes ■up the right amount of chromium to enable it to assume the ruby colour. On cooling the melted alumina crystallizes in large flakes, which on examination by transmitted light are seen to be true ruby. The development of the red colour is said by C. Greville- Williams only to take place at a white heat. It is not due to the presence of chromic acid, but to a reaction between alumina and chromic oxide, which requires an elevated temperature. Artificially made but real rubies have been put on the market,

prepared by a process of fusion by A. Verneuil. He finds that certain

conditions have to be fulfilled in order to get the alumina in a transparent form. The temperature must not be higher than is absolutely necessary for fusion. The melted product must always be in the same part of the oxyhydrogen flame, and the point of contact between the melted product and the support should be reduced to as small an area as possible. M. Verneuil uses a vertical blowpipe flame directed on a support capable of move- ment up and down by means of a screw, so that the fused product may be removed from the zone of fusion as it gets higher by addition of fresh material. The material employed is either composed of small, valueless rubies, or alumina coloured with the right amount of chromium. It is very finely powdered and fed in through the blowpipe orifice, whence it is blown in a highly heated condition into the zone of fusion. The support is a small cylinder of alumina placed in the axis of the blowpipe. As the operation proceeds the fine grains of powder driven on to the support in the zone of fusion form a cone which gradually rises and broadens out until it becomes of sufficient size to be used for cutting. Rubies prepared in this way have the same specific gravity and hardness as the natural ruby, and they are also dichroic, and in the vacuum tube under the influence of the cathode stream they phosphoresce with a discontinuous spectrum showing the strong alumina line in the red. When properly cut and mounted it is almost impossible to distinguish them from natural stones.

The Sapphire. — Auguste Daubree has shown that when a full quantity of chromium is added to the bath from which white sapphire crystallizes the colour is that of ruby, but when much less chromium is added the colour is blue, forming the true Oriental sapphire. The real colouring matter of the Oriental sapphire is not definitely known, some chemists considering it to be chromium and others cobalt. Artificial sapphires have been made of a fair size and perfectly transparent by the addition of cobalt to the igneous bath of alumina, but the writer does not consider them equal in colour to true Oriental sapphire.

The Oriental Emerald. — The stone known as emerald consists chemically of silica, alumina and glucina. Like the ruby, it owes its colour to chromium, but in a different state of oxidation. As already mentioned, there is another stone which consists of crystallized alumina coloured with chromium, but holding the chromium in a different state of oxidation. This is called the Oriental emerald, and, owing to its beauty of colour, its hardness and rarity, it is more highly prized than the emerald itself and commands higher prices. The Oriental emerald has been produced artificially in the same way as the ruby, by adding a larger amount of chromium to the alumina

bath and regulating the temperature.

The Oriental Amethyst. — The amethyst is rock crystal (quartz) of a bluish-violet colour. It is one of the least valuable of the precious stones. The sapphire, however, is found occasionally of a beautiful violet colour; it is then called the Oriental amethyst, and, on account of its beauty and rarity, is of great value. It is evident that if to the igneous bath of alumina some colouring matter, such as manganese, is added capable of communicating a violet colour to the crystals of alumina, the Oriental amethyst will be the result. Oriental amethyst has been so formed artifici- ally, but the stone being known only as a curiosity to mineralogists and experts in precious stones, and the public not being able to discriminate between the violet sapphire and amethystine quartz, there is no demand for the artificial stone.

The Oriental Topaz. — The topaz is what is called a semi- precious stone. It occurs of many colours, from clear white to pink, orange, yellow and pale green. The usual colour is from straw-yellow to sherry colour. The exact composition of the colouring matter is not known; it is not entirely of mineral origin, as it changes colour and sometimes fades altogether on exposure to light. Chemically the topaz consists of alumina, silica and fluorine. It is not so hard as the sapphire. There is also a yellow variety of quartz, which is sometimes called " false topaz." The Oriental topaz, on the other hand, is a precious stone of great value. It consists of clear crystalline sapphire

coloured with a small quantity of ferric oxide. It has been produced artificially by adding iron instead of chromium to the matrix from which the white sapphire crystallizes.

The Zircon. — The zircon is a very beautiful stone, varying in colour, like the topaz, from red and yellow to green and blue. It is sometimes met with colourless, and such are its refractive powers and brilliancy that it has been mistaken for diamond. It is a compound of silica and zirconia. H. Sainte-Claire Deville formed the zircon artificially by passing silicon fluoride at a red heat over the oxide zirconia in a porcelain tube. Octahedral crystals of zircon are then produced, which have the same crystalline form, appearance and optical qualities as the natural zircon.

Bibliography. — Sir William Crookes, " A New Formation of Diamond," Proc. Roy. Soc. vol. lxxvi. p. 458; " Diamonds," a lecture delivered before the British Association at Kimberley, South Africa, 5th September, 1905, Chemical News, vol. xcii. pp. !35i H7> J 59; J- J- Ebelmen, " Sur la production artificielle des pierres dures,"

Comptes renins, vol. xxv. p. 279; " Sur unenouvelle mˆthode pour obtenir, par la voie seiche, des combinations crystal- liseses, et sur ses applications a la reproduction de plusieurs espeices minerales," Comptes rendus, vol. xxv. p. 661 ; Edmond Fremy and C. Feil, " Sur la production artificielle du corindon, du rubis, et de differents silicates crystallises, " Comptes rendus, vol. lxxxv. p. 1029; C. Friedel, " Sur l'existence du diamant dans le fer mektkirique de Canon Diablo," Comptes rendus, vol. cxv. p. 1037, vol. cxvi. p. 290; H. Moissan, "Etude de la meteorite de Canon Diablo," Comptes rendus, vol. cxvi. p. 288; " Experiences sur la reproduction du diamant," Comptes rendus, vol. cxviii. p. 320; " Sur quelques experiences relatives a la preparation du diamant," Comptes rendus, vol. cxxiii. p. 206; Le Four electrigue (Paris, 1897); H. Sainte-Claire Deville and H. Caron, " Sur un nouveau mode de production a l'etat cristallise d'un certain nombre d'especes chimiques et minera- logiques," Comptes rendus, vol. xlvi. p. 764; A. Verneuil, " Pro- duction artificielle des rubis par fusion," ibid. vol. cxxxv. p. 791 ; J. Boyer, La Synthbse des pierres precieuses (Paris, 1909). (W. C.)

GEMBLOUX, a town in the province of Namur and on the borders of Brabant, Belgium, 25 m. S.E. of Brussels on the main line to Namur and Luxemburg. Pop. (1904) 4643. It is a busy place with large railway and engine works, and the junction for several branch lines. On the 31st of January 1578 Don John of Austria gained here a signal victory over the army of the provinces led by Antony de Goignies.

GEMINI (" The Twins," i.e. Castor and Pollux), in astronomy, the third sign in the zodiac, denoted by the symbol II. It is also a constellation, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.), and catalogued by Ptolemy, 25 stars, Tycho Brahe 25, and Hevelius 38. By the Egyptians this constellation was symbolized as a couple of young kids; the Greeks altered this symbol to two children, variously said to be Castor and Pollux, Hercules and Apollo, or Triptolemus and Iasion; the Arabians used the symbol of a pair of peacocks. Interesting objects in this constellation are: a Geminorum or Castor, a very fine double star of magnitudes 2-0 and 2-8, the fainter component is a spectroscopic binary; 17 Geminorum, a long period (231 days) variable, the extreme range in magnitude being 3-2 to 4;ˆ Geminorum, a short period variable, 10-15 days, the extreme range in magnitude being 3-7 to 4-5; Nova Geminorum, a " new " star discovered in 1903 by H. H. Turner of Oxford; and the star cluster M.35 Geminorum, a fine and bright, but loose, cluster, with very little central condensation.

GEMINIANI, FRANCESCO (c. 1680-1762), Italian violinist, was born at Lucca about 1680. He received lessons in music from Alessandro Scarlatti, and studied the violin under Lunati (Gobbo) and afterwards under Corelli. In 17 14 he arrived in London, where he was taken under the special protection of the earl of Essex, and made a living by teaching and writing music. In 1715 he played his violin concertos with Handel at the English court. After visiting Paris and residing there for some time, he returned to England in 1755. In 1761 he went to Dublin, where a servant robbed him of a musical manuscript on which he had bestowed much time and labour. His vexation at this loss is said to have hastened his death on the 1 7th of September 1762. He appears to have been a first-rate violinist, but most of his compositions are dry and deficient in melody. His Art of Playing the Violin is a good work of its kind, but his Guida

irrmonica is an inferior production. He published a number of solos for the violin, three sets of violin concertos, twelve violin trios, The Art of Accompaniment on the Harpsichord, Organ, &c, Lessons for the Harpsichord and some other works.

GEMISTUS PLETHO [or Plethon], GEORGIUS (c. 1355-1450), Greek Platonic philosopher and scholar, one of the chief pioneers of the revival of learning in Western Europe, was a Byzantine by birth who settled at Mistra in the Peloponnese, the site of ancient Sparta. He changed his name from Gemistus to the equivalent Pletho (" the full "), perhaps owing to the similarity of sound between that name and that of his master Plato. He invented a religious system founded on the speculative mysticism of the Neoplatonists, and founded a sect, the members of which believed that the new creed would supersede all existing forms of belief. But he is chiefly memorable for having introduced Plato to the Western world. This took place upon his visit to Florence in 1439, as one of the deputies from Constantinople on occasion of the general council. Cardinal Bessarion became his disciple; he produced a great impression upon Cosimo de' Medici; and though not himself making any very important contribution to the study of Plato, he effectually shook the exclusive domination which Aristotle had exercised overEuropean thought for eight centuries. He promoted the union of the Greek and Latin Churches as far as possible, but his efforts in this direction bore no permanent fruit. He probably died before the capture of Constantinople. The most important of his published works are

treatises on the distinction between Plato and Aristotle as philosophers (published at Venice in 1540); on the religion of Zoroaster (Paris, 1538); on the condition of the Peloponnese (ed. A. Ellissen in Analekten der miltel- und neugriechischen Literatur, iv.) ; and the N6/#h (ed. C. Alexandre, Paris, 1858). In addition to these he compiled several volumes of excerpts from ancient authors, and - wrote a number of works on geography, music and other subjects, many of which still exist in MS. in various European libraries.

See especially F. Schultze, Geschichte der Philosophie der Renaissance, i. (1874); also J. A. Symonds, The Renaissance in Italy (1877), ii. p. 198; H. F. Tozer, " A Byzantine Reformer," in Journal of Hellenic Studies, vii. (1886), chiefly on Pletho's scheme of political and social reform for the Peloponnese, as set forth in the pamphlets addressed to Manuel II. Palaeologus and his son Theodore, despot of the Morea; W. Gass, Gennadius und Pletho (1844). Most of Pletho's works will be found in J. P. Migne, Patrologia Graeca, clx. ; for a complete list see Fabricius, Bibliotheca Graeca (ed. Harles), xii.

GEMMI PASS, a pass (7641 ft.) leading from Frutigen in the Swiss canton of Bern to Leukerbad in the Swiss canton of the Valais. It is much frequented by travellers in summer. From Kandersteg (75 m. by road above Frutigen, which is 12 m. by rail fiom Spiez on the Berne-Interlaken line) a mule path leads to the summit of the pass, passing over the Spitalmatte plain, where in 1782" and again in 1895 a great avalanche fell from the Altels (11,930 ft.) to the S.E., causing on both occasions great loss of life and property. The mule path descends on the south side of the pass by an extraordinary series of zigzags, made accessible for mules (though no rider is now allowed to descend on mule-back) by a band of Tirolese workmen in 1 740-1 741. They are cut in a very steep wall of rock, about 1 800 ft. in height, and lead down to the village of Leukerbad, which is 95 m. by carriage road past Leuk above the Susten station in the Rh6ne valley and on the Simplon line. (W. A. B. C.)

GENDARMERIE, originally a body of troops in France composed of gendarmes or men-at-arms. In the days of chivalry they were mounted and armed cap-a-pie, exactly as were the lords and knights, with whom they constituted the most important part of an army. They were attended each by five soldiers of inferior rank and more lightly armed. In the later middle ages the men-at-arms were furnished by owners of fiefs. But after the Hundred Years' War this feudal gendarmerie was replaced by the compagnies d'ordonnance which Charles VII. formed when the English were driven out of

France, and which were distributed throughout the whole extent of the kingdom for preserving order and maintaining the king's authority. These companies, fifteen in number, were composed of 100 lances or gendarmes fully

equipped, each of whom was attended by at least three archers, one coutillier (soldier armed with a cutlass) and one varlet (soldier's servant). The states-general of Orleans (1439) had voted a yearly subsidy of 1,200,000 livres in perpetuity to keep up this national soldiery, which replaced, and in fact was recruited chiefly amongst, the bands of mercenaries who for about a century had made France their prey. The number and com- position of the compagnies d'ordonnance were changed more than once before the reign of Louis XIV. This sovereign on his accession to the throne found only eight companies of gendarmes surviving out of an original total of more than one hundred, but after the victory of Fleurus (1690), which had been decided by their courage, he increased their number to sixteen. The four first companies (which were practically guard troops) were designated by the names of Gendarmes ecossais, Gendarmes anglais, Gendarmes bourguignons and Gendarmes flamands, from the nationality of the soldiers who had originally composed them; but at that time they consisted entirely of French soldiers and officers. These four companies had a captain-general, who was the king. The fifth company was that of the queen; and the others bore the name of the princes who respectively commanded them. This organization was dissolved in 1788. The Revolution swept away all these institutions of the monarchy, and, with the exception of a short revival of the Gendarmes de la garde at the Restoration, henceforward the word " gendarmerie " possesses an. altogether different significance — viz. military police.

GENEALOGY (from the Gr. yevos, family, and X670S, theory), a pedigree or list of ancestors, or the study of family history.

1. Biblical Genealogies. — The aims and methods of ancient genealogists require to be carefully considered before the value of the numerous ancestral lists in the Bible can be properly estimated. Many of the old " genealogies," like those of Greece, have arisen from the desire to explain the origin of the various groups which they include. Information relating to the sub- division of tribes, their relation to each other, the intermingling of populations and the like are thus frequently represented in the form of genealogies. The " sons " of a " father " often stand merely for the branches of a family as they existed at some one period, and since in course of time tribal relations would vary, lists which have originated at different periods

will present discrepancies. It is obvious that many of the Biblical names are nothing more than personifications of nations, tribes, towns, &c, which are grouped together to convey some idea of. the bond by which they were believed to be connected.

For the personification of a people or tribe, cp. Gen. xxxiv. 30 (" Jacob said ... I am a few men "), Josh. xvii. 14 (" the children of Joseph said ... I am a numerous people "), Ex. xiv. 25 (" Egypt said, let me flee"), Jos. ix. 7, 1 Sam. v. 10, &c. ; see G. B. Gray on Numbers, xx. 14 {Internal. Crit. Comm.). Thus we find among the "sons" of Japhet: (the nations) Gomer, Javan, Tubal; Canaan "begat" Sidon and Heth; the "sons" of Ishmael include the well-known tribes Kedar and Jetur; Jacob, or the synonym Israel,

fersonifies the " children of Israel " (cf. use of " I," " thou " of the sraelites in Deut., and in poetical passages). The recognition of this characteristic usage often furnishes an ethnological interpre- tation to those genealogical stories which obviously do not relate to persons, but to tribes or peoples personified. The Edomites and Israelites are regarded as " brothers " (cf. Num. xx. 14, Deut. ii. 4, Am. i. 11), and since Esau (Edom) was born before Jacob (Israel) it would appear that the Edomites were held to be the older nation. The union of two clans is expressed as a marriage, or the wife is the territory which is dominated by the husband (tribe) ; see Caleb. If the woman is not of noble blood, but is a handmaiden or concubine, her children are naturally not upon the same footing as those of the wife; consequently the descendants of Ishmael, the son of Hagar ˆSarah's maid), are inferior to Isaac and his descendants, whilst the children of Keturah (" incense "), Abraham's concubine, are still lower — from the Israelite point of view. This application of the terms of relationship is characteristic of the Semites. The " father " of the Rechabites is their head or founder (cf. 1 Sam. x. 12: " who is their father?"), and a common bond, which is not necessarily physical, unites all " sons," whether they are " sons of the prophets (members of prophetic guilds) or " sons of Belial " (worthless men).

The interpretation of ethnological or statistical genealogies may easily be pushed too far. Every case has to be judged upon

its own merits, and due allowance must be made both for the ambition of the weaker to claim or to strengthen an alliance with the

stronger, and for the not unnatural desire of clans or indi- viduals to magnify the greatness of their ancestry. The first step must always be the careful comparison of related lists in order to test the consistency of the tradition. Next, these must be critically studied in the light of all available historical material, though indeed such evidence is not necessarily conclusive. Finally, (o) literary criticism must be employed to determine if possible the dates of such lists, since obviously a contemporary register is more trustworthy than one which is centuries later; (b) a critical estimate of the character of the names and of their use in various periods of Old Testament history is of importance in estimating the antiquity of the list 1 — for example, many of the names in Chronicles attributed to the time of David are indubit- ably exilic or post-exilic; and © principles of ordinary historical probability are as necessary here as in dealing with the genealogies of other ancient peoples, and attention must be paid to such features as fluctuation in the number of links, representation of theories inconsistent with the growth of national life, schemes of relationship not in accordance with sociological conditions, &c.

The Biblical genealogies commence with " the generations of the heaven and earth," and by a process of elimination pass from Adam and Eve by successive steps to Jacob and to his sons (the tribes), and finally to the subdivisions of each tribe (cp. i Chron. i.-ix. i). According to this theory every Israelite could trace back his descent to Jacob, the common father of the whole nation (Josh. vii. 17 seq., 1 Sam. x. 21). Such a scheme, however, is full of manifest improbabilities. It demands that every tribe and every clan should have been a homogeneous group which had preserved its unity from the earliest times, that family records extending back for several centuries were in existence, and that such a tribe as Simeon was able to maintain its independence in spite of the tradition that it lost its autonomy in very early times (Gen. xlix. 7). The whole conception of the unity of

the tribes cannot be referred to a date previous to the time of David, and in the older writings a David or a Jeroboam was sufficiently described as the son of Jesse or of Nebat. The genealogical zeal as represented in the Old Testament is chiefly of later growth, and the exceptions are due to interpolation (Josh. vii. 1 18, contrast v. 24), or to the desire to modify or qualify an older notice. This, in the case of Saul (1 Sam. ix. 1), has led to textual corruption; a list of such a length as his should have reached back to one of the " sons " of Benjamin (cf. e.g. Gen. xlvi. 21), else it were purposeless. The genealogies, too, are often inconsistent amongst themselves and in contradiction to their object. They show, for example, that the population of southern Judah, so far from being " Israelite " was half-Edomite (see Judah), and several of the clans in this district bear names which indicate their original affinity with Midian or Edom. Moreover, there was a free intermixture of races, and many cities had a Canaanite (i.e. pre-Israelite) population which must have been gradually absorbed by the Israelites (cf. Judg. i.). That spirit of religious exclusiveness which marked later Judaism did not become prominent before the Deuteronomic reformation (see Deuteronomy), and it is under its influence that the writings begin to emphasize the importance of maintaining the purity of Israelite blood, although by this time the fusion was complete (see Judg. iii. 6) and for practical purposes a distinction between

Canaanites and Israelites within the borders of Palestine could

scarcely be discerned.

Many of the genealogical data are intricate. Thus, the' interpretation of Gen. xxxiv. is particularly obscure (see Levites ad fin. ; Simeon). As regards the sons of Jacob, it is difficult to explain their division among the four wives of Jacob; viz. (a) the sons ot Leah are Reuben, Simeon, Levi and Judah (S. Palestine), Issachar and Zebulun (in the north), and Dinah (associated with Shechem) ;

(b) of Leah's maid Zilpah, Gad and Asher (E. and N. Palestine) ;

(c) of Rachel, Joseph (Manasseh and Ephraim, i.e. central Palestine) and Benjamin; (d) of Rachel's maid Bilhah, Dan and Naphtali

1 G. B. Gray's Hebrew Proper Names (1896), with his article in the Expositor (Sept. 1897), pp. 173-190, should be consulted for the application and range of Hebrew names in O.T. genealogies and

list6.

(N. Palestine). It has been urged that (b) and (d) stood upon a lower footing than the rest, or were of later origin; or that Bilhah points to an old clan associated with Reuben (Gen. xxxv. 22) or Edom (Bilhan, Gen. xxxvi. 27), whilst Zilpah represents an Aramaean strain. Tradition may have combined distinct schemes, and the belief that the wives were Aramaean at least coincides with the circumstance that Aramaean elements predominated in certain of the twelve tribes. The number " twelve " is artificial and can be obtained only by counting Manasseh and Ephraim as one or by omitting Levi, and a careful study of Old Testament history makes it extremely difficult to recover the tribes as historical units. See, on these points, the articles on the several tribes, B. Luther, Zeit. d. alttest. Wissens. (1901), pp. 1 sqq.; G. B. Gray, Expositor (March 1902), pp. 225-240, and in Ency. Bib., art. " Tribes "; and H. W. Hogg's thorough treatment of the tribes in the last-mentioned work.

The ideal of purity of descent shows itself conspicuously in portions of Deuteronomic law (Deut. vii. 1-3, xxiii. 2-8), and in the reforms of Nehemiah and Ezra (Ezr. ix. 1-4, n sqq.; Neh. xiii. 1-3). The desire to prove the continuity of the race, enforced by the experience of the exile, gave the impetus to genealogical zeal, and many of the extant lists proceed from this age when the true historical succession of names was a memory of the past. This applies with special force to the lists in Chronicles which present finished schemes of the Levitical

divisions by the side of earlier attempts, with consequent confusion and contradiction. Thus the immediate ancestors of Ethan appear in the time of Hezekiah (2 Chron. xxix. 12), but he with Asaiah and Heman are contemporaries of David, and their genealogies from Levi down- wards contain a very unequal number of links (1 Chron. vi.). By another application of genealogical method the account of the institution of priests and Levites by David (1 Chron. xxiv.) presents many names which belong solely to post-exilic days, thus suggesting that the scribes desired to show that the honourable families of their time were not unknown centuries previously. Everywhere we find the results of much skill and labour, often in accordance with definite theories, but a thorough investigation reveals their weakness and often quite incidentally furnishes valuable evidence of another nature.

The intricate Levitical genealogies betray the result of successive genealogists who sought to give effect to the development of the hierarchal system (see Levites). The climax is reached when all Levites are traced back to Gershon, Kehath and Merari, to which are ascribed respectively Asaph, Heman and Ethan (or Jeduthun). The last two were not originally Levites in the later accepted sense of the term (see I Kings iv. 31). To Kehath is reckoned an important subdivision descended from Korah, but in 2 Chron. xx. 19 the two are distinct groups, and Korah's name is that of an Edomite clan (Gen. xxxvi. 5, 14, 18) related to Caleb, and thus included among the descendants of Judah (1 Chron. ii. 43). Cases of adjustment, re-distribution and " Levitizing " of individuals are frequent. There are traces of varying divisions both of the singers (Neh. xi. 17) and of the Levites (Num. xxvi. 58; Ezr. ii. 40, iii. 9; 1 Chron. xv. 5-10, xxiii.), and it is noteworthy that in the case of the latter we have mention of such families as Hebroni (Hebronite), Libni (from Libnah) — ethnics of South Judaean towns. In fact, a significant number of Levitical names find their analogy in the lists of names belonging to Judah, Simeon and even Edom, or are closely connected with the family of Moses; e.g. Mushi (i.e. Mosaite), Gershon and Eleazar(cp. Gershom and Eliezer, sons of Moses). The Levites bear a class- name, and the genealogies show that many of them were connected with the minor clans and families of South Palestine which included among them Moses and his kin. Hence, it is not unnatural that Obed-edom, for example, obviously a southerner, should have been reckoned later as a Levite, and the work ascribed by the chronicler's history to the closing years of David's life may be influenced by the tradition that it was through him these mixed populations first attained importance. See further David ; Jews;

Levites.

In the time of JosephXis every priest was supposed to be able to prove his descent, and perhaps from the time of Ezra down- wards lists were carefully kept. But when Anna is called an Asherite (Luke ii. 36), or Paul a Benjamite (Rom. xi. 1), family tradition was probably the sole support to the claim, although the tribal feeling had not become entirely extinct. The genealogies of Jesus prefixed to two of the gospels are intended to prove that He was a son of David. But not that alone, for in Matt. i. he is traced back to Abraham the father of the Jews, whilst in Luke iii. He, as the second Adam, is traced back to the first man. The two lists are hopelessly inconsistent; not because one of them follows the line of Mary, but because they represent independent attempts. That in Matthew is characteristically arranged in

three series of fourteen generations each through the kings of Judah, whilst Luke's passes through an almost unknown son of David; in spite of this, however, both converge in the person of Zerubbabel.

See further, A. C. Hervey, Genealogies of Our Lord; H. von Soden, Ency. Bib. ii. col. 1666 sqq.; B. W. Bacon, Hastings' Diet. Bib. ii. pp. 138 seq. On the subject generally see J. F. M'Lennan's Studies (2nd ser., ch. ix., "fabricated genealogies"); S. A. Cook, Ency. Bib. ii. col. 1657 sqq. (with references); W. R. Smith, Kinship and Marriage (2nd ed., especially ch. i.). (S. A. C.)

2. Greek and Roman Genealogies. — A passing reference only is needed to the intricate genealogies of gods and sons of gods which form so conspicuous a feature in classical literature. 1 In every one of the numerous states into which ancient Greece was divided there were aristocratic families, whose genealogies as a rule went back to prehistoric times, their first ancestor being some hero of divine descent, from whom, or from some distin- guished younger ancestor, they derived their names. Many of these families were, as families, undoubtedly of great antiquity even at the beginning of the historical period; and in several instances they continued to maintain a conspicuous and separate existence for centuries. The element of family pride is prominent in the poetry of the Megarian Theognis; and in an inscription belonging to the 2nd century B.C. the recipient of certain honours from the community of Gythium is represented as

the thirty- ninth in direct descent from the Dioscuri and the forty-first from Heracles. Even in Athens, long after the constitution had become thoroughly democratic, some of the clans continued to be known as Eupatridae (of noble family); and Alcibiades, for example, as a member of the phratria of the Eurysacidae, traced his origin through many generations to Eurysaces, who was represented as having been the first of the Aeacidae to settle in Attica. The Corinthian Bacchiadae traced their descent back to Heracles, but took their name from Bacchis, a younger ancestor. It is very doubtful, however, whether such pedigrees as this were very seriously put forward by those who claimed them; and it is certain that, almost along the whole line, they were unsupported by evidence. 2 We have the authority of Pollux (viii. in) for stating that the Athenian 76)ˆ7, of which there were thirty in each (pparpia, were organized without any exclusive regard being had to blood-relationship; they were constantly receiving accessions from without; and the public written registers of births, adoptions and the like do not appear to have been pre- served with such care as would have made it possible to verify a pedigree for any considerable portion even of the strictly historical period. 3

The great antiquity of the early Roman (patrician) gentes, who universally traced themselves back to illustrious ancestors, is indisputable; and the rigid exclusiveness with which each pre- served its hereditates gentiliciae or sacra gentilicia is sufficiently illustrated by the fact that towards the close of the republic there were not more than fifty patrician families (Dion. Halic. i. 85). Yet even in these it is obvious that, owing to the frequency of resort to the well-recognized practice of adoption, while there was every guarantee for the historical identity of the family, there was none (documents apart) for the personal genealogy of the individual. There is no evidence that sufficient records of

1 On the subject generally see articles " Genos " and " Gens," by A. H. Greenidge, in Smith's Dictionary of Greek and Roman Antiquities (3rd ed., 1890), where the chief authorities are given.

2 The fondness of Euripides for genealogies is ridiculed by Aris-tophanes {Acharnians, 47).

3 All the earlier Greek historians appear to have constructed their narratives on assumed genealogical bases. The four books of Hecataeus of Miletus dealt respectively with the traditions about Deucalioh, about Heracles and the Heraclidae, about the early settlements in Peloponnesus, arid about those in Asia Minor; be

further made a pedigree for himself, in which his sixteenth ancestor was a god. The works of Hellanicus of Lesbos bore titles (AeuicoXicineia and the like) which sufficiently explain their nature; his disciple, Damastes of Sigeum, was the author of genealogical histories of Trojan heroes; Apollodorus of Athens made use of three books of receaXoTixd by Acusilaus of Argos; Pherecydes of LerOs also wrote yevea\oy leu. See J. A. F. Topffer, Attische Genealogie (1889); also J. H. Schubart, Quaestt. geneal. historical (1832); G. Marckscheffel, De genealogica Graecorum po'esi (1840).

pedigree were kept during the earlier centuries of the Roman commonwealth, although the leading houses drew up genealogical tables, and their family pedigree was painted on the walls of the entrance hall. In later times, it is true, even plebeian families began to establish a prescriptive right (known as the jus imaginum) to preserve in small wooden shrines in their halls the busts (or rather, wax portrait masks fastened on to busts) of those of their members who had attained to curule office, and to exhibit these in public on appropriate occasions. Under these imagines majortim i it became usual to inscribe on the wall their respective tituli, the relationship of each to each being indicated by means of connecting lines; and thus arose the stemmata gentilicia, which at a later time began to be copied into family records. In the case of plebeian families (whose stemmata in no case went farther back than 366 B.C.) these written genealogies were probably trustworthy enough; but in the case of patricians who went back to Aeneas, 5 so much cannot, it is obvious, be said; and from a comparatively early period it was clearly recognized that such records lent themselves too readily to the devices of the falsifier and the forger to deserve confidence or reverence (Pliny, H.N. xxxv. 2; Juv. viii. 1).

Thus, parvenus were known to place the busts of fictitious ancestors in the shrines and to engage needy literary men to trace back their descent even to Aeneas himself.

The many and great social changes which marked the closing centuries of the Western empire almost invariably militated with great strength against the maintenance of an aristocracy of birth; and from the time of Constantine the dignity of patrician ceased to be hereditary. 6

3. Modern. — Two forces have combined to give genealogy its importance during the period of modern history: the laws of inheritance, particularly those which govern the descent of real estate, and the desire to assert the privileges of a hereditary

aristocracy. But it is long before genealogies are found in the possession of private families. The succession of kings and princes are in the chronicle book; the line of the founders and patrons of abbeys are recorded by the monks with curious embellishment of legend. But the famous suit of Scrope against Grosvenor will illustrate the late appearance of private genealogies in England. In 1385 Sir Richard Scrope, lord, of Bolton, displaying his banner in the host that invaded Scotland, found that his arms of a golden bend in a blue field were borne by a knight of the Chester palatinate, one Sir Robert Grosvenor. He carried the dispute to a court of chivalry, whose decision in his favour was confirmed on appeal to the king. Grosvenor asserted that he derived his right from an ancestor, Sir Gilbert Grosvenor, who had come over with the Conqueror, while an intervening claimant, a Cornish squire named Thomas Carminowe, boasted that his own ancestors had borne the like arms since the days of King Arthur's Round Table. It is remarkable that in support of the false statements made by the claimants no written genealogy is produced. The evidence of tombs and monuments and the reports of ancient men are advanced, but no pedigree is exhibited in a case which hangs upon genealogy. It is possible that the art of pedigree-making had its first impulse in England from the many genealogies constructed to make men familiar with the claims of Edward III. to the crown of France, a second crop of such royal pedigrees being raised in later generations during the contests of York and Lancaster. But it is not until after the close of the middle ages that genealogies multiply in men's houses and are collected into volumes. The medieval baron, knight or squire, although proud of the nobility of his race, was content to let it rest upon legend handed down the

4 The chief authority on this subject is Polybius (vi. 53) ; see also T. Mommsen, Romisches Staatsrecht, i. (1887), p. 442.

_ 6 At the funeral of Drusus the images of Aeneas, of the Alban kings, of Romulus, of the Sabine nobles, of Attus Clausus, and of " the rest of the Claudians " were exhibited (Tac. Ann. iv. 9).

6 The Roman stemmata had, as will be seen afterwards, great interest for the older modern genealogists. Reference may be made to J. Glandorp's Descriptio gentis Antoniae (1557); to the Descriptio gentis Juliae (1576) of the same author; and to J. Hiibner's Genealogische Tabellen. See also G. A. Ruperti's Tabulae genealogicae sive stemmata nobiliss. gent. Rom. (1794). (X.)

generations. The exact line of his descent was sought only when it was demanded for a plea in the king's courts to support his title to his lands.

From the first the work of the genealogist in England had that taint of inaccuracy tempered with forgery from which it has not yet been cleansed. The medieval kings, like the Welsh gentry of later ages, traced their lines to the household of Eden garden, while lesser men, even as early as the 14th century, eagerly asserted their descent from a companion of the Conqueror. Yet beside these false imaginations we find the law courts, whose business was often a clash of pedigrees, dealing with genealogies centuries long which, constructed as it would seem from worthy evidences, will often bear the test of modern criticism.

Genealogies in great plenty are found in manuscripts and printed volumes from the 16th century onward. Remarkable among these are the descents recorded in the Visitation Books of the heralds, who, armed with commissions from the crown, the first of which was issued in 20 Hen. VIII., perambulated the English counties, viewing arms and registering pedigrees. The notes in their register books range from the simple registra- tion of a man's name and arms to entries of pedigrees many generations long. To the heralds these visitations were rare opportunities of obtaining fees from the visited, and the value of the pedigrees registered is notably unequal. Although it has always been the boast of the College of Arms that Visitation records may be produced as evidence in the law courts, few of these officially recorded genealogies are wholly trustworthy. Many of the officers of arms who recorded them were, even by the testimony of their comrades, of indifferent character, and even when the visiting herald was an honourable man and an industrious he had little time to spare for the investigation of any single genealogy. Deeds and evidences in private hands may have been hastily examined in some instances — indeed, a herald's summons invites their production — and monuments were often viewed in the churches, but for the most part men's memories and the hearsay of the country-side made the backbone of the pedigree. The further the pedigree is carried beyond the memory of living men the less trustworthy does it become. The principal visitations took place in the reigns of Elizabeth, James I. and Charles II. No commission has been issued since the accession of William and Mary, but from that time onwards large numbers of genealogies have been recorded in the registers of the College of Arms, the modern ones being compiled with

a care which contrasts remarkably with the unsupported state- ments of the Tudor heralds.

Outside the doors of the College of Arms genealogy has now been for some centuries a favourite study of antiquaries, whose researches have been of the utmost value to the historian, the topographer and the biographer. County histories, following the example of Dugdale's Warwickshire folios, have given much space to the elucidation of genealogies and to the amassing of material from which they may be constructed. Dugdale's great work on the English baronage heads another host of works occupied with the genealogy of English noble families, and the second edition of " G.E.C.'s " Complete Peerage shows the mighty advance of the modern critical spirit. Nevertheless, the 20th century has not yet seen the abandoning of all the genealogical fables nourished by the Elizabethan pedigree-mongers, and the ancestry of many noble houses as recorded in popular works of reference is still derived from mythical forefathers. Thus the dukes of Norfolk, who, by their office of earl marshal are patrons of the heralds, are provided with a 10th-century Hereward for an ancestor; the dukes of Bedford, descendants of a 1 sth-century burgess of Weymouth, are traced to the knightly house of Russell of Kingston Russell, and the dukes of Westminster to the mythical Gilbert le Grosvenor who " came over in the train of the Conqueror."

Genealogical research has, however, made great advance during the last generation. The critical spirit shown in such works as Round's Studies in Peerage and Family History (1901) has assailed with effective ridicule the methods of dishonest pedigree-

makers. Much raw material of genealogy has been made available for all by the publication of parish registers, marriage- licence allegations, monumental inscriptions and the like, and above all by the mass of evidences contained in the volumes issued by the Public Record Office.

Within a small space it is impossible to set forth in detail the methods by which an English genealogy may be traced. But those who are setting out upon the task may be warned at the outset to avoid guesswork based upon the possession of a surname which may be shared by a dozen families between whom is no tie of kinship. A man whose family name is Howard may be presumed to descend from an ancestor for whom Howard was a personal name: it may not be presumed that this ancestor was he in whom the dukes of Norfolk have their origin. A genealogy should not be allowed to stray from facts which can be supported by evidence. A man may know that his

grand- father was John Stiles who died in 1850 at the age of fifty-five. It does not follow that this John is identical with the John Stiles who is found as baptized in 1795 at Blackacre, the son of William Stiles. But if John the grandfather names in his letters a sister named Isabel Nokes, while the will of William Stiles gives legacies to his son and daughter John Stiles and Isabel Nokes, we may agree that reasonable proof has been given of the added genera- tion. A new pedigree should begin with the carefully tested statements of living members of a family. The next step should be to collate such family records as bible entries, letters and diaries, and inscriptions on mourning rings, with monumental inscriptions of acknowledged members of the family. From such beginnings the genealogist will continue his search through the registers of parishes with which the family has been connected ; wills and administrations registered in the various probate courts form, with parish registers, the backbone of most middle-class family histories. Court rolls of manors in which members of the family were tenants give, when existing and accessible, proofs which may carry back a line, however obscure, through many descents. When these have been exhausted the records of legal proceedings, and notably those of the court of chancery, may be searched. Few English households have been able in the past to avoid an appeal to the chancery court, and the bill and answer of a chancery plaintiff and defendant will often tell the story of a family quarrel in which a score of kinsfolk are involved, and the pleadings may contain the material for a family tree of many branching generations. Coram Rege and De Banco rolls may even, in the course of a dispute over a knight's fee or a manor carry a pedigree to the Conquest of England, although such good fortune can hardly be expected by the searcher out of an un- distinguished line. In proving a genealogy it must be remembered that in the descent of an estate in land must be sought the best evidence for a pedigree.

*At the present time the study of genealogy grows rapidly in English estimation. It is no less popular in America, where societies and private persons have of late years published a vast number of genealogies, many of which combine the results of laborious research in American records with extravagant and unfounded claims concerning the European origin of the families dealt with. A family with the surname of Cuthbert has been known to hail St Cuthbert of Lindisfarne as its progenitor, and one surnamed Eberhardt has*incorporated in its pedigree such German princes of old times as were found to have Eberhardt for a Christian name. *>*

Genealogy in modern France has, with a few honourable exceptions, fallen into the hands of the popular pedigree-makers, whose concern

is to gratify the vanity of their employers. Italy likewise has not yet shaken off the influence of those venal genealogists who, three hundred years ago, sold pedigrees cheaply to all comers. But much laborious genealogical inquiry had been made in Germany since the days of Hiibner, and even in Russia there has been some attempt to apply modern standards of criticism to the chronicles of the swarming descendants of the blood of Rurik.

In no way is the gap made by the Dark Ages between ancient and modern history more marked than by the fact that no

European family makes a serious claim to bridge it with its genealogy. The unsupported claim of the Roman house of Massimo to a descent from Fabius Maximus is respectable beside such legends as that which made Levis-Mirepoix head of the priestly tribe of Levi, but even the boast of such remote ancestry has now become rare. The ancient sovereign houses of Europe are, for the most part, content to attach themselves to some ancestor who, when the mist that followed the fall of the Western empire begins to lift, is seen rallying with his sword some group of spearmen.

Authorities. — Genealogical works have been published in such abundance that the bibliographies of the subject are already substantial volumes. Amongst the earlier books from the press may be noted Benvenuto de San Georgio's Montisferrati marchionum et principum regiae propagium successionumque series (1515); Pingonius's Arbor gentilitiae Sabaudiae Saxoniaeque domus (1521); Gebweiler's Epitome regii ac vetustissimi ortus Caroli V. et Ferdinandi I., omniumque archiducum Austriae et comitum Habsburgiensium (1527); Meyer's work on the counts of Flanders (1531), and Du Boulay's genealogies of the dukes of Lorraine (1547). Later in the same century Reineck of Helmstadt put forth many works having a wider genealogical scope, and we may cite Henninges's Genealogiae Saxonicae (1587) and Theatrum genealogicum (1598), and Reusner's Opus genealogicum catholicum (1589-1592). For the politically in- convenient falseness of Francois de Rosieres' Stemmata Lotharingiae ac Barri ducum (1580), wherein the dukes of Lorraine were deduced from the line of Charlemagne, the author was sent to the Bastille by the parlement of Paris and his book suppressed.

The 17th century saw the production in England of Dugdale's great Baronage (1675-1676), a work which still holds a respectable place by reason of its citation of authorities, and of Sandford's history of the royal house. In the same century Andre' Duchesne, the historian of the Montmorencys, Pierre d'Hozier, the chronicler of the house of La Rochefoucauld, Rittershusius, Imhoff, Spener, Lohmeier and many others contribute to the body of continental genealogies. Pierre de Guibours, known as PSre Anselme de Ste Marie, published in 1674 the first edition of his magnificent Histoire genealogique de la maison royale de France, des pairs, grands officiers de la couronne et de la maison du roy et des anciens barons du royaume. Of this encyclopaedic work a third and complete edition appeared in 1 726-1 733. A modern edition under the editor- ship of M. Potier de Courcy began to be issued in 1873, but remains incomplete. Among 18th-century work Johann Hiibner's Biblio- theca genealogica (1729) and Genealogische Tabellen (1725-1733), with Lenzen's commentary on the latter work (c. 1756), may be signalized, with Gatterer's Handbuch der Genealogie (1761) and his Abriss der Genealogie (1788), the latter an early manual on the science of genealogy. Hergott's Genealogia diplomatica augustae gentis Habsburgicae (1737) is the imperial genealogy compiled by the emperor's own historiographer.

Modern peerages in England may be said to date from that of Arthur Collins, whose one-volume first edition was published in 1709. The fifth edition appeared in 1778, in eight volumes, to be republished in 1812 by Sir Egerton Brydges, the " Baptist Hatton " of Disraeli's novel, who corrected many legendary pedigrees, besides inserting his own forged descent from a common ancestor with the dukes of Chandos. From this work and from the Irish peerage of Lodge (as re-edited by Archdall) most of the later peerages have quarried their material. With these may be named the baronetages of Wotton and Betham. Of modern popular peerages and baronet- ages that of Burke has been published since 1822 in many editions and now appears yearly. Most important for the historian are the Complete Peerage of G. E. Qockayne] (2nd ed., 1910), and the Complete Baronetage of the same author. The Peerage of Scotland (1769) of Sir Robert Douglas of Glenbervie came to a second edition in 1813, edited by J. P. Wood, and the whole work has been revised and re-edited by Sir James Baifour Paul (1904, &c). Of the popular manuals of English untitled families, Burke's Genealogical and Heraldic Dictionary of the Commoners (1833-1838) is now brought up to date from time to time and reissued as the Landed Gentry.

Lists of pedigrees in English printed works are supplied by Mar-

shall's Genealogist' s Guide (1903), while pedigrees in the manuscript collections of the British Museum are indexed in the list of R. Sims (1849). Valuable genealogical material .will be found in such periodicals as the Genealogist, the Herald and Genealogist, the Topo- grapher and Genealogist, Collectanea topographica et genealogica, Miscellanea genealogica et heraldica and the Ancestor. In Germany the Deutscher Herold is the organ of the Berlin Heraldic and Genea- logical Society. The Nederlandsche Leeuw is a similar publication in the Low Countries.

Modern criticism of the older genealogical methods will be found in J. H. Round's Peerage and Pedigree, 2 vols. (London, 1910), and in other volumes by the same author. The Harleian Society has published many volumes of the Herald's Visitations; and the British Record Society's publications, supplying a key to a vast mass of wills, Chancery suits and marriage licences, are of still greater importance. The Victoria History of the Counties of England

includes genealogies of the ancient English county families still among the land-owning classes. English pedigrees of the age before the Conquest are collected in W. G. Searle's Anglo-Saxon Bishops, Kings and Nobles (1899).

Genealogical dictionaries of noble French families include Victor de Saint Allais's Nobiliaire universel (21 vols., 1872-1877) and Aubert de la Chenaye-Desbois' Dictionnaire de la noblesse (15 vols., 1863-1876). A sumptuous work on the genealogy and heraldry of the ancient duchy of Savoy by Count Amedee de Foras began to appear in 1863. Spain has Lopez de Haro's Nobiliario genealogico de los reyes y titulos de Espana. Italy has the Teatro araldico of Tettoni and Saladini (1841-1848), Litti's Famiglie celebri and an Annuario delta nobilita. Such annuals are now published more or less inter- mittently in many European countries. Finland has a Ridderscap och Adels Kalender, Belgium the Annuaire de la noblesse, the Dutch Netherlands an Adelsboek, Denmark the Adels-Garbog and Russia the Annuaire of Ermerin. But chief of all such publications is the ancient Almanack de Gotha, containing the modern kinship of royal and princely houses, and now accompanied by volumes dealing with the houses of German and Austrian counts and barons, and with houses ennobled in modern times by patent. A useful modern reference book for students of history is Stokvis's Manuel d'histoire et de genealogie de tous les Hats du globe (1 888-1 893). The best manual for the English genealogist is Walter Rye's Records and

Record Searching (1897), while an ill-arranged but valuable bibliography of English and foreign works on the subject is that of George Gatfield (1892). (O. Ba.)

GENELLI, GIOVANNI BUONA VENTURA (1798 – 1868), German painter, was born at Berlin on the 28th of September 1798. He was the son of Janus Genelli, a painter whose land- scapes are still preserved in the Schloss at Berlin, and grandson to Joseph Genelli, a Roman embroiderer employed to found a school of gobelins by Frederick the Great. Buonaventura Genelli first took lessons from his father and then became a student of the Berlin academy. After serving his time in the guards he went with a stipend to Rome, where he lived ten years, a friend and assistant to Koch the landscape painter, a colleague of the sculptor Ernst Hahnel (1811-1891), Reinhart, Overbeck and Fuhrich, all of whom made a name in art. In 1830 he was commissioned by Dr Hartel to adorn a villa at Leipzig with frescoes, but quarrelling with this patron he withdrew to Munich, where he earned a scanty livelihood at first, though he succeeded at last in acquiring repute as an illustrative and figure draughts- man. In 1859 he was appointed a professor at Weimar, where he died on the 13th of November 1868. Genelli painted few pictures, and it is very rare to find his canvases in public galleries, but there are six of his compositions in oil in the Schack collection at Munich. These and numerous water-colours, as well as designs for engravings and lithographs, reveal an artist of considerable power whose ideal was the antique, but who was also fascinated by the works of Michelangelo. Though a German by birth, his spirit was unlike that of Overbeck or Fuhrich, whose art was reminiscent of the old masters of their own country. He seemed to hark back to the land of his fathers and endeavour to revive the traditions of the Italian Renaissance. Subtle in thought and powerfully conceived, his compositions are usually mythological, but full of matter, energetic and fiery in execution, and marked almost invariably by daring effects of foreshortening. Impeded by straitened means, the artist seems frequently to have drawn from imagination rather than from life, and much of his anatomy of muscle is in consequence conventional and false. But none the less Genelli merits his reputation as a bold and imaginative artist, and his name deserves to be remembered beyond the narrow limits of the early schools of Munich and Weimar.

GENERAL (Lat. generalis, of or relating to a genus, kind or class), a term which, from its pointing to all or most of the members of a class, the whole of an area, &c, as opposed to" par- ticular " or to " local," is hence used in various shades of meaning, for that which is

prevalent, usual, widespread or miscellaneous, indefinite, vague. It has been added to the titles of various officials, military officers and others; thus the head of a religious order is the " superior-general," more usually the " general," and we find the same combination in such offices as that of " accountant-general," " postmaster-general," " attorney-" or " solicitor-general, "and many others, the additional word implying that the official in question is of superior rank, as having a wider

authority or sphere of activity. This is the use that accounts for the application of the term, as a substantive, to a military officer of superior rank, a " general officer," or " general," who commands or administers bodies of troops larger than a regiment, or consisting of more than one arm of the service (see also Officers). It was towards the end of the 16th century that the word began to be used in its present sense as a noun, and in the armies of the time the " general " was commander-in-chief, the " lieutenant-general " commander of the horse and second in command of the army, and the " major-general " (strictly " sergeant-major-general ") commander of the foot and chief of the staff. Field marshals, who have now the highest rank, were formerly subordinate to the general officers. These titles — general, lieutenant-general and major-general — are still applied in most armies to the first, second and third grades of general officer, and in the French service until 1870 the chief of the staff of the army bore the title of major-general. In the German and Russian services the three grades are qualified by the addition of the words " of cavalry," " of infantry " and " of artillery." The French service possesses only two grades, " general of brigade " and " general of division." The Austrian service has two ranks of general officers peculiar to itself, " lieutenant field marshal," equivalent to lieutenant-general, and Feldzeug- meister (master of the ordnance), equivalent to the German general of infantry or artillery. There is also the rank of " general of cavalry." The Spanish army still retains the old term " captain-general." In the German service General Oberst (colonel-general) and General Feldzeugmeister (master-general of ordnance) are ranks intermediate between that of full general and that of general field marshal. It may be noted that during the 17th century " general " was not confined to a commanding officer of an army, and was also equivalent to

“admiral”; thus when under the Protectorate the office of lord high admiral was put into commission, the three first com- missioners, Blake, Edward Popham and Richard Deane, were styled ” generals at sea.”

GENERATION (from Lat. generare, to beget, procreate; genus, stock, race), the act of procreation or begetting, hence any one of the various methods by which plants, animals or substances are produced. As applied to the result of procreation, ” generation ” is used of the offspring of the same parents, taken as one degree in descent from a common ancestor, or, widely, of the body of living persons born at or near the same time; thus the word is also used of the age or period of a generation, usually taken as about thirty years, or three generations to a century. As a term in biology or physiology, generation is synonymous with the Gr. fiioyiveevs and the Ger. Zeugung, and may comprehend the whole history of the first origin and continued reproduction of living bodies, whether plants or animals; but it is frequently restricted to the sexual reproduction of animals. The subject may be divided into the following branches, viz.: (1) the first origin of life and living beings, (2) non-sexual or agamic repro- duction, and (3) gamic or sexual reproduction. For the first two of these topics see Abiogenesis, Biogenesis and Biology; for the third and more extensive division, including (1) the formation and fecundation of the ovum, and (2) the development of the em- bryo in different animals, see Reproduction and Embryology.

GENESIS (Gr. yevtais, becoming; the term being used in English as a synonym for origin or process of coming into being), the name of the first book in the Bible, which derives its title from the Septuagint rendering of ch. ii. 4. It is the first of the five books (the Pentateuch), or, with the inclusion of Joshua, of the six (the Hexateuch), which cover the history of the Hebrews to their occupation of Canaan. The ” genesis ” of Hebrew history begins with records of antediluvian times: the creation of the world, of the first pair of human beings, and the origin of sin (i.-iii.), the civilization and moral degeneration of mankind, the history of man to the time of Noah (iv.-vi. 8), the flood (vi. 9-ix.), the confusion of languages and the divisions of the human race (x.-xi.) . Turning next to the descendants of Shem, the book deals with Abraham (xii.xxv. 18), Isaac and Jacob (xxv. 19 sxxv.), the ” fathers ” of the tribes of Israel, and concludes with

the personal history of Joseph, and the descent of his father Jacob (or Israel) and his brethren into the land of Egypt (xxxvii.-l.) . The book of Genesis, as a whole, is closely connected with the subsequent oppression of the sons of Israel, the revelation of Yahweh the God of

their fathers (Ex. iii. 6, 15 seq., vi. 2-8), the " exodus " of the Israelites to the land promised to their fathers (Ex. xiii. 5, Deut. i. 8, xxvi. 3 sqq., xxxiv. 4) and its con- quest (Josh. i. 6, xxiv.); cf. also the summaries Neh. ix. 7 sqq., Ps. cv. 6 sqq.

*The words, " these are the generations of the heavens and of th<- earth when they were created " (ii. 4), introduce an account of the creation of the world, which, however, is preceded by a Analysis relatively later and less primitive record (i. i-ii. 3). The **

differences between the two accounts lie partly in the style and partly in the form and contents of the narratives, i. i-ii. 3 is marked by stereotyped formulae (" and God [Eldhim] said . . . and it was so . . . and God saw that it was good, and there was evening and there was morning," &c); it is precise and detailed, whereas ii. 46-iii. is less systematic, fresher and more anthropomorphic. The former is cosmic, the latter is local. It is the latter which mentions the mysterious garden and the wonderful trees which Yahweh planted, and depicts Yahweh conversing with man and walking in the garden in the cool of the evening. The former, on the other hand, has an enlightened conception of Eldhim ; the Deity, though grand, is a lifeless figure; several antique ideas are nevertheless preserved. The account of the creation, too, is different; for example, in chap. i. man and woman are created together, whereas in ii. man is at first alone. The naiveness of the story of the creation of woman is in line with the interest which this more popular source takes in the origin or existence of pheno- mena, customs and contemporary beliefs (the garden, the naming of animals, &c). The primitive record is continued in the story of Cain and Abel (iv.), where the old-time problem of Cain's wife and the reference to other human beings (iv. 14 seq.) gave rise in pre- critical days to the theory of pre- Adamites, as though Adam and Eve were not the only inhabitants of the earth. But all the indications go to show that there were at least two distinct popular narratives, one of which ignores the flood. Cain the murderer, doomed to be a wanderer, now becomes the builder of a city, and his descendants introduce various arts (iv. 16&-24). 1 (See the articles Abel; Adam; Cain; Cosmogony; Enoch; Eve; Lamech.) From the " genera- tions " of the heavens and the earth (which one would have expected at the head of ch. i.) we pass to the " generations of Adam " (v. 1). The list of the " Sethites," with its characteristically stereotyped framework, has an older parallel in iv. 25 seq. (with the origin of the worship of Yahweh contrast Ex. vi. 2. seq.), and a fragment from the same source is found in v. 29.

After the birth of Noah the son of Lamech (v. 29, contrast iv. 19

sqq.) comes the brief story of the demigods (vi. 1-4). It is no part of the account of the fall or of the flood (note verse 4 and Num. x 'ii-33). least of all does it furnish grounds for the old view of the division of the human race into evil Cainites and God-fearing Sethites. The excerpt with its description of the fall of the angels is used to form a prelude to the wickedness of man and the avenging flood (vi. 5). Noah, the father of Ham, Shem and Japheth, appears as the hero in the Hebrew version of the flood (see Deluge; Noah). Duplicates (vi. 5-8, 9-13) and discrepancies (vi. 19 sq. contrasted with vii. 2; or vii. 11, viii. 14 contrasted with viii. 8, 10, 12) point to the use of two sources (harmonizing passages in vii. 3, 7-9). The later narrative, which begins with " the generations of Noah (vi. 9-22; vii. 6, 11, 13-17(1, 18-21, 24; viii. i-2a, 36-5, 13a, 14-19; ix. 1-17), is almost complete; note the superscription and the length of the flood (365 days; according to other notices the flood apparently lasted only 61 or 68 days). In the earlier source Noah collects seven pairs of clean animals, one of each kind ; he sacrifices after leaving the ark, and Yahweh promises not to curse the ground or to smite living things again. But in the later, he takes only one pair, and subsequently Elohim blesses Noah and makes a covenant never again to destroy all flesh by a flood. 2 The covenant (character- istic of the latest narratives in Genesis) also prohibits the shedding of blood (cf. the story of Cain and Abel in the earlier source). Man- kind is now made to descend from the three sons of Noah. The older story, however, continues with another step in the history of civilization, and to Noah is ascribed the cult of the vine, the abuse of which leads to the utterance of a curse upon Canaan and a blessing upon Shem and Japheth (ix. 20-27). The table of nations in x. (" the generations of the sons of Noah ") preserves several signs of composite origin (contrast e.g. x. 7 with w. 28 sq., Ludim v. 13 with "v. 22, and the Canaanite families v. 16 with the dispersion " after- wards," v. 18, &c); see Canaan; Genealogy; Nimrod. The history of the primitive age concludes with the story of the tower

1 The abrupt introduction of a small poem (iv. 23 seq.) was long ago regarded as due to the use of separate sources (so the Calvinist Isaac de la Peyrtre, 1654).

2 The divergences of detail, with corresponding stylistic variations were recognized long ago (e.g. by Father Simon in 1682).*

of Babel (xi. 1-9), which, starting from a popular etymology of Babel (" gate of God "), as though from Balbel (" confusion "), tells how

Yahweh feared lest mankind should become too powerful (cf . iii. 22-24) . and seeks to explain the origin of the numerous languages in use. It is independent of x., which already assumes a confusion of tongues (vv. 5, 20, 31), the existence of Babel (v. 10), and gives a different account of the rise of the various races. This incident in the journey eastwards (xi. 2) is equally independent of the story of the Deluge and of Noah's family (see Wellhausen, Prolegomena, p. 316). The continuation of the chapter, " the generations of Shem " (xi. 10-27, see the Shemite genealogy in x. 21 sqq., and contrast the ages with vi. 3), is in the same stereotyped style as ch. v., and prepares the way for the history of the patriarchs.

The " generations of Terah " (xi. 27) lead to the introduction of the first great patriarch Abraham (q.v.). 1 There is a twofold account of his migration to Bethel with his nephew Lot ; the more statistical form in xi. 31 sq., xii. 46, 5 belongs to the latest source. The statement that the Canaanite was then in the land (xii. 6, cf . xiii. 7) points to a time long after the Israelite conquest, when readers needed such a reminder (so Hobbes in his Leviathan, 1651). A famine forces him to descend into Egypt, where a story of Sarai (here at least 65 years of age; see xii. 4, xvii. 17) is one of three variants of a similar peculiar incident (cf. xx. 1-17, xxvi. 6-14). The passage is an in- sertion (xii. 10-xiii. 2; xii. 9,' xiii. 3 seq. being harmonistic). The thread is resumed in the account of the separation of the patriarch and his nephew Lot, who divide the land between them. Abraham occupies Canaan, but moves south to Hebron, which, according to Josh. xiy. 15, was formerly known as Kirjath-Arba. Lot dwells in the basin of the Jordan, and his history is continued in the story of the destruction of Sodom and Gomorrah (xviii.-xix. ; Hos. xi. 8, Deut. xxix. 23 speak of Admah and Zeboim). Lot is saved and becomes the ancestor of the Moabites and Ammonites, who are thus closely related to the descendants of Abraham (note xix. 37, " unto this day "). The great war with Amraphel and Chedorlaomer — the defeat of a world-conquering army by 318 men — with the episode of Melchizedek, noteworthy for the reference to Jerusalem (xiv. 18, cf. Ps. lxxvi. 2), has nothing in common with the context (see Abraham ; Melchizedek). It treats as individuals the place- names Mamre and Eshcol (xiv. 13, cf. Num. xiii. 23 seq.), and by mentioning Dan (v. 14) anticipates the events in Josh. xix. 47, Judg. xviii. 29. 2 A cycle of narratives deals with the promise that the barren Sarai (Sarah) should bear a child whose descendants would inhabit the land of Canaan. The importance of the tradition for the history of Israel explains both the prominence given to it (cf. already xii. 7, xiii. 14-17) and their present complicated character (due to

repeated revision). The older narratives comprise (a) the promise that Abraham shall have a son of his' own flesh (xv.) — the account is composite; 3 (b) the birth of Ishmael, Abraham's son by Hagar, their exile, and Yahweh's promise (xvi., with a separate framework in vv. la. 3, 15 seq.) — before the birth of Isaac; and (c-) the promise of a son to Sarai (xviii. 1-15), now combined with the story of Lot and the overthrow of Sodom. The latest source (xvii.) is marked by the solemn covenant between Yahweh and Abraham, the revela- tion of God Almighty (El-Shaddai, cf. Ex. vi. 3), and the institution of circumcision (otherwise treated in Ex. iv. 26, Josh. v. 2 seq.). The more elevated character of this source as contrasted with xv. and xviii. is as striking as the difference of religious tone in the two accounts of the creation (above). Abraham now travels thence (xx. 1, Hebron, see xviii. 1), and his adventure in the land of Abimelech, king of Gerar (xx.), is a duplicate of xii. (above). It is continued in xxi. 22-34, which has a close parallel in the life of Isaac (xxvi., below). Isaac is born in accordance with the divine promise (xviii. 10 at Hebron); the scene is the south of Palestine. The story of the dismissal of Hagar and Ishmael, and the revelation (xxi. 8-21) cannot be separated from xvi. 4-14, where vv. 9 seq. are intended to harmonize the passages. Although about sixteen years intervene (see xvi. 16; xxi. 5, 8), Ishmael is a young child who has to be carried (xxi. 15), but the Hebrew text of xxi. 14 (not, however, the Septuagint) endeavours to remove the discrepancy. 4 " After these things " comes the offering of Isaac which implicitly annuls the sacrifice of the first-born, a not unfamiliar rite in Palestine as the denunciations prove (cf. Ezek. xvi. 20 seq., xx. 26; Mic. vi. 7; Is. lvii. 5), and thus marks an advance, e.g. upon the story of Jephthah's daughter (Judg. xi.). The story may be contrasted with the Phoenician account of the sacrifice by Cronos (to be identified with El) of his only son, which practically justified the horrid custom.

579

1 As early as 1685 Jean le Clerc observed that Ur of the Chaldees (Chasdim) in xi. 28 anticipates Chesed in xxii. 22, and implied some knowledge of the land of the Chaldaeans (cf. Ezek. i. 3, xi. 24).

2 The Catholic priest Andrew du Maes (1570) already pointed to the names Hebron and Dan as signs of post-Mosaic date.

3 Note the repetitions in vv. 2 and 3; Abraham's faith, vv. 4-6, and his request, v. 8; contrast the time of day, v. 5 and v. 12, and the dates, v. 13 and v. 16. In vv. 12-15 there is a reference to the

bondage in Egypt.

4 These and other chronological embarrassments, now recognized as due to the framework of the post-exilic writer (P), have long been observed — by Spinoza, 1671.

The detailed account of the purchase of the cave of Machpelah (contrast the brevity of xxxiii. 19) is of great importance for the traditions of the patriarchs, and, like the references to the death of Sarah and Abraham, belongs to the latest source (xxiii., xxv. 7-1 la). 5 The idyllic picture of life in xxiv. presupposes that Isaac is sole heir (v. 36) ; since this is first stated in xxv. 5, it is probable that xxv. 5, 116 (and perhaps vv. 6, 18) are out of place. It is noteworthy that the district is Abraham's native place (xxiv. 4, 7, 10; contrast the Babylonian home specified in xi. 28, 31; xv. 7). In xxv. 1 sqq. Abraham takes as wife (but concubine, 1 Chron. i. 32 seq.) Keturali (" incense ") and becomes the father of various Arab tribes, e.g. Sheba and Dedan (grandsons of Cush in x. 7).

After " the generations of Ishmael " (xxv. 12 sqq.) the narrative turns to ' the generations of Isaac " (xxv. 19 sqq.). The story of the events at the court of Abimelech (xxvi.) finds a parallel in the now disjointed xx., xxi. 22-34; note the new explanation of Beer- sheba, the reference in xxvi. I to the parallel story in xii., the absence of allusion to xx., and the apparent editorial references to xxi. in vv. 15, 18. On the whole, the story of Isaac's wife at Gerar is briefer and not so elevated as that of Sarah, but the parallel to xxi. 22-34 is more detailed. The birth of Esau and Jacob (xxv. 21-34) intro- duces the story of Jacob's craft when Isaac is on the point of death (xxvii.). Jacob flees to Laban at Haran to escape Esau's hatred (xxvn. 41-45) ; but, according to the latest source (P), he is charged by Isaac to go to Paddan-Aram, and take a wife there, and his father transfers to him the blessing of Abraham (xxvii. 46-xxviii. 9). On his way to Haran he stops at Bethel (formerly Luz, according to Judg. i. 22-26), where a vision prompts him to accept the God of the place should he return in peace to his father's home (xxviii. 10-22). He passes to the land of " the children of the east " (xxix. 1), and the scenes which follow are scarcely situated at Haran, the famous and ancient seat of the worship of the moon-god, but in the desert. Here he resides fifteen years or more, and by the daughters of Laban and their handmaidens becomes the " father " of the tribes of Israel. There are numerous traces of composition from different sources, but a satisfactory analysis is impossible. 6 The flight of Jacob and his household (from Paddan-Aram, xxxi. 18 P) leads over " the River " (v. 21, i.e. the Euphrates); though the seven days' journey of this

concourse of men and cattle suggests that he came to Gilead, not from Haran (300 m. distant), but from some nearer locality. This is to be taken with the evidence against Haran already noticed, with the use of the term " children of the east " (xxix. 1 ; cf. Jer. xlix. 28; Ezek. xxv. 4, 10), and with the details of Laban's kindred (xxii. 20-24). 7 The arrival at Mahanaim (" [two ?] camps ") gives rise to specific allusions to the meaning of the name (xxxii. 1 seq., 7-12, 13-21); cf. also the plays upon Jabbok, Israel and Peniel in xxxii. 22-32. He meets Esau (xxxii. 3-21, xxxiii. 1-16, another reference to Peniel, " face of God," in v. 10), but they part. Jacob now comes to Shechem " in peace " (cf. the phrase in xxviii. 21), where he buys land and erects an altar (xxxiii. 18-20, cf. Abraham in xii. 6 seq.). There is a remarkable story of the violation of his daughter Dinah by Shechem, the son of Hamor the Hivite (xxxiv.). It has been heavily revised; note the alternating prominence of Hamor and Shechem, the condemnation of Simeon and Levi for their vengeance (cf. the curse in xlix. 5-7), the destruction of the city Shechem by all the sons of Jacob, and the survival of the Hamorites as a family centuries later (xxxiii. 19, Judg. ix. 28). The narrative continues with Jacob's journey to Bethel, the death of Deborah (who accompanied Rebekah to Palestine 140 years previously, see xxiv. 59, and the latest source in xxv. 20, xxxv. 28), the death of Rachel (xxxv. 16-20, contrast xxxvii. 10), and ceases abruptly in the middle of a sentence (xxxv. 22, but see xlix. 3-4). The latest source (xxxv. 9-13, 15, 226-29) gives another account of the origin of the names Israel (cf. xxxii. 28) and Bethel (cf. xxviii. 19), and the genealogy wrongly includes Benjamin among the sons born outside Palestine (w. 24-26). In narrating Jacob's leisurely return to Isaac at Hebron, the writers quite ignore the many years which have elapsed since he left his father at the point of death in Beersheba (xxvii. 1, 2, 7, 10, 41).

" The generations of Esau, the same is Edom," provide much valuable material for the study of Israel's rival (xxxvi.). The chapter gives yet another account of the separation of Jacob and Esau (with vv. 6-8, cf. Abraham and Lot, xiii. 5 seq.), and describes the latter's withdrawal to Seir (cf. already xxxii. 3; xxxiii. 14, 16). It includes lists of diverse origin (e.g. vv. 2-5, contrast xxvi. 34, xxviii. 9) ; various " dukes " (R.V. marg. " chiefs "), or rather

6 Points of resemblance in xxiii. with Babylonian usage have often been exaggerated ; comparison " shows noteworthy differences " (T. G. Pinches, The Old Testament, p. 238); see Carpenter and Harford-Battersby, Hexateuch, i. 64, Driver, Gen. p. 230, and Addenda.

6 Note, e.g., the sudden introduction of xxix. 15, the curious

position of v. 24 (due to P), the double play upon the names Zebulun and Joseph, xxx. 20, 23 seq., the internal intricacies in the agreement, ib. vv. 31-43; the difficulties in the reference to the latter in xxxi. 6 sqq. (especially v. 10).

7 See Ed. Meyer (and B. Luther), Die Israelilen und ihre Nachbar-stamme (1906), pp. 238 sqq.; also the shrewd remarks of C. T. Beke Origines biblicae (1834), pp. 123 sqq.

" thousands " or " clans "; and also the " sons " of Seir the Horite, i.e. Horite clans (vv. 20 seq. and tf .-29 seq.). A summary of Edomite kings is ascribed to the period before the Israelite monarchy (vv. 3i-39) > and the record concludes with the " dukes " of Esau, the father of the Edomites (vv. 40-43, cf. names in vv. 10-14, I 5 _I 9)- 1

Finally, Genesis turns from the patriarchs to the " generations of Jacob " (xxxvii. 2), and we have stories of the " sons," the ancestors of the tribes. (In xxxiv. the incidents which primarily concerned Simeon and Levi alone have, however, been adjusted to the general history of Jacob and his family.) The first place is given to Joseph (xxxvii.), although xxxviii. crowds the early history of the family of Judah into the twenty-two years between xxxvii. 2 and Jacob's descent into Egypt (see xli. 46, 47; xlv. 6). 2 In xxxvii., xxxix. sqq. we have an admirable specimen of writing quite distinct in stamp from the patriarchal stories. The romance which has here been utilized shows an acquaintance with Egypt; the narratives are discursive, not laconic, everything is more detailed, and more under the influence of literary art. The Reuben and Simeon which appear in it are not the characters which we meet in xxxiv., xxxv. 22, or in the poem xlix. 3-7; and the tribes of Ephraim and Manasseh do not scruple to claim ancestry from Joseph and the daughter of an Egyptian priest at the seat of the worship of the sun-god (xli. 45). The narratives are composite. Joseph incurs the ill-will of his brethren because of Israel's partiality or because of his significant dreams. He is at Shechem or at Dothan; and when the brothers seek to slay him, Judah proposes that he should be sold to Ishmaelites, or Reuben suggests that he should be cast into a pit, where Midianites find and kidnap him (xxxvii., cf. xl. 15). The latter sell him to the eunuch Potiphar, but he appears in the service of a married house-holder (xxxix., the second clause of v. I harmonizes). Among other

signs of dual origin are the alternation of " Jacob " and " Israel," and the prominence of Judah (xliii. 3, 8; xliv. 14, 18) or of Reuben (xlii. 22, 37). The money is found in a " bag " as the brothers encamp (xlii. 27, 28a; xliii.), or in a " sack " when they reach home (xlii. 8-26, 29-35, 286, 36 sq.). When Israel and his family descend into Egypt, the latest source gives a detailed list which agrees in the main with the Israelite subdivisions (xlvi. 6-27, cf. Num. xxvi. and I Chron. ii.-viii.). The families dwell in the land of Goshen, east of the Delta, " for every shepherd is an abomination unto the Egyptians" (xlv. 10; xlvi. 28-34; xlvii. 1-6); or they are in the "land of Rameses " (xlvii. II, and Septuagint in xlvi. 28) ; 8 Joseph's policy during the famine is next described (xlvii. 13-26), although it would have been more in place after xli. (see ib. 34). There are several difficulties in Jacob's blessing of the sons of Joseph (xlviii.). 4 The blessing in xlix. is a collection of poetical passages praising or blaming the various tribes, and must certainly date after the Israelite settlement in Palestine; see further the articles on the tribes. Jacob's dying instructions to Joseph (xlvii. 29-31) are continued in 1. I sqq., his charge to his sons (xlix. 28 sqq., P) in 1. 12 seq. It is significant that Jacob's body is taken to Palestine, but the brethren return to Egypt; in spite of a possible allusion to the famine in v. 21, the late chronological scheme would imply that it had long ceased (see xlv. 6, xlvii. 28). The book closes with the death of Joseph about fifty years later, after the birth of the children of Machir, who himself was a contemporary of Moses forty years after the Exodus (Num. xxxii. 39-41). Joseph's body is embalmed, but it is not until the concluding chapter of the book of Joshua (xxiv. 32) that his bones find their last resting-place.

Only on the assumption that the book of Genesis is a composite work is it possible to explain the duplication of events, the varying use of the divine names Yahweh and Elohim, the A com- linguistic and stylistic differences, the internal intri- work. cacies of the subject matter, and the differing stand- points as regards tradition, chronology, morals and religion. 6 The cumulative effect of the whole evidence is too strong to be withstood, and already in the 17th century it was recognized that the book was of composite origin. Immense labour has been spent in the critical analysis of the contents, but it is only since the work of Graf (1866) and Wellhausen (1878) that a satisfactory literary hypothesis has been found which explained

1 It is interesting to find that the Spanish Rabbi Isaac, (of Toledo, A.D. 982-1057), noticing that the royal list must be later than the time of Saul (also recognized by Martin Luther and others), proposed

to assign the chapter to the age of Jehoshaphat.

- *But the chronology is hopeless, and only ten years are allowed according to another and later scheme (xxv. 26, xxxv. 28, xlvii. 9).'*
- *Cf. the account of the Israelites in Egypt, where they are in Goshen, unaffected by the plagues (Ex. viii. 22, ix. 26), or, according to another view, are living in the midst of the Egyptians (e.g. xii. 23).*

4 V. 7 breaks the context; there is repetition in vv. 106 and 136; interchange of the names Jacob and Israel; v. 12 suggests a blessing upon Joseph himself; and with vv. 15 seq. (the blessing of the sons, not of Joseph), contrast vv. 20 sqq. (the singular " in thee," v. 20).

- *Only the more noticeable peculiarities have been mentioned in the preceding columns.*

the most obvious intricacies. The Graf-Wellhausen literary theory has gained the assent of almost all trained and unbiased biblical scholars, it has not been shaken by the more recent light from external evidence, and no alternative theory has as yet beeD produced. The internal features of Genesis demand some formulated theory, more precise than the indefinite concessions of the 1 7th century, beyond which the opponents of modern literary criticism scarcely advance, and the Graf-Wellhausen theory, in spite of the numerous difficulties which it leaves untouched, is the only adequate starting-point for the study of the book. According to this, Genesis is a post-exilic work composed of a post-exilic priestly source (P) and non-priestly earlier sources which differ markedly from P in language, style and religious standpoint, but much less markedly from one and another. 6 These sources can be traced elsewhere in the Pentateuch and Joshua, and P itself is related to the post-exilic works Chronicles, Ezra and Nehemiah. In its present form Genesis is an indis- pensable portion of the biblical history, and consequently its literary growth cannot be viewed apart from that of the books which follow. On internal grounds it appears that the Pentateuch and Joshua, as they now read, virtually come in between an older history by " Deuteronomic " compilers (easily recognizable in Judges and Kings) , and the later treatment of the monarchy in Chronicles, where the influence of the circle which produced P and the present Mosaic legislation is quite discernible. There have been stages where earlier extant sources have been cut down, adjusted or revised by compilers who have incorporated fresh material, and it is the later

compilers of Genesis who have made the book a fairly knit whole. The technical investigation of the literary problems (especially the extent of the earlier sources) is a work of great complexity, and, for ordinary purposes, it is more important to obtain a preliminary appreciation of the general features of the contents of Genesis.

That the records of the pre-historic ages in Gen. i.xi. are at complete variance with modern science and archaeological research is unquestionable. 7 But although it is im possible to regard them any longer either as genuine tˆauioas. history or as subjects for an allegorical interpretation (which would prove the accuracy of any record) they are of distinct value as human documents. They reflect the ideas and thoughts of the Hebrews, they illustrate their conceptions of God and the universe, and they furnish material for a comparison of the moral development of the Hebrews with that of other early races. Some of the traditions are closely akin to those current in ancient Babylonia, but a careful and impartial comparison at once illustrates in a striking manner the relative, moral and spiritual superiority of our writers. On these subjects see further Cosmogony; Deluge. 8

The records of the patriarchal age, xii.-l. are very variously estimated, although the great majority of scholars agree that they are not contemporary and that they cannot be used, as they stand, for pre-Mosaic times. Apart from the ordinary arguments of historical criticism, it is to be noticed that external evi- dence does not support the assumption that the records preserve

6 On the course of modern criticism and on the various sources : P, J (Judaean or Yahwist), E (Ephraimite or Elohist), see Bible (Old Test. Criticism). The passages usually assigned to P in Genesis are: i. ,l-ii. 40; v. 1-28, 30-32; vi. 9-22; vii. 6 (and parts of 7-9), 11, 13-160, 18-21, 24; viii. l-2a, 36-5, 13a, 14-19; ix. 1-17,28-29; x. 1-7, 20, 22-23, 31-32; xi. 10-27, 31-32; x ii- 4ˆ-5; x "i. 6, 116-120; xvi. io, 3, 15-16; xvii.; xix. 29; xxi. lb, 26-5; xxiii.; xxv. 7-na, 12-17, 19-20, 266; xxvi. 34-35; xxvii. 46-xxviii. 9; xxix. 24, 286, 29; xxxi. 186; xxxiii. 18a; xxxiv. i-2a, 4, 6, 8-10, 13-18, 20-24, part of 25, 27-29; xxxv. 9-13, 15, 226-29; xxxvi. (in the main); xxxvii. 1-20; xli. 46; xlvi. 6-27; xlvii. 5-60, 7-11, 276-28; xlviii. 3-7; xlix. la, 286-33, 1- 12-13.

7 See on this, especially, S. R. Driver's Genesis in the "Westminster Commentaries " (seventh ed., 1909).

8 The above is typical of modern biblical criticism which is

compelled to recognize the human element (and can thus have no a priori preconceptions in approaching the Old Testament), but at the same time reveals ever more decisively the presence of purifying influences, without which the records of Israel would have had no permanent interest or value. They thus gain a_ new value which cannot be impaired when it is realized that their significance is quite independent of their origins.

genuine pre-Mosaic history. There are no grounds for any arbitrary distinction between the " pre-historic " pre-Abrahamic age and the later age. External evidence, which recognizes no universal deluge and no dispersal of mankind in the third millen- nium B.C., throws its own light upon the opening centuries of the second. It has revealed conditions which are not reflected in Genesis, and important facts upon which the book is silent — unless, indeed, there is a passing allusion to the great Babylonian monarch Khammurabi in the Amraphel of Gen. xiv. Any careful perusal of modern attempts to recover historical facts or an historical outline from the book will show how very inadequate the material proves to be, and the reconstructions will be found to depend upon an interpretation of the narratives which is often liberal and not rarely precarious, and to imply such reshaping and rewriting of the presumed facts that the cautious reader can place little reliance on them. Whatever future research may bring, it cannot remove the internal peculiarities which combine to show that Genesis preserves, not literal history, but popular traditions of the past. External evidence has proved the antiquity of various elements, but not that of the form or context in which they now appear; and the difference is an important one. We have now a background upon which to view the book, and, on the one hand, it has become obvious that the records preserve — as is only to be expected — Oriental customs, beliefs and modes of thought. But it has not been demonstrated ' that these are exclusively pre-Mosaic. On the other hand, a better acquaint- ance with the ancient political, sociological and religious con- ditions has made it increasingly difficult to interpret the records as a whole literally, or even to find a place in pre-Mosaic Palestine for the lives of the patriarchs as they are depicted. 1 Nevertheless, though one cannot look to Genesis for the history of the early part of the second millennium B.C., the study of what was thought of the past, proves in this, as in many other cases, to be more instructive than the facts of the past, and it is distinctly more important for the biblical student

and the theologian to under- stand the thought of the ages immediately preceding the founda- tion of Judaism in the 5th century B.C. than the actual history of many centuries earlier.

A noteworthy feature is the frequent personification of peoples,

tribes or clans (see Genealogy: Biblical). Midian (i.e. the

Midianites) is a. son of Abraham ; Canaan is a son of

d/ˆre”” Ham (ix – 22)’ and Cush the son of Ham is the father features. °f Ramah and grandfather of the famous S. Arabian

state Sheba and the traders of Dedan (x. 6 sq., cf. Ezek. xxvii. 20-22). Bethuel the father of Rebekah is the brother of the tribal names Uz and Buz (xxii. 21 sqq., cf. Jer. xxv. 20, 23) , Jacob is otherwise known as Israel and becomes the father of the tribes of Israel; Joseph is the father of Ephraim and Manasseh, and incidents in the life of Judah lead to the birth of Perez and Zerah, Judaean clans. This personification is entirely natural to the Oriental, and though ” primitive ” is not necessarily an ancient trait. 2 It gives rise to what may be termed the ” prophetical interpretation of history ” (S. R. Driver, Genesis, p. m), where the character, fortunes or history of the apparent individual are practically descriptive of the people or tribe which, according to tradition, is named after or descended from him. The utterance of Noah over Canaan, Shem and Japheth (ix. 25 sqq.), of Isaac over Esau and Jacob (xxvii.), of Jacob over his sons (xlix.) or grandsons (xlviii.), would have no meaning to Israelites unless they had some con- nexion with and interest for contemporary life and thought. Herein lies the force of the description of the wild and independent Ishmael (xvi. 12), the “father” of certain well-known tribes (xxv. 13-15); or the contrast between the skilful hunter Esau and the quiet and respectable Jacob (xxv. 27), and between the

1 See the remarks of W. R. Smith, Eng. Hist. Rev. (1888), pp. 128 seq. (from the sociological side), and for general considerations, A. A. Bevan, Crit. Rev. (1893), pp. 138 sqq.; S. R. Driver, Genesis, pp. xliii. sqq.

2 Cf. Amos i. 1 1 ; 1 Chron. ii. iv. (note iv. 10), the Book of Jubilees (see above), and also Arabian usage (W. R. Smith, Kinship and Marriage, eh. i.). For modern examples, see E. Littmann, Orient. Stud. Theodor Noldeke (ed. Bezold, 1906), pp. 942-958.

tiller Cain who becomes the typical nomad and the pastoral Abel (iv. 1-15). The interest of the struggles between Jacob and Esau lay, not

in the history of individuals of the distant past, but in the fact that the names actually represented Israel and its near rival Edom. These features are in entire accordance with Oriental usage and give expression to current belief, existing relationships, or to a poetical foreshadowing of historical vicissi- tudes. But in the effort to understand them as they were originally understood it is very obvious that this method of interpretation can be pressed too far It would be precarious to insist that the entrances into Palestine of Abraham and Jacob (or Israel) typified two distinct immigrations. The sepaiation of Abraham from Lot (cf. Lotan, an Edomite name), of Isaac from Hagar-Ishmael, or of Jacob from Esau-Edom scarcely points to the relative antiquity of the origin of these non- Israelite peoples who, to judge from the evidence, were closely related. Or, if the " sons " of Jacob had Aramaean mothers, to prove that those which are derived from the wives were upon a higher level than the " sons " of the concubines is more difficult than to allow that certain of the tribes must have contained some element of Aramaean blood (cf. 1 Chron. vii. 14, and see Asher; Gad; Manasseh). Some of the names are clearly not those of known clans or tribes (e.g. Abraham, Isaac), and many of the details of the narratives obviously have no natural ethnological meaning. Stories of heroic ancestors and of tribal eponyms intermingle; personal, tribal and national traits are interwoven. The entrance of Jacob or Israel with his sons suggests that of the children of Israel. The story of Simeon and Levi at Shechem is clearly not that of two individuals, sons of the patriarch Israel; in fact the story actually uses the term " wrought folly in Israel " (cf. Jud. xx. 6, 10), and the individual Shechem, the son of Hamor, cannot be separated from the city, the scene of the incidents. Yet Jacob's life with Laban has many purely individual traits. And, further, there intervenes a remarkable passage with an account of his conflict with the divine being who fears the dawn and is unwilling to reveal his name. In a few verses the " wrestling " ('-b -£) of Jacob (y&'&qob) is associated with the Jabbok (yabbdq); his " striving " explains his name Israel; at Peniel he sees " the face of God," and when touched on his vulnerable spot — the hollow of the thigh — he is lamed, hence " the children of Israel eat not the sinew of the hip which is upon the hollow of the thigh unto this day " (xxxii. 24-32). Other examples of the fusion of different features can be readily found. Three divine beings appear to Abraham at the sacred tree of Hebron, and when the birth of Isaac (from sahaq, " laugh ") is foretold, the account of Sarah's behaviour is merely a popular and trivial story suggested by the child's name (xviii. 12-15; see also xvii. 17, xxi. 6, 9). An extremely fine passage then describes the patriarch's inter- cession for Sodom and Gomorrah, and the

narrative passes on to the catastrophe which explains the Dead Sea and its desert region and has parallels elsewhere (e.g. the Greek legend of Zeus and Hermes in Phrygia). Lot escapes to Zoar, the name gives rise to the pun on the " little " city (xix. 20), and his wife, on looking back, becomes one of those pillars of salt which still invite speculation. Finally the names of his children Moab and Ammon are explained by an incident when he is a cave-dweller on a mountain. ˆ v L .j

To primitive minds which speculated upon the " why and where- fore " of what they saw around them, the narratives of Genesis afforded an answer. They preserve, in fact, some of the popular philosophy and belief of the Hebrews. They furnish what must have been a satisfactory origin of the names Edom, Moaband Ammon, Mahanaim and Succoth, Bethel, Beersheba, &c. They explain why Shechem, Bethel and Beersheba were ancient sanctuaries (see further below); why the serpent writhes alone the ground (iii. 14); and why the hip sinew might not be eaten (xxxii. 32). To these and a hundred other questions the national and tribal stories — of which no doubt only a few have survived, and of which other forms, earlier or later, more crude or more refined, were doubtless current — furnish an evidently adequate answer. Myth and legend, fact and fiction, the common stock of oral tradition, have been handed down, and thus constitute one of the most valuable sources for popular Hebrew thought.

The book is not to be judged from any one-sided estimate of its

contents. By the side of much that seems trivial, and even non- moral — for the patriarchs themselves are not saints — it is noteworthy how frequently the narratives are didactic. The characteristic sense of collective responsibility, which appears more incidentally in xx. 7, is treated with striking intensity in a passage (xviii. 23-33) which uses the legend of Sodom and Gomorrah as a vehicle for the statement of a familiar problem (cf. Ezek. xviii., Ps. lxxiii., Job). It will be observed that interviews with divine beings presented as little difficulty to the primitive minds of old as to the modern native; even the idea of intercourse of supernatural beings with mortals (vi. 1-4) is to-day equally intelligible. The modern un- tutored native has a not dissimilar undeveloped and childlike attitude towards the divine, a naive theology and a simple cultus. The most circumstantial tales are told of imaginary figures, and the most incredible details clothe

the lives of the historical heroes of the past. So abundant is the testimony of modern travellers to the extent to which Eastern custom and thought elucidate the interpretation of the Bible, that it is very important to notice those features which illustrate Genesis. " The Oriental," writes S. I. Curtiss (Bibl. sacra, Jan. 1901, pp. 103 sqq.), " is least of all a scientific historian. He is the prince of story-tellers, narratives, real and imaginative, spring from his lips, which are the truest portraiture of composite rather than individual Oriental life, though narrated under forms of individual experience." There are, there- fore, many preliminary points which combine to show that the critical student cannot isolate the book from Oriental life and thought; its uniqueness lies in the manner in which the material has been shaped and the use to which it has been put.

The Book of Jubilees (not earlier than the 2nd. century B.C.) presents the history in another form. It retains some of the canonica! matter, often with considerable reshaping, ofdate." S om it s many detail? (especially those to which exception .could be taken), and adds much that is novel. The chronological system of the latest source in Genesis becomes an elaborate reckoning of heavenly origin. Written under the obvious influence of later religious aims, it is especially valuable because one can readily compare the two methods of presenting the old traditions. 1 There is the same kind of personification, fresh examples of the " prophetical interpretation of history," and by the side of the older " primitive " thought are ideas which can only belong to this later period. In each case we have merely a selection of current traditional lore. For example, Gen. vi. 1-4 mentions the marriage of divine beings with the daughters of men and the birth of Nephlllm or giants (cf. Num. xiii. 33). Later allusions to this myth (e.g. Baruch iii. 26-28, Book of Enoch vi. sqq., 2 Peter ii. 4, &c.) are not based upon this passage; the fragment itself is all that remains of some more organic written myth which, as is well-known, has parallels among other peoples. 2 Old myths underlie the account of the creation and the garden of Eden, and traces of other versions or forms appear elsewhere in the Old Testament. Again, the Old Testament throws no light upon the redemption of Abraham (Is. xxix. 22), although the Targums and other sources profess to be well-informed. The isolated reference to Jacob's conquest of Shechem in Gen. xlviii. 22 must have belonged to another context, and later writings give in a later and thoroughly in- credible form allied traditions. In Hosea xii. 4, Jacob's wrestling is mentioned before the scene at Bethel (Gen. xxxii. 24 sqq., xxviii. 11 sqq.). The overthrow of Sodom and Gomorrah is described in Genesis (xviii. seq.), but Hosea refers only to that of Admah and Zeboim (xi.

8, cf. Deut. xxix. 23, Gen. x. 19) — different versions of the great catastrophe were doubtless current. Consequently investigation must start with the particular

1 The Book of Jubilees also enables the student to test the arguments based upon any study restricted to Genesis alone. Thus it shows that the " primitive " features of Genesis afford a criterion which is sociological rather than chronological. This is often ignored. For example, the conveyance of the field of Machpelah (xxiii.) is conspicuous for the absence of any reference to a written contract in contrast to the " business " methods in Jer. xxxii. This does not prove that Gen. xxiii. is early, because writing was used in Palestine about 1400 B.C., and, on the other hand, the more simple forms of agreement are still familiarafter the time of Jeremiah (e.g. Ruth, Proverbs). Similarly, no safe argument can be based upon the institution of blood-revenge in Gen. iv., when one observes the undeveloped conditions among the Trachonites of the time of Herod the Great (Josephus, Ant. xvi. 9, 1), or the varying usages among modern tribes.

2 On the Jewish forms, see R. H. Charles, Book of Jubilees (1902), pp. 33 seq.

details which happen to be preserved, and these not necessarily in their original or in their only form. Since the antiquity of elements of tradition is independent of the shape in which they appear before us, a careful distinction must be drawn between those details which do not admit of being dated or located and those which do. There is evidence for the existence of the names Abram, Jacob and Joseph previous to 900 B.C., but this does not prove the antiquity of the present narratives encircling them. Babylonian tablets of the creation date from the 7th century B.C., but their contents are many centuries earlier (viz. the age of Khammurabi), whereas the Phoenician myths of the origin of things are preserved in a late form by the late writers Damascius and Philo of Byblus. Gen. xiv., which may preserve some knowledge of the reign of Khammurabi, is on internal literary grounds of the post-exilic age, and it is at least a coincidence that the Babylonian texts, often quoted in support of the genuineness of the narrative, belong to about the same period and use early Babylonian history for purely didactic purposes. 3 In general, just as the Book of Jubilees, while presenting many elements of old tradition, betrays on decisive internal grounds an age later than Genesis itself, so, in turn, there is sufficient conclusive evidence that Genesis in its present form includes older features, but belongs to the age to which (on quite independent grounds) the rest of the Pentateuch must be ascribed.

Popular tradition often ignores events of historical importance, or, as repeated experience shows, will represent them in such a form that the true historical kernel could never have been recovered without some external clue. The H lst ° rical absence of definite references to the events of the grounds. Israelite monarchy does not necessarily point to the priority of the traditions in Genesis or their later date. Neverthe- less, some allusion to national fortunes is reflected in the exalta- tion of Jacob (Israel) over Esau (Edom), and in the promise that the latter should break the yoke from his neck. 4 Israelite kings are foreshadowed (xvii. 6, xxxv. 11, P), and Israel's kingdom has the ideal limits as ascribed to Solomon (xv. 18, see 1 Kings iv. 21 ; but cf. art. Solomon). Judah is promised a world-wide king (xlix.8-10), though elsewhere the supremacy of Joseph rouses the jealousy of his "brothers" (xxxvii. 8). Different dates and circles of interest are thus manifest. The cursing and dispersion of Simeon and Levi (xlix. 5-7) recall the fact that Simeon's cities were in the territory of Judah (Josh.xix. 1,9), and that the Levitical priests are later scattered and commended to the benevolence of the Israelites. But the curse obviously represents an attitude quite opposed to the blessing pronounced upon Levi by Moses (Deut. xxxiii. 8-11). The Edomite genealogies (xxxvi.) represent a more extensive people than the references in the popular stories suggest, and the latter by no means indicate that Edom had so important a career as we actually gather from a few allusions to its kings (xxxvi. 3 1-39) . 5 The references to Philis- tines are anachronistic for the pre-Mosaic age, and it is clear that the tradition of a solemn covenant with a Philistine king and his general (xxi. 22 seq., xxvi. 26 sqq.) does not belong to the age Or the circle which remembered the grievous oppressions of the Philistines or felt contempt for these " uncircumcised " enemies of Israel 6 . Finally, the thread of the tradition unmistak- ably represents a national unity of the twelve sons (tribes) of

3 A. H. Sayce, Proc. of the Soc. of Bibl. Arch. (1907), pp. 13-17.

4 xxvii. 27-29, 39 seq. This is significantly altered in the later writings (Jub. xxvi. 34 and the Targums). It is worth noticing that in Jub. xxvi. 35 a new turn is given to Gen. xxvii. 41 by changing Isaac's approaching death (which raises serious difficulties in the history of Jacob) into Esau's wish that it may soon come.

6 See E. Meyer (and B. Luther), Die Israelites, und ihre Nachbar- stamme (1906), pp. 386-389, 442-446.

6 See Philistines. The covenant with Abimelech may be compared

with the friendship between David and Achish (1 Sam. xxvii.), who is actually called Abimelech in the heading of Ps. xxxiv. (see 1 Sam. xxi. 10). If this is a mistake (and not a variant tradi- tion) it is a very remarkable one. The treatment of the covenant by the author of Jubilees (xxiv. 28 sqq.), on the other hand, is only intelligible when one recalls the attitude of Judah to the Philistine cities in the 2nd century B.C. ; see R. H. Charles, ad loc.

GENESIS

Israel; but this unity was not felt at certain periods of dis-organization, and the idea of including Judah among the sons of Israel could not have arisen at a time when Israel and Judah were rival kingdoms. 1 In so far as the traditions can be read in the light of biblical history it is evident that they belong to different ages and represent different national, tribal, or local standpoints. Another noteworthy feature is the interest taken in sacred sites. Certain places are distinguished by theophanies or by the

erection of an altar (lit. place of sacrificial slaughter), /uteres* anc j incidents are narrated with a very intelligible places. purpose. Mizpah in Gilead is the scene of a covenant

or treaty between Jacob and his Aramaean relative commemorated by a pillar (Massebah). It was otherwise known for an annual religious ceremony, the traditional origin of which is related in the story of Jephthah's vow and sacrifice (Judg. xi.), and its priests are denounced by Hosea (v. 1). Shechem, the famous city of the Samaritans (" the foolish nation," Ecclus. I. 26), where Joseph was buried (Josh. xxiv. 32), had a sanctuary and a sacred pillar and tree. It was the scene of the coronation (a religious ceremony) of Abimelech (Judg. ix.), and Rehoboam (1 Kings xii. 1). The pillar was ascribed to Joshua (Josh. xxiv. 26 seq.), and although Jacob set up at Shechem an " altar," the verb suggests that the original object was a pillar (Gen. xxxiii. 20). The first ancestor of Israel, on the other hand, is merely associated with a theophany at an oracular tree (xii. 6). TheBen- jamite Bethel was especially famous in Israelite religious history. The story tells how Jacob discovered its sanctity, — it was the gate of heaven, — made a covenant with its God, established the sacred pillar, and instituted its tithes (xxviii.). The prophetess Deborah dwelt under a palm-tree near Bethel (Judg. iv. 5), and her name is also that of the foster-mother of Rebekah who was buried near Bethel beneath the " oak of weeping " (xxxv. 8). Bochim (" weeping ") elsewhere receives its name when an angel appeared to the Israelites (Judg. ii. 1, Septuagint adds Bethel). To the prophets Hosea and Amos the cultus of Bethel was superstitious and immoral, even though it was Yahweh himself who was worshipped there (see Bethel). South of Hebron lay Beersheba, an important centre and place of pilgrim- age, with a special numen by whom oaths were taken (Amos viii. 14, see Sept. and the commentaries). Isaac built its altar, and Isaac's God guarded Jacob in his journeying (xxxi. 29, xlvi. 1). This patriarch and his " brother " Ishmael are closely

associated with the district south of Judah, both are connected with Beer-lahai-roi (xxiv. 62, Sept. xxv. n), whose fountain was the scene of a theophany (xvi.), and their traditions are thus localized in the district of Kadesh famous in the events of the Exodus (cf. xvi. 14, xxi. 21, xxv. 18, Ex. xv. 22). (See Exodus, The.) Abraham planted a sacred tree at Beersheba and invoked " the everlasting God" (xxi. 33). But the patriarch is more closely identified with Hebron, which had a sanctuary (cf . 2 Sam. xv. 7 seq.), andun altar which he built " unto Yahweh " (xiii. 18). The sacred oak of Mamre was famous in the time of Josephus (B. J. iv. 9, 7), it was later a haunt of " angels " (Sozomen), and Constantine was obliged to put down the heathenish cultus. The place still has its holy tree. Beneath the oak there appeared the three divine beings, and in the cave of Machpelah the illustrious ancestor and his wife were buried. The story of his descent into Egypt and the plaguing of Pharaoh is a secondary insertion (xii. ia-xiii. 2), and where the patriarch appears at Beersheba it is in incidents which tend to connect him with his " son " Isaac. There is a very distinct tendency to emphasize the importance of Hebron. Taken from primitive giants by the non-Israelite clan Caleb (q.v.) it has now become predominant in the patriarchal traditions. Jacob leaves his dying father at Beersheba (xxviii. 10) , but according to the latest source he returns to him at Hebron (xxxv. 27), and here, north of Beersheba, he continues to live (xxxvii. 14, xlvi. 1-5). The cave of Machpelah became the grave of Isaac, Rebekah and Leah (but not Rachel) ; and though Jacob

1 In 2 Sam. xix. 43 (original text) the men of Israel claim to be the first-born rather than Judah; cf. 1 Chron. v. 1 seq., where the birthright (after Reuben was degraded) is explicitly conferred upon Joseph (Ephraim and Manasseh).

appears to be buried beyond the Jordan, it is the latest source which places his grave at Hebron (1. i-n and 12 seq.). So in still later tradition, all the sons of Jacob with the exception of Joseph find their last resting-place at Hebron, and in Jewish prayers for the dead it is besought that their souls may be bound up with those of the patriarchs, or that they may go to the cave of Machpelah and thence to the Cherubim. 2 The increasing prominence of the old Calebite locality is not the least interesting phase in the comparative study of the patriarchal traditions.

The association of the ancestors of Israel with certain sites is a feature which finds analogies even in modern Palestine. There are old centres of cult which have never lost the veneration of the people; the shrines are known as the tombs of saints or walis (patrons) with

such orthodox names as St George, Elijah, &c. Traditions justify the reputation for sanctity, and not only are similar stories told of distinct figures, but there are varying traditions of a single figure. 3 The places have retained their sacred character despite political and religious vicissitudes; they are far older than their present names, and such is the con- servatism of the east that it is not surprising when, for example, a sacred tomb at Gezer stands quite close to the site of an ancient holy place, about 3000 years old, the existence of which was first made known in the course of excavation. Genesis preserves a selection of traditions relating to a few of the old Palestinian centres of cult. We cannot suppose that these first gained their sacred character in the pre-Mosaic "'patriarchal " age; there is in any case the 'obvious difficulty of bridging the gap between the descent into Egypt and the Exodus, and it is clear that when the Israelites entered Palestine they came among a people whose religion, tradition and thought were fully established. It is only in accordance with analogy if stories were current in Israel of the institution of the sacred places, and closer study shows that we do not preserve the original version of these traditions. 4

A venerated tree in modern Palestine will owe its sanctity to some tradition, associating it, it may be, with some saint; the Israelites in their turn held the belief that the sacred tree at Hebron was one beneath which their first an- cestor sat when three divine beings revealed themselves to him. But it is noteworthy that Yahweh alone is now prominent; the tradition has been revised, apparently in writing, and, later, the author of Jubilees (xvi.) ignores the triad. At Beer-lahai-roi an El (" god ") appeared to Hagar, whence the name of her child Ishmael; but the writer prefers the unambiguous proper name Yahweh, and, what is more, the divine being is now Yahweh's angel — the Almighty's subordinate (xvi.). The older traits show themselves partly in the manifestation of various Els, and partly in the cruder anthropomorphism of the earlier sources. Later hands have by no means eliminated or modified them altogether, and in xxxi. 53 one can still perceive that the present text has endeavoured to obscure the older belief that the God of Abraham was not the God of his " brother " Nahor (see the commentaries). The sacred pillar erected by Jacob at Bethel was solemnly anointed with oil, and it (and not the place) was regarded as the abode of the Deity (xxviii. 18, 22). This agrees with all that is known of stone-cults, but it is quite obvious that this interesting example of popular belief is far below the religious ideas of the writer of the chapter in its present form. 5 There were many places where it could be said that Yahweh had recorded his name and would bless his worshippers (Ex. xx. 24).

They were abhorrent to the advanced ethical teaching of prophets and of those imbued with the spirit of Deuteronomy (cf. 2 Kings xviii. 4 with v. 22), and it is patent from Jeremiah,

2 Cf . Josephus, Antiq. ii. 8, 2; Test, of xii. Patriarchs; Acts vii. 16 (where Shechem is an error) ; Oesterley and Box, Religion and

.-Worship of the Synagogue, pp. 340 seq.; M. G. Dampier, in Church and Synagogue (1909), p. 78.

3 See J. P. Peters, Early Heb. Story (1904), pp. 81 sqq. ; S. A. Cook, Relig. of Anc. Palestine (1908), pp. 19 sqq.

4 In like manner the Babylonian story of the flood has been revised and adapted to the Hebrew Noah (cf. Nippur, ad fin.).

6 The writer in Jub. xxvii. 27 treats the pillar as a "sign." Another useful example of revision is to be found in Josh, xxii., where what was regarded (by a reviser) as an object unworthy of the religion of Yahweh is now merely commemorative.

sH

GENESIS

Ezekiel and Is. lvi.-lxvi. that even at a late date opinion varied as to how Yahweh was to be served. 1 It is significant, therefore, that the narratives in Genesis (apart from P) reflect a certain tolerant attitude; there is much that is contrary to prophetical thought, but even the latest compilers have not obliterated all features that, from a strict standpoint, could appear distasteful. Although the priestly source shows how the lore could be reshaped, and Jubilees represents later efforts along similar lines, it is evident that for ordinary readers the patriarchal traditions could not be presented in an entirely new form, and that to achieve their aims the writers could not be at direct variance with current thought.

It will now be understood why several scholars have sought to recover earlier forms of the traditions, the stages through which the material has passed, and the place of the earlier forms and stages in the history and religion of Israel. These labours are indispensable for scientific biblical study, and are most fruitful when they depend upon comprehensive methods of research. When, for example, one observes the usual forms of hero-cult and the tendency to regard the occupant of the modern sacred shrine as the ancestor of his clients, deeper significance is attached to the references to the pro- tective

care of Abraham and Israel (Is. lxiii. 16), or to the motherly sympathy of Rachel (Jer. xxxi. 15). And, again, when one perceives the tendency to look upon the alleged ancestor or well as an almost divine being, there is much to be said for the view that the patriarchal figures were endowed by popular opinion with divine attributes. But here the same external evidence warns us that these considera- tions throw no light upon the original significance of the patriarchs. It is impossible to recover the earliest traditions from the present narratives, and these alone offer sufficiently perplexing problems. 2

From a careful survey of all the accessible material it is beyond doubt that Genesis preserves only a selection of traditions of various ages and interests, and often not in their interests, original form. We have relatively little tradition from North Israel; Beersheba, Beer-lahai-roi and Hebron are more prominent than even Bethel or Shechem, while there are no stories of Gilgal, Shiloh or Dan. Yet in the nature of the case, there must have been a great store of local tradition accessible to some writers and at some periods. 3 Interest is taken not in Phoenicia, Damascus or the northern tribes, but in the east and south, in Gilead, Ammon, Moab and Ishmael. Particular attention is paid to Edom and Jacob, and there is good evidence for a close relationship between Edomite and allied names and those of South Palestine (including Simeon and Judah). Especially significant, too, is the interest in tradi- tions which affected the South of Palestine, that district which is of importance for the history of Israel in the wilderness and of the Levites. 4 It is noteworthy, therefore, that while different peoples had their own theories of their earliest history, the first- born of the first human pair is Cain, the eponym of the Kenites, and the ancestor of the beginnings of civilization (iv. 17, 20-22). This " Kenite " version had its own view of the institution of the worship of Yahweh (iv. 26); it appears to have ignored the Deluge, and it implies the existence of a fuller corpus of written tradition. Elsewhere, in the records of the Exodus, there are traces of specific traditions associated with Kadesh, Kenites, Caleb and Jerahmeel, and with a movement into Judah, all originally independent of their present context. Like the prominence of the traditions of Hebron and its hero Abraham, these features cannot be merely casual. 6

1 For popular religious thought and practice (often described as pre-prophetical, though non-prophetical would be a safer term), see Hebrew Religion.

2 Among recent efforts to find and explain mythical elements, see

especially Stucken, Astralmythen; H. Winckler, Geschichte Israels, vol. ii. ; and P. Jensen, Das Gilgamesch-Epos in der Weltlitteratur.

3 Again the analogy of the modern East is instructive. Especially interesting are the traditions associating the same figure or incident with widely separated localities.

4 See Exodus, The ; Levites. On this feature see Luther and Meyer, op. cit. pp. 158 seq., 227_sqq., 259, 279, 305, 386, 443. Their

■ researches on this subject are indispensable for a critical study of Genesis.

6 The notion of an Eve (hawwah, " serpent ") as the first woman may be conjecturally associated with (a) the frequent traditions of the serpent-origin of clans, and (b) with evidence which seems to connect the Levites and allied families with some kind of serpent-cult (see Meyer, op. cit. pp. 116, 426 seq., 443, and art. Serpent-Worship). The account of mankind as it now reads (ii. seq.) is in

The fact that one is not dealing with literal history complicates the question of the nomadic or semi-nomadic life of the Israelite ancestors. 6 They are tent-dwellers, shepherds, sojourners (xvii. 8, xxiii. 4, xxviii. 4, xxxvi. 7, xxxvii. 1), and we breathe the air of the open country. But the impression gained from the narratives is of course due to the narrators. The movements of the patriarchs serve mainly to connect them with traditions which were originally independent. When Abraham separates from Lot he settles in " the land of Canaan," while Lot dwells in " the cities of the plain " (xiii. 12). Isaac at Beersheba enters into an alliance with the Philistines (xxvi. 12 sqq.), while Jacob seems to settle at Shechem (xxxiv.), and there or at Dothan, a few miles north, his sons pasture their father's flock (xxxvii. 12 sqq.). 7 Indeed, according to an isolated fragment Jacob conquered Shechem and gave it to Joseph (xlviii. 22), and this tradition underlies (and has not given birth to) the late and fantastic stories of his warfare (Jub. xxxiv. 1-9, Test, of Judah iii.). Judah, also, is represented as settling among the Canaanites (xxxviii.), and Simeon marries a Canaanite — accord- ing to late tradition, a woman of Zephath (xlvi. 10; Jub. xxxiv. 20, xliv. 13; see Judg. i. 17). These representations have been sub- ordinated to others, in particular to the descent into Egypt of Jacob (Israel) and his sons, and the Exodus of the Israelites. But the critical study of these events raises very serious historical problems. Abraham's grandson, with his family — a mere handful of people — went down into Egypt during a famine (cf. Abraham xii. 10, and Isaac xxvi. I seq.) ; 400 years

pass, all memory of which is practically obliterated, and the Israelite nation composed of similar subdivisions returns. Although the later genealogies from Jacob to Moses allow only four generations (cf. Gen. xv. 16), the difficulties are not re- moved. Joseph lived to see the children of Machir (1. 23, note Ex. i. 8), though Machir received Gilead from the hands of Moses (Num. xxxii. 40) ; Levi descended with Kehath, who became the grand- father of Aaron and Moses, while Aaron married a descendant in the fifth generation from Judah (Ex. vi. 23). On the other hand the genealogies in 1 Chron. ii. sqq. are independent of the Exodus; Ephraim's children raid Gath, his daughter founds certain cities, and Manasseh has an Aramaean concubine who becomes the mother of Machir (1 Chron. vii. 14, 20-24). 8 Moreover the whole course of the invasion and settlement of Israel (under Joshua) has no real connexion with pre-Mosaic patriarchal history. If we reinterpret the history of the family and its descent into Egypt, and belittle its increase into a nation, and if we figure to ourselves a more gradual occupation of Palestine, we destroy the entire continuity of history as it was understood by those who compiled the biblical history, and we have no evidence for any confident reconstruction. With such thoroughness have the compilers given effect to their views that only on closer examination is it found that even at a relatively late period fundamentally differing traditions still existed, and that those which belonged to circles which did not recognize the Exodus have been subordinated and adjusted by writers to whom this was the profoundest event in their past. 9

That the journey of Jacob-Israel from his Aramaean relatives into Palestine hints at some pre-Mosaic immigration is possible, but has not been either proved or disproved. The details point rather to a reflection of the entrance of So ˆ Aera the children of Israel, elsewhere ascribed to the leader- nac ieas. ship of Joshua (q.v.). Though the latter proceeded to Gilgal, a variant tradition, now almost lost, seems to have re- corded an immediate journey to Shechem (Deut. xxvii. 1-10, Josh. viii. 30-35) previous to Joshua's great campaigns (Josh. x. seq., cf. Jacob's wars). His religious gathering at Sheche.m several respects less primitive (contrast vi. 1 seq.), and the present story of Cain and his murder of Abel really places the former in an unfavourable light.

6 See the discussion between B. D. Eerdmans and G. A. Smith in the Expositor (Aug.-Oct. 1908), and the former's Alttest. Siudien, ii. (1908), passim.

7 xxxiv. (note v. 9) indicates a possible alliance with Shechemites,

and xxxv. 4 (taken literally) implies a residence long enough for a religious reform to be necessary. Yet the present aim of the narratives is to link together the traditions and emphasize Jacob's return from Laban to his dying father (xxviii. 21 ; xxxi. 3, 13, 18; xxxii. 9; xxxv. I, 27).

8 Cf. Benjamin's descendants in 1 Chron. viii. 6 seq. and see on the naive and primitive character of these traditions, Kittel, com- ment, ad loc.

9 That there are traditions in Genesis which do not form the prelude to Exodus is very generally recognized by those who agree that the Israelites after entering Palestine took over some of the indigenous lore (whether from the Canaanites or from a presumed earlier layer of Israelites). This adoption of native tradition by new settlers, however, cannot be confined to any single period. See further, Luther and Meyer, op. cit. pp. 108, no, 156, 227 seq., 254 seq., 414 seq., 433; on traditions related to the descent into Egypt, ib. 122 sqq., 151 seq., 260; and on the story of Joseph (ch. xxxv., xxxvii. sqq.), as an independent cycle used to form a connecting link, Luther, ib. pp. 142-154.

before the dismissal of the tribes finds its parallel in Jacob's reforms before leaving for Bethel (xxiv.; cf. v. 26, Gen. xxxv. 4). Owing, perhaps, to the locale of the writers, we hear relatively little of the northern tribes. Judah and Simeon are the first to conquer their lot, and the " house of Joseph " proceeds south to Bethel, where the story of the " weeping " at Bochim finds a parallel in the " oak of weeping " (Gen. xxxv. 8). In Gen. xxxviii. " at that time Judah went down from his brethren " — in xxxvii. they are at Shechem or Dothan — and settled among Canaanites, and there is a fragmentary allusion to a similar alliance of Simeon (xlvi. 10). The trend of the two series of traditions is too close to be accidental, yet the present sequence of the narratives in Joshua and Judges associates them with the Exodus. Further, Jacob's move to Shechem, Bethel and the south is parallel to that of Abraham, but his history actually represents a twofold course. On the one hand, he is the Aramaean (Deut. xxvi. 5), the favourite son of his Aramaean mother. On the other, Rebekah is brought to Beer-lahai-roi (xxiv.), Jacob belongs to the south and he leaves Beersheba for his lengthy sojourn beyond the Jordan. His separation from Esau, the revelation at Bethel, and the new name

Israel are recorded twice, and if the entrance into Palestine reflects one ethnological tradition, the possibility that his departure from Beersheba reflects another, finds support (a) in the genealogies which associate the nomad " father " of the southern clans Caleb and Jerahmeel with Gilead (1 Chron. ii. 21), and (b) in the hints of an " exodus " from the district of Kadesh north- wards.

The history of an immigration into Palestine from beyond the Jordan would take various shapes in local tradition. In Genesis it is preserved from the southern point of view. The northern standpoint appears when Rachel, mother of Joseph and Benjamin, is the favoured wife in contrast to the despised Leah, mother of Judah and Simeon; when Joseph is supreme among his brethren; and when Judah is included among the " sons " of Israel. It is possible that the application of the traditional immigration to the history of the tribes is secondary. This at all events suggests itself when xxxiv. extends to the history of all the sons, incidents which originally concerned Simeon and Levi alone, and which may have represented the Shechemite version of a " Levitical " tradition (see Levites). However this may be, it is necessary to account for the nomadic colouring of the narratives (cf. Meyer, pp. 305, 472) and the prominence of southern interests, and it would be in accordance with biblical evidence elsewhere if northern tradition had been taken over and adapted to the standpoint of the southern members of Israel, with the incorpora- tion of local tradition which could only have originated in the south. 1 These and other indications point to a late date in biblical history. There is a manifest difference between the religious importance of Shechem in the traditions of Joshua (xxiv.) and Jacob's reforms when he leaves behind him the heathen symbols before journeying to the holy site of Bethel (Gen. xxxv. 4). There is even some polemic against marriage with Shechemites (xxxiv.; more emphatic in Jub. xxx.), while in the story of the Hebronite Abraham, Bethel itself is avoided and Shechem is of little significance. Again, the present object of xxxviii. is to trace the origin of certain Judaean subdivisions after the death of the wicked Er and Onan. It is purely local and is interested in Shelah, and more especially in Perez and Zerah, names of families or clans of the post-exilic age. 2 Else-

1 Cf. the late " Deuteronomic " form of Judges where a hero of Kenizzite origin (and therefore closely connected with Caleb) stands at the head of the Israelite " judges "; also, from another aspect, the specifically Judaean and anti-Israelite treatment of the history of the monarchy. But in each case the feature belongs to a relatively late stage in the literary history of the books; see Judges; Samuel, Books of ; Kings.

2 Mahalalel (son of Kenan, another form of Cain, v. 12) is also a prominent ancestor in Perez (Nch. xi. 4), and Zerah claimed the renowned sages of Solomon's day (1 Chron. ii. 6, 1 Kings iv. 31). The story implies that Perez surpassed his " brother " clan Zerah (xxxviii. 27-30), and in fact Perez is ultimately reckoned the head of the Judaean subdivisions (1 Chron. ii. 4 sqq.), and thus is the reputed ancestor of the Davidic dynasty (Ruth iv. 12, 18 sqq.).

where, in r Chron. ii. and iv., the genealogies represent a Judah composed of clans from the south (Caleb and Jerahmeel) and of small families or guilds, Shelah included. It is not the Judah of the monarchy or of the post-exilic Babylonian-Israelite community. But the mixed elements were ultimately reckoned among the descendants of Judah, through Hezron the " father " of Caleb and Jerahmeel, and just as the southern groups finally became incorporated in Israel, so it is to be observed that although Hebron and Abraham have gained the first place in the patriarchal history, the traditions are no longer specifically Calebite, but are part of the common Israelite heritage.

We are taken to a period in biblical history when, though the historical sources are almost inexplicably scanty, the narratives of the past were approaching their present shape. Some time after the fall of Jerusalem (587 B.C.) there was a movement from the south of Judah northwards to the vicinity of Jerusalem (Bethlehem, Kirjath-jearim, &c), where, as can be gathered from 1 Chron. ii., were congregated Kenite and Rechabite communities and families of scribes. Names related to those of Edomite and kindred groups are found in the late genealogies of both Judah and Benjamin, and recur even among families of the time of Nehemiah. 3 The same obscure period witnessed the advent of southern families, 4 the revival of the Davidic dynasty and its mysterious disappearance, the outbreak of fierce hatred of Edom, the return of exiles from Babylonia, the separation of Judah from Samaria and the rise of bitter anti-Samaritan feeling. It closes with the reorganization associated with Ezra and Nehemiah and the compilation of the historical books in practically their present form. It contains diverse interests and changing stand- points by which it is possible to explain the presence of purely southern tradition, the southern treatment of national history, and the antipathy to northern claims. As has already been mentioned, the specifically southern writings have everywhere been modified or adjusted to other standpoints, or have been almost entirely subordinated, and it is noteworthy, therefore, that in narratives elsewhere which reflect rivalries and conflicts among the priestly families, there is sometimes an animus against those whose names and traditions point to a southern origin (see Levites).

Thus the book of Genesis represents the result of efforts to systematize the earliest history, and to make it a worthy prelude to the Mosaic legislation which formed the charter of „ Judaism as it was established in or about the 5th century B.C. It goes back to traditions of the most varied character, whose tone was originally more in accord with earlier religion and thought. Though these have been made more edifying, they have not lost their charm and interest. The latest source, it is true, is without their freshness and life, but it is a matter for thankfulness that the simple compilers were cort- servative, and have neither presented a work entirely on the lines of P, nor rewritten their material as was done by the author of Jubilees and by Josephus. It is obvious that from Jubilees alone it would have been impossible to conceive the form which the traditions had taken a few centuries previously — viz. in Genesis. Also, from P alone it would have been equally impossible to recover the non-priestly forms. But while there is no immeasur- able gulf, between the canonical book of Genesis and Jubilees, the internal study of the former reveals traces of earlier traditions most profoundly different as regards thought and contents. It

The sympathies of these traditions are as suggestive as their presence in the canonical history, which, it must be remembered, ultimately passed through the hands of Judaean compilers.

3 Neh. iii. 9, 14; see Meyer, pp. 300, 430; S. A. Cook, Critical Notes on O.T. History, p. 58 n. 2. While the evidence points to an early close relationship among S. Palestinian groups (Edom, Ishmael, &c. ; cf. Meyer, p. 446), there are many allusions to subsequent treacherous attacks which made Edom execrable. Here again biblical criticism cannot at present determine precisely when or precisely why the changed attitude began; see Edom; Jews, §§ 20, 22.

4 Although the movement reflected in 1 Chron. ii. is scarcely

E re-exilic, yet naturally there had always been a close relation etween Judah and the south, as the Assyrian inscriptions of the I latter part of the 8th century B.C. indicate.

is not otherwise when one looks below the traditional history elsewhere (e.g. Samuel, Kings). An explanation may be found in the vicissitudes of the age. The movement from the south, which seems to

account for a considerable cycle of the patriarchal traditions, belongs to the age after the downfall of the Israelite and(later)the Judaean monarchies when there were vital political and social changes. The removal of prominent inhabitants, by Assyria and later by Babylonia, the introduction of colonists from distant lands, and the movements of restless tribes around Palestine were more fatal to the continuity of trustworthy tradition than to the persistence of popular thought. New conditions arose as the population was reorganized, a new Israel claimed to be the heirs of the past (cf . e.g. the Samaritans, Ezr. iv. 2, Joseph. Antiq. ix. 14, 3; xi. 8, 6), and not until after these vicissitudes did the book of Genesis begin to assume its present shape. 1 (See Jews; Palestine: History.)

The above pages handle only the more important details for the study of a book which, as regards contents and literary history, cannot be separated from the series to which it forms the intro- duction. As regards the literary-critical problems it is clear that with the elimination of P we have the sources (minor adjustment and revision excepted) which were accessible to the last compiler in the post-exilic age. Most critics have inclined to date these sources (J and E) as early as possible, whereas the admitted presence of secondary and of relatively late passages (e.g. xviii. 22 sqq.,J; xxii., E) shows that one must work back from the sources as known in P's age, and that one can rely only upon those criteria which can be approximately dated. It is usual to regard the more primitive character of J and E as a mark of antiquity; but this ignores the regular survival of primitive modes of thought and of popular tradition outside more cultured circles. It is also recognized that J and E are non-prophetical and non-Deuteronomic, but it has not been proved that the present J and E are earlier than the prophets or the Deuteronomic reforms of Josiah (2 Kings xxii. seq.). J and E are linguistically almost identical (in contrast to P), and differ from P in features which are often not of chronological but of sociological significance (e.g. the mentality of the writers). Their language is without some of the phenomena found in narratives which emanate from the north (e.g. Judges v., stories of Elijah and Elisha), and their stylistic variations may be, as Gunkel suggests, the mark of a district or region ; for this district one would look in the neighbour- hood of Jerusalem. The conclusion that P's narratives and laws in the Pentateuch are post-exilic was found by biblical scholars to be a necessary correction to the original hypothesis of Graf (1866) that P's narratives were to be retained (with J and E) at an early date. This view was influenced by the close connexion between the subject-matter, J, E and P representing the same trend of tradition. But by still ascribing J and E as written

sources to about the 9th or 8th century (individual opinion varies), many difficulties and inconsistencies are involved. The present J and E reflect a re- shaping and readjustment of earlier tradition which is found else- where, and the suggestion that they are not far removed from the age of the priestly writers and redactors does not conflict with what is known of language, forms of religious thought, or tendencies of tradition. We reach thus approximately the age when post- Deuteronomic editors were able to utilize such records as Judg. i., xvii. sqq., 2 Sam. ix.xx. (see Judges; Samuel, Books OF), which are equally valuable as specimens of current thought and of written. tradition. In conclusion, the tendency of criticism has been to recognize " schools " of J and E extending into the exile, thus making the three sources J, E and P more nearly contempor aneous. The most recent conservative authority also inclines to a similar contemporaneity (" collaboration " or " co-operation "), but at an impossibly early date (J. On, Problem of the 0. T., 1905, pp. 216, 345, 354, 375 seq., 527). By admitting possible revision in the post-exilic age (pp. 226, 369, 375 seq.), the conservative theory recalls the old legend that Ezra rewrote the Old Testament (2 Esd. xiv.) and thus restored the Law which had been lost; a view which, through the early Christian Fathers, gained currency and has en- joyed a certain popularity to the present day. But when once revision or rewriting is conceded, there is absolutely no guarantee that the present Pentateuch is in any way identical with the five books which tradition ascribed to Moses (q.v.), and the necessity for a comprehensive critical investigation of the present contents makes itself felt. 2

Literature. — Only a few of the numerous works can be men- tioned. Of those written from a conservative or traditional stand-

point the most notable are: W. H. Green's Unity of Genesis (1895); and J. Orr, Problem of the 0. T. (which is nevertheless a great advance upon earlier non-critical literature). S. R. Driver's commentary (Westminster Series) deals thoroughly with all preliminary problems of criticism, and is the best for the ordinary reader; that of A. Dillmann (6th ed., Eng. trans.) is more technical, that of W. H. Bennett (Century Bible) is more concise and popular. G. J. Spurrell, Notes on the Text of Genesis, and C. J. Ball (in Haupt's Sacred Books of the 0. T.) appeal to Hebrew students. W. E. Addis, Documents of the Hexateuch, Carpenter and Harford-Battersby, The Hexateuch, and C. F. Kent, Beginnings of Hebrew History, are more important for the literary analysis. J. Wellhausen's sketch in his Proleg. to Hist, of Israel (Eng. trans., pp. 259-342) is admirable, as also is the general Introduction (trans, by W. H.

Carruth, 1907) to H. Gunkel's valuable commentary. Of recent works bearing upon the subject- matter reference may be made to J. P. Peters, Early Hebrew Story (1904), A. R. Gordon, Early Traditions of Genesis (1907), and T. K. Cheyne, Traditions and Beliefs of Ancient Israel (1907). Special mention must be made of Eduard Meyer and B. Luther, to whose Die Israeliten und ihre Nachbarstdmme (1906) the present writer is indebted for many valuable suggestions and hints. Fuller biblio- graphical information will be found in the works already mentioned, in the articles in the Ency. Bib. (G. F. Moore), and Hastings's Diet. (G. A. Smith), and in the volume by J. Skinner in the elaborate and encyclopaedic International Critical Series. (S. A. C.)

GENET, typically a south European carnivorous mammal referable to the Viverridae or family of civets, but also taken to include several allied species from Africa. The true genet (Genetta vulgaris or Genetta genetta) occurs throughout the south of Europe and in Palestine, as well as North Africa. The fur is of a dark-grey colour, thickly spotted with black, and having a dark streak along the back, while the tail, which is nearly as long as the

1 The south of Palestine, if less disturbed by these changes, may well have had access to older authoritative material.

2 For Orr's other concessions bearing upon Genesis, see op. cit., pp. 9 seq., 87, 93, and (on J, E, P) 196, 335, 340. These, like the concessions of other apologetic writers, far outweigh the often hypercritical, irrelevant, and superficial objections brought against the literary and historical criticism of Genesis.

body, is ringed with black and white. The genet is rare in the south of France, but commoner in Spain, where it frequents the banks of streams, and feeds on small mammals and birds. It differs from the true civets in that the anal pouch is a mere depression, and contains only a faint trace of the highly character- istic odour of the former. In south-western Europe and North Africa it is sought for its soft and beautifully spotted fur. In some parts of Europe, the genet, which is easily tamed, is kept like a cat for destroying mice and other vermin.

GENEVA, a city of Ontario county, New York, U.S.A., at the N. end of Seneca Lake, about 52 m. S.E. of Rochester. Pop. (1890) 7557; (1900) 10,433 (°f whom 1916 were foreign-born); (1910 census) 12,446. It is served by the New York Central & Hudson River, and the Lehigh Valley railways, and by the Cayuga & Seneca Canal. It is an attractively built city, and has good mineral springs. Malt,

tinware, flour and grist-mill products,

boilers, stoves and ranges, optical supplies, wall-paper, cereals, canned goods, cutlery, tin cans and wagons are manufactured, and there are also extensive nurseries. The total value of the factory product in 1905 was $4,951,964, an increase of 82-3 % since 1900. Geneva has a public library, a city hospital and hygienic institute. It is the seat of the New York State Agricultural Experiment Station and of Hobart College (non- sectarian), which was first planned in 181 2, was founded in 1822 (the majority of its incorporators being members of the Protestant Episcopal church) as successor to Geneva Academy, received a full charter as Geneva College in 1825, and was renamed Hobart Free College in 1852 and Hobart College in i860, in honour of Bishop John Henry Hobart. The college had in 1908- 1909 107 students, 21 instructors, and a library of 50,000 volumes and 15,000 pamphlets. A co-ordinate woman's college, the William Smith school for women, opened in 1908, was endowed in 1906 by William Smith of Geneva, who at the same time provided for a Hall of Science and for further instruction in science, especially in biology and psychology. In 1888 the Smith Observa- tory was built at Geneva, being maintained by William Smith, and placed in charge of Dr William Robert Brooks, professor of astronomy in Hobart College. The municipality owns its water- supply system. Geneva was first settled about 1787 almost on 1 he site of the Indian village of Kanadasega, which was destroyed in 1779 during Gen. John Sullivan's expedition against the Indians in western New York. It was chartered as a city in 1898. GENEVA (Fr. Geneve, Ger. Genf, Ital. Ginevra, Late Lat. Gehenna, though Genava in good Latin), a city and canton of Switzerland, situated at the extreme south-west corner both of the country and of the Lake of Geneva or Lake Leman. The canton is, save Zug, the smallest in the Swiss Confederation, while the city, long the most populous in the land, is now sur- passed by Zurich and by Basel.

The canton has an area of 108-9 sq. m., of which 88-5 sq. m – are classed as " productive " (forests covering 9-9 sq. m. and vine- yards 6-8 sq. m., the rest being cultivated land). Of the " unproductive " 20-3 sq. m., n| are accounted for by that portion of the Lake of Geneva which belongs to the canton. It is entirely surrounded by French territory (the department of Haute Savoie lying to the south, and that of the Ain to the west and the north), save for about 3! m.

on the extreme north, where it borders on the Swiss canton of Vaud. The Rhone flows through it from east to west, and then along its south-west edge, the total length of the river in or within the canton being about 13 m., as it is very sinuous. The turbid Arve is by far its largest tributary (left), and flows from the snows of the chain of Mont Blanc, the only other affluent of any size being the London (right). Market gardens, orchards, and vineyards occupy a large proportion of the soil (outside the city), the apparent fertility of which is largely due to the unremitting industry of the inhabitants. In 1901 there were 6586 cows, 3881 horses, 2468 swine and 2048 bee-hives in the canton. Besides building materials, such as sandstone, slate, &c, the only mineral to be found within the canton is bituminous shale, the products of which can be used for petroleum and asphalt. The broad-gauge railways in the canton have a length of i8f rn., and include bits of the main lines towards Paris and Lausanne (for Bern or the Simplon), while there are also 72! m. of electric tramways. The canton was admitted into the Swiss Confedera- tion in 18 1 5 only, and ranks as the junior of the 22 cantons. In 1815-1816 it was created by adding to the old territory belonging to the city (just around it, with the outlying districts of Jussy, Genthod, Satigny and Cartigny) 16 communes (to the south and east, including Carouge and Chene) ceded by Savoy, and 6 communes (to the north, including Versoix), cut off from the French district of Gex.

In 1900 there were, not counting the city, 27,813 inhabitants in the canton, or, including the city, 132,609, the city alone having thus a population of 104,796. (In the following statistics those for the city are enclosed within brackets.) In 1900 this popula- tion was thus divided in point of religion: Romanists, 67,162 (49,965), Protestants. 62,400 (52,121), and Jews 1119 (1081).

The canton.

Statistics of canton and city.

In point of language 109,741 (84,259) were French-speaking, 13)343 (12,004) German-speaking, and 7345 (6574) Italian-speaking, while there were also 89 (76) Romonsch- speaking persons. More remarkable are the results as to nationality: 43,55c (31,607) were Genevese citizens, and 36,415 (30,582) Swiss citizens of other cantons. Of the 52,644 (42,607) foreigners, there were 34,277 (26,018) French, 10,211 (91 26) Italians, 4653 (4283) subjects of the German empire, 583 (468) British subjects, 832 (777) Russians, and 285 (251) citizens of the United States of America. In the

canton there were 10,821 (5683) inhabited houses, while the number of separate households was 35,450 (28,621). Two points as to these statistics deserve to be noted. The number of foreign residents is steadily rising, for in 1900 there were only 79,965 (62,189) Swiss in all as against 52,644 (42,607) foreigners. One result of this foreign immigration, particularly from France and Italy, has been the rapid increase of Romanists, who now form the majority in the canton, while in the city they were still slightly less numerous than the Protestants in 1900; later (local) statistics give in the Canton 75,400 Romanists to 64,200 Protestants, and in the city 52,638 Romanists to 51,221 Pro- testants. Geneva has always been a favourite residence of foreigners, though few can ever have expected to hear that the " protestant Rome " has now a Romanist majority as regards its inhabitants. Galiffe {Geneve hist, et arcMolog.) estimates the population in 1356 at 5800, and in 1404 at 6490, in both cases within the fortifications. In 1536 the old city acquired the outlying districts mentioned above, as well as the suburb of St Gervais on the right bank of the Rhone, so that in 1545 the number is given as 12,500, reduced by 1572 to 11,000. After the revocation of the Edict of Nantes (1685) it rose, by 1698, to 16,934. Thenceforward the progress was fairly steady: 18,500 (1711); 24,712 (1782); 26,140 (1789). After the creation of the canton (181 5) the numbers were (those for the city are enclosed within brackets) 48,489 (25,289), the city rising in 1837 to 33,714, and in 1843 to 36,452. The result of the Federal censuses (begun in 1850) are as follows: in 1850, 64,146 (42,127); in i860, 82,876 (59,826); in 1870, 88,791 (65,606); in 1880, 99,712 (76,197), and in 1888, 105,509 (81,407).

The canton comprises 3 administrative districts: the 13 communes on the right bank and the 34 on the left bank each form one, while the city proper, on both sides of the river, forms one district and one commune. From meat?' i8i5to 1842 the city and the cantonal government was the same. But at that date the city obtained its inde- pendence, and is now ruled by a town council of 41 members, and an executive of 5 members, the election in each case being made direct by the citizens, and the term of office being 4 years. The existing cantonal constitution dates, in most of its main features, from 1847. The legislature or Grand Conseil (now com- posed of 100 members) is elected (in the proportion of 1 member for every 1000 inhabitants or fraction over 500) for 3 years by a direct popular vote, subject (since 1892) to the principles of proportional representation, while the executive or conseil d'etat (7 members) is elected (no proportional representation) by a popular vote for 3 years. By the

latest enactments (one dating from 1905) 2500 citizens can claim a vote (" facultative referendum ") as to any legislative project, or can exercise the " right of initiative " as to any such project or as to the revision of the cantonal constitution. The canton sends 2 members (elected by a popular vote) to the Federal Standerath, and 7 to the Federal Nationalrath.

The Consistory rules the Established Protestant Church, and is now composed of 31 members, 25 being laymen and 6 (formerly 15) clerics, while the "venerable company of pastors " (pastors actually holding cures) has greatly lost its former importance and can now only submit proposals to the Consistory. The Christian Catholic Church is also " established " at Geneva (since 1873) and is governed by the conseil superieur, composed of 25 lay members and 5 clerics. No other religious denominations are " established " at Geneva. But the Romanists (who form 13 % of the electors) are steadily growing in numbers

Religion.

and in influence, while the Christian Catholics are losing ground rapidly, the highest number of votes received by a candidate for the conseil suptrieur having fallen from 2003 in 1874 to 806 in 1890 and 507 in 1906, while they are abandoning the country churches (some were lost as early as 1892) which they had taken from the Romanists in the course of the Kulturkampf.

The fairs of Geneva (held 4 times a year) are mentioned as early as 1262, and attained the height of their prosperity about 1450, but declined after Louis XL's grants of 1462- 1463 in favour of the fairs of Lyons. Among the chief articles brought to these fairs (which were largely fre- quented by Italian, French and Swiss merchants) were cloth, silk, armour, groceries, wine, timber and salt, this last coming mainly from Provence. The manufacturers of Geneva formed in 1487 no fewer than 38 gilds, including tailors, hatters, mercers, weavers, tanners, saddle-makers, furriers, shoe-makers, painters on glass, &c. Goldsmiths are mentioned as early as 1290. Printing was introduced in 1478 by Steinschaber of Schweinfurth, and nourished much in the 16th century, though the rigorous supervision exercised by the

Consistory greatly hampered the Estiennes (Stephanus) in their enterprises. Nowadays the best known industry at Geneva is that of watchmaking, which was introduced in 1587 by Charles Cusin of Autun, and two years later regulations as to the trade were issued. In 1685 there were in Geneva 100 master watchmakers, employing 300 work-people, who turned out 5000 pieces a year, while in 1760 this trade employed 4000 work-people. Of recent years its prosperity has diminished greatly, so that the watchmaking and jewelry trades in 1902 numbered respectively but 38 and 32 of the 394 establishments in Geneva which were subject to the factory laws. Lately, huge establishments have been constructed for the utilization of the power contained in the Rhone. The local commerce of Geneva is much aided by the fact that the city is nearly entirely surrounded by " free zones," in which no customs duties are levied, though the districts are politically French: this privilege was given to Gex in 1814, and to the Savoyard districts in i860, when they were also neutralized.

Considering the small size of Geneva, till recently, it is surprising how many celebrated persons have been connected with it as natives or as residents. Here are a few of the principal, t)eSm ' special articles being devoted to many of them in this work. In the 1 6th century, besides Calvin andBonivard, we have Isaac Casaubon, the scholar; Robert and Henri Estienne, the printers, and, from 1572 to 1574, Joseph Scaliger himself, though but for a short time. J. J. Rousseau is, of course, the great Genevese of the 18th century. At that period, and in the 19th century, Geneva was a centre of light, especially in the case of various of the physical sciences. Among the scientific celebrities were de Saussure, the most many-sided of all; de Candolle and Boissier, the botanists; Alphonse Favre and Necker, the geologists; Marignac, the chemist; Deluc, the physicist, and Plantamour, the astronomer. Charles Bonnet was both a scientific man and a philosopher, while Amiel belonged to the latter class only. Pradier and Chaponniere, the sculptors ; Arlaud, Diday and Calame, the artists; Mallet, who revealed Scandinavia to the literary world; Necker, the minister; Sismondi, the historian of the Italian republics; General Dufour, author of the great survey which bears the name of the Dufour Map," have each a niche in the Temple of Fame. Of a less severe type were Cherbuliez, the novelist; Topffer, who spread a taste for pedestrianism among Swiss youth; Duchosal, the poet; Marc Monnier, the litterateur; not to mention the names of any persons still living, or of politicians of any date.

The city of Geneva is situated at the south-western extremity of the beautiful lake of the same name, w' ence the " arrowy Rhone " flows westwards under the seven bridges by andUs which the two halves*

of the town communicate with buildings, each other. To the south is the valley of the Arve (descending from the snows of the Mont Blanc chain), which unites with that of the Rhone a little below the town; while behind the Arve the grey and barren rocks of the Petit Saleve rise like a wall, which in turn is overtopped by the distant

and ethereal snows of Mont Blanc. Yet the actual site of the town is not as picturesque as that of several other spots in Switzerland. Though the cathedral crowns the hillock round which clusters the old part of the town, a large portion of the newer town is built on the alluvial flats on either bank of the Rhone. Since the demolition of the fortifications in 1849 the town has extended in every direction, and particularly on the right bank of the Rhone. It possesses many edifices, public and private, which are handsome or elegant, but it has almost nothing to which the memory reverts as a masterpiece of archi- tectural art. It is possible that this is, in part, due to the artistic blight of the Calvinism which so long dominated the town. But, while lacking the medieval appearance of Fribourg or Bern, or Sion or Coire, the great number of modern fine buildings in Geneva, hotels, villas, &c, gives it an air of prosperity and comfort that attracts many visitors, though on others modern French architecture produces a blinding glare. On the other hand, there are broad quays along the river, while public gardens afford grateful shade.

The cathedral (Protestant) of St Pierre is the finest of the older buildings in the city, but is a second-rate building, though as E. A. Freeman remarks, " it is an excellent example of a small cathedral of its own style and plan, with unusually little later alteration." The hillock on which it rises was no doubt the site of earlier churches, but the present Transitional building dates only from the 1 2 th and 1 3 th centuries, while its portico was built in the 1 8th century; after the model of the Pantheon at Rome. It contains a few sepulchral monuments, removed from the cloisters (pulled down in i72i),anda fine modern organ, but the historical old bell La Clemence has been replaced by a newer and larger one which bears the same name. More interesting than the church itself is the adjoining chapel of the Maccabees, built in the 15th century, and recently restored. Near the cathedral are the arsenal (now housing the historical museum, in which are pre- served many relics of the " Escalade " of 1602, including the famous ladders) , and the maison de ville or town hall. The latter building is first mentioned in 1448, but most of the present building dates from far later times, though the quaint paved spiral pathway (taking the place of a staircase in the interior) was made in the middle of the 16th century. In the Salle du Conseil d'£tat some curious 15th-century frescoes have lately been discovered, while the

old Salle des Festins is now known as the Salle de P Alabama, in memory of the arbitration tribunal of 1872. In the isth-century Tour Baudet, adjoining the Town Hall, are preserved the rich archives of the city. Not far away is the palais de justice, built in 1 709 as a hospital, but used as a court house since 1858. On the lie in the Rhone stands the tower (built c. 1 2 19) of the old castle belonging to the bishop. Among the modern buildings we may mention the following: the University(founded in 1559, but raised to the rank of a University in 1873 only), the Athenee, the Conservatoire de Musique, the Victoria Hall (a concert hall, presented in 1904 to the city by Mr Barton, formerly H.B.M.'s Consul), the theatre, the Salle dela Reformation (for religious lectures and popular concerts), the Batiment Electoral, the Russian church and the new post office. At present the museums of various kinds at Geneva are widely dispersed, but a huge new building in course of construction (1906) will ultimately house most of them. The Musee Rath contains pictures and sculptures; the Musee Fol, antiquities of various dates; the Musee des Arts Decoratifs, inter alia, 3. fine collection of prints; the Musee Industriel, industrial objects and models; the Musee Archeologique, prehistoric and archaeological remains; the Musee d'Histoire Naturelle, scientific collections; and the Musee Epigraphique, a considerable number of inscriptions. Some way out of the town is the Musee Ariana (extensive art collections) , left, witha fine park, in 1890 to the city by a rich citizen, Gustave Revilliod. The public library is in the university buildings and contains many valuable MSS. and printed books. Geneva boasts also of a fine observatory and of a number of technical schools (watchmaking, chemistry, medicine, commerce, fine arts, &c), some of which are really annexes of the university, which in June 1906 was attended by n 58 matriculated students, of whom 903

were non-Swiss, the Russians (475 in number) forming the majority of the foreign students. Geneva is well supplied with charitable institutions, hospitals, &c. Among other remarkable sights of the city may be mentioned the great hydraulic establish- ment (built 1882-1899) of the Forces Matrices du Rhdne (turbines), the singular monument set up to the memory of the late duke of Brunswick who left his fortune to the city in 1873, and the lie Jean- Jacques Rousseau now connected with the Pont des Bergues. The house occupied by Rousseau is No. 40 in the Grand' Rue, while No. 13 in the same street is on the site of Calvin's house, though not the actual

dwelling inhabited by him.

The real name of the city is Genava, that being the form under which it appears in almost all the known documents up to the „. 7th century, a.d., the variation Genua (which has led to

great confusion with Genoa) being also found in the 6th century. But Geneva and Gehenna are of later date. The first mention of the city is made by Caesar {Bell. Galli. i. 6-7) who tells us that it was the last oppidum of the Allobroges, and the nearest to the territory of the Helvetii, with which it was connected by a bridge that, for military reasons, he was forced to destroy. Inscriptions of later date state that it was only a vicus of the Viennese province, while mentioning the fact that a gild of boatmen flourished there. But the many Roman remains found on the original site(in the region of the cathedral) of the city show that it must have been of some importance, and that it possessed a considerable commerce. About 400 the Notitia Galliarum calls it a civitas (so that it then had a municipal administration of its own), and reckons it as first among those of the Viennese. Prob- ably this rise in dignity was connected with the establishment of a bishop's see there, the first bishop certainly known, Isaac, being heard of about 400 in a letter addressed by St Eucherius to Salvius, while, in 450, a letter of St Leo states that the see was then a suffragan of the archbishopric of Vienne. It is possible that there may be some ground for the local tradition that Christianity was introduced into this region by Dionysius and Paracodus, who successively occupied the see of Vienne, but another tradition that the first bishop was named St Nazarius rests on a confusion, as that saint belongs to Genoa and not to Geneva.

About the middle of the 5th century a.d. it came into the possession of the Burgundians, who held it as late as 527 (thus leaving no room for any occupation by the Ostrogoths), and in 534 passed into the hands of the Franks. The Burgundian kings seem to have made Geneva one of their principal residences, and the Notitia (above named) tells us that the city was restaurata by King Gundibald (d. 516) which is generally supposed to mean that he first surrounded it with a wall, the city then comprising little more than the hill on which the present cathedral stands. That building is of course of much later date, but it seems certain that when (c. 513-516) Sigismund, son of King Gundibald, built a stone church on the site, it took the place of an earlier wooden church, constructed on Roman foundations, all three layers being clearly visible at the present day. We know that St Avitus, archbishop of Vienne (d. 518), preached a sermon (pre- served to us) at the dedication of a church at Geneva

which had been built on the site of one burnt by the enemy, and the bits of half-burnt wood found in the second of the two layers mentioned above, seem to make it probable that the reference is to Sigis- mund 's church. But Geneva was in no sense one of the great cities of the region, though it is mentioned in the Antonine Itinerary and in the Peutinger Talk (both 4th century a.d.), no doubt owing to its important position on the bank of the Rhone, which then rose to the foot of the hill on which the original city stood. This is no doubt the reason why, apart from some passing allusions (for instance, Charles the Great held a council of war there in 773, on his first journey to Italy), we hear very little about it.

In 1032, with the rest of the kingdom of Burgundy or Aries, it reverted to the emperor Conrad II., who was crowned king at Payerne in 1033, and in 1034 was recognized as such at Geneva by a great assembly of nobles from Germany, Burgundy and Italy, this rather unwilling surrender signifying the union of

those 3 kingdoms. It is said that Conrad granted the temporal sovereignty of the city to the bishop, who, in 1162, was raised to the rank of a prince of the Holy Roman Empire, being elected, from 1215, by the chapter, but, after 1418, named directly by the pope himself.

Like many other prince-bishops, the ruler of Geneva had to defend his rights: without against powerful neighbours, and within against the rising power of the citizens. These struggles constitute the entire political history of Geneva up to about 1535, when a new epoch of unrest opens with the adoption of Protestantism. The first foe without was the family of the counts of the Genevois (the region south of the city and in the neighbour- hood of Annecy), who were also " protectors " (advocati) of the church of Geneva, and are first heard of in the nth and 12th centuries. Their influence was probably never stronger than during the rule as bishop (1118-1119) of Guy, the brother of the reigning count. But his successor, Humbert de Grammont, resumed the grants made to the count, and inii25bythe Accord of Seyssel, the count fully acknowledged the suzerainty of the bishop. A fresh struggle under Bishop Ardutius (1135-1185) ended in the confirmation by Frederick Barbarossa, as emperor, of the position of the bishop as subject to no one but himself (1 1 53) , this declaration being strengthened by the elevation of the bishop and his successors to the rank of princes of the empire

(1162).

In 1250 the counts of Savoy first appear in connexion with Geneva, being mortgagees of the Genevois family, and, in 1263, practically their heirs as " protectors " of the city. It was thus natural that the citizens should invoke Jhe aid of Savoy against their bishop, Robert of the Genevois (1276-1287). But Count Amadeus of Savoy not merely seized (1287) the castle built by the bishops (about 1219) on the lie, but also (1288) the office of vicedominus [vidotnne], the official through whom the bishop exercised his minor judicial rights. The new bishop, William of Conflans (1 287-1 295) could recover neither, and in 1290 had to formally recognize the position of Savoy (which was thus legalized) in his own cathedral city. It was during this struggle that about 1287 (these privileges were finally sanctioned by the bishop in 1309) the citizens organized themselves into a commune or corporation, elected 4 syndics, and showed their independent position by causing a seal for the city to be prepared. The bishop was thus threatened on two sides by foes of whom the influence was rising, and against whom his struggles were of no avail. In 1365 the count obtained from the emperor the office of imperial vicar over Geneva, but the next bishop William of Marcossay (1366-1377 : he began the construction of a new wall round the greatly extended city, a process not completed till 1428) secured the withdrawal of this usurpation (1366-1367), which the count finally 'renounced (1371). One of that bishop's successors, Adhemar Fabri (1385-1388) codified and confirmed all the franchises, rights and privileges of the citizens (1387), this grant being the Magna Carta of the city of Geneva. In 1401 Amadeus VIII. of Savoy bought the county of the Genevois, as the dynasty of its rulers had become extinct. Geneva was now surrounded on all sides by the dominions of the house of Savoy.

Amadeus did homage, in 1405, to the bishop for those of the newly acquired lands which he held from the bishop. But, after his power had been strengthened by his elevation (141 7) by the emperor to the rank of a duke, and by his succession to the principality of Piedmont (1418, long held by a cadet branch of his house), Amadeus tried to purchase Geneva from its bishop, John of Pierre-Seise' or Rochetaillee (1418-1422). This offer was refused both by the bishop and by the citizens, while in 1420 the emperor Sigismund declared that he alone was the suzerain of the city, and forbade any one to attack it or harm it in any fashion. Oddly enough Amadeus did in the end get hold of the city, for, having been elected pope under the name of Felix V., he named himself to the vacant see of Geneva (1444), and kept it, after his resignation of the Papacy in 1449, till his death in 145 1. For the most part of this period he resided in

Geneva. From 1451 to 1522 the see was almost continuously held by a cadet of the house of Savoy, which thus treated it as a kind of appange.

*Most probably Geneva would soon have become an integral part of the realms of the house of Savoy had it not been for the appearance of a new protector on the scene — the Swiss confedera- tion. In the early 15th century the town of Fribourg made an alliance with Geneva for commercial purposes (the cloth ware- houses of Fribourg at Geneva being enlarged in 1432 and 1465), as the cloth manufactured at Fribourg found a market in the fairs of Geneva (which are mentioned as early as 1262, and were at the heightof their prosperity about 1450). The duke, however, was no better inclined towards the Swiss than towards Geneva. He struck a blow at both, when, in 1462-1463, he induced his son- in-law, Louis XI. of France, to forbid French merchants to attend the fairs of Geneva, altering also the days of the fairs at Lyons (established in 1420 and increased in number in 1463) so as to make them clash with those fixed for the fairs of Geneva. This nearly ruined Geneva, which, too, in r477 had to pay a large indem- nity to the Swiss army that, after the defeat of Charles the Bold, duke of Burgundy, advanced to take vengeance on the dominions of his ally, Yolande, dowager duchess of Savoy and sister of Louis XI. , as well as on the bishop of Geneva, her brother-in-law. But, after this payment, the bishop made an alliance with the Swiss. A prolonged attempt was made (15 17-1530) by the reigning duke of Savoy, Charles III. (1504-1553), to secure Geneva for his family, at first with the help of his bastard cousin John (15*3- 1522), the last of his house to hold the see. In this struggle the syndic, Philibert Berthelier, succeeded in concluding (1519) an alliance with Fribourg, which, however, had to be given up almost immediately. It split the citizens into two parties; the Eidgenols relying on the Swiss, while the Mamelus (mamelukes) supported the duke. Berthelier was executed in 1519, and Ame Levrier in 1524, but Bezanson Hugues (d.1532) took their place, and in 1526 succeeded in renewing the alliance with Fribourg and adding to it one with Bern. This much enraged the duke, who took active steps against the citizens, and tried (1527) to carry off the bishop, Pierre de la Baume (1522-1544), who soon found it best to make his submission.*

The Genevese, thus abandoned by their natural protector, looked to

the Swiss for help. They sent (October 1530) a con- siderable army to save the city. This armed intervention compelled the duke to sign the treaty of St Julien (19th October) by which he engaged not to trouble the Genevese any more, agreeing that if he did so the two towns of Fribourg and Bern should have the right to occupy his barony of Vaud. The two towns also, by the decision given as arbitrators at Payerne (30th December 1530), upheld their alliance with Geneva, condemned the duke to pay all the expenses of the war, and confirmed the clause as to their right to occupy Vaud; they also surrounding the exercise of the powers of vidomne by the duke with so many restrictions that in 1532 the duke, after much resistance, formally agreed to recognize the alliance of Geneva with the two towns and not to annoy the Genevese any more. Thus a legal tie between Geneva and two of the Swiss cantons was established, while the duke did not any longer venture to annoy the Genevese, as he clung to his fine barony of Vaud. In the course of this struggle (and especially after the last episcopal vidomne had left the town in 1526) the municipal authorities of the city greatly developed, a grand conseil of 200 members being set up in imitation of those at Bern and at Fribourg, while within the larger assembly there was a petit conseil of 60 members for more confidential business. Thus 1530 marks the date at which Geneva became its own mistress within, while allied externally with the Swiss confedera- tion. But hardly had this settlement been reached when a fresh element of discord threatened to wholly upset matters — the adoption of Protestant principles by the city. Just before this event, however, the fortifications were once more (1534) rebuilt , (bits still remain) and extended so as to take in several new suburbs, including that of St Gervais on the right bank of the Rhone which, till then, seems to have been unenclosed (1511-

1527)-

In 1532 William Farel, a Protestant preacher from Dauphin6, who had converted Vaud, &c, to the new belief, first came to Geneva and settled there in 1533. But although Bern supported

the Reform, Fribourg did not, and in 1534 withdrew from its alliance with Geneva, while directly afterwards the duke of Savoy made a fresh attempt to seize the city. On the roth of August 1535 the Protestant faith was formally adopted by Geneva, but an offer of help from France having been refused, as the city was unwilling to give up any of its sovereign rights, the duke's party continued its intrigues. Finally Bern, fearing that Geneva might fall to France instead of to itself, sent an army to protect the city (January r536),

but, not being able to persuade the citizens to give up their freedom, had to content itself with the conquest of the barony of Vaud and of the bishopric of Lausanne, thus acquir- ing rich territories, while becoming close neighbours of Geneva (January and March 1536). Meanwhile Farel had been advancing the cause of religious reform, which was definitively adopted on the 2 1st of May 1 536. In July r 536 a French refugee, John Calvin (q.v.), came to Geneva for a night, but was detained by Farel who found in him a powerful helper. The opposition party of the Libertins succeeded in getting them both exiled in 1538, but, in September 1541, Calvin was recalled (Farel spending the rest of his life at Neuchatel, where he died ˆ65) to Geneva. Born in 1 509, he was then about 3 2 years of age. He set up this theocracy in Geneva, and ruled the reorganized republic with a strong hand till his death in ˆ64, when he was succeeded by the milder Theodore de Beza (T519-1605).

The great blot on Calvin's rule was his intolerance of other thinkers, as. exemplified by his burning of Gruet (1547) and of Servetus (1553). But, on the other hand, he founded (1559) the Academy, which, originally meant as a seminary for his preachers, later greatly extended its scope, and in T873 assumed the rank of a University. The strict rule of Calvin drove out many old Genevese families, while be caused to be received as citizens many French, Italian and English refugees, so that Geneva became not merely the " Protestant Rome " but also quite a cosmopolitan little city. The Bernese often interfered with the internal affairs of Geneva (while Calvin, a Frenchman, naturally looked towards France), and refused to allow the city to conclude any alliances save with itself. That alliance was finally renewed in r558, while in 1560 the Romanist cantons made one with the duke of Savoy, a zealous supporter of the old faith. In 1564, after long negotiations, Bern restored to the duke part of its

conquests of 1536, viz. Gex, the Genevois and the Chablais, Geneva being thus once more placed amid the dominions of the duke; though by the same treaty (that of Lausanne, October 1564, Calvin having died the preceding May) the alliance of Bern with Geneva was maintained. In 1579 Geneva was included in the alliance concluded by France with Bern and Soleure, while in 1584 Zurich joined Bern in another alliance with Geneva. The struggle widened as Geneva became a pawn in the great attempt of the duke of Savoy to bring back his subjects to the old faith, his efforts being seconded by Francois de Sales, the " apostle of the Chablais. " But the king of France, for political reasons, opposed Savoy, with whom, however, he made peace in i6or.

In December 1602 Francois de Sales was consecrated bishop of Geneva (since 1535 the bishops had lived at Annecy), and a few days later the duke of Savoy made a final attempt to get hold of the city by a surprise attack in the night of n-r2th December 1602 (Old Style), known in history as the " Escalade," as ladders were used to scale the city walls. It was successfully repelled, over 200 of the foe being slain, while 17 Genevese only perished. Filled with joy at their rescue from this attack, the citizens crowded to their cathedral, where Beza (then 83 years of age) bid them to sing the 1 24th Psalm which has ever since been sung on the anniversary of this great delivery. The peace of St Julien (2rst of July 1603) marked the final defeat of the duke of Savoy

in the long struggle waged (since 1290) by his house against the

city of Geneva.

In the charter of 1387 we hear only of the conseil gSnSral (composed of all male heads of families) which acted as the legis- lature, and elected annually the executive of 4 syndics; no doubt this form of rule existed earlier than 1387. Even before 1387 there was also the petit conseil or conseil ordinaire or conseil Stroit, a body not recognized by the law, though it became very

powerful; it was composed of the 4 syndics, with several other counsellors, and acted originally as the adviser of the syndics who were legally responsible for the rule of the city. In 1457 we first hear of the Council of the Fifty (re-established in 1502 and later known as the Sixty), and in 1526 of the Council of the Two Hundred (established in imitation of those of Bern and Fribourg), both being summoned in special cases of urgency. The members of both were named by the petit conseil, of which, in turn, the members were confirmed or not by the Two Hundred. By the Constitution of 1543 the conseil geniral had only the right of choosing the 4 syndics out of a list of 8 presented by the petit conseil and the Two Hundred, which therefore really elected them, subject to a formal approbation on the part of the larger body. This system was slightly modified in 1568, the constitution of that date lasting till 1794. The conseil general fell more and more into the background, the members of the other councils gradually obtained the privilege of being irremovable, and the system of co-optation resulted in the creation of a close monopoly of political offices in the hands of a few leading families.

During the 17th and 18th centuries, while the Romanist majority of the Swiss cantons steadily refused to accept Geneva as even a subordinate member of the Confederation, the city itself was distracted on several occasions by attempts of the citizens, as a whole, to gain some share in the aristocratic govern- ment of the town, though these attempts were' only partially successful. But the last half of the 18th century marks the most brilliant period in the literary history of Geneva, whether as regards natives or resident foreigners, while in the succeeding half century the number of Genevese scientific celebrities is remarkable. In 1794 the effects of the French Revolution were shown in the more liberal constitution

granted by the city government. But in 1798 the city was annexed to France and became the capital of the French department of Leman (to be carefully distinguished from the Swiss canton of Leman, that is Vaud,.of the Helvetic Republic, also set up in 1798), while in 1802, by the Concordat, the ancient bishopric of Geneva was suppressed. On the fall of Napoleon (1813) the city recovered its independence, and finally, in 181 5, was received as the junior member of the Swiss confederation, several bits of French and Savoyard territory (as pointed out above) being added to the narrow bounds of the old Genevese Republic in order to give the town some protection against its non-Swiss neighbours.

The constitution of 18 14 set up a common form of government for the city and the canton, the city not obtaining its municipal independence till the constitution of 1842. From 1535 to 1798 public worship according to the Romanist form had been strictly forbidden. In 1799 already the first attempts were made to re-establish it, and in 1803 the church of St Germain was handed over to the Romanists. The constitution of 1814, looking for- ward to the annexation of Romanist districts to the city territory to form the new canton, guaranteed to that body the freedom of worship, at any rate in these newly gained districts. In 18 19 the canton (the new portions of which were inhabited mainly by Romanists) was annexed to the bishopric of Lausanne, the bishop in 1821 being authorized to add " and of Geneva " to his episcopal style. After the adventure of the " Escalade " the fortifications were once more strengthened and extended, these works being completed about 1726. But, in 1822, some of the bastions were converted into promenades, while in 1849 the rest of the fortifications were pulled down so as to allow the city to expand and gradually assume its present aspect.

When Geneva recovered its political independence in 1814 a new constitution was drawn up, but it was very reactionary, for there is no mention in it of the sovereignty of the people. It set up a conseil representatif or legislature of 250 members,- which named the conseil d'etat or executive, while it was itself ' elected by a limited class, for the electoral qualification was the annual payment of direct taxes to the amount of 20 Swiss livres or about 23 shillings. It was not till 1842 that this system, though much criticized, was modified. In the early part of 1841 the " Third of March Association " was formed to watch over the interests of the citizens, and in November of that year the

government was forced by a popular demonstration to summon an assemblie constituante, which in 1842 elaborated a new con-

stitution that was accepted by the citizens. Besides bestowing on the city a government distinct from that of the canton, it set up for the latter a grand conseil or legislature, and a conseil d'etat or executive of 13 members, both elected for the term of 4 years. But this constitution did not seem liberal enough to many citizens, so that in 1846 the government gave way to the Radicals, led by James Fazy (1794-1878), who drew up a con- stitution that was accepted by a popular vote on the 21st of May 1847. It was much more advanced than that of 1842, and in its main features still prevails. From that date till 1864 the Radicals ruled the state, their head, Fazy, being an able man, though extravagant and inclined to absolutism. Under his sway the town was modernized and developed, but the finances were badly administered, and Fazy became more and more a radical dictator. " On voudrait faire de Geneve," sighed the conser- vative, de la Rive, " la plus petite des grandes villes, et pour moi je prefere qu'elle reste la plus grande des petites villes." In 1 86 1 and in 1864 Fazy failed to secure his re-election to the conseil d'Uat, riots followed his defeat, and the Federal troops were forced to intervene so as to restore order.

The Democratic party (liberal-conservative) ruled from 1865 to 1870, and did much to improve the finances of the state. In 1870 the Radicals regained the supremacy under their new chief, Antoine Carteret (1813-1889) and kept it till 1878. This was a period of religious strife, due to the irritation caused by the Vatican council, and the pope's attempt to revive the bishopric of Geneva. Gaspard Mermillod (1824-1891) was named in 1864 cure of Geneva, and made bishop of Hebron in partibus, acting as the helper of the bishop of Lausanne. Early in 1873 the pope named him " vicar apostolic of Geneva," but he was ex- pelled a few weeks later from Switzerland, not returning till 1883, when he became bishop of Lausanne, being made cardinal in 1890. The Radical government enacted severe laws as to the Romanists in Geneva, and gave privileges to the Christian Catholic Church, which, organized in 1874 in Switzerland, had absorbed the community founded at Geneva by Pere Hyacinthe, an ex-Carmelite friar. The Romanists therefore were no longer recognized by the state, and were persecuted in divers ways, though the tide afterwards turned in their favour. The Democrats ruled from 1878 to 1880, and introduced the " Referendum " (1879) into the cantonal constitution, but, their policy of the separation of church and state having been rejected by the people at a vote, they gave way to the Radicals. The Radicals went out in 1889, and the Democrats held the reins of power till 1897, their leader being Gustave Ador. In 1891 they introduced the "Initiative" into the cantonal constitution,

and in 1892 the principle of proportional representation so far as regards the grand conseil, while Th. Turrettini did much to increase the economical prosperity of the city. In 1897 the Radicals came in again, their leaders being first Georges Favon (1843-1902) till his death, and then Henri Fazy, a distant relative of James and an excellent historian. They attempted to rule by aid of the Socialists, but their power fluctuated as the demands of the Socialists became greater. On the 30th of June 1907 the Genevese, by a popular vote, decided on the separation of Church and State.

Authorities. — D. Baud-Bovy, Peintres genevois, 1702-1807 (2 vols., Geneva, 1903-1904) ; J. T. de Belloc, Le Cardinal Mermillod (Fribourg, 1892); M. Besson, Recherches sur les origines des Mches de Geneve, Lausanne et Sion (Fribourg, 1906) ; J. D. Blavignac. Armorial genevois (Geneva, 1849), and ILtudes sur Geneve depuis Vantiquitk jusqu'd. nos jours (2 vols., Geneva, 1872-1874); Fr. Bonivard, Chroniques de Geneve (Reprint) (2 vols., Geneva, 1867); F. Borel, Les Foires de Geneve au XV e siecle (Geneva, 1892); Ch. Borgeaud, Histoire de I'universite de Geneve, 155Q-1798 (Geneva, 1900) ; E. Choisy, La Theocratie a Geneve au temps de Calvin (Geneva, 1898), and L'Etat chrUien Calviniste a Geneve au temps de Theodore de Beze (Geneva, 1902) ; F. de Crue, La Guerre feodale de Geneve et V eiablissement de la Commune, 1205-1320 (Geneva, 1907) ; H. Denkinger, Histoire populaire du canton de Geneve (Geneva, 1905) ; E. Doumergue, La Geneve Calviniste (containing a minute topo- graphical description of 16th-century Geneva, and forming vol. iii. of the author's Jean Calvin) (Lausanne, 1905) ; E. Dunant, Les

Relations politiques de Geneve avec Berne et les Suisses, de 1536 d. 1564 (Geneva, 1894); Documents de VEscalade de Geneve (Geneva, 1903); G. Fatio and F. Boissonnas, La Campagne genevoise d'apres nature (Geneva, 1899), and Geneve & travers les siecles (Geneva, 1900); H. Fazy, Histoire de Geneve & I'epoque de VEscalade, 1598-1603 (Geneva, 1902), and Les Constitutions de la Republique de Geneve (to 1847) (Geneva, 1890); J. B. G. Galiffe, Geneve historique et archeo- logique (2 vols., Geneva, 1869-1872); J. A. Gautier, Histoire de Geneve (to 1691) (6 vols., 1896-1903); F. Gribble and J. H. and M. H. Lewis, Geneva (London, 1908); j. Jullien, Histoire de Geneve (new ed., Geneva, 1889); C. Martin, La Maison de Ville de Geneve (Geneva, 1906) ; MSmoires et documents

(publ. by the local Historical Society since 1821); F. Mugnier, Les ~ £,vbques de Geneve- Annecy, 1535-1870 (Paris, 1888); Pierre de Geneve, St (monograph on the cathedral), 4 parts (Geneva, 1891-1899); A. de Montet, Diction- naire biographique des Genevois, &c. (2 vols., Lausanne, 1878) ; C. L. Perrin, Les Vieux Quartiers de Geneve (Geneva, 1904); A. Pfleghart, Die schiveizerische Uhrenindustrie (Leipzig, 1908) ; Rigeste genevois avant 131 2 (Geneva, 1866); Registres du conseil de Geneve, vols. i. and ii., 1409-1477 (Geneva, 1900-1906) ; A. Roget, Histoire du peuple de Geneve depuis la Reforme jusqu'a VEscalade (7 vols., from 1536-1568; Geneva, 1870-1883); A. Rilliet, Le Retablissement du Catholicisme & Geneve il y a deux siecles (Geneva, 1880); P. Vaucher, Luttes de Geneve contre la Savoie, 1517-1530 (Geneva, 1889) ; Recueil ginealogique Suisse (Geneve) (2 vols., Geneva, 1902- 1907). (W. A. B. C.)

GENEVA CONVENTION, an international agreement for the purpose of improving the condition of wounded soldiers of armies in the field, originally adopted at an international conference held at Geneva, Switzerland, in 1864, and afterwards replaced by the convention of July 6, 1906, also adopted at Geneva. This later agreement is the one now known as the Geneva Con- vention. The conference of 1864 was the result of a movement which sprang from the publication in 1862 of a book entitled Un Souvenir de Solferino by Henri Dunant, a Genevese philan- thropist, in which he described the sufferings of the wounded at the battle of Solferino with such vivid effect that the subject became forthwith one of public interest. It was energetically taken up by M. Gustave Moynier, whose agitation led to an unofficial congress being held at Geneva in October 1863. This was followed by an official one at Geneva, called by the Swiss government in 1864. The convention which was there signed (22nd August 1864) on behalf of the states represented, after- wards received the adherence of every civilized power.

At a second conference on the same subject, held at Geneva in 1868, a supplementary convention was drawn up, consisting of fourteen additional articles, five of which related to war on land and nine to naval warfare. The additional articles were not, however, ratified by the chief states, and never became operative. The Brussels International Conference (1874) for the codification of the law and customs of war occupied itself with the Geneva Convention and again drew up a number of articles which were submitted to the interested governments. But, as in the case of the additional articles of 1868, no effect was ever given to them. At the Peace Conference of 1899 Great Britain withdrew her objections to the application of

the convention to maritime warfare, and agreed to the adoption of a special convention " adapting to Maritime warfare the principles of the Geneva Convention." A voeu was also adopted by the conference express- ing the wish that a special conference should be held as soon as possible for the purpose of revising the convention of 1864.

In deference to the above voeu the Swiss government in 1901 sounded the other parties to the convention of 1864 as to whether the time had not come to call the proposed special conference, but the replies received did not give much encouragement and the matter was dropped for the time being. By a circular note of the 1 7th of February 1903, the Swiss government invited all the states which had signed or adhered to the Geneva Convention to send representatives to a conference to be held at Geneva in the following September. Some governments did not accept the invitation in time and the conference had to be postponed . At the beginning of 1904, there being no apparent obstacle, the Swiss government again invited the powers to send delegates to a conference in the following May. Meanwhile war broke out between Russia and Japan and there was again an adjourn- ment. At length in March 1906 an invitation was accepted by thirty-five states, only Turkey, Salvador, Bolivia, Venezuela,

Nicaragua and Colombia abstaining and the conference was held at Geneva in July 1906, when a full revised convention was adopted, which now takes the place of that of 1864. 1 The adoption of the new Geneva Convention entailed a revision of the above-mentioned Hague Convention and a new edition of the latter is one of the documents adopted at the Peace Conference of 1907.

The new Geneva Convention consists of thirty-three articles divided into the following chapters, (i.) the wounded and sick; (ii.) medical units and establishments; (iii.) personnel; (iv.) material; (v.) convoys of evacuation; (vi.) the distinctive emblem; (vii.) application and carrying out of the Convention; (viii.) prevention of abuses and infractions; (ix.) general pro- visions.

The essential parts of the new Hague Convention of 1907 (18th of October) adapting the above conventions to maritime warfare as follows: (N.B. The alterations are in italics. The parts of the older convention of 1899 which have been suppressed are in brackets).

i. Military hospital-ships, that is to say, ships constructed _ or assigned by states specially and solely for the purpose of assisting the wounded, sick or shipwrecked, and the names of which shall have

been communicated to the belligerent powers at the commence- ment or during the course of hostilities, and in any case before they are employed, shall be respected and cannot be captured while hostilities last.

These ships, moreover, are not on the same footing as men-of-war as regards their stay in a neutral port.

ii. Hospital-ships, equipped wholly or in part at the cost of private individuals or officially-recognized Relief Societies, shall likewise be respected and exempt from capture, provided the belligerent power to whom they belong has given them an official commission and has notified their names to the hostile power at the commence- ment of or during hostilities, and in any case before they are employed, These ships should be furnished with a certificate from the com- petent authorities, declaring that they had been under their control while fitting out and on final departure.

iii. Hospital-ships, equipped wholly or in part at the cost of private individuals or officially-recognized Societies of neutral countries shall be respected and exempt from capture [if the neutral power to whom they belong has given them an official commission and notified their names to the belligerent powers at the commence- ment of or during hostilities, and in any case before they are em- ployed] on condition that they are placed under the orders of one of the belligerents, with the previous consent of their own Government and with the authorization of the belligerent, and on condition that the latter shall have notified their names to the enemy at the commencement or during the course of hostilities, in any event, before they are employed. iv. The ships mentioned in Articles i., ii. and iii. shall afford relief and assistance to the wounded, sick and shipwrecked of the bel- ligerents independently of their nationality.

The governments engage not to use these ships for any military purpose.

These ships must not in any way hamper the movements of the combatants.

During and after an engagement they will act at their own risk and peril.

The belligerents will have the right to control and visit them; they can refuse to help them, order them off, make them take a certain course, and put a commissioner on board; they can even detain them,

if important circumstances require it.

As far as possible the belligerents shall inscribe in the sailing papers of the hospital-ships the orders they give them.

v. The military hospital-ships shall be distinguished by being painted white outside with a horizontal band of green about a metre and a half in breadth.

The ships mentioned in Articles ii. and iii. shall be distinguished by being painted white outside with a horizontal band of red about a metre and a half in breadth.

The boats of the ships above mentioned, as also small craft which may be used for hospital work, shall be distinguished by similar painting.

All hospital-ships shall make themselves known by hoisting, together with their national flag, the white flag with a red cross provided by the Geneva Convention, and, in addition, if they belong to a neutral Stale, by hoisting on the mainmast the national flag of the belligerent under whose direction they are placed.

Hospital-ships which, under the terms of Article iv., are detained by

1 Another International Conference held in December 1904 at the

Hague dealt with the status of hospital-ships in time of war. Great

Britain did not take part in this Conference. Her abstention,

however, was not owing to any objection of principle, but purely

I to considerations of domestic legislation.

the enemy, must lower the national flag of the belligerent under whom they were acting.

The above-mentioned vessels and boats, desiring at night-time to ensure the respect due to them, shall, with the consent of the belligerent whom they are accompanying, take the necessary steps that the special painting denoting them shall be sufficiently conspicuous.

vi. [Neutral merchantmen, yachts or vessels, having, or taking on board, sick, wounded or shipwrecked of the belligerents, cannot be captured for so doing, but they are liable to capture for any violation of neutrality they may have committed.]

The distinctive signs provided by Article v. can only be used, whether in time of peace or in time of war, to protect ships therein mentioned.

vii. In the case of a fight on board a war-ship, the hospitals shall be respected and shall receive as much consideration as possible.

These hospitals and their belongings are subject to the laws of war, but shall not be employed for any other purpose so long as they shall be necessary for the sick and wounded.

Nevertheless, the commander who has them under his orders, may make use of them in case of important military necessity, but he shall first ensure the safety of the sick and wounded on board.

viii. The protection due to hospital-ships and to hospitals on board war-ships shall cease if they are used against the enemy.

The fact that the crew of hospital-ships, and attached to hospitals on war-ships, are armed for the maintenance of order and for the defence of the sick or wounded, and the existence of a radio-telegraphic installa- tion on board, is not considered as a justification for withdrawing the above-mentioned protection.

ix. Belligerents may appeal to the charitable zeal of commanders of neutral merchant vessels, yachts or other craft, to take on board and look after the sick and wounded.

Ships having responded to this appeal, as well as those who have spontaneously taken on board sick, wounded or shipwrecked men, shall have the advantage of a special protection and of certain immunities. In no case shall they be liable to capture on account of such transport; but subject to any promise made to them they are liable to capture for any violation of neutrality they may have committed.

[vii.] x. The religious, medical or hospital staff of any captured ship is inviolable, and its members cannot be made prisoners of war. On leaving the ship they take with them the objects and surgical instruments which are their own private property.

This staff shall continue to discharge its duties while necessary, and

can afterwards leave when the commander-in-chief considers it possible.

The belligerents must guarantee to the staff that has fallen into their hands [the enjoyment of their salaries intact] the same allow- ances and pay as those of persons of the same rank in their own navy.

[viii.] xi. Sailors and soldiers, and other persons officially attached to navies or armies, who are taken on board when sick or wounded, to whatever nation they belong, shall be [protected] respected and looked after by the captors.

xii. Every vessel of war of a belligerent parly may claim the return of the wounded, sick or shipwrecked who are on board military hospital- ships, hospital-ships of aid societies or of private individuals, merchant ships, yachts or other craft, whatever be the nationality of these vessels.

xiii. // the wounded, sick or shipwrecked are received on board a neutral ship of war, it shall be provided, as far as possible, that they may take no further part in war operations.

xiv. The shipwrecked, wounded or sick of one of the belligerents who fall into the hands of the other, are prisoners of war. The captor must decide, according to circumstances, if it is best to keep them or send them to a port of his own country, to a neutral port, or even to a hostile port. In the last case, prisoners thus repatriated cannot serve as long as the war lasts.

xv. The shipwrecked, wounded or sick who are landed at a neutral port with the consent of the local authorities, must, failing a contrary arrangement between the neutral State and the belligerents, be guarded by the neutral State, so that they may not be again able to take part in the military operations.

The expenses of hospital treatment and internment shall be borne by the State to which the shipwrecked, wounded or sick belong. (T. Ba.)

GENEVA, LAKE OF, the largest lake of which any portion belongs to Switzerland, and indeed in central Europe. It is called Locus Lemannus by the old Latin and Greek writers, in 4th century a.d. Lacus Lausonius or Losanetes, in the middle ages generally Lac de Lausanne, but from the 16th century onwards Lac de Geneve, though from the end of the 18th century the name Lac Leman was revived — according to Prof. Forel Le Leman is the proper form. Its area is estimated at 223 sq.m. (Swiss Topo- graphical Bureau) or 2255 sq.

m. (Forel), of which about 140 sq. m. (134J sq. m. Forel) are politically Swiss (1235 sq. m. belonging to the canton of Vaud, nˆ sq. m. to that of Geneva, and 5 sq. m. to that of the Valais), the remainder (83 sq. m.) being French since the annexation of Savoy in i860 — the entire lake is included in the territory (Swiss or Savoyard) neutralized by the congress of Vienna in 181 5. The French part takes in nearly the whole of

the south shore, save its western and eastern extremities, which belong respectively to Geneva and to the Valais.

The lake is formed by the Rhone, which enters it at its east end, between Villeneuve (E.) and St Gingolph (W.), and quits it at its west end, flowing through the city of Geneva. The only important tributaries are the Drance (S.), the Venoge (N.) and the Veveyse (N.). The form of the lake is that of a crescent, of which the east end is broad and rounded, while the west end tapers towards the city of Geneva. The bird's eye length of the whole lake, from Chillon to Geneva, is 395 m., but along its axis 45 m. The coast-line of the north shore is 59 m. in length and that of the south shore 44J m. The maximum depth is 1015I ft., but the mean depth only 500 ft. The surface is 1231J ft. (Swiss Topog. Bureau) or 1220 ft. (Forel) above sea-level. The greatest width (between Morges and Amphion) is 8J m., but the normal width is 5 m. The lake forms two well-marked divisions, separated by the strait of Promenthoux, which is 2i6| ft. in depth, as a bar divides the Grand Lac from the Petit Lac. The Grand Lac includes the greater portion of the lake, the Petit Lac (to the west of the strait or bar) being the special Genevese portion of the lake, and having an area of but 30J sq. m. The unusual blueness of the waters has long been remarked, and the transparency increases the farther we get from the point where the Rhone enters it, the deposits which the river brings down from the Alps gradually sinking to the bottom of the lake. At Geneva we recall Byron's phrase, " the blue rushing of the arrowy Rhone " (Childe Harold, canto iii. stanza 71). The limit of visibility of a white disk is 33 ft. in winter (in February 1891 Prof. Forel observed an extreme of 70J ft.) and 21 i ft. in summer. Apart from the seasonal changes in the level of the lake (which is highest in summer, no doubt because of the melting of the Alpine snows that feed the Rhone), there are also the remarkable temporary disturbances pf level known as the seiches, in which the whole mass of water in the lake rhythmically swings from shore to shore. According to Prof. Forel there are both longitudinal and transverse seiches. The effect of the longitudinal seiches at Geneva is four times as great as at Chillon, at the other end of the lake, while the extreme duration of this phenomenon is 73 minutes for the uninodal

longitudinal seiches (35J minutes for the binodal) and 10 minutes for the transverse seiches (5 minutes for the binodal). The maximum height of a recorded seiche at Geneva is rather over 6 ft. (October 1841). The currents in the water itself are irregular. The principal winds that blow over the lake are the bise (from the N.E.), the vaudaire or Fbhn (from the S.E.), the sudois or vent de pluie (from the S.W.) and the joran (from the N.W.). The storm winds are the molan (from the Arve valley towards Geneva) and the bornan (from the Drance valley towards the central portion of the lake). The lake is not as rich in fish as the other Swiss lakes, one reason being the obstacle opposed by the Perte du Rh6ne to fish seeking to ascend that river. Prof. Forel knows of but twenty indigenous species (of which the Fira, or Coregonus fera, is the principal) and six that have been introduced by man in the 19th century. A number of lake dwellings, of varying dates, have been found on the shores of the lake. The first steamer placed on the lake was the " Guillaume Tell," built in 1823 at Geneva by an Englishman named Church, while in 1873 the present Compagnie generate de navigation sur le lac Lehman was formed, and in 1875 constructed the first saloon steamer, the " Mont Blanc." But despite this service and the railways along each shore, the red lateen sails of minor craft still brighten the landscape. The railway along the northern shore runs from Geneva past Nyon, Rolle, Morges, Ouchy (the port of Lausanne), Vevey and Montreux to Villeneuve (56! m.). That on the south shore gains the edge of the lake at Thonon only (22 J m. from Geneva), and then runs past Evian and St Gingolph to Le Bouveret (20 m. from Thonon). In the harbour of Geneva two erratic boulders of granite project above the surface of the water, and are named Pierres du Niton (supposed to be altars to Neptune). The lower of the two, which is also the farthest from the shore, has been taken as the basis of the triangulation of Switzer- land: the official height is 376-86 metres, which in 1891 was reduced to 373 – 54 metres, though 376-6 metres is now said to be the real figure. Of course the heights given on the Swiss Government map vary with these different estimates of the point taken as basis.

For all matters relating to the lake, see Prof. F. A. Forel's monumental work, Le Leman (3 vols., Lausanne, 1 892-1 904) ; also (with fine illustrations) G. Fatio and F. Boissonnas, Autour du lac Leman (Geneva, 1902). (W. A. B. C.)

GENEVIEVE, or Genovefa, ST (c. 422-512), patroness of Paris, lived during the latter half of the 5th century. According to tradition, she was born about 422 at Nanterre near Paris; her parents were called Severus and Gerontia, but accounts differ widely as to their social

position. According to the legend, she was only in her seventh year when she was induced by St Germain, bishop of Auxerre, to dedicate herself to the religious life. On the death of her parents she removed to Paris, where she distinguished herself by her benevolence, as well as by her austere i life. She is said to have predicted the invasion of the Huns; and

when Attila with his army was threatening the city, she persuaded the inhabitants to remain on the island and encouraged them by an assurance, justified by subsequent events, that the attack would come to nothing (451). She is also said to have had great influence over Childeric, father of Clovis, and in 460 to have caused a church to be built over the tomb of St Denis. Her death occurred about 512 and she was buried in the church of the Holy Apostles, popularly known as the church of St Genevieve. In 1793 the body was taken from the new church, built in her honour by Louis XV., when it became the Pantheon, and burnt on the Place de Greve; but the relics were enshrined in a chapel of the neighbouring church of St Etienne du Mont, where they still attract pilgrims; her festival is celebrated with great pomp on the 3rd of January. The frescoes of the Pantheon by Puvis de Chavannes are based upon the legend of the saint.

Bibliography. — The main source is the anonymous Vita s. Genovefae virginis Parisiorum, published in 1687 by D. P. Charpentier. The genuineness of this life was attacked by B. Krusch (Neues Arckiv, 1893 and 1894) and defended by L. Duchesne, Bibliotheque de I'Ecole des Chartes (1893), Bulletin critique (1897), p. 473. Krusch continued to hold that the life was an 8th-century forgery (Scriptores rer. Merov. iii. 204-238). See A. Potthast, Bibliotheca medii aevi (1331, 1332), and G. Kurth, Clovis, ii. 249-254. The legends and miracles are given in the Bollandists'^4 eta Sanctorum, January 1st; there is a short sketch by Henri Lesetre, Ste Genevieve, in " Les Saints " series (Paris, 1900).

GENEVIEVE, Genoveva or Genovefa, OF BRABANT, heroine of medieval legend. Her story is a typical example of the widespread tale of the chaste wife falsely accused and repudiated, generally on the word of a rejected suitor. Genovefa of Brabant was said to be the wife of the palatine Siegfried of Treves, and was falsely accused by the majordomo Golo. Sentenced to death she was spared by the executioner, and lived for six years with her son in a cave in the

Ardennes nourished by a roe. Siegfried, who had meanwhile found out Golo's treachery, was chasing the roe when he discovered her hiding-place, and reinstated her in her former honour. Her story is said to rest on the history of Marie of Brabant, wife of Louis II., duke of Bavaria, and count-palatine of the Rhine, who was tried by her husband and beheaded on the 1 8th of January 1256, for supposed infidelity, a crime for which Louis afterwards had to do penance. The change in name may have been due to the cult of St Genevieve, patroness of Paris. The tale first obtained wide popularity in L' Innocence reconnue, ou vie de Sainte Genevieve de Brabant (pr. 1638) by the Jesuit Ren6 de Cerisier (1603-1662), and was a frequent subject for dramatic representation in Germany. With Genovefa's history may be compared the Scandinavian ballads of Ravengaard og Memering, which exist in many recensions. These deal with the history of Gunild, who married Henry, duke of Brunswick and Schleswig. When Duke Henry went to the wars he left his wife in charge of Ravengaard, who accused her of infidelity. Gunild is cleared by the victory of her champion Memering, the " smallest of Christian men." The Scottish ballad of Sir Aldingar is a version of the same story. The heroine Gunhilda is said to have been the daughter of Canute the Great and Emma. She married in 1036 King Henry, afterwards the emperor Henry III., and there was nothing in her domestic history to warrant the legend, which is given as authentic history by William of Malmesbury {De gestis regum Anglorum, lib.ii. § 188). She was called Cunigund after her marriage, and perhaps was confused with St Cunigund, the wife of the emperor Henry II. In the Karlamagnus-saga the innocent wife is Oliva, sister of Charlemagne and wife of King Hugo, and in the French Carolingian cycle the emperor's wife Sibille (La Reine Sibille) or Blanchefleur (Macaire). Other forms of the legend are to be found in the story of Doolin's mother in Doon deMayence, the English romance of Sir Triamour, in the story of the mother of Octavian in Octavian the Emperor, in the German folk book ■ Historie von der geduldigen Konigin Crescentia, based on a 12th- century poem to be found in the Kaiserchronik ; and the English Erl of Toulouse (c. 1400). In the last-named romance it has been suggested that the story gives the relations between Bernard I. count of Toulouse, son of the Guillaume d'Orange of the Caro- lingian romances, and the empress Judith, second wife of Louis the Pious.

See F. J. Child, English and Scottish Popular Ballads, vol. ii. (1886), art. "Sir Aldingar"; S. Grundtvig, Danske Kaempeviser (Copenhagen, 1867); " Sir Triamore," in Bishop Percy's Folio MS., ed. Hales and Furnivall, vol. ii. (London, 1868); The Romance of Octavtan, ed. E.

M. Goldsmid (Aungervyle Soc, Edinburgh, 1882); The Erl of Toulous and the Emperes of Almayn, ed. G. Liidtke (Berlin, 1881); B. Seuffert, Die Legende von der Pfalzgrafin Genovefa (Wfirz- burg, 1877); B. Golz, Pfalzgrafin Genovefa in der deutschen Dichtung (Leipzig, 1897); R. Kohler, " Die deutschen Volksbiicher von der Pfalzgrafin Genovefa," in Zeitschr. fur deutsche Philologie (1874).

6EN6A, GIROLAMO (c. 1476-1551), Italian painter and architect, was born in Urbino about 1476. At the age of ten he was apprenticed trj the woollen trade, but showed so much inclination for drawing that he was sent to study under an obscure painter, and at thirteen under Luca Signorelli, with whom he remained a considerable while, frequently painting the accessories of his pictures. He was afterwards for three years with Pietro Perugino, in company with Raphael. He next worked in Florence and Siena, along with Timoteo della Vite; and in the latter city he painted various compositions for Pandolfo Petrucci, the leading local statesman. Returning to Urbino, he was employed by Duke Guidobaldo in the decora- tions of his palace, and showed extraordinary aptitude for theatrical adornments. Thence he went to Rome; and in the church of S. Caterina da Siena, in that capital, is one of his most distinguished works, " The Resurrection," remarkable both for design and for colouring. He studied the Roman antiquities with zeal, and measured a number of edifices; this practice, combining with his previous mastery of perspective, qualified him to shine as an architect. Francesco Maria della Rovere, the reigning duke of Urbino, recalled Genga, and commissioned him to execute works in connexion with his marriage-festivities. This prince being soon afterwards expelled by Pope Leo X., Genga followed him to Mantua, whence he went for a time to Pesaro. The duke of Urbino was eventually restored to his dominions; he took Genga with him, and appointed him the ducal architect. As he neared the close of his career, Genga retired to a house in the vicinity of Urbino, continuing still to produce designs in pencil; one, of the " Conversion of St Paul," was particularly admired. Here he died on the nth of July 1 551. Genga was a sculptor and musician as well as painter and architect. He was jovial, an excellent talker, and kindly to his friends. His principal pupil was Francesco Menzocchi. His own son Bartolommeo (1518-1558) became an architect of celebrity. In Genga's paintings there is a great deal of freedom, and a certain peculiarity of character consonant with his versatile, lively and social temperament. One of his leading works is in the church of S. Agostino in Cesena — a triptych in oil-colours, representing the " Annunciation," " God the Father in Glory," and the " Madonna and Child." Among his architectural labours are the church of San

Giovanni Battista in Pesaro; the bishop's palace at Sinigaglia; the facade of the cathedral of Mantua, ranking high among the productions of the 16th century; and a new palace for the duke of Urbino, built on the Monte Imperiale. He was also concerned in the fortifications of Pesaro.

GENISTA, in botany, a genus of about eighty species of shrubs belonging to the natural order Leguminosae, and natives of Europe, western Asia and North Africa. Three are native in Britain. G. anglica is the needle-furze or petty whin, found on heaths and moist moors, a spinous plant with' slender spreading branches 1 to 2 ft. long, very small leaves and short racemes of small yellow papilionaceous flowers. The pollen is emitted in a shower when an insect alights on it. G. tinctoria, dyer's green-weed, the flowers of which yield a yellow dye, has no spines. Other species are grown on rock-work or as green- house plants.

GENIUS (from Lat. genere, gignere), a term which originally meant, in Roman mythology, a generative and protecting spirit, who has no exact parallel in Greek religion, and at least in his earlier aspect is of purely Italian origin as one of the deities of family or household. Every man has his genius, who is not his creator, but only comes into being with him and is allotted to him at his birth. As a creative principle the genius is restricted

to man, his place being taken by a Juno (cp. Juno Lucina, the goddess of childbirth) in the case of women. The male and female spirit may thus be distinguished respectively as the protector of generation and of parturition (tutela generandi, pariendi), although the female appears less prominent. It is the genius of the paterfamilias that keeps the marriage bed, named after him lecius genialis and dedicated to him, under his special protection. The genius of a man, as his higher intellectual self, accompanies him from the cradle to the grave. In many ways he exercises a decisive influence on the man's character and mode of life (Horace, Epistles, ii. 2. 187). The responsi- bility for happiness or unhappiness, good or bad fortune, lay with the genius; but this does not suppose the existence of two genii for man, the one good and- the other bad (ayadoSaifiuv, KaKoSalfuiiv), an idea borrowed from the Greek philosophers. The Roman genius, representing man's natural optimism, always endeavoured to guide him to happiness; that man

was intended to enjoy life is shown by the fact that the Roman spoke of in- dulging or cheating his genius of his due according as he enjoyed himself or failed to do so, when he had the opportunity. A man's birthday was naturally a suitable occasion for honouring his genius, and on that occasion offerings of incense, wine, garlands, and cakes were made (Tibullus ii. 2; Ovid, Tristia, iii. 13. 18). As the representative of a man's higher self and participating in a divine nature, the genius could be sworn by, and a person could take an oath by his own or some one else's genius. When under Greek influence the Roman idea of the gods became more and more anthropomorphized, a genius was assigned to them, not however as a distinct personality. Thus we hear of the genius of Jupiter (Jovis Genio, C.I.L. i. 603), Mars, Juno, Pluto, Priapus. In a more extended sense the genius is also the generator and preserver of human society, as manifested in the family, corporate unions, the city, and the state generally. Thus, the genius publicus Populi Romani — probably distinct from the genius Urbis Romae, to whom an old shield on the Capitol was dedicated, with an inscription expressing doubt as to the sex (Genio . . . sive mas sive femina) — stood in the forum near the temple of Concord, in the form of a bearded man, crowned with a diadem, and carrying a cornu copiae and sceptre. It frequently appears on the coins of Trajan and Hadrian. Sacrifice, not confined to bloodless offerings like those of the genius of the house, was offered to him annually on the 8th of October. There were genii of cities, colonies, and even of provinces; of artists, business people and craftsmen; of cooks, gladiators, standard-bearers, a legion, a century, and of the army generally (genius sanctus castrorum peregrinorum totiusque exercilus). In imperial times the genius of Augustus and of the reigning emperor, as part of the sacra of the imperial family, were publicly worshipped. It was a common practice (often compulsory) to swear by the genius of the emperor, and any one who swore falsely was flogged. Localities also, such as theatres, baths, stables, streets, and markets, had their own genius. The word thus gradually lost its original meaning; the nameless local genii became an expression for the universality of the divinum numen and were sometimes identified with the higher gods. The local genius was usually represented by a snake, the symbol of the fruitfulness of the earth and of perpetual youth. Hence snakes were usually kept in houses (Virgil, Aen. v. 95; Persius i. 113), their death in which was considered a bad omen. The personal genius usually appeared as a handsome youth in a toga, with head sometimes veiled and sometimes bare, carrying a drinking cup and cornu copiae, frequently in the position of one offering sacrifice.

See W. H. Roscher, Lexikon der Mythologie, and article by J. A.

Hild in Daremberg and Saglio, Dictionnaire des antiquites, where

full references to ancient and modern authorities are given ; L.

, Preller, Romische Mythologie, 3rd ed., by H.Jordan; G. Wissowa,

Religion und Kultur der Romer.

Apart from the Latin use of the term, the plural " genii " (with a singular " genie ") is used in English, as equivalent to the Arabic jinn, for a class of spirits, good or bad, such as are described, for instance, in The Arabian Nights. But " genius " itself has become the regular English word for the highest

conceivable form of original ability, something altogether extraordinary and beyond even supreme educational prowess, and differing, in kind apparently, from " talent," which is usually distinguished as marked intellectual capacity short only of the inexplicable and unique endowment to which the term ■" genius " is confined. The attempt, however, to define either quality, or to discriminate accurately between them, has given rise to continual controversy, and there is no agreement as to the nature of either; and the commonly quoted definitions of genius— such as Carlyle's " transcendant capacity of taking trouble, first of all," 1 in which the last three words are usually forgotten — are either admittedly incomplete or are of the nature of epigrams. Nor can it be said that any substantial light has been thrown on the matter by the modern physiological school, Lombroso and others, who regard the eccentricity of genius as its prime factor, and study it as a form of mental derangement. The error here is partly in ignoring the history of the word, and partly in misrepresenting the nature of the fact. There are many cases, no doubt, in which persons really insane, of one type or another, or with a history of physical degeneration or epilepsy, have shown remarkable originality, which may be described as genius, but there are at least just as many in whom no such physical abnormality can be observed. The word " genius " itself however has only gradually been used in English to express the degree of original greatness which is beyond ordinary powers of explanation, i.e. far beyond the capacity of the normal human being in creative work; and it is a convenient term (like Nietzsche's " superman ") for application to those rare individuals who in the course of evolution reveal from time to time the heights to which humanity may develop, in literature, art, science, or administrative

life. The English usage was originally derived, naturally enough, from the Roman ideas contained in the term (with the analogy of the Greek baifmv), and in the 16th and 17th centuries we find it equivalent simply to " distinctive character or spirit," a meaning still commonly given to the word. The more modern sense is not even mentioned in Johnson's Dic- tionary, and represents an 18th-century development, primarily due to the influence of German writers; the meaning of "dis- tinctive natural capacity or endowment " had gradually been applied specially to creative minds such as those of poets and artists, by contrast with those whose mental ability was due to the results of education and study, and the antithesis has extended since, through constant discussions over the attempt to differentiate between the real nature of genius and that of " talent," until we now speak of the exceptional person not merely as having genius but as " a genius." This phraseology appears to indicate some reversion to the original Roman usage, and the identification of the great man with a generative spirit. Modern theories on the nature of " genius " should be studied with considerable detachment, but there is much that is interesting and thought-provoking in such works as J. F. Nisbet's Insanity of Genius (1891), Sir Francis Galton's Hereditary Genius (new ed., 1892), and C. Lombroso's Man of Genius (Eng. trans., 1891).

GENLIS, STEPHANIE-FELICITfi DU CREST DE SAINT- AUBIN, Comtesse de (1746-1830), French writer and educator, was born of a noble but impoverished Burgundian family, at Champcery, near Autun, on the 25th of January 1746. When six years of age she was received as a canoness into the noble chapter of Alix,' near Lyons, with the title of Madame la Comtesse de Lancy, taken from the town of Bourbon-Lancy. Her entire education, however, was conducted at home. In 1758, in Paris, her skill as a harpist and her vivacious wit speedily attracted admiration. In her sixteenth year she was married to Charles Brulart de Genlis, a colonel of grenadiers, who afterwards became marquis de Sillery, but this was not allowed to interfere with her determination to remedy her incomplete education, and to satisfy a taste for acquiring and imparting knowledge. Some years later, through the influence of her aunt, Madame de Montesson, who had been clandestinely married to the duke of Orleans, she entered the Palais Royal as lady-in-waiting to the duchess of Chartres (1770). She acted with great energy and zeal as governess to the daughters of the family, and was in 1781 1 Frederick the Great, iv. iii. 1407.

appointed by the duke of Chartres to the responsible office of gouvemeur of his sons, a bold step which led to the resignation of all the tutors as well as to much social scandal, though there is no reason to suppose that the intellectual interests of her pupils suffered on that account. The better to carry out her ingenious theories of education, she wrote several works for their use, the best known of which are the Theatre d'iducation (4 vols., 1779- 1780), a collection of short comedies for young people, Les Annales de la vertu (2 vols., 1781) and Adele et Theodore (3 vols., 1782). Sainte-Beuve tells how she anticipated many modern methods of teaching. History was taught with the help of magic lantern slides and her pupils learnt botany from a practical botanist during their walks. In 1789 Madame de Genlis showed herself favourable to the Revolution, but the fall of the Girondins in 1 793 compelled her to take refuge in Switzerland along with her pupil Mademoiselle d'Orleans. In this year her husband, the marquis de Sillery, from whom she had been separated since 1782, was guillotined. An " adopted " daughter, Pamela, 1 had been married to Lord Edward Fitzgerald (q.v.) in the preceding December.

In 1794 Madame de Genlis fixed her residence at Berlin, but, having been expelled by the orders of King Frederick William, she afterwards settled in Hamburg, where she supported herself for some years by writing and painting. After the revolution of 18th Brumaire (1799) she was permitted to return to France, and was received with favour by Napoleon, who gave her apart- ments at the arsenal, and afterwards assigned her a pension of 6000 francs. During this period she wrote largely, and pro- duced, in addition to some historical novels, her best romance, Mademoiselle de Clermont (1802). Madame de Genlis had lost her influence over her old pupil Louis Philippe, who visited her but seldom, although he allowed her a small pension. Her government pension was discontinued by Louis XVIII. , and she supported herself largely by her pen. Her later years were occupied largely with literary quarrels, notably with that which arose out of the publication of the Diners du Baron d'Holbach (1822), a volume in which she set forth with a good deal of sarcastic cleverness the intolerance, the fanaticism, and the eccentricities of the " philosophes " of the 18th century. She survived until the 31st of December 1830, and saw her former pupil, Louis Philippe, seated on the throne of France.

The numerous works of Madame de Genlis (which considerably exceed eighty), comprising prose and poetical compositions on a vast variety of subjects and of various degrees of merit, owed much of their success to adventitious causes which have long ceased to

operate. They are useful, however (especially the voluminous Memoires inedits sur le XVIII' Steele, 10 vols., 1825), as furnishing material for history. Most of her writings were translated into English almost as soon as they were published. A list of her writings with useful notes is given by Querard in La France littiraire. Start-ling light was thrown on her relations with the due de Chartres by the publication (1004) of her correspondence with him in L'Idylle d'un " gouvemeur " by G. Maugras. See also Sainte-Beuve, Causeries du lundi, vol. iii. ; H. Austin Dobson, Four Frenchwomen (1890) ; L. Chabaud, Les Precurseurs du feminisme (1901); W. de Chabreul, Gouvemeur de princes, 1737-1830 (1900) ; and Leltres inedites a . . . Casimir Baecker, 1802-1830 (1902), edited by Henry Lapauze.

GENNA, a word of obscure origin borrowed from the Assamese, and used technically by anthropologists to describe a class of social and religious ordinances based on sanctions which derive their validity from a vague sense of mysterious danger which results from disobedience to them. These prohibitions — or system of things forbidden — affect the relations, permanent and temporary, of individuals (either as members of a tribe, village, clan or household, o'r as occupying an official position in the village or clan) towards other persons or groups of persons and towards material objects which possess intrinsic sanctity. The term is extended to the communal rites performed by the village, clan or household, either as magical ceremonies or as prophy- lactics on special occasions when the social, commensal, conjugal and alimentary relations of the group affected are subjected to temporary modifications. These practices and beliefs are observed among the hill tribes of Assam from the Abors and Mishmis on the north to the Lusheis on the south, all linguistically members 1 See Gerald Campbell, Edward and Pamela Fitzgerald (1905).

of the Tibeto-Burman group, and among the Khasis, members of the Mon-Khmer group. Genna and taboo (q.v.) are products of an identical level of culture and similar psychological processes, and provide the mechanism of the social and religious systems.

Permanent Gennas. — The only universal genna is that which forbids the intermarriage of members of the same clan. In some cases in Manipur animals are genna to the tribe — i.e. they must not be killed or eaten — but tribal differentiation is, in practice, based on dialectical distinctions rather than on tribal gennas. The village as such possesses no permanent gennas, but the clans, as the units of marriage under the law of exogamy, have distinct elementary gennas, especially the clan to which the priest-chief belongs. The

most important individual gennas are those which protect the priest-chief from impurity or contact with " sacred " substances such as the flesh of animals used in sacrifices. He may neither eat in a strange house, nor utter words of abuse, nor take an oath in a dispute, except in his representative capacity on behalf of his village. The first-fruits are genna to the village until he eats, thus establishing an opposition between him and his co-villagers. Married and unmarried women are subject to ali- mentary gennas; thus unmarried girls are forbidden the flesh of any male animal or of any female animal dying gravid.

Ritual Gennas. — Ritual gennas are held annually to foster the rice crops, all other industries and activities being genna (for- bidden) during the cultivating season, to secure good hunting, to avert sickness, especially epidemics, to take omens, and to lay finally to rest the ghosts of all that have died within the year. The village gates are closed, men and women eat apart, and con- jugal relations are suspended. Special village gennas are held when rain is needed, when a villager dies in any manner out of the ordinary, as women in childbirth, when an animal gives birth to still-born offspring, and when any permanent genna has been violated. Clan gennas are held for all ordinary cases of death. Household gennas are held on the occasions of birth (when the aliment and conduct of the father are specially regulated), naming, ear-piercing, the first hair-cutting, sickness, and, in certain areas, tattooing. Individuals are subjected to temporary gennas as warriors both before and after a head-hunting raid, pregnant women, married persons at the beginning of their married life, the wives of the priest-chief, and those who from ambition or pride of wealth seek to perpetuate their names by erecting a stone monument, an act which confers the right to wear the distinctive clothes of the priest-chief which otherwise are genna to the whole village. Ritual gennas are of varying duration. Some last for a month while others are complete in two days. As religious or magical rites, they prevent danger or establish and restore normal relations with powers which are potentially harmful or require placation.

Authorities. — Official records of the government of India, Nos. 23 (1855), 27 (1859), 68 (1870); Colonel T. H. Lewin, Hill Tracts of Chittagong; Report on the Census of Assam (189 1), vol. i. Report, note by A. W. Davis, p. 237 seq. ; Major P. R. T. Gurdon, The Khasis (1907); T. C. Hodson, Journal of the Royal Anthropological Institute, vol. xxxvi. (1906). (T. C. H.)

GENNADIUS II. [as layman Georgios Scholarios] (d. c. 1468),

patriarch of Constantinople from 145410 1456, philosopher and theologian, was one of the last representatives of Byzantine learning. Extremely little is known of his life, but he appears to have been born at Constantinople about 1400 and to have entered the service of the emperor John VII. Paleologus as imperial judge or counsellor. Georgios first appears conspicuously in history as present at the great council held in 1438 at Ferrara and Florence with the object of bringing about a union between the Greek and Latin Churches. At the. same council was present the celebrated Platonist, Gemistus Pletho, the most 'powerful opponent of the then dominant Aristotelianism, and consequently the special object of reprobation to Georgios. In church matters, as in philosophy, the two were opposed, — Pletho maintaining strongly the principles of the Greek Church, and being unwilling to accept union through compromise, while Georgios, more politic and cautious, pressed the necessity for union and was instrumental in drawing up a form which from its vagueness and ambiguity might be accepted by both parties.

GENOA

597

He was at a disadvantage because, being a layman; he could not directly take part in the discussions of the council. But on his re- turn to Greece his views changed, and he violently and obstinately opposed the union he had previously urged. In 1448 he became a monk at Pantokrator and took the name Gennadius. In 1453, after the capture of Constantinople by the Turks, Mahommed II. , finding that the patriarchal chair had been vacant for some time, resolved to elect some one to the office, and the choice fell on Gennadius. While holding the episcopal office Gennadius drew up, apparently for the use of Mahommed, a lucid confession or exposition of the Christian faith, which was translated into Turkish by Ahmed, judge of Beroea, and first printed by A. Brassicanus at Vienna in 1530. After a couple of years Gennadius found the position of patriarch under a Turkish sultan so irksome that he retired to the monastery of John the Baptist near Serrae in Macedonia, where he died about 1468. About one hundred of his alleged writings exist, the majority in manuscript and of doubtful authenticity.

The fullest account of his writings is given in Gass, Gennadius and Pletho (Berlin, 1844), the second part of which contains Pletho's Contra Gennadium. See also F. Schultze, Gesch. der Phil. d. Renais- sance, i. (1874). A list of the known writings of Gennadius is given in Fabricius, Bibliotheca Graeca, ed. Harles, vol. xi., and what has

been printed is to be found in Migne, Patrol. Gr. vol. clx.

GENOA (anc. Genua, Ital. Genova, Fr. Gbies), the chief port of Liguria, Italy, and capital of the ptovince of Genoa, 119 m. N.W. of Leghorn by rail. Pop. (1906) 255,294 (town); 267,248 (commune) . The town is situated on the Gulf of Genoa, and is the chief port and commercial town of Italy, the seat of an archbishop and a university, the headquarters of the IV. Italian army corps, and a strong fortress. The city, as seen from the sea, is " built nobly," and deserves the title it has acquired or assumed of the Superb. Finding only a small space of level ground along the shore, it has been obliged to climb the lower hills of the Ligurian Alps, which afford many a coign of vantage for the effective display of its architectural magnificence. The original nucleus of the city is that portion which lies to the east of the port in the neighbourhood of the old pier (Molo Vecchio). In the 10th century it began to feel a lack of room within the limits of its fortifications; and accordingly, in the middle of the 1 2th century, it was found necessary to extend the line of circumvallation. Even this second circuit, however, was of small compass, and it was not till 13 20-1330 that a third line took in the greater part of the modern site of the city proper. This presented about 3 m. of rampart towards the land side, and can still be easily traced from point to point through the city, though large portions, especially towards the east, have been dismantled. The present line of circumvallation dates from 1626-163 2, the period when the independence of Genoa was threatened by the dukes of Savoy. From the mouth of the Bisagno in the east, and from the lighthouse point in the west, it stretches inland over hill and dale to the great fort of Sperone, i.e. the Spur, on the summits of Monte Peraldo at a height of 1650 ft., — the circuit being little less than 12 m., and all the important points along the line being defended by forts or batteries.

A portion of the enclosed area is open country, dotted only here and there with houses and gardens. There are eight gates, the more important being Porta Pila and Porta Romana towards the east , and the Porta Lanterna or Lighthouse Gate to the west. The main architectural features of Genoa are its medieval churches, with striped facades of black and white marble, and its magnifi- cent 16th-century palaces. The earlier churches of Genoa show a mixture of French Romanesque and the Pisan style — they are mostly basilicas with transepts, and as a rule a small dome; the pillars are sometimes ancient columns, and sometimes formed of alternate layers of black and white marble. The facades are simple, without galleries, having only pilasters projecting from the wall, and are also alternately black and white. This style continued in Gothic times

also. The oldest is S. Maria di Castello (nth century), the columns and capitals of which are almost all antique. S. Cosma, S. Donato (with remains of the 10th-century building) and others belong to the

1 2th century, and S. Giovanni di Pre, S. Agostino (with a fine campanile), S. Stefano, S. Matteo and others to the 13th. The famous painting of the martyrdom of S. Stephen, by Giulio Romano, carried off by Napoleon in 181 1, was restored to S. Stefano in 181 5. S. Matteo, the church of the D'Oria or Doria family, was founded in n 26 by Martino Doria. The facade dates from 1278, and the interior of the edifice dates in the main from 1543. In the crypt is the tomb of Andrea Doria by Montorsoli, and above the main altar hangs the dagger presented to the doge by Pope Paul III. To the left of the church is an exquisite cloister of 1308 with double columns, in which a number of inscriptions relating to the Doria family and also the statue of Andrea Doria by Montorsoli are preserved. The little square in front of the church is surrounded by Gothic palaces of the Doria family. Of the churches the principal is the comparatively small cathedral of S. Lorenzo. Tradition makes its first founda- tion contemporary with St Lawrence himself; and a document of 987 implies that it was even then the metropolitan church. Reconstructed about the end of the nth and beginning of the 1 2th century, it was formally consecrated by Pope Gelasius II. on the 18th of October 1118; and since then it has undergone a large number of extensive though partial renovations. The facade, with its three elaborate doorways, belongs to the 14th century and is a copy of French models of the 13th. The two side portals with Romanesque sculptures belong to the 12th- 14th centuries. Some pagan reliefs are built into the tower. The interior was rebuilt in 1307, the old columns being used. The belfry, which rises above the right-hand doorway, was erected about 1520 by the doge, Ottaviano da Campofragoso, and the cupola was erected after the designs of the architect Galeazzo Alessi in 1567. The fine Early Renaissance (1448) sculptural decorations of the chapel of S. John the Baptist were due to Domenico Gagini of Bissone on the Lake of Lugano, who later transferred his activities to Naples and Palermo, and other Lombard masters. An edict of Innocent VIII. forbids women to enter the chapel except on one day in the year. In the treasury of the cathedral is a magnificent silver monstrance dating from 1553, and an octagonal bowl, the Sacro Catino, brought from Caesarea in nor, which corresponds to the de- scriptions given of the Holy Grail, and was long regarded as an emerald of matchless value, but was found when broken at Paris, whither it had been carried by Napoleon I., to be only a remark- able piece of ancient glass. The choir-stalls are a very

fine work of the 15th century and later, with intarsias. Near the cathedral is a small 12th-century (?) cloister.

Of older date than the cathedral is the church of S. Ambrose and S. Andrew, if its first foundation be correctly assigned to 1 the Milanese bishop Honoratus of the 6th century; but the present edifice is due to the Society of Jesus, who obtained possession of the church in 1 587. The interior is richly decorated and contains the " Circumcision " and " St Ignatius " by Rubens, and the " Assumption " of Guido Reni. The Annunziata del Guastato is one of the largest churches in the city, erected in r587. It is a cruciform structure, with a dome, and the central nave is supported by fourteen Corinthian columns of white marble. To the otherwise unfinished brick facade a portal borne by marble columns was added in 1843. The interior is covered with gilding and frescoes of the 17th century, and is somewhat overloaded with rich decoration, while a range of white marble columns supports the nave. Santa Maria delle Vigne probably dates from the gth century, but the present structure was erected in 1586. The campanile, however, is a remarkable work of the 13th century. Adjoining the church is a ruined cloister of the nth century. San Siro, originally the " Church of the Apostles" and the cathedral of Genoa, was rebuilt by the Benedictines in the nth century, and restored and enlarged by the Theatines in 1576, the facade being added in 1830; in this church in 1339 Simone Boccanera was elected first doge of Genoa. Santa Maria di Carignano, or more correctly Santa Maria Assunta e SS. Fabiano e Sebastiano, belongs mainly to the 16th century, and was designed by Galeazzo Alessi, in imitation of Bramante's plan for S. Peter's at Rome, as it was then being executed by

Michelangelo. The interior is fine, harmonious and restrained, painted in white and grey, while the colouring of the exterior is less pleasing. From the highest gallery of the dome — 368 ft. above the sea-level, and 194 ft. above the ground — a magnifi- cent view is obtained of the city and the neighbouring coast.

Buildings of the 15th century do not occupy an important place in Genoa, but there are some small private houses and remains of sculptural decoration of the Early Renaissance to be seen in the older portions of the town. The palaces of the Genoese patricians, famous for their sumptuous architecture, their general effectiveness (though

the architectural details are often faulty if closely examined), and their artistic collections, were many of them built in the latter part of the 16th century by Galeazzo Alessi, a pupil of Michelangelo, whose style is of an imposing and uniform character and displays marvellous ingenuity in using a limited or unfavourable site to the greatest advantage. Several of the villas in the vicinity of the city are also his work. The Via Garibaldi is flanked by a succession of magnificent palaces, chief among which is the Palazzo Rosso, so called from its red colour. Formerly the palace of the Brignole-Sale family, it was presented by the duchess of Galliera to the city in 1874, along with its valuable contents, its library and picture gallery, which includes fine examples of Van Dyck and Paris Bordone. The Palazzo Municipale, built by Rocco Lurago at the end of the 1 6th century, once the property of the dukes of Turin, has a beautiful entrance court and a hanging terraced garden fronting a noble staircase of marble which leads to the spacious council chamber. In an adjoining room are preserved a bronze tablet dating from 117 B.C. (see below), two autograph letters of Columbus, and the violin of Paganini, also a native of Genoa. Opposite the Palazzo Rosso is the Palazzo Bianco, a palace full of art treasures bequeathed to the city by the duchess of Galliera upon her death in 1889, and subsequently converted into a museum. The Roman antiquities here preserved belong to other places — Luna, Libarna, &c. The Adorno, Giorgio Doria (both containing small but choice picture-galleries), Parodi and Serra and other palaces in this street are worthy of mention. The Via Balbi again contains a number of palaces. The Durazzo Pallavicini palace has a noble facade and staircase and a rich picture-gallery. The street takes its name, however, from the Palazzo Balbi-Senarega, which has Doric colonnades and a fine orangery. The Palazzo dell' Universita has an extremely fine court and staircase of the early 17th century. The Palazzo Reale is also handsome but somewhat later. The Palazzo Doria in the Piazza del Principe, presented to Andrea Doria by the Genoese in 1522, is on the other hand earlier; it was remodelled in 1529 by Montorsoli and decorated with fine frescoes by Perino del Vaga. The old palace of the doges, originally a building of the 13th century, to which the tower alone belongs,, the rest of the building having been remodelled in the 16th century and modernized after a fire in 1777, stands in the Piazza Umberto Primo near the cathedral, and now contains the telegraph and other government offices. Another very fine building is the Gothic Palazzo di S. Giorgio, near the harbour, dating from about 1260, occupied from 1408 to 1797 by the Banca di S. Giorgio, and now converted into a produce exchange. The Campo Santo or Cimitero di Staglieno, about 15 m.

from the city on the banks of the Bisagno, is one of the chief features of Genoa; its situation is of great natural beauty and it is remarkable for its sepulchral monuments, many of which have been executed by the foremost sculptors of modern Italy. The university, founded in 147 1, is a flourishing institution with faculties in law, medicine, natural science, engineering and philosophy. Attached to it are a library, an observatory, a botanical garden, and a physical and natural history museum. Genoa is also well supplied with technical schools and other institutions for higher education, while ample provision is made for primary education. The hospitals and the asylum for the poor are among the finest institutions of their kind in Italy. Mention must also be made of the Academy of Fine Arts, the municipal library, the great Teatro Carlo Felice and the Verdi Institute of Music.

The irregular relief, of its site and its long confinement within the limits of fortifications, which it had outgrown, have both contributed to render Genoa a picturesque confusion of narrow streets, lanes and alleys, varied with stairways climbing the steeper slopes and bridges spanning the deeper valleys. Large portions of the town are inaccessible to ordinary carriages, and many of the important streets have very little room for traffic. In modern times, however, a number of fine streets and squares with beautiful gardens have been laid out. The Piazza Ferrari, a large irregular space, is the chief focus of traffic and the centre of the Genoese tramway system; it is embellished with a fine equestrian statue of Garibaldi, unveiled in 1893, which stands in front of the Teatro Carlo Felice. Leading from this piazza is the Via Venti Settembre, a broad, handsome street laid out since 1887, leading south-east to the Ponte Pila, the central bridge over the Bisagno. The street is itself spanned by an elegant bridge carrying the Corso Andrea Podesta, a modern avenue on the heights above. Adjoining the church of the. Madonna della Consolazione is the new market, a building of no little beauty. The Via Roma, another important centre of traffic which gives on to the Via Carlo Felice near the Piazza Ferrari, leads to the Piazza Corvetto, in the centre of which stands the colossal equestrian statue of Victor Emmanuel II. To the left is the Villetta Dinegro, a beautiful park belonging to the city, decorated with cascades and a number of statues and busts of prominent statesmen and citizens. To the right is another park, the Acquasola, laid out in 1837 on the site of the old ramparts. In the west of the city, in front of the principal station, is the Piazza Acquaverde. On the north side, embowered in palm trees, is a great statue of Columbus, at whose feet kneels the figure of America. Opposite is the Palazzo Faraggiana, with scenes from the

life of Columbus in relief on its marble pediment. Among other modern thoroughfares, the Via di Circonvallazione a Monte, laid out since 1876 on the hills at the back of the town, leads by many curves from the Piazza Manin along the hill-tops westward, and finally descends into the Piazza Acquaverde; its entire length is traversed by an electric tramway, and it commands magnificent views of the town. A similar road, the Via di Circonvallazione a Mare, was laid out in 1893- 1895 on the site of the outer ramparts, and skirts the sea- front from the Piazza Cavour to the mouth of the Bisagno, thence ascending the right bank to the Ppnte Pila. Genoa is remarkably well served with electric tramways, which are found in all the wider streets, and run, often through tunnels, into the suburbs and to the surrounding country on the east as far as Nervi and to Pegli oh the west. Three funicular railways from different points of the city give access to the highest parts of the hills behind the town.

Though its existence as a maritime power was originally due to its port, it is only since 1870 that Genoa has provided the conveniences necessary for the modern development of its trade, the duke of Galliera's gift of £800,000 to the city in 1875 being devoted to this purpose. A further enlargement of the harbour was necessitated upon the opening of the St Gotthard tunnel in 1882, which extended the commercial range of the port through Switzerland into Germany. The old harbour is semi-circular in shape, 23a acres in area, with numerous quays, and protected by moles front southern and south-westerly winds. An outer harbour, 247 acres in area, has been constructed in front of this by extending the Molo Nuovo.by the Molo Duca di Galliera, and another basin, the Vittorio Emanuele III., for coal vessels, with an area of 96 acres, is in course of construction to the west of this, between it and the lofty lighthouse which rises on the promontory at the south-west extremity of thp harbour. This basin is to be entered from both the east and the west, and allows for a future extension in front of San Pier d'Arena as far as the mouth of the river Polcevera. The port administration was placed under an autonomous harbour board (consorzio) in 1903; The largest ships can enter the harbour, which has a minimum depth of 30 ft. ; it has two dry docks, a graving dock and a floating dry dock. Very large warehouses have been constructed. The exports ate olive oil, hemp, flax, rice, fruit, wine, hats, cheese, steel, velvets, gloves, flour, paper, soap and marble, while the main imports are coal, cotton, grain, machinery, &c. Genoa has a large emigrant traffic with America, and a large general passenger steamer traffic both for America and for the East.

The development of industry has kept pace with that of the harbour.

The Ansaldo shipbuilding yards construct armoured cruisers both for the Italian navy ■ and for foreign governments.

The Odero yards, for the construction of merchant and passenger steamers, have been similarly extended, and the Foce yard is also important. A number of foundries and metallurgical works supply material for repairs and shipbuilding. The sugar-refining industry has been introduced by two important companies, and most of the capital employed in sugar-refining in other parts of Italy has been subscribed at Genoa, where the administrative offices of the principal companies and individual refiners are situated. The old industries of macaroni and cognate products maintain their superiority. Tanneries and cotton-spinning and weaving mills have considerably extended throughout the province. Cement works have acquired an extension previously unknown, more than thirty firms being now engaged in that branch of industry. The manufactures of crystal- lized fruits and of filigree silver-work may also be mentioned. The trade of the port increased from well under 1,000,000 tons in 1876 to 6,164,873 metric tons in 1906 (the latter figure, however, includes home trade in a proportion of about 12%). Of this large total 5.365.544 tons are imports and only 799,319 tons are exports, and, comparing 1906 with 1905, we have a decrease of 34,355 tons on the exports, and an increase of 436,123 tons on the imports. The effect upon the railway problem is of course very great, inasmuch as, while the supply of trucks required per day in 1906 was from 1000 to 1200, about 80% of these had to be sent down empty to the harbour. Of the four main lines which centre on Genoa — (1) to Novi, which is the junction for Alessandria, where lines diverge to Turin and France via the Mont Cenis, and to Novara and Switzerland and France via the Simplon, and for Milan; (2) to Acqui and Pied- mont; (3) to Savona, Ventimiglia and the French Riviera, along the coast ; (4) to Spezia and Pisa — the first line has to take no less than 78% of the traffic. It has indeed two alternative double lines for the passage over the Apennines, but one of them has a maximum gradient of I : 18 and a tunnel over 2 m. long, and the other has a maximum gradient of I : 62, and a tunnel over 5 m. long. A marshalling station costing some £800,000, connected directly with the harbour by tunnels, with 31 m. of rails, capable of taking 2000 trucks, was constructed at Campasso in 1906 north of San Pier d'Arena (through which till then the traffic of the first three lines, representing 95% of the total, had to pass). It is computed that some

40% of the total commerce of Italy passes through Genoa; it is indeed the most important harbourinthewesternMediterranean, with the exception of Marseilles, with which it carries on a keen rivalry. Genoa has in the past been somewhat handicapped in the race by the insufficiency of railway communication, which, owing to the mountains which ancircle it, is difficult to secure, many tunnels being necessary. The general condition of the Italian railways has also affected it, and the increased traffic has not always found the necessary facilities in the way of a proper amount of trucks to receive the goods discharged, leading to considerable encumbrance of the port and consequent diversion of a certain amount of trade elsewhere, and besides this to serious temporary deficiencies in the coal supply of northern Italy.

The imports of Genoa are divided into four main classes: about 50% of the total weight is coal, grain about 12%, cotton about 6 %, and miscellaneous about 34 %. Of the coal imports the great bulk is from British ports: about half comes from Cardiff and Barry, one-tenth from other Welsh ports, one-fifth from the Tyne ports. The amount shows an almost continued increase from 617,798 tons in 1881 to 2,737,919 in 1906. The total of shipping entered in 1906 was 6586 vessels with a tonnage of 6,867,442, while that cleared was 66 11 vessels with a tonnage of 6,682,104.

History. — Genoa, being a natural harbour of the first rank, must have been in use as a seaport as early as navigation began in the Tyrrhenian Sea. We hear nothing from ancient authorities of its having been visited or occupied by the Greeks, but the discovery of a Greek cemetery of the 4th century B.C. 1 proves it. The construction of the Via Venti Settembre gave occasion for the discovery of a number of tombs, 85 in all, the bulk of which dated from the end of the 5th and the 4th centuries B.C. The bodies had in all cases been cremated, and were buried in small shaft graves, the interment itself being covered by a slab of limestone. The vases were of the last red figure style, and were mostly imported from Greece or Magna Graecia, while the bronze objects came from Etruria, and the brooches {fibulae) from Gaul. This illustrates the early importance of Genoa as a trading port, and the penetration of Greek customs, inhumation being the usual practice of the Ligurians. Genoa is believed to derive its name from the fact that the shape of this portion of the coast resembles that of a knee (genu).

We hear of the Romans touching here in 216 B.C., and of its destruction by the Carthaginians in 209 B.C. and immediate restoration by the Romans, who made it and Placentia their

‘See Noiizie degli scavi (1898), 395 (A. d’Andrade), 464 (G. Ghirardini).

headquarters against the Ligurians. It was reached from Rome by the Via Aurelia, which ran along the north-west coast, and its prolongation, which later acquired the name of the Via Aemilia (Scauri); for the latter was only constructed in 109 B.C., and there must have been a coast-road long before, at least as early as 148 B.C., when the Via Postumia was built from Genua through Libarna (mod. Serravalle, where remains of an amphitheatre and inscriptions have been found), Dertona, Iria, Placentia, Cremona, and thence eastwards. We also have an inscription of 117 b.c (now preserved in the Palazzo Municipale at Genoa) giving the text of the decision given by the patroni, Q. and M. Minucius, of Genua, in accordance with a decree of the Roman senate, in a controversy between the people of Genua and the Langenses or Langates (also known as the Viturii), the inhabitants of a neighbouring hill-town, which was included in the territory of Genua. But none of the other inscriptions found in Genoa or existing there at the present day, which are practically all sepulchral, can be demonstrated to have belonged to the ancient city; it is equally easy to suppose that they were brought from elsewhere by sea (Mommsen in Corp. Inscr. Lai. v. p. 884). It is only from inscriptions of other places that we know that it had municipal rights, and we do not know at what period it obtained them. Classical authors tell us but little of it. Strabo (iv. 6. 2, p. 202) states that it exported wood, skins and honey, and imported olive oil and wine, though Pliny speaks of the wine of the district as the best of Liguria(fl”.iV.) xiv. 67.)

The history of Genoa during the dark ages, throughout the Lombard and Carolingian periods, is but the repetition of the general history of the” Italian communes, which succeeded in snatching from contending princes and barons the first charters of their freedom. The patriotic spirit and naval prowess of the Genoese, developed in their defensive wars against the Saracens, led to the foundation of a popular constitution, and to the rapid growth of a powerful marine. From the necessity of leaguing together against the common Saracen foe, Genoa united with Pisa early in the nth century in expelling the Moslems from the island of Sardinia, but the Sardinian territory thus acquired soon furnished occasions of jealousy to the conquering allies, and there commenced between the two republics the long naval wars destined to terminate so fatally for Pisa. With not less adroitness than Venice, Genoa saw and secured all the advantages of the great carrying trade which the crusades created between Western Europe and the East. The seaports wrested at the same period from

the Saracens along the Spanish and Barbary coasts became important Genoese colonies, whilst in the Levant, on the shores of the Black Sea, and along the banks of the Euphrates were erected Genoese fortresses of great strength. No wonder if these con- quests generated in the minds of the Venetians and the Pisans fresh jealousy against Genoa, and provoked fresh wars; but the struggle between Genoa and Pisa was brought to a disastrous conclusion for the latter state by the battle of Meloria in 1284.

The commercial and naval successes of the Genoese during the middle ages were the more remarkable because, unlike their rivals, the Venetians, they were the unceasing prey to intestine discord — the Genoese commons and nobles fighting against each other, rival factions amongst the nobles themselves striving to grasp the supreme power in the state, nobles and commons alike invoking the arbitration and rule of some foreign captain as the sole means of obtaining a temporary truce. From these contests of rival nobles, in which the names of Spinola and Doria stand forth with greatest prominence, Genoa was soon drawn into the great vortex of the Guelph and Ghibelline factions; but its recog- nition of foreign authority — successively German, Neapolitan and Milanese — gave way to a state of greater independence in 1339, when the government assumed a more permanent form with the appointment of the first doge, an office held at Genoa for life, in the person of Simone Boccanera. Alternate victories and defeats of the Venetians and Genoese — the most terrible being the defeat sustained by the Venetians at Chioggia in 1380 — ended by establishing the great relative inferiority of the Genoese rulers, who fell under the power now of France, now of the Visconti of Milan. The Banca di S. Giorgio, with its large possessions.

mainly in Corsica, formed during this period the most stable element in the state, until in 1528 the national spirit appeared to regain its ancient vigour when Andrea Doria succeeded in throwing off the French domination and restoring the old form of government. It was at this very period — the close of the 1 5th and commencement oftheі6th century — that the genius and daring of a Genoese mariner, Christopher Columbus, gave to Spain that new world, which might have become the possession of his native state, had Genoa been able to supply him with the ships and sea- men which he so earnestly entreated her to furnish. The govern- ment as restored by. Andrea

Doria, with certain modifications tending to impart to it a more conservative character, remained unchanged until the outbreak of the French Revolution and the creation of the Ligurian republic. During this long period of nearly three centuries, in which the most dramatic incident is the conspiracy of Fieschi, the Genoese found no small compensation for their lost traffic in the East in the vast profits which they made as the bankers of the Spanish crown and outfitters of the Spanish armies and fleets both in the old world and the new, and Genoa, more fortunate than many of the other cities of Italy, was comparatively immune from foreign domination.

At the end of the 17th century the city was bombarded by the French, and in 1746, after the defeat of Piacenza, surrendered to the Austrians, who were, however, soon driven out. A revolt in Corsica, which began in 1729, was suppressed with the help of the French, who in 1768 took possession of the island for them- selves (see Corsica: History).

The short-lived Ligurian republic was soon swallowed up in the French empire, not, however, until Genoa had been made to experience, by the terrible privations of the siege when Massena held the city against the Austrians (1800), all that was meant by a participation in the vicissitudes of the French Revolution. In 1814 Genoa rose against the French, on the assurance given by Lord William Bentinck that the allies would restore to the re- public its independence. It had, however, been determined by a secret clause of the treaty of Paris that Genoa should be incorpor- ated with the dominions of the king of Sardinia. The discontent created at the time by the provision of the treaty of Paris as confirmed by the congress of Vienna had doubtless no slight share in keeping alive in Genoa the republican spirit which, through the influence of a young Genoese citizen, Joseph Mazzini, assumed forms of permanent menace not only to the Sardinian monarchy but to all the established governments of the peninsula. Even the material benefits accruing from the union with Sardinia and the constitutional liberty accorded to all his subjects by King Charles Albert were unable to prevent the republican outbreak of 1 848, when, after a short and sharp struggle, the city, momentarily seized by the republican party, was recovered by General Alfonzo La Marmora.

Among the earlier Genoese historians the most important are Bartolommeo Fazio and Jacopo Bracelli, both of the 15th century, and Paolo Partenopeo, Jacopo Bonfadio, Oberto Foglietta and Agostino Giustiniano of the 16th. Paganetti wrote the ecclesiastical history of the city; and Accinelli and Gaggero collected material for

the ecclfsiastical archaeology. The memoirs of local writers and artists were treated by Soprani and Ratti. Among more general works are Brequigny, Histoire des revolutions de Genes jusqu'en 1748; Serra, La Storia dell' antica Liguria e di Genova (Turin, 1834); Varesi, Storia delta repubblica di Genova sino al 18 14 (Genoa, 1835- 1839); Canale, Storia dei Genovesi (Genoa, 1 844-1 854), Nuova istoria delta repubblica di Genova (Florence, 1858), and Storia delta rep. di Genova dall' anno 1528 al 1550 (Genoa, 1874); Blumenthal, Zur Verfassungs- und Verwaltungsgeschichte Genua's im I2ten Jahr- hundert (Kalbe an der Saale, 1872); Malleson, Studies from Genoese History (London, 1875). The Liber jurium reipublicae Genuensis was edited by Ricotti in the 7th, 8th and 9th volumes of the Monu- menta historiae patriae (Turin, 1854-1857). A great variety of interesting matter will be found in the Alti delta Societa Ligure di storia patria (1861 sqq.), and in the Giornale Ligustico di archeologia, , storia, e belle arti. The history of the university has been written by Lorenzo Isnardi, and continued by Em. Celesia (2 vols., Genoa).

(T. As.)

GENOVESI, ANTONIO (1712-1769), Italian writer on philo- sophy and political economy, was born at Castiglione, near Salerno, on the 1st of November 1 7 1 2. He was educated for the church, and, after some hesitation, took orders in 1736 at Salerno,

where he was appointed professor of eloquence at the theological seminary. During this period of his life he began the study of philosophy, being especially attracted by Locke. Dissatisfied with ecclesiastical life, Genovesi resigned his post, and qualified as an advocate at Rome. Finding law as distasteful as theology, he devoted himself entirely to philosophy, of which he was appointed extraordinary professor in the university of Naples. His first works were Elementa Metaphysicae (1743 et seq.) and Logica (1 74S). The former is divided into four parts, Ontosophy, Cosmosophy, Theosophy, Psychosophy, supplemented by a treatise on ethics and a dissertation on first causes. The Logic, an eminently practical work, written from the point of view of Locke, is in five parts, dealing with (1) the nature of the human mind, its faculties and operations; (2) ideas and their kinds; (3) the true and the false, and the various degrees of knowledge; (4) reasoning and argumentation; (5) method and the ordering of our thoughts. If Genovesi does not take a high rank in philo- sophy, he deserves the credit of having introduced the new order of ideas into Italy, at the same time preserving a just mean between the two extremes of sensualism and idealism. Although

bitterly opposed by the partisans of scholastic routine, Genovesi found influential patrons, amongst them Bartolomeo Intieri, a Florentine, who in 1754 founded the first Italian or European chair of political economy (commerce and mechanics), on con- dition that Genovesi should be the first professor, and that it should never be held by an ecclesiastic. The fruit of Genovesi's professorial labours was the Lezioni di Commercio, the first complete and systematic work in Italian on economics. On the whole he belongs to the " Mercantile " school, though he does not regard money as the only form of wealth. Specially noteworthy in the Lezioni are the sections on human wants as the foundation of economical theory, on labour as the source of wealth, on personal services as economic factors, and on the united working of the great industrial functions. He advocated freedom of the corn trade, reduction of the number of religious communities, and deprecated regulation of the interest on loans. In the spirit of his age he denounced the relics of medieval institutions, such as entails and tenures in mortmain. Gioja's more important treatise owes much to Genovesi's lectures. Genovesi died on the 22nd of September 1769.

See C. Ugoni, Delta letteratura italiana nella seconda meth del secolo XVIII (1820-1822); A. Fabroni, Vitae Italorum doctrina excel- lentium (1778-1799); R. Bobba, Commemorazione di A. Genovesi (Benevento, 1867).

GENSONNlJ, ARMAND (1758-1793), French politician, the son of a military surgeon, was born at Bordeaux on the 10th of August 1758. He studied law, and at the outbreak of the Revolution was an advocate of the parlement of Bordeaux. In 1790 he became procureur of the Commune, and in July 1791 was elected by the newly created department of the Gironde a member of the court of appeal. In the same year he was elected deputy for the department to the Legislative Assembly. As reporter of the diplomatic committee, in which he supported the policy of Brissot, he proposed two of the most revolutionary measures passed by . the Assembly: the decree of accusation against the king's brothers (January 1, 1792), and the declaration of war against the king of Bohemia and Hungary (April 20, 1792). He was vigorous in his denunciations of the intrigues of the court and of the " Austrian committee "; but the violence of the extreme democrats, culmin- ating in the events of the 10th of August, alarmed him; and when he was returned to the National Convention, he attacked the Commune of Paris (October 24 and 25). At the trial of I ouis XVI. he supported an appeal to the people, but voted for the death sentence. As a member of the Committee of General Defence, and as president of the Convention (March 7-21, 1793), he shared in

the bitter attacks of the Girondists on the Mountain; and on the fatal day of the 2nd of June his name was among the first of those inscribed on the prosecution list. He was tried by the Revolutionary Tribunal on the 24th of October 1793, con- demned to death and guillotined on the 31st of the month, displaying on the scaffold a stoic fortitude. Gensonne was accounted one of the most brilliant of the little band of brilliant

orators from the Gironde, though his eloquence was somewhat cold and he always read his speeches.

GENTIAN, botanically Gentiana, a large genus of herbaceous plants belonging to the natural order Gentianaceae. The genus comprises about 300 species, — most of them perennial plants with tufted growth, growing in hilly or mountainous districts, chiefly in the northern hemisphere, some of the blue-flowered species ascending to a height of 16,000 ft. in the Himalaya Mountains. The leaves are opposite, entire and smooth, and often strongly ribbed. The flowers have a persistent 4- to 5- lobed calyx and a 4- to 5-lobed tubular corolla; the stamens are equal in number to the lobes of the corolla. The ovary is one-celled, with two stigmas, either separate and rolled back or contiguous and funnel-shaped. The fruit when ripe separates into two valves, and contains numerous small seeds. The majority of the genus are remarkable for the deep or brilliant blue colour of their blossoms, comparatively few having yellow, white, or more rarely red flowers; the last are almost exclusively found in the Andes.

Only a few species occur in Britain. G. amarella (felwort) and G. campestris are small annual species growing on chalky or calcareous hills, and bear in autumn somewhat tubular pale purple flowers; the latter is most easily distinguished by having two of the lobes of the calyx larger than the other two, while the former has the parts of the calyx in fives, and equal in size. Some intermediate forms between these two species occur, although rarely, in England; one of these, G. germanica, has larger flowers of a bluer tint, spreading branches, and a stouter stem. Some of these forms flower in spring. G. pneumonanthe, the Calathian violet, is a rather rare perennial species, growing in moist heathy places from Cumberland to Dorsetshire. Its average height is from 6 to o in. It has linear leaves, and a bright blue corolla 15 in. long, marked externally with five greenish bands, is without hairs in its throat, and is found in

perfection about the end of August. It is the handsomest of the British species; two varieties of it are known in cultivation, one with spotted and the other with white flowers. G. vema and G. nivalis are small species with brilliant blue flowers and small leaves. The former is a rare and local perennial, occurring, however, in Teesdale and the county of Clare in Ireland in toler- able abundance. It has a tufted habit of growth, and each stem bears only one flower. It is sometimes cultivated as an edging for flower borders. G. nivalis in Britain occurs only on a few of the loftiest Scottish mountains. It differs from the last in being an annual, and having a more isolated habit of growth, and in the stem bearing several flowers. On the Swiss mountains these beautiful little plants are very abundant; and the splendid blue colour of masses of gentian in flower is a sight which, when once seen, can never be forgotten. For ornamental purposes several species are cultivated. The great difficulty of growing them successfully renders them, however, less common than would otherwise be the case; although very hardy when once estab- lished, they are very impatient of removal, and rarely flower well until the third year after planting. Of the ornamental species found in British gardens some of the prettiest are G. acaulis, G. vema, G. pyrenaica, G. bavarica, G. septemfida and G. gelida. Perhaps the handsomest and most easily grown is the first named, often called Gentianella, which produces its large intensely blue flowers early in the spring.

All the species of the genus are remarkable for possessing an intense but pure bitter taste and tonic properties. About forty species are used in medicine in different parts of the world. The name of felwort given to G. amarella, but occasionally applied to the whole genus, is stated by Dr Prior to be given in allusion to these properties — fel meaning gall, and wort a plant. In the same way the Chinese call G. asclepiadea, and the Japanese G. Ruergeri, " dragon's gall plants," in common with several other very bitter plants whose roots they use in medicine. G. campestris is sometimes used in Sweden and other northern countries as a substitute for hops.

By far the most important of the species used in medicine is G. lutea, a large handsome plant 3 or 4 ft. high, growing in open

grassy places on the Alps, Apennines and Pyrenees, as well as on some of the mountainous ranges of France and Germany, extending as far east as Bosnia and the Danubian principalities. It has large oval strongly-ribbed leaves and dense whorls of conspicuous yellow flowers. Its use in medicine is of very ancient date. Pliny and Dioscorides mention that the plant was noticed by Gentius, a king of the Illyrians, living 180-167 B.C., from whom the name Gentiana is

supposed to be derived. During the middle ages it was much employed in the cure of disease, and as an ingredient in counter-poisons. In 1552 Hieronymus Bock (Tragus) (1498-15 54), a German priest, physician and botanist, mentions the use of the root as a means of dilating wounds.

The root, which is the part tised in medicine, is tough and flexible, scarcely branched, and of a brownish colour and spongy texture. It has a pure bitter taste acd faint distinctive odour. The bitter principle, known as gentianin, is a glucoside, soluble in water and alcohol. It can be decomposed into glucose and gentiopicrin by the action of dilute mineral acids. It is not precipitated by tannin or subacetate of lead. A solution of caustic potash or soda forms with gentianin a yellow solution, and the tincture of the root to which either of these alkalis has been added loses its bitterness in a few days. Gentian root also contains gentianic acid (C14H10O5), which is inert and tasteless. It forms pale yellow silky crystals, very slightly soluble in water or ether, but soluble in hot strong alcohol and in aqueous alkaline solutions. This substance is also called gentianin, gentisin and gentisic acid.

The root also contains 12 to 15% of an uncrystallizable sugar called gentianose, of which fact advantage has long been taken in Switzerland and Bavaria for the production of a bitter cordial spirit called Enzianbranntwein. The use of this spirit, especially in Switzerland, has sometimes been followed by poisonous symptoms, which have been doubtfully attributed to inherent narcotic properties possessed by some species of gentian, the roots of which may have been indiscriminately collected with it ; but it is quite possible that it may be due to the contamination of the root with that of Veratrum album, a poisonous plant growing at the same altitude, and having leaves extremely similar in appearance and size to those of G. lutea.

Gentian is one of the most efficient of the class of substances which act upon the stomach so as to invigorate digestion and thereby increase the general nutrition, without exerting any direct influence upon any other portion of the body than the alimentary canal. Having a pleasant taste and being non- astringent (owing to the absence of tannic acid), it is the most widely used of all bitter tonics. The British Pharmacopoeia contains an aqueous extract (dose, 2-8 grains), a compound infusion with orange and lemon peel (dose, J-i ounce), and a compound tincture with orange peel and cardamoms (dose 5-1 drachm). It is used in dyspepsia, chlorosis, anaemia and various other diseases, in which the tone of the stomach and alimentary canal is deficient, and is sometimes added to purgative

medicines to increase and improve their action. In veterinary medicine it is also used as a tonic, and enters into a well-known compound called diapente as a chief ingredient.

GENTIANACEAE (the gentian family), in botany, an order of Dicotyledons belonging to the sub-class Sympetalae or Gamo-petalae, and containing about 750 species in 64 genera. It has a world-wide distribution, and representatives adapted to very various conditions, including, for instance, alpine plants, like the true gentians {Gentiana), meadow plants such as the British Chloraperfoliata(yeHow-v<'OTt) or Erythraea Centaurium(centa. \iry) , marsh plants such as Menyanthes trifoliata (bog-bean), floating water plants such as Limnanthemum, or steppe and sea-coast plants such as Cicendia. They are annual or perennial herbs, rarely becoming shrubby, and generally growing erect, with a characteristic forked manner of branching; the Asiatic genus Crawfurdia has a climbing stem; they are often low-growing and caespitose, as in the alpine gentians.

The leaves are in decussating pairs (that is, each pair is in a plane at right angles to the previous or succeeding pair), except in

Menyanthes and a few allied aquatic or marsh genera, where they are alternate or radical. Several genera, chiefly American, are sapro-phytes, forming slender low-growing herbs, containing little or no chlorophyll and with leaves reduced to scales; such are Voyria and Leiphaimos, mainly tropical American. The inflorescence is generally cymose, often dichasial, recalling that of Caryophyllaceae, the lateral branches often becoming monochasial; it is sometimes reduced to a few flowers or one only, as in some gentians. The flowers are hermaphrodite, and regular with parts in 4's and 5's, with reduction to 2 in the pistil ; in Chlora there are 6 to 8 members in each whorl. The calyx generally forms a tube with teeth or segments which usually overlap in the bud. The corolla shows great variety in form ; thus among the British genera it is rotate in Chlora, funnel-shaped in Erythraea, and cylindrical, bell-shaped, funnel-shaped or salver-shaped in Centiana; the segments are

generally twisted to the right in the bud ; the throat is often fimbriate or bears scales. The stamens, as many as, and alternating with, the corolla-segments, are inserted at very dif- ferent heights on the

corolla-tube; the fila- ments are slender, the anthers are usually attached dor- sally, are versatile, and dehisce by two longitudinal slits; after escape of the pollen they some- times become spir- ally twisted as in Erythraea. Dimor- phic flowers are frequent, as in the bog-bean (Meny- anthes). There is considerable varia- tion in the size, shape and external mark- ings of the pollen grains, and a divi- sion of the order into tribes and sub- tribes based prim- arily on pollen characters has been proposed. The form of the honey-secret- ing developments of the disk at the base of the ovary also shows considerable variety. The superior ovary is generally one-chambered, with two variously de- veloped parietal pla- centas, which occa- sionally meet, form- ing two chambers; the ovules are gener- ally very numerous and anatropous or half – anatropous in form. The style, which varies much in length, is simple, with an undivided or bilobed or bipartite stigma. The fruit is generally a membranous or leathery capsule, splitting septicidally into two valves; the seeds are small and numerous, and contain a small embryo in a copious endosperm.

The brilliant colour of the flowers, often occurring in large numbers (as in the alpine gentians), the presence of honey-glands and the frequency of dimorphy and dichogamy, are adaptations for polli- nation by insect visitors. In the true gentians (Gentiana) the flowers of different species are adapted for widely differing types of insect visitors. Thus Gentiana lutea, with a rotate yellow corolla arid freely exposed honey, is adapted to short-tongued insect visitors; G. Pneumonanthe, with a long-tubed, bright blue corolla, is visited by humble bees; and G. verna, with a still longer narrower tube, is visited by Lepidoptera.

Gentiana, the largest genus, contains nearly three hundred species, distributed over Europe (including arctic), five being British, the mountains of Asia, south-east Australia and New Zealand, the whole of North America and along the Andes to Cape Horn; it does not occur in Africa. Bitter principles are general in the

Central figure and figs. 1-4 after Curtis, Flora Londinensis. Gentiana Amarella.

1, A small form, natural size.

2, Calyx and protruding style.

3, Corolla, laid open.

4, Capsule, bursting into two valves, and

showing the seeds attached to their margins.

5, Floral diagram.

vegetative parts, especially in the rhizomes and roots, and have given a medicinal value to many species, e.g. Gentiana lutea and others.

GENTILE, in the English Bible, the term generally applied to those who were not of the Jewish race. It is an adaptation of the Lat. gentilis, of or belonging to the same gens, the clan or family; as denned in Paulus ex Festo " gentilis dicitur et ex eodem genere ortus et is qui simili nomine; ut ait Cincius, gentiles mihi sunt, qui meo nomine appellantur." In post- Augustan Latin gentilis became wider in meaning, following the usage of gens, in the sense of race, nation, and meant " national," belonging to the same race. Later still the word came to mean " foreign," i.e. other than Roman, and was so used in the Vulgate, with gentes, to translate the Hebrew goyyim, nations, LXX. Wvq, the non-Israelitish peoples (see further Jews).

GENTILE DA FABRIANO (c. 1370-c. 1450), Italian painter, was born at Fabriano about 1370. He is said to have been a pupil of Allegretto di Nuzio, and has been supposed to have received most of his early instruction from Fra Angelico, to whose manner his bears in some respects a close similarity. About 141 1 he went to Venice, where by order of the doge and senate he was engaged to adorn the great hall of the ducal palace with frescoes from the life of Barbarossa. He executed this work so entirely to the satisfaction of his employers that they granted him a pension for life, and accorded him the privilege of wearing the habit of a Venetian noble. About 1422 he went to Florence, where in 1423 he painted an "Adoration of the Magi" for the church of Santa Trinita, which is preserved in the Florence Accademia; this painting is considered his best work now extant. To the same period belongs a " Madonna and Child," which is now in the Berlin Museum. He had by this time attained a wide reputation, and was engaged to paint pictures for various churches, more particularly Siena, Perugia, Gubbio and Fabriano. About 1426 he was called to Rome by Martin V. to adorn the church of St John Lateran with frescoes from the life of John the Baptist. He also executed a portrait of the pope attended by ten cardinals, and in the church of St Francesco Romano a painting of the " Virgin and Child attended by St Benedict and St Joseph," which was much esteemed by Michelangelo, but is no longer in existence. Gentile da Fabriano died about 1450. Michelangelo said of him that his works

resembled his name, meaning noble or refined. They are full of a quiet and serene joyousness, and he has a naive and innocent delight in splendour and in gold ornaments, with which, however, his pictures are not overloaded.

GENTILESCHI, ARTEMISIA and ORAZIO DE\ Italian painters.

Oeazio (c. 1565-1646) is generally named Orazio Lomi de' Gentileschi; it appears that De' Gentileschi was his correct surname, Lomi being the surname which his mother had borne during her first marriage. He was born at Pisa, and studied under his half-brother Aurelio Lomi, whom in course of time he sur- passed. He afterwards went to Rome, and was associated with the landscape-painter Agostino Tasi, executing the figures for the landscape backgrounds of this artist in the Palazzo Rospigliosi, and it is said in the great hall of the Quirinal Palace, although by some authorities the figures in the last-named building are ascribed to Lanfranco. His best works are " Saints Cecilia and Valerian," in the Palazzo Borghese, Rome; " David after the death of Goliath," in the Palazzo Doria, Genoa; and some works in the royal palace, Turin, noticeable for vivid and uncommon colouring. At an advanced age Gentileschi went to England at the invitation of Charles I., and he was employed in the palace at Greenwich. Vandyck included him in his portraits of a hundred illustrious men. His works generally are strong in shadow and positive in colour. He died in England in 1646.

Artemisia (1590-1642), Orazio's daughter, studied first under Guido, acquired much renown for portrait-painting, and con- siderably excelled her father's fame. She was a beautiful and elegant woman; her likeness, limned by her own hand, is to be seen in Hampton Court. Her most celebrated composition is " Judith and Holofernes," in the Uffizi Gallery; certainly a work of singular energy, and giving ample proof of executive faculty,.

but repulsive and unwomanly in its physical horror. She accompanied her father to England, but did not remain there long; the best picture which she produced for Charles I. was " David with the head of Goliath." Artemisia refused an offer of marriage from Agostino Tasi, and bestowed her hand on Pier Antonio Schiattesi, continuing, however, to use her own sur- name. She settled in Naples, whither she returned after her English sojourn; she lived

there in no little splendour, and there she died in 1642. She had a daughter and perhaps other children.

GENTILI, ALBERICO (1552-1608), Italian jurist, who has great claims to be considered the founder of the science of international law, second son of Matteo Gentili, a physician of noble family and scientific eminence, was born on the 14th of January 1552 at Sanginesio, a small town of the march of Ancona which looks down from the slopes of the Apennines upon the distant Adriatic. After taking the degree of doctor of civil law at the university of Perugia, and holding a judicial office at Ascoli, he returned to his native city, and was entrusted with the task of recasting its statutes, but, sharing the Protestant opinions of his father, shared also, together with a brother, Scipio, afterwards a famous professor at Altdorf, his flight to Carniola, where in 1579 Matteo was appointed physician to the duchy. The Inquisition con- demned the fugitives as contumacious, and they soon received orders to quit the dominions of Austria.

Alberico set out for England, travelling by way of Tubingen and Heidelberg, and everywhere meeting with the reception to which his already high reputation entitled him. He arrived at Oxford in the autumn of 1580, with a commendatory letter from the earl of Leicester, at that time chancellor of the university, and was shortly afterwards qualified to teach by being admitted to the same degree which he had taken at Perugia. His lectures on Roman law soon became famous, and the dialogues, disputations and commentaries, which he published henceforth in rapid succession, established his position as an accomplished civilian, of the older and severer type, and secured his appointment in 1587 to the regius professorship of civil law. It was, however, rather by an application of the old learning to the new questions suggested by the modern relations of states that his labours have produced their most lasting result. In 1 584 he was consulted by government as to the proper course to be pursued with Mendoza, the Spanish ambassador, who had been detected in plotting against Elizabeth. He chose the topic to which his attention had thus been directed as a subject for a disputation when Leicester and Sir Philip Sidney visited the schools at Oxford in the same year; and this was six months later expanded into a book, the De legationibus libri tres. In 1588 Alberico selected the law of war as the subject of the law disputations at the annual " Act " which took place in July; and in the autumn published in London the De Jure Belli commcntatio prima. A second and a third Commentatio followed, and the whole matter, with large additions and improvements, appeared at Hanau, in 1598, as the De Jure Belli libri tres. It was doubtless in conse- quence of the reputation gained by

these works that Gentili became henceforth more and more engaged in forensic practice, and resided chiefly in London, leaving his Oxford work to be partly discharged by a deputy. In 1600 he was admitted to be a member of Gray's Inn, and in 1605 was appointed standing counsel to the king of Spain. He died on the 19th of June 1608, and was buried, by the side of Dr Matteo Gentili, who had followed his son to England, in the churchyard of St Helen's, Bishopsgate. By his wife, Hester de Peigni, he left two sons, Robert and Matthew, and a daughter, Anna, who married Sir John Colt. His notes of the cases in which he was engaged for the Spaniards were post- humously published in 1613 at Hanau, as Hispanicae advocationis libri duo. This was in accordance with his last wishes; but his direction that the remainder of his MSS. should be burnt was not complied with, since fifteen volumes of them found their way, at the beginning of the 19th century, from Amsterdam to the Bodleian library.

The true history of Gentili and of his principal writings has only been ascertained in recent years, in consequence of a revived

appreciation of the services which he rendered to international law. The movement to do him honour originated in 1875 in England, as the result of the inaugural lecture of Prof. T. E. Holland, and was warmly taken up in Italy. In spreading through Europe it encountered two curious cross-currents of opinion, — one the ultra-Catholic, which three centuries before had ordered his name to be erased from all public documents and placed his works in the Index; another the narrowly-Dutch, which is, it seems, needlessly careful of the supremacy of Grotius. These two currents resulted respectively in a bust of GarciaMoreno being placed in the Vatican, and in the unveiling in 1886, with much international oratory, of a fine statue of Grotius at Delft. The English committee, under the honorary presidency of Prince Leopold, in 1877 erected a monument to the memory of Gentili in St Helen's church, and saw to the publication of a new edition of the De Jure Belli. The Italian committee, of which Prince (after- wards King) Humbert was honorary president, was less successful. It was only in 1908, the tercentenary of the death of Alberico, that the statue of the great heretic was at length unveiled in his native city by the minister of public instruction, in the presence of numerous deputations from Italian cities and universities. Preceding writers had dealt with various international questions, but they dealt with them singly, and with a servile submission to the decisions of the church. It was left to Gentili to grasp as a whole the relations of states one to another, to distinguish international questions from questions with which they are more or less intimately connected, and

to attempt their solution by principles entirely independent of the authority of Rome. He uses the reasonings of the civil and even the canon law, but he proclaims as his real guide the Jus Naturae, the highest common sense of mankind, by which historical precedents are to be criticized and, if necessary, set aside.

His faults are not few. His style is prolix, obscure, and to the modern reader pedantic enough; but a comparison of his greatest work with what had been written upon the same subject by, for instance, Belli, or Soto, or even Ayala, will show that he greatly improved upon his predecessors, not only by the fulness with which he has worked out points of detail, but also by clearly separating the law of war from martial law, and by placing the subject once for all upon a non-theological basis. If, on the other hand, the same work be compared with the De Jure Belli et Pads of Grotius, it is at once evident that the later writer is indebted to the earlier, not only for a large portion of his illustrative erudition, but also for all that is commendable in the method and arrange- ment of the treatise.

The following is probably a complete list of the writings of Gentili, with the places and dates of their first publication : De juris interpreti- bus dialogi sex (London, 1582); Lectionum et epist. quae ad jus civile pertinent libri tres (London, 1 583-1 584); De legationibus libri tres (London, 1585) ; Legal, comitiorum Oxon. actio (London, 1585-1586); De divers, temp, appellationibus (Hanau, 1586); De nascendi tempore disputatio (Witteb., 1586) ; Disputationum decas prima (London, 1587); Conditionum liber singularis (London, 1587); De jure belli comm. prima (London, 1588); secunda, ib. (1588-1589); tertia (1589); De injustitia bellica Romanorum (Oxon, 1590) ; Ad tit. de Malef. et Math, de Prof, et Med. (Hanau, 1593) ; Dejure belli libri tres (Hanau, 1598) ; De armis Romanis, &c. (Hanau, 1599); De actoribus et de abusu mendacii (Hanau, 1599); De ludis scenicis epist. duae (Middleburg, 1600) ; Ad I. Maccabaeorum et de Unguarum mistura disp. (Frankfurt, 1600) ; Lectiones Virgilianae (Hanau, 1600) ; De nuptiis libri septem (1601); In tit. si quis principi, et ad leg. Jul. maiest. (Hanau, 1604); De latin, vet. Bibl. (Hanau, 1604); De libro Pyano (Oxon, 1604); Laudes Acad. Perus. et Oxon. (Hanau, 1605); De unione Angliae et Scotiae (London, 1605); Disputationes tres, de libris jur. can., de libris jur. civ., de latinitate vet. vers. (Hanau, 1605) ; Regales disput. tres, de pot. regis absoluta, de unione regnorum, de vi civium (London, 1605); Hispanicae advocationis libri duo (Hanau, 1613); In tit. de verb, signif. (Hanau, 1614); De legatis in test. (Amsterdam, r66i). An edition of the Opera omnia, commenced at Naples in 1770, was cut short by the death of the

publisher, Gravier, after the second volume. Of his numerous unpublished writings, Gentili complained that four volumes were lost " pessimo pontificiorum facinore," meaning probably that they were left behind in his flight to Carniola.

Authorities. — Several tracts by the Abate Benigni in Colucci, Antichitd. Picene (1790) ; a dissertation by W. Reiger annexed to the Program of the Groningen Gymnasium for 1867; an inaugural lecture delivered in 1874 by T. E. Holland, translated into Italian,

with additions by the author, by A. Saffi (1884) ; the preface to a new

edition of the De jure belli (1877) and Studies in International Law (1898) (which see, for details as to the family and MSS. of Gentili), by the same; works by Valdarnini and Foglietti (1875), Speranza and De Giorgi (1876), Fiorini (a translation of the De jure belli, with essay, 1877), A. Saffi (1878), L. Marson (1885), M. Thamm (1896), B. Brugi (1898) T. A. Walker (an analysis of the principal works of Gentili) in his History of the Law of Nations, vol. i. (1899) ; H. Nezarel, in Pillet's Fondateurs de droit international (1904); E. Agabiti (1908). See also E. Comba, in the Rivista Christiana (1876-1877); Sir T. Twiss, in the Law Review (1878); articles in the Revue de droit international (1875-1878, 1883, 1886, 1908); O. Scalvanti, in the Annali dell' Univ. di Perugia, N.S., vol. viii. (1898). (T. E. H.)

GENTLE (through the Fr. gentil, from Lat. gentilis, belonging to the same gens, or family), properly an epithet of one born of a " good family "; the Latin generosus, " well born" (see Gentle- man), contrasted with " noble " on the one side and " simple " on the other. The word followed the wider application of the word " gentleman "; implying the manners, character and breeding proper to one to whom that name could be applied, courteous, polite; hence, with no reference to its original meaning, free from violence or roughness, mild, soft, kind or tender. With a physical meaning of soft to the touch, the word is used sub- stantively of the maggot of the bluebottle fly, used as a bait by fishermen. At the end of the 16th century the French gentil was again adapted into English in the form " gentile," later changed to " genteel." The word was common in the 17th and 18th centuries as applied to behaviour, manner of living, dress, &c,

suitable or proper to persons living in a position in society above the ordinary, hence polite, elegant. From the early part of the 19th century it has also been used in an ironical sense, and applied chiefly to those who pay an excessive and absurd importance to the outward marks of respectability as evidence of being in a higher rank in society than that to which they properly belong.

GENTLEMAN (from Lat. gentilis, " belonging to a race or gens," and " man "; Fr. gentilhomme, Span, gentil hombre, Ital. gentil huomo, in its original and strict signification, a term denoting a man of good family, the Lat. generosus (its invariable translation in English-Latin documents). In this sense it is the equivalent of the Fr. gentilhomme, " nobleman," which latter term has in Great Britain been long confined to the peerage (see Nobility); and the term "gentry" (" gentrice" from O. Fr. gcnterise for gentelise) has much of the significance of the Fr. noblesse or the Ger. Adel. This was what was meant by the rebels under John Ball in the 14th century when they repeated: " When Adam delved and Eve span, Who was then the gentleman ? ' '

Selden {Titles of Honor, 1672), discussing the title " gentleman," speaks of " our English use of it " as " convertible with nobilis," and describes in connexion with it the forms of ennobling in various European countries. William Harrison, writing a century earlier, says " gentlemen be those whom their race and blood, or at the least their virtues, do make noble and known." But for the complete gentleman the possession of a coat of arms was in his time considered necessary; and Harrison gives the following account of how gentlemen were made in Shakespeare's day:

"... gentlemen whose ancestors are not known to come in with William duke of Normandy (for of the Saxon races yet remaining we now make none accompt, much less of the British issue) dp take their beginning in England after this manner in our times. Who soever studieth the laws of the realm, who so abideth in the uni- versity, giving his mind to his book, or professeth physic and the liberal sciences, or beside his service in the room of a captain in the wars, or good counsel given at home, whereby his commonwealth is benefited, can live without manual labour, and thereto is able and will bear the port, charge and countenance of a gentleman, he shall for money have a coat and arms bestowed upon him by heralds (who in the charter of the same do of custom pretend an- , tiquity and service, and many gay things) and thereunto being made so good cheap be called master, which is the title that men give to esquires and gentlemen, and reputed for a gentleman ever after. Which is so much

the less to be disallowed of, for that the prince doth lose nothing by it, the gentleman being so much subject to taxes and public payments as is the yeoman or husbandman, which he likewise doth bear the gladlier for the saving of his repu- tation. . Being called also to the wars (for with the government of

the commonwealth he medleth little) what soever it cost him, he will both array and arm himself accordingly, and show the more manly courage, and all the tokens of the person which he repre- senteth. No man hath hurt by it but himself, who peradventure will go in wider buskins than his legs will bear, or as our proverb saith, now and then bear a bigger sail than his boat is able to sustain." 1

In this way Shakespeare himself was turned, by the grant of his coat of arms, from a " vagabond " into a gentleman.

The fundamental idea of " gentry," symbolized in this grant of coat-armour, had come to be that of the essential superiority of the fighting man; and, as Selden points out (p. 707), the fiction was usually maintained in the granting of arms "to an ennobled person though of the long Robe wherein he hath little use of them as they mean a shield." At the last the wearing of a sword on all occasions was the outward and visible sign of a " gentleman "; and the custom survives in the sword worn with " court dress." This idea that a gentleman must have a coat of arms, and that no one is a "gentleman" without one is, however, of comparatively late growth, the outcome of the natural desire of the heralds to magnify their office and collect fees for registering coats; and the same is true of the conception of " gentlemen " as a separate class. That a distinct order of " gentry " existed in England very early has, indeed, been often assumed, and is supported by weighty authorities. Thus, the late Professor Freeman (Ency. Brit. xvii. p. 540 b, 9th ed.) said: "Early in the nth century the order of 'gentlemen' as a separate class seems to be forming as something new. By the time of the conquest of England the distinction seems to have been fully established." Stubbs (Const. Hist., ed. 1878, iii. 544, 548) takes the same view. Sir George Sitwell, however, has conclusively proved that this opinion is based on a wrong conception of the conditions of medieval society, and that it is wholly opposed to the documentary evidence. The fundamental social cleavage in the middle ages was between the nobiles, i.e. the tenants in chivalry, whether earls, barons, knights, esquires or franklins, and the ignobiles, i.e. the villeins, citizens and burgesses; 2 and between the most powerful noble and the humblest franklin there was, until the 15th century, no " separate class of gentlemen." Even so late as 1400 the word " gentleman " still only

had the sense of generosus, and could not be used as a personal description denoting rank or quality, or as the title of a class. Yet after 1413 we find it increasingly so used; and the list of landowners in 1431, printed in Feudal Aids, contains, besides knights, esquires, yeomen and husbandmen (i.e. house- holders), a fair number who are classed as " gentilman."

Sir George Sitwell gives'a lucid explanation of this development, the incidents of which are instructive and occasionally amusing. The immediate cause was the statute 1 Henry V. cap. v. of 1413, which laid down that in all original writs of action, personal appeals and indictments, in which process of outlawry lies, the " estate degree or mystery " of the defendant must be stated, as well as his present or former domicile. Now the Black Death (1349) had put the traditional social organization out of gear. Before that the younger sons of the nobiles had received their share of the farm stock, bought or hired land, and settled down as agriculturists in their native villages. Under the new conditions

1 Description of England, bk. ii. ch. v. p. 128. Henry Peacham, in his Compleat Gentleman (1634), takes this matter more seriously. "Neither must we honour or esteem," he writes, " those ennobled, or made gentle in blood, who by mechanic and base means have raked up a mass of wealth … or have purchased an ill coat (of arms) at a good rate; no more than a player upon the stage, for wearing a lord's cast suit: since nobility hangeth not upon the airy esteem of vulgar opinion, but is indeed of itself essential and absolute " (Reprint, p. 3). Elsewhere (p. 161) he deplores the abuse of heraldry, which had even in his day produced " all the world over such a medley of coats " that, but for the commendable activity of the earls marshals, he feared that yeomen would soon be "as rare in England as they are in France." See also an amusing instance from the time of Henry VIII., given in " The Gentility of Richard Barker," by Oswald Barron, in the Ancestor, vol. ii. (July

1902).

2 Even this classification would seem to need modifying. For certain of the great patrician families of the cities were certainly nobiles.

this became increasingly impossible, and they were forced to seek

their fortunes abroad in the French wars, or at home as hangers-on of the great nobles. These men, under the old system, had no definite status; but they were generosi, men of birth, and, being now forced to describe themselves, they disdained to be classed with franklins (now sinking in the social scale), still more with yeomen or husbandmen; they chose, therefore, to be described as " gentlemen." On the character of these earliest " gentlemen" the records throw a lurid light. According to Sir George Sitwell (p. 76), " the premier gentleman of England, as the matter now stands, is ' Robert Erdeswyke of Stafford, gentilman,' " who had served among the men-at-arms of Lord Talbot at Agincourt (ib. note). He is typical of his class. " Fortunately — for the gentle reader will no doubt be anxious to follow in his footsteps — some particulars of his life may be gleaned from the public records. He was charged at the Staffordshire Assizes with housebreaking, wounding with intent to kill, and procuring the murder of one Thomas Page, who was cut to pieces while on his knees begging for his life." If any earlier claimant to the title of " gentleman " be discovered, Sir George Sitwell predicts that it will be within the same year (1414) and in connexion with some similar dis- reputable proceedings. 1

From these unpromising beginnings the separate order of " gentlemen " was very slowly evolved. The first "gentleman" commemorated on an existing monument was John Daundelyon of Margate (d. c. 1445); the first gentleman to enter the House of Commons, hitherto composed mainly of " valets," was " William Weston, gentylman "; but even in the latter half of the 15th century the order was not clearly established. As to the connexion of " gentilesse " with the official grant or recognition of coat-armour, that is a profitable fiction invented and upheld by the heralds; for coat-armour was but the badge assumed by gentlemen to distinguish them in battle, and many gentlemen of long descent never had occasion to assume it, and never did. This fiction, however, had its effect; and by the 16th century, as has been already pointed out, the official view had become clearly established that " gentlemen " constituted a distinct order, and that the badge of this distinction was the heralds' recognition of the right to bear arms. It is unfortunate that this view, which is quite unhistorical and contradicted by the present practice of many undoubtedly " gentle " families of long descent, has of late years been given a wide currency in popular manuals of heraldry.

In this narrow sense, however, the word " gentleman " has long since become obsolete. The idea of " gentry " in the continental sense of noblesse is extinct in England, and is likely to remain so, in spite of the efforts of certain enthusiasts to revive it (see A. C. Fox-Davies,

Armorial Families, Edinburgh, 1895). That it once existed has been sufficiently shown; but the whole spirit and tendency of English constitutional and social development tended to its early destruction. The comparative good order of England was not favourable to the continuance of a class, developed during the foreign and civil wars of the 14th and 15th centuries, for whom fighting was the sole honourable occupation. The younger sons of noble families became apprentices in the cities, and there grew up a new aristocracy of trade. Merchants are still " citizens " to William Harrison; but he adds " they often change estate with gentlemen, as gentle- men do with them, by a mutual conversion of the one into the other." A frontier line between classes so indefinite could not be maintained, especially as in England there was never a " nobiliary prefix " to stamp a person as a gentleman by his 1 The designation " gentilman " is, indeed, found some two centuries earlier. In the Jnquisitio maneriorum Ecclesiae S. Pauli Londin. of a.d. 1222 (W. A. Hale, Domesday of Si Paul's, Camden Soc, 1858, p. 80) occurs the entry: Adam gentilma dim acra, p' Hi. d. This is probably the earliest record Of the " grand old name of gentleman "; but Adam, who held half an acre at a rent of three pence — less by half than that held by " Ralph the bondsman" (Rad' le bunde) in the same list — was certainly not a " gentleman." " Gentilman " here was a nickname, perhaps suggested by Adam's name, and thus in some sort anticipating the wit of the famous couplet repeated by John Ball's rebels.

surname, as in France or Germany. 2 The process was hastened, moreover, by the corruption of the Heralds' College and by the ease with which coats of arms could be assumed without a shadow of claim; which tended to bring the " science of armory " into contempt. The word " gentleman " as an index of rank had already become of doubtful value before the great political and social changes of the 19th century gave to it a wider and essentially higher significance. The change is well illustrated in the definitions given in the successive editions of the En- cyclopaedia Britannica. In the 5th edition (1815) " a gentleman is one, who without any title, bears a coat of arms, or whose ancestors have been freemen." In the 7th edition (1845) it still implies a definite social status: " All above the rank of yeomen." In the 8th edition (1856) this is still its " most ex- tended sense "; " in a more limited sense " it is defined in the same words as those quoted above from the 5th edition; but the writer adds, " By courtesy this title is generally accorded to all persons above the rank of common tradesmen when their manners are indicative of a certain amount of refinement and intelligence." The Reform Bill of 1832 has done its work; the " middle classes " have come into their own; and the word " gentleman " has come in common use to signify not a distinction of blood, but a distinction of position, education and manners. The test is no longer good birth, or the right to bear arms, but the capacity to mingle on equal terms in good society. In its best use, moreover, " gentleman " involves a certain superior standard of conduct, due, to quote the 8th edition once more, to " that self-respect and intellectual refinement which manifest themselves in unrestrained yet delicate manners." The word " gentle," originally implying a certain social status, had very early come to be associated with the standard of manners expected from that status. Thus by a sort of punning process the " gentleman " becomes a " gentle-man." Chaucer in the Meliboeus (c. 1386) says: " Certes he sholde not be called a gentil man, that . . . ne dooth his diligence and bisynesse, to kepen bis good name "; and in the Wife of Bath's Tale: " Loke who that is most vertuous alway Prive and apert, and most entendeth ay To do the gentil dedes that he can And take him for the gretest gentilman,"

and in the Romance of the Rose (c. 1400) we find " he is gentil bycause he doth as longeth to a gentilman." This use develops through the centuries, until in 17 14 we have Steele, in the Tatler (No. 207), laying down that " the appellation of Gentle- man is never to be affixed to a man's circumstances, but to his Behaviour in them," a limitation over-narrow even for the present day. In this connexion, too, may be quoted the old story, told by some — very

improbably — of James II., of the monarch who replied to a lady petitioning him to make her son a gentleman, "I could make him a nobleman, but God Almighty could not make him a gentleman." Selden, however, in referring to similar stories " that no Charter can make a Gentleman, which is cited as out of the mouth of some great Princes that have said it," adds that " they without question understood Gentleman for Generosus in the antient sense, or as if it came from Gentilis in that sense, as Gentilis denotes one of a noble Family, or indeed for a Gentleman by birth." For " no creation could make a man of another blood than he is." The word " gentleman," used in the wide sense with which birth and circumstances have nothing to do, is necessarily incapable of strict definition. For " to behave like a gentleman " may mean little or much, according to the person by whom the phrase is used; " to spend money like a gentleman " may even be no great praise; but " to conduct a business like a gentleman " implies a standard at least as high as that involved

2 The prefix " de " attached to some English names is in no sense " nobiliary." In Latin documents de was the equivalent of the English " of," as de la of " at " (so de la Pole for Atte Poole, cf. such names as Attwood, Attwater). In English this " of " was in the 15th century dropped; e.g. the grandson of Johannes de Stoke (John of Stoke) in a 14th-century document becomes John Stoke. In modern times, under the influence of romanticism, the prefix " de " has been in some cases " revived " under a misconception, e.g. " de Trafford," " de Hoghton." Very rarely it is correctly retained as derived from a foreign place-name, e.g. de Grey.

in the phrase " noblesse oblige." In this sense of a person of culture, character and good manners the word " gentleman " has supplied a gap in more than one foleign language.

The evolution of this meaning of " gentleman " reflects very accurately that of English society; and there are not wanting signs that the process of evolution, in the one as in the other, is not complete. The indefinableness of the word mirrors the indefinite character of " society " in England; and the use by " the masses " of " gentleman " as a mere synonym for " man " has spread pari passu with the growth of democracy. It is a protest against implied inferiority, and is cherished as the modern French bourgeois

cherishes his right of duelling with swords, under the ancien regime a prerogative of the noblesse. Nor is there much justification for the denunciation by purists of the " vulgarization " and " abuse " of the " grand old name of gentleman." Its- strict meaning has now fallen completely obsolete. Its current meaning varies with every class of society that uses it. But it always implies some sort of excellency of manners or morals. It may by courtesy be over-loosely applied by one common man to another; but the common man would understand the reproach conveyed in " You're no gentleman."

Authorities. — Selden, Titles of Honor (London, 1672) ; William Harrison, Description of England, ed. G. F. J. Furnivall for the New Shakspere Soc. (London, 1 877-1 878); Sir George Sitwell, "The English Gentleman," in the Ancestor, No. I (Westminster, April 1902); Peacham's Compleat Gentleman (1634), with an introduction by G. S. Gordon (Oxford, 1906) ; A. Smythe-Palmer, D.D., The Ideal of a Gentleman, or a Mirror for Gentlefolk: A Portrayal in Literature from the Earliest Times (London, 1908), a very exhaustive collection of extracts from authors so wide apart as Ptah-hotep (3300 B.C.) and William Watson, arranged under headings: " The Historical Idea of a Gentleman," "The Herald's Gentleman," " The Poet's Gentleman," &c. (W. A. P.)

GENTZ, FRIEDRICH VON (1764-1832), German publicist and statesman, was born at Breslau on the 2nd of May 1764. His father was an official, his mother an Ancillon, distantly related to the Prussian minister of that name. On his father's transference to Berlin, as director of the mint, the boy was sent to the Joachimsthal gymnasium there; his brilliant talents, however, did not develop until later, when at the university of Konigsberg he fell under the influence of Kant. But though his intellect was sharpened and his zeal for learning quickened by the great thinker's influence, Kant's " categorical imperative " did not prevent him from yielding to the taste for wine, women and high play which pursued him through life. When in 1785 he returned to Berlin, he received the appointmentof secret secretary to the royal Generaldirectorium, his talents soon gaining him promotion to the rank of councillor for war (Kriegsrath) . During an illness, which kept him virtuous by confining him to his room, he studied French and English, gaining a mastery of these languages which, at that time exceedingly rare, opened up for him opportunities for a diplomatic career.

His interest in public affairs was, however, first aroused by the outbreak of the French Revolution. Like most quick-witted young men, he greeted this at first with enthusiasm; but its subsequent

developments cooled his ardour and he was converted to more conservative counsels by Burke's Essay on the French Revolution, a translation of which into German (1794) was his first literary venture. This was followed, next year, by translations of works on the Revolution by Mallet du Pan and Mounier, and at this time he also founded and edited a monthly journal, the Neue deutsche Monalsschrift, in which for five years he wrote, mainly on historical and political questions, maintaining the principles of British constitutionalism against those of revolution- ary France. The knowledge he displayed of the principles and practice of finance was especially remarkable. In 1797, at the instance of English statesmen, he published a translation of a history of French finance by Francois d'lvernois (1757-1842), an eminent Genevese exile naturalized and knighted in England, extracts from which he had previously given in his journal. His literary output at this time, all inspired by a moderate Liberalism, was astounding, and included an essay on the results of the discovery of America, and another, written in French, on the English financial system (Essai sur I'Stat de I' administration

des finances de la Grande- Bretagne, London, 1800). Especially noteworthy, however, was the Denkschrift or Missive addressed by him to King Frederick William III. on his accession (1797), in which, inter alia, he urged upon the king the necessity for granting freedom to the press and to commerce. For a Prussian official to venture to give uncalled-for advice to his sovereign was a breach of propriety not calculated to increase his chances of favour; but it gave Gentz a conspicuous position in the public eye, which his brilliant talents and literary style enabled him to maintain. Moreover, he was from the first aware of the probable developments of the Revolution and of the consequences to Prussia of the weakness and vacillations of her policy. Opposition to France was the inspiring principle of the Historisches Journal founded by him in 1 799-1 800, which once more held up English institutions as the model, and became in Germany the mouth- piece of British policy towards the revolutionary aggressions oi the French republic. In 1801 he ceased the publication of the Journal, because he disliked the regularity of journalism, and issued instead, under the title Beitrdge zur Geschichte, &c, a series of essays on contemporary politics. The first of these was Uberden UrsprungundCharakter des Krieges gegen diefranzosische Revolution (1801), by many regarded as Gentz's masterpiece; another important brochure, Von dem politischen Zustande von Europa vor und nach der Revolution, a criticism of Hauterive's De I'Stat de la France d la fin de Van VIII, appeared the same year.

This activity gained him recognition abroad and gifts of money from the British and Austrian governments; but it made his position as an official in Berlin impossible, for the Prussian government had no mind to abandon its attitude of cautious neutrality. Private affairs also combined to urge Gentz to leave the Prussian service; for, mainly through" his own fault, a separation with his wife was arranged. In May 1802, accordingly, he took leave of his wife and left with his friend Adam Miiller for Vienna. In Berlin he had been intimate with the Austrian ambassador, Count Stadion, whose good offices procured him an introduction to the emperor Francis. The immediate result was the title of imperial councillor, with a yearly salary of 4000 gulden (December 6th, 1802); but it was not till 1809 that he was actively employed. Before returning to Berlin to make arrangements for transferring himself finally to Vienna, Gentz paid a visit to London, where he made the acquaintance of Pitt and Granville, who were so impressed with his talents that, in addition to large money presents, he was guaranteed an annual pension by the British government in recognition of the value of the services of his pen against Bonaparte. From this time forward he was engaged in a ceaseless polemic against every fresh advance of the Napoleonic power and pretensions; with matchless sarcasm he lashed " the nerveless policy of the courts, which suffer indignity with resignation "; he denounced the recognition of Napoleon's imperial title, and drew up a manifesto of Louis XVIII. against it. The formation of the coalition and the outbreak of war for a while raised his hopes, in spite of his lively distrust of the competence of Austrian ministers; but the hopes were speedily dashed by Austerlitz and its results. Gentz used his enforced leisure to write a brilliant essay on " The relations between England and Spain before the outbreak of war between the two powers" (Leipzig, 1806); and shortly after- wards appeared Fragmente aus der neuesten Geschichte des poli- tischen Gleichgewichts in Europa (translated s.t. Fragments on the Balance of Power in Europe, London, 1806). This latter, the last of Gentz's works as an independent publicist, was a masterly expose of the actual political situation, and at the same time prophetic in its suggestions as to how this should be retrieved : " Through Germany Europe has perished, through Germany it must rise again." He realized that the dominance of France could only be broken by the union of Austria and Prussia, acting in concert with Great Britain. He watched with interest the Prussian military preparations, and, at the invitation of Count Haugwitz, he went at the outset of the campaign to the Prussian headquarters at Erfurt, where he drafted the king's proclamation and his letter to Napoleon. The writer was known, and it was in

this connexion that Napoleon referred to him as ” a wretched scribe named Gentz, one of those men without honour who sell themselves for money.” In this mission Gentz had no official mandate from the Austrian government, and whatever hopes he may have cherished of privately influencing the situation in the direction of an alliance between the two German powers were speedily dashed by the campaign of Jena.

The downfall of Prussia left Austria the sole hope of Germany and of Europe. Gentz, who from the winter of 1806 onwards divided his time between Prague and the Bohemian watering- places, seemed to devote himself wholly to the pleasures of society, his fascinating personality gaining him a ready reception in those exalted circles which were to prove of use to him later on in Vienna. But, though he published nothing, his pen was rot idle, and he was occupied with a series of essays on the future of Austria and the best means of liberating Germany and redressing the balance of Europe; though he himself confessed to his friend Adam Muller (August 4th, 1806) that, in the miser- able circumstances of the time, his essay on ” the principles of a general pacification ” must be taken as a ” political poem.”

In 1809, on the outbreak of war between Austria and France, Gentz was for the first time actively employed by the Austrian government under Stadion; he drafted the proclamation an- nouncing the declaration of war (15th of April), and during the continuance of hostilities his pen was ceaselessly employed. But the peace of 1810 and the fall of Stadion once more dashed his hopes, and, disillusioned and ” hellishly blas£,” he once more retired to comparative inactivity at Prague. Of Metternich, Stadion’s successor, he had at the outset no high opinion, and it was not till 181 2 that there sprang up between the two men the close relations that were to ripen into life-long friendship. But when Gentz returned to Vienna as Metternich’s adviser and henchman, he was no longer the fiery patriot who had sympathized and corresponded with Stein in the darkest days of German depression and in fiery periods called upon all Europe to free itself from foreign rule. Disillusioned and cynical, though clear-sighted as ever, he was henceforth before all things an Austrian, more Austrian on occasion even than Metternich; as, e.g., when, during the final stages of the campaign of 1814, he expressed the hope that Metternich would substitute ” Austria ” for ” Europe ”

in his diplomacy and — strange advice from the old hater of Napoleon and of France— secure an Austro- French alliance by maintaining the husband of Marie Louise on the throne of France.

For ten years, from 181 2 onward, Gentz was in closest touch with all the great affairs of European history, the assistant, confidant, and adviser of Metternich. He accompanied the chancellor on all his journeys; was present at all the conferences that preceded and followed the war; no political secrets were hidden from him; and his hand drafted all important diplomatic documents. He was secretary to the congress of Vienna (1814- 181 5) and to all the congresses and conferences that followed, up to that of Verona (1822), and in all his vast knowledge of men and affairs made him a power. He was under no illusion as to their achievements; his memoir on the work of the congress of Vienna is at once an incisive piece of criticism and a monument of his own disillusionment. But the Liberalism of his early years was gone for ever, and he had become reconciled to Metternich's view that, in an age of decay, the sole function of a statesman was to " prop up mouldering institutions." It was the hand of the author of that offensive Missive to Frederick William III., on the liberty of the press, that drafted the Carlsbad decrees; it was he who inspired the policy of repressing the freedom of the universities; and he noted in his diary as " a day more important than that of Leipzig" the session of the Vienna conference of 1819, in which it was decided to make the convocation of representative assemblies in the German states impossible, by enforcing the letter of Article XIII. of the Act of Confederation.

As to Gentz's private life there is not much to be said. He remained to the last a man of the world, though tormented with an exaggerated terror of death. His wife he had never

seen again since their parting at Berlin, and his relations with other women, mostly of the highest rank, were too numerous to record. But passion tormented him to the end, and his infatuation for Fanny Elssler, the celebrated danseuse, forms the subject of some remarkable letters to his friend Rahel, the wife of Varnhagen von Ense (1830-1831). He died on the 9th of June 1832.

Gentz has been very aptly described as a mercenary of the pen, and assuredly no other such mercenary has ever carved out for himself a more remarkable career. To have done so would have been impossible, in spite of his brilliant gifts, had he been no more than the " wretched scribe " sneered at by Napoleon. Though by birth belonging to the middle class in a country of hide-bound aristocracy,

he lived to move on equal terms in the society of princes and statesmen; which would never have been the case had he been notoriously "bought and sold." Yet that he was in the habit of receiving gifts from all and sundry who hoped for his backing is beyond dispute. He notes that at the congress of Vienna he received 22,000 florins through Talley- rand from Louis XVIII. , while Castlereagh gave him £600, accompanied by les plus folles promesses ; and his diary is full of such entries. Yet he never made any secret of these gifts; Metternich was aware of them, and he never suspected Gentz of writing or acting in consequence against his convictions. As a matter of fact, no man was more free or outspoken in his criticism of the policy of his employers than this apparently venal writer. These gifts and pensions were rather in the nature of subsidies than bribes; they were the recognition by various powers of the value of an ally whose pen had proved itself so potent a weapon in their cause.

It is, indeed, the very impartiality and objectivity of his attitude that make the writings of Gentz such illuminating documen ts for the period of history which they cover. Allowance must of course be made for his point of view, but less so perhaps than in the case of any other writer so intimately concerned with the policies which he criticizes. And, apart from their value as historical documents, Gentz's writings are literary monuments, classical examples of nervous and luminous German prose, or of French which is a model for diplomatic style.

A selection of Gentz's works (Ausgewdhlte Schriften) was published by Weick in 5 vols. (1836-1838); his lesser works (Mannheim, 1 838-1 840) in 5 vols, and Memoires et lettres inedites (Stuttgart, 1841) were edited by G. Schlesier. Subsequently there have appeared Brief e an Chr. Garve (Breslau, 1857); correspondence (Briefwechsel) with Adam Muller (Stuttgart, 1857); Briefe an Pilat (2 vols., Leipzig, 1868); Aus dem Nachlass Friedrichs von Gentz (2 vols.), edited by Count Anton Prokesch-Osten (Vienna, 1867); Aus der alien Registrator der Staats-Kanzlei: Briefe politischen Inhalts von und an Friedrich von Gentz, edited by C. von Klinkowstrom (Vienna, 1870); Depiches inedites du chev. de Gentz aux Hospodars de Valachie 181J-1828 (a correspondence on current affairs commissioned by the Austrian government), edited by Count Anton von Prokesch- Osten the younger (3 vols., Paris, 1876), incomplete, but partly supplemented in Oesterreichs Teilnahme an den Befreiungskriegen (Vienna, 1887), a collection of documents of the greatest value; Zur Geschichte der orientalischen Frage: Briefe aus dem Nachlass Friedrichs von Gentz (Vienna, 1877), edited by Count Prokesch- Osten the younger. Finally Gentz's diaries, from 1800 to

1828, an invaluable mine of authentic material, were edited by Varnhagen von Ense and published after his death under the title Tagebucher, &c. (Leipzig, 1861; new ed., 4 vols., ib. 1873). Several lives of Gentz exist. The latest is by E. Guglia, Friedrich von Gentz (Vienna, 1901). (W. A. P.)

GEOCENTRIC, referred to the centre of the earth (Gr. 77J) as an origin; a term designating especially the co-ordinates of a heavenly body referred to this origin.

GEODESY (from the Gr. yrj, the earth, and dalav, to divide), the science of surveying (q.v.) extended to large tracts of country, having in view not only the production of a system of maps of very great accuracy, but the determination of the curvature of the surface of the earth, and eventually of the figure and dimensions of the earth. This last, indeed, may be the sole object in view, as was the case in the operations conducted in Peru and in Lapland by the celebrated French astronomers P. Bouguer, C. M. de la Condamine, P. L. M. de Maupertuis, A. C. Clairault and others; and the measurement of the meridian

arc of France by P. F. A. Mechain and J. B. J. Delambre had for its end the determination of the true length of the " metre " which was to be the legal standard of length of France (see Earth, Figure or the).

The basis of every extensive survey is an accurate triangulation, and the operations of geodesy consist in the measurement, by theodolites, of the angles of the triangles; the measurement of one or more sides of these triangles on the ground; the determin- ation by astronomical observations of the azimuth of the whole network of triangles; the determination of the actual position of the same on the surface of the earth by observations, first for latitude at some of the stations, and secondly for longitude; the determination of altitude for all stations.

For the computation, the points of the actual surface of the earth are imagined as projected along their plumb lines on the mathematical figure, which is given by the stationary sea-level, and the extension of the sea through the continents by a system of imaginary canals. For many purposes the mathematical surface is assumed to be a plane; in other cases a sphere of radius 6371 kilometres

(20,900,000 ft.). In the case of extensive operations the surface must be considered as a compressed ellipsoid of rotation, whose minor axis coincides with the earth's axis, and whose compression, flattening, or ellipticity is about

1/298.

Measurement of Base Lines.

To determine by actual measurement on the ground the length of a side of one of the triangles (" base line "), wherefrom to infer the lengths of all the other sides in the triangulation, is not the least difficult operation of a trigonometrical survey. When the problem is stated thus — To determine the number of times that a certain standard or unit of length is contained between two finely marked points on the surface of the earth at a distance of some miles asunder, so that the error of the result may be pronounced to lie between certain very narrow limits, — then the question demands very serious consideration. The representation of the unit of length by means of the distance between two fine lines on the surface of a bar of metal at a certain temperature is never itself free from uncertainty and probable error, owing to the difficulty of knowing at any moment the precise temperature of the bar; and the transference of this unit, or a multiple of it, to a measuring bar will be affected not only with errors of observation, but with errors arising from uncertainty of temperature of both bars. If the measuring bar be not self-compensating for temperature, its expansion must be determined by very careful experiments. The thermometers required for this purpose must be very carefully studied, and their errors of division and index error determined.

In order to avoid the difficulty in exactly determining the temperature of a bar by the mercury thermometer, F. W. Bessel introduced in 1834 near Konigsberg a compound bar which constituted a metallic thermometer. 1 A zinc bar is laid on an iron bar two toises long, both bars being perfectly planed and in free contact, the zinc bar being slightly shorter and the two bars rigidly united at one end. As the temperature varies, the difference of the lengths of the bars, as perceived by the other end, also varies, and affords a quantitative correction for temperature variations, which is applied to reduce the length to standard temperature. During the measurement of the base line the bars were not allowed to come into contact, the interval being measured by the insertion of glass wedges. The results of the comparisons of four measuring rods with one another and with the standards were elaborately computed by the method of least-squares.

The probable error of the measured length of 935 toises (about 6000 ft.) has been estimated as 1/863500 or 1-2 n (jj. denoting a millionth). With this apparatus fourteen base lines were measured in Prussia and some neighbouring states; in these cases a somewhat higher degree of accuracy was obtained.

The principal triangulation of Great Britain and Ireland has seven base lines: five have been measured by steel chains, and two, more exactly, by the compensation bars of General T. F. Colby, an apparatus introduced in 1827-1828 at Lough Foyle in Ireland. Ten base lines were measured in India in 1 831-1869 by the same apparatus. This is a system of six compound-bars self-correcting for temperature. The bars may be thus described: Two bars, one of brass and the other of iron, are laid in parallelism side by side, firmly united at their centres, from which they may freely expand or contract; at the standard temperature they are of the same length. Let AB be one bar, A'B' the other; draw lines through the corresponding ' extremities AA' (to P) and BB' (to Q), and make A'P = B'Q, AA' being equal to BB'. If the ratio A'P/AP equals the ratio of the co- efficients of expansion of the bars A'B' and AB, then, obviously, the distance PQ is constant (or nearly so). In the actual instrument

1 An arrangement acting similarly had been previously introduced by Borda.

P and Q are finely engraved dots 10 ft. apart. In practice the bars, when aligned, are not in contact, an interval of 6 in. being allowed between each bar and its neighbour. This distance is accurately measured by an ingenious micrometrkal arrangement constructed on exactly the same principle as the bars themselves.

The last base line measured in India had a length of 8913 ft. In consequence of some suspicion as to the accuracy of the compensation apparatus, the measurement was repeated four times, the operations being conducted so as to determine the actual values of the probable errors of the apparatus. The direction of the line (which is at Cape Comorin) is north and south. In two of the measurements the brass component was to the west, in the others to the east ; the differences between the individual measurements and the mean ot the four were +0-0017, —0-0049, —0-0015, +0-0045 ft. These differences are very small ; an elaborate investigation of all sources of error shows that the probable error r>l a base line in India is on the average ±2-8 11. These compensation bars were also used by Sir Thomas Maclear in the measurement of the base line in

his extension of Lacaille's arc at the Cape. The account of this operation will be found in a volume entitled Verification and Extension of Lacaille's Arc of Meridian at the Cape of Good Hope, by Sir Thomas Maclear, published in 1866. A rediscussion has been given by Sir David Gill in his Report on the Geodetic Survey of South Africa, fife, 1896.

A very simple base apparatus was employed by W. Struve in his triangulations in Russia from 1817 to 1855. This consisted of four wrought-iron bars, each two toises (rather more than 13 ft.) long; one end of each bar is terminated in a small steel cylinder presenting a slightly convex surface for contact, the other end carries a contact lever rigidly connected with the bar. The shorter arm of the lever terminates below in a polished hemisphere, the upper and longer arm traversing a vertical divided arc. In measuring, the plane end of one bar is brought into contact with the short arm of the contact lever (pushed forward by a weak spring) of the next bar. Each bar has two thermometers, and a level for determining the inclination of the bar in measuring. The manner of transferring the end of a bar to the ground is simply this: under the end of the bar a stake is driven very firmly into the ground, carrying on its upper surface a disk, capable of movement in the direction of the measured line by means of slow-motion screws. A fine mark on this disk is brought vertically under the end of the bar by means of a theodolite which is planted at a distance of 25 ft. from the stake in a direction perpendicular to the base. Struve investigated for each base the probable errors of the measurement arising from each of these seven causes: Alignment, inclination, comparisons with standards, read- ings of index, personal errors, uncertainties of temperature, and the probable errors of adopted rates of expansion. He found that ±o-8 n was the mean of the probable errors of the seven bases measured by him. The Austro-Hungarian apparatus is similar; the distance of the rods is measured by a slider, which rests on one of the ends of each rod. Twenty-two base lines were measured in

1 840-1 899.

General Carlos Ibafiez employed in 1858-1879, for the measurement of nine base lines in Spain, two apparatus similar to the apparatus previously employed by Porro in Italy; one is complicated, the other simplified. The first, an apparatus of the brothers Brunner of Paris, was a thermometric combination of two bars, one of platinum and one of brass, in length 4 metres, furnished with three levels and four thermometers. Suppose A, B, C three micrometer microscopes very firmly supported at intervals of 4 metres with their

axes vertical, and aligned in the plane of the base line by means of a transit instrument, their micrometer screws being in the line of measurement. The measuring bar is brought under say A and B, and those micro- meters read ; the bar is then shifted and brought under B and C. By repetition of this process, the reading of a micrometer indicating the end of each position of the bar, the measurement is made.

Quite similar apparatus (among others) has been employed by the French and Germans. Since, however, it only permitted a distance of about 300 m. to be measured daily, Ibafiez introduced a simplification; the measuring rod being made simply of steel, and provided with inlaid mercury thermometers. This apparatus was used in Switzerland for the measurement of three base lines. The accuracy is shown by the estimated probable errors: =to-2 it to ±o-8 \t. The distance measured daily amounts at least to 800 m.

A greater daily distance can be measured with the same accuracy by means of Bessel's apparatus; this permits the ready measure- ment of 2000 m. daily. For this, however, it is important to notice that a large staff and favourable ground are necessary. An im- portant improvement was introduced by Edward Jaderin of Stock- holm, who measures with stretched wires of about 24 metres long; these wires are about 1-65 mm. in diameter, and when in use are stretched by an accurate spring balance with a tension of 10 kg. 2 The nature of the ground has a very trifling effect on this method. The difficulty of temperature determinations is removed by employ- ing wires made of invar, an alloy of steel (64 %) and nickel (36 %) which has practically no linear expansion for small thermal changes

2 Geodetic Survey of South Africa, vol. iii. (i905),p.viii;2>s Nouveaux Appareils pour la mesure r abide des bases geod., par J. Ren6 Benoit et Ch. fid. Guillaume (1906).

at ordinary temperatures; this alloy was discovered in 1896 by Ben6it and Guillaume of the International Bureau of Weights and Measures at Breteuil. Apparently the future of base-line measurements rests with the invar wires of the Jaderin apparatus; next comes Porro's apparatus with invar bars 4 to 5 metres long.

Results have been obtained in the United States, of great im-

portance in view of their accuracy, rapidity of determination and economy. For the measurement of the arc of meridian in longitude 98 E., in 1900, nine base lines of a total length of 69-2 km. were measured in six months. The total cost of one base was $1231. At the beginning and at the end of the field-season a distance of exactly 100 m. was measured with R. S. Woodward's " 5-m. ice- bar " (invented in 1891); by means of the remeasurement of this length the standardization of the apparatus was done under the same conditions as existed in the case of the base measurements. For the measurements there were employed two steel tapes of 100 m. long, provided with supports at distances of 25 m., two of 50 m., and the duplex apparatus of Eimbeck, consisting of four 5-m. rods. Each base was divided into sections of about 1000 m. ; one of these, the " test kilometre," was measured with all the five apparatus, the others only with two apparatus, mostly tapes. The probable error was about = ± = o-8 it, and the day's work a distance of about 2000 m. Each of the four rods of the duplex apparatus consists of two bars of brass and steel. Mercury thermometers are inserted in both bars; these serve for the measurement of the length of the base lines by each of the bars, as they are brought into their con- secutive positions, the contact being made by an elastic-sliding contact. The length of the base lines may be calculated for each bar only, and also by the supposition that both bars have the same temperature. The apparatus thus affords three sets of results, which mutually control themselves, and the contact adjustments*

Cermit rapid work. The same device has been applied to the older imetallic-compensating apparatus of Bache-Wiirdemann (six bases, 1847-1857) and of Schott. There was also employed a single rod bimetallic apparatus on F. Porro's principle, constructed by the brothers Repsold for some base lines. Excellent results have been more recently obtained with invar tapes.

The following results show the lengths of the same German base lines as measured by different apparatus :

metres.

Base at Berlin 1864 Apparatus of Bessel 2336-3920

,, ,, 1880 ,, Brunner -3924

Base at- Strehlen 1854 ,, Bessel 2762-5824

,, 1879 ,, Brunner -5852

Old base at Bonn 1847 ,, Bessel 2133-9095

.. 11 1892 ,, ,, -9097

New base at Bonn 1892 ,, ,, 2512-9612

,, ,, 1892 „ Brunner -9696

It is necessary that the altitude above the level of the sea of every part of a base line be ascertained by spirit levelling, in order that the measured length may be reduced to what it would have been had the measurement been made on the surface of the sea, produced in imagination. Thus if / be the length of a measuring bar, h its height at any given position in the measurement, r the radius of the earth, then the length radially projected on to the level of the sea is l(i-h/r). In the Salisbury Plain base line the reduction to the level of the sea is -0-6294 ft.

The total number of base lines measured in Europe up to the present time is about one hundred and ten, nineteen of which do not exceed in length 2500 metres, or about ii miles, and three- one in France, the others in Bavaria — ■ exceed 19,000 metres. The question has been frequently discussed whether or not the advantage of a long base is sufficiently great to warrant the ex- penditure of time that it requires, or whether as much precision is not obtain- able in the end by careful triangulation from a short base. But the answer cannot be given generally; it must depend on the circumstances of each particular case. With Jaderin 's appa- ratus, provided with invar wires, bases : of 20 to 30 km. long are obtained with- out difficulty.

In working away from a base line ab, stations c, d, e, f are carefully selected so as to obtain from well-shaped triangles gradually increasing sides Before, how- ever, finally leaving the base line, it is usual to verify it by triangulation 'thus : during the measurement two or more points, as p, q (fig. 1), are marked in the t FlG. I. base in positions such that the lengths of

the different segments of the line are known; then, taking suitable external stations, as h, k, the angles of the triangles bhp, phq, hqk, kqa are measured. From these angles can be computed the ratios of the segments, which must agree, if all operations are correctly performed, with the ratios resulting from

XI. SO

the measures. Leaving the base line, the sides increase up to 10, 30

or 50 miles occasionally, but seldom reaching 100 miles. The triangulation points may either be natural objects presenting themselves in suitable positions, such as church towers ; or they may be objects specially constructed in stone or wood on mountain tops or other prominent ground. In every case it is necessary that the precise centre of the station be marked by some permanent mark. In India no expense is spared in making permanent the principal trigonometrical stations — costly towers in masonry being erected. It is essential that every trigonometrical station shall present a fine object for observation from surrounding stations.

Horizontal Angles. In placing the theodolite over a station to be observed from, the first point to be attended to is that it shall rest upon a perfectly solid foundation. The method of obtaining this desideratum must depend entirely on the nature of the ground; the instrument must if possible be supported on rock, or if that be impossible a solid foundation must be obtained by digging. When the theodolite is required to be raised above the surface of the ground in order to command particular points, it is necessary to build two scaffolds, — the outer one to carry the observatory, the inner one to carry the instrument, — and these two edifices must have no point of contact. Many cases of high scaffolding have occurred on the English Ordnance Survey, as for instance at Thaxted church, where the tower, 80 ft. high, is surmounted by a spire of 90 ft. The scaffold for the ob- servatory was carried from the base to the top of the spire; that for the instrument was raised from a point of the spire 140 ft. above the ground, having its bearing upon timbers passing through the spire at that height. Thus the instrument, at a height of 178 ft. above the ground, was insulated, and not affected by the action of the wind on the observatory.

At every station it is necessary to examine and correct the adjustments of the theodolite, which are these: the line of collimation of the telescope must be perpendicular to its axis of rotation; this axis perpendicular to the vertical axis of the instrument; and the latter perpendicular to the plane of the horizon. The micrometer microscopes must also measure correct quantities on the divided circle or circles. The method of observing is this. Let A, B, C . . . be the stations to be observed taken in order of azimuth ; the telescope is first directed to A and the cross-hairs of the telescope made to bisect the object presented by A, then the microscopes or verniers of the horizontal circle (also of the vertical circle if necessary) are read and recorded. The telescope is then turned to B, which is observed in the same manner; then C and the other stations. Coming round by continuous motion to A, it is again observed, and the agreement of

this second reading with the first is some test of the stability of the instrument. In taking this round of angles — or " arc," as it is called on the Ordnance Survey — it is desirable that the interval of time between the first and second observations of A should be as small as may be consistent with due care. Before taking the next arc the horizontal circle is moved through 20° or 30"; thus a different set of divisions of the circle is used in each arc, which tends to eliminate the errors of division.

It is very desirable that all arcs at a station should contain one point in common, to which all angular measurements are thus referred, — the observations on each arc commencing and ending with this point, which is on the Ordnance Survey called the " referring object." It is usual for this purpose to select, from among the points which have to be observed, that one which affords the best object for precise observation. For mountain tops a " referring object " is constructed of two rectangular plates of metal in the same vertical plane, their edges parallel and placed at such a distance apart that the light of the sky seen through appears as a vertical line about 10″ in width. The best distance for this object is from I to 2 miles.

This method seems at first sight very advantageous but if, however, it be desired to attain the highest accuracy, it is better, as shown by General Schreiber of Berlin in 1878, to measure only single angles, and as many of these as possible between the directions to be determined. Division-errors are thus more perfectly eliminated, and errors due to the variation in the stability, &c, of the instruments are diminished. This method is rapidly gaining precedence.*

The theodolites used in geodesy vary in pattern and in size — the horizontal circles ranging from 10 in. to 36 in. in diameter. In Ramsden's 36-in. theodolite the telescope has a focal length of 36 in. and an aperture of 2-5 in., the ordinarily used magnifying power being 54; this last, however, can of course be changed at the requirements of the observer or of the weather. The probable error of a single observation of a fine object with this theodolite is about o"-2. Fig. 2 represents an altazimuth theodolite, of an improved pattern used on the Ordnance Survey. The horizontal circle of 14-in. diameter is read by three micrometer microscopes; the vertical circle has a diameter of 12 in., and is read by two micro- scopes. In the great trigonometrical survey of India the theodolites used in the more important parts of the work have been of 2 and 3 ft. diameter — the circle read by five equidistant microscopes. Every angle is measured twice in each position of the zero of the horizontal circle, of which there are generally ten ; the entire

number of measures of an angle is never less than 20. An examination of 1407 angles showed that the probable error of an observed angle is on the average = * o”-28.

For the observations of very distant stations it is usual to employ a heliotrope (from the Gr. ijXios, sun; tpotos, a turn), invented by Gauss at Gottingen in 182 1. In its simplest form this is a plane mirror, 4, 6, or 8 in. in diameter, capable of rotation round a horizontal and a vertical axis. This mirror is placed at the station to be ob- served, and in fine weather it is kept so directed that the rays of the sun reflected by it strike the distant observing telescope. To the observer the heliotrope presents the appearance of a star of the first or second magnitude, and is generally a pleasant object for observing.

Observations at night, with the aid of light-signals, have been repeatedly made, and with good results, particularly in France by General Francois Perrier, and more recently in the United States by the Coast and Geodetic Survey; the signal employed being an acetylene bicycle-lamp, with a lens 5 in. in diameter. Particularly noteworthy are the trigonometrical connexions of Spain and Algeria, which were carried out in 1879 by Generals Ibafiez and Perrier (over a distance of 270 km.), of Sicily and Malta in 1900, and of the islands of Elba and Sardinia in 1902 by Dr Guarducci (over distances up to 230 km.) ; in these cases artificial

Fig. 2. — Altazimuth Theodolite.

light was employed : in the first case electric light and in the two others acetylene lamps.

Astronomical Observations. The direction of the meridian is determined either by a theodolite or a portable transit instrument. In the former case the operation consists in observing the angle between a terrestrial object— generally a mark specially erected and capable of illumination at night — and a close circumpolar star at its greatest eastern or western azimuth, or, at any rate, when very near that position. If the observation be made / minutes of time before or after the time of greatest azimuth, the azimuth then will differ from its maximum value by (450/) 2 sin 1″ sin 25/ sin 2, in seconds of

angle, omitting .smaller terms, 8 being the star's declination and z its zenith distance. The collimation and level errors are very carefully determined before and after these observations, and it is usual to arrange the observations by the reversal of the telescope so that collimation error shall disappear. If b, c be the level and collimation errors, the correction to the circle reading is b cot z ± c cosec 2, b being positive when the west end of the axis is high. It is clear that any uncertainty as to the real state of the level will produce a corre-

sponding uncertainty in the resulting value of the azimuth, — an uncertainty which increases with the latitude and is very large in high latitudes. This may be partly remedied by observing in connexion with the star its reflection in mercury. In determining the value of " one division " of a level tube, it is necessary to bear in mind that in some the value varies considerably with the tempera- ture. By experiments on the level of Ramsden's 3-foot theodolite, it was found that though at the ordinary temperature of 66° the value of a division was about one second, yet at 32 ° it was about five seconds.

In a very excellent portable transit used on the Ordnance Survey, the uprights carrying the telescope are constructed of mahogany, each upright being built of several pieces glued and screwed together; the base, which is a solid and heavy plate of iron, carries a reversing apparatus for lifting the telescope out of its bearings, reversing it and letting it down again. Thus is avoided the change of tempera- ture which the telescope would incur by being lifted by the hands of the observer. Another form of transit is the German diagonal form, in which the rays of light after passing through the object- glass are turned by a total reflection prism through one of the trans- verse arms of the telescope, at the extremity of which arm is the eye-piece. The unused half of the ordinary telescope being cut away is replaced by a counterpoise. In this instrument there is the advantage that the observer without moving the position of his eye commands the whole meridian, and that the level may remain on the pivots whatever be the elevation of the telescope. But there is the disadvantage that the flexure of the transverse axis causes a variable collimation error depending on the zenith distance of the star to which it is directed ; and moreover it has been found that in some cases the personal error of an observer is not the same in the two positions of the telescope.

To determine the direction of the meridian, it is well to erect two marks at nearly equal angular distances on either side of the north meridian line, so that the pole star crosses the vertical of each mark a short time before and after attaining its greatest eastern and

western azimuths.

If now the instrument, perfectly levelled, is adjusted to have its centre wire on one of the marks, then when elevated to the star, the star will traverse the wire, and its exact positipn in the field a,t any moment can be measured by the micrometer wire. Alternate observations of the star and the terrestrial mark, combined with careful level readings and reversals of the instrument, will enable one, even with only one mark, to determine the direction of the meridian in the course of an hour with a probable error of less than a second. The second mark enables one to complete the station more rapidly and gives a check upon the work. As an instance, at Findlay Seat, in latitude 57 ° 35', the resulting azimuths of the two marks were 177° 45′ 37"-29±o"-20 and 182° 17′ is"-6i ±o"-i3, while the angle between the two marks directly measured by a theodolite was found to be 4 31′ 37"-43±o"-23.

We now come to the consideration of the determination of time with the transit instrument. Let fig. 3 represent the sphere stereo-graphically projected on the plane of the horizon,- — ns being the meridian, ■we the prime vertical, Z,P the zenith and the pole. Let p be the point in which the production of the axis of the instrument meets the celestial sphere, S the position of a star when observed on a wire whose distance from the collimation centre is c. Let a be the azimuthal deviation, namely, the angle wZp, b the level error so that Zp = go°-b. Let also the hour angle corresponding to p be 90°-™, and the declination of the same =m, the star's declination being 5, and the latitude cf>. Then to find the hour angle ZPS = t of the star when observed, in the triangles £PS, pVZ we have, since f>PS = 90 +t — »,

-Sin c= sin m sin 5+cos m cos 5 sin (n-r), Sin m— sin b sin — cos b cos sin a, Cos m sin » = sin b cos 0-f-cos b sin sin a. And these equations solve the problem, however large be the errors of the instrument. Supposing, as usual, a, b, m, n to be small, we have at once t=m+c sec 8+m tan 5, which is the correction to the observed time of transit. Or, eliminating m and 11 by means of the second and third equations, and putting 2 for the zenith distance of the star, / for the observed time of transit, the corrected time is t+{a sin 2+6 cos z+c)j cos 8. Another very convenient form for stars near the zenith is t = 6 sec <£+c sec 8+m (tan 8— tan#).

Suppose that in commencing to observe at a station the 1 error of the chronometer is not known; then having secured for the instrument a very solid foundation, removed as far as possible level and colli-

mation errors, and placed it by estimation nearly in the meridian, let two stars differing considerably in declination be observed — the instrument not being reversed between them. From these twg stars, neither of which should be a close circumpolar star, a good approximation to the , chronometer error can be obtained; thus

Fig. 3.

let £i, «, be the apparent clock errors given by these stars if Si, 82 be their declinations the real error is

e = ei + («-«) (tan <£-tan 8i)/(tan Si-tan 82). Of course this is still only approximate, but it will enable the observer (who by the help of a table of natural tangents can compute e in a few minutes) to find the meridian by placing at the proper time, which he now knows approximately, the centre wire of his instrument on the first star that passes — not near the zenith.

The transit instrument is always reversed at least once in the course of an evening's observing, the level being frequently read and recorded. It is necessary in most instruments to add a correction for the difference in size of the pivots.

The transit instrument is also used in the prime vertical for the determination of latitudes. In the preceding figure let q be the point in which the northern extremity of the axis of the instrument produced meets the celestial sphere. Let nZq be the azimuthal deviation =a, and b being the level error, Zg=go°-6; let also nPq = r and Pq = \j/. Let S' be the position of a star when observed on a wire whose distance from the collimation centre is c, positive when to the south, and let h be the observed hour angle of the star, viz. ZPS'. Then the triangles gPS', gPZ give

-Sin c = sin 5 cos ˆ-cos 8 sin cos a, Sin tf' sin r = cos b sin a.

Now when a and b are very small, we see from the last two equations that i/ = ' by the formula cot ' =cot 8 cos h, the first equation leads us to this result — = (j>'\{a sin z+b cos z+c)/cos 2,

the correction for instrumental error being very ' similar to that applied to the observed time of transit in the case of meridian observations. When a is not very small and z is small, the formulae

required are more complicated.

The method of determining latitude by transits in the prime vertical has the disadvantage of being a somewhat slow process, and of requiring a very precise knowledge of the time, a disadvantage from which the zenith telescope is free. In principle this instrument

is based on the proposi- tion that when the me- ridian zenith distances of two stars at their upper culminations — one being to the north and the other to the south of the zenith —are equal, the latitude is the mean of their declinations; or, if the zenith distance of a star culminating to the south of the zenith be Z, its declination being 8, and that of another culminat- ing to the north with zenith distance Z' and declination 6', then clearly the latitude is i(5+&') + i(Z-Z'). Now the zenith telescope does away with the divided circle, and substitutes the measure- ment micrometrically of the quantity Z'-Z.

In fig. 4 is shown a zenith telescope by H. Wanschaff of Berlin, which is the type used (according to the Central Bureau at Potsdam) since about 1890 for the deter- mination of the variations of latitude due to different, but as yet imperfectly understood, influences.

The instrument is sup- ported on a strong tripod, fitted with levelling screws; to this tripod is fixed the azimuth circle and a long vertical steel axis. Fitting on this axis is a hollow axis which carries on its upper end a short transverse horizon- tal axis with a level. This latter carries the telescope, which, supported at the centre of its length, is free to rotate in a vertical plane. The telescope is thus mounted eccentrically with respect to the vertical axis around which it revolves. Two extremely sensitive levels are attached to

Fig. 4. — Zenith Telescope constructed for the International Stations at Mizu- sawa, Carloforte, Gaithersburg and Ukiah, by Hermann Wanschaff, Berlin.

the telescope, which latter carries a micrometer in its eye-piece, with a screw of long range for measuring differences of zenith dis- tance. Two levels are employed for controlling and increasing the accuracy. For this instrument stars are selected in pairs, passing north and south of the zenith, culminating within a few minutes of time and within about twenty minutes (angular) of zenith dis- tance of each other. When a pair of stars is to be observed, the telescope is set to the mean of the zenith distances and in the plane of the meridian. The first star on passing the central meridional wire is bisected by

*the micrometer; then the telescope is rotated very carefully through 180 round the vertical axis, and the second star on passing through the field is bisected by the micrometer on the centre wire. The micrometer has thus measured the difference of the zenith distances, and the calculation to get the latitude is most simple. Of course it is necessary to read the level, and the observations are not necessarily confined to the centre wire. In fact if n, s be the north and south readings of the level for the south star, n', s' the same for the north star, I the value of one division of the level, m the value of one division of the micrometer, r, r' the refraction corrections, ju, yu' the micrometer readings of the south and north star, the micrometer being supposed to read from the zenith, then, supposing the observation made on the centre wire, — 4 > *°i(.S + S') + hb-n')m + l(n + n'-s-s')l + i(r-r').. It is of course of the highest importance that the value m of the screw be well determined. This is done most effectually by observing the vertical movement of a close circumpolar star when at its greatest azimuth.*

In a single night with this instrument a very accurate result, say with a probable error of about o"-2, could be obtained for latitude from, say, twenty pair of stars; but when the latitude is required to be obtained with the highest possible precision, two nights at least are necessary. The weak point of the zenith telescope lies in the circumstance that its requirements prevent the selection of stars whose positions are well fixed ; very frequently it is necessary to have the declinations of the stars selected for this instrument specially observed at fixed observatories. The zenith telescope is made in various sizes from 30 to 54 in. in focal length ; a 30-in. telescope is sufficient for the highest purposes and is very portable. The net observation probable-error for one pair of stars is only ± o"-l.

The zenith telescope is a particularly pleasant instrument to work with, and an observer has been known (a sergeant of Royal Engineers, on one occasion) to take every star in his list during eleven hours on a stretch, namely, from 6 o'clock P.M. until 5 A.M., and this on a very cold November night on one of the highest points of the Grampians. Observers accustomed to geodetic operations attain considerable powers of endurance. Shortly after the commencement of the observations on one of the hills in the Isle of Skye a storm carried away the wooden houses of the men and left the observatory roofless. Three observatory roofs were subsequently demolished, and for some time the observatory was used without a roof, being filled with snow every night and emptied every morning. Quite different, however, was the experience of the same party when

on the top of Ben Nevis, 4406 ft. high. For about a fortnight the state of the atmosphere was unusually calm, so much so, that a lighted candle could often be carried between the tents of the men and the observatory, whilst at the foot of the hill the weather was wild and stormy.

The determination of the difference of longitude between two stations A and B resolves itself into the determination of the local time at each of the stations, and the comparison by signals of the clocks at A and B. Whenever telegraphic lines are available these comparisons are made by telegraphy. A small and delicately-made apparatus introduced into the mechanism of an astronomical clock or chronometer breaks or closes by the action of the clock an electric circuit every second. In order to record the minutes as well as seconds, one second in each minute, namely that numbered O or 60, is omitted. The seconds are recorded on a chronograph, which consists of a cylinder revolving uniformly at the rate of one revolution per minute covered with white paper, on which a pen having a slow movement in the direction of the axis of the cylinder describes a continuous spiral. This pen is deflected through the agency of an electromagnet every second, and thus the seconds of the clock are recorded on the chronograph by offsets from the spiral curve. An observer having his hand on a contact key in the same circuit can record in the same manner his observed times of transits of stars. The method of determination of difference of longitude is, therefore, virtually as follows. After the necessary observations for instru- mental corrections, which are recorded only at the station of obser- vation, the clock at A is put in connexion with the circuit so as to ‘ write on both chronographs, namely, that at A and that at B. Then the clock at B is made to write on both chronographs. It is clear that by this double operation one can eliminate the effect of the small interval of time consumed in the transmission of signals, for the difference of longitude obtained from the one chronograph will be in excess by as much as that obtained from the other will be in defect. The determination of the personal errors of the observers in this delicate operation is a matter of the greatest importance, as therein lies probably the chief source of residual error.

These errors can nevertheless be almost entirely avoided by using the impersonal micrometer of Dr Repsold (Hamburg, 1889). In this device there is a movable micrometer wire which is brought by hand

into coincidence with the star and moved along with it; at fixed points there are electrical contacts, which replace the fixed wires. Experiments at the Geodetic Institute and Central Bureau at Potsdam in 1891 gave the following personal equations in the case of four observers : —

A-B A-G A-S B-G B-S G-S

Older Procedure. New Procedure.

— o s – 108 — o”-oo4 -o’-3i4 -o»-035 — o’-i84 — o’-027 — O s -225 +o’-oi3

— o»-o86 — o”-023 +o”-io9 — o”-oo6

These results show that in the later method the personal equation is small and not so variable; and consequently the repetition of longitude determinations with exchanged observers and apparatus entirely eliminates the constant errors, the probable error of such determinations on ten nights being scarcely ˆo’-oi.

Calculation of Triangulation.

The surface of Great Britain and Ireland is uniformly covered by triangulation, of which the sides are of various lengths from 10 to 1 1 1 miles. The largest triangle has one angle at Snowdon in Wales, another on Slieve Donard in Ireland, and a third at Scaw Fell in Cumberland; each side is over a hundred miles and the spherical excess is 64”. The more ordinary method of triangulation is, however, that of chains of triangles, in the direction of the meridian and perpendicular thereto. The principal triangulations of France, Spain, Austria and India are so arranged. Oblique chains of triangles are formed in Italy, Sweden and Norway, also in Germany and Russia, and in the United States. Chains are composed sometimes merely of consecutive plain triangles; sometimes, and more frequently in India, of combinations of triangles forming consecutive polygonal figures. In this method of triangulating, the sides of the triangles are generally from 20 to 30 miles in length — seldom exceed- ing 40.

The inevitable errors of observation, which are inseparable from all angular as well as other measurements, introduce a great difficulty into the calculation of the sides of a triangulation. Starting from a given base in order to get a required distance, it may generally be obtained in several different ways — that is, by using different sets of triangles. The results will certainly differ one from another, and

probably no two will agree. The experience of the computer will then come to his aid, and enable him to say which is the most trustworthy result; but no experience or ability will carry him through a large network of triangles with anything like assurance. The only way to obtain trustworthy results is to employ the method of least squares. We cannot here give any illustration of this method as applied to general triangulation, for it is most laborious, even for the simplest cases.

Three stations, projected on the surface of the sea, give a spherical or spheroidal triangle according to the adoption of the sphere or the ellipsoid as the form of the surface. A spheroidal triangle differs from a spherical triangle, not only in that the curvatures of the sides are different one from another, but more especially in this that, while in the spherical triangle the normals to the surface at the angular points meet at the centre of the sphere, in the spheroidal triangle the normals at the angles A, B, C meet the axis of revolution of the spheroid in three different points, which we may designate o, (3, y respectively. Now the angle A of the triangle as measured by a theodolite is the inclination of the planes BAa and CAa, and the angle at B is that contained by the planes AB0and CB/3. But the planes ABa and AB0 containing the line AB in common cut the surface in two distinct plane curves. In order, therefore, that a spheroidal triangle may be exactly defined, it is necessary that the nature of the lines joining the three vertices be stated. In a mathematical point of view the most natural definition is that the sides be geodetic or shortest lines. C. C. G. Andrae, of Copenhagen, has also shown that other lines give a less convenient computation.

K. F. Gauss, in his treatise, Disquisitiones generates circa superficies curvas, entered fully into the subject of geodetic (or geodesic) triangles, and investigated expressions for the angles of a geodetic triangle whose sides are given, not certainly finite expressions, but approximations inclusive of small quantities of the fourth order, the side of the triangle or its ratio to the radius of the nearly spherical surface being a small quantity of the first order. The terms of the fourth order, as given by Gauss for any surface in general, are very complicated even when the surface is a spheroid. If we retain smajl quantities of the second order only, and put A, B,

A=A+ ff (2a+b+t)/ 12 , B = B+ ff (a+2b-t-r)/ 12 , ffl = C+< r (a-r-b+2r)/ 12 .

For the sphere a = b = r, and making this simplification , we obtain the theorem previously given by A. M. Legendre. With the terms of

the fourth order, we have (after Andrae) :

■- B -§+§(2 ^*+ ! 5r).*

in which e = 2 +c 2 , 3=a+b+r. For the ellipsoid of rotation the measure of curvature is equal to i/p», p and n being the radii of curvature of the meridian and per- pendicular.*

It is rarely that the terms of the fourth order are required. As a rule spheroidal triangles are calculated as spherical (after Legendre), i.e. like plane triangles with a decrease of each angle of about e/3; c must, however, be calculated for each triangle separately with its mean measure of curvature k.

The geodetic line being the shortest that can be drawn on any surface between two given points, we may be conducted to its most important characteristics by the following considerations: let p, q be adjacent points on a curved surface; through s the middle point of the chord pq imagine a plane drawn perpendicular to pq, and let S be any point in the intersection of this plane with the surface; then £>S+Sg is evidently least when sS is a minimum, which is when sS is a normal to the surface; hence it follows that of all plane curves on the surface joining p, q, when those points are in- definitely near to one another, that is the shortest which is made by_ the normal plane. That is to say, the osculating plane at any point of a geodetic line contains the normal to the surface at that

goint. Imagine now three points in space, A, B, C, such that AB = C=c; let the direction cosines of AB be /, m, n, those of BC I', m', n', then x, y, z being the co-ordinates of B, those of A and C will be respectively — ■

x—cl : y — cm : z—cn x--cl' ': y+cm' : z--cn'.

Hence the co-ordinates of the middle point M of AC are x+ic(l'-l), y +lc(m'-m), z+ic(n'n), and the direction cosines of BM are therefore proportional to /'/: m'-m: n'-n. If the angle made by BC with AB be indefinitely small, the direction cosines of BM are as U : hm : hn. Now if AB, BC be two contiguous elements of a geodetic, then BM must be a normal to the surface, and since 5/, hm, hn are in this case represented by h(dx/ds), h(dyjds), &{dzjds), and if the equation of the surface be « = o, we have

*d*x jdu d 2 y jdu d?z jdu ds 2 / dx ~ ds 2 / dy ~ ds 2 j dz*

which, however, are equivalent to only one equation. In the case of

the spheroid this equation becomes

d 2 x d 2 y _ y ds 2 ~ x ds~ ‘ which integrated gives ydx-xdyˆCds. This again may be put in the form r sin a = C, where a is the azimuth of the geodetic at any point — the angle between its direction and that of the meridian — and r the distance of the point from the axis of revolution.*

From this it may be shown that the azimuth at A of the geodetic joining AB is not the same as the astronomical azimuth at A of B or that determined by the vertical plane AaB. Generally speaking, the geodetic lies between the two plane section curves joining A and B which are formed by the two vertical planes, supposing these points not far apart. If, however, A and B are nearly in the same latitude, the geodetic may cross (between A and B) that plane curve which lies nearest the adjacent pole of the spheroid. The condition of crossing is this. Suppose that for a moment we drop the considera- tion of the earth’s non-sphericity, and draw a perpendicular from the pole C on AB, meeting it in S between A and B. Then A being that point which is nearest the pole, the geodetic will cross the plane curve, if AS be between JAB and |AB. If AS lie between this last value and JAB, the geodetic will lie wholly to the north of both plane curves, that is, supposing both points to be in the northern hemisphere.

The difference of the azimuths of the vertical section AB and of the geodetic AB, i.e. the astronomical and geodetic azimuths, is very small for all observable distances, being approximately: —

e 2

Geod. azimuth = Astr. azimuth —

■)•

12 1 —e z pn

(cos 2 sin 2a-f-

— sin 2

\a\ /

and semi-major axis respectively of the meridian ellipse, and a are the latitude and azimuth at A, i = AB, and p and n are the radii of curvature of the meridian and perpendicular at A. For s = ioo kilometres, only the first term is of moment; its value is o”-028 cos 2

sin 2a, and it lies well within the errors of observation. If we imagine the geodetic AB, it will generally trisect the angles between the vertical sections at A and B, so that the geodetic at A is near

*the vertical section AB, and at B near the section BA. 1 The greatest distance of the vertical sections one from another is e*s 3 cos 2 o sin 2oo/i6a 2 , in which 0o and ao are the mean latitude and azimuth respectively of the middle point of AB. For the value 5 = 64 kilometres, the maximum distance is 3 mm.*

An idea of the course of a longer geodetic line may be gathered from the following example. Let the line be that joining Cadiz and St Petersburg, whose approximate positions are —

Cadiz. Lat. 36° 22′ n. Long. 6° 18′ w.

St Petersburg. 59° 56′ N.

3O 17′ E.

If G be the point on the geodetic corresponding to F on that one of the plane curves which contains the normal at Cadiz (by " corre- sponding " we mean that F and G are on a meridian) then G is to the north of F ; at a quarter of the whole distance from Cadiz GF is 458 ft., at half the distance it is 637 ft., 'and at three-quarters it is 473 ft. The azimuth of the geodetic at Cadiz differs 20″ from that of the vertical plane, which is the astronomical azimuth.

The azimuth of a geodetic line cannot be observed, so that the line does not enter of necessity into practical geodesy, although many formulae connected with its use are of great simplicity and elegance. The geodetic line has always held a more important place in the science of geodesy among the mathematicians of France, Germany and Russia than has been assigned to it in the operations of the English and Indian triangulations. Although the observed angles of a triangulation are not geodetic angles, yet in the calcula- tion of the distance and reciprocal bearings of two points which are far apart, and are connected by a long chain of triangles, we may fall upon the geodetic line in this manner: —

If A, Z be the points, then to start the calculation from A, we obtain by some preliminary calculation the approximate azimuth of Z, or

the angle made by the direction of Z with the side AB or AC of the first triangle. Let Pi be the point where this line inter- sects BC; then, to find P 2 , where the line cuts the next triangle side CD, we make the angle BPiP 2 such that BPiP 2 -f-BPiA = l8o°. This fixes P 2l and P 3 is fixed by a repetition of the same process; so for P4, P 6 . . . . Now it is clear that the points Pi, P 2 , P3 so com- puted are those which would be actually fixed by an observer with a theodolite, proceeding in the following manner. Having set the instrument up at A, and turned the telescope in the direction of the computed bearing,, an assistant places a mark Pi on the line BC, adjusting it till bisected by the cross-hairs of the telescope at A. The theodolite is then placed over Pi, and the telescope turned to A; the horizontal circle is then moved through 180°. The assistant then places a mark P 2 on the line CD, so as to be bisected by the telescope, which is then moved to P 2 , and in the same manner P 3 is fixed. Now it is clear that the series of points Pi, P 2 , P3 approaches to the geodetic line, for the plane of any two consecutive elements P„-: Pn, Pn Pn+i contains the normal at P„.

*If the objection be raised that not the geodetic azimuths but the astronomical azimuths are observed, it is necessary to consider that the observed vertical sections do not correspond to points on the sea-level but to elevated points. Since the normals of the ellipsoid of rotation do not in general intersect, there consequently arises an influence of the height on the azimuth. In the case of the measure- ment of the azimuth from A to B, the instrument is set to a point A' over the surface of the ellipsoid (the sea-level), and it is then adjusted to a point B', also over the surface, say at a height h'. The vertical plane containing A' and B' also contains A but not B : it must therefore be rotated through a small azimuth in order to contain B. The correction amounts approximately to — e*h' cos 2 sin 2a/2a; in the case of h' = 1000 m., its value is o"-io8 cos V sin 20.*

This correction is therefore of greater importance in the case of observed azimuths and horizontal angles than in the previously considered case of the astronomical and the geodetic azimuths. The observed azimuths and horizontal angles must therefore also be corrected in the case, where it is required to dispense with geodetic lines.

When the angles of a triangulation have been adjusted by the method of least squares, and the sides are calculated, the next process is to calculate the latitudes and longitudes of all the stations starting from one given point. The calculated latitudes, longitudes and azimuths, which are designated geodetic latitudes, longitudes and azimuths, are

not to be confounded with the observed latitudes, longitudes and azimuths, for these last are subject to somewhat large errors. Supposing the latitudes of a number of .stations in the triangulation to be observed, practically the mean of these determines the position in latitude of the network, taken as a whole. So the orientation or general azimuth of the whole is inferred from all the azimuth observations. The triangulation is then supposed to be projected on a spheroid of given elements, representing as nearly as one knows the real figure of the earth. Then, taking the latitude of one point and the direction of the meridian there as given —

1 See a paper " On the Course of Geodetic Lines on the Earth's Surface" in the Phil. Mag. 1870; Helmert, Theorien der hokeren Geodasie, 1. 321.

obtained, namely, from the astronomical observations there — one can compute the latitudes of all the other points with any degree of precision that may be considered desirable. It is necessary to employ for this purpose formulae which will give results true even for the longest distances to the second place of decimals of seconds, otherwise there will arise an accumulation of errors from imperfect calculation which should always be avoided. For very long distances, eight places of decimals should be employed in logarithmic calculations; if seven places only are available very great care will be required to keep the last place true. Now let , 4,' be the latitudes of two stations A and B; a, a their mutual azimuths counted from north by east continuously from 0° to 360 ; w their difference of longitude measured from west to east; and s the distance AB.*

First compute a latitude 0i by means of the formula 0i = 0 + (s cos a)/p, where p is the radius of curvature of the meridian at the latitude 0; this will require but four places of logarithms. Then, in the first two of the following, five places are sufficient — j

e = ~ — sin a cos a,

2p»

*= – — sin 2 a tan 0i , 2p» vl **

0'0 = — cos(o|e)-i7,

s sin(q — \t) w ~ncos{4 > ' + h)' a — a = wsin(0'-)-§77)— e + 180 .*

Here n is the normal or radius of curvature perpendicular to the

meridian; both n and p correspond to latitude 0i, and p to latitude 4(0+0')- For calculations of latitude and longitude, tables of the logarithmic values of p sin 1 “, » sin 1 “, and 2np sin I ” are necessary. The following table contains these logarithms for every ten minutes of latitude from' 52° to 53 ° computed with the elements a =20926060 and a : 6 = 295 : 2 94 : —

Lat.

T 1

1

1

Lo S > “sinl”'

Log -»sini”'

°'2p» sin 1″

/

52

7-9939434

7.9928231

0-37131

10

9309

8190

29

20

9185

8148

28

30

9060

8107

26

40

8936

8065

24

50

8812

8024

23

53

8688

7982

22

The logarithm in the last column is that required also for the calculation of spherical excesses, the spherical excess of a triangle being expressed by ab sin CJ2pri sin 1 “.

It is frequently necessary to obtain the co-ordinates of one point with reference to another point ; that is, let a perpendicular arc be drawn from B to the meridian of A meeting it in P, then, a being the azimuth of B at A, the co-ordinates of B with reference to A are

AP = S COS (a — fe), BP = S sin (a — \t),

where e is the spherical excess of APB, viz. s 2 sin a cos a multiplied by the quantity whose logarithm is in the fourth column of the above table.

If it be necessary to determine the geographical latitude and longitude as well as the azimuths to a greater degree of accuracy

than is given by the above formulae, we make use of the following formula: given the latitude of A, and the azimuth a and the distance s of B, to determine the latitude ‘ and longitude 10 of B, and the back azimuth a’. Here it is understood that a’ is symmetrical to o, so that a*+a’ =360°. .

Let and

6=sA/a, where A = (1 — e 2 sin 2 0)i

r = ˆ (– I _ e2) COS 2 0sin2a, f’ = gˆ— ˆ) cos2 cos 2 a ;

f , f’ are always very minute quantities even for the longest distances; then, putting k = 9o°-0,

, ■*’ + ?•-<■> _ sinM«-0—r’) t «

tan 2 . _ sint(*+0+r’) 2

a’ + f+w cosi(K-0-f) a

-0” i “ˆ;f-)(I gco S 2 ˆ) ; v v po sin J (a +£ +0) \ 12 2 /’

here po is the radius of curvature of the meridian for the mean latitude J(0+0’)- These formulae are approximate only, but they are sufficiently precise even for very long distances.

For lines of any length the formulae of F. W. Bessel (Astr. Nach., 1823, iv. 241) are suitable.

If the two points A and B be defined by their geographical

co-ordinates, we can accurately calculate the corresponding astronomical azimuths, i.e. those of the vertical section, and then proceed, in the case of not too great distances, to determine the length and the azimuth of the shortest lines. For any distances recourse must again be made to Bessel’s formula. 1

Let o, o’ be the mutual azimuths of two points A, B on a spheroid, k the chord line joining them, p, n’ the angles made by the chord with the normals at A and B, , ‘, a their latitudes and difference of longitude, and (x 2 +j |2)/a 2 +z 2 6 2 = I the equation of the surface; then if the plane xz passes through A the co-ordinates of A

and B will be

x = (a/A) cos , x' = (a/A') cos ' cos co,

y = y' — (a/A') cos ' sin a,

2 = (a/A) (i-e 2) sin , z' = (a/A') (i -e 2) sin <£',

where A = (l— e 2 sin 2 <£), A' = (i— e 2 sin 2 <£')», and e is the eccen- tricity. Let /, g, h be the direction cosines of the normal to that plane which contains the normal at A and the point B, and whose inclinations to the meridian plane of A is =a; let also /, m, n and /', m', n' be the direction cosines of the normal at A, and of the tangent to the surface at A which lies in the plane passing through B, then since the first line is perpendicular to each of the other two and to the chord k, whose direction cosines are proportional to '-, y'-y, z'-z, we have these three equations f(x'-x)+gy'+h(z'-z) =0 // --gm +hn =o fl'--gm'+hn'=o. Eliminate /, g, h from these equations, and substitute / = cos V = —sin cos a*

m = o

« = sin

m = sin a n' = cos cos

and we get

(x' — x) sin 0+y' cot a — {z'—z) cos = o.

The substitution of the values of x, z, x', y', z' in this equation will give immediately the value of cot a; and if we put f, f' for the corresponding azimuths on a sphere, or on the supposition e = o, the following relations exist

cota-cotf= e>^±Q cos 4> A

. , . „, ,cos'0

cot a -cotf = -e 2 2fJ£

cos A*

A'sin0-A sin' =Q sin u. If from B we let fall a perpendicular on the meridian plane of A, and from A let fatl a perpendicular on the meridian plane of B, then the following equations become geometrically evident : k sin fi sin a = (a/A') cos ' sin u k sin y! sin*

a' = (a/A) cos sin a. Now in any surface u = o we have

fe 2 = (*' – xf + (/ – yY + (z' – 2) 2

'doc ' KJ J 'dy ' K " Z) dz\l R \dx^dy^dzi)

(* -*)3? + (y -y^ + {z ~ Z >aVj /* (aV 2+ ay 2+ aV^j ' In the present case, if we put

~~- = U,

sM=[(x'-*)^+(y-y)£, + (z'-

distances and azimuths, of any two points on a spheroid whose latitudes and difference of longitude are given.

By a series of reductions from the equations containing f, f' it may be shown that

a+a' = f+r+JeM4>'- and ', and the higher powers of e are neglected. A short computation will show that the small quantity on the right-hand side of this equation cannot amount even to the thousandth part of a second for fe, 4>' be the latitudes of two points on the surface of a spheroid, u their difference of longitude, a, a' their reciprocal azimuths, tan fw = cot §(a+o') (cos §('tf>)/sin J(0'+0)1

The computation of the geodetic from the astronomical azimuths has been given above From k we can now compute the length i of the vertical section, and from this the shortest length. The difference of length of the geodetic line and either of the plane curves is

eVcos 4 <|>o sin 2 2a /36o a i . At least this is an approximate expression. Supposing s=o-ia, this quantity would be less than one-hundredth of a millimetre. The line 5 is now to be calculated as a circular arc with a mean radius r along AB. If o = i(+tf>'). a = §(i8o°+a-a'), A = (i-e 2 sin 2 4>)'i

then- = — °(i-j — — -j-cos 2 <£o cos 2 a) , and approximately sin {sJ2r) —

k/2r. These formulae give, in the case of h =o-ia, values certain to eight logarithmic decimal places. An excellent series of formulae for the solution of the problem, to determine the azimuths, chord and distance along the surface from the geographical co-ordinates, was given in 1882 by Ch. M. Schols {Archives Nierlandaises, vol. xvii.).

Irregularities of the Earth's Surface. In considering the effect of unequal distribution of matter in the earth's crust on the form of the surface, we may simplify the matter by disregarding the considerations of rotation and eccentricity. In the first place, supposing the earth a sphere covered with a film of water, let the density p be a function of the distance from the centre so that surfaces of equal density are concentric spheres. Let now a disturbance of the arrangement of matter take place, so that the density is no longer to be expressed by p, a function of r only, but is expressed by p+p', where p' is a function of three co-ordinates 0, , r. Then p' is the density of what may be designated disturbing matter; it is positive in some places and negative in others, and the whole quantity of matter whose density is p' is zero. The previously spherical surface of the sea of radius a now takes a new form. Let P be a point on the disturbed surface, P' the corresponding point vertically below it on the undisturbed surface, PP' = N. The knowledge of N over the whole surface gives us the form of the disturbed or actual surface of the sea ; it is an equipotential surface, and if V be the potential at P of the disturbing matter p', M the mass of the earth (the attraction-constant is assumed equal to unity)

M

+V= C =

M M

a

a

;N+V.

XX zz a 6 2 then*

cos m = (a/£)AU ; cos / = (a/k) A'U. Let u be such an angle that

(1 -e 2)'sin = A sin « cos 4> = A cos u, then on expressing x, x', 2, z' in terms of u and u',

U = I – cos u cos u' cos w – sin u sin u' ; also, if v be the third side of a spherical triangle, of which two sides are \ir-u and \ir-u' and the included angle u, using a sub- sidiary angle

sin 4 1 sin \v = e sin J (u' — u) cos §(«'+«), we obtain finally the

following equations : —

k = 2a cos

cos m = A sec 4 1 sin \v

cos m' = A' sec >A sin \v

sin n sin a — (a/k) cos u' sin a

sin m' sin a' = (a/k) cos « sin w.

These determine rigorously the distance, and the mutual zenith

1 Helmert, Theorien der hoheren Geoddsie, 1. 232, 247.

o + N

As far as we know, N is always a very small quantity, and we have with sufficient approximation N = 3V/47rto, where 6 is the mean density of the earth. Thus we have the disturbance in elevation of the sea-level expressed in terms of the potential of the disturbing matter. If at any point P the value of N remain constant when we pass to any adjacent point, then the actual surface is there parallel to the ideal spherical surface; as a rule, however, the normal at P is inclined to that at P', and astronomical observations have shown that this inclination, the deflection or deviation, amounting ordinarily to one or two seconds, may in some cases exceed 10", or, as at the foot of the Himalayas, even 60". By the expression " mathematical figure of the earth " we mean the surface of the sea produced in imagination so as to percolate the continents. We see then that the effect of the uneven distribution of matter in the crust of the earth is to produce small elevations and depressions on the mathematical surface which would be otherwise spheroidal. No geodesist can proceed far in his work without encountering the irregularities of the mathematical surface, and it is necessary that he should know how they affect his astronomical observations. The whole of this subject is dealt with in his usual elegant manner by Bessel in the Astronomische Nachrichten, Nos. 329, 330, 331, in a paper entitled " Ueber den Einfluss der Unregelmassigkeiten der Figur der Erde auf geodatische Arbeiten, &c." But without entering into further details it is not difficult to see how local attraction at any station affects the determinations of latitude, longitude and azimuth there.

Let there be at the station an attraction to the north-east throwing

the zenith to the south-west, so that it takes in the celestial sphere a position Z', its undisturbed position being Z. Let the rectangular components of the displacement ZZ' be £ measured southwards

and 7) measured westwards. Now the great circle joining Z' with 1 the pole of the heavens P makes there an angle with the meridian PZ = i; cosec PZ' = t7 sec , where is the latitude of the station. Also this great circle meets the horizon in a point whose distance from the great circle PZ is q sec <) > sin = ij tan . That is, a meridian mark, fixed by observations of the pole star, will be placed that amount to the east of north. Hence the observed latitude requires the correction £; the observed longitude a correction t; sec ; and any observed azimuth a correction tj tan . Here it is supposed that azimuths are measured from north by east, and longitudes eastwards. The horizontal angles are also influenced by the deflec tions of the plumb-line, in fact, just as if the direction of the vertical axis of the theodolite varied by the same amount. This influence, however, is slight, so long as the sights point almost horizontally at the objects, which is always the case in the observation of distant points.

The expression given for N enables one to form an approximate estimate of the effect of a compact mountain in raising the sea-level. Take, for instance, Ben Nevis, which contains about a couple of cubic miles; a simple calculation shows that the elevation produced would only amount to about 3 in. In the case of a mountain mass like the Himalayas, stretching over some 1500 miles of country with a breadth of 300 and an average height of 3 miles, although it is diffi- cult or impossible to find an expression for V, yet we may ascertain that an elevation amounting to several hundred feet may exist near their base. The geodetical operations, however, rather negative this idea, for it was shown by Colonel Clarke {Phil. Mag., 1878) that the form of the sea-level along the Indian arc departs but slightly from that of the mean figure of the earth. If this be so, the action of the Himalayas must be counteracted by subterranean tenuity.

Suppose now that A, B, C, . . . are the stations of a network of triangulation projected on or lying on a spheroid of semiaxis major and eccentricity a, e, this spheroid having its axis parallel to the axis of rotation of the earth, and its surface coinciding with the mathe- matical surface of the earth at A. Then basing the calculations on the

observed elements at A, the calculated latitudes, longitudes and directions of the meridian at the other points will be the true latitudes, &c, of the points as projected on the spheroid. On comparing these geodetic elements with the corresponding astronomical determinations, there will appear a system of differences which represent the inclinations, at the various points, of the actual irregular surface to the surface of the spheroid of reference. These differences will suggest two things, — first, that we may improve the agreement of the two surfaces, by not restricting the spheroid of reference by the condition of making its surface coincide with the mathematical surface of the earth at A; and secondly, by altering the form and dimensions of the spheroid. With respect to the first circumstance, we may allow the spheroid two degrees of freedom, that is, the normals of the surfaces at A may be allowed to separate a small quantity, compounded of a meridional difference and a difference perpendicular to the same. Let the spheroid be so placed that its normal at A lies to the north of the normal to the earth's surface by the small quantity £ and to the east by the quantity r;. Then in starting the calculation of geodetic latitudes, longitudes and azimuths from A, we must take, not the observed elements 4>, a, but for , <£+£, and for a, a+i; tan and zero longitude must be replaced by r) sec . At the same time suppose the elements of the spheroid to be altered from a, e to a-da, e+de. Confining our attention at first to the two points A, B, let (<#>')> (a'), (u) be the numerical elements at B as obtained in the first calculation, viz. before the shifting and alteration of the spheroid; they will now take the form

(')+1Z+gn+hda+kde, (o.') + 1'Z+g'v+h'da+k'de, (a>)+1"Z +g"r,+h"da+k"de,

where the coefficients /, g, . . . &c. can be numerically calculated. Now these elements, corresponding to the projection of B on the spheroid of reference, must be equal severally to the astronomically determined elements at B, corrected for the inclination of the surfaces there. If £', i' be the components of the inclination at that point, then we have

I' = («£') 4.'+f£+gv+hda+kde. ■n'tan'(a')-a'+1'£+g'ii+h'da +k'de, n' sec <£' = H -u+1"Z+g"7,+h"da+k"de,

where ', a', « are the observed elements at B. Here it appears that the observation of longitude gives no additional information, but is available as a check upon the azimuthal observations.

If now there be a number of astronomical stations in the tri-angulation, and we form equations such as the above for each point, then we can from them determine those values of £, -q, da, de, which make the quantity £ 2 -rV+£' 2 +')' 2 + ... a minimum. Thus we obtain that spheroid which best represents the surface covered by the triangulation.

In the Account of the Principal Triangulation of Great Britain and Ireland will be found the determination, from 75 equations, of the spheroid best representing the surface of the British Isles. Its elements are = 209270054=295 ft., b : a — 6 = 280 + 8; and it is so placed that at Greenwich Observatory { = i"-864, t\= — o"-546.

Taking Durham Observatory as the origin, and the tangent plane to the surface (determined by £ = — o"664, 77 = —4" 117) as the plane of x and y, the former measured northwards, and 2 measured vertically downwards, the equation to the surface is •99524953× 2 + •99288005J1 2 + -99763052s 2 — 0-0067 1003×2 —

416550702 = 0.

Altitudes.

The precise determination of the altitude of his station is a matter of secondary importance to the geodesist; nevertheless it is usual to observe the zenith distances of all trigonometrical points. Of great importance is a knowledge of the height of the base for its re- duction to the sea-level. Again the height of a station does influence a little the observation of terrestrial angles, for a vertical line at B does not lie generally in the vertical plane of A (see above). The height above the sea-level also influences the geographical latitude, inasmuch as the centrifugal force is increased and the magnitude and direction of the attraction of the earth are altered, and the effect upon the latitude is a very small term expressed by the formula h{g' — g) sin 2xj>jag, where g, g' are the values of gravity at the equator and at the pole. This is h sin 20/5820 seconds, h being in metres, a quantity which may be neglected, since for ordinary mountain heights it amounts to only a few hundredths of a second. We can assume this amount as joined with the northern component of the plumb-line perturbations.

The uncertainties of terrestrial refraction render it impossible to determine accurately by vertical angles the heights of distant points. Generally speaking, refraction is greatest at about daybreak; from that time it diminishes, being at a minimum for a couple of hours

before and after mid-day; later in the afternoon it again increases. This at least is the general march of the phenomenon, but it is by no means regular. The vertical angles measured at the station on Hart Fell showed on one occasion in the month of September a refraction of double the average amount, lasting from I p.m. to 5 P.M. The mean value of the coefficient of refraction k determined from a very large number of observations of terrestrial zenith distances in Great Britain is -0792=ˆ-0047; and if we separate those rays which for a considerable portion of their length cross the sea from those which do not, the former give £ = -0813 and the latter £ = -0753. These values are determined from high stations and long distances ; when the distance is short, and the rays graze the ground, the amount of refraction is extremely uncertain and variable. A case is noted in the Indian survey where the zenith distance of a station 10-5 miles off varied from a depression of 4′ 52 "-6 at 4.30 p.m. to an elevation of 2′ 24"-o at 10.50 p.m.

If h, h' be the heights above the level of the sea of two stations, 90° +5, 90°-f-8′ their mutual zenith distances (5 being that observed at h), s their distance apart, the earth being regarded as a sphere of radius = a, then, with sufficient precision,

h' — h = s tan (s— — 5) , h — h' = s tan I s— — S'J .

If from a station whose height is h the horizon of the sea be observed to have a zenith distance 90°+ 5, then the above formula gives for h the value

. a tan 2 S

k ~2l-2k

Suppose the depression S to be n minutes, then k = 1 -054» 2 if the ray be for the greater part of its length crossing the sea; if otherwise, h — l-oˆon 1 . To take an example: the mean of eight observations of the zenith distance of the sea horizon at the top of Ben Nevis is 91° 4′ 48", or 6 = 64-8; the ray is pretty equally dis- posed over land and water, and hence A = l-o47» 2 = 4396 ft. The actual height of the hill by spirit-levelling is 4406 ft., so that the error of the height thus obtained is only 10 ft.

The determination of altitudes by means of spirit-levelling is undoubtedly the most exact method, particularly in its present development as precise-levelling, by which there have been deter- mined in all civilized countries ciose-meshed nets of elevated points

covering the entire land. (A. R. C; F. R. H.)

GEOFFREY, surnamed Martel (1006-1060), count of Anjou, son of the count Fulk Nerra (q.v.) and of the countess Hildegarde or Audegarde, was born on the 14th of October 1006. During his father's lifetime he was recognized as suzerain by Fulk 1'Oison (" the Gosling "), count of Vendome, the son of his half-sister Adela. Fulk having revolted, he confiscated the countship, which he did not restore till 1050. On the 1st of January 1032 he married Agnes, widow of William the Great, duke of Aquitaine, and taking arms against William the Fat, eldest son and successor of William the Great, defeated him and took him prisoner at Mont-Couer near Saint-Jouin-de-Marneson the 20th of September 1033. He then tried to win recognition as dukes of Aquitaine for the sons of his wife Agnes by William the Great, who were still minors, but Fulk Nerra promptly took up arms to defend his , suzerain William the Fat, from whom he held the Loudunois and

Saintonge in fief against his son. In 1036 Geoffrey Martel had to liberate William the Fat, on payment of a heavy ransom, but the latter having died in 1038, and the second son of William the Great, Odo, duke of Gascony, having fallen in his turn at the siege of Mauze (10th of March 1039) Geoffrey made peace with his father in the autumn of 1039, and had his wife's two sons recog- nized as dukes. About this time, also, he had interfered in the affairs of Maine, though without much result, for having sided against Gervais, bishop of Le Mans, who was trying to make himself guardian of the young count of Maine, Hugh, he had been beaten and forced to make terms with Gervais in 1038. In 1040 he succeeded his father in Anjou and was able to conquer Touraine (1044) and assert his authority over Maine (see Anjou). About 1050 he repudiated Agnes, his first wife, and married Gr6cie, the widow of Bellay, lord of Montreuil-Bellay (before August 1052), whom he subsequently left in order to marry Adela, daughter of a certain Count Odo. Later he returned to Grecie, but again left her to marry Adelaide the German. When, however, he died on the 14th of November 1060, at the monastery of St Nicholas at Angers, he left no children, and transmitted the countship to Geoffrey the Bearded, the eldest of his nephews (see Anjou).

See Louis Halphen, Le Comte d' Anjou au XI" stick (Paris, 1906) A summary biography is given by Celestin Port, Dictionnaire histonque, geographique et biographique de Maine-et-Loire (3 vols Pans-Angers, 1874-1878), vol. ii. pp. 252-253, and a sketch of the wars by Kate

Norgate, England under the Angevin Kings (2 vols , London, 1887), vol. i. chs. iii. iv. (L. H.)*

GEOFFREY, surnamed Plantagenet [or Plantegenet] (1 1 13-1 1 5 1) , count of Anjou, was the son of Count Fulk the Young and of Eremburge (or Arembourg of La Fleche; he was born on the 24th of August 1 1 13. He is also called " le bel " or " the handsome," and received the surname of Plantagenet from the habit which he is said to have had of wearing in his cap a sprig of broom (genet) . In 1 1 2 7 he was made a knight, and on the 2nd of June 1129 married Matilda, daughter of Henry I. of England, and widow of the emperor Henry V. Some months afterwards he succeeded to his father, who gave up the countship when he definitively went to the kingdom of Jerusalem. The years of his government were spent in subduing the Angevin barons and in conquering Normandy (see Anjou). In n 51, while returning from the siege of Montreuil-Bellay, he took cold, in consequence of bathing in the Loir at Chateau-du-Loir, and died on the 7 th of September. He was buried in the cathedral of Le Mans. By his wife Matilda he had three sons: Henry Plantagenet, born at Le Mans on Sunday, the 5th of March 1133; Geoffrey, born at Argentan on the 1st of June 1 134; and William Long-Sword, born on the 22nd of July 1136.

*See Kate Norgate, England under the Angevin Kings (2 vols London, 1887), vol. i. chs. v.-viii. ; Celestin Port, Dictionnaire histonque, geographique et biographique de Maine-et-Loire (3 vols Pans-Angers 1874-1878), vol. ii. pp. 254-256. A history of Geoffrey le Bel has yet to be written; there is a biography of him written in the 12th century by Jean, a monk of Marmoutier, Historia Gaufredi, ducts Normannorum et comitis Andegavorum, published by Marchegay et Salmon; " Chroniques des comtes d'Anjou " (SociUe de I htstoire de France, Paris, 1856), pp. 229-310. (L H *)*

GEOFFREY (n 58-1 186), duke of Brittany, fourth son of the English king Henry II. and his wife Eleanor of Aquitaine, was born on the 23rd of September 1 j s 8. In 1 1 67 Henry suggested a marriage between Geoffrey and Constance (d. 1201), daughter and heiress of Conan IV., duke of Brittany (d. 1171); and Conan not only assented, perhaps under compulsion, to this proposal, but surrendered the greater part of his unruly duchy to the English king. Having received the homage of the Breton nobles, Geoffrey joined his brothers, Henry and Richard, who, in alliance with Louis VII. of France, were in revolt against their father; but he made his peace in n 74, afterwards helping to restore order in Brittany and Normandy, and aiding the new French king, Philip Augustus, to crush some rebellious vassals.

In July 1181 his marriage with Constance was celebrated, and practically the whole of his subsequent life was spent in warfare with his brother Richard. In 1 183 he made peace with his father, who had come to Richard's assistance; but a fresh struggle soon broke out for the possession of Anjou, and Geoffrey was in Paris treating for aid with Philip Augustus, when he died on the 19th of August

1 1 86. He left a daughter, Eleanor, and his wife bore a posthumous son, the unfortunate Arthur.

GEOFFREY (c. 1152-1212), archbishop of York, was a bastard son of Henry II., king of England. He was distinguished from his legitimate half-brothers by his consistent attachment and fidelity to his father. He was made bishop of Lincoln at the age of twenty-one (n 73); but though he enjoyed the temporalities he was never consecrated and resigned the see in 1183. He then became his father's chancellor, holding a large number of lucrative benefices in plurality. Richard nominated him archbishop of York in 1189, but he was not consecrated till 1191, or enthroned till 1 194. Geoffrey, though of high character, was a man of uneven temper; his history in chiefly one of quarrels, with the see of Canterbury, with the chancellor Willian Longchamp, with his half-brothers Richard and John, and especially with his canons at York. This last dispute kept him in litigation before Richard and the pope for many years. He led the clergy in their refusal to be taxed by John and was forced to fly the kingdom in 1207. He died in Normandy on the 12th of December 1212.

See Giraldus Cambrensis, Vita Galfridi; Stubbs's prefaces to Roger de Hoveden, vols. iii. and iv. (Rolls Series). (H. W. C. D.)

GEOFFREY DE MONTBRAY (d. 1093), bishop of Coutances (Constanhensis) , a right-hand man of William the Conqueror, was a type of the great feudal prelate, warrior and administrator at need. He knew, says Orderic, more about marshalling mailed knights than edifying psalm-singing clerks. Obtaining, as a young man, in 1048, the see of Coutances, by his brother's influence (see Mowbray), he raised from his fellow nobles and from their Sicilian spoils funds for completing his cathedral, which was consecrated in 1056. With bishop Odo, a warrior like himself, he was on the battle-field of Hastings, exhorting the Normans to victory; and at William's coronation it was he who called on them to acclaim their duke as king. His reward in England was a mighty fief scattered over twelve counties. He accompanied William on his visit to Normandy (1067), but, returning, led a royal force to the relief of Montacute in

September 1069. In 1075 he again took the field, leading with Bishop Odo a vast host against the rebel earl of Norfolk, whose stronghold at Norwich they besieged and captured.

_ Meanwhile the Conqueror had invested him with important judicial functions. In 1072 he had presided over the great Kentish suit between the primate and Bishop Odo, and about the same time over those between the abbot of Ely and his despoilers, and between the bishop of Worcester and the abbot of Ely, and there is some reason to think that he acted as a Domesday commissioner (1086), and was placed about the same time in charge of Northumberland. The bishop, who attended the Conqueror's funeral, joined in the great rising against William Rufus next year (1088), making Bristol, with which (as Domesday shows) he was closely connected and where he had built a strong castle, his base of operations. He burned Bath and ravaged Somerset, but had submitted to the king before the end of the year. He appears to have been at Dover with William in January 1090, but, withdrawing to Normandy, died at Coutances three years later. In his fidelity to Duke Robert he seems to have there held out for him against his brother Henry, when the latter obtained the Cotentin.

See E.ˆA. Freeman, Norman Conquest and William Rufus; J. H. Kound, Feudal England; and, for original authorities, the works of Orderic Vitahs and William of Poitiers, and of Florence of Worcester; the Anglo-Saxon Chronicle; William of Malmesbury's Gesta pon- hficum, and Lanfranc's works, ed. Giles; Domesday Book

(J. H. R.)

GEOFFREY OF MONMOUTH (d. 1154), bishop of St Asaph and writer on early British history, was born about the year 1 100. Of his early life little is known, except that he received a liberal education under the eye of his paternal uncle, Uchtryd, who was at that time archdeacon, and subsequently bishop, of Llandaff. In 1 1 29 Geoffrey appears at Oxford among the witnesses of an Oseney charter. He subscribes himself Geoffrey Arturus; from this we may perhaps infer that he had already begun his experiments in the manufacture of Celtic mythology. A first edition of his Historia Britonum was in circuiiWton by the year

1 139, although the text which' we possess appears to date from 1147. This famous work, which the author has the audacity to place on the same level with the histories of William of Malmesbury and Henry of Huntingdon, professes to be a transla- tion from a Celtic source; " a very old book in the British tongue " which Walter, archdeacon of Oxford, had brought from Brittany. Walter the archdeacon is a historical personage; whether his book has any real existence may be fairly questioned. There is nothing in the matter or the style of the Historia to preclude us from supposing that Geoffrey drew partly upon confused traditions, partly on his own powers of invention, and to a very slight degree upon the accepted authorities for early British history. His chronology is fantastic and incredible; William of Newburgh justly remarks that, if we accepted the events which Geoffrey relates, we should have to suppose that they had happened in another world. William of Newburgh wrote, however, in the reign of Richard I. when the reputation of Geoffrey's work was too well established to be shaken by such criticisms. The fearless romancer had achieved an immediate success. He was patronized by Robert, earl of Gloucester, and by two bishops of Lincoln; he obtained, about 1140, the arch- deaconry of Llandaff " on account of his learning "; and in 1 1 51 was promoted to the see of St Asaph.

Before his death the Historia Brilonum had already become a model and a quarry for poets and chroniclers. The list of imitators begins with Geoffrey Gaimar, the author of the Estorie des Engles (c. 1147), and Wace, whose Roman de Brut {1155) is partly a translation and partly a free paraphrase of the Historia. In the next century the influence of Geoffrey is unmistakably attested by the Brut of Layamon, and the rhyming English chronicle of Robert of Gloucester. Among later historians who were deceived by the Historia Britonum it is only needful to mention Higdon, Hardyng, Fabyan (1512), Holinshed (1580) and John Milton. Still greater was the influence of Geoffrey upon those writers who, like Warner in Albion's England (1586), and Drayton in Polyolbion (1613), deliberately made their accounts of English history as poetical as possible. The stories which Geoffrey preserved or invented were not infrequently a source of inspiration to literary artists. The earliest English tragedy, Gorboduc (1565), the Mirror for Magistrates (1587), and Shakespeare's Lear, are instances in point. It was, however, the Arthurian legend which of all his fabrications attained the greatest vogue. In the work of expanding and elaborating this theme the successors of Geoffrey went as far beyond him as he had gone beyond Nennius; but he retains the credit due to the founder of a great school. Marie de France, who wrote at the court of Henry II., and Chretien de Troyes,

her French con- temporary, were the earliest of the avowed romancers to take up the theme. The succeeding age saw the Arthurian story popularized, through translations of the French romances, as far afield as Germany and Scandinavia. It produced in England the Roman du Saint Graal and the Roman de Merlin, both from the pen of Robert de Borron; the Roman de Lancelot; the Roman de Tristan, which is attributed to a fictitious Lucas de Gast. In the reign of Edward IV. Sir Thomas Malory paraphrased and arranged the best episodes of these romances in English prose. His Morte d' Arthur, printed by Caxton in 1485, epitomizes the rich mythology which Geoffrey's work had first called into life, and gave the Arthurian story a lasting place in the English imagination. The influence of the Historia Britonum may be illustrated in another way, by enumerating the more familiar of the legends to which it first gave popularity. Of the twelve books into which it is divided only three (Bks. IX., X., XI.) are concerned with Arthur. Earlier in the work, however, we have the adventures of Brutus; of his follower Corineus, the vanquisher of the Cornish giant GoemagoJ (Gogmagog); of Locrinus and his daughter Sabre (immortalized in Milton's Comus) ; of Bladud the builder of Bath; of Lear and his daughters; of the three pairs of brothers, Ferrex and Porrex, Brennius and Belinus, Elidure and Peridure. The story of Vortigern and Rowena takes its final form in the Historia Brilonum; and Merlin makes his first. appearance in the prelude to the Arthur legend. Besides

the Historia Britonum Geoffrey is also credited with a Life of Merlin composed in Latin verse. The authorship of this work has, however, been disputed, on the ground that the style is dis- tinctly superior to that of the Historia. A minor composition, the Prophecies of Merlin, was written before 1 136, and afterwards incor- porated with the Historia, of which it forms the seventh book. For a discussion of the manuscripts of Geoffrey's work, see Sir T. D. Hardy's Descriptive Catalogue (Rolls Series), i. pp. 341 ff. The Historia Britonum has been critically edited by San Marte (Halle, 1854). There is an English translation by J. A. Giles (London, 1842). The Vita Merlini has been edited by F. Michel and T. Wright (Paris, 1837). See also the Dublin Unit. Magazine for April 1876, for an article by T. Gilray on the literary influence of Geoffrey ; G. Heeger's Trojanersage der Britten (1889) ; and La Borderie's Etudes historiques bretonnes (1883). (H. W. C. D.)

GEOFFREY OF PARIS (d. c. 1320), French chronicler, was probably

the author of the Chronique metrique de Philippe le Bel, or Chronique rimSe de Geoffroi de Paris. This work, which deals with the history of France from 1300 to 13 16, contains 7918 verses, and is valuable as that of a writer who had a personal knowledge of many of the events which he relates. Various short historical poems have also been attributed to Geoffrey, but there is no certain information about either his life or his writings.

The Chronique was published by J. A. Buchon in his CoUectiondes chroniques, tome ix. (Paris, 1827), and it has also been printed in tome xxii. of the Recueil des historiens des Gaules et de la France (Paris, 1865). See G. Paris, Histoire de la litteraiure francaise au moyen age (Paris, 1890); and A. Molinier, Les Sources de l' histoire de France, tome iii. (Paris, 1903).

GEOFFREY THE BAKER (d. c. 1360), English chronicler, is also called Walter of Swinbroke, and was probably a secular clerk at Swinbrook in Oxfordshire. He wrote a Chronicon Angliae temporibus Edwardi II. et Edwardi III., which deals with the history of England from 1303 to 1356. From the begin- ning until about 1324 this work is based upon Adam Murimuth's Continuatio chronicarum, but after this date it is valuable and interesting, containing information not found elsewhere, and closing with a good account of the battle of Poitiers. The author obtained his knowledge about the last days of Edward II. from William Bisschop, a companion of the king's murderers, Thomas Gurney and John Maltravers. Geoffrey also wrote a Chroni- culum from the creation of the world until 1336, the value of which is very slight. His writings have been edited with notes by Sir E. M. Thompson as the Chronicon Galfridi le Baker de Swynebroke (Oxford, 1889). Some doubt exists concerning Geoffrey's share in the compilation of the Vita et mors Edwardi II., usually attributed to Sir Thomas de la More, or Moor, and printed by Camden in his Anglica scripta. It has been maintained by Camden and others that More wrote an account of Edward's reign in French, and that this was translated into Latin by Geoffrey and used by him in compiling his Chronicon. Recent scholarship, however, asserts that More was no writer, and that the Vita et mors is an extract from Geoffrey's Chronicon, and was attributed to More, who was the author's patron. In the main this conclusion substantiates the verdict of Stubbs, who has published the Vita et mors in his Chronicles of the reigns of Edward I. and Edward II. (London, 1883). The manuscripts of Geoffrey's works are in the Bodleian library at Oxford.

GEOFFRIN, MARIE THERESE RODET (1699-1777), a Frenchwoman who played an interesting part in French literary and artistic life,

was born in Paris '.n 1699. She married, on the 19th of July 1713, Pierre Francois Geoffrin, a rich manufacturer and lieutenant-colonel of the National Guard, who died in 1750. It was not till Mme Geoffrin was nearly fifty years of age that we begin to hear of her as a power in Parisian society. She had learned much from Mme de Tencin, and about 1748 began to gather round her a literary and artistic circle. She had every week two dinners, on Monday for artists, and on Wednesday for her friends the Encyclopaedists and other men of letters. She received many foreigners of distinction, Hume and Horace Walpole among others. Walpole spent much time in her society before he was finally attached to Mme du Deffand, and speaks of her in his letters as a model of common sense. She was indeed somewhat of a small tyrant in her circle. She had adopted the pose of an old woman earlier than necessary, and her coquetry, if

such it can be called, took the form of being mother and mentor to her guests, many of whom were indebted to her generosity for substantial help. Although her aim appears, to have been to have the Encyclopedic in conversation and action around her, she was extremely displeased with any of her friends who were so rash as to incur open disgrace. Marmontel lost her favour after the official censure of Belisaire, and her advanced views did not prevent her from observing the forms of religion. A devoted Parisian, Mme Geoffrin rarely left the city, so that her journey to Poland in 1766 to visit the king, Stanislas Poniatowski, whom she had known in his early days in Paris, was a great event in her life. Her experiences induced a sensible gratitude that she had been born " Francaise " and " particuliere." In her last illness her daughter, Therese, marquise de la Ferte Imbault, excluded her mother's old friends so that she might die as a good Christian, a proceeding wittily described by the old lady: " My daughter is like Godfrey de Bouillon, she wished to defend my tomb from the infidels." Mme Geoffrin died in Paris on the 6th of October

1777-

See Correspondance inedite du roi Stanislas Auguste Poniatowski et de Madame Geoffrin, edited by the comte de Mouy (1875); P. de Segur, Le Royaume de la rue Sainl-Honore, Madame Geoffrin et sa fille (1897); A. Tornezy, Un Bureau d 'esprit au XVIII' siecle: le salon de Madame Geoffrin (1895) ; and Janet Aldis, Madame

Geoffrin, her Salon and her Times, 1750-1777 (1905).

GEOFFROY, ETIENNE FRANgOIS (1672-1731), French chemist, born in Paris on the 13th of February 1672, was first an apothecary and then practised medicine. After studying at Montpellier he accompanied Marshal Tallard on his embassy to London in 1698 and thence travelled to Holland and Italy. Returning to Paris he became professor of chemistry at the Jardin du Roi and of pharmacy and medicine at the College de France, and dean of the faculty of medicine. He died in Paris on the 6th of January 1731. His name is best known in connexion with his tables of affinities {tables des rapports), which he presented to the French Academy in 1718 and 1720. These were lists, prepared by collating observations on the actions of substances one upon another, showing the varying degrees of affinity exhibited by analogous bodies for different reagents, and they retained their vogue for the rest of the century, until displaced by the profounder conceptions introduced by C. L. Berthollet. Another of his papers dealt with the delusions of the philosopher's stone, but nevertheless he believed that iron could be artificially formed in the combustion of vegetable matter. His Tractalus de materia medica, published posthumously in 1741, was long celebrated.

His brother Claude Joseph, known as Geoffroy the younger (1685-1752), was also an apothecary and chemist who, having a considerable knowledge of botany, devoted himself especially to the study of the essential oils in plants.

GEOFFROY, JULIEN LOUIS (1743-1814), French critic, was born at Rennes in 1743. He studied in the school of his native town and at the College Louis le Grand in Paris. He took orders and fulfilled for some time the humble functions of an usher, eventually becoming professor of rhetoric at the College Mazarin. A bad tragedy, Calon, was accepted at the Theatre Franqais, but was never acted. On the death of Elie Freron in 1776 the other collaborators in the Annee litteraire asked Geoffroy to succeed him, and he conducted the journal until in 1792 it ceased to appear. Geoffroy was a bitter critic of Voltaire and his followers, and made for himself many enemies. An enthusiastic royalist, he published with Freron's brother-in-law, the abbe Thomas Royou (1741-1792), a journal, U Ami du roi (1790-1792), which possibly did more harm than good to the king's cause by its ill-advised partisanship. During the Terror Geoffroy hid in the neighbourhood of Paris, only returning in 1799. An attempt to revive the Annee litteraire failed, and Geoffroy undertook the dramatic feuilleton of the Journal des debats. His scathing criticisms

had a success of notoriety, but their popularity was ephemeral, and the publication of them (5 vols., 1819-1820) as Cours de litterature dramatique proved a failure. He was also the author of a perfunctory Commentaire on the works of Racine prefixed to Lenormant's edition (1808). He died in Paris on the 27th of. February 1814.

GEOFFROY SAINT-HILAIRE, ETIENNE (1772-1844), French naturalist, was the son of Jean Gerard Geoffroy, procurator and magistrate of Etampes, Seine-et-Oise, where he was born on the 15th of April 1772. Destined for the church he entered the college of Navarre, in Paris, where he studied natural philosophy under M. J. Brisson; and in 1788 he obtained one of the canoni- cates of the chapter of Sainte Croix at Etampes, and also a benefice. Science, however, offered him a more congenial career, and he gained from his father permission to remain in Paris, and to attend the lectures at the College de France and the Jardin des Plantes, on the condition that he should also read law. He accordingly took up his residence at Cardinal Lemoine's college, and there became the pupil and soon the esteemed associate of Brisson's friend, the abbe Haiiy, the mineralogist. Having, before the close of the year 1790, taken the degree of bachelor in law, he became a student of medicine, and attended the lectures of A. F. de Fourcroy at the Jardin des Plantes, and of L. J. M. Daubenton at the College de France. His studies at Paris were at length suddenly interrupted, for, in August 1792, Haiiy and the other professors of Lemoine's college, as also those of the college of Navarre, were arrested by the revolutionists as priests, and confined in the prison of St Firmin. Through the influence of Daubenton and others Geoffroy on the 14th of August obtained an order for the release of Haiiy in the name of the Academy; still the other professors of the two colleges, save C. F. Lhomond, who had been rescued by his pupil J. L. Tallien, remained in confinement. Geoffroy, foreseeing their certain destruction if they remained in the hands of the revolutionists, determined if possible to secure their liberty by stratagem. By bribing one of the officials at St Firmin, and disguising himself as a commissioner of prisons, he gained admission to his friends, and entreated them to effect their escape by following him. All, however, dreading lest their deliverance should render the doom of their fellow- captives the more certain, refused the offer, and one priest only, who was unknown to Geoffroy, left the prison. Already on the night of the 2nd of September the massacre of the proscribed had begun, when Geoffroy, yet intent on saving the life of his friends and teachers, repaired to St Firmin. At 4 o'clock on the morning of the 3rd of September, after eight hours' waiting, he by means of a ladder assisted the escape of twelve ecclesiastics, not of

the number of his acquaintance, and then the approach of dawn and the discharge of a gun directed at him warned him, his chief purpose unaccomplished, to return to his lodgings. Leaving Paris he retired to Etampes, where, in consequence of the anxieties of which he had lately been the prey, and the horrors which he had witnessed, he was for some time seriously ill. At the beginning of the winter of 1792 he returned to his studies in Paris, and in March of the following year Daubenton, through the interest of Bernardin de Saint Pierre, procured him the office of sub-keeper and assistant demonstrator of the cabinet of natural history, vacant by the resignation of B. G. E. Lacepede. By a law passed in June 1793, Geoffroy was appointed one of the twelve professors of the newly constituted museum of natural history, being assigned the chair of zoology. In the same year he busied himself with the formation of a menagerie at that institution.

In 1794 through the introduction of A. H. Tessier he entered into correspondence with Georges Cuvier, to whom, after the perusal of some of his manuscripts, he wrote: " Venez jouer parmi nous le role de Linne, d'un autre legislateur de l'histoire naturelle." Shortly after the appointment of Cuvier as assistant at the Museum d'Histoire Naturelle, Geoffroy received him into his house. The two friends wrote together five memoirs on natural history, one of which, «n the classification of mammals, puts forward the idea of the subordination of characters upon which Cuvier based his zoological system. It was in a paper entitled " Histoire des Makis, ou singes de Madagascar, " written in 1795, that Geoffroy first gave expression to his views on " the unity of organic composition," the influence of which is per- ceptible in all his subsequent writings; nature, he observes, presents us with only one plan of construction, the same in principle, but varied in its accessory parts.

In 1798 Geoffroy was chosen a member of the great scientific expedition to Egypt, and on the capitulation of Alexandria in August 1 801, he took part in resisting the claim made by the British general to the collections of the expedition, declaring that, were that demand persisted in, history would have to record that he also had burnt a library in Alexandria. Early in January 1802 Geoffroy returned to his accustomed labours in Paris. He was elected a member of the academy of sciences of that city in September 1807. In March of the following year the emperor, who had already recognized his national

services by the award of the cross of the legion of honour, selected him to visit the museums of Portugal, for the purpose of procuring collections from them, and in the face of considerable opposition from the British he eventually was successful in retaining them as a permanent possession for his country. In 1809, the year after his return to France, he was made professor of zoology at the faculty of sciences at Paris, and from that period he devoted himself more exclusively than before to anatomical study. In 1818 he gave to the world the first part of his celebrated Philo- sophic anatomique, the second volume of which, published in 1822, and subsequent memoirs account for the formation of monstrosities on the principle of arrest of development, and of the attraction of similar parts. When, in 1830, Geoffroy pro- ceeded to apply to the invertebrata his views as to the unity of animal composition, he found a vigorous opponent in Georges Cuvier, and the discussion between them, continued up to the time of the death of the latter, soon attracted the attention of the scientific throughout Europe. Geoffroy, a synthesist, con- tended, in accordance with his theory of unity of plan in organic composition, that all animals are formed of the same elements, in the same number, and with the same connexions: homologous parts, however they differ in form and size, must remain associated in the same invariable order. With Goethe he held that there is in nature a law of compensation or balancing of growth, so that if one organ take on an excess of development, it is at the expense of some other part; and he maintained that, since nature takes no sudden leaps, even organs which are superfluous in any given species, if they have played an important part in other species of the same family, are retained as rudiments, which testify to the permanence of the general plan of creation. It was his conviction that, owing to the conditions of life, the same forms had not been perpetuated since the origin of all things, although it was not his belief that existing species are becoming modified. Cuvier, who was an analytical observer of facts, admitted only the prevalence of " laws of co-existence " or " harmony " in animal organs, and maintained the absolute invariability of species, which he declared had been created with a regard to the circumstances in which they were placed, each organ contrived with a view to the function it had to fulfil, thus putting, in Geoffroy's considerations, the effect for ■ the cause.

In July 1840 Geoffroy became blind, and some months later he had a paralytic attack. From that time his strength gradually failed him. He resigned his chair at the museum in 1841, and died at Paris on the 19th of June 1844.

Geoffroy wrote: Catalogue des mammiferes du Museum National d' Histoire Naturelle (1813), not quite completed; Philosophic anatomique — t. i., Des organes respiratoires (1818), and t. ii., Des monstruo- sites humaines (1822) ; Systeme dentaire des mammiferes et des oiseaux (1st pt., 1824); Sur le principe de I'unite de composition organique (1828); Cours de I'histoire naturelle des mammiferes (1829); Principes de philosophic zoologique (1830); Htudes progres- sives d'un naluralisle (1835); Fragments biographiques (1832); Notions synthetiques , historiques et physiologiques de philosophic naturelle (1838), and other works; also part of ' the Description de l'£gypte par la commission des sciences (1821-1830); and, with Frederic Cuvier (1773-1838), a younger brother of G. Cuvier, Histoire naturelle des mammiferes (4 vols., 1820-1842); besides numerous • papers on such subjects as the anatomy of marsupials, ruminants and electrical fishes, the vertebrate theory of the skull, the opercula of fishes, teratology, palaeontology and the influence of surrounding conditions in modifying animal forms.

See Vie, travaux, et doctrine scientifique d'&ienne Geoffroy Saint-Hilaire, par. son fils M. Isidore Geoffroy Saint-Hilaire (Paris and Strasburg, 1847), to which is appended a list of Geoffroy's works; and Joly, in Biog. universelle, t. xvi. (1856).

GEOFFROY SAINT-HILAIRE, ISIDORE (1805-1861), French zoologist, son of the preceding, was born at Paris on the 16th of December 1805. In his earlier years he showed an aptitude for mathematics, but eventually he devoted himself to the study of natural history and of medicine, and in 1824 he was appointed assistant naturalist to his father. On the occasion of his taking the degree of doctor of medicine in September 1829, he read a thesis entitled Propositions sur la monstruositi, consideree chez I'homme et les animaux; and in 183 2- 183 7 was published his great teratological work, Histoire generale et particuliere des anomalies de V organisation chez I'homme et les animaux, 3 vols. 8vo. with 20 plates. In 1829 he delivered for his father the second part of a course of lectures on ornithology, and during the three following years he taught zoology at the Athen6e, and teratology at the ficole pratique. He was elected a member of the academy of sciences at Paris in

1833, was in 1837 appointed to act as deputy for his father at the faculty of sciences in Paris, and in the following year was sent to Bordeaux to organize a similar faculty there. He became successively inspector of the academy of Paris (1840), professor of the museum on the retirement of his father (1841), inspector-general of the university (1844), a member of the royal council for public instruction (1845), and on the death of H. M. D. de Blainville, professor of zoology at the faculty of sciences (1850). In 1854 he founded the Acclimatization Society of Paris, of which he was president. He died at Paris on the 10th of November 1861.

Besides the above-mentioned works, he wrote: Essais de zoologie g&nerale (1841); Vie . . . d'Etienne Geoffroy Saint-Hilaire (1847); Acclimatation et domestication des animaux utiles (1849; 4th ed., 1 861); Lettres sur les substances alimentaires et particulierement sur la viande de cheval (1856) ; and Histoire naturelle generale des regnes organiques (3 vols., 1854-1862), which was not quite completed. He was the author also of various papers on zoology, comparative anatomy and palaeontology.

GEOGRAPHY (Gr. 7?}, earth, and ypatbav, to write), the exact and organized knowledge of the distribution of phenomena on the surface of the earth. The fundamental basis of geography is the vertical relief of the earth's crust, which controls all mobile distributions. The grander features of the relief of the lithosphere or stony crust of the earth control the distribution of the hydrosphere or collected waters which gather into the hollows, filling them up to a height corresponding to the volume, and thus producing the important practical division of the surface into land and water. The distribution of the mass of the atmosphere over the surface of the earth is also controlled by the relief of the crust, its greater or lesser density at the surface corfesponding to the lesser or greater elevation of the surface. The simplicity of the zonal distribution of solar energy on the earth's surface, which would characterize a uniform globe, is entirely destroyed by the dissimilar action of land and water with regard to radiant heat, and by the influence of crust-forms on the direction of the resulting circulation. The influence of physical environment becomes clearer and stronger when the distribution of plant and animal life is considered, and if it is less distinct in the case of man, the reason is found in the modifica- tions of environment consciously produced by human effort. Geography is a synthetic science, dependent for the data with which it deals on the results' of specialized sciences such as astronomy, geology, oceanography, meteorology, biology and anthropology, as well as on topographical description. The physical and natural sciences are

concerned in geography only so far as they deal with the forms of the earth's surface, or as regards the distribution of phenomena. The distinctive task of geography as a science is to investigate the control exercised by the crust-forms directly or indirectly upon the various mobile distributions. This gives to it unity and definiteness, and renders superfluous the attempts that have been made from time to time to define the limits which divide geography from geology on the one hand and from history on the other. It is essential to classify the subject-matter of geography in such a manner as to give prominence not only to facts, but to their mutual relations and their natural and inevitable order.

The fundamental conception of geography is form, including

the figure of the earth and the varieties of crustal relief. Hence mathematical geography (see Map), including cartography as a practical application, comes first. It merges into physical geography, which takes account of the forms of the lithosphere (geomorphology), and also of the distribution of the hydrosphere and the rearrangements resulting from the workings of solar energy throughout the hydrosphere and atmosphere (oceano- graphy and climatology). Next follows the distribution of plants and animals (biogeography), and finally the distribution of mankind and the various artificial boundaries and redistributions (anthropogeography). The applications of anthropogeography to human uses give rise to political and commercial geography, in the elucidation of which all the earlier departments or stages have to be considered, together with historical and other purely human conditions. The evolutionary idea has revolutionized and unified geography as it did biology, breaking down the old hard-and-fast partitions between the various departments, and substituting the study of the nature and influence of actual terrestrial environments for the earlier motive, the discovery and exploration of new lands.

History of Geographical Theory

The earliest conceptions of the earth, like those held by the primitive peoples of the present day, are difficult to discover and almost impossible fully to grasp. Early generalizations, as far as they were

made from known facts, were usually expressed in symbolic language, and for our present purpose it is not profitable to speculate on the underlying truths which may sometimes be suspected in the old mythological cosmogonies.

The first definite geographical theories to affect the western world were those evolved, or at least first expressed, by the Greeks. 1 Early The ear l' est theoretical problem of geography was the

Greek f orm ° *% earth . The natural supposition that the earth*

Ideas. >s a A at disk, circular or elliptical in outline, had in the

*_ time of Homer acquired a special definiteness by the introduction of the idea of the ocean river bounding the whole, an application of imperfectly understood observations. Thales of Flat earth Miletus is claimed as the first exponent of the idea of a of Homer, spherical earth ; but, although this does not appear to be warranted, his disciple Anaximander (c. 580 B.C.) put forward the theory that the earth had the figure of a solid body hanging freely in the centre of the hollow sphere of the starry heavens. The Pythagorean school of philosophers adopted the theory of a spherical earth, but from metaphysical rather than scientific reasons ; their convincing argument was that a sphere being the most perfect solid figure was the only one worthy to circumscribe the dwelling- place of man. The division of the sphere into parallel zones and some of the consequences of this generalization seem to have pre- sented themselves to Parmenides (c. 450 B.C.); but these ideas did not influence the Ionian school of philosophers, who in their treat- ment of geography preferred to deal with facts demonstrable by Hecataeus. travel rather than with speculations. Thus Hecataeus, claimed by H. F. Tozer 2 as the father of geography on account of his Periodos, or general treatise on the earth, did not advance beyond the primitive conception of a circular disk. He systematized the form of the land within the ring of ocean — the oinovitevT), or habitable world — by recognizing two continents: Europe to the north, and Asia to the south of the midland sea. Herodotus. Herodotus, equally oblivious of the sphere, criticized and ridiculed the circular outline of the oekumene, which he knew to be longer from east to west than it was broad from north to south. He also pointed out reasons for accepting a division of the land into three continents — Europe, Asia and Africa. Beyond the limits of his personal travels Herodotus applied the characteristically Greek theory of symmetry to complete, in the unknown, outlines The Idea c * ' an ds and rivers analogous to those which had been ofsym- explored. Symmetry was in fact the first*

geographical metry. theory, and the effect of Herodotus's hypothesis that the Nile must flow from west to east before turning north in order to balance the Danube running from west to east before turning south lingered in the maps of Africa down to the time of Mungo Park. 3

To Aristotle (384-322 B.C.) must be given the distinction of found- ing scientific geography. He demonstrated the sphericity of the rf ,

1 A concise sketch of the whole history of geographical method or ' theory as distinguished from the history of geographical discovery

(see later section of this article) is only to be found in the introduction to H. Wagner's Lehrbuch der Geographie, vol. i. (Leipzig, 1900), which is in every way the most complete treatise on the principles of geography.

2 History of Ancient Geography (Cambridge, 1897), p. 70.

3 See J. L. Myres, " An Attempt to reconstruct the Maps used by Herodotus," Geographical Journal, viii. (1896), p. 605.

Aristotle and the sphere.

earth by three arguments, two of which could be tested by obser- vation. These were: (1) that the earth must be spherical, because of the tendency of matter to fall together towards a com- mon centre; (2) that only a sphere could always throw a circular shadow on the moon during an eclipse; and (3) that the shifting of the horizon and the appearance of new constellations, or the disappearance of familiar stars, as one travelled from north to south, could only be explained on the hypo- thesis that the earth was a sphere. Aristotle, too, gave greater definiteness to the idea of zones conceived by Parmenides, who had pictured a torrid zone uninhabitable by reason of heat, two frigid zones uninhabitable by reason of cold, and two intermediate temper- ate zones fit for human occupation. Aristotle defined the temperate zone as extending from the tropic to the arctic circle, but there is some uncertainty as to the precise meaning he gave to the term " arctic circle." Soon after his time, however, this conception was clearly established, and with so large a generalization the mental horizon was widened to conceive of a geography which was a science, Aristotle had himself shown that in the southern temperate zone winds similar to those of the northern temperate zone should blow, but from the opposite direction.

While the theory of the sphere was being elaborated the efforts of

practical geographers were steadily directed towards ascertaining the outline and configuration of the oekumene, or habitable Flttl th world, the only portion of the terrestrial surface known ˆlumene to the ancients and to the medieval peoples, and still to the retaining a shadow of its old monopoly of geographical S ohere attention in its modern name of the " Old World." The fitting of the oekumene to the sphere was the second theoretical problem. The circular outline had given way in geographical opinion to the elliptical with the long axis lying east and west, and Aristotle was inclined to view it as a very long and relatively narrow band almost encircling the globe in the temperate zone. His argu- ment as to the narrowness of the sea between West Africa and East Asia, from the occurrence of elephants at both extremities, is difficult to understand, although it shows that he looked on the distribution of animals as a problem of geography.

Pythagoras had speculated as to the existence of antipodes, but it was not until the first approximately accurate measurements of the globe and estimates of the length and breadth of the p roo i em oekumene were made by Eratosthenes (c. 250 B.C.) that „/

Aristotle left no work on geography, so that it is impossible to know what facts he associated with the science of the earth's surface. The word geography did not appear before Aristotle, ˆ r i s t fj e > s the first use of it being in the Xlepi koo-juwc, which is one „ eo . of the writings doubtfully ascribed to him, and H. Berger graphical considers that the expression was introduced by Eratos- v j ews , thenes. 4 Aristotle was certainly conversant with many facts, such as the formation of deltas, coast-erosion, and to a certain extent the dependence of plants and animals on their physical surroundings. He formed a comprehensive theory of the variations of climate with latitude and season, and was convinced of the neces- sity of a circulation of water between the sea and rivers, though, like Plato, he held that this took place by water rising from the sea through crevices in the rocks, losing its dissolved salts in the process. He speculated on the differences in the character of races of mankind living in different climates, and correlated the political forms of communities with their situation on a seashore, or in the neighbour- hood of natural strongholds.

Strabo (c. 50 b.c.a.d. 24) followed Eratosthenes rather than Aristotle, but with sympathies which went out more to the human interests than the mathematical basis of geography. He Strabo compiled a very remarkable work dealing, in large measure from personal travel, with the countries surrounding the Mediter ranean. He may be said to have set the pattern which was followed in

succeeding ages by the compilers of " political geographies "

4 Geschichte der wissenschaftlichen Erdkunde der Griechen (Leipzig. 1891), Abt. 3, p. 60.

dealing less with theories than with facts, and illustrating rather than formulating the principles of the science.

Claudius Ptolemaeus (c. A.D. 150) concentrated in his writings the final outcome of all Greek geographical learning, and passed it across the gulf of the middle ages by the hands of the Arabs, Ptolemy. to f orm jhe starting-point of the science in modern times. His geography was based more immediately on the work of his predecessor, Marinus of Tyre, and on that of Hipparchus, the follower and critic of Eratosthenes. It was the ambition of Ptolemy to describe and represent accurately the surface of the oekumene, for which purpose he took immense trouble to collect all existing determinations of the latitude of places, all estimates of longitude, and to make every possible rectification in the estimates of distances by land or sea. His work was mainly cartographical in its aim, and theory was as far as possible excluded. The symmetrically placed hypothetical islands in the great continuousocean disappeared, and the oekumene acquired a new form by the representation of the Indian Ocean as a larger Mediterranean completely cut off by land from the Atlantic. The terra incognita uniting Africa and Farther Asia was an unfortunate hypothesis which helped to retard exploration. Ptolemy used the word geography to signify the description of the whole oekumene on mathematical principles, while choro- graphy signified the fuller description of a particular region, and topography the very detailed description of a smaller locality. He introduced the simile that geography represented an artist's sketch of a whole portrait, while chorography corresponded to the careful and detailed drawing of an eye or an ear. 1

The Caliph al-Mamun (c. a.d. 815), the son and successor of Harun al-Rashid, caused an Arabic version of Ptolemy's great astronomical work (Sforafis neyloTij) to be made, which is known as the Almagest, the word being nothing more than the Gr. fxeylarri with the Arabic article al prefixed. The geography of Ptolemy was also

known and is constantly referred to by Arab writers. The Arab astronomers measured a degree on the plains of Mesopotamia, thereby deducing a fair approximation to the size of the earth. The caliph's librarian, Abu Jafar Muhammad Ben Musa, wrote a geographical work, now unfortunately lost, entitled Rasm el Arsi (" A Description of the World "), which is often referred to by subsequent writers as having been composed on the model of that of Ptolemy.

The middle ages saw geographical knowledge die out in Christendom, although it retained, through the Arabic translations of Ptolemy, a certain vitality in Islam. The verbal inter- Oeograpby pre tation of Scripture led Lactantius (c. a.d. 320) and mhi other ecclesiastics to denounce the spherical theory of the

middle earth as heretical. The wretched subterfuge of Cosmas ages ' (c. a.d. 550) to explain the phenomena of the apparent

movements of the sun by means of an earth modelled on the plan of the Jewish Tabernacle gave place ultimately to the wheel-maps — the T in an O — which reverted to the primitive ignorance of the times of Homer and Hecataeus. 2

The journey of Marco Polo, the increasing trade to the East and the voyages of the Arabs in the Indian Ocean prepared the way for the reacceptance of Ptolemy's ideas when the sealed books of the Greek original were translated into Latin by Angelus in 1410.

The old arguments of Aristotle and the old measurements of Ptolemy were used by Toscanelli and Columbus in urging a westward voyage to India; and mainly on this account did the Revival of crossm g f t ne Atlantic rank higher in the history of geography. sc ; ent ;g c geography than the laborious feeling out of the coast-line of Africa. But not until the voyage of Magellan shook the scales from the eyes of Europe did modern geography begin to advance. Discovery had outrun theory; the rush of new facts made Ptolemy practically obsolete in a generation, after having been the fount and origin of all geography for a millennium.

The earliest evidence of the reincarnation of a sound theoretical geography is to be found in the text-books by Peter Apian and Sebastian Miinster. Apian in his Cosmographicus liber, Aplaaas. published in 1524, and subsequently edited and added to by Gemma Frisius under the title of Cosmographia, based the whole science on mathematics and measurement. He followed Ptolemy closely,

enlarging on his distinction between geography and choro- graphy, and expressing the artistic analogy in a rough diagram. This slender distinction was made much of by most subsequent writers until Nathanael Carpenter in 1625 pointed out that the difference between geography and chorography was simply one of degree, not of kind.

Sebastian Miinster, on the other hand, in his Cosmographia universalis of 1544, paid no regard to the mathematical basis of M1 t geography, but, following the model of Strabo, described

MUas er. tne wor jj according to its different political divisions, and entered with great zest into the question of the productions

1 Bunbury's History of Ancient Geography (2 vols., London, 1879), Miiller's Geographi Graeci minores (2 vols., Paris, 1855, 1861) and Berger's Geschichte der wissenschaftlichen Erdkunde der Griechen (4 vols., Leipzig, 1 887-1 893) are standard authorities on the Greek geographers.

2 The period of the early middle ages is dealt with in Beazley's Dawn of Modern Geography (London; part i., 1897; part ii., 1901 ; part iii., 1906); see also Winstedt, Cosmos Jndicopleusles (1910).

of countries, and into the manners and costumes of the various peoples. Thus early commenced the separation between what were long called mathematical and political geography, the one subject appealing mainly to mathematicians, the other to historians.

Throughout the 16th and 17th centuries the rapidly accumulating store of facts as to the extent, outline and mountain and river systems of the lands of the earth were put in order by the generation of cartographers of which Mercator was the chief; but the writings of Apian and Miinster held the field for a hundred years without a serious rival, unless the many annotated editions of Ptolemy might be so considered. Meanwhile the new facts were the subject of original study by philosophers and by practical men without reference to classical traditions. Bacon argued keenly on geographical matters and was a lover of maps, in which he observed and reasoned upon such resemblances as that between the outlines of South America and Africa.

Philip Cluver's Introductio in geographiam universam tarn veterem guam novam was published in 1624. Geography he defined as

the description of the whole earth, so far as it is known to us." It is distinguished from cosmography by dealing cluve " as – with the

earth alone, not with the universe, and from chorography and topography by dealing with the whole earth, not with a country or a place. The first book, of fourteen short chapters, is concerned with the general properties of the globe; the remaining six books treat in considerable detail of the countries of Europe and of the other continents. Each country is described with particular regard to its people as well as to its surface, and the prominence given to the human element is of special interest.

A little-known book which appears to have escaped the attention of most writers on the history of modern geography was published at Oxford in 1625 by Nathanael Carpenter, fellow of Exeter College, with the title Geographie delineated forth Carpenter. in Two Bookes, containing the Sphericall and Topicall parts thereof. It is discursive in its style and verbose; but, considering the period at which it appeared, it is remarkable for the strong common sense displayed by the author, his comparative freedom from prejudice, and his firm application of the methods of scientific reasoning to the interpretation of phenomena. Basing his work on the principles of Ptolemy, he brings together illustrations from the most recent travellers, and does not hesitate to take as illustrative examples the familiar city of Oxford and his native county of Devon. He divides geography into The Spherical Part, or that for the study of which mathematics alone is required, and The Topical Part, or the description of the physical relations of parts of the earth's surface, preferring this division to that favoured by the ancient geographers — into general and special. It is distinguished from other English geographical books of the period by confining attention to the principles of geography, and not describing the countries of the world.

A much more important work in the history of geographical method is the Geographia generalis of Bernhard Varenius, a Germar medical doctor of Leiden, who died at the age of twenty- eight in 1650, the year of the publication of his book. Vareal "S' Although for a time it was lost sight of on the continent, Sir Isaac Newton thought so highly of this book that he prepared an annotated edition which was published in Cambridge in 1672, with the addition of the plates which had been planned by Varenius, but not produced by the original publishers. " The reason why this great man took so much care in correcting and publishing our author was, because he thought him necessary to be read by his audience, the young gentlemen of Cambridge, while he was delivering lectures on the same subject from the Lucasian Chair." 3 The treatise of Varenius is a model of logical arrangement and terse expression; it is a work of science and of

genius ; one of the few of that age which can still be studied with profit. The English translation renders the definition thus: " Geography is that part of mixed mathematics which explains the state of the earth and of its parts, depending on quantity, viz. its figure, place, magnitude and motion, with the celestial appearances, &c. By some it is taken in too limited a sense, for a bare description of the several countries; and by others too extensively, who along with such a description would have their political constitution."

_ Varenius was reluctant to include the human side of geography in his system, and only allowed it as a concession to custom, and in order to attract readers by imparting interest to the sterner details of the science. His division of geography was into two parts — (i.) General or universal, dealing with the earth in general, and explaining its properties without regard to particular countries ; and (ii.) Special or particular, dealing with each country in turn from the chorographi- cal or topographical point of view. General geography was divided into — (1) the Absolute part, dealing with the form, dimensions, position and substance of the earth, the distribution of land and water, mountains, woods and deserts, hydrography (including all the waters of the earth) and the atmosphere; (2) the Relative part, including the celestial properties, i.e. latitude, climate zones, longi- tude, &c; and (3) the Comparative part, which "considers the

3 From translator's preface to the English version by Mr Dugdale (J 733) > entitled A Complete System of General Geography, revised by Dr Peter Shaw (London, 1756).

particulars arising from comparing one part with another " ; but under this head the questions discussed were longitude, the situation and distances of places, and navigation. Varenius does not treat of special geography, but gives a scheme for it under three heads — • (l) Terrestrial, including position, outline, boundaries, mountains, mines, woods and deserts, waters, fertility and fruits, and living creatures; (2) Celestial, including appearance of the heavens and the climate; (3) Human, but this was added out of deference to popular usage.

This system of geography founded a new epoch, and the book — translated into English, Dutch and French — was the unchallenged standard for more than a century. The framework was capable of accommodating itself to new facts, and was indeed far in advance of the knowledge of the period. The method included a recognition of the causes and effects of phenomena as well as the mere fact of their occurrence, and for the first time the importance of the vertical relief of the land was fairly recognized.

The physical side of geography continued to be elaborated after Varenius's methods, while the historical side was developed separately. Both branches, although enriched by new facts, remained stationary so far as method is concerned until nearly the end of the 18th century. The compilation of " geography books " by uninstructed writers led to the pernicious habit, which is not yet wholly overcome, of reducing the general or " physical " part to a few pages of concentrated information, and expanding the particular or " political " part by including unrevised travellers' stories and uncritical descriptions of the various countries of the world. Such books were in fact not geography, but merely compressed travel.

The next marked advance in the theory of geography may be taken as the nearly simultaneous studies of the physical earth carried out by the Swedish chemist, To'rbern Bergman, Bergman. actm g un(j er the impulse of Linnaeus, and by the German philosopher, Immanuel Kant. Bergman's Physical Description of the Earth was published in Swedish in 1 766, and translated into English in 1772 and into German in 1774. It is a plain, straight- forward description of the globe, and of the various phenomena of the surface, dealing only with definitely ascertained facts in the natural order of their relationships, but avoiding any systematic classification or even definitions of terms.

The problems of geography had been lightened by the destructive criticism of the French cartographer D Anville (who had purged „ . the map of the world of the last remnants of traditional

an ' fact unverified by modern observations) and rendered

richer by the dawn of the new era of scientific travel, when Kant brought his logical powers to bear upon them. Kant's lectures on physical geography were delivered in the university of Konigsberg from 1765 onwards. 1 Geography appealed to him as a valuable educational discipline, the joint foundation with anthropology of that " knowledge of the world " which was the result of reason and

experience. In this connexion he divided the communication of experience from one person to another into two categories— the narrative or historical and the descriptive or geographical; both history and geography being viewed as descriptions, the former a description in order of time, the latter a description in order of space.

Physical geography he viewed as a summary of nature, the basis not only of history but also of " all the other possible geographies," of which he enumerates five, viz. (1) Mathematical geography, which deals with the form, size and movements of the earth and its place in the solar system; (2) Moral geography, or an account of the different customs and characters of mankind according to the region they inhabit; (3) Political geography, the divisions according to their organized governments; (4) Mercantile geography, dealing with the trade in the surplus products of countries; (5) Tlieological geography, or the distribution of religions. Here there is a clear and formal statement of the interaction and causal relation of all the phenomena of distribution on the earth's surface, including the influence of physical geography upon the various activities of mankind from the lowest to the highest. Notwithstanding the form of this classification, Kant himself treats mathematical geography as preliminary to, and therefore not dependent on, physical geography. Physical geography itself is divided into two parts: a general, which has to do with the earth and all that belongs to it — water, air and land; and a particular, which deals with special products of the earth — mankind, animals, plants and minerals. Particular importance is given to the vertical relief of the land, on which the various branches of human geography are shown to depend.

Alexander von Humboldt (1769-1859) was the first modern geographer to become a great traveller, and thus to acquire an extensive H I Idt stoc k °f first-hand information on which an improved um ° ' system of geography might be founded. The impulse given to the study of natural history by the example of Linnaeus; the results brought back by Sir Joseph Banks, Dr Solander and the two Forsters, who accompanied Cook in his voyages of discovery; the studies of De Saussure in the Alps, and the lists of desiderata in physical geography drawn up by that investigator, combined to

1 Printed in Schriften zur physischen Geographie, vol. vi. of Schubert's edition of the collected works of Kant (Leipzig, 1839). First published with notes by Rink in 1 802.

prepare the way for Humboldt. The theory of geography was

advanced by Humboldt mainly by his insistence on the great principle of the unity of nature. He brought all the "observable things," which the eager collectors of the previous century had been heaping together regardless of order or system, into relation with the vertical relief and the horizontal forms of the earth's surface. Thus he demonstrated that the forms of the land exercise a directive and determining influence on climate, plant life, animal life and on man himself. This was no new idea; it had been familiar for centuries in a less definite form, deduced from a priori considerations, and so far as regards the influence of surrounding circumstances upon man, Kant had already given it full expression. Humboldt's concrete illustrations and the remarkable power of his personality enabled him to enforce these principles in a way that produced an immediate and lasting effect. The treatises on physical geography by Mrs Mary Somerville and Sir John Herschel (the latter written for the eighth edition of the Encyclopaedia Britannica) showed the effect produced in Great Britain by the stimulus of Humboldt's work. Humboldt's contemporary, Carl Ritter (1779-1859), extended and disseminated the same views, and in his interpretation of " Com- parative Geography " he laid stress on the importance of „,., forming conclusions, not from the study of one region by e ' itself, but from the comparison of the phenomena of many places. Impressed by the influence of terrestrial relief and climate on human movements, Ritter was led deeper and deeper into the study of history and archaeology. His monumental Vergleichende Geographie, which was to have made the whole world its theme, died out in a wilderness of detail in twenty-one volumes before it had covered more of the earth's surface than Asia and a portion of Africa. Some of his followers showed a tendency to look on geography rather as an auxiliary to history than as a study of intrinsic worth.

*During the rapid development of physical geography many branches of the study of nature, which had been included in the cosmography of the early writers, the physiography, of QeoirraDhr Linnaeus and even the Erdkunde of Ritter, had been as * so much advanced by the labours of specialists that na < ur . a / their connexion was apt to be forgotten. Thus geology, SC j ence , meteorology, oceanography and anthropology developed into distinct sciences. The absurd attempt was, and sometimes is still, made by geographers to include all natural science in geo- graphy ; but it is more common for specialists in the various detailed sciences to think, and sometimes to assert, that the ground of physical geography is now fully occupied by these sciences. Political geography has been too often looked on from both sides as a mere summary of guide-book knowledge, useful*

in the schoolroom, a poor relation of physical geography that it was rarely necessary to recognize.

The science of geography, passed on from antiquity by Ptolemy, re-established by Varenius and Newton, and systematized by Kant, included within itself definite aspects of all those terrestrial phenomena which are now treated exhaustively under the heads of geology, meteorology, oceanography and anthropology; and the inclusion of the requisite portions of the perfected results of these sciences in geography is simply the gathering in of fruit matured from the seed scattered by geography itself.

The study of geography was advanced by improvements in cartography (see Map), not only in the methods of survey and projection, but in the representation of the third dimension by means of contour lines introduced by Philippe Buache in 1737, and the more remarkable because less obvious invention of isotherms introduced by Humboldt in 1817.

The " argument from design " had been a favourite form of reasoning amongst Christian theologians, and, as worked out by Paley in his Natural Theology, it served the useful purpose The teieo . of emphasizing the fitness which exists between all the fo^/a,/^. inhabitants of the earth and their physical environment. g ^ meat /a It was held that the earth had been created so as to fit g eo g r aphy. the wants of man in every particular. This argument was tacitly accepted or explicitly avowed by almost every writer on the theory of geography, and Carl Ritter distinctly recognized and adopted it as the unifying principle of his system. As a student of nature, however, he did not fail to see, and as professor of geography he always taught, that man was in very large measure conditioned by his physical environment. The apparent opposition of the observed fact to the assigned theory he overcame by looking upon the forms of the land and the arrangement of land and sea as instru- ments of Divine Providence for guiding the destiny as well as for supplying the requirements of man. This was the central theme of Ritter's philosophy; his religion and his geography were one, and the consequent fervour with which he pursued his mission goes far to account for the immense influence he acquired in Germany.

The evolutionary theory, more than hinted at in Kant's " Physical Geography," has, since the writings of Charles Darwin, become the unifying principle in geography. The conception of the The tbeory development of the plan of the earth from the first O f evo / U . cooling of the surface of the planet throughout the long tlon la

geological periods, the guiding power of environment on geogra p],y, the circulation of water and of air, on the distribution of plants and animals, and finally on the movements of man, give to geography a philosophical dignity and a scientific completeness

which it never previously possessed. The influence of environment on the organism may not be quite so potent as it was once believed to be, in the writings of Buckle, for instance, 1 and certainly man, the ultimate term in the series, reacts upon and greatly modifies his environment ; yet the fact that environment does influence all distributions is established beyond the possibility of doubt. In this way also the position of geography, at the point where physical science meets and mingles with mental science, is explained and justified. The change which took place during the 19th century in the substance and style of geography may be well seen by com- paring the eight volumes of Malte-Brun's Geographie universelle (Paris, 1812-1829) with the twenty-one volumes of Reclus's Geo- graphie universelle (Paris, 1876-1895).

In estimating the influence of recent writers on geography it is usual to assign to Oscar Peschel (1826-1875) the credit of having corrected the preponderance which Ritter gave to the historical element, and of restoring physical geography to its old pre-eminence. 2 As a matter of fact, each of the leading modern exponents of theo- retical geography — such as Ferdinand von Richthofen, Hermann Wagner, Friedrich Ratzel, William M. Davis, A. Penck, A. de Lapparent and Elisee Reclus — has his individual point of view, one devoting more attention to the results of geological processes, another to anthropological conditions, and the rest viewing the subject in various Mendings of the extreme lights.

The two conceptions which may now be said to animate the theory of geography are the genetic, which depends upon processes of origin, and the morphological, which depends on facts of form and distribution.

Progress of Geographical Discovery

Exploration and geographical discovery must have' started from more than one centre, and to deal justly with the matter one ought to

treat of these separately in the early ages before the whole civilized world was bound together by the bonds of modern intercommunication. At the least there should be some consideration of four separate systems of discovery — the Eastern, in which Chinese and Japanese explorers acquired knowledge of the geography of Asia, and felt their way towards Europe and America; the Western, in which the dominant races of the Mexican and South American plateaus extended their knowledge of the American continent before Columbus; the Polynesian, in which the conquering races of the Pacific Islands found their way from group to group; and the Mediterranean. For some of these we have no certain informa- tion, and regarding others the tales narrated in the early records are so hard to reconcile with present knowledge that they are better fitted to be the battle-ground of scholars championing rival theories than the basis of definite history. So it has come about that the only practicable history of geographical exploration starts from the Mediterranean centre, the first home of that civilization which has come to be known as European, though its field of activity has long since overspread the habitable land of both temperate zones, eastern Asia alone in part excepted.

From all centres the leading motives of exploration were probably the same — commercial intercourse, warlike operations, whether resulting in conquest or in flight, religious zeal expressed in pilgrimages or missionary journeys, or, from the other side, the avoidance of persecution, and, more particularly in later years, the advancement of knowledge for its own sake. At different times one or the other motive predominated.

Before the 14th century B.C. the warrior kings of Egypt had carried the power of their arms southward from the delta of the Nile well-nigh to its source, and eastward to the confines of Assyria. The hieroglyphic inscriptions of Egypt and the cuneiform inscriptions of Assyria are rich in records of the movements and achievements of armies, the conquest of towns and the subjugation of peoples; but though many of the recorded sites have been identified, their discovery by wandering armies was isolated from their subsequent history and need not concern us here.

The Phoenicians are the earliest Mediterranean people in the consecutive chain of geographical discovery which joins prehistoric time with the present. From Sidon, and later from its

jw e ” more famous rival Tyre, the merchant adventurers of ” ” Phoenicia explored and colonized the coasts of the Medi-

terranean and fared forth into the ocean beyond. They traded also on the Red sea, and opened up regular traffic with India as well as with the ports of the south and west, so that it was natural for Solomon to employ the merchant navies of Tyre in his oversea trade. The western emporium known in the scriptures as Tarshish was probably situated in the south of Spain, possibly at Cadiz, although some writers contend that it was Carthage in North Africa. Still more diversity of opinion prevails as to the southern gold-exporting port of Ophir, which some scholars place in Arabia, others at one or another point on the east coast of Africa. Whether associated with the exploitation of Ophir (q.v.) or not the first great voyage of African discovery appears to have been accomplished by the Phoe-

1 History of Civilization, vol. i. (1857).

2 See H. J. Mackinder in British Association Report (Ipswich), 1895, p. 738, for a summary of German opinion, which has been expressed by many writers in a somewhat voluminous literature.

nicians sailing the Red sea. Herodotus (himself a notable traveller in the 5th century B.C.) relates that the Egyptian king Necho of the XXVIth Dynasty (c. 600 B.C.) built a fleet on the Red Sea, and confided it to Phoenician sailors with the orders to sail south- ward and return to Egypt by the Pillars of Hercules and the Medi-terranean sea. According to the tradition, which Herodotus quotes sceptically, this was accomplished ; but the story is too vague to be accepted as more than a possibility.

The great Phoenician colony of Carthage, founded before 800 B.C., perpetuated the commercial enterprise of the parent state, and ex-tended the sphere of practical trade to the ocean shores of Africa and Europe. The most celebrated voyage of antiquity undertaken for the express purpose of discovery was that fitted out by the senate of Carthage under the command of Hanno, with the intention of founding new colonies along the west coast of Africa. According to Pliny, the only authority on this point, the period of the voyage was that of the greatest prosperity of Carthage, which may be taken as somewhere between 570 and 480 B.C. The extent of this voyage is doubtful, but it seems probable that the farthest point reached was on the east-running coast which bounds the Gulf of Guinea on the

north. Himilco, a contemporary of Hanno, was charged with an expedition along the west coast of Iberia northward, and as far as the uncertain references to this voyage can be understood, he seems to have passed the Bay of Biscay and possibly sighted the coast of England.

The sea power of the Greek communities on the coast of Asia Minor and in the Archipelago began to be a formidable rival to the Phoenician soon after the time of Hanno and Himilco, and peculiar interest attaches to the first recorded Greek voyage beyond the Pillars of Hercules. Pytheas, a navigator of the Phocean colony of Massilia (Marseilles), determined the latitude of that port with considerable precision by the somewhat clumsy method of ascertaining the length of the longest day, and when, about 330 B.C., he set out on exploration to the northward in search of the lands whence came gold, tin and amber, he followed this system of ascertaining his position from time to time. If on each occasion he himself made the observations his voyage must have extended over six years; but it is not impossible that he ascertained the approximate length of the longest day in some cases by questioning the natives. Pytheas, whose own narrative is not preserved, coasted the Bay of Biscay, sailed up the English Channel and followed the coast of Britain to its most northerly point. Beyond this he spoke of a land called Thule, which, if his estimate of the length of the longest day is correct, may have been Shetland, but was possibly Iceland; and from some confused statements as to a sea which coukl not be sailed through, it has been assumed that Pytheas was the first of the Greeks to obtain direct knowledge of the Arctic regions. During this or a second voyage Pytheas entered the Baltic, discovered the coasts where amber is obtained and re- turned to the Mediterranean. It does not seem that any maritime trade followed these discoveries, and indeed it is doubtful whether his contemporaries accepted the truth of Pytheas's narrative; Strabo four hundred years later certainly did not, but the critical studies of modern scholars have rehabilitated the Massilian explorer. The Greco-Persian wars had made the remoter parts of Asia Minor more than a name to the Greek geographers before the time of Alexander the Great, but the campaigns of that con- queror from 329 to 325 B.C. opened up the greater Asia A ' exan ° er to the knowledge of Europe. His armies crossed the plains Great. beyond the Caspian, penetrated the wild mountain passes north- west of India, and did not turn back until they had entered on the Indo-Gangetic plain. This was one of the few great epochs of geographical discovery.

The world was henceforth viewed as a very large place stretching far

on every side beyond the Midland or Mediterranean Sea, and the land journey of Alexander resulted in a voyage of discovery in the outer ocean from the mouth of the Indus to that of the Tigris, thus opening direct intercourse between Grecian and Hindu civiliza- tion. The Greeks who accompanied Alexander described with care the towns and villages, the products and the aspect of the country. The conqueror also intended to open up trade by sea between Europe and India,, and the narrative of his general Nearchus records this famous voyage of discovery, the detailed accounts of the chief pilot Onesicritus being lost. At the beginning of October 326 B.C. Nearchus left the Indus with his fleet, and the anchorages sought for each night are carefully recorded. He entered the Persian Gulf, and rejoined Alexander at Susa, when he was ordered to prepare another expedition for the circumnavigation of Arabia. Alexander died at Babylon in 323 B.C., and the fleet was dispersed without making the voyage.

. The dynasties founded by Alexander's generals, Seleucus, An- tiochus and Ptolemy, encouraged the same spirit of enterprise which their master had fostered, and extended geographical knowledge in several directions. Seleucus Nicator established the Greco- Bactrian empire and continued the intercourse with India. Authentic information respecting the great valley of the Ganges was supplied by Megasthenes, an ambassador sent by Seleucus, who reached the remote city of Patali-putra, the modern Patna.

The Ptolemies in Egypt showed equal anxiety to extend the I bounds of geographical knowledge. Ptolemy Euergetes (247-222 B.C.)

rendered the greatest service to geography by the protection and encouragement of Eratosthenes, whose labours gave the first ap- _ proximate knowledge of the true size of the spherical

-.". . earth. The second Euergetes and his successor Ptolemy no ernes. L^hyrus (118-115 B.C.) furnished Eudoxus with a fleet to explore the Arabian sea. After two successful voyages, Eudoxus, impressed with the idea that Africa was surrounded by ocean on the south, left the Egyptian service, and proceeded to Cadiz and other Mediterranean centres of trade seeking a patron who would finance

an expedition for the purpose of African discovery; and we learn from Strabo that the veteran explorer made at least two voyages southward along the coast of Africa. The Ptolemies continued to send fleets annually from their Red Sea ports of Berenice and Myos Hormus to Arabia, as well as to ports on the coasts of Africa and India.

The Romans did not encourage navigation and commerce with the same ardour as their predecessors; still the luxury of Rome, _. which gave rise to demands for the varied products

_ e of all the countries of the known world, led to an active

"""" trade both by ships and caravans. But it was the military genius of Rome, and the ambition for universal empire, which led, not only to the discovery, but also to the survey of nearly all Europe, and of large tracts in Asia and Africa. Every new war produced a new survey and itinerary of the countries which were conquered, and added one more to the imperishable roads that led from every quarter of the known world to Rome. In the height of their power the Romans had surveyed and explored all the coasts of the Mediterranean, Italy, Greece, the Balkan Peninsula, Spain, Gaul, western Germany and southern Britain. In Africa their empire included Egypt, Carthage, Numidia and Mauritania. In Asia they held Asia Minor and Syria, had sent expeditions into Arabia, and were acquainted with the more distant countries formerly invaded by Alexander, including Persia, Scythia, Bactria and India. Roman intercourse with India especially led to the extension of geographical knowledge.

Before the Roman legions were sent into a new region to extend the limits of the empire, it was usual to send out exploring expeditions to report as to the nature of the country. It is narrated by Pliny and Seneca that the emperor Nero sent out two centurions on such a mission towards the source of the Nile (probably about a.d. 60), and that the travellers pushed southwards until they reached vast marshes through which they could not make their way either on foot or in boats. This seems to indicate that they had penetrated to about 9° N. Shortly before A.D. 79 Hippalus took advantage of the regular alternation of the monsoons to make the voyage from the Red Sea to India across the open ocean out of^sight of land. Even though this sea-route was known, the author of the Periplus of the Erythraean Sea, published after the time of Pliny, recites the old itinerary around the coast of the Arabian Gulf. It was, however, in the reigns of Severus and his immediate successors that Roman intercourse with

India was at its height, and from the writings of Pausanias (c. 174) it appears that direct communication between Rome and China had already taken place.

After the division of the Roman empire, Constantinople became the last refuge of learning, arts and taste; while Alexandria con- tinued to be the emporium whence were imported the commodities of the East. The emperor Justinian (483-565), in whose reign the greatness of the Eastern empire culminated, sent two Nestorian monks to China, who returned with eggs of the silkworm concealed in a hollow cane, and thus silk manufactures were established in the Peloponnesus and the Greek islands. It was also in the reign of Justinian that Cosmas Indicopleustes, an Egyptian merchant, made several voyages, and afterwards composed his Xp«rT«m/ci) ToroypatfrLa (Christian Topography), containing, in addition to his absurd cosmogony, a tolerable description of India.

*The great outburst of Mahommedan conquest in the 7th century was followed by the Arab civilization, having its centres at Bagdad The Arabs an< ˆ Cordova, in connexion with which geography again * received a share of attention. The works of the ancient Greek geographers were translated into Arabic, and starting with a sound basis of theoretical knowledge, exploration once more made progress. From the 9th to the 13th century intelligent Arab travellers wrote accounts of what they had seen and heard in distant lands. The earliest Arabian traveller whose observations have come down to us is the merchant Sulaiman, who embarked in the Persian Gulf and made several voyages to India and China, in the middle of the 9th century. Abu Zaid also wrote on India, and his work is the most important that we possess before the epoch-making discoveries of Marco Polo. Masudi, a great traveller who knew from personal experience all the countries between Spain and China, described the plains, mountains and seas, the dynasties and peoples, in his Meadows of Gold, an abstract made by himself of his larger work News of the , Time. He died in 956, and was known, from the comprehensive- ness of his survey, as the Pliny of the East. Amongst his contempo- raries were Istakhri, who travelled through all the Mahommedan countries and wrote his Book of Climates in 950, and Ibn Haukal, whose Book of Roads and Kingdoms, based on the work of Istakhri, was written in 976. Idrisi, the best known of the Arabian geo- graphical authors, after travelling far and wide in the first half of the 12th century, settled in Sicily, where he wrote a treatise descrip-*

tive of an armillary sphere which he had constructed for Roger II.,

the Norman king, and in this work he incorporated all accessible results of contemporary travel.

The Northmen of Denmark and Norway, whose piratical adven- tures were the terror of all the coasts of Europe, and who established themselves in Great Britain and Ireland, in France and Th Sicily, were also geographical explorers in their rough but jvorffimen practical way during the darkest period of the middle ages. All Northmen were not bent on rapine and plunder; many were peaceful merchants. Alfred the Great, king of the Saxons in England, not only educated his people in the learning of the past ages; he inserted in the geographical works he translated many narratives of the travel of his own time. Thus he placed on record the voyages of the merchant Ulfsten in the Baltic, including par- ticulars of the geography of Germany. And in particular he' told of the remarkable voyage of Other, a Norwegian of Helgeland, who was the first authentic Arctic explorer, the first to tell of the rounding of the North Cape and the sight of the midnight sun. This voyage of the middle of the 9th century deserves to be held in happy memory, for it unites the first Norwegian polar explorer with the first English collector of travels. Scandinavian merchants brought the products of India to England and Ireland. From the 8th to the nth century a commercial route from India passed through Novgorod to the Baltic, and Arabian coins found in Sweden, and particularly in the island of Gotland, prove how closely the enterprise of the North- men and of the Arabs intertwined. Five-sixths of these coins preserved at Stockholm were from the mints of the Samanian dynasty, which reigned in Khorasan and Transoxiana from about a.d. 900 to 1000. It was the trade with the East that originally gave importance to the city of Visby in Gotland.

In the end of the 9th century Iceland was colonized from Norway ; and about 985 the intrepid viking, Eric the Red, discovered Green- land, and induced some of his Icelandic countrymen to settle on its in- hospitable shores. His son, Leif Ericsson, and others of his followers were concerned in the discovery of the North American coast (see Vinland), which, but for the isolation of Iceland from the centres of European awakening, would have had momentous consequences. As things were, the importance of this discovery passed unrecognized. The story of two Venetians, Nicolo and Antonio Zeno, who gave a vague account of voyages in the northern seas in the end of the 13th century, is no longer to be accepted as history.

At length the long period of barbarism which accompanied and

*followed the fall of the Roman empire drew to a close in Europe. The Crusades had a favourable influence on the intellectual state of the Western nations. Interesting regions, J?°*f °[known only by the scant reports of pilgrims, were made tbeaark the objects of attention and study; while religious zeal, a S es – and the hope of gain, combined with motives of mere curiosity, induced several persons to travel by land into remote regions of the East, far beyond the countries to which the operations of the crusaders extended. Among these was Benjamin of Tudela, who set out from Spain in 1 160, travelled by land to Constantinople, and having visited India and some of the eastern islands, returned to Europe by way of Egypt after an absence of thirteen years.*

Joannes de Piano Carpini, a Franciscan monk, was the head of one of the missions despatched by Pope Innocent to call the chief and people of the Tatars to a better mind. He reached the headquarters of Batu, on the Volga, in February ■™ s/a ” c 1246; and, after some stay, went on to the camp of the frurneys. great khan near Karakorum in central Asia, and returned safely in the autumn of 1247. A few years afterwards, a Fleming named Rubruquis was sent on a similar mission, and had the merit of being the first traveller of this era who gave a correct account of the Caspian Sea. He ascertained that it had no outlet. At nearly the same time Hayton, king of Armenia, made a journey to Karakorum in 1254, by a route far to the north of that followed by Carpini and Rubruquis. He was treated with honour and hospitality, and returned by way of Samarkand and Tabriz, to his own territory. The curious narrative of King Hayton was translated by Klaproth. While the republics of Italy, and above all the state of Venice, were engaged in distributing the rich products of India and the Far East over the Western world, it was impossible that motives of curiosity, as well as a desire of commercial advantage, should not be awakened to such a degree as to impel some of the merchants to visit those remote lands. Among these were the brothers Polo, who traded with the East and themselves visited Tatary. The recital of their travels fired the youthful imagination of young Marco Polo, son of Nicolo, and he set out for the court of Kublai Khan, with his father and uncle, in 1265. Marco remained for seventeen years in the service of the Great Khan, and was employed on many important missions. Besides what he learnt from his own obser- vation, he collected much information from others concerning countries which he did not visit. He returned to Europe possessed of a vast store of knowledge respecting the eastern parts of the world, and, being afterwards made a prisoner by the Genoese, he dictated the narrative of his travels during his

captivity. The work of Marco Polo is the most valuable narrative of travels that appeared during the middle ages, and despite a cold reception and many denials of the accuracy of the record, its substantial truthful- ness has been abundantly proved.

GEOGRAPHY

PROGRESS]

Missionaries continued to do useful geographical work. Among them were John of Monte Corvino, a Franciscan monk, Andrew of Perugia, John Marignioli and Friar Jordanus, who visited the west coast of India, and above all Friar Odoric of Pordenone. Odoric set out on his travels about 1318, and his journeys embraced parts of India, the Malay Archipelago, China and even Tibet, where he was the first European to enter Lhasa, not yet a forbidden city.

Ibn Batuta, the great Arab traveller, is separated by a wide space of time from his countrymen already mentioned, and he finds his proper place in a chronological notice after the days of Marco Polo, for he did not begin his wanderings until 1325, his career thus coin- ciding in time with the fabled journeyings of Sir John Mandeville. While Arab learning flourished during the darkest ages of European ignorance, the last of the Arab geographers lived to see the dawn of the great period of the European awakening. Ibn Batuta went by land from Tangier to Cairo, then visited Syria, and performed the pilgrimages to Medina and Mecca. After exploring Persia, and again residing for some time at Mecca, he made a voyage down the Red sea to Yemen, and travelled through that country to Aden. Thence he visited the African coast, touching at Mombasa and Quiloa, and then sailed across to Ormuz and the Persian Gulf. He crossed Arabia from Bahrein to Jidda, traversed the Red sea and the desert to Syene, and descended the Nile to Cairo. After this he revisited Syria and Asia Minor, and crossed the Black sea, the desert from Astrakhan to Bokhara, and the Hindu Kush. He was in the service of Muhammad Tughluk, ruler of Delhi, about eight years, and was sent on ah embassy to China, in the course of which the ambassadors sailed down the west coast of India to Calicut, and then visited the Maldive Islands and Ceylon. Ibn Batuta made the voyage through the Malay Archipelago to China, and on his return he proceeded from Malabar to Bagdad and Damascus, ultimately reaching Fez, the capital of his native country, in November 1349. After a journey into Spain he set out once more for Central Africa in 1352, and reached Timbuktu and the Niger, returning to Fez in 1353. His narrative was committed to writing from his dictation.

The European country which had come the most completely under the influence of Arab culture now began to send forth explorers to distant lands, though the impulse came not from the Spanish Moors but from Italian merchant navigators in Spanish explora- service. The peaceful reign of Henry III. of Castile is thn. famous for the attempts of that prince to extend the

diplomatic relations of Spain to the remotest parts of the earth. He sent embassies to all the princes of Christendom and to the Moors. In 1403 the Spanish king sent a knight of Madrid, Ruy Gonzalez de Clavijo, to the distant court of Timur, at Samarkand. He returned in 1406, and wrote a valuable narrative of his travels.

Italians continued to make important journeys in the East during the 15th century. Among them was Nicolo Conti, who passed through Persia, sailed along the coast of Malabar, visited Sumatra, Java and the south of China, returned by the Red sea, and got home to Venice in 1444 after an absence of twenty-five years. He related his adventures to Poggio Bracciolini, secretary to Pope Eugenius IV.; and the narrative contains much interesting infor- mation. One of the most remarkable of the Italian travellers was Ludovico di Varthema, who left his native land in 1502. He went to Egypt and Syria, and for the sake of visiting the holy cities became a Mahommedan. He was the first European who gave an account of the interior of Yemen. He afterwards visited and described many places in Persia, India and the Malay Archipelago, returning to Europe in a Portuguese ship after an absence of five years.

In the 15th century the time was approaching when the discovery of the Cape of Good Hope was to widen the scope of geographical enterprise. This great event was preceded by the general Porta- utilization in Europe of the polarity of the magnetic

guese ex- ne edle in the construction of the mariner's compass. ploratlon- p or t U g a l took the lead along this new path, and foremost Prlace among her pioneers stands Prince Henry the Navigator

v"" 3 '/ (1394-1460), who was a patron both of exploration and Navigator. Q £ ˆ stuc jy Q f geographical theory. The great westward projection of the coast of Africa, and the islands to the north-west of that continent, were the principal scene of the work of the mariners sent out at his expense; but his object was to push onward and reach India from the Atlantic. The progress of discovery received a check on his death, but only for a time. In 1462 Pedro de Cintra extended

Portuguese exploration along the African coast and dis- covered Sierra Leone. Fernan Gomez followed in 1469, and opened trade with the Gold Coast; and in 1484 Diogo Cao discovered the mouth of the Congo. The king of Portugal next despatched Bartolo- meu Diaz in i486 to continue discoveries southwards; while, in the following year, he sent Pedro de Covilhao and Affonso de Payva to discover the country of Prester John. Diaz succeeded in rounding the southern point of Africa, which he named Cabo Tormentoso — the Cape of Storms — but King Joao II., foreseeing the realization of the long-sought passage to India, gave it the stimulating and enduring name of the Cape of Good Hope. Payva died at Cairo ; but Covilhao, having heard that a Christian ruler reigned in the mountains of Ethiopia, penetrated into Abyssinia in 1490. He delivered the letter which Joao 11. had addressed to Prester John to the Negus Alexander of Abyssinia, but he was detained by that prince and never allowed to leave the country.

Vasco da Gama.

The Portuguese, following the lead of Prince Henry, continued to look for the road to India by the Cape of Good Hope. The same end was sought by Christopher Columbus, following the Co / um j,, s . suggestion of Toscanelli, and under-estimating the dia- meter of the globe, by sailing due west. The voyages of Columbus (1492-1498) resulted in the discovery of the West Indies and North America which barred the way to the Far East. In 1493 the pope, Alexander VI., issued a bull instituting the famous " line of demar- cation " running from N. to S. 100 leagues W. of the Azores, to the west of which the Spaniards were authorized to explore and to the east of which the Portuguese received the monopoly of discovery. The direct line of Portuguese exploration resulted in the discovery of the Cape route to India by Vasco da Gama (1498), and in 1500 to the independent discovery of South America by Pedro Alvarez Cabral. The voyages of Columbus and of Vasco da Gama were so important that it is unnecessary to detail their results in this place. See Columbus, Christopher; Gama, Vasco da.

The three voyages of Vasco da Gama (who died on the scene of his labours, at Cochin, in 1524) revolutionized the commerce of the East. Until then the Venetians held the carrying trade of India, which was brought by the Persian Gulf and Red sea into Syria and Egypt, the Venetians receiving the_ products of the East at Alexandria and Beirut and distributing them over Europe. This commerce was a great

source of wealth to Venice; but after the discovery of the new passage round the Cape, and the conquests of the Portuguese, the trade of the East passed into other hands.

The discoveries of Columbus awakened a spirit of enterprise in Spain which continued in full force for a century; adventurers flocked eagerly across the Atlantic, and discovery followed Spanlar g s discovery in rapid succession. Many of the companions £ of Columbus continued his work. Vicente Yafiez Pinzon Amertca , in 1500 reached the mouth of the Amazon. In the same year Alonso de Ojeda, accompanied by Juan de la Cosa, from whose maps we learn much of the discoveries of the 16th century navi- gators, and by a Florentine named Amerigo Vespucci, touched the coast of South America somewhere near Surinam, following the shore as far as the Gulf of Maracaibo. Vespucci afterwards made three voyages to the Brazilian coast; and in 1504 he wrote an account of his four voyages, which was widely circulated, and became the means of procuring for its author at the hands of the cartographer Waldseemuller in 1507 the disproportionate distinction of giving his name to the whole continent. In 1508 Alonso de Ojeda obtained the government of the coast of South America from Cabo de la Vela to the Gulf of Darien; Ojeda landed at Cartagena in 1510, and sustained a defeat from the natives, in which his lieutenant, Juan de la Cosa, was killed. After another reverse on the east side of the Gulf of Darien Ojeda returned to Hispaniola and died there. The Spaniards in the Gulf of Darien were left by Ojeda under the com- mand of Francisco Pizarro, the future conqueror of Peru. After suffering much from famine and disease, Pizarro resolved to leave, and embarked the survivors in small vessels, but outside the harbour they met a ship which proved to be that of Martin Fernandez Enciso, Ojeda's partner, coming with provisions and reinforcements. One of the crew of Enciso's ship, Vasco Nunez de Balboa, the future dis- coverer of the Pacific Ocean, induced his commander to form a settlement on the other side of the Gulf of Darien. The soldiers became discontented and deposed Enciso, who was a man of learning and an accomplished cosmographer. His work Suma de Geografia, which was printed in 1519, is the first Spanish book which gives an account of America. Vasco Nufiez, the new commander, entered upon a career of conquest in the neighbourhood of Darien, which ended in the discovery of the Pacific Ocean on the 25th of September 1513. Vasco Nunez was beheaded in 1517 by Pedrarias de Avila, who was sent out to supersede him. This was one of the greatest calamities that could have happened to South America; for the discoverer of the South sea was on the point of sailing with a little

fleet into his unknown ocean, and a humane and judicious man would probably have been the conqueror of Peru, instead of the cruel and ignorant Pizarro. In the year 15 19 Panama was founded by Pedrarias ; and the conquest of Peru by Pizarro followed a few years afterwards. Hernan Cortes overran and conquered Mexico from 15 1 8 to 1 52 1, and the discovery and conquest of Guatemala by Alvarado,'the invasion of Florida by De Soto, and of Nueva Granada by Quesada, followed in rapid succession. The first detailed account of the west coast of South America was written by a keenly observant old soldier, Pedro de Cieza de Leon, who was travelling in South America from 1533 to 1550, and published his story at Seville

in 1553-

The great desire of the Spanish government at that time was to find a westward route to the Moluccas. For this purpose Juan Diaz de Solis was despatched in October 1515, and in January 1516 he discovered the mouth of the Rio de la Plata. He was, however, killed by the natives, and his ships returned. In the following year the Portuguese Ferdinando Magalhaes, familiarly known as Magellan, laid before Charles V., at Valladolid, a scheme for reaching the Spice Islands by sailing westward. He started on the 21st of September 1519, entered the strait which now bears his name in October 1520, worked his way I through between Patagonia and Tierra del Fuego, and entered on

Pacific Ocean.

Portu- guese in Africa and the Bast.

the vast Pacific which he crossed without sighting any of its in- numerable island groups. This was unquestionably the greatest of the voyages which followed from the impulse of Prince Henry, and it was rendered possible only by the magnificent courage of the com- mander in spite of rebellion, mutiny and starvation. It was the 6th of March 1521 when he reached the Ladrone Islands. Thence Magellan proceeded to the Philippines, and there his career ended in an unimportant encounter with hostile natives. Eventually a Biscayan named Sebastian del Cano, sailing home by way of the Cape of Good Hope, reached San Lucar in command of the " Vic- toria " on the 6th

of September 1522, with eighteen survivors; this one ship of the squadron which sailed on the quest succeeded in accomplishing the first circumnavigation of the globe. Del Cano was received with great distinction by the emperor, who granted him a globe for his crest, and the motto Primus circumdedisti me.

While the Spaniards were circumnavigating the world and completing their knowledge of the coasts of Central and South America, the Portuguese were actively engaged on similar work as regards Africa and the East Indies.

With Abyssinia the mission of Covilhao led to further intercourse. In April 1520 Vasco da Gama, as viceroy of the Indies, took a fleet into the Red sea, and landed an embassy consisting of Dom Rodriguez de Lima and Father Francisco Alvarez, a priest whose detailed narrative is the earliest and not the least interesting account we possess of Abyssinia. It was not until 1526 that the embassy was dismissed ; and not many years afterwards the negus entreated the help of the Portuguese against Mahommedan invaders, and the viceroy sent an expeditionary force, commanded by his brother Cristoforo da Gama, with 450 musketeers. Da Gama was taken prisoner and killed, but his followers enabled the Christians of Abyssinia to regain their power, and a Jesuit mission remained in the country. The Portuguese also established a close connexion with the kingdom of Congo on the west side of Africa, and obtained much information respecting the interior of the continent. Duarte Lopez, a Portuguese settled in the country, was sent on a mission to Rome by the king of Congo, and Pope Sixtus V. caused him to recount to his chamberlain, Felipe Pigafetta, all he had learned during the nine years he had been in Africa, from 1578 to 1587. This narrative, under the title of Description of the Kingdom of Congo, was published at Rome by Pigafetta in 159 1. A map was attached on which several great equatorial lakes are shown, and the empire of Monomwezi or Unyamwezi is laid down. The most valuable work on Africa about this time is, however, that written by the Moor Leo Africanus in the early part of the 16th century. Leo travelled extensively in the north and west of Africa, and was eventually taken by pirates and sold to a master who presented him to Pope Leo X. At the pope's desire he translated his work on Africa into Italian.

In Further India and the Malay Archipelago the Portuguese acquired predominating influence at sea, establishing factories on the Malabar coast, in the Persian Gulf, at Malacca, and in the Spice Islands, and extending their commercial enterprises from the Red sea to China. Their missionaries were received at the court of Akbar, and Benedict

Goes, a native of the Azores, was despatched on a journey overland from Agra to China. He started in 1603, and, after traversing the least-known parts of Central Asia, he reached the confines of China. He appears to have ascended from Kabul to the plateau of the Pamir, and thence onwards by Yarkand, Khotan and Aksu. He died on the journey in March 1607; and thus, as one of the brethren pronounced his epitaph, "seeking Cathay he found heaven."

The activity and love of adventure, which became a passion for two or three generations in Spain and Portugal, spread to other English countries. It was the spirit of the age; and England, Dutch and Holland and France were fired by it. English enterprise French. was nrst arouse d by John and Sebastian Cabot, father and son, who came from Venice and settled at Bristol in the time of Henry VII. The Cabots received a patent in 1496, empowering them to seek unknown lands; and John Cabot dis- covered Newfoundland and part of the coast of America. Sebastian afterwards made a voyage to Rio de la Plata in the service of Spain, but he returned to England in 1548 and received a pension from Edward VI. At his suggestion a voyage was undertaken for the dis- covery of a north-east passage to Cathay, with Sir Hugh Willoughby as captain-general of the fleet and Richard Chancellor as pilot- major. They sailed in May 1553, but Willoughby and all his crew perished on the Lapland coast. Chancellor, however, was more fortunate. He reached the White Sea, performed the journey overland to Moscow, where he was well received, and may be said to have been the founder of the trade between Russia and England. He returned to Archangel and brought his ship back in safety to England. On a second voyage, in 1556, Chancellor was drowned; and three subsequent voyages, led by Stephen Burrough, Arthur Pet and Charles Jackman, in small craft of 50 tons and under, carried on an examination of the straits which lead into the Kara sea.

The French followed closely on the track of John Cabot, and Norman and Breton fishermen frequented the banks of Newfound- land at the beginning of the 16th century. In 1524 Francis I. sent Giovanni da Verazzano of Florence on an expedition of discovery

to the coast of North America; and the details of his voyage were embodied in a letter addressed by him to the king of France from Dieppe, in July 1524. In 1534 Jacques Cartier set out to continue the discoveries of Verazzano, and visited Newfoundland and the Gulf of St Lawrence. In the following year he made another voyage, discovered the island of Anticosti, and ascended the St Lawrence to Hochelaga, now Montreal. He returned, after passing two winters in

Canada; and on another occasion he also failed to establish a colony. Admiral de Coligny made several unsuccessful endeavours to form a colony in Florida under Jean Ribault of Dieppe, Ren6 de Laudonniere and others, but the settlers were furiously assailed by the Spaniards and the attempt was abandoned.

The reign of Elizabeth is famous for the gallant enterprises that were undertaken by sea and land to discover and bring to light the unknown parts of the earth. The great promoter of xheBHza-geographical discovery in the Elizabethan period was b etnan Richard Hakluyt (1553-1616), who was active in the for- enfc mation of the two companies for colonizing Virginia in 1606; and devoted his life to encouraging and recording similar undertakings. He published much, and left many valuable papers at his death, most of which, together with many other narratives, were published in 1622 in the great work of the Rev. Samuel Purchas, entitled Hakluytus Posthumus, or Purchas his Pilgrimes.

It is from these works that our knowledge of the gallant deeds of the English and other explorers of the Elizabethan age is mainly derived. The great and splendidly illustrated collections of voyages and travels of Theodorus de Bry and Hulsius served a similar useful purpose on the continent of Europe. One important object of English maritime adventurers of those days was to discover a route to Cathay by the north-west, a second was to settle Virginia, and a third was to raid the Spanish settlements in the West Indies. Nor was the trade to Muscovy and Turkey neglected; while latterly a resolute and successful attempt was made to establish direct commercial relations with India.

The conception of the north-western route to Cathay now leads the story of exploration, for the first time as far as important and sustained efforts are concerned, towards the Arctic seas. This part of the story is fully told under the heading of Polar Regions, and only the names of Martin Frobisher (1576), John Davis (1585), Henry Hudson (1607) and William Baffin (1616) need be mentioned here in order to preserve the complete conspectus of the history of discovery. The Dutch emulated the British in the Arctic seas during this period, directing their efforts mainly towards the discovery of a north-east passage round the northern end of Novaya Zemlya; and William Barents or Barendsz (1594-1597) is the most famous name in this connexion, his boat voyage along the coast of Novaya Zemlya after losing his ship and wintering in a high latitude, being one of the most remarkable achievements in polar annals.

Many English voyages were also made to Guinea and the West Indies, and twice English vessels followed in the track of Magellan, and circumnavigated the globe. In 1577 Francis Drake, who had previously served with Hawkins in the West Indies, undertook his celebrated voyage round the world. Reaching the Pacific through the Strait of Magellan, Drake proceeded northward along the west coast of America, resolved to attempt the discovery of a northern passage from the Pacific to the Atlantic. The coast from the southern extremity of the Californian peninsula to Cape Mendocino had been discovered by Juan Rodriguez Cabrillo and Francisco de Ulloa in 1539. Drake's discoveries extended from Cape Mendocino to 48° N., in which latitude he gave up his quest, sailed across the Pacific and reached the Philippine Islands, returning home round the Cape of Good Hope in 1580.

Thomas Cavendish, emulous of Drake's example, fitted out three vessels for an expedition to the South sea in 1586. He took the same route as Drake along the west coast of America. From Cape San Lucas Cavendish steered across the Pacific, seeing no land until he reached the Ladrone Islands. He returned to England in 1588. The third English voyage into the Pacific was not so fortunate. Sir Richard Hawkins (1593) on reaching the bay of Atacames, in 1° N. in 1594, was attacked by a Spanish fleet, and, after a desperate naval engagement, was forced to surrender. Hawkins declared his object to be discovery and the survey of unknown lands, and his voyage, though terminating in disaster, bore good fruit. The Observations of Sir Richard Hawkins in his Voyage into the South Sea, published in 1622, are very valuable. It was long before another British ship entered the Pacific Ocean. Sir John Narborough took two ships through the Strait of Magellan in 1670 and touched on the coast of Chile, but it was not until 1685 that Dampier sailed over the part of the Pacific where Hawkins met his defeat.

The exploring enterprise of the Spanish nation did not wane after the conquest of Peru and Mexico, and the acquisition of the vast empire of the Indies. It was spurred into renewed activity by the audacity of Sir John Hawkins in the West Indies, and by the appearance of Drake, Cavendish and Richard Hawkins in the Pacific.

In the interior of South America the Spanish conquerors had explored the region of the Andes from the isthmus of Panama to Chile. Pedro de Valdivia in 1540 made an expedition into the country of the Araucanian Indians of Chile, and was the first to

PROGRESS]

explore the eastern base of the Andes in what is now Argentine Patagonia. In 1541 Francisco de Orellana discovered the whole course of the Amazon from its source in the Andes to the Atlantic. A second voyage on the Amazon was made in 1561 by the mad pirate Lope de Aguirre; but it was not until 1639 that a full account was written of the great river by Father Crlstoval de Acuna, who ascended it from its mouth and reached the city of Quito.

The voyage of Drake across the Pacific Was preceded by that of Alvaro de Mendana, who was despatched from Peru in 1567 to discover the great Antarctic continent which was believed

la'the * to exten d rar northward into the South sea, the search Pacific

for which now became one of the leading motives of exploration. After a voyage of eighty days across the Pacific, Mendana discovered the Solomon Islands; and the expedi- tion returned in safety to Callao. The appearance of Drake on the Peruvian coast led to an expedition being fitted out at Callao, to go in chase of him, under the command of Pedro Sarmiento. He sailed from Callao in October 1579, and made a careful survey of the Strait of Magellan, with the object of fortifying that entrance to the South sea. The colony which he afterwards took out from Spain was a complete failure, and is only remembered now from the name of " Port Famine," which Cavendish gave to the site at which he found the starving remnant of Sarmiento's settlers. In June 1595 Mendana sailed from the coast of Peru in command of a second expedition to colonize the Solomon Islands. After discovering thj Marquesas, he reached the island of Santa Cruz of evil memory, where he and many of the settlers died. His young widow took command of the survivors and brought them safely to Manila. The viceroys of Peru still persevered in their attempts to plant a colony in the hypothetical southern continent. Pedro Fernandez de Quiros, who was pilot under Mendana and Luis Vaez de Torres, were sent in command of two ships to continue the work of explora- tion. They sailed from Callao in December 1605, and discovered several islands of the New Hebrides group. They anchored in a bay of a large island which Quiros named " Australia del Espiritu Santo. ' From this place Quiros returned to America, but Torres continued the voyage, passed through the strait between Australia and New Guinea which bears his name, and explored and

mapped the southern and eastern coasts of New Guinea.

The Portuguese, in the early part of the 17th century (1578- 1640), were under the dominion of Spain, and their enterprise was to some extent damped ; but their missionaries extended geographical knowledge in Africa. Father Francisco Paez acquired great influence in Abyssinia, and explored its highlands from 1600 to 1622. Fathers Mendez and Lobo traversed the deserts between the coast of the Red sea and the mountains, became acquainted with Lake Tsana, and discovered the sources of the Blue Nile in 1624-1633.

But the attention of the Portuguese was mainly devoted to vain attempts to maintain their monopoly of the trade of India against „, . . the powerful rivalry of the English and Dutch. The tf^Eas/ English enterprises were persevering, continuous and e ‘ successful. James Lancaster made a voyage to the Indian Ocean from 1591 to 1594; and in 1599 the merchants and adven- turers of London resolved to form a company, with the object of establishing a trade with the East Indies. On the 31st of December 1599 Queen Elizabeth granted the charter of incorporation to the East India Company, and Sir James Lancaster, one of the directors, was appointed general of their first fleet. He was accompanied by John Davis, the great Arctic navigator, as pilot-major. This voyage was eminently successful. The ships touched at Achin in Sumatra and at Java, returning with full ladings of pepper in 1603. The second voyage was commanded by Sir Henry Middleton; but it was in the third voyage, under Keelinge and Hawkins, that the mainland of India was first reached in 1607. Captain Hawkins landed at Surat and travelled overland to Agra, passing some time at the court of the Great. Mogul. In the voyage of Sir Edward Michelborne in 1605, John Davis lost his life in a fight with a Japanese junk. The eighth voyage, led by Captain Saris, extended the operations of the company to Japan; and in 1613 the Japanese government granted privileges to the company; but the British retired in 1623, giving up their factory. The chief result of this early intercourse between Great Britain and Japan was the interesting series of letters written by William Adams from i6ntol6i7. From the tenth voyage of the East India Company, commanded by Captain Best, who left England in 1612, dates the establishment of permanent British factories on the coast of India. It was Captain Best who secured a regular firman for trade from the Great Mogul. From that time a fleet was despatched every year, and the company’s operations greatly increased geographical knowledge of India and the Eastern Archipelago. British visits to Eastern countries, at this time, were not confined to the voyages of the company. Journeys were also made by land, and, among others, the enter- taining author

of the Crudities, Thomas Coryate, of Odcombe in Somersetshire, wandered on foot from France to India, and died {161 7) in the company's factory at Surat. In 1561 Anthony Jenkin- son arrived in Persia with a letter from Queen Elizabeth to the shah. He travelled through Russia to Bokhara, and returned by the Caspian and Volga. _ In 1579 Christopher Burroughs built a ship at Nizhniy Novgorod and traded across the Caspian to Baku ; and in 1598 Sir Anthony and Robert Shirley arrived in Persia, and

Robert was afterwards sent by the shah to Europe as his ambassador. He was followed by a Spanish mission under Garcia de Silva, who wrote an interesting account of his travels;' and to Sir Dormer Cotton's mission, in 1628, we are indebted for Sir Thomas Herbert's charming narrative. In like manner Sir Thomas Roe's mission to India resulted not only in a large collection of valuable reports and letters of his own, but also in the detailed account of his chaplain Terry. But the most learned and intelligent traveller in the East, during the 17th century, was the German, Engelbrecht Kaempfer, who accompanied an embassy to Persia, in 1684, and was afterwards a surgeon in the service of the Dutch East India Company. He was in the Persian Gulf, India and Java, and resided for more than two years in Japan, of which he wrote a history.

The Dutch nation, as soon as it was emancipated from Spanish tyranny, displayed an amount of enterprise, which, for a long time, was fully equal to that of the British. The Arctic voyages _ of Barents were quickly followed by the establishment of D " tc " ex " a Dutch East India Company ; and the Dutch, ousting yJ%,??J the_ Portuguese, not only established factories on the ' ow ~' . " mainland of India and in Japan, but acquired a preponder cei3l ' ines ' ating influence throughout the Malay Archipelago. In 15-83 Jan Hugen van Linschoten made a voyage to India with a Portuguese fleet, and his full and graphic descriptions of India, Africa, China and the Malay Archipelago must have been of no small use to his countrymen in their distant voyages. The first of the Dutch Indian voyages was performed by ships which sailed in April 1595, and rounded the Cape of Good Hope. A second large Dutch fleet sailed in 1598; and, so eager was the republic to extend her commerce over the world that another fleet, consisting of five ships of Rotter- dam, was sent in the same year by way of Magellan's Strait, under Jacob Mahu as admiral, with William Adams as pilot. Mahu died on the passage out, and was succeeded by Simon de Cordes, who was killed on .the coast of Chile. In September 1599 the fleet had entered the Pacific. The ships were then steered direct for Japan, and anchored off Bungo in April 1600. In the same year, 1598, a third expedition

was despatched under Oliver van Noort, a native of Utrecht, but the voyage contributed nothing to geography. The Dutch Company in 1614 again resolved to send a fleet to the Moluccas by the westward route, and Joris Spilbergen was appointed to the command as admiral, with a commission from the States-General. He was furnished with four ships of Amsterdam, two of Rotterdam and one from Zeeland. On the 6th of May 1615 Spilbergen entered the Pacific Ocean, and touched at several places on the coast of Chile and Peru, defeating the Spanish fleet in a naval engagement off Chilca. After plundering Payta and making requisitions at Acapulco, the Dutch fleet crossed the Pacific and reached the Moluccas in March 1616.

The Dutch now resolved to discover a passage into the Pacific to the south of Tierra del Fuego, the insular nature of which had been ascertained by Sir Francis Drake. The vessels fitted out for this purpose were the " Eendracht," of 360 tons, commanded by Jacob Lemaire, and the " Hoorn," of no tons, under Willem Schouten. They sailed from the Texel on the 14th of June 1615, and by the 20th of January 1616 they were south of the entrance of Magellan's Strait. Passing through the strait of Lemaire they came to the southern extremity of Tierra del Fuego, which was named Cape Horn, in honour of the town of Hoorn in West Friesland, of which Schouten was a native. They passed the cape on the 31st of January, encountering the usual Westerly winds. The great merit of this discovery of a second passage into the South sea lies in the fact that it was not accidental or unforeseen, but was due to the sagacity of those who designed the voyage. On the 1st of March the Dutch fleet sighted the island of Juan Fernandez; and, having crossed the Pacific, the explorers sailed along the north coast of New Guinea and arrived at the Moluccas on the 17th of September

1616.

There were several early indications of the existence of the great Australian continent, and the Dutch endeavoured to obtain further knowledge concerning the country and its extent; but only its northern and western coasts had been visited before the time of Governor van Diemen. ' Dirk Hartog had been on the west coast in latitude 26 30′ S. in 1616. Pelsert struck on a reef called " Hout-man's Abrolhos " on the 4th of June 1629. In 1697 the Dutch captain Vlamingh landed on the west coast of Australia, then called New Holland, in 31 ° 43′ S., and named the Swan river from the black swans he discovered there. In 1642 the governor and council of Batavia fitted out two ships to prosecute the discovery of the south land, then believed to be part of a vast Antarctic continent, and

entrusted the command to Captain Abel Jansen Tasman. This voyage proved to be the most important to geography that had been "■undertaken since the first circumnavigation of the globe. Tasman sailed from Batavia in 1642, and on the 24th of November sighted high land in 42° 30′ S., which was named van Diemen's Land, and after landing there proceeded to the discovery of the western coast of New Zealand ; at first called Staten Land, and supposed to be connected with the Antarctic continent from which this voyage proved New Holland to be separated. He then reached Tongatabu, one of the Friendly Islands of Cook; and returned by the north coast of New Guinea to Batavia. In 1644 Tasman made a second voyage to effect a fuller discovery of New Guinea.

[PROGRESS

The French directed their enterprise more in the direction of North America than of the Indies. One of their most distinguished French In ex pl° re rs was Samuel Champlain, a captain in the navy, North wno > after a remarkable journey through Mexico and the

America. West Indies from 1599 to 1602, established his historic connexion with Canada, to the geographical knowledge of which he made a very large addition.

The principles and methods of surveying and position finding had by this time become well advanced, and the most remarkable Mission- example of the early application of these improvements arte In ls to be found in the survey of China by Jesuit missionaries. the Bast. They first prepared a map of the country round Peking, which was submitted to the emperor Kang-hi, and, being satisfied with the accuracy of the European method of survey- ing, he resolved to have a survey made of the whole empire on the same principles. This great work was begun in July 1708, and the completed maps were presented to the emperor in 1718. The records preserved in each city were examined, topographical infor- mation was diligently collected, and the Jesuit fathers checked their triangulation by meridian altitudes of the sun and pole star and by a system of remeasurements. The result was a more accurate map of China than existed, at that time, of any country in Europe. Kang-hi next ordered a similar map to be made of Tibet, the survey being executed by two lamas who were carefully trained as surveyors by the Jesuits at*

Peking. From these surveys were constructed the well-known maps which were forwarded to Duhalde, and which D'Anville utilized for his atlas.

Several European missionaries had previously found their way from India to Tibet. Antonio Andrada, in 1624, was the first The 18th European to enter Tibet since the visit of Friar Odoric century. m '3 2 5- The next journey was that of Fathers Grueber and Dorville about 1660, who succeeded in passing from China, through Tibet, into India. In 1715 Fathers Desideri and Freyre made their way from Agra, across the Himalayas, to Lhasa, and the Capuchin Friar Orazio della Penna resided in that city from 1735 until 1747. But the most remarkable journey in this direction was performed by a Dutch traveller named Samuel van de Putte. He left Holland in 1718, went by land through Persia to India, and eventually made his way to Lhasa, where he resided for a long time. He went thence to China, returned to Lhasa, and was in India in time to be an eye-witness of the sack of Delhi by Nadir Asia. Shah in 1737. In 1743 he left India and died at Batavia

on the 27th of September 1745. The premature death of this illustrious traveller is the more to be lamented because his vast knowledge died with him. Two English missions sent by Warren Hastings to Tibet, one led by George Bogle in 1774, and the other by Captain Turner in 1783, complete Tibetan exploration in the 1 8th century.

From Persia much new information was supplied by Jean Chardin,

Sean Tavernier, Charles Hamilton, Jean de TheVenot and Father ude Krusinski, and by English traders on the Caspian. In 1738 ohn Elton traded between Astrakhan and the Persian port of ˆnzeli on the Caspian, and undertook to build a fleet for Nadir Shah. Another English merchant, named Jonas Hanway, arrived at Astrabad from Russia, and travelled to the camp of Nadir at Kazvin. One lasting and valuable result of Hanway's wanderings was a charming book of travels. In 1700 Guillaume Delisle pub- lished his map of the continents of the Old World ; and his successor D'Anville produced his map of India in 1752. D'Anville's map contained all that was then known, but ten years afterwards Major Rennell began his surveying labours, which extended over the

Ceriod from 1763 to 1782. His survey covered an area 900 m. long y 300 wide, from the eastern confines of Bengal to Agra, and from the Himalayas to Calpi. Rennell was indefatigable in collecting

?;eographical information; his Bengal atlas appeared in 1781, his amous map of India in 1788 and the memoir in 1792. Surveys were also made along the Indian coasts.

Arabia received very careful attention, in the 18th century, from the Danish scientific mission, which included Carsten Niebuhr among its members. Niebuhr landed at Loheia, on the coast of Yemen, in December 1762, and went by land to Sana. All the other members of the mission died, but he proceeded from Mokha to Bombay. He then made a journey through Persia and Syria to Constantinople, returning to Copenhagen in 1767. His valuable work, the Description of Arabia, was published in 1772, and was followed in 1 774-1 778 by two volumes of travels in Asia. The great traveller survived until 1815, when he died at the age of eighty-two. James Bruce of Kinnaird, the contemporary of Niebuhr, was equally devoted to Eastern travel; and his principal geographical Africa work was the tracing of the Blue Nile from its source to

its junction with the White Nile. Before the deathjof Bruce an African Association was formed, in 1788, for collecting information respecting the interior of that continent, with Major Rennell and Sir Joseph Banks as leading members. The association first employed John Ledyard (who had previously made an extra- ordinary journey into Siberia) to cross Africa from east to west on the parallel of the Niger, and William Lucas to cross the Sahara to Fezzan. Lucas went from Tripoli to Mesurata, obtained some information respecting Fezzan and returned in 1789. One of the chief problems the association wished to solve was that of the exist-

ence and course of the river Niger, which was believed by some authorities to be identical with the Congo. Mungo Park, then an assistant surgeon of an Indiaman, volunteered his services, which were accepted by the association, and in 1795 he succeeded in reaching the town of Segu on the Niger, but was prevented from continuing his journey to Timbuktu. Five years later he accepted an offer from the government to command an expedition into the interior of Africa, the plan being to cross from the Gambia to the Niger and descend the latter river to the sea. After losing most of his companions he himself and the rest perished in a rapid on the Niger at Busa, having been attacked from the shore by order of a chief who thought he had not received suitable presents. His work, however, had established the fact that the Niger was not identical with the Congo.

While the British were at work in the direction of the Niger, the

Portuguese were not unmindful of their old exploring fame. In 1798 Dr F. J. M. de Lacerda, an accomplished astronomer, was appointed to command a scientific expedition of discovery to the north of the Zambesi. He started in July, crossed the Muchenja Mountains, and reached the capital of the Cazembe, where he died of fever. Lacerda left a valuable record of his adventurous journey ; but with Mungo Park and Lacerda the history of African exploration in the 18th century closes.

In South America scientific exploration was active during this period. The great geographical event of the century, as regards that continent was the measurement of an arc of the south meridian. The undertaking was proposed by the French America. Academy as part of an investigation with the object of ascertaining the length of the degree near the equator and near the pole respectively so as to determine the figure of the earth. A commission left Paris in 1735, consisting of Charles Marie de la Condamine, Pierre Bouguer, Louis Godin and Joseph de Jussieu the naturalist. Spain appointed two accomplished naval officers, the brothers Ulloa, as coadjutors. The operations were carried on during eight years on a plain to the south of Quito; and, in addition to his memoir on this memorable measurement, La Condamine collected much valuable geographical information during a voyage down the Amazon. The arc measured was 3 7′ 3″ in length; and the work consisted of two measured bases connected by a series of triangles, one north and the other south of the equator, on the meridian of Quito. Contemporaneously, in 1738, Pierre Louis Moreau de Maupertuis, Alexis Claude Clairaut, Charles Etienne Louis Camus, Pierre Charles Lemonnier and the Swedish physicist Celsius measured an arc of the meridian in Lapland.

The British and French governments despatched several expedi- tions of discovery into the Pacific and round the world during the 18th century. They were preceded by the wonderful Tna and romantic voyages of the buccaneers. The narratives Pacific of such men as Woodes Rogers, Edward Davis, George Ocean. Shelvocke, Clipperton and William Dampier, can never fail to interest, while they are not without geographical value. The works of Dampier are especially valuable, and the narratives of William Funnell and Lionel Wafer furnished the best accounts then extant of the Isthmus of Darien. Dampier's literary ability eventually secured for him a commission in the king's service; and he was sent on a voyage of discovery, during which he explored part of the coasts of Australia and New Guinea, and discovered the strait which bears his name between New Guinea and New Britain, returning in 1701. In 1721 Jacob Roggewein was despatched on a voyage of some importance across the Pacific by the

Dutch West India Company, during which he discovered Easter Island on the 6th of April 1722.

The voyage of Lord Anson to the Pacific 'in 1 740-1 744 was of a predatory character, and he lost more than half his men from scurvy ; while it is not pleasant to reflect that at the very time when the French and Spaniards were measuring an arc of the meridian at Quito, the British under Anson were pillaging along the coast of the Pacific and burning the town of Payta. But a romantic interest attaches to the wreck of the " Wager," one of Anson's fleet, on a desert island near Chiloe, for it bore fruit in the charming narrative of Captain John Byron, which will endure for all time. In 1764 Byron himself was sent on a voyage of discovery round the world, which' led immediately after his return to the despatch of another to complete his work, under the command of Captain Samuel Wallis. The expedition, consisting of the " Dolphin " commanded by Wallis, and the " Swallow " under Captain Philip Carteret, sailed in September 1766, but the ships were separated on entering the Pacific from the Strait of Magellan. Wallis discovered Tahiti on the 19th of June 1767, and he gave a detailed account of that island. He returned to England in May 1 768. Carteret discovered the Charlotte and Gloucester Islands, and Pitcairn Island on the 2nd of July 1767 ; revisited the Santa Cruz group, which was discovered by Mendafia and Quiros; and discovered the strait separating New Britain from New Ireland. He reached Spithead again in February 1769. Wallis and Carteret were followed very closely by the French expedition of Bougainville, which sailed from Nantes in November 1766. Bougainville had first to perform the unpleasant task of delivering up the Falkland Islands, where he had encouraged the formation of a French settlement, to the Spaniards. He then entered the Pacific, and reached Tahiti in April 1768. Passing through the New

Hebrides group he touched at Batavia, and arrived at St Malo after an absence of two years and four months.

The three voyages of Captain James Cook form an era in the history of geographical discovery. In 1767 he sailed for Tahiti, with the Caotaln object of observing the transit of Venus, accompanied _/;. by two naturalists, Sir Joseph Banks and Dr Solander,

a pupil of Linnaeus, as well as by two astronomers. The transit was observed on the 3rd of June 1769. After exploring Tahiti and the Society group, Cook spent six months surveying New Zealand, which he discovered to be an island, and the coast of New South Wales from latitude 38 ° S. to the northern extremity. The belief in a vast Antarctic continent stretching far into the temperate zone had never been abandoned, and was vehemently asserted by Charles Dalrymple, a disappointed candidate nominated by the Royal Society for the command of the Transit expedition of 1769. In 1772 the French explorer Yves Kerguelen de Tremarec had dis- covered the land that bears his name in the South Indian Ocean without recognizing it to be an island, and naturally believed it to be part of the southern continent.

Cook's second voyage was mainly intended to settle the question of the existence of such a continent once for all, and to define the limits of any land that might exist in navigable seas towards the Antarctic circle. James Cook at his first attempt reached a south latitude of 57° 15'. On a second cruise from the Society Islands, in !773> ne > fi rst of all men, crossed the Antarctic circle, and was stopped by ice in 71 10′ S. During the second voyage Cook visited Easter Island, discovered several islands of the New Hebrides and New Caledonia ; and on his way home by Cape Horn, in March 1774, he discovered the Sandwich Island group and described South Georgia. He proved conclusively that any southern continent that might exist lay under the polar ice. The third voyage was intended to attempt the passage from the Pacific to the Atlantic by the north-east. The " Resolution " and " Discovery " sailed in 1776, and Cook again took the route by the Cape of Good Hope. On reaching the North American coast, he proceeded northward, fixed the position of the western extremity of America and surveyed Bering Strait. He was stopped by the ice in 70° 41′ N., and named the farthest visible point on the American shore Icy Cape. He then visited the Asiatic shore and discovered Cape North. Returning to Hawaii, Cook was murdered by the natives. Onthe 14th of February '779> b> s second, Captain Edward Clerke, took command, and proceeding to Petropavlovsk in the following summer, he again examined the edge of the ice, but only got as far as 70° 33′ N. The ships returned to England in October 1780.

In 1785 the French government carefully fitted out an expedition of discovery at Brest, which was placed under the command of Francois La Perouse, an accomplished and experienced officer. After touching at Concepcion in Chile and at Easter Island, La P6rouse proceeded to Hawaii and thence to the coast of California, of which he has given a very interesting account. He then crossed the Pacific to Macao, and

in July 1787 he proceeded to explore the Gulf of Tartary and the shores of Sakhalin, remaining some time at Castries Bay, so named after the French minister of marine. Thence he went to the Kurile Islands and Kamchatka, and sailed from the far north down the meridian to the Navigator and Friendly Islands. He was in Botany Bay in January 1788; and sailing thence, the explorer, his ship and crew were never seen again. Their fate was long uncertain. In September 1791 Captain Antoine d'Entre- casteaux sailed from Brest with two vessels to seek for tidings. He visited the New Hebrides, Santa Cruz, New Caledonia and Solo- mon Islands, and made careful though rough surveys of the Louisiade Archipelago, islands north of New Britain and part of New Guinea. D'Entrecasteaux died on board his ship on the 20th of July 1793, without ascertaining the fate of La Perouse. Captain Peter Dillon at length ascertained, in 1828, that the ships of La Perouse had been wrecked on the island of Vanikoro during a hurricane.

The work of Captain Cook bore fruit in many ways. His master, Captain William Bligh, was sent in the " Bounty" to convey bread-fruit plants from Tahiti to the West Indies. He reached Tahiti in October 1788, and in April 1789 a mutiny broke out, and he, with several officers and men, was thrust into an open boat in mid-ocean. During the remarkable voyage he then made to Timor, Bligh passed amongst the northern islands of the New Hebrides, which he named the Banks Group, and made several running surveys. He reached England in March 1790. The " Pandora," under Captain Edwards, was sent out in search of the " Bounty," and discovered the islands of Cherry and Mitre, east of the Santa Cruz group, but she was eventually lost on a reef in Torres Strait. In 1 796-1797 Captain Wilson, in the missionary ship " Duff," discovered the Gambier and other islands, and rediscovered the islands known to and seen by Quiros, but since called the Duff Group. Another result of Captain Cook's work was the colonization of Australia. On the 1 8th of January 1788 Admiral Phillip and Captain Hunter arrived in Botany Bay in the " Supply "and " Sirius, ' followed by six transports, and established a colony at Port Jackson. Surveys were then undertaken in several directions. In 1795 and 1796 Matthew Flinders and George Bass were engaged on exploring work in a small boat called the " Tom Thumb." In 1797 Bass, who had been a surgeon; made an expedition southwards, continued the work of Cook from Ram Head, and explored the strait which bears his

name, and in 1798 he and Flinders were surveying on the east coast of Van Diemen's land.

Yet another outcome of Captain Cook's work was the voyage of George Vancouver, who had served as a midshipman in Cook's second and third voyages. The Spaniards under Quadra had begun a survey of north-western America and occupied Nootka Sound, which their government eventually agreed to surrender. Captain Vancouver was sent out to receive the cession, and to survey the coast from Cape Mendocino northwards. He commanded the old " Discovery," and was at work during the seasons of 1792, 1793 and 1794, wintering at Hawaii. Returning home in 1795, he completed his narrative and a valuable series of charts.

The 18th century saw the Arctic coast of North America, reached at two points, as well as the first scientific attempt to reach the North Pole. The Hudson Bay Company had been in- Arctic corporated in 1670, and its servants soon extended their "; operations over a wide area to the north and west of regions. Canada. In 1741 Captain Christopher Middleton was ordered to solve the question of a passage from Hudson Bay to the westward. Leaving Fort Churchill in July 1742, he discovered the Wager river and Repulse Bay. He was followed by Captain W. Moor in 1746, and Captain Coats in 1751, who examined the Wager Inlet up to the end. In November 1769 Samuel Hearne was sent by the Hudson Bay Company to discover the sea on the north side of America, but was obliged to return. In February 1770 he set out again from Fort Prince of Wales; but, after great hardships, he was again forced to return to the fort. He started once more in December 1771, and at length reached the Coppermine river, which he surveyed to its mouth, but his observations are unreliable. With the same object Alexander Mackenzie, with a party of Canadians, set out from Fort Chippewyan on the 3rd of June 1789, and descending the great river which now bears the explorer's name reached the Arctic sea.

In February. 1 773 the Royal Society submitted a proposal to the king for an expedition towards the North Pole. The expedition was fitted out under Captains Constantine Phipps and Skeffington Lutwidge, and the highest latitude reached was 80° 48′ N., but no opening was discovered in the heavy Polar pack. The most im-portant Arctic work in the 18th century was performed by the Russians, for they succeeded in delineating the whole of the northern coast of Siberia. Some of this work was possibly done at a still earlier date. The Cossack Simon Dezhneff is thought to have made a voyage, in the summer of 1648, from the river Kolyma, through Bering Strait (which was rediscovered by Vitus Bering in 1728) to Anadyr. Between 1738 and 1750 Manin and Sterlegoff made their way in small sloops from the mouth of the Yenesei as far north as 75

15′ N. The land from Taimyr to Cape Chelyuskin, the most northern extremity of Siberia, was mapped in many years of patient exploration by Chelyuskin, who reached the extreme point (77° 34′ N.) in May 1742. To the east of Cape Chelyuskin the Russians encountered greater difficulties. They built small vessels at Yakutsk on the Lena, 900 m. from its mouth, whence the first expedition was despatched under Lieut. Prontschichev in 1735. He sailed from the mouth of the Lena to the mouth of the Olonek, where he wintered, and on the 1st of September 1736 he got as far as 77 29′ N., within 5 m. of Cape Chelyuskin. Both he and his young wife died of scurvy, and the vessel returned. A second expedition, under Lieut. Laptyev, started from the Lena in 1739, but encountered masses of drift ice in Chatanga bay, and with this ended the voyages to the westward of the Lena. Several attempts were also made to navigate the sea from the Lena to the Kolyma. In 1736 Lieut. Laptyev sailed, but was stopped by the drift ice in August, and in 1739, during another trial, he reached the mouth of the Indigirka, where he wintered. In the season of 1740 he continued his voyage to beyond the Kolyma, wintering at Nizhni Kolymsk. In September 1740 Vitus Bering sailed from Okhotsk on a second Arctic voyage with George William Steller on board as naturalist. In June 1741 he named the magnificent peak on the coast of North America Mount St Elias and explored the Aleutian Islands. In November the ship was wrecked on Bering Island; and the gallant Dane, worn out with scurvy, died there on the 8th of December 1741. In March 1770 a merchant named Liakhov saw a large herd of reindeer coming from the north to the Siberian coast, which induced him to start in a sledge in the direction whence they came. Thus he reached the New Siberian or Liakhov Islands, and for years afterwards the seekers for fossil ivory resorted to them. The Russian Captain Vassili Chitschakov in 1765 and 1766 made two persevering attempts to penetrate the ice north of Spitsbergen, and reached 80° 30′ N., while Russian parties twice wintered at Bell Sound.

In reviewing the progress of geographical discovery thus far, it has been possible to keep fairly closely to a chronological order. But in the 19th century and after exploring work was so ˆ Qm generally and steadily maintained in all directions, and graphical was in so many cases narrowed down from long journeys societies. to detailed surveys within relatively small areas, that it becomes desirable to cover the whole period at one view for certain great divisions of the world. (See Africa; Asia; Australia; Polar Regions; &c.) Here, however, may be noticed the development of geographical societies devoted to the encouragement of exploration and research. The first

of the existing geographical societies was

that of Paris, founded in 1825 under the title of La Society de Geographie. The Berlin Geographical Society (Gesellschaft fur Erdkunde) is second in order of seniority, having been founded in 1827. The Royal Geographical Society, which was founded in London in 1830, comes third on the list; but it may be viewed as a direct result of the earlier African Association founded in 1788. Sir John Barrow, Sir John Cam Hobhouse (Lord Broughton), Sir Roderick Murchison, Mr Robert Brown and Mr Bartle Frere formed the foundation committee of the Royal Geographical Society, and the first president was Lord Goderich. The action of the society in supplying practical instruction to intending travellers, in astronomy, surveying and the various branches of science useful to collectors, has had much to do with advancement of discovery. Since the war of 1870 many geographical societies have been established on the continent of Europe. At the close of the 19th century there were upwards of 100 such societies in the world, with more than 50,000 members, and over 150 journals were devoted entirely to geographical subjects. 1 The great development of photography has been a notable aid to explorers, not only by placing at their disposal a faithful and ready means of recording the features of a country and the types of inhabitants, but by supplying a method of quick and accurate topographical surveying.

The Principles of Geography

As regards the scope of geography, the order of the various departments and their inter-relation, there is little difference of opinion, and the principles of geography 2 are now generally accepted by modern geographers. The order in which the various subjects are treated in the following sketch is the natural succession from fundamental to dependent facts, which corresponds also to the evolution of the diversities of the earth's crust and of its inhabitants. The fundamental geographical conceptions are mathematical, the relations of space and form. The figure and dimensions of the „ . earth are the first of these. They are ascertained by a

. a , em _ ' combination of actual measurement of the highest £ eo "

precision on the surface and angular observations of the ‘ positions of the heavenly bodies. The science of geodesy is part of mathematical geography, of which the arts of surveying and cartography are applications. The motions of the earth as a planet must be taken into account, as they render possible the determination of position and direction by observations of the heavenly bodies. The diurnal rotation of the earth furnishes two fixed points or poles, the axis joining which is fixed or nearly so in its direction in space. The rotation of the earth thus fixes the directions of north and south and defines those of east, and west. The angle which the earth’s axis makes with the plane in which the planet revolves round the sun determines the varying seasonal distribution of solar radiation over the surface and the mathematical zones of climate. Another important consequence of rotation is the deviation produced in moving bodies relatively to the surface. In the form known as Ferrell’s Law this runs: ” If a body moves in any direction on the earth’s surface, there is a deflecting force which arises from the earth’s rotation which tends to deflect it to the right in the northern hemisphere but to the left in the southern hernisphere. ” The deviation is of importance in the movement of air, of ocean currents, and to some exteilt of rivers. 3

In popular usage the words ” physical geography ” have come to mean geography viewed from a particular standpoint rather p . ., than any special department of the subject. The popular ys a . meaning is better conveyed by the word physiography, a geograp y. term w hich appears to have been introduced by Linnaeus, and was reinvented as a substitute for the cosmography of the middle ages by Professor Huxley. Although the term has since been limited by some writers to one particular part of the subject, it seems best to maintain the original and literal meaning. In the stricter sense, physical geography is that part of geography which involves the processes of contemporary change in the crust and the circulation of the fluid envelopes. It thus draws upon physics for the explana- tion of the phenomena with the space-relations of which it is specially concerned. Physical geography naturally falls into three divisions, dealing respectively with the surface of the lithosphere — geomor- phology; the hydrosphere — oceanography; and the atmosphere — climatology. All these rest upon the facts of mathematical geo- graphy, and the three are so closely inter-related that they cannot be rigidly separated in any discussion.

Geomorphology is the part of geography which deals with terres- trial relief, including the submarine as well as the subaerial portions of the crust. The history of the origin of the various forms belongs

1 H. Wagner's year-book, Geographische Jalirbuch, published at Gotha, is the best systematic record of the progress of geography, in all departments; and Haack's Geographen Kalender, also published* annually at Gotha, gives complete lists of the geographical societies

' and geographers of the world.

2 This phrase is old, appearing in one of the earliest English works on geography, William Cuningham's Cosmographical Glasse conteinyng the pleasant Principles of Cosmographie, Geographie, Hydrographie or Navigation (London, 1559).

3 See also S. Giinther, Handbuch der mathematischen Geographie (Stuttgart, 1890).

to geology, and can be completely studied only by geological methods. But the relief of the crust is not a finished piece of sculpture ; the forms are for the most part transitional, owing their characteristic outlines to the process by which they eomor P are produced; therefore the geographer must, for strictly ° osy ' geographical purposes, take some account of the processes which are now in action modifying the forms of the crust. Opinion still differs as to the extent to which the geographer's work should overlap that of the geologist.

The primary distinction of the forms of the crust is that between elevations and depressions. Granting that the geoid or mean surface of the ocean is a uniform spheroid, the distribution of land and water approximately indicates a division of the surface of the globe into two areas, one of elevation and one of depression. The increasing number of measurements of the height of land in all continents and islands, and the very detailed levellings in those countries which have been thoroughly surveyed, enable the average elevation, of the land above sea-level to be fairly estimated, although many vast gaps in accurate knowledge remain, and the estimate is not an exact one. The only part of the sea-bed the configuration of which is at all well known is the zone bordering the coasts where the depth is less than about 100 fathoms or 200 metres, i.e. those parts which sailors speak of as " in soundings." Actual or projected routes for telegraph cables across the deep sea have also been sounded with extreme accuracy in many cases; but beyond these lines of sounding the vast spaces of the ocean remain unplumbed save for the rare researches of scientific expeditions, such as those of the " Challenger," the " Valdivia," the " Albatross " and the " Scotia." Thus the best approximation to the average depth of the ocean is little more than

an expert guess ; yet a fair approximation is probable for the features of sub-oceanic relief are so much more uniform than those of the land that a smaller number of fixed points is required to determine them.

The chief element of uncertainty as to the largest features of the relief of the earth's crust is due to the unexplored area in the Arctic region and the larger regions of the Antarctic, of which we know nothing. We know that the earth's surface if Crustal unveiled of water would exhibit a great region of elevation relief. arranged with a certain rough radiate symmetry round the north pole, and extending southwards in three unequal arms which taper to points in the south. A depression surrounds the little-known south polar region in a continuous ring and extends northwards in three vast hollows lying between the arms of the elevated area. So far pnly is it possible to speak with certainty, but it is permissible to take a few steps into the twilight of dawning knowledge and indicate the chief subdivisions which are likely, to be established in the great crust-hollow and the great crust-heap. The boundary between these should obviously be the mean surface of the sphere.

Sir John Murray deduced the mean height of the land of the globe as about 2250 ft. above sea-level, and the mean depth of the oceans as 2080 fathoms or 12,480 ft. below sea-level. 4 Calculating the area of the land at 55,000,000 sq. m. (or 28-6% of the surface), and that of the oceans as 137,200,000 sq. m. (or 71-4% of the surface), he found that the volume of the land above sea-level was 23,450,000 cub. m., the volume of water below sea-level 323,800,600, and the total volume of the water equal to about ˆfsth of the volume of the whole globe. From these data, as revised by A. Supan, 5 H. R. Mill calculated the position of mean sphere-level at about 10,000 ft. or 1700 fathoms below sea-level. He showed that an imaginary spheroidal shell, concentric with the earth and cutting the slope between the elevated and depressed areas at the contour-line of 1 700 fathoms, would not only leave above it a volume of the crust equal to the volume of the hollow left below it, but would also divide the surface of the earth so that the area of the elevated region was equal to that of the depressed region. 6

A similar observation was made almost simultaneously by Romieux, 7 who further speculated on the equilibrium between the weight of the elevated land mass and that of the total waters of the ocean, and deduced some interesting rela- T 6850 ' tions between them. Murray, as the result of his study, ˆˆjˆL divided theearth's surface into three zones — the continental , ju urr f v area containing all dry land, the

transitional area including the submarine slopes down to 1000 fathoms, and the abysmal area consisting of the floor of the ocean beyond that depth; and Mill proposed to take the line of mean-sphere level, instead of the em- pirical depth of 1000 fathoms, as the boundary between the transi- tional and abysmal areas.

An elaborate criticism of all the existing data regarding the volume relations of the vertical relief of the globe was made in 1894 by Professor Hermann Wagner, whose recalculations of volumes

4 " On the Height of the Land and the Depth of the Ocean," Scot. Geog. Mag. iv. (1888), p. 1. Estimates had been made previously by Humboldt, De Lapparent, H. Wagner, and subsequently by Penck and Heiderich, and for the oceans by Karstens.

5 Petermanns Mitteilungen, xxv. (1889), p. 17.

6 Proc. Roy. Soc. Edin. xvii. (1890) p. 185.

7 Comptes rendus Acad. Sci. (Paris, 1890), vol. iii. p. 994.

Lap- worth's fold- theory.

second great series of crust waves from north to south, giving rise by their interference to six great elevated masses (the continents), arranged in three groups, each consisting of a northern and a southern member separated by a minor depression. These elevated masses are divided from one another by similar great depressions. • He says: " The surface of each of our great continental masses of land resembles that of a long and broad arch-like form, of which we see the simplest type in the New World. The surface of the North American arch is sagged down- wards in the middle into a central depression which lies between two long marginal plateaus, and these plateaus are finally crowned by the wrinkled crests which form its two modern mountain systems. The surface of each of our ocean floors exactly resembles that of a continent turned upside down. Taking the Atlantic as our simplest type, we may say that the surface of an ocean basin resembles that of a mighty trough or syncline, buckled up more or less centrally in a medial ridge, which is bounded by two long and deep marginal hollows, in the cores of which still

deeper grooves sink to the profoundest depths. This complementary relationship descends even to the minor features of the two. Where the great continental sag sinks below the ocean level, we have our gulfs and our Mediterraneans, seen in our type continent, as the Mexican Gulf and Hudson Bay. Where the central oceanic buckle attains the water-line we have our oceanic islands, seen in our type ocean, as St Helena and the Azores. Al- though the apparent crust-waves are neither equal in size nor symmetrical in form, this complementary relationship between them is always discernible. The broad Pacific depression seems to answer to the broad elevation of the Old World — the narrow trough of the Atlantic to the narrow continent of America."

The most thorough discussion of the great features of terrestrial relief in the light of their origin is that by Professor E. Suess, 5 who points out that the plan of the earth is the result of two movements of the crust — one, subsidence over ^" eSS , S wide areas, giving rise to oceanic depressions and leaving eo O'-

the continents protuberant; the other, folding along comparatively narrow belts, giving rise to mountain ranges. This theory of crmst blocks dropped by subsidence is opposed to Lapworth's theory of vast crust-folds, but geology is the science which has to decide between them.

Geomorphology is concerned, however, in the suggestions which have been made as to the cause of the distribution of heap and hollow in the larger features of the crust. Elie de Beaumont, in his speculations on the relation between the direction of mountain ranges and their geological age and character, was feeling towards a comprehensive theory of the forms of crustal relief; but his ideas were too geometrical, and his theory that the earth is a spheroid built up on a rhombic dodecahedron, the pentagonal faces of whiciti determined the direction of mountain ranges, could not be proved, 6 The " tetrahedral theory " brought forward by Lowthian Green,' that the form of the earth is a spheroid based on a regular tetra- hedron, is more serviceable, because it accounts for three very M h ■ htnf r d.- 2300ft interesting facts of the terrestrial plan — (1) the antipodal ;s ^> SaffiwH >.rpr«r'»H Mean, Levelof CJobe (Zand and SeayJSO ft position of continents and ocean basins; (2) the tri- – angular outline of the continents; and (3) the excess of

and mean heights — the best results which have yet been obtained — led to the following conclusions. 1

, The area of the dry land was taken as 28-3 % of the surface of the globe, and that of the oceans as 71-7%. The mean height deduced for the land was 2300 ft. above sea-level, the mean depth Areas or Q f ˆ sea hˆqo ft. below, while the position of mean- the crust g php re i eve i co mes out as 7500 ft. (1250 fathoms) below according sea _ leveL From th ; s ; t wou l c [appear that 43% of the ‘ sner ‘ earth’s surface was above and 57% below the mean level. It must be noted, however, that since 1895 the soundings of Nansen in the north polar area, of the ” Valdivia,” ” Belgica,” ” Gauss” and ” Scotia ” in the Southern Ocean, and of various surveying ships in the North and South Pacific, have proved that the mean depth of the ocean is considerably greater than had been supposed, and mean-sphere level must therefore lie deeper than the calculations of 1S95 show; possibly not far from the position deduced from the freer estimate of 1888. The whole of the available data were utilized by the prince of Monaco in 1905 in the preparation of a complete bathymetrical map of the oceans on a uniform scale, which must long remain the standard work for reference on ocean depths.

By the device of a hypsographic curve co-ordinating the vertical relief and the areas of the earth’s surface occupied by each zone of elevation, according to the system introduced by Supan, 2 Wagner showed his results graphically.

This curve with the values reduced from metres to feet is re-produced below.

Wagner subdivides the earth’s surface, according to elevation, into the following five regions:

Wagner’s Divisions of the Earth’s Crust:

Name.

Per cent of Surface.

From

To

Depressed area . Oceanic plateau . Continental slope Continental plateau. Culminating area

3 54

9 28

Deepest.

- 16,400 feet.

- 7,400 „

- 660 ,, + 3,300 ,,

- 16,400 feet.

- 7,400 „

- 660 „ + 3,ooo „

Highest.

The continental plateau might for purposes of detailed study be ivided into the continental shelf from —660 ft. to sea-level, and lowlands from sea-level to +660 ft. (corresponding to the mean level of the whole globe). 3 Uplands reaching from 660 ft. to 2300 (the approximate mean level of the land), and highlands, from 2300 upwards, might also be distinguished.

A striking fact in the configuration of the crust is that each continent, or elevated mass of the crust, is diametrically opposite to an ocean basin or great de-

-„ .2^^MfSCki^^?tM»£oj:ih£j^ust;3pO_OJiL

l g£ i ^ t Jjl^A&UojJ-!tei)X£4hJ&JBltl

pression ;

Arrange- ment of world-

the only partial exception being in the case of southern

South America, which is antipodal to eastern Asia.

Professor C. Lapworth has generalized the grand features

of crustal relief in a scheme of attractive simplicity. He

. sees throughout all the chaos of irregular crust-forms the

” f recurrence of a certain harmony, a succession of folds or

ws ‘ waves which build up all the minor features. 4 One

great scries of crust waves from east to west is crossed by a

1 ” Areal und mittlere Erhcbung der Landflachen sowie der Erd-kruste ” in Gerland’s Beilrdge zur Ceophysik, ii. (1895) p. 667. See also Nature, 54 (1896), p. 112.

- Peter manns Mitteilungen, xxxv. (1889) p. 19.

3 The areas of the continental shelf and lowlands are approximately equal, and it is an interesting circumstance that, taken as a whole, the actual coast-line comes just midway on the most nearly level belt of the earth’s surface, excepting the ocean floor. The configuration of the continental slope has been treated in detail by Nansen in Scientific Results of Norwegian North Polar Expedition, vol. iv. (1904), where full references to the literature of the subject will be found..

‘ British Association Report (Edinburgh, 1892), p. 699.

sea in the southern hemisphere. Recent investigations, have recalled attention to the work of Lowthian Green, but the question is still in the controversial stage. 8 The study of tidal strain in the earth’s crust by Sir George Darwin has led that physicist to indicate the possibility of the triangular form and southerly direction of the continents being a result of the differential or tidal attraction of the sun and moon. More recently Professor A. E. H. Love has shown that the great features of the relief of the lithosphere may be expressed by spherical harmonics of the first, second and third degrees, and their formation related to gravitational action in a sphere of unequal density. 9 In any case it is fully recognized that the plan of the earth is so

clear as to leave no doubt as to its being due to some general cause

which should be capable of detection.

If the level of the sea were to become coincident with the mean

level of the lithosphere, there would result one tri-radiate land-mass

of nearly uniform outline and one continuous sheet of water

5 Das Antlitz der Erde (4 vols., Leipzig, 1885, 1888, 1901). Translated under the editorship of E. de Margerie, with much additional matter, as La Face de la terre, vols. i. and ii. (Paris, 1897, 1900),

and into English by Dr Hertha Sollas as The Face of the Earth, vols. i. and ii. (Oxford, 1904, 1906).

6 Elie de Beaumont, Notice sur les systemes de montagnes (3 vols., Paris, 1852).

7 Vestiges of the Molten Globe (London, 1875).

8 See J. W. Gregory, " The Plan of the Earth and its Causes," Geog. Journal, xiii. (1899) p. 225; Lord Avebury, ibid. xv. (1900) p. 46; Marcel Bertrand, " Deformation tetraedrique de la terre et displacement du pole," Comptes rendus Acad. Sci. (Paris, 1900), vol. exxx. p. 449 ; and A. de Lapparent, ibid. p. 614.

9 See A. E. H. Love, " Gravitational Stability of the Earth," Phil. Trans, ser. A. vol. ccvii. (1907) p. 171.

broken by few islands. The actual position of sea- level lies so near the summit of the crust-heap that the varied relief of the upper _. portion leads to the formation of a complicated coast-

1 Be con- (me anc j a g reat num ber of detached portions of land. nents. pˆ hydrosphere is, in fact, continuous, and the land is all in insular masses: the largest is the Old World of Europe, Asia and Africa; the next in size, America; the third, possibly, Antarctica; the fourth, Australia; the fifth, Greenland. After this there is a considerable gap before New Guinea, Borneo, Mada gascar, Sumatra and the vast multitude of smaller islands descending in size by regular gradations to mere rocks. The contrast between island and mainland was natural enough in the days before the discovery of Australia, and the mainland of the Old World was traditionally divided into three continents. These " continents," " parts of the earth," or "quarters of the globe," proved to be convenient divisions; America was added as a fourth, and subse- quently divided into two, while Australia on its discovery was classed sometimes as a new continent, sometimes merely as an island, some- times compromisingly as an island-continent, according to individual opinion. The discovery of the insularity of Greenland might again give rise to the argument as to the distinction between island and continent. Although the name of continent was not applied to large

portions of land for any physical reasons, it so happens that there is a certain physical similarity or homology between them which is not shared by the smaller islands or peninsulas.

The typical continental form is triangular as regards its sea-level outline. The relief of the surface typically includes a central plain, Homology s ° metimes dipping below sea-level, bounded by lateral at con- highlands or mountain ranges, loftier on one side than tiaents. on tne ? tner < tne higher enclosing a plateau shut in by mountains. South America and North America follow this type most closely ; Eurasia (the land mass of Europe and Asia) comes next, while Africa and Australia are farther removed from the type, and the structure of Antarctica and Greenland is unknown.

If the continuous, unbroken, horizontal extent of land in a continent is termed its trunk, 1 and the portions cut up by inlets or channels of the sea into islands and peninsulas the limbs, it is possible to compare the continents in an instructive manner.

The following table is from the statistics of Professor H. Wagner, 2 his metric measurements being transposed into British units:

*Comparison of the Continent**

Area

Mean

Area

Area penin- sulas,

Area

Area

Area

total

height,

trunk,

islands,

limbs,

limbs,

mil.

feet.

mil.

mil.

mil.

mil.

per

sq. m.

sq. m.

sq. m.

sq. m.

sq. m.

cent.

Old World . .

35-8

2360

New World

l6-2

2230

Eurasia

20-85

2620

15-42

4-09

1-34

5-43

26

Africa

11-46

2130

11-22

0-24

0-24

2-1

North America

9-26

2300

6-92

0-78

1-56

2- 34

25

South America

6-84

1970

6-76

0-02

0-06

0-08

I-I

Australia

3-43

1310

2-77

0-16

0-50

o-66

19

Asia

17-02

3120

1293

3-05

1-04

4-09

24

Europe .

3-83

980

2-49

1-04

0-30

1-34

35

The usual classification of islands is into continental and oceanic. The former class includes all those which rise from the continental Islands. sne 'f> or show evidence in the character of their rocks of haying at one time been continuous with a neighbouring continent. The latter rise abruptly from the oceanic abysses. Oceanic islands are divided according to their geological character into volcanic islands and those of organic origin, including coral islands. More elaborate subdivisionsaccording to structure, origin and position have been proposed. 3 In some cases a piece of land is only an island

at high water, and by imperceptible gradation the form passes into a peninsula. The typical peninsula is connected with the mainland by a relatively narrow isthmus; the name is, however, ex- tended to any limb projecting from the trunk of the mainland, even when, as in the Indian peninsula, it is connected by its widest part.

Small peninsulas are known as promontories or headlands, and the extremity as a cape. The opposite form, an inlet of the sea, is Coasts. known when wide as a gulf, bay or bight, according to size and degree of inflection, or as a fjord or ria when long and narrow. It is convenient to employ a specific name for a projection of a coast-line less pronounced than a peninsula, and for an inlet less pronounced than a bay or bight ; outcurve and incurve may serve the turn. The varieties of coast-lines were reduced to an exact classification by Richthofen, who grouped them according to . the height and slope of the land into cliff-coasts (Steilkiisten) — narrow beach coasts with cliffs, wide beach coasts with cliffs, and*

1 Rumpf, in German, the language in which this distinction was first made.

2 Lehrbuch der Geographie (Hanover and Leipzig, 1900), Bd. i. S.

245, 249-

3 See, for example, F. G. Hahn's Insel-Studien (Leipzig, 1883).

low coasts, subdividing each group according as the coast-line runs parallel to or crosses the line of strike of the mountains, or is not related to mountain structure. A further subdivision depends on the character of the inter-relation of land and sea along the shore producing such types as a fjord-coast, ria-coast or lagoon-coast. This extremely elaborate subdivision may be reduced, as Wagner points out, to three types— the continental coast where the sea comes up to the solid rock-material of the land ; the marine coast, which is formed entirely of soft material sorted out by the sea ; and the com- posite coast, in which both forms are combined.

On large-scale maps it is necessary to show two coast-lines, one for the highest, the other for the lowest tide; but in small-scale maps a single line is usually wider than is required to -, represent the whole breadth of the inter-tidal zone. «»«• The measurement of a coast-line is difficult, because s **

the length will necessarily be greater when measured on a large- scale map where minute irregularities can be taken into account. It is

usual to distinguish between the general coast-line measured from point to point of the headlands disregarding the smaller bays, and the detailed coast-line which takes account of every inflection shown by the map employed, and follows up river entrances to the point where tidal action ceases. The ratio between these two coast-lines represents the " coastal development " of any region.

While the forms of the sea-bed are not yet sufficiently well known to admit of exact classification, they are recognized to be as a rule distinct from the forms of the land, and the importance c . of using a distinctive terminology is felt. Efforts have J u6mariae been made to arrive at a definite international agreement forms ' on this subject, and certain terms suggested by a committee were adopted by the Eighth International Geographical Congress at New York in 1904. 4 The forms of the ocean floor include the " shelf," or shallow sea margin, the " depression," a general term applied to all submarine hollows, and the " elevation." A depression when of great extent is termed a " basin," when it is of a more or less round form with approximatelyequal diameters, a " trough " when it is wide and elongated with gently sloping borders, and a " trench " when narrow and elongated with steeply sloping borders, one of which rises higher than the other. The extension of a trough or basin penetrating the land or an elevation is termed an " embay- ment ' when wide, and a " gully " when long and narrow; and the deepest part of a depression is termed a " deep." A depression of small extent when steep-sided is termed a " caldron," and a long narrow depression crossing a part of the continental border is termed a " furrow." An elevation of great extent which rises at a very gentle angle from a surrounding depression is termed a " rise," one which is rela- tively narrow and steep-sided a " ridge," and one which is approximately equal in length and breadth but steep-sided a " plateau," whether it springs direct from a depression or from a rise. An eleva- tion of small extent is distinguished as a " dome " when it is more than 100 fathoms from the surface, a " bank " when it is nearer the surface than 100 fathoms but deeper than 6 fathoms, and a " shoal " when it comes within 6 fathoms of the surface and so becomes a serious danger to ship- ping. The highest point of an elevation is termed a " height," if it does not form an island or one of the minor forms.

The forms of the dry land are of infinite variety, and have been studied in great detail. 6 From the descriptive or topographical point of view, geometrical form alone should be con- sidered; but the origin and geological structure of h land forms must in many cases be taken into account 1orms – when dealing with the function they exercise in the control of mobile distributions. The geographers who have

hitherto given most attention to the forms of the land have been trained as geo- logists, and consequently there is a general tendency to make origin or structure the basis of classification rather than form alone.

*The fundamental form-elements may be reduced to the six proposed by Professor Penck as the basis of his double system of classification by form and origin. 6 These may be looked _. upon as being all derived by various modifications or T ˆ esix arrangements of the single form-unit, the slope or inclined * ,emeat ™y plane surface. No one form occurs alone, but always rnis ‘*

grouped together with others in various ways to make up districts, regions and lands of distinctive characters. The form-elements are :

4 See Geographical Journal, xxii. (1903) pp. 191-194.

6 The most important works on the classification of land forms are

F. von Richthofen, Fuhrer fur Forschungsreisende (Berlin, 1886);

G. de la Noe and E. de Margerie, Les Formes du terrain (Paris, 1888) ; and above all A. Penck, Morphologie der Erdoberfldche (2 vols., Stuttgart, 1894). Compare also A. de Lapparent, Lecons de geo- graphie physique (2nd ed., Paris, 1898), and W. M. Davis, Physical Geography (Boston, 1899).

6 ” Geomorphologie als genetische Wissenschaft,” in Report of Sixth International Geog. Congress (London, 1895), p. 735 (English Abstract, p. 748).

1. The plain or gently inclined uniform surface.

2. The scarp or steeply inclined slope ; this is necessarily of small extent except in the direction of its length.

3. The valley, composed of two lateral parallel slopes inclined towards a narrow strip of plain at a lower level which itself slopes downwards in the direction of its length. Many varieties of this fundamental form may be distinguished.

4. The mount, composed of a surface falling away on every side from a particular place. This place may either be a point, as in a volcanic cone, or a line, as in a mountain range or ridge of hills.

5. The hollow or form produced by a land surface sloping inwards from all sides to a particular lowest place, the converse of a mount.

6. The cavern or space entirely surrounded by a land surface. These forms never occur scattered haphazard over a region,

but always in an orderly subordination depending on their mode _ of origin. The dominant forms result from crustal

and find movements, the subsidiary from secondary reactions for—, during the action of the primitive forms on mobile distri-

butions. The geological structure and the mineral com- position of the rocks are often the chief causes determining the character of the land forms of a region. Thus the scenery of a lime- stone country depends on the solubility and permeability of the rocks, leading to the typical Karst-formations of caverns, swallow- holes and underground stream courses, with the contingent pheno- mena of dry valleys and natural bridges. A sandy beach or desert owes its character to the mobility of its constituent sand-grains, which are readily drifted and piled up in the form of dunes. A region where volcanic activity has led to the embedding of dykes or bosses of hard rock amongst softer strata produces a plain broken by abrupt and isolated eminences. 1

It would be impracticable to go fully into the varieties of each specific form; but, partly as an example of modern geographical _ … classification, partly because of the exceptional import- tloa of ‘ ance °f mountains amongst the features of the land, one mountains exce Ption may be made. The classification of mountains

‘ into types has usually had regard rather to geological structure than to external form, so that some geologists would even apply the name of a mountain range to a region not distinguished by reiief from the rest of the country if it bear geological evidence of having once been a true range. A mountain may be described (it cannot be defined) as an elevated region of irregular surface rising comparatively abruptly from lower ground. The actual elevation of a summit above sea-level does not necessarily affect its mountainous character; a gentle eminence, for instance, rising a few hundred feet above a tableland, even if at an elevation of say 15,000 ft., could only be called a hill.

2 But it may be said that any abrupt slope of 2000 ft. or more in vertical height may justly be called a mountain, while abrupt slopes of lesser height may be called hills. Existing classifications, however, do not take account of any difference in kind between mountain and hills, although it is common in the German language to speak of Hiigel- land, Mittelgebirge and Hochgebirge with a definite significance.

The simple classification employed by Professor James Geikie 3 into mountains of accumulation, mountains of elevation and moun- tains of circumdenudation, is not considered sufficiently thorough by German geographers, who, following Richthofen, generally adopt a classification dependent on six primary divisions, each of which is subdivided. The terms employed, especially for the sub- divisions, cannot be easily translated into other languages, and the English equivalents in the following table are only put forward tentatively : —

*Richthofen's Classification of Mountains * I. Tektonische Gebirge — Tectonic mountains.*

(a) Bruchgebirge oder Schollengebirge — Block mountains.

1. Einseitige Schollengebirge oder Schollenrandgebirge —

Scarp or tilted block mountains.

(i.) Tafelscholle — Table blocks.

(ii.) Abrastonsscholle — Abraded blocks, (hi.) Transgressionsscholle — Blocks of unconform- able strata.

2. Flexurgebirge — Flexure mountains.

3. Horstgebirge — Symmetrical block mountains. (4) Faltungs gebirge — Fold mountains.

1. Homoomarphe Faltungsgebirge — Homomorphic fold

mountains.

2. Heteromorphe Faltungsgebirge — Heteromorphic fold

mountains.

1 On this subject see J. Geikie, Earth Sculpture (London, 1898); J. E. Marr, The Scientific Study of Scenery (London, 1900) ; Sir A.

Geikie, The Scenery and Geology of Scotland (London, 2nd ed., 1887) ; Lord Avebury (Sir J. Lubbock), The Scenery of Switzerland (London, 1896) and The Scenery of England (London, 1902).

2 Some geographers distinguish a mountain from a hill by origin ; thus Professor Seeley says " a mountain implies elevation and a hill implies denudation, but the external forms of both are often identical." Report VI. Int. Geog. Congress (London, 1895), P- 75 1 –

*' " Mountains," in Scot. Geog. Mag. ii. (1896) p. 145. * Fuhrer fur Forschungsreisende, pp. 652-685.*

II. Rumpfgebirge oder Abrasionsgebirge — Trunk or abraded mountains.

III. Ausbruchsgebirge — Eruptive mountains.

IV. Aufschilttungsgebirge — Mountains of accumulation.

V. Flachbbden — Plateaux.

(a) Abrasionsplatten — Abraded plateaux.

(b) Marines Flachland — Plain of marine erosion.

(c) Schichtungstafelland — Horizontally stratified tableland.

(d) l/bergusstafelland — Lava plain.

(e) Stromflachland — River plain.

(f) Flachboden der atmosphdrischen Aufschiittung — Plains of

aeolian formation.

VI. Erosionsgebirge — Mountains of erosion.

From the morphological point of view it is more important to distinguish the associations of forms, such as the mountain mass or group of mountains radiating from a centre, with the „ valleys furrowing their flanks spreading towards every ™ ounta ' a direction ; the mountain chain or line of heights, forming a t0Tms – long narrow ridge or series of ridges separated by parallel valleys; the dissected plateau or highland, divided into mountains of circum-denudation by a system of deeply-cut valleys; and the isolated peak, usually a volcanic cone or a hard rock mass left projecting after the softer strata which embedded it have been worn away (Monad- nock

of Professor Davis).

The geographical distribution of mountains is intimately associated with the great structural lines of the continents of which they form the culminating region. Lofty lines of fold mountains _, . . form the ” backbones ” of North America in the Rocky Jr ” Mountains and the west coast systems, of South America oa °. , in the Cordillera of the Andes, of Europe in the Pyrenees, ”’”’”’”’”’”’^ Alps, Carpathians and Caucasus, and of Asia in the mountains of Asia Minor, converging on the Pamirs and diverging thence in the Himalaya and the vast mountain systems of central and eastern Asia. The remarkable line of volcanoes around the whole coast of the Pacific and along the margin of the Caribbean and Mediter- ranean seas is one of the most conspicuous features of the globe.*

If land forms may be compared to organs, the part they serve in the economy of the earth may, without straining the term, be characterized as functions. The first and simplest _ function of the land surface is that of guiding loose F “^ ct “° as material to a lower level. The downward pull of gravity ? suffices to bring about the fall of such material, but the orms – path it will follow and the distance it will travel before coming to rest depend upon the land form. The loose material may, and in an arid region does, consist only of portions of the higher parts of the surface detached by the expansion and tantf contraction produced by heating and cooling due to waste. radiation. Such broken material rolling down a uniform scarp would tend to reduce its steepness by the loss of material in the upper part and by the accumulation of a mound or scree against the lower part of the slope. But where the side is not a uniform scarp, but made up of a series of ridges and valleys, the tendency will be to distribute the detritus in an irregular manner, directing it away from one place and collecting it in great masses in another, so that in time the land form assumes a new appearance. Snow accumulating on the higher portions of the land, when compacted into ice and caused to flow downwards by gravity, gives rise, on account of its more coherent character, to continuous „ . glaciers, which mould themselves to the slopes down u,aclers – which they are guided, different ice-streams converging to send forward a greater volume. Gradually coming to occupy definite beds, which are deepened and polished by the friction, they impress a characteristic appearance on the land, which guides them as they traverse it, and, although the ice melts at lower levels, vast quantities of clay and broken stones are brought down and deposited in terminal moraines where the glacier ends.

Rain is by far the most important of the inorganic mobile dis-

tributions upon which land forms exercise their function of guidance and control. The precipitation of rain from the aqueous „

vapour of the atmosphere is caused in part by vertical Kala.

*movements of the atmosphere involving heat changes and apparently independent of the surface upon which precipitation occurs; but in greater part it is dictated by the form and altitude of the land surface and the direction of the prevailing winds, which itself is largely influenced by the land. It is on the windward faces of the highest ground, or just beyond the summit of less dominant heights upon the leeward side, that most rain falls, and all that does not evaporate or percolate into the ground is conducted back to the sea by a route which depends only on the form of the land. More mobile and more searching than ice or rock rubbish, the trickling drops are guided by ■ the deepest lines of the hillside in their incipient flow, and as these lines converge, the stream, gaining strength, proceeds in „. its torrential course to carve its channel deeper and en- v * r trench itself in permanent occupation. Thus the stream- sys ems ‘ bed, from which at first the water might be blown away into a new channel by a gale of wind, ultimately grows to be the strongest line of the landscape. As the main valley deepens, the tributary stream- beds are deepened also, and gradually cut their way headwards, enlarging the area whence they draw their supplies. Thus new land forms are created — valleys of curious complexity, for example —*

by the ” capture ” and diversion of the water of one river by another, leading to a change of watershed. 1 The minor tributaries become more numerous and more constant, until the system of torrents has impressed its own individuality on the mountain side. As the river leaves the mountain, ever growing by the accession of tributaries, it ceases, save in flood time, to be a formidable instru- ment of destruction ; the gentler slope of the land surface gives to it only power sufficient to transport small stones, gravel, sand and ultimately mud. Its valley banks are cut back by the erosion of minor tributaries, or by rain-wash if the climate be moist, or left steep and sharp while the river deepens its bed if the climate be arid. The outline of the curve of a valley’s sides ultimately depends on the angle of repose of the detritus which covers them, if there has been

no subsequent change, such as the passage of a glacier along the valley, which tends to destroy the regularity of the cross- section. The slope of the river bed diminishes until the plain compels the river to move slowly, swinging in meanders proportioned to its size, and gradually, controlled by the flattening land, ceasing to transport material, but raising its banks and silting up its bed by the dropped sediment, until, split up and shoaled, its distributaries struggle across its delta to the sea. This is the typical river of which there are infinite varieties, yet every variety would, if time were given, and the land remained unchanged in level relatively to the sea, Adiust- ultimately approach to the type. Movements of the land meat of e 'ther of subsidence or elevation, changes in the land by rivers to tne act ' on °f erosion in cutting back an escarpment or /anil cutting through a col, changes in climate by affecting the

rainfall and the volume of water, all tend to throw the river valley out of harmony with the actual condition of its stream. There is nothing more striking in geography than the perfection of the adjustment of a great river system to its valleys when the land has remained stable for a very lengthened period. Before full adjustment has been attained the river bed may be broken in places by waterfalls or interrupted by lakes; after adjust- ment the bed assumes a permanent outline, the slope diminishing more and more gradually, without a break in its symmetrical descent. Excellent examples of the indecisive drainage of a new land surface, on which the river system has not had time to impress itself, are to be seen in northern Canada and in Finland, where rivers are separated by scarcely perceptible divides, and the numerous lakes frequently belong to more than one river system.

The action of rivers on the land is so important that it has been made the basis of a system of physical geography by Professor W. M. Davis, who classifies land surfaces in terms of Thegeo- ˆe three factors — structure, process and time. 2 Of grap ica these time ; during which the process is acting on the cyce ' structure, is the most important. A land may thus be

characterized by its position in the " geographical cycle, or cycle of erosion, as young, mature or old, the last term being reached when the base-level of erosion is attained, and the land, however varied its relief may have been in youth or maturity, is reduced to a nearly uniform surface or peneplain. By a re-elevation of a peneplain the rivers of an old land surface may be restored to youthful activity, and resume their shaping action, deepening the old valleys and initiating new ones, starting afresh the whole course of the

geographical cycle. It is, however, not the action of the running water on the land, but the function exercised by the land on the running water, that is considered here to be the special province of geography. At every stage of the geographical cycle the land forms, as they exist at that stage, are concerned in guiding the condensation and flow of water in certain definite ways. Thus, for example, in a mountain range at right angles to a prevailing sea- wind, it is. the land forms which determine that one side of the range shall be richly watered and deeply dissected by a complete system of valleys, while the other side is dry, indefinite in its valley systems, and sends none of its scanty drainage to the sea. The action of rain, ice and rivers conspires with the movement of land waste to strip the layer of soil from steep slopes as 'rapidly as it forms, and to cause it to accumulate on the flat valley bottoms, on the graceful flattened cones of alluvial fans at the outlet of the gorges of tributaries, or in the smoothly-spread surface of alluvial plains.

The whole question of the regime of rivers and lakes is sometimes treated under the name hydrography, a name used by some writers in the sense of marine surveying, and by others as synonymous with oceanography. For the study of rivers alone the name potamology 3 has been suggested by Penck, and the subject being of much practical importance has received a good deal of attention. 4

The study of lakes has also been specialized under, the name of

1 See, for a summary of river-action, A. Phillipson, Sludien iiber Wasserscheiden (Leipzig, 1886); also I.C. Russell, River Development, (London, 1898) (published as The Rivers of North America, New York,

limnology (see Lake). 6 The existence of lakes in hollows of the land depends upon the balance between precipitation and evaporation. A stream flowing into a hollow will tend to fill it up, and the water will begin to escape as soon as its level rises high Jr" a . enough to reach the lowest part of the rim. In the case 3 e . rJ1 L of a large hollow in a very dry climate the rate of rmaa ˆ e ' evaporation may be sufficient to prevent the water from ever rising to the lip, so that there is no outflow to the sea, and a basin.of internal drainage is the result. This is the case, for instance, in the Caspian sea, the Aral and Balkhash lakes, the Tarim basin, the Sahara, inner Australia, the great basin of the United States and the Titicaca basin. These basins of internal drainage are calculated- to amount to 22 % of the land surface. The percentages of the land surface draining to the different oceans are approximately — Atlantic; 34-3 % ; Arctic sea, 16-5 ;_

Pacific, 14-4; Indian Ocean 12-8 %. <

The parts of a river system have not been so clearly defined as is desirable, hence the exaggerated importance popularly attached to " the source " of a river. A well-developed river system has in fact many equally important and widely-separated J erai 'Of > " sources, the most distant from the mouth, the highest, "°sy ot or even that of largest initial volume not being neces- sˆetn sarily of greater geographical _ interest than the rest. ys s ' The whole of the land which directs drainage towards one river is known as its basin, catchment area or drainage area — sometinies, by an incorrect expression, as its valley or even its watershed. The boundary line between one drainage area and others is rightly termed the watershed, but on account of the ambiguity which has been tolerated it is better to call it water-parting or, as in America, divide. The only other important term which requires to be noted here is talweg, a word introduced from the German into French and English, and meaning the deepest line along the valley, which is necessarily occupied by a stream unless the valley is dry.

The functions of land forms extend beyond the control of the circulation of the atmosphere, the hydrosphere and the water which is continually being interchanged between them; they are exercised with increased effect in the higher departments of biogeography and anthropogeography.

The sum of the organic life on the globe is termed by some, geographers the biosphere, and it has been .estimated that the whole mass of living substance in existence at one time would cover the surface of the earth to a depth of one-fifth of Blogeo' an inch. 7 The distribution of living organisms is a graphy. complex problem, a function of many factors, several of which are yet but little known. They include the biological nature of the organism and its physical environment, the latter involving conditions in which geographical elements, direct or indirect, pre- ponderate. The direct geographical elements are the arrangement of land and sea (continents and islands standing in sharp contrast) and the vertical relief of the globe, which interposes barriers of a less absolute kind between portions of the same land area or oceanic depression. The indirect geographical elements, which, as a rule, act with and intensify the direct, are mainly climatic; the pre- vailing winds, rainfall, mean and extreme temperatures of every locality depending on the arrangement of land and sea and of land forms. Climate thus guided affects the Weathering 'of ■ rocks, and so determines the kind and arrangement of soil. Different species of organisms come to

perfection in different climates; and it may be stated as a general rule that a species, whether of plant or animal, once established at one point, would spread over the Whole, zone of the climate congenial to it unless some barrier were interposed to its progress. In the case of land and fresh-water 'organises the sea is the chief barrier; in the case of marine organisms, the land. Differences in land forms do not exert great influence on the distribution of living creatures directly, but indirectly such land forms as mountain ranges and internal drainage basins are very potent through their action on soil and climate. A snow-capped mountain ridge or an arid desert forms a barrier between different forms of life which is often more effective than an equal breadth of sea. In this way the surface of the land is divided into numerous natural regions, the flora and fauna of each of which include some distinctive species not shared by the others. The distribution of life is discussed in the various articles in this Encyclopaedia dealing with biological, botanical and zoological subjects. 8

2 W. M. Davis, " The Geographical Cycle," Geog. Journ. xiv. (1899) p. 484.

1 A. Penck, " Potamology as a Branch of Physical Geography," f>. Journ. x. (1897) p. 619.

4 See, for instance, E. Wisotzki, Hauptfluss und Nebenfluss (Stettin, 1889). For practical studies see official reports on the Mississippi, Rhine, Seine, Elbe and other great rivers.

5 F. A. Forel, Handbuch der Seenkunde: allgemeine Limnologie (Stuttgart, 1901); F. A. Forel, " La Limnologie, branche de la geographic," Report VI. Int. Geog. Congress (London, 1895), p. 593; also Le Leman (2 vols., Lausanne, 1892, 1894); H. Lullies. " Studien iiber Seen," Jubilaumsschrift der Albertus-Vniversitdt (Konigsbefg, 1894); and G. R. Credner, " Die Reliktenseen," Petermanns Mitteilungen, Erganzungshefte 86 and 89 (Gotha. 1887, 1888). : ,;

6 J. Murray, " Drain -ge Areas of the Continents," Scot. Geog. Mag. ii. (1886) p. 548. _ ■

7 Wagner, Lehrbuch der Geographic (1900), i. 586.

8 For details, see A. R. Wallace, Geographical Distribution of Animals and Island Life; A. Heilprin, Geographical and Geological Distribution of Animals (1887); O. Drude, Handbuch der Pflanzehgeographie; A. Engler, Entwickelungsgeschichte der Pflanzenwett;

also Beddard, Zoogeography (Cambridge, 1895); and Sclater, The Geography of Mammals (London, 1899).

PRINCIPLES]

GEOGRAPHY

635

Floral zones.

The classification of the land surface into areas inhabited by distinctive groups of plants has been attempted by many phyto-geographers, but without resulting in any scheme of general acceptance. The simplest classification is perhaps that of Drude according to climatic zones, subdivided according to continents. This takes account of — (1) the Arctic- Alpine zone, including all the vegetation of the region bordering on perpetual snow; (2) the Boreal zone, including the temperate lands of North America, Europe and Asia, all of which are sub- stantially alike in botanical character; (3) the Tropical zone, divided sharply into (a) the tropical zone of the New World, and (6) the tropical zone of the Old World, the forms of which differ in a sig- nificant degree; (4) the Austral zone, comprising all continental land south of the equator, and sharply divided into three regions the floras of which are strikingly distinct — (a) South American, (6) South African and © Australian; (5) the Oceanic, comprising all oceanic islands, the flora of which consists exclusively of forms whose seeds could be drifted undestroyed by ocean currents or carried by birds. To these might be added the antarctic, which is still very imperfectly known. Many subdivisions and transitional zones have been suggested by different authors.

From the point of view of the economy of the globe this classi-fication by species is perhaps less important than that by mode of life and physiological character in accordance with Vegetation environment. The following are the chief areas of areas. vegetational activity usually recognized: (1) The ice-

deserts of the arctic and antarctic and the highest mountain regions, where there is no vegetation except the lowest forms, like that which causes " red snow." (2) The tundra or region of intensely cold winters, forbidding tree-growth, where mosses and lichens cover most of the ground when unfrozen, and shrubs occur of species which in other conditions are trees, here stunted to the height of a few inches. A similar zone surrounds the permanent snow on lofty mountains in

all latitudes. The tundra passes by imperceptible gradations into the moor, bog and heath of warmer climates. (3) The temperate forests of evergreen or deciduous trees, according to circumstances, which occupy those parts of both temperate zones where rainfall and sunlight are both abundant. (4) The grassy steppes or prairies where the rainfall is diminished and temperatures are extreme, and grass is the prevailing form of vegetation. These pass imperceptibly into — (5) the arid desert, where rainfall is at a minimum, and the only plants are those modified to subsist with the smallest supply of water. (6) The tropical forest, which represents the maximum of plant luxuriance, stimulated by the heaviest rainfall, greatest heat and strongest light. These divisions merge one into the other, and admit of almost indefinite subdivision, while they are subject to great modifications by human interference in clearing and cultivating. Plants exhibit the control- ling power of environment to a high degree, and thus vegetation is usually in close adjustment to the bolder geographical features of a region.

The divisions of the earth into taunal regions by Dr P. L. Sclater have been found to hold good for a large number of groups of animals as different in their mode of life as birds and mammals, Faunal .. an(j t j, ey may t j, us ˆ e acce pted as based on nature. realms. They are six in number: (1) Palaearctic, including Europe, Asia north. of the Himalaya, and Africa north of the Sahara; (2) Ethiopian, consisting of Africa south of the Atlas range, and Madagascar; (3) Oriental, including India, Indo-China and the Malay Archipelago north of Wallace's line, which runs between Bali and Lombok; (4) Australian, including Australia, New Zealand, New. Guinea and Polynesia; (5) Nearctic or North America, north of Mexico; and (6) Neotropical or South America. Each of these divisions is the home of a special fauna, many species of which are confined to it alone; in the Australian region, indeed, practically the whole fauna is peculiar and distinctive, suggesting a prolonged period of complete biological isolation. In some cases, such as the Ethiopian and Neotropical and the Palaearctic and Nearctic regions, the faunas, although distinct, are related, several forms on opposite sides of the Atlantic being analogous, e.g. the lion and puma, ostrich and rhea. Where two of the faunal realms meet there is usually, though not always, a mixing of faunas. These facts have led some naturalists to include the Palaearctic and Nearctic regions in one, termed Holarctic, and to suggest transitional regions, such as the Sonoran, between North and South America, and the Mediterranean, between Europe and Africa, or to create sub-regions, such as Mada- gascar and New Zealand. Oceanic islands have, as a rule, distinctive faunas and floras which

resemble, but are not identical with, those of other islands in similar positions.

The study of the evolution of- faunas and the comparison of the faunas of distant regions have furnished a trustworthy Biological instrument of pre-historic geographical research, which dl&trlbu enables earlier geographical relations of land and sea to tioo as v, e traced out] anc j (he approximate period, or at least the a means chronological order of the larger changes, to be estimated. e TL . In this way, for example, it has been suggested that a graphical [anc j 11 Lemuria," once connected Madagascar with the researc . ˆ a [a y Archipelago, and that a northern extension' of the antarctic land once united the three southern continents.*

The distribution of fossils frequently makes it possible to map out

approximately the general features of land and sea in long-past geological periods, and so to enable the history of crustal relief to be traced. 1

While the tendency is for the living forms to come into harmony with their environment and to approach the state of equilibrium by successive adjustments if the environment should happen to change, it is to be observed that the action React ‘° a ° of organisms themselves often tends to change their organisms environment. Corals and other quick-growing cal- °" eavlto ‘ 1 ‘ careous marine organisms are the most powerful in this mea ‘ respect by creating new land in the ocean. Vegetation of all sorts acts in a similar way, either in forming soil and assisting in break- ing up rocks, in filling up shallow lakes, and even, like the man- grove, in reclaiming wide stretches of land from the sea. Plant life, utilizing solar light to combine the inorganic elements of water, soil and air into living substance, is the basis of all. animal life. This is not by the supply of food alone, but also by the withdrawal of carbonic acid from the atmosphere, by which vegetation maintains the composition of the air in a state fit for the support of animal life. Man in the primitive stages of culture is scarcely to be dis- tinguished from other animals as regards his subjection to environ- ment, but in the higher grades of culture the conditions of control and reaction become much more complicated, and the department of anthropogeography is devoted to their consideration.*

The first requisites of all human beings are food and protection, in their search for which men are brought into intimate relations with the forms and productions of the earth's surface. The degree of

dependence of any people upon environ- Amaropo- ment varies inversely as the degree of culture or civiliza- S^°S ra P n y- tion, which for this purpose may perhaps be defined as the power of an individual to exercise control over the individual and over the environment for the benefit of the community. The develop- ment of culture is to a certain extent a question of race^ and although forming one species, the varieties of mandiffer in almost imperceptible gradations with a complexity defying classification (see Anthro- pology). Professor Keane groups man round four leading types, which maybe named the black, yellow, red and white, or the Ethiopia, Mongolic, American and Caucasic. Each may be subdivided, though not with great exactness, into smaller groups, either according to physical characteristics, of which the form of the head is most important, or according to language.

The black type is found only in tropical or sub-tropical countries, and is usually in a primitive condition of culture, unless educated by contact with people of the white type. They follow _ .

the most primitive forms of religion (mainly fetishism), ^ n live on products of the woods or of the chase, with the minimum of work, and have only a loose political organization. The red type is peculiar to America, inhabiting every climate from polar to equatorial, and containing representatives of many stages of culture which had apparently developed without the aid or interference of people of any other race until the close of the 15th century. The yellow type is capable of a higher culture, cherishes higher religious beliefs, and inhabits as a rule the temperate zone, although extending to the tropics on one side and to the arctic regions on the other. The white type, originating in the north ■temperate zone, has spread over the whole world. They have attained the highest culture, profess the purest forms of mono- theistic religion, and have brought all the people of the black type and many of those of the yellow under their domination.

The contrast between the yellow and white types has been softened by the remarkable development of the Japanese following the assimilation of western methods.

The actual number of human inhabitants in the world has been calculated as follows :

Asia . Europe . Africa . America Australia and Polynesia

Total .

By Continents. 2

875,000,000 392,000,000 170,000,000 143,000,000

7,000,000

1,587,000,000

ByKace.3 White (Caucasic) 770,000,000 Yellow (Mong) . 540,000,000 Black (Ethiopic) . 175,000,000 Red (American) . 22,000,000

Total . 1,507,000,000

In round numbers the population of the world is about 1,600,000,000, and, according to an estimate by Ravenstein, 4 the maximum population which it will be possible for the earth to maintain is 6000 millions, a number which, if the average rate of increase in 1891 continued, would be reached within 200 years.

While highly civilized communities are able to evade many of the restrictions of environment, to overcome the barriers to inter-communication interposed by land or sea, to counteract the adverse

1 See particularly A. de Lapparent, Traite de geologie (4th ed., Paris, 1900).

2 Estimate for 1900. H. Wagner, Lehrbuch der Geographie, i. p. 658.

3 Estimate for year not stated. A. H. Keane in International Geography, p. 108.

4 In Proc. R.G.S. xiii. (1891) p. 27.

influence of climate, and by the development of trade even to inhabit countries which cannot yield a food-supply, the mass of mankind is still completely under the control of those conditions which in the past determined the distribution and the mode of life of the whole human race.

In tropical forests primitive tribes depend on the collection of

wild fruits, and in a minor degree on the chase of wild animals, for

their food. Clothing is unnecessary; hence there is

influence j;|- t i e occasion for exercising the mental faculties beyond

”’ the sense of perception to avoid enemies, or the in-

of environ- ment on

ventive arts beyond what is required for the simplest weapons and the most primitive fortifications. When the pursuit of game becomes the chief occupation of a people there is of necessity a higher development of courage, skill, powers of observation and invention; and these qualities are still further enhanced in predatory tribes who take by force the food, clothing and other property prepared or collected by a feebler people. The fruit-eating savage cannot stray beyond his woods which bound his life as the water bounds that of a fish; the hunter is free to live on the margin of forests or in open country, while the robber or warrior from some natural stronghold of the mountains sweeps over the adjacent plains and carries his raids into distant lands. Wide grassy steppes lead to the organization of the people as nomads whose wealth consists in flocks and herds, and their dwellings are tents. The nomad not only domesticates and turns to his own use the gentler and more powerful animals, such as sheep, cattle, horses, camels, but even turns some predatory creatures, like the dog, into a means of defending their natural prey. They hunt the beasts of prey destructive to their flocks, and form armed bands for protection against marauders or for purposes of aggression on weaker sedentary neighbours. On the fertile low grounds along the margins of rivers or in clearings of forests, agricultural communities naturally take their rise, dwelling in villages and cultivating the wild grains, which by careful nurture and selection have been turned into rich cereals. The agriculturist as a rule is rooted to the soil. The land he tills he holds, and acquires a closer connexion with a particular patch of ground than either the hunter or the herdsman. In the temperate zone, where the seasons are sharply contrasted, but follow each other with regularity, foresight and self-denial were fostered, because if men did not exercise these qualities seed-time or harvest might pass into lost opportunities and the tribes would suffer. The more extreme climates of arid regions on the margins of the tropics, by the unpredictable succession of droughts and floods, confound the prevision of uninstructed people, and make prudence and industry qualities too uncertain in their results to be worth cultivating. Thus the civilization of agricultural peoples of the

temperate zone grew rapidly, yet in each community a special type arose adapted to the soil, the crop and the climate. On the sea- shore fishing naturally became a means of livelihood, and dwellers by the sea, in virtue of the dangers to which they are exposed from storm and unseaworthy craft, are stimulated to a higher degree of foresight, quicker observation, prompter decision and more energetic action in emergencies than those who live inland. The building and handling of vessels also, and the utilization of such uncon- trollable powers of nature as wind and tide, helped forward mechanical invention. To every type of coast there may be related a special type of occupation and even of character; the deep and gloomy fjord, backed by almost impassable mountains, bred bold mariners whose only outlet for enterprise was seawards towards other lands — the viks created the vikings. On the gently sloping margin of the estuary of a great river a view of tranquil inland life was equally presented to the shore-dweller, and the ocean did not present the only prospect of a career. Finally the mountain valley, with its patches of cultivable soil on the alluvial fans of tributary torrents, its narrow pastures on the uplands only left clear of snow in summer, its intensified extremes of climates and its isolation, almost equal to that of an island, has in all countries produced a special type of brave and hardy people, whose utmost effort may bring them com- fort, but not wealth, by honest toil, who know little of the outer world, and to whom the natural outlet for ambition is marauding on the fertile plains. The highlander and viking, products of the valleys raised high amid the mountains or half -drowned in the sea, are everywhere of kindred spirit.

It is in some such manner as these that the natural conditions of regions, which must be conformed to by prudence and utilized by labour to yield shelter and food, have led to the growth of peoples differing in their ways of life, thought and speech. The initial differences so produced are confirmed and perpetuated by the same barriers which divide the faunal or floral regions, the sea, mountains, deserts and the like, and much of the course of past history and present politics becomes clear when the combined results of differing race and differing environment are taken into account. 1

The specialization which accompanies the division of labour has important geographical consequences, for it necessitates communi-

1 On the influence of land on people see Shaler, Nature and Man in America (New York and London, 1892); and Ellen C. Semple's American History and its Geographic Conditions (Boston,

1903).

cation between communities and the interchange of their pro- ducts. Trade makes it possible to work mineral resources in localities where food can only be grown with great wnulation difficulty and expense, or which are even totally barren and waterless, entirely dependent on supplies from distant sources.

The population which can be permanently supported by a given area of land differs greatly according to the nature of the resources and the requirements of the people. Pastoral communities are always scattered very thinly over large areas; agricultural popula- tions may be almost equally sparse where advanced methods of agriculture and labour-saving machinery are employed; but where a frugal people are situated on a fertile and inexhaustible soil, such as the deltas and river plains of Egypt, India and China, an enormous population may be supported on a small area. In most cases, however, a very dense population can only be maintained in regions where mineral resources have fixed the site of great manufacturing industries. The maximum density of population which a given region can support is very difficult to determine ; it depends partly on the race and standard of culture of the people, partly on the nature and origin of the resources on which they depend, partly on the artificial burdens imposed and very largely on the climate. Density of population is measured by the average number of people residing on a unit of area; but in order to compare one part of the world with another the average should, strictly speaking, be taken for regions of equal size or of equal population; and the portions of the country which are permanently uninhabitable ought to be excluded from the calculation. 2 Considering the average density of population within the political limits of countries, the following list is of some value; the figures for a few smaller divisions of large countries are added (in brackets) for comparison :

Average Population on 1 sq. m. {For ipoo or 1901.)

Country.

Density of pop.

(Saxony) .... Belgium ....

Java

(England and Wales) (Bengal) .... Holland .... United Kingdom Japan ....

Italy

China proper German Empire Austria .... Switzerland . France .... Indian Empire . Denmark

Hungary .... Portugal ....

*743 3 589 3 568**

558

495 4

436

344

317

293

270 4

270

226

207

188

167 4

160 4

154 4 146

Country.

Density of pop.

Ceylon Greece .

European Turkey Spain .

European Russia Sweden United States Mexico Norway Persia . New Zealand Argentina Brazil . Eastern States of

Australia Dominion of Canada Siberia West Australia

141 4 97 90

97

*55 **

30

25

18

18

15

7

5

4-5

3

i-5

1

0-2

The movement of people from one place to another without the immediate intention of returning is known as migration, and according to its origin it may be classed as centrifugal (directed from a particular area) and centripetal' (directed towards M '8 ra "on, a particular area). Centrifugal migration is usually a matter of compulsion; it may be necessitated by natural causes, such as a change of climate leading to the withering of pastures or destruction of agricultural land, to inundation, earthquake, pestilence or to an excess of population over means of support ; or to artificial causes, such as the wholesale deportation of a conquered people; or to political or religious persecution. In any case the people are driven out by some adverse change; and when the urgency is great they may require to drive out in turn weaker people who occupy a desirable territory, thus propagating the wave of migration, the direction of which is guided by the forms of the land into inevitable channels.

Many of the great historic movements of peoples were doubtless due to the gradualchange of geographical or climatic conditions ; and the slow desiccation of Central Asia has been plausibly suggested as the real cause of the peopling of modern Europe and of the medieval wars of the Old World, the theatres of which were critical points on the great natural lines of communication between east and west.

In the case of centripetal migrations people flock to some particular place where exceptionally favourable conditions have been found to exist. The rushes to gold-fields and diamond-fields are typical instances; the growth of towns on coal-fields and near other sources of power, and the rapid settlement of such rich agricultural districts as the wheat-lands of the American prairies and great plains are other examples.

There is, however, a tendency for people to remain rooted to the

2 See maps of density of population in Bartholomew's great large-scale atlases, Atlas of Scotland and Atlas of England.

3 Almost exclusively industrial.

4 Almost exclusively agricultural.

land of their birth, when not compelled or induced by powerful external causes to seek a new home.

Thus arises the spirit of patriotism, a product of purely geographical conditions, thereby differing from the sentiment of loyalty, Political which is of racial origin. Where race and soil conspire to rcorravbv ev ° ,,ce both loyalty and patriotism in a people, the moral geograp y. q Ua jj t j es f a g rea t and permanent nation are secured. It is noticeable that the patriotic spirit is strongest in those places where people are brought most intimately into relation with the land ; dwellers in the mountain or by the sea, and, above all, the people of rugged coasts and mountainous archipelagoes, have always been renowned for love of country, while the inhabitants of fertile plains and trading communities are frequently less strongly attached to their own land.

Amongst nomads the tribe is the unit of government, the political bond is personal, and there is no definite territorial association of the people, who may be loyal but cannot be patriotic. The idea of a country arises only when a nation, either homogeneous or composed of several races, establishes itself in a region the boundaries of which may be defined and defended against aggression from without. Political geography takes account of the partition of the earth amongst organized communities, dealing with the relation of races to regions, and of nations to countries, and considering the conditions of territorial equilibrium and instability.

The definition of boundaries and their delimitation is one of the most important parts of political geography. Natural boundaries Bound- are a ‘ wavs tne mos t definite and the strongest, lending ˆ es ‘ themselves most readily to defence against aggression. The sea is the most effective of all, and an island state is recognized as the most stable. Next in importance comes a moun- tain range, but here there is often difficulty as to the definition of the actual crest-line, and mountain ranges being broad regions, it may happen that a small independent state, like Switzerland or Andorra, occupies the mountain valleys between two or more great countries. Rivers do not form effective international boundaries, although between dependent self-governing communities they are convenient lines of demarcation. A desert, or a belt of country left purposely without inhabitants, like the mark, marches or debatable lands of the middle ages, was once a common means of separating nations which nourished hereditary grievances. The ” buffer-state ” of modern diplomacy is of the same ineffectual type. A less definite though very practical boundary is that formed by the meeting-line of two languages, or the districts inhabited by two races. The line of fortresses protecting Austria from Italy lies in some places well back from the political boundary, but just inside the linguistic frontier, so as to separate the German and Italian races occupying Austrian territory. Arbitrary lines, either traced from point to point and marked by posts on the ground, or defined as portions of meridians and parallels, are now the most common type of boundaries fixed by treaty. In Europe and Asia frontiers are usually strongly fortified and strictly watched in times of peace as well as during war. In South America strictly defined boundaries are still the exception, and the claims of neighbouring nations have very frequently given rise to war, though now more commonly to arbitration. 1

The modes of government amongst civilized peoples have little influence on political geography; some republics are as arbitrary and exacting in their frontier regulations as some absolute monarchies. It

is, however, to be noticed that absolute monarchies are confined to the east of Europe and to Asia, Japan being the only established constitutional monarchy east of the Carpathians. Limited monarchies are (with the exception of Japan) peculiar to Europe, and in these the degree of democratic control may be said to diminish as one passes east- wards from the United Kingdom. Republics, although represented in Europe, are the peculiar form of government of America and are unknown in Asia.

The forms of government of colonies present a series of transi- tional types from the autocratic administration of a governor appointed by the home government to complete democratic self- government. The latter occurs only in the temperate possessions of the British empire, in which there is no great preponderance of a coloured native population. New colonial forms have been developed during the partition of Africa amongst European powers, the sphere of influence being especially worthy of notice. This is a vaguer form of control than a protectorate, and frequently amounts merely to an agreement amongst civilized powers to respect the right of one of their number to exercise government within a certain area, if it should decide to do so at any future time.

The central governments of all civilized countries concerned with external relations are closely similar in their modes of action, but the internal administration may be very varied. In this respect a country is either centralized, like the United Kingdom or France,

1 For the history of territorial changes in Europe, see Freeman, Historical Geography of Europe, edited by Bury (Oxford), 1903; and for the official definition of existing boundaries, see Hertslet, The Map of Europe by Treaty (4 vols., London, 1875, 1891); The Map of Africa by Treaty (3 vols., London, 1896). Also Lord Curzon's Oxford address gn Frontiers (1907).

Form ot govern- ment.*

or federated of distinct self-governing units like Germany (where the units include kingdoms, at least three minor types of monarchies, municipalities and a crown land under a nominated governor), or the United States, where the units are democratic republics. The ulti- mate cause of the predominant form of federal government may be the geographical diversity of the country, as in the cantons occupying the once isolated mountain valleys of Switzerland, the racial diversity of the people, as in Austria-Hungary, or merely political expediency, as in republics of the American type.

The minor subdivisions into provinces, counties and parishes, or analogous areas, may also be related in many cases to natural features or racial differences perpetuated by historical causes. The territorial divisions and subdivisions often survive the conditions which led to their origin; hence the study of political geography is allied to history as closely as the study of physical geography is allied to geology, and for the same reason.

The aggregation of population in towns was at one time mainly brought about by the necessity for defence, a fact indicated by the defensive sites of many old towns. In later times, towns have been more often founded in proximity to Towns. valuable mineral resources, and at critical points or nodes on lines of communication. These are places where the mode of travelling or of transport is changed, such as seaports, river ports and railway termini, or natural resting-places, such as a ford, the foot of a steep ascent on a road, the entrance of a valley leading up from a plain into the mountains, or a crossing-place of roads or railways. 2 The existence of a good natural harbour is often sufficient to give origin to a town and to fix one end of a line of land com- munication.

*In countries of uniform surface or faint relief, roads and railways may be constructed in any direction without regard to the con- figuration. In places where the low ground is marshy, , . . roads and railways often follow the ridge-lines of hills, co *' eS ° . or, as in Finland, the old glacial eskers, which run parallel c «^ n " " to the shore. Wherever the relief of the land is pro nounced, roads and railways are obliged to occupy the lowest ground winding along the valleys of rivers and through passes in the moun- tains. In exceptional cases obstructions which it would be impossible or too costly to turn are overcome by a bridge or tunnel, the magni- tude of such works increasing with the growth of engineering skill and financial enterprise. Similarly the obstructions offered to water communication by interruption through land or shallows are overcome by cutting canals or dredging out channels. The economy and success of most lines of communication depend on following as far as possible existing natural lines and utilizing existing natural sources of power. 3*

Commercial geography may be defined as the description of the earth's surface with special reference to the discovery, production, transport and exchange of commodities. The transport cmun r . concerns land routes and sea routes, the latter being e

the more important. While steam has been said to make a ship

independent of wind and tide, it is still true that a long voyage even by steam must be planned so as to encounter the least resistance possible from prevailing winds and permanent currents, and this involves the application of oceano- graphical and meteorological knowledge. The older navigation by utilizing the power of the wind demands a very intimate knowledge of these conditions, and it is probable that a revival of sailing ships may in the present century vastly increase the importance of the study of maritime meteorology.

The discovery and production of commodities require a know- ledge of the distribution of geological formations for mineral pro- ducts, of the natural distribution, life-conditions and cultivation or breeding of plants and animals and of the labour market. Atten- tion must also be paid to the artificial restrictions of political geo- graphy, to the legislative restrictions bearing on labour and trade as imposed in different countries, and, above all, to the incessant fluctuations of the economic conditions of supply and demandfand the combinations of capitalists or workers which affect the market. 4 The term " applied geography " has been employed to designate commercial geography, the fact being that every aspect of scientific geography may be applied to practical purposes, including the purposes of trade. But apart from the applied science, there is an aspect of pure geography which concerns the theory of the relation of economics to the surface of the earth.

It will be seen that as each successive aspect of geographical science is considered in its natural sequence the conditions become

2 For numerous special instances of the determining causes of town sites, see G. G. Chisholm, " On the Distribution of Towns and Villages in England," Geographical Journal (1897), ix. 76, x. 511,

3 The whole subject of anthropogeography is treated in a masterly way by F. Ratzel in his Anthropogeographie (Stuttgart, vol. i. 2nd ed., 1899, vol. ii. 1891), and in his Polttische Geographie (Leipzig, 1897). The special question of the reaction of man on his environ- ment is handled by G. P. Marsh in Man and Nature, or Physical Geography as modified by Human Action (London, 1864).

4 For commercial geography see G. G. Chisholm, Manual of Com- mercial Geography (1890).

clal geo- graphy.

more numerous, complex, variable and practically important. From the underlying abstract mathematical considerations all through the superimposed physical, biological, anthropo-

Con- elusion*

logical, political and commercial development of the subject runs the determining control exercised by crust- forms acting directly or indirectly on mobile distributions ; and this is the essential principle of geography. (H. R. M.)

GEOID (from Gr. yrj, the earth), an imaginary surface em- ployed by geodesists which has the property that every element of it is perpendicular to the plumb-line where that line cuts it. Compared with the " spheroid of reference " the surface of the geoid is in general depressed over the oceans and raised over the great land masses. (See Earth, Figure of the.)

GEOK-TEPE, a former fortress of the Turkomans, in Russian Transcaspia, in the oasis of Akhal-tekke, on the Transcaspian railway, 28 m. N.W. of Askabad. It consisted of a walled enclosure ifm. in circuit, the wall being 18 ft. high and 20 to 30 ft. thick. In December 1880 the place was attacked by 6000 Russians under General Skobelev, and after a siege of twenty-three days was carried by storm, although the defenders numbered 25,000. A monument and a small museum com- memorate the event.

GEOLOGY (from Gr. yrj, the earth, and X670S, science), the science which investigates the physical history of the earth. Its object is to trace the structural progress of .our planet from the earliest beginnings of its separate existence, through its various stages of growth, down to the present condition of things. It seeks to determine the manner in which the evolution of the earth's great surface features has been effected. It un- ravels the complicated processes by which each continent has been built up. It follows, even into detail, the varied sculpture of mountain and valley, crag and ravine. Nor does it confine itself merely to changes in the inorganic world. Geology shows that the present races of plants and animals are the descendants of other and very different races which once peopled the earth. It teaches that there has been a progressive development of the inhabitants, as well as one of the globe on which they have dwelt; that each successive period in the earth's history, since the introduction of living things, has been marked by character- istic

types of the animal and vegetable kingdoms; and that, however imperfectly the remains of these organisms have been preserved or may be deciphered, materials exist for a history of life upon the planet. The geographical distribution of existing faunas and floras is often made clear and intelligible by geological evidence; and in the same way light is thrown upon some of the remoter phases in the history of man himself. A subject so comprehensive as this must require a wide and varied basis of evidence. It is one of the characteristics of geology to gather evidence from sources which at first sight seem far removed from its scope, and to seek aid from almost every other leading branch of science. Thus, in dealing with the earliest conditions of the planet, the geologist must fully avail himself of the labours of the astronomer. Whatever is ascertainable by telescope, spectroscope or chemical analysis, regarding the constitution of other heavenly bodies, has a geological bearing. The experiments of the physicist, undertaken to determine conditions of matter and of energy, may sometimes be taken as the starting-points of geological investigation. The work of the chemical laboratory forms the foundation of a vast and increasing mass of geological inquiry. To the botanist, the zoologist, even to the unscientific, if observant, traveller by land or sea, the geologist turns for information and assistance.

But while thus culling freely from the dominions of other sciences, geology claims as its peculiar territory the rocky framework of the globe. In the materials composing that framework, their composition and arrangement, the processes of their formation, the changes which they have undergone, and the terrestrial revolutions to which they bear witness, lie the main data of geological history. It is the task of the geologist to group these elements in such a way that they may be made to yield up their evidence as to the march of events in the evolution of the planet. He finds that they have in large measure arranged themselves in chronological sequence, — the

oldest lying at the bottom and the newest at the top. Relics of an ancient sea-floor are overlain by traces of a vanished land-surface ; these are in turn covered by the deposits of a former lake, above which once more appear proofs of the return of the sea. Among these rocky records lie the lavas and ashes of long-extinct volcanoes. The ripple left upon the shore, the cracks formed by the sun's heat upon the muddy bottom of a dried-up pool, the very imprint of the drops of a passing rain- shower, have all been accurately preserved, and yield their evidence as to geographical conditions often widely different from those which exist where such markings are now found.

But it is mainly by the remains of plants and animals imbedded in the rocks that the geologist is guided in unravelling, the chronological succession of geological changes. He ,has fpund that a certain order of appearance characterizes these organic remains, that each great group of rocks is marked by its own special types of life, and that these types can be recognized, and the rocks in which they occur can be correlated even in distant countries, and where no other means of comparison would be possible. At one moment he has to deal with the bones of some large mammal scattered through a deposit of superficial gravel,at another time with the minute foraminifers and ostraco'ds of an upraised sea-bottom. Corals and crinoids crowded and crushed into a massive limestone where they lived and died, ferns and terrestrial plants matted together into a bed of coal where they originally grew, the scattered shells of a submarine sand-bank, the snails and lizards which lived and died within a hollow-tree, the insects which have been imprisoned within the exuding resin of old forests, the footprints of birds and quadrupeds, the trails of worms left upon former shores— these, and innumerable other pieces of evidence, enable the geologist to realize in some measure what the faunas and floras of successive periods have been, and what geographical changes the site of every land has undergone.

It is evident that to deal successfully with these varied materials, a considerable acquaintance with different branches of science is needful. Especially necessary is a tolerably wide knowledge of the processes now at work in changing the surface of the earth, and of at least those forms of plant and animal life whose remains are apt to be preserved in geological deposits, or which in their structure and habitat enable us to realize what their forerunners were. It has often been, insisted that the present is the key to the past; and in a wide sense this assertion is eminently true. Only in proportion as we understand the present, where everything is open on all sides to the fullest investi- gation, can we expect to decipher the past, where so much is obscure, imperfectly preserved or not preserved at all. . A study of the existing economy of nature ought thus to be the foundation of the geologist's training.

While, however, the present condition of things is thus em- ployed, we must obviously be on our guard against the danger of unconsciously assuming that the phase of nature's operations which we now witness has been the same in all past time, that geological changes have always or generally taken place in former ages in the manner and on the scale which we behold to-day, and that at the present time all the great geological processes, which have produced

changes in the past eras of th(e earth's history, are still existent and active. As a working hypothesis we may suppose that the nature of geological processes has remained constant from the beginning; but we cannot postulate that the action of these processes has never varied. in energy. The few centuries wherein man has been observing nature obviously form much too brief an interval by which to measure the intensity of geological action in all past time.. For 'aught we can tell the present is an era of quietude and slow changle, compared with some of the eras which have preceded it. Nor perhaps can we be quite sure that, when we have' explored every geological process now in progress, we have exhausted all the causes of change which, even in comparatively recent times, have been at work.

In dealing with the geological record, as the accessible soljd part of the globe is called, we cannot- too vividly realize that at

the best it forms but an imperfect chronicle. Geological history cannot be compiled from a full and continuous series of docu- ments. From the very nature of its origin the record is necessarily fragmentary, and it has been further mutilated and obscured by the revolutions of successive ages. And even where the chronicle of events is continuous, it is of very unequal value in different places. In one case, for example, it may present us with an unbroken succession of deposits many thousands of feet in thickness, from which, however, only a few meagre facts as to geological history can be gleaned. In another instance it brings before us, within the compass of a few yards, the evidence of a. most varied and complicated series of changes in physical geography, as well as an abundant and interesting suite of organic remains. These and other characteristics of the geological record become more apparent and intelligible as we proceed in the study of the science.

Classification. — For systematic treatment the subject may be conveniently arranged in the following parts: —

1. The Historical Development of Geological Science. — Here a brief outline will be given of the gradual growth of geological conceptions from the days of the Greeks and Romans down to modern times, tracing the separate progress of the more important branches of

inquiry and noting some of the stages which in each case have led up to the present condition of the science.

2. The Cosmical Aspects of Geology. — This section embraces the evidence supplied by astronomy and physics regarding the form and motions of the earth, the composition of the planets and sun, and the probable history of the solar system. The subjects dealt with under this head are chiefly treated in separate articles.

3. Geognosy. — An inquiry into the materials of the earth's substance. This division, which deals with the parts of the earth, its envelopes of air and water, its solid crust and the probable condition of its interior, especially treats of the more important minerals of the crust, and the chief rocks of which that crust is built up. Geognosy thus lays a foundation of know- ledge regarding the nature of the materials constituting the mass of the globe, and prepares the way for an investigation of the processes by which these materials are produced and altered.

4. Dynamical Geology studies the nature and working of the various geological processes whereby the rocks of the earth's crust are formed and metamorphosed, and by which changes are effected upon the distribution of sea and land, and upon the forms of terrestrial surfaces. Such an inquiry necessitates a careful examination of the existing geological economy of nature, and forms a fitting introduction to an inquiry into the geological changes of former periods.

5. Geolectonic or Structural Geology has for its object the architecture of the earth's crust. It embraces an inquiry into the ; manner in which the various materials composing this crust have been arranged. It shows that some have been formed in beds or strata of sediment on the floor of the sea, that others have been built up by the slow aggregation of organic forms, that others have been poured out in a molten condition or in showers of loose dust from subterranean sources. .. It further reveals that, though originally laid down in almost horizontal beds, the rocks have subsequently been crumpled, contorted and dislocated, that they have been incessantly worn down, and have often been depressed and buried beneath later accumulations.

6. Palaeontological Geology. — This branch of the subject, starting from the evidence supplied by the organic forms which are found preserved in the crust of the earth, includes such questions as the relations between extinct and living types, the laws which appear to

have governed the distribution of life- in time and in space, the relative importance of different genera

'of animals in geological inquiry, the nature and use of the evidence from organic remains regarding former conditions of physical geography. Some of these problems belong also to zoology and botany, and are more fully discussed in the articles Palaeontology and Palaeobotany.

7. Straligraphical Geology. — This section might be called

geological history. It works out the chronological succession of the great formations of the earth's crust, and endeavours to trace the sequence of events of which they contain the record. More particularly, it determines the order of succession of the various plants and animals which in past time have peopled the earth, and thus ascertains what has been the grand march of life upon this planet.

8. Physio graphical Geology, proceeding from the basis of fact laid down by stratigraphical geology regarding former geographical changes, embraces an inquiry into the origin and history of the features of the earth's surface — continental ridges and ocean basins, plains, valleys and mountains. It explains the causes on which local differences of scenery depend, and shows under what very different circumstances, and at what widely separated intervals, the hills and mountains, even of a single country, have been produced.

Most of the detail embraced in these several sections is relegated to separate articles, to which references are here inserted. The following pages thus deal mainly with the general principles and historical development of the science: —

Part I. — Historical Development

Geological Ideas among the Greeks and Romans. — Many geological phenomena present themselves in so striking a form that they could hardly fail to impress the imagination of the earliest and rudest races of mankind. Such incidents as earthquakes and volcanic eruptions, destructive storms on land and sea, disastrous floods and landslips suddenly strewing valleys with ruin, must have awakened the terror of those who witnessed them. Prominent features of landscape, such as mountain-chains with their snows, clouds and thunderstorms, dark river-chasms that seem purposely cleft open in order to give

passage to the torrents that rush through them, crags with their impressive array of pinnacles and recesses must have appealed of old, as they still do, to the awe and wonder of those who for the first time behold them. Again, banks of sea-shells in far inland districts would, in course of time, arrest the attention of the more intelligent and reflective observers, and raise in their minds some kind of surmise as to how such shells could ever have come there. These and other conspicuous geological problems found their earliest solution in legends and myths, wherein the more striking terrestrial features and the elemental forces of nature were represented to be the manifestation of the power of unseen super- natural beings.

The basin of the Mediterranean Sea was especially well adapted, from its physical conditions, to be the birth-place of such fables. It is a region frequently shaken by earthquakes, and contains two distinct centres of volcanic activity, one in the Aegean Sea and one in Italy. It is bounded on the north by a long succession of lofty snow-capped mountain-ranges, whence copious rivers, often swollen by heavy rains or melted snows, carry the drainage into the sea. On the south it boasts the Nile, once so full of mystery; likewise wide tracts of arid desert with their dreaded dust storms; The Mediterranean itself, though an inland sea, is subject to gales, which, on exposed coasts, raise breakers quite large enough to give a vivid impression of the power of ocean waves. The countries that surround this great sheet of water display in many places widely- spread deposits full of sea shells, like those that still live in the neighbouring bays and gulfs. Such a region was not only well fitted to supply subjects for mythology, but also to furnish, on every side, materials which, in their interest and suggestiveness, would appeal to the reason of observant men. .

It was natural, therefore, that the early philosophers of Greece should have noted some of these geological features, and should have sought for other explanations of them than those to be found in the popular myths. The opinions entertained in antiquity on these subjects may be conveniently grouped under two heads: (1) Geo- logical processes now in operation, and (2) geological changes in the past.

1. Contemporary Processes. — The geological processes of the present time are partly at work underground and partly on the surfaceof the earth. The former, from their frequently disastrous character, received much attention from Greek and Earth- Roman authors. Aristotle, in his Meteorics, cites the 9 “, esan< ' speculations of several of his predecessors which he rejects volcaaoes

– in favour of his own opinion to the effect that earthquakes are due to the generation of wind within the earth, under the influence of the warmth of the sun and the internal heat. Wind, being the lightest and most rapidly moving body, is the cause of motion in other bodies, and fire, united with wind, becomes flame, which is endowed with great rapidity of motion. Aristotle looked upon earthquakes and volcanic eruptions as closely connected with each other, the discharge of hot materials to the surface being the result of a severe earthquake, when finally the wind rushes out with violence, and sometimes buries the surrounding country under sparks and cinders,

as had happened at Lipari. These crude conceptions of the nature of volcanic action, and the cause of earthquakes, continued to prevail for many centuries. They are repeated by Lucretius, who, however, following Anaximenes, includes as one of the causes of earthquakes the fall of mountainous masses of rock undermined by time, and the consequent propagation of gigantic tremors far and wide through the earth. Strabo, having travelled through the volcanic districts of Italy, was able to recognize that Vesuvius had once been an active volcano, although no eruption had taken place from it within human memory. He continued to hold the belief that volcanic energy arose from the movement of subterranean wind. He believed that the district around the Strait of Messina, which had formerly suffered from destructive earthquakes, was seldom visited by them after the volcanic vents of that region had been opened, so as to provide an escape for the subterranean fire, wind, water and burning masses. He cites in his Geography a number of examples of wide- spread as well as local sinkings of land, and alludes also to the uprise of the sea-bottom. He likewise regards some islands as having been thrown up by volcanic agency, and others as torn from the mainland by such convulsions as earthquakes.

The most detailed account of earthquake phenomena which has come down to us from antiquity is that of Seneca in his Quaestiones Naturahs. This philosopher had been much interested in the accounts given him by survivors and witnesses of the earthquake which convulsed the district of Naples in February a.d. 63. He distinguished

several distinct movements of the ground: 1st, the up and down motion (succussio) ; 2nd, the oscillatory motion {in- climtio) ; and probably a third, that of trembling or vibration. While admitting that some earthquakes may arise from the collapse of the walls of subterranean cavities, he adhered to the old idea, held by the most numerous and important previous writers, that these commotions are caused mainly by the movements of wind imprisoned within the earth. As to the origin of volcanic outbursts he supposed that the subterranean wind in struggling for an outlet, and whirling through the chasms and passages, meets with great store of sulphur and other combustible substances, which by mere friction are set on fire. The elder Pliny reiterates the commonly accepted opinion as to the efficacy of wind underground. In discussing the phenomena of earthquakes he remarks that towns with many culverts and houses with cellars suffer less than others, and that at Naples those houses are most shaken which stand on hard ground. It thus appears that with regard to subterranean eological operations, no advance was made during the time of the ireeks and Romans as to the theoretical explanation of these pheno- mena; but a considerable body of facts was collected, especially as to the effects of earthquakes and the occurrence of volcanic eruptions.

The superficial processes of geology, being much less striking than those of subterranean energy, naturally attracted less attention in Action at ant i°,uity. The operations of rivers, however, which so rivers intimately affect a human population, were watched with

more or less care. Herodotus, struck by the amount of alluvial silt brought down annually by the Nile and spread over the flat inundated land, inferred that " Egypt is the gift of the river." Aristotle, in discussing some of the features of rivers, displays con- siderable acquaintance with the various drainage-systems on the north side of the Mediterranean basin. He refers to the mountains as condensers of the atmospheric moisture, and shows that the largest rivers rise among the loftiest high grounds. He shows how sensibly the alluvial deposits carried down to the sea increase the breadth of the land, and cites some parts of the shores of the Black Sea, where, in sixty years, the rivers had brought down such a quantity of material that the vessels then in use required to be of much smaller draught than previously, the water shallowing so much that the marshy ground would, in course of tim?, become dry land. Strabo supplies further interesting information as to the work of rivers in making their alluvial plains and in pushing their deltas seaward. He remarks that these deltas are prevented from ad- vancing farther outward by the ebb and flow of the tides.

2. Past Processes. — The abundant well-preserved marine shells exposed among the upraised Tertiary and post-Tertiary deposits in ^^ the countries bordering the Mediterranean are not in-

0ocurm frequently alluded to in Greek and Latin literature. ™ nc ji s Xenophanes of Colophon (614 B.C.) noticed theoccurrence fossils. j gjjgjjg an(j other marine productions inland among the mountains, and inferred from them that the land had risen out of the sea. A similar conclusion was drawn by Xanthus the Lydian (464 B.C.) from shells like scallops and cockles, which were found far from the sea in Armenia and Lower Phrygia. • Herodotus, Eratos- thenes, Strato and Strabo noted the vast quantities of fossil shells in different parts of Egypt, together with beds of salt, as evidence that the sea had once spread over the country. But by far the most philosophical opinions on the past mutations of the earth's surface are those expressed by Aristotle in the treatise already cited. Re-viewing the evidence of these changes, he recognized that the sea now covers tracts that were once dry land, and that land will one day reappear where there is now sea. These alternations are to be regarded as following each other in a certain order and periodicity. But they are apt to escape our notice because they require successive periods. of time, which, compared with our brief existence, are of

enormous duration, and because they are brought about so im-perceptibly that we fail to detect them in progress. In a celebrated passage in his Metamorphoses, Ovid puts into the mouth of the philosopher Pythagoras an account of what was probably regarded as the Pythagorean view of the subject in the Augustan age. It affirms the interchange of land and sea, the erosion of valleys by descending rivers, the washing down of mountains into the sea, the disappearance of the rivers and the submergence of land by earth-quake movements, the separation of some islands from, and the union of others with, the mainland, the uprise of hills by volcanic action, the rise and extinction of burning mountains. There was a time before Etna began to glow, and the time is coming when the mountain will cease to burn.

From this brief sketch it will be seen that while the ancients had accumulated a good deal of information regarding the occurrence of geological changes, their interpretations of the phenomena were to a considerable extent mere fanciful speculation. They had acquired only a most imperfect conception of the nature and operation of the geological processes; and though many writers realized that the surface of the earth has not always been, and will not always remain, as it is now, they had no glimpse of the vast succession of

changes of that surface which have been revealed by geology. They built hypotheses on the slenderest basis of fact, and did not realize the necessity of testing or verifying them.

Progress oj Geological Conceptions in the Middle Ages. — During the centuries that succeeded the fall of the Western empire little progress was made in natural science. The schoolmen in the monasteries and other seminaries were content to take their science from the literature of Greece and Rome. The Arabs, however, not only collected and translated that literature, but in some departments made original observations themselves. To one of the most illustrious of their number, Avicenna, the translator of Aristotle, a treatise has been ascribed, in which singularly modern ideas are expressed regarding mountains, some of which are there stated to have been produced by an uplifting of the ground, while others have been left prominent, owing to the wearing away of the softer rocks around them. In either case, it is confessed that the process would demand long tracts of time for its completion.

After the revival of learning the ancient problem presented by fossil shells imbedded in the rocks of the interior of many countries received renewed attention. But the conditions for its solution were no longer what they had been in the days of the philosophers of antiquity. Men were not now free to adopt and teach any doc- trine they pleased on the subject. The Christian church had mean- while arisen to power all over Europe, and adjudged as heretics all who ventured to impugn any of her dogmas. She taught that the land and the sea had been separated on the third day of creation, before the appearance of any animal life, which was not created until the fifth day. To assert that the dry land is made up in great part of rocks that were formed in the sea, and are crowded with the remains of animals, was plainly to impugn the veracity of the Bible. Again, it had come to be the orthodox belief that only somewhere about 6000 years had elapsed since the time of Adam and Eve. If any thoughtful observer, impressed with the overwhelming force of the evidence that the fossiliferous formations of the earth's crust must have taken long periods of time for their accumulation, ven- tured to give public expression to his conviction, he ran considerable risk of being proceeded against as a heretic. It was needful, there- fore, to find some explanation of the facts of nature, which would not run counter to the ecclesiastical system of the day. Various such interpretations were proposed, doubtless in an honest endeavour at reconciliation. Three of these deserve special notice: (1) Many able observers and diligent collectors of fossils persuaded themselves that these objects never belonged to organisms of any kind, but should be

regarded as mere " freaks of nature," having no more connexion with any once living creature than the frost patterns on a window. They were styled '" formed " or " figured stones, " lapides sui generis," and were asserted to be due to some inorganic imitative process within the earth or to the influence of the stars. (2) Observers who could not resist the evidence of their senses that the fossil shells once belonged to living animals, and who, at the same time, felt the necessity of accounting for the presence of marine organisms in the rocks of which the dry land is largely built up, sought a way out of the difficulty by invoking the Deluge of Noah. Here was a catastrophe which, they said, extended over the whole globe, and by which the entire dry land was submerged even up to the tops of the high hills. True, it only lasted one hundred and fifty days, but so little were the facts then appreciated that no difficulty seems to have been generally felt in crowding the accumulation of the thousands of feet of fossiliferous formations into that brief space of time. (3) Some more intelligent men in Italy, recognizing that these interpretations could not be upheld, fell back upon the idea that the rocks in which fossil shells are imbedded might have been heaped up by repeated and vigorous eruptions from volcanic centres. Certain modern eruptions in the Aegean Sea and in the Bay of Naples had drawn attention to the rapidity with which hills of considerable size could be piled around an active crater. It was argued that if Monte Nuovo near Naples could have been accumulated to a height of nearly 500 ft. in two days, there seemed to be no reason against believing that, during the time of the Flood, and in the course of the

centuries that have elapsed since that event, the whole of the fossiliferous rocks might have been deposited. Unfortunately for this hypothesis it ignored the fact that these rocks do not consist of volcanic materials.

So long as the fundamental question remained in dispute as to the true character and history of the stratified portion of the earth's crust containing organic remains, geology as a science could not begin its existence. The diluvialists (those who relied on the hypothesis of the Flood) held the field during the 16th, 17th and a great part of the 18th century. They were looked on as the champions of orthodoxy; and, on that account, they doubtless

wielded much more influence than would have been gained by them from the force of their arguments. Yet during those ages there were not wanting occasional observers who did good service in combating the prevalent misconceptions, and in preparing the way for the ultimate triumph of truth. It was more especially in Italy, where many of the more striking phenomena of geology are conspicuously displayed, that the early pioneers of the science arose, and that for several generations the most marked progress was made towards placing the investigations of the past history of the earth upon a basis of careful observation and scientific deduction. One of the first of Leonardo these leaders was Leonardo da Vinci (1452-1519), who, da Vinci • b es 'des his achievements in painting, sculpture, archi- Pracas- ' tecture and engineering, contributed some notable obser- torio- vations regarding the great problem of the origin of fossil

Fallopplo. shells. He ridiculed the notion that these objects could have been formed by the influence of the stars, and main- tained that they had once belonged to living organisms, and there- fore that what is now land was formerly covered by the sea. Girolamo Fracastorio (1483-1553) claimed that the shells could never have been left by the Flood, which was a mere temporary inundation, but that they proved the mountains, in which they occur, to have been successively uplifted out of the sea. On the other hand, even an accomplished anatomist like Gabriello Falloppio (I 5 2 3 _I 562) found it easier to believe that the bones of elephants, teeth of sharks, shells and other fossils were mere earthy inorganic concretions, than that the waters of Noah's Flood could ever have reached as far as Italy.

By much the most important member of this early band of Italian writers was undoubtedly Nicolas Steno (1631-1687), who, though Nicolas born in Copenhagen, ultimately settled in Florence. Steno. Having made a European reputation as an anatomist, his attention was drawn to geological problems by finding that the rocks of the north of Italy contained what appeared to be sharks' teeth closely resembling those of a dog-fish, of which he had published the anatomy. Cautiously at first, for fear of offending orthodox opinions, but afterwards more boldly, he proclaimed his conviction that those objects had once been part of living animals, and that they threw light on some of the past history of the earth. He published in 1669 a small tract, De solido intra solidum naturaliter contento, in which he developed the ideas he had formed of this history from an attentive study of the rocks. He showed that the stratified formations of the hills and valleys consist of such materials as would be laid down in the form of sediment in turbid water; that where they contain marine productions this water is proved to have been the sea;

that diversities in their composition point to commingling of currents, carrying different kinds of sediment of which the heaviest would first sink to the bottom. He made original and important observations on stratification, and laid down some of the fundamental axioms in stratigraphy. He reasoned that as the original position of strata was approximately horizontal, when they are found to be steeply inclined or vertical, or bent into arches, they have been disrupted by subterranean exhalations, or by the falling in of the roofs of underground cavernous spaces. It is to this alteration of the original position of the strata that the in- equalities of the earth's surface, such as mountains, are to be ascribed, though some have been formed by the outburst of fire, ashes and stones from inside the earth. Another effect of the dislocation has been to provide fissures, which serve as outlets for springs. Steno's anatomical training peculiarly fitted him for dealing authoritatively with the question of the nature and origin of the fossils contained in the rocks. He had no hesitation in affirming that, even if no shells had ever been found living in the sea, the internal structure of these fossils would demonstrate that they once formed parts of living animals. And not only shells, but teeth, bones and skeletons of many kinds of fishes had been quarried out of the rocks, while some of the strata had skulls, horns and teeth of land-animals. Illustrating his general principles by a sketch of what he supposed to have been the past history of Tuscany, he added a series of diagrams which show how clearly he had conceived the essential elements of strati- graphy. He thought he could perceive the records of six successive' phases in the evolution of the framework of that country, and was inclined to believe that a similar chronological sequence would be found all over the world. He anticipated the objections that would be brought against his views on account of the insuperable difficulty in granting the length of time that would be required for all the geographical vicissitudes which his interpretation required. He thought that many of the fossils must be as old as the time of the general deluge, but he was careful not to indulge in any speculation as to the antiquity of the earth.

XI. 21

*To the Italian school, as especially typified in Steno, must be assigned the honour of having thus begun to lay firmly and truly the first foundation stones of the modern science of geology. The same school included Antonio Vallisneri *- az ** ro (1661-1730), who surpassed his predecessors in his wider oro * and more exact knowledge of the fossilife'-ous rocks that form the backbone of the Italian peninsula, which he contended were formed during a wide*

and prolonged submergence of the region, altogether different from the brief deluge of Noah. There was likewise Lazzaro Moro (1687-1740), who did good service against the diluvialists, but the fundamental feature of his system of nature lay in the preponderant part which, unaware of the great difference between volcanic materials and ordinary sediment, he assigned to volcanic action in the production of the sedimentary rocks of the earth's crust. He supposed that in the beginning the globe was completely surrounded with water, beneath which the solid earth lay as a smooth ball. On the third day of creation, however, vast fires were kindled inside the globe, whereby the smooth surface of stone was broken up, and portions of it, appearing above the water, formed the earliest land. From that time onward, volcanic eruptions succeeded each other, not only on the emerged land, but on the sea-floor, over which the ejected material spread in an ever augmenting thickness of sedimentary strata. In this way Moro carried the history of the stratified rocks beyond the time of the Flood back to the Creation, which was supposed to have been some 1600 years earlier; and he brought it down to the present day, when fresh sedimentary deposits are continually accumulating. He thus incurred no censure from the ecclesiastical guardians of the faith, and he succeeded in attract- ing increased public attention to the problems of geology. The influence of his teaching, however, was subsequently in great part due to the Carmelite friar Generelli, who published an eloquent exposition of Moro's views.

The Cosmogonists and Theories of the Earth. — While in Italy substantial progress was made in collecting information regarding the fossiliferous formations of that country, and in forming con- clusions concerning them based upon more or less accurate observa- tions, the tendency to mere fanciful speculation, which could not be wholly repressed in any country, reached a remarkable extravagance in England. In proportion as materials were yet lacking from which to construct a history of the evolution of our planet in accord- ance with the teaching of the church, imagination supplied the place of ascertained fact, and there appeared during the last twenty years of the 18th century a group of English cosmogonists, who, by the sensational character of their speculations, aroused general attention both in Britain and on the continent. It may be doubted, however, whether the effect of their writings was not to hinder the advance of true science by diverting men from the observation of nature into barren controversy over unrealities. It is not needful here to do more than mention the names of Thomas Burnet, whose Sacred Theory of the Earth appeared in 1681, and William Whiston, whose New

Theory of the Earth was published in 1696. Hardly less fanciful than these writers, though his practical acquaintance with rocks and fossils was infinitely greater, was John Woodward, whose Essay towards a Natural History of the Earth dates from 1695. More important as a contribution to science was the catalogue of the large collection of fossils, which he had made from the rocks of England and which he "bequeathed to the university of Cambridge. This catalogue appeared in 1728-1729 with the title of An attempt towards a Natural History of the Fossils of England.

A striking contrast to these cosmogonists is furnished by another group, which arose in France and Germany, and gave to the world the first rational ideas concerning the probable primeval rtescartes evolution of our globe. The earliest of these pioneers was the illustrious philosopher Rene Descartes (1596-1650). He propounded a scheme of cosmical development in which he represented the earth, like the other planets, to have been originally a mass of glowing material like the sun, and to have gradually cooled on the outside, while still retaining an incandescent, self-luminous nucleus. Yet with this noble conception, which modern science has accepted, Descartes could not shake himself free from the time-honoured error in regard to the origin of volcanic action. He thought that certain exhalations within the earth condense into oil, which, when in violent motion, enters into the subterranean cavities, where it passes into a kind of smoke. This smoke is from time to time ignited by a spark of fire and, pressing violently against its containing walls, gives rise to earthquakes. If the flame breaks through to the surface at the top of a mountain, it may escape with enormous energy, hurling forth much earth mingled with sulphur or bitumen, and thus producing a volcano. The mountain might burn for a long time until at last its store of fuel in the shape of sulphur or bitumen would be exhausted. Not only did the philosopher refrain from availing himself of the high internal temperature of the globe as the source of volcanic energy, he even did not make use of it as the cause of the ignition of his supposed internal fuel, but speculated on the kindling of the subterranean fires by the spirits or gases setting fire to the exhalations, or by the fall of masses of rock and the sparks produced by their friction or percussion.

The ideas of Descartes regarding planetary evolution were enlarged and made more definite by Wilhelm Gottfried Leibnitz (1646-1716), whose teaching has largely influenced all subsequent speculation

on the subject. In his great tract, the Protogaea (published in 1749, thirty-three years after his death), he traced the probable passage Leibnitz. °^ our eartn from an original condition of incandescent vapour into that of a smooth molten globe, which, by continuous cooling, acquired an external solid crust and rugose surface. He thought that the more ancient rocks, such as granite and gneiss, might be portions of the earliest outer crust; and that as the external solidification advanced, immense subterranean cavities were left which were filled with air and water. By the collapse of the roofs of these caverns, valleys might be originated at the surface, while the solid intervening walls would remain in place and form mountains. By the disruption of the crust, enormous bodies of water were launched over the surface of the earth, which swept vast quantities of sediment together, and thus gave rise to sedimentary deposits. After many vicissitudes of this kind, the terrestrial forces calmed down, and a more stable condition of things was established. An important feature in the cosmogony of Leibnitz is the prominent place which he assigned to organic remains in the stratified rocks of the crust. Ridiculing the foolish attempts to account for the presence of these objects by calling them " sports of nature," he showed that they are to be regarded as historical monuments; and he adduced a number of instances wherein successive platforms of strata, containing organic remains, bear witness to a series of advances and retreats of the sea. He recognized that some of the fossils appeared to have nothing like them in the living world of to-day, but some analogous forms might yet be found, he thought, in still unexplored parts of the earth; and even if no living repre- sentatives should ever be discovered, many types of animals might have undergone transformation during the great changes which had affected the surface of the earth. In spite of his clear realization of the vast store of potential energy residing within the highly heated interior of the earth, Leibnitz continued to regard volcanic action as due to the combustion of inflammable substances enclosed within the terrestrial crust, such as stone-coal, naphtha and sulphur.

Appealing to a much wider public than Descartes or Leibnitz, and basing his speculations on a wider acquaintance with the organic Button. an ^ inorganic realms of nature, G. L. L. de Buff on (1707-1788) was undoubtedly one of the most influential forces that in

Europe guided the growth of geological ideas during the 1 8th century. He published in 1749 a Theory of the Earth, in which he adopted views similar to those of Descartes and Leibnitz as to planetary evolution; but though he realized the importance of fossils as records of former conditions of the earth's surface, he accounted for them by supposing that they had been deposited from a universal ocean, a large part of which had subsequently been engulfed into caverns in the interior of the globe. Thirty years later, after having laboured with skill and enthusiasm in all branches of natural history, he published another work, his famous Epoques de la nature (1778), which is specially remarkable as the first attempt to deal with the history of the earth in a chronological manner, and to compute, on a basis of experiment, the antiquity of the several stages of this history. His experiments were made with globes of cast iron, and could not have yielded results of any value for his purpose; but in so far as his calculations were not mere random guesses but had some kind of foundation on experiment, they deserve respectful recognition. He divided the history of our earth into six periods of unequal duration, the whole comprising a period of some 70,000 or 75,000 years. He supposed that the stage of incandescence, before the globe had consolidated to the centre, lasted 2936 years, and that about 35,000 years elapsed before the surface had cooled sufficiently to be touched, and therefore to be capable of supporting living things. Terrestrial animal life, however, was not introduced until 55,000 or 60,000 years after the beginning of the world or about 15,000 years before our time. Looking into the future, he foresaw that, by continued refrigeration, our globe will eventually become colder than ice, and this fair face of nature, with its manifold varieties of plant and animal life, will perish after having existed for 132,000 years.

Button's conception of the operation of the geological agents did not become broader or more accurate in the interval between the appearance of his two treatises. He still continued to believe in the lowering of the ocean by subsidence into vast subterranean cavities, with a consequent emergence of land. He still looked on volcanoes as due to the burning of " pyritous and combustible stones," though he now called in the co-operation of electricity. He calculated that the first volcanoes could not arise until some 50,000 years after the beginning of the world, by which time a sufficient extent of dense vegetation had been buried in the earth to supply them with fuel. He appears to have had but an imperfect acquaintance with the literature of his own time. At least there can be little doubt that had he availed himself of the labours of his- own countryman, Jean

Etienne Guettard (1715-1786), of Giovanni Arduino (1714-1795) in Italy, and of Johann Gottlob Lehmann ‘ (d. 1767) and George Christian Fiichsel (1722-1773) in Germany, he would have been able to give to his ” epochs ” a more definite succes- sion of events and a greater correspondence with the facts of nature. Among the writers of the 18th century, who formed philosophical conceptions of the system of processes by which the life of our earth as a. habitable globe is carried on, a foremost place must be assigned to James Hutton (1726-1797). Educated for the medical profession,

John Play/air.

he studied at Edinburgh and at Paris, and took his doctor’s degree at Leiden. But having inherited a small landed property in Berwickshire, he took to agriculture, and after putting j am es his land into excellent order, let his farm and betook Hutton. himself to Edinburgh, there to gratify the scientific tastes which he had developed early in life. He had been more especially led to study minerals and rocks, and to meditate on the problems. which they suggest as to the constitution and history of the earth. His journeys in Britain and on the continent of Europe had furnished him with material for reflection; and he had gradu- ally evolved a system or theory in which all the scattered facts could be arranged so as to show their mutual dependence and their place in the orderly mechanism of the world. He used to discuss his views with one or two of his friends, but refrained from publishing them to the world until, on the foundation of the Royal Society of Edinburgh, he communicated an outline of his doctrine to that learned body in 1785. Some years later he expanded this first essay into a larger work in two volumes, which were published in 1795 with the title of Theory of the Earth, with Proofs and Illustrations.

Hutton’s teaching has exercised a profound influence on modern

geology. This influence, however, has arisen less from his own

writings than from the account of his doctrines given by

his friend John Playfair in the classic work entitled

Illustrations of the Huttonian Theory, published in 1802.

Hutton wrote in so prolix and obscure a style as rather to repel than

attract readers. Playfair, on the other hand, expressed himself in

such clear and graceful language as to command general attention, and to gain wide acceptance for his master's views. Unlike the older cosmogonists, Hutton refrained from trying to explain the origin of things, and from speculations as to what might possibly have been the early history of our globe. He determined, from the outset to interpret the past by what can be seen to be the present order of nature; and he refused to admit the operation of causes which cannot be shown to be part of the actual terrestrial system. Like other observers who. had preceded him, he recognized in the various rocks composing the dry land evidence of former geographical

conditions very different; from those which now prevail. He saw that the vast majority of rocks consist of hardened sediments and must have been deposited in the sea. He could distinguish among them an older or Primary series, and a younger or Secondary series ; and did not dispute the existence of a Tertiary series claimed by Peter Simon Pallas (1741-1811). He believed that these various aqueous accumulations had been consolidated by subterranean heat, that the oldest and lowest rocks had suffered most from this action, that into these more deep-seated masses subsequent veins and larger bodies of molten matter were injected from below, and thus that, what was originally loose detritus eventually became changed in such crystalline schists as are now found in mountain-chains. In the course of these terrestrial revolutions sedimentary strata,

originally more or less nearly horizontal, have been pushed upward, dislocated, crumpled, placed on end, and even elevated to form ranges of lofty mountains. Hutton looked upon these disturbances as due to the expansive power of subterranean heat ; but he did not attempt to sketch the mechanism of the process, and he expressly declined to offer any conjecture as to how the land so elevated remains in that position. He thought that the interior of our planet may " be a fluid mass, melted, but unchanged by the action of heat " ; and, far from connecting volcanoes with the combustion of inflammable substances, as had been the prevalent belief for so many centuries, he looked upon them as a beneficent provision of " spiracles to the subterranean furnace, . in order to prevent the unnecessary elevation of land and fatal effects of earthquakes."

A distinguishing feature of the Huttonian philosophy is to be seen in the breadth of its conceptions regarding the geological operations continually in progress on the surface of the globe. Hutton saw that the land is undergoing a ceaseless process of degrada- tion, through the influence of the air, frost, rain, rivers and the sea, and that in course of time, if no countervailing agency should inter- vene, the whole of the dry land will be washed away into the sea. But he also, perceived that this universal erosion is not everywhere carried on at the same rate; that it is specially active along the channels of torrents and rivers, and that,. owing to this difference these channels are gradually deepened and widened, until the complicated valley-system of a country is carved out. He recognized that the detritus worn away from the land must be spread out over the floor of the sea, so as to form there strata similar to those that compose most of the dry land. As he could detect in the structure of land convincing evidence that former sea floors had been elevated to form the continents and islands of to-day, he could look forward to future ages, when the same subterranean agency which had raised up the

present land would again be employed to uplift the bed of the existing ocean, thus to renew the surface cf our earth as a habitable globe, and to start a fresh cycle of erosion and deposition. Though Hutton was not unaware that organic remains abound in many of the stratified rocks, he left them out of consideration in the elaboration of his theory. It was otherwise with Lamarck. one of his French contemporaries, the illustrious J. B. Lamarck (1744-1829), who, after having attained great eminence as a botanist, turned to zoology when he was nearly fifty years of age, and before long rose to even greater distinction in that department.

of science. His share in the classification and description of the mollusca and in founding invertebrate palaeontology, his theory of organic evolution and his philosophical treatment of many biological questions have been tardily recognized, but his contribu- tions to geology have been less generally acknowledged. When he accepted the " professorship of zoology; of insects, of worms and of microscopic animals " at the Museum of Natural History, Paris, in 1 793> he at once entered with characteristic ardour and capacity into the new field of research then opened to him. In dealing with the mollusca he considered not merely the living but also the extinct forms, especially the abundant, varied and well-preserved genera and species furnished by the- Tertiary deposits of the Paris basin, of which he published descriptions and plates that proved of essential service in the stratigraphical work of Cuvier and Alexandre Brongniart (1770-1847). His labours among these relics of ancient seas and lakes led him to ponder over the past history of the globe, and as he was seldom dilatory in making known the opinions he had formed, he communicated some of his conclusions to the National Institute in 1799. These, including a further elaboration of his views, he published in 1802 in a small volume entitled Hydrogeologie. This treatise, though it did not reach a second edition and has never been reprinted, deserves an honourable place in geological literature. Its object, the author states, was to present some im- portant and novel considerations, which he thought should form the basis of a true theory of the earth. He entirely agreed with, the doctrine of the subaerial degradation of the land and the erosion of valleys by running water. Not even Playfair could have stated this doctrine more emphatically, and it is worthy of notice that Playfair's

Illustrations of the Huttonian Theory appeared in the same year with Lamarck's book. The French naturalist, however, carried his conclusions so far as to take no account of any great' movements of the terrestrial crust, which might have produced or modified the main physical features of the surface of the globe. He thought that all mountains, except such as were thrown up by volcanic agency or local accidents, have been cut out of plains, the original surfaces of which are indicated by the crests and summits of these elevations.

Lamarck, in reflecting upon the wide diffusion of fossil shells and the great height above the sea at which they are found, conceived the extraordinary idea that the ocean basin has been scoured out by the sea, and that, by an impulse communicated to the waters through the influence chiefly of the moon, the sea is slowly eating away the eastern margins of the continents, and throwing up detritus on their western coasts, and is thus gradually shifting its basin round the globe. He would not admit the operation of cataclysms ; but insisted as strongly as Hutton on the continuity of natural processes, and on the necessity of explaining former changes of the earth's surface by causes which can still be seen to be in operation. As might be anticipated from his previous studies, he brought living things and their remains into the forefront of his theory of the earth. He looked upon fossils as one of the chief means of comprehending the revolutions which the surface of the earth has undergone; and in his little volume he again and again dwells on the vast antiquity to which these revolutions bear witness. He acutely argues, from the condition of fossil shells, that they must have lived and died where their remains are now found.

In the last part of his treatise Lamarck advances some peculiar opinions in physics and chemistry, which he had broached eighteen years before, but which had met with no acceptance among the scientific men of his time. He believed that the tendency of all compound substances is to decay, and thereby to be resolved into their component constituents. Yet he saw that the visible crust of the earth consists almost wholly of compound bodies. He there- fore set himself to solve the problem thus presented. Perceiving that the biological action of living organisms is constantly forming combinations of matter, which would never have otherwise come into existence, he proceeded to draw the extraordinary conclusion that the action of plant and animal life (the Pouvoir de la vie) upon the inorganic world is so universal and so potent, that the rocks and minerals which form the outer part of the earth's crust are all, without exception, the result of the operations of once living bodies. Though this sweeping deduction must be allowed to detract from the

value of Lamarck's work, there can be no doubt that he realized, more fully than any one had done before him, the efficacy of plants and animals as agents of geological change.

The last notable contributor to the cosmological literature of geology was another illustrious Frenchman, the comparative ana- C ler tomist Cuvier (1769-1832). He was contemporary with Lamarck, but of a very different type of mind. The brilliance of his speculations, and the charm with which he expounded them, early gained for him a prominent place in the society of Paris. He too was drawn by his zoological studies to investigate fossil organic remains, and to consider the former conditions of the earth's surface, of which they are memorials. It was among the vertebrate organisms of the Paris basin that he found his chief material, and from them that he prepared the memoirs which led to him being regarded as the founder of vertebrate palaeontology. But beyond their biological interest, they awakened in him a keen desire to ascertain the character and sequence of the geographical revolutions to which they bear witness. He approached the subject from an opposite and less philosophical point of view than that of Lamarck,

coming to it with certain preconceived notions, which affected all his subsequent writings. While Lamarck was by instinct an evolu- tionist, who sought to trace in the history of the past the operation of the same natural processes as are still at work, Cuvier, on tho other hand, was a catastrophist, who invoked a succession of vast cataclysms to account for the interruptions in the continuity of the geological record.

In a preliminary Discourse prefixed to his Recherches sur les ossemens fcssiles (1821) Cuvier gave an outline of what he conceived to have been the past history of our globe, so far as he had been able to comprehend it from his investigations of the Tertiary formations of France. He believed that in that 1 istory evidence can be recognized of the occurrence of many suddei 1 and disastrous revolu- tions, which, to judge from their effects on the animal life of the time, must have exceeded in violence anything we can conceive at the present day, and must have been brought aboot by other agencies than those which are now in operation. Yet, in spite of these catastrophes, he saw that there has been an upward progress in the animal forms inhabiting the globe, until the series ended in the advent of man. He could not, however, find any evidence that one species has been developed from another, for in that case there should have been traces of intermediate forms among the stratified forma- tions, where he affirmed that they had never been found. A

prominent position in the Discourse is given to a strenuous argument to disprove the alleged antiquity of some nations, and to show that the last great catastrophe occurred not more than some 5000 or 6000 years ago. Cuvier thus linked himself with those who in previous generations had contended for the efficacy of the Deluge. But his researches among fossil animals had given him a far wider outlook into the geological past, and had opened up to him a succession of deeply interesting problems in the history of life upon the earth, which, though he had not himself material for their solution, he could foresee would be cleared up in the future.

Gradual Shaping of Geology into a Distinct Branch of Science. — It will be seen from the foregoing historical sketch that it was only after the lapse of long centuries, and from the labours of many successive generations of observers and writers, that what we now know as the science of geology came to be recognized as a distinct department of natural knowledge, founded upon careful and ex- tended study of the structure of the earth, and upon observation of the natural processes, which are now at work in changing the earth's surface. The term " geology," 1 descriptive of this branch of the investigation of nature, was not proposed until the last quarter of the 18th century by Jean Andre De Luc (1727-1817) and Horace Benedict De Saussure (1740-1749). But the science was then in a markedly half-formed condition, theoretical speculation still in large part supplying the place of deductions from a detailed examination of actual fact. In 1807 a few enterprising spirits founded the Geological Society of London for the special purpose of counter- acting the prevalent tendency and confining their intention " to investigate the mineral structure of the earth." The cosmogonists and framers of Theories of the Earth were succeeded by other schools of thought. The Catastrophists saw in the composition of the crust of the earth distinct evidence that the forces of nature were once much more stupendous in their operation than they now are, and that they had from time to time devastated the earth's surface; extirpating the races of plants and animals, and preparing the ground for new creations of organized life. Then came the Uniformitarians, who, pushing the doctrines of Hutton to an extreme which he did not propose, saw no evidence that the activity of the various geo- logical causes has ever seriously differed from what it is at present. They were inclined to disbelieve that the stratified formations of the earth's crust furnish conclusive evidence of a gradual pro- gression,, from simple types of life in the oldest strata to the most highly developed forms in the youngest; and saw no reason why remains of the' higher vertebrates should not be met with among the Palaeozoic

formations. Sir Charles Lyell (1797-1875) was the great leader of this school. His admirably clear and philosophical presentations of geological facts which, with unwearied industry, he collected from the writings of observers in all parts of the world, impressed his views upon the whole English-speaking world, and gave to geological science a coherence and interest which largely accelerated its progress. In his later years, however, he frankly accepted the views of Darwin in regard to the progressive character of the geological record.

The youngest of the schools of geological thought is that of the) Evolutionists. Pointing to the whole body of evidence from in-organic and organic nature, they maintain that the history of our planet has been one of continual and unbroken development from the earliest cosmical beginnings down to the present time, and that the crust of the earth contains an abundant, though incomplete, record of the successive stages through which the plant and animal

1 In De Luc's Lettres physiques et morales sur les montagnes (1778), the word " cosmology " is used for our science, the author stating that " geology " is more appropriate, but it, " was not a word in use." In a completed edition, published in 1779, the same statement is made, but "geology" occurs in the text; in the same year De Saussure used the word without any explanation, as if it were well known.

kingdoms have reached their existing organization. The publication of Darwin's Origin of Species in 1859, in which evolution was made the key to the history of the animal and vegetable kingdoms, pro-duced an extraordinary revolution in geological opinion. The older schools of thought rapidly died out, and evolution became the recognized creed of geologists all over the world.

Development of Opinion regarding Igneous Rocks. — So long as the idea prevailed that volcanoes are caused by the combustion of inflammable substances underground, there could be no rational conception of volcanic action and its products. Even so late as the middle of the 18th century, as above remarked, such a good observer as Lazzaro Moro drew so little distinction between volcanic and other rocks that he could believe the fossiliferous formations to have

been mainly formed of materials ejected from eruptive vents. After his time the notion continued to prevail that all the rocks which form the dry land were laid down under water. Even streams of lava, which were seen to flow from an active crater, were regarded only as portions of sedimentary or other rocks, which had been melted by the fervent heat of the burning inflammable materials that had been kindled underground. In spite of the speculations of Descartes and Leibnitz, it was not yet generally comprehended that there exists beneath the terrestrial crust a molten magma, which, from time to time, has been injected into that crust, and has pierced through it, so as to escape at the surface with all the energy of an active volcano. What we now recognize to be memorials of these former injections and propulsions were all confounded with the rocks of unquestionably aqueous origin. The last great teacher by whom these antiquated doctrines were formulated into a system w and promulgated to the world was Abraham Gottlob

weraer. Werner (1749-1815), the most illustrious German mineralogist and geognost of the second half of the 18th century. While still under twenty-six years of age, he was appointed teacher of mining and mineralogy at the Mining Academy of Freiberg in Saxony — a post which he continued to fill up to the end of his life. Possessed of great enthusiasm for his subject, clear, methodical and eloquent in his exposition of it, he soon drew around him men from all parts of the world, who repaired to study under the great oracle of what he called geognosy (Gr. 7ˆ, the earth, yvwais, knowledge) or earth-knowledge. Reviving doctrines that had been current long before his time ; he taught that the globe was once completely surrounded with an ocean, from which the rocks of the earth's crust were deposited as chemical precipitates, in a certain definite order over the whole planet. Among these " universal formations " of aqueous origin were included many rocks, which have long been recognized to have been once molten, and to have risen from below into the upper parts of the terrestrial crust. Werner, following the old tradition, looked upon volcanoes as modern features in the history of the planet, which could not have come into existence until a sufficient amount of vegetation had been buried to furnish fuel for their maintenance. Hence he attached but little importance to them, and did not include in his system of rocks any division of volcanic or igneous materials. From the predominant part assigned by him to the sea in the accumulation of the materials of the visible part of the earth, Werner and his school were known as " Neptunists." But many years before the Saxon professor began to teach, clear evidence had been produced from central France that basalt, one n . . of the rocks

claimed by him as a chemical precipitate and ft aft" a un ' versa ' formation, is a lava which has been poured as ' out in a molten state at various widely separated periods of time and at many different places. So far back as 1752 J. E. Guettard (1715-1786) had shown that the basaltic rocks of Auvergne are true lavas, which have flowed out in streams from groups of once active cones. Eleven years later the observation was confirmed and greatly extended by Nicholas Desmarest (1725-1815), who, during a long course of years, worked out and mapped the com- plicated volcanic records of that interesting region, and demonstrated to all who were willing impartially to examine the evidence the true volcanic nature of basalt. These views found acceptance from some observers, but they were vehemently opposed by the followers of Werner, who, by the force of his genius, made his theoretical con- ceptions predominate all over Europe. The controversy as to the origin of basalt was waged with great vigour during the later decades of the 1 8th century. Desmarest took no part in it. He had accu- mulated such conclusive proof of the correctness of his deductions, and had so fully expounded the clearness of the evidence in their favour furnished by the region of Auvergne, that, when any one came to consult him on the subject, he contented himself with giving the advice to " go and see." While the debate was in progress on the continent, the subject was approached from a new and independent point of view by Hutton in Scotland. This illustrious philosopher, as already stated, realized the importance of the internal heat of the globe in consolidating the sedimentary rocks, and believed . that molten material from the earth's interior has been protruded from below into the overlying crust: Some of the material thus injected could be recognized, he thought, in granite and in the various dark massive rocks which, known in Scotland under the name of " whinstone," were afterwards called " Trap," and are now grouped under various names, such as basalt, dolerite and diorite. So important a share did Hutton thus assign to the internal heat in the geological evolution of the planet, that he and those who adopted

the same opinions were styled " Plutonists," or, especially where they concerned themselves with the volcanic origin of basalt, " Vul- canists." The geological world was thus divided into two hostile camps, that of the Neptunists or Wernerians, and that of the Plutonists, Vulcanists or Huttonians.

After many years of futile controversy the first serious weakening of the position of the dominant Neptunist school arose from the defection of some of the most prominent of Werner's pupils. In particular Jean Francois D'Aubuisson de Voisins (1769-1819), who had written a treatise on the aqueous origin of the basalts of Saxony,

went afterwards to Auvergne, where he was speedily a convert t6 the views expounded by Desmarest as to the volcanic nature of basalt. Having thus to relinquish one of the fundamental articles of the Freiberg faith, he was subsequently led to modify hisadherence to others until, as he himself confessed, his views came almost wholly to agree with those of Hutton. Not less complete, and even more important, was the conversion of the great Leopold von Buch (i774~ 1853). He, too, was trained by Werner himself, and proved to be the most illustrious pupil of the Saxon professor. Full of admiration for the Neptunism in which he had been reared, he, in his earliest separate work, maintained the aqueous origin of basalt, and contrasted the wide field opened up to the spirit of observation by his master's teaching with the narrower outlook offered by " the volcanic theory." But a little further acquaintance with the facts of nature led Von Buch also to abandon his earlier prepossessions. It was a personal visit to the volcanic region of Auvergne that first opened his eyes, and led him to recant what he had believed and written about basalt. But the abandonment of so essential a portion of the Wernerian creed prepared the way for further relinquishments. When a few years later he went to Norway and found to his astonish- ment that granite, which he had been taught to regard as the oldest chemical precipitate from the universal ocean, could there be seen to have broken through and metamorphosed fossiliferous limestones, and to have sent veins into them, his faith in Werner's order of the succession of the rocks in the earth's crust received a further moment- ous shock. While one after another of the Freiberg doctrines crumbled away before him, he was now able to interrogate nature on a wider field than the narrow limits of Saxony, and he was thus gradually led to embrace the tenets of the opposite school. His commanding position, as the most accomplished geologist on the continent, gave great importance to his recantation of the Neptunist creed. His defection indeed was the severest blow that this creed had yet sustained. It may be said to have rung the knell of Wernerianism, which thereafter rapidly declined in influence, while Plutonism came steadily to the front,where it has ever since remained. Although Desmarest had traced in Auvergne a long succession of volcanic eruptions, of which the oldest went back to a remote period of time, and although he had shown that this succession, coupled with the records of contemporaneous denudation, might be used in defining epochs of geological history, it was not until many years after his day that volcanic action came to be recognized as a normal part of the mechanism of our globe, which had been in operation from the remotest past, and which had left numerous records among the rocks of the terrestrial crust. During the progress of the controversy

between the two great opposing factions in the later portion of the 18th and the first three decades of the 19th century, those who espoused the Vulcanist cause were intent on proving that certain rocks, which are intercalated among the stratified formations and which were claimed by .the Neptunists as obviously formed by water, are nevertheless of truly igneous origin. These observers fixed their eyes on the evidence that the material of such rocks, instead of having been deposited from aqueous solution, had once been actually molten, and had in that condition been thrust between the strata, had enveloped portions of them, and had in- durated or otherwise altered them. They spoke of these masses as " unerupted lavas "; and undoubtedly in innumerable instances they were right. But their zeal to establish an intrusive origin led them to overlook the proofs that some intercalated sheets of igneous material had not been injected into the strata, but had been poured out at the surface as truly volcanic discharges, and therefore belonged to the ancient periods represented by the strata between which they are interposed. It may readily be supposed that any proofs of the contemporaneous intercalation of such sheets would be eagerly seized upon by the Neptunists in favour of their aqueous theory. The influence of the ancient belief that " burning mountains " could only rise from the combustion of subterranean inflammable materials extended even into the ranks of the Vulcanists, so far at least as to lead to a general acquiescence in the assumption that volcanoes appeared to belong to a late phase in the history of the planet. It was not until after considerable progress had been made in determining the palaeontological distinctions and order of suc- cession of the stratified formations of the earth's crust that it became possible to trace among these formations a succession of volcanic episodes which were contemporaneous with them. In no part of the world has an ampler record of such episodes been preserved than in the British Isles. It was natural, therefore, that the subject should there receive most attention. As far back as 1820 Ami Boud (1794-1881) showed that the Old Red Sandstone of Scotland includes a great series of volcanic rocks, and that other rocks of volcanic origin are associated with the Carboniferous formations. H. T.

de la Beche (1796-1855) afterwards traced proofs of contemporaneous eruptions among the Devonian rocks of the south-

west of England. Adam Sedgwick (1785-1873) showed, first in the Lake District, and afterwards in North Wales, the presence of abundant volcanic sheets among the oldest divisions of the Palaeozoic series; while Roderick Impey Murchison (1792-1871) made similar discoveries among the Lower Silurian rocks. From the time of these pioneers the volcanic history of the country has been worked out by many observers until it is now known with a fulness as yet unattained in any other region.

Growth of Opinion regarding Earthquakes. — We have seen how crude were the conceptions of the ancients regarding the causes of volcanic action, and that they connected volcanoes and earthquakes as results of the commotion of wind imprisoned within subterranean caverns and passages. One of the earliest treatises, in which the phenomena of terrestrial movements were discussed in the spirit of modern science, was the posthumous collection of papers by Robert Hooke (1635-1703), entitled Lectures and Discourses of Earthquakes and Subterranean Eruptions, where the probable agency of earthquakes in upheaving and depressing land is fully considered, but without any definite pronouncement as to the author's conception of its origin. Hooke still associated earthquakes with volcanic action, and connected both with what he called " the general congregation of sulphurous subterraneous vapours." He conceived that some kind of ". fermentation " takes place within the earth, and that the materials which catch fire and give rise to eruptions or earthquakes are analogous to those that constitute gunpowder. The first essay wherein earthquakes are treated from the modern point of view as the results of a shock that sends waves through the crust of the earth was written by the Rev. John Michell, and com- municated to the Royal Society in the year 1760. ' Still under the old misconception that volcanoes are due to the combustion of inflammable materials, which he thought might be set on fire by the spontaneous combustion of pyritous strata, he supposed that, by the sudden access of large bodies of water to these subterranean fires, vapour is produced in such quantity and with such force as to give rise to the shock. From the centre of origin of this shock waves, he thought, are propagated through the earth, which are largest at the start and gradually diminish as they travel outwards. By drawing lines at different places in the direction of the track of these waves, he believed that the place of common intersection of these lines would be nearly the centre of the disturbance. In this way he showed that the great Lisbon earthquake of 1755 had its focus under the Atlantic, somewhere between the latitudes of Lisbon and Oporto, and he estimated that the depth at which it originated could not be much

less than 1 m., and probably did not exceed 3 m. Michell, however, misconceived the character of the waves which he described, seeing that he believed them to be due to the actual propagation of the vapour itself underneath the surface of the earth. A century had almost passed after the date of his essay before modern scientific methods of observation and the use of recording instruments began to be applied to the study of earthquake phenomena. In 1846 Robert Mallet (18 10-188 1) published an important paper "On the Dynamics of Earthquakes " in the Transactions of the Royal Irish Academy. From that time onward he continued to devote his energies to the investigation, studying the effects of the Calabrian earthquake of 1857, experimenting on the transmission of waves of shock through various materials, caused by exploding charges of gunpowder, and collecting all the information to be obtained on the subject. His writings, and especially his work in two volumes on The First Principles of Observational Seismology, must be regarded as having laid the foundations of this branch of modern geology (see Earth- quake; Seismometer).

History of the Evolution of Stratigraphical Geology. — Men had long been familiar with the evidence that the present dry land once lay under the sea, before they began to realize that the rocks, of which the land consists, contain a record of many alternations of land and sea, and relics of a long succession of plants and animals from early and simple types up to the manifold and complex forms of to-day. In countries where coal-mining had been prosecuted for generations, it had been recognized that the rocks consist of strata superposed on each other in a definite order, which was found to extend over the whole of a district. As far back as 1719 John Strachey drew attention to this fact in a communication published in the Philosophical Transactions. John Michell (1760), in the paper on earthquakes already cited, showed that he had acquired a clear understanding of the order of succession among stratified formations, and perceived that to disturbances of the terrestrial crust must be ascribed the fact that the lower or older and more inclined strata form the mountains, while the younger and more horizontal strata are spread over the plains.

In Italy G. Arduino (1713-1795) classified the rocks in the north of the peninsula as Primitive, Secondary, Tertiary and Volcanic. A similar threefold order was announced for the Harz and Erzgebirge by J. G. Lehmann in 1756. He recognized in that region an ancient series of rocks in inclined or vertical strata, which rise to the tops of the hills and descend to an unknown depth into the interior. These masses, he thought, were contemporaneous with the making of the

world. Next came the Flotzgebirge, consisting of younger sediments, disposed in flat or gently inclined sheets which overlie

the first and more disturbed series, and are full of petrified remains of plants and animals. Lastly he included the mountains which have from time to time been formed by local accidents. Still more advanced were the conceptions of G. C. Fuchsel, who in the year 1762 published in Latin A History of the Earth and the Sea, based on a History of the Mountains of Thunngia; and in 1773, in German, a Sketch of the most Ancient History of the Earth and Man. In these works he described the stratigraphical relations and general characters of the various geological formations in his little principality; and taking them as indicative of a general order of succession, he traced what he believed to have been a series of revolutions through which the earth has passed. In interpreting this geological history, he laid great stress on the evidence of the fossils contained in the rocks. He recognized that the various formations differ from each other in their enclosed organic remains, and that from these dif- ferences the existence of former sea-bottoms and land surfaces can be determined.

The labours of these pioneers paved the way for the advent of Werner. Though the system evolved by this teacher claimed to discard theory and to be established on a basis of observed facts, it rested on a succession of hypotheses, for which no better foundation could be shown than the belief of their author in their validity. Starting from the extremely limited stratigraphical range displayed in the geological structure of Saxony, he took it as a type for the rest of the globe, persuading himself and impressing upon his followers that the rocks of that small kingdom were to be taken as examples of his " universal formations." The oldest portion of the series, classed by him as " Primitive," consisted of rocks which he main- tained had been deposited from chemical solution. Yet they included granite, gneiss, basalt, porphyry and serpentine, which, even in his own day, were by many observers correctly regarded as of igneous origin. A later group of rocks, to which he gave the name of " Transition," comprised, in his belief, partly chemical, partly mechanical sediments, and contained the earliest fossil organic remains. A third group, for which he reserved Lehmann's name " Flotz," was made up chiefly of mechanical detritus, while youngest of all came the " Alluvial " series of loams, clays, sands, gravels and peat. It was by the gradual subsidence of the ocean that, as he believed, the general mass of the dry land emerged, the first-formed rocks being left standing up, sometimes on end, to form the mountains, while those of later date, less steeply inclined, occupied successively lower levels

down to the flat alluvial accumula- tions of the plains. Neither Werner, nor any of his followers, ventured to account for what became of the water as the sea-level subsided, though, in despite of their antipathy to anything like speculation, they could not help suggesting, as an answer to the cogent arguments of their opponents, that " one of the celestial bodies which sometimes approach near to the earth may have been able to withdraw a portion of our atmosphere and of our ocean." Nor was any attempt made to explain the extraordinary nature of the supposed chemical precipitates of the universal ocean. The progress of inquiry even in Werner's lifetime disproved some of the fundamental portions of his system. Many of the chemical precipitates were shown to be masses that had be'en erupted in a molten state from below. His order of succession was found not to hold good; and though he tried to readjust his sequence and to introduce into it modifications to suit new facts, its inherent arti- ficiality led to its speedy decline after his death. It must be con- ceded, however, that the stress which he laid upon the fact that the rocks of the earth's crust were deposited in a definite order had an important influence in directing attention to this subject, and in preparing the way for a more natural system, based not on mere mineralogical characters, but having regard to the organic remains, which were now being gathered in ever-increasing numbers and variety from stratified formations of many different ages and from all parts of the globe.

It was in France and in England that the foundations of strati- graphy, based upon a knowledge of organic remains, were first successfully laid. Abb6 J. L. Giraud-Soulavie (1752-1813), in his Histoire naturelle de la France meridionale, which appeared in seven volumes, subdivided the limestones of Viyarais into five ages, each marked by a distinct assemblage of shells. In the lowest strata, representing the first age, none of the fossils were believed by him to have any living representatives, and he called these rocks " Prim- ordial." In the next group a mingling of living with extinct forms was observable. The third age was marked by the presence of shells of still existing species. The strata of the fourth series were characterized by carbonaceous shales or slates, containing remains of primordial vegetation, and perhaps equivalents of the first three calcareous series. The fifth age was marked by recent deposits containing remains of terrestrial vegetation and of land animals. It is remarkable that these sagacious conclusions should have been formed and published at a time when the geologists of the Continent were engaged in the controversy about the origin of basalt, or in disputes about the character and stratigraphical position of the

supposed universal formations, and when the interest and importance of fossil organic remains still remained unrecognized by the vast majority of the combatants.

The rocks of the Paris basin display so clearly an orderly arrangement, and are so distinguished for the variety and perfect

preservation of their enclosed organic remains, that they could not fail to attract the early notice of observers. J. E. Guettard, G. F. Rouelle (1703-1770), N. Desmarest, A. L. Lavoisier (1743-1794) and others made observations in this interesting district. But it was reserved for Cuvier (1769-1832) and A. Brongniart (1770-1847) to work out the detailed succession of the Tertiary formations, and to show how each of these is characterized by its own peculiar assemblage of organic remains. The later progress of investigation has slightly corrected and greatly amplified the tabular arrangement established by these authors in 1808, but the broad outlines of the Tertiary stratigraphy of the Paris basin remain still as Cuvier and Brongniart left them. The most important subsequent change in the classification of the Tertiary formations was made by Sir Charles Lyell, who, conceiving in 1828 the idea of a classification of these rocks by reference to their relative proportions of living and extinct species of shells, established, in collaboration with G. P. Dcshayes, the now universally accepted divisions Eocene, Miocene and Pliocene.

Long before Cuvier and Brongniart published an account of their researches, another observer had been at work among the Secondary formations of the west of England, and had independently discovered that the component members of these formations were each distinguished by a peculiar group of organic remains; and that this distinction could be used to discriminate them over all the region through which he had traced them. The remarkable man who arrived at this far-reaching generalization was William Smith (1769- 1839), a land surveyor who, in the prosecution of his professional business, found opportunities of traversing a great part of England, and of putting his deductions to the test. As the result of these journeys he accumulated materials enough to enable him to produce a geological map of the country, on which the distribution and succession of the

rocks w-ere for the first time delineated. Smith's labours laid the foundation of stratigraphical geology in England and he was styled even in his lifetime the " Father of English geology." From his day onward the significance of fossil organic remains gained rapidly increasing recognition. Thus in England the outlines traced by him among the Secondary and Tertiary formations were admirably filled in by Thomas Webster (1 773-1 844) ; while the Cretaceous series was worked out in still greater detail in the classic memoirs of William Henry Fitton (1780-1861).

There was one stratigraphical domain, however, into which William Smith did not enter. He traced his sequence of rocks down into the Coal Measures, but contented himself with only a vague reference to what lay underneath that formation. Though some of these underlying rocks had in various countries yielded abundant fossils, they had generally suffered so much from terrestrial disturbances, and their order of succession was consequently often so much obscured throughout western Europe, that they remained but little known for many years after the stratigraphy of the Secondary and Tertiary series had been established. At .last in 1831 Murchison began to attack this terra incognita on the, borders of South Wales, working into it from the Old Red Sandstone, the stratigraphical position of which was well known. In a few years he succeeded in demonstrating the existence of a succession of formations, each distinguished. by its own peculiar assemblage of organic remains which were distinct from those in any of the overlying strata. To these formations he gave the name of Silurian (q.v.). From the key which his researches supplied, it was possible to recognize in other countries the same order of formations and the same sequence

of fossils, so tiiat, in the course of a few years, representatives of the Silurian system were found far and wide over the globe. While Murchison was thus engaged, Sedgwick devoted himself to the more difficult task of unravelling the complicated structure of North Wales. He eventually made out the order of the several formations there, with their vast intercalations of volcanic material. He named them the Cambrian system (q.v.), and found them to contain fossils, which, however, lay for some time unexamined by him. He at first believed, as Murchison also did, that his rocks were all older than any part of the Silurian series. It was eventually discovered that a portion of them was equivalent to the lower part of that series. The oldest of Sedgwick's groups, containing distinctive fossils, retain the name Cambrian, and are of high interest, as they enclose the remains of the earliest faunas which are yet well known. Sedgwick and Murchison rendered yet another signal service to stratigraphical geology by establishing, in 1839, on a basis of palaeontological evidence supplied by W. Lonsdale, the independence of the Devonian system (q.v.).

For many years the rocks below the oldest fossiliferous deposits received comparatively little attention. They were vaguely described as the " crystalline schists " and were often referred to as parts of the primeval crust in which no chronology was to be looked for. W. E. Logan (1 798-1 875) led the way, in Canada, by establishing . there several vast series of rocks, partly of crystalline schists and gneisses (Laurentian) and partly of slates and conglomerates (Huronian). Later observers, both in Canada and the United States, have greatly increased our knowledge of these rocks, and have shown their structure to be much more complex than was at first supposed (see Akchean System).

During the latter half of the 19th century the most important development of stratigraphical geology was the detailed working

out and application of the principle of zonal classification to the fossiliferous formations — that is, the determination of the sequence and distribution of organic remains in these formations, and the arrangement of the strata into zones, each of which is distinguished by a peculiar assemblage of fossil species (see under Part VI.). The zones are usually named after one especially characteristic species. This system of classification was begun in Germany with reference to the members of the Jurassic system (q.v.) by A. Oppel (1856ˆ1858) and F. A. von Quenstedt (1858), and it has since been extended through the other Mesozoic formations. It has even been found to be applicable to the Palaeozoic rocks, which are now subdivided into palaeontological zones. In the Silurian system, for example, the graptolites have been shown by C. Lapworth to furnish a useful basis for zonal subdivisions. The lowest fossiliferous horizon in the Cambrian rocks of Europe and North America is known as the Olenellus zone, from the prominence in it of that genus of trilobite. Another conspicuous feature in the progress of stratigraphy during the second half of the 19th century was displayed by the rise and rapid development of what is known as Glacial geology. The various deposits of " drift " spread over northern Europe, and the boulders scattered across the surface of the plains had long attracted notice, and had even found a place in popular legend and supersti- tion. When men began to examine them with a view to ascertain their origin, they were naturally regarded as evidences of the Noachian deluge. The first observer who drew attention to the smoothed and striated surfaces of rock that underlie the Drifts was Hutton's friend, Sir James Hall, who studied them in the lowlands of Scotland and referred them to the action of great debacles of water, which, in the course of some ancient terrestrial convulsion, had been launched across the face of the country. Playfair, however, pointed out that the most potent geological agents for the trans- portation of large blocks of stone are the glaciers. But no one was then bold enough to connect the travelled boulders with glaciers on the plains of Germany and of Britain. Yet the transporting agency of ice was invoked in explanation of their diffusion. It came to be the prevalent belief among the geologists of the first half of the 19th century, that the fall of temperature, indicated by the gradual increase in the number of northern species of shells in the English Crag deposits, reached its climax during the time of the Drift, and that much of the north and centre of Europe was then submerged beneath a sea, across which floating icebergs and floes transported the materials of the Drift and

dropped the scattered boulders. As the phenomena are well developed around the Alps, it was necessary to suppose that the submergence involved the lowlands of the Continent up to the foot of that mountain chain — a geographical change so stupendous as to demand much more evidence than was adduced in its support. At last Louis Agassiz (1807-1873), who had varied his palaeontological studiesat Neuchatel by excursions into the Alps, was so much struck by the proofs of the former far greater extension of the Swiss glaciers, that he pursued the investigation and satisfied himself that the ice had formerly extended from the Alpine valleys right across the great plain of Switzerland, and had transported huge boulders from the central mountains to the flanks of the Jura. In the year 1840 he visited Britain and soon found evidence of similar conditions there. He showed that it was not by submergence in a sea cumbered with floating ice, but by the former presence of vast glaciers or sheets of ice that the Drift and erratic blocks had been distributed. The idea thus propounded by him did not at once command complete approval, though traces of ancient glaciers in Scotland and Wales were soon detected by native geologists, particularly by W. Buckland, Lyell, J. D. Forbes and Charles Maclaren. Robert Chambers (1802-1871) did good service in gathering additional evidence from Scotland and Norway in favour of Agassiz's views, which steadily gained adherents until, after some quarter of a century, they were adopted by the great majority of geologists in Britain, and subsequently in other countries. Since that time the literature of geology has been swollen by a vast number of contributions in which the history of the Glacial period, and its records both in the Old and New World, have been fully discussed.

Rise and Progress of Palaeontological Geology. — As this branch of the science deals with the evidence furnished by fossil organic remains as to former geographical conditions, It early attracted observers who, in the superficial beds of marine shells found at some distance from the coast, saw proofs of the former submergence of the land under the sea. But the occurrence of fossils embedded in the heart of the solid rocks of the mountains offered much greater difficulties of explanation, and further progress was consequently slow. Especially baneful was the belief that these objects were mere sports of nature, and had no connexion with any once living organisms. So long as the true organic origin of the fossil plants and animals contained in the rocks was in dispute, it was hardly possible that much advance could be made in their systematic study, or in the geological deductions to be drawn from them. One good result of the controversy, however, was to be seen in the large collections of these

” formed stones” that were gathered together in thecabinets and museums of the 17th and 18th centuries. The accumulation and comparison of these objects naturally led to the production of treatises in which they were described and not unfrequently illustrated by good engravings. Switzerland was more particularly

noted for the number and merit of its works of this kind, such as that of K. N. Lang (Historic, lapidum figuratorum Helvetiae, 1708) and those of Johann Jacob Scheuchzer (1672-1733). In England, also, illustrated treatises were published both by men who looked on fossils as mere freaks of nature, and by those who regarded them as proofs of Noah’s flood. Of the former type were the works of Martin Lister (1638-1712) and Robert Plot [Natural History of Oxfordshire, 1677). The Celtic scholar Edward Llwyd (1660-1709) wroteaLatin treatise containing good plates of a thousand fossils in the Ashmolean Museum, Oxford, and J. Woodward, in 1728-1729, published his Natural History of the Fossils of England, already mentioned, wherein he described his own extensive collection, which he bequeathed to the University of Cambridge, where it is still carefully preserved. The most voluminous and important of all these works, however, appeared at a later date at Nuremberg. It was begun by G. W. Knorr (1705-1761), who himself engraved for it a series of plates, which for beauty and accuracy have seldom been surpassed. After his death the work was continued by J. E. I. Walch (1725-1778), and ultimately consisted of four massive folio volumes and nearly 300 plates under the title of Lapides diluvii universalis testes. Although the authors supposed their fossils to be relics of Noah’s flood, their work must be acknowledged to mark a distinct onward stage in the palaeontological department of geology.

It was in France that palaeontological geology began to be cultivated in a scientific spirit. The potter Bernard Palissy, as far back as 1580, had dwelt on the importance of fossil shells as monuments of revolutions of the earth’s surface; but the observer who first undertook the detailed study of the subject was Jean Etienne Guettard, who began in 1751 to publish his descriptions of fossils in the form of memoirs presented to the Academy of Sciences of Paris. To him they were not only of deep interest as monuments of former types of existence, but they had an especial value as records of the

changes which the country had undergone from sea to land and from land to sea. More especially noteworthy was a monograph by him which appeared in 1765 bearing the title " On the accidents that have befallen Fossil Shells compared with those which are found to happen to shells now living in the Sea." In this treatise he showed that the fossils have been encrusted with barnacles and serpulae, have been bored into by other organisms, and have often been rounded or broken before final entombment; and he inferred that these fossils must have lived and'died on the sea-floor under similar conditions to those which obtain on the sea-floor to-day. His argument was the most triumphant that had ever been brought against the doctrine of lusus naturae, and that of the efficacy of Noah's flood — doctrines which still held their ground in Guettard's day. When Soulavie, Cuvier and Brongniart in France, and William Smith in England, showed that the rock formations of the earth's crust could be arranged in chronological order, and could be recognized far and wide by means of their enclosed organic remains, the vast significance of these remains in geological research was speedily realized, and palaeontological geology af once entered on a new and enlarged phase of development. But apart from their value as chronological monuments, and as witnesses of former conditions of geography, fossils presented in themselves a wide field of investigation as types of life that had formerly existed, but had now passed away. It was in France that this subject first took definite shape as an important branch of science. The mollusca of the Tertiary deposits of the Paris basin became, in the hands of Lamarck, the basis on which invertebrate palaeontology wasfounded. The same series of strata furnished to Cuvier the remains of extinct land animals, of which, by critical study of their fragmentary bones and skeletons, he worked out restorations that may be looked on as the starting-point of vertebrate palaeontology. These brilliant researches, rousing widespread interest in such studies, showed how great a flood of light could be thrown on the past history of the earth and its inhabitants. But the full significance of these extinct types of life could not be understood so long as the doctrine of the immuta- bility of species, so strenuously upheld by Cuvier, maintained its sway among naturalists. Lamarck, as far back as the year 1800, had begun to propound his theory of evolution and the transforma- tion of species; but his views, strongly opposed by Cuvier and the great body of naturalists of the day, fell into neglect. Not until after the publication in 1859 of the Origin of Species by Charles Darwin were the barriers of old prejudice in this matter finally broken down. The possibility of tracing the ancestry of living forms back into the remotest ages was then perceived ; the time-honoured fiction that the

stratified formations record a series of catastrophes and re-creations was finally dissipated; and the earth's crust was seen to contain a noble, though imperfect, record of the grand evolution of organic types of which our planet has been the theatre.

Development of Petrographical Geology. — Theophrastus, the favour- ite pupil of Aristotle, wrote a treatise On Stones, which has come down to our own day, and may be regarded as the earliest work on petrography. At a subsequent period Pliny, in his Natural History, collected all that was known in his day regarding the occurrence and uses of minerals and rocks. But neither of these works is of great scientific importance, though containing much interesting information. Minerals from their beauty and value attracted notice before much attention was paid to rocks, and their study gave rise to the science of mineralogy long before geology came

into existence. When rocks began to be more particularly scrutin- ized, it was chiefly from the side of their usefulness for building and other economic purposes. The occurrence of marine shells in many of them had early attracted attention to them. But their varieties of composition and origin did not become the subject of serious study until after Linnaeus and J. G. Wallerius in the 1 8th century had made a beginning. The first important contribution to this department of the science was that of Werner, who in 1786 published a classification and description of rocks in which he arranged them in two divisions, simple and compound, and further distinguished them by various external characters and by their relative age. The publication of this scheme may be said to mark the beginning of scientific petrography. Werner's system, however, had the serious defect that the chronological order in which he grouped the rocks, and the hypothesis by which he accounted for them as chemical precipitates from the original ocean, were both alike contrary to nature. It was hardly possible indeed that much progress could be made in this branch of geology until chemistry and mineralogy had made greater advances; and especially until it was possible to ascertain the intimate chemical and mineralogical composition, and the minute structure of rocks. The study, however, continued to be pursuedjin Germany, where the influence of Werner's enthusiasm still led men to enter the petrographical rather than the palaeontological domain. The resources of modern chemistry were pressed into the service, and analyses were made and multiplied to such a degree that it seemed as if the ultimate chemical constitution of every type of rock had now been thoroughly revealed. The condition of the science in the middle of the 19th century was well shown by J. L. A. Roth, who in 1861 collected about 1000 trust-

worthy analyses which up to that time had been made. But though the chemical elements of the rocks had been fairly well determined, the manner in which they were combined in the compound rocks could for the most part be only more or less plausibly conjectured. As far back as 1831 an account was published of a process devised by William Nicol of Edinburgh, whereby sections of fossil wood could be cut, mounted on glass, and reduced to such a degree of transparency as to be easily examined under a microscope. Henry Sorby, of Sheffield, having seen Nicol's preparations, perceived how admirably adapted the process was for the study of the minute structure and composition of rocks. In 1858 he published in the Quarterly Journal of the Geological Society a paper " On the Microscopical Structure of Crystals." This essay led to a complete revolutionof petrographical methods and gave a vast impetus to the study of rocks. Petrology entered upon a new and wider field of investigation. Not only were the' mineralogical constituents of the rocks detected, but minute structures were revealed which shed new light on the origin and history of these mineral masses, and opened up new paths in theoretical geology. In the hands of H. Vogelsang, F. Zirkel, H. Rosenbusch, and a host of other workers in all civilized countries, the literature of this department of the science has grown to a remarkable extent. Armed with the powerful aid of modern optical instruments, geologists are now able with far more prospect of success to resume the experiments begun a century before by de Saussure and Hall. G. A. Daubree, C. Friedel, E. Sarasin, F. Fouque and A. Michel L6vy in France, C. Doelter y Cisterich and E. Hussak of Gratz, J. Morozewicz of Warsaw and others, have greatly advanced our knowledge by their synthetical analyses, and there is every reason to hope that further advances will be made in this field of research.

Rise of Physiographical Geology. — Until stratigraphical geblogy had advanced so far as to show of what a vast succession of rocks the crust of the earth is built up, by what a long and complicated series of revolutions these rocks have come to assume their present positions, and how enormous has been the lapse of time which all these changes represent, it was not possible to make a scientific study of the surface features of our globe. From ancient times it had been known that many parts of the land had once been under the sea ; but down even to the beginning of the 19th century the vaguest conceptions con- tinued to prevail as to the operations concerned in the submergence and elevation of land, and as to the processes whereby the present outlines of terrestrial topography were determined. We have seen, for instance, that according to the

teaching of Werner the oldest rocks were first precipitated from solution in the universal ocean to form the mountains, that the vertical position of their strata was original, that as the waters subsided successive formations were deposited and laid bare, and that finally the superfluous portion of the ocean was whisked away into space by some unexplained co-operation of another planetary body. Desmarest, in his investigation of the volcanic history of Auvergne, was the first observer to perceive by what a long process of sculpture the present configuration of the land hasbeen broughtabout. Heshowed conclusively that thevalleys have been carved out by the streams that flow in them, and that while they have sunk deeper and deeper into the framework of the land, the spaces of ground between them have been left as intervening ridges and hills. De Saussure learnt a similar lesson from his studies of the Alps, and Hutton and Playfair made it a cardinal feature in their theory of the earth. Nevertheless the idea encountered so much opposition that it made but little way until after the middle of the 19th century. Geologists preferred to believe in convul- sions of nature, whereby valleys were opened and mountains were

upheaved. That the main features of the land, such as the great mountain-chains, had been produced by gigantic plication of the terrestrial crust was now generally admitted, and also that minor fractures and folds had probably initiated many of the valleys. But those who realized most vividly the momentous results achieved by ages of subaerial denudation perceived that, as Hutton showed, even without the aid of underground agency, the mere flow of water in streams across a mass of land must in course of time carve out just such a system of valleys as may anywhere be seen. It was J. B. Jukes who, in 1862, first revived the Huttonian doctrine, and showed how completely it explained the drainage-lines in the south of Ireland. Other writers followed in quick succession until, in a few years, the doctrine came to be widely recognized as one of the established principles of modern geology. Much help was derived from the admirable illustrations of land-sculpture and river-erosion supplied from the Western Territories and States of the American Union.

Another branch of physiographical geology which could only come into existence after most of the other departments of the science had

made large progress, deals with the evolution of the framework of each country and of the several continents and oceans of the globe. It is now possible, with more or less confidence, to trace backward the history of every terrestrial area, to see how sea and land have there succeeded each other, how rivers and lakes have come and gone, how the crust of the earth has been ridged up at widely separated intervals, each movement determining some line of mountains or plains, how the boundaries of the oceans have shifted again and again in the past, and thus how, after so prolonged a series of revolutions, the present topography of each country, and of the globe as a whole, has been produced. In the prosecution of this subject maps have been constructed to show what is conjectured to have been the distribution of sea and land during the various geological periods in different parts of the world, and thus to indicate the successive stages through which the architecture of the land has been gradually evolved. The most noteworthy contribution to this department of the science is the Anttitz der Erde of Professor Suess of Vienna. This important and suggestive work has been translated into French and English.

Part II. — Cosmical Aspects

Before geology had attained to the position of an inductive science, it was customary to begin investigations into the history of the earth by propounding or adopting some more or less fanciful hypothesis in explanation of the origin of our planet, or even of the universe. Such preliminary notions were looked upon as essential to a right understanding of the manner in which the materials of the globe had been put together. One of the distinguishing features of Hutton's Theory of the Earth consisted in his protest that it is no part of the province of geology to discuss the origin of things. He taught that in the materials from which geological evidence is to be compiled there can be found " no traces of a beginning, no prospect of an end." In England, mainly to the influence of the school which he founded, and to the subsequent rise of the Geological Society of London, which resolved to collect facts instead of fighting over hypotheses, is due the disappearance of the crude and unscientific cosmologies by which the writings of the earlier geologists were distinguished.

But there can now be little doubt that in the reaction against those visionary and often grotesque speculations, geologists were carried too far in an opposite direction. In allowing themselves to believe that geology had nothing to do with questions of cosmogony, they gradually grew up in the conviction that such questions could never be other than mere speculation, interesting or amusing as a theme for

the employment of the fancy, but hardly coming within the domain of sober and inductive science. Nor would they soon have been awakened out of this belief by anything in their own science. It is still true that in the data with which they are accustomed to deal, as comprising the sum of geological evidence, there can be found no trace of a beginning, though the evidence furnished by the terrestrial crust shows a general evolution of organic ' forms from some starting-point which cannot be seen. The oldest rocks which have been discovered on any part of the globe have probably been derived from other rocks older than themselves. Geology by itself has not yet revealed, and is little likely ever to reveal, a trace of the first solid crust of our glpbe. If, then, geological history is to be compiled from direct evidence furnished by the rocks of the earth, it cannot begin at the

beginning of things, but must be content to date its first chapter from the earliest period of which any record has been preserved among the rocks.

Nevertheless, though geology in its usual restricted sense has been, and must ever be, unable to reveal the earliest history of our planet, it no longer ignores, as mere speculation, what is attempted in this subject by its sister sciences. Astronomy, physics and chemistry have in late years all contributed to cast light on the earlier stages of the earth's existence, previous to the beginning of what is commonly regarded as geological history. But whatever extends our knowledge of the former conditions of our globe may be legitimately claimed as part of the domain of geology. If this branch of inquiry, therefore, is to continue worthy of its name as the science of the earth, it must take cognizance of these recent contributions from other sciences. It must no longer be content to begin its annals with the records of the oldest rocks, but must endeavour to grope its way through the ages which preceded the formation of any rocks. Thanks to the results achieved with the telescope, the spectroscope and the chemical laboratory, the story of these earliest ages of our earth is every year becoming more definite and intelligible.

Up to the present time no definite light has been thrown by physics on the origin and earliest condition of our globe. The famous nebular theory (q.v.) of Kant and Laplace sketched the supposed evolution of the solar system from a gaseous nebula, slowly rotating round a more condensed central portion of its mass, which eventually became the sun. As a consequence of increased rapidity of rotation resulting from cooling and con- traction, the nebula acquired a more and more lenticular form, until at last it threw off from its equatorial

protuberance a ring of matter. Subsequently the same process was repeated, and other similar rings successively separated from the parent mass. Each ring went through a corresponding series of changes until it ultimately became a planet, with or without one or more attendant satellites. The intimate relationship of our earth to the sun and the other planets was, in this way, shown. But there are some serious physical difficulties in the way of the acceptance of the nebular hypothesis. Another explanation is given by the meteoritic hypothesis, according to which, out of the swarms of meteorites with which the regions of space are crowded, the sun and planets have been formed by gradual accretion.

According to these theoretical views we should expect to find a general uniformity of composition in the constituent matter of the solar system. For many years the only available evidence on this point was derived from the meteorites (q.v.) which so constantly fall from outer space upon the surface of the earth. These bodies were found to consist of elements, all of which had been recognized as entering into the constitution of the earth. But the discoveries of spectroscopic research have made known a far more widely serviceable method of investigation, which can be applied even to the luminous stars and nebulae that lie far beyond the bounds of the solar system. By this method information has been obtained regarding the constitution of the sun, and many of our terrestrial metals, such as iron, nickel and magnesium, have been ascertained to exist in the form of in- candescent vapour in the solar atmosphere. The present condition of the sun probably represents one of the phases through which stars and planets pass in their progress towards becoming cool and dark bodies in space. If our globe was at first, like its parent sun, an incandescent mass of probably gaseous matter, occupying much more space than it now fills, we can conceive that it has ever since been cooling and contract- ing until it has reached its present form and dimensions, and that it still retains a high internal temperature. Its oblately spheroidal form is such as would be assumed by a rotating mass of matter in the transition from a vaporous and self-luminous or liquid condition to one of cool and dark solidity. But it has been claimed that even a solid spherical globe might develop, under the influence of protracted rotation, such a shape as the earth at present possesses. The observed increase of temperature downwards in our

planet has hitherto been generally accepted as a relic and proof of an original high temperature and mobility of substance. Recently, however, the validity of this proof has been challenged on the ground that the ascertained amount of radium in the rocks of the outer crust is more than sufficient to account for the observed downward increase of temperature. Too little, however, is known of the history and properties of what is called radium to afford a satisfactory ground on which to discard what has been, and still remains, the prevalent belief on this subject.

An important epoch in the geological history of the earth was marked by the separation of the moon from its mass (see Tide). Whether the severance arose from the rupture of a surrounding ring or the gradual condensation of matter in such a ring, or from the ejection of a single mass of matter from the rapidly rotating planet, it has been shown that our satellite was only a few thousand miles from the earth's surface, since when it has retreated to its present distance of 240,000 m. Hence the influence of the moon's attraction, and all the geological effects to which it gives rise, attained their maximum far back in the development of the globe, and have been slowly diminishing throughout geological history.

The sun by virtue of its vast size has not yet passed out of the condition of glowing gas, and still continues to radiate heat beyond the farthest planet of the solar system. The earth, however, being so small a body in comparison, would cool down much more quickly. Underneath its hot atmosphere a crust would conceivably begin to form over its molten surface, though the interior might still possess a high temperature and, owing to the feeble conducting power of rocks, would remain intensely hot for a protracted series of ages.

Full information regarding the form and size of the earth, and its relations to the other planetary members of the solar system, will be found in the articles Planet and Solar System. For the purposes of geological inquiry the reader will bear in mind that the equatorial diameter of our globe is estimated to be about 7925 m., and the polar diameter about 7899 m. ; the difference between these two sums representing the amount of flattening at the poles (about 265m.). The planet has been compared in shape to an orange, but it resembles an orange which has been somewhat squeezed, for its equatorial circum- ference is not a regular circle but an ellipse, of which the major axis lies in long. 8° 15′ W. — on- a meridian which cuts the north- west corner of America, passing through Portugal and

Ireland, and the north-east corner of Asia in the opposite hemisphere.

The rotation of the earth on its axis exerts an important influence on the movements of the atmosphere, and thereby affects the geological operations connected with these movements. The influence of rotation is most marked in the great aerial circulation between the poles and the equator. Currents of air, which set out in a meridional direction from high latitudes towards the. equator, come from regions where the velocity due to rotation is small to where it is greater, and they consequently fall behind. Thus, in the northern hemisphere a north wind, as it moves away from its northern source of origin, is gradually deflected more and more towards the west and becomes a north- east current; while in the opposite hemisphere a wind making from high southern latitudes towards the equator becomes, from the same cause, a south-east current. Where, on the other hand, the air moves from the equatorial to the polar regions its higher velocity of rotation carries it eastward, so that on the south side of the equator it becomes a north-west current and on the north side a south-west current. It is to this cause that the easting and westing of the great atmospheric currents are to be attributed, as is familiarly exemplified in the trade winds.

The atmospheric circulation thus deflected influences the circulation of the ocean. The winds which persistently blow from the north-east on the north side of the equator, and from the south-east on the south side, drive the superficial waters onwards, and give rise to converging oceanic currents which unite to form the great westerly equatorial current. A more direct effect of terrestrial rotation has been claimed

in the case of rivers which flow in a meridional direction. It has been asserted that those, which in the northern hemisphere flow from north to south, like the Volga, by continually passing into regions where the velocity of rotation is increasingly greater, are thrown more against their western than their eastern banks, while those whose general course is in an opposite direction, like the Irtisch and Yenesei, press more upon their eastern sides. There cannot be any doubt that the tendency of the streams must be in the directions indicated. But when the comparatively slow current and constantly meandering course of most rivers are taken into consideration, it may be doubted whether the influence of rotation is of much practical account so far as river-erosion is concerned.

One of the cosmical relations of our planet which has been more

especially prominent in geological speculations relates to the position of the earth's axis of rotation. Abundant evidence has now been obtained to prove that at a comparatively late geological period a rich flora, resembling that of warm climates at the present day, existed in high latitudes even within less than 9° of the north pole, where, with an extremely low temperature and darkness lasting for half of the year, no such vegetation could possibly now exist. It has accordingly been maintained by many geologists that the axis of rotation must have shifted, and that when the remarkable Arctic assemblage of fossil plants lived the region of their growth must have lain in latitudes much nearer to the equator of the time.

The possibility of any serious displacement of the rotational axis since a very early period in the earth's history has been strenuously denied by astronomers, and their arguments have been generally, but somewhat reluctantly, accepted by geologists, who find themselves confronted with a problem which has hitherto seemed insoluble. That the axis is not rigidly stable, however, has been postulated by some physicists, and has now been demonstrated by actual observation and measurement. It is admitted that by the movement of large bodies of water the air over the surface of the globe, and more particularly by the accumulation of vast masses of snow and ice in different regions, the position of the axis might be to some extent shifted; more serious effects might follow from widespread upheavals or depressions of the surface of the lithosphere. On the assump- tion of the extreme rigidity of the earth's interior, however, the general result of mathematical calculation is to negative the supposition that in any of these ways within the period repre- sented by what is known as the " geological record," that is, since the time of the oldest known sedimentary formations, the rotational axis has ever been so seriously displaced as to account for such stupendous geological events as the spread of a luxuriant vegetation far up into polar latitudes. If, however, the inside of the globe possesses a great plasticity than has been allowed, the shifting of the axis might not be impossible, even to such an extent' as would satisfy the geological requirements. This question is one on which the last word has not been said, and regarding which judgment must remain in suspense.

In recent years fresh information bearing on the minor devaga- tions of the pole has been obtained from a series of several thousand careful observations made in Europe and North America. It has thus been ascertained that the pole wanders with a ' curiously irregular but somewhat spiral movement, within an amplitude of between 40 and 50 ft., and completes its erratic circuit in about 428 days. It was not supposed that its movement had any geological interest, but Dr

John Milne has recently pointed out that the times of sharpest curvature in the path of the pole coincide with the occurrence of large earthquakes, and has suggested that, although it can hardly be assumed that this coincidence shows any direct connexion between earthquake frequency and changes in the position of the earth's axis, both effects may not improbably arise from the same redistribution of surface material by ocean currents and meteorological causes.

If for any reason the earth's centre of gravity were sensibly

displaced, momentous geological changes would necessarily

I ensue. That the centre of gravity does not coincide with the

centre of figure of the globe, but lies to the south of it, has long been known. This greater aggregation of dense material in the southern hemisphere probably dates from the early ages of the earth's consolidation, and it is difficult to believe that any readjustment of the distribution of this material in the earth's interior is now possible. But certain rearrangements of the hydrosphere on the surface of the globe may, from time to time, cause a shifting of the centre of gravity, which will affect the level of the ocean. The accumulation of enormous masses of ice around the pole will give rise to such a displacement, and will thus increase the body of oceanic water in the glaciated hemisphere. Various calculations have been made of the effect of the transference of the ice-cap from one pole to the other, a revolution which may possibly have occurred more than once in the past history of the globe. James Croll estimated that if the mass of ice in the southern hemisphere be assumed to be 1000 ft. thick down to lat. 60°, its removal to the opposite hemisphere would raise the level of the sea 80 ft. at the north pole, while the Rev. Osmond Fisher made the rise as much as 409 ft. The melting of the ice would still further raise the sea-level by the addition of so large a volume of water to the ocean. To what extent superficial changes of this kind have operated in geological history remains an unsolved problem, but their probable occurrence in the past has to be recognized as one of the factors that must be considered in tracing the revolutions of the earth's surface.

The Age of the Earth. — Intimately connected with the relations of

our globe to the sun and the other members of the solar system is the question of the planet's antiquity — a subject of great geological importance, regarding which much discussion has taken place since the middle of the 19th century. Though an account of this discussion necessarily involves allusion to depart- ments of geology which are more appropriately referred to in later parts of this article, it may perhaps be most conveniently included here.

Geologists were for many years in the habit of believing that no limit could be assigned to the antiquity of the planet, and that they were at liberty to make unlimited drafts on the ages of the past. In 1862 and subsequent years, however, Lord Kelvin (then Sir William Thomson) pointed out that these demands were opposed to known physical facts, and that the amount of time required for geological history was not only limited, but must have been comprised within a comparatively narrow compass. His argument rested on three kinds of evidence: (1) the internal heat and rate of cooling of the earth; (2) the tidal retardation of the earth's rotation; and (3)the origin and age of the sun's heat.

1. Applying Fourier's theory of thermal conductivity, Lord Kelvin contended that in the known rate of increase of tempera- ture downward and beneath the surface, and the rate of loss of heat from the earth, we have a limit to the antiquity of the planet. He showed, from the data available at the time, that the superficial consolidation of the globe could not have occurred less than 20 million years ago, or the underground heat would have been greater than it is; nor more than 400 million years ago, otherwise the underground temperature would have shown no sensible increase downwards. He admitted that very wide limits were necessary. In subsequently discussing the subject, he inclined rather towards the lower than the higher antiquity, but concluded that the limit, from a consideration of all the evidence, must be placed within some such period of past time as 100 millions of years.

2. The argument from tidal retardation ' proceeds on the admitted fact that, owing to the friction of the tide-wave, the rotation of the earth is retarded, and is, therefore, much slower

, now than it must have been at one time. Lord Kelvin affirmed that had the globe become solid some 10,000 million years ago, or indeed any high antiquity beyond 100 million years, the centrifugal force due to the more rapid rotation must have given the planet a very much greater polar flattening than it actually possesses. He admitted, however, that, though 100 million years ago that force must have

been about 3 % greater than now,

yet " nothing we know regarding the figure of the earth, and the disposition of land and water, would justify us in saying that a body consolidated when there was more centrifugal force by 3% than now, might not now be in all respects like the earth, so far as we know it at present."

3. The third argument, based upon the age of the sun's heat, is confessedly less to be relied on than the two previous ones. It proceeds upon calculations as to the amount of heat which would be available by the falling together of masses from space, which gave rise by their impact to our sun. The vagueness of the data on which this argument rests may be inferred from the fact that in one passage P. G. Tait placed the limit of time during which the sun has been illuminating the earth as, "on the very highest computation, not more than about 15 or 20 millions of years "; while, in another sentence of the same volume, he admitted that, " by calculations in which there is no possibility of large error, this hypothesis [of the origin of the sun's heat by the falling together of masses of matter] is thoroughly competent to explain 100 millions of years' solar radiation at the present rate, perhaps more." In more recently reviewing his argument, Lord Kelvin expressed himself in favour of more strictly limiting geological time than he had at first been disposed to do. He insists that the time " was more than 20 and less than 40 millions of years and probably much nearer 20 than 40." Geologists appear to have reluctantly brought themselves to believe that perhaps, after all, 100 millions of years might suffice for the evolution of geological history. But when the time was cut down to 15 or 20 millions' they protested that such a restricted period was insufficient for that evolution, and though they did not offer any effective criticism of the arguments of the physicists they felt convinced that there must be some flaw in the premises on which these arguments were based.

By degrees, however, there have arisen among the physicists themselves grave doubts as to the validity of the physical evidence on which the limitation of the earth's age has been founded, and at the same time greater appreciation has been shown of the signification and stength of the geological proofs of the high antiquity of our planet. In an address from the chair of the Mathematical Section of the British Association in 1886, Professor (afterwards Sir) George Darwin reviewed the controversy, and pronounced the following deliberate judgment in regard to it: " In considering these three arguments I have adduced some reasons against the validity of the first [tidal friction], and have endeavoured to show that there are

elements of uncertainty surrounding the second [secular cooling of the earth] ; nevertheless, they undoubtedly constitute a contribution of the first importance to physical geology. Whilst, then, we may protest against the precision with which Professor Tait seeks to deduce results from them, we are fully justified in following Sir William Thomson, who says that ‘ the existing state of things on the earth, life on the earth — all geological history showing continuity of life — must be limited within some such period of past time as 100 million years’.” Lord Kelvin has never dealtwith the geological and palaeontologieal objections against the limitation of geological time to a few millions of years. But Professor Darwin, in the address just cited, uttered the memorable warning: ” At present our knowledge of a definite limit topological time has so little precision that we should do wrong summarily to reject theories which appear to demand longer periods of time than those which now appear allowable.” In his presidential address to the British Association at Cape Town in 1 905 he returned to the subject, remarking that the argument derived from the increase of underground temperature ” seems to be entirely destroyed ” by the discovery of the properties of radium. He thinks that ” it does not seem ex- travagant to suppose that 500 to 1000 million years may have elapsed since the birth of the moon.” He has ” always believed that the geologists were more nearly correct than the physicists, notwithstanding the fact that appearances were so strongly against them,” and he concludes thus: ” It appears, then, that the physical argument is not susceptible of a greater degree of

certainty than that of the geologists, and the scale of geological time remains in great measure unknown ” (see also Tide, chap, viii.).

In an address to the mathematical section of the American Association for the Advancement of Science in 1889, the vice-president of the section, R. S. Woodward, thus expressed himself with regard to the physical arguments brought forward by Lord Kelvin and Professor Tait in limitation of geological time: ” Having been at some pains to look into this matter, I feel bound to state that, although the hypothesis appears to be the best which can, be formulated at present, the odds are against its correctness. Its weak links are the unverified assumptions of an initial uniform temperature and a constant diffusivity. Very likely these are

approximations, but of what order we cannot decide. Furthermore, if we accept the hypothesis, the odds appear to be against the present attainment of trustworthy numerical results, since the data for calculation, obtained mostly from observations on continental areas, are far too meagre to give satisfactory average values for the entire mass of the earth."

Still more emphatic is the protest made from the physical side by Professor John Perry. He has attacked each of the three lines of argument of Lord Kelvin, and has impugned the validity of the conclusions drawn from them. . The argument from tidal retardation he dismisses as fallacious, following in ihis contention the previous criticism of the Rev. Maxwell Close and Sir George Darwin. In dealing with the argument based on the secular cooling of the earth, he holds it to be perfectly allowable to assume a much higher conductivity for the interior of the globe, and that such a reasonable assumption would enable us greatly to increase our estimate of the earth's antiquity. As for the third argument, from the age of the sun's heat, he points out that the sun may have been repeatedly fed by a supply of meteorites from outside, while the earth may have been protected from radiation, and been able to retain much of its heat by being enveloped in a dense atmosphere. Remarking that " almost anything is possible as to the present internal state of the earth," he concludes thus: " To sum up, we can find no published record of any lower maximum age of life on the earth, as calculated by physicists, than 400 millions of years. Prom the three physical arguments Lord Kelvin's higher limits are 1000, 400 and 500 million years. I have shown that we have reasons for believing that the age, from all these, may be very considerably underestimated. It is to be observed that if we exclude everything but the arguments from mere physics, the probable age of life on the earth is much less than any of the above estimates; but if the palaeontologists have good reasons for demanding much greater times, I see nothing from the physicists' point of view which denies them four times the greatest of these estimates."

A fresh line of argument against Lord Kelvin's limitation of the antiquity of our globe has recently been started by the remarkable discoveries in radio-activity. From the ascertained properties of radium it appears to be possible that our estimates of solar heat, as derived from the theory of gravitation, may have to be augmented ten or twenty times; that stores of radium and similar bodies within the earth may have in- definitely deferred the establishment of the present temperature gradient from the surface inward; that consequently the earth may have remained for long ages at a

temperature not greatly different from that which it now possesses, and hence that the times during which our globe has supported animal and vegetable life may be very much longer than that allowed in the estimates previously made by physicists from other data (see Radio- activity).

The arguments from the geological side against the physical contention that would limit the age of our globe to some 10 or 20 millions of years are mainly based on the observed rates of geological and biological changes at the present time upon land and sea, and on the nature, physical history and organic contents of the stratified crust of the earth. Unfortunately, actual numerical data are not obtainable in many departments of

geological activity, and even where they can be procured they do, not yet rest on a sufficiently wide collection of accurate and co-ordinated observations. But in some branches of dynamical geology, material exists for, at least, a preliminary computation of the rate of change.. This is more especially the case in respect of the wide domain of denudation. The observational records of the action of the sea, of springs, rivers and glaciers are becom- ing gradually fuller and more trustworthy. A method of making use of these records for estimating the rate of denudation of the land has been devised. Taking the Mississippi as a general type of river action, it has been shown that the amount of material conveyed by this stream into the sea in one year is equivalent to the lowering of the general surface of the drainage basin of the river by eVon of a foot. This would amount to one foot in 6000 years and 1000 ft. in 6 million years. So that at the present rate of waste in the Mississippi basin a whole con- tinent might be worn away in a few millions of years.

It is evident that as, deposition and denudation are simul- taneous processes, the ascertainment of the rate at which solid material is removed from the surface of the land supplies some necessary information for estimating the rate at which new sedimentary formations are being accumulated on the floor of the sea, and for a computation of the length of time that would be required at the present rate of change for the deposition of all the stratified rocks that enter into the, composition of the crust of our globe. If the thickness of these rocks be assumed to be 100,000 ft., and if we could suppose them to have been laid down over as wide an area as that of the drainage basins from the waste of which they were derived, then at the present rate of denudation their accumulation would require some f>oo millions of years. But, as Dr A. R. Wallace has justly pointed out, the tract of sea-floor over which the material

derived from the waste of the terrestrial surface is laid down is at present much less than that from which this material is worn away. We have no means, however, of determining what may have been the ratio between the two areas in past time. Certainly ancient marine sedimentary rocks cover at the present day a much more extensive area than that in which they are now being elaborated. If we take the ratio postulated by Dr Wallace — 1 to 19 — the 100,000 ft. of sedimentary strata would require 31 millions of years for their accumulation. It is quite possible, however, that this ratio may be much too high. There are reasons for believing that the propor- tion of coast-line to land area has been diminishing during geo- logical, time; in other words, that in early times the land was more insular and is now more continental. So that the 31 millions of years may be much less than the period that would be required, even on the supposition of continuous uninterrupted denudation and sedimentation, during the whole of the time represented by the stratified formations.

But no one who has made himself familiar with the actual composition of these formations and the detailed structure of the terrestrial crust can fail to recognize how vague, imperfect and misleading are the data on which such computations are founded. It requires no prolonged acquaintance with the earth's crust to impress upon the mind that one all-important element is omitted, and indeed can hardly be allowed for from want of sufficiently precise data, but the neglect of which must needs seriously impair the value of all numerical calculations made without it. The assumption that the stratified formations can be treated as if they consisted of a continuous unbroken sequence of sediments, indicating a vast and uninterrupted process of waste and deposi- tion, is one that is belied on every hand by the actual structure of these formations. It can only give us a minimum of the time required; for, instead of an unbroken series, the sedimentary formations are full of " unconformabilities " — gaps in the sequence of the chronological records — as if whole chapters and groups of chapters had been torn out of a historical work. It can often be shown that these breaks of continuity must have been of vast duration, and actually exceeded in chronological importance thick groups of strata lying below and above them (see Part VI.). Moreover, even among the uninterrupted strata, where no such unconformabilities exist, but where the sediments

follow each other in apparently uninterrupted sequence, and might be thought to have been deposited continuously at the same general rate, and without the intervention of any pause, it can be demonstrated that sometimes an inch or two of sediment much, on certain horizons, represent the deposit of an enormously longer period than a hundred or a thousand times the same amount of sediment on other horizons. A prolonged study of these questions leads to a profound conviction that in many parts of the geological record the time represented by sedi- mentary deposits may be vastly less than the time which is not so represented.

It has often been objected that the present rate of geological change ought not to be taken as a measure of the rate in past time, because the total sum of terrestrial energy has been steadily diminishing, and geological processes must consequently have been more vigorous in former ages than they are now. Geo- logists do not pretend to assert that there has been no variation or diminution in the activities of the various processes which they have to study. What they do insist on is that the present rate of change is the only one which we can watch and measure, and which will thus supply a statistical basis for any computations on the subject. But it has been dogmatically affirmed that because terrestrial energy has been diminishing therefore all kinds of geological work must have been more vigorously and more rapidly carried on in former times than now; that there were far more abundant and more stupendous volcanoes, more frequent and more destructive earthquakes, more gigantic upheavals and subsidences, more powerful oceanic waves and tides, more violent atmospheric disturbances with heavier rainfall and more active denudation.

It is easy to make these assertions, and they look plausible; but, after all, they rest on nothing stronger than assumption. They can be tested by an appeal to the crust of the earth, in which the geological history of our planet has been so fully re- corded. Had such portentous manifestations of geological activity ever been the normal condition of things since the beginning of that history, there ought to be a record of them in the rocks. But no evidence for them has been found there, though it has been diligently sought for in all quarters of the globe. We may confidently assert that while geological changes may quite possibly have taken place on a gigantic scale in the earliest ages of the earth's existence, of which no geological record remains, there is no proof that they have ever done so since the time when the very oldest of the stratified formations were deposited.

There is no need to maintain that they have always been conducted precisely on the same scale as now, or to deny that they may have gradually become less vigorous as the general sum of terrestrial energy has diminished. But we may unhesitat- ingly affirm that no actual evidence of any such progressive diminution of activity has been adduced from the geological record in the crust of the earth: that, on the contrary, no appear- ances have been detected there which necessarily demand the assumption of those more powerful operations postulated by physicists, or which are not satisfactorily explicable by reference to the existing scale of nature's processes.

That this conclusion is warranted even with regard to the innate energy of the globe itself will be seen if we institute a comparison between the more ancient and the more recent manifestations of that energy. Take, for example, the proofs of gigantic plication, fracture and displacement within the terrestrial crust. These, as they have affected the most ancient rocks of Europe, have been worked out in great detail in the north-west of Scotland. But they are not essentially different from or on a greater scale than those which have been proved to have affected the Alps, and to have involved strata of so recent a date as the older Tertiary formations. On the contrary, it may be doubted whether any denuded core of an ancient mountain-chain reveals traces of such stupendous disturbances of the crust as those which have given rise to the younger mountain-chains of the globe. It may, indeed, quite well have been the rule that instead of diminishing in intensity of effect, the consequences of terres- trial contraction have increased in magnitude, the augmenting

thickness of the crust offering greater resistance to the stresses, and giving rise to vaster plications, faults, thrust-planes and metamorphism, as this growing resistance had to be overcome.

The assertion that volcanic action must have been more violent and more persistent in ancient times than it is now has assuredly no geological evidence in its support. It is quite true that there are vastly more remains of former volcanoes scattered over the surface of the globe than there are active craters now, and that traces of copious eruptions of volcanic material can be followed back into some of the oldest parts of the geological record. But we have no proof that ever at any one time in geological history there have been more or larger or more vigorous volcanoes than those of recent periods. It may be said that the absence of such proof ought not to invalidate the assertion until a far wider area of the earth's surface has been geologically studied. But most assuredly, as far as geological investigation has yet gone, there is an overwhelming body of

evidence to show that from the earliest epochs in geological history, as registered in the stratified rocks, volcanic action has manifested itself very much as it does now, but on a less rather than on a greater scale. Nowhere can this subject be more exhaustively studied than in the British Isles, where a remarkably complete series of volcanic eruptions has been chronicled ranging from the earliest Palaeozoic down to older Tertiary time. The result of a prolonged study of British volcanic geology has demonstrated that, even to minute points of detail, there has been a singular uniformity in the phenomena from beginning to end. The oldest lavas and ashes differ in no essential respect from the youngest. Nor have they been erupted more copiously or more frequently. Many successive volcanic periods have followed each other after pro- longed intervals of repose, each displaying the same general sequence of phenomena and similar evidence of gradual diminu- tion and extinction. The youngest, instead of being the feeblest, were the most extensive outbursts in the whole of this prolonged series.

If now we turn for evidence of the alleged greater activity of all the epigene or superficial forces, and especially for proofs of more rapid denudation and deposition on the earth's surface, we search for it in vain among the stratified formations of the terrestrial crust. Had the oldest of these rocks been accumulated in a time of great atmospheric perturbation, of torrential rains, colossal tides and violent storms, we might surely expect to find among the sediments some proof of such disturbed meteorological and geographical conditions. We should look, on the one hand, for tumultuous accumulations of coarse unworn detritus, rapidly swept by rains, floods and waves from land to sea, and on the other hand, for an absence of any evidence of the tranquil and continuous deposit of such fine laminated silt as could only settle in quiet water. But an appeal to the geological record is made in vain for any such proofs. The oldest sediments, like the youngest, reveal the operation only of such agents and such rates of activity as are still to be witnessed in the accumulation of the same kind of deposits. If, for instance, we search the most ancient thick sedimentary formation in Britain — the Torridon Sandstone of north-west Scotland, which is older than the oldest fossiliferous deposits — we meet with nothing which might not be found in any Palaeozoic, Mesozoic or Cainozoic group of similar sediments. We see an accumulation, at least 8000 or 10,000 ft. thick, of consolidated sand, gravel and mud, such as may be gathering now on the floor of any large mountain- girdled lake. The conglomerates of this ancient series are not pell-mell heaps of angular detritus, violently swept away from the land and huddled

promiscuously on the sea-floor. They are, in general, built up of pebbles that have been worn smooth, rounded and polished by prolonged attrition in running water, and they follow each other on successive platforms with inter- vening layers of finer sediment. The sandstones are composed of well water-worn sand, some of which has been laid down so tranquilly that its component grains have been separated out in layers according to their specific gravity, in such manner that they now present dark laminae in which particles of magnetic iron, zircon and other heavy minerals have been sifted out

together, just as iron-sand may be seen gathered into thin sheets on sandy beaches at the present day. Again, the same series of primeval sediments includes intercalations of fine silt, which has been deposited as regularly and intermittently there as it has been among the most recent formations. These bands of shale have been diligently searched for fossils, as yet without success; but they may eventually disclose organic remains older than any hitherto found in Europe.

We now come to the consideration of the palaeontological evidence as to the value of geological time. Here the conclusions derived from a study of the structure of the sedimentary forma- tions are vastly strengthened and extended. In the first place, the organization of the most ancient plants and animals furnishes no indication that they had to contend with any greater violence of storm, flood, wave or ocean-current than is familiar to their modern descendants. The oldest trees, shrubs, ferns and club-mosses display no special structures that suggest a difference in the general conditions of their environment. The most ancient crinoids, sponges, crustaceans, arachnids and molluscs were as delicately constructed as those 01 to-day, and their remains are often found in such perfect preservation as to show that neither during their lifetime nor after their death were they subject to any greater violence of the elements than their living representatives now experience. Of much . more cogency, however, is the evidence supplied by the grand upward succession of organic forms, from the most ancient stratified rocks up to the present day. No biologist now doubts for a moment that this marvellous succession is the result of a gradual process of evolution from lower to higher types of organization. There may be differences of opin ion as to the causes which have governed this process and the

order of the steps through which it has advanced, but no one who is conversant with the facts will now venture to deny that it has taken place, and that, on any possible explanation of its progress, it must have demanded an enormous lapse of time. In the Cambrian or oldest fossiliferous formations there is already a large and varied fauna, in which the leading groups of invertebrate life are represented. On no tenable hypothesis can these be regarded as the first organisms that came into being on our planet. They must have had a long ancestry, and as Darwin first maintained, the time required for their evolution may have been " as long as, or probably far longer than, the whole interval from the Silurian [Cambrian] age to the present day." The records of these earliest eras of organic development have unfortunately not survived the geological revolutions of the past; at least, they have not yet been recovered. But it cannot be doubted that they once existed and registered their testimony to the prodigious lapse of time prior to the deposition of the most ancient fossiliferous formations which have escaped destruction.

The impressive character of the evidence furnished by the sequence of organic forms throughout the great series of fossili- ferous strata can hardly be fully realized without a detailed and careful study of the subject. Professor E. B. Poulton, in an address to the zoological section of the British Association at the Liverpool Meeting in 1896, showed how overwhelming are the demands which this evidence makes for long periods of time, and how impossible it is of comprehension unless these demands be conceded. The history of life upon the earth, though it will probably always be surrounded with great and even insuperable difficulties, becomes broadly comprehensible in its general progress when sufficient time is granted for the evolution which it records; but it remains unintelligible on any other conditions.

Taken then as a whole, the body of evidence, geological and palaeontological, in favour of the high antiquity of our globe is so great, so manifold, and based on such an ever-increasing breadth of observation and reflection, that it may be confidently appealed to in answer to the physical arguments which would seek to limit that antiquity to ten or twenty millions of years. In the present state of science it is out of our power to state positively what must be the lowest limit of the age of the earth. But we cannot assume it to be much less, and it may possibly

have been much more, than the 100 millions of years which Lord Kelvin was at one time willing to concede. 1

Part III. — Geognosy. The Investigation of the Nature and Composition of the Materials of which the Earth Consists

This division of the science is devoted to a description of the parts of the earth— of the atmosphere and ocean that surround the planet, and more especially of the solid materials that underlie these envelopes and extend downwards to an unknown distance into the interior. These various constituents of the globe are here considered as forms of matter capable of being analysed, and arranged according to their composition and the place they take in the general composition of the globe.

Viewed in the simplest way the earth may be regarded as made up of three distinct parts, each of which ever since an early period of planetary history has been the theatre of im- portant geological operations. (1) An envelope of air, termed the atmosphere, which surrounds the whole globe; (2) A lower and less extensive envelope of water, known as the hydrosphere (Gr. v8(i>p, water) which, constituting the oceans and seas, covers nearly three-fourths of the underlying solid surface of the planet; (3) A globe, called the lithosphere (Gr. Xi0os, stone), the external part of which, consisting of solid stone, forms the crust, while underneath, and forming the vast mass of the interior, lies the nucleus, regarding the true constitution of which we are still ignorant.

1. The Atmosphere. — The general characters of the atmosphere are described in separate articles (see especially Atmosphere; Meteorology). Only its relations to geology have here to be considered. As this gaseous envelope encircles the whole globe it is the most universally present and active of all the agents of geological change. Its efficacy in this respect arises partly from its composition, and the chemical reactions which it effects upon the surface of the land, partly from its great variations in temperature and moisture, and partly from its movements.

Many speculations have been made regarding the chemical composition of the atmosphere during former geological periods. There can indeed be little doubt that it must originally have differed greatly from its present condition. If the whole mass of the planet originally existed in a gaseous state, there would be practically no atmosphere. The present outer envelope of air may be considered to be the surviving relic of this condition, after all the other con- stituents have been incorporated into the hydrosphere and litho- sphere. The oxygen, which now forms fully a half of the outer crust of the earth, was doubtless originally, whether free or in

combination, part of the atmosphere. So, too, the vast beds of coal found all over the world, in geological formations of many different ages, represent so much carbonic acid once present in the air. The chlorides and other salts in the sea may likewise partly represent materials carried down out of the atmosphere in the primitive condensation of the aqueous vapour, though they have been continually increased ever since by contributions from the drainage of the land. It has often been suggested that, during the Carboniferous period, the atmosphere must have been warmer and more charged with aqueous vapour and carbon dioxide than at the present day, to admit of so luxuriant a flora as that from which the coal-seams were formed. There seems, however, to be at present no method of arriving at any certainty on this subject. Lastly, the amount of carbonic acid absorbed in the weathering of rocks at the surface, and the consequent production of carbonates, represents an enormous abstraction of this gas.

As at present constituted, the atmosphere is regarded as a

1 The subject of the age of the earth has also been discussed by Professor J. Joly and Professor W. J. Sollas. The former geologist, approaching the question from a novel point of view, has estimated the total quantity of sodium in the water of the ocean and the quantity of that element received annually by the ocean from the denudation of the land. Dividing the one sum by the other, he arrives at the result that the probable age of the earth is between 90 and 100 millions of years (Trans. Roy. Dublin Soc. ser. ii. vol. vii., 1899, p. 23; Geol. Mag., 1900, p. 220). Professor Sollas believes that this limit exceeds what is required for the evolution of geological history, that the lower limit assigned by Lord Kelvin falls short of what the facts demand, and that geological time will probably be found to have been comprised within some indeterminate period between these limits. (Address to Section C, Brit. Assoc. Report, 1900; Age of the Earth, London, 1905.)

mechanical mixture of nearly four volumes of nitrogen and one of oxygen, together with an average of 3-5 parts of carbon dioxide in every 10,000 parts of air, and minute quantities of various other gases and solid particles. Of the vapours contained in it by far the

most important is that of water which, although always present, varies greatly in amount according to variations in temperature. By condensation the water vapour appears in visible form as dew, mist, cloud, rain, hail, snow and ice, and in these forms includes and carries down some of the other vapours, gases and solid particles present in the air. The circulation, of water from the atmosphere to the land, from the land to the sea, and again from the sea to the land, forms the great geological process whereby the habitable condition of the planet is maintained and the surface of the land is sculptured (Part IV.).

2. The Hydrosphere. — The water envelope covers nearly three-fourths of the surface of the earth, and forms the various oceans and seas which, though for convenience of reference distinguished by separate names, are all linked together in one great body. The physical characters of this vast envelope are discussed in separate articles (see Ocean and Oceanography). Viewed from the geological standpoint, the features of the sea that specially deserve attention are first the composition of its waters, and secondly its movements.

Sea-water is distinguished from that of ordinary lakes and rivers by its greater specific gravity and its saline taste. Its average density is about 1-026, but it varies even within the same ocean, being least where large quantities of fresh water are added from rain or melting snow and ice, and greatest where evaporation is most active. That sea-water is heavier than fresh arises from the greater proportion of salts which it contains in solution. These salts con- stitute about three and a half parts in every hundred of water. They consist mainly of chlorides of sodium and magnesium, the iulphates of magnesium, calcium and potassium, with minuter quantities of magnesium bromide and calcium carbonate. Still smaller proportions of other substances have been detected, gold for example having been found in the proportion of 1 part in 15,180,000.

That many of the salts have existed in the sea from the time of its first condensation out of the primeval atmosphere appears to be probable. It is manifest, however, that, whatever may have been the original composition of the oceans, they have for a vast section of geological time been constantly receiving mineral matter In solution from the land. Every spring, brook and river removes various salts from the rocks over which it moves, and these sub- stances, thus dissolved, eventually find their way into the sea. Consequently sea-water ought to contain more or less traceable proportions of every substance which the terrestrial waters can remove from the land, in short, of probably every element present in the outer shell of the

globe, for there seems to be no constituent of this earth which may not, under certain circumstances, be held in solution in water. Moreover, unless there be some counteracting process to remove these mineral ingredients, the ocean water ought lo be growing, insensibly perhaps, but still assuredly, Salter, for the supply of saline matter from the land is incessant.

To the geologist the presence of mineral solutions in sea-water is ,1 fact of much importance, for it explains the origin of a considerable part of the stratified rocks of the earth's crust. By evaporation the water has given rise to deposits of rock-salt, gypsum and other materials. The lime contained in solution, whether as sulphate or carbonate, has been extracted by many tribes of marine animals, which have thus built up out of their remains vast masses of solid limestone, of which many mountain-chains largely consist. .

Another important geological feature of the sea is to be seen in the fact that its basins form the great receptacles for the detritus worn away from the land. Besides the limestones, the visible parts Df the terrestrial crust are, in large measure, composed of sedimentary rocks which were originally laid down on the sea-bottom. More-over, by its various movements, the sea occupies a prominent place among the epigene or superficial agents which produce geological changes on the surface of the globe.

3. The Lilhosphere. — Beneath the gaseous and liquid envelopes lies the solid part of the planet, which is conveniently regarded as consisting of two parts, — (a) the crust, and (b) the interior or nucleus.

It was for a long time a prevalent belief that' the interior of the globe is. a molten mass round which an outer shell has gradually The crust. f° rrne d through cooling. Hence the term "crust" was applied to this external solid envelope, which

were adduced to show the great rigidity of the earth as a whole, the idea of a thin crust enclosing a molten nucleus was reluctantly abandoned by geologists, who found the problem of the earth's interior to be incapable of solution by any evidence which their science could produce, They continued, however, to use the term " crust " as a convenient word to denote the cool outer layer of the earth's mass, the structure and history of which form the main subjects of geological investigation. More recently, however, various lines of research have concurred in suggesting that, whatever may be the condition of the interior, its substance must differ greatly from

that of the outer shell, and that there may be more reason than appeared for the retention of the name of crust. Observations on earthquake motion by Dr John Milne and others, show that the rate and character of the waves transmitted through the interior of the earth differ in a marked degree from those propagated along the crust. This difference indicates that rocky material, such as we know at the surface, may extend inwards for some 30 m., below which the earth's interior rapidly becomes fairly homo- geneous and possesses a high rigidity. From measurements of the force of gravity in India by Colonel S. G. Burrard, it has been inferred that the variations in density of the outer parts of the earth do not descend farther than 30 or 40 m., which might be assumed to be the limit of the thickness of the crust. Recent researches in regard to the radio-active substances present in rocks suggest that the crust is not more than 50 m. thick, and that the interior differs from it in possessing little or no radio-active material.

Though we cannot hope ever to have direct acquaintance with more than the mere outside skin of our planet, we may be led to infer the irregular distribution of materials within the crust from the present distribution of land and interior water, and the observed differences in the amount of deflection of the plumb-line near the sea and near mountain- chains. The fact that the southern hemisphere is almost wholly covered with water appears explicable only on the assumption of an excess of density in the mass of that portion of the planet. The existence of such a vast sheet of water as that of the Pacific Ocean is to be accounted for, as Archdeacon J. H. Pratt pointed out, by the presence of " some excess of matter in the solid parts of the earth between the Pacific Ocean and the earth's centre, which retains the water in its place, otherwise the ocean would flow away to the other parts of the earth." A deflection of the plumb-line towards the sea, which has in a number of cases been observed, indicates that " the density of the crust beneath the mountains must be less than that below the plains, and still less than that below the ocean-bed." Apart therefore from the depression of the earth's surface in which the oceans lie, we must regard the internal density, whether of crust or nucleus, to be somewhat irregularly arranged, there being an excess of heavy materials in the water hemisphere, and beneath the ocean-beds, as compared with the continental masses.

In our ignorance regarding the chemical constitution of the nucleus of our planet, an argument has sometimes been based upon the known fact that the specific gravity of the globe as a whole is about double that of the crust. This has been held by some writers to prove that the interior must consist of much heavier material and is

therefore probably metallic. But the effect of pressure ought to make the density of the nucleus much higher, even if the interior consisted of matter no heavier than the crust. That the total density of the planet does not greatly exceed its observed amount seems only explicable on the supposition that some antagonistic force counteracts the effects of pressure. The only force we can suppose capable of so acting is heat. But comparatively little is yet known regarding the compression of gases, liquids and solids under such vast pressures as must exist within the nucleus.

That the interior of the earth possesses a high temperature is inferred from the evidence of various sources. (1) Volcanoes, which are openings that constantly, or intermittently, give out hot vapours and molten lava from reservoirs beneath the crust. Besides active volcanoes, it is known that former eruptive vents

have been abundantly and widely distributed over the globe from the earliest geological periods down to our own day. (2) Hot springs are found in many parts of the globe, with temperatures varying up to the boiling point of water. (3) From mines, tunnels and deep borings into the earth it has been ascertained that in all quarters of the globe below the superficial zone of invariable temperature, there is a progressive increase of heat towards the interior. The rate of this increase varies, being influenced, among other causes, by the varying conductivity of the rocks. But the average appears to be about i° Fahr. for every 50 or 60 ft. of descent, as far down as observations have extended. Though the increase may not advance in the same proportion at great depths, the inference has been confidently drawn that the temperature of the nucleus must be exceedingly high.

The probable, condition of the earth's interior has been a fruit- ful source of speculation ever since geology came into existence; but no general agreement has been arrived at on the subject. Three chief hypotheses have been propounded: (1) that the nucleus is a molten mass enclosed within a solid shell; (2) that, save in local vesicular spaces which may be filled with molten or gaseous material, the globe is solid and rigid to the centre; (3) that the great body of the nucleus consists of incandescent vapours and gases, especially vaporous iron, which under the gigantic pressure within the earth are

so compressed as to confer practical rigidity on the globe as a whole, and that outside this main part of the nucleus the gases pass into a shell of molten magma, which, in turn, shades off outwards into the compara- tively thin, cool solidified crust. Recent seismological observa- tions have led to the inference that the outer crust, some 30 to 45 m. thick, must rapidly merge into a fairly homogeneous nucleus which, whatever be its constitution, transmits undulatory movements through its substance with uniform velocity and is believed to possess a high rigidity.

The origin of the earth's high internal temperature has been variously accounted for. Most usually it has been assumed to be the residue of the original " tracts of fluent heat " out of which the planet shaped itself into a globe. According to another supposition the effects of the gradual gravitational compression of the earth's mass have been the main source of the high temperature. Recent researches in radio-activity, to which reference has already been made, have indicated another possible source of the internal heat in the presence of radium in the rocks of the crust. This substance has been detected in all igneous rocks, especially among the granites, in quantity sufficient, according to the Hon. R. J. Strutt, to account for the observed temperature-gradient in the crust, and to indicate that this crust cannot be more than 45 m. thick, otherwise the outflow of heat would be greater than the amount actually ascertained. Inside this external crust containing radio-active substances, it is supposed, as already stated, that the nucleus consists of some totally different matter containing little or no radium.

Constitution of the Earth's Crust. — As the crust of the earth contains the " geological record," or stony chronicle from which geology interprets the history of our globe, it forms the main subject of study to the geologist. The materials of which this crust consists are known as minerals and rocks. From many chemical analyses, which have been made of these materials, the general chemical constitution of, at least, the accessible portion of the crust has been satisfactorily ascertained. This information becomes of much importance in speculations regarding the early history of the globe. Of the elements known to the chemist the great majority form but a small proportion of the composition of the crust, which is mainly built up of about twenty of them. Of these by far the most important are the non-metallic elements oxygen and silicon. The former forms about 47 % and the latter rather more than 28 % of the original crust, so that these two elements make up about three- fourths of the whole. Next after them come the metals aluminium (8- 16%), iron (4-64), calcium (3-50), magnesium (2-62), sodium (2-63), and

potassium (2-35). The other twelve elements included in the twenty vary in amount from a proportion of 0-41 % in the case of titanium, to not more than o-oi % of chlorine, fluorine, chromium, nickel and lithium. The other fifty or more elements exist in such minute proportions in the crust that, probably, not one of them amounts to as much as o-oi %, though they include the useful metals, except iron. Taking the crust, and the external

envelopes of the ocean and the air, we thus perceive that these outer parts of our planet consist of more than three-fourths of non- metals and less than one-fourth of metals.

The combinations of the elements which are of most importance in the constitution of the terrestrial crust consist of oxides. From the mean of a large number of analyses of the rocks of the lower or primitive portion of the crust, it has been ascertained that silica (SiOa) forms almost 60% and alumina (A! 2 3) upwards of 15% of the whole. The other combinations in order of importance are lime (CaO) 4-90%, magnesia (MgO) 4-36, soda (Na 2 0) 3-55, ferrous oxide (FeO) 3-52, potash (K 2 0) 2-80, ferric oxide (Fe»0 3) 2-63, water (H 2 0) 1-52, titanium oxide (TiOz) o-6o, phosphoric acid (P2O5) 0-22 ; the other combinations of elements thus form less than 1 % of the crust.

These different combinations of the elements enter into further combinations with each other so as to produce the wide assortment of simple minerals (see Mineralogy). Thus, silica and alumina are combined to form the aluminous silicates, which enter so largely into the composition of the crust of the earth. The silicates of magnesia, potash and soda constitute other important families of minerals. A mass of material composed of one, but more usually of more than one mineral, is known as a rock. Under this term geologists are accustomed to class not only solid stone, such as granite and limestone, but also less coherent materials such as clay, peat and even loose sand. The accessible portion of the earth's crust consists of various kinds of rocks, which differ from each other in structure, composition and origin, and are therefore susceptible of diverse classifications according to the point of view from, which they are considered. The details of this subject will be found in the article Petrology.

Classification of Rocks. — Various systems of classification of rocks have been proposed, but none of them is wholly satisfactory. The most useful -arrangement for most purposes of the geologist is one based on the broad differences between them in regard to their mode

of origin. From this point of view they may be ranged in three divisions :

1. In the first place, a large number of rocks may be described as original or underived, for it is not possible to trace them back to any earlier source. They belong to the primitive constitution of the planet, and, as they have all come up from below through the crust, they serve to show the nature of the material which lies immediately below the outer parts of that crust. They include the numerous varieties of lava, which have been poured out in a molten state from volcanic vents, also a great series of other rocks which, though they may never have been erupted to the surface, have been forced upward in a melted condition into the other rocks of the crust and have solidified there. From their mode of origin this great class of rocks has been called " igneous " or " eruptive." As they generally show no definite internal structure save such as may result from joints, they have been termed "massive" or " unstratified," to distinguish them from those of the second division which are strongly marked out by the presence of a stratified structure. The igneous rocks present a considerable range of composition. For the most part they consist mainly of aluminous silicates, some of them being highly acid compounds with 75 % or more of silica. But they also include highly basic varieties wherein the proportion of silica sinks to 40%, and where magnesia greatly predominates over alumina. The textures of igneous rocks likewise comprise a wide series of varieties. On the one hand, some are completely vitreous, like obsidian, which is a natural glass. From this extreme every gradation may be traced through gradual increase of the products of devitrification, until the mass may become completely crystalline. Again, some crystalline igneous rocks are so fine in grain as not to show their component crystals save under the micro- scope, while in others the texture is so coarse as to present the component minerals in separate crystals an inch or more in length. These differences indicate that, at first, the materials of the rock may have been as completely molten as artificial glass, and that the crystalline condition has been subsequently developed by cooling, and the separation of the chemical constituents into definite crystal- line minerals. Many of the characters of igneous rocks have been reproduced experimentally by fusing together their minerals, or the constituents of their minerals, in the proper proportion. But it has not yet been found possible to imitate the structure of such rocks as granite. Doubtless these rocks consolidated with extreme slowness at great depths below the surface, under vast pressures and probably in the presence of water or water-vapour — conditions which cannot be adequately

imitated in a laboratory.

Though theigneous rocks occupy extensive areas in some countries, they nevertheless cover a much smaller part of the whole surface of the land than is taken up by the second division or stratified rocks. But they increase in quantity downwards and probably extend continuously round the globe below the other rocks. This important series brings before us the relations of the molten magma within the earth to the overlying crust and to the outer surface. On the one hand, it includes the oldest and most deep-seated extravasations of that magma, which have been brought to light by ruptures and upheavals of the crust and prolonged denudation. On the other, it presents to our study the varied outpourings of molten and fragmentary materials in the discharges of modern and ancient

volcanoes. Between these two extremes of position and age, we find that the crust has been, as it were, riddled with injections of the magma from below. These features will be further noticed in Part V. of this article.

2. The " sedimentary " or " stratified rocks " form by much the larger part of the dry land of the globe, and they are prolonged to an unknown distance from the shores under the bed of the sea. They include those masses of mineral matter which, unlike the igneous rocks, can be traced back to a definite origin on the surface of the earth. Three distinct types may be recognized among them :

(a) By far the largest proportion of them consists of different kinds of sediment derived from the disintegration of pre-existing rocks. In this " fragmental " group are placed all the varieties of shingle, gravel, sand, clay and mud, whether these materials remain in a loose incoherent condition, or have been compacted into solid stone.

(b) Another group consists of materials that have been deposited by chemical precipitation from solution in water. The white, sinter laid down by calcareous springs is a familiar example on a small scale. Beds of rock-salt, gypsum and dolomite have, in some regions, been accumulated to a thickness of many thousand feet, by successive precipitations of the salt contained in the water of inland seas, (c) An abundant and highly important series of sedi- mentary formations

has been formed from the remains of plants and animals. Such accumulations may arise either from the transport and deposit of these remains, as in the case of sheets of drift-wood, and banks of drifted sea-shells, or from the growth and decay of the organisms on the spot, as happens in peat bogs and in coral- reefs.

As the sedimentary rocks have for the most part been laid down under water, and more especially on the sea-floor, they are often spoken of as " aqueous," in contradistinction to the igneous rocks. Some of them, however, are accumulated by the drifting action of wind upon loose materials, and are known as " aeolian " formations. Familiar instances of such wind-formed deposits are the sand-dunes along many parts of the sea coast. Much more extensive in area are the sands of the great deserts in the arid regions of the globe.

It is from the sedimentary rocks that the main portion of geological history is derived. They have been deposited one over another in successive strata from a remote period in the development of the globe down to the present time. From this arrangement they have been termed " stratified," in contrast to the unstratified or igneous series. They have preserved memorials of the geographical revolutions which the surface . of the earth has undergone; and above all, in the abundant fossils which they have enclosed, they furnish a momentous record of the various tribes of plants and animals which have successively flourished on land and sea. Their investigation is thus the most important task which devolves upon the geologist.

3. In the third place comes a series of rocks which are not now in their original condition, but have undergone such alteration as to have acquired new characters that more or less conceal their first structures. Some of them can be readily recognized as altered igneous masses; others are as manifestly of sedimentary origin; while of many it is difficult to decide what may have been their pristine character. To this series the term " metamorphic " has been applied. Its members are specially distinguished bya prevailing fissile, or schistose, structure which they did not at first possess, and which differs from anything found in unaltered igneous or sedimentary rocks. This fissility is combined with a more or less pronounced crystalline structure. These changes are believed to be the result of movements within the crust of the earth, whereby the most solid rocks were crushed and sheared, while, at the same time, under the influence of a high temperature and the presence of water, they underwent internal chemical reactions, which led to a rearrangement and recomposition of their mineral constituents and the production

of a crystalline structure (see Metamorphism).

Among the less altered metamorphic rocks of sedimentary origin, the successive laminae of deposit of the original sediment can be easily observed; but they are also traversed by a new set of divi- sional planes, along which they split across the original bedding. Together with this superinduced cleavage there have been developed in them minute hairs, scales and rudimentary crystals. Further stages of alteration are marked by the increase of micaceous scales, garnets and other minerals, especially along the planes of cleavage, until the whole rock becomes crystalline, and displays its chief component minerals in successive discontinuous folia which merge into each other, and are often crumpled and puckered. Massive igneous rocks can be observed to have undergone intense crushing and cleavage, and to have ultimately assumed a crystalline foliated character. Rocks which present this aspect are known as schists (?.».). They range from the finest silky slates, or phyllites, up to the coarsest gneisses, which in hand-specimens can hardly be distin- ‘ guished from granites. There is indeed every reason to believe that such gneisses were probably originally true granites, and that their foliation and recrystallization have been the result of meta- morphism.

The schists are more especially to be found in the heart of mountain- chains, and in regions where the lowest and oldest parts of the earth’s crust have, in the course of geological revolutions, been exposed to the light of day. They have been claimed by some

writers to be part of the original or primitive surface of our globe that first consolidated on the molten nucleus. But the progress of investigation all over the world has shown that this supposition cannot be sustained. The oldest known .rocks present none of the characters of molten material that has cooled and hardened in the air, like the various forms of recent lava. On the contrary, they possess many of the features characteristic of bodies of eruptive material that have been injected into the crust at some depth under- ground, and are now visible at the surface, owing to the removal by denudation of the rocks under which they consolidated. In their less foliated portions they can be recognized as true eruptive rocks. In many places gneisses that possess a thoroughly typical foliation have been found to pierce ancient sedimentary formations as intrusive bosses and veins.

Part IV. — Dynamical Geology

This section of the science includes the investigation of those processes of change which are at present in progress upon the earth, whereby modifications are made on the structure and composition of the crust, on the relations between the interior and the surface, as shown by volcanoes, earthquakes and other terrestrial disturbances, on the distribution of oceans and continents, on the outlines of the land, on the form and depth of the sea-bottom, on climate, and on the races of plants and animals by which the earth is tenanted. It brings before us, in short, the whole range of activities which it is the province of geology to study, and leads us to precise notions regarding their relations to each other and the results which they achieve. A knowledge of this branch of the subject is thus the essential groundwork of a true and fruitful acquaintance with the principles of geology, seeing that it necessitates a study of the present order of nature, and thus provides a key for the interpretation of the past.

The whole range of operations included within the scope of inquiry in this branch of the science may be regarded as a vast cycle of change, into which we may break at any point, and round which we may travel, only to find ourselves brought back to our starting-point. It is a matter of comparatively small moment at what part of the cycle we begin our inquiries. We shall always find that the changes we see in action have resulted from some that preceded, and give place to others which follow them.

At an early time in the earth's history, anterior to any of the periods of which a record remains in the visible rocks, the chief sources of geological action probably lay within the earth itself. If, as is generally supposed, the planet still retained a great store of its initial heat, it was doubtless the theatre of great chemical changes, giving rise, perhaps, to manifestations of volcanic energy somewhat like those which have so marvellously roughened the surface of the moon. As the outer layers of the globe cooled, and the disturbances due to internal heat and chemical action became less marked, the conditions would arise in which the materials for geological history were accumu- lated. The influence of the sun, which must always have operated, would then stand out more clearly, giving rise to that wide circle of superficial changes wherein variations of tempera- ture and the circulation of air and water over the surface of the earth come into play.

In the pursuit of his inquiries into the past history and into the present rSgime of the earth, the geologist must needs keep his mind ever open to the reception of evidence for kinds and especially for

degrees of action which he had not before imagined. Human experience has been too short to allow him to assume that all the causes and modes of geological change have been definitively ascertained. On the earth itself there may remain for future discovery evidence of former operations by heat, magnetism, chemical change or otherwise, which may explain many of the phenomena with which geology has to deal. Of the influences, so many and profound, which the sun exerts upon our planet, we can as yet only perceive a little. Nor can we tell what other cosmical influences may have lent their aid in the evolution of geological changes.

Much useful information regarding many geological processes has been obtained from experimental research in laboratories and elsewhere, and much more may be confidently looked for

from future extensions of this method of inquiry. The early experiments of Sir James Hall, already noticed, formed the starting-point for numerous subsequent researches, which have elucidated many points in the origin and history of rocks. It is true that we cannot hope to imitate those operations of nature which demand enormous pressures and excessively high tempera- tures combined with a long lapse of time. But experience has shown that in regard to a large. number of processes, it is possible to imitate nature's working with sufficient accuracy to enable us to understand them, and so to modify and control the results as to obtain a satisfactory solution of some geological problems.

In the present state of our knowledge, all the geological energy upon and within the earth must ultimately be traced back to the primeval energy of the parent nebula or sun. There is, however, a certain propriety and convenience in distinguishing between that part of it which is due to the survival of some of the original energy of the planet and that part which arises from the present supply of energy received day by day from the sun. In the former case we have to deal with the interior of the earth, and its reaction upon the surface; in the latter, we deal with the surface of the earth and to some extent with its reaction on the interior. This distinction allows of a broad treatment of the subject under two divisions:

I. Hypogene or Plutonic Action: The changes within the earth caused by internal heat, mechanical movement and chemical rearrangements.

■ *II. Epigene or Surface Action: The changes produced on the superficial parts of the earth, chiefly by the circulation of air and water set in motion by the sun's heat.*

DIVISION I —HYPOGENE OR PLUTONIC ACTION In the discussion of this branch of the subject we must carry in our minds the conception of a globe still possessing a high internal temperature, radiating heat into space and consequently contracting in bulk. Portions of molten rocks from inside are from time to time poured out at the surface. Sudden shocks are generated by which destructive earthquakes are propagated through the diameter of the globe as well as to and along its surface. Wide geographical areas are pushed up or sink down. In the midst of these movements remarkable changes are produced upon the rocks of the crust; they are plicated, fractured, crushed, rendered crystalline and even fused.

(A) Volcanoes and Volcanic Action.

This subject is discussed in the article Volcano, and only a general view of its main features will be given here. Under the term volcanic action (vulcanism, vulcanicity) are embraced all the phenomena connected with the expulsion of heated materials from the interior of the earth to the surface. A volcano may be denned as a conical hill or mountain, built up wholly or mainly of materials which have been ejected from below, and which have accumulated around the central vent of eruption. As a rule its truncated summit presents a cup-shaped cavity, termed the crater, at the bottom of which is the opening of the main funnel or pipe whereby com- munication is maintained with the heated interior. From time to time, however, in large volcanoes rents are formed on the sides of the cone, whence steam and other hot vapours and also streams of molten lava are poured forth. On such rents smaller or parasitic cones are often formed, which imitate the operations of the parent cone and, after repeated eruptions, may rise to hills hundreds of feet in height. In course of centuries the result of the constant outpouring of volcanic materials may be to build up a large mountain like Etna, which towers above the sea to a height of 10,840 feet, and has some 200 minor cones along its flanks.

But all volcanic eruptions do not proceed from central orifices. In Iceland it has been observed that, from fissures opened in the ground

and extending for long distances, molten material has issued in such abundance as to be spread over the surrounding country for many miles, while along the lines of fissure small cones or hillocks of fragmentary material have accumulated round more active parts of the rent. There is reason to believe that in the geological past this fissure-type of eruption has repeatedly been developed, as well as the more common form of central cones like Vesuvius or Etna.

In the operations of existing volcanoes only the superficial manifestations of volcanic action are observable. But when the rocks of the earth's crust are studied, they are found to enclose the relics of former volcanic eruptions. The roots of ancient volcanoes have thus been laid bare by geological revolutions; and some of the

subterranean phases of volcanic action are thereby revealed which are wholly concealed in an active volcano. Hence to obtain as complete a conception as possible of the nature and history of volcanic action, regard must be had, not merely to modern volcanoes, but to the records of ancient eruptions which have been preserved within the crust.

The substances discharged from volcanic vents consist of — (1) Gases and vapours: which, dissolved in the molten magma of the interior, take the chief share in volcanic activity. They include in greatest abundance water-gas, which condenses into the clouds of steam so conspicuous in volcanic eruptions. Hydrochloric acid and sulphuretted hydrogen are likewise plentiful, together with many other substances which, sublimed by the high internal tem- perature, take a solid form on cooling at the surface. (2) Molten rock or lava: which ranges from the extremely acid type of the obsidians and rhyolites with 70 % or more of silica, to the more basic and heavy varieties such as basalts and leucite-lavas with much iron, and sometimes no more than 45% of silica. The specific gravity of lavas varies between 2-37 and 3-22, and the texture ranges from nearly pure glass, like obsidian, to a coarse granitoid compound, as in some rhyolites. (3) Fragmentary materials, which are sometimes discharged in enormous quantity and dispersed over a wide extent of country, the finer particles being transported by upper air-currents for hundreds of miles. These materials arise either from the explosion of lava by the sudden expansion of the dissolved vapours and gases, as the molten rock rises to the surface, or from the breaking up and expulsion of portions of the walls of the vent, or of the lava, which happens to have solidified within these walls. They vary from the finest impalpable dust and ashes, through increasing stages of coarseness up to huge " bombs " torn from the upper surface of the

molten rock in the vent, and large blocks of already solidified lava, or of non-volcanic rock detached from the sides of the pipe up which the eruptions take place.

Nothing is yet known as to the determining cause of any particular volcanic eruption. Some vents, like that of Stromboli, in the Mediterranean, are continually active, and have been so ever since man has observed them. Others again have been only intermittently in eruption, with intervals of centuries between their periods of activity. We are equally in the dark as to what has determined the sites on which volcanic action has manifested itself. There is reason, indeed, to believe that extensive fractures of the terrestrial crust have often provided passages up which the vapours, imprisoned in the internal magma, have been able to make their way, accom- panied by other products. Where chains of volcanoes rise along definite lines, like those of Sumatra, Java, and many other tracts both in the Old and the New World, there appears to be little doubt that their linear distribution should be attributed to this cause. But where a volcano has appeared by itself, in a region previously exempt from volcanic action, the existence of a contributing fissure cannot be so confidently presumed. The study of certain ancient volcanoes, the roots of which have been exposed by long denudation, has shown an absence of any visible trace of the"ir having availed themselves of fractures in the crust. The inference has been drawn that volcanic energy is capable of itself drilling an orifice through the crust, probably at some weaker part, and ejecting its products at the surface. The source of this energy is to be sought in the enormous expansive force of the vapours and gases dissolved in the magma. They are kept in solution by the enormous.pressure within the earth ; but as the lava approaches the surface and this pressure is relieved these dissolved vapours and gases rush out with explosive violence, blowing the upper part of the lava column into dust, and allowing portions of the liquid mass below to rise and escape, either from the crater or from some fissure which the vigour of explosion has opened on the side of the cone. So gigantic is the energy of these pent-up vapours, that, after a long period of volcanic quiescence, they sometimes burst forth with such violence as to blow off the whole of the upper part or even one side of a large cone. The history of Vesuvius, and the great eruptions of Krakatoa in 1883 and of Bandaizan in 1888 furnish memorable examples of great volcanic convulsions. It has been observed that such stupendous discharges of aeriform and fragmentary matter may be attended with the emission of little or no lava. On the other hand, some of the largest outflows of lava have been accompanied by comparatively little fragmentary

material. Thus, the great lava-floods of Iceland in 1783 spread for 40 m. away from their parent fissure, which was marked only by a line of little cones of slag.

The temperature of lava as it issues from underground has been measured more or less satisfactorily, and affords an indication of that existing within the earth. At Vesuvius it has been ascertained to be more than 2000° Fahr. At first the molten rock glows with a ‘ white light, which rapidly reddens, and disappears under the rugged brown and black crust that forms on the surface. Underneath this badly conducting crust, the lava cools so slowly that columns of steam have been noticed rising from its surface more than 80 years after its eruption.

Considerable alteration in the topography of volcanic regions

may be produced by successive eruptions. The fragmentary

materials are sometimes discharged in such abundance as to cover

the ground for many miles around with a deposit of loose ashes,

I cinders and slag. Such a deposit accumulating to a depth of many

feet may completely bury valleys and water-courses, and thus greatly affect the drainage. The coarsest materials accumulate nearest to the vent that emits them. The finer dust is not infre- quently hurled forth with such an impetus as to be carried for thousands of feet into the tracks of upper air-currents, whereby it may be borne for hundreds of miles away from the vent so as ulti- mately to fall to the ground in countries far removed from any active volcano. Outflows of lava, from their greater solidity and durability, produce still more serious and lasting changes in the external features of the ground over which they flow. As they naturally seek the lowest levels, they find their way into the channels of streams. If they keep along the channels, they seal them up under a mass of compact stone which the running water, if not wholly diverted elsewhere, will take many long centuries to cut through. If, on the other hand, the lava cresses a stream, it forms a massive dam, above which the water is ponded back so as to form a lake.

As the result of prolonged activity a volcanic cone is gradually built up by successive outflows of lava and showers of dust and stones. These materials are arranged in beds, or sheets, inclined outwards from the central vent. On surrounding level ground the alternating beds are flat. In course of time, deep gullies are cut on the outer slopes of the cone by rain, and by the heavy showers that arise from the condensation of the copious discharges^ of steam during eruptions. Along the sides of these ravines instructive sections may be studied of the volcanic strata. The larger rivers of some volcanic regions have likewise eroded vast gorges in the more horizontal lavas and ashes of the flatter country, and have thus laid bare stupendous cliffs, along which the successive volcanic sheets can be seen piled above each other for many hundred feet. On a small scale, some of these features are well displayed among the rivers that drain the volcanic tracts of central France; on a great scale, they are presented in the course of the Snake river, and other streams that traverse the great volcanic country of western North America. Similar volcanic scenery has been produced in western Europe by the action of denudation in dissecting the flat Tertiary lavas of Scotland, the Faeroe Isles and Iceland.

Of special interest to the geologist are those volcanoes which have taken their rise on the sea-bottom; for the volcanic intercalations among the stratified formations of the earth's crust are almost entirely of submarine origin. Many active volcanoes situated on islands have begun their eruptions below sea-level. Both Vesuvius and Etna sprang up on the floor of the Mediterranean sea, and have gradually built up their cones into conspicuous parts of the dry land. Examples of a similar history are to be found among the volcanic islands of the Pacific Ocean. In some of these cases a movement of elevation has carried the submarine lavas, tuffs and agglomerates above sea-level, and has furnished opportunities of comparing these materials with those of recent subaerial origin, and also with the ancient records of submarine eruptions which have been preserved among the stratified formations. From the evidence thus supplied, it can be shown that the materials ejected from modern submarine volcanic vents closely resemble those accumulated by subaerial volcanoes; that the dust, ashes and stones become intermingled or interstratified with coral-mud, or other non-volcanic deposit of the sea-bottom, that vesicular lavas may be intercalated among them as on land, and that between the successive sheets of volcanic origin, layers of limestone may be laid down which are composed chiefly, or wholly, of the remains of calcareous marine organisms.

Though active volcanoes are widely distributed over the globe, and

are especially abundant around the vast basin of the Pacific Ocean, they afford an incomplete picture of the extent to which volcanic action has displayed itself on the surface of our planet. When the rocks of the land are attentively studied they disclose proofs of that action in many districts where there is now no outward sign of it. Not only so, but they reveal that volcanoes have been in eruption in some of these districts during many different periods of the past, back to the beginnings of geological history. The British Islands furnish a remarkable example of such a series of ancient eruptions. From the Cambrian period all through Palaeozoic times there rose at intervals in that country a succession of volcanic centres from some of which thousands of feet of lavas and tuffs were dis- charged. Again in older Tertiary times the same region witnessed a stupendous outpouring of basalt, the surviving relics of which are more than 3000 ft. thick, and cover many hundreds of square miles. Similar evidence is supplied in other countries both in the Old and the New world. Hence it is proved that, in the geological past, volcanic action has been vigorous at long intervals on the same sites during a vast series of ages, though no active vents are to be seen there now. The volcanoes now active form but a small pro- portion of the total number which has appeared on the surface of the earth.

With regard to the- cause of volcanic action much has been , speculated, but little can be confidently affirmed. That water in the form of occluded gas plays the chief part in forcing the lava column up a volcanic chimney, and in the violent explosions that accompany the rise of the molten material, is generally admitted. But opinions differ as to the source of this water. According to some investigators, it should be regarded as in large measure of meteoric origin, derived from the descent of rain into the earth, and its absorption by the molten magma in the interior. Others, con-

tending that the supply so furnished, even if it could reach and be dissolved in the magma, would yet be insufficient to furnish the prodigious quantity of aqueous vapour discharged during an eruption, maintain that the water belongs to the magma itself. They point to the admitted fact that many substances, particularly metals in a state of fusion, can absorb large quantities of vapours and gases without chemical combination, and on cooling discharge them with eruptive phenomena somewhat like those of volcanoes. This question must be regarded as one of the still unsolved problems of geology.

(B) Movements of the Earth's Crust.

Among the hypogene forces in geological dynamics an important

place must be assigned to movements of the terrestrial crust. Though the expression " the solid earth " has become proverbial, it appears singularly inappropriate in the light of the results obtained in recent years by the use of delicate instruments of observation. With the facilities supplied by these instruments (see Seismometer), it has been ascertained that the ground beneath our feet is subject to continual slight tremors, and feeble pulsations of longer duration, some of which may be due to daily or seasonal variations of tem- perature, atmospheric pressure or other meteorological causes. The establishment of self-recording seismometers all over the world has led to the detection of many otherwise imperceptible shocks, over and above the appreciable earth-waves propagated from earths quake centres of disturbance. Moreover, it has been ascertained that some parts of the surface of the land, are sloy/ly rising, while others are falling with reference to the sea-level. From time to time the surface suffers calamitous devastation from earthquakes, when portions of the crust under great strain suddenly give way. Lastly, at intervals, probably separated from each other by vast periods of time, the terrestrial crust undergoes intense plication arid fracture, and is consequently ridged up into mountain-chains. No event of this kind has been witnessed since man began to record his experiences. But from the structure of mountains, as laid open by prolonged denudation, it is possible to form a vivid conception of the nature and effects of these most stupendous of all geological revolutions.

In considering this department of geological inquiry it will be convenient to treat it under the following heads: (1) Slow depres- sion and upheaval; (2) Earthquakes; (3) Mountain-making; (4) Metamorphism of rocks.

I. Slow Depression and Upheaval. — On the west side of Japan the land is believed to be sinking below the sea, for fields are replaced by beaches of sand or shingle, while the depth of the sea off shore has perceptibly increased. A subsidence of the south of Sweden has taken place in comparatively recent times, for streets and foundations of houses at successive levels are found below high-water mark. The west coast of Greenland over an extent of more than 600 m. is sinking, and old settlements are now submerged. Proofs of submergence of land are furnished by "submerged forests," and beds of terrestrial peat now lying at various depths below the level of the sea, of which many examples have been collected along the shores of the British Isles, Holland and France. Interestingevidence that the west of Europe now stands at a lower level than it did at a late geological period is supplied in the charts of the North Sea and Atlantic, which show that the valleys of the land are prolonged under

the sea. These valleys have been eroded Out of the rocks by the streams which flow in them, and the depth of their submerged portions below the sea level affords an indication of the extent of the subsidence.

The uprise of land has been detected in various parts of the world. One of the most celebrated instances is that of the shores of the Gulf of Bothnia, where, at Stockholm, the elevation, between the years 1774 and 1875, appears to have been 48 centimetres (185 in.) in a century. But on the west side of Sweden, fronting the Skager Rak, the coast, between the years 1820 and 1870, rose 30 centimetres, which is at the rate of 60 centimetres, or nearly 2 ft. in a century. In the region of the Great Lakes in the interior of Canada and the United States it has been ascertained that the land is undergoing a slow tilt towards the south-west, of which the mean rate appears to be rather less than 6 in. in a century. If this rate of change should continue the waters of Lake Michigan, owing to the progress of the tilt, will, in some 500 or 600 years, submerge the city of Chicago, and eventually the drainage of the lakes will be diverted into the basin of the Mississippi. Proof of recent emergence of land is supplied by what are called " raised beaches " or " strand-lines," that is, lines of former shores marked by sheets of littoral deposits, or platforms cut by shore-waves in rock and flanked by old sea-cliffs and lines of sea-worn caves. Admirable examples of these features are to be seen along the west coast of Europe from the south of England to the north of Norway. These lines of old shores become fainter in proportion to their antiquity. In Britain they occur at various heights, the platforms at 25, 50 and 100 ft. being well marked.

The cause of these slow upward and downward movements of the crust of the earth is still imperfectly understood. Upheaval might conceivably be produced by an ascent of the internal magma, and the consequent expansion of the overlying crust by heat ; while depression might follow any subsidence of the magma, or its displacement

to another district. If, as is generally believed, the globe is still contracting., the shrinkage of the surface may cause both these movements. Subsidence will be in excess, but between subsiding tracts lateral thrust may suffice to push upward intervening more

solid and stable ground ; but no solution of the problem yet proposed is wholly satisfactory.

2. Earthquakes, — As this subject is discussed in a separate article it will be sufficient here to take note of its more important geological bearings. It was for many centuries taken for granted that earthquakes and volcanoes are due to a common cause. We have seen that in classical antiquity they were looked on as the results of the movements of wind imprisoned within the earth. Long after this notion was discarded, and a more scientific appreciation of volcanic action was reached, it was still thought that earthquakes should be regarded as manifestations of the same source of energy as that which displays itself in volcanic eruptions. It is true that earthquakes are frequent in districts of active volcanoes, and they may undoubtedly be often due there to the explosions of the magma, or to the rupture of rocks caused by its ascent towards the surface. But such shocks are comparatively local in their range and feeble in their effects. There is now a general agreement that between the great world-shaking earthquakes and volcanic phenomena, no immediate and intimate relationship ca.n be traced, though they may be connected in ways which are not yet perceived. Some of the more recent great earthquakes on land have proved that the waves of shock are produced by the sudden rupture or collapse of rocks under great strain, either along lines of previous fracture or of new rents in the terrestrial crust; and that such ruptures may occur at a remote distance from any volcano. Thus the recent disastrous San Francisco earthquake has been recognized to have resulted from a slipping of ground along the line of an old fault, which has been traced for a long distance in California generally parallel to the coast. The position of this fault at the surface has long been clearly followed by its characteristic topography. After the earthquake these superficial features were found to have been removed by the same cause that had originated them. For some 300 m. on the track of this old fault-line a renewed slipping was seen to have taken place along one or both sides, and the ground at the surface was ruptured as well as displaced horizontally. Obviously, the jar occasioned by the sudden and simultaneous subsidence of a portion of the earth's crust several hundred miles long, must be far more serious than could be produced by an earthquake radiating from a single local volcanic focus.

From their disastrous effects on buildings and human lives, an exaggerated importance has been imputed to earthquakes as agents of geological change. Experience shows that even after a severe shock which may have destroyed numerous towns and villages, together with thousands of their inhabitants, the face of the country has

suffered scarcely any perceptible change, and that, in the course of a year or two, when the ruined houses and prostrate trees have been cleared away, little or no obvious trace of the catastrophe may remain. Among the more enduring records of a great earthquake may be enumerated (a) landslips, which lay bare hillsides, and sometimes pond back the drainage of valleys so as to give rise to lakes; (b) alterations of the topography, as in Assuring of the ground, or in the production of inequalities whereby the drainage is affected; new valleys and new lakes may thus be formed, while previously existing lakes may be emptied; (c) permanent changes of level, either in an upward or downward direction.

3. Mountain-mahing.— This subject may be referred to here for the striking evidence which it supplies of the importance of move- ments of the earth's crust among geological processes. The structure of a great mountain-chain such as the Alps proves that the crust of the earth has been intensely plicated, crumpled and fractured. Vast piles of sedimentary strata have been folded to such an extent as to occupy now only half of their original horizontal extent. This compression in the case of the Alps has been computed to amount to as much as 120,000 metres or 74 English miles, so that two points on the opposite sides of that chain have been brought by so much nearer to each other than they were originally before the movements. Besides such intense plication, extensive rupturing of the crust has taken place in the same range of mountains. Not only have the most ancient rocks been squeezed up into the central axis of the chain, but huge slices of them have been torn away from the main body, and thrust forward for many miles, so as now actually to form the summits of mountains, which are almost entirely composed of much younger formations. If these colossal disturbances occurred rapidly, they would give rise to cataclysms of inconceivable magnitude over the surface of the globe. No record has been dis- covered of such accompanying devastation. But whether sudden and violent, or prolonged and gradual, such stupendous upturningfs of the crust did undoubtedly take place, as is clearly revealed in

• innumerable natural sections, which have been laid open by the denudation of the crests and sides of the mountains.

4. Metamorphism of Rocks (see Metamorphism). — During the movements to which the crust of the earth has been subject, not only have the rocks been folded and fractured, but they have like- wise, in many regions, acquired new internal structures, and have thus undergone a process of " regional metamorphism." This rearrangement of their substance has been governed by conditions

which are probably .not yet all.recognized, but among them we should doubtless include a high temperature, intense pressure, mechanical movement resulting in ‘ crushing, shearing and foliation, and the presence of water in their pores. It is among igneous rocks that the progressive stages of; metamorphism can be most easily traced. Their definite original structure and mineral composition afford a starting-point from which the investigation may be begun and . pursued. Where an igneous rock has been invaded by metamorphic changes, it may be observed to have been first broken down into separate lenticles, the cores of which may still retain, with little or no alteration, the original characteristic minerals and crystalline structure of the rock. Between these lenticles, the intervening portions have been crushed down into a powder or paste, which seems to have been squeezed round and past them, and shows a laminated arrangement that resembles the flow-structure in. lavas. As the degree of metamorphism .increases, the lenticles diminish in size, and the intervening crushed and foliated matrix increases in amount, until at last it may form the entire mass of the rock. While the original minerals are thus broken down, new varieties make their appearance. Of these, among the earliest to present themselves are usually the micas, that impart their characteristic silvery sheen to the. surfaces of the folia along which, they spread. Younger felspars, as well as mica, are developed, and there arise also silli- manite, garnet, andalusite and many others. The texture becomes more coarsely . crystalline, and the segregation of the constituent minerals more definite along the lines of foliation. From the finest silky phyllites a graduation may be traced through successively coarser mica-schists, until .we reach the almost granitic texture of the coarsest gneisses.

Regional metamorphism has arisen in the heart of mountain- chains, and in any other district where the deformation of the crust has been sufficiently intense. There is another type of alteration termed ” contact-inetamorphism,” which is developed around masses of igneous rock, especially where these have been intruded in large bosses, among.stratified formations. It is particularly displayed around masses of granite, where sandstones are found altered into quaftzite, shales and grits into schistose compounds, and where some- times fossils are still recognizable among the metamorphic minerals.

DIVISION II.— EPIGENE OR SUPERFICIAL ACTION

It is on the surface of the globe, and by the operation of agents working there, that at present the chief amount of visible geo- logical

change is effected. In considering this branch of inquiry, we are not involved in a preliminary difficulty regarding the very nature of the agencies as is the case in the investigation of plutonic action. On the contrary, the surface agents are carrying on their work under our very eyes. We can watch it in all its stages, measure its progress, and mark in many ways how accurately it represents similar changes which, for long ages previously, must have been effected by the same means. But in the systematic treatment of this subject we encounter a difficulty of another kind. We discover thatwhile the operations to be discussed are numerous and readily observable, they are so interwoven into one great network that any separation of them under different subdivisions is sure to be more or less artificial and to convey an erroneous impression. While, therefore, under the unavoidable necessity of making use of such a classification of subjects, .we must always bear in mind that it is employed merely for convenience, and that in nature superficial geological action must be. continually viewed as a whole, since the work of each agent has constant reference to that of the others,, and is not properly intelligible unless that connexion be kept in view.

The movements of 'the air; the evaporation from land and sea; the fall of rain, hail and snow; the flow of rivers and glaciers; the tides, currents and waves of the ocean; the growth and decay of organized existence, alike on land and in the depths of the sea;— in short, the whole circle of movement, which is continually in progress upon the surface of our planet, are the subjects now to be examined. , It is desirable to adopt some general term to embrace the whole of this range of inquiry. For this end the word epigene (Gr. hri, upon) has been suggested as a convenient term, and antithetical to hypogene (Gr. imb, under), or subterranean action.

A simple arrangement of this part of Geological Dynamics is in three sections:

A. Air. — The influence of the atmosphere in destroying and

. forming rocks.

B. Water. — The geological functions of the circulation' of

water through the air and between sea and land, and the action of the sea.

C. Life. — The part taken by plants and animals in preserving, destroying or reproducing geological formations.

The words destructive, reproductive and conservative, employed in describing the operations of the epigene agents, do not necessarily imply that anything useful to man is destroyed, reproduced or preserved. On the contrary, the destructive action of the atmosphere may turn barren rock into rich soil, while its reproductive effects sometimes turn rich land into barren desert. Again, the conservative influence of vegetation has sometimes for centuries retained as barren morass what might otherwise have become rich meadow or luxuriant wood- land. The terms, therefore, are used in a strictly geological sense, to denote the removal and re-deposition of material, and its agency in preserving what lies beneath it.

(A) The Air. As a geological agent, the air brings about changes partly by its component gases and partly by its movements. Its destructive action is both chemical and mechanical. The chemical changes are probably mainly, if not entirely, due to the moisture of the air, and particularly to the gases, vapours and organic matter which the moisture contains. Dry air seems to have little or no appreciable influence in promoting these reactions. As the changes in question are similar to those much more abundantly brought about by rain they are described in the following section under the division on rain. Among the more recognizable mechanical changes effected in the atmosphere, one of considerable importance is to be seen in the result of great and rapid changes of temperature. Heat expands rocks, while cold contracts them. In countries with a great annual range of temperature, considerable difficulty is sometimes experienced in selecting building materials liable to be little affected by the alternate expansion and contraction, which prevents the joints of masonry from remaining close and tight. In dry tropical climates, where the days are intensely hot and the nights extremely cold, the rapid nocturnal contraction produces a strain so great as to rival frost in its influence upon the surface of exposed rocks, disintegrating them into sand, or causing them to crack or peel off in skins or irregular pieces. Dr Livingstone found in Africa (12° S. lat., 34 E. long.) that surfaces of rock which during the day were heated up to 137° Fahr., cooled so rapidly by. radiation at night that, unable to sustain the strain of contraction, they split and threw off sharp angular fragments from a few ounces to 100 or 200 lb in weight. In temperate regions this action, though much less pronounced, still makes itself felt. In these climates, however, and

still more in high latitudes, somewhat similar results are brought about by frost. By its motion in wind the air drives loose sand over rocks, and in course of time abrades and smoothes them. " Desert polish " is the name given to the characteristic lustrous surface thus imparted. Holes are said to be drilled in window glass at Cape Cod by the same agency. Cavities are now and then hollowed out of rocks by the gyration in them of little fragments of stone or grains of sand kept in motion by the wind. Hurricanes form important geological agents upon land in uprooting trees, and thus sometimes impeding the drainage of a country and giving rise to the formation of peat mosses.

The reproductive action of the air arises partly from the effect of the chemical and mechanical disintegration involved in the process of " weathering," and partly from the transporting power of wind and of aerial currents. The layer of soil, which covers so much of the surface of the land, is the result of the decay of the underlying rocks, mingled with mineral matter blown overthe ground by wind, or washed thither by rain, and with the mouldering remains of plants and animals. The extent to which fine dust may be transported over the surface of the land can hardly be realized in countries clothed with a covering of vegetation, though even there, in dry weather during spring, clouds of dust may often be seen blown away by wind from bare ploughed fields. Intercepted by the leaves of plants and washed down to their roots by rain, this dust goes to increase the soil below. In arid climates, where dust clouds are dense and frequent, enormous quantities of fine mineral particles are thus borne along and accumulated. The remarkable deposit of " Loess," which is sometimes more than 1500 ft. thick and covers extensive areas in China and other countries, is regarded as due to the drifting of dust by wind. Again the dunes of sand so abundant along the inner side _ of sandy sea-beaches in many different parts of the world are attributable to the same action.

(B) Water.

In treating of the epigene action of water in geological processes it will be convenient to deal first with its operations in traversing the land, and then with those which it performs in the sea. The circulation of water from land to sea and again from sea -to land constitutes the fundamental cause of most of the daily changes by which the surface of the land is affected.

1. Rain. — Rain effects two kinds of changes upon the surface of the land. It acts chemically upon soils and stones, and sinking under

ground continues a great series of similar reactions there. It acts mechanically, by washing away loose materials, and thus powerfully affecting the contours of the land. Its chemical action depends mainly upon the nature and proportion of the substances which, in descending to the earth, it abstracts from the atmosphere. Rain always absorbs a little air, which, in addition to its nitrogen and oxygen, contains carbonic acid, and in minute proportions, sodium chloride, sulphuric acid and other ingredients, especially inorganic dust, organic particles and living germs. Probably the most generally efficient of these constituents are oxygen, carbonic acid and organic matter. Armed with these reagents, rain effects a chemical decomposition of the rocks on which it falls, and through which it sinks underground. The principal changes thus produced are as follows: (a) Oxidation. — Owing to the prominence of oxygen in rain-water, and its readiness to unite with any substance which can contain more of it, a thin oxidized pellicle is formed on the surface of many rocks on which rain falls, and this oxidized layer if not at once washed off, sinks deeper until a crust is formed over the stone. A familiar illustration of this action is afforded by the rust, or oxide, which forms on iron when exposed to moisture, though this iron may be kept long bright if allowed to remain screened from moist air and rain, (b) Deoxidation. — Organic matter having an affinity for more oxygen decomposes peroxides by depriving them of some part of their share of that element and reducing them to protoxides. These changes are especially noticeable among the iron oxides so abundantly diffused among rocks. Hence rain-water, in sinking through soil and obtaining such organic matter, becomes thereby a reducing agent, (c) Solution. — This may take place either by the simple action of the water, as in the solution of rock-salt, or by the influence of the carbonic acid present in the rain, (d) Formation of Carbonates. — A familiar example of the action of carbonic acid in rain is to be seen in the corrosion of exposed marble slabs. The carbonic acid dissolves some of the lime, which, as a bicarbonate, is held in solution in the carbonated water, but is deposited again when the water loses its carbonic acid or evaporates. It is not merely carbonates, however, which are liable to this kind of destruc- tion. Even silicates of lime, potash and soda, combinations existing abundantly as constituents of rocks, are attacked; their silica is liberated, and their alkalis or alkaline earths, becoming carbonates, are removed in solution, (e) Hydration. — Some minerals, containing little or no water, and therefore called anhydrous, when exposed to the action of the atmosphere, absorb water, or become hydrous, and are then usually more prone to further change. Hence the rocks of which they form part become disintegrated.

Besides the reactions here enumerated, a considerable amount of decay may be observed as the result of the presence of sulphuric and nitric acid in the air, especially in that of large towns and manufacturing districts, where much coal is consumed. Metallic surfaces, as well as various kinds of stone, are there corroded, while the mortar of walls may often be observed to be slowly swelling out and dropping off, owing to the conversion of the lime into sulphate. Great injury is likewise done from a similar cause to marble monuments in exposed graveyards.

The general result of the disintegrating action of the air and of rain, including also that of plants and animals, to be noticed in the sequel, is denoted by the term " weathering." The amount of decay depends partly on conditions of climate, especially the range of temperature, the abundance of moisture, height above the sea and exposure to prevalent winds. Many rocks liable to be saturated with rain and rapidly dried under a warm sun are apt to disintegrate at the surface with comparative rapidity. The nature and progress of the weathering are mainly governed by the composition and texture of the rocks exposed to it. Rocks composed of particles liable to little chemical change from the influence of moisture are best fitted to resist weathering, provided they possess sufficient cohesion to withstand the mechanical processes of disintegration. Siliceous sandstones are excellent examples of this permanence. Consisting wholly or mainly of the durable mineral quartz, they are sometimes able so to withstand decay that buildings made of them still retain, after the lapse of centuries, the chisel-marks of the builders. Some rocks, which yield with comparative rapidity to the chemical attacks of moisture, may show little or no mark of disintegration on their surface. This is particularly the case with certain calcareous rocks._ Limestone when pure is wholly soluble in acidulated water. Rain falling on such a rock removes some of it in solution, and will continue to do so until the whole is dissolved away. But where a limestone is full of impurities, a weathered crust of more or less insoluble particles remains after the solution of the calcareous part of the stone. Hence the relative purity of limestones may be_ roughly determined by examining their weathered surfaces, where, if they contain much sand, the grains will be seen projecting from the calcareous matrix, and where, should the rock be very ferruginous, the yellow hydrous peroxide, or ochre, will be found as a powdery crust. In limestones containing abundant encrinites, shells, or other organic remains,_ the weathered surface commonly presents the fossils standing out in relief. The crystalline arrange- ment of the lime in the organic structures enables them to resist disintegration

better than the general mechanically aggregated matrix of the rock. An experienced fossil collector will always search well such weathered surfaces, for he often finds there, delicately

picked out by the weather, minute and frail fossils which are wholly invisible on a freshly broken surface of the stone. Many rocks weather with a thick crust, or even decay inwards for many feet or yards. Basalt, for example, often shows a yellowish-brown ferruginous layer on its surface, formed by the conversion of its felspar into kaolin, and the removal of its calcium silicate as carbonate, by the hydration of its olivine and augite and their conversion into serpentine, or some other hydrous magnesian silicate, and by the conversion of its magnetite into limonite. Granite sometimes shows in a most remarkable way the distance to which weathering can reach. It may occasionally be dug into for a depth of 20 or 30 ft., the quartz crystals and veins retaining their original positions, while the felspar is completely kaolinized. It is to the endlessly varied effects of weathering that the abundant fantastic shapes assumed by crags and other rocky masses are due. Most varieties of rock have their own characteristic modes of weathering, whereby they may be recognized even from a distance. To some of these features reference will be made in Part VIII.

The mechanical action of rain, which is intimately bound up with its chemical action, consists in washing off the fine superficial particles of rocks which have been corroded and loosened by the process of weathering, and in thus laying open fresh portions to the same influences of decay. The detritus so removed is partly carried down into the soil which is thereby enriched, partly held in suspension in the little runnels into which the rain-drops gather as they begin to flow over the land, partly pushed downwards along the surface of sloping ground. A good deal of it finds its way into the nearest brooks and rivers, which are consequently made muddy by heavy rain.

It is natural that a casual consideration of the subject should lead to an impression that, though the general result of the fall of rain upon a land-surface must lead to some amount of disintegration and lowering of that surface, the process must be so slow and slight as

hardly to be considered of much importance among geological operations. But further attention will show such an impression to be singularly erroneous. It loses sight of the fact that a change which may be hardly appreciable within a human lifetime, or even within the comparatively brief span of geological time embraced in the compass of human history, may nevertheless become gigantic in its results in the course of immensely protracted periods. An instructive lesson in the erosive action of rain may be found in the pitted and channelled surface of ground lying under the drip of the eaves of a cottage. The fragments of stone and pebbles of gravel that form part of the soil can there be seen sticking out of the ground, because being hard they resist the impetus of the falling drops, protecting for a time the earth beneath them, while that which surrounded and covered them is washed away. From this familiar illustration the observer may advance through every stage in the disappearance of material which once covered the surface, until he comes to examples where once continuous and thick sheets of solid rock have been reduced to a few fragments or have been entirely removed. Since the whole land surface over which rain falls is exposed to this waste, the superficial covering of decayed rock or soil, as Hutton insisted, is constantly, though imperceptibly, travel- ling outward and downward to the sea. In this process of transport rain is an important carrying agent, while at the same time it serves to connect the work of the other disintegrating forces, and to make it conducive to the general degradation of the land. Though this decay is general and constant, it is obviously not uniform. In some places where, from the nature of the rock, from the flatness of the ground, or from other causes, rain works 'under great difficulties, the rate of waste may be extremely slow. In other places it may be rapid enough to be appreciable from year to year. A survey of this department of geological activity shows how unequal wasting by rain, combined with the operations of brooks and rivers, has produced the details of the present relief of the land, those tracts where the destruction has been greatest forming hollows and valleys, others, where it has been less, rising into ridges and hills (Part VIII.). Rain-action is not merely destructive, but is accompanied with reproductive effects, chief of which is the formation of soil. In favourable situations it has gathered together accumulations of loam and earth from neighbouring higher ground, such as the " brick- earth," " head," and " rain-wash " of the south of England — earthy deposits, sometimes full of angular stones, derived from the subaerial waste of the rocks of the neighbourhood.

2. Underground Water. — Of the rain which falls upon the land one portion flows off into brooks and rivers by which the water is

conducted back to the ocean; the larger part, however, sinks into the ground and disappears. It is this latter part which has now to be considered. Over and above the proportion of the rainfall _ which is absorbed by living vegetation and by the soil, there is a continual filtering down of the water from the surface into the rocks that lie below, where it partly lodges in pores and interstices, and partly finds its way into subterranean joints and fissures, in which it performs an underground circulation, and ultimately issues once more at the surface in the form of springs (q.v.). In the course of this circulation the water performs an important geological task. Not only carrying down with it the substances which the rain has abstracted from the air, but obtaining more acids and organic matter from the soil, it is enabled to effect chemical changes in the

rocks underneath, and especially to dissolve limestone and other calcareous formations. So considerable is the extent of this solution in some places that the springs which come to the surface, and begin there to evaporate and lose some of their carbonic acid, contain more dissolved lime than they can hold. They consequently deposit it in the form of calcareous tuff or sinter (q.v.). Other subterranean waters issue with a large proportion of iron-salts in solution which form deposits of ochre. The various mineral springs so largely made use of for the mitigation or cure of diseases owe their pro- perties to the various salts which they have dissolved out of rocks underground. As the result of prolonged subterranean solution in limestone districts, passages and caves (q.v.), sometimes of great width and length, are formed. When these lie near the surface their roofs sometimes fall in and engulf brooks and rivers, which then flow for some way underground until the tunnels conduct them back again to daylight on some lower ground.

Besides its chemical activity water exerts among subterranean rocks a mechanical influence which leads to important changes in the topography of the surface. In removing the mineral matter, either in solution or as fine sediment, it sometimes loosens the support of overlying masses of rock which may ultimately give way on sloping ground, and rush down the declivities in the form of landslips. These destructive effects are specially frequent on the sides of valleys in mountainous countries and on lines of sea-cliff.

3. Brooks and Rivers.— As geological agents the running waters on the face of the land play an important part in epigene changes. Like rain and springs they have both a chemical and a mechanical action. The latter receives most attention, as it un- doubtedly is the more important; but the former ought not to be omitted in any survey of

the general waste of the earth's surface. The water of rivers must possess the powers of a chemical solvent like rain and springs, though its actual work in this respect can be less easily measured, seeing that river water is directly derived from rain and springs, and necessarily contains in solution mineral sub- stances supplied to it by them and not by its own operation. Never- theless, it is sometimes easy to prove that streams dissolve chemically the rocks of their channels. Thus, in limestone districts the base of the cliffs of river ravines may be found eaten away into tunnels, arches, and overhanging projections, presenting in their smooth surfaces a great contrast to the angular jointed faces of the same rock, where now exposed to the influence only of the weather on the higher parts of the cliff.

The mechanical action of rivers consists (a) in transporting mud, sand, gravel and blocks of stone from higher to lower levels; (b) in using these loose materials to widen and deepen their channels by erosion ; (c) in depositing their load of detritus wherever possible and thus to make new geological formations.

(a) Transporting Power. — River-water is distinguished from that of springs by being less transparent, because it contains more or less mineral matter in suspension, derived mainly from what is washed down by rain, or carried in by brooks, but partly also from the abrasion of the water-channels by the erosive action of the rivers themselves. The progress of this burden of detritus may be instruc- tively followed from the mountain-tributaries of a river down to the mouth of the main stream. In the high grounds the water- courses may be observed to be choked with large fragments of rock disengaged from the cliffs and crags on either side. Traced downwards the blocks are seen to become gradually smaller and more rounded. They are ground against each other, and upon the rocky sides and bottom of the channel, getting more and more reduced as they descend, and at the same time abrading the rocks over or against which they are driven. Hence a great deal of debris is produced, and is swept along by the onward and downward movement of the water. The finer portions, such as mud and fine sand, are carried in suspension, and impart the characteristic turbidity to river- water; the coarser sand and gravel are driven along the river- bottom. The proportion of suspended mineral matter has been ascertained with more or less precision for a number of rivers. As an illustrative example of a river draining a vast area with different climates, forms of surface and geological structure the Mississippi may be cited. The average proportion of sediment in its water was ascertained by Humphreys and Abbot to be iˆnr by weight

or tsW by volume. These engineers found that, in addition to this suspended material, coarse detritus is constantly being pushed forward along the bed of the river into the Gulf of Mexico, to an amount which they estimated at about 750,000,000 cubic ft. of sand, earth and gravel ; they concluded that the Mississippi carries into the gulf every year an amount of mechanically transported sediment sufficient to make a prism one square mile in area and 268 ft. in height.

(b) Excavating Power. — It is by means of the sand, gravel and stones which they drive against the sides and bottoms of their channels that streams have hollowed out the beds in which they flow. Not only is the coarse detritus reduced in size by the friction of the stones against each other, but, at the same time, these materials abrade the rocks against which they are driven by the current. Where, owing to the shape of the bottom of the channel, the stones are caught in eddies, and are kept whirling round there, they become more and more worn down themselves, and at the same time scour out basin-shaped cavities, or " pot-holes," in the solid rock below.

The uneven bed of a swiftly flowing stream may in this way be honeycombed with such eroded basins which coalesce and thus appreciably lower the surface of the bed. The steeper the channel, other conditions being equal, the more rapid will be the erosion. Geological structure also affects the character and rate of the excava- tion. Where the rocks are so arranged as to favour the formation and persistence of a waterfall, a long chasm may be hollowed out. like that of the Niagara below the falls, where a hard thick bed of nearly flat limestone lies on softer and more easily eroded shales. The latter are scooped out from underneath the limestone, which from time to time breaks off in large masses and the waterfall gradually retreats up stream, while the ravine is proportionately lengthened. To the excavating power of rivers the origin of the valley systems of the dry land must be mainly assigned (see Part VI 1 1.). (c) Reproductive Power. — So long as a stream flows over a steep declivity its velocity suffices to keep the sediment in suspension, but when from any cause, such as a diminution of slope, the velocity is checked, the transporting power is lessened and the sediment begins to fall to the bottom and to remain there. Hence various river-formed or " alluvial " deposits are laid down. These some- times cover considerable spaces at the foot of mountains. The floors of valleys are strewn with detritus, and their level may thereby be sensibly raised. In floods the ground inundated on either side of a stream intercepts some part of the detritus, which is then spread over the flood-plain and gradually heightens it. At the same time the stream continues to erode the channel, and ultimately is unable to reach the old flood-plain. It consequently forms a new plain at a lower level, and thus, by degrees, it comes to be flanked on either side by a series of successive terraces or platforms, each of which marks one of its former levels. Where a river enters a large body of water its current is checked. Some of its sediment is consequently dropped, and by slow accumulation forms a delta (q.v.). On land, every lake in mountain districts furnishes instances of this kind of alluvium. But the most important deltas are those formed in the sea at the mouths of the larger rivers of the globe. Off many coast- lines the detritus washed from the land gathers into bars, which enclose long strips of water more or less completely separated from the sea outside and known as lagoons. A chain of such lagoon- barriers stretches for hundreds of miles round the Gulf of Mexico and the eastern shores of the United States.

4. Lakes. — These sheets of water, considered as a whole, do not belong to the normal system of drainage on the land whereby valleys are excavated. On the contrary they are exceptional to it ; for the

constant tendency of running water is to fill them up, or to drain them by wearing down the barriers that contain them at their outflow. Some of them are referable to movements of the terrestrial crust whereby depressions arise on the surface of the land, as has been noted after earthquakes. Others have arisen from solution such as that of rock-salt or of limestone, the removal of which by underground water causes a subsidence of the ground above. A third type of lake-basin occurs in regions that are now or have once been subject to the erosive action of glaciers (see under next sub- division, Terrestrial Ice). Many small lakes or tarns have been caused by the deposit of debris across a valley as by landslips or moraines. Considered from a geological point of view, lakes perform an important function in regulating the drainage of the ground below their outfall and diminishing the destructive effects of floods, in filtering the water received from their affluent streams, and in providing undisturbed areas of deposit in which thick and extensive lacustrine formations may be accumulated. In the inland basins of some dry climates the lakes are salt, owing to excess of evaporation, and their bottoms become the sites of chemical deposits, particularly of chlorides of sodium and magnesium, and calcium sulphate and carbonate.

5. Terrestrial Ice. — Each of the forms assumed by frozen water has its own characteristic action in geological processes. Frost has a powerful influence in breaking up damp soils and surfaces of stone in the pores or cracks of which moisture has lodged. The water in freezing expands, and in so doing pushes asunder the component particles of soil or stone, or widens the space between the walls of joints or crevices. When the ice melts the loosened grains remain apart ready to be washed away by rain or blown off by wind, while by the widening of joints large blocks of rock are detached from the faces of cliffs. Where rivers or lakes are frozen over the ice exerts a marked pressure on their banks; and when it breaks up large sheets of it are driven ashore, pushing up quantities of gravel and stones above the level of the water. The piling up of the dis- rupted ice against obstructions in rivers ponds back the water, and often leads to destructive floods when the ice barriers break. Where the ice has formed round boulders in shallow water, or at the bottom ("anchor-ice"), it may lift these up when the frost gives way,' and may transport them for some distance. Ice formed in the ■ atmosphere, and descending to the ground in the form of hail, often causes great destruction to vegetation and not infrequently to animal life. Where the frozen moisture reaches the earth as snow, it serves to protect rock, soil and vegetation from the effectsof frost; but on sloping

ground it is apt to give rise to destructive avalanches or landslips, while indirectly, by its rapid melting, it may cause serious floods in rivers.

But the most striking geological work performed by terrestrial

ice is that achieved by glaciers (q.v.) and ice-sheets. These vast masses of moving ice, when they descend from mountains where the steeper rocks are clear of snow, receive on their surface the debris detached by frost from the declivities above, and bear these materials to lower levels or to the sea. Enormous quantities of rock-rubbish are thus transported in the Alps and other high mountain ranges. When the ice retreats the boulders carried by it are dropped where it melts, and left there as memorials of the former extension of the glaciers. Evidence of this nature proves the much wider extent of the Alpine ice at a comparatively recent geological date. It can also be shown that detritus from Scandinavia has been ice-borne to the south-east of England and far into the heart of Europe.

The ice, by means of grains of sand and pieces of stone which it drags along, scores, scratches and polishes the surfaces of rock underneath it, and, in this way, produces the abundant fine sediment that gives the characteristic milky appearance to the rivers that issue from the lower ends of glaciers. By such long-continued attrition the rocks are worn down, portions of them of softer nature, or where the ice acts with especial vigour, are hollowed out into cavities which, on the disappearance of the ice, may be filled with water and become tarns Or lakes. Rocks over which land-ice has passed are marked by a peculiar smooth, flowing outline, which forms a contrast to the more rugged surface produced by ordinary weathering. They are covered with groovings, which range from the finest striae left by sharp grains of sand to deep ruts ground out by blocks of stone. The trend of these markings shows the direction in which the ice flowed. By their evidence the position and move- ment of former glaciers in countries from which the ice has entirely vanished may be clearly determined (see Glacial Period).

6. The Sea. — The physical features of the sea are discussed in separate articles (see Ocean and Oceanography). The sea must be regarded as the great regulator of temperature and climate over the globe, and as thus exerting a profound influence on the distribu- tion of plant and animal life. Its distinctly geological work is partly erosive and partly reproductive. As an eroding agent it must to some extent effect chemical decompositions in the rocks and sedi- ments over which it spreads; but these changes have not yet been

satisfactorily studied. Undoubtedly, its chief destructive power is of a mechanical kind, and arises from the action of its waves in beating upon shore-cliffs. By the alternate compression and expansion of the air in crevices of the rocks on which heavy breakers fall, and by the hydraulic pressure which these masses of sea- water exert on the walls of the fissures into which they rush, large masses of rock are loosened and detached, and caves and tunnels are drilled along the base of sea-cliffs. Probably still more efficacious are the blows of the loose shingle, which, caught up and hurled forward by the waves, falls with great force upon the shore rocks, battering them as with a kind of artillery until they are worn away. The smooth surfaces of the rocks within reach of the waves contrasted with their angular forms above that limit bear witness tothe amount of waste while the rounded forms of the boulders and shingle show that they too are being continually reduced in size. Thus the sea, by its action on the coasts, produces much sediment, which is swept away by its waves and currents and strewn over its floor. Besides this material, it is constantly receiving the fine silt and sand carried down by rivers. As the floor of the ocean is thus the final receptacle for the waste of the land, it becomes the chief era on the surface of the globe for the accumulation of new stratified formations. And such has been one of its great functions since the beginning of geological time, as is proved by the rocks that form the visible part of the earth's crust, and consist in great part of marine deposits. Chemical precipitates take place more especially in enclosed parts of the sea, where concentration of the water by evaporation can take place, and where layers of sodium chloride, calcium sulphate and carbonate, and other salts are laid down. But the chief marine accumulations are of detrital origin. Near the land and for a variable distance extending sometimes to 200 or 300 m. from shore the deposits consist chiefly of sediments derived from the waste of the land, the finer silts being transported farthest from their source. At greater depths and distances the ocean floor receives a slow deposit of exceedingly fine clay, which is believed to be derived from the decomposition of pumice and volcanic dust from insular or sub- marine volcanoes. Wide tracts of the bottom are covered with various forms of ooze derived from the accumulation of the remains of minute organisms.*

(C) Life.

Among the agents by which geological changes are carried on upon the surface of the globe living organisms must be enumerated. Both plants and animals co-operate with the inorganic agents in promoting the degradation of the land. In some cases, on the other hand, they protect rocks from decay, while, by the accumulation of their

remains, they give rise to extensive formations both upon the land and in the sea. Their operations may hence be described as alike destructive, conservative and reproductive. Under this head- ing also the influence of Man as a geological agent deserves notice.

(a) Plants. — Vegetation promotes the disintegration of rocks and soil in the following ways: (r) By keeping the surfaces of stone moist, and thus promoting both mechanical and chemical dissolution, as is especially shown by liverworts, mosses and other moisture- loving plants. (2) By producing through their deca.v carbonic and

other acids, which, together with decaying organic matter taken up by passing moisture, become potent in effecting the chemical decom- position of rocks and in promoting the disintegration of soils. (3) By inserting their roots or branches between joints of rock, which are thereby loosened, so that large slices may be eventually wedged off. (4) By attracting rain, as thick woods, forests and peat-mosses do, and thus accelerating the general waste of a country by running water. (5) By promoting the decay of diseased and dead plants and animals, as when fungi overspread a damp rotting tree or the carcase . of a dead animal.

That giants also exert a conservative influence on the surface of the land is shown in various ways. (1) The formation of a stratum of turf protects the soil and rocks underneath from being rapidly disintegrated and washed away by atmospheric action. (2) Many plants, even without forming a layer of turf, serve by their roots or branches to protect the loose sand or soil on which they grow from being removed by wind. The common sand-carex and other arenace- ous plants bind the loose sand-dunes of our coasts, and give them a permanence, which would at once be destroyed were the sand laid bare again to storms. The growth of shrubs and brushwood along the course of a stream not only keeps the alluvial banks from being so easily undermined and removed as would otherwise be the case, but serves to arrest the sediment in floods, filtering the water and thereby adding to the height of the flood plain. (3) Some marine plants, like the calcareous nullipores, afford protection to shore rocks by covering them with a hard incrustation. The tangles and smaller Fuci which grow abundantly on the littoral zone break the

force of the waves or diminish the effects of ground swell. (4) Forests and brushwood protect the soil, especially on slopes, from being washed away by rain or ploughed up by avalanches.

Plants contribute by the aggregation of their remains to the formation of stratified deposits. Some marine algae which secrete carbonate of lime not only encrust rocks but give rise to sheets of submarine limestone. An analogous part is played in fresh-water lakes by various lime-secreting plants, such as Chara. Long-continued growth of vegetation has, in some regions, produced thick accumulations of a dark loam, as in the black cotton soil (regur) of India, and the black earth (tchernozoni) of Russia. Peat-mosses are formed in temperate and arctic climates by the growth of marsh-loving plants, sometimes to a thickness of 40 or 50 ft. In tropical regions the mangrove swamps on low moist shores form a dense jungle, sometimes 20 m. broad, which protects these shores from the sea until, by the arrest of sediment and the constant contribution of decayed vegetation, the spongy ground is at last turned into firm soil. Some plants (diatoms) can abstract silica and build it into their framework, so that their remains form a siliceous deposit or ooze which covers spaces of the deep sea-floor estimated at more than ten millions of square miles in extent.

(6) Animals. — These exert a destructive influence in the following ways: (i).By seriously affecting the composition and arrangement of the vegetable soil. Worms bring up the lower portions of the soil to the surface, and while thus promoting its fertility increase its liability to be washed away by rain. Burrowing animals, by throwing up the soil and subsoil, expose these to be dried and blown ‘ away by the wind. At the same time their subterranean passages serve to drain off the superficial water and to injure the stability of the surface of the ground above them. In Britain the mole and rabbit are familiar examples. (2) By interfering with or even divert- ing the flow of streams. Thus beaver-dams check the current of \;ater-courses, intercept floating materials, and sometimes turn streams into new channels. The embankments of the Mississippi are sometimes weakened to such an extent by the burrowings of the cray-fish as to give way and allow the river to inundate the sur- rounding country. Similar results have happened in Europe from subterranean operations of rats. (3) Some mollusca bore into stone or wood and by the number of contiguous perforations greatly weaken the material. (4) Many animals exercise a ruinously destructive influence upon vegetation. Of the numerous plagues of this kind the locust, phylloxera and Colorado beetle may be cited. The most important geological function performed- by animals is the formation

of new deposits out of their remains. It is chiefly by the lower grades of the animal kingdom that this work is accom- plished, especially by molluscs, corals and foraminifera. Shell-banks are formed abundantly in such comparatively shallow and enclosed basins as that of the North Sea, and on a much more extensive scale on the floor of the West Indian seas. By the coral polyps thick masses of limestones have been built up in the warmer seas of the globe (see Coral Reefs). The floor of the Atlantic and other oceans is covered with a fine calcareous ooze derived mainly from the remains of foraminifera, while in Other regions the bottom shows a siliceous ooze formed almost entirely of radiolaria. Vertebrate animals give rise to phosphatic deposits formed sometimes of their excrement, as in guano and coprolites, sometimes of an accumulation of their bones.

(c) Man. — No survey of the geological workings of plant and animal life upon the surface of the globe can be complete which does not take account of the influence of man — an influence of enormous and increasing consequence in physical geography, for man has introduced, as it were, an element of antagonism to nature. His interference shows itself in his relations to climate, where he has

affected the meteorological conditions of different countries: (1) By removing forests, and laying bare to. the sun and winds areas which were previously kept cool and damp under trees, or which, lying on the lee side, were protected from tempests. It is supposed that the wholesale destruction of the woodlands formerly existing in countries bordering the Mediterranean has been in part the cause of the present desiccation of these districts. (2) By drainage, whereby the discharged rainfall is rapidly removed, and the evaporation is lessened, with a consequent diminution of rainfall and some increase in the general temperature of a country. (3) By the other processes of ■ *agriculture, such as the transformation, of moor and bog into cultivated land, and the clothing of bare hillsides with green crops or plantations of coniferous and hardwood trees.*

Still more obvious are the results of human interference with the flow of water: (1) By increasing or diminishing the rainfall man directly affects the volume of rivers. (2) By his drainage operations he makes the rain to run off more rapidly than before, and thereby increases the magnitude of floods and of the destruction caused by them. (3) By wells, bores, mines, or other subterranean' Works he interferes with the underground waters, and consequently with the discharge of springs. (4) By embanking rivers he confines them to narrow channels, sometimes increasing their scour, and enabling them to

carry their sediment further seaward, sometimes causing them to deposit it over the plains and raise their level. (5) By his engineering operations for water-supply he abstracts water from its natural basins and depletes the streams.

In many ways man alters the aspect of a country: (1) By changing forest into bare mountain, or clothing bare mountains with forest.

(2) By promoting the growth or causing the removal, of peat-mosses.

(3) By heedlessly uncovering sand-dunes, and thereby setting in motion a process of destruction which may convert hundreds of acres of fertile land into waste sand, or by prudently planting the dunes with- sand-loving vegetation and thus arresting their landward progress. (4) By so guiding the course of rivers as to make them aid him in reclaiming waste land, and bringing it under cultivation. (5) By piers and bulwarks, whereby the ravages of the sea ■ are stayed, or by the thoughtless removal from the beach of stones which the waves had themselves thrown up, and which would have served for a time to protect the land. (6) By forming new deposits either designedly or incidentally. The roads, bridges, canals, railways, tunnels, villages and towns with which man- has covered the surface of the land will in many cases form a permanent record of his presence. Under his hand the whole surface of civilized countries is very slowly covered with a stratum, either formed wholly by him or due in great measure to his operations and con- taining many relics of his presence. The soil of ancient towns has been increased to a depth of many feet by their successive destruc- tions and renovations.

Perhaps the most subtle of human influences are to be seen in the distribution of plant and animal life upon the globe. Some of man's doings in this domain are indeed plain enough, such as the extirpation of wild animals, the diminution or destruction of some forms of vegetation, the introduction of plants and animals useful to himself, and especially the enormous predominance given by him to the cereals and to the spread of sheep and cattle. But no such extensive disturbance of the normal conditions of the distribution of life can take place without carrying with it many secondary effects, and setting in motion a wide cycle of change and of reaction in the animal and vegetable kindgoms. For example, the incessant warfare waged by man against birds and beasts of prey in districts given up to the chase leads sometimes to unforeseen results. The weak game is allowed to live, which would otherwise be killed off and give more room for the healthy remainder. Other animals which feed perhaps on the same materials as the game are by the same cause permitted

to live unchecked, and thereby to act as a further hindrance to the spread of the protected species. But the indirect results of man's interference with the regime of plants and animals still require much prolonged observation.

Part V. — Geotectonic or Structural Geology .

From a study of the nature and composition of minerals and rocks, and an investigation of the different agencies by which they are formed and modified, the geologist proceeds to inquire how fhese materials have been put together so as to build up the visible part of the earth's crust. He soon ascertains that they have not been thrown together wholly at random, but that they show a recognizable order of arrangement. Some of them, especially those of most recent growth, remain in their original condition and position, but, in proportion to their antiquity, they generally present increasing alteration, until it may no longer be possible to tell what was their pristine state. As by far the largest accessible portion of the terrestrial crust consists of stratified rocks, and as these furnish clear evidence of most of the modifications to which they have been subjected in the long ' course of geological history, it is convenient to take them into

consideration first. They possess a number of structures which belong to the original conditions in which they were accumulated. They present in addition other structures which have been super- induced upon them, and which they share with the unstratified or igneous rocks.

i. Original Structures

(a) Stratified Rocks.— This extensive and important series is above all distinguished by possessing a prevailing stratified arrangement. Their materials have been laid down in laminae, layers and strata, or beds, pointing generally to the intermittent deposition of the sediments of which they consist. As this stratification was, as a rule, originally nearly or quite horizontal, it serves as a. base from which to measure any subsequent dis- turbance which the rocks have undergone. The occurrence of false-bedding, i.e. bands of inclined layers between the normal planes of stratification, does not form any

real exception; but indicates the action of shifting currents whereby the sediment was transported and thrown down. Other important records of the original conditions of deposit are supplied by ripple-marks, sun-cracks, rain-prints and concretions.

From the nature of the material further light is cast on the geographical conditions in which the strata were accumulated. Thus, conglomerates indicate the proximity of old shore-lines, sandstones mark deposits in comparatively shallow water, clays and shales point to the tranquil accumulation of fine silt at a greater depth and further from land, while fossiliferous limestones bear witness to clearer water in which organisms flourished at some distance from deposits of sand and mud. Again, the alternation of different kinds of sediment suggests a variability in the conditions of deposition, such as a shifting of the sediment-bearing currents and of the areas of muddy and clear water. A thick group of conformable strata, that is, a series of deposits which show no discordance in their stratification, may usually be regarded as having been laid down on a sea-floor that was gently sinking. Here and there evidence is obtainable of the limits or of the progress of the subsidence by what is called " overlap." Of the absolute length of time represented by any strata or groups of strata no satisfactory estimates can yet be formed. Certain general conclusions may indeed be drawn, and comparisons may be made between different series of rocks. Sand- stones full of false-bedding were probably accumulated more rapidly than finely-laminated shales or clays. It is not uncommon in certain Carboniferous formations to find coniferous and other trunks embedded in sandstone. Some of these trees seem to have been carried along and to have sunk, their heavier or root end touching the bottom and their upper end slanting upward in the direction of the current, exactly as in the case of the snags of the Mississippi. In other cases the trees have been submerged while still in their positions of growth. The continuous deposit of sand at last rose above the level of the trunks and buried them. It is clear then that the rate of deposit must have been sometimes sufficiently rapid to allow sand to accumulate to a depth of 30 ft. or more before the decay of the wood. Modern instances are known where, under certain circumstances, submerged trees may last for some centuries, but even the most durable must decay in what, after all, is a brief space of geological time. Since continuous layers of the same kind of deposit suggest a persistence of geological conditions, while numerous alternations of different kinds of sedimentary matter point to vicissitudes or alternations of conditions, it may be supposed that the time represented by a given thickness of similar strata was less than

that shown by the same thickness of dissimilar strata, because the changes needed to bring new varieties of sediment into the area of deposit would usually require the lapse of some time for their completion. But this conclusion may often be erroneous. It will be best supported when, from the very nature of the rocks, wide variations in the character of the water-bottom can be established. Thus a group of shales followed by a fossiliferous limestone would almost always mark the lapse of a much longer period than an equal depth of sandy strata. A thick mass of limestone, made up of organic remains which lived and died upon the spot, and whose remains are crowded together generation above generation, must have demanded many years or centuries for its formation.

But in all speculations of this kind we must bear in mind that the length of time represented by a given depth of strata is not to be estimated merely from their thickness or lithological character. The interval between the deposit of two successive laminae of shale . may have been as long as, or even longer than, that required for the formation of one of the laminae. In like manner the interval needed for the transition from one stratum or kind of strata to another may often have been more than equal to the time required for the formation of the strata on either side. But the relative chronological importance of the bars or lines in the geological record can seldom be satisfactorily discussed merely on lithological grounds. This must mainly be decided on the evidence of organic*

remains, as shown in Part VI., where the grouping of the stratified rocks into formations and systems is described.

(b) Igneous Rocks. — As part of the earth's crust these rocks present characters by which they are strongly differentiated from the stratified series. While the broad petrographical distinctions of their several varieties remain persistent, they present sufficient local variations of type to point to the existence of what have been called petrographic provinces, in each of which the eruptive masses are connected by a general family relationship, differing more or less from that of a neighbouring province. In each region presenting a long chronological series of eruptive rocks a petrographical sequence can be traced, which is observed to be not absolutely the same everywhere, though its general features may be persistent. The earliest manifestations of eruptive material in any district appear to have been most frequently of an intermediate type between acid and basic, passing thence into a thoroughly acid series and concluding with an effusion of basic material.

Considered as part of the architecture of the crust of the earth, igneous rocks are conveniently divisible into two great series: (1) those bodies of material which have been injected into the crust and have solidified there, and (2) those which have reached the surface and have been ejected there, either in a molten state as lava or in a fragmental form as dust, ashes and scoriae. The first of these divisions represents the plutonic, intrusive or subsequent phase of eruptivity; the second marks the volcanic, interstratified or contemporaneous phase.

1. The plutonic or intrusive rocks, which have been forced into the crust and have consolidated there, present a wide range of texture from the most coarse-grained granites to the most perfect natural glass. Seeing that they have usually cooled with extreme slowness underground, they are as a general rule more largely crystalline than the volcanic series. The form assumed by each individual body of intrusive material has depended upon the shape of the space into which it has been injected, and where it has cooled and become solid. This shape has been determined by the local structure of the earth's crust on the one hand and by the energy of the eruptive force on the other. It offers a convenient basis for the classification of the intrusive rocks, which, as part of the framework of the crust, may thus be grouped according to the shape of the cavity which received them, as bosses, sills, (Tikes and necks.

Bosses, or stocks, are the largest and most shapeless extravasations of erupted material. They include the great bodies of granite which, in most countries of the world, have risen for many miles through the stratified formations and have altered the rocks around them by contact-metamorphism. Sills, or intrusive sheets, are bed-like masses which have been thrust between the planes of sedimentary or even of igneous rocks. The term laccolite has been applied to sills which are connected with bosses. Intrusive sheets are dis- tinguishable from true contemporaneously intercalated lavas by not keeping always to the same platform, but breaking across and altering the contiguous strata, and by the closeness of their texture where they come in contact with the contiguous rocks, which, being cold, chilled the molten material and caused it to consolidate on its outer margins more rapidly than in its interior. Dikes or veins are vertical walls or ramifying branches of intrusive material which has consolidated in fissures or irregular clefts of the crust.- Necks are volcanic chimneys which have been filled up with erupted material, and have now been exposed at the surface after prolonged denudation has removed not only the superficial volcanic masses originally associated with them, but also more or less of the upper part of the vents. Plutonic rocks do

not present evidence of their precise geological age. All that can be certainly affirmed from them is that they must be younger than the rocks into which they have been intruded. From their internal structure, however, and from the evidence of the rocks associated with them, some more or less definite conjectures may be made as to the limits of time within which they were probably injected.

2. The interstratified or volcanic series is of special importance in geology, inasmuch as it contains the records_ of volcanic action during the past history of the globe. It was pointed out in Part I. that while towards the end of the 1 8th and in the beginning of the 19th century much attention was paid by Hutton and his followers to the proofs of intrusion afforded by what they called the "_un- erupted lavas " within the earth's crust, these observers lost sight of the possibility that some of these rocks might have been erupted at the surface, and might thus be chronicles of volcanic action in former geological periods. It is not always possible to satisfactorily discriminate between the two types of contemporaneously inter-calated and subsequently injected material. But rocks of the former type have not broken into or involved the overlying strata, and they are usually marked by the characteristic structures of superficial lavas and by their association with volcanic tuffs. By

means of the evidence which they supply, it has been ascertained that volcanic action has been manifested in the globe since the earliest geological periods. In the British Isles, for example, the volcanic record is remarkably full for the long series of ages from Cambrian to Perfnian time, and again for the older Tertiary period.

2. Subsequently induced Structures After their accumulation, whether as stratified or eruptive masses, all kinds of rocks have been subject to various changes, and have acquired in consequence a variety of superinduced structures. It has been pointed out in the part of this article dealing with dynamical geology that one of the most important forms of energy in the evolution of geological processes is to be found in the movements that take place within the crust of the earth. Some of these movements are so slight as to be only recognizable by means of delicate instruments; but from this inferior limit they range up to gigantic convulsions by which mountain-chains

are upheaved. The crust must be regarded as in a perpetual state of strain, and its component materials are therefore subject to all the effects which flow from that condition. It is the one great object of the geotectonic division of geology to study the structures which have been developed in consequence of earth-movements, and to discover from this investigation the nature of the processes whereby the rocks of the crust have been brought into the condition and the positions in which we now find them. The details of this subject will be found in separate articles descriptive of each of the technical terms applied to the several kinds of superinduced structures. All that need be offered here is a general outline connecting the several portions of the subject together.

One of the most universal of these later structures is to be seen in the divisional planes, usually vertical or highly inclined, by which rocks are split into quadrangular or irregularly shaped blocks. To these planes the name of joints has been given. They are of prime importance from an industrial point of view, seeing that the art of quarrying consists mainly in detecting and making proper use of them. Their abundance in all kinds of rocks, from those of recent date up to those of the highest antiquity, affords a remarkable testimony to the strains which the terrestrial crust has suffered. They have arisen sometimes from tension, such as that caused by contraction from the drying and consolidation of an aqueous sediment or from the cooling of a molten mass ; sometimes from torsion during movements of the crust.

Although the stratified rocks were originally deposited in a more or less nearly horizontal position on the floor of the sea, where now visible on the dry land they are seldom found to have retained their flatness. On the contrary, they are seen to have been generally tilted up at various angles, sometimes even placed on end (crop, dip, strike). When a sufficiently large area of ground is examined, the inclination into which the strata have been thrown may be observed not to continue far in the same direction, but to turn over to the opposite or another quarter. It can then be seen that in reality the rocks have been thrown into undulations. From the lowest and flattest arches where the departure from horizontality may be only trifling, every step may be followed up to intense curvature, where the strata have been compressed and plicated as if they had been piles of soft carpets (anticline, syncline, monocline, geo-anticline, geo-syncline, isoclinal, plication, curvature, qua-qua- versal). It has further happened abundantly all over the surface of the globe that relief from internal strain in the crust has been obtained by fracture, and the consequent subsidence or elevation of one or both sides of

the fissure. The differential movement between the two sides may be scarcely perceptible in the feeblest dislocation, but in the extreme cases it may amount to many thousand feet (fault, fissure, dislocation, hade, slickensides). The great faults in a country are among its most important structural features, and as they not infrequently continue to be lines of weakness in the crust along which sudden slipping may from time to time take place, they become the lines of origin of earthquakes. The San Francisco earthquake of 1906, already cited, affords a memorable illustration of this connexion.

It is in a great mountain-chain that the extraordinary complica- tion of plicated and faulted structures in the crust of the earth can be most impressively beheld. The combination of overturned folds' with rupture has been already referred to as a characteristic feature , in the Alps (Part IV.). The gigantic folds have in many places been pushed over each other so as to lie almost flat, while the upper limb has not infrequently been driven for many miles beyond the lower by a rupture along the axis. In this way successive slices of a thick series of formations have been carried northwards on the northern slope of the Alps, and. have been piled so abnormally above each other that some of their oldest members recur several times on different tbrust-planes, the whole being underlain by Tertiary

strata (see Alps). Further proof of the colossal compression to which the rocks have been subjected is afforded by their intense crumpling and corrugation, and by the abundantly faulted and crushed condition to which they have been reduced. Similar evidence as to stresses in the terrestrial crust and the important changes which they produce among the rocks may also be obtained on a smaller scale in many non-mountainous countries.

Another marked result of the compression of the terrestrial crust has been induced in some rocks by the production of the fissile structure which is typically shown in roofing-slate (cleavage). Closely connected with this internal rearrangement has been the development of microscopic microlites or crystals (rutile, mica, &c.) in argillaceous slates which were undoubtedly originally fine marine mud and silt. From this incipient form of metamorphism successive 1 stages may be traced through the various kinds of argillite and phyllite into mica-schist, and thence into more crystalline gneissoid varieties (foliation, slate, mica-schist, gneiss). The Alps afford excellent illustrations of these transformations.

The fissures produced in the crust are sometimes clean, sharply

defined divisional planes, like cracks across a pane of glass. Much more usually, however, the rocks on either side have been broken up by the friction of movement, and the fault is marked by a variable breadth of this broken material. Sometimes the walls have separated and molten rock has risen from below and solidified between them as a dike. Occasionally the fissures have opened to the surface, and have been filled in from above with detritus, as in the sandstone-dikes of Colorado and California. In mineral districts the fissures have been filled with various spars and ores, forming what are known as mineral veins.

Where one series of rocks is covered by another without any break or discordance in the stratification they are said to be con- formable. But where the older series has been tilted up or visibly denuded before being overlain by the younger, the latter is termed unconformable. This relation is one of the greatest value in structural geology, for it marks a gap in the geological record, which may represent a vast lapse of time not there recorded by strata.

Part VI. — Palaeontological Geology This division of the science deals with fossils, or the traces of plants and animals preserved in the rocks of the earth's crust, and endeavours to gather from them information as to the history of the globe and its inhabitants. The term " fossil " (Lat. fossilis, from fodere, to dig up), meaning literally anything " dug up," was formerly applied indiscriminately to any mineral substance taken out of the earth's crust, whether organized or not. Since the time of Lamarck, however, the meaning of the word has been restricted, so as to include only the remains or traces of plants and animals preserved in any natural formation whether hard rock or superficial deposit. It includes not merely the petrified structures of organisms, but whatever was directly connected with or produced by these organisms. Thus the resin which was exuded from trees of long-perished forests is as much a fossil as any portion of the stem, leaves, flowers or fruit, and in some respects is even more valuable to the geologist than more determinable remains of its parent trees, because it has often preserved in admirable perfection the insects which flitted about in the woodlands. The burrows and trails of a worm preserved in sandstone and shale claim recognition as fossils, and indeed are commonly the only indications to be met with of the existence of annelid life among old geological forma- tions. The droppings of fishes and reptiles, called coprolites, are excellent fossils, and tell their tale as to the presence and food of vertebrate life in ancient waters. The little agglutinated cases of the caddis-worm remain as fossils in formations from which, perchance, most other traces of life may have passed away. Nay, the very

handiwork of man, when preserved in any natural manner, is entitled to rank among fossils; as where his flint-implements have been dropped into the pre- historic gravels of river-valleys or where his canoes have been buried in the silt of lake-bottoms.

A study of the land-surfaces and sea-floors of the present time shows that there are so many chances against the conservation of the remains of either terrestrial or marine animals and plants that if, as is probable, the same conditions existed in former geological periods, we should regard the occurrence of organic remains among the stratified formations of the earth's crust as generally the result of various fortunate accidents.

Let us consider, in the first place, the chances for the preservation of remains of the present fauna and flora of a country. The surface of the land may be densely clothed with forest and abundantly peopled with animal life. But the trees die and moulder into soil.

The animals, too, disappear, generation after generation, and leave few or no perceptible traces of their existence. If we were not aware from authentic records that central and northern Europe were covered with vast forests at the beginning of our era, how could we know this fact. J What has become of the herds of wild oxen, the bears, wolves and other denizens of primeval Europe? How could we prove from the examination of the surface soil of any country that those creatures had once abounded there? The conditions for the preservation of any relics of the plant and animal life of a ter-restrial surface must obviously be always exceptional. They are supplied only where the organic remains can be protected from the air and superficial decay. Hence they may be observed in (i) the deposits on the floors of lakes; (2) in peat-mosses; (3) in deltas at river-mouths; and (4) under the stalagmite of caverns in limestone districts. But in these and other favourable places a mere infinitesi-mal fraction of the fauna or flora of a land-surface is likely to be entombed or preserved.

In the second place, although in the sea the conditions for the preservation of organic remains are in many respects more favourable than on land, they are apt to be frustrated by many adverse circum- stances .While the level of the land remains stationary, there can be but little effective entombment of marine

organisms, in littoral deposits; for only a limited accumulation of sediment will be formed until subsidence of the sea-floor takes place. In the trifling beds of sand or gravel thrown up on a stationary shore, only the harder and more durable forms of life, such as gastropods and lamellibranchs, which can withstand the triturating effects of the beach waves, are likely to remain uneffaced.

Below tide-marks, along the margin of the land where sediment is gradually deposited, the conditions are more favourable for the preservation of marine organisms. In the sheets of sand and mud there laid down the harder parts of many forms of life may be entombed and protected from decay. But only a small proportion ot the total marine fauna may be expected to appear in such deposits. At the best, merely littoral and shallow-water forms will occur, and, even under the most favourable conditions, they will represent but a traction of the whole assemblage of life in these juxta-terrestrial parts of the ocean. As we recede from the land the rate Df deposition ot sediment on the sea-floor must become feebler, until, in the remote central abysses, it reaches a hardly appreciable minimum. Except, therefore, where some kind of ooze or other deposit is accumulating in these more pelagic regions, the conditions must be on the whole unfavourable for the preservation of any adequate representation ot the deep-sea fauna. Hard durable objects, such as teeth and bones, may slowly accumulate, and be protected by a coating of peroxide of manganese, or of some of the silicates now forming here and there over the deep-sea bottom; or the rate of growth of the abysmal deposit may be so tardy that most of the remains of at least the larger animals will disappear, owing to decay, before they can be covered up and preserved. Any such deep-sea formation, it raised into land, would supply but a meagre picture of the whole life of the sea.

It would thus appear that the portion of the sea-floor best suited tor receiving and preserving the most varied assemblage of marine organic remains is the area in front of the land, to which rivers and currents bring continual supplies of sediment. The most favourable conditions tor the accumulation of a thick mass of marine f ossiliferous strata will arise when the area of deposit is undergoing a gradual subsidence. It the rate of depression and that of deposit were equal, or nearly so, the movement might proceed for a vast period without producing any great apparent change in marine geography, and even without seriously affecting the distribution of life over the sea-floor within the area of subsidence. Hundreds or thousands of feet of sedimentary strata might in this way be heaped up round the con- tinents, containing a fragmentary series of organic remains

belonging to those forms of comparatively shallow-water life which had hard parts capable of preservation. There can be little doubt that such has, in tact, been the history of the main mass of stratified formations in tne earth s crust. By far the largest proportion of these piles ot marine strata has unquestionably been laid down in water of no great depth within the area of deposit of terrestrial sediment. 1 he enormous thickness to which they attain seems only explicable by prolonged and repeated movements of subsidence, interrupted, however, as we know, by other movements of a contrary kind.

Since the conditions for the preservation of organic remains exist more favourably under the sea than on land, marine organisms must be tar more abundantly conserved than those of the land. This is true to-day, and has, as far as known, been true in all past geological time. Hence for the purposes of the geologist the fossil remains of marine forms of life far surpass all others in value. Among them there will necessarily be a gradation of importance, regulated chiefly' by their relative abundance. Now, of all the marine tribes which ' l'u Ve »],,'" the l uxta ,-terrestrial belt of sedimentation, unquestionably the Mollusca stand in the place of pre-eminence as regards their aptitude for becoming fossils. They almost all possessa hard, durable shell, capable of resisting considerable abrasion and readily passing into a mineralized condition. They are extremely abundant both as to individuals and genera. They occur on the shore within tide mark, and range thence down into the abysses. Moreover, they appear to have possessed these Qualifications from early geological

times. In the marine Mollusca, therefore, we have a common ground of comparison between the stratified formations of different periods. They have been styled the alphabet of palaeontological inquiry.

There are two main 1 purposes to which fossils may be put in geological research: (1) to throw light upon former conditions of physical geography, such as the presence of land, rivers, lakes and seas, in places where they do not now exist, changes of climate, and the former distribution of plants and animals; and (2) to furnish a guide in geological chronology whereby rocks may be classified according to relative date, and the facts of geological history may be arranged and interpreted as a connected record of the earth's progress.

: I. As examples of the first of these two directions of inquiry reference may be made to (a) former land-surfaces revealed by the

occurrence of layers of soil with tree-stumps and roots still in the position of growth (see Purbeckian) ; (6) ancient lakes proved by beds of marl or limestone full of lacustrine shells; (c) old sea-bottoms marked by the occurrence of marine organisms; (d) variations in the quality of the water, such as freshness or saltness, indicated by changes in the size and shape of the fossils; (e) proximity to former land, suggested by the occurrence of abundant drift-wood in the strata; (/) former conditions of climate, different from the present, as ˆ evidenced by such organisms as tropical types of plants and animals intercalated among the strata of temperate or northern countries.

2 . I n applying fossils to the determination of geological chronology it is first necessary to ascertain the order of superposition of the rocks. 'Obviously, in a continuous series of undisturbed sedimentary deposits the lowest must necessarily be the oldest, and the plants or animals ; , which they contain must have lived and died before any of the organisms that occur in the overlying strata. This order of superposition having been settled in a series of formations, it is found that the fossils at the bottom are not quite the same as those at the top of the series. Tracing the beds upward, we discover that species after species of the lowest platforms disappears, until perhaps not one of them is found. With the cessation of these older species ° th e rs make their entrance. These, in turn, are found to die out, and to be replaced by newer forms. After patient examination of the rocks, it has been ascertained that every well-marked " forma- tion, 'or group of strata, is characterized by its own species or genera, or by a general assemblage, or fades, of organic forms. Such a generalization can only, of course," be determined by actual practical experience over an area of some size. When the typical fossils of a formation are known, they serve to identify that formation m rts progress across a country. Thus, in tracts where the true order of superposition cannot be determined, owing to the want of sections or to the disturbed condition of the rocks, fossils serve as a means of identification and furnish a guide to the succession of the focks – . Tr fy even demonstrate that in some mountainous ground the beds have been turned completely upside down, where it can be shown that the fossils in what are now the uppermost strata ought properly to lie underneath those in the beds below them.

It is by their characteristic fossils that the stratified rocks of the earth s crust can be most satisfactorily subdivided into convenient groups of strata and classed in chronological order. Each " forma- tion _' is distinguished by its own peculiar assemblage of organic remains, by means of which it can be followed and recognized, even

amid the crumplings and dislocations of a disturbed region. The same general succession of organic types can be observed over a large part of the world, though, of course, with important modifica- tions in different countries. This similarity of succession has been termed homotaxis, a term which expresses the fact that the order in which the leading types of organized existence have appeared upon the earth has been similar even in widely separated regions. It is evident that, in' this way, a reliable method of comparison is furnished, whereby the stratified formations of different parts of the earth's crust can be brought into relation with each other. Had the- geologist continued to remain, as in the days of Werner, hampered by the limitations imposed by a reliance on mere litho- l'ogical characters, he would have made little or no progress in deciphering the record of the successive phases of the history of the globe chronicled in the crust. Just as, at the present time, sheets of gravel in one place are contemporaneous with sheets of mud at another, so in the past all kinds of sedimentation have been in progress simultaneously, and those of one period may not be distinguishable in themselves from those of another. Little or no reliance can be placed upon lithological resemblances or differences in comparing the sedimentary formations of different countries.

In making use of fossil evidence for the purpose of subdividing the stratified rocks of the earth's crust, it is found to be applicable to the smaller details of stratigraphy as well as to the definition of large groups of strata. Thus a particular stratum may be marked by the Occurrence in it of various fossils, one or more of which may be distinctive, either from occurring in no other bed above and below or from special abundance in that stratum. One or more qf these species is therefore used as a guide to the occurrence of the bed

in question, which is called by the name of the most abundant species. In this way what is called a " geological horizon," or "zone," is marked off, and its exact position in the seriesof formations is fixed.

Perhaps the most distinctive feature in the progress of palaeonto- logical geology during the last half century has been the recognition and wide application of this method of zonal stratigraphy, which, in

itself, was only a further development of William Smith's famous idea, " Strata identified by Organized Fossils." It was first carried out in detail by various palaeontologists in reference to the Jurassic formations, notably by F. A. von Quenstedt and C. A. Oppel in Germany and A. D. d'Orbigny in France. The publication of Oppel's classic work Die Juraformation Englands, Frankreichs und des ■siidwestlichen Deutschlands (1856-1858) marked an epoch in the development of stratigraphical geology. Combining what had been done by various observers with his own laborious researches in France, England, Wiirttemberg and Bavaria, he drew up a classification of the Jurassic system, grouping its several formations into zones, each characterized by some distinctly predominant fossil after which it was named (see Lias). The same method of classification was afterwards extended to the Cretaceous series by A. D. d'Orbigny, E. Hebert and others, until the whole Mesozoic rocks from the Trias to the top of the Chalk has now been partitioned into zones, each named after some characteristic species or genus of fossils. More recently the principle has been extended to the Palaeozoic formations, though as yet less fully than to the younger parts of the geological record. It has been successfully applied by Professor C. Lapworth to the investigation of the Silurian series (see Silurian; Ordovician System). He found that the species of graptolites have each a comparatively narrow vertical range, .and they may consequently be used for stratigraphical purposes. Applying the method, in the first instance, to the highly plicated Silurian rocks of the south of Scotland, he found that by means of graptolites he was able to work out the structure of the ground. Each great group of strata was seen to possess its own graptolitic zones, and by their means could be identified not only in the original complex Scottish area, but in England and Wales and in Ireland. It was eventually ascertained that the succession of zones in Great Britain could be recognized on the Continent, in North America and even in Australia,' The brachiopods and trilobites have likewise been made use of for zonal purposes among the oldest sedimentary formations. The most ancient of the Palaeozoic systems has as its fitting base the Olencllus zone.

Within undefined and no doubt variable geographical limits palaeontological zones have been found to be remarkably persistent. They follow each other in the same general order, but not always with equal definiteness. The type fossil may appear in some districts on a higher or a lower platform than it does in others. Only to a limited degree is there any coincidence between lithological variations in the strata and the sequence of the zones. In the Jurassic

forma- tions, indeed, where frequent alternations of different sedimentary materials are to be met with, it is in some cases possible to trace a definite upward or downward limit for a zone by some abrupt change in the sedimentation, such as from limestone to shale. But such a precise demarcation is impossible where no distinct bands of different sediments are to be seen. The zones can then only be vaguely determined by finding their characteristic fossils, and noting where these begin to appear in the strata and where they cease. It would seem, therefore, that the sequence of palaeontological zones, or life-horizons, has not depended merely upon changes in the nature of the conditions under which the organisms lived. We should naturally expect that these changes would have had a marked influence; that, for instance, a difference should be perceptible between the character of the fossils in a limestone and that of those in a shale or a sandstone. The environment, when a limestone was in course of deposition, would generally be one of clear water, favourable for a more vigorous and more varied fauna than where a shale series was accumulating, when the water would be dis-coloured, and only such animals would continue to live in it, or on the bottom, as could maintain themselves in the midst of mud. But no such lithological reason, betokening geographical changes that would affect living creatures, can be adduced as a universally applicable explanation of the occurrence and limitation of palaeon- tological zones. One of these zones may be only a few inches, or feet or yards in vertical extent, and no obvious lithological or other cause can be seen why its specially characteristic fossils should not be found just as frequently in the similar strata above and below. There is often little or no evidence of any serious change in the conditions of sedimentation, still less of any widespread physical disturbance, such as the catastrophes by which the older, geologists explained the extinction of successive types of life.

. It has been suggested that, where the life-zones are well defined, sedimentation has been extremely slow, and that though these zones follow each other with no break in the sedimentation, they were really separated by prolonged intervals of time during which organic evolution could come effectively into play. But it is not easy to explain how, for example in the Lower Lias, there could have been a succession of prodigious intervals, when practically no sediment was laid down, and yet that the Strata should show no sign of con-

temporaneous disturbance or denudation, but succeed each other as if they had been accumulated by one continuous process of deposit. It must be admitted that the problem of life-zones in stratigraphical geology has not yet been solved.

As Darwin first cogently showed, the history of life has been very imperfectly registered in the stratified parts of the earth's crust. Apart from the fact that, even under the most favourable conditions, only a small proportion of the total flora and fauna of any period would be preserved in the fossil state, enormous gaps occur' where no record has survived at all. It is as if whole chapters and books were missing from a historical work. Some of these lacunae are sufficiently obvious. Thus, in some cases, powerful dislocations have thrown considerable portions of the rocks out of sight. Sometimes extensive metamorphism has so affected them that their original characters, including their organic contents, have been destroyed. Oftenest of all, denudation has come into play, and vast masses of fossiliferous rock have been entirely worn away, as is demonstrated by the abundant unconformabilities in the structure of the earth's crust.

While the mere fact that one series of rocks lies unconformably on another proves the lapse of a considerable interval between their respective dates, the relative length of this interval may sometimes be proved by means. of fossil evidence, and by this alone. Let us suppose, for example, that a certain group of formations has been disturbed, upraised, denuded and covered unconformably by < a second group. In lithological characters the two may closely resemble each other, and there may be nothing to show that the gap repre- sented by their unconformability is of an important character. In many cases, indeed, it would be quite impossible to pronounce any well-grounded judgment as to the amount of interval, even measured by the vague relative standards of geological chronology. But if each group contains a well-preserved suite of organic remains, it may not only be possible, but easy, to say exactly how much of the geological record has been left out between the two sets of formations. By comparing the fossils with those obtained from regions where the geological record is more complete, it may be ascertained, perhaps, that the lower rocks belong to a certain platform or stagein geological history which for our present purpose we may call D, and that the upper rocks can in like manner be paralleled with stage H. It would be then apparent that at this locality the chronicles of three great geological periods E, F, and G were wanting, which are elsewhere found to be intercalated between D and H. The lapse of time repre- sented by this unconformability would thus be equivalent to that required for the accumulation of the three missing formations in those regions where sedimentation was more continuous.

Fossil evidence may be made to prove the existence of gaps which are not otherwise apparent. As has been already remarked, changes in

organic forms must, on the whole, have been extremely slow in the geological past. The whole species of a sea-floor could not pass entirely away, and be replaced by other forms, without the lapse of long periods of time. If then among the conformable stratified formations of former ages we encounter sudden and abrupt changes in the fades of the fossils, we may be certain that these must mark omissions in the record, which we may hope to fill in from a more perfect series elsewhere. The complete biological contrasts between the fossil contents of unconformable strata are sufficiently explicable. It is not so easy to give a satisfactory account of those which occur where the beds are strictly conformable, and where no evidence can be observed of any considerable change of physical conditions at the time of deposit. A group of strata having the same general litho- logical characters throughout may be marked by a great discrepance between the fossils above and below a certain line. A few species may pass from the one into the other, or perhaps every species may be different. In cases of this kind, when proved to be not merely local but persistent over wide areas, we must admit, notwithstanding the apparently undisturbed and continuous character of the original deposition of the strata, that the abrupt transition from the one fades of fossils to the other represents a long interval of time which has not been recorded by the deposit of strata. A. C. Ramsay, who called attention to these gaps, termed them " breaks in the succession of organic remains." He showed that they occur abundantly among the Palaeozoic and Secondary rocks of England. It is obvious, of course, that such breaks, even though traceable over wide regions, were not general over the whole globe. There have never been. any universal interruptions in the continuity of the chain of being, so far as geological evidence can show. But the physical changes which caused the breaks may have been general over a zoological district or minor region. They no doubt often caused the complete extinction of genera and species which had a small geographical r range.

From all these facts it is clear that the geological record, as it now exists, is at the best but an imperfect chronicle of geological history. In no country is it complete. The lacunae of one region must be supplied from another. Yet in proportion to the geographical distance between the localities where the gaps occur and those whence the missing intervals are supplied, the element of uncertainty in our reading of the record is increased. The most ˆdesirable method of research is to exhaust the evidence for each area or province, and to compare the general order of its succession as a whole with that which Can be established for other provinces.

Part VII. — Stratigraphical Geology

This branch of the science arranges the rocks of the earth's crust in the order of their appearance, and interprets the sequence of events of which they form the records. Its province is to cull from the other departments of geology the facts which may be needed to show what has been the progress of our planet, and of each continent and country, from the earliest times of which the rocks have preserved any memorial. Thus from mineralogy and petrography it contains information regarding the origin and subsequent mutations of minerals and rocks. From dynamical geology it learns by what agencies the materials of the earth's crust have been formed, altered, broken, upheaved and melted. From geotectonic geology it understands the various processes whereby these materials were put together so as to build up the complicated crust of the earth. From palaeontological geology it receives in well-determined fossil remains a clue by which to discriminate the different stratified formations, and to trace the grand onward march of organized existence upon this planet. Stratigraphical geology thus gathers up the sum of all that is made known by the other departments of the science, and makes it subservient to the interpretation of the geological history of the earth.

The leading principles of stratigraphy may be summed up as follows:

i. In every stratigraphical research the fundamental requisite is to establish the order of superposition of the strata. Until this is accomplished it is impossible to arrange the dates, and make out the sequence of geological history.

2. The stratified portion of the earth's crust, or what has been called the " geological record," can be subdivided into natural groups, or series of strata, characterized by distinctive organic remains and recognizable by these remains, in spite of great changes in lithological character from place to place. A bed, or a number of beds, linked together by containing one or more distinctive species or genera of fossils is termed a zone or horizon, and usually bears the name of one of its more characteristic fossils, as the Planorbis-zone of the Lower Lias, which is so called from the prevalence in it of the

ammonite Psiloceras planorbis. Two or more such zones related to each other by the possession of a number of the same characteristic species or genera have been designated beds or an assise. Two or more sets of beds or assises similarly related form a group or stage; a number of groups or stages make a series, formation or section, and a succession of formations may be united into a system.

3. Some living species of plants and animals can be traced downwards through the more recent geological formations; but the number which can be so followed grows smaller as the examination is pursued into more ancient deposits. With their disappearance other species or genera present themselves which are no longer living. These in turn may be traced backward into earlier formations, till they too cease and their places are taken by yet older forms. It is thus shown that the stratified rocks contain the records of a gradual progression of organic forms. A species which has once died out does not seem ever to have reappeared.

4. When the order of succession of organic remains among the stratified rocks has been determined, they become an invaluable guide in the investigation of the relative age of rocks and the structure of the land. Each zone and formation, being character- ized by its own species or genera, may be recognized by their means, and the true succession of strata may thus be confidently established even in a country wherein the rocks have been shattered by dislocation, folded, inverted or metamorphosed.

5. Though local differences exist in regard to the precise zone in which a given species of organism may make its first appearance the general order of succession of the organic forms found in the rocks is never inverted. The record is nowhere complete in any region, but the portions represented, even though extremely imperfect, always follow each other in their proper chronological order, unless where disturbance of the crust has intervened to destroy the original sequence.*

6. The relative chronological value of the divisions of the

geological record is not to be measured by mere depth of strata. While it may be reasonably assumed that, in general, a great thickness of stratified rock must mark the passage of a long period of time, it cannot safely be affirmed that a much less thickness elsewhere must represent a correspondingly diminished period. The need for this caution may sometimes be made evident by an unconformability between two sets of rocks, as has already been

explained. The total depth of both groups together may be, say 1000 ft. Elsewhere we may find a single unbroken formation reaching a depth of 10,000 ft.; but it would be unwarrantable to assume that the latter represents ten times the length of time indicated by the former two. So far from this being the case, it might not be difficult to show that the minor thickness of rock really denotes by far the longer geological interval. If, for instance, it could be proved that the upper part of both the sections lies on one and the same geological platform, but that the lower unconformable series in the one locality belongs to a far lower and older system of rocks than the base of the thick conformable series in the other, then it would be clear that the gap marked by the unconformability really indicates a longer period than the massive succession of deposits. 7. Fossil evidence furnishes the chief means of comparing the relative value of formations and groups of rock. A " break in the succession of organic remains," as already explained, marks an interval of time often unrepresented by strata at the place where the break is found. The relative importance of these breaks, and therefore, probably, the comparative intervals of time which they mark, may be estimated by the difference of the fades or general character of the fossils on each side. If, for example, in one case we find every species to be dissimilar above and below a certain horizon, while in another locality only half of the species on each side are peculiar, we naturally infer, if the total number of species seems large enough to warrant the inference, that the interval marked by the former break was much longer than that marked by the second. But we may go further and compare by means of fossil evidence the relation between breaks in. the succession of organic remains and the depth of strata between them.

Three formations of fossiliferous strata, A, C, and H, may occur conformably above each other. By a comparison of the fossil contents of all parts of A, it may be ascertained that, while some species are peculiar to its lower, others to its higher portions, yet the majority extend throughout the formation. If now it is found that of the total number of species in the upper portion of A only one-third passes up into C, it may be inferred with some plausibility that the time represented by the break between A and C was really longer than that required for the accumulation of the whole of the formation A. It might even be possible to discover elsewhere a thick inter- mediate formation B filling up the gap between A and C. In like manner were it to be discovered that, while the whole of the formation C is characterized by a common suite of fossils, not one of the species and only one half of the genera pass up into H, the inference could hardly be resisted that the gap between the two

formations marks the passage of a far longer interval than was needed for the deposition of the whole of C. And thus we reach the remarkable conclusion that, thick though the stratified formations of a country may be, in some cases they may not represent so long a total period of time as do the gaps in their succession, — in other words, that non-deposi- tion was more frequent and prolonged than deposition, or that the intervals of time which have been recorded by strata have not been so long as those which have not been so recorded.

In all speculations of this nature, however, it is necessary to reason from as wide a basis of observation as possible, seeing that so much of the evidence is negative. Especially needful is it to bear in mind that the cessation of one or more species at a certain line among the rocks of a particular district may mean nothing more than that, onward from the time marked by that line, these species, owing to some change in the conditions of life, were compelled to migrate or became locally extinct or, from some alteration in the conditions of fossilization, were no longer imbedded and preserved as fossils. They may have continued to flourish abundantly in neighbouring districts for a long period afterward. Many examples of this obvious truth might be cited. Thus in a great succession of mingled marine, brackish-water and terrestrial strata, like that of the Carboniferous Limestone series of Scotland, corals, crinoids

and brachiopods abound in the limestones and accompanying shales, but disappear as the sandstones, ironstones, clays, coals and bituminous shales supervene. An observer meeting for the first time with an instance of this disappearance, and remember- ing what he had read about breaks in succession, might be tempted to speculate about the extinction of these organisms, and their replacement by other and later forms of life, such as the ferns, lycopods, estuarine or fresh-water shells, ganoid fishes and other fossils so abundant in the overlying strata. But further research would show him that high above the plant- bearing sandstones and coals other limestones and shales might be observed, once more charged with the same marine fossils as before, and still farther overlying groups of sandstones, coals and carbonaceous beds followed by yet higher marine limestones. He would thus learn that the same organisms, after being

locally exterminated, returned again and again to the same area. After such a lesson he would probably pause before too confidently asserting that the highest bed in which we can detect certain fossils marks their final appearance in the history of life. Some breaks in the succession may thus be extremely local, one set of organisms having been driven to a different part of the same region, while another set occupied their place until the first was enabled to return.

8. The geological record is at the best but an imperfect chronicle of the geological history of the earth: It abounds in gaps, some of which have been caused by the destruction of strata owing to metamorphism, denudation or otherwise, others by original non-deposition, as above explained. Nevertheless from this record alone can the progress of the earth be traced. It contains the registers of the appearance and disappearance of tribes of plants and animals which have from time to time flourished on the earth. Only a small proportion of the total number of species which have lived in past time have been thus chronicled, yet by collecting the broken fragments of the record an outline at least of the history of life upon the earth can be deciphered.

It cannot be too frequently stated, nor too prominently kept in view, that, although gaps occur in the succession of organic remains as recorded in the rocks, they do not warrant the conclu- sion that any such blank intervals ever interrupted the progress of plant and animal life upon the globe. There is every reason to believe that the march of life has been unbroken, onward and upward. Geological history, therefore, if its records in the stratified formations were perfect, ought to show a blending and gradation of epoch with epoch. But the progress has been constantly interrupted, now by upheaval, now by volcanic outbursts, now by depression. These interruptions serve as natural divisions in the chronicle, and enable the geologist to arrange his history into periods. As the order of succession among stratified rocks was first made out in Europe, and as many of the gaps in that succession were found to be widespread over the European area, the divisions which experience established for that portion of the globe came to be regarded as typical, and the names adopted for them were applied to the rocks of other and far distant regions. This application has brought out the fact that some of the most marked breaks in the European series do not exist elsewhere, and, on the other hand, that some portions of that series are much more complete than the corre- sponding sections in other regions. Hence, while the general similarity of succession may remain, different subdivisions and nomenclature are required as we pass from continent to continent. The nomenclature adopted for the

subdivisions of the geological record bears witness to the rapid growth of geology. It is a patch-work in which no system nor language has been adhered to, but where the influences by which the progress of the science has been moulded may be distinctly traced. Some of the earliest names are lithological, and remind us of the fact that mineralogy and petrography preceded geology in the order of birth — Chalk, Oolite, Greensand, Millstone Grit. Others are topographical, and often recall the labours of the early geologists of England — London Clay, Oxford Clay, Purbeck, Portland, Kimmeridge beds. Others are taken from local English provincial names, and

remind us of the debt we owe to William Smith, by whom so many of them were first used — Lias, Gault, Crag, Cornbrash. Others of later date recognize an order of superposition as already established among formations — Old Red Sandstone, New Red Sandstone. By common consent it is admitted that names taken from the region where a formation or group of rocks is typically developed are best adapted for general use. Cambrian, Silurian, Devonian, Permian, Jurassic are of this class, and have been adopted all over the globe.

But whatever be the name chosen to designate a particular group of strata, it soon comes to be used as a chronological or homotaxial term, apart altogether from the stratigraphical character of the strata to which it is applied. Thus we speak of the Chalk or Cretaceous system, and embrace under that term formations which may contain no chalk; and we may describe as Silurian a series of strata utterly unlike in lithological characters to the formations in the typical Silurian country. In using these terms we unconsciously allow the idea of relative date to arise prominently before us. Hence such a word as ” chalk ” or ” cretaceous ” does not suggest so much to us the group of strata so called as the interval of geological history which these strata represent. We speak of the Cretaceous, Jurassic, and Cambrian periods, and of the Cretaceous fauna, the Jurassic flora, the Cambrian trilobites, as if these adjectives denoted simply epochs of geological time.

The stratified formations of the earth’s crust, or geological record, are classified into five main divisions, which in their order of antiquity are as follows: (1) Archean or Pre-Cambrian, called also sometimes Azoic (lifeless) or Eozoic (dawn of life); (2) Palaeozoic (ancient life) or Primary; (3) Mesozoic (middle life) or Secondary; (4) Cainozoic (recent life) or Tertiary; (5) Quaternary or Post-Tertiary. These divisions are further ranged into systems, formations, groups or stages, assises and zones. Accounts of the various

subdivisions named are given in separate articles under their own headings. In order, however, that the sequence of the formations and their parallelism in Europe and North America may be presented together a strati- graphical table is given on next page.

Part VIII. — Physic-graphical Geology

This department of geological inquiry investigates the origin and history of the present topographical features of the land. As these features must obviously be related to those of earlier time which are recorded in the rocks of the earth's crust, they cannot be satisfactorily studied until at least the main outlines of the history of these rocks have been traced. Hence physio- graphical research comes appropriately after the other branches of the science have been considered. |

From the stratigraphy of the terrestrial crust we learn that by far the largest part of the area of dry land is built up of marine formations; and therefore that the present land is not an aboriginal portion of the earth's surface, but has been overspread by the sea in which its rocks were mainly accumulated. We further discover that this submergence of the land did not happen once only, but again and again in past ages and in all parts of the world. Yet although the terrestrial areas varied much from age to age in their extent and in their distribution, being at one time more continental, at another more insular, there is reason to believe that these successive diminutions and expansions have on the whole been effected within, or not far outside, the limits of the existing continents. There is no evidence that any portion of the present land ever lay under the deeper parts of the ocean. The abysmal deposits of the ocean- floor have no true representatives among the sedimentary formations anywhere visible on the land. Nor, on the other hand, can it be shown that any part of the existing ocean abysses ever rose above sea-level into dry land. Hence geologists have drawn the inference that the ocean basins have probably been always where they now are; and that although the con- tinental areas have often been narrowed by submergence and by denudation, there has probably seldom or never been a complete

The Geological Record or Order of Succession of the Stratified

ˆFormations of the Earth's Crust.

Europe.

Historic, up to the present time.

Prehistoric, comprising deposits of the Iron, Bronze, and later Stone Ages.

Neolithic — alluvium, peat, lake-dwell- ings, loess, &cv

Palaeolithic — river-gravels, cave – de-

posits, &c.

Older Loess and valley-gravels; cave- deposits.

Strand-lines or raised beaches; youngest moraines.

Upper Boulder-clays; eskers; marine sands and clays.

Interglacial deposits.

Lower boulder-clay or Till, with striated rock-surfaces below.

Newer: — English Forest-Bed Group; Red and Norwich Crag; Amstelian and Scaldesian groups of Belgium and Holland; Sicilian and Astian of France and Italy.

Older : — English Coralline Crag; Dies- tian of Belgium; Plaisancian of south- ern France and Italy.

Wanting in Britain; well developed in France, S. E. Europe and Italy; divis- ible into the following groups iD descending order: (1) Pontian; (2) Sarmatian; (3) Tortonian; (4) Hel- vetian; (5) Laaghian (Burdigalian).

In Britain the "fluvio-marine series" of the Isle of Wight; also the volcanic plateaux of Antrim and Inner Hebrides and those of the Faeroe Isles and Ice- land. In continental Europe the following subdivisions have been established in descending order: (1) Aquitanian, (2) Stampian (Rupelian), (3) Tongrain (Sannoisian).

Barton sands and clays; Ludian series

of France. Bracklesham Beds; Lutetian (Calcaire

grossier and Caillasses) of Paris basin. London clay, Woolwich and Reading

Beds ; T hanet sands ; Y presian or

Londinian of N. France and Belgium;

Sparnacian and Thanetian groups.

Danian — wanting in Britain; uppermost

limestone of Denmark. Senonian — Upper Chalk with Flints of

England ; Aturian and Emscherian

stages on the European continent. Turonian— Middle Chalk with few

flints, and comprising the Angoumian

and Ligerian stages. Cenomanian — Lower Chalk and Chalk

Marl. Albian '— Upper Greensand and Gault. Aptian— Lower Greensand; Marls and

limestones of Provence, &c. Urgonian (Barremian) — Atherfield clay;

massive Hippurite limestones of

southern France. Neocomian — Weald clay and Hastings

sand ; Hauterivian and Valanginian

sub-stages of Switzerland and France.

Purbecktan — Purbeck beds; Munder Mergel; largely present in West-phalia.

Pordandian — Portland group of Eng- land, represented in S. France by the

. thick Tithonian limestones.

Kimmeridgian — Kimmeridge Clay of England; Virgulian and Pterocerian groups of N. France; represented by thick limestones in the Mediterranean baˆin.

North America.

Similar to the European 'de- velopment, but with scantier traces of the presence of man.

As in Europe, it is hardly pos- sible to assign a definite chronological place to each of the various deposits of tnis period, terrestrial and marine. They generally resemble the European series. The charac- teristic marine, fluviatile and lacustrine terraces, which overlie the older drifts, have been classed . as the Champ- lain Group.

On the Atlantic border repre- sented by the marine Floridian series; in the interior by a subaerial and lacustrine series; and on the Pacific border by the thick marine series of San Francisco.

Represented in the Eastern States by a marine series (Yorktown or Chesapeake, Chipola and Chattahoochee groups), and in the interior by the lacustrine Loup Fork (Nebraska), Deep River, and John Day groups.

On the Atlantic border no equivalents have been satis- factorily recognised, but on the Pacific side there are marine deposits in N. W. Oregon, which may represent this division. In the interior the equivalent is believed to be the ; fresh-water White River series, including (1) Proto- ceras beds, (2) Oreodon beds, and (3) Titanethervum beds.

Woodstock and Aquia Creek groups of Potomac River ; Vicksburg, Jackson, Clai- borne, Buhrstone, and Lig- nitic groups of Mississippi.

In the interior a thick series of fresh-water formations, com- prising, in descending order, the Uinta, Bridger, Wind River, Wasatch, Torrejon, and Puerco groups.

On the Pacific side the marine Tejon series of Oregon and California.

On the Atlantic border both marine strata and Qthers con- taining a terrestrial flora re- present the Cretaceous series of formations.

In the interior there is also a commingling of marine with lacustrine deposits. At the top lies the Laramie or Lig- nitic series with an abundant terrestrial flora, passing down into the lacustrine and brackish-water Montana

series. Of older date, the Colorado series contains , an abundant marine fauna, yet includes also some coal-seams. The Niobrara marls and lime- stones are likewise of marine origin, but the lower members of the series (Benton and Dakota) show another great

representation of fresh-water sedimentation with lignites and coils.

In California a vast succession of marine deposits (Shasta- Chico) represents the Cre- taceous system; and in western British N. America coal-seams also occur.

Representatives of the Middle and lower Jurassic forma- tions have been found in California and Oregon, and farther north among the Arctic islands.

Strata containing Lower Juras- sic marine fossils appear in Wyoming and Dakota; and above them come the Atlanto- saurus and Baptanodon beds,

Europe,

Coral lian— Coral Rag, Coralline Oolite; Sequanian stages of the Continent, comprising the sub-stages of Astartian and Rauracian.

Oxford ian— Oxford Clay; Argovian and

. Neuvizyan stages.

Callovian—- Kellaways Rock, Divesian sub-stage of N. France.

Bathonian— series of English strata from Cornbrash down to Fuller's Earth.

Bajocian— Inferior Oolite of England.

Liassic — divisible into (1) Upper Lias or Toarcian, (2) Middle Lias, Marl- stone or Charmouthian, (3) Lower Lias of Sinemurian and Hettangian.

North America

In Germany and western Europe this division represents the deposits of inland seas or lagoons, and is divisible into the following stages in descending order; (1) Rhaetic, (2) Keuper, (3) Muschelkalk, (4) Bunter. In the eastern Alps and the Mediterranean basin the contemporaneous sediment- ary formations are those of open clear sea, in which a thickness of many thousand feet of strata was accumu- lated.

Thuringian — Zechstein, Magnesian Limestone; named from its develop- ment^ in Thuringia; well represented also in Saxony, Bavaria and Bohemia.

Saxonian — Rothliegendes Group; Red Sandstones, &c.

Autunian— where the strata present the lagoon facies, well displayed at Autun in France; where the marine type is predominant, as In Russia, the group has been termed Artinskian.

To this division of the geologi- cal record the Upper Barren Measures of the coal-fields of Pennsylvania, Prince Edward Island, Nova Scotia and New Brunswick have been assigned. . ,

Farther south in Kansas, Texas, and Nebraska the representa- tives of the division have an abundant marine fauna.

Stephanian or Uralian — represented in Russia by marine formations, and in central and western Europe by numer- ous small basins containing a peculiar flora and in some places a great variety of insects.

W e s t p h a I i a n or Moscovian— Coal- measures, Millstone Grit.

Culm or Dinantian — Carboniferous Lime- stone and Calciferous Sandstone series.

Devonian type..

tt~™ i Famennian.

Mdd Mi$£-

T^wpf ^ Goblentzian. ^ wer }Gedinnian.

Old Red Sand- stone type.

Yellow and red sandstone with H oloptychtus, BotfyriolepiSj&LC.

Caithness Flag- stones with Osteolepus,Dip- terus y liomo- steus, &c.

Red and purple sandstones and conglomerates with Cepkal- aspis, Pter- aspis, &c.

Upper

(Ludlow Group. •I Wenlock ” (Llandovery”

Lower (Caradoc or Bala Group.

(Ordovician)-j»lo

Upper or Olenus series— Tremadoc slates

and Lingula Flags. Middle or Paradoxides series — Mene-

vian Group. Lower or Olenellus series — Llanberis

and Harlech Group, and Olenellus-

zone.

In Scotland, underneath the Cambrian Olenellus group, lies unconformably a mass of red sandstone and con- glomerate (Torridonian) 8000 or 10,000 ft. thick, which rests with a strong unconformabiHty on a series of coarse gneisses and schists (Lewisian). A thick series of slates and phyllites lies below the oldest Palaeozoic rocks in central Europe, with coarse gneisses below.

which have yielded so large a

variety of deinosaurs and other vertebrates, and especially the remains of a number of'genera of small mammals.

In New York, Connecticut, New Brunswick, and Nova Scotia a series of red sandstone (Newark series) contains land- plants and labyrinthodonts like the lagoon type of central and_ western Europe. On the Pacific slope, however, marine equivalents occur, represent- ing the pelagic type of south- eastern Europe.

Upper productive Coal- measures.

Lower Barren measures.

Lower productive Coal- measures. ■ ■*■■

Pottsville conglomerate. – .

Mau'ch Chunk shales; lime- stones of Chester, St Louis, &c.

Pocono series ; Kinderhook limestone.

'Catskill red sandstone; Old. Red Sandstone type: the strata below show the Devonian type.

I Chemung Group.

L Genesee . ■ *"*

1 Hamilton Group. ; Marcellus ”

Corniferous Lime- f Upper stone. J Helder-

Onondaga LimeM , berg stone. \ Group.

Oriskany Sandstone.

**” Lower Helderberg Group.*

Water-Lime.

Niagara Shale and Limestone. I Clinton Group.

Medina ” f Cincinnati Group,

Uiica ” ■

Trenton ”

Chazy ”

[Calciferous ”

Upper or Potsdam series with

Olenus and Dicelocepfmlus

fauna. Middle or Acadian series with

Paradoxides fauna. Lower or Georgian series with

Olenellus fauna.

In Canada ˆand the Lake Superior region of the United States a vast : succession of rocks of Pre-Cambrian age has been grouped into the following subdivisions in de- scending order: (1) Keweena- wan, lying unconformably on

(2) Animikie, separated by a strong unconformabiHty from

(3) Upper Huronian, ($) Lower Huronian with an unconform- able base, (5) Goutchiching,

(6) Lanrentian. In the eastern part of Canada, Newfound- land, &c, and also in Mon- tana, sedimentary formations of great thickness below the lowest Cambrian zone have been found to contain some obscure organisms.

disappearance of land. The fact that the sedimentary forma- tions of each successive geological period consist to so large an extent of mechanically formed terrigenous detritus, affords good evidence of the coexistence of tracts of land as well as of extensive denudation.

From these general considerations we proceed to inquire how the existing topographical features of the land arose. Obviously the co-operation of the two great geological agencies of hypogene and epigene energy, which have been at work from the beginning of our globe's decipherable history, must have been the cause to which these features are to be assigned; and the task of the geologist is to ascertain, if possible, the part that has been taken by each. There is a natural tendency to see in a stupendous piece of scenery, such as a deep ravine, a range of hills, a line of precipice or a chain of mountains, evidence only of subterranean convulsion; and before the subject was taken up as a matter of strict scientific induction, an appeal to former cataclysms was considered a sufficient solution of the problems presented by such features of landscape. ' The rise of the modern Huttonian school, however, led to a more careful examination of these problems. The important share taken by erosion in the determination of the present features of landscape was then recognized, while a fuller appreciation of the relative parts played by the hypogene and epigene causes has gradually been reached.

1. The study of the progress of denudation at the present time has led to the conclusion that even if the rate of waste were not more rapid than it is to-day, it would yet suffice in a comparatively brief geological period to reduce the dry land to below the sea-level. But not only would the area of the land be diminished by denudation, it could hardly fail to be more or less involved in those widespread movements of subsidence, during which the thick sedimentary formations of the crust appear to have been accumulated. It is thus manifest that there must have been from time to time during the history of our globe upward movements of the crust, whereby the balance between land and sea was redressed. Proofs of such movements have been abundantly preserved among the stratified formations. We there learn that the uplifts have usually followed each other at long intervals between which subsidence prevailed, and thus that there has been a prolonged oscillation of the crust over the

great continental areas of the earth's surface.

An examination of that surface leads to the recognition of two great types of upheaval. In the one, the sea-floor, with all its thick accumulations of sediment, has been carried upwards, sometimes for several thousand feet, so equably that the strata retain their original flatness with hardly any sensible disturbance for hundreds of square miles. In the other type the solid crust has been plicated, corrugated and dislocated, especially along particular lines, and has attained its most stupendous disruption in lofty chains of mountains. Between these two phases of uplift many intermediate stages have been developed, according to the direction and intensity of the subterranean force and the varying nature and disposition of the rocks of the crust.

(a) Where the uplift has extended over wide spaces, without appreciable deformation of the crust, the flat strata have given rise to low plains, or if the amount of uprise has been great enough, to high plains, plateaux or tablelands. The plains of Russia, for example, lie for the most part on such tracts of equably uplifted strata. The great plains of the western interior of the United States form a great plateau or tableland, 5000 or 6000 ft. above the sea, and many thousands of square miles in extent, on which the Rocky Mountains have been ridged up.

(b) It is in a great mountain-chain that the complicated structures developed during disturbances of the earth's crust? can best be studied (see Parts IV. and V. of this article), and

' where the influence of these structures on the topography of the surface is most effectively displayed. Such a chain may be the result of one colossal disturbance; but those of high geological antiquity usually furnish proofs of successive uplifts with more or less intervening denudation. Formed along lines of continental displacement in the crust, they have again and again given

relief from the strain of compression by fresh crumpling, fracture and uprise. The chief guide in tracing these successive stages of growth is supplied by unconformability. If, for example, a mountain-range consists of upraised Silurian rocks, upon the upturned and denuded edges of which the Carboniferous Lime- stone lies transgressively, it is clear that its original upheaval must have taken place in the period of geological time represented by the interval between the Silurian and the Carboniferous Limestone formations. If, as the range is followed along its course, the Carboniferous

Limestone is found to be also highly inclined and covered unconformably by the Upper Coal-measures, a second uplift of that portion of the ground can be proved to have taken place between the time of the Limestone -and that of the Upper Coal-measures. By this simple and obvious kind of evidence the relative ages of different mountain-chains may be compared. In most great chains, however, the rocks have been so intensely crumpled, and even inverted, that much labour may be required before their true relations can be determined.

The Alps furnish an instructive example of the long series of revolutions through which a great mountain-system may have passed before reaching its present development. The first beginnings of the chain may have been upraised before the oldest Palaeozoic formations were laid down. There are at least traces of land and shore-lines in the Carboniferous period. Subsequent submergences and uplifts appear to have occurred during the Mesozoic periods. There is evidence that thereafter the whole region sank deep under the sea, in which the older Tertiary sediments were accumulated, and which seems to have spread right across the heart of the Old World. But after the deposition of the Eocene formations came the gigantic disruptions whereby all the rocks of the Alpine region were folded over each other, crushed, corrugated, fractured and displaced, some of their older portions, including the fundamental gneisses and schists, being squeezed up, torn off, and pushed horizontally for many miles over the younger rocks. But this upheaval, though the most momentous, was not the last which the chain has undergone, for at a later epoch in Tertiary time renewed disturbance gave rise to a further series of ruptures and plications. The chain thus successively upheaved has been continuously exposed to denudation and has consequently lost much of its original height. That it has been left in a state of instability is indicated by the frequent earthquakes of the Alpine region, which doubtless arise from the sudden snapping of rocks under intense strain.

A distinct type of mountain due to direct hypogene action is to be seen in a volcano. It has been already pointed out (Part IV. sect. 1) that at the vents which maintain a communication between the molten magma of the earth's interior and the surface, eruptions take place whereby quantities of lava and fragmentary materials are heaped round each orifice of discharge. A typical volcanic mountain takes the form of a perfect cone, but as it grows in size and its main vent is choked, while the sides of the cone are unable to withstand the force of the explosions or the pressure of the ascending column of lava, eruptions take place laterally, and numerous parasitic cones

arise on the flanks of the parent mountain. Where lava flows out from long fissures, it may pile up vast sheets of rock, and bury the surrounding country under several thousand feet of solid stone, covering many hundreds of square miles. In this way volcanic tablelands have been formed which, attacked by the denuding forces, are gradually trenched by valleys and ravines, until the original level surface of the lava-field may be almost or wholly lost. As striking examples of this physio- graphical type reference may be made to the plateau of Abyssinia, the Ghats of India, the plateaux of Antrim, the Inner Hebrides and Iceland, and the great lava-plains of the western territories of the United States.

2. But while the subterranean movements have upraised portions of the surface of the lithosphere above the level of the ocean, and have thus been instrumental in producing the existing tracts of land, the detailed topographical features of a landscape

are not solely, nor in general even chiefly, attributable to these movements. From the time that any portion of the sea-floor appears above sea-level, it undergoes erosion by the various epigene agents. Each climate and geological region has its own development of these agents, which include air, aridity, rapid and frequent alternations of wetness and dryness or of heat and cold, rain, springs, frosts, rivers, glaciers, the sea, plant and animal life. In a dry climate subject to great extremes of temperature the character and rate of decay will differ from those of a moist or an arctic climate. But it must be remembered that, however much they may vary in activity and in the results which they effect, the epigene forces work without intermission, while the hypogene forces bring about the upheaval of land only after long intervals. Hence, trifling as the results during a human life may appear, if we realize the multiplying influence of time we are led to perceive that the apparently feeble super- ficial agents can, in the course of ages, achieve stupendous transformations in the aspect of the land. If this efficacy may be deduced from what can be seen to be in progress now, it may not less convincingly be shown, from the nature of the sedimentary rocks of the earth's crust, to have been in progress from the early beginnings of geological history. Side by side with the various upheavals and subsidences, there has been a continuous removal of materials from

the land, and an equally persistent deposit of these materials under water, with the consequent growth of new rocks. Denudation has been aptly compared to a process of sculpturing wherein, while each of the implements employed by nature, like a special kind of graving tool, produces its own characteristic impress on the land, they all combine harmoniously towards the achievement of their one common task. Hence the present contours of the land depend partly on the original configuration of the ground, and the influence it may have had in guiding the operations of the erosive agents, partly on the vigour with which these agents perform their work, and partly on the varying structure and powers of resistance possessed by the rocks on which the erosion is carried on.

Where a new tract of land has been raised out of the sea by such an energetic movement as broke up the crust and produced the complicated structure and tumultuous external forms of a great mountain chain, the influence of the hypogene forces on the topography attains its highest development. But even the youngest existing chain has suffered so greatly from denudation that the aspect which it presented at the time of its uplift can only be dimly perceived. No more striking illustration of this feature can be found than that supplied by the Alps, nor one where the geotectonic structures have been so fully studied in detail. On the outer flanks of these mountains the longitudinal ridges and valleys of the Jura correspond with lines of anticline and syncline. Yet though the dominant topographical elements of the region have obviously been produced by the plication of the stratified formations, each ridge has suffered so large an amount of erosion that the younger rocks have been removed from its crest where the older members of the series are now exposed to view, while on every slope proofs may be seen of extensive denudation. If from these long wave-like undulations of the ground, where the relations between the disposition of the rocks below and the forms of the surface are so clearly traceable, the observer proceeds inwards to the main chain, he finds that the plications and displacements of the various formations assume an increasingly complicated character; and that although proofs of great denudation continue to abound, it becomes increasingly difficult to form any satisfactory conjecture as to the shape of the ground when the upheaval ended or any reliable estimate of the amount of material which has since then been removed. Along the central heights the mountains lift themselves towards the sky like the storm-swept crests of vast earth-billows. The whole aspect of the ground suggests intense commotion, and the impression thus given is often much intensified by the twisted and. crumpled strata, visible

from a long distance, on the crags and crests. On this broken-up surface the various agents of

denudation have been ceaselessly engaged since it emerged from the sea. They have excavated valleys, sometimes along depressions provided for them by the subterranean disturbances, sometimes down the slopes of the disrupted blocks of ground. So powerful has been this erosion that valleys cut out along lines of anticline, which were natural ridges, have sometimes become more important than those in lines of syncline, which were structurally depressions. The same subaerial forces have eroded lake-basins, dug out corries or cirques, notched the ridges, splintered the crests and furrowed the slopes, leav- ing no part of the original surface of the uplifted chain unmodified.

It has often been noted with surprise that features of underground structure which, it might have been confidently anticipated, should have exercised a marked influence on the topography of the surface have not been able to resist the levelling action of the denuding agents, and do not now affect the surface at all. This result is conspicuously seen in coal-fields where the strata are abundantly traversed by faults. These dislocations, having sometimes a displacement of several hundred feet, might have been expected to break up the surface into a network of cliffs and plains; yet in general they do not modify the level character of the ground above. One of the most remarkable faults in Europe is the great thrust which bounds the southern edge of the Belgian coal-field and brings the Devonian rocks above the Coal-measures. It can be traced across Belgium into the Boulonnais, and may not improbably run beneath the Secondary and Tertiary rocks of the south of England. It is crossed by the valleys of the Meuse and other northerly-flowing streams. Yet so indistinctly is it marked in the Meuse valley that no one would suspect its existence from any peculiarity in the general form of the ground, and even an experienced geologist, until he had learned the structure of the district, would scarcely detect any fault at all.

Where faults have influenced the superficial topography, it is usually by giving rise to a hollow along which the subaerial agents and especially running water can act effectively. Such a hollow may be eventually widened and deepened into a valley. On bare crags and crests, lines of fault are apt to be marked by notches or clefts, and they thus help to produce the pinnacles and serrated outlines of these exposed uplands.

It was cogently enforced by Hutton and Playfair, and inde- pendently by Lamarck, that no co-operation of underground agency is needed to produce such topography as may be seen in a great part of the world, but that if a tract of sea-floor were upraised into a wide plain, the fall of rain and the circulation of water over its surface would in the end carve out such a system of hills and valleys as may be seen on the dry land now. No such plain would be a dead-level. It would have inequalities on its surface which would serve as channels to guide the drainage from the first showers of rain. And these channels would be slowly widened and deepened until they would become ravines and valleys, while the ground between them would be left project- ing as ridges and hills. Nor would the erosion of such a system of water-courses require a long series of geological periods for its accomplishment. From measurements and estimates of the amount of erosion now taking place in the basin of the Mississippi river it has been computed that valleys 800 ft. deep might be carved out in less than a million years. In the vast tablelands of Colorado and other western regions of the United States an impressive picture is presented of the results of mere subaerial erosion on undisturbed and nearly level strata. Systems of stream-courses and valleys, river gorges unexampled elsewhere in the world for depth and length, vast winding lines of escarp- ment, like ranges of sea-cliffs, terraced slopes rising from plateau to plateau, huge buttresses and solitary stacks standing like islands out of the plains, great mountain-masses towering into picturesque peaks and pinnacles cleft by innumerable gullies, yet everywhere marked by the parallel bars of the horizontal strata out of which they have been carved-— these are the orderly symmetrical characteristics of a country where the scenery is due entirely to the action of subaerial agents on the one hand and

the varying resistance of perfectly regular stratified rocks on the other.

The details of the sculpture of the land have mainly depended on the nature of the materials on which nature's erosive tools have been employed. The joints by which all rocks are traversed have been especially serviceable as dominant lines down which the rain has filtered, up which the springs have risen and into which the frost wedges have been driven. On the high bare scarps of a lofty

mountain the inner structure of the mass is laid open, and there the system of joints even more than faults is seen to have determined the lines of crest, the vertical walls of cliff and precipice, the forms of buttress and recess, the position, of cleft and chasm, the outline of spire and pinnacle. On the lower slopes, even under the tapestry of verdure which nature delights to hang where she can over her naked rocks, we may detect the same pervading influence of the joints upon the forms assumed by ravines and crags. Each kind of stone, too, gives rise to its own characteristic form of scenery. Massive crystalline rocks, such as granite, break up along their joints and often decay into sand or earth along their exposed surfaces, giving rise to rugged crags with long talus slopes at their base. The stratified rocks besides splitting at their joints are especially distinguished by parallel ledges, cornices and recesses, produced by the irregular decay of their component strata, so that they often assume curiously architectural types of scenery. But besides this family feature they display many minor varieties of aspect according to their lithological composition. A range of sandstone hills, for example, presents a marked contrast to one of limestone, and a line of chalk downs to the escarpments formed by alternating bands of harder and softer clays and shales.

It may suffice here merely to allude to a few of the more important parts of the topography of the land in their relation to physiographical geology. A true mountain-chain, viewed from the geological side, is a mass of high ground which owes its prominence to a ridging-up of the earth's crust, and the intense plication and rupture of the rocks of which it is composed. But ■ ranges of hills almost mountainous in their bulk may be formed by the gradual erosion of valleys out of a mass of original high ground, such as a high plateau or tableland. Eminences which have been isolated by denudation from the main mass of the formations of which they originally formed part are known as " outliers " or " hills of circumdenudation."

Tablelands, as already pointed out, may be produced either by the upheaval of tracts of horizontal strata from the sea-floor into land; or by the uprise of plains of denudation, where rocks of various composition, structure and age have been levelled down to near or below the level of the sea by the co-operation of the various erosive agents. Most of the great tablelands of the globe are platforms of little-disturbed strata which have been upraised bodily to a considerable elevation. No sooner, however, are they placed in that position than they are attacked by running water, and begin to be hollowed out into systems of valleys. As the valleys sink, the

platforms between them grow into narrower and more definite ridges, until eventually the level tableland is converted into a complicated network of hills and valleys, wherein, nevertheless, the key to the whole arrange- ment is furnished by a knowledge of the disposition and effects of the flow of water. The examples of this process brought to light in Colorado, Wyoming, Nevada and the other western regions by Newberry, King, Hayden, Powell and other explorers, are among the most striking monuments of geological operations in the world.

Examples of ancient and much decayed tablelands formed by the denudation of much disturbed rocks are furnished by the' Highlands of Scotland and of Norway. Each of these tracts of ' high ground consists of some of the oldest and most dislocated formations of Europe, which at a remote period were worn down into a plain, and in that condition may have lain long submerged under the sea and may possibly have been overspread there with younger formations. Having at a much later time been raised several thousand feet above sea-level the ancient platforms

of Britain and Scandinavia have been since exposed to denuda- tion, whereby each of them has been so deeply channeled into glens and fjords that it presents to-day a surface of rugged hills, either isolated or connected along the flanks, while only fragments of the general surface of the tableland can here and there be recognized amidst the general destruction.

Valleys have in general been hollowed out by the greater erosive action of running water along the channels of drainage. Their direction has been probably determined in the great majority of cases by irregularities of the surface along which the drainage flowed on the first emergence of the land. Some- times these irregularities have been produced by folds of the terrestrial crust, sometimes by faults, sometimes by the irregu- larities on the surface of an uplifted platform of deposition or of denudation. Two dominant trends may be observed among them. Some are longitudinal and run along the line of flexures in the upraised tract of land, others are transverse where the drainage has flowed down the slopes of the ridges into the longi- tudinal valleys or into the sea. The forms of valleys have been governed partly by the structure and composition of the rocks, and partly by the relative potency of the different denuding agents. Where the influence of rain and frost has been slight, and the streams, supplied from distant sources, have had sufficient declivity, deep, narrow, precipitous ravines or gorges have been excavated. The

canyons of the arid region of the Colorado are a magnificent example of this result. Where, on the other hand, ordinary atmospheric action has been more rapid, the sides of the river channels have been attacked, and open sloping glens and valleys have been hollowed out. A gorge or defile is usually due to the action of a waterfall, which, beginning with some abrupt declivity or precipice in the course of the river when it first commenced to flow, or caused by some hard rock crossing the channel, has eaten its way backward.

Lakes have been already referred to, and their modes of origin have been mentioned. As they are continually being filled up with the detritus washed into them from the surrounding regions they cannot be of any great geological antiquity, unless where by some unknown process their basins are from time to time widened and deepened.

In the general subaerial denudation of a country, innumerable minor features are worked out as the structure of the rocks controls the operations of the eroding agents. Thus, among comparatively undisturbed strata, a hard bed resting upon others of a softer kind is apt to form along its outcrop a line of cliff or escarpment. Though a long range of such cliffs resembles a coast that has been worn by the sea, it may be entirely due to mere atmospheric waste. Again, the more resisting portions of a rock may be seen projecting as crags or knolls. An igneous mass will stand out as a bold hill from amidst the more decom- posable strata through which it has risen. These features, often so marked on the lower grounds, attain their most con- spicuous development among the higher and barer parts of the mountains, where subaerial disintegration is most rapid. The torrents tear out deep gullies from the sides of the declivities. Corries or cirques are scooped out on the one hand and naked precipices are left on the other. The harder bands of rock project as massive ribs down the slopes, shoot up into prominent aiguilles, or help to give to the summits the notched saw-like outlines they so often present.

The materials worn from the surface of the higher are spread out over the lower grounds. The streams as they descend begin to drop their freight of sediment when, by the lessening of their declivity, their carrying power is diminished. The great plains of the earth's surface are due to this deposit of gravel, sand and loam. They are thus monuments at once of the destructive and reproductive processes which have been in progress unceasingly since the first land rose above the sea and the first shower of rain fell. Every pebble and particle of their soil, once part of the distant mountains, has travelled slowly and fitfully to lower levels. Again and again have

these materials been shifted, ever moving downward and sea-ward. For centuries, perhaps, they have taken their share in the fertility of the plains and

have ministered to the nurture of flower and tree, of the bird of the ar, the beast of the field and of man himself. But their destiny is still the great ocean. In that bourne alone can they find undisturbed repose, and there, slowly accumulating in massive beds, they will remain until, in the course of ages, renewed upheaval shall raise them into future land, there once more to pass through the same cycle of change. (A. Ge.)

Literature. — Historical: The standard work is Karl A. von Zittel's Geschichte der Geologie und Paldontologie (1899), of which there is an abbreviated, but stil! valuable, English translation; D'Archiac, Histoire des progrbs de la geologie, deals especially with the period 1 834-1 850; Keferstein, Geschichte und Literatur der Geognosie, gives a summary up to 1840; 'while Sir A. Geikie's Founders of Geology (1897; 2nd ed., 1906) deals more particularly with the period 1750-1820. General treatises: Sir Charles Lyell's Principles of Geology is a classic. Of modern English works, Sir A. Geikie's Text Book of Geology (4th ed., 1903) occupies the first place; the work of T. C. Chamberlin and R..D. Salisbury, Geology; Earth History (3 vols..,. 1905— 1906), is especially valuable for American geology. A. de Lapparent's Traitide geologie (5th ed., 1906), is the standard French work. H. Credner's Elemente der Geologie has gone through several editions in Germany. Dynamical and physio- graphical geology are elaborately"treated by E. Suess, Das Antlitz der Erde, translated into English, with the title The Face of the Earth. The practical study of the.sciehce is treated of by F. von Richthofen, Fiihrer fiir Forschungsreiseh.de (1886); G. A. Cole, Aids in Practical Geology (5th ed., 1906); A. Geikie, Outlines of Field Geology (5th ed., 1900). The practical applications of Geology are discussed by J. V. Elsden, Applied Geology (1898-1899). The relations of Geology to scenery are dealt with by Sir A. Geikie, Scenery of Scotland (3rd ed., I9 01); J- E. Marr, The Scientific Study of Scenery (1900); Lord Avebury, The Scenery of Switzerland (1896) ; The Scenery of England (1902); and J. Geikie, Earth Sculpture (1898). A detailed biblio- graphy is given in Sir A. Geikie's Text Book of Geology. See

also the separate articles on geological subjects for special references to authorities.

GEOMETRICAL CONTINUITY. In a report of the Institute prefixed to Jean Victor Poncelet's Traite des proprietes pro- jectiles des figures (Paris, 1822), it is said that he employed " ce qu'il appelle le principe de continuite." The law or principle thus named by him had, he tells us, been tacitly assumed as axiomatic by " les plus savans geometres." It had in fact been enunciated as " lex continuationis," and " la loi de la continuite," by Gottfried Wilhelm Leibnitz (Oxf. - N.E.D.), and previously under another name by Johann Kepler in cap. iv. 4 of his Ad Vitellionem paralipomena quibus astronomiae pars optica traditur (Francofurti, 1604). Of sections of the cone, he says, there are five species from the " recta linea " or line-pair to the circle. From the line-pair we pass through an infinity of hyperbolas to the parabola, and thence through an infinity of ellipses to the circle. Related to the sections are certain remarkable points which have no name. Kepler calls them foci. The circle has one focus at the centre, an ellipse or hyperbola two foci equi- distant from the centre. The parabola has one focus within it, and another, the " eaecus focus," which may be imagined to be at infinity on the axis within or without the. curve. The line from it to any point of the section is parallel to the axis. To carry out the analogy we must speak paradoxically, and say that the line- pair likewise has foci, which in this case coalesce as in the circle and fall upon the lines themselves; for our geometrical terms should be subject to analogy. Kepler dearly loves analogies, his most trusty teachers, acquainted with all the secrets of nature, "omnium naturae arcanorum conscios." And they are to be especially regarded in geometry as, by the use of "however absurd expressions," classing extreme limiting forms with- an infinity of intermediate cases, and placing the whole essence of a thing clearly before the eyes.

Here, then, we find formulated by Kepler the doctrine of the concurrence of parallels at a single point at infinity and the principle of continuity (under the name analogy) in relation to the infinitely great. Such conceptions so strikingly propounded in ' a famous work could not escape the notice of contemporary mathematicians. Henry Briggs, in a letter to Kepler from Merton College, Oxford, dated " 10 Cal. Martiis 1625," suggests improvements in the Ad Vitellionem paralipomena, and gives the following construction: Draw a line CBADC, and let an ellipse, a parabola, and a. hyperbola have B and A for focus and

vertex. Let CC be the other foci of the ellipse and the hyperbola.

Make AD equal to AB, and with centres CC and radius in each case equal to CD describe circles. Then any point of the ellipse is equidistant from the focus B and one circle, and any point of the hyperbola from the focus B and the other circle. Any point P of the parabola, in which the second focus is missing or in- finitely distant, is equidistant from the focus B and the line through D which we call the directrix, this taking the place of either circle when its centre C is at infinity, and every line C2 being then parallel to the axis. Thus Briggs, and we know not how many " savans geometres " who have left no record, had already taken up the new doctrine in geometry in its author's lifetime. Six years after Kepler's death in i63oGirardDesargues, " the Monge of his age," brought out the first of his remarkable works founded on the same principles, a short tract entitled Methode universelle de mettre en perspective les objels donn&s riellement ou en devis (Paris, 1636); but " Le privilege etoit de 1630," (Poudra, CEuvres de Des., i. 55). Kepler as a modern geometer is best known by his New Stereometry of Wine Casks (Lincii,.i6i5), in which he replaces the circuitous Archimedean method of exhaustion by a direct " royal road " of infinitesimals, treating a vanishing arc as a straight line and regarding a curve as made up of a succession of short chords. Some 2000 years previously one Antipho, probably the well-known opponent of Socrates, has regarded a circle in like manner as the limiting form of a many-sided inscribed rectilinear figure. Antipho's notion was rejected by the men of his day as unsound, and when reproduced by Kepler it was again stoutly opposed as incapable of any sort of geometrical demonstration — not altogether with- out reason, for it rested on an assumed law of continuity rather than on palpable proof.

To complete the theory of continuity, the one thing needful was the idea of imaginary points implied in the algebraical geometry of Rene Descartes, in which equations between vari- ables representing co-ordinates were found often to have imaginary roots. Newton, in his two sections on " Inventio orbium " (Principia i. 4, 5), shows in his brief way that he is familiar with the principles of modern geometry. In two propositions he uses . an auxiliary line which is supposed to cut the conic in X and Y, but, as he remarks at the end of the second (prop. 24), it may not cut it at all. For the sake of brevity he passes on at ones with the observation that the required constructions are evident from the case in which the line cuts the trajectory. In the scholium appended to prop. 27, after saying that an asymptote is a tangent at infinity, he gives an unexplained general construction for the axes of a conic, which seems to imply that it has asymptotes. In all such cases, having equations to his loci in the background, he

may have thought of elements of the figure as passing into the imaginary state in such manner as not to vitiate conclusions arrived at on. the hypothesis of their reality.

Roger Joseph Boscovich, a careful student of Newton's works, has a full and thorough discussion of geometrical continuity in the third and last volume of his Elementa universae matheseos (ed. prim. Venet, 1757), which contains Sectionum conicarum elementa nova quadam methodo concinnata et dissertalionem de transformation locorum geometricorum, ubi de continuitatis lege, et de quibusdam infinili mysteriis. His first principle is that all varieties of a defined locus have the same properties, so that what is demonstrable of one should be demonstrable in like manner of all, although some artifice may be required to bring out the underlying analogy between them. The. opposite extremities of an infinite straight line, he says, are to be regarded as joined, as if the line were a circle having its centre at the infinity on either side of it. This leads up to the idea of a veluli plus quam infinita extensio, a line-circle containing, as .we say, the line infinity. Change from the real to the imaginary state is Contingent upon the passage of some element of a figure through zero or infinity and never takes place per saltum. Lines being some positive and some negative, there must be negative rect- angles and negative squares, such as those of the exterior diameters of a hyperbola. Boscovich's first principle was that of Kepler, by whose quantumvis absurdis locutionibus the boldest

applications of it are covered, as when we say with Poncelet that all concentric circles in a plane touch one another in two imaginary fixed points at infinity. In G. K. Ch. von Staudt's Geometric der Lage and Beitrdge zur G. der L. (Niirnberg, 1847, 1856-1860) the geometry of position, including the extension of the field of pure geometry to the infinite and the imaginary, is presented as an independent science, " welche des Messens nicht bedarf." (See Geometry: Projective.)

Ocular illusions due to distance, such as Roger Bacon notices in the Opus majus (i. 126, ii. 108, 497; Oxford, 1897), lead up to or illustrate the mathematical uses of the infinite and its re- ciprocal the infinitesimal. Specious objections can, of course, be made to the

anomalies of the law of continuity, but they are inherent in the higher geometry, which has taught us so much of the " secrets of nature." Kepler's excursus on the " analogy " between the conic sections hereinbefore referred to is given at length in an article on " The Geometry of Kepler and Newton " in vol. xviii. of the Transactions of the Cambridge Philosophical Society (1 900) . It had been generally overlooked, until attention was called to it by the present writer in a note read in 1880 (Proc. C.P.S. iv. 14-17), and shortly afterwards in The Ancient and Modern Geometry of Conies, with Historical Notes and Prolego- mena (Cambridge 1881). (C. T.)*

GEOMETRY, the general term for the branch of. mathematics which has for its province the study of the properties of space. From experience, or possibly intuitively, we characterize existent space by certain fundamental qualities, termed axioms, which are insusceptible of proof; and these axioms, in conjunc- tion with the mathematical entities of the point, straight line, curve, surface and solid, appropriately defined, are the premises from which the geometer draws conclusions. The geometrical axioms are merely conventions; on the one hand, the system may be based upon inductions from experience, in which case the deduced geometry may be regarded as a branch of physical science; or, on the other hand, the system may be formed by purely logical methods, in which case the geometry is a phase of pure mathematics. Obviously the geometry with which we are most familiar is that of existent space — the three-dimensional space of experience; this geometry may be termed Euclidean, after its most famous expositor. But other geometries exist, for it is possible to frame systems of axioms which definitely characterize some other kind of space, and from these axioms to deduce a series of non-contradictory propositions; such geometries are called non-Euclidean.

It is convenient to discuss the subject-matter of geometry under the following headings:

I. Euclidean Geometry: a discussion of the axioms of existent space and of the geometrical entities, followed by a synoptical account of Euclid's Elements.

II. Projective Geometry: primarily Euclidean, but differing from I. in employing the notion of geometrical continuity (q.v.) — points and lines at infinity.

III. Descriptive Geometry: the methods for representing upon planes figures placed in space of three dimensions.

IV. Analytical Geometry: the representation of geometrical figures and their relations by algebraic equations.

V. Line Geometry: an analytical treatment of the line regarded as the space element.

VI. Non-Euclidean Geometry: a discussion of geometries other than that of the space of experience.

VII. Axioms of Geometry: a critical analysis of the foundations of geometry.

Special subjects are treated under their own • headings : e.g. Projection, Perspective; Curve, Surface; Circle, Conic Section; Triangle, Polygon, Polyhedron; there are also articles on special curves and figures, e.g. Ellipse, Parabola, Hyperbola; Tetrahedron, Cube, Octahedron, Dodecahedron, Icosahedron;Cardioid, Catenary, Cissoid, Conchoid, Cycloid, Epicycloid, Limacon, Oval, Quadratrix, Spiral, &c.

History. — The origin of geometry (Gr. yrj, earth, fjkrpov, a measure) is, according to Herodotus, to be found in the etymology of the word. Its birthplace was Egypt, and it arose from the need of surveying the lands inundated by the Nile floods. In

its infancy it therefore consisted of a few rules, very rough and approximate, for computing the areas of triangles and quadri-laterals; and, with the Egyptians, it proceeded no further, the geometrical entities — the point, line, surface and solid— being only discussed in so far as they were involved in practical affairs. The point was realized as a mark or position, a straight line as a stretched string or the tracing of a pole, a surface as an area; but these units were not abstracted; and for the Egyptians geometry was only an art — an auxiliary to surveying. 1 The first step towards its elevation to the rank of a science was made by Thales (q.v.) of Miletus, who transplanted the elementary Egyptian mensuration to Greece. Thales clearly abstracted the notions of points and lines, founding the geometry of the latter unit, and discovering per saltum many propositions con- cerning areas, the circle, &c. The empirical rules of the Egyptians were corrected and developed by the Ionic School which he founded, especially by Anaximander and Anaxagoras, and in the 6th century B.C. passed into the care of the Pythagoreans. From this time geometry exercised a powerful influence on Greek thought. Pythagoras {q.v.), seeking the key of the universe in arithmetic and geometry, investigated logically the

principles underlying the known propositions; and this resulted in the formulation of definitions, axioms and postulates which, in addition to founding a science of geometry, permitted a crystallization, fractional, it is true, of the amorphous collection of material at hand. Pythagorean geometry was essentially a geometry of areas and solids; its goal was the regular solids — the tetrahedron, cube, octahedron, dodecahedron and icosa- hedron — which symbolized the five elements of Greek cosmology. The geometry of the circle, previously studied in Egypt and much more seriously by Thales, was somewhat neglected, although this curve was regarded as the most perfect of all plane figures and the sphere the most perfect of all solids. The circle, however, was taken up by the Sophists, who made most of their discoveries in attempts to solve the classical problems of squaring the circle, doubling the cube and trisecting an angle. These problems, besides stimulating pure geometry, i.e. the geometry of con- structions made by the ruler and compasses, exercised consider- able influence in other directions. The first problem led to the discovery of the method of exhaustion for determining areas. Antiphon inscribed a square in a circle, and on each side an isosceles triangle having its vertex on the circle; on the sides of the octagon so obtained, isosceles triangles were again con- structed, the process leading to inscribed polygons of 8, 16 and 32 sides; and the areas of these polygons, which are easily determined, are successive approximations to the area of the circle. Bryson of Hera.clea took an important step when he circumscribed, in addition to inscribing, polygons to a circle, but he committed an error in treating the circle as the mean of the two polygons. The method of Antiphon, in assuming that by continued division a polygon can be constructed coincident with the circle, demanded that magnitudes are not infinitely divisible. Much controversy ranged about this point; Aristotle supported the doctrine of infinite divisibility; Zeno attempted to show its absurdity. The mechanical tracing of loci, a principle initiated by Archytas of Tarentum to solve the last two problems', was a frequent subject for study, and several mechanical curves were thus discovered at subsequent dates (cissoid, conchoid, quadratrix). Mention may be made of Hippocrates, who, besides developing the known methods, made a study of similar figures, and, as a consequence, of proportion. This step is important as bringing into line discontinuous number and continuous magnitude.

jh fresh stimulus was given by. the succeeding Platonists, who, accepting in part the Pythagorean cosmology, made the study of geometry preliminary to that of philosophy. The many discoveries made by this school were facilitated in no small measure by the

clarification of the axioms and definitions, the logical sequence of propositions which was adopted, and, more especially, by the formulation of the analytic method, i,e. of assuming the truth of a proposition and then reasoning to a 1 For Egyptian geometry see EoyPT, § Science and Mathematics.

known truth. The main strength of the Platonist geometers lies in stereometry or the geometry of solids. The Pythagoreans had dealt with the sphere and regular solids, but the pyramid, prism, cone and cylinder were but little known until the Platonists took them in hand. Eudoxus established their mensuration, proving the pyramid and cone to have one-third the content of a prism and cylinder on the same base and of the same height, and was probably the discoverer of a proof that the volumes of spheres are as the cubes of their radii. The discussion of sections of the cone and cylinder led to the discovery of the three curves named the parabola, ellipse and hyperbola (see C6nic Section) ; it is difficult to over-estimate the importance of this discovery; its investigation marks the crowning achievement of Greek geometry, and led in later years to the fundamental theorems and methods of modern geometry.

The presentation of the subject-matter of geometry as a con- nected and logical series of propositions, prefaced by "Opoi or foundations, had been attempted by many; but it is to Euclid that we owe a complete exposition. Little indeed in the Elements is probably original except the arrangement; but in this Euclid surpassed such predecessors as Hippocrates, Leon, pupil of Neocleides, and Theudius of Magnesia, devising an apt logical model, although when scrutinized in the light of modern mathe- matical conceptions the proofs are riddled with fallacies. Accord- ing to the commentator Proclus, the Elements were written with a twofold object, first, to introduce the novice to geometry, and secondly, to lead him to the regular solids; conic sections found no place therein. What Euclid did for the line and circle, Apollonius did for the conic sections, but there we have a discoverer as well as editor. These two works, which contain the greatest contributions to ancient geometry, are treated in detail in Section I. Euclidean Geometry and the articles Euclid; Conic Section; Apollonius. Between Euclid and Apollonius there flourished the illustrious Archimedes, whose geometrical dis- coveries are

mainly concerned with the mensuration of the circle and conic sections, and of the sphere, cone and cylinder, and whose greatest contribution to geometrical method is the elevation of the method of exhaustion to the dignity of an instru- ment of research. Apollonius was followed by Nicomedes, the inventor of the conchoid; Diodes, the inventor of the cissoid; Zenodorus, the founder of the study of isoperimetrical figures; Hipparchus, the founder of trigonometry; and Heron the elder, who wrote after the manner of the Egyptians, and primarily directed attention to problems of practical surveying.

Of the many isolated discoveries made by the later Alexandrian mathematicians, those of Menelaus are of importance. He showed how to treat spherical triangles, establishing their properties and determining their congruence; his theorem on the products of the segments in which the sides of a triangle are cut by a line was the foundation on which Carnot erected his theory of transversals. These propositions, and also those of Hipparchus, were utilized and developed by Ptolemy (q.v.), the expositor of trigonometry and discoverer of many isolated propositions. Mention may be made of the commentator Pappus, whose Mathematical Collections is valuable for its wealth of historical matter; of Theon, an editor of Euclid's Elements and commentator of Ptolemy's Almagest; of Proclus, a commentator of Euclid; and of Eutocius, a commentator of Apollonius and Archimedes.

The Romans, essentially practical and having no inclination to study science qua science, only had a geometry which sufficed for surveying; and even here there were abundant inaccuracies, the empirical rules employed being akin to those of the Egyptians and Heron. The Hindus, likewise, gave more attention to computation, and their geometry was either of Greek origin of in the form presented in trigonometry, more particularly con- nected with arithmetic. It had no logical foundations; each proposition stood alone; and the results were empirical. The Arabs more closely followed the Greeks, a plan adopted as a sequel to the translation of the works of Euclid, Apollonius, Archimedes and many others into Arabic. Their chief con- tribution to geometry is exhibited in their solution of algebraic

equations by intersecting conies, a step already taken by the Greeks in isolated cases, but only elevated into a method by Omar al Hayyami, who flourished in the nth century. During the middle ages little was added to Greek and Arabic geometry. Leonardo of Pisa wrote a Practica geometriae (1220), wherein Euclidean methods are employed; but it was not until the 14th century that geometry,

generally Euclid's Elements, became an essential item in university curricula. There was, however, no sign of original development, other branches of mathematics, mainly algebra and trigonometry, exercising a greater fascination until the 16th century, when the subject again came into favour.

The extraordinary mathematical talent which came into being in the 16th and 17th centuries reacted on geometry and gave rise to all those characters which distinguish modern from ancient geometry. The first innovation of moment was the formulation of the principle of geometrical continuity by Kepler. The notion of infinity which it involved permitted generalizations and systematizations hitherto unthought of (see Geometrical Continuity) ; and the method of indefinite division applied to rectification, and quadrature and cubature problems avoided the cumbrous method of exhaustion and provided more accurate results. Further progress was made by Bonaventura Cavalieri, who, in his Geometria indivisibilibus continuorum (1620), de- vised a method intermediate between that of exhaustion and the infinitesimal calculus of Leibnitz and Newton. The logical basis of his system was corrected by Roberval and Pascal; and their discoveries, taken in conjunction with those of Leibnitz, Newton, and many others in the fluxional calculus, culminated in the branch of our subject known as differential geometry (see Infinitesimal Calculus; Curve; Surface).

A second important advance followed the recognition that conies could be regarded as projections of a circle, a conception which led at the hands of Desargues and Pascal to modern projective geometry and perspective. A third, and perhaps the most important, advance attended the application of algebra to geometry by Descartes, who thereby founded analytical geometry. The new fields thus opened up were diligently explored, but the calculus exercised the greatest attraction and relatively little progress was made in geometry until the beginning of the 19th century, when a new era opened.

Gaspard Monge was the first important contributor, stimulating analytical and differential geometry and founding descriptive geometry in a series of papers and especially in his lectures at the Ecole polytechnique. Projective geometry, founded by Desar- gues, Pascal, Monge and L. N. M. Carnot, was crystallized by J. V. Poncelet, the creator of the modern methods. In his Trait6 des proprietis des figures (1822) the line and circular points at infinity, imaginaries, polar reciprocation, homology, cross- ratio and projection are systematically employed. In Germany, A. F. Mobius, J. Plucker and J. Steiner were making far-reaching contributions.

Mobius, in his Barycenlrische Calcul (1827), introduced homogeneous co-ordinates, and also the powerful notion of geometrical transformation, including the special cases of collineation and duality; Pliicker, in his Analytisch- geometrische Enlwickelungen (1828-1831), and his System der analytischen Geomelrie (1835), introduced the abridged notation, line and plane co-ordinates, and the conception of generalized space elements; while Steiner, besides enriching geometry in numerous directions, was the first to systematically generate figures by projective pencils. We may also notice M. Chasles, whose Apercu historique (1837) is a classic. Synthetic geometry, characterized by its fruitfulness and beauty, attracted most attention, and it so happened that its originally weak logical foundations became replaced by a more substantial set of axioms. These were found in the anharmonic ratio, a device leading to the liberation of synthetic geometry from metrical relations, and in involution, which yielded rigorous definitions of imagin- aries. These innovations were made by K. J. C. von Staudt. Analytical geometry was stimulated by the algebra of invariants, a subject much developed by A. Cayley, G. Salmon, S. H. Aron- hold, L. O. Hesse, and more particularly by R. F. A. Clebsch. The introduction of the line as a space element, initiated by

H. Grassmann (1844) and Cayley (1859), yielded at the hands of Plucker a new geometry, termed line geometry, a subject developed more notably by F. Klein, Clebsch, C. T. Reye and F. O. R. Sturm (see Section V., Line Geometry).

N ‘ on-euclidean geometries, having primarily their origin in the discussion of Euclidean parallels, and treated by Wallis, Saccheri and Lambert, have been especially developed during the 19th century. Four lines of investigation may be distinguished: — the naive-synthetic, associated with Lobatschewski, Bolyai, Gauss; the metric differential, studied by Riemann, Helmholtz, Beltrami; the projective, developed by Cayley, Klein, Clifford; and the critical-synthetic, promoted chiefly by the Italian mathematicians Peano, Veronese, Burali-Forte, Levi Civitta, and the Germans Pasch and Hilbert. (C. E.)*

I. Euclidean Geometry

This branch of the science of geometry is so named since its methods and arrangement are those laid down in Euclid's Elements.

§ 1. Axioms. — The object of geometry is to investigate the properties of space. The first step must consist in establishing those fundamental properties from which all others follow by processes of deductive reasoning. They are laid down in the Axioms, and these ought to form such a system that nothing need be added to them in order fully to characterize space, and that nothing may be omitted without making the system in- complete. They must, in fact, completely " define " space.

§ 2. Definitions. — The axioms of Euclidean Geometry are obtained from inspection of existent space and of solids in existent space, — hence from experience. The same source gives us the notions of the geometrical entities to which the axioms relate, viz. solids, surfaces, lines or curves, and points. A solid is directly given by experience; we have only to abstract all material from it in order to gain the notion of a geometrical solid. This has shape, size, position, and may be moved. Its boundary or boundaries are called surfaces. They separate one part of space from another, and are said to have no thickness. Their boundaries are curves or lines, and these have length only. Their boundaries, again, are points, which have no magnitude but only position. We thus come in three steps from solids to points which have no magnitude; in each step we lose one extension. Hence we say a solid has three dimensions, a surface two, a line one, and a point none. Space itself, of which a solid forms only a part, is also said to be of three dimensions. The same thing is intended to be expressed by saying that a solid has length, breadth and thickness, a surface length and breadth, a line length only, and a point no extension whatsoever.

Euclid gives the essence of these statements as definitions: — Def. 1, I. A point is that which has no parts, or which has no mag- nitude. Def. 2, 1. A line is length without breadth.

Def. 5, I. A superficies is that which has only length and breadth. Def. 1, XI. A solid is that which has length, breadth and thickness.

It is to be noted that the synthetic method is adopted by Euclid; the analytical derivation of the successive ideas of "surface," "line," and "point" from the experimental realiza- tion of a " solid " does not find a place in his system, although possessing more advantages.

If we allow motion in geometry, we may generate these entities by

moving a point, a line, or a surface, thus: —

The path of a moving point is a line.

The path of a moving line is, in general, a surface.

The path of a moving surface is, in general, a solid.

And we may then assume that the lines, surfaces and solids, as defined before, can all be generated in this manner. From this generation of the entities it follows again that the boundaries — the first and last position of the moving element — of a line are points, and so on; and thus we come back to the considerations with which we started.

Euclid points this out in his definitions, — Def. 3, 1., Def. 6, 1., and Def. 2, XI. He does not, however, show the connexion which these definitions have with those mentioned before. When points and lines have been defined, a statement like

Def. 3, 1., " The extremities of a line are points," is a proposition which either has to be proved, and then it is a theorem, or which has to be taken for granted, in which case it is an axiom. And so with Def. 6, 1., and Def. 2, XI.

§ 3. Euclid's definitions mentioned above are attempts to describe, in a few words, notions which we have obtained by inspection of and abstraction from solids. A few more notions have to be added to these, principally those of the simplest line — the straight line, and of the simplest surface — the flat surface or plane. These notions we possess, but to define them accurately is difficult. Euclid's Definition 4, I., " A straight line is that which lies evenly between its extreme points," must be meaningless to any one who has not the notion of straightness in his mind. Neither does it slate a property of the straight line which can be used in any further investigation. Such a property is given in Axiom 10, 1. It is really this axiom, together with Postulates 2 and 3, which characterizes the straight line.

Whilst for the straight line the verbal definition and axiom are kept apart, Euclid mixes them up in the case of the plane. Here the Definition 7, 1., includes an axiom. It defines a plane as a surface which has the property that every straight line which joins any two points in it lies altogether in the surface. But if we take a straight line and a point in such a surface, and draw all straight lines which join the latter to all points in the first line, the surface will be fully determined. This construction is therefore sufficient as a definition.

That every other straight line which joins any two points in this surface lies altogether in it is a further property, and to assume it gives another axiom.

Thus a number of Euclid's axioms are hidden among his first definitions. A still greater confusion exists in the present editions of Euclid between the postulates and axioms so called, but this is due to later editors and not to Euclid himself. The latter had the last three axioms put together with the postulates {axTr)ixaTo), so that these were meant to include all assumptions relating to space. The remaining assumptions, which relate to magnitudes in general, viz. the first eight " axioms " in modern editions, were called " common notions " (icoivai Ivvoiax). Of the latter a few may be said to be definitions. Thus the eighth might be taken as a definition of " equal," and the seventh of " halves." If we wish to collect the axioms used in Euclid's Elements, we have therefore to take the three postulates, the last three axioms as generally given, a few axioms hidden in the definitions, and an axiom used by Euclid in the proof of Prop. 4, I, and on a few other occasions, viz. that figures may be moved in space without change of shape or size.

§ 4. Postulates. — The assumptions actually made by Euclid may be stated as follows: —

(1) Straight lines exist which have the property that any one of them may be produced both ways without limit, that through any two points in space such a line may be drawn, and that any two of them coincide throughout their indefinite extensions as soon as two points in the one coincide with two points in the other. (This gives the contents of Def. 4, part of Def. 35, the first two Postulates, and Axiom 10.)

(2) Plane surfaces or planes exist having the property laid down in Def. 7, that every straight line joining any two points in such a surface lies altogether in it.

(3) Right angles, as defined in Def. 10, are possible, and all right angles are equal ; that is to say, wherever in space we take a plane, and wherever in that plane we construct a right angle, all angles thus constructed will be equal, so that any one of them may be made to coincide with any other. (Axiom 11.)

(4) The 12th Axiom of Euclid. This we shall not state now, but only introduce it when we cannot proceed any further without it.

(5) Figures maybe freely moved in space without change of shape or size. This is assumed by Euclid, but not stated as an axiom.

(6) In any plane a circle may be described, having any point in that plane as centre, and its distance from any other point in that plane as radius. (Postulate 3.)

The definitions which have not been mentioned are all " nominal definitions," that is to say, they fix a name for a thing described. Many of them overdetermine a figure.

§ 5. Euclid's Elements (see Euclid) are contained in thirteen books. Of these the first four and the sixth are devoted to " plane geometry," as the investigation of figures in a plane is generally called. The 5th book contains the theory of proportion

which is used in Book VI. The 7th, 8th and oth books are purely arithmetical, whilst the 10th contains a most ingenious treatment of geometrical irrational quantities. These four books will be excluded from our survey. The remaining three books relate to figures in space, or, as it is generally called, to " solid geometry." The 7th, 8th, oth, 10th, 13th and part of the nth and 12th books are now generally omitted from the school editions of the Elements. In the first four and in the 6th book it is to be under- stood that all figures are drawn in a plane.

Book I. of Euclid's " Elements!" § 6. According to the third postulate it is possible to draw in any plane a circle which has its centre at any given point, and its radius equal to the distance of this point from any other point given in the plane. This makes it possible (Prop. 1) to construct on a given line AB an equilateral triangle, by drawing first a circle with A as centre and AB as radius, and then a circle with B as centre and BA as radius. The point where these circles intersect — that they intersect Euclid quietly assumes — is the vertex of the required triangle. Euclid does not suppose, however, that a circle may be drawn which has its radius equal to the distance between any two points unless one of the points be the centre. This implies also that we are not supposed to be able to make any straight line equal to any other straight line, or to carry a distance about in space. Euclid therefore next solves the problem: It is required along a given

straight line from a point in it to set off a distance equal to the length of another straight line given anywhere in the plane. This is done in two steps. It is shown in Prop. 2 how a straight line may be drawn from a given point equal in length to another given straight line not drawn from that point. And then the problem itself is solved in Prop. 3, by drawing first through the given point some straight line of the required length, and then about the same point as centre a circle having this length as radius. This circle will cut off from the given straight line a length equal to the required one. Nowadays, instead of going through this long process, we take a pair of compasses and set off the given length by its aid. This assumes that we may move a length about without changing it. But Euclid has not assumed it, and this proceeding would be fully justified by his desire not to take for granted more than was necessary, if he were not obliged at his very next step actually to make this assumption, though without stating it.
.

§ 7. We now come (in Prop. 4) to the first theorem. It is the fundamental theorem of Euclid's whole system, there being only a very few propositions (like Props. 13, 14, 15, I.), except those in the 5th book and the first half of the 11th, which do not depend upon it. It is stated very accurately, though somewhat clumsily, as follows: —

If two triangles have two sides of the one equal to two sides of the other, each to each, and have also the angles contained by those sides equal to one another, they shall also have their bases or third sides equal; and the two triangles shall be equal; and their other angles shall be equal, each to each, namely, those to which the equal sides are opposite.

That is to say, the triangles are " identically " equal, and one may be considered as a copy of the other. The proof is very simple. The first triangle is taken up and placed on the second, so that the parts of the triangles which are known to be equal fall upon each other. It is then easily seen that also the remaining parts of one coincide with those of the other, and that they are therefore equal. This process of applying one figure to another Euclid scarcely uses again, though many proofs would be simplified by doing so. The process introduces motion into geometry, and includes, as already stated, the axiom that figures may be moved without change of shape or size.

If the last proposition be applied to an isosceles triangle, which has two sides equal, we obtain the theorem (Prop. 5), if two sides of a triangle are equal, then the angles opposite these sides are equal.

Euclid's proof is somewhat complicated, and a stumbling-block to many schoolboys. The proof becomes much simpler if we consider the isosceles triangle ABC (AB = AC) twice over, once as a triangle BAC, and once as a triangle CAB ; and now remember that AB, AC in the first are equal respectively to. AC, AB in the second, and the angles included by these sides are equal. Hence the triangles are equal, and the angles in the one are equal to those in the other, viz. those which are opposite equal sides, i.e. angle ABC in the first equals angle ACB in the second, as they are opposite the equal sides AC and AB in the two triangles.

There follows the converse theorem (Prop. 6). If two angles in 4 a triangle are equal, then the sides opposite them are equal, — i.e. the triangle is isosceles. The proof given consists in what is called a reductio ad absurdum, a kind of proof often used by Euclid, and principally in proving the converse of a previous theorem. It assumes that the theorem to be proved is wrong, and then shows that this assumption leads to an absurdity, i.e. to a conclusion which is in contradiction to a proposition proved before — that therefore the assumption made cannot be true, and hence that the theorem is true. It is often stated that Euclid invented this kind of proof, but the method is most likely much older.

§ 8. It is next proved that two triangles which have the three sides of the one equal respectively to those of the other are identically equal, hence that the angles of the one are equal respectively to those of the other, those being equal which are opposite equal sides. This is Prop. 8, Prop. 7 containing only a first step towards its proof.

These theorems allow now of the solution of a number of prob- lems, viz. : —

To bisect a given angle (Prop. 9). To bisect a given finite straight line (Prop. 10). To draw a straight line perpendicularly to a given straight line through a given point in it (Prop. 11), and also through a given point not in it (Prop. 12).

The solutions all depend upon properties of isosceles triangles. § 9. The next three theorems relate to angles only, and might have been proved before Prop. 4, or even at the very beginning. The first (Prop. 13) says, The angles which one straight line makes with another straight line on one side of it either are two right angles or are together equal to two right angles. This theorem would have been unnecessary if Euclid had admitted the notion of an angle such that its two limits are in the same straight line, and had besides defined

the sum of two angles.

Its converse (Prop. 14) is of great use, inasmuch as it enables us in many cases to prove that two straight lines drawn from the same point are one the continuation of the other. So also is

Prop. 15. If two straight lines cut one another, the vertical or opposite angles shall be equal.

§ 10. Euclid returns now to properties of triangles. Of great importance for the next steps (though afterwards superseded by a more complete theorem) is

Prop. 16. // one side of a triangle be produced, the exterior angle shall be greater than either of the interior opposite angles.

Prop. 17. Any two angles of a triangle are together less than two right angles, is an immediate consequence of it. By the aid of these two, the following fundamental properties of triangles are easily proved : —

Prop. 18. The greater side of every triangle has the greater angle opposite to it;

Its converse, Prop. 19. The greater angle of every triangle is sub-tended by the greater side, or has the greater side opposite to it ;

Prop. 20. Any two sides of a triangle are together greater than the third side;

And also Prop. 21. If from the ends of the side of a triangle there be drawn two straight lines to a point within the triangle, these shall be less than the other two sides of the triangle, but shall contain a greater angle.

§ II'. Having solved two problems (Props.22, 23),hereturns to two triangles which have two sides of the one equal respectively to two sides of the other. It is known (Prop. 4) that if the included angles are equal then the third sides are equal; and conversely (Prop. 8), if the third sides are equal, then the angles included by the first sides are equal. From this it follows that if the included angles are not equal, the third sides are not equal ; and conversely, that if the third sides are not equal, the included angles are not equal. Euclid now completes this knowledge by proving, that " if the included angles are not equal, then the third side in that triangle is the greater which contains ike greater angle "; and conversely, that " if the third sides

are unequal, that triangle contains the greater angle which contains the greater side." These are Prop. 24 and Prop. 25.

§ 12. The next theorem (Prop. 26) says that if two triangles have one side and two angles of the one equal respectively to one side and two angles of the other, viz. in both triangles either the angles adjacent to the equal side, or one angle adjacent and one angle opposite it, then the two triangles are identically equal.

This theorem belongs to a group with Prop. 4 and Prop. 8. Its first case might have been given immediately after Prop. 4, but the second case requires Prop. 16 for its proof.

§ 13. We come now to the investigation of parallel straight lines, ■i.e. of straight lines which lie in the same plane, and cannot be made to meet however far they be produced either way. The investigation which starts from Prop. 16, will become clearer if a few names be explained which are not all used by Euclid. If two straight lines be cut by a third, the latter is now generally called a " transversal " of the figure. It forms at the two points where it cuts the given lines four angles with each. Those of the angles which lie between the given lines are called interior angles, and of these, again, any two which lie on opposite sides of the transversal but one at each of the two points are called " alternate angles."

We may now state Prop. 16 thus: — // two straight lines which meet are cut by a transversal, their alternate angles are unequal. For the lines will form a triangle, and one of the alternate angles will be an exterior angle to the triangle, the other interior and opposite to it.

From this follows at once the theorem contained in Prop. 27. // two straight lines which are cut by a transversal make alternate angles equal, the lines cannot meet, however far they be produced, hence they are parallel. This proves the existence of parallel lines.

Prop. 28 states the same fact in different forms. // a straight line, falling on two other straight lines, make the exterior angle equal to the interior and opposite angle on the same side of the line, or make

the interior angles on the same side together equal to two right

angles, the two straight lines shall be parallel to one another.

Hence we know that, " if two straight lines which are cut by a transversal meet, their alternate angles are not equal "; and hence that, " if alternate angles are equal, then the lines are parallel."

The question now arises, Are the propositions converse to these true or not ? That is to say,. " If alternate angles are unequal, do the lines meet?" And "if the lines are parallel, are alternate angles necessarily equal ?"

The answer to either of these two questions implies the answer to the other. But it has been found impossible to prove that the negation or the affirmation of either is true.

The difficulty which thus arises is overcome by Euclid assuming that the first question has to be answered in the affirmative. This gives his last axiom (12), which we quote in his own words.

Axiom 12'. — If a straight line meet two straight lines, so as to make the two interior angles .on the' same side of it taken together less than hvo right angles, these straight lines, being continually produced, shall at length meet on that side ort which are the angles which are less than two right angles.

The answer to the second of the above questions follows from this, and gives the theorem Prop. 29: — If a straight line fall on two parallel straight lines, it makes the alternate angles equal to one another, and the exterior angle equal to the interior and' opposite angle on the same side, and also the two interior angles on the same side together equal to two right angles.

§ 14. With this a new part of elementary geometry begins. The earlier propositions are . independent of this axiom, and would be true even if a wrong, assumption had been made in it. They all relate to figures in a plane. But a plane is only one among an infinite number of conceivable surfaces. We may draw figures on any one of them and study their properties. We may, for instance, take a sphere instead, of the plane, and obtain " spherical " in the place of " plane " geometry. If on one of these surfaces lines and figures could be drawn, answering to all the definitions of our plane figures, and if the axioms with the exception of the last all hold, then all propositions up to the 28th will be true for these figures. This is the case in spherical geometry if. we substitute " shortest line" or " great circle " for " straight line," " small circle " for " circle," and if,

besides, we limit all figures to a part of the sphere which is less than a hemisphere, so that two points on it cannot be opposite ends of a diameter, and therefore determine always one and only one great circle. ;

For spherical triangles, therefore, all the important propositions 4, 8, 26; 5 and 6; and 18, 19 and 20 will hold good.

This remark will be sufficient to show the impossibility of proving Euclid's last axiom, which would mean proving that this axiom is a consequence of the others, and hence that the theory of parallels would hold on a spherical surface, where the other axioms do hold, whilst parallels do not even exist.

It follows that the axiom iri question states an inherent difference between the plane and other, surfaces, and that the plane is only fully characterized when {his axiom is added to the other assumptions.

§ 15. The introduction of, the new axiom and of parallel lines leads to a new class of propositions.

After proving (Prop. 30) that " two lines which are each parallel to a third are parallel to each other," we obtain the new properties of triangles contained in Prop. 32. Of these the second part is the most important, viz. the theorem, The three interior angles of every triangle are together equal to two right angles.

As easy deductions not given by Euclid but added by Simson follow the propositions about the angles in polygons; they are given in English editions as corollaries to Prop- 3 2 –

These theorems do not hold for spherical figures. The sum of the interior angles of a spherical triangle is always greater than two right angles, and increases with the area.

§ 16. The theory of parallels as such may be said to be finished with Props. 33 and 34, which state properties of the parallelogram, i.e. of a quadrilateral formed by two pairs of parallels. They are — ■

Prop. 33. The straight lines which join the extremities of two equal and parallel straight lines towards the same parts are themselves equal and parallel; and

Prop. 34. The opposite sides and angles of a parallelogram are equal to one another, and the diameter {diagonal) bisects the parallelo-

gram, that is, divides it into two equal parts.

§ 17. The rest of the first book relates to areas of figures.

The theory is made to depend upon- the theorems —

P ro P- 35- Parallelograms on the same base and between the same parallels are equal to one another; and

Prop. 36. Parallelograms on equal bases and between the same parallels are equal to one another.

As each parallelogram is bisected by a diagonal, the last theorems hold also if the word parallelogram be replaced by " triangle," as is done in Props. 37 and 38.

It is to be rematked that Euclid proves these propositions only in the case when the parallelograms or triangles have their bases in the same straight line.

The theorems converse to the last form the contents of the next three propositions, viz.: Props, 40 and 41. — Equal triangles, on

the same or on equal bases, in the same straight line, and on the same side of it, are between the same parallels.

That the two cases here stated are given by Euclid in two separate propositions proved separately is characteristic of his method.

§18. To compare areas of other figures, Euclid shows first, in Prop. 42, how to draw a parallelogram which is equal in area to a given triangle, and has one of its angles equal to a given angle. If the given angle is right, then the problem is solved to draw a " rectangle " equal in area to a given triangle.

Next this parallelogram is transformed into another parallelogram, which has one of its sides equal to a given straight line, whilst its angles remain unaltered. This may be done by aid of the theorem in

Prop. 43. The complements of the parallelograms which are about the diameter of any parallelogram are equal to one another.

Thus the problem (Prop. 44) is solved to construct a parallelogram on a given line, which is equal in area to a given triangle, and which has one angle equal to a given angle (generally a right angle).

As every polygon can be divided into a number of triangles, we can

now construct a parallelogram having a given angle, say a right angle, and being equal in area to a given polygon. For each of the triangles into which the polygon has been divided, a parallelo- gram may be constructed, having one side equal to a given straight line and one angle equal to a given angle. If these parallelograms be placed side by side, they may be added together to form a single parallelogram, having still one side of the given length. This is done in Prop. 45.

Herewith a means is found to compare areas of different polygons. We need only construct two rectangles equal in area to the given polygons, and having each one side of given length. By comparing the unequal sides we are enabled to judge whether the areas are equal, or which is the greater. Euclid does not state thisconsequence, but the problem is taken up again at the end of the second book, where it is shown how to construct a square equal in area to a given polygon.

Prop. 46 is : To describe a square on a given straight line.

§19. The first book concludes with one of the most important theorems in the whole of geometry, and one which has been cele- brated since the earliest times. It is stated, but on doubtful authority, that Pythagoras discovered it, and it has been called by his name. If we call that side in a right-angled triangle which is opposite the right angle the hypotenuse, we may state it as follows : —

Theorem of Pythagoras (Prop. 47). — In every right-angled triangle the square on the hypotenuse is equal to the sum of the squares of the other sides.

And conversely —

Prop. 48. 7/ the square described on one of the sides of a triangle be equal to the squares described on the other sides, then the angle contained by these two sides is a right angle.

On this theorem (Prop. 47) almost all geometrical measurement depends, which cannot be directly obtained.

Book II.

§ 20. The propositions in the second book are very different in character from those in the first ; they all relate to areas of rectangles and squares. Their true significance is best seen by stating them in an algebraic form. This is often done by expressing the lengths of lines by aid of numbers, which tell how many times a

chosen unit is contained in the lines. If there is a unit to be found which is con- tained an exact number of times in each side of a rectangle, it is easily seen, and generally shown in the teaching of arithmetic, that the rectangle contains a number of unit squares equal to the product of the numbers which measure the sides, a unit square being, the square on the unit line. If, however, no such unit can be found, this process requires that connexion between lines and numbers which is only established by aid of ratios of lines, and which is there- fore at this stage altogether inadmissible. But there exists another way of connecting these propositions with algebra, based on modern notions which seem destined greatly to change and to simplify mathematics. We shall introduce here as much of it as is required for our present purpose.

At the beginning of the second book we find a definition according to which " a rectangle is said to be ' contained ' by the two sides which contain one of its right angles "; in the text this phraseology is extended by speaking of rectangles contained by any two straight lines, meaning the rectangle which has two adjacent sides equal to the two straight lines.

We shall denote a finite straight line by a single small letter, a, b, c, . . . x, and the area of the rectangle contained by-two lines a and b by ab, and this we shall call the product of the two lines a and b. It will be understood that this definition has nothing to do with the definition of a product of numbers.

We define as follows : —

The sum of two straight lines a and b means a straight line c which may be divided in two parts equal respectively to a and b. This sum is denoted by a+b.

The difference of two lines a and b (in symbols, a-b) means a line c which when added to b gives a ; that is,

a-b = c if b--c = a.

The product of two lines a and b (in symbols, ab) means the area

of the rectangle contained by the lines o and 6. For aa, which means the square on the line a, we write a 2 .

§ 21. The first ten of the fourteen propositions of the second book may then be written in the form of formulae as follows : —

Prop. I. a(6+e+d+ . . ,)=ab+ac+ad+ . . . „ 2. ab+ac = a 2 if b--c = a.

3. o(a+6)=o 2 +o6.

4. (a+6) 2 = o 2 +2o6+6. „ 5. (a+6) (a 6) +6ˆ a 2 . „ 6. (a+6) (o&)+6 2 = a*.*

„ 7. a+(a-6) 2 = 2a(a-6)+6 2 .*

„ 8. 4(a+6)<+6 2 =(2a+6) 2 .*

„ 9. (o+6) 2 + (a-6) 2 = 2o 2 +26”.

„ 10. (a+6) 2 +(a-6) 2 = 2a 2 +2& 2 .

It will be seen that 5 and 6, and also 9 and 10, are identical. In Euclid’s statement they do not look the same, the figures being arranged differently.

If the letters a, b, c, . . . denoted numbers, it follows from algebra that each of these formulae is true. But this does not prove them in our case, where the letters denote lines, and their products areas without any reference to numbers. To prove them we have to discover the laws which rule the operations introduced, viz. addition and multiplication of segments. This we shall do now ; and we shall find that these laws are the same with those which hold in algebraical addition and multiplication.

§ 22. In a sum of numbers we may change the order in which the numbers are added, and we may also add the numbers together in groups and then add these groups. But this also holds for the sum of segments and for the sum of rectangles, as. a little considera- tion shows. That the sum of rectangles has always a meaning follows from the Props. 43-45 in the first book. These laws about addition are reducible to the two —

0+6 = 6+0 . . . (1),

o + (6+c)=o+6+c . . . (2);

or, when expressed for rectangles,

o6 + ed' = ed + a& . . . (3),

ab + (cd + ef) = ab + cd + ef . . . (4).

The brackets mean that the terms in the bracket have been added together before they are added to another term. The more general cases for more terms may be deduced from the above.

For the product of two numbers we have the law that it remains unaltered if the factors be interchanged. This also holds for our geometrical product. For if 06 denotes the area of the rectangle which has o as base and 6 as altitude, then 60 will denote the area of the rectangle which has 6 as base and a as altitude. But in a rectangle we may take either of the two lines which contain it as base, and then the other will be the altitude. This gives

o& = 6o .... (5).

In order further to multiply a sum by a number, we have in algebra the rule: — Multiply each term of the sum, and add the products thus obtained. That this holds for our geometrical products is shown by Euclid in his first proposition of the second book, where he proves that the area of a rectangle whose base is the sum of a number of segments is equal to the sum of rectangles which have these segments separately as bases. In symbols this gives, in the simplest case,

a(6 + c) = a& + ae)

and (b + c)a = ba + ca\ ■ • ^-

To these laws, which have been investigated by Sir William Hamilton and by Hermann Grassmann, the former has given special names. He calls the laws expressed in

(1) and (3) the commutative law for addition ;

(5) „ ,, multiplication;

(2) and (4) the associative laws for addition ;

(6) the distributive law.

5 23. Having proved that these six laws hold, we can at once prove every one of the above propositions in their algebraical form.

The first is proved geometrically, it being one of the fundamental laws. The next two propositions are only special cases of the first. Of the others we shall prove one, viz. the fourth : —

(o+6) = (o+6) (o+6) = (o+6)o+(o+6)6 by (6).*

But (0+6)0 = 00+60 by (6),

= aa+a6 by (5);

and (0+6)6 = 06+66 by (6).

Therefore (o+&) 2 = aa+a&+(a&+6&) V

= oo+(o6+o6)+66 f by (4).—

=00+206+66)

This gives the theorem in question.

In the same manner every one of the first ten propositions is proved.

It will be seen that the operations performed arc exactly the same as if the letters denoted numbers.

Props. 5 and 6 may also be written thus — (0+6) (o-6)=o»-6 a .

Prop. 7, which is an easy consequence of Prop. 4, may be transformed. If we denote by c the line 0+6, so that

c = a+b, o = c-6, we get

£ 2 + (c-6) 2 = 2c(e-&)+6 2 = 2c 2 -26e+6 2 . Subtracting c 2 from both sides, and writing o for c, we get (o-6) 2 = o 2 -2o6+6 2 .

In Euclid's Elements this form' of the theorem does not appear, all propositions being so stated that the notion of subtraction does not enter into them.

§ 24. The remaining two theorems (Props. 12 and 13) connect the square on one side of a triangle with the sum of the squares on the other sides, in case that the angle between the latter is acute or obtuse. They are important theorems in trigonometry, where it is possible to include them in a single theorem.

§ 25. There are in the second book two problems, Props. 1 1 and 14.

*If written in the above symbolic language, the former requires to find a line x such that a(a-x)=x i . Prop. 11 contains, therefore, the solution of a quadratic equation, which we may write * 2 +az = a 2 . The solution is required later on in the construction of a regular decagon.*

More important is the problem in the last proposition (Prop. 14). It requires the construction of a square equal in area to a given rectangle, hence a solution of the equation

x i = ab.

In Book I., 42-45, it has been shown howa rectangle may be constructed equal in area to a given figure bounded by straight lines. By aid of the new proposition we may therefore now determine a line such that the square on that line is equal in area to any given rectilinear figure, or we can square any such figure.

As of two squares that is the greater which has the greater side, it follows that now the comparison of two areas has been reduced to the comparison of two lines.

The problem of reducing other areas to squares is frequently met with among Greek mathematicians. We need only mention the problem of squaring the circle (see Circle).*

In the present day the comparison of areas is performed in a simpler way by reducing all areas to rectangles having a common base. Their altitudes give then a measure of their areas.

The construction of a rectangle having the base «, and being equal in area to a given rectangle, depends upon Prop. 43, 1. This therefore gives a solution of the equation

ab=ux, where x denotes the unknown altitude.

Book III.

§ 26. The third book of the Elements relates exclusively to properties of the circle. A circle and its circumference have been defined in Book I., Def. 15. We restate it here in slightly different words : —

Definition. — The circumference of a circle is a plane curve such that all points in it have the same distance from a fixed point in the plane. This point is called the " centre " of the circle.

Of the new definitions, of which eleven are given at the beginning of the third book, a few only require special mention. The first,, which says that circles with equal radii are equal, is in part a theorem, but easily proved by applying the one circle to the other. Or it may be considered proved by aid of Prop. 24, equal circles not being used till after this theorem.

In the second definition is explained what is meant by a line which " touches " a circle. Such a line is now generally called a tangent to the circle. The introduction of this name allows us to state many of Euclid's propositions in a much shorter form.

For the same reason we shall call a straight line joining two points on the circumference of a circle a " chord."

Definitions 4 and 5 may be replaced with a slight generalization by the following: —

Definition. — By the distance of a point from a line is meant the length of the perpendicular drawn from the point to the line.

§ 27. From the definition of a circle it follows that every circle has a centre. Prop. 1 requires to find it when the circle is given, i.e. when its circumference is drawn.

To solve this problem a chord is drawn (that is, any two points in the circumference are joined), and through the point where this is bisected a perpendicular to it is erected. Euclid then proves, first, that no point off this perpendicular can be the centre, hence that the centre must lie in this line; and, secondly, that of the points on the perpendicular one only can be the centre, viz. the one which bisects the parts of the perpendicular bounded by the circle. In the second part Euclid silently assumes that the perpendicular there used does cut the circumference in two, and only in two points. The proof therefore is incomplete. The proof of the first part, however, is exact. By drawing two non-parallel chords, and the perpendiculars which bisect them, the centre will be found as the point where these perpendiculars intersect.

§ 28. In Prop. 2 it is proved that a chord of a circle lies altogether within the circle.

What we have called the first part of Euclid's solution of Prop. I may be stated as a theorem : —

Every straight line which bisects a chord, and is at right angles to it, passes through the centre of the circle.

The converse to this gives Prop. 3, which may be stated thus: — // a straight line through the centre of a circle bisect a chord, then it is perpendicular to the chord, and if it be perpendicular to the chord it bisects it.

An easy consequence of this is the following theorem, which is essentially the same as Prop. 4 : —

Two chords of a circle, of which neither passes through the centre, cannot bisect each other.

These last three theorems are fundamental for the theory of the circle. It is to be remarked that Euclid never proves that a straight line cannot have more than two points in common with a circumference.

§ 29. The next two propositions (5 and 6) might be replaced by a single and a simpler theorem, viz :—

Two circles which have a common centre, and whose circumferences have one point in common, coincide.

Or, more in agreement with Euclid's form: — Two different circles, whose circumferences have a point in common, cannot have the same centre.

That Euclid treats of two cases is characteristic of Greek mathematics.

The next two propositions (7 and 8) again belong together. They may be combined thus :■ —

If from a point in a plane of a circle, which is not the centre, straight lines be drawn to the different points of the circumference, then of all these lines one is the shortest, and one the longest, and these lie both in that straight line which joins the given point to the centre. Of all the remaining lines each is equal to one and only one other, and these equal lines lie on opposite sides of the shortest or longest, and

make equal angles with them.

Euclid distinguishes the two cases where the given point lies within or without the circle, omitting the case where it lies in the circumference.

From the last proposition it follows that if from a point more than two equal straight lines can be drawn to the circumference, this point must be the centre. This is Prop. 9. As a consequence of this we get

If the circumferences of the two circles have three points in common they coincide.

For in this case the two circles have a common centre, because from the centre of the one three equal lines can be drawn to points on the circumference of the other. But two circles which have a common centre, and whose circumferences have a point in common, coincide. (Compare above statement of Props. 5 and 6.) This theorem may also be stated thus: —

Through three points only one circumference may be drawn; or, Three points determine a circle.

Euclid does not give the theorem in this form. He proves, how- ever, that the two circles cannot cut another in more than two points (Proo. 10), and that two circles cannot touch one another in more points than'one (Proo. 13).

§ 30. Propositions 11 and 12 assert that if two circles touch, then the point of contact lies on the line joining their centres. This gives two propositions, because the circles may touch either internally or externally.

§ 31. Propositions 14 and 15 relate to the length of chords. The first says that equal chords are equidistant from the centre, and that chords which are equidistant from the centre are equal ;

Whilst Prop. 15 compares unequal chords, viz. Of all chords the diameter is the greatest, and of other chords that is the greater which is nearer to the centre; and conversely, the greater chord is nearer to the centre.

§ 32. In Prop. 16 the tangent to a circle is for the first time introduced. The proposition is meant to show that the straight line at the end point of the diameter and at right angles to it is a tangent. The proposition itself does not state this. It runs thus: —

Prop. 16. The straight line drawn at right angles to the diameter of a circle, from the extremity of it, falls without the circle; and no straight line can be drawn from the extremity, between that straight line and the circumference, so as not to cut the circle.

Corollary. — The straight line at right angles to a diameter drawn through the end point of it touches the circle.

The statement of the proposition and its whole treatment show the difficulties which the tangents presented to Euclid.

Prop. 17 solves the problem through a given point, either in the circumference or without it, to draw a tangent to a given circle.

Closely connected with Prop. 16 are Props. 18 and 19, which state (Prop. 18), that the line joining the centre of a circle to the point of contact of a tangent is perpendicular to the tangent; and con- versely (Prop. 19), that the straight line through the point of contact of, and perpendicular to, a tangent to a circle passes through the centre of the circle.

§ 33. The rest of the book relates to angles connected with a circle, viz. angles which have the vertex either at the centre or on the circumference, and which are called respectively angles at the centre and angles at the circumference. Between these

two kinds of angles exists the important relation expressed as follows : —

Prop. 20. The angle at the centre of a circle is double of the angle at the circumference on the same base, that is, on the same arc.

This is of great importance for its consequences, of which the two following are the principal : —

Prop. 21. The angles in the same segment of a circle are equal to one another;

Prop. 22. The opposite angles of any quadrilateral figure inscribed in a circle are together equal to two right angles. Further consequences are : —

Prop. 23. On the same straight line, and on the same side of it, there cannot be two similar segments of circles, not coinciding with one another ;

Prop. 24. Similar segments of circles on equal straight lines are equal to one another.

The problem Prop. 25. A segment of a circle being given to describe the circle of which it is a segment, may be solved much more easily by aid of the construction described in relation to Prop. 1, III., in § 27.

§ 34. There follow four theorems connecting the angles at the centre, the arcs into which they divide the circumference, and the chords subtending these arcs. They are expressed for angles, arcs and chords in equal circles, but they hold also for angles, arcs and chords in the same circle. The theorems are : —

Prop. 26. In equal circles equal angles stand on equal arcs, whether they be at the centres or circumferences ;

Prop. 27. (converse to Prop. 26). In equal circles the angles which stand on equal arcs are equal to one another, whether they be at the centres or the circumferences;

Prop. 28. In equal circles equal straight lines (equal chords) cut off equal arcs, the greater equal to the greater, and the less equal to the less;

Prop. 29 (converse to Prop. 28). In equal circles equal arcs are subtended by equal straight lines.

§ 35- Other important consequences of Props. 20-22 are: — Prop. 31. In a circle the angle in a semicircle is a right angle; but the angle in a segment greater than a semicircle is less than a right angle ; and the angle in a segment less than a semicircle is greater than a right angle ;

Prop. 32. If a straight line touch a circle, and from the point of contact a straight line be drawn cutting the circle, the angles which this line makes with the line touching the circle shall be equal to the angles which are in the alternate segments of the circle.

§ 36. Propositions 30, 33, 34, contain problems which are solved by aid of the propositions preceding them : —

Prop. 30. To bisect a given arc, that is, to divide it into two equal parts;

Prop. 33. On a given straight line to describe a segment of a circle

containing an angle equal to a given rectilineal angle ;

Prop. 34. From a given circle to cut off a segment containing an angle equal to a given rectilineal angle.

§ 37. If we draw chords through a point A within a circle, they will each be divided by A into two segments. Between these seg- ments the law holds that the rectangle contained by them has the same area on whatever chord through A the segments are taken. The value of this rectangle changes, of course, with the position of A.

A similar theorem holds if the point A be taken without the circle. On every straight line through A, which cuts the circle in two points B and C, we have two segments AB and AC, and the rectangles contained by them are again equal to one another, and equal to the square on a tangent drawn from A to the circle.

The first of these theorems gives Prop. 35, and the second Prop. 36, with its corollary, whilst Prop. 37, the last of Book III., gives the converse to Prop. 36. The first two theorems may be combined in one:—

// through a point A in the plane of a circle a straight line be drawn cutting the circle in B and C, then the rectangle A B.AC has a constant value so long as the point A be fixed; and if from A a tangent AD can be drawn to the circle, touching at D, then the above rectangle equals the square on AD. '

Prop. 37 may be stated thus: —

If from a point A without a circle a line be drawn cutting the circle in B and C, and another line to a point D on the circle, and AB.AC = AD 1 , then the line AD touches the circle at D.

It is not difficult to prove also the converse to the general pro- position as above stated. This proposition and its converse may be expressed as follows : —

If four points A BCD be taken on the circumference of a circle, and if the lines AB, CD, produced if necessary, meet at E, then

EA.EB = EC.ED;

and conversely, if this relation holds then the four points lie on a circle, that is, the circle drawn through three of them passes through the fourth.

That a circle may always be drawn through three points, provided

1 that they do not lie in a straight line, is proved only later on in

1 Book IV.

Book IV. § 38. The fourth book contains only problems, all relating to the construction of triangles and polygons inscribed in and circum- scribed about circles, and of circles inscribed in or circumscribed about triangles and polygons. They are nearly all given for their own sake> and not for future use in the construction of figures, as are most of those in the former books. In seven definitions at the beginning of the book it is explained what is understood by figures inscribed in or described about other figures, with special reference to the case where one figure is a circle. Instead, however, of saying that one figure is described about another, it is now generally said that the one figure is circumscribed about the other. We may then state the definitions 3 or 4 thus: —

Definition. — A polygon is said to be inscribed in a circle, and the circle is said to be circumscribed about the polygon, if the vertices of the polygon lie in the circumference of the circle. And definitions 5 and 6 thus:—

Definition. — A polygon is said to be circumscribed about a circle, and a circle is said to be inscribed in a polygon, if the sides of the polygon are tangents to the circle.

§ 39. The first problem is merely constructive. It requires to draw in a given circle a chord equal to a given straight line, which is not greater than the diameter of the circle. The problem is not a determinate one, inasmuch as the chord may be drawn from any point in the circumference. This may be said of almost all problems in this book, especially of the next two. They are : — •

Prop. 2. In a given circle to inscribe a triangle equiangular to a given triangle;

Prop. 3. About a given circle to circumscribe a triangle equiangular to a given triangle.

§ 40. Of somewhat greater interest are the next problems, where the triangles are given and the circles to be found. Prop. 4. To inscribe a circle in a given triangle. The result is that the problem has always a solution, viz. the centre of the circle is the point where the bisectors of two of the interior angles of the triangle meet. The solution shows, though Euclid does not state this, that the problem has but one solution; and also,

The three bisectors of the interior angles of any triangle meet in a point, and this is the centre of the circle inscribed in the triangle.

The solutions of most of the other problems contain also theorems. Of these we shall state those which are of special interest; Euclid does not state any one of them.

§ 41 . Prop. 5. To circumscribe a circle about a given triangle. The one solution which always exists contains the following : — The three straight lines which bisect the sides of a triangle at right angles meet in a point, and this point is the centre of the circle circumscribed about the triangle.

Euclid adds in a corollary the following property: — The centre of the circle circumscribed about a triangle lies within, on a side of, or without the triangle, according as the triangle is acute-angled, right-angled or obtuse-angled.

§ 42. Whilst it is always possible to draw a circle which is inscribed in or circumscribed about a given triangle, this is not the case with quadrilaterals or polygons of more sides. Of those for which this is possible the regular polygons, i.e. polygons which have all their sides and angles equal, are the most interesting. In each of them a circle may be inscribed, and another may be circumscribed about it. Euclid does not use the word regular, but he describes the polygons in question as equiangular and equilateral. We shall use the name regular polygon. The regular triangle is equilateral, the regular quadrilateral is the square.

Euclid considers the regular polygons of 4, 5, 6 and 15 sides. For each of the first three he solves the problems — (1) to inscribe such a polygon in a given circle; (2) to circumscribe it about a given circle; (3) to inscribe a circle in, and (4) to circumscribe a circle about, such a polygon.

For the regular triangle the problems are not repeated, because more general problems have been solved.

Props. 6, 7, 8 and 9 solve these problems for the square. The general problem of inscribing in a given circle a regular polygon of n sides depends upon the problem of dividing the cir- cumference of a circle into n equal parts, or what comes to the same thing, of drawing from the centre of the circle n radii such that the angles between consecutive radii are equal, that is, to divide the space about the centre into n equal angles. Thus, if it is required to inscribe a square in a circle, we have to draw four lines from the centre, making the four angles equal. This is done by drawing two diameters at right angles to one another. The ends of these, diameters are the vertices of the required square. If, on the other hand, tangents be drawn at these ends, we obtain a square circum- scribed about the circle.

§ 43. To construct a regular pentagon, we find it convenient first to construct a regular decagon. This requires to divide the space about the centre into ten equal angles. Each will be foxh of a right angle, or 1th of two right angles. If we suppose the decagon con- structed, and if we join the centre to the end of one side, we get an isosceles triangle, where the angle at the centre equals Jth of two right angles; hence each of the angles at the base will be jfths of

two right angles, as all three angles, together equal two right angles. Thus we have to construct an isosceles triangle, having the angle at the vertex equal to half an angle at the base. This is solved in Prop. 10, by aid of the problem in Prop. 11 of the second book. If we make the sides of this triangle equal to the radius of the given circle, then the base will be the side, of the regular decagon inscribed in the circle. This side being known the decagon can be constructed, and if the vertices are joined alternately, leaving out half their number, we obtain the regular pentagon. (Prop, n.)

Euclid does not proceed thus. He wants the pentagon before the decagon. This, however, does not change the real nature of his solution, nor does his solution become simpler by not mentioning the decagon.

Once the regular pentagon is inscribed, it is easy to circumscribe another by drawing tangents at the vertices of the inscribed pentagon. This is shown in Prop. 12.

Props. 13 and 14 teach how a circle may be inscribed in qr cir- cumscribed about any given regular pentagon.

§ 44. The regular hexagon is more easily constructed, as shown in Prop. 15. The result is that the side of the regular hexagon inscribed

in a circle is equal to the radius of the circle.

For this polygon the other three problems mentioned are not solved. .

§ 45, The book closes with Prop. 16. To inscribe a regular quindecagon in a given circle. If we inscribe a regular pentagon and a regular hexagon in the circle, having one vertex in common, then the arc from the common vertex to the next vertex of the pentagon is- Jth of the circumference, and to the next vertex of the hexagon is Jth of the circumference. The difference between these arcs is, therefore, &.— J = sˆth of the circumference. The latter may, therefore, be divided into thirty, and hence also in fifteen equal parts, and the regular quindecagon be described.

§ 46. We conclude with a few theorems about regular polygons which are not given by Euclid.

The straight lines perpendicular to and bisecting the sides of any regular poly gon meet in a point. The straight lines bisecting the angles in the regular polygon meet in the same point. This point is the centre of the circles circumscribed about and inscribed in the regular polygon.

We can bisect any given arc (Prop. 30, III.). Hence we can divide a circumference into 2« equal parts as soon as it has been divided into n equal parts, or as soon as a regular polygon of n sides has been constructed. Hence —

// a regular polygon of n sides has been constructed, then a regular polygon of 2n sides, of 4n, of 8n sides, &c, may also be constructed. Euclid shows how to construct regular polygons of 3, 4, 5 and 15 sides. It follows that we can construct regular polygons of

3, 6, 12, 24. . .sides

4, 8, 16, 32. . . ,,

5, 10, 20, 40. .. ,, 15, 30, 60, 120. . . ,,

The construction of any. new regular polygon not included in one of these series will give rise to a new series. Till the beginning of the 19th century nothing was added to the knowledge of regular polygons as given by Euclid. Then Gauss, in his celebrated Arithmetic, proved that every regular polygon of 2™+i sides may be constructed if this number 2™+ 1 be prime, and that no others except those with 2" l (2 n -t-i) sides can be" constructed by

elementary methods. This shows that regular polygons of 7, 9, 13 sides cannot thus be constructed, but that a regular polygon of 17 sides is possible; for I7 = 2 4 + I. The next polygon is one of 257 sides. , The construction becomes already rather complicated for 17 sides.

BookV.

§ 47. The fifth book of the Elements is not exclusively geometrical. It contains the theory of ratios and proportion of quantities, in general. The treatment, as here given, is admirable, and in eve'ry respect superior to the algebraical method by which Euclid's theory is now generally replaced. We shall treat the subject in! order to show why the usual algebraical treatment of proportion is not really sound. We begin by quoting those definitions at the beginning >of Book V. which are most important. These definitions have given rise to much discussion.

The only definitions which are essential for the fifth book are Defs. 1, 2, 4, 5, 6 and 7. Of the remainder 3, 8: and 9 are more than useless, and probably not Euclid's, but additions of later editors, of whom Theon of Alexandria was the most prominent. Defs. 10 and 1 1 belong rather to the sixth book, whilst all the others are merely nominal. The really important ones are 4, 5, 6 and 7.

§ 48. To define a magnitude is not attempted by Euclid. The first two definitions state what is meant by a " part," that is, a submultiple or measure, and by a .." multiple " of a given magni- tude. The meaning of Def . 4 is that two given quantities can have a ratio to one another only in case that they are comparable as to their magnitude, that is, if they are of the same kind.

Def. 3, which is probably due to Theon, professes to define a ratio, but is as meaningless as it is uncalled for, for all that is wanted is given in Defs. 5 and 7.

In Def. 5 it is explained what is meant by saying that two mag- nitudes have the same ratio to one another as two other magnitudes,

and in Def. 7 what we have to understand by a greater or a less

ratio. The 6th definition is only nominal, explaining the meaning of the word proportional.

Euclid represents magnitudes by lines, and often denotes them either by single letters or, like lines, by two letters. We shall use only single letters for the purpose. If a and b denote two magnitudes of the same kind, their ratio will be denoted by a : b; if c and d are two other magnitudes of the same kind, but possibly of a different kind from a and b, then if c and d have the same ratio to one another as a and b, this will be expressed by writing — a : b : : c : d. Further, if m is a (whole) number, ma shall denote the multiple of a which is obtained by taking it m times.

§ 49. The whole theory of ratios is based on Def. 5. Def. 5. The first of four magnitudes is said to have the same ratio to the second that the third has to the fourth when, any equimultiples whatever of the first and the third being taken, and any equimultiples whatever of the second and the fourth, if the multiple of the first be less than that of the second, the multiple of the third is also less than that of the fourth; and if the multiple of the first. is equal to that of the second, the multiple of the third is also equal to that of the fourth ; and if the multiple of the first is greater than that of the second, the multiple of the third is also greater than that of the fourth.

It will be well to show at once in an example how this definition can be used, by proving the first part of the first proposition in the sixth book. Triangles of the same altitude are to one another as their bases, or if a and b are the bases, and a and /3 the areas, of two triangles which have the same altitude, then a : b : : a : 0. To prove this, we havei according to Definition 5, to show — if ma > nb, then ma > n@, if ma = nb, then ma = nff, if ma

§ 50. It will be seen that even rn this example it does not become evident what a ratio really is.' It is still an open question whether ratios are magnitudes which we can compare. We do not know whether the ratio of two lines is a magnitude of the same kind as the ratio of two areas. Though we might say that Def. 5 defines equal ratios, still we do not know whether they are equal in the sense of the axiom, that two things which are equal to a third are equal to one another. That this is the case requires a proof, and until this proof is given we shall use the : : instead of the sign = , which, how- ever, we shall afterwards introduce.

As. soon as it has been established that all ratios are like magni- tudes, it becomes easy to show that, in some cases at least, they are

numbers. This step was never made by Greek mathematicians. They distinguished always most carefully between continuous magnitudes and the discrete series of numbers. In modern times it has become the custom to ignore this difference.

If, in determining the ratio of two lines, a common measure can be found, which is contained m times in the first, and n times in the second, then the ratio of the two lines equals the ratio of the two numbers m : n. This is shown by Euclid in Prop. 5, X. But the ratio of two numbers is, as a rtile, a fraction, and the Greeks did not, as we do, consider fractions as numbers. Far less had they any notion of introducing irrational numbers, which are neither whole nor fractional, as we are obliged to do if we wish to say that all ratios are numbers. The incommensurable numbers which are thus introduced as- ratios of incommensurable quantities are nowa- days as familiar to us as fractions; but a proof is generally omitted that we may apply to them the rules which have been established for rational numbers only., Euclid's treatment of ratios avoids this difficulty. His definitions hold for commensurable as well as for incommensurable quantities. Even the notion of incommensurable quantities is avoided in Book V. But he proves that the more elementary rules of algebra hold for ratios. We shall state all his propositions in that algebraical form' to which we are now accus- tomed. This may, of course, be done without changing the character of Euclid's method.

§51. Using the notation explained above we express the first propositions as follows: —

Prop. 1. If $a = ma'$, $b — mb'$, $c = mc'$,

then $a+b+c = m(a'+b'+c')$.

Prop. 2. If $a = mb$, and $c = md$,

$e = nb$: and $f = nd$.

then $a+e$ is the same multiple of b as $c+f$ is of d, viz. : —

$a--e = \{m+n)b$, and $c+f— \{m--n)d$.

Prop. 3. If $a = mb$, $c — md$, then is na the same multiple of b that nc is of d, viz. $na = nmb$, $nc = nmd$.

If

Prop. 4. then

Prop. 5. If then

nd.

a : b : : c : d, ma : nb : :mc

a< =mb, and c = md, a~c = m{b~d).

Prop. 6. If a = mb, c=md,

then are a -nb and c-nd either equal to, or equimultiples of, b and d, viz. a-nb = (m-n)b and c-nd=(m-n)d, where m-n may be unity.

All these propositions relate to equimultiples. Now follow propositions about ratios which are compared as to their magnitude.

§ 52. Prop. 7. If a = b, then a : c : : b : c and c : a : : c : b.

The proof is simply this. As a = b we know that ma=mb; there- fore if ma>nc, then mb>nc, if ma=nc, then mb — nc, if ma

therefore the first proportion holds by Definition 5.

Prop. 8. If a>b, then a : c>b : c,

and c : a

The proof depends on Definition 7.

Prop. 9 (converse to Prop. 7). If

a : c : :b:c, or if c ; a : : c : b, then a = b.

Prop. 10 (converse to Prop. 8). If

a : c>b : c, then a>6 and if c : a

Prop. II. If a : b : : c : d,

and a : b : : e : f,

then c : d : : e : f.

In words, if two ratios are equal to a third, they are equal to one another. After these propositions have been proved, we have a right to consider a ratio as a magnitude, for only now can we con- sider a

ratio as something for which the axiom about magnitudes holds: things which are equal to a third are equal to one another.

We shall indicate this by writing in future the sign = instead of : : . The remaining propositions, which explain themselves, may then be stated as follows:

§ 53. Prop. 12. If a :b=c : d = e : f, then a+c+e : b+d+f = a : b.

Prop. 13. If a : b = c : d and c : d>e : f,

then a : b>e : f.

Prop. 14. If a :b = c : d, and a>c, then b>d.

Prop. 15. Magnitudes have the same ratio to one another that their equimultiples have —

ma : mb = a : b. Prop. 16. If a, b, c, d are magnitudes of the same kind, and if a : b = c : d, then a : c — b : d.

Prop. 17. If a+b : b = c+d : d,

then a : b=c : d.

Prop. 18 (converse to 17). If

a : b=c : d then a+b : b=c+d : d.

Prop. 19. If a, b, c, d are quantities of the same kind, and if

a : b = c : d, then a-c :b-d=a : b.

§ 54. Prop. 20. If there be three magnitudes, and another three, which have the same ratio, taken two and two, then if the first be greater than the third, the fourth shall be greater than the sixth: and if equal, equal; and if less, less.

If we understand by

a : b : c : d : e : . . . =a' :b':c':d':e':... that the ratio of any two consecutive magnitudes on the first side equals that of the corresponding magnitudes on the second side, we may write this theorem in symbols, thus : —

If a, b, c be quantities of one, and d, e, f magnitudes of the same or any other kind, such that

a :b : c = d : e :/, and if a > c, then d > f,

but if a = c, then d = f,

and if a

Prop. 21. If a : b = e : f and b : c = d : e,

or if

u I.I.I.

fed

and if a > c, then d > f,

but if a = c, then d =/,

and if a

By aid of these two propositions the following two are proved.

§ 55- Prop. 22. If there be any number of magnitudes, and as many others, which have the same ratio, taken two and two in order, the first shall have to the last of the first magnitudes the same ratio which the first of the others has to the last.

We may state it more generally, thus :

If a:b :c :d:e:. .. = > a' :b' :c' :d' :e' :...,

then not only have two consecutive, but any two magnitudes on the first side, the same ratio as the corresponding magnitudes on the other. For instance —

a : c = a' : c' ; b : e = 6′ : e', &c.

Prop. 23 we state only in symbols, viz. : —

If then

1 j 1.1

a : : c : a : e : . . . = — -, ■ tj

1 1

a : c = c : a , 6 : e — e' : V , ,and so on.

Prop. 24 comes to this : If a : b = c : d and e : & = / : d, then a + e : b = c + f : d.

Some of the proportions which are considered in the above propositions have special names. These we have omitted, as being of no use, since algebra has enabled us to bring the different operations

contained in the propositions under a common point of view.

§ 56. The last proposition in the fifth book is of a different character.

Prop. 25. If four magnitudes of the same kind be proportional, the greatest and least of them together shall be greater than the other two together. In symbols —

If a, b, c, d be magnitudes of the same kind, and if $a : b = c : d$, and if a is the greatest, hence d the least, then $a + d > b + c$.

§ 57- We return once again to the question, What is a ratio ? We have seen that we may treat ratios as magnitudes, and that all ratios are magnitudes of the same kind, for we may compare any two as to their magnitude. It will presently be shown that ratios of lines may be considered as quotients of lines, so that a ratio appears as answer to the question, How often is one line contained in another ? But the answer to this question is given by a number, at least in some cases, and in all cases if we admit incommensurable numbers. Considered from this point of view, we may say the fifth book of the Elements shows that some of the simpler algebraical operations hold for incommensurable numbers. In the ordinary algebraical treatment of numbers this proof is altogether omitted, or given by a process of limits which does not seem to be natural to the subject.

Book VI.

§ 58. The sixth book contains the theory of similar figures. After a few definitions explaining terms, the first proposition gives the first application of the theory of proportion.

Prop. 1. Triangles and parallelograms of the same altitude are to vne another as their bases.

The proof has already been considered in §49.

From this follows easily the important theorem

Prop. 2. If a straight line be drawn parallel to one of the sides of a triangle it shall cut the other sides, or those sides produced, proportionally; and if the sides or the sides produced be cut proportionally, the straight line which joins the points of section shall be parallel to the remaining side of the triangle.

§ 59. The next proposition, together with one added by Simson as Prop. A, may be expressed more conveniently if we introduce a

modern phraseology, viz. if in a line AB we assume a point C between A and B, we shall say that C divides AB internally in the ratio AC : CB; but if C be taken in the line AB produced, we shall say that AB is divided externally in the ratio AC : CB.

The two propositions then come to this :

Prop. 3. The bisector of an angle in a triangle divides the opposite side internally in a ratio equal to the ratio of the two sides including that angle; and conversely, if a line through the vertex of a triangle divide the base internally in the ratio of the two other sides, then that line bisects the angle at the vertex.

Simson's Prop. A. The line which bisects an exterior angle of a triangle divides the opposite side externally in the ratio of the other sides ; and conversely, if a line through the vertex of a triangle divide the base externally in the ratio of the sides, then it bisects an exterior angle at the vertex of the triangle.

If we combine both we have —

The two lines which bisect the interior and exterior angles at one vertex of a triangle divide the opposite side internally and externally in the same ratio, viz. in the ratio of the other two sides. _

§ 60. The next four propositions contain the theory of similar triangles, of which four cases are considered. They may be stated together.

Two triangles are similar, —

1. (Prop. 4). If the triangles are equiangular:

To divide a straight line in a given ratio.

To find a third proportional to two given straight lines.

To find a fourth proportional to three given straight

To find a mean proportional between two given straight

2. (Prop. 5). If the sides of the one are proportional to those of the other;

3. (Prop. 6). If two sides in one are proportional to two sides in the other, and if the angles contained by these sides are equal ;

4. (Prop. 7). If two sides in one are proportional to two sides in the other, if the angles opposite homologous sides are equal, and if the angles opposite the other homologous sides are both acute, both right or both obtuse; homologous sides being in each case those which are opposite equal angles.

An important application of these theorems is at once made to a right-angled triangle, viz. : —

Prop. 8. In a right-angled triangle, if a perpendicular be drawn from the right angle to the base, the triangles on each side of it are similar to the whole triangle, and to one another.

Corollary. — From this it is manifest that the perpendicular drawn from the right angle of a right-angled triangle to the base is a mean proportional between the segments of the base, and also that each of the sides is a mean proportional between the base and the segment of the base adjacent to that side.

§ 61. There follow four propositions containing problems, in language slightly different from Euclid's, viz. : —

Prop. 9. To divide a straight line into a given number of equal parts.

Prop. 10.

Prop. 11.

Prop. 12. lines.

Prop. 13. lines.

The last three may be written as equations with one unknown quantity — viz. if we call the given straight lines a, 6, c, and the required line x, we have to find a line x so that

Prop. 11. $a : b = b. : x;$

Prop. 12. $a : b — c : x;$

Prop. 13. $a : x = x : b.$

We shall see presently how these may be written without the signs of ratios.

§ 62. Euclid considers next proportions connected with parallelograms and triangles which are equal in area.

Prop. 14. Equal parallelograms which have one angle of the one equal to one angle of the other have their sides about the equal angles reciprocally proportional; and parallelograms which have one. angle of the one equal to one angle of the other, and their sides about the equal angles reciprocally proportional, are equal to one another.

Prop. 15. Equal triangles which have one angle of the one equal to one angle of the other, have their sides about the equal angles recipro- cally proportional; and triangles which have one angle of the one equal to one angle of the other, and their sides about the equal angles recipro- cally proportional, are equal to one another.

The latter proposition is really the same as the former, for if, as in the accompanying diagram, in the figure belonging to the Ai former the two equal parallelo- grams AB and BC be bisected by the lines DF and EG, and if EF be drawn, we get the figure belonging to the latter.

It is worth noticing that the lines FE and DG are parallel. We may state there- fore the theorem —

// two triangles are equal in area, and have one angle in the one vertically opposite to one angle in the other, then the two straight lines which join the remaining two vertices of the one to those of the other _ triangle are parallel.

§ 63. A most important theorem is

Prop. 16. If four straight lines be proportionals, the rectangle contained by the extremes is equal to the rectangle contained by the means; and if the rectangle contained by the extremes be equal to the rectangle contained by the means, the four straight lines are proportionals.

In symbols, if a, b, c, d are the four lines, and if $a : b = c : d$,

then $ad = bc$;

and conversely, if $ad = bc$,

then $a : b = c : d$,

where ad and be denote (as in § 20), the areas of the rectangles contained by a and d and by 6 and c respectively.

This allows us to transform every proportion between four lines into

an equation between two products.

It shows further that the operation of forming a product of two lines, and the operation of forming their ratio are each the inverse of the other.

If we now define a quotient 7 of two lines as the number which multiplied into 6 gives a, so that

T-b = a,

EUCLIDEAN]

we see that from the equality of two quotients

a c

5=2

GEOMETRY

685

%b.d = ˆd.b,

follows, if we multiply both sides by bd

-2′

ad = cb.

But from this it follows, according to the last theorem, that

a : b=c : d. Hence we conclude that the quotient 5 and the ratio a : b are different forms of the same magnitude, only with this important difference that the quotient j would have a meaning only if a and

6 have a common measure, until we introduce incommensurable numbers, while the ratio a : b has always a meaning, and thus gives rise to the introduction of incommensurable numbers.

Thus it is really the theory of ratios in the fifth book which enables us to extend the geometrical calculus given before in connexion with Book II. It will also be seen that if we write the ratios in Book V. as quotients, or rather as fractions, then most of the theorems state properties of quotients or of fractions.

§ 64. Prop. 1 7. // three straight lines are proportional the rectangle contained by the extremes is equal to the square on the mean ; and conversely, is only a special case of 16. After the problem, Prop. 18, On a given straight line to describe a rectilineal figure similar and similarly situated to a given rectilineal figure, there follows another fundamental theorem :

Prop. 19. Similar triangles are to one another tn the duplicate ratio of their homologous sides. In other words, the areas of similar triangles are to one another as the squares on homologous sides. This is generalized in :

Prop. 20. Similar polygons may be divided into the same number of similar triangles, having the same ratio to one another that the polygons have; and the polygons are to one another in the duplicate ratio of their homologous sides.

§ 65. Prop. 21. Rectilineal figures which are similar to the same rectilineal figure are also similar to each other, is an immediate consequence of the definition of similar figures. As similar figures may be said to be equal in " shape " but not in " size," we may state it also thus:

" Figures which are equal in shape to a third are equal m shape to each other."

Prop. 22. // four straight lines be proportionals, the similar rectilineal figures similarly described on them shall also be proportionals; and if the similar rectilineal figures similarly described on four straight lines be proportionals, those straight lines shall be proportionals.

This is essentially the same as the following: — If $a : b = c : d$,

then $a^*:b > = c^*:d^*$.

§ 66. Now follows a proposition which has been much discussed with regard to Euclid's exact meaning in saying that a ratio is compounded of two other ratios, viz. :

Prop. 23. Parallelograms which are equiangular to one another, have to one another the ratio which is compounded of the ratios of their sides.

The proof of the proposition makes its meaning clear. In symbols the ratio $a : c$ is compounded of the two ratios $a : b$ and $b : c$, and if a-

b = a':b', b: c = b": c", then a : c is compounded of a': b' and b" : c'.

If we consider the ratios as numbers, we may say that the one ratio is the product of those of which it is compounded, or in symbols,

*a_a.b_*

b" . t a a' ,b b" •pif 5 = F and- = p-

The theorem in Prop. 23 is the foundation of all mensuration of areas. From it we see at once that two rectangles have the ratio of their areas compounded of the ratios of their sides.

If A is the area of a rectangle contained by a and b, and B that of a rectangle contained by c and d, so that A = ab, B = cd, then A : B = ai : cd, and this is, the theorem says, compounded of the ratios a : c and b : a. In forms of quotients,

a_b _ab % c ~d~cd

This shows how to multiply quotients in our geometrical calculus.

Further, Two triangles have the ratios of their areas compounded of the ratios of their bases and their altitude. For a triangle is equal in' area to half a parallelogram which has the same base and the same altitude.

§ 67. To bring these theorems to the form in which they are usually given, we assume a straight line u as our unit of length (generally an inch, a foot, a mile, &c), and determine the number a which expresses how often u is contained in a line a, so that a denotes the ratio a : « whether commensurable or not, and that a = au. We

call this number o the numerical value of a. If in the same manner j8 be the numerical value of a line 6 we have

a :b = a : P; in words : The ratio of two lines (and of two like quantities in general) is equal to that of their numerical values.

This is easily proved by observing that a = au, b = 0u, therefore a : b = au: /3k, and this may without difficulty be shown to equal a :0.

If now a, b be base and altitude of one, a', V those of another parallelogram, a, /3 and a', 0′ their numerical values respectively, and A, A' their areas, then

A ° ° _"■ P "ft ■

In words: The areas of two parallelograms are to each other as the products of the numerical values of their bases and altitudes.

If especially the second parallelogram is the unit square, i.e. a square on the unit of length, then o' = /S' = i, A' = u\ and we have

A

£7 = a/3 or A = aj3.« 2 .

This gives the theorem : The number of unit squares contained in a parallelogram equals the product of the numerical values of base and altitude, and similarly the number of unit squares contained in a triangle equals half the product of the numerical values of base and altitude.

This is often stated by saying that the area of a parallelogram is equal to the product of the base and the altitude, meaning by this product the product of the numerical values, and not the product as defined above in § 20.

§ 68. Propositions 24 and 26 relate to parallelograms about diagonals, such as are considered in Book I., 43. They are —

Prop. 24. Parallelograms about the diameter of any parallelogram are similar to the whole parallelogram and to one another; and its converse (Prop. 26), i/ two similar parallelograms have a common angle, and be similarly situated, they are about the same diameter. Between these is inserted a problem.

Prop. 25. To describe a rectilineal figure which shall be similar to one given rectilinear figure, and equal to another given rectilineal figure.

§ 69. Prop. 27 contains a theorem relating to the theory of maxima and minima. We may state it thus:

Prop. 27. If a parallelogram be divided into two by a straight line cutting the base, and if on half the base another parallelogram be con- structed similar to one of those parts, then this third parallelogram is greater than the other part.

Of far greater interest than this general theorem is a special case of it, where the parallelograms are changed into rectangles, and where one of the parts into which the parallelogram is divided is made a square; for then the theorem changes into one which is easily

recognized to be identical with the following: —

Of all rectangles which have the same perimeter the square has the greatest area.

This may also be stated thus : —

Of all rectangles which have the same area the square has the least perimeter. _

§ 70. The next three propositions contain problems which may be said to be solutions of quadratic equations. The first two are, like the last, involved in somewhat obscure language. We tran- scribe them as follows :

Problem. — To describe on a given base a parallelogram, and to divide it either internally (Prop. 28) or externally (Prop. 29) from a point on the base into two parallelograms, of which the one has a given size (is equal in area to a given figure), whilst the other has a given shape (is similar to a given parallelogram).

If we express this again in symbols, calling the given base a, the one part x, and the altitude y, we have to determine x and y in the first case from the equations

(a-x)y = k i ,

**=£, y q*

Jfe 2 being the given size of the first, and p and q the base and altitude of the parallelogram which determine the shape of the second of the required parallelograms.

If we substitute the value of y, we get

S or,

ax-x 1 = V,

pk 2 where o and b are known quantities, taking b t = t -~ •

The second case (Prop. 29) gives rise, in the same manner, to the quadratic

ax+x 2 = b i .

The next problem —

Prop. 30. To cut a given straight line in extreme and mean ratio, leads to the equation

$$ax + x^* = a\,2\,.$$

This is, therefore, only a special case of the last, and is, besides, an old acquaintance, being essentially the same problem as that proposed in II. II.

Prop. 30 may therefore be solved in two ways, either by aid of Prop. 29 or by aid of II. 11. Euclid gives both solutions.

§ 71. Prop. 31 (Theorem). In any right-angled triangle, any rectilineal figure described on the side subtending the right angle is equal to the similar and similarly-described figures on the sides containing the right angle, — is a pretty generalization of the theorem of Pythagoras (I. 47).

Leaving out the next proposition, which is of little 1 interest, we come to the last in this book.

Prop. 33. In equal circles angles, whether at the centres or the circumferences, have the same ratio which the arcs on which they stand have to one another; so also have the sectors.

Of this, the part relating to angles at the centre is of special importance ; it enables us to measure angles by arcs.

With this closes that part of the Elements which is devoted to the study of figures in a plane.

Book XI.

§ 72. In this book figures are considered which are not confined to a plane, viz. first relations between lines and planes in space, and afterwards properties of solids.

Of new definitions we mention those which relate to the perpendicularity and the inclination of lines and planes.

Def. 3. A straight line is perpendicular, or at right angles, to a plane

when it makes right angles with every straight line meeting it- in that plane.

The definition of perpendicular planes (Def. 4) offers no difficulty. Euclid defines the inclination of lines to planes and of planes to planes (Defs. 5 and 6) by aid of plane angles, included by straight lines, with which we have been made familiar in the first books.

The other important definitions are those of parallel planes, which never meet (Def. 8), and of solid angles formed by three or more planes meeting in a point (Def. 9).

To these we add the definition of a line parallel to a plane as a line which does not meet the plane.

§ 73. Before we investigate the contents of Book XI., it will be well to recapitulate shortly what we know of planes and lines from the definitions and axioms of the first book. There a plane has been defined as a surface which has the property that every straight line which joins two points in it lies altogether in it. This is equi- valent to saying that a straight line which has two points in a plane has all points in the plane. Hence, a straight line which does not lie in the plane cannot have more than one point in common with the plane. This is virtually the same as Euclid's Prop. 1, viz. : —

Prop. 1 . One part of a straight line cannot be in a plane and another part without it.

It also follows, as was pointed out in § 3, in discussing the defini- tions of Book I., that a plane is determined already by one straight line and a point without it, viz. if all lines be drawn through the point, and cutting the line, they will form a plane.

This may be stated thus:—

A plane is determined —

1st, By a straight line and a point which does not lie on it;

2nd, By three points which do not lie in a straight line; for if two of these points be joined by a straight line we have case I ;

3rd, By two intersecting straight lines; for the point of intersection and two other points, one in each line, give case 2 ;

4th, By two parallel lines (Def. 35, I.).

The third case of this theorem is Euclid's

Prop. 2. Two straight lines which cut one another are in one plane, and three straight lines which meet one another are in one plane.

And the fourth is Euclid's

Prop. 7. // two straight lines be parallel, the straight line drawn from any point in one to any point in the other is in the same plane with the parallels. From the definition of a plane further follows

Prop. 3. // two planes cut one another, their common section is a straight line.

§ 74. Whilst these propositions are virtually contained in the definition of a plane, the next gives us a new and fundamental property of space, showing at the same time that it is possible to have a straight line perpendicular to a plane, according to Def. 3. It states —

Prop. 4. If a straight line is perpendicular to two straight lines in a plane which it meets, then it is perpendicular to all lines in the plane which it meets, and hence it is perpendicular to the plane.

Def. 3 may be stated thus: If a straight line is perpendicular to a plane, then it is perpendicular to every line in the plane which it meets. The converse to this would be

All straight lines which meet a given straight line in the same point, • and are perpendicular to it, lie in a plane which is perpendicular to that line.

This Euclid states thus:

Prop. 5. If three straight lines meet all at one point, and a straight line stands at right angles to each of them at that point, the three straight lines shall be in one and the same plane.

§ 75. There follow theorems relating to the theory of parallel lines in space, viz. : —

Prop. 6. Any two lines which are perpendicular to the same plane are parallel to each other ; and conversely

Prop. 8. // of two parallel straight lines one is perpendicular to a plane, the other is so also.

Prop. 7. // two straight line-s are parallel,- the-‘ straight line whiih ■ joins any point in one to any point in. the other is in the same plane as the parallels. (See above, § 73.)

Prop. 9. Two straight lines which are each of them parallel to the same straight line, and not in the same plane with it, are parallel to one another; where the words, ” and not in the same plane with it,” may be omitted, for they exclude the case of three parallels in a plane, which has been proved before ; and

Prop. 10. If two angles, in different-plants- have the two limits ‘of the one parallel to those of the other, then the angles are equal. That their planes are parallel is shown later on in Prop. 15. f: ■ ■••’”

This theorem is not necessarily truey for the angles in question may be supplementary; but then the one angle will be’ equal to 1 that which is adjacent and supplementary to the other, and this, latter angle will also have its limits parallel to, those of the first.

From this theorem it follows that if we take any two straight lines in space which do not meet, and if we draw through any point P in space two lines ˆparallel to them, then the angle included by these lines will always be the same, whatever the position of the’ point P may be. This angle has in modern times been called the angle between the given lines : —

By the angles between two not intersecting lines we understand the angles which two intersecting lines include that are parallel respectively to the two given lines. ,

§ 76. It is now possible to solve the following two problems : — –

To draw a straight line perpendicular to a given plane from a given point which lies

1. Not in the plane (Prop. 11). .

2. In the plane (Prop. 12).

The second case is easily reduced to the first— viz. if by aid of the first we have drawn any perpendicular to the plane from some point without it, we need only draw through the given point in the plane a line parallel to it, in order to have the required perpendicular given. The solution of the first part is of interest in itself. It de- pends upon a construction which may be expressed as a theorem. , , , If from a point A without a plane a perpendicular AB be drawn to the plane,

and if from the foot B of this perpendicular another perpendicular ., BC be drawn to any straight line in the, plane, then the straight. line,, joining A to the foot C of this second perpendicular will also be perpen- dicular to the line in the plane.

The theory of perpendiculars to a plane is concluded by the theorem —

Prop. 13. Through any point in space, whether in. or without a plane, only one straight line can be drawn perpendicular to the plane., § 77. The next four propositions treat of parallel planes. It, is shown that planes which have a common perpendicular are parallel (Prop. 14); that two planes are parallel, if two intersecting straight lines in the one are parallel respectively to two straight lines in the other plane (Prop. 15); that parallel planes are cut by any plane in parallel straight lines (Prop. 16) ; and lastly, that any two straight lines are cut proportionally by a series of parallel planes (Prpp. 1 7). .

This theory is made more complete by adding the following theorems, which are easy deductions from the last: Two parallel planes have common perpendiculars (converse to 14) ; and Two planes which are parallel to a third plane are parallel, to each other.

It will be noted that Prop. 15 at once allows of the solution pf the problem: " Through a given point to draw a plane parallel to a given plane." And it is also easily proved that this problem allows always of one, and only of one, solution.

§ 78. We come now to planes which are perpendicular to one, another. Two theorems relate to them.

Prop. 18. If a straight line be at right, angles to a plane, every plane which passes through it shall be at right angles to that plane.

Prop. 19. If two planes which cut one another be each of them perpendicular to a third plane, their common section shall be per- pendicular to the same plane. ., , . • ■■.■-

§ 79. If three planes pass through a comnion point, and if they bound each other, a solid angle of three faces, or a trihedral angje, is formed, and similarly by more planes a solid angle of more faces, or a polyhedral angle. These have many properties which are quite analogous to those of triangles and polygons in. a plane. Euclid states some, viz. : —

Prop. 20. If a solid angle be contained by three plane angles, any two of them are together greater than the third. But the next —

*Prop. 21. Every solid angle is contained by plane angles, which are together less than four right angles — has no analogous theorem in the plane. **

We may mention, however, that the theorems about triangles contained in the propositions of Book I., which do not depend upon the theory of parallels (that is all up to Prop. 27), have their corresponding theorems about trihedral angles. The latter are formed, if for "side of a triangle " we write " plane _ angle " or " face " of trihedral angle, and for "angle of triangle " we sub- stitute " angle between two faces " where the planes containing the solid angle are called its faces. We get, for instance, from I. 4, the

theorem, // two trihedral angles have the angles of two faces in the one equal to the angles of two faces in the other, and have likewise the angles included by these faces equal, then the angles in the remaining faces are equal, and the angles between the other faces are equal each to each, viz. those which are opposite equal faces. The solid angles themselves are not necessarily equal, for they may be only symmetrical like the right hand and the left.

The connexion indicated between triangles and trihedral angles will also be recognized in

Prop. 22. // every two of three plane angles be greater than the third, and if the straight lines which contain them be all equal, a triangle may be made of the straight lines that join the extremities of those equal straight lines.

And Prop. 23 solves the problem, To construct a trihedral angle having the angles of its faces equal to three given plane angles, any two of them being greater than the third. It is, of course, analogous to the problem of constructing a triangle having its sides of given length.

Two other theorems of this kind are added by Simson in his edition of Euclid's Elements.

§ 80. These are the principal properties of lines and planes in space, but before we go on to their applications it will be well to define the word distance. In geometry distance means always " shortest distance "; viz. the distance of a point from a straight line, or from a plane, is the length of the perpendicular from the point to the line or plane. The distance between two non-intersect- ing lines is the length of their common perpendicular, there being but one. The distance between two parallel lines or between two parallel planes is the length of the common perpendicular between the lines or the planes.

§ 81. Parallelepipeds. — The rest of the book is devoted to the study of the parallelepiped. In Prop. 24 the possibility of such a solid is proved, viz. : —

Prop. 24. // a solid be contained by six planes two and two of which are parallel, the opposite planes are similar and equal parallelo- grams.

Euclid calls this solid henceforth a parallelepiped, though he never defines the word. Either face of it may be taken as base, and its distance from the opposite face as altitude.

Prop. 25. // a solid parallelepiped be cut by a plane parallel to two of its opposite planes, it divides tiie whole into two solids, the base of one of which shall be to the base of the other as the one solid is to the other.

This theorem corresponds to the theorem (VI. 1) that parallelo- grams between the sdme parallels are to one another as their bases. A similar analogy is to be observed among a number of the remaining propositions.

§ 82. After solving a few problems we come to Prop. 28. // a solid parallelepiped be cut by a plane passing through the diagonals of two of the opposite planes, it shall be cut in two equal parts.

In the proof of this, as of several ether propositions, Euclid neglects the difference between solids which are symmetrical like the right hand and the left.

Prop. 31. Solid parallelepipeds, which are upon equal bases, and of the same altitude, are equal to one another.

Props. 29 and 30 contain special cases of this theorem leading up to the proof of the general theorem.

As consequences of this fundamental theorem we get Prop. 32. Solid parallelepipeds, which have the same altitude, are to one another as their bases ; and

P ro P,- 33- Similar solid parallelepipeds are to one another in the triplicate ratio of their homologous sides.

If we consider, as in § 67, the ratios of lines as numbers, we may also say —

The ratio of the volumes of similar parallelepipeds is equal to the ratio cf the third powers of homologous sides.

Parallelepipeds which are not similar but equal are compared by aid of the theorem

Prop. 34. The bases and altitudes of equal solid parallelepipeds and reciprocally proportional; and if the bases and altitudes be reciprocally proportional, the solid parallelepipeds are equal.

§ 83. Of the following propositions the 37th and 40th are of special interest.

Prop- 37- If four straight lines be proportionals, the similar solid parallelepipeds, similarly described from them, shall also be proportionals; and if the similar parallelepipeds similarly described from four straight lines be proportionals, the straight lines shall be proportionals.

In symbols it says —

If a:b = c :d, then a:V = c*:d 3 . Prop. 40 teaches how to compare the volumes of triangular pri.-ms with those of parallelepipeds, by proving that a triangular prism is equal in volume to a parallelepiped, which has its altitude and its base equal to the altitude and the base of the triangular prism.*

§ 84. From these propositions follow all results relating to the mensuration of volumes. We shall state these as we did in the case of areas. The starting-point is the " rectangular " parallelepiped, which has every edge perpendicular to the planes it meets, and

which takes the place of the rectangle in the plane. If this has all its edges equal we obtain the " cube."

If we take a certain line u as unit length, then the square on u is the

unit of area, and the cube on « the unit of volume, that is to say, if we wish to measure a volume we have to determine how many unit cubes it contains. ‘

A rectangular parallelepiped has, as a rule, the three edges un-equal, which meet at a point. Every other edge is equal to one of them. If a, b, c be the three edges meeting at a point, then we may take the rectangle contained by two of them, say by b and c, as base and the third as altitude. Let V be its volume, V’ that of another rectangular parallelepiped which has the edges a’, b, c, hence the same base as the first. It follows then easily, from Prop. 25 or 32, that V:V’ = a:o’; or in words,

Rectangular parallelepipeds on equal bases are proportional to theit altitudes.

If we have two rectangular parallelepipeds, of which the first has the volume V and the edges a, b, c, and the second, the volume V and the edges a’, b’, c’ , we may compare them by aid of two new ones which have respectively the edges a’, b, c and a’, V , c, and the volumes Vi and V 2 . We then have

V:V 1 = a:a’;V l :V 2 = 6:6’, V 2 :V’ = c:c’.

Compounding these, we have

V:V’ = (o:o’) (b:b’) (c: c’), or

V_a b_ c_ V’~V‘6’V

Hence, as a special case, making V equal to the unit cube U on u we get

V a b c_ a TJ-u.‘u – u – a -P-t’ where a, ft, 7 are the numerical values of a, b, c; that is, The number of unit cubes in a rectangular parallelepiped is equal to the product of the numerical values of its three edges. This is generally ex- pressed by saying the volume of a rectangular parallelepiped is measured by the product of its sides, or by the product of its base into its altitude, which in this case is the same. ‘

Prop. 31 allows us to extend this to any parallelepipeds, and Props. 28 or 40, to triangular prisms.

The volume of any parallelepiped, or of any triangular prism, is measured by the product of base and altitude.

The consideration that any polygonal prism may be divided into a number of triangular prisms, which have the same altitude and the sum of their bases equal to the base of the polygonal prism, shows further that the same holds for any prism whatever.

Book XII.

§ 85. In the last part of Book XI. we have learnt how to compare the volumes of parallelepipeds and of prisms. In order to determine the volume of any solid bounded by plane faces we must determine the volume of pyramids, for every such solid may be decomposed into a number of pyramids.

As every pyramid may again be decomposed into triangular pyramids, it becomes only necessary to determine their volume. This is done by the

Theorem. — Every triangular pyramid is equal in volume to one third of a triangular prism having the same base and the same altitude as the pyramid.

This is an immediate consequence of Euclid's

Prop. 7. Every prism having a triangular base may be divided into three pyramids that have triangular bases, and are equal to one another.

The proof of this theorem is difficult, because the three triangular pyramids into which the prism is divided are by no means equal in shape, and cannot be made to coincide. It has first to be proved that two triangular pyramids have equal volumes, if they have equal bases and equal altitudes. This Euclid does in the following manner. He first shows (Prop. 3) that a triangular pyramid may be di vided.into four parts, of which two are equal triangular pyramids similar to the whole pyramid, whilst the other two are equal tri-angular prisms, and further, that these two prisms together are greater than the two pyramids, hence more than half the given pyramid. He next shows (Prop. 4) that if two triangular pyramids are given, having equal bases and equal altitudes, and if each be divided as above, then the two triangular prisms in the one are equal to those in the other, and each of the remaining pyramids in the one has its base and altitude equal to the base and altitude of the remaining pyramids in the other. Hence to these pyramids the same process is again applicable. We are thus enabled to cut out of the two given pyramids equal parts, each greater than half the original

pyramid. Of the remainder we can again cut out equal parts greater

To Greek mathematicians this conclusion offers far greater

difficulties. They prove elaborately, by a reductio ad absurdum, that the volumes cannot be unequal. This proof must be read in the Elements. We must, however, state that we have in the above not proved Euclid's Prop. 5, but only a special case of it. Euclid does not suppose that the bases of the two pyramids to be compared are equal, and hence he proves that the volumes are as the bases. The reasoning of the proof becomes clearer in the special case, from which the general one may be easily deduced.

§ 86. Prop. 6 extends the result to pyramids with polygonal bases. From these results follow again the rules at present given for the mensuration of solids, viz. a pyramid is the third part of a triangular prism having the same base and the same altitude. But a triangular prism is equal in volume to a parallelepiped which has the same base and altitude. Hence if B is the base and h the altitude, we have

Volume of prism = Bft, Volume of pyramid = iBA,

statements which have to be taken in the sense that B means the number of square units in the base, h the number of units of length in the altitude, or that B and h denote the numerical values of base and altitude.

§ 87. A method similar to that used in proving Prop. 5 leads to the following results relating to solids bounded by simple curved surfaces: —

Prop. 10. Every cone is the third part of a cylinder which has the same base, and is of an equal altitude with it.

Prop. 11. Cones or cylinders of the same altitude are to one another as their bases.

Prop. 12. Similar cones or cylinders have to one another the triplicate ratio of that which the diameters of their bases have.

Prop. 13. If a cylinder be cut by a plane parallel to its opposite planes or bases, it divides the cylinder into two cylinders, one of which is to the other as the axis of the first to the axis of the other; which may also be stated thus: —

Cylinders on the same base are proportional to their altitudes.

Prop. 14.. Cones or cylinders upon equal bases are to one another as thetr altitudes.

Prop. 15. The bases and altitudes of equal cones or cylinders are reciprocally proportional, and if the bases and altitudes be reciprocally proportional, the cones or cylinders are equal to one another.

These theorems again lead to formulae in mensuration, if we compare a cylinder with a prism having its base and altitude equal to the base and altitude of the cylinder. This may be done by the method of exhaustion. We get, then, the result that their bases are equal, and have, if B denotes the numerical value of the base, and h that of the altitude,

Volume of cylinder = Bh, Volume of cone = $Bh.

§ 88. The remaining propositions relate to circles and spheres. Of the sphere only one property is proved, viz. : —

Prop. 18. Spheres have to one another the triplicate ratio of that which their diameters have. The mensuration of the sphere, like that of the circle, the cylinder and the cone, had not been settled in the time of Euclid. It was done by Archimedes.

Book XIII.

§ 89. The 13th and last book of Euclid's Elements is devoted to the regular solids (see Polyhedron). It is shown that there are five of them, viz. : —

1 . The regular tetrahedron, with 4 triangular faces and 4 vertices ;

2. The cube, with 8 vertices and 6 square faces;

3. The octahedron, with 6 vertices and 8 triangular faces;

4. The dodecahedron, with 12 pentagonal faces, 3 at each of the 20 vertices;

5. The icosahedron, with 20 triangular faces, 5 at each of the 12 vertices.

It is shown how to inscribe these solids in a given sphere, and how to determine the lengths of their edges.

§ 90. The 13th book, and therefore the Elements, conclude with the scholium, " that no other regular solid exists besides the five ones enumerated."

The proof is very simple. Each face is a regular polygon, hence the angles of the faces at any vertex must be angles in equal regular polygons, must be together less than four right angles (XI. 21), and must be three or more in number. Each angle in a regular triangle equals two-thirds of one right angle. Hence it is possible to form a solid angle with three, four or five regular triangles or faces. ' These give the solid angles of the tetrahedron, the octahedron and the icosahedron. The angle in a square (the regular quadrilateral) equals one right angle. Hence three will form a solid angle, that of the cube, and four will not. The angle in the regular pentagon equals £ of a ryfht angle. Hence three of them equal ˆ (i.e. less than 4) right angles, and form the solid angle of the dodecahedron. Three regular polygons of six or more sides cannot form a solid angle. • Therefore no other regular solids are possible. (O. H.)

II. Projective Geometry

It is difficult, at the outset, to characterize projective geometry as compared with Euclidean. But a few examples will at least indicate the practical differences between the two.

In Euclid's Elements almost all propositions refer to the magni- tude of lines, angles, areas or volumes, and therefore to measure- ment. The statement that an angle is right, or that two straight lines are parallel, refers to measurement. On the other hand, the fact that a straight line does or does not cut a circle is inde- pendent of measurement, it being dependent only upon the mutual " position " of the line and the circle. This difference becomes clearer if we project any figure from one plane to another (see Projection). By this the length of lines, the magnitude of angles and areas, is altered, so that the projection, or shadow, of a square on a plane will not be a square; it will, however, be some quadrilateral. Again, the projection of a circle will not be a circle, but some other curve more or less resembling a circle. But one property may be stated at once — no straight line can cut the projection of a circle in more than two

points, because no straight line can cut a circle in more than two points. There are, then, some properties of figures which do not alter by projection, whilst others do. To the latter belong nearly all properties relating to measurement, at least in the form in which they are generally given. The others are said to be projective properties, and their investigation forms the subject of projective geometry.

Different as are the kinds of properties investigated in the old and the new sciences, the methods followed differ in a still greater degree. In Euclid each proposition stands by itself; its connexion with others is never indicated; the leading ideas contained in its proof are not stated; general principles do not exist. In the modern methods, on the other hand, the greatest importance is attached to the leading thoughts which pervade the whole; and general principles, which bring whole groups of theorems under one aspect, are given rather than separate pro- positions. The whole tendency is towards generalization. A straight line is considered as given in its entirety, extending both ways to infinity, while Euclid never admits anything but finite quantities. The treatment of the infinite is in fact another fundamental difference between the two methods: Euclid avoids it; in modern geometry it is systematically introduced.

Of the different modern methods of geometry, we shall treat principally of the methods of projection and correspondence which have proved to be the most powerful. These have become inde- pendent of Euclidean Geometry, especially through the Geometric der Lage of V. Staudt and the Ausdehnungslehre of Grassmann.

*For the sake of brevity we shall presuppose a knowledge of Euclid's Elements, although we shall use only a few of his pro- positions. **

§ 1. Geometrical Elements. We consider space as filled with points, lines and planes, and these we call the elements out of which our figures are to be formed, calling any combination of these elements a " figure."

By a line we mean a straight line in its entirety, extending both ways to infinity; and by a plane, a plane surface, extending in all directions to infinity.

We accept the three-dimensional space of experience — the space assumed by Euclid — which has for its properties (among others) : —

Through any two points in space one and only one line may be drawn ;

Through any three points which are not in a line, one and only one plane may be placed;

The intersection of two planes is a line;

A line which has two points in common with a plane lies in the plane, hence the intersection of a line and a plane is a single point ; and

Three planes which do not meet in a line have one single point in common.

These results may be stated differently in the following form : — I. A plane is determined — A point is determined —

1. By three points which do 1. By three planes which do

not lie in a line ; not pass through a line ;

2. By two intersecting lines ; 2. By two intersecting lines;

3. By a line and a point 3. By a plane and a line

which does not lie in it. which does not lie in it.

II. A line is determined —

1. By two points; 2. By two planes.

It will be observed that not only are planes determined by points, but also points by planes; that therefore the planes may be con- sidered as elements, like points; and also that in any one of the above statements we may interchange the words point and plane, and we obtain again a correct statement, provided that these statements themselves are true. As they stand, we ought, in several cases, to add " if they are not parallel," or some such words, parallel lines and planes being evidently left altogether out of consideration. To correct this we have to reconsider the theory of parallels.

§ 2. Parallels. Point at Infinity. — Let us take in a plane a line p (fig. 1), a point S not in this line, and a line q drawn through S.

Then this line q will meet the line p in a point A. If we turn the line j about S towards q', its point of intersection with p will move along p towards B, passing, on continued turn- ing, to a greater and greater distance, until it is moved out of our reach. If we turn q still farther, its con- tinuation' will meet p, but now at the other side of A. The point of inter- section has disappeared to the right and reappeared to the left. There is one intermediate position where q is parallel to p — that is where it does not cut p. In every other position it cuts p in some finite point. If, on the other hand, we move the point A to an infinite distance in p, then the line q which passes through A will be a line which does not cut p at any finite point. Thus we are led to say: Every line through S which joins it to any point at an infinite distance in p is parallel to p. But by Euclid's 12th axiom there is but one line parallel to p through S. The difficulty in which we are thus involved is due to the fact that we try to reason about infinity as if we, with our finite capabilities, could comprehend the infinite. To overcome this difficulty, we may say that all points at infinity in a line appear to us as one, and may be replaced by a single " ideal " point.

We may therefore now give the following definitions and axiom : — Definition. — Lines which meet at infinity are called parallel. Axiom. — All points at an infinite distance in a line may be con- sidered as one single point.

Definition. — This ideal point is called the point at infinity in the line.

The axiom is equivalent to Euclid's Axiom 12, for it follows from either that through any point only one line may be drawn parallel to a given line.

This point at infinity in a line is reached whether we move a point in the one or' in the opposite direction of a line to infinity. A line thus appears closed by this point, and we speak as if we could move a point along the line from one position A to another B in two ways, either through the point at infinity or through finite points only.

It must never be forgotten that this point at infinity is ideal; in fact, the whole notion of " infinity ' is only a mathematical conception, and owes its introduction (as a method of research) to the working generalizations which it permits.

§ 3. Line and Plane at Infinity. — Having arrived at the notion of replacing all points at infinity in a line by one ideal point, there is no

difficulty in replacing all points at infinity in a plane by one ideal line.

To make this clear, let us suppose that a line p, which cuts two fixed lines a and 6 in the points A and B, moves parallel to itself to a greater and greater distance. It will at last cut both a and b at t'ueir points at infinity, so that a line which joins the two points at infinity in two intersecting lines lies altogether at infinity. Every other line in the plane will meet it therefore at infinity, and thus it contains all points at infinity in the plane.

All points at infinity in a plane lie in a line, which is called the line at infinity in the plane.

It follows that parallel planes must be considered as planes having a common line at infinity, for any other plane cuts them in parallel lines which have a point at infinity in common.

If we next take two intersecting planes, then the point at infinity in their line of intersection lies in both planes, so that their lines at infinity meet. Hence every line at infinity meets every other line at infinity, and they are therefore all in one plane.

All points at infinity in space may be considered as lying in one ideal plane, which is called the plane at infinity.

§ 4. Parallelism. — We have now the following definitions : — Parallel lines are lines which meet at infinity ; Parallel planes are planes which meet at infinity; A line is parallel to a plane if it meets it at infinity. Theorems like this — Lines (or planes) which are parallel to a third are parallel to each other — follow at once.

This view of parallels leads therefore tc no contradiction of Euclid's Elements.

As immediate consequences we get the propositions: —

Every line meets a plane in one point, or it lies in it;

Every plane meets every other plane in a line;

Any two lines in the same plane meet.

§ 5- Aggregates of Geometrical Elements. — We have called points, lines and planes the elements of geometrical figures. We also say that an element of one kind contains one of the other if it lies in it or

passes through it.

All the elements of one kind which are contained in one or two elements of a different kind form aggregates which have to be enumerated. They are the following: — I. Of one dimension.

1 . The row, or range, of points formed by all points in a line,

which is called its base.

2. The flat pencil formed by all the lines through a point in

a plane. Its base is the point in the plane.

3. The axial pencil formed by all planes through a line

which is called its base or axis. II. Of two dimensions.

1 . The field of points and lines — that is, a plane with all its

points and all its lines.

2. The pencil of lines and planes — that is, a point in space

with all lines and all planes through it.

III. Of three dimensions.

The space of points — that is, all points in space. The space of planes — that is, all planes in space.

IV. Of four dimensions.

The space of lines, or all lines in space.

§ 6. Meaning of " Dimensions." — The word dimension in the above needs explanation. If in a plane we take a row p and a pencil with centre Q, then through every point in p one line in the pencil will pass, and every ray in Q will cut p in one point, so that we are entitled to say a row contains as many points as a flat pencil lines, and, we may add, as an axial pencil planes, because an axial pencil is cut by a plane in a flat pencil.

The number of elements in the row, in the flat pencil, and in the axial pencil is, of course, infinite and indefinite too, but the same in all. This number may be denoted by 00. Then a plane contains oo s points and as many lines. To see this, take a flat pencil in a plane. It

contains 00 lines, and each line contains 00 points, whilst each point in the plane lies on one of these lines. Similarly, in a plane each line cuts a fixed line in a point. But this line is cut at each point by 00 lines and contains co points ; hence there are °o l lines in a plane.

A pencil in space contains as many lines as a plane contains points and as many planes as a plane contains lines, for any plane cuts the pencil in a field of points and lines. Hence a pencil con- tains 00 s lines and » 2 planes. The field and the pencil are of two dimensions.

To count the number of points in space we observe that each point lies on some line in a pencil. But the pencil contains 00 s lines, and each line 00 points; hence space contains °o a points. Each plane cuts any fixed plane in a line. But a plane contains

00 2 lines, and through each pass 00 planes ; therefore space contains

00 3 planes.

Hence space contains as many planes as points, but it contains an infinite number of times more lines than points or planes. To count them, notice that every line cuts a fixed plane in one point. But 00 2 lines pass through each point, and there are oo 2 points in the plane. Hence there are 00 4 lines in space. The space of points and planes is of three dimensions, but the space of lines is of four dimensions.

A field of points or lines contains an infinite number of rows and flat pencils; a pencil contains an infinite number of flat pencils and of axial pencils; space contains a triple infinite number of pencils and of fields, 00 4 rows and axial pencils and °o 5 flat pencils — or, in other words, each point is a centre of 00 2 flat pencils.

§ 7. The above enumeration allows a classification of figures. Figures in a row consist of groups of points only, and figures in the flat or axial pencil consist of groups of lines or planes. In the plane we may draw polygons; and in the pencil or in the point, solid angles, and so on.

We may also distinguish the different measurements We have —

In the row, length of segment ;

In the flat pencil, angles;

In the axial pencil, dihedral angles between two planes;

In the plane, areas;

In the pencil, solid angles;

In the space of points or planes, volumes.

Segments of a Line § 8. Any two points A and B in space determine on the line through them a finite part, which may be considered as being described by a point moving from A to B. This we shall denote by AB, and distinguish it from BA, which is supposed as being described by a point moving from B to A, and hence in a direction or in a " sense " opposite to AB. Such a finite line, which has a definite sense, we shall call a " segment," so that AB and BA denote different segments, which are said to be equal in length but of opposite sense. The one sense is often called positive and the other negative.

c

A

B

A

c

B

Fig. 2.

In introducing the word " sense " for direction in a line, we have the word direction reserved for direction of the line itself, so that different lines have different directions, unless they be parallel, whilst in each line we have a positive and negative sense.

We may also say, with Clifford, that AB denotes the " step " of going from A to B.

§ 9. If we have three points A, B, C in a line (fig. 2), the step AB will bring us from A to B, and the step A b C BC from B to C. Hence both steps are

equivalent to the one step AC. This is expressed by saying that AC is the " sum " of AB and BC ; in symbols —

$AB + BC = AC,$

where account is to be taken of the sense.

This equation is true whatever be the position of the three points on the line. As a special case we have

$AB + BA = o, \ (1)$

and similarly

$AB + BC + CA = o, \ (2)$

which again is true for any three points in a line. We further write

$AB = -BA.$

where — denotes negative sense.

We can then, just as in algebra, change subtraction of segments into addition by changing the sense, so that AB-CB is the same as AB + (-CB) or AB + BC. A figure will at once show the truth of this.ˆ The sense is, in fact, in every respect equivalent to the " sign " of a number in algebra.

§ 10. Of the many formulae which exist between points in a line we shall have to use only one more, which connects the segments between any four points A, B, C, D in a line. We have

$BC = BB + DC, \ CA = CD + DA, \ AB = AD + DB;$ *or multiplying these by AD, BD, CD respectively, we get*

$BC \,.\, AD = BD \,.\, AD + DC \,.\, AD = BD \,.\, AD - CD \,.\, AD \ CA \,.\, BD = CD \,.\, BD + DA \,.\, BD = CD \,.\, BD - AD \,.\, BD \ AB \,.\, CD = AD \,.\, CD + DB \,.\, CD = AD \,.\, CD - BD \,.\, CD.$

It will be seen that the sum of the right-hand sides vanishes, hence that

$BC \,.\, AD + CA \,.\, BD + AB \,.\, CD = o \ (3)$

for any four points on a line.

§ 11. If C is any point in the line AB, then we say that C divides the

segment AB in the ratio AC/CB, account being taken of the sense of the two segments AC and CB. If C lies between A and B the ratio is positive, as AC and CB have the same sense. But if C lies without the segment AB, i.e. if C divides AB externally, then

the ratio is negative.

Q A M B P To see how the value of

~ ‘ ~ ‘ ‘ this ratio changes with

Fig. 3. C, we will move C along

the whole line (fig. 3), whilst A and B remain fixed. If C lies at the point A, then AC =0, hence the ratio AC’.CB vanishes. As C moves towards B, AC increases and CB decreases, so that our ratio increases. At the middle point M of AB it assumes the value +1, and then increases till it reaches an infinitely large value, when C arrives at B. On passing beyond B the ratio becomes negative. If C is at P we have AC=AP = AB+BP, hence

AC AB BP_ CB PB+PB –

AB “BP”

In the last expression the ratio AB :BP is positive, has its greatest value 00 when C coincides with B, and vanishes when BC becomes infinite. Hence, as C moves from B to the right to the point at infinity, the ratio AC :CB varies from — 00 to — 1.

If. on the other hand, C is to the left of A, say at Q, we have

AC=AQ=AB + BQ=AB-QB, hence £g=ˆ5-i.

Here AB

” As C moves along the line from an infinite distance to the left to an infinite distance at the right, the ratio always increases; it start* with the value- 1, reaches o at A, +1 at M, 00 at B, now changes sign to — 00 , and increases till at an infinite distance it reaches again the value — 1 . // assumes therefore all possible values from — 00 to +cc,and each value only once, so that not only does every position of C determine a definite value of the ratio AC:CB, but also, conversely, to every positive or negative value of this ratio belongs one single point in the line AB.

[Relations between segments of lines are interesting as showing an application of algebra to geometry. The genesis of such relations

from algebraic identities is very simple. For example, if a, b, c, X be any four quantities, then

b

+7

{a-b){a-~c){x-a)' r (b-c){b-a)(x-b)

1 +

ic—a)(c — b){x — c) (x — a)(x — b)(x—c)' this may be proved, cumbrously, by multiplying up, or, simply, by decomposing the right-hand member of the identity into partial fractions. Now take a line ABCDX, and let AB =a, AC = b, AD=c, AX = x. Then obviously (a-b) =AB-AC =-BC, paying regard to signs; (a-c) =AB-AD = DB, and so on. Substituting these values in the identity we obtain the following relation connecting the segments formed by five points on a line :- –

AB AC AD AX

> +?

' + T

BC . BD . BX T CD . CB . CX T DB . DC . DX~BX . CX . DX' Conversely, if a metrical relation be given, its validity may be tested by reducing to an algebraic equation, which is an identity if the relation be true. For example, if ABCDX be five collinear points, prove

AD . AX , BD . BX , CD . CX

r +

+ 7

AB.AC T BC. BA T CA.CB Clearing of fractions by multiplying throughout by AB . BC . CA, we have to prove

-AD.AX.BC-BD.BX.CA-CD.CX.AB=AB.BC.CA.

Take A as origin and let AB = a, AC = b, AD = c, AX = x.

Substituting for the segments in terms of a, b, c, x, we obtain on simplification

a?b-ab =-ab 2 -{-a 2 b, an obvious identity.*

An alternative, method of testing a relation is illustrated in the example: following —If A, B, C, D, E, F be six collinear points, then

AE.AF

5 + 1

BE.BF

:+ <

CE.CF

[+ f

DE . DF

; = 0.

AB.AC.ADˆBC. BD.BA T CD.CA.CB T DA DB . DC = Clearing of fractions by multiplying throughout by AB . BC . CD . DA, and reducing to a common origin O (calling OA = a, OB =b, &c), an equation containing the second and lower powers of OA (= a), &c, is obtained. Calling OA = x, it is found that x = b, x = c, x = d are solutions. Hence the quadratic has three roots; consequently it is an identity.

The relations connecting five points which we have instanced above may be readily deduced from the six-point relation; the first by taking D at infinity, and the second by taking F at infinity, and then making the obvious permutations of the points.]

Projection and Cross-Ratios § 12. If we join a point A to a point S, then the point where the line SA cuts a fixed plane x is called the projection of A on the plane x from S as centre of projection. If we" have two planes x and x' and a point S, we may project every point A in x to the other plane. If A' is the projection of A, then A is also the pro- jection of A', so that the relations are reciprocal. To every figure in x we get as its projection a corresponding figure in x'.

We shall determine such properties of figures as remain true for the projection, and which are called projective properties. For this

purpose it will be sufficient to consider at first only constructions in one plane.

Let us suppose we have given in a plane two lines p and p' and a centre S (fig. 4) ; we may then project the points in p from S to p'.

Fig. 4.

Fig. 5.

Let A', B' ... be the projections of A, B . . ., the point at infinity in p which we shall denote by I will be projected into a finite point

II

PROJECTIVE]

GEOMETRY

691

(AB.CD)] (BA, DC) I (CD,AB)f (DC, BA)J (AB, DC)] (BA, CD) I (CD, BA) f (DC,AB)J (AC, BD)] (BD,AC)I (CA, DB) \ (DB, CA)J

*I' in p', viz. into the point where the parallel to p through S cuts *'. Similarly one point J in p will be projected into the point J' at infinity in p' . This point J is of course the point where the parallel to p through S cuts p. We thus see that every point in p is projected into a single point in p'.*

Fig. 5 shows that a segment AB will be projected into a segment A'B' which is not equal to it, at least not as a rule; and also that the ratio AC : CB is not equal to the ratio A'C' : C'B' formed by the projections. These ratios will become equal only if p and p' are parallel, for in this case the triangle SAB is similar to the triangle SA'B'. Between three points in a line and their pro- jections there exists therefore in general no relation. But between four points a relation does exist.

§ 13. Let A, B, C, D be four points in p, A', B', O, D their projections in p', then the ratio of the two ratios AC:CB and AD:DB into which C and D divide the segment AB is equal to the corresponding expression between A', B', C, D'. In symbols we have AC AD_.A/C_' A'D' CB : DB – C'B' : D'B'' This is easily proved by aid of similar triangles. Through the points A and Bonf draw parallels to p', which cut

the projecting rays in C 2 , D 2 , B 2 and Aj, G, D t , as indicated in fig. 6. The two triangles ACC 2 and BCd will be similar, as will also be the triangles ADD 2 and BDD,.

The proof is left to the reader.

This result is of funda- mental importance.

The expression AC/CB-.AD/DB has been called by Chasles the " anharmonic ratio of the Fig. 6. four points A, B, C, D."

Professor Clifford pro- posed the shorter name of " cross-ratio." We shall adopt the latter. We have then the

Fundamental Theorem. — The cross-ratio of four points in a line is equal to the cross-ratio of their projections on any other line which lies in the same plane with it.

§ 14. Before we draw conclusions from this result, we must in- vestigate the meaning of a cross-ratio somewhat more fully.

If four points A, B, C, D are given, and we wish to form their cross- ratio, we have first to divide them into two groups of two, the points in each group being taken in a definite order. Thus, let A, B be the first, C, D the second pair, A and C being the first points in each pair. The cross-ratio is then the ratio AC:CB divided by AD : DB. This will be denoted by (AB, CD), so that

(AB,CD) = ˆ:ˆ§.

This is easily remembered. In order to write it out, make first the two lines for the fractions, and put above and below these

A A the letters A and B in their places, thus, — tt : — jr ; and then fill

up, crosswise, the first by C and the other by D.

§ 15. If we take the points in a different order, the value of the cross- ratio will change. We can do this in twenty-four different ways by forming all permutations of the letters. But of these twenty-four cross-ratios groups of four are equal, so that there are really only six different ones, and these six are reciprocals in pairs.

We have the following rules : —

I. If in a cross-ratio the two groups be interchanged, its value

remains unaltered, i.e.

(AB, CD) = (CD, AB) = (BA, DC) = (DC, BA).

II. If in a cross-ratio the two points belonging to one of the two groups be interchanged, the cross-ratio changes into its reciprocal, i.e.

(AB, CD) = i/(AB, DC) = i/(BA, CD) = i/(CD, BA) = i/(DC, AB).

From I. and II. we see that eight cross-ratios are associated with (AB, CD).

III. If in a cross-ratio the two middle letters be interchanged, the cross-ratio a changes into its complement 1 —a, i.e. (AB, CD) = I-(AC, BD).

[§ 16. If X = (AB, CD), m=(AC, DB), v=(AD, BC), then X, m, ” and their reciprocals l/\, i/m, l/v are the values of the total number of twenty-four cross-ratios. Moreover, X, p, v are connected by the relations

X + i/m=m + i/>’ = >’+ i /^ =— X/ii>=i; this proposition may be proved by substituting for X, ti, v and

reducing to a common origin. There are therefore four equations between three unknowns; hence if one cross-ratio be given, the remaining twenty-three are determinate. Moreover, two of the quantities X, n, v are positive, and the remaining one negative.

The following scheme shows the twenty-four cross-ratios expressed in terms of X, Mi »••]

l/X

I-X

1-M

1/(1 -M)

1/(1-)*

1-/(1—1)

(AC,DB)1 (BD, CA) I (CA, BD) f (DB,AC)J (AD, BC)-| (BC, AD) I (CB, DA) [(DA,CB)J (AD, CB)i (BC, DA) (CB,AD)f (DA,BC)J

1/(1 -X)

(X-i)/X

V(X-i)

i/m

m/(m-i)

&•-!)//•

{“-1)1”

*I/**

§ 17. If one of the points of which a cross-ratio is formed is the point at infinity in the line, the cross-ratio changes into a simple ratio. It is convenient to let the point at infinity occupy the last place in the symbolic expression for the cross-ratio. Thus if I is a point at infinity, we have (AB, CI) = — AC/CB, because AI : IB = — 1.

Every common ratio of three points in a line may thus be ex- pressed as a cross-ratio, by adding the point at infinity to the group of points.

Harmonic Ranges

*§ 18. If the points have special positions, the cross-ratios may have such a value that, of the six different ones, two and two become equal. If the first two shall be equal, we get X = i/X, or X 2 = i, X= = *l.*

If we take X= +i, we have (AB, CD) = i, or AC/CB = AD/DB; that is, the points C and D coincide, provided that A and B are different.

If we take X=-i, so that (AB, CD) = -i, we have AC/CB = — AD/ DB. Hence C and D divide AB internally and externally in the same ratio.

The four points are in this case said to be harmonic points, and C and D are said to be harmonic conjugates with regard to A and B.

But we have also (CD, AB) = — I, so that A and B are harmonic conjugates with regard to C and D.

The principal property of harmonic points is that their cross-ratio remains unaltered if we interchange the two points belonging to one

pair, viz.

(AB, CD) = (AB, DC) = (BA, CD).

For four harmonic points the six cross-ratios become equal two and two:

X= —I, I— X = 2, :

- = 2.

*x-i 2 ‘ x~ “i-X – *’ x*

Hence if we get four points whose cross-ratio is 2 or J, then they are harmonic, but not arranged so that conjugates are paired. If this is the case the cross-ratio = — 1.

§ 19. If we equate any two of the above six values of the cross-ratios, we get either X = i, o, oo, or X= — 1, 2, J, or else X becomes a root of the equation X 2 — X+i =0, that is, an imaginary cube root of — 1. In this case the six values become three and three equal, so that only two different values remain. This case, though important in the theory of cubic curves, is for our purposes of no interest, whilst harmonic points are all-important.

§ 20. From the definition of ‘harmonic points, and by aid of § 11, the following properties are easily deduced.

If C and D are harmonic conjugates with regard to A and B, then one of them lies in, the other without AB ; it is impossible to move from A to B without passing either through C or through D; the one blocks the finite way, the other the way through in- finity. This is expressed by saying A and B are “separated ” by C and D.

For every position of C there will be one and only one point D which is its harmonic conjugate with regard to any point pair A,B.

If A and B are different points, and if C coincides with A or B, D does. But if A and B coincide, one of the points C or D, lying between them, coincides with them, and the other may be anywhere in the line. It follows that, ” if of four harmonic conjugates two ˆcoincide, then a third coincides with them, and the fourth may be any point in the line.”

If C is the middle point between A and B, then D is the point at infinity; for AC:CB = +i, hence AD.-DB must be equal to —1. The

harmonic conjugate of the point at infinity in a line with regard to two points A, B is the middle point of AB.

This important property gives a first example how metric pro- perties are connected with projective ones.

[§ 21. Harmonic properties of the complete quadrilateral and quad- rangle.

[PROJECTIVE

A figure formed by (our lines in a plane is called a complete quadri- lateral, or, shorter, a four-side. The four sides meet in six points, named the " vertices," which may be joined by three lines (other than the sides), named the " diagonals " or " harmonic lines." The diagonals enclose the " harmonic triangle of the quadrilateral." In fig. 7, A'B'C, B'AC, CAB, CBA are the sides, A,A', B,B', C,C

Fig. 7.

Fig. 8.

the vertices, AA', BB', CC the harmonic lines, and afly the harmonic triangle of the quadrilateral. A figure formed by four coplanar points is named a complete quadrangle, or, shorter, a four-point. The four points may be joined by six lines, named the " sides," which intersect in three other points, termed the " diagonal or harmonic points." The harmonic points are the vertices of the " harmonic triangle of the complete quadrangle." In fig. 8, AA', BB' are the points, AA', BB', A'B', B'A, AB, BA' are the sides, L, M, N are the diagonal points, and LMN is the harmonic triangle of the quadrangle.

The harmonic property of the complete quadrilateral is: Any diagonal or harmonic line is harmonically divided by the other two; and of a complete quadrangle: The angle at any harmonic point is divided harmonically by the joins to the other harmonic points. To prove the first theorem, we have to prove (AA', f3y), (BB',7a), (CC, /3a) are harmonic. Consider the cross-ratio (CC, a/3). Then projecting from A on BB' we have A(CC, a/3)=A(B'B, ay). Projecting from A' on BB', A'(CC, a/3) = A'(BB', ay). Hence (B'B, 07) = (BB', ay), i.e. the cross-ratio (BB', 07) equals that of its reciprocal ; hence the range is harmonic.

The second theorem states that the pencils L(BA,NM) ,M (B'A.LN) , N(BA, LM) are harmonic. Deferring the subject of harmonic pencils to the next section, it will suffice to state here that any transversal intersects an harmonic pencil in an harmonic range. Consider the pencil L(BA, NM), then it is sufficient to prove (BA', NM') is harmonic. This follows from the previous theorem by considering A'B as a diagonal of the quadrilateral ALB'M.]

This property of the complete quadrilateral allows the solution of the problem :

To construct the harmonic conjugate D to a point C with regard' to two given points A and B.

Through A draw any two lines, and through C one cutting the former two in G and H. Join these points to B, cutting the former two lines in E and F. The point D where EF cuts AB will be the harmonic conjugate required.

This remarkable construction requires nothing but the drawing of lines, and is therefore independent of measurement. In a similar manner the harmonic conjugate of the line VA for two lines VC, VD is constructed with the aid of the property of the complete quadrangle.

§ 22. Harmonic Pencils. — The theory of cross-ratios may be extended from points in a row to lines in a flat pencil and to planes in an axial pencil. We have seen (§ 13) that if the lines which join four points A, B, C, D to any point S be cut by any other line in A', B', C, D', then (AB, CD) = (A'B', CD'). In other words, four lines in a flat pencil are cut by every other line in four points whose cross-ratio is constant.

Definition. — By the cross-ratio of four rays in a flat pencil is meant the cross-ratio of the four points in which the rays are cut by any line. If a, b, c, d be the lines, then this cross-ratio is denoted by {ah, cd).

Definition. — By the cross-ratio of four planes in an axial pencil is understood the cross-ratio of the four points in which any line cuts the planes, or, what is the same thing, the cross-ratio of the four rays in which any plane cuts the four planes.

In order that this definition may have a meaning, it has to be proved that all lines cut the pencil in points which have the same cross-ratio. This is seen at once for two intersecting lines, as their plane cuts the

axial pencil in a flat pencil, which is itself cut try the two lines. The cross-ratio of the four points on one line is therefore equal to that on the other, and equal to that of the four rays in the flat pencil.

If two non-intersecting lines p and q cut the four planes in A, B, C, D and A', B', C, D', draw a line r to meet both p and q, and let this line cut the planes in A", B", C, D". Then (AB, CD) = (A'B', C'D'), for each is equal to (A"B", CD").

§ 23. We may now also extend the notion of harmonic elements,

Definition. — Four rays in a flat pencil and four planes in an axial pencil are said to be harmonic if their cross-ratio equals -I, that is, if they are cut by a line in four harmonic points.

If we understand by a " median line " of a triangle a line which joins a vertex to the middle point of the opposite side, and by a "median line" of a parallelogram a line joining middle points of opposite sides, we get as special cases of the last theorem :

The diagonals and median lines of a parallelogram form an harmonic pencil ; and

At a vertex of any triangle, the two sides, the median line, and the line parallel to the base form an harmonic pencil.

Taking the parallelogram a rectangle, or the triangle isosceles, we get :

Any two lines and the bisections of their angles form an harmonic

ncil. Or :

In an harmonic pencil, if two conjugate rays are perpendicular, then the other two are equally inclined to them; and, conversely, if one ray bisects the angle between conjugate rays, it is perpendicular to its conjugate.

This connects perpendicularity and bisection of angles with projective properties.

§ 24. We add a few theorems and problems which are easily proved or solved by aid of harmonics.

An harmonic pencil is cut by a line parallel to one of its rays in three equidistant points.

Through a given point to draw a line such that the segment determined on it by a given angle is bisected at that point.

Having given two parallel lines, to bisect on either any given segment without using a pair of compasses.

Having given in a line a segment and its middle point, to draw through any given point in the plane a line parallel to the given line.

To draw a Tine which joins a given point to the intersection of two – given lines-which meet off the drawing paper (by aid of § 21).

Correspondence. Homographic and Perspective Ranges § 25. Two rows, p and p', which are one the projection of the other (as in fig. 5), stand in a definite relation to each other, char- acterized by the following properties.

1. To each point in either corresponds one point in the other; that is, those points are said to correspond which are projections of one another.

2. The cross-ratio of any four points in one equals that of the corre- sponding points in the other.

3. The lines joining corresponding points all pass through the same point.

If we suppose corresponding points marked, and the rows brought into any other position, then the lines joining corresponding points will no longer meet in a common point, and hence the third of the above properties will not hold any longer; but we have still a correspondence between the points in the two rows possessing the first two properties. Such a correspondence has been called a one-one correspondence, whilst the two rows between which such correspond- ence has been established are said to be projective or homographic. Two rows which are each the projection of the other are therefore projective. We shall presently see, also, that any two projective rows may always be placed in such a position that one appears as the projection of the other. If they are in such a position the rows are said to be in perspective position, or simply to be in perspective.

§ 26. The notion of a one-one correspondence between rows may be extended to flat and axial pencils, viz. a flat pencil will be said to be projective to a flat pencil if to each ray in the first corresponds one ray in the second, and if the cross-ratio of four rays in one equals

that of the corresponding rays in the second.

Similarly an axial pencil may be projective to an axial pencil. But a flat pencil may also be projective to an axial pencil, or either pencil may be projective to a row. The definition is the same in each case: there is a one-one correspondence between the elements, and four elements have the same cross-ratio as the corresponding ones.

§ 27. There is also in each case a special position which is called perspective, viz.

1. Two projective rows are perspective if they lie in the same plane, and if the one row is a projection of the other.

2. Two projective flat pencils are perspective — (1) if they lie in the same plane, and have a row as a common section; (2) if they lie in the same pencil (in space), and are both sections of the same axial pencil; (3) if they are in space and have a row as common section, or are both sections of the same axial pencil, one of the conditions involving the other.

3. Two projective axial pencils, if their axes meet, and if they have a flat pencil as a common section.

4. A row and a projective flat pencil, if the row is a section of the pencil, each point lying in its corresponding line.

5. A row and a projective axial pencil, if the row is a section of the pencil, each point lying in its corresponding line.

6. A flat and a projective axial pencil, if the former is a section of the other, each ray lying in its corresponding plane.

That in each case the correspondence established by the position indicated is such as has been called projective follows at once from the definition. It is not so evident that the perspective position may always be obtained. We shall show in § 30 this for the first three

cases. First, however, we shall give a few theorems which relate to the general correspondence, not to the perspective position.

§ 28. Two rows or pencils, flat or axial, which are projective to a third are projective to each other; this follows at once from the definitions.

§ 29. // two rows, or two pencils, either Hat or axial, or a row and a pencil, be projective, we may assume to any three elements in the one the three corresponding elements in the other, and then the correspondence is uniquely determined.

For if in two projective rows we assume that the points A, B, C in the first correspond to the given points A', B', C in the second, then to any fourth point D in the first will correspond a point D' in the second, so that

(AB,CD) = (A'B', CD').

But there is only one point, D', which makes the cross-ratio (A'B', CD') equal to the given number (AB, CD). The same reasoning holds in the other cases.

§ 30. If two rows are perspective, then the lines joining corre- sponding points all meet in a point, the centre of projection ; and the point in which the two bases of the rows intersect as a point in the first row coincides with its corresponding point in the second.

This follows from the definition. The converse also holds, viz.

If two projective rows have such a position that one point in the one coincides with its corresponding point in the other, then they are per- spective, that is, the lines joining corresponding points all pass through a common point, and form a flat pencil.

For let A, B, C, D . . . be points in the one, and A', B', C, D' . . . the corresponding points in the other row, and let A be made to coincide with its corresponding point A'. Let S be the point where the lines BB' and CC meet, and let us join S to the point D in the first row. This line will cut the second row in a point D", so that A, B, C, D are projected from S into the points A, B', C, D". The cross-ratio (AB, CD) is therefore equal to (AB', CD"), and by hypo- thesis k is equal to (A'B', CD'). Hence (A'B', CD") = (A'B', CD'), that is, D" is the same point as D'.

§ 31. If two projected flat pencils in the same plane are in per- spective, then the intersections of corresponding lines form a row, and the line joining the two centres as a line in the first pencil corresponds to the same line as a line in the second. And con-

versely,

// two projective pencils in the same plane, but with different centres, have one line in the one coincident with its corresponding line in the other, then the two pencils are perspective, that is, the intersection of corresponding lines lie in a line. The proof is the same as in § 30.

§ 32. If two projective flat pencils in the same point (pencil in space), but not in the same plane, are perspective, then the planes joining corresponding rays all pass through a line (they form an axial pencil), and the line common to the two pencils (in which their planes intersect) corresponds to itself. And conversely : —

If two flat pencils which have a common centre, but do not lie in a common plane, are placed so that one ray in the one coincides with its corresponding ray in the other, then they are perspective, that is, the planes joining corresponding lines all pass through a line.

§ 33. If two projective axial pencils are perspective, then the intersection of corresponding planes lie in a plane, and the plane common to the two pencils (in which the two axes lie) corresponds to itself. And conversely : —

If two projective axial pencils are placed in such a position that a plane in the one coincides with its corresponding plane, then the two pencils are perspective, that is, corresponding planes meet in lines which lie in a plane.

The proof again is the same as in § 30.

§ 34. These theorems relating to perspective position become illusory if the projective rows of pencils have a common base. We then have : —

In two projective rows on the same line — and also in two projective and concentric flat pencils in the same plane, or in two projective axial pencils with a common axis — every element in the one coincides with its corresponding element in the other as soon as three elements in the one coincide with their corresponding elements in the other.

Proof (in case of two rows). — Between four elements A, B, C, D and their corresponding elements A', B', C, D' exists the relation (ABCD) = (A'B'CD'). If now A', B', C coincide respectively with A, B, C, we get (AB, CD) = (AB, CD'), hence D and D' coincide. The last

theorem may also be stated thus: — In two projective rows or pencils, which have a common base but are not identical, not more than two elements in the one can coincide with their corresponding elements in the other.

Thus two projective rows on the same line cannot have more than two pairs of coincident points unless every point coincides with its corresponding point.

It is easy to construct two projective rows on the same line, which have two pairs of corresponding points coincident. Let the points A, B, C as points belonging to the one row correspond to A,

Fig. 9.

B, and C as points in the second. Then A and B coincide with their

corresponding points, but C does not. It is, however, not necessary

that two such rows

have twice a point

coincident with its cor- responding point; it is

possible that this hap- pens only once or not

at all. Of this we shall

see examples later.

§ 35. If two projective

rows or pencils are in

perspective position, we

know at once which

element in one corre- sponds to any given

element in the other.

If p and a (fig. 9) are

two projective rows, so

that K corresponds to

itself, and if we know

that to A and B in p

correspond A' and B' in q, then the point S, where AA' meets BB',

is the centre of projection, and hence, in order to find the point C

corresponding to C, we have only to join C to S; the point C,

where this line cuts q, is the point required.

If two flat pencils, Si and S2, in a plane are perspective (fig. 10),

we need only to know two pairs, a, a' and b t V , of corresponding

rays in order to find the

axis i of projection. This

being known, a ray c' in

S2, corresponding to a given

ray c in Si, is found by

joining S2 to the point

where c cuts the axis 5. A similar construction

holds in the other cases

of perspective figures. On this depends the

solution of the following

general problem.

§ 36. Three pairs of cor- responding elements in two

projective rows or pencils

being given, to determine

for any element in one

the corresponding element

in the other.

We solve this in the two cases of two projective rows and of two projective flat pencils in a plane.

Problem I. — Let A, B, C be Problem II. — Let a, b, c be three points in a row s, A', B', C three rays in a pencil S, a', V ', c' the corresponding points in a the corresponding rays in a pro- projective row s', both being in a jective pencil S', both being in plane ; it is required to find for the same plane ; it is required to any point D in s the correspond- find for any ray d in S the corre- ing point D' in s'. sponding ray d' in S'.

The solution is made to depend on the construction of an auxiliary row or pencil which is perspective to both the given ones. This is found as follows: —

Solution of Problem I. — On the line joining two corresponding points, say AA' (fig. 11), take any two points, S and S', as centres of auxiliary pencils. Join the intersection Bi of SB and S'B' to the intersection Q of SC and S'C by the line si. Then a row on Si will be perspective to s with S as centre of projec- tion, and to s' with S' as centre. To find now the point D' on s' cor- responding to a point D on 5 we have only to determine the point D I(where the line SD cuts si, and to draw S'Di; the point where this line cuts s' will be the re- quired point D'.

Proof. — The rows 5 and s' are both perspec- tive to the row si, hence they are projective to one another. To A, B, C, D on _ s correspond Ai, Bi, Ci,' Di on si, and to these correspond A', B', C, D' on s' corresponding points as required.

Fig. 10.

Fig. 11.

so that D and D' are

Fig. 12.

Solution of Problem II. — Through the intersection A of two corresponding rays a and a' (fig. 12), take two lines, 5 and s', as

bases of auxiliary rows. Let Si j" be the point where the line 61,

which joins B and B', cuts the line Ci, which joins C and C Then a pencil Si will be per- spective to S with s as axis of projection. To find the ray d' in S' corresponding to a given ray d in S, cut d by 5 at D; project this point from Si to D' on s' and join D' to S'. This will be the required ray.

Proof. — That the pencil Si is perspective to S and also to S' follows from construction. To the lines 01, 61, Ci, d\ in Si corre- spond the lines a, b, c, d in S and the lines a', b', c', d' in S', so that d and d' are corresponding rays.

In the first solution the two centres, S, S', are any two points on a line joining any two corre- sponding points, so that the solu- tion of the problem allows of a great many different constructions. But whatever construction be used, the point D', corresponding to D, must be always the same, according to the theorem in § 29. This gives rise to a number of theorems, into which, however, we shall not enter. The same remarks hold for the second, problem.

§ 37. Homological Triangles. — As a further application of the theorems about perspective rows and pencils we shall prove the following important theorem.

Theorem. — If ABC and A'B'C (fig. 13) be two triangles, such that the lines AA', BB', CC meet in a point S, then the intersections of BC and B'C, of CA and C'A', and of AB and A'B' will lie in a line. Such triangles are said to be homological, or in perspective. The triangles are " co-axial " in virtue of the property that the meets of corresponding sides are collinear and copolar, since the lines joining corresponding vertices are concurrent.

Proof. — Let a, b, c denote the lines AA', BB', CC', which meet at

S. Then these may be taken as bases of projective rows, so that

A, A', S on a correspond to B,.B', S on b, and to C, C, S on c. As

the point S is common to all, any two of these rows will be perspective.

If Si be the centre of projection of rows 6 and c,

52 ,, ,, ,, c and a,

53 ,, ,, ,, a and b,

and if the line SiS 2 cuts a in Ai, and 6 in Bi, and c in G, then Ai, B x

will be corresponding points in a and b, both corresponding to Ci in c. But a and b are perspective, therefore the line A1B1, that is S1S2, joining corresponding points must pass through the centre of projection S3 of a and b. In other words, Si, Sj, S3 lie in a line. This is Desargues' cele- brated theorem if we state it thus: —

Theorem of Desargues. — If each of two triangles has one vertex on each of three con- current lines, then the inter- sections of corresponding sides lie in a line, those sides being called corresponding which are opposite to vertices on the same line.

The converse theorem holds also, viz.

Theorem. — If the sides of one triangle meet those of another in three points which lie in a line, then the vertices lie on three lines which meet in a point.

The proof is almost the same as before.

§ 38. Metrical Relations between Projective Rows. — Every row contains one point which is distinguished from all others, viz. the point at infinity. In two projective rows, to the point I at infinity in one corresponds a point I' in the other, and to the point J' at infinity in the second corresponds a point J in the first. The points I' and J are in general finite. If now A and B are any two points in the one, A', B' the corresponding points in the other row, then

(AB,JI) = (A'B',JT), or

A-J/JB :AI/IB=A'J'/J'B' : AT'/I'B'. But, by § 17,

AI/IB = A'J'/J'B'=-i; therefore the last equation changes into

AJ. A'I' = BJ.BT, that is to say —

Fig. 13.

Theorem.- — The product of the distances of any two corresponding points in two projective rows from the points which correspond to the points at infinity in the other is constant, viz. AJ . A'I' = &. Steiner has called this number k the Power of the correspondence.

[The relation AJ . A'l' = k shows that if J, I' be given then the point A' corresponding to a specified point A is readily found ; hence A, A' generate homographic ranges of which I and J' correspond to the points at infinity on the ranges. If we take any two origins 0, O', on the ranges and reduce the expression AJ . A'l' = k to its alge- braic equivalent, we derive an equation of the form axx'-j-flx+yx' +6=0. Conversely, if a relation of this nature holds, then points corresponding to solutions in x, x' form homographic ranges.]

§ 39. Similar Rows. — If the points at infinity in two projective rows correspond so that I' and J are at infinity, this result loses its meaning. But if A, B, C be any three points in one, A', B', C the corresponding ones on the other row, we have (AB, CI) = (A'B', CI'), which reduces to

AC/CB = A'C'/C'B' or AC/A'C = BC/B'C, that is, corresponding segments are proportional. Conversely, if corresponding segments are proportional, then to the point at infinity in one corresponds the point at infinity in the other. If we call such rows similar, we may state the result thus —

Theorem. — Two projective rows are similar if to the point at infinity in one corresponds the point at infinity in the other, and conversely, if two rows are similar then they are projective, and the points at infinity are corresponding points.

From this the well-known propositions follow : — Two lines are cut proportionally (in similar rows) by a series of parallels. The rows are perspective, with centre of projection at infinity.

If two similar rows are placed parallel, then the lines joining homologous points pass through a common point.

§ 40. If two fiat pencils be projective, then there exists in either, one single pair of lines at right angles to one another, such that the corresponding lines in the other pencil are again at right angles.

To prove this, we place the pencils in perspective position (fig. 14) by making one ray coin- cident with its correspond- ing ray. Corresponding rays meet then on a line p. And now we draw the circle which has its centre O on p, and which passes through the centres S and S' of the two pencils. This circle cuts p in two points H and K. The two pairs of rays, h, k, and h', k , joining these points to S and S' will be pairs of corresponding rays at right angles. The construction gives in general but one circle, but if the line p is the perpendicular bisector of SS', there exists an in- finite number, and to every right angle in the one pencil other.

Fig. 14. corresponds a right angle in the

Principle of Duality

§ 41. It has been stated in § 1 that not only points, but also planes and lines, are taken as elements out of which figures are built up. We shall now see that the construction of one figure which possesses

certain properties gives rise in many cases to the construction of another figure, by replacing, according to definite rules, elements of one kind by those of another. The new figure thus obtained will then possess properties which may be stated as soon as those of the original figure are known.

We obtain thus a principle, known as the principle of duality or of reciprocity, which enables us to construct to any figure not containing any measurement in its construction a reciprocal figure, as it is called, and to deduce from any theorem a reciprocal theorem, for which no further proof is needed.

It is convenient to print reciprocal propositions on opposite sides of a page broken into two columns, and this plan will occasionally be adopted.

We begin by repeating in this form a few of our former state- ments :-

Two points determine a line.

Three points which are not in a line determine a plane.

A line and a point without it determine a plane.

Two lines m a plane determine a point.

Two planes determine a line.

Three planes which do not pass through a line determine a point.

A line and a plane not through it determine a point.

Two lines through a point determine a plane.

These propositions show that it will be possible, when any figure is given, to construct a second figure by taking planes instead of points, and points instead of planes, but lines where we had lines.

For instance, if in the first figure we take a plane and three points in it, we have to take in the second, figure a point and three planes through it. The three points in the first, together with the three lines

joining them two and two, form a triangle; the three planes in the second and their three lines of intersection form a trihedral angle. A triangle and a trihedral angle are therefore reciprocal figures.

Similarly, to any figure in a plane consisting of points and lines will correspond a figure consisting of planes and lines passing through a point S, and hence belonging to the pencil which has S as centre.

The figure reciprocal to four points in space which do not lie in a plane will consist of four planes which do not meet in a point. In this case each figure forms a tetrahedron.

§ 42. As other examples we have the following: —

To a row is reciprocal an axial pencil,

,, a fiat pencil ,, a flat pencil,

,, a field of points and lines ,, a pencil of planes and lines,

,, the space of points ,, the space of planes.

For the row consists of a line and all the points in it, reciprocal to it therefore will be a line with all planes through it, that is, an axial pencil ; and so for the other cases.

This correspondence of reciprocity breaks down, however, if we take figures which contain measurement in their construction. For instance, there is no figure reciprocal to two planes at right angles, because there is no segment in a row which has a magnitude as definite as a right angle.

We add a few examples of reciprocal propositions which are easily proved.

Theorem. — If a, /?, 7, 5 are four planes in space, and if the lines o/3 and 75 meet, then all four planes lie in a point (pencil), hence also ay and (id, as well as a.5 and f)y, meet.

Theorem.— II A, B, C, D are any four points in space, and if the lines AB and CD meet, then all four points lie in a plane, hence also AC and BD, as well as AD and BC, meet.

Theorem. — If of any number of lines every one meets every other, whilst all do not

lie in a point, then all lie in a lie in a plane, then all lie in a plane.

point (pencil).

§ 43. Reciprocal figures as explained lie both in space of three dimensions. If the one is confined to a plane (is formed of elements which He in a plane), then the reciprocal figure is confined to a pencil (is formed of elements which pass through a point).

But there is also a more special principle of duality, according to which figures are reciprocal which lie both in a plane or both in a pencil. In the plane we take points and lines as reciprocal elements, for they have this fundamental property in common, that two elements of one kind determine one of the other. In the pencil, on the other hand, lines and planes have to be taken as reciprocal, and here it holds again that two lines or planes determine one plane or line.

Thus, to one plane figure we can construct one reciprocal figure in the plane, and to each one reciprocal figure in a pencil. We mention a few of these. At first we explain a few names : —

A figure consisting of n points A figure consisting of n lines in a plane will be called an in a plane will be called an «-side.

n-pomt.

A figure consisting of n planes in a pencil will be called an n-flat.

A figure consisting of n lines in a pencil will be called an w-edge.

It will be understood that an «-side is different from a polygon of n sides. The latter has sides of finite length and n vertices, the former has sides all of infinite extension, and every point where two of the sides meet will be a vertex. A similar difference exists

between a solid angle and an ticularly —

A four-point has six sides, of which two and two are opposite, and three diagonal points, which are intersections of opposite sides.

A four-flat has six edges, of which two and two are opposite, and three diagonal planes, which pass through opposite edges.

ge or an »-flat. We notice par-

A four-side has six vertices, of which two and two are opposite, and three diagonals, which join opposite vertices.

A four-edge has six faces, of which two and two are opposite, and

three diagonal edges, which are intersections of opposite faces.

Fig. 15.

To a surface as locus of points corresponds, in the same manner, a surface as envelope of planes; and to a curve in space as locus Of points cor- responds a developable surface as en- velope of planes.

It will be seen from the above that we may, by aid of the principle of duality, construct for every figure a reciprocal figure, and that to any property of the one a reciprocal pro- perty of the other will exist, as long as we consider only properties which depend upon nothing but the positions and intersections of the different elements and not upon measurement.

For such propositions.it will therefore be unnecessary to prove more than one of two reciprocal theorems.

Generation of Curves and Cones of Second Order or Second Class

§ 45. Conies. — If we have two projective pencils in a plane, corresponding rays will meet, and their point of intersection will constitute some locus which we have to investigate. Reciprocally, if two projective rows in a plane are given, then the lines which join corresponding points will envelope some curve. We prove first : —

Theorem. — If two projective Theorem. — If two projective flat pencils lie in a plane, but rows lie in a plane, but are are neither in perspective nor neither in perspective nor on a

A four-side is usually called a complete quadrilateral, and a four-point a complete quadrangle. The above notation, however, seems better adapted for the statemeht of reciprocal propositions.

§44-

If a point moves in a plane it If a line moves in a plane it describes a plane curve. envelopes a plane curve (fig. 15).

If a plane moves in a pencil it If a line moves in a pencil it envelopes a cone. describes a cone.

A curve thus appears as generated either by points, and then we call it a " locus," or by lines, and then we call it an " envelope." In the same manner a cone, which means here a surface, appears either as the locus of lines passing through a fixed point, the " vertex " of the

cone, or as the envelope of planes passing through the same point.

concentric, then the locus of intersections of corresponding rays is a curve of the second order, that is, no line contains more than -two points of the locus.

Proof. — We draw any line /. This cuts each of the pencils in a row, so that we have on / two rows, and these are projective because the pencils are pro- jective. If corresponding rays of the two pencils meet on the line t, their intersection will be a point in the one row which coincides with its corresponding point in the other. But two projective rows on the same base cannot have more than two points of one coincident with their corresponding points in the other (§ 34).

common base, then the envelope of lines joining corresponding points is a curve of the second class, that is, through no point pass more than two of the enveloping lines.

Proof. — We take any point T and join it to all points in each row. This gives two concentric pencils, which are projective because the rows are projective. If a line joining corresponding points in the two rows passes through T, it will be a line in the one pencil which coincides with its corresponding line in the other. But two projective con- centric flat pencils in the same plane cannot have more than two lines of one coincident with their corresponding line in the other (§34)-

It will be seen that the proofs are reciprocal, so that the one may be copied from the other by simply interchanging the words point and line, locus and envelope, row and pencil, and so on. We shall therefore in future prove seldom more than one of two reciprocal theorems, and often state one theorem only, the reader being recom- mended to go through the reciprocal proof by himself, and to supply the reciprocal theorems when not given.

§ 46. We state the theorems in the pencil reciprocal to the last, without proving them : —

Theorem. — If two projective flat pencils are concentric, but are neither perspective nor co- planar, then the envelope of the planes joining corresponding rays is a cone of the second class; that is, no line through the common centre contains more than two of the enveloping planes.

Theorem. — If two projective axial pencils lie in the same pencil (their axes meet in a point), but are neither perspec- tive nor co-

axial, then the locus of lines joining corresponding planes is a cone of the second order; that is, no plane in the pencil contains more than two of these lines, j

§ 47. Of theorems about cones of second order and cones of second class we shall state only very few. We point out, however, the following connexion between the curves and cones under con- sideration :

Every plane section of a cone of the second order is a curve of the second order.

Every plane section of a cone of the second class is a curve of the second class.

The lines which join any point in space to the points on a curve of the second order form a cone of the second order.

The planes which join any point in space to the lines en- veloping a curve of the second class envelope themselves a cone of the second class.

By its aid, or by the principle of duality, it will be easy to obtain theorems about them from the theorems about the curves.

We prove the first. A curve of the second order is generated by two projective pencils. These pencils, when joined to the point in space, give rise to two projective axial pencils, which generate the cone in question as the locus of the lines where corresponding planes meet.

II

6 9 6

§48.

Theorem, — The curve of second order which is generated by two projective flat pencils passes through the centres of the two pencils.

Proof. — If S and S' are the two

GEOMETRY

[PROJECTIVE

Theorem. — The envelope of second class which is generated by two projective rows contains the bases of these rows as en- veloping lines

or tangents.

Proof. — If s and s' are the two

the pencil S a ray p, which is different from p', for the pencils are not perspective. But p and p' meet at S, so that S is a point on the curve, and similarly S'.

pencils, then to the ray SS' or p' rows, then to the point ss' or P' in the pencil S' corresponds in as a point in s' corresponds in s <-u,, :i c _ — i. _..l:i :_ a p omt p_ wn ich is not coincident

with P', for the rows are not perspective. But P and P' are joined by s, so that s is one of the enveloping lines, and similarly s'.

It follows that every line in one of the two pencils cuts the curve in two points, viz. once at the centre S of the pencil, and once where it cuts its corresponding ray in the other pencil. These two points, however, coincide, if the line is cut by its corresponding line at S itself. The line p in S, which corresponds to the line SS' in S', is therefore the only line through S which has but one point in common with the curve, or which cuts the curve in two coincident points. Such a line is called a tangent to the curve, touching the latter at the point S, which is called the " point of contact."

In the same manner we get in the reciprocal investigation the result that through every point in one of the rows, say in s, two tangents may be drawn to the curve, the one being s, the other the line joining the point to its corresponding point in s'. There is, however, one point P in s for which these two lines coincide. Such a point in one of the tangents is called the " point of contact " of the tangent. We thus get —

Theorem. — To the line joining the centres of the projective pencils as a line in one pencil corresponds in the other the tangent at its centre.

Theorem. — To the point of intersection of the bases of two projective rows as a point in one row corresponds in the other the point of contact of its base.

§ 49. Two projective pencils are determined if three pairs of corresponding lines are given. Hence if a u b u Ci are three lines in a pencil Si, and a?, 62, c 2 the corresponding lines in a projective pencil Sj, the correspondence and therefore the curve of the second order generated by the points of intersection of corresponding rays is

determined. Of this curve we know the two centres Si and S 2 , and the three points aiOi, &ii 2 , Cic 2 , hence five points in all. This and the reciprocal considerations enable us to solve the following two problems:

Problem. — To construct a curve Problem. — To construct a curve of the second order, of which five of the second class, of which five points Si, S2, A, B, C are given. tangents u u uˆ, a, b, c are given.

In order to solve the left-hand problem, we take two of the given points, say Si and Sj, as centres of pencils. These we make projective by taking the rays 01, 61, c u which join S! to A, B, C respectively, as corresponding to the rays 02, i 2 , c 2 , which join S 2 to A, B, C respectively, so that three rays meet their corresponding rays at the given points A, B, C. This determines the correspondence of the pencils which will generate a curve of the second order passing through A, B, C and through the centres Si and S 2 , hence through the five given points. To find more points on the curve we have to construct for any ray in Si the corresponding ray in S 2 . This has been done in § 36. But we repeat the construction in order to deduce further properties from it. We also solve the right-hand problem. Here we select two, viz. Mi, m 2 of the five given lines, «i, « 2 , a, b, c, as bases of two rows, and the points Ai, Bi, Ci where a, b, c cut Ui as corresponding to the points A 2 , B 2 , C 2 where a, b, c cut w 2 .

We get then the following solutions of the two problems:

Solution. — Through the point Solution. — In the line a take A draw any two lines, u x and m 2 any two points Si and S 2 as

(fig. 16), the first Ui to cut the pencil Si in a row AB1C1, the other u % to cut the pencil Sˆ in a row AB 2 C 2 . These two rows will be perspective, as the point A corresponds to itself, and the centre of projection will be the point S, where the lines BiB 2 and CiC 2 meet. To find now for any ray d\ in S t its corresponding ray d\ in Sj., we determine the point Di where di cuts «i, project this point from S to D 2 on Ut and join S 2 to D 2 . This will be the required ray

centres of pencils (fig. 17), the first Si (AiB,Ci) to project the row Wi, the other S2 (A 2 B 2 C 2) to project the row « 2 . These two pencils will be perspective, the line S1A1 being the same as the corresponding line SjA 2 , and the axis of projection will be the line u, which joins the intersection B of S1B1 and SiBj to the intersection C of S1C1 and S 2 C 2 . To find now for any point Di in Mi the corresponding point D 2 in « 2l we draw S1D1 and project the point

D where this line cuts u from S 2 to « 2 . This will give the required point D 2 , and the line d joining Di to D 2 will be a new tangent to the curve.

§ 50. These constructions prove, when rightly interpreted, very important properties of the curves in question.

If in fig. 16 we' draw in the pencil Si the ray h which passes

Sx~ /t

through the auxiliary centre S, it will be found that the corre- sponding ray fe cuts it on %. Hence —

Theorem. — In the above con- struction the bases of the auxil- iary rows Ui and th cut the curve where they cut the rays SsS and SiS respectively.

Theorem. — In the above con- struction (fig. 1 7) the tangents to the curve from the centres of the auxiliary pencils Si and S2 are the lines which pass through mu and U\u respectively.

As A is any given point on the curve, and Mi any line through it, we have solved the problems :

Problem.— To find the second Problem. — To find the second point in which any line through a tangent which can be drawn known point on the curve cuts from any point in a given tangent the curve. to the curve.

If we determine in Si (fig. 16) the ray corresponding to the ray S 2 Si in S 2 , we get the tangent at Si. Similarly, we can determine the point of contact of the tangents U\ or « 2 in fig. 17.

§ 51. If five points are given, of which not three are in a line, then we can, as has just been shown, always draw a curve of the

Fig. 17.

second order through them ; we select two of the points as centres of projective pencils, and then one such curve is determined. It will be presently shown that we get always the same curve if two other points are taken as centres of pencils, that therefore five points determine one curve of the second order, and reciprocally, that five tangents determine one curve of the second class. Six points taken at random will therefore not lie on a curve of the second order. In order

that this may be the case a certain condition has to be satisfied, and this condition is easily ob- tained from the construction in § 49, fig. 16. If we consider the conic determined by the five points A, Si, S2, K, L, then the point D will be on the curve if, and only if, the points on Di, S, D 2 be in a line.

This may be stated differently if we take AKSiDS 2 L (figs. 16 and 18) as a hexagon inscribed in the conic, then AK and DS 2 will be opposite sides, so will be KSi and S 2 L, as well as SiD and LA. The first two meet in D 2 , the others in S and Di respectively.

We may therefore state the

required condition, together with the reciprocal one, as follows:-

Brianchon's Theorem. — If a hexagon be circumscribed about a curve of the second class, then the lines joining opposite vertices are three lines meeting in a point.

PROJECTIVE]

Pascal's Theorem. — If a hexagon De inscribed in a curve of the second order, then the intersec- tions of opposite sides are three points 12 a line.

These celebrated theorems, which are known by the names of their discoverers, are perhaps the most fruitful in the whole theory of conies. Before we go over to their applications we have to show that we obtain the same curve if we take, instead of Si, S2, any two other points on the curve as centres of projective pencils.

§52. We know that the curve depends only upon the correspond- ence between the pencils Si and S2, and not upon the special con- struction used for finding new points on the curve. The point A (fig. 16 or 18), through which the two auxiliary rows «i, % were drawn, may therefore be changed to any other point on the curve. Let us now suppose the curve drawn, and keep the points Si, S2, K, L and D, and hence also the point S fixed, whilst we move A along the curve. Then the line AL will describe a pencil about L as centre, and the point Di a row on SiD perspective to the pencil L. At the same time AK describes a pencil about K and D2 a row perspective to it on S2D. But by Pascal's theorem Di and D2 will always lie in a line with S, so that the rows described by Di and D 2 are perspective. It follows that the pencils K and L will themselves be projective, corresponding rays meeting on the curve. This proves that we get the same curve whatever pair of the five given points we take as centres of projective

pencils. Hence —

Only one curve of the second Only one curve of the second order can be drawn which passes class can be drawn which touches through five given points. five given lines.

We have seen that if on a curve of the second order two points coincide at A, the line joining them becomes the tangent at A. If, therefore, a point on the curve and its tangent are given, this will be equivalent to having given two points on the curve. Simi- larly, if on the curve of second class a tangent and its point of contact are given, this will be equivalent to two given tangents.

We may therefore extend the last theorem :

Only one curve of the second Only one curve of the second order can be drawn, of which class can be drawn, of which four

four points and the tangent at one of them, or three points and the tangents at two of them, are given.

§ 53. At the same time it has been proved :

tangents and the point of contact at one of them, or three tangents and the points of contact at two of them, are given.

If all points on a curve of the second order be joined to any two of them, then the two pencils thus formed are projective, those rays being corresponding which meet on the curve. Hence —

The cross-ratio of four rays joining a point S on a curve of second order to four fixed points A, B, C, D in the curve is in- dependent of the position of S, and is called the cross-ratio of the four points A, B, C, D.

If this cross-ratio equals — I the four points are said to be four harmonic points.

All tangents to a curve of second class are cut by any two of them in projective rows, those being corresponding points which lie on the same tangent. Hence —

The cross-ratio of the four points in which any tangent u is cut by

four fixed tangents a, b, c, d is independent of the position of u, and is called the cross-ratio of the four tangents a, b, c, d.

If this cross-ratio equals — 1 the four tangents are said to be four harmonic tangents.

We have seen that a curve of second order, as generated by projective pencils, has at the centre of each pencil one tangent; and further, that any point on the curve may be taken as centre of such pencil. Hence —

A curve of second order has at A curve of second class has on every point one tangent. every tangent a point of contact.

§ 54. We return to Pascal's and Brianchon's theorems and their applications, and shall, as before, state the results both for curves of the second order and curves of the second class, but prove them only for the former.

Pascal's theorem may be used when five points are given to find more points on the curve, viz. it enables us to find the point where any line through one of the given points cuts the curve again. It is convenient, in making use of Pascal's theorem, to number the points, to indicate the order in which they are to be taken in forming a hexagon, which, by the way, may be done in 60 different ways. It will be seen that I 2 (leaving out 3) 4 5 are opposite sides, so are 2 3 and (leaving out 4) 5 6, and also 3 4 and (leaving out 5) 6 I.

If the points 12345 are given, and we want a 6th point on a line drawn through I, we know all the sides of the hexagon with the exception of 5 6, and this is found by Pascal's theorem.

If this line should happen to pass through I, then 6 and 1 coincide, or the line 6 I is the tangent at I. And always if two consecutive vertices of the hexagon approach nearer and nearer, then the side joining them will ultimately become a tangent.

We may therefore consider a pentagon inscribed in a curve of second order and the tangent at one of its vertices as a hexagon, and thus get the theorem:

Every pentagon inscribed in a curve of second order has the property that the intersections of two pairs of non-consecutive sides lie in a line with the point where the fifth side cuts the tan- gent at the opposite vertex.

Every pentagon circumscribed about a curve of the second class has the property that the lines which join two pairs of non- consecutive vertices meet on that line which joins the fifth vertex to the point of contact of the opposite side.

This enables us also to solve the following problems.

Given five tangents to a curve of second class to construct the point of contact of any one of them.

Given five points on a curve of second order to construct the tangent at any one of them.

Fig. 19.

If two pairs of adjacent vertices coincide, the hexagon becomes a quadrilateral, with tangents at two vertices. These we take to be opposite, and get the following theorems:

If a quadrilateral be circum- scribed about a curve of second class, the lines joining opposite vertices, and also the lines joining

If a quadrilateral be inscribed in a curve of second order, the intersections of opposite sides, and also the intersections of the tangents at opposite vertices, lie in a line (fig. 19).

points of contact of sides, meet in a point.

opposite

Fig. 20.

If we consider the hexagon made up of a triangle and the tangents at its vertices, we get —

If a triangle is inscribed in a If a triangle be circumscribed curve of the second order, the about a curve of second class, points in which the sides are cut the lines which join the vertices by the tangents at the opposite to the points of contact of the vertices meet in a point. opposite sides meet in a point

(fig. 20).

‘ § 55- Of these theorems, those about the quadrilateral give rise to a number of others. Four points A, B, C, D may in three different ways be formed into a quadrilateral, for we may take them in the order ABCD, or ACBD, or ACDB, so that either of the points B, C, D may

be taken as the vertex opposite to A. Accordingly we may apply the theorem in three different ways.

Let A, B, C, D be four points on a curve of second order (fig. 21), and let us take them as forming a quadrilateral by taking the points in the order ABCD, so that A, C and also B, D are pairs of opposite vertices. Then P, Q will be the points where opposite sides meet,

and E, F the intersections of tangents at opposite vertices. The four points P, Q, E, F lie therefore in a line. The quadrilateral ACBD gives us in the same way the four points Q, R, G, H in a line, and the quadrilateral ABDC a line containing the four points R, P, I, K. These three lines form a triangle PQR.

The relation between the points and lines in this figure may be expressed more clearly if we consider ABCD as a four-point inscribed in a conic, and the tangents at these points as a four-side circumscribed about it, — viz. it will be seen that P, Q, R are the diagonal points of the four-point ABCD, whilst the sides of the triangle PQR are the diagonals of the circumscribing four-side. Hence the theorem —

Any four-point on a curve of the second order and the four-side farmed by the tangents at these points stand in this relation that the diagonal points of the four-point lie in the diagonals of the four-side. And conversely,

If a four-point and a circumscribed four-side stand in the above relation, then a curve of the second order may be described which passes through the four points and touches there the four sides of these figures.

That the last part of the theorem is true follows from the fact that the four points A, B, C, D and the line a, as tangent at A, deter-

Fig. 21.

mine a curve of the second order, and the tangents to this curve at the other points B, C, D are given by the construction which leads to fig. 21.

The theorem reciprocal to the last is —

Any four-side circumscribed about a curve of second class and the four-point formed by the points of contact stand in this relation that the diagonals of the four-side pass through the diagonal points of the four-point. And conversely,

If a four-side and an inscribed four-point stand in the above relation, then a curve of the second class may be described which touches the sides of the four-side at the points of the four-point.

§ 56. The four-point and the four-side in the two reciprocal theorems are alike. Hence if we have a four-point ABCD and a four-side abed related in the manner described, then not only m3y a curve of the second order be drawn, but also a curve of the second class, which both touch the lines a, b, c, d at the points A, B, C, D.

The curve of second order is already more than determined by the points A, B, C and the tangents a, b, c at A, B and C. The point D may therefore be any point on this curve, and d any tangent to the curve. On the other hand the curve of the second class is more than determined by the three tangents a, b, c and their points of contact A, B, C, so that d is any tangent to this curve. It follows that every tangent to the curve of second order is a tangent of a

curve of the second class having the same point of contact. In other words, the curve of second order is a curve of second class, and vice versa. Hence the important theorems —

Every curve of second order is Every curve of second class is a a curve of second class. curve of second order.

The curves of second order and of second class, having thus been proved to be identical, shall henceforth be called by the common name of Conies.

For these curves hold, therefore, all properties which have been proved for curves of second order or of second class. We may therefore now state Pascal's and Brianchon's theorem thus—

Pascal's Theorem. — If a hexagon be inscribed in a conic, then the intersections of opposite sides lie in a line.

Brianchon's Theorem.— -If a hexagon be circumscribed about a conic, then the diagonals forming opposite centres meet in a point.

§ 57. If we suppose in fig. 21 that the point D together with the tangent d moves along the curve, whilst A, B, C and their tangents

a, b, c remain fixed, then the ray DA will describe a pencil about A, the point Q a projective row on the fixed line BC, the point F the row 6, and the ray EF a pencil about E. But EF passes always through Q. Hence the pencil described by AD is projective to the pencil described by EF, and therefore to the row described by F on

b. At the same time the line BD describes a pencil about B pro- jective to that described by AD (§ 53). Therefore the pencil BD and the row F on b are projective. Hence —

// on a conic a point A be taken and the tangent a at this point, then the cross-ratio of the four rays which join A to any four points on the curve is equal to the cross-ratio of the points in which the tangents at these points cut the tangent at A.

§ 58. There are theorems about cones of second order and second class in a pencil which are reciprocal to the above, according to § 43. We mention only a few of the more important ones.

The locus of intersections of corresponding planes in two pro- jective axial pencils whose axes meet is a cone of the second order.

The envelope of planes which join corresponding lines in two projective flat pencils, not in the same plane, is a cone of the second class.

Cones of second order and cones of second class are identical.

Every plane cuts a cone of the second order in a conic.

A cone of second order is uniquely determined by five of its edges or by five of its tangent planes, or by four edges and the tangent plane at one of them, &c. &c.

Pascal's Theorem. — If a solid angle of six faces be inscribed in a cone of the second order, then the intersections of opposite faces are three lines in a plane.

Brianchon's Theorem. — If a solid angle of six edges be circum- scribed about a cone of the second order, then the planes through opposite edges meet in a line.

Each of the other theorems about conies may be stated for cones of

the second order.

§ 59. Projective Definitions of the Conies. — We now consider the shape of the conies. We know that any line in the plane of the cOnic, and hence that the line at infinity, either has no point in common with the curve, or one (counting for two coincident points) or two distinct points. If the line at infinity has no point on the curve the latter is altogether finite, and is called an Ellipse (fig. 21). If the line at infinity has only one point in common with the conic, the latter extends to infinity, and has the line at infinity a tangent. It is called a Parabola (fig. 22). If, lastly, the line at infinity cuts the curve in two points, it consists of two separate parts which each extend in two branches to the points at infinity where they meet. The curve is in this case called an Hyperbola (see fig. 20). The tangents at the two points at infinity are finite because the line at infinity is not a tangent. They are called Asymptotes. The branches of the hyper- bola approach these lines indefinitely as a point on the curves moves to in- finity.

§ 60. That the circle belongs to the curves of the second order is seen at once if we state in

a slightly different form the theorem that in a circle all angles at the circumference standing upon the same arc are equal. If two points Si, S 2 on a circle be joined to any other two points A and B on the circle, then the angle included by the rays SiA and SiB is equal to that between the rays S 2 A and S 2 B, so that as A moves along the circumference the rays SiA and S 2 A describe equal and therefore projective pencils. The circle can thus be generated by two projective pencils, and is a curve of the second order.

If we join a point in space to all points on a circle, we get a (circular) cone of the second order (§ 43). Every plane section of this cone is a conic. This conic will be an ellipse, a parabola, or an hyperbola, according as the line at infinity in the plane has no, one or two points in common with the conic in which the plane at infinity cutsthe cone. It follows that our curves of second order may be obtained as sections of a circular cone, and that they are identical with the " Conic Sections " of the Greek mathematicians.

§ 61. Any two tangents to a parabola are cut by all others in projective rows; but the line at infinity being one of the tangents, the points at infinity on the rows are corresponding points, and the rows therefore similar. Hence the theorem —

The tangents to a parabola cut each other proportionally.

Pole and Polar § 62. We return once again to fig. 21, which we obtained in § 55. If a four-side be circumscribed about and a four-point inscribed in a conic, so that the vertices of the second are the points of contact of the sides of the first, then the triangle formed by the diagonals of the first is the same as that formed by the diagonal points of the other.

Such a triangle will be called a polar-triangle of the conic, so that PQR in fig. 21 is a polar-triangle. It has the property that on the side p opposite P meet the tangents at A and B, and also those at C and D. From the harmonic properties of four-points and four-sides it follows further that the points L, M, where it cuts the lines AB and CD, are harmonic conjugates with regard to AB and CD respectively.

If the point P is given, and we draw a line through it, cutting the conic in A and B, then the point Q harmonic conjugate to P with regard to AB, and the point H where the tangents at A and B meet, are determined. But they lie both on p, and therefore this line is determined. If we now draw a second line through P, cutting the conic in C and D, then the point M harmonic conjugate to P with regard to CD, and the point G where the tangents at C and D meet, must also lie on p. As the first line through P already deter- mines p, the second may be any line through P. Now every two lines through P determine a four-point ABCD on the conic, and therefore a polar-triangle which has one vertex at P and its opposite side at p. This result, together with its reciprocal, gives the theorems —

All polar-triangles which have one vertex in common have also the opposite side in common.

All polar-triangles which have one side in common have also the opposite vertex in common.

§ 63. To any point P in the plane of, but not on, a conic corresponds thus one line p as the side opposite to P in all polar-triangles which have one vertex at P, and reciprocally to every line" p corresponds one point P as the vertex opposite to p in all triangles which have p as one side.

We call the line p the polar of P, and the point P the pole of the line p with regard to the conic.

If a point lies on the conic, we call the tangent at that point its polar; and reciprocally we call the point of contact the pole of tangent.

§ 64. From these definitions and former results follow —

The polar of any point P not The pole of any line p not a on the conic is a line p, which has tangent to the conic is a point the following properties:— P, which has the following pro-

perties: —

1. On every line through P 1. Of all lines through a point which cuts the conic, the polar on p from which two tangents of P contains the harmonic con- may be drawn to the conic, the jugate of P with regard to those pole P contains the line which is points on the conic. harmonic conjugate to p, with

regard to the two tangents.

2. If tangents can be drawn 2. If p cuts the conic, the from P, their points of contact lie tangents at the intersections on p. meet at P.

3. Tangents drawn at the 3. The point of contact of points where any line through P tangents drawn from any point cuts the conic meet on p; and oh p to the conic lie in a line with conversely, P; and conversely,

4. If from any point on p, 4. Tangents drawn at points tangents be drawn, their points where any line through P cuts the of contact will lie in a line with P. conic meet on p.

5. Any four-point on the conic 5. Any four-side circumscribed which has one diagonal point at about a conic which has one P has the other two lying on p. diagonal on p has the other two

meeting at P.

The truth of 2 follows from 1. If T be a point where p cuts the conic, then one of the points where PT cuts the conic, and which are harmonic conjugates with regard to PT, coincides with T; hence the other does — that is, PT touches the curve at T.

That 4 is true follows thus: If we draw from a point H on the polar

one tangent a to the conic, join its point of contact A to the pole P, determine the second point of intersection B of this line with the conic, and draw the tangent at B, it will pass through H, and will therefore be the second tangent which may be drawn from H to the curve.

§ 65. The second property of the polar or pole gives rise to the theorem —

From a point in the plane of a conic, two, one or no tangents may be drawn to the conic, according as its polar has two, one, or no points in common with the curve.

A line in the plane of a conic has two, one or no points in common with the conic, accord- ing as two, one or no tangents can be drawn from its pole to the conic.

Of any point in the plane of a conic we say that it was without, on or within the curve according as two, one or no tangents to the curve pass through it. The points on the conic separate those within the conic from those without. That this is true for a circle is known from elementary geometry. That it also holds for other conies follows from the fact that every conic may be considered as the projection of a circle, which will be proved later on.

The fifth property of pole and polar stated in § 64 shows how to find the polar of any point and the pole of any line by aid of the straight-edge only. Practically it is often convenient to draw three secants through the pole, and to determine only one of the diagonal points for two of the four-points formed by pairs of these lines and the conic (fig. 22).

These constructions also solve the problem — From a point without a conic, to draw the two tangents to the conic by aid of the straight-edge only.

For we need only draw the polar of the point in order to find the points of contact.

§ 66. The property of a polar-triangle may now be stated thus — In a polar-triangle each side is the polar of the opposite vertex, and each vertex is the pole of the opposite side.

If P is one vertex of a polar-triangle, then the other vertices, Q and R, lie on the polar p of P. One of these vertices we may choose arbitrarily. For if from any point Q on the polar a secant be drawn

cutting the conic in A and D (fig. 23), and if the lines joining these points to P cut the conic again at B and C, then the line BC will pass through Q. Hence P and Q are two of the vertices on the polar-triangle which is determined by the four- point ABCD. The third vertex R lies also on the line p. It follows, therefore, also —

If Q is a point on the polar of P, then P is a point on the polar ofQ; and reciprocally, // q is a line through the pole of p, then p is a line through the pole of q.

This is a very important thus —

If a point moves along a line describing a row, its polar turns about the pole of the line describing a pencil.

This pencil is projective to the row, so that the cross-ratio of four poles in a row equals the cross-ratio of its four polars, which pass through the pole of the row.

To prove the last part, let us suppose that P, A and B in fig. 23 remain fixed, whilst Q moves along the polar p of P. This will make CD turn about P and move R along p, whilst QD and RD describe projective pencils about A and B. Hence Q and R describe projective rows, and hence PR, which is the polar of Q, describes a pencil projective to either.

§ 67. Two points, of which one, and therefore each, lies on the polar of the other, are said to be conjugate with regard to the conic; and two lines, of which one, and therefore each, passes through the pole of the other, are said to be conjugate with regard to the conic. Hence all points conjugate to a point P lie on the polar of P; all lines conjugate 'to a line p pass through the pole of p.

If the line joining two conjugate poles cuts the conic, then the poles are harmonic conjugates with regard to the points of inter- section; hence one lies within the other without the conic, and all points conjugate to a point within a conic lie without it.

Of a polar-triangle any two vertices are conjugate poles, any two sides conjugate lines. If, therefore, one side cuts a conic, then one of the two vertices which lie on this side is within and the other ..without the conic. The vertex opposite this side lies also without, for it is the pole of a line which cuts the curve. In this case there- fore one vertex lies within, the other two without. If, on the other hand, we begin with a side which does not cut the conic, then its pole lies within and the other vertices without. Hence — Every polar-triangle

has one and only one vertex within the conic. We add, without a proof, the theorem —

The four points in which a conic is cut by two conjugate polars are four harmonic points in the conic.

§ 68. If two conies intersect in four points (they cannot have more points in common, § 52), there exists one and only one

II

theorem.

Fig. 23. It may also – be stated

four-point which is inscribed in both, and therefore one polar-triangle common to both.

Theorem. — Two conies which intersect in four points have always one and only one common polar-triangle ; and reciprocally,

Two conies which have four common tangents have always one and only one common polar-triangle.

Diameters and Axes of Conics | 69. Diameters. — The theorems about the harmonic properties of poles and polars contain, as special cases, a number of important metrical properties of conics. These are obtained if either the pole or the polar is moved to infinity, — it being remembered that the harmonic conjugate to a point at infinity, with regard to two points A, B, is the middle point of the segment AB. The most important properties are stated in the following theorems : —

The middle points of parallel chords of a conic lie in a line — viz. on the polar to the point at infinity on the parallel chords. This line is called a diameter. The polar of every point at infinity in a diameter. The tangents at the end points of a diameter are parallel, and are parallel to the chords bisected by the diameter.

All diameters pass through a common point, the pole of the line at infinity.

All diameters of a parabola are parallel, the pole to the line at infinity being the point where the curve touches the line at infinity. In case of the ellipse and hyperbola, the pole to the line at infinity is a finite point called the centre of the curve. A centre of a conic bisects every chord through it. The centre of an ellipse is within the curve, for the line at infinity does not cut the ellipse.

The centre of an hyperbola is without the curve, because the line at infinity cuts the curve. Hence also —

From the centre of an hyperbola two tangents can be drawn to the curve which have their point of contact at infinity. These are called Asymptotes (§ 59).

To construct a diameter of a conic, draw two parallel chords and join their middle points.

To find the centre of a conic, draw two diameters ; their intersection will be the centre.

§ 70. Conjugate Diameters. — A polar-triangle with one vertex at the centre will have the opposite side at infinity. The other two sides pass through the centre, and are called cdnjugate diameters, each being the polar of the point at infinity on the other.

Of two conjugate diameters each bisects the chords parallel to the other, and if one cuts the curve, the tangents at its ends are parallel to the other diameter. Further —

Every parallelogram inscribed in a conic has its sides parallel to two conjugate diameters ; and

Every parallelogram circumscribed about a conic has as diagonals two conjugate diameters.

This will be seen by considering the parallelogram in the first case as an inscribed four-point, in the other as a circumscribed four-side, and determining in each case the corresponding polar- triar.gle. The first may also be enunciated thus —

The lines which join any point on an ellipse or an hyperbola to the ends of a diameter are parallel to two conjugate diameters.

§ 71. // every diameter is perpendicular to its conjugate the conic is a circle.

For the lines which join the ends of a diameter to any point on the curve include a right angle.

A conic which has more than one pair of conjugate diameters at right angles to each other is a circle.

Let AA' and BB' (fig. 24) be one pair of conjugate diameters at right angles to each other, CC and DD' a second pair. If we draw

through the end point A of one diameter a chord AP parallel to DD', and join P to A', then PA and PA' are, according to § 70, parallel to two conjugate diameters. But PA is parallel to DD', hence PA' is parallel to CC, and therefore PA and PA' are perpendicular. If we further draw the tangents to the conic at A and A', these will be perpendicular to AA', they being parallel to the conjugate diameter BB'. We know thus five points on the conic, viz. the points A and A' with their tangents, and the point P. Through these a circle may be drawn having AA' as diameter; and as through five points , one conic only can be drawn, this circle must coincide with the given conic.

§ 72. Axes. — Conjugate diameters perpendicular to each other are called axes, and the points where they cut the curve vertices of the conic.

In a circle every diameter is an axis, every point on it is a vertex; and any two lines at right angles to each other may be taken as a pair of axes of any circle which has its centre at their intersection.

If we describe on a diameter AB of an ellipse or hyperbola a circle concentric to the conic, it will cut the latter in A and B (fig. 25). Each of the semicircles in which it is divided by AB will be partly within, partly without the curve, and must cut the latter therefore again in a point. The circle and the conic have thus four points A, B, C, D, and therefore one polar-triangle, in com- mon (§68). Of this the centre is one vertex, for the line at infinity is the polar to this point, both with regard to the circle and the other conic. The other two sides are con- jugate diameters of both, hence perpendicular to each other. This gives —

An ellipse as well as an hyperbola has one pair of axes.

This reasoning shows at the same time how to con- struct the axis of an ellipse or of an hyperbola.

A parabola has one axis, if we define an axis as a diameter perpendicular to the chords which it bisects. It is easily constructed.

The line which bisects any two parallel chords is a diameter. Chords perpendicular to it will be bisected by a parallel diameter, and this is the axis.

§ 73. The first part of the right-hand theorem in §64 may be stated thus: any two conjugate lines through a point P without a conic are harmonic conjugates with regard to the two tangents that may be drawn from P to the conic.

If we take instead of P the centre C of an hyperbola, then the conjugate lines become conjugate diameters, and the tangents asymptotes. Hence —

Any two conjugate diameters of an hyperbola are harmonic conjugates with regard to the asymptotes.

As the axes are conjugate diameters at right angles to one another, it follows (§ 23) —

The axes of an hyperbola bisect the angles between the asymptotes.

Let O be the centre of the hyperbola (fig. 26), t any secant which cuts the hyperbola in C,D and the asymptotes in E,F, then the line OM which bisects the chord CD is a diameter conjugate to the

Fig. 24.

Fig. 25.

Fig. 26.

diameter OK which is parallel to the secant /, so that OK and OM are harmonic with regard to the asymptotes. The point M there- fore bisects EF. But by construction M bisects CD. It follows that DF = EC, andED = CF; or

On any secant of an hyperbola the segments between the curve and the asymptotes are equal.

If the chord is changed into a tangent, this gives —

The segment between the asymptotes on any tangent to an hyperbola is bisected by the point of contact.

The first part allows a simple solution of the problem to find any number of points on an hyperbola, of which the asymptotes and one point are given. This is equivalent to three points and the tangents at

two of them. This construction requires measurement.

§ 74. For the parabola, too, follow some metrical properties. A diameter PM (fig. 27) bisects every chord conjugate to it, and the pole P of such a chord BC lies on the diameter. But a diameter cuts the parabola once at infinity. Hence —

The segment PM which joins the middle point M of a chord of a parabola to the pole P of the chord is bisected by the parabola at A.

§ 75. Two asymptotes and any two tangents to an hyperbola may be considered as a quadrilateral circumscribed about the

hyperbola. But in such a quadrilateral the intersections of the diagonals and the points of contact of opposite sides lie in a line

(§54). If therefore DEFG (fig. 28) is such a quadri- lateral, then the diagonals DF and GE will meet on the line which joins the points of contact of the asymptotes, that is, on the line at infinity; hence they are parallel. From this the following theorem is a simple deduction :

All triangles formed by a tangent and the asymptotes of an hyperbola are equal in area.

If we draw at a point P (fig. 28) on an hyperbola a tangent, the part HK between the asymptotes is bisected at P. The parallelogram PQOQ' formed by the asymptotes and lines parallel to them through P will be half the triangle OHK, and will therefore be con- stant. If we now take the asymptotes OX and OY as oblique

Fig. 27.

Fig. 28.

axes ot co-ordinates, the lines OQ and QP will be the co-ordinates of P, and will satisfy the equation xy — const. =

For the asymptotes as axes of co-ordinates the equation of the hyperbola is xy = const.

Involution

§ 76. If we have two projective rows, ABC on u and A'B'C on u', and place their bases on the same line, then each point in this line counts twice, once as a point in the row u and once as a point in the row u'. In fig. 29 we denote the points as points in the one row by letters above the line A, B, C . . ., and as points in the second

row by A', B', C . . . below the A B line. Let now A and B' be the

B'

Fig. 29.

r

same point, then to A will corre- spond a point A' in the second, and to B a point B in the first row. In general these points A'

and B will be different. It may, however, happen that they coincide. Then the correspondence is a peculiar one, as the following theorem shows :

// two projective rows lie on the same base, and if it happens that to one point in the base the same point corresponds, whether we consider the point as belonging to the first or to the second row, then the same will happen for every point in the base — that is to say, to every point in the line corresponds the same point in the first as in the second row.

In order to determine the correspondence, we may assume three pairs of corresponding points in two projective rows. Let then

A', B', C', in fig. 30, correspond to

A D B C A, B, C, so that A and B', and also — I, I , l (H- B and A',, denote the same point.

B c A' D Let us further denote the point.

Fig. 30. C when considered as a point in

the first row by D; then it is to

be proved that the point D', which corresponds to D, is the same

point as C. We know that the cross-ratio of four points is equal

to that of the corresponding row. Hence

(AB, CD) = (A'B', CD')

but . replacing the dashed letters by those undashed ones which denote the same points, the second cross-ratio equals (BA, DD'),

which, according to § 15, equals (AB, D'D); so that the equation becomes

(AB, CD) = (AB, D'D).

This requires that C and D' coincide.

§ 77. Two projective rows on the same base, which have the above property, that to every point, whether it be considered as a point in the one or in the other row, corresponds the same point, are said to be in involution, or to form an involution of points on the line.

We mention, but without proving it, that any two projective rows may be placed so as to form an involution.

An involution may be said to consist of a row of pairs of points, to every point A corresponding a point A', and to A' again the point A. These points are said to be conjugate, or, better, one point is termed the " mate " of the other.

From the definition, according to which an involution may be considered as made up of two projective rows, follow at once the following important properties:

1. The cross-ratio of four points equals that of the four conjugate points.

2. If we call a point which coincides with its mate a " focus " or " double point " of the involution, we may say: An involution has either two foci, or one, or none, and is called respectively a hyperbolic, parabolic or elliptic involution (§ 34).

3. In a hyperbolic involution any two conjugate points are harmonic conjugates with regard to the two foci.

For if A, A' be two conjugate points, Fi, F 2 the two foci, then to the points Fi, F2, A, A' in the one row correspond the points Fi, F2, A', A in the other, each focus corresponding to itself. Hence (FiF 2 , AA') = (FiF2,A'A) — that is, we may interchange the two points AA' without altering the value of the cross-ratio, which is the characteristic property of harmonic conjugates (§ 18).

4. The point conjugate to the point at infinity is called the " centre " of- the involution. Every involution has a centre, unless the point at infinity be a focus, in which case we may say that the centre is at infinity.

In an hyperbolic involution the centre is the middle point between the foci.

5. The product of the distances of two conjugate points A, A' from the centre O is constant : OA . OA' = c.

For let A, A' and B, B' be two pairs of conjugate points, O the centre, I the point at infinity, then

(AB, OI) = (A'B', 10), or

OA.OA' = OB.OB'.

In order to determine the distances of the foci from the centre, we write F for A and A' and get

OF 2 = c; 0F= ± Vc Hence if c is positive OF is real, and has two values, equal and opposite. The involution is hyperbolic.

If e=o, OF = o, and the two foci both coincide with the centre.

If c is negative, Vc becomes imaginary, and there are no foci. Hence we may write —

In an hyperbolic involution, OA . 0A' = £ J , In a parabolic involution, OA . OA' = o, In an elliptic involution, OA . OA' =-k 2 .

From these expressions it follows that conjugate points A, A' in an hyperbolic involution lie on the same side of the centre, and in an elliptic involution on opposite sides of the centre, and that in a parabolic involution one coincides with the centre.

In the first case, for instance, OA . OA' is positive; hence OA and OA' have the same sign.

It also follows that two segments, AA' and BB', between pairs of conjugate points have the following positions: in an hyperbolic involution they lie either one altogether within or altogether without each other ; in a parabolic involution they have one point in common ; and in an elliptic involution they overlap, each being partly within and partly without the other.

Proof.— We have OA . OA' = OB . OB' = k in case of an hyperbolic involution. Let A and B be the points in each pair which are nearer to the centre 0. If now A, A' and B, B' lie on the same side of O, and if B is nearer to O than A, so that OBOA'; hence B' lies farther away from O than A', or the segment AA' lies within BB'. And so on for the other cases.*

6. An involution is determined —

(a) By two pairs of conjugate points. Hence also ((3) By one pair of conjugate points and the centre; (7) By the two foci ;

(5) By one focus and one pair of conjugate points; («) By one focus and the centre.

7. The condition that A, B, C and A', B', C may form an in- volution may be written in one of the forms —

(AB, CC) = (A'B', CC), or (AB, CA')«(A'B', CA), ■

or (AB, CA') = (A'B', CA),

for each expresses that in the two projective rows in which A, B, C

and A', B', C are conjugate points two conjugate elements may be interchanged.

8. Any three pairs, A, A', B, B', C, C, of conjugate points are connected by the relations:

AB'.BC'.CA' AB'.BC.C'A' ABB'C.CA' AB.B'C.C'A' A'B.B'C.C'A _ A'B.B'C'.CA~A'B'.BC.C'A~A'B'.BC'.CA _ l –

These relations readily follow by working out the relations in (7) (above).

§ 78. Involution of a quadrangle.— The sides of any four-point are cut by any line in six points in involution, opposite sides being cut in conjugate points.

Let A1B1C1D1 (fig. 31) be the four-point. If its sides be cut by the

line p in the points A, A', B, B', C, C, if further, C1D1 cuts the line A1B1 in C 2 , and if we project the row A1B1QC to p once from D, and once from C,, we get (A'B', C'C) = (BA, C'C).

Interchanging in the last cross-ratio the letters in each pair we get (A'B', C'C) = (AB, CC). Hence by § 77 (7) the points are in in- volution.

The theorem may also be stated thus:

The three points in which any line cuts the sides of a triangle and the projections, from any point in the plane, of the vertices of the triangle on to the same line are six points in involution.

Or again —

The projections from any point on to any line of the six vertices

*A^**

of a four-side are six points in involution, the projections of opposite vertices being conj ugate points.

This property gives a simple means to construct, by aid of the straight edge only, in an involution of which two pairs of conjugate points are given, to any point its conjugate.

§ 79. Pencils in Involution. — The theory of involution may at once be extended from the row to the flat and the axial pencil — viz. we say that there is an involution in a flat or in an axial pencil if any line cuts the pencil in an involution of points. An involution in a pencil consists of pairs of conjugate rays or planes; it has two, one or no focal rays (double lines) or planes, but nothing corresponding to a centre.

An involution in a flat pencil contains always one, and in general only one, pair of conjugate rays which are perpendicular to one another. For in two projective flat pencils exist always two corre- sponding right angles (§ 40).

Each involution in an axial pencil contains in the same manner one pair of conjugate planes at right angles to one another.

As a rule, there exists but one pair of conjugate lines or planes at right angles to each other. But it is possible that there are more, and then there is an infinite number of such pairs. An in- volution in a

flat pencil, in which every ray is perpendicular to its conjugate ray, is said to be circular. That such involution is possible is easily seen thus: if in two concentric flat pencils each ray on one is made to correspond to that ray on the other which is perpendicular to it, then the two pencils are projective, for if we turn the one pencil through a right angle each ray in one coincides with its corresponding ray in the other. But these two projective pencils are in involution.

A circular involution has no focal rays, because no ray in a pencil coincides with the ray perpendicular to it.

§ 80. Every elliptical involution in a row may be considered as a section of a circular involution.

In an elliptical involution any two segments AA' and BB' lie .partly within and partly without each other (fig. 32). Hence two circles described on AA and BB' as diameters will intersect in two points E and E'. The line EE' cuts the base of the involution at a point O, which has the property that OA.OA' = OB.OB', for each is equal to OE.OE'. The point is therefore the centre of the involution. If we wish to construct to any point C the conjugate point C, we may draw the circle through CEE'. This, will cut the

Fig. 32.

base in the required point C for OC . OC = OA . OA'. But EC and EC are at right angles. Hence the involution which is obtained by joining E or E' to the points in the given involution is cir- cular. This may also be ex- pressed thus:

Every elliptical involution has the property that there are two definite points in the plane from which any two conjugate points are seen under a right angle.

At the same time the follow- ing problem has been solved :

To determine the centre and also the point corresponding to any given point in an elliptical involution of which two pairs of conjugate points are given.

§ 81. Involution Range on a Conic. — By the aid of § 53, the points on a conic may be made to correspond to those on a line, so that the row of points on the conic is projective to a row of points on a line. We may also have two projective rows on the same conic, and these will be in involution as soon as one point on the conic has the same point corresponding to it all the same to whatever row it belongs. An

involution of points on a. conic will have the property (as follows from its definition, and from § 53) that the lines which join conjugate points of the involution to any point on the conic are conjugate lines of an involution in a pencil, and that a fixed tangent is cut by the tangents at conjugate points on the conic in points which are again conjugate points of an involution on the fixed tangent. For such involution on a conic the following theorem holds:

The lines which join corresponding points in an involution on a conic all pass through a fixed point; and reciprocally, the points of inter- section of conjugate lines in an involution among tangents to a conic lie on a line.

We prove the first part only. The involution is determined by two pairs of conjugate points, say by A, A' and B, B' (fig. 33). Let A A' a n d B E r meet in P. If we join the points in involution to any point on the conic, and the conjugate points to another point on the conic, we obtain two projective pencils. We take A and A' as centres of these pencils, so that the pencils A(A'BB') and A'(AB'B) are pro- jective, and in perspective posi- tion, because AA' corresponds to A'A. Hence cor- responding rays

Fig. 33.

meet in a line, of which two points are found by joining AB' tp A'B and AB to A'B'. It follows that the axis of perspective is the polar of the point P, where AA' and BB' meet. If we now wish to construct to any other point C on the conic the corresponding point C, we join C to A' and the point where this line cuts p to A. The latter line cuts the conic again in C But we know from the theory of pole and polar that the line CC passes through P. The point of concurrence is called the " pole of the involution," and the line of collinearity of the meets is called the " axis of the involution."

Involution determined by a Conic on a Line. — Foci

§ 82. The polars, with regard to a conic, of points in a row p form a pencil P projective to the row (§ 66). This pencil cuts the base of the row p in a projective row.

If A is a point in the given row, A' the point where the polar of A cuts p, then A and A will be corresponding points. If we take A' a point in the first row, then the polar of A' will pass through A, so that A corresponds to A' — in other words, the rows are in involution. The conjugate points in this involution are conjugate points with regard

to the conic. Conjugate points coincide only if the polar of a point A passes through A — that is, if A lies on the conic. Hence —

A conic determines on every line in its plane an involution, in which those points are conjugate -which are also conjugate with regard to the conic.

If the line cuts the conic the involution is hyperbolic, the points of intersection being the foci.

If the line touches the conic the involution is parabolic, the two foci coinciding at the point of contact.

If the line does not cut the conic the involution is elliptic, having no foci.

PROJECTIVE]

GEOMETRY

7°3

If, on the other hand, we take a point P in the plane of a conic, we get to each line a through P one conjugate line which joins P to the pole of a. These pairs of conjugate lines through P form an involution in the pencil at P. The focal rays of this involution are the tangents drawn from P to the conic. This gives the theorem reciprocal to the last, viz: —

A conic deter, nines in every pencil in its plane an involution, corre-sponding lines teing conjugate lines with regard to the conic.

If the point is without the conic the involution is hyperbolic, the tangents from the points being the focal rays.

If the point lies on the conic the involution is parabolic, the tangent at the point counting for coincident focal rays.

If the point is within the conic the involution is elliptic, having no focal rays.

It will further be seen that the involution determined by a conic on any line p is a section of the involution, which is determined by the conic at the pole P of p.

§ 83. Foci.— The centre of a pencil in which the conic determines a circular involution is called a ” focus ” of the conic.

In other words, a focus is such a point that every line through it is perpendicular to its conjugate line. The polar to a focus is called a directrix of the conic.

From the definition it follows that every focus lies on an axis, for the line joining a focus to the centre of the conic is a diameter to which the conjugate lines are perpendicular; and every line joining two foci is an axis, for the perpendiculars to this line through the foci are conjugate to it. These conjugate lines pass through the pole of the line, the pole lies therefore at infinity, and the line is a diameter, hence by the last property an axis.

It follows that all foci lie on one axis, for no line joining a point in one axis to a point in the other can be an axis.

As the conic determines in the pencil which has its centre at a focus a circular involution, no tangents can be drawn from the focus to the conic. Hence each focus lies within a conic; and a directrix does not cut the conic.

Further properties are found by the following considerations:

§ 84. Through a point P one line p can be drawn, which is with regard to a given conic conjugate to a given line q, Viz. that line which joins the point P to the pole of the line q. If the line q is made to describe a pencil about a point Q, then the line p will describe a pencil about P. These two pencils will be projective, for the line p passes through the pole of q, and whilst q describes the pencil Q, its pole describes a projective row, and this row is perspective to the pencil P.

We now take the point P on an axis of the conic, draw any line p through it, and from the pole of p draw a perpendicular q to p. Let q cut the axis in Q. Then, in the pencils of conjugate lines, which have their centres at P and Q, the lines p and q are conjugate lines at right angles to one another. Besides, to the axis as a ray in either pencil will correspond in the other the perpendicular to the axis (§ 72). The conic generated by the intersection of corresponding lines in the two pencils is therefore the circle on PQ as diameter, so that every line in P is perpendicular to its corresponding line inQ.

To every point P on an axis of a conic corresponds thus a point Q, such that conjugate lines through P and Q are perpendicular.

We shall show that these point-pairs P, Q form an involution. To do this let us move P along the axis, and with it the line p, keeping the

latter parallel to itself. Then P describes a row, p a perspective pencil (of parallels), and the pole of p a projective row. At the same time the line q describes a pencil of parallels perpendicular to p, and perspective to the row formed by the pole of p. The point Q, therefore, where q cuts the axis, describes a row projective to the row of points P. The two points P and Q describe thus two pro- jective rows on the axis; and not only does P as a point in the first row correspond to Q, but also Q as a point in the first corresponds to P. The two rows therefore form an involution. The centre of this involution, it is easily seen, is the centre of the conic.

A focus of this involution has the property that any two conjugate lines through it are perpendicular; hence, it is a focus to the conic.

Such involution exists on each axis. But only one of these can have foci, because all foci lie on the same axis. The involution on one of the axes is elliptic, and appears (§ 80) therefore as the section of two circular involutions in two pencils whose centres lie in the other axis. These centres are foci, hence the one axis contains two foci, the other axis none ; or every central conic has two foci which lie on one axis equidistant from the centre.

The axis which contains the foci is called the principal axis; in case of an hyperbola it is the axis which cuts the curve, because the foci lie within the conic.

In case of the parabola there is but one axis. The involution on this axis has its centre at infinity. One focus is therefore at infinity, the one focus only is finite. A parabola has only one focus.

§ 85. If through any point P (fig. 34) on a conic the tangent PT and the normal PN (i.e. the perpendicular to the tangent through the point of contact) be drawn, these will be conjugate lines with regard to the conic, and at right angles to each other. They will therefore cut the principal axis in two points, which are conjugate in the involution considered in § 84; hence they are harmonic

conjugates with regard to the foci. If therefore the two foci Fi and F2 be joined to P, these lines will be harmonic with regard to the

X

Fig. 34.

tangent and normal. As the latter are perpendicular, they will bisect the angles between the other pair. Hence —

The lines joining any point on a conic to the two foci are equally inclined to the tangent and normal at that point.

In case of the parabola this becomes —

The line joining any point on a parabola to the focus and the diameter through the point, are equally inclined to the tangent and normal at that point.

From the definition of a focus it follows that —

The segment of a tangent between the directrix and the point of contact is seen from the focus belonging to the directrix under a right angle, because the lines joining the focus to the ends of this segment are conjugate with regard to the conic, and therefore perpendicular.

With equal ease the following theorem is proved :

The two lines which join the points of contact of two tangents each to one focus, but not both to the same, are seen from the intersection of the tangents under equal angles.

§ 86. Other focal properties of a conic are obtained by the following considerations :

Let F (fig. 35) be a focus to a conic, / the corresponding directrix, A and B the points of contact of two tangents meeting at T, and P the point where the line AB cuts the direc- trix. Then TF will be the polar of P (because polars of F and T meet at P). Hence TF and PF are conjugate lines through a focus, and therefore perpendicular. They are further har- monic conjugates with regard to FA and FB (§§ 64 and 13), so that As they bisect the angles formed by these lines. This by the way proves —

The segments between the point of intersection of two tangents to a conic and their points of con- tact are seen from a focus under equal angles.

If we next draw through A and B lines parallel to TF, then the points Ai, Bi where these cut the directrix will be harmonic conju- gates with regard to P and the point where FT cuts the directrix. The lines FT and FP bisect therefore also the angles between FA! and FBi. From this it follows easily that the triangles FAA, and FBBi are

Bi

B2

Fig. 35.

equiangular, and therefore similar, so that FA : AAi = FB : BBi.

The triangles AA1A2 and BB1B2 formed by drawing perpendiculars from A and B to the directrix are also similar, so that AAi : AA 2 = BBi : BB2. This, combined with the above proportion, gives FA : AA 2 = FB : BB 2 . Hence the theorem:

The ratio of the distances of any point on a conic from a focus and the corresponding directrix is constant.

To determine this ratio we consider its value for a vertex on the principal axis. In an ellipse the focus lies between the two vertices on this axis, hence the focus is nearer to a vertex than to the corresponding directrix. Similarly, in an hyperbola a vertex is nearer

to the directrix than to the focus. In a parabola the vertex lies halfway between directrix and focus.

It follows in an ellipse the ratio between the distance of a point from the focus to that from the directrix is less than unity, in the parabola it equals unity, and in the hyperbola it is greater than unity.

It is here the same which focus we take, because the two foci lie symmetrical to the axis of the conic. If now P is any point on the conic having the distances n and r 2 from the foci and the distances di and d 2 from the corresponding directrices, then ri/

where e is constant. Hence also . ., , =e.

di = ± dz

In the ellipse, which lies between the directrices, dx--di is constant, therefore also ri + r 2 . In the hyperbola on the other hand dr-d\ is constant, equal to the distance between the directrices, therefore in this case ri~r% is constant.

If we call the distances of a point on a conic from the focus its focal

distances we have the theorem :

In an ellipse the sum of the focal distances is constant; and in an hyperbola the difference of the focal distances is constant.

This constant sum or difference equals in both cases the length of the principal axis.

Pencil of Conics

§ 87. Through four points A, B, C, D in a plane, of which no three lie in a line, an infinite number of conics may be drawn, viz. through these four points and any fifth one single conic. This system of conics is called a pencil of conics. Similarly, all conics touching four fixed lines form a system such that any fifth tangent determines one and only one conic. We have here the theorems : •

The pairs of points in which The pairs of tangents which any line is cut by a system of can be drawn from a point to conics through four fixed points a system of conics touching four are in involution. fixed lines are in involution.

We prove the first theorem only. Let ABCD (fig. 36) be the four-point, then any line t will cut two opposite sides AC, BD in

*the points E, E', the pair AD, BC in points F, F', and any conic of the system in M, N, a*id we have A(CD, MN) = B(CD, MN).*

If we cut these pencils by / we get

(EF, MN) = (F'E', MN) or (EF, MN) = (E'F, NM).

But this is, according to § 77 (7), the condition that M, N are corresponding points in the involution determined by the point pairs E, E', F, F' in which the line I cuts pairs of opposite sides of the four-point ABCD. This involution is independent of the particular conic chosen.

§ 88. There follow several important theorems:

Through four points two, one, or no conics may be drawn which touch any given line, according as the involution determined by the given four-point on the line has real, coincident or imaginary foci.

Two, one, or no conics may be drawn which touch four given lines and pass through a given point, according as the involution

determined by the given four-side at the point has real, coincident or imaginary focal rays.

For the conic through four points which touches a given line has its point of contact at a focus of the involution determined by the four-point on the line.

As a special case we get, by taking the line at infinity:

Through four points of which none is at infinity either two or no parabolas may be drawn.

The problem of drawing a conic through four points and touching a given line is solved by determining the points of contact on the line, that is, by determining the foci of the involution in which the line cuts the sides of the four-point. The corresponding remark holds for the problem of drawing the conics which touch four lines and pass through a given point.

Ruled Quadric Surfaces I 89. We have considered hitherto projective rows which lie in the same plane, in which case lines joining corresponding points envelop a conic. We shall now consider projective rows whose bases do not meet. In this case, corresponding points will be joined by lines which do not lie in a plane, but on some surface, which like every surface generated by lines is called a ruled surface. This surface clearly contains the bases of the two rows.

If the points in either row be joined to the base of the other, we obtain two axial pencils which are also projective, those planes being corresponding which pass through corresponding points in the given rows. If A', A be two corresponding points, a, a' the planes in the axial pencils passing through them, then AA' will be the line of intersection of the corresponding planes o, a' and also the line joining corresponding points in the rows.

If we cut the whole figure by a plane this will cut the axial pencils in two projective fiat pencils, and the curve of the second order generated by these will be the curve in which the plane cuts the surface. Hence

The locus of lines joining corresponding points in two projective rows which do not lie in the same plane is a surface which contains the bases of the rows, and which can also be generated by the lines of inter- section of corresponding planes in two projective axial pencils. This surface is cut by every plane in a curve of the second order, hence either in a conic or in a line-pair. No line which does not lie

altogether on the surface can have more than two points in common with the surface, which is therefore said to be of the second order or is called a ruled quadric surface.

That no line which does not lie on the surface can cut the surface in more than two points is seen at once if a plane be drawn through the line, for this will cut the surface in a conic. It follows also that a line which contains more than two points of the surface lies alto- gether on the surface.

§ 90. Through any point in space one line can always be drawn cutting two given lines which do not themselves meet.

If therefore three lines in space be given of which no two meet, then through every point in either one line may be drawn cutting the other two.

// a line moves so that it always cuts three given lines of which no two meet, then it generates a ruled quadric surface.

Let a, b, c be the given lines, and p,q,r . . . lines cutting them in the points A, A', A" ... ; B, B', B" . . . ; C, C, C" . . . respectively ; then the planes through a containing p, q, r, and the planes through b con- taining the same lines, may be taken as corresponding planes in two axial pencils which are projective, because both pencils cut the line c in the same row, C, C, C . . .; the surface can therefore be gener- ated by projective axial pencils.

Of the lines p, q, r . . . no two can meet, for otherwise the lines a, b, c which cut them would also lie in their plane. There is a single infinite number of them, for one passes through each point of a. These lines are said to form a set of lines on the surface.

If now three of the lines p, q, r be taken, then every line d cutting them will have three points in common with the surface, and will therefore lie altogether on it. This gives rise to a second set of lines on the surface. From what has been said the theorem follows :

A ruled quadric surface contains two sets of straight lines. Every line of one set cuts every line of the other, but no two lines of the same set meet.

Any two lines of the same set may be taken as bases of two projective rows, or of two projective pencils which generate the surface. They are cut by the lines of the other set in two projective rows.

The plane at infinity like every other plane cuts the surface either in a conic proper or in a line-pair. In the first case the surface is called an Hyperboloid of one sheet, in the second an Hyperbolic Paraboloid.

The latter may be generated by a line cutting three lines of which one lies at infinity, that is, cutting two lines and remaining parallel to a given plane.

Quadric Surfaces § 91. The conics, the cones of the second order, and the ruled quadric surfaces complete the figures which can be generated by projective rows or flat and axial pencils, that is, by those aggre- gates of elements which are of one dimension (§§ 5, 6). We shall now consider the simpler figures which are generated by aggregates of two dimensions. The space at our disposal will not, however, allow us to do more than indicate a few of the results.

§ 92. We establish a correspondence between the lines and planes in pencils in space, or reciprocally between the points and lines in two or more planes, but consider principally pencils.

In two pencils we may either make planes correspond to planes and lines to lines, or else planes to lines and lines to planes. If hereby the condition be satisfied that to a flat, or axial, pencil corresponds in the first case a projective flat, or axial, pencil,_ and in the second a projective axial, or flat, pencil, the pencils are said to be projective in the first case and reciprocal in the second.

*For instance, two pencils which join two points Si and S 2 to the different points and lines in a given plane * are projective (and in perspective position), if those lines and planes be taken as*

corresponding which meet the plane it in the same point or in the same line. In this case every plane through both centres Si and S 2 of the two pencils will correspond to itself. If these pencils are brought into any other position they will be projective (but not perspective).

The correspondence between two projective pencils is uniquely determined, if to four rays {or planes) in the one the corresponding rays (or planes) in the other are given, provided that no three rays of

either set lie in a plane.

Let a, b, c, d be four rays in the one, a', b', c', d' the corresponding rays in the other pencil. We shall show that we can find for every ray e in the first a single corresponding ray e' in the second. To the axial pencil a (b, c, d . . .) formed by the planes which join a to b, c r d . . . , respectively corresponds the axial pencil a' (b 1 , c',d' . . .), and this correspondence is determined. Hence, the plane a' e' which corresponds to the plane ae is determined. Similarly the plane b'e' may be found and both together determine the ray e'.

Similarly the correspondence between two reciprocal pencils is determined if for four rays in the one the corresponding planes in the other are given.

§ 93. We may now combine —

1. Two reciprocal pencils.

Each ray cuts its corresponding plane in a point, the locus of these points is. a quadric surface.

2. Two projective pencils.

Each plane cuts its corresponding plane in a line, but a ray as a rule does not cut its corresponding ray. The locus of points where a ray cuts its corresponding ray is a twisted cubic. The lines where a plane cuts its corresponding plane are secants.

3. Three projective pencils.

The locus of intersection of corresponding planes is a cubic surface.

Of these we consider only the first two cases.

§ 94. If two pencils are reciprocal, then to a plane in either corresponds a line in the other, to a flat pencil an axial pencil, and so on. Every line cuts its corresponding plane in a point. If Si and S 2 be the centres of the two pencils, and P be a point where a line di in the first cuts its corresponding plane a 2 , then the line b 2 in the pencil S 2 which passes through P will meet its corresponding plane ft in P. For 62 is a line in the plane a 2 . The corresponding plane ft must therefore pass through the line ai, hence through P.

The points in which the lines in Si cut the planes corresponding to them in S2 are therefore the same as the points in which the lines in

S 2 cut the planes corresponding to them in Si.

The locus of these points is a surface which is cut by a plane in a conic or in a line-pair and by a line in not more than two points unless it lies altogether on the surface. The surface itself is therefore called a quadric surface, or a surface of the second order.

To prove this we consider any line p in space.

The flat pencil in Si which lies in the plane drawn through p and the corresponding axial pencil in S2 determine on p two pro- jective rows, and those points in these which coincide with their corresponding points lie on the surface. But there exist only two, or one, or no such points, unless every point coincides with its corresponding point. In the latter case the line lies altogether on the surface.

This proves also that a plane cuts the surface in a curve of the second order, as no line can have more than two points in common with it. To show that this is a curve of the same kind as those considered before, we have to show that it can be generated by projective flat pencils. We prove first that this is true for any plane through the centre of one of the pencils, and afterwards that every point on the surface may be taken as the centre of such pencil. Let then a t be a plane through Si. To the flat pencil in Si which it contains corresponds in Sj a projective axial pencil with axis Oi and this cuts cti in a second flat pencil. These two flat pencils in ai are projective, and, in general, neither concentric nor per- spective. They generate therefore a conic. But if the line a 2 passes through Si the pencils will have Si as common centre, and may therefore have two, or one, or no lines u nited with their corresponding lines. The section of the surface by the plane ai will be accordingly a line-pair or a single line, or else the plane ax will have only the point Si in common with the surface.

Every line h through Si cuts the surface in two points, viz. first in Si and then at the point where it cuts its corresponding plane. If now the corresponding plane passes through Si, as in the case just considered, then the two points where l L cuts the surface coincide at Si, and the line is called a tangent to the surface with Si as point of contact. Hence if h be a tangent, it lies in that plane t x which corresponds to the line S 2 Si as a line in the pencil S 2 . The section of this plane has just been considered. It follows that — . All tangents to quadric surface at the centre of one of the reciprocal pencils lie in a plane which is called the tangent plane to the surface

at that point as point of contact.

To the line joining the centres of the two pencils as a line in one corresponds in the other the tangent plane at its centre.

The tangent plane to a quadric surface either cuts the surface in two lines, or it has only a single line, or else only a single point in common with the surface.

XI. 23

In the first case the point of contact is said to be hyperbolic, in the second parabolic, in the third elliptic.

*§ 95. It remains to be proved that every point S on the surface (may be taken as centre of one of the pencils which generate the surface. Let S be any point on the surface #' generated by the reciprocal pencils Si and S 2 . We have to establish a reciprocal correspondence between the pencils S and Si, so that the surface generated by them is identical with <£. To do this we draw two planes ai and ft through Si, cutting the surface * in two conies .which we also denote by ai and ft. These conies meet at Si, and at some other point T where the line of intersection of 01 and ft cuts the surface.*

In the pencil S we draw some plane a which passes through T, but not through Si or S 2 . It will cut the two conies first at T, and therefore each at some other point which we call A and B respec- tively. These we join to S by lines a and b, and now establish the required correspondence between the pencils Si and S as follows :— To SiT shall correspond the plane a, to the plane ai the line a, and to ft the line b, hence to the flat pencil in m the axial pencil a. These pencils are made projective by aid of the conic in 01.

*In the same manner the flat pencil in ft is made projective to the axial pencil b by aid of the conic in ft, corresponding elements being those which meet on the conic. This determines the correspondence, for we know for more than four rays in Si the corresponding planes in S. The two pencils S and Si thus made reciprocal generate a quadric surface *', which passes through the point S and through the two conies ai and ft.*

*The two surfaces and *' have therefore the points S and Si and the conies a t and ft in common. To show that they are identical, we draw a plane through S and S 2 , cutting each of the conies ai and ft in two points, which will always be possible. This plane cuts * and *' in two conies which have the point S and the points where it cuts ai*

and. ft in common, that is five points in all. The conies therefore coincide.

*This proves that all those points P on *' lie on * which have the property that the plane SS 2 P cuts the conies 01, ft in two points each. If the plane SS 2 P has not this property, then we draw a plane SSiP. This cuts each surface in a conic, and these conies have in common the points S, Si, one point on each of the conies*

§ 96. The following propositions follow: — A quadric surface has at every point a tangent plane. Every plane section of a quadric surface is a conic or a line-pair. Every line which has three points in common with a quadric surface lies on the surface.

Every conic which has five points in common with a quadric surface lies on the surface.

Through two conies which lie in different planes, but have two points in common, and through one external point always one quadric surface may be drawn.

§ 97. Every plane which cuts a quadric surface in a line-pair is a tangent plane. For every line in this plane through the centre of the line-pair (the point of intersection of the two lines) cuts the surface in two coincident points and is therefore a tangent to the surface, the centre of the line-pair being the point of contact.

If a quadric surface contains a line, then every plane through this line cuts the surface in a line-pair {or in two coincident lines). For this plane cannot cut the surface in a conic. Hence

// a quadric surface contains one line p then it contains an infinite number of lines, and through every point Q on the surface, one line q can be drawn which cuts p. For the plane through the point Q and the line p cuts the surface in a line-pair which must pass through Q and of which p is one line.

No two such lines q on the surface can meet. For as both meet p their plane would contain p and therefore cut the surface in a triangle.

Every line which cuts three lines q will be on the surface; for it has three points in common with it.

Hence the quadric surfaces which contain lines are the same as the ruled quadric surfaces considered in §§ 89-93, but with one important exception. In the last investigation we have left out of

considera- tion the possibility of a plane having only one line (two coincident lines) in common with a quadric surface.

§ 98. To investigate this case we suppose first that there is one point A on the surface through which two different lines a, b can be drawn, which lie altogether on the surface.

If P is any other point on the surface which lies neither on a nor b, then the plane through P and a will cut the surface in a second 'line a' which passes through P and which cuts a. Similarly there is a line b' through P which cuts b. These two lines a' and b' may coincide, but then they must coincide with PA.

If this happens for one point P, it happens for every other point Q. For if two different lines could be drawn through Q, then by the same reasoning the line PQ would be altogether on the surface, hence two lines would be drawn through P against the assumption. From this follows : —

If there is one point on a quadric surface through which one, but only one, line can be drawn on the surface, then through every point one line

can be drawn, and all these lines meet in a point. The surface is a cone of the second order.

If through one point on a quadric surface, two, and only two, lines can be drawn on the surface, then through every point two lines may be drawn, and the surface is a ruled quadric surface.

If through one point on a quadric surface no line on the surface can be drawn, then the surface contains no lines.

Using the definitions at the end of § 95, we may also say: —

On a quadric surface the points are all hyperbolic, or all parabolic, or all elliptic.

As an example of a quadric surface with elliptical points, we mention

the sphere which may be generated by two reciprocal pencils, where to each line in one corresponds the plane perpendicular to it in the other.

§ 99. Poles and Polar Planes. — The theory of poles and polars with regard to a conic is easily extended to quadric surfaces.

Let P be a point in space not on the surface, which we suppose not to be a cone. On every line through P which cuts the surface in two points we determine the harmonic conjugate Q of P with regard to the points of intersection. Through one of these lines we draw two planes a and 0. The locus of the points Q in a is a line a, the polar of P with regard to the conic in which a cuts the surface. Similarly the locus of points Q in P is a line b. This cuts a, because the line of intersection of o and p contains but one point Q. The locus of all points Q therefore is a plane. This plane is called the polar plane of the point P, with regard to the quadric surface. If P lies on the surface we take the tangent plane of P as its polar.

The following propositions hold : —

1. Every point has a polar plane, which is constructed by drawing the polars of the point with regard to the conies in which two planes through the point cut the surface.

2. // Q is a point in the polar of P, then P is a point in the polar of £>, because this is true with regard to the conic in which a plane through PQ cuts the surface.

3. Every plane is the polar plane of one point, which is called the Pole of the plane.

The pole to a plane is found by constructing the polar planes of three points in the plane. Their intersection will be the pole.

4. The points in which the polar plane of P cuts the surface are points of contact of tangents drawn from P to the surface, as is easily seen. Hence : — –

5. The tangents drawn from a point P to a quadric surface form a cone of the second order, for the polar plane of P cuts it in a conic.

6. // the pole describes a line a, its polar plane will turn about another line a', as follows from 2. These lines a and a' are said to be conjugate with regard to the surface.

§ 100. The pole of the line at infinity is called the centre of the surface. If it lies at the infinity, the plane at infinity is a tangent plane, and the surface is called a paraboloid.

The polar plane to any point at infinity passes through the centre, and is called a diametrical plane.

A line through the centre is called a diameter. It is bisected at the centre. The line conjugate to it lies at infinity.

If a point moves along a diameter its polar plane turns about the conjugate line at infinity; that is, it moves parallel to itself, its centre moving on the first line.

The middle points of parallel chords lie in a plane, viz. in the polar plane of the point at infinity through which the chords are drawn.

The centres of parallel sections lie in a diameter which is a line conjugate to the line at infinity in which the planes meet.

Twisted Cubics

§ 101. If two pencils with centres Si and S 2 are made projective, then to a ray in one corresponds a ray in the other, to a plane a plane, to a flat or axial pencil a projective flat or axial pencil, and so on.

There is a double infinite number of lines in a pencil. We shall see that a single infinite number of lines in one pencil meets its corresponding ray, and that the points of intersection form a curve in space.

Of the double infinite number of planes in the pencils each will meet its corresponding plane. This gives a system of a double infinite number of lines in space. We know (§ 5) that there is a quadruple infinite number of lines in space. From among these we may select those which satisfy one or more given conditions. The systems of lines thus obtained were first systematically investigated and classified by Plucker, in his Geometrie des Raumes. He uses the following names: —

A treble infinite number of lines, that is, all lines which satisfy one condition, are said to form a complex of lines; e.g. all lines cutting a given line, or all lines touching a surface.

A double infinite number of lines, that is, all lines which satisfy two

conditions, or which are common to two complexes, are said to form a congruence of lines; e.g. all lines in a plane, or all lines cutting two curves, or all lines cutting a given curve twice.

A single infinite number of lines, that is, all lines which satisfy three conditions, or which belong to three complexes, form a ruled surface; e.g. one set of lines on a ruled quadric surface, or develop- able surfaces which are formed by the tangents to a curve.

It follows that all lines in which corresponding planes in two

projective pencils meet form a congruence. We shall see this con- gruence consists of all lines which cut a twisted cubic twice, or of all secants to a twisted cubic.

§ 102. Let h_ be the line SiS 2 as a line in the pencil Si. To it corresponds a line li in S2. At each of the centres two corresponding lines meet. The two axial pencils with h and h as axes are pro- jective, and, as their axes meet at S2, the intersections of corre- sponding planes form a cone of the second order (§ 58), with S 2 as centre. If iri and tt 2 be corresponding planes, then their intersection will be a line pi which passes through S 2 . Corresponding to it in Si will be a line pi which lies in the plane in, and which therefore meets pi at some point P. Conversely, if pi be any line in S 2 which meets its corresponding line pi at a point P, then to the plane l 2 pi will correspond the plane hpi, that is, the plane S1S2P. These planes intersect in pi, so that pi is a line on the quadric cone generated by the axial pencils h and 4. Hence : —

All lines in one pencil which meet their corresponding lines in the other form a cone of the second order which has its centre at the centre of the first pencil, and passes through the centre of the second.

From this follows that the points in which corresponding rays meet lie on two cones of the second order which have the ray joining their centres in common, and form therefore, together with the line S1S2 or h, the intersection of these cones. Any plane cuts each of the cones in a conic. These two conies have necessarily that point in common in which it cuts the line h, and therefore besides either one or three other points. It follows that the curve is of the third order as a plane may cut it in three, but not in more than three, points. Hence: —

The locus of points in which corresponding lines on two projective pencils meet is a curve of the third order or a " twisted cubic " k, which passes through the centres of the pencils, and which appears

as the intersection of two cones of the second order, which have one line in common.

A line belonging to the congruence determined by the pencils is a secant of the cubic; it has two, or one, or no points in common with this cubic, and is called accordingly a secant proper, a tangent, or a secant improper of the cubic. A secant improper may be considered, to use the language of coordinate geometry, as a secant with imaginary points of intersection.

§ 103. If (Zi and Oi be any two corresponding lines in the two pencils, then corresponding planes in the axial pencils having a t and ai as axes generate a ruled quadric surface. If P be any point on the cubic k, and if pi, pi be the corresponding rays in Si and S2 which meet at P, then to the plane ai pi in Si corresponds aip 2 in S 2 . These therefore meet in a line through P. This may be stated thus: —

Those secants of the cubic which cut a ray ai, drawn through the centre Si of one pencil, form a ruled quadric surface which passes through both centres, and which contains the twisted cubic k. Of such surfaces an infinite number exists. Every ray through Si or S2 which is not a secant determines one of them.

If, however, the rays a x and o 2 are secants meeting at A, then the ruled quadric surface becomes a cone of the second order, having A as centre. Or all lines of the congruence which pass through a point on the twisted cubic kform a cone of the second order. In other words, the projection of a twisted cubic from any point in the curve on to any plane is a conic.

If ai is not a secant, but made to pass through any point Q in space, the ruled quadric surface determined by ai will pass through Q. There will therefore be one line of the congruence passing through Q, and only one. For if two such lines pass through Q, then the lines SiQ and S 2 Q will be corresponding lines ; hence Q will be a point on the cubic k, and an infinite number of secants will pass through it. Hence : —

Through every point in space not on the twisted cubic one and only one secant to the cubic can be drawn.

*§ 104. The fact that all the secants through a point on the cubic form a quadric cone shows that the centres of the projective pencils generating .the cubic are not distinguished from any other points on the cubic. If we take any two points S, S' on the cubic, and draw the_*

secants through each of them, we obtain two quadric cones, which have the line SS' in common, and which intersect besides along the cubic. If we make these two pencils having S and S' as centres projective by taking four rays on the one cone as corre- sponding to the four rays on the other which meet the first on the cubic, the correspondence is determined. These two pencils will generate a cubic, and the two cones of secants having S and S' as centres will be identical with the above cones, for each has five rays in common with one of the first, viz. the line SS' and the four lines determined for the correspondence ; therefore these two cones intersect in the original cubic. This gives the theorem : —

On a twisted cubic any two points may be taken as centres of pro- jective pencils which generate the cubic, corresponding planes being those which meet on the same secant.

Of the two projective pencils at S and S' we may keep the first fixed, and move the centre of the other along the curve. The pencils will hereby remain projective, and a plane a in S will be cut by its corresponding plane a always in the same secant a. Whilst S' moves along the curve the plane a' will turn about a, describing an axial pencil.

Authorities. — In this article we have given a purely geometrical theory of conies, cones of the second order, quadric surfaces, &c. In doing so we have followed, to a great extent, Reye's Geometrie der Lage, and to this excellent work those readers are referred who wish for a more exhaustive treatment of the subject. Other works especially valuable as showing the development of the subject are: Monge, Geometrie descriptive: Carnot, Geometrie de position (1803), containing a theory of transversals; Poncelet's great work Traite des proprietes projectives des figures (1822); Mobins, Bary- centrischer Calcul (1826); Steiner, Abhdngigkeit geometrischer Gestalten (1832), containing the first full discussion of the projective relations between rows, pencils, &c. ; Von Staudt, Geometrie der Lage (1847) and Beitrdge zur Geometrie der Lage (1856- 1860), in which a system of geometry is built up from the beginning without any reference to number, so that ultimately a number itself gets a geometrical definition, and in which imaginary elements are

systematically introduced into pure geometry; Chasles, Apercu historique (1837), in which the author gives a brilliant account of the progress of modern geometrical methods, pointing out the advantages of the different purely geometrical methods as compared with the analytical ones, but without taking as much account of the German as of the French authors; Id., Rapport stir les progres de la geometrie (1870), a continuation of the Apercu; Id., TraitS de geometrie superieure (1852); Cremona, Introduzione ad una teoria geometrica delle curve piane (1862) and its continuation Preliminari di una teoria geometrica delle superficie (German translations by Curtze). As more elementary books, we mention: Cremona, Elements of Projective Geometry, translated from the Italian by C. Leudesdorf (2nd ed., 1894) ; J. W. Russell, Pure Geometry (2nd ed., 1905)- (O. H.)

III. Descriptive Geometry

This branch of geometry is concerned with the methods for representing solids and other figures in three dimensions by drawings in one plane. The most important method is that which was invented by Monge towards the end of the 18th century. It is based on parallel projections to a plane by rays perpendicular to the plane. Such a projection is called ortho- graphic (see Projection, § 18). If the plane is horizontal the projection is called the plan of the figure, and if the plane is vertical the elevation. In Monge's method a figure is represented by its plan and elevation. It is therefore often called drawing in plan and elevation, and sometimes simply orthographic projection.

§ 1. We suppose then that we have two planes, one horizontal, the other vertical, and these we call the planes of plan and of eleva- tion respectively, or the horizontal and the vertical plane, and denote them by the letters in and ir 2 . Their line of intersection is called the axis, and will be denoted by xy.

If the surface of the drawing paper is taken as the plane of the plan, then the vertical plane will be the plane perpendicular to it through the axis xy. To bring this also into the plane of the drawing paper we turn it about the axis till it coincides with the horizontal plane. This process of turning one plane down till it coincides with another is called rabatting one to the other. Of course there is no necessity to have one of the two planes horizontal, but even when this is not the case it is convenient to retain the above names.

The whole arrangement will be better understood by referring to fig.

37. A point A in space is there projected by the perpendicular

Aj

:b,J c – is, i

Apj ;B ICq D„

r J ! ■

A,l

.y

Fig. 37.

Fig. 38.

AAi and AA 2 to the planes in and ir 2 so that Ai and A 2 are the horizontal and vertical projections of A.

If we remember that a line is perpendicular to a plane that is' perpendicular to every line in the plane if only it is perpendicular to any two intersecting lines in the plane, we see that the axis which is perpendicular both to AA, and to AA 2 is' also perpendicular to A]Ao and to A 2 A because these four lines are all in the same plane. Hence, if the plane ir 2 be turned about the axis till it coincides with the plane in, then A 2 A will be the continuation of A1A0. This position of the planes is represented in fig. 38, in which the line AiA 2 is perpendicular to the axis x.

B,"

C, B,!

Ill

!A, S

IV

-'D

Fig. 39.

Conversely any two points Ai, A 2 in a line perpendicular to the axis will be the projections of some point in space when the plane ir 2 is

turned about the axis till it is perpendicular to the plane m, because in this position the two perpendiculars to the planes in and ir 2 through the points Ai and A 2 will be in a plane and therefore meet at some point A.

Representation of Points. — We have thus the following method of representing in a single plane the position of points in space: — we take in the plane a line xy as the axis, and then any pair of points Ai, A 2 in the plane on a line perpendicular to the axis represent a point A in space. If the line AiA 2 cuts the axis at Ao, and if at Aj a perpendicular be erected to the plane, then the point A will be in it at a height AiA = A A 2 above the plane. This gives the position of the point A relative to the plane n. In the same way, if in a perpendicular to 7r 2 through A 2 a point A be taken such that A 2 A = A0A1, then this will give the point A relative to the plane 7r 2 .

§ 2. The two planes in, ir 2 in their original position divide space into four parts. These are called the four quadrants. We suppose that the plane ir 2 is turned as indicated in fig. 37, so that the point P comes to Q and R to S, then the quadrant in which the point A lies is called the first, and we say that in the first quadrant a point lies above the horizontal and in front of the vertical plane. Now we go round the axis in the sense in which the plane ir 2 is turned and come in succession to the second, third and fourth quadrant. In the second a point lies above the plane of the plan and behind the plane of elevation, and so on. In fig. 39, which represents a side view of the planes in fig. 37 the quadrants are marked, and in each a point with its pro- jection is taken. Fig. 38 shows how these are represented when the plane n is turned down. We see that

A point lies in the first quadrant if the plan lies below, the elevation above the axis; in the second if plan and elevation both lie above; in the third if the plan lies above, the elevation below; in the fourth if plan and elevation both lie below the axis.

If a point lies in the horizontal plane, its elevation lies in the axis and the plan coincides with the point itself. // a point lies in the vertical plane, its plan lies in the axis and the elevation coincides with the point itself. // a point lies in the axis, both its plan and elevation lie in the axis and coincide with it.

Of each of these propositions, which will easily be seen to be true,

the converse holds also.

§ 3. Representation of a Plane. — As we are thus enabled to represent

points in a plane, we can represent any finite figure by representing

its separate points. It is, however, not possible to represent a plane

in this way, for the projections of its points completely cover the

planes in and ir 2 , and no plane would appear different from any other.

But any plane o cuts each of the planes in, ir 2 in a line. These are

called the traces of the plane. They cut each other in the axis at the

point where the latter cuts the plane o. A plane is determined by its two traces, which are two lines that meet

on the axis, and, conversely, any two lines which meet on the axis

determine a plane.

If the plane is parallel to the axis its traces are parallel to the axis.

Of these one may be at infinity; then the plane will cut one of the

planes of projection at infinity and will be parallel to it. Thus a

plane parallel to the horizontal plane of the plan has only one finite

trace, viz. that with the plane of elevation.

If the plane passes through the axis both its traces coincide with the

axis. This is the only case in which the representation of the plane

by its two traces fails. A third plane of projection is therefore

introduced, which is best taken perpendicular to the other two.

We call it simply the third plane and denote it by irj. As it is

perpendicular to in, it may be

taken as the plane of elevation, \

its line of intersection y with in \

being the axis, and be turned

down to coincide with m. Thjs

is represented in fig. 40. OC is

the axis xy whilst OA and OB

are the traces of the third plane.

They lie in one line y. The plane £■

is rabatted about 7 to the hori- zontal plane. A plane o through

the axis xy will then show in it

a trace 03. In fig. 40 the lines OC

and OP will thus be the traces

of a plane through the axis xy,

which makes an angle POQ with

the horizontal plane.

We can also find the trace

which any other plane makes

with ir a . In rabatting the plane

ir s its trace OB with the plane ir 2 will come to the position OD.

Hence a plane having the traces CA and CB will have with the

third plane the trace ft, or AD if OD = OB.

It also follows immediately that —

// a plane a is perpendicular to the horizontal plane, then every point in tt has its horizontal projection in the horizontal trace of the plane, as all the rays projecting these points lie in the plane itself.

Any plane which is perpendicular to the horizontal plane has its vertical trace perpendicular to the axis.

Any plane which is perpendicular to the vertical plane has its hori- zontal trace perpendicular to the axis and the vertical projections of all points in the plane lie in this trace.

§ 4. Representation of a Line. — A line is determined either by two points in it or by two planes through it. We get accordingly two

representations of it either by projections or by traces.

First. — A line a is represented by its projections a\ and a% on the two planes ti and ir 2 . These may be any two lines, for, bringing the planes in, x 2 into their original position, the planes through these lines perpendicular to xi and 7r 2 respectively will intersect in some line a which has a l(a® as its projections.

Secondly.— A line a is represented by its traces — that is, by the points in which it cuts the two planes n, irj. Any two points may be taken as the traces of a line in space, for it is determined when the planes are in their original position as the line joining the two traces. This representation becomes undetermined if the two traces coincide in the axis. In this case we again use a third plane, or else the projections of the line.

The fact that there are different methods of representing points and planes, and hence two methods of representing lines, suggests the principle of duality (section ii., Projective Geometry, § 41). It is worth while to keep this in mind. It is also worth remembering that traces of planes or lines always lie in the planes or lines which they represent. Projections do not as a rule do this excepting when the point or line projected lies in one of the planes of projection.

Having now shown how to represent points, planes and lines, we have to state the conditions which must hold in order that these elements may lie one in the other, or else that the figure formed by them may possess certain metrical properties. It will be found that the former are very much simpler than the latter.

Before we do this, however, we shall explain the notation used; for it is of great importance to have a systematic notation. We shall denote points in space by capitals A, B, C; planes in space by Greek letters o, 0, y; lines in space by small letters a, b, c; horizontal projections by suffixes 1, like Ai, Oi; vertical projections by suffixes 2, like A 2 , Ojj traces by single and double dashes a' a", a , a'. Hence Pi will be the horizontal projection of a point P in space; a line a will have the projections 01, a 2 and the traces a' and a"; a plane o has the traces a' and a".

§ 5. If a point lies in a line, the projections of the point lie in the projections of the line.

If a line lies in a plane, the traces of the line lie in the traces of the plane.

These propositions follow at once from the definitions of the projections and of the traces.

If a point lies in two lines its projections must lie in the projections of both. Hence

If two lines, given by their projections, intersect, the intersection of their plans and the intersection of their elevations must lie in a line perpendicular to the axis, because they must be the projections of the point common to the two lines.

Similarly — // two lines given by their traces lie in the same plane or intersect, then the lines joining their horizontal and vertical traces respectively must meet on the axis, because they must be the traces of the plane through them.

§ 6. To find the projections of a line which joins two points A, B

fiven by their projections Ai, A 2 and Bi, B 2 , we join Ai, Bi and A 2 , h; these will be the projections required. For example, the traces of a line are two points in the line whose projections are known or at all events easily found. They are the traces themselves and the feet of the perpendiculars from them to the axis.

Hence if a' a" (fig. 41) are the traces of a line a, and if the per- pendiculars from them cut the axis in P and Q respectively, then the

line a'Q will be the horizontal and a"P the vertical projection of the line.

Conversely, if the projections ai, Oj of a line are given, and if these cut the axis in Q and P respectively, then the perpen- diculars Pa' and Qa" to the axis drawn through these points cut the projections 01 and a? in the traces a' and a".

To find the line of intersection op

two planes, we observe that this

p line lies in both planes; its traces

- *○ '_ must therefore he in the traces*

of both. Hence the points where the horizontal traces of the given

planes meet will be the horizontal, and the point where the vertical

traces meet the vertical trace of the line required.

§ 7. To decide whether a point A, given by its projections, lies in a plane a, given by its traces, we draw a line p by joining A to some point in the plane o and determine its traces. If these lie in the

traces of the plane, then the line, and therefore the point A, lies in the plane; otherwise not. This is conveniently done by joining Ai to some point p' in the trace a'; this gives pi; and the point where the perpendicular from p' to the axis cuts the latter we join to A 2 ; this gives pi. If the vertical trace of this line lies in the vertical trace of the plane, then, and then only, does the line p, and with it the point A, lie in the plane a.

§ 8. Parallel planes have parallel traces, because parallel planes are cut by any plane, hence also by iti and by ir 2 , in parallel lines.

Parallel lines have parallel projections, because points at infinity are projected to infinity.

// a line is parallel to a plane, then lines through the traces of the line and parallel to the traces of the plane must meet on the axis, because these lines are the traces of a plane parallel to the given plane.

§ 9. To draw a plane through two intersecting lines or through two parallel lines, we determine the traces of the lines; the lines joining their horizontal and vertical traces respectively will be the horizontal and vertical traces of the plane. They will meet, at a finite point or at infinity, on the axis if the lines do intersect.

To draw a plane through a line and a point without the line, we join the given point to any point in the line and determine the plane through this and the given line.

To draw a plane through three points which are not in a line, we draw two of the lines which each join two of the given points and draw the plane through them. If the traces of all three lines AB, BC, CA be found, these must lie in two lines which meet on the axis.

§ 10. We have in the last example got more points, or can easily get more points, than are necessary for the determination of the figure required — in this case the traces of the plane. This will happen in a great many constructions and is of considerable im- portance. It may happen that some of the points or lines obtained are not convenient in the actual construction. The horizontal traces of the lines AB and

AC may, for instance, fall very near together, in which case the line joining them is not well defined. Or, one or both of them may fall beyond the drawing paper, so that they are practically non-existent for the construction. In this Case the traces of the line BC may be used. Or, if the vertical traces of AB and AC are both in convenient position, so that the vertical trace of the required plane is found and one of the horizontal traces is got, then we may join the latter to the point where the vertical trace cuts the axis.

The draughtsman must remember that the lines which he draws are not mathematical lines without thickness, and therefore every drawing is affected by some errors. It is therefore very desirable to be able constantly to check the latter. Such checks always present themselves when the same result can be obtained by different constructions, or when, as in the above case, some lines must meet on the axis, or if three points must lie in a line. A careful draughts-man will always avail himself of these checks.

§ 11. To draw a plane through a given point parallel to a given plane a, we draw through the point two lines which are parallel to the plane o, and determine the plane through them; or, as we know that the traces of the required plane are parallel to those of the given one (§ 8), we need only draw one line I through the point parallel to the plane and find one of its traces, say the vertical trace /"; a line through this parallel to the vertical trace of a will be the vertical trace 0″ of the required plane 0, and a line parallel to the horizontal trace of a meeting /S" on the axis will be the horizontal trace /J'.

Let Ai A 2 (fig. 42) be the given point, o' a" the given plane, a

a' and a horizontal line h through

line h through Ai, parallel to A 2 will be the projections of a line / through A parallel to the plane, because the horizontal plane through this line will cut the plane o in a line c which has its horizontal projection parallel to a'.

§ 12. We now come the metrical properties figures.

A line is perpendicular to a plane if the projec- tions of the line are per- pendicular to the traces of the plane.

projection. If a line p is perpendicular "to a plane a, every plane through p is perpendicular to a; hence also the vertical plane which projects the line p to pi. As this plane is perpendicular both to the horizontal plane and to the plane o, it is also perpendicular to their

intersection — that is, to the horizontal trace of a. It follows that every line in this projecting plane, therefore also pi, the plan of p, is perpendicular to the horizontal trace of o.

To draw a plane through a given point A perpendicular to a given line p, we first draw through some point in the axis lines y , y" perpendicular respectively to the projections pi and pi of the given line. These will be the traces of a plane y which is perpendicular to the given line. We next draw through the given point A a plane parallel to the plane y; this will be the plane required.

Fig. 42. We prove it for the horizontal

DESCRIPTIVE}

GEOMETRY

709

Other metrical properties depend on the determination of the real size or shape of a figure.

In general the projection of a figure differs both in size and shape from the figure itself. But figures in a plane parallel to a plane of projection will be identical with their projections, and will thus be given in their true dimensions. In other cases there is the problem, constantly recurring, either to find the true shape and size of a plane figure when plan and elevation are given, or, con- versely, to find the latter from the known true shape of the figure itself. To do this, the plane is turned about one of its traces till it is laid down into that plane of projection to which the trace belongs. This is technically called rabatting the plane respectively into the plane of the plan or the elevation. As there is no difference in the treatment of the two cases, we shall consider only the case of rabatt- ing a plane a into the plane of the plan. The plan of the figure is a parallel (orthographic) projection of the figure itself. The results of parallel projection (see Projection, §§ 17 and 18) may there- fore now be used. The trace a will hereby take the place of what formerly was called the axis of projection. Hence we see that corre- sponding points in the plan and in the rabatted plane are joined by lines which^are perpendicular to the trace a' and that corresponding lines meet on this trace. We also see that the correspondence is completely determined if we know for one point or one line in the plan the corresponding point or line in the rabatted plane.

Before, however, we treat of this we consider some special cases. §

13. To determine the distance between two points A, B given by their projections Ai, Bi and A2, B 2 , or, in other words, to determine (he true length of a line the plan and elevation of which are given.

Solution. — The two points A, B in space lie vertically above their plans Ai, Bi (fig. 43) and AiA = A A 2 , BiB = B B 2 . The four points

A, B, Ai, Bi therefore form a plane quadrilateral on the base A1B1 and having right angles at the base. This plane we rabatt about A1B1 by drawing AiA and BiB per- pendicular to AiB! and making A,A = A A 2 , BiB = B B 2 . Then y AB will give the length required. The construction might have been performed in the elevation by making A 2 A = AoAi and B 2 B = BoBi on lines perpendicular to A 2 B 2 . Of course AB must have the same length in both cases.

This figure may be turned into a model. Cut the paper along AiA, AB and BBi, and fold the piece A1ABB1 over along A1B1 till

Fig. 43.

it stands upright at right angles to the horizontal plane. The points A, B will then be in their true position in space relative to xi. Simi- larly if B 2 BAA 2 be cut out and turned along A 2 B 2 through a right angle we shall get AB in its true position relative to the plane ir 2 . Lastly we fold the whole plane of the paper along the axis x till the plane x 2 is at right angles to xi. In this position the two sets of points AB will coincide if the drawing has been accurate.

Models of this kind can be made in many cases and their con- struction cannot be too highly recommended in order to realize orthographic projection.

§ 14. To find the angle between two given lines a, b of which the projections 01, ii and at, 62 are given.

Solution. — Let a u b x (fig. 44) meet in Pi, a 2 , 6 2 in T, then if the line PiT is not perpendicular to the axis the two lines will not meet. In

this case we draw a line parallel to b to meet the line a. This is easiest done by drawing first the line P1P2 perpendicular to the axis to meet a? in P 2 , and then drawing through P 2 a line c 2 parallel to 6 2 ; then bi, Ci will be the projections of a line c which is parallel to b and meets a in P. The plane a which these two lines determine we rabatt to the plan. We determine the traces a' and c' of the lines a

and c; then a'c' is the trace a' of their plane. On rabatting the point P comes to a point S on the line PiQ perpendicular to a'c', so that QS = QP. But QP is the hypotenuse of a triangle PPjQ with a right angle Pi. This we construct by making QR = PoP 2 ; then PiR = PQ. The lines a'S and c'S will therefore include angles equal to those made by the given lines. It is to be remembered that two lines include two angles which are supplementary. Which of these is to be taken in any special case depends upon the circumstances.

To determine the angle between a line and a plane, we draw through any point in the line a perpendicular to the plane (§ 12) and determine the angle between it and the given line. The complement of this angle, is the required one.

To determine the angle between two planes, we draw through any

Fig. 44.

Fig. 45.

point two lines perpendicular to the two planes and determine the angle between the latter as above.

In special cases it is simpler to determine at once the angle between the two planes by taking a plane section perpendicular to the inter- section of the two planes and rabatt this. This is especially the case if one of the planes is the horizontal or vertical plane of pro- jection.

Thus in fig. 45 the angle PiQR is the angle which the plane o makes with the horizontal plane.

§ 15. We return to the general case of rabatting a plane a of which the traces a' a" are given.

Here it will be convenient to determine first the position which the trace o" — which is a line in o — assumes when rabatted. Points in this line coincide with their elevations. Hence it is given in its true dimension, and we can measure off along it the true distance between two points in it. If therefore (fig. 45) P is any point in a" originally coincident with its elevation P 2 , and if O is the point where o" cuts the axis xy, so that is also in a', then the point P will after rabatting the plane assume such a posi- tion that OP = OP 2 . At the same time the plan is an orthographic projection of the plane a. Hence the line joining P to the plan Pi will after rabatting be perpendicular to a'. But Pi is known; it is the foot of the perpendicular from P 2 to the axis xy. We draw therefore, to find P,

from Pi a perpendicular PiQ to a' and find on it a point P such that OP = OP 2 . Then the line OP will be the position of a" when rabatted. This line corresponds therefore to the plan of a" — that is, to the axis xy, corresponding points on these lines being those which lie on a perpendicular to a'.

We have thus one pair of corresponding lines and can now find for any point Bi in the plan the corresponding point B in the rabatted plane. We draw a line through Bi, say B1P1, cutting a' in C. To it corresponds the line CP, and the point where this is cut by the project- ing ray through Bj, perpendicular to a', is the required point B.

Similarly any figure in the rabatted plane can be found when the plan is known; but this is usually found in a different manner without any reference to the general theory of parallel projection. As this method and the reasoning employed for it have their peculiar advantages, we give it also.

Supposing the planes x t and x 2 to be in their positions in space perpendicular to each other, we take a section of the whole figure by a plane perpendicular to the trace a' about which we are going to rabatt the plane a. Let this section pass through the point Q in a'. Its traces will then be the lines QPi and PiP 2 (fig. 9). These will be at right angles, and will therefore, together with the section QP 2 of the plane a, form a right-angled triangle QPiP 2 with the right angle at Pi, and having the sides PiQ and PiP 2 which both are given in their true lengths. This triangle we rabatt about its base PiQ, making PiR = PiP 2 . The line QR will then give the true length of the line QP in space. If now the plane a be turned about a' the point P will describe a circle about Q as centre with radius QP = QR, in a plane perpendicular to the trace a'. Hence when the plane a has been rabatted into the horizontal plane the point P will lie in the perpendicular PiQ to a', so that QP = QR.

If Ai is the plan of a point A in the plane a, and if Ai lies in QPi, then the point A will lie vertically above Ai in the line QP. On turning down the triangle QPiP 2 , the point A will come to Ao, the line AiAo being perpendicular to QPi. Hence A will be a point in QP such that QA = QAo.

If Bi is the plan of another point, but such that A1B1 is parallel to a', then the corresponding line AB will also be parallel to a'. Hence, if. through A a line AB be drawn parallel to a', and Bi B perpendicular to a', then their intersection gives the point B. Thus of any point

given in plan the real position in the plane a, when rabatted, can be found by this second method. This is the one most generally given in books on geometrical drawing. The first method explained is, however, in most cases preferable as it gives the draughtsman a greater variety of constructions. It requires a somewhat greater amount of theoretical knowledge.

If instead of our knowing the plan of a figure the latter is itself given, then the process of finding the plan is the reverse of the above and needs little explanation. We give an example.

§ 16. It is required to draw the plan and elevation of a polygon of which the real shape and position in a given plane a are known.

We first rabatt the plane o (fig. 46) as before so that Pi comes to P, hence OPi to OP. Let the given polygon in a be the figure ABCDE. We project, not the vertices, but the sides. To project the line AB, we produce it to cut a' in F and OP in G, and draw GGi perpendicular to a' ; then Gi corresponds to G, therefore FGj to FG. In the same manner we might project all the other sides, at least

those which cut OF and OP in convenient points. It will be best however, first to produce all the sides to cut OP and a' and then to

draw all the projecting rays through A, B, C

Fig. 46.

perpendicular to a', and in the same direction the lines G, Gi, &c. By drawing FG we get the points Ai, Bi on the project- ing ray through A and B. We then join B to the point M where BC pro- duced meets the trace a'. This gives Ci. So we go on till we have found Ei. The line Ai Ei must then meet AE in of, and this gives a check. If one of the sides cuts a' or OP beyond the drawing paper this method fails, but then we may easily find the pro- jection of some other line, say of a diagonal, or directly the pro- jection of a point, by the former methods. The diagonals may also serve to check

making FoF = OF s , &c. If the figure representing the development of the pyramid, or better a copy of it, is cut out, and if the lateral faces be bent along the lines AB, BC, &c, we get a model of the pyramid with the section marked on its faces. This may be placed on its plan ABCD and the plane of elevation bent about the axis x. The pyramid stands then in front of its elevations. If next the plane a with a hole cut out representing the true section be bent along the trace o' till its edge coincides with a", the edges of the hole ought to coincide with the lines EF, FG, &c, on the faces.

§ 18. Polyhedra like the pyramid in § 17 are represented by the projections of their edges and vertices. But solids bounded by curved surfaces, or surfaces themselves, cannot be thus representee?.

For a surface we may use, as in case of the plane, its traces — that is, the curves in which it cuts the planes of projection. We may also project points and curves on the surface. A ray cuts the surface generally in more than one point; hence it will happen that some of the rays touch the surface, if two of these points coincide. The points of contact of these rays will form some curve on the surface, and this will appear from the centre of projection as the boundary of the surface or of part of the surface. The outlines of all surfaces of solids which we see about us are formed by the points at which rays through our eye touch the surface. The projections of these contours are therefore best adapted to give an idea of the shape of a surface.

Thus the tangents drawn from any finite centre to a sphere form a right circular cone, and this will be cut by any plane in a conic.

V,

the drawing, for two corresponding diagonals must meet in the trace a'.

Having got the plan we easily find the elevation. The elevation of G is above Gi in a", and that of F is at F 2 in the axis. This gives the elevation F2G2 of FG and in it we get A2B2 in the verticals through Ai and Bi. As a check we have OG = OG 2 . Similarly the elevation of the other sides and vertices are found.

§ 17. We proceed to give some applications of the above principles to the representation of solids and of the solution of problems connected with them.

Of a pyramid are given its base, the length of the perpendicular from the vertex to the base, and the point where this perpendicular cuts

the base ; it is required first to develop the whole surface of the pyramid into one plane, and second to determine its section by a plane which cuts the plane of the base in a given line and makes a given angle with it.

1. As the planes of projection are not given we can take them as we like, and we select them in such a manner that the solution becomes as simple as possible. We take the plane of the base as the horizontal plane and the vertical plane perpendicular to the plane of the section. Let then (fig. 47) ABCD be the base of the pyramid, Vi the plan of the vertex, then the elevations of A, B, C, D will be in the axis at A 2 , B2, C2, D 2 , and the vertex at some point V2 above Vi at a known distance from the axis. The lines ViA, VjB, &c, will be the plans and the lines V 2 A S , V2B2, &c, the elevations of the edges of the pyramid, of which thus plan and elevation are known.

We develop the surface into the plane of the base by turning each lateral face about its lower edge into the horizontal plane by the method used in § 14. If one face has been turned down, say ABV to ABP, then the point Q to which the vertex of the next face BCV comes can be got more simply by finding on the line ViQ perpendicular to BC the point Q such that BQ = BP, for these lines represent the same edge BV of the pyramid. Next R is found by making CR = CQ, and so on till we have got the last vertex — in this case S. The fact that AS must equal AP gives a convenient check.

2. The plane a whose section we have to determine has its horizontal trace given perpendicular to the axis, and its vertical trace makes the given angle with the axis. This determines it. To find the section of the pyramid by this plane there are two methods applicable: we find the sections of the plane either with the faces or with the edges of the pyramid. We use the latter.

As the plane o is perpendicular to the vertical plane, the trace a" contains the projection of every figure in it; the points E 2 , Fu> Gi, H 2 where this trace cuts the elevations of the edges will therefore , be the elevations of the points where the edges cut a. From these we find the plans Ei, Fi, Gi, Hi, and by joining them the plan of the section. If from Ei, Fi lines be drawn perpendicular to AB, these will determine the points E, F on the developed face in which the plane a cuts it; hence also the line EF. Similarly on the other faces. Of course BF must be the same length on BP and on BQ. If the plane a be rabatted to the plan, we get the real shape of the section as shown in the figure in EFGH. This i9 done easily by

Fig. 47.

It is often called the projection of a sphere, but it is better called the contour-line of the sphere, as it is the boundary of the projections of all points on the sphere.

If the centre is at infinity the tangent cone becomes a right circular cylinder touching the sphere along a great circle, and if the projection is, as in our case, orthographic, then the section of this cone by a plane of projection will be a circle equal to the great circle of the sphere. We get such a circle in the plan and another in the elevation, their centres being plan and elevation of the centre of the sphere.

Similarly the rays touching a cone of the second order will lie in two planes which pass through the vertex of the cone, the contour- line of the projection of the cone consists therefore of two lines meeting in the projection of the vertex. These may, however, be invisible if no real tangent rays can be drawn from the centre of projection; and this happens when the ray projecting the centre of the vertex lies within the cone. In this case the traces of the cone are of importance. Thus in representing a cone of revolution with a vertical axis we get in the plan a circular trace of the surface whose centre is the plan of the vertex of the cone, and in the elevation the contour, consisting of a pair of lines intersecting in the elevation of the vertex of the cone. The circle in the plan and the pair of lines in the elevation do not determine the surface, for an infinite number of surfaces might be conceived which pass through the circular trace and touch two planes through the contour lines in the vertical plane. The surface becomes only completely defined if we write down to the figure that it shall represent a cone. The same holds for all

surfaces. Even a plane is fully represented by its traces only under the silent understanding that the traces are those of a plane.

§ 19. Some of the simpler problems connected with the representation of surfaces are the determination of plane sections and of the curves of intersection of two such surfaces. The former is constantly used in nearly all problems concerning surfaces. Its solution depends of course on the nature of the surface.

To determine the curve of intersection of two surfaces, we take a plane and determine its section with each of the two surfaces, rabatting this plane if necessary. This gives two curves which lie in the same plane and whose intersections will give us points on both surfaces. It must here be remembered that two curves in space do not necessarily intersect, hence that the points in which their projections intersect are not necessarily the projections of points common to the two curves. This will, however, be the case if the two curves lie in a common plane. By taking then a number of plane sections of the surfaces we can get as many points on their curve of intersection as we like. These planes have, of course, to be selected in such a way that the sections are curves as simple as the case permits of, and such that they can be easily and accurately drawn. Thus when possible the sections should be straight lines or circles. This not only saves time in drawing but determines all points on the sections, and therefore also the points where the two curves meet, with equal accuracy.

§ 20. We give a few examples how these sections have to be selected. A cone is cut by every plane through the vertex in lines, and if it is a cone of revolution by planes perpendicular to the axis in circles.

A cylinder is cut by every plane parallel to the axis in lines, and if it is a cylinder of revolution by planes perpendicular to the axis in circles.

A sphere is cut by every plane in a circle.

Hence in case of two cones situated anywhere in space we take sections through both vertices. These will cut both cones in lines. Similarly in case of two cylinders we may take sections parallel to the axis of both. In case of a sphere and a cone of revolution with vertical axis, horizontal sections will cut both surfaces in circles whose plans are circles and whose elevations are lines, whilst vertical sections through the vertex of the cone cut the latter in lines and the sphere in circles. To avoid drawing the projections of these circles, which would in general be ellipses, we rabatt the plane and then draw the circles in their real shape. And so on in other cases.

Special attention should in all cases be paid to those points in which the tangents to the projection of the curve of intersection are parallel or perpendicular to the axis x, or where these projections touch the contour of one of the surfaces. (0. H.)

IV. Analytical Geometry

1. In the name geometry there is a lasting record that the science had its origin in the knowledge that two distances may be compared by measurement, and in the idea that measurement must be effectual in the dissociation of different directions as well as in the comparison of distances in the same direction. The distance from an observer's eye of an object seen would be specified as soon as it was ascertained that a rod, straight to the eye and of length taken as known, could be given the direction of the line of vision, and had to be moved along it a certain number of times through lengths equal to its own in order to reach the object from the eye. Moreover, if a field had for two of its boundaries lines straight to the eye, one running from south to north and the other from west to east, the position of a point in the field would be specified if the rod, when directed west, had to be shifted from the point one observed number of times westward to meet the former boundary, and also, when directed south, had to be shifted another observed number of times southward to meet the latter. Comparison by measurement, the beginning of geometry, involved counting, the basis of arith- metic; and the science of number was marked out from the first as of geometrical importance.

But the arithmetic of the ancients was inadequate as a science of number. Though a length might be recognized as known when measurement certified that it was so many times a standard length, it was not every length which could be thus specified in terms of the same standard length, even by an arithmetic enriched with the notion of fractional number. The idea of possible incommensurability of lengths was introduced into Europe by Pythagoras; and the corresponding idea of irration- ality of number was absent from a crude arithmetic, while there were great practical difficulties in the way of its introduction. Hence perhaps it arose that, till comparatively modern times, appeal to arithmetical aid in geometrical reasoning was in all

possible ways restrained. Geometry figured rather as the helper of the more difficult science of arithmetic.

2. It was reserved for algebra to remove the disabilities of arithmetic, and to restore the earliest ideas of the land-measurer to the position of controlling ideas in geornetrical investigation. This unified science of pure number made comparatively little headway in the hands of the ancients, but began to receive due attention shortly after the revival of learning. It expresses whole classes of arithmetical facts in single statements, gives to arithmetical laws the form of equations involving symbols which may mean any known or sought numbers, and provides processes which enable us to analyse the information

given by an equation and derive from that equation other equations, which express laws that are in effect consequences or causes of a law started from, but differ greatly from it in form. Above all, for present purposes, it deals not only with integral and fractional number, but with number regarded as capable of continuous growth, just as distance is capable of continuous growth. The difficulty of the arithmetical expression of irrational number, a difficulty considered by the modern school of analysts to have been at length surmounted (see Function), is not vital to it. It can call the ratio of the diagonal of a square to a side, for instance, or that of the circumference of a circle to a diameter, a number, and let a or x denote that number, just as properly as it may allow either letter to denote any rational number which may be greater or less than the ratio in question by a difference less than any minute one we choose to assign.

*Counting only, and not the counting of objects, is of the essence of arithmetic, and of algebra. But it is lawful to count objects, and in particular to count equal lengths by measure. The widened idea is that even when a or * is an irrational number we may speak of a or a; unit lengths by measure. We may give concrete interpretation to an algebraical equation by allowing its terms all to mean numbers of times the same unit length, or the same unit area, or &c. and in any equation lawfully derived from the first by algebraical processes we may do the same. Descartes in his G&ometrie (1637) was the first to system- atize the application of this principle to the inherent first notions of geometry; and the methods which he instituted have become the most potent methods of all in geometrical research. It is hardly too much to say that, when known facts as to a geometrical figure have once been expressed in algebraical terms, all strictly consequential facts as to the figure can be deduced by almost mechanical processes. Some may well be unexpected consequences; and in obtaining those of which there has been suggestion beforehand the often bewildering labour of constant attention to the figure is obviated. These are the methods of what is now called analytical, or sometimes algebraical, geometry.*

3. The modern use of the term " analytical " in geometry has obscured, but not made obsolete, an earlier use, one as old as Plato. There is nothing algebraical in this analysis, as dis- tinguished from synthesis, of the Greeks, and of the expositors of pure geometry. It has reference to an order of ideas in demonstration, or, more frequently, in discovering means to effect the geometrical construction of a figure with an assigned special property. We have to suppose hypothetically that the construction has been performed, drawing a rough figure which exhibits it as nearly as is practicable.

We then analyse or critically examine the figure, treated as correct, and ascertain other properties which it can only possess in association with the one in question. Presently one of these properties will often be found which is of such a character that the construction of a figure possessing it is simple. The means of effecting synthetic- ally a construction such as was desired is thus brought to light by what Plato called analysis. Or again, being asked to prove a theorem A, we ascertain that it must be true if another theorem B is, that B must be if C is, and so on, thus eventually finding that the theorem A is the consequence, through a chain of inter- mediaries, of a theorem Z of which the establishment is easy. This geometrical analysis is not the subject of the present article; but in the reasoning from form to form of an equation or system

of equations, with the object of basing the algebraical proof I forms of expression which actual geometry has, in return for

of a geometrical fact on other facts of a more obvious character, the same logic is utilized, and the name " analytical geometry " is thus in part explained.

4. In algebra real positive number was alone at first dealt with, and in geometry actual signless distance. But in algebra it became of importance to say that every equation of the first degree has a root, and the notion of negative number was intro- duced. The negative unit had to be defined as what can be added to the positive unit and produce the sum zero. The corresponding notion was readily at hand in geometry, where it was clear that a unit distance can be measured to the left or down from the farther end of a unit distance already measured to the right or up from a point O, with the result of reaching O again. Thus, to give full interpretation in geometry to the algebraically negative, it was only necessary to associate distinct- ness of sign with oppositeness of direction. Later it was discovered that algebraical reasoning would be much facilitated, and that conclusions as to the real would retain all their soundness, if a pair of imaginary units =•= V — 1 of what might be called number were allowed to be contemplated, the pair being defined, though not separately, by the two properties of having the real sum o and the real product 1. Only in these two real combinations do they enter in

conclusions as to the real. An advantage gained Was that every quadratic equation, and not some quadratics only, could be spoken of as having two roots. These admissions of new units into algebra were final, as it admitted of proof that all equations of degrees higher than two have the full numbers of roots possible for their respective degrees in any case, and that every root has a value included in the form a + b V — i, with a, b, real. The corresponding enrichment could be given to geometry, with corresponding advantages and the same absence of danger, and this was done. On a line of measurement of distance we contemplate as existing, not only an infinite continuum of points at real distances from an origin of measurement O, but a doubly infinite continuum of points, all but the singly infinite continuum of real ones imaginary, and imaginary in conjugate pairs, a conjugate pair being at imaginary distances from O, which have a real arithmetic and a real geometric mean. To geometry enriched with this conception all algebra has its application.

5. Actual geometry is one, two or three-dimensional, i.e. lineal, plane or solid. In one-dimensional geometry positions and measurements in a single line only are admitted. Now descriptive constructions for points in a line are impossible without going out of the line. It has therefore been held that there is a sense in which no science of geometry strictly confined to one dimension exists. But an algebra of one variable can be applied to the study of distances along a line measured from a chosen point on it, so that the idea of construction as distinct from measurement is not essential to a one-dimensional geo- metry aided by algebra. In geometry of two dimensions, the flat of the land-measurer, the passage from one point to any other point, can be effected by two successive marches, one east or west and one north or south, and, as will be seen, an algebra of two variables suffices for geometrical exploitation. In geometry of three dimensions, that of space, any point can be reached from a chosen one by three marches, one east or west, one north or south, and one up or down; and we shall see that an algebra of three variables is all that is necessary. With three dimensions actual geometry stops; but algebra can supply any number of variables. Four or more variables have been used in ways analogous to those in which one, two and three variables are used for the purposes of one, two and three- dimensional geometry, and the results have been expressed in quasi-geometrical language on the supposition that a highet space can be conceived of, though not realized, in which four , independent directions exist, such that no succession of marches along three of them can effect the same displacement of a point as a

march along the fourth; and similarly for higher numbers than four. Thus analytical, though not actual, geometries exist for four and more dimensions. They are in fact algebras furnished with nomenclature of a geometrical cast, suggested by convenient

benefits received, conferred on algebras of one, two and three variables.

We will confine ourselves to the dimensions of actual geometry, and will devote no space to the one-dimensional, except incident- ally as existing within the two-dimensional. The analytical method will now be explained for the cases of two and three dimensions in succession. The form of it originated by Descartes, and thence known as Cartesian, will alone be considered in much

detail.

I. Plane Analytical Geometry. 6. Coordinates. — It is assumed that the points, lines and figures considered lie in one and the same plane, which plane therefore need not be in any way referred to. In the plane a point O, and two lines x'Ox, y'Oy, intersecting in O, are taken once for all, and regarded as fixed. O is called the origin, and x'Ox, y'Oy the axes of x and y respectively. Other positions in the plane are specified in relation to this fixed origin and these fixed axes. From any point P we

M

Fig. 48.

Fig. 49.

suppose PM drawn parallel to the axis of y to meet the axis of x in M, and may also suppose PN drawn parallel to the axis of x to meet the axis of y in N, so that OMPN is a parallelogram. The position of P is determined when we know OM (= NP) and MP (= ON). If OM is x times the unit of a scale of measurement chosen at pleasure, and MP is y times the unit, so that x and y have numerical values, we call x and y the (Cartesian) coordinates of P. To distinguish them we often speak of y as the ordinate, and of x as the abscissa.

It is necessary to attend to signs; x has one sign or the other according as the point P is on one side or the other of the axis of y, and y one sign or the other according as P is on one side or the other of the axis of x. Using the letters N, E, S, W, as in a map, and considering the plane as divided into four quadrants by the axes, the

signs are usually taken to be :

X

+

y t

+

or quadr

N E

+

S E

+

N W

—

S W

A point is referred to as the point (a, b), when its coordinates are x = a, y = b. A point may be fixed, or it may be variable, i.e. be regarded for the time being as free to move in the plane. The coordinates (x, y) of a variable point are algebraic variables, and are said to be " current coordinates."

*The axes of x and y are usually (as in fig. 48) taken at right angles to one another, and we then speak of them as rectangular axes, and of x and y as " rectangular coordinates " of a point P; OMPN is then a rectangle. Sometimes, however, it is convenient to use axes which are oblique to one another, so that (as in fig. 49) the angle xOy between their positive directions is some known angle w distinct from a right angle, and OMPN is always an oblique parallelo- gram with given angles; and we then speak of * and yas" oblique coordinates." The coordinates are as a rule taken to be rectangular in what follows.*

7. Equations and loci. If {x, y) is the point P, and if we are given that x = o, we are told that, in fig. 48 or fig. 49, the point M lies at O, whatever value y may have, i.e. we are told the one fact that P lies on the axis of y. Conversely, if P lies anywhere on the axis of y,

*we have always OM =0, i.e. x = o. Thus the equation x = o is one satisfied by the coordinates (x, y) of every point in the axis of y, and not by those of any other point. We say that x = o is the equation of the axis of y, and that the axis of y is the locus repre- sented by the equation je = o. Similarly y = o is the equation of the axis of x. An equation x = a, where a is a constant, expresses that P lies on a parallel to the axis of y through a point M on the axis of x such that OM =a. Every line parallel to the axis of y has an equation of this form. Similarly, every line parallel to the axis of * has an equation of the form y = b, where b is some definite constant.*

These are simple cases of the fact that a single equation in the current coordinates of a variable point (x, y) imposes one limitation on the freedom of that point to vary. The coordinates of a point

taken at random in the plane will, as a rule, not satisfy the equation, but infinitely many points, and in most cases infinitely many real ones, have coordinates which do satisfy it, and these points are exactly those which lie upon some locus of one dimension, a straight line or more frequently a curve, which is said to be represented by the equation. Take, for instance, the equation y = mx, where m is a given constant. It is satisfied by the coordinates oi every point r, wnich is such that, in fig. 48, the distance MP, with its proper sign is m times the distance OM, with its proper sign, i.e. by the co-ordinates of every point in the straight line through O which we arrive at by making a line, originally coincident with x'Ox, revolve about U in the direction opposite to that of the hands of a watch through an angle of which m is the tangent, and by those of no other points, lhat line is the locus which it represents. Take, more generally, the equation y = 0(x), where 0(x) is any given non-ambigu- ous Junction of x. Choosing any point M on x'Ox in fig. 1, and giving to x the value of the numerical measure of OM, the equation determines a single corresponding y, and so determines a single point P on the line through M parallel to y'Oy. .This is one point whose coordinates satisfy the equation. Now let M move from the extreme left to the extreme right of the line x'Ox, regarded as extended both ways as far as we like, i.e. let x take all real values from – 00 to 00 With every value goes a point P, as above, on the parallel to y Oy through the corresponding M ; and we thus find that there is a path from the extreme left to the extreme right of the figure, all points P along which are distinguished from other points

by the exceptional property of satisfying the equation by their coordinates. This path is a locus; and the equation y = 0(x) represents it. More generally still, take an equation f(x, y) = o which involves both x and y under a functional form. Any particular value given to x in it produces from it an equation forthe determina- tion of a value or values of y, which go with that value of x in specify- ing a point or points (x, y), of which the coordinates satisfy the equation /(x, y) = 0. Here again, as x takes all values, the point or points describe a path or paths, which constitute a locus represented by the equation. Except when y enters to the first degree only in /(x, y), it is not to be expected that all the values of y, determined as going with a chosen value of x, will be necessarily real; indeed it is not uncommon for all to be imaginary for some ranges of values ■; u . cus , may lal ? el y consist of continua of imaginary points; but the real parts of it constitute a real curve or real curves JNote that we have to allow x to admit of all imaginary, as well as 01 all real, values, in order to obtain all imaginary parts of the*

A locus or curve may be algebraically specified in another way; viz. we may be given two equations x = /(0), y = F(6), which express the coordinates of any point of it as two functions of the same variable parameter to which all values are open. As takes all values in turn, the point (x, y) traverses the curve.

It is a good exercise to trace a number of curves, taken as defined by the equations which represent them. This, in simple cases, can be done approximately by plotting the values of y given by the equation of a curve as going with a considerable number of values of x, and connecting the various points (x, y) thus obtained. But methods exist for diminishing the labour of this tentative process. Another problem, which will be more attended to here, is that of determining the equations of curves of known interest, taken as defined by geometrical properties. It is not a matter for surprise that the curves which have been most and longest studied geo- metrically are among those represented by equations of the simplest character. r

8. The Straight Line.— This is the simplest type of locus. Also the simplest type of equation in x and y is Ax + By + C = 0, one of the first degree. Here the coefficients A, B, C are constants. They are, like the current coordinates, x, y, numerical. But, in giving interpretation to such an equation, we must of course refer to numbers Ax, By, C of unit magnitudes of the same kind, of units ol counting for instance, or unit lengths or unit squares. It will

now be seen that every straight line has an equation of the first

degree, and that every equation of the first degree represents a straight line.

It has been seen (§ 7) that lines parallel to the axes have equa- tions of the first degree, free from one of the variables. Take now a straight line ABC inclined to both axes. . Let it make a given angle a with the positive direction of the axis of x, i.e. in fig. 50 let this be the angle through which Ax must be re- volved counter-clockwise about A in order to be made coin- cident with the line. Let C, of … . „ . . coordinates (/z, k), be a fixed point

™ n’,” e ; and P (• y > anv other P cint u P° n !t – Draw the ordinates CD, PM of C and P, and let the parallel to the axis of x through C meet PM, produced if necessary, in R. The right-angled triangle*

*7*3*

C,

/’. a

p 1

y

/

B

/A

O

I

) J

1

Fig. 50.

SPu 1 !! 1 ! U ™ hat l> V$ the s! S ns appropriate to their directions attached to CR and RP,

RP = CRtano, i.e. MP-DC = (OM-OD) tan a, and this gives that

y-k=tnn a (x-h), an equation of the first degree satisfied by x and y. No point not on the line satisfies the same equation; for the line from C to any point off the line would make with CR some angle 8 different from a and the point in question would satisfy an equation y -k = tan B(x -h) which is inconsistent with the above equation.

The equation of the line may also be written y=mx+b, where jre-tan o, and b=*k-h tan o. Here b is the value obtained for y from the equation when o is put for x, i.e. it is the numerical measuie, with proper sign, of OB, the intercept made by the line on the axis of y, measured from the origin. For different straight lines, m and b may have any constant values we like.

Now the general equation of the first degree Ax+By+C=o may be written y = -gx-g, unless B=o, in which case it represents a line parallel to the axis of y; and -A/B, -C/B are values which can be given to m and b, so that every equation of the first degree represents aˆstraight line. It is important to notice that the general equation, which in appearance contains three constants A, B, C, in ertect depends on two only, the ratios of two of them to the third, in virtue of this last remark, we see that two distinct conditions suffice to determine a straight line. For instance, it is easy from the above to see that

is the equation of a straight line determined by the two conditions that it makes intercepts OA, OB on the two axes, of which a and b are the numerical measures with proper signs : note that in fie so a is negative. Again, °

y-yi

y2-yi / .

(ji — W*- (xi— x 2)y+Xiy 2 — x 2 y x = 0, represents the line determined by the data that it passes through two given points fo, yi) and (x 2 , y t). To prove this find m in the equation y- yi =m(x- Xl) of a line through (*„ y,), from the con- dition that (x 2 , y 2) lies on the line.

In this paragraph the coordinates have been assumed rectangular Had they been oblique, the doctrine of similar triangles would have given the same results, except that in the forms of equation y-k = m{x-h), y = mx+b, we should not have had w = tan a.

9. The Circle.— \t is easy to write down the equation of a given circle. Let {h, k) be its given centre C, and p the numerical measure

of its given radius. Take P (x, y) any point on its circumference, and construct the triangle CRP, in fig. 50 as above. The fact that this is right-angled tells us that

CR 2 +RP 2 = CP 2 ,, and this at once gives the equation

(x-h) 2 + (y-k)=p>. A point not upon the circumference of the particular circle is at some distance from (fc, k) different from p, and satisfies an equation inconsistent with this one; which accordingly represents the cir- cumference, or, as we say, the circle. The equation is of the form*

- *2 +y 2 +2Ax+2By+C =0. Conversely every equation of this form represents a circle: we have only to take -A, -B, A 2 +B 2 C for h, k, p 2 respectively, to obtain its centre and radius. But this statement must appear too un restricted. _ Ought we not to require A 2 B 2 C to be positive? Certainly, if by circle we are only to mean the visible round cir cumference of the geometrical definition. Yet, analytically, we contemplate altogether imaginary circles, for which p 2 is negative, and circles, for which p = o, with all their reality condensed into their centres. Even when p 2 is positive, so that a visible round circumference exists, we do not regard this as constituting the whole of the circle. Giving to x any value whatever in (x — /t) 2 (y — £) 2 = p 2 , we obtain two values of y, real, coincident or imaginary, each of which goes with the abscissa x as the ordinate of a point, real or imaginary, on what is represented by the equation of the circle.*

The doctrine of the imaginary on a circle, and in geometry gener- ally, is of purely algebraical inception ; but it has been in its entirety accepted by modern pure geometers, and signal success has attended the efforts of those who, like K. G. C. von Staudt, have striven to base its conclusions on principles not at all algebraical in form, though of course cognate to those adopted in introducing the imaginary into algebra.

A circle with its centre at the origin has an equation x 2 +y 2 = p 2 .

In oblique coordinates the general equation of a circle is x 2 +2xy cos &> +y 2 -|-2Ax-|-2By-r-C=o.

10. The conic sections are the next simplest loci; and it will be seen later that they are the loci represented by equations of the second

degree. Circles are particular cases of conic sections; and

they have just been seen to have for their equations a particular class of equations of the second degree. Another particular class of such equations is that included in the form $(Ax+By+C)(A'x + B'y+C) = 0$, which represents two straight lines, because the product on the left vanishes if, and only if, one of the two factors does, i.e. if, and only if, (x, y) lies on one or other of two straight lines. The condition that ax i +2hxy+by*+2gx+2fy+c = o, which is often written (a, b, c,f, g, h) (x,y, i) 2 = o, takes this form is abc+2fgh — a/ 2 — eg 2 — cfc 2 = o. Note that the two lines may, in particular cases, be parallel or coincident.

Any equation like Fi(x, y) F 2 (x, y) . . . F„(x, y)=o, of which the left-hand side breaks up into factors, represents all • the loci separately represented by Fife y) = o, F 2 _(x, y) =o, . . . F„(x, y) = o. In particular an equation of degree n which is free from x represents n straight lines parallel to the axis of x, and one of degree n which is homogeneous in * and y, i.e. one which upon division by x" be- comes an equation in the ratio y/x, represents n straight lines through the origin.

Curves represented by equations of the third degree are called cubic curves. The general equation of this degree will be written (•)(*, y..i)»-o.

ii. Descriptive Geometry. — A geometrical proposition is either descriptive or metrical: in the former case the statement of it is independent of the idea of magnitude (length, inclination, &c), and in the latter it has reference to this idea. The method of co- ordinates seems to be by its inception essentially metrical. Yet in dealing by this method with descriptive propositions we are eminently free from metrical considerations, because of our power to

use general equations, and to avoid all assumption that measurements implied are any particular measure- ments.

12. It is worth while to illustrate this by the in- stance of the well-known theorem of the radical centre of three circles. The theorem is that, given any three circles A, B, C (fig. 51), the common chords

aa', /3/3', 77′ of the three pairs of circles meet in a point.

The geometrical proof is metrical throughout : —

Take O the point of inter- section of oa',/3/3', and joining this with 7', suppose that y'O does not pass through 7, but that it meets the circles A, B in two distinct points 72 , 71 respectively. We have then the known metrical property of intersecting chords of a circle; viz. in circle C, where aa', /3/3', are chords meeting at a point O,

Oa.Oa' = 00.00', where, as well as in what immediately follows, Oa, &c, denote, of course, lengths or distances. Similarly in circle A,

0/3.0/3′ =072.07',

and in circle B,

Oa.Oa' = 071.07'. Consequently O71.O7′ =072.07', that is, 071=072, or the points 71 and 72 coincide ; that is, they each coincide with 7. We contrast this with the analytical method : — Here it only requires to be known that an equation Ax+By+C =0 represents a line, and an equation x 2 +y 2 +Ax+By+C =0 represents a circle. A, B, C have, in the two cases respectively, metrical significations; but these we are not concerned with. Using S to denote the function x 2 +y 2 + Ax+By+C, the equation of a circle is S=o. Let the equation of any other circle be S', = x 2 +y 2 +A'x + B'y+C' = o; the equation S— S' = o is a linear equation (S — S' is in fact = (A-A')x+(B-B') y+C-C), and it thus represents a line; this equation is satisfied by the coordinates of each of the points of intersection of the two circles (for at each of these points S = o and S' = o, therefore also S— S'=o); hence the equation S — S' = o is that of the line joining the two points of intersection of the two circles, or say it is the equation of the common chord of the two circles. Considering then a third circle S",=x 2 +y 2 +A"x+B"y +C" = o, the equations of the common chords are S — S'=o, S— S"=0, S'— S" = o (each of these a linear equation); at the intersection of the first and second of these lines S = S' and S = S", therefore also S' = S", or the equation of the third line is satisfied by the coordinates of the point in question ; that is, the three chords intersect in a point O, the co- ordinates of which are determined by the equations S = S'=S". " It further appears that if the two circles S =0, S' =0 donot intersect in any real points, they must be regarded as intersecting in two imaginary points, such that the line joining them is the real line represented by the equation S — S' = o; or that two circles, whether their intersections be real or imaginary,

have always a real common chord (or radical axis), and that for any three circles the common chords intersect in a point (of course real) which is the radical centre. And by this very theorem, given two circles with imaginary inter-

Fig. 51.

sections, we can, by drawing circles which meet each of them in real points, construct the radical axis of the first-mentioned two circles.

13. The principle employed in showing that the equation of the common chord of two circles is S — S'=o is one of very extensive application, and some more illustrations of it may be given.

Suppose S = o, S'=o are lines (that is, let S, S now denote linear functions Ax+By+C, A'x+B'y+C), then S-feS' = o(/fe an arbitrary constant) is the equation of any line passing through the point of intersection of the two given lines. Such a line may be made to pass through any given point, say the point (x , y) ; i.e. if So, S'o are what S, S' respectively become on writing for (x, y) the values (x , y), then the value of k is k = So s S' . The equation in fact is SS'e — S S' = o ; and starting from this equation we at once verify it a posteriori; the equation is a linear equation satisfied by the values of (x, y) which make S = o, S'=o; and satisfied also by the values (x , y) ; and it is thus the equation of the line in question.

If , as before, S = o, S' = o represent circles, then (k being arbitrary) S — feS'=o is the'equation of any circle passing through the two points of intersection of the two circles; and to make this pass through a given point (x , y) we have again fe = S -5-S' . In the particular case k = 1 , the circle becomes the common chord (more accurately it becomes the common chord together with the line infinity; see § 23 below).

If S denote the general quadric function,

S = ax 2 +2hxy+by i +2fy+2gx+c, then the equation S = o represents a conic; assuming this, then, if S'=o represents another conic, the equation S — £S' = o represents any conic through the four points of intersection of the two conies.

14. The object still being to illustrate the mode of working with coordinates for descriptive pur- poses, we consider the theorem of the polar of a point in regard to a circle. Given a circle and a point O (fig. 52), we draw through O any two lines meeting the circle in the points A, A' and B, B' respectively, and then taking Q as the

intersection of the lines AB' and A'B, the theorem is that the locus of the point Q is a right line de- pending only upon O and the particular lines OAA' and OBB'.

circle, but

Fig. 52. independent of the

Taking O as the origin, and for the axes any two lines through O at right angles to each other, the equation of the circle will be

x 2 +y 2 +2Ax+2By+C=o; and if the equation of the line OAA' is taken to be y = mx, then the points A, A' are found as the intersections of the straight line with the circle ; or to determine x we have

X 2 (l+OT 2)+2x(A + B»j)+C=0.

*If (*ii yi) are the coordinates of A, and (x 2 , y 2) of A', then the roots of this equation are Xi, x 2 , whence easily*

1+1= .

XI X 2

A+Bm

And similarly, if the equationofthelineOBB' is taken to be y = m'x, and the coordinates of B, B' to be (x 3 , y 3) and (x 4 , yi) respectively,

then

X 3 X4 _ 2

A+Bot'

c •

We have then by § 8

x(yi-y4)-y(xi-x,)+Xry t -x,yi=o,

x(y2-yz)-y{x 2 -x i)+X2y 3 -x 3 y2 = o,

as the equations of the lines AB' and A'B respectively. Reducing

by means of the relations yi — mxi = o, y 2 — jnx 2 = o, ys— m'x3 = o,

yi— m'xt — o, the two equations become

x(mxi—m'x,) —y(xi—x 4) + (m' — m)xiX t = o, x(mx% — m'x 3) — y (x 2 — x 3) + (m' — m)x 2 x s = 0, and if we divide the first of these equations by X1X4, and the second by X2X3, and then add, we obtain

+2m' — 2tn = o, or, what is the same thing,

(fi+fJ - (i+x 1) (y-mx)+2m'-2m = o, which by what precedes is the equation of a line through the point Q. Substituting herein for — +—, — +— their foregoing values, the

equation becomes

-(A+Bm) (y-m'x) + (A+Bm') (y-mx)+C{m'—m)=o; that is,

{m-m') (Ax+By+C) =0;

ANALYTICAL]

GEOMETRY

7i5

or finally it is A+By-(-C = o, showing that the point Q lies in a line the position of which is independent of the particular lines OAA', OBB' used in the construction.. It is proper to notice that there is no correspondence to each other of the points A, A' and B, B'; the grouping might as well have been A, A' and B', B ; and it thence appears that the line Ax+By+C =0 just obtained is in fact the line joining the point Q with the point R which is the intersection of AB and A'B*

15. In § 8 it has been seen that two conditions determine the equation of a straight line, because in Ax+By+C = o one of the coefficients may be divided out, leaving only two parameters to be determined. Similarly five conditions instead of six determine an equation of the second degree (a, b, c,f, g, h) (x, y, i) 2 = o, and nine instead of ten determine a cubic (*) (x, y, l) 3 = o. It thus appears that a cubic can be made to pass through 9 given points, and that the cubic so passing through 9 given points is completely determined. There is, however, a remarkable exception. Considering

two given cubic curves S = o, S' = o, these intersect in 9 points, and through these 9 points we have the whole series of cubics S — £S'=o, where k is an arbitrary constant : k may be determined so that the cubic shall pass through a given tenth point (fe = So-s-S'o, if the coordinates are (x , y«), and So, S'o denote the corresponding values of S, S'). The resulting curve SS'o— S'So = o may be regarded as the cubic determined by the conditions of passing through 8 of the 9 points and through the given point (x , y

The applications of this theorem are very numerous; for instance, we derive from it Pascal's theorem of the inscribed hexagon. Con- sider a hexagon inscribed in a conic. The three alternate sides constitute a cubic, and the other three alternate sides another cubic. The cubics intersect in 9 points, being the 6 vertices of the hexagon, and the 3 Pascalian points, or intersections of the pairs of opposite sides of the hexagon. Drawing a line through two of the Pascalian points, the conic and this line constitute a cubic passing through 8 of the 9 points of intersection, and it therefore passes through the remaining point of intersection — that is, the third Pascalian point; and since obviously this does not lie on the conic, it must lie on the line — that is, we have the theorem that the three Pascalian points (or points of intersection of the pairs of opposite sides) lie on a line.

16. Metrical Theory resumed. Projections and Perpendiculars. — It is a metrical fact of fundamental importance, already used in § 8, that, if a finite line PQ be projected on any other line OO' by per- pendiculars PP', QQ' to OO', the length of the projection P'Q' is equal to that of PQ multiplied by the cosine of the acute angle between the two lines. Also the algebraical sum of the projections of the sides of any closed polygon upon any line is zero, because as a point goes round the polygon, from any vertex A to A again, the point which is its projection on the line passes from A' the projection of A to A' again, i.e. traverses equal distances along the line in positive and negative senses. If we consider the polygon as con- sisting of two broken lines, each extending from the same initial to the same terminal point, the sum of the projections of the lines which compose the one is equal, in sign and magnitude, to the sum of the projections of the lines composing the other. Observe that the projection on a line of a length perpendicular to the line is zero.

Let us hence find the equation of a straight line such that the perpendicular OD on it from the origin is of length p taken as positive, and is inclined to the axis of x at an angle xOD = a, measured counter-clockwise from Ox. Take any point P (x, y) on the line, and construct OM and MP as in fig. 48. The sum of the

projections of OM and MP on OD is OD itself; and this gives the equation of the line

X cos a--y sin a = p. Observe that cos o and sin a here are the sin a and —cos o, or the — sin a and cos a of § 8 according to circumstances.

We can write down an expression for the perpendicular distance from this line of any point (x', y') which does not lie upon it. If the parallel through (x', y') to the line meet OD in E, we have x' cos a+ y' sin a=OE, and the perpendicular distance required is OD-OE, i.e. p—x' cos a—y' sin a; it is the perpendicular distance taken positively or negatively according as (x', y') lies on the same side of the line as the origin or not.

*The general equation Ax-f-By-l-C=o may be given the form * cos a +y sin a — p = o by dividing it by V(A 2 B 2). Thus(Ax' B/+C) -5- V (A 2 +B 2) is in absolute value the perpendicular distance of (x', y') from the line A*+By-|-C=o. Remember, however, that there is an essential ambiguity of sign attached to a square root. The expression found gives the distance taken positively when (x', y') is on the origin side of the line, if the sign of C is given to V(A 2 + B 2).*

17. Transformation of Coordinates.- — We often need to adopt new axes of reference in place of old ones; and the above principle of projections readily expresses the old coordinates of any point in terms of the new.

Fig. 53.

Suppose, for instance, that we want to take for new origin the point O' of old coordinates OA = A, A0′ = &, and for new axes of X and Y lines through O' obtained by rotating parallels to the old axes of x and y through an angle 6 counter-clockwise. Construct (fig- 53) the old and new co- ordinates of any point P. Ex- pressing that the projections, first on the old axis of x and secondly on the old axis of y, of OP are equal to the sums of the projections, on those axes respec- tively, of the parts of the broken line OO'M'P, we obtain:

- *= fc+Xcos0-|-Y cos (0-t-M=i h+X cos0 — Y sin0, and*

y = k+X cos(iir— 0)+Y cos = fe+Xsin0+Ycos0.

Be careful to observe that these formulae do not apply to every conceivable change of reference from one set of rectangular axes to

another. It might have been required to take O'X, O'Y' for the positive directions of the new axes, so that the change of directions of the axes could not be effected by rotation. We must then write — Y for Y in the above.

Were the new axes oblique, making angles a, /3 respectively with the old axis of x, and so inclined at the angle 0— a, the same method would give the formulae

$x = h + X \cos o + Y \cos/3,\ y = fc + X \sin o + Y \sin /3.$

18. The Conic Sections. — The conies, as they are now called, were at first defined as curves of intersection of planes and a cone; but Apollonius substituted a definition free from reference to space of three dimensions. This, in effect, is that a conic is the locus of a point the distance of which from a given point, called the focus, has a given ratio to its distance from a given line, called the directrix (see Conic Section). If e : 1 is the ratio, e is called the eccentricitv. The distances are considered signless.

Take {h, k) for the focus, and * cos a+y sin a—p = o for the directrix. The absolute values of V ! (x — h) 2 + (y — k) 2 \ and p —x cos o — y sin o are to have the ratio e : 1 ; and this gives

$(x—h)\ 2 + (y — k)\ 2 = e\ 2\ (p—x \cos a—y \sin a)\ 2$

as the general equation, in rectangular coordinates, of a conic.

It is of the second degree, and is the general equation of tHat degree. If, in fact, we multiply it by an unknown X, we can, by solving six simultaneous equations in the six unknowns X, h, k, e, p, a, so choose values for these as to make the coefficients in the equation equal to those in any equation of the second degree which may be given. There is no failure of this statement in the special case when the given equation represents two straight lines, as in § 10, but there is speciality: if the two lines intersect, the intersection and either bisector of the angle between them are a focus and directrix; if they are united in one line, any point on the line and a perpendicular to it through the point are : if they are parallel, the case is a limiting one in which e and h 2 +k 2 have become infinite while e~ i (h 2 +k' i) remains finite. In the case (§ 9) of an equation such as represents a circle there is another instance of proceeding to a limit: e has to become o, while ep remains finite: moreover o is indeterminate. The centre of a circle is its focus, and its directrix has gone to infinity, having no special direction. This last fact illustrates the necessity,

which is also forced on plane geometry by three-dimensional considerations, of treating all points at infinity in a plane as lying on a single straight line.

Sometimes, in reducing an equation to the above focus and directrix form, we find for h, k, e, p, tan a, or some of them, only imaginary values, as quadratic equations have to be solved; and we have in fact to contemplate the existence of entirely imaginary conies. For instance, no real values of x and y satisfy x 2 +2y 2 +z =0. Even when the locus represented is real, we obtain, as a rule, four sets of values of h, k, e, p, of which two sets are imaginary; a real conic has, besides two real foci and corresponding directrices, two others that are imaginary.

In oblique as well as rectangular coordinates equations of the second degree represent conies.

19. The three Species of Conies. — A real conic, which does not degenerate into straight lines, is called an ellipse, parabola or hyperbola according as e<, =, or >i. To trace the three forms it is best so to choose the axes of reference as to simplify their equations.

In the case of a parabola, let 2c be the distance between the given focus and directrix, and take axes referred to which these are the point (c, 0) and the line x— —c. The equation becomes (x — c) i +y i = (x+c) 2 , i.e. y 2 = 4c.*

In the other cases, take a such that a(e ~e _1) is the distance of focus from directrix, and so choose axes that these are (ae, 0) and x^aer 1 , thus getting the equation (— ae) 2 +y 2 = &(x — oe _1) 2 ,i'.e.(i — e 2)x 2 +y 2 = a 2 (i—e 2). When ei, i.e. in the case of an hyperbola, x 2 /a 2 — y 2 lb 2 = i, where & 2 = o s (e 2 — 1).*

The axes thus chosen for the ellipse and hyperbola are called the principal axes.

In figs. 54, 55, 56 in order, conies of the three species, thus referred, are depicted.

The oblique straight lines in fig. 56 are the asymptotes x/a = ±y/b

of the hyperbola, lines to which the curve tend with unlimited*

Fig. 54.

Fig. 55.

Fig. 56.

closeness as it goes to infinity. The hyperbola would have an equation of the form xy = c if referred to its asymptotes as axes, the coordinates being then oblique, unless o = 6, in which case the hyperbola is called rectangular. An ellipse has two imaginary asymptotes. In particular a circle x 2 +y 2 = a?, a particular ellipse, has for asymp- totes the imaginary lines x = = > =yV-i. These run from the centre to the so-called circular points at infinity.

**20. Tangents and Curvature. — Let {x , 37') and (x'+h, Y+k) be two neighbouring points P, P' on a curve. The equation of the line on which both lie is h(y— y')=k(x — x'). Now keep P fixed, and let P' move towards coincidence with it along the curve. The con- necting line will tend towards a limiting position, to which it can never attain as long as P and P' are distinct. The line which occupies this limiting position is the tangent at P. Now if we sub- tract the equation of the curve, with (x', y') for the coordinates in it, from the like equation in (x'+h, y'+k), we obtain a relation in h and k, which will, as a rule, be of the form o = Ah+Bk + terms of higher degrees in h and k, where A, B and the other coefficients involve x' and y'. This gives k/h=—A/B + terms which tend to vanish as h and k do, so that —A : B is the limiting value tended to byfe : h. Hence the equation of the tangent is B(y— y)+A(x — x')=o.*

The normal at (x\ y') is the line through it at right angles to the tangent, and its equation is A(y—y') — B(x—x') =0.

In the case of the conic (a, b, c, f, g, h) (x, y, l) 2 =o we find that A/B = (ax'+hy' +g)l(hx'+by' +f).

We can obtain the coordinates of Q, the intersection of the normals QP, QP' at (x', y') and (x'+h, y'+k), and then, using the limiting value of k : h, deduce those of its limiting position as P' moves up to P. This is the centre of curvature of the curve at P (x r , y'), and is so called because it is the centre of the circle of closest contact with the curve at that point. That it is so follows from the facts that the closest circle is the limit tended to by the circle which touches the curve at P and passes through P', and that the arc from P to P' of this circle lies between the circles of centre Q and radii QP, QP', which

circles tend, not to different limits as P' moves up to P, but to one. The distance from P to the centre of curvature is the radius of curvature.

2 1 . Differential Plane Geometry. — The language and notation of the differential calculus are very useful in the study of tangents and curvature. Denoting by (£, r\) the current coordinates, we find, as above, that the tangent at a point (x, y) of a curve is tt-y = ({ r - x)dyjdx, where dy/dx is found from the equation of the curve. If this be f(x, y) = o the tangent is (£-x) (df/dx) + (tf-y) (df/dy) =0. Up and (a, fi) are the radius and centre of curvature at (x, y), we find that

■ q(a-x)=-p(i+p 2),q(p-y) = i+p i , gV = (i+£ 2) 3 , where p, q denote dy/dx, iPy/dx* respectively. (See Infinitesimal Calculus.)

In any given case we can, at all events in theory, eliminate x, y between the above equations for a— x and /3— y, and the equation of the curve. The resulting equation in (a, 0) represents the locus of the centre of curvature. This is the evolute of the curve.

22. Polar Coordinates. — In plane geometry the distance of any point P from a fixed origin (or pole) O, and the inclination *OP of OP

to a fixed line 0#, determine the point: r, the numerical measure of OP, the radius vector, and 0, the circular measure of xOP, the inclination, are called polar coordinates of P. The formulae x — r cos 9, y = r sin connect Cartesian and polar coordinates, and make transition from either system to the other easy. In polar coordinates the equations of a circle through 0, and of a conic with O as focus, take the simple forms r = 2a cos (9-a), r\i-e cos (0-a)) =/. The use of polar coordinates is very convenient in discussing curves which have properties of symmetry akin to that of a regular polygon, such curves for instance as r=a cos md, with m integral, and also the curves called spirals, which have equations giving r as functions of itself, and not merely of sin and cos 0. In the geometry of motion under central forces the advantage of working with polar coordinates is great.

23. Trilinear and Areal Coordinates. — Consider a fixed triangle ABC, and regard its sides as produced without limit. Denote, as in trigonometry, by a, b, c the positive numbers of units of a chosen scale contained in the lengths BC, CA, AB, by A, B, C the angles, and by A the area, of the triangle. We might, as in § 6, take CA, CB as

axes of x and y, inclined at an angle C. Any point P (x, y) in the plane is at perpendicular distances y sin C and x sin C from CA and CB. Call these j8 and a respectively. The signs of /3 and a are those of y and x, i.e. is positive or negative according as P lies on the same side of CA as B does or the opposite, and similarly for o. An equation in (x, y) of any degree may, upon replacing in it x and y by o cosec C and /S cosec C, be written as one of the same degree in (a, 0). Now let 7 be the perpendicular distance of P from the third side AB, taken as positive or negative as P is on the C side of AB or not. The geometry of the figure tells us that aa+bf)+cy=2A. By means of this relation in o, 0, 7 we can give an equation con- sidered countless other forms, involving two or all of o, j3, 7. In particular we may make it homogeneous in a, ft 7: to do this we have only to multiply the terms of every degree less than the highest present in the equation by a power of (aa+ b0+cy)J2A just sufficient to raise them, in each case, to the highest degree.

We call (a, /8, 7) trilinear coordinates, and an equation in them the trilinear equation of the locus represented. Trilinear equations are, as a rule, dealt with in their homogeneous forms. An advantage thus gained is that we need not mean by (a, /3, 7) the actual measures of the perpendicular distances, but any properly signed numbers which have the same ratio two and two as these distances.

In place of a, {}, 7 it is lawful to use, as coordinates specifying the position of a point in the plane of a triangle of reference ABC, any given multiples of these. For instance, we may use x=aa/2A, y = b0J2A, 3=4:7/2 A, the properly signed ratios of the triangular areas PBC, PCA, PAB to the triangular area ABC. These are called the areal coordinates of P. In areal coordinates the relation which enables us to make any equation homogeneous takes the simple form x+y+z=i; and, as before, we need mean by x, y, 2, in a homogeneous equation, only signed numbers in the right ratios.

Straight lines and conies are represented in trilinear and in areal, because in Cartesian, coordinates by equations of the first and second degrees respectively, and these degrees are preserved when the equations are made homogeneous. What must be said about points infinitely far off in order to make universal the statement, to which there is no exception as long as finite distances alone are considered, that every homogeneous equation of the first degree represents a straight line? Let the point of areal coordinates (x', y', 2') move infinitely far off, and mean by x, y, 2 finite quantities in the ratios which x', y', z' tend to assume as they become infinite. The relation x'+y'+z' = \ gives that the limiting state of things tended

to is expressed by $x+y+z=p$. This particular equation of the first degree is satisfied by no point at a finite distance; but we see the propriety of saying that it has to be taken as satisfied by all the points conceived of as actually at infinity. Accordingly the special property of these points is expressed by saying that they lie on a special straight line, of which the areal equation is $x+y+z=o$. In trilinear coordinates this line at infinity has for equation 00+ 6/3+

C7 = 0.

On the one special line at infinity^ parallel lines are treated as meeting. There are on it two special (imaginary) points, the circular points at infinity of § 19, through which all circles pass in the same sense. In fact if $S=0$ be one circle, in areal coordinates, $S + (x+y+z)(Ix+my+nz) = 0$ may, by proper choice of I, m, n, be made any other; since the added terms are once $lx+my+nz$, and have the generality of any expression like $a'x+b'y+c'$ in Cartesian coordinates. Now these two circles intersect in the two points where either meets $x+y+z=o$ as well as in two points on the radical axis $lx+my+nz=o$.

24. Let us consider the perpendicular distance of a point (a', &', 7') from a line la+mP+ny. We can take rectangular axes of _ Cartesian coordinates (for clearness as to equalities of angle it is best to choose an origin inside ABC), and refer to them, by putting expres- sions p—x cos d—y sin 0, &c, for a &c; we can then apply § 16 to get the perpendicular distance; and finally revert to the trilinear notation. The result is to find that the required distance is

(la.'+mP'+ny')l\l, m, n), where {I, m, n) 2 = P+m i +n i —2mn cos A— 2nl cos B— 2lm cos C.

In areal coordinates the perpendicular distance from (', y', **)*

II

ANALYTICAL]

GEOMETRY

717

to lx+my+nz = o is 2A(lx'+my'+nz')/{al, bm, en). In both cases the coordinates are of course actual values.

Now let I, 7), f be the perpendiculars on the line from the vertices A,

B, C, i.e. the points (1, o, o), (o, 1, o), (o, o, 1), with signs in accord with a convention that oppositeness of sign implies dis- tinction between one side of the line and the other. Three applica- tions of the result above give

£//=2A/{a/, bm, cn\ =ri!m = tln;

and we thus have the important fact that £#'+i)y'+fz' is the perpendicular distance between a point of areal coordinates (x'y'z 1) and a line on which the perpendiculars from A, B, C are j, 71, f respectively. We have also that f*+i)y+f5 = o is the areal equation of the line on which the perpendiculars are £, 17, f ; and, by equating the two expressions for the perpendiculars from (*', y', z') on the line, that in all cases {a{, by, efj 2 = 4A 2 .

25. Line-coordinates. Duality. — A quite different order of ideas may be followed in applying analysis to geometry. The notion of a straight line specified may precede that of a point, and points may be dealt with as the intersections of lines. The specification of a line may be by means of coordinates, and that of a point by an equation, satisfied by the coordinates of lines which pass through it. Systems of line-coordinates will here be only briefly considered. Every such system is allied to some system of point-coordinates; and space will be saved by giving prominence to this fact, and not recommencing ab initio.

Suppose that any particular system of point-coordinates, in which lx +my--nz = o may represent any straight line, is before us: notice that not only are trilinear and areal coordinates such systems, but Cartesian coordinates also, since we may write x/z, y/z for the Cartesian x, y, and multiply through by z. The line is exactly assigned if /, m, n, or their mutual ratios, are known. Call (/, m, n) the coordinates of the line. Now keep x, y, z constant, and let the coordinates of the line vary, but always so as to satisfy the equation. This equation, which we now write xl--ym--zn=o, is satisfied by the coordinates of every line through a certain fixed point, and by those of no other line; it is the equation of that point in the line-coordinates /, m, n.

Line-coordinates are also called tangential coordinates. A curve is the envelope of lines which touch it, as well as the locus of points which lie on it. A homogeneous equation of degree above the first in I, m, n is a relation connecting the coordinates of every line which touches some curve, and represents that curve, regarded as an envelope. For instance, the condition that the line of coordinates (/,

m, n), i.e. the line of which the allied point-coordinate equation is lx--my+nz = o, may touch a conic (a, b, c, /, g, h) (x, y, z) 2 = o, is readily found to be of the form (A, B, C, F, G, H) (/, m, n) 2 = o, i.e. to be of the second degree in the line-coordinates. It is not hard to show that the general equation of the second degree in /, m, n thus represents a conic ; but the degenerate conies of line-coordinates are not line-pairs, as in point-coordinates, but point-pairs.

The degree of the point-coordinate equation of a curve is the order of the curve, the number of points in which it cuts a straight line. That of the line-coordinate equation is its class, the number of tangents to it from a point. The order and class of a curve are generally different when either exceeds two.

26. The system of line-coordinates allied to the areal system of point-coordinates has special interest.

The /, m, n of this system are the perpendiculars £, 7), f of § 24; and x'l-j-y'ji+z'f =0 is the equation of the point of areal coordinates (x\ y', z'), i.e. is a relation which the perpendiculars from the vertices of the triangle of reference on every line through the point, but no other line, satisfy. Notice that a non-homogeneous equation of the first degree in £, tj, f does not, as a homogeneous one does, represent a point, but a circle. In fact x'£-r-/r>—r-z'f = R expresses the constancy of the perpendicular distance of the fixed point x'£+y'ii-{- z'f = from the variable line (£, tj, f), i.e. the fact that (£, 71, f) touches a circle with the fixed point for centre. The relation in any £, 7;, f which enables us to make an equation homogeneous is not linear, as in point-coordinates, but quadratic, viz. it is the relation [a£, bi), ef| 2 = 4A 2 of § 24. Accordingly the homogeneous equation of the above circle is

4A 2 (x'?t/7,-t-z'r) 2 =R 5 H, H cr} 2 .

Every circle has an equation of this form in the present system of line-coordinates. Notice that the equation of any circle is satisfied by those coordinates of lines which satisfy both x'£+y , 7i+z'f = 0, the equation of its centre, and \a£, 6ij, ef} 2 =0. This last equation, of which the left-hand side satisfies the condition for breaking up into two factors, represents the two imaginary circular points at infinity, through which all circles and their asymptotes pass.

There is strict duality in descriptive geometry between point-line-locus and line-point-envelope theorems. But in metrical geometry duality is encumbered by the fact that there is in a plane one special

line only, associated with distance, while of special points, associated with direction, there are two: moreover the line is real, and the points both imaginary.

II. Solid Analytical Geometry.

27. Any point in space may be specified by three coordinates. We consider three fixed planes of reference, and generally, as in all

that follows, three which are at right angles two and two. They intersect, two and two, in lines x'Ox, y'Oy, z'Oz, called the axes of x, y, z respectively, and divide all space into eight parts called octants. If from any point P in space we draw PN parallel to zOz' to meet the plane xOy in N, and then from N draw NM parallel

y/ n

Fig. 57. Fig. 58.

to yOy' to meet x'Ox in M, the coordinates (x, y, z) of P are the numerical measures of OM, MN, NP; in the case of rectangular coordinates these are the perpendicular distances of P from the three planes of reference. The sign of each coordinate is positive or negative as P lies on one side or the other of the corresponding plane. In the octant delineated the signs are taken all positive.

In fig. 57 the delineation is on a plane of the paper taken parallel to the plane zOx, the points of a solid figure being projected on that plane by parallels to some chosen line through O in the positive octant. Sometimes it is clearer to delineate, as in fig. 58, by pro- jection parallel to that line in the octant which is equally inclined to Ox, Oy, Oz upon a plane of the paper perpendicular to it. It is possible by parallel projection to delineate equal scales along Ox, Oy, Oz by scales having any ratios we like along lines in a plane having any mutual inclinations we like.

For the delineation of a surface of simple form it frequently suffices to delineate the sections by the coordinate planes; and, in particular, when the surface has symmetry about each coordinate plane, to delineate the quarter-sections be- longing to a single octant. Thus fig. 59 conveniently repre- sents an octant of the wave surface, which cuts each coordinate plane in a circle and an ellipse. Or we may delineate a series of contour lines, i.e. sec- tions by planes parallel to xOy, or some other chosen plane ; of course other sections may be indicated too for greater clearness. For the delineation of a curve a good , method is to represent, as above, a series of points P thereof,

each accompanied by its ordinate PN, which serves to refer it to the plane of xy. The employment of stereographic projection is also interesting.

28. In plane geometry, reckoning the line as a curve of the first order, we have only the point and the curve. In solid geometry, reckoning a line as a curve of the first order, and the plane as a surface of the first order, we have the point, the curve and the surface; but the increase of complexity is far greater than would hence at first sight appear. In plane geometry a curve is considered in connexion with lines (its tangents) ; but in solid geometry the curve is considered in connexion with lines and planes (its tangents and osculating planes), and the surface also in connexion with lines and planes (its tangent lines and tangent planes) ; there are surfaces arising out of the line — cones, skew surfaces, developables, doubly and triply infinite systems of lines, and whole classes of theories which have nothing analogous to them in plane geometry : it is thus *a very small part indeed of the subject which can be even referred to in the present article.

In the case of a surface we have between the coordinates (x, y, z) a single, or say a onefold relation, which can be represented by a single relation /(x, y, z) = o; or we may consider the coordinates expressed each of them as a given function of two variable parameters p, q; the form z = /(x, y) Is a particular case of each of these modes of representation ; in other words, we have in the first mode /(x, y, z)—z-j{x, y), and in the second mode x — p, y — q for the expression of two of the coordinates in terms of the parameters.

Fig. 59.

Fig. 60.

In the case of a curve we have between the coordinates (, y, z) a twofold relation: two equations /(, y, z) = o, (x, y, z) = o give such a relation ; i.e. the curve is here considered as the intersection of two surfaces (but the curve is not always the complete intersection of two surfaces, and there are hence difficulties) ; or, again, the coordinates may be given each of them as a function of a single variable parameter. The form y = (x) , z = 4/{x) , where two of the

coordinates are given in terms of the third, is a particular case of each of these modes of representation.

*29. The remarks under plane geometry as to descriptive and metrical propositions, and as to the non-metrical character of the method of coordinates when used for the proof of a descriptive proposition, apply also to solid geometry; and they might be illustrated in like manner by the instance of the theorem of the radical centre of four spheres. The proof is obtained from the consideration that S and S' being each of them a function of the form * 2 +;y 2 -fz 2 | ax+by +cz+d, the difference S — S' is a mere linear function of the coordinates, and consequently that S — S'=o is the equation of the plane containing the circle of intersection of the two spheres S = o and S'=o.*

30. Metrical Theory.— -The foundation in solid geometry of the metrical theory is in fact the before-mentioned theorem that if a finite right line PQ be projected upon any other line OO' by lines

perpendicular to OO', then the length of the projection P'Q' is equal to the length of PQ into the cosine of its inclination to P'Q' — or (in the form in which it is now convenient to state the theorem) the perpendicular distance P'Q' of two parallel planes is equal to the inclined distance PQ ■ into the cosine of the inclination. The principle of § 16, that the algebraical sum of the projections of the sides of any closed polygon on any line is zero, or that the two sets of sides of the polygon which connect a vertex A and a vertex B have the same sum of projections on the line, in sign and magnitude, as we pass from A to B, is applicable when the sides do not all lie in one plane.

31. Consider the skew quadrilateral QMNP, the sides QM, MN, NP being respectively parallel to the three rectangular axes Ox, Oy, Oz; let the lengths of these sides be {, jj, f, and that of the side QP be = p; and let the cosines of the inclinations (or say the cosine-inclinations) of p to the three axes be a, /3, 7; then projecting successively on the three sides and on QP we have

I, y, t-p. p/3. P7, and p = aJ+(3T)+7f,*

whence p 2 = ?+i 2 -l-f 2 i which is the relation between a distance p and its projections £, ij, f upon three rectangular axes. And from the same equations we obtain a 2 H3 2 +7 2 = 1 , which is a relation con necting the cosine-inclinations of a line to three rectangular axes.

Suppose we have through Q any other line QT, and let the cosine-inclinations of this to the axes be a', 0', y', and S be its cosine-inclination to QP; also let p be the length of the projection of QP upon QT ; then projecting on QT we have p = a'i+p'ri+y'i = pi. And in the last equation substituting for £, tj, f their values pa, p/3, py we find

S = aa'+ffl'+yy', which is an expression for the mutual cosine-inclination of two lines, the cosine-inclinations of which to the axes are o, 0, y and a', 0', y' respectively. We have of course a?+P 2 +y i = l and a' 2 +/S' 2 + y' 1 = I ; and hence also

I-5 2 = (a 2 +j3 2 +7 2)(a' 2 +i8' 2 7' 2)-(aa'^'+Y7') J , = (/? 7'-/9'7) 2 +(7a'-7'a) 2 +(a0'-aW 2 ;

so that the sine of the inclination can only be expressed as a square root. These formulae are the foundation of spherical trigonometry.

32. Straight Lines, Planes and Spheres. — The foregoing formulae give at once the equations of these loci.

For first, taking Q to be a fixed point, coordinates (a, 6, c), and the cosine-inclinations (a, ff, y) to be constant, then P will be a point in the line through Q in the direction thus determined; or, taking (, y, z) for its coordinates, these will be the current co- ordinates of a point in the line. The values of f, 17, f then are x — a, y — b, z — c, and we thus have*

x— a y — b z—c. .

.which (omitting the last equation, —p) are the equations of the line through the point (a, b, c), the cosine-inclinations to the axes being a, 0, y, and these quantities being connected by the relation a 2 +/8 2 -r-7 2 = i. This equation may be omitted, and then a, 0, 7, instead of being equal, will only be proportional, to the cosine- inclinations.

Using the last equation, and writing

**, y, z = a+op, 6+0p, c+yp,*

these are expressions for the current coordinates in terms of a parameter p, which is in fact the distance from the fixed point (a, b, c).

It is easy to see that, if the coordinates (, y, z) are connected by any two linear equations, these equations can always be brought into the*

foregoing form, and hence that the two linear equations represent a line.

Secondly, taking for greater simplicity the point Q to be coincident with the origin, and a', 0', 7', p to be constant, then p is the perpendicular distance of a plane from the origin, and a', 0', 7′ are the cosine- inclinations of this distance to the axes (a' 2 4-0′ 2 -j-7′ 2 = i). P is any point in this plane, and taking its coordinates to be (x, y, z) then (£, 1» ?) are =(*, y, z), and the foregoing equation £ = a'£ +0'i?-r7'f becomes

a'x+P'y+y'z = p, which is the equation of the plane in question.

If, more generally, Q is not coincident with the origin, then, taking its coordinates to be (o, b, c), and writing pi instead of p, the equation is

a'(x-a)+l3'(y-b)+y'(z-c)=p l ; _ and we thence have pi=p — (aa'--bfi'--cy'), which is an expression for the perpendicular distance of the point (a, b, c) from the plane in question.

It is obvious that any linear equation Ax + By +Cz+D = between the coordinates can always be brought into the foregoing form, and hence that such an equation represents a plane.

Thirdly, supposing Q to be a fixed point, coordinates (a, b, c), and the distance QP, =p, to be constant, say this is =d, then, as before, the values of £, tj, f are x— a, y—b, z—c, and the equation ?--i?+!? = P i becomes

(*-a) 2 |(J r-5) 2 f(z C) 2 =rf 2 , which is the equation of the sphere, coordinates of the centre = (a,b,c) , and radius = d.

A quadric equation wherein the terms of the second order are * 2 +;y 2 +z 2 , viz. an equation

x*+y 2 +z*+Ax+By+Cz+D =0,

can always, it is clear, be brought into the foregoing form ; and it thus appears that this is the equation of a sphere, coordinates of thecentre -iA, -|B, -JC, and squared radius = KA 2 +B 2 +C 2)-D.

33. Cylinders, Cones, ruled Surfaces. — If the two equations of a straight line involve a parameter to which any value may be given, we have a singly infinite system of lines. They cover a surface, and the equation of the surface is obtained by eliminating the parameter

between the two equations.

If the lines all pass through a given point, then the surface is a cone; and, in particular, if the lines are all parallel to a.giveri line, then the surface is a cylinder.

Beginning with this last case, suppose the lines are parallel to the line x = mz, y—nz, the equations of a line of the system are x = mz+a, y = nz--b, — where a, b are supposed to be functions of the variable parameter, or, what is the same thing, there is between them a relation /(a, b)=o: we have a = x — mz, b = y—nz, and the result of the elimination of the parameter therefore is f(x—tnz, y — nz)=o, which is thus the general equation of the cylinder the generating lines whereof are parallel to the line x=mz, y=nz. The equation of the section by the plane z = o is/(#, y) =0, and conversely if the cylinder be determined by means of its curve of intersection with the plane z = o, then, taking the equation of this curve to be f(x, y) =0, the equation of the cylinder is f(x—mz, y — nz) =0. Thus, if the curve of intersection be the circle (x — o) 2 +(ji— 0) 2 = 7 2 , we have {x— mz — a) 2 + (y — nz— 0) 2 = 7 2 as the equation of an oblique cylinder on this base, and thus also {x — a) 2 +(ji— 0) 2 = 7 2 as the equation of the right cylinder.

*If the lines all pass through a given point (a, b, c), then the equations of a line are x—a=*a{z—c), y — b=f3(z—c), where o, are functions of the variable parameter, or, what is the same thing, there exists between them an equation /(o, 18) =0; the elimination*

of the parameter gives,' therefore, fyr— , \zTr) = ! an d this

equation, or, what is the same thing, any homogeneous equation f(x — a, y — b, z—c)=o, or, taking / to be a rational and integral function of the order n, say () (x— a, y — b, z— c) n — o, is the general equation of the cone having the point (a, b, c) for its vertex. Taking the vertex to be at the origin, the equation is () (x, y, z) n =o; and, in particular, (*) (x, y, z) 2 = o is the equation of a cone of the second order, or quadricone, having the origin for its vertex.

34. In the general case of a singly infinite system of lines, the locus is a ruled surface (or regulus). Now, when a line is changing its position in space, it may be looked upon as in a state of turning about some point in itself, while that point is, as a rule, in a state of moving out of the plane in which the turning takes place. If instantaneously it is only in a state of turning, it is usual, though not strictly accurate, to say that it intersects its consecutive position. A

regulus such that consecutive lines on it do not intersect, in this sense, is called a skew surface, or scroll; one on which they do is called a developable surface or torse.

Suppose, for instance, that the equations of a line (depending on

the variable parameter 9) are f + ?- e (I +f) > \~ ~c = g[1 ~ f) ■

y-2 z l «j2 3-2 ˆ2 2 S

then, eliminating 0, we have -j — 5 = 1— rj, or say -5 + T5 — s = I »

Q, C Or c

the equation of a quadric surface, afterwards called the hyperboloid of one sheet; this surface is consequently a scroll. It is to be remarked that we have upon the surface a second singly infinite series of lines; the equations of a line of this second system (de- pending on the variable parameter) are

It is easily shown that any line of the one system intersects every line of the other system.

Considering any curve (of double curvature) whatever, the tangent lines of the curve form a singly infinite system of lines, each line intersecting the consecutive line of the system, — that is, they form a developable, or torse; the curve and torse are thus inseparably connected together, forming a single geometrical figure. An osculating plane of the curve (see § 38 below) is a tangent plane of the torse all along a generating line.

35. Transformation of Coordinates. — There is no difficulty in changing the origin, and it is for brevity assumed that the origin remains unaltered. We have, then, two sets of rectangular axes, Ox, Oy, Oz, and Oxi, Oyi, Ozi, the mutual cosine-inclinations being shown by the diagram —

X

y

z

Xl

a

p

7

yi

a'

p

■*V*

Zi

a"

0"

7"

37. The Species of Quadric Surfaces. — -Surfaces represented by equations of the second degree are called quadric surfaces. Quadric surfaces are either proper or special. The special ones arise when the coefficients in the general equation are limited to satisfy certain special equations; they comprise (1) plane-pairs, including in particular one plane twice repeated, and (2) cones, including in particular cylinders; there is but one form of cone, but cylinders may be elliptic, parabolic or hyperbolic.

A discussion of the general equation of the second degree shows that the proper quadric surfaces are of five kinds, represented respectively, when referred to the most convenient axes of reference, by equations of the five types (0 and b positive) :

(1)

that is, a, 0, y are the cosine-inclinations of Oxi to Ox, Oy, Oz; a', 0', y' those of Oy u &c.

And this diagram gives also the linear expressions of the co-ordinates fa, yi, zi) or (x, y, z) of either set in terms of those of the

other set; we thus have

*Xi = a *+/3 y--y z, x = aXi--a'yi--a"zi,*

yi = a'x+p'y+y'z, y = px 1 +p'y l +p"z l ,

z 1 = a"x+0"y+y"z, z = yxi+y'y 1 +y"z 1 ,

which are obtained by projection, as above explained. Each of

these equations is, in fact, nothing else than the before-mentioned

equation p = a'£--0'ii--y'£, adapted to the problem in hand.

But we have to consider the relations between the nine coefficients. By what precedes, or by the consideration that we must have identically x i +y i +z=Xi i +yi i +zi. 2 , it appears that these satisfy the relations —*

a 2 +P +7 2 =1, o 4 +a' 2 -fa" 2 =1,

a' 2 +/3' 2 +7' 2 i =1, P>+0' 2 +P" 2 =1,

a 2 +/J' 2 +y n =1, V+7' 2 +y" 2 =1.*

a'a"+8'f)"+y'y' = 0, 07+0V+/JV = O,

a"a +/S"0 +7'7 =0, ya+y'a' +y"a" <=0,

00' +flS' +77' =0, aj8+a'/3'+a"j8" = 0,

either set of six equations being implied in the other set. It follows that the square of the determinant

, P , 7 ,P,y' , P", y" is = i; and hence that the determinant itself is= ±I. The dis- tinction of the two cases is an important one: if the determinant is = +1, then the axes Ox\, Oy\, Ozi are such that they can by a rotation about O be brought to coincide with Ox, Oy, Oz respect- ively ; if it is = — I , then they cannot. But in the latter case, by measuring x u y it Zi in the opposite directions we change the signs of all the coefficients and so make the determinant to be = +1 ; hence the former case need alone be considered, and it is accordingly assumed that the determinant is = +1. This being so, it is found that we have the equality o=/3'7"— 0"y', and eight like ones, obtained from this by cyclical interchanges of the letters o, /J, 7, and of unaccented, singly and doubly accented letters.

36. The nine cosine-inclinations above are, as has been seen, connected by six equations. It ought then to be possible to express them all in terms of three parameters. An elegant means of doing this has been given by Rodrigues, who has shown that the tabular expression of the formulae of transformation may be written

X

y

z

X,

I+A'-V-o 2

2(X/i-!>)

2(v\+ix)

y-.

2(X M + »)

i-x 2 -tv-j- 2

2(/U"fX)

Z

2(i>X-m)

2(M^+X)

I — X 2 — M 2 + 1 ^

(2) (3) (4)

(5)

x V z = — +^-t, elliptic paraboloid.

|z = ^r, hyperbolic paraboloid.

^4-2! 4.5! a^b^c 2

-1, ellipsoid.

,-\~ — 2 = I > hyperboloid of one sheet.

•1, ‘hyperboloid of two sheets.

a-

o 2+ 6 2 c 2

It is at once seen that these are distinct surfaces ; and the equa- tions also show very readily the general form and mode of genera- tion of the several surfaces.

In the elliptic paraboloid (fig. 61) the sections by the planes of zx and zy are the parabolas

x> y* la i-o having the common axes Oz; and the section by any plane z = y parallel to that of xy is the ellipse * 2 . y 1 y = Ta + ~>>”

2b’

Fig. 61.

so that the surface is generated by

a variable ellipse moving parallel to itself along the parabolas as

directrices.

In the hyperbolic paraboloid (figs. 62 and 63) the sections by the

planes of zx, zy are the parabolas z = gj>z = -gp having the opposite

axes Oz, Oz’, and the section by 3. plane z — y parallel to that of

xyis the hyperbola 7 = ˆ — 2j. which has its transverse axis parallel

to Ox or Oy according as 7 is positive or negative.

z

The surface is thus

-(I+X 2 +M 2 +ˆ),

the meaning being that the coefficients in the transformation are fractions, with numerators expressed as in the table, and the

common denominator.

generated by a variable hyperbola moving parallel to itself along the parabolas as directrices. The form is best seen from fig. 63, which represents the sec- tions by planes parallel to the plane of xy, or say the contour lines; the con- tinuous lines are the sec- tions above the plane of xy, and the dotted lines the sections below this plane. The form is, in fact, that of a saddleˆ

In the ellipsoid (fig. 64) the sections by the planes of zx, zy, and xy are each of them an ellipse, and the section by any parallel plane is also an ellipse.

The surface may be con- Fig. 64.

sidered as generated by an ellipse moving parallel to itself along two ellipses as directrices.

In the hyperboloid of one sheet (fig. 65), the sections by the planes of zx, zy are the hyperbolas

& _ z« _ , jf

-2 ,2 ‘ £2~

1,

E. c z

Fig. 65.

we get in like manner the generators of the other system; there will be the same general configuration when a + 6. The hyperbolic paraboloid is also covered by two systems of rectilinear generators as a method like that used in § 34 establishes without difficulty. The figures should be studied to see how they can lie.

In the hyperboloid of two sheets (fig. 66) the sections by the planes of zx and zy are the hyperbolas

_z?-! £_£ =*

c * a 2 l > £ 2 £2 J .

having a common transverse axis along z'Oz; the section by any plane z= ±7 parallel to that of xy is the ellipse

a?^ & c 2 ' provided 7 2 >c 2 , and the surface, consisting of two distinct portions or sheets, may be considered as generated by a variable ellipse moving parallel to itself along the hyperbolas as directrices.

38. Differential Geometry of Curves. — For convenience consider the coordinates (x, y, z) of a point on a curve in space to be given as functions of a variable parameter 8, which may in particular be one of themselves. Use the notation x', x" for dx/d8, dtx/dB*, and similarly as to y and z. Only a few formulae will be given. Call the current coordinates (£, 7;, f).

The tangent at (x, y, z) is the line tended to as a limit by the connector of (x, y, z) and a neighbouring point of the curve when the latter moves up to the former: its equations are

a-x)/x'=(,-y)//=(r-z)/z'.

The osculating plane at (x, y, z) is the plane tended to as a limit by that through (z, y, z) and two neighbouring points of the curve as these, remaining distinct, both move up to (x, y, z) : its one equation is

(£-x)(y'z" -y»z') + (i,-y)(z'x" -z"x') + {r-z)(x'y" -x»y')=o.

The normal plane is the plane through (x, y, z) at right angles to the tangent line, i.e. the plane

x'(£-x)+y(T,-y)+z'(!;-z)=o. It cuts the osculating plane in a line called the principal normal. Every line through (x, y, z) in the normal plane is a normal. The normal perpendicular to the osculating plane is called the binomial. A tangent, principal normal, and binormal are a convenient set of rectangular axes to use as those of reference,»when the nature of a< curve near a point on it is to be discussed.

Through (x, y, z) and three neighbouring points, all on the curve, passes a single sphere ; and as the three points all move up to {x, y, z) continuing distinct, the sphere tends to a limiting size and position. The limit tended to is the sphere of closest contact with the curve at x, y, z)\ its centre and radius are called the centre and

radius of spherical curvature. It cuts the osculating plane in a circle, called the circle of absolute curvature; and the centre and radius of this circle are the centre and radius of absolute curvature. The centre of

absolute curvature is the limiting position of the point where the principal normal at (x, y, z) is cut by the normal plane at a neighbour- ing point, as that point moves up to (x, y, z).

39. Differential Geometry of Surfaces. — Let (x, y, z) be any chosen point on a surface /(x, y, z) = o. As a second point of the surface moves up to (x, y, z), its connector with (x, y, z) tends to a limiting position, a tangent line to the surface at (x, y, z). All these tangent lines at (x, y, z), obtained by approaching (x, y, z) from different directions on a surface, lie in one plane

!«-) + g(,-:v) + g(f-s) = o.*

This plane is called the tangent plane at (x, y, z). One line through (x, y, z) is at right angles to the tangent plane. This is the normal

The tangent plane is cut by the surface in a curve, real or imaginary, with a node or double point at {x, y, z). Two of the tangent lines touch this curve at the node. They are called the " chief tangents " (Haupi-tangenten) at (x, y, z) ; they have closer contact with the surface than any other tangents.

In the case of a quadric surface the curve of intersection of a tangent and the surface is of the second order and has a node, it must therefore consist of two straight lines. Consequently a quadric surface is covered by two sets of straight lines, a pair through every point on it ; these are imaginary for the ellipsoid, hyperboloid of two sheets, and elliptic paraboloid.

A surface of any order is covered by two singly infinite systems of curves, a pair through every point, the tangents to which are all chief tangents at their respective points of contact. These are called chief-tangent curves ; on a quadric surface they are the above straight lines.

40. The tangents at a point of a surface which bisect the angles between the chief tangents are called the principal tangents at the point. They are at right angles, and together with the normal constitute a convenient set of rectangular axes to which to refer the surface when its properties near the point are under discussion. At a special point which is such that the chief tangents there run to the

circular points at infinity in the tangent plane, the principal tangents are indeterminate ; such a special point is called an umbilic of the surface.

There are two singly infinite systems of curves on a surface, a pair cutting one another at right angles through every point upon it, all tangents to which are principal tangents of the surface at their respective points of contact. These are called lines of curvature, because of a property next to be mentioned.

As a point Q moves in an arbitrary direction on a surface from coincidence with a chosen point P, the normal at it, as a rule, at once fails to meet the normal at P ; but, if it takes the direction of a line of curvature through P, this is instantaneously not the case. We have thus on the normal two centres of curvature, and the distances of these from the point on the surface are the two principal radii of curvature of the surface at that point ; these are also the radii of curvature of the sections of the surface by planes through the normal and the two principal tangents respectively ; or say they are the radii of curvature of the normal sections through the two principal tangents respectively. Take at the point the axis of z in the direction of the normal, and those of x and y in the directions of the principal tangents respectively, then, if the radii of curvature be a, b (the signs being such that the coordinates of the two centres of curvature are z = o and z = b respectively), the surface has in the neighbourhood of the point the form of the paraboloid

and the chief -tangents are determined by the equation O = – — [-
£■■

The two centres of curvature may be on the same side of the point or on opposite sides ; in the former case a and b have the same sign, the paraboloid is elliptic, and the chief -tangents are imaginary; in the latter case a and b have opposite signs, the paraboloid is hyperbolic, and the chief -tangents are real.

The normal sections of the surface and the paraboloid by the same plane have the same radius of curvature; and it thence readily follows that the radius of curvature of a normal section of the surface by a plane inclined at an angle $ to that of zx is given by the equation

l_cos 2 9 , sin 2 fl P a b

The section in question is that by a plane through the normal and a

line in the tangent plane inclined at an angle 8 to the principal tangent along the axis of x. To complete the theory, consider the section by a plane having the same trace upon the tangent plane, but inclined to the normal at an angle 4 >; then it is shown without difficulty (Meunier's theorem) that the radius of curvature of this inclined section of the surface is =«p cos .

Authorities. — The above article is largely based on that by Arthur Cayley in the 9th edition of this work. Of early and im- portant recent publications on analytical geometry, special mention

is to be made of R. Descartes, Giomitrie (Leyden, 1637) ; John Wallis, Tractatus de sectionibus conicis nova melhodo expositis (1655, Opera mathematica, i., Oxford, 1695); de l'Hospital, Traiti analytique des sections coniques (Paris, 1720); Leonhard Euler, Inlroductio in analysin infinitorum, ii. (Lausanne, 1748); Gaspard Monge, " Appli- cation d'algebre a la geome'trie " (Journ. Scole Polytech., 1801); Julius Pliicker, Analytisch-geometrische Entwickelungen, 3 Bde. (Essen, 1828-1831); System der analytischen Geometrie (Berlin, '835); G. Salmon, A Treatise on Conic Sections (Dublin, 1848; 6th ed., London, 1879) ; Ch. Briot and J. Bouquet, Lecons de geo- metrie analytique (Paris, 1851; 16th ed., 1897); M. Chasles, Traiti de geometrie supirieure (Paris, 1852); Wilhelm Fiedler, Analytische Geometrie der Kegelschnitte nach G. Salmon frei bearbeitet (Leipzig, 5te Aufl., 1887-1888); N. M. Ferrers, An Elementary Treatise on Trilinear Coordinates (London, 1861); Otto Hesse, Vorlesungen aus der analytischen Geometrie (Leipzig, 1865, 1881); W. A. Whit- worth, Trilinear Coordinates and other Methods of Modem Analytical Geometry (Cambridge, 1866); J. Booth, A Treatise on Some New Geometrical Methods (London, i., 1873; ii., 1877); A. Clebsch- F. Lindemann, Vorlesungen iiber Geometrie, Bd. i. (Leipzig, 1876, 2te Aufl., 1891); R. Baltser, Analytische Geometrie (Leipzig, 1882); Charlotte A. Scott, Modern Methods of Analytical Geometry (London, 1894); G. Salmon, A Treatise on the Analytical Geometry of three Dimensions (Dublin, 1862; 4th ed., 1882); Salmon-Fiedler, Analy- tische Geometrie des Raumes (Leipzig, 1863; 4te Aufl., 1898); P. Frost, Solid Geometry

(London, 3rd ed., 1886; 1st ed., Frost and J. Wolstenholme). See also E. Pascal, Repertorio di matematiche superiori, II. Geometria (Milan, 1900), and articles now appearing in the Encyklopadie der mathematiscfwn Wissenschaften, Bd. iii. 1, 2.

. (E. B. El.)

V. Line Geometry

Line geometry is the name applied to those geometrical investigations in which the straight line replaces the point as element. Just as ordinary geometry deals primarily with- points and systems of points, this theory deals in the first instance with straight lines and systems of straight lines. In two dimen- sions there is no necessity for a special line geometry, inasmuch as the straight line and the point are interchangeable by the principle of duality; but in three dimensions the straight line is its own reciprocal, and for the better discussion of systems of lines we require some new apparatus, e.g., a system of co- ordinates applicable to straight lines rather than to points. The essential features of the subject are most easily elucidated by analytical methods: we shall therefore begin with the notion of line coordinates, and in order to emphasize the merits of the system of coordinates ultimately adopted, we first notice a system without these advantages, but often useful in special investigations.

In ordinary Cartesian coordinates the two equations of a straight line may be reduced to the form $y = rx+s$, $z = tx+u$, and r, s, t, u may be regarded as the four coordinates of the line. These co-ordinates lack symmetry: moreover, in changing from one base of reference to another the transformation is not linear, so that the degree of an equation is deprived of real significance. For purposes of the general theory we employ homogeneous coordinates; if Xiy^ZiWi and XiytZ&Oi are two points on the line, it is easily verified that the six determinants of the array

I Xiy 2 ZiWi I

are in the same ratios for all point-pairs on the line, and further, that when the point coordinates undergo a linear transformation so also do these six determinants. We therefore adopt these six determinants for the coordinates of the line, and express them by the symbols /, \, m, m, «> v where l = XiW 2 — x 2 Wi, 'k=yiZ i —yiZi, &c. There is the further advantage that if aibiCidi and OibiCiih be two planes through the line, the six determinants

1 aibiCidi I

I aibtCzdi I are in the same ratios as the foregoing, so that except as regards a factor of proportionality we have \ = bic 2 — btCi, l — Cid 2 — Czdi, &c. The identical relation l--mn--nv = o reduces thenumber of inde- pendent constants in the six coordinates to four, for we are only concerned with their mutual ratios; and the quadratic character of this relation marks an essential difference between point geometry and line geometry. The condition of intersection of two lines is

l' +l'--mn'+m'n \nv --n'v = o

where the accented letters refer to the second line. If the coordinates are Cartesian and /, m, n are direction cosines, the quantity on the left is the mutual moment of the two lines.

Since a line depends on four constants, there are three distinct types of configurations arising in line geometry — those containing a triply- infinite, a doubly- infinite and a singly-infinite number of lines; thev

are called Complexes, Congruences, and Ruled Surfaces or Skews respectively. A Complex is thus a system of lines satisfying one condition — that is, the coordinates are connected by a single relation ; and the degree of the complex is the degree of this equation supposing it to be algebraic. The lines of a complex of the nth degree which pass through any point lie on a cone of the reth degree, those which lie in any plane envelop a curve of the nth class and there are re lines of the complex in any plane pencil; the last statement combines the former two, for it shows that the cone is of the nth degree and the curve is of the nth class. To find the lines common to four complexes of degrees n it n 2 , n 3 , nt, we have to solve five equations, viz. the four complex equations together with the quadratic equation connecting the line coordinates, therefore the number of common lines is 2nire2n 3 »4. As an example of complexes we have the lines meeting a twisted curve of the nth degree, which form a complex of the nth degree.

A Congruence is the set of lines satisfying two conditions: thus a finite number m of the lines pass through any point, and a finite number n lie in any plane; these numbers are called the degree and class respectively, and the congruence is symbolically written (m, n).

The simplest example of a congruence is the system of lines

constituted by all those that pass through m points and those that lie in n planes; through any other point there pass m of these lines, and in any other plane there lie n, therefore the congruence is of degree m and class n. It has been shown by G. H. Halphen that the number of lines common to two congruences is mm'+nn', which may be verified by taking one of them to be of this simple type. The lines meeting two fixed lines form the general (1, 1) congruence; and the chords of a twisted cubic form the general type of a (1, 3) congruence; Halphen's result shows that two twisted cubics have in general ten common chords. As regards the analytical treatment, the difficulty is of the same nature as that arising in the theory of curves in space, for a congruence is not in general the complete intersection of two complexes.

A Ruled Surface, Regulus or Skew is a configuration of lines which satisfy three conditions, and therefore depend on only one parameter. Such lines all lie on a surface, for we cannot draw one through an arbitrary point; only one line passes through a point of the surface; the simplest example, that of a quadric surface, is really two skews on the same surface.

The degree of a ruled surface qua line geometry is the number of its generating lines contained in a linear complex. Now the number which meets a given line is the degree of the surface qua point geometry, and as the lines meeting a given line form a particular case of linear complex, it follows that the degree is the same from whichever point of view we regard it. The lines common to three com-Clexes of degrees, nimni, form a ruled surface of degree 2rain2ns; ut not every ruled surface is the complete intersection of three complexes.

In the case of a complex of the first degree (or linear complex) the lines through a fixed point lie in a plane called the polar plane or nul-plane of that point, and those lying in a fixed plane

pass through a point called the nul-point or pole of the comniex plane. If the nul-plane of A pass through B, then the nul-plane of B will pass through A; the nul-planes of all points on one line h pass through another line k- The relation between h and h is reciprocal; any line of the complex that meets one will also meet the other,";and every line meeting both belongs to the complex. They are called conjugate or polar lines with respect to the complex. On these principles can be founded a theory of reciprocation with respect to a linear complex.

This may be aptly illustrated by an elegant example due to A. Voss. Since a twisted cubic can be made to satisfy twelve conditions, it might be supposed that a finite number could be drawn to touch four given lines, but this is not the case. For, suppose one such can be drawn, then its reciprocal with respect to any linear complex containing the four lines is a curve of the third class, i.e. another twisted cubic, touching the same four lines, which are unaltered in the process of reciprocation; as there is an infinite number of complexes containing the four lines, there is an infinite number of cubics touching the four lines, and the problem is poristic.*

The following are some geometrical constructions relating to the unique linear complex that can be drawn to contain five arbitrary lines:

To construct the nul-plane of any point O, we observe that the two lines which meet any four of the given five are conjugate lines of the complex, and the line drawn through to meet them is therefore a ray of the complex; similarly, by choosing another four we can find another ray through jO : these rays lie in the nul- plane, and there is clearly a result involved that the five lines so obtained all lie in one plane. A reciprocal construction will enable us to find the nul-point of any plane. Proceeding now to the metrical properties and the statical and dynamical applications, we remark that there is just one line such that the nul-plane of any point on it is perpendicular to it. This is called the central axis; if d be the shortest distance, 9 the angle between it and a ray of the complex, then d tan 6 = p, where p is a constant called the pitch or parameter. Any system of forces can be reduced to a force R along a certain line, and a couple G perpendicular to that line; the lines of nul-moment

for the system form a linear complex of which the given line is the central axis and .the quotient G/R is the pitch. Any motion of a rigid body can be reduced to a screw motion about a certain line, i.e. to an angular velocity a about that line combined with a linear velocity u along the line. The plane drawn through any point perpendipular to the direction of its motion is its nul-plane with respect to a linear complex having this line for central axis, and the quotient u/oi for pitch (cf. Sir R. S. Ball, Theory of Screws).

The following are some properties of a configuration of two linear complexes:

The lines common to the two-complexes also belong to an infinite number of linear complexes, of which two reduce to single straight lines. These two lines are conjugate lines with respect to each of the complexes, but they may coincide, and then some simple modifications are required. The locus of the central axis of this system of complexes is a surface of the third degree called the cylindroid, which plays a leading part in the theory of screws as developed synthetically by Ball. Since a linear complex has an invariant of the second degree in its coefficients, it follows that two linear complexes have a lineo-linear invariant. This invariant is fundamental : if the complexes be both straight lines, its vanishing is the condition of their intersection as given above; if only one of them be a straight line, its vanishing is the condition that this line should belong to the other complex. When it vanishes for any two complexes they are said to be in involution or apolar; the nul-points P, Q of any plane then divide harmonically the points in which the plane meets the common conjugate lines, and each complex is its own reciprocal with respect to the other. As regards a configuration of these linear complexes, the common lines from one system of generators of a quadric, and the doubly infinite system of complexes containing the common lines, include an infinite number of straight lines which form the other system of generators of the same quadric.

If the equation of a linear complex is AZ + BOT-t-Cn + DX + Eju-r- Fv = o, then for a line not belonging to the complex we may regard the expression on the left-hand side as a multiple of the General momen t of the line with respect to the complex, the word rdfates moment being used in the statical sense; and we infer ‘ that when the coordinates are replaced by linear functions

of themselves the new coordinates are multiples of the moments of the line with respect to six fixed complexes. The essential features of this coordinate system are the same as those of the original one, viz. there are six coordinates connected by a quadratic equation, but this relation has in general a different form. By suitable choice of the six fundamental complexes, as they may be called, this con- necting relation may be brought into other simple forms of which we mention two: (i.) When the six are mutually in involution it can be reduced to xf + xf + xf + xf + xf + xj^o; (ii.) When the first four are in involution and the other two are the lines common to the first four it is xi + Xt’ + x? + xf— 2*5*8 = 0. These generalized coordinates might be explained without reference to actual magni- tude, just as*

.homogeneous point coordinates can be; the essential remark is that the equation of any coordinate to zero represents a linear complex, a point of view which includes our original system, for the equation of a coordinate to zero represents all the lines meeting an edge of the fundamental tetrahedron.

The system of coordinates referred to six complexes mutually in involution was introduced by Felix Klein, and in many cases is more useful than that derived directly from point coordinates; e.g. in the discussion of quadratic complexes: by means of it Klein has developed an analogy between line geometry and the geometry of spheres as treated by G. Darboux and others. In fact, in that geometry a point is represented by ./roe coordinates, connected by a relation of the same type as the one just mentioned when the five fundamental spheres are mutually at right angles and the equation of a sphere is of the first degree. Extending this to four dimensions of space, we obtain an exact analogue of line geometry, in which (i.) a point corresponds to a line; (ii.) a linear complex to a hyper- sphere; (iii.) two linear complexes in involution to two orthogonal hyperspheres; (iv.) a linear complex and two conjugate lines to a hypersphere and two inverse points. Many results may be obtained by this principle, and more still are suggested by trying to extend the properties of circles to spheres in three and four dimensions. Thus the elementary theorem, that, given four lines, the circles circumscribed to the four triangles formed by them are concurrent, may be extended to six hyperplanes in four dimensions; and then we can derive a result in line geometry by translating the inverse of this theorem. Again, just as there is an infinite number of spheres touching a surface at a given point, two of them having contact of a closer nature, so there is an infinite number of linear complexes touching a non-linear complex at a given line, and three of these have contact of a closer nature (cf. Klein, Math. Ann. v.).

Sophus Lie has pointed out a different analogy with sphere geometry. Suppose, in fact, that the equation of a sphere of radius f is

$x\ i\ +y\ 2\ +sP+2ax+2by+2cz+d=o,$

so that r I =a , +6 2 +c ! — d;then introducing the quantity* to make this equation homogeneous, we may regard the sphere as given by the six coordinates a, b, c, d, e, r connected by the equation a 2 + b?ˆ-c s — r 8 — 2e. = o, and it is easy to see that two spheres touch, if

the polar form 2aa l +2bb 1 +2cc l —2rr 1 —de l —d l e vanishes.

Com- paring this with the equation x 1 1 +x i 2 +Xs 2 +x i i 2XiX e = o given above, it appears that this sphere geometry and line g eome try are identical, for we may write o = Xi, b = x 2 , c = Xt, r = Xt& — l, d — x&, e = i 6 ; but it is to be noticed that a sphere is really replaced by two lines whose coordinates only differ in the sign of x v so that they are polar lines with respect to the complex * 4 =o, Two spheres which touch correspond to two lines which intersect, or more accurately to two pairs of lines (p, p') and(g, g')» of which the pairs (p, q) and (p', q') both intersect. By this means the problem of describing a sphere to touch four given spheres is reduced to that of drawing a pair of lines (/, t') (of which t intersects one line of the four pairs (PP')t (2?')> ('''''). (w')> a "d f intersects the remaining four). We may, however, ignore the accented letters in translating theorems, for a configuration of lines and its polar with respect to a linear complex have the same projective properties. In Lie's transforma tion a linear complex corresponds to the totality of spheres cutting a given sphere at a given angle. A most remarkable result is that lines of curvature in the sphere geometry become asymptotic lines in the line geometry.*

Some of the principles of line geometry may be brought into clearer light by admitting the ideas of space of four and five dimensions.

Thus, regarding the coordinates of a line as homogeneous co-ordinates in five dimensions, we may say that line geometry is equivalent to geometry on a quadric surface in five dimensions. A linear complex is represented by a hyperplane section; and if two such complexes are in involution, the corresponding hyperplanes are conjugate with respect to the fundamental quadric. By pro- jecting this quadric stereographically into space of four dimensions we obtain Klein's analogy. In the same way geometry in a linear complex is equivalent to geometry on a quadric in four dimensions; when two lines intersect the representative points are on the same generator of this quadric. Stereographic projection, therefore, converts a curve in a linear complex, i.e. one whose tangents all belong to the complex, into one whose tangents intersect a fixed conic : when this conic is the imaginary circle at infinity the curve is what Lie calls a minimal curve. Curves in a linear complex have been extensively studied. The osculating plane at any point of such a curve is the nul-plane of the point with respect to the complex, and points of superosculation always coincide in pairs at the points of contact of stationary tangents. When a point of such a curve is given, the osculating plane is determined, hence all the curves through a given point with the same tangent have the same torsion.

The lines through a given point that belong to a complex of the wth degree lie on a cone of the nth degree : if this cone has a double line the point is said to be a singular point. Similarly, «._.. a plane is said to be singular when the envelope of the , " lines in it has a double tangent. It is very remarkable , " that the same surface is the locus of the singular points '*

and the envelope of the singular planes: this surface is called the singular surface, and "both its degree and class are in general 2«(»-i) 2 , which is equal to four for the quadratic complex.

The singular lines of a complex F = o are the lines common to F and the complex

§E 5 Z_i_?Il s E_l s Jl ?E_n SI S\ + Sm S/i + Sn Sv~°-

As already mentioned, at each line I of a complex there is an infinite number of tangent linear complexes, and they all contain the lines adjacent to /. If now / be a singular line, these complexes all reduce to straight lines which form a plane pencil containing the line /. Suppose the vertex of the pencil is A, its plane a, and one of its lines £, then /' being a complex line near I, meets f, or more accurately the mutual moment of /', and is of the second order of small quantities. If P be a point on I, a line through P quite near I in the plane a will meet £ and is therefore a line of the complex; hence the complex-cones of all points on 7 touch a and the complex-curves of all planes through I touch I at A. It follows that I is a double line of the complex-cone of A, and a double tangent of the complex- curve of a. Conversely, a double line of a cone or curve is a singular line, and a singular line clearly touches the curves of all planes through it in the same point. Suppose now that the consecutive line V is also a singular line, A' being the allied singular point, a' the singular plane and £' any line of the pencil (A', a') so that J' is a tangent line at /' to the complex: the mutual moments of the pairs /', £ and /, £ are each of the second order; hence the plane a' meets the lines / and f' in two points very near A. This being true for all singular planes, near a the point of contact of a with its envelope is in A, i.e. the locus of singular points is the same as the envelope of singular planes. Further, when a line touches a complex it touches the singular surface, for it belongs to a plane pencil like (Ao), and thus in Klein's analogy the analogue of a focus of a hyper- surface being a bitangent line of the complex is also a bitangent line of the singular surface. The theory of cosingular complexes is thus brought into line with that of confocal surfaces in four dimensions, and guided by these principles the existence of cosingular quadratic complexes can

easily be established, the analysis required being almost the same as that invented for confocal, cyclides by Darboux

LINE]

know n ther8, ° f C ° singular C0I "Plexes of higher degree nothing is

Following J. Plucker, we give an account of the lines of a quadratic complex that meet a given line. 4 c

• IJV!} 68 ˆ h0se v ? rtices are on the given line all pass throueh eight fixed points and envelop a surface of the fourth degree the conies whose planes contain the given line all lie on a surface of the fourth class and touch eight fixed planes. It is easy to see by ele- mentary geometry that these two surfaces are identical. Further the given line contains four singular points A u A 2 , A,, A 4 and the planes into which their cones degenerate are the eght 'common tangent planes mentioned above; similarly, there are four singular planes a,, «,, «„ B4l through the line, and the eight points into which their comes degenerate are the eight common points above The locus of the pole of the line with respect to all the conies in planes through it is a straight line called the polar line of the given one; and through this line passes the polar plane of the given line with respect to each of the cones. The name polar is applied in the ordinary analytical sense; any line has an infinite number of polar complexes with respect to the given complex, for the equation of the latter can be written in an infinite number of ways; one of these polars is a straight line, and is the polar line already introduced. The surface on which he all the comes through a line I is called the Plucker surface of that line: from the known properties of (2 2) correspondences it can be shown that the Plucker surface of / cuts /, in a range of the same cross ratio as that of the range in which the Plucker surface of /, cuts /. Applying this to the case in which h is the polar of /, we find that the cross ratios of (A l7 A 2 , A 3 A 4) and (a,, a,, a,, at) are equal. The identity of the locus of the A's with the envelope of the a s follows at once; moreover, a- line meets the singular surface in four points having the same cross ratio as that of the four tangent planes drawn through the line to touch the sur- face. The Plucker surface has eight nodes, eight singular tangent planes and is a double line. The relation between I line and its W I mV S BOt -\ ˆiproral one wi th respect to the complex; but VV. Stahl has pointed out that the relation is reciprocal as far as the singular surface is concerned.

To facilitate the discussion of the general quadratic complex we Quadratic introduce Klein s canonical form. We have, in fact, to

complexes. aeal w *h two quadratic equations in six variables ; and by form suitable “near transformations these can be reduced to the

ai*i’fas*2 s +a 3 *8 I +04*4 a +a 5 × 6 »- r -a (i * e » = o *i 2 + * 2 2 + xj+ Xi ‘+ x?+ * 6 2 = o subject to certain exceptions, which will be mentioned later rWW?, . r – St eq – uation , t0 be , that of the complex, we remark

orH ™?e *? uatlons f r . e unaltered by changing the sign of any co-ordinate; the geometrical meaning of this is, that the quadratic complex is its Own reciprocal with respect to each of the six funda- E £t \Z & 1 f ° r c * an Z\ n S the sign of a coordinate is equivalent to taking the polar of a line with respect to the corresponding fundamental complex. It is easy to establish the existence of

r 4 Tr Tl\ 1/ bl l a ; nge ‘L t , hnear . co’PP’exes, for the complex hxi-t hXi+l3X t +la l +l s x i +l tXt = o is a bitangent when

/ I= o, and Ji-+J£- + J^ + ii!_

.... , d 2~ a l °3-Ol at-Ui Js-o/lIi-J, ”’

and its lines of contact are conjugate lines with respect to the first fundamental complex We therefore infer the existence of six systems of bitangent lines of the complex, of which the first is given bv

_xi , x 3 2 , x

GEOMETRY

*i=o,-

+

: + ;

+

e- . f l .• Ch ~. a ‘ a 3-^i ‘ a t -ai ‘ a b -a, ‘ a^a, Each of these lines is a bitangent of the singular surface, which is therefore completely determined as. being the focal surface of the (2, 2) congruence above It is thence easy to verify that the two complexes Xaf = o and SZ > * 2 = o are cosingular if b r = a r X+M/a r(, + „

The singular surface of the general quadratic complex is the famous quartic, with sixteen nodes and sixteen singular tangent planes, first discovered by E. E. Kummer “-anient

We cannot give a full account of its properties here, but we deduce at once from the above that its bitangents break up into six (2 2) congruences, and the six linear complexes containing these are mutually in involution. The nodes of the singular surface are points whose complex cones are coincident planes, and the complex conic in a singular tangent plane consists of two coincident points This configuration of sixteen points and planes has many interesting properties; thus each plane contains six points which lie on a conic, while through each point there pass six planes which touch a quadric cone. In many respects the Kummer quartic plays a part in three dimensions analogous to the general quartic curve in two; it further gives a natural representation of certain relations between hyper- elhptic functions (cf. R W. H. T. Hudson, Rummer's Quartic, 190O . As might be expected from the magnitude of a form in six variables the number of projectivally distinct varieties of quadratic complexes Classifies. 1S vef y great; and in fact Adolf Weiler, by whom the Hon ot S ue ^!°. n was first systematically studied on lines indicated quadratic Dy Kleln , enumerated no fewer than forty-nine different complexes. types. But the principle of the classification is so im- , . . portant, and withal so simple, that we give a brief sketch which indicates its essential features. sxetcn

■ *723*

P YL% ^ P. racticaI >y to s tudy the intersection of two quadrics F and F in six variables and to classify the different cases arising we make use of the results of Karl Weierstrass on the equivalencf

*thevaTL ^ Palr cf ° f «J uad « tic «: A * f a r a * a t presen? required! they areas follows: Suppose that the factorized form of the deter- minantal equation Disct (F+XF') =0 is*

(X-a)"i+VI-V • •(X-/3) t i+ , 2+Vk .....

where the root a occurs , + +„ . . . times in the determinant,

*minor' H™, 65 m IZ ^ mm ? r ' *> + ■•• times in every second minor and so on; the meaning of each exponent is then perfectly*

felemenVarvT '* W.f ^ tyP ? ^^ ^ CalIed an elem!nSl ttTJl Y dlV1S ° f r) ° f *, he det ^n;inant, and the condition of equiva- rh™. ? PairS .° f ^ d F atlcs w amply that their determinants have*

aiiv Xs rT/ 7 d /,7 sors \ We T, e the pair of forms s y mbolic –

ally thus [(S1S2 . . .), (tih ...),.. .], letters n the inner brackets

referring to the same factor. Returning now to the two quadratics

3?wn tmg S he COmpleX> ˆ he SUm of the exponents wm be six and two complexes are put in the same class if they have the same symbolical expression; i.e. the actual values of the roots ofX determinantal equation need not be the same for both, but their

thHwo 4 C p UrrenCe ‘ aS – far as f h T indicated, must be identical in the two. The enumeration of all possible cases is thus reduced to a simple question in combinatorial analysis, and the actual study of any particular case is much facilitated by a useful rule of Klein’s

£v P n r ˆ’ ng Wn T a JT P H form two quadratics belonging to a given class— one of which, of course, represents the equation connecting line coordinates, and the other the equation of the complex The general complex is naturally [mm]; the complex of tangents UotTˆV- I(III)’.(III)1 and that of lines meeting a conic is [aI«} 1 ” ˆformation will be found in Weiler’s memoir, Math.

SLflrl, VOl. VII.

=„K;!! e , detailed , Study of each variet y of complex opens up a vast ˆtZAˆTplT SPedal CaS6S ‘ the ha ™onic implex The harmonic complex, first studied by Battaglini, is generated in an infinite number of ways by the lines cutting two quadrics harmonically Taking the most general case, and referring thl ~£n to n th a elr . comm °n self-conjugate tetrahedron, we can find its

H? Ua nH 1 a SlmpIe f ° rm ‘ and venf y that this complex really depends only on seventeen constants, so that it is not the most general quadratic complex. It belongs to the general type in so far as it is discussed above, but the roots of the determinant are in involution. The singular surface is the ” tetrahedroid ” discussed bv t Y iT y i> . Asa ,Particular case, from a metrical point of view, we have L. b. Painvins complex generated by the lines of intersection of heinˆ n R ICU r tangent Pla f nes ofa quadric, the singular surface now being Fresnel s wave surface. The tetrahedral or Reye complex is

ˆLrˆK ˆ b r St kn °u Wn u° f proper quadratic complexes. It is generated by the lines which cut the faces of a tetrahedron in a constant cross ratio, and therefore by those subtending the same cross ratio at the four vertices. The singular surface is made up of the faces or the vertices of the fundamental tetrahedron, and each edge of this tetrahedron is a double line of the complex. The complex was first discussed by K. T. Reye as the assemblage of lines

s™ n p P ng a nH r ˆ S – POndlI !. g P01 ” tS J” ? nomographic transformation of space, and this point of view leads to many important and elegant properties. A (metrically) particular case of great interest is the complex generated by the normals to a family of confocal quadrics and tor many investigations it is convenient to deal with this com-

fteVhP rred f t0 thC P ” nci ?, al aX6S – For exam P’e. L ie has developed fcˆ curve f ln a R eye complex (i.e. curves whose tangents belong to the complex) as solutions of a differential equation of the hiiV ˆWyte + Mydtdx + Wzdxdy-o, and we can simplify this equation by a logarithmic transformation. Many theorems connecting complexes with differential equations have been given by Lie and his school, A line complex, in fact, corresponds to a Mongian equation having 00 » line integrals.

As the coordinates of a line belonging to a congruence are functions ?o Z’? P f n ‘ Parameters, the theory of congruences is analogous to that of surfaces, and we may regard it as a fundamental inquiry to find the simplest form of surface into which Coa xru- a given congruence can be transformed. Most of those eaces ‘ on , Se nl P / n?h rtleS K aV 5 bee , n exte nsively discussed can be represented rffffirife hi b ˆ atl ° na l transformation. But in addition to the fnfnrl ˆ ,f e ˆV ° f al g e braic surfaces, a subject still in its infancy, the theory of congruences has other difficulties in that a congruence is seldom completely represented, even by two equations. A fundamental theorem is that the lines of a congruence are in general bitangents of a surface; in fact, since the condition of Inter f£T ? i W ° consec utive straight lines is ld\ + dmdu + dnd, = o, a fine / of the congruence meets two adjacent lines, say h and U

?A P a P rthen tW\ the P ‘ an ˆ Pe i n – Cil – {A l ai) and ‘• U in the Plane penc CA 2 a2), then the locus of the A’s is the same as the envelope of the

called”ˆ? t ˆ 6 ta ? gent i° lane at Al and a ‘ at A2 – This Surface is are hitPnˆnt tu 1 ˆ? the congruence, and to it all the lines I are bitangent. The distinctive property of the points A is that two

InlZˆ lme t ˆ hr ° Ugh them coincide, and in like manner the planes a each contain two coincident lines. The focal surface consists of two sheets, but one or both may degenerate into curves-

thus, for example, the normals to a surface are bltangents of the surface of centres, and in the case of Dupin's cyclide this surface degenerates into two conies.

In the discussion of congruences it soon becomes necessary to introduce another number r, called the rank, which expresses the number of plane pencils each of which contains an arbitrary line and two lines of the congruence. The order of the focal surface is 2tn(n-i)-2r, and its class is m{m-\)-2r. Our knowledge of congruences is almost exclusively confined to those in which either m or n does not exceed two. We give a brief account of those of the second order without singular lines, those of order unity not being especially interesting. A congruence generally has singular points through which an infinite number of lines pass; a singular point is said to be of order r when the lines through it lie on a cone of the rth degree. By means of formulae connecting the number of singular points and their orders with the class tn of quadratic con- gruence Kummer proved that the class cannot exceed seven. The focal surface is of degree four and class 2m; this kind of quartic surface has been extensively studied by Kummer, Cayley, Rohn and others. The varieties (2, 2), (2, 3), (2, 4), (2, 5) all belong to at least one Reye complex; and so also does the most important class of (2, 6) congruences which includes all the above as special cases. The congruence (2,2) belongs to a linear complex and forty different Reye complexes; as above remarked, the singular surface is Rummer's sixteen-nodal quartic, and the same surface is focal for six different congruences of this variety. The theory of (2, 2) congruences is completely analogous to that of the surfaces called cyclides in three dimensions. Further particulars regarding quad- ratic congruences will be found in Rummer's memoir of 1866, and the second volume of Sturm's treatise. The properties of quadratic congruences having singular lines, i.e. degenerate focal surfaces, are not so interesting as those of the above class; they have been discussed by Kummer, Sturm and others.

Since a ruled surface contains only 00 x elements, this theory is practically the same as that of curves. If a linear complex contains Ruled more than n generators of a ruled surface of the nth degree,

surfaces. '*• conta ' ns au the generators, hence for « = 2_ there are three linearly independent complexes, containing all the generators,

and this is a well-known property of quadric surfaces. In ruled cubics the generators all meet two lines which may or may not coincide; these two cases correspond to the two main classes of cubics discussed by Cayley and Cremona. As regards ruled quartics, the generators must lie in one and may lie in two linear complexes. The first class is equivalent to a quartic in four dimensions and is always rational, but the latter class has to be subdivided into the elliptic and the rational, just like twisted quartic curves. A quintic skew may not lie in a linear complex, and then it is unicursal, while of sextics we have two classes not in a linear complex, viz. the elliptic variety, having thirty-six places where a linear complex contains six consecutive generators, and the rational, having six such places.

The general theory of skews in two linear complexes is identical with that of curves on a quadric in three dimensions and is known. But for skews lying in only one linear complex there are difficulties; the curve now lies in four dimensions, and we represent it in three by stereographic projection as a curve meeting a given plane in n points on a conic. To find the maximum deficiency for a given degree would probably be difficult, but as far as degree eight the space-curve theory of Halphen and Nother can be translated into line geometry at once. When the skew does not lie in a linear complex at all the theory is more difficult still, and the general theory clearly cannot advance until further progress is made in the study of twisted curves.

References. — The earliest works of a general nature are Plucker, Neue Geometrie des Raumes (Leipzig, 1 868) ; and Kummer, " liber die algebraischen Strahlensysteme," Berlin Academy (1866). Systematic development on purely synthetic lines will be found in the three volumes of Sturm, Liniengeometrie (Leipzig, 1892, 1893, 1896); vol. i. deals with the linear and Reye complexes, vols. ii. and iii. with quadratic congruences and complexes respectively. For a highly suggestive review by Gino Loria see Bulletin des sciences mathematiques (1893, 1897). A shorter treatise, giving a very interesting account of Klein's coordinates, is the work of Koenigs, La Geometrie riglee et ses applications (Paris, 1898). English treatises are C. M. Jessop, Treatise on the Line Complex (1903); R. W. H. T. Hudson, Rummer's Quartic (1905). Many references to memoirs on line geometry will be found in Hagen, Synopsis der] hbheren Mathematik, ii. (Berlin, 1894) ; Loria, II passato ed it presente delle principali teorie geometriche (Milan, 1897); a clear resum6 of the principal results is contained in the very elegant volume of Pascal, Repertorio di mathematiche superiori, ii. (Milan, 1900). Another treatise dealing extensively with line geometry is Lie, Geometrie der Berilhrungstrans- formationen (Leipzig, 1896). Many memoirs on

the subject have appeared in the Mathematische Annalen; a full list of these will be found in the index to the first fifty volumes, p. 115. Perhaps the two memoirs which have left most impression on the subsequent development of the subject are Klein, " Zur Theorie der Linien- complexe des ersten und zweiten Grades," Math. Ann. ii.; and Lie, " Tiber Complexe, insbesondere Linien- und Kugelcomplexe," Math. Ann. v. (J. H. Gr.)

VI. Non-Euclidean Geometry

The various metrical geometries are concerned with the properties of the various types of congruence-groups, which are defined in the study of the axioms of geometry and of their immediate consequences. But this point of view of the subject is the outcome of recent research, and historically the subject has a different origin. Non-Euclidean geometry arose from the discussion, extending from the Greek period to the present day, of the various assumptions which are implicit in the traditional Euclidean system of geometry. In the course of these investiga- tions it became evident that metrical geometries, each internally consistent but inconsistent in many respects with each other and with the Euclidean system, could be developed. A short historical sketch will explain this origin of the subject, and describe the famous and interesting progress of thought on the subject. But previously a description of the chief characteristic properties of elliptic and of hyperbolic geometries will be given, assuming the standpoint arrived at below under VII. Axioms of Geometry.

First assume the equation to the absolute (cf. loc. cit.) to be v?-x l -y 1 -z l = o. The absolute is then real, and the geometry is hyberbolic.

The distance (du) between the two points (x u yi, zi, Wi) and (%, yi, Z2, wi) is given by cosh (d x Jy) = {wiWz – x\Xi – yiyi – Z1Z2)/) (a»i 2 – x? – yi 2 – zi 2)

(wf – xf – y? – z 2 2)}i

(1)

The only points to which the metrical geometry applies are those within the region enclosed by the quadric; the other points are " improper ideal points." The angle (#12) between two planes, liX-f-miy-f»tz-f-ritt> = o and hx-^-m i y+n i z+r 2 w = o, is given by cos 0i2 = (hk+minh+nith – rirs)/{(/i 2 +i»i 2 +»i ! – n 2)

J->:. ; ‘ ... (W+mf+nt-tf)} (2)*

These planes only have a real angle of inclination if they possess a line of intersection within the actual space, i.e. if they intersect. Planes which do not intersect possess a shortest distance along a line which is perpendicular to both of them. If this shortest distance is 812, we have cosh (S12/7) = (hh+mmi+nini – nr 2)l{{li 2 +mi 2 +ni 2 – r ?)

W+mJ+nJ-rftl (3)

Thus in the case of the two planes one and only one of the two, 6a and S12, is real. The same considerations hold for coplanar straight lines (see VII. Axioms of Geometry). Let O (fig. 67) be the point (o, o, o, 1), OX the line y = o, z = o, OY the line z = o, x = o, and OZ the line x = o, y = o. These are the coordinate axes and are at right angles to each other. Let P be any point, and let p be the distance OP, 8 the angle POZ, and the angle between the planes ZOX and ZOP. Then the co- ordinates of P can be taken to be

sinh {ply) sin 9 cos<£, sinh (ply) sin sin , sinh (ply) cos0, cosh {ply).

If ABC is a triangle, and the sides and angles are named accord- _

ing to the usual convention.we have ˆ IG- °7-

sinh {a/y)/sin A = sinh (bly)/sin B = sinh (c/7)/sin C,

(4)

and also

cosh (0/7) =cosh (6/7) cosh (c/y) — sinh (6/7) sinh (cjy) cos A, (5)

with two similar equations. The sum of the three angles of a triangle is always less than two right angles. The area of the triangle ABC isX 2 (?r— A — B — C). If the base BC of a triangle is kept fixed and the vertex A moves in the fixed plane ABC so that the area ABC is constant, then the locus of A is a line of equal distance from BC. This locus is not a straight line. The whole theory of similarity is inapplicable; two triangles are either congruent, or their angles are not equal two by two. Thus the elements of a triangle are determined when its three angles are given. By keeping A and B and the line BC fixed, but by making C move off to infinity along BC, the lines BC and AC become parallel, and the sides a and b become infinite. Hence from equation (5) above, it follows that two parallel lines (cf.

Geometry) must be considered as making a zero angle with each other. Also if B be a right angle, from the equation (5), remembering that, in the limit,

cosh (o/7)/cosh (6/7) =cosh (a/7)/sinh (6/7) < = > I,

toC

*toCj

NON-EUCLIDEAN]

GEOMETRY

725

we have cos A = tanh (e/27) . . . . (6).

The angle A is called by N. I. Lobatchewsky the ” angle of parallelism.”

The whole theory of lines and planes at right angles to each other is simply the theory of conjugate elements with respect to the absolute, where ideal lines and planes are introduced.

Thus if / and V be any two conjugate lines with respect to the absolute (of which one of the two must be improper, say /’). then any plane through V and containing proper points is perpendicular to I. Also if p is any plane containing proper points, and P is its pole, which is necessarily improper, then the lines through P are the normals to P. The equation of the sphere, centre (xi, yi, z t , w{) and radius p, is (ifli 2 — xi 1 — y^ — Z1 2) (w* — x 2 — y* — z 2) cosh 2 (p/7) =

(viiiv— xix— yiy— ziz) 2 (7). The equation of the surface of equal distance (a) from the plane lx J rmy--nz J rrw = o is {l 2 -^-m i --n’ i — r 2) (w 2 —x 2 — y 1 —z 2) sinh 2 (

(rw+lx+my+nz) 2 (8).

A surface of equal distance is a sphere whose centre is improper; and both types of surface are included in the family

^(■uP-xt-yt-z*) = (ax+by+cz+dwy . . (9).

But this family also includes a third type of surfaces, which can be looked on either as the limits of spheres whose centres have approached the absolute, or as the limits of surfaces of equal distance whose central planes haye approached a position tangential to the absolute. These surfaces are called limit-surfaces. Thus (9) denotes a limit-surface, if d 2 — a 2 — b 2 — £ 2 = o. Two limit-surfaces only differ in position. Thus the two limit-surfaces which touch the plane YOZ at O, but have their concavities turned in opposite directions, have as their equations

w 2 -x* – y* -z 2 = (w ± *) 2 .

The geodesic geometry of a sphere is elliptic, that of a surface of equal distance is hyperbolic, and that of a limit-surface is parabolic (i.e. Euclidean). The equation of the surface (cylinder) of equal distance (5) from the line OX is

(w 2 -x 2) tanh 2 (5/7)-y 2 -z 2 = o.

This is not a ruled surface. Hence in this geometry it is not possible for two straight lines to be at a constant distance from each other.

Secondly, let the equation of the absolute be x t +y*+z 2 + •u? = o. The absolute is now imaginary and the geometry is elliptic.

The distance (da) between the two points (xi, yi, Z\, w{) and (*2> y?. Zi, Wi) is given by cos (da/y) = = ± (xiXi+yiyi+ZiZz+wiWi)/ {(xS+y^+zS+Wi 2)

(xS+y2 2 +Z2*+wj>)\t (10).

Thus there are two distances between the points, and if one is da, the other is wy — du. Every straight line returns into itself, forming a closed series. Thus there are two segments between any two points, together forming the whole line which contains them; one distance is associated with one segment, and the other distance with the other segment. The complete length of every straight line is vy. The angle between the two planes hx--miy--niZ+riiv — o and hx--m t y--niZ--riw = o is

cos 8i2 = (,hh+mim i +n 1 ni+r l r 2)/{(li i +m l *+ni-+r 1 i)

(/ 2 2 +w 2 2 +« 2 2 +r 2 2)j* (11).

The polar plane with respect to the absolute of the point (x\, y it zi, Wi) is the real plane XiX+yiy+ZiZ+WiW = 0, and the pole of the

plane lix--miy--niZ+riiv = o is the point (h, m u m, n). Thus (from equations 10 and 11) it follows that the angle between the polar planes of the points (xi, . . .) and (xt, . . .) is da/y, and that the distance between the poles of the planes (l x ,...) and (h, ...) is 70i>. Thus there is complete reciprocity between points and planes in respect to all properties. This complete reign of the principle of duality is one of the great beauties of this geometry. The theory of lines and planes at right angles is simply the theory of conjugate elements with respect to the absolute. A tetrahedron self-conjugate with respect to the absolute has all its intersecting elements (edges and planes) at right angles. If I and I' are two conjugate lines, the planes through one are the planes perpendicular to the other. If P is the pole of the plane p, the lines through P are the normals to the plane p. The distance from P to p is %wy. Thus every sphere is also a surface of equal distance from the polar of its centre, and conversely. A plane does not divide space; for the line joining any two points P and Q only cuts the plane once, in L say, then it is always possible to go from P to Q by the segment of the line PQ which does not contain L. But P and Q may be said to be separated by a plane p, if the point in which PQ cuts p lies on the shortest segment between P and Q. With this sense of " separation," it is possible l to find three points P, Q, R such that P and Q are separated

1 Cf. A. N. Whitehead, Universal Algebra, Bk. vi. (Cambridge,

1898).

by the plane p, but P and R are not separated by p, nor are Q and R.

Let A, B, C be any three non-collinear points, then four triangles are defined by these points. Thus if 0, b, c and A, B, C are the elements of any one triangle, then the four triangles have as their elements :

(1) a, b, c,

(2) a, iry — b, wy — c,

(3) Try— a, b, iry — c,

(4) iry— a, iry — b, c,

The formulae connecting the elements are

A,

B,

c.

A,

TT-B,

7T-C.

-A,

B,

TT-C,

-A,

TT-B,

c.

and

sin A/sin (0/7)= sin B/sin (b/y) = sin C/sin (c/y), . (12) cos (a/7) =cos (6/7) cos (c/y) +sin (6/7) sin (c/y) cos A, (13)

with two similar equations.

Two cases arise, namely (I.) according as one of the four triangles has as its sides the shortest segments between the angular points, or (II.) according as this is not the case. When case I. holds there is said to be a " principal triangle." 2 If all the figures considered lie within a sphere of radius iwy only case I. can hold, and the principal triangle is the triangle wholly within this sphere, also the peculiarities in respect to the separation of points by a plane cannot then arise. The sum of the three angles of a triangle ABC is always greater than two right angles, and the area of the triangle is 7 2 (A + B-(-C— ?r). Thus as in hyperbolic geometry the theory of similarity does not hold, and the elements of a triangle are determined when its three angles are given. The coordinates of a point can be written in the form

sin (p/7) sin 8 cos have the same meanings as in the corresponding formulae in hyperbolic geometry. Again, suppose a watch is laid on the plane OXY, face upwards with its centre at O, and the line 12 to 6 (as marked on dial) along the line YOY. Let the watch be continually pushed along the plane along the line OX, that is, in the direction 9 to 3. Then the line XOX being of finite length, the watch will return to O, but at its first return it will be found to be face downwards on the other side of the plane, with the line 12 to 6 reversed in direction along the line YOY. This peculiarity was first pointed out by Felix Klein. The theory of parallels as it exists in hyperbolic space has no application in elliptic geometry. But another property of Euclidean parallel lines holds in elliptic geo metry, and by the use of it parallel lines are defined. For the equa- tion of the surface (cylinder) of equal distance (b) from the line XOX is

(x 2 +w) tan 2 (S/y) – (y 2 +z 2) =0.*

This is also the surface of equal distance, ˆ7 — S, from the line conjugate to XOX. Now from the form of the above equation this is a ruled surface, and through every point of it two generators pass. But these generators are lines of equal distance from XOX. Thus throughout every point of space two lines can be drawn which are lines of equal distance from a given line /. This property was dis- covered by W. K. Clifford. The two lines are called Clifford's right and left parallels to I through the point. This property of parallel- ism is reciprocal, so that if m is a left parallel to /, then / is a left parallel to m. Note also that two parallel lines / and m are not coplanar. Many of those properties of Euclidean parallels, which do not hold for Lobatchewsky's parallels in hyperbolic geometry, do

hold for Clifford's parallels in elliptic geometry. The geodesic geometry of spheres is elliptic, the geodesic geometry of surfaces of equal distance from lines (cylinders) is Euclidean, and surfaces of revolution can be found 3 of which the geodesic geometry is hyperbolic. But it is to be noticed that the connectivity of these surfaces is different to that of a Euclidean plane. For instance there are only 00 2 congruence transformations of the cylindrical surfaces of equal distance into themselves, instead of the 00 3 for the ordinary plane. It would obviously be possible to state " axioms " which these geodesies satisfy, and thus to define independently, and not as loci, quasi-spaces of these peculiar types. The existence of such Euclidean quasi-geometries was first pointed out by Clifford. 4

In both elliptic and hyperbolic geometry the spherical geometry, i.e. the relations between the angles formed by lines and planes passing through the same point, is the same as the " spherical trigonometry " in Euclidean geometry. The constant 7, which appears in the formulae both of hyperbolic and elliptic geometry, does not by its variation produce different types of geometry. There is only one type of elliptic geometry and one type of hyperbolic geometry; and the magnitude of the constant y in each case simply depends upon the magnitude of the arbitrary unit of length in comparison with the natural unit of length

2 Cf. A. N. Whitehead, loc. cit.

3 Cf. A. N. Whitehead, " The Geodesic Geometry of Surfaces in non-Euclidean Space," Proc. Lond. Math. Soc. vol. xxix.

4 Cf. Klein, " Zur nicht-Euklidischen Geometric" Math. Annat. vol. xxxvii.

which each particular instance of either geometry presents. The existence of a natural unit of length is a peculiarity common both to hyperbolic and elliptic geometries, and differentiates them from Euclidean geometry. It is the reason for the failure of the theory of similarity in them. If 7 is very large, that is, if the natural unit is very large compared to the arbitrary unit, and if the lengths involved in the figures considered are not large compared to the arbitrary unit, then both the elliptic and hyperbolic geometries approximate to

the Euclidean. For from formulae (4) and (5) and also from (12) and (13) we find, after retaining only the lowest powers of small quantities, as the formulae for any triangle ABC,

af sin A = bj sin B = c/ sin C, and

a t = b 2 --c i — 2bc cos A,

with two similar equations. Thus the geometries of small figures are in both types Euclidean.

History. — " In pulcherrimo Geometriae corpore," wrote Sir Henry Savile in 1621, " duo sunt naevi, duae labes nee quod Theory ot sc i am plures, in quibus eluendis et emaculendis cum parallels veterum turn recentiorum . . . vigilavit industria." before These two blemishes are the theory of parallels and Gauss. t jj e t jj eor y f proportion. The " industry of the moderns," in both respects, has given rise to important branches of mathematics, while at the same time showing that Euclid is in these respects more free from blemish than had been previously credible. It was from endeavours to improve the theory of parallels that non-Euclidean geometry arose; and though it has now acquired a far wider scope, its historical origin remains instructive and interesting. Euclid's " axiom of parallels " appears as Postulate V. to the first book of his Elements, and is stated thus, " And that, if a straight line falling on two straight lines make the angles, internal and on the same side, less than two right angles, the two straight lines, being produced indefinitely, meet on the side on which are the angles less than two right angles." The original Greek is Kal tav eis 5vo eWelas evdeia kixirlvTovca ras ivros Kal eri to. avra ixkpri yoivias Svo bpddv ekaaaovas iroifj, kKfiaWonevas ras &vo evddas or' aireipov avuiriiTTUV, k' a niprj eUflv at toiv hvo 6pdu>v eXacrowes.

To Euclid's successors this axiom had signally failed to appear self-evident, and had failed equally to appear indemonstrable. Without the use of the postulate its converse is proved in Euclid's 28th proposition, and it was hoped that by further efforts the postulate itself could be also proved. The first step consisted in the discovery of equivalent axioms. Christoph Clavius in 1574 deduced the axiom from the assumption that a line whose points are all equidistant from a straight line is itself straight. John Wallis in 1663 showed that the postulate follows from the possibility of similar triangles on different scales. Girolamo Saccheri (1733) showed that it is sufficient to have a single triangle, the sum of whose angles is two right angles. Other equivalent forms may be obtained, but none shows any essential

superiority to Euclid's. Indeed plausibility, which is chiefly aimed at, becomes a positive demerit where it conceals a real assumption.

A new method, which, though it failed to lead to the desired goal, proved in the end immensely fruitful, was invented by Saccheri, in a work entitled Euclides ab omni naevo vindicatus (Milan, 1733). If the postulate of parallels is involved in Euclid's other assumptions, contradictions must emerge when it is denied while the others are maintained. This led Saccheri to attempt a reductio ad absurdum, in which he mistakenly believed himself to have succeeded. What is interest- ing, however, is not his fallacious conclusion, but the non-Euclidean results which he obtains in the process. Saccheri distinguishes three hypotheses (corresponding to what are now known as Euclidean or parabolic, elliptic and hyperbolic geo- metry), and proves that some one of the three must be univer sally true. His three hypotheses are thue obtained: equal perpendiculars AC, BD are drawn from a straight line AB, and CD are joined. It is shown that the angles ACD, BDC are

Saccheri.

Lambert.

equal. The first hypothesis is that these are both right angles; the second, that they are both obtuse; and the third, that they are both acute. Many of the results afterwards obtained by Lobatchewsky and Bolyai are here developed. Saccheri fails to be the founder of non-Euclidean geometry only because he does not perceive the possible truth of his non-Euclidean hypo- theses.

Some advance is made by Johann Heinrich Lambert in his Theorie der Parallellinien (written 1766; posthumously published 1786). Though he still believed in the necessary truth of Euclidean geometry, he confessed that, in all his attempted proofs, something remained undemonstrated. He deals with the same three hypotheses as Saccheri, showing that the second holds on a sphere, while the third would hold on a sphere of purely imaginary radius. The second hypothesis he succeeds in condemning, since, like all who preceded Bernhard Riemann, he is unable to conceive of the straight line as finite and closed. But the third hypothesis, which is the same as Lobatchewsky's, is not even professedly refuted. 1

Non-Euclidean geometry proper begins with Karl Friedrich Gauss. The advance which he made was rather philosophical than mathematical: it was he (probably) who first Three recognized that

the postulate of parallels is possibly periods ot false, and should be empirically tested by measuring "on- the angles of large triangles. The history of non- Buc, ' de ^ B Euclidean geometry has been aptly divided by Felix Klein into three very distinct periods. The first — which contains only Gauss, Lobatchewsky and Bolyai — is characterized by its synthetic method and by its close relation to Euclid. The attempt at indirect proof of the disputed postulate would seem to have been the source of these three men's discoveries; but when the postulate had been denied, they found that the results, so far from showing contradictions, were just as self-consistent as Euclid. They inferred that the postulate, if true at all, can only be proved by observations and measurements. Only one kind of non-Euclidean space is known to them, namely, that which is now called hyperbolic. The second period is analytical, and is characterized by a close relation to the theory of surfaces. It begins with Riemann's inaugural dissertation, which regards space as a particular case of a manifold; but the characteristic standpoint of the period is chiefly emphasized by Eugenio Beltrami. The conception of measure of curvature is extended by Riemann from surfaces to spaces, and a new kind of space, finite but unbounded (corresponding to the second hypothesis of Saccheri and Lambert), is shown to be possible. As opposed to the second period, which is purely metrical, the third period is essentially projective in its method. It begins with Arthur Cayley, who showed that metrical properties are projective properties relative to a certain fundamental quadric, and that different geometries arise according as this quadric is real, imaginary or degenerate. Klein, to whom the development of Cayley's work is due, showed further that there are two forms of Riemann's space, called by him the elliptic and the spherical. Finally, it has been shown by Sophus Lie, that if figures are to be freely movable throughout all space in «o« ways, no other three-dimensional spaces than the above four are possible.

Gauss published nothing on the theory of parallels, and it was not generally known until after his death that he had interested himself in that theory from a very early date. In 1799 he announces that Euclidean geometry would follow from the assumption that a triangle can be drawn greater than any given triangle. Though unwilling to assume this, we find him in 1804 still hoping to prove the postulate of parallels. In 1830 he announces his conviction that geometry is not an a priori science; in the following year he explains that non-Euclidean geometry is free from contradictions, and that, in this system, the angles of a triangle diminish without limit when all the sides are increased. He also gives for the

1 On the theory of parallels before Lobatchewsky, see Stackel und Engel, Theorie der Parallellinien von Euklid bis auf Gauss (Leipzig, 1 895) . The foregoing remarks are based upon the materials collected in this work.

Gauss.

circumference of a circle of radius r the formula irk{e'l k —e r ~l h), where k is a constant depending upon the nature of the space. In 1832, in reply to the receipt of Bolyai's Appendix, he gives an elegant proof that the amount by which the sum of the angles of a triangle falls short of two right angles is proportional to the area of the triangle. From these and a few other remarks it appears that Gauss possessed the foundations of hyperbolic geometry, which he was probably the first to regard as perhaps true. It is not known with certainty whether he influenced Lobatchewsky and Bolyai, but the evidence we possess is against such a view. 1

The first to publish a non-Euclidean geometry was Nicholas Lobatchewsky, professor of mathematics in the new university of Kazan. 2 In the place of the disputed postulate chewsky. ne P uts tne following: " All straight lines which, in a plane, radiate from a given point, can, with respect to any other straight line in the same plane, be divided into two classes, the intersecting and the non-intersecting. The boundary line of the one and the other class is called parallel to the given line." It follows that there are two parallels to the given line through any point, each meeting the line at infinity, like a Euclidean parallel. (Hence a line has two distinct points at infinity, and not one only as in ordinary geometry.) The two parallels to a line through a point make equal acute angles with the perpendicular to the line through the point. If p be the length of the perpendicular, either of these angles is denoted by H(p). The determination of H(p) is the chief problem (cf. equation (6) above); it appears finally that, with a suitable choice of the unit of length,

tan § n(p) = e-". Before obtaining this result it is shown that spherical trigono- metry is unchanged, and that the normals to a circle or a sphere still pass through its centre. When the radius of the circle or sphere becomes infinite all these normals become parallel, but the

circle or sphere does not become a straight line or plane. It becomes what Lobatchewsky calls a limit-line or limit-surface. The geometry on such a surface is shown to be Euclidean, limit- lines replacing Euclidean straight lines. (It is, in fact, a surface of zero measure of curvature.) By the help of these propositions Lobatchewsky obtains the above value of H{p), and thence the solution of triangles. He points out that his formulae result from those of spherical trigonometry by substituting ia, ib, ic, for the sides a, b, c.

John Bolyai, a Hungarian, obtained results closely correspond- ing to those of Lobatchewsky. These he published in an appendix to a work by his father, entitled Appendix Scienliam spatii absolute veram exhibens: a veritate aut falsitate Axiomatis XI. Euclidei (a priori haud unquam decidenda) in- dependentem: adjecta ad casum falsitatis, quadratura circuit geometrica? This work was published in 1831, but its conception dates from 1823. It reveals a profounder appreciation of the importance of the new ideas, but otherwise differs little from Lobatchewsky's. Both men point out that Euclidean geometry as a limiting case of their own more general system, that the geometry of very small spaces is always approximately Euclidean, that no a priori grounds exist for a decision, and that observation can only give an approximate answer. Bolyai gives also, as his title indicates, a geometrical construction, in hyperbolic space, for the quadrature of the circle, and shows that the area of the greatest possible triangle, which has all its sides parallel and all its angles zero, is « 2 ,where i is what we should now call the space-constant.

J See Stackel und Engel, op. cil., and "Gauss, die beiden Bolyai, und die nicht-Euklidische Geometrie," Math. Annalen, Bd. xlix. ; also Engel's translation of Lobatchewsky (Leipzig, 1898), pp. 378 ft.,

2 Lobatchewsky's works on the subject are the following: — " On the Foundations of Geometry," Kazafi Messenger, 1829-1830; " New Foundations of Geometry, with a complete Theory of Parallels," Proceedings of the University of Kazan, 1835 (both in Russian, but translated into German by Engel, Leipzig, 1898); " G6om6trie imaginaire," Crelle's Journal, 1837; Theorie der Parallellinien (Berlin, 1840; 2nd ed., 1887; translated by Halsted, Austin, Texas, 1891). His results appear to have been set forth in a paper (now lost) which he read at Kazan in 1826.

- *Translated by Halsted (Austin, Texas, 4th ed., 1896).*

Bolyai.

The works of Lobatchewsky and Bolyai, though known and valued by Gauss, remained obscure and ineffective until,in 1866, they were translated into French by J. Hoiiel. But . at this time Riemann's dissertation, Uber die Hypothesen, welche der Geometrie zu Grunde liegen, 4 was already about to be published. In this work Riemann, without any knowledge of his predecessors in the same field, inaugurated a far more profound discussion, based on a far more general standpoint; and by its publication in 1867 the attention of mathematicians and philosophers was at last secured. (The dissertation dates from 1854, but owing to changes which Riemann wished to make in it, it remained unpublished until after his death.)

Riemann's work contains two fundamental conceptions, that of a manifold and that of the measure of curvature of a continuous manifold possessed of what he calls flatness in the smallest parts. By means of these conceptions space is made to appear at the end of agradual series of more and more specialized D ˆ" nlt ' oa conceptions. Conceptions of magnitude, he explains, /„/

Both concepts have been elaborated and superseded by the modern procedure in respect to the axioms of geometry, and by the conception of abstract geometry involved therein. Riemann proceeds to specialize the manifold by con- aˆatare. siderations as to measurement. If measurement is to be possible, some magnitude, we saw, must be independent of position; let us consider manifolds in which lengths of lines are such magnitudes, so that every line is measurable by every other. The coordinates of a point being Xi, x 2 , . . . x n , let us con- fine ourselves to lines along which the ratios dx.dx?.:. . . :Axh alter continuously. Let us also assume that the element of length, ds, is unchanged (to the first order) when all its points undergo the same infinitesimal motion. Then if all the increments dx be altered in the same ratio, ds is also altered in this ratio. Hence ds is a homogeneous function of the first degree of the increments dx. Moreover, ds must be unchanged when all the dx change sign. The simplest possible case is, therefore, that in which ds is the square root of a quadratic function of the dx. This case includes space, and is alone considered in what follows. It is called the case of flatness in the smallest parts. Its further discussion depends upon the measure of curvature, the second of Riemann's fundamental conceptions. This conception, derived from the theory of surfaces, is applied as follows. Any one of the shortest lines which issue from a given point(say the origin) is completely determined by the initial ratios of the dx. Two such lines, defined by dx and dx say, determine a pencil, or one- dimensional series, of shortest lines, any one of which is defined

4 Abhandlungen d. Konigl. Ges. d. Wiss. zu Gottingen, Bd. xiii.; Ges. math. Werhe, pp. 254-269; translated by Clifford, Collected Mathematical Papers.

6 Cf. Gesamm. math, und phys. Werke, vol. i. (Leipzig, 1894).

by ~Kdx--n5x, where the parameter X : p may have any value. This pencil generates a two-dimensional series of points, which may be regarded as a surface, and for which we may apply Gauss's formula for the measure of curvature at any point. Thus at every point of our manifold there is a measure of curvature correspo ndin g to every such pencil; but all these can be found when n.n — 1/2 of them are known. If figures are to be freely movable, it is necessary and sufficient that the measure of curvature should be the same for all points and all directions at each point. Where this is the case, it a be the measure of curvature, the linear element can be put into the form ds = ˆCSdx 2)l(l+laSx 2).

If a be positive, space is finite, though still unbounded, and every straight line is closed — a possibility first recognized by Riemann. It is pointed out that, since the possible values of a form a continuous series, observations cannot prove that our space is strictly Euclidean. It is also regarded as possible that, in the infinitesimal, the measure of curvature of our space should be variable.

There are four points in which this profound and epoch-making work is open to criticism or development — (1) the idea of a mani- fold requires more precise determination; (2) the introduction of coordinates is entirely unexplained and the requisite pre-suppositions are unanalysed; (3) the assumption that ds is the square root of a quadratic function of dxi, dxz, ... is arbitrary; (4) the idea of superposition, or congruence, is not adequately analysed. The modern solution of these difficulties is properly considered in connexion with the general subject of the axioms of geometry.

The publication of Riemanh's dissertation was closely followed by two works of Hermann von Helmholtz, 1 again undertaken

in ignorance of the work of predecessors. In these a

proof is attempted that ds must be a rational integral quadratic function of the increments of the coordinates. This proof has since been shown by Lie to stand in need of correction (see VII. Axioms of Geometry). Helmholtz's remaining works on the subject 2 are of almost exclusively philosophical interest. We shall return to them later.

The only other writer of importance in the second period is Eugenio Beltrami, by whom Riemann's work was brought into

connexion with that of Lobatchewsky and Bolyai.

As he gave, by an elegant method, a convenient Euclidean interpretation of hyperbolic plane geometry, his results will be stated at some length. 3 The Saggio shows that Lobatchewsky's plane geometry holds in Euclidean geometry on surfaces of constant negative curvature, straight lines being replaced by geodesies. Such surfaces are capable of a conformal representation on a plane, by which geodesies are represented by straight lines. Hence if we take, as coordinates on the surface, the Cartesian coordinates of corresponding points on the plane, the geodesies must have linear equations. Hence it follows that

ds 2 = R 2 w~ i [(a 2 -v' i)du 2 2uvdudv(a—u' i)dv i }*

where w 2 = a 2 — u 2 — i> 2 , and — 1/R 2 is the measure of curvature of our surface (note that k = y as used above). The angle between two geodesies u — const., v = const, is 9, where

cos = ml V I (a 2 – u 1) (a 2 – v 2) 1 , sin = awl V ((a J – w J) (a 2 – v 2) } .

Thus w = o is orthogonal to all geodesies v = const., and vice versa. In order that sin $ may be real, w 2 must be positive; thus geo- desies have no real intersection when the corresponding straight lines intersect outside the circle u 2 --v 2 = a 2 . When they intersect on this circle, = o. Thus Lobatchewsky's parallels are represented by straight lines intersecting on the circle. Again, transforming to polar coordinates u — r cosju, v = r sin/x, and calling p the geodesic

1 Wiss. Abh. vol. ii. pp. 610, 618 (1866, 1868).

2 Mind, O.S., vols. i. and iii.; Vorlrdge und Reden, vol. ii. pp. 1,

3 His papers are " Saggio di interpretazione della geometria non-Euclidea," Giornale di malemaliche, vol. vi. (1868); " Teoria fondamentale degli spazii di curvatura costante," Annali di matematica, vol. ii. (1868-1869). Both were translated into French by J. Hoiiel, Annates scientifiques de VEcole Normale superieure, vol. vi. (1869).

Beltrami.

distance of 11, v from the origin, we have, for a geodesic through the origin,

dp = Radrjia 2 – r 2) , p =-|R log^, r = a tanh ^.

Thus points on the surface corresponding to points in the plane on the limiting circle r = a, are all at an infinite distance from the origin. Again, considering r constant, the arc of a geodesic circle subtending an angle p. at the origin is

tan 11(8) . sinh (8/R) = 1, or tan Jn(8) =

Beltrami's treatment connects two curves which, in the earlier treatment, had no connexion. These are limit-lines and curves of constant distance from a straight line. Both may be regarded as circles, the first having an infinite, the second an imaginary radius. The equation to a circle of radius p and centre «oi > o is

(a 2 — uuo —w) 2 = cosh 2 (p/R) w§w 2 = CV (say) .

This equation remains real when p is a pure imaginary, and remains finite when «»o = o, provided p becomes infinite in such a way that Wo cosh (p/R) remains finite. In the latter case the equation represents a limit-line. In the former case, by giving different values to C, we obtain concentric circles with the imaginary centre tioVo- One of these, obtained by putting C = o, is the straight line a 2 — «%— ro = o. Hence the others are each throughout at a constant distance from this line. (It may be shown that all motions in a hyperbolic plane consist, in a general sense, of rotations; but three types must be distinguished according as the centre is real, imaginary or at infinity. All points describe, accordingly, one of the three types of circles.)

The above Euclidean interpretation fails for three or more dimensions. In the Teoria fondamentale, accordingly, where n dimensions are considered, Beltrami treats hyperbolic space in a purely

analytical spirit. The paper shows that Lobatchewsky's space of any number of dimensions has, in Riemann's sense, a constant negative measure of curvature. Beltrami starts with the formula (analogous to that of the Saggio)

ds = R 2 x- 2 (dx 2 +dxi 2 +dxi i + . . . +dx n 2) where x 2 +xi 2 xi?. . . +x n 2 = a 2 .*

*He shows that geodesies are represented by linear equations between *i, #2, . • • , x n , and that the geodesic distance p between two points x and x' is given by*

coshw =

a'— xix\— x 2 × 2 — .

~XnX n

(a formula practically identical with Cayley's, though obtained by a very different method). In order to show that the measure of curvature is constant, we make the substitutions

*Xi = rXi, X2 = rX2...#n = rX,,, where 2X 2 = 1. Hence ds * HRadrfc 2 – ˆf + RW A 2 / (a 2 – r*) .*

where . dA 2 =Sd\ 2 .

Also calling p the geodesic distance from the origin, we have cosh (p/R) = v(a f_ r 2j , sinh (p/R) = ˆ ˆJ_ fl) .

Hence ' ds~d P *+(R sinh (p/R)) 2 <2A 2 .*

Putting Zi = pXi, 2 2 = pX 2) ...z,, = pX,,.,

we obtain

(WˆSaV+i J (- sinh ˆ l j 2(z^^«fe0 , •

Hence when p is small, we have approximately

ds 2 = ~S,dz 2J t^^{zidz k -z k dziY . . (1).

Considering a surface element through the origin, we may choose our axes so that, for this element,

= z» = 0.

Zs = Zi-

Thus

ds 2 = dzˆ--dzl + ˆi{zidzi — zzdzi) 2

*< *)•*

Now the area of the triangle whose vertices are (o, o), (zi, 22), (dz\, dzi) is J(zi, dzi—zˆdzi). Hence the quotient when the terms of the fourth order in (2) are divided by the square of this triangle is

NON-EUCLIDEAN]

GEOMETRY

729

4/3R 2 ; hence, returning to general axes, the same is the quotient when the terms of the fourth order in (1) are divided by the square of the triangle whose vertices are (o, o,...o), (zi, z%, Zs,...z n), (dz u

The Saggio, as we saw, gives a Euclidean interpretation confined to two dimensions. But a consideration of the auxiliary Transition pl an e suggests a different interpretation, which may be to the extended to any number of dimensions. If, instead

*projective f referring to the pseudosphere, we merely define me ° ‘ distance and angle, in the Euclidean plane, as those functions of the coordinates which gave us distance and angle on the pseudosphere, we find that the geometry of our plane has become Lobatchewsky’s. All the points of the limiting circle are now at infinity, and points beyond it are imaginary. If we give our circle an imaginary radius the geometry on the plane becomes elliptic. Replacing the circle by a sphere, we obtain an analogous representation for three dimensions. Instead of a circle or sphere we may take any conic or quadric. With this definition, if the fundamental quadric be S ra = o, and if ~2xx be the polar form of S ra , the distance p between x and *’ is given by the projective formula*

*cos(p/i(0 = 2x*7{2».SxVU. That this formula is projective is rendered evident by observing that e’tidk is the anharmonic ratio of the range consisting of the two points and the intersections of the line joining them with the fundamental quadric. With this we are brought to the third or projective period. The method of this period is due to Cayley; its application to previous non-Euclidean geometry is due to*

Klein. The projective method contains a generalization of dis- coveries already made byLaguerre 2 in 1853 as regards Euclidean geometry. The arbitrariness of this procedure of deriving metrical geometry from the properties of conies is removed by Lie's theory of congruence. We then arrive at the stage of thought which finds its expression in the modern treatment of the axioms of geometry.

The projective method leads to a discrimination, first made by Klein, 3 of two varieties of Riemann 's space; Klein calls The two these elliptic and spherical. They are also called the kinds of polar and antipodal forms of elliptic space. The latter elliptic names will here be used. The difference is strictly space. analogous to that between the diameters and the points of a sphere. In the polar form two straight lines in a plane always intersect in one and only one point; in the antipodal form they intersect always in two points, which are antipodes. According to the definition of geometry adopted in section VII. {Axioms of Geometry), the antipodal form is not to be termed " geometry," since any pair of coplanar straight lines intersect each other in two points. It may be called a " quasi-geometry." Similarly in the antipodal form two diameters always determine a plane, but two points on a sphere do not determine a great circle when they are antipodes, and two great circles always intersect in two points. Again, a plane does not form a boundary among lines through a point: we can pass from any one such line to any other without passing through the plane. But a great circle does divide the surface of a sphere. So, in the polar form, a complete straight line does not divide a plane, and a planedoes not divide space, and does not, like a Euclidean plane, have two sides. 4 But, in the antipodal form, a plane is, in these respects, like a Euclidean plane.

It is explained in section VII. in what sense the metrical geometry of the material world can be considered to be deter- minate and not a matter of arbitrary choice. The scientific

1 Beltrami shows also that this definition agrees with that of Gauss.

' " Sur la theorie des foyers," Nouv. Ann. vol. xii.

3 Math. Annalcn, iv. vi., 1871-1872.

- *For an investigation of these and similar properties, see White- head, Universal Algebra (Cambridge, 1898), bk. vi. ch. ii. The polar form was independently discovered by Simon Newcomb in 1877.*

question as to the best available evidence concerning the nature of this geometry is one beset with difficulties of a peculiar kind. We are obstructed by the fact that all existing physical science assumes the Euclidean hypothesis. This hypothesis has been involved in all actual measurements of large distances, and in all the laws of astronomy and physics. The principle of simplicity would therefore lead us, in general, where an observation con- flicted with one or more of those laws, to ascribe this anomaly, not to the falsity of Euclidean geometry, but to the falsity of the laws in question. This applies especially to astronomy. On the earth our means of measurement are many and direct, and so long as no great accuracy is sought they involve few scientific laws. Thus we acquire, from such direct measurements, a very high degree of probability that the space-constant, if not infinite, is yet large as compared with terrestrial distances. But astronomical distances and triangles can only be measured by means of the received laws of astronomy and optics, all of which have been established by assuming the truth of the Euclidean hypothesis. It therefore remains possible (until a detailed proof of the contrary is forthcoming) that a large but finite space-constant, with different laws of astronomy and optics, would have equally explained the phenomena. We cannot, therefore, accept the measurements of stellar parallaxes, &c, as conclusive evidence that the space-constant is large as compared with stellar distances. For the present, on grounds of simplicity, we may rightly adopt this view; but it must remain possible that, in view of some hitherto undiscovered discrepancy, a slight correc- tion of the sort suggested might prove the simplest alternative. But conversely, a finite parallax for very distant stars, or a negative parallax for any star, could not be accepted as conclusive evidence that our geometry is non Euclidean, unless it were shown — and this seems scarcely possible — that no modification of astronomy or optics could account for the phenomenon. Thus although we may admit a probability that the space constant is large in comparison with stellar distances, a conclusive proof or disproof seems scarcely possible.

Finally, it is of interest to note that, though it is theoretically possible to prove, by scientific methods, that our geometry is non-Euclidean, it is wholly impossible to prove by such methods that it is accurately Euclidean. For the unavoidable errors of observation must always leave a slight margin in our measure- ments. A triangle might be found whose angles were certainly greater, or certainly less, than two right angles; but to prove them exactly equal to two right angles must always be beyond our powers. If, therefore, any man cherishes a hope of proving the exact truth of Euclid, such a hope must be

based, not upon scientific, but upon philosophical considerations.

Bibliography. — Thebibliography appended tosection VII. should be consulted in this connexion. Also, in addition to the citations already made, the following works may be mentioned.

For Lobatchewsky's writings, cf. Urkunden zur Geschichte der nichteuklidischen Geometrie, i., Nikolaj Iwanowitsch Lobatschefsky, by F. Engel and P. Stackel (Leipzig, 1898). For John Bolyai's Appendix, cf. Absolute Geometrie nach Johann Bolyai, by J. Frischauf (Leipzig, 1872), and also the new edition of his father's large work, Tentamen . . . , published by the Mathematical Society of Budapest ; the second volume contains the appendix. Cf. also J. Frischauf, Elemente der absoluten Geometrie (Leipzig, 1876); M. L. Gerard, Sur la geometrie non-Euclidienne (thesis for doctorate) (Paris, 1892); de Tilly, Essai sur les principes fondamentales de la geometrie el de la micanique (Bordeaux, 1879); Sir R. S. Ball, "On the Theory of Content," Trans. Roy. Irish Acad. vol. xxix. (1889); F. Lindemann, " Mechanik bei projectiver Maasbestimmung," Math. Annal. vol. vii. ; W. K. Clifford, " Preliminary Sketch of Biquaternions," Proc. •of Lond. Math. Soc. (1873), and Coll. Works; A. Buchheim, " On the Theory of Screws in Elliptic Space," Proc. Lond. Math. Soc. vols, xv., xvi., xvii. ; H. Cox, "On the Application of Quaternions and Grassmann's Algebra to different Kinds of Uniform Space," Trans. Camb. Phil. Soc. (1882) ; M. Dehn, " Die Legendarischen Satze iiber die Winkelsumme im Dreieck," Math. Ann. vol. 53 (1900), and " Uber den Rauminhalt," Math. Annal. vol. 55(1902).

For expositions of the whole subject, cf. F. Klein, Nicht-Euklidische Geometrie (Gottingen, l8g3)f; R. Bonola, La Geometria non-Euclidea (Bologna, 1906); P. Barbarin, La Geometrie non-Euclidienne (Paris, 1902) ; W. Killing, Die nicht-Euklidischen Raumformen in analytischer Behandlung (Leipzig, 1885). The last-named work also deals with geometry of more than three dimensions; in this connexion cf. also 1 G. Veronese, Fondamenti di geometria a pi-it dimension! ed a piU specie

di unita rettilinee . . . (Padua, 1891, German translation, Leipzig,

1894) ; G. Fontene, V Hyperespace & (n — 1) dimensions (Paris, 1892J; and A. N. Whitehead, loc. cit. Cf. also E. Study, " t)ber nicht- Euklidische und Liniengeometrie," Jahr. d. Deutsch. Math. Ver. vol. xv. (1906) ; W. Burnside, " On the Kinematics of non-Euclidean Space," Proc. Lond. Math. Soc. vol. xxvi. (1894). A bibliography on the subject up to 1878 has been published by G. B. Halsted, Amer. Journ. of Math. vols. i. and ii. ; and one up to 1900 by R. Bonola, Index operum ad geometriam absolutam spectantium . . . (1902, and Leipzig, 1903). (B. A. W. R.; A. N. W.)

VII. Axioms of Geometry Until the discovery of the non-Euclidean geometries (Lobat- chewsky, 1826 and 1829; J. Bolyai, 1832; B. Riemann, 1854), geometry was universally considered as being ex- ot space, clusively the science of existent space. (See section VI. Non-Euclidean Geometry.) In respect to the science, as thus conceived, two controversies may be noticed. First, there is the controversy respecting the absolute and relational theories of space. According to the absolute theory, which is the traditional view (held explicitly by Newton), space has an existence, in some sense whatever it may be, independent of the bodies which it contains. The bodies occupy space, and it is not intrinsically unmeaning to say that any definite body occupies this part of space, and not that part of space, without reference to other bodies occupying space. According to the relational theory of space, of which the chief exponent was Leibnitz, 1 space is nothing but a certain assemblage of the rela- tions between the various particular bodies in space. The idea of space with no bodies in it is absurd. Accordingly there can be no meaning in saying that a body is here and not there, apart from a reference to the other bodies in the universe. Thus, on this theory, absolute motion is intrinsically unmeaning. It is admitted on all hands that in practice only relative motion is directly measurable. Newton, however, maintains in the Principia (scholium to the 8th definition) that it is indirectly measurable by means of the effects of " centrifugal force " as it occurs in the phenomena of rotation. This irrelevance of absolute motion (if there be such a thing) to science has led to the general adoption of the relational theory by modern men of science. But no decisive argument for either view has at present been elaborated. 2 Kant's view of space as being a form of perception at first sight appears to cut across this controversy. But he, saturated as he was with the spirit of the Newtonian physics, must (at least in both editions of the Critique) be classed with the upholders of the absolute theory. The form of per- ception has a type of existence proper to itself independently of the particular bodies which it contains. For example he writes: 3 " Space does not represent any

quality of objects by themselves, or objects in their relation to one another, i.e. space does not represent any determination which is inherent in the objects themselves, and would remain, even if all subjective conditions of intuition were removed."

*The second controversy is that between the view that the axioms applicable to space are known only from experience, Axioms anc ˆ t ˆ le vlew that * n some sense these axioms are given a priori. Both these views, thus broadly stated, are capable of various subtle modifications, and a discussion of them would merge into a general treatise on epistemology. The cruder forms of the a priori view have been made quite untenable by the modern mathematical discoveries. Geometers now profess ignorance in many respects of the exact axioms which apply to existent space, and it seems unlikely that a profound study of the question should thus obliterate a priori' intuitions.*

Another question irrelevant to this article, but with some relevance to the above controversy, is that of the derivation

• > For an analysis of Leibnitz's ideas on space, cf. B. Russell, The Philosophy of Leibnitz, chs. viii.-x.

2 Cf. Hon. Bertrand Russell, " Is Position in Time and Space Absolute or Relative?" Mind, n.s. vol. 10 (1901), and A. N. Whitehead, " Mathematical Concepts of the Material World," Phil. Trans. (1906), p. 205.

3 Cf. Critique of Pure Reason, 1st section; "Of Space," con- clusion A, Max Mliller's translation.

of our perception of existent space from our various types of sensation. This is a question for psychology. 4

Definition of Abstract Geometry. — Existent space is the subject matter of only one of the applications of the modern science of abstract geometry, viewed as a branch of pure mathematics. Geometry has been defined 6 as " the study of series of two or more dimensions." It has also been defined 6 as " the science of cross classification." These definitions are founded upon the actual practice of mathematicians in respect to their use of the term " Geometry." Either of them brings out the fact that geometry is not a science with a determinate subject matter. It is concerned with any subject matter to which the formal axioms may apply. Geometry is not peculiar in this respect. All branches of pure mathematics deal

merely with types of relations. Thus the fundamental ideas of geometry (e.g. those of points and of straight lines) are not ideas of determinate entities, but of any entities for which the axioms are true. And a set of formal geometrical axioms cannot in themselves be true or false, since they are not determinate propositions, in that they do not refer to a determinate subject matter. The axioms are propositional functions. 7 When a set of axioms is given, we can ask (1) whether they are consistent, (2) whether their " existence theorem " is proved, (3) whether they are independent. Axioms are consistent when the contradictory of any axiom cannot be deduced from the remaining axioms. Their existence theorem is the proof that they are true when the fundamental ideas are considered as denoting some determinate subject matter, so that the axioms are developed into determinate propositions. It follows from the logical law of contradiction that the proof of the existence theorem proves also the consistency of the axioms. This is the only method of proof of consistency. The axioms of a set are independent of each other when no axiom can be deduced from the remaining axioms of the set. The independence of a given axiom is proved by establishing the consistency of the remaining axioms of the set, together with the contradictory of the given axiom. The enumeration of the axioms is simply the enumeration of the hypotheses 8 (with respect to the undetermined subject matter) of which some at least occur in each of the subsequent propositions.

Any science is called a " geometry " if it investigates the theory of the classification of a set of entities (the points) into classes (the straight lines), such that (1) there is one and only one class which contains any given pair of the entities, and (2) every such class contains more than two members. In the two geometries, important from their relevance to existent space, axioms which secure an order of the points on any line also occur. These geometries will be called " Projective Geometry " and " Descriptive Geometry." In projective geometry any two straight lines in a plane intersect, and the straight lines are closed series which return into themselves, like the circumference of a circle. In descriptive geometry two straight lines in a plane do not necessarily intersect, and a straight line is an open series without beginning or end. Ordinary Euclidean geometry is a descriptive geometry; it becomes a projective geometry when the so-called " points at infinity " are added.

Projective Geometry. Projective geometry may be developed from two undefined fundamental ideas, namely, that of a " point " and that of a " straight line." These undetermined ideas take different specific meanings for the various specific subject matters to which projective

geometry can be applied. The number of the axioms is always to some extent arbitrary, being dependent upon the verbal forms of statement which are adopted. They will

‘ 4 Cf. Ernst Mach, Erkenntniss und Irrtum (Leipzig) ; the relevant chapters are translated by T. J. McCormack, Space and Geometry (London, 1906); also A. Meinong, Uber die Stellung der Gegenstands- theorie im System der Wissenschaften (Leipzig, 1907).

5 Cf. Russell, Principles of Mathematics, § 352 (Cambridge, 1903).

6 Cf. A. N. Whitehead, The Axioms of Projective Geometry, § 3 (Cambridge, 1906).

7 Cf. Russell, Princ. of Math., ch. i.

8 Cf. Russell, loc. cit., and G. Frege, ” tlber die Grundlagen der Geometrie,” Jahresber. der Deutsch. Math. Ver. (1906).

be presented 1 here as twelve in number, eight being “axioms of classification,” and four being ” axioms of order.”

Axioms of Classification. — The eight axioms of classification are as follows:

i. Points form a class of entities with at least two members.

2. Any straight line is a class of points containing at least three members.

3. Any two distinct points lie in one and only one straight line.

4. There is at least one straight line which does not contain all the points.

5. If A, B, C are non-collinear points, and A’ is on the straight line BC, and B’ is on the straight line CA, then the straight lines AA’ and BB’ possess a point in common.

Definition. — If A, B, C are any three non-collinear points, the plane ABC is the class of points lying on the straight lines joining A with

the various points on the straight line BC.

6. There is at least one plane which does not contain all the points.

7. There exists a plane a, and a point A not incident in a, such that any point lies in some straight line which contains both A and a point in a.

Definition. — Harm. (ABCD) symbolizes the following conjoint statements: (1) that the points A, B, C, D are collinear, and (2) that a quadrirateral can be found with one pair of opposite sides intersecting at A, with the other pair intersecting at C, and with its diagonals passing through B and D respectively. Then B and D are said to be " harmonic conjugates " with respect to A and C.

8. Harm. (ABCD) implies that B and D are distinct points. In the above axioms 4 secures at least two dimensionˆ axiom

S is the fundamental axiom of the plane, axiom 6 secures at least three dimensions, and axiom 7 secures at most three dimensions. From axioms 1-5 it can be proved that any two distinct points in a straight line determine that line, that any three non-collinear points in a plane determine that plane, that the straight line containing any two points in a plane lies wholly in that plane, and that any two straight lines in a plane intersect. From axioms 1-6 Desargues's well-known theorem on triangles in perspective can be proved.

The enunciation of thiS theorem is as follows: If ABC and A'B'C are two coplanar triangles such that the lines AA', BB', CC are concurrent, then the three points of intersection of BC and B'C of CA and C'A', and of AB and A'B' are collinear; and conversely if the three points of intersection are collinear, the three lines are concurrent. The proof which can be applied is the usual projective proof by which a third triangle A'B C' is constructed not coplanar with the other two, but in perspective with each of them.

' It has been proved 2 that Desargues's theorem cannot be deduced from axioms 1-5, that is, if the geometry be confined to two dimensions. All the proofs proceed by the method of producing a specification of " points " and " straight lines " which satisfies axioms 1-5, and such that Desargues's theorem does not hold.

It follows from axioms 1-5 that Harm. (ABCD) implies Harm. (ADCB) and Harm. (CBAD), and that, if A, B, C be any three distinct collinear points, there exists at least one point D such that Harm. (ABCD). But it requires Desargues's theorem, and hence

axiom 6, to prove that Harm. (ABCD) and Harm. (ABCD') imply the identity of D and D'.

The necessity for axiom 8 has been proved by G. Fano, 3 who has produced a three dimensional geometry of fifteen points, i.e. a method of cross classification of fifteen entities, in which each straight line contains three points, and each plane contains seven straight lines. In this geometry axiom 8 does not hold. Also from axioms 1-6 and 8 it follows that Harm. (ABCD) implies Harm. (BCDA).

Definitions. — When two plane figures can be derived from one another by a single projection, they are said to be in perspective. When two plane figures can be derived one from the other by a finite series of perspective relations between intermediate figures, they

1 This formulation — though not in respect to number — is in all essentials that of M. Pieri, cf. " I principii della Geometria di Posizjone." Accad. R. di Torino (1898); also cf. Whitehead, loc. cit.

2 Cf. G. Peano, " Sui fondamenti della Geometria," p. 73, Rivista di mcuematica, vol. iv. (1894), and D. Hilbert, Grundlagen der Geometric (Leipzig, 1899); and R. F. Moulton, " A Simple non-Desarguesian Plane Geometry," Trans. Amer. Math. Soc, vol. iii. (1902).

3 Cf. " Sui postulati fondamentali della geometria projettiva," Giorn. di matematica, vol. xxx. (1891); also of Pieri, loc. cit., and Whitehead, loc. cit.

are said to be protectively related. Any property of a plane figure which necessarily also belongs to any projectively related figure, is called a projective property.

The following theorem, known from its importance as " the fundamental theorem of projective geometry," cannot be proved 4 from axioms 1-8. The enunciation is: "A projective correspond- ence between the points on two straight lines is completely deter- mined when the correspondents of three distinct points on one line are determined on the other." This theorem is equivalent 6 (assuming axioms 1-8) to another theorem, known as Pappus's Theorem, namely: " If / and /' are two distinct coplanar lines, and A, B, C are three distinct points on /, and A', B', C are three distinct points on /', then the three points of intersection of AA' and B'C, of A'B and CC, of BB' and C'A, are collinear." This theorem is obviously Pascal's well-known theorem respecting a hexagon inscribed in a conic, for

the special case when the conic has de- generated into the two lines / and /'. Another theorem also equivalent (assuming axioms 1-8) to the fundamental theorem is the following: 6 If the three collinear pairs of points, A and A', B and B', C and C, are such that the three pairs of opposite sides of a complete quadrangle pass respectively through them, i.e. one pair through A and A' respectively, and so on, and if also the three sides of the quadrangle which pass through A, B, and C, are con- current in one of the corners of the quadrangle, then another quad- rangle can be found with the same relation to the three pairs of points, except that its three sides which pass through A, B, and C, are not concurrent.

Thus, if we choose to take any one of these three theorems as an axiom, all the theorems of projective geometry which do not require ordinal or metrical ideas for their enunciation can be proved. Also a conic can be defined as the locus of the points found by the usual construction, based upon Pascal's theorem, for points on the conic through five" given points. But it is unnecessary to assume here any one of the suggested axioms; for the fundamental theorem can be deduced from the axioms of order together with axioms 1-8.

Axioms of Order. — It is possible to define (cf. Pieri, loc. cit.) the property upon which the order of points on a straight line depends. But to secure that this property does in fact range the points in a serial order, some axioms are required. A straight line is to be a closed series; thus, when the points are in order, it requires two points on the line to divide it into two distinct complementary segments, which do not overlap, and together form the whole line. Accordingly the problem of the definition of order reduces itself to the definition of these two segments formed by any two points on the line; and the axioms are stated relatively to these segments.

Definition. — If A, B, C are three collinear points, the points on the segment ABC are defined to.be those points such as X, for which there exist two points Y and Y' with the property that Harm. (AYCY') and Harm. (BYXY') both hold. The supplementary segment ABC is defined to be the rest of the points on the line. This definition is elucidated by noticing that with our ordinary geometrical ideas, if B and X are any two points between A and C, then the two pairs of points, A and C, B and X, define an involution with real double points, namely, the Y and Y' of the above definition. The property of belonging to a segment ABC is projective, since the harmonic relation is projective.

The first three axioms of order (cf. Pieri, loc. cit.) are:

9. If A, B, C are three distinct collinear points, the supple- mentary segment ABC is contained within the segment BCA.

10. If A, B, C are three distinct collinear points, the common part of the segments BCA and CAB is contained in the supple- mentary segment ABC.

11. If A, B, C are three distinct collinear points, and D lies in the segment ABC, then the segment ADC is contained within the segment ABC.

From these axioms all the usual properties of a closed order follow. It will be noticed that, if A, B, C are any three collinear points, C is necessarily traversed in passing from A to B by one route along the line, and is not traversed in passing from A to B along the other route. Thus there is no meaning, as referred to closed straight lines, in the simple statement that C lies between A and B. But there may be a relation of separation between two pairs of collinear points, such as A and C, and B and D. The couple B and D is said to separate A and C, if

- *Cf. Hilbert, loc. cit. ; for a fuller exposition of Hilbert's proof cf. K. T. Vahlen, Abstrokte Geomelrie (Leipzig, 1905), also Whitehead, loc. cit.*

6 Cf. H. Wiener,, Jahresber. der Deutsch. Math. Ver. vol. i. (1890); and F. Schur, " tjber den Fundamentalsatz der projectiven Geo- metric," Math. Ann. vol. li. (1899).

6 Cf. Hilbert, loc. cit., and Whitehead, loc. cit.

the four points are collinear and D lies in the segment comple- mentary to the segment ABC. The property of the separation of pairs of points by pairs of points is projective. Also it can be proved that Harm. (ABCD) implies that B and D separate A and C.

Definitions— A series of entities arranged in a serial order, open or closed, is said to be compact, if the series contains no immediately consecutive entities, so that in traversing the series from any one entity to any other entity it is necessary to pass through entities

distinct from either. It was the merit of R. Dedekind and of G. Cantor explicitly to formulate another fundamental property of series. The Dedekind property 1 as applied to an open series can be denned thus: An open series possesses the Dedekind property, if, however, it be divided into two mutually exclusive classes u and v, which (i) contain between them the whole series, and (2) are such that every member of u precedes in the serial order every member of v, there is always a member of the series, belonging to one of the two, u or v, which precedes every member of v (other than itself if it belong to v), and also succeeds every member of u (other than itself if it belong to w). Accordingly in an open series with the Dedekind property there is always a member of the series marking the junction of two classes such as u and v. An open series is con- tinuous if it is compact and possesses the Dedekind property. A closed series can always be transformed into an open series by taking any arbitrary member as the first term and by taking one of the two ways round as the ascending order of the series. Thus the definitions of compactness and of the Dedekind property can be at once trans- ferred to a closed series.

12. The last axiom of order is that there exists at least one straight line for which the point order possesses the Dedekind property.

It follows from axioms 1-12 by projection that the Dedekind property is true for all lines. Again the harmonic system A BC, where A, B, C are collinear points, is defined 2 thus: take the harmonic conjugates A', B', C of each point with respect to the other two, again take the harmonic conjugates of each of the six points A, B, C, A', B', C with respect to each pair of the remaining five, and proceed in this way by an unending series of steps. The set of points thus obtained is called the harmonic system ABC. It can be proved that a harmonic system is compact, and that every segment of the line containing it possesses members of it. Furthermore, it is easy to prove that the fundamental theorem holds for harmonic systems, in the sense that, if A, B, C are three points on a line /, and A', B', C are three points on a line /', and if by any two distinct series of projections A, B, C are projected into A', B', C, then any point of the harmonic system ABC corresponds to the same point of the harmonic system A'B'C according to both the projective relations which are thus established between I and /'. It now follows immediately that the fundamental theorem must hold for all the points on the lines I and /', since (as has been pointed out) harmonic systems are " everywhere dense " on their containing lines. Thus the fundamental theorem follows from the axioms of order.

A system of numerical coordinates can now be introduced, possessing the property that linear equations represent planes and straight lines. The outline of the argument by which this remarkable problem (in that " distance " is as yet undefined) is solved, will now be given. It is first proved that the points on any line can in a certain way be definitely associated with all the positive and negative real numbers, so as to form with them a one-one correspondence. The arbitrary elements in the establishment of this relation are the points on the line associated with o, 1 and 00 .

This association 3 is most easily effected by considering a class of projective relations of the line with itself, called by F. Schur (loc. cit.) prospeclivilies.

Let / (fig. 69) be the given line, m and n any two lines intersecting at U on /, S and S' two points on n. Then a projective relation between I and itself is formed by projecting / from S on to m, and then by projecting m from S' back on to /. All such projective

1 Cf. Dedekind, Stetigkeit und irrationale Zahlen (1872).

2 Cf. v. Staudt, Geometrie der Lage (1847).

3 Cf. Pasch, Vorlesungen iiber neuere Geometrie (Leipzig, 1882), a classic work; also Fiedler, Die darstellende Geometrie (1st ed., 1871, 3rd ed., 1888); Clebsch, Vorlesungen iiber Geometrie, vol. iii.; Hilbert, loc. cit.\ F. Schur, Math. Ann. Bd. lv. (1902); Vahlen, loc. cit. ; Whitehead, loc. cit.

Fig. 60.

relations, however m, n, S and S' be varied, are called " prospectivities," and U is the double point of the prospectivity. If a point O on / is related to A by a prospectivity, then all prospectivities, which (1) have the same double point U, and (2) relate O to A, give the same correspondent (Q, in figure) to any point P on the line /; in fact they are all the same prospectivity, however m, n, S, and S' may have been varied subject to these conditions. Such a prospectivity will be denoted bv (OAU 2).

The sum of two prospectivities, written (OAU 2) + (OBU 2), is defined to be that transformation of the line / into itself which is obtained by first applying the prospectivity (OAU 2) and then applying the prospectivity (OBU 2). Such a transformation, when the two summands have the same double point, is itself a prospectivity with that double point.

With this definition of addition it can be proved that prospec- tivities with the same double point satisfy all the axioms of mag- nitude. Accordingly they can be associated in a one-one corre- spondence with the positive and negative real numbers. Let E (fig. 70) be any point on /, distinct from O and U. Then the prospectivity (OEU 2) is associated with unity, the prospectivity (OOU 2) is associated with zero, and (OUU 2) with 00. The pro- spectivities of the type (OPU 2), where P is any point on the seg- ment OEU, correspond to the posi- tive numbers; also if P' is the harmonic conjugate of P with respect to O and U, the prospec- tivity (OP'U 2) is associated with the corresponding negative number. L

*(The subjoined figure explains this *" o e p u*

relation of the positive and nega- Fig. 70.

tiye prospectivities.) Then any

point P on / is associated with the same number as is the prospec- tivity (OPU 2). v v

*It can.be proved that the order of the numbers in algebraic order of magnitude agrees with the order on the line of the associated points. Let the numbers, assigned according to the preceding specification, be said to be associated with the points according to the " numeration-system (OEU)." The introduction of a coordinate system for a plane is now managed as follows: Take any triangle OUV in the plane, and on the lines OU and OV establish the numeration systems (OEiU) and (OE 2 V), where Ei and E 2 are arbitrarily chosen. Then (cf. fig. 71) if M and N are associated with the numbers * and y according to these systems, the coordinates of P are x and y. It then follows that the equation of a straight line is of the form ax--by--c = o. Both coordinates of any point on the line UV are infinite. This can be avoided by introducing homogeneous coordinates X, Y, Z, where x — 'K/Z, and y = Y/Z, and Z = o is the equation of UV.*

The procedure for three dimensions is similar. Let OUVW (fig. 72) be any tetrahedron, and associate points on OU, OV, OW with numbers according to the numera- tion systems (OEiU), (OE 2 V), and (OE3W). Let the planes VWP, WUP, UVP cut OU, OV, OW in L, M, N respec- tively; and let x, y, z be the numbers associated with L, M, N respectively, o Then P is the point (x, y, z). Also Ijomogeneous coordinates can be in- troduced as before, thus avoiding the infinitieson the plane UVW.

The cross ratio of a range of four „

collinear points can now be defined rlG. 72.

as a number characteristic of that range. Let the coordinates of any point P r of the range Pi P 2 P3 P4 be

\a+fi r +a' \b+»rb' Xc+ˆc' , .,

*and let (XrM») be written for \fj.,-\ s fj. T . Then the cross ratio (Pi P 2 P 3 P>3i*i)lfam)(h3Hz). The equality of the cross ratios of the ranges (Pi P 2 Ps P4) and (Qi Q2 Qs Qi) is proved to be the necessary and sufficient condition for their mutual projectivity. The cross ratios of all harmonic ranges are then easily seen to be all equal to – 1 , by comparing with the range (OEiUE'i) on the axis of x.*

Thus all the ordinary propositions of geometry in which distance and angular measure do not enter otherwise than in cross ratios can now be enunciated and proved. Accordingly the greater part of the analytical theory of conies and quadrics belongs to geometry

Fig. 71.

AXiOMSJ

GEOMETRY

at this stage The theory of distance will be considered after the principles of descriptive geometry have been developed.

Descriptive Geometry.

Descriptive geometry is essentially the science of multiple order for open series. The first satisfactory system of axioms was given by M. Pasch. 1 An improved version is due to G. Peano. Both these authors treat the idea of the class of points constituting the segment lying between two points as an undefined fundamental idea. Thus in fact there are in this system two fundamental ideas, namely, of points and of segments. It is then easy enough to define the prolongations of the segments so as to form the complete straight lines. D. Hilbert's 3 formula- tion of the axioms is in this respect practically based on the same fundamental ideas. His work is justly famous for some of the mathematical investigations contained in it, but his exposition of the axioms is distinctly inferior to that of Peano. Descriptive geometry can also be considered 4 as the science*

of a class of relations, each relation being a two-termed serial relation, as considered in the logic of relations, ranging the points between which it holds into a linear open order. Thus the relations are the straight lines, and the terms between which they hold are the points. But a combination of these two points of view yields the simplest statement of all. Descriptive geometry is then conceived as the investigation of an undefined fundamental relation between three terms (points); and when the relation holds between three points A, B, C, the points are said to be " in the [linear] order ABC."

O. Veblen's axioms and definitions, slightly modified, are as follows: —

i. If the points A, B, C are in the order ABC, they are in the order CBA.

2 If the points A, B, C are in the order ABC, they are not in the order BCA.

3- H the points A, B, C are in the order ABC, A is distinct from C.

4- If A and B are any two distinct points, there exists a point C such that A, B, C are in the order ABC.

Definition.— The line AB (A ± B) consists of A and B, and of all points X in one of the possible orders, ABX, AXB, XAB The points X in the order AXB constitute the segment AB.

5- If points C and D (C ± D) lie on the line AB, then A lies on the line CD.

6. There exist three distinct points A, B, C not in any of the orders ABC, BCA, CAB.

7. If three distinct points A, B, C (fig. 73) do not lie on the same fine, and D and £ are two distinct points in the ordeis

BCD and CEA, then a point F exists in the order AFB, and such that D, E, F are collinear.

Definition— U A, B, C are three non-collinear points, the plane ABC is the class of points which lie on any one of the lines joining any two of the points belonging to the boundary of Fig. 73. the triangle ABC, the boundary being

*AB. The interior of the tn£ˆfi*ˆ£ > J£«&*

rwiTf^ s ^:ntr Q Bcrs A p B. and Q are points «&££

8. There exists a plane ABC, which does not contain all the points.

ARTnSi' A ' ?' ^ ° a £ l° Ur "on-coplanar points, the space

two Joints on th S ° f P ? mtS T^ He °" any ° f the lines containing two points on the surface of the tetrahedron ABCD, the surface bejng formed by the interiors of the triangles ABC, BCD, DCa!

9- There exists a space ABCD which contains all the points.' 1 Cf. loc. cit.

a u CL I P'inpiPfi di geometria (Turin, 1889) and " Sui fondamenti della geometria," Rivista di mat. vol. iv. (1804) t°ndamenti

3 Cf. loc. cit. ^

I Cf- Va iUti Rivista di mat. vol. iv. and Russell, loc. cit. § 376.

*Tra C nl: A nJ.lli So°^t ^° mS * G ^ f "*

733

10. The Dedekind property holds for the order of the points on any straight fine.

It follows from axioms 1-9 that the points on any straight line are arranged in an open serial order. Also all the ordinary theorems respecting a point dividing a straight line into two parts, a straight line dividing a plane into two parts, and a plane dividing space into two parts, follow.

Again, in any plane a consider a line / and a point A (fig. 74)

Let any point B divide/ into two half-lines h and l 2 . Then it can be proved that the set of half-lines, emanating from A and inter secting h (such as m), are bounded by two half-lines, of which ABC is one. Let r be the other. Then it can be proved that r does not intersect h. Similarly for the half-line, such as n, intersecting h. Let s be its bounding half-line. Then two cases are possible. (1) The half-lines r and jr are collinear, and together form one com- plete line. In this case, there is one and only one line (viz. r+s) through A and lying in o which does not intersect I. This is the Euclidean case, and the assumption that this case holds is the Euclidean parallel axiom. But (2) the half-lines r and s may not be collinear. In this case there will

be an infinite number of lines, such as k for instance, containing A and lying in a. which do not intersect I. Then the lines through A in a are divided into two classes by reference to /, namely, the secant lines which intersect /, and the non-secant lines which do not intersect /. The two boundary non-secant lines, of which r and s are respectively halves, may be called the two parallels to / through A.

I he perception of the possibility of case 2 constituted the starting-point from which Lobatchewsky constructed the first explicit coherent theory of non-Euclidean geometry, and thus created a revolution in the philosophy of the subject. For many centuries the speculations of mathematicians on the foundations of geometry were almost confined to hopeless attempts to prove the " parallel axiom without the introduction of some equivalent axiom. 6

Associated Projective and Descriptive Spaces.— A region of a projective space, such that one, and only one, of the two supplementary segments between any pair of points within it lies entirely within it, satisfies the above axioms (1-10) of descriptive geometry, where the points of the region are the descriptive points, and the portions of straight lines within the region are the descriptive lines. If the excluded part of the original pro- jective space is a single plane, the Euclidean parallel axiom also holds, otherwise it does not hold for the descriptive space of the limited region. Again, conversely, starting from an original descriptive space an associated projective space can be con- structed by means of the concept of ideal points J These are also called projective points, where it is understood that the simple points are the points of the original descriptive space. An ideal point is the class of straight lines which is composed of two coplanar lines a and b, together with the lines of intersection of all pairs of intersecting planes which respectively contain a and b, together with the lines of intersection with the plane ab of all planes containing any one of the lines (other than a or b) already specified as belonging to the ideal point. It is evident that, if the two original lines a and b intersect, the corresponding ideal point is nothing else than the whole class of lines which are concurrent at the point ab. But the essence of the definition is that _ an ideal point has an existence when the lines a and b do not intersect, so long as they are coplanar. An ideal point is termed proper, if the lines composing it intersect: otherwise it is improper.

A theorem essential to the whole theory is the following: if any two of the three lines a, b, c are coplanar, but the three lines are not all coplanar, and similarly for the lines a, b, d, then c and d are coplanar. It follows that any two lines belonging to an ideal point

can be used as the pair of guiding lines in the definition. An ideal point is said to be coherent with a plane, if any of the fines composing it lie in the plane. An ideal line is the class of ideal points each of which is coherent with two given planes.

rZbfb v St ˆ el an £ F — ? nge1 ‘ Die Theorie der Parallellinien von Kuklid bis auf Gauss (Leipzig, 1895).

‘Cf Pasch, foe cit, and R. Bonola, ” Sulla introduzione degli 1907O; , and Whitehead, Axioms of Descriptive Geometry (Cambridge,

If the planes intersect, the ideal line is termed proper, otherwise it is improper. It can be proved that any two planes, with which any two of the ideal points are both coherent, will serve as the guiding planes used in the definition. The ideal planes are defined as in projective geometry, and all the other definitions (for segments, order, &c.) of projective geometry are applied to the ideal elements. If an ideal plane contains some proper ideal points, it is called proper, otherwise it is improper. Every ideal plane contains some improper ideal points.

It can now be proved that all the axioms of projective geometry hold of the ideal elements as thus obtained; and also that the order of the ideal points as obtained by the projective method agrees with the order of the proper ideal points as obtained from that of the associated points of the descriptive geometry. Thus a projective space has been constructed out of the ideal elements, and the proper ideal elements correspond element by element with the associated descriptive elements. Thus the proper ideal elements form a region in the projective space within which the descriptive axioms hold. Accordingly, by substituting ideal elements, a descriptive space can always be considered as a region within a projective space. This is the justification for the ordinary use of the ” points at infinity ” in the ordinaryEuclidean geometry; the reasoning has been transferred from the original descriptive space to the associated projective space of idea! elements; and with the Euclidean parallel axiom the improper ideal elements reduce to the ideal points on a single improper ideal plane, namely, the plane at infinity. 1

Congruence and Measurement. — The property of physical space which is expressed by the term ” measurability ” has now to be

considered. This property has often been considered as essential to the very idea of space. For example, Kant writes, 2 " Space is represented as an infinite given quantity." This quantitative aspect of space arises from the measurability of distances, of angles, of surfaces and of volumes. These four types of quantity depend upon the two first among them as fundamental. The measurability of space is essentially connected with the idea of congruence, of which the simplest examples are to be found in the proofs of equality by the method of superposition, as used in elementary plane geometry. The mere concepts of " part " and of " whole " must of necessity be inadequate as the founda- tion of measurement, since we require the comparison as to quantity of regions of space which have no portions in common. The idea of congruence, as exemplified by the method of super- position in geometrical reasoning, appears to be founded upon that of the " rigid body," which moves from one position to another with its internal spatial relations unchanged. But unless there is a previous concept of the metrical relations between the parts of the body, there can be no basis from which to deduce that they are unchanged.

It would therefore appear as if the idea of the congruence, or metrical equality, of two portions of space (as empirically sug- gested by the motion of rigid bodies) must be considered as a fundamental idea incapable of definition in terms of those geometrical concepts which have already been enumerated. This was in effect the point of view of Pasch. 3 It has, however, been proved by Sophus Lie 4 that congruence is capable of definition without recourse to a new fundamental idea. This he does by means of his theory of finite continuous groups (see Groups, Theory of), of which the definition is possible in terms of our established geometrical ideas, remembering that co- ordinates have already been introduced. The displacement of a rigid body is simply a mode of defining to the senses a one- one transformation of all space into itself. For at any point of space a particle may be conceived to be placed, and to be rigidly connected with the rigid body; and thus there is a definite correspondence of any point of space with the new point occupied by the associated particle after displacement. Again two suc-

1 The original idea' (confined to this particular case) of ideal points is due to von Staudt (loc. cit.).

2 Cf. Critique, " Trans. Aesth." Sect. I. » Cf . he. cit.

- *Cf . Vber die Grundlagen der Geometric (Leipzig, Ber., 1890); and Theor.ieder Transformationsgruppen (Leipzig, 1893), vol.*

cessive displacements of a rigid body from position A to position B, and from position B to position C, are the same in effect as one displacement from A to C. But this is the characteristic " group " property. Thus the transformations of space into itself defined by displacements of rigid bodies form a group.

Call this group of transformations a congruence-group. Now according to Lie a congruence-group is defined by the following characteristics : —

1. A congruence-group is a finite continuous group of one-one transformations, containing the identical transformation.

2. It is a sub-group of the general projective group, i.e. of the group of which any transformation converts planes into planes, and straight lines into straight lines.

3. An infinitesimal transformation can always be found satis- fying the condition that, at least throughout a certain enclosed region, any definite line and any definite point on the line are latent, i.e. correspond to themselves.

4. No infinitesimal transformation of the group exists, such that, at least in the region for which (3) holds, a straight line, a point on it, and a plane through it, shall all be latent.

The property enunciated by conditions (3) and (4), taken together, is named by Lie " Free mobility in the infinitesimal." Lie proves the following theorems for a projective space: —

1. If the above four conditions are only satisfied by a group throughout part of projective space, this part either (a) must be the region enclosed by a real closed quadric, or (/S) must be the whole of the projective space with the exception of a single plane. In case (a) the corresponding congruence group is the continuous group for which the enclosing quadric is latent ; and in case (/3) an imaginary conic (with a real equation) lying in the latent plane is also latent, and the congruence group is the continuous group for which the plane and conic are latent.

2. If the above four conditions are satisfied by a group throughout the whole of projective space, the congruence group is the continuous group for which some imaginary quadric (with a real equation) is latent.

By a proper choice of non-homogeneous co-ordinates the equation of any quadrics of the types considered, either in theorem I (a), or in theorem 2, can be written in the form I +c(x 2 --y i +z') =0, where c is negative for a real closed quadric, and positive for an imaginary quadric. Then the general infinitesimal transformation is defined by the three equations:

dxldt=u— m sy+ a >2Z+cx(ux+vy+wz), “) dy/dt — v—<°iz+ °>ax+cy(ux+vy+wz), V (A) dz/dt=w—•° i x+ l >‘iy+cz(ux+vy +wz).) In the case considered in theorem 1 (0), with the proper choice of co-ordinates the three equations defining the general infinitesimal transformation are :

dx/dt = u — “ay+ˆiz,) dyldt-v — o>iz+”!tx, > (B) dz/di=w—< °2X+ a 'iy.) In this case the latent plane is the plane for which at least one of x, y, z are infinite, that is, the plane o.x+o.y+o.z+a = o; and the latent conic is the conic in which the cone x 2 +y 2 +z 2 = o intersects the latent plane.

It follows from theorems 1 and 2 that there is not one unique congruence-group, but an indefinite number of them. There is one congruence-group corresponding to each closed real quadric, one to each imaginary quadric with a real equation, and one to each imaginary conic in a real plane and with a real equation. The quadric thus associated with each congruence-group is called the absolute for that group, and in the degenerate case of 1 (j3) the absolute is the latent plane together with the latent imaginary conic. If the absolute is real, the congruence-group is hyperbolic; if imaginary, it is elliptic; if the absolute is a plane and imaginary conic, the group is parabolic. Metrical geometry is simply the theory of the properties of some particular congruence-group selected for study.

The definition of distance is connected with the corresponding congruence-group by two considerations in respect to a range of five • points (Ai, Aj, Pi, P2, P s), of which Ai and A 2 are on the absolute.

Let (AiPiAjPii) stand for the cross ratio (as defined above) of the range (A1P1A2P2), with a similar notation for the other ranges. Then

(1) log{AiPiA 2 P s | + logl^PjAjPs} =log{A 1 PiA 2 P,} ,

and

(2), if the points Ai, A 2 , Pi, P2 are transformed into A'i, A' s , P'i, P's by any transformation of the congruence-group, (o) (A1P1A2P2I = |A'iP'iA'2P'2| , since the transformation is projective, and ifi) A'i, A> are on the absolute since Ai and A2 are on it. Thus if we define

AXI0MS1

GEOMETRY

735

the distance PiP 2 to be §k log {AiPiA 2 P 2 |, where Ai and A 2 are the points in which the line PiP 2 cuts the absolute, and k is some con- stant, the two characteristic properties of distance, namely, (i) the addition of consecutive lengths on a straight line, and (2) the in- variability of distances during a transformation of the congruence- group, are satisfied. .This is the well-known Cayley-Klein projective definition 1 of distance, which was elaborated in view of the addition property alone, previously to Lie's discovery of the theory of con- gruence-groups. For a hyperbolic group when Pi and P 2 are in the region enclosed by the absolute, logjAiPiA 2 P 2 j is real, and therefore k must be real. For an elliptic group Ai and A 2 are conjugate imaginaries, and log {AiPiA 2 P 2 j is a pure imaginary, and k is chosen to be KJi, where k is real and i = V — .

Similarly the angle between two planes, pi and p 2 , is defined to be (1/21) log (hpikpt), where h and h are tangent planes to the absolute through the line" pip%. The planes h and h are imaginary for an elliptic group, and also for an hyperbolic group when the planes pi and p% intersect at points within the region enclosed by the absolute. The development of the consequences of these metrical definitions is the subjct of non-Euclidean geometry.

The definitions for the parabolic case can be arrived at as limits of those obtained in either of the other two cases by making k ultimately to vanish. It is also obvious that, if Pi and P 2 be the points (xi, yi, Zi) and (x 2 , y 2 , zj, it follows from equations (B) above that {(xi— x») 2 r(yi— y 2) 2 + (zi— Z2) 2 !* is unaltered by a congruence transformation and also satisfies the addition property for collinear distances. Also the previous definition of an angle can be adapted to this case, by making h and h to be the, tangent planes through the line pip% to the imaginary conic. Similarly if pi and pi are inter- secting lines, the same definition of an angle holds, where h and h are now the lines from the point pipi to the two points where the plane p\p% cuts the imaginary conic. These points are in fact the

" circular points at infinity " on the plane. The development of the consequences of these definitions for the parabolic case gives the ordinary Euclidean metrical geometry.

Thus the only metrical geometry for the whole of projective space is of the elliptic type. But the actual measure-relations (though not their general properties) differ according to the elliptic congruence-group selected for study. In a descriptive space a congruence-group should possess the four characteristics of such a group throughout the whole of the space. Then form the associated ideal projective space. The associated congruence- group for this ideal space must satisfy the four conditions throughout the region of the proper ideal points. Thus the boundary of this region is the absolute. Accordingly there can be no metrical geometry for the whole of a descriptive space unless its boundary (in the associated ideal space) is a closed quadric or a plane. If the boundary is a closed quadric, there is one possible congruence-group of the hyperbolic type. If the boundary is a plane (the plane at infinity), the possible congruence-groups are parabolic; and there is a congruence- group corresponding to each imaginary conic in this plane, together with a Euclidean metrical geometry corresponding to each such group. Owing to these alternative possibilities, it would appear to be more accurate to say that systems of quantities can be found in a space, rather than that space is a quantity.

Lie has also deduced 2 the same results with respect to con- gruence-groups from another set of defining properties, which explicitly assume the existence of a quantitative relation (the distance) between any two points, which is invariant for any transformation of the congruence-group. 3

The above results, in respect to congruence and metrical geometry, considered in relation to existent space, have led to the doctrine 4 that it is intrinsically unmeaning to ask which system of metrical geometry is true of the physical world. Any one of these systems can be applied, and in an indefinite number of ways. The only question before us is one of convenience in respect to simplicity of statement of the physical laws. This point of view seems to neglect the consideration that science is to be relevant to the definite perceiving minds of men; and. that (neglecting the ambiguity introduced by the invariable slight inexactness of observation which is not relevant to this special doctrine)

1 Cf. A. Cayley, " A Sixth Memoir on Quantics," Trans. Roy. Soc, 1859, and Coll. Papers, vol. ii. ; and F. Klein, Math. Ann. vol. iv.,

1871.

2 Cf. loc. cit.

3 For similar deductions from a third set of axioms, suggested in essence by Peano, Riv. mat. vol. iv. loc. cit. cf. Whitehead, Desc. Geom. loc. cit:

4 Cf. H. Poincarfi, La Science et I'hypothese, ch. iii.

we have, in fact, presented to our senses a definite set of trans-formations forming a congruence-group, resulting in a set of measure relations which are in no respect arbitrary. Accordingly our scientific laws are to be stated relevantly to that particular congruence-group. Thus the investigation of the type (elliptic, hyperbolic or parabolic) of this special congruence-group is a perfectly definite problem, to be decided by experiment. The consideration of experiments adapted to this object requires some development of non-Euclidean geometry (see section VI., N on- Euclidean Geometry). But if the doctrine means that, assuming some sort of objective reality for the material universe, beings can be imagined, to whom either all congruence-groups are equally important, or some other congruence-group is specially important, the doctrine appears to be an immediate deduction from the mathematical facts. Assuming a definite congruence- group, the investigation of surfaces (or three-dimensional loci in space of four dimensions) with geodesic geometries of the form of metrical geometries of other types of congruence-groups forms an important chapter of non-Euclidean geometry. Arising from this investigation there is a widely-spread fallacy, which has found its way into many philosophic writings, namely, that the possibility of the geometry of existent three-dimensional space being other than Euclidean depends on the physical existence of Euclidean space of four or more dimensions. The foregoing exposition shows the baselessness of this idea.

Bibliography. — For an account of the investigations on the axioms of geometry during the Greek period, see M. Cantor, Vor- lesungen uber die Geschichte der Mathematik, Bd. i. and iii. ; T. L. Heath, The Thirteen Books of Euclid's Elements, a New Translation from the Greek, with Introductory Essays and Commentary, Historical, Critical, and Explanatory (Cambridge, 1908) — this work is the standard source of information; W. B. Frankland, Euclid, Book I., with a Commentary (Cambridge, 1905) — the commentary contains copious extracts from the ancient commentators. The next period of really substantive importance is that of the 1 8th century. The

leading authors are: G. Saccheri, S.J., Euclides ab omni naevo vindicatus (Milan, 1733). Saccheri was an Italian Jesuit who unconsciously discovered non-Euclidean geometry in the course of his efforts to prove its impossibility. J. H. Lambert, Theorie der Parallellinien (1766) ; A. M. Legendre, Elements de geometrie (1794). An adequate account of the above authors is given by P. Stackel and F. Engel, Die Theorie der Parallellinien von Euklid bis auf Gauss (Leipzig, 1895). The next period of time (roughly from 1800 to 1870) contains two streams of thought, both of which are essential to the modern analysis of the subject. The first stream is that which produced the discovery and investigation of non-Euclidean geometries, the second stream is that which has produced the geometry of position, com- prising both projective and descriptive geometry not very accurately discriminated. The leading authors on non-Euclidean geometry are K. F. Gauss, in private letters to Schumacher, cf. Stackel and Engel, loc. cit. ; N. Lobatchewsky, rector of the university of Kazan, to whom the honour of the effective discovery of non-Euclidean geometry must be assigned. His first publication was at Kazan in 1826. His various memoirs have been re-edited by Engel; cf. Urkunden zur Geschichte der nichteuklidischen Geometrie by Stackel and Engel, vol. i. "Lobatchewsky." J. Bolyai discovered non-Euclidean geometry apparently in independence of Lobat- chewsky. His memoir was published in 1 831 as an appendix to a work by his father W. Bolyai, Tentamen juventutem. . . . This memoir has been separately edited by J. Frischaui, Absolute Geometrie nach J. Bolyai (Leipzig, 1872); B. Riemann, Tiber die Hypothesen, welche der Geometrie zu Grunde liegen (1854); cf. Gesamte Werke, a translation in The Collected Papers of W. K. Clifford. This is a fundamental memoir on the subject and must rank with the work of Lobatchewsky. Riemann discovered elliptic metrical geometry, and Lobatchewsky hyperbolic geometry. A full account of Rie- mann's ideas, with the subsequent developments due to Cliffcrd, F. Klein and W. Killing, will be found in The Boston Colloquium for iqoj (New York, 1905), article " Forms of Non-Euclidean Space," by F. S. Woods. A. Cayley, loc. cit. (1859), and F. Klein, " Uber die sogenannte nichteuklidische Geometrie," Math. Annal. vols. iv. and vi. (1871 and 1872), between them elaborated the projective theory of distance; H. Helmholtz, " tiber die thatsachlichen Grundlagen der Geometrie" (1866), and " Uber die Thatsachen, die der Geometrie zu Grunde liegen" (1868), both in his Wissenschaflliche Abhandlungen, vol. ii., and S. Lie, loc. cit. (1890 and 1893), between them elaborated the group theory of congruence.

The numberless works which have been written to suggest equivalent alternatives to Euclid's parallel axioms may be neglected as being of trivial importance, though many of them are marvels of geometric ingenuity.

The second stream of thought confined itself within the circle of ideas of Euclidean geometry. Its origin was mainly due to a

succession of great French mathematicians, for example, G. Monge, Geometrie descriptive (1800); J. V. Poncelet, Traite des proprietSs projectives des figures (1822); M. Chasles, Apercu historique sur I'origine el le developpement des methodes en geometrie (Bruxelles, 1 837), and Traite de geometrie superieure (Paris, 1852); and many others. But the works which have been, and are still, of decisive influence on thought as a store-house of ideas relevant to the foundations of geometry are K. G. C. von Staudt's two works, Geometrie der Lage (Nurnberg, 1847); and Beitrdge zur Geometrie der Lage (Nurnberg, 1856, 3rd ed. i860).

The final period is characterized by the successful production of exact systems of axioms, and by the final solution of problems which have occupied mathematicians for two thousand years. The successful analysis of the ideas involved in serial continuity is due to R. Dedekind, Stetigkeit und irrationale Zahlen (1872), and to G. Cantor, Grundlagen einer allgemeinen Mannigfaltigkeitslehre (Leipzig, 1883), and Acta math. vol. 2.

Complete systems of axioms have been stated by M. Pasch, loc. cit. ; G. Peano, loc. cit. ; M. Pieri, loc. cit. ; B. Russell, Principles of Mathematics; O. Veblen, loc. cit.; and by G. Veronese in his treatise, Fondamenti di geometria (Padua, 1891 ; German transl. by A. Schepp, Grundziige der Geometrie, Leipzig, 1894). Most of the leading memoirs on special questions involved have been cited in the text; in addition there may be mentioned M. Pieri, " Nuovi principii di geometria projettiva complessa," Trans. Accad. R. d. Sci. (Turin, 1905); E. H. Moore, " On the Projective Axioms of Geometry," Trans. Amer. Math. Soc, 1902; O. Veblen and W. H. Bussey, "Finite Projective Geometries," Trans. Amer. Math. Soc., 1905; A. B. Kempe, " On the Relation between the Logical Theory of Classes and the Geometrical Theory of Points," Proc. Lond. Math. Soc, 1890; J. Royce, "The Relation of the Principles of Logic to the Foundations of

Geometry," Trans, of Amer. Math. Soc, 1905; A. Schoenflies, " tlber die Moglichkeit einer projectiven Geometrie bei transfiniter (nichtarchimedischer) Massbestimmung," Deutsch. M.-V. Jahresb., 1906.

For general expositions of the bearings of the above investiga- tions, cf. Hon. Bertrand Russell, loc cit. ; L. Couturat, Les Principes des mathematiques (Paris, 1905) ; H. Poincar6, loc. cit. ; Russell and Whitehead, Principia mathematica (Cambridge, Univ. Press). The philosophers whose views on space and geometric truth de- serve especial study are Descartes, Leibnitz, Hume, Kant and J. S. Mill. (A. N. W.)

GEOPONICI, 1 or Scriptores rei rusticae, the Greek and Roman writers on husbandry and agriculture. On the whole the Greeks paid less attention than the Romans to the scientific study of these subjects, which in classical times they regarded as a branch of economics. Thus Xenophon's Oeconomicus (see also Memo- rabilia, ii. 4) contains a eulogy of agriculture and its beneficial ethical effects, and much information is to be found in the writings of Aristotle and his pupil Theophras-tus. About the same time as Xenophon, the philosopher Democritus of Abdera wrote a treatise Ilept Teupyias, frequently quoted and much used by the later compilers of Geoponica (agricultural treatises). Greater attention was given to the subject in the Alexandrian period; a long list of names is given by Varro and Columella, amongst them Hiero II. and Attalus III. Philometor. Later, Cassius Dionysius of Utica translated and abridged the great work of the Carthaginian Mago, which was still further condensed by Diophanes of Nicaea in Bithynia for the use of King Deiotarus. From these and similar works Cassianus Bassus (q.v.) compiled his Geoponica. Mention may also be made of a little work ITepi TeupyiK&v by Michael Psellus (printed in Boissonade, Anecdota Graeca, i.).

The Romans, aware of the necessity of maintaining a numerous and thriving order of agriculturists, from very early times endeavoured to instil into their countrymen both a theoretical and a practical knowledge of the subject. The occupation of the farmer was regarded as next in importance to that of the soldier, and distinguished Romans did not disdain to practise it. In furtherance of this object, the great work of Mago was translated into Latin by order of the senate, and the elder Cato wrote his De agri cultura (extant in a very corrupt state), a simple record in homely language of the rules observed by the old, Roman landed proprietors rather than a theoretical treatise. He was followed by the two Sasernae (father and

son) and Gnaeus Tremellius Scrofa, whose works are lost. The learned Marcus Terentius Varro of Reate, when eighty years of age, composed his Rerum rusticarum, libri tres, dealing with agriculture, the

1 The latinized form of a non-existent Tecmovwol, used for convenience.

rearing of cattle, and the breeding of fishes. He was the first to systematize what had been written on the subject, and supplemented the labours of others by practical experience gained during his travels. In the Augustan age Julius Hyginus wrote on farming and bee-keeping, Sabinus Tiro on horticulture, and during the early empire Julius Graecinus and Julius Atticus on the culture of vines, and Cornelius Celsus (best known for his De medicina) on farming. The chief work of the kind, however, is that of Lucius Junius Moderatus Columella (q.v.). About the middle of the 2nd century the two Quintilii, natives of Troja, wrote on the subject in Greek. It is remarkable that Columella's work exercised less influence in Rome and Italy than in southern Gaul and Spain, where agriculture became one of the principal subjects of instruction in the superior educational establishments that were springing up in those countries. One result of this was the preparation of manuals of a popular kind for use in the schools. In the 3rd century Gargilius Martialis of Mauretania compiled a Geoponica in which medical botany and the veterinary art were included. The De re ruslica of Palladius (4th century), in fourteen books, which is almost entirely borrowed from Columella, is greatly inferior in style and knowledge of the subject. It is a kind of farmer's calendar, in which the different rural occupations are arranged in order of the months. The fourteenth book (on forestry) is written in elegiacs (85 distichs). The whole of Palladius and considerable fragments of Martialis are extant.

The best edition of the Scriptores rei rusticae is by J. G. Schneider (1794-1797)-, and the whole subject is exhaustively treated by A. Magerstedt, Bilder aus der romischen Landwirtschaft (1858- 1863); see also Teuffel-Schwabe, Hist, of Roman Literature, 54; C. F. Biihr in Ersch and Gruber's Allgemeine Encyklopadie.

GEORGE, SAINT (d. 303), the patron saint of England, Aragon and Portugal. According to the legend given by Metaphrastes the Byzantine hagiologist, and substantially repeated in the Roman Acta sanctorum and in the Spanish breviary, he was born in Cappadocia of noble Christian parents, from whom he received a careful religious training. Other accounts place his birth at Lydda, but preserve his

*Cappadocian parentage. Having em- braced the profession of a soldier, he rapidly rose under Dio- cletian to high military rank. In Persian Armenia he organized and energized the Christian community at Urmi (Urumiah), and even visited Britain on an imperial expedition. When Diocletian had begun to manifest a pronounced hostility towards Christianity, George sought a personal interview with him, in which he made deliberate profession of his faith, and, earnestly remonstrating against the persecution which had begun, resigned his commission. He was immediately laid under arrest, and after various tortures, finally put to death at Nicomedia (his body being afterwards taken to Lydda) on the 23rd of April 305. His festival is observed on that anniversary by the entire Roman Catholic Church as a semi-duplex, and by the Spanish Catholics as a duplex of the first class with an octave. The day is also celebrated as a principal feast in the Orthodox Eastern Church, where the saint is distinguished by the titles i*ey aXbjxapTVp and rpoTraiodiopos.*

The historical basis of the tradition is particularly unsound, there being two claimants to the name and honour. Eusebius, Hist. eccl. viii. 5, writes: " Immediately on the promulgation of the edict (of Diocletian) a certain man of no mean origin, but highly esteemed for his temporal dignities, as soon as the decree was published against the' churches in Nicomedia, stimulated by a divine zeal and excited by an ardent faith, took it as it was openly placed and posted up for public inspection, and tore it to shreds as a most profane and wicked act. This, too, was done when the two Caesars were in the city, the first of whom was the eldest and chief of all and the other held fourth grade of the imperial dignity after him. But this man, as the first that was distinguished there in this manner, after enduring what was likely to follow an act so daring, preserved his mind, calm and serene, until the moment when his spirit fled." Rivalling this anonymous martyr, who is often supposed to have been St George, is an earlier martyr briefly mentioned in the Chronicon Pascale: " In the year 22s of the Ascension of our Lord a persecution of the Christians took place, and many

suffered martyrdom, among whom also the Holy George was martyred."

Two Syrian church inscriptions bearing the name, one at Ezr'a and the other at Shaka, found by Burckhardt and Porter, and discussed

by J. Hogg in the Transactions of the Royal Literary Society, may with some probability be assigned to the middle of the 4th century. Calvin impugned the saint's existence altogether, and Edward Reynolds (i 599-1676), bishop of Norwich, like Edward Gibbon a century later, made him one with George of Laodicea, called " the Cappadocian," the Arian bishop of Alexandria (see George of Laodicea).

Modern criticism, while rejecting this identification, is not unwilling to accept the main fact that an officer named Georgios, of high rank in the army, suffered martyrdom probably under Diocletian. In the canon of Pope Gelasius (494) George is mentioned in a list of those " whose names are justly reverenced among men, but whose acts are known only to God," a statement which implies that legends had already grown up around his name. The caution of Gelasius was not long preserved; Gregory of Tours, for example, asserts that the saint's relics actually existed in the French village of Le Maine, where many miracles were wrought by means of them; and Bede, while still explaining that the Gesta Georgii are reckoned apocryphal, commits himself to the statement that the martyr was beheaded under Dacian, king of Persia, whose wife Alexandra, however, adhered to the Christian faith. The great fame of George, who is reverenced alike by Eastern and Western Christendom and by Mahom- medans, is due to many causes. He was martyred on the eve of the triumph of Christianity, his shrine was reared near the scene of a great Greek legend (Perseus and Andromeda), and his relics when removed from Lydda, where many pilgrims had visited them, to Zorava in the Hauran served to impress his fame not only on the Syrian population, but on their Moslem con- querors, and again on the Crusaders, who in grateful memory of the saint's intervention on their behalf at Antioch built a new cathedral at Lydda to take the place of the church destroyed by the Saracens. This cathedral was in turn destroyed by Saladin.

The connexion of St George with a dragon, familiar since the Golden Legend of Jacobus de Voragine, can be traced to the close of the 6th century. At Arsuf or Joppa — neither of them far from Lydda — Perseus had slain the sea-monster that threatened the virgin Andromeda, and George, like many another Christian saint, entered into the inheritance of veneration pre- viously enjoyed by a pagan hero. 1 The exploit thus attaches itself to the very common Aryan myth of the sun-god as the conqueror of the powers of darkness.

The popularity of St George in England has never reached the height attained by St Andrew in Scotland, St David in Wales or St Patrick

in Ireland. The council of Oxford in 1222 ordered that his feast should be kept as a national festival; but it was not until the time of Edward III. that he was made patron of the kingdom. The republics of Genoa and Venice were also under his protection.

Sec P. Heylin, The History of ... S. George of Cappadocia (1631); S. Baring-Gould, Curious Myths of the Middle Ages; Fr. Gorres, " Der Ritter St Georg in der Geschichte, Legende und Kunst " (Zeit- schrift fur wissenschaftliche Theologie, xxx., 1887, Heft i.) ; E. A. W. Budge, The Martyrdom and Miracles of St George of Cappadocia: the Coptic texts edited with an English translation (1888); Borland, Acta Sancti, iii. 101 ; E. O. Gordon, Saint George (1907); M. H. Bulley, St George for Merrie England (1908).

1 G. A. Smith (Hist. Geog. of Holy Land, p. 164) points out another coincidence. " The Mahommedans who usually identify St George with the prophet Elijah, at Lydda confound his legend with one about Christ himself. Their name for Antichrist is Dajjal, and they have a tradition that Jesus will slay Antichrist by the gate of Lydda. The notion sprang from an ancient bas-relief of George and the Dragon on the Lydda church. But Dajjal may be derived, by a very common confusion between n and I, from Dagon, whose name two neighbouring villages bear to this day, while one of the gates of Lydda used to be called the Gate of Dagon. It is a curious process by which the monster that symbolized heathenism conquered by Christianity has been evolved out of the first great rival of ˆhe God of Israel.

XI, 24

GEORGE I. [George Louis] (1660-1727), king of Great Britain and Ireland, born in 1660, was heir through his father Ernest Augustus to the hereditary lay bishopric of Osnabriick, and to the duchy of Calenberg, which formed one portion of the Hano- verian possessions of the house of Brunswick, whilst he secured the reversion of the other portion, the duchy of Celle or Zell, by his marriage (1682) with the heiress, his cousin Sophia Dorothea. The marriage was not a happy one. The morals of German courts in the end of the 17th century took their tone from the splendid profligacy of Versailles. It became the fashion for a prince to amuse himself with a mistress or more frequently with many mistresses simultaneously, and he was often content that the mistresses whom he favoured should be neither beautiful nor witty. George Louis followed the usual course. Count Konigsmark — a handsome adventurer — seized the opportunity of paying court to the deserted wife. Conjugal infidelity was held at

Hanover to be a privilege of the male sex. Count Konigsmark was assassinated. Sophia Dorothea was divorced in 1694, and remained in seclusion till her death in 1726. When George IV., her descendant in the fourth genera- tion, attempted in England to call his wife to account for sins of which he was himself notoriously guilty, free-spoken public opinion reprobated the offence in no measured terms. But in the Germany of the 17th century all free-spoken public opinion had been crushed out by the misery of the Thirty Years' War, and it was understood that princes were to arrange their domestic life according to their own pleasure.

The prince's father did much to raise the dignity of his family. By sending help to the emperor when he was struggling against the French and the Turks, he obtained the grant of a ninth electorate in 1692. His marriage with Sophia, the youngest daughter of Elizabeth the daughter of James I. of England, was not one which at first seemed likely to confer any prospect of advancement to his family. But though there were many persons whose birth gave them better claims than she had to the English crown, she found herself, upon the death of the duke of Gloucester, the next Protestant heir after Anne. The Act of Settlement in 1701 secured the inheritance to herself and her descendants. Being old and unambitious she rather permitted herself to be burthened with the honour than thrust herself forward to meet it. Her son George took a deeper interest in the matter. In his youth he had fought with determined courage in the wars of William III. Succeeding to the electorate on his father's death in 1698, he had sent a welcome reinforcement of Hanoverians to fight under Marlborough at Blenheim. With prudent persistence he attached himself closely to the Whigs and to Marlborough, refusing Tory offers of an independent command, and receiving in return for his fidelity a guarantee by the Dutch of his succession to England in the Barrier treaty of 1709. In 1 7 14 when Anne was growing old, and Bolingbroke and the more reckless Tories were coquetting with the son of James II., the Whigs invited George's eldest son, who was duke of Cambridge, to visit England in order to be on the spot in case of need. Neither the elector nor his mother approved of a step which was likely to alienate the queen, and which was specially distasteful to himself, as he was on very bad terms with his son. Yet they did not set themselves against the strong wish of the party to which they looked for support, and it is possible that troubles would have arisen from any attempt to carry out the plan, if the deaths, first of the electress (May 28) and then of the queen (August 1, 1714), had not laid open George's way to the succession without further effort of his own.

In some respects the position of the new king was not unlike that of William III. a quarter of a century before. Both sovereigns were foreigners, with little knowledge of English politics and little interest in English legislation. Both sovereigns arrived at a time when party spirit had been running high, and- when the task before the ruler was to still the waves of contention. In spite of the difference between an intellectually great man and an intellectually small one, in spite too of the difference between the king who began by choosing his ministers from both parties and the king who persisted in choosing his minister.'

it

from only one, the work of pacification was accomplished by George even more thoroughly than by William.

George I. was fortunate in arriving in England when a great military struggle had come to an end. He had therefore no reason to call upon the nation to make great sacrifices. All that he wanted was to secure for himself and his family a high position which he hardly knew how to occupy, to fill the pockets of his German attendants and his German mistresses, to get away as often as possible from the uncongenial islanders whose language he was unable to speak, and to use the strength of England to obtain petty advantages for his German principality. In order to do this he attached himself entirely to the Whig party, though he refused to place himself at the disposal of its leaders. He gave his confidence, not to Somers and Wharton and Marlborough, but to Stanhope and Townshend, the states- men of the second rank. At first he seemed to be playing a dangerous game. The Tories, whom he rejected,were numerically superior to their adversaries, and were strong in the support of the country gentlemen and the country clergy. The strength of the Whigs lay in the towns and in the higher aristocracy. Below both parties lay the mass of the nation, which cared nothing for politics except in special seasons of excitement, and which asked only to be let alone. In 1715 a Jacobite in- surrection in the north, supported by the appearance of the Pretender, the son of James II., in Scotland, was suppressed, and its suppression not only gave to the government a character of stability, but displayed its adversaries in an unfavourable light as the disturbers of the peace.

Even this advantage, however, would have been thrown away if the Whigs in power had continued to be animated by violent party spirit. What really happened was that the Tory leaders were excluded from office, but that the principles and prejudices of the Tories were admitted to their full weight in the policy of the government. The natural result followed. The leaders to whom no regard was paid continued in opposition. The rank and file, who would personally have gained nothing by a party victory, were conciliated into quiescence.

This mingling of two policies was conspicuous both in the foreign and the domestic actions of the reign. In the days of • Queen Anne the Whig party had advocated the continuance of war with a view to the complete humiliation of the king of France, whom they feared as the protector of the Pretender, and in whose family connexion with the king of Spain they saw a danger for England. The Tory party, on the other hand, had been the authors of the peace of Utrecht, and held that France was sufficiently depressed. A fortunate concurrence of circum 7 stances enabled George's ministers, by an alliance with the

regent of France, the duke of Orleans, to pursue at the same time the Whig policy of separating France from Spain and from the cause of the Pretender, and the Tory policy of the maintenance of a good understanding with their neighbour across the Channel. The same eclecticism was discernible in the proceedings of the home government. The Whigs were conciliated by the repeal of the Schism Act and the Occasional Conformity Act, whilst the Tories were conciliated by the maintenance of the Test Act in all its vigour. The satisfaction of the masses was increased by the general well-being of the nation.

Very little of all that was thus accomplished was directly owing to George I. The policy of the reign is the policy of his ministers. Stanhope and Townshend from 17 14 to 17 17 were mainly occupied with the defence of the Hanoverian settlement. After the dismissal of the latter in 17 17, Stanhope in conjunction with Sunderland took up a more decided Whig policy. The Occasional Conformity Act and the Schism Act were repealed in 1 7 19. But the wish of the liberal Whigs to modify if not to repeal the Test Act remained unsatisfied. In the following year the bursting of the South Sea bubble, and the subsequent deaths of Stanhope in 1721 and of Sunderland in 1722, cleared the way for the accession to power of Sir Robert Walpole, to whom and not to the king was due the conciliatory policy which quieted Tory opposition by abstaining from pushing Whig principles to their legitimate consequences.

Nevertheless something of the honour due to Walpole must be reckoned to the king's credit. It is evident that at his acces- sion his decisions were by no means unimportant. The royal authority was still able within certain limits to make its own terms. This support was so necessary to the Whigs that they made no resistance when he threw aside their leaders on his arrival in England. When by his personal intervention he dismissed Townshend and appointed Sunderland, he had no such social and parliamentary combination to fear as that which almost mastered his great-grandson in his struggle for power. If such a combination arose before the end of his reign it was owing more to his omitting to fulfil the duties of his station than from the necessity of the case. As he could talk no English, and his ministers could talk no German, he absented himself from the meetings of the cabinet, and his frequent absences from England and his want of interest in English politics strengthened the cabinet in its tendency to assert an independent position. Walpole at last by his skill in the management of parliament rose as a subject into the almost royal position denoted by the name of prime minister. In connexion with Walpole the force of wealth and station established

the Whig aristocracy in a point of vantage from which it was afterwards difficult to dislodge them. Yet, though George had allowed the power which had been exercised by William and Anne to slip through his hands, it was understood to the last that if he chose to exert himself he might cease to be a mere cipher in the conduct of affairs. As late as 1727 Bolingbroke gained over one of the king's mistresses, the duchess of Kendal; and though her support of the fallen Jacobite took no effect, Walpole was not without fear that her reiterated entreaties would lead to his dismissal. The king's death in a carriage on his way to Hanover, in the night between 10th and nth June in the same year, put an end to these apprehensions.

His only children were his successor George II. and Sophia Dorothea (1687-1757), who married in 1706 Frederick William, crown prince (afterwards king) of Prussia. She was the mother of Frederick the Great. (S. R. G.)

See the standard English histories. A recent popular work is L. Melville's The First George in Hanover and England (1908).

GEORGE II. [George Augustus] (1683-1760), king of Great Britain and Ireland, the only son of George I., was born in 1683. In 1705 he married Wilhelmina Caroline of Anspach. In 1706 he was created earl of Cambridge. In 1708 he fought bravely at Oudenarde. At his father's accession to the English throne he was thirty-one years of age. He was already on bad terms with his father. The position of an heir-apparent is in no case an easy one to fill with dignity, and the ill-treatment of the prince's mother by his father was not likely to strengthen in him a reverence for paternal authority. It was most unwillingly that, on his first journey to Hanover in 1716, George I. appointed the prince of W.ales guardian of the realm during his absence. In 1 71 7 the existing ill-feeling ripened into an open breach. At the baptism of one of his children, the prince selected one god- father whilst the king persisted in selecting another. The young man spoke angrily, was ordered into arrest, and was subsequently commanded to leave St James's and to be excluded from all court ceremonies. The prince took up his residence at Leicester House, and did everything in his power to support the opposition against his father's ministers.

When therefore George I. died in 1 7 2 7, it was generally supposed that Walpole would be at once dismissed. The first direction of the new king was that Sir Spencer Compton would draw up the speech in which he was to announce to the privy council his accession. Compton, not knowing how to set about his task, applied to Walpole

for aid. Queen Caroline took advantage of this evidence of incapacity, advocated Walpole's cause with her husband and procured his continuance in office. This curious scene was indicative of the course likely to be taken by the new sovereign. His own mind was incapable of rising above the merest details of business. He made war in the spirit of a drill-sergeant, and he economized his income with the minute regularity of a clerk. A blunder of a master of the ceremonies

in marshalling the attendants on a levee put him out of temper. He took the greatest pleasure in counting his money piece by piece, and he never forgot a date. He was above all things methodical and regular. " He seems," said one who knew him well, " to think his having done a thing to-day an unanswerable reason for his doing it to-morrow."

Most men so utterly immersed in details would be very impracticable to deal with. They would obstinately refuse to listen to a wisdom and prudence which meant nothing in their ears, and which brought home to them a sense of their own inferiority. It was the happy peculiarity of George II. that he was exempt from this failing. He seemed to have an instinctive understanding that such and such persons were either wiser or even stronger than himself, and when he had once discovered that, he gave way with scarcely a struggle. Thus it was that, though in his domestic relations he was as loose a liver as his father had been, he allowed himself to be guided by the wise but unobtrusive counsels of his wife until her death in 1737, and that when once he had recognized Walpole's superiority he allowed himself to be guided by the political sagacity of the great minister. It is difficult to exaggerate the importance of such a temper upon the development of the constitution. The apathy of the nation in all but the most exciting political questions, fostered by the calculated conservatism of Walpole, had thrown power into the hands of the great landowners. They maintained their authority by supporting a minister who was ready to make use of corrup- tion, wherever corruption was likely to be useful, and who could veil over the baseness of the means which he employed by his talents in debate and in finance. To shake off a combination so strong would not have been easy. George II. submitted to it without a struggle.

So strong indeed had the Whig aristocracy grown that it began to

lose its cohesion. Walpole was determined to monopolize power, and he dismissed from office all who ventured to oppose him. An opposition formidable in talents was gradually formed. In its composite ranks were to be found Tories and discontented Whigs, discarded official hacks who were hungry for the emolu- ments of office, and youthful purists who fancied that if Walpole were removed, bribes and pensions would cease to be attractive to a corrupt generation. Behind them was Bolingbroke, excluded from parliament but suggesting every party move. In 1737 the opposition acquired the support of Frederick, prince of Wales. The young man, weak and headstrong, rebelled against the strict discipline exacted by his father. His marriage in 1736 to Augusta of Saxony brought on an open quarrel. In 1737, just as the princess of Wales was about to give birth to her first child, she was hurried away by her husband from Hampton Court to St James's Palace at the imminent risk of her life, simply in order that the prince might show his spite to his father who had provided all necessary attendance at the former place. George ordered his son to quit St James's, and to absent himself from court. Frederick in disgrace gave the support of his name, and he had nothing else to give, to the opposition. Later in the year 1737, on the 20th of November, Queen Caroline died. In 1742 Walpole, weighed down by the unpopularity both of his reluctance to engage in a war with Spain and of his supposed remissness in conducting the operations of that war, was driven from office. His successors formed a composite ministry in which Walpole's old colleagues and Walpole's old opponents were alike to be found.

The years which followed settled conclusively, at least for this reign, the constitutional question of the power of appointing ministers. The war between Spain and England had broken out in 1739. In 1741 the death of the emperor Charles VI. brought on the war of the Austrian succession. The position of' George II. as a Hanoverian prince drew him to the side of Maria . Theresa through jealousy of the rising Prussian monarchy. Jealousy of France led England in the same direction, and in 1 74 1 a subsidy of £300,000 was voted to Maria Theresa. The king himself went to Germany and attempted to carry on the war according to his own notions. Those notions led him to regard the safety of Hanover as of far more importance than

the wishes of England. Finding that a French army was about to march upon his German states, he concluded with France a treaty of neutrality for a year without consulting a single English minister. In England the news was received with feelings of disgust. The expenditure of English money and troops was to be thrown uselessly away as soon as it appeared that Hanover was in the slightest

danger. In 1742 Walpole was no longer in office. Lord Wilmington, the nominal head of the ministry, was a mere cipher. The ablest and most energetic of his colleagues, Lord Carteret (afterwards Granville), attached himself specially to the king, and sought to maintain himself in power by his special favour and by brilliant achievements in diplomacy.

In part at least by Carteret's mediation the peace of Breslau was signed, by which Maria Theresa ceded Silesia to Frederick (July 28, 1742). Thus relieved on her northern frontier, she struck out vigorously towards the west. Bavaria was overrun by her troops. In the beginning of 1743 one French army was driven across the Rhine. On June 27th another French army was defeated by George II. in person at Dettingen. Victory brought elation to Maria Theresa. Her war of defence was turned into a war of vengeance. Bavaria was to be annexed. The French frontier was to be driven back. George II. and Carteret after some hesitation placed themselves on her side. Of the public opinion of the political classes in England they took no thought. Hanoverian troops were indeed to be employed in the war, but they were to be taken into British pay. Collisions between British and Hanoverian officers were frequent. A storm arose against the preference shown to Hanoverian interests. After a brief struggle Carteret, having become Lord Granville by his mother's death, was driven from office in November 1744.

Henry Pelham, who had become prime minister in the preceding year, thus saw himself established in power. By the acceptance of this ministry, the king acknowledged that the function of choosing a ministry and directing a policy had passed from his hands. In 1745 indeed he recalled Granville, but a few days were sufficient to convince him of the futility of his attempt, and the effort to exclude Pitt at a later time proved equally fruitless.

Important as were the events of the remainder of the reign, therefore, they can hardly be grouped round the name of George II. The resistance to the invasion of the Young Pretender in 1745, the peace of Aix-la-Chapelle in 1748, the great war ministry of Pitt at the close of the reign, did not receive their impulse from him. He had indeed done his best to exclude Pitt from office. He disliked him on account of his opposition in former years to the sacrifices demanded by the Hanoverian connexion. When in 1756 Pitt became secretary of state in the Devonshire adminis- tration, the king bore the yoke with difficulty. Early in the next year he complained of Pitt's long speeches as being above his comprehension, and on April 5, 1757, he dismissed him, only to take him back shortly after, when Pitt,

coalescing with Newcastle, became master of the situation. Before Pitt's dis- missal George II. had for once an opportunity of placing himself on the popular side, though, as was the case of his grandson during the American war, it was when the popular side happened to be in the wrong. In the true spirit of a martinet, he wished to see Admiral Byng executed. Pitt urged the wish of the House of Commons to have him pardoned. " Sir, " replied the king," you have taught me to look for the sense of my subjects in another place than in the House of Commons." When George II. died in 1760, he left behind him a settled understanding that the monarchy was one of the least of the forces by which the policy of the country was directed. To this end he had contributed much by his disregard of English opinion in 1743; but it may fairly be added that, but for his readiness to give way to irresistible adversaries, the struggle might have been far more bitter and severe than it was.

Of the connexion between Hanover and England in this reign two memorials remain more pleasant to contemplate than the records of parliamentary and ministerial intrigues. With the support of George II., amidst the derision of the English fashion- able world, the Hanoverian Handel produced in England those

masterpieces which have given delight to millions, whilst the foundation of the university of Gottingen by the same king opened a door through which English political ideas afterwards penetrated into Germany.

George II. had three sons, — Frederick Louis (1707-1751); George William (1717-1718); and William Augustus, duke of Cumberland (17 2 1-1765); and five daughters, Anne (1709-17 59), married to William, prince of Orange, 1734; Amelia Sophia Eleonora (1711-1786); Elizabeth Caroline (1713-1757); Mary (1723-1772), married to Frederick, landgrave of Hesse-Cassel, 1740; Louisa (1724-1751), married to Frederick V., king of Denmark, 1743. (S. R. G.)

See Lord Hervey, Memoirs of the Reign of George II., ed. by J. W, Croker (3 vols., 1 London, 1884) ; Horace Walpole, Mem. of the Reign of George II., with notes by Lord Holland (3 vols., 2nd ed., 1847).

GEORGE III. [George William Frederick] (1738-1820), king of Great Britain and Ireland, son of Frederick, prince of Wales, and grandson of George II., whom he succeeded in 1760, was born on the 4th of June 1738. After his father's death in 1751 he had been educated in seclusion from the fashionable world under the care of his mother and of her favourite counsellor the earl of Bute. He had been taught to revere the maxims of Boling- broke's " Patriot King," and to believe that it was his appointed task in life to break the power of the Whig houses resting upon extensive property and the influence of patronage and corruption. That power had already been gravely shaken. The Whigs from their incompetency were obliged when the Seven Years' War broke out to leave its management in the hands of William Pitt. The nation learned to applaud the great war minister who succeeded where others had failed, and whose immaculate purity put to shame the ruck of barterersˆ votes for places and pensions.

In some sort the work of the new king was the continuation of the work of Pitt. But his methods were very different. He did not appeal to any widely spread feeling or prejudice; nor did he disdain the use of the arts which had maintained his opponents in power. The patronage of the crown was to be really as well as nominally his own; and he calculated, not without reason, that men would feel more flattered in accepting a place from a king than from a minister. The new Toryism of which he was the founder was no recurrence to the Toryism of the days of Charles II. or even of Anne. The question of the amount of toleration to be accorded to Dissenters had been entirely laid aside. The point at issue was whether the crown should be replaced in the position which George I. might have occupied at the beginning of his reign, selecting the ministers and influencing the deliberations of the cabinet. For this struggle George III. possessed no inconsiderable advantages. With an inflexible tenacity of purpose, he was always ready to give way when resistance was really hopeless. As the first English-born sovereign of his house, speaking from his birth the language of his subjects, he found a way to the hearts of many who never regarded his predecessors as other than foreign intruders. The contrast, too, between the pure domestic life which he led with his wife Charlotte, whom he married in i76r, and the habits of three generations of his house, told in his favour with' the vast majority of his subjects. Even his marriage had been a sacrifice to duty. Soon after his accession he had fallen in love with Lady Sarah Lennox, and had been observed to ride morning by morning along the Kensington Road, from which the object of his affections was to be seen from the lawn of Holland House making hay, or engaged in

some other ostensible employment. Before the year was over Lady Sarah appeared as one of the queen's bridesmaids, and she was herself married to Sir Charles Bunbury in 1762.

At first everything seemed easy to him. Pitt had come to be regarded by his own colleagues as a minister who would pursue war at any price, and in getting rid of Pitt in 1761 and in carrying on the negotiations which led to the peace of Paris in 1762, the king was able to gather round him many persons who would not be willing to acquiesce in any permanent change in the system of government. With the signature of the peace his real diffi

culties began. The Whig houses, indeed, were divided amongst themselves by personal rivalries. But they were none of them inclined to let power and the advantages of power slip from their hands without a struggle. For some years a contest of influence was carried on without dignity and without any worthy aim. The king was not strong enough to impose upon parliament a ministry of his own choice. But he gathered round himself a body of dependants known as the king's friends, who were secure of his favour, and who voted one way or the other according to his wishes. Under these circumstances no ministry could possibly be stable; and yet every ministry was strong enough to impose some conditions on the king. Lord Bute, the king's first choice, resigned from a sense of his own incompetency in 1763. George Grenville was in office till 1765; the marquis of Rockingham till 1766; Pitt, becoming earl of Chatham, till illness compelled him to retire from the conduct of affairs in 1767, when he was succeeded by the duke of Grafton. But a struggle of interests could gain no real strength for any govern- ment, and the only chance the king had of effecting a permanent change in the balance of power lay in the possibility of his associating himself with some phase of strong national feeling, as Pitt had associated himself with the war feeling caused by the dissatisfaction spread by the weakness and ineptitude of his predecessors.

Such a chance was offered by the question of the right to tax America. The notion that England was justified in throwing on America part of the expenses caused in the late war was popular in the country, and no one adopted it more pertinaciously then George III. At the bottom the position which he assumed was as contrary to the principles of parliamentary government as the encroachments of Charles I. had been. But it was veiled in the eyes of Englishmen by the prominence given to the power of the British parliament rather than to the power of the British king. In fact the theory of parliamentary government, like most theories after their truth has

long been universally acknowledged, had become a superstition. Parliaments were held to be properly vested with authority, not because they adequately represented the national will, but simply because they were parliaments. There were thousands of people in England to whom it never occurred that there was any good reason why a British parliament should be allowed to levy a duty on tea in the London docks and should not be allowed to levy a duty on tea at the wharves of Boston. Undoubtedly George III. derived great strength from his honest participation in this mistake. Contending under parliamentary forms, he did not wound the susceptibilities of members of parliament, and when at last in 1770 he appointed Lord North — a minister of his own selection — prime minister, the object of his ambition was achieved with the concurrence of a large body of politicians who had nothing in common with the servile band of the king's friends.

As long as the struggle with America was carried on with any hope of success they gained that kind of support which is always forthcoming to a government which shares in the errors and prejudices of its subjects. The expulsion of Wilkes from the House of Commons in 1 769, and the refusal of the House to accept him as a member after his re-election, raised a grave constitutional question in which the king was wholly in the wrong; and Wilkes was popular in London and Middlesex. But his case roused no national indignation, and when in 1774 those sharp measures were taken with Boston which led to the commencement of the American rebellion in 1775, the opposition to the course taken by the king made little way either in parliament or in the country. Burke might point out the folly and inexpedience of the proceed- ings of the government. Chatham might point out that the true spirit of English government was to be representative, and that that spirit was being violated at home and abroad. George III., who thought that the first duty of the Americans was to obey himself, had on his side the mass of unreflecting Englishmen who thought that the first duty of all colonists was to be useful and submissive to the mother-country. The natural dislike of every country engaged in war to see itself defeated was on his side, and when the news of Burgoyne's surrender at Saratoga arrived

in 1777, subscriptions of money to raise new regiments poured freely in.

In March 1778 the French ambassador in London announced that a treaty of friendship and commerce had been concluded between France and the new United States of America. Lord North was anxious to resign power into stronger hands, and begged the king to receive Chatham as his prime minister. The king would not hear of it. He would have nothing to say to " that perfidious man " unless he would humble himself to enter the ministry as North's subordinate. Chatham naturally refused to do anything of the kind, and his death in the course of the year relieved the king of the danger of being again overruled by too overbearing a minister. England was now at war with France, and in 1779 she was also at war with Spain.

George III. was still able to control the disposition of office. He could not control the course of events. His very ministers gave up the struggle as hopeless long before he would acknowledge the true state of the case. Before the end of 1779, two of the leading members of the cabinet, Lords Gower and Weymouth, resigned rather than bear the responsibility of so ruinous an enterprise as the attempt to overpower America and France together. Lord North retained office, but he acknowledged to the king that his own opinion was precisely the same as that of his late colleagues.

The year 1780 saw an agitation rising in the country for economical reform, an agitation very closely though indirectly connected with the war policy of the king. The public meetings held in the country on this subject have no unimportant place in the development of the constitution. Since the presentation of the Kentish petition in the reign of William III. there had been from time to time upheavings of popular feeling against the doings of the legislature, which kept up the tradition that parliament existed in order to represent the nation. But these upheavings had all been so associated with ignorance and violence as to make it very difficult for men of sense to look with displeasure upon the existing emancipation of the House of Commons from popular control. The Sacheverell riots, the violent attacks upon the Excise Bill, the no less violent advocacy of the Spanish War, the declamations of the supporters of Wilkes at a more recent time, and even in this very year the Gordon riots, were not likely to make thoughtful men anxious to place real power in the hands of the classes from whom such exhibitions of folly proceeded. But the movement for economical reform was of a very different kind. It was carried on soberly in manner, and with a definite practical object. It asked for no more than the king ought to have been willing to concede. It attacked useless expenditure upon sinecures and unnecessary offices in the household, the only use of which was to spread abroad corruption amongst the upper classes. George III.

could not bear to be interfered with at all, or to surrender any element of power which had served him in his long struggle with the Whigs. He held out for more than another year. The news of the capitula- tion of Yorktown reached London on the 25th of November 1781. On the 20th of March 1782 Lord North resigned.

George III. accepted the consequences of defeat. He called the marquis of Rockingham to office at the head of a ministry composed of pure Whigs and of the disciples of the late earl of Chatham, and he authorized the new ministry to open negotia- tions for peace. Their hands were greatly strengthened by Rodney's victory over the French fleet, and the failure of the combined French and Spanish attack upon Gibraltar; and before the end of 1782 a provisional treaty was signed with America, preliminaries of peace with France and Spain being signed early in the following year. On the 3rd of September 1 783 the definitive treaties with the three countries were simultane- ously concluded. " Sir," said the king to John Adams, the first minister of the United States of America accredited to him, " I wish you to believe, and that it may be understood in America, that I have done nothing in the late contest but what I thought myself indispensably bound to do by the duty which I owed to my people. I will be very frank with you. I was the last to consent to the separation: but the separation having been made

and having become inevitable, I have always said, as I say now, that I would be the first to meet the friendship of the United States as an independent power."

Long before the signature of the treaties Rockingham died (July 1, 1782). The king chose Lord Shelburne, the head of the Chatham section of the government, to be prime minister. Fox and the followers of Rockingham refused to serve except under the duke of Portland, a minister of their own selection, and resigned office. The old constitutional struggle of the reign was now to be fought out once more. Fox, too weak to obtain a majority alone, coalesced with Lord North, and defeated Shelburne in the House of Commons on the 27th of February 1 783. On the 2nd of April the coalition took office, with Portland as nominal prime minister, and Fox and North the secretaries of state as its real heads.

This attempt to impose upon him a ministry which he disliked made the king very angry. But the new cabinet had a large majority in the House of Commons, and the only chance of resisting it lay in an appeal to the country against the House of Commons. Such an appeal was not likely to be responded to unless the ministers discredited

themselves with the nation. Goerge III. therefore waited his time. Though a coalition between men bitterly opposed to one another in all political principles and drawn together by nothing but love of office was in itself discreditable, it needed some more positive cause of dissatisfaction to arouse the constituencies, which were by no means so ready to interfere in political disputes at that time as they are now. Such dissatisfaction was given by the India Bill, drawn up by Burke. As soon as it had passed through the Com- mons the king hastened to procure its rejection in the House of Lords by his personal intervention with the peers. He authorized Lord Temple to declare in his name that he would count any peer who voted for the bill as his enemy. On the 17th of December 1783 the bill was thrown out. The next day ministers were dismissed. William Pitt became prime minister. After some weeks' struggle with a constantly decreasing majority in the Commons, the king dissolved parliament on the 25th of March 1784. The country rallied round the crown and the young minister, and Pitt was firmly established in office.

There can be no reasonable doubt 1 that Pitt not only took advantage of the king's intervention in the Lords, but was cognizant of the intrigue before it was actually carried out. It was upon him, too, that the weight of reconciling the country to an administration formed under such circumstances lay. The general result, so far as George III. was concerned, was that to all outward appearance he had won the great battle of his life. It was he who was to appoint the prime minister, not any clique resting on a parliamentary support. But the circum- stances under which the victory was won were such as to place the constitution in a position very different from that in which it would have been if the victory had been gained earlier in the reign. Intrigue there was indeed in 1783 and 1784 as there had been twenty years before. Parliamentary support was con- ciliated by Pitt by the grant of royal favours as it had been in the days of Bute. The actual blow was struck by a most question- able message to individual peers. But the main result of the whole political situation was that George III. had gone a long way towards disentangling the reality of parliamentary govern- ment from its accidents. His ministry finally stood because it had appealed to the constituencies against their representatives. Since then it has properly become a constitutional axiom that no such appeal should be made by the crown itself. But it may reasonably be doubted whether any one but the king was at that time capable of making the appeal. Lord Shelburne, the leader of the ministry expelled by the coalition, was unpopular in the country, and the younger Pitt had not had time to make his great abilities known beyond a limited circle. The real

question for the constitutional historian to settle is not whether under ordinary circumstances a king is the proper person to place himself really as well as nominally at the head of the government; but whether under the special circumstances 1 See Lord Fitzmaurice's Life of Shelburne, iii. 393.

which existed in 1783 it was not better that the king should j call upon the people to support him, than that government should be left in the hands of men who rested their power on close boroughs and the dispensation of patronage, without looking beyond the walls of the House of Commons for support. That the king gained credit far beyond his own deserts by the glories of Pitt's ministry is beyond a doubt. Nor can there be any reasonable doubt that his own example of domestic propriety did much to strengthen the position of his minister. It is true that that life was insufferably dull. No gleams of literary or artistic taste lightened it up. The dependants of the court became inured to dull routine unchequered by loving sympathy. The sons of the household were driven by the sheer weariness of such an existence into the coarsest profligacy. But all this was not visible from a distance. The tide of moral and religious improvement which had set in in England since the days of Wesley brought popularity to a king who was faithful to his wife, in the same way that the tide of manufacturing industry and scientific progress brought popularity to the minister who in some measure translated into practice the principles of the Wealth of Nations.

Nor were there wanting subjects of importance beyond the circle of politics in which George III. showed a lively interest. The voyages of discovery which made known so large a part of the islands and coasts of the Pacific Ocean received from him a warm support. In the early days of the Royal Academy, its finances were strengthened by liberal grants from the privy purse. His favourite pursuit, however, was farming. When Arthur Young was issuing his Annals of Agriculture, he was supplied with information by the king, under the assumed name of Mr Ralph Robinson, relating to a farm at Petersham.

The life of the king was suddenly clouded over. Early in his reign, in 1765, he had been out of health, and — though the fact was studiously concealed at the time — symptoms of mental aberration were even then to be perceived. In October 1788 he was again out of

health, and in the beginning of the following month his insanity was beyopd a doubt. Whilst Pitt and Fox were contending in the House of Commons over the terms on which the regency should be committed to the prince of Wales, the king was a helpless victim to the ignorance of physicians and the brutalities of his servants. At last Dr Willis, who had made himself a name by prescribing gentleness instead of rigour in the treatment of the insane, was called in. Under his more humane management the king rapidly recovered. Before the end of February 1789 he was able to write to Pitt thanking him for his warm support of his interests during his illness. On the 23rd of April he went in person to St Paul's to return thanks for his recovery.

The popular enthusiasm which burst forth around St Paul's was but a foretaste of a popularity far more universal. The French Revolution frightened the great Whig landowners till they made their peace with the king. Those who thought that the true basis of government was aristocratical were now of one mind with those who thought that the true basis of government was monarchical; and these two classes were joined by a far larger multitude which had no political ideas whatever, but which had a moral horror of the guillotine. As Elizabeth had once been the symbol of resistance to Spain, George was now the symbol of resistance to France. He was not, however, more than the symbol. He allowed Pitt to levy taxes and incur debt, to launch armies to defeat, and to prosecute the English imitators of French revolutionary courses. At last, however, after the Union with Ireland was accomplished, he learned that Pitt was planning a scheme to relieve the Catholics from the disabilities under which they laboured. The plan was revealed to him by the chancellor, Lord Loughborough, a selfish and intriguing ■ politician who had served all parties in turn, and who sought to forward his own interests by falling in with the king's prejudices. George III. at once took up the position from which he never swerved. He declared that to grant concessions to the Catholics involved a. breach of his coronation oath. No one has ever doubted that the king was absolutely convinced of the serious

nature of the objection. Nor can there be any doubt that he had the English people behind him. Both in his peace ministry and in his war ministry Pitt had taken his stand on royal favour and on popular support. Both failed him alike now, and he resigned office at once. The shock to the king's mind was so great that it brought on a fresh attack of insanity. This time, however, the recovery was rapid. On the 14th of March 1801 Pitt's resignation was formally accepted, and the late speaker, Mr Addington, was installed in office as prime minister.

The king was well pleased with the change. He was never capable of appreciating high merit in any one; and he was unable to perceive that the question on which Pitt had resigned was more than an improper question, with which he ought never to have meddled. " Tell him," he said, in directing his physician to inform Pitt of his restoration to health, " I am now quite well, quite recovered from my 'Uness; but what has he not to answer for, who has been the cause of my having been ill at all? " Addington was a minister after his own mind. Thoroughly honest and respectable, with about the same share of abilities as was possessed by the king himself, he was certainly not likely to startle the world by any flights of genius. But for one circum- stance Addington's ministry would have lasted long. So strong was the reaction against the Revolution that the bulk of the nation was almost as suspicious of genius as the king himself. Not only was there no outcry for legislative reforms, but the very idea of reform was unpopular. The country gentlemen were predominant in parliament, and the country gentlemen as a body looked upon Addington with respect and affection. Such a minister was there- fore admirably suited to preside over affairs at home in the existing state of opinion. But those who were content with inaction at home would not be content with inaction abroad. In time of peace Addington would have been popular for a season. In time of war even his warmest admirers could not say that he was the man to direct armies in the most terrible struggle which had ever been conducted by an English government.

For the moment this difficulty was not felt. On the 1st of October 1801, preliminaries of peace were signed between England and France, to be converted into the definitive peace of Amiens on the 27th of March 1802. The ruler of France was now Napoleon Bonaparte, and few persons in England believed that he had any real purpose of bringing his aggressive violence to an end. " Do you know what I call this peace?" said the king; " an experimental peace, for it is nothing else. But it was unavoidable."

The king was right. On the 18th of May 1803 the declaration of war was laid before parliament. The war was accepted by all classes as inevitable, and the French preparations for an invasion of England roused the whole nation to a glow of enthusiasm only equalled by that felt when the Armada threatened its shores. On the 26th of October the king reviewed the London volunteers in Hyde Park. He found himself the centre of a great national movement with which he heartily sympathized, and which heartily sympathized with him.

On the 1 2th of February 1804. the king's mind was again affected.

When he recovered, he found himself in the midst of a ministerial crisis. Public feeling allowed but one opinion to prevail in the country — that Pitt, not Addington, was the proper man to conduct the administration in time of war. Pitt was anxious to form an administration on a broad basis, including Fox and all prominent leaders of both parties. The king would not hear of the admission of Fox. His dislike of him was personal as well as political, as he knew that Fox had had a great share in drawing the prince of Wales into a life of profligacy. Pitt accepted the king's terms, and formed an administration in which he was the only man of real ability. Eminent men, such as Lord Grenville, refused to join a ministry from which the king had excluded a great statesman on purely personal grounds.

The whole question was reopened on Pitt's death on the 23rd of January 1806. This time the king gave way. The ministry of All the Talents, as it was called, included Fox amongst its members. At first the king was observed to appear depressed at the necessity of surrender. But Fox's charm of manner soon

gained upon him. " Mr Fox," said the king, " I little thought that you and I should ever meet again in this place; but I have no desire to look back upon old grievances, and you may rest assured I never shall remind you of them." On the 13th of September Fox died, and it was not long before the king and the ministry were openly in collision. The ministry proposed a measure enabling all subjects of the crown to serve in the army and navy in spite of religious disqualifications. The king objected even to so slight a modification of the laws against the Catholics and Dissenters, and the ministers consented to drop the bill. The king asked more than this. He demanded a written and positive engagement that this ministry would never, under any circumstances, propose to him " any measure of concession to the Catholics, or even connected with the question." The ministers v«ry properly refused to bind themselves for the future. They were consequently turned out of office, and a new ministry was formed with the duke of Portland as first lord of the treasury and Mr Perceval as its real leader. The spirit of the new ministry was distinct hostility to the Catholic claims. On the 27th of April 1807 a dissolution of parliament was announced, and a majority in favour of the king's ministry was returned in the elections which speedily followed.

The elections of 1807, like the elections of 1784, gave the king the mastery of the situation. In other respects they were the counterpart of one another. In 1784 the country declared, though perhaps without any clear conception of what it was doing, for a wise and progressive policy. In 1807 it declared for an unwise and retrogressive policy, with a very clear under- standing of what it meant. It is in his reliance upon the prejudices and ignorance of the country that the constitutional significance of the reign of George III. appears. Every strong government derives its power from its representative character. At a time when the House of Commons was less really representative than at any other, a king was on the throne who represented the country in its good and bad qualities alike, in its hatred of revolutionary violence, its moral sturdiness, its contempt of foreigners, and its defiance of all ideas which were in any way strange. Therefore it was that his success was not permanently injurious to the working of the constitution as the success of Charles I. would have been. If he were followed by a king less English than himself, the strength of representative power would pass into other hands than those which held the sceptre.

The overthrow of the ministry of All the Talents was the last political act of constitutional importance in which George III. took part. The substitution of Perceval for Portland as the nominal head of the ministry in 1800 was not an event of any real significance, and in 181 1 the reign practically came to an end. The king's reason finally broke down after the death of the princess Amelia, his favourite child; and the prince of Wales (see George IV.) became prince regent. The remaining nine years of George III.'s life were passed in insanity and blindness, and he died on the 29th of January 1820.

His wife, Charlotte Sophia (1744-1818), was a daughter of Charles Louis of Mecklenburg-Strelitz (d. 1816), and was married to the king in London on the 8th of September 1761. After a peaceful and happy married life the queen died at Kew on the 17th of November 1818.

George III. had nine sons. After his successor came Frederick, duke of York and Albany (1763-1827); William Henry, duke of Clarence, afterwards King William IV. (1765-1837); Edward Augustus, duke of Kent (1767-1825), father of Queen Victoria; Ernest Augustus, duke of Cumberland, afterwards king of Hanover (1771-1851); Augustus Frederick, duke of Sussex (1773-1843); Adolphus Frederick, duke of Cambridge (1774- 1850); Octavius (1770-1783); Alfred (1780-1782). He had also six daughters — Charlotte Augusta (1766-1828), married in 1797 to Frederick, afterwards king of Wurttemberg; Augusta Sophia (1768-1840); Elizabeth (1770-1840),

married Frederick, landgrave of Hesse-Homburg, 1818; Mary (1776-1857), married to William Frederick, duke of Gloucester, 1816; Sophia (1777— 1848); Amelia (1783-1810). (S. R. G.)

The numerous contemporary memoirs and diaries are full of the best material for a picture of George III.'s reign, apart from the standard histories. Thackeray's Four Georges must not be trusted so far as historical judgment is concerned; Jesse's Memoirs of the Life and Reign of George III. (2nd ed., 1867) is chiefly concerned with personalities. See also Beckles Willson, George III., as Man, Monarch and Statesman (1907).

GEORGE IV. [George Augustus Frederick] (1 762-1830), king of Great Britain and Ireland, eldest son of George III., was born at St James's Palace, London, on the 12th of August 1762. He was naturally gifted, was well taught in the classics, learnt to speak French, Italian and German fluently, and had considerable taste for music and the arts; and in person he was remarkably handsome. His tutor, Bishop Richard Hurd, said of him when fifteen years old that he would be " either the most polished gentleman or the most accomplished blackguard in Europe — possibly both "; and the latter prediction was only too fully justified. Reaction from the strict and parsimonious style of his parents' domestic life, which was quite out of touch with the gaiety and extravagance of London " society," had its natural effect in plunging the young prince of Wales, flattered and courted as he was, into a whirl of pleasure-seeking. At the outset his disposition was brilliant and generous, but it was essentially unstable, and he started even before he came of age on a career of dissipation which in later years became wholly profligate. He had an early amour with the actress Mary (" Perdita ") Robinson, and in the choice of his friends he opposed and annoyed the king, with whom he soon became (and always remained) on the worst of terms, by associating himself with Fox and Sheridan and the Whig party. When in 1783 he came of age, a compromise between the coalition ministry and the king secured him an income of £50,000 from the Civil List, and £60,000 was voted by parliament to pay his debts and start his separate establish- ment at Carlton House. There, under the auspices of C. J. Fox and Georgiana, duchess of Devonshire, he posed as a patron of Whig politics and a leader in all the licence and luxury of gay society — the " First gentleman in Europe," as his flatterers described him as years went on. And at this early age he fell seriously in love with the famous Mrs Fitzherbert.

His long connexion with this lady may most conveniently be summarized here. It was indeed for some time the one re- deeming

and restraining factor in his life, though her devotion and self-sacrificing conduct were in marked contrast with his unscrupulousness and selfishness. Mary Anne (or as she always called herself, Maria) Fitzherbert (1756-1837) was the daughter of Walter Smythe, the second son of Sir John Smythe, Bart., of Acton Burnell Park, Shropshire, and came of an old Roman Catholic family. Educated at a French convent, she married first in 1775 Edward Weld, who died within the year, and secondly in 1778 Thomas Fitzherbert, who died in 1781, leaving his widow with a comfortable fortune. A couple of years later she became a prominent figure in London society, and her beauty and charm at once attracted the young prince, who wooed her with all the ardour of a violent passion. She herself was distracted between her desire to return his love, her refusal to contemplate becoming his mistress, and her knowledge that state reasons made a regular marriage impossible. The Act of Settlement (1689) entailed his forfeiture of the succession if he married a Roman' Catholic, apart from the fact that the Royal Marriage Act of 1772 made any marriage illegal without the king's consent, which was out of the question. But after trying for a while to escape his attentions, her scruples were overcome. In Mrs Fitzherbert's eyes the state law was, after all, not everything. To a Roman Catholic, and equally to any member of the Christian church, a formal marriage ceremony would be ecclesiastically and sacramentally binding; and after a period of passionate importunacy on his part they were secretly married by the Rev. R. Burt, a clergyman of the Church of England, on the 15th of December 1785. 1 There is no doubt as to Mrs Fitzherbert's belief, supported by ecclesiastical considerations, in her correct

1 For a discussion of the ecclesiastical validity of the marriage see W. H. Wilkins, Mrs Fitzherbert and George IV (1905), chs.. vi. and vii.

and binding, though admittedly illegal, relationship to the prince as his canonical wife; and though that relationship was not, and for political reasons could not be, publicly admitted, it was in fact treated by their intimates on the footing of a morganatic marriage. The position nevertheless was inevitably a false one; Mrs Fitzherbert had promised not to publish the evidence of the marriage (which, according to a strict interpretation of the Act of Settlement might have barred succession to the crown), and the rumours which soon

got about led the prince to allow it to be disavowed by his political friends. He lived in the most extra- vagant way, became heavily involved in debt, and as the king would not assist him, shut up Carlton House, and went to live with Mrs Fitzherbert at Brighton. In 1787 a proposal was brought before the House of Commons by Alderman Newnham for a grant in relief of his embarrassments. It was on this occasion that Fox publicly declared in the House of Commons, as on the prince's own authority, in answer to allusions to the marriage, that the story was a malicious falsehood. A little later Sheridan, in deference to Mrs Fitzherbert's pressure and to the prince's own compunction, made a speech guardedly modifying Fox's statement ; but though in private the denial was understood, it effected its object, the House voting a grant of £221 ,000 to the prince and the king adding £10,000 to his income ; and Mrs Fitzherbert, who at first thought of severing her connexion with the prince, forgave him. Their union — there was no child of the marriage — was brutally broken off in June 1 794 by the prince, when further pressure of debts (and the influence of a new Egeria in Lady Jersey) made him contemplate his official marriage with princess Caroline; in 1800, however, it was renewed, after urgent pleading on the prince's part, and after Mrs Fitzherbert had obtained a formal decision from the pope pronouncing her to be his wife, and sanctioning her taking him back; her influence over him continued till shortly before the prince became regent, when his relations with Lady Hertford brought about a final separation. For the best years of his life he had at least had in Mrs Fitzherbert the nearest approach to a real wife, and this was fully recognized by the royal family. 1 But his dissolute nature was entirely selfish, and his various liaisons ended in the dominance of Lady Conyngham, the " Lady Steward "of his household, from 1821 till his death.

Notorious as the prince of Wales had become by 1788, it was in that year that his father's first attack of insanity made his position in the state one of peculiar importance. Fox main- tained and Pitt denied that the prince of Wales, as the heir- apparent, had a right to assume the regency independently of any parliamentary vote. Pitt, with the support of both Houses, proposed to confer upon him the regency with certain restrictions. The recovery of the king in February 1789 put an end, however, to the prince's hopes. In 1794 the prince con-

1 Mrs Fitzherbert herself, after her final separation from the prince, with an annuity of £6000 a year, lived an honoured and more or less retired life mainly at Brighton, a town which owed its rapid develop- ment in fashionable popularity and material wealth to its selection by the prince and herself as a residence from the earliest years of

their union; and there she died, seven years after the death of George IV., in 1837. William IV. on his accession offered to create her a duchess, but she declined; she accepted, however, his per- mission to put her servants in royal livery. William IV. in fact did all he could, short of a public acknowledgment (which the duke of Wellington opposed on state grounds), to recognize her position as his brother's widow. Charles Greville, writing of her after her death, says in his Diary, " She was not a clever woman, but of a very noble spirit, disinterested, generous, honest and affectionate." The actual existence of a marriage tie and the documentary evidence of her rights were not definitely established for many years; but in 1905 a sealed packet, deposited at Coutts's bank in 1833, was at length opened by royal permission, and the marriage certificate and other conclusive proofs therein contained were published in Mr W. H. Wilkins's Mrs Fitzherbert and George IV. In 1796 the ' prince had made a remarkable will in Mrs Fitzherbert's favour, which he gave her in 1799, and it is included among these documents (now in the private archives at Windsor). In this he speaks of her emphatically throughout as " my wife." It also contained directions that at his death a locket with her miniature, which he always wore, should be interred with him ; and Mrs Fitzherbert was privately assured, on the duke of Wellington's authority, that when the king was buried at Windsor the miniature was on his breast.

sented to a marriage with a German Protestant princess, because his father would not pay his debts on any other terms, and his cousin, Princess Caroline of Brunswick, was brought over from Germany and married to him in 1795. Her behaviour was light and flippant, and he was brutal and unloving. The ill- assorted pair soon parted, and soon after the birth of their only child, the princess Charlotte, they were formally separated. With great unwillingness the House of Commons voted fresh sums of money to pay the prince's debts.

In 1 81 1 he at last became prince regent in consequence of his father's definite insanity. No one doubted at that time that it was in his power to change the ministry at his pleasure. He had always lived in close connexion with the Whig opposition, and he now empowered Lord Grenville to form a ministry. There soon arose differences of opinion between them on the answer to be returned to the address of the Houses, and the prince regent then informed the prime minister, Mr Perceval, that he should continue the existing ministry in office. The ground alleged by him for this desertion of his friends was the fear lest his father's recovery might be rendered impossible if he should come to hear of the advent of the opposition to power. Lord Wellesley's resignation in February 1812 made the reconstruction of

the ministry inevitable. As there was no longer any hope of the king's recovery, the former objection to a Whig administration no longer existed. Instead of taking the course of inviting the Whigs to take office, he asked them to join the existing administration. The Whig leaders, however, refused to join, on the ground that the question of the Catholic disabilities was too important to be shelved, and that their difference of opinion with Mr Perceval was too glaring to be ignored. The prince regent was excessively angry, and continued Perceval in office till that minister's assassination on the nth of May, when he was succeeded by Lord Liverpool, after a negotiation in which the proposition of entering the cabinet was again made to the Whigs and rejected by them. In the military glories of the following years the prince regent had no share. When the allied sovereigns visited England in 1814, he played the part of host to perfection. So great was his unpopularity at home that hisses were heard in the streets as he accompanied his guests into the city. The disgust which his profligate and luxurious life caused amongst a people suffering from almost universal distress after the conclusion of the war rapidly increased. In 1817 the windows of the prince regent's carriage were broken as he was on his way to open parliament.

The death of George III. on the 29th of January 1820, gave to his son the title of king without in any way altering the position which he had now held for nine years. Indirectly, however, this change brought out a manifestation of popular feeling such as his father had never been subjected to even in the early days of his reign, when mobs were burning jack-boots and petticoats. The relations between the new king and his wife unavoidably became the subject of public discussion. In 1806 a charge against the princess of having given birth to an illegitimate child had been conclusively disproved, and the old king had consequently refused to withdraw her daughter, the princess Charlotte, from her custody. When in the regency the prince was able to interfere, and prohibited his wife from seeing her daughter more than once a fortnight. On this, in 1813, the princess addressed to her husband a letter setting forth her complaints, and receiving no answer published it in the Morning Chronicle. The prince regent then referred the letter, together with all papers relating to the inquiry of 1806, to a body of twenty-three privy councillors for an opinion whether it was fit that the restrictions on the intercourse between the princess Charlotte and her mother should continue in force. All except two answered as the regent wished them to answer. But if the official leaning was towards the husband, the leaning of the general public was towards the wife of a man whose own life had not been such as to justify him in complaining of her

whom he had thrust from him without a charge of any kind. Addresses of sympathy were sent up to the princess from the city of London and other public bodies. The discord again broke out in 1814 in

consequence of the exclusion of the princess from court during the visit of the allied sovereigns. In August in that year she left England, and after a little time took up her abode in Italy. The accession of George IV. brought matters to a crisis. He ordered that no prayer for his wife as queen should be admitted into the Prayer Book. She at once challenged the accusation which was implied in this omission by returning to England. On the 7th of June she arrived in London. Before she left the continent she had been informed that proceedings would be taken against her for adultery if she landed in England. Two years before, in 1818, commissioners had been sent to Milan to investigate charges against her, and their report, laid before the cabinet in 1819, was made the basis of the prosecution. On the d,ay on which she arrived in London a message was laid before both Houses recommending the criminating evidence to parliament. A secret committee in the House of Lords after considering this evidence brought in a report on which the prime minister founded a Bill of Pains and Penalties to divorce the queen and to deprive her of her royal title. The bill passed the three readings with diminished majorities, and when on the third reading it obtained only a majority of nine, it was abandoned by the Government. The king's unpopularity, great as it had been before, was now greater than ever. Public opinion, without troubling itself to ask whether the queen was guilty or not, was roused to indignation by the spectacle of such a charge being brought by a husband who had thrust away his wife to fight the battle of life alone, without protection or support, and who, whilst surrounding her with spies to detect, perhaps to invent, her acts of infidelity, was himself notorious for his adulterous life. In the following year (1821) she attempted to force her way into Westminster Abbey to take her place at the coronation. On this occasion the popular support failed her; and her death in August relieved the king from further annoyance.

Immediately after the death of the queen, the king set out for Ireland. He remained there but a short time, and his effusive declaration that rank, station, honours were nothing compared with the exalted happiness of living in the hearts of his Irish subjects

gained him a momentary popularity which was beyond his attainment in a country where he was better known. His reception in Dublin encouraged him to attempt a visit to Edin- burgh in the following year (August 1822). Since Charles II. had come to play the sorry part of a covenanting king in 1650 no sovereign of the country had set foot on Scottish soil. Sir Walter Scott took the leading part in organizing his reception. The enthusiasm with which he was received equalled, if it did not surpass, the enthusiasm with which he had been received in Dublin. But the qualities which enabled him to fix the fleeting sympathies of the moment were not such as would enable him to exercise the influence in the government which had been indubitably possessed by his father. He returned from Edin- burgh to face the question of the appointment of a secretary of state which had been raised by the death of Lord Londonderry (Castlereagh). It was upon the question of the appointment of ministers that the battle between the Whigs and the king had been fought in the reign of George III. George IV. had neither the firmness nor the moral weight to hold the reins which his father had grasped. He disliked Canning for having taken his wife's side very much as his father had disliked Fox for taking his own. But Lord Liverpool insisted on Canning's admission to office, and the king gave way. Tacitly and without a struggle the constitutional victory of the last reign was surrendered. But it was not surrendered to the same foe as that from which it had been won. The coalition ministry in. 1784 rested on the great landowners and the proprietors of rotten boroughs. Lord Liverpool's ministry had hitherto not been very enlightened, and it supported itself to a great extent upon a narrow constitu- ' ency. But it did appeal to public opinion in a way that the coalition did not, and what it wanted itself in popular support would be supplied by its successors. What one king had gained from a clique another gave up to the nation. Once more, on Lord Liverpool's death in 1827, the same question was tried with the same result. The king not only disliked Canning

personally, but he was opposed to Canning's policy. Yet after some hesitation he accepted Canning as prime minister; and when, after Canning's death and the short ministry of Lord Goderich, the king in 1828 authorized the duke of Wellington to form a ministry, he was content to lay down the principle that the members of it were not expected to be unanimous on the Catholic question. When in 1829 the Wellington ministry unexpectedly proposed to introduce a Bill to remove the disabilities of the Catholics, he feebly strove against the proposal and quickly withdrew his opposition. The worn-out debauchee had neither the merit of acquiescing in the change nor the

courage to resist it.

George IV. died on the 26th of June 1830, and was succeeded by his brother, the duke of Clarence, as William IV. His only child by Queen Caroline, the princess Charlotte Augusta, was married in 1816 to Leopold of Saxe-Coburg, afterwards king of the Belgians, and died in childbirth on the 6th of November

1817.

George IV. was a bad king, and his reign did much to disgust the country with the Georgian type of monarchy; but libertine and profligate as he became, the abuse which has been lavished on his personal character has hardly taken into sufficient consideration the loose morals of contemporary society, the political position of the Whig party, and his own ebullient temperament. Thackeray, in his Four Georges, is frequently unfair in this respect. The just condemnation of the moralist and satirist requires some qualification in the light of the picture of the period handed down in the memoirs and diaries of the time, such as Greville's, Croker's, Creevey's, Lord Holland's, Lord Malmesbury's, &c. Among later works see The First Gentleman of Europe, by Lewis Melville (1906), a book for the general reader. (S. R. G. ; H. Ch.)

GEORGE V. [George Frederick Ernest Albert], king of Great Britain and Ireland and of the British Dominions beyond the Seas, emperor of India (1865-), second son of King Edward VII., was born at Marlborough House, London, on the 3rd of June 1865. When four years old, he and his elder brother, Prince Albert Victor, two years his senior, were placed under the tutorship of John Neale Dalton, then curate of Sand- ringham. In 1877 the two princes became naval cadets on the " Britannia " at Spithead, where they passed through the ordinary curriculum, and in 1879 they joined H.M.S. " Bac- chante " under the command of Captain Lord Charles Scott, making a voyage to the West Indies, in the course of which they were rated midshipmen. After a month at home in 1880 they returned to the ship to make another prolonged cruise in H.M.S. " Bacchante," in the course of which they visited South America, South Africa, Australia, the Fiji Islands, Japan, Ceylon, Egypt, Palestine and Greece. A narrative of this voyage, The Cruise of H.M.S. " Bacchante," compiled from the letters, diaries and notebooks of the princes, was published in 1886. At the close of this tour in 1882 the brothers separated. Prince George, who remained in the naval service, was appointed to H.M.S. " Canada," commanded by Captain Durrant, on the North American and West Indian station, and was promoted sub-

lieutenant. On his return home he passed through the Royal Naval College at Greenwich and the gunnery and torpedo schools, being promoted lieutenant in 1885. A year later he was appointed to H.M.S. " Thunderer " of the Mediterranean squadron, and was subsequently transferred to H.M.S. " Dread- nought " and H.M.S. " Alexandra." In 1889 he joined the flagship of the Channel squadron, H.M.S. " Northumberland," and in that year was in command of torpedo boat No. 79 for the naval manoeuvres. In 1890 he was put in command of the gunboat H.M.S. " Thrush " for service on the North American and West Indian station. After his promotion as commander in 1891 he commissioned H.M.S. " Melampus," the command of which he relinquished on the death of his brother, Albert Victor, the duke of Clarence, in January 1892, since his duties as eventual heir to the crown precluded him from devoting himself exclusively to the navy. He was promoted captain in 1893, rear-admiral in 1901, and vice-admiral in 1903. He was created duke of York, earl of Inverness, and Baron Killarney in 1892, and on the 6th of July 1893 he married Princess Victoria Mary (b. 26th May 1867), daughter of Francis, duke of Teck,

and Princess Mary Adelaide, duchess of Teck, daughter of Adolphus Frederick, duke of Cambridge. Their eldest son, Prince Edward Albert, was born at White Lodge, Richmond, on the 23rd of June 1894; Prince Albert Frederick George was born at Sandringham on the 14th of December 1895; Princess Victoria Alexandra on the 25th of April 1897; Prince Henry- William Frederick Albert on the 31st of March 1900; Prince George Edward Alexander Edmund on the 20th of December 1902; and Prince John Charles Francis on the 12th of July 1905. The duke and duchess of York visited Ireland in 1899, and it had been arranged before the death of Queen Victoria that they should make a tour in the colonies. On the accession of King Edward VII. (1901) this plan was confirmed. They sailed in the " Ophir " on the 16th of March 1901, travelling by the ordinary route, and landed at Melbourne in May, when they opened the first parliament of the Commonwealth. They then proceeded to New Zealand, returning by way of South Africa and Canada. An official account of the tour was published by Sir Donald Mackenzie Wallace as The Web of Empire (1902). In November- 1 901 the duke was created prince of Wales. On the death of Edward VII. (May 6, 1910) he succeeded to the Crown as George V., his consort taking the style of Queen Mary.

GEORGE V., king of Hanover (1819-1878), was the only son of

Ernest Augustus, king of Hanover and duke of Cumberland, and consequently a grandson of the English king George III. Born in Berlin on the 27th of May 1819, his youth was passed in England and in Berlin until 1837, when his father became king of Hanover and he took up his residence in that country. He lost the sight of one eye during a childish illness, and the other by an accident in 1833. Being thus totally blind there were doubts whether he was qualified to succeed to the govern- ment of Hanover; but his father decided that he should do so, as the law of the dissolved empire only excluded princes who were born blind. This decision was a fatal one to the dynasty. Both from his father and from his maternal uncle, Charles Frederick, prince of Mecklenburg-Strelitz ˆ785-1837), one of the most influential men at the Prussian court, George had learned to take a very high and autocratic view of royal authority. His blindness prevented him from acquiring the shrewdness and knowledge of the world which had assisted his father, and he easily fell into the hands of unwise, and perhaps dishonest and disloyal, advisers. A man of deep religious feeling, he formed a fantastic conception of the place assigned to the house of Guelph in the divine economy, and had ideas of founding a great Guelph state in Europe. It is, therefore, not surprising that from the time of his accession in November 1851 he was constantly engaged in disputes with his Landtag or parliament, and was consequently in a weak and perilous position when the crisis in the affairs of Germany came in 1866. Having supported Austria in the diet of the German confederation in June 1866, he refused, contrary to the wishes of his parliament, to assent to the Prussian demand that Hanover should observe an unarmed neutrality during the war. As a result his country and his capital were at once occupied by the Prussians, to whom his army surrendered on the 29th of June 1866, and in the following September Hanover was formally annexed by Prussia. From his retreat at Hietzing near Vienna, George appealed in vain to the powers of Europe; and supported by a large number of his subjects, an agitation was carried on which for a time caused some embarrassment to Prussia. All these efforts, however, to bring about a restoration were unavailing, and the king passed the remainder of his life at Gmunden in Austria, or in France, refusing to the last to be reconciled with the Prussian government. Whilst visiting Paris for medical advice he died in that city on the 1 2th of June 1878, and was buried in St George's chapel, Windsor. In February 1843 he had married Marie, daughter of Joseph, duke of Saxe-Altenburg, by whom he left a son and two daughters. His son, Ernest Augustus, duke of Cumberland (b. 1845), continued to maintain the claim of his house to the kingdom of Hanover.

By the capitulation of 1866 the king was allowed to retain his personal property, which included money and securities

equal to nearly £1,500,000, which had been sent to England before the Prussian invasion of Hanover. The crown jewels had also been secretly conveyed to England. His valuable plate, which had been hidden at Herrenhausen, was restored to him in 1867; his palace at Herrenhausen, near Hanover, was reserved as his property; and in 1867 the Prussian govern- ment agreed to compensate him for the loss of his landed estates, but owing to his continued hostility the payment of the in- terest on this sum was suspended in the following year (see Hanover).

See O. Klopp, Konig Georg V. (Hanover, 1878); O. Theodor, Erinnerungen an Georg V. (Bremerhaven, 1878); and O. Meding, Memoiren zur Zeitgeschichte (Leipzig, 1881-1884).

GEORGE I., king of the Hellenes (1845-) > second son of King Christian IX. of Denmark, was born at Copenhagen on the 24th of December 1845. After the expulsion of King Otho in 1862, the Greek nation, by a plebiscite, elected the British prince, Alfred, duke of Edinburgh (subsequently duke of Coburg), to the vacant throne, and on his refusal the national assembly requested Great Britain to nominate a candidate. The choice of the British government fell on Prince Christian William Ferdinand Adolphus George of Schleswig-Holstein-Sonderburg- Glucksburg, whose election as king of the Hellenes, with the title George I., was recognized by the powers (6th of June 1863). The sister of the new sovereign, Princess Alexandra, had a few months before (10th March) married the prince of Wales, after- wards King Edward VII., and his father succeeded to the crown of Denmark in the following November. Another sister, Princess Dagmar, subsequently married the grand duke Alexander Alexandrovitch, afterwards Emperor Alexander III. of Russia. On his accession, King George signed an act resigning his right of succession to the Danish throne in favour of his younger brother Prince Waldemar. He was received with much enthusiasm by the Greeks. Adopting the motto, " My strength is the love of my people," he ruled in strict accordance with constitutional principles, though not hesitating to make the fullest use of the royal prerogative when the intervention of the crown seemed to be required by circumstances. For the events of his reign see Greece: History.

King George married, on the 27th of October 1867, the grand duchess Olga Constantinovna of Russia, who became distinguished in Greece for her activity on behalf of charitable objects. Their children

were Prince Constantine, duke of Sparta (b. 1868), who married in 1889 Princess Sophia of Prussia, daughter of the emperor Frederick, and granddaughter of Queen Victoria; Prince George (b. 1869), from November 1898 to October 1906 high commissioner of the powers in Crete; Prince Nicholas (b. T872), who married in 1902 the grand duchess Helen-Vladi- mirovna of Russia; Prince Andrew (b. r882), who married in 1903 Princess Alice of Battenberg; Prince Christopher (b. 1888); and a daughter, Princess Marie (b. 1876), who married in 1900 the grand duke George Michailovich of Russia.

GEORGE, king of Saxony (1832-1904), the youngest son of King John of Saxony (d. 1873) and Queen Amelia, was born at Dresden on the 8th of August 1832. From an early age he received a careful scientific and military training, and in 1846 entered the active army as a lieutenant of artillery. In 1849- 1850 he was a student at the university of Bonn, but soon returned to military life, for which he had a predilection. In the Austro- Prussian War of 1866 he commanded a Saxon cavalry brigade, and in the early part of the war of 1870-71 a division, but later succeeded to the supreme command of the XII. (Saxon) army corps in the room of his brother, the crown prince Albert (afterwards king) of Saxony. His name is inseparably associated ‘ with this campaign, during which he showed undoubted military ability and an intrepidity which communicated itself to all ranks under his command, notably at the battles of St Privat and Beaumont, in which he greatly distinguished himself. On his brother succeeding to the throne he became commander-in- chief of the Saxon army, and was in 1888 made a Prussian field marshal by the emperor William I. He married in 1859 I the infanta Maria, sister of King Louis of Portugal, and King

Albert’s marriage being childless, succeeded on his death in 1902 to the throne of Saxony. He died on the 15th of October 1904, at Pillnitz.

GEORGE OF LAODICEA in Syria, often called ” the Cappa- docian,” from 356 to 361 Arian archbishop of Alexandria, was born about the beginning of the 4th century. According to Ammianus (xxii. 11), he was a native of Epiphania, in Cilicia. Gregory Nazianzen tells us that his father was a fuller, and that he himself soon became notorious as a parasite of so mean a type that he would ” sell himself for a cake.” After many wanderings, in the course of which he seems

to have amassed a considerable fortune, first as an army-contractor and then as a receiver of taxes, he ultimately reached Alexandria. It is not known how or when he obtained ecclesiastical orders; but, after Athanasius had been banished in 356, George was pro- moted by the influence of the then prevalent Arian faction to the vacant see. His theological attitude was that known as semi- Arian or Homoiousian, and his associates were Eustathius of Sebaste and Basil of Ancyra. At George's instigation the second Sirmian formula (promulgated by the third council of Sirmium 357), which was conciliatory towards strict Arianism, was opposed at the council of Ancyra in 358 (Harnack, Hist, of Dogma, iv. 76). His persecutions and oppressions of the orthodox ultimately raised a rebellion which compelled him to flee for his life; but his authority was restored, although with difficulty, by a military demonstration. Untaught by experience, he resumed his course of selfish tyranny over Christians and heathen alike, and raised the irritation of the populace to such a pitch that when, on the accession of Julian, his downfall was proclaimed and he was committed to prison, they dragged him thence and killed him, finally casting his body into the sea (24th of December 361). With much that was sordid and brutal in his character George combined a highly cultivated literary taste, and in the course of his chequered career he had found the means, of collecting a splendid library, which Julian ordered to be conveyed to Antioch for his own use. An anony- mous work against the Manicheans discovered by Lagarde in 1859 in a MS. of Titus of Bostra has been attributed to him.

The original sources for the facts of the life of George of Laodicea are Ammianus, Gregory Nazianzen, Epiphanius and Athanasius. His character has been drawn with graphic fidelity by Gibbon in the 23rd chapter of the Decline and Fall; but the theory, accepted by Gibbon, which identifies him with the patron saint of England is now rejected (see George, Saint). See C. S. Hulst, St George of Cappadocia in Legend and History (1910).

GEORGE OF TREBIZOND (1395-1484), Greek philosopher and scholar, one of the pioneers of the revival of letters in the Western world, was born in the island of Crete, and derived his surname Trapezuntios from the fact that his ancestors were from Trebizond. At what period he came to Italy is not certain ; according to some accounts he was summoned to Venice about 1430 to act as amanuensis to Francesco Barbaro, who appears to have already made his acquaintance; according to others he did not visit Italy till the time of the council of Florence (1438- 1439). He learned Latin from Vittorino da Feltre, and made such rapid progress that in three

years he was able to teach Latin literature and rhetoric. His reputation as a teacher and a translator of Aristotle was very great, and he was selected as secretary by Pope Nicholas V., an ardent Aristotelian. The needless bitterness of his attacks upon Plato (in the Comparatio Aristotelis et Platonis), which drew forth a powerful response from Bessarion (q.v.), and the manifestly hurried and inaccurate character of his translations of Plato, Aristotle and other classical authors, combined to ruin his fame as a scholar, and to endanger his position as a teacher of philosophy. The indignation against him on account of his first-named work was so great that he would probably have been compelled to leave Italy had not ■ Alphonso V. given him protection at the court of Naples. He subsequently returned to Rome, where he died in great poverty on the 1 2th of August 1484. He had long outlived his reputation, and towards the end of his life his intellect failed him. From all accounts he was a man of very disagreeable character, conceited and quarrelsome.*

See G. Voigt, Die Wiederbelebung des klassischen Altertums (1893). and article by C. F. Bahr in Ersch and Gruber's Allgemeine Encyklo- pddie. For a complete list of his numerous works, consisting of translations from Greek into Latin (Plato, Aristotle and the Fathers) and original essays in Greek (chiefly theological) and Latin (gram- matical and rhetorical), see Fabricius, Bibliotheca Graeca (ed. Harles), xii.

GEORGE THE MONK [Georgios Monachos], called Hamar- tolos (Greek for " sinner "), Byzantine chronicler, lived during the reign of Michael III. (842-867). He wrote a Chronicle of events, in four books, from the creation of the world to the death of the emperor Theophilus (842), whose widow Theodora restored the worship of images in the same year. It is the only original contemporary authority for the years 813-842, and therefore so far indispensable; the early parts of the work are merely a compilation. In the introduction the author disclaims all pre- tensions to literary style, and declares that his only object was to relate such things as were " useful and necessary " with a strict adherence to truth. Far too much attention, however, is devoted to religious matters; the iconoclasts are fiercely attacked, and the whole is interlarded with theological discussions and quotations from the fathers. The work was very popular, and translations of it served as models for Slavonic writers. The MSS. give a continuation down to 948, the author of which is indicated simply as " the logothete," by whom probably Symeon Metaphrastes (second half of the 10th century) is meant. In this religious questions are relegated to the background, more attention is

devoted to political history, and the language is more popular. Still further continuations of little value go down to 1 143. The large circulation of the work and its sub- sequent reissues, with alterations and interpolations, make it very difficult to arrive at the original text.

Editions: E. de Muralt (St Petersburg, 1859); J. P. Migne, Patrologia Graeca, ex. ; C. de Boor (in Teubner series, 1904-). See F. Hirsch, Byzantinische Studien (1876); C. de Boor in His- torische Untersuchungen (in honour of Arnold Schafer, Bonn, 1882); C. Krumbacher, Geschichte der byzantinischen Litteratur (1897).

GEORGE THE SYNCELLUS [Georgios Synkellos], of Constantinople, Byzantine chronicler and ecclesiastic, lived at the end of the 8th and the beginning of the 9th century a.d. He was the syncellus (cell-mate, the confidential campanion assigned to the patriarchs, sometimes little more than a spy; see Syncellus) or private secretary of Tara(u)sius, patriarch of Constantinople (784-806), after whose death he retired to a convent, and wrote his Chronicle of events from Adam to Dio- cletian (285). At his earnest request, the work, which he doubt- less intended to bring down to his own times, was continued after his death by his friend Theophanes Confessor. The Chronicle, which, as its title implies, is rather a chronological table (with notes) than a history, is written with special reference to pre-Christian times and the introduction of Christianity, and exhibits the author as a staunch upholder of orthodoxy. But in spite of its religious bias and dry and uninteresting character, the frag- ments of ancient writers and apocryphal books preserved in it render it specially valuable. For instance, considerable portions of the original text of the Chronicle of Eusebius have been restored by the aid of Syncellus. His chief authorities were Annianus of Alexandria (5th century) and Panodorus, an Egyptian monk, who wrote about the year 400 and drew largely from Eusebius, Dexippus and Julius Africanus.

Editio princeps, by J. Goar (1652); in Bonn Corpus scriptorum hist. Byz., by W. Dindorf (1829). See also H. Gelzer, Sextus Julius Africanus, ii. 1 (1885) ; C. Krumbacher, Geschichte der byzantinischen Litteratur (1897).

GEORGE, HENRY (1839-1897), American author and political economist, was born in Philadelphia, Penn., on the 2nd of Sep- tember 1839. He settled in California in 1858; removed to New York, 1880; was first a printer, then an editor, but finally devoted all his life to economic and social questions. In 1871 he published

Our Land Policy, which, as further developed in 1879 under the title of Progress and Poverty, speedily attracted the widest attention both in America and in Europe. In 1886 he published Protection or Free Trade. Henry George had no political ambition, but in 1886 he received an independent nomination as mayor of New York City, and became so popular

that it required a coalition of the two strongest political parties to prevent his election. He received 68,000 votes, against 90,000 for the coalition candidate. His death on the 29th of October 1897 was followed by one of the greatest demonstrations of popular feeling and general respect that ever attended the funeral of any strictly private citizen in American history. The fundamental doctrine of Henry George, the equal right of all men to the use of the earth, did not originate with him; but his clear statement of a method by which it could be enforced, without increasing state machinery, and indeed with a great, simplification of government, gave it a new form. This method he named the Single Tax. His doctrine may be condensed as follows: The land of every country belongs of right to all the people of that country. This right cannot be alienated by one generation, so as to affect the title of the next, any more than men can sell their yet unborn children for slaves. Private ownership of land has no more foundation in morality or reason than private ownership of air or sunlight. But the private occupancy and use of land are right and indispensable. Any attempt to divide land into equal shares is impossible and un- desirable. Land should be, and practically is now, divided for private use in parcels among those who will pay the highest price for the use of each parcel. This price is now paid to some persons annually, and it is called rent. By applying the rent of land, exclusive of all improvements, to the equal benefit of the whole community, absolute justice would be done to all. As rent is always more than sufficient to defray all necessary expenses of government, those expenses should be met by a tax upon rent alone, to be brought about by the gradual abolition of all other taxes. Landlords should be left in undisturbed possession and nominal ownership of the land, with a sufficient margin over the tax to induce them to collect their rents and pay the tax. They would thus be transformed into mere land agents. Obviously this would involve absolute free trade, since all taxes on imports, manufactures, successions, documents, personal property, build- ings or improvements would disappear. Nothing made by man would be taxed at all. The right of private property in

all things made by man would thus be absolute, for the owner of such things could not be divested of his property, without full compensation, even under the pretence of taxation. The idea of concentrating all taxes upon ground-rent has found followers in Great Britain, North America, Australia and New Zealand. In practical politics this doctrine is confined to the " Single Tax, Limited," which proposes to defray only the needful public expenses from ground-rent, leaving the surplus, whatever it may be, in the undisturbed possession of land-owners.

The principal books by Henry George are: Progress and Poverty (1879), The Irish Land Question (1881), Social Problems (1884), Protection or Free Trade (1886), The Condition of Labor (1891), A Perplexed Philosopher (1892), Political Economy (1898). His son, Henry George (b. 1862), has written a Life (1900). For the Single Tax theory see Shearman's Natural Taxation (1899). (T. G. S.)

GEORGE PISIDA [Geoegios Pisides], Byzantine poet, born in Pisidia, flourished during the 7th century a.d. Nothing is known of him except that he was a deacon and chartophylax (keeper of the records) of the church of St Sophia. His earliest work, in three cantos (aKpoaaus) , on the campaign of the emperor Heraclius against the Persians, seems to be the work of an eye- witness. This was followed by the Avarica, an account of a futile attack on Constantinople by the Avars (626), said to have been repulsed by the aid of the Virgin Mary; and by the Heraclias, a general survey of the exploits of Heraclius both at home and abroad down to the final overthrow of Chosroes in 627. George Pisida was also the author of a didactic poern, Hexaemeron or Cosmourgia, upon the creation of the world; a treatise on the vanity of life, after the manner of Ecclesiastes; a controversial composition against Severus, bishop of Antioch; two short poems upon the resurrection of Christ and on the recovery of the sacred crucifix stolen by the Persians. The metre chiefly used is the iambic. As a versifier Pisida is correct and even elegant; as a chronicler of contemporary events he is exceedingly useful; and later Byzantine writers enthusiastically compared him with, and even preferred him to Esiripides . Recent criticism, however,

characterizes his compositions as artificial and almost uniformly dull.

Complete works in J. P. Migne, Patrologia Graeca, xcii.; see also De Georgii Pisidae apud Theophanem aliosque historicos reliquiis. (1900), by S. L. Sternbach, who has edited several new poems for the first time from a Paris MS. in Wiener Studien, xiii., xiv. (1891-

1892); C. Krumbacher, Geschichte der byzantinischen Litteratur (1897) ; C. F. Bahr in Ersch and Gruber's Allgemeine Encyklopddie .

GEORGE, LAKE, a lake in the E. part of New York, U.S.A., among the S.E. foothills of the Adirondack Mountains. It extends from N.N.E. to S.S.W. about 34 m., and varies in width from 2 to 4 m. It has a maximum depth of about 400 ft., and is 323 ft. above the sea and 227 ft. above Lake Champlain, into which it has an outlet to the northward through a narrow channel and over falls and rapids. The lake is fed chiefly by mountain brooks and submerged springs; its bed is for the most part covered with a clean sand; its clear water is coloured with beautiful tints of blue and green; and its surface is studded with about 220 islands and islets, all except nineteen of which belong to the state and constitute a part of its forest reserve. Near the head of the lake is Prospect Mountain, rising 1736 ft. above the sea, while several miles farther down the shores is BlackMountain, 2661 ft. in height. Lake George has become a favourite summer resort. Lake steamers ply between the village of Lake George (formerly Caldwell) at the southern end of the lake and Baldwin, whence there is rail connexion with Lake Champlain steamers.

Lake George was formed during the Glacial period by glacial drift which clogged a pre-existing valley. According to Prof. J. F. Kemp the valley occupied by Lake George was a low pass before the Glacial period; a dam of glacial drift at the southern end and of lacustrine clays at the northern end formed the lake which has submerged the pass, leaving higher parts as islands. Before the advent of the white man the lake was a part of the war-path over which the Iroquois Indians frequently made their way northward to attack the Algonquins and the Hurons, and during the struggle between the English and the French for supremacy in America, waterways being still the chief means of communica- tion, it was of great strategic importance (see Champlain, Lake). Father Isaac Jogues, Rene Goupil and Guillaume Couture seem to have been the first white men to see the lake (on the 9th of August 1642) as they were being taken by their Iroquois captors from the St Lawrence to the towns of the Mohawks, and in 1646 Father Jogues, having undertaken a half - religious, half-political mission to the Mohawks, was again at the lake, to which, in allusion to his having reached it on the eve of Corpus Christi, he gave the name Lac Saint Sacrement. This name it bore until the summer of 1755, when General William Johnson renamed it Lake George in honour of King George II.

General Johnson was at this time in command of a force of colonists and Indians sent against the French at Crown Point on Lake

Champlain. The expedition, however, had proceeded no farther than to the head of Lake George when Johnson was informed that a force of French and Indians under Baron Ludwig August Dieskau was pushing on from Crown Point to Fort Lyman (later Fort Edward), 14 m. to the S. of their encampment. Accordingly, on the morning of the 8th of September a detach- ment of 1000 colonials under Colonel Ephraim Williams (1715- 1755) and 200 Indians under Hendrick, a Mohawk chief, was sent to aid Fort Lyman, but when about 3 m. S. of the lake this detachment fell into an ambuscade prepared for it by Dieskau and both Williams and Hendrick were killed. The survivors were pursued to their camp, and then followed on the same day the main battle of Lake George, in which 1000 colonials fighting at first behind a hastily prepared barricade defeated about 1400 French and Indians. Both commanders were wounded; Dieskau was captured; the French lost about 300; and the colonials nearly the same (including those who fell earlier in the day). Johnson now built on the lake shore, near the battlefield, a fort of gravel and logs and called it Fort William Henry (the site was occupied by the Fort William Henry Hotel till it was burned in 1909). In the meantime the French entrenched them- selves at Ticonderoga at the foot of the lake. In March 1757 Fort William Henry successfully withstood an attack of 1600

men sent out by the marquis de Vaudreuil, governor of Canada, but on the 9th of August of the same year its garrison, after being reduced to desperate straits, surrendered to the marquis de Montcalm. By the terms of surrender the garrison was to be allowed to march out with the honours of war and was to be escorted to Fort Edward, but the guard provided by Montcalm was inadequate to protect them from his Indian allies and on the day following the surrender many were massacred or taken prisoners. The fort was razed to the ground. In 1758 General James Abercrombie proceeded by way of Lake George against Fort Ticonderoga, and in 1759 Baron Jeffrey Amherst, while on his way to co-operate with General James Wolfe against Quebec, built near the site of Fort William Henry one bastion of a fort since known as Fort George, the ruins of which still remain.

A monument commemorative of the battle of Lake George was unveiled on the 8th of September 1903, on the site of the battle, and within the state reservation of 35 acres known as Fort George Battle

Park. Horicon is a name that was given to the lake by James Fenimore Cooper. The Indian name of the lake was Andia-ta-roc-te.

See Francis Parkman, Montcalm and Wolfe (Boston, 1884); and E. E. Seelye, Lake George in History (Lake George, 1897).

GEORGE JUNIOR REPUBLIC, an American industrial institution, situated near the small village of Freeville, in Tomp- kins county, New York, U.S.A., 9 m. E.N.E. of Ithaca, at the junction of the Sayre-Auburn and the Elmira-Cortland branches of the Lehigh Valley railway. The George Junior Republic forms a miniature state whose economic, civic and social condi- tions, as nearly as possible, reproduce those of the United States, and whose citizenship is vested in young people, especially those who are neglected or wayward, who are thus taught self-reliance, self-control and morality. The founder, William Reuben George (b. 1866), was a native of West Dryden, a village near Freeville, who as a business man in New York City became interested in the Fresh Air Fund charity supervised by the New York Tribune, took charge of summer outings for city children (1890-1894), and, becoming convinced that such charities tended to promote pauperism and crime among the older of their proteges, devised first (1894) the plan of requiring payment by the children in labour for all they received during these summer jaunts, then (1895) self-government for a summer colony near Freeville, and finally a permanent colony, in which the children stay for several years. The Republic was founded on the 10th of July 1895; the only check on the powers of executive, representative and judicial branches of the government lies in the veto of the superintendent. " Nothing without labour " is the motto of the community, so strictly carried out that a girl or boy in the Republic who has not money 1 to pay for a night's lodging must sleep in jail and work the next day for the use of the cell. The legislative body, originally a House of Representatives and a Senate, in 1899 became more like the New England town meeting. The respect for the law that follows its enactment by the citizens themselves is remarkable in a class so largely of criminal tend- encies; and it is particularly noticeable that positions on the police force are eagerly coveted. Fifteen is the age of majority; suffrage is universal, children under fifteen must be in charge of a citizen guardian. The average age of citizens was seventeen in 1908. The proportion of girls to boys was originally small, but gradually increased ; in 1 908 there were about 70 girls and 90 boys. The tendency is to admit only those aged at least sixteen and physically well equipped. In the Republic's earlier years the citizens lived in boarding-houses of different grades, but later in family groups in cottages (there were in 19×0 twelve cottages) under the care of "

house-mothers." The labour of the place is divided into sewing, laundry work, cooking and domestic service for the girls, and furniture making, carpentry, farm work, baking bread and wafers (the business of an Auburn biscuit factory was bought in 1 903) , plumbing and printing for the boys. Masonry and 1 The " government " issued its own currency in tin and later in aluminium, and " American " money could not be passed within the 48 acres of the Republic until 1906, when depreciation forced the Republic's coinage out of use and " American " coin was made legal tender. .

shoe and harness making were tried for a few years. There is an efficient preparatory and high school, from which students enter directly leading colleges. The religious influence is strong, wholesome and unsectarian; students in Auburn Theological Seminary have assisted in the religious work; Roman Catholic and Hebrew services are also held; and attendance at church services is compulsory only on convicts and prisoners.

There are " Woman's Aid " societies in New York City, Ithaca, Syracuse, Buffalo, Boston and elsewhere, to promote the work of the Republic. A " republic " for younger boys, begun at Freeville, was established in Litchfield, Connecticut; and a National Junior .Republic near Annapolis Junction, Maryland, and a Carter Junior Republic at Readington, near Easton, Pennsylvania, are modelled on the George Junior Republic. In 1908-1910 new " states " were established at Chino, California, Grove City, Pennsylvania, and Flemington Junction, New Jersey. In February 1908 the National Associa- tion of Junior Republics was formed with Mr George (its founder) as its director, its aims being to establish at least one " republic " in each state of the Union, and in other countries similar institu- tions for youth and miniature governments modelled on that of the country in which each " state " is established, and to establish colonies for younger children, to be sent at the age of fifteen to the Junior Republic. At the time of its formation the National Association included the " states " at Freeville, N.Y., Litchfield, Conn., and Annapolis Junction, Md.; others joined the federa- tion later.

See William R. George, The Junior Republic: its History and Ideals (New York, 1910); The Junior Republic Citizen (Freeville, 1895 sqq.), written and printed by "citizens"; Nothing Without Labor, George Junior Republic (7th ed., Freeville, 1909), a manual; J. R. Commons, " The Junior Republic," in The American Journal of Sociology (1898); D. F. Lincoln, " The George Junior Republic," in The Coming Age (1900); and Lyman Abbott, "A Republic within a

Republic," in the Outlook for February 15, 1908.

GEORGETOWN, the capital of British Guiana (see Guiana), and the seat of the colonial government, situated on the left bank of the Demerara river at its mouth, in 6° 29′ 24″ N. and 58 11′ 30″ W. It was known during the Dutch occupation as Stabroek, and was established as the seat of government of the combined colonies of Essequibo and Demerara (now with Berbice forming the three counties of British Guiana) in 1784, its name being changed to Georgetown in 181 2. It is one of the finest towns in this part of the world, the streets being wide and straight, intersecting each other at right angles, several having double roadways with lily-covered canals in the centre, the grass banks on either side carrying rows of handsome shade trees. In Main Street, the finest street in Georgetown, the canal has been filled in to form a broad walk, an obvious precedent for the treatment of the other canals, which (however beautiful) are useless and merely act as breeding grounds for mosquitoes. The principal residences, standing in their own gardens surrounded by foliage and flowers, are scattered over the town, as are also the slums, almost the worst of which abut on the best residential quarters. Water Street, the business centre, runs parallel to the river for about 2J m. and contains the stores of the wholesale and retail merchants, their wharves running out into the river to allow steamers to come alongside. Most of the houses and public buildings are constructed of wood, the former generally raised on brick pillars some 4 ft. to 10 ft. from the ground, the bright colouring of the wooden walls, jalousies and roofs adding to the beauty of the best streets. The large structure known as the Public Buildings in the centre of the city, containing the offices of the executive government and the hall of the court of policy, was erected between 1829 and 1834. It is a handsome, E-shaped, brick-plastered building of considerable size, with deep porticos and marble-paved galleries carried on cast-iron columns. The law courts, built in the 'eighties, have a ground floor of concrete and iron, the upper storey being of hardwood. Among other public buildings are the town hall, the Anglican and Roman Catholic cathedrals, several handsome churches, the local banks and insurance offices, and the almshouse. The public hospital consists of several large blocks. The Royal

Agricultural and Commercial Society has a large reading-room and lending library. The assembly rooms, above and owned by the

Georgetown club, has a good stage and is admirably adapted to dramatic and musical entertainments. A museum (free), belonging to the Royal Agricultural and Commercial Society, is chiefly devoted to the fauna of British Guiana, but also contains an instructive collection of local economic, minera- logical and botanical exhibits, a miscellaneous collection of foreign birds and mammals, and an interesting series of views of the colony. The botanical gardens to the east of the city are of considerable extent and admirably laid out. The nurseries cover a large area and are devoted chiefly to the raising of plants of economic importance which can be purchased at nominal rates. The collections of ferns and orchids are very fine. In the gardens are also located the fields of the board of agriculture, where experimental work in the growth of sugar-cane, rice, cotton and all tropical plants of economic importance is carried on. Other popular resorts are the sea wall and the promenade gardens in the centre of the city.

The local government of Georgetown is vested in a mayor and town council elected under a very restricted franchise. The city is divided into fourteen wards each with one representative. A councillor must possess, either personally or through his wife, premises within the city of the appraised value of at least $1300. A voter must either own house property of the appraised value of $250 or occupy premises of an annual rental of $240. There are indeed only 297 municipal voters in a population of nearly 50,000. The revenue, just over £50,000 annually, is mainly derived from a direct rate on house property. The colonial government pays rates on its property and also gives a grant- in-aid towards the upkeep of the streets. The expenditure is principally on sanitation, fire brigade, streets, water-supply, street lighting and drainage. Street lighting is carried out under contract by the Demerara Electric Company, which has a monopoly of private lighting and works an excellent tram service. Water for public and domestic purposes is taken from the con-servancy of the east coast and is delivered by pumping throughout the city, but drinking-water is collected in tanks attached to the dwellings from the rain falling on the roofs. The fire brigade is a branch of the police force, half the cost being borne by the rates and half by the general revenue. There is an excellent service of telephones, a branch of the post office, and halfpenny postage within the city boundaries. There are in Georgetown two well-equipped foundries, a dry dock, and factories for the manufacture of rice, cigars, soap, boots, chocolate, candles, aerated waters and ice. Georgetown is connected by rail and ferry with New Amsterdam, by ferry and rail with the west coast of Demerara, and by steamer with

all the country districts along the coast and up the navigable reaches of the principal rivers. (A. G. B.)*

GEORGETOWN, formerly a city of the District of Columbia, U.S.A., and now part (sometimes called West Washington) of the city of Washington, U.S.A., at the confluence of the Potomac river and Rock Creek, and on the Chesapeake and Ohio Canal, about 25 m. W.N.W. of the National Capitol. Pop. (1890) 14,046; (1900) 14,549. The streets are old-fashioned, narrow and well shaded. On the " Heights " are many fine residences with beautiful gardens; the Monastery and Academy (for girls) of Visitation, founded in 1799 by Leonard Neale, second archbishop of Baltimore; and the college and the astronomical observatory (1842) of Georgetown University. The university was founded as a Roman Catholic Academy in 1789, was opened in 1791, transferred to the Society of Jesus in 1805, authorized in 1815 by Congress to confer college or university degrees, and by the Holy See in 1833 to confer degrees in philosophy and theology, incorporated as Georgetown College by Act of Congress in 1844, and began graduate work about 1856. The college library includes the historical collection of James Gilmary Shea. A school of medicine was opened in 1851, a dental school in 1901 and a school of law in 1870. In 1909- i9io.the university had an enrolment of 859 students. Rising in terraces from Rock Creek is Oak Hill Cemetery, a beautiful

burying-ground containing the graves of John Howard Payne, the author of " Home, Sweet Home," Edwin McMasters Stanton and Joseph Henry. On the bank of the Potomac is a brick house which was for several years the home of Francis Scott Key, author of "The Star-Spangled Banner"; on Analostan Island in the river was a home of James Murray Mason ; Georgetown Heights was the home of the popular novelist, Mrs Emma Dorothy Eliza Nevitte Southworth (1819-1899). Before the advent of railways Georgetown had an important commerce by way of the Chesapeake and Ohio Canal; by which considerable coal as well as some grain is still brought hither, and of which Georgetown is now a terminus; the canal formerly crossed the Potomac at this point on an aqueduct bridge (1446 ft. long), but in 1887 the crossing was abandoned and the old bridge was purchased by the United States government, which in 1889 constructed a new steel bridge upon the old masonry piers. Chief among the manufactories are several large flour mills — Georgetown flour was long noted for its excellence. There is a very large fish-market here. Georgetown was settled late in the 17th century, was laid out as a town in 1751, chartered as a city in 1789, merged in the District of Columbia in 1871, and annexed to the city of

Washington in 1878. In the early days of Washington it was a social centre of some importance, where many members of Congress as well as some cabinet officers and representatives of foreign countries lived and the President gave state dinners; and here were the studio, for two years, of Gilbert Stuart, and "Kalorama," the residence of Joel Barlow.

GEORGETOWN, a city and the county-seat of Scott county, Kentucky, U.S.A., about 11 miles N. of Lexington. Pop. (1900)3823 (1677 negroes); (1910)4533. Georgetown is served by the Cincinnati Southern (Queen & Crescent Route), the Frankfort & Cincinnati, and the Southern railways, and is connected with Lexington by an electric line. It is the seat of Georgetown College (Baptist, co-educational), chartered in 1829 as the successor of Rittenhouse Academy, which was founded in 1798. Georgetown is situated in the Blue Grass region of Kentucky, and the surrounding country is devoted to agriculture and stock-raising. One of the largest independent oil refineries in the country (that of the Indian Refining Co.) is in Georgetown, and among manufactures are bricks, flour, ice, bagging and hemp. The remarkable " Royal Spring," which rises near the centre of the city, furnishes about 200,000 gallons of water an hour for the city's water supply, and for power for the street railway and for various industries. The first settlement was made in 1775, and was named McClellan's, that name being changed to Lebanon a few years afterwards. In 1790 the place was incorporated as a town under its present name (adopted in honour of George Washington), and Georgetown was chartered as a city of the fourth class in 1894. Bacon College, which developed into Kentucky (now Transylvania) University (see Lexington, Ky.), was established here by the Disciples of Christ in 1836, but in 1839 was removed to Harrodsburg.

GEORGETOWN, a city, a port of entry and the county-seat of Georgetown county, South Carolina, U.S.A., at the head of Winyah Bay, and at the mouth of the Pedee river, about 15 m. from the Atlantic Ocean, and about 55 m. N.E. of Charleston. Pop. (1890) 2895; (1900) 4138(2718 negroes); (1910) 5530. Georgetown is served by the Georgetown & Western railway, has steamship communication with Charleston, Wilmington, New York City and other Atlantic ports, and, by the Pedee river and its tributaries (about 1000 m. of navigable streams), has trade connexions with a large area of South Carolina and part of North Carolina. The principal public buildings are the post office and custom house. Among the city's manufactures are lumber, foundry and machine-shop products, naval stores and oars; and there are shad and

sturgeon fisheries. The growing of cotton and truck-gardening are important industries in the neighbouring region, and there is considerable trade in such products. The first settlement here was made about 1700; and the town was laid out a short time before 1 734. The Winyah Indigo Society grew out of a social club organized about 1740, and was founded in 1757 by a group of planters interested in

raising indigo; it long conducted a school (discontinued during the Civil War) which eventually became part of the city's public school system. In 1780 Georgetown was occupied by a body of Loyalist troops, with whom the American troops had several skirmishes, but on the 10th of August 1781 General Francis Marion forced the evacuation of the town and took possession of it. A few days later, an American named Manson, who had joined the British forces, attacked the town from an armed vessel, and burned about forty houses, the small body of militia being unable to make an effective resistance. General Lafayette first landed on American soil at Georgetown on the 24th of April 1777. Georgetown was incorporated as a town in 1805, and was chartered as a city in 1895.

GEORGETOWN, a city and the county-seat of Williamson county, Texas, U.S.A., on the San Gabriel river, about 25 m. N. by E. of Austin. Pop. (1890) 2447; (1900) 2790 (608 negroes); (1910) 3096. The city is served by the International & Great Northern, and the Missouri, Kansas & Texas rail- ways. Georgetown is the seat of the Southwestern University (Methodist Episcopal, South, co-educational), formed in 1873 (chartered 1875) by the combination of Ruterville College (Methodist Episcopal, at Ruterville, Texas, chartered in 1840, and closed in 1850), McKenzie College (at Clarksville, Texas, founded in 1841 and closed in 1872), Wesleyan College at San Augustine (chartered in 1844, burned a few years later, and not rebuilt), and Soule University at Chapel Hill (chartered in 1856, but closed in 1870). The university includes a fitting school at Georgetown, and a medical department at Dallas, Texas; in 1909 it had an enrolment of 1037 students. The principal manufactures of Georgetown are cotton and cotton-seed oil, and planing-mill products. In Page Park are mineral springs, whose waters have medicinal qualities similar to the famous Karlsbad waters. The first settlement was made here in 1848; and Georgetown

was incorporated as a town in 1866, and was chartered as a city in 1890.

GEORGIA, a southern state of the United States of America, one of the thirteen original states, situated between 30° 31′ 39″ and 35° N., and between 8i° and 85° 53′ 38″ W. It is bounded N. by Tennessee and North Carolina, E. by South Carolina and the Atlantic Ocean, S. by Florida, and W. by Alabama. The total area of the state is 59,265 sq. m., of which 540 sq. m. are water surface.

The surface of Georgia is divided into five physiographic zones. From the sea coast, which is skirted by fertile, semi-tropical islands, a plain of 35,000 sq. m., known as South Georgia, extends northward to the " fall-line " passing from Augusta, through Milledgeville and Macon, to Columbus. This is a part of the great Atlantic Coastal Plain. For 20 m. from the coast its elevation is 10 ft., then it rises abruptly 70 ft. higher, and 20 m. farther N. another elevation begins, which reaches 575 ft. at Milledgeville, the average elevation of the entire region being 250 ft. North of the line men- tioned, and collectively known as North Georgia, are the four other regions, each with well-defined characteristics. The largest and southernmost, a broad belt extending from the " fall-line " to a line passing through Clarkesville, Habersham county, Cartersville, Bartow county and Buchanan, Haralson county (approximately), is known as the Piedmont Belt or Plateau, being a region of faint relief eroded on highly complicated crystalline rocks. The Blue Ridge escarpment, a striking topographic feature in Virginia and the Carolinas, extends into Georgia along the north-eastern border of this belt, but is less strongly developed here than elsewhere, dying out entirely towards the south-west. North of the Piedmont Belt lie the Appalachian Mountains Region and the Great Valley Region, the former to the east, the latter to the west of a dividing line from Cartersville northward. The former region consists of detached mountain masses of crystalline rocks, not yet eroded down to the level of the Piedmont Belt. In Towns county, in the Appalachian Region, is the highest point in the state,- Brasstown Bald, also called Enota Mountain (4768 ft.). The Great Valley Region consists of folded sedimentary rocks, extensive erosion having removed the soft layers to form valleys, leaving the hard layers as ridges, both layers running in a N.E.-S.W. direction. In the extreme north-west corner of the state is a small part of the Cumber- land Plateau, represented by Lookout and Sand Mts.

On the Blue Ridge escarpment near the N.E. corner of the state is a water-parting separating the waters which find their way respectively

N.W. to the Tennessee river, S.W. to the Gulf of Mexico and S.E. to the Atlantic Ocean; indeed, according to B. M. and M. R. Hall (Water Resources of Georgia, p. 2), "there are three

springs in north-east Georgia within a stone's throw of each other that send out their waters to Savannah, Ga., to Apalachicola, Fla., and to New Orleans, La." The water-parting between the waters flowing into the Atlantic and those flowing into the Gulf extends from this point first S.E. for a few miles, then turns S.W. to Atlanta, and from there extends S.S.E. to the Florida line. West of where the escarpment dies out, the Great Valley Region and a considerable portion of the Appalachian Mountains Region are drained by the Coosa, the Tallapoosa and their tributaries, into Mobile Bay, but the Cumberland Plateau, like that part of the Appalachian Moun- tains Region which lies directly N. of the Blue Ridge escarpment, constitutes a part of the Tennessee Basin. The principal rivers of the state are the Chattahoochee and the Flint, which unite in the S.W. corner to form the Apalachicola; the Ocmulgee (whose western tributary, the Towaliga, falls 96 ft. in less than a quarter of a mile), and the Oconee, which unite in the S.E. to form the Altamaha; and the Savannah, which forms the boundary between Georgia and South Carolina. All of these rise in the upper part of the Piedmont Plateau, through which they pursue a rapid course over rocky beds, and are navigable only south of the " fall-line," at which and north of which they furnish an abundance of water-power. The upper Savannah river first flows S.W., then turns abruptly S.E., while the Chattahoochee river rises near this point and con- tinues S.W. This is because the upper Savannah 1 was formerly part of the Chattahoochee, but was captured and turned S.E. by headward growth of the Savannah. As a result of the capture there is a deep gorge along the upper Savannah, especially along the branch called the Tallulah river; and the upper Tallulah, in a series of cascades, 2§ m. long, falls 525 ft. from the former higher level down to the main bed of the upper Savannah, at Tallulah Falls, a summer resort.

The fauna and flora have no distinctive features. [See United States.)

Climate and Soils. — The climate of Georgia, though temperate, differs considerably in different parts of the state. All the nine climate belts in the United States, except that of southern Florida, are represented within its borders. The lowest mean annual temperature, 40 F. and below, is that of some of the mountain tops of northern Georgia; from the mountain-sides to the Piedmont Plateau this mean temperature varies from 45 to 60°; on the

Piedmont Plateau from 60° to 65 ; and on the Coastal Plain from 6o° to 70°. The July isotherm of 80° crosses the state a little N. of Augusta and Macon, touching the W. boundary at West Point, Troup county. The mean July tempera- ture for the whole state is 81 -8°; for the part S. of the 8o° isotherm the average temperature for July is between 8o° and 85 . The -average rainfall for the state is 49-3 in.; the maximum is 71-7 in., at Rabun Gap in the extreme N.E. part of the state; the minimum is 39-4 at Swainsboro, Emanuel county, a little S.E. of the centre of the state.

Georgia is also notable for the variety of its soils. In the Cumberland Plateau and Great Valley Regions are a red or brown loam, rich in decomposed limestone and calcareous shales, and sandy or gravelly loams. In the Piedmont Plateau and Appala- chian Mountains Regions the surface soil is generally-sandy, but in considerable areas the subsoil is a red clay derived largely from the decomposition of hornblende. By far the greatest variety of soils is found in the Coastal Plain Region. Here the Central Cotton Belt, extending from the " fall-line " as far S. as a line bisecting Early county in the W. and passing through Baker, Worth, Dooly, Dodge, Laurens, Johnson, Jefferson and Burke counties, has three distinct kinds of soil; a sand, forming what is known as the sand-hill region; red clay derived from silicious rock in the red hills; and grey, sandy soils with a subsoil of yellow loam. South of the Cotton Belt is the Lime Sink Region, which includes Miller, Baker, Mitchell, Colquitt and Worth counties, the northern portions of Decatur, Grady, Thomas, Brooks and Lowndes, the eastern parts of Dooly and Lee, and the eastern portions of Berrien, Irwin, Wilcox, Dodge, and some parts of Burke, Screven and Bulloch. The soft lime- stone underlying this region is covered, in the uplands, with grey, sandy soils, which have a subsoil of loam; in the lowlands the surface soils are loams, the subsoils clays. Adjoining this region are the pine barrens, which extend S. to a line passing through the northern portions of Pierce, Wayne, Liberty, Bryan 1 According to the usual nomenclature, the branch flowing S.W. is called the Chattooga ; this unites with the Tallulah to form the Tugaloo, which in turn unites with the Kiowee to form the Savannah 1 proper.

and Effingham counties. Here the prevailing soils are grey and sandy with a subsoil of loam, but they are less fertile than those of the Lime Sink or Cotton Belts. The coast counties of the S.E. and generally

those on the Florida frontier are not suitable for cultivation, on account of the numerous marshes and swamps, Okefinokee Swamp being 45 m. long and approximately 30 m. wide; but the southern portions of Decatur, Grady, Thomas and Brooks counties are sufficiently elevated for agriculture, and the islands off the coast are exceedingly productive.

Minerals. — The mineral resources of Georgia are as varied as its climate and soils, a total of thirty-nine different mineral products being found within its borders. The most important is stone: in 1905 the value of the granite quarried in the state was $971,207 (Georgia ranking fifth in the United States), of the marble $774,550 (Georgia ranking third in the United States, Vermont and New York being first and second) ; in 1908 the granite was valued at $970,832 (Georgia ranking fifth in the United States), and the marble at $916,281 (Georgia ranking second in the United States, Vermont being first). Generally more than one-fourth of the granite is used for pav- ing; curb, building and monument stone are next in importance in the order named. Stone Mountain (1686 ft.) in De Kalb county near Atlanta is a remarkable mass of light-coloured muscovite granite, having a circumference at its base of 7 m. Stone Mountain granite was first quarried about 1850; it is extensively used as building material in Georgia and other southern states. A laminated granite, otherwise like the Stone Mountain granite, is found in De Kalb, Rockdale and Gwinnett counties, and is used for curbing and build- ing. Biotite granites, which take a good polish and are used for monuments and for decoration, are quarried in Oglethorpe and Elbert counties. Georgia marble was first quarried on a large scale in Pickens county in 1884; the pure white marble of this county had been worked for tombstones near Tate, the centre of the marble belt, in 1840; after its commercial exploitation it was used in the capitol buildings of Georgia, Rhode Island, Mississippi and Minne- sota, in the Corcoran Art Gallery, Washington, D.C., and in St Luke's Hospital, New York City. It is sometimes used for the entire building, and sometimes only for decoration. Other colours than the snowy white are found in the main marble belt of the state, which runs from Canton, Cherokee county, 60 m. generally N. to the northern boundary of the state. Other deposits, less well known, are the dark brown and light grey marbles of Whitfield county, which resemble the stone quarried in eastern Tennessee. Limestone and slate are quarried at Rock Mart, Polk county, and there are cement quarries at Cement, near Kingston, Bartow county. Iron deposits occur in Bartow, Polk and Floyd counties, where are the more important brown ores, and (red ores) in Walker and Chattooga counties. The

quantity of iron ore mined in Georgia declined from 1890 to 1900; it was 200,842 long tons in 1905 and 321,060 long tons in 1908, when 319,812 tons were brown haematite and 1248 tons were red haematite. Before the discovery of gold in California the Georgia " placers " were very profitable, the earliest mining being in 1829 by placer miners from the fields of Burke county, North Carolina, who began work in what is now White county, and went thence to Habersham and Lumpkin counties. Dahlonega and Auraria, the latter named by John C. Calhoun, who owned a mine there, were the centres of this early gold mining. Work was summarily stopped by Federal troops enforcing the governor's proclamation in 1831, because of the disorder in the mining region; but it was soon renewed and a mint was established at Dahlonega in 1838. After the discovery of gold in California, mining in Georgia was not renewed on anything but the smallest scale until the early 'eighties. In 1908 the gold product was valued at $56,207 (it was $96,910 in 1905) and the silver product at $106. Up to 1909 the gold product of Georgia (see State Geol. Survey Bulletin 19) was about $17,500,000. Extensive clay deposits occur in all parts of the state, and are remarkable for their com- parative freedom from impurities and for their high fusion point ; the most valuable are sedimentary, and form a belt several miles wide across the middle of the state from Augusta to Columbus. In 1908 the clay products of the state were valued at $1,928,611. More asbestos has been found in Georgia than in any other state of the Union; it occurs in the amphibole form throughout the N. part of the state, and most of the country's domestic supply comes from the Sail Mountain mine in White county. Manganese ores, found in Bartow, Polk and Floyd counties, were formerly important; in 1896 4096 long tons were mined, in 1905 only 150 tons, and in 1908 none. Bauxite was found in Georgia first of the United States, near Rome, in 1887; the output, principally from Floyd, Bartow, and Polk counties, was the entire product of the United States until 1 89 1, and in 1902 was more than half the country's product, but in 1908, even when combined with the Alabama output, was less than the amount mined in Arkansas. Coal is not extensively found, but the mine on Sand Mountain, in Walker county, was one of the first opened S. of the Ohio river; in 1908 the value of the coal mined in the state was $364,279 (264,822 short tons), the value of coke at the ovens was. $137 ,524 (39,422 short tons), and the value of ammonium sul- phate, coal tar, illuminating gas and gas coke was more than $800,000.

Copper was mined in Fannin and Cherokee counties before the Civil War. In 1906 the copper mined was valued at $5057. Corundum was

discovered on Laurel Creek in Rabun county in 187 1, and was worked there and at Trackrock, Union county, especially between 1880 and 1893, but in later years low prices closed most of the mines. The limestone formations furnished most of the lime for domestic use. Sandstone, ochre, slate, soapstone, graphite are also mined, and lead, zinc, barytes, gypsum and even diamonds have been discovered but not exploited.

Agriculture. — The principal occupation in Georgia is agricul- ture, which in 1900 engaged seven-tenths of the land surface of the state and the labour of three-fifths of the population, ten years old and over, who are employed in profitable occupations. The products are so diversified that, with the exception of some tropical fruits of California and Florida, almost everything cultivated in the United States can be produced. The chief staple is cotton, of which a valuable hybrid called the Floradora, a cross of long and short staple, has been singularly successful. Cotton is raised in all counties of the state except Rabun, Towns and Fannin in the extreme north, and about one-third of the total cultivated land of the state was devoted to it in 1900-1907. In 1899-1904 the crop exceeded that of the other cotton-produc- ing states except Texas, and in 1899, 1900 and 1903 Mississippi, averaging 1,467,121 commercial bales per annum; the crop in 1904 was 1,991,719 bales, and in 1907-1908 the crop was 1,815,834 bales, second only to the crop of Texas. The cause of this extensive cultivation of cotton is not a high average yield per acre, but the fact that before i860 " Cotton was King," and that the market value of the staple when the Civil War closed was so high that farmers began to cultivate it to the ex- clusion of the cereals, whose production, Indian corn excepted, showed a decline during each decade from 1879 to 1899. But in the 'nineties the price of the cotton fell below the cost of pro- duction, owing to the enormous supply, and this was accompanied by economic depression. These conditions have caused some diversification of crops, and successful experiments in cattle- raising, movements encouraged by the Department of Agriculture and the leading newspapers.'

The principal cereals cultivated are Indian corn (product, 53,750,000 bushels in 1908) and wheat; the cultivation of the latter, formerly remunerative, declined on account of the com- petition of the Western States, but revived after 1899, largely owing to the efforts of the Georgia Wheat Growers' Association (organized in 1897), and in 1908 the yield was 2,208,000 bushels. The sugar-cane crop declined in value after 1890, and each year more of it was made into syrup. In 1908 the tobacco crop was 2,705,625 lb, and the average farm price was 35 cents, being nearly as high as that of

the Florida crop; Sumatra leaf for wrappers is grown successfully. The acreage and product of tobacco and peanuts increased from 1890 to 1900 respectively 188% and 319-2%, and 92-6% and 129-9%, an d i n the pro- duction of sweet potatoes Georgia was in 1899 surpassed only by North Carolina. Alfalfa and grasses grow well. Truck farming and the cultivation of orchard and small fruits have long been remunerative occupations; the acreage devoted to peaches doubled between 1890 and 1900. Pecan nuts are an increasingly important crop.

Agriculture in Georgia was in a state of transition at the beginning of the 20th century. Owing to the abundance of land and to negro slavery, .exploitative methods of cultivation were employed before the Civil War, and such methods, by which lands after being worked to exhaustion are deserted for new fields, had not yet been altogether abandoned. One reason for this was that, according to the census of 1900, 36-9% of the farms were operated by negroes, of whom 86 % were tenants who desired to secure the greatest possible product without regard to the care of the soil. Consequently there were large tracts of unfilled " waste " land; but these rapidly responded to fertilization and rotation of crops, often yielding 800 to 1200 ft) of cotton per acre, and Georgia in 1899 used more fertilizers than any other state in the Union. Another feature of agriculture in Georgia was the great increase in the number of farms, the average size of plantations having declined from 440 acres in i860 to 117-5 in 1900, or almost 75%, while the area in cultivation increased only 15-6% between 1850 and 1900. The tenantry system was also undergoing a change — the share system which developed in the years succeeding the Civil War being replaced by a system of cash rental.

I Manufactures. — Although excelled by Alabama in the

«3°

■Kr t h|#

GEORGIA

Scale, 1:2.400,000

English Miles o 10 20 30 40 5 6°

Railways

County Seats ?

manufacture of mineral products, and by North Carolina and South Carolina in the number and output of cotton mills, in iooo and in 1905 Georgia surpassed each of those states in the total value of factory products, which was, however, less than the value of the factory products of Louisiana and Virginia among the southern states. The chief features of this industrial activity are its early beginning and steady, constant development. As far back as 1850 there were 1522 manufacturing establishments (35 of which were cotton mills) in the state, whose total product was valued at $7,082,073. Despite the Civil War, there was some advance during each succeeding decade, the most prosperous relatively being that from 1880 to 1890. In 1900 the number of establishments was 7504, an increase of 75-1% over the number in 1890; the capital invested was $89,789,656, an increase of 57-7%, and the value of products ($106,654,527) was 54-8% more than in 1890. Of the 7504 establishments in 1900, 3015 were conducted under the " factory system," and had a capital of $79,303,316 and products valued at $94,532,368. In 1905 there were 3219 factories, with a capital of $135,211,551 (an increase of 70-5% over 1900), and a gross product valued at $151,040,455 (59-8% greater than the value of the factory product in 1900).

The most important manufacturing industries are those that depend upon cotton for raw material, with a gross product in 1900 valued at 826,521,757. In that year 1 there were 67 mills engaged in the manufacture of cotton goods, with a capital of $24,158,159, and they yielded a gross product valued at $18,457,645; the increase between 1900 and 1905 was actually much larger (and proportionately very much larger) than between 1890 and 1900; the number of factories in 1905 was 103 (an increase of 53-7% over 1900); their capital was §42,349,618 (75-3% more than in 1900); and their gross product was valued at §35,174,248 (an increase of 90-6% since 1900). The rank of Georgia among the cotton manufacturing states was seventh in 1900 and fourth in 1905. Cotton-seed oil and cake factories increased in number from 17 to 43 from 1890 to 1900, and to 112 in 1905, and the value of their product increased from $1,670, 196 to $8,064, 1 1 2, or 382 -8% in 1 890-1900, and

to $13,539,899 in 1905, or an increase of 67-9% over 1900, and in 1900 and in 1905 the state ranked second (to Texas) in this industry in the United States. This growth in cotton manufactures is due to various causes, among them being the proximity of raw material, convenient water-power, municipal exemption from taxation and the cheapness of labour. The relation between employer and employee is in the main far more personal and kindly than in the mills of the Northern States.

The forests of Georgia, next to the fields, furnish the largest amount of raw material for manufactures. The yellow pines of the southern part of the state, which have a stand of approximately 13,778,000 ft., yielded in 1900 rosin and turpentine valued at $8,110,468 (more than the product of any other state in the Union) and in 1905 valued at $7,705,643 (second only to the product of Florida). From the same source was derived most of the lumber product valued 2 in 1900 at $13,341,160 (more than double what it was in 1890) and in 1905 at $16,716,594. The other important woods are cypress, oak and poplar.

Fourth in value in 1905 (first, cotton goods; second, lumber and timber; third, cotton-seed oil and cake) were fertilizers, the value of which increased from $3,367,353 in 1900 to $9,461,415 in 1905, when the state ranked first of the United States in this industry; in 1900 it had ranked sixth.

Communications. — Means of transportation for these products are furnished by the rivers, which are generally navigable as far north as the " fall line " passing through Augusta, Milledgeville, Macon and Columbus; by ocean steamship lines which have piers at St Mary's, Brunswick, Darien and Savannah; and by railways whose mileage in January 1909 was 6,871-8 m. T^e most important of the railways are the Central of Georgia, the Southern, the Atlantic Coast Line, the Seaboard Air Line, the Georgia and the Georgia Southern & Florida. In 1878 a state railway commission was estab- lished which has mandatory power for the settlement of all traffic problems and makes annual reports.

Population. — The population of Georgia in 1880 was 1,542,180; in 1890 1,837,353, an increase of 19'!%; in 1900 2,216,331, afur-

1 The manufacturing statistics for 1900 which follow are not those given in the Twelfth Census, but are taken from the Census of Manufactures, 1905, the 1900 figures here given being only for " establishments on a factory basis," and thus being comparable with

those of 1905. In 1890 there were 53 mills with a capital of $17,664,675 and a product valued at $12,035,629.

2 In these valuations for 1900 and for 1905 the rough lumber dressed or remanufactured in planing mills enters twice into the value of the product.

therincreaseof 20-6% 3 ;ini9ic, 2,609,121. Of the 1900 population, !>3‘3% were whites and 46-7% were negroes, 4 the centre of the black population being a little south of the ” fall line.” Here the negroes increased, from 1890 to 1900, faster than the whites in eighteen counties, but in northern Georgia, where the whites are in the majority, the negro population declined in twelve counties. Also the percentage of negro illiteracy is higher in northern Georgia than in other parts of the state, the per- centage of negro male illiterates of voting age being 38-3% in Atlanta in 1900, and in Savannah only 30-7%. The population of Georgia has a very slight foreign-born element (-6% in 1900) and a small percentage (1-7% in 1900) of people of foreign parentage. The urban population (i.e. the population in places of 2500 inhabitants and over) was 15-6% of the total in 1900, and the number of incorporated cities, towns and villages was 372. Of these only forty had a population exceeding 2000, and thirteen exceeding 5000. The largest city i-n 1900 was Atlanta, the capital since 1868 (Louisville, Jefferson county, was the capital in 1795-1804, and Milledgeville in 1804-1868), with 89,872 inhabitants. Savannah ranked second with 54,244, and Augusta third with 39,441. In 1900 the other cities in the state with a population of more than 5000 were: Macon (23,272), Columbus (17,614), Athens (10,245), Brunswick (9081), Americus (7674), Rome (7291), Griffin (6857), Waycross (5919), Valdosta (5613), and Thomasville (5322).

The total membership of the churches in 1906 was about 1,029,037, of whom 596,319 were Baptists, 349,079 were Metho- dists, 24,040 were Presbyterians, 19,273 were Roman Catho- lics, 12,703 were Disciples of Christ, 9790 were Protestant Episcopalians, and 5581 were Congregationalists.

Government. — The present constitution, which was adopted in 1877, 6 provides for a system of government similar in general to that of the other states (see United States). The executive officials are elected for a term of two years, and the judges of the Supreme Court and of the court of appeals for six years, while those of the superior court and of the ordinaries and the justices of the peace are chosen every four years. Before 1909 all male citizens of the United

States at least twenty-one years of age (except those mentioned below) , who had lived in the state for one year immediately preceding an election and in the county six months, and had paid their taxes, were entitled to vote. From the suffrage and the holding of office are excluded idiots and insane persons and all those who have been convicted of treason, embezzlement, malfeasance in office, bribery or larceny, or any crime involving moral turpitude and punishable under the laws of the state by imprisonment in the penitentiary — this last disqualification, however, is removable by a pardon for the offence. Before 1909 there was no constitutional discrimina- tion aimed against the exercise of the suffrage by the negro, but in fact the negro vote had in various ways been greatly reduced. By a constitutional amendment adopted by a large majority at a special election in October 1908, new requirements for suffrage, designed primarily to exclude negroes, especially illiterate negroes, were imposed (supplementary to the require- ments mentioned above concerning age, residence and the payment of taxes), the amendment coming into effect on the 1st of January 1909: in brief this amendment requires that the voter shall have served in land or naval forces of the United States or of the Confederate States or of the state of Georgia in time of war, or be lawfully descended from some one who did so serve; or that he be a person of good character who proves to the satisfaction of the registrars of elections that he under- stands the duties and obligations of a citizen; or that he read correctly in English and (unless physically disabled) write any paragraph of the Federal or state constitution; or that he own 40 acres of land or property valued at $500 and assessed for

8 The population of the state was 82,548 in 1790, 162,686 in 1800, 252,433 in 1810, 340,989 in 1820, 516,823 in 1830, 691,392 in 1840, 906,185 in 1850, 1,057,286 in i860, and 1,184,100 in 1870.

4 This negro percentage includes 211 Chinese, Japanese and Indians.

6 The state has had four other constitutions — those of 1777, 1789, 1798 and 1868.

taxation. After the ist of January 191 5 no one may qualify as a voter under the first or second of these clauses (the " grand- father " and "understanding" clauses); but those who shall have registered under their requirements before the ist of January 1915 thus become

voters for life.

The governor, who receives a salary of $5000, must be at least thirty years old, must at the time of his election have been a citizen of the United States for fifteen years and of the state for six years, and " shall not be eligible to re-election after the expiration of a second term, for the period of four years." In case of his " death, removal or disability," the duties of his office devolve in the first instance upon the president of the Senate, and in the second upon the speaker of the House of Representatives. The governor's power of veto extends to separate items in appropriation bills, but in every case his veto may be overriden by a two-thirds vote of the legislature. An amendment to the constitution may be proposed by a two- thirds vote of the legislature, and comes into effect on receiving a majority of the popular vote. Members of the Senate must be at least twenty-five years old, must be citizens of the United States, and must, at the time of their election, have been citizens of the state for four years, and of the senatorial district for one year; representatives must be at least twenty-one years old, and must, at the time of their election, have been citizens of the state for two years. By law, in Georgia, lobbying is a felony.

Habitual intoxication, wilful desertion for three years, cruel treatment, and conviction for an offence the commission of which involved moral turpitude and for which the offender has been sentenced to imprisonment for at least two years, are recognized as causes for divorce. All petitions for divorce must be approved, by two successive juries, and a woman holds in her own name all property acquired before and after marriage. Marriage between the members of the white and negro races is prohibited by law.

As the result of the general campaign against child labour, an act was passed in 1906 providing that no child under 10 shall be employed or allowed to labour in or about any factory, under any circumstances; after the ist of January 1907 no child under 12 shall be so employed, unless an orphan with no other means of support, or unless a widowed mother or disabled or aged father is dependent on the child's labour, in which case a certificate to the facts, holding good for one year only, is required; after the ist of January 1908 no child under 14 shall be employed in a factory between the hours of 7 p.m. and 6 a.m. ; after the same date no child under 14 shall be employed in any factory without a certificate of school attendance for 1 2 weeks (of which 6 weeks must be consecutive) of the preceding year; no child shall be employed without the filing of an affidavit as to age. Making a false affidavit as to age or as to other

facts required by the act, and the violation of the act by any agent or representative of a factory or by any parent or guardian of a child are misdemeanours.

In 1907 a state law was passed prohibiting after the ist of January 1908 the manufacture or sale of intoxicating liquors; nine-tenths of the counties of the state, under local option laws, were already " dry " at the passage of this bill. The law permits druggists to keep for sale no other form of alcoholic drink than pure alcohol; physicians prescribing alcohol must fill out a blank, specifying the patient's ailment, and certifying that alcohol is necessary; the prescription must be filled the day it is dated, must be served directly to the physician or to the patient, must not call for more than a pint, and may not be refilled. 1

The state supports four benevolent institutions: a lunatic

*asylum for the whites and a similar institution for the negroes^*

both at Milledgeville, an institute for the deaf and dumb at

• Cave Spring, and an academy for the blind at Macon. There are

1 Owing to the custom which holds in Georgia of choosing state senators in rotation from each of the counties making up a senatorial district, it happened in 1907 that few cities were represented directly l>y. senators chosen from municipalities. It is believed that this fact contributed to the passage of the prohibition law.

also a number of private charitable institutions, the oldest being the Bethesda orphan asylum, near Savannah, founded by George Whitefield in 1739. The Methodist, Baptist, Roman Catholic and Protestant Episcopal Churches, and the Hebrews of the state also support homes for orphans. A penitentiary was established in 1 8 1 7 at Milledgeville. In 1 866 the lease system was introduced, by which the convicts were leased for a term of years to private individuals. In 1897 this was supplanted by the contract system, by which a prison commission accepted contracts for convict labour, but the prisoners were cared for by state officials. But the contract system for convicts and the peonage system (under which immigrants were held in practical slavery while they " worked out " advances made for passage-money, &c.) were still sources of much injustice. State laws made liable to prosecution for misdemeanour any contract labourer who, having received advances, failed for any but good cause to fulfil the contract; or any contract labourer who made a second

contract without giving notice to his second employer of a prior and unfulfilled contract; or any employer of a labourer who had not completed the term of a prior contract. In September 1908, after an investigation which showed that many wardens had been in the pay of convict lessees and that terrible cruelty had been practised in convict camps, an extra session of the legislature practically put an end to the convict lease or contract system; the act then passed provided that after the 31st of March 1909, the date of expiration of leases in force, no convicts may be leased for- more than twelve months and none may be leased at all unless there are enough convicts to supply all demands for convict labour on roads made by counties, each county to receive its pro rata share on a population basis, and to satisfy all demands made by municipalities which thus secure labour for $100 per annum (per man) paid into the state treasury, and all demands made by the state prison farm and factory established by this law.

Education. — Georgia's system of public instruction was not instituted until 1870, but as early as 1817 the legislature provided a fund for the education in the private schools of the state of children of indigent parents. The constitution of 1868 authorized " a thorough system of general education, to be for ever free to all children of the State," and in 1870 the first public school law was enacted. Education, however, has never been made compulsory. The constitution, as amended in 1905, provides that elections on the question of local school taxes for counties or for school districts may be called upon a petition signed by one-fourth of the qualified voters of the county, or district, in question; under this provision several counties and a large number of school districts are supplementing the general fund. But the principal source of the annual school revenue is a state tax; the fund derived from this tax, however, is not large enough. In 1908 the common school fund approximated $3,786,830, of which amount the state paid $2,163,200 and about $1,010,680 was raised by local taxation. In 1908 69% of the school population (79% of whites; 58% of negroes) were enrolled in the schools; in 1902 it was estimated that the negroes, 52-3 % of whom (10 years of age and over) were illiterates (i.e. could not write or could neither read nor write) in 1900 (81 -6% of them were illiterate in 1880), received the benefit of only, about a fifth of the school fund. Of the total population, 10 years of age and over, 30-5% were illiterates in 1900 — 49-9% were illiterates in 1880 — and as regards the whites of native birth alone, Georgia ranked ninth in illiteracy, in 1900, among the states and territories of the Union. Of the illiterates about four-fifths were negroes in 1900. In addition to the public schools,

the state also supports the University of Georgia; and in 1906 $235,000 was expended for the support of higher educa- tion. In 1 906- 1 907 eleven agricultural and mechanical arts colleges were established, one in each congressional district of the state. Of the colleges of the university, Franklin was the first state college chartered in America (1785); the Medical College of Georgia, at Augusta, was opened in 1829; the State College of Agriculture and Mechanic Arts was established at Athens in 1872; the North Georgia Agricultural College, at

Dahlonega, was opened in 1873; the Georgia School of Tech- nology, at Atlanta, in 1888; the Georgia Normal and Industrial College (for women), in Milledgeville, in 1899; the Georgia State Normal School, at Athens, in 1895; the Georgia State Industrial College for Coloured Youth, near Savannah, in 1890; the School of Pharmacy, at Athens, in 1903; and the School of Forestry, and the Georgia State College of Agriculture, at Athens, in 1906. Affiliated with the university, but not receiving state funds, are three preparatory schools, the South Georgia Military and Agricultural College at Thomasville, the Middle Georgia Military and Agricultural College at Milledgeville, and the West Georgia Agricultural and Mechanical College at Hamilton. Among the institutions generally grouped as denomi- national are — Baptist: Mercer University, at Macon (Penfield, 1837; Macon, 1871), Shorter College (1877) at Rome, Spelman Seminary (1881) in Atlanta for negro women and girls, and Bessie Tift College, formerly Monroe College (1849) for women, at Forsyth; Methodist Episcopal: Emory College (1836), at Oxford, and Wesleyan Female College (1836) at Macon, both largely endowed by George Ingraham Seney (1837-1893), and the latter one of the earliest colleges for women in the country; Methodist Episcopal Church, South: Young Harris College (1855) at Young Harris, Andrew Female College (1854) at Cuthbert, and Dalton Female College (1872) at Dalton; Presby- terian: Agnes Scott College at Decatur; and African Methodist Episcopal: Morris Brown College (1885) at Atlanta. A famous school for negroes is the non-sectarian Atlanta University (incorporated in 1867, opened in 1869), which has trained many negroes for teaching and other professions. Non-sectarian colleges for women are: Lucy Cobb Institute (1858) at Athens, Cox College (1843) a t College Park, near Atlanta, and Brenau College Conservatory (1878) at Gainesville.

Finance, — The assessed value of taxable property in 1910 was about §735,000,000. A general property tax, which furnishes about four-fifths of the public revenue, worked so inequitably that a Board of Equalization was appointed in 1901. By the Constitution the tax rate is limited to $5 on the thousand, and, as the rate of taxation has increased faster than the taxable property, the state has been forced to contract several temporary loans since 1901, none of which has exceeded $200,000, the limit for each year set by the Constitution. On the 1st of January 19 10 the bonded debt was $6,944,000, mainly incurred by the extravagance of the Re- construction administration (see History, below). Each year 8100,000 of this debt is paid off, and there are annual appropriations for the payment of interest (about $303,260 in 19 10). The state owns the Western & Atlantic railway (137 m. long) from Chattanooga, Tennessee, to Atlanta, which has valuable terminal facilities in both cities, and which in 1910 was estimated to be worth $8,400,240 (more than the amount of the bonded debt) ; this railway the state built in 1841-1850, and in 1890 leased for 29 years, at an annual rental of $420,012, to the Nashville, Chattanooga & St Louis railway.

Banking in Georgia is in a prosperous condition. The largest class of depositors are the farmers, who more and more look to the banks for credit, instead of to the merchants and cotton speculators. Hence the number of banks in agricultural districts is increasing. The state treasurer is the bank examiner, and to him all banks must make a quarterly statement and submit their books for examination twice a year. The legal rate of interest is 7 %, but by contract it may be 8 %.

History. — Georgia derives its name from King George II. of Great Britain. It was the last to be established of the English colonies in America. Its formation was due to a desire of the British government to protect South Carolina from invasion by the Spaniards from Florida and by the French from Louisiana, as well as to the desire of James Edward Oglethorpe (q.v.) to found a refuge for the persecuted Protestant sects and the unfortunate but worthy indigent classes of Europe. A charter was granted in 1732 to " the Trustees for establishing the colony of Georgia in America," and parliament gave £10,000 to the enterprise. The first settlement was made at Savannah in 1733 under the personal supervision of Oglethorpe. The early colonists were German Lutherans (Salzburgers), Piedmontese, Scottish Highlanders, Swiss, Portuguese Jews and Englishmen; but the main tide of immigration, from Virginia and the Carolinas, did not set in until 1752. As a bulwark against the Spanish, the colony was successful, but as an economic experiment it was a failure. The trustees desired that there should be grown

in the colony wine grapes, hemp, silk and medical plants (barilla, kali, cubeb, caper, madder, &c.) for which England was dependent upon foreign countries; they required the settlers to plant mulberry trees, and forbade the sale of rum, the chief commercial staple of the colonies. They also forbade the introduction of negro slaves. Land was leased by military tenure, and until 1739 grants were made only in male tail and alienations were forbidden. The industries planned for the colony did not thrive, and as sufficient labour could not be obtained, the importation of slaves was permitted under certain conditions in 1749. About the same time the House of Commons directed the trustees to remove the prohibition on the sale of rum. In 1753 the charter of the trustees expired and Georgia became a royal province.

Under the new regime the colony was so prosperous that Sir James Wright (1716-1785), the last of the royal governors, declared Georgia to be " the most flourishing colony on the continent." The people were led to revolt against the mother country through sympathy with the other colonies rather than through any grievance of their own. The centre of revolutionary ideas was St John's Parish, settled by New Englanders (chiefly from Dorchester, Massachusetts). The Loyalist sentiment was so strong that only five of the twelve parishes sent repre- sentatives to the First Provincial Congress, which met on the 18th of January 1775, and its delegates to the Continental Congress therefore did not claim seats in that assembly. But six months later all the parishes sent representatives to another Provincial Congress which met on the 4th of July 1775. Soon afterward the royal government collapsed and the administration of the colony was assumed by a council of safety.

The war that followed was really a severe civil conflict, the Loyalist and Revolutionary parties being almost equal in numbers. In 1778 the British seized Savannah, which they held until 1782, meanwhile reviving the British civil administra- tion, and in 1779 they captured Augusta and Sunbury; but after 1780 the Revolutionary forces were generally successful. Civil affairs also fell into confusion. In 1777 a state constitution was adopted, but two factions soon appeared in the government, led by the governor and the executive council respectively, and harmony was not secured until 1781.

Georgia's policy in the formation of the United States govern- ment was strongly national. In the constitutional convention of 1787 its delegates almost invariably gave their support to measures designed to strengthen the central government. Georgia was the fourth state to ratify (January 2, 1788), and one of the three that ratified

unanimously, the Federal Constitution. But a series of conflicts between the Federal government and the state government caused a decline of this national sentiment and the growth of States Rights theories.

First of these was the friction involved in the case, before the Supreme Court of the United States', of Chisolm v. Georgia, by which the plaintiff, one Alexander Chisolm, a citizen of South Carolina, secured judgment in 1793 against the state of Georgia (see 2 Dallas Reports 419). In protest, the Georgia House of Representatives, holding that the United States Supreme Court had no constitutional power to try suits against a sovereign state, resolved, that any Federal marshal who should attempt to execute the court's decision would be " guilty of felony, and shall suffer death, without benefit of clergy, by being hanged." No effort was made to execute the decision, and in 1798 the Eleventh Amendment to the Federal Constitution was adopted, taking from Federal courts all jurisdiction over any suit brought " against one of the United States by citizens of another state, or by citizens or subjects of any foreign state."

The position of Congress and of the Supreme Court with reference to Georgia's policy in the Yazoo Frauds also aroused distrust of the Federal government. In 1795 the legislature granted for $500,000 the territory extending from the Alabama and Coosa rivers to the Mississippi river and between 35° end 31 N. lat. (almost all of the present state of Mississippi and more than half of the present state of Alabama) to four land companies, but in the following year a new legislature rescinded the contracts

on the ground that they had been fraudulently and corruptly made, as was probably the case, and the rescindment was em- bodied in the Constitution of 1798., In the meantime the United States Senate had appointed a committee to inquire into Georgia's claim to the land in question, and as this committee pronounced that claim invalid, Congress in 1800 established a Territorial government over the region. The legislature of Georgia remon- strated but expressed a willingness to cede the land to the United States, and in 1802 the cession was ratified, it being stipulated among other things that the United States should pay to the state $1,250,000, and should extinguish " at their own expense, for the use of Georgia, as soon as the same can be peaceably obtained on reasonable terms," the Indian

title to all lands within the state of Georgia. Eight years later the Supreme Court of the United States decided in the case of Fletcher v. Peck (6 Cranch 87) that such a rescindment as that in the new state constitution was illegal, on the ground that a state cannot pass a law impairing the obligation of contracts; and at an expense of more than four millions of dollars the Federal govern- ment ultimately extinguished all claims to the lands.

This decision greatly irritated the political leaders of Georgia, and the question of extinguishing the Indian titles, on which there had long been a disagreement, caused further and even more serious friction between the Federal and state authorities. The National government, until the administration of President Jackson, regarded the Indian tribes as sovereign nations with whom it alone had the power to treat, while Georgia held that the tribes were dependent communities with no other right to the soil than that of tenants at will. In 1785 Georgia made treaties with the Creeks by which those Indians ceded to the state their lands S. and W. of the Altamaha river and E. of the Oconee river, but after a remonstrance of one of their half-breed chiefs Congress decided that the cessions were invalid, and the National government negotiated, in 1790, a new treaty which ceded only the lands E. of the Oconee. The state appealed to the National government to endeavour to secure further cessions, but none had been made when, in 1802, the United States assumed its obligation to extinguish all Indian titles within the state. Several cessions were made between 1802 and 1824, but the state in the latter year remonstrated in vigorous terms against the dilatory manner in which the National government was discharg- ing its obligation, and the effect of this was that in 1825 a treaty was negotiated at Indian Springs by which nearly all the Lower Creeks agreed to exchange their remaining lands in Georgia for equal territory beyond the Mississippi. But President J. Q. Adams, learning that this treaty was not approved by the entire Creek nation, authorized a new one, signed at Washington in 1826, by which the treaty of 1825 was abrogated and the Creeks kept certain lands W. of the Chattahoochee. The Georgia government, under the leadership of Governor George M. Troup (1780-1856), had proceeded to execute the first treaty, and the legislature declared the second treaty illegal and unconstitutional. In reply to a communication of President Adams early in 1827 that the United States would take strong measures to enforce its policy, Governor Troup declared that he felt it his duty to resist to the utmost any military attack which the government of the United States should think proper to make, and ordered the military companies to prepare to resist " any hostile

invasion of the territory of this state." But the strain produced by these conditions was relieved by information that new negotiations had been begun for the cession of all Creek lands in Georgia. These negotiations were completed late in the year.

There was similar conflict in the relation of the United States and Georgia with the Cherokees. In 1785 the Cherokees of Georgia placed themselves under the protection of the Federal government, and in 1823 their chiefs, who were mostly half-breeds, declared: " It is the fixed and unalterable determination of this nation never again to cede one foot more of land," and that they coujd not " recognize the sovereignty of any state within the limits of their territory "; in 1827 they framed a constitution and organized a representative government. President Monroe and President J. Q. Adams treated the Cherokees with the

courtesy due to a sovereign nation, and held that the United States had done all that was required to meet the obligation assumed in 1802. The Georgia legislature, however, contended that the United States had not acted in good faith, declared that all land within the boundaries of the state belonged to Georgia, and in 1828 extended the jurisdiction of Georgia law to the Cherokee lands. Then President Jackson, holding that Georgia was in the right on the Indian question, informed the Cherokees that their only alternative to submission to Georgia was emigra- tion. Thereupon the chiefs resorted to the United States Supreme Court, which in 1832 declared that the Cherokees formed a distinct community " in which the laws of Georgia have no force," and annulled the decision of a Georgia court that had extended its jurisdiction into the Cherokee country {Worcester v. Georgia). But the governor of Georgia declared that the decision was an attempt at usurpation which would meet with determined resistance, and President Jackson refused to enforce the decree. The President did, however, work for the removal of the Indians, which was effected in 1838.

On account of these conflicts a majority of Georgians adopted the principles of the Democratic-Republican party, and early in the 19th century the people were virtually unanimous in their political ideas. Local partisanship centred in two factions: one, led by George M. Troup, which represented the interests of the aristocratic and slave-holding communities; the other, formed by John Clarke (1766-1832) and his brother Elijah, found support among the non-slave-holders and the frontiersmen. The cleavage of these factions was at first purely personal; but by 1832 it had become one of principle. Then the Troup faction under the name of States Rights party, endorsed

the nullification policy of South Carolina, while the Clarke faction, calling itself a Union party, opposed South Carolina's conduct, but on the grounds of expediency rather than of principle. On account, however, of its opposition to President Jackson's attitude toward nullification, the States Rights party affiliated with the new Whig party, which represented the national feeling in the South, while the Union party was merged into the Democratic party, which emphasized the sovereignty of the states.

The activity of Georgia in the slavery controversy was import- ant. As early as 1835 the legislature adopted a resolution which asserted the legality of slavery in the Territories, a principle adopted by Congress in the Kansas Bill in 1854, and in 1847 ex-Governor Wilson Lumpkin (1783-1870) advocated the organization of the Southern states to resist the aggression of the North. Popular opinion at first opposed the Compromise of 1850, and some politicians demanded immediate secession from the Union; and the legislature had approved the Alabama Platform of 1848. But Congressmen Robert Toombs, Alexander H. Stephens, Whigs, and Howell Cobb, a Democrat, upon their return from Washington, contended that the Compromise was a great victory for the South, and in a campaign on this issue secured the election of such delegates to the state convention (at Milledgeville) of 1850 that that body adopted on the 10th of December, by a vote of 237 to 19, a series of conciliatory resolutions, since known as the " Georgia Platform, " which declared in substance: (1) that, although the state did not wholly approve of the Compromise, it would " abide by it as a permanent adjustment of this sectional controversy," to preserve the Union, as the thirteen original colonies had found compromise necessary for its formation; (2) that the state " will and ought to resist, even (as a last resort) to the disruption of every tie that binds her to the Union," any attempt to, prohibit slavery in the Territories or a refusal to admit a slave state. The adoption of this platform was accompanied by a party reorganization, those who approved it organizing the Constitutional Union party, and those who disapproved, mostly Democrats, organizing the Southern Rights party; the approval in other states of the Georgia Platform in preference to the Alabama Platform (see Alabama) caused a reaction in the South against secession. The reaction was followed for a short interval by a return to approximately the former party alignment, but in 1854 the rank

and filof the Whigs joined the American or Know-Nothing party while nost of the Whig leaders went over to the Democrats. The Iiow-Nothing party was nearly destroyed by its crushing defeatin 1856 and in the next year the Democrats by a large majory elected for governor Joseph Emerson Brown (1821- 1894) who by three successive re-elections was continued in that cftce until the close of the Civil War. Although Governor Brow represented the poorer class of white citizens he had takeni course in law at Yale College, had practised law, and at the the of his election was judge of a superior court; although he hd never held slaves he believed that the abolition of slave? would soon result in the ruin of the South, and he was a ma of strong convictions. The Kansas question and the attitile of the North toward the decision in the Dred Scott case ere arousing the South when he was inaugurated the first timeand in his inaugural address he clearly indicated that he woul favour secession in the event of any further encroachment on tb part of the North. In July 1859 Senator Alfred Iverson (179!- 1 8 74) declared that in the event of the election of a Free- Soil resident in i860 he would favour the establishment of an indepndent confederacy; later in the same year Governor Brow expressed himself to a similar effect and urged the improve- meniof the military service. On the 7th of November following the lection of President Lincoln the governor, in a special messge to the legislature, recommended the calling of a con- ventm to decide the question of secession, and Alexander H. Stepens was about the only prominent political leader who contnded that Lincoln's election was insufficient ground for suchaction. On the 17th of November the legislature passed an at directing the governor to order an election of delegates on te 2nd of January 1861 and their meeting in a convention on te 16th. On the 19th this body passed an ordinance of secesion by a vote of 208 to 89. Already the first regiment of Geogia Volunteers, under Colonel Alexander Lawton (1818- 189(1 na(i seized Fort Pulaski at the mouth of the Savannah rive and now Governor Brown proceeded to Augusta and seized the r ederal arsenal there. Toward the close of the same year, howver, Federal warships blockaded Georgia's ports, and early in 362 Federal forces captured Tybee Island, Fort Pulaski, St vlary's, Brunswick and St Simon Island. Georgia had respnded freely to the call for volunteers, but when the Con- federate Congress had passed, in April 1862, the Conscript Law whth required all white men (except those legally exempted fron service) between the ages of 18 and 35 to enter the Confederate service, Governor Brown, in a correspondence witi President Davis which was continued for several months, offffed serious objections, his leading contentions being that the measure was unnecessary as to Georgia, unconstitutional,

subversive of the state's sovereignty, and therefore " at war witi the principles for the support of which Georgia entered inb this revolution."

h 1863 north-west Georgia. was involved in the Chattanooga canpaign. In the following spring Georgia was invaded from Tennessee by a Federal army under General William T. Sherman; thi resistance of General Joseph E. Johnston and General J. B. H(od proved ineffectual; and on the 1st of September Atlanta was taken. Then Sherman began his famous " march to the sea," frcm Atlanta to Savannah, which revealed the weakness of the Confederacy. In the spring of 1865, General J. H. Wilson with a body of cavalry entered the state from Alabama, seized Columbus and West Point on the 16th of April, and on the 10th of May :aptured Jefferson Davis, president of the Confederacy, at Irwinville in Irwin county.

In accord with President Andrew Johnson's plan for reorganiz- ing the Southern States, a provisional governor, James Johnson, was appointed on the 17th of June 1865, and a state convention reformed the constitution to meet the new conditions, rescinding the orcinance of secession, abolishing slavery and formally repudiating the state debt incurred in the prosecution of the war. A gove-nor and legislature were elected in November 1865, the legislature ratified the Thirteenth Amendment on the 9th of December and five days later the governor-elect was inaugurated.

But both the convention and legislature incurred the suspicion and ill-will of Congress; the convention had congratulated the president on his policy, memorialized him on behalf of Jefferson Davis, and provided pensions for disabled Confederate soldiers and the widows of those who had lost their lives during the war, while the legislature passed apprenticeship, labour and vagrancy laws to protect and regulate the negroes, and rejected the Fourteenth Amendment. Although the civil rights were con- ferred upon the freedmen, Congress would not tolerate the political incapacity and social inferiority which the legislature had assigned to them, and therefore Georgia was placed under military government, as part of the third military district, by the Reconstruction Act of the 2nd of March 1867. Under the auspices of the military authorities registration of electors for a new state convention was begun and 95,168 negroes and 96,333 whites were registered. The acceptance of the proposition to call the convention and the election of many conscientious and intelligent delegates were largely due to the influence of ex-Governor Brown, who was strongly convinced that the wisest course for the South was to accept quickly what Congress

had offered. The convention met in Atlanta on the 9th of December 1867 and by March 1868 had revised the constitution to meet the requirements of the Reconstruction Acts. The constitution was duly adopted by popular vote, and elections were held for the choice of a governor and legislature. Rufus Brown Bullock (b. 1834), Republican, was chosen governor, the Senate had a majority of Republicans, but in the House of Representatives a tie vote was cast for the election of a speaker. On the 21st of July the Fourteenth Amendment was ratified, and a section of the state constitution (which denied the power of state courts to entertain against any resident of the state suits founded on contracts existing on the 15th of June 1865) was repealed by the legislature in pursuance of the congressional " Omnibus Bill " of the 25th of June 1868, and as evidence of the restoration of Georgia to the Union the congressmen were seated on the 25th of July in that year.

But in September of the same year the Democrats in the state legislature, being assisted by some of the white Republicans, expelled the 27 negro members and seated their defeated white contestants, relying upon the legal theory that the right to hold office belonged only to those citizens designated by statute, the common law or custom. In retaliation the 41st Congress excluded the state's representatives on a technicality, and, on the theory that the government of Georgia was a pro- visional organization, passed an act requiring the ratification of the Fifteenth Amendment before the admission of Georgia's senators and representatives. The war department now con- cluded that the state was still subject to military authority, and placed General A. H. Terry in command. With his aid, and that of Congressional requirements that all members of the legislature must take the Test Oath and none be excluded on account of colour, a Republican majority was secured for both houses, and the Fifteenth Amendment was ratified. Georgia was now finally admitted to the Union by Act of Congress, on the 15th of July 1870.

The Reconstruction period in Georgia is remarkable for its comparative moderation. Although there was great political excitement, there was not as much extravagance in public administration as there was in other Southern States, the state debt increasing approximately from $6,600,000 to $16,000,000. The explanation lies in the fact that there were comparatively few " carpet-baggers " or adventurers in the state, and that a large number of conservative citizens, under the leadership of ex-Governor Brown, supported the Reconstruction -policy of Congress and joined the Republican party.

The election of 1871 gave the Democrats a majority in the legislature; Governor Bullock, fearing impeachment, resigned, and at a special election James M. Smith was chosen to fill the unexpired term. After that the control of the Democrats was complete. In 1891 the Populist party was organized, but it never succeeded in securing a majority of the votes in the state.

75«

GEORGIA

List of Governors I. Administration of the Trustees.

James Edward Oglethorpe ‘ . . 1732-1743

William Stephens 2 1743-1751

Henry Parker 2 1 751-1753

Patrick Graham 2 …. 1753-1754 II. Royal Administration.

John Reynolds I754—I757

Henry Ellis 1757-1760

Sir James Wright …. 1760-1782

III. Provincial Administration.

William Ewen » …. 1775

*Archibald Bulloch * . 1776*

*Button Gwinnett * . 1777*

Jonathan Bryan 4 …. 1777

IV. Georgia as a State. John A. Treutlen John Houston

John Wereat 6 George Walton . Richard Hawley Stephen Heard 8 Myrick Davies 6 Nathan Brownson John Martin Lyman Hall Samuel Elbert’ . Edward Telfair . George Matthews George Handley George Walton . Edward Telfair . George Matthews Jared Irwin James Jackson .

David Emanuel . Josiah Tattnall . John Milledge .

Jared Irwin

David B. Mitchell

Peter Early

David B. Mitchell

William Rabun ‘

Matthew Talbot 7

John Clarke

George M. Troup

John Forsyth

George R. Gilmer

Wilson Lumpkin

William Schley .

George Gilmer .

Charles J. McDonald

George W. Crawford

George W. B. Towns

Howell Cobb

Herschell V. Johnson

Joseph E. Brown

James Johnson 8

Charles J. Jenkins

Thomas H. Ruger

Rufus B. Bullock

Benjamin Cpnley 7

James M. Smith

Alfred H. Colquitt

Alexander H. Stephens

James S. Boynton 7

Henry D. McDaniel

John B. Gordon

W. J. Northen .

W. Y. Atkinson .

A. D. Candler .

Joseph M. Terrell

Hoke Sm.ith

Joseph M. Brown

Hoke Smith

A brief bibliography

1777-1778

I 778-1 779

1779 1779-1780

1780 1780-1781

1781 1781-1782 1782-1783 1783-1785 1785-1786 1786-1787 1787-1788 1788-1789

1789-1790 Democratic-Republican

1790-1793 1 793-1 796 1 796-1 798 1798-1801

1801 1 801-1802 1802-1806 1 806-1 809 1809-1813 1813-1815 1815-1817 1817-1819

1819 1819-1823 1823-1827 1827-1829

1829-1831 National Republican 1 831-1835 Democratic-Republican Union Democrat Union Whig Democrat

Constitutional Union Democrat

1835-1837 1837-1839 1 839-1 843 1 843-1 847 1847-1851 1851-1853 1 853-1 856 1857-1865

1865

1865-1868

1868

1 868-1 87 1 Republican

1871-1872

1 872-1 876 Democrat

1876-1882

1882-1883 „

1883

1883-1886 „

1 886- 1 890

1890-1894 „

1894-1898 ,,

1898-1902 „

1902-1907 „

1907-1909 „

1909-1911

1911-

chiefly of historical materials, is given by

U. B. Phillips in his monograph "Georgia and State Rights," m vol. ii. of the Annual Report of the American Historical Association for iqoi

(Washington, 1902). Valuable information concerning the resources and products of the state is given in the publications of

1 De facto. ‘ President of the Colony.

- *President of the Council of Safety. ‘ President of Georgia.*
- *First Governor under a State Constitution.*

‘ President Executive Council and de facto Governor. r President of Senate. ” Provisional.

the Department of Agriculture, which include weekly and onthly Bulletins, biennial Reports and a volume entitled Georgia, btoricat and Industrial (Atlanta, 1901). The Reports of the UniteiStates Census (especially the Twelfth Census for 1900 and the speciicensus of manufactures for 1905) should be consulted, and Mevirs of Georgia (2 vols., Atlanta, Ga., 1895) contains chapters on inustrial conditions.

The principal sources for public administration are themnual reports of the state officers, philanthropic institutions, theprison commission and the railroad commission, and the revised ode of Georgia (Atlanta, 1896), adopted in 1895; see a l so L. F. Schecke- bier’s ” Taxation in Georgia” {Johns Hopkins University Studs, vol. xviii.) and ” Banking in Georgia ” (Banker’s Magazine, vol.lviii.). Education and social conditions are treated in C. E. Jones’s Hstoiy of Education in Georgia (Washington, 1890), the Annual Reprts of the School Commissioner, and various magazine articles, sch as ” Georgia Cracker in the Cotton Mill ” (Century Magazine, v<. xix.) and "A Plea for Light " (South Atlantic Quarterly, vol. iii.). The view of slavery given in Frances A. Kemble's Journal of a Rddence on a Georgia Plantationin 1838-1839 (New York, 1863) shouldbcom- pared with R. Q. Mallard's Plantation Life before Emanaation (Richmond, Va., 1897), and with F. L. Olmsted's A Journeyln the Seaboard Slave States (New York, 1856).

The best book for the entire field of Georgia history is Lwton B. Evans’s A Student’s History of Georgia (New York, 1898), text- book for schools. This should be supplemented by C. C. jnes’s Antiquities of the Southern Indians, particularly of the Georgiaˆribes (New York, 1873), for the aborigines; W. B. Stevens’s Histry of Georgia to 1798 (2 vols., Philadelphia, 1 847-1 859) and C. C. Jone jun. , History of Georgia (2 vols., Boston, 1883) for the Colonial and Evolu- tionary periods; C. H. Haskins’s The Yazoo Land Comanies (Washington,

1891); the excellent monograph (mentioned oove) by U. B. Phillips for politics prior to i860; Miss Annie H. ibel's monograph " The History of Events Resulting in Indian Conalida- tion West of the Mississippi," in vol. i. of the Annual Reporbf the American Historical Association for 1906 (Washington, 1908) for a good account of the removal of the Indians from Georgia the judicious monograph by E. C. Woolley, Reconstruction in Gorgia (New York, 1901) ; and I. W. Avery's History of Georgia froni850 to 1881 (New York, 1881), which is marred by prejudice but cotains material of value. The Confederate Records of the State of Georgiwere published at Atlanta in 1909. See also: E. J. Harden's Life ofleorge M. Troup (Savannah, 1840) ; R. M. Johnston and W. H. Browm Life of Alexander H. Stephens (Philadelphia, 1878), and Louis Pend:ton, Life of Alexander H. Stephens (Philadelphia, 1907) ; P. A. Staall's Robert Toombs (New York, 1892); H. Fielder's Life, Time: and Speeches of Joseph E. Brown (Springfield, Mass., 1883) and t. C. Jones, jun., Biographical Sketches of Delegates from Georgia > the Continental Congress (New York, 1891). There is much valiable material, also, in the publications (beginning with 1840) o! the Georgia Historical Society (see the list in vol. ii. of the Report f the American Historical Association for 1905).

GEORGIA, a former kingdom of Transcaucasia, which exited historically for more than 2000 years. Its earliest name was Karthli or Karthveli ; the Persians knew it as Gurjistan, the Romans and Greeks as Iberia, though the latter placed Cohhis also in the west of Georgia. Vrastan is the Armenian nameind Gruzia the Russian. Georgia proper, which included Kathli and Kakhetia, was bounded on the N. by Ossetia and Daghestan, on the S. by the principalities of Erivan and Kars, and on the W. by Guria and Imeretia; but the kingdom also includec at different times Guria, Mingrelia, Abkhasia, Imeretia and Eag- hestan, and extended from the Caucasus range on the N. to the Aras or Araxes on the S. It is now divided between the Russan governments of Tiflis and Kutais, under which headings furtier geographical particulars are given. (See also Caucasia.)

History. — According to traditional accounts, the Georgan (Karthlian), Kakhetian, Lesghian, Mingrelian and other races of Transcaucasia are the descendants of Thargamos, great-grandson of Japheth, son of Noah, though Gen. x. 3 makes Togarmah to be the son of Gomer, who was the son of Japheth. These various races were subsequently known under the general name of Thargamosides. Karthlos, the second son of Thargamos, is the eponymous king of his race, their country being called Karthli after him. Mtskhethos, son of Karthlos, founded the city of Mtskhetha (the modern Mtskhet) and

made it the capital of his kingdom. We come, however, to firmer historic ground when we read that Georgia was conquered by Alexander the Great, or rather by one of his generals. The Macedonian yoke was shaken off by Pharnavaz or Pharnabazus, a prince of the royal race, who ruled from 302 to 237 B.C. All through its history Georgia, being on the outskirts of Armenia and Persia, both of

them more powerful neighbours than itself, was at times more or less closely affected by their destinies. In this way it was sometimes opposed to Rome, sometimes on terms of friendship with Byzantium, according as these were successively friendly or hostile to the Armenians and the Persians. In the end of the 2nd century B.C. the last Pharnavazian prince was dethroned by his own subjects and the crown given to Arsaces, king of Armenia, whose son Arshag, ascending the throne of Georgia in 93 B.C., established there the Arsacid dynasty. This close association with Armenia brought upon the country an invasion (65 B.C.) by the Roman general Pompey, who was then at war with Mithradates, king of Pontus and Armenia; but Pompey did not establish his power permanently over Iberia. A hundred and eighty years later the Emperor Trajan penetrated (a.d. 114) into the heart of the country, and chastised the Georgians; yet his conquest was only a little more permanent than Pompey's. During one of the internecine quarrels, which were not infrequent in Georgia, the throne fell to Mirhan or Mirian (265-342), a son of the Persian king, who had married a daughter of Asphagor, the last sovereign of the Arsacid dynasty.

With Mirian begins the Sassanian dynasty. He and his subjects were converted to Christianity by a nun Nuno (Nino), who had escaped from the religious persecutions of Tiridates, king of Armenia. Mirian erected the first Christian church in Georgia on the site now occupied by the cathedral of Mtskhet. In or about the year 371 Georgia was overrun by the Persian king Shapur or Sapor II., and in 379 a Persian general built the stronghold of Tphilis (afterwards Tiflis) as a counterpoise to Mtskhet. The Persian grasp upon Georgia was loosened by Tiridates, who reigned from 393 to 405. One of Mirian's successors, Vakhtang (446-499), surnamed Gurgaslan or Gurgasal, the Wolf-Lion, established a patriarchate at Mtskhet and made Tphilis his capital. This sovereign, having conquered Mingrelia and Abkhasia, and subdued the Ossetes, made himself master of a large

part of Armenia. Then, co-operating for once with the king of Persia, he led an army into India; but towards the end of his reign there was enmity between him and the Persians, against whom he warred unsuccessfully. His son Dachi or Darchil (499-514) upon ascending the throne transferred the seat of government permanently from Mtskhet to Tphilis (Tiflis). Again Persia stretched out her hand over Georgia, and proved a formidable menace to the existence of the kingdom, until, owing to the severe pressure of the Turks on the one side and of the Byzantine Greeks on the other, she found it expedient to relax her grasp. The Georgians, seizing the opportunity, appealed (571) to the Byzantine emperor, Justin II. who gave them a king in the person of Guaram, a prince of the Bagratid family of Armenia, conferring upon him the title, not of king, but of viceroy. Thus began the dynasty of the Bagratids, who ruled until 1803.

This was not, however, the first time that Byzantine influence had been effectively exercised in Georgia. As early as the reign of Mirian, in the 3rd century, the organizers of the early Georgian church had looked to Byzantium, the leading Christian power in the East, for both instruction and guidance, and the connexion thus begun had been strengthened as time went on. From this period until the Arab (i.e. Mahommedan) invasions began, the authority of Byzantium was supreme in Georgia. Some seventy years after the Bagratids began to rule in Georgia the all-conquering Arabs appeared on the frontiers of the country, and for the next one hundred and eighty years they frequently devastated the land, compelling its inhabitants again and again to accept Islam at the sword's point. But it was not until the death of the Georgian king Ashod (787-826) that they completely subdued the Caucasian state and imposed their will upon it. Nevertheless they were too much occupied elsewhere or too indifferent to its welfare to defend it against alien aggressors, for in 842 Bogha, a Turkish chief, invaded the country, and early in the 10th century the Persians again overran it. But a period of relief from these hostile incursions was afforded by the reign of Bagrat III. (980-1014). During his father's lifetime he had been made king of Abkhasia, his mother belonging to the royal house of that land, and after ascending the Georgian throne he

made his power felt far beyond the frontiers of his hereditary dominions, until his kingdom extended from the Black Sea to the Caspian, while Armenia, Azerbaijan and Kirman all paid him tribute. Not only did he encourage learning and patronize the fine arts, but he built, in 1003, the cathedral at Kutais, one of the finest examples extant of Georgian architecture. During the reign of Bagrat IV. (1027-1072) the Seljuk Turks more than once burst, after 1048,

into the country from Asia Minor, but they were on the whole successfully repulsed, although they plundered Tiflis. During the reign of the next king, George II., they again devastated Tiflis. But once more fortune changed after the accession of David II. (1089-1125), surnamed the Renovator, one of the greatest of Georgian kings. With the help of the Kipchaks, a Mongol or Turkish race, from the steppe lands to the north of the Caucasus, whom he admitted into his country, David drove the Seljuks out of his domains and forced them back over the Armenian mountains. Under George III. (1156-1184), a grandson of David II., Armenia was in part conquered, and Ani, one of its capitals, taken. George's daughter Thamar or Tamara, who succeeded him, reigned over the kingdom as left by David II. and further extended her power over Trebizond, Erzerum, Tovin (in Armenia) and Kars. These successes were continued by her son George IV. (1212-1223), who conquered Ganja (now Elisavetpol) and repulsed the attacks of the Persians; but in the last years of his reign there appeared (1 2 20 and 1222) the people who were to prove the ruin of Georgia, namely the Mongol hosts of Jenghiz Khan, led by his sons. George IV. was succeeded by his sister Rusudan, whose capital was twice captured by the Persians and her kingdom overrun and fearfully devastated by the Mongols in 1 236. Then, after a period of wonderful recovery under George V. (13 18-1346), who conquered Imeretia and reunited it to his crown, Georgia was again twice (1386 and 1393-1394) desolated by the Mongols under Timur (Tamerlane), prince of Samarkand, who on the second occasion laid waste the entire country with fire and sword, and crushed it under his relentless heel until the year 1403. Alexander I. (1413-1442) freed his country from the last of the Mongols, but at the end of his reign divided his territory between his three sons, whom he made sovereigns of Imeretia, Kakhetia and Karthli (Georgia) respectively. The first men- tioned remained a separate state until its annexation to Russia in 18 10; the other two were soon reunited.

Political relations between Russia and Georgia began in the end of the same century, namely in 1492, when the king of Kakhetia sought the protection of Ivan III. during a war between the Turks and the Persians. In the 17th century the two states were brought into still closer relationship. In 1619, when Georgia was harried by Shah Abbas of Persia, Theimuraz (1629-1634), king of Georgia, appealed for help to Michael, the first of the Romanov tsars of Russia, and his example was followed later in the century by the rulers of other petty Tharga- mosid or Caucasian states, namely Imeretia and Guria. In 1638 the prince of Mingrelia took the oath of allegiance to the

Russian tsar, and in 1650 the same step was taken by the prince of Imeretia. Vakhtang VI. of Georgia put himself under the protection of Peter the Great early in the 18th century. When Persia fell into the grip of the Afghans early in the 18th century the Turks seized the opportunity, and, ousting the Persians from Georgia, captured Tiflis and compelled Vakhtang to abdicate. But in 1735 they renounced all claim to supremacy over the Caucasian states. This left Persia with the predominating influence, for though Peter the Great extorted from Persia (1722) her prosperous provinces beside the Caspian, he left the mountaineers to their own dynastic quarrels. Heraclius II. of Georgia declared himself the vassal of Russia in 1 783, and when, twelve years later, he was hard pressed by Agha Mahommed. shah of Persia, who seized Tiflis arid laid it in ruins, he appealed to Russia for help. The appeal was again renewed by the next king of Georgia, George XIII. , in 1798, and in the following year he renounced his crown in favour of the tsar, and in 1801 Georgia was converted into a Russian province. The state of I Guria submitted to Russia in 1829. (J. T. Be.)

GEORGIA

Ethnology. — Of the three main groups into which the Caucasian races are now usually divided, the Georgian is in every respect the most important and interesting. It has accordingly largely occupied the attention of Orientalists almost incessantly from the days of Klaproth. Yet such are the difficulties connected with the origin and mutual relations of the Caucasian peoples that its affinities are still far from being clearly established. Anton von Schiefner and P. V. Uslar, however, arrived at some negative conclusions valuable as starting-points for further research. In their papers, published in the Memoirs of the St Petersburg Imperial Academy of Sciences and elsewhere (1859 et seq.), they finally disposed of the views of Bopp and Brosset (1836), who attempted on linguistic grounds to connect the Georgians with the Indo-European family. They also clearly show that Max Miiller's " Turanian " theory is untenable, and they go a long way towards proving that the Georgian, with all the other Caucasian languages except the Ossetian. forms a distinct linguistic family absolutely independent of all others. This had already been suspected by Klaproth, and the same conclusion was arrived at by Fr. Miiller and Zagarelli.

Uslar's " Caucasian Family " comprises the following three great divisions:

1 . Western Group. Typical races : Circassians and Abkhasians.

2. Eastern Group. Typical races: Chechens and Lesghians.

3. Southern Group. Typical race: Georgians.

Here the term ” family ” must be taken in a far more elastic sense than when applied, for instance, to the Indo-European, Semitic or Eastern Polynesian divisions of mankind. Indeed the three groups present at least as wide divergences as are found to exist between the Semitic and Hamitic linguistic families. Thus, while the Abkhasian of group 1 is still at the agglutinating, the Lesghian of group 2 has fairly reached the inflecting stage, and the Georgian seems still to waver between the two. In consequence of these different stages of development, Uslar hesitated finally to fix the position of Georgian in the family, regarding it as possibly a connecting link between groups 1 and 2, but possibly also radically distinct from both.

Including all its numerous ramifications, the Georgian or southern group occupies the greater part of Transcaucasia, reaching from about the neighbourhood of Batum on the Black Sea eastwards to the Caspian, and merging southwards with the Armenians of Aryan stock. It comprises altogether nine sub- divisions, as in the subjoined table:

1. The Georgians Proper, who are the Iberians of the ancients and the Grusians of the Russians, but who call themselves Karthlians, and who in medieval times were masters of the Rion and Upper Kura as far as its confluence with the Alazan.

2. The Imeretians, west of the Suram mountains as far as the river Tskheniz-Tskhali.

3. The Gurians, between the Rion and Lazistan.

4. The Lazis of Lazistan on the Black Sea.

5. The Svanetians, Shvans or Swanians, on the Upper Ingur and Tskheniz-Tskhali rivers.

6. The MiNGRElians, between the rivers Tskheniz-Tskhali, Rion, Ingur and the Black Sea.

7. The Toshes or Mosoks . -> headstreams of the

8. The Pshavs or Ph CHAVY . W A i a7nr , ar ,j Y ora rivers

9. The Khevsurs J Alazan and Yora nvers –

The representative branch of the race has always been the Karthlians. It is now pretty well established that the Georgians are the descendants of the aborigines of the Pambak highlands, and that they found their way to their present homes from the south-east some four or five thousand years ago, possibly under pressure from the great waves of Aryan migration flowing from the Iranian tableland westwards to Asia Minor and Europe. The Georgians proper are limited on the east by the Alazan, on the north by the Caucasus, on the west by the Meskes hills/ separating them from the Imeretians, and on the south by the Kura river and Kara-dagh and Pambak mountains. South- wards, however, no hard and fast ethnical line can be drawn, for even immediately south of Tiflis, Georgians, Armenians and Tatars are found intermingled confusedly together.

The Georgian race, which represents the oldest elements of civilization in the Caucasus, is distinguished by some excellent

mental qualities, and is especially noted for personal courage and a passionate love of music. The people, however, are described as fierce and cruel, and addicted to intemperance, though Max von Thielmann (Journey in the Caucasus, &c, 1875) speaks of them as " rather hard drinkers than drunkards." Physically they are a fine athletic race of pure Caucasian type; hence during the Moslem ascendancy Georgia supplied, next to Cir- cassia, the largest number of female slaves for the Turkish harems and of recruits for the Osmanli armies, more especially for the select corps of the famous

Mamelukes.

The social organization rested on a highly aristocratic basis, and the lowest classes were separated by several grades of vassalage from the highest. But since their incorporation with the Russian empire, these relations have become greatly modified, and a more sharply defined middle class of merchants, traders and artisans has been developed. The power of life and death, formerly claimed and freely exercised by the nobles over their serfs, has also been expressly abolished. The Georgians are altogether at present in a fairly well-to-do condition, and under Russian administration they have become industrious, and have made considerable moral and material progress.

Missionaries sent by Constantine the Great introduced Chris- tianity about the beginning of the 4th century. Since that time the people have, notwithstanding severe pressure from sur- rounding Mahommedan communities, remained faithful to the principles of Christianity, and are still amongst the most devoted adherents of the Orthodox Greek Church. Indeed it was their attachment to the national religion that caused them to call in the aid of the Christian Muscovites against the proselytizing attempts of the Shiite Persians — a step which ultimately brought about their political extinction.

As already stated, the Karthli language is not only funda- mentally distinct from the Indo-European linguistic family, but cannot be shown to possess any clearly ascertained affinities with either of the two northern Caucasian groups. It resembles them chiefly in its phonetic system, so that according to Rosen (Sprache der Lazen) all the languages of central and western Caucasus might be adequately rendered by the Georgian alphabet. Though certainly not so harsh as the Avar, Lesghian and other Daghestan languages, it is very far from being euphonious, and the frequent recurrence of such sounds as ts, ds, thz, kh, khh, gh (Arab. f-) > q (Arab. .S), for all of which there are distinct

characters, renders its articulation rather more energetic and rugged than is agreeable to ears accustomed to the softer tones of the Iranian and western Indo-European tongues. It presents great facilities for composition, the laws of which are very regular. Its peculiar morphology, standing midway between agglutination and true inflexion, is well illustrated by its simple declension common to noun, adjective and pronoun, and its more intricate verbal conjugation, with its personal endings, seven tenses and incorporation of pronominal subject and object, all showing decided progress towards the inflecting structure of the Indo-European and

Semitic tongues.

Georgian is written in a native alphabet obviously based on the Armenian, and like it attributed to St Mesropius (Mesrop), who flourished in the 5th century. Of this alphabet there are two forms, differing so greatly in outline and even in the number of the letters that they might almost be regarded as two distinct alphabetic systems. The first and oldest, used exclusively in the Bible and liturgical works, is the square or monumental Khutsuri, i.e. "sacerdotal," consisting of 38 letters, and approach- ing the Armenian in appearance. The second is the Mkhedruli kheli, i.e. " soldier's hand," used in ordinary writing, and consisting of 40 letters, neatly shaped and full of curves, hence at first sight not unlike the modern Burmese form of the Pali. .

Of the Karthli language there are several varieties; and, besides those comprised in the above table, mention should be made of the Kakhetian current in the historic province of Kakhetia. A distinction is sometimes drawn between the Karthlians proper and the Kakhetians, but it rests on a purely political basis, having originated with the parti tionin 1424 of the ancient Iberian

estates into the three new kingdoms of Karthlinia, Kakhetia and Imeretia. On the other hand, both the Laz of Lazistan and the Svanetian present such serious structural and verbal differences from the common type that they seem to stand rather in the relation of sister tongues than of dialects to the Georgian proper. All derive obviously from a common source, but have been developed independently of each other. The Tush or Mosok appears to be fundamentally a Kistinian or Chechen idiom affected by Georgian influences.

The Bible is said to have been translated into Georgian as early as the 5th century. The extant version, however, dates only from the 8th century, and is attributed to St Euthymius. But even so, it is far the most ancient work known to exist in the language. Next in importance is, perhaps, the curious poem entitled The Amours of Turiel and Nestan Darejan, or The man clothed in the panther's skin, attributed to Rustevel, who lived during the prosperous reign of Queen Thamar (nth century). Other noteworthy compositions are the national epics of the Baramiani and the Rostomiani, and the prose

romances of Visramiani and Darejaniani, the former by Sarg of Thmogvi, the latter by Mosi of Khoni. Apart from these, the great bulk of Georgian literature consists of ecclesiastical writings, hymns sacred and profane, national codes and chronicles.

Bibliography. — The standard authority on the history is M. F. Brosset's translation of the Georgian chronicles under the title of Histoire de la Gcorgie (5 vols., St Petersburg, 1849-1858) ; but compare also Khakanov, Histoire de Georgie (Paris, 1900). See further A. Leist, Das georgische Volk (Dresden, 1903); M. de Villeneuve, La Georgie (Paris, 1870); O. Wardrop, Tlie Kingdom of Georgia (London, 1888); and Langlois, Numismatique georgienne (Paris, i860). For the philology see Zagarelli, Examen de la lilterature relative & la grammaire georgienne (1873); Friedrich Miiller, Grundriss der Sprachwissenschaft (1887), iii. 2; Leist, Georgische Dichter (1887); Erskert, Sprachen des kaukasischen Stammes (1895). For other points as to anthropology, Michel Smirnow's paper in Revue d' anthropologic (April 15, 1878) ; Chantre, Recherches anthropologiques dans le Caucase (1883-1887); and Erckert, Der Kaukasus und seine Volker (1887).

GEORGIAN BAY, the N.E. section of Lake Huron, separated from it by Manitoulin Island and the peninsula comprising the counties of Grey and Bruce, Ontario. It is about 100 m. long and 50 m. wide, and is said to contain 30,000 islands. It receives numerous rivers draining a large extent of country; of these the chief are the French river draining Lake Nipissing, the Maganatawan draining a number of small lakes, the Muskoka draining the Muskoka chain of lakes (Muskoka, Rosseau, Joseph, &c.) and the Severn draining Lake Simcoe. Into its southern extremity, known as Nottawasaga Bay, flows the river of the same name. The Trent valley canal connects Georgian Bay with the Bay of Quinte and Lake Ontario, and a canal system has long been projected to Montreal by way of the French and Ottawa rivers and Lake Nipissing.

GEORGSWALDE, a town of Bohemia, Austria, 115 m. N.E. of Prague by rail. Pop. (1900) 8131, including Neu-Georgswalde, Wiesenthal and Philippsdorf, which form together a single commune. Georgswalde is one of the oldest industrial places of Bohemia, and together with the neighbouring town of Rum- burg is the principal centre of the linen industry. The village of Philippsdorf, now incorporated with Georgswalde, has become since 1866 a famous place of pilgrimage, owing to the miracles attributed to an image of the Virgin, placed now in a magnificent new church (1885).

GEPHYREA, the name used for several groups of worm-like animals with certain resemblances but of doubtful affinity. In the article " Annelida " in the 9th edition of this Encyclopaedia, W. C. Mcintosh followed the accepted view in associating in this group the Echiuridae, Sipunculidae and Priapulidae. E. Ray Lankester, in the preface to the English translation of C- Gegenbaur's Comparative Anatomy (1878), added the Phoro- nidae to these forms. Afterwards the same author (article " Zoology," Ency. Brit., 9th ed.) recognized that the Phoronidae had other affinities, and placed the other " gephyreans " in association with the Polyzoa as the two classes of a phylum Podaxonia. In the present state of knowledge the old group Gephyrea is broken up into Echiuroidea (q.v.) or Gephyrea

armata, which are certainly Annelids; the Sipunculoidea (q.v.) or Gephyrea achaeta, an independent group, certainly coelomate, but of doubtful affinity; the Priapuloidea (q.v.), equally of doubtful affinity; and the Phoronidea (q.v.), which are almost certainly Hemichordata.

GERA, a town of Germany, capital of the principality of Reuss-Schleiz (called also Reuss younger line), situated in a valley on the banks of the White Elster, 45 m. S.S.W. of Leipzig on the railway to Probstzella. Pop. (1885) 34,152; (1905) 47,455. It has been mostly rebuilt since a great fire in 1 780. and the streets are in general wide and straight, and contain many handsome houses. There are three Evangelical churches and one Roman Catholic. Among other noteworthy buildings are the handsome town-hall (1576, afterwards restored) and the theatre (1902). Its educational establishments include a gymnasium, a commercial and a weaving school. The castle of Osterstein, the residence of the princes of Reuss, dates from the 9th century, but has been almost entirely rebuilt in modern times. Gera is noted for its industrial activity. Its industries include wool-weaving and spinning, dyeing, iron-founding, the manufacture of cotton and silk goods, machinery, sewing machines and machine oil, leather and tobacco, and printing (books and maps) and flower gardening.

Gera (in ancient chronicles Geraha) was raised to the rank of a town in the nth century, at which time it belonged to the counts of Groitch. In the 1 2th century it came into the posses- sion of the lords of Reuss. It was stormed and sacked by the Bohemians in 1450, was two-thirds burned down by the Swedes in 1639 during the Thirty Years' War, and suffered afterwards from great conflagrations in 1686 and 1780, being in the latter year almost completely destroyed.

GERALDTON, a town in the district of Victoria, West Australia, on Champion Bay, 306 m. by rail N.W. of Perth. Pop. (1901) 2593. It is the seat of a Roman Catholic bishop, an important seaport carrying on a considerable trade with the surrounding gold-fields and agricultural districts, the centre of a considerable railway system and an increasingly popular seaside resort. The harbour is safe and extensive, having a pier affording accommodation for large steamers. The chief exports are gold, copper, lead, wool and sandalwood.

GERANDO, MARIE JOSEPH DE (1772-1842), French philosopher, was born at Lyons on the 29th of February 1772. When the city was besieged in 1793 by the armies of the Republic, de Gerando took up arms, was made prisoner and with difficulty escaped with his life. He took refuge in Switzerland, whence he afterwards fled to Naples. In 1796 the establishment of the Directory allowed him to return to France. At the age of twenty- five he enlisted as a private in a cavalry regiment. About this time the Institute proposed as a subject for an essay this question, — " What is the influence of symbols on the faculty of thought ? " De Gerando gained the prize, and heard of his success after the battle of Zurich, in which he had distinguished himself. This literary triumph was the first step in his upward career. In 1799 he was attached to the ministry of the interior by Lucien Bonaparte; in 1804 he became general secretary under Cham- pagny; in 1805 he accompanied Napoleon into Italy; in 1808 he was nominated master of requests; in 181 1 he received the title of councillor of state; and in the following year he was appointed governor of Catalonia. On the overthrow of the empire, de Gerando was allowed to retain this office; but having been sent during the hundred days into the department of the Moselle to organize the defence of that district, he was punished at the second Restoration by a few months of neglect. Ha was soon after, however, readmitted into the council of state, , where he distinguished himself by the prudence and conciliatory tendency of his views. In 1819 he opened at the law-school of Paris a class of public and administrative law, which in 1822 was suppressed by government, but was reopened six years later under the Martignac ministry. In 1837 he was made a baron. He died at Paris on the 9th of November 1842.

De Gerando's best-known work is his Histoire comparie des systemes de philosophic relativement aux principes des connais- sances humaines (Paris, 1804, 3 vols.). The germ of this work

had already appeared in the author's Mimoire de la gSnSration des connaissances humaines (Berlin, 1802), which was crowned by the Academy of Berlin. In it de Gerando, after a rapid review of ancient and modern speculations on the origin of our ideas, singles out the theory of primary ideas, which he endeavours to combat under all its forms. The latter half of the work, devoted to the analysis of the intellectual faculties, is intended to show how all human knowledge is the result of experience; and reflection is assumed as the source of our ideas of substance, of unity and of identity. It is divided into two parts, the first of which is purely historical, and devoted to an exposition of various philosophical systems; in the second, which comprises fourteen chapters of the entire work, the distinctive characters and value of these systems are compared and discussed. In spite of the disadvantage that it is impossible to separate advantageously the history and critical examination of any doctrine in the arbitrary manner which de Gerando chose, the work has great merits. In correctness of detail and comprehensive- ness of view it was greatly superior to every work of the same kind that had hitherto appeared in France. During the Empire and the first years of the Restoration, de Gerando found time to prepare a second edition (Paris, 1822, 4 vols.), which is enriched with so many additions that it may pass for an entirely new work. The last chapter of the part published during the author's lifetime ends with the revival of letters and the philosophy of the 1 5th century. The second part, carrying the work down to the close of the 18th century, was published posthumously by his son in 4 vols. (Paris, 1847) • Twenty-three chapters of this were left complete by the author in manuscript; the remaining three were supplied from other sources, chiefly printed but unpublished memoirs.

His essay Du perfectionnement moral etde I 'education de soi-mlme was crowned by the French Academy in 1825. The fundamental idea of this work is that human life is in reality only a great education, of which perfection is the aim.

Besides the works already mentioned, de G6rando left many others, of which we may indicate the following: — Considerations sur diverses mithodes a" observation des peuples sauvages (Paris, 1801); Eioge de Dumarsais, — discours qui a remporte le prix propose par la seconde classe de VInstitut National (Paris, 1805) ; Le Visiteur de pauvre (Paris, 1820); Instituts du droit administratis (4 vols., Paris, 1830); Cours normal des instituteurs primaires ou directions relatives d Veducation physique, morale, et intellectuelle dans les ecoles primaires (Paris, 1832); De Veducation des sourds-muets (2 vols., Paris, 1832); De la bienfaisance publique (4 vols., 1838). A

detailed analysis of the Histoire comparee des systemes will be found in the Fragments philosophiques of M. Cousin. In connexion with his psychological studies, it is interesting that in 1884 the French Anthropological Society reproduced his instructions for the obser- vation of primitive peoples, and modern students of the beginnings of speech in children and the cases of deaf-mutes have found useful matter in his works. See also J. P. Damiron, Essai sur la philosophic en France au XIX" siecle.

GERANIACEAE, in botany, a small but very widely distributed natural order of Dicotyledons belonging to the subclass Poly- petalae, containing about 360 species in n genera. It is re- presented in Britain by two genera, Geranium (crane's-bill) and Erodium (stork's-bill), to which belong nearly two-thirds of the total number of species. The plants are mostly herbs, rarely becoming shrubby, with generally simple glandular hairs on the stem and leaves. The opposite or alternate leaves have a pair of small stipules at the base of the stalk and a palminerved blade. The flowers, which are generally arranged in a cymose inflorescence, are hermaphrodite, hypogynous, and, except in Pelargonium regular. The parts are arranged in fives. There are five free sepals, overlapping in the bud, and, alternating with these, five free petals. In Pelargonium the flower is zygomorphic with a spurred posterior sepal and the petals differing in size or shape. In Geranium the stamens are obdiplostemonous, i.e. an outer whorl of five opposite the petals alternates with an inner whorl of five opposite the sepals; at the base of each of the antisepalous stamens is a honey-gland. In Erodium the members of the outer whorl are reduced to scale-like structures (staminodes), and in Pelargonium from two to seven only are fertile. There is no satisfactory explanation of this break in

the regular alternation of successive whorls; the outer whorl of stamens arises in course of development before the inner, so that there is no question of subsequent displacement. There are five, or sometimes fewer, carpels, which unite to form an ovary with as many chambers, in each of which are one or two, rarely more, pendulous anatropous ovules, attached to the central column in such a way that the micropyle points outwards and the raphe is turned towards the placenta. The long beak-like style divides at the top into a corresponding number of slender stigmas.

The larger-flowered species of Geranium are markedly protan- drous, the outer stamens, inner stamens and stigmas becoming functional in succession. For instance, in meadow crane's-bill G. pratense, each whorl of stamens ripens in turn, becoming erect and shedding their

pollen; as the anthers wither the fila- ments bend outwards, and when all the anthers have diverged the stigmas become mature and ready for pollination. By this

Meadow Crane's-bill, Geranium pratense. (After Curtis, Flora Londinensis.)

1, Flower after removal of petals. 3, Floral diagram, the dots

2, Fruit after splitting. 1 and 2 opposite the inner stamens

about natural size. represent honey-glands.

arrangement self-pollination is prevented and cross-pollination ensured by the visits of bees which come for the honey secreted by the glands at the base of the inner stamens.

In species with smaller and less conspicuous flowers, such as G. molle, the flowers of which are only \ to J in. in diameter, self-pollination is rendered possible, since the divisions of the stigma begin to separate before the outer stamens have shed all their pollen; the nearness of the stigmas to the dehiscing anthers favours self-pollination.

In the ripe- fruit the carpels separate into five one-seeded portions {cocci), which break away from the central column, either rolling elastically outwards and upwards or becoming spirally twisted. In most species of Geranium the cocci split open on the inside and the seeds are shot out by the elastic uptwisting (fig. 1); in Erodium and Pelargonium each coccus remains closed, and the long twisted upper portion separates from the central column, forming an awn, the distribution of which is favoured by the presence of bristles or hairs. The embryo generally fills the seed, and the cotyledons are rolled or 1 folded on each other.

GERANIUM

763

Geranium is the most widely distributed genus; it has 160 species and is spread over all temperate regions with a few species in the tropics. Three British species — G. sylvaticum, G. pralense and G. Robertianum (herb-Robert) — reach the arctic zone, while G. patagonicum and G. magellanicum are found in the antarctic. Erodium contains 50 species (three are British), most of which are confined to the Mediterranean region and west Asia, though others

occur in America, in South Africa and West Australia. Pelargonium, with 175 species, has its centre in South Africa; the well-known garden and green- house " geraniums " are species of Pelargonium (see Geranium). GERANIUM, the name of a genus of plants, which is taken by botanists as the type of the natural order Geraniaceae. The name, as a scientific appellation, has a much more restricted application than when taken in its popular sense. Formerly the genus Geranium was almost conterminous with the order Geraniaceae. Then as now the geranium was very popular as a garden plant, and the species included in the original genus became widely known under that name, which has more or less clung to them ever sin.ce, in spite of scientific changes which have removed the larger number of them to the genus Pelar- gonium. This result has been probably brought about in some degree by an error of the nurserymen, who seem in many cases to have acted on the conclusion that the group commonly known as Scarlet Geraniums were really geraniums and not pelargoniums, and were in consequence inserted under the former name in their trade catalogues. In fact it may be said that, from a popular point of view, the pelargoniums of the botanist are still better known as geraniums than are the geraniums themselves, but the term " zonal Pelargonium " is gradually making its way amongst the masses.

The species of Geranium consist mostly of herbs, of annual or perennial duration, dispersed throughout the temperate regions of the world. They number about 160, and- bear a considerable family resemblance. The leaves are for the most part palmately- lobed, and the flowers are regular, consisting of five sepals, five imbricating petals, alternating with five glandules at their base, ten stamens and a beaked ovary. Eleven species are natives of the British Isles and are popularly known as crane's-bill. G. Robertianum is herb-Robert, a common plant in hedgebanks. G. sanguineum, with flowers a deep rose colour, is often grown in borders, as are also the double-flowered varieties of G. pralense. Many others of exotic origin form handsome border plants in our gardens of hardy perennials; amongst these G. armenum, G. Endressi, G. ibericum and its variety platypetalum are con- spicuous.

From these regular-flowered herbs, with which they had been mixed up by the earlier botanists, the French botanist L'Heritier in 1787 separated those plants which have since borne the name of Pelargonium, and which, though agreeing with them in. certain points of structure, differ in others which are admitted to be of generic value. One obvious distinction of Pelargonium is that the flowers are irregular, the two petals which stand uppermost being

different^Iarger, smaller or differently marked — from the other three, which latter are occasionally wanting. This difference of irregularity the modern florist has done very much to annul, for the increased size given to the flowers by high breeding has usually been accompanied by the enlargement of the smaller petals, so that a very near approach to regularity has been in some cases attained. Another well-marked difference, however, remains in Pelargonium: the back or dorsal sepal has a hollow spur, which spur is adnate, i.e. joined for its whole length with the flower-stalk; while in Geranium there is no spur. This peculiarity is best seen by cutting clean through the flower-stalk just behind the flower, when in Pelargonium there will be seen the hollow tube of the spur, which in the case of Geranium will not be found, but the stalk will appear as a solid mass. There are other characters which support those already pointed out, such as the absence of the glandules, and the declination of the stamens; but the features already described offer the most ready and obvious distinctions.

To recapitulate, the geraniums properly so-called are regular-flowered herbs with the flower-stalks solid, while many geraniums falsely so-called in popular language are really pelargoniums, and may be distinguished by their irregular flowers and hollow flower-stalks. In a great majority of cases too, the pelargoniums so commonly met with in greenhouses and summer parterres are of shrubby or sub-shrubby habit.

The various races of pelargoniums have sprung from the intermixture of some of the species obtained from the Cape. The older show-flowered varieties have been gradually acquired through a long series of years. The fancy varieties, as well as the French spotted varieties and the market type, have been evolved from them. The zonal or bedding race, on the other hand, has been more recently perfected; they are supposed to have arisen from hybrids between Pelargonium inquinans and P. zonale. In all the sections the varieties are of a highly ornamental character, but for general cultivation the market type is preferable for indoor purposes, while the zonals are effective either in the greenhouse or flower garden. Some of the Cape species are still in cultivation — the leaves of many of them being beautifully subdivided, almost fern-like in character, and some of them are deliciously scented; P. quercifolium is the oak-leaf geranium. The ivy-leaf geranium, derived from P. peltalum, has given rise to ah important class of both double- and single-flowered forms adapted especially for pot culture, hanging baskets, window boxes and the greenhouse. Of late years the ivy-leaf " geraniums " have been crossed with the " zonals," and a new race is being gradually evolved

from these two distinct groups.

The best soil for pelargoniums is a mellow fibrous loam with good well-rotted stable manure or leaf-mould in about the pro- portion of one-fifth; when used it should not be sifted, but pulled to pieces by the hand, and as much sand should be added as will allow the wate.r to pass freely through it. The large- flowered and fancy kinds cannot bear so much water as most soft-wooded plants, and the latter should have a rather lighter soil.

All the pelargoniums are readily increased by cuttings made from the shoots when the plants are headed down after flowering, or in the spring, when they will root freely in a temperature of 65 to 70 . They must not be kept too close, and must be very moderately watered. When rooted they may be moved into well-drained 3-in. pots, and when from 6 to 8 in. high, should have the points pinched out in order to induce them to push out several shoots nearer the base. These shoots are, when long enough, to be trained in a horizontal direction; and when the> have made three joints they should have the points again pinched out. These early-struck plants will be ready for shifting into 6-in. pots by the autumn, and should still be trained outwards. The show varieties after flowering .should be set out of doors in a sunny spot to ripen their wood, and should only get water enough to keep them from flagging. In the course of two or three weeks they will be ready to cut back within two joints of where these were last stopped, when they should be placed in a frame or pit, and kept close and dry until they have broken. When they have pushed an inch or so, turn them out of their pots, shake off the old soil, trim the straggling roots, and repot them firmly in smaller pots if practicable; keep them near the light, and as the shoots grow continue to train them outwardly. They require to be kept in a light house, and to be set well up to the glass; the night temperature should range about 45°; and air should be given on all mild days, but no cold currents allowed, nor more water than is necessary to keep the soil from getting parched. The young shoots should be topped about the end of October, and when they have grown an inch or two beyond this, they may be shifted into 7-in. pots for flowering. The shoots must be kept tied out so as to be fully exposed to the light. If required to flower early they should not be stopped again; if not until June they may be stopped in February.

The zonal varieties, which are almost continuous bloomers, are of much value as decorative subjects; they seldom require much pruning after the first stopping. For winter flowering,

young plants should be raised from cuttings about March, and grown on during the summer, but should not be allowed to flower. When blossoms are required, they should be placed close up to the glass in a light house with a temperature of 65°, only just as much water being given as will keep them growing. For bedding purposes the zonal varieties are best struck towards the middle of August in the open air, taken up and potted or planted in boxes as soon as struck, and preserved in frames or in the greenhouse during winter.

The fancy varieties root best early in spring from the half- ripened shoots; they are slower growers, and rather more delicate in constitution than the zonal varieties, and very im- patient of excess of water at the root.

GERARD (d. 1108), archbishop of York under Henry I., began his career as a chancery clerk in the service of William Rufus. He was one of the two royal envoys who, in 1095, persuaded Urban II. to send a legate and Anselm's pallium to England. Although the legate disappointed the king's expectations, Gerard was rewarded for his services with the see of Hereford (1096). On the death of Rufus he at once declared for Henry I., by whom he was nominated to the see of York. He made diffi- culties when required to give Anselm the usual profession of obedience; and it was perhaps to assert the importance of his see that he took the king's side on the question of investitures. He pleaded Henry's cause at Rome with great ability, and claimed that he had obtained a promise, on the pope's part, to condone the existing practice of lay investiture. But this statement was contradicted by Paschal, and Gerard incurred the suspicion of perjury. About 1103 he wrote or inspired a series of tracts which defended the king's prerogative and attacked the oecumeni- cal pretensions of the papacy with great freedom of language. He changed sides in 1105, becoming a stanch friend and sup- porter of Anselm. Gerard was a man of considerable learning and ability; but the chroniclers accuse Jiim of being lax in his morals, an astrologer and a worshipper of the devil.

See the Tractatus Eboracenses edited by H. Bochmer in Libelli de lite Sacerdotii el Imperii, vol. iii. (in the Monumenta hist. Germaniae, quarto series), and the same author's Kirche und Staat in England und in der Normandie (Leipzig, 1899). (H. W. C. D.)

GERARD (c. 1040-1120), variously surnamed Tum, Tunc, Tenque or Thom, founder of the order of the knights of St John of Jerusalem (q.v.), was born at Amain about the year 1040. According to other accounts Martigues in Provence was his birthplace, while one authority even names the Chateau d' Avesnes in Hainaut. Either as a soldier or a merchant, he found his way to Jerusalem, where a hospice had for some time existed for the convenience of those who wished to visit the holy places. Of this institution Gerard became guardian or provost at a date not later than 11 00; and here he organized that religious order of St John which received papal recognition from Paschal II. in 1 1 13, by a bull which was renewed and confirmed by Calixtus II. shortly before the death of Gerard in n 20.

GERARD OF CREMONA (c. 1114-1187), the medieval trans- lator of Ptolemy's Astronomy, was born at Cremona, Lombardy, in or about 11 14. Dissatisfied with the meagre philosophies of his Italian teachers, he went to Toledo to study in Spanish Moslem schools, then so famous as depositories and interpreters of ancient wisdom; and, having thus acquired a knowledge of the Arabic language, he appears to have devoted the remainder of his life to the business of making Latin translations from its literature. The date of his return to his native town is uncertain, but he is known to have died there in n 87. His most celebrated work is the Latin version by which alone Ptolemy's Almagest was known to Europe until the discovery of the original MeyaXr; 2wTa£is. In addition to this, he translated various othep treatises, to the number, it is said, of sixty-six; among these ' were the Tables of " Arzakhel," or Al Zarkala of Toledo, Al Farabi On the Sciences (De scientiis), Euclid's Geometry, Al Farghani's Elements of Astronomy, and treatises on algebra, arithmetic and astrology. In the last-named latitudes are reckoned from Cremona and Toledo. Some of the works, how- ever, with which he has been credited (including the Theoria

or Theorica planetarum, and the versions of Avicenna's Canon of Medicine — the basis of the numerous subsequent Latin editions of that well-known work — and of the Almansorius of Abu Bakr Razi) are probably due to a later Gerard, of the 13th century, also called Cremonensis but more precisely de Sabloneta (Sabbionetta). This writer undertook the task of interpreting to the Latin world some of the best work of Arabic physicians, and his translation of Avicenna is said to have been made by order of the emperor Frederic II.

See' Pipini, " Cronica," in Muratori, Script, rer. Hal. vol. ix. ; Nicol. Antonio, Bibliotheca Hispana vetus, vol. ii.; Tiraboschi, Storia della

letleratura lialiana, vols. iii. (333) and iv. ; Arisi, Cremona lilerata; Jourdain, Recherches sur . . . Vorigine des traductions latines d'Aristote; Chasles, Apercu hislorique des melhodes en geometrie, and in Comptes rendus de V Academic des Sciences, vol. xiii. p. 506; J. T. Reinaud, Geographie dAboulfeda, introduction, vol. 1. pp. ccxlvi.-ccxlviii. ; Boncompagni, Delia vita e delle opere di Gherardo Cremonese e di Gherardo da Sabbionetta (Rome , 1 85 1) . M uch of the work of both the Gerards remains in manuscript, as in Paris, National Library, MSS. Lat. 7400, 7421 ; MSS. Suppl. Lat. 49 ; Rome, Vatican library, 4083, and Ottobon, 1826; Oxford, Bodleian library, Digby, 47, 61. The Vatican MS. 2392 is stated to contain a eulogy of " Gerard of Cremona " and a list of " his." translations, apparently confusing the two scholars. The former's most valuable work was in astronomy ; the latter's in medicine. (C. R. B.)

GERARD, ETIENNE MAURICE, Count (1773-1852), French general, was born at Damvilliers (Meuse), on the 4th of April 1773. He joined a battalion of volunteers in 1791, and served in the campaigns of 1 792-1 793 under Generals Dumouriez and Jourdan. In 1795 he accompanied Bernadotte as aide-de-camp. In 1799 he was promoted chef d'escadron, and in 1800 colonel. He distinguished himself at the battles of Austerlitz and Jena, and was made general of brigade in November 1806, and for his conduct in the battle of Wagram he was created a baron. In the Spanish campaign of 1810 and 181 1 he gained special dis- tinction at the battle of Fuentes d'Onor ; and in the expedition to Russia he was present at Smolensk and Valutina, and displayed such bravery and ability in the battle of Borodino that he was made general .of division. He won further distinction in the disastrous retreat from Moscow. In the campaign of 18 13, in command of a division, he took part in the battles of Liitzen and Bautzen and the operations of Marshal Macdonald, and at the battle of Leipzig (in which he commanded the XL corps) he was dangerously wounded. After the battle of Bautzen he was created by Napoleon a count of the empire. In the campaign of France of 1814, and especially at La Rothiere and Montereau, he won still greater distinction. After the first restoration he was named by Louis XVIII. grand cross of the Legion of Honour and chevalier of St Louis. In the Hundred Days Napoleon made Gerard a peer of France and placed him in command of the IV. corps of the Army of the North. In this capacity Gerard took a brilliant part in the battle of Ligny (see Waterloo Campaign), and on the morning of the 18th of June he was foremost in advis- ing Marshal Grouchy to march to the sound of the guns. Gerard retired to Brussels after the fall of Napoleon, and did not return to France till 1817. He sat as a member of the chamber of

deputies in 1822-1824, and was re-elected in 1827. He took part in the revolution of 1830, after which he was appointed minister of war and named a marshal of France. On account of his health he resigned the office of war minister in the October following, but in 1831 he took the command of the northern army, and was successful in thirteen days in driving the army of Holland out of Belgium. In 1832 he commanded the besieging army in the famous scientific siege of the citadel of Antwerp. He was again chosen war minister in July 1834, but resigned in the October following. In 1836 he was named grand chancellor of the Legion of Honour in succession to Marshal Mortier, and in 1838 commander of the National Guards of the Seine, an office which he held till 1842. He became a senator under the empire in 1852, and died on the 17th of April in the same year.

GERARD, FRANCOIS, Baron (1770-1837), French painter, was born on the 4th of May 1770, at Rome, where his father occupied a post in the house of the French ambassador. At the age of twelve Gerard obtained admission into the Pension du Roi at Paris. From the Pension he passed to the studio of

Pajou (sculptor), which he left at the end of two years for that of the painter Brenet, whom he quitted almost immediately to place himself under David. In 1789 he competed for the Prix de Rome, which was carried off by his comrade Girodet. In the following year (1790) he again presented himself, but the death of his father prevented the completion of his work, and obliged him to accompany his mother to Rome. In 1791 he returned to Paris; but his poverty was so great that he was forced to forgo his studies in favour of employment which should bring in immediate profit. David at once availed himself of his help, and one of that master's most celebrated pictures — Le Pelletier de St Fargeau — may owe much to the hand of Gerard. This painting was executed early in 1793, the year in which Gerard, at the request of David, was named a member of the revolu- tionary tribunal, from the fatal decisions of which he, however, invariably absented himself. In 1 794 he obtained the first prize in a competition, the subject of which was " The Tenth of August," and, further stimulated by the successes of his rival and friend Girodet in the Salons of 1793 and 1794, Gerard (nobly aided by Isabey the miniaturist) produced in 1795 his famous " Belis- aire." In 1796 a portrait of his generous friend (in the Louvre) obtained undisputed success, and the money received from Isabey for these two works enabled Gerard to execute

in 1797 his "Psyche et 1 'Amour. " At last, in 1799, his portrait of Madame Bonaparte established his position as one of the first portrait-painters of the day. In 1808 as many as eight, in 1810 no less than fourteen portraits by him, were exhibited at the Salon, and these figures afford only an indication of the enormous numbers which he executed yearly; all the leading figures of the empire and of the restoration, all the most celebrated men and women of Europe, sat to Gerard. This extraordinary vogue was due partly to the charm of his manner and conversa- tion, for his salon was as much frequented as his studio; Madame de Stael, Canning, Talleyrand, the duke of Wellington, have all borne witness to the attraction of his society. Rich and famous, Gerard was stung by remorse for earlier ambitions abandoned ; at intervals he had indeed striven to prove his strength with Girodet and other rivals, and his " Bataille d'Austerlitz " (1810) showed a breadth of invention and style which are even more conspicuous in " L'Entree d'Henri IV " (Versailles) — the work with which in 18 17 he did homage to the Bourbons. After this date Gerard declined, watching with impotent grief the progress of the Romantic school. Loaded with honours — baron of the empire, member of the Institute, officer of the legion of honour, first painter to the king — he worked on sad and discouraged; the revolution of 1830 added to his disquiet; and on the nth of January 1837, after three days of fever, he died. By his portraits Gerard is best remembered; the colour of his paintings has suffered, but his drawings show in uninjured delicacy the purity of his line; and those of women are specially remarkable for a virginal simplicity and frankness of expression.

M. Ch. Lenormant published in 1846 Essai de biographic et de critique sur Francois Gerard, a second edition of which appeared in 1847 ; and M. Delecluze devoted several pages to the same subject in his work Louis David, son ecole et son temps.

GERARD, JEAN IGNACE ISIDORE (1803-1847), French caricaturist, generally known by the pseudonym of Grandville — the professional name of his grandparents, who were actors — was born at Nancy on the 13th of September 1803. He received his first instruction in drawing from his father, a miniature painter, and at the age of twenty-one came to Paris, where he soon afterwards published a collection of lithographs entitled Les Tribulations de la petite propriety. He followed this by Les Plaisirs de louldge and La Sibylle des salons; but the work which first established his fame was Metamorphoses du jour, published in 1828, a series of seventy scenes in which individuals" with the bodies of men and faces of animals are made to play a human comedy. These drawings are remarkable

for the extra- ordinary skill with which human characteristics are represented in animal features. The success of this work led to his being engaged as artistic contributor to various periodicals, such as La Silhouette, L' Artiste, La Caricature, Le Charivari; and his political caricatures, which were characterized by marvellous fertility of

satirical humour, soon came to enjoy a general popularity. Besides supplying illustrations for various standard works, such as the songs of Beranger, the fables of La Fontaine, Don Quixote, Gulliver's Travels, Robinson Crusoe, he also continued the issue of various lithographic collections, among which may be mentioned La Vie privee et publique des animaux, Les Cent Proverbes, L' Autre Monde and Les Flews animees. Though the designs of GeYard are occasionally unnatural and absurd, they usually display keen analysis of character and marvellous inventive ingenuity, and his humour is always tempered and refined by delicacy of sentiment and a vein of sober thoughtful- ness. He died of mental disease on the 17th of March 1847.

A short notice of Gerard, under the name of Grandville, is contained in Theophile Gautier's Portraits contemporains. See also Charles Blanc, Grandville (Paris, 1855).

GERARD, JOHN (1545-1612), English herbalist and surgeon, was born towards the end of 1545 at Nantwich in Cheshire. He was educated at Wisterson, or Willaston, 2 m. from Nantwich, and eventually, after spending some time in travelling, took up his abode in London, where he exercised his profession. For more than twenty years he also acted as superintendent of the gardens in London and at Theobalds, in Hertfordshire, of William Cecil, Lord Burghley. In 1596 he published a catalogue of plants cultivated in his own garden in Holborn, London, 1039 in number, inclusive of varieties of the same species. Their English as well as their Latin names are given in a revised edition of the catalogue issued in 1599. In 1597 appeared Gerard's well-known Herball, described by him in its preface as " the first fruits of these mine own labours," but more truly an adaptation of the Stirpium historiae pemptades of Rembert Dodoens (1518-1585), published in 1583, or rather of a translation of the whole or part of the same by Dr Priest, with M. Lobel's arrangement. Of the numerous illustrations of the Herball sixteen appear to be original, the remainder are mostly impressions from the wood blocks employed by Jacob Theodorus Tabernaemontanus in his Icones stirpium, published at Frankfort in 1590. A second edition of the Herball, with considerable improvements and additions, was brought

out by Thomas Johnson in 1633, and reprinted in 1636. Gerard was elected a member of the court of assistants of the barber-surgeons in 1595, by which company he was appointed an examiner in 1598, junior warden in 1605, and master in 1608. He died in February 16 12, and was buried at St Andrews, Holborn.

See Johnson's preface to his edition of the Herball; and A Catalogue of Plants cultivated in the Garden of John Gerard in the years 1596-1599, edited with Notes, References to Gerard's Herball, the Addition of modern Names, and a Life of the Author, by Benjamin Daydon Jackson, F.L.S., privately printed (London, 1876, 4to).

GERARDMER, a town of north-eastern France, in the depart- ment of Vosges, 2,3 m. E.S.E. of Epinal by rail. Pop. (1906) of the town, 3993; of the commune, 10,041. Gerardmer is beautifully situated at a height of 2200 ft. at the eastern end of the small Lake of Gerardmer (285 acres in extent) among forest-clad mountains. It is the chief summer-resort of the French Vosges and is a centre for excursions, among which may be mentioned those to the Hohneck (4481 ft.), the second highest summit in the Vosges, the Schlucht, the mountain pass from France to Germany, and, nearer the town, the picturesque defile of Granges, watered by the Vologne, which at one point forms the cascade known as the Saut des Cuves. The town itself, in which the chief object of interest is the huge lime-tree in the market-place, carries on cloth-weaving, bleaching, wood- sawing and the manufacture of wooden goods; there is trade in the cheeses (geromis) manufactured in the neighbourhood. Gerardmer is said to owe its name to Gerard of Alsace, 1st duke of Lorraine, who in the nth century built a tower on the bank of the lake or mer, near which, in 1285, a new town was founded.

GERASA (mod. Gerash or Jerash), a city of Palestine, and a member of the league known as the Decapolis (q.v.), situated amid the mountains of Gilead, about 1757 ft. above the sea, 20 m. from the Jordan and 21 m. N. of Philadelphia. Of its origin nothing is known; it has been suggested that it represents the biblical Ramoth Gilead. From Josephus we learn that it

was captured by Alexander Jannaeus (c. 83 B.C.), rebuilt by the Romans (c. a.d. 65), burned by the Jews in revenge for the massacre at Caesarea, and again plundered and depopulated by Annius, the

general of Vespasian; but, in spite of these disasters, it was still in the 2nd and 3rd centuries of the Christian era one of the wealthiest and most flourishing cities of Palestine. It was a centre of Greek civilization, devoted especially to the worship of Artemis, and producing famous teachers, of whom Stephen the Byzantine mentions Ariston, Kerykos and Plato. As late as 1 1 21 the soldiers of Baldwin II. found it defended by a castle built by a king of Damascus; but at the beginning of the following century the Arabian geographer Yaqut speaks of it as deserted and overthrown. The ruins of Jerash, discovered about 1806, and since then frequently visited and described, still attest the splendour of the Roman city. They are distributed along both banks of the Kerwan, a brook which flows south through the Wadi-ed-Der to join the Zerka or Jabbok; but all the principal buildings are situated on the level ground to the right of the stream. The town walls, which can still be traced and indeed are partly standing, had a circuit of not more than 2 m., and the main street was less than half a mile in length; but remains of buildings on the road for fully a mile beyond the south gate, show that the town had outgrown the limit of its fortifications. The most striking feature of the ruins is the pro- fusion of columns, no fewer than 230 being even now in position; the main street is a continuous colonnade, a large part of which is still entire, and it terminates to the south in a forum of similar formation. Among the public buildings still recognizable are a theatre capable of accommodating 6060 spectators, a naumachia (circus for naval combats) and several temples, of which the largest was probably the grandest structure in the city, possessing a portico of Corinthian pillars 38 ft. high. The desolation of the city is probably due to earthquake; and the absence of Moslem erections or restorations seems to show that the disaster took place before the Mahommedan period.

The town is now occupied by a colony of Circassians, whose houses have been built with materials from the earlier buildings, and there has been much destruction of the interesting ruins. " The country of the Gerasenes " (Matt. viii. 28 and parallels; other readings, Gadarenes, Gergesenes) must be looked for in another quarter — on the E. coast of the Sea of Galilee, probably in the neighbourhood of the modern Khersa (C. W. Wilson in Recovery of Jerusalem, p. 369). (R. A. S. M.)

GERAULT-RICHARD, ALFRED LEON (i860-), French journalist and politician, was born at Bonnetable in the depart- ment of Sarthe, of a peasant family. He began life as a working upholsterer, first at Mans, then at Paris (1880), where his peasant and socialist songs soon won him fame in the Montmartre quarter. Lissagaray, the

communist, offered him a position on La Balaille, and he became a regular contributor to the advanced journals, especially to La Petite Ripublique, of which he became editor-in- chief in 1897. In 1893 he founded Le Chambard, and was im- prisoned for a year (1894) on account of a personal attack upon the president, Casimir-Perier. In January 1895 ne was elected to the chamber as a Socialist for the thirteenth arrondissement of Paris. He was defeated at the elections of 1898 at Paris, but was re-elected in 1902 and in 1906 by the colony of Guadeloupe.

GERBER, ERNST LUDWIG (1746-1819), German musician, author of a famous dictionary of musicians, was born at Sonders- hausen in the principality of Schwarzburg-Sondershausen on the 29th of September 1746. His father, Henry Nicolas Gerber (1702-1775), a pupil of J. S. Bach, was an organist and composer of some distinction, and under his direction Ernst Ludwig at an early age ha'd made great progress in his musical studies. In 1765 he went to Leipzig to study law, but the claims of music, which had gained additional strength from his acquaintanceship with J. A. Hiller, soon came to occupy almost his sole attention. On his return to Sondershausen he was appointed music teacher to the children of the prince, and in 1775 he succeeded his father as court organist. Afterwards he devoted much of his time to the study of the literature and history of music, and with this

view he made himself master of several modern languages. His Historisch-biographisches Lexikon der Tonkiinstler appeared in 1790 and 1792 in two volumes; and the first volume of what was virtually an improved and corrected edition of this work was published in 1810 under the title Nev.es historisch-bio- graphisches Lexikon der Tonkiinstler, followed by other three volumes in 1812, 1813 and 1814. Gerber also contributed a number of papers to musical periodicals, and published several minor musical compositions. He died at Sondershausen on the 30th of June 1819.

GERBERON, GABRIEL (1628-1711), French Jansenist monk, was born on the 12th of August 1628 at St Calais, in the depart- ment of Sarthe. At the age of twenty he took the vows of the Benedictine order at the abbey of Ste Melaine, Rennes, and after- wards taught rhetoric and philosophy in several monasteries. His open advocacy of Jansenist opinions, however, caused his superiors to relegate him to the most obscure houses of the order, and finally to keep him under surveillance at the abbey of St Germain-des-Pres at Paris. Here he wrote a defence of the doctrine of the Real Presence against the Calvinists in the form of an apology for Rupert, abbot of Deutz

{Apologia pro Ruperto abbate Tuitensi, Paris, 1669). In 1676 he published at Brussels, under the name of " Sieur Flore de Ste Foi " his Miroir de la pitte chretienne, an enlarged edition of which appeared at Liege in the following year. This was condemned by certain arch- bishops and. theologians as the repetition of the five condemned propositions of Jansen, and Gerberon defended it, under the name of " Abbe Valentin " in Le Miroir sans tache (Paris, 1680). He had by this time aroused against him the full fury of the Jesuits, and at their instigation a royal provost was sent to Corbie to arrest him. He had, however, just time to escape, and fled to the Low Countries, where he lived in various towns. He was invited by the Jansenist clergy to Holland, where he wrote another controversial work against the Protestants: Defense de VEglise Romain contre la calomnie des Protestants (Cologne, 1688-1691). This produced unpleasantness with the Reformed clergy, and feeling himself no longer safe he returned to Brussels. In 1700 he published his history of Jansenism (Histoire generate du Jansenisme) , a dry work, by which, however, he is best remembered. He adhered firmly to the Augustinian doctrine of Predestination, and on the 30th of May 1703 he was arrested at Brussels at the instance of the archbishop of Malines, and ordered to subscribe the condemnation of the five sentences of Jansen. On his refusal, he was handed over to his superiors and imprisoned in the citadel of Amiens and afterwards at Vincennes. Every sort of pressure was brought to bear upon him to make his submission, and at last, broken in health and spirit, he consented to sign a formula which the cardinal de Noailles claimed as a recantation. Upon this he was released in 1 7 10. The first use he made of his freedom was to write a work (which, however, his friends prudently prevented him from publishing) , Le Vaine Triomphe du cardinal de Noailles, containing a virtual withdrawal of the compulsory recantation. He died at the abbey of St Denis on the 29th of March 1711.

GERBERT, MARTIN (1 720-1 793), German theologian, historian and writer on music, belonged to the noble family of Gerbert von Hornau, and was born at Horb on the Neckar, Wiirttemberg, on the 12th (or nth or 13th) of August 1720. He was educated at Freiburg in the Breisgau, at Klingenau in Switzerland and at the Benedictine abbey of St Blasien in the Black Forest, where in 1737 he took the vows. In 1744 he was ordained priest, and immediately afterwards appointed professor, first of philosophy and later of theology. Between 1754 and 1764 he published a series of theological treatises, their main tendency being to modify the rigid scholastic system by an appeal to the Fathers, notably Augustine; from 1759 to

1762 he travelled in Germany, Italy and France, mainly with a view to examining the collections of documents in the various monastic libraries. In 1764 he was elected prince-abbot of St Blasien, and proved himself a model ruler both as abbot and prince. His examination of archives during his travels had awakened in him a taste for historical research, and under his rule St

Blasien became a notable centre of the methodical study of history; it was here that Marquard Herrgott wrote his Monu- menta domus Austriacae, of which the first two volumes were edited, for the second edition, by Gerbert, who also published a Codex epistolaris Rudolphi I., Romani regis (1772) and De Rudolpho Suevico comite de Rhinfelden, duce et rege, deque ejus familia (1785). It was, however, in sacramental theology, liturgiology, and notably ecclesiastical music that Gerbert was mainly interested. In 1774 he published two volumes De cantu et musica sacra; in 1777, Monumenta veteris liturgiae Alemannicae; and in 1784, in three volumes, Scriplores ecclesiastici de musica sacra, a collection of the principal writers on church music from the 3rd century till the invention of printing. The materials for this work he had gathered during his travels, and although it contains many textual errors, its publication has been of great importance for the history of music, by preserving writings which might either have perished or remained unknown. His interest in music led to his acquaintance with the composer Gluck, who became his intimate friend.

As a prince of the Empire Gerbert was devoted to the interests of the house of Austria; as a Benedictine abbot he was opposed to Joseph II. 's church policy. In the Febronian controversy (see Febronianism) he had early taken a mediating attitude, and it was largely due to his influence that Bishop Hontheim had been induced to retract his extreme views.

In 1768 the abbey of St Blasien, with the library and church, was burnt to the ground, and the splendid new church which rose on the ruins of the old (1783) remained until its destruction by fire in 1874, at once a monument of Gerbert's taste in archi- tecture and of his Habsburg sympathies. It was at his request that it was made the mausoleum of all the Austrian princes buried outside Austria, whose remains were solemnly transferred to its vaults. In connexion with its consecration he published his Historia Nigrae Silvae, ordinis S.

Benedicti coloniae (3 vols., St Blasien, 1783). ■

Gerbert, who was beloved and respected by Catholics and Protestants alike, died on the 3rd of May 1793.

See Joseph Bader, Das ehemalige Kloster St Blasien und seine Gelehrlenakademie (Freiburg-im-Breisgau, 1874), which contains a chronological list of Gerbert's works.

GERBIL, or Gerbille, the nanfe of a group of small, elegant, large-eyed, jumping rodents typified by the North African Gerbillus aegyptiacus (or gerbillus), and forming a special sub- family, Gerbillinae, of the rat tribe or Muridae. They are found over the desert districts of both Asia and Africa, and are classed in the genera Gerbillus (or Talera), Pachyuromys, Meriones, Psammomys and Rhombomys, with further divisions into sub- genera. They have elongated hind-limbs and long hairy tails; and progress by leaps, in the same manner as jerboas, from which they differ in having five hind-toes. The cheek-teeth have trans- verse plates of enamel on the crowns; the number of such plates diminishing from three in the first tooth to one or one and a half in the third. The upper incisor teeth are generally marked by grooves. Gerbils are inhabitants of open sandy plains, where they dwell in burrows furnished with numerous exits, and con- taining large grass-lined chambers. The Indian G. indicus produces at least a dozen young at a birth. All are more or less completely nocturnal.

GERENUK, the Somali name of a long-necked aberrant gazelle, commonly known as . Waller's gazelle (Lithocranius walleri), and ranging from Somaliland to Kilimanjaro. The long neck and limbs, coupled with peculiarities in the structure of the skull, entitle the gerenuk, which is a large species, to represent a genus. The horns of the bucks are heavy, and have a peculiar forward curvature at the tips; the colour of the coat is red-fawn, with a broad brown band down the back. Gerenuk are browsing ruminants, and, in Somaliland, are found in small family-parties, and feed more by browsing on the branches and leaves of trees and shrubs than by grazing. Frequently they raise themselves by standing on their hind-legs with the fore-feet resting against the trunk of the tree on which they are feeding. Their usual pace is an awkward trot, not unlike that of a camel; and they seldom

break into a gallop. The Somali form has been separated as L. sclatert, but is not more than a local race. (See Antelope.)

GER60VIA (mod. Gergovie), in ancient geography, the chief town of the Arverni, situated on a hill in the Auvergne, about 8 m. from the Puy de D6me, France. Julius Caesar attacked it in 52 B.C., but was beaten off; some walls and earthworks seem still to survive from this period. Later, when Gaul had been subdued, the place was dismantled and its Gaulish inhabitants resettled 4 m. away in the plain at the new Roman city of Augustonemetum (mod. Clermont-Ferrand).

GERHARD, FRIEDRICH WILHELM EDUARD (1795-1867), German archaeologist, was born at Posen on the 29th of November 1795, and was educated at Breslau and Berlin. The reputation he acquired by his Lectiones Apollonianae (1816) led soon afterwards to his being appointed professor at the gymnasium of Posen. On resigning that office in 1819, on account of weakness of the eyes, he went in 1822 to Rome, where he remained for fifteen years. He contributed to Platner's Beschreibung der Stadt Rom, then under the direction of Bunsen, and was one of the principal originators and during his residence in Italy director of the Instituto di corrispondenza archeologica, founded at Rome in 1828. Returning to Germany in 1837 he was appointed archaeologist at the Royal Museum of Berlin, and in 1844 was chosen a member of the Academy of Sciences, and a pro- fessor in the university. He died at B erlin on the 1 2 th of May 1 86 7 .

Besides a large number of archaeological papers in periodicals, in the Annali of the Institute of Rome, and in the Transactions of the Berlin Academy, and several illustrated catalogues of Greek, Roman and other antiquities in the Berlin, Naples and Vatican Museums, Gerhard was the author of the following works: Antike Bildwerke (Stuttgart, 1827-1844); Auserlesene griech. Vasenbilder (1839-1858); Etruskische Spiegel (1839-1865); Hyperboreisch-rom. Studien (vol. i., 1833; vol. ii., 1852); Prodromus mytholog. KunsterMarung (Stutt- gart and Tubingen, 1828) ; and Griech. Mythologie (1854-1855). His Gesammelte akademische Abhandlungen und Heine Schriften were published posthumously in 2 vols., Berlin, 1867.

GERHARD, JOHANN (1582-1637), Lutheran divine, was born in Quedlinburg on the 17 th of October 1582. In his fifteenth year, during a dangerous illness, he came under the personal influence of Johann Arndt, author of Das wahre Christenthum, and resolved to study for the church. He entered the university of Wittenberg in 1599, and first studied philosophy. He also attended lectures in theology, but, a relative having persuaded him to change his subject,

he studied medicine for two years. In 1603, however, he resumed his theological reading at Jena, and in the following year received a new impulse from J. W. Winckelmann (1551-1626) and Balthasar Mentzer (1565-1627) at Marburg. Having graduated and begun to give lectures at Jena in 1605, he in 1606 accepted the invitation of John Casimir, duke of Coburg, to the superintendency of Heldburg and master- ship of the gymnasium; soon afterwards he became general superintendent of the duchy, in which capacity he was engaged in the practical work of ecclesiastical organization until 161 6, when he became theological professor at Jena, where the re- mainder of his life was spent. Here, with Johann Major and Johann Himmel, he formed the " Trias Johannea." Though still comparatively young, Gerhard had already come to be regarded as the greatest living theologian of Protestant Germany; in the numerous " disputations " of the period he was always protagonist, while on all public and domestic questions touching on religion or morals his advice was widely sought. It is recorded that during the course of his lifetime he had received repeated calls to almost every universityin Germany {e.g. Giessen, Altdorf, Helmstadt, Jena, Wittenberg), as well as to Upsala in Sweden. He died in Jena on the 20th of August 1637.

His writings are numerous, alike in exegetical, polemical, dog- matic and practical theology. To the first category belong the Commenlarius in harmoniam hisloriae evangelicae de passione Chrisli (i6i7),_ the Comment, super priorem D. Petri epistolam (1641), and also his commentaries on Genesis (1637) and on Deuteronomy (1658). Of a controversial character are the Confessio Catholica (1633-1637), an extensive work which seeks to prove the evangelical and catholic character of the doctrine of the Augsburg Confession from the writings of approved Roman Catholic authors; and the Loci communes theologici (1610-1622), his principal contribution to science, in which Lutheranism is expounded " nervose, solide.

et copiose," in fact with a fulness of learning, a force of logic and a minuteness of detail that had never before been approached. The Meditationes sacrae (1606), a work expressly devoted to the uses of Christian edification, has been frequently reprinted in Latin and has been translated into most of the European languages, including Greek. The English translation by R. Winterton (1631) has passed

through at least nineteen editions. There is also an edition by W. Papillon in English blank verse (1801). His life, Vita J oh. Gerhardi, was published by E. R. Fischer in 1723, and by C. J. Bottcher, Das Leben Dr Johann Gerhards, in 1858. See also W. Gass, Geschichte der protestantischen Dogmatik (1854-1867), and the article in the Allgemeine deutsche Biographic

GERHARDT, CHARLES FREDERIC (1816-1856), French chemist, was born at Strassburg on the 21st of August 1816. After attending the gymnasium at Strassburg and the polytechnic at Karlsruhe, he was sent to the school of commerce at Leipzig, where he studied chemistry tinder Otto Erdmann. Returning home in 1834 he entered his father's white lead factory, but soon found that business was not to his liking, and after a sharp disagreement with his father enlisted in a cavalry regiment. In a few months military life became equally distasteful, and he purchased his discharge with the assistance of Liebig, with whom, after a short interval at Dresden, he went to study at Giessen in 1836. But his stay at Giessen was also short, and in 1837 he re-entered the factory. Again, however, he quarrelled with his father, and in 1838 went to Paris with introductions from Liebig. There he attended Jean Baptiste Dumas' lectures and worked with Auguste Cahours (18 13-1891) on essential oils, especially cumin, in Michel Eugene Chevreul's laboratory, while he earned a precarious living by teaching and making translations of some of Liebig's writings. In 1841, by the influence of Dumas, he was charged with the duties of the chair of chemistry at the Montpellier faculty of sciences, becoming titular professor in 1844. In 1842 he annoyed his friends in Paris by the matter and manner of a paper on the classification of organic compounds, and in 1845 he and his opinions were the subject of an attack by Liebig, unjustifiable in its personalities but not altogether surprising in view of his wayward disregard of his patron's advice. The two were reconciled in 1830, but his faculty for disagreeing with his friends did not make it easier for him to get another appointment after resigning the chair at Montpellier in 1851, especially as he was unwilling to go into the provinces. He obtained leave of absence from Montpellier in 1848 and from that year till 1855 resided in Paris. During that period he established an " ficole de chimie pratique " of which he had great hopes; but these were disappointed, and in 1855, after refusing the offer of a chair of chemistry at the new Zurich Polytechnic in 1854, he accepted the professorships of chemistry at the Faculty of Sciences and the Ecole Polytechnique at Strassburg, where he died on the 19th of August in the following year. Although Gerhardt did some noteworthy experimental work — for instance, his preparation of

acid anhydrides in 1852 — his contributions to chemistry consist not so much in the dis- covery of new facts as in the introduction of new ideas that vitalized and organized an inert accumulation of old facts. In particular, with his fellow-worker Auguste Laurent (1807- 1853), he did much to reform the methods of chemical formula- tion by insisting on the distinction between atoms, molecules and equivalents; and in his unitary system, directly opposed to the dualistic doctrines of Berzelius, he combined Dumas' substitution theory with the old radicle theory and greatly extended the notion of types of structure. His chief works were Pricis de chimie organique (1844-1845), and Traitf de chimie organique (1853-1856).

See Charles Gerhardt, sa vie, son

GERHARDT, PAUL (c. 1606-1676), German hymn-writej, was born of a good middle-class family at Grafenljainichen, a small town on the railway between Halle and Wittenberg, in 1606 or 1607 — some authorities, indeed, give the date March 12, 1607, but neither the year nor the day is accurately known. His education appears to have been retarded by the troubles of the period, the Thirty Years' War having begun about the time he reached his twelfth year. After completing his studies for the church he is known to have lived for some years at

Berlin as tutor in the family of an advocate named Berthold, whose daughter he subsequently married, on receiving his first ecclesiastical appointment at Mittelwald (a small town in the neighbourhood of Berlin) in 1651. In 1657 he accepted an invitation as " diaconus " to the Nicolaikirche of Berlin; but, in consequence of his uncompromising Lutheranism in refusing to accept the elector Frederick William's " syncretistic " edict of 1664, he was deprived in 1666. Though absolved from submission and restored to office early in the following year, on the petition of the citizens, his conscience did not allow him to retain a post which, as it appeared to him, could only be held on condition of at least a tacit repudiation of the Formula Concordiae, and for upwards of a year he lived in Berlin without fixed employ- ment. In 1668 he was appointed archdeacon of Lubben in the duchy of Saxe-Merseburg, where, after a somewhat sombre ministry of eight years, he died on the 7th of June 1676. Gerhardt is the greatest hymn-writer of Germany, if not indeed of Europe. Many of his best-known hymns were originally published in various church hymn-books, as for example in that for Branden- burg, which appeared in 1658; others first saw the light in Johann Criiger's Geistliche Kirchenmelodien (1649) an(i Praxis pietatis melica (1656). The first complete set of them is the Geistliche

Andachten, published in 1666-1667 by Ebeling, music director in Berlin. No hymn by Gerhardt of a later date than 1667 is known to exist.

The life of Gerhardt has been written by Roth (1829), by Langbecker (1841), by Schultz (1842), by Wildenhahn (1845) and by Bachmann (1863) ; also by Kraft in Ersch u. Gruber's Allg. Encycl. (1855). The best modern edition of the hymns, published by Wackernagel in 1843, has often been reprinted. There is an English translation by Kelly (Paul Gerhardt 's Spiritual Songs, 1867).

GERICAULT, JEAN LOUIS ANDRE THEODORE (1791-1824), French painter, the leader of the French realistic school, was born at Rouen in 1791. In 1808 he entered the studio of Charles Vernet, from which, in 1810, he passed to that of Guerin, whom he drove to despair by his passion for Rubens, and by the un- orthodox manner in which he persisted in interpreting nature. At the Salon of 181 2 Gericault attracted attention by his "Officier de Chasseurs a Cheval " (Louvre), a work in which he personified the cavalry in its hour of triumph, and turned to account the solid training received from Guerin in rendering a picturesque point of view which was in itself a protest against the cherished convictions of the pseudo-classical school. Two years later (1814) he re-exhibited this work accompanied with the reverse picture " Cuirassier blesse " (Louvre), and in both subjects called attention to the interest of contemporary aspects of life, treated neglected types of living form, and exhibited that mastery of and delight in the horse which was a feature of his character. Disconcerted by the tempest of contradictory opinion which arose over these two pictures, Gericault gave way to his enthusiasm for horses and soldiers, and enrolled himself in the mousquetaires. During the Hundred Days he followed the king to Bethune, but, on his regiment being disbanded, eagerly returned to his profession, left France for Italy in 1816, and at Rome nobly illustrated his favourite animal by his great painting " Course des Chevaux Libres." Returning to Paris, Gericault exhibited at the Salon of 1819 the " Radeau de la M6duse " (Louvre), a subject which not only enabled him to prove his zealous and scientific study of the human form, but contained those elements of the heroic and pathetic, as existing in situations of modern life, to which he had appealed in his earliest productions. Easily depressed or elated, Gericault took to heart the hostility which this work excited, and passed nearly two years in London, where the " Radeau " was exhibited with success, and where he executed many series of admirable lithographs now rare. At the close of 1822 he was again in Paris, and produced a great quantity of projects for vast

compositions, models in wax, and a horse ecorche, as preliminary to the produc- tion of an equestrian statue. His health was now completely undermined by various kinds of excess, and on the 26th of January 1824 he died, at the age of thirty-three.

Gericault's biography, accompanied by a catalogue raisonne of his works, was published by M. C. Clement in 1868.

GERIZIM, a mountain in the hill-country of Samaria, 2849 ft- above the sea-level, and enclosing, with its companion Ebal, the valley in which lies the town of Nablus (Shechem). It is the holy place of the community of the Samaritans, who hold that it was the scene of the sacrifice of Isaac — a tradition accepted by Dean Stanley but no other western writers of importance. Here, on the formal entrance of the Israelites into the possession of the Promised Land, were pronounced the blessings connected with a faithful observance of the law (Josh. viii. 33, 34; cf. Deut. xi. 29, 30, xxvii. 12-26), the six tribes, Simeon, Levi, Judah, Issachar, Joseph and Benjamin, standing here for the purpose while the remaining tribes stood on Ebal to accept the curses attached to specific violations thereof. Gerizim was probably chosen as the mount of blessing as being on the right hand, the fortunate side, of a spectator facing east. The counter- suggestion of Eusebius and Jerome that the Ebal and Gerizim associated with this solemnity were not the Shechem mountains at all, but two small hills near Jericho, is no longer considered important. From this mountain Jotham spoke his parable to the elders of Shechem (Judg. ix. 7). Manasseh, the son of the Jewish high-priest in the days of Nehemiah, married the daughter of Sanballat and, about 432 B.C., erected on this mountain a temple for the Samaritans; it was destroyed by Hyrcanus about 300 years afterwards. Its site is a small level plateau a little under the summit of the mountain. Close to this is the place where the Passover is still annually celebrated in exact accordance with the rites prescribed in the Pentateuch. On the summit of the mountain, which commands a view embracing the greater part of Palestine, are a small Moslem shrine and the ruins of a castle probably dating from Justinian's time. There was an octagonal Byzantine church here, but the foundations alone remain. Josephus describes it as the highest of the mountains of Samaria, but Ebal and Tell Azur are both higher. (R. A. S. M.)

GERLACHE, ETIENNE CONSTANTIN, Baron de (1785- 1871),

Belgian politician and historian, was born at Biourge, Luxemburg, on the 24th of December 1785. He studied law in Paris and practised there for some time, but settled at Liege after the establishment of the kingdom of the Netherlands. As member of the states-general he was an energetic member of the opposition, and, though he repudiated an ultramontane policy, he supported the alliance of the extreme Catholics with the Liberal party, which paved the way for the revolution of 1830. On the outbreak of disturbance in August 1830 he still, however, thought the Orange-Nassau dynasty and the union with the Dutch states essential; but his views changed, and, after holding various offices in the provisional government, he became president of congress, and brought forward the motion inviting Leopold of Saxe-Coburg to become king of the Belgians. In r832 he was president of the chamber of representatives, and for thirty-five years he presided over the court of appeal. He presided over the Catholic congresses held at Malines between 1863 and 1867. That his early Liberal views underwent some modification is plain from the Conservative principles enunciated in his Essai sur le mouvement des partis en Belgique (Brussels, 1852). As an historian his work was strongly coloured by his anti-Dutch prejudices and his Catholic predilections. His Histoire des Pays-Bas depuis 1814 jusqu'en 1830 (Brussels, 2 vols., 1839), which reached a fourth edition in 1875, was a piece of special pleading against the Dutch domination. The most important of his other works were his Histoire de LiSge (Brussels, T843) and his Etudes sur Salluste et sur quelques-uns des principaux historiens de I'antiquite (Brussels, 1847).

A complete edition of his works (6 vols., Brussels, 1874-1875) contains a biography by M. Thonissen.

GERLE, CHRISTOPHE ANTOINE (r7 3 6-c. 1801), Frencli. revolutionist and mystic, was born at Riom in Auvergne. Enter- , ing the Carthusian order early in life, he became prior of Laval- Dieu in Perche, and afterwards of Pont-Sainte-Marie at Moulins. Elected deputy to the states-general in 1789, Gerle became very popular, and though he had no seat in the assembly until after the Tennis Court oath, being only deputy suppleant, he is repre- sented in David's classic painting as taking part in it. In 1792

he was chosen elector of Paris. In the revolutionary turmoil Gerle developed a strong vein of mysticism, mingled with ideas of reform, and in June 1790 the prophetic powers of Suzanne Labrousse (1747-1821), a visionary who had predicted the Revolution ten

years before, were brought by him to the notice of the Convention. In Paris, where he lived first with a spiritual- istic doctor and afterwards, like Robespierre, at the house of a cabinetmaker, his mystical tendencies were strengthened. The insane fancies of Catherine Theot, a convent servant turned prophetess, who proclaimed herself the Virgin, the " Mother of God " and the " new Eve," were eminently attractive to Gerle; in the person of Robespierre he recognized the Messiah, and at the meetings of the Theotists he officiated with the aged prophetess as co-president. But the activities of Catherine and her adepts were short-lived. The Theotists' cult of Robespierre was a weapon in the hands of his opponents; and shortly after the festival of the Supreme Being, Vadier made a report to the Convention calling for the prosecution of Catherine, Gerle and others as fanatics and conspirators. They were arrested, thrown into prison and, in the confusion of Robespierre's fall, apparently forgotten. Catherine died in prison, but Gerle, released by the Directory, became one of the editors of the Messager du soir, and was afterwards in the office of Pierre Benezech (1775-1802), minister of the interior. Having renounced his monastic vows in Paris, he is thought to have married, towards the close of his life, Christine Raffet, aunt of the artist Denis Raffet. The date of his. death is uncertain.

GERMAN BAPTIST BRETHREN, or German Brethren, a sect of American Baptists which originated in Germany, and whose members are popularly known in the United States as " Dunkers," " Dunkards " or " Tunkers," corruptions of the German verb tunken, " to dip," in recognition of the sect's continued adherence to the practice of trine immersion. The sect was the outcome of one of the many Pietistic movements of the 17th century, and was founded in 1708 by Andrew Mack of Swartzenau, Germany, and seven of his followers, upon the general issue that both the Lutheran and Reformed churches were taking liberties, with the literal teachings of the Scriptures. The new sect was scarcely organized in Germany when its members were compelled by persecution to take refuge in Holland, whence they emigrated to Pennsylvania, in small companies, between 1719 and 1729. The first congregation in America was organ- ized on Christmas Day 1723 by Peter Becker at Germantown, Pennsylvania, and here in 1743 Christopher Sauer, one of the sect's first pastors, and a printer by trade, printed the first Bible (a few copies of which are still in existence) published in a European language in America. From Pennsylvania the sect spread chiefly westward, and, after various vicissitudes, caused by defections and divisions due to doctrinal differences, in 1908 were most numerous in Pennsylvania,

Maryland, Virginia, Ohio, Indiana, Illinois, Iowa, Missouri, Nebraska, Kansas and North Dakota.

There is much uncertainty about the early theological history of the sect, but it is probable that Mack and his followers were influenced by both the Greek Catholics and the Waldensians. P. H. Bashor in his historical sketch, read before the World's Fair Congress of the Brethren Church (1894), says: "From the history of extended labour by Greek missionaries, from the active pro- paganda of doctrine by scattered Waldensian refugees, through parts of Germany and Bavaria, from the credence that may generally be given to local tradition, and from the strong simi- larity between the three churches in general features of circum- stantial service, the conclusion, without additional evidence, is both reasonable and natural that the founders of the new church received their teaching, their faith and much of their church idea from intimate acquaintance with the established usages of both societies, and from their amplification and enforcement by missionaries and pastors. ... In doctrine the church has been from the first contentious for believers' baptism, holding that nowhere in the New Testament can be found any authority even by inference, precept or example for the baptism of infants. On questions of fundamental doctrine they held to the belief

in one self-existing supreme ruler of the Universe — the Divine Godhead — the Father, the Son and the Holy Spirit — the tri-personality." Hence their practice of triple immersion, which provides that the candidate shall kneel in the water and be immersed, face first, three times — in the name of the Father, the Son and the Holy Spirit. (From this practice the sect received the less commonly used nickname " Dompelaers," meaning " tumblers.") They accept implicitly and literally the New Testament as the infallible guide in spiritual matters, holding it to be the inspired word of God, revealed through Jesus Christ and, by inspiration, through the Apostles. They also believe in the inspiration of the Old Testament. In their cele-bration of the communion service they aim exactly to imitate the forms observed by Christ. It is celebrated in the evening, and is accompanied by the ancient love feast (partaken by all communicants seated at a common table), by the ceremony of the washing of feet and by the salutation of the holy kiss, the three last-

named ceremonies being observed by the sexes separ- ately. They pray over their sick and, when so requested, anoint them with oil. They are rigid non-resistants, and will not bear arms or study the art of war; they refuse to take oaths, and discountenance going to law over issues that can possibly be settled out of the courts. The taking of interest was at first forbidden, but that prohibition is not now insisted upon. They " testify " against the use of intoxicating liquor and tobacco, and advocate simplicity in dress. In its earlier history the sect opposed voting or taking any active part in political affairs, but these restrictions have quite generally disappeared. Similarly the earlier prejudice against higher education, and the mainten- ance of institutions for that purpose, has given place to greater liberality along those lines. In 1782 the sect forbade slave- holding by its members.

The church officers (generally unpaid) comprise bishops (or ministers), elders, teachers, deacons (or visiting brethren) and deaconesses — chiefly aged women who are permitted at times to take leading parts in church services. The bishops are chosen from the teachers; they are itinerant, conduct marriage and funeral services, and are present at communions, at ordinations, when deacons are chosen or elected, and at trials for the ex-communication of members. The elders are the first or oldest teachers of congregations, for which there is no regular bishop. They have charge of the meetings of such congregations, and participate in excommunication proceedings, besides which they preach, exhort, baptize, and may, when needed, take the offices of the deacons. The teachers, who are chosen by vote, may also exhort or preach, when their services are needed for such purposes, and may, at the request of a bishop, perform marriage or baptismal ceremonies. The deacons have general oversight of the material affairs of the congregation, and are especially charged with the care of poor widows and their children. In the discharge of these duties they are expected to visit each family in the congregation at least once a year. The govern- ment of the church is chiefly according to the congregational principle, and the women have an equal voice with the men; but annual meetings, attended by the bishops, teachers and other delegates from the several congregations are held, and at these sessions the larger questions involving church polity are considered and decided by a committee of five bishops.

An early secession from the general body of Dunkers was that of the Seventh Day Dunkers, whose distinctive principle was that the seventh day was the true Sabbath. Their founder was Johann Conrad Beissel (1 690-1 768), a native of Eberbach and one of the first

emigrants, who, after living as a hermit for several years on Mill Creek, Lancaster county, Pennsylvania, founded the sect (1725), then again lived as a hermit in a cava, (formerly occupied by another hermit, one Elimelech) on the • Cocalico Creek in Pennsylvania, and in 1732-1735 established a semi-monastic community (the " Order of the Solitary ") with a convent (the " Sister House ") and a monastery (the " Brother House ") at Ephrata, in what is now Lancaster county, about 55 m. W. by N. from Philadelphia. Among the industries of the men were printing (in both English and German), book-

binding, tanning, quarrying, and the operation of a saw mill, a bark mill, and perhaps a pottery; the women did embroidery, quilting, and engrossing in a beautiful but peculiar hand, known as Fracturschrift. 1 The monastic feature was gradually aban- doned, and in 1814 the Society was incorporated as the Seventh Day Baptists, its affairs being placed in the hands of a board of trustees. More important in the history of the modern church was the secession, in the decade between 1880 and 1890, of the Old Order Brethren, who opposed Sunday Schools and the missionary work of the Brethren, in Asia Minor and India, and in several European countries; and also in 1882 of the radicals, or Progressives, who objected to a distinctive dress and to the absolute supremacy of the yearly conferences. Higher education was long forbidden and is consistently opposed by the Old Order. The same element in the Brethren opposed a census, but according to Howard Miller's census of 1880 (Record of the Faithful) the number of Dunkers was 59,749 in that year; by the United States census of 1890 it was then 73,795; the figures for 1904 are given by Henry King Carroll in his " Statistics of the Churches " in the Christian Advocate (Jan. 5, 1905): Conservatives, or German Baptist Brethren, 95,000; Old Order, 4000; Progressives or Brethren, 15,000; Seventh Day, i94;total, 114,194. In 1909 the German Baptist Brethren had an estimated membership of approximately 100,000, and the Brethren of 18,000. The main body, or Conservatives, support schools at Huntingdon, Pennsylvania; Mt. Morris, Illinois; Lordsburg,- California; McPherson, Kansas; Bridgewater, Virginia; Canton, Ohio; Chicago, Illinois; North Manchester, Indiana; Plattsburg, Missouri; Elizabethtown, Pennsylvania; Union Bridge, Maryland; and Fruitdale, Alabama. They have a publishing house at Elgin, Illinois, and maintain missions in Denmark, Sweden, France, Italy, India and China. The Progressives have a college, a theological seminary and a publish- ing house at Ashland, Ohio; and they carry on missionary work in Canada, South America and Persia.

Authorities.- — Lamech and Agrippa, Chronicon Ephratense, in German (Ephrata, Penn., 1786) and in English (Lancaster, 1889); G. N. Falkenstein, " The German Baptist Brethren, or Dunkers," part 8 of " Pennsylvania: The German Influence in its Settlement and Development," in vol. x. of the Pennsylvania German Society, Proceedings and Addresses (Lancaster, Penn., 1900) ; Julius Friedrich Sachse, The German Sectarians of Pennsylvania, 1742-1800: A Critical and Legendary History of the Ephrata Cloister and the Dunkers (Philadelphia, 1900) ; and John Lewis Gillin, The Dunkers: A Sociological Interpretation (New York, 1906), a doctor's dissertation, with full bibliography.

GERMAN CATHOLICS (Deutschkatholiken) , the name assumed in Germany towards the close of 1844 by certain dissentients from the Church of Rome. The most prominent leader of the German Catholic movement was Johann Ronge, a priest who in the Sdchsische V aterlandsbldtter for the 15th of October 1844 made a vigorous attack upon Wilhelm Arnoldi, bishop of Trier since 1842, for having ordered (for the first time since 1810) the exposition of the " holy coat of Trier," alleged to be the seamless robe of Christ, an event which drew countless pilgrims to the cathedral. Ronge, who had formerly been chaplain at Grottkau, was then a schoolmaster at Laurahiitte near the Polish border. The article made a great sensation, and led to Ronge's excom- munication by the chapter of Breslau in December 1844. The ex-priest received a large amount of public sympathy, and a dissenting congregation was almost immediately formed at Breslau with a very simple creed, in which the chief articles were belief in God the Father, creator and ruler of the universe;

1 Beissel (known in the community as " Friedsam ") was their leader until his death; he published several collections of hymns. The stone over his grave bears the inscription: " Here rests an out- growth of the love of God, ' Friedsam, a Solitary Brother, after- wards a leader of the Solitary and the Congregation of Grace in and around Ephrata . . . Fell asleep July 6, 1768, in the 52nd year of his spiritual life, but the 72nd year and fourth month of his natural life." The borough of Ephrata was separated from the township in 1891. Pop. (1900) of the borough, 2451 ; of the township, 2390. The ' Brother House " and the " Sister House " are still standing (though in a dilapidated condition). In 1777, after the battle of Brandywine, many wounded American soldiers were nursed here by the Sisters, and about 200 are buried here.

GERMAN EAST AFRICA

_ˆ A i?

in Jesus Christ the Saviour, who delivers from the bondage of sin by his life, doctrine and death; in the operation of the Holy Ghost; in a holy, universal, Christian church; in forgiveness of sins and the life everlasting. The Bible was made the sole rule, and all external authority was barred. Within a few weeks similar communities were formed at Leipzig, Dresden, Berlin, Offenbach, Worms, Wiesbaden and elsewhere; and at a " council " convened at Leipzig at Easter 1845, twenty-seven congregations were represented by delegates, of whom only two or at most three were in clerical orders.

Even before the beginning of the agitation led by Ronge, another movement fundamentally distinct, though in some respects similar, had been originated at Schneidemuhl, Posen, under the guidance of Johann Czerski (1813-1893), also a priest, who had come into collision with the church authorities on the then much discussed question of mixed marriages, and also on that of the celibacy of the clergy. The result had been his suspension from office in March 1844; his public withdrawal, along with twenty-four adherents, from the Roman com- munion in August; his excom- munication; and the formation, in October, of a " Christian Catholic " congregation which, while rejecting clerical celibacy, the use of Latin in public worship, and the doctrines of purgatory and transubstantia- tion, retained the Nicene theology and the doctrine of the seven sacra- ments. Czerski had been at some of the sittings of the " German Catholic " council of Leipzig; but when a formula somewhat similar to that of Breslau had been adopted, he refused his signature because the divinity of Christ had been ignored, and he and his congregation con- tinued to retain by preference the name of " Christian Catholics," which they had originally assumed. Of the German Catholic congrega- tions which had been represented at Leipzig some manifested a preference for the fuller and more positive creed of Schneidemuhl, but a great majority continued to accept the compara- tively rationalistic position of the B reslau school. The number of these rapidly increased, and the congrega- tions scattered over Germany num- bered nearly 200. External and in- ternal checks, however, soon limited this advance. In Austria, and ulti- mately also in Bavaria, the use of the

name German Catholics was officially prohibited, that of " Dis- sidents " being substituted, while in Prussia, Baden and Saxony the adherents of the new creed were laid under various disabilities, being

suspected both of undermining religion and of encouraging the revolutionary tendencies of the age. Ronge himself was a foremost figure in the troubles of 1848; after the dissolution of the Frankfort parliament he lived for some- time in London, returning in 186 1 to Germany. He died at Vienna on the 26th of October 1887. In 1859 some of the German Catholics entered into corporate union with the " Free Congregations," an associa- tion of free-thinking communities that had since 1844 been gradually withdrawing from the orthodox Protestant Church, when the united body took the title of "The Religious Society of Free Congregations." Before that time many of the congrega- tions which were formed in 1844 and the years immediately following had been dissolved, including that of Schneidemuhl

itself, which ceased to exist in 1857. There are now only about 2000 strict German Catholics, all in Saxony. The movement has been superseded by the Old Catholic (q.v.) organization.

See G. G. Gervinus, Die Mission des Deutschkatholicismus (1846) ; F. Kampe, Das Wesen des Deutschkatholicismus (i860); Findel, Der Deutschkatholicismus in Sachsen (1895); Carl Mirbt, in Herzog-Hauck's Realencyk. fur prot. Theol. iv. 583.

GERMAN EAST AFRICA, a country occupying the east- central portion of the African continent. The colony extends at its greatest length north to south from 1° to 11° S., and west to east from 30 to 40 E. It is bounded E. by the Indian Ocean (the coast-line extending from 4 20′ to io° 40′ S.), N.E. and N. by British East Africa and Uganda, W. by Belgian Congo, S.W. by British Central Africa and S. by Portuguese East Africa.

Area and Boundaries.— On the north the boundary line runs N.W. from the mouth of the Umba river to Lake Jipe and Mount Kili-

Rallways..

A Longr.East3»°of Greenwich

Emery Walker cc

manjaro, including both in the protectorate, and thence to Victoria Nyanza,- crossing it at 1° S., which parallel it follows till it reaches 30° E. In the west the frontier is as follows: From the point of intersection of 1° S. and 30° E., a line running S. and S.W. to the north-west end of Lake Kivu, thence across that lake near its western shore, and along the river Rusizi, which issues from it, to the spot

where the Rusizi enters the north end of Lake Tanganyika; along the middle line of Tanganyika to near its southern end, when it is deflected eastward to the point where the river Kalambo enters the lake (thus leaving the southern end of Tanganyika to Great Britain). From this point the frontier runs S.E? across the plateau between Lakes Tanganyika and Nyasa, in its southern section follow- ing the course of the river Songwe. Thence it goes down the middle of Nyasa as far as ii° 30′ S. The southern frontier goes direct from the last-named point eastward to the Rovuma river, which separates German and Portuguese territory. A little before the Indian Ocean is reached the frontier is deflected south so as to leave the mouth of the Rovuma in German East Africa. These boundaries include an area of about 364,000 sq. m. (nearly double the size of Germany), with a population estimated in 1910 at 8,000,000. Of

these above 10,000 were Arabs, Indians, Syrians and Goanese, and 3000 Europeans (over 2000 being Germans). The island of Mafia (see below) is included in the protectorate.

Physical Features. — The coast of German East Africa (often spoken of as the Swahili coast, after the inhabitants of the seaboard) is chiefly composed of coral, is little indented, and is generally low, partly sandy, partly rich alluvial soil covered with dense bush or mangroves. Where the Arabs have established settlements the coco-palm and mango tree introduced by them give variety to the vegetation. The coast plain is from 10 to 30 m. wide and 620 m. long; it is bordered on the west by the precipitous eastern side of the interior plateau of Central Africa. This plateau, considerably tilted from its horizontal position, attains its highest elevation north of Lake Nyasa (see Livingstone Mountains), where several peaks rise over 7000 ft., one to 9600, while its mean altitude is about 3000 to 4000 ft. From this region the country slopes towards the north-west, and is not distinguished toy any considerable mountain ranges. A deep narrow gorge, the so-called " eastern rift-valley," traverses the middle of the plateau in a meridional direction. In the northern part of the country it spreads into several side valleys, from one of which rises the extinct volcano Kilimanjaro (q.v.), the highest mountain in Africa (19,321 ft.). Its glaciers send down a thousand rills which combine to form the Pangani river. About 40 m. west of Kilimanjaro is Mount Meru (14,955 ft.), another volcanic peak, with a double crater. The. greater steepness of its sides makes Meru in some aspects

a more striking object than its taller neighbour. South-east of Mount Kilimanjaro are the Pare Moun- tains and Usambara highlands, separated from the coast by a com- paratively narrow strip of plain. To the south of the Usambara hills, and on the eastern edge of the plateau, are the mountainous regions of Nguru (otherwise Unguru), Useguha and Usagara. As already indicated, the southern half of Victoria Nyanza and the eastern shores, in whole or in part, of Lakes Kivu, Tanganyika and Nyasa, are in German territory. (The lakes are separately de- scribed.) Several smaller lakes occur in parts of the eastern rift- valley. Lake Rukwa (q.v.) north-west of Nyasa is presumably only the remnant of a much larger lake. Its extent varies with the rainfall of each year. North-west of Kilimanjaro is a sheet of water known as the Natron Lake from the mineral alkali it contains. In the northern part of thecolonytheVictoriaNyanzaisthedominant physical feature. The western frontier coincides with part of the eastern wall of another depression, the Central African or Albertine rift-valley, in which lie Tanganyika, Kivu and other lakes. Along the north-west frontier north of Kivu are volcanic peaks (see Mfumbiro).

The country is well watered, but with the exception of the Rufiji the rivers, save for a few miles from their mouths, are unnavigable. The largest streams are the Rovuma and Rufiji (q.v.), both rising in the central plateau and flowing to the Indian Ocean. Next in importance is the Pangani river, which, as stated above, has its head springs on the slopes of Kilimanjaro. Flowing in a south-easterly direction it reaches the sea after a course of some 250 m. The Wami and Kingani, smaller streams, have their origin in the moun- tainous region fringing the central plateau, and reach the ocean opposite the island of Zanzibar. Of inland river systems there are four — one draining to Victoria Nyanza, another to Tanganyika, a third to Nyasa and a fourth to Rukwa. Into Victoria Nyanza are emptied, on the east, the waters of the Mori and many smaller streams; on the west, the Kagera (q.v.), besides smaller rivers. Into Tanganyika flows the Malagarasi, a considerable river with many affluents, draining the west-central part of the plateau. The Kalambo river, a comparatively small stream near the southern end of Tanganyika, flows in a south-westerly direction. Not far from its mouth there is a magnificent fall, a large volume of water falling 600 ft. sheer over a rocky ledge of horse-shoe shape. Of the streams entering Nyasa the Songwe has been mentioned. The Ruhuhu, which enters Nyasa in lo° 30′ S., and its tributaries drain a considerable area west of 36° E. The chief feeders of Lake Rukwa are the Saisi and the Rupa-Songwe.

Mafia Island lies off the coast immediately north of 8° N. It has an

area of 200 sq. m. The island is low and fertile, and exten- sively planted with coco-nut palms. It is continued southwards by an extensive reef, on which stands the chief village, Chobe, the residence of a few Arabs and Banyan traders. Chobe stands on a shallow creek almost inaccessible to shipping.

Geology. — The narrow foot-plateau of British East Africa broadens out to the south of Bagamoyo to a width of over 100 m. This is covered to a considerable extent by rocks of recent and late Tertiary ages. Older Tertiary rocks form the bluffs of Lindi. Cretaceous marls and limestones appear at intervals, extending in places to the edge of the uppef plateau, and are extensively developed on the' Makonde plateau. They are underlain by Jurassic rocks, from beneath which sandstones and shales yielding Glossopteris browniana var. indica, and therefore of Lower Karroo age, appear in the south but are overlapped on the north by Jurassic strata. The central plateau consists almost entirely of metamorphic rocks with extensive tracts of granite in Unyamwezi. In the vicinity of Lakes Nyasa and Tanganyika, sandstones and shales of Lower Karroo age and yielding seams of coal are considered to owe their position and preservation to being let down by rift faults into hollows of the

crystalline rocks. In Karagwe certain quartzites, slates and schistose sandstones resemble the ancient gold-bearing rocks of South Africa.

The volcanic plateau of British East Africa extends over the boundary in the region of Kilimanjaro. Of the sister peaks, Kibo and Mawenzi, the latter is far the oldest and has beengreatly denuded, while Kibo retains its crateriform shape intact. The rift-valley faults continue down the depression, marked by numerous volcanoes, in the region of the Natron Lake and Lake Manyara; while the steep walls of thedeep depression of Tanganyika and Nyasa represent the western rift system at its maximum development.

Fossil remains of saurians of gigantic size have been found; one thigh bone measures 6 ft. 10 in., the same bone in the Diplodocus Carnegii measuring only 4 ft. II in.

Climate. — The warm currents setting landwards from the Indian Ocean bring both moisture and heat, so that the Swahili coast has a higher temperature and heavier rainfall than the Atlantic seaboard under the same parallels of latitude. The mean temperature on the west and east coasts of Africa is 72 and 8o° Fahr. respectively, the average rainfall in Angola 36 in., in Dar-es-Salaam 60 in. On the Swahili coast the south-east monsoon begins in April and the north-

east monsoon in November. In the interior April brings south-east winds, which continueuntil aboutthe beginning of October. During the rest of the year changing winds prevail. These winds are charged with moisture, which they part with on ascending the precipitous side of the plateau. Rain comes with the south-east monsoon, and on the northern part of the coast the rainy season is divided into two parts, the great and the little Masika: the former falls in the months of September, October, November; the latter in February and March. In the interior the climate has a more continental character, and is subject to considerable changes of temperature; the rainy season sets in a little earlier the farther west and north the region, and. is well marked, the rain beginning in November and ending in April; the rest of the year is dry. On the highest parts of the plateau the climate is almost European, the nights being sometimes exceedingly cold. Kilimanjaro has a climate of its own ; the west and south sides of the mountain receive the greatest rainfall, while the east and north sides are dry nearly all the year. Malarial diseases are rather frequent, more so on the coast than farther inland. The Kilimanjaro region is said to enjoy immunity. Small- pox is frequent on the coast, but is diminishing before vaccination; other epidemic diseases are extremely rare.

Flora and Fauna. — The character of the vegetation varies with and depends on moisture, temperature and soil. On the low littoral zone the coast produced a rich tropical bush, in which the mangrove is very prominent. Coco-palms and mango trees have been planted in great numbers, and also many varieties of bananas. The bush is grouped in copses on meadows, which produce a coarse tall grass. The river banks are lined with belts of dense forest, in which useful timber occurs. The Hyphaene palm is frequent, as well as various kinds of gum-producing mimosas. The slopes of the plateau which face the rain-bringing monsoon are in some places covered with primeval forest, in which timber is plentiful. The silk-cotton tree (Bombax ceiba), miomba, tamarisk, copal tree (Hymenaea courbaril) are frequent, besides sycamores, banyan trees (Ficus indica) and the deleb palm (Borassus aethiopum). It is here we find the Landolphia florida, which yields the best rubber. The plateau is partly grass land without bush and forest, partly steppe covered with mimosa bush, which sometimes is almost impenetrable. Mount Kilimanjaro and Mount Meru exhibit on a vertical scale the various forms of vegetation which characterize East Africa (see Kilimanjaro).

East Africa is rich in all kinds of antelope, and the elephant, rhinoceros and hippopotamus are still plentiful in parts. Character-

istic are the giraffe, the chimpanzee and the ostrich. Buffaloes and zebras occur in two or three varieties. Lions and leopards are found throughout the country. Crocodiles are numerous in all the larger rivers. Snakes, many venomous, abound. Of birds there are comparatively few on the steppe, but by rivers, lakes and swamps they are found in thousands. Locusts occasion much damage, and ants of various kinds are often a plague. The tsetse fly (Glossina morsitans) infests several districts; the sand-flea has been imported from the west coast. Land and water turtles are numerous.

Inhabitants. — On the coast and at the chief settlements inland are Arab and Indian immigrants, who are merchants and agri- culturists. The Swahili (q.v.) are a mixed Bantu and Semitic race inhabiting the seaboard. The inhabitants of the interior may be divided into two classes, those namely of Bantu and those of Hamitic stock. What may be called the indigenous population consists of the older Bantu races. These tribes have been subject to the intrusion from the south of more recent Bantu folk, such as the Yao, belonging to the Ama-Zulu branch of the race, while from the north there has been an immigration of Hamito-Negroid peoples. Of these the Masai and Wakuafi are found in the region between Victoria Nyanza and Kilimanjaro. The Masai (q.v.) and allied tribes are nomads and cattle raisers. They are warlike,

and live in square mud-plastered houses called tembe which can be easily fortified and defended. The Bantu tribes are in general peaceful agriculturists, though the Bantus of recent immigration retain the warlike instincts of the Zulus. The most important group of the Bantus is the Wanyamwezi (see Unyamwezi), divided into many tribes. They are spread over the central plains, and have for neighbours on the south-east, between Nyasa and the Rufiji, the warlike Wahehe. The Wangoni (Angoni), a branch of the Ama-Zulu, are widely spread over the central and Nyasa regions. Other well-known tribes are the Wasambara, who have given their name to the highlands between Kilimanjaro and the coast, and the VVarundi, inhabiting the district between Tangan- yika and the Kagera. In Karagwe, a region adjoining the south- west shores of Victoria Nyanza, the Bahima are the ruling caste. Formerly Karagwe under its Bahima kings was a powerful state. Many different dialects are spoken by the Bantu tribes, Swahili being the most widely known (see Bantu Languages). Their religion is the worship of spirits, ancestral

and otherwise, accom- panied by a vague and undefined belief in a Supreme Being, generally regarded as indifferent to the doings of the people.

The task of civilizing the natives is undertaken in various ways by the numerous Protestant and Roman Catholic missions established in the colony, and by the government. The slave trade has been abolished, and though domestic slavery is allowed, all children of slaves born after the 31st of December 1905 are free. For certain public works the Germans enforce a system of compulsory labour. Efforts are made by instruction in govern- ment and mission schools to spread a knowledge of the German language among the natives, in order to fit them for subordinate posts in administrative offices, such as the customs. Native chiefs in the interior are permitted to help in the administration of justice. The Mission du Sacre Cceur in Bagamoyo, the oldest mission in the colony, has trained many young negroes to be useful mechanics. The number of native Christians is small. The Moslems have vigorous and successful missions.

Chief Towns. — The seaports of the colony are Tanga (pop. about 6000), Bagamoyo 5000 (with surrounding district some 18,000), Dar-es-Salaam 24,000, Kilwa 5000, (these have separate notices), Pangani, Sadani, Lindi and Mikindani. Pangani (pop. about 3500) is situated at the mouth of the river of the same name ; it serves a district rich in tropical products, and does a thriving trade with Zanzibar and Pemba. Sadani is a smaller port midway between Pangani and Bagamoyo. Lindi (10° o' S., 39 40′ E.) is 80 m. north of Cape Delgado. Lindi (Swahili for The Deep Below) Bay runs inland 6 m. and is 3 m. across, affording deep anchorage. Hills to the west of the bay rise over 1000 ft. The town (pop. about 4000) is picturesquely situated on the north side of the bay. The Arab boma, constructed in 1800, has been rebuilt by the Germans, who have retained the fine sculptured gateway. Formerly a rendezvous for slave caravans Lindi now has a more legitimate trade in white ivory. Mikindani is the most southern port in the colony. Owing to the prevalence of malaria there, few Europeans live at the town, and trade is almost entirely in the hands of Banyans.

Inland the principal settlements are Korogwe, Mrogoro, Kilossa, Mpapua and Tabora. Korogwe is in the Usambara hills, on the north bank of the Pangani river, and is reached by railway from Tanga. Mrogoro is some 140 m. due west of Dar-es-Salaam, and is the first important station on the road to Tanganyika. Kilossa and Mpapua are farther inland on the same caravan route. Tabora (pop. about 37,000), the chief town of the Wanyamwezi tribes, occupies an

important position on the central plateau, being the meeting-place of the trade routes from Tanganyika, Victoria Nyanza and the coast. In the railway development of the colony Tabora is destined to become the central junction of lines going north, south, east and west.

On Victoria Nyanza there are various settlements. Mwanza, on the southern shore, is the lake terminus of the route from Bagamoyo : Bukoba is on the western shore, and Schirati on the eastern shore ; both situated a little south of the British frontier. On the German coast of Tanganyika are Ujiji (q.v.), pop. about 14,000, occupying a central position; Usumbura, at the northern end of the lake where is a fort built by the Germans; and Bismarckburg, near the souther end. On the shores of the lake between Ujiji and Bismarckburg are four stations of the Algerian " White Fathers," all possessing churches, schools and other stone buildings. Langenburg is a settlement on the north-east side of Lake Nyasa. The government station, called New Langenburg, occupies a higher and more healthy site north-west of the lake. Wiedhafen is on the east side of Nyasa at the mouth of the Ruhuhu, and is the terminus of the caravan route from Kilwa.*

Productions. — The chief wealth of the country is derived from

agriculture and the produce of the forests. From the forests are obtained rubber, copal, bark, various kinds of fibre, and timber (teak, mahogany, &c). The cultivated products include coffee, the coco-nut palm, tobacco, sugar-cane, cotton, vanilla, sorghum, earth-nuts, sesame, maize, rice, beans, peas, bananas (in large quantities), yams, manioc and hemp. Animal products are ivory, hides, tortoise-shell and pearls. On the plateaus large numbers of cattle, goats and sheep are reared. The natives have many small smithies. Gold, coal, iron, graphite, copper and salt have been found. Garnets are plentiful in the Lindi district, and agates, topaz, moonstone and other precious stones are found in the colony. The chief gold and iron deposits are near Victoria Nyanza. In the Mwanza district are conglomerate reefs of great extent. Mining began in 1905. Mica is mined near Mrogoro. The chief exports are sisal fibre, rubber, hides and skins, wax, ivory, copra, coffee, ground-nuts and cotton. The imports are chiefly articles of food, textiles, and metals and hardware. More than half the entire trade, both export and import, is with Zanzibar. Germany takes about 30% of the trade. In the ten years 1896-1905 the value of the external trade increased from about £600,000 to over £1,100,000. In 1907 the imports were valued at £1,190,000, the exports at £625,000.

Numerous companies are engaged in developing the resources of the country by trading, planting and mining. The most important is the Deutsch-Ostafrikanische Gesellschaft, founded in 1885, which has trading stations in each seaport, and flourishing plantations in various parts of the country. It is the owner of vast tracts of land. From 1890 to 1903 this company was in possession of extensive mining, railway, banking and coining rights, but in the last-named year, by agreement with the German government, it became a land company purely. The company has a right to a fifth part of the land within a zone of 10 m. on either side of any railway built in the colony previously to 1935. In addition to the companies a comparatively Jarge number of private individuals have laid out plantations, Usambara and Pare having become favourite districts for agricultural enterprise. In the delta of the Rufiji and in the Kilwa district cotton-growing was begun in 1901. The plantations are all worked by native labour. The government possesses large forest reserves.

Communications. — Good roads for foot traffic have been made from the seaports to the trading stations on Lakes Nyasa, Tanganyika and Victoria. Caravans from Dar-es-Salaam to Tanganyika take 60 days to do the journey. The lack of more rapid means of communication hindered the development of the colony and led to economic crises (1898-1902), which were intensified, and in part created, by the building of a railway in the adjacent British protectorate from Mombasa to Victoria Nyanza, the British line securing the trade with the lake. At that time the only railway in the country was a line from Tanga to the Usambara highlands. This railway passes through Korogwe (52 m. from Tanga) and is continued via Mombo to Wilhelmstal, a farther distance of 56 m. The building of a trunk line from Dar-es-Salaam to Mrogoro (140 m.), and ultimately to Ujiji by way of Tabora, was begun in 1905. Another proposed line would run from Kilwa to Wiedhafen on Lake Nyasa. This railway would give the quickest means of access to British Central Africa and the southern part of Belgian Congo. On each of the three lakes is a government steamer. British steamers on Victoria Nyanza maintain communication between the German stations and the lake terminus of the Uganda railway. The German East Africa Line of Hamburg runs a fleet of first-class steamers to East Africa, which touch at Tanga, Dar-es-Salaam and Zanzibar. There is a submarine cable from Dar-es-Salaam to Zanzibar, and an overland line connecting all the coast stations.

Administration, Revenue, &c. — For administrative purposes the country is divided into districts (Bezirksdmter), and stations

{Stations- bezirke). Each station has a chief, who is subordinate to the official of his district, these in their turn being under the governor, who resides in Dar-es-Salaam. The governor is commander of the colonial force, which consists of natives under white officers. District councils are constituted, on which the European merchants and planters are represented. Revenue is raised by taxes on imports and exports, on licences for the sale of land and spirituous liquors, and for wood-cutting, by harbour and other dues, and a hut tax on natives. The deficiency between revenue and expenditure is met by a subsidy from the imperial government. In no case during the first twenty-one years' existence of the colony had the local revenue reached 60 % of the local expenditure, which in normal years amounted to about £500,000. In 1909, however, only the expenditure necessary for military purposes (£183,500) was received by way of subsidy.

History. — Until nearly the middle of the 19th century only the coast lands of the territory now forming German East Africa were known either to Europeans or to the Arabs. When at the beginning of the 16th century the Portuguese obtained possession of the towns along the East African coast, they had been, for periods extending in some cases fully five hundred years, under Arab dominion. After the final withdrawal of the Portuguese in the early years of the 18th century, the coast towns north of Cape Delgado fell under the sway of the Muscat Arabs, passing

from them to the sultan of Zanzibar. From about 1830, or a little earlier, the Zanzibar Arabs began to penetrate inland, and by 1850 had established themselves at Ujiji on the eastern shore of Lake Tanganyika. The Arabs also made their way south to Nyasa. This extension of Arab influence was accom- panied by vague claims on the part of the sultan of Zanzibar to include all these newly opened countries in his empire. How far from the coast the real authority of the sultan extended was never demonstrated. Zanzibar at this time was in semi- dependence on India, and British influence was strong at the court of Bargash, who succeeded to the sultanate in 1870. Bargash in 1877 offered to Sir (then Mr) William Mackinnon a lease of all his mainland territory. The offer, made in the year in which H. M. Stanley's discovery of the course of the Congo initiated the movement for the partition of the continent, was declined. British influence was, however, still so powerful in Zanzibar that the agents

of the German Colonization Society, who in 1884 sought to secure for their country territory on the east coast, deemed it prudent to act secretly, so that both Great Britain and Zanzibar might be confronted with accomplished facts. Making their way inland, three young Germans, Karl Peters, Joachim Count Pfeil and Dr Jiihlke, concluded a " treaty " in November 1884 with a chieftain in Usambara who was declared to be independent of Zanzibar. Other treaties followed, and on the 17th of February 1885, the German emperor granted a charter of protection to the Colonization Society. The German acquisitions were resented by Zanzibar, but were acquiesced in by the British government (the second Gladstone administration). The sultan was forced to acknowledge their validity, and to grant a German company a lease of his mainland territories south of the mouth of the Umba river, a British company formed by Mackinnon taking a lease of the territories north of that point. The story of the negotiations between Great Britain, Germany and France which led to this result is told elsewhere (see Africa, section 5). By the agreement of the 1 st of July 1890, between the British and German governments, and by agreements concluded between Germany and Portugal in 1886 and 1894, and Germany and the Congo Free State in 1884 and later dates, the German sphere of influence attained its present area. On the 28th of October 1890 the sultan of Zanzibar ceded absolutely to Germany the mainland territories already leased to a German company, receiving as compensation £200,000. While these negotiations were going on, various German companies had set to work to exploit the country, and on the 1 6th of August 1888 the German East African Company, the lessee of the Zanzibar mainland strip, took over the administra- tion from the Arabs. This was followed, five days later, by a revolt of all the coast Arabs against German rule — the Germans, raw hands at the task of managing Orientals, having aroused intense hostility by their brusque treatment of the dispossessed rulers. The company being unable to quell the revolt, Captain Hermann Wissmann — subsequently Major Hermann von Wiss- mann (1853-1905) — was sent out by Prince Bismarck as imperial commissioner. Wissmann, with 1000 soldiers, chiefly Sudanese officered by Germans, and a German naval contingent, succeeded by the end of 1889 in crushing the power of the Arabs. Wissmann remained in the country until 1891 as commissioner, and later (1895-1896) was for eighteen months governor of the colony — as the German sphere had been constituted by proclamation (1st of January 1897). Towards the native population Wiss- mann's attitude was conciliatory, and under his rule the develop- ment of the resources of the country was pushed on. Equal success did not attend the efforts of other administrators;

in 1891-1892 Karl Peters had great trouble with the tribes in the Kilimanjaro district and resorted to very harsh methods,, such as the execution of women, to maintain his authority. In 1896 Peters was condemned by a disciplinary court for a misuse of official power, and lost his commission. After 1891, in which year the Wahehe tribe ambushed and almost completely annihilated a German military force of 350 men under Baron von Zelewski, there were for many years no serious risings against German authority, which by the end of 1898 had been

established over almost the whole of the hinterland. The development of the country was, however, slow, due in part to the disinclination of the Reichstag to vote supplies sufficient for the building of railways to the fertile lake regions. Count von Gotzen (governor 1901-1906) adopted the policy of maintaining the authority of native rulers as far as possible, but as over the greater part of the colony the natives have no political organiza- tions of any size, the chief burden of government rests on the German authorities. In August 1905 serious disturbances broke out among the Bantu tribes in the colony. The revolt was due largely to resentment against the restrictions enforced by the Germans in their efforts at civilization, including com- pulsory work on European plantations in certain districts. Moreover, it is stated that the Herero in rebellion in German South-west Africa sent word to the east coast natives to follow their example, an instance of the growing solidarity of the black races of Africa. Though the revolt spread over a very large area, the chief centre of disturbance was the region between Nyasa and the coast at Kilwa and Lindi. Besides a number of settlers a Roman Catholic bishop and a party of four missionaries and nuns were murdered in the Kilwa hinterland, while nearer Nyasa the warlike Wangoni held possession of the country. The Germans raised levies of Masai and Sudanese, and brought natives from New Guinea to help in suppressing the rising, besides sending naval and military contingents from Germany. In general, the natives, when encountered, were easily dispersed, but it was not until March 1906 that the coast regions were again quiet. In July following the Wangoni were beaten in a decisive engagement. It was officially stated that the death-roll for the whole war was not below 120,000 men, women and children. In 1907 a visit was paid to the colony by Herr B. Dernburg, the colonial secretary. As a result of this visit more humane methods in the treatment of the natives were introduced, and measures taken to develop more fully the economic resources of the country.

Authorities. — S. Passarge and others, Das deutsche Kolonial- reich,

Erster Band (Leipzig, 1909) ; P. Reichard, Deutsch Ostafrika, das Land und seine Bewohner (Leipzig, 1892); F. Stuhlmann, Mit Emin Pasha im Herzen von Afrika (Berlin, 1894); Brix Foerster, Deutsch-Ostafrika; Geographie und Geschichte (Leipzig, 1890); Oscar Baumann, InDeutsch-Ostafrikawdhrenddes Auf stands (Vienna, 1890), Usambara und seine Nachbargebiete (Berlin, 1891), and Durch Massailand zur Nilquelle (Berlin, 1894). For special studies see P. Samassa, Die Besiedelung Deutsch-Ostafrikas (Leipzig, 1909); A. Engler, Die Pflanzenwelt Ost-Afrikas und der Nachbargebiete (Berlin, 1 895-1 896) and other works by the same author; Stromer von Reichenbach, Die Geologie der deutschen Schutzgebiete in Afrika (Munich and Leipzig, 1896); W. Bornhardt, Deutsch-Ostafrika (Berlin, 1898); F. Fullerborn, Beitrage zur physischen Anthropologic der Nord-Nyassaldnder (Berlin, 1902), a fine series of pictures of native types, and Das Deutsche Nyassa- und Ruwuma-gebiet, Land und Leute (Berlin, 1906) ; K. Weule, Native Life in East Africa (London, 1909); Hans Meyer, Der Kilimandjaro (Berlin, 1900) and Die Eisenbahnen im tropischen Afrika (Leipzig, 1902); J. Strandes, Die Portugiesenzeit von Deutsch- u. Englisch-Ostafrika (Berlin, 1899), a valuable monograph on the Portuguese period. See also British Official Reports on East Africa (specially No. 4221 ann. ser.), the German White Books and annual reports, the Mitteilungen aus den deutschen Schutzgebiete, and the Deutsches Kolonialblatt, published fortnightly at Berlin since 1890. The Deutscher Kolonial-Atlas has maps on the r. 1,000,000 scale. (F. R. C.)

GERMAN EVANGELICAL SYNOD OF NORTH AMERICA,

a Protestant church dating from October 1840, and known, in its early years, as the German Evangelical Association of the West. It was formed by six German ministers who had been ordained in Prussia and were engaged in missionary and pioneer work in Missouri and Illinois. The original organization was strengthened in 1858 by amalgamation with the German Evan- gelical Church Association of Ohio, and later by the inclusion of the German United Evangelical Synod of the East (i860), the Evangelical Synod of the North-West (1872) and the United Evangelical Synod of the East (1872). The church bases its position on the Bible as interpreted by the symbols of the Lutheran and Reformed churches so far as they are in agreement, points of difference being left to ” that liberty of conscience which, as a component part of the basis of man’s ultimate

responsibility to God himself, is the inalienable privilege of every believer." The church, which has (1900) 985 ministers and some 238,000 communicant members, is divided into seven- teen districts, with officers responsible to the General Synod, which meets every four years. There are boards for home and foreign missions, the latter operating chiefly in the Central Provinces of India. The literature of the church is mainly in German, though English is rapidly gaining ground.

GERMANIC LAWS, EARLY. Of those Germanic laws of the early middle ages which are known as leges barbarorum, we here deal with the principal examples other than Frankish, viz. (1) Leges Wisigothorum, (2) Lex Burgundionum, (3) Partus Alamannorum and Lex Alamannorum, (4) Lex Bajuvariorum, (5) Lex Saxonum, (6) Lex Frisionum, (7) Lex Angliorum et Weri- norum, hoc est, Thuringorum, and (8) Leges Langobardorum. All these laws may in general be described as codes of procedure and tariffs of compositions. They present somewhat similar features with the Salic law, but often differ from it in the date of compilation, the amount of fines, the number and nature of the crimes, the number, rank, duties and titles of the officers, &c. For the Salic law and other Frankish laws, see Salic Law, and for the edict of Theodoric I., which was applicable to the Ostrogoths and Romans, see Roman Law.

For the whole body of the Germanic laws see P. Canciani, Bar- barorum leges antiquae (Venice, 1781-1789); F. Walter, -Corpus juris germanici antiqui (Berlin, 1824) ; Monumenta Germaniae hislorica, Leges. For further information on the codes in general, see H. M. Zopfl, Deutsche Rechtsgeschichte (4th ed., Heidelberg, 1871-1876); J. E. O. Stobbe, Geschichte der deutschen Rechtsquellen (Brunswick, 1860-1864) ; Paul Viollet, Histoire du droit civil francais (2nd ed., Paris, 1893); H. Brunner, Deutsche Rechtsgeschichte (2nd ed., Leipzig, 1906).

1. Leges Wisigothorum. — Karl Zeumer's edition of these laws in the 4to series of the Mon. Germ. Hist, throws new light on all questions relating to their date and composition. It is now certain that the earliest written code of the Visigoths dates back to King Euric (466-485). Besides his own constitutions, Euric included in this collection constitutions of his predecessors, Theodoric I. (419-451), Thorismund (451-453), and Theodoric II. (453-466), and he arranged the whole in a logical order. Of this code fragments of chapters cclxxvi. to cccxxxvi. 1 have been discovered in a palimpsest MS. in the Bibliotheque Nationale at Paris (Latin coll., No. 12161), a fact which proves that the code ran over a large area. Euric's code

was used for all cases between Goths, and between them and Romans; in cases between Romans, Roman law was used. At the instance of Euric's son, Alaric II., an examination was made of the Roman laws in use among Romans in his dominions, and the resulting compilation was approved in 506 at an assembly at Aire, in Gascony, and is known as the Breviary of Alaric, and sometimes as the Liber Aniani, from the fact that the authentic copies bear the signature of the referendarius Anian.

Euric's code remained in force among the Visigoths of Spain until the reign of Leovigild (568-586), who made a new one, improving upon that of his predecessor. This work is lost, and we have no direct knowledge of any fragment of it. In the 3rd codification, however, many provisions have been taken from the 2nd, and these are designated by the word " antiqua"; by means of these " antiqua " we are enabled in a certain measure to reconstruct the work of Leovigild.

After the reign of Leovigild the legislation of the Visigoths underwent a transformation. The new laws made by the kings were declared to be applicable to all the subjects in the king- dom, of whatever race — in other words, they became territorial; and this principle of territoriality was gradually extended to the ancient code. Moreover, the conversion of Reccared I. (586-601) to orthodoxy effaced the religious differences among his subjects, and all subjects, qua Christians, had to submit to the canons of the councils, which were made obligatory by the kings. After this change had been accepted, Recceswinth (649- 672) made a new code, which was applicable to Visigoths and Romans alike. This code, known as the Liber judiciorum, is

1 The lacunae in these fragments have been filled in by the aid of the law of the Bavarians, where the chief provisions are reproduced.

divided into 12 books, which are subdivided into tiluli and chapters (aerae). It comprises 324 constitutions taken from Leovigild's collection, a few of the laws of Reccared and Sisebut, 99 laws of Chindaswinth (642-653), and 87 of Recceswinth. A recension of this code of Recceswinth was made in 681 by King Erwig (680-687), and is known as the Lex Wisigothorum renovata; and, finally, some additamenta were made by Egica (687-702). In Zeumer's edition of the Leges Wisigothorum the versions of Recceswinth and Erwig, where they differ from each other, are shown in parallel columns, and the laws later than Erwig are denoted by the sign " nov."

For further information see the preface to Zeumer's edition; H. Brunner, Deutsche Rechtsgeschichte (2nd ed., Leipzig, 1906) ; Urena y Smenyaud, La Legislacion Gotico-hispana (Madrid, 1905).

2. Lex Burgundionum. — This code was compiled by King Gundobald (474-516), very probably after his defeat by Clovis in 500. Some additamenta were subsequently introduced either by Gundobald himself or by his son Sigismund. This law bears the title of Liber Constitutionum, which shows that it emanated from the king; it is also known as the Lex Gundobada or Lex Gombata. It was used for cases between Burgundians, but was also applicable to cases between Burgundians and Romans. For cases between Romans, however, Gundobald compiled the Lex Romana Burgundionum, called sometimes, through a mis- reading of the MSS., the Liber Papiani or simply Papianus. The barbarian law of the Burgundians shows strong traces of Roman influence. It recognizes the will and attaches great importance to written deeds, but on the other hand sanctions the judicial duel and the cojuratores (sworn witnesses). The vehement protest made in the 9th century by Agobard, bishop of Lyons, against the Lex Gundobada shows that it was still in use at that period. So late as the 10th and even the nth centuries we find the law of the Burgundians invoked as personal law in Cluny charters, but doubtless these passages refer to accretions of local customs rather than to actual paragraphs of the ancient code.

The text of the Lex Burgundionum has been published by F. Bluhme in the Mon. Germ, hist., Leges, iii. 525; by Karl Binding in the Pontes rerum Bernensium (vol. i., 1880) ; by J. E. Valentin Smith (Paris, 1889 seq.) ; and by von Salis (1892) in the 4to series of the Mon. Germ. hist. Cf. R. Dareste, " La Loi Gombette," in the Journal des savants (July 1891).

3. Partus Alamannorum and Lex Alamannorum. — Of the laws of the Alamanni, who dwelt between the Rhine and the Lech, and spread over Alsace and what is now Switzerland to the south of Lake Constance, we possess two different texts. The earlier text, of which five short fragments have come down to us, is known as the Partus Alamannorum, and from the per- sistent recurrence of the expression " et sic convenit " was most probably drawn up by an official commission. The reference to affranchisement in ecclesia shows that it was composed at. a period subsequent to the conversion of the Alamanni to Christianity. There is no doubt that the text dates back to the reign of Dagobert I., i.e. to the first half of the 7th century. The later text, known as the Lex Alamannorum, dates from a period when Alamannia was independent under national dukes, but

recognized the theoretical suzerainty of the Frankish kings. There seems no reason to doubt the St Gall MS., which states that the law had its origin in an agreement between the great Alamannic lords and Duke Landfrid, who ruled the duchy from 709 to 730.

The two texts have been published by J. Merkel in the Mon. Germ, hist., Leges, iii., and by Karl Lehmann in the 4to series of the same collection.

4. Lex Bajuvariorum. — We possess an important law of the Bavarians, whose duchy was situated in the region east of the Lech, and was an outpost of Germany against the Huns, known later as Avars. Parts of this law have been taken directly from the Visigothic law of Euric and from the law of the Alamanni. The Bavarian law, therefore, is later than that of the Alamanni. It dates unquestionably from a period when the Frankish authority was very strong in Bavaria, when the dukes were vassals of the Frankish kings. Immediately after the revolt of Bavaria in 743 the Bavarian duke Odilo was forced to submit 1 to Pippin and Carloman, the sons of Charles Martel, and to

recognize the Frankish suzerainty. About the same period, too, the church of Bavaria was organized by St Boniface, and the country divided into several bishoprics; and we find frequent references to these bishops (in the plural) in the law of the Bavarians. On the other hand, we know that the law is anterior to the reign of Duke Tassilo III. (749-788). The date of com- pilation must, therefore, be placed between 743 and 749.

There is an edition of the Lex Bajuvariorum by J. Merkel in the Mon. Germ, hist., Leges, iii. 183, and another was undertaken by E. von Schwind for the 4to series of the same collection. Cf. von Schwind's article in the Neues Archiv, vol. xxxi.

5. Lex Saxonum. — Germany comprised two other duchies, Saxony and Frisia, of each of which we possess a text of law. The Lex Saxonum has come down to us in two MSS. and two old editions (those of B. J. Herold and du Tillet), and the text has been edited by Karl von Richthofen in the Mon. Germ, hist., Leges, v. The law contains ancient customary enactments of Saxony, and, in the form in which it has reached us, is later than the conquest of Saxony by

Charlemagne. It is preceded by two capitularies of Charlemagne for Saxony — the Capitulatio de partibus Saxoniae (A. Boretius i. 68), which dates undoubtedly from 782, and is characterized by great severity, death being the penalty for every offence against the Christian religion; and the Capitulare Saxonicum (A. Boretius i. 71), of the 28th of October 797, in which Charlemagne shows less brutality and pronounces simple compositions for misdeeds which formerly entailed death. The Lex Saxonum apparently dates from 803, since it contains provisions which are in the Capitulare legi Ribuariae additum of that year. The law established the ancient customs, at the same time eliminating anything that was contrary to the spirit of Christianity; it proclaimed the peace of the churches, whose possessions it guaranteed and whose right of asylum it recognized.

6. Lex Frisionum. — This consists of a medley of documents of the most heterogeneous character. Some of its enactments are purely pagan — thus one paragraph allows the mother to kill her new-born child, and another prescribes the immolation to the gods of the defiler of their temple; others are purely Christian, such as those which prohibit incestuous marriages and working on Sunday. The law abounds in contradictions and repetitions, and the compositions are calculated in different moneys. From this it would appear that the documents were merely materials collected from various sources and possibly with a view to the compilation of a homogeneous law. These materials were appar- ently brought together at the beginning of the 9th century, at a time of intense legislative activity at the court of Charlemagne.

There are no MSS. of the document extant; our knowledge of it is based upon B. J. Herold's edition (Originum ac Germanicarum antiquitatum libri, Basel, 1557), which has been reproduced by Karl von Richthofen in the Mon. Germ, hist., Leges, iii. 631.

7. Lex Angliorum el Werinorum, hoc est, Thuringorum. — In early times there dwelt in Thuringia, south of the river Unstrut, the Angli, who gave their name to the pagus Engili, and to the east, between the Saale and the Elster, the Warni (Werini, or Varini) , whose name is seen in Werenof eld. In the 9th century, however, this region (then called Werenofeld) was occupied by the Sorabi, and the Warni and Angli either coalesced with the Thuringi or sought an asylum in the north of Germany. A collection of laws has come down to us bearing the name of these two peoples, the Lex Angliorum et Werinorum, hoc est, Thuringorum. This text is a collection of local customs arranged in the same order as the law of the Ripuarians. Parts of it are based

on the Capitulare legi Ribuariae additum of 803, and it seems to have been drawn up in the same conditions and circum- stances as the law of the Saxons. There is an edition of this code by Karl von Richthofen in the Mon. Germ, hist., Leges, v. 103. The old opinion that the law originated in south Holland is entirely without foundation.

• 8. Leges Langobardorum. — We possess a fair amount of information on the origin of the last barbarian code, the laws of the Lombards. The first part, consisting of 388 chapters, is known as the Edictus Langobardorum, and was promulgated by King Rothar at a diet held at Pavia on the 22 nd of November 643. This work, composed at one time and arranged on a

systematic plan,isveryremarkable. The compilers knew Roman law, but drew upon it only for their method of presentation and for their terminology; and the document presents Germanic law in its purity. Rothar's edict was augmented by his successors: Grimoald (668) added nine chapters; Liutprand (713-735), fifteen volumes, containing a great number of ecclesiastical enactments; Ratchis (746), eight chapters; and Aistulf (755), thirteen chapters. After the union of the Lombards to the Frankish kingdom, the capitularies made for the entire kingdom were applicable to Italy. There were also special capitularies for Italy, called Capitula Italica, some of which were appended to the edict of Rothar.

At an early date compilations were formed in Italy for the use of legal practitioners and jurists. Eberhard, duke and margrave of Rhaetia and Friuli, arranged the contents of the edict with its successive additamenta into a Concordia de singulis causis (829-832). In the 10th century a collection was made of the capitularies in use in Italy, and this was known as the Capitulare Langobardorum. Then appeared, under the influence of the school of law at Pavia, the Liber legis Langobardorum, also called Liber Papiensis (beginning of nth century), and the Lombarda (end of nth century) in two forms — that given in a Monte Cassino MS. and known as the Lombarda Casinensis, and the Lombarda Vulgala.

There are editions of the Edictus, the Concordia, and the Liber Papiensis by F. Bluhme and A. Boretius in the Mon. Germ, hist., Leges, iv. Bluhme also gives the rubrics of the Lombardae, which were published by F. Lindenberg in his Codex legum antiguarum in 1613. For further information on the laws of the Lombards see J. Merkel, Geschichte des Langobardenrechts (1850); A. Boretius, Die Kapitularien im Langobardenreich (1864); and C. Kier, Edictus

Rotari (Copenhagen, 1898). Cf. R. Dareste in the Nouvelle Revue historique de droit francais et etranger (1900, p. 143). (C. Pf.)

GERMANICUS CAESAR (15 b.c.-a.d. 19), a Roman general and provincial governor in the reign of Tiberius. The name Germanicus, the only one by which he is known in history, he inherited from his father, Nero Claudius Drusus, the famous general, brother of Tiberius and stepson of Augustus. Hismotber was the younger Antonia, daughter of Marcus Antonius and niece of Augustus, and he married Agrippina, the granddaughter of the same emperor. It was natural, therefore, that he should . be regarded as a candidate for the purple. Augustus, it would seem, long hesitated whether he should name him as his successor, and as a compromise required his uncle Tiberius to adopt him, though Tiberius had a son of his own. Of his early years and education little is known. That he possessed considerable literary abilities, and that these were carefully trained, we gather, both from the speeches which Tacitus puts into his mouth, and from the reputation he left as an orator, as attested by Suetonius and Ovid, and from the extant fragments of his works.

At the age of twenty he served his apprenticeship as a soldier under Tiberius, and was rewarded with the triumphal insignia for his services in crushing the revolt in Dalmatia and Pannonia. In a.d. 11 he accompanied Tiberius in his campaign on the Rhine, undertaken, in consequence of the defeat of Varus, with the object of securing the German frontier. In 12 he was made consul, and increased his popularity by appearing as an advocate in the courts of justice, and by the celebration of brilliant games. Soon afterwards he was appointed by Augustus to the important command of the eight legions on the Rhine. The news of the emperor's death (14) found Germanicus at Lugdunum (Lyons), where he was superintending the census of Gaul. Close upon this came the report that a mutiny had broken out among his legions on the lower Rhine. Germanicus hurried back to the camp, which was now in open insurrection. The tumult was with difficulty quelled, partly by well-timed concessions, for which the authority of the emperor was forged, but chiefly owing to his personal popularity. Some of the insurgents actually proposed that he should put himself at their head and secure the empire for himself, but their offer was rejected with indig- nation. In order to calm the excitement Germanicus determined at once on an active campaign. Crossing the Rhine, he attacked and routed the Marsi, and laid waste the valley of the Ems.

GERMANIUM— GERMAN LANGUAGE

In the following year he marched against Arminius, the conqueror of Varus, and performed the last rites over the remains of the Roman soldiers that still lay there unburied, erecting a barrow to mark the spot. Arminius, however, favoured by the marshy ground, was able to hold his own, and it required another campaign before he was finally defeated. A masterly combined movement by land and water enabled Germanicus to concentrate his forces against the main body of the Germans encamped on theWeser,andto crush them in two obstinately contested battles. A monument erected on the field proclaimed that the army of Tiberius had conquered every tribe between the Rhine and the Elbe. Great, however, as the success of the Roman arms had been, it was not such as to justify this boastful inscription; we read of renewed attacks from the barbarians, and plans of a fourth campaign for the next summer.

But the success of Germanicus had already stirred the jealousy and fears of Tiberius, and he was reluctantly compelled to return to Rome. On the 26th of May 17 he celebrated a triumph. The enthusiasm with which he was welcomed, not only by the populace, but by the emperor's own praetorians, was so great that the earliest pretext was seized to remove him from the capital. He was sent to the East with extraordinary powers to settle a disputed succession in Parthia and Armenia. At the same time Gnaeus Calpurnius Piso, one of the most violent and ambitious of the old nobility, was sent as governor of Syria to watch his movements. Germanicus proceeded by easy stages to his province, halting on his way in Dalmatia, and visiting the battle- field of Actium, Athens, Ilium, and other places of historic interest. At Rhodes he met his coadjutor Piso, who was seeking everywhere to thwart and malign him. When at last he reached his destina- tion, he found little difficulty in effecting the settlement of the disturbed provinces, notwithstanding Piso's violent and persistent opposition. At Artaxata Zeno, the popular candidate for the throne, was crowned king of Armenia. To the provinces of Cappadocia and Commagene Roman governors were assigned; Parthia was conciliated by the banishment of the dethroned king Vonones.

After wintering in Syria Germanicus started for a tour in Egypt. The chief motive for his journey was love of travel and antiquarian study, and it seems never to have occurred to him, till he was warned by Tiberius, that he was thereby transgressing an unwritten law which forbade any Roman of rank to set foot in Egypt without express permission. On his return to Syria he found that all his

arrangements had been upset by Piso. Violent recriminations followed, the result of which, it would seem, was a promise on the part of Piso to quit the province. But at this juncture Germanicus was suddenly attacked at Epidaphne near Antioch by a violent illness, which he himself and his friends attributed to poison administered by Plancina, the wife of Piso, at the instigation of Tiberius. Whether these suspicions were true is open to question; it seems more probable that his death was due to natural causes. His ashes were brought to Rome in the following year (20) by his wife Agrippina, and deposited in the grave of Augustus. He had nine children, six of whom, three sons and three daughters, survived him, amongst them the future emperor Gaius and the notorious Agrippina, the mother of Nero. The news of his death cast a gloom over the whole empire. Nor was Germanicus unworthy of this passionate devotion. He had wiped out a great national disgrace; he had quelled the most formidable foe of Rome. His private life had been stainless, and he possessed a singularly attractive personality. Yet there were elements of weakness in his character which his short life only half revealed: an impetuosity which made him twice threaten to take his own life; a superstitious vein which impelled him to consult oracles and shrink from bad omens; an amiable dilettantism which led him to travel in Egypt while his enemy was plotting his ruin; a want of nerve and resolution which prevented him from coming to an open rupture with Piso till it was too late.

He possessed considerable literary abilities; his speeches and Greek comedies were highly spoken of by his contemporaries. But the only specimen of his work that has come down to us is

the translation in Latin hexameters (generally attributed to him, although some consider Domitian the author), together with scholia, of the Phaenomena of Aratus, which is superior to those of Cicero and Avienus (best edition by A. Breysig, 1867; 1899, without the scholia). A few extant Greek and Latin epigrams also bear the name Germanicus.

In addition to monographs by A. Zingerle (Trent, 1867) and A. Breysig (Erfurt, 1892), there are treatises on the German campaigns by E. von Wietersheim (1850), P. Hofer (1884), F. Knoke (1887, 1889), W. Fricke (1889), A. Taramelli (1891), Dahm (1902).

See Tacitus, Annals, i.-iv. (ed. Furneaux) ; Suetonius, Augustus, Tiberius ; J. C. Tarver, Tiberius (1902) ; Merivale, Hist, of the Romans under the Empire, chs. 42, 43; H. Schiller, Gesckichte der

romischen Kaiserzeit, i. 1 (1883), pp. 227, 258, 261-266, 270-276; M. Schanz, Gesckichte der romischen Litteratur, pt. ii. (2nd ed., 1901), and Teuffel- Schwabe, Hist, of Roman Literature (Eng. tr., 1900), 275.

GERMANIUM (symbol Ge, atomic weight 72-5); one of the metallic elements included in the same natural family as carbon, silicon, tin and lead. It was discovered in 1886 by C. Winkler in argyrodite, a mineral found at Freiberg in Saxony. On ex- amination of the metal and its salts it was shown to be identical with the hypothetical element ekasilicon, whose properties had been predicted by D. Mendeleeff many years previously. The element is of extremely rare occurrence, being met with only in argyrodite and, to a very small extent, in euxenite. It may be obtained from argyrodite by heating the mineral in a current of hydrogen; or by heating the dioxide to redness with carbon. It forms grey coloured octahedra of specific gravity 5-496 at 20° C., melting at 900° C.; it burns at a red heat, is insoluble in hydrochloric acid, but dissolves in aqua regia, and is also soluble in molten alkalis. Two oxides of germanium are known, the dioxide, Ge02, being obtained by roasting the sulphide and treatment with nitric acid. It is a white powder, very slightly soluble in water, and possesses acid properties. By heating with a small quantity of magnesium it is converted into germanious oxide, GeO. By heating the metal with chlorine, germanic chloride, GeCL,, is obtained as a colourless fuming liquid boiling at 86-87 C., it is decomposed by water forming a hydrated germanium dioxide. Germanium dichloride, GeCl 2l and germanium chloroform, GeHCU, have also been described.

Germanium compounds on fusion with alkaline carbonates and sulphur form salts known as thiogermanates. If excess of a mineral acid be added to a solution of an alkaline thiogermanate a white precipitate of germanium disulphide, GeS2, is obtained. It can also be obtained by passing sulphuretted hydrogen through a solution of the dioxide in hydrochloric acid. It is appreciably soluble in water, and also in solutions of the caustic alkalis and alkaline sulphides. By heating the disulphide in a current of hydrogen, germanious sulphide, GeS, is formed. It sublimes in thin plates of a dark colour and metallic lustre, and is soluble in solutions of the caustic alkalis. Alkyl compounds of ger- manium such as germanium tetra-ethyl, Ge(C2H 5) 4 , a liquid boiling at 160 C., have been obtained. The germanium salts are most readily recognized by the white precipitate of the disulphide, formed in acid solutions, on passing sulphuretted hydrogen. The atomic weight of the element was determined by C. Winkler by analysis of the pure chloride GeCU, the value obtained

being 72-32, whilst Lecoq de Boisbaudran (Comptes rendus, 1886, 103, 45 2), by a comparison of the lines in the spark spectrum of the element, deduced the value 72-3.

GERMAN LANGUAGE. Together with English and Frisian, the German language forms part of the West Germanic group of languages. To this group belongs also Langobardian, a dialect which died out in the 9th or 10th century, while Burgun- dian, traces of which are not met with later than the 5th century, is usually classed with the East Germanic group. Both these tongues were at an early stage crushed out by Romance dialects, a fate which also overtook the idiom of the Western Franks, who, in the so-called Strassburg Oaths x of 842, use the Romance tongue, and are addressed in that tongue by Louis the German.

Leaving English and Frisian aside, we understand by Deutsche

1 K. Mullenhoff and W. Scherer, Denkmdler deutscher Poesie und Prosa, 3rd ed., by E. Steinmeyer, 1892, No. lxvii.

Sprache the language of those West Germanic tribes, who, at their earliest appearance in history, spoke a Germanic tongue, and still speak it at the present day. The chief of these tribes are: the Saxons, the Franks (but with the restriction noted above), the Chatti (Hessians), Thuringians, Alemannians and Bavarians. This definition naturally includes the languages spoken in the Low Countries, Flemish and Dutch, which are offsprings of the Low Franconian dialect, mixed with Frisian and Saxon elements; but, as the literary development of these languages has been in its later stages entirely independent of that of the German language, they are excluded from the present survey.

The German language, which is spoken by about seventy-one millions, and consequently occupies in this respect the third place among European languages, borders, in the west and south, on Romance languages (French, Italian), and also to some extent on Slavonic. On Italian and Slovenian territory there are several German-speaking " islands," notably the Sette and Tredici Communi, east and north-east of the Lake of Garda, and the " Gottschee Landchen " to the south of Laibach. The former of these is, however, on the point of dying out. Neighbours on the east, where the

boundary line runs by no means as straight as on the west or south, are the Magyars and again Slavonic races. Here, too, there are numerous " islands " on Hungarian and Slavonic territory. Danes and Frisians join hands with the Germans in the north. 1

In the west and south the German language has, compared with its status in earlier periods, undoubtedly lost ground, having been encroached upon by Romance tongues. This is the case in French Flanders, in Alsace and Lorraine, at any rate before the war of 1870, in the valleys south of Monte Rosa and in southern Tirol; in Styria and Carinthia the encroachment is less marked, but quite perceptible. On the east, on the other hand, German steadily spread from the days of Charles the Great down to recent times, when it has again lost considerable ground in Bohemia, Moravia and Livonia. At the time of Charles the Great the eastern frontier extended very little beyond the lower Elbe, following this river beyond Magdeburg, whence it passed over to the Saale, the Bohemian forest and the river Enns (cf. the map in F. Dahn, Urgeschichte der germanischen und romanischen V biker, vol. iii.). Partly as a result of victories gained by the Germans over the Avars and Slavs, partly owing to peaceful colonization, the eastern boundary was pushed forward in subsequent centuries; Bohemia was in this way won for the German tongue by German colonists in the 13th century, Silesia even a little earlier; in Livonia German gained the upper hand during the 13th century, while about the same time the country of the Prussians was conquered and colonized by the knights of the Teutonic order. The dialect which these colonists and knights introduced bore the Middle German character; and this, in various modifications, combined with Low German and even Dutch elements, formed the German spoken in these newly-won territories. In the north (Schleswig), where at the time of Charles the Great the river Eider formed the linguistic boundary, German has gained and is still gaining on Danish.

Before considering the development of the language spoken within these boundaries, a word of explanation is perhaps necessary with regard to the word deutsch. As applied to the language, deutsch first appears in the Latin form theotiscus, lingua theotisca, teutisca, in certain Latin writings of the 8th and gth centuries, whereas the original Old High German word thiudisc, tiutisc (from thiot, diot, " people," and the suffix -isc) signified only " appertaining to the people,". " in the manner of the people." Cf. also Gothic }Hudisko as a translation of Wvik&s (Gal. ii. 14). It, therefore, seems probable that if the application' of the word to the language (lingua theotisca) was not exactly an invention of Latin authors of German nationality, its use in this sense was at least encouraged by them in order to

1 For a detailed description of the boundary line cf. 0. Behaghel's irticle in Paul's Grundriss, 2nd ed., pp. 652-657, where there is also a map, and a very full bibliography relative to the changes in the boundary.

distinguish their own vernacular (lingua vulgaris) from Latin as well as from the lingua romana?

In the 8th and 9th centuries German or " Deutsch " first appears as a written language in the dialects of Old High German and Old Low German. Of an " Urdeutsch " or primitive German, i.e. the common language from which these sharply distinguished dialects of the earliest historical period must have developed, we have no record; we can only infer its character — and it was itself certainly not free from dialectic variations — by a study of the above-named and other Germanic dialects. It is usual to divide the history of the German language from this earliest period, when it appears only in the form of proper names and isolated words as glosses to a Latin text, down to the present day, into three great sections: (1) Old High German (Althochdeutsch) and Old Low German (Old Saxon; Altnieder-deutsch, Altsdchsisch); (2) Middle High German (Mittelhoch-deutsch) and Middle Low German (Mittelniederdeutsch); and (3) Modern High German and Modern Low German (Neuhoch- deutsch and Neunieder deutsch). It is more difficult to determine the duration of the different periods, for it is obvious that the transition from one stage of a language to another takes place slowly and gradually.

The first or Old High German period is commonly regarded as extending to about the year 1 100. The principal characteristic of the change from Old High German to Middle High German is the weakening of the unaccented vowels in final syllables (cf. O.H.G. tagd, gesli, geban, gdbum and M.H.G. tage, geste, geben, gaben). But it must be remembered that this process began tentatively as early as the 10th century in Low German, and also that long, unaccented vowels are preserved in the Alemannic dialect as late as the 14th century and even later. Opinion is more at variance with regard to the division between the second and third periods. Some would date Modern High German from the time of Luther, that is to say, from about 1500. But it must be noted that certain characteristics attributed to the Modern German vowel system, such as lengthening of Middle High German short vowels, the change from Middle High German I, u, iu to Modern High German ei, au, eu (6u), of Middle High German ie, uo, tie to Modern High German i, u, U, made their appearance long before 1500. Taking this fact into consideration, others distinguish a period of classical Middle High German

extending to about 1250, and a period of transition (sometimes called Friihneuhochdeutsch, or Early Modern High German) from 1250 to 1650. The principal characteristics of Modern High German would then consist in a greater stability of the grammatical and syntactical rules, due to the efforts of earlier grammarians, such as Schottelius, Gottsched and others, and the substitution of a single vowel sound for the varying vowels of the singular and plural of the preterite of strong verbs (cf. Middle High German schreib, schriben, and Modern High German schrieb, schrieben, &c). The much debated question of the origins of Modern High German has been recently reopened by O. Behaghel (Geschichte der deutschen Sprache, I.e. 661), who hopes that a more satisfactory solution may be arrived at by the study of certain syntac- tical peculiarities to be seen in the dialects of more recent periods.

As the middle ages did not produce a German Schriftsprache or literary language in the modern sense of the word, which — as is undoubtedly the case in Modern German — might have influenced the spoken language (Umgangssprache), the history of the language in its earlier stages is a history of different dialects. These dialects will, therefore, claim our attention at some length.

It may be assumed that the languages of the different West Germanic tribes enumerated above were, before the appearance of the tribes in history, distinguished by many dialectic variations ; 2 Cf. J. Grimm, Deutsche Grammatik, 3rd ed., i. p. 13; F. Kluge, Etymologisches Wbrterbuch, 6th ed., pp. 75 ff . ; K. Luick, " Zur Geschichte des Wortes 'deutsch,' " in Anzeiger fur deutsches Altertum, xv., pp. 135, 248; H. Fischer, " Theotiscus, Deutsch," in Paul and Braune's Beitrage, xviii. p. 203; H. Paul, Deutsches Worterbuch (1897), P- 93-

this was certainly the case immediately after the Migrations, when the various races began to settle down. But these differ- ences, consisting presumably in matters of phonology and vocabulary, were nowhere so pronounced as to exclude a mutual understanding of individuals belonging to different tribes. One might compare the case of the Poles and Czechs of the present day. During the 6th century, however, a phonological process set in, which ultimately resulted in the separation of Germany into two great linguistic divisions, south and north, or, as the languages are called, High and Low German.

This fundamental change, which is known as the second or High German Soundshifting (Lautverschiebung) , spread northward from the mountainous districts in the south, and, whatever its cause may have been, 1 left behind it clear and easily recognizable effects on the Germanic voiced stop d, which became changed to t, and more especially on the voiceless stops t, p and k. Dialects which have shifted initial t and U in the middle of a word to the affricate tz (written z, tz) and p and k in corresponding positions to the affricates pf and k\ (written ch), further, t, p and k in the middle of words between vowels, to the double spirant zz (now written ss, sz),jf, hh (written ch),a,re called High German; those in which these changes have not taken place form the Low German group, this group agreeing in this respect with English and Frisian.

Of these sound changes, that of t to tz and zz (ss) is the most universal, extending over the whole region in which shifting occurs; that of k to k\ (ch), the most restricted, being only found in Old Bavarian, and in the Swiss pronunciation, e.g. in chind. The remaining dialects occupy positions between the two extremes of complete shifting and the absence of shifting. Some Franconian dialects, for instance, leave p unchanged under certain conditions, and in one dialect at least, Middle Franconian, / has remained after vowels in certain pronominal forms (dat, ■mat, allet, &c). On this ground a subdivision has been made in the High German dialects into (a) an Upper German (Oberdeutsch) and (b) a Middle German (Mitleldeutsch) group; and this sub- division practically holds good for all periods of the language, although in Old High German times the Middle German group is only represented, as far as the written language is concerned, by Franconian dialects.

As the scientific study of the German language advanced there arose a keen revival of interest — and that not merely on the part of scholars — in the dialects which were so long held in con- tempt as a mere corruption of the Schriftsprache? We are still in the midst of a movement which, under the guidance of scholars, has, during the last three decades, bestowed great care on many of the existing dialects; phonological questions have received most attention, but problems of syntax have also not been neglected. Monumental works like. Wenker's Sprachallas des deutschen Retches and dialect dictionaries are either in course of publication or preparing; 3 while the difficult questions concerned with defining the boundaries of the various dialects

1 Cf. P. Kretschmer, Einleitung in die Geschichte der griechischen Sprache (Gottingen, 1896), who holds the mingling of Celtic and

Germanic elements in southern and south-western Germany responsible for the change. It might also be mentioned here that H. Meyer (Zeitschriftf. deut. Altertum, xlv. pp. 101 ff.) endeavours to explain the first soundshifting by the change of abode of the Germanic tribes from the lowlands to the highlands of the Carpathian Mountains.

2 Of writers who have made extensive use of dialects, it must suffice to mention here the names of J. H. Voss, Hebel, Klaus Groth, Fritz Reuter, Usteri, G. D. Arnold, Holtei, Castelli, J. G. Seidl and Anzengruber, and in our own days G. Hauptmann.

3 Cf. F. Staub and L. Tobler, Schweizerisches Idiotikon (1881 ff.); E. Martin and F. Lienhart, Worterbuch der elsdssischen Mundarten (Strassburg, 1899 ff.); H. Fischer, Schwdbisches Wbrterbuth (Tubingen, 1901 ff.). Earlier works, which are already completed, are J. A. Schmeller, Bayrisches Worterbuch (2nd ed., 2 vols., Munich, 1872-1877); J. B. Schopf, Tiroler Idiotikon (Innsbruck, 1886); M. Lexer, Kdrntisches Worterbuch (1862); H. Gradl, Egerldnder Worterbuch, i. (Eger, 1883); A. F. C. Vilmar, Idiotikon von Kur- hessen (Marburg, 1883) (with supplements by H. von Pfister) ; W. Crecelius, Oberhessisches Worterbuch (Darmstadt, 1890-1898). Professor J. Franck is responsible for a Rheinisches Worterbuch for the Prussian Academy.

and explaining the reasons for them form the subject of many monographs. 4

Beginning in the north we shall now pass briefly in review the dialects spoken throughout the German-speaking area.

A. The Low German Dialects The Low German dialects, as we have seen, stand nearest to the English and Frisian languages, owing to the total absence of the consonantal shifting which characterizes High German, as well as to other peculiarities of sounds and inflections, e.g. the loss of the nasals m and n before the spirants/, s and p. Cf. Old Saxon fif (five), us (us), kup (cf. uncouth). The boundary-line between Low and High German, the so-called Benrather Linie, may roughly be indicated by the following place-names, on the understanding, however, that the Ripuarian dialect (see below) is to be classed with High German: Montjoie (French border-town), Eupen, Aachen, Benrath, Diisseldorf, north of Siegen, Cassel, Heiligenstadt, Harzgerode, to the Elbe south of Magdeburg; this river forms the boundary as far as Wittenberg, whence the line passes to Lubben on the Spree, Fiirstenwald on the Oder and Birnbaum near

the river Warthe. Beyond this point the Low Germans have Slavs as their neighbours. Compared with the conditions in the 13th century, it appears that Low German has lost ground; down to the 14th and 15th centuries several towns, such as Mansfeld, Eisleben, Merseburg, Halle, Dessau and Wittenberg, spoke Low German.

Low German falls into two divisions, a western division, namely, Low Franconian, the parent, as we have already said, of Flemish and Dutch, and an eastern division, Low Saxon (Plattdeutsch, or, as it is often simply called, Low German). The chief characteristic of the division is to be sought in the ending of the first and third person plural of the present indicative of verbs, this being in the former case -en, in the latter -et. Inasmuch as the south-eastern part of Low Franconian — inclusive of Gelderland and Cleves — shifts final k to ch (e.g. ich, mich, auch, lich), it must obviously be separated from the rest, and in this respect be grouped with High German. Low Saxon is usually divided into Westphalian (to the west of the Weser) and Low Saxon proper, between Weser and Elbe. The south eastern part of the latter has the verbal ending -en and further shows the peculiarity that the personal pronoun has the same form in the dative and accusative (mih, dick), whereas the remainder, as well as the Westphalian, has mi, di in the dative, and mi, di or mik, dik in the accusative. To these Low German dialects must also be added those spoken east of the Elbe on what was originally Slavonic territory ; they have the ending -en in the first and third person plural of verbs. 6

B. The High German Dialects

1. The Middle German Group. — This group, which comprises the dialects of the Middle Rhine, of Hesse, Thuringia, Upper Saxony (Meissen), Silesia and East Prussia to the east of the lower Vistula between Bischofswerder, Marienburg, Elbing, Wormditt and Wartenberg — a district originally colonized from Silesia — may be most conveniently divided into an East and a West Middle German group. A common characteristic of all these dialects is the diminutive suffix -chen, as compared with the Low German form -ken and the Upper German lein (O.H.G. tin). East Middle German consists of Silesian, Upper Saxon and Thuringian, 6 together with the lin guistic colony in East Prussia. While these dialects have shifted initial Germanic p to ph, or even to/ (fert=Pferd), the West Middle German dialects (roughly speaking to the west of the watershed of Werra and Fulda) have retained it. If, following a convincing article in the Zeitschrift fur deutsches Altertum (37, 288 ff.) by F. Wrede, we class East and South Franconianˆbothˆ together may be called High

Franconian — with the Upper German dialects, there only remain in the West Middle German group: 7 (a) Middle

4 Cf. the article " Mundarten " by R. Loewe in R. Bethge, Ergebnisse und Fortschritte der germanistischen Wissenschaft (Leipzig, 1902), pp. 75-88; and F. Mentz, Bibliographic der deutschen Mundarlforschung (Leipzig, 1892). Of periodicals may be mentioned Deutsche Mundarten, by J. W. Nagl (Vienna, 1896 ff.); Zeitschrift fur hochdeutsche Mundarten, by O. Heilig and Ph. Lenz (Heidelberg,

1900 ff.), continued as Zeitschrift f. deutsche Mundarten, Verlag des Allgemeinen Deutschen Sprach vereins. Owing to its importance as a model for subsequent monographs J. Kinteler's Die Kerenzer Mundart des Kantons Glarus (Leipzig, 1876) should not be passed unnoticed.

5 Cf. especially H. Tumpel, " Die Mundarten des alten niedersachsischen Gebietes zwischen 1300 und 1500 " (Paul und Braune's Beitrdge, vii. pp. 1-104) ; Niederdeutsche Studien, by the same writer (Bielefeld, 1898); Bahnke, " Uber Sprach- und Gaugrenzen zwischen Elbe und Weser " (Jahrbuch des Vereins fur niederdeutsche Sprachfor- schung, vii. p. 77).

6 Upper Saxon and Thuringian are sometimes taken as a separate group.

7 Cf. W. Braune, " Zur Kenntnis des Frankischen " (Beitrdge, i. pp. 1-56); O. Bohme, Zur Kenntnis des Oberfrdnkischen im 13. 14. und 15. Jahrh. (Dissertation) (Leipzig, 1893), where a good account of the differences between the Rhenish Franconian and South Franconian dialects will be found.

Franconian and (b) Rhenish Franconian. The former of these, 1 which with its dat, mat, allet, &c. (cf. above) and its retention of the voiced spirant b (written v) represents a kind of transition dialect to Low German, is itself divided into (a) Ripuarian or Low Rhenish with Cologne and Aachen (Aix-la-Chapelle) as centres, and (0) Moselle Franconian 2 with Trier (Treves) as principal town. The latter is distinguished by the fact that in the Middle High German period it shifts Germanic rp and rd, which are retained in (a), to-r/-and rl (cf. werfen, hirtin with werpen, hirdin). 3 The Rhenish Franconian dialect is spoken in the Rhenish palatinate, in the northern part of

Baden (Heidelberg), Hesse 4 and Nassau, and in the German-speaking part of Lorraine. A line drawn from Falkenberg at the French frontier to Siegen on the Lahn, touching the Rhine near Boppard, roughly indicates the division between Middle and Rhenish Franconian.

2. The Upper German Group. — The Upper German dialects, which played the most important part in the literature of the early periods, may be divided into (a) a Bavarian-Austrian group and (b) a High Franconian-Alemannic group. Of all the German dialects the Bavarian-Austrian has carried the soundshifting to its furthest extreme; here only do we find the labial voiced stop b written p in the middle of a word, viz. old Bavarian kapames, old Alemannic kabames (" we gave ") ; here too, in the 12th century, we find the first traces of that broadening of i, u, iu (u) to ei, au, eu, a change which, even at the present day, is still foreign to the greater part of the Alemannic dialects. Only in Bavarian do we still find the old pronominal dual forms es and enk (for ihr and euch). Finally, Bavarian forms diminutives in -el and -erl (Mddel, Maderl), while the Franconian-Alemannic forms are -la and -le (Mddle). On the other hand, the pronunciation of -s as -sch, especially -st as scht (cf. Last, Haspel, pronounced Lascht, Haschpel), may be mentioned as characteristic of the Alemannic, just as the fortis pronuncia tion of initial t is characteristic of High Franconian, while the other Franconian and Upper German dialects employ the lenis.

The Alemannic dialect which, roughly speaking, is separated from Bavarian by the Lech and borders on Italian territory in the south and on French in the west, is subdivided into: (a) Swabian, the dialect of the kingdom of Wiirttemberg and the north-western part of Tirol (cf. H. Fischer, Geographie der schwabischen Mundart, 1895); (b) High Alemannic (Swiss), including the German dialects of Switzerland, of the southern part of the Black Forest (the Basel-Breisgau dialect), and that of Vorarlberg; (c) Low Alemannic, comprising the dialects of Alsace- and part of Baden (to the north of the Feldberg and south of Rastatt), also, at the present day, the town of Basel. Only Swabian has taken part in the change of i to ei, &c, mentioned above, while initial Germanic k has been shifted to ch (x) only in High Alemannic (cf. chalt, chind, chorn, for kalt, kind, horn). The pronunciation of u as «, « (Hiis for Haus) is peculiar to Alsatian.

The High Franconian dialects, that is to say, east and south (or south-Rhenish) Franconian, which are separated broadly speaking by the river Neckar, comprise the language spoken in a part of Baden,

the dialects of the Main valley from Wiirzburg upwards to Bamberg, the dialect of Nuremberg and probably of the Vogtland (Plauen) and Egerland. During the older historical period the principal difference between East and South Franconian consisted in the fact that initial Germanic d was retained in the latter dialect, while East Franconian shifted it to /. Both, like Bavarian and Alemannic, shift initial German p to the affricate pf.

Finally, the Bavarian-Austrian dialect is spoken throughout the greater part of the kingdom of Bavaria (i.e. east of the Lech and a fine drawn from the point where the Lech joins the Danube to the sources of the riversElster and Mulde, this being the East Franconian border-line), in Austria, western Bohemia, and in the German linguistic " islands " embedded in Hungary, in Gottschee and the Sette and Tredici Communi (cf. above). 6

1 Cf. C. Norrenberg, " Lautverschiebungsstufe des Mittelfrankischen " (Beitrage, ix. 371 ff.) ; R. Heinzel, Geschichle der niederfran- kischen Geschaftssprache (Paderborn, 1874).

J This is also the dialect of the so-called Siebenbiirger Sachsen.

3 Cf. E. Sievers, Oxforder Benediktinerregel (Halle, 1887), p. xvi. ; J. Meier, Jolande (1887), pp. vii. ff. ; 0. Bohme, I.e. p. 60.

4 Lower Hesse (the northern and eastern parts) goes, however, in many respects its own way.

6 On the High German dialects cf. K. Weinhold, Alemannische Grammatik (Berlin, 1863); F. Kauffmann, Geschichle der schwabischen Mundart (Strassburg, 1870) ; E. Haendcke, Die mundartlichen Elemente in den elsassischen Urkunden (Strassburg, 1894) ; K. Weinhold, Bairische Grammatik (1867) ; J. A. Schmeller, Die Mund- arten Baierns (Munich, 1821); J. N. Schwabl, Die altbairischen Mundarten (Miinchen, 1903) ; O. Brenner, Mundarten und Schrift- sprache in Bayern (Bamberg, 1890) ; J. Schatz, Die Mundart von Imst (Strassburg, 1897) ; J. W. Nagl, Der Vocalismus der bairisch- osterreichischen Mundarten (1890-1891); W. Gradl, Die Mundarten Westbohmens (Munich, 1896) ; P. Lessiak, " Die Mundart von Pernegg in Karnten " (Paul and Braune, Beitrage, vol. xxviii.). t

The Old High German Period The language spoken during the Old High German period, that is to say, down to about the year 1050, is remarkable for the fulness and richness of its vowel-sounds in word-

stems as well as in inflections. Cf. elilenti, Elend; luginari, Ltigner; karkari, Kerker; menniskono slahta, Menschengeschlecht; herzono, Herzen (gen. pi.) ; furisto, vorderste; hartost, (am) hartesten; sibunzug, siebzig; ziohemes,. (wir) ziehen; salbota, (er) salbte; gaworahtos, (du) wirktest, &c. Of the consonantal changes which took place during this period that of the spirant th (preserved only in English) to d (werthan, werdan; theob, deob) deserves mention. It spread from Upper Germany, where it is noticeable as early as the 8th century to Middle and finally, in the nth and 12th centuries, to Low Germany. Further, the initial h in hi, hn, hr, hiv (cf. hwer, wer; hreini rein; hlahhan, lachen) and w in wr (wrecceo, Recke) disappeared, this change also starting in Upper Germany and spreading slowly north. The most important vowel-change is the so-called mutation (Umlaut), 6 that is to say, the qualitative change of a vowel (except i) in a stem- syllable, owing to the influence of an i or j in the following syllable. This process commenced in the north where it seems to have' been already fully developed in Low German as early as the 8th century. It is to be found, it may be noted, in Anglo-Saxon, as early as the 6th century. It gradually worked its way southwards to Middle and Upper Germany where, however, certain consonants seem to have protected the stem syllable from the influence of i in a following syllable. Cf., for instance, Modern High German drucken and drucken; glauben, kaufen, Haupt, words which in Middle German dialects show mutation. Orthographically, however, this process is, during the first period, only to be seen in the change of a toe; from the 10th century onwards there are, it is true, some traces of other changes, and vowels like u, 0, on must have already been affected, otherwise we could not account for the mutation of these vowels at a period when the cause of it, the i orj, no longer existed. A no less important change, for it helped to differentiate High from Low German, was that of Germanic e 2 (a closed e-sound) and o diph- thongs in Old High German, while they were retained in Old Low German. Cf. O.H.G. her, hear,_ hiar, O.L.G. her; O.H.G. fuoz, O.L.G. jot. The final result was that in the 10th century ie (older forms, ia, ea) and uo (older ua, oa in Alemannic, ua in South Franconian) had asserted themselves throughout all the High German dialects. Again while in Old High German the older diphthongs ai and au were pre- served as ei and ou, unless they happened to stand at the end of a word or were followed by certain consonants (h, w, r in the one case, and h, r, I, n, th, d, t, z, s in the other; cf. zeh from zihan, zoh from ziohan, verlds, &c.) , the Old Low German shows throughout the monophthongs e (in Middle Low German a closed sound) and (cf. O.L.G. sten, oga). These monophthongs are also to be heard in

Rhenish Fran- conian, the greater part of East Franconian and the Upper Saxon and Silesian dialects of modern times (cf. Stein: Steen or Stan; laufen: lofen or lopen).

Of the dialects enumerated above, Bavarian and Alemannic, High and Rhenish Franconian as well as Old Saxon are more or less represented in the literature of the first period. But this litera- ture, the chief monuments of which are Otfrid's Evangelienbuch (in South Franconian), the Old Saxon Heliand (a life of Christ in alliterative verse), the translation of Tatian's Gospel Harmony (East Franconian) and that of a theological tract by Bishop Isidore of Seville and of parts of the Bible (Rhenish Franconian), is almost exclusively theological and didactic in character. One isconsequently inclined to attach more value to the scanty remains of the Hilde-brandslied and some interesting and ancient charms. The didactic spirit again pervades the translations and commentaries of Notker of St Gall in the early part of the nth century, as well as a para- phrase of the Song of Songs by an abbot Williram of Ebersberg a little later. Latin, however, reigned supreme throughout this period, it being the language of the charters, the lawbooks (there is nothing in Germany to compare with the laws of the Anglo-Saxons), of science, medicine, and even poetry. It is thus needless to say that there was no recognized literary language (Schriftsprache) during this period, nor even any attempt to form one; at most, we might speak of schools in the large monasteries, such as Reichenau, St Gall, Fulda, which contributed to the spread and acceptance of certain orthographical rules.

The Middle High German Period

The following are the chief changes in sounds and forms which mark the development of the language in the Middle High German period. The orthography of the MSS. reveals a much more extensive employment of mutation (Umlaut) than was the case in the first •period ; we find, for instance, as the mutation of 0, 6, of o, as, of u, iu (u), of uo, He, of ou, du, and eu (cf. holer, basse, hiuser, giiete, bourne), although many scribes, and more especially those of Middle and Low German districts, have no special signs for the mutation of u, ii, and 0. Of special interest is the so-called " later (or weaker)

6 Cf., for a hypothesis of two Umlaulsperioden during the Old High German time, F. Kauffmann, Geschichle der schwabischen Mundart (Strassburg, 1890), S. 152.

mutation " (jiingerer oder schwacherer Umlaut) of a to a very open e sound, which is often written d. Cf. mdhte (O.H.G mahti), mdgede (O.H.G. magadi). The earlier mutation of this sound produced an e(6), a closed sound {i.e. nearer i). Cf. geste (O.H.G. gesti).

The various Old High German vowels in unstressed syllables were either weakened to an indifferent e sound (geben, O.H.G. geban; bote, O.H.G. boto; sige, O.H.G. sigu) or disappeared altogether. The latter phenomenon is to be observed after I and r, and partly after n and m (cf. ar(e), O.H.G. aro; zal, O.H.G. zala; wundern, O.H.G. wuntardn, &c.) ; but it by no means took place everywhere in the same degree and at the same time. It has been already noted that the Alemannic dialect (as well as the archaic poets of the German national epic) retained at least the long unstressed vowels until as late as the 14th century (gemarterot, gekriuzegot, &c), and Low and Middle German preserved the weakened e sound in many cases where Upper German dropped it. In this period the beginnings are also to be seen in Low and Middle German (Heinrich von Veldeke shows the first traces of it) of a process which became of great importance for the formation of the Modern German literary lan- guage. This is the lengthening of originally short vowels in open syllables, 1 for example, in Modern High German Tages, Weges, lobe (Middle High German tages, weges, lobe). In Austria, on the other hand, there began as far back as the first half of the 12th century another movement of equal importance for Modern High German, namely, the conversion of the long vowels, i, M, w, into ei (ou), an, eu (du). 2 It is, therefore, in MSS. written in the south-east that we find forms like zeit, lauter (loter), heute, &c, for the first time. With the exception of Low German and Alemannic — Swabian, however, follows in this respect the majority — all the German dialects par- ticipated in this change between the 14th and- 16th centuries, although not all to the same degree. The change was perhaps assisted by the influence of the literary language which had recognized the new sounds. In England the same process has led to the modern pronunciation of time, house, &c, and in Holland to that of tijd, huis, &c. F. Wrede (Zeitschnft fur deutsches Altertum xxxix. 257 ff.) has suggested that the explanation of the change is to be sought in the apocope and syncope of the final e, and the greater stress which was in consequence put on the stem-syllable. The tendency to a change in the opposite direction, namely, the narrowing of diphthongs to monophthongs, is to be noticed in Middle German dialects, i.e. in dialects which resisted the apocope of the final e, where ie, uo, tie become I, it, u; thus we have for Brief, brif, for

huon, hun, for briieder, bruder, and this too was taken over into the Modern High German literary language. 3

No consonantal change was so widespread during this period as that of initial s to sch before /, n, m, w, p and t. Cf. slingen, schlingen ; swer (e) n, schworen, &c. The forms scht- and schp- are often to be met with in Alemannic MSS., but they were discarded again, although modern German recognizes the pronunciation schp, scht. With regard to changes affecting the inflections of verbs and nouns, it must suffice here to point out that the weakening or disappearance of vowels in unstressed syllables necessarily affected the characteristic endings of the older language; groups of verbs and substantives which in Old High German were distinct now become confused. This is best seen in the case of the weak verbs, where the three Old High German classes (cf. nerien, salbon, dagen) were fused into one. Similarly in the declensions we find an increasing tendency of certain forms to influence substantives belonging to other classes; there is, for instance, an increase in the number of neuter nouns taking -er (ir) in the plural, and of those which show mutation in the plural on the model of the i stems (O.H.G. gast, pi. gesti; cf. forms like ban, benne; hals, helse; wald, welde). Of changes in syntax the gradual decay in the use of the genitive case dependent on a noun or governed by a verb (cf. constructions like eine brunne rotes goldes, or des lodes wiinschen) towards the end of the period, and also the disappearance of the Old High German sequence of tenses ought at least to be mentioned.

In the Middle High German period, the first classical period of German poetry, the German language made great advances as a vehicle of literary expression ; its power of expression was increased and it acquired a beauty of style hitherto unknown. This was the period of the Minnesang and the great popular and court epics, of VValther von Her Vogelweide, Hartmann von Aue, Wolfram von Eschenbach and Gottfried von Strassburg; it was a period when literature enjoyed the fostering care of the courts and the nobility. At the same time German prose celebrated its first triumphs in the sermons of Berthold von Regensburg, and in the mystic writings and sermons of Meister Eckhart, Tauler and others. History (Eike von Repkow's Weltchronik) and law (Sachsenspiegel, Schwabenspiegel) no longer despised the vernacular, and from about the middle of. the 13th century German becomes, in an ever-increasing percentage, the language of deeds and charters.

It has been a much debated question how far Germany in Middle High German times possessed or aspired to possess a Schriftsprache

or literary language. 5 About the year 1200 there was undoubtedly a marked tendency towards a unification of the literary language on the part of the more careful poets like Walther von derVogelweide, Hartmann von Aue and Gottfried von Strassburg; they avoid, more particularly in their rhymes, dialectic peculiarities, such as the Bavarian dual forms es and enk, or the long vowels in unstressed syllables, retained in Alemannic, and they do not make use of archaic words or forms. We have thus a right to speak, if not of a Middle High German literary language in the widest sense of the word, at least of a Middle High German Dichtersprache or poetic language, on an Alemannic-Franconian basis. Whether, or in how far, this may have affected the ordinary speech of the nobility or courts, is a matter of conjecture; but it had an undeniable influence on Middle and Low German poets, who endeavoured at least to use High German forms in their rhymes. Attempts were also made in Low German districts, though at a later stage of this period, to unify the dialects and raise them to the level of an accepted literary lan- guage. It will be shown later why these attempts were unsuccessful. Unfortunately, however, the efforts of the High German poets to form a uniform language were also shortlived ; by the end of the 13th century the Dichtersprache had disappeared, and the dialects again reigned supreme.

Modern High German Although the Middle High German period had thus not succeeded in effecting any permanent advance in the direction of a uniform literary language, the desire for a certain degree of uniformity was never again entirely lost. At the close of the 13th century literature had passed from the hands of the nobility to those of the middle classes of the towns; the number of writers who used the German tongue rapidly increased; later the invention of printing, the in- creased efficiency of the schools, and above all the religious movement of the Reformation, contributed to awakening the desire of being understood by those who stood outside the dialectic community of the individual. A single authoritative form of writing and spelling 1 was felt on all sides to be particularly necessary. This was found in the language used officially by the various chanceries (Kanzleien), and more especially the imperial chancery. Since the days of Charles IV. (1347-1378) the latter had striven after a certain uniform, language in the documents it issued, and by the time of Maximilian I. ‘ (1493-1519) all its official documents were characterized by pretty much the same phonology, forms and vocabulary, in whatever part of Germany they originated. And under Maximilian’s successor, Charles V., the conditions remained pretty much the same. The fact that the seat of the imperial chancery had

for a long time been in Prague, led to a mingling of Upper and Middle German sounds and inflections; but when the crown came with Frederick III. (1440- 1493) to the Habsburgs, the Upper German elements were con- siderably increased. The chancery of the Saxon electorate, whose territory was exclusively Middle German, had to some extent, under the influence of the imperial chancery, allowed Upper German characteristics to influence its official language. This is clearly marked in the second half of the 15th century, and about the year 1 500 there was no essential difference between the languages of the two chanceries. Thuringia, Silesia and Brandenburg soon followed suit, and even Low German could not ultimately resist the accepted High German notation (6, h, ii, u, it, ie, &c). We have here very favourable conditions for the creation of a uniform literary language, and, as has already been said, the tendency to follow these authorities is clearly marked.

In the midst of this development arose the imposing figure of Luther, who, although by no means the originator of a common High German speech, helped very materially to establish it. He deliber- ately chose (cf. the often quoted passage in his Tischreden, ch. 69) the language of the Saxon chancery as the vehicle of his Bible translation and subsequently of his own writings. The differences between Luther's usage and that of the chancery, in phonology and inflection, are small; still he shows, in his writings subsequent to 1524, a somewhat more pronounced tendency towards Middle German. But it is noteworthy that he, like the chancery, retained the old vowel-change in the singular and plural of the preterite of the strong verbs (i.e. steig, stigen; starb, sturben), although before Luther's time the uniformity of the modern preterite had already begun to show itself here and there. The adoption of the language

1 Cf. W. Wilmanns, Deutsche Grammatik, i. (2nd edition) pp.

300-304.

2 Wilmanns, I.e. pp. 273-280. It might be mentioned that, in Modern High German, these new diphthongs are neither in spelling nor in educated pronunciation distinguished from the older ones.

3 Cf. Wilmanns, pp. 280-284. 4 fbid. pp. 129-132.

5 Cf. K. Lachmann, Kleinere Schriflen, i. p. 161 ff . ; Miillenhoff and Scherer's Denkmdler (3rd ed.), i. p. xxvii. ; H. Paul, Gab es eine mhd. Schriftsprache? (Halle, 1873); O. Behaghel, Zur Frage nach einer mhd. Schriftsprache (Basel, 1886) (Cf. Paul and Braune's

Beitrdge, xiii. p. 464 ff.) ; A. Socin, Schriftsprache und Dialekte (Heilbronn, 1888) ; H. Fischer, Zur Geschichte des Mittelhoch-deutschen (Tubingen, 1889) ; O. Behaghel, Schriftsprache und Mund- art (Giessen, 1896); K. Zwierzina, Beobachtungen zum Reimgebrauch Hartmanns und Wolframs (Haile, 1898); S. Singer, Die mhd. Schrift- sprache (1900) ; C. Kraus, Heinrich von Veldeke und die mhd. Dichtersprache (Halle, 1899); G. Roethe, Die Reimvorreden des Sachsenspiegels (Berlin, 1899); H. Tumpel, Niederdeutsche Studien

(1898).

of the chancery gave rise to the mixed character of sounds and forms which is still a feature of the literary language of Germany. Thus the use of the monophthongs t, it, and ii, instead of the old diphthongs ie, uo and tie, comes from Middle Germany; the forms of the words and the gender of the nouns follow Middle rather than Upper German usage, whereas, on the other hand, the consonantal system (p to pf; d to /) betrays in its main features its Upper German (Bavarian-Austrian) origin.

The language of Luther no doubt shows greater originality in its style and vocabulary (cf. its influence on Goethe and the writers of the Sturm und Drang), for in this respect thechancery could obviously afford him but scanty help. His vocabulary is drawn to a great extent from his own native Middle German- dialect, and the fact that, since the 14th century, Middle German literature (cf. for in- stance, the writings of the German mystics, at the time of and subsequent to Eckhart) had exercised a strong influence over Upper Germany, stood him in good stead. Luther is, therefore, strictly speaking, not the father of the modern German literary language, but he forms the most important link in a chain of development which began long before him, and did not reach its final stage until long after him. To infer that Luther's language made any rapid conquest of Germany would not be correct. It was, of course, immediately acceptable to the eastern part of the Middle German district (Thuringia and Silesia), and it did not find any great difficulty in penetrating into Low Germany, at least into the towns and districts lying to the east of the Saale and Elbe (Magdeburg, Hamburg). One may say that about the middle of the 16th century Luther's High German was the language of the chanceries, about 1600 the language of the pulpit

(the last Bible in Low German was printed at Goslar in 1621) and the printing presses. Thus the aspirations of Low Germany to have a literary language of its own were at an early stage crushed. Protestant Switzerland, on the other hand, resisted the " uncommon new German " until well into the 17th century. It was also natural that the Catholic Lower Rhine (Cologne) and Catholic South Germany held out against it, for to adopt the language of the reformer would have seemed tantamount to offering a helping hand to Protestant ideas. At the same time, geographical and political conditions, as well as the pronounced character of the Upper German dialects, formed an important obstacle to a speedy unifica- tion. South German grammarians of the 16th century, such as Laurentius Albertus, raise a warning] voice against those who, although far distant from the proper use of words and the true pronunciation, venture to teach nos puriores Germanos, namely, the Upper Germans.

In J- 593 J- Helber, a Swiss schoolmaster and notary, spoke of three separate dialects as being in use by the printing presses; 1 (1) Mitteldeulsch (the language of. the printers in Leipzig, Erfurt, Nurem- berg, Wiirzburg, Frankfort, Mainz, Spires, Strassburg and Cologne ; at the last mentioned place in the event of their attempting to print Ober-Teulsch) ; (2) Donauisch (the printers' language in South Germany, but limited to Bavaria and Swabia proper — here more particularly the Augsburg idiom, which was considered to be par- ticularly zierlich) ; 2 (3) Hochst Reinisch, which corresponds to Swiss German. Thus in the 1 6th century Germany was still far from real unity in its language; but to judge from the number and the geographical position of the towns which printed in Mitteldeulsch it is pretty clear which idiom would ultimately predominate. During the 17th century men like M. Opitz (Buck von der deutschen Poeterey) and J. G. Schottelius [Teutsclie Sprachkunst, 1641, and Von der teutschen Sprachkunst, 1663), together with linguistic societies like the Fruchtbringende Gesellschaft and the Nuremberg Pegnitzorden, did a great deal to purify the German language from foreign (especi- ally French) elements ; they insisted on the claims of the vernacular to a place beside and even above Latin (in 1687 Christian Thomasius held for the first time lectures in the German language at the uni- versity of Leipzig), and they established a firm grammatical basis for Luther's common language, which especially in the hymnals had become modernized and more uniform. About the middle of the 17th century the disparity between the vowels of the singular and plural of the preterite of the strong verbs practically ceases; under East Middle German influence the final e is restored to words like Knabe, Jude,

Pfaffe, which in South German had been Knab, &c. ; the mixed declension (Ehre, Ehren; Schmerz, Schmerzen) was established, and the plural in -er was extended to some masculine nouns (Wald, Wdlder) ; 3 the use of the mutated sound has now

1 For literature bearing on the complicated question of the Druckersprachen, readers are referred to the article " Neuhoch-deutsche Schriftsprache," by W. Scheel, in Bethge's Ergebnisse . . . der germanislischen Wissenschaft (1902), pp. 47, 50 f. Cf. also K. von Bahder, Grundlagen des nhd. Lautsystems (1890), pp. 15 ff.

2 A German Priamel mentions as an essential quality in a beautiful woman : " die red dort her von Swaben."

3 Cf. for a detailed discussion of the noun declension, K. Boiunga, Die Entwickelung der mhd. Substantivflexion (Leipzig, 1890); and, more particularly for the masculine and neuter nouns, two articles by H. Molz, " Die Substantivflexion seit mhd. Zeit," in Paul and Braune's Beitrdge, xxvii. p. 209 ff. and xxxi. 277 ff. For the changes in the gender of nouns, A. Polzin, Geschlechtswandel der Substantiva im Deutschen (Hildesheim, 1903).

become the rule as a plural sign tVater, Baume). How difficult, even in the first half of the 1 8th century, it was for a Swiss to write the literary language which Luther had established is to be seen from the often quoted words of Haller (1708-1777): " I am a Swiss, the German language is strange to me, and its choice of words was almost unknown to me." The Catholic south clung firmly to its own literary language, based on the idiom of the imperial chancery, which was still an influential force in the 17th century or on local dialects. This is apparent in the writings of Abraham a Sancta Clara, 4 who died in 1709, or in the attacks of the Benedictine monk, Augustin Dornbluth, on the Meissner Schriftsprache in 1755.

In the 18th century, to which these names have introduced us, the grammatical writings of J. C. Gottsched (Deutsche Sprachkunst, 1748) and J. C. Adelung [Grammatisch-kritisches Wbrterbuch der hochdeutschen Mundart, 1 774-1 786) exercised a decisive and far-reaching influence. Gottsched took as his basis the spoken language {Umgangssprache) of the educated classes of Upper Saxony (Meissen), which at this time approximated as nearly as possible to the literary language. His Grammar did enormous services to the cause of unification, ultimately winning over the resisting south; but he carried his purism to pedantic lengths, he would tolerate no archaic or dialectical words, no unusual forms or constructions, and

con- sequently made the language unsuited for poetry. Meanwhile an interest in Old German literature was being awakened by Bodmer ; Herder set forth better ideas on the nature of language, and insisted on the value of native idioms; and the Sturm und Drang led by Goethe encouraged all individualistic tendencies. All this gave rise to a movement counter to Gottsched's absolutism, which resulted in the revival of many obsolete German words and forms, these being drawn partly from Luther's Bible translation (cf. V. Hehn, " Goethe und die Sprache der Bibel," in the Goethe- Jahrbuch, viii. p.' 187 ff.), partly from the older language and partly from the vocabulary peculiar to different social ranks and trades. 6 The latter is still a source of linguistic innovations. German literary style underwent a similar rejuvenation, for we are on the threshold of the second classical period of German literature. It had strengthened Gott- sched's hand as a linguistic reformer that the earlier leaders of German literature, such as Gellert, Klopstock and Lessing, were Middle Germans; now Wieland's influence, which was particularly strong in South Germany, helped materially towards the establish- ment of one accepted literary language throughout all German- speaking countries ; and the movement reaches its culmination with Goethe and Schiller. At the same time this unification did not imply the creation of an unalterable standard ; for, just as the lan- guage of Opitz and Schottelius differed from that of Luther, so — although naturally in a lesser degree — the literary language of our day differs from that of the classic writers of the 18th century. Local peculiarities are still to be met with, as is to be seen in the modern German literature that emanates from Switzerland or Austria.

But this unity, imperfect as it is, is limited to the literary language. The differences are much more sharply accentuated in the Umgangs- sprache, 6 whereby we understand the language as it is spoken by educated people throughout Germany; this is not only the case with regard to pronunciation, although it is naturally most noticeable here, but also with regard to the choice of words and the construction of sentences. Compared with the times of Goethe and Schiller a certain advance towards unification has undoubtedly been made, but the differences between north and south are still very great. This is particularly noticeable in the pronunciation of r — either the uvular r or the r produced by the tip of the tongue; of the voiced and voiceless fstops, b, p, d, t, g and k; of the s sounds; of the diphthongs; of the long vowels e and oe, &c. (cf. W. Vietor, German Pronunciation, 2nd ed., 1890). The question as to whether a unified pronunciation (Einheitaussprache) is desirable or even possible has occupied the attention of academies, scholars and the educated

public during recent years, and in 1898 a commission made up of scholars and theatre directors drew up a scheme of pronunciation for use in the royal theatres of Prussia. 7 This scheme has since been recommended to all German theatres by the German Biihnenverein. Desirable as such a uniform pronunciation is for the national theatre, it is a much debated question how far it should be adopted in the ordinary speech of everyday life. Some scholars, such as W. Braune, declared themselves strongly in favour of its adoption; 8 Braune's

4 Cf. C. Blanckenburg, Studien tiber die Sprache Abrahams a S. Clara (Halle, 1897); H. Strigl, " Einiges tiber die Sprache des P. Abraham a Sancta Clara (Zeitschr. f. deutsche Wortforschung, viii. 206 ff.).

5 Cf. F. Kluge, Elymologisches Wbrterbuch (6th ed.), pp. 508 ff. One can speak of: Studenten-, Soldaten-, Weidmanns-, Bergmanns-, Drucker-, Juristen-, und Zigeuner sprache, und Rotwelsch. Cf. F. Kluge, Die deutsche Studenlensprache (Strassburg, 1894) ; Rotwelsch i. (Strassburg, 1901); R. Bethge, Ergebnisse, &c, p. 55 f.

6 Cf. H. Wunderlich, Unsere Umgangssprache (Weimar, 1894).

7 Cf. Th. Siebs, Deutsche Buhnenaussprache (2nd ed., Berlin, 1901), and the same writer's Grundziige der Buhnensprache (1900).

8 W. Braune, Uber die Einigung der deutschen Aussprache (Halle, 1905) ; and the review by O. Brenner, in the Zeitschrift des allgemeinen deutschen Sprachvereins, Beihefte iv. 27, pp. 228-232.

argument being that the system of modern pronunciation is based on the spelling, not on the sounds produced in speaking. The latter, he holds, is only responsible for the pronunciation of chs as ks in wachsen, Ochse, &c, or for that of sp- and st- in spielen, stehen, &c. Other scholars, again, such as K. Luick and O. Brenner, warn against any such attempts to create a living language on an artificial basis; 1 the Biihnendeutsch or "stage-German" they regard as little more than an abstract ideal. Thus the decision must be left to time.

Authorities. — General Literature: J. Grimm, Geschichle der deulschen Sprache (Leipzig, 1848; 4th ed., 1880); W. Scherer, Zur Geschichte der deulschen Sprache (Berlin, 1868; 2nd ed., 1878);

E. Forstemann, Geschichte des deutschen Sprachstammes (Nordhausen, 1874-1875); O. Behaghel, Die deutsche Sprache (Leipzig, 1886; 2nd ed., 1902); the same, " Geschichte der deutschen Sprache," in Paul's Grundriss der germanischen Philologie (2nd ed.), i. pp. 650 ff . ; O. Weise, Unsere deutsche Sprache, ihr Werden und ihr Wesen (Leipzig, 1898); K. von Raumer, Geschichte der germanischen Philologie (Munich, 1870); J. Grimm, Deutsche Grammatik (4 vols., vols, i.-iii. in new edition, 1870-1890); Dieter, Laut- und Formenlehre der altgermanischen Dialekte (2 vols., Leipzig, 1898-1900) ; F. Kauffmann, Deutsche Grammatik (2nd ed., 1895); W. Wilmanns, Deutsche Grammatik, so far, vols. L, ii. and iii., 1 (Strassburg, 1893-1906, vol. i., 2nd ed., 1897) ; O. Brenner, Grundziige der geschichtlichen Grammatik der deutschen Sprache (Munich, 1896); H. Lichtenberger, Histoire de la langue allemande (Paris, 1895).

Old and Middle High German Period: W. Braune, Althochdeutsche Grammatik (2nd ed., Halle, 1891); the same, Abriss der althoch-deutschen Grammatik (3rd ed., 1900); F. Holthausen, Altsdchsisches Elementarbuch (Heidelberg, 1899); W. Schliiter, Untersuchungen zur Geschichte der altsdchsichen Sprache, i. (Gottingen, 1892) ; O. Schade, Altdeutsches Worterbuch (2nd ed., Halle, 1872-1882); G. E. Graff, Althochdeutscher Sprachschatz (6 vols., Berlin, 1834-1842) (Index by Massmann, 1846); E. Steinmeyer and E. Sievers, Althochdeutsche Glossen (4 vols., Berlin, 1879-1898); J. A. Schmeller, Glossarium Saxonicum (Munich, 1840); K. Weinhold, Mittelhochdeutsche Grammatik (3rd ed., Paderborn, 1892); H. Paul, Mittelhochdeutsche Grammatik (5th ed., Halle, 1900); V. Michels, Mittelhochdeutsches Elementarbuch (Heidelberg, 1900); O. Brenner, Mittelhochdeutsche Grammatik (3rd ed., Munich, 1894); K. Zwierzina, "Mittelhoch- deutsche Studien," in Zeitschrift fur deutsches Altertum, vols. xliv. and xlv.; A. Liibben, Mittelniederdeutsche Grammatik (Leipzig, 1882); W. Miiller and F. Zarncke, Mittelhochdeutsches Worterbuch (4 vols., Leipzig, 1854-1866); M. Lexer, Mittelhochdeutsches Hand- wbrlerbuch (3 vols., 1872-1878); the same, Mittelhochdeutsches Taschenworterbuch (8th ed., 1906); K. Schiller and A. Liibben, Mitlelniederdeutsches Worterbuch (6 vols., Bremen, 1875-1881); A. Liibben, Mitlelniederdeutsches Handworterbuch (Norden, 1888) ;

F. Seiler, Die Entwickelung derdeutsch. Kulturim Spiegel des deutschen Lehnworts (Halle, i., 1895, 2nd ed., 1905, ii., 1900).

Modern High German Period: E. Wiilcker, " Die Entstehung der kursiichsischen Kanzleisprache " (in the Zeitschrift des Vereins fur

kursachsische Geschichle, ix. p. 349); the same, " Luthers Stellung zur kursachsischen Kanzleisprache " (in Germania, xxviii. pp. 191 ff.) ; P. Pietsch, Martin Luther und die hochdeutsche Schriftsprache (Breslau, 1883) ; K. Burdach, Die Einigung der neuhochdeutschen Schriftsprache, (1883); E. Opitz, Die Sprache Luthers (Halle, 1869); J. Luther, Die Sprache Luthers in der Septemberbibel (Halle, 1887); F. Kluge, Von Luther bis Lessing (Strassburg, 1888) (cf. E. Schroder's review in the Gottinger gelehrle Anzeiger, 1888, 249); H. Riickert, Geschichle der neuhochdeutschen Schriftsprache bis zur Mitte des 18. Jahrhunderts (•875); J- Kehrein, Grammatik der deutschen Sprache des 15. bis 77. Jahrhunderts (Leipzig, 2nd ed., 1863) ; K. von Bahder, Grundlagen des neuhochdeutschen Lautsystems (Strassburg, 1890); R. Meyer, Einfiihrung in das altere Neuhochdeutsche (Leipzig, 1894) ; W. Scheel, Beitrdge zur Geschichte der neuhochdeutschen Gemeinsprache in Koln (Marburg, 1892); R. Brandstetter, Die Rezeption der neuhoch- deutschen Schriftsprache in Stadt und Landschaft Luzern (1892) ; K. Burdach, " Zur Geschichte der neuhochdeutschen Schriftsprache " {Forschungen zur deutschen Philologie, 1894) ; the same, " Die Sprache des jungen Goethe" (Verhandlungen der Dessauer Philologenver- sammlung, 1884, p. 164 ff.); F. Kasch, Die Sprache des jungen Schiller (Dissertation, 1900); F. Kluge, " Uber die Entstehung unserer Schriftsprache " (Beihefte zur Zeitschrift des allgemeinen Sprachvereins, Heft 6, 1894); A. Waag, Bedeutungsentwickelung unseres Wortschatzes (Lahr, 1901).

Mention must also be made of the work of the German commission of the Royal Prussian Academy, which in 1904 drew up plans for making an inventory of all German literary MSS. dating from before the year 1600 and for the publication of Middle High German and early Modern High German texts. This undertaking, which has made considerable progress, provides rich material for the study of the somewhat neglected period between the 14th and 16th centuries; at the same time it provides a basis on which a monumental history of Modern High German may be built up, as well as for a Thesaurus linguae germanicae. . (R.Pr.)

1 Cf . K. Luick, Deutsche Lautlehre mil besonderer Beriicksichtigung der Sprechweise Wiens und der osterreichischen Alpenldnder (1904); O. Brenner, " Zur Aussprache des Hochdeutschen," I.e., pp. 218-228.

GERMAN LITERATURE. Compared with other literatures, that of the German-speaking peoples presents a strangely broken and interrupted course; it falls into more or less isolated groups,

separated from each other by periods which in intellectual darkness and ineptitude are virtuaily without a parallel in other European lands. The explanation of this irregularity of develop- ment is to be sought less in the chequered political history of the German people — although this was often reason enough— than in the strongly marked, one might almost say, provocative character of the national mind as expressed in literature. The Germans were not able, like their partially latinized English cousins — or even their Scandinavian neighbours — to adapt themselves to the various waves of literary influence which emanated from Italy and France and spread with irresistible power over all Europe; their literary history has been rather a struggle for independent expression, a constant warring against outside forces, even when the latter — like the influence of English literature in the 18th century and of Scandinavian at the close of the 19th — were hailed as friendly and not hostile. It is a peculiarity of German literature that in those ages when, owing to its own poverty and impotence, it was reduced to borrowing its ideas and its poetic forms from other lands, it sank to the most servile imitation; while the first sign of returning health has invariably been the repudiation of foreign influence and the assertion of the right of genius to untrammelled expression. Thus Germany's periods of literary efflorescence rarely coincide with those of other nations, and great European movements, like the Renaissance, passed over her without producing a single great poet.

This chequered course, however, renders the grouping of Ger- man literature and the task of the historian the easier. The first and simplest classification is that afforded by the various stages of linguistic development. In accordance with the three divisions in the history of the High German language, there is an Old High German, a Middle High German and a New High German or Modern High German literary epoch. It is obvious, however, that the last of these divisions covers too enormous a period of literary history to be regarded as analogous to the first two. The present survey is consequently divided into six main sections:

I. The Old High German Period, including the literature of the Old Saxon dialect, from the earliest times to the middle of the nth century.

II. The Middle High German Period, from the middle of the nth to the middle of the 14th century.

III. The Transition Period, from the middle of the 14th century to the Reformation in the 16th century.

IV. The Period of Renaissance and Pseudo-classicism, from the end of the 16th century to the middle of the 18th.

V. The Classical Period of Modern German literature, from the middle of the 18th century to Goethe's death in 1832.

VI. The Period from Goethe's death to the present day.

I. The Old High German Period (c. 750-1050) Of all the Germanic races, the tribes with which we have more particularly to deal here were the latest to attain intellectual maturity. The Goths had, centuries earlier, under their famous bishop "Ulfilas or Wulfila, possessed the Bible in their vernacular, the northern races could point to their Edda, the Germanic tribes in England to a rich and virile Old English poetry, before a written German literature of any consequence existed at all. At the same time, these continental tribes, in the epoch that lay between the Migrations of the 5th century and the age of Charles the Great, were not. without poetic literature of a kind, but it was not committed to writing, or, at least, no record of such a poetry has come down to us. Its existence is vouched for by indirect historical evidence, and by the fact that the sagas, out of which the German national epic was welded at a later date, originated in the great upheaval of the 5th century. When the vernacular literature began to emerge from an unwritten state in the 8th century, it proved to be merely a weak reflection of the ecclesiastical writings of the monasteries; and this, with

very few exceptions', Old High German literature remained. Translations of the liturgy, of Tatian's Gospel Harmony (c. 835), of fragments of sermons, form a large proportion of it. Occasion- ally, as in the so-called Monsee Fragments, and at the end of the period, in the prose of Notker Labeo (d. 1022), this ecclesiastical literature attains a surprising maturity of style and expression. But it had no vitality of its own; it virtually sprang into existance at the command of Charlemagne, whose policy with regard to the use of the vernacular in place of Latin was liberal and far-seeing; and it docilely obeyed the tastes of the rulers that followed, becoming severely orthodox under Louis the Pious, and consenting to immediate extinction when the Saxon emperors withdrew their favour from it. Apart from a few shorter poetic fragments of interest, such as the Merseburg Charms (Zauber- spriiche), an undoubted relic

of pre-Christian times, the Wesso- brunn Prayer (c. 780), the Muspilli, an imaginative description of the Day of Judgment, and the Ludwigslied (881), which may be regarded as the starting point for the German historical ballad, the only High German poem of importance in this early period was the Gospel Book {Liber evangeliorum) of Otfrid of Weissenburg (c. 800-870). Even this work is more interesting as the earliest attempt to supersede alliteration in German poetry by rhyme, than for such poetic life as the monk of Weissen- burg was able to instil into his narrative. In fact, for the only genuine poetry of this epoch we have to look, not to the High German but to the Low German races. They alone seemed able to give literary expression to the memories handed down in oral tradition from the 5th century; to Saxon tradition we owe the earliest extant fragment of a national saga, the Lay of Hildebrand (Hildebrandslied, c. 800), and a Saxon poet was the author of a vigorous alliterative version of the Gospel story, the Heliand, (c. 830), and also of part of the Old Testament (Genesis). This alliterative epic — for epic it may be called — is the one poem of this age in which the Christian tradition has been adapted to German poetic needs. Of the existence of a lyric poetry we only know by hearsay; and the drama had nowhere in Europe yet emerged from its earliest purely liturgic condition. Such as it was, the vernacular literature of the Old High German period enjoyed but a brief existence, and in the 10th and nth centuries darkness again closed over it. The dominant "German' ' literature in these centuries is in Latin; but that literature is not without national interest, for it shows in what direction the German mind was moving. The Lay of Walter (Waltharilied, c. 930), written in elegant hexameters by Ekkehard of St Gall, the moralizing dramas of Hrosvitha (Roswitha) of Gandersheim, the Ecbasis captivi (c. 940), earliest of all the Beast epics, and the romantic adventures of Ruodlieb (c. 1030), form a literature which, Latin although it is, foreshadows the future developments of German poetry.

II. The Middle High German Period (1050-1350) (a) Early Middle High German Poetry. — The beginnings of Middle High German literature were hardly less tentative than those of the preceding period. The Saxon emperors, with their Latin and even Byzantine tastes, had made it extremely difficult to take up the thread where Notker let it drop. Williram of Ebersberg, the commentator of the Song of Songs (c. 1063), did certainly profit by Notker's example, but he stands alone. The Church had no helping hand to offer poetry, as in the more liberal epoch of the great Charles; for, at the middle of the nth century, when the linguistic change from Old to Middle High

German was taking place, a movement of religious asceticism, originating in the Burgundian monastery of Cluny, spread across Europe, and before long all the German peoples fell under its influence. For a century there was no room for any literature that did not place itself unreservedly at the service of the Church, ‘ a service which meant the complete abnegation of the brighter side of life. Repellent in their asceticism are, for instance, poems like Memento mori (c. 1050), Vom Glauben, a verse com- mentary on the creed by a monk Hartmann (c. 1120), and a poem wi.” the remembrance of death ” (Von des todes gehugede) by Heinreich von Melk (c. 11 50); only rarely, as in a few narrative*

poems on Old Testament subjects, are the poets of this time able to forget for a time their lugubrious faith. In the Ezzolied (c. 1060), a spirited lay by a monk of Bamberg on the life, miracles and death of Christ, and in the Annolied (c. 1080), a poem in praise of the archbishop Anno of Cologne, we find, however, some traces of a higher poetic imagination.

The transition from this rigid ecclesiastic spirit to a freer, more imaginative literature is to be seen in the lyric poetry inspired by the Virgin, in the legends of the saints which bulk so largely in the poetry of the 12th century, and in the general trend towards mysticism. Andreas, Pilatus, Aegidius, Albanius are the heroes of monkish romances of that age, and the stories of Sylvester and Crescentia form the most attractive parts of the Kaiserchronik (c. 11 30-1 150), a long, confused chronicle of the world which contains many elements common to later Middle High German poetry. The national sagas, of which the poet of the Kaiserchronik had not been oblivious, soon began to assert themselves in the popular literature. The wandering Spielleute, the lineal descendants of the jesters and minstrels of the dark ages, who were now rapidly becoming a factor of importance in literature, were here the innovators; to them we owe the romance of Konig Rother (c. n 60), and the kindred stories of Orendel, Oswald and Salomon und Markolf (Salman und Morolf). All these poems bear witness to a new element, which in these years kindled the German imagination and helped to counteract the austerity of the religious faith — the Crusades. With what alacrity the Germans revelled in the wonderland of the East is to be seen especially in the Alexanderlied (c. 1130), and in Herzog Ernst (c. 11 80), romances which point out the way to another important development cf German medieval literature, the Court epic. The latter type of romance was the immediate product of the social conditions created by chivalry and, like chivalry itself, was determined and influenced by its French origin; so also was the

version of the Chanson de Roland (Rolands- lied, c. 1 135), which we owe to another priest, Konrad of Regens- burg, who, with considerable probability, has been identified with the author of the Kaiserchronik.

The Court epic was, however, more immediately ushered in by Eilhart von Oberge, a native of the neighbourhood of Hildes- heim who, in his Tristant (c. n 70), chose that Arthurian type of romance which from now on was especially cultivated by the poets of the Court epic; and of equally early origin is a knightly romance of Floris und Blancheflur, another of the favourite love stories of the middle ages. In these years, too, the Beast epic, which had been represented by the Latin Ecbasis captivi, was reintroduced into Germany by an Alsatian monk, Heinrich der Glichezasre, who based his Reinhart Fuchs (c. 1 180) on the French Roman de Renart. Lastly, we have to consider the beginning of the Minnesang, or lyric, which in the last decades of the 1 2th century burst out with extraordinary vigour in Austria and South Germany. The origins are obscure, and it is still debatable how much in the German Minnesang is indigenous and national, how much due to French and Provencal influence; for even in its earliest phases the Minnesang reveals correspond- ences with the contemporary lyric of the south of France. The freshness and originality of the early South German singers, such as Kiirenberg, Dietmar von Eist, the Burggraf of Rieten- burg and Meinloh von Sevelingen, are not, however, to be questioned; in spite of foreign influence, their verses make the impression of having been a spontaneous expression of German lyric feeling in the 12 th century. The Spruchdichtung, a form of poetry which in this period is represented by at least two poets who call themselves Herger and " Der Spervogel," was less dependent on foreign models; the pointed and satirical strophes of these poets were the forerunners of a vast literature which did not reach its highest development until after literature had passed from the hands of the noble-born knight to those of the burgher of the towns.

(b) The Flourishing of Middle High German Poetry. — Such was the preparation for the extraordinarily brilliant, although brief epoch of German medieval poetry, which corresponded to the reigns of the Hohenstaufen emperors, Frederick I.

Barbarossa, Henry VI. and Frederick II. These rulers, by their ambitious political aspirations and achievements, filled the German peoples with a sense of " world-mission," as the leading political power in medieval Europe. Docile pupils of French chivalry, the Germans had no sooner learned their lesson than they found themselves in the position of being able to dictate to the world of chivalry. In the same way, the German poets, who, in the 12th century, had been little better than clumsy translators of French romances, were able, at the beginning of the 13th, to substitute for French chansons de geste epics based on national sagas, to put a completely German imprint on the French Arthurian romance, and to sing German songs before which even the lyric of Provence paled. National epic, Court epic and Minnesang — these three types of medieval German literature, to which may be added as a subordinate group didactic poetry comprise virtually all that has come down to us in the Middle High German tongue. A Middle High German prose hardly existed, and the drama, such as it was, was still essentially Latin.

The first place among the National or Popular epics belongs to the Nibelungenlied, which received its present form in Austria about the turn of the 12th and 13th centuries. Combining, as it does, elements from various cycles of sagas — the lower Rhenish legend of Siegfried, the Burgundian saga of Gunther and Hagen, the Gothic saga of Dietrich and Etzel — it stands out as the most representative epic of German medieval life. And in literary power, dramatic intensity and singleness of purpose its eminence is no less unique. The vestiges of gradual growth — of irreconcilable elements imperfectly welded together — may not have been entirely effaced, but they in no way lessen the impression of unity which the poem leaves behind it; whoever the welder of the sagas may have been, he was clearly a poet of lofty imagination and high epic gifts (see Nibelungenlied). Less imposing as a whole, but in parts no less powerful in its appeal to the modern mind, is the second of the German national epics, Gudrun, which was written early in the 13th century. This poem, as

it has come down to us, is the work of an Austrian, but the subject belongs to a cycle of sagas which have their home on the shores of the North Sea. It seems almost a freak of chance that Siegfried, the hero of the Rhineland, should occupy so prominent a position in the Nibelungenlied, whereas Dietrich von Bern {i.e. of Verona), the name under which Theodoric the Great had been looked up to for centuries by the German people as their national hero, should have left the stamp of his person- ality on no single epic of the intrinsic worth of the Nibelungenlied. He appears, however, more or less in the background of a number of romances — Die Rabenschlacht, Dielrichs Flucht. Alpharts Tod, Biterolf und Dietlieb, Laurin, &c. — which make up what is usually called the Heldenbuch. It is tempting, indeed, to see in this very unequal collection the basis for what, under more favourable circumstances, might have developed into an epic even more completely representative of the German nation than the Nibelungenlied.

While the influence of the romance of chivalry is to be traced on all these popular epics, something of the manlier, more primitive ideals that animated German national poetry passed over to the second great group of German medieval poetry, the Court epic. The poet who, following Eilhart von Oberge's tentative beginnings, established the Court epic in Germany was Heinrich von Veldeke, a native of the district of the lower Rhine; his Eneit, written between n 73 and 1186, is based on a French original. Other poets of the time, such as Herbort von Fritzlar, the author of a Liet von Troye, followed Heinrich's example, and selected French models for German poems on antique themes; while Albrecht von Halberstadt translated, about the year 1210 the Metamorphoses of Ovid into German verse. With the three masters of the Court epic, Hartmann von Aue, Wolfram von Eschenbach and Gottfried von Strass- burg — all of there contemporaries — the Arthurian cycle became the recognized theme of this type of romance, and the accepted embodiment of the ideals of the knightly classes. Hartmann was a Swabian, Wolfram a Bavarian, Gottfried presumably a

native bf Strassburg. Hartmann, who in his Erec and Iwein, Gregorius and Der arme Heinrich combined a tendency towards religious asceticism with a desire to imbue the worldly life of the knight with a moral and religious spirit, provided the Court epic of the age with its best models; he had, of all the medieval court poets, the most delicate sense for the formal beauty of poetry, for language, verse and style. Wolfram and Gottfried, on the other hand, represent two extremes of poetic tempera- ment. Wolfram's Parzival is filled with mysticism and obscure spiritual significance; its flashes of

humour irradiate, although they can hardly be said to illumine, the gloom; its hero is, unconsciously, a symbol and allegory of much which to the poet himself must have been mysterious and inexplicable; in other words, Parzival — and Wolfram's other writings, Willehalm and Titurel, point in the same direction — is an instinctive or, to use Schiller's word, a " na'ive " work of genius. Gottfried, again, is hardly less gifted and original, but he is a poet of a wholly different type. His Tristan is even more lucid than Hartmann's Iwein, his art is more objective; his delight in it is that of the conscious artist who sees his work growing under his hands. Gottfried's poem, in other words, is free from the obtrusion of those subjective elements which are in so high a degree characteristic of Parzival; in spite of the tragic character of the story, Tristan is radiant and serene, and yet un- contaminated by that tone of frivolity which the Renaissance introduced into Iqve stories of this kind.

Parzival and Tristan are the two poles of the German Court epic, and the subsequent development of that epic stands under the influence of the three poets, Hartmann, Wolfram and Gottfried; according as the poets of the. 13th century tend to imitate one or other of these, they fall into three classes. To the followers and imitators of Hartmann belong Ulrich von Zatzikhoven, the author of a Lanzelel (c. 1195); Wirnt von Gravenberg, a Bavarian, whose Wigalois (c. 1205) shows con- siderable imaginative power; the versatile Spielmann, known as " Der Strieker,"; and Heinrich von dem Turlin, author of an unwieldy epic, Die Krone (" the crown of all adventures, "c. 1220). The fascination of Wolfram's mysticism is to be seen in Der j linger e Titurel of a Bavarian poet, Albrecht von Scharfenberg (c. 1270), and in the still later Lohengrin of an unknown poet; whereas Gottfried von Strassburg dominates the Flore und Blanscheflur of Konrad Fleck (c. 1220) and the voluminous romances of the two chief poets of the later 13th century, Rudolf von Ems, who died in 1254, and Konrad von Wtirzburg, who lived till 1287. Of these, Konrad alone carried on worthily the tradi- tions of the great age, and even his art, which excels within the narrow limits of romances like Die Herzemoere and Engelhard, becomes diffuse and wearisome on the unlimited canvas of Der Trojanerkrieg and Partonopier und Meliur.

The most conspicuous changes which came over the narrative poetry of the 13th century were, on the one hand, a steady en- croachment of realism on the matter and treatment of the epic, and, on the other, a leaning to didacticism. The substitution of the " history " of the chronicle for the confessedly imaginative stories of the earlier poets is to be seen in the work of Rudolf von Ems, and of- a number of

minor chroniclers like Ulrich von Eschenbach, Berthold von Holle and Jans Enikel; while for the growth of realism we may look to the PJajje Amis, a collection of comic anecdotes by " Der Strieker," the admirable peasant romance Meier Helmbrecht, written between 1236 and 1250 by Wernher der Gartenaere in Bavaria, and to the adventures of Ulrich von Lichtenstein, as described in his Frauendienst (1255) and Frauenbuch (1257).

More than any single poet of the Court epic, more even than the poet of the Nibelungenlied, W T alther von der Vogelweide summed up in himself all that was best in the group of poetic literature with which he was associated — the Minnesang. The early Austrian singers already mentioned, poets like Heinrich von Veldeke, who in his lyrics, as in his epic, introduced the French conception of Minne, or like the manly Friedrich von Hausen, and the Swiss imitator of Provencal measures, Rudolf von Fenis appear only in the light of forerunners. Even more

original poets, like Heinrich von Morungen and Walther's own master, Reinmar von Hagenau, the author of harmonious but monotonously elegiac verses, or among immediate contemporaries, Hartmann von Aue and Wolfram von Eschenbach, whose few lyric strophes are as deeply stamped with his individuality as his epics — seem only tributary to the full rich stream of Walther's genius. There was not a form of the German Minnesang which Walther did not amplify and deepen; songs of courtly love and lowly love, of religious faith and delight in nature, patriotic songs and political Spriiche — in all he was a master. Of Walther's life we are somewhat better informed than in the case of his con- temporaries: he was born about 1170 and died about 1230; his art he learned in Austria, whereupon he wandered through South Germany, a welcome guest wherever he went, although his vigorous championship of what he regarded as the national cause in the political struggles of the day won him foes as well as friends. For centuries he remained the accepted exemplar of German lyric poetry; not merely the Minnesanger who followed him, but also the Meistersinger of the 15th and 16th centuries looked up to him as one of the founders and lawgivers of their art. He was the most influential of all Germany's lyric poets, and in the breadth, originality and purity of his inspiration one of her greatest (see

Walther von der Vogelweide).

The development of the German Minnesang after Walther's death and under his influence is easily summed up. Contem- poraries had been impressed by the dual character of Walther's lyric; they distinguished a higher courtly lyric, and a lower more outspoken form of song, free from the constraint of social or literary conventions. The later Minnesang emphasized this dualism. Amongst Walther's immediate contemporaries, high- born poets, whose lives were passed at courts, naturally cultivated the higher lyric; but the more gifted and original singers of the time rejoiced in the freedom of Walther's poetry of niedere Minne. It was, in fact, in accordance with the spirit of the age that the latter should have been Walther's most valuable legacy to his successors; and the greatest of these, Neidhart von Reuental (c. 1180-e. 1250), certainly did not allow himself to be hampered by aristocratic prejudices. Neidhart sought the themes of his hofische Dorfpoesie in the village, and, as the mood happened to dictate, depicted the peasant with humorous banter or biting satire. The lyric poets of the later 13th century were either, like Burkart von Hohenfels, Ulrich von Winterstetten and Gottfried von Neifen, echoes of Walther von der Vogel- weide and of Neidhart, or their originality was confined to some particular form of lyric poetry in which they excelled. Thus the singer known as " Der Tannhauser " distinguished himself as an imitator of the French pastourelle; Reinmar von Zweter was purely a Spruchdichter. More or less common to all is the con- sciousness that their own ideas and surroundings were no longer in harmony with the aristocratic world of chivalry, which the poets of the previous generation had glorified. The solid advantages, material prosperity and increasing comfort of life in the German towns appealed to poets like Steinmar von Klingenau more than the unworldly ideals of self-effacing knighthood which Ulrich von Lichtenstein and Johann Hadlaub of Zurich clung to so tenaciously and extolled so warmly. On the whole, the Spruchdichter came best out of this ordeal of changing fashions; and the increasing interest in the moral and didactic applications of literature favoured the development of this form of verse. The confusion of didactic purpose with the lyric is common to all the later poetry, to that of the learned Marner, of Boppe, Rumezland and Heinrich von Meissen, who was known to later generations as " Frauenlob." The Spruchdichtung, in fact, was one of the connecting links between the Minnesang of the 13th and the lyric and satiric poetry, of the 15th and 16th centuries.

The disturbing and disintegrating element in the literature of the 13th century was thus the substitution of a utilitarian didacticism for

the idealism of chivalry. In the early decades of that century, poems like Der Winsbeke, by a Bavarian, and Der welsche Gast, written in 121 5-1 216 by Thomasin von Zir- claere (Zirclaria), a native of Friuli, still teach with uncompromis-

ing idealism the duties and virtues of the knightly life. But in the Bescheidenheit (c. 121 5-1230) of a wandering singer, who called himself Freidank, we find for the first time an active antagonism to the unworldly code of chivalry and an unmistakable reflection of the changing social order, brought about by the rise of what we should now call the middle class. Freidank is the spokesman of the Burger, and in his terse, witty verses may be traced the germs of German intellectual and literary development in the coming centuries — even of the Reformation itself. From the advent of Freidank onwards, the satiric and didactic poetry went the way of the epic; what it gained in quantity it lost in quality and concentration. The satires associated with the name of Seifried Helbling, an Austrian who wrote in the last fifteen years of the 13th century, and Der Rentier by Hugo von Trimberg, written at the very end of the century, may be taken as character- istic of the later period, where terseness and incisive wit have given place to diffuse moralizing and allegory.

There is practically no Middle High German literature in prose; such prose as has come down to us — the tracts of David of Augsburg, the powerful sermons of Berthold von Regensburg (d. 1 2 7 2) , Germany's greatest medieval preacher, and several legal codes, as the Sachsenspiegel and Schwabenspiegel — only prove that the Germans of the 13th century had not yet realized the possibilities of prose as a medium of literary expression.

III. The Transition Period (1350-1600) (a) The Fourteenth and Fifteenth Centuries. — As is the case with all transitional periods of literary history, this epoch of. German literature may be considered under two aspects: on the one hand, we may follow in it the decadence and disintegra- tion of the literature of the Middle High German period; on the other, we may study the beginnings of modern forms of poetry and the preparation of that spiritual revolution, which meant hardly less to the Germanic peoples than the Renaissance to the Latin races — the Protestant Reformation.

By the middle of the 14th century, knighthood with its chivalric ideals was rapidly declining, and the conditions under which medieval poetry had flourished were passing away. The social change rendered the courtly epic of Arthur's Round Table in great measure incomprehensible to the younger genera- tion, and made it

difficult for them to understand the spirit that actuated the heroes of the national epic; the tastes to which the lyrics of the great Minnesingers had appealed were vitiated by the more practical demands of the rising middle classes. But the stories of chivalry still appealed as stories to the people, although the old way of telling them was no longer appreciated. The feeling for beauty of form and expression was lost; the craving for a moral purpose and didactic aim had to be satisfied at the cost of artistic beauty; and sensational incident was valued more highly than fine character-drawing or inspired poetic thought. Signs of the decadence are to be seen in the Karlmeinet of this period, stories from the youth of Charlemagne, in a continuation of Parzival by two Alsatians, Claus Wisse and Philipp Colin (c. 1335), in an Apollonius von Tyrus by Heinrich von Neuenstadt (c. 1315), and a Konigstochter von Frankreich by Hans von Biihel (c. 1400). The story of Siegfried was retold in a rough ballad, Das Lied von hiirnen Seyfried, the Heldenbuch was recast in Kniltelvers or doggerel (1472), and even the Arthurian epic was parodied. A no less marked symptom of decadence is to be seen in a large body of allegorical poetry analogous to the Roman de la rose in France; Heinzelein of Constance, at the end of the 13th, and Hadamar von Laber and Hermann von Sachsenheim, about the middle of the 1 5th century, were representatives of this movement. As time went on, prose versions of the old stories became more general, and out of these developed the Volksbiicher, such as Loher und Mailer, Die Haimonskinder, Die schSne Magelone, Melusine, which formed the favourite reading of the German people for centuries. As the last monuments of the decadent narrative ..literature of the middle ages, we may regard the Buck der Abenteuer of Ulrich Fuetrer, written at the end of the 15th century, and Der Weiss konig and Teuerdank by the emperor Maximilian I. (1459-1519)*

printed in the early years of the 16th. At the beginning of the new epoch the Minnesang could still point to two masters able to maintain the great traditions of the 13th century, Hugo von Montfort (1357-1423) and Oswald von Wolkenstein (1367-1445); but as the lyric passed into the hands of the middle-class poets of the German towns, it was rapidly shorn of its essentially lyric qualities; die Minne gave place to moral and religious dogmatism, emphasis was

laid on strict adherence to the rules of composition, and the simple forms of the older lyric were superseded by ingenious metrical distortions. Under the influence of writers like Heinrich von Meissen (" Frauenlob,"e. 1250-13 18) and Heinrich von Miigeln in the 14th century, like Muskatblut and Michael Beheim (1416-c. 1480) in the 15th, the Minnesang thus passed over into the Meistergesang. In the later 15th and in the 16th centuries all the south German towns possessed flourishing Meistersinger schools in which the art of writing verse was taught and practised according to complicated rules, and it was the ambition of every gifted citizen to rise through the various grades from Schiller to Meister and to distinguish himself in the " singing contests " instituted by the schools.

Such are the decadent aspects of the once rich literature of the Middle High German period in the 14th and 15th centuries. Turning now to the more positive side of the literary movement, we have to note a revival of a popular lyric poetry — the Volkslied — which made the futility and artificiality of the Meistergesang more apparent. Never before or since has Germany been able to point to such a rich harvest of popular poetry as is to be seen in the Volkslieder of these two centuries. Every form of popular poetry is to be found here — songs of love and war, hymns and drinking-songs, songs of spring and winter, historical ballads, as well as lyrics in which the old motives of the Minnesang reappear stripped of all artificiality. More obvious ties with the literature of the preceding age are to be seen in the develop- ment of the Schwank or comic anecdote. Collections of such stories, which range from the practical jokes of Till Eulenspiegel (1515), and the coarse witticisms of the Pfaffe vom Kalenberg (end of 14th century) and Peter Leu (1550), to the religious and didactic anecdotes of J. Pauli's Schimpf und Ernst (1522) or the more literary Rollwagenbilchlein (1555) of Jorg Wickram and the Wendunmut (1563 ff.) of H. W. Kirchhoff — these dominate in large measure the literature of the 15th and 16th centuries; they are the literary descendants of the medieval Pfaffe Amis, Markolf and Rcinhart Fuchs. An important development of this type of popular literature is to be saen in the Narrenschiff of Sebastian Brant (1457-1521), where the humorous anecdote became a vehicle of the bitterest satire; Brant's own contempt for the vulgarity of the ignorant, and the deep, unsatisfied craving of all strata of society for a wider intellectual horizon and a more humane and dignified life, to which Brant gave voice, make the Narrenschiff, which appeared in 1494, a landmark on the way that led to the Reformation. Another form — the Beast fable and Beast epic — which is but sparingly represented in earlier times, appealed with

peculiar force to the new genera- tion. At the very close of the Middle High German period, Ulrich Boner had revived the Aesopic fable in his Edelstein (1349), translations of Aesop in the following century added to the popularity of the fable (q.v.), and in the century of the Re- formation it became, in the hands of Burkard Waldis (Esopus, 1548) and Erasmus Alberus (Buck von der Tugend und Weisheit, 1550), a favourite instrument of satire and polemic. A still more attractive form of the Beast fable was the epic of Reinke de Vos, which had been cultivated by Flemish poets in the 13th and 14th centuries and has come down to. us in a Low Saxon translation, published at Liibeck in 1498. This, too, like Brant's poem, is a powerful satire on human folly, and is also, like the Narrenschiff, a harbinger of the coming Reformation.

A complete innovation was the drama {q.v.), which, as we have seen, had practically no existence in Middle High German times. As in all European literatures, it emerged slowly and with difficulty from its original subservience to the church liturgy. As time went on, the vernacular was substituted for the original Latin, and with increasing demands for pageantry, the scene

of the play was removed to the churchyard or the market-place; thus the opportunity arose in the 14th and 15th centuries for developing the W eihnachtsspiel, Osterspiel and Passionsspiel on secular lines. The enlargement of the scope of the religious play to include legends of the saints implied a further step in the direction of a complete separation of the drama from ecclesi- astical ceremony. The most interesting example of this encroach- ment of the secular spirit is the Spiel von Frau Jutten — Jutta being the notorious Pope Joan — by an Alsatian, Dietrich Schernberg, in 1480. Meanwhile, in the 1 5th century, a beginning had been made of a drama entirely independent of the church. The mimic representations — originally allegorical in character — with which the people amused themselves at the great festivals of the year, and more especially in spring, were interspersed with dialogue, and performed on an improvised stage. This was the beginning of the Fastnachtsspiel or Shrovetide-play, the subject of which was a comic anecdote similar to those of the many collections of Schwdnke. Amongst the earliest culti- vators of the Fastnachtsspiel were Hans Rosenplut (fl. c. 1460) and Hans Folz (fl. c. 15 10), both of whom were associated with Nuremberg.

(b) The Age of the Reformation. — Promising as were these literary beginnings of the 15th century, the real significance of the period in Germany's intellectual history is to be sought outside literature, namely, in two forces which immediately prepared the way for the

Reformation — mysticism and humanism. The former of these had been a more or less constant factor in German religious thought throughout the middle ages, but with Meister Eckhart (? 1260-1327), the most powerful and original of all the German mystics, with Heinrich Seuse or Suso (c. 1300-1366), and Johannes Tauler (c. 1300-1361), it became a clearly defined mental attitude towards religion; it was an essentially personal interpretation of Christianity, and, as such, was naturally conducive to the individual freedom which Protestantism ultimately realized. It is thus not to be wondered at that we should owe the early translations of the Bible into German — one was printed at Strassburg in 1466 — to the mystics. Johann Geiler von Kaisersberg (1445-1510), a pupil of the humanists and a friend of Sebastian Brant, may be regarded as a link between Eckhart and the earlier mysticists and Luther. Humanism was transplanted to German soil with the foundation of the university of Prague in 1348, and it made even greater strides than mysticism. Its immediate influence, however, was restricted to the educated classes; the pre-Reformation humanists despised the vernacular and wrote and thought only in Latin. Thus although neither Johann Reuchlin of Pforzheim (1455-1522), nor even the patriotic Alsatian, Jakob Wimpfeling (or Wimpheling) (1450-1528) — not to mention the great Dutch humanist Erasmus of Rotterdam (1466-1536) — has a place in the history of German literature, their battle for liberalism in thought and scholarship against the narrow ortho- doxy of the Church cleared the way for a healthy national literature among the German-speaking peoples. The incisive wit and irony of humanistic satire — we need only instance the Epistolae obscurorum virorum (1515-1517) — prevented the German satirists of the Reformation age from sinking entirely into that coarse brutality to which they were only too prone. To the influence of the humanists we also owe many trans- lations from the Latin and Italian dating from the 15th century. Prominent among the writers who contributed to the group of literature were Niklas von Wyl, chancellor of Wurttemberg, and his immediate contemporary Albrecht von Eyb (1420-1475). Martin Luther (1483-1546), Germany's greatest man in this age of intellectual new-birth, demands a larger share of attention in a survey of literature than his religious and ecclesiastical activity would in itself justify, if only because the literary activity of the age cannot be regarded apart from him. From the Volkslied and the popular Schwank to satire and drama, literature turned exclusively round the Reformation which had been •inaugurated on the 31st of October 1517 by Luther's publication of the Theses against Indulgences in Wittenberg. In his three tracts, An den christlichen Add deutscher Nation, De captivitatt

Babylonica ecclesiae, and Von der Freiheit eines Christenmenschen (1520), Luther laid down his principles of reform, and in the following year resolutely refused to recant his heresies in a dramatic scene before the Council of Worms. Luther's Bible (1522-1534) had unique importance not merely for the religious and intellectual welfare of the German people, but also for their literature. It is in itself a literary monument, a German classic, and the culmination and justification of that movement which had supplanted the medieval knight by the burgher and swept away Middle High German poetry. Luther, well aware that his translation of the Bible must be the keystone to his work, gave himself endless pains to produce a thoroughly German work — German both in language and in spirit. It was important that the dialect into which the Bible was translated should be compre- hensible over as wide an area as possible of the German-speaking world, and for this reason he took all possible care in choosing the vocabulary and forms of his Gemeindeutsch. The language of the Saxon chancery thus became, thanks to Luther's initiative, the basis of the modern High German literary language. As a hymn-writer (Geistliche Lieder, 1 564) , Luther was equally mindful of the importance of adapting himself to the popular tradition; and his hymns form the starting-point for a vast development of German religious poetry which did not reach its highest point until the following century.

The most powerful and virile literature of this' age was the satire with which the losing side retaliated on the Protestant leaders. Amongst Luther's henchmen, Philipp Melanchthon (1497-1560), the " praeceptor Germaniae," and Ulrich von Hutten (1488-1523) were powerful allies in the cause, but their intellectual sympathies were with the Latin humanists; and with the exception of some Vigorous German prose and still more vigorous German verse by Hutten, both wrote in Latin. The satirical dramas of Niklas Manuel, a Swiss writer and the polemical fables of Erasmus Alberus (c. 1500-1553), on the other hand, were insignificant compared with the fierce assault on Protestantism by the Alsatian monk, Thomas Murner (1475- IS37)- The most unscrupulous of all German satirists, Murner shrank from no extremes of scurrility, his attacks on Luther reaching their culmination in the gross personalities of Von dem lutherischen Narren (1522). It was not until the following generation that the

Protestant party could point to a satirist who in genius and power was at all comparable to Murner, namely, to Johann Fischart (c. 1550-c. 1591) ; but when Fischart's Rabelaisian humour is placed by the side of his predecessor's work, we see that, in spite of counter-reformations, the Protestant cause stood in a very different position in Fischart's day from that which it had occupied fifty years before. Fischart took his stand on the now firm union between humanism and Protestantism. His chief work, the Affentheuerlich Naupengeheurliche Geschicht- klitterung (1575), a Germanization of the first book of Rabelais' satire, is a witty and ingenious monstrosity, a satirical comment on the life of the 16th century, not the virulent expression of party strife. The day of a personal and brutal type of satire was clearly over, and the writers of the later 1 6th century reverted more and more to the finer methods of the humanists. The satire of Bartholomaeus Ringwaldt (1530-1599) and of Georg Rollenhagen (1542-1609), author of the Froschmeuseler (1595), was more " literary " and less actual than even Fischart's.

On the whole, the form of literature which succeeded best in emancipating itself from the trammels of religious controversy in the 16th century was the drama. Protestantism proved favourable to its intellectual and literary development, and the humanists, who had always prided themselves on their imita- tions of Latin comedy, introduced into it a sense for form and proportion. The Latin school comedy in Germany was founded by J. Wimpfeling with his Stylpho (1470) and by J. Reuchlin with his witty adaptation of Maitre Patelin in his Henna (1498). In the 1 6th century the chief writers of Latin dramas were Thomas Kirchmair or Naogeorgus (1511-1563), Caspar Brülow (1585-1627), and Nikodemus Frischlin (1547-1590), who also wrote dramas in the vernacular. The work of these men bears testimony in its form and its choice of subjects to the close

relationship between Latin and German drama in the 16th century. One of the earliest focusses for a German drama inspired by the Reformation was Switzerland. In Basel, Pamphilus Gengenbach produced moralizing Fastnachtsspiele in 1515-1516; Niklas Manuel of Bern (1484-1530) — who has just been mentioned — ■ employed the same type of play as a vehicle of pungent satire against the Mass and the sale of indulgences. But it was not long before the German drama benefited by the humanistic example: the Parabell vam vorlorn Szohn by Burkard Waldis (1527), the many dramas on the subject of Susanna — notably those of Sixt Birck (1 53 2) and PaulRebhun (153 5) — and Frischlin's German plays are attempts to treat Biblical themes according to classic methods. In another of the

important literary centres of the 1 6th century, however, in Nuremberg, the drama developed on indigenous lines. Hans Sachs (1494-1576), the Nuremberg cobbler and Meistersinger, the most productive writer of the age, went his own way; a voracious reader and an unwearied story- teller, he left behind him a vast literary legacy, embracing every form of popular literature from Spruch and Schwank to com- plicated Meistergesang and lengthy drama. He laid under contribution the rich Renaissance literature with which the humanistic translators had flooded Germany, and he became himself an ardent champion of the " Wittembergisch Nachtigall " Luther. But in the progressive movement of the German drama he played an even smaller role than his Swiss and Saxon con- temporaries; for his tragedies and comedies are deficient in all dramatic qualities; they are only stories in dialogue. In the Fastnachtsspiele, where dramatic form is less essential than anec- dotal point and brevity, he is to be seen at his best. Rich as the 1 6th century was in promise, the conditions for the development of a national drama were unfavourable. At the close of the century the influence of the English drama — brought to Germany by English actors — introduced the deficient dramatic and theatrical force into the humanistic and " narrative " drama which has just been considered. This is to be seen in the work of Jakob Ayrer (d. 1605) and Duke Henry Julius of Brunswick (1564-1613). But unfortunately these beginnings had hardly made themselves felt when the full current of the Renaissance was diverted across Germany, bringing in its train the Senecan tragedy. Then came the Thirty Years' War, which completely destroyed the social conditions indis- pensable for the establishment of a theatre at once popular and national.

The novel was less successful than the drama in extricating itself from satire and religious controversy. Fischart was too dependent on foreign models and too erratic — at one time adapting Rabelais, at another translating the old heroic romance of Amadis de Gaula — to create a national form of German fiction in the 16th century; the most important novelist was a much less talented writer, the Alsatian Meistersinger and dramatist Jorg Wickram (d. c. 1560), who has been already mentioned as the author of a popular collection of anecdotes, the Rollwagen- biichlein. His longer novels, Der Knabenspiegel (1554) and Der Goldfaden (1557), are in form, and especially in the importance they attach to psychological developments, the forerunners of the movement to which we owe the best works of German fiction in the 18th century. But Wickram stands alone. So inconsiderable, in fact, is the fiction of the Reformation age in Germany that we have to regard the old

Volksbticher as its equivalent; and it is significant that of all the prose writings of this age, the book which affords the best insight into the temper and spirit of the Reformation was just one of these crude Volksbticher, namely, the famous story of the magician Doctor Johann Faust, published at Frankfort in 1587.

IV. The Renaissance (1500-1740) The 17th century in Germany presents a complete contrast, to its predecessor; the fact that it was the century of the Thirty Years' War, which devastated the country, crippled the prosperity of the towns, and threw back by many generations the social development of the people, explains much, but it can hardly be held entirely responsible for the intellectual apathy, the slavery

to foreign customs and foreign ideas, which stunted the growth of the nation. The freedom of Lutheranism degenerated into a paralyzing Lutheran orthodoxy which was as hostile to the " Freiheit eines Christenmenschen " as that Catholicism it had superseded; the idealism of the humanists degenerated in the same way into a dry, pedantic scholasticism which held the German mind in fetters until, at the very close of the century, Leibnitz set it free. Most disheartening of all, literature which in the 16th century had been so full of promise and had conformed with such aptitude to the new ideas, was in all its higher manifestations blighted by the dead hand of pseudo-classicism. The unkempt literature of the Reformation age admittedly stood in need of guidauce and discipline, but the 17th century made the fatal mistake of trying to impose the laws and rules of Romance literatures on a people of a purely Germanic stock.

There were, however, some branches of German poetry which escaped this foreign influence. The church hymn, continuing the great Lutheran traditions, rose in the 1 7th century to extra-ordinary richness both in quality and quantity. Paul Gerhardt (1607-1676), the greatest German hymn-writer, was only one of many Lutheran pastors who in this age contributed to the German hymnal. On the Catholic side, Angelus Silesius, or Johann Scheffler (1624-1677) showed what a wealth of poetry lay in the mystic speculations of Jakob Boehme, the gifted shoemaker of Gorlitz (1575-1624), and author of the famous Aurora, oder M or gemote

im Aufgang (161 2); while Friedrich von Spee (1591-1635), another leading Catholic poet of the century, cultivated the pastoral allegory of the Renaissance. The revival of mysticism associated with Boehme gradually spread through the whole religious life of the 17th century, Protestant as well as Catholic, and in the more specifically Protestant form of pietism, it became, at the close of the period, a force of moment in the literary revival. Besides the hymn, the Volkslied, which amidst the struggles and confusion of the great war bore witness to a steadily growing sense of patriotism, lay outside the domain of the literary theorists and dictators, and developed in its own way. But all else — if we except certain forms of fiction, which towards the end of the 17th century rose into prominence — stood completely under the sway of the Latin Renaissance.

The first focus of the movement was Heidelberg, which had been a centre of humanistic learning in the sixteenth century. Here, under the leadership of J. W. Zincgref (1591-1635), a number of scholarly writers carried into practice that interest in the vernacular which had been shown a little earlier by the German translator of Marot, Paul Schede or Melissus, librarian in Heidelberg. The most important forerunner of Opitz was G. R. Weckherlin (1584-1653), a native of Wiirttemberg who had spent the best part of his life in England; his Oden und Gesdnge (1 6 1 8- 1 6 1 a) ushered in the era of Renaissance poetry in Germany with a promise thatwasbtft indifferentlyfulfilledbyhissuccessors. Of these the greatest, or at least the most influential, was Martin Opitz (1 597-1639). He was a native of Silesia and, as a student in Heidelberg, came into touch with Zincgref 's circle; subsequently, in the course of a visit to Holland, a more definite trend was given to his ideas by the example of the Dutch poet and scholar, Daniel Heinsius. As a poet, Opitz experimented with every form of recognized Renaissance poetry from ode and epic to pastoral romance and Senecan drama; but his poetry is for the most part devoid of inspiration; and his extraordinary fame among his contemporaries would be hard to understand, were it not that in his Buch von der deutschen Poeterey (1624) he gave the German Renaissance its theoretical textbook. In this tract, in which Opitz virtually reproduced in German the accepted dogmas of Renaissance theorists like Scaliger and Ronsard, he not merely justified his own mechanical verse-making, but also gave Germany a law-book which regulated her literature for a hundred years.

The work of Opitz as a reformer was furthered by another institution of Latin origin, namely, literary societies modelled on the Accademia della Crusca in Florence. These societies, of which the chief were the Fruchtbringende Gesellschaft or Palmenorden (founded 161 7), the

Elbschwanenorden in Hamburg

and the Gekrbnter Blumenorden an der Pegnitz or Gesellschaft der Pegnitzschdfer in Nuremberg, were the centres of literary activity during the unsettled years of the war. Although they produced much that was trivial— such as the extraordinary Niürnberger Trickier (1647-1653) by G. P. Harsdorffer (1607- 1658), a treatise which professed to turn out a fully equipped German poet in the space of six hours — these societies also did German letters an invaluable service by their attention to the language, one of their chief objects having been to purify the German language from foreign and un-German ingredients. J. G. Schottelius (1612-1676), for instance, wrote his epoch- making grammatical works with the avowed purpose of furthering the objects of the Fruchtbringende Gesellschaft. Meanwhile the poetic centre of gravity in Germany had shifted from Heidelberg to the extreme north-east, to Konigsberg, where a group of academic poets gave practical expression to the Opitzian theory. Chief among them was Simon Dach (1605-1659), a gentle, elegiac writer on whom the laws of the Buck von der deutschen Poeterey did not lie too heavily. He, like his more manly and vigorous contemporary Paul Fleming (1609-1640), showed, one might say, that it was possible to write good and sincere poetry notwith-standing Opitz's mechanical rules.

In the previous century the most advanced form of literature had been satire, and under the new conditions the satiric vein still proved most productive; but it was no longer the full- blooded satire of the Reformation, or even the rich and luxuriant satiric fancy of Fischart, which found expression in the 17 th century. Satire pure and simple was virtually only cultivated by two Low German poets, J. Lauremberg (1 590-1658) and J. Rachel (1618-1669), of whom at least the latter was accepted by the Opitzian school; but the satiric spirit rose to higher things in the powerful and scathing sermons of J. B. Schupp (1610-1661), an outspoken Hamburg preacher, and in the scurril- ous wit of the Viennese monk Abraham a Sancta Clara (1644- 1709), who had inherited some of his predecessor Murner's intellectual gifts. Best of all are the epigrams of the most gifted of all the Silesian group of writers, Friedrich von Logau (1604- 1655). Logau's three thousand epigrams {Deutsche Sinngedichte, 1654) afford a key to the intellectual temper of the 17th century; they are the epitome of their age. Here are to be seen reflected the vices of the time, its aping of French customs and its con- tempt for what was national and German; Logau held up to ridicule the vain bloodshed of the war in the interest of Chris- tianity, and, although he praised Opitz, he was far from prostrat- ing himself at the dictator's feet.

Logau is an epigrammatist of the first rank, and perhaps the most remarkable product of the Renaissance movement in Germany.

Opitz found difficulty in providing Germany with a drama according to the classic canon. He had not himself ventured beyond translations of Sophocles and Seneca, and Johann Rist (1607-1667) in Hamburg, one of the few contemporary dramatists, had written plays more in the manner of Duke Heinrich Julius of Brunswick than of Opitz. It was not until after the latter's death that the chief dramatist of the Renaissance movement came forward in the person of Andreas Gryphius (16 16-1664). Like Opitz, Gryphius also was a Silesian, and a poet of no mean ability, as is to be seen from his lyric poetry; but his tragedies, modelled on the stiff Senecan pattern, suffered from the lack of a theatre, and from his ignorance of the existence of a more highly developed drama in France, not to speak of England. As it was, he was content with Dutch models. In the field of comedy, where he was less hampered by theories of dramatic propriety, he allowed himself to benefit by the freedom of the Dutch farce and the comic effects of the English actors in Germany; in his Horribilicribrifaxa.nd.Herr Peter Squentz — the latter an adaptation of the comic scenes of the Midsummer Night's Dream — Grvphius has produced the best German plays of the 17th century.

The German novel of the 17 th century was, as has been already indicated, less hampered by Renaissance laws than other forms of literature, and although it was none the less at the mercy of foreign influence, that influence was more varied and manifold in its character. Don Quixote had been partly

translated early in the 17th century, the picaresque romance had found its way to Germany at a still earlier date; while H. M. Moscherosch (1601-1669) in his Gesichte Philanders von Sittewald (1642-1643) made the Suenos of Quevedo the basis for vivid pictures of the life of the time, interspersed with satire. The best German novel of the 17th century, Der abenteurliche Simplicissimus (1669) by H. J. Christoffel von Grimmelshausen(c 1625-1676), is a picaresque novel, but one that owed little more than its form to the Spaniards. It is in great measure the autobiography of its author, and describes with uncompromising realism the social

disintegration and the horrors of the Thirty Years' War. But this remarkable book stands alone; Grimmelshausen's other writings are but further contributions to the same theme, and he left no disciples worthy of carrying on the tradition he had created. Christian Weise (1642-1708), rector of the Zittau gymnasium, wrote a few satirical novels, but his realism and satire are too obviously didactic. He is seen to better advantage in his dramas, of which he wrote more than fifty for performance by his scholars.

The real successor of Simplicissimus in Germany was the English Robinson Crusoe, a novel which, on its appearance, was immediately translated into German (17 21); it called forth an extraordinary flood of imitations, the so-called " Robinsonaden," the vogue of which is even still kept alive by Der schweizerische Robinson of J. R. Wyss (1812 ff.). With the exception of J. G. Schnabel's Insel Felsenburg (1731-1743), the literary value of these imitations is slight. They represented, however, a healthier and more natural development of fiction than the " galant " romances which were introduced in the train of the Renaissance movement, and cultivated by writers like Philipp von Zesen (1619-1689), Duke Anton Ulrich of Brunswick (1633-1714), A. H. Buchholtz(i6o7-i67i), H. A. von Ziegler (1653-1697) — author of the famous Asiatische Banise (1688) — and D. C. von Lohenstein (1635-1683), whose Arminius (1680-1690) is on the whole the most promising novel of this group. The last men- tioned writer and Christian Hofmann von Hofmannswaldau (161 7-1679) are sometimes regarded as the leaders of a " second Silesian school," as opposed to the first school of Opitz. As the cultivators of the bombastic and Euphuistic style of the Italians Guarini and Marini, and of the Spanish writer Gongora, Lohen- stein and Hofmannswaldau touched the lowest point to which German poetry ever sank.

But this aberration of taste was happily of short duration. Although socially the recovery of the German people from the desolation of the war was slow and laborious, the intellectual life of Germany was rapidly recuperating under the influence of foreign thinkers. Samuel Pufendorf (1632-1694), Christian Thomasius (1655-1728), Christian von Wolff (1679-1754) and, above all, Gottfried Wilhelm Leibnitz (1646-1716), the first of the great German philosophers, laid the foundations of that system of rationalism which dominated Germany for the better part of the 18th century; while German religious life was strengthened and enriched by a revival of pietism, under mystic thinkers like Philipp Jakob Spener (1635-1705), a revival which also left its traces on religious poetry. Such hopeful signs of convalescence could not but be accompanied by an improve-

ment in literary taste, and this is seen in the first instance in a substitution for the bombast and conceits of Lohenstein and Hofmannswaldau, of poetry on the stricter and soberer lines laid down by Boileau. The so-called " court poets " who opposed the second Silesian school, men like Rudolf von Canitz (1654-1699), Johann von Besser (1654-1729) and Benjamin Neukirch (1665-1729), were not inspired, but they had at least a certain "correctness" of taste; and from their midst sprang one gifted lyric genius, Johann Christian Günther (1695-1723), who wrote love-songs such as had not been heard in Germany since the days of the Minnesang. The methods of Hofmanns- waldau had obtained considerable vogue in Hamburg, where the Italian opera kept the decadent Renaissance poetry alive. Here, however, the incisive wit of Christian Wernigke's (1661- 1725) epigrams was an effective antidote, and Barthold Heinrich Brockes.(i68o-i747), a native of Hamburg, who had been deeply

impressed by the appreciation of nature in English poetry, gave the artificialities of the Silesians their death-blow. But the influence of English literature was not merely destructive in these years; in the translations and imitations of the English Spectator, Taller and Guardian — the so-called moralische Wochen- schriften — it helped to regenerate literary taste, and to implant healthy moral ideas in the German middle classes.

The chief representative of the literary movement inaugurated by the Silesian " court poets " was Johann Christoph Gottsched (1 700-1 766), who between 1724 and 1740 succeeded in establish- ing in Leipzig, the metropolis of German taste, literary reforms modelled on the principles of French 17th-century classicism. He reformed and purified the stage according to French ideas, and provided it with a repertory of French origin; in his Kritische Dichtkunst (1730) he laid down the principles according to which good literature was to be produced and judged. As Opitz had reformed German letters with the help of Ronsa'rd, so now Gottsched took his standpoint on the principles of Boileau as interpreted by contemporary French critics and theorists. With Gottsched, whose services in purifying the German language have stood the test of time better than his literary or dramatic reforms, the period of German Renaissance literature reaches its culmination and at the same time its close. The movement of the age advanced too rapidly for the Leipzig dictator; in 1740 a new epoch opened in German poetry and he was soon left hopelessly behind.

V. The Classical Period of Modern German Literature

(1 740-1832)

(a) From the Swiss Controversy to the " Sturm und Drang." — Between Opitz and Gottsched German literature passed succes- sively through the various stages characteristic of all Renaissance literatures — from that represented by Trissino and the French P16iade, by way of the aberrations of Marini and the estilo culto, to the art poetique of Boileau. And precisely as in France, the next advance was achieved in a battle between the " ancients " and the " moderns," the German " ancients " being represented by Gottsched, the " moderns " by the Swiss literary reformers, J. J. Bodmer (1698-1783) and J. J. Breitinger (1701-1776). The latter in his Kritische Dichtkunst (1739) maintained doctrines which were in opposition to Gottsched's standpoint in his treatise of the same name, and Bodmer supported his friend's initiative; a pamphlet war ensued between Leipzig and Zurich, with which in 1 740-1 741 the classical period of modern German literature may be said to open. The Swiss, men of little origin- ality, found their theories in the writings of Italian and English critics; and from these they learned how literature might be freed from the fetters of pseudo-classicism. Basing their argu- ments on Milton's Paradise Lost, which Bodmer had translated into prose (1732), they demanded room for the play of genius and inspiration; they insisted that the imagination should not be hindered in its attempts to rise above the world of reason and common sense. Their victory was due, not to the skill with which they presented their arguments, but to the fact that literature itself was in need of greater freedom. It was in fact a triumph, not of personalities or of leaders, but of ideas. The effects of the controversy are to be seen in a group of Leipzig writers of Gottsched's own school, the Bremer Beitrdger as they were called after their literary organ. These men — C. F. Gellert (1715-1769), the author of graceful fables and tales in verse, G. W. Rabener (1714-1771), the mild satirist of Saxon provinci- ality, the dramatist J. Elias Schlegel (1 719-1749), who in more ways than one was Lessing's forerunner, and a number of minor writers — did not set themselves up in active opposition to their master, but they tacitly adopted many of the principles which the Swiss had advocated. And in the Bremer Beitrdge there appeared in 1 748 the first instalment of an epic by F. G. Klopstock (1724-1803), Der Messias, which was the best illustration of that lawlessness against which Gottsched had protested. More effectively than Bodmer's dry and uninspired theorizing, Klop- stock's Messias, and in a still higher degree, his Odes, laid the foundations of modern German literature in the 18th century.

His immediate followers, it is true, did not help to advance matters; Bodmer and J. K. Lavater (1741-1801), whose " physiognomic " investigations interested Goethe at a later date, wrote dreary and now long forgotten epics on religious themes. Klopstock's rhapsodic dramas, together with Macpher- son's Ossian, which in the 'sixties awakened a widespread enthusiasm throughout Germany, were responsible for the so-called " bardic " movement; but the noisy rhapsodies of the leaders of this movement, the " bards " H. W. von Gersten- berg (1737-1823), K. F. Kretschmann (1738-1809) and Michael Denis (1729-1800), had little of the poetic inspiration of Klop- stock's Odes.

The indirect influence of Klopstock as the first inspired poet of modern Germany and as the realization of Bodmer's theories can, however, hardly be over-estimated. Under Frederick the Great, who, as the docile pupil of French culture, had little sympathy for unregulated displays of feeling, neither Klopstock nor his imitators were in favour in Berlin, but at the university of Halle considerable interest was taken in the movement inaugurated by Bodmer. Here, before Klopstock's name was known at all, two young poets, J. I. Pyra (1715-1744) and S. G. Lange (1711-1781), wrote Freundschaflliche Lieder (1737), which were direct forerunners of Klopstock's rhymeless lyric poetry; and although the later Prussian poets, J. W. L. Gleim (1719- 1803), J. P. Uz (1720-1706) and J. N. Gotz (1721-1781), who were associated with Halle, and K. W. Ramler (1725-1798) in Berlin, cultivated mainly the Anacreontic and the Horatian ode — artificial forms, which kept strictly within the classic canon— yet Friedrich von Hagedorn (1708-17 54) in Hamburg showed to what perfection even the Anacreontic and the lighter vers de societe could be brought. The Swiss physiologist Albrecht von Haller (1708-1777) was the first German poet to give expression to the beauty and sublimity of Alpine scenery (Die Alpcn, T734), and a Prussian officer, Ewald Christian von Kleist _(*/ '^5-1759), author of Der Friihling (1749), wrote the most inspired nature-poetry of this period. Klopstock's supreme importance lay, however, in the fact that he was a forerunner of the movement of Sturm und Drang. But before turning to that movement we must consider two writers who, strictly speaking, also belong to the age under consideration — LessingandWieland. As Klopstock had been the first of modern Germany's inspired poets, so Gotthold Ephraim Lessing (1729-1781) was the first critic who brought credit to the

German name throughout Europe. He was the most liberal-minded exponent of 18th- century rationalism. Like his predecessor Gottsched, whom he vanquished more effectually than Bodmer had done, he had unwavering faith in the classic canon, but " classic " meant for him, as for his contemporary, J. J. Winckelmann (1717-1768), Greek art and literature, and not the products of French pseudo- classicism, which it had been Gottsched's object to foist on Germany. He went, indeed, still further, and asserted that Shakespeare, with all his irregularities, was a more faithful observer of the spirit of Aristotle's laws, and consequently a greater poet, than were the French classic writers. He looked to England and not to France for the regeneration of the German theatre, and his own dramas were pioneer-work in this direction. Miss Sara Sampson (1755) is a burgerliche Tragodie on the lines of Lillo's Merchant of London, Minna von Barnhelm (1767), a comedy _ in the spirit of Farquhar; in Emilia Galotli (1772), again with English models in view, he remoulded the "tragedy of common life " in a form acceptable to the Sturm und Drang; and finally in Nathan der Weise (1779) he won acceptance for iambic blank verse as the medium of the higher drama. His two most promising disciples— J. F. von Cronegk (1731-1758). and J. W. von Brawe (1738-1758)— unfortunately died young," , and C. F. Weisse (1726-1804) was not gifted enough to advance the drama in its literary aspects. Lessing's name is associated with Winckelmann's in Laokoon (1766), a treatise in which he set about defining the boundaries between painting, sculpture and poetry, and with those of the Jewish philosopher, Moses Mendelssohn (1729-1786) and the Berlin bookseller C. F. Nicolai (1 733-i8i 1) in the famous Lileraturbriefe. Here Lessing identified

himself with the best critical principles of the rationalistic move-ment—principles which, in the later years of his life, he employed in a fierce onslaught on Lutheran orthodoxy and intolerance.

To the widening and deepening of the German imagination C. M. Wieland (1733-1813) also contributed, but in a different way. Although no enemy of pseudo-classicism, he broke with the stiff dogmatism of Gottsched and his friends, and tempered the pietism of Klopstock by introducing the Germans to the lighter poetry of the south of Europe. With the exception of his fairy epic Oberon (1780), Wieland's work has fallen into neglect; he did, however, excellent service to the development of German prose fiction with his psychological novel, Agathon (1766-1767), which may be regarded

as a forerunner of Goethe's Wilhelm Meister, and with his humorous satire Die Abderiten (1774). Wieland had a considerable following, both among poets and prose writers; he was particularly looked up to in Austria, towards the end of the 18th century, where the literary movement advanced more slowly than in the north. Here Aloys Blumauer (!755-i789) and J. B. von Alxinger (1755-1797) wrote their travesties and epics under his influence. In Saxony, M. A. von Thummel (1738-1817) showed his adherence to Wieland's school in his comic epic in prose, Wilhelmine (1764), and in the general tone of his prose writings; on the other hand, K. A. Kortum (1745-1824), author of the most popular comic epic of the time, Die Jobsiade (1 784) , was but little influenced by Wieland. The German novel owed much to the example of Agathon, but the groundwork and form were borrowed from English models; Gellert had begun by imitating Richardson in his Schwedische Grdfin (1 747-1 748), and he was followed by J. T. Hermes (1738-1821), by Wieland's friend Sophie von Laroche (1730-1807), by A. von Knigge (1752-1796) and J. K. A. Musaus (1735-1787), the last mentioned being, however, best known as the author of a collection of Volksmarchen (1782-1786). Meanwhile a rationalism, less materialistic and strict than that of Wolff, was spreading rapidly through educated middle-class society in Germany. Men like Knigge, Moses Mendelssohn, J. G. Zimmermann (1728-1795), T. G. von Hippel (1741-1796), Christian Garve (1742-1798), J. J. Engel (1741-1802), as well as the educational theorists J. B. Basedow (17 23-1 790) and J. H. Pestalozzi (1746-1827), wrote books and essays on "popular philosophy" which were as eagerly read as the moralische Wochenschriften of the preceding epoch; and with this group of writers must also be associated the most brilliant of German 18th-century satirists, G. C. Lichtenberg (1742-1799).

Such was the milieu from which sprang the most advanced pioneer of the classical epoch of modern German literature, J. G. Herder (1 744-1803). The transition from the popular philosophers of the Aufklarung to Herder was due in the first instance to the influence of Rousseau; and in Germany itself that transition is represented by men like Thomas Abbt (1738- 1766) and J. G. Hamann (1 730-1 788). The revolutionary nature of Herder's thought lay in that writer's antipathy to hard and fast systems, to laws imposed upon genius; he grasped, as no thinker before him, the idea of historical evolution. By regarding the human race as the product of a slow evolution from primitive conditions, he revolutionized the methods and stand- point of historical science and awakened an interest — for which, of course, Rousseau had prepared the way — in the early

history of mankind. He himself collected and published the Volkslieder of all nations (1778-1770), and drew attention to those elements in German life and art which were, in the best and most precious sense, national— elements which his predecessors had despised as inconsistent with classic formulae and systems. Herder is thus not merely the forerunner, but the actual founder of the literary movement known as Sturm und Drang. New ground was broken in a similar way by a group of poets, who show the results of Klopstock's influence on the new literary movement: the Gottingen " Bund " or " Hain," a number of young students who met together in 1772, and for several years published their poetry in the Gottinger Musenalmanach. With the exception of the two brothers, Ch. zu Stolberg (1748-1821) and F. L. zu Stolberg (1750-1819), who occupied a somewhat peculiar position

in the " Bund," the members of this coterie were drawn from the peasant class of the lower bourgeoisie; J. H. Voss (1751- 1826), the leader of the " Bund," was a typical North German peasant, and his idyll, Luise (1784), gives a realistic picture of German provincial life. L. H. C. Holty (1748-1776) and J. M. Miller (1750-1814), again, excelled in simple lyrics in the tone of the Volkslied. Closely associated with the Gottingen group were M. Claudius (1 740-181 5), the Wandsbecker Bote — as he was called after the journal he edited — an even more unassuming and homely representative of the German peasant in literature than Voss, and G. A. Burger (1 748-1794) who contributed to the Gottinger Musenalmanach ballads, such as the famous Lenore (1 7 74) , of the very first rank. These ballads were the best products of the Gottingen school, and, together with Goethe's Strassburg and Frankfort songs, represent the highest point touched by the lyric and ballad poetry of the period.

But the Gottingen " Bund " stood somewhat aside from the main movement of literary development in Germany; it was only a phase of Sturm und Drang, and quieter, less turbulent than that on which Goethe had set the stamp of his personality. Johann Wolfgang Goethe (1749-1832) had, as a student in Leipzig (1765-1768), written lyrics in the Anacreontic vein and dramas in alexandrines. But in Strassburg, where he went to continue his studies in 1770-1771, he made the personal acquaintance of Herder, who won

his interest for the new literary movement. Herder imbued him with his own ideas of the importance of primitive history and Gothic architecture and inspired him with a pride in German nationality; Herder convinced him that there was more genuine poetry in a simple Volkslied than in all the ingenuity of the German imitators of Horace or Anacreon; above all, he awakened his enthusiasm for Shakespeare. The pamphlet Von deutscher Art und Kunst (!773); t0 which, besides Goethe and Herder, the historian Justus Moser (1720-1794) also contributed, may be regarded as the manifesto Of the Sturm und Drang. The effect on Goethe of the new ideas was instantaneous; they seemed at once to set his genius free, and from 1771 to 1775 he was extraordinarily fertile in poetic ideas and creations. His Golz von Berlichingen (1771-1773), the first drama of the Sturm und Drang, was followed within a year by the first novel of the movement, Werthers Leiden (1774); he dashed off Clavigo and Stella in a few weeks in 1774 and 1775, and wrote a large number of Singspiele, dramatic satires and fragments — including Faust in its earliest form (the so-called Urfaust) — not to mention love-songs which at last fulfilled the promise of Klopstock. Goethe's lyrics were no less epoch-making than his first drama and novel, for they put an end to the artificiality which for centuries had fettered German lyric expression. In all forms of literature he set the fashion to his time; the Shakespearian restlessness of Golz von Berlichingen found enthusiastic imitators in J. M. R. Lenz (1751-1792), whose Anmerkungenubers Theater (1774) formulated theoretically the laws, or defiance of laws, of the new drama, in F. M. von Klinger (1752-1831), J. A. Leisewitz (1752-1806), H.L. Wagner (1747-1779) and Friedrich Miiller, better known as Maler Miiller (1749-182 5): The dramatic literature of the Sturm und Drang was its most characteristic product — indeed, the very name of the movement was borrowed from a play by Klinger; it was inspired, as Gbtz von Berlichingen had been, by the desire to present upon the stage figures of Shakespearian grandeur impelled and tortured by gigantic passions, all considerations of plot, construction and form being regarded as subordinate to the development of character. The fiction of the Sturm und Drang, again, was in its earlier stages dominated by Werthers Leiden, as may be seen in the novels of F. H. Jacobi (1743-1819) and J.'M. Miller, who has been already mentioned. Later, in the hands of J. J. W. Heinse (1749-1803), author of Ardinghello (1787), Klinger, K. Ph. Moritz (1757-1793), whose Anton Reiser (1785) clearly foreshadows Wilhelm Meister, it reflected not merely the sentimentalism, but also the philosophic and artistic ideas of the period.

With the production of Die Rauber (1781) by Johann Friedrich Schiller (1750-1805), the drama of the Sturm und Drang entered

upon a new development. Although hardly less turbulent in spirit than the work of Klinger and Leisewitz, Schiller's tragedy was more skilfully adapted to the exigencies of the theatre; his succeeding dramas, Fiesco and Kabale und Liebe, were also admirable stage-plays, and in Don Carlos (1787) he abandoned prose for the iambic blank verse which Les-sing had made accept- able in Nathan der Weise. The " practical " character of the new drama is also to be seen in the work of Schiller's contem- porary, O. von Gemmingen (1755—1836), the imitator of Diderot, in the excellent domestic dramas of the actors F. L. Schroder (1744-1816) and A. W. Iffland (1759-1814), and even in the popular medieval plays, the so-called Ritterdramen of which Golz von Berlichingen was the model. Germany owes to the Sturm und Drang her national theatre; permanent theatres were established in these years at Hamburg, Mannheim, Gotha, and even at Vienna, which, as may be seen from the dramas of C. H. von Ayrenhoff (1733-1819), had hardly then advanced beyond Gottsched's ideal of a national literature. The Hofburg- theater of Vienna, the greatest of all the German stages, was virtually founded in 1776.

(6) German Classical Literature. — The energy of the Sturm und Drang, which was essentially iconoclastic in its methods, soon exhausted itself. For Goethe this phase in his development came to an end with his departure for Weimar in 1775, while, after writing Don Carlos (1787), Schiller turned from poetry to the study of history and philosophy. These subjects occupied his attention almost exclusively for several years, and not until the very close of the century did he,under the stimulus of Goethe's friendship, return to the drama. The first ten years of Goethe's life in Weimar were comparatively unproductive; he had left the Sturm und Drang behind him; its developments, for which he himself had been primarily responsible, were distasteful to him; and he had not yet formed a new creed. Under the influence of the Weimar court, where classic or even pseudo- classic tastes prevailed, he was gradually finding his way to a form of literary art which should reconcile the humanistic ideals of the 18th century with the poetic models of ancient Greece. But he did not arrive at clearness in his ideas until after his sojourn in Italy ˆ786-1788), an episode of the first importance for his mental development. Italy was, in the first instance, a revelation to Goethe of the antique; he had gone to Italy to find realized what Winckelmann had taught, and here he con- ceived that ideal of a classic literature, which for the next twenty years dominated German

literature and made Weimar its metropolis. In Italy he gave Iphigenie auf Tauris (1787) its final form, he completed Egmont (1788) — like the exactly con- temporary Don Carlos of Schiller, a kind of bridge from Sturm und Drang to classicism — and all but finished Torquato Tasso (1790). Wilhelm Meisters Lehrjahre (1795-1796) bears testimony to the clear and decisive views which he had acquired on all questions of art and of the practical conduct of life.

Long before Wilhelm Meister appeared, however, German thought and literature had arrived at that stability and self- confidence which are the most essential elements in a great literary period. In the year of Lessing's death, 1781, Immanuel Kant (1724-1804), the great philosopher, had published his Kritik der reinen Vernunft, and this, together with the two later treatises, Kritik der praktischen Vernunft (1788) and Kritik der Urleilskraft (1790), placed the Germans in the front rank of thinking nations. Under the influence of Kant, Schiller turned from the study of history to that of philosophy and more especi- ally aesthetics. His philosophic lyrics, his treatises on Anmut und Wiirde, on the Asthetische Erziehung des Menschen (1795), and liber naive und sentimentalische Dichtung (1795) show, on the philosophic and the critical side, the movement of the century from the irresponsible subjectivity of Sturm und Drang to the calm idealism of classic attainment. In the same way, German historical writing had in these years, under the leadership of men like Justus Moser, Thomas Abbt, I. Iselin, F. C. Schlosser, Schiller himself and, greatest of all, Johannes von Miiller (1752- 1809), advanced from disconnected, unsystematic chronicling to a clearly thought-out philosophic and scientific method. J. G.

A. Forster (1754-1794), who had accompanied Cook round the world, and Alexander von Humboldt (1 760-1859), gave Germany models of clear and lucid descriptive writing. In practical politics and economics, when once the unbalanced vagaries of undiluted Rousseauism had fallen into discredit, Germany pro- duced much wise and temperate thinking which prevented the spread of the French Revolution to Germany, and provided a practical basis on which the social and political fabric could be built up anew, after the Revolution had made the old regime impossible in Europe. Men like Wilhelm von Humboldt (1767- 1835) and the philosopher J. G.

Fichte (1762-1814) were, in two widely different spheres, representative of this type of intellectual eminence.

Meanwhile, in 1794, that friendship between Goethe and Schiller had begun, which lasted, unbroken, until the younger poet's death in 1805. These years mark the summit of Goethe and Schiller's classicism, and the great epoch of Weimar's history as a literary focus. Schiller's treatises had provided a theoreticai basis; his new journal, Die Horen, might be called the literary organ of the movement — although in this respect the subsequent Musenalmanach, in which the two poets published their magnifi- cent ballad poetry, had more value. Goethe, as director of the ducal theatre, could to a great extent control dramatic production in Germany. Under his encouragement, Schiller turned from philosophy to poetry and wrote the splendid series of classic dramas beginning with the trilogy of Wallenstein and closing with Wilhelm Tell and the fragment of Demetrius; while to Goethe we owe, above all, the epic of Hermann und Dorothea. Less important were the latter's severely classical plays Die naiiirliche Tochter and Pandora; but it must not be forgotten that it was chiefly owing to Schiller's stimulus that in those years Goethe brought the first part of Faust{\&o&).o a conclusion. Although acknowledged leaders of German letters, Goethe and Schiller had considerable opposition to contend with. The Sturm und Drang had by no means exhausted itself, and the representatives of the once dominant rationalistic movement were particularly arrogant and overbearing. The literature associated with both Sturm und Drang and rationalism was at this period palpably decadent; no comparison could be made between the magnificent achievements of Goethe and Schiller, or even of Herder and Wieland with the " family " dramas of IfBand, still less with the extraordinarily popular plays of A. von Kotzebue (1761-1819), or with those bustling medieval Ritter- dramen, which were especially cultivated in south Germany. There is a wide gap between Moritz's Anton Reiser or the philo- sophic novels which Klinger wrote in his later years, and Goethe's Meister; nor can the once so fervently admired novels of Jean Paul Richter (1763-1825) take a very high place. Neither the fantastic humour nor the penetrating thoughts with which Richter's books are strewn make up for their lack of artistic form and interest; they are essentially products of Sturm und Drang. Lastly, in the province of lyric and epic poetry, it is impossible to regard poets like the gentle F. von Matthisson (1761-1831), or the less inspired G. L. Kosegarten (1758-1818) and C. A. Tiedge (1 752-1841), as worthily seconding the masterpieces of Goethe and Schiller. Thus when we speak of the greatness of Germany's classical

period, we think mainly of the work of her two chief poets; the distance that separated them from their immediate contemporaries was enormous. Moreover, at the very close of the 18th century a new literary movement arose in admitted opposition to the classicism of Weimar, and to this movement, which first took definite form in the Romantic school, the sympathies of the younger generation turned. Just as in the previous generation the Sturm und Drang had been obliged to make way for a return to classic and impersonal principles of literary composition, so now the classicism of Goethe • and Schiller, which had produced masterpieces like Wallenstein and Hermann und Dorothea, had to yield to a revival of individual- ism and subjectivity, which, in the form of Romanticism, pro- foundly influenced the literature of the whole 19th century.

(c) The Romantic Movement. — The first Romantic school, however, was founded, not as a protest against the classicism of

Weimar, with which its leaders were in essential sympathy, but against the shallow, utilitarian rationalism of Berlin. Ludwig Tieck (1773-1853), a leading member of the school, was in reality a belated Sliirmer und Dr'dnger, who in his early years had chafed under the unimaginative tastes of the Prussian capital, and sought for a positive faith to put in their place. Friedrich Holderlin (1 770-1843), one of the most gifted poets of this age, demonstrates no less clearly than Tieck the essential affinity between Sturm und Drang and Romanticism; he, too, forms a bridge from the one individualistic movement to the other. The theoretic basis of Romanticism was, however, established by the two brothers, August Wilhelm and Friedrich Schlegel (1767-1845 and 1772-1829), who, accepting, in great measure, Schiller's aesthetic conclusions, adapted them to the needs of their own more subjective attitude towards literature. While Schiller, like Lessing before him, insisted on the critic's right to sit in judgment according to a definite code of principles, these Romantic critics maintained that the first duty of criticism was to understand and appreciate; the right of genius to follow its natural bent was sacred. The Herzensergiessungen eines kunstliebenden Klosterbruders by Tieck's school-friend W. H. Wackenroder (1773-1798) contained the Romantic art-theory, while the hymns and fragmentary novels of Friedrich von Hardenberg (known as Novalis, 1772-1801), and the dramas and fairy tales of Tieck, were the characteristic products of Romantic literature. The universal sympathies of the movement were exemplified by the many admirable translations — greatest of all, Schlegel's Shakespeare (1 797-1810) — which were produced under its auspices. Romanticism was essentially conciliatory in its tendencies, that is to say, it aimed

at a reconciliation of poetry with other provinces of social and intellectual life; the hard and fast boundaries which the older critics had set up as to what poetry might and might not do, were put aside, and the domain of literature was regarded as co-extensive with life itself; paint- ing and music, philosophy and ethics, were all accepted as con- stituent elements of or aids to Romantic poetry. Fichte, and to a much greater extent, F. W. J. von Schelling (1775-1854) were the exponents of the Romantic doctrine in philosophy, while the theologian F. 'E. D. Schleiermacher (1768-1834) demonstrated how vital the revival of individualism was for religious thought.

The Romantic school, whose chief members were the brothers Schlegel, Tieck, Wackenroder and Novalis, was virtually founded in r7g8, when the Schlegels began to publish their journal the Athenaeum; but the actual existence of the school was of very short duration. Wackenroder and Novalis died young, and by the year 1804 the other members were widely separated. Two years later, however, another phase of Romanticism became associated with the town of Heidelberg. The leaders of this second or younger Romantic school were K. Brentano (1778- 1842), L. A. von Arnim ˆ781-1831) and J. J. von Gorres (i77°- 1848), their organ, corresponding to the Athenaeum, was the Zeitung fur Einsiedler, or Trost-Einsamkeit, and their most characteristic production the collection of Volkslieder, published under the title Des Knaben Wunderhom (1805-1808). Compared with the earlier school the Heidelberg writers were more practical and realistic, more faithful to nature and the commonplace life of everyday. They, too, were interested in the German past and in the middle ages, but they put aside the idealizing glasses of their predecessors and kept to historic truth; they wrote historical novels, not stories of an imaginary medieval world as Novalis had done, and when they collected Volkslieder and Volksbilcher, they refrained from decking out the simple tradition with musical effects, or from heightening the poetic situation by " Romantic irony." Their immediate influence on German intellectual life was consequently greater; they stimulated and deepened the interest of the German people in their own past; and we owe to them the foundations of the study of German philology and medieval literature, both the brothers Jakob and Wilhelm Grimm (1 785-1863 and 1 786-1859) having been in touch with this circle in their early days. Again, the Heidelberg poets strengthened the national and patriotic spirit

of their people; they prepared the way for the rising against Napoleon, which culminated in the year 1813, and produced that outburst of patriotic song, associated with E. M. Arndt (1769-1860), K. Th. Korner (1791-1813) and M. von Schenken- dorf (1783-1817).

The subsequent history of Romanticism stands in close relation to the Heidelberg school, and when, about 1809, the latter broke up, and Arnim and Brentano settled in Berlin, the Romantic movement followed two clearly marked lines of development, one north German, the other associated with Wurttemberg. The Prussian capital, hotbed of rationalism as it was, had, from the first, been intimately associated with Romanticism; the first school had virtually been founded there, and north Germans, like Heinrich von Kleist (1777-1811) and Zacharias Werner (i768-i823)had done more for the develop- ment of the Romantic drama than had the members of either Romantic school. These men, and more especially Kleist, Prussia's greatest dramatic poet, showed how the capricious Romantic ideas could be brought into harmony with the classic tradition established by Schiller, how they could be rendered serviceable to the national theatre. At the same time, Berlin was not a favourable soil for the development of Romantic ideas, and the circle of poets which gathered round Arnim and Brentano there, either themselves demonstrated the decadence of these ideas, or their work contained elements which in sub- sequent years hastened the downfall of the movement. Friedrich de la Motte Fouque (1777-1843), for instance, shows how easy it was for the medieval tastes of the Romanticists to degenerate into mediocre novels and plays, hardly richer in genuine poetry than were the productions of the later Sturm und Drang; and E. T. A. Hoffmann (1776-1822), powerful genius though he was, cultivated with preference in his stories, a morbid super- naturalism, which was only a decadent form of the early Romantic delight in the world of fairies and spirits. The lyric was less sensitive to baleful influences, but even here the north German Romantic circle could only point to one lyric poet of the first rank, J. von Eichendorff (1788-1857); while in the poetry of A. von Chamisso (1781-1838) the volatile Romantic spirituality is too often wanting. Others again, like Friedrich Ruckert (1788-1866), sought the inspiration which Romanticism was no longer able to give, in the East; still another group, of which Wilhelm Muller (1794-1827) is the chief representative, followed Byron's example and awakened German sympathy for the oppressed Greeks and Poles.

Apart from Eichendorff, the vital lyric poetry of the third and last phase of Romanticism must be looked for in the Swabian school, which gathered round Uhland. Ludwig Uhland (1787- 1862) was himself a disciple of the Heidelberg poets, and, in his lyrics and especially in his ballads, he succeeded in grafting the lyricism of the Romantic school on to the traditions of German ballad poetry which had been handed down from Burger, Schiller and Goethe. But, as was the case with so many other disciples of the Heidelberg Romanticists, Uhland's interest in the German past was the serious interest of the scholar rather than the purely poetic interest of the earlier Romantic poets. The merit of the Swabian circle, the chief members of which were J. Kerner (1786-1862), G.Schwab (1792-1830), W.Waiblinger(i8o4-i83o), W. Hauff (1802-1827) and, most gifted of all, E. Morike (1804- 1875) was that these writers preserved the Romantic traditions from the disintegrating influences to which their north German contemporaries were exposed. They introduced few new notes into lyric poetry, but they maintained the best traditions intact, and when, a generation later, the anti-Romantic movement of " Young Germany " had run its course, it was to Wurttemberg Germany looked for a revival of the old Romantic ideas. '

Meanwhile, in the background of all these phases of Romantic evolution, through which Germany passed between 1798 and 1832, stands the majestic and imposing figure of Goethe. Personally he had in the early stages of the movement been opposed to that reversion to subjectivity and lawlessness which the first Romantic school seemed to him to represent ; to the end of his life he regarded himself as a "classic," not a "romantic"

poet. But, on the other hand, he was too liberal-minded a thinker and critic to be oblivious to the fruitful influence of the new movement. Almost without exception he judged the young poets of the new century fairly, and treated them sympathetically and kindly; he was keenly alive to the new — and for the most part " unclassical " — development of literature in England, France and Italy; and his own published work, above all, the first part of Faust (1808), Die W ahlverwandtschaften (1809), Dichtung und Wahrheit (1811-1814, a final volume in 1833), Westosllicher Divan (181 9), Wilhelm Meisters Wander jahre (1821-1829) and the second part of Faust (published in 1832 after the poet's death), stood in no antagonism to the Romantic ideas of their time. One might rather say that Goethe was the bond between the two fundamental literary movements of the German classical age; that his work achieved that reconciliation of " classic " and " romantic " which, rightly regarded, was the supreme

aim of the Romantic school itself.

VI. German Literature since Goethe (1832-1906)

(a) Young Germany. — With Goethe's death a great age in German poetry came to a close. Long before 1832 Romanticism had, as we have seen, begun to lose ground, and the July revolu- tion of 1830, the effects of which were almost as keenly felt in Germany as in France, gave the movement its death-blow. Meanwhile the march of ideas in Germany itself had not been favourable to Romanticism. Schelling had given place to G. W. F. Hegel (1770-1831), now the dominant force in German philosophy, and the Hegelian metaphysics proved as unfruitful an influence on literature as that of Fichte and Schelling had been fruitful. The transference of Romantic ideas to the domain of practical religion and politics had proved reactionary in its effects; Romanticism became the cloak for a kind of Neo-catholicism, and Romantic politics, as enunciated by men like F. von Gentz (1764-1832) and Adam Muller (1779-1829), served as an apology for the Metternich regime in Austria. Only at the universities — in Gottingen, Heidelberg and Berlin — did the movement continue, in the best sense, to be productive; German philology, German historical science and German jurisprudence benefited by Romantic ideas, long after Romantic poetry had fallen into decay. The day of Romanticism was clearly over; but a return to the classic and humanitarian spirit of the 1 8th century was impossible. The social condition of Europe had been profoundly altered by the French Revolution ; the rise of industrialism had created new economic problems, the march of science had overturned old prejudices. And in a still higher degree were the ideas which lay behind the social upheaval of the July revolution incompatible with a reversion in Germany to the conditions of Weimar classicism. There was, moreover, no disguising the fact that Goethe himself did not stand high with the younger generation of German writers who came into power after his death.

" Young Germany " did not form a school in the sense in which the word was used by the early Romanticists; the bond of union was rather the consequence of political persecution. In December i835the German " Bund " issued adecree suppressing the writings of the " literary school " known as " Young Germany," and mentioned by name Heinrich Heine, Karl Gutzkow, Ludolf Wienbarg, Theodor Mundt and Heinrich Laube. Of these men, Heine (1797-1856) was by far the most famous. He had made his reputation in 1826 and 1827 with Die Harzreise and Das Buck der Lieder, both of which books show how deeply he was immersed in the Romantic traditions.

But Heine felt perhaps more acutely than any other man of his time how the ground was slipping away from beneath his feet; he repudiated the Romantic movement and hailed the July revolution as the first stage in the " liberation of humanity " ; while ultimately he sought in France the freedom and intellectual stimulus which Germany withheld from him. Heine suffered from having been born in an age of transition ; he was unable to realize in a whole- hearted way all that was good in the new movement, which he had embraced so warmly; his optimism was counteracted by doubts as to whether, after all, life had not been better in that

old Romantic Germany of his childhood for which, to the last, he retained so warm an affection. Personal disappointments and unhappiness added to the bitterness of Heine's nature, and the supremely gifted lyric poet and the hardly less gifted satirist were overshadowed by the cynic from whose biting wit nothing was safe.

Heine's contemporary and — although he was not mentioned in the decree against the school — fellow-fighter, Ludwig Borne (1786-1837), was a more characteristic representative of the " Young German " point of view; for he was free from Romantic prejudices. Borne gave vent to his enthusiasm for France in eloquent Briefe aus Paris (1830-1833), which form a landmark of importance in the development of German prose style. With Karl Gutzkow (1811-1878), who was considerably younger than either Heine or Borne, the more positive aspects of the " Young German " movement begin to be apparent. He, too, had become a man of letters under the influence of the July revolution, and with an early novel, Wally, die Zweiflerin (1835), which was then regarded as atheistic and immoral, he fought in the battle for the new ideas. His best literary work, however, was the comedies with which he enriched the German stage of the 'forties, and novels like Die Ritter vom Geiste (1850-1851), and. Der Zauberer von Rom (1858-1861), which have to be con- sidered in connexion with the later development of German fiction. Heinrich Laube (1 806-1 884), who, as the author of lengthy social novels, and Reisenovellen in the style of Heine's Reisebilder, was one of the leaders of the new movement, is now only remembered as Germany's greatest theatre-director. Laube's connexion (1850-1867) with the Burgtheater of Vienna forms one of

the most brilliant periods in the history of the modern stage. Heine and Borne, Gutzkow and Laube — these were the leading spirits of " Young Germany " ; in their train followed a host of lesser men, who to the present generation are hardly even names. In the domain of scholarship and learning the " Young German " movement was associated with the supremacy of Hegelianism, the leading spirits being D. F. Strauss (1808-1874), author of the Leben Jesu (1835), the historians G.G.Gervinus(i8o5-i87i) and W.Menzel (1798-1873), and the philosopher L. A. Feuerbach (1804-1872), who, although a disciple of Hegel, ultimately helped to destroy the latter's influence.

Outside the immediate circle of "Young Germany," other tentative efforts were made to provide a substitute for the discredited literature of Romanticism. The historical novel, for instance, which Romanticists like Arnim had cultivated, fell at an early date under the influence of Sir Walter Scott; Wilhelm Hauff, Heinrich Zschokke (1771-1848) and K. Spindler (1796- 1855) were the most prominent amidst the many imitators of the Scottish novelist. The drama, again, which since Klei'st and Werner, had been without definite principles, was, partly under Austrian influence, finding its way back to a condition of stability. In Germany proper, the men into whose hands it fell were, on the one hand, undisciplined geniuses such as C. D. Grabbe (1801-1836), or, on the other, poets with too little theatrical blood in their veins like K. L. Immermann (1 796-1 840) , or with too much, like E. von Raupach (1784-1852), K. von Holtei (1798-1880) and Adolf Mullner (1774-1829) — the last named being the chief representative of the so-called Schicksals- tragodie. In those years the Germans were more seriously interested in their opera, which, under C. M. Weber, H. A. Marschner, A. Lortzing and O. Nicolai, remained faithful to the Romantic spirit. In Austria, however, the drama followed lines of its own; here, at the very beginning of the century, H. J. von Collin (1771-1811) attempted in Regulus and other works to substitute for the lifeless pseudo-classic tragedy of Ayrenhoff the classic style of Schiller. His attempt is the more interesting, as the long development that had taken place in Germany between Gottsched and Schiller was virtually un-represented in Austrian literature. M. von Collin (1779-1824), a younger brother of H. J. von Collin, did a similar service for the Romantic drama. Franz Grillparzer (1791-1872), Austria's greatest poet, began in the school of Mullner with a " fate

drama," but soon won an independent place for himself; more successfully than any other dramatist of the century, he carried out that task which Kleist had first seriously faced, the reconcilia- tion of the classicism of Goethe and Schiller with the Romantic and modern

spirit of the 19th century. It is from this point of view that works like Das goldene Vliess (1820), Konig Ottokars Gliick und Ende (1825), Der Traum, ein Leben (1834) and Des Mecres und der Licbe Wellen (1831) must be regarded. As far as the poetic drama was concerned, Grillparzer stood alone, for E. F. J. von Miinch-Bellinghausen (1806-187 1), his most promising contemporary, once so popular under the pseudonym of Friedrich Halm, soon fell back into the trivial sentimentality of the later Romanticists. In other forms of dramatic literature Austria could point to many distinguished writers, notably the comedy-writer, E. von Bauernfeld (1 802-1 890), while a host of playwrights, chief of whom were F. Raimund (1 790-1836) and J. Nestroy (1801-1862), cultivated the popular Viennese farce and fairy-play. Thus, in spite of Metternich's censorship of the drama, the Viennese theatre was, in the first half of the 19th century, in closer touch with literature than that of any other German centre.

The transitional character of the age is best illustrated by two eminent writers whom outward circumstances rather than any similarity of character and aim have classed together. These were K. L. Immermann, who has been already mentioned, and A. von Platen-Hallermund (1796-1835). Immermann's dramas were of little practical value to the theatre, but one at least, Merlin (1 83 2) , is a dramatic poem of great beauty. In his novels, however, Die Epigonen (1836) and Munchhausen (1838-1839),' Immermann was the spokesman of his time. He looked back- wards rather than forwards; he saw himself as the belated follower of a great literary age rather than as the pioneer of a new one. The bankruptcy of Romanticism and the poetically arid era of " Young Germany " left him little confidence in the future. Platen, on the other hand, went his own way; he, too, was the antagonist both of Romanticism and " Young Germany," and with Immermann himself he came into sharp conflict. But in his poetry he showed himself indifferent to the strife of contending literary schools. He began as an imitator of the German oriental poets — the only Romanticists with whom he had any personal sympathy — and with his matchless Sonette aus Venedig (1825) he stands out as a master in the art of verse- writing and as the least subjective of all German lyric poets. In the imitation of Romance metres he sought a refuge from the extravagances and excesses of the Romantic decadence.

Meanwhile the political side of the " Young German " move- ment, which the German Bund aimed at stamping out, gained rapidly in importance under the influence of the unsettled political conditions between the revolutions of 1830 and 1848. The early 'forties were in

German literature marked by an extraordinary outburst of political poetry, which may be aptly compared with the national and patriotic lyric evoked by the year 1813. The principles which triumphed in France at the revolution of 1848 were, to a great extent, fought out by the German singers of 1841 and 1842. Begun by mediocre talents like N. Becker (1809-1845) and R. E. Prutz (1816-1872), the movement found a vigorous champion in Georg Herwegh (1817-1875), who in his turn succeeded in winning Ferdinand Freiligrath (1810-1876) for the revolutionary cause. Others joined in the cry for freedom — F. Dingelstedt (1814-1881), A. H. Hoffmann von Fallersleben (1798-1874), and a number of Austrians, who had even more reason for rebellion and discontent than the north Germans. But the best Austrian political poetry, the Spaziergdnge eines Wiener Poeten, 1831, by " Anastasius Griin " (Graf A. A. von Auersperg, 1806-1876), belonged to a decade earlier. The political lyric culminated in and ended with the year 1848; the revolutionists of the 'forties were, if not appeased, at least silenced by the revolution which in their eyes had effected so little. If Freiligrath be excepted, the chief lyric poets of this epoch stood aside from the revolutionary movement; even E. Geibel (1815-1884), the representative poet of the I succeeding age, was only temporarily interested in the political

movement, and his best work is of a purely lyric character. M. von Strachwitz's(i822-i847)promisingtalentdidnot flourish in the political atmosphere; Annette von Droste-Hulshoff (1797-1848), and the Austrian, Nikolaus Lenau (1802-1850), both stand far removed from the world of politics; they are imbued with that pessimistic resignation which is, more or less, characteristic of all German literature between 1850 and

1870.

(b) Mid-Century Literature. — When once the revolution of 1848 was over, a spirit of tranquillity came over German letters; but it was due rather to the absence of confidence in the future than to any hopefulness or real content. The literature of the middle of the century was not wanting in achievement, but there was nothing buoyant or youthful about it; most significant of all, the generation between 1848 and 1880 was either oblivious or indifferent to the

good work and to the new and germinating ideas which it produced. Hegel, who held the earlier half of the 19th century in his ban, was still all-powerful in the universities, but his power was on the wane in literature and public life. The so-called " Hegelian Left " had advanced so far as to have become incompatible with the original Hegelianism; the new social and economic theories did not fit into the scheme of Hegelian collectivism; the interest in natural science — fostered by the popular books of J. Moleschott (1822-1893), Karl Vogt (1817-1895) and Ludwig Buchner (1824-1899) — created a healthy antidote to the Hegelian metaphysics. In literature and art, on which Hegel, as we have seen, had exerted so blight- ing an influence, his place was taken by the chief exponent of philosophic pessimism, Arthur Schopenhauer (1788-1860). Schopenhauer's antagonism to Hegelianism was of old standing, for his chief work, Die Welt als Wille und Vorstellung, had appeared as far back as 1819; but the century was more than half over before the movement of ideas had, as it were, caught up with him, before pessimism became a dominant force in intellectual life.

The literature produced between 1850 and 1870 was pre- eminently one of prose fiction. The beginnings which the " Young German " school had made to a type of novel dealing with social problems — the best example is GutzkowV Ritter vom Geiste — developed rapidly in this succeeding epoch. Friedrich Spielhagen (born 1829) followed immediately in Gutzkow's footsteps, and in a series of romances from Problema- tische Naturen (i860) to Sturmflut (1876), discussed in a militant spirit that recalls Laube and Gutzkow the social problems which agitated German life in these decades. Gustav Freytag (1816-1895), although an older man, freed himself more success- fully from the " Young German " tradition; his romance of German commercialism, Soil und Haben (1855), i s tne master- piece of mid-century fiction of this class. Less successful was Freytag's subsequent attempt to transfer his method to the milieu of German academic life in Die verlorene Handschrift (1864). As was perhaps only natural in an age of social and political interests, the historical novel occupies a subordinate place. The influence of Scott, which in the earlier period had been strong, produced only one writer, Wilhelm Haring (" Willi- bald Alexis," 1798-1871), who was more than a mere imitator of the Scottish master. In the series of six novels, from Der Roland von Berlin to Dorolhe, which Alexis published between 1840 and 1856, he gave Germany, and more particularly Prussia, a historical fiction which might not unworthily be compared with the Waverley Novels. But Alexis had no successor, and the historical novel soon made way for a type of fiction in which

the accurate reproduction of remote conditions was held of more account than poetic inspiration or artistic power. Such are the " antiquarian " novels of ancient Egyptian life by ■ Georg Ebers (183 7-1 898), and those from primitive German history by Felix Dahn (born 1834). The vogue of historical fiction was also transferred to some extent, as in English literature, to novels of American life and adventure, of which the chief German cultivators were K. A. Postl, who wrote under the pseudonym of Charles Sealsfield (1793-1864) and Friedrich Gerstacker (1816-1872).

Of greater importance was the fiction which owed its inspira- tion to the Romantic traditions that survived the " Young German " age. To this group belongs the novel of peasant and provincial life, of which Immermann had given an excellent example in Der Oberhof, a story included in the arabesque of Miinchhausen. A Swiss pastor, Albrecht Bitzius, better known by his pseudonym " Jeremias Gotthelf " (1797-1854), was, however, the real founder of this class of romance; and his simple, unvarnished and naively didactic stories of the Swiss peasant were followed not long afterwards by the more famous Schwarswalder Dorfgeschichten (1843-1854) of Berthold Auer- bach (1812-1882). Auerbach is not by any means so naive and realistic as Gotthelf, nor is his work free from tendencies and ideas which recall " Young German " rationalism rather than the unsophisticated life of the Black Forest; but the Schwarzwalder Dorfgeschichten exerted a decisive influence; they were the forerunners of a large body of peasant literature which described with affectionate sympathy and with a liberal admixture of dialect, south German village life. With this group of writers may also be associated the German Bohemian, A. Stifter (1805-1868), who has called up unforgettable pictures and impressions of the life and scenery of his home.

Meanwhile, the Low German peoples also benefited by the revival of an interest in dialect and peasant life; it is to the credit of Fritz Reuter (1810-1874) that he brought honour to the Plattdeutsch of the north, the dialects of which had played a fitful, but by no means negligible r61e in the earlier history of German letters. His Mecklenburg novels, especially U I de Franzosentid (i860), Utmine Festungstid (1863) and Ut mine Stromtid (186 2- 1864), are a faithful reflection of Mecklen- burg life and temperament, and hold their place beside the best German fiction of the period. What Reuter did for Plattdeutsch prose, his contemporary, Klaus Groth (1819-1899), the author olQuickborn (1852), didforits verse. We owe, however, the best German prose fiction of these years to two writers, whose affinity with the older Romanticists was closer. The

north German, Theodor Storm (181 7-1888) is the author of a series of short stories of delicate, lyric inspiration, steeped in that elegiac Romanticism which harmonized so well with mid-century pessimism in Germany. Gottfried Keller (1819-1890), on the other hand, a native of Zurich, was a modern Romanticist of a robuster type; his magnificent autobiographical novel, Der griine Heinrich (1854-1855), might be described as the last in the great line of Romantic fiction that had begun with Wilhelm Meister, and the short stories, Die Leute von Seldwyla (1856- 1874) and Zuricher Novellen (1878) are masterpieces of the first rank.

In the dramatic literature of these decades, at least as it was reflected in the repertories of the German theatres, there was little promise. French influence was, in general, predominant ; French translations formed the mainstay of the theatre-directors, while successful German playwrights, such as R. Benedix (1811- 1873) and Charlotte Birch- Pfeiffer (1800-1868), have little claim to consideration in a literary survey. Gustav Freytag's admirable comedy, Die Journalisten (1852), was one of the rare exceptions. But the German drama of this epoch is not to be judged solely by the theatres. At the middle of the century Germany could point to two writers who, each in his way, con- tributed very materially to the development of the modern drama. These were Friedrich Hebbel (1813-1863) and Otto Ludwig (1813-1865). Both of these men, as a later generation discovered, were the pioneers of that dramatic literature which at the close of the century accepted the canons of realism and aimed at superseding outward effects by psychological conflicts and problems of social life. Hebbel, especially, must be regarded as the most original and revolutionary German dramatist of the 19th century. Unlike his contemporary Grillparzer, whose aim had been to reconcile the " classic " and the " romantic " drama with the help of Spanish models, Hebbel laid the founda- tions of a psychological and social drama, of which the most modern interpreter has been Henrik Ibsen. Hebbel's first tragedy, Judith, appeared in 1840, his masterpieces, Her odes

und Marianne, Agnes Bernauer, Gyges und sein Ring, and the trilogy of Die Nibelungen between 1850 and 1862.

In this period of somewhat confused literary striving, there is, however, one body of writers who might be grouped together as a school, although the designation must be regarded rather as an outward accident of union than as implying conformity of aims. This is the group which Maximilian II. of Bavaria gathered round him in Munich between 1852 and i860. A leading spirit of the group was Emanuel Geibel, who, as we have seen, set a model to the German lyric in this age; F. von Boden- stedt (1819-1892), the popular author of Mirza Schaffy; and J. V. von Scheffel (1826-1886), who, in his verse-romance, Der Trompeler von Sackingen (1854), broke a lance for a type of literature which had been cultivated somewhat earlier, but with no very conspicuous success, by men like O. von Redwitz (1823-1891) and G. Kinkel (1815-1882). The romance was, in fact, one of the favourite vehicles of poetic expression of the Munich school, its most successful exponents being J. Wolff (b. 1834) and R. Baumbach (1840-1905); while others, such as H. Lingg (1820-1905) and R. Hamerling (1830-1889) devoted themselves to the more ambitious epic. The general tone of the literary movement was pessimistic, the hopelessness of the spiritual outlook being most deeply engrained in the verse of H. Lorm (pseudonym for Heinrich Landesmann, 1821- 1902) and H. Leuthold (1827-1879). On the whole, the most important member of the Munich group is Paul Heyse (b. 1830), who, as a writer of " Novellen " or short stories, may be classed with Storm and Keller. An essentially Latin genius, Heyse excels in stories of Italian life, where his lightness of touch and sense of form are shown to best advantage; but he has also written several long novels. Of these, Kinder der Welt (1873) and, in a lesser degree, Im Paradiese (1875), sum up the spirit and tendency of their time, just as, in earlier decades, Die Rilter vom Geiste, Problemalische Naturen and Soil und Haben were characteristic of the periods which produced them.

(c) German Literature after 1870. — In the years immediately following the Franco- German War, the prevailing conditions were unfavourable to literary production in Germany, and the re-establishment of the empire left comparatively little trace on the national literature. All minds were for a time engrossed by the Kulturkampf, by the financial difficulties — the so-called Griindertum — due to unscrupulous speculation, and, finally, by the rapid rise of social democracy as a political force. The intellectual basis of the latter movement was laid by Ferdinand Lassalle (1825-1864) and Karl Marx (1818-1883), author of Das Kapital (vol. i, 1867). But evenhad such disturbing elements been wanting, the general tone of German intellectual life at that time was not

buoyant enough to inspire a vigorous literary revival. The influence of Hegel was still strong, and the " his- torical " method, as enunciated in Der alte und der neue Glaube (1872) by the Hegelian D. F. Strauss, was generally accepted at the German universities. To many the compromise which H. Lotze (1817-1881) had attempted' to establish between science and metaphysics, came as a relief from the Hegelian tradition, but in literature and art the dominant force was still, as before the war, the philosophy of Schopenhauer. In his Philosophie des Unbewussten (1869), E. von Hartmann (1842-1906) endeavoured to bring pessimism into harmony with ideal- ism. In lyric poetry, the dull monotony was broken by the excitement of the war, and the singers of the revolution of 1848 were among the first to welcome the triumph and unification of Germany. At the same time, men of the older generation, like Herwegh, Freiligrath and Geibel could ill conceal a certain disappointment with the new regime; the united Germany of 1 87 1 was not what they had dreamed of in their youth, when all hopes were set on the Frankfort parliament.

The novel continued to be what it was before 1870, the most vigorous form of German literature, but the novelists who were popular in the early 'seventies were all older men. Laube, Gutzkow and Auerbach – were still writing; Fritz Reuter was a universal favourite; while among the writers of short stories, Storm, who, between 1877 and 1888,' put the crown to his work

with his Chroniknovellen, and Paul Heyse were the acknowledged masters. It was not until at least a decade later that the genius of Gottfried Keller was generally recognized. The historical novel seemed, in those days, beyond hope of revival. Gustav Freytag, it is true, had made the attempt in Die Ahnen (1872- 1881), a number <5f independent historical romances linked together to form an ambitious prose epic; but there was more of the spirit of Ebers and Dahn in Freytag's work than of the spacious art of Scott, or of Scott's disciple, Willibald Alexis.

The drama of the 'seventies was in an even less hopeful condition than during the preceding period. The classical iambic, tragedy was cultivated by the Munich school, by A. Wilbrandt (b. 1837), A. Lindner (1831-1888), H. Kruse (1815-1902), by the Austrian F. Nissel (1831-1893), and A. Fitger (b. 1840); but it was characteristic of the time that Halm was popular, while Hebbel and Grillparzer were neglected, it might even be said ignored. The most gifted German dramatist belonging exclusively to the decade between 1870 and 1880 was an Austrian, Ludwig Anzengruber (1839-1889),

whose Pfarrer von Kirchfeld (1870) recalled the controversies of the Kulturkampf. This was Anzen- gruber's first drama, and it was followed by a series of power- ful plays dealing with the life of the Austrian peasant; Anzen- gruber was, indeed, one of the ablest exponents of that village life, which had attracted so many gifted writers since the days of Gotthelf and Auerbach. But the really popular dramatists of this epoch were either writers who, like Benedix in the older generation, cultivated the bourgeoise comedy— A. L'Arronge (b. 1838), G. von Moser (1825-1903), F. von Schonthan (b. 1849) and O. Blumenthal (b. 1852) — or playwrights, of whom P. Lindau (b. 1839) may be regarded as representative, who imitated French models. The only sign of progress in the dramatic history of this period was the marked improvement of the German stage, an improvement due, on the one hand, to the artistic reforms introduced by the duke of Meiningen in the Court theatre at Meiningen, and, on the other hand, to the ideals of a national theatre realized at Bayreuth by Richard Wagner (1813-1883). The greatest composer of the later 19th century is also one of Germany's leading dramatists; and the first performance of the trilogy Der Ring der Nibelungen at Bayreuth in the summer of 1876 may be said to have inaugurated the latest epoch in the history of the German drama.

The last fifteen or twenty years of the 19th century were distinguished in Germany by a remarkable literary activity. Among the younger generation, which was growing up as citizens of the united German empire, a more hopeful and optimistic spirit prevailed. The influence of Schopenhauer was on the wane, and at the universities Hegelianism had lost its former hold. The sponsor of the new philosophic movement was Kant, the master of 18th-century " enlightenment," and under the in- fluence of the " neo-Kantian " movement, not merely German school philosophy, but theology also, was imbued with a healthier spirit. L. von Ranke (1795-1886) was still the dominant force in German historical science, and between 1881 and 1888 nine volumes appeared of his last great work, Weltgeschichte. Other historians of the period were H. von Sybel (1817-1895) and H. von Treitschke (1834-1896), the latter a vigorous and inspiring spokesman of the new political conditions; while J. Burckhardt (18 1 8-1 897), author of the masterly Kultur der Renaissance in I (alien (i860) and the friend of Nietzsche, exerted an influence on German thought which was not confined to academic circles. Literary criticism perhaps benefited most of all by the dethrone- ment of Hegel and the more objective attitude towards Schopen- hauer; it seemed as if in this epoch the Germans first

formed definite ideas — and ideas which were acceptable and accepted outside Germany — as to the rank and merits of their great poets. A marked change came over the nation's attitude towards Goethe, a poet to whom, as we have seen, neither the era of Hegel nor that of Schopenhauer had been favourable; Schiller was regarded with less national prejudice, and — most important of all — amends were made by the new generation for the earlier neglect of Kleist, Grillparzer, Hebbel and Keller. The thinker and poet who most completely embodies the spirit

of this period — who dealt the Hegelian metaphysics its death- blow as far as its wider influence was concerned — was Friedrich Nietzsche (1844- 1900). Nietzsche had begun as a disciple of Schopenhauer and a friend of Wagner, and he ultimately became the champion of an individualistic and optimistic philosophy which formed the sharpest possible contrast to mid-century pessimism. The individual, not the race, the Herrenmensch, not the slave, self-assertion, not self-denying renunciation — these are some of the ideas round which this new optimistic ethics turns. Nietzsche looked forward to the human race emerging from an effete culture, burdened and clogged by tradi- tion, and re-establishing itself on a basis that is in harmony with man's primitive instincts. Like Schopenhauer before him, Nietzsche was a stylist of the first rank, and his literary master- piece, Also sprach Zarathustra (1883ˆ1891), is to be regarded as the most important imaginative work of its epoch.

Nietzschean individualism was only one of many factors which contributed to the new literary development. The realistic movement, as it had manifested itself in France under Flaubert, the Goncourts, Zola and Maupassant, in Russia under Dostoievsky and Tolstoi, and in Norway under Ibsen and Bjornson, was, for a time, the dominant force in Germany, and the younger generation of critics hailed it with undisguised satisfaction ; most characteristic and significant of all, the centre of this revival was Berlin, which, since it had become the imperial capital, was rapidly establishing its claim to be also the literary metropolis. It was the best testimony to the vitality of the movement that it rarely descended to slavish imitation of the realistic masterpieces of other literatures; realism in Germany was, in fact,

only an episode of the 'eighties, a stimulating influence rather than an accepted principle or dogma. And its suggestive character is to be seen not merely in the writings of the young Stiirmer und Dranger of this time, but also in those of the older generation who, in temperament, were naturally more inclined to the ideals of a past age.

Of the novelists of the latter class, A. Wilbrandt, who has already been mentioned as a dramatist, has shown, since about 1890, a remarkable power of adapting himself, if not to the style and artistic methods of the younger school, at least to the ideas by which it was agitated; F. Spielhagen's attitude towards the realistic movement has been invariably sympathetic, while a still older writer, Theodor Fontane (1819-1898), wrote between 1880 and 1898 a series of works in which the finer elements of French realism were grafted on the German novel. To the older school belong Wilhelm Jensen (b. 1837), and that fine humorist, Wilhelm Raabe (b. 1831), with whom may be associated as other humorists of this period, H Seidel (1842-1906) and W. Busch (1832-1908). Some of the most interesting examples of recent German fiction come, however, from Austria and Switzerland. The two most eminent Austrian authors, Marie von Ebner- Eschenbach' (b. 1830), and Ferdinand, von Saar (1833-1906), both excel as writers of Novellen or short stories— the latter especially being an exponent of that pessimism which is Austria's peculiar heritage from the previous generation of her poets. Austrians too, are Peter Rosegger (b. 1843), who has won popularity with his novels of peasant life, K. E. Franzos (1848- 1904) and L. von Sacher-Masoch (1835-1895). German prose fiction is, in Switzerland, represented by two writers of the first rank: one of these, Gottfried Keller, has already been 'mentioned; the other, Konrad Ferdinand Meyer (1825-1898), turned to literature or, at least, made his reputation, comparatively late in life. Although, like Keller, a writer of virile, original verse, Meyer is best known as a novelist; he, too, was a master of the short story. His themes are drawn by preference from the epoch of the Renaissance, and his method is characterized by an objectivity of standpoint and a purity of style exceptional in German writers.

The realistic novels of the period were written by H. Conradi (1862-1890), Max Kretzer (b. 1854), M. G. Conrad (b. 1846), H. Heiberg (b. 1840), K. Bleibtreu (b. 1859), K. Alberti (pseudonym for Konrad Sittenfeld, b. 1862) and Hermann Sudermann (b. 1857). A want of stability was, however, as has been already

indicated, characteristic of the realistic movement in Germany; the

idealistic trend of the German mind proved itself ill-adapted to the uncompromising realism of the French school, and the German realists, whether in fiction or in drama, ultimately sought to escape from the logical consequences of their theories. Even Sudermann, whose Frau Sorge (1887), Der Kalzensteg (1889), and the brilliant, if somewhat sensational romance, Es war (1894), are among the best novels of this period, has never been a consistent realist. It is consequently not surprising to find that, before long, German fiction returned to psychological and emotional problems, to the poetical or symbolical presenta- tion of life, which was more in harmony with the German tempera- ment than was the robuster realism of Flaubert or Zola. This trend is noticeable in the work of Gustav Frenssen (b. 1863), whose novel Jorn Uhl (1901) was extraordinarily popular; it is also to be seen in the studies of child life and educational problems which have proved so attractive to the younger writers of the present day, such as Hermann Hesse (b. 1877), Emil Strauss (b. 1866), Rudolf Huch (b. 1862) and Friedrich Huch (b. 1873). One might say, indeed, that at the beginning of the 20th century the traditional form of German fiction, the Bildungsroman, had come into its ancient rights again. Mention ought also to be made of J. J. David (1859-1907), E. von Keyserling (b. 1858), W. Hegeler (b. 1870), G. von Ompteda (b. 1863), J. Wassermann (b. 1873), Heinrich Mann (b. 1871) and Thomas Mann (b. 1875). Buddenbrooks (1902) by the last mentioned is one of the outstanding novels of the period. Some of the best fiction of the most recent period is the work of women, the most distinguished being Helene Bohlau (b. 1859), Gabriele Reuter (b. 1859), Clara Viebig (C. Cohn-Viebig, b. i860) and Ricarda Huch (b. 1864). Whether the latest movement in German poetry and fiction, which, under the catch- word Heimatkunsl, has favoured the province rather than the city, the dialect in preference to the language of the educated classes, will prove a permanent gain, it is still too soon to say, but the movement is at least a protest against the decadent tendencies of naturalism.

At no period of German letters were literature and the theatre in closer touch than at the end of the 19th and the beginning of the 20th centuries; more than at any previous time has the theatre become the arena in which the literary battles of the day are fought out. The general improvement in the artistic, technical and economic conditions of the German stage have already been indicated; but it was not until 1889 that the effects of these improvements became apparent in dramatic literature. Before that date, it is true, Ernst von Wildenbruch (1845-1909) had attempted to revive the historical tragedy, but the purely literary qualities of his work were

handicapped by a too effusive patriotism and a Schillerian pathos; nor did the talent of Richard Voss (b. 1851) prove strong enough to effect any lasting reform. In October 1889, however, Gerhart Hauptmann's play, Vor Sonnenaujgang, was produced on the then recently founded Freie Btihne in Berlin; and a month later, Die Ehre by Hermann Sudermann met with a more enthusiastic reception in Berlin than had fallen to the lot of any German play for more than a generation.

Hauptmann (b. 1862), the most original of contemporary German writers, stands, more or less, alone. His early plays, the most powerful of which is Die Weber (1892), were written under the influence either of an uncompromising realism, or of that modified form of realism introduced from Scandinavia; but in Hanneles Himmelfahrt (1893) he combined realism with the poetic mysticism of a child's dream, in Florian Geyer (1895) he adaptf d the methods of realism to an historical subject, and in the year 1896 he, to all appearance, abandoned realism to write an allegorical dramatic poem, Die versunkene Glocke. Hauptmann's subsequent work has oscillated between the extremes marked out by these works — from the frank naturalism of Fuhrmann Henschel (1898) and Rose Berndt (1903), to the fantastic mysticism of Der arme Heinrich (1902) and Und Pippa lanzt! (1906).

The dramatic talent of Hermann Sudermann has developed

on more even lines; the success of Die Ehre was due in the first instance to the ability which Sudermann had shown in adapting the ideas of his time and the new methods of dramatic presenta- tion to the traditional German biirgerliches Drama. This is the characteristic of the majority of the many plays which followed of which Heimat (1893), Das Glilck im Winkel (1896) and Es lebe das Leben! (1902) may be mentioned as typical. With less success Sudermann attempted in Johannes (1898) a tragedy on lines suggested by Hebbel. A keen observer, a writer of brilliant and suggestive ideas, Sudermann is, above all, the practical playwright; but it is unfortunate that the theatrical element in his work too often overshadows its literary qualities.

Since 1889, the drama has occupied the foreground of interest in Germany. The permanent repertory of the German theatre has not, it is true, been much enriched, but it is at least to the credit of contemporary German playwrights that they are un- willing to rest content with their successes and are constantly experimenting with new forms. Besides Hauptmann and Sudermann, the most talented dramatists of the day are Max Halbe (b. 1865), O. E. Hartleben (1864-1905), G. Hirschfeld (b. 1873), E. Rosmer (pseudonym for Elsa Bernstein, b. 1866), Ludwig Fulda (b. 1862), Max Dreyer (b. 1862), Otto Ernst (pseudonym for O. E. Schmidt, b. 1862) and Frank Wedekind (b. 1864). In Austria, notwithstanding the preponderant influ- ence of Berlin, the drama has retained its national character- istics, and writers like Arthur Schnitzler (b. 1862), Hermann Bahr (b. 1863), Hugo von Hofmannsthal (b. 1874) and R. Beer-Hofmann (b. 1866) have introduced symbolistic elements and peculiarly Austrian problems, which are foreign to the theatre of north Germany.

The German lyric of recent years shows a remarkable variety of new tones and pregnant poetic • ideas ; it has, as is natural, been more influenced by the optimism of Nietzsche — himself a lyric poet of considerable gifts — than has either novel or drama. Detlev von Liliencron (1 844-1 909) was one of the first to break with the traditions of the lyric as handed down from the Romantic epoch and cultivated with such facility by the Munich poets. An anthology of specifically modern lyrics, Moderne Dichtercharaktere (1885) by W. Arent (b. 1864), may be regarded as the manifesto of the movement in lyric poetry corresponding to the period of realism in fiction and the drama. Representative poets of this movement are Richard Dehmel (b. 1863), K. Henckell (b. 1864), J. H. Mackay (b. 1864 at Greenock), G. Falke (b. 1853), F. Avenarius (b. 1856), F. Evers (b. 1871), F. Dormann (b. 1870) and K. Busse (b. 1872). A later development of the lyric — a return to mysticism and symbolism — is to be seen in the poetry of Hofmannsthal, already mentioned as a dramatist, and especially in Stefan George (b. 1868). Epic poetry, although little in harmony with the spirit of a realistic age, has not been altogether neglected. Heinrich Hart (1855- 1906), one of the leading critics of the most advanced school, is also the author of an ambitious Liedder Menschheit (vols. 1-3, 1888-1896) ; more conservative, on the other hand, is Robespierre (1894), an epic in the style of Hamerling by an Austrian, Marie delle Grazie (b. 1864). Attention may also be drawn to the popularity which, for a few years, the so-called Uberbrettl or cabaret enjoyed, a popularity which has left its mark on the latest developments of the lyric.

Associated with this movement are O. J. Bierbaum (1865-1910), whose lyrics, collected in Der Irrgarten der Liebe (1901), have been extraordinarily popular, E. von Wolzogen (b. 1855) and the dramatist F. Wedekind, who has been already mentioned.

Whether or not the work that has been produced in such rich measure since the year 1889 — or however much of it — is to be regarded as a permanent addition to the storehouse of German national literature, there can be no question of the serious artistic earnestness of the writers; the conditions for the produc- tion of literature in the German empire in the early years of the 20th century were eminently healthy, and herein lies the best promise for the future.*

Bibliography. — (a) General Histories, Anthologies, &c. : A. Koberstein, Grundriss der Geschichte der deutschen Nationalliteratur (1827; 5th ed. by K. Bartsch, 5 vols., 1872-1874; 6th ed., vol. i.,

1884); G. G. Gervinus, Geschichte der poetischen Nationalliteratur der Deutschen (5 vols., 1835-1842; 5th ed. by K. Bartsch, 1871-1874); A. F. C. Vilmar, Geschichte der deutschen Nationalliteratur (1848; 25th ed., 2 vols., 1900, with a continuation by A. Stern); W. Wackernagel, Geschichte der deutschen Literatur (1851-1855; 2nd ed. by E. Martin, 1879-1894); K. Goedeke, Grundriss zur Geschichte der deutschen Dichtung (3 vols., 1857-1881; 2nd ed. by E. Goetze and others, in 9 vols., 1884 ff.) ; W. Menzel, Deutsche Dichtung von der altesten bis auf die neueste Zeit (1858-1859); H. Kurz, Geschichte der deutschen Literatur mit ausgewdhlten Stuchen (3 vols., 1857-1859; 7th ed., 4 vols., 1876-1882); O. Roquette, Geschichte der deutschen Dichtung (2 vols., 1862 ; 3rd ed., 1878-1879) ; W. Scherer, Geschichte der deutschen Literatur (1883; 10th ed., 1905). English translation by Mrs F, C. Conybeare (2 vols., 1885 ; new ed., 1906) ; Kuno Francke, German Literature as determined by Social Forces (1896; 6th ed., 1903); F. Vogt and M. Koch, Geschichte der deutschen Literatur (1897; 2nd ed., 2 vols., 1903); J. G. Robertson, History of German Literature (1902) ; A. Bartels, Geschichte der deutschen Literatur (2 vols., 1901-1902), with the accompanying bibliographical summary, Handbuch zur Geschichte der deutschen Literatur (1906). There are also histories of the literature of separate countries and districts, such as J. Bachtold, Geschichte der deutschen Literatur in der Schweiz (1887) ; R. Krauss, Schwabische Literatur- geschichte (2 vols., 1897-1899); J. W. Nagl and J. Zeidler, Deutsch- osterreichische Literaturgeschichte (2 vols., 1899 ff.). The most comprehensive collection of German literature in selections is J. Kurschner,

Deutsche Nationalliteratur (222 vols., 1882-1898). Of general anthologies mention may be made of W. Wackernagel, Deutsches Lesebuch (4 vols., 1835-1872; new ed., 1882 ff.), and

F, Max M tiller, The German Classics from the Fourth to the Nineteenth Century (1858; ed. by F. Lichtenstein, 2 vols., 1886; new ed., 1906). For illustrations to the history of German literature, see

G. Konnecke, Bilderatlas zur Geschichte der deutschen Nationalliteratur (1887; 2nd ed., 1895).

(b) Special Periods: i. Old High German and Middle High German Periods: R. Kogel and W. Bruckner, " Geschichte der althochdeutschen Literatur," and F. Vogt, "Geschichte der mittel-hochdeutschen Literatur," in H. Paul's Grundriss der germanischen Philologie (2nd ed., vol. ii. pt. i., 1901); F. Khull, Geschichte der altdeutschen Dichtung (1886); J. Kelle, Geschichte der deutschen Literatur, i.-ii. (1892-1896); R. Kogel, Geschichte der deutschen Literatur bis zum Ausgang des Mittelalters, i. (1894-1897); W. Golther, Geschichte der deutschen Literatur von den ersten Anfdngen bis zum Ausgang des Mittelalters (in Kiirschner's Deutsche National-literatur, vol. 163, pt. i., 1892); W. Scherer, Geschichte der deutschen Dichtung im II. und 12. Jahrhundert, and by the same author, Geistliche Poeten der deutschen Kaiserzeit (both works in Quellen und Forschungen, 1874-1875); O. Lyon, Minne- und Meistersang (1882). There are numerous series of editions of medieval texts: K. Mullenhoff and W. Scherer, Denkmdler deutscher Poesie und Prosa aus den 8.12. Jahrhundert (2 vols., 3rd ed., 1892); M. Heyne, Bibliothek der altesten deutschen Literaturdenkmaler (14 vols., begun 1858) ; F. Pfeiffer, Deutsche Klassiker des Mittel alters (12 vols., begun 1865), with the supplementary Deutsche Dichtungen des Mittelalters, edited by K. Bartsch (7 vols., 1872 ff.); K. Goedeke, Deutsche Dichtung im Mittelalter (2nd ed., 1871); J. Zacher, Germanistische Handbibliothek (9 vols., begun 1869) ; H. Paul, Altdeutsche Textbibliothek (16 vols., begun 1882); Deutsche Texte des Mittelalters, ed. by the Berlin Academy (1904 ff.). Convenient editions of the Minnesang are K. Lachmann and M. Haupt, Des Minnesangs Friihling (4th ed. by F. Vogt, 1888), and K. Bartsch, Deutsche Liederdichter des 12. bis 14. Jahrh. (4th ed. by W. Golther,

1903)-

ii. From 1350-1700. — L. Geiger, Renaissance und Humanismus in Ilalien und Deutschland (1882; 2nd ed. 1899); K. Borinski, Geschichte der deutschen Literatur seit dem Ausgang des Mittelalters

(in Kiirschner's Deutsche Nationalliteratur, vol. 163, ii., 1898); H. Palm, Beitrage zur Geschichte der deutschen Literatur des 16. und 17. Jahrhunderts (1877) ; C. H. Herford, Studies in the Literary Relations of England and Germany in the Sixteenth Century (1886); C. Lemcke, Von Opitz bis Klopstock, i. (1871; 2nd ed. 1882); M. von Waldberg, Deutsche Renaissance-Lyrik (1888), and Die galante Lyrik (1885) ; F. Bobertag, Geschichte des Romans in Deutschland, i. (to 1700) (1877-1884); K. Borinski, Die Poetik der Renaissance und die Anfdnge der literarischen Kritik in Deutschland (1886). A vast quantity of the literature of these centuries has been republished by the Stuttgarter literarischer Verein (founded in 1839), whose publications now number considerably over two hundred volumes ; further, W. Braune, Neudrucke deutscher Literatur- werke des 16. und 17. Jahrhunderts (begun 1882); K. Goedeke and J. Tittmann, Deutsche Dichter des 16. Jahrhunderts (18 vols., 1867 ff.), and Deutsche Dichter des 17. Jahrhunderts (15 vols., 1869 ff.). A valuable anthology is K. Goedeke's Elf Biicher deutscher Dichtung von Sebastian Brant bis auf die Gegenwart (2 vols., 1849). Since 1890 the Jahresberichte filr neuere deutsche Literaturgeschichte have provided an exhaustive survey of all publications dealing with modern German literature. A useful practical bibliography for English readers, covering this and the succeeding periods, is J. S. Nollen, A Chronology and Practical Bibliography of Modern German Literature (1903).

iii. The Eighteenth Century. — J. Schmidt, Geschichte der deutschen Literatur von Leibniz bis auf unsere Zeit (4 vols., 1862-1867; 2nd ed. 1886-1890); J. Hillebrand, Die deutsche Nationalliteratur im 18. und iq. Jahrhundert (3 vols., 1845-1846; 3rd ed. 1875); H. Hettner, Geschichte der deutschen Literatur im 18. Jahrhundert (4 vols., 1862-1870; 4th ed. by O. Harnack, 1893-1895); J. W. Schafer, Geschichte der deutschen Literatur des 18. Jahrhunderts (1855-1860; 2no ed. by F. Muncker, 1881); J. K. Morikofer, Die schweizerische Literatur des 18. Jahrhunderts (1861); J. W. Lobell, Entwickelung der deutschen Poesie von Klopstock bis zu Goethes Tod (3 vols., 1856-1865). There are also innumerable more special treatises, such as A. Eloesser, Das burgerliche Drama (1898) ; O. Brahm, Das deutsche Ritterdrama des 18. Jahrhunderts (1880), &c. Of collections of the literature of this and the following century, reference need only be made to the Bibliothek der deutschen National- literatur des 18. und iq. Jahrhunderts, published by

Brockhaus (44 vols., 1868-1891), and Deutsche Literaturdenhmale des 18. und iq. Jahrhunderts, edited first by B. Seuffert (1882-1894), and subse- quently by A. Sauer.

iv. The Nineteenth Century. — Th. Ziegler, Die geistigen und sozialen Stromungen des neunzehnten Jahrhunderts (1899; 2nd ed. 1901); R. von Gottschall, Die deutsche Nationalliteratur des IQ. Jahr- hunderts (1854; 7th ed., 4 vols., 1900-1902); R. M. Meyer, Die deutsche Literatur des iq. Jahrhunderts (1899; 4th ed. 1910); R. M. Meyer, Grundriss der neueren deutschen Literatur geschichte (1902); C. Busse, Geschichte der deutschen Dichtung im neunzehnten Jahrhundert (1901); R. Haym, Die romantische Schule (1870; 2nd ed. 1906) ; G. Brandes, " Den romantiske Skole i Tyskland " (1873), and " Det unge Tyskland" (1890), in Hovedstrbmninger i det iQde Aarhundredes Litleratur, vols. ii. and vi. (German translations, 1887 and 1891; several subsequent editions, Danish' and German; English translations, ii. 1903, and vi. 1905) ; R. Huch, Die Blutezeit der Romantik (2nd ed. 1901), and Ausbreitung und Verfall der Romantik (1902) ; F. Wehl, Das junge Deutschland (1886) ; J. Proelss, Das junge Deutschland (1892); A. Bartels, Die deutsche Dichtung der Gegenwart (7th ed., 1907) ; A. von Hanstein, Das jiingste Deutschland (2nd ed., 1901); J. F. Coar, Studies in German Literature in the Nineteenth Century (1903) ; Ch. Petzet, Die Blutezeit der deutschen politischen Lyrik (1903) ; H. Mielke, Der deutsche Roman des iq. Jahrhunderts (4th ed., 1900) ; S. Friedmann, Das deutsche Drama des iq. Jahrhunderts (2 vols., 1 900-1 903) ; B. Litzmann, Das deutsche Drama in den literarischen Bewegungen der Gegenwart (4th ed., 1898). (J. G. R.)

GERMAN REED ENTERTAINMENT. The dramatic and musical entertainment which for many years was known in London by the title of " German Reed " was a form of theatrical enterprise deserving of commemoration in connexion with those who made it successful. Mr Thomas German Reed (born in Bristol in 181 7, died 1888) married in 1844 Miss Priscilla Horton (1818-1895), an(l m t-ˆ55 they started their entertain- ment at the " Gallery of Illustration," in Waterloo Place, London. From i860 to 1877 they were assisted by John Orlando Parry (1810-1879), an accomplished pianoforte player, mimic, parodist and humorous singer; and the latter created a new type of musical and dramatic monologue which became very popular. His tradition was carried on after 1870 by Mr Corney Grain (1844-1895), who, as a clever, refined, and yet highly humorous society entertainer (originally a barrister), was one of the best- known figures of his day. After the retirement of the elder German Reeds, their son, Alfred German Reed (1846-1895), himself

a capital actor, carried on the business in partnership with Corney Grain. The " German Reed Entertainment " — which was always patronized by a large class of people, many of whom objected on principle to going or taking their children to a regular theatre or a music-hall — retained its vogue for forty years at Waterloo Place and at the St George's Hall, Regent Street. But the death of Mr Corney Grain almost simultaneously with Mr Alfred German Reed, in 1895, together with the changed public attitude towards the regular theatre, ended its career.

GERMAN SILVER or Nickel Silver, an alloy of copper, nickel and zinc, prepared either by melting the copper and nickel together in a crucible, and adding piece by piece the previously heated zinc, or by heating the finely divided metals under a layer of charcoal. To destroy its crystalline structure and so render it fit for working, it is heated to dull redness, and then allowed to cool. German silver is harder than silver; it resembles that metal in colour, but is of a greyer tinge. Exposed to the air it tarnishes slightly yellow, and with vinegar affords a crust of verdigris. At a bright red heat it melts, losing its zinc by oxida-*

tion unless protected from the atmosphere. At a heat above dull redness it becomes exceedingly brittle. German silver in various modifications of composition is much used in the arts. Alloys, of which about 50% is copper and the residue zinc and nickel in about equal proportions take a fine polish, and are used as imitation silver for knives and forks. With a somewhat higher proportion of copper an alloy is formed suitable for rolling and for wire. In Chinese white silver or packfong (paktong) the amount of copper is smaller, about 40%, with about 32% of nickel, 25 of zinc, and 2 or 3 of iron. German silver for casting contains 2 or 3 % of lead, which like iron increases the whiteness of the alloy. German silver, having a high specific resistance and a low temperature coefficient, has been used for electrical resistance coils, and these qualities are possessed in a still greater degree in manganin, which contains manganese in place of zinc, its composition being 84% of copper, 12 of manganese and 4 of nickel. The addition of a trace of tungsten to German silver, as in platinoid, also largely increases the resistance.

GERMAN SOUTH-WEST AFRICA. This German possession is bounded W. by the Atlantic, N. by Angola, S. by the Cape province, E. by Bechuanaland and Rhodesia, and is the only German dependency in Africa suited to white colonization. It has an area of about 322,450 sq. m., and a population of Bantu Negroes and Hottentots estimated in 1903 at 200,00c. 1 The European

inhabitants, in addition to the military, numbered 71 10 in 1907, of whom the majority were German.

Area and Boundaries. — The boundary separating the German protectorate from the Portuguese possessions of Angola is the lower Kunene, from its mouth in 17 18′ S., 11° 40′ E. to the limit of navigability from the sea, thence in a direct line, corresponding roughly to the lat. of 17 20′ S., to the river Okavango, which it follows eastwards until the stream turns abruptly south (towards Lake Ngami). From this point a strip of German territory 300 m. long and about 50 m. broad, projects eastward until it reaches the Zambezi a little above the Victoria Falls. On the south this narrow strip of land (known as the Caprivi enclave) is separated from southern Rhodesia by the Kwando or Chobe river. On the east the frontier between British and German territory is in its northern half the 2 1st degree of E. longitude, in its southern half the 20th degree. This frontier is drawn through desert country. The southern frontier is the Orange river from its mouth to the 20° E. The coast-line between the Kunene and Orange rivers is not wholly German. Just north of the tropic of Capricorn is the British enclave of Walfish Bay {a. v.). The northern part of the protectorate is known as Ovam-poland, the central portion as Damara (or Herero) land ; the southern regions as Great Namaqualand. These names are derived from those of the dominant native races inhabiting the country.

Physical Features. — The coast-line is generally low and little broken by bays or promontories. In its entire length of about 800 m. it has no good natural harbour, and its bays — Angra Pequena, otherwise Luderitz Bay, Sierra Bay, Sandwich Harbour— are in danger of being filled with sand by the strong, cold, northerly coast current. Swakopmund is an artificial harbour at the mouth'Of the river Swakop. The small islands which stud the coast north and south of Angra Pequena belong to Great Britain. The coast-line is bordered by a belt of sand-dunes and desert, which, about 35 m. wide in the south, narrows towards the north. This coast belt is flanked by a mountain range, which attains its highest elevation in Mount Omatako (8972 ft.), in about 21 ° 15′ S., 16 40′ E. N.E. of Omatako is the Omboroko range, otherwise known as the Waterberg. South of Omboroko, occupying the centre of the country, the range attains its highest average altitude. The following massifs with their highest points may be distinguished: Gans (7664 ft.), Nu-uibeb (7480 ft.), Onyati (7201 ft.), Awas (6988 ft.), Komas (5331 ft.) and Ganab (4002 ft.). In the S.E. are the Karas mountains, which attain an elevation of 6570 ft. The mountains for the main part form the escarpment of the great Kalahari plateau, which, gently rising from

the interior towards the west, slopes again towards the south and north from the point of its highest elevation. The Kalahari plateau changes the undulating character it has in the west to a perfect plain in the far east, where the watered and habitable country merges into the sterile Kalahari desert. In the northern half of the country the central plateau contains much rich grass-land, while in the north-eastern region the Omaheke desert has all the characteristics of the Kalahari.

There are no rivers of importance wholly within German South- West Africa. The Kunene (q.v.) has but a small portion of the southern bank in the colony, and similarly only part of the northern

1 As the result of wars with the natives, the population greatly decreased. The number of adult (native) males in the colony at the beginning of 1908 was officially estimated at 19,900, a figure indicating a total population of little more than 100,000.

bank of the Orange river (q.v.) is in German territory. Several streams run south into the Orange; of those the chief is the Great Fish river, which has a course of nearly 500 m. Both the Kunene and the Orange carry water all the year round, but are not navigable. Neither is the Great Fish river, which, however, is rarely dry. The Okavango, which comes from the north and runs towards Ngami (q .».), is perennial, but like the Kunene and Orange, belongs only partly to the hydrographic system of the country. From the inner slopes of the coast chain many streams go N.E. to join the Okavango. They cross the Omaheke waste and are usually dry. Ovampoland has a hydrographic system connected with the Kunene, and, in seasons of great flood, with that of Ngami. Before the Kunene breaks through the outer edge of the plateau, it sends divergent channels south-east to a large marsh or lake called Etosha, which is cut by 17° E. and 19° S. Of these channels the Kwamatuo or Okipoko, which is perennial, enters Etosha at its N.W. corner. The lake when full extends about 80 m. W. to E. and 50 m. N. to S. From its S.E. corner issues the Omuramba, which divides into two branches, known respectively as the Omaheke and the Ovampo. These streams have an easterly direction, their beds, often dry, joining the Okavango. The other rivers of the protectorate have as a rule plenty of water in their upper courses in the rainy season, though some river beds are dry for years together. After a heavy thunderstorm such a river bed will be

suddenly filled with a turbid current half a mile wide. The water is, however, before long absorbed by the thirsty land. Only in exceptionally rainy years do the streams which cross the sand belt carry water to the ocean. But in the sand which fills the river beds water may be obtained by digging. Of rivers running direct to the Atlantic the Little Fish river enters the sea at Angra Pequena and the Kuisip in Walfish Bay. The Swakop rises in the hills near the Waterberg, and north of it is the Omaruru, which carries water for the greater part of the year. Hot springs are numerous, and it is remarkable that those of Windhoek flow more copiously during the dry than the rainy season. There are also many cold springs, and wells which contain water all the year. Geology. — Gneiss and schist, with intrusive granites and porphyries, overlain to a great extent by sand and lateritic deposits, occupy the coast belt, coast mountains and the plateau of Damaraland. In the Huib and Han-ami plateaus of Great Namaqualand the crystalline rocks are overlain by sandstones, slates, quartzites and jasper rocks, and these in turn by dolomites. They are probably equivalent to the Transvaal and Pretoria series (see Transvaal: Geology). The next oldest rocks are of recent geological date. The Kalahari Kalk, which extends over large areas to the south-east of Ovampoland, may be of Miocene age, but it has not yielded fossils. Extensive tracts of alluvium occur in the basin of the Ovampo, while the dunes and sand-tracts of the Kalahari occupy the eastern regions.

Climate.— On the coast the mean temperature is low, and there is little rainfall. Moisture is supplied by dense fogs, which rise almost daily. South-west winds prevail. Inland the climate is temperate rather than tropical, with bracing, clear atmosphere. There are considerable differences of temperature between day and night, and two well-marked seasons, one cold and dry from May to September, the other hot and rainy from October to April. In winter ice frequently forms during the night on open water on the plateau, but it never remains all day. The yearly rainfall is about 20 in. in the Damara Hills; there is more rain in the north than in the south, and in the east than in the west. In the greater part of the colony the climate is favourable for European settlement.

Flora and Fauna. — The vegetation corresponds exactly with the climate. In the dry littoral region are plants able to exist with the minimum of moisture they derive from the daily fog — Amarantaceae, Sarcocaula, Aloe dichotoma, Aristida subacaulis and the wonderful Welwitschia. Farther inland are plants which spring up and dis- appear with the rain, and others whose roots reach permanent water. The former are chiefly grasses, the latter exist

almost solely in or near river-beds. Amongst the fine trees often seen here, the ana tree (Acacia albida) is the most noteworthy, its seeds being favourite fodder for all domestic animals. Acacia giraffae, Ac. horrida, Adansonia sterculia, near the Kunene the Hyphaeneventricosa, deserve special notice. The vegetation in the mountain valleys is luxuriant, and towards the north is of a tropical character. The palm zone extends a considerable distance south of the Kunene, and here vegetation spreads over the sand-dunes of the coast plain, which are covered with grasses.

Large game, formerly abundant, especially pachyderms, is scarce. Of antelopes the following species are plentiful in parts: springbok, steenbok, kudu, rietbok, pallah; of monkeys, the Cynocephalus porcarius is frequent. Various kinds of hyenas and jackals with fine fur (Canis mesomelas), also Felis caracal, abound. The spring hare (Pedestea caffer) and rock-rabbit (Hyrax capensis) may often be observed. Of birds there are 728 species. Crocodiles, turtles and ■ snakes are numerous.*

Inhabitants. — Among the natives of German South-West Africa three classes may be distinguished. In the first class are the Namaqua (Hottentots) and Bushmen. The Namaqua probably eame from the south, while the Bushmen may be looked upon as an indigenous race. The Hottentots, the purest

existing types of that race, are divided into numerous tribes, independent of one another, such as the Witbois, Swartzbois, Bondelzwarts. The Bushmen are found scattered over the eastern parts of the country (see Hottentots and Bushmen). The second class consists of the mountain Damara (Hau-Khoin), a race of doubtful affinities, probably of Bantu-Negro origin, but speaking the Hottentot language. The third class belongs to the Bantu-Negro stock, and came from the north-east, ex- pelling and enslaving the mountain Damara, and settling in various parts of the country under different names. The most prominent are the Herero, thorough nomads and cattle-breeders; while the Ovampo (Ovambo or Ambo), in the northern part of the protectorate, are agriculturists. The Herero (q.v.) are also known by the Hottentot name Damara, and by this name their country is generally called. The Bastaards, who live in Namaqua- land, are a small tribe originating from a mingling of Cape Boers with Hottentots. They are Christians, and able to read and write. The other natives are spirit-worshippers, save for the comparatively few converts of the Protestant missions established in

the country. Of white races represented the chief are Germans and Boers. In the S.E. Boer settlers form the bulk of the white population. There are also numbers of British colonists in this region — emigrants from the Cape. The immigration of Germans is encouraged by subsidies and in other ways.

Towns. — The chief port is Swakopmund, built on the northern bank of the Swakop river (the southern bank belonging to the British territory of Walfish Bay). The harbour is partially protected by a breakwater. There are also settlements at Liideritz Bay (white pop. 1909, over 1000) and at Sandwich Harbour. Swakopmund is connected by a narrow gauge railway with Windhoek, the administrative capital of the colony, situated in a hilly district 180 m. due east of the port, but 237 m. by the railway. Karibib is the only place of consequence on the line. Otyimbingue is a government station 70 m. W.N.W. of Windhoek, and Tsumeb a mining centre 240 m. N.N.E. of the same place. Olukonda is a government post in Ovampoland. In the S.E. corner of the colony, 30 m. N. of the Orange river, is the town of Warmbad. Keetmanshoop, 100 m. N. of Warmbad and 1 80 m. E. of Liideritz Bay, is the centre of a small mining industry. Gibeon is a government station and missionary settlement about midway between Keetmanshoop and Windhoek. Besides these places there are numbers of small native towns at which live a few white traders and missionaries. The missionaries have given Biblical names to several of their stations, such as Bethany and Beersheba in Namaqualand, and Rehoboth in Damaraland. In the Caprivi enclave are a German residency and the site of the town of Linyante, once the capital of the Makololo dynasty of Barotseland (see Barotse).

Industries. — Agriculture is followed by the natives in the northern districts, but the chief industry is stock-raising. The scarcity of water in the southern parts is not favourable for agricultural pursuits, while the good grazing lands offer splendid pasturage for cattle, which the Herero raise in numbers amounting to many hundred thousands. Sheep and goats thrive well. Horses have been im- ported from the Cape. Unfortunately the climate does not suit them everywhere, and they are subject to a virulent distemper. Cattle and sheep also suffer from the diseases which are common in the Cape Colony. Camels have been imported, and are doing well. Wheat, maize and sorghum are the chief crops raised, though not enough is grown to meet even local requirements. Near the coast the natives collect the kernels of the nara, a wild-growing pumpkin which, in the words of an early traveller, C. J. Andersson, " are eaten by oxen, mice, men, ostriches and lions." About half the European settlers are

engaged in agriculture. They raise maize, wheat, tobacco, fruit and vegetables. Cotton cultivation and viti- culture- are carried on in some districts.

Minerals, especially copper, are plentiful in the country. The chief copper deposits are at Tsumeb, which is 4230 ft. above the sea, in the Otavi district. Diamonds are found on and near the surface of the soil in the Liideritz Bay district, and diamonds have also been found in the neighbourhood of Gibeon. A little pottery is made, and the Hottentot women are clever in making fur cloths. In the north the Ovampo do a little smith-work and grass-plaiting. The external trade of the country was of slow growth. The exports, previous to the opening up of the Otavi mines, consisted chiefly of five stock — sent mainly to Cape Colony — guano, ivory, horns, hides and ostrich feathers. The chief imports are food stuffs, textiles and metals, and hardware. In 1903 the value of the exports was £168,560, that of the imports £388,210. The war which followed (see below, History) led to a great shrinking of exports, rendering the figures for the period 1904-1907 useless for purposes of comparison. About 85 % of the imports are from Germany.

Communications. — The economic development of the country is largely dependent on transport facilities. The railway from

Swakopmund to Windhoek, mentioned above, was begun in 1897, and was opened for traffic in July 1902. It cost nearly £700,000 to build. Another narrow gauge railway, to serve the Otavi copper mines, was begun in 1904 and completed in 1908. It starts from Swakop- mund and is 400 m. long, the terminus being at Grootfontein, 40 m. S.E. of Tsumeb. The highest point on this line is 5213 ft. above the sea. In 1906-1908 a railway, 180 m. long, was built from Ltideritz Bay to Keetmanshoop. This line is of the standard South African gauge (3 ft. 6 in.), that gauge being adopted in view of the eventual linking up of the line with the British railway systems at Kimberley. A branch from Seeheim on the Keetmanshoop line runs S.E. to Kalkfontein.

Besides railways, roads have been made between the chief centre's of population. Along these, in the desert districts, wells have been dug. Across the Awas Mountains, separating Windhoek from the central plateau, a wide road has been cut. In 1903 the colony was

E laced in telegraphic communication with Europe and Cape Colony y the laying of submarine cables having their terminus at Swakop-mund. There is a fairly complete inland telegraphic service.

There is regular steamship communication between Hamburg and Swakopmund, Walfish Bay and Ltideritz Bay. Regular com-munication is also maintained between Cape Town and the ports of the colony.

Administration. — At the head of the administration is an imperial governor, responsible to the colonial office in Berlin, who is assisted by a council consisting of chiefs of departments. The country is divided into various administrative districts. In each of these there is a Bezirksamtmann, with his staff of officials and police force. In each district is a law court, to whose jurisdiction not alone the whites, but also the Bastaards are subject. As in all German colonies, there is a court of appeal at the residence of the governor. The government maintains schools at the chief towns, but education is principally in the hands of missionaries. The armed force consists of regular troops from Germany and a militia formed of Bastaards. The local revenue for some years before 1903 was about £130,000 per annum, the expenditure about £400,000, the difference between focal receipts and expenditure being made good by imperial subsidies. In 1908 local revenue had risen to £250,000, but the imperial authori- ties incurred an expenditure of over £2,000,000, largely for military purposes. On articles of export, such as feathers and hides, 5% ad valorem duty has to be paid ; on cattle and horses an export tax per head. There is a 10% ad valorem duty on all imports, no difference being made between German and foreign goods. The sale of spirituous liquors is subject to a licence.

History. — The coast of south-west Africa was discovered by Bartholomew Diaz in 1487, whilst endeavouring to find his way to the Indies. He anchored in a bay which by reason of its smallness he named Angra Pequena. Portugal, however, took no steps to acquire possession of this inhospitable region, which remained almost unvisited by Europeans until the early years of the 19th century. At this time the country was devastated by a Hottentot chief known as Afrikander, who had fled thither with a band of outlaws after murdering his master, a Boer farmer by whom he had been ill-treated, in 1796. In 1805 some missionaries (of German nationality) went into Namaqualand in the service of the London Missionary Society, which society subsequently transferred its missions in this region to the Rhenish mission, which had had agents in the country since about 1840. The chief station of the missionaries was at a

Hottentot settle- ment renamed Bethany (1820), a place 125 m. E. by Angra Pequena. The missionaries had the satisfaction of stopping Afrikander's career of bloodshed. He became a convert, a great friend of the mission, and took the name of Christian. The proximity of Great Namaqualand to Cape Colony led to visits from British and Dutch farmers and hunters, a few of whom settled in the country, which thus became in some sense a dependency of the Cape.

In 1867 the islands along the coast north and south of Angra Pequena, on which were valuable guano deposits, were annexed to Great Britain. At this time a small trade between the natives and the outside world was developed at Angra Pequena, the merchants engaged in it being British and German. The political influence of the Cape spread meantime northward to the land of ■ the Herero (Damara). The Herero had been subjugated by Jonker Afrikander, a son of Christian Afrikander, who followed the early footsteps of his sire and had renounced Christianity, but in 1865 they had recovered their independence. The Rhenish missionaries appealed (1868) to the British government for protection, and asked for the annexation of the country. This request, although supported by the Prussian government,

was refused. In 1876, however, a special commissioner (W. Coates Palgrave) was sent by the Cape government " to the tribes north of the Orange river." The commissioner concluded treaties with the Namaqua and Damara which fixed the limits of the territories of the two races and placed the whole country now forming German South-West Africa within the sphere of British influence. In the central part of Damaraland an area of some 35,000 sq. m. was marked out as a British reservation. The instrument by which this arrangement was made was known as the treaty of Okahandya. Neither it nor the treaty relating to Great Namaqualand was ratified by the British government, but at the request of Sir Bartle Frere, then high commissioner for South Africa, Walfish Bay (the best harbour along the coast) was in 1878 annexed to Great Britain.

*In 1880 fighting between the Namaqua, who were led by Jan Afrikander, son of Jonker and grandson of Christian Afrikander, and the Damara broke out afresh, and was German not ended until the establishment of European rule. In rule 1883 F. A. E. Ltideritz (1834- 1886), aBremen merchant, estab – with the approval of Prince Bismarck, established a WsAe * trading station at Angra Pequena. This step led to the annexa- tion of the "whole country to Germany (see Africa, § 5) with the exception of Walfish Bay and the islands actually British territory. On the establishment of German*

rule Jonker Afrikander's old headquarters were made the seat of administra- tion and renamed Windhoek. The Hottentots, under a chieftain named Hendrik Witboi, offered a determined opposition to the Germans, but after a protracted war peace was concluded in 1894 and Hendrik became the ally of the Germans. Thereafter, notwithstanding various local risings, the country enjoyed a measure of prosperity, although, largely owing to economic conditions, its development was very slow.

In October 1903 the Bondelzwarts, who occupy the district immediately north of the Orange river, rose in revolt. This act was the beginning of a struggle between the Germans and the natives which lasted over four years, and cost wan Germany the lives of some 5000 soldiers and settlers, and entailed an expenditure of £15,000,000. Abuses committed by white traders, the brutal methods of certain officials and the occupation of tribal lands were among the causes of the war, but impatience of white rule was believed to be the chief reason for the revolt of the Herero, the most formidable of the opponents of the Germans. The Herero had accepted the German pro- tectorate by treaty — without fully comprehending that to which they had agreed. To crush the Bondelzwarts, an object attained by January 1904, the governor, Colonel Theodor Leutwein, had denuded Damaraland of troops, and advantage was taken of this fact by the Herero to begin a long-planned and well-prepared revolt. On the 12th of January 1904 most of the German farmers in Damaraland were attacked, and settlers and their families murdered and the farms devastated. Reinforcements were sent from Germany, and in June General von Trotha arrived and took command of the troops. On the 1 ith of August von Trotha attacked the Herero in their stronghold, the Water- berg, about 200 m. N. of Windhoek, and inflicted upon them a severe defeat. The main body of the enemy escaped, however, from the encircling columns of the Germans, and thereafter the Herero, who were under the leadership of Samuel Maherero, maintained a guerrilla warfare, rendering the whole countryside unsafe. The Germans found pursuit almost hopeless, being crippled by the lack of water and the absence of means of trans- port. To add to their troubles a Herero bastard named Morenga, with a following of Hottentots, had, in July, recommenced hostilities in the south. On the 2nd of October 1904 von Trotha, exasperated at his want of success in crushing the enemy, issued a proclamation in which he said: " Within the German frontier every Herero with or without a rifle, with or without cattle, will be shot. I will not take over any more women and children. But I will either drive them back to your people or have

them fired on." In a later order von Trotha instructed his soldiers not to fire into, but to fire over the heads of the women and I children, and Prince Biilow ordered the general to repeal the

whole proclamation. Whenever they had the chance, however, the Germans hunted down the Herero, and thousands perished in the Omaheke desert, across which numbers succeeded in passing to British territory near Ngami.

On the day following the issue of von Trotha's proclamation to the Herero, i.e. on the 3rd of October 1904, Hendrik Witboi sent a formal declaration of war to the Germans. Hendrik had helped to suppress the Bondelzwarts rising, and had received a German decoration for his services, and his hostility is said to have been kindled by the supersession of Colonel Leutwein, for whom he entertained a great admiration. The Witbois were joined by other Hottentot tribes, and their first act was to murder some sixty German settlers in the Gibeon district. Both British and Boer farmers were spared — the Hottentots in this matter following the example of the Herero. In November, considerable reinforcements having come from Germany, the Witbois were attacked, and Hendrik's headquarters ; Reitmont, captured. Another defeat was inflicted on Hendrik in January 1905, but, lacking ammunition and water, the Germans could not follow up their victory. As in Damaraland, the warfare in Namaqualand now assumed a guerrilla character, and theGermans found it almost impossible to meet their elusive enemy, while small detachments were often surprised and sometimes annihilated. In May 1905 von Trotha tried the effect on the Hottentots of another of his proclamations. He invited them to surrender, adding that in the contrary event all rebels would be exterminated. A price was at the same time put on the heads of Hendrik Witboi and other chiefs. This proclamation was unheeded by the Hottentots, who were in fact continuing the war with rifles and ammunition seized from the Germans, and replenishing their stock with cattle taken from the same source. In the north, however, Samuel Maherero had fled to British territory, and the resistance of the Herero was beginning to collapse. Concentration camps were established in which some thousands of Herero women and children were cared for. Meanwhile, the administration of von Trotha, who had assumed the governorship as well as the command of the troops, was severely criticized by the civilian population, and the non-success of the operations against the

Hottentots provoked strong military criticism. In August 1905 Colonel (afterwards General) Leutwein, who had returned to Germany, formally resigned the governorship of the protectorate, and Herr von Lindequist, late German consul-general at Cape Town, was nominated as his successor. Von Trotha, who had publicly criticized Prince Billow's order to repeal the Herero proclamation, was superseded. He had in the summer of 1905 instituted a series of " drives " against the Witbois, with no particular results. Hendrik always evaded the columns and frequently attacked them in the rear.

In November 1905 von Lindequist arrived at Windhoek. The new governor issued a general amnesty to the Herero, and set aside two large reserves for those who surrendered. His conciliatory policy was in the end successful, and the Ovampo, who threatened to give trouble, were kept in hand. The task of pacifying Damaraland was continued throughout 1906, and by the close of that year about 16,000 Herero had been established in the reserves. Some 3000 had sought refuge in British territory, while the number who had perished may be estimated at between 20,000 and 30,000.

In Namaqualand von Lindequist found an enemy still unbroken. On the 3rd of November, however, Hendrik Witboi died, aged seventy-five, and his son and successor Samuel Isaac ™etteatots ˆ V ' tlt)oi shortly afterwards surrendered, and the subdued, hostility of the tribe ceased. Morenga now became the chief of the rebel Hottentots, and " drives " against him were organized. Early in May 1906 an encounter between Morenga and a German column was fought close to the British frontier of the Bechuanaland protectorate. Morenga fled, was pursued across the frontier, and wounded, but escaped. On the 16th of Ma/ he was found hiding by British patrols and interned. Other Hottentot chiefs continued the conflict, greatly aided by the immense difficulty the Germans had in transporting supplies; to remedy which defect the building of a railway

from Liideritz Bay to Kubub was begun early in 1906. A camel transport corps was also organized, and Boer auxiliaries engaged. Throughout the later half of 1906 the Hottentots maintained the struggle, the Karas mountains forming a stronghold from which their dislodgment was extremely difficult. Many of their leaders and numbers of the tribesmen had a considerable strain of white (chiefly Dutch) blood and were fairly educated men, with a knowledge not only of native, but European ways; facts which helped to make them formidable opponents. Gradually the resistance of the Hottentots was overcome, and in December 1906 the Bondelzwarts again surrendered. Other tribes continued the fight for months longer, but

by March 1907 it was found possible to reduce the troops in the protectorate to about 5000 men. At the height of the campaign the Germans had 19,000 men in the field.

In August 1907 renewed alarm was created by the escape of Morenga from British territory. The Cape government, regarding the chief as a political refugee, had refused to extradite him and he had been assigned a residence near Upington. This place he left early in August and, eluding the frontier guards, re-entered German territory. In September, however, he was again on the British side of the border. Meantime a force of the Cape Mounted Police under Major F. A. H. Eliott had been organized to effect his arrest. Summoned to surrender, Morenga fled into the Kalahari Desert. Eliott's force of sixty men pursued him through a waterless country, covering 80 m. in 24 hours. When overtaken (September 21st), Morenga, with ten followers, was holding a kopje and fired on the advancing troops. After a sharp engagement the chief and five of his men were killed, the British casualties being one killed and one wounded. The death of Morenga removed a serious obstacle to the complete pacifica- tion of the protectorate. Military operations continued, however, during 1908. Herr von Lindequist, being recalled to Berlin to become under-secretary in the colonial office, was succeeded as governor (May 1907) by Herr von Schuckmann. In 1908 steps were taken to establish German authority in the Caprivi enclave, which up to that time had been neglected by the colonial authorities.

The discovery of diamonds in the Liideritz Bay district in July 1908 caused a rush of treasure-seekers. The diamonds were found mostly on the surface in a sandy soil and were of small size. The stones resemble Brazilian Discovery diamonds. By the end of the year the total yield was % amoa< is. over 39,000 carats. One of the difficulties encountered in developing the field was the great scarcity of fresh water. During 1909 various companies were formed to exploit the diamondiferous area. The first considerable packet of diamonds from the colony reached Germany in April 1909. The output for the year was valued at over £1,000,000.

Authorities. — Karl Dove, Deutsch-Sudwestafrika (Berlin, 1903); W. Ktllz, Deutsch-Sudafrika . . . (Berlin, 1909) ; T. Leutwein, Elf Jahre Gouverneur in Deutsch-Sudwestafrika (Berlin, 1908), an authoritative work, largely historical; P. Rohrbach, Deutsche Kolonialwirtschaft, Band 1: Sudwestafrika (Berlin, 1907), a compre-hensive economic study; I. Irle, Die Herero, ein Beitrag zur Landes-, Volks- und Missionskunde (Giitersloh, 1906), a valuable summary of information concerning Damaraland ; Major K. Schwabe, Im

deutschen Diamantenlande (Berlin, 1909) ; T. Rehbock, Deutsch-Siidwestafrika, seine wirtsckaftliche Erschliessung unter besonderer Berucksichtigung der Nutzbarmachung des Wassers (Berlin, 1898) ; C. von Francois, Deutsch-Sudwestafrika: Geschichte der Kolonisalion bis zum Ausbruch des Krieges mit Witbooi, April 1893 (Berlin, 1899), a history of the protectorate up to 1893; H. Schintz, Deutsch-Sudwest- afrika, Forschungsreisen durch die deutschen Schutzgebiete Gross-Nama und Hereroland, nach dem Kunene, &c, 1884-1887 (Oldenburg, n.d. [1891]); H. von Francois, Nama und Damara (Magdeburg, N.D. [1896]). See also for Ethnology, " Die Eingeborenen Deutsch- ■Slidwestafrikas nach Geschichte, Charakter, Sitten, Gebrauchen und Sprachen," in Mitleilungen des Seminars fiir orientalische Sprachen (Berlin and Stuttgart) for 1899 and 1900; and G. W. Stow, The Native Races of South Africa (London, 1905) ; ch. xvii. contains an account of the Afrikander family. For geology consult A. Schenk, " Die geologische Entwicklung Sudafrikas (mit Karte)," Petertn. Mitt. (1888); Stromer von Reichenbach, Die Geologie der deutschen Schutzgebiete in Afrika (Munich and Leipzig, 1896). Of early books of travel the most valuable are: F. Galton, Tropical South Africa (1853; new ed. 1889); Charles J. Andersson, Lake Ngami (1856),

The Okavango River (1861) and Notes of Travel (1875). See also Sir J. E. Alexander, An Expedition of Discovery into the Interior of Africa (London, 1838). Reports on the German colonies are published by the British foreign office. The Kriegskarte von Deutsch-Sudwestafrika (Berlin, 1904), in nine sheets on a scale of 1 : 800,000, will be found useful. (F. R. C.)

GERMANTOWN, a residential district and former suburb, now the Twenty-second Ward, of Philadelphia, Pennsylvania, U.S.A., on Wissahickon Creek, in the N. part of the city. It is served by the Pennsylvania and the Philadelphia & Reading railways. There are many old colonial houses and handsome modern residences along Main Street (the old Germantown Road or Avenue). Prominent among the historic houses is Cliveden, or the " Chew House," built about 1761 by Benjamin Chew (1722-1810), who was chief-justice of Pennsylvania in 1774-1777 and was imprisoned as a Loyalist in 1777, and whose home during the battle of Germantown (see below) was occupied by British troops. The well-preserved Morris House (1772) was the headquarters of General Howe at the close of the

battle, and in 1793, when Germantown, owing to the yellow fever in Philadelphia, was the temporary capital of the United States, it was occupied by President Washington. Three doors above stood until 1904 the Ashmead House, used for a time by Count Nicholas Lewis Zinzendorf and his daughters for their Moravian school, which was removed to Bethlehem. In the same street, opposite Indian Queen Lane, is the old Wister Mansion, built as a country-seat in 1744 and occupied by British officers during the War of Independence. In another old house (now Nos. 5275-5277), John Fanning Watson (1779-1860), the annalist of Philadelphia, did most of his literary work. Just outside the ward limits, in what has since become a part of Fairmont Park, is the house in which David Rittenhouse, the astronomer, was born; it stands on Monoshore Creek or Paper Mill Run, in what was long called Roxborough (now the 21st ward of Philadelphia). In this vicinity the first paper mill in America was erected in 1690 by a company of which William Rittenhouse, David's great-grandfather, was the leading member. The King of Prussia Inn, built about 1740, and the Mermaid Hotel, as old or older, are interesting survivals of the inns and taverns of old German- town. The Germantown Academy was built in 1760, and after the battle of Germantown was used by the British as a hospital. In Germantown are also a Friends' (orthodox) school, a Friends' free library, and the Germantown branch of the Philadelphia public library. The first school in Germantown was established about 1 701, and for the first eighteen years was under the master- ship of Francis Daniel Pastorius (165 1-1 7 1 9) , the leader in founding the town, who lived in a house that stood on thesiteof thepresent First Methodist Episcopal church, High Street and Main Street. He compiled a primer which was the first school book produced in the state; with three others he drafted and signed in 1688 what seems to have been the first public protest made in America against slavery; and he is celebrated in Whittier's Pennsylvania Pilgrim. Later the same school passed to Christopher Dock (d. 1771), who in 1770. published an essay on teaching (written in 1750), which is said to have been the first book on pedagogy published in America. The first Bible printed in America in any European language was published in Germantown in 1743 by Christopher Sauer (d. 1758), a preacher of the German Baptist Brethren, who in 1739 established Germantown's first newspaper, The High German Pennsylvania Historian, or Collec- tion of Important News from the Kingdom of Nature and of the Church. His grandsons are said to have cast about 1772 the first American printing type. The Friends were the first sect to erect a meeting-house of their own (about 1 693) . The Mennonites built a log meeting-house in 1709, and their present stone church was built in 1770. The

town hall of Germantown was used as a hospital during the last three years of the Civil-War. In Market ■ Square a soldiers' monument was erected in 1883. The Site and Relic Society of Germantown maintains a museum of relics. Many of the early settlers were linen weavers, and Germantown still manufactures textiles, knit goods and yarns.

Germantown was founded in October 1683 by thirteen families

from Crefeld, Germany, under the leadership of Francis Daniel

Pastorius. The township, as originally laid out, contained four distinct villages known as Germantown, Cresheim, Sommer- housen and Crefield. Cresheim was later known as Mount Airy, and Sommerhousen and Crefield became known as Chestnut Hill. The borough of Germantown was incorporated in 1689. For many years it was a straggling village extending about 2 m. along Main Street. Its growth was more rapid from the middle of the 1 8th century. In 1789 a motion for the permanent location of the national capital at Germantown was carried in the Senate, and the same measure passed the House, amended only with respect to the temporary government of the ceded district; but the Senate killed the bill by voting to postpone further consideration of it until the next session. Germantown was annexed to Philadelphia in 1854.

Battle of Germantown. — This famous encounter in the American War of Independence was fought on the 4th of October 1777. After the battle of Brandywine (q.v.) and the occupation of Philadelphia, the British force commanded by Sir W. Howe encamped at Germantown, where Washington determined to attack them. The Americans advanced by two roads, General Sullivan leading the column on the right and General Greene that on the left. Washington himself accompanied Sullivan, with whom were Stirling (an officer who claimed to be earl of that name) and Anthony Wayne. The right at first met with success, driving the British advanced troops back on the main body near the Chew House. Colonel Musgrave, of the 40th Foot, threw a portion of his regiment into this house, and General Agnew came up with his command. The Americans under Stirling attempted to dislodge Musgrave, thus losing time and alarming part of Sullivan's advance who had pushed farther forward in the fog. General Greene on the left was even less fortunate. Meeting with unexpected opposition at the first point of attack his troops were thrown into confusion and compelled to retreat. One of his brigades extended itself to the right wing, and by opening fire on the Chew House caused Wayne to retreat, and presently both of the American

columns retired rapidly in the direction of their camp. The surprise had failed, with the loss to Washington's army of 673 men as against 500 on the side of the British. The British General Agnew and the American General Nash were both mortally wounded. In December Washington went into winter quarters at Valley Forge, 40 m. west of Philadelphia. The British wintered in and around the city.

See N. H. Keyser, " Old Historic Germantown," in the Proceedings and Addresses of the Pennsylvania-German Society (Lancaster . 1906) ; S. W. Pennypackeri The Settlement of Germantown, Pennsylvania, and the Beginning of German Emigration to North America (Philadelphia, 1899), and S. F. Hotchkin, Ancient and Modem Germantown, Mount Airy and Chestnut Hill (Philadelphia, 1889).

GERMANY (Ger. Deutschland) , or, more properly, The German Empire {Deutsches Reich), a country of central Europe. The territories occupied by peoples of distinctively Teutonic race and language are commonly designated as German, and in this sense may be taken to include, besides Germany proper (the subject of the present article), the German-speaking sections of Austria, Switzerland and Holland. But Germany, or the German empire, as it is now understood, was formed in 1871 by virtue of treaties between the North German Confederation and the South German states, and by the acquisition, in the peace of Frankfort (May 10, 1871), of Alsace-Lorraine, and embraces all the countries of the former German Confederation, with the exception of Austria, Luxemburg, Limburg and Liech- tenstein. The sole addition to the empire proper since that date is the island of Heligoland, ceded by Great Britain in 1890, but Germany has acquired extensive colonies in Africa and the Pacific (see below, Colonies) .

The German empire extends from 47 16′ to 55° 53′ N., and from 5 52′ to 22 52′ E. The eastern provinces project so far that the extent of German territory is much greater from south- west to north-east than in any other direction. Tilsit is 815 m. from Metz, whereas Hadersleben, in Schleswig, is only 540 m. from the Lake of Constance. The actual difference in time between the eastern and western points is 1 hour and 8 minutes,

GEOGRAPHY]

but the empire observes but one time — 1 hour E. of Greenwich. The empire is bounded on the S.E. and S. by Austria and Switzer- land (for 1659 m.), on the S.W. by France (242 m.), on the W. by Luxemburg, Belgium and Holland (together 558 m.). The length of German coast on the North Sea or German Ocean is 293 m., and on the Baltic 927 m., the intervening land boundary on the north of Schleswig being only 47 m. The eastern boundary is with Russia 843 m. The total length of the frontiers is thus 4569 m. The area, including rivers and lakes but not the hafls or lagoons on the Baltic coast, is 208,830 sq. m., and the popula- tion (1905) 60,641,278. In respect of its area, the German empire occupied in 1909 the third place among European countries, and in point of population the second, coming in point of area immediately after Russia and Austria-Hungary, and in population next to Russia.

Political Divisions. — The empire is composed of the following twenty-six states and divisions: the kingdoms of Prussia, Bavaria, Saxony and Wiirttemberg; the grand-duchies of Baden, Hesse, Mecklenburg-Schwerin, Mecklenburg-Strelitz, Oldenburg and Saxe-Weimar; the duchies of Anhalt, Brunswick, Saxe-Altenburg, Saxe-Coburg-Gotha and Saxe-Meiningen; the principalities of Lippe-Detmold, Reuss-Greiz, Reuss-Schleiz, Schaumburg-Lippe, Schwarzburg-Rudolstadt, Schwarzburg- Sondershausen and Waldeck-Pyrmont ; the . free towns of Bremen, Hamburg and Liibeck, and the imperial territory of Alsace-Lorraine.

Besides these political divisions there are certain parts of Germany which, not conterminous with political boundaries, retain appellations derived either from former tribal settlements or from divisions of the old Holy Roman Empire. These are Franconia (Franken), which embraces the districts of Bamberg, Schweinfurt and Wiirzburg on the upper Main; Swabia (Schwa- ben), in which is included Wiirttemberg, parts of Bavaria and Baden and Hohenzollern; the Palatinate (Pfalz), embracing Bavaria west of the Rhine and the contiguous portion of Baden; Rhineland, applied to Rhenish Prussia, Nassau, Hesse-Darmstadt and parts of Bavaria and Baden; Vogtland, 1 the mountainous country lying in the south-west corner of the kingdom of Saxony; Lusatia (Lausitz), the eastern portion of the kingdom of Saxony and the adjacent portion of Prussia watered by the upper Spree; Thuringia (Thuringen), the country lying south of the Harz Mountains and including the Saxon duchies; East Friesland (Ost Friesland), the country lying between the lower course of the Weser and the Ems, and Westphalia (Westfalen), the fertile plain lying north and west of the Harz Mountains and extending to the North Sea and the Dutch frontier.

Coast and Islands. — The length of the coast-line is considerably less than the third part of the whole frontier. The coasts are shallow, and deficient in natural ports, except on the east of Schleswig-Holstein, where wide bays encroach upon the land, giving access to the largest vessels, so that the great naval harbour could be constructed at Kiel. With the exception of those on the east coast of Schleswig-Holstein, all the important trading ports of Germany are river ports, such as Emden,Bremen, Hamburg, Liibeck, Stettin, Danzig, Konigsberg, Memel. A great difference, however, is to be remarked between the coasts of the North Sea and those of the Baltic. On the former, where the sea has broken up the ranges of dunes formed in bygone times, and divided them into separate islands, the mainland has to be protected hy massive dikes, while the Frisian Islands are being gradually washed away by the waters. On the coast of East Friesland there are now only seven of these islands, of which Norderney is best known, while of the North Frisian Islands, on the western coast of Schleswig, Sylt is the most considerable. Besides the ordinary waste of the shores, there have been extensive inundations by the sea within the historic ' period, the gulf of the Doliart having been so caused in the year 1276. Sands surround the whole coast of the North Sea to such an extent that the entrance to the ports is not practicable without the aid of pilots. Heligoland is a rocky island, but it

1 i.e. the territory once under the jurisdiction of an imperial Vogt or advocatus (see Advocate).

also has been considerably reduced by the sea. The tides rise to the height of 12 or 13 ft. in the Jade Bay and at Bremerhaven, and 6 or 7 ft. at Hamburg. The coast of the Baltic, on the other hand, possesses few islands, the chief being Alsen and Fehmarn off the coast of Schleswig-Holstein, and Riigen off Pomerania. It has no extensive sands, though on the whole very flat. The Baltic has no perceptible tides; and a great part of its coast-line is in winter covered with ice, which also so blocks up the harbours that navigation is interrupted for several months every year. Its hajfs fronting the mouths of the large rivers must be regarded as lagoons or extensions of the river beds, not as bays. The Pommersche or Oder Haff is separated from the sea by two islands, so that the river flows out by three mouths, the middle one (Swine) being the most considerable. The Frische Haff is formed by the Nogat, a branch of the Vistula, and by the Pregel, and communicates with the sea by means of the Pillauer Tief. The Kurische Haff receives the Memel, called Niemenin Russia, and has its outlet in the extreme north at Memel. Long narrow alluvial strips called Nehrungen, lie between the

last two haffs and the Baltic. The Baltic coast is further marked by large indentations, the Gulf of Liibeck, that of Pomerania, east of Riigen, and the semicircular Bay of Danzig between the promontories of Rixhoft and Briisterort. The German coasts are well provided with lighthouses.

Surface. — In respect of physical structure Germany is divided into two entirely distinct portions, which bear to one another a ratio of about 3 to 4. The northern and larger part may be described as a uniform plain. South and central Germany, on the other hand, is very much diversified in scenery. It possesses large plateaus, such as that of Bavaria, which stretches away from the foot of the Alps, fertile low plains like that intersected by the Rhine, mountain chains and isolated groups of mountains, comparatively low in height, and so situated as not seriously to interfere with communi- cation either by road or by railway.

Bavaria is the only division of the country that includes within it any part of the Alps, the Austro-Bavarian frontier running along the ridge of the Northern Tirolese or Bavarian Alps. The „ ,

loftiest peak of this group, the Zugspitze (57 m. S. of ™" Btatns Munich), is 9738 ft. in height, being the highest summit p j ateaus in the empire. The upper German plain sloping north- wards from the Bavarian Alps is watered by the Lech, the Isar and the Inn, tributaries of the Danube, all three rising beyond the limits of German territory. This plain is separated on the west from the Swiss plain by the Lake of Constance (Bodensee, 1306 ft. above sea-level), and on the east from the undulating grounds of Austria by the Inn. The average height of the plain may be esti- mated at about 1800 ft., the valley of the Danube on its north border being from 1540 ft. (at Ulm) to 920 ft. (at Passau). The plain is not very fertile. In the upper part of the plain, towards the Alps, there are several lakes, the largest being the Ammersee, the Wiirmsee or Starnberger See and the Chiemsee. Many portions of the plain are covered by moors and swamps of large extent, called Moose. The left or northern bank of the Danube from Regensburg downwards presents a series of granitic rocks called the Bavarian Forest (Bayrischer Wald), which must be regarded as a branch of the Bohemian Forest (Bohmer Wald). The latter is a range of wooded heights on the frontier of Bavaria and Bohemia, occupying the least known and least frequented regions of Germany. The summits of the Bayrischer Wald rise to the height of about 4000 ft., and those of the Bohmer Wald to 4800 ft., Arber being 4872 ft. The valley of the Danube above Regensburg is flanked by plateaus sloping gently to the Danube, but precipitous towards the

valley of the Neckar. The centre of this elevated tract is the Rauhe Alb, so named on account of the harshness of the climate. The plateau continuing to the north-east and then to the north, under the name of the Franconian Jura, is crossed by the valley of the winding Altmuhl, and extends to the Main. To the west extensive undulating grounds or low plateaus occupy the area between the Main and the Neckar.

The south-western corner of the empire contains a series of better defined hill-ranges. Beginning with the Black Forest (Sch warzwald) , we find its southern heights decline to the valley of the Rhine, above Basel, and to the Jura. The summits are rounded and covered with wood, the highest being the Feldberg (10 m. S.E. of Freiburg, 4898 ft.). Northwards the Black Forest passes into the plateau of the Neckarbergland (average height, 1000 ft.). The heights between the lower Neckar and the Main form the Odenwald (about 1700 ft.) ; and the Spessart, which is watered by the Main on three sides, is nothing but a continuation of the Odenwald. West of this range of hills lies the valley of the upper Rhine, extending about 180 m. from south to north, and with a width of only 20 to 25 m. In the upper parts the Rhine is rapid, and therefore navigable with diffi- culty; this explains why the towns there are not along the banks of I the river, but some 5 to 10 m. off. But from Spires (Speyer) town

succeeds town as far down as Dusseldorf. The western boundary of this valley is formed in the first instance by the Vosges, where granite summits rise from under the surrounding red Triassic rocks (Sulzer Belchen, 4669 ft.)- To the south the range is not con- tinuous with the Swiss Jura, the valley of the Rhine being connected here with the Rhone system by low ground known as the Gate of Miilhausen. The crest of the Vosges is pretty high and unbroken, the first convenient pass being near Zabern, which is followed by the railway from Strassburg to Paris. On the northern side the Vosges are connected with the Hardt sandstone plateau (Kalmit, 2241 ft.), which rises abruptly from the plain of the Rhine. The mountains south of Mainz, which are mostly covered by vineyards, are lower, the Donnersberg, however, raising its head to 2254 ft. These hills are bordered on the west by the high plain of Lorraine and the coal- fields of Saarbriicken, the former being traversed by the river Mosel. The larger part of Lorraine belongs to France, but the German part possesses great mineral wealth in its rich layers of ironstone

(siderite) and in the coal-fields of the Saar. The tract of the Hunsrilck, Taunus and Eifel is an extended plateau, divided into separate sections by the river valleys. Among these the Rhine valley from Bingen to Bonn, and that of the Mosel from Trier to Coblenz, are winding gorges excavated by the rivers. The Eifel presents a sterile, thinly-peopled plateau, covered by extensive moors in several places. It passes westwards imperceptibly into the Ardennes. The hills on the right bank of the Rhine also are in part of a like barren character, without wood; the Westerwald (about 2000 ft.), which separates the valleys of the Sieg and Lahn, is particularly so. The northern and southern limits of the Niederrheinische Gebirge present a striking contrast to the central region. In the south the declivities of the Taunus (2890 ft.) are marked by the occurrence of mineral springs, as at Ems on the Lahn, Nauheim; Homburg, Soden, Wiesbaden, &c, and by the vineyards which produce the best Rhine wines. To the north of this system, on the other hand, lies the great coal basin of Westphalia, the largest in Germany. In the south of the hilly duchy of Hesse rise the isolated mountain groups of the Vogels- berg (2530 ft.) and the Rhon (31 17 ft.), separated by the valley of the Fulda, which uniting farther north with the Werra forms the Weser. To the east of Hesse lies Thuringia, a province consisting of the far-stretching wooded ridge of the Thuringian Forest (Thiiringer- wald ; with three peaks upwards of 3000 ft. high), and an extensive elevated plain to the north. Its rivers are the Saale and Unstrut. The plateau is bounded on the north by the Harz, an isolated group of mountains, rich in minerals, with its highest elevation in the bare summit of the Brocken (3747 ft.). To the west of the Harz a series of hilly tracts is comprised under the name of the Weser Mountains, out of which above Minden the river Weser bursts by the Porta Westphalica. A narrow ridge, the Teutoburger Wald (1300 ft.), extends between the Weser and the Ems as far as the neighbourhood of Osnabriick.

To the east the Thuringian Forest is connected by the plateau of the Frankenwald with the Fichtelgebirge. This group of mountains, occupying what may be regarded as ethnologically the centre of Germany, forms a hydrographical centre, whence the Naab flows southward to the Danube, the Main westward to the Rhine, the Eger eastward to the Elbe, and the Saale northward, also into the Elbe. In the north-east the Fichtelgebirge connects itself directly with the Erzgebirge, which forms the northern boundary of Bohemia. The southern sides of this range are comparatively steep; on the north it slopes gently down to the plains of Leipzig, but is intersected by the deep valleys of the Elster and Mulde. Although by no means fertile,

the Erzgebirge is very thickly peopled, as various branches of industry have taken root there in numerous small places. Around Zwickau there are productive coal-fields, and mining for metals is carried on near Freiberg. In the east a tableland of sandstone, called Saxon Switzerland, from the picturesque outlines into which it has been eroded, adjoins the Erzgebirge; one of its most notable features is the deep ravine by which the Elbe escapes from it. Numerous quarries, which supply the North German cities with stone for buildings and monuments, have been opened along the valley. The standstone range of the Elbe unites in the east with the low Lusatian group, along the east of which runs the best road from northern Germany to Bohemia. Then comes a range of lesser hills clustering together to form the frontier between Silesia and Bohemia. The most western group is the Isergebirge, and the next the Riesengebirge, a narrow ridge of about 20 miles' length, with bare summits. Excluding the Alps, the Schneekoppe (5266 ft.) is the highest peak in Germany; and the southern declivities of this range contain the sources of the Elbe. The hills north and north-east of it are termed the Silesian Mountains. Here one of the minor coal-fields gives employment to a population grouped round a number of comparatively small centres. One of the main roads' into Bohemia (the pass of Landshut) runs along the eastern base ■ of the Riesengebirge. Still farther to the east the mountains are grouped around the hollow of Glatz, whence the Neisse forces its way towards the north. This hollow is shut in on the east by the Sudetic group, in which the Altvater rises to almost 4900 ft. The eastern portion of the group, called the Gesenke, slopes gently away to the valley of the Oder, which affords an open route for the inter- national traffic, like that through the Miilhausen Gate in Alsace. Geographers style this the Moravian Gate.

The North German plain presents little variety, yet is not abso- lutely uniform. A row of low hills runs generally parallel to the mountain ranges already noticed, at a distance of 20 to 30 m. to the north. To these belongs the upper Silesian coal-basin, which occupies a considerable area in south-eastern Silesia. North of the middle districts of the Elbe country the heights are called the Flaming hills. Westward lies as the last link of this series the Luneburger Heide or Heath, between the Weser and Elbe, north of Hanover. A second tract, of moderate elevation, sweeps round the Baltic, without, however, approaching its shores. This plateau contains a considerable number of lakes, and is divided into three portions by the Vistula and the Oder. The most eastward is the so-called Prussian Seenplatte. Spirdingsee (430 ft. above sea- level and 46 sq. m. in area) and Mauersee are the largest lakes ; they are situated in the

centre of the plateau, and gjive rise to the Pregel. Some peaks near the Russian frontier attain to 1000 ft. The Pomeranian Seenplatte, between the Vistula and the Oder, extends from S.W. to N.E., its greatest elevation being in the neighbourhood of Danzig (Turmberg, 1086 ft.). The Seenplatte of Mecklenburg, on the other hand, stretches from S.E. to N.W., and most of its lakes, of which the Miiritz is the largest, send their waters towards the Elbe. The finely wooded heights which surround the bays of the east coast of Holstein and Schleswig may be regarded as a con- tinuation of these Baltic elevations. The lowest parts, therefore, of the North German plain, excluding the sea-coasts, are the central districts from about 52 ° to 53° N. lat., where the Vistula, Netze, Warthe, Oder, Spree and Havel form vast swampy lowlands (in German called Brtiche), which have been considerably reduced by the construction of canals and by cultivation, improvements due in large measure to Frederick the Great. The Spreewald, to the S.E. of Berlin, is one of the most remarkable districts of Germany. As the Spree divides itself there into innumerable branches, enclosing thickly wooded islands, boats form the only means of communication. West of Berlin the Havel widens into what are called the Havel lakes, to which the environs of Potsdam owe their charms. In general the soil of the North German plain cannot be termed fertile, the cultivation nearly everywhere requiring severe and constant labour. Long stretches of ground are covered by moors, and there turf- cutting forms the principal occupation of the inhabitants. The greatest extent of moorland is found in the westernmost parts of the plain, in Oldenburg and East Frisia. The plain contains, however, a few districts of the utmost fertility, particularly the tracts on the central Elbe, and the marsh lands on the west coast of Holstein and the north coast of Hanover, Oldenburg and East Frisia, which, within the last two centuries, the inhabitants have reclaimed from the sea by means of immense dikes.

Rivers. — Nine independent river-systems may be distinguished: those of the Memel, Pregel, Vistula (Weichsel), Oder, Elbe, Weser, Ems, Rhine and Danube. Of these the Pregel, Weser and Ems belong entirely, and the Oder mostly, to the German empire. The Danube has its sources on German soil ; but only a fifth part of its course is German. Its total length is 1750 m., and the Bavarian frontier at Passau, where the Inn joins it, is only 350 m. distant from its sources. It is navigable as far as Ulm, 220 m. above Passau ; and its tributaries the Lech, Isar, Inn and Altrmihl are also navigable. The Rhine is the most important river of Germanyˆ although neither its sources nor its mouths are within the limits of the empire. From the Lake of Constance to Basel (122 m.) the Rhine forms the boundary

between the German empire and Switzer- land; the canton of Schaffhausen, however, is situated on the northern bank of the river. From Basel to below Emmerich the Rhine belongs to the German empire — about 470 m. or four-sevenths of its whole course. It is navigable all this distance as are also the Neckar from Esslingen, the Main from Bamberg, the Lahn, the Lippe, the Ruhr, the Mosel from Metz, with its affluents the Saar and Sauer. Sea-going vessels sail up the Ems as far as Halte, and river craft as far as Greven, and the river is connected with a widely branching system of canals, as the Ems- Jade and Dortmund-Ems canals. The Fulda, navigable for 63 m., and the Werra, 38 m., above the point where they unite, form by their junction the Weser, which has a course of 271 m., and receives as navigable tributaries the Aller, the Leine from Hanover, and some smaller streams. Ocean- going steamers, however, cannot get as far as Bremen, and unload at Bremerhaven. The Elbe, after a course of 250 m., enters German territory near Bodenbach, 490 m. from its mouth. It is navigable above this point through its tributary, the Moldau, to Prague. Hamburg may be reached by vessels of 17 ft. draught. The navi- gable tributaries of the Elbe are the Saale (below Naumburg), the Havel, Spree, Elde, Sude and some others. The Oder begins to be navigable almost on the frontier at Ratibor, 480 m. from its mouth, receiving as navigable tributaries the Glatz Neisse and the Warthe. Only the lower course of the Vistula belongs to the German empire, within which it is a broad, navigable stream of considerable volume. On the Pregel ships of 3000 tons reach Konigsberg, and river barges reach Insterburg; the Alle, its tributary, may also be navigated. The Memel is navigable in its course of 113 m. from the Russian frontier. Germany is thus a country abounding in natural water- ways, the total length of them being estimated at 7000 m. But it is only the Rhine, in its middle course, that has at all times sufficient volume of water to meet the requirements of a good navigable river.

Lakes. — The regions which abound in lakes have already been pointed out. The Lake of Constance or Bodensee (204J sq. m.) is on the frontier of the empire, portions of the northern banks belonging severally to Bavaria, Wurttemberg and Baden. In the south the largest lakes are the Chiemsee (33 sq. m.) ; the Ammersee and the Wiirmsee. A good many smaller lakes are to be found in the

Bavarian Alps. The North German plain is dotted with upwards of 500 lakes, covering an area of about 2500 sq. m. The largest of these are the three Haffs — the Oder Haff covering 370 sq. m., the Frische Haff, 332, and the Kurische Haff, 626. The lakes in the Prussian and Pomeranian provinces, in Mecklenburg and in Holstein, and those of the Havel, have already been mentioned. In the west the only lakes of importance are the Steinhuder Meer, 14 m. north- west of Hanover, and the Diimmersee on the southern frontier of Oldenburg. (P. A. A.)

Geology. — Germany consists of a floor of folded Palaeozoic rocks upon which rest unconformably the comparatively little disturbed beds of the Mesozoic system, while in the North German plain a covering of modern deposits conceals the whole of the older strata from view, excepting some scattered and isolated outcrops of Cretaceous and Tertiary beds. The rocks which compose the ancient floor are thrown into folds which run approximately from W.S.W. to E.N.E. They are exposed on the one hand in the neighbourhood of the Rhine and on the other hand in the Bohemian massif. With the latter must be included the Frankenwald, the Thuringerwald, and even the Harz. The oldest rocks, belonging to the Archaean system, occur in the south, forming the Vosges and the Black Forest in the west, and the greater part of the Bohemian massif, including the Erzgebirge, in the east. They consist chiefly of gneiss and schist, with granite and other eruptive rocks. Farther, north, in the Hunsriick, the Taunus, the Eifel and Westerwald, the Harz and the Frankenwald, the ancient floor is composed mainly of Devonian beds. Other Palaeozoic systems are, however, included in the folds. The Cambrian, for example, is exposed at Leimitz near Hof in the Frankenwald, and the important coal-field of the Saar lies on the southern side of the Hunsriick, while Ordovician and Silurian beds have been found in several localities. Along the northern border of the folded belt lies the coal basin of the Ruhr in Westphalia, which is the continuation of the Belgian coal-field, and bears much the same relation to the Rhenish Devonian area that the coal basin of Liege bears to the Ardennes. Carboniferous and Devonian beds are also found south-east of the Bohemian massif, where lies the extensive coal-field of Silesia. The Permian, as in England, is not involved in the folds which have affected the older beds, and in general lies unconformably upon them. It occurs chiefly around the masses of ancient rock, and one of the largest areas is that of the Saar.

Between the old rocks of the Rhine on the west and the ancient massif of Bohemia on the east a vast area of Triassic beds extends from Hanover to Basel and from Metz to Bayreuth. Over the greater

part of this region the Triassic beds are free from folding and are nearly horizontal, but faulting is by no means absent, especially along the margins of the Bohemian and Rhenish hills. The Triassic beds must indeed have covered a large part of these old rock masses, but they have been preserved only where they were faulted down to a lower level. Along the southern margin of the Triassic area there is a long band of Jurassic beds dipping towards the Danube; and at its eastern extremity this band is continuous with a synclinal of Jurassic beds, running parallel to the western border of the Bohemian massif, but separated from it by a narrow strip of Triassic beds. Towards tTie north, in Hanover and West- phalia, the Triassic beds are followed by Jurassic and Cretaceous deposits, the latter being here the more important. As in the south of England, the lower beds of the Cretaceous are of estuarine origin and the Upper Cretaceous overlaps the Lower, lying in the valley of the Ruhr directly upon the Palaeozoic rocks. In Saxony also the upper Cretaceous beds rest directly upon the Palaeozoic or Archaean rocks. Still more to the east, in the province of Silesia, both Jurassic and Cretaceous beds are again met with, but they are to a large extent concealed by the recent accumulations of the great plain. The Eocene system is unknown in Germany except in the foothills of the Alps; but the Oligocene and Miocene are widely spread, especially in the great plain and in the depression of the Danube. The Oli- gocene is generally marine. Marine Miocene occurs in N.W. Germany and the Miocene of the Danube valley is also in part marine, but in central Germany it is of fluviatile or lacustrine origin. The lignites of Hesse, Cassel, &c, are interstratified with basaltic lava-flows which form the greater part of the Vogelsbsrg and other hills. The trachytes of the Siebengebirge are probably of slightly earlier date. The precise age of the volcanoes of the Eifel, many of which are in a very perfect state of preservation, is not clear, but they are certainly Tertiary or Post-tertiary. Leucite and nepheline lavas are here abundant. In the Siebengebirge the little crater of Roderberg, with its lavas and scoriae of leucite-basalt, is posterior to some of the Pleistocene river deposits.

A glance at a geological map of Germany will show that the greater part of Prussia and of German Poland is covered by Quaternary deposits. These are in part of glacial origin, and contain Scandi- navian boulders; but fluviatile and aeolian deposits also occur. Quaternary beds also cover the floor of the broad depression through

which the Rhine meanders from Basel to Mainz, and occupy a large part of the plain of the Danube. The depression of the Rhine is a trough lying between two faults or system of faults. The very much

broader depression of the Danube is associated with the formation of the Alps, and was flooded by the sea during a part of the Miocene period. (P. La.)

Climate. — The climate of Germany is to be regarded as intermediate between the oceanic and continental climates of western and eastern Europe respectively. It has nothing in common with the Mediterranean climate of southern Europe, Germany being separated from that region by the lofty barrier of the Alps. Although there are very considerable differences in the range of temperature and the amount of rainfall throughout Germany, these are not so great as they would be were it not that the elevated plateaus and mountain chains are in the south, while the north is occupied by low-lying plains. In the west no chain of hills intercepts the warmer and moister winds which blow from the Atlantic, and these accordingly influence at times even the eastern regions of Germany. The mean annual temperature of south-western Germany, or. the Rhine and Danube basins, is about 52° to 54° F., that of central Germany 48° to 50°, and that of the northern plain 46 ° to 48°. In Pomerania and West Prussia it is only 44° to 45 , and in East Prussia 42 to 44 °. The

I I Quaternary y/A Tertiary 1.1 Cretaceous Jurassic

&£Zmi Triassic

1 Permian

ˆCarboniferous fc££M Devonian

EmcxyVaWtef tc.

Siluro-Cambrian

tBBm Archaean & Metamorphic l+ + fl Plutonic Rocks Wk Ifolcanic Hocks

mean January temperature varies between 22° and 34° (in Masuren and Cologne respectively) ; the mean July temperature, between 6l° in north Schleswig and 68″ at Cologne. The extremes of cold and heat are, as recorded in the ten years 1895-1905, 7° in Konigsberg and 93 in Heidelberg (the hottest place in Germany). The difference in the mean annual temperature between the south-west and north-west of Germany amounts to about 3 . The contrasts of heat and cold are furnished by the valley of the Rhine above Mainz, which has the greatest mean heat, the mildest winter and the highest summer temperature, and the lake plateau of East Prussia, where Arys on the

Spirdingsee has a like winter temperature to the Brocken at 3200 ft. The Baltic has the lowest spring temperature, and the autumn there is also not characterized by an appreciably higher degree of warmth. In central Germany the high plateaus of the Erz and Fichtelgebirge are the coldest regions. In south Germany the upper Bavarian plain experiences an inclement winter and a cold summer. In Alsace-Lorraine the Vosges and the plateau of Lorraine are also remarkable for low temperatures. The warmest districts of the German empire are the northern parts of the Rhine plain, from Karlsruhe downwards, especially the Rheintal; these are scarcely 300 ft. above the sea-level, and are protected by mountainous tracts ..of land. The same holds true of the valleys of the Neckar, Main and Mosel. Hence the vine is everywhere cultivated in these districts. The mean summer temperature there is 66° and upwards, while the average temperature of January does not descend to the freezing point (32°). The climate of north-western Germany (west of the Elbe) shows a predominating oceanic character, the summers not being too hot (mean summer temperature 60° to 62°), and snow in winter remaining but a short time on the ground. West of the Weser the average temperature of January exceeds 32°; to the east it sinks to 30 , and therefore the Elbe is generally covered with ice for some months of the year, as are also its tributaries. The farther

one proceeds to the east the greater are the contrasts of summer and winter. While the average summer warmth of Germany is 6o c to 62 , the January temperature falls as low as 26 to 28 in West Prussia, Posen and Silesia, and 22° to 26 in East Prussia and upper Silesia. The navigation of the rivers is regularly interrupted by frost. Similarly the upper basin of, the Danube, or the Bavarian plain, has a rather inclement climate in winter, the average for January being 25 to 26 .

As regards rainfall, Germany belongs to those regions where precipitation takes place at all seasons, but chiefly in the form of summer rains. In respect to the quantity of rain the empire takes a middle position between the humidity of north-western Europe and the aridity of the east. There are considerable differences between particular places. The rainfall is greatest in the Bavarian tableland and the hilly regions of western Germany. For the Eifel, Sauerland,

Harz, Thuringian Forest, Rhon, Vogelsberg, Spessart, the Black Forest, the Vosges, &c, the annual average may be stated at 34 in. or more, while in the lower terraces of south-western Germany, as in the Erzgebirge and the Sudetic range, it is estimated at 30 to 32 in. only. The same average obtains also on the humid north-west coast of Germany as far as Bremen and Hamburg. In the remaining parts of western Germany, on the shores of farther Pomerania, and in East Prussia, it amounts to upwards of 24 in. In western Germany there is a district famous for the scarcity of rain and for producing the best kind of wine : in the valley of the Rhine below Strassburg, in the Palatinate, and also in the valley of the Main, no more than from 16 to 20 in. fall. Mecklenburg, Brandenburg and Lusatia, Saxony and the plateau of Thuringia, West Prussia, Posen and lower Silesia are also to be classed among the more arid regions of Germany, the annual rainfall being 16 to 20 in. Thunderstorms are most frequent in July, and vary between fifteen and twenty-five in the central districts, descending in the eastern provinces of Prussia to ten annually.

Flora. — The flora of Germany comprises 3413 species of phanero- gamic and 4306 cryptogamic plants. The country forms a section of the central European zone, and its flora is largely under the influence of the Baltic and Alpine elements, which to a great degree here coalesce. All plants peculiar to the temperate zone abound. Wheat, rye, barley and oats are cultivated everywhere, but spelt only in the south and buckwheat in the north and north-west. Maize only ripens in the south. Potatoes grow in every part of the country, those of the sandy plains in the north being of excellent quality. All the commoner sorts of fruit — apples, pears, cherries, &c— grow everywhere, but the more delicate kinds, such as figs, apricots and peaches, are confined to the warmer districts. The vine flourishes as far as the 51° N., but only yields good wine in the districts of the Rhine and Danube. Flax is grown in the north, and hemp more particularly in the central districts. Rape can be produced everywhere when the soil permits. Tobacco is cultivated on the upper Rhine and in the valley of the Oder. The northern plain, especially in the province of Saxony, pro- duces beet (for sugar), and hops are largely grown in Bavaria, Wurttemberg, Alsace, Baden and the Prussian province of Posen.

Speaking generally, northern Germany is not nearly so well

Forests. wo ° ded as central and southern Ger- many, where indeed most of the lower mountains are covered with timber, as is indicated by the frequent use of the termina- tion wald affixed to the names of

the mountain ranges (as Schwarzwald, Thuringerwald, &c). The " Seenplatten " are less wooded than the hill country, but the eastern por- tion of the northern lowlands is well provided with timber. A narrow strip along the shores of the Baltic is covered with oaks and beeches; farther in- land, and especially east of the Elbe, coniferous trees are the most prevalent, praticularly the Scotch fir; birches are also abundant. The mountain forests consist chiefly of firs, pines and larches, but contain also silver firs, beeches and oaks. Chestnuts and walnuts appear on the terraces of the Rhine valley and in Swabia and Franconia. The whole north-west of Germany is desti-

Area

tute of wood, but to compensate for this the people have ample supplies of fuel in the extensive stretches of turf.

Fauna. — The number of wild animals in Germany is not very great. Foxes, martens, weasels, badgers and otters are to be found every- where; bears are found in the Alps, wolves are rare, but they find their way sometimes from French territory to the western provinces, or from Poland to Prussia and Posen. Among the rodents the hamster and the field-mouse are a scourge to agriculture. Of game there are the roe, stag, boar and hare; the fallow deer and the wild rabbit are less common. The elk is to be found in the forests of East Prussia. The feathered tribes are everywhere abundant in the fields, woods and marshes. Wild geese and ducks, grouse, partridges, snipe, woodcock, quails, widgeons and teal are plentiful all over the country, and in recent years preserves have been largely stocked with pheasants. The length of time that birds of passage remain in Germany differs considerably with the different species. The stork is seen for about 170 days, the house-swallow 160, the snow-goose 260, the snipe 220. In northern Germany these birds arrive from twenty to thirty days later than in the south.

The waters of Germany abound with fish; but the genera and species are few. The carp and salmon tribes are the most abundant ; after them rank the pike, the eel, the shad, the roach, the perch and the lamprey. The Oder and some of the tributaries of the Elbe abound in crayfish, and in the stagnant lakes of East Prussia leeches are bred. In addition to frogs, Germany has few varieties of Amphibia. Of serpents there are only two poisonous kinds, the common viper and the adder (Kreuzotter).

Population. — Until comparatively recent times no estimate of the population of Germany was precise enough to be of any value. At the

beginning of the 19th century the country was divided into some hundred states, but there was no central agency for instituting an exact census on a uniform plan. The formation of the German Confederation in 1815 effected but little change in this respect, and it was left to the different states to arrange in what manner the census should be taken. On the foundation, however, of the German customs union, or Zollverein, between certain German states, the necessity for accurate statistics became apparent and care was taken' to compile trustworthy tables. Researches show the population of the German empire, as at present constituted, to have been: (1816) 24,833,396; (1855) 36,113,644; and (1871) 41,058,792. The following table shows the population and area of each of the states included in the empire for the years 1871, 1875, 1900 and 1905: —

and Population of the German States.

States of the Empire.

Kingdoms —

Prussia

Bavaria

Saxony

Wurttemberg

Grand-Duchies —

Baden

Hesse

Mecklenburg-Schwerin .

Saxe-Weimar

Mecklenburg-Strelitz

Oldenburg . . . . .

Duchies —

Brunswick

Saxe-Meiningen .

Saxe-Altenburg . . . .

Saxe-Coburg-Gotha .

Anhalt

Principalities —

Schwarzburg-Sondershausen

Schwarzburg-Rudolstadt.

Waldeck

Reuss-Greiz

Reuss-Schleiz

Schaumburg-Lippe .

Lippe

Free Towns —

Lubeck

Bremen

Hamburg

Imperial Territory —

Alsace-Lorraine .

German Empire .

Area English Sq. m.

Popu

ation.

Density

1871.

1875-

1900.

I905-

per Sq. m.

134,616

24,691,433

25,742,404

34,472,509

37,293,324

277-3

29,292

4,863,450

5,022,390

6,176,057

6,524,372

222-7

5,789

2,556,244

2,760,586

4,202,216

4,508,601

778-8

7,534

1,818,539

1,881,505

2,169,480

2,302,179

305-5

5,823

1,461,562

1,507,179

1,867,944

2,010,728

345-3

2,966

852,894

884,218

l,“9,893

1,209,175

407-6

5,o68

557,897

553,785

607,770

625,045

!23-3

i,397

286,183

292,933

362,873

388,095

277-8

1,131

96,982

95,673

102,602

103,451

9i-5

2,482

314,459

3i9,3H

399,180

438,856

176-8

1,418

311,764

327,493

464,333

485,958

342-5

953

187,957

194,494

250,731

268,916

282-2

5ii

142,122

H5,844

194,914

206,508

404-1

764

174,339

182,599

229,550

242,432

317-3

888

203,437

213,565

316,085

328,029

369-4

333

- *75,523*

76,676

80,898

85,152

255-7

363

67,191

67,480

93,059

96,835

266-7

433

56,224

54,743

57,918

59,127

136-5

122

45,094

46,985

68,396

70,603

578-7

319

89,032

92,375

139,210

144,584

453-2

131

32,059

33,133

43,132

44,992

343-4

469

m,i35

112,452

138,952

H5,577

310-4

115

52,158

56,912

96,775

105,857

920-5

99

122,402

142,200

224,882

263,440

2661-0

160

338,974

388,6×8

768,349

874,878

5467-9

5,604

1,549,738

1,531,804

1,719,470

1,814,564

323-8

208,780

41,058,792

42,727,360

56,367,178

60,641,278

290-4

c U

.a s Ji <«

*to 0.0 „ £ S o 8» * S B rˆ -a ”*

POPULATION]

GERMANY

809

The population of the empire has thus increased, since 1871, by 19,582,486 or 476%. The increase of population during 1895- 1900 was greatest in Hamburg, Bremen, Lubeck, Saxony, Prussia and Baden, and least in Mecklenburg-Strelitz and Wakieck. Of the total population in 1900, 54-3% was urban (i.e. living in towns of ‘2000 inhabitants and above), leaving 45-7 % to be classified as rural. On the 1st of December 1905, of the total population 29,884,681 were males and 30,756,597 females; and it is noticeable that the male population shows of late years a larger relative increase than the

female, the male population having in five years increased by 2,147,434 a "d the female by only 2,126,666. The greater increase in the male population is attributable to diminished emigration and to the large increase in immigrants, who are mostly males. In 1905, 485,906 marriages were contracted in Germany, being at the rate of 8-0 per thousand inhabitants. In the same year the total number of births was 2,048,453. Of these, 61,300 were stillborn and 174,494 illegitimate, being at the rate, respectively, of 3 % and 8-5 % of the total. Illegitimacy is highest in Bavaria (about T 5%), Berlin (14%), and over 12% in Saxony, Mecklenburg- Schwerin and Saxe-Meiningen. It is lowest in the Rhine Province and Westphalia (3-9 and 2-6 respectively). Divorce is steadily on the increase, being in 1904, ii-i per 10,000 marriages, as against 81, 81, 93 and io-i for the four preceding years. The average deaths for the years 1901-1905 amounted to 1,227,903 ; the rate was thus 20-2 per thousand inhabitants, but the death-rate has materially decreased, the total number of deaths in 1907 standing at 1,178,349 ; the births for the same year were 2,060,974. In connexion with suicides, it is interesting to observe that the highest rates prevail in some of the smaller and more prosperous states of the empire — for example, in Saxe-Weimar, Saxe-Coburg-Gotha and Saxe- Altenburg (on a three years' average of figures), while the Roman Catholic country Bavaria, and the impoverished Prussian province of Posen show the most favourable statistics. For Prussia the rate is 20, and for Saxony it is as high as 31 per 100,000 inhabitants. The large cities, notably Berlin, Hamburg, Breslau and Dresden, show, however, relatively the largest proportion.

In 1900 the German-speaking population of the empire amounted to 51,883,131. Of the inhabitants speaking other languages there were: Polish, 3,086,489; French (mostly in Lorraine), 211,679; Masurian, 142,049; Danish, 141,061; Lithuanian, 106,305; Cassubian, 100,213; Wendish, 93,032; Dutch, 80,361; Italian, 65,961; Moravian, 64,382; Czech, 43,016; Frisian, 20,677; English, 20,217; Walloon, 11,841. In 1905 there were resident within the empire 1,028,560 subjects of foreign states, as compared with 778,698 in 1900. Of these 17,293 were subjects of Great Britain and Ireland, 17,184 of the United States of America and 20,584 of France. The bulk of the other foreigners residing in the country belonged to countries lying contiguous, such as Austria, which claimed nearly the half, Russia and Italy.

Languages. — The German-speaking nations in their various branches and dialects, if we include the Dutch and the Walloons, extend in a compact mass along the shores of the Baltic and of the

North Sea, from Memel in the east to a point between Gravelines and Calais near the Straits of Dover. On this northern line the Germans come in contact with the Danes who inhabit the northern parts of Schleswig within the limits of the German empire. A line from Flensburg south-westward to Joldelund and thence north- westward to Hoyer will nearly give the boundary between the two idioms. 1 The German-French frontier traverses Belgium from west to east, touching the towns of St Omer, Courtrai and Maastricht. Near Eupen, south of Aix-la-Chapelle, it turns southward, and near Arlon south-east as far as the crest of the Vosges mountains, which it follows up. to Belfort, traversing there the watershed of the Rhine and the Doubs. In the Swiss territory the line of demarcation passes through Bienne, Fribourg, Saanen, Leuk and Monte Rosa. In the south the Germans come into contact with Rhaeto-Romans and Italians, the former inhabiting the valley of the Vorder-Rhein and the Engadine, while the latter have settled on the southern slopes of the Alps, and are continually advancing up the valley of the Adige. Carinthia and Styria are inhabited by German people, except the valley of the Drave towards Klagenfurt. Their eastern neigh- bours there are first the Magyars, then the northern Slavs and the Poles. The whole eastern frontier is very much broken, and cannot be described in a few words. Besides detached German colonies in Hungary proper, there is a considerable and compact German (Saxon) population in Transylvania. The river March is the frontier north of the Danube from Pressburg as far as Briinn, to the north of which the German regions begin near Olmtltz, the interior of Bohemia and Moravia being occupied by Czechs and Moravians. In these countries the Slav language has been steadily superseding the German. In the Prussian provinces of Silesia and Posen the eastern parts are mixed territories, the German language progressing very slowly among the Poles. In Bromberg and Thorn, in the valley of the Vistula, German is prevalent. In West Prussia some parts of the interior, and in East Prussia a small region along the Russian frontier, are occupied by Poles (Cassubians in West Prussia, Masurians in

1 The question, much disputed between Germans and Danes, is exhaustively treated by P. Lauridsen in F. de Jessen's La Question de Sleswig (Copenhagen, 1906), pp. 114 et seq.

East Prussia). The total number of German-speaking people, within the boundaries wherein they constitute the compact mass of the population, may be estimated, if the Dutch and Walloons be included, at 65 millions.

The geographical limits of the German language thus do not quite coincide with the German frontiers. The empire contains about 3_J millions of persons who do not make use of German in everyday life, not counting the resident foreigners.

Apart from the foreigners above mentioned, German subjects speaking a tongue other than German are found only in Prussia, Saxony and Alsace-Lorraine. The following table shows roughly the distribution of German-speaking people in the world outside the German empire : —

Austria-Hungary Netherlands (Dutch) Belgium (Walloon) . Luxemburg . Switzerland . France ....

12,000,000 5,200,000 4,000,000

200,000 2,300,000

500ˆ000

Other European

Countries America . Asia . Africa . Australia.

2,300,000

13,000,000

100,000

600,000

150,000

According to the census of the 1st of December 1900 there were 51,634,757 persons speaking commonly one language and 248,374 speaking two languages. In the kingdom of Saxony, according to the census of 1900, there were 48,000 Wends, mostly in Lusatia. With respect to Alsace-Lorraine, detailed estimates (but no census) gave the number of French in the territory of Lorraine at about 170,000, and in that of Alsace at about 46,000.

The Poles have increased very much, owing to a greater surplus of births than in the case of the German people in the eastern provinces of Prussia, to immigration from Russia, and to the Polonization of many Germans through clerical and other influences (see History). The Poles are in the majority in upper Silesia (Government district of

Oppeln-, 55%) and the province of Posen (60%). They are numerous in West Prussia (34 %) and East Prussia (14 %).

The Wends are decreasing in number, as are also the Lithuanians on the eastern border of East Prussia, Czechs are only found in Silesia on the confines of Bohemia.

Russians flocked to Germany in thousands after the Russo-Japanese War and the insurrections in Russia, and the figures given for 1900 had been doubled in 1907. Males preponderate among the various nationalities, with the exception of the British, the larger proportion of whom are females either in domestic service or engaged in tuition.

Chief Towns. — According to the results of the census of the 1st of December 1905 there were within the empire 41 towns with populations exceeding 100,000, viz. : —

State.

Population.

Berlin

Prussia

2,040,148

Hamburg .

Hamburg

802,793

Munich

Bavaria

53 8 .393

Dresden

Saxony

516,996

Leipzig

,,

5°2.570

Breslau

Prussia

470,751

Cologne

, f

428,503

Frankfort-on-]V

lair

1

,,

334.951

Nuremberg Diisseldorf.

Bavaria

294.344

Prussia

253.099

Hanover .

,,

250,032

Stuttgart .

Wtirttemberg

249.443

Chemnitz .

Saxony

244.405

Magdeburg

Prussia

240,661

Charlottenburg

,,

239.512

Essen .

,,

231,396

Stettin

,,

224,078

Konigsberg

,,

219,862

Bremen

Bremen

214.953

Duisburg .

Prussia

192,227

Dortmund

”

175.575

Halle . .

169,899

Altona

”

168,301

Strassburg

Alsace-Lorraine

167,342

Kiel . .

Prussia

163,710

Elberfeld .

t»

162,682

Mannheim

Baden

162,607

Danzig

Prussia

159,685

Barmen

t.

156,148

Rixdorf

”

153,650

Gelsenkirchen

”

H7,037

Aix-la-Chapelle

t>

143,906

Schoneberg

”

140,992

Brunswick

Brunswick

136,423

Posen .

Prussia

137,067

Cassel

”

120,446

Bochum

”

“8,455

Karlsruhe .

Baden

111,200

Crefeld .

Prussia

110,347

Plauen

Saxony

105,182

Wiesbaden

Prussia

100,953

8io

GERMANY

[AGRICULTURE

Density of Population. — In respect of density of population , Germany with (1900) 269-9 and (1905) 290-4 inhabitants to the square mile is exceeded in Europe only by Belgium, Holland and England. Apart from the free cities, Hamburg, Bremen and Lubeck, the kingdom of Saxony is the most, and Mecklenburg- Strelitz the least, closely peopled state of the empire. The most thinly populated districts are found, not as might be expected in the mountain regions, but in some parts of the plains. Leaving out of account the small centres, Germany may be roughly divided into two thinly and two densely populated parts. In the former division has to be classed all the North German plain. There it is only in the valleys of the larger navigable rivers and on the southern border of the plain that the density exceeds 200 inhabitants per square mile. In some places,

indeed, it is far greater, e.g. at the mouths of the Elbe and the Weser, in East Holstein, in the delta of the Memel and the environs of Hamburg. This region is bordered on the south by a densely peopled district, the northern boundary of which may be defined by a line from Coburg via Cassel to Miinster, for in this part there are not only very fertile districts, such as the Goldene Aue in Thuringia, but also centres of industry. The population is thickest in upper Silesia around Beuthen (coal-fields), around Ratibor, Neisse and Waldenburg (coal-fields), around Zittau (kingdom of Saxony), in the Elbe valley around Dresden, in the districts of Zwickau and Leipzig as far as the Saale, on the northern slopes of the Harz and around Bielefeld in Westphalia. In all these the density exceeds 400 inhabitants to the square mile, and in the case of Saxony rises to 750. The third division of Germany comprises the basin of the Danube and Franconia, where around Nuremberg, Bamberg and Wiirzburg the population is thickly clustered. The fourth division embraces the valleys of the upper Rhine and Neckar and the district of Dusseldorf on the lower Rhine. In this last the proportion ex- ceeds 1200 inhabitants to the square mile.

Emigration. — There have been great oscillations in the actual emigration by sea. It first exceeded 100,000 soon after the Franco-German War (1872, 126,000), and this occurred again in the years 1880 to 1892. Germany lost during these thirteen years more than 1,700,000 inhabitants by emigration. The total number of those who sailed for the United States from 1820 to 1900 may be estimated at more than 4,500,000. The number of German emigrants to Brazil between 1870 and 1900 was about 52,000. The greater number of the more recent emigrants was from the agricultural provinces of northern Germany— West Prussia, Posen, Pomerania, Mecklenburg, Schleswig-Holstein and Hanover, and sometimes the emigration reached I % of the total population of these provinces. In subsequent years the emigration of native Germans greatly decreased and, in 1905, amounted only to 28,075. But to this number must be added 284,787 foreigners who in that year were shipped from German ports (notably Hamburg and Bremen) to distant parts. Of the above given numbers of purely German emigrants 26,007 sailed for the United States of America; 243 to Canada ; 333 to Brazil ; 674 to the Argentine Republic ; 7 to other parts of America; 57 to Africa; and 84 to Australia.

Agriculture. — Despite the enormous development of industries and commerce, agriculture and cattle-rearing still represent in Germany a considerable portion of its economic wealth. Almost two-thirds of the soil is occupied by arable land, pastures and meadows, and of the

whole area, in 1900, 91 % was classed as productive. Of the total area 47-67% was occupied by land under tillage, 0-89% by gardens, 11-02% by meadow-land, 501 % by pastures, and 0-25% by vineyards. The largest estates are found in the Prussian provinces of Pomerania, Posen and Saxony, and in East and West Prussia, while in the Prussian Rhine province, in Baden and Wiirttemberg small farms are the rule.

The same kinds of cereal crops are cultivated in all parts of the empire, but in the south and west wheat is predominant, and in the north and east rye, oats and barley. To these in some districts are added spelt, buckwheat, millet, rice-wheat, lesser spelt and maize. In general the soil is remarkably well cultivated. The three years' rotation formerly in use, where autumn and spring-sown grain and fallow succeeded each other, has now been abandoned, except in some districts, where the system has been modified and improved. In south Germany the so-called Fruchtwechsel is practised, the fields being sown with grain crops every second year, and with pease or beans, grasses, potatoes, turnips, &c, in the intermediate years. In north Germany the mixed Koppelwirthschaft is the rule, by which system, after several years of grain crops, the ground is. for two or three seasons in pasture.

Taking the average of the six years 1900-1905, the crop of wheat amounted to 3,550,033 tons (metric), rye to 9,296,616 tons, barley . to 3,102,883 tons, and oats to 7,160,883 tons. But, in spite of this considerable yield in cereals, Germany cannot cover her home consumption, and imported on the average of the six years 1900-1905 about 45 million tons of cereals to supply the deficiency. The potato is largely cultivated, not merely for food, but for dis- tillation into spirits. This manufacture is prosecuted especially in eastern Germany. The number of distilleries throughout the German empire was, in 1905-1906, 68,405. The common beet

(Beta vulgaris) is largely grown in some districts for the production of sugar, which has greatly increased of recent years. There are two centres of the beet sugar production: Magdeburg for the districts Prussian Saxony, Hanover, Brunswick, Anhalt and Thuringia, and Frankfort-on-Oder at the centre of the group Silesia, Branden- burg and Pomerania. Flax and hemp are cultivated, though not so much as formerly, for manufacture into linen and canvas, and also rape seed for the production of oil. The home supply of the former no longer suffices for the native demand. The cultivation of hops is in a very thriving condition in the southern states of Germany. The soil occupied by hops was estimated in 1905 at 98,000 acres — a larger

area than in Great Britain, which had in the same year about 48,000 acres. The total production of hops was 29,000 tons in 1905, and of this over 25,000 were grown in Bavaria, Wiirttemberg, Baden and Alsace-Lorraine. Almost the whole yield in hops is consumed in the country by the great breweries.

Tobacco forms a most productive and profitable object of culture in many districts. The total extent under this crop in 1905 was about 35,000 acres, of which 45% was in Baden, 12% in Bavaria, 30% in Prussia, and the rest in Alsace and Hesse-Darmstadt. In the north the plant is cultivated principally in Pomerania, Brandenburg and East and West Prussia. Of late years the production has some- what diminished, owing to the extensive tobacco manufacturing industries of Bremen and Hamburg, which import almost exclusively foreign leaves.

Ulm, Nuremberg, Quedlinburg, Erfurt, Strassburg and Guben are famed for their vegetables and garden seeds. Berlin is noted for its flower nurseries, the Rhine valley, Wiirttemberg and the Elbe valley below Dresden for fruit, and Frankfort-on-main for cider.

The culture of the vine is almost confined to southern and western Germany, and especially to the Rhine district. The northern limits of its growth extend from Bonn in a north-easterly direction through Cassel to the southern foot of the ae '

Harz, crossing 52 ° N. on the Elbe, running then east some miles to the north of that parallel, and finally turning sharply towards the south-west on the Warthe. In the valley of the Saale and Elbe (near Dresden), and in lower Silesia (between Guben and Griinberg), the number of vineyards is small, and the wines of inferior quality ; but along the Rhine from Basel to Coblenz, in Alsace, Baden, the Palatinate and Hesse, and above all in the province of Nassau, the lower slopes of the hills are literally covered with vines. Here are produced the celebrated Rildesheimer, Hochheimer and Johannis-berger. The vines of the lowerMain, particularly those of Wiirzburg, are the best kinds; those of the upper Main and the valley of the Neckar are rather inferior. The Moselle wines are lighter and more acid than those of the Rhine. The total amount produced in Germany is estimated at 1000 million gallons, of a value of £4,000,000 ; Alsace-Lorraine turning out 400 millions; Baden, 175; Bavaria, Wiirttemberg and Hesse together, 300 ; while the remainder, which though small in quantity is in quality the best, is produced by Prussia.

The cultivation of grazing lands in Germany has been greatly improved in recent times and is in a highly prosperous condition. The provinces of Schleswig-Holstein, Pomerania, Hanover , , s

On the whole, despite the prosperous condition of the German live-stock farming, the consumption of meat exceeds the amount rendered available by home production, and prices can only be kept down by a steady increase in the imports from abroad.

Fisheries. — The German fisheries, long of little importance, have been carefully fostered within recent years. The deep-sea fishing in the North Sea, thanks to the exertions of the German fishing league (Deutscher Fischereiverein) and to government support, is extremely active. Trawlers are extensively employed, and steamers bring the catches directly to the large fish markets at Geestemunde and Altona, whence facilities are afforded by the railways for the rapid transport of fish to Berlin and other centres. The fish mostly caught are cod, haddock and herrings, while Heligoland yields lobsters, and the islands of Fohr, Amrum and Sylt oysters of good quality. The German North Sea fishing fleet numbered in 1905 618 boats, with an aggregate crew of 5441 hands. Equally well developed are the Baltic fisheries, the chief ports engaged in which are Danzig, Eckern- forde, Kolberg and Travemiinde. The principal catch is haddock and herringg. The catch of the North Sea and Baltic fisheries in 1906 was valued at over £700, 000, exclusive of herrings for salting. The fisheries do not, however, supply the demand for fish, and fresh, salt and dried fish is imported largely in excess of the home yield.

Mines and Minerals. — Germany abounds in minerals, and the extraordinary industrial development of the country since 1870 is largely due to its mineral wealth. Having left France much behind in this respect, it now rivals Great Britain and the United States.

Germany produces more silver than any other European state, and the quantity is annually increasing. It is extracted from the ores in the mines of Freiburg (Saxony), the Harz Mountains, upper Silesia, Merseburg, Aix-la-Chapelle, Wiesbaden and Arnsberg. Gold is found in the sand of the rivers Isar, Inn and Rhine, and also, to a limited extent, on the Harz. The quantity yielded in 1905 was! of silver,

about 400 tons of a value of £1,600,000, and gold, about 4 tons, valued at about £548,000.

Lead is produced in considerable quantities in upper Silesia, the Harz Mountains, in the Prussian province of Nassau, in the Saxon Erzgebirge and in the Sauerland. The yield in 1905 amounted to about 153,000 tons; of which 20,000 tons were exported.

Copper is found principally in the Mansfeld district of the Prussian province of Saxony and near Arnsberg in the Sauerland, the ore yielding 31,713 tons in 1905, of which 5000 tons were exported.

About 90% of the zinc produced in Europe is yielded by Belgium and Germany. It is mostly found in upper Silesia, around Beuthen and in the districts of Wiesbaden and Aix-la-Chapelle. In 1905 no less than 198,000 tons of block zinc were produced, of which 16 500 tons were exported.

Of other minerals (with the exceptions of coal, iron and salt treated below) nickel and antimony are found in the upper Harz; cobalt in the hilly districts of Hesse and the Saxon Erzgebirge; arsenic in the , Riesengebirge ; quicksilver in the Sauerland and in the spurs of the Saarbriicken coal hills; graphite in Bavaria; porcelain clay in Saxony and Silesia; amber along the whole Baltic coast; and lime and gypsum in almost all parts.

Coal-mining appears to have been first practised in the 14th century at Zwickau (Saxony) and on the Ruhr. There are six large coal-Coal. fields, occupying an area of about 3600 sq. m., of which

the most important occupies the basin of the Ruhr its extent being estimated at 2800 sq. m. Here there are more than 60 beds, of a total thickness of 150 to 200 ft. of coal; and the amount in the pits has been estimated at 45,000 millions of tons. Smaller fields are found near Osnabriick, Ibbenbliren and Minden and a larger one near Aix-la-Chapelle. The Saar coal-field, within the area enclosed by the rivers Saar, Nahe and Blies (460 sq. m.), is of great importance. The thickness of 80 beds amounts to 250 ft and the total mass of coal is estimated at 45,400 million tons. The greater part of the basin belongs to Prussia, the rest to Lorraine A still larger field exists in the upper Silesian basin, on the border- land between Austria and Poland, containing about 50.000 million tons. Beuthen is the chief centre. The Silesian coal-fields have a second centre in Waldenburg, east of the Riesengebirge. The Saxon coal-fields stretch eastwards for some miles from Zwickau. Deposits of less consequence

are found in upper Bavaria, upper Franconia Baden, the Harz and elsewhere. '

The following table shows the rapidly increasing development of the coal production. That of lignite is added, the provinces of Saxony and Brandenburg being rich in this product: —

Production of Coal and Lignite.

Year.

Coal.

Lignite.

Quantities.

Value.

Hands.

Quantities.

Value.

Hands.

1871 1 88 1 1891 1899 1900 1905

Mill. Tons.

29-4

48-7

73-7 .101-6 109-3

I2I-2

Mill. Mks.

218-4 252-3 589-5 789-6 966-1 1049-9

186,000 283,000 379,000 414,000 490,000

Mill. Tons.

8-5

12-8

20-5 34-2 40-5 52-5

Mill. Mks.

26-2

38-1 54-2 78-4

98-5

122-2

25,600

35,7oo

44,700 50,900 52,800

This production permits a considerable export of coal to the west and south of the empire, but the distance from the coal-fields to the German coast is such that the import of British coal cannot yet be dispensed with (1905, over 7,000,000 tons). Besides this, from 7,000,000 to 8,000,000 tons of lignite come annually from Bohemia. In north Germany peat is also of importance as a fuel ; the area of the peat moors in Prussia is estimated at 8000 sq. m., of which 2000 are in the north of Hanover.

The iron-fields of Germany fall into three main groups: those of the lower Rhine and Westphalia, of which Dortmund and Diisseldorf are the centres; those of Lorraine and the Saar; and those of upper Silesia. The output of the ore has enormously increased of recent years, and the production of pig iron, as given for 1905, amounted to 10,875,000 tons of a value of £28,900,000.

Germany possesses abundantsaltdeposits. The actual production not only covers the home consumption, but also allows a yearly increasing exportation, especially to Russia, Austriaand Scandinavia. The provinces of Saxony and Hanover, with Thuringia and Anhalt produce half the whole amount. A large salt-work is found at Strzalkowo (Posen), and smaller ones near Dortmund, Lippstadt and Minden (Westphalia). In south Germany salt abounds most in Wurttemberg (Hall, Heilbronn, Rottweil) ; the principal Bavarian works are at the foot of the Alps near Freilassing and Rosenheim. Hesse and Baden, Lorraine and the upper Palatinate

have also salt- works. The total yield of mined salt amounted in 1905 to 6,209 000 tons, including 1,165,000 tons of rock salt. The production has made great advance, having in 1850 been only 5 million cwts.

Manufactures. — In no other country of the world has the manufacturing industry made such rapid strides within recent years as in Germany. This extraordinary development of industrial energy embraces practically all classes of manufactured articles. In a general way the chief manufactures may be geographically distributed as follows. Prussia, Alsace-Lorraine, Bavaria and Saxony are the chief seats of the iron manufacture. Steel is produced in Rhenish Prussia. Saxony is predominant in the production of textiles, though Silesia and Westphalia manufacture linen. Cotton goods are largely produced in Baden, Bavaria, Alsace-Lorraine and Wurttemberg, woollens and worsteds in Saxony and the Rhine province, silk in Rhenish Prussia (Elberfeld), Alsace and Baden. Glass and porcelain are largely produced in Bavaria; lace in Saxony; tobacco in Bremen and Hamburg; chemicals in the Prussian province of Saxony; watches in Saxony (Glashutte) and Nuremberg; toys in Bavaria; gold and silver filagree in Berlin and Aschaffen- burg; and beer in Bavaria and Prussia.

It is perhaps more in respect of its iron industry than of its other manufactures that Germany has attained a leading position in the markets of the world. Its chief centres are in Westphalia and the Rhine province (auf roter Erde), in upper Silesia, lroa in Alsace-Lorraine and in Saxony. Of thetotal production '"dustry. of pig iron in 1905 amounting to over 10,000,000 tons, more than the half was produced in the Rhineland and Westphalia. Huge blast furnaces are in constant activity, and the output of rolled iron and steel is constantly increasing. In the latter the greatest advance has been made. The greater part of it is produced at or around Essen, where are the famous Krupp works, and Bochum Many states have been for a considerable time supplied by Krupp with steel guns and battleship plates. The export of steel (railway) rails and bridges from this part is steadily on the increase.

Hardware also, the production of which is centred in Solingen Heilbronn Esshngen, &c, is largely exported. Germany stands second to Great Britain in the manufacture of machines and engines There are in many large cities of north Germany extensive establish- ments for this purpose, but the industry is not limited to the large cities In agricultural machinery Germany is a serious competitor with England. The locomotives and wagons for theGerman railways are

almost exclusively built in Germany; and Russia, as well as Austria, receives large supplies of railway plant from German works. In shipbuilding, likewise, Germany is practically independent yards having been established for the construction of the largest vessels.

Before 1871 the production of cotton fabrics in France exceeded that in Germany, but as the cotton manufacture is pursued largely in Alsace, the balance is now against the former country. In 1905 there were about 9,000,000 spindles in Germany. The export of the goods manufactured amounted in this year to an estimated value of £19,600,000. Cotton spinning and weaving are not confined to one district but are prosecuted in upper Alsace (Mtilhausen,' Gebweiler, Colmar) in Saxony (Zwickau, Chemnitz, Annaberg), in Silesia (Breslau, Liegnitz), in the Rhine province (Diissel- uˆU Munster Cologne), in Erfurt and Hanover, in Wurttemberg (Reuthngen, Cannstatt), in Baden, Bavaria (Augsburg, Bamberg, Bayreuth) and in the Palatinate

Cotton

and

textiles.

Although Germany produces wool, flax and hemp, the home production of these materials is not sufficient to meet the demand of manufactures, and large quantities of them have to be imported. In 1 895 almost a million persons (half of them women) were employed in this branch of industry, and in 1 897 the value of the cloth, buckskin and flannel manufacture was estimated at £18,000,000. The chief seats of this manufacture are the Rhenish districts of Aix-la-Chapelle, Duren, Eupen and Lennep, Brandenburg, Saxony, Silesia and lower Lusatia, the chief centres in this group being Berlin, Cottbus, Sprem- berg, Sagan and Sommerfeld.

The manufacture of woollen and half-woollen dress materials centres mainly in Saxony, Silesia, the Rhine province and in Alsace. Furniture covers, table covers and plush are made in Elberfeld and Chemnitz, in Westphalia and the Rhine province (notably in Elberfeld and Barmen) ; shawls in Berlin and the Bavarian Vogtland ;

carpets in Berlin, Barmen and Silesia. In the town of Schmiedeberg in the last district, as also in Cottbus (Lusatia), oriental patterns are successfully imitated. The chief seats of the stocking manufacture are Chemnitz and Zwickau in Saxony, and Apolda in Thuringia. The export of woollen goods from Germany in 1905 amounted to a value of £13,000,000.

Although linen was formerly one of her most important articles of manufacture, Germany is now left far behind in this industry by Great Britain, France and Austria-Hungary. This branch of textile manufacture has its principal centres in Silesia, Westphalia, Saxony and Wurttemberg, while Hirschberg in Silesia, Bielefeld in Westphalia and Zittau in Saxony are noted for the excellence of their productions. The goods manufactured, now no longer, as formerly, coarse in tex- ture, vie with the finer and more delicate fabrics of Belfast. In the textile industry for flax and hemp there were, in 1905, 276,000 fine spindles, 22,300 hand-looms and 17,600 power-looms in operation, and, in 1905, linen and jute materials were exported of an estimated value of over £2,000,000. The jute manufacture, the principal centres of which are Berlin, Bonn, Brunswick and Hamburg, has of late attained considerable dimensions.

Raw silk can scarcely be reckoned among the products of the empire, and the annual demand has thus to be provided for by importation. The main centre of the silk industry is Crefeld and its neighbourhood; then come Elberfeld and Barmen, Aix-la-Chapelle, as well as Berlin, Bielefeld, Chemnitz, Stuttgart and the district around Miilhausen in Alsace.

The manufacture of paper is prosecuted almost everywhere in the empire. There were 1020 mills in operation in 1895, and the exports in 1905 amounted to more than £3,700,000 sterling, as Paper. against imports of a value of over £700,000. The manu-

facture is carried on to the largest extent in the Rhine province, in Saxony and in Silesia. Wall papers are produced chiefly in Rhenish Prussia, Berlin and Hamburg; the finer sorts of letter-paper in Berlin, Leipzig and Nuremberg; and printing-paper (especially for books) in Leipzig, Berlin and Frankfort-on-Main.

The chief seat of the leather industry is Hesse-Darmstadt, in which Mainz and Worms produce excellent material. In Prussia large factories are in operation in the Rhine province, in Leather. Westphalia and Silesia (Brieg). Boot and shoe manu- factures are

carried on everywhere ; but the best goods are produced by Mainz and Pirmasens. Gloves for export are extensively made in Wurttemberg, and Offenbach and Aschaffenburg are renowned for fancy leather wares, such as purses, satchels and the like.

Berlin and Mainz are celebrated for the manufacture of furniture; Bavaria for toys; the Black Forest for clocks; Nuremberg for pencils; Berlin and Frankfort-on-Main for various perfumes; and Cologne for the famous eau-de-Cologne.

The beetroot sugar manufacture is very considerable. It centres

mainly in the Prussian province of Saxony, where Magdeburg is the

chief market for the whole of Germany, in Anhalt, Bruns-

***'" wick and Silesia. The number of factories was, in 1905,*

376, and the amount of raw sugar and molasses produced amounted

to 2,643,531 metric tons, and of refined sugar 1,711,063 tons.

Beer is produced throughout the whole of Germany. The pro- duction is relatively greatest in Bavaria. The Brausteuergebiet (beer excise district) embraces all the states forming the r ' Zollverein, with the exception of Bavaria, Wurttemberg,

Baden and Alsace-Lorraine, in which countries the excise duties are separately collected. The total number of breweries in the beer excise district was, in 1905-1906, 5995, which produced 1017 million gallons ; in Bavaria nearly 6000 breweries with 392 million gallons ; in Baden over 700 breweries with 68 million gallons; in Wurttem- berg over 5000 breweries with 87 million gallons; and in Alsace-Lorraine 95 breweries with about 29 million gallons. The amount brewed per head of the population amounted, in 1905, roughly to 160 imperial pints in the excise district; to 450 in Bavaria; 280 in Wurttemberg; 260 in Baden; and 122 in Alsace-Lorraine. It may be remarked that the beer brewed in Bavaria is generally of darker colour than that produced in other states, and extra strong brews are exported largely into the beer excise district and abroad.

Commerce.— The rapid development of German trade dates from the Zollverein (customs union), under the special rules and regulations of which it is administered. The Zollverein

emanates from a convention originally entered into, in 1828,

between Prussia and Hesse, which, subsequently joined by the Bavarian customs-league, by the kingdom of Saxony and the Thuringian states, came into operation, as regards the countries concerned, on the 1st of January 1834. With progressive territorial extensions during the ensuing fifty years, and embrac- ing the grand-duchy of Luxemburg, it had in 1871, when the German empire was founded, an area of about 209,281 sq. m., with a population of 40,678,000. The last important addition was in October 1888, when Hamburg and Bremen were in- corporated. Included within it, besides the grand-duchy of Luxemburg, are the Austrian communes of Jungholz and Mittelberg; while, outside, lie the little free-port territories of Hamburg, Cuxhaven, Bremerhaven and Geestemiinde, Heligoland, and small portions of the districts of Constance and Waldshut, lying on the Baden Swiss frontier. Down to 1879 Germany was, in general, a free-trade country. In this year, however, a rigid protective system was introduced by the Zolltarifgesetz, since modified by the commercial treaties between Germany and Austria-Hungary, Italy, Switzerland and Belgium, of the 1st of February 1892, and by a customs tariff law of the 25th of December 1902. The foreign commercial relations of Germany were again altered by the general and conventional customs tariff, which came into force on the 1st of March 1906. The Zolltarifgesetz of the 15th of July 1879, while restricting the former free import, imposed considerable duties. Exempt from duty were now only refuse, raw products, scientific instru- ments, ships and literary and artistic objects; forty-four articles — notably beer, vinegar, sugar, herrings, cocoa, salt, fish oils, ether, alum and soda — were unaffected by the change, while duties were henceforth levied upon a large number of articles which had previously been admitted duty free, such as pig iron, machines and locomotives, grain, building timber, tallow, horses, cattle and sheep; and, again, the tariff law further increased the duties leviable upon numerous other articles. Export duties were abolished in 1865 and transit dues in 1861. The law under which Great Britain enjoyed the " most favoured nation treat- ment " expired on the 31st of December 1905, but its provisions were continued by the Bundesrat until further notice. The average value of each article is fixed annually in Germany under . the direction of the Imperial Statistical Office, by a commission of experts, who receive information from chambers of commerce and other sources. There are separate valuations for imports and exports. The price fixed is that of the goods at the moment of crossing the frontier. For imports the price does not include customs duties, cost of transport, insurance, warehousing, &c, incurred after the frontier is passed. For exports, the price includes all charges within the territory, but

drawbacks and bounties are not taken into account. The quantities are deter- mined according to obligatory declarations, and, for imports, the fiscal authorities may actually weigh the goods. For packages an official tax is deducted. The countries whence goods are imported and the ultimate destination of exports are registered. The import dues amounted in the year 1906, the first year of the revised tariff, to about £31,639,000, or about 10s. sd. per head of population.

Statistics relating to the foreign trade of the Empire are necessarily confined to comparatively recent times. The quantities of such imported articles as are liable to duty have, indeed, been known for many years; and in 1872 official tables were compiled showing the value both of imports and of exports. But when the results of these tables proved the importation to be very much greater than the exportation, the conviction arose that the valuation of the exports was erroneous and below the reality. In 1872 the value of the imports was placed at £173,400,000 and that of the exports at £124,700,000. In 1905 the figures were — imports, £371,000,000, and exports, £292,000,000, including precious metals.

Table A following shows the classification of goods adopted before the tariff revision of 1906. From 1907 a new classification has been adopted, and the change thus introduced is so great that it is impossible to make any comparisons between the statistics of years subsequent to and preceding the year 1906. Table B shows imports and exports for 1907 and 1908 according to the new classification adopted.

Table A. — Classes of Imports and Exports, 1905.

Refuse

Cotton and cottons

Lead and by-products …. Brush and sieve makers' goods Drugs, chemists' and oilmen's

colours

Iron and iron goods …. Ores, precious metals, asbestos, &c. Flax and other vegetable spinning

materials except cotton . Grain and agricultural produce

Glass

Hair, feathers, bristles ….

Skins

Wood and wooden wares .

Hops

Instruments, machines, &c.

Calendars

Caoutchouc, &c

Clothes, body linen, millinery . Copper and copper goods .

Hardware, &c

Leather and leather goods .

Linens .

Candles

Literary and works of art . Groceries and/confectionery

Fats and oils i .. 1

Paper goods

Furs

Petroleum

Silks and silk goods

Soap'and perfumes . . . .

Playing cards

Stone goods

Coal, lignite, coke and peat Straw and hemp goods . . . . Tar, pitch, resin . . .. .

Animals, and animal products .

Earthenware goods

Cattle

Oilcloth

Wools and woollen textiles Zinc and zinc goods . . . . Tin and japanned goods Goods insufficiently declared .

Total

Import.

£6,866,250

23.488.750

996,300

102,400

15,896.900

3,156,500

28,834,050

6,794,100

59,136,200

538,050

3,218,600

18,965,500

16,940,850

913,150

4.35i.5oo

34.300

7,379,600

739,900

8,273,400

2,042,400

3.567.950

1,750,100

11,150

3,066,050

41,446,400

12,510,600

1,086,800

265,700

5,036,600

9.523,300

151,600

400

2,822,000

10,136,800

561,650

2,504,400

9,926,200

391.650

11,366,200

43.150

25,290,200

682,250

1.770,550

Export.

£352,317.250

£1,170,200

22,949,600

979,400

515.450

23. 196,250

33,126,400

9.899.450

l,235,7O0

7,496,500

2,743,900

1,848,150

9,548,450

6,056,150

2,135,600

17,898,250

74,70O

4,616,400

7,321,050

10,307,050

12,610,550

9,665,300

1,904,950

42,350

9,025,500

17,585,000

2,631,600

7,158,800

720,200

132,300

8,889,000

768,200

18,950

2,110,550

15.096,450

262,100

834,100

590,700

5,076,350

725,100

177,300

21,562,900

2,413,600

744,100

806,300

£284,626,900

TaBLE B. — Classes of Imports and Exports, 1907 and 1908.

Groups of Articles.

Agricultural and forest pro- duce 2

Agricultural produce 3

Colonial produce and sub- stitutes for the same

Southern fruit and fruit peel

Forest produce .

Resins

Animals and animal pro- ducts 2 ……

Hides and skins

Meat, oil, sugar, beverages Mineral and fossil raw ma- terials, mineral oils .

Earths and stones

Ores, slag, cinders

Mineral fuel ….

Mineral oils and other fossil raw materials .

Coal-tar, coal-tar oils

Imports.

Value in £1000.

1907.

215,532 93,253

12,151

3,214

28,166

8,216

63,283 16,920 21,523

47,575

6,54i

16,465

16,895

7,168 506

1908. 1

205,512 102,954

12,328

3,262

26,299

8,209

6i,794

17,699 20,404

45,540

7,542

I5,45i

14,910

7,209 428

Exports.

Value in £1000.

1907.

45,796 10,369

84

20 4,066 2,500

0,607

5,383 20,284

26,166 3,250 1,407

19,445

558 1,506

1908. 1

50,324 15,168

108

23 3,967 2,325

9,676

5,453 20,048

26,208 3,006 1,206

20,020

491 1,485

Groups of Articles.

Imports.

1907.

*1 Provisional figures only. 1 Excluding vegetable and animal textile materials. * Excluding vegetable textile materials.*

Chemical and pharma- ceutical products, colours Chemical primary mate- rials, acids, salts . . Colours and dyeing ma- terials

Varnish, lacquer . Ether, alcohol not in- cluded elsewhere, essen- tial oils, perfumery and cosmetics …. Artificial manures Explosives of all kinds . Other chemical and phar- maceutical products Animal and vegetable tex- tile materials and wares thereof …. Silk and silk goods .

Wool

Unworked wool .

Worked wool

Wares of spun wool

Cotton ….

Unworked cotton .

Worked cotton .

Cotton wares

Other vegetable textile

materials .

Unworked .

Worked ….

Wares thereof .

Leather and leather wares

furriers' wares .

Leather ….

Leather wares

Furriers' wares

Caoutchouc wares .

Wares of soft caoutchouc Hardened caoutchouc and wares thereof Wares of animal or vegetable material for carving moulding …. Wooden wares . Paper, cardboard and wares

thereof ....

Books, pictures, paintings

Earthenware

Glass and glassware

Precious metals and wares

thereof ...

Gold ....

Gold ...

Gold wares

Silver ....

Silver .

Silver wares

Base metals and v,

thereof .

Iron and iron wares

Pig iron (including non

malleable alloys) Iron wares . Aluminium and alumi

nium wares Raw aluminium . Aluminium wares Lead and lead wares Raw lead (including waste) . Lead wares Zinc and zinc wares Raw zinc (including waste) Zinc wares . Tin and tin wares

Raw tin (including waste) .... Tin wares . Nickel and nickel wares Raw nickel .

14,784 9,226

951 189

1,979

992

86

1.36J

98,540 13,533

33,26o

19,975 4,625 8,660

38,543

27,705

980

9,858

10,783

7,923

166

2,685

1908.

Exports.

Value in £1000. Value in £1000.

14,850

9,550

879 158

1,918

1,001

74

1,270

92,105

13,704

3i,i95

19,309

4,96i

6,925

34,456

26,167

950

7,338

10,411

7,8i9

168

2,423

1907.

6,695

6,657

2,658

2,804

1,332

1,176

2,698

2,672

694

754

670

735

24

2,448 859

1.349

1,992

467

747

13,281

11,616

11,184

432

1,665

1.434 231

26,035 5.903

1,601 4.302

546

529

17

1,438

1,427 11

727

706

21

2,405

2,357

48

400

375

19

2,068 769

1,205 2,036

377 728

21,243

19,295

18,873

422

1,948

1,716

232

26,398 4,472

912

3,56o

453

433

20

1,484

1,470

14 847

825

22

2,629

2,581

48 540 527

1908. 4

28,116

9,661

11,630 206

1,118

1,303 1,612

2,586

78,086

13,324

27,114

2,647

3,799

20,668

29,004

3,264

(912

24,828

3,777

1,125

122

2,53'

16,778

7,503 4,016

5,237 2,328 1,694

634

4,260 1,707

9,342 4,667 5,224 5,671

18,629

15,898

11,071

4,827

2,731

1,206

1,525

57,146 38,899

966 37,933

368 152 216

945

525 420

2.433

1. 63 1

802

1,380

787

593 246 160

26,845 9,832

10,518 221

1,004 1,236 1,269

2,765

70,343

11,364

24,918

2,561

3,393

18,964

26,201

2,987

891

22,324

3,471 1,211

137 2,124

17,835 8,328 3,867

5,6i6

2,325 1,723

602

4,131 1,666

9,111 4,765 4,612 5,149

6,858

6,151 2,897

3,254 2,707 1,418 1,289

58,895 40,162

905 39,257

273

77

196

985

568

417 2,489

1,784

705

1,236

688

548 298

233

4 Provisional figures only.

Groups of Articles.

Imports.

Exports.

Groups of Articles.

Imports.

Exports.

Value in £1000.

Value in £1000.

Value in £1000.

Value in £1000.

1907.

1908. 1

1907.

1908. 1

1907.

1908. 1

1907.

1908. 1

Nickel wares Copper and copper wares Raw copper (including copper coin, brass, tombac, &c.) . Copper wares . Instruments of precision Machinery, vehicles Machinery ....

25 13.803

12.995 808

813 7.093 4,090

13 15,088

14,192

896

885

5,489

3,451

86 7,998

2,204

5,794

4,877

33.“7

19,041

65 8,470

2,014

6,456

4,982

34,653

20,684

Electro-technical products Vehicles and vessels . Firearms, clocks, musical instruments, toys . Clocks and watches . Musical instruments . Toys

Total . . .

1 ;

411 2,562

1,732

1,382

223

39

45i

1,587

1,424

I.I34

170

35

8,227 5.849

8,704 1,296 3,176 3.949

9.107 4,862

7,505 1,210 2,780 3,273

442,663

429,636

349.H4

336,347

Provisional figures only.

The following table shows the commercial intercourse in imports and exports, exclusive of bullion and coin, between Germany

and the chief countries of the world in 1905, 1906 and 1907.

Imports.

1905.

1906.

1907.

Percentage

Percentage

Percentage

Country.

Value

of

Value

of

Value

of

in

Germany's

in

Germany's

in

Germany's

£1000.

Total Imports.

£1000.

Total Imports. •

£1000.

Total Imports.

Belgium . . . . . .

13,439

3-8

14,315

3-6

14,586

3”4

Denmark

5.986

1-7

6,302

1-6

6,050

1-4

France .

19,772

5‘6

21,306

5-4

22,302

5-2

United Kingdom

35,320

IO-I

40,531

103

48,014

II-2

Italy

10,350

3

11,851

3

14,030

3-3

Netherlands .

12,077

3

1 1 ,864

3

11,187

2-6

Austria-Hungary

36,974

io-6

39,814

IO-I

39,939

9-3

Rumania

4,568

i-3

5,774

1-5

7,365

i-7

Russia .

47,816

13-6

52,528

13-4

54,447

12-7

Sweden .

5,887

i-7

7,359

1-9

8,457

2

Switzerland

8,980

2-6

10,659

2-9

10,366

2-4

Spain

5,742

1-6

7,410

1-9

6,878

16

British South Africa

1,769

o-5

1,766

0-4

2,258

o-5

Dominion of Canada

481

o-i

463

O-I

483

o-i

New Zealand .

75

87

94

..

British West Africa

2,562

0-7

2.73 1

07

3,601

o-8

British India .

13.657

3‘9

15,842

4

20,016

4-7

Dutch Indies .

5,848

i-7

7,002

1-8

9,199

21

Argentine Republic

18,150

*5*2*

18,302

4-7

2i,756

5-i

Brazil ….

8,454

2-4

9,246

2-4

9,636

2-2

Chile

6,536

1-9

7,131

1,8

7,074

1-6

1 United States

48,770

13-9

60,787

15-4

64,864

i5-i

Commonwealth of Australia

7,690

2-2

8,619

2-2

11,209

2-6

Exports.

I9<

35-

19

36.

1907.

Percentage

Percentage

Percentage

Country.

Value

of

Value

of

Value

of

in

Germany's

in

Germany's

in

Germany's

£1000.

Total Exports.

£1000.

Total Exports.

£1000.

Total Exports.

Belgium ……

15,364

5-5

17.509

5-6

16,861

5

Denmark

8,668

3-1

9,699

3-i

10,182

3

France

14,420

5-i

18,815

6

22,080

6-6

United Kingdom

51,253

18-2

52,473

16-8

52,135

15-5

Italy

8,045

2-9

“,354

3-6

H,893

4-4

Netherlands

21,295

7-6

21,799

7

22,232

6-6

Norway

3,447

1-2

3,573

1-2

4,211

I- 3,

Austria-Hungary

28,526

IO-I

31,926

10-2

35,231

10-5

Rumania

2,144

o-8

3,HO

I

3,372

1

Russia .

17,027

6

19,962

6-4

2i,53i

6-4

Sweden .

7,653

2-7

8,675

2-8

9,177

2-7

Switzerland

17,649

6-3

18,367

5-9

21,948

6-5

Spain

2,609

09

2,838

0-9

3,228

1

British South Africa

1,687

o-6

1,607

o-5

1,422

0-4

Dominion of Canada

1,071

0-4

1,203

0-4

i,456

0-4

New Zealand .

227

,o-i

244

O-I

263

O-I

Turkey .

3,484

i-3

3,357

i-i

4,011

1-2

British India .

4,226

i-5

5,oil

1-6

4,868

1-4

China

3-727

i-3

3,331

i-i

3,105

09

Japan

4,158

1-5

4,328

1-4

5,036

i-5

Argentine Republic

6,463

2-3

8,367

2-7

8,810

2-6

Brazil

3.525

i-3

4,364

1-4

5,n8

i-5

Chile

2,632

09

3,56i

1-2

4,167

1-2

United States

26,660

9-5

31,281

10

32,070

9-5

Commonwealth of Australia

2,264

o-8

2,863

1 0-9

3.004

09

RAILWAYS]

GERMANY

815

The commerce of Germany shows an upward tendency, which progresses pari passu with its greatly increased production. The export of ships from the United Kingdom to the empire decreased during two years, 1903 (£305,682) and 1904 (£365,062), almost to a vanishing point, German yards being able to cope with the demands made upon them for the supply of vessels of all classes, including mercantile vessels and ships of war. In 1905 and subsequent years, however, the degree of employment in German yards increased to such an extent, principally owing to the placing of the Admiralty contracts with private builders, that the more urgent orders for mercantile vessels were placed abroad.

The following tables give the value of trade between the United Kingdom and Germany in 1900 and 1905 : —

Staple Imports into the United Kingdom from Germany.

Sugar

Glass and manufactures

Eggs

Cottons and yarn .

Woollens and yarn

Iron and steel and manufactures

Machinery ....

Paper

Musical instruments

Toys

Zinc and manufactures Wood and manufactures Chemicals ....

1900.

£

9,164,573 1,078,648 1,017,119

992,244 1,312,671 1,012,376

411,178

523,544 660,777 644,690 461,023 1,470,839 513,200

i9°5-

10,488,085

1,108,117

764,966

1,476,385

1,984,475

379,479

735,536

528,946

676,391

714,628

673,602

1,109,584

735-830

Principal Articles exported by Great Britain to Germany.

Cottons and yarn . Woollens and yarn Alpaca, &c, yarn . Wool Ironwork Herrings Machinery Coals, cinders New ships

1900.

£

3,843,917

3,743,842

1,022,259

742,632

2,937,055 1,651,441 2,040,797 4,267,172 1,592,865

1905.

£

4,941,917

3,795,59i

1,325,519 1,691,035 1,500,414 2,042,483 2,102,835 3,406,535 1,377.081

Navigation. — The seamen of Frisia are among the best in the world, and the shipping of Bremen and Hamburg had won a respected name long before a German mercantile marine, properly ao called, was heard of. Many Hamburg vessels sailed under charter of English and other houses in foreign, especially Chinese, waters. Since 1868 all German ships have carried a common flag — black, white, red; but formerly Oldenburg, Hanover, Bremen, Hamburg, Liibeck, Mecklenburg and Prussia had each its own flag, and Schleswig-Holstein vessels sailed under the Danish flag. The German mercantile fleet occupies, in respect of the number of vessels, the fourth place — after Great Britain, the United States of America and Norway; but in respect of tonnage it stands third — after Great Britain and the United States only.

The following table shows its distribution on the 1st of January of the two years 1905 and 1908 : —

The chief ports are Hamburg, Stettin, Bremen, Kiel, Liibeck, Flensburg, Bremerhaven, Danzig (Neufahrwasser), Geestemiinde and Emden ; and the number and tonnage of vessels of foreign nationality entering and clearing the ports of the empire, as compared with national shipping, were in 1906: —

Number

Number

Foreign Ships.

entered in Cargo.

Tonnage.

cleared in Cargo.

Tonnage.

Danish

5917

1,589,346

5059

1,219,388

British . . .

5327

5,129,017

3211

2,552,268

Swedish

4891

1,164,431

3317

747,656

Dutch . . .

2181

458,401

1973

316,562

Norwegian .

1565

817,483

720

347,8n

Russian

720

250,564

439

I43,983

Baltic Ports.

North Sea Ports.

Total Shipping.

Number.

Tonnage.

Number.

Tonnage.

Number.

Tonnage.

1905— Sailing vessels . Steamers

386 486

19,067 236,509

2181 1171

559,436 1,537,563

2567 1657

578,503 1,774,072

Totals

1908— Sailing vessels . Steamers

Totals .

872

255,576

3352

2,096,999

4224

2,352,575

394 521

17,472 274,952'

2255 1401

516,180 1,981,831

2649 1922

533,652 2,256,783

915

292,424

3656

2,498,011

4571

2,790,435

In 1905, 2136 vessels of 283,171 tons, and in 1908, 2218 vessels of 284,081 tons, belonged to Prussian ports, and the number of sailors of the mercantile marine was 60,616 in 1905 and 71,853 in 1908.

The ports of Hamburg and Bremen, which are the chief outlets for emigration to the United States of America, carry on a vast commercial trade with all the chief countries of the world, and are the main gates of maritime intercourse between the United Kingdom and Germany.

The inland navigation is served by nearly 25,000 river, canal and coasting vessels, of a tonnage of about 4,000,000.

Railways.— The period of railway construction was inaugurated in Germany by the opening of the line (4 m. in length) from Nuremberg to Furth in 1835, followed by the main line (71 m.) between Leipzig and Dresden, opened throughout in 1839. The development of the railway system was slow and was not conceived on any uniform plan. The want of a central govern- ment operated injuriously, for it often happened that intricate negotiations and solemn treaties between several sovereign states were required before a line could be constructed; and, moreover, the course it was to take was often determined less by the general exigencies of commerce than by many trifling interests or desires of neighbouring states. The state which was most self-seeking in its railway politics was Hanover, which separated the eastern and western parts of the kingdom of Prussia. The difficulties arising to Prussia from this source were experienced in a still greater degree by the seaports of Bremen and Hamburg, which were severely hampered by the particularism displayed by Hanover.

The making of railways was from the outset regarded by some German states as exclusively a function of the government. The South German states, for example, have only possessed state railways. In Prussia numerous private companies, in the first instance, constructed their systems, and the state contented itself for the most part with laying lines in such districts only as were not likely to attract private capital.

The development of the German railway system falls con- veniently into four periods. The first, down in 1840, embraces the beginnings of railway enterprise. The next, down to 1848, shows the linking-up of various existing lines and the establish- ment of inter-connexion

between the chief towns. The third; down to 1 88 1, shows the gradual establishment of state control in Prussia, and the formation of direct trunk lines. The fourth begins from 1881 with the purchase of practically all the railways in Prussia by the government, and the introduc- tion of a uniform system of interworking between the various state systems. The purchase of the railways by the Prussian government was on the whole equably carried out, but there were several hard cases in the expropriation of some of the smaller private lines.

The majority of the German railways are now owned by the state governments. Out of 34,470 m. of railway completed and open for traffic in 1906, only 2579 m. were the property of private undertakings, and of these about 150 were worked by the state. The bulk of the railways are of the normal 4 ft. 85 in. gauge. Narrow-gauge (25 ft.) lines — or light railways — extended over 12 18 m. in 1903, and of these 537 m. were worked by the state.

The board responsible for the imperial control over the whole railway system in Germany is the Reichseisenbahnamt

in Berlin, the administration of the various state systems residing, in Prussia, in the ministry of public works; in Bavaria in the ministry of the royal house and of the exterior; in Wurttemberg in the ministry of the exterior; in Saxony in the ministry of the interior; in Baden and- Hesse-Darmstadt in commissions of the ministry of finance; and in Alsace-Lorraine in the imperial ministry of railways.

The management of the Prussian railway system is committed to the charge of twenty " directions," into which the whole network of lines is divided, being those of Altona, Berlin, Breslau, Bromberg, Danzig, Elberfeld, Erfurt, Essen a.d. Ruhr, Frankfort-on-Main, Halle a.d. Saale, Hanover, Cassel, Kattowitz, Cologne, Konigsberg, Magdeburg, Miinster, Posen, Saarbrucken and Stettin. The entire length of the system was in 1906 20,835 m., giving an average of about 950 m. to each " direction." The smallest mileage controlled by a " direction " is Berlin, with 38b m., and the greatest, Konigsberg, with 1200 m.

The Bavarian system embraces 4642 m., and is controlled and managed, apart from the " general direction " in Munich, by ten

traffic boards, in Augsburg, Bamberg, Ingolstadt, Kempten, Munich, Nuremberg, Regensburg, Rosenheim, Weiden and Wtirzburg.

The system of the kingdom of Saxony has a length of 1616 m., and is controlled by the general direction in Dresden.

The length of the Wiirttemberg system is 1141 m., and is managed by a general direction in Stuttgart.

Baden (state) controls 1233, Oldenburg (state) 382, Mecklenburg-Schwerin 726 and Saxe-Weimar 257 m. respectively. Rail- ways lying within the other smaller states are mostly worked by Prussia.

Alsace-Lorraine has a separate system of 1085 m., which is worked by the imperial general direction in Strassburg.

By the linking-up of the various state systems several grand trunk line routes have been developed — notably the lines Berlin- Vienna-Budapest; Berlin-Cologne-Brussels and Paris; Berlin-Halle-Frankfort-on-Main-Basel; Hamburg-Cassel-Munich and Verona; and Breslau-Dresden-Bamberg-Geneva. Until 1907 no uniform system of passenger rates had been adopted, each state retaining its own fares — a condition that led to much confusion. From the 1st of May 1907 the following tariff came into force. For ordinary trains the rate for first class was fixed at Ijd. a mile; for second class at -yd. ; for third class at Jd., and for fourth class at id. a mile. For express trains an extra charge is made of 2s. for distances exceeding 93 m. (150 kils.) in the two superior classes, and is. for a lesser distance, and of is. and 6d. respectively in the case of third class tickets. Fourth class passengers are not conveyed by express trains. The above rates include government duty ; but the privilege of free luggage (as up to 56 lb) has been withdrawn, and all luggage other than hand baggage taken into the carriages is charged for. In 1903 371,084,000 metric tons of goods, including animals, were conveyed by the German railways, yielding £68,085,000 sterling, and the number of passengers carried was 957,684,000, yielding £29,500,000.

The passenger ports of Germany affording oversea communications to distant lands are mainly those of Bremen (Bremerhaven) and Hamburg (Cuxhaven) both of which are situate on the North Sea. From them great steamship lines, notably the North German Lloyd, the Hamburg-American, the Hamburg South American and the German East African steamship companies, maintain express mail and other services with North and South America, Australia, the Cape of Good Hope and the Far East. London and other English

ports, French, Italian and Levant coast towns are also served by passenger steamboat sailings from the two great North Sea ports. The Baltic ports, such as Liibeck, Stettin, Danzig (Neufahrwasser) and Konigsberg, principally provide communication with the coast towns of the adjacent countries, Russia and Sweden.

Waterways. — In Germany the waterways are almost solely in the possession of the state. Of ship canals the chief is the Kaiser Wilhelm canal (1887-1895), 61 m. long, connecting the North Sea and the Baltic; it was made with a breadth at bottom of 72 ft. and at the surface of 213 ft., and with a depth of 29 ft. 6 in., but in 1908 work was begun for doubling the bottom width and increasing the depth to 36 ft. In respect of internal navigation, the principal of the greater undertakings are the Dortmund-Ems and the Elbe-Trave canals. The former, con- structed in 1892-1899, has a length of 150 m. and a mean depth of 8 ft. The latter, constructed 1895-1900, has a length of 43 m. and a mean depth of about 75 ft. A project was sanctioned in 1905 for a canal, adapted for vessels up to 600 tons, from the Rhine to the Weser at Hanover, utilizing a portion of the Dort- mund-Ems canal; for a channel accommodating vessels of similar size between Berlin and Stettin; for improving the waterway between the Oder and the Vistula, so as to render it capable

of accommodating vessels of 400 tons; and for the canalization of the upper Oder.

On the whole, Germany cannot be said to be rich in canals. In South Germany the Ludwigs canal was, until the annexation of Alsace-Lorraine, the only one of importance. It was constructed by King Louis I. of Bavaria in order to unite the German Ocean and the Black Sea, and extends from the Main at Bamberg to Kelheim on the Danube. Alsace-Lorraine had canals for connecting the Rhine with the Rhone and the Marne, a branch serving the collieries of the Saar valley. The North German plain has, in the east, A canal by which Russian grain is conveyed to Konigsberg, joining the Pregel to the Memel, and the upper Silesian coalfield is in com- munication with the Oder by means of the Klodnitz canal. The greatest number of canals is found around Berlin; they serve to join the Spree to the Oder and Elbe, and include the Teltow canal opened in 1906. The canals in Germany (including ship canals through lakes) have a total length of about 2600 m. Navigable and canalized rivers, to which belong the great water-systems of the Rhine, Elbe and Oder, have a total length of about 6000 m.*

Roads. — The construction of good highways has been well attended

to in Germany only since the Napoleonic wars. The separation of the empire into small states was favourable to road-making, inasmuch as it was principally the smaller govern- ments that expended large sums for their network of roads. Hanover and Thuringia have long been distinguished for the excellence of their roads, but some districts suffer even still from the want of good highways. The introduction of railways for a time diverted attention from road-making, but this neglect has of late been to some extent remedied. In Prussia the districts (Kreise) have undertaken the charge of the construction of the roads; but they receive a subsidy from the public funds of the several provinces. Turnpikes were abolished in Prussia in 1874 and in Saxony in 1885. The total length of the public roads is estimated at 80,000 m.

Posts and Telegraphs. — With the exception of Bavaria and Wurttemberg, which have administrations of their own, all the German states belong to the imperial postal district {Reichs-postgebiet). Since 1874 the postal and telegraphic departments have been combined. Both branches of administration have undergone a surprising development, especially since the reduc- tion of the postal rates. Germany, including Bavaria and Wurttemberg, constitutes with Austria- Hungary a special postal union (Deutsch-Osterreichischer Postverband), besides forming part of the international postal union. There are no statistics of posts and telegraphs before 1867, for it was only when the North German union was formed that the lesser states resigned their right of carrying mails in favour of the central authority. Formerly the prince of Thurn-and-Taxis was postmaster-general of Germany, but only some of the central states belonged to his postal territory. The seat of management was Frankfort-on- Main.

The following table shows the growth in the number of post offices for the whole empire : —

Year.

Post Offices.

Men employed.

1872

7,518

1880

9,460

1890

24.952

128,687

1899

36.388

206,945

1904

38,658

261,985

1907

40,083

319,026

In 1872 there were 2359 telegraph offices; in 1880, 9980; in 1890, 17,200; and in 1907, 37,309. There were 188 places provided with telephone service in 1888, and 13,175 in 1899. The postal receipts amounted for the whole empire in 1907 to £33,789,460, and the ex- penditure to £31,096,944, thus showing a surplus of £2,692,516.

Constitution. — The constitution of the German empire is, in all essentials, that of the North German Confederation, which came into force on the 7th of June 1867. Under this the pre- sidency (Praesidium) of the confederation was vested in the king of Prussia and his heirs. As a result of the Franco-German war of 1870 the South German states joined the confederation; on the 9th of December 1870 the diet of the confederation accepted the treaties and gave to the new confederation the name of German Empire {Deutsche Reich), and on the 18th of January 187 1 the king of Prussia was proclaimed German

CONSTITUTION]

GERMANY

emperor (Deutscher Kaiser) at Versailles. This was a change of style, not of functions and powers. The title is " German em- peror," not " emperor of Germany," being intended to show that the Kaiser is but primus inter pares in a confederation of territorial sovereigns; his authority as territorial sovereign (Landesherr) extends over Prussia, not over Germany.

The imperial dignity is hereditary in the line of Hohenzollern, and follows the law of primogeniture. The emperor exercises the imperial power in the name of the confederated states. In his office he is assisted by a federal council {Bundesrat), which represents the governments of the individual states of Germany. The members of this council, 58 in number, are appointed for each session by the governments of the individual states. The legislative functions of the empire are vested in the emperor, the Bundesrat, and the Reichstag or imperial Diet. The members of the latter, 397 in number, are elected for a space of five years by universal suffrage. Vote is by ballot, and one member is elected by (approximately) every 150,000 inhabitants.

As regards its legislative functions, the empire has supreme and independent control in matters relating to military affairs and the navy, to the imperial finances, to German commerce, to posts and telegraphs, and also to railways, in so far as these affect the common defence of the country. Bavaria and Wurttem- berg, however, have preserved their own postal and telegraphic administration. The legislative power of the empire also takes precedence of that of the separate states in the regulation of matters affecting freedom of migration (Freizilgigkeit) , domicile, settlement and the rights of German subjects generally, as well as in all that relates to banking, patents, protection of intellectual property, navigation of rivers and canals, civil and criminal legislation, judicial procedure, sanitary police, and control of the press and of associations.

The executive power is in the emperor's hands. He represents the empire internationally, and can declare war if defensive, and make peace as well as enter into treaties with other nations; he also appoints and receives ambassadors. For declaring offensive war the consent of the federal council must be obtained. The separate states have the privilege of sending ambassadors to the other courts; but all consuls abroad are officials of the empire and are named by the emperor.

Both the Bundesrat and the Reichstag meet in annual sessions convoked by the emperor who has the right of proroguing and dissolving the Diet; but the prorogation must not exceed 60 days, and in case of dissolution new elections must be ordered within 60 days, and the new session opened within 90 days. All laws for the regulation of the empire must, in order to pass, receive the votes of an absolute majority of the federal council and the Reichstag.

Alsace-Lorraine is represented in the Bundesrat by four commissioners (Kommissare) , without votes, who are nominated by the Statthalter (imperial lieutenant).

The fifty-eight members of the Bundesrat are nominated by the governments of the individual states for each session; while the members of the Reichstag are elected by universal suffrage and ballot for the term of five years. Every German who has completed his twenty-fifth year is prima facie entitled to the suffrage in the state within which he has resided for one year. Soldiers and those in the navy are not thus entitled, so long as they are serving under the colours. Excluded, further, are persons under tutelage, bankrupts and paupers, as also such persons who have been deprived of civil rights, during the time of such deprivation. Every German citizen who has completed his twenty-fifth year and has resided for a year in one of the federal states is eligible for election in any part of the empire, provided he has not been, as in the cases above, excluded from the right of suffrage. The secrecy of the. ballot is ensured by special regulations passed on the 28th of April 1903. The voting-

Eaper, furnished with an official stamp, must be placed in an envelope y the elector in a compartment set apart for the purpose in the polling room, and, thus enclosed, be handed by him to the presiding officer. An absolute majority of votes decides the election. If (as in the case of several candidates) an absolute majority over all the others has not been declared, a test election (Slichwahl) takes place between the two candidates who have received the greatest number of votes. In case of an equal number of votes being cast for both candidates, the decision is by lot.

The subjoined table gives the names of the various states com- posing the empire and the number of votes which the separate states

have in the federal council. Each state may appoint as many members to the federal council as it has votes. The table also gives the number of the deputies in the Reichstag.

States of the Empire.

Kingdom of Prussia ,, Bavaria

,, Saxony

„ Wiirttemberg

Grand duchy of Baden . „ Hesse

,, Mecklenburg-Schwerin

„ Saxe-Weimar

„ Mecklenburg-Strelitz

„ Oldenburg .

Duchy of Brunswick

,, Saxe-Meiningen . ,, Saxe-Altenburg ,, Saxe-Coburg-Gotha ,, Anhalt …. Principality of Schwarzburg-Sonders- hausen „ Schwarzburg-Rudol-

stadt „ Waldeck

„ Reuss-Greiz

,, Reuss-Schleiz

„ Schaumburg-Lippe

,,. Lippe .

Free town of Liibeck

,, Bremen .

,, Hamburg.

Imperial territory of Alsace-Lorraine

Total .

No. of

Members in

Bundesrat.

No. of _ Members in Reichstag.

17 6

4 4 3 3 2

58

236 48 23 17

H

9 6

3 1

3 3 2 1 2 2

1 1 1 1 1 1 1 1 3 15

397

The Reichstag must meet at least once in each year. Since November 1906 its members have been paid (see Payment of Members).

The following table shows its composition after the elections of 1903 and 1907 : —

Parties.

Centre . . .

Social Democrats

Conservatives

National Liberals

Freisinnige Volkspartei

Reichspartei .....

Alsatians, Guelphs and Danes ....

Poles

Wirtschaftliche Vereinigung (Reform Partei)

Freisinnige Vereinigung

Wilde (no party)

Bund der Landwirte

Bauernbund

1903.

1907

IOO

108

81

43

51

60

49

57

27

33

19

22

18

5

16

20

12

21

9

16

9

5

3

6

3

I

All the German states have separate representative assemblies, except Alsace-Lorraine and the two grand-duchies of Mecklenburg. The six larger states have adopted the two-chamber system, but in the composition of the houses great differences are found. The lesser states also have chambers of representatives numbering from 12 members (in Reuss-Greiz) to 48 members (in Brunswick), and in most states the different classes, as well as the cities and the rural districts, are separately represented. The free towns have legislative assemblies, numbering from 1 20 to 200 members.

Imperial measures, after passing the Bundesrat and the Reichstag, must obtain the sanction of the emperor in order to become law, and must be countersigned, when promulgated, by the chancellor of the empire (Reichskanzler). All members of the federal council are entitled to be present at the deliberations of the Reichstag. The Bundesrat, acting under the direction of the chancellor of the empire, is also a supreme administrative and consultative board, and as such it has nine standing com- mittees, viz.: for army and fortresses; for naval purposes; for tariffs, excise and taxes; for trade and commerce; for railways, posts and telegraphs; for civil and criminal law; for financial accounts; for foreign affairs; and for Alsace-Lorraine. Each committee includes representatives of at least four states of the empire.

[LOCAL GOVERNMENT

For the several branches of administration a considerable number of imperial offices have been gradually created. All of them, however, either are under the immediate authority of the chancellor of the empire, or are separately managed under his responsibility. The most important are the chancery office, the foreign office and the general post and telegraph office. But the heads of these do not form a cabinet.

The Chancellor of the Empire (Reichskanzlcr) . — The Prussian plenipotentiary to the Bundcsrat is the president of that assembly; he is ap- pointed by the emperor, and bears the title Reichskanzler. This head official can be repre- sented by any other member of the Bundesrat named in a document of substitution. The Reichskanzler is the sole responsible official, and conducts all the affairs of the empire, with the exception of such as are of a purely military character, and is the intermediary between the emperor, the Bundesrat and the Reichstag. All imperial rescripts require the counter-signature of the chancellor before attaining validity. All measures passed by the Reichstag require the sanction of the majority of the Bundesrat, and only become binding on being proclaimed on behalf of the empire by the chancellor, which publication takes place through the Reichs- gesetzblait (the official organ of the chancellor).

Government Offices. — The following imperial offices are directly responsible to the chancellor and stand under his I control : —

1. The foreign office, which is divided into three departments: (i.) the political and diplomatic; (ii.) the political and commercial; (iii.) the legal. The chief of the foreign office is a secretary of state, taking his instructions immediately from the chancellor.

2. The colonial office (under the direction of a secretary of state) is divided into (i.) a civil department; (ii.) a military department; (iii.) a disciplinary court.

3. The ministry of the interior or home office (under the conduct of a secretary of sta,te). This office is divided into four departments, dealing with (i.) the business of the Bundesrat, the Reichstag, the elections, citizenship, passports, the press, and military and naval matters, so far as the last concern the civil authorities; (ii.) purely social matters, such as old age pensions, accident insurance, migra- tion, settlement, poor law administration, &c; (iii.) sanitary matters,

patents, canals, steamship lines, weights and measures; and (iv.) commercial and economic relations — such as agriculture, industry, commercial treaties and statistics.

4. The imperial admiralty (Reichsmarineamt) , which is the chief board for the administration of the imperial navy, its maintenance and development.

5. The imperial ministry of justice (Reichsjustizami) , presided over by a secretary of state. This office, not to be confused with the Reichsgericht (supreme legal tribunal of the empire) in Leipzig, deals principally with the drafting of legal measures to be submitted to the Reichstag.

6. The imperial treasury (Reichsschatsamt), or exchequer, is the head financial office of the empire. Presided over by a secretary of state, its functions are principally those appertaining to the control of the national debt and its administration, together with such as in the United Kingdom are delegated to the board of inland revenue.

7. The imperial railway board (Reichseisenbahnamt) , the chief official of which has the title of " president," deals exclusively with the management of the railways throughout the empire, in so far as they fall under the control of the imperial authorities in respect of laws passed for their harmonious interworking, their tariffs and the safety of passengers conveyed.

8. The imperial post office (Reichspostamt) , under a secretary of state, controls the post and telegraph administration of the empire (with the exception of Bavaria and Wiirttemberg) , as also those in the colonies and dependencies.

9. The imperial office for the administration of the imperial railways in Alsace-Lorraine, the chief of which is the Prussian minister of public works.

10. The office of the accountant-general of the empire (Rechnungs-hof), which controls and supervises the expenditure of the sums voted by the legislative bodies, and revises the accounts of the imperial bank (Reichsbank). '

11. The administration of the imperial invalid fund, i.e. of the ' fund set apart in 1871 for the benefit of soldiers invalided in the war

of 1870-71 ; and

12. The imperial bank (Reichsbank), supervised by a committee of four under the presidency of the imperial chancellor, who is a fifth and permanent member of such committee.

The heads of the various departments of state do not form, as in England, the nucleus of a cabinet. In so far as they are secretaries of state, they are directly responsible to the chancellor, who repre-

sents all the offices in his person, and, as has been said, is the medium of communication between the emperor and the Bundesrat and Reichstag.

Colonies. — The following table gives some particulars of the dependencies of the empire: —

Name.

Date of Acquisition.

Area

(estimated)

sq. m.

Pop. (estimated).

In Africa —

Togoland

Cameroon .....

S.W. Africa

East Africa

Total in Africa . In the Pacific — German New Guinea Bismarck Archipelago . Caroline, Pelewand Mariana Islands Solomon Islands .... Marshall Islands .... Samoan Islands ....

Total in Pacific . In Asia —

Kiao-chow

Total dependencies

1884 1884 1884 1885

1884 1884 1899 1886 1885 1899

1897

33-700 190,000 322,450 364,000

1,000,000

3,500,00c

200,000

7,000,000

910,150

70,000

20,000

800

4,200

160

985

11,700,000

no,ooo(?)

188,000 41,600

45,000

15,000

33,000

96,145 117

432,600 60,000

1 884-1 899

1,006,412

12,192,600

Except Kiao-chow, which is controlled by the admiralty, the dependencies of the empire are under the direction of the colonial office. This office, created in 1907, replaced the colonial department of the foreign office which previously had had charge of colonial affairs. The value of the trade of the colonies with Germany in 1906 was: imports into Germany, £1,028,000; exports from Germany, £2,236,000. For 1907 the total revenue from the colonies was £849,000; the expenditure of the empire on the colonies in the same year being £4,362,000. (See the articles on the various colonies.)

Local Government. — In the details of its organization local self-government differs considerably in the various states of the German empire. The general principle on which it is based, however, is that which has received its most complete expression in the Prussian system: government by experts, checked by lay criticism and the power of the purse, and effective control by the central authorities. In Prussia at least the medieval system of local self-government had succumbed completely to the centralizing policy of the monarchy, and when it was revived it was at the will and for the purposes of the central authorities, as subsidiary to the bureaucratic system. This fact determined its general characteristics. In England the powers of the local authorities are defined by act of parliament, and within the limits of these powers they have a free hand. In Germany general powers are granted by law, subject to the approval of the central authorities, with the result that it is the government departments that determine what the local elected authorities may do, and that the latter regard themselves as commissioned to carry out, not so much the will of the locality by which they are elected, as that of the central government. This attitude is, indeed, inevitable from the double relation in which they stand. A Bur germeister, once elected, becomes a member of the bureaucracy and is responsible to the central administration: even the head- man of a village commune is, within the narrow limits of his functions, a government official. Moreover, under the careful classification of affairs into local and central, many things which in England are regarded as local (e.g. education, sanitary admini- stration, police) are regarded as falling under the sphere of the central government, which either administers them directly or by means of territorial delegations consisting either of individuals or of groups of individuals. These may be purely official (e.g. the Prussian Regierung), a mixture of officials and of elected non-official members approved by the government (e.g. the

Bezirksausschuss) , or may consist wholly of authorities elected for another purpose, but made to act as the agents of the central departments (e.g. the Kreisausschuss) . That this system works without friction is due to the German habit of discipline; that it is, on the whole, singularly effective is a result of the

peculiarly enlightened and progressive views of the German bureaucracy. 1

The unit of the tJerman system of local government is the commune (Gemeinde, or more strictly Ortsgemeinde). These are divided into rural communes (Landgemeinden) and urban com- munes (Stadtgemeinden) , the powers and functions of which, though differing widely, are based upon the same general principle of representative local self-government. The higher organs of local government, so far as these are representative, are based on the principle of a group or union of communes (Gemeindeverband) . Thus, in Prussia, the representative assembly of the Circle (Kreistag) is composed of delegates of the rural communes, as well as of the large landowners and the towns, while the members of the provincial diet (Provinzial- landtag) are chosen by the Kreistage and by such towns as form separate Kreise.

In Prussia the classes of administrative areas are as follows: (1) the province, (2) the government district (Regierungsbezirk) ,

(3) the rural circle (Landkreis) and urban fcircle (Stadtkreis),

(4) the official district {Amtsbezirk) , (5) the town commune (Stadlgemeinde) and rural commune (Land gemeinde). Of these areas the provinces, circles and communes are for the purposes both of the central administration and of local self-government, and the bodies by which they are governed are corporations. The Regierungsbezirke and Amlsbezirke, on the other hand, are for the purposes of the central administration only and are not incorporated. The Prussian system is explained in greater detail in the article Prussia (q.v). Here it must suffice to indicate briefly the general features of local government in the other German states, as compared with that in,Prussia. The province, which usually covers the area of a formerly independent state (e.g. Hanover) is peculiar to

Prussia. The Regierungsbezirk, however, is common to the larger states under various names, Regierungsbezirk in Bavaria, Kreiskauplmannschaft in Saxony, KrewinWurttemberg. Common to allisthepresident(i?eg'er««g5- prdsident, Kreishauptmann in Saxony), an official who, with a committee of advisers, is responsible for the oversight of the administration of the circles and communes within his jurisdic- tion. Whereas in Prussia, however, the Regierung is purely official, with no representative element, the Regierungsbezirk in Bavaria has a representative body, the Landrat, consisting of delegates of the district assemblies, the towns, large landowners, clergy and — in certain cases — the universities; the president is assisted by a committee (Landralsausschuss) of six members elected by the Landrat. In Saxony the Kreishauptmann is assisted by a committee (Kreisausschuss).*

Below the Regierungsbezirk is the Kreis, or Circle, in Prussia, Baden and Hesse, which corresponds to the Dislrikt in Bavaria, the Oberaml in Wurttemberg 2 and the Amtshauptmannschaft in Saxony. The representative assembly of the Circle (Kreistag, Distriktsrat' in Bavaria, Amtsversammlung in Wurttemberg, Bczirksvenammlung in Saxony) is elected by the communes, and is presided over by an official, either elected or, as in the case of the Prussian Landrat, nominated from a list submitted by the assembly. So far as their administrative and legislative functions are concerned the GermanKreistage have been compared to the English county councils or the Hungarian comilatus. Their decisions, however, are subject to the approval of their official chiefs. To assist the executive a small committee (Kreisausschuss, Distriktsaussckuss, &c.) is elected subject to official approval. The official district (Amtsbezirk), a subdivision of the circle for certain administrative purposes (notably police), is peculiar to Prussia.

Rural Communes. — As stated above, the lowest administrative area is the commune, whether urban or rural. The laws as to tKe constitution and powers of the rural communes vary much in the different states. In general the commune is a body corporate, its assembly consisting either (in small villages) of the whole body of the qualified inhabitants {Gemeindeversammlung) , or of a representative

1 See the comparative study in Percy Ashley's Local and Central Government (London, 1906).

2 The Kreis in Wurttemberg corresponds to the Regierungsbezirk elsewhere.

assembly (Gemeindevertretung) elected by them (in communes where there are more than forty qualified inhabitants). At its head is an elected headman (Schulze, Dorfvorsteher, &c), with a small body of assistants (Schoffen, &c). He is a government official responsible, inter alia, for the policing of the commune. Where there are large estates these sometimes constitute communes of themselves. For common purposes several communes may combine, such combinations being termed in Wurttemberg Bur germeister eien, in the Rhine province Amtsverbande. In general the communes are of slight importance. Where the land is held by small peasant proprietors, they display a certain activity; where there are large ground landlords, these usually control them absolutely.

Towns. — The constitution of the towns (Stadteverfassung) varies more greatly in the several states than that of the rural communes. According to the so-called Stein'sche Stadteverjassung (the system introduced in Prussia by Stein in 1808), which, to differentiate between it and other systems, is called the Magistratsverfassung (or magisterial constitution), the municipal communes enjoy a greater degree of self-government than do the rural. In the magisterial constitution of larger towns and cities, the members of the Magistral, i.e. the executive council (also called Stadtrat, Gemeinderat) , are elected by the representative assembly of the citizens (Stadtverordnetenversammlung) out of their own body.

In those parts of Germany which come under the influence of French legislation, the constitution of the towns and that of the rural communes (the so-called Burgermeistereiverfassung) is identical, in that the members of the communal executive body are, in the same way as those of the communal assembly, elected to office immediately by the whole body of municipal electors.

The government of the towns is regulated in the main by municipal codes (Stadteordnungen) , largely based upon Stein's reform of 1808. This, superseding the autonomy severally enjoyed by the towns and cities since the middle ages (see Commune), aimed at welding the citizens, who had hitherto been divided into classes and gilds, into one corporate whole, and giving them all an active share in the ad- ministration of public affairs, while reserving to the central authorities the power of effective control.

The system which obtains in all the old Prussian provinces (with the exception of Rtlgen and Vorpommern or Hither Pomerania) and in Westphalia is that of Stein, modified by subsequent laws — notably those of 1853 and 1856 — which gave the state a greater influence,

while extending the powers of the Magistral. In Vor- pommern and Rugen, and thus in the towns of Greifswald, Stralsund and Bergen, among others, the old civic constitutions remain un- changed. In the new Prussian provinces, Frankfort-on-Main re- ceived a special municipal constitution in 1867 and the towns of Schleswig-Holstein in 1869. The province of Hanover retains its system as emended in 1858, and Hesse-Nassau, with the exception of Frankfort-on-Main, received a special corporate system in 1897. The municipal systems of Bavaria, Wurttemberg and Saxony are more or less based on that of Stein, but with a wider sphere of self- government. In Mecklenburg there is no uniform system. In Saxe-Coburg, the towns of Coburg and Neustadt have separate and peculiar municipal constitutions. In almost all the other states the system is uniform. The free cities of Liibeck, Hamburg and Bremen, as sovereign states, form a separate class. Their con- stitutions are described in the articles on them.

Where the " magisterial " constitution prevails, the members of the Magistral, i.e. the executive council (also called variously Stadtrat, Gemeindevorstand, &c), are as a rule elected by the repre- sentative assembly of the burgesses (Stadtverordnetenversammlung; also Gemeinderat, stddtischer Ausschuss, Kollegium der Biirgervorsteher, Stadtdltesten, &c). The Magistral consists of the chief burgomaster (Erster Burgermeister or Stadtschultheiss, and in the large cities Oberbilr germeister), a second burgomaster or assessor, and in large towns of a number of paid and unpaid town councillors (Ratsherren, Senatoren, Schoffen, Ratsmdnner, Magistratsrdte) , together with certain salaried members selected for specific purposes (e.g. Baurat, for building). Over this executive body the Stadtverordneten, who are elected by the whole body of citizens and unpaid, exercise a general control, their assent being necessary to any measures of importance, especially those involving any considerable outlay. They are elected for from three to six years; the members of the Magistral are chosen for six, nine or twelve years, sometimes even for life. In the large towns the burgomasters must be jurists, and are paid. The police are under the control of the Magistrat, except in certain large cities, where they are under a separate state de- partment.

The second system mentioned above (Burgermeistereiverfassung) prevails in the Rhine province, the Bavarian Palatinate, Hesse, Saxe-Weimar, Anhalt, Waldeck and the principalities of Reuss and Schwarzburg. In Wurttemberg, Baden and Hesse-Nassau the system is a compromise between the two ; both the town and rural communes have a mayor (Burgermeister or Schultkeiss, as the caie may be) and a Gemeinderat for administrative purposes, the citizens exercising control through a representative Gemeindeaussckuss

(communal committee).

Justice. — By the Judicature Act — Gerichtsverfassungsgeselz — of 1879, the so-called "regular litigious" jurisdiction of the

courts of law was rendered uniform throughout the empire, and the courts are now every where alike in character and composition; and with the exception of the Reichsgericht (supreme court of the empire), immediately subject to the government of the state in which they exercise jurisdiction, and not to the imperial government. The courts, from the lowest to the highest, are Amtsgerichl, Landgericht, Oberlandesgericht and Reichsgericht. There are, further, V erwaltungsgerichte (administrative courts) for the adjustment of disputes between the various organs of local government, and other special courts, such as military, consular and arbitration courts (Schiedsgericht). In addition to litigious business the courts also deal with non-litigious matters, such as the registration of titles to land, guardianship and the drawing up and custody of testamentary dispositions, all which are almost entirely within the province of the Amts- gerichte. There are uniform codes of criminal law (Strafgeselz-buch), commercial law and civil law (Biirgerliches Gesetzbuch) , the last of which came into force on the ist of January 1900. The criminal code, based on that of Prussia anterior to 1870, was gradually adopted by all the other states and was generally in force by 1872. It has, however, been frequently emended and supplemented.

The lowest courts of first instance are the Amtsgerickte, each presided over by a single judge, and with jurisdiction in petty criminal and civil cases, up to 300 marks (£15). They are also competent to deal

with all disputes as to wages, and letting and hiring, without regard to the value of the object in dispute. Petty criminal cases are heard by the judge (Amtsrichter) sitting with two Schbffen — assessors — selected by lot from the jury lists, who are competent to try prisoners for offences punishable with a fine, not exceeding 600 marks (£30) or corresponding confinement, or with imprison- ment not exceeding three months. The Landgerichte revise the decisions of the

Amtsgerichte, and have also an original jurisdiction in criminal and civil cases and in divorce proceedings. The criminal chamber of the Landgericht is composed of five judges, and a majority of four is required for a conviction. These courts are competent to try cases of felony punishable with a term of imprisonment not exceeding five years. The preliminary examination is conducted by a judge, who does not sit on the bench at the trial. Jury courts (Schwurger ichte) are not permanent institutions, but are periodically held. They are formed of three judges of the Landgericht and a jury of twelve; and a two- thirds majority is necessary to convict. There are 173 Landgerichte in the empire, being one court for every 325,822 inhabitants. The first court of second instance is the Oberlandesgericht, which has an original jurisdiction in grave offences and is composed of seven judges. There are twenty-eight such courts in the empire. Bavaria alone has an Oberstes Landesgericht, which exercises a revising jurisdiction over the Oberlandesgerichte in the state. The supreme court of the German empire is the Reichs- gericht, having its seat at Leipzig. The judges, numbering ninety- two, are appointed by the emperor on the advice of the federal council (Bundesrat). This court exercises an appellate jurisdiction in civil cases remitted, for the decision of questions of law, by the inferior courts and also in all criminal cases referred to it. It sits in four criminal and six civil senates, each consisting of seven judges, one of whom is the president. The judges are styled Reichsgerichtsrdte (counsellors of the imperial court).

In the Amtsgericht a private litigant may conduct his own case; but where the object of the litigation exceeds 300 marks (£15), and in appeals from the Amtsgericht to the Landgericht, the plaintiff (and also the defendant) must be represented by an advocate — Rechtsanwalt.

A Rechtsanwalt, having studied law at a university for four years and having passed two state examinations, if desiring to practise must be admitted as " defending counsel " by the Amtsgericht or Landgericht, or by both. These advocates are not state officials, but are sworn to the due execution of their duties. In case a client has suffered damage owing to the negligence of the advocate, the latter can be made responsible. In every district of the Oberlandes- gericht, the Rechtsanwalte are formed into an A nwaltkammer (chamber of advocates), and the council of each chamber, sitting as a , court of honour, deals with and determines matters affecting the honour of the profession. An appeal lies from this to a second court of honour, consisting of the president, three judges of the Reichsgericht and of three lawyers admitted to practice before that court.

Criminal prosecutions are conducted in the name of the crown by the Staatsdnwdlte (state attorneys), who form a separate branch of the judicial system, and initiate public prosecutions or reject evidence as being insufficient to procure conviction. The proceedings in the

courts are, as a rule, public. Only in exceptional circumstances are cases heard in camera.

Military offences come before the military court and serious offences before the Kriegsgericht. The court-martial is, in every case, composed of the commander of the district as president, and four officers, assisted by a judge-advocate (Kriegsgerichtsrat), who conducts the case and swears the judges and witnesses. In the most serious class of cases, three officers and two judge-advocates are the judges. The prisoner is defended by an officer, whom he may himself appoint, and can be acquitted by a simple majority, but only be condemned by a two-thirds majority. There are also Kaufmanns- and Gewerbegerichte (commercial and industrial courts) , composed of persons belonging to the classes of employers and employees, under the presidency of a judge of the court. Their aim is the effecting of a reconciliation between the parties. From the decision of these courts an appeal lies to the Landgericht where the amount of the object in dispute exceeds 100 marks (£5).

The following table shows the number of criminal cases tried before the courts of first instance, with the number and sex of con- victed persons, and the number of the latter per 10,000 of the civil population over twelve years of age: —

Cases tried.

Parsons convicted.

Convictions

Year.

Total.

per 10,000

Amtsgericht.

Landgericht.

Males.

Females.

Inhabitants.

1900

1,143,687

94,241

396,975

72,844

469,819

“9‘5

1901

1,205,558

101,471

419,592

77,7i8

497,310

1256

1902

1,221,080

104,434

43L257

81,072 ■

512,329

127-3

1903

1,251,662

105,241

424,813

80,540

505,353

123-4

1904

1,287,686

105,457

435,191

81,785

516,976

124-2

Of those convicted in 1904, 225,326 had been previously convicted.

Poor Law. — A law passed by the North German Confederation of the 6th of June 1870, and subsequently amended by an imperial law of the 12th of March 1894, laid down rules for the relief of the destitute in all the states composing the empire, with the exception of Bavaria and Alsace-Lorraine. According to the system adopted, the public relief of the poor is committed! to the care of local unions (Orlsarmenverbdnde) and provincial unions (Landarmenverbdnde) , the former corresponding, generally, to the commune, and the latter to a far wider area, a circle or a province. Any person of eighteen years, who has continuously resided with a local union for the space of two years, there acquires his domicile. But any destitute German subject must be relieved by the local union in which he happens to be at the time, the cost of the relief being defrayed by the local or provin- cial union in which he has his domicile. The wife and children have also their domicile in the place where the husband or father has his. 1

Relief of the poor is one of the chief duties of the organs of local self-government. The moneys for the purpose are mainly derived from

general taxation (poor rates per se being but rarely directly levied), special funds and voluntary contributions. In some German states and communes certain dues (such as the dog tax in Saxony), death duties and particularly dues payable in respect of public entertainments and police court fines, are assigned to the poor- relief chest. In some large towns the Elberfeld system of unpaid district visitors and the interworking of public and private charity is in force. The imperial laws which introduced the compulsory insurance of all the humbler workers within the empire, and gave them, when incapacitated by sickness, accident and old age, an absolute right to pecuniary assistance, have greatly reduced pauper- ism and crime. , . »

Workmen's Insurance. — On June 15, 1883, the Reichstag, as the result of the policy announced by the emperor William I. in his speech from the throne in 1881, passed an act making insurance against sickness, accident, and incapacity compulsory on all workers in industrial pursuits. By further laws, in 1885 and 1892, this obligation was extended to certain other classes of workers, and the system was further modified by acts passed in 1900 and 1903. Under this system every person insured has a right to assistance in case of sickness, accident, or incapacity, while in case of death his widow and children receive an annuity.

1. Insurance against sickness is provided for under these laws partly by the machinery already existing, i.e. the sick benefit societies,

1 The system of compulsory registration, which involves a notification to the police of any change of address (even temporary), of course makes it easy to determine the domicile in any given case.

partly by new machinery devised to meet the new obligation imposed. The sick-funds (Krankenkassen) are thus of seven kinds: (1) free assistance funds (Freie Hilfskassen), either registered under the law of 1876, as modified in 1884 (Eingeschriebene Hilfskassen), or established under the law of the separate states (landesrechtliche Hilfskassen) ; (2) Betriebs- or Fabrikkrankenkassen, funds established by individual factory-owners; (3) Baukrankenkasse, a fund estab- lished for workmen engaged on the construction {Bate)

of particular engineering works (canal-digging, &c), by individual contractors; (4) gild sick funds (Innungskranhenkassen) , established by the gilds for the workmen and apprentices of their members; (5) miners' sick fund (Knappschaftskasse) ; (6) local sick fund (Ortskrankenkasse), established by the commune for particular crafts or classes of workmen ; (7) Gemeindekrankenversicherung, i.e. insurance of members of the commune as such, in the event of their not subscribing to any of the other funds. Of these, 2, 3, 6 and 7 were created under the above-mentioned laws.

The number of such funds amounted in 1903 to 23,271, and included 10,224,297 workmen. The Ortskrankenkassen, with 4,975,322 members, had the greatest, and the Baukrankenkassen, with 16,459, the smallest number of members. The Ortskranken-kassen, which endeavour to include workmen of a like trade, have to a great extent, especially in Saxony, fallen under the control of the Social Democrats. The appointment of permanent doctors (Kassendrzte) at a fixed salary has given rise to much difference between the medical profession and this local sick fund; and the insistence on " freedom of choice " in doctors, which has been made by the members and threatens to militate against the interest of the profession, has been, met on the part of the medical body by the appointment of a commission to investigate cases of undue influence in the selection.

According to the statistics furnished in the Vie.rteljahreshefte zur Slalistik des deutschen Reiches for 1905, the receipts amounted to upwards of £10,000,000 for 1903, and the expenditure to somewhat less than this sum. Administrative changes were credited with nearly £600,000, and the invested funds totalled £9,000,000. The workmen contribute at the rate of two-thirds and the employers at the rate of one-third; the sum payable in respect of each worker varying from 15-3% of the earnings in the " communal sick fund " to at most 1 1-4% in the others.

2. Insurance' against old age and invalidity comprehends all persons who have entered upon their 17th year, and who belong to one of the following classes of wage-earners: artisans, apprentices, domestic servants, dressmakers, charwomen, laundresses, seam- stresses, housekeepers, foremen, engineers, journeymen, clerks and apprentices in shops (excepting assistants and apprenticesin chemists' shops), schoolmasters, schoolmistresses, teachers and governesses, provided the earnings do not exceed £100 per annum. The insured are arranged in five classes, according to the amount of their yearly earnings: viz. £17, 10s. ; £27, 10s. ; £47, 10s. ; £57,

10s. ; and £100. The contributions, affixed to a " pension book " in stamps, are payable each week, and amount, in English money, to l-45d., 2-34d., 2-82d., 3"30d. and 4-23d. Of the contribution one half is paid by the employer and the other by the employee, whose duty it is to see that the amount has been properly entered in the pension book. The pensions, in case of invalidity, amount (including a state subsidy of £2, 10s. for each) respectively to £8, 8s. ; £u. 5s.; £13, 10s. ; £15, 15s.; and £18. The old-age pensions (beginning at 70 years) amount to £5, 10s. ; £7; £8, 10s. ; £10; and £11, 10s. The old-age and invalid insurance is carried out by thirty-one large territorial offices, to which must be added nine special unions. The income of the forty establishments was, in I 9°3> £8,500,000 (including £1,700,000 imperial subsidy). The capital collected was upwards of £50,000,000.

It may be added that employees in mercantile and trading houses, who have not exceeded the age of 40 years and whose income is below £150, are allowed voluntarily to share in the benefits of this insurance.

3. Accident Insurance (Unfallversicherung). — The insurance of workmen and the lesser officials against the risks of accident is effected not through the state or the commune, but through associations formed ad hoc. These associations are composed of members following the same or allied occupations (e.g. foresters, seamen, smiths, &c), and hence are called " professional associations " (Berufsgenossenschaften). They are empowered, subject to the limits set by the law, to regulate their own business by means of a general meeting and of elected committees. The greater number of these associations cover a very wide field, generally the whole empire; in such cases they are empowered to divide their spheres into sections, and to establish agents in different centres to inquire into cases of accident, and to see to the carrying out of the rule prescribed by the association for the avoidance of accidents. Those associations, of which the area of operations extends beyond any single state, are subordinate to the control of the imperial insurance bureau (Reichsversicherungsamt) at Berlin ; those that are confined to a single state (as generally in the case of foresters and husband- men) are under the control of the state insurance bureau (Landes-versicherungsamt) .*

So far as their earnings do not exceed £1 50 perannum, the following classes are under the legal obligation to insure: labourers in mines,

quarries, dockyards,wharves,manufactoriesand breweries;

bricklayers and navvies ; post-office, railway, and naval and military servants and officials; carters, raftsmen and canal hands; cellarmen, warehouse- men ; stevedores ; and agricultural labourers. Each of these groups forms an association, which within a certain district embraces all the industries with which it is connected. The funds for covering the compensation payable in respect of accidents are raised by payments based, in agriculture, on the taxable capital, and in other trades and industries on the earnings of the insured. Compensation in respect of injury or death is not paid if the accident was brought about through the culpable negligence or other delict of the insured. In case of injury, involving incapacity for more than, thirteen weeks (for the earlier period the Krankenkassen provide), the weekly sum payable during complete or permanent incapacity is fixed at the ratio of two-thirds of the earnings during the year preceding the accident, and in case of partial disablement, at such a proportion of the earnings as corresponds to the loss through disablement. In certain circumstances (e.g. need for paid nursing) the sum may be increased to the full rate of the previous earnings. In case of death, as a consequence of injury, the following payments are made: (1) a sum of at least £2, 10s. to defray the expenses of interment; (2) a monthly allowance of one-fifth of the annual earnings as above to the widow and each child up to the age of 15.

Life Insurance. — There were forty-six companies in 1900 for the insurance of life. The number of persons insured was 1,446,249 at the end of that year, the insurances amounting to roughly £320,000,000. Besides these are sixty-one companies — of which forty-six are comprised in the above life insurance companies — paying subsidies in case of death or of military service, endowments, &c. Some of these companies are industrial. The transactions of all these companies included in 1900 over 4,179,000 persons, and the amount of insurances effected was £80,000,000.

Religion. — So far as the empire as a whole is concerned there is no state religion, each state being left free to maintain its own establishment. Thus while the emperor, as king of Prussia, is summits episcopus of the Prussian Evangelical Church, as em- peror he enjoys no such ecclesiastical headship. In the several states the relations of church and state differ fundamentally according as these states are Protestant or Catholic. In the latter these relations are regulated either by concordats between the governments and the Holy See, or by bulls of circumscription issued by the pope after negotiation. The effects of concordats and bulls alike are tempered by the exercise by the civil power of certain traditional reserved rights, e.g. the placetum regium, recursus ab abusu, nominatio regia, and that of

vetoing the nomination of personae minus gratae. In the Protestant states the ecclesiastical authority remains purely territorial, and the sovereign remains effective head of the established church. During the 19th century, however, a large measure of ecclesiastical self-government (by means of general synods, &c.) was introduced, pari passu with the growth of constitutional government in the state; and in effect, though the theoretical supremacy of the sovereign survives in the church as in the state, he cannot exercise it save through the general synod, which is the state parliament for ecclesiastical purposes. Where a sovereign rules over a state containing a large proportion of both Catholics and Protestants, which is usually the case, both systems coexist. Thus in Prussia the relations of the Roman Catholic community to the Protestant state are regulated by arrangement between the Prussian government and Rome; while in Bavaria the king, though a Catholic, is legally summus episcopus of the Evangelical Church.

According to the religious census of 1900 there were in the German empire- 35,231,104 Evangelical Protestants, 20,327,913 Roman Catholics, 6472 Greek Orthodox, 203,678 Christians belonging to other confessions, 586,948 Jews, 11,597 members of other sects and 5938 unclassified. The Christians belonging to other confessions include Moravian Brethren, Mennonites, Baptists, Methodists and Quakers, German Catholics, Old Catholics, &c. The table on following page shows the distribution of the population according to religious beliefs as furnished by the census of 1900.

Almost two-thirds of the population belong to the Evangelical Church, and rather more than a third to the Church of Rome; the actual figures (based on the census of 1900) being () Evan- gelical Protestants, 62-5; Roman Catholics, 36-1; Dissenters and others, -043, and Jews, i-o. The Protestants have not increased proportionately in number since 1890, while the Roman Catholics show a small relative increase. Three states in Germany have a decidedly predominant Roman Catholic population, viz. Alsace-Lorraine, Bavaria and Baden ; and in four states the Protestant element prevails, but with from 24 to 34 of Roman Catholics; viz. Prussia, Wiirttemberg, Hesse and Oldenburg. In Saxony and

1

States.

Evangelicals.

Catholics.

Other Christians.

Jews.

Prussia

21.817-577

12,113,670

139,127

392,322

Bavaria

1,749,206

4-363,178

7,607

54,928

Saxony

3,972,063

198,265

19,103

12,416

Wurttemberg

1,497-299

650,392

9,426

11,916

Baden ....

704,058

1,131,639

5,563

26,132

Hesse ....

746,201

341,570

7,368

24,486

Mecklenburg-Schwerin

597,268

8,182

487

1,763

Saxe-Weimar

347,144

14,158

36i

1,188

Mecklenburg-Strelitz

100,568

1,612

62

331

Oldenburg .

s^-sjo

86,920

1,334

i,359

Brunswick .

436,976

24,175

1,271

1,824

Saxe-Meiningen

244,810

4,170

395

i,35i

Saxe-Altenburg .

189,885

4,723

206

99

Saxe-Coburg-Gotha .

225,074

3,330

515

608

Anhalt

301,953

1 1 ,699

794

1,605

Schwarzburg-Sondsrshausen

79,593

1,110

27

166

Schwarzburg-Rudolstadt

92,298

676

37

48

Waldeck ....

55,285

1,831

164

637

Reuss-Greiz

66,860

1,043

444

48

Reuss-Schleiz

135,958

2,579

466

178

Schaumburg-Lippe

41 ,908

785

177

257

Lippe ....

132,708

5,157

205

879

Ltibeck

93,671

2,190

213

670

Bremen

208,815

13,506

876

1,409

Hamburg

712,338

30,903

3,149

17,949

Alsace-Lorraine

372,078

1,310,450

4,30i

32,379

Total

35,231,104

20,327,913

203,678

586,948

Roman

Catholic

Church.

the eighteen minor states the number of Roman Catholics is only from 0-3 to 3-3 % of the population.

From the above table little can be inferred as to the geographical distribution of the two chief confessions. On this point it must be borne in mind that the population of the larger towns, on account of the greater mobility of the population since the introduction of railways and the abolition of restrictions upon free settlement, has become more mixed — Berlin, Leipzig, Hamburg, &c, showing proportionally more Roman Catholics, and Cologne, Frankfort-on-Main, Munich more Protestants than formerly. Otherwise the geographical limits of the confessions have beeji but little altered since the Thirty Years' War. In the mixed territories those places which formerly belonged to Roman Catholic princes are Roman Catholic still, and vice versa. Hence a religious map of South Germany looks like an historical map of the 17th century. The number of localities where the two confessions exist side by side is small. Generally speaking, South Germany is predominantly Roman Catholic. Some districts along the Danube (province of Bavaria, Upper Palatinate, Swabia), southern Wurttemberg and Baden, and in Alsace-Lorraine are entirely so. These territories are bordered by a broad stretch of country on the north, where Protestantism has maintained its hold since the time of the Reformation, including Bayreuth or eastern upper Franconia, middle Franconia, the northern half of Wurttemberg and Baden, with Hesse and the Palatinate. Here the average proportion of Protestants to Roman Catholics is two to one. The basin of the Main is again Roman Catholic from Bamberg to Aschaffenburg (western upper Franconia and lower Franconia). In Prussia the western and south-eastern provinces are mostly Roman Catholic, especially the Rhine province, together with the government districts of Miinster and Arnsberg. The territories of the former principality of Cleves and of the countship of Mark (comprising very nearly the basin of the Ruhr), which went to Brandenburg in 1609, must, however, be excepted. North of Miinster, Roman Catholicism is still prevalent in the territory of the former bishopric of Osnabrtlck. In the east, East Prussia (Ermeland excepted) is purely Protestant. Roman Catholicism was predominant a hundred years ago in all the frontier provinces ac- quired by Prussia in the days of Frederick the Great, but since then the German immigrants have widely propagated the Protestant faith in these districts. A prevailingly Roman Catholic population is still found in the district of Oppeln and the countship of Glatz, in the province of Posen, in the Polish-speaking Kreise of West Prussia, and in Ermeland (East Prussia). In all the remaining territory the Roman

Catholic creed is professed only in the Eichsfeld on the southern border of the province of Hanover and around Hildesheim.

Tlie adherents of Protestantism are divided by their confessions into Reformed and Lutheran. To unite these the " church union " Pr t t t ˆ as Deen introduced in several Protestant states, as for Church example in Prussia and Nassau in 1817, in the Palatinate in 1818 and in Baden in 1822. Since 1817 the distinction has accordingly been ignored in Prussia, and Christians are there enumerated only as Evangelical or Roman Catholic. The,union, how- ever, has not remained wholly unopposed — a section of the more rigid Lutherans who separated themselves from the state church being now known as Old Lutherans. In 1866 Prussia annexed Hanover and Schleswig-Holstein, where the Protestants were Lutherans,

and Hesse, where the Reformed Church had the preponderance. The inhabitants of these countries opposed the introduction of the union, but could not prevent their being sub- ordinated to the Prussian Oberkirchenrat (high church-council), the supreme court of the state church. A synodal constitution for the Evangelical State Church was introduced in Prussia in 1875. The Oberkirchenrat retains the right of supreme management. The ecclesiastical affairs of the separate provinces are directed by consistorial boards. The parishes (Pfarreien) are grouped into dioceses (Sprengel) , presided over by superintendents, who are subordinate to the superintendent- general of the province. Prussia has sixteen superintendents-general. The ecclesiastical administration is similarly regulated in the other countries of the Protestant creed. Regarding the number of churches and chapels Germany has no exact statistics.

There are five archbishoprics within the German empire: Gnesen-Posen, Cologne, Freiburg (Baden), Munich-Freising and Bamberg. The twenty bishop- rics are : Breslau (where the bishop has the title of " prince-bishop "), Ermeland (seat at Frauenburg, East Prussia). Kulm (seat at Pelplin, West Prussia), Fulda, Hildesheim, Osnabrtick, Paderborn, Miinster, Limburg, Trier, Metz, Strassburg, Spires, Wurzburg, Regensburg, Passau, Eichstatt, Augsburg, Rottenburg (Wurttemberg) and Mainz. Apostolic vicariates exist in Dresden (for Saxony), and others for Anhalt and the northern missions.

The Old Catholics (q.v.), who seceded from the Roman Church in consequence of the definition of the dogma of papal infallibility, number roughly 50,000, with 54 clergy.

It is in the towns that the Jewish element is chiefly to be found. They

belong principally to the mercantile class, and are to a very large extent dealers in money. Their wealth has grown jews.

to an extraordinary degree. They are increasingly numer- ous in Hamburg, Berlin, Frankfort-on-Main, Breslau, Kcnigsberg, Posen, Cologne, Nuremberg and Fiirth. As a rule their numbers are proportionately greater in Prussia than elsewhere within the empire. But, since 1871, the Jewish population of Germany shows a far smaller increase than that of the Christian confessions, and even in the parts of the country where the Jewish population is densest it has shown a tendency to diminish. It is relatively greatest in the province of Posen, where the numbers have fallen from 61,982 (39-1 per thousand) in 18711035,327 (18-7 per thousand) in 1900. The explanation is twofold — the extraordinary increase (1) in their numbers in Berlin and the province of Brandenburg, and (2) in the number of conversions to the Christian faith. In this last regard it may be remarked that the impulse is less from religious conviction than from a desire to associate on more equal terms with their neighbours. Though still, in fact at least, if not by law, excluded from many public offices, especially from commands in the army, they nevertheless are very powerful in Germany, the press being for the most part in their hands, and they furnish in many cities fully one-half of the lawyers and the members of the corpora- tion. It should be mentioned, as a curious fact, that the numbers of the Jewish persuasion in the kingdom of Saxony increased from 3358 (1-3 per thousand) in 1871 to 12,416 (3 per thousand) in 1900.

Education. — In point of educational culture Germany ranks high among all the civilized great nations of the world (see Education: Germany). Education is general and compulsory throughout the empire, and all the states composing it have, with minor modifications, adopted the Prussian system providing for the establishment of elementary schools — Volksschulen — in every town and village. The school age is from six to fourteen, and parents can be compelled to send their children to a Volks- schule, unless, to the satisfaction of the authorities, they are receiving adequate instruction in some other recognized school or institution.

The total number of primary schools was 60,584 in 1906- 1907; teachers, 166,597; pupils, 9,737,262 — an average of about one Volksschule to every 900 inhabitants. The annual expendi- ture was over £26,000,000, of which sum £7,500,000 was pro- vided by state subvention. There were also in Germany in the same year 643 private schools, giving instruction similar to that of the elementary schools, with 41,000 pupils. A good criterion of the progress of

education is obtained from the diminish- ing number of illiterate army recruits, as shown by the following

EDUCATION]

GERMANY

823

Unable to Read or Write.

Number of Recruits.

Years.

Total.

Per 1000 Recruits.

1 875-1876

139,855

33i 1

23-7

1 880-1 88 1

151,180

2406

15-9

1885-1886

152,933

1657

io-8

1890-1891

193,318

1035

5-4

1895-1896

250,287

374

i-5

1898-1899

252,382

173

0-7

1900-1901

253,000

131

o-45

Of the above 131 illiterates in 1900-1901, 114 were in East and West Prussia, Posen and Silesia.

Universities and Higher Technical Schools. — Germany owes its large number of universities, and its widely diffused higher education to its former subdivision into many separate states. Only a few of the universities date their existence from the 19th century; the majority of them are very much older. Each of the larger provinces, except Posen, has at least one university, the entire number being 21. All have four faculties except Miinster, which has no faculty of medicine. As regards theology, Bonn, Breslau and Tubingen have both a Protestant and a Catholic faculty; Freiburg, Munich, Miinster and Wiirzburg are exclusively Catholic; and all the rest are Protestant.

The following table gives the names of the 21 universities, the dates of their respective foundations, the number of their professors and other teachers for the winter half-year 1908-1909, and of the students attending their lectures during the winter half-year of 1907-1908:

Date of Foundation.

Professors

and Teachers.

Students.

Total.

Theology.

Law.

Medicine.

Philosophy.

Berlin . . .

1809

493

326

2747

“53

3934

8220

Bonn

1818

190

395

833

282

1699

3209

Breslau .

1811

189

330

617

284

840

2071

Erlangen

1743.

77

155

323

355

225

1058

Freiburg

H57

150

219

373

580

642

1814

Giessen .

1607

100

63

204

331

546

1 144

Gottingen

1737

161

102

441

188

1126

1857

Greifswald .

1456

105

68

188

186

36i

803

Halle . . .

1694

174

331

450

217

1239

2237

Heidelberg .

1385

177

55

357

385

879

1676

Jena . . .

1558

116

48

267

265

795

1375

Kiel . . .

1665

121

35

271

239

480

1025

Konigsberg .

1544

152

68

317

218

502

1 105

Leipzig .

1409

234

303

•1013

606

2419

4341

Marburg

1527

117

133

400

261

876

1670

Munich .

1826

239

169

1892

1903

1979

5943

Münster

1902

95

278

458

870

1606

Rostock

1418

65

48

67

211

322

648

Strassburg

1872

167

241

369

255

844

1709

Tubingen

1477

in

464

467

263

384

1578

Wiirzburg

1582

102

106

33i | 625

320

1382

Not included in the above list is the little academy — Lyceum Hosianum — L at Braunsberg in Prussia, having faculties of theology (Reman Catholic) and philosophy, with 13 teachers and 150 students. In all the universities the number of matriculated students in 1907- 1908 was 46,471, including 320 women, 2 of whom studied theology, 14 law, 150 philosophy and 154 medicine. There were also, within the same period, 5653 non-matriculated Horer (hearers), including 2486 women.

Ten schools, technical high schools, or Polytecknica, rank with the universities, and have the power of granting certain degrees. They have departments of architecture, building, civil engineering, chemistry, metallurgy and, in some cases, anatomy. These schools

are as follows: Berlin (Charlottenburg), Munich, Darmstadt, Karlsruhe, Hanover, Dresden, Stuttgart, Aix-la-Chapelle, Brunswick and Danzig; in 1908 they were attended by 14,149 students (2531 foreigners), and had a teaching staff of 753. Among the remaining higher technical schools may be mentioned the three mining academies of Berlin, Clausthal, in the Harz, and Freiberg in Saxony. For instruction in agriculture there are agricultural schools attached to several universities — notably Berlin, Halle, Gottingen, Konigsberg, Jena, Poppelsdorf near Bonn, Munich and Leipzig. Noted academies of forestry are those of Tharandt (in Saxony), Eberswalde, Munden on the Weser, Hohenheim Year . 1570 1600 near Stuttgart, Brunswick, Eisenach, Giessen and Books. 229 791 Karlsruhe. Other technical schools are again the

addition to 424 commercial schools of a lesser degree, 100 schools for textile manufactures and numerous schools for special metal industries^ wood-working, ceramic industries, naval architecture and engineering and navigation. For military science there are the academies of war (Kriegsakademien) in Berlin and Munich, a naval academy in Kiel, and various cadet and non-commissioned officers' schools.

Libraries. — Mental culture and a general diffusion of knowledge are extensively promoted by means of numerous public libraries established in the capital, the university towns and other places. The most celebrated public libraries are those of Berlin (1,000,000 volumes and 30,000 MSS.); Munich (1,000,000 volumes, 40,000 MSS.); Heidelberg (563,000 volumes, 8000 MSS.); Goningen (503,000 volumes, 6000 MSS.); Strassburg (760,000 volumes); Dresden (500,000 volumes, 6000 MSS.); Hamburg (municipal library, 600,000 volumes, 5000 MSS.) ; Stuttgart (400,000 volumes, 3500 MSS.) ; Leipzig (university library, 500,000 volumes, 5000MSS.) ; Wiirzburg (350,000 volumes) ; Tubingen (340,000 volumes) ; Rostock (318,000 volumes); Breslau (university library, 300,000 volumes, 7000 MSS.); Freiburg-im-Breisgau (250,000 volumes); Bonn (265,000 volumes); and Konigsberg (230,000 volumes, 1100 MSS.). There are also famous libraries at Gotha, Wolfenbiittel and Celle.

Learned Societies. — There are numerous societies and unions, some of an exclusively scientific character and others designed for the popular diffusion of useful knowledge. Foremost among German academies is the Academy of Sciences (Akademie der Wissenschaften) in Berlin, founded in 1700 on Leibnitz's great plan and opened in 1711. After undergoing various vicissitudes, it was

reorganized by Frederick the Great on the French model and received its present constitution in 1812. It has four sections: physical, mathematical, philosophical and historical. The members are (1) ordinary (50 in number, each receiving a yearly dotation of £30), and (2) extra- ordinary , -consisting of honorary and corresponding (foreign) members. It has published since 181 1 a selection of treatises furnished by its

most eminent men, among whom must be reckoned Schleier- macher, the brothers Humboldt, Grimm, Savigny, Bockh, Ritter and Lachmann, and has promoted philo- logical and historical research by helping the production of such works as Corpus in- scriptionum Graecarum ; Corpus inscriptionum Latiparum; Monu- menta Germaniae his- torica, the works of Aristotle, Frederick the Great's works and Kant's collected works. Next in order come (1) the Academy of Sciences at Munich, founded in 1759, divided into three classes, philosophical, historical and physical, . . and especially famous

for its historical research ; (2) the Society of Sciences (GeseUschaft der Wissenschaften) in Gottingen, founded in 1742; (3) that of Erfurt, founded 1758; (4) Gorlitz (1779) and (5) the " Royal Saxon Society of Sciences " (Konigliche sdchsische GeseUschaft der Wissenschaften), founded in Leipzig in 1846. Ample provision is made for scientific collections of all kinds in almost all places of any importance, either at the public expense or through private munificence.

Observatories. — These have in recent years been considerably augmented. There are 19 leading observatories' in the empire, viz. at Bamberg, Berlin (2), Bonn, Bothkamp in Schleswig, Breslau, Dusseldorf, Gotha, Gottingen, Hamburg, Heidelberg, Jena, Kiel, Konigsberg, Leipzig, Munich, Potsdam, Strassburg and Wilhelms- haven.

Booh Trade. — This branch of industry, from the important position it has gradually acquired since the time of the Reformation, is to be regarded as at once a cause and a result of the mental culture of Germany. Leipzig, Berlin and Stuttgart are the chief centres of the trade. The number of booksellers in Germany was not less than 10,000 in 1907, among whom were approximately 6000 publishers. The following figures will show the recent progress of German literary production, in so far as published works are concerned:

1650

1700

1750

1800

1840

1884

1902

1293

725

951

1219

3335

6904

15,607

26,902

five veterinary academies of Berlin, Hanover, Munich, Dresden and Stuttgart, the commercial colleges (Handclshochschulen) of Leipzig, Aix-la-Chapelle, Hanover, Frankfort-on-Main and Cologne, in

Newspapers. — While in England a few important newspapers have an immense circulation, the newspapers of Germany are much more numerous, but on the whole command a more limited sale.

Some large cities, notably Berlin, Cologne, Hamburg, Dresden, Leipzig and Munich, have, however, newspapers with a daily circulation of over 100,000 copies, and in the case of some papers in Berlin a million copies is reached. Most readers receive their newspapers through the post office or at their clubs, which may help

to explain the smaller number of copies sold.

Fine Arts. — Perhaps the chief advantage which Germany has derived from the survival of separate territorial sovereignties within the empire has been the decentralization of culture. Patronage of art is among the cherished traditions of the German princes; and even where — as for instance at Cassel — there is no longer a court, the artistic impetus given by the former sovereigns has survived their fall. The result has been that there is in Germany no such concentration of the institutions for the encouragement and study of the fine arts as there is in France or England. Berlin has no practical monopoly, such as is possessed by London or Paris, of the celebrated museums and galleries of the country. The picture galleries of Dresden, Munich and Cassel still rival that at Berlin, though the latter is rapidly becoming one of the richest in the world in works of the great masters, largely at the cost of the private collections of England. For the same reason the country is very well provided with excellent schools of painting and music. Of the art schools the most famous are those of Munich, Dtisseldorf, Dresden and Berlin, but there are others, e.g. at Karlsruhe, Weimar and Konigsberg. These schools are in close touch with the sovereigns and the governments, and the more promising pupils are thus from the first assured of a career, especially in connexion with the decora- tion of public buildings and monuments. To this fact is largely due the excellence of the Germans in grandiose decorative painting and sculpture, a talent for the exercise of which plenty of scope has been given them by the numerous public buildings and memorials raised since the war of 1870. Perhaps for this very reason, however, the German art schools have had no such cosmopolitan influence as that exercised by the schools of Paris, the number of foreign students attending them being comparatively small. It is otherwise with the schools of music, which exercise a profound influence far beyond the borders of Germany. Of these the most important are the conservatoires of Leipzig, Dresden, Berlin, Munich and Frankfort- on-Main. The fame of Weimar as a seat of musical education, though it possesses an excellent conservatoire, is based mainly on the tradition of the abbe Liszt, who gathered about him here a number of distinguished pupils, some of whom have continued to make it their- centre. Music in Germany also receives a great stimulus from the existence, in almost every important town, of opera-houses partly supported by the sovereigns or by the civic authorities. Good music being thus brought within the reach of all, appreciation of it is very wide-spread in all classes of the population. The imperial government maintains institutes at Rome and Athens which have done much for the advancement of archaeology. (P. A.

A.)

Army. — The system of the " nation in arms " owes its existence to the reforms in the Prussian army that followed Jena. The " nation in arms " itself was the product of the French Revolu- tionary and Napoleonic wars, but it was in Prussia that was seen the systematization and the economical and effective application of the immense forces of which the revolutionary period had demonstrated the existence (see also Army; Con- scription; French Revolutionary Wars, &c). It was with an army and a military system that fully represented the idea of the " nation in arms " that Prussia created the powerful Germany of later days, and the same system was extended by degrees over all the other states of the new empire. But these very successes contained in themselves the germ of new troubles. Increased prosperity, a still greater increase in popula- tion and the social and economic disturbances incidental to the conversion of an agricultural into a manufacturing com- munity, led to the practical abandonment of the principle of universal service. More men came before the recruiting officer than there was money to train; and in 1895 the period of service with the colours was reduced from three to two years — a step since followed by other military powers, the idea being that with the same peace effective and financial grants half as many men again could be passed through the ranks as before.

In 1907 the recruiting statistics were as follows: Number of young men attaining service age (including

those who had voluntarily enlisted before their time) . 556, 772 Men belonging to previous years who had been put back

for re-examination, &c, still borne on the lists . . 657,753

Voluntarily enlisted in the army and navy,

on or before attaining service age . . 57,739 Assigned as recruits to the navy . . . 10,374 Put back, &c 684,193

[ARMY

788,968

Deduct— Physically unfit, &c 35.802

Struck off 860

1,214-525

Available as army recruits, fit 4 2 5,557

Of these, (a) Assigned to the active army for two or three

years' service with the colours 212,661

(b) Assigned to the Ersatz-Reserve of the "1 f „ „ army and navy \untrained\ I2 ?' io

(c) Assigned to the 1st levy of LandsturmJ L_£l_I

425.557

Thus only half the men on whom the government has an effective hold go to the colours in the end. Moreover few of the men " put back, &c," who figure on both sides of the account for any one year, and seem to average 660,000, are really " put back." They are in the main those who have failed or fail to present them- selves, and whose names are retained on the liability lists against the day of their return. Many of these have emigrated.

By the constitution of the 16th of April 1871 every German is liable to service and no substitution is allowed. Liability begins at the age of seventeen, and actual service, as a rule, from the age of twenty. The men serve in the active army and army reserve for seven years, of which two years (three in the case of cavalry and horse artillery recruits) are spent with the colours. During his four or five years in the reserve, the soldier is called out for training with his corps twice, for a maximum of eight weeks (in practice usually for six). After quitting the reserve the soldier is drafted into the first ban of the Landwehr for five years more, in which (except in the cavalry, which is not called out in peace time) he undergoes two trainings of from eight to fourteen days. Thence he passes into the second ban and remains in it until he has completed his thirty-ninth year— i.e. from six to seven years more, the whole period of army and Land- wehr service being thus nineteen years. Finally, all soldiers are passed into the Landsturm, in the first ban of which they remain until the completion of their forty-fifth year. The second ban consists of untrained men between the ages of thirty-nine and forty-five. Young men who reach a certain standard of educa- tion, however, are only obliged to serve for one year in the active army. They are called One-Year Volunteers (Einjdhrig-Frei- willigen), defray their own expenses and are the chief source of supply of reserve and Landwehr officers. That proportion of the annual contingents which is dismissed

untrained goes either to the Ersatz-Reserve or to the 1st ban of the Landsturm (the Landwehr, it will be observed, contains only men who have served with the colours). The Ersatz consists exclusively of young men, who would in war time be drafted to the regimental depots and thence sent, with what training circumstances had in the meantime allowed, to the front. Some men of the Ersatz receive a short preliminary training in peace time.

In 1907 the average height of the private soldiers was 5 ft. 6 in., that of the non-commissioned officers 5 ft. 65 in., and that of the one-year volunteers 5 ft. 95 in. A much greater proportion of the country recruits were accepted as " fit " than of those coming from the towns. Voluntary enlistments of men who desired to become non-commissioned officers were most frequent in the provinces of the old Prussian monarchy, but in Berlin itself and in Westphalia the enlistments fell far short of the number of non-commissioned officers required for the territorial regiments, of the respective districts. Above all, in Alsace- Lorraine one-eighth only of the required numbers were obtained. Peace and War Strengths. — German military policy is revised every five years; thus a law of April 1905 fixes the strength and establishments to be attained on March 31, 1910, the necessary augmentations, &c, being carried out gradually in the intervening years. The peace strength for the latter date was fixed at 505,839 men (not including officers, non-commissioned officers and one-year volunteers), forming —

633 battalions infantry. 510 squadrons cavalry. 574 batteries field and horse artillery. 40 battalions foot artillery. 29 battalions pioneers. . 12 battalions communication troops. 23 train battalions, &c.

The addition of about 25,000 officers and 85,000 non-commissioned officers, one-year men, &c, brings the peace footing of the German army in 1910 to a total of about 615,000 of all ranks.

As for war, the total fighting strength of the German nation (including the navy) has been placed at as high a figure as 1 1 ,000,000, Of these 7,000,000 have received little or no training, owing to medical unfitness, residence abroad, failure to appear,

surplus of annual contingents, &c, as already explained, and not more than 3,000,000 of these would be available in war. The real military resources of Germany, untrained and trained, are thus about 7,000,000, of whom 4,000,000 have at one time or another done a continuous period of service with the colours. 1 This is of course for a war of defence A outrance. For an offensive war, only the active army, the reserve, the Ersatz and the 1st levy of the Landwehr would be really available.

A rough calculation of the number of these who go to form or to reinforce the field armies and the mobilized garrisons may be given :

Cadres of officers and non-commissioned officers From 7 annual contingents of recruits {i.e.

active army and reserve) .... From 5 contingents of Landwehr (1st ban) From 7 classes of Ersatz reserve called to the

depots, able-bodied men .... One-year volunteers recalled to the colours or

serving as reserve and Landwehr officers

100,000

1,200,000 600,000 '

400,000

2,400,000

These again would divide into a first line army of 1,350,000 and a second of 1,050,000. It is calculated that the field army would consist, in the third week of a great war, of 633 battalions, 410 squadrons and 574 batteries, with technical, departmental and medical troops (say 630,000 bayonets, 60,000 sabres and 3444 guns, or 750,000 men), and that these could be reinforced in three or four weeks by 350 fresh battalions. Behind these forces there would shortly become available for secondary operations about 460 bat- talions of the 1st ban Landwehr, and 200 squadrons and about 220 batteries of the reserve and Landwehr. In addition, each would leave behind depot troops to form the nucleus on which the 2nd ban Landwehr and the Landsturm would eventually be built up. The total number of units of the three arms in all branches may be stated approximately at 2200 battalions, 780 squadrons and 950 batteries. Command and Organization. — By the articles of the constitution

the whole of the land forces of the empire form a united army in war and peace under the orders of the emperor. The sovereigns of the chief states are entitled to nominate the lower grades of officers, and the king of Bavaria has reserved to himself the special privilege of superintending the general administration of the three Bavarian army corps; but all appointments are made subject to the emperor's approval. The emperor is empowered to erect fortresses in any part of the empire. It is the almost invariable practice of the kings of Prussia to command their forces in person, and the army commands, too, are generally held by leaders of royal or princely rank. The natural corollary to this is the assignment of special advisory duties to a responsible chief of staff. The officers are recruited either from the Cadet Corps at Berlin or from amongst those men, of sufficient social standing, who join the ranks as " avantageurs " with a view to obtaining commissions. Reserve and Landwehr officers are drawn from among officers and selected non-commissioned officers retired from the active army, and one-year volunteers who have passed a special examination. All candidates, from whatever source they come, are subject to approval or rejection by their brother officers before being definitively commissioned. Promotion in the German army is excessively slow, the senior subalterns having eighteen to twenty years' commissioned service and the senior captains sometimes thirty. The number of officers on the active list is about 25,000. The under-officers number about 84,000.

The German army is organized in twenty-three army corps, stationed and recruited in the various provinces and states as follows : Guard, Berlin (general recruiting) ; I. Konigsberg (East Prussia) ; II. Stettin (Pomerania); III. Berlin (Brandenburg) ; IV. Magdeburg (Prussian Saxony) ; V. Posen (Poland and part of Silesia) ; VI. Breslau (Silesia); VII. Munster (Westphalia); VIII. Coblenz (Rhineland) ; IX. Altona (Hanse Towns and Schleswig-Holstein) ; X. Hanover (Hanover) ; XL Cassel (Hesse-Cassel) ; XII. Dresden (Saxony); XIII. Stuttgart (Wurttemberg); XIV. Karlsruhe (Baden); XV. Strassburg (Alsace) ; XVI. Metz (Lorraine) ; XVII. Danzig (West Prussia); XVIII. Frankfurt-am-Main (Hesse Darm- stadt, Main country) ; XIX. Leipzig (Saxony) ; I. Bavarian Corps, Munich; II. Bavarian Corps, Wilrzburg; III. Bavarian Corps, Nuremberg. The formation of a XX. army corps out of the extta division of the XIV. corps at Colmar in Alsace, with the addition of two regiments from Westphalia and drafts of the XV. and XVI. corps, was announced in 1908 as the final step of the programme for the period 1906-1910. The normal composition of an army corps on war is (a) staff, (b) 2 infantry divisions, each of 2 brigades (4

1 Actually between 1883 and 1908 over five million recruits passed through the drill sergeant's hands, as well as perhaps 210,000 one-year volunteers.

regiments or 12 battalions), 2 regiments of field artillery (comprising 9 batteries of field-guns and 3 of field howitzers, 72 pieces in all), 3 squadrons of cavalry, 1 or 2 companies of pioneers, a bridge train and 1 or 2 bearer companies; (c) corps troops, I battalion rifles, telegraph troops, bridge train, ammunition columns, train (supply) battalion, field bakeries, bearer companies and field hospitals, &c, with, as a rule, one or two batteries of heavy field howitzers or mortars and a machine-gun group. The remainder of the cavalry and horse artillery attached to the army corps in peace goes in war to form the cavalry divisions. Certain corps have an increased effective ; thus the Guard has a whole cavalry division, and the I. corps (Konigsberg) has three divisions. Several corps possess an extra infantry brigade of two 2-battalion regiments, but these, unless stationed on the frontiers, are gradually absorbed into new divisions and army corps. In war several army corps, cavalry divisions and reserve divisions are grouped in two or more " armies, and in peace the army corps are divided for purposes of superior control amongst several " army inspections."

The cavalry is organized in regiments of cuirassiers, dragoons, lancers, hussars and mounted rifles, 2 the regiments having four service and one depot squadrons. Troopers are armed with lance, sword and carbine (for which in 1908 the substitution of a short rifle with bayonet was suggested). In peace time the highest permanent organization is the brigade of two regiments or eight squadrons, but in war and at manoeuvres divisions of three brigades, with horse artillery attached, are formed.

The infantry consists of 216 regiments, mostly of three battalions each. These are numbered, apart from the eight Guard regiments and the Bavarians, serially throughout the army. Certain regiments are styled grenadiers and fusiliers. In addition there are eighteen chasseur or rifle battalions (Jdger). The battalion has always four companies, each, at war strength, 250 strong. The armament of the infantry is the model 1898 magazine rifle and bayonet (see Rifle).

The field (including horse) artillery consists in peace of 94 regiments subdivided into two or three groups (Abteilungen), each of two or three 6-gun batteries. The field gun in use is the quick- firing gun 96/N.A. (see Ordnance : Field Equipments).

The foot artillery is intended for siege and fortress warfare, and to furnish the heavy artillery of the field army. It consists of forty battalions. Machine gun detachments, resembling 4-gun batteries and horsed as artillery, were formed to the number of sixteen in 1904-1906. These are intended to work with the cavalry divisions. Afterwards it was decided to form additional small groups of two guns each, less fully horsed, to assist the infantry, and a certain number of these were created in 1906-1908.

The engineers are a technical body, not concerned with field warfare or with the command of troops. On the other hand, the pioneers (29 battalions) are assigned to the field army, with duties corresponding roughly to those of field companies R.E. in the British service. Other branches represented in Great Britain by the Royal Engineers are known in Germany by the title " communication troops," and comprise railway, telegraph and airship and balloon battalions. The Train is charged with the duties of supply and transport. There is one battalion to each army corps.

Remounts. — The peace establishment in horses is approximately"' 100,000. Horses serve eight to nine years in the artillery and nine to ten in the cavalry, after which, in the autumn of each year, they are sold, and their places taken by remounts. The latter are bought at horse-fairs and private sales, unbroken, and sent to the 25 remount depots, whence, when fit for the service, they are sent to the various units, as a rule in the early summer. Most of the cavalry and artillery riding horses come from Prussia proper. The Polish districts produce swift Hussar horses of a semi-eastern type. Hanover is second only to East Prussia in output of horses. Bavaria, Saxony and Wurttemberg do not produce enough horses for their own armies and have to draw on Prussia. Thirteen thousand four hundred and forty-five young horses were bought by the army authorities during 1907. The average price was about £51 for field artillery draught horses, £65 for heavy draught horses, and £46 for riding horses.

The military expenditure of Germany, according to a comparative table furnished to the House of Commons by the British war office in 1907, varied between £36,000,000 and £44,000,000 per annum in the period 1899-1902, and between £42,000,000 and £51,000,000 per annum in that of 1905-1909.

Colonial Troops. — In 1906 these, irrespective of the brigade of occupation then maintained in north China and of special reinforcements sent to S.W. Africa during the Herrero war, consisted of the German East Africa troops, 220 Europeans and 1470 natives; the

Cameroon troops, 145 European and 1170 natives; S.W. African troops, entirely European and normally consisting of 606 officers

2 These last have a curious history. They were formed from about 1 890 onwards, by individual squadrons, two or three being voted each year. Ostensibly raised for the duties of mounted orderlies, at a time when it would have been impolitic to ask openly for more cavalry, they were little by little trained in real cavalry work, then combined in provisional regiments for disciplinary purposes and at last frankly classed as cavalry.

and men active and a reserve of ex-soldier settlers; the Kiao-Chau garrison (chiefly marines), numbering 2687 officers and men; and various small police forces in Togo, New Guinea, Samoa, &c.

Fortresses. — The fixed defences maintained by the German empire (apart from naval ports and coast defences) belong to two distinct epochs in the military policy of the state. In the first period (roughly 1 871-1899), which is characterized by the development of the offensive spirit, the fortresses, except on the French and Russian frontiers, were reduced to a minimum. In the interior only Spandau, Ciistrin, Magdeburg, Ingolstadt and Ulm were maintained as defensive supporting points, and similarly on the Rhine, which was formerly studded with fortresses from Basel to Emmerich, the defences were limited to New Breisach, Germersheim, Mainz, Coblenz, Cologne and Wesel, all of a " barrier " character and not organized specially as centres of activity for field armies. The French frontier, and to a less extent the Russian, were organized offensively. Metz, already surrounded by the French with a girdle of forts, was extended and completed (see Fortification and Siege- craft) as a great entrenched camp, and Strassburg, which in 1870 possessed no outlying works, was similarly expanded, though the latter was regarded an instrument of defence more than of attack. On the Russian frontier Konigsberg, Danzig, Thorn, Posen, Glogau (and on a smaller scale Boyen in East Prussia and Graudenz on the Vistula) were modernized and improved.

From 1899, however, Germany began to pay more attention to her fixed defences, and in the next years a long line of fortifications

came into existence on the French frontier, {he positions and strength of which were regulated with special regard to a new strategic disposition of the field armies and to the number and sites of the " strategic railway stations " which were constructed about the same time. Thus, the creation of a new series of forts extending from Thionville (Diedenhofen) to Metz and thence south-eastward was coupled with the construction of twelve strategic railway stations between Cologne and the Belgian frontier, and later — the so-called " fundamental plan " of operations against France having apparently undergone modification in consequence of changes in the foreign relations of the German government — an immense strategic railway station was undertaken at Saarburg, on the right rear of Thionville and well away from the French frontier, and many im- portant new works both of fortification and of railway construction were begun in Upper Alsace, between Colmar and Basel.

The coast defences include, besides the great naval ports of Wilhelmshaven on the North Sea and Kiel on the Baltic, Danzig, Pillau, Memel, Friedrichsort, Cuxhaven, Geestemunde and Swinemiinde. (C. F. A.)

Navy. — The German navy is of recent origin. In 1848 the German people urged the construction of a fleet. Money was collected, and a few men-of-war were fitted out; but these were subsequently sold, the German Bundestag (federal council) not being in sympathy with the aspirations of the nation. Prussia however, began laying the foundations of a small navy. To meet the difficulty arising from the want of good harbours in the Baltic, a small extent of territory near Jade Bay was bought from Oldenburg in 1854, for the purpose of establishing a war-port there. Its construction was completed at enormous expense, and it was opened for ships by the emperor in June 1869 under the name of Wilhelmshaven. In 1864 Prussia, in annexing Holstein, obtained possession of the excellent port of Kiel, which has since been strongly fortified. From the time of the formation of the North German Confederation the navy has belonged to the common federal interest. Since 1st October 1867 all its ships have carried the same flag, of the national colours — black, white, red, with the Prussian eagle and the iron cross.

From 1848 to 1868 the increase of the navy was slow. In 1851 it consisted of 51 vessels, including 36 small gunboats of 2 guns each. In 1868 it consisted of 45 steamers (including 2 ironclads) and 44 sailing vessels, but during the various wars of the period 1848-1871, only a few minor actions were fought at sea, and for many years after the French War the development of the navy did not keep pace

with that of the empire's com- mercial interests beyond the seas, or compete seriously with the naval power of possible rivals. But towards the end of tne 19th century Germany started on a new naval policy, by which her fleet was largely and rapidly increased. Details of this development will be found in the article Navy (see also History below, ad fin.). It will be sufficient here to give the statistics relating to the beginning of the year 1909, reference being made only to ships effeclive at that date and to ships authorized in the construction programme of 1907 ;

Modern battleships . . 20 effective, 4 approaching completion. Old battleships and coast

defence ships . . . 11 effective (4 non-effective).

Armoured cruisers ... 9 effective, 1 approaching completion.

Protected cruisers . . . 31 effective, 2 approaching completion. Torpedo craft of modern

types 130 effective, 3 approaching completion.

Administration. — In 1889 the administration was transferred from the ministry of war to the imperialadmiralty (Reichsmarineamt) , at the head of which is the naval secretary of state. The chief command was at the same time separated from the administration and vested in a naval officer, who controls the movements of the fleet, its personnel and training, while the maintenance of the arsenals and dockyards, victualling and clothing and all matters immediately affecting the materiel, fall within the province of the secretary of state. The navy is divided between the Baltic (Kiel) and North Sea (Wilhelmshaven) stations, which are strategically linked by the Kaiser Wilhelm Canal (opened in 1 895) , across the Schleswig-Holstein peninsula. Danzig, Cuxhaven and Sonderburg have also been made naval bases.

Personnel. — The German navy is manned by the obligatory service of the essentially maritime population — such as sailors, fishermen and others, as well as by volunteers, who elect for naval service in preference to that in the army. It is estimated that the total seafaring population of Germany amounts to 80,000. The active naval personnel was, in 1906, 2631 officers (including engineers, marines, medical, &c.) and 51,138 under-officers and men, total 53,769. In addition, there is a reserve of more than 100,000 officers and men. (P. A. A.)

Finance. — The imperial budget is voted every year by the Reichstag. The " extraordinary funds," from which considerable sums appear annually in the budget, were created after the Franco-German War. Part of the indemnity was invested for definite purposes. The largest of these investments served for paying the pensions of the invalided, and amounted originally to £28,000,000. Every year, not only the interest, but part of the capital is expended in paying these pensions, and the capital sum was thus reduced in 1903 to £15,100,000, and in 1904 to £13,200,000. Another fund, of about £5,200,000, serves for the construction and armament of fortresses; while £6,000,000, known as the Reichskriegsschatz — or " war treasure fund " — is not laid out at interest, but is stored in coined gold and bullion in the Juliusturm at Spandau. In addition to these, the railways in Alsace-Lorraine, which France bought of the Eastern Railway Company for £13,000,000, in order to transfer them to the control of Germany, are also the property of the empire.

During the years 1908 and 1909 considerable public discussion and political activity were devoted to the reorganization of German imperial finance, and it is only possible here to deal historically with the position up to that time, since further developments of an important nature were already foreshadowed.

In 187 1 the system accepted was that the imperial budget should be financed substantially by its reliance on the revenue from what were the obvious imperial resources — customs and excise duties, stamp duties, post and telegraph .receipts, and among minor sources the receipts from the Alsace-Lorraine railways. But it was also provided that, for the purpose of deficits, the states should, in addition, if required by the imperial minister of finance, contribute their quotas according to popula- tion — Matrikular Beitrdge. It was not expected that these would become chronic, but in a few years, and emphatically by the early 'eighties, they were found to be an essential part of the financial system, owing to regular deficits. It had been intended that, in return for the Matrikular Beitrdge, regular assignments (Uber- weisungen) should be returned to the states, in relief of their own taxation, which would practically wipe out the contribution; but instead of these the Uberweisungen were considerably less. Certain reorganizations were made in 1887 and 1902, but the excess of the Matrikular Beitrdge over the Uberweisungen con- tinued; the figures in 1905 and 1908 being as follows (in millions of marks) : —

Matrikular- Beitrage.

Uberweisungen.

Excess.

1905

1908

213 346

189 195

24 150

These figures show how natural it was to desire to relieve the states by increasing the direct imperial revenue.

Meanwhile, in spite of the " matricular contributions," the calls on imperial finance had steadily increased, and up to 1908 were continually met to a large extent by loans, involving a continual growth of the imperial debt, which in 1907 amounted to 3643 millions of marks. The imperial budget, like that of most European nations, is divided into two portions, the ordinary and the extraordinary; and the increase under both heads (especially for army and navy) became a recurrent factor. A typical situation is represented by the main figures for 1905 and 1906 (in millions of marks):

Expenditure.

Revenue.

Raised by Loan.

Ordinary.

Extra- ordinary.

1905

1906

2002 2157

‘93

235

2053 2118

341 258

The same process went on in 1907 and 1908, and it was necessarily recognized that the method of balancing the imperial budget by a regular increase of debt could not be satisfactory in a country where the general increase of wealth and taxable capacity had meanwhile been conspicuous. And though the main proposals made by the government for new taxation, including new direct taxes, resulted in a parliamentary deadlock in 1909, and led to Prince von Billow’s resignation as chancellor, it was already evident that some important reorganization of the imperial financial system was inevitable.

Currency. — The German empire adopted a gold currency by the law of the 4th of December 1 87 1. Subsequently the old local coinages {Landesmiinzen) began to be called in and re- placed by new gold and silver coins. The old gold coins, amounting to £4,550,000, had been called in as early as 1873; and the old silver coins have since been successively put out of circulation, so that none actually remains as legal tender but the thaler (3s.). The currency reform was at first facilitated by the French indemnity, a great part of which was paid in gold. But later on that metal became scarcer; the London gold prices ran higher and higher, while silver prices declined. The average rate per ounce of standard silver in 1866- 1870 was 6ofd., in January 1875 only 57jd., in July 1876 as low as 49d. It rose in January 1877 to 57id., but again declined, and in September 1878 it was 5o|d. While the proportion of like weights of fine gold and fine silver in 1866-1870 averaged j to 15-55, >t was 1 to 17-79 in 1876, 1 to 17-18 in 1877, and, in 1902, in consequence of the heavy fall in silver, the ratio became as much as 1 to 39. By the currency law of the 9th of July 1873, the present coinage svstem was established and remains, with certain minor modifica- tions, now in force as then introduced. The unit is the mark (1 shilling) — the tenth part of the imperial gold coin (Krone = crown), of which last 139J are struck from a pound of pure gold. Besides these ten-mark pieces, there are Doppelkronen (double crowns), about equivalent in value to an English sovereign (the average rate of exchange being 20 marks 40 pfennige per £1 sterling), and, formerly, half-crowns

(halbe Kronen =5 marks) in gold were also issued, but they have been withdrawn from circulation. _ Silver coins are 5, 2 and 1 mark pieces, equivalent to 5, 2 and I shillings respec- tively, and 50 pfennige pieces = 6d. Nickel coins are 10 and 5 pfennige pieces, and there are bronze coins of 2 and I pfennige. The system is decimal ; thus 100 pfennige = I mark, 1000 pfennige = the gold krone (or crown), and id. English amounts roughly to 8 pfennige.

Banking. — A new banking law was promulgated for the whole empire o.n the 14th of March 1875. Before that date there existed thirty-two banks with the privilege of issuing notes, and on the 31st of December 1872, £67,100,000 in all was in circulation, £25,100,000 of that sum being uncovered. The banking law was designed to reduce this circulation of notes; £19,250,000 was fixed as an aggre- . gate maximum of uncovered notes of the banks. The private banks were at the same time obliged to erect branch offices in Berlin or Frankfort-on-Main for the payment of their notes. In consequence of this regulation numerous banks resigned the privilegeˆ of issuing notes, and at present there are in Germany but the following private note banks, issuing private notes, viz. the Bavarian, the Saxon, the Wurttemberg, the Baden and the Brunswick, in addition to the

Imperial Bank. The Imperial Bank (Reichsbank) ranks far above the others in importance. It took the place of the Prussian Bank in 1876, and is under the superintendence and management of the empire, which shares in the profits. Its head office is in Berlin, and it is entitled to erect branch offices in any part of the empire. It has a capital of £9,000,000 divided into 40,000 shares of £150 each, and 60,000 shares of £50 each. The Imperial Bank is privileged to issue bank-notes, which must be covered to the extent of Is. 3d. in coined money, bullion or bank-notes, the remainder in bills at short sight. Of the net profits, a dividend of 3§ % is first payable to the shareholders, 20 % of the remainder is transferred to the reserve until this has reached a total of £3,000,000, and of the remainder again a quarter is apportioned to the shareholders and three-quarters falls to the imperial exchequer. If the net profits do not reach 3 J , the balance must be made good from the reserve. Private note banks are not empowered to do business outside the state which has conceded them the privilege to issue notes, except under certain limitations. One of these is that they agree that their privilege to issue private notes may be withdrawn at one year's notice without compensation. But this condition has not been enforced in the case of such banks as have agreed to accept as binding the official rate of discount of the Reichsbank after this has reached or when it exceeds

4. At other times they are not to discount at more than i % below the official rate of the Reichsbank, or in case the Reichsbank itself discounts at a lower rate than the official rate, at more than \ % below that rate.

The following table shows the financial condition of the note- issuing banks, in thousands of marks, over a term of years :

Liabilities.

Yeaf.

Banks.

Capital.

Reserve.

Notes in Circulation.

— .. -j

Total, including other Liabilities.

1900 1901 1902 1903 1904

8

7 6 6 6

219,672 231,672 216,000 216,000 216,000

48,329 54,901 56,684 60,131 64,385

1,313,855 1,345,436 1,373,482 1,394,336 1,433,421

2,237,017 2,360,453

2,353,951 2,365,256 2,378,845

A ssets.

Year.

Banks.

Coin and Bullion.

Notes of State and other Banks.

Bills.

Total.

1900 1901 1902 1903 1904

8

7 6 6 6

899,630

990,262

1,052,391

973,953 996,601

5i,93i

60,770

54,389 54,231 66,372

1,036,961 990,950 901,408 984,604 947,358

2,239,564 2,360,355

2,354,253 2,356,511 2,379,234

The total turnover of the Imperial Bank was, in the first year of its foundation, if milliards pounds sterling; and, in 1899, 90 milliards. Eighty-five per cent of its bank-notes have been, on the average, covered by metal reserve.

The total value of silver coins is not to exceed 10 marks, and that of copper and nickel 25 marks per head of the population. While the coinage of silver, nickel and copper is reserved to the state, the coinage of gold pieces can be undertaken by the state for the account of private individuals on payment of a fixed charge. The coinage takes place in the six mints belonging to the various states — thus Berlin (Prussia), Munich (Bavaria), Dresden (in the Muldener- hiitte near Freiberg, Saxony), Stuttgart (Wurttemberg), Karlsruhe (Baden) and Hamburg (for the state of Hamburg). Of the thalers, the Vereinsthaler, coined until 1867 in Austria, was by ordinance of the

Bundesrat declared illegal tender since the 1st of January 1903. No one can be compelled to accept more than 20 marks in silver or more than 1 mark in nickel and copper coin ; but, on the other hand, the Imperial Bank accepts imperial silver coin in payment to any amount.

The total value of thalers, which, with the exception of the Vereinsthaler, are legal tender, was estimated in 1894 at about £20,000,000.

Bibliography. — Cotta, Deutschlands Boden (2 vols., 1853) ; H. A. Daniel, Deutschland (1896); J. Kutzen, Das deutsche Land (Breslau, 1900); Von Kloden, Geographisch.es Handbuch, vol. ii. (1875); G. Neumann, Das deutsche Reich (2 vols., 1874); O. Brunckow, Die Wohnpldtze des deutschen Reiches — aufGrundderamtlichen Materialien bearbeitet (new ed., Berlin, 1897); Handbuch der Wirtschaftskunde Deutschlands (4 vols., Leipzig, 1901-1905); Gothaischer genealogischer Hofkalender auf das Jahr IQ07 (Gotha) ; A. von W. Keil, Neumanns Ortslexikon des deutschen Reiches (3rd ed., Leipzig, 1894); Meyer, Konversations-Lexihon (1902 seqq.) ; Brockhaus, Konversations- Lexikon (1900 seqq.); J. Kilrschner, Staats- Hof- und Kommnnal- handbuch des Reiches und der Einzelstaaten (Leipzig, 1900); P. Hage, Grundriss der deutschen Staats- und Rechtskunde (Stuttgart, 1906), and for statistical matter chiefly the following: Centralblatt fur das deutsche Reich. Herausgegeben im Reichsamt der Innern (Berlin, 1900) ; Die deutsche Armee und die kaiserliche Marine (Berlin, 1 889);

Gewerbe und Handel im deutschen Reich nach der gewerblichen Betriebszahlung, vom 14. Juni 1895 (Berlin, 1899); Handbuch fur das deutsche Reich auf das Jahr 1900, bearbeitet im Reichsamt der Innern (Berlin) ; Handbuch fur die deutsche Handelsmarine auf das Jahr 1900; Statistik des deutschen Reichs, published by the Kaiser-liches Statistisches Amt (including trade, navigation, criminal statistics, sick insurance, &c); Statistisches Jahrbuch fur das deutsche Reich (Berlin, 1906) and Vierteljahrshefte filr Statistik des deutschen Reichs (including census returns, commerce and railways). See also among English publications on geographical and statistical matter: Annual Statement of the Trade of the United

Kingdom with Foreign Countries and British Possessions for the Year 1899 (London, 1900) ; and G. G. Chisholm, Europe, being vols. i. and ii. of Stanford's Compendium of Geography and Travel (London, 1899 and 1900). The fullest general account of the geology of Germany will be found in R. Lepsius, Geologie von Deutschland und den angrenzenden Gebieten (Stuttgart, first volume completed in 1892). Snorter descriptions will be found in E. Kayser, Lehrbuch der geologischen Formations- kunde (Stuttgart, English edition under the title Text-book of Com- parative Geology), and H. Credner, Elemente der Geologie (Leipzig).

Archaeology

From an archaeological point of view Germany is very far from being a homogeneous whole. Not only has the develop- ment of the south differed from that of the north, and the west been subjected to other influences than those affecting the east, but even where the same influences have been at work the period of their operation has often varied widely in the different districts, so that in a general sketch of the whole country the chronology can only be a very rough approximation. In this article the dates assigned to the various periods in south Germany are those given by Sophus Miiller, on the lines first laid down by Montelius. As regards north Germany, Miiller puts the Northern Bronze age 500 years later than the Southern, but a recent find in Sweden bears out Montelius's view that southern influence made itself rapidly felt in the North. The conclusions of Montelius and Miiller are disputed by W. Ridgeway, who maintains that the Iron age originated in central Europe, and that iron must con- sequently have been worked in those regions as far back as c. 2000 B.C.

Older Palaeolithic Period.— The earliest traces of man's handiwork are found either at the end of the pre-Glacial epoch, or in an inter-Glacial period, but it is a disputed point whether the latter is the first of a series of such periods. A typical German find is at Taubach, near Weimar, where almond-shaped stone wedges, small flint knives, and roughly-hacked pieces of porphyry and quartz are found, together with the remains of elephants. There are also bone implements, which are not found in the earliest periods in France.

Palaeolithic Transition Period (Solutr() . — More highly developed forms are found when the mammoth has succeeded the elephant. Implements of chipped stone for the purposes of boring and scraping suggest that man worked hides for clothing. Ornaments of perforated teeth and shells are found.

Later Palaeolithic Period {La Madeleine). — The next period is marked by the presence of reindeer. In the Hohlefels in the Swabian Achthal there is still no trace of earthenware, and we find the skull of a reindeer skilfully turned into a drinking-vessel. Saws, needles, awls and bone harpoons are found. It is to be noticed that none of the German finds (mostly in the south and west) show any traces of the highly developed artistic sense so characteristic of the dwellers in France at this period.

The gap in our knowledge of the development of Palaeolithic into Neolithic civilization has recently been partially filled in by discoveries in north Germany and France of objects showing rather more developed forms than those of the former period, but still unaccompanied by earthenware. It is a disputed point whether the introduction of Neolithic civilization is due to a new ethnological element.

Neolithic Age (in south Germany till c. 2000 B.C.). — Neolithic man lived under the same climatic conditions as prevail to-day, but amidst forests of fir. He shows advance in every direction, and by the end of the later Neolithic period he is master of the arts of pottery and spinning, is engaged in agricultural pursuits, owns domestic animals, and makes weapons and tools of fine shape, either ground and polished or beautifully chipped.

Traces of Neolithic settlements have been found chiefly in the neighbourhood of Worms, in the Main district and in Thuringia. These dwellings are usually holes in the ground, and presumably had thatched roofs. Our knowledge of the later Neolithic age, as of the succeeding periods, is largely gained from the remains of lake-dwellings, represented in Germany chiefly by Bavarian finds. The lake-dwellings in Mecklenburg, Pomerania and East Prussia are of a different type, and it is not certain that they date back to the Stone age. Typical Neolithic cemeteries are found at Hinkelstein, Alzey and other places in the neighbourhood of Worms. In these graves the skeletons lie flat, while in other cemeteries, as at Flomborn in Rhine-Hessen, and near Heilbronn, they are in a huddled position (hence the name Hockergraber). Necklaces and bracelets of Mediterranean shells point to a con- siderable amount of commerce. Other objects found in the graves are small flint knives, stone axes, flint and lumps of pyrites for obtaining fire, and, in the women's graves, hand-mills for grinding corn. The earthenware vessels usually have rounded bottoms. The earliest ornamentation consists of finger-imprints. Later we find two periods of zigzag designs in south Germany with an intermediate stage of spirals and wavy lines, while in north and

east Germany the so-called string-ornamentation predominates. Towards the end of the period the inhabitants of north Germany erect megalithic graves, and in Hanover especially the passage-graves.

Bronze Age (in south Germany from c. 2000-1000 B.C.). — In the later Stone age we note the occasional use of copper, and then the gradual appearance of bronze. The bronze civilization of the Aegean seems to have had direct influence along the basins of the Danube and Elbe, while the culture of the western parts of central Germany was transmitted through Italy and France. No doubt the pre-eminence of the north, and especially of Den- mark, at this period, was due to the amber trade, causing southern influence to penetrate up the basin of the Elbe to Jutland. The earlier period is characterized by the practice of inhumation in barrows made of clays, stones or sand, according to the district. Bronze is cast, whereas at a later time it shows signs of the hammer. From the finds in Bavarian graves it appears that the chief weapons were the dagger and the long pointed Paistab (palstave), while a short dagger fixed like an axe on a long shaft is characteristic of the North. The women wore two bronze pins, a bracelet on each arm, amber ornaments and a necklace of bronze tubes in spirals. One or two vases are found in each barrow, ornamented with finger-imprints, " string " decoration, &c. The later period is characterized by the practice of crema- tion, though the remains are still placed in barrows. Swords make their appearance. The women wear more and more massive ornaments. The vases are highly polished and of elegant form, with zigzag decoration.

Hallstatt Period (in Germany 8th-sth century B.C.). — The Hallstatt stage of culture, named after the famous cemetery in upper Austria, is marked by the introduction of iron (see Hallstatt). In Germany its centre is Bavaria, Baden and Wurttemberg, with the Thuringian forest as the northern boundary. In Brandenburg, Lusatia, Silesia, Posen and Saxony, where there was no strong Bronze age tradition, Hallstatt in- fluence is very noticeable. In west Prussia the urns with human faces deserve notice. The dead are either buried in barrows or cremated, the latter especially in north and east Germany. In Bavaria both practices are resorted to, as at Hallstatt. The pottery develops beautiful form and colour. Fibulae, often of the " kettle-drum " form, take the place of the Bronze age pin.

La Tene Period (4th-ist century B.C.). — Down to this time there is very little evidence concerning the racial affinilies of the popula- tion. When our records first begin the western and southern portions

of Germany seem to have been inhabited by Celtic peoples (see below "Ethnography"). La Tene, in Switzerland, has given its name to the period, of which the earlier part corresponds to the time of Celtic supremacy. It is interesting to note how the Celts absorb Roman and still more Greek culture, even imitating foreign coins, and pass on their new arts to their Teutonic neighbours; but in spite of the strong foreign influence

the Celtic civilization can in some sort be termed national. Later it has a less rich development, betraying the political decay of the race. Its centres in Germany are the southern districts as far as Thuringia, and the valleys of the Main and Saar. The ornamentation is of the conventionalized plant type: gold is freely used, and enamel, of a kind different from the Roman enamel used later in Germany, is applied to weapons and orna- ments. Chariots are used in war, and fortified towns are built, though we must still suppose the houses to have consisted of a wooden framework coated with clay. In these districts La Tene influence is contemporary with the use of tumuli, but in the (non-Celtic) coast districts it must be sought in urn-cemeteries.

Roman Period (from the 1st century a.d.). — The period suc- ceeding to La Tene ought rather to be called Romano-Germanic, the relation of the Teutonic races to the Roman civilization being much the same as that of the Celts to classical culture in the preceding period. The Rhine lands were of course the centre of Roman civilization, with Roman roads, fortresses, stone and tiled houses and marble temples. By this time the Teutonic peoples had probably acquired the art of writing, though the origin of their national (Runic) alphabet is still disputed. The graves of the period contain urns of earthenware or glass, cremation being the prevalent practice, and the objects found include one or more coins in accordance with Roman usage.

Period of National Migrations (a.d. 300-500).— The grave-finds do not bear out the picture of a period of ceaseless war painted by the Roman historians. On the contrary, weapons are seldom found, at any rate in graves, the objects in which bear witness to a life of extraordinary .luxury. Magnificent drinking- vessels, beautifully ornamented dice and draughtsmen, masses of gay beads, are among

the commonest grave-finds. A peculiarity of the period is the development of decoration inspired by animal forms, but becoming more and more tortuous and fan- tastic. Only those eastern parts of Germany which were now occupied by Slavonic peoples remaiied uninfluenced by this rich civilization.

The Merovingian Period (a.d. 500-800) sees the completion of the work of converting the German tribes to Christianity. Reihengrdber, containing objects of value, but otherwise like modern cemeteries, with the dead buried in rows (Reihen), are found over all the Teutonic part of Germany, but some tribes, notably the Alamanni, seem still to have buried their dead in barrows. Among the Franks and Burgundians we find mono- lithic sarcophagi in imitation of the Romans, and in other districts sarcophagi were constructed out of several blocks of stone — the so-called Plattengraber. The weapons are the spatha, or double-bladed German sword, the sax (a short sword, or long knife, semispathium), the knife, shield, and the favourite German axe, though this latter is not found in Bavaria. The ornaments are beads, earrings, brooches, rings, bracelets, &c, thickly studded with precious stones.

Authorities. — S. Mtiller, Urgeschichte Europas (1905), and Tierornamentik (1881); O. Montelius, " Chronologie der Bronze- zeit in N. Deutschland und Skandinavien," in Archiv fur Anthro- pologic, vols. xxv. and xxvi.; M. Hoernes, Urgeschichte des Menschen (1892), and Der diluviale Mensch in Europa (1903); M. Much, Kupferzeit in Europa (1893); R. Munro, Lake-dwellings of Europe (1890); J. Naue, Bronzezeit in Ober-Bayern (1894) ; O. Tischler, Ostpreussische Altertiimer (1902); R. Virchow, Uber Hiinengraber und Pfahlbauten (1866); J. Mestorf, Urnenfriedhofe in Schleswig-Holstein (1886); A. Lissauer, Prdhistorische Denkmdler Preussens (1887); I. Undset, Erstes Auftreten des Eisens in N. Europa (1882); L. Lindenschmit, Handbuch der deutschen Altertumskunde, i. (1880-1889); and W. Ridgeway, Early Age of Greece, i. (1901). Also articles by the above and others, chiefly in Zeitschrift fur Ethnologie (Berlin); Archiv fur Anthropologic (Brunswick); Globus (Bruns-wick) ; Westdeutsche Zeitschrift (Trier) ; Schriften der physikalisch-okonomischen Gesellschaft (Konigsberg) ; Nachrichten uber deutsche Altertumskunde (Berlin); Verhandlungen der Berliner Gesellschaft fur Anthropologic, &c. ; Beilrdge zur Anthropologic Bayerns (Munich) ; and Zeitschrift fur deutsches Altertum (Berlin). (B. S. P.)

Ethnography and Early History Our direct knowledge of Germany begins with the appoint- ment of Julius Caesar as governor of Gaul in 59 B.C. Long before that time there is evidence of German

communication

with southern civilization, as the antiquities prove, and occa- sional travellers from the Mediterranean had made their way into those regions (e.g. Pytheas, towards the end of the 4th century), but hardly any records of their journeys sur- J ” I!as vive. The first Teutonic peoples whom the Romans are aermany. said to have encountered are the Cimbri and Teutoni, probably from Denmark, who invaded Illyria, Gaul and Italy towards the end of the 2nd century B.C. When Caesar arrived in Gaul the westernmost part of what is now Germany was in the possession of Gaulish tribes. The Rhine practically formed the boundary between Gauls and Germans, though one Gaulish tribe, the Menapii, is said to have been living beyond the Rhine at its mouth, and shortly before the arrival of Caesar an invading force of Germans had seized and settled down in what is now Alsace, 72 b.c. At this time the Gauls were being pressed by the Germans along the whole frontier, and several of Caesar's campaigns were occupied with operations, either against the Germans, or against Gaulish tribes set in motion by the Germans. Among these we may mention the campaign of his first year of office, 58 B.C., against the German king Ariovistus, who led the movement in Alsace, and that of 55 B.C. in which he expelled the Usipetes and Tencteri who had crossed the lower Rhine. During the period of Caesar's government he succeeded in annexing the whole of Gaul as far as the Rhine. (For the cam- paigns see Caesar, Julius.)

After peace had been established in Italy by Augustus, attempts'were made to extend the Roman frontier beyond the Rhine. The Roman prince Nero Claudius Drusus (o.ti.) _.

1 1 1 ‘ ” e cam'

in the year 12 B.C. annexed what is now the kingdom pa /gas 0/ of the Netherlands, and constructed a canal (Fossa other Drusiana) between the Rhine and the lake Flevo ˆ ot ” sn (Lacus Flevus), which partly corresponded to the Zuyder Zee, though the topography of the district has greatly altered. He also penetrated into regions beyond and crossed the Weser, receiving the submission of the Bructeri, Chatti and Cherusci. After Drusus' death in 9 B.C., while on his return from an expedition which reached the Elbe, the German command was twice undertaken by Tiberius, who in a.d. 5 received the submission of all the tribes in this quarter, including the Chauci and the Langobardi. A Roman garrison was left in the conquered districts between the Rhine and the Elbe, but the reduction was not thoroughly completed. About the same time the Roman fleet voyaged

along the northern coast apparently as far as the north of Jutland, and received the nominal submission of several tribes in that region, including the Cimbri and the Charudes. In a.d. 9 Quintilius Varus, the successor of Tiberius, was surprised in the Saltus Teutobergensis between the Lippe and the Weser by a force raised by Arminius, a chief of the Cherusci, and his army consisting of three legions was annihilated. Germanicus Caesar, during his tenure of the command of the Roman armies on the Rhine, made repeated attempts to recover the Roman position in northern Germany and exact vengeance for the death of Varus, but without real success, and after his recall the Rhine formed for the greater part of its course the boundary of the Empire. A standing army was kept up on the Rhine, divided into two commands, upper and lower Germany, the head-quarters of the former being at Mainz, those of the latter at Vetera, near Xanten. A number of important towns grew up, among which we may mention Trier (Augusta Trevirorum), Cologne (Colonia Agrippinensis), Bonn (Bonna),Worms(Borbeto- magus), Spires (Noviomagus), Strassburg (Argentoratum) and Augsburg (Augusta Vindelicorum).

At a later date, however, probably under the Flavian emperors, the frontier of upper Germany was advanced somewhat beyond the Rhine, and a fortification, the Pfahlgraben, constructed to protect it. It led from Honningen on the Rhine, about half-way between Bonn and Coblenz, to Mittenberg above Aschaffenburg on the Main, thence southwards to Lorch in Wurttemberg, whence it turned east to the junction of the Altmuhl with the Danube at Kelheim.

During the wars of Drusus, Tiberius and Germanicus the Romans had ample opportunity of getting to know the tribal

geography of Germany, especially the western part, and though most of our authorities lived at a somewhat later period, it is probable that they derived their information very largely from records of that time. It will be convenient, therefore, to give an account of the tribal geography of Germany in the timeof Augustus, as our knowledge of the subject is much more complete for his reign than for several centuries later.

Of the Gaulish tribes west of the Rhine, the most important

was the Treveri, inhabiting the basin of the Moselle, from whom

the city of Trier(Treves)derives its name. The Rauraci

?" e probably occupied the south of Alsace. To the south

Germ mq

tribe. of the Treveri lay the Mediomatrici, and to the west of them lay the important tribe of the Sequani, who had called in Ariovistus. The Treveri claimed to be of German origin, and the same claim was made by a number of tribes in Belgium, the most powerful of which were the Nervii. The meaning of this claim is not quite clear, as there is some obscurity concerning the origin of the name Germani. It appears to be a Gaulish term, and there is no evidence that it was ever used by the Germans themselves. According to Tacitus it was first applied to the Tungri, whereas Caesar records that four Belgic tribes, namely, the Condrusi, Eburones, Caeraesi and Paemani, were collectively known as Germani. There is no doubt that these tribes were all linguistically Celtic, and it is now the prevailing opinion that they were not of German origin ethno- logically, but that the ground for their claim was that they had come from over the Rhine (cf. Caesar, De Bello Gallico ii. 4). It would therefore seem that the name Germani originally denoted certain Celtic tribes to the east of the Rhine, and that it was then transferred to the Teutonic tribes which subsequently occupied the same territory.*

There, is little doubt that during the last century before the Christian era the Celtic peoples had been pushed considerably farther west by the Teutonic peoples, a process which was still going on in Caesar's time, when we hear of the overthrow of the Menapii, the last Gaulish tribe beyond the Rhine. In the south the same process can be observed. The Boii were expelled from their territories inBohemia by the Marcomanni in the time of Augustus, and the Helvetii are also recorded to have occupied formerly lands east of the Rhine, in what is now Baden and Wurttemberg. Caesar also mentions a Gaulish tribe named Volcae Tectosages as living in Germany in his time. The Volcae Arecomici in the south of France and the Tectosages of Galatia were in all probability offshoots of this people. The name of the tribe was adopted in the Teutonic languages as a generic term for all Celtic and Italian peoples (O.H.G. Walha, A.S. Wealas), from which it is probably to be inferred that they were the Celtic people with whom the Teutonic races had the closest association in early

times. It has been thought that they inhabited the basin of the Weser, and a number of place-names in this district are supposed to be of Celtic origin. Farther to the south and west Ptolemy mentions a number of place-names which are certainly Celtic, e.g. Mediolanion, Aregelia, Lougidounon, Lokoriton, Segodounon. There is therefore great probability that a large part of western Germany east of the Rhine had formerly been occupied by Celtic peoples. In the east a Gaulish people named Cotini are mentioned, apparently in the upper basin of the Oder, and Tacitus speaks of a tribe in the same neighbourhood, the Osi, who he says spoke the Pannonian language. It is probable, therefore, that in other directions also the Germans had consider- ably advanced their frontier southwards at a comparatively recent period.

Coming now to the Germans proper, the basin of the Rhine between Strassburg and Mainz was inhabited by the Tribocci," Tribes Nemetes and Vangiones, farther down by the Mattiaci •a the about Wiesbaden, and the Ubii in the neighbourhood west and f Cologne; beyond them were the Sugambri, and "° ' in the Rhine delta the Batavi and other smaller tribes. All these tribes remained in subjection to the Romans. Beyond them were the Tencteri, probably about the basin of the Lahn, and the Usipetes about the basin of the Ruhr. The

Their move meats.

basin of the Lippe and the upper basin of the Ems were inhabited by the Bructeri, and in the same neighbourhood were the Ampsi- varii, who derive their name from the latter river. East of them lay the Chasuarii, presumably in the basin of the Hase. The upper basin of the Weser was inhabited by the Chatti, whose capital was Mattium, supposed to be Maden on the Eder. To the north-west of them were situated the Marsi, apparently between the Diemel and the Lippe, while the central part of the basin of the Weser was inhabited by the Cherusci, who seem to have extended considerably eastward. The lower part of the river-basin was inhabited by the Angrivarii. The coastlands north of the mouth of the Rhine were occupied by the Cannine- fates, beyond them by the Frisii as far as the mouth of the Ems, thence onward to the mouth of the Elbe by the Chauci. As to the affinities of all these various tribes we have little definite information, but it is worth noting that the Batavi in Holland are said to have been a branch of the Chatti, from whom they had separated owing to a seditio domestica. The basin of the Elbe was inhabited by Suebic tribes, the chief of which were the Marcomanni, who seem to have been settled on the Saale during the latter part of

the 1st century B.C., but moved into Bohemia before the beginning of the Christian era, where they at once became a formidable power under their king Maroboduus. The Quadi were settled somewhat farther east about the source of the Elbe. The Hermunduri in the basin of the Saale were in alliance with the Romans and occupied northern Bavaria with their consent. The Semnones apparently dwelt below the junction of the Saale and Elbe. The Langobardi (see Lombards) possessed the land between the territory of the Semnones and the mouth of the river. Their name is supposed to be preserved in Bardengau, south of Hamburg. From later evidence it is likely that another division of the Suebi inhabited western Holstein. The province of Schleswig (perhaps only the west coast) and the islands adjacent were inhabited by the Saxons, while the east coast, at least in later times, was occupied by the Angli. The coast 'of Mecklenburg was probably inhabited by the Varini (the later Warni). The eastern part of Germany was much less known to the Romans, information being particu- larly deficient as to the populations of the coast districts, though it seems probable that the Rugii inhabited the eastern part of Pomerania, where a trace of them is preserved in the name Riigenwalde. The lower part of the basin of the Oder was probably occupied by the Burgundiones, and the upper part by a number of tribes collectively known as Lugii, who seem to correspond to the Vandals of later times, though the early Roman writers apparently used the word Vandilii in a wider sense, embracing all the tribes of eastern Germany. Among the Lugii we may probably include the Silingae, who afterwards appear among the Vandals in Spain, and whose name is preserved in Slavonic form in that of the province Silesia. The Goths (Gotones) apparently inhabited the basin of the Vistula about the middle of its course, but the lower part of the basin was inhabited by non-Teutonic peoples, among whom we may mention the Galindi, probably Prussians, and the Aestii, either Prussian or Esthonian, in the coastlands at the mouth of the river, who are known especially in connexion wnh the amber trade. To the east of the Vistula were the Slavonic tribes (Veneti), and amongst them, perhaps rather to the north, a Finnish population(Fenni), which disappeared in later times.

In the time of Augustus by far the most powerful ruler in Germany was Maroboduus, king of the Marcomanni. His supremacy extended over all the Suebic tribes (except Domestic perhaps the Hermunduri), and most of the peoples wars of eastern Germany, including apparently the Lugii of the and Goths. But in the year a.d. 1 7 he became involved ermans. in an unsuccessful campaign against Arminius, prince of the Cherusci, in which the Semnones and

Langobardi revolted against him, and two years later he was deprived of his throne by a certain Catualda. The latter, however, was soon expelled by Vibilius,king of the Hermunduri, and his power was transferred to Vannius, who belonged to the Quadi. About the same time Arminius met his death while trying to make himself king of the

Cherusci. In the year 28 the Frisians revolted from the Romans, and though they submitted again in the year 47, Claudius immediately afterwards recalled the Roman troops to the left bank of the Rhine. In the year 50 Vannius, king of the Suebi, was driven from the throne by Vibilius, king of the Hermunduri, and his nephews Vangio and Sido obtained his kingdom. In the year 58 the Chatti suffered a serious disaster in a campaign against the Hermunduri. They seem, however, to have recovered very soon, and at the end of the 1st century had apparently extended their power at the expense of the Cherusci. During the latter part of the 1st century the Chauci seem to have been enlarging their territories: as early as the year 47 we find them raiding the Roman lands on the lower Rhine, and in 58 they expelled the Ampsivarii, who after several vain attempts to acquire new possessions were annihilated by the neighbouring tribes. During the last years of the 1st century the Angrivarii are found moving westwards, probably under pressure from the Chauci, and the power of the Bructeri was almost destroyed by their attack. In 69 the Roman territory on the lower Rhine was disturbed by the serious revolt of Claudius Civilis, a prince of the Batavi who had served in the Roman army. He was joined by the Bructeri and other neighbouring tribes, but being defeated by Petilius Cerealis (afterwards consular legate in Britain) at Vetera and in other engagements gaye up the struggle and arranged a capitulation in a.d. 76. By the end of the 1st century the Chauci and Chatti seem to have become by far the most powerful tribes in western Germany, though the former are seldom mentioned after this time.

After the time of Tacitus our information regarding German affairs becomes extremely meagre. The next important con- flict with the Romans was the Marcomannic War (166-180), in which all the Suebic tribes together with the Vandals (apparently the ancient Lugii) and the Sarmatian lazyges seem to have taken part. Peace was

made by the emperor Commodus in a.d. 180 on payment of large sums of money.

About the beginning of the 3rd century we find a forward movement in south-west Germany among a group of tribes Th Ai – known collectively as Alamanni (q.v.) who came in manni. conflict with the emperor Caracalla in the year 213. the Qoths About the same time the Goths also made their first and the appearance in the south-east and soon became the most formidable antagonists of Rome. In the year 251 they defeated and slew the emperor Decius, and in the reign of Gallienus their fleets setting out from the north of the Black Sea worked great havoc on the coast of the Aegean (see Goths). It is not to be supposed, however, that they had quitted their own lands on the Vistula by this time. In this connexion we hear also of the Heruli (q.v.), who some twenty years later, about 289, make their appearance in the western seas. In 286 we hear for the first time of maritime raids by the Saxons in the same quarter. About the .middle of the 3rd century the name Franks {q.v.) makes its first appearance, apparently a new collective term for the tribes of north-west Germany from the Chatti to the mouth of the Rhine.

In the 4th century the chief powers in western Germany were the Franks and the Alamanni, both of whom were in constant conflict with the Romans. The former were pressed Arrival j n tne j r rear by tne Saxons, who at some time before the middle of the 4th century appear to have invaded and conquered a considerable part of north-west Germany. About the same time great national movements seem to have been taking place farther east. The Burgundians made their appearance in the west shortly before the end of the 3rd century, settling in the basin of the Main, and it is probable that some portions of the north Suebic peoples, perhaps the ancient Semnones, had already moved westward. By the middle of the 4th century the Goths had become the dominant power in eastern Germany, and their King Hermanaric held a supremacy which seems to have stretched from the Black Sea to Holstein. At his death, however, the supremacy of eastern Germany passed to the Huns, an invading people from the east, whose arrival seems to have produced a complete displacement of

of the Huns.

population in this region. With regard to the course of events in eastern Germany we have no knowledge, but during the 5th century several of the peoples previously settled there appear to have made their way into the lands south of the Carpathians and Riesengebirge,

amongst whom (besides the Goths) may be especially mentioned the Rugii and the Gepides, the latter perhaps originally a branch of the Goths. According to tradition the Vandals had been driven into Pannonia by the Goths in the time of Constantine. We do not know how far northward the Hunnish power reached in the time of Attila, but the in- vasion of this nation was soon followed by a great westward movement of the Slavs.

In the west the Alamanni and the descendants of the Marco- manni, now called Baiouarii (Bavarians), had broken through the frontiers of the Roman provinces of Vindelicia The Bur- and Noricum at the beginning of the $th century, gundians while the Vandals together with some of the Suebi and other and the non-Teutonic Alani from the east crossed trlbes% the Rhine and invaded Gaul in 406. About 435-440 the Bur- gundians were overthrown by Attila, and their king Guntha- carius (Gundahar) killed. The remains of the nation • shortly afterwards settled in Gaul. About the same time the Franks overran and occupied the modern Belgium, and in the course of the next half-century their dominions were enormously extended towards the south (see Franks). After the death of Attila in 453 the power of the Huns soon collapsed, but the political divisions of Germany in the ensuing period are far from clear.

In the 6th century the predominant peoples are the Franks, Frisians, Saxons, Alamanni, Bavarians, Langobardi, Heruli and Warni. By the beginning of this century the f ne Saxons seem to have penetrated almost, if not quite, Franks to the Rhine in the Netherlands. Farther south, and others however, the old land of the Chatti was included in lnthe 6th thekingdomof Clovis. Northern Bavaria was occupied cen ury ‘ by the Franks, whose king Clovis subdued the Alamanni in 495. To the east of the Franks between the Harz, the Elbe and the Saale lay the kingdom of the Thuringi, the origin of whom is not clear. The Heruli also had a powerful kingdom, probably in the basin of the Elbe, and to the east of them were the Lango- bardi. The Warni apparently now dwelt in the regions about the mouth of the Elbe, while the whole coast from the mouth of the Weser to the west Scheldt was in the hands of the Frisians. By this time all the country east of the lower Elbe seems to have been Slavonic. In the north, perhaps in the province of Schleswig, we hear now for the first time of the Danes. Theodoric, king of the Ostrogoths, endeavoured to form a confederacy with the Thuringi, Heruli and Warni against Clovis in order to protect the Visigoths in the early years of the 6th century, but very shortly afterwards the king of the Heruli was slain by the Langobardi and their existence as an independent power came to an end. In 531 the Thuringian kingdom was destroyed by the Frankish

king Theodoric, son of Clovis, with whom the Saxons were in alliance.

During the 6th and 7th centuries the Saxons were intermit- tently under Frankish supremacy, but their conquest was not complete until the time of Charlemagne. Shortly j- ne after the middle of the 6th century the Franks were Saxons threatened with a new invasion by the Avars. In and the 567-568 the Langobardi, who by this time had moved ran s ' into the Danube basin, invaded Italy and were followed by those of the Saxons who had settled in Thuringia. Their lands were given by the Frankish king Sigeberht to the north Suebi and other tribes who had come either from the Elbe basin or possibly from the Netherlands. About the same time Sigeberht was defeated by the Avars, and though the latter soon withdrew from the Frankish frontiers, their course was followed by a movement of the Slavs, who occupied the basin of the Elster and penetrated to that of the Main.

By the end of the 6th century the whole basin of the Elbe except the Saxon territory near the mouth had probably become Slavonic. To the east of the Saale were the Sorbs (Sorabi), and beyond them the Daleminci and Siusli. To the east of the

Saxons were the Polabs (Polabi) in the basin of the Elbe, and beyond them the Hevelli about the Havel. Farther north in Mecklenburg were the Warnabi, and in eastern Holstein the Obotriti and the Wagri. To the east of the .Warnabi were the Liutici as far as the Oder, and beyond that river the Pomerani. To the south of the Oder were the Milcieni and the Lusici, and farther east the Poloni with their centre in the basin of the Vistula. The lower part of the Vistula basin, however, was in possession of Prussian tribes, the Prussi and Lithuani.

The Warni now disappear from history, and from this time the Teutonic peoples of the north as far as the Danish boundary about the Eider are called Saxons. The conquest of the Frisians by the Franks was begun by Pippin (Pepin) of Heristal in 689 and practically completed by Charles Martel, though they were not entirely brought into subjection until the time of Charle- magne. The great overthrow of the Saxons took place about 772-773, and by the

end of the century Charlemagne had extended his conquests to the border of the Danes. By this time the whole of the Teutonic part of Germany had been finally brought under his government.

Authorities. — Caesar, De hello Gallico, especially i. 31 ff., iv. 1-19, vi. 21 ff. ; Velleius Paterculus, especially ii. 105 ff. ; Strabo, especially pp. 193 ff., 290 ff . ; Pliny, Natural History, iv. §§ 99 ff ., 106; Tacitus, Annales, i. 38 ff., ii. 5 ff., 44 ff., 62 f.,.88; Germania, passim; Histories, iv. ; Ptolemy ii. 9, §§ 2 ff., 11, iii. 5, §§ 19 ff. ; Dio Cassius, passim; Julius Capitolinus; Claudius Mamertinus; Ammianus Marcellinus, passim; Zosimus; Jordanes, De origine Getarum; Procopius, De hello Gothico; K. Zeuss, Die Deutschen und die Nachbarstamme ; O. Bremer in Paul's Grundriss d. germ. Philologie (2nd ed.), vol. iii. pp. 735 ff. (F. G. M. B.)

MEDIEVAt AND MODERN HlSTOEY

When Clovis, or Chlodovech, became king of a tribe of the Salian Franks in 481, five years after the fall of the Western

empire, the region afterwards called Germany was Divisions divided into five main districts, and its history for Germany. tne succeeding three centuries is mainly the history

of the tribes inhabiting these districts. In the north- east, dwelling between the Rhine and the Elbe, were the Saxons (q.v.), to the east and south of whom stretched the extensive kingdom of Thuringia (q.v.). In the south-west the Alamanni occupied the territory afterwards called Swabia (q.v.), and ex- tended along the middle Rhine until they met the Ripuarian Franks, then living in the northern part of the district which at a later period was called after them, Franconia (q.v.); and in the south-east were the Bavarians, although it was some time before their country came to be known as Bavaria (q.v.).

Clovis was descended from Chlogio, or Clodion, who had ruled over a branch of the Salian Franks from 427 to 447, and whose

successors, following his example, had secured an J/CtoWsf influential position for their tribe. Having obtained

possession of that part of Gaul which lay between the Seine and the Loire, Clovis turned his attention to his eastern neighbours, and was soon engaged in a struggle with the Alamanni which probably arose out of a quarrel between them and the Ripuarian Franks for the possession of the middle Rhine. When in 496, or soon afterwards,

the Alamanni were defeated, they were confined to what was afterwards known as Swabia, and the northern part of their territory was incorporated withthekingdom of the Franks. Clovis had united the Salian Franks under his rule, and he persuaded, or compelled, the Ripuarian Franks also to accept him as their king; but on his death in 511 his kingdom was divided, and the Ripuarian, or Rhenish, Franks as they are sometimes called, together with some of the Alamanni, came under the rule of his eldest son Theuderich orTheodoricI. This was the first of the many partitions which effectually divided the kingdom of the Franks into an eastern and a western portion, that is to say, into divisions which eventually became Germany and France respectively, and the district ruled by Theuderich was almost identical with that which afterwards bore the name of Austrasia. In 531 Theuderich killed Hermannfried, king of the Thuringians, a former ally, with whom he had quarrelled, conquered his kingdom, and added its southern portion to his own possessions. His son and successor, Theudebert I., exercised

a certain supremacy over the Alamanni and the Bavarians, and even claimed authority over various Saxon tribes between whom and the Franks there had been some fighting. After his death in 548, however, the Frankish power in Germany sank to very minute proportions, a result due partly to the spirit of tribal independence which lingered among the German races, but principally to the paralysing effect of the unceasing rivalry between Austrasia and Neustria. From 548 the Alamanni were ruled by a succession of dukes who soon made themselves in- dependent; and in 555 a duke of the Bavarians, who exercised his authority without regard for the Frankish supremacy, is first mentioned. In Thuringia, which now only consisted of the central part of the former kingdom, King Dagobert I. set up in 634 a duke named Radulf who soon asserted his independence of Dagobert and of his successor, Sigebert III. The Saxons for their part did not own even a nominal allegiance to the Frankish kings, whose authority on the right bank of the Rhine was con- fined to the district actually occupied by men of their own name, which at a later date became the duchy of Franconia. During these years the eastern border of Germany was constantly ravaged by various Slavonic tribes. King Dagobert sent troops to repel these marauders from time to time, but the main burden of defence fell upon the Saxons, Bavarians and Thuringians. The virtual independence of these German tribes lasted until the union of Austrasia and Neustria in 687, an achievement mainly due to the efforts of Pippin 6f Heristal, who soon became the actual, though not the nominal, ruler of the Frankish realm. Pippin and his son Charles

Martel, who was mayor of the palace from 717 to 741, renewed the struggle with the Germans and were soon successful in re-establishing the central power which the Merovingian kings had allowed to slip from their grasp. The ducal office was abolished in Thuringia, a series of wars reduced the Alamanni to strict dependence, and both countries were governed by Frankish officials. Bavaria was brought into subjection about the same time; the Bavarian law, com- mitted to writing between 739 and 748, strongly emphasizes the supremacy of the Frankish king, whose authority it recognizes as including the right to appoint and even to depose the duke of Bavaria. The Saxons, on the other hand, succeeded in retain- ing their independence as a race, although their country was ravaged in various campaigns and some tribes were compelled from time to time to pay tribute. The rule of Pippin the Short, both before and after his coronation as king, was troubled by constant risings on the part of his East Frankish or German subjects, but aided by his brother Carloman, who for a time administered this part of the Frankish kingdom, Pippin was generally able to deal with the rebels.

After all, however, even these powerful Frankish conquerors had but imperfect success in Germany. When they were present with their formidable armies, they could command . obedience; when engaged, as they often were, in saxons distant parts of the vast Frankish territory, they remain could not trust to the fulfilment of the fair promises tade pend- they had exacted. One of the chief causes of their ill-success was the continued independence of the Saxons. Evei since they had acquired the northern half of Thuringia, this war- like race had been extending its power. They were still heathens, cherishing bitter hatred towards the Franks, whom they regarded as the enemies both of their liberties and of their religion; and their hatred found expression, not only in expeditions into Frankish territory, but in help willingly rendered to every German confederation which wished to throw off the Frankish yoke. Hardly any rebellion against the dukes of the Franks, or against King Pippin, took place in Germany without the Saxons coming 'forward to aid the rebels. This was perfectly understood by the Frankish rulers, who tried again and again to put an end to the evil by subduing the Saxons. They could not, however, attain their object. An occasional victory was gained , and some border tribes were from time to time compelled to pay tribute; but the mass of the Saxons remained unconquered. This was partly due to the fact that the Saxons had not, like the other German confederations,adukewho, whenbeaten, could be held responsible

for the engagements forced upon him as the representative of his subjects. A Saxon chief who made peace with the Franks could undertake nothing for the whole people. As a conquering race, they were firmly compact; conquered, they were in the hands of the victor a rope of sand.

It was during the time of Pippin of Heristal and his son and grandson that the conversion of the Germans to Christianity was mainlyeffected. Some traces of Roman Christianity Christian- g) .jjj]j n g ere(j i n the Rhine valley and in southern Germany. Germany, but the bulk of the people were heathen, in spite of the efforts of Frank and Irish missionaries and the command of King Dagobert I. that all his subjects should be baptized. Rupert, bishop of Worms, had already made some progress in the work of converting the Bavarians and Alamanni, as had Willibrord among the Thuringians when St Boniface appeared in Germany in 7 1 7. Appointed bishop of the Germans byPopeGregory II., and supported byCharles Martel,hepreached with much success in Bavaria and Thuringia, notwithstanding some hostility from the clergy who disliked the influence of Rome. He founded or restored bishoprics in Bavaria, Thuringia and elsewhere, and in 742 presided over the first German council. When he was martyred in 755 Christianity was professed by all the German races except the Saxons, and the church, organized and wealthy, had been to a large extent brought under the control of the papacy. The old pagan faith was not yet entirely destroyed, and traces of its influence may still be detected in popular beliefs and customs. But still Christianity was dominant, and soon became an important factor in the process of civiliza- tion, while the close alliance of the German church with the papacy was followed by results of the utmost consequence for Germany.

The reign of Charlemagne is a period of great importance in the history of Germany. Under his rule the first signs of national unity and a serious advance in the progress of tchˆte- or(ˆ er an d civilization may be seen. The long struggle, magne. which ended in 804 with the submission of the Saxons to the emperor, together with the extension of a real Frankish authority over the Bavarians, brought the German races for the first time under a single ruler;

while war and government, law and religion, alike tended to weld them into one people. The armies of Charlemagne contained warriors from all parts of Germany; and although tribal law was respected and codified, legislation common to the whole empire was also introduced. The general establishment of the Frankish system of government and the presence of Frankish officials helped to break down the barriers of race, and the influence of Christianity was in the same direction. With the conversion of the Saxons the whole German race became nominally Christian; and their ruler was lavish in granting lands and privileges to prelates, and untiring in founding bishoprics, monasteries and schools. Measures were also taken for the security and good government of the country. Campaigns against the Slavonic tribes, if sometimes failing in their immediate object, taught those peoples to respect the power of the Frankish monarch; and the establishment of a series of marches along the eastern frontier gave a sense of safety to the neighbouring districts. The tribal dukes had all disappeared, and their duchies were split up into districts ruled by counts (q.v.), whose tendencies to independence the emperor tried to check by the visits of the missi dominici (q.v.). Some of the results of the government of Charlemagne were, however, less beneficial. His coronation as Roman emperor in 800, although it did not produce at the time so powerful an impression in Germany as in France, was fraught with consequences not always favourable for the former country. The tendencies of the tribe to independence were crushed as their ancient popular assemblies were discouraged; and the liberty of the freemen was curtailed owing to the exi- gencies of military service, while the power of the church was rarely directed to the highest ends.

The reign of the emperor Louis I. was marked by a number of abortive schemes for the partition of his dominions among his sons, which provoked a state of strife that was largely responsible for the increasing weakness of the Empire. The mild nature of

his rule, however, made Louis popular with his German subjects, to whose support mainly he owed his restoration to power on two occasions. When in 825 his son Louis, after- wards called ” the German,” was entrusted with the and his government of Bavaria and from this centre gradually sons. extended his authority over the Carolingian dominions east of the Rhine, a step was taken in the process by which East Francia, or Germany, was becoming a unit distinguish- able from other portions of the Empire; a process which was carried further by the treaty of Verdun in August 843, when,

after a struggle between Louis the German and his brothers for their father's inheritance, an arrangement was made by which Louis obtained the bulk of the lands east of the Rhine together with the districts around Mainz, Worms and Spires on the left bank. Although not yet a single people, the German tribes had now for the first time a ruler whose authority was confined to their own lands, and from this time the beginnings of national life may be traced. For fifty years the main efforts of Louis were directed to defending his kingdom from the inroads of his Slavonic neighbours, and his detachment from the rest of the Empire necessitated by these constant engagements towards the east, gradually gave both him and his subjects a distinctive character, which was displayed and emphasized when, in ratifying an alliance with his half-brother, the West-Frankish king, Charles the Bald, the oath was sworn in different tongues. The East and West Franks were unable to understand each other's speech, so Charles took the oath in a Romance, and Louis in a German dialect.

*Important as is the treaty of Verdun in German history, that of Mersen, by which Louis and Charles the Bald settled in 870 their dispute over the kingdom of Lothair, second son /, ou / s u, e of the emperor Lothair I., is still more important. German The additional territory which Louis then obtained and his gave to his dominions almost the proportions which succ * ssors ° Germany maintained throughout the middle ages. They were bounded on the east by the Elbe and the Bohemian mountains, and on the west beyond the Rhine they included the districts known afterwards as Alsace and Lorraine. His jurisdiction embraced the territories occupied by the five ancient German tribes, and included the five archbishoprics of Mainz, Treves (Trier), Cologne, Salzburg and Bremen. When Louis died in 876 his kingdom was divided among his three sons, but as the two elder of these soon died without heirs, Germany was again united in 882 under his remaining son Charles, called " the Fat," who soon became ruler of almost the whole of the extensive domains of Charlemagne. There was, however, no cohesion in the restored empire, the disintegration of which, moreover, was hastened by the ravages of the Northmen, who plundered the cities in the valley of the Rhine. Charles attempted to buy off these redoubtable invaders, a policy which aroused the anger of his German subjects, whose resentment was accentuated by the king's indifference to their condition, and found expression in 887 when Arnulf, an illegitimate son of Carloman, the eldest son of Louis the German, led an army of Bavarians against him. Arnulf himself was recognized as German or East-Frankish king, although his actual authority was confined to*

Bavaria and its neighbourhood. He was successful in freeing his kingdom for a time from the ravages of the Northmen, but was not equally fortunate in his contests withthe Moravians. After his death in 899 his kingdom came under the nominal rule of his young son Louis " the Child," and in the absence of firm rule and a central authority became the prey of the Magyars and other hordes of invaders.

During these wars feudalism made rapid advance in Germany. The different peoples compelled to attend to their own defence appointed dukes for special military services (see Duke); and these dukes, chosen often from members /n eu aUsm of the old ducal families, succeeded without much Germany. difficulty in securing a more permanent position for themselves and their descendants. In Saxony, for example, we hear of Duke Otto the Illustrious, who also ruled over Thuringia; and during the early years of the 10th century dukes

§3+

GERMANY

[HISTORY

Conrad I.

appear iq Franconia, Bavaria, Swabia and Lorraine. These dukes acquired large tracts of land of which they gave grants on conditions of military service to persons on whom they could rely; while many independent landowners sought their protection on terms of vassalage. The same process took place in the case of great numbers of freemen of a lower class, who put themselves at the service of their more powerful neighbours in return for protection. In this manner the feudal tenure of land began to prevail in almost all parts of Germany, and the elaborate social system which became known as feudalism was gradually built up. The dukes became virtually independent, and when Louis the Child died in 911, the royal authority existed in name only.

While Louis the Child lived the German dukes were virtually kings in their duchies, and their natural tendency was to make themselves absolute rulers. But, threatened as they were by the Magyars, with the Slavs and Northmen always ready to take advantage of their weakness, they could not afford to do without a central government. Accordingly the nobles assembled at Forchheim, and by the advice of Otto the Illustrious, duke of Saxony, Conrad of Franconia was

chosen German king. The dukes of Bavaria, Swabia and Lorraine were displeased at this election, probably because Conrad was likely to prove considerably more powerful than they wished. Rather than acknowledge him, the duke of Lotharingia, or Lorraine, transferred his allegiance to Charles the Simple of France; and it was in vain that Conrad protested and despatched armies into Lorraine. With the help of the French king the duke maintained his ground, and for the time his country was lost to Germany. Bavaria and Swabia yielded, but, mainly through the fault of the king himself, their submission was of brief duration. The rise of the dukes had been watched with extreme jealousy by the leading prelates. They saw that the independence they had hitherto enjoyed would be much more imperilled by powerful local governors than by a sovereign who necessarily regarded it as part of his duty to protect the church. Hence they had done everything they could to prevent the dukes from extending their authority, and as the government was carried on during the reign of Louis the Child mainly by Hatto I., archbishop of Mainz, they had been able to throw considerable obstacles in the way of their rivals. They had now induced Conrad to quarrel with both Swabia and Bavaria, and also with Henry, duke of Saxony, son of the duke to whom he chiefly owed his crown. In these contests the German king met with indifferent success, but the struggle with Saxony was not very serious, and when dying in December 919 Conrad recommended the Franconian nobles to offer the crown to Henry, the only man who could cope with the anarchy by which he had himself been baffled.

The nobles of Franconia acted upon the advice of their king, and the Saxons were very willing that their duke should rise to still higher honours. Henry I. , called " the Fowler," who was chosen German king in May 919, was one of the best of German kings, and was a born statesman and warrior. His ambition was of the noblest order, for he sank his personal interests in the cause of his country, and he knew exactly when to attain his objects by force, and when by concession and moderation. Almost immediately he overcame the opposition of the dukes of Swabia and Bavaria; some time later, taking advantage of the troubled state of France, he accepted the homage of the duke of Lorraine, which for many centuries afterwards remained a part of the German kingdom.

Having established internal order, Henry was able to turn to matters of more pressing moment. In the first year of his reign the Magyars, who had continued to scourge Henry Germany during the reign of Conrad, broke into Saxony and plundered the land almost without hind- rance. In 924 they returned, and this time by good fortune one

of their greatest princes fell into the hands of the Germans. Henry restored him to his countrymen on condition that they made a truce for nine years; and he promised to pay yearly tribute during this period. The barbarians accepted his terms, and faithfully kept their word in regard to Henry's own

*Henry the Fowler**

work in Saxonyˆ

and the Magyars.

lands, although Bavaria, Swabia and Franconia they occasionally invaded as before. The king made admirable use of the oppor- tunity he had secured, confining his efforts, however, to Saxony and Thuringia, the only parts of Germany over which he had any control.

In the southern and western German lands towns and fortified places had long existed; but in the north, where Roman influence had only been feeble, and where even the Franks had not exercised much authority until the time of Henry's Charlemagne, the people still lived as in ancient times, either on solitary farms or in exposed villages. Henry saw that, while this state of things lasted, the population could never be safe, and began the construction of fortresses and walled towns. Of every group of nine men one was compelled to devote himself to this work, while the remaining eight cultivated his fields and allowed a third of their produce to be stored against times of trouble. The necessities of military discipline were also a subject of attention. Hitherto the Germans had fought mainly on foot, and, as the Magyars came on horseback, the nation was placed at an immense disadvantage. A powerful force of cavalry was now raised, while at the same time the infantry were drilled in new and more effective modes of fighting. Although these preparations were carried on directly under Henry's supervision, only in Saxony and Thuringia the neigh- bouring dukes were stimulated to follow his example. When he was ready he used his new troops, before turning them against their chief enemy, the Magyars, to punish refractory Slavonic tribes; and he brought under temporary subjection nearly all the Slavs between the Elbe and the Oder. He proceeded also against the Bohemians, whose duke was compelled to do homage.

The truce with the Magyars was not renewed, whereupon in 933 a body of invaders crossed, as in former years, the frontier of Thuringia. Henry prudently waited until dearth of provisions forced the enemy to divide into two |" fie bands. He then swept down upon

the weaker force, return. annihilated it, and rapidly advanced against the remaining portion of the army. The second battle was more severe than the first, but not less decisive. The Magyars, unable to cope with a disciplined army, were cut down in great numbers, and those who survived rode in terror from the field. The exact scenes of these conflicts are not known, although the date of the second encounter was the 15th of March 933; but few more important battles have ever been fought. The power of the Magyars was not indeed destroyed, but it was crippled, and the way was prepared for the effective liberation of Germany from an intolerable plague. While the Magyars had been troubling Germany on the east and south, the Danes had been irritating her on the north. Charlemagne had established a march between the Eider and the Schlei; but in course of time the Danes had not only seized this territory, but had driven the German popula- tion beyond the Elbe. The Saxons had been slowly reconquering the lost ground, and now Henry, advancing with his victorious army into Jutland, forced Gorm, the Danish king, to become his vassal and regained the land between the Eider and the Schlei. But Henry's work concerned the duchy of Saxony rather than the kingdom of Germany. He concentrated all his energies on the government and defence of northern and eastern Germany, leaving the southern and western districts to profit by his example, while his policy of refraining from interference in the affairs of the other duchies tended to diminish the ill-feeling which existed between the various German tribes and to bring peace to the country as a whole. It is in these directions that the reign of Henry the Fowler marks a stage in the history of .Germany.

When this great king died in July 936 every land inhabited by a German population formed part of the German kingdom, and none of the duchies were at war either with him or among themselves. Along the northern and eastern frontier were tribu- tary races, and the country was for the time rid of an enemy which, for nearly a generation, had kept it in perpetual fear. Great as were these results, perhaps Henry did even greater service

GERMANY

887.1137

The Great Duchies

Boifndarf 0/ OirrMuˆ .. ‘ 1

KnglUh Mites

GERMANY 555ˆ57

Guttph lands. _„..

*The Transi'tion to Empire tUˆ f fˆ B l'[U Se "ˆ —***"**

*Boundary of Germany ■■■— cU. J3ˆS*ˆ- JCˆSt ˆff* 11*

Church Lands.

GERMANY

1254-1500

Mouse of Luxemburg (c.1$70) Fˆ ■ 1

s« 0/ Mf/ft»/rtoe •«•"«*« {=*{*

Palatinate I 1

House of Habtburg I _ |

Ecclesiastical States CˆZj

*Imperial Cities – ^^^^*

Dominions of Charles The Bold.. t I

Hanta Towns underlined Lubeck

*Boundary of Germany _ ..... . -~ˆ m ˆ m * »*

English Miles Ritzcbuttey

*to -o 10 *p \o too*

Emery Walker sc

HISTORY]

GERMANY

835

growth 0/ towns.

in beginning the growth of towns throughout north Germany. Not content with merely making them places of defence, he decreed that they should be centres for the administra- The tion of justice, and that in them should be held all public

festivities and ceremonies; he also instituted markets, and encouraged traders to take advantage of the oppor- tunities provided for them. A strong check was thus imposed upon the tendency of freemen to become the vassals of great lords. This movement had become so powerful by the troubles of the epoch that, had no other current of influence set in, the entire class of freemen must soon have disappeared. As they now knew that they could find protection without looking to a superior, they had less temptation to give up their independence, and many of them settled in the towns where they could be safe and free. Besides maintaining a manly spirit in the population, the towns rapidly added to their importance by the stimulus they gave to all kinds of industry and trade.

Before his death Henry obtained the promise of the nobles at a national assembly, or diet, at Erfurt to recognize his son Otto as his successor, and the promise was kept, Otto being chosen German king in July 936. Otto I. the Great began his reign under the most favourable circumstances. He was twenty-four years of age, and at the coronation festival, which was held at Aix-la-Chapelle, the dukes performed for the first time the nominally menial offices known as the arch-offices of the German kingdom. But these peaceful relations soon came to an end. Reversing his father's policy, Otto resolved that the dukes should act in the strictest sense as his vassals, or lose their dignities. At the time of his coronation Germany was virtually a federal state; he wished to transform it into a firm and compact monarchy. This policy speedily led to a formidable rebellion, headed by Thankmar, the king's half- brother, a fierce warrior, who fancied that he had a prior claim to the crown, and who secured a number of followers in Saxony. He was joined by Eberhard, duke of Franconia, and it was only by the aid of the duke of Swabia, whom the duke of Franconia had offended, that the rising was put down. This happened in 938, and in 939 a second rebellion, led by Otto's brother Henry, was supported by the duke of Franconia and by Giselbert, duke of Lorraine. Otto again triumphed, and derived immense ad- vantages from his success. The duchy of Franconia he kept in his own hands, and in 944 he granted Lorraine to Conrad the Red, an energetic and honourable count, whom he still further attached to hims.elf by giving him his daughter for his wife. Bavaria, on the death of its duke

in 947, was placed under his brother Henry, who, having been pardoned, had become a loyal subject. The duchy of Swabia was also brought into Otto's family by the marriage of his son Ludolf with Duke Hermann's daughter, and by these means Otto made himself master of the kingdom. For the time, feudalism in truth meant that lands and offices were held on condition of service; the king was the genuine ruler, not only of freemen, but of the highest vassals in the nation.

In the midst of these internal troubles Otto was attacked by the French king, Louis IV., who sought to regain Lorraine. _., , However, the German king was soon able to turn his

wars with arms against his new enemy; he marched into France France and made peace with Louis in 942. Otto's subsequent a ? d Z ltl ' interventions in the affairs of France were mainly directed towards making peace between Louis and his powerful and rebellious vassal, Hugh the Great, duke of the Franks, both of whom were married to sisters of the German king. Much more important than Otto's doings in France were his wars with his northern and eastern neighbours. The duke of Bohemia, after a long struggle, was brought to submission in. 950. Among the Slavs between .the Elbe and the Oder the king was represented by Margrave Gero, a warrior well fitted for the rough work he had to do, loyal to his sovereign, but capable of any treachery towards his enemies, who conquered much of the country north of Bohemia between the Oder and the upper and middle Elbe. Margrave Billung, who looked after the Abotrites on the lower Elbe, was less fortunate, mainly because

Otto la Italy.

of the neighbourhood of the Danes, who, after the death of King Henry, often attacked the hated Germans, but some progress was made in bringing this district under German influence. Otto, having profound faith in the power of the church to reconcile conquered peoples to his rule, provided for the benefit of the Danes the bishoprics of Schleswig, Ripen and Aarhus; and among those which he established for the Slavs were the important bishoprics of Brandenburg and Havelberg. In his later years he set up the archbishopric of Magdeburg, which took in the sees of Meissen, Zeitz and Merseburg.

Having secured peace in Germany and begun the real conquest of the border races, Otto was by far the greatest sovereign in Europe; and, had he refused to go beyond the limits within which he had hitherto

acted, it is probable that he would have established a united monarchy. But a decision to which he soon came deprived posterity of the results which might have sprung from the policy of his earlier years. About 951 Adelaide, widow of Lothair, son of Hugh, king of Italy, having refused to marry the son of Berengar, margrave of Ivrea, was cast into prison and cruelly treated. She appealed to Otto; other reasons called him in the same direction, and in 951 he crossed the Alps and descended into Lombardy. He displaced Berengar, and was so fascinated by Queen Adelaide that within a few weeks he was married to her at Pavia. But Otto's son, Ludolf, who had received a promise of the German crown, saw his rights threatened by this marriage. He went to an old enemy of his father, Frederick, archbishop of Mainz, and the two plotted together against the king, who, hearing of their proceedings, returned to Germany in 952, leaving Duke Conrad of Lorraine as his representative in Italy. Otto, who did not suspect how deep were the designs of the conspirators, paid a visit to Mainz, where he was seized and was com- pelled to take certain solemn pledges which, after his escape, he repudiated.

War broke out in 953, and the struggle was the most serious in which he had been engaged. In Lorraine, of which duchy Otto made his brother Bruno, archbishop of Cologne, administrator, his cause was triumphant; but every- where else dark clouds gathered over his head. Conrad the Red hurried from Italy and joined the rebels; in Swabia, in Bavaria, in Franconia and even in Saxony, the native land of the king, many sided with them. It is extremely remarkable that this movement acquired so quickly such force and volume. The explanation, according to some historians, is that the people looked forward with alarm to the union of Germany with Italy. There were still traditions of the hardships inflicted upon the common folk by the expeditions of Charlemagne, and it is supposed that they anticipated similar evils in the event of his empire being restored. Whether or not this be the true explana- tion, the power of Otto was shaken to its foundations. At last he was saved by the presence of an immense external peril. The Magyars were as usual stimulated to action by the disunion of their enemies; and Conrad and Ludolf made the blunder of inviting their help, a proceeding which disgusted the Germans, many of whom fell away from their side and rallied to the head and protector of the nation. In a very short time Conrad and the archbishop of Mainz submitted, and although Ludolf held out a little longer he soon asked for pardon. Lorraine was given to Bruno; but Conrad, its former duke, although thus punished, was not disgraced, for Otto needed his services in the war with the Magyars. The great battle against these foes was fought on the 10th of August 955 on the

Lechfeld near Augsburg. After a fierce and obstinate fight, in which Conrad and many other nobles fell, the Germans were victorious; the Magyars were even more thoroughly scourged than in the battles in which Otto's father had given them their first real check. The deliverance of Ger- many was complete, and from this time, notwithstanding certain wild raids towards the east, the Magyars began to settle in the land they still occupy, and to adapt themselves to the conditions of civilized life.

Entreated by Pope John XII., who needed a helper against

The civil war.

Defeat of Magyars.

Berengar, Otto went a second time to Italy, in 961; and on this occasion he received from the pope at Rome the imperial crown. In 966 he was again in Italy, where he re- otto mained six years, exercising to the full his imperial

empemr. rights in regard to the papacy, but occupied mainly in an attempt to make himself master of the southern, as well as of the northern half of the peninsula,

By far the most important act of Otto's eventful life was his assumption of the Lombard and the imperial crowns. His _ successors steadily followed his example, and the

ion of sovereign crowned at Aix-la-Chapelle claimed as his Germany right coronation by the pope in Rome. Thus grew with the U p tne n iy Roman Empire, that strange state which, mp ' directly descending through the empire of Charlema gne from the empire of the Caesars, contained so many elements foreign to ancient life. We are here concerned with it only as it affected Germany. Germany itself never until our own day became an empire. It is true that at last the Holy Roman Empire was in reality confined to Germany; but in theory it was something quite different. Like France, Germany was a kingdom, but it differed from France in this, that its king was also king in Italy and Roman emperor. As the latter title made him nominally the secular lord of the world, it might have been expected to excite the

pride of his German subjects; and doubtless, after a time, they did learn to think highly of them- selves as the imperial race. But the evidence tends to show that at first at least they had no wish for this honour, and would have preferred their ruler to devote himself entirely to his own people.

There are signs that during Otto's reign they began to have a distinct consciousness of national life, their use of the word " deutsch " to indicate the whole people being one of these symptoms. Their common sufferings, struggles and triumphs, however, account far more readily for this feeling than the supposition that they were elated by their king undertaking obligations which took him for years together away from his native land. So solemn were the associations of the imperial title that, after acquiring it, Otto probably looked for more intimate obedience from his subjects. They were willing enough to admit the abstract claims of the Empire; but in the world of feudalism there was a multitude of established customs and rights which rudely conflicted with these claims, and in action, remote and abstract considerations gave way before concrete and present realities. Instead of strengthening the allegiance of the Germans towards their sovereign, the imperial title was the means of steadily undermining it. To the connexion of their kingdom with the Empire they owe the fact that for centuries they were the most divided of European nations, and that they have only recently begun to create a genuinely united state. France was made up of a number of loosely connected lands, each with its own lord, when Germany, under Otto, was to a large extent moved by a single will, well organized and strong. But the attention of the French kings was concentrated on their immediate interests, and in course of time they brought their unruly vassals to order. The German kings, as emperors, had duties which often took them away for long periods from Germany. This alone would have shaken their authority, for, during their absence, the great vassals seized rights which were afterwards difficult to recover. But the emperors were not merely absent, they had to engage in struggles in which they exhausted the energies necessary to enforce obedience at home; and, in order to obtain help, they were sometimes glad to concede advantages to which, under other conditions, they would have tenaciously clung. Moreover, the greatest of all their struggles was with the papacy; so that a power outside their kingdom, but exercis. ing immense influence within it, was in the end always prepared to weaken them by exciting dissension among their people. Thus the imperial crown was the most fatal gift that could have been offered to the German kings; apparently giving them all things, it deprived them of nearly

everything. And in doing this it inflicted on many generations incalculable and needless suffering.

By the policy of his later years Otto did much to prepare the way for the process of disintegration which he rendered inevitable by restoring the Empire. With the kingdom divided into five great duchies, the sovereign could OU % th always have maintained at least so much unity as Henry duchies. the Fowler secured; and, as the experience of Otto himself showed, there would have been chances of much greater centralization. Yet he threw away this advantage. Lorraine was divided into two duchies, Upper Lorraine and Lower Lorraine. In each duchy of the kingdom he appointed a count palatine, whose duty was to maintain the royal rights ; and after Margrave Gero died in 965 his territory was divided into three marches, and placed under margraves, each with the same powers as Gero. Otto gave up the practice of retaining the duchies either in his own hands or in those of relatives. Even Saxony, his native duchy and the chief source of his strength, was given to Margrave Billung, whose family kept it. for many years. To combat the power of the princes, Otto, especially after he became emperor and looked upon himself as the protector of the church, immensely increased the importance of the prelates. They received great gifts of land, were endowed with jurisdiction in criminal as well as civil cases, and obtained several other valuable sovereign rights. The emperor's idea was that, as church lands and offices could not be hereditary, their holders would necessarily favour the crown. But he forgot that the church had a head outside Germany, and that the passion for the rights of an order may be not less intense than that for the rights of a family. While the Empire was at peace with the popes the prelates did strongly uphold it, and their influence was unquestionably, on the whole, higher than that of rude secular nobles. But with the Empire and the Papacy in conflict, they could not but abide, as a rule, by the authority which had the most sacred claims to their loyalty. From all these circumstances it curiously happened that the sovereign who did more than almost any other to raise the royal power, was also the sovereign who, more than any other, wrought its decay.'

Otto II. had been crowned German king at Aix-la-Chapelle and emperor at Rome during his father's lifetime. Becoming sole ruler in May 973, his troubles began in Lorraine, but were more serious in Bavaria, which was now a very important duchy. Its duke, Henry, the brother of Otto I., had died in 955 and had been succeeded by a young son, Henry, whose turbulent career subsequently induced the Bavarian historian Aventinus to describe him as. rixosus, or the Quarrel- some. In 973 Burchard II., duke of Swabia, died, and the

new emperor refused to give this duchy to Henry, further irritating this duke by bestowing it upon his enemy, Otto, a grandson of the emperor Otto I. Having collected allies Henry rebelled, and in 976 the emperor himself marched against him and drove him into Bohemia. Bavaria was taken from him and given to Otto of Swabia, but it was deprived of some of its importance. The southern part, Carinthia, which had hitherto been a march district, was separated from it and made into a duchy, and the church in Bavaria was made dependent upon the king and not upon the duke. Having arrived at this settlement Otto marched against the Bohemians, but while he was away from Germany war was begun against him by Henry, the new duke of Carinthia, who, forgetting the benefits he had just received, rose to avenge the wrongs of his friend, the deposed duke Henry of Bavaria. The emperor made peace with the Bohemians and quickly put down the rising. Henry of Bavaria was handed over to the keeping of the bishop of Utrecht and Carinthia received another duke.

In his anxiety to obtain possession of southern Italy, Otto I. had secured as a wife for his son and successor Theophano, daughter of the East Roman emperor, Romanus II., the ruler of much of southern Italy. Otto II., p rance , having all his father's ambition with much of his strength and haughtiness, longed to get away from Germany and to claim these remoter districts. But he was detained for some time owing to the sudden invasion of Lower Lorraine by Lothair, king of France, in 978. So stealthily did the invader

Otto II.

HISTORY]

GERMANY

»37

Otto la Italy.

advance that the emperor had only just time to escape from Aix-la-Chapelle before the town was seized and plundered. As quickly as possible Otto placed himself at the head of a great army and marched to Paris, but he was compelled to retreat without taking the city, and in 980 peace was made.

At last, after an expedition against the Poles, Otto was able to fulfil the wish of his heart; he went to Italy in 980 and never returned to Germany. His claims to southern Italy were vehemently opposed, and

in July 982 he suffered a disastrous defeat at the hands of the East Roman emperor's subjects and their Saracen allies. The news of this crushing blow cast a gloom over Germany, which was again suffering from the attacks of her unruly neighbours. The Saxons were able to cope with the Danes and the German boundary was pushed forward in the south-east; but the Slavs fought with such courage and success that during the reigns of the emperors Otto II. and Otto III. much of the work effected by the margraves Hermann Billung and Gero was undone, and nearly two centuries passed before they were driven back to the position which they had perforce occupied under Otto the Great. Such were the first-fruits of the assumption of the imperial crown.

About six months before his death in Rome, in December 983, Otto held a diet at Verona which was attended by many of the German princes, who recognized his infant ' son Otto as his successor. Otto was then taken to Germany, and after his father's death he was crowned at Aix-la-Chapelle on Christmas Day 983. Henry of Bavaria was released from his confinement and became his guardian; but as this restless prince showed an inclination to secure the crown for himself, the young king was taken from him and placed in the care of his mother Theophano. Henry, however, gained a good deal of support both within and without Germany and caused much anxiety to Otto's friends, but in 985 peace was made and he was restored to Bavaria. While Theophano acted as regent, the chief functions of government were discharged by Willigis, archbishop of Mainz (d. ion), a vigorous prelate who had risen from a humble rank to the highest position in the German Church. He was aided by the princes, each of whom claimed a voice in the administration, and, during the lifetime of Theophano at least, a stubborn and sometimes a successful resistance was offered to the attacks of the Slavs. But under the prevalent conditions a vigorous rule was impossible, and during Otto's minority the royal authority was greatly weakened. In Saxony the people were quickly forgetting their hereditary connexion with the successors of Henry the Fowler; in Bavaria, after the death of Duke Henry in 995, the nobles, heedless of the royal power, returned to the ancient German custom and chose Henry's son Henry as their ruler.

In 995 Otto III. was declared to have reached his majority. He had been so carefully trained in all the learning of the time that he was called the " wonder of the world," and a character certain fascination still belongs to his imaginative and of Otto. fantastic nature. Imbued by his mother with the extravagant ideas of the East Roman emperors he introduced into his court an amount of

splendour and ceremonial hitherto unknown in western Europe. The heir of the western emperors and the grandson of an eastern emperor, he spent most of his time in Rome, and fancied he could unite the world under his rule. In this vague design he was encouraged by Gerbert, the greatest scholar of the day, whom, as Silvester II., he raised to the papal throne. Meanwhile Germany was suffering severely from internal disorders and from the inroads of her rude neighbours; and when in the year 1000 Otto visited his northern kingdom there were hopes that he would smite these enemies with the vigour of his predecessors. But these hopes were disappointed; on the contrary, Otto seems to have released Boleslaus, duke of the Poles, from his vague allegiance to the German kings, and he founded an archbishopric at Gnesen, thus freeing the Polish sees from the authority of the archbishop of Magdeburg.

When Otto III. died in January 1002 there remained no representative of the elder branch of the imperial family, and several candidates came forward for the vacant throne. Among these candidates was Henry of Bavaria, son eary of Duke Henry the Quarrelsome and a great-grandson of Henry the Fowler, and at Mainz in June 1002 this prince was chosen German king as Henry II. Having been recognized as king by the Saxons, the Thuringians and the nobles of Lorraine, the new king was able to turn his attention to the affairs of government, but on the whole his reign was an unfortunate one for Germany. For ten years civil war raged in Lorraine; in Saxony much blood was shed in petty quarrels; and Henry made expeditions against his turbulent vassals in Flanders and Friesland. He also interfered in the affairs of Burgundy, but the acquisition of this kingdom was the work of his successor, Conrad II. During nearly the whole of this reign the Germans were fighting the Poles. Boleslaus of Poland, who was now a very powerful sovereign, having conquered Lusatia and Silesia, brought Bohemia also under his rule and was soon at variance with the German king. Anxious to regain these lands Henry allied himself with some Slavonic tribes, promising not to interfere with the exercise of their heathen religion, while Boleslaus found supporters among the discontented German nobles. The honours of the ensuing war were with Henry, and when peace was made in 1006 Boleslaus gave up Bohemia, but the struggle was soon renewed and neither side had gained any serious advantage when peace was again made in 1013. A third Polish war broke out in 1015. Henry led his troops in person and obtained assistance from the Russians and the Hungarians; peace was concluded in 1018, the Elbe remaining the north-east boundary of Germany. Henry made three journeys to Italy, being crowned king of the Lombards at Pavia

in 1004 and emperor at Rome ten years later. Before the latter event, in order to assert his right of sovereignty over Rome, he called himself king of the Romans, a designation which henceforth was borne by his successors until they received the higher title from the pope. Hitherto a sovereign crowned at Aix-la-Chapelle had been " king of the West Franks," or " king of the Franks and Saxons." Henry was generous to the church, to which he looked for support, but he maintained the royal authority over the clergy. Although generally unsuccessful he strove hard for peace, and during this reign the principle of inheritance was virtually established with regard to German fiefs.

After Henry's death the nobles met at Kamba, near Oppen- heim, and in September 1024 elected Conrad, a Franconian count, to the vacant throne. Although favoured by the German clergy the new king, Conrad II., had to face some opposition; this, however, quickly vanished and he re- ceived the homage of the nobles in the various duchies and seemed to have no reason to dread internal enemies. Nevertheless, he had soon to battle with a conspiracy headed by his stepson, Ernest II., duke of Swabia. This was caused primarily by Conrad's avowed desire to acquire the kingdom of Burgundy, but other reasons for dissatisfaction existed, and the revolting duke found it easy to gather around him the scattered forces of dis- content. However, the king was quite able to deal with the rising, which, indeed, never attained serious proportions, although Ernest gave continual trouble until his death in 1030. With regard to the German duchies Conrad followed the policy of Otto the Great. He wished to control, not to abolish them. In 1026, when Duke Henry of Bavaria died, he obtained the duchy for his son Henry, afterwards the emperor Henry III.; later, despite the opposition of the nobles, he invested the same prince with Swabia, where the ducal family had died out. Franconia was in the hands of Conrad himself; thus Saxony, Thuringia, Carinthia and Lorraine were the only duchies not completely dependent upon the king.

When Conrad ascended the throne the safety of Germany was endangered from three different points. On the north was Denmark ruled by Canute the Great; on the east was the wide Polish state whose ruler, Boleslaus, had just taken the title of king; and on the south-east was Hungary, which under its king,

[HISTORY

Conrad la Italy.

St Stephen, was rapidly becoming an organized and formidable power. Peace was maintained with Canute, and in 1035 a treaty The was concluded and the land between the Eider and

neigh- the Schlei was ceded to Denmark. In 1030 Conrad bouting waged a short war against Hungary, but here also countries. ˆ e was obliged to assent to a cession of territory. In Poland he was more fortunate. After the death of Boleslaus in 1025 the Poles plunged into a civil war, and Conrad was able to turn this to his own advantage. In 103 1 he recovered Lusatia and other districts, and in 1033 the Polish duke of Mesislaus did homage to him at Merseburg. His authority was recognized by the Bohemians, and two expeditions taught the Slavonic tribes between the Elbe and the Oder to respect his power.

In Italy, whither he journeyed in 1026 and 1036, Conrad was not welcomed. Although as emperor and as king of the Lombards he was the lawful sovereign of that country, the Germans were still regarded as intruders and could only maintain their rights by force. The event which threw the greatest lustre upon this reign was the acquisition of the kingdom of Burgundy, or Aries, which was bequeathed to Conrad by its king, Rudolph III., the uncle of his wife, Gisela. Rudolph died in 1032, and in 1033 Conrad was crowned king at Peterlingen, being at once recognized by the German-speaking population. For about two years his rival, Odo, count of Champagne, who was supported by the Romance-speaking inhabitants, kept up the struggle against him, but eventually all opposition was overcome and the possession of Burgundy was assured to the German king.

This reign is important in the history of Germany because it marks the beginning of the great imperial age, but it has other The features- of interest. In dealing with the revolt of

nobles Ernest of Swabia Conrad was aided by the reluctance and the f the vassals of the great lords to follow them against a ” ‘ the king. This reluctance was due largely to the

increasing independence of this class of landholders, who were beginning to learn that the sovereign, and not their immediate lord, was the protector of their liberties; the independence in its turn arose from the growth of the principle of heredity. In Germany Conrad did

not definitely decree that fiefs should pass from father to son, but he encouraged and took advantage of the tendency in this direction, a tendency which was, obviously, a serious blow at the power of the great lords over their vassals. In 1037 he issued from Milan his famous edict for the kingdom of Italy which decreed that upon the death of a landholder his fief should descend to his son, or grandson, and that no fiefholder should be deprived of his fief without the judgment of his peers. In another direction Conrad's policy was to free himself as king from dependence upon the church. He sought to regain lands granted to the church by his predecessors; prelates were em- ployed on public business much less frequently than heretofore. He kept a firm hand over the church, but his rule was purely secular; he took little or no interest in ecclesiastical affairs. During this reign the centre and basis of the imperial power in Germany was moved southwards. Saxony, the home of the Ottos, became less prominent in German politics, while Bavaria and the south were gradually gaining in importance.

Henry III., who had been crowned German king and also king of Burgundy during his father's lifetime, took possession of his great inheritance without the slightest sign of opposition, in June 1039. He was without the im- pulsiveness which marred Conrad's great qualities, but he had the same decisive judgment, wide ambition and irresistible will as his father. During the late king's concluding years a certain Bretislaus, who had served Conrad with distinction in Lusatia, became duke of Bohemia and made war upon the disunited Poles, easily bringing them into subjection. Thus Germany was again threatered with the establishment of a great and independent Slavonic state upon her eastern frontier. To combat this danger Henry invaded Bohemia, and after two reverses compelled Bretislaus to appear before him as a suppliant at Regensburg. The German king treated his foe generously

Henry's wars.

Henry III.

of a loyal vassal; he also gained the goodwill of the Poles by helping to bring about the return of their duke, Casimir I., who willingly did homage for his land. The king of Denmark, too, acknowledged Henry as his feudal lord. Moreover, by several campaigns in Hungary the German king brought that country into the position of a fief of the German crown. This war was occasioned by the violence of the Hungarian usurper, Aba Samuel, and formed Henry's principal occupation from 1041 to 1045.

In Germany itself Henry acquired, during the first ten years of his rule, an authority which had been unknown since the days of Otto the Great. Early in his reign he had made a determined enemy of Godfrey the Bearded, duke of Henry's upper Lorraine, who, in 1044, conspired against him policy. and who found powerful allies in Henry I., king of France, in the counts of Flanders and Holland, and in certain Burgundian nobles. However, Godfrey and his friends were easily worsted, and when the dispossessed duke again tried the fortune of war he found that the German king had detached Henry of France from his side and was also in alliance with the English king, Edward the Confessor. While thus maintaining his authority in the north-east corner of the country by alliances and expeditions, Henry was strong enough to put the laws in motion against the most powerful princes and to force them to keep the public peace. Under his severe but beneficent rule, Germany enjoyed a period of internal quiet such as she had probably never experienced before, but even Henry could not permanently divert from its course the main political tendency of the age, the desire of the great feudal lords for independence. Cowed, but unpacified and discontented, the princes awaited their opportunity, while the king played into their hands by allowing the southern duchies, Swabia, Bavaria and Carinthia, to pass from under his own immediate control. His position was becoming gradually weaker when in 105 1 he invaded Hungary, where a reaction against German influence was taking place. After a second campaign in 1052 the Hungarian king, Andrew, was compelled to make peace and to own himself the vassal of the German king. Mean- while Saxony and Bavaria were permeated by the spirit of unrest, and Henry returned from Hungary just in time to frustrate a widespread conspiracy against him in southern Germany. Encouraged by the support of the German rebels, Andrew of Hungary repudiated the treaty of peace and the German supremacy in that country came to a sudden end. Among the causes which undermined Henry's strength was the fact that the mediate nobles, who had stood loyally by his father, Conrad, were not his friends; probably his wars made serious demands upon them, and his strict administration of justice, especially his insistence upon the maintenance of the public peace, was displeasing to them.

At the beginning of Henry's reign the church all over Europe was in a deplorable condition. Simony was universally practised and the morality of the clergy was very low. The Papacy, too, had sunk to a degraded condition and its ˆaTL authority was annihilated, not only by the character church. of successive popes, but by the fact that there were at the same time three claimants for the papal throne.

Henry, a man of deep, sincere and even rigorous piety, regarded these evils with sorrow; he associated himself definitely with the movement for reform which proceeded from Cluny, and commanded his prelates to put an end to simony and other abuses. Then moving farther in the same direction he resolved to strike at the root of the evil by the exercise of his imperial authority. In 1046 he entered Italy at the head of an army which secured for him greater respect than had been given to any German ruler since Charlemagne, and at Sutri and in Rome he deposed the three rival popes. He then raised to the papal see Suidger, bishop of Bamberg, who, as Pope Clement II., crowned him emperor; after Clement three other German popes — Damasus II., Leo IX. and Victor II. — owed their elevation to Henry. Under these popes a new era began for the church, and in thus reforming the Papacy Henry III. fulfilled what was

and was rewarded by receiving to the end of his reign the service 1 regarded as the noblest duty of his imperial office, but he also

sharpened a weapon whose keen edge was first tried against his son.

The last years of Henry III. form a turning-point in German history. Great kings and emperors came after him, but none of them possessed the direct, absolute authority which he freely wielded; even in the case of the strongest the forms of feudalism more and more interposed themselves between the monarch and the nation, and at last the royal authority virtually disappeared. During this reign the towns entered upon an age of prosperity, and the Rhine and the Weser became great avenues of trade.

When Henry died in October 1036 the decline of the royal authority was accelerated by the fact that his successor was a The child. Henry IV., who had been crowned king in

minority 1054, was at first in charge of his mother, the empress of Henry Agnes, whose weak and inefficient rule was closely watched by Anno, archbishop of Cologne. In 1062, however, Anno and other prominent prelates and laymen, perhaps jealous of the influence exercised at court by Henry, bishop of Augsburg (d. 1063), managed by a clever trick to get possession of the king's person. Deserted by her friends Agnes retired, and forthwith Anno began to rule the state.

But soon he was compelled to share his duties with Adalbert, archbishop of Bremen, and a year or two later Adalbert became virtually the ruler of Germany, leaving Anno to attend to affairs in Italy. Adalbert's rule was very successful. Compelling King Solomon to own Henry's supremacy he restored the influence of Germany in Hungary; in internal affairs he re strained the turbulence of the princes, but he made many enemies, especially in Saxony, and in 1066 Henry, who had just been declared of age, was compelled to dismiss him. The ambitious prelate, however, had gained great influence over Henry, who had grown up under the most diverse influences. The young king was generous and was endowed with considerable intellectual gifts; but passing as he did from Anno's gloomy palace at Cologne to Adalbert's residence in Bremen, whore he was petted and flattered, he became wayward and wilful.

Henry IV. assumed the duties of government soon after the fall of Adalbert and quickly made enemies of many of the chief princes, including Otto of Nordheim, the powerful Henry's d u k e f Bavaria, Rudolph, duke of Swabia, and ru/e. Berthold of Zahringen, duke of Carinthia. In Saxony,

where, like his father, he frequently held his court, he excited intense hostility by a series of injudicious proceedings. While the three Ottos were pursuing the shadow of imperial greatness in Italy, much of the crown land in this duchy had been seized by the nobles and was now held by their descendants. Henry IV. insisted on the restoration of these estates and en- croached upon the rights of the peasants. Moreover, he built a number of forts which the people thought were intended for prisons; he filled the land with riotous and overbearing Swabians; he kept in prison Magnus, the heir to the duchy; and is said to have spoken of the Saxons in a tone of great contempt. All classes were thus combined against him, and when he ordered his forces t& assemble for a campaign against the Poles the Saxons refused to join the host. In 1073 the universal discontent found expression in a great assembly at Wormesleben, in which the leading part was taken by Otto of Nordheim, by Werner, archbishop of Magdeburg, and by Burkhard II., bishop of Halberstadt. Under Otto's leadership the Thuringians joined the rising, which soon spread far and wide. Henry was surprised by a band of rebels in his fortress at the Harzburg; he fled to Hersfeld and appealed to the princes for support, but he could not compel them to aid him and they would grant him nothing. After tedious negotiations he was obliged to yield to the demands of his enemies, and peace was made at Gerstungen in 1074. Zealously carrying out the conditions of the peace, the peasants not only battered down the detested forts, they even

destroyed the chapel at the Harzburg and committed other acts of desecra- tion. These proceedings alarmed the princes, both spiritual and secular, and Henry, who had gained support from the cities of the Rhineland, was able to advance with a formidable army

into Saxony in 1075. He gained a decisive victory, rebuilt the forts and completely restored the authority of the crown.

In 1073, while Germany was in this confused state, Hildebrand had become pope as Gregory VII., and in 1075 he issued his famous decree against the marriage of the clergy and against their investiture by laymen. To the latter ˆpe decree it was impossible for any sovereign to submit, yil. and in Germany there were stronger reasons than elsewhere for resistance. A large part of the land of the country was held by the clergy, and most of it had been granted to them because it was supposed that they would be the king's most efficient helpers. Were the feudal tie broken, the crown must soon vanish, and the constitution of medieval society undergo a radical change. Henry, who hitherto had treated the new pope with excessive respect, now announced his intention of going to Rome and assuming the imperial title. The pope, to whom the Saxons had been encouraged to complain, responded by sending back certain of Henry's messengers, with the command that the king should do penance for the crimes of which his subjects accused him. Enraged by this unexpected arrogance, Henry summoned a synod of German bishops to Worms in January 1076, and Hildebrand was declared deposed. The papal answer was a bull excommunicating the German king, dethroning him and liberating his subjects from their oath of allegiance.

Never before had a pope ventured to take so bold a step. It was within the memory even of young men that a German king had dismissed three popes, and had raised in Effect of turn four of his own prelates to the Roman see. And Henry's now a pope attempted to drag from his throne the excom- successor of this very sovereign. The effect of the munica- bull was tremendous; no other was ever followed by equally important results. The princes had long been chafing under the royal power; they had shaken even so stern an autocrat as Henry III., and the authority of Henry IV. was already visibly weakened. At this important stage in their contest with the crown a mighty ally suddenly offered himself, and with indecent eagerness they hastened to associate themselves with him. Their vassals and subjects, appalled by the invisible powers wielded by the head of the church, supported them in their rebellion. The Saxons again rose in arms and Otto of Nordheim succeeded in uniting the North and South German supporters of the pope. Henry had looked

*for no such result as this; he did not understand the influences which lay beneath the surface and was horrified by his unexpected isolation. At * diet in Tribur he humbled himself before the princes, but in vain. They turned from him and decided that the pope should be asked to judge Henry; that if, within a year, the sentence of excommunication were not removed, the king should lose his crown; and that in the meantime he should live in retirement.*

Next came the strange scene at Canossa which burned itself into the memory of Europe. For three days the representative of the Caesars entreated to be admitted into the pope's .

presence. No other mode of escape than complete canossa. subjection to Gregory had suggested itself, or was perhaps possible; but it did not save him. Although the pope forgave him, the German princes, resolved not to miss the chance which fortune had given them, met in March 1077, and deposed him, electing Rudolph, duke of Swabia, as his successor. But Henry's bitter humfliations transformed his character; they brought out all his latent capacities of manliness.

The war of investitures that followed was the opening of the tremendous struggle between the Empire and the Papacy, which is the central fact of medieval history and f ne which, after two centuries of conflict, ended in the struggle exhaustion of both powers. Its details belong more over in- to the history of Italy than to that of Germany, ves ures ' where it took the form of a fight between two rival kings, but in Germany its effects were more deeply felt. The nation now plucked bitter fruit from the seed planted by Otto the Great in assuming the imperia'l crown and by a long line of kings and emperors in lavishing worldly power upon the church. In the

anti- kings.

ambition of the spiritual and the secular princes the pope had an immensely powerful engine of offence against the emperor, and without the slightest scruple this was turned to the best advantage.

When this struggle began it may be said in general that Henry was supported by the cities and the lower classes, while Rudolph Henry iv. relied upon the princes and the opponents of a united and the

Germany; or, to make another division, Henry's strength lay in the duchies of Franconia and Bavaria, Rudolph's in Swabia and Saxony. In the Rhineland and in southern Germany the cities had been steadily growing in wealth a-nd power, and they could not fail to realize that they had more to fear from the princes than from the crown. Hence when Henry returned to Germany in 1078 Worms, Spires and many other places opened their gates to him and contributed freely to his cause; nevertheless his troops were beaten in three encounters and Pope Gregory thundered anew against him in March 1080. However, the fortune of war soon turned, and in October 1080 Rudolph of Swabia was defeated and slain. Henry then carried the war into Italy; in 1084 he was crowned emperor in Rome by Wibert, archbishop of Ravenna, whom, as Clement III., he had set up as an anti-pope, and in 1085 Gregory died an exile from Rome. Meanwhile in Germany Henry's opponents had chosen Hermann, count of Luxemburg, king in succession to Rudolph of Swabia. Hermann, however, was not very successful, and when Henry returned to Germany in 1084 he found that his most doughty opponent, Otto of Nordheim, was dead, and that the anti-king had few friends outside Saxony. This duchy was soon reduced to obedience and was treated with consideration, and when the third anti-king, Egbert, margrave of Meissen, was murdered in 1090 there would have been peace if Germany had followed her own impulses.

In the Papacy, however, Henry had an implacable foe; and

again and again When he seemed on the point of a complete

triumph the smouldering embers of revolt were kindled

He ˆ1i once more into flame. In Italy his son, Conrad, was

and the , ... , . J ' ,', .

Papacy. stirred up against mm and in 1093 was crowned king

at Monza; then ten years later, when Germany was more peaceful than it had been for years and when the emperor's authority was generally acknowledged, his second son, Henry, afterwards the emperor Henry V., was induced to head a danger- ous rebellion. The Saxons and the Thuringians were soon in arms, and they were joined by those warlike spirits of Germany to whom an age of peace brought no glory and an age of pro- sperity brought no gain. After some desultory fighting Henry IV. was taken prisoner and compelled to abdicate; he had, however, escaped and had renewed the contest

when he died in August

1106.

During this reign the first crusade took place, and the German king suffered severely from the pious zeal which it expressed

and intensified. The movement was not in the end Crusade, favourable to papal supremacy, but the early crusaders,

and those who sympathized with them, regarded the enemies of the pope as the enemies of religion.

The early years of Henry V.'s reign were spent in campaigns in Flanders, Bohemia, Hungary and Poland, but the new king

was soon reminded that the dispute over investitures Henry v. was unse ttled.. Pope Paschal II. did not doubt, now Germany, that Henry IV. was dead, that he would speedily

triumph; but he was soon undeceived. Henry V., who with unconscious irony had promised to treat the pope as a father, continued, like his predecessors,, to invest prelates with the ring and the staff, and met the expostulations of Paschal by declaring that he would not surrender a right which had belonged to all former kings. Lengthened negotiations took place but they led to no satisfactory result, while the king's enemies in Germany, taking advantage of the deadlock, showed signs of revolt. One of the most ardent of these enemies was Lothair of Supplinburg, whom Henry himself had made duke of Saxony upon the extinction of the' Billung family in 1106. Lothair was humbled in 1112, but he took advantage of the

emperor's difficulties to rise again and again, the twin pillars of his strength being the Saxon hatred of the Franconian emperors and an informal alliance with the papal see. Henry's chief friends were his nephews, the two Hohenstaufen princes, Frederick and Conrad, to whose father Frederick the emperor Henry IV. had given the duchy of Swabia when its duke Rudolph became his rival. The younger Frederick succeeded to this duchy in 1105, while ten years later Conrad was made duke of Franconia, a country which for nearly a century had been under the immediate government of the crown. The two brothers were enthusiastic imperialists, and with persistent courage, they upheld the cause of their sovereign during his two absences in Italy.

At last, in September 1122, the investiture question was settled by

the concordat of Worms. By this compromise, which exhaustion forced upon both parties, the right of electing prelates was granted to the clergy, and l, co t n ~ the emperor surrendered the privilege of investing of Worms. them with the ring and the staff. On the other hand it was arranged that these elections should take place in the presence of the emperor or his representative, and that he should invest the new prelate with the sceptre, thus signifying that the bishop, or abbot, held his temporal fiefs from him and not from the pope. In Germany the victory remained with the emperor, but it was by no means decisive. The Papacy was far from realizing Hildebrand's great schemes; yet in regard to the question in dispute it gained solid advantage, and its general authority was incomparably more important than it had been half a century before. During this period it had waged war upon the emperor himself. ' Instead of acknowledging its inferiority as in former times it had claimed to be the higher power; it had even attempted to dispose of the imperial crown as if the Empire were a papal fief; and it had found out that it could at any time tamper, and perhaps paralyse, the imperial authority by exciting internal strife in Germany. Having thus settled this momentous dispute Henry spent his later years in restoring order in Germany, and in planning to assist his father-in-law, Henry I. of England, in France. During this reign under the lead of Otto, bishop of Bamberg (c. 1063-1139), Pomerania began to come under the influence of Germany and of Christianity.

The Franconian dynasty died out with Henry V. in May 1125, and after a protracted contest Lothair, duke of Saxony, the candidate of the clergy, was chosen in the following The reign August to succeed him. The new king's first enter- 0/ Lothair prise was a disastrous campaign in Bohemia, but ˆ e before this occurrence he had aroused the enmity of the Hohenstaufen princes by demanding that they should surrender certain lands which had formerly been the property of the crown. Lothair's rebuff in Bohemia stiffened the backs of Frederick and Conrad, and in order to contend with them the king secured a powerful ally by marrying his daughter Gertrude to Henry the Proud, a grandson of Welf, whom Henry IV. had made duke of Bavaria, a duchy to which Henry himself had succeeded in n 26. Henry was perhaps the most powerful of the king's subjects, nevertheless the dukes of Swabia and Franconia withstood him, and a long war desolated South Germany. This was ended by the submission of Frederick in 1 1 34 and of Conrad in the following year. Lothair's position, which before 1130 was very weak, had gradually become stronger. He had put down the disorder in Bavaria, in Saxony and in Lorraine; a diet held at Magdeburg in 1135 was

attended by representatives from the vassal states of Denmark, Hungary, Bohemia and Poland; and in 1136, when he visited Italy for the second time, Germany was in a very peaceful condition. In June 1 1 33 during the king's first visit to Italy he had received from Pope Innocent II. the imperial crown and also the investi- ture of the extensive territories left by Matilda, marchioness of Tuscany; and at this time the pope seems to have claimed the emperor as his vassal, a statement to this effect (post homo fit papae, sumit quo dante coronam) being inscribed in the audience hall of the Lateran at Rome.

Saxon.

HISTORY?

GERMANY

841

Conrad III.

Nothing could indicate more clearly than this fact how much of their old power the German kings had lost. It was not past hope that even yet some of their former splendour '^ coro/ . might be restored, and for a brief period monarchy power. did again stand high. Still, its foundations were sapped. Incessant war, both at home and in Italy, had deprived it of its force; it had lost moral influence by humiliations, of which the scene at Canossa was an extreme type. Steadily, with unwearied energy, letting no opportunity escape, the princes had advanced towards independence, and they might well look forward to such a bearing in regard to the kings as the kings had formerly adopted in. regard to them.

Henry the Proud was confident that he would succeed Lothair, who had died on his return from Italy in December 1137; but, by a hasty and irregular election, Conrad of Hohen- staufen, duke of Franconia, was chosen king in March 1 138. Henry the Proud rebelled and was declared to have forfeited his two duchies, Saxony and Bavaria, the former being given to Albert the Bear, margrave of Brandenburg, and the latter to Leopold IV., margrave of Austria. Henry defended his rights with vigour and once again Germany was ravaged by war, for although he was unpopular in Bavaria he was strongly supported by the Saxons, who, since the time of Henry IV., had always been ready to join in an attack on the monarchy, and he had little difficulty in driving Albert the Bear from the land. However, in October 1139

Henry died suddenly, but his young son, Henry the Lion, was recognized at once as duke of Saxony, while his brother, Welf, upheld the fortunes of his house in Bavaria. The struggle went on until May 1142, when peace was made at Frankfort. Saxony, with the assent of Albert the Bear, was granted by Conrad to Henry the Lion, and Bavaria was given to Henry Jasomirgott, who had just succeeded his brother Leopold as margrave of Austria. But this was only a lull in the civil strife, which was renewed after the king had made a successful expedition into Bohemia. The princes clerical and lay were fighting against each other, and the Bavarians were at war with the Hungarians, who gained a great victory in 1146. Notwithstanding the many sources of confusion Conrad was persuaded by the passionate eloquence of Bernard of Clairvaux to take part in the second crusade; he left for the East in 1147 and returned to Germany in 1149, to find Welf again in arms and Henry the Lion claiming Bavaria. The king had done nothing to stem the rising tide of disorder when he died atBamberg in February 1152. During this reign the work of conquering and Germanizing the Slavonic tribes east of the Elbe was seriously taken in hand under the lead of Albert the Bear and Henry the Lion, and the foundation of the ma'rgraviate of Brandenburg by Albert tended to make life and property more secure in the north-east of Germany.

After Conrad's death Germany passed under the rule of one of the greatest of her sovereigns, Frederick I., called Barbarossa, nephew of the late king and son of Frederick, that duke Frederick I. j Swabia. who had fought along with Conrad against king. Henry the Proud. Frederick himself had also been

closely associated with Conrad, who advised the princes to choose his nephew as his successor. This was done, and the new king was crowned at Aix-la-Chapelle in March n 52. Allied through his mother to the Welfs of Bavaria, and anxious to put an end to the unrest which dominated Germany, especially to the strife between the families of Welf and Hohenstaufen, Frederick began his reign by promising to secure for Henry the Lion the duchy of Bavaria, and by appeasing Henry's uncle, Count Welf, by making him duke of Spoleto and margrave of Tuscany. But the new king had another, and perhaps a more potent, reason for wishing to see peace restored in Germany. For his adventurous and imaginative spirit Italy and the imperial title had an irresistible charm, and in 1154, two years after he had ascended the throne, he crossed the Alps, being crowned emperor at Rome in June n 55. After this event the best years of his life were sp'ent in Italy, where, in his long and obstinate struggle with the Lombard cities and with Pope Alexander III., he chiefly

acquired his fame. Although on the emperor's side

this struggle was conducted mainly with German troops It falls properly under the history of Italy. In that country the record of this reign is a blood-stained page, while in the history of Germany, on the contrary, Frederick's name is associated with a peaceful and prosperous period.

The promise that Bavaria should be granted to Henry the Lion was not easily fulfilled, as Henry Jasomirgott refused to give up the duchy. At last, however, in 1156, after his return from his first expedition to Italy, Frederick Bavaria reconciled the latter prince by making Austria into a Saxoay. duchy with certain special privileges, an important step in the process by which that country became the centre of a powerful state. Henry Jasomirgott then renounced Bavaria, and Henry the Lion became its duke. It was, however, in his other duchy of Saxony that the latter duke's most important work was done. Although he often gave offence by his haughty and aggressive disposition, few German princes have earned so thoroughly the goodwill of posterity. Since the death of Otto the Great the Slavonic lands to the east of the Elbe had been very imperfectly held in subjection by the Germans. Devoting himself to the conquest of the lands lying along the shore of the Baltic, Henry succeeded as no one before him had ever done. But he was not only a conqueror. He built towns and encouraged those which already existed; he founded and restored bishoprics in his new territories; and between the Elbe and the Oder he planted bodies of industrious colonists. While he was thus at work a similar task was being performed to the south-east of Saxony by Albert the Bear, the first margrave of Brandenburg, who, by his energetic rule was preparing this country for its great destinies.

Early in his reign, by settling a dispute over the crown of Denmark, Frederick brought the king of that country once more into the position of a German vassal. Having spent Frederick the year 1156 in settling the Bavarian question and la Poland in enforcing order in the Rhineland and elsewhere, and Qer ~ the emperor marched into Poland in 1157, compelled maay ' its ruler, Boleslaus IV., to do the homage which he had previously refused to perform, and in return for services rendered during the campaign and for promises of future aid, raised the duke of Bohemia to the rank of a king, a change which in no way affected his duties to the German crown, but which gave him a certain precedence over other vassal princes. The king of Hungary, too, although no attempt was made to subdue him, became a useful ally. Thus the fame of Germany in the neighbouring

countries, which had been nearly destroyed during the confusion of Henry IV.'s reign, was to a large extent restored. Frederick asserted his authority in Burgundy or, as it was sometimes called, Franche Comte. In Germany itself internal order was established by a strict appliance of the existing laws against those who broke the peace, fresh orders for its observance were issued, and in Frederick the robber nobles found a most implac- able enemy. The cities, too, flourished during this reign. The emperor attached them to himself by granting to many of them the very liberties which, by a strained interpretation of his imperial rights, he withheld from the cities of Lombardy. Yet, notwithstanding his policy, in these directions the German nobles appear to have been enthusiastically devoted to Frederick. Time after time they followed him to Italy, enduring serious losses and hardships in order that he might enforce claims which were of no advantage to them, and which, previously, had been a curse to their nation. Their loyalty is well illustrated by the famous scene at Besancon in October n 57. During a meeting of the diet a papal legate read a letter from Pope Adrian IV., which seemed to imply that the Empire was a papal fief. In- dignant murmurs rose from the assembled nobles, and the life of the legate was only saved from their fury by the intervention of the emperor himself. The secret of Frederick's great popularity was partly the national pride excited by his foreign achievements, partly the ascendance over other minds which his genius gave him, and partly the conviction that while he would forego none of his rights he would demand from his vassals nothing more than was sanctioned by the laws of the Empire.

Having suppressed a rising at Mainz Frederick set out in the

autumn of 1163 for Italy, which country was now distracted

by a papal schism. This incident was bound to affect

Frederick German politics. After the death of Adrian IV. in and Alex- r . .

aaderin. 1I: 59 the imperial party put forward an anti-pope, Victor IV., against Alexander III., who had been canonically elected. The emperor made stupendous efforts to secure for Victor and then for his successor, Paschal III., recog- nition by the sovereigns of Europe,

but in vain; and almost the only support which the anti-pope received came from the German clergy. In May 1 1 6 5 Frederick held a diet at Wurzburg, where the princes lay and clerical swore to be faithful to Paschal and never to recognize Alexander. But Alexander soon found partisans among the German clergy, hitherto the most loyal of the emperor's friends; and Frederick retaliated by driving the offending prelates from their sees, a proceeding which tended to disturb the peace of the land. Then in August 1167, in the midst of the struggle in Italy, came the pestilence which destroyed the imperial army in Rome, and drove the emperor as a fugitive across the Alps. After this humiliation Frederick remained for six years in Germany. He was fully occupied in restoring order in Saxony, in the diocese of Salzburg and elsewhere; in adding to his hereditary lands; in negotiating for a better understanding with France and England; and in reminding the vassal states, Hungary, Poland and Bohemia, of their duties towards the Empire. The success with which he carried out this work shows clearly that, in Germany at least, the disaster at Rome had not seriously affected his prestige. Again in Italy in 1 1 74 the contest with the Papacy was abruptly ended by Frederick's overwhelming defeat at Legnano in May n 76, and by the treaty of Venice made about a year later with Alexander III.

In the later years of his reign the emperor's chief enemy was Henry the Lion. Rendered arrogant by success and confident that his interests were in northern, and not in southern aad "tieary Europe, the Saxon duke refused to assist Frederick the Lion, in the campaign which ended so disastrously at Legnano. Ascribing his defeat to Henry's defection, Frederick returned to Germany full of anger against the Saxon duke and firmly resolved to punish him. The immediate cause of Henry's downfall, however, was not his failure to appear in Italy, but his refusal to restore some lands to the bishop of Halberstadt, and it was on this charge that he was summoned before the diet. Three times he refused to appear, and early in 1 1 80 sentence was pronounced against him; he was condemned to lose all his lands and to go into banishment. For some time he resisted, but at length the emperor in person marched against him and he was forced to submit; the only favour he could secure when peace was made at Erfurt in November 1181 was permission to retain Brunswick and Liineburg, which have remained in the possession of his descendants until our own day. Bavaria was granted to Otto of Wittelsbach, but it lost some of its importance because Styria was taken from it and made into a separate duchy. The extensive duchy of Saxony was com- pletely dismembered. The name was taken by the small portion of the former duchy which was given to Bernard, son of Albert the

Bear, the founder of a new Saxon line, and the extensive western part was added to the archbishopric of Cologne. The chief prelates of Saxony and many of the late duke's most important feudatories were made virtually independent of all control save that of the crown. Frederick's object in thus break- ing up the two greatest duchies in his kingdom was doubtless to strengthen the imperial authority. But in reality he made it certain that the princes would one day shake off the imperial power altogether; for it was perhaps more difficult for the sovereign to contend with scores of petty nobles than with two or three great princes.

Less serious than the struggle with Henry the Lion was Frederick's struggle with Philip of Heinsberg, archbishop of Cologne (d. 1101), on whom he had just conferred a great part of Saxony. When the emperor went to Italy in n 84 he left the government of Germany to his son Henry, afterwards the emperor Henry VI., who had been crowned German king in 1169. On all

sides, but especially in the north-west, Henry was faced with incipient revolution, and while he was combating this the quarrel between Frederick and the Papacy broke out Frederick again in Italy. At this juncture Philip of Cologne andPhilip united the German and the Italian oppositions. Several otHeins- princes rallied to his standard and foreign powers promised aid, but although very formidable in appearance the combination had no vestige of popular support. The greater part of the German clergy again proved their loyalty to Frederick, who hurried to Germany only to see the opposition vanish before him. In March 1188 Philip of Cologne submitted at Mainz.

Germany was now at peace. With the accession of Gregory VIII. pope and emperor were reconciled, and by the marriage of his son Henry with Constance, daughter of Roger I., king of Sicily, the emperor had reason to hope that the iˆ"s" Empire would soon include Naples and Sicily. Re- death. solving that the sunset of his life should be even more splendid than its dawn he decided to go on crusade, and in 1189 he started with a great army for the Holy Land. When the news reached Germany that he had been drowned, an event which took place in Cilicia in June 1190, men felt that evil days were coming upon the country, for the elements of discord would no longer be controlled by the strong hand of the great emperor.*

Evil days did not, however, come in the time of Henry VI., who, although without his father's greatness, had some of his determination and energy, and was at least his equal „ VJ in

ambition. Having in 11 90 reduced Henry the Lion once more to submission, the new king set out to take possession of his Sicilian kingdom, being on the way crowned emperor at Rome. At the end of 1191 he returned to Germany, where he was soon faced by two serious risings. The first of these centred round the restless and unruly Welfs; after a time these in- surgents were joined by their former enemies, the rulers of Saxony, of Thuringia and of Meissen, who were angered by Henry's conduct. The Welfs also gained the assistance of Canute VI., king of Denmark. Equally dangerous was a rebellion in the Lower Rhineland, where the emperor made many foes by appointing, regardless of their fitness, his own candidates to vacant bishoprics. At Liege this led to serious complications; and when Bishop Albert, who had been chosen against Henry's wish, was murdered at Reims in November 1192, the emperor was openly accused of having instigated the crime. At once the rulers of Brabant, of Limburg and of Flanders, with the arch- bishops of Cologne and Trier, were in arms. In the east of Germany Ottakar I. of Bohemia joined the circle of Henry's enemies, and the southern duchies, Bavaria, Swabia and Austria, were too much occupied with internal quarrels to send help to the harassed emperor. But formidable as were these risings they were crushed, although not entirely by force of arms. In 1 193 Richard I. of England passed as a prisoner into Henry's keeping, and with rare skill the emperor used him as a means of compelling his enemies to come to terms. Henry the Lion was the last to submit. He made his peace in 1194, when his son Henry was promised the succession to the Rhenish Palatinate. Returning from another visit to Sicily, the emperor was now so powerful that, in pursuance of his plan for making himself the head of a great world monarchy, he put forward the suggestion that the- imperial crown should be declared hereditary in his family. This proposal aroused much opposition, but Henry persisted with it; he promised important concessions to the princes, many of whom were induced to consent, and but for his sudden death, which occurred in Sicily in September 1197, it is probable that he would have attained his end.

Great as was Henry's authority many of the princes, chief among them being Adolph, archbishop of Cologne (d. 1220), refused to recognize his son, Frederick, who had been pblliD of chosen king of the Romans in 1196. This attitude swabia was possibly owing to the fact that Frederick was and otto young and inexperienced; it was, however, more ot l ˆ n "' s " probably due to a revival of the fear that the German princes would be entangled in Italian politics. For a time Adolph and his friends, who were mainly princes of the Rhineland ,

sought in vain for a new king. While they were thus employed the friends of the house of Hohenstaufen, convinced that Frederick's kingship was not possible, chose the late emperor's brother, Philip, duke of Swabia, to fill the vacant throne; soon afterwards the enemies of the house found a candidate in the person of- Henry the Lion's son, Otto of Brunswick, who was also chosen German king. Thus the struggle between Welf and Hohenstaufen was renewed and civil war broke out at once. Philip's supporters were the nobles of southern and eastern Germany, while a few cities in the west owned his authority; Otto's friends were found mainly in the north and the north-west of the country. The number of available warriors was increased by the return of many crusaders, among them being the famous soldier, Henry von Kalden, who was mainly responsible for the success of Philip's cause in 1100. If Germany had been un- connected with the Papacy, or even if the Papacy had been as weak as in the days of Henry VI., the issue of the strife would almost certainly have been an early victory for Philip. A majority of the princes were on his side and the French king Philip Augustus was his ally, while his personal character com- manded general respect. Otto, whose chief supporter outside Germany was his uncle Richard I. of England, on the other hand was a harsh and violent man. But unfortunately for Germany the papal chair at this time was occupied by Innocent III., a pope who emulated Hildebrand in ambition and in statesmanship. At first vacillating, but by no means indifferent, Innocent was spurred to action when a number of princes met at Spires in May 1200, declared Philip to be the lawful king, and denied the right of the pope to interfere. He was also annoyed by Philip's attitude with regard to a vacancy in the archbishopric of Cologne, and in March 1201 he declared definitely for Otto. The efforts of the pope helped to rekindle the expiring flames of war, and for a year or two success com- pletely deserted Philip. He lost the support of Ottakar of Bohemia and of' Hermann I., landgrave of Thuringia; he was driven from North Germany into Swabia and Otto's triumph seemed assured. From 1204 onwards, however, fortune again veered round, and Philip's prospects began to improve. Deserted by Ottakar and even by Adolph of Cologne and his own brother Henry, count palatine of the Rhine, Otto was forced to take refuge in Brunswick, his last line of defence, and was only saved by Philip's murder, which occurred at Bamberg in June 1208. A feature

of this struggle was the reckless way in which the rival kings gave away the property of the crown in order to gain adherents, thus enriching the princes and weakening the central government.

Otto was now again chosen German king, and to aid and mark the general reconciliation he was betrothed to the murdered king's daughter Beatrix. Nearly all the princes otto iv. acknowledged him, and as pope and king were at soiekiag. peace, Germany enjoyed a period of comparative quiet. This however, did not last long. Having secured his coronation at Rome in October 1209, Otto repudiated the many pledges he had made to Innocent and began to act in defiance of the papal wishes. To punish him the pope put forward his own ward, Henry VI. 's son Frederick, who was living in Sicily, as a rival king. While Otto was warring in Italy a number of influential princes met at Nuremberg, at the instigation of Innocent and of his ally Philip Augustus of France, and invited Frederick to come to Germany. Otto then left Italy hurriedly, but he was quickly followed by his young rival, who in the warfare which had already broken out proved himself a formidable opponent. Seeking to mend his failing fortunes, the Welf went to France to support his ally, the English king John, against Philip Augustus, and at the battle of Bouvines (July 27, 1 2 14) memorable in the history alike of Germany, of England and of France, his fate was sealed, although until his death in May 12 18 he maintained a desultory warfare against Frederick.

Frederick II. was, if not the strongest, certainly the most brilliant of German kings. With the medieval passion for adventure he combined the intellectual culture and freedom of

a modern gentleman. A lover of poetry, of art and of science,

he was also a great statesman; he knew how to adapt his policy

to changing circumstances and how to move men by

J Frederick

appealing at one time to their selfishness and weak- lL ness and at another time to the nobler qualities of human nature. For outward splendour his position was never surpassed, and before he died he possessed six crowns, those of the Empire, Germany, Sicily, Lombardy, Burgundy and Jerusalem. But Germany profited neither by his gifts nor by his prestige. After Bouvines he purchased the assistance of Valdemar II., king of Denmark, by ceding to him a large stretch of land along the Baltic coast; and, promising to go on

crusade, he secured his coronation at Aix-la-Chapelle in July 121 5. Then being generally recognized as king he was able to do something to quell disturbances in various parts of the country, and, in April 1220, to bring about the election of his young son Henry as king of the Romans. But for this favour he had been compelled to pay a high price. Seven years before, at Eger in July 1213, he had made extensive concessions to the church, undertaking to take no part in episcopal elections, thus surrender- ing the advantages gained by the concordat of Worms, and to allow to German bishops the right of appeal to Rome. Proceeding a step farther in the same direction, he now promised to erect no new toll-centre, or mint, on the lands of the spiritual princes, and to allow no towns to be built thereon. Thus the prelates possessed nearly all the rights of sovereigns, and regarded the pope in Italy and not the king in Germany as their head, a state of affairs which was fatal to the unity, nay, even to the existence of the Empire.

Having made peace with Henry, count palatine of the Rhine and brother of Otto IV., and settled a dispute about the lands of the extinct family of Zahringen in the south-west oermaa of the country, Frederick left Germany in August in Freder- 1220; engaged in his bitter contest with the Papacy kk's and the Lombard cities, in ruling Sicily, and, after abseace – several real or imaginary delays, in fulfilling his crusading vow, he did not return to it for fifteen years. During this period he was represented by his son Henry, in whose name the government of Germany was carried on by the regent Engelbert, archbishop of Cologne. While Engelbert lived the country was in a fairly peaceable condition, although, thanks to the emperor's conces- sions, the spiritual princes were predominant, and all possible means were taken to check the growth of the towns, whose interests and aspirations were not favourable to this state of affairs. There was, moreover, a struggle between Valdemar of Denmark and some neighbouring German nobles. But after Engelbert's murder (November 1225) there was a change for the worse, and the only success which can be placed to the credit of the German arms during the next few years was trie regaining of the lands ceded to Denmark in 12 15, lands which included the cities of Hamburg and Liibeck. Under the rule of the new regent, Louis I., duke of Bavaria, confusion reigned supreme, and civil war prevailed in nearly every part of the country. –

After the treaty of San Germano, which was made with Pope Gregory in 1230, and the consequent lull in the struggle with the Papacy, Frederick was able to devote some little attention to Germany, and in 1231 he sanctioned Rebellion the great Privilege of Worms. This was

a reward Henry. to the princes for their efforts in bringing about the peace, and an extension of the concessions made in 1220. The princes, now for the first time referred to officially as do-mini terrae, were given full rights of jurisdiction over their lands and all the inferior officers of justice were made subservient to them. Practically they became independent sovereigns, and to make their victory more complete serious restraints were laid upon the freedom of the towns. Before this date King Henry had begun to take a personal part in the government and was already involved in a quarrel with Otto II., duke of Bavaria. He disliked the Privilege of Worms and, favouring the towns against the princes, his policy was diametrically opposed to that of th« emperor; however, in 1232 he went to Italy and promised to

obey his father's commands. But in 1234, at a time of great and increasing disorder in Germany, he rebelled; he appealed publicly to the princes for support, gained some followers, especially in his own duchy of Swabia, and made an alliance with the Lombard cities. Confident of his strength Frederick entered Germany with a few attendants in the middle of 1235, and his presence had the anticipated effect of quelling the in- surrection; Henry was sent a prisoner to Italy and disappeared from history. Then, in August 1235, amid surroundings of great splendour, the emperor held a diet at Mainz, which was attended by a large number of princes. This diet is very important in the legal history of Germany, because here was issued that great " land peace " (Landfrieden) which became the model for all subsequent enactments of the kind. By it private war was declared unlawful, except in cases where justice could not be obtained; a chief justiciar was appointed for the Empire; all tolls and mints erected since the death of Henry VI. were to be removed; and other provisions dealt with the maintenance of order.

In 1236, during another short stay in Germany, Frederick in person led the imperial army against Frederick II., duke of

Austria, who had defied and overcome his repre- Frederick sen tatives; having taken possession of Vienna and Germany, the Austrian duchies he there secured . the election

of his son Conrad, who had already succeeded his brother as duke of Swabia, as king of the Romans (May 1237). But in spite of these imposing displays of power the princes looked with suspicion upon an emperor who was almost a stranger to their country and who was believed to be a renegade from their faith, and soon after Frederick's return to Italy the gulf between him and his German subjects was widened by his indifference to a great danger which threatened them. This came from the Mongols who ravaged the eastern frontiers of the country, but the peril was warded off by the efforts of Henry II., duke of Silesia, who lost his life in a fight against these foes near Liegnitz in April 1241, and of Wenceslaus I., king of Bohemia.

The emperor's attitude with regard to the Mongol invasion is explained by events in Italy where Frederick was engaged

in a new and, if possible, a more virulent struggle with

Frederick tn L om b ar(i cities and with Gregory IX. As usual, and the , ..._ ° , . , ...

pope. the course of politics in Germany, which at this time

was ruled by King Conrad and by the regent Siegfried, archbishop of Mainz (d. 1249), was influenced by this quarrel. Frederick of Austria had allied himself with Wenceslaus of Bohemia, and spurred on by the papal emissary had tried to set up a rival king; but both the Danish and the French princes who were asked to accept this thankless position declined the invitation, and Frederick and Wenceslaus made their peace, trie former receiving back his duchies. After the defeat of the Mongols, however, there was again the danger of a rebellion based upon a union between the princes and the pope. Siegfried of Mainz deserted his master, and visiting Germany in 1242 Frederick found it necessary to purchase the support of the towns by a grant of extensive privileges; but, although this had the desired effect, Conrad could make but little headway against the increasing number of his enemies. At last the Papacy found an anti-king. Having declared Frederick deposed at the council of Lyons in 1245, Gregory's successor, Innocent IV., induced a number of princes to choose as their king the land- grave of Thuringia, Henry Raspe, who had served as regent of Germany. This happened in May 1246, and the conduct of the struggle against the Pfafenkonig, as Henry was called, was left to Conrad, who was aided by the Bavarians, until February 1247, when the anti-king died. The papal party then elected William II., count of Holland, as Henry Raspe's successor, and during the state of anarchy which now prevailed in

Germany the emperor died in Italy in December 1250.

Upon his father's death Conrad IV. was acknowledged by

many as king in Germany, but in 12 51 he went to Italy, where

Conrad IV. ne was ^^ occupied in fighting against the enemies

of his house until his death in May 1254. The

struggle to maintain the position of the Hohenstaufen in Italy

was continued after this event; but in October 1268, by the execution of Conrad's son Conradin, the family became extinct.

After Conrad's death William of Holland received a certain allegiance, especially in the north of the country, and was recognized by the Rhenish cities which had just formed a league for mutual protection, a league which T h . e for a short time gave promise of great strength and regnum. usefulness. In January 1256, however, William was killed, and in the following year there was a double election for the German crown, Alphonso X., king of Castile, a grandson of Philip of Swabia, and Richard, earl of Cornwall, brother of the English king Henry III., being each chosen by parties of electors. Richard was crowned in May 1257, but the majority of his subjects were probably ignorant of his very name; Alphonso did not even visit the country over which he claimed to rule.

During the reign of Frederick II. Prussia was conquered for Christianity and civilization by the knights of the Teutonic Order, who here built up the state which was later, Tne in association with Brandenburg, deeply to influence Teutonic the course of history. This work was begun in 1 230. Order in Knights -eager to win fame by engaging in the war Prussla – against the heathen Prussians flocked hither from all lands; towns, Konigsberg, Thorn, Kulm and others, were founded; and in alliance with the Brothers of the Sword, the order was soon pressing farther eastwards. Courland and Livonia" were brought into subjection, and into these lands also Christian institutions were introduced and German settlers brought the arts of peace.

The age of the Hohenstaufen emperors is, in many respects, the most interesting in the medieval history of Germany. It was a period of great men and great ideas, of dramatic period of contrasts of character and opinion — on the one side Hohen- a broad humanitarianism combined with a gay enjoy- stauten ment of the

world, on the other side an almost super- d W ast y- human spirituality which sought its ideal in the rejection of all that the world could give. It saw the new-birth of poetry and of art; it witnessed the rise of the friars. The contest between Empire and Papacy was more than a mere struggle for supremacy between two world-powers; it was a war to the death between two fundamentally opposite conceptions of life, which in many respects anticipated and prepared the way for the Renaissance and the Reformation. The emperor Frederick II. himself stands out as the type of the one tendency; Innocent III., Francis of Assisi and Dominic, in their various degrees, are types of the other. Frederick himself, of course, was Italian rather than German, akin to the despots of the Renaissance in his many-sided culture, his tolerant scepticism and his policy of " cruelty well applied." The culture of which he was the supreme representative, that of Italy and of Provence, took a more serious shade when it penetrated into Germany. The German Minnesinger and romance-writers, whose golden age corresponded with that of the Hohenstaufen, were not content only to sing the joy of life or the chivalrous virtues of courage, courtesy and reverence for women; they in some sort anticipated the underlying ideas of the Reformation by championing the claims of the German nation against the papal monarchy and pure religion, as they conceived it, against the arrogance and corruption of the clergy. In them the medieval lay point of view became articulate, finding perhaps its most remarkable expression in the ideas of religious toleration proclaimed by Walther von der Vogelweide and Wolfram von Eschenbach. In Germany, as elsewhere, the victory of the Papacy was the victory of obscurantism. German culture, after a short revival, perished once more amid the smoke of the fires kindled by Conrad of Marburg and his fellow inquisitors.

In architecture, as in literature, this period was also one of great achievement in Germany. Of the noble palaces which it produced the castle of the Wartburg (q.v.) remains a perfect specimen, while the many magnificent churches dating from this time that still survive, prove the taste, wealth and piety

of the burghers. For the science of government, too, much was done, partly by the introduction from Italy of the study of Roman law,

partly by the collection of native customs in the Sachsen- spiegel compiled by Eike von Repgow early in the 13 th century, and the less valuable Deutschenspiegel and Schwabenspiegel. Altogether, Germany has seen no more fascinating epoch, none more full of life, movement and colour.

Yet it was in this age that the German nation utterly lost its political strength. Even after Lothair the Saxon, a line of sovereigns rigidly confining themselves to their own character kingdom might have mastered the many influences of which were making for disunion. But the Hohen-

Uermaoy s t au f en family, like their Saxon and Franconian predecessors, would be content with nothing short of universal dominion; and thus the crown which had once been significant of power and splendour gradually sank into contempt. Under the strong rule of Frederick Barbarossa and his son this process was temporarily stopped, but only to advance more rapidly when they were gone. During the confusion of the civil war carried on by Otto IV. and Philip, the princes, being subject to hardly any check, freely obtained crown lands and crown rights, and the mischief was too extensive to be undone by Frederick II. In 1220, in order to secure the adhesion of the church to his son Henry, he formally confirmed the spiritual princes in their usurpations; eleven years later at Worms still more extensive advantages were granted to the princes, both spiritual and secular, and these formal concessions formed the lawful basis of the independence of the princely class. Such authority as the emperor reserved for himself he could exercise but feebly from a distant land in which his energies were other- wise occupied. His immediate successors can hardly be said to have exercised any authority whatever; and they lost hold of the border countries which had hitherto been dependent upon or connected with Germany. Thenceforth Denmark and Poland rendered no homage to the German crown, and Burgundy was gradually absorbed by France.

The country was not now divided into a few duchies which, with skilful management, might still in times of emergency Classes ˆave been ma< ˆ e to act together. The age of the of the great duchies was past. As we have seen, Bavaria popula- W as shorn of extensive lands, over which new dukes ""• were placed, and the duchy of Saxony was altogether

broken up. Swabia and Franconia ceased to have dukes, and Lorraine gave place to the duchy of Brabant and other smaller states. Thus there were archbishops, bishops, abbots, dukes, margraves,

landgraves, counts — forming together a large body — each of whom claimed to have no superior save the emperor, whose authority they and their predecessors had slowly destroyed. All immediate nobles were not princes; but even petty knights or barons, who possessed little more than the rude towers from which they descended upon passing travellers, if their only lord was the emperor, recognized no law save their own will. Another independent element of the state was composed of the imperial cities. So long as the emperor really reigned, they enjoyed only such liberties as they could wring from him, or as he voluntarily conferred. But when the sovereign's power decayed, the imperial cities were really free republics, governing themselves according to their own ideas of law and justice (see Commune). Besides the imperial cities, and the princes and other immediate nobles, there were the mediate nobles, the men who held land in fief of the highest classes of the aristocracy, and who, in virtue of this feudal relation, looked down upon the allodial proprietors or freemen, and upon the burghers'. There were also mediate towns, acknowledging the supremacy of some lord other than the sovereign. Beneath all these, forming the mass of the agricultural population, were the peasantry and the serfs, the latter attached to the land, the former ground down by heavy taxes. There was another class, large and increasing in number, which was drawn from various sections of society. This was composed of men who, being without land, attached themselves to the emperor or to some powerful noble; they performed services, generally of a military nature, for their

lord, and were called Dienstmannen {ministeriales) . They were often transformed into " free knights " by the grant of a fief, and the class ultimately became absorbed in that of the knights.

The period from the death of Conrad IV. to the election of Rudolph of Habsburg in 1273 is generally called the Great Interregnum, and it was used by the princes to extend their territories and to increase their authority. On e i ec tors. several occasions it had seemed as if the German crown would become hereditary, but it had been kept elective by a variety of causes, among them being the jealousy of the Papacy and the growing strength of the aristocracy. In theory the election of each king needed the sanction of the whole of the immediate nobles, but in practice the right to choose the king had passed into the hands of a small but varying number of the leading princes. During the 13th century several attempts were made to enumerate these princes, and at the contested election of 1257 seven of them took part. This was the real beginning of the electoral college whose members at this time were the archbishops of Mainz, Cologne

and Trier, the duke of Saxony, the duke of Bavaria, who was also count palatine of the Rhine, the margrave of Brandenburg and the king of Bohemia. After this event the electors became a distinct element in the state. They were important because they could maintain the impotence of the crown to check disorder by imposing conditions upon candidates for the throne, and by taking care that no prince powerful enough to be dangerous to themselves should be elected to this position.

*Until the time of the interregnum the territories of a prince were rarely divided among his descendants, the reason being that, although the private fiefs of the nobles were Divisions hereditary, their offices — margrave, count and the like of the — were in theory at the disposal of the king. There was princely now a tendency to set this principle aside. Otto II., ‘ an< ' s * duke of Bavaria, a member of the Wittelsbach family, had become by marriage ruler of the Rhenish Palatinate, and after his death these extensive lands were ruled in common by his two sons; but in 1255 a formal division took place and the powerful family of Wittelsbach was divided into two branches. About the same time the small duchy of Saxony was divided into two duchies, those of Wittenberg and Lauenburg, the former to the south and the latter to the north of the great mark of Brandenburg, and there were similar divisions in the less import- ant states. It was thus practically settled that the offices and territories, as well as the private fiefs, of the princes were heredi- tary, to be disposed of by them at their pleasure. This being thoroughly established it would have been hard, perhaps im- possible, even for a sovereign of the greatest genius, to reassert in anything like its full extent the royal authority. The process of division and subdivision which steadily went on broke up Germany into a bewildering multitude of principalities; but as a rule the members of each princely house held together against common enemies, and ultimately they learned to arrange by private treaties that no territory should pass from the family while a single representative survived.*

The consolidation of the power of the princes was contemporary with the rise of the cities into new importance. Several of them, especially Mainz, Worms and Spires, had received valuable rights from the kings and other lords; they were becoming self-governing and to some extent independent communities and an important and growing element in the state. The increase of trade and a system of taxation pro- vided the governing body with funds, which were used to fortify the city and in other ways to make life and property more secure. The destruction of imperial authority compelled them to organize

their resources, so as to be at all times prepared against ambitious neighbours. They began to form leagues which the greatest princes and combinations of princes could not afford to despise. Of these leagues the chief at this time was the Rhenish Con- federation, which has been already mentioned. Great importance was also acquired by the Hanseatic League, which had originated during the interregnum in a treaty of alliance between Ltibeck

and Hamburg. It ultimately included more than eighty cities and became one of the greatest commercial powers in Europe (see Hanseatic League).

A political system which allowed the princes to do as they pleased was very much to their liking, and if they had followed their own impulse it is possible that they would never R fH > 'b"- ^ ave pl ace d a king over their country. But the pope burg. intervened. He found from his troubles in Italy and

from his diminished revenues from Germany that it would be still convenient to have in the latter country a sovereign who, like some of his predecessors, would be the protector of the church. Therefore, after the death of Richard of Cornwall in April 1272, Pope Gregory X., ignoring the absent Alphonso of Castile, told the electors that if they did not choose a king he himself would appoint one. The threat was effective. In September 1273 the electors met and raised to the throne a Swabian noble, Rudolph, count of Habsburg, who proved to possess more energy than they had imagined possible. For some time before this event the most powerful prince in Germany had been Ottakar II., king of Bohemia, who by marriage and conquest had obtained large territories outside his native king- dom, including the duchy of Austria and other possessions of the extinct family of Babenberg. Having himself cherished some hopes of receiving the German crown Ottakar refused to do homage to the new sovereign; after a time war broke out between them, and in August 1278 in a battle at Diirnkrut on the March Ottakar was defeated and slain, his lands, save Bohemia, passing into the possession of the victor. Rudolph had been able to give his whole attention to this enterprise owing to the good understanding which had been reached between himself and the pope, to whom he had promised to allow a free hand

in Italy.

Rudolph has often been called the restorer of the German kingdom, but he has little real claim to this honourable title. He marched once or twice against law-breakers, but in all the German duchies there were frequent dis- turbances which he did very little to check. In his later years he made some attempts to maintain the public peace, and he distinguished himself by the vigour with which he punished robber barons in Thuringia; he also won back some of the crown lands and dues which had been stolen during the interregnum. But he made no essential change in the condition of Germany. There seemed to be only one way in which a king could hope to overcome the arrogance of the princes, and that was to en- courage the towns by forming with them a close and enduring alliance. Rudolph, however, almost invariably favoured the princes and not the towns. The latter had a class of burgher called Pfahlbiirger, men who lived in the open country outside the Pfahle, or palisades of the town, but who could claim the protection of the municipal authorities. By becoming Pfahl- biirger men were able of escape from the tyranny of the large landholders, and consequently the princes strongly opposed the right of the towns to receive them. Not only did the king take the part of the princes in this important struggle, but he harassed the towns by subjecting them to severe imposts, a proceeding which led to several risings. About this time the princes were gaining influence in another direction. Their assent to all im- portant acts of state, especially to grants of crown property, was now regarded as necessary and was conveyed by means of Willebriefe; henceforward they were not merely the advisers of the king, they were rather partners with him in the business of government.

Rudolph had all the sympathies and prejudices of the noble class, and the supreme object of his life was not to increase the power of the state but to add to the greatness of his Habsb nt own larm ly> a policy which was perhaps justified by family. the condition of the German kingdom, the ruler of which had practically no strength save that which he derived from his hereditary lands. In this he was very successful. Four years after the fall of Ottakar he obtained from the princes a tardy and reluctant assent to the granting of Austria, Styria and Carniola to his own sons, Rudolph and Albert. In 1286

His reign.

Albert!.

Carinthia was given to Meinhard, count of Tirol, on condition that

when his male line became extinct it should pass to the Habsburgs. Thus Rudolph made himself memorable as the real founder of the house of Habsburg.

It was in vain that Rudolph sought to obtain the succession to the crown for one of his sons; the electors would not take a step which might endanger their own rights, and nearly a year after the king's death in July 1291 they jv a ˚ S a U ,˚ chose Adolph, count of Nassau, and not Rudolph's surviving son Albert, as their sovereign. Adolph, an insignificant prince, having been obliged to reward his supporters richly, wished to follow the lines laid down by his predecessor and to secure an extensive territory for his family. Meissen, which he claimed as a vacant fief of the Empire, and Thuringia, which he bought from the landgrave Albert II., seemed to offer a favourable field for this undertaking, and he spent a large part of his short reign in a futile attempt to carry out his plan. In his foreign policy Adolph allied himself with Edward I. of England against Philip IV. of France, but after declaring war on France in August 1294 he did nothing to assist his ally. At home he relieved the cities of some of their burdens and upheld them in the quarrel about the Pfahlbiirger; and he sought to isolate Albert of Habsburg, who was treating with Philip of France. But many of the princes were disgusted with him and, led by Albert of Habsburg, Gerhard, archbishop of Mainz, and Wenceslaus II., king of Bohemia, they decided to overthrow him, and at Mainz in June 1298 he was declared deposed. He resisted the sentence, but Albert, who had been chosen his successor, marched against him, and in July 1298, at Gollheim near Worms, Adolph was defeated and killed.

After Adolph's death Albert was again chosen German king, and was crowned at Aix-la-Chapelle in August 1298. Like his father Rudolph, the new king made it the principal object of his reign to increase the power of his house, but he failed in his attempts to add Bohemia and Thuringia to the hereditary lands of the Habsburgs, and he was equally unsuccessful in his endeavour to seize the countries of Holland and Zealand as vacant fiefs of the Empire. In other directions, however, he was more fortunate. He recovered some of the lost crown lands and sought to abolish new and unauthorized tolls on the Rhine; he encouraged the towns and took measures to repress private wars; he befriended the serfs and protected the persecuted Jews. For a time Albert allied himself with Philip IV. of France against Pope Boniface VIII. , who had refused to recognize him as king, but in 1303 he made peace with the pope, a step which enabled him to turn his attention to Bohemia and Thuringia. The greatest danger which he had to face during his reign came from a

league which was formed against him in 1300 by the four Rhenish electors — the three archbishops and the count palatine of the Rhine — who disliked his foreign policy and resented his action with regard to the tolls. Albert, however, supported by the towns, was victorious; and the revolting electors soon made their peace.

After Albert's murder, which took place in May 1308, Henry, count of Luxemburg, a brother of Baldwin (1285-1354), the powerful archbishop of Trier, became king as Henry VII. Although fortunate enough to obtain for his son John the crown of Bohemia,, the aggrandizement of his ' family was not the main object of this remarkable sovereign, the last German king of the old, ambitious type. It was the memory of the Empire which stirred his blood; from the begin- ning of his reign he looked forward to securing the Lombard and the imperial qrowns. His purpose to cross the Alps at the head ,of a great force was hailed with delight by the Ghibellines, whose aspirations found utterance in Dante's noble prose, but his life was too short for him to fulfil the hopes of his friends. Having restored the Rhine tolls to the Rhenish archbishops and made his peace with the Habsburgs, Henry went to Italy in the autumn of 1310, not, however, with a large army, and remained in the peninsula until his death in August 1313. As in former times the effect of the connexion of Germany with Italy was altogether mischievous, because to expedite his Italian journey the king

had added to the great privileges of the princes and had repressed the energies of the towns.

After Henry's death the electors, again fearing lest the German crown should become hereditary, refused to choose the late o Is the king's young son, John of Bohemia, as their ruler, Bavarian although the candidature of this prince was supported and by the powerful archbishops Baldwin of Trier and

Frederick p e ter of Mainz. They failed, inf act, to agree upon any o us ia. one candidate, and after a long delay there was a double election for the throne. This took place in October 1314, when the larger party chose Louis IV., duke of Upper Bavaria, while the smaller party gave their votes to Frederick the Fair, duke of Austria,

a son of King Albert I. Although related to each other, Louis and Frederick had come to blows before this event; they represented two rival houses, those of Wittelsbach and Habsburg, and the election only served to feed the flame of their antagonism. A second time war broke out between them. The struggle, marked by numerous raids, sieges and skirmishes, lasted for nine years, being practically ended by Frederick's decisive defeat at Miihldorf in September 1322. The vanquished king remained in captivity until 1325, when, during the contest between the Empire and the Papacy, Louis came to terms with him. Frederick acknowledged his rival, and later the suggestion was put forward that they should rule Germany jointly, but this arrangement aroused much opposition and it came to nothing. Frederick returned into an honourable captivity and died in January 1330.

The success of Louis in his war with Frederick was to some extent due to the imperial cities, which supported him from _ the first. Not only did they pay high taxes, but they

of the made splendid voluntary contributions, thus enabling success ot the sovereign of their choice to continue the fight. Louis. g ut l ou j s was perhaps still more indebted for his victory to the memorable conflict between the Swiss and the Habsburgs, the defeat of Leopold of Austria at Morgarten in 13 1 5 striking a heavy blow at his position. Thus this struggle for freedom, although belonging properly to the history of Switzerland, exercised much influence on the course of German history.

Had Louis been wise and prudent, it would have been fairly easy for him to attain a strong position after his victory at Miihldorf. But he threw away his advantages. He Louis iv. ff en d ec j John of Bohemia, who had aided him at Miihldorf, thus converting a useful friend into a for- midable foe, and his other actions were hardly more judicious. John was probably alarmed at the increase in the power of the German king, and about the same time a similar fear had begun to possess Pope John XXII. and Charles IV. of France. About 1323 Louis had secured the mark of Branden- burg for his son Louis, and he was eager to aggrandize his family in other directions. It was just at the time when he had estranged John of Bohemia that the pope made his decisive move. Assert- ing that the German crown could only be worn by one who had received the papal approbation he called upon Louis to lay it down; the answer was an indignant refusal, and in 1324 the king was declared deposed and excommunicate. .Thus the ancient struggle between the Papacy and the Empire was renewed, a struggle in which the pen, wielded by

Marsiglio of Padua, William of Occam, John of Jandun and others, played an important part, and in which the new ideas in religion and politics worked steadily against the arrogant papal claim. The pope and his French ally, Charles IV., whom it was proposed to seat upon the German throne, had completely misread the -signs of the times, and their schemes met with very little favour in Germany. No longer had the princes as in former years any reason to dread the designs of an ambitious king; the destinies of the kingdom were in their own hands and they would not permit them to be controlled by an alien power. Such was the attitude of most of the temporal princes, and many spiritual princes took the same view. As for the electors, they had the strongest possible motive for resisting the papal claim, because if this were once admitted they would quickly lost their growing importance in the state.*

and the pope.

Lastly, the cities which had stood behind the Empire in the most difficult crises of its contest with Rome were not likely to desert it now.

Thus encouraged, or rather driven forward, by the national sentiment Louis continued to assert the independence of the crown against the pope. In 1327 he marched into Italy, where he had powerful and numerous friends ita"y. " in the' Ghibelline party, the Visconti family and others; in January 1328 he was crowned emperor at Rome, and after this event he declared Pope John deposed and raised Peter of Corvara to the papal chair as Nicholas V. The concluding stages of this expedition were not favourable to the new emperor, but his humiliation was only slight and it did not appreciably affect the conditions of the controversy.

For a short time after the emperor's return to Germany there was peace. But this was soon broken by a dispute over the succession to the duchy of Carinthia and the county of Tirol, then ruled by Henry V., who was without Germany sons, and whose daughter, Margaret Maultasch, was married to John Henry, margrave of Moravia, a son of John of Bohemia. Upon these lands the three great families in Germany, those of Wittelsbach, of Habsburg and of Luxemburg, were already casting covetous eyes; Carinthia, moreover, was claimed by the Habsburgs in virtue of an arrangement made in 1 286. Thus a struggle between the Luxemburgs and the Habs- burgs appeared certain, and Louis, anxious to secure for his house a share of the spoil, hesitated for a time between these rivals. In 1335 Duke Henry died and the emperor adjudged his lands to the Habsburgs; wars

broke out, and the result was that John Henry secured Tirol while the other contending family added Carinthia to its Austrian possessions.

During this time Louis had been negotiating continually with Pope John and with his successor Benedict XII. to regain the favour of the church, and so to secure a free hand for his designs in Germany. But the pope was not The pope equally complaisant, and in 1337 the emperor allied gf ect0 ˆ m himself with Edward III. of England against Philip VI. of France, whom he regarded as primarily responsible for the unyielding attitude of the Papacy. This move was very popular in Germany, and the papal party received a further rebuff in July 1338 when the electors met at Rense and declared that in no possible manner could they allow any control over, or limitation of, their electoral rights. As a sequel to this declara- tion the diet, meeting at Frankfort a month later, asserted that the imperial power proceeded from God alone and that the individual chosen by a majority of the electors to occupy this high station needed no confirmation from the pope, or from any one else, to make his election valid. Contrary opinions they denounced as pestifera dogmata.

But in spite of this support Louis threw away his advantages; he abandoned Edward III. in 1341, although this step did not win for him, as he desired, the goodwill of the pope, Louis and he was soon involved in a more serious struggle and the with John of Bohemia and the Luxemburgs. With Luxem- his Bohemian followers John Henry had made himself urgs ~ very unpopular in Tirol, where his wife soon counted herself among his enemies, and in 1341 he was driven from the land, while Margaret announced her intention of repudiating him and marrying the emperor's son Louis, margrave of Brandenburg. The emperor himself entered heartily into this scheme for increasing the power of his family; he declared the marriage with John Henry void, and bestowed upon his son and his bride Margaret not only Tirol, but also Carinthia, now in the hands of the Habsburgs. Nothing more was needed to unite together all the emperor's foes, including Pope Clement VI., who, like his predecessors, had rejected the advances of Louis; but in 1345, before the gathering storm broke, the emperor took possession of the counties of Holland, Zealand and Friesland, which had been left without a ruler by the death of his brother-in-law, Count William IV. By this time John of Bohemia and his allies had completed their plans. In July 1346 five of the electors met, and, having declared Louis deposed, they raised John's

son Charles, margrave of Moravia, to the German throne. For a time no serious steps were taken against Louis, but after King John had met his death at Crecy Charles, who succeeded him as king of Bohemia, began to make vigorous preparations for war, and only the sudden death of the emperor (October 1347) saved Germany from civil strife.

Notwithstanding the defects of Louis's personal character his reign is one of the most important in German history. The Tae claim of the Papacy to political supremacy received

domestic in his time its death-blow, and the popes themselves policy of sowed the seeds of the alienation from Rome which s ' was effected at the Reformation. With regard to the public peace Louis persistently followed the lines laid down by Albert I. He encouraged the princes to form alliances for its maintenance, and at the time of his death such alliances existed in all parts of the country. To the cities he usually showed himself a faithful friend. In many of them there had been for more than a century a struggle between the old patrician families and the democratic gilds. Louis could not always follow his own impulses, but whenever he could he associated himself with the latter party. Thus in his day the government of the imperial cities became more democratic and industry and trade flourished as they had never before done. The steady dislike of the princes was the best proof of the. importance of the cities. They contained elements capable of enormous development; and had a great king arisen he might even yet, by their means, have secured for Germany a truly national life. In January 1349 the friends of the late emperor elected Gunther, count of Schwarzburg, as their king, but before this occurrence Charles Charles of Moravia., by a liberal use of gifts and promises, iv. be- had won over many of his enemies, prominent among comes whom were the cities. In a few months Gunther ** himself abandoned the struggle, dying shortly after-

wards, and about the same time his victorious rival was recog- nized by Louis of Brandenburg, the head of the Wittelsbach family. As king of Bohemia Charles was an enlightened and capable ruler, but he was indifferent towards Germany, although this country never stood in more urgent need of a strong and beneficent sovereign. In the

early years of the reign the people, especially in the south and west, attacked and plundered the Jews; and the consequent disorder was greatly increased by the ravages of the Black Death and by the practices and preaching of the Flagellants, both events serving to spur the maddened populace to renewed outrages on the Jews. In dealing with this outburst of fanaticism many of the princes, both spiritual and secular, displayed vigour and humanity, but Charles saw only in the sufferings of this people an excuse for robbing them of their wealth.

Charles's most famous achievement was the issue of the Golden Bull (q.v.). Although the principle of election had

long been admitted and practised with regard to the Golden German crown, yet it was surrounded by many practical Bull. difficulties. For instance, if the territory belonging

to an electoral family were divided, as was often the case, it had never been settled whether all the ruling princes were to vote, or, if one only were entitled to this privilege, by what principle the choice was to be made. Over these and other similar points many disputes had arisen, and, having been crowned emperor at Rome in April 1355, Charles decided to set these doubts at rest. The Golden Bull, promulgated in January 1356 and again after some tedious negotiations in December of the same year, fixed the number of electors at seven, Saxe- Wittenberg and not Saxe-Lauenburg obtaining the Saxon vote, and the vote of the Wittelsbachs being given to the ruler of the Rhenish Palatinate and not to the duke of Bavaria. The votes of a majority of the electors were held to make an election valid. In order that there might be no possibility of dispute between the princes of a single house, the countries ruled by the four secular electors — Bohemia, the Rhenish Palatinate, Saxony and Brandenburg — were declared to be indivisible and to be heritable only by the accepted rules of primogeniture. The electors • were granted full sovereign rights over their lands,*

and their subjects were allowed to appeal to the royal or the imperial tribunals only in case they could not obtain justice else- where. A blow was struck at the cities, which were forbidden to form leagues or to receive Pfahlburger.

If the Golden Bull be excepted, the true interest of this reign is in the movements beyond the range of the emperor's influence. It is significant that at this time the Femgerichte, or Fehmic Courts (q.v.), vastly extended the sphere of courts. their activities, and that in the

absence of a strong central authority they were respected as a check upon the lawless- ness of the princes. The cities, notwithstanding every kind of discouragement, formed new associations for mutual defence or strengthened those which already existed. The Hanseatic League carried on war with Valdemar V., king of Denmark, and his ally, the king of Norway, seventy-seven towns declaring war on these monarchs in 1367, and emerged victorious from the struggle, while its commerce extended to nearly all parts of the known world. In 1376 some Swabian towns formed a league which, in spite of the imperial prohibition, soon became powerful in south-west Germany and defeated the forces of the count of Wurttemberg at Reutlingen in May 1377. The emperor, meanwhile, was occupied in numerous intrigues to strengthen his personal position and to increase the power of his house. In these he was very fortunate, managing far more than his predecessors to avoid conflicts with the Papacy and the princes. The result was that when he died in November 1378 he wore the crowns of the Empire, of Germany, of Bohemia, of Lombardy and of Burgundy; he had added Lower Lusatia and parts of Silesia to Bohemia; he had secured the mark of Brandenburg for his son Wenceslaus in 1373; and he had bought part of the Upper Palatinate and territories in all parts of Germany.

*After the death of Charles, his son Wenceslaus, who had been crowned German king in July 1376, was recognized by the princes as their ruler, but the new sovereign was careless and indolent and in a few years he left Germany laus^**' to look after itself. During his reign the struggle between the princes and the cities reached its climax. Following the example set by the electors at Rense both parties formed associations for protection, prominent among these being the Swabian League on the one side and the League of the Lion (Lowenbund) 1 on the other. The result was that the central authority was almost entirely disregarded. Wenceslaus favoured first one of the antagonists and then the other, but although he showed some desire to put an end to the increasing amount of disorder he was unable, or unwilling, to take a strong and definite line of action. The cities entered upon the approach- ing contest at a considerable disadvantage. Often they were separated one from the other by large stretches of territory under the rule of a hostile prince and their trade was peculiarly liable to attack by an adventurous body of knights. The citizens, who were called upon to fight their battles, were usually unable to contend successfully with men whose whole lives had been passed in warfare; the isolation of the cities was not favourable to the creation or mobilization of an active and homogeneous force; and, moreover, at this time many of them were*

disturbed by internal troubles. However, they minimized this handicap by joining league to league; in 1381 the Swabian and the' Rhenish cities formed an alliance for three years, while the Swabian League obtained promises of help from the Swiss.

The Swiss opened the fight. Attacked by the Habsburgs they defeated and killed Duke Leopold of Austria at Sempach in July 1386 and gained another victory at Nafels two years later; but their allies, the Swabian cities, ^"“ff 1 ,

>, 11 r r™ disorder In

were not equally prompt or equally fortunate. The Germany. decisive year was 1388, when the strife became general all over south-west Germany. In August 1388 the princes, under Count Eberhard of Wurttemberg, completely defeated their foes at Doffingen, while in the following November Rupert II., elector palatine of the Rhine, was equally successful in his attack on the forces of the Rhenish cities near Worms-

1 So called from the badge worn by the knights (Lowenrilter) who composed it.

Exhaustion soon compelled the combatants to come to terms, and greatly to the disadvantage of the cities peace was made in 1389. The main result of this struggle was everywhere to strengthen the power of the princes and to incite them to fresh acts of aggression. During the same time the Hanse towns were passing through a period of difficulty. They were disturbed by democratic movements in many of the cities and they were threatened by the changing politics of the three northern kingdoms, Norway, Sweden and Denmark, and by their union in 1397; their trading successes had raised up powerful enemies and had embroiled them with England and with Flanders, and the Teutonic Order and neighbouring princes were not slow to take advantage of their other difficulties.

*Towards the close of the century the discontent felt at the incompetent and absent German king took a decided form. The movement was led by the four Rhenish electors, *" pert and after some preliminary proceedings these princes yZg. met in August 1400;*

having declared Wenceslaus

dethroned they chose one of their number, the elector palatine Rupert III., in his stead, and the deposed monarch accepted the sentence almost without demur. Rupert was an excellent elector, and under more favourable circumstances would have made a good king, but so serious were the jealousies and divisions in the kingdom that he found little scope for his energies outside the Palatinate. In spite of the peace of 1389 the cities had again begun to form leagues for peace; but, having secured a certain amount of recognition in the south and west of Germany, the new king turned aside from the pressing problems of govern- ment and in 1401 made a futile attempt to reach Rome, an enterprise which covered him with ridicule. After his return to Germany he had to face the hostility of many of the princes, and this contest, together with vain attempts to restore order, occupied him until his death in May 1410.

After's Rupert's death two cousins, Jobst, margrave of Moravia, and Sigismund, king of Hungary, were in the autumn of 1410 both chosen to fill the vacant throne by oppos- Sigismund m g p ar ties; and the position was further complicated kte g ° Se by the fact that the deposed king, Wenceslaus, was still alive. Jobst, however, died in January 141 1, and in the succeeding July Sigismund, having come to terms with Wenceslaus, was again elected king and was generally recognized. The commanding questions of this reign were ecclesiastical. It was the age of the great schism, three popes claiming the allegiance of Christendom, and of the councils of Constance and of Basel; in all ranks of the Church there was an urgent cry for reform. Unfortunately the council of Constance, which met mainly through the efforts of Sigismund in 1414, marred its labours by the judicial murders of John Huss and of Jerome of Prague. This act greatly incensed the Bohemians, who broke into revolt in 1419, and a new and fiercer outburst occurred in 1420 when Sigismund, who had succeeded his brother Wenceslaus as king of Bohemia in the preceding August, an- nounced his intention of crushing the Hussites. Led by their famous general, John 2izka, the Bohemians won several battles and spread havoc and terror through the neighbouring German lands. During the progress of this revolt Germany was so divided and her king was so poor that it was impossible to collect an army of sufficient strength to crush the malcontents. At the diet of Nuremberg in 1422 and at that of Frankfort in 1427 Sigismund endeavoured to raise men and money by means of contributions from the estates, but the plan failed owing to mutual jealousies and especially to the resistance of the cities. He secured some help from Frederick of Brandenburg, from Albert of

Austria, afterwards the German king Albert II., anpl from Frederick of Meissen, to whom he granted the electoral duchy of Saxe-Wittenberg; but it was only when the Hussites were split into two factions, and when Zizka was dead, that Germany was in any way relieved from a crushing and intolerable burden.

The continual poverty which hindered the successful prosecu- tion of the war against the Hussites, and which at times placed Sigismund in the undignified position of having to force himself

Albert 11.

the Papacy.

as an unwelcome guest upon princes and cities, had, however, one good result. In 141 5 he granted, or rather sold, the mark of Brandenburg to his friend Frederick of Hohen- Branden- zollern, burgrave of Nuremberg, this land thus passing burg and into the hands of the family under whom it was des- theiiohen- tined to develop into the kingdom of Prussia. During zoUems – this reign the princes, especially the electors, continued their endeavours to gain a greater share in the government of Germany, and to some extent they succeeded. Sigismund, on his part, tried to enforce peace upon the country by forming leagues of the cities, but to no purpose; in fact all his plans for reform came to nothing.

Sigismund, who died in December 1437, was succeeded on the German throne and also in Hungary and Bohemia by his son-in-law Albert of Austria, and from this time, although remaining in theory elective, the German crown was always conferred upon a member of the house of Habsburg until the extinction of the male line of this family in 1740. The reign of Albert II. was too short to enable him to do more than indicate his good intentions; he acted in general with the electors in observing a neutral attitude with regard to the dispute between the council of Basel and Pope Eugenius IV., and he put forward a scheme to improve the administration of justice. He died in October 1439, and was succeeded by his kinsman Frederick, duke of Styria, who became German king as Frederick IV. and, after his coronation at Rome in 1452, emperor as Frederick III.

The first concern of the new king was with the papal schism. The council of Basel was still sitting, and had elected an anti-pope, Felix V., in opposition to Eugenius IV., while the Frederick electors, adhering to their neutral attitude, sought ///. and to bring Frederick into line with them on this question. Some years were occupied in

negotiations, but the king soon showed himself anxious to come to terms with Eugenius, and about 1446 the electors ceased to act together. Atflˆgth peace was made. The consent of several of the electors having been purchased by concessions, Frederick signed with Pope Nicholas V., the successor of Eugenius, in February 1448 the concordat of Vienna, an arrangement which bound the German Church afresh to Rome and perpetuated the very evils from which earnest churchmen had been seeking deliverance. Thus Germany lost the opportunity of reforming the Church from within, and the upheaval of the 16th century was rendered inevitable.

Frederick's reign is one of great importance in the history of Austria and of the house of Habsburg, but under him the fortunes of Germany sank to the lowest possible point. Without any interference from the central authority wars were ° erniaa y 1 • ‘ ■ r 1 ,,- i- under waged in every part of the country, and disputes of Frederick. every kind were referred to the decision of the sword. The old enmity between the cities and the princes blazed out afresh; grievances of every kind were brought forward and many struggles were the result. Perhaps the most famous of these was one between a confederation of Franconian and Swabian cities under the leadership of Nuremberg on the one side, and Albert Achilles, afterwards elector of Brandenburg, and a number of princes on the other. The war was carried on with great barbarity for about four years (1449-1453), and was in every respect a critical one. If the cities had gained the day they might still have aimed at balancing the power of the princes, but owing partly to their imperfect union, partly to

the necessity of fighting with hired troops, they did not gain any serious advantage. On the whole, indeed, in spite of temporary successes, they decidedly lost ground, and on the conclusion of peace there was no doubt that the balance of power in the state inclined to the princes. Frederick meanwhile was involved in wars with the Swiss, with his brother Albert and his Austrian subjects, and later with the Hungarians. He had no influence in Italy; in Burgundy he could neither stop Duke Philip the Good from adding Luxemburg to his possessions, nor check the towering ambition of Charles the Bold; while after the death of Charles in 1477 he was equally unable to prevent the king of

France from seizing a large part of his lands. Torn by dissensions the Teutonic Order was unsuccessful in checking the encroach- ments of the Poles, and in 1466 the land which it had won in the north-east of Germany passed under the suzerainty of Poland, care being taken to root out all traces of German influence therein. Another loss took place in 1460, when Schleswig and Holstein were united with Denmark. In Germany itself the king made scarcely any pretence of exercising the supreme authority; for nearly thirty years he never attended the imperial diet, and the suggestions which were made for his deposition failed only because the electors could not agree upon a successor. In his later years he became more of a recluse than ever, and even before February i486, when his son Maximilian was chosen German king, he had practically ceased to take any part in the business of the Empire, although he survived until August 1493. During the reign of Frederick the electors and the greater princes continued the process of consolidating and increasing their power. Lands under their rule, which were fttfe° Wer technically imperial fiefs, were divided and devised princes. by them at will like other forms of private property ; they had nearly all the rights of a

sovereign with regard to levying tolls, coining money, administering justice and granting privileges to towns; they were assisted in the work of government by a privy council, while their courts with their numerous officials began to resemble that of the king or emperor. They did not, however, have everything their own way. During this century their power was limited by the formation of diets in many of the principalities. These bodies were composed of the mediate prelates, the mediate nobles and representatives of the mediate cities. They were not summoned because the princes desired their aid, but because arms could only be obtained from the nobles and money from the cities, at least on an adequate scale. Once having been formed these local diets soon extended their functions. They claimed the right of sanctioning taxation; they made their voice heard about the expenditure of public money; they insisted, although perhaps not very effectually, on justice being administered. Such institutions as these were clearly of the highest importance, and for two centuries they did something to atone for the lack of a genuine monarchy.

During this reign the conditions of warfare began to change. The discovery of gunpowder made small bodies of men, adequately armed, more than a match for great forces 'of war equipped in medieval fashion. Hence the custom of tare. hiring mercenary troops was introduced, and a prince*

could never be certain, however numerous his vassals might be, that the advantage would not rest with his opponent. This fact, added to the influence of the local diets, made even the princes weary of war, and a universal and continuous demand arose for some reform of the machinery of government. Partly at the instance of the emperor a great Swabian confederation was formed in 1488. This consisted of both princes and cities and was intended to enforce the public peace in the south- western parts of Germany. Its effects were excellent; but obviously no partial remedy was sufficient. It was essential that there should be some great reform which would affect every part of the kingdom, and for the present this was not to be secured. Maximilian came to the throne in i486 with exceptional advan- tages. He was heir to the extensive Austrian lands, and as the widowed husband of Charles the Bold's daughter Mary he administered the Netherlands. Although he soon gave up these provinces to his son Philip, the fact that they were in the possession of his family added to his influence, and this was further increased when Philip married Joanna, the heiress of the Spanish kingdoms. From Maximilian's accession the Empire exercised in the affairs of Europe an authority which had not belonged to it for centuries. The reason for this was not that the Empire was stronger, but that its crown was worn by a succession of

princes who were great sovereigns in their own right.

Having in 1490 driven the Hungarians from Vienna and recovered his hereditary lands, and having ordered the affairs of the Netherlands, Maximilian turned his attention to Italy,

Maxi- milian I.

whither he was drawn owing to the invasion of that country by Charles VIII. of France in 1494. But before he could take any steps to check the progress of Charles pecuniary neces- Reforms sities compelled him to meet the diet. At this time the '» German, or imperial, diet consisted of three colleges, ?]'g£ u "' y ' one of the electors, another of the princes, both spiritual and secular, and a third of representatives of the free cities, who had, however, only just gained the right to sit beside the other two estates. The diet was an extremely clumsy instrument of government, and it was perhaps never more discredited or more impotent than when it met Maximilian at Worms in March 1495. But in spite of repeated rebuffs the party of reform was valorous, and undaunted; its members knew that their case was overwhelmingly strong. Although disappointed in the hope which they had nourished until about 1490 that Maximilian himself would lead them, they had found a capable head in Bertold, elector of Mainz. The king lost no time in acquainting the diet with his demands. He wished for men and money to encounter the French in Italy and to resist the Turks. Bertold retorted that redress of grievances must precede supply, and Maximilian and the princes were soon discussing the proposals put forward by the sagacious elector. His first suggestion that a council nominated by the estates should be set up with the power of vetoing the acts of the king was abandoned because of the strenuous opposition of Maximilian; but Bertold was successful in getting the diet to proclaim an eternal Landfriede, that is, to forbid private war without any limitation of time, and it was agreed that the diet should meet annually to advise the king on matters of moment. The idea of a council, however, was not given up although it took a different form. An imperial court of justice, the Reichskammergericht, was established; this consisted of sixteen members nominated by the estates and a president appointed by the king. Its duties were to judge between princes of the Empire and to act as the supreme court of appeal in cases where humbler persons were concerned. Partly to provide for the expenses of this court, partly to furnish Maximilian with the promised monetary aid, a tax called the common penny was instituted, this impost taking the form both of a property tax and of a poll tax. Such in outline were the reforms effected by the important

diet of Worms.

The practical difficulties of the reformers, however, were only just beginning. Although Maximilian took some interest in the collection of the common penny it was difficult, biffi- and from some classes impossible, to obtain payment cutties and of this tax, and the king was persistently hostile to far ^' er the imperial court of justice, his hostility and the want of money being indeed successful in preventing that institution for a time from doing any real service to Germany. In 1497 he set up a new Aulic council or Hofrat, the members of which were chosen by himself, and to this body he gave authority to deal with all the business of the Empire. Thus he undermined the foundations of the Reichskammergericht and stole a march upon Bertold and his friends. A series of diets between 1495 and 1499 produced only mutual recriminations, and then Maximilian met with a serious rebuff. The Swiss refused to pay the common penny and to submit to the jurisdiction of the imperial court of justice. Consequently, in 1499, Maximilian sent such troops as he could collect against them, but his forces were beaten, and by the peace of Basel he was forced to concede all the demands made by the Swiss, who became virtually independent of the Empire. Heartened by this circumstance Bertold and his followers returned to the attack when the diet met at Augsburg in 1500. The common penny as a means of taxation fell into the background, and in its place a scheme was accepted which it was thought would provide the king with an army of about 30,000 men. But more important perhaps was the administrative council, or Reichsregiment, which was established by the diet at this time. A revival of the idea put forward by the elector of Mainz at Worms in 1495, this council was to consist of twenty members appointed by the electors and other princes and by representatives of the cities, with a president named by the king. Its work was practically that of

the reformers.

governing Germany, and it was the most considerable encroachment which had yet been made on the power of the king. It is not surprising therefore that Maximilian hated the new body, to the establishment of which he had only consented under great pressure.

In 1500 the Reichsregiment met at Nuremberg and began at once to treat for peace with France. Maximilian was not M , slow to resent this interference; he refused to appoint

miiian a president, and soon succeeded in making the meetings hampers of the council impossible. The relations between the king and the princes were now very strained. Bertold called the electors together to decide upon a plan of campaign; Maximilian on his part tried to destroy the electoral union by winning over individual members. The result was that when the elector of Mainz died in 1504 the king's victory was complete. The Reichskammergericht and the Reichsregiment were for all practical purposes destroyed, and greater authority had been given to the Hofrat. Hence- forward it was the king who put forward schemes of reform and the diet which modified or rejected them. When the diet met at Cologne in 1505 Maximilian asked for an army and the request was granted, the necessary funds being raised by the old plan of a levy on the estates. At Constance, two years later, the diet raised men and money in a similar fashion, and on this occasion the imperial court of justice was restored, with some slight alteration in the method of appointing its members. After Maximilian had taken the novel step of assuming the title of Roman emperor at Trent in 1508 the last of the reforming diets met at Cologne in 151 2. In 1500 Germany had been divided into six circles (Kreise) or districts, for the purpose of sending representatives to the Reichsregiment. These circles were now increased in number to ten and an official (Hauptmann) was placed over each, his duties being to enforce the decisions of the Reichskammergericht. But it was some time before the circles came into working order; the only permanent reform of the reign was the establishment of the imperial court of justice, and even this was not entirely satisfactory, Maximilian's remain- ing diets loudly denouncing it for delay and incompetence. The period marked by the attempted reform of Bertold of Mainz was that of the last struggle between the supporters of a united Germany and those who preferred a loose confederation of states. Victory remained with the latter party. Maximilian himself had done a great deal to promote the unity of his Austrian lands and, incidentally, to cut them off from the remainder of the German kingdom, and other princes were following his example. This movement spelled danger to the small princi- palities and to the free cities, but it gave a powerful impetus to the growth of Brandenburg, of Saxony, of Bavaria and of the Palatinate, and the future of the country seemed likely to remain with the particularist and not with the national idea.

During the period of these constitutional struggles the king's chief energies were spent in warring against the French kings Maxi-

Charles VIII. and Louis XII. in Italy, where he hoped

mllian's to restore the claims, dormant, perhaps even extinct, wars la f the German kings. In 1508 he helped to promote tay ' the league of Cambrai, formed to despoil Venice, but

he soon returned to his former policy of waging war against France, and he continued to do this until peace was made in 1 5 16. The princes of Germany showed themselves singularly indifferent to this struggle, and their king's battles were largely fought with mercenary troops. Maximilian gained his most conspicuous success in his own kingdom in 1504, when he interfered in a struggle over the succession to the duchy of Bavaria-Landshut. He gained some additions of territory, but his victory was more important because it gave him trie prestige which enabled him to break down the opposition of the princes and to get his own way with regard to his domestic policy.

In many respects the reign of Maximilian must be regarded as the end of the middle ages. The feudal relation between the king and the princes and between the princes and their vassals had become purely nominal. No real control was exerted by the

crown over the heads of the various states, and, now that war was carried on mainly by mercenary troops, the mediate nobles did not hold their lands on condition of military service. The princes were sovereigns, not merely feudal lords; ˆ ec ˆy° f and by the institution of local diets in their territories relations. an approach was made to modern conceptions of government. The age of war was far indeed from being over, but men were at least beginning to see that unnecessary bloodshed is an evil, and that the true outlet for the mass of human energies is not conflict but industry. By the growth of the cities in social, if not in political, importance the products of labour were more and more widely diffused; and it was easier than at any previous time for the nation to be moved by common ideas and impulses. The discovery of America, the invention of printing, the revival of learning and many other causes had contributed to effect a radical change in the point of view from which the world was regarded; and the strongest of all medieval relations, that of the nation to the Church, was about to pass through the fiery trial of the Reforma- tion. This vast movement, which began in the later years of Maximilian, definitely severed the medieval from the modern world.

The seeds of the. Reformation were laid during the time of the great conflict between the Papacy and the Empire. The arrogance and the

ambition of the popes then stamped upon the minds of the people an impression that was f orn j^j on never effaced. During the struggle of Louis IV. with the popes of his day the feeling revived with fresh intensity; all classes, clerical as well as lay, looked upon resistance to papal pretensions as a necessity imposed by the national honour. At the same time the spiritual teaching of the mystics awakened in many minds an aspiration which the Church, in its corrupt state, could not satisfy, and which was in any case unfavourable to an external authority. The Hussite movement further weakened the spell of the Church. Still more powerful, because touching other elements of human nature and affecting a more important class, was the influence of the Renaissance, which, towards the end of the 15th century, passed from Italy to the universities of Germany. The men of the new learning did not sever themselves from Christianity, but they became indifferent to it; its conceptions seemed to them dim and faded, while there was a constantly increasing charm in literature, in philosophy and in art. No kind of effort was made by the Church to prepare for the storm. The spiritual princes, besides displaying all the faults of the secular princes, had special defects of their own; and as simony was universally practised, the lives of multitudes of the inferior clergy were a public scandal, while their services were cold and unimpressive. The moral sense was outraged by such a pope as Alexander VI.; and neither the military ambition of Julius II. nor the refined paganism of Leo X. could revive the decaying faith in the spirituality of their office. Pope Leo, by his incessant demands for money and his unscrupulous methods of obtaining it, awakened bitter hostility in every class of the community.

The popular feeling for the first time found expression when Luther, on All Saints' day 1517, nailed to a church door in Wittenberg the theses in which he contested the doctrine which lay at the root of the scandalous traffic in in- dulgences carried on in the pope's name by Tetzel and his like. This episode, derided at first at Rome as the act of an obscure Augustinian friar intent on scoring a point in a scholastic dis- putation, was in reality an event of vast significance, for it brought to the front, as the exponent of the national sentiment, one of the mightiest spirits whom Germany has produced. Under the influence of Luther's strong personality the most active and progressive elements of the nation were soon in more or less open antagonism to the Papacy.

When Maximilian died in January 1519 his throne was com- peted for by his grandson Charles, king of Spain, and by Francis I. of France, and after a long and costly contest the former was chosen in the following June. By the time Charles reached I Germany and was crowned at Aix-la-Chapelle (October 1520)

Lather.

Luther had confronted the cardinal legate Cajetan, had passed through his famous controversy at Leipzig with Johann Eck, and was about to burn the bull of excommunication. and S ' After this daring step retreat was impossible, and with Luther. keen excitement both the reformer's followers and his enemies waited for the new sovereign to declare himself on one side or on the other. Charles soon made up his mind about the general lines of his policy, although he was completely ignorant of the strength of the feeling which had been aroused. He fancied that he had to deal with a mere monkish quarrel; at one time he even imagined that a little money would set the difficulty at rest. It was not likely, however, in any case that he would turn against the Roman Church, and that for various reasons. He was by far the most important ruler of the time, and the peoples under his direct sway were still adherents of the old faith. He was king of Spain, of Sicily, of Naples and of Sardinia ; he was lord of the Netherlands, of the free county of Burgundy and of the Austrian archduchies; he had at his command the immense resources of the

New World; and he had been chosen king of Germany, thus gaining a title to the imperial crown. Following the example set by Maximilian he called himself emperor without waiting for the formality of a coronation at Rome. Now the protection of the Church had always been regarded as one of the chief functions of the emperors; Charles could not, therefore, desert it when it was so greatly in need of his services. Like his predecessors he reserved to himself the right to resist it in the realm of politics; in the realm of faith he considered that he owed to it his entire allegiance. Moreover, he intended to undertake the subjugation of northern Italy, a task which had baffled his imperial grand- father, and in order to realize this scheme it was of the highest importance that he should do nothing to offend the pope. Thus it came about that at the diet of Worms, which met in January 1 521, without any thorough examination of Luther's position, Charles issued the famous edict, drawn up by Cardinal Aleandro, which denounced the reformer and his followers. This was accepted by the diet and Luther was placed under the imperial ban. 1.

When Charles was chosen German king he was obliged to make certain promises to the electors. Embodied in a Wahl- Charies kapitulation, as it was called, these were practically and the the conditions on which the new sovereign was allowed move- to take the crown, and the precedent was followed at subsequent elections. At the diet of Worms steps were taken to carry these promises into effect. By his W aklkapitulation Charles had promised to respect the freedom of Germany, for the princes looked upon him as a foreigner. He was neither to introduce foreign troops into the country, nor to allow a foreigner to command German soldiers; he must use the German language and every diet must meet on German soil. An administrative council, a new Reichsregiment, must be established, and other reforms were to be set on foot. The constitution and powers of this Reichsregiment were the chief subject of difference between Charles and the princes at the diet. Eventually it was decided that this council should consist of twenty-two members with a president named by the emperor; but it was only to govern Germany during the absence of the sovereign, at other times its functions were merely advisory. The imperial chamber was restored on the lines laid down by Bertold of Mainz in 1495 (it survived until the dissolution of the Empire in 1806), and the estates undertook to aid the emperor by raising and paying an army. In April 1521 Charles invested his brother Ferdinand, afterwards the emperor Ferdinand I., with the Austrian archduchies, and soon afterwards he left Germany to renew his long struggle with Francis I. of France.

While the emperor was thus absent great disturbances took place in Germany. Among Luther's friends was one, Ulrich von Hutten, at once penetrated with the spirit of the Renaissance and emphatically a man of action. The class to which Hutten and his friend, Franz von Sickingen, a daring and ambitious Rhenish baron, belonged, was that of the small feudal tenants in chief, the

ment tor reform.

Ritterschaft or knights of the Empire. This class was subject only to the emperor, but its members lacked the territorial possessions which gave power to the princes; they were partly deprived of their employment owing to the mn's " suppression of private wars, and they had suffered rising. through the substitution of Roman law for the ancient feudal laws and customs. They had no place in the constitution or in the government of Germany, and they had already paralysed the administration by refusing to pay the taxes. They were intensely jealous of the princes, and it occurred to Hutten and Sickingen that the Reformation might be used to improve the condition of the knights and to effect a total change in the constitution of the Empire. No general reform, they maintained, either in church or state, could be secured while the country was divided into a number of principalities, and their plan was to combine with all those who were dis- contented with the existing order to attack the princes and to place the emperor at the head of a united nation. Sickingen, who has been compared to Wallenstein, and who doubtless hoped to secure a great position for himself, had already collected a large army, which by its very presence had contributed some- what to the election of Charles at Frankfort in 1519. He had also earned renown by carrying on feuds with the citizens of Worms and of Metz, and now, with a view to realizing his larger ambitions, he opened the campaign (August 1522) by attacking the elector of Trier, who, as a spiritual prince, would not, it was hoped, receive any help from the religious reformers. For a moment it seemed as if Hutten's dream would be realized, but it was soon evident that it was too late to make so great a change. Luther and other persons of influence stood aloof from the movement ; on the other hand, several princes, includ- ing Philip, landgrave of Hesse, united their forces against the knights, and in May 1523 Sickingen was defeated and slain. A few weeks later Hutten died on an island in the lake of Zurich. This war was followed by another of a much more serious nature. The German peasants had grievances compared with which those of the knights and lesser barons were Tne imaginary. For about a century several causes had causes tended to make their condition worse and worse, otthe While taxes and other

burdens were increasing the t Wa ™ r ants ‘ power of the king to protect them was decreasing; with or without the forms of law they were plundered by every other class in the community; their traditional privileges were withdrawn and, as in the case of the knights, their position had suffered owing to the introduction of Roman law into Germany. In the west and south-west of the country especially, opportuni- ties of migration and- of expansion had been gradually reduced, and to provide for their increasing numbers they were compelled to divide their holdings again and again until these patches of land became too small for the support of a household. Thus, solely under the influence of social and economic conditions, various risings of the peasants had taken place during the latter part of the 15th century, the first one being in 1461, and at times the insurgents had combined their forces with those of the lower classes in the towns, men whose condition was hardly more satisfactory than their own. In the last decade of the 15th and the first decade of the 16th century there were several insurrections in the south-west of Germany, each of which was called a Bundschuh, a shoe fastened upon a pole serving as the standard of revolt. In 15 14 Wurttemberg was disturbed by the rising of ” poor Conrad,” but these and other similar revolts in the neighbourhood were suppressed by the princes. These movements, however, were only preludes to the great revolution, which is usually known as the Peasants’ War (Bauernkrieg).

The Renaissance and the Reformation were awakening extra- vagant hopes in the minds of the German peasants, and it is still a matter, of controversy among historians to what extent Luther and the reformers were responsible for pe asan t s ‘ their rising. It may, however, be stated with some War. certainty that their condition was sufficiently wretched to drive them to revolt without any serious pressure from outside. The rising was due primarily neither to religious nor to political,

but to economic causes. The Peasants’ War, properly so called, broke out at Stiihlingen in June 1522. The insurgents found a leader in Hans Miiller of Bulgenbach, who gained some support in the surrounding towns, and soon all Swabia was in revolt. Quickly the insurrection became general all over central and southern Germany.

In the absence of the emperor and of his brother, the archduke Ferdinand, the authorities in these parts of the country were unable to check the movement and, aided by many knights, prominent among whom was Gotz von Ber- lichingen, the peasants were everywhere victorious, while another influential recruit, Ulrich, the dispossessed duke of Wiirttemberg, joined them in the hope of recovering his duchy. Ulrich's attempt, which was made early in 1525, was, however, a failure, and about the same time the peasants drew up twelve articles embodying their demands. These were sufficiently moderate. They asked for a renewal of their ancient rights of fishing and hunting freely, for a speedier method of obtaining justice, and for the removal of new and heavy burdens. In many places the lords yielded to these demands, among those who granted con- Cessions being the elector palatine of the Rhine, the bishops of Bamberg and of Spires, and the abbots of Fulda and of Hersfeld. But meanwhile the movement was spreading through Franconia to northern Germany and was especially formidable in Thuringia, where it was led by Thomas Miinzer. Here again success attended the rebel standards. But soon the victorious peasants became so violent and so destructive that Luther himself urged that they should be sternly punished, and a number of princes, prominent among whom was Phi-lip of Hesse, banded themselves together to crush the rising. Miinzer and his followers were defeated at Frankenhausen in May, the Swabian League gained victories in the area under its control, successes were gained elsewhere by the princes, and with much cruelty the revolt of the peasants was suppressed. The general result was that the power of the territorial lords became greater than ever, although in some cases, especially in Tirol and in Baden, the condition of the peasants was somewhat improved. Elsewhere, however, this was not the case; many of the peasants suffered still greater oppression and some of the immediate nobles were forced to submit to a detested yoke.

Before the suppression of this rising the Reichsregiment had met with very indifferent success in its efforts to govern Germany. Meeting at Nuremberg early in 1522 it voted some ™? _ slight assistance for the campaign against the invading regiment. Turks, but the proposals put forward for raising the necessary funds aroused much opposition, an opposition which came mainly from the large and important cities. The citizens appealed to Charles V., who was in Spain, and after some hesitation the emperor decided against the Reichsregiment. Under such disheartening conditions it is not surprising that this body was totally unable to cope with Sickingen's insurrection, and that a few weeks after its meeting at Nuremberg in 1524 it

succumbed to a series of attacks and disappeared from the history of Germany. But the Reichsregiment had taken one step, although this was of a negative character. It had shown some sympathy with the reformers and had declined to put the edict of Worms into immediate execution. Hardly less lukewarm, the imperial diet ordered the edict to be enforced, but only as far as possible, and meanwhile the possibilities of accommodation between the two great religious parties were becoming more and more remote. A national assembly to decide the questions at issue was announced to meet at Spires, but the emperor forbade this gathering. Then the Romanists, under the guidance of Car- dinal Campeggio and the archduke Ferdinand, met at Regens- burg and decided to take strong and aggressive measures to destroy Lutheranism, while, on the other hand, representatives of the cities met at Spires and at Ulm, and asserted their inten- tion of forwarding and protecting the teaching of the reformed doctrines. All over the country and through all classes of the people men were falling into line on one side or the other, and everything was thus ready for a long and bitter religious war.

During these years the religious and political ideas of the Reformation were rapidly gaining ground, and, aided by a

vigorous and violent polemic literature, opposition to Rome was growing on every side. Instigated by George of Saxony the Romanist princes formed a defensive league at Dessau in 1525; the reforming princes took a similar step at progress Gotha in 1526. Such were the prevailing conditions of the when the diet met at Spires in June 1526 and those Reforma- who were still loyal to the Roman Church clamoured “” for repressive measures. But on this occasion the reformers were decidedly in the ascendant. Important ecclesiastical reforms were approved, and instructions forbidding all innovations and calling upon the diet to execute the edict of Worms, sent by the emperor from Spain, were brushed aside on the ground that in the preceding March when this letter was written Charles and the pope were at peace, while now they were at war. Before its dissolution the diet promulgated a decree providing that, pending the assembly of a national council, each prince should order the ecclesiastical affairs of his own state in accordance with his own conscience, a striking victory for the reformers and incidentally for separatist ideas. The three years which elapsed between this diet and another important diet which met in the same city are full of incident. Guided by Luther and Melanchthon, the principal states and cities in which the ideas of the reformers prevailed — electoral Saxony, Brandenburg, Hesse and the Rhenish Palatinate, Strassburg, Nuremberg, Ulm and Augsburg — began to carry out measures of church reform. The Romanists saw

the significance of this movement and, fortunately for them, were able to profit by the dissensions which were breaking out in the ranks of their opponents, especi- ally the doctrinal differences between the followers of Luther and those of Zwingli. Persecutions for heresy had begun, the feeling between the two great religious parties being further embittered by some revelations made by Otto von Pack (q.v.) to Philip of Hesse. Pack's stories, which concerned the existence of a powerful league for the purpose of making war upon the reformers, were proved to be false, but the soreness occasioned thereby remained. The diet met in February 1529 and soon received orders from the emperor to repeal the decree of 1526. The supporters of the older faith were now predominant and, although they were inclined to adopt a somewhat haughty attitude towards Charles, they were not averse from taking strong measures against the reformers. The decree of the diet, formulated in April, forbade the reformers to make further religious changes, while the toleration which was conceded to Romanists in Lutheran states was withheld from Lutherans in Romanist states. This decree was strongly resented by the reforming princes and cities. They drew up a formal protest against it (hence the name " Protestant "), which they presented to the archduke Ferdinand, setting forward the somewhat novel theory that the decree of 1526 could not be annulled by a succeed- ing diet unless both the parties concerned assented thereto. By this decree they declared their firm intention to abide.

*The untiring efforts of Philip of Hesse to unite the two wings of the Protestant forces met with very little success, and the famous conference at Marburg in the autumn of 1529, for which he was responsible, revealed the fact that it of * o ^. was practically impossible for the Lutherans and the burg. Zwinglians to act together even when threatened by a common danger, while a little later the alliance between the Lutheran states of north Germany and the - Zwinglian cities of the south was destroyed by differences upon points of doctrine. In 1 530 the emperor, flushed with success in Italy and at peace with his foreign foes, came to Germany with the express intention of putting an end to heresy. In June he opened the diet at Augsburg, and here the Lutherans submitted a summary of their doctrines, afterwards called the Augsburg Confession. Drawn up by Melanchthon, this pronouncement was intended to widen the breach between the Lutherans and the Zwinglians, and to narrow that between the Lutherans and the Romanists; from this time it was regarded as the chief standard of the Lutheran faith. Four Zwinglian cities, Strassburg, Constance, Lindau and Memmingen, replied with a confession of their own and the Romanists also drew up an answer.*

The period of

8 54

GERMANY

[HISTORY

Schmal- kalden

negotiation which followed served only to show that no accommodation was possible. Charles himself made no serious effort to understand the controversy; he was resolved, whether the Lutherans had right on their side or not, that they should submit, and he did not doubt but that he would be able to awe them into submission by an unwonted display of power. But to his surprise the Lutheran princes who attended the diet refused to give way. They were, however, outnumbered by their enemies, and it was the Romanist majority which dictated the terms of the decree, which was laid before the diet in September, enjoining a return to religious conformity within seven months. The Protestant princes could only present a formal protest and leave Augsburg. Finally the decree of the diet, promulgated in November, ordered the execution of the edict of Worms, the restoration of all church property, and the maintenance of the jurisdiction of the bishops. The duty of enforcing the decree was especially entrusted to the Reichskammergericht; thus by the processes of law the Protestant princes were to be deprived of much of their property, and it seemed probable that if they did not submit the emperor would have recourse to arms.

For the present, however, fresh difficulties with France and an invasion by the Turks, who had besieged Vienna with an The immense army in the autumn of 1529, forced Charles

league of to mask his designs. Meanwhile some of the Lutherans, angered and alarmed by the decisions of the Reichs- kammergericht, abandoned the idea that resistance- to the imperial authority was unlawful and, meeting in December 1530, laid the foundation of the important league of Schmalkalden, among the first members of the confederation being the rulers of Saxony and Hesse and the cities of Bremen and Magdeburg. The league was soon joined by other strong cities, among them Strassburg, Ulm, Constance, Liibeck and Goslar; but it was not until after the defeat and death of Zwingli atKappel in October 1 53 1 that it was further strengthened by the adhesion of those towns which had hitherto looked for leadership to the Swiss

reformer. About this time the military forces of the league were organized, their heads being the elector of Saxony and the landgrave of Hesse. But the league had a political as well as a religious aspect. It was an alliance between the enemies of the house of Habsburg, and on this side it gained the support of the duke of Bavaria and treated with Francis I. of France. To this its rapid growth was partly due, but more perhaps to the fact that the Reformation in Germany was above all things a popular movement, and thus many princes who would not have seceded from the Roman Church of their own accord were compelled to do so from political motives. They had been strong enough to undermine the imperial power; they were not strong enough to resist the pressure put upon them by a majority of their subjects. It was early in 1532, when faced with the necessity of resisting the Turkish advance, that Charles met the diet at Regensburg. He must have men and money for this purpose even at the price of an arrangement with the Protestants. But the Lutherans were absent from the diet, and the Romanists, although they voted help, displayed a very uncompromising temper towards their religious foes. Under these circumstances the emperor took the matter into his own hands, and his negotia- tions with the Protestants resulted in July 1532 in the religious peace of Nuremberg, a measure which granted temporary tolera- tion to the Lutherans and which was repeatedly confirmed in the following years. Charles's reward was substantial and immediate. His subjects vied with each other in hurrying soldiers to his standard, and in a few weeks .the great Turkish host was in full retreat.

While the probability of an alliance between Pope Clement VII. and Francis I. of France, together with other international ' complications, prevented the emperor from following*

affairs of U P n ' s victory over the Turks, or from reducing the Oerotany. dissenters from the Roman religion to obedience, Protestantism was making substantial progress in the states, notably in Anhalt and in Pomerania, and in the cities, and in January 1534 the Protestant princes were bold

enough to declare that they did not regard the decisions of the Reichskammergericht as binding upon them. About this time Germany witnessed three events of some importance. Through the energy of Philip of Hesse, who was aided by Francis I., Ulrich of Wurttemberg was forcibly restored to his duchy. The members of the Romanist league recently founded at Halle would not help the Habsburgs, and in June 1 534, by the treaty of Cadan, King Ferdinand was forced to recognize the restoration as a. fait

accompli; at the same time he was compelled to promise that he would stop all proceedings of the Reichskammergericht against the members of the league of Schmalkalden. The two other events were less favourable for the new religion, or rather for its orthodox manifestations. After a struggle, the Ana- baptists obtained control of Munster and for a short time governed the town in accordance with their own peculiar ideas, while at Liibeck, under the burgomaster Jiirgen Wullenweber, a democratic government was also established. But the bishop of Miinster and his friends crushed the one movement, and after interfering in the affairs of Denmark the Liibeckers were com- pelled to revert to their former mode of government. The outbreak of the war between the Empire and France in 1536 almost coincided with the enlargement of the league of Schmal- kalden, the existence of which was prolonged for ten years. All the states and cities which subscribed to the confession of Augsburg were admitted to it, and thus a large number of Protestants, including the duchies of Wurttemberg and Pomerania and the cities of Augsburg and Frankfort, secured a needful protection against the decrees of the Reichskammer- gericht, which the league again repudiated. Among the new membersof the confederation was Christian III., king of Denmark. About the same time (May 1536) an agreement between the Lutherans and the Zwinglians was arranged by Martin Bucer, and was embodied in a document called the Concord of Witten- berg, and for the present the growing dissensions between the heads of the league, John Frederick, elector of Saxony, and Philip of Hesse, were checked. Thus strengthened the Protestant princes declared against the proposed general council at Mantua, while as a counterpoise to the league of Schmalkalden the imperial envoy, Mathias Held (d. 1563), persuaded the Romanist princes in June 1538 to form the league of Nuremberg. But, although he had made a truce with France at Nice in this very month, Charles V. was more conciliatory than some of his representatives, and at Frankfort in April 1539 he came to terms with the Protestants, not, however, granting to them all their demands. In 1 S39, too, the Protestants received a great accession of strength, the Lutheran prince Henry succeeding his Romanist brother George as duke of Saxony. Ducal Saxony was thus completely won for the reformed faith, and under the politic elector Joachim T I. the same doctrines made rapid advances in Brandenburg. Thus practically all North Germany was united in supporting the Protestant cause.

In 1542, when Charles V. was again involved in war with, France and Turkey, who were helped by Sweden, Denmark and Scotland, the

league of Schmalkalden took advantage successes of his occupations to drive its stubborn foe, Henry, 0/ the duke of Brunswick-Wolfenbiittel, from his duchy and Protestm to enthrone Protestantism completely therein. But this was not the only victory gained by the Protestants about this time. The citizens of Regensburg accepted their doctrines, which also made considerable progress in the Palatinate and in Austria, while the archbishop of Cologne, Hermann von Wied, and William, duke of Gelderland, Cleves and Juliers, announced their secession from the Roman religion. The Protestants were now at the height of their power, but their ascendancy was about to be destroyed, and that rather by the folly and imprudence of their leaders than by the skill and valour of their foes. The unity and the power of the league of Schmalkalden were being undermined by two important events, the bigamy of Philip of Hesse, which for political reasons was condoned by the Lutheran divines, and the dissen- sions between John Frederick, the ruler of electoral, and Maurice, the new ruler of ducal Saxony. To save himself from the

Their defeats.

consequences of his double marriage, which had provided him with powerful enemies, Philip in June 1541 came to terms with the emperor, who thus managed to spike the guns of the league of Schmalkalden, although the strength of this confederation did not fail until after the campaign against Henry of Brunswick. But while on the whole the fortunes of the European war, both in the east and in the west, were unfavourable to the imperialists, Charles V. found time in 1543 to lead a powerful force against William of Gelderland, who had joined the circle of his foreign foes. William was completely crushed; Gelderland was added to the hereditary lands of the Habsburgs, while the league of Schmalkalden impotently watched the proceedings. This happened about a year after war between the two branches of the Saxon house had only been averted by the mediation of Luther and of Philip of Hesse. The emperor, however, was unable, or unwilling, to make a more general attack on the Protestants. In accordance with the promises made to them at Frankfort in 1 530,

conferences between the leaders of the two religious parties were held at Hagenau, at Worms and at Regens- burg, but they were practically futile. The diets at Regensburg and at Nuremberg gave very little aid for the wars, and did nothing to solve the religious difficulties which were growing more acute with repeated delays. At the diet of Spires in 1544 Charles purchased military assistance from the Protestants by making lavish promises to them. With a new army he marched against the French, but suddenly in September 1 544 he concluded the treaty of Crepy with Francis I. and left himself free to begin a new chapter in the history of Germany.

Charles was now nearly ready to crush the Protestants, whose influence and teaching had divided Germany and weakened Vict f t ˆ ie i m P ei "ial power, and were now endangering the Charles supremacy of the Habsburgs in the Netherlands and over the in Alsace. His plan was to bring about the meeting league of of a general council to make the necessary reforms in the church, and then at whatever cost to compel the Protestants to abide by its decisions. While Pope Paul III., somewhat reluctantly, summoned the council which ultimately met at Trent, Charles made vigorous preparations for war. Having made peace with the Turks in October 1545 he began to secure allies. Assistance was promised by the pope; the emperor purchased the neutrality of Duke William of Bavaria, and at a high price the active aid of Maurice of Saxony; he managed to detach from the league of Schmalkalden those members who were without any enthusiasm for the Protestant cause and also those who were too timid to enter upon a serious struggle. Meanwhile the league was inactive. Its chiefs differed on questions of policy, one section believing that the emperor did not intend to proceed to extremities, and for some time no measures were taken to meet the coming peril. At last, in June 1546, during the meeting of the diet at Regensburg, Philip and John Frederick of Saxony realized the extent of the danger and began to muster their forces. They were still much more powerful than the emperor, but they did not work well together, or with Sebastian Schartlin von Burtenbach, who led their troops in South Germany. In July 1546 they were placed under the imperial ban, and the war began in the valley of the Danube. Charles was aided by soldiers hurried from Italy and the Nether- lands, but he did not gain any substantial successes until after October 1546, when his ally Maurice invaded electoral Saxony and forced John Frederick to march northwards to its defence. The Lutheran cities of southern and central Germany, among them Strassburg, Augsburg, Ulm and Frankfort, now submitted to the emperor, while Ulrich of Wurttemberg and the elector palatine of the Rhine, Frederick II.,

followed their example. Having restored Roman Catholicism in the archbishopric of Cologne and seen Henry of Brunswick settled in his duchy early in 1547, Charles led his men against his principal enemies, Philip of Hesse and John Frederick, who had quickly succeeded in driving Maurice from his electorate. At Miihlberg in April 1547 he overtook the army of the Saxon elector. His victory was complete. John Frederick was taken prisoner, and a little later Philip of. Hesse, after vainly prolonging the struggle, was induced

to surrender. The rising in the other parts of northern Germany was also put down, and the two leaders of political Lutheranism were prisoners in the emperor's hands.

Unable to shake the allegiance of John Frederick to the Lutheran faith, Charles kept him and Philip of Hesse in captivity and began to take advantage of his triumph, although Magdeburg was still offering a stubborn resistance tertm."' to his allies. By the capitulation of Wittenberg the electorate qf Saxony was transferred to Maurice, and in the mood of a conqueror the emperor met the diet at Augsburg in September 1547. His proposals to strengthen and reform the administration of Germany were, however, not acceptable to the princes, and the main one was not pressed; but the Netherlands were brought under the protection of the Empire and some minor reforms were carried through. A serious quarrel with the pope, who had moved the council from Trent to Bologna, only increased the determination of Charles to establish religious conformity. In consultation with both Romanist and Lutheran divines a confession of faith called the Interim was drawn up; this was in the nature of a compromise and was issued as an edict in May 1548, but owing to the opposition of the Romanist princes it was not made binding upon them, only upon the Lutherans. There was some resistance to the Interim, but force was employed against Augsburg and other recalcitrant cities, and soon it was generally accepted. Thus all Germany seemed to lie at the emperor's feet. The Reformation had enabled him to deal with the princes and the imperial cities in a fashion such as no sovereign had dealt with them for three centuries.

Being now at the height of his power Charles wished to secure the succession to the imperial throne to his son Philip, after- wards Philip II. of Spain. This intention produced The dissensions among the Habsburgs, especially between imperial the emperor and his brother Ferdinand, and other succes- causes were at work, moreover, to undermine the former's position. The Romanist princes were becoming alarmed at his predominance, the Protestant princes resented his arbitrary measures and disliked the harsh treatment

meted out to John Frederick and to Philip of Hesse; all alike, irritated by the presence of Spanish soldiers in their midst, objected strongly to take Philip for their king and to any extension of Spanish influence in Germany. Turkey and France were again threaten- ing war, and although the council had returned to Trent it seemed less likely than ever to satisfy the Protestants. The general discontent found expression in the person of The Maurice of Saxony, a son-in-law of Philip of Hesse, revolt of whose services to Charles against the league of Schmal- Maurice ol kalden had made him very unpopular in his own country. Caring little or nothing about doctrinal disputes, but a great deal about increasing his own importance, Maurice now took the lead in plotting against the emperor. He entered into an alliance with John, margrave of Brandenburg-Ciistrin, with another Hohenzollern prince, Albert Alcibiades of Bayreuth, and with other Lutheran leaders, and also with Henry II. of France, who eagerly seized this opportunity of profiting by the dissensions in the Empire and who stipulated for a definite reward. Charles knew something of these proceedings, but his recent victory had thrown him partly off his guard. The treaty with France was signed in January 1552; in March Henry II. invaded Germany as the protector of her liberties, while Maurice seized Augsburg and marched towards Innsbruck, where the em- peror was residing, with the intention of making him a prisoner. An attempt at accommodation failed; Charles fled into Carinthia; and at one stroke all the advantages which he had gained by his triumph at Miihlberg we're lost. Masters of the situation, Maurice and his associates met their opponents at Passau in May 1552 and arranged terms of peace, although the emperor did not assent to them until July. The two captive princes were released, but the main point agreed upon was that a diet should be called for the purpose of settling the religious difficulty, and that in the meantime the Lutherans were to enjoy full religious liberty.

End of the reign.

Delayed by the war with France and Turkey, the diet for the settlement of the religious difficulty did not meet at Augsburg until February 1555. Ferdinand represented his

. brother, and after a prolonged discussion conditions

peace or ‘ r J ° .

Augsburg, of peace were arranged. Romanists and Lutherans were placed upon an equal footing, but the toleration which was granted to them was not extended to the Calvinists. Each secular prince had the right to eject from his land all those who would not accept the form of religion established therein; thus the principle of cujus regio ejus religio was set up. Although the Lutherans did not gain all their demands, they won solid advantages and were allowed to keep all ecclesiastical property secularized before the peace of Passau. A source of trouble, however, was the clause in the treaty usually called the eccles- iastical reservation. This required an ecclesiastical prince, if he accepted the teaching of the confession of Augsburg, or in other words became a Lutheran, forthwith to resign his princi- pality. The Lutherans denied the validity of this clause, and notwithstanding the protests of the Roman Catholics several prelates became Lutheran and kept their territories as secular possessions. The peace of Augsburg can hardly be described as a satisfactory settlement. Individual toleration was not allowed, or only allowed in unison with exile, and in the treaty there was abundant material for future discord.

After Maurice of Saxony had made terms with Charles at Passau he went to help Ferdinand against the Turks, but one of his allies, Henry II. of France, continued the war in Germany while another, Albert Alcibiades, entered upon a wild campaign of plunder in Franconia. The French king seized Metz, which was part of the spoil promised to him by his allies, and Charles made an attempt to regain the city. For this purpose he took Albert Alcibiades into his service, but after a stubborn fight his troops were compelled to retreat in January 1553. Albert then renewed his raids, and these became so terrible that a league of princes, under Maurice of Saxony, was formed to crush him; although Maurice lost his life at Sievershausen in July 15 S3, this purpose was accom- plished, and Albert was driven from Germany. After the peace of Augsburg, which was published in September 1555, the emperor carried out his intention of abdicating. He entrusted Spain and the Netherlands to Philip, while Ferdinand took over the conduct of affairs in Germany; although it was not until 1558 that he was formally installed as his brother’s successor.

Ferdinand I., who like all the German sovereigns after him was recognized as emperor without being crowned by the pope, made it a prime object of his short reign to defend and enforce the religious

peace of Augsburg for which he was largely responsible. Although in all probability numerically superior at this time to the Romanists, the Pro- testants were weakened by divisions, which were becoming daily more pronounced and more serious, and partly owing to this fact the emperor was able to resist the demands of each party and to moderate their excesses. He was continually harassed by the Turks until peace was made in 1562, and con- nected therewith were troubles in Bohemia and especially in Hungary, two countries which he had acquired through marriage, while North Germany was disturbed by the wild schemes of Wilhelm von Grumbach (q.v.) and his associate John Frederick, duke of Saxony. With regard to the religious question efforts were made to compose the differences among the Protestants; but while these ended in failure the Roman Catholics were gaining ground. Ferdinand sought earnestly to reform the church from within, and before he died in July 1564 the Counter-Reformation, fortified by the entrance of the Jesuits into Germany and by the issue of the' decrees of the council of Trent, had begun.

Under Ferdinand's rule there were some changes in the administration of the Empire. Lutherans sat among the judges Adminis- °f the Reichskammergericht, and the Aulic Council, or trative Hofrat, established by Maximilian I. for the Austrian changes, lands, extended its authority over the Empire and was known as the Reichshofral. Side by side with these

Ferdin- and 1.

changes the imperial diet was becoming more useless and un- wieldy, and the electors were gaining power, owing partly to the Wahlkapitulation, by which on election they circumscribed the power of each occupant of the imperial throne.

Ferdinand's son and successor, the emperor Maximilian II., was a man of tolerant views; in fact at one time he was sus- pected of being a Lutheran, a circumstance which greatly annoyed the Habsburgs and delayed his own ml i ian //, election as king of the Romans. However, having given to the electors assurances of his fidelity to the Roman Church, he was chosen king in November 1562, and became ruler of Germany on his father's death nearly two years later. Like other German sovereigns Maximilian pursued the phantom of religious union. His first diet, which met at Augsburg in 1566, was, however, unable, or unwilling, to take any steps in this direction, and while the Roman Catholics urged the enforce- ment of the decrees of the council of Trent the serious differences among the Protestants received fresh proof from the attempt made to exclude

the Calvinist prince Frederick III., elector palatine of the Rhine, from the benefits of the peace of Augsburg. After this Frederick and the Calvinists looked for sympathy more and more to the Protestants in France and the Netherlands, whom they assisted with troops, while the Lutherans, whose chief prince was Augustus, elector of Saxony, adopted a more cautious policy and were anxious not to offend the emperor. There wˆre, moreover, troubles of a personal and private nature between these two electors and their families, and these embittered their religious differences. But these divergences of opinion were not only between Roman Catholic and Lutheran or between Lutheran and Calvinist, they were, in electoral and ducal Saxony at least, between Lutheran and Lutheran. Thus the Protestant cause was weakened just when it needed strengthen- ing, as, on the other side, the Roman Catholics, especially Albert, duke of Bavaria, were eagerly forwarding the progress of the older faith, which towards the end of this reign was restored in the important abbey of Fulda. In secular affairs Maximilian had, just after his accession, to face a renewal of the Turkish war. Although his first diet voted liberal assistance for the defence of the country, and a large and splendid army was collected, he had gained no advantage when the campaign ended. The diet of Spires, which met in 1570, was mainly occupied in discussing measures for preventing the abuses caused by the enlistment by foreigners of German mercenary troops, but nothing was done to redress this grievance, as the estates were unwilling to accept proposals which placed more power in the emperor's hands. Maximilian found time to make earnest but unavailing efforts to mediate between his cousin, Philip II. of Spain, and the revolted Netherlands, and also to interfere in the affairs of Poland, where a faction elected him as their king. He was still dealing with this matter and hoping to gain support for it from the diet of Regensburg when he died (October iS76).

Maximilian's successor was his son, Rudolph II., who had been chosen king of the Romans in October 1575, and who in his later years showed marked traces of insanity. The new emperor had little of his father's tolerant spirit, w " op and under his feeble and erratic rule religious and political considerations alike tended to increase the disorder in Germany. The death of the Calvinist leader, the elector palatine Frederick III., in October 1576 and the accession of his son Louis, a prince who held Lutheran opinions, obviously afforded a favourable opportunity for making another attempt to unite the Protestants. Under the guidance of Augustus of Saxony a Lutheran confession of faith, the Formula concordiae, was drawn up; but, although this was accepted by 51 princes and 35 towns, others

— like the landgraves of Hesse and the cities of Madgeburg and Strassburg — refused to sign it, and thus it served only to emphasize the divisions among the Protestants. Moreover, the friendship between the Saxon and the Palatine houses was soon destroyed; for, when the elector Louis died in 1583, he was succeeded by a minor, his son Frederick IV., who was under the guardianship of his uncle John Casimit

GERMANY

at the time of the Reformation ”ˆSUl

**547*

*Boundary *6fi Germany . . ˆ ■■ ,iu “.-. .ToHdrnburs*

Bcciniattica! Statma

*Imperial Cities- ……. .JBI _ < ~ ***ˆ*

GERMANY I

after the Peace of Westphalia

1,648

Boundary of Germany

te-tˆSTf —a

Mgf /

1

A Hj/\D ‘

»

*vS ‘*X N*

v

*ˆ CiMgw/*ˆ l*

K v

B Y

line iWJuWrt

*/i //^e. .”.J-— _J

{Brands vr 1 L-I...J ■:■/■-■ 1 = =2- frttncowan (>m \
Electorate. . u . ,. ..;..■’:.„...’. . . .„.^..

1 Z?i/e*$;..;.., _„..../ .^..^„.,..

I ftwctrfa .....i lMfc

.«» J . |0«»imew*AOlrfft»l of Oldenburg <

[HQlttein-Qottorp..,

£ac/*s/«st/ca/ Stat»# „.,,;,„ ,.,,. > „„„.!..,.i

.‘mptrttH I Pre* Citttm... >. **■*&

HISTORY]

GERMANY

857

(1543-1592), a prince of very marked Calvinist sympathies and of some military experience. Just before this time much unrest in the north-west of Germany had been caused by the settlement there of a number of refugees from the Netherlands. Spreading their advanced religious views, these settlers were partly responsible for two serious outbreaks of disorder, At Aix-la- Chapelle the Protestants, not being allowed freedom of worship, took possession of the city in 1581. The matter came before the diet, which was opened at Augsburg in July 1582, but the case was left undecided; afterwards, however, the Reichshofrat declared against the insurgents, although it was not until 1598 that Protestant worship was abolished and the Roman Catholic governing body was restored. At Cologne the archbishop, Gebhard Truchsess von Waldburg, married and announced his intention of retaining his spiritual office. Had this proceeding passed unchallenged, the Protestants, among whom Gebhard now counted himself, would have had a majority in the electoral college. The Roman Catholics, however, secured the deposition of Gebhard and the election in his stead of Ernest, bishop of Liege, and war broke out in 1583. Except John Casimir, the Protestant princes showed no eagerness to assist Gebhard, who in a short time was driven from his see, and afterwards took up his residence in Strassburg, where also

he instigated a rebellion on a small scale. Thus these quarrels terminated in victories for the Roman Catholics, who were successful about this time in restoring their faith in the bishoprics of Wiirzburg, Salzburg, Bamberg, Paderborn, Minden and Osnabriick. Another dispute also ended in a similar way. This was the claim made by the administrator of the a rchbishopric of Magdeburg, a Hohenzollern prince, Joachim Frederick, afterwards elector of Brandenburg, to sit and vote in the imperial diet; it was not admitted, and the administrator retired from Augsburg, a similar fate befalling a similar claim made by several other administrators some years later.

*After the death of Augustus of Saxony in February 1586 there was another brief alliance between the Protestant parties, The Pro- although on this occasion the lead was taken not by testaat the Saxon, but by the Palatine prince. Less strict ***"■ in his adherence to the tenets of Lutheranism than*

ances. Augustus, the new elector of Saxony, Christian I., fell under the influence of John Casimir. The result was that Protestant princes, including the three temporal electors, united in placing their grievances before the emperor; obtaining no redress they met at Torgau in 1591 and offered help to Henry IV. of France, a proceeding which was diametrically opposed to the past policy of Saxony. But this alliance, like its forerunner, was of very short duration. Christian I. died in 1 591 , and under Christian II. electoral Saxony re-established a rigid Lutheranism at home and pursued a policy of moderation and neutrality abroad. A short time afterwards the militant party among the Protestants suffered a heavy loss by the death of their leader, John Casimir, whose policy, however, was continued by his nephew and pupil, the elector Frederick IV. But neither desertion nor death was able to crush entirely the militant Protestants, among whom Christian, prince of Anhalt (1568- 1630), was rapidly becoming the most prominent figure. They made themselves very troublesome at the diet of Regensburg in 1593, and also at the diet held in the same city four years later, putting forward various demands for greater religious freedom and seeking. to hinder, or delay, the payment of the grant for the Turkish war. Moreover, in 1598 they put forward the theory that the vote of a majority in the diet was not binding upon the minority; they took up the same position at Regens- burg in 1603, when they raised strong objections to the decisions of the Reichshofrat and afterwards withdrew from the diet in a body. Thus, under Maximilian of Bavaria and Christian of Anhalt respectively the two great parties were gaining a better idea of their own needs and of each other's aims and were watching vigilantly the*

position in the duchies of Cleves, Julich and Berg, where a dispute over the succession was impending. While wars and rumours of wars were disturbing the peace in the west of Germany the Turks were again harassing the east.

The war between them and the Empire, which was renewed in 1593, lasted almost without interruption until November 1606, when peace was made, the tribute long paid by the emperor to the sultan being abandoned. This peace was concluded not by Rudolph, but by his brother, the archduke Matthias, who owing to the emperor's mental incapacity had just been declared by his kinsman the head of the house of Habsburg. Rudolph resented this indignity very greatly, and until his death in January 1612 the relations between the brothers were very strained, but this mainly concerns the history of Hungary and of Bohemia, which were sensibly affected by the fraternal discord.

By this time however, there were signs of substantial progress on the part of the great Catholic reaction, which was to have important consequences for Germany. This was due rhe mainly to the persistent zeal of the Jesuits. For a Counter- long time the Protestants had absorbed the intellectual Reformat strength of the country, but now many able scholars "" and divines among the Jesuits could hold their own with their antagonists. These devoted missionaries of the church gave their attention mainly to the young, and. during the reign of Rudolph II. they were fortunate enough to make a deep impression upon two princes, each of whom was destined to play a great part in the events of his time. These princes were Maximilian, duke of Bavaria, and Ferdinand, archduke of Styria, the former a member of the house of Wittelsbach, and the latter of the house of Habsburg. Maximilian became pro- minent in 1607 by executing an imperial mandate against the free city of Donauworth, where a religious riot had taken place, and afterwards treating it as his own. Rendered suspicious by this arbitrary act, the, Protestant princes in 1608 formed a confederation known as the Evangelical Union, and in response the Roman Catholics, under the guidance of Maximilian, united in a similar confederation afterwards called the Catholic League. This was founded at Munich in July 1609. As the Union was headed by the elector palatine of the Rhine, Frederick IV., who was a Calvinist, many Lutherans, among them the elector of Saxony, were by no means enthusiastic in its support. It acquired, however, immense importance through its alliance with Henry IV. of France, who, like Henry II., wished to profit by the quarrels in Germany, and who interfered in the disputed succession to the duchies of Cleves and Julich. War seemed about to break out between the two

confederations and their foreign allies over this question, but after the murder of the French king in May 1610 the Union did not venture to fight.

Ferdinand was even more vigorous than Maximilian in defence of his religion. On assuming the government of Styria he set to work to extirpate Protestantism, which had made considerable progress in the Austrian arch-duchies. w e nan Soon afterwards he was selected by the Habsburgs as the heir of the childless emperor Matthias, and on coming to Vienna after the death of that sovereign in March 16 19 he found himself in the midst of hopeless confusion. The Bohemians refused to acknowledge him as their king and elected in his stead Frederick V., the elector palatine of the Rhine, a son-in- law of the English king James I., and the Hungarians and the Austrians were hardly less disaffected. As Ferdinand II., however, he succeeded in obtaining the imperial crown in August' 1619, and from that time he was dominated by a fixed resolve to secure the triumph of his church throughout the Empire, a resolve which cost Germany |he Thirty Years' War.

He began with Bohemia. Although supported by Spain he could not obtain from this quarter an army sufficiently strong to crush the Bohemians, and for some time he remained powerless and inactive in Vienna. Then at the The coa ~ beginning of 1620 he came to terms with Maximilian Bohemia. of Bavaria, who, after carefully securing his own interests, placed the army of the League, commanded by the celebrated Tilly, at his disposal. Conditionally the Union promised assistance to Frederick, but he wasted several months and vaguely hoped that the English king would help him out of his embarrassments. Meanwhile Tilly advanced into Bohemia, and in November 1620 Frederick's army was utterly routed at

the battle of the White Hill, near Prague, and the unfortunate elector had just time to escape from the kingdom he had rashly- undertaken to govern. Ferdinand drove to the uttermost the advantages of his victory. The Union being destroyed and the Bohemian revolution crushed, attention was turned to the hereditary lands of the elector palatine. The Spanish troops and the army of the League invaded the Rhenish Palatinate, which was defended by Frederick's remaining

adherents, Christian of Brunswick and Count Ernst von Mansfeld, but after several battles it passed completely into the possession of the imperialists. Having been placed under the imperial ban Frederick became an exile from his inheritance, and the electorate which he was declared to have forfeited was conferred on Maximilian.

Thus ended the first stage of the Thirty Years' War, although some desultory fighting continued between the League and Danish i ts opponents. The second began in 1625 with the later- formation, after much fruitless negotiation, of a ferencein p ro testant combination, which had the support of e war. £ n gi anc j) although its leading member was Christian IV., king of Denmark, who as duke of Holstein was a prince of the Empire, and who like other Lutherans was alarmed at the emperor's successes. It was in this war that Europe first became familiar with the great name of Wallenstein. Unable himself to raise and equip a strong army, and restive at his depend- ence on the League, Ferdinand gladly accepted Wallenstein's offer to put an army into the field at no cost to him- self. After Wallenstein had beaten Mansfeld at the bridge of Dessau in April 1626, and Tilly had defeated Christian of Denmark at Lutter in the succeeding August, the two generals united their forces. Denmark was invaded, and Wallenstein. now duke of Friedland, was authorized to govern the conquered duchies of Mecklenburg and Pomerania; but his ambitious scheme of securing the whole of the south coast of the Baltic was thwarted by the resistance of the city of Stralsund, which for five months he vainly tried to take. Denmark, however, was compelled to conclude peace at Liibeck in May 1629.

Intoxicated by success, Ferdinand had issued two months before the famous Edict of Restitution. This ordered the restoration of all ecclesiastical lands which had come ofwaUen- ' nto tne possession of the Protestants since the peace stela. of Passau in 1552, and, as' several archbishoprics

and bishoprics had become Protestant, it struck a tremendous blow at the emperor's foes and stirred among them intense and universal opposition. A little later, yielding to Maximilian and his colleagues in the League, Ferdinand dismissed Wallenstein, whose movements had aroused their resentment, from his service. A more inauspicious moment could not have been chosen for these two serious steps, because in the summer of 1630 Gustavus Adolphus left Sweden at the head of a strong army for the purpose of sustaining the Protestant cause in Germany. At first this great king was coldly received by the Protestants, who were ignorant of his designs and did

not want a stranger to profit by the internal disputes of their country. A mistake at the outset would probably have been fatal to him, but he saw the dangers of his position and moved so warily that in less than a year he had obtained the alliance of the elector of Saxony, a consequence of the terrible sack of Magdeburg by the imperialists in May 1631 and of the devastation of the electorate by Tilly. He had also obtained on his own terms the assistance of France, and was ready to enter upon his short but brilliant campaign.

Having captured Frankfort-on-Oder and forced the hesitating elector of Brandenburg, George William, to grant him some assist- The cam- ance, Gustavus Adolphus added the Saxon army to his paignof own, and in September 1631 he met Tilly, at the head of nearly the whole force of the League, at Breitenfeld, near Leipzig, where he gained a victory which placed North Germany entirely at his feet. So utterly had he shattered the emperor's power that he could doubtless have marched straight to Vienna; he preferred, however, to proceed through central into southern Germany, while his Saxon ally, the elector John George, recovered Silesia and Lusatia and invaded Bohemia.

Qtistavus Adolphus.

Wiirzburg and Frankfort were among the cities which opened their gates to the Swedish king as the deliverer of the Protestants; several princes sought his alliance, and, making the captured city of Mainz his headquarters, he was busily engaged for some months in resting and strengthening his army and in negotiating about the future conduct of the war. Early in 1632 he led his troops into Bavaria. In April he defeated Tilly at the crossing of the Lech, the imperialist general being mortally wounded during this fight, and then he took possession of Augsburg and of Munich. Before these events Ferdinand had realized how serious had been his mistake in dismissing Wallenstein, and after some delay his agents persuaded the great general to emerge from his retirement. The conditions, however, upon which Wallenstein consented to come to the emperor's aid were remark- ably onerous, but Ferdinand had perforce to assent to them. He obtained sole command of the imperial armies, with the power of concluding treaties and of granting pardons, and he doubtless insisted on the withdrawal of the Edict of Restitu- tion, .although this is not absolutely certain; in brief, the only limits to his power were the limits to the strength of his army. Having quickly assembled this, he, drove the Saxons from Bohemia, and then marched towards Franconia, with the intention of crossing swords with his only serious

rival, Gustavus Adolphus, who had left Munich when he heard that this foe had taken the field. The Swedes and their allies occupied Nurem- berg, while the imperialists fortified a great camp and blockaded the city. Gustavus made an attempt to storm these fortifications, but he failed to make any impression on them; he failed also in inducing Wallenstein to accept battle, and he was forced to abandon Nuremberg and to march to the protection of Saxony. Wallenstein followed, and the two armies faced each other at Liitzen on the 16th of. November 1632. Here the imperialists were beaten, but the victory was even more disastrous to the Protestant cause than a defeat, for the Swedish king was among the slain.

The Swedes, whose leader was now the chancellor Oxenstjerna, were stunned by this catastrophe, but in a desultory fashion they maintained the struggle, and in April 1633 a new league was formed at Heilbronn between them and i eague of the representatives of four of the German circles, Heilbronn while by a new agreement France continued to furnish and the monetary aid. Of this alliance Sweden was the pre- ˆ w ° dominant member, but the German allies had a certain stein. voice in the direction of affairs, the military command being divided between the Swedish general Horn and Bernhard, duke of Saxe- Weimar. About this time some discontent arose in the allied army, and to allay this Bernhard was granted the bishoprics of Wiirzburg and of Bamberg, with the title of duke of Franconia, but on the strange condition that he should hold the duchy as the vassal of Sweden, not as a vassal of the Empire. The war, thus revived, was waged principally in the valleys of the Danube and the Rhine, the Swedes, seizing Alsace while Bernhard captured Regensburg. Meanwhile Wallenstein was again arousing the suspicions of his nominal allies. Instead of attacking the enemy with his accustomed vigour, he withdrew into Bohemia and was engaged in lengthy negotiations with the Saxon soldier and diplomatist, Hans Georg von Arnim (1581- 1641); his object being doubtless to come to terms with Saxony and Brandenburg either with or without the emperor's consent. His prime object was, however, to secure for himself a great territorial position, possibly that of king of Bohemia, and it is obvious that his aims and ambitions were diametrically opposed to the ends desired by Ferdinand and by his Spanish and Bavarian allies. At length he set his troops in motion. Having gained some successes in the north-east of Germany he marched to succour the hardly pressed elector of Bavaria; then suddenly abandoning this purpose he led his troops back to Bohemia and left Bernhard of Saxe-Weimar in possession of the Danube valley. It is not surprising that a cry, louder than ever, now arose for his dismissal. Ferdinand did as

he was required. In January 1634 he declared Wallenstein deposed from his command, but he was still at the head of an army when he was

murdered in the follgwing month at Eger. Commanded now by the king of Hungary, afterwards the emperor Ferdinand III., the imperialists retook Regensburg and captured Donau worth; then, aided by some Spanish troops, they gained a victory at Nordlingen in September 1634, the results of which were as decisive and as satisfactory for them as the results of Breitenfeld had been for their foes two years before.

The demoralization of the Swedes and their allies, which was a consequence of the defeat at Nordlingen, was the opportunity France °^ F rance – Having by clever diplomacy placed gar- takespart risons in several places in Alsace and the Palatinate, ia the the king of France, or rather Cardinal Richelieu, now

war ‘ entered the field as a principal, made a definite alliance

with Sweden at Compiegne in April 1635, and in the following month declared war and put four armies in motion. But the thoughts of many had already turned in the direction of peace, and in this manner John George of Saxony took the lead, signing in May 1635 the important treaty of Prague with the emperor. The vexed and difficult question of the ownership of the ecclesi- astical lands was settled by fixing November 1627 as the deciding date; those who were in possession then were to retain them for forty years, during which time it was hoped a satisfactory arrangement would be reached. The Saxon elector gained some additions of territory and promised to assist Ferdinand to recover any lands which had been taken from him by the Swedes, or by other foes. For this purpose a united army was to serve under an imperial general, and all leagues were to be dissolved. In spite of the diplomatic efforts of Sweden the treaty of Prague was accepted almost at once by the elector of Branden- burg, the duke of Wurttemberg and other princes, and also by several of the most important of the free cities. It was only, in fact, the failure of Saxony and Sweden to come to terms which prevented a general peace in Germany. The Thirty Years’ War now

took a different form. Its original objects were almost forgotten and it was continued mainly to further the ambitions of France, thus being a renewal of the great fight between the houses of Habsburg and of Bourbon, and to secure for Sweden some recompense for the efforts which she had put forward.

While the signatories of the peace of Prague were making ready to assist the emperor the only Germans on the other side were found in the army under Bernhard of Saxe-

Bernhard Weimar. The final stage of the war opened with con-

Weimar. siderable Swedish successes in the north of Germany, especially the signal victory gained by them over the imperialists and the Saxons at Wittstock in October 1636. At the same time good fortune was attending the operations of the French in the Rhineland, where they were aided by Bernhard of Saxe-Weimar, a satisfactory financial arrangement between these parties having been reached in the autumn of 1635. The year 1638 was. an especially fortunate one for France and her allies. Bernhard's capture of Rheinfelden and of Breisach gave them possession of the surrounding districts, but dissensions arose concerning the division of the spoil; these, however, were stopped by the death of Bernhard in July 1639, when France took his army into her pay. Thus the war continued, but the desire for peace was growing stronger, and this was reflected in the proceedings of the diet which met at Regensburg in 1640. Under Count Torstenssen the Swedes defeated the imperialists at Breitenfeld in 1642; three years later they gained another

victory at Jankau and advanced almost to Vienna, and then the last decisive move of the war was made by the great French general, Turenne. Having been successful in the Rhineland, where he had captured Philippsburg and Worms, Turenne joined his forces to those of Sweden under Wrangel and advanced into Bavaria. Ravagingtheland,they compelled the elector Maximilian t,o sign a truce and to withdraw his troops from the imperial army. When, however, the allied army had retired Maximilian repented of his action. Again he joined the emperor, but his punishment was swift and sure, as Turenne and Wrangel again marched into the electorate and defeated the Bavarians at Zusmarshausen, near Augsburg, in May 1648. A few minor operations followed, and then came the welcome news of the conclusion of the treaty of Westphalia.

The preliminary negotiations for peace were begun at Hamburg and Cologne before the death of the emperor Ferdinand II. in 1637. By a treaty signed at Hamburg in December 1 64 1 it was agreed that peace conferences should meet The P eace at Minister and at Osnabruck in March 1642, the p/,ˆ/” ” emperor treating with France in the former, and with Sweden in the latter city. The Roman Catholic princes of the Empire were to be represented at Miinster and the Protestants at Osnabruck. Actually the conferences did not meet until 1645, when the elector of Brandenburg had made, and the elector of Saxony was about to make, a truce with Sweden, these two countries being withdrawn from the ravages of the war. In three years the many controversial questions were discussed and settled, and in October 1648 the treaty of Westphalia was signed and the Thirty Years’ War was at an end.

The Thirty Years’ War settled once for all the principle that men should not be persecuted for their religious faith. It is true that the peace of Westphalia formally recognized only Et f ects „f the three creeds, Catholicism, Lutheranism and the Thirty Calvinism, but so much suffering had been caused years’ by the interference of the

state with individual con- r ” viction, that toleration in the largest sense, so far as law was concerned, was virtually conceded. This was the sole advantage gained from the war by the Protestants. The Catholics insisted at first on keeping all the ecclesiastical lands which had been taken from them before the Edict of Restitution in 1629. The Protestants responded by demanding that they should lose nothing which they had held before 1618, when the war began. A compromise was at last effected by both parties agreeing to the date 1624, an arrangement which secured to the Catholics their gains in Bohemia and the other territories of the house of Habsburg. The restoration of the elector palatine to part of his lands, and his reinstatement in the electoral office, were im- portant concessions; but on the other hand, the duke of Bavaria kept the Upper Palatinate, the elector palatine becoming the eighth and junior member of the electoral college.

The country suffered enormous territorial losses by the war. Up to this time the possession of Metz, Toul and Verdun by France had never been officially recognized; now these bishoprics were formally conceded to her. She territory. also received as much of Alsace as belonged to Austria. To the Swedes were granted Western Pomerania, with Stettin, and the archbishopric of Bremen and the bishopric of Verden. These acquisitions, which surpassed the advantages Gustavus Adolphus had hoped to win, gave Sweden the command both of the Baltic and of the North Sea. In virtue of her German posses- sions Sweden became a member of the Empire; but France obtained absolute control of her new territories. There was a further diminution of Germany by the recognition of the inde- pendence of Switzerland and the United Provinces. Both had long been virtually free; they now for the first time took the position of distinct nations.

In the political constitution of Germany the peace of West- phalia did not so much make changes as sanction those already effected. The whole tendency of the Reformation had been to relax the bonds which united the various ma e tlo ˆ ° r ‘ elements of the state to each other and to their head, ana the It divided the nation into two hostile parties, and the political emperor was not able to assume towards them a constltu ‘ perfectly impartial position. His imperial crown im- posed upon him the necessity of associating himself with the Roman Catholics; so that the Protestants had a new and power- ful reason for looking upon him with jealousy, and trying to diminish his authority. The Roman Catholics, while maintaining their religion, were willing enough toco-operate with them for this object; and Germany often saw the strange spectacle of princes rallying round

the emperor for the defence of the church, and at the same time striking deadly blows at his political influence. The diet was a scene of perpetual quarrelling between the two factions, and their differences made it impossible for the imperial

chamber to move beyond the region of official routine. Thus before the Thirty Years' War the Empire had virtually ceased to exist, Germany having become a loose confederation of princi- palities and free cities. For a moment the emperor Ferdinand appeared to have touched the ideal of Charles V. in so far, at least, as it related to Germany, but only for a moment. The stars in their courses fought against him, and at the time of his death he saw how far beyond his power were the forces with which even Charles had been unable to contend. The state of things which actually existed the peace of Westphalia made legal. So nearly complete was the independence of the states that each received the right to form alliances with any of the others, or with foreign powers, nominally on condition that their alliances should not be injurious to the emperor or to the Empire. Any authority which still lawfully belonged to the emperor was transferred to the diet. It alone had now the power of making laws, of concluding treaties in the name of Germany, and of declaring war and re-establishing peace. No one, however, ex- pected that it would be of any real service. From 1663 it became a permanent body, and was attended only by the representatives of the princes and the cities; and from that time it occupied itself mainly with trifles, leaving the affairs of each state to be looked after by its own authorities, and those of the country generally to such fortunes as chance should determine.

It would not have been strange if so shadowy an Empire had been brought altogether to an end. Some slight bond of con- Coatiaw nexion was, however, necessary for defence against aace common dangers; and the Empire had existed so long,

of the anc i so many great associations were connected with emp re. ^ ^^ ^ t seemed to all parties preferable to any other form of union. Moreover, Sweden, and other states which were now members of the Empire, warmly supported it; and the house of Habsburg, on which it reflected a certain splendour, would not willingly have let it die. An

Austrian ruler, even when he spoke only in the name of Austria, derived authority from the fact that as emperor he represented many of the greatest memories of European history.

The effect of the Thirty Years' War on the national life was disastrous. It had not been carried on by disciplined armies, but by hordes of adventurers whose sole object was lite. plunder. The cruelties they inflicted on their victims

are almost beyond conception. Before the war the population was nearly twenty millions; after it the number was probably about six millions. Whole towns and villages were laid in ashes, and vast districts turned into deserts. Churches and schools were closed by hundreds, and to such straits were the people often reduced that cannibalism is said to have been not uncommon. Industry and trade were so com- pletely paralysed that in 1635 the Hanseatic League was virtually broken up, because the members, once so wealthy, could not meet the necessary expenditure. The population was not only impoverished and reduced in numbers but broken in spirit. It lost confidence in itself, and for a time effected in politics, literature, art and science little that is worthy of serious study.

The princes knew well how to profit by the national prostration. The local diets, which, as we have seen, formed a real check on petty tyranny, and kept up an intimate relation between the princes and their subjects, were nearly all destroyed. Those which remained were injurious rather than beneficial, since they often gave an appearance of lawfulness to the caprices of arbitrary sovereigns. After the Thirty Years' War it became fashionable for the heirs of princi- palities to travel, and especially to spend some time at the court of France. Here they readily imbibed the ideas of Louis XIV/, and in a short time nearly every petty court in Germany was a feeble imitation of Versailles. Before the Reformation, and even for some time after it, the princes were thorough Germans in sympathies and habits; they now began to be separated by a wide gulf from their people. Instead of studying the general welfare, they wrung from exhausted states the largest possible revenue to support a lavish and ridiculous expenditure. The

The princes.

The cities.

Leopold I.

pettiest princeling had his army, his palaces, his multitudes of household officers; and most of them pampered every vulgar appetite without respect either to morality or to decency. Many nobles, whose lands had been wasted during the war, flocked to the little capitals to make their way by contemptible court services. Beneath an outward gloss of refinement these nobles were, as a class, coarse and selfish, and they made it their chief object to promote their own interests by fostering absolutist tendencies. Among the people there was no public opinion to discourage despotism; the majority accepted their lot as inevitable, and tried rather to reproduce than to restrain the vices of their rulers. Even the churches offered little opposition to the excesses of persons in authority, and in many instances the clergy, both Protestant and Catholic, acquired an unenviable notoriety for their readiness to overlook or condone actions which outraged the higher sentiments of humanity. In the free imperial cities there was more manliness of tone than else- where, but there was little of the generous rivalry among the different classes which had once raised them to a high level of prosperity. Most of them resigned their liberties into the hands of oligarchies, and others allowed themselves to be annexed by ambitious princes. (A. W. H.)*

Ferdinand III. succeeded to the throne when the fortunes of his house were at a low ebb, and he continued the Thirty Years' War, not in the hope of re-establishing the Roman Catholic religion or of restoring the imperial /w authority, ' but of remedying as far as he could the havoc caused by his father's recklessness. After the conclusion of peace nothing happened to make his reign memorable. His son Leopold I. was a man of narrow intellect and feeble will; yet Germany seldom so keenly felt the need of a strong emperor, for she had during two generations to contend with a watchful and grasping rival. For more than a century it had been the policy of France to strengthen herself by fostering the internal dissensions of Germany. This was now easy, and Louis XIV. made unscrupulous use of the advantages his predecessors had helped to gain for ylv t him. Germany, as a whole, could not for a long time France. be induced to resist him. His schemes directly threatened the independence of the princes; but they were too indolent to unite against his ambition. They grudged even the contributions necessary for the maintenance of the frontier fortresses, and many of them stooped to accept the bribes he offered them on condition that they should remain quiet. In his war with the United Provinces and Spain, begun in 1672, he was opposed by the emperor as ruler of Austria, and by Frederick William, the elector of Brandenburg; and in 1675 the latter gained a splendid victory at Fehrbellin over his allies, the Swedes. At the end*

of the war, in 1678, by the peace of Nijmwegen, Louis took care that Frederick William should be deprived of the fruits of his victory, and Austria had to resign Freiburg im Breisgau to the French. Under the pretence that when France gained the Austrian lands in Alsace she also acquired a right to all places that had ever been united to them, Louis began a series of systematic robberies of German towns and territories. " Chambers of Reunion " were appointed to give an appearance of legality to these proceedings, which culminated, in 1681, in the seizure of Strassburg. Germans of all states and ranks were indignant at so gross a humiliation, but even the loss of Strassburg did not suffice to move the diet. The emperor himself might probably have interfered, but Louis had provided him with ample employment by stirring up against him the Hungarians and the Turks. So complete was his hold over the majority of the princes that when the Turks, in 1683, surrounded Vienna, and appeared not unlikely to advance into the heart of Germany, they looked on indifferently, and allowed the emperor to be saved by the promptitude and courage of John Sobieski, king of Poland. At last, when, in 1680, on the most frivolous pretext, Louis poured into southern Germany armies which were guilty of shameful outrages, a number of princes came forward and aided the emperor. This time France was sternly opposed by the league of which William III. of England was the moving spirit;*

Charles VI.

and although at the end of the war he kept Strassburg, he had to give up Freiburg, Philipsburg, Breisach, and the places he War of na(l seized because of their former connexion with Spanish Alsace. In the War of the Spanish Succession two Succes- powerful princes, the elector of Bavaria and the elector

of Cologne, joined Louis; but as the states of the Empire declared war against him in 1702, the other princes, more or less loyally, supported the emperor and his allies. Leopold died during the progress of this war, but it was vigorously continued by his son Joseph I.

Joseph's brother and successor, Charles VI., also went on with it; and

such were the blows inflicted on France by the victories

of Blenheim, Ramillies and Malplaquet that the war ‘ was generally expected to end in her utter discomfiture. But the conclusion of the treaty of Utrecht by England, in 1713, so limited the military power of Charles VI. that he was obliged to resign the claims of Austria to the Spanish throne, and to content himself with the Spanish Netherlands, Milan, Naples and Sardinia. He cared so little for Germany, as distinguished from Austria, that he allowed Louis to compel the diet to cede the imperial fortress of Landau. At a later stage in his reign he was guilty of an act of even grosser selfishness; for after the War of the Polish Succession, in which he supported the claims of Augustus III., elector of Saxony, he yielded Lorraine to Stanislaus Leszczynski, whose claims had been defended by France, and through whom France ultimately secured this beautiful German

province. Having no son, Charles drew up in 17 13 sanation. tne pragmatic sanction, which ordained that, in the

event of an Austrian ruler being without male heirs, his hereditary lands and titles should pass to his nearest female relative. The aim of his whole policy was to secure for this measure, which was proclaimed as a fundamental law in 1724, the approval of Europe; and by promises and threats he did at last obtain the guarantee of the states of the Empire and the leading European powers.

Germany was now about to be aroused from the torpor into which she had been cast by the Thirty Years’ War; but her

awakening was due, not to the action of the Empire, Prussia. ° which was more and more seen to be practically dead,

but to the rivalry of two great German states, Austria and Prussia. The latter had long been laying the foundations of her power. Brandenburg, the centre of the Prussian kingdom, was, as we have seen, granted in the 15th century by the emperor Sigismund to Frederick, count of Hohenzollern. In his hands, and in those of his prudent successors, it became one of the most flourishing of the North-German principalities. At the time of the Reformation Albert, a member of a subordinate branch of the house of Hohenzollern, happened to be grand master of the Teutonic Order. He became a Protestant, dissolved the order, and received in fief of the king of Poland the duchy of Prussia. In 161 1 this. duchy fell by inheritance to the elector of Branden- burg, and by the treaty of Wehlau, in 1657, in the time of Frederick William, the Great Elector, it was

declared independent of Poland. By skill, foresight and courage Frederick William managed to add largely to his territories; and in an age of degenerate sovereigns he was looked upon as an almost model ruler. His son, Frederick, aspired to royal dignity, and in 1701, having obtained the emperor's assent, was crowned king of Prussia. The extravagance of Frederick drained the resources of his state, but this was amply atoned for by the rigid economy of Frederick William I., who not only paid off the debts accumu- lated by his father, but amassed an enormous treasure. He so

organized all branches of the public service that they Theresa. were brought to a point of high efficiency, and his army was one of the largest, best appointed and best trained in Europe (see Prussia: History). He died in 1740, . and within six months, when Frederick II. was on the Prussian throne, Maria Theresa claimed, in virtue of the pragmatic sanc- tion, the lands and hereditary titles of her father Charles VI.

Frederick II., a young, ambitious and energetic sovereign, longed not only to add to his dominions but to play a great part in European politics. His father had guaranteed the prag-

matic sanction, but as the conditions on which the guarantee had been granted had not been fulfilled by Charles VI., Frederick did not feel bound by it, and revived some old claims of his family on certain Silesian duchies. Maria Frederick Theresa would not abate her rights, but before she Q rea t, could assert them Frederick had entered Silesia and made himself master of it. Meanwhile, the elector of Bavaria had come forward and disputed Maria Theresa's right to the succession, and the elector of Saxony had also put in a claim to the Austrian lands. Taking advantage of ^™ wa £' these disputes, France formed an alliance with the two electors and with the king of Prussia against Austria; and in the war which followed the allies were at first so successful that the elector of Bavaria, through the influence of France, was crowned emperor as Charles VII. (1742-1745). Maria Theresa, a woman of a noble and undaunted spirit, appealed, with her infant son, afterwards Joseph II., VI " s in her arms, to the Hungarian diet, and the enthusiastic Magyars responded chivalrously to her call. To be more at freedom she concluded peace with Frederick, and ceded Silesia to him, although greatly against her will. Saxony also was pacified and retired from the struggle. After this Maria Theresa, supported by England, made way so rapidly and so triumphantly that Frederick became alarmed for his new possessions; and in 1742 he once more proclaimed war against her, nominally in aid of the emperor, Charles VII. Ulti-

Second mately, in -1 748, she was able to conclude an honourable ^^f a " peace at Aix-la-Chapelle; but she had been forced, as before, to rid herself of Frederick by confirming him in the sovereignty of the territory he had seized.

After the death of Charles VII., Francis, grand duke of Tuscany, Maria Theresa's husband, was elected emperor. Francis I. (1745-1765), an amiable nonentity, with the instincts of a shopkeeper, made no pretence of discharging important imperial duties, and the task of ruling the hereditary possessions of the house of Habsburg fell wholly to the empress- queen. She executed it with discretion and vigour, so that Austria in her hands was known to be one of the most formidable powers in the world. Her rival, Frederick II., was, if possible, still more active. It did not occur to him, any more than to the other German sovereigns of the 18th century, to associate his people with him in the government of the country; he was in every respect a thoroughly absolute sovereign. But he shared the highest ideas of the age respecting the responsibilities of a king, and throughout his long reign acted in the main faithfully as " the first servant of the state." The army he always kept in readiness for war; but he also encouraged peaceful arts, and diffused throughout his kingdom so much of his own alert and aggressive spirit that the Prussians became more intelligent and more wealthy than they had ever before been. He excited the admiration of the youth of Germany, and it was soon the fashion among the petty princes to imitate his methods of govern- ment. As a rule, they succeeded only in raising far larger armies than the taxpayers could afford to maintain.

Maria Theresa never gave up the hope of winning back Silesia, and, in order to secure this object, she laid aside the jealousies of her house, and offered to conclude an alliance with France. Frederick had excited the envy of surrounding sovereigns, and had embittered them against him by stinging sarcasms. Not only France, therefore, but Russia, Saxony and ultimately Sweden, willingly came to terms with Austria, and the aim of their union was nothing short of the partition of Prussia. Frederick, gaining knowledge of the plot, turned to The Sevea England, which had in the previous war helped Years' Austria. At the close of 1755 his offer of an alliance War, was acceded to; and in the following year, hoping {£??' by vigorously taking the initiative to prevent his enemies from united action, he invaded Saxony, and began the Seven Years' War (q.v.), the result of which was to confirm Prussia in the possession of Silesia.

Prussia now took rank as one of the leading European powers, and

by her rise a new element was introduced into the political

life of Germany. Austria, although associated with the Empire, could no longer feel sure of her predominance, and it was inevi- table that the jealousies of the two states should lead to a final conflict for supremacy. Even before the Seven Years' War there were signs that the German people were beginning to tire of incessant imitation of France, for in literature they welcomed the early efforts of Klopstock, Wieland and Lessing; but the movement received a powerful impulse from the great deeds of Frederick. The nation, as a whole, was proud of him, and began, for the first time since the Thirty Years' War, to feel that it might once more assume a commanding place in the world.

In 1772 the necessities of Frederick's position compelled him to join Russia and Austria in the deplorable partition of Poland, whereby he gained West Prussia, exclusive of Danzig of Poland. an0 – Thorn, and Austria acquired West Silesia. After this he had to watch closely the movements of the emperor Joseph II., who, although an ardent admirer of Frederick, was anxious to restore to Austria the greatness she had partially lost. The younger branch of the Wittelsbach line, which had hitherto possessed Bavaria, having died out in 1777, Joseph asserted claims to part of its territory. Frederick intervened, and although no battle was fought in the nominal war which followed, the emperor was obliged to content himself with a very unimportant concession. He made a second attempt in 1785, but Frederick again came forward. This time he formed a league (Furstenbund) for the defence of the imperial constitution, and it was joined by the majority of the small states. The memory of this league was almost blotted out by the tremendous events which soon absorbed the attention of Germany and the world, but it truly indicated the direction of the political forces which were then at work beneath the surface, and which long afterwards triumphed. The formation of the league was a distinct attempt on the part of Prussia to make herself the centre for the national aspirations both of northern and of southern Germany.

The French Revolution was hailed by many of the best minds of Germany as the opening of a new era. Among the princes it excited horror and alarm, and in 1792 the emperor i?7v"/u- Leopold II. and Frederick William II., the unworthy tioo. successor of Frederick ' the Great, met at Pillnitz,

and agreed to support by arms the cause of the French king. A more important resolution was never taken. It plunged Europe into a conflict which cost millions of lives, and which overthrew the entire states system of the continent. Germany herself was the principal sufferer. The structure which the princes had so laboriously built up crumbled into ruins, and the mistakes of centuries were expiated in an agony of disaster and humiliation.

The states of the Empire joined Austria and Prussia, and, had there been hearty co-operation between the allies, they could scarcely have failed of success. While the war was in progress, in 1793, Prussia joined Russia in the second partition of Poland. Austria considered herself overreached, and began negotiations with Russia for the third and final partition, which was effected by the three powers in 1795. Prussia, irritated by the proceedings of her rival, did as little as possible in the war with France; and in 1795 she retired from the struggle, ana by the treaty of Basel ceded to the French republic her possessions on the left bank of the Rhine. The war was continued by Austria, but her power was so effectually shattered by blow after blow that in 1797 she was forced to conclude the peace of Campo Formio. Napoleon Bonaparte, to whose genius the triumph of France was mainly due, began separate negotiations with the states of the Empire at Rastadt; but, before term could be agreed upon, war again began in 1799, Austria acting on this occasion as the ally of Great Britain and Russia. She was beaten, and the peace of Luneville added fresh humiliations to those imposed upon her by the previous war. France now obtained the whole of the left bank of the Rhine, the dispossessed princes being compensated by grants of secularized church lands and of mediatized imperial cities (1803). The contempt*

of Napoleon for the Empire was illustrated by his occupation of Hanover in 1803, and by his seizure of the duke of Enghien on imperial territory in 1804. In 1805 Austria once more appealed to arms in association with her former allies, but in vain. By the peace of Presburg she accepted more disastrous terms than ever, and for the moment it seemed as if she could not again hope to rise to her former splendour. In this war she was opposed not only by France, but by Bavaria, Wiirttemberg and Baden, all of which were liberally rewarded for their services, the rulers of the two former countries

being proclaimed kings. The degradation of Germany was completed by the formation, in 1806, of the Confederation of the Rhine, which was composed of the chief central and southern states. The welfare of the Empire was asserted to be its object, but a body of Bad of which Napoleon was the protector existed, of course, the Holy for no other purpose than to be a menace to Austria Roman and Prussia. Francis II., who had succeeded Leopold Bwpre. II. in 1792 and in 1804 had proclaimed himself hereditary emperor of Austria, as Francis I., now resigned the imperial crown, and thus the Holy Roman Empire and the German kingdom came to an end. The various states, which had for centuries been virtually independent, were during the next few years not connected even by a nominal bond. (J. Si.)

Frederick William III. (1797-1840) of Prussia, the successor of Frederick William II., had held aloof from the struggle of Austria with France. This attitude had been dictated partly by his constitutional timidity, partly by the ?ˆ ss / a d desire to annex Hanover, to which Austria and Russia a f j ena . would never have assented, but which Napoleon was willing to concede in return for a Prussian alliance. The Con- federation of the Rhine, however, was a menace to Prussia too serious to be neglected; and Frederick William's hesitations were suddenly ended by Napoleon's contemptuous violation of Prussian territory in marching three French brigades through Ansbach without leave asked. The king at once concluded a convention with the emperor Alexander I. of Russia and declared war on France. The campaign that ended in the disastrous battle of Jena (October 14, 1806) followed; and the prestige of the Prussian arms, created by Frederick the Great, perished at a blow. With the aid of Russia Frederick William held out a while longer, but after Napoleon's decisive victory at Friedland (June 14, 1807) the tsar came to terms with the French emperor, sacrificing the interests of his ally. By the treaty of Tilsit (July 9) the king of Prussia was stripped of the best part of his dominions and more than half his subjects.

Germany now seemed fairly in the grip of Napoleon. Early in November 1806 he had contemptuously deposed the elector of Hesse and added his dominions to Jerome's kingdom of Westphalia; on the 21st of the same month he i a power. issued from Berlin the famous decree establishing the " continental system," which, by forbidding all trade with England, threatened German commerce with ruin. His triumph seemed complete when, on the nth of October 1807, Metternich signed at Fontainebleau, on behalf of Austria, a convention that conceded all his outstanding claims, and seemed to

range the Habsburg monarchy definitely on his side. There was, however, to be one final struggle before Napoleon's supremacy was estab- lished.. The submission of Austria had been but an expedient for gaining time; under Count Stadion's auspices she set to work increasing and reorganizing her forces; and when it became clear from Napoleon's resentment that he was meditating fresh designs against her she declared war (1809). The campaign ended in the crushing defeat of Wagram (July 6) and the humiliat- ing treaty of peace dictated by Napoleon at the palace of Schon- brunn in Vienna (October 14). Austria, shorn of her fairest provinces, robbed of her oversea commerce, bankrupt and surrounded on all sides by the territories of the French emperor and his allies, seemed to exist only on sufferance, and had ceased to have any effective authority in Germany — now absolutely in the power of Napoleon, who proved this in 1810 by annexing the whole of the northern coast as far as the Elbe I to his empire.

Libera tlon.

The very completeness of the humiliation of Germany was the means of her deliverance. She had been taught self-respect by Frederick II., and by her great writers in literature Germany. anc ˆ philosophy; it was felt to be intolerable that in politics she should do the bidding of a foreign master. Among a large section of the community patriotism became for the first time a consuming passion, and it was stimulated by the counsels of several manly teachers, among whom the first place belongs to the philosopher Fichte. The governments cautiously took advantage of the national move- ment to strengthen their position. Even in Austria, where on the 8th of October 1809 Metternich had become minister for foreign affairs and the dominant influence in the councils of the empire, some timely concessions were made to the various populations. Prussia, under the guidance of her great minister Stein, reorganized her entire administration. She abolished serfdom, granted municipal rights to the cities, established an admirable system of elementary and secondary education, and invited all classes to compete for civil offices; and ample means were provided for the approaching struggle by drastic military reform. Napoleon had extracted an engagement that the Prussian army should be limited to 42,000 men. This was fulfilled in the letter, but

in spirit set aside, for one body of men was trained after another until the larger part of the male population were in a position, when a fitting opportunity should occur, to take up arms for their country.

The disastrous retreat of the French from Moscow in 181 2 gave Germany the occasion she desired. In 1813 King Frederick William, after an agony of hesitation, was forced by War of (■ jjg patriotic initiative of General Yorck, who concluded with the Russians the convention of Tauroggen on his own responsibility, and by the pressure of public opinion supported by Queen Louise and by Hardenberg, to enter into an alliance with Russia. All now depended on the attitude of Austria ; and this was for some time doubtful. The diplomacy of Metternich (q.v.), untouched by the patriotic fervour which he disliked and distrusted, was directed solely to gaining time to enable Austria to intervene with decisive effect and win for the Habsburg monarchy the position it had lost. When the time came, after the famous interview with Napoleon at Dresden, and the breakdown of the abortive congress of Prague, Austria threw in her lot with the allies. The campaign that followed, after some initial reverses, culminated in the crushing victory of the allies at Leipzig (October 16-18, i8i3),and was succeeded by the joint invasion of France, during which the German troops wreaked vengeance on the unhappy population for the wrongs and violences of the French rule in Germany.

Long before the issue of the War of Liberation had been finally decided, diplomacy had been at work in an endeavour to settle the future constitution of Germany. In this matter, as in others, the weakness of the Prussian government played into the hands of Austria. Metternich had been allowed to take the initiative in negotiating with the princes of the Confederation of the Rhine, and the price of their adhesion to the cause of the allies had been the guarantee by Austria of their independent sovereignty. The guarantee had been willingly given; for Metternich had no desire to see the creation of a powerful unified German empire, but aimed at the establishment of a loose confederation of weak states over which Austria, by reason of her ancient imperial prestige and her vast non-German power, would exercise a dominant influence. This, then, was the view that prevailed, and by the treaty of Chaumont (March 1, 1814) it was decided that Germany should consist of a confederation of sovereign states.

The new constitution of Germany, as embodied in the Fin#l Act of the congress of Vienna (June 9, 181 5) was based on this _. principle. It was the work of a special committee of

German the congress, presided over by Metternich; and, contedera- owing to the panic created by Napoleon's return from tlon. Elba (March 5), it remained a mere sketch, the hasty

output of a few hurried sessions, of which the elaboration was reserved for the future. In spite of the clamour of the mediatized

princes for the restoration of their " liberties," no attempt was made to reverse the essential changes in the territorial disposition of Germany made during the revolutionary epoch. Of the 300 odd territorial sovereignties under the Holy Empire only 39 survived, and these were readjusted on the traditional prin- ciples of " compensations," " rectification of frontiers " and " balance of power." The most fateful arrangements were naturally those that affected the two leading powers, Austria and Prussia. The latter had made strenuous efforts, supported by Alexander I. of Russia, to obtain the annexation of the whole of Saxony, a project which was defeated by the opposition of Great Britain, Austria and France, an opposition which resulted in the secret treaty of the 3rd of January 1815 for eventual armed intervention. She received, however, the northern part of Saxony, Swedish Pomerania, Posen and those territories — formerly part of the kingdom of Westphalia — which constitute her Rhine provinces. While Prussia was thus established on the Rhine, Austria, by exchanging the Netherlands for Lombardo-Venetia and abandoning her claims to the former Habsburg possessions in Swabia, definitively resigned to Prussia the task of defending the western frontier of Germany, while she strengthened her power in the south-east by recovering from Bavaria, Salzburg, Vorarlberg and Tirol. Bavaria, in her turn, received back the greater part of the Palatinate on the left bank of the Rhine, with a strip of territory to connect it with the main body of her dominions. For the rest the sovereigns of Wiirttem- berg and Saxony retained the title of king bestowed upon them by Napoleon, and this title was also given to the elector of Hanover; the dukes of Weimar, Mecklenburg and Oldenburg became grand dukes; and Liibeck, Bremen, Hamburg and Frankfort were declared free cities.

As the central organ of this confederation {Bund) was estab- lished the federal diet {Bundestag), consisting of delegates of the several states. By the terms of the Final Act this diet had very wide powers for the development J" e of the mutual relations of the governments in all dletm matters of common interest. It was empowered to arrange the fundamental laws of the confederation; to fix the organic institutions relating to its external, internal and military arrangements; to regulate the trade relations between the various*

federated states. Moreover, by the famous Article 13, which enacted that there were to be " assemblies of estates " in all the countries of the Bund, the constitutional liberties of the German people seemed to be placed under its aegis. But the constitution of the diet from the first condemned its debates to sterility. In the so-called narrower assembly (Engere V ersammlung) , for the transaction of ordinary business, Austria, Prussia, Bavaria, Saxony, Hanover, Wiirttemberg, Baden, Hesse-Cassel, Hesse-Darmstadt, Holstein and Luxemburg had one vote each; while the remaining twenty-eight states were divided into six curiae, of which each had but a single vote. In this assembly a vote of the majority decided. Questions of more than usual importance were, however, to be settled in the general assembly {Plenum) where a two-thirds majority was necessary to carry a resolution. In this assembly the voting power was somewhat differently distributed; but the attempt to make it bear some proportion to the importance of the various states, worked out so badly that Austria had only four times the voting power of the tiny principality of Liechtenstein. Finally it was laid down by Article 7 that a unanimous vote was necessary for changing " fundamental laws, organic institu- tions, individual rights, or in matters of religion," a formula wide enough to embrace every question of importance with which the diet might be called upon to deal. Austria, in virtue of her tradition, received the perpetual presidency of the diet. It was clear that in such a governing body neither Austria nor Prussia would be content with her constitutional position, and that the internal politics of Germany would resolve themselves into a diplomatic duel for ascendancy between the two powers, for which the diet would merely serve as a convenient arena.*

In this duel the victory of Austria was soon declared. The Prussian government believed that the effective government

of Germany could only be secured by a separate understanding between the two great powers; and the indiscretion of the Prussian plenipotentiary revealed to the diet a plan for what meant practically the division of Germany into Prussian and Austrian spheres of influence. This threw the lesser princes, already alarmed at the growth of Prussian military power, into the arms of Austria, which thus secured a permanent majority in the diet. To avoid any possible

modification of a situation so satisfactory, Count Buol, the Austrian president of the diet, was instructed to announce that the constitution as fixed by the Final Act, and guaranteed by Europe, must be regarded as final; that it might be interpreted, but not altered.

The conception of the diet as a sort of international board of control, responsible in the last resort not to Germany but to Europe, exactly suited Metternich's policy, in which the interests of Germany were subordinate to the wider ambitions of the Habsburg monarchy. It was, moreover, largely justified by the constituent elements of the diet itself. Of the German states represented in it even Prussia, by the acquisition of Posen, had become a non-German power; the Habsburg monarchy was predominantly non-German; Hanover was attached to the crown of Great Britain, Holstein to that of Denmark, Luxem- burg to that of the Netherlands. The diet, then, properly controlled, was capable of being converted into an effective instrument for furthering the policy of " stability " which Metternich sought to impose upon Europe. Its one effort to make its authority effective as the guardian of the constitution, in the matter of the repudiation of the Westphalian debt and of the sale of the domains by the elector of Hesse, was crushed by the indignant intervention of Austria. Henceforth its sole effective function was to endorse and promulgate the decrees of the government of Vienna.

In this respect the diet fairly reflected the place of Germany in Europe. The constitution was the work of the powers, which in all matters arising out of it constituted the final court of appeal. The result was not wholly one- sided. Until the congress of Troppau in 1820 " Jacobinism " was still enthroned in high places in the person of Alexander I. of Russia, whose " divine mission," for the time, included a not wholly disinterested advocacy of the due carrying out of Article 13 of the Final Act. It was not to Russia's interest to see Austrian influence supreme in the confederation. The lesser German princes, too, were quick to grasp at any means to strengthen their position against the dominant powers, and to this end they appealed to the Liberal sentiment of their peoples. Not that this sentiment was very deep or widespread. The mass of the people, as Metternich rightly observed, wished for rest, not constitutions; but the minority of thoughtful men — professors, students, officials, many soldiers — resented the dashing of the hopes of German unity aroused by the War of Liberation, and had drunk deep of the revolutionary inspiration. This sentiment, since it could not be turned to the uses of a united Germany, might be made to serve the purposes of particularism. Prussia, in spite of the promises of Frederick William

*in the hour of need, remained without a central constitution; all the more reason why the states of second rank should provide themselves with one. Charles Augustus, the enlightened grand duke of Weimar, set the example, from the best of motives. Bavaria, Baden, Wiirttemberg and others followed, from motives less dis- interested. Much depended on the success of these experiments. To Metternich they were wholly unwelcome. In spite of the ring-fence of censors, and custom-house officers, there was danger Metter- ˚f tn * Liberal infection spreading to Austria, with aich and disintegrating results; and the pose of the tsar as. the con- protector of German liberties was a perpetual menace. The zeal and inexperience of German Liberals played into his hands. The patriotism and Pan-Germanism of the gymnastic societies (Turnvereine) and students' associations (Burschenschaflen) expressed themselves with more noise than discretion; in the South-German parliaments the platitudes and catchwords of the Revolution were echoed. Soon, in Baden, in*

The

question of con- stitutions.

Wiirttemberg, in Bavaria, the sovereigns and the chambers were at odds, united only in a common opposition to the central authority. To sovereigns whose nerves had been shattered by the vicissitudes of the revolutionary epoch these symptoms were in the highest degree alarming; and Metternich was at pains to exaggerate their significance. The"Wartburg Tne festival " of October 1818, which issued in nothing Wartburg worse than the solemn burning, in imitation of Dr festival, Martin Luther, of Kamptz's police law, a corporal's cane and an uhlan's stays, was magnified into a rebellion; drew down upon the grand duke of Weimar a collective protest of the powers; and set in motion the whole machinery of reaction. The murder of the dramatist Kotzebue, as an agent of this reaction, in the following year, by a fanatical student named Karl Sand, clinched the matter; it became obvious to the govern- ments that a policy of rigorous repression was necessary if a fresh revolution were to be avoided. In October, after a pre- liminary meeting between Metternich and Hardenberg, in the course of which the latter signed a convention pledging Prussia to Austria's system, a meeting of German ministers was held at Carlsbad, the discussion of which issued in the famous Carlsbad Decrees (October 17, 1819). These contained elaborate provisions for supervising the universities and muzzling the press, laying down that no constitution " inconsistent with the monarchical principle " should be granted, and setting up a central com- mission at Mainz to inquire into the machinations of

the great revolutionary secret society which existed only in the imagina- tion of the authorities. The Carlsbad Decrees, hurried through the diet under Austrian pressure, excited considerable opposition among the lesser sovereigns, who resented the claim of the diet to interfere in the internal concerns of their states, and whose protests at Frankfort had been expunged from the records. The king of Wiirttemberg, ever the champion of German " particularism," gave expression to his feelings by issuing a new constitution to his kingdom, and appealed to his relative, the emperor Alexander, who had not yet been won over by Metternich to the policy of war & outrance against reform, and took this occasion to issue a fresh manifesto of his Liberal creed. At the conference of ministers which met at Vienna, on the 20th of November, for the purpose of " developing and completing the Federal Act of the congress of Vienna," Metternich found himself face to face with a more formidable opposition than at Carlsbad. The " middle " states, headed by Wiirttemberg, had drawn together, to form the nucleus of an inner league of " pure German States " against Austria and Prussia, and of "Liberal particularism" against the encroachments of the diet. With Russia and, to a certain extent, Great Britain sympathetic, it was impossible to ignore their opposition. Moreover, Prussia was hardly prepared to endorse a policy of greatly strengthening the authority of the diet, which might have been fatal to the Customs Union of which she was laying the foundation. Metter- nich realized the situation, and yielded so gracefully that he gave his temporary defeat the air of a victory. The result was that the Vienna Final Act (May 15, 1820), which received the sanction of the diet on the 8th of June, was not unsatisfactory to the lesser states while doing nothing to lessen Austrian prestige. This instrument merely defined more clearly the principles of the Federal Act of 1815. So far from enlarging the powers of the diet, it reaffirmed the doctrine of non-intervention; and, above all, it renewed the clause forbidding any fundamental modification of the constitution without a unanimous vote. On the vexed question of the interpretation of Article 13 Metternich recognized the inexpediency of requiring the South German states to revise their constitutions in a reactionary sense. By Articles 56 and 57, however, it was laid down that constitu- tions could only be altered by constitutional means; that the complete authority of the state must remain united in its head; and that the sovereign could be bound to co-operate with the estates only in the exercise of particular rights. These provisions, in fact, secured for Metternich all that was necessary for the success of his policy: the maintenance of the status quo. So long as the repressive machinery instituted by the Carlsbad

Decrees worked smoothly, Germany was not likely to be troubled by revolutions.

The period that followed was one, outwardly at least, of political stagnation. The Mainz Commission, though hampered by the jealousy of the governments (the king of Prussia refused to allow his subjects to be haled before it), was none the less effective enough in preventing all free expression of opinion; while at the universities the official " curators " kept Liberal enthusiasts in order. The exuberance of the epoch of Liberation gave place to a dull lethargy in things political, relieved only by the Philhellenism which gave voice to the aspirations of Germany under the disguise of enthusiasm for Greece. Even the July revolution of 1830 in Paris reacted but partially and spasmodic- ally on Germany. In Hanover, Brunswick, Saxony and Rerolu- Hesse-Cassel popular movements led to the granting 1830. of constitutions, and in the states already constitu-

tional Liberal concessions were made or promised. But the governments of Prussia and Austria were unaffected; and when the storm had died downMetternich was able, with the aid of the federal diet, to resume his task of holding " the Revolu- tion " in check. No attempt was, indeed, made to restore the deposed duke of Brunswick, who by universal consent had richly deserved his fate; but the elector of Hesse could reckon on the sympathy of the diet in his struggle with the chambers (see Hesse-Cassel), and when, in 1837,. King Ernest Augustus of Hanover inaugurated his reign by restoring the old illiberal constitution abolished in 183 1, the diet refused to interfere. It was left to the seven professors of Gottingen to protest; who, deprived of their posts, became as famous in the con- stitutional history of Germany as the seven bishops in that of England.

Yet this period was by no means sterile in developments destined to produce momentous results. In Prussia especially the government continued active in organizing and I t consolidating the heterogeneous elements introduced system. into the monarchy by the settlement of 1815. The task was no easy one. There was no sense of national unity between the Catholics of the Rhine provinces, long sub- mitted to the influence of liberal France, and the Lutheran squires of the mark of Brandenburg, the most stereotyped class in*

Europe; there was little in common between either and the Polish population of the province of Posen. The Prussian monarchy, the traditional champion of Protestant orthodoxy, found the new Catholic elements difficult to assimilate; and premonitory symptoms were not wanting of a revival of the secular contest between the spiritual and temporal powers which was to culminate after the promulgation of the dogma of papal infallibility (1870) in the Kullurkampf. These conditions formed the excuse for the continual postponement of the promised constitution. But the narrow piety of Frederick William III. was less calculated to promote the success of a benevolent despotism than the contemptuous scepticism of Frederick the Great, and a central parliament would have proved a safety valve for jarring passions which the mistaken efforts of the king to suppress, by means of royal decrees and military coercion, only served to embitter. Yet the conscientious tradition of Prussian officialism accomplished much in the way of administra- tive reform.

Above all it evolved the Customs-Union (Zollverein) , which gradually attached the smaller states, by material interests if The not ky s y m pathy, to the Prussian system. A reform

Prussian of the tariff conditions in the new Prussian monarchy Zoii- had been from the first a matter of urgent necessity,

vereia. anc j t }jj s was undertaken under the auspices of Baron Heinrich von Billow (1792-1846), minister in the foreign depart- ment for commerce and shipping, and Karl Georg Maassen (1769-1834), the minister of finance. When they took office there were in Prussia sixty different tariffs, with a total of nearly 2800 classes of taxable goods: in some parts importation was free, or all but free; in others there was absolute prohibition, or duties so heavy as to amount to practical prohibition. More- over, the long and broken line of the Prussian frontier, together XI. 28

with the numerous enclaves, made the effective enforcement of a high tariff impossible. In these circumstances it was decided to introduce a system of comparative free trade; raw materials were admitted free; a uniform import of 10% was levied on manufactured goods, and 20% on "colonial wares," the tax being determined not by the estimated value, but by the weight of the articles. It was soon realized, however, that to make this system complete the neighbouring states must be drawn into it; and a beginning was made with those which were enclaves in Prussian territory, of which there were no less than thirteen. Under tiie new tariff laws light transit dues were imposed on goods passing through Prussia; and it was easy

to bring pressure to bear on states completely surrounded by Prussian territory by increasing these dues or, if need were, by forbidding the transit altogether. The small states, though jealous of their sovereign independence, found it impossible to hold out. Schwarzburg-Sondershausen was the first to succumb (18 19); Schwarzburg-Rudolstadt (1822), Saxe- Weimar and Anhalt-Bernburg (1823), Lippe-Detmold and Mecklenburg- Schwerin (1826) followed suit so far as their " enclaved " territories were concerned; and in 1826 Anhalt-Dessau and Anhalt-Cothen, after several years' resistance, joined the Prussian Customs-Union. In 1828 Hesse-Cassel entered int» a commercial treaty with Prussia. Meanwhile, alarmed at this tendency, and hopeless of obtaining any general system from the federal diet, the " middle " states had drawn together; by a treaty signed on the 18th of January 1828 Wurttemberg and Bavaria formed a tariff union, which was joined in the following year by the Hohenzollern principalities; and on the 24th of September 1828 was formed the so-called " Middle German Commercial Union " (Handelsverein) between Hanover, Hesse- Cassel, the Saxon duchies, Brunswick, Nassau, the principalities of Reuss and Schwarzburg, and the free cities of Frankfort and Bremen, the object of which was to prevent the extension of the Prussian system and, above all, any union of the northern Zollverein with that of Bavaria and Wurttemberg. It was soon, however, found that these separate systems were unwork- able; on the 27th of May 1829 Prussia signed a commercial treaty with the southern union; the Handelsverein was broken up, and one by one the lesser states joined the Prussian Customs- Union. Finally, on the 22nd of March 1833, the northern and southern unions were amalgamated; Saxony and the Thuringian states attached themselves to this union in the same year; and on the 1st of January 1834 the German Customs- and Commercial-Union (Deulscher Zoll- und Handelsverein) came into existence, which included for tariff purposes within a single frontier the greater part of Germany. Outside this, though not in hostility to it, Hanover, Brunswick, Oldenburg and Schaum- burg-Lippe formed a separate customs-union {Steuerverein) by treaties signed on the 1st of May 1834 and the 7th of May 1836, and to this certain Prussian and Hessian enclaves were attached. Subsequently other states, e.g. Baden and Nassau (1836), Frank- fort and Luxemburg (1842), joined the Prussian Zollverein, to which certain of the members of the Steuerverein also transferred themselves (Brunswick and Lippe, 1842). Finally, as a counter- move to the Austrian efforts to break up the Zollverein, the latter came to terms with the Steuerverein, which, on the 1st of January 1854, was absorbed in the Prussian system. Hamburg was to remain outside until 1883; but practically

the whole of what now is Germany was thus included in a union in which Prussia had a predominating influence, and to which, when too late, Austria in vain sought admission. 1

Even in the earlier stages of its development the Zollverein had a marked effect on the condition of the country. Its , growth coincided with the introduction of railways, and enabled the nation to derive from them the full benefit; so that, in spite of the confusion of political powers, material prosperity increased, together with the consciousness of national unity and a tendency to look to Berlin rather than to Vienna as the centre of this unity.

1 The best account, in English, of the development of the Zoll- verein is in Percy Ashley's Modern Tariff History (London, 1904),

William IV.

This tendency was increased by the accession to the throne of Prussia, in 1840, of Frederick William IV., a prince whose conspicuous talents and supposed " advanced " views Frederick ra j sec i t ne hopes of the German Liberals in the same degree as they excited the alarm and contempt of Metternich. In the end, however, the fears were more justified than the hopes. The reign began well, it is true, notably in the reversal of the narrow ecclesiastical policy of Frederick William III. But the new king was a child of the romantic movement, with no real understanding of, and still less sympathy with, the modern Liberal point of view. He cherished the idea of German unity, but could conceive of it only in the form of the restored Holy Empire under the house of Habsburg; and so little did he understand the growing nationalist temper of his people that he seriously negotiated for a union of the Lutheran and Anglican .churches, of which the sole premature offspring was the Protestant bishopric of Jerusalem.

Meanwhile the Unionist and Liberal agitation was growing in strength, partly owing to the very efforts made to restrain it. The emperor Nicholas I. of Russia, kept informed by his agents of the tendencies of opinion, thought it right to warn his kinsman of Prussia

of the approach of danger. But Frederick William, though the tsar's influence over him was as great as over his father, refused to be convinced. He even thought the time opportune for finishing " the building begun by Papa " by summoning the central assembly of the diets, and wrote to the tsar to this effect (December 31, 1845); and he persevered in this intention in spite of the tsar's paternal remonstrances. On the 13th of February 1847 was issued a patent summoning the united diet of' Prussia. But, as Metternich had prophesied, this only provided an organ for giving voice to larger constitu- tional aspirations. The result was a constitutional dead-lock; for the diet refused to sanction loans until its " representative " character was recognized; and the king refused to allow "to come between Almighty God in heaven and this land a blotted parchment, to rule us with paragraphs, and to replace the ancient, sacred bond of loyalty." On the 26th of June the diet was dissolved, nothing having been done but to reveal the widening gulf between the principle of monarchy and the growing forces of German Liberalism.

The strength of these forces was revealed when the February revolution of 1848 in Paris gave the signal for the outbreak of popular movements throughout Europe. The effect of the revolution in Vienna, involving the fall of Metternich (May 13) and followed by the nationalist movements in Hungary and Bohemia, was stupendous in Germany. Accustomed to look to Austria for guidance and material support, the princes every- where found themselves helpless in face of the popular clamour. The only power which might have stemmed the tide was Prussia. But Frederick William's emotional and kindly temperament little fitted him to use "the mailed fist"; though the riot which broke out in Berlin on the 1 5th of March was suppressed by the troops with but little bloodshed, the king shrank with horror from the thought of fighting his " beloved Berliners," and when on the night of the 18th the fighting was renewed, he entered into negotiation with the insurgents, negotiations that resulted in the withdrawal of the troops from Berlin. The next day, Frederick William, with characteristic histrionic versatility, was heading a procession round the streets of Berlin, wrapped in the German tricolour, and extolling in a letter to the indignant tsar the consummation of " the glorious German revolution."

The collapse of the Prussian autocracy involved that of the lesser German potentates. On the 30th of March the federal diet hoisted the German tricolour and authorized tioaal- t ˆ ie assemDun g of the German national parliament at ism. Frankfort. Arrangements for this had already been

made without official sanction. A number of deputies, belonging to different legislative assemblies, taking it upon them- selves to give voice to the national demands, had met at Heidel- berg,, and a committee appointed by them had invited all

Germans who then were, or who had formerly been, members of diets, as well as some other public men, to meet at Frankfort for the purpose of considering the question of national reform. About 500 representatives accepted the invitation. They con- stituted themselves a preliminary parliament (Vorparlament), and at once began to provide for the election of a national assembly. It was decided that there should be a representative for every group of 50,000 inhabitants, and that the election should be by universal suffrage. A considerable party wished that the preliminary parliament should continue to act until the assembly should be formed, but this was overruled, the majority contenting themselves with the appointment of a committee of 50, whose duty it should be in the interval to guard the national interests. Some of those who were discontented with this decision retired from the preliminary parliament, and a few of them, of republican sympathies, called the population of Upper Baden to arms. The rising was put down by the troops of Baden, but it did considerable injury by awakening the fears of the more moderate portion of the community. Great hindrances were put in the way of the elections, but, as the Prussian and Austrian governments were too much occupied with their immediate difficulties to resist to the uttermost, the parliament was at last chosen, and met at Frankfort on the 1 8th May. The old diet, without being formally dissolved, (an omission that was to have notable consequences) broke up, and the national representatives had before them a clear field. Their task would in any case have been one of extreme difficulty. The new-born sentiment of national unity disguised a variety of conflicting ideals, as well as deep-seated P J a T "^° H traditional local antagonisms; the problem of con- went. structing a new Germany out of states, several of which, and those the most powerful, were largely composed of non-German elements, was sure to lead to international com- plications; moreover, the military power of the monarchies had only been temporarily paralysed, not destroyed. Yet, had the parliament acted with promptitude and discretion it might have been successful. Neither Austria nor Prussia was for some time in a position to thwart it, and the sovereigns of the smaller states were too much afraid of the revolutionary elements manifested on all sides to oppose its will. But the Germans had had no experience of free political life. Nearly every deputy had his own theory of the course which ought to be pursued, and felt sure that the country would go to

ruin if it were not adopted. Learned professors and talkative journalists insisted on delivering interminable speeches and on examining in the light of ultimate philosophical principles every proposal laid before the assembly. Thus precious time was lost, violent antagonisms were called forth, the patience of the nation was exhausted, and the reactionary forces were able to gather strength for once more asserting themselves. IThe very first important question brought out the weaknesses of the deputies. This related to the nature of the central provisional executive. A committee appointed to discuss the matter suggested that there should be a directory of three members, appointed by the German governments, subject to the approval of the parliament, and ruling by means of ministers responsible to the latter body. This elaborate scheme found favour with a large number of members, but others insisted that there should be a president or a central committee, appointed by the parliament, while another party pleaded that the parliament itself should exercise executive as well as legislative functions. At last, after a vast amount of tedious and useless discussion, it was agreed that the parliament should appoint an imperial vicar (Reichsverweser) who ihould carry on the government by means of a ministry selected by himself; and on the motion of Heinrich von Gagern the archduke John of Austria was chosen. by a large majority for the office. With as little delay as possible he formed an imperial cabinet, and there were hopes that, as his appointment was generally approved both by the sovereigns and the people, more rapid progress would.be made with the great and compli- cated work in hand. Unfortunately, however, it was necessary to enter upon the discussion of the fundamental laws, a subject

presenting many opportunities for the display of rhetoric and intellectual subtlety. It was soon obvious that beneath all varieties of individual opinion there were two bitterly hostile tendencies — republican and constitutionalist. These two parties attacked each other with constantly growing animosity, and in a few weeks sensible men outside the parliament gave up all hope of their dealing satisfactorily with the problem they had been appointed to solve.

In the midst of these disputes the attention of the nation was occupied by a question which had arisen before the out- break of the

revolutionary movements — the so- ScA/es- called " Schleswig-Holstein question " (g.v.). In 1846 tioistein. Christian VIII. of Denmark had officially proclaimed that Schleswig and the greater part of Holstein were indissolubly connected with the Danish monarchy. This excited vehement opposition among the Germans, on the ground that Holstein, although subject to the king of Denmark, was a member of the German confederation, and that in virtue of ancient treaties it could not be severed from Schleswig. In 1848 the German party in the duchies, headed by Prince Frederick of Augustenburg, rose against the Danish government. Frederick VII., who had just succeeded Christian VIII., put down the rebellion, but Prussia, aciing in the name of the confederation, despatched an army against the Danes, and drove them from Schleswig. The Danes, who were supported by Russia, responded by blockading the Baltic ports, which Germany, having no navy, was unable effectually to defend. By the mediation of Great Britain an armistice was concluded, and the Prussian troops evacuated the northern districts of Schleswig. As the Danes soon afterwards took possession of Schleswig again, thePrussians once more drove them back, but, in view of the threatening attitude of the powers, Frederick William summoned up courage to flout the opinion of the German parliament, and on the 26th of August, without the central government being consulted, an armistice of seven months was agreed upon at Malmoe.

The full significance of this event was not at once realized. To indignant patriots it seemed no more than a piece of perfidy, Disputes f' r which Prussia should be called to account by united ia the Germany. The provisional government of the duchies

Frankfort appealed from Prussia to the German regent; and assemb y. t j ie Frankfort parliament hotly took up its cause. A large majority voted an order countermanding the withdrawal of the Prussian troops, in spite of the protest of the ministry, who saw that it would be impossible to make it effective. The ministry resigned, but no other could be found to take its place; and the majority began to realize the situation. The central government depended ultimately on the armed support of the two great powers; to quarrel with those would be to ruin the constitution, or at best to play into the hands of the extreme revolutionists. On the 14th of September the question of the convention of Malmoe again came up for discussion, and was angrily debated. The democrats called their adherents to arms against the traitors who were preparing to sell the Schleswig-Holsteiners. The Moderates took alarm; they had no stomach for an open war with the governments; and in the end the convention was confirmed by a sufficient majority. The result was civil war in the

streets of Frankfort; two deputies were murdered: and the parliament, which could think of no better way of meeting the crisis than by continuing " with imposing calm " to discuss •" fundamental rights," was only saved from the fury of the mob by Prussian troops. Its existence was saved, but its prestige had vanished; and the destinies of the German people were seen to be in the hands that held the sword.

While these events were in progress, it seemed not impossible" that the Austrian empire would fall to pieces. Bohemia and the Italian states were in revolt, and the Hungarians . strove with passionate earnestness for independence.

in Austria. Towards the end of 1848 Vienna was completely in the hands of the revolutionary party, and it was re- taken only ■ after desperate fighting. A reactionary ministry, headed by Prince Schwarzenberg, was then raised to power,

and in order that a strong policy might be the more vigorously pushed forward, the emperor Ferdinand resigned, and was succeeded by his nephew, Francis Joseph.

The prospects of reform were not much more favourable in Prussia. The assembly summoned amid the revolutionary excitement of March met on the 22nd of May. De- mands for a constitutional system were urged with pru°™ a , n great force, and they would probably have been granted but for the opposition due to the violence of politicians out of doors. The aristocratic class saw ruin before it if the smallest concession were made to popular wishes, and it soon recovered from the terror into which it had been plunged at the outbreak of the revolution. Extreme antagonism was excited by such proposals as that the king should no longer be said to wear his crown " by the grace of God "; and the animosity between the liberal and the conservative sections was driven to the highest pitch by the attack of the democratic majority of file diet on the army and the attempt to remodel it in the direction of a national militia. Matters came to a crisis at the end of October when the diet passed a resolution calling on the king to intervene in favour of the Viennese revolutionists. When, on the evening of the 30th, a mob surrounded the palace, clamouring for the king to give effect to this resolution, Frederick William lost patience, ordered General Wrangel to occupy Berlin with troops, and on the 2nd of November placed Count Brandenburg, a scion of the royal house and a Prussian of the old school, at the head of a new ministry. On the pretext that fair deliberation was impossible in the capital, the assembly was now ordered to meet in

Brandenburg, while troops were concentrated near Berlin and a state of siege was proclaimed. In vain the assembly protested and continued its sittings, going even so far as to forbid the payment of taxes while it was subjected to illegal treatment. It was forced in the end to submit. But the dis- cussions in Brandenburg were no more successful than those in Berlin; and at last, on the 5th of December, the king dissolved the assembly, granted a constitution about which it had riot been consulted, and gave orders for the election of a representative chamber.

About the time that the Prussian parliament was thus created, and that the emperor Ferdinand resigned, the Frankfort parliament succeeded in formulating the fundamental y he ques . laws, which were duly proclaimed to be those of Ger- tloa of the many as it was now to be constituted. The principal consatu- clauses of the constitution then began to be discussed.

By far the most difficult question was the relation in which Austria should stand to the Germany of the future. There was a universal w;sh that the Austrian Germans should be included in the German state; on the other hand, it was felt that if all the various nationalities of Austria formed a united monarchy, and if this monarchy as a whole were included in the confederation, it would necessarily overshadow Germany, and expose her to unnecessary external dangers. It was therefore resolved that, although a German country might be under the same ruler as non- German lands, it could not be so joined to them as to form with them a single nation. Had the parliament adopted this resolution at once, instead of exhausting itself by pedantic disquisitions on the abstract principles of jurisprudence,

it might have hoped to triumph; but Austria was not likely to submit to so severe a blow at the very time when she was strong enough to appoint a reactionary government, and had nearly re-established her authority, not only in Vienna, but in Bohemia and in Italy. Prince Schwarzenberg took the earliest opportunity to declare that the empire could not assent to any weakening of its influence. Bitter strife now broke out in the parliament between the Great German (Gross-Deutsch) and Little German (Klein- Deutsch) parties. Two of the ministers resigned, and one of those who took their place, Heinrich von Gagern (q.v.), proposed that, since Austria was to be a united state, she should not enter the confederation, but that her relations to Germany should be regulated by a special act of union. This of course meant that Prussia should be at the head of Germany, and recommended itself to the majority of the

constitutional party. It was resisted by the Austrian members, who were supported by the ultramontanes and the democrats, both of whom disliked Prussia, the former because of her Protestantism, the latter because of her bureaucratic system. Gagern's proposal was, however, adopted. Immediately after- wards the question as to the character of the executive was raised. Some voted that a directory of princes should be ap- pointed, others that there should be a president, eligible from the whole German nation; but the final decision was that the headship of the state should be offered by the parliament to some particular German prince, and that he should bear the title of German emperor.

The whole subject was as eagerly discussed throughout the country as in Frankfort. Austria firmly opposed the idea of a united German state, insisting that the Austrian empire. emperor could not consent to be subordinate to any other prince. She was supported by Bavaria, but on the other side were Prussia, Brunswick, Baden, Nassau, Mecklerf- burg and various other countries, besides the Hanseatic towns. For some time Austria offered no counter scheme, but she ultimately proposed that there should be a directory of seven princes, the chief place being held alternately by a Prussian and an Austrian imperial vicar. Nothing came of this suggestion, and in due time the parliament proceeded to the second reading of the constitution. It was revised in a democratic sense, but the imperial title was maintained, and a narrow majority decided that it should be hereditary. Frederick William IV. of Prussia was then chosen emperor.

All Germany awaited with anxiety the reply of Frederick William. It was thought not improbable that he would accept the honour offered him, for in the early part of his reign he had spoken of German unity as enthusiastically as of liberty, and, besides, the opportunity was surprisingly favourable. The larger number of the North-German states were at least not unwilling to submit to the arrangement; and Austria, whose opposition in ordinary circumstances would have been fatal, was paralysed by her struggle with Hungary. Frederick William, however, whose instincts were far from democratic, refused " to pick up a crown out of the gutter "; and the deputa- tion which waited upon him was dismissed with the answer that he could not assume the imperial title without the full sanction of the princes and the free cities.

This answer was in reality a death-blow to the hopes of German patriots, but the parliament affected to believe that its cause End of was not vet l° st > an£ l appointed a committee to see Frankfort that the provisions of the constitution were carried pariia- out ˆ vigorous agitation began in the country for the acceptance of the constitution by the governments. The king of Wurttemberg was forced to accede to it; and in Saxony, Baden and Rhenish Bavaria armed multitudes kept the sovereigns in terror. Prussia, which, following the example of Austria, had recalled her representatives from Frankfort, sent her troops to put down these risings, and on the 21st of May 1849 the larger number of the deputies to the parliament voluntarily resigned their seats. A few republican members held on by it, and transferred the sittings to Stuttgart. Here they even elected an imperial government, but they had no longer any real influence, and on the 18th of June they were forcibly dispersed by order of the

Wurttemberg ministry.

Although Frederick William had refused to become emperor,

he was unwilling to miss altogether the opportunity afforded

by the difficulties of Austria. He invited the states

I e , to send representatives to Berlin to discuss the condi-*

Prusslaa r _ r . , , . , . ,

Union. tlon °i Germany; and he concluded a treaty with the kings of Saxony and Hanover. Two days after- – wards the three allies agreed upon a constitution which was in many respects identical with that drawn up by the Frankfort parliament. The functions of the executive were, however, extended, the electoral law was made less democratic, and it was decided that, instead of an emperor, there should be merely a supreme chief aided by a college of princes. This constitution was accepted by a number of states, which assumed the name

of " The Union," and on the 20th of March 1850 a parliament consisting of two houses met in Erfurt. Both houses accepted the constitution; and, immediately after they broke up, the members of the Union assembled in Berlin, and a provisional college of princes was elected. By that time, however, the whole situation of Germany had changed. In the autumn of 1849 Austria had succeeded, by the help of Russia, in quelling the Hungarian insurrection, and she was then in no mood to let herself be thrust aside by Prussia. Austria. Encouraged by her, Hanover and Saxony had severed themselves from the Union, and Saxony, Wurttemberg and Bavaria arrived at an understanding as to a wholly new constitu- tion. Afterwards all four states, with several others, accepted the invitation of Austria to consider the propriety of re-establish- ing the Confederation. The representatives of the states favourable to this proposal, i.e, Austria, Luxemburg, Denmark and the four kingdoms, came together in Frankfort on the 4th of September 1850, constituted themselves a Plenum of the old diet and refused to admit the other states except under the terms of the act of 181 5.

Thus the issue to which the events of about a century had been pointing was apparently raised; Germany was divided into two hostile parties, one set of states grouping Disturb- themselves around Austria, another around Prussia, ancein A difficulty which arose in Hesse-Cassel almost Hesse- compelled the powers to bring their

*differences to the Casse/ * test of war. In this small state the liberal movement of 1848 had been followed by reaction, and the elector ventured to replace Hassenpflug, the unpopular minister who had been driven from power. Hassenpflug, being detested by the chamber, dissolved it in June 1850; but the new one was not less hostile, and refused to sanction the collection of the taxes until it had considered the budget. For this offence it also was dissolved, and orders were issued for the raising of the taxes without its consent. Many officials refused to obey; the judges remained loyal to the constitution; and when attempts were made to solve the difficulty by the army, the officers instructed to act resigned in a body. Meanwhile, Hassenpflug had appealed to the representatives in Frankfort who claimed to be the restored diet, and under the influence of Austria they resolved to support him. Prussia, on the other hand, announced its determination to carry out the principles of the Union and to maintain the Hessian constitution. Austrian and Bavarian troops having entered Hesse, a Prussian army immediately occupied Cassel, and war appeared to be imminent. Prussia, however, was wholly unprepared for war; and, when this was realized, Radowitz, the foreign minister, who had so far pursued a vigorous policy, retired, and was replaced by Manteuffel, who, although the whole Prussian army was mobilized, began by making concessions. The Union was dissolved; and after Austria had despatched an ultimatum formulating her demands, Baron Manteuffel met Prince Schwarzenberg at Olmiitz, and, by a convention signed on the 29th of November 1850, virtually yielded everything he insisted upon. The difficulty in Hesse was to be left to the decision of the German governments; and as soon as possible ministerial conferences were to be held in Dresden, with a view to the settlement of the German constitution.*

The Austrian government strove to secure the appointment of a stronger executive than had hitherto existed; but its proposals met with steady opposition from Prussia. Every Prussian scheme was in like manner resisted ' ˆreiT by Austria. Thus, from the sheer inability of the assembled ministers to devise a plan on which all could agree, Prussia and the states that had joined her in the Union were compelled to recognize the Frankfort diet. From the 12th of June 1851 its sittings went on as if nothing had occurred since it was dispersed.

This wretched fiasco was hardly less satisfactory to the majority of Germans than the manner in which the national claims in Schleswig-Holstein were maintained. The armistice of Malmoe having expired in March 1840, the war with Denmark was resumed. A considerable

army was despatched against

the Danes by the Frankfort government, but on the 10th of July an armistice was signed at Berlin for six months, and a year afterwards Prussia concluded peace. The inhabitants of the duchies, however, continued the war. During the inter- view at Olmutz between Manteuffel and Schwarzenberg it was agreed that, like the affairs of Hesse-Cassel, those of Schleswig- Holstein should be submitted to the decision of all German states, but that, in the meantime, Prussia and Austria should act together. By the intervention of Austrian troops peace was restored; and when, early in 1852, the government of Denmark, in providing a constitution for the whole monarchy, promised to appoint separate ministers for Schleswig and Holstein, and to do equal justice to the German and the Danish populations, the two powers declared themselves satisfied and the Austrian' forces were withdrawn. The diet also, after some delay, pro- fessed to be content with this arrangement. While it was discussing the subject, a conference of the European powers met in London, and by the protocol of May 28, 1852, settled that Frederick VII. of Denmark should be succeeded by Christian, duke of Gliicksburg, arid that the duchies should be indissolubly united to the Danish monarchy. Austria and Prussia accepted the protocol, but it was not signed by the diet.

In all these later events the first place had been taken by Austria. The temporary dissolution of the Zollverein in 1851 Austria gave her an opportunity of trying to extend her in- aadthe fluence; she demanded that a union should be formed Zoii- of which she should be the leading member. A congress

vereia. £ a j] Q erman states, with the exception of Prussia and one or two states which sympathized with her, was held in Vienna; and it was followed by several other congresses favour- able to Austrian pretensions. Prussia, however, being here on strong ground, refused to give way; and not only was the customs union restored in accordance with her wishes, but Austria concluded with her in 1853 a treaty of commerce which embodied some important concessions.

Germany had now fairly entered a period which, although it did not

last very long, was, in some respects, as humiliating as any in her history. The popular movement, from reaction. wmcn great things had been hoped, had on some occasions almost touched its goal; and, as might have been expected, a reaction set in, which the princes knew how to turn to the fullest advantage. The Austrian government, after the subjection of Hungary, withdrew every concession it had made under pressure, and established a thorough despotism, trampling upon the rights of the individual nationalities, and forcing all its subjects into a common political mould. In Prussia the parliament, summoned by the king on the 5th of December 1848, met early in the following year. Although the democrats had declined to vote, it was not conservative enough for the court, and not till the 31st of January 1850 was an understanding arrived at respecting the constitution. The system thus established was repeatedly revised, and always with the same object — to reduce to a minimum the power of the national representatives, and to exalt and extend that of the government. At the same time the ministry persecuted the press, and allowed hardly a whisper of discontent to pass un- punished. The smaller states followed with alacrity in the steps of the two leading powers. The Liberal ministries of 1848 were dismissed, the constitutions were changed or abolished, and new chambers were elected under a severely restricted suffrage. Had the battle been fairly fought out between the govern- ments and the people, the latter would still have triumphed ; but the former had now, in the Frankfort diet, a mightier instrument than ever against freedom. What it could do was seen too clearly from the case of Hesse-Cassel. After the settle- ment of Olmutz, federal troops occupied that country, and federal execution was carried out with shameful harshness. Martial law was everywhere proclaimed; officers, and all classes of officials who had incurred the displeasure of the government, were subjected to arbitrary penalties; and such was the misery of the people that multitudes of them were compelled to emigrate.

The constitution having been destroyed by the Bund, the elector proclaimed one of his own making; but even the chamber elected under the provisions of this despotic scheme could not tolerate his hateful tyranny, and there were incessant disputes between it and the government. The Bund interfered in a like spirit in Hanover, although with less disastrous results, after the accession of George V. in 1851. For the whole of Germany this was emphatically the period of petty despotism; and not only from Hesse, but from all parts of the country there was a vast stream of emigration, mainly to the New World.

The outbreak of the Crimean War profoundly moved the German

nation. The sympathies of Austria were necessarily with the Western powers, and in Prussia the majority of the people took the same side; but the Prussian war. government, which was at this time completely under the control of Russia, gave its moral support to the tsar. It did, indeed, assent to a treaty — afterwards signed on behalf of the confederation — by which Prussia and Austria guaranteed each other, but it resolutely opposed the mobilization of the confederate army. The Prussian people were keenly irritated by the cordial relations between their court and the most despotic power in Europe. They felt that they were thus most unjustly separated from the main stream of Western progress.

During the Crimean War the political reaction continued with unabated force. In Prussia the government appeared resolved to make up for its temporary submission to the popular will by the utmost violence on which it could venture. A general election took place in the autumn of 1855, and so harshly was the expression of opinion restrained that a chamber was returned with scarcely a single liberal element of serious importance. The feudalists called for a still further revision of the constitution, and urged that even the reforms effected by Stein should be undone. In Bavaria a chamber elected about the same time as that of Prussia was rather less docile; but the government shared to the full the absolutist tendencies of the day, and energetically combated the party which stood up for law and the constitution. The Hanoverian government, backed by the Frankfort diet, was still more successful in its warfare with the moderate reformers whom it was pleased to treat as revolutionists; and in Austria the feudalists so completely gained the upper hand that on the 18th of August 1855 the government signed a concordat, by which the state virtually submitted itself to the control of the church.

The German people seemed to have lost both the power and the will to assert their rights; but in reality they were deeply dissatisfied. And it was clear to impartial observers Prussia that, in the event of any great strain upon the power and of the governments, the absolutist system would Switter- break down. The first symptom that the reaction ,and ‘ had attained its utmost development displayed itself in Prussia, whose attention was for a time distracted from home politics by a quarrel with Switzerland. The Swiss authorities had imprisoned some foolish royalists of Neuchatel, in which the house of Hohenzollern had never resigned its rights. War was threatened by Prussia, but when the prisoners were set free, the two states entered upon negotiations, and in the summer of 1857 King Frederick William withdrew all claims to the principality.

Soon after this, the mental condition of the king made it

necessary that his duties should be undertaken by a substitute,

and his brother William, the prince of Prussia, took his

place for three months. In October 1858 the prince R " f „, . ° , . , ˆ of William

became regent. The accession to power of the new /p russ /a.

regent was universally recognized as involving a change of system. The temper of William, in contradistinction to that of his brother, was pre-eminently practical; and he had the reputation of a brave, piously orthodox Prussian soldier. The nickname " cartridge-prince " (Karlatschenprinz) bestowed upon him during the troubles of '48 was undeserved ; but he was notori- ously opposed to Liberalism and, had he followed his own instincts, he would have modified the constitution in a reactionary sense. Fortunately, however, he was singularly open to conviction,

Italian War.

and Otto von Bismarck, though not yet in office, was already in his confidence. Bismarck realized that, in the struggle with Austria which he foresaw, Prussia could only be weakened were she to take up an attitude of opposition to the prevailing Liberal sentiment, and that to tamper with the constitution would not only be inexpedient, but useless, since special measures could always be resorted to, to meet special circumstances. The interests of Prussia, he urged, had been too often sacrificed to abstract ideas. William listened and was convinced. He not only left the constitution intact, but he dismissed Manteuffel's " feudal " ministry and replaced it with moderate Liberals.

The change was more revolutionary in appearance than in reality. Manteuffel and his policy were associated in the regent's mind with the humiliation of Olmiitz, and the dismissal of the ministry symbolized the reversal of this policy. William believed with his whole soul in the unification of Germany, and in Prussia as its

instrument; and, if he doubted, it was only as to the how and when. Of one thing he was certain — that who- ever aspired to rule over Germany must be prepared to seize it (letter to von Natzmer, May 20, 1849). This attitude had little in common with the Liberal appeal to the voice of the people. Such a revolutionary foundation might be good enough for "the ephemeral empires of France; the appeal of Prussia should be to the God of battles alone.

The antagonism between these conflicting principles was not long in revealing itself. In Germany the relations between j. . Austria and Prussia were becoming unpleasantly and the strained in the question of the admission of the Habs- Austro- burg monarchy to the Zollverein, in that of the elector of Hesse and his parliament, in that of the relation of the Elbe duchies to the crown of Denmark. But for the outbreak of the Italian war of 1859 the struggle of 1866 might have been anticipated. The outcome of the war increased the prestige of Prussia. She had armed, not with the idea of going to the aid of a German power in difficulties, but in order, at the right moment, to cast her sword into the scale wherein her own interests might for the time lie. At the menace of her armaments, concentrated on the Rhine, Napoleon had stopped dead in the full career of victory; Austria, in the eyes of German men, had been placed under an obligation to her rival; and Italy realized the emergence of a new military power, whose interests in antagonism to Austria were identical with her own.

So striking an object lesson was not lost on the Prussian regent, and he entered on a vigorous policy of reforming and strengthen- ing the army, General von Roon being appointed reforms m i mster 01 war 10r this purpose. To the Liberal and cow ministers, however, and to the Liberal majority in stiiutionai the Prussian diet, this was wholly objectionable. Schemes were under discussion for reforming the con- stitution of the Confederation and drawing the German states closer together on a Liberal basis; the moment seemed singularly inopportune for Prussia, which had not shown herself particularly zealous for the common interests, to menace the other German governments by increasing her separate armaments. When, therefore, on the 10th of February i860, the bills necessary for carrying out the reform of the army were introduced into the diet, they met with so strenuous an opposition that they had to be withdrawn. Supplies were, however, granted for fourteen months, and the regent took this as justifying him in proceeding with his plans. On the 1st of January 1861 the standards of the new regiments were solemnly blessed; on the next day Frederick William IV. died, and the new king was face to face with a constitutional crisis.

Austria, meanwhile, had been making the first tentative essays in constitutional concession, which culminated, in May 1 86 1, in the establishment at Vienna of a Reichsrat for the whole ‘ empire, including Hungary. The popularity she thus gained among German Liberals and Nationalists was helped by the course of events at Berlin. The Prussian diet of 1862 was no whit more tractable than its predecessor, but fell to attacking the professional army and advocating the extension of the militia {LandivQhr) system; on the nth of March the king dissolved

crisis in Prussia.

Bismarck.

it in disgust, whereupon the Liberal ministry resigned, and was succeeded by the Conservative cabinet of Prince Hohenlohe. Public opinion was now violently excited against the govern- ment; the new elections resulted (May 6) in the return of a yet larger Liberal majority; on the 22nd of August the army estimates were thrown out. Hohenlohe now declared himself incapable of carrying on the government, and King William entrusted it to Otto von Bismarck.

In choosing this man of iron will as his instrument during the actual crisis the king’s instinct had not betrayed him. For nine years

Prussian delegate at the diet of Frankfort, Bismarck was intimately acquainted with all the issues of the German problem; with his accustomed calculated blunt- ness he had more than once openly asserted that this problem could only be settled by Austria ceasing to influence the German courts and transferring "her centre of gravity towards Buda- pest "; with equal bluntness he told the committee on the budget, on the 30th of September 1862, that the problem could not be solved " by parliamentary decrees," but only " by blood and iron." For the supreme moment of this solution he was determined that Prussia should be fully prepared; and this meant that he must defy the majority within the diet and public opinion without. Some sort of constitutional pretence was given to the decision of the government to persevere with the military reforms by the support of the Upper House, and of this Bismarck availed himself to raise the necessary taxes without the consent of the popular assembly. He regretted the necessity for flouting public opinion, which he would have preferred to carry with him ; in due course he would make his peace with Liberal sentiment, when success should have justified his defiance of it. His plans were singularly helped by international developments. The Polish rising of 1863 came just in time to prevent a threatened Franco-Russian alliance; the timid and double-faced attitude of both France and Austria during the revolt left them isolated in Europe, while Bismarck's ready assistance to Russia assured at least the benevolent neutrality in the coming struggle with the Habsburg power.

Meanwhile, among the German people the object lesson of the Italian war had greatly stimulated the sentiment of national unity. As to the principle, however, on which this views unity was to be based, the antagonism that had been as to fatal in 1849 still existed. The German National German Union (Deutscher Nationalverein), organized in the «""?• autumn of 1859, favoured the exclusion of Austria and the establishment of a federation under the hegemony of Prussia; it represented the views of the so-called " Gothaer," the political heirs of the rump of the Frankfort parliament which had re-assembled at Gotha in June 1849, and supported the Prussian Union and the Erfurt parliament. To counteract this, a con- ference of five hundred " Great Germans " assembled at Frank- fort and, on the 22nd of October 1862, founded the German Reform Union {Deutscher Reformverein) , which, consisting mainly of South German elements, supported the policy of Austria and the smaller states. The constitutional crisis in Prussia, however, brought both societies into line, and in 1863 the National Union united with the Reform Union in an attempt to defeat Prussian policy in the

Schleswig-Holstein question.

This ■ anti-Prussian feeling Austria now tried to exploit for her own advantage. On the 2nd of August the emperor Francis Joseph proposed to King William, during a meeting The ., Fijr . at Gastein, to lay before an assembly of the German stentag" princes a scheme for the reconstitution of the Bund, of Frank- The king neither accepted nor refused; but, without tort ' waiting for his assent, invitations were sent out to the other princes, and on the 14th the congress (Furstentag) opened at Frankfort. Of the German sovereign states but four were unrepresented — -Anhalt-Bernburg, Holstein, Lippe and Prussia; but the absence of Prussia was felt to be fatal; the minor princes existed by reason of the balance between the two great powers, and objected as strongly to the exclusion of the one as of the other from the Confederation; an invitation to King William was therefore signed by all present and carried by the king of Saxony

in person to Berlin. Bismarck, however, threatened to resign if the king accepted; and the congress had to do the best it could without Prussian co-operation. On the 1st of September it passed, with some slight modifications, the Austrian proposals for the reconstruction of the Bund under a supreme Directory, an assembly of delegates from the various parliaments, a federal court of appeal and periodical conferences of sovereigns. Every- thing now depended on the attitude of Prussia, and on the 22nd her decision was received. " In any reform of the Bund," it ran, " Prussia, equally with Austria, must have the right of vetoing war; she must be admitted, in the matter of the presidency, to absolute equality with Austria; and, finally, she will yield no tittle of her rights save to a parliament representing the whole German nation."

Prussia thus made a bid for the sympathy of the democracy at the same time as she declared war against the dynasties; and her power was revealed by the fact that her veto was sufficient to wreck a proposal seconded by the all but unanimous vote of the German sovereigns. The Austrian stroke had failed, and worse than failed, for Napoleon III., who had been filled with alarm at this attempt to create on his flank an " empire of 70,000,000," saw in Prussia's attitude no more than a deter- mination to maintain for her own

ends the division and weakness of Germany; and this mistaken diagnosis of the situation determined his attitude during the crisis that followed.

This crisis was due to the reopening of a fresh acute phase of the Schleswig-Hoistein question by the accession of the ~ he " protocol-king " Christian IX. to the throne of Den-

*Sthieswig- mark (November 15, 1863), and his adhesion to the Hoisteia new constitution, promulgated two days before, which *""" on ' embodied the principle of the inalienable union of the Elbe duchies with the Danish body politic. The news of this event caused vast excitement in Germany; and the federal diet was supported by public opinion in its decision to uphold the claims of Prince Frederick of Augustenburg to the succession of the duchies. An agitation in his favour had already begun in Holstein and, after the promulgation of the new Danish constitution, this was extended to Schleswig. On the 24th of December Saxon and Hanoverian troops occupied Holstein in the name of the German Confederation, and sup- ported by their presence and the favour of the population the prince of Augustenburg, as Duke Frederick VIII., assumed the government.*

From these proceedings Prussia and Austria held rigorously aloof. Both had signed the protocol of 1852, and both realized that, if the European powers were to be given no excuse to inter- vene, their attitude must be scrupulously " correct "; and this involved the recognition of King Christian's rights in the duchies. On the other hand, the constitution of the 13th of November had been in flat contradiction to the protocol of London, which recognized the'separate rights of the duchies; and if the two great German powers chose to make this violation of an agreement to which they had been parties a casus belli, Europe would have no right to interfere. Prussia had begun to mobilize in November; and Austria also soon realized that action must speedily be taken if the lesser German governments were not to be allowed to get out of hand. Russia and Great Britain had already protested against the occupation of Holstein and the support given to the Augustenburg claimant; and now Beust, the Saxon minister, was proposing that the federal diet, which had been no party to the protocol, should formally recognize his claim. Bismarck, then, had no difficult task in persuading Austria that the time for action had come. A last attempt of the twp powers to carry the diet with them in recognizing the protocol having failed, they formally announced that they would act in the matter as independent European powers. On the 16th of January Prussia ^64 the agreement between them was signed, an

article, alliance. drafted by Austria, intended to safeguard the settlement of 1852, being replaced at the instance of Prussia by another, which stated that the contracting powers would decide only in concert upon the relations of the duchies, and that in no case would they determine the succession save by mutual

consent. A clause was also inserted provisionally recognizing the principle of the integrity of Denmark.

Whatever Austria's ulterior views may have been, 'Bismarck certainly from the first had but one aim before him. He saw clearly what the possession of the duchies would mean to Germany, their vast importance for the future of German sea-power; already he had a vision of the great war-harbour of Kiel and the canal connecting the Baltic and the North seas; and he was determined that these should be, if not wholly Prussian, at least wholly under Prussian control. Annexation was the goal which from the beginning he kept steadily before his eyes {Reminiscences, ii. 10). As for treaties to the contrary, he was to avow in his Reminiscences that these have little force when no longer reinforced by the interests of the contracting parties. His main fear was that the Danes might refuse to fight and appeal instead to a European congress; and, to prevent this, he led the Copenhagen government to believe that Great Britain had threatened to intervene in the event of Prussia going to war, " though, as a matter of fact, England did nothing of the kind. " This sufficed to provoke the defiance of the Danes, and on the ist of February 1864 the Austrian and Prussian troops crossed the Eider. The issue of a War of war between powers so ill-matched was a foregone 1864. conclusion; the famous rampart of the Dannewerk (q.v.), on which the Danish defence chiefly relied, was turned, and after a short campaign, in which the Danes fought with distinguished courage, peace was concluded by the treaty of Vienna (August 1, 1864), by which Schleswig, Holstein and Lauenburg were ceded to Austria and Prussia jointly.

*The Austro-Prussian alliance had been only an interlude in the great drama in which the two powers were playing rivfd parts. To the other causes of friction between them had been 4 KS *w a added, just before the war, a renewed quarrel as to Prussia Austria's relation to the Zoilverein. In 1862, in the andthe name of the customs union, Prussia had concluded with Zo "' France a commercial treaty, based mainly on free trade principles. This treaty most of the small states refused to sign, and they were supported in their objections by Austria, which loudly complained that Prussia had given to a foreign power what she had denied to a sister state of the Bund. Prussia,*

how- ever, remained firm, and declared that, were the treaty rejected, she would break up the Zoilverein. After the war Bismarck in fact succeeded in obtaining the signature of the smaller states to the treaty; and Austria, her protests having proved unavail- ing, was fain to sign a commercial treaty with the Zoilverein, essentially the same as that of 1853. Treaties concluded with Great Britain and Belgium, about the same time, also tended to enhance Prussian prestige.

Austria now sought in the question of the Elbe duchies an occasion for re-establishing her influence in Germany. The ambitions of Prussia were notorious, and Austria had no wish to see her rival still further strengthened by tloa ot the annexation of the duchies. In this attitude she Gastein. was sure of the support of the German princes, and of German public opinion, which was enthusiastically in favour of the Augustenburg claimant. She therefore took up the cause of Duke Frederick, and under her influence a small majority of the federal diet decided to request the two powers to invest him with the sovereignty of Holstein. Bismarck's reply was to deny the competency of the diet to interfere; and in the Prussian parlia- ment the minister of war moved for a special grant for the creation of a war-harbour at Kiel. Against this Austria protested, as having the same right as Prussia to Kiel; an angry correspond- ence followed; but neither power was quite prepared for war, and on the 20th of August 1865 the convention of Gastein, to use Bismarck's phrase, " papered over the cracks." Pending a settlement, Schleswig was to be occupied and administered by Prussia, Holstein by Austria; while Lauenburg was made over absolutely to Prussia in return for a money payment. This was so far a diplomatic victory for Prussia, as it ignored entirely the claims of the duke of Augustenburg.

Bismarck had consented to the convention of Gastein in order

to gain time to prepare the ground for the supreme struggle

with Austria for the hegemony of Germany. He had no intention

of postponing the issue long; for the circumstances of the two

powers were wholly favourable to Prussia. The Prussian army

had attained an unprecedented excellence of organization and discipline; the Prussian people, in spite of the parliamentary deadlock, were loyal and united; while in Austria army and state were alike disorganized by nationalist discontent and the breakdown of the centralized system. But there were other factors to be considered. The attitude of Napoleon was dubious ; the active alliance of Italy was necessary to the certainty of Prussian success; and the policy of Italy depended ultimately upon that of France. Lastly, the conscience of King William, though since the acquisition of Lauenburg he had " developed a taste for conquest," shrank from provoking war with a German power. The news of the convention of Gastein, which seemed to re-cement the union of Germany, had been received

H 2?Z"f 1 in France with clamorous indignation: and on the attitude 01 , , . , r 1 i- • • .1

France. 20t h of August, under pressure of public opinion, the

French government issued a circular note denouncing it as an outrage on national liberty and European law, the protest being backed by note of the 14th of September circulated by Lord John Russell on behalf of the British government. But Napoleon was himself little inclined to use the warlike tone of his people; and Bismarck found it easy to win him over to his views by explaining the temporary nature of the convention, and by dropping hints at the famous interview at Biarritz (September 30, 1865) of possible " compensations " to France in the event of a Prussian victory over Austria; the probability of a prolonged struggle in Germany between two powers apparently evenly matched, moreover, held out to the French emperor the prospect of his being able to intervene at the proper moment with overwhelming effect.

Napoleon having been successfully hoodwinked, Bismarck turned to Italy. His previous advances had been interrupted End of the ˆy

Gastein convention, which seemed to the Italian Austro- government a betrayal of the Italian cause. Italy Prussian attempted to negotiate with Austria for the purchase of Venetia; but the offer was curtly refused by the emperor Francis Joseph, and the counter-proposal of a commercial rapprochement was forestalled by Prussia, which with the aid of most of the lesser states, angered by the betrayal of their interests by Austria at Gastein, arranged a commercial treaty between Italy and the Zollverein, an act which involved the recognition of the Italian kingdom. The counter-stroke of Austria was to embarrass Prussia by allowing full play in Holstein to the agitation in favour of the Augustenburg claimant. To the protests of Prussia, Austria replied that she had a full right to do what she liked in the duchy, and that she still adhered to the declaration of the princes, made on the 28th of May 1864, in favour of Duke Frederick. This " perfidy " removed the last scruples of King William; and the Austro-Prussian alliance came to an end with the declaration of Bismarck that Prussia " must win full freedom for her own entire policy " and his refusal to continue the correspondence.

War, though still postponed, was now certain; and with this certainty the desire of the Italians for the Prussian alliance, now recommended by Napoleon, revived. By the 16th of March 1866 the Austrian war preparations were so far advanced that Count Mensdorff thought it safe to send an ultimatum to Prussia and, at the same time, a circular note to the princes declaring that, in the event of an evasive reply, Austria would move in the diet for the mobilization of the federal forces. On the 24th. Bismarck in his turn issued a circular note stating that, in view of the Austrian war preparations, Prussia must take measures' for her defence; at the same time he laid before the princes the outline of the Prussian scheme for the reform of the Confedera- tion, a scheme which included a national parliament to be elected by universal suffrage, " as offering surer guarantees for conserva- tive action than limitations that seek to determine the majority beforehand." Clearly Prussia meant war, and the Italian government thought it safe to sign, on the 8th of April 1866,

under' standing.

a treaty of alliance. By this instrument it was agreed that in the event of her proposals for the reform of the federal constitu- tion being rejected by the German princes, Prussia should declare war " in order to give effect to her pro- aBa"' posals," and that, in that case, Italy would also declare alliance. war against Austria. As a result of the war Venetia was to be added to Italy and an equivalent amount of territory in North Germany to Prussia. The agreement,

however, was only to hold good if war broke out within three months.

On the day after the signature of the treaty the Prussian project of reform was presented to the federal diet. It was, however, no more than a bid for the support of public opinion on the part of Bismarck ; for even while it was j under discussion an angry correspondence was being for the carried on between Berlin and Vienna on the question reform of armaments, and by the beginning of May both °!^ nd » powers were making undisguised preparations for war. On the 21st of April, the very day when the discussion of the Prussian proposals began in the diet, Austria, alarmed at a threatened attack by Garibaldi on Venetia, began to mobilize in defiance of an agreement just arrived at with Prussia. Five days later, in spite of this, she sent an ultimatum to Berlin, demanding the continuance of the Prussian disarmament and an immediate settlement of the Schleswig-Holstein question. The supreme issue was, however, delayed for a few weeks by the intervention of Napoleon, who, urged on by the loud alarm of the French people at the prospective aggrandizement of Prussia, attempted to detach Italy, from the Prussian alliance by persuad- ing Austria to a cession of Venetia. The negotiations broke downon the refusal of Italy to throw over her ally, and Napoleon's proposal of a European congress, to reconsider the whole settle- ment under the treaties of 181 5, proved equally abortive. Mean- while the preparations for war had been continued, and on the 1 st of June Austria flung down the gage by declaring her intention of submitting the whole question of the duchies to the federal diet and of summoning a meeting of the Holstein estates. This was denounced by Bismarck in a circular note to the powers as a breach of the convention of Gastein and of the treaty of January 16, 1864, by which Austria and Prussia had agreed to govern the duchies in common. At the same time he handed in the formal protest of Prussia to the federal diet. Prussia, he said, would only recognize the right of a reformed federal power to settle the Schleswig-Holstein question, and this power must be based on a German parliament, which alone could guarantee Prussia that any sacrifices she might make would be for the good of Germany and not of the dynasties. The Prussian plan of reform laid before the diet included the exclusion of Austria from the Confederation; the creation of a federal navy; the division of the supreme command of the army between Prussia and Bavaria; a parliament elected by manhood suffrage; the regulation of the relations between the Confederation and Austria by a special treaty. In the event of the actual constitu- tion of the Bund being shattered by war, the German states were asked whether they would be

prepared to join this new organiza- tion. On the 9th of June Prussian troops had already marched into Holstein, the Austrians, with Duke Frederick, falling back on Altona. On the 14th the Prussian scheme of reform was laid before the diet, together with Austria's counter-proposal for a decree of federal execution against Prussia. In the event of the rejection of Prussia's motion, Bismarck had made it clear that Prussia would withdraw from the Confederation, and prt, ss ; a that in the event of her being victorious in the ensuing withdraws war those states of northern Germany that voted tromthe against her would cease to exist. In spite of this, " Bund -" the Austrian motion was carried by nine votes to six. The Prussian delegate at once withdrew from the diet, and on the following day (June 15) the Prussian troops advanced over the Saxon frontier.

The war that followed, conveniently called the Seven Weeks' War (q.v.), culminated before a month had passed, on the 3rd of July, in the crushing Prussian victory of Koniggratz. The rapidity and overwhelming character of the Prussian success

ensured the triumph of Bismarck's policy. The intervention which Napoleon had planned resolved itself into diplomatic Austro-pourparlers of which the result was wholly insignificant ; Prussian and even before the war was ended Bismarck was War of preparing for an understanding with Austria and with the South German states that should minimize the risk of a French attack. By the preliminary treaty of peace signed at Nikolsburg on the 26th of July the great objects for which Prussia had fought were fully secured. By Article Treaty of j t j le integrity of the Austrian monarchy was pre-August23. served, with the exception of Lombardo-Venetia; by Article II. Austria consented to " a new organiza- tion of Germany without the participation of the empire of Austria,'.' consented to " the closer union " to be founded by the king of Prussia to the north of the Main, and to the German states south of the Main entering into a union, the national relations of which with the North German Confederation were to be " the subject of an ulterior agreement between the two parties "; by Article III. Austria transferred all her rights in Schleswig and Holstein to Prussia, reserving the right of the people of north Schleswig to be again united to Denmark should they " express a desire to be so by a vote freely given "; by Article V. the

territory of Saxony was to remain intact. These Articles, enbodying the more important terms, were included with slight verbal alterations in the treaty of peace signed at Prague on the 23rd of August. Separate treaties of peace had been signed with Wiirttemberg on the 13th, with Baden on the 17th and with Bavaria on the 22nd of August; treaties with Hesse-Darmstadt followed on the 3rd of September, with Saxe-Meiningen Aggrand- on tne g tn j October and with Saxony on the 21st. Prussia. The other unfortunate North German states which had sided with Austria were left to their fate, and on the 20th of September King William issued a decree annexing Hanover, Hesse-Cassel, Nassau and the free city of Frankfort to the Prussian monarchy, and bringing them under the Prussian constitution.

The return of King William to his capital had been a triumphal progress; and Bismarck had shared to the full the new-born popularity of his master. He seized the occasion to Fede ™'_ make his peace with Liberal sentiment, and the bill tion. of indemnity for past ministerial breaches of the

constitution was carried in the new Prussian diet with enthusiasm. On the 24th of February 1867 the constituent diet of the confederation, elected by universal suffrage and the ballot, met in Berlin, and soon accepted in its essential features the constitution submitted to it. It was arranged that the headship of the confederation should be hereditary, that it should belong to the king of Prussia, and that legislative functions should be exercised by a federal council (Bundesrat), repre- sentative of the various governments, and by a diet (Bundestag) elected by the whole people.

The federal parliament began at once the task of consolidating the new institutions. In the sessions of 1869 and 1870 it estab- lished a supreme tribunal of commerce, sitting in Liberals. Leipzig, and passed a new penal code. Great as were these results, they did not satisfy the aspirations of patriotic Germans, who, having so suddenly and so unex- pectedly approached unity, longed that the work should be completed. A party called the National Liberals was formed, whose main object was to secure the union of South with North Germany, and it at once entered into peculiar relations with Bismarck, who, in spite of his native contempt for parliaments and parliamentary government, was quite prepared to make use of any instruments he found ready to his hand. There was, indeed, plentiful need for some show of concession to Liberal' sentiment, if a union of hearts was to be established between the South and North Germans. The states south of the Main had issued from the war as sovereign

and independent powers, and they seemed in no great haste to exchange this somewhat pre- carious dignity either for a closer alliance among each other or with the North German Confederation. The peoples, too, fully shared the dislike of their rulers to the idea of a closer union

with North Germany. The democrats hated Prussia as " the land of the corporal's stick," and Bismarck as the very incarna- tion of her spirit. The Roman Catholics hated her as the land par excellence of Protestantism and free thought. Nothing but the most powerful common interests could have drawn the dissevered halves of Germany together. This sense of common interests it was Bismarck's study to create. An important step was taken in 1867 by the conclusion of a treaty with the southern states, by which it was agreed that Customs all questions of customs should be decided by the meat federal council and the federal diet, and that, for the consideration of such questions, the southern states should send representatives to Berlin. In reality, however, the customs parliament (Zollparlament) was of little service beyond the limits of its special activity. In the election to the south customs parliament in 1868, Wiirttemberg did not re- German turn a single deputy who was favourable to the national hostility cause; in Bavaria the anti-nationalists had a large ounon. majority; and even in Baden and Hesse-Darmstadt, where the opposition to Prussia was less severe, a powerful minority of the deputies had no liking for Bismarck and his ways. Thus the customs parliament was kept rigidly to the objects for which it was founded, greatly to the disappointment of patriots who had not doubted that it would become an effective instrument for the attainment of far larger purposes. Had the completion of unity depended wholly on internal causes, it certainly would not have been soon achieved; but other forces, not altogether unexpectedly, came to Bismarck's aid. fp rance . France had been irritated by the enormous increase of Prussian power, and even before the treaty of Prague was signed the emperor Napoleon III. indicated a wish to be " compensated " with the left bank of the Rhine. This was a claim exactly calculated to play into Bismarck's hands. The communication of the French emperor's original proposals to the South German governments, whose traditional policy had been to depend on France to save them from the ambitions of the German great powers, was enough to throw them into the arms of Prussia. The treaties of peace between Prussia and the South German states were accompanied by secret treaties of offensive and defensive alliance, under which the supreme command in war was to be given to the Prussian king. A common war against a common enemy now

appeared the surest means of welding the dissevered halves of Germany together, and for this war Bismarck steadily prepared. There were soon plentiful signs of where this enemy was to be sought. On the 14th of March 1867 Thiers in the French Chamber gave voice to the indignation of France at the bungling policy that had suffered the aggrandizement of Prussia. The reply of Bismarck was to publish (March 19) the secret treaties with the South German states. War was now only a question of time, and the study of Bismarck was to bring it on at the moment most favourable to Germany, and by a method that should throw upon France the appearance of being the aggressor. The European situation was highly favourable. France was hampered by the Roman question, which divided her own counsels while it embroiled her with Italy; the Luxemburg question, arising out of her con- tinued demand for " compensation," had only served to isolate her still further in Europe. French patriotic feeling, suspicious, angry and alarmed, needed only a slight provocation to cause it to blaze up into an uncontrollable fever for war.

The provocation was supplied at the right moment by the candi- dature of the prince of Hohenzollern for the vacant crown of Spain. To bring the Peninsula under French influence had _,. been for centuries the ambition of French statesmen; Hohen- it was intolerable that it should fall to a " Prussian " zoiiern

candi- dature.

prince and that France should be threatened by this new power not only from the east but from the south. High language was used at Paris; and the French am- bassador, Count Benedetti, was instructed to demand from the king of Prussia the withdrawal of the Hohenzollern candidature. The demand was politely but firmly refused, and Bismarck, judging that the moment had come for applyine the match to

the powder magazine, published an " edited " version of the telegram from the king describing the episode, a version which " without the addition of a single word " turned the refusal into an insult. The " Ems telegram " made the con- Franco- tinuance of peace impossible;

on the 14th of July Napoleon III. signed the declaration of war; and on the 2nd of August the affair of Saarbriicken opened the struggle which was to cause the downfall of the French and the creation of the German empire (see Franco-German War). On the 18th of January 1871, ten days before the capitulation Prociama- °f Paris, William I., king of Prussia, was proclaimed tioaofthe German emperor in the great hall of the palace of German Versailles, on the initiative of the king of Bavaria, the ‘ most powerful of the South German sovereigns, the traditional ally of France. The cession of Alsace and the greater part of Lorraine, wrested two centuries before by Louis XIV. from the Holy Empire, was the heaviest part of the price that France had to pay for peace (treaty of Frankfort, May 10, 1871). (W. A. P.)*

The foundation of the empire in 187 1 begins a new era in the history of Germany. The rivalry of the dynasties to which for so long the interests of the nation had been The new sacrificed now ceased. By the treaties of Versailles “tsri. ‘ the kingdoms of Bavaria and Wiirttemberg, and the grand-duchy of Baden, as well as the southern provinces of the grand-duchy of Hesse, were added to the North German Confederation. Henceforward all the German states that had survived the struggle of 1866, with the exception of the empire of Austria, the grand-duchy of Luxemburg, and the principality of Liechtenstein, were incorporated in a permanent federal state under the leadership of Prussia. The revision in 1871 made no important alterations in the constitution of 1867. The states retained their autonomy except in those matters which were expressly transferred to the imperial authorities; the princes retained their sovereignty; - the king of Prussia, though he now took the title of German emperor, was only primus inter pares; he was president of the confederation, but had no suzerainty over the other princes. None the less, from this time the acts of the state governments and parliaments have ceased to have more than a local importance; the history of the nation is centred in Berlin, in the Bundesrat or federal council, in which the interests of the individual states are represented; in the Reichstag, in which the feelings and wishes of the nation are expressed; and above all, in the Prussian government and imperial executive.

The new constitution has stood the test. The number of states of which the empire consists has remained unaltered; 1 occasional disputes have been settled harmoniously in a legal T f eew ~ manner. The special rights reserved to Bavaria and the states. Wiirttemberg have not proved, as was feared, a danger to the stability of the empire. Much apprehension had been caused by the establishment of a permanent committee for foreign affairs in the Bundesrat, over

which the Bavarian representative was to preside; but the clause remained a dead letter. There is no record that the committee ever met until July 1900, when it was summoned to consider the situation in China; and on that occasion it probably formed a useful support to the government, and helped to still apprehension lest a too adventurous policy should be pursued. , Another clause deter- mined that in a division in the Reichstag on any law which did not concern the whole empire, the representatives of those states which were not concerned should not vote. This, had it been retained, would have destroyed the coherence of the Reichstag as representative of the whole nation. It was repealed in 1873. The permission to maintain diplomatic missions has been equally harmless: most of the states have recalled all their diplomatic ■ representatives; Saxony, Bavaria and Wiirttemberg have maintained only those at Vienna, the Vatican and at St Peters-

_ ‘ The only formal change is that the duchy of Lauenburg, which since 1865 had been governed by the king of Prussia as a separate principality (but without a vote in the Bundesrat), was in 1876 incorporated in the Prussian province of Schleswig-Holstein.

burg. Bavaria has even voluntarily adopted many imperial laws from which it was legally exempted; for instance, the laws of settlement.

If the states have been loyal to the empire, the imperial govern- ment has also respected the constitutional privileges of the states. The harmonious working of the constitution depends on the union of policy betv/een the empire and Prussia, a’ndthe for it is the power of Prussia which gives strength to empire. the empire. This was practically secured by the fact that the emperor, who is king of Prussia, appoints the chancellor, and the chancellor is generally president of the Prussian ministry as well as minister of foreign affairs — in his person the govern- ment of the two is identified. For twenty years the double office was held by Bismarck, who, supported as he was by the absolute confidence of the emperor, and also of the allied princes, held a position greater than that ever attained by any subject in modern Europe since the time of Richelieu. For ten months in 1873 he, indeed, resigned the office of minister-president to Roon; and in the same way Caprivi, during the years 1893-1894, held the chancellorship alone; but in neither case was the experiment successful, and Hohenlohe and Biilow adhered to the older plan. So important is the practical co-operation of the imperial administration and the Prussian government, that it has become customary to appoint to seats in the Prussian ministry the more important of the secretaries of state who administer imperial affairs under the

chancellor. Delbriick, head of the imperial chancery, had held this position since 1868; in 1877 Biilow, secretary of state for foreign affairs, was appointed Prussian minister, and this has become the ordinary practice. One result of this is to diminish the control which the Prussian parliament is able to maintain over the Prussian ministry.

In the federal council Prussian policy nearly always prevails, for though Prussia has only seventeen votes out of fifty-eight, the smaller states of the North nearly always support her; practically she controls the vote of Waldeck and since 1885 those of Bruns- wick. A definite defeat of Prussia on an important question of policy must bring about a serious crisis; it is generally avoided because, as the meetings are secret, an arrangement or com- promise can be made. Bismarck, knowing that nothing would more impede the consolidation of the empire than an outbreak of local patriotism, always so jealous of its rights, generally used his influence to avoid constitutional disputes, and discouraged the discussion of questions which would require an authoritative interpretation of the constitution. It was, however, opposition in the Bundesrat which obliged him to abandon his scheme for imperial railways, and when, in 1877, it was necessary to deter- mine the seat of the new supreme court of justice, the proposal of the government that Berlin should be chosen was out-voted by thirty to twenty-eight in favour of Leipzig. On this occasion Bismarck accepted the decision, but when important interests were at stake he showed himself as ready to crush opposition as in the older days, as in the case of Hamburg and Bremen.

The great personal qualities of the reigning emperors and the widely extended family connexions of the house of Hohenzollern have enabled them to hold with ease their position as leaders among the ruling families. So far as is known, with one or two unimportant exceptions, the other princes loyally accepted their new position. It is only as regards the house of Brunswick that the older dynastic questions still have some political importance.

The other princes who were dispossessed in 1866 have all been reconciled to Prussia. The elector of Hesse and the duke of Nassau have formally relinquished their claims. Hanover. In 1883 the daughter of the duke of Augustenburg, the former claimant to the duchies of Schleswig and Holstein, married the heir to the Prussian throne, who became William II. On the other hand, the royal family of Hanover has never ceased to protest against the acts by which they were deprived of their dominions. King George to the end of his days,

whether in Austria or in France, still regarded himself as in a state of war with Prussia. As he had used his large personal property to organize a regiment in order to regain his possessions, the Prussian

government had sequestrated that part of his income, amounting to some £50,000, over which they had control, and used it as secret service money chiefly for controlling the press; to this fund the name " Welfen-Fond " was commonly given. After 1870 the Hanoverian regiment was disbanded, but the sequestra- tion continued. The death of the old king in 1878 made no difference, for his son in a letter to the king of Prussia announced that he assumed and maintained all his father's rights, and that he did not recognize the legal validity of the acts by which he was, as a matter of fact, prevented from enjoying them. His protest was supported by a considerable number of his former subjects, who formed a party in the Reichstag. The marriage of the duke of Cumberland (the title by which the king called himself till he could come into his possessions) with Princess Thyra of Denmark in the same year was made the occasion of a great demonstration, at which a deputation of the Hanoverian nobility assured the duke of their continued attachment to his house.

After Bismarck's retirement the emperor attempted to bring about a reconciliation with the duke and the Hanoverians. His attention had been drawn to the bad moral effect of the use to which the Welfen-Fond was applied, and on the duke of Cumber- land writing him a letter, in which, while maintaining his claims to the throne of Hanover, he recognized the empire and undertook not to support any enterprise against the empire or Prussia, with the consent of the Prussian parliament the sequestration of his property was removed. The attitude of passive resistance is, however, still maintained, and has affected the position of the duchy of Brunswick.

In 1884 William, duke of Brunswick, died after a reign of

fifty-four years. The younger son of the duke who fell at

Quatre Bras, he had been called to the throne in 183 1

Ducbyof tQ take tne place £ nis elc j er Drotner Charles, who had

wick. been deposed. Duke Charles had died at Geneva in

1873, and as both brothers were childless the succession went to the duke of Cumberland as head of the younger branch of the house of Brunswick-Liineburg. Duke William before his death had arranged that the government should be carried on by a council of regency so long as the heir was prevented from actually assuming the government; at the end of a year a regent was to be chosen from among the non-reigning German princes. He hoped in this way to save his duchy, the last remnant of the dominions of his house, from being annexed by Prussia. As soon as he dieˆfl the town was occupied by the Prussian troops already stationed therein; the duke of Cumber- land published a patent proclaiming his succession; the council of state, however, declared, in agreement with the Bundesrat, that the relations in which he stood to the kingdom of Prussia were inconsistent with the alliances on which the empire was based, and that therefore he could not assume the government. The claim of the duke of Cambridge as the only male heir of full age was referred to the Bundesrat, but the duke refused to bring it before that body, and after a year the Brunswick government elected as regent Prince Albert of Hohenzollern, to hold office so long as the true heir was prevented from entering on his rights. On the death of Prince Albert in September 1906, the Brunswick diet petitioned the Bundesrat to allow the youngest son of the duke of Cumberland to succeed to the duchy on renouncing his personal claims to the crown of Hanover. This was refused, and on the 28th of May 1907 Duke John Albert of Mecklenburg- Schwerin was elected regent by the diet. Under the regency of Prince Albert, Brunswick, which had hitherto steadily opposed all attempts to assimilate and subordinate its institutions to those of Prussia, though it retained formal independence, was brought into very close dependence upon Prussia, as is the case with all the other northern states. In them the armies are incorporated in the Prussian army;' the railways are generally merged in the Prussian system; indirect taxation, post office, w id k an< ˆ near ly tne whole of the judicial arrangements are imperial. None,however, has yet imitated the prince of Waldeck, who in 1867, at the wish of his own subjects, transferred the administration of his principality to Prussia. The local estates

Lippe.

still meet, and the principality still forms a separate administra- tive district, but it is managed by a director appointed by Prussia. The chief reason for this act was that the state could not meet the obligations laid upon it under the new system, and the re-

sponsibility for any deficit now rests with Prussia.

A curious difficulty, a relic of an older state of society, arose in the principality of Lippe, in consequence of the extinction of the elder ruling line and a dispute as to the succession (see Lippe). Some political importance attached to the case, for it was not impossible that similar difficulties might occur elsewhere, and the open support given by the emperor to the prince of Schaumburg-Lippe, who had married his sister, caused apprehension of Prussian aggression.

A much more serious question of principle arose from the peculiar circumstances of Mecklenburg. The grand-duchies, which, though divided between two lines of the ducal The M eC £. house, had a common constitution, were the only lenburg state in Germany in which the parliament still took the coostitu- form of a meeting of the estates — the nobility and the on ‘ cities — and had not been altered by a written constitution. Repeated attempts of the grand-dukes to bring about a reform were stopped by the opposition of the Ritterschaft. Buffing, one of the Mecklenburg representatives in the Reichstag, there- fore proposed to add to the imperial constitution a clause that in every state of the confederation there should be a parlia- mentary assembly. This was supported by all the Liberal party and carried repeatedly; of course it was rejected by the Bundesrat, for it would have established the principle that the constitution of each state could be revised by the imperial authorities, which would have completely destroyed their independence. It is noticeable that in 1894 when this motion was introduced it was lost; a striking instance of the decay of Liberalism.

The public political history of Germany naturally centres around the debates in the Reichstag, and also those in the Prussian parliament. In the Prussian parliament Public are discussed questions of education, local government, affairs: religion and direct taxation, and though of course it political is only concerned with Prussian affairs, Prussia is so par large a part of Germany that its decisions have a national import- ance. A very large number of the members of the Reichstag and of the Prussian parliament sit in both, and the parties in the two are nearly identical. In fact, the political parties in the Reichstag are generally directly descended from the older Prussian parties.

The first place belongs to the Conservatives, who for twenty years had been the support of the Prussian government. The party of the feudal aristocracy in North Germany, they „ erya . were strongest in the agricultural districts east of the Wves . Elbe; predominantly

Prussian in origin and in feeling, they had great influence at court and in the army, and desired to maintain the influence of the orthodox Lutheran Church. To them Bismarck had originally belonged, but the estrangement begun in 1866 constantly increased for the next ten years. A considerable number of the party had, however, seceded in 1867 and formed a new union, to which was given the name of the Deutsche Reichspartei (in the Prussian House they were called the Frei Conservativen). These did not include any prominent parliamentary leaders, but many of the most important ministers and officials, including Moltke and some of the great nobles. They were essentially a government party, and took no part in the attacks on Bismarck, which came from the more extreme Conservatives, the party of the Kreuzzeitung.

The events of 1866 had brought about a similar division among the Progressives. A large section, including the most important leaders, determined to support Bismarck Natlona i in his national policy and to subordinate to this, uberals. though not to surrender, the struggle after constitu- tional development. Under the name of National-Liberal-Partei they became in numbers as in ability the strongest party both in Prussia and the empire. Essentially a German, not a Prussian, party, they were joined by the Nationalists from the annexed provinces of Hanover and Hesse; in 1871 they were greatly

strengthened by the addition of the National representatives from the southern states; out of fourteen representatives from Baden twelve belonged to them, seventeen out of eighteen Wiirttemberger, and a large majority of the Bavarians. It was on their support that Bismarck depended in building up the institutions of the empire. The remainder of the Progressives, the Fortschrittspartei, maintained their protest against the military and monarchical elements in the state; they voted against the constitution in 1867 on the ground that it did not provide sufficient guarantees for popular liberty, and in 1871 against the treaty with Bavaria because it left too much independence to that state. Their influence was strongest in Berlin, and in the towns of East Prussia; they have always remained characteristically Prussian.

These great parties were spread over the whole of Germany, and

represented the great divisions of political thought. To them must be added others which were more local, as the Volks- partei or People's party in Wurttemberg, which kept alive the extreme democratic principles of 1848, but was opposed to Socialism. They had been opposed to Prussian supremacy, and in 1870 for the time completely lost their influence, though they were to regain it in later years.

Of great importance was the new party of the Centre. Till the year 1863 there had been a small party of Catholics in the Prussian parliament who received the name of the Centre. Centrum, from the part of the chamber in which they sat. They had diminished during the years of conflict and disappeared in 1866. In December 1870 it was determined to found a new party which, while not avowedly Catholic, practically consisted entirely of Catholics. The programme required the support of a Christian-Conservative tendency; it was to defend positive and historical law against Liberalism, and the rights of the individual states against the central power. They were especially to maintain the Christian character of the schools. Fifty-four members of the Prussian parliament at once joined the new party, and in the elections for the Reichstag in 1 87 1 they won sixty seats. Their strength lay in Westphalia and on the Rhine, in Bavaria and the Polish provinces of Prussia. The close connexion with the Poles, the principle of federalism which they maintained,the support given to them by the Bavarian " patriots," their protest against the " revolution from above " as represented equally by the annexation of Hanover and the abolition of the papal temporal power, threw them into strong opposition to the prevailing opinion, an opposition which re- ceived its expression when Hermann von Mallincrodt (182 1-1874), the most respected of their parliamentary leaders, declared that " justice was not present at the birth of the empire." For this reason they were generally spoken of by the Nationalist parties as Reichsfeindlich.

This term may be more properly applied to those who still refuse to recognize the legality of the acts by which the empire was founded. Of these the most important were the so-called Guelphs (W elf en), described by themselves as the Hannoverische Rechtspartei, member of the old Hanoverian nobility who repre- sented the rural districts of Hanover and still regarded the deposed King George V. and, after his death, the duke of Cumber- land as their lawful sovereign. In the elections of 1898 they still returned nine members to the Reichstag, but in those of 1903 their representation had sunk to six, and in 1907 it had practi- cally disappeared. A similar shrinkage has been displayed in the case of the protesting Alsace-Lorrainers, who reVorned only two deputies in 1907. A pleasant concession to

Hanoverian feeling was made in 1899, when the emperor ordered that the Hanoverian regiments in the Prussian army should be allowed to assume the names and so continue the traditions of the Hanoverian army which was disbanded in 1866.

The government has also not succeeded in reconciling to the empire the alien races which have been incorporated in the kingdom of Prussia. From the Polish districts of West Prussia, Posen and Silesia a number of repre- sentatives have continued to be sent to Berlin to protest against their incorporation in the empire. Bismarck, influenced by the

Poles.

older Prussian traditions, always adopted towards them an atti- tude of uncompromising opposition. The growth of the Polish population has caused much anxiety; supported by the Roman Catholic Church, the Polish language has advanced, especially in Silesia, and this is only part of the general, tendency, so marked throughout central Europe, for the Slavs to gain ground upon the Teutons. The Prussian government has attempted to prevent this by special legislation and severe administrative measures. Thus in 1885 and 1886 large numbers of Austrian and Russian Poles who had settled in these provinces were expelled. Wind- thorst thereupon raised the question in the Reichstag, but the Prussian government refused to take any notice of the inter- polation on the ground that there was no right in the constitution for the imperial authority to take cognizance of acts of the Prussian government. In the Prussian parliament Bismarck introduced a law taking out of the hands of the local authorities the whole administration of the schools and giving them to the central authority, so as to prevent instruction being given in Polish. A further law authorized the Prussian government to spend £5,000,000 in purchasing estates from Polish families and settling German colonists on the land. The commission, which was appointed for the purpose, during the next ten years bought land to the amount of about 200, 000 acres and on it settled more than 2000 German peasants. This policy has not, however, produced the intended effect; for the Poles founded a society to protect their own interests, and have often managed to profit by the artificial value given to their property. It has merely caused great bitterness among the Polish peasants, and the effect on the population is also counteracted by the fact that the large proprietors in purely German districts continue to import Polish labourers to work on their estates.

In the general change of policy that followed after the retire- ment of

Bismarck an attempt was made by the emperor to con- ciliate the Poles. Concessions were made to them in the matter of schools, and in 1891 a Pole, Florian von Stablewski (r84i- 1906), who had taken a prominent part in the Kulturkampf, was accepted by the Prussian government as archbishop of Posen- Gnesen. A moderate party arose among the Poles which accepted their position as Prussian subjects, gave up all hopes of an immediate restoration of Polish independence, and limited their demands to that free exercise of the religion and language of their country which was enjoyed by the Poles in Austria. They supported government bills in the Reichstag, and won the commendation of the emperor., Unfortunately, for reasons which are not apparent, the Prussian government did not continue a course of conciliation; in 1901 administrative edicts still further limited the use of the Polish language; even religious instruction was to be given in German, and an old royal ordinance of 18T7 was made the pretext for forbidding private instruction in Polish.

All these efforts have been in vain. The children in the schools became the martyrs of Polish nationality. Religious instruction continued to be given to them in German, and when they refused to answer questions which they did not understand, they were kept in and flogged. In 1906, as a protest, the school children to the number of 100,000 struck throughout Prussian Poland; and, as a result of a pastoral issued by the archbishop, Polish parents withdrew their children from religious instruction in the schools. The government responded by fining and imprisoning the parents. The efforts of the government were not confined to the forcible Germanization of the children. Polish newspapers were confiscated and their editors imprisoned, fines were imposed for holding Polish meetings, and peasants were forbidden to build houses on their own land. The country gentlemen could not have a garden party without the presence of a commissary of police.

The climax, however, was reached in 1907 when Prince Bulow, on the 26th of November, introduced into the Prussian parlia- ment a bill to arm the German Colonization Committee in Posen with powers of compulsory expropriation. He pointed out that though the commission had acquired 815,000 acres of land and settled upon it some 100,000 German colonists, nearly 250,000

acres more had passed from German into Polish hands. He proposed, therefore, to set aside a credit of £17,500,000 for this purpose. On the 26th of February 1908 the discussion on this bill was continued, Count Arnim defending it on the ground that " conciliation had failed and other measures must now be tried!" The Poles were aiming at raising their standard of civilization and learning and thus gradually expelling the Germans, and this, together with the rapid growth of the Polish population, con- stituted a grave danger. These arguments were reinforced by an appeal of Prince Billow to the traditions of Bismarck, and in spite of a strenuous and weighty opposition, the bill with certain modifications passed by 143 votes to 111 in the Upper House, and was accepted by the Lower House on the 13th of March. A bill forbidding the use of any language but German at public meetings, except by special permission of the police, had been laid before the Reichstag in 1907 by Prince Bulow at the same time as he had introduced the Expropriation Bill into the Prussian parliament. The bill, with certain drastic amendments limiting its scope, passed the House on the 8th of April by a majority of 200 to 179. This law gave increased freedom in the matter of the right of association and public meeting; but in the case of the Poles it was applied with such rigidity that, in order to evade it they held " mute " public meetings, resolutions being written up in Polish on a blackboard and passed by show of hands, without a word being said. 1

Compared with the Polish question, that of the Danes in North Schleswig is of minor importance; they number less than 150,000, and there is not among them, as among the Poles, the constant encroachment along an extended line of frontier; there is also no religious question involved. These Danish subjects of Germany have elected one member to the Reichstag, whose duty is to demand that they should be handed over to Denmark. Up to the year 1878 they could appeal to the treaty of Prague; one clause in it determined that the inhabitants of selected districts should be allowed to vote whether they should be Danish or German. This was inserted merely to please Napoleon; after his fall there was no one to demand its execution. In 1878, when the Triple Alliance was concluded, Bismarck, in answer to the Guelphic demonstration at Copenhagen, arranged with Austria, the other party to the treaty of Prague, that the clause should lapse. Since then the Prussian government, by prohibiting the use of Danish in the schools and public offices, and by the expulsion

from the country of the numerous Danish optants who had returned to Schleswig, has used the customary means for compelling all subjects of the king to become German in language and feeling. 2

The attempt to reconcile the inhabitants of Alsace-Lorraine to their condition proved equally difficult. The provinces had been placed under the immediate rule of the emperor Lorraine. an(* tne chancellor, who was minister for them; laws were to be passed by the Reichstag. In accordance with the treaty of Frankfort, the inhabitants were permitted to choose between French and German nationality, but all who chose the former had to leave the country; before the 1st of October 1872, the final day, some 50,000 had done so. In 1874, for the first time, the provinces were enabled to elect members for the Reichstag; they used the privilege to send fifteen Elsasser, who, after delivering a formal protest against the annexation, retired from the House; they joined no party, and took little part in the proceedings except on important occasions to vote against the government. The same spirit was shown in the elections for local purposes. It seemed to be the sign of a change when a new party, the Autonomisten, arose, who demanded as a practical concession that the dictatorship of the chancellor should cease and local self-government be granted. To some extent this was done in 1879; a resident governor or Statthalter was appointed, and a local representative assembly, which was consulted as to new laws. _ All the efforts of Field marshal*

1 See Annual. Register (1908), pp. 289 et seq.

2 The whole question is exhaustively treated from the Danish point of view in La Question de Slesvig (Copenhagen, 1906), a collective work edited by F. de Jessens.

Edwin von Manteuffel, the first governor, to win the confidence of the people failed; the anti-German feeling increased; the party of protestors continued in full numbers. The next governor, Prince Hohenlohe, had to use more stringent measures, and in 1888, to "prevent the agitation of French agents, an imperial decree forbade any one to cross the frontier without a passport. Since 1890 there has been, especially in the neighbourhood of Strassburg, evidence of a spread of national German feeling, probably to a great extent due to the settlement of Germans from across the Rhine.

The presence of these anti-German parties, amounting some- times to one-tenth of the whole, in the Reichstag added greatly to the difficulty of parliamentary government. Gradually, how- ever, as a

new generation grew up their influence declined. In the Reichstag of 1907, Guelphs, Alsace-Lorrainers and Danes together could muster only five members.

The great work since 1870 has been that of building up the institutions of the empire. For the first time in the history of Germany there has been a strong administration ordering, directing and arranging the life of the whole Tgf,, perlod nation. The unification of Germany was not ended jgzs. by the events of 1866 and 1871; it was only begun. The work has throughout been done by Prussia; it has been the extension of Prussian principles and Prussian administrative energy over the whole of Germany. It naturally falls into two periods; the first, which ends in 1878, is that in which Bismarck depended on' the support of the National Liberals. They were the party of union and uniformity. The Conservatives were attached to the older local diversities, and Bismarck had therefore to turn for help to his old enemies, and for some years an alliance was maintained, always precarious but full of results.

The great achievement of the first period was legal reform. In nothing else was legislation so much needed. Forty-six districts have been enumerated, each of which enjoyed a separate legal system, and the boundaries of these reform districts seldom coincided with the frontiers of the states. Everywhere the original source of law was the old German common law, but in each district it had been wholly or partly superseded by codes, text-books and statutes to a great extent founded on the principles of the Roman civil law. Owing to the political divisions, however, this legislation, which reached back to the 14th century, had always been carried out by local authorities. There had never been any effective legislation applicable to the whole nation. There was not a state, not the smallest principality, in which some authoritative but imperfect law or code had not been published. Every free city, even an imperial village, had its own " law," and these exist down to the present time. In Bremen the foundation of the civil code was still the statutes of 1433; in Munich, those of 1347. Most of the states by which these laws had been published had long ago ceased to exist ; probably in every case their boundaries had changed, but the laws remained valid (except in those cases in which they had been expressly repealed) for the whole of the district for which they had been originally promulgated. Let us take a particular case. In 1591 a special code was published for the upper county of Katzellenbogen. More than a hundred years ago Katzellenbogen was divided between the neighbouring states. But till the end of the 19th century this code still re- tained its validity for those villages in Hesse, and in the Prussian province of Hesse, which

in old days had been parts of Katzellen- bogen. The law, however, had to be interpreted so as to take into consideration later legislation by the kingdom of Westphalia, the electorate of Hesse, and any other state(and they are several) in which for a short time some of these villages might have been incorporated.

In addition to these earlier imperfect laws, three great codes have been published, by which a complete system was applied to a large district: the Prussian Code of 1794, the Austrian Code of 181 1 and the Code Napoleon, which applied to all Germany left of the Rhine; for neither Prussia, nor Bavaria, nor Hesse had ever ventured to interfere with the French law. In Prussia therefore the older provinces came under the Prussian

Code, the Rhine provinces had French law, the newly annexed provinces had endless variety, and in part of Pomerania considerable elements of Swedish law still remained, a relic of the long Swedish occupation. On the other hand, some districts to which the Prussian Code applied no longer belonged to the kingdom of Prussia — for instance, Anspach and Bayreuth, which are now in Bavaria. In other parts of Bavaria in the same way Austrian law still ran, because they had been Austrian in 1811. In two states only was there a more or less uniform system: in Baden, which had adopted a German translation of the Code Napoleon; and in Saxony, which had its own code, published in 1865. In criminal law and procedure there was an equal variety. In one district was trial by jury in an open court ; in another the old procedure by written pleadings before a judge. In many districts, especially in Mecklenburg and some of the Prussian provinces, the old feudal jurisdiction of the manorial courts survived.

The constant changes in the law made by current legislation in the different states really only added to the confusion, and though imperial laws on these points with which the central government was qualified to deal superseded the state laws, it is obvious that to pass occasional acts on isolated points would have been only to introduce a further element of complication. It was therefore convenient, so far as was possible, to allow the existing system to continue until a full and complete code dealing with the whole of one department of law

could be agreed upon, and thus a uniform system (superseding all older legislation) be adopted. Legislation, therefore, has generally taken the form of a series of elaborate codes, each of which aims at scientific completeness, and further alterations have been made by amend- ments in the original code. The whole work has been similar in character to the codification of French law under Napoleon; in most matters the variety of the older system has ceased, and the law of the empire is now comprised in a limited number of codes.

A beginning had been made before the foundation of the empire; as early as 1861 a common code for trade, commerce and banking had been agreed upon by the states included in the Germanic Confederation. It was adopted by the new confedera- tion of 1869. In 1897 it was replaced by a new code. In 1869 the criminal law had been codified for the North German Con- federation, and in 1870 there was passed the Gewerbeordnung, an elaborate code for the regulation of manufactures and the relations of masters to workmen. These were included in the law of the empire, and the work was vigorously continued.

In 1 87 1 a commission was appointed to draw up regulations for civil and criminal procedure, and also to frame regulations for the organization of the law courts. The draft code of civil procedure, which was published in December 1872, introduced many important reforms, especially by substituting public and verbal procedure for the older German system, under which the proceedings were almost entirely carried on by written documents. It was very well received. The drafts for the other two laws were not so successful. Protests, especially in South Germany, were raised against the criminal procedure, for it was proposed to abolish trial by jury and substitute over the whole empire the Prussian system, and a sharp conflict arose as to the method of dealing with the press. After being discussed in the Reichstag, all three projects were referred to a special commission, which after a year reported to the diet, having completely remodelled the two latter laws. After further amendment they were eventually accepted, and became law in 1877. By these and other supplementary laws a uniform system of law courts was established throughout the whole empire; the position and pay of the. judges, the regulations regarding the position of advocates, and costs, were uniform, and the procedure in every state was . identical. To complete the work a supreme court of appeal was established in Leipzig, which was competent to hear appeals not only from imperial law, but also from that of the individual states.

By the original constitution, the imperial authorities were only

qualified to deal with criminal and commercial law; the

whole of the private law, in which the variety was greatest, was withdrawn from their cognizance. Lasker, to remedy this defect, proposed, therefore, an alteration in the constitution, which, after being twice carried against the opposition of the Centre, was at last accepted by the Bundesrat. A commission was then appointed to draw up a civil code. They completed the work by the end of 1887 ; the draft which they then published was severely criticized, and it was again submitted for revision to a fresh commission, which reported in 1895. In its amended form this draft was accepted by the Reichstag in 1896, and it- entered into force on the 1st of January 1900. The new Civil Code deals with nearly all matters of law, but excludes those concerning or arising out of land tenure and all matters in which private law comes into connexion with public law; for instance-, the position of government officials, and the police: it excludes also the relations of master and servant, which in most points are left to the control of individual states. It was accompanied by a revision of the laws for trade and banking.

Equal in importance to the legal was the commercial reform, for this was the condition for building up the material prosperity of the country. Germany was a poor country, but the poverty was to a great extent the result of political Com- causes. Communication, trade, manufactures, were reform. impeded by the political divisions, and though the establishment of a customs union had preceded the foundation of the empire, the removal of other barriers required imperial legislation; A commori system of weights and measures was introduced in 1868. The reform of the currency was the first task of the empire, In 1871 Germanystill had seven different systems; the most important was the Thaler and the Groschen, which pre- vailed over most of North Germany, but even within this there were considerable local differences. Throughout the whole of the south of Germany and in some North German states the gulden and kreuzer prevailed. Then there were other systems in Hamburg and in Bremen. Everywhere, except in Bremen, the currency was on a silver basis. In addition to this each state had its own paper money, and there were over 100 banks with the right of issuing bank-notes according to regulations which varied in each state. In 18 71 a common system for the whole empire was established, the unit being the Mark (= 1 ifd.) , which was divided into a hundred Pfennige: a gold currency was introduced (Doppel-Kronen= 20 M.; Kronen =10 M.); no more silver was to be coined, and silver was made a legal tender only up to the sum of twenty marks. The gold required for the introduction of the new coinage was provided from the indemnity paid by France.

Great quantities of thalers, which hitherto had been the staple of the currency, were sold. The right of coinage was, however, left to the individual states, and as a special concession it was determined that the rulers of the states should be permitted to have their head placed on the reverse of the gold coins. All paper currency, except that issued by the empire, ceased, and in 1873 the Prussian Bank was converted into the Imperial Bank (Reichsbank) .

Closely connected with the reform of the currency and the codification of the commercial law was the reform of the bank- ing laws. Here the tendency to substitute uniform imperial laws for state laws is clearly seen. Before laws. 1870 there had been over 100 banks with the right of issue, and the conditions on which the privilege was granted varied in each state. By the Bank Act of March 14, 1875, which is the foundation of the existing system, the right of granting the privilege is transferred from the governments of the states to the Bundesrat. The existing banks could not be deprived of the concessions they had received, but unless they submitted to the regulations of the new law their notes were not to be recognized outside the limits of the state by which the concession had been granted. All submitted to the conditions except the Brunswick Bank, which remained outside the banking system of the empire until the Bank Act of June 5, 1906, was passed, when it surrendered its right to issue notes. The experience of Germany in this matter has been different from that of England, for nearly all the private banks have now

surrendered their privilege, and there remain only five banks, including the Reichsbank, which still issue bank notes. The other four are situated in Bavaria, Saxony, Wiirttemberg and Baden. The total note-issue was fixed by the law of 1875, a proposal being assigned to each bank. Any part of this issue assigned to private banks which might be withdrawn from circulation, owing to a deficiency in the legal reserve funds, was to be transferred to the Reichsbank. The result has been the tendency of the latter gradually to absorb the whole note-issue. By the law of 1906 the Reichsbank was authorized to issue 20 M. and 50 M. notes. Treasury notes {Reich s-

Kassenscheine) for these amounts were no longer to be issued; but the state reserved the right to circulate notes of the value of 5 M. and 10 M.

The organization of the imperial post-office was carried out with great success by Herr von Stephan (q.v.), who remained at the head of this department from its creation till his death in 1897. Proposals were also made to Bavaria and Wiirttemberg to surrender their special rights, but these were not accepted.

The unification of the railways caused greater difficulties. Nearly every state had its own system; there was the greatest variety in the methods of working and in the tariffs, and the through traffic, so important for the commercial prosperity of the country, was very ineffective. In Baden, Wiirttemberg and Hanover the railways were almost entirely the property of the state, but in all other parts public and private lines existed side by side, an arrangement which seemed to combine the disadvantages of both systems. In 1871 three-quarters of the railway lines belonged to private companies, and the existence of these powerful private corporations, while they were defended by many of the Liberals, was, according to the national type of thought, something of an anomaly. Bis- marck always attached great importance to the improvement of the railway service, and he saw that uniformity of working and of tariffs was very desirable. In the constitution of the empire he had intrpduced several clauses dealing with it. The independent administration of its lines by each state was left, but the empire received the power of legislating on railway matters; it could build lines necessary for military purposes even against the wish of the state in whose territory they lay, and the states bound themselves to administer their lines as part of a common system. In order to carry out these clauses a law was passed on the 27th of June 1873 creating an imperial railway office (Reichseisenbahnamt) for the purpose of exercising a general control over the railways. This office has done much in the matter of unifying the systems of various railways and of regulating their relations to the military, postal and telegraph organizations; it also took a leading part in the framing of the international laws regarding goods traffic; but the imperial code of railway law which it drafted has never been laid before the Reichstag. It effectively controls only the privately owned lines in Prussia. Yet, in setting it up, Bismarck had in mind the ultimate acquisition of all the railways by the empire. He found, however, that it was impossible to carry any Bill enforcing this. He therefore determined to begin by transferring to the imperial authority the Prussian state railways; had he been able to carry this out the influence of the imperial railways would have

been so great that they would gradually have absorbed those of the other states. The Bill was carried through the Prussian parliament, but the opposition aroused in the other states was so great that he did not venture even to introduce in the Bundesrat a law empowering the empire to acquire the Prussian railways. In many of the state parliaments resolutions were carried protesting against the system of imperial railways, and from that time the preservation of the local railway manage- ment has been the chief object towards which, in Saxony, Bavaria and Wiirttemberg, local feeling has been directed. The only imperial railways are those in Alsace-Lorraine.

The result of the legal reform and other laws has been greatly to diminish the duties of the state governments, for every new imperial law permanently deprives the local parliaments of part of their authority. Generally there remains to them the control of education and Teligion — their most important duty — police,

all questions connected with land tenure, local government, the raising of direct taxes, and, in the larger states, the manage- ment of railways. The introduction of workmen's insurance, factory legislation, and other measures dealing with the condition of the working classes by imperial legislation, was at a later period still further to limit the scope of state legislation.

Meanwhile the government was busy perfecting the administra- tion of the national defences. From the war indemnity large sums had been expended on coast defence, on fortifica- tions and on replacing the equipment and stores Arm – y destroyed during the war. A special fund, producing t i oa , annually about a million pounds, was put aside, from which pensions to the wounded, and to the widows and orphans of those who had fallen, should be provided. It was also desir- able to complete the military organization. It must be remem- bered that technically there is no German army, as there is no German minister of war. Each state, however small, maintains its own contingent, subject to its own prince, who has the right and the obligation of administering it according to the provisions of the treaty by which he entered the federation. Practically they are closely tied in every detail of military organization. The whole of the Prussian military system, including not only the obligation to military service, but the rules for recruiting, organization, drill and uniforms, has to be followed in all the states; all the contingents are under the command of the emperor, and the soldiers have to swear obedience to him in addition to the oath of allegiance to their own sovereign. It is therefore not surprising that, having so little freedom in the exercise of their command, all the princes and free cities (with

the exception of the three kings) arranged separate treaties with the king of Prussia, transferring to him (except for certain formal rights) the administration of their contingents, which are thereby definitely incorporated in the Prussian army. The first of these treaties was arranged with Saxe-Coburg Gotha in 1861; those with the other North German states followed at short intervals after 1866. The last was that with Brunswick, which was arranged in 1885; Duke William had always refused to surrender the separate existence of his army. Owing to the local organiza- tion, this does not prevent the contingent of each state from preserving its separate identity; it is stationed in its own district, each state contributing so many regiments.

In 1872 a common system of military jurisprudence was introduced for the whole empire except Bavaria (a revised code of procedure in military courts was accepted by B avaria in 1898); finally, 'in February 1874, an important unnau" law was laid before the Reichstag codifying the administrative rules. This superseded the complicated system of laws and royal ordinances which had accumulated in Prussia during the fifty years that had elapsed since the system of short service had been introduced; the application to other states of course made a clearer statement of the laws desirable. Most of this was accepted without opposition or debate. On one clause a serious constitutional conflict arose. In 1867 the peace establishment had been provisionally fixed by the constitution at 1% of the population, and a sum of 225 thalers (£33, 15s.) had been voted for each soldier. This arrangement had in 187 1 been again continued to the end of 1874, and the peace estab- lishment, fixed at 401,659. The new law would have made this permanent. If this had been done the power of the Reichstag over the administration would have been seriously weakened ; its assent would no longer have been required for either the number of the army or the money. The government attached great importance to the clause, but the Centre and the Liberal parties combined to throw it out. A disastrous struggle was 1 averted by a compromise suggested by Bennigsen. The numbers were fixed for the next seven years (the so-called Septennat); this was accepted by the government, and carried against the votes of the Centre and some of the Progressives. On this occasion the Fortschrittpartei, already much diminished, split up into two sections. The principle then established has since been maintained; the periodical votes on the army have become the occasion for formally testing the strength of the Government.

The influence of Liberalism, which served the government so well in this work of construction, brought about also the conflict „ with the Roman Catholic Church which distracted

kampf. Germany for many years. The causes were, indeed, partly political. The Ultramontane party in Austria, France and Bavaria had, after 1866, been hostile to Prussia; there was some ground to fear that it might still succeed in bringing about a Catholic coalition against the empire, and Bismarck lived in constant dread of European coalitions. The Polish sympathies of the Church in Germany made him regard it as an anti-German power, and the formation of the Catholic faction in parliament, supported by Poles and Hanoverians, appeared to justify his apprehensions. But besides these reasons of state there was a growing hostility between the triumphant National parties and the Ultramontanes, who taught that the pope was greater than the emperor and the Church than the nation. The conflict had already begun in Baden. As in every other country, the control of the schools was the chief object of contention, but the government also claimed a control over the education and training of the clergy. With the formation of the empire the conflict was transferred from Baden to Prussia, where there had been for thirty years absolute peace, a peace gained, indeed, by allowing to the Catholics complete freedom; the Prussian constitution ensured them absolute liberty in the management of ecclesiastical affairs; in the ministry for religion and education there was a separate department for Catholic affairs, and (owing to the influence of the great family of the Radziwills) they enjoyed considerable power at court.

The latent opposition was aroused by the Vatican decrees. A small number of Catholics, including several men of learning _. and distinction, refused to accept Papal Infallibility.

Catholics. They were encouraged by the Bavarian court, which maintained the Febronian tradition and was jealous of any encroachment of the Papacy (see Febronianism) ; but besides this the Protestants throughout Germany and all opponents of the Papacy joined in the agitation. They made it the occasion for an attack on the Jesuits; even in 1869 there had been almost a riot in Berlin when a chapel belonging to a religious order was opened there. During 1870 and 1871 meetings were held by the Gustavus Adolphus

Verein, and a great Protestant conference was called, at which resolutions were passed demand- ing the expulsion of the Jesuits and condemning the Vatican decrees. As the leaders in these meetings were men like Virchow and Bluntschli, who had been lifelong opponents of Catholicism in every form, the result was disastrous to the Liberal party among the Catholics, for a Liberal Catholic would appear as the ally of the bitterest enemies of the Church; whatever possibility of success the Old Catholic movement might have had was destroyed by the fact that it was supported by those who avowedly wished to destroy the influence of Catholicism. No bishop joined it in Germany or in Austria, and few priests, though the governments were ready to protect them in the enjoyment of the privileges secured to Catholics, and to maintain them in the use of the temporalities. There was no great following among the people; it was only in isolated places that priests and con- gregation together asserted their rights to refuse to accept the decrees of the Church. Without the help of the bishops, the leaders had no legal basis; unsupported by the people, they were generals without an army, and the attempt to use the movement for political purposes failed.

None the less this was the occasion for the first proceedings against the Catholics, and curiously enough the campaign began in Bavaria. The archbishop of Munich had published the Vatican decrees without the Regium plocetum, which was re- quired by the constitution, and the government continued to treat Old Catholics as members of the Church. In the con- troversy which ensued, Lutz, the chief member of the ministry, found himself confronted by an Ultramontane majority, and the priests used their influence to stir up the people. He therefore turned for help to the imperial government, and at his instance a clause was added to the penal code forbidding priests in their official capacity to deal with political matters. (This law, which

still exists, is popularly known as the Kanzlei or Pulpit-para- graph.) It was of course opposed by the Centre, who declared that the Reichstag had no right to interfere in what was after all a religious question, and the Bavarian Opposition expressed much indignation that their government should turn for help to the Protestants of the North in order to force upon the Catholics of Bavaria a law which they could not have carried in that state.

For twenty years the Old Catholics continued to be a cause of contention in Bavaria, until the struggle ended in the victory of the Ultramontanes. In 1875 the parliament which had been elected in 1869 for six years came to an end. In order to strengthen their position for the new elections, the Liberal ministry, who owed their

position chiefly to the support of the king, by royal ordinance ordered a redistribution of seats. By the constitution this was within their power, and by clever manipulation of the constituencies they brought it about that the Ultramontane majority was reduced to two. It does not appear that this change represented any change of feeling in the majority of the people. The action of the government, however, caused great indignation, and in a debate on the address an amendment was carried petitioning the king to dismiss his ministry. They offered their resignation, but the king refused to accept it, publicly expressed his confidence in them, and they continued in office during the lifetime of the king, although in 188 1 the growing reaction gave a considerable majority to the Ultramontane party. After the death of the king the prince-regent, Luitpold, still retained the old administration, but several concessions were made to the Catholics in regard to the schools and univer- sities, and in 1890 it was decided that the claim of the Old Catholics to be regarded officially as members of the Church should no longer be recognized.

Meanwhile at Berlin petitions to the Reichstag demanded the expulsion of the Jesuits, and in 1872 an imperial law to this effect was carried ; this was again a serious interference „ , with the control over religious matters reserved to the states. In Prussia the government, having determined to embark on an anti-Catholic policy, suppressed the Catholic division in the ministry, and appointed a new minister, Falk, a Liberal lawyer of uncompromising character. A law was carried placing the inspection of schools entirely in the hands of the state; hitherto in many provinces it had belonged to the clergy, Catholic or Protestant. This was followed by the measures to which the name Kulturkampf really applied(an expression used first by Virchow to imply that it was a struggle of principle between the teaching of the Church and that of modern society). They were measures in which the state no longer, as in the school inspection law or in the introduction of civil marriage, defended its prerogatives against the Church, but assumed itself a direct control over ecclesiastical matters.

At the end of 1872 and the beginning of 1873 Falk laid before the Prussian Lower House the draft of four laws. Of these, one forbade ministers of religion from abusing ecclesiastical punish- ment; the second, which was the most important, introduced a law already adopted in Baden, that no one should be appointed to any office in the Church except a German, who must have received his education in a German gymnasium, have studied for three years in a German university, and have passed a state examination in philosophy, history, German literature and classics; all ecclesiastical seminaries

were placed under the control of the state, and all seminaries for boys were forbidden. Moreover, every appointment to an ecclesiastical benefice was to be notified to the president of the province, and the confirmation could be refused on the ground that there were facts which could support the assumption that the appointment would be dangerous to public order. The third law appointed a court for trying ecclesiastical offences, to which was given the right of suspending both priests and bishops, and a fourth determined the procedure necessary for those who wished to sever their connexion with the Roman Catholic Church.

As these laws were inconsistent with those articles of the Prussian constitution which guaranteed to a religious corporation

the independent management of its own affairs, it was therefore necessary to alter the constitution. This was done, and a later law in 1875 repealed the articles altogether.

The opposition of the bishops to these laws was supported even by many Protestants, especially by the more orthodox Lutherans, who feared the effect of this increased subjection of all churches to the state; they were opposed also by the Conservative members of the Upper House. All, however, was unavailing. Bismarck in this case gave the Liberals a free hand, and the laws eventually were carried and proclaimed on the 15th of May 1873; hence they got the name of the May laws, by which they are always known. The bishops meanwhile had held a meeting at Fulda, at the tomb of St Boniface, whence they addressed a protest to the king, and declared that they would be unable to recognize the laws as valid. They were supported in this by the pope, who addressed a protest personally to trhe emperor. The laws were put into force with great severity. Within a year six Prussian bishops were imprisoned, and in over 1300 parishes the administration of public worship was suspended. The first sufferer was the cardinal archbishop of Posen, Count Ledochowski. He refused to report to the president of the province appointments of incumbents; he refused also to allow the government commissioners to inspect the seminaries for priests, and when he was summoned before the new court refused to appear. He was then deprived of the temporalities of his office ; but the Polish nobles

continued to support him, and he continued to act as bishop. Heavy fines were imposed upon him, but he either could not or would not pay them, and in March 1874 he was condemned to imprisonment for two years, and dismissed from his bishopric. The bishop of Trier, the archbishop of Cologne, and other bishops soon incurred a similar fate. These measures of the government, however, did not succeed in winning over the Catholic population, and in the elections .for the Reichs- tag in January 1874 the party of the Centre increased in number from 63 to 91; 1,443,170 votes were received by them. In Bavaria the Ultramontanes won a complete victory over the more moderate Catholics. The Prussian government proceeded to further measures. According to the ordinary practice towards parties in opposition, public meetings were broken up on the smallest pretence, and numerous prosecutions for insult to government officials (Beamtenbeleidigung) were brought against members of the party. The Catholic agitation was, however, carried on with increased vigour throughout the whole empire; over a hundred newspapers were founded (three years before there had been only about six Catholic papers in the whole of Germany), and great numbers of pamphlets and other polemical works were published. The bishops from their prisons continued to govern the dioceses; for this purpose they appointed repre- sentatives, to whom they transferred their rights as ordinary and secretly authorized priests to celebrate services and to perform the other duties of an incumbent. To meet this a further law was passed in the Prussian parliament, forbidding the exercise of ecclesiastical offices by unauthorized persons, and it contained a provision that any one who had been convicted under the law could be deprived of his rights of citizenship, ordered to live in a particular district, or even expelled from the kingdom. The result was that in numerous parishes the police were occupied in searching for the priest who was living there among the people; although his habitation was known to hundreds of people, the police seldom succeeded in arresting him. Bismarck confesses that his doubts as to the wisdom of this legislation were raised by the picture of heavy but honest gens d'armes pursuing light-footed priests from house to house. This law was followed by one authorizing the government to suspend, in every diocese where the bishop continued recalcitrant, the payment of that contribution to the Roman Catholic Church which by agreement had been given by the state since 181 7. The only result of this was that large sums were collected by voluntary contribution among the Roman Catholic population.

The government tried to ˆfnd priests to occupy the vacant parishes; few consented to do so, and the Staatskatholiken who consented to

the new laws were avoided by their parishioners.

Men refused to attend their ministrations; in some cases they were subjected to what was afterwards called boycotting, and it was said that their lives were scarcely safe. Other laws excluded all religious orders from Prussia, and civil marriage was made compulsory; this law, which at first was confined to Prussia, was afterwards passed also in the Reichstag.

These laws were all peculiar to Prussia, but similar legislation was carried out in Baden and in Hesse, where in 1871, after twenty-one years of office, the particularist and Conservative government of Dalwigk 1 had come to an end and after the interval of a year been succeeded by a Liberal ministry. In Wiirttemberg alone the government continued to live peaceably with the bishops.

The government had used all its resources; it had alienated millions of the people; it had raised up a compact party of nearly a hundred members in parliament. The attempt of the Liberals to subjugate the Church had given to the Papacy greater power than it had had since the time of Wallenstein.

The ecclesiastical legislation and other Liberal measures completed the alienation between Bismarck and the Conserva- tives. In the Prussian parliament seventy-three Reaction members broke off from the rest, calling them- against selves the " old Conservatives "; they used their Liberal- position at court to intrigue against him, and hoped to " bring about his fall; Count Arnim (q.v.) was looked upon as his successor. In 1876, however, the party in Prussia, reunited on a programme- which demanded the maintenance of the Christian character of the schools, cessation of the Kulturkampf , limitation of economic liberty, and repression of social democracy, and this was accepted also by the Conservatives in the Reichstag. This reunion of the Conservatives became the nucleus of a great reaction against Liberalism. It was not confined to any one department of life, but included Protection as against Free Trade, State Socialism as against individualism, the defence of religion as against a separation of Church and State, increased stress laid on the monarchical character of the state, continued increase of the army, and colonial expansion.

The causes of the change in public opinion, of which this was to be the beginning, are too deep-seated to be discussed here. We must note that it was not peculiar to Germany; it was part of that great reaction against Liberal doctrine which marked the last quarter of the 19th century in so many countries. In Germany, however, it more

rapidly attained political importance than elsewhere, because Bismarck used it to carry out a great change of policy. He had long been dissatisfied with his position-. He was much embarrassed by the failure of his ecclesiastical policy. The alliance with the Liberals had always been half- hearted, and he wished to regain his full freedom of action; he regarded as an uncontrollable bondage all support that was not given unconditionally. The alliance had been of the nature of a limited co-operation between two hostile powers for a definite object; there had always been suspicion and jealousy on either side, and a rupture had often been imminent, as in the debates on the military bill and the law reform. Now that the immediate object had been attained, he wished to pass on to other projects in which they could not follow him. Political unity had been firmly established; he desired to use the whole power of the imperial government in developing the material resources of the country. In doing this he placed himself in opposition to both the financial and the economic doctrines of the Liberals.

The new period which now begins was introduced by some alterations in the official organization. Hitherto almost the whole of the internal business had been concentrated in the imperial chancery (Reichskanzleramt), and changes. . Bismarck had allowed great freedom of action to D elbriick, the head of the office. D elbriick, however, had resigned in 1876, justly foreseeing that a change of policy was imminent

1 Reinhard Karl Friedrich von Dalwigk (1802-1880). Though a Lutheran, he had been accused in 1854 of an excessive subserviency to the Roman Catholic Church. He was responsible for the policy which threatened to involve the grand-duchy of Hesse in the fate of the Electorate in 1866. But it was due to his diplomatic skill that Upper Hesse was saved for the grand-duke.

in which he could no longer co-operate with Bismarck. The work of the office was then divided between several departments, at the head of each of which was placed a separate official, the most important receiving the title of secretary of state. Bis- marck, as always, refused to appoint ministers directly re- sponsible either to the emperor or to parliament; the new officials in no way formed a

collegiate ministry or cabinet. He still retained in his own hands, as sole responsible minister, the ultimate control over the whole imperial administration. The more important secretaries of state, however, are political officials, who are practically almost solely responsible for their department ; they sit in the Bundesrat, and defend their policy in the Reichstag, and they often have a seat in the Prussian ministry. Moreover, a law of 1878, the occasion of which was Bismarck's long absence from Berlin, empowered the chancellor to appoint a substitute or representative {Stellvertreter) either for the whole duties of his office or for the affairs of a particular department. The signature of a man who holds this position gives legal validity to the acts of the emperor.

This reorganization was a sign of the great increase of work which had already begun to fall on the imperial authorities, and was a necessary step towards the further duties which Bismarck intended to impose upon them.

Meanwhile the relations with the National Liberals reached a crisis. Bismarck remained in retirement at Varzin for nearly a year; before he returned to Berlin, at the end of 1877, he was visited by Bennigsen, and the Liberal leader was offered the post of vice-president of the Prussian ministry and vice-president of the Bundesrat. The negotiations broke down, apparently because Bennigsen refused to accept office unless he received a guarantee that the constitutional rights of the Reichstag should be respected, and unless two other members of the party, Forcken- beck and Stauffenberg, were given office. Bismarck would not assent to these conditions, and, even if he had been willing to do so, could hardly have overcome the prejudices of the emperor. On the other hand, Bennigsen refused to accept Bismarck's proposal for a state monopoly of tobacco. From the beginning the negotiations were indeed doomed to failure, for what Bismarck appears to have aimed at was to detach Bennigsen from the rest of his party and win his support for an anti-Liberal policy.

The session of 1878, therefore, opened with a feeling of great uncertainty. The Liberals were very suspicious of Bismarck's intentions. Proposals for new taxes, especially one on after 1878. tobacco, were not carried. Bismarck took the oppor- tunity of avowing that his ideal was a monopoly of tobacco, and this statement was followed by the resignation of Camphausen, minister of finance. It was apparent that there was no prospect of his being able to carry through the great financial reform which he contemplated. He was looking about for an opportunity of appealing

to the country on some question which would enable him to free himself from the control of the Liberal majority. The popular expectations were ex- pressed in the saying attributed to him, that he would " crush the Liberals against the wall." The opportunity was given by the Social Democrats.

The constant increase of the Social Democrats had for some years caused much uneasiness not only to the government, but also among the middle classes. The attacks on Jemo- national feeling, the protest against the war of 1870, cracy. the sympathy expressed for the Communards, had

offended the strongest feelings of the nation, especially as the language used was often very violent; the soldiers were spoken of as murderers, the generals as cut-throats. Attacks on religion, though not an essential part of the party programme, were common, and practically all avowed Social Democrats were hostile to Christianity. These qualities, combined with the open criticism of the institutions of marriage, of monarchy, and of all forms of private property, joined to the deliberate attempt to stir up class hatred, which was indeed an essential part of their policy, caused a widespread feeling that the Social Democrats were a serious menace to civilization. They were looked upon even by many Liberals as an enemy to be crushed;

much more was this the case with the government. Attempts had already been made to check the growth of the party. Charges of high treason were brought against some. In 1872 Bebel and Liebknecht were condemned to two years' imprisonment. In 1876 Bismarck proposed to introduce into the Criminal Code a clause making it an offence punishable with two years' imprison- ment " to attack in print the family, property, universal military service, or other foundation of public order, in a manner which undermined morality, feeling for law, or the love of the Father- land." The opposition of the Liberals prevented this from being carried. Lasker objected to these " elastic paragraphs," an ex- pression for which in recent years there has been abundant tise. The ordinary law was, however, sufficient greatly to harass the Socialists. In nearly every state there still existed, as survivals of the old days, laws forbidding the union of different political associations with one another, and all unions or associations of working men which followed political, socialistic or communistic ends. It was possible under these to procure decisions in courts of justice dissolving the General Union of Workers and the coali- tions and unions of working men. The only result was, that the number of Socialists steadily increased. In 1874 they secured nine

seats in the Reichstag, in 1877 twelve, and nearly 500,000 votes were given to Socialist candidates.

There was then no ground for surprise that, when in April 1878 an attempt was made on the life of the emperor, Bismarck used the excuse for again bringing in a law expressly Le „ /s / a , directed against the Socialists. It was badly drawn up tion and badly defended. The National Liberals refused to against voteforit,anditwaseasilydefeated. The Reichstag was ' e prorogued; six days later a man named Nobiling again Socla,ists – shot at the emperor, and this time inflicted dangerous injuries. It is only fair to say that no real proof was brought that the Socialists had anything to do with either of these crimes, or that either of the men was really a member of the Socialist party; nevertheless, a storm of indignation rose against them. The government seized the opportunity. So great was the popular feeling, that a repressive measure would easily have been carried; Bismarck, however, while the excitement was at its height, dissolved the Reichstag, and in the elections which took place immediately, the Liberal parties, who had refused to vote for the first law, lost a considerable number of seats, and with them their control over the Reichstag.*

The first use which Bismarck made of the new parliament was to deal with the Social Democrats. A new law was introduced forbidding the spread of Socialistic opinions by books, news- papers or public meetings, empowering the police to break up meetings and to suppress newspapers. The Bundesrat could proclaim a state of siege in any town or district, and when this was done any individual who was considered dangerous by the police could be expelled. The law was carried by a large majority, being opposed only by the Progressives and the Centre. It was applied with great severity. The whole organization of news- papers, societies and trades unions was at once broken up. Almost every political newspaper supported by the party was suppressed; almost all the pamphlets and books issued by them were forbidden; they were thereby at once deprived of the only legitimate means which they had for spreading their opinions. In the autumn of 1878 the minor state of siege was proclaimed in Berlin, although no disorders had taken place and no resistance had been attempted, and sixty-seven members of the party were excluded from the city. Most of them were married and had families; money was collected in order to help those who were suddenly deprived of their means of subsistence. Even this was soon forbidden by the police. At elections every kind of agitation, whether by meetings of the party or by distribution of literature, was suppressed. The only place in Germany where Socialists could still proclaim their opinions

was in the Reichstag. Bismarck attempted to exclude them from it also. In this, however, he failed. Two members who had been ex- pelled from Berlin appeared in the city for the meeting of the Reichstag at the end of 1878. The government at once asked permission that they should be charged with breaking the law.

The constitution provided that no member of the House might be brought before a court of justice without the permission of the House, a most necessary safeguard. In this case the per- mission was almost unanimously refused. Nor did they assent to Bismarck's proposal that the Reichstag should assume power to exclude from the House members who were guilty of mis- using the liberty of speech which they enjoyed there. Bismarck probably expected, and it is often said that he hoped, to drive the Socialists into some flagrant violation of the law, of such a kind that it would be possible for him completely to crush them. This did not happen. There were some members of the party who wished to turn to outrage and assassination. Most, a printer from Leipzig, who had been expelled from Berlin, went to London, where he founded the Freihcit, a weekly paper, in which he advocated a policy of violence. He was thereupon excluded from the party, and after the assassination of the emperor Alexander II. of Russia had to leave England for Chicago. A similar expulsion befell others who advocated union with the Anarchists. As a whole, however, the party remained firm in opposition to any action which would strengthen the hands of their opponents. They carried on the agitation as best they could, chiefly by distributing reports of speeches made in the Reichstag. A weekly paper, the Social-Democrat, was established at Zurich. Its introduction into Germany was of course forbidden, but it was soon found possible regularly to distribute thousands of copies every week in every part of the country, and it continued to exist till 1887 at Zurich, and till 1890 in London. In August of 1880 a congress of Socialists was held at the castle of Wyden, in Switzerland, at which about eighty members of the party met, discussed their policy, and separated before the police knew anything of it. Here it was determined that the members of the Reichstag, who were protected by their position, should henceforward be the managing committee of the party, and arrangements were made for contesting the elections of 1881. A similar meeting was held in 1883 at Copenhagen, and in 1887 at St

Gallen, in Switzerland. Notwithstanding all the efforts of the government, though every kind of public agitation was for- bidden, they succeeded in winning twelve seats in 1881. The law, which had obviously failed, was renewed in 1881; the state of siege was applied to Hamburg, Leipzig and Stettin, but all to no purpose; and though the law was twice more renewed, in 1886 and in 1888, the feeling began to grow that the Socialists were more dangerous under it than they had been before.

The elections of 1878, by weakening the Liberal parties, enabled Bismarck also to take in hand the great financial reform which he had long contemplated.

At the foundation of the North German Confederation it had been arranged that the imperial exchequer should receive the produce of all customs duties and also of excise. It reform. depended chiefly on the taxes on salt, tobacco, brandy, beer and sugar. So far as the imperial expenses were not covered by these sources of revenue, until imperial taxes were introduced, the deficit had to be covered by " matricular " contributions paid by the individual states in proportion to their population. All attempts to introduce fresh imperial taxes had failed. Direct taxation was opposed by the governments of the states, which did not desire to see the imperial authorities interfering in those sources of revenue over which they had hitherto had sole control; moreover, the whole organization for collecting direct taxes would have had to be created. At the same time, owing to the adoption of free trade, the income from customs was continually diminishing. The result was that the sum to be contributed by the individual states constantly increased, and the amount to be raised by direct taxation, including local rates, threatened to become greater than could conveniently be borne. Bismarck had always regarded this system with disapproval, but during the first four or five years he had left the care of the finances entirely to the special officials, and had always been thwarted in his occasional attempts to introduce a change. His most cherished project was a large in- crease in the tax on tobacco, which at this time paid, for home- grown tobacco, the nominal duty of four marks per hundred

kilo, (about a farthing a pound), and on imported tobacco twenty- four marks. Proposals to increase it had been made in 1869 and in 1878, and on the latter occasion Bismarck for the first time publicly announced his desire for a state monopoly, a project which he never gave up, but for which he never was able to win any support. Now, however, he was able to take up the work. At his invitation a conference of the finance ministers met in July at Heidelberg; they

agreed to a great increase in the indirect taxes, but refused to accept the monopoly on tobacco. At the beginning of the autumn session a union of 204 members of the Reichstag was formed for the discussion of economic questions, and they accepted Bismarck's reforms. In December he was therefore able to issue a memorandum explaining his policy; it included a moderate duty, about 5%, on all imported goods, with the exception of raw material required for German manufactures (this was a return to the old Prussian principle) ; high finance duties on tobacco, beer, brandy and petroleum; and protective duties on iron, corn, cattle, wood, wine and sugar. The whole of the session of 1879 was occupied with the great struggle between Free Trade and Protection, and it ended with

a decisive victory for the latter. On the one side n. . .,

1 1 1 i c ii Protection.

were the seaports, the chambers of commerce, and the

city of Berlin, the town council of which made itself the centre of the opposition. The victory was secured by a coalition between the agricultural interests and the manufacturers; the latter promised to vote for duties on corn if the landlords would support the duties on iron. In the decisive vote the duty on iron was carried by 218 to 88, on corn by 226 to 109. The principle of protection was thus definitely adopted, though considerable alterations have been made from time to time in the tariff. The result was that the income from customs and excise rose from about 230 million marks in 1878-1879 to about 700 millions in 1 898-1 899, and Bismarck's object in removing a great burden from the states was attained.

The natural course when the new source of income had been obtained would have been simply to relieve the states of part or all of their contribution. This, however, was not done. The Reichstag raised difficulties on the con- Stat fi. stitutional question. The Liberals feared that if the buttons. government received so large a permanent source of revenue it would be independent of parliament; the Centre, that if the contributions of the states to the imperial exchequer ceased, the central government would be completely independent of the states. Bismarck had to come to an agreement with one party or the other; he chose the Centre, probably for the reason that the National Liberals were themselves divided on the policy to be pursued, and therefore their support would be uncertain; and he accepted an amendment, the celebrated Franckenstein Clause, proposed by Georg Arbogast Freiherr von Franckenstein

(1825-1890), one of the leaders of the Centre, by which all pro- ceeds of customs and the tax on tobacco above 130 million marks should be paid over to the individual states in proportion to their population. Each year a large sum would be paid to the states from the imperial treasury, and another sum as before paid back to meet the deficit in the form of state contributions. From 187 1 to 1879 the contribution of the states had varied from 94 to 67 million marks; under the new system the surplus of the contributions made by the states over the grant by the imperial treasury was soon reduced to a very small sum, and in 1884-1885 the payments of the empire to the states exceeded the contributions of the states to the empire by 20 million marks, and this excess continued for many years; so that there was, as it were, an actual grant in relief of direct taxation. In Prussia, by the Lex Huene, from 1885 to 1895, all that sum paid to Prussia, so far as it exceeded 1 5 million marks, was handed over to the local authorities in relief of rates. The increased ex- penditure on the navy after 1897 again caused the contributions required from the states to exceed the grants to them from the imperial exchequer. In 1903 Baron von Stengel, who succeeded Baron von Thielmann as finance minister in this year, proposed that the matricular contributions of the several states, instead I of varying as heretofore with the exigencies of the annual budget,

Seces- sionists.

should be fixed by law. This plan, originally suggested by Dr von Miquel, was adopted by the Reichstag in May 1904. The deficits in the imperial budget, however, continued. In 1909 the whole system of German imperial finance was once more in the melting-pot, and, in spite of the undoubted wealth of the country, the conflict of state and party interests seemed to make it practically impossible to remould it on a satisfactory basis.

The acceptance by Bismarck of the principle of Protection and his alliance with the Catholic Centre were followed by the dis- ruption of the National Liberal party and a complete changes, change in the parliamentary situation. Already the Liberal ministers, Falk and Hobrecht, had resigned, as well as Max von Forckenbeck the president, and Stauffenberg the vice-president of the Reichstag; in

their place there were chosen a Conservative, and the Catholic Baron von Francken- stein. The whole party had voted against the Franckenstein Clause, but a few days later fifteen of the right wing left the party and transferred their support to the government. For another year the remainder kept together, but there was no longer any real harmony or co-operation; in 1880 nineteen, including most of the ablest leaders, Lasker, Forckenbeck, Bamberger and Bunsen, left the party altogether. The avowed cause of difference was commercial policy; they were the Free Traders, but they also justly foresaw that the reaction would extend to other matters. They took the name of the Liberate Vereini- gung, but were generally known as the Sezessionisten; they hoped to become the nucleus of a united Liberal party in which all sections should join together on the principles of Free Trade and constitutional development. At the elections of 1881 they secured forty-seven seats, but they were not strong enough to maintain themselves, and with great reluctance in 1884 formed a coalition with the Progressives (Freisinnigen) , who had gained greatly in strength owing to the breach among the government parties. They did so reluctantly, because they would thereby condemn themselves to assume that attitude of purely negative criticism which, during the great days of their prosperity, they had looked down upon with contempt, and were putting themselves under the leadership of Eugen Richter, whom they had long opposed. The new party, the Deutschfreisinnige, had no success; at the election of 1884 they secured only sixty-seven seats, a loss of thirty-nine; they were subjected to all inconveniences which belonged to opposition; socially, they were boycotted by all who were connected with the court or government; they were cut off from all hope of public activity, and were subjected to constant accusations for Bismarck Beleidigung. Their only hope was in the time when the crown prince, who had shown great sympathy with them, should succeed. They were popularly known as the crown prince's party. Lasker soon died; others, such as Forcken- beck and Bunsen, retired from public life, unable to maintain their position at a time when the struggle of class interests had superseded the old conflicts of principle. At the election of 1887 they lost more than half their seats, and in 1893 the party again broke up.

The remainder of the National Liberals only won forty-five seats in 1881, and during the next three years they were without influence on the government; and even Bennigsen, unable to follow Bismarck in his new policy, disgusted at the proposals for biennial budgets and the misuse of government influence at the elections, retired from political life. In 1884 a new develop- ment took place: under the

influence of Miquel a meeting was held at Heidelberg of the South German members of the party, who accepted the commercial and social .policy of the govern- ment, including the Socialist law; their programme received Bismarck's approval, and was accepted by the rest of the party, so that they henceforward were taken into favour by the govern- ment ; but they had won the position by sacrificing almost all the characteristics of the older Liberalism- the hope of a reunion for all the different sections which had hitherto kept the name of Liberal was at an end.

These events had a very unfortunate effect on the character of the parliament. From 1878 to 1887 there was no strong party

Prelsla- nlge.

on which Bismarck could depend for support. After 1881 the parties of opposition were considerably strengthened. Alsatians and Poles, Guelphs, Clericals and Radicals were joined in a common hostility to the government. Parlia-

PolUlcal reaction.

mentary history took the form of a hostile criticism of the government proposals, which was particularly bitter because of the irreconcilable opposition of the Free Traders. Few of the proposals were carried in their entirety, many were completely lost; the tobacco monopoly and the brandy monopoly were contemptuously rejected by enormous majorities; even an increase of the tax on tobacco was refused; the first proposals for a subsidy to the Norddeutsche Lloyd were rejected. The personal relations of the chancellor to Parliament were never so bitter. At the same time, in Prussia there was a tendency to make more prominent the power of the king and to diminish the influence of the parliament. A proposal to introduce biennial budgets was for this reason regarded with great suspicion by the Opposition as a reactionary measure, and rejected. The old feelings of suspicion and jealousy were again aroused; the hostility which Bismarck encountered was scarcely less than in the old days of the conflict. After the elections of 1881 a protest was raised against the systematic influence exercised by Prussian officials. Puttkammer, who had now become minister of the interior, defended the practice, and a royal edict of 4th January 1882 affirmed the monarchical character of the Prussian constitution, the right of the king personally to direct the policy of the state, and required those officials who held appointments of a political nature to defend the policy of the government, even at elections.

One result of the new policy was a reconciliation with the Centre. Now that Bismarck could no longer depend on the support of the Liberals, it would be impossible to carry on the government if the Catholics maintained their End of, the policy of opposition to all government measures, kampt. They had supported him in his commercial reform of 1878, but by opposing the Septennate in 1880 they had shown that he could not depend upon them. It was impossible to con- tinue to treat as enemies of the state a party which had supplied one of the vice-presidents to the Reichstag, and which after the election of 1881 outnumbered by forty votes any other single party. Moreover, the government, which was now very seriously • alarmed at the influence of the Social Democrats, was anxious to avail itself of every influence which might be used against them. In the struggle to regain the adherence of the working men it seemed as though religion would be the most valuable ally, and it was impossible to ignore the fact that the Roman Catholic priests had alone been able to form an organization in which hundreds of thousands of working men had been enlisted. It was therefore for every reason desirable to remedy a state of things by which so many parishes were left without incumbents, a condition the result of which must be either to diminish the hold of Christianity over the people, or to confirm in them the belief that the government was the real enemy, of Christianity. It was not easy to execute this change of front with dignity, and impossible to do so without forsaking the principles on which they had hitherto acted. Ten years were to pass before the work was completed. But the cause of the conflict had been rather in the opinions of the Liberals than in the personal desire of Bismarck himself. The larger political reasons which had brought about the conflict were also no longer valid; the fears to which the Vatican decrees had given rise had not been fulfilled; the failure of the Carlists in Spain and of the Legitimists in France, the consolidation of the new kingdom in Italy, and the alliance with Austria had dispelled the fear of a Catholic league. The growth of the Catholic democracy in Germany was a much more serious danger, and it proved to be easier to come to terms with the pope than with the parliamentary Opposition. It would clearly be impossible to come to any agreement on the principles. Bismarck hoped, indeed, putting all questions of principle aside, to establish a modus vivendi; but even this was difficult to attain. An opportunity was given by the death of the pope in 1878. Leo XIII. notified his accession to the Prussian government in

a courteous despatch; the interchange of letters was followed by a confidential discussion between Bismarck and Cardinal Franchi at Kissingen during the summer of 1878. The hope that this might bring about some agreement was frustrated by the sudden death of the cardinal, and his successor was more under the influence of the Jesuits and the more extreme party. Bismarck, however, was not discouraged.

The resignation of Falk in July 1879 was a s ig n ˚f the change of policy; he was succeeded by Puttkammer, who belonged to the old-fashioned Prussian Conservatives and had no sympathy with the Liberal legislation. The way was further prepared by a lenient use of the penal laws. On the 24th of February 1880 the pope, in a letter to the ex-archbishop of Cologne, said he was willing to allow clerical appointments to be notified if the govern- ment withdrew the obnoxious laws. In 1880 a provisional Bill was submitted to parliament giving the crown discretionary power not to enforce the laws. It was opposed by the Liberals on the ground that it conceded too much, by the Clericals that it granted too little, but, though carried only in a mutilated form, it enabled the priests who had been ejected to appoint substitutes, and religious worship was restored in nearly a thousand parishes. In the elections of 1881 the Centre gained five more seats, and in 1883 a new law was introduced prolong- ing and extending that of 1881. Meanwhile a Prussian envoy had again been appointed at the Vatican; all but three of the vacant bishoprics were filled by agreement between the pope and the king, and the sequestrated revenues were restored. Finally, in 1886, a fresh law, besides other concessions, did away with the Kultur Examen, and exempted seminaries from state control. It also abolished the ecclesiastical court, which, in fact, had proved to be almost unworkable, for no priests would appeal to it. By this, the real Kulturkampf, the attempt of the state to control the intellect and faith of the clergy, ceased. A further law of 1887 permitted the return to Prussia of those orders which were occupied in charitable work.

As permanent results of the conflict there remain only the alteration in the Prussian constitution and the expulsion of the Jesuits; the Centre continued to demand the repeal of this, and to make it the price of their support of government measures; in 1897 the Bundesrat permitted the return of the Redemptorists, an allied order. With these exceptions absolute religious peace resulted; the Centre to a great extent succeeded to the position which the National Liberals

formerly held; in Bavaria, in Baden, in Prussia they obtained a dominant position, and they became a government party.

Meanwhile Bismarck, who was not intimidated by the parliamentary opposition, irritating and embarrassing though it was, resolutely proceeded with his task of developing the National!-material resources of the empire. In order to do so railways, the better, he undertook, in addition to his other offices, that of Prussian minister of commerce. He was now able to carry out, at least partially, his railway schemes, for he could afford to ignore Liberal dislike to state railways, and if he was unable to make all the lines imperial, he could make most of them Prussian. The work was continued by his suc- cessors, and by the year 1896 there remained only about 2000 kilometres of private railways in Prussia; of these none except those in East Prussia belonged to companies of any great import- ance. More than this, Bismarck was able to obtain Prussian control of the neighbouring states; in 1886 the Brunswick railways were acquired by the Prussian government, and in 1895 the private fines in Thuringia. The imperial railways in Alsace- Lorraine are. managed in close connexion with the Prussian system, and in 1895 an important step was taken towards ex- tending Prussian influence in the south. A treaty was made between Prussia and Hesse by which the two states together bought up the Hesse-Ludwig railway (the most important private company remaining in Germany), and in addition to this agreed that they would form a special union for the joint administration of all the lines belonging to either state. What this means is that the Hessian lines are managed by the Prussian department, but Hesse has the right of appointing one director,

and the expenses and profits are divided between the two states in proportion to their population. Thus a nucleus and precedent has been formed similar to that by which the Zollverem was begun, and it was hoped that it might be possible to arrange similar agreements with other states, so that in this way a common management for all lines might be established. There is, how- ever, strong opposition, especially in South Germany, and most of the states cling to the separate management of their own lines. Fearful that Prussia might obtain control over the private lines, they have imitated Prussian policy and acquired all railways for the state, and much of the old opposition to Prussia is revived in defence of the local railways.

A natural supplement to the nationalization of railways was the development of water communication. This is of great importance in Germany, as all the chief coal-fields and manufacturing districts — Silesia, Saxony, Westphalia and Alsace — are far removed from the

sea. The most important works were the canal from Dortmund to the mouth of the Ems, and the Jahde canal from the Ems to the Elbe, which enables Westphalian coal to reach the sea, and so to compete better with English coal. In addition to this, however, a large number of smaller works were undertaken, such as the canalization of the Main from Frankfort to the Rhine; and a new canal from the Elbe to Liibeck. The great ship canal from Kiel to the Elbe, which was begun in 1887 and completed in 1896, has perhaps even more importance for naval than for commercial purposes. The Rhine, so long the home of romance, has become one of the great arteries of traffic, and lines of railways on both sides have caused small villages to become large towns. The Prussian government also planned a great scheme by which the West- phalian coal-fields should be directly connected with the Rhine in one direction and the Elbe in the other by a canal which would join together Minden, Hanover and Magdeburg. This would give uninterrupted water communication from one end of the country to the other, for the Elbe, Oder and Vistula are all navigable rivers connected by canals. This project, which was a natural continuation of Bismarck's policy, was, however, rejected by the Prussian parliament in 1899. The opposition came from the Agrarians and extreme Conservatives, who feared that it would enable foreign corn to compete on better terms with German corn; they were also jealous of the attention paid by the government to commercial enterprise in which they were not immediately interested. The project was again laid by the government before the Prussian Landtag on the 14th of April 1901 and was again rejected. In 1904 it was once more intro- duced in the modified form of a proposal of a canal from the Rhine to Leine in Hanover, with a branch from Datteln to Ham, and also of a canal from Berlin to Stettin. This bill was passed in February 1905.

Equally important was the action of the government in developing foreign trade. The first step was the inclusion of Hamburg and Bremen in the Zollverein; this was necessary if German maritime enterprise was to become Hamburg a national and not merely a local concern, for the two Bremen. Hansa cities practically controlled the whole foreign trade and owned three-quarters of the shipping; but so long as they were excluded for the Customs Union their interests were more cosmopolitan than national. Both cities, but especi- ally Hamburg, were very reluctant to give up their privileges and the commercial independence which they had enjoyed almost since their foundation. As a clause in the constitution deter- mined that they should remain outside the Customs Union until they voluntarily offered to enter it, there was some difficulty in overcoming their opposition. Bismarck, with characteristic etlergy, proposed to take

steps, by altering the position of the imperial customs stations, which would practically destroy the commerce of Hamburg, and some of his proposals which seemed contrary to the constitution aroused a very sharp resistance in the Bundesrat. It was, however, not necessary to go to ex- tremities, for in 1 88 1 the senate of Hamburg accepted an agree- ment which, after a keen struggle, was ratified by the citizens. By this Hamburg was to enter the Zollverein; a part of the

harbour was to remain a free port, and the empire contributed two million pounds towards rearranging and enlarging the harbour. A similar treaty was made with Bremen, the free port of that city being situated near the mouth of the Weser at Bremerhaven; and in 1888, the necessary works having been completed, the cities entered the Customs Union. They have had no reason to regret the change, for no part of the country profited so much by the great prosperity of the following years, notwithstanding the temporary check caused by the serious outbreak of cholera at Hamburg in 1892.

During the first years of the empire Bismarck had occasionally been asked to interest himself in colonial enterprise. He had refused, for he feared that foreign complications might ensue, and that the country might weaken itself by dissipation of energy. He was satisfied that the Germans should profit by the commercial liberty allowed in the British colonies. Many of the Germans were, however, not contented with this, and disputes regarding the rights of German settlers in Fiji caused some change of feeling. The acquisition of German colonies was really the logical and almost necessary sequel of a protective policy. For that reason it was always opposed by the extreme Liberal party.

The failure of the great Hamburg house of Godefroy in 1879 threatened to ruin the growing German industries in the South Seas, which it had helped to build up. Bismarck therefore con- sented to apply to the Reichstag for a state guarantee to a com- pany which would take over its great plantations in Samoa. This was refused, chiefly owing to the influence of the Liberal party. Bismarck therefore, who took this rebuff much to heart, said he would have

nothing more to do with the matter, and warned those interested in colonies that they must depend on self-help; he could do nothing for them. By the support of some of the great financial firms they succeeded in forming a company, which carried on the business and undertook fresh settlements on the islands to the north of New Guinea. This event led also to the foundation of a society, the Deutscher Kolonial Verein, under the presidency of the prince of Hohenlohe- Langenburg, to educate public opinion. Their immediate object was the acquisition of trading stations. The year 1884 brought a complete change. Within a few months Germany acquired extended possessions in several parts both of Africa and the South Seas. This was rendered possible owing to the good understanding which at that time existed between Germany and France. Bismarck therefore no longer feared, as he formerly had, to encounter the difficulties with Great Britain which would be the natural result of a policy of colonial expansion.

His conversion to the views of the colonial party was gradual, as was seen in his attitude to the proposed acquisition of German stations in South-West Africa. In Namaqualand and Damaraland, British influence, exercised from Cape Colony, had long been strong, but the British government had refused to annex the country even when asked so to do by the German missionaries who laboured among the natives. In 1882 F. A. Liideritz, a Bremen tobacco merchant, approached Bis- marck on the question of establishing a trading station on the coast at Angra Pequena. The chancellor, while not discouraging Liideritz, acted with perfect fairness to Great Britain, and throughout 1883 that country might have acted had she known her mind. She did not, and in the summer of 1884 Bismarck decided no longer to await her pleasure, and the south-west coast of Africa from the frontier of the Portuguese possessions to the Orange river, with the exception of Walfish Bay, was taken under German protection. During the same year Dr Nachtigal was despatched to the west coast, and stealing a march on his British and French rivals he secured not only Togoland but Cameroon for the Germans. On the east coast Bismarck acted decisively without reference to British interests. A company, the Gesellschaft fur deutsche Kolonization, was founded early in 1884 by Dr Carl Peters, who with two com- panions went off to the east coast of Africa and succeeded in November of that year in negotiating treaties with various chiefs on the mainland who were alleged to be independent of Zanzibar.

Africa.

In this region British opposition had to be considered, but in

February 1885 a German protectorate over the territory acquired by Peters was proclaimed.

Similar events took place in the South Seas. The acquisition of Samoa, where German interests were most extensive, was prevented (for the time being) by the arrangement made in 1879 with Great Britain and the United States. But in 1884 and 1885 the German flag was hoisted on the north of New Guinea (to which the name Kaiser Wilhelmsland has Pacific been given), on several parts of the New Britain Archi- pelago (which afterwards became the Bismarck Archipelago), and on the Caroline Islands. The last acquisition was not kept. The Spanish government claimed the islands, and Bismarck, in order to avoid a struggle which would have been very disastrous to monarchical government in Spain, suggested that the pope should be asked to mediate. Leo XIII. accepted the offer, which was an agreeable reminiscence of the days when popes determined the limits of the Spanish colonial empire, all the more gratefully that it was made by a Protestant power. He decided in favour of Spain, Germany being granted certain rights in the islands. The loss of the islands was amply compensated for by the political advantages which Bismarck gained by this attention to the pope, and, after all, not many years elapsed before they became German.

Bismarck in his colonial policy had repeatedly explained that he did not propose to found provinces or take over for the government the responsibility for their administration; he intended to leave the responsibility for their material develop- ment to the merchants, and even to entrust to them the actual government. He avowedly wished to imitate the older form of British colonization by means of chartered companies, which had been recently revived in the North Borneo Company; the only responsibility of the imperial government was to be their protection from foreign aggression. In accordance with this policy, the territories were not actually incorporated in the empire (there would also have been constitutional difficulties in doing that), and they were officially known as Protectorates (Schutz- gebiete), a word which thus acquired a new signification. In 1885 two new great companies were founded to undertake the govern- ment. The Deutsch-Ost-Afrika Gesellschaft, with a capital of £200,000, took over the territories acquired by Dr Peters, and for the South Seas the Neu-Guinea Gesellschaft, founded by an amalgamation of a number of firms in 1884, received a charter in 1885. It was not, however, possible to limit the imperial responsibility as Bismarck intended. In East Africa the great revolt of the Arabs in 1888 drove the company out of all their possessions, with the exception of the port of Dar-es-Salam. The company was not*

strong enough to defend itself; troops had to be sent out by the emperor under Captain Wissmann, who as imperial commissioner took over the government. This, which was at first a temporary arrangement, was afterwards made permanent. -,;

The New Guinea Company had less formidable enemies to contend with, and with the exception of a period of three years between 1889 and 1892, they maintained a full responsi- bility for the administration of their territory till the year 1899, when an agreement was made and ratified in the Reichstag, by which the possession and administration was transferred to the empire in return for a subsidy of £20,000 a year, to be continued for ten years. The whole of the colonies have therefore now come under the direct administration of the empire. They were at first placed under the direction of a special department of the Foreign Office, and in 1890 a council of experts on colonial matters was instituted, while in 1907 a separate office for colonial affairs was created. In 1887 the twochief societies for supporting the colonial movement joined under the name of the Deutsche Kolonialgesellschaft. This society takes a great part in forming public opinion on colonial matters.

This new policy inevitably caused a rivalry of interests with other countries, and especially with Great Britain. In every spot at which the Germans acquired territory they found themselves in opposition to British interests. The settlement of Angra

Pequena caused much ill-feeling in Cape Colony, which was, however, scarcely justified, for the Cape ministry was equally o rman responsible with the British government for the dila- aad toriness which led to the loss of what is now German

areat South-West Africa. In Togoland and Cameroon British

Britain. traders had long been active, and the proclamation of British sovereignty was impending when the German flag was hoisted. The settlement in East Africa menaced the old-estab- lished British influence over Zanzibar, which was all the more serious because of the close connexion between Zanzibar and the rulers of the Persian Gulf; and Australia saw with much concern the German settlement in New Guinea, especially as a British Protectorate (which in the view

of Australians should have in- cluded the whole of what Germany was allowed to take) had previously been established in the island. In Africa Britain and France proceeded to annex territory adjacent to the German acquisitions, and a period followed during which the boundaries of German, French and British possessions were determined by negotiation. The overthrow of Jules Ferry and the danger of war with France made a good understanding with Great Britain of more importance. Bismarck, by summoning a conference to Berlin (1884-1885) to discuss African questions, secured for Germany a European recognition which was very grateful to the colonial parties; and in 1888, by lending his support to the anti-slavery movement of Cardinal Lavigerie, he won the support of the Centre, who had hitherto opposed the colonial policy. Finally a general agreement for the demarcation of Africa was made in 1890 (see Africa, § 5). A similar agreement had been made in 1886 regarding the South Seas. It was made after Bismarck had retired from office, and he, as did the colonial party, severely criticized the details; for the surrender of Zanzibar and Witu cut short the hopes which had been formed of building up a great German empire controlling the whole of East Africa. Many of the colonial party went further, and criticized not only the details, but the principle. They were much offended by Caprivi's statement that no greater injury could be done to Germany than to give her the whole of Africa, and they refused to accept his contention that " the period of flag-hoisting was over," and that the time had come for consolidating their possessions. It must, however, be recognized that a continuation of the ambitious policy of the last few years might easily have involved Germany in dangerous disputes.

It appeared a small compensation that Great Britain sur- rendered to Germany the island of Heligoland, which she had

taken from the Danes in the Napoleonic wars. It HeUgo- was annexe(j to Prussia; the natives born before the

year 1880 were exempted from military service, and till the year 1901 no additional import duties were to be imposed. It has been strongly fortified and made a naval station.

It was easy for the Opposition to criticize the colonial policy. They could point out that, with the exception of parts of South- Progress West Africa, no territory had been acquired in which of German any large number of German emigrants could live colonial an(j rear families. They went as a rule to the United expans on. g tates an(j g 0U (- n America, or to territories under the British flag. As markets

for German products the colonies remained of small importance; in 1907 the whole value of the trade, import and export, between Germany and her colonies was less than £3,300,000, and the cost of administration, including the grant to the shipping companies, often exceeded the total trade. Many mistakes were made in the administration, and cases of misconduct by individual officials formed the text for attacks on the whole system. Generally, however, these criticisms were premature; it was surely wise, while the opportunity was still open, to take care that Germany, in the partition of the world among European races, should not alone go entirely without a share. The lack of colonial experience, and, often, the lack of sympathy with, or understanding of, the negro and other races over whom they had assumed a protectorate, were contributory causes in the slow development of Germany's African colonies. The unwillingness of the Reichstag to sanction the expenditure of any large sums on railways and other public works also

hindered the exploitation of the economic resources of very large areas. Yet at the close of the first twenty-five years' existence of the colonial empire it might be said that the initial difficulties had been overcome, and sufficient knowledge gained to ensure Germany a return fairly commensurate with the efforts she had put forth. The necessity to enlist the interests of the natives on the side of the government, if any progress was to be made in industry or trade, was a lesson slowly learned. After the Arab opposition had been crushed on the east coast of Africa, colonial there still remained the native states to be dealt with, wars . and few tribes voluntarily submitted to European The control. There was a serious rising in 1905-1906, H'™" when thousands of lives were lost. In Togoland there were disturbances of a comparatively minor character; in the Cameroon hinterland campaigns were undertaken against the Fulu and Bornuese princes. It was, however, in South-West Africa that the Germans had their chief and most bitter ex- perience in colonial warfare. Though " annexed " in 1884 it was not till ten years later, after protracted fighting, that the Hotten- tots of Namaqualand recognized Germany. After another decade of comparative peace war again broke out (1903) and spread from the Hottentots to the Herero. The Anglo-Boer War had then but recently ended, and in Germany generally, and especially in military circles, it had provoked much adverse criticism on the inability of the British to bring the contest to a speedier con- clusion. To their surprise the Germans now found that, against an inferior foe operating in a more restricted area, they were unable to do as well as the British army had done. The story of the war is told elsewhere (see German South-*

West Africa) ; it lasted well into 1908 and the Germans were indebted to the Cape Mounted Police for material help in bringing it to an end. As it progressed the Germans adopted many of the methods employed by the British in their colonial wars, and they learned to appreciate more accurately the immensity of the task which Lord Kitchener accomplished in overcoming the guerrilla warfare in the Boer republics.

It was obviously little use acquiring colonies and creating manufactures if German foreign trade was to be in the hands of other nations. As early as 1881 the government had pub- lished a proposal for a subvention to German shipping; f"{ ars j?. it was criticized with peculiar energy by Bamberger „ /fcv. and the Free Traders; a Bill introduced in 1884 was abandoned, but in 1885 Bismarck succeeded in carrying a vote by which, for fifteen years, four million marks could annually be devoted to helping a line of mail steamers to the Pacific and Australia and a branch line in the Mediterranean. An agree- ment was made with the Norddeutsche Lloyd, one clause of which was that all the new steamers were to be built in Germany; in 1890 a further vote was passed for a line to Delagoa Bay and Zanzibar. This far from exhausts the external activity of the nation and the government: the establishment of studentships for the study of oriental languages enabled Germans to make their way in the Turkish and Persian empires, and to open up a fresh market for German goods; by the great excavations at Pergamum and Olympia Germany entered with great distinction on a field in which the way had been shown by France and Great Britain. The progress of technical studies and industrial enter- prise enabled Germany to take a leading place in railway and shipbuilding, in the manufacture of military weapons, in chemical experiments, and in electrical work.*

It was a part of the new policy not only to combat Social Democracy by repression, but to win the confidence of the working men by extending to them the direct protection of the state. Recent legislation, culminating in the reforms. 'Gewerbeordnung of 1869, had, in accordance with the principles of the Liberal Economists, or, as the Germans called it, the Manchester School, instituted freedom from state control in the relations between employers and workmen. The old gilds had been destroyed, compulsory apprenticeship had ceased; little protection, however, was given to the working men, and the restrictions on the employment of women and children were of little use, as there was no efficient system of factory inspection.

It was difficult for the men by their own exertions to improve their condition, for the masters had full liberty of association, which the law refused to the workmen. Even before 1870 a protest was raised against this system among the Roman Catholics, who were chiefly concerned for the preservation of family life, which was threatened by the growth of the factory system and also by the teaching of the Social Democrats. Baron von Ketteler, archbishop of Mainz, had maintained that it was the duty of the state to secure working men work and provision during sickness and old age. The general interest of the Church in the social question was recognized by a congress of the bishops at Fulda. Ketteler's work was continued by Canon Moufang, and Catholics brought forward motions in the Reichstag demand- ing new factory legislation. The peculiar importance of the Catholic movement is that it alone was able to

some extent to meet the Socialists on their own ground. The Catholics formed societies which were joined by large numbers of workmen. Originated by Father Kolping on the Rhine, they soon spread over the whole of Catholic Germany. Herr von Schorlemer-Ast, a Catholic landed proprietor from Westphalia, formed similar associations among the peasants. The result of this has been that the Social Democrats have failed to conquer the Catholic as they have the Protestant districts. A similar movement began among the Protestants after the commercial crisis of 1873, which forms an epoch in German thought, since it was from that year that men first began to question the economic doctrines of Liberalism, and drew attention to the demoralization which seemed to arise from the freedom of speculation and the influence of the stock exchange — a move- ment which in later years led to some remarkable attempts to remedy the evil by legislation. A minister, Rudolph Todt, and Rudolph Meyer criticized the moral and economic doctrines of Liberalism; his writings led to the foundation of the Christlich-Soziale-Arbeitervereiti, which for a few years attained considerable notoriety under the leadership of Adolph Stocker. The Pro- testant movement has not succeeded in attaining the same position as has the Catholic among the working men; but it received considerable support among the influential classes at court, and part of the programme was adopted by the Con- servative party, which in 1876 demanded restriction of industrial liberty and legislation which

would prevent the ruin of the independent artizans.

In a country where learned opinion has so much influence on public affairs it was of especial importance that several of the younger teachers separated themselves from the dominant Manchester School and asserted the duty of the state actively to promote the well-being of the working classes. At a congress held in Erfurt in 1873, Schmoller, Wagner, Brentano and others founded the Verein fur Sozial-Politik, which by its publications has had much influence on German thought.

The peculiar social conditions brought it about that in many cases the Christian Social movement took the form of Anti- Semitism (q.v.). Nearly all the bankers and stock- brokers in Germany were Jews. Many of the leaders of the Liberal parties, e.g. Bamberger and Lasker, were of Jewish origin; the doctrines of Liberalism were supported by papers owned and edited by Jews; hence the wish to restore more fully the avowedly Christian character of the state, coincid- ing with the attack on the influence of finance, which owed so much to the Liberal economic doctrines, 'easily degenerated into attacks on the Jews. The leader in this was Stocker. During the years 1879 to 1881 the anti-Semite agitation gained consider- able importance in Berlin, Breslau and other Prussian cities, and it culminated in the elections of that year, leading in some cases to riots and acts of violence.

So long as the government was under the influence of the National Liberals, it was indifferent, if not hostile to these move- ments. The Peasants' Union had actually been forbidden by the police; Bismarck himself was violently attacked for his reputed connexion with a great Jewish firm of bankers. He had, however, kept himself informed regarding these movements, chiefly by means of Hermann Wagener, an old editor of the

Anti- Semites.

Kreuzzeitung, and in the year 1878 he felt himself free to return in this matter to his older opinions. The new policy suggested in that year was definitely announced at the opening of the session in the spring of 1881, and at the meeting of the new Reichstag in November 1881. It was explained in a speech from the throne, which, as the emperor could not be present, became an imperial message. This is generally spoken of as the beginning of a new era. The help of the Reichstag was asked for " healing social evils by means of legislation . . . based on the morai foundation of Christianity." Compulsory

insurance, the creation of corporate unions among working men under the protection of the state, and the introduction of indirect taxes, were the chief elements in the reform.

The condition of parties was such that Bismarck could not hope to win a majority for his schemes, especially as he could not obtain the monopoly on tobacco on which he depended to cover the expense. The first reform was the restoration of the gilds, to which the Conservatives attached great importance. Since 1869 they continued to exist only as voluntary associations with no public duties; many had been dissolved, and this is said to have brought about bad results in the management of lodging-houses, the condition of apprentices, support during illness, and the maintenance of labour bureaus. It was supposed that, if they could be restored, the corporate spirit would prevent the working men from falling under the influence of the Socialists. The law of 1881, while it left membership voluntary, gave to them many duties of a semi-public nature, especially that of arbitration between masters and men. These were ex- tended by a further law in 1884.

The really important element was the scheme for a great imperial system by which all working men and women should be provided for in case of sickness, accident or old age. Bismarck hoped by this to relieve the parishes of the Compul- burden of the poor-rate, which would be transferred su%„«. to the empire; at th'e same time the power of the government would be greatly extended. The first proposal in March 1881 was for compulsory insurance against accidents. Every one employed on railways, mines and factories was to be insured in an imperial office; the premium was to be divided equally between masters, workmen and the state. It was bitterly opposed by the Liberals, especially by Bamberger; all essential features were altered by the Reichstag, and it was withdrawn by the government after it had passed the third reading.

In 1882 a fresh scheme was laid before the newly elected Reichstag dealing with insurance against accident and against sickness. The two parts were separated by the Reichstag; the second, which was the necessary prelude to the other, was passed in 1883. The law was based on an old Prussian principle; insurance was made compulsory, but the state, instead of doing the work itself, recognized the existing friendly and other societies; they were still to enjoy their corporate existence and separate administration, but they were placed under state con- trol, and for this purpose an imperial insurance department was created in the office of the secretary of state for the interior. Uniform regulations were to be followed in all trades and

districts; one-third of the premium was paid by the employer, two-thirds by the workmen.

The Accident Law of 1883 was rejected, for it still included the state contribution to which the Reichstag would not assent, and also contributions from the workmen. A new law, drafted according to their wishes, was passed in 1884. It applied only to those occupations, mines and factories, in which the use of machinery was common; it threw the whole burden of com- pensation on to the masters; but, on the other hand, for the first thirteen weeks after an accident the injured workman received compensation from the sick fund, so that the cost only fell on the masters in the more serious cases. The masters were compelled to insure themselves against the payments for which they might become liable, and for this purpose had to form trades associations, self-governing societies, which in each district included all the masters for each particular trade. The applica- tion of this law was subsequently extended to other trades.

HISTORY]

GERMANY

889

It was not till 1889 that the greatest innovation, that of insurance against old age, was carried. The obligation to insure rested on all who were in receipt of wages of not more than two pounds a week. Half the premium, according to the wages received, was paid by the master. The pension began at the age of seventy, the amount varying by very complicated rules, but the state paid a fixed sum of two pounds ten shillings annually in addition to the pension. These measures worked well. They were re- garded with satisfaction by masters and men alike. Alterations have been made in detail, and further alterations demanded, but the laws have established themselves in practice. The large amount of self-administration has prevented an undue increase of bureaucratic power. The co-operation of masters and men in the administration of the societies has a good effect on the relations of the classes.

Except in the matter of insurance, the total result, however, for the moment was small. The demands repeatedly made by the Centre and the Conservatives for effective factory legis- lation and prohibition of Sunday labour were not successful. Bismarck did not wish to lay heavier burdens on the capitalists, and it was not till a later period that they were carried out.

During all this period Bismarck's authority was so great, that in the conduct of foreign affairs he was freed from the Foreign criticism and opposition which so often hampered affairs: him in his internal policy, and he was able to establish !wH Trip,e t ˆ at svstem ˚f alliances on which for so many years the political system of Europe depended. The close union of the three empires which had existed since the meeting of the emperors in 1872 did not survive the outbreak of dis- turbances in the East. Bismarck had maintained an attitude of neutrality, but after the congress of Berlin he found himself placed between the alternatives of friendship with Austria or Russia. Movements of Russian troops on the western frontier threatened Austria, and the tsar, in a letter to the German emperor, stated that peace could only be maintained if Germany gave her support to Russia. Bismarck, now that the choice was forced upon him, determined in favour of Austria, and during a visit to Vienna in October, arranged with Count Andrassy an alliance by which in the event of either being attacked by Russia the other was to assist; if either was attacked by any power other than Russia, the other was to preserve benevolent neutrality unless the attacking power was helped by Russia. The effect of this was to protect Austria from attack by Russia, and Germany from the danger of a combined attack by France and Russia. Bismarck with some difficulty procured the consent of the emperor, who by arranging a meeting with the tsar had attempted to preserve the old friendship. From that time the alliance with Austria has continued. In 1883 it was joined by Italy, and was renewed in 1887, and in 1891 for six years, and if not then denounced, for twelve.

In 1882, after the retirement of Gorchakov, the relations with Russia again improved. In 1884 there was a meeting of the three emperors, and at the same time Bismarck came to a close understanding with France on colonial questions. The period of quiet did not last long. The disaster in Tongking brought about a change of ministry in France, and Bulgarian affairs again alienated Austria and Russia. Bismarck with great skill used the growing foreign complications as a means of freeing himself from parliamentary difficulties at the same time that he secured the position of Germany in Europe.

To meet the increase in the French army, and the open menaces in which the Russian press indulged, a further increase in the German army seemed desirable. The Septennate of 1887. would expire in 1888. In the autumn of 1886 a pro- posal was laid before the Reichstag to increase the peace establishment for the next seven years to 468,409 men. The Reichstag would not assent to this, but the opposition parties offered to vote the required increase for three

years. Bismarck refused to accept this compromise, and the Reichstag was dis- solved. Under his influence the Conservatives and National Liberals formed a coalition or Cartel by which each agreed to support the candidates of the other. The elections caused

greater excitement than any which had taken place since 1870. The numbers who went to the poll were much larger, and all the opposition parties, except the Catholics, including even the Socialists, suffered severe loss. Bismarck, in order to win the support of the Centre, appealed directly to the pope, but Wind- thorst took the responsibility of refusing to obey the pope's request on a matter purely political. The National Liberals again became a government party, but their position was much changed. They were no longer, as in the old days, the leading factor. They had to take the second place. They were sub- ordinate to the Conservatives. They could no longer impose their will upon the government. In the new parliament the govern- ment proposals were accepted by a majority of 223. to 48 (seven members of the Centre voted for it, the others abstained) . The op- position consisted chiefly of Socialists and Radicals (Freisinnigen) . The fall of Boulanger removed the immediate danger from France, but for the rest of the year the relations with Russia caused serious apprehensions. Anti- German articles appeared in Russian newspapers. The growth of the ˆ h ons Nationalist party in Russia led to measures injurious Russia. to German trade and German settlers in Russia. German vessels were forbidden to trade on the Niemen. The increase of the duties on iron injured German trade. Stringent measures were taken to stamp out German nationality in the Baltic provinces, similar to those used by the Germans against the Poles. Foreigners were forbidden to hold land in Russia. The German government retaliated by a decree of the Reichs- bank refusing to deal with Russian paper. Large accumulations of troops on the western frontier excited alarm in Germany and Austria. During a short visit paid by the emperor of Russia to Berlin in November Bismarck discovered that forged despatches misrepresenting the policy of Germany in the Eastern Question had been communicated to him. This did not seem to remove all danger, and in February 1888 the government introduced an amendment to the imperial Military Law extending the obligation for service from twelve to eighteen years. In this way it was possible to increase the war establishment, excluding the Landsturm, by about half a million men without adding to the burden in time of peace. Another law authorized a loan of £14,000,000 for military equipment. At the same time the text of the Triple Alliance was published. The two laws were adopted without opposition. Under the effect of one of

Bismarck's speeches, the Military Bill was unanimously passed almost without debate.

It was probably at the meeting of 1884 that a secret treaty, the existence of which was not known for many years, was arranged between Germany and Russia. The full text Secret has never been published, and the exact date is un- treaty certain. Either state pledged itself to observe bene- n" A , volent neutrality in case the other were attacked by a third power. Apparently the case of an attack by France on Germany, or by Austria on Russia, was expressly mentioned. The treaty lapsed in 1890, and owing to Bismarck's dismissal was not renewed. Caprivi refused to renew it because it was doubtful whether by increasing the number of treaties the value of them was not diminished. Under this system it was to be apprehended that if war broke out between Austria and Russia, Austria would claim the support of Germany under the Triple Alliance, Russia neutrality under this treaty. The decision of Germany would theoretically have to depend on the question which party was the aggressor — a question which notoriously is hardly ever capable of an answer. (For this treaty see the debate in the Reichstag of the 16th of November 1896; the Hamburger Nachrichten of 24th October in the same year; and Schulthess, Europdisches Geschichtskalendar, 1896.)

The emperor William died on the 9th of March 1888. He was succeeded by his son, who took the title of Frederick III. In Italy the older title of king of Piedmont has been absorbed in the newer kingdom of Italy; this is not prfalrick the case in Germany, where the title German emperor ///. is merely attached to and not substituted for that of I king of Prussia. The events of this short reign, which lasted

only ninety-nine days, have chiefly a personal interest, and are narrated under the articles Frederick III. and Bismarck. The illness and death of the emperor, however, destroyed the last hope of the Liberals that they might at length succeed to power. For a generation they had waited for his accession, and bitter was their disappointment, for it was known that his son was more inclined to follow the principles of Bismarck than those of his own father. The

emperor, crippled and dying though he was, showed clearly how great a change he would, had he lived, have introduced in the spirit of the government. One of his first acts was severely to reprimand Puttkammer for misusing government influence at elections. The minister sent in his resignation, which was accepted, and this practice, which had been deliberately revived during the last ten years, was thereby publicly disavowed. Bismarck's own position would naturally have been seriously affected by the fall of a colleague with whom he was closely connected, and another point of internal policy showed also how numerous were the differences between the chancellor and the emperor. Laws had been passed prolonging the period of both the Prussian and Imperial parliaments from three to five years; when they were laid before the emperor for his signature he said that he must consider them. Bismarck then pointed out that the constitution of the empire did not authorize the emperor to withhold his assent from a law which had passed both the Reichstag and the Bundesrat; he could as king of Prussia oppose it by his representatives in the federal council, but when it had been accepted there, it was his duty as emperor to put the law into execution. The emperor accepted this exposition of the constitution, and after some delay eventu- ally gave his consent also to the Prussian law, which he was qualified to reject.

He was succeeded by his eldest son, William II. (q.v.). The first year of the new reign was uneventful. In his public speeches the emperor repeatedly expressed his reverence for lL am the memory of his grandfather, and his determination to continue his policy; but he also repudiated the attempt of the extreme Conservatives to identify him with their party. He spent much time on journeys, visiting the chief courts of Europe, and he seemed to desire to preserve close friendship with other nations, especially with Russia and Great Britain. Changes were made in the higher posts of the army and civil service, and Moltke resigned the office of chief of the staff, which for thirty years he had held with such great distinction.

The beginning of the year 1890 brought a decisive event. The period of the Reichstag elected in 1887 expired, and the new elections, the first for a quinquennial period, would take Bismarck. pl ace – The chief matter for decision was the fate of the Socialist law; this expired on the 30th of September 1890. The government at the end of 1889 introduced a new law, which was altered in some minor matters, and which was to be permanent. The Conservatives were prepared to vote for it; the Radicals and Centre opposed it; the decision rested with the National Liberals, and they were willing to accept it on condition that the clause was omitted which allowed the

state governments to exclude individuals from districts in which the state of siege had been proclaimed. The final division took place on the 25th of February 1890. An amendment had been carried omitting this clause, and the National Liberals therefore voted for the bill in its amended form. The Conservatives were ready to vote as the government wished; if Bismarck was content with the amended bill, they would vote for it, and it would be carried; no instructions were sent to the party; they therefore voted against the bill, and it was lost. The House was immediately dissolved. It was to have been expected that, as in 1878, the government would appeal to the country to return a Conservative majority willing to vote for a strong law against the Socialists. Instead of this, the emperor, who was much interested in social reform, published two proclamations. In one addressed to the chancellor he declared his intention, as emperor, of bettering the lot of the working classes; for this purpose he proposed to call an international congress to consider the possibility of meeting the requirements and wishes of the working men; in the other,

which he issued as king of Prussia, he declared that the regulation of the time and conditions of labour was the duty of the state, and the council of state was to be summoned to discuss this and kindred questions. Bismarck, who was less hopeful than the emperor, and did not approve of this policy, was thereby prevented from influencing the elections as he would have wished to do; the coalition parties, in consequence, suffered severe loss; Socialists, Centre and Radicals gained numerous seats. A few days after the election Bismarck was dismissed from office. The difference of opinion between him and the emperor was not confined to social reform; beyond this was the more serious question as to whether the chancellor or the emperor was to direct the course of the government. The emperor, who, as Bismarck said, intended to be his own chancellor, required Bismarck to draw up a decree reversing a cabinet order of Frederick William IV., which gave the Prussian minister- president the right of being the sole means of communication between the other ministers and the king. This Bismarck refused to do, and he was therefore ordered to send in his resignation.

Among those more immediately connected with the govern- ment his fall was accompanied by a feeling of relief which was not confined to the Opposition, for the burden of his chancel- rule had pressed heavily upon all. There was, however, lot ship of no change in the principles of government or avowed Count von change in policy; some uncertainty of direction and Ca P riy,% sudden oscillations of policy showed the presence of a less ex- perienced hand. Bismarck's

successor, General von Caprivi, held a similar combination of offices, but the chief control passed now into the hands of the emperor himself. He aspired by his own will to direct the policy of the state ; he put aside the reserve which in modern times is generally observed even by absolute rulers, and by his public speeches and personal influence took a part in political controversy. He made very evident the monarchical character of the Prussian state, and gave to the office of emperor a prominence greater than it had hitherto had.

One result of this was that it became increasingly difficult in political discussions to avoid criticizing the words and actions of the emperor. Prosecutions for lese-majestt became commoner than they were in former reigns, and the difficulty was much felt in the conduct of parliamentary debate. The rule adopted was that discussion was permitted on those speeches of the emperor which were officially published in the Reichsanzeiger. It was, indeed, not easy to combine that respect and reverence which the emperor required should be paid to him, with that open criticism of his words which seemed necessary (even for self- defence) when the monarch condescended to become the censor of the opinions and actions of large parties and classes among his subjects. The attempts to combine personal government with representative institutions was one of much interest; it was more successful than might have been anticipated, owing to the dis- organization of political parties and the absence of great political leaders; in Germany, as elsewhere, the parliaments had not succeeded in maintaining public interest, and it is worth noting that even the attendance of members was very irregular. There was below the surface much discontent and subdued criticism of the exaggeration of the monarchical power, which the Germans called byzantinismus; but after all the nation seemed to welcome the government of the emperor, as it did that of Bismarck. The uneasiness which was caused at first by the unwonted vigour of his utterances subsided, as it became apparent how strong was his influence for peace, and with how many-sided an activity he supported and encouraged every side of national life. Another result of the personal government by the emperor was that it was impossible, in dealing with recent history, to determine how far the ministers of state were really responsible for the measures which they defended, and how far they were the instruments and mouthpieces of the policy of the emperor.

The first efforts of the " New course," as the new administra- tion was termed, showed some attempt to reconcile to the govern- ment those parties and persons whom Bismarck had kept in opposition. The continuation of social reform was to win over the allegiance of

the working men to the person of the emperor;

Factory laws.

an attempt was made to reconcile the Guelphs, and even the Poles were taken into favour; Windthorst was treated with marked distinction. The Radicals alone, owing to their ill-timed criticism on the private relations of the imperial family, and their continued opposition to the army, were excluded. The attempt, however, to unite and please all parties failed, as did the similar attempt in foreign policy. Naturally enough, it was social re- form on which at first activity was concentrated, and the long- delayed factory legislation was now carried out. In 1887 and 1888 the Clerical and Conservative majority had carried through the Reichstag laws restricting the employment of women andchildren and prohibiting labour onSundays. These were not accepted by the Bundesrat, but after the International Congress of 1890 an important amendment and addition to the Gewerbeordnung was carried to this effect. It was of even greater importance that a full system of factory inspection was created. A further provision empowered the Bundesrat to fix the hours of labour in unhealthy trades; this was applied to the bakeries by an edict of 1895, but the great outcry which this caused prevented any further extension.

These acts were, however, accompanied by language of great decision against the Social Democrats, especially on the occasion of a great strike in Westphalia, when the emperor of'social- warne d the men that for him every Social Democrat ism. was an enemy to the empire and country. None the

less, all attempts to win the working men from the doctrinaire Socialists failed. They continued to look on the whole machinery of government, emperor and army, church and police, as their natural enemies, and remained completely under the bondage of the abstract theories of the Socialists, just as much as fifty years ago the German bourgeois were controlled by the Liberal theories. It is strange to see how the national character- istics appeared in them. What began as a great revolutionary movement became a dogmatic and academic school of thought; it often almost seemed as though the orthodox

interpretation of Marx's doctrine was of more importance than an improvement in the condition of the working men, and the discussions in the annual Socialist Congress resembled the arguments of theologians rather than the practical considerations of politicians. The party, however, prospered, and grew in strength beyond all anticipation. The repeal of the Socialist law was naturally wel- come to them as a great personal triumph over Bismarck; in the elections of 1890 they won thirty-five, in 1B93 forty-four, in 1898 fifty-six seats. Their influence was not confined to the artisans; among their open or secret adherents were to be found large numbers of government employes and clerks. In the autumn of 1890 they were able, for the first time, to hold in Germany a general meeting of delegates, which was continued annually. In the first meetings it appeared that there were strong opposing tendencies within the party which for the first time could be brought to public discussion. On the one side there was a small party, die Jungen, in Berlin, who attacked the parliamentary leaders on the ground that they had lent themselves to com- promise and had not maintained the old intransigeant spirit. In 1891, at Erfurt, Werner and his followers were expelled from the party; some of them drifted into anarchism, others dis- appeared. On the other hand, there was a large section, the leader of whom was Herr von Vollmar, who maintained that the social revolution would not come suddenly, as Bebel and the older leaders had taught, but that it would be a gradual evolution; they were willing to co-operate with the government in remedial measures by which, within the existing social order, the prosperity and freedom of the working classes might be advanced; their position was very strong, as Vollmar had succeeded in extending Socialism even in the Catholic parts of Bavaria. An attempt to treat them as not genuine Socialists was frustrated, and they continued in co-operation with the other branch of the party. Their position would have been easier were it not for the repeated attempts of the Prussian government to crush the party by fresh legislation and the supervision exercised by the police. It was a sign of most serious import for the future that in 1897 the electoral law in the kingdom of Saxony was altered with the

express purpose of excluding the Socialists from the Saxon Landtag. This and other symptoms caused serious apprehension that some attempt might be made to alter the law of universal suffrage for the Reichstag, and it was policy of this kind which maintained and justified the profound distrust of the governing classes and the class hatred on which Social democracy depends. On the other hand, there were signs of a greater willingness among the Socialists to co-operate

with their old enemies the Liberals.

In foreign affairs a good understanding with Great Britain was maintained, but the emperor failed at that time to preserve the friendship of Russia. The close understanding between France and Russia, and the constant increase i eg i s i a . in the armies of these states, made a still further increase tion. of the German army desirable. In 1890, while the Septennate had still three more years to run, Caprivi had to ask for an additional 20,000 men. It was the first time that an increase of this kind had been necessary within the regular period. When, in 1893, the proposals for the new period were made, they formed a great change. Compulsory service was to be made a reality; no one except those absolutely unfit was to escape it. To make enlistment of so large an additional number of recruits possible, the period of service with the colours was reduced to two years. The parliamentary discussion was very confused; the government eventually accepted an amend- ment giving them 557,093 for five and a half years instead of the 570,877 asked for; this was rejected by 210 to 162, the greater part of the Centre and of the Radicals voting against it. Parlia- ment was at once dissolved. Before the elections the Radical party broke up, as about twenty of them determined to accept the compromise. They took the name of the Freisinnige Vereinigung, the others who remained under the leadership of Richter forming the Freisinnige Volkspartei. The natural result of this split was a great loss to the party. The Liberal opposition secured only twenty-three seats instead of the sixty-seven they had held before. It was, so far as now can be foreseen, the final collapse of the old Radical party. Notwithstanding this the bill was only carried by sixteen votes, and it would have been thrown out again had not the Poles for the first time voted for the government, since the whole of the Centre voted in opposition.

This vote was a sign of the increasing disorganization of parties and of growing parliamentary difficulties which were even more apparent in the Prussian Landtag. Miquel, as minister of finance, succeeded indeed in carrying a reform by which the proceeds of the tax on land and buildings were transferred to the local government authorities, and the loss to the state exchequer made up by increased taxation of larger incomes and industry. The series of measures which began in 1891, and were completed in 1895, won a more general approbation than is usual, and Miquel in this successfully carried out his policy of reconciling the growing jealousies arising from class interests.

Caprivi's administration was further remarkable for the arrangement of commercial treaties. In 1892 treaties with Austria-Hungary, Italy,

Belgium and Switzerland for twelve years bound together the greater part of the !!.;;

continent, and opened a wide market for German treaties. manufactures; the idea of this policy was to secure, by a more permanent union of the middle European states, a stable market for the goods which were being excluded owing to the great growth of Protection in France, Russia and America. These were followed by similar treaties with Rumania and Servia, and in 1894, after a period of sharp customs warfare, with Russia. In all these treaties the general principle was a reduction of the import duties on corn in return for advantages given to German manufactures, and it is this which brought about the struggle of the government with the Agrarians which after 1894 took the first place in party politics.

The agricultural interests in Germany had during the middle of the 19th century been in favour of Free Trade. The reason of this was that, till some years after the foundation of the empire, the production of corn and food-stuffs was more than sufficient for the population; as long as they exported corn, potatoes and cattle, they required no protection

from foreign competition, and they enjoyed the advantages of being able to purchase colonial goods and manufactured articles cheaply. Mecklenburg and Hanover, the purely agricultural states, had. until their entrance into the Customs Union, followed a completely Free Trade policy. The first union of the Agrarian party, which was formed in 1876 under the name of the Society for the Reform of Taxation, did not place protection on their programme; they laid stress on bimetallism, on the reform of internal taxation, especially of the tax on land and buildings, and on the reform of the railway tariff, and demanded an increase in the stamp duties. These last three points were all to some extent attained. About this time, however, the introduction of cheap corn from Russia began to threaten them, and it was in 1879 that, probably to a great extent influenced by Bismarck, they are first to be found among those who ask for protection.

After that time there was a great increase in the importation of food-

stuffs from America. The increase of manufactures and the rapid growth of the population made the introduction of cheap food from abroad a necessity. In the youth of the empire the amount of corn grown in Germany was sufficient for the needs of its inhabitants; the amount consumed in 1899 exceeded the amount produced by about one-quarter of the total. At the same time the price, making allowance for the fluctuations owing to bad harvests, steadily decreased, notwithstanding the duty on corn. In twenty years the average price fell from about 235 to 135 marks the 1000 kilo. There was therefore a constant decrease in the income from land, and this took place at a time when the great growth of wealth among the industrial classes had made living more costly. The agriculturists of the north and east saw themselves and their class threatened with loss, and perhaps ruin; their discontent, which had long been growing, broke out into open fire during the discussion of the commercial treaties. As these would inevitably bring about a large increase in the importation of corn from Rumania and Russia, a great agitation was begun in agricultural circles, and the whole in- fluence of the Conservative party was opposed to the treaties. This brought about a curious situation, the measures being only carried by the support of the Centre, the Radicals, and the Socialists, against the violent opposition of those classes, especi- ally the landowners in Prussia, who had hitherto been the supporters of the government. In order to prevent the com- mercial treaty with Russia, a great agricultural league was founded in 1893, the Bund der Landwirte; some 7000 land- owners joined it immediately. Two days later the Peasants' League, or Deutsche Bauernbund, which had been founded in 1885 and included some 44,000 members, chiefly from the smaller proprietors in Pomerania, Posen, Saxony and Thuringia, merged itself in the new league. This afterwards gained very great proportions. It became, with the Social Democrats, the most influential society which had been founded in Germany for defending the interests of a particular class; it soon numbered more than 200,000 members, including landed proprietors of all degrees. Under its influence a parliamentary union, the Wirt- schaflsvereinigung, was founded to ensure proper consideration for agricultural affairs; it was joined by more than 100 members of the Reichstag; and the Conservative party fell more and more under the influence of the Agrarians.

Having failed to prevent the commercial treaties, Count Kanitz introduced a motion that the state should have a monopoly of all imported corn, and that the price at which it was to be sold should be fixed by law. On the first occasion, in 1894, only fifty members were

found to vote for this, but in the next year ninety- seven supported the introduction of the motion, and it was con- sidered worth while to call together the Prussian council of state for a special discussion. The whole agitation was extremely inconvenient to the government. The violence with which it was conducted, coming, as it did, from the highest circles of the Prussian nobility, appeared almost an imitation of Socialist methods; but the emperor, with his wonted energy, personally rebuked the leaders, and warned them that the opposition of Prussian nobles to their king was a monstrosity. Nevertheless they were able to overthrow the chancellor, who was specially

obnoxious to them. In October 1894 he was dismissed suddenly, without warning, and almost without cause, while the emperor was on a visit to the Eulenburgs, one of the most influential families of the Prussian nobility.

Caprivi's fall, though it was occasioned by a difference between him and Count Eulenburg, and was due to the direct act of the emperor, was rendered easier by the weakness of his parliamentary position. There was no party on whose caorivt help he could really depend. The Military Bill had offended the prejudices of conservative military critics; the British treaty had alienated the colonial party; the commercial treaties had only been carried by the help of Poles, Radicals and Socialists; but it was just these parties who were the most easily offended by the general tendencies of the internal legislation, as shown in the Prussian School Bill. Moreover, the bitter and unscrupulous attacks of the Bismarckian press to which Caprivi was exposed made him unpopular in the country, for the people could not feel at ease so long as they were governed by a minister of whom Bismarck disapproved. There was therefore no prospect of forming anything like a stable coalition of parties on which he could depend.

The emperor was fortunate in securing as his successor Prince Chlodwig von Hohenlohe. Though the new chancellor once more united with this office that of Prussian minister- chancellor president, his age, and perhaps also his character, Prince v. prevented him from exercising that constant activity ^°' len ' and vigilance which his two predecessors had displayed. During his administration even the secretary of state for foreign affairs, Baron Marschall von Bieberstein, and afterwards Count von Biilow, became the ordinary spokesman of the government, and in the management of other departments the want of a strong hand at the head of affairs was often missed. Between the emperor, with whom the final direction of policy rested, and his subordinates, the chancellor often

appeared to evade public notice. The very first act of the new chancellor brought upon him a severe rebuff. At the opening of the new buildings which had been erected in Berlin for the Reichstag, cheers were called for the emperor. Some of the Socialist members remained seated. It was not clear that their action was deliberate, but none the less the chancellor himself came down to ask from the House permission to bring a charge of Vese-majesU against them, a request which was, of course, almost unanimously refused.

The Agrarians still maintained their prominent position in Prussia. They opposed all bills which would appear directly or indirectly to injure agricultural interests. They looked with suspicion on the naval policy of the emperor, for they disliked all that helps industry and commerce. They would only give their support to the Navy Bills of 1897 and 1900 in return for large concessions limiting the importation of margarine and American preserved meat, and the removal of the Indemnitats Nachweis acted as a kind of bounty on the export of corn. They successfully opposed the construction of the great canal from Westphalia to the Elbe, on the ground that it would facilitate the importation of foreign corn. They refused to accept all the compromises which Miquel, who was very sympathetic towards them, suggested, and thereby brought about his retirement in May 1901.

The opposition of the Agrarians was for many reasons peculiarly embarrassing. The franchise by which the Prussian parliament is elected gave the Conservatives whom they controlled a pre- dominant position. Any alteration of the franchise was, however, out of the question, for that would admit the Socialists. It was, moreover, the tradition of the Prussian court and the Prussian government (and it must be remembered that the imperial government is inspired by Prussian traditions) that the nobility and peasants were in a peculiar way the support of the crown and the state. The old distrust of the towns, of manufacturers and artisans, still continued. The preservation of a peasant class was considered necessary in the interests of the army. Besides, intellectual and social prejudices required a strong Conservative party. In the south and west of Germany, however, the Con- servative party was practically non-existent. In these parts,

owing to the changes introduced at the revolution, the nobility, who hold little land, are, comparatively speaking, without political importance. In the Catholic districts the Centre had become absolutely master, except so far as the Socialists threaten their position. Those of the great industrialists who belonged to the National Liberals or the Moderate Conservatives did not command that influence which men of their class generally hold in Great Britain, because the influence of Social Democracy banded together the whole of the working men in a solid phalanx of irreconcilable opposition, the very first principle of which was the hostility of classes. The government, therefore, were compelled to turn for support tothe Centre and the Conservatives, the latter being almost completely under the influence of the old Prussian nobility from the north-east. But every attempt to carry out the policy supported by these parties aroused an opposition most embarrassing to the government.

The Conservatives distrusted the financial activity which centred round the Exchanges of Berlin and other towns, and in this they had the sympathy of Agrarians and rejrufaˆ" Anti-Semites, as well as of the Centre. The Agrarians Uoas. believed that the Berlin Exchange was partly re-*

sponsible for the fall of prices in corn; the Anti- Semites laid stress on the fact that many of the financiers were of Jewish extraction; the Centre feared the moral effects of specula- tion. This opposition was shown in the demand for additional duties on stamps (this was granted by Bismarck), in the opposi- tion to the renewal of the Bank Charter, and especially in the new regulations for the Exchange which were carried in 1896. One clause in this forbade the dealing in " futures " in corn, and at the same time a special Prussian law required that there should be representatives of agriculture on the managing com- mittee of the Exchange. The members of the Exchanges in Berlin and ether towns refused to accept this law. When it came into effect they withdrew and tried to establish a private Exchange. This was prevented, and after two years they were compelled to submit and the Berlin Bourse was again opened.

Political parties now came to represent interests rather than principles. The government, in order to pass its measures, was obliged to purchase the votes by class legislation, b main- an(ˆ ' f ' bought those with whom it could make the best lag. bargain — these being generally the Centre, as the ablest

tacticians, and the Conservatives, as having the highest social

position and being boldest in declaring their demands. No great parliamentary leader took the place of Windthorst, Lasker and Bennigsen; the extra – parliamentary societies, less responsible and more violent, grew in influence. The Anti- Semites gained in numbers, though not in reputation. The Conservatives, hoping to win votes, even adopted an anti- Semite clause in their programme. The general tendency among the numerous societies of Christian Socialism, which broke up almost as quickly as they appeared, was to drift from the alliance with the ultra-Conservatives and to adopt the economic and many of the political doctrines of the Social Democrats. The National-Sozialer Verein defended the union of Monarchy and Socialism. Meanwhile the extreme spirit of nationality was fostered by the All-deulscher Verein, the policy of which would quickly involve Germany in war with every other nation. More than once the feelings to which they gave Expression endangered the relations of Germany and Austria- Hungary. The persecution of the Poles in Prussia naturally iroused indignation in Austria, where the Poles had for long been among the strongest elements on which the government depended; and it was not always easy to prevent the agitation on behalf of the Germans in Bohemia from assuming a dangerous aspect.

In the disintegration of parties the Liberals suffered most.' The unity of the Conservatives was preserved by social forces and the interests of agriculture; the decay of the Liberals was the result of universal suffrage. Originally the opponents of the landed interest and the nobility, they were the party of the educated middle class, of the learned, of the officials and finance. They never succeeded in winning the support of the working men. They had identified themselves with the interests of the

capitalists, and were not even faithful to their own principles. In the day of their power they showed themselves as intolerant as their opponents had been. They resorted to the help of the government in order to stamp out the opinions with which they disagreed, and the claims of the artisans to practical equality were rejected by them, as in earlier days the claims of the middle class had been by the nobles.

The Centre alone maintained itself. Obliged by their con- stitution to regard equally the material interests of all classes — for they represent rich and poor, peasants and artisans — they were the natural support of the government when it attempted to find a compromise between the clamour of opposing interests. Their own demands were generally limited to the defence of order and religion, and to some extent coincided with the wishes of the emperor; but

every attempt to introduce legislation in accordance with their wishes led to a conflict with the educated opinion of the country, which was very detrimental to the authority of the government. In the state parliaments of Bavaria, Baden and Hesse their influence was very great. There was, moreover, a tendency for local parties to gain in numbers and influence — the V olkspartei in Wurttemberg, the Anti-Semites in Hesse, and the Bauernbund (Peasants' League) in Bavaria. The last demanded that the peasants should be freed from the payment to the state, which represented the purchase price for the remission of feudal burdens. It soon lost ground, however, partly owing to personal reasons, and partly because the Centre, in order to maintain their influence among the peasants, adopted some features of their programme.

Another class which, seeing itself in danger from the economic changes in society, agitated for special legislation was the small retail traders of the large towns. They demanded additional taxation on the vast shops and stores, the s taad~- growth of which in Berlin, Munich and other towns politik, seemed to threaten their interests. As the preservation of the smaller middle class seemed to be important as a bulwark against Socialism, they won the support of the Conservative and Clerical parties, and laws inspired by them were passed in Bavaria, Wurttemberg and Prussia. This Miitelstand-Politik, as it is called, was very characteristic of the attitude of mind which was produced by the policy of Protection. Every class appealed to the government for special laws to protect itself against the effects of the economic changes which had been brought about by the modern industrial system. Peasants and landlords, artisans and tradesmen, each formed their own league for the protection of their interests, and all looked to the state as the proper guardian of their class interests.

After the fall of Caprivi the tendency of the German govern- ment to revert to a strong Conservative policy in matters of religion, education, and in the treatment of political discussions became very marked. The complete re 2™ us alienation of the working classes from Christianity policy. caused much natural concern, combined as it was with that indifference to religion which marks the life of the educated classes in the large towns, and especially in Berlin. A strong feeling arose that social and political dangers could only be avoided by an increase in religious life, and the emperor gave the authority of his name to a movement which produced numerous societies for home mission work, and (at least in Berlin) led to the erection of numerous churches. Unfortunately, this movement was too often connected with political reaction, and the working classes

were inclined to believe that the growth of religion was valued because it afforded an additional support to the social and political order. The situation was somewhat similar to that which existed during the last years of Frederick William IV., when the close association of religion with a Con- servative policy made orthodoxy so distasteful to large sections of society. The government, which had not taken warning by the fate of the School Bill, attempted to carry other measures of the same kind. The emperor had returned to Bismarck's policy of joining social reform with repressive legislation. In a speech at Konigsberg in November 1894, he summoned the nobles ci Prussia to support him in the struggle for religion, for morality,

Lex Heinze.

for order, against the parties of Umsturz, or Revolution, and shortly afterwards an amendment of the Criminal Code, com- monly called the Umsturz-Vorlage, was introduced, Voriaze' containing provisions to check attempts to undermine the loyalty of the soldiers, and making it a crime punishable with three years' imprisonment to attack religion, monarchy, marriage, the family or property by abusive expres- sions in such a manner as to endanger public peace. The dis- cussion of this measure occupied most of the session of 1895; the bill was amended by the Centre so as to make it even more strongly a measure for the defence of religion; and clauses were introduced to defend public morality, by forbidding the public exhibition of pictures or statues, or the sale of writings, which, " without being actually obscene, might rudely offend the feeling of modesty." These Clerical amendments aroused a strong feeling of indignation. It was represented that the freedom of art and literature was being endangered, and the government was obliged to withdraw the bill. The tendency towards a stricter censorship was shown by a proposal which was carried through the Prussian parliament for controlling the instruction given at the universities by the Privatdozenten. Some of the Con- servative leaders, especially Baron von Stumm, the great manu- facturer (one of Bismarck's chief advisers on industrial matters), demanded protection against the teaching of some of the pro- fessors with whose economic doctrines they did not agree; pastors who took part in the Christian-Social

movement incurred the displeasure of the government; and Professor Delbriick was summoned before a disciplinary court because, in the Preussische Jahrbiicher, which he edited, he had ventured to criticize the policy of the Prussian government towards the Danes in Schleswig. All the discontent and suspicion caused by this policy broke out with greater intensity when a fresh attempt was made in 1900 to carry those clauses of the old Umsturz-Vorlage which dealt with offences against public morality. The gross immoralities connected with prostitution in Berlin had been disclosed in the case of a murderer called Heinze in 1891; and a bill to strengthen the criminal law on the subject was introduced but not carried. The measure continued, however, to be discussed, and in 1900 the government proposed to incorporate with this bill (which was known as the Lex Heinze) the articles from the Umsturz-Vorlage subjecting art and literature to the control of the criminal law and police. The agitation was renewed with great energy. A Goethe- Verein was founded to protect Kultur, which seemed to be in danger. In the end the obnoxious clauses were only withdrawn when the Socialists used the forms of the House to prevent business from being transacted. It was the first time that organized obstruction had appeared in the Reichstag, and it was part of the irony of the situation that the representatives of art and learning owed their victory to the Socialists, whom they had so long attacked as the great enemies of modern civilization.

These were not the only cases in which the influence of the parties of reaction caused much discontent. There was the question of the right of combination. In nearly every Law ° f state there still existed old laws forbidding political tioa. ‘ societies to unite with one another. These laws had been passed in the years immediately after the revolu- tion of 1848, and were quite out of place under modern conditions. The object of them was to prevent a network of societies from being formed extending over large districts, and so acquiring political power. In 1895 the Prussian police used a law of 1850 as a pretext for dissolving the Socialist organization in Berlin, as had been done twenty years before. A large majority of the Reichstag demanded that an imperial law should be passed repealing these laws and establishing the right of combination, and they refused to pass the revised Civil Code until the chancellor promised that this should be done. Instead of this course being adopted, however, special laws were introduced in most of the states, which, especially in Prussia and Saxony, while they gave the right of combination, increased the power of the police to forbid assemblies and societies. It was apparent that large and influential parties still regarded political

meetings as something

in themselves dangerous and demoralizing, and hence the demand of the Conservatives that women and young persons should be forbidden to attend. In Prussia a majority of the Upper House and a very large minority of the Lower House (193 to 206) voted for an amendment expressly empowering the police to break up meetings in which anarchistic, socialistic or communistic doctrines were defended in such a manner as to be dangerous to society; the Saxon Conservatives demanded that women at least should be forbidden to attend socialistic meetings, and it remained illegal for any one under twenty-one years of age to be present at a political meeting. In consequence of the amend- ments in the Upper House the Prussian law was lost; and at last, in 1899, a short imperial law was carried to the effect that " societies of every kind might enter into union with one another." This was at once accepted by the chancellor; it was the time when the Navy Bill was coming on, and it was necessary to win votes. The general feeling of distrust which this pro- longed controversy aroused was, however, shown by the almost contemptuous rejection in 1899 of a Bill to protect artisans who were willing to work against intimidation or violence (the Zuchthaus-V orlage) , a vote which was the more significant as it was not so much occasioned by the actual provisions of the bill, but was an expression of the distrust felt for the motives by which the government was moved and the reluctance to place any further powers in their hands.

Meanwhile the emperor had set himself the task of doing for the German fleet what his grandfather had done for the army. The acquisition of Heligoland enabled a new naval station to be established off the mouth of the Elbe; the completion of the canal from Kiel to the mouth of the Elbe, by enabling ships of war to pass from the Baltic to the North Sea greatly increased the strategic strength of the fleet. In 1890 a change in the organiza- tion separated the command of the fleet from the office of secre- tary of state, who was responsible for the representation of the admiralty in the Reichstag, and the emperor was brought into more direct connexion with the navy. During the first five years of the reign four line-of -battle ships were added and several armoured cruisers for the defence of commerce and colonial interests. With the year 1895 began a period of expansion abroad and great naval activity. The note was given in a speech of the emperor's on the twenty-fifth anniversary of the foundation of the empire, in which he said, " the German empire has become a world empire." The ruling idea of this new Welt-. Politik was that Germany could no longer remain Poiutk.

merely a continental power; owing to the growth of population she depended for subsistence on trade and exports; she could not maintain herself amid the rivalry of nations unless the government was able actively to support German traders in all parts of the world. The extension of German trade and in- fluence has, in fact, been carried out with considerable success. There was no prospect of further territory in Equatorial Africa, and the hope of bringing about a closer union with the South African Republic was not fulfilled. On the Pacific, however, there were great gains; 1 long-established plans for obtaining a port in China which might serve as a base for the growing trade at Tientsin were carried out at the end of 1897; the murder of two Catholic missionaries was made the pretext for landing troops in the bay of Kiao-chau; and in amends China granted the lease of some 50 sq. m. of territory, and J t he also a concession for building railways. The emperor flst „ showed his strong personal interest by sending his brother, Prince Henry, in command of a squadron to take possession of this territory, and the visit of a German prince to the emperor of China strongly appealed to the popular imagina- tion. The emperor's characteristically rhetorical speeches on this occasion — particularly his identification of his brother with the " mailed fist " of Germany — excited considerable comment.

1 In 1899, following the Spanish-American War, Germany pur- chased the Caroline, Pelew and Marianne Islands from Spain ; in 1 899-1900 by agreement with Great Britain and America she acquired the two largest of the Samoan islands, renouncing in favour of Britain her protectorate over certain of the Solomon islands.

gramme,

1897.

In Turkey the government, helped again by the personal interest of the emperor, who himself visited the sultan at Constantinople, gained important concessions for German influence and German commerce. The Turkish armies were drilled and commanded by German officers, and in 1890 a German firm gained an im- portant concession for building a railway to Baghdad. In Brazil organized private enterprise

established a considerable settle- ment of German emigrants, and though any political power was for the time impossible, German commerce increased greatly throughout South America.

Encouraged by the interest which the events in China had aroused, a very important project was laid before the Reichstag in November 1897, which would enable Germany to Navaipro- ta k e a higher place among the maritime powers. A completely new procedure was introduced. Instead of simply proposing to build a number of new ships, the bill laid down permanently the number of ships of every kind of which the navy was to consist. They were to be com- pleted by 1904; and the bill also specified how often ships of each class were to be replaced. The plan would establish a normal fleet, and the Reichstag, having once assented, would lose all power of controlling the naval budget. The bill was strongly opposed by the Radicals; the Centre was divided; but the very strong personal influence of the emper.or, supported by an agitation of the newly-formed Flottenverein (an imitation of the English Navy League), so influenced public opinion that the opposition broke down. A general election was imminent, and no party dared to go to the country as the opponents of the fleet.

Scarcely had the bill been carried when a series of events took place which still more fully turned public attention to colonial affairs, and seemed to justify the action of the govern- Hostmty ment. The war between the United States and Spain England, showed how necessary an efficient fleet was under modern conditions, and also caused some feeling of apprehension for the future arising from the new policy of ex- tension adopted by the United States. And the brewing of the storm in South Africa, where the Boers were preparing to resist British suzerainty, helped to make the nation regret that their fleet was not sufficiently strong to make German sympathies effective. The government used with great address the bitter irritation against Great Britain which had become one of the most deep-seated elements in modern German life. This feeling had its origin at first in a natural reaction against the excessive admiration for . English institutions which distinguished the Liberals of an older generation. This reaction was deliberately fostered during Bismarck's later years for internal reasons; for, as Great Britain was looked upon as the home of parlia- mentary government and Free Trade, a less favourable view might weaken German belief in doctrines and institutions adopted from that country. There also existed in Germany a curious compound of jealousy and contempt, natural in a nation the whole institutions of which centred round the army and com- pulsory service, for a nation whose institutions were based not on military, but on parliamentary and legal institutions. It came about that in the minds of many Germans the whole national regeneration was regarded as a liberation from British influence. This feeling was deliberately

fostered by publicists and historians, and was intensified by commercial rivalry, since in the struggle for colonial expansion and trade Germans naturally came to look on Great Britain, who held the field, as their rival. The sympathy which the events of 1896 and 1899 awakened for the Pro-Boer j} oers caused all these feelings, which- had long been growing, to break out in a popular agitation more widespread than any since the foundation of the empire. It was used by the Nationalist parties, in Austria as well as in Germany, to spread the conception of Pan- Germanism; the Boers as Low Germans were regarded as the representatives of Teutonic civilization, and it seemed possible that the con- ception might be used to bring about a closer friendship, and even alliance, with Holland. In 1896 the emperor, by despatching a telegram of congratulation to President Kruger after the collapse

move- meat.

of the Jameson Raid, had appeared to identify himself with the national feeling. When war broke out in 1899 it was obviously impossible to give any efficient help to the Boers, but the govern ment did not allow the moment to pass without using it for the very practical purpose of getting another lg ˆ ‘ ‘ bill through the Reichstag by which the navy was to be nearly doubled. Some difficulties which arose regarding the exercise by the British government of the right of search for contraband of war were also used to stimulate public feeling. The Navy Bill was introduced in January 1900. There were some criticisms of detail, but the passing of the bill was only a matter of bargaining. Each party wished in return for its support to get some concessions from the government. The Agrarians asked for restrictions on the importation of food; the Centre for the Lex Heinze and the repeal of the Jesuit law; the Liberals for the right of combination.

The murder of the German ambassador, Baron von Ketteler, at Peking in 1900 compelled the government to take a leading part in the joint expedition of the powers to China. A force of over 20,000 men was organized by voluntary Y°J enlistment from among the regular army; and the cnanc eUor. supreme command was obtained by the emperor for Count von Waldersee, who had succeeded Moltke as chief of the staff. The government was, however, sharply criticized for not first consulting the Reichstag in a matter involving the first military expedition since the foundation of the empire. It was desirable in such circumstances that a younger and more vigorous statesman than Prince Hohenlohe should be placed at the head of affairs before the Reichstag met; and on the 17th of October he*

resigned, and was succeeded as chancellor by Herr von Bulow, the foreign secretary. (J. W. He. ; W. A. P.)

It remains only to sketch the main features of German history in later years. In spite of the denunciation by the Social Demo- cratic leaders of what they stigmatized as a " policy of brag," the general popularity of the idea of estab- p ™gre8a. lishing a strong sea power was proved by the rapid extension of the Navy League, which in 1904 had already 3595 branches. For an increase in the navy there was, indeed, sufficient excuse in the enormous expansion of German over-sea commerce and the consequent growth of the mercantile marine; the value of foreign trade, which in 1894 was £365,000,000, had risen in 1904 to £610,000,000, and in the same period the tonnage of German merchant shipping had increased by 234%. In the session of 1901 Admiral von Tirpitz, the minister of marine, admitted in answer to a Socialist interpellation that the naval programme of 1900 would have to be enlarged. In 1903 Count Biilow declared in the Reichstag that the government was endeavouring to pursue a middle course between " the extrava- gant aspirations of the Pan-Germans and the parochial policy of the Social Democrats, which forgets that in a struggle for life and death Germany's means of communication might be cut off." At the same time the emperor presented to the Reichstag a com- parative table, drawn up by his own hand, showing the relative strength of the British and German navies. An inspired article in the Grenzboten declared the object of this to be to moderate at once the aggressive attitude of the Pan- Germans towards Great Britain and British alarms at the naval development of Germany. This gave' a fresh impetus to the naval agitation and counter- agitation. In 1904 Count Biilow again found it necessary, in reply to the Socialist leader Bebel, to declare that the German naval armaments were purely defensive. "I cannot conceive," he said, " that the idea of an Anglo-German war should be seriously entertained by sensible people in either country." On the 16th of November 1905 a new Navy Bill amplifying the programme of 1900 was accepted by the Federal Diet. The Navy League, encouraged by its success, now redoubled its exertions and demanded that the whole programme should be completed by 1912 instead of 1917. Bebel denounced this agitation as obviously directed against England; and the government thought it expedient to disavow the action of its too zealous allies. A telegram addressed by the emperor William to the presidents of the League, Generals Keim and Menges, led to

their resignation ; but the effect of this was largely counteracted by the presence of Prince Henry of Prussia and the king of Wurttemberg at the annual congress of the League at Stuttgart in May, while at the Colonial Congress in the autumn the necessity for a powerful navy was again one of the main themes of dis- cussion. That the government was, in fact, at one with the League as to the expediency of pushing on the naval programme was proved by the revelations of the first lord of the admiralty, Mr McKenna, in the debate on the naval estimates in the British parliament of 1909. From these it was clear that the German government had for some time past been pressing on its naval armaments with little regard to the ostensible programme, and that in the matter of the newest types of battleships, Great Britain had to reckon with the fact that, before the date fixed for the completion of the programme, Germany might establish at least an equality.

The same determined spirit which characterized German naval policy was evident also in her relations with the other powers. The suspicions as to the stability of the Triple Alliance produced, indeed, for some years a kind of nervous- ness in the attitude of the government, whose deter- mination to assert for Germany a leading international r61e tended to isolate her in Europe. This nervousness was, in 1903 and 1904, especially evident in the efforts to weaken the Franco- Russian alliance by the policy of what Bebel denounced as Germany " crawling on her stomach before Russia." Germany not only backed up Russian policy in the East, and at the out- break of the Russo-Japanese War took up towards her an attitude of more than benevolent neutrality, but the cabinets of Berlin and St Petersburg entered into an agreement under which political offenders against either government were to be treated as traitors to both. This arrangement, which made the Prussian police the active allies of the Third Section in the persecution of The political suspects, created vast indignation among all

KSaigs- shades of Liberal opinion in Germany, an indignation " which culminated with the famous Konigsberg trial.

tHaI ' This was a prosecution of nine German subjects for

sedition, conspiracy and lese^majeste against the Russian emperor, and for the circulation of books and pamphlets attacking him and his government. The defendants were poor smugglers from the Esthonian border marshes, who in the course of their ordinary avocations had carried bales of revolutionary tracts into Russia without troubling as to their contents. The trial, which took place in July 1904, excited widespread attention. The prosecution was conducted with all the force of the govern- ment ; the defence was undertaken by some of the most brilliant Liberal advocates of Germany and developed in effect into an elaborate indictment, supported by a great weight of first-hand evidence, of the iniquities of the Russian regime. The verdict of the court, was a serious rebuff for the government; after a preliminary investigation of nine months, and a public trial of a fortnight, the major charges against the prisoners were dismissed, and six of them were condemned only to short terms of imprison- ment for conspiracy.

The progress of the Russo-Japanese War, however, soon re- lieved Germany of all anxiety as to the safety of her eastern frontiers, and produced a corresponding change in her attitude. The Russian disasters in Manchuria at the beginning of 1905 were followed by an extraordinary demonstration of the emperor William's ideas as to " the world-wide dominion of the Hohen- zollerns," in a sort of imperial progress in the East, made for the purpose of impressing the Mahommedan world with the power of Germany. In 1904 the German attitude towards Great Britain had been in the highest degree conciliatory; the Anglo- French agreement as to Egypt was agreed to at Berlin; a visit of King Edward VII. to Kiel was reciprocated by that of the German squadron to Plymouth; in July a treaty of arbitration was signed between the two countries, while in the Reichstag the chancellor declared that, Germany's interests in Morocco being purely commercial, the understanding between France and England as to that country, embodied in the convention of the 8th of April 1904, did not immediately concern her. This attitude

was now changed. On the 31st of March 1905 the emperor William landed at Tangier, and is reported on this occasion to have used language which in effect amounted to a promise to support the sultan of Morocco in resisting French control. His visit to the Holy Land and the solemn pilgrimage to Jerusalem were, in the same way, a striking coup de tkSdtre designed to strengthen the influence won by Germany in the councils of the Ottoman empire, an influence which she had been careful not to weaken by taking too active a part in the concert of the powers engaged in pressing on the question of Macedonian reform.

Meanwhile pressure was being put upon France to admit the German claim to a voice in the affairs of North Africa, a claim fortified by the mission of Count von Tattenbach, German minister at Lisbon, to Fez for the purpose of securing from the sherifian government special privileges for Germany. This aggressive policy was firmly resisted by M. Delcasse, the French minister of foreign affairs, and for a while war seemed to be inevitable. At Berlin powerful influences, notably that of Herr von Holstein — that mysterious omnipotence behind the throne- were working for this end; the crippling of Russia seemed too favourable an opportunity to be neglected for crushing the menace of French armaments. That an actual threat of war was conveyed to the French government (through the German ambassador at Rome, it is said) there can be no doubt. That war was prevented was due partly to the timidity of French ministers, partly to the fact that at the last moment Herr von Holstein shrank from the responsibility of pressing his arguments to a practical conclusion. The price of peace, however, was the resignation of M. Delcasse, who had been prepared to maintain a bold front. Germany had perhaps missed an opportunity for putting an end for ever to the rivalry of France; but she had inflicted a humiliation on her rival, and proved her capacity to make her voice heard in the councils of Europe. 1 The proceedings of the conference of Algeciras (see Morocco) emphasized the restored confidence of Germany in her international position. It was notably the part played by Austria in supporting the German point of view throughout at the conference that . strengthened the position of Germany in Europe, by drawing closer the bonds of sympathy between the two empires. How strong this position had become was demonstrated during the crisis that arose after the revolution in Turkey and the annexa- tion of Bosnia and Herzegovina by Austria in October 1908. The complete triumph of Baron von Aehrenthal's policy, in the face of the opposition of most of the European powers, was due to German support, and Germany suddenly appeared as the arbiter of the affairs of the European continent (see Europe: History) . German nervousness, which had seen B ritish intrigues everywhere, and suspected in the beneficent activities of King Edward VII. a Machiavellian plan for isolating Germany and surrounding her with a net of hostile forces, gave way to a spirit of confidence which could afford to laugh at the terror of Germany which, to judge from the sensational reports of certain popular British journals, had seized upon Great Britain.

The great position gained by the German empire in these years was won in the face of great and increasing internal diffi- culties. These difficulties were, in the main, the out- come of the peculiar

constitution of the empire, of J" 1 the singular compromise which it represented between curies the traditional medieval polity and the organization of a modern state, and of the conflicts of ideals and of interests to which this gave rise; these being complicated by the masterful personality of the emperor William, and his tendency to confuse his position as German emperor by the will of the princes with his position as king of Prussia by the grace of God.

In general, Germany had passed since the war through a social and economic revolution similar to that undergone by Great Britain during the earlier half of the 19th century, though on a greater scale and at a much accelerated pace. A country

1 The elevation of Count Billow to the rank of prince immediately after the crisis was significantly compared with the same honour I bestowed on Bismarck at Versailles in 1 871.

mainly agricultural, and in parts purely feudal, was changed into one of vast industries and of great concentrations of population; and for the ferment created by this change there was no such safety-valve in the representative system as had existed in England since the Reform Bill. In spite of the election of the Reichstag by manhood suffrage, there existed, as Count Bulow pointed out in 1904, no real parliamentary system in Germany, and " owing to the economic, political, social and religious structure of the nation" there could never be one. Of the numerous groups composing the German parliament no one ever secured a majority, and in the absence of such a majority the imperial government, practically independent of parliament, knew how to secure its assent to its measures by a process of bargaining with each group in turn. This system had curious and very far-reaching results. The only group which stood outside it, in avowed hostility to the whole principle on which the constitution was based, was that of the Social Democrats, " the only great party in Germany which," so the veteran Mommsen declared in 1901, " has any claim to political respect." The consequence was the rapid extension and widening of the chasm that divided the German people. The mass of the working-class population in the Protestant parts of Germany belonged to the Social Democracy, an inclusive term covering variations of opinion from the doctrinaire system of

Marx to a degree of Radicalism which in England would not be considered a bar to a peerage. To make head against this, openly denounced by the emperor himself as a treasonable movement, the government was from time to time forced to make concessions to the various groups which placed their sectional interests in the forefront of their programmes. To conciliate the Catholic Centre party, numeri- cally the strongest of all, various concessions were from time to time made to the Roman Catholic Church, e.g. the repeal in 1904 of the clause of the Anti- Jesuit Law forbidding the settlement of individual members of the order in Germany. The Conserva- tive Agrarians were conciliated by a series of tariff acts placing heavy duties on the importation of agricultural produce and exempting from duty agricultural implements.

The first of these tariffs, which in order to overcome Socialist obstruction was passed en bloc on December 13-14, 1902, led to an alarming alteration in the balance of parties Social j n tjj e new Reichstag of 1903, the Socialists — who had previously numbered 58 — winning 81 seats, a gain of 23. Of the other groups only one, and that hostile to the government — the Poles — had gained a seat. This startling victory of the Social Democracy, though to a certain extent discounted by the dissensions between the two wings of the party which were revealed at the congress at Dresden in the same year, was in the highest degree disconcerting to the government; but in the actual manipulation of the Reichstag it facilitated the work of the chancellor by enabling him to unite the other groups more readily against the common enemy. The most striking effect of the development of this antagonism was the gradual disappearance as a factor in politics of the Liberals, the chief builders of the Empire. Their part henceforth was to vote blindly with the Conservative groups, in a common fear of the Social Democracy, or to indulge in protests, futile because backed by no power inside or outside the parliament; their impotence was equally revealed when in December 1902 they voted with the Agrarians for the tariff, and in May 1909 when they withdrew in dudgeon from the new tariff committee, and allowed the reactionary elements a free hand. The political struggle of the future lay between the Conservative and Clerical elements in the state, alike powerful forces, and- the organized power of the Social Democracy. In the elections of 1907, indeed, the Social Democratic party, owing to the unparalleled exertion of the government, had a set-back, its representation in parlia- ment sinking to 43 ; but at the International Socialist Congress, which met at Stuttgart on the 18th of August, Herr Bebel was able to point out that, in spite of its defeat at the polls, the Socialist cause had

actually gained strength in the country, their total poll having increased from 3,010,771- in 1903 to

3,250,000.

xi. 29

Demo cracy.

Personal Inter- vention of the emperor.

In addition to the political strife and anxiety due to this fundamental cleavage within the nation, Germany was troubled during the first decade of the 20th century by friction and jealousies arising out of the federal constitution Pra I s lf of the Empire and the preponderant place in it of Empire. Prussia. In the work of pressing on the national and international expansion of Germany the interests and views of the lesser constituent states of the Empire were apt to be over- looked or overridden; and in the southern states there was considerable resentment at the unitarian tendency of the north, which seemed to aim at imposing the Prussian model on the whole nation. This resentment was especially conspicuous in Bavaria, which clings more tenaciously than the other states to its separate traditions. When, on the 1st of April 1902, a new stamp, with the superscription " Deutsches Reich," was issued for the Empire, including Wurttemberg, Bavaria refused to accept it, retaining the stamp with the Bavarian lion, thus emphasizing her deter- mination to retain her separate postal establishment. On the 23rd of October 1903 Baron Podevils, the new premier, addressing the Bavarian diet, declared that his government " would combat with all its strength" any tendency to assure the future of the Empire on any lines other than the federative basis laid down in the imperial constitution.

This protest was the direct outcome of an instance of the tendency of the emperor to interfere in the affairs of the various governments of the Empire. In 1902 the Clerical majority in the Bavarian diet had refused to vote £20,000 asked by the government for art purposes, whereupon the emperor had telegraphed expressing his indignation and offering to give the money himself, an offer that was politely declined. Another instance of the emperor's interference, constitutionally of more importance as directly affecting the rights of the German sovereigns, was in the question of the succession to the principality of Lippe (see Lippe). The impulsive character of the emperor, which led him, with the best intentions and often with excellent effect, to interfere everywhere and in everything and to

utter opinions often highly inconvenient to his ministers, was the subject of an interpellation in the Reichstag on the 20th of January 1903 by the Socialist Herr von Vollmar, himself a Bavarian. Count Bulow, in answer to his criticisms, declared that " the German people desired, not a shadow, but an emperor of flesh and blood." None the less, the continued " indiscretions " of the emperor so incensed public opinion that, five years later, the chancellor himself was forced to side with it in obtaining from the emperor an undertaking to submit all his public utterances previously to his ministers for approval (see William II., German emperor).

Meanwhile, the attempt to complete the Germanization of the frontier provinces of the Empire by conciliation or repression continued. In this respect progress was made especially The non . in Alsace-Lorraine. In May 1902, in return for the German money granted by the Reichslilnder for the restoration nation- of the imperial castle of Hohekonigsburg in the Vosges, as '

the emperor promised to abolish the Diktaturparagraphen; the proposal was accepted by the Reichstag, and the exceptional laws relating to Alsace-Lorraine were repealed. Less happy were the efforts of the Prussian government at the Germaniza- tion of Prussian Poland and Schleswig. In the former, in spite of, or perhaps because of, the attempt to crush the Polish language and spirit, the Polish element continuously increased, reinforced by immigrants from across the frontier; in the latter the Danish language more than held its own, for similar reasons, but the treaty signed on the nth of January 1907 between Prussia and Denmark , as to the status of the Danish " optants " in the duchies, removed the worst grievance from which the province was suffer- ing (see Schleswig-Holstein Question).

Of more serious import were the yearly and increasing deficits in the imperial budget, and the consequent enormous growth of the debt. This was partly due to the commercial and industrial depression of the early years of the century, partly was another outcome of the federal constitution, which made it difficult to

adjust the budget to the growing needs of the Empire without

disarranging the finances of its constitutent states. The crisis Resigaa- became acute when the estimates for the year 1909 (ton of showed that some £25,000,000 would have to be raised Prince von foy additional taxes, largely to meet the cost of the ex- panded naval programme. The budget presented to the Reichstag by Prince Biilow, which laid new burdens upon the landed and capitalist classes, was fiercely opposed by the Agrarians, and led to the break-up of the Liberal-Conservative bloc on whose support the chancellor had relied since the elections of 1906. The budget was torn to pieces in the committee selected to report on it; the Liberal members, after a vain protest, seceded; and the Conservative majority had a free hand to amend it in accord- ance with their views. In the long and acrimonious debates that followed in the Reichstag itself the strange spectacle was pre- sented of the chancellor fighting a coalition of the Conservatives and the Catholic Centre with the aid of the Socialists and Liberals. The contest was from the first hopeless, and, but for the personal request of the emperor that he would pilot the Finance Bill through the House in some shape or other, Prince Biilow would have resigned early in the year. So soon as the budget was passed he once more tendered his resignation, and on the 14th of July a special edition of the Imperial Gazette announced that it had been accepted by the emperor. The post of imperial chancellor was at the same time conferred on Theobald von Bethmann-Hollweg, the imperial secretary of state for the interior. 1 (W. A. P.)

Bibliography of German History. — Although the authorities for the history of Germany may be said to begin with Caesar, it is Tacitus who is especially useful, his Germania being an in- valuable mine of information about the early inhabitants of the country. In the dark and disordered centuries which followed there are only a few scanty notices of the Germans, mainly in the works of foreign writers like Gregory of Tours and Jordanes; and then the 8th and 9th centuries, the time of the revival of learning which is associated with the name of Charlemagne, is reached. By the end of this period Christianity had been firmly established among most of the German tribes; the monks were the trustees of the new learning, and we must look mainly, although not exclusively, to the monasteries for our authorities. The work of the monks generally took the form of Annales or Chronica, and among the numerous German monasteries which are famous in this connexion may be mentioned Fulda, Reichenau, St Gall and Lorsch. For contemporary history and also for the century or so which preceded the lifetimes of their authors these writings are fairly trustworthy, but beyond this they are little more than collections of legends. There are also a large number of

lives of saints and churchmen, in which the legendary element is still more conspicuous.

With regard to the Annates and Chronica three important considerations must be mentioned. They are local, they are monastic, and they are partisan. The writer in the Saxon abbey of Corvey, or in the Franconian abbey of Fulda, knows only about events which happened near his own doors; he records, it is true, occurrences which rumour has brought to his ears, but in general he is trustworthy only for the history of his own neighbourhood. The Saxon and the Franconian annalists know nothing of the distant Bavarians; there is even a gulf between the Bavarian and the Swabian. Then the Annals are monastic. To their writers the affairs of the great world are of less importance than

1 He was born on November 29, 1856, the son of a wealthy Rhenish landowner, and grandson of Moritz August von Bethmann- Hollweg (1 795-1877), professor of law at Bonn, ennobled in 1840, and from 1858 to 1862 minister of education and religion at Berlin. Herr von Bethmann-Hollweg studied law at Strassburg, Leipzig and Berlin, entered the Prussian civil service in 1882, and, passing successfully through the various stages of a German administrative career, became governor (Oberprasident) of the province of Branden- burg in 1899. In 1905 he became Prussian minister of the interior. Two years later he succeeded Count Posadowskyas imperial secretary of state for the interior and representative of the imperial chancellor, and was at the same time made vice-president of the council of Prussian ministers, an office and title which had been in abeyance for some years and were now again suppressed.

those of the monastery itself. The Saxon Widukind, for instance, gives more space to the tale of the martyrdom of St Vitus than he does to several of the important campaigns of Henry the Fowler. Lastly, the annalist is a partisan. One is con- cerned to glorify at all costs the Carolingian house; another sacrifices almost everything to attack the emperor Henry IV. and to defend the Papacy; while a third holds a brief for some king or emperor, like Louis the Pious or Otto the Great.

Two difficulties are met with in giving an account of the sources of German history. In the 7 th, 8th and 9th centuries it is hard, if not impossible, to disentangle the history of Germany from that of the rest of the Frankish empire of which it formed part; in fact it is not until the time of the dissensions between the sons of the emperor Louis I. that there are any signs of demarcation between the East and

the West Franks, or, in other words, any separate history of Germany. The second difficulty arises later and is due to the connexion of Germany with the Empire. Germany was always the great pillar of the imperial power; for several centuries it was the Empire in everything but in name, and yet its political history is often overshadowed by the glamour of events in Italy. While the chroniclers were recording the deeds of Frederick I. and of Frederick II. in the peninsula, the domestic history of Germany remained to a large extent unwritten.

Among the early German chroniclers the Saxon Widukind, the author of the Res gestae Saxonicae, is worthy of mention. He was a monk of Corvey, and his work is the best authority for the early history of Saxony. Lambert, a monk of Hersfeld, and Widu- kind's countryman, Bruno, in his De bello Saxonico, tell the story of the great contest between the emperor Henry IV. and Pope Gregory VII., with special reference to the Saxon part of the struggle. But perhaps the ablest and the most serviceable of these early writers is Otto of Freising, a member of the Baben- berg family. Otto was also related to the great house of Hohen- staufen, a relationship which gave him access to sources of information usually withheld from the ordinary monastic annalist, and his work is very valuable for the earlier part of the career of Frederick I. Something is learned, too, from biographies written by the monks, of which Einhard's Vita Karoli Magni is the greatest and the best, and Wipo's life of the emperor Conrad II. is valuable, while another Carolingian courtier, Nithard, has a special interest as, almost alone among these early chroniclers, being a soldier and not a monk.

The monastic writers remain our chief authorities until the great change brought about by the invention of printing, although a certain amount of work was done by clerical writers attached to the courts of various rulers. Parallel with this event the revival of learning was producing a great number of men who could write, and, more important still, of men who were throwing off themonastic habits of thought and passing into a new intellectual atmosphere. The Renaissance was followed by the fierce con- troversies aroused by the Reformation, and the result was the output of an enormous mass of writings covering every phase of the mighty combat and possessing every literary virtue save that of impartiality. But apart from these polemical writings, many of which had only an ephemeral value, the Renaissance was the source of another stream of historical literature. Several princes and other leading personages, foremost among whom was the emperor Maximilian I., had spent a good deal of time and money in collecting the manuscripts of the medieval

chroniclers, and these now began to be printed. The chronicle of Otto of Freising, which appeared in 151 5, and the Vita of Einhard, which appeared six years later, are only two among the many printed at this time. The publication of collections of chronicles began in 1529, and the uncritical fashion in which these were reproduced made forgeries easy and frequent. There was, indeed, more than a zeal for pure learning behind this new movement; for both parties in the great religious controversy of the time used these records of the past as a storehouse of weapons of offence. The Protestants eagerly sought out the writings which exposed and denounced the arrogance of the

popes, while the Romanists attempted to counter them with the numerous lives of the saints.

But before the raw material of history thus began to increase enormously in bulk, it had already begun to change its character and to assume its modern form. The Chronicle still survived as a medium of conveying information, though more often than not this was now written by a layman; but new stores of information were coming into existence, or rather the old stores were expanding and taking a different form. Very roughly these may be divided into six sections. (1) Official documents issued by the emperors and other German rulers. (2) Treaties concluded between Germany and other powers and also between one German state and another. (3) Despatches sent to England, Spain and other countries by their representatives in various parts of Germany.

(4) Controversial writings or treatises written to attack or defend a given position, largely the product of the Reformation period.

(5) The correspondence of eminent and observant persons. (6) An enormous mass of personal impressions taking the form of Commentaries, Memoirs and Diaries (Tagebucher). Moreover, important personages still find eulogistic biographers and defenders, e.g. the fanciful writings about the emperor Maxi- milian I. or Pufendorf's De rebus gestis Friderici Wilhelmi Magni electoris Brandenburgici.

Through the dust aroused by the great Reformation controversy appear the dim beginnings of the scientific spirit in the writing of

history, and in this connexion the name of Aventinus, " the Bavarian Herodotus," may be mentioned. But for many years hardly any progress was made in this direction. Even if they possessed the requisite qualifications the historiographers attached to the courts of the emperor Charles V. and of lesser potentates could not afford to be impartial. Thus new histories were written and old ones unearthed, collected and printed, but no attempt was made to criticize and collate the manuscripts of the past, or to present two sides of a question in the writings of the present. Among the collections of authorities made during the 16th and 17th centuries those of J. Pistorius (Frankfort, 1583-1607), of E. Lindenbrog (Frankfort, 1609) and of M. Freher (Frankfort, 1600-1611), may be noticed, although these were only put together and printed in the most haphazard and unconnected fashion. Passing thus through these two centuries we reach the beginning of the 18th century and the work done for German historical scholarship by the philosopher Leibnitz, who sought to do for his own country what Muratori was doing for Italy. For some years it had been recognized that the collection and arrangement of the authorities for German history was too great an undertaking for any one man, and societies under very influential patronage were founded for this purpose. But very slight results attended these elaborate schemes, although their failure did not deter Leibnitz from pursuing the same end. The two chief collections which were issued by the philosopher are the Accessiones historicae (1608-1700) and the Scriptores rerum Brunsvicensium; the latter of these, containing docu- ments centring round the history of the Welf family, was pub- lished in three volumes at Hanover (1707-1711). Leibnitz worked at another collection, the Origines Guelficae, which was completed and issued by his pupils (Hanover, 1750-1780), and also at Annales imperii occidentis Brunsvicenses, which, although the most valuable collection of the kind yet made, was not pub- lished until edited'by G. H. Pertz (Hanover, 1843-1846). Other collections followed those of Leibnitz, among which may be mentioned the Corpus hisloricum medii aevi of J. G. Eccard (Leipzig, 1723) and the Scriptores rerum Germanicarum of J. B. Mencke (Leipzig, 1728). But these collections are merely heaps of historical material, good and bad; the documents therein were not examined and they are now quite superseded. They give, however, evidence of the great industry of their authors, and are the foundations upon which modern German scholarship has built.

In the 10th century the scientific spirit received a great impetus from the German system of education, one feature of which was that the universities began to require original work for some of their degrees.

In this field of scientific research the

Germans were the pioneers, and in it they are still pre-eminent, with Ranke as their most famous name and the Monumenta Germaniae historica as their greatest production. The Monu- menta is a critical and ordered collection of documents relating to the history of Germany between 500 and 1 500. It owes its origin mainly to the efforts of the statesman Stein, who was responsible for the foundation of the Gesellschaft fur dltere deutsche Geschichtskunde, under the auspices of which the work was begun. The Gesellschaft was established in 1810, and, the editorial work having been entrusted to G. H. Pertz, the first volume of the Monumenta was published in 1826. The work was divided into five sections: Scriptores, Leges, Diplomata, Epistolae and Antiquitates, but it was many years before anything was done with regard to the two last-named sections. In the three remaining ones, however, folio volumes were published regularly, and by 1909 thirty folio volumes of Scriptores, five of Leges and one of Diplomata imperii had appeared. But meanwhile a change of organization had taken place. When Pertz resigned his editorial position in 1874 and the Gesellschaft was dissolved, twenty-four folio volumes had been published. The Prussian Academy of Sciences now made itself responsible for the continu- ance of the work, and a board of direction was appointed, the presidents of which were successively G. Waitz, W. Wattenbach, E. Diimmler and O. Holder-Egger. Soon afterwards as money became more plentiful the scope of work was extended; the production of the folio volumes continued, but the five sections were subdivided and in each of these a series of quarto volumes was issued. The titles of these new sections give a sufficient idea of their contents. The Scriptores are divided into Auctores antiquissimi, Scriptores rerum Merovingicarum, Scriptores rerum Langobardicarum et Italicarum, Libelli de lite imperatorum et pontificum, Gesta pontificum Romanorum and Deutsche Chroniken, or Scriptores qui vernacula lingua usi sunt. The Leges are divided into Leges nationum Germanicarum, Capitularia regum Francorum, Concilia, Conslitutiones imperatorum et regum and Formulae. Three quarto volumes of Diplomata regum et imperatorum Germaniae and one of Diplomata Karolingorum had been pub- lished by 1909. Work was also begun upon the Antiquitates and the Epistolae. The sections of the former are Po'etae Latini medii aevi, Libri confraternitatum and Necrologia Germaniae, and of the latter Epistolae saeculi XIII. and Epistolae Mero- vingici et Karolini aevi. Meanwhile the publication of the Scriptores proper continues, although the thirty-first and sub- sequent volumes are in quarto and not in folio, and the number of

volumes in the whole undertaking is continually being increased. The archives of the Gesellschaft have been published in twelve volumes, and a large number of volumes of the Neues Archiv have appeared. Some of the MSS. have been printed in facsimile, and an index to the Monumenta, edited by O. Holder-Egger and K. Zeumer, appeared in 1890. The writings of the more im- portant chroniclers have been published separately, and many of them have been translated into German.

It will thus be seen that the ground covered by the Monumenta is enormous. The volumes of the Scriptores contain not only the domestic chroniclers, but also selections from the work of foreign writers who give information about the history of Germany — for example, the Englishman Matthew Paris. In the main these writings are arranged in chronological order. Each has been edited by an expert, and the various introductions give evidence of the number of MSS. collated and the great pains taken to ensure textual accuracy on the part of the different editors, among whom may be mentioned Mommsen aud Lappenberg. Other great names in German historical scholarship have also assisted in this work. In addition to Waitz the Leges section has ■enjoyed the services of F. Bluhme and of H. Brunner, and the Diplomata section of T. Sickel, H. Bresslau and E. Miihlbacher. The progress of the Monumenta stimulated the production of other works of a like nature, and among the smaller collections of authorities which appeared during the 19th century two are worthy of mention. These are the Fontes rerum Germanicarum, edited by J. F. Bohmer (Stuttgart, 1843-1868), a collection of sources of the 12th, 13th and 14th centuries, and the Bibliotheca

rerum Germanicarum, edited by Ph. Jaffe (Berlin, 1864-1873). Another development followed the production of the Monumenta, this being the establishment in most of the German states of societies the object of which was to foster the study of local history. Reference may be made to a Verein for this purpose in Saxony and to others in Silesia and in Mecklenburg. Much has also been done in Prussia, inBrandenburg,in Bavaria, in Hanover, in Wiirttemberg and in Baden, and collections of authorities have been made by competent scholars, of which the Geschichts- quellen der Provinz Sachsen und

angrenzender Gebiete (Halle, 1870, fol.), which extends to forty volumes, the smaller Scriplores rerum Prussicarum (Leipzig, 1861-1874), and the seventy-seven volumes of the Publikationen aus den kbniglichen preussischen Staatsarchiven, veranlasst und unterstutzt durch die kbnigliche Archiwerwallung (Leipzig, 1878, fol.), may be cited as examples. The cities have followed the same path and their archives are being thoroughly examined. In 1836 an Urkundenbuchoi Frank- fort was published, and this example has been widely followed, the work done in Cologne, in Bremen and in Mainz being perhaps specially noticeable. Moreover an historical commission at Munich has published twenty-eight volumes in the series Die Chroniken der deutschen Stadte vom 14. bis ins 16. Jahrhundert (Leipzig, 1862, fol.). Lastly, many documents relating to the great families of Germany, among them those of Hohenzollern and of Wittelsbach, have been carefully edited and given to the world.

With this great mass of material collected, sifted and edited by scholars of the highest standing it is not surprising that modern works on the history of Germany are stupendous in number and are generally of profound learning, and this in spite of the fact that some German historians— Gregorovius, Pauli and Lappenberg, for example — have devoted their time to researches into the history of foreign lands.

The earliest period is dealt with by K. Zeuss in Die Deutschen und die Nachbarstamme ”(Munich, 1837; new ed., Gottingen, 1904); and then by F. Dahn in his Urgesckichte der germanischen und roma- nischen Volker (Berlin, 1 880-1 889) and his Die Kbnige der Germanen, volumes of which have appeared at intervals between 1861 and 1909.

The Carolingian time is covered by E. Diimmler’s Geschichte des ostfrankischen Reichs (Leipzig, 1 887-1 888), and then follow Ranke’s Jahrbiicher des deutschen Reichs unter dem sdchsischen Hause (Berlin, 1 837-1 840), W. von Giesebrecht’s Geschichte der deutschen Kaiserzeit (1855-1888), and F. Raumer’s Geschichte der Hohenstaufen.

For the reigns of Lothair the Saxon and Conrad III. P. Jaff6’s books, Geschichte des deutschen Reiches unter Lothar dem Sachsen (Berlin, 1843) and Geschichte des deutschen Reiches unter Conrad III. (Hanover, 1845), may be consulted.

The chief histories on the period between the fall of the Hohen-

staufen and the Renaissance are: T. Lindner, Deutsche Geschichte unter den Habsburgern und Luxemburgern (Stuttgart, 1 888-1 893); O. Lorenz, Deutsche Geschichte im 13. und 14. Jahrhundert (Vienna, 1863-1867); J. Aschbach, Geschichte Kaiser Sigmunds (Hamburg, 1838— 1845); K. Fischer, Deutsches Leben und deutsche Zustdnde von der Hohenstaufenzeit bis ins Reformationszeitalter (Gotha, 1884); V. von Kraus, Deutsche Geschichte im Ausgange des Mittelalters (Stuttgart, 1 888-1905), and A. Bachmann, Deutsche Reichs geschichte im Zeitalter Friedrichs III. und Maximilians I. (Leipzig, 1 884-1 894).

The two greatest works on the Reformation period are L. von Ranke's Deutsche Geschichte im Zeitalter der Reformation (Leipzig, 1882) and J. Janssen's Geschichte des deutschen Volkes seit dem Ausgang des Mittelalters (1897-1903). Other works which may be mentioned are: F. B. von Bucholtz, Geschichte der Regierung Ferdinands I. (Vienna, 1831-1838) ; C. Egelhaaf, Deutsche Geschichte im Zeitalter der Reformation (Berlin, 1893), and F. von Bezold, Geschichte der deutschen Reformation (Berlin, 1890).

For the years after the Reformation we have Ranke, Zur deutschen Geschichte — Vom Religionsfrieden bis zum $ojdhrigen Kriege (Leipzig, 1888); M. Ritter, Deutsche Geschichte im Zeitalter der Gegenrefor- mation und des dreissigjdhrigen Krieges (Stuttgart, 1887, fol.); G. Droysen, Geschichte der Gegenreformation (Berlin, 1893) ; A. Gindely, Rudolf II. und seine Zeit (Prague, 1862-1868) and Geschichte des dreissigjdhrigen Krieges (Prague, 1869-1880). Gindely's book is, of course, only one among an enormous number of works on the Thirty Years' War.

For the period leading up to the time of Frederick the Great we have B. Erdmannsdorffer, Deutsche Geschichte vom Westfdlischen Frieden bis zum Regierungsantritt Friedrichs des Grossen (Berlin, 1 892-1 893) ; and then follow Ranke, Zur Geschichte von Osterreich und Preussen zitischen den Friedensschliissen von Aachen und Hubertus-burg (Leipzig, 1875) an d Die deutschen Mdchte und der Fiirstenbund

(Leipzig, 1871-1872); K. Biedermann, Deutschland im 18. Jahr-hundert (Leipzig, 1854-1880); W. Oncken, Das Zeitalter Friedrichs des Grossen (Berlin, 1880-1882) ; A. von Arneth, Geschichte Maria Theresias (Vienna, 1863-1879); L. Hausser, Deutsche Geschichte vom Tode Friedrichs des Grossen bis zur Griindung des Deutschen Bundes (Berlin, 1861-1863), and K.T. von~Heige\, Deutsche Geschichte vom Tode Friedrichs des Grossen bis zur Auflosung des

alien Reichs (Stuttgart, 1899, f'l-)-

For the 19th century we may mention: H. von Treitschke, Deutsche Geschichte im 19. Jahrhundert (Leipzig, 1 879-1 894); H. von Sybel, Die Begriindung des deutschen Reiches durch Wilhelm I. (Munich, 1889-1894); G. Kaufmann, Polilische Geschichte Deutsch- lands im 19. Jahrhundert (Berlin, 1900), and H. von Zwiedeneck-Sudenhorst, Deutsche Geschichte von der Auflosung des alien bis zur Griindung des neuen Reiches (Stuttgart, 1897-1905). These are perhaps the most important, but there are many others of which the following is a selection : K. Fischer, Die Nation und der Bundestag (Leipzig, 1880); K. Klupfel, Geschichte der deutschen Einheits-bestrebungen bis zu ihrer Erfiillung (Berlin, 1872-1873); H. Blum, Die deutsche Revolution 1848-1849 (Florence, 1897) and Das deutsche Reich zur Zeit Bismarcks (Leipzig, 1893); W. Maurenbrecher, Griindung des deutschen Reiches (Leipzig, 1892); H. Friediung, Der Kampf um die Vorherrschaft in Deutschland 1859-1866 (Stuttgart, 1897); C. von Kaltenborn, Geschichte der deutschen Bundesverhdlt- nisse und Einheitsbestrebungen von 1806-1856 (Berlin, 1857); J. Jastrow, Geschichte des deutschen Einheitstraumes und seiner Erfiillung (Berlin, 1885), and P. Kloppel, Dreissig Jahre deutscher Verfassungs- geschichte (Leipzig, 1900).

For the most recent developments of German politics see H. Schulthess, Europdischer Geschichtskalender (Nordlingen, 1861, fob, a work similar to the English Annual Register) ; W. Miiller and K. Wippermann, Politische Geschichte der Gegenwart (Berlin, 1868, fol.) ; the Statistisches Jahrbuch des deutschen Reichs, and A. L. Lowell, Governments and Parties in Continental Europe (1896).

A good general history of Germany is the Bibliothek deutscher Geschichte, edited by H. von Zwiedeneck-Slidenhorst (Stuttgart, 1876, fob). Other general histories, although on a smaller scale, are K. Lamprecht, Deutsche Geschichte (Berlin, 1891-1896) ; O. Kammel, Deutsche Geschichte (Dresden, 1889); K. Biedermann, Deutsche Volks- und Kultur geschichte (Wiesbaden, 1885); T. Lindner, Ge- schichte des deutschen Volks (Stuttgart, 1894); the Handbuch der deutschen Geschichte, edited by B. Gebhardt (Stuttgart, 1901), and K. W. Nitzsch, Geschichte des deutschen Volkes bis zum Augsburger Religionsfrieden (Leipzig, 1883-1885).

Special reference is deservedly made to three works of the highest value. These are J. G. Droysen's great Geschichte der preussischen Politik (Berlin, 1855-1886); the Deutsche Reichstagsakten, the first series of which was published at Munich (1867, fol.) and the second

at Gotha (1893-1901); and the collection known as the Regesta imperii, which owes its existence to the labours of J. F. Bohmer. Nearly the whole of the period between 751 and 1347 is covered by these volumes; the charters and other documents of some of the German kings being edited by Bohmer himself, and new and enlarged editions of certain sections have been brought out by J. Ficker, E. Winkelmann and others. . Much useful information on the history of different periods is contained in the lives of individual emperors and others. Among these are H. Prutz, Kaiser Friedrich I. (Danzig, 1871-1874); F. W. Schirrmacher, Kaiser Friedrich II. (Gottingen, 1859-1865); H. Ulmann, Kaiser Maximilian I. (Stutt- gart, 1884-1891); F. von Hurter, Geschichte Kaiser Ferdinands II. (Schaffhausen, 1857-1864), and H. Blum, Fiirst Bismarck und seine Zeit (Munich, 1895). There is also the great series of volumes, primary and supplementary, forming the Allgemeine deutsche Biographie (Leipzig, 1875, fob), in which the word deutsche is interpreted in the widest possible sense.

Apart from political histories there are useful collections of laws and other official documents of importance, and also a large number of valuable works on the laws and constitutions of the Germans and on German institutions generally. Among the collections are M. Goldast, Collectio constitutionum imperialium (16 13; new and enlarged edition, 1673) ; the Capitulationes imperatorum et regum Romana-Germanorum (Strassburg, 1 851) of Johann Limnaus, and the Corpus juris Germanici antiqui (Berlin, 1824) of F. Walter. Collections dealing with more recent history are J. C. Glaser's Archiv des norddeutschen Bundes. Sammlung alter Gesetze, Vertrdge und Aktenstiicke, die Verhdltnisse des norddeutschen Bundes betreffend (Berlin, 1867); W. Jungermann's Archiv des deutschen Reiches (Berlin, 1873, fob), and the ActaBorussica. Denkmaler der preussischen Staatsverwaltung im 18. Jahrhundert (Berlin, 1892, fob). Mention may also be made of C. C. Homeyer's edition of the Sachsenspiegel and L. A. von Lassberg's edition of the Schwabenspiegel ; the many volumes of Wallenstein's letters and papers; the eighteen volumes of the Urkunden und Aktenstiicke zur Geschichte des Kurfiirsten Friedrich Wilhelm von Brandenburg (Berlin, 1864, fol.) ; and the thirty volumes of the Politische Korrespondenz Friedrichs des Grossen (Berlin, 1879-1905). Modern writers on these subjects distinguished for their learning are G. Waitz {Deutsche Verfassungsgeschichte, Kiel and Berlin, 1844, fol.) and G. L. von Maurer {Geschichte der Stddte- verfassung in Deutschland, Erlangen, 1 869-1 871, and other cognate writings), their works being valuable not only fortheearly institutions

erf the Germans, but also for those of other Teutonic peoples. Vtner works on the German constitution and German laws are K. K Eichhorn, Deutsche Staats- und Rechtsgeschichte (Gottingen, 1 843-1 844); R. Schroder, Lehrbuch der deutschen Rechtsgeschichte (Leipzig, 1889 and again 1902); H. Brunner, Deutsche Rechts-geschichte (Leipzig, 1 887-1 892), and Grundzilge der deutschen Rechts- geschichte (Leipzig, 1 901-1903), and E. Mayer, Deutsche und franzb- stsche Verfassungsgeschichte vom q.ii. Jahrhundert (Leipzig 1899) Manners and customs are dealt with in J. Scherr's Deutsche Kultur

%f,JoTZ ?e X af (Lei P z !SV 8 52-l853); J. Lippert's Deutsche Sittengeschichte (Vienna and Prague, 1889); O. Henne am Rhyn's Kulturgeschichte des deutschen Volkes (Berlin, 1886); the Geschichte des deutschen Volkes und seiner Kultur im Mittelalter (Leipzig, 1891-

• »i-« , i, A,' a ? d F ' von L6her ' s Kulturgeschichte der Deutschen im Mittelalter (Munich 1 891-1894). Among the works on husbandry maybe mentioned: K Biicher, Die Entstehung der Volkswirtschaft (Tubingen, 1893); K. T. von Inama-Sternegg, Deutsche Wirtschafts-W^ll, f, , (I t eipz . lg ' J.? 7 ?790i), .and K. Lamprecht, Deutsches Wirtschaflsleben im Mittelalter (Leipzig, 1886). For antiquities see l-ZJ^'i Fu "f. Bucher deutscher Hausaltertiimer von den altesten geschichtlichen Zeiten bis zum 16. Jahrhundert (Leipzig, 1899-iao^ and L. Lindenschmit Handbuch der deutschen Altertumskunde Brunswick, 1880-1889). For the history of the German church I ? w d' K^ngeschichte Deutschlands (Leipzig, 1887-1001) • s Z' Re J ttl ? er g' Kirchengeschichte Deutschlands (Gottingen, 1846- s2, ',sa <, J ' Jriedrich, Kirchengeschichte Deutschlands (Bamberg, J?l~l 9 \ ■ r <- n – ance , see ?• D – Hullmann, Deutsche Finanz- geschichtedes Mittelatters (1805); for the administration of justice J* ac- -i 1 ' Da ^ e ^ hskl >fgertchtim Mittelalter (Weimar, 1867-1869) Terriinfl^lkt ^ En l mc * elun g/ es gdehrten Richtertums in deutschen lerritonen (Stuttgart, 1872); for the towns and their people see Lt R W '- S Volkszahl deutscher Stddte zu Ende des Mitielalters und zu Begmnder Neuzeit Berlin, 1886) ; F. W. Barthold Geschichte d" deutschen Stddte und des deutschen Burgertums^^ T8 5 £-

■uintin^ n' ■ g ' J d i te undGilden der Sermanischen Vblkerim Mjttdalter (Leipzig, 1891); and for manufactures and commerce or V 1? a ' ?r le Geschichte des deutschen Handels (Leipzig 18SQ 7ei? 'L ■ •„, / ^ as ^ her ' Da \ d Z lSch ! Gewerbewesen von der friihesten

Zeit bs auf die Gegenwart (Potsdam, 1866); F. W. Stahl Das denser Handverk (Giessen, 1874); the numerous writings on the history of the Hanseatic League and other works. The nobles and the other social classes have each their separate histories among

Bredau'lio Uit i? n p S ˆ Geschichte des deutschen Adls

(tSreslau 1845), and K. H. Roth von Schreckenste n, Die Ritterwurde

und der Rilterstand (Freiburg, 1866). KMierwurae

The Germans have produced some excellent historical atlases

(GoX fc K • ™ n ˆ™™\mstorisch-geogra P hischer HandaTas (Uotna, 1853); a new edition of this by T. Menke railed Hn,lntln? fur die Geschichte des Mitielalters und dl neZenliˆothai88o) and G. Droysen s Allgememer historischer Handatlas (Leipzig! 1886) The historical geography of Germany is dealt with in B Knull's HistorischeGeographie Deutschlands im Mittelalter (Breslau 190,)" in F H. Muller's Die deutschen Stdmme und ihre Fiir-sten Hamburg country '" ma " y ° th6r WOrkS referring t0 the different ˆ oftlfe English books on the history of Germany are not very numerous There is a short History of Germany by James Sime (iSˆTZther by E. F Henderson (1902)ˆ and A History of Germany 1715-181$ by C. T. Atkinson (1909). H. A. L. Fisher's Medieval Empire (189$ is very useful for the earlier period, and J. Bryce's Holy Roman*

?t P Z e u ˆTˆh, There is a translation of Jan senˆs G " schichte by M. A. Mitchell and A. M. Christie (1896, fol) and there

HisZT Two EnVh hV d ff6 – rent r' U T S ° f the Cambridge Modern

fahfˆjhˆˆr kˆso rfk ˆ

H von Svbel, and the Historisches Jahrbuch

In guides to the historical sources and to modern historical works Germany is well served There is the Quellenkundederdeul c hen Geschichte (Leipzig, 1906) of Dahlmann-Waitz, a most comneX!

(B Xn' a ,8j, th fe rn of W "wtl ˆfˆlUn \ZTiMaTr ˆtseriin, I893-1894) of W. Wattenbach; A. Potthast's Bibltothern histonca medu aem (Berlin, 1896), and the Deulschfands Gechithtl quellen sender Mitte des 13. Jahrhunderts (Berlin, 188ˆ1887) ofO Lorenz and A. Goldmann. 7a w H *1*

GERMERSHEIM, a fortified town of Germany in Rhenish Bavaria at the confluence of the Queich and the Rhine, 8 m b.W.of Speyer. Pop. (1905) 5914. It possesses a Roman Catholic and an Evangelical church, a synagogue, a progymnasium and a hospital. The industries include fishing, shipbuilding and brewing Germersheim existed as a Roman stronghold under the name oiVtcus Julius. The citadel was rebuilt by the emperor Conrad II. but the town itself was founded in 1276 by the em- peror Rudolph I., who granted it the rights of a free imperial city

From 1330 to 1622, when it was conquered by Austria, the town formed part of the Palatinate of the Rhine. From 1644 to 1650 it was in the possession of France; but on the conclusion of the peace of Westphalia it was again joined to the Palatinate. In 1674 it was captured and devastated by the French under Turenne, and after the death of the elector Charles (1685) it was claimed by the French as a dependency of Alsace. As a consequence there ensued the disastrous Germersheim war of succession, which lasted till the peace of Ryswick in 1697. Through the intervention of the pope in 1702, the French, on payment of a large sum, agreed to vacate the town, and in 1715 its fortifications were rebuilt. On the 3rd of July 1744 the French were defeated there by the imperial troops, and on the 19th and 22nd of July 1793 by the Austrians. In 1835 the new town was built, and the present fortifications begun.

See Probst, Geschichte der Stadt und Festung Germersheim (Speyer,

GERMISTON, a town of the Transvaal, 9 m. E. of Johannes- burg. Pop. of the municipality (1904) 29,477, of whom 9123 were whites. It lies 5478 ft. above the sea, in the heart of the Witwatersrand gold-mining district, and is an important railway junction. The station, formerly called Elandsfontein Junction, is the meeting-point of lines from the ports of the Cape and Natal, and from Johannesburg, Pretoria and Delagoa Bay. Though possessing a separate municipality, Germiston is practically a suburb of Johannesburg (q.v.) .

GERMONIUS, ANASTASIUS [Anastase Germon] (1551-1627), canon lawyer, diplomatist and archbishop of Tarantaise, belonged to the family of the marquises of Ceve, in Piedmont, where he was born. As archdeacon at Turin he was a member of the com- mission appointed by Pope Clement VIII. to edit the Liber Septimus decretalium; and he also wrote Paratitla on the five books of the

Decretals of Gregory IX. He represented the duke of Savoy at the court of Rome under Clement VIII. and Paul V., and was ambassador to Spain under Kings Philip III. and iv! He died on the 4th of August 1627. Germonius is best known for his treatise on ambassadors, Be legatis principum et populorum hbri trcs (Rome, 1627). The book is diffuse, pedantic and some- what heavy in style, but valuable historically as written by a theorist who was also an expert man of affairs. (See Diplomacy.)

GERO (c. 900-965), margrave of the Saxon east mark, was probably a member of an influential Saxon family. In 937 he was entrusted by the German king Otto, afterwards the emperor Otto the Great, with the defence of the eastern frontier of Saxony against the Wends and other Slavonic tribes; a duty which he discharged with such ability and success that in a few years he extended the Saxon frontier almost to the Oder, and gained the chief credit for the suppression of a rising of the conquered peoples in a great victory on the 16th of October 955. In 963 he defeated the Lusatians, compelled the king of the Poles to recognize the supremacy of the German king, and extended the area of his mark so considerably that after his death it was partitioned into three, and later into five marks. Gero, who is said to have made a journey to Rome, died on the 20th of May 965, and was buried in the convent of Gernrode which he had founded on his Saxon estates. He is referred to by the historian Widukmd as a preses, and is sometimes called the " great mar- grave." He has been accused of treachery and cruelty, is cele- brated in song and story, and is mentioned as the " marcgrave Gere " in the Nibelungenlied.

See Widukind, "Res gestae Saxonicae," in the Monumenta Germamae histonca. Scriptores, Band iii. ; O. von Heinemann, Markgraf Gero (Brunswick, i860).

_ GEROLSTEIN, a village and climatic health resort of Germany, in the Prussian Rhine Province, attractively situated on the Kyll, m the Eifel range, 1100 ft. above the sea, 58 m. W. of Andernach by rail, and at the junction of lines to Treves and St Vith. The castle of Gerolstein, built in 1 1 1 5 and now in ruins, affords a fine view of the Kyllthal. Gerolstein is celebrated for its lithia waters, which are largely exported. Pop. (1900) 1308

GEROME, JEAN LEON (1824-1904), French painter, was born on theiith of May 1824 at Vesoul (Haute-Sadne). He went to Pans in 1841 and worked under Paul Delaroche, whom he

accompanied to Italy (1844-1845). On his return he exhibited " The Cock-fight," which gained him a third-class medal in the Salon of 1847. " The Virgin with Christ and St John " and " Anacreon, Bacchus and Cupid " took a second-class medal in 1848. He exhibited "Bacchus and Love, Drunk," a " Greek Interior" and "Souvenir dTtalie," in 1851; " Paestum" (1852); and " An Idyll " (1853). In 1854 Gerome made a journey to Turkey and the shores of the Danube, and in 1857 visited Egypt. To the exhibition of 1855 he contributed a " Pifferaro," a " Shepherd," " A Russian Concert " and a large historical canvas, " The Age of Augustus and the Birth of Christ." The last was somewhat confused in effect, but in recognition of its consummate ability the State purchased it. Gerome's reputation was greatly enhanced at the Salon of 1857 by a collection of works of a more popular kind: the " Duel: after a Masquerade," " Egyptian Recruits crossing the Desert," " Memnon and Sesostris " and " Camels Watering," the drawing of which was criticized by Edmond About. In " Caesar " (1859) Ger6me tried to return to a severer class of work, but the picture failed to interest the public. " Phryne before the Areopagus," " Le Roi Candaule " and " Socrates finding Alcibiades in the House of Aspasia " (1861) gave rise to some scandal by reason of the subjects selected by the painter, and brought down on him the bitter attacks of Paul de Saint-Victor and Maxjme Ducamp. At the same Salon he exhibited the " Egyptian chopping Straw," and " Rembrandt biting an Etching," two very minutely finished works. Gerome's best paintings are of Eastern subjects; among these may be named the " Turkish Prisoner " and "Turkish Butcher" (1863); "Prayer" (1865); "The Slave Market" (1867); and "The Harem out Driving" (1869). He often illustrated history, as in " Louis XIV. and Moliere " (1863); "The Reception of the Siamese Ambassadors at Fontainebleau " (1865); and the "Death of Marshal Ney " (1868). Gerome was also successful as a sculptor; he executed, among other works, " Omphale '" (1887), and the statue of the due d'Aumale which stands in front of the chateau of Chantilly (1899). His " Bellona " (1892), in ivory, metal, and precious stones, which was also exhibited in the Royal Academy of London, attracted great attention. The artist then began an interesting series of " Conquerors," wrought in gold, silver and gems — "Bonaparte entering Cairo" (1897); "Tamerlane" (1898); and " Frederick the Great " (1899). Gerome was elected member of the Institut in 1865. He died in 1904.

GERONA, a maritime frontier province in the extreme north- east of Spain, formed in 1833 of districts taken from Catalonia, and

bounded on the N. by France, E. and S.E. by the Mediter- ranean Sea, S.W. and W. by Barcelona, and N.W. by Lerida. Pop. (1900) 299,287; area, 2264 sq. m. In the north-west a small section of the province, with the town of Llivia, is entirely isolated and surrounded by French territory; otherwise Gerona is separated from France by the great range of the Pyrenees. Its general aspect is mountainous, especially in the western districts. Most of the lower chains are covered with splendid forests of oak, pine and chestnut. There are comparatively level tracts of arable land along the lower course of the three main rivers — the Ter, Muga and Fluvia, which rise in the Pyrenees and flow in a south-easterly direction to the sea. The coast-line is not deeply indented, but includes one large bay, the Gulf of Rosas. Its two most conspicuous promontories, Capes Creus and Bagur, are the easternmost points of the Iberian Peninsula. The climate is generally temperate and rainy during several months in the valleys and near the coast, but cold in the Cerdana district and other mountainous regions during eight months, while Gerona, La Bisbal and Santa Coloma are quite Mediter- ranean in their hot summers and mild winters. Agriculture is backward, but there are profitable fisheries and fish-curing establishments along the whole seaboard, notably at the ports of Llansa, Rosas, Palamos, San Feliu de Guixols and Blanes. Next in importance is the cork industry at San Feliu de Guixols, Palafrugell and Cassa. More than one hundred mineral springs are scattered over the province, and in 1903 twenty mines were at work, although their total output, which included antimony,

coal, copper, lead, iron and other ores, was valued at less than £7000. There are also important hydraulic cement and ochre works, and no fewer than twenty-two of the towns are centres of manufactures of linen, cotton, woollen stuffs, paper, cloth, leather, steel and furniture. The commerce of the province is important, Port Bou (or Portbou) being, after Irun, the most active outlet for the trade by railway not only with France but with the rest of the continent. The main railway from Barcelona to France runs through the province, and several branch railways, besides steam and electric tramways, connect the principal towns. Gerona, the capital (pop. 1900, 15,787), and Figueras (10,714), long a most important frontier fortress, are described in separate articles; the only other towns with more than 7000 inhabitants are San Feliu de Guixols (11,333), Olot (7938) and Palafrugell (7087). The inhabitants of the province are, like most Catalans, distinguished for their enter- prise, hardiness and keen local patriotism; but emigration, chiefly to Barcelona, kept their numbers almost stationary during the years 1875-1905. The percentage of illegitimate births (1-5) is lower than

in any other part of Spain. (See also Catalonia.) GERONA, the capital of the province of Gerona, in north- eastern Spain, on the railway from Barcelona to Perpignan in France, and on the right bank of the river Ter, at its confluence with the Ona, a small right-hand tributary. Pop. (1900) 15,787. The older part of the town occupies the steep slope of the Montjuich, or Hill of the Capuchins, and with its old-fashioned buildings presents a picturesque appearance against a back- ground of loftier heights; the newer portion stretches down into the plain and beyond the Ona, which is here crossed by a bridge of three arches. The old city walls and their bastions still remain, though in a dilapidated state; and the hill is crowned by what were at one time very strong fortifications, now used as a prison. Gerona is the seat of a bishop, has a seminary, a public library and a theatre, and carries on the manufacture of paper and cotton and woollen goods. Its churches are of ex- ceptional interest. The cathedral is one of the grandest specimens of Gothic architecture in Spain, the nave being the widest pointed vault in Christendom, as it measures no less than 73 ft. from side to side, while Albi, the next in size, is only 58 ft., and Westminster Abbey is only 38. The old cathedral on the same site was used as a mosque by the Moors, and on their expulsion in 1015 it appears to have been very greatly modified, if not entirely rebuilt. During the 14th century new works were again carried out on an extensive scale, but it was not till the beginning of the 15th that the proposal to erect the present magnificent nave was originated by the master of the works, Guillermo Boffiy. The general appearance of the exterior is rather un- gainly, but there is a fine approach by a flight of 86 steps to the facade, which rises in tiers and terminates in an oval rose-window. Among the tombs may be mentioned those of Bishop Berenger or Berenguer (d. 1408), Count Ramon Berenger II. (d. 1082) and the countess Ermesinda (d. 1057). The collegiate church of San Feliu (St Felix) is mainly of the 14th century, but it was considerably modified in the 16th, and its facade dates from the 18th. It is one of the few Spanish churches that can boast of a genuine spire, and it thus forms a striking feature in the general view of the town. The Benedictine church of San Pedro de Galligans (or de los Gallos) is an interesting Romanesque building of early date. It is named from the small river Galligans, an affluent of the Ona, which flows through the city. In the same neighbourhood is a small church worthy of notice as a rare Spanish example of a transverse triapsal plan.

Gerona is the ancient Gerunda, a city of the Auscetani. It claims to be the place in which St Paul and St James first rested when they came to Spain; and it became the see of a bishop about 247. For a

considerable period it was in the hands of the Moors, and their emir, Suleiman, was in alliance with Pippin the Short, king of the Franks, about 759. It was taken by Charlemagne in 785; but the Moors regained and sacked it in 795, and it was not till 1015 that they were finally expelled. At a later date it gave the title of count to the king of Aragon's eldest son. It has been besieged no fewer than twenty-five times in all, and only four

of the sieges have resulted in its capture. The investment by the French under Marshal Hocquincourt in 1653, that of 1684 by the French under Marshal Bellefonds, and the successful enterprise of Marshal Noailles in 1694 are the three great events of its history in the 17th century. Surrendered by the French at the peace of Ryswick, it was again captured by the younger Marshal Noailles in 1706, after a brilliant defence; and in 1717 it held out against the Austrians. But its noblest resistance was yet to be made. In May 1809 it was besieged by the French, with 35,000 troops, under J. A. Verdier, P. F. Augereau and Gouvion St Cyr ; forty batteries were erected against it and a heavy bombardment maintained; but under the leadership of Mariano Alvarez de Castro it held out till famine and fever compelled a capitulation on the 12th of December. The French, it is said, had spent 20,000 bombs and 60,000 cannon balls, and their loss was estimated at 15,000 men.

See Juan Gaspar Roig y Jalpi, Resumen de las Grandezas, &c. (Barcelona, 1678); J. A. Nieto y Samaniego, Memorias (Tarragona, 1810) ; G. E. Street, Gothic Architecture in Spain (London, 1869).

GEROUSIA (Gr. yepoucrla, Doric yepcata), the ancient council of elders at Sparta, corresponding in some of its functions to the Athenian Boule. In historical times it numbered twenty-eight members, to whom were added ex officio the two kings and, later, the five ephors. Candidates must have passed their sixtieth year, i.e. they must no longer be liable to military service, and they were possibly restricted to the nobility. Vacancies were filled by the Apella, that candidate being declared elected whom the assembly acclaimed with the loudest shouts — a method which Aristotle censures as childish (Polit. ii. 9, p. 1271 a 9). Once elected, the gerontes held office for life and were irresponsible. The functions of the. council were among the most important in the state. It prepared the business which was to be submitted to the Apella, and was

empowered to set aside, in conjunction with the kings, any " crooked " decision of the people. Together with the kings and, ephors it formed the supreme executive committee of the state, and it exercised also a considerable criminal and political jurisdiction, including the trial of kings; its competence extended to the infliction of a sentence of exile or even of death. These powers, or at least the greater part of them, were transferred by Cleomenes III. to a board of patronomi (Pausanias ii. 9. 1) ; the gerousia, however, continued to exist at least down to Hadrian's reign, consisting of twenty-three members annually elected, but eligible for re-election {Sparta Museum Catalogue, Nos. 210, 612 and Introduction § 17).

Fuller discussions of the gerousia will be found in Aristotle, Politics, ii. 9, 17-19; Plutarch, Lycurgus, 5, 26; G. F. Schomann, Antiquities of Greece; The State (Eng. trans.), p. 230 ff. ; G. Gilbert, Constitutional Antiquities of Sparta and Athens (Eng. trans.), p. 47 ff. ; C. O. Miiller, History and Antiquities of the Doric Race (Eng. trans.), iii. c. 6, §§ 1-3; G. Busolt, Die griechischen Staats- und Rechtsalter- tiimer (Iwan Miiller's Handbuch der klassischen Altertumswissenschaft, iv. 1), 5 89; Griechische Geschichte, 2te Auflage i. 550 ff. ; A. H. J. Greenidge, Handbook of Greek Constitutional History, 100 ff. ; H. Gabriel, De magistratibus Lacedaemoniorum, 31 ff. (M. N. T.)

GERRESHEIM, a town of Germany, in the Prussian Rhine Province, 6 m. by rail E. of Dusseldorf. It contains a fine Romanesque church, dating from the 13th century, which forms a portion of an ancient nunnery (founded in the 10th century and secularized in 1806), and has extensive glass manufactures and wire factories. Pop. (1905) 14,434.

GERRHA (Arab. al-Jar'a), an ancient city of Arabia, on the west side of the Persian Gulf, described by Strabo (Bk. xvi.) as inhabited by Chaldean exiles from Babylon, who built their houses of salt and repaired them by the application of salt water. Pliny (Hist. Nat. vi. 32) says it was 5 m. in circumference with towers built of square blocks of salt. Various identifications of the site have been attempted, J. P. B. D'Anville choosing El Katif, C. Niebuhr preferring Kuwet and C. Forster suggesting the ruins at the head of the bay behind the islands of Bahrein.

See A. Sprenger, Die alte Geographie Arabiens (Bern, 1875), pp.

135-137-

GERRtJS, a small province of Persia, situated between Khamseh and Azerbaijan in the N., Kurdistan in the W. and Hamadan in the S. Its population is estimated at 80,000, and its capital, Bijar, 180 m. from Hamadan, has a population of

about 4000 and post and telegraph offices. The province is fief of the chief of the Gemis Kurds, pays a yearly revenue of about £3000, and supplies a battalion of infantry (the 34th) to the army.

GERRY, ELBRIDGE (1 744-1814), American statesman, was born in Marblehead, Massachusetts, on the 17th of July 1744, the son of Thomas Gerry (d. 1774), a native of Newton, England, who emigrated to America in 1730, and became a prosperous Marblehead merchant. The son graduated at Harvard in 1762 and entered his father's business. In 1772 and 1773 he was a member of the Massachusetts General Court, in which he identified himself with Samuel Adams and the patriot party, and in 1773 he served on the Committee of Correspondence, which became one of the great instruments of intercolonial resistance. In 1774-1775 he was a member of the Massachusetts Provincial Congress. The passage of a bill proposed by him (November 1775) to arm and equip ships to prey upon British commerce, and for the establishment of a prize court, was, according to his biographer, Austin, " the first actual avowal of offensive hostility against the mother country, which is to be found in the annals of the Revolution." It is also noteworthy, says Austin, as " the first effort to establish an American naval armament." From 1776 to 1781 Gerry was a member of the Continental Congress, where he early advocated independence, and was one of those who signed the Declaration after its formal signing on the 2nd of August 1776, at which time he was absent. He was active in debates and committee work, and for some time held the chair- manship of the important standing committee for the superin-tendence of the treasury, in which capacity he exercised a pre-dominating influence on congressional expenditures. In February 1780 he withdrew from Congress because of its refusal to respond to his call for the yeas and nays. Subsequently he laid his protest before the Massachusetts General Court which voted its approval of his action. On his return to Massachusetts, and while he was still a member of Congress, he was elected under the new state constitution (1780) to both branches of the state legislature, but accepted only his election to the House of Representatives. On the expiration of his congressional term, he was again chosen a delegate by the Massachusetts legislature, but it was not until 1 783 that he resumed his seat. During the second period of his service in Congress, which lasted until 1785, he was a member of the committee to consider the

treaty of peace with Great Britain, and chairman of two committees appointed to select a permanent seat of government. In 1 784 he bitterly attacked the establishment of the order of the Cincinnati on the ground that it was a dangerous menace to democratic institutions. In 1786 he served in the state House of Representatives. Not favouring the creation of a strong national government he declined to attend the Annapolis Convention in 1786, but in the following year, when the assembling of the Constitutional Convention was an assured fact, although he opposed the purpose for which it was called, he accepted an appointment as one of the Massachusetts delegates, with the idea that he might personally help to check too strong a tendency toward centralization. His exertions in the convention were ceaseless in opposition to what he believed to be the wholly undemocratic character of the instrument, and eventu- ally he refused to sign the completed constitution. Returning to Massachusetts, he spoke and wrote in opposition to its ratifica- tion, and although not a member of the convention called to pass upon it, he laid before this convention, by request, his reasons for opposing it, among them being that the constitution contained no bill of rights, that the executive would unduly influence the legislative branch of the government, and that the judiciary would be oppressive. Subsequently he served as an Anti-Federalist in the national House of Representatives in 1789- 1793, taking, as always, a prominent part in debates and other legislative concerns. In 1797 he was sent by President John Adams, together with John Marshall and Charles Cotesworth Pinckney, on a mission to France to obtain from the govern- ment of the Directory a treaty embodying a settlement of several long-standing disputes. The discourteous and under- handed treatment of this embassy by Talleyrand and his agents,

who attempted to obtain their ends by bribery, threats and duplicity, resulted in the speedy retirement of Marshall and Pinckney. The episode is known in American history as the " X Y Z Affair." Gerry, although despairing of any good results, remained in Paris for some time in the vain hope that Talleyrand might offer to a known friend of France terms that had been refused to envoys whose anti-French views were more than suspected. This action of Gerry's brought down upon him from Federalist partisans a storm of abuse and censure, from which he never wholly cleared himself. In 1810-1812 he was governor of Massachusetts. His administration, which was marked by extreme partisanship, was especially notable for the enact- ment

of a law by which the state was divided into new senatorial districts in such a manner as to consolidate the Federalist vote in a few districts, thus giving the Democratic-Republicans an undue advantage. The outline of one of these districts, which was thought to resemble a salamander, gave rise in 181 2, through a popular application of the governor's name, to the term "Gerrymander" (q.v.). In 1812, Gerry, who was an ardent advocate of the war with Great Britain, was elected vice-presi- dent of the United States, on the ticket with James Madison. He died in office at Washington on the 23rd of November 1814. See J. T. Austin, Life of Elbridge Gerry, with Contemporary Letters (2 vols., Boston, 1828-1829).

GERRYMANDER (usually pronounced " jerrymander," but the g was originally pronounced hard), an American expression which has taken root in the English language, meaning to arrange election districts so as to give an unfair advantage to the party in power by means of a redistribution act, and so to manipulate constituencies generally, or arrange any political measure, with a view to an unfair party advantage. The word is derived from the name of the American politician Elbridge Gerry {q.v.). John Fiske, in his Civil Government in the United States (1890), says that in 181 2, when Gerry was governor of Massachusetts, the Democratic state legislature (in order, according to Winsor, to secure an increased representation of the Democratic party in the state senate) " redistributed the districts in such wise that the shapes of the towns forming a single district in Essex county gave to the district a somewhat dragon-like contour. This was indicated upon a map of Massachusetts which Benjamin Russell, an ardent Federalist and editor of the Cenlinel, hung up over the desk in his office. The painter, Gilbert Stuart, coming into the office one day and observing the uncouth figure, added with his pencil a head, wings and claws, and exclaimed, ' That will do for a salamander! ' ' Better say a Gerrymander,' growled the editor; and the outlandish name, thus duly coined, soon came into general currency." It was, however, only the name that was new. Fiske (who also refers to Winsor's Memorial History of Boston, iii. 212, and Bryce's American Commonwealth, i. 121) says that gerrymandering, as a political dodge, "seems to have been first devised in 1788, by the enemies of the Federal constitution in Virginia, in order to prevent the election of James Madison to the first Congress, and fortunately it was unsuccess- ful." But it was really earlier than that, and in the American colonial period political advantage was often obtained by changing county lines. In 1709 the Pennsylvania counties of Bucks, Chester and Philadelphia formed a combination for preventing the city of Philadelphia from securing its propor-

tionate representation; and in 1732 George Burrington, royal governor of North Carolina, divided the voting precincts of the province for his own advantage. Gerry was not the originator of the Massachusetts law of 181 2, which was probably drafted by Samuel Dana or by Judge Story. The law resulted in 29 seats being secured in Massachusetts by 50,164 Democratic votes, while 51,766 Federalist votes only returned n members"; and Essex county, which, undivided, sent 5 Federalists to the Senate, returned 3 Democrats and 2 Federalists after being " gerrymandered," Stuart's drawing (reproduced in Fiske's book) was contrived so as to make the back line of the creature's body form a caricature of Gerry's profile. The law of 1812 was repealed in 18 13, when the Federalists had again gained control of the Massachusetts legislature.

See also Elmer C. Griffith, The Rise and Development of the Gerry-mander (Chicago, 1907) ; John W. Dean, " History of the Gerry-mander," in New England Historical and Genealogical Register, vol. xlvi. (Boston, 1892).

GERS, a department of south-western France, composed of the whole or parts of certain districts of Gascony, viz. Armagnac, Astarac, Fezensac, Pardiac, Pays de Gaure, Lomagne, Com- minges, Condomois and of a small portion of Agenais. It is bounded N. by the department of Lot-et-Garonne, N.E. by Tarn-et-Garonne, E. and S.E. by Haute-Garonne, S. by Hautes- Pyrenees, S.W. by Basses-Pyrenees and W. by Landes. Fop. (1906) 231,088. Area, 2428 sq. m. The department consists of a plateau sloping from south to north and traversed by numerous rivers, most of them having their source close together in the Plateau de Lannemezan (Hautes-Pyrenees), from which point they diverge in the shape of a fan to the north-west, north and north-east. In the south several summits exceed 1100 ft. in height. Thence the descent towards the north is gradual till on the northern limit of the department the lowest point (less than 200 ft.) is reached. The greater part of the department belongs to the basin of the Garonne, while a small portion in the west is drained by the Adour. The chief affluents of the former are the Save, Gimone, Arrats, Gers and Baise, which derive their waters in great part from the Canal de la Neste in the department of Hautes-Pyrenees; and of the latter, the Arros, Midou and Douze, the last two uniting and taking the name of Midouze before joining the Adour. The climate is temperate; its drawbacks are the unwholesome south-east wind and the destructive hail-storms which sometimes occur in spring. There is seldom any snow or frost. Over the greater portion of the department the annual rainfall varies between 28 and 32 in. Gers is primarily agricultural. The south-western district is the most productive, but*

the valleys generally are fertile and the grain produced is more than sufficient for local consumption. Wheat, maize and oats are the principal cereals. About one- third of the wine produced is used for home consumption, and the remainder is chiefly manufactured into brandy, known by the name of Armagnac, second only to Cognac in reputation. The natural pastures are supplemented chiefly by crops of sain- foin and clover; horses, cattle, sheep and swine are reared in considerable numbers; turkeys, geese and, other poultry are abundant. There are mineral springs at Aurenson, Barbotan and several other places in the department. The mineral pro- duction and manufactures are unimportant. Building stone and clay are obtained. Flour-mills, saw-mills, tanneries, brick- works and cask-works are the chief industrial establishments.

Gers is divided into the arrondissements of Auch, Lectoure, Mirande, Condom and Lombez, with 29 cantons and 466 com- munes. The chief town is Auch, the seat of an archbishopric. The department falls within the circumscription of the appeal- court of Agen, and the region of the XVII. army corps. It forms part of the academie (educational circumscription) of Toulouse. Auch, Condom, Lectoure and Mirande are the principal towns. The following are also of interest: Lombez, with its church of Sainte-Marie, once a cathedral, dating from the 14th century, when the bishopric was created; Flaran, with an abbey-church of the last half of the 12th century; La Romieu, with a church of the same period and a beautiful cloister; Simorre, with a fortified abbey-church of the 14th century; and Fleurance, with a handsome church, also of the 14th century, containing stained glass of the 16th century.

GERSON, JOHN (1363-1429), otherwise Jean Charlier de Gerson, French scholar and divine, chancellor of the university of Paris, and the ruling spirit in the oecumenical councils of Pisa and Constance, was born at the village of Gerson, in the bishopric of Reims and department of Ardennes, on the 14th of December 1363. His parents, Arnulph Charlier and Elizabeth de la Chardeniere, " a second Monica," were pious peasants, and seven of their twelve children, four daughters and three sons, devoted themselves to a religious life. Young Gerson was sent to Paris to the famous college of Navarre when fourteen years of age. After a five years' course he obtained the degree of licentiate of

arts, and then began his theological studies under two very celebrated teachers, Gilles des Champs (Aegidius Campensis) and Pierre d' Ailly (Petrus de Alliaco), rector of the college of Navarre, chancellor of the university, and afterwards bishop of Puy, archbishop of Cambrai and cardinal. Pierre d'Ailly remained his life-long friend, and in later life the" pupil seems to have become the teacher (see pref. to Liber de vita Spir. Animae). Gerson very soon attracted the notice of the university. He was elected procurator for the French " nation " in 1383, and again in 1384, in which year he graduated bachelor of theology. Three years later a still higher honour was bestowed upon him; he was sent along with the chancellor and others to represent the university in a case of appeal taken to the pope. John of Montson (Monzon de Montesono), an Aragonese Dominican who had recently graduated as doctor of theology at Paris, had in 1387 been condemned by the faculty of theology because he had taught that the Virgin Mary, like other ordinary descendants of Adam, was born in original sin; and the Dominicans, who were fierce opponents of the doctrine of the immaculate conception, were expelled the university. John of Montson appealed to Pope Clement VII. at Avignon, and Pierre d'Ailly, Gerson and the other university delegates, while they personally supported the doctrine of the immaculate conception, were content to rest their case upon the legal rights of the university to test in its own way its theological teachers. Gerson's biographers have compared his journey to Avignon with Luther's visit to Rome. It is certain that from this time onwards he was zealous in his endeavours to spiritualize the universities, to reform the morals of the clergy, and to put an end to the schism which then divided the church. In 1392 Gerson became doctor of theology, and in 1395, when Pierre d'Ailly was made bishop of Puy, he was, at the early age of thirty-two, elected chancellor of the university of Paris, and made a canon of Notre Dame. The university was then at the height of its fame, and its chancellor was necessarily a man prominent not only in France but in Europe, sworn to maintain the rights of his university against both king and pope, and entrusted with the conduct and studies of a vast crowd of students attracted from almost every country in Europe. Gerson's writings bear witness to his deep sense of the responsibilities, anxieties and troubles of his position. He was all his days a man of letters, and an analysis of his writings is his best biography. His work has three periods, in which he was engaged in reforming the university studies, maturing plans for overcoming the schism (a task which after 1404 absorbed all his energies), and in the evening of his life writing books of devotion.

Gerson wished to banish scholastic subtleties from the studies of the university, and at the same time to put some evangelical warmth into them. He was called at this period of his life Doctor Christianissimus; later his devotional works brought him the title Doctor Consolatorius. His plan was to make theo- logy plain and simple by founding it on the philosophical prin- ciples of nominalism. His method was a clear exposition of the principles of theology where clearness was possible, with a due recognition of the place of mystery in the Christian system of doctrine. Like the great nominalist William of Occam, he saved himself from rationalism by laying hold on mysticism — the Christian mysticism of the school of St Victor. He thought that in this way he would equally guard against the folly of the old scholasticism, and the seductions of such Averroistic pantheism as was preached by heretics like Amalric of Bena. His plans for the reformation of university studies may be learned from his Tract, de examinatione doctrinurum (Opp. L 7), Epistolae de reform, theol. (i. 121), Epistolae ad studentes Collegii Navarrae, quid et qualiler studere debeat novus theologiae auditor, et contra curiositatem sludenlium (i. 106), and Lectiones duae contra vanam curiositatem in negotio fidei (i. 86). The study of the Bible and of the fathers was to supersede the idle questions of the schools, and in his Tract, contra romantiam de rosa (iii. 297) he warns young men against the evil consequences of romance-reading. He was oftentimes weary of the chancellorship, — it involved him in strife and in money difficulties; he grew tired of public life, and

longed for learned leisure. To obtain it he accepted the deanery of Bruges from the duke of Burgundy, but after a short sojourn he returned to Paris and to the chancellorship.

Gerson's chief work was what he did to destroy the great schism. Gregory XL had died in 1378, one year after Gerson went to the college of Navarre, and since his death the church had had two popes, which to the medieval mind meant two churches and a divided Christ. The schism had practically been brought about by France. The popes had been under French influence so long that it appeared to France a political necessity to have her own pope, and pious Frenchmen felt themselves somewhat responsible for the sins and scandals of the schism. Hence the melancholy piety of Gerson, Pierre d'Ailly and their companions, and the energy with which they strove to bring the schism to an end. During the lifetime of Clement VII. the university of Paris, led by Pierre d' Ailly, Gerson and Nicolas of Clamenges, 1 met in deliberation about the state of Christendom, and resolved that the schism could be ended in three ways, — by cession, if both popes renounced the tiara unconditionally, by arbitration or

by a general council. Clement died. The king of • France, urged by the university, sent orders that no new pope should be elected. The cardinals first elected, and then opened the letter. In the new elections, however, both at Rome and Avignon, the influence of Paris was so much felt that each of the new popes swore to " cede " if his rival would do so also.

Meanwhile in 1395 the national assembly of France and the French clergy adopted the programme of the university — cession or a general council. The movement gathered strength. In 1398 most of the cardinals and most of the crowned heads in Europe had given their adhesion to the plan. During this period Gerson's literary activity was untiring, and the throb of public expectancy, of hope and fear, is revealed in his multitude of pamphlets. At first there were hopes of a settlement by way of cession. These come out in Protest, super statum ecclesiae (ii. 1), Tract, de modo habendi se tempore schismatis, De schismale, &c. But soon the conduct of the popes made Europe impatient, and the desire for a general council grew strong — see De concilio generali unius obedientiae (ii. 24). The council was resolved upon. It was to meet at Pisa, and Gerson poured forth tract after tract for its guidance. The most important are — Trilogus in materia schismatis (ii. 83), and De unitate Ecclesiae (ii. 113), in which, following Pierre d' Ailly (see Tschackert's Peter v. Ailli, p. 153), Gerson demonstrates that the ideal unity of the church, based upon Christ, destroyed by the popes, can only be restored by a general council, supreme and legitimate, though un- summoned by a pope. The council met, deposed both anti-popes, and elected Alexander V. Gerson was chosen to address the new pope on the duties of his office. He did so in his Sermo coram Alexandro Papa in die ascensionis in concilio Pisano (ii. 131). All hopes of reformation, however, were quenched by the conduct of the new pope. He had been a Franciscan, and loved his order above measure. He issued a bull which laid the parish clergy and the universities at the mercy of the mendi- cants. The great university of Paris rose in revolt, headed by her chancellor, who wrote a fierce pamphlet — Censura professorum in theologia circa bjdlam Alexandri V. (ii. 442). The pope died soon after, and one of the most profligate men of that time, Pope John XXIII. (Baldassare Cossa), was elected his successor. The council of Pisa had not brought peace; it had only added a third pope. Pierre d'Ailly despaired of general councils (see his De difficultate reformationis in concilio universali), but Gerson struggled on. Another matter too had roused him. The feuds between the houses of Orleans and Burgundy had long distracted France. The duke of Orleans had been treacherously

murdered by the follo.wers of the duke of Burgundy, and a theologian, Jean Petit (c. 1360-1411), had publicly and unambiguously justified the murder. His eight verities, as he called them — his apologies for the murder — had been, mainly through the influence of Gerson, condemned by the university of Paris, and by the

1 Born c. 1360; rector of the university of Paris 1393; afterwards treasurer of Langres and archdeacon of Bayeux; died at Paris in

1437-

archbishop and grand inquisitor, and his book had been publicly burned before the cathedral of Notre Dame. Gerson wished a council to confirm this sentence. His literary labours were as untiring as ever. He maintained in a series of tracts that a general council could depose a pope; he drew up indictments against the reigning pontiffs, reiterated the charges against Jean Petit, and exposed the sin of schism — in short, he did all he could to direct the public mind towards the evils in the church and the way to heal them. His efforts were powerfully seconded by the emperor Sigismund, and the result was the council of Constance (see Constance, Council of). Gerson's influence at the council was supreme up to the election of a new pope. It was he who dictated the form of submission and cession made by John XXIII., and directed the process against Huss. Many of Gerson's biographers have found it difficult to reconcile his proceedings against Huss with his own opinions upon the supre- macy of the pope; but the difficulty has arisen partly from misunderstanding Gerson's position, partly from supposing him to be the author of a famous tract — De modis uniendi ac refor- mandi Ecclesiam in concilio universali. All Gerson's high-sounding phrases about the supremacy of a council were meant to apply to some time of emergency. He was essentially a trimmer, and can scarcely be called a reformer, and he hated Huss with all the hatred the trimmer has of the reformer. The three bold treatises, De necessitate reformationis Ecclesiae, De modis uniendi ac reformandi Ecclesiam, and De difficultate reformationis in concilio universali, long ascribed to Gerson, were proved by Schwab in his Johannes Gerson not to be his work, and have since been ascribed to Abbot Andreas of Randuf, and with more reason to Dietrich of Nieheim (see Niem, Dietrich of).

The council of Constance, which revealed the eminence of Gerson, became in the end the cause of his downfall. He was the prosecutor in the case of Jean Petit, and the council, overawed by the duke of Burgundy, would not affirm the censure of the university and archbishop of Paris. Petit's justification of murder was declared to be only a moral and philosophical opinion, not of faith. The utmost length the council would go was to con- demn one proposition, and even this censure was annulled by the new pope, Martin V., on a formal pretext. Gerson dared not return to France, where, in the disturbed state of the kingdom, the duke of Burgundy was in power. He lay hid for a time at Constance and then at Rattenberg in Tirol, where he wrote his famous book De consolatione theologiae. On returning to France he went to Lyons, where his brother was prior of the Celestines. It is said that he taught a school of boys and girls in Lyons, and that the only fee he exacted was to make the children promise to repeat the prayer, " Lord, have mercy on thy poor servant Gerson. ' ' His later years were spent in writing books of mystical devotion and hymns. He died at Lyons on the 12th of July 1429. Tradition declares that during his sojourn there he translated or adapted from the Latin a work upon eternal consolation, which afterwards became very famous under the title of The Imitation of Christ, and was attributed to Thomas a. Kempis. It has, however, been proved beyond a doubt that the famous Imitatio Christi was really written by Thomas, and not by John Gerson or the abbot Gerson.

The literature on Gerson is very abundant. SeeDupin,Gersoniana, including Vita Gersoni, prefixed to the edition of Gerson's works in 5 vols, fol., from which quotations have here been made; Charles Schmidt, Essai sur Jean Gerson, chancelier de V Universili de Paris (Strassburg, 1839) ; J. B. Schwab, Johannes Gerson (Wiirzburg, 1859); H. Jadart, Jean Gerson, son origine, son village natal et sa familie (Reims, 1882). On the relations between Gerson and D'Ailly see Paul Tschackert, Peter von Ailli (Gotha, 1877). On Gerson's public life see also histories of the councils of Pisa and Constance, especially Herm. v. der Hardt, Con. Constantiensis libri- iv. (1695-1699). The best editions of his works are those of Paris (3 vols., 1606) and Antwerp (5 vols., 1706). See also Ulysse Chevalier, Repertoire des sources hist. Bio-bibliographie (Paris, 1905, &c), s.v. "Gerson." (T.M. L.;X.)

GERSONIDES, or Ben Gerson (Gershon), LEVI, known also as Ralbag (1 288-1344), Jewish philosopher and commentator, was born at Bagnols in Languedoc, probably in 1288. As in the case of the other medieval Jewish philosophers little is known

of his life. His family had been distinguished for piety and exegetical skill, but though he was known in the Jewish com- munity by commentaries on certain books of the Bible, he never seems to have accepted any rabbinical post. Possibly the freedom of his opinions may have put obstacles in the way of his preferment. He is known to have been at Avignon and Orange during his life, and is believed to have died in 1344, though Zacuto asserts that he died at Perpignan in 1370. Part of his writings consist of commentaries on the portions of Aristotle then known, or rather of commentaries on the commentaries of Averroes. Some of these are printed in the early Latin editions of Aristotle's works. His most important treatise, that by which he has a place in the history of philosophy, is entitled Milhamoth ' Adonai (The Wars of God), and occupied twelve years in com- position (1317-1329). A portion of it, containing an elaborate survey of astronomy as known to the Arabs, was translated into Latin in 1342 at the request of Clement VI. The Milhamoth is throughout modelled after the plan of the great work of Jewish philosophy,, the Moreh Nebuhim of Moses Maimonides, and may be regarded as an elaborate criticism from the more philo- sophical point of view (mainly Averroistic) of the syncretism of Aristotelianism and Jewish orthodoxy as presented in that work. The six books pass in review (1) the doctrine of the soul, in which Gersonides defends the theory of impersonal reason as mediating between God and man, and explains the formation of the higher reason (or acquired intellect, as it was called) in humanity, — his view being thoroughly realist and resembling that of Avicebron; (2) prophecy; (3) and (4) God's knowledge of facts and providence, in which is advanced the curious theory that God does not know individual facts, and that, while there is general providence for all, special providence only extends to those whose reason has been enlightened; (5) celestial substances, treating of the strange spiritual hierarchy which the Jewish philosophers of the middle ages accepted from the Neoplatonists and the pseudo-Dionysius, and also giving, along with astronomi- cal details, much of astrological theory; (6) creation and miracles, in respect to which Gerson deviates widely from the position of Maimonides. Gersonides was also the author of a commentary on the Pentateuch and other exegetical and scientific works.

A careful analysis of the Milhamoth is given in Rabbi Isidore Weil's Philosophie religieuse de Levi-Ben-Gerson (Paris, 1868). See also Munk, Melanges de phil. juive et arabe; and Joel, Religions- philosophie d. L. Ben-Gerson (1862). The Milhamoth was pub- lished in 1560 at Riva di Trento, and has been published at Leipzig, 1866.

(I. A.)

GERSOPPA, FALLS OF, a cataract on the Sharavati river in the North Kanara district of Bombay. The falls are considered the finest in India. The river descends in four separate cascades called the Raja or Horseshoe, the Roarer, the Rocket and the Dame Blanche. The cliff over which the river plunges is 830 ft. high, and the pool at the base of the Raja Fall is 132 ft. deep. The falls are reached by boat from Honavar, or by road from Gersoppa village, 18 m. distant. Near the village are extensive ruins (the finest of which is a cruciform temple) of Nagarbastikere, the capital of the Jain chiefs of Gersoppa. Their family was established in power in 1409 by the Vijayanagar kings, but subsequently became practically independent. The chieftaincy was several times held by women, and on the death of the last queen (1608) it collapsed, having been attacked by the chief of Bednur. Among the Portuguese the district was celebrated for its pepper, and they called its queen " Regina da pimenta " (queen of pepper).

GERSTACKER, FRIEDRICH (1816-1872), German novelist and writer of travels, was born at Hamburg on the 10th of May 1816, the son of Friedrich Gerstacker (1790-1825), a celebrated opera singer. After being apprenticed to a commercial louse he learnt farming in Saxony. In 1837, however, having imbibed from Robinson Crusoe a taste for adventure, he went to America and wandered over a large part of the United States, supporting himself by whatever work came to hand. In 1843 he returned to Germany, to find himself, to his great surprise, famous as an author. His mother had shown his diary, which he regularly

sent home, and which contained descriptions of his adventures in the New World, to the editor of the Rosen, who published them in that periodical. These sketches having found favour with the public, Gerstacker issued them in 1844 under the title Streif-und Jagdzilge durch die Vereinigten Staaten Nordamerikas. In 1845 his first novel, Die Reguialoren in Arkansas, appeared, and hence- forth the stream of his productiveness flowed on uninterruptedly. From 1849 to 1852 Gerstacker travelled round the world, visiting North and South America, Polynesia and Australia, and on his return settled in Leipzig. In i860 he again went to South America, chiefly with a view to inspecting the German colonies there and reporting on the

possibility of diverting the stream of German emigration in this direction. The result of his observations and experiences he recorded in Achtzehn Monate in Siidamerika (1.862) . In 1862 he accompanied Duke Ernest of Saxe-Coburg-Gotha to Egypt and Abyssinia, and on his return settled at Coburg, where he wrote a number of novels descriptive of the scenes he had visited. In 1867-1868 Gerstacker again undertook a long journey, visiting North America, Venezuela and the West Indies, and on his return lived first at Dresden and then at Brunswick, where he died on the 31st of May 1872. His genial and straightforward character made him personally beloved; and his works, dealing as they did with the great world hitherto hidden from the narrow " parochialism " of German life, obtained an immense popularity. This was not due to any graces of style, in which they are sin- gularly lacking; but the unstudied freshness of the author's descriptions, and his sturdy humour, appealed to the wholesome instincts of the public. Many of his books were translated into foreign languages, notably into English, and became widely known on both sides of the Atlantic. His best works, from a literary point of view, are, besides the above-mentioned Regula- tor en, his Flusspiraten des Mississippi (1848); the novel Tahiti (1854); his Australian romance Die beiden Strdflinge (1857); Aus dem Matrosenleben (1857); and Blau Wasser (1858). His Travels exist in an English translation.

Gerstacker's Gesammelte Schriflen were published at Jena in 44 vols. (1872-1879) ; a selection, edited by D. Theden in 24 vols. (1889-1890). See A. Karl, Friedrich Gerstacker, der Weitgereiste. Ein Lebensbild (1873).

GERSTENBERG, HEINRICH WILHELM VON (1 737-1823), German poet and critic, was born at Tondern in Schleswig on the 3rd of January 1737. After studying law at Jena he entered the Danish military service and took part in the Russian campaign of 1762. He spent the next twelve years in Copenhagen, where he was intimate with Klopstock. From 1775 to 1783 he repre- sented Denmark's interests as " Danish Resident " at Ltibeck, and in 1786 received a judicial appointment at Altona, where he died on the 1st of November 1823. In the course of his long life Gerstenberg passed through many phases of his nation's literature. He began as an imitator of the Anacreontic school {Tdndeleien, 1759); then wrote, in imitation of Gleim, Kriegslieder eines danischen Grenadiers (1762); with his Gedicht eines Skalden (1766) he joined the group of " bards " led by Klopstock. His Ariadne auf Naxos (1767) is the best cantata of the 18th century; he translated Beaumont and Fletcher's Maid's Tragedy (1767), and helped to usher in the Sturm und Drang

period with a gTue- some but powerful tragedy, Ugolino (1 768). But he did perhaps even better service to the new literary movement with his Briefe iiber Merkwurdigkeiten der Literatur (1766-1770), in which the critical principles of the Sturm und Drang — and especially its enthusiasm for Shakespeare, — were first definitely formulated. In later life Gerstenberg lost touch with literature, and occupied himself mainly with Kant's philosophy.

His Vermischte Schriflen appeared in 3 vols. (1815). The Briefe iiber Merkwiirdigkeiten der Literatur were republished by A. von Weilen (1888), and a selection of his poetry, including Ugolino, by R. Hamel, will be found in Kiirschner's Deutsche Nationalliteratur, vol. 48 (i8&t).

GERUZEZ, NICOLAS EUGENE (1 799-1865), French critic, was born on the 6th of January 1799 at Reims. He was assistant professor at the Sorbonne, and in 1852 he became secretary to the faculty of literature. He wrote a Histoire de Viloquence politique el religieuse en France aux XI V, X V, et X VI' siecles

(1837-1838); an admirable Histoire de la lilterature franˆaise depuis les origines jusqu'd la Revolution (1852), which he supple- mented in 1859 by a volume bringing down the history to the close of the revolutionary period; and some miscellaneous works. Geruzez died on the 29th of May 1865 in Paris. A posthumous volume of Melanges et pensees appeared in 1877.

GERVAIS, PAUL (1816-1879), French palaeontologist, was born on the 26th of September 18 16 at Paris, where he obtained the diplomas of doctor of science and of medicine, and in 1835 he began palaeontological research as assistant in the laboratory of comparative anatomy at the Museum of Natural History. In 1 84 1 he obtained the chair of zoology and comparative anatomy at the Faculty of Sciences in Montpellier, of which he was in 1856 appointed dean. In 1848-1852 appeared his im- portant work Zoologie et paleontologie jranQaises, supplementary to the palaeontological publications of G. Cuvier and H. M. D. de BlainviLle; of this a second and greatly improved edition was issued in 1859. In 1865 he accepted the professorship of zoology at the Sorbonne, vacant through the death of L. P. Gratiolet; this post he left in 1868 for the chair of comparative anatomy at the Paris museum of natural history, the anatomical collections of which were greatly enriched by his exertions. He died in Paris on the 10th of February 1879.

He also wrote Histoire naturelle des mammiferes (1853, &c); Zoologie medicale (1859, with P. J. van Beneden) ; Recherches sur I'anciennete de I'homme et la periods quaternaire, 19 pi. (1867) ; Zoologie et paUontologie generates ('1867); Osteographie des cetaces (1869, &c, with van Beneden).

GERVASE OF CANTERBURY (d. c. 1210), English monk and chronicler, entered the house of Christchurch, Canterbury, at an early age. He made his profession and received holy orders in 1 163; but we have no further clue to the date of his birth. We know nothing of his life beyond what may be gathered from his own writings. Their evidence suggests that he died in or shortly after 12 10, and that he had resided almost continuously at Canterbury from the time of his admission. The only office which we know him to have held is that of sacrist, which he received after n 90 and laid down before 11 97. He took a keen interest in the secular quarrels of the Canterbury monks with their archbishops, and his earliest literary efforts were controversial tracts upon this subject. But from 1188 he applied his mind to historical composition. About that year he began the compilation of his Chronica, a work intended for the private reading of his brethren. Beginning with the accession of Stephen he continued his narrative to the death of Richard I. Up to n 88 he relies almost entirely upon extant sources; but from that date on- wards is usually an independent authority. A second history, the Gesta Regum, is planned on a smaller scale and traces the fortunes of Britain from the days of Brutus to the year 1 209. The latter part of this work, covering the years n 99-1 209, is perhaps an attempt to redeem the promise, which he had made in the epilogue to the Chronica, of a continuation dealing with the reign of John. This is the only part of the Gesta which deserves much attention. The work was continued by various hands to the year 1328. From the Gesta the indefatigable Gervase turned to a third project, the history of the see of Canterbury from the arrival of Augustine to the death of Hubert Walter (1205). A topographical work, with the somewhat misleading title Mappa mundi, completes the list of his more important writings. The Mappa mundi contains a useful description of England shire by shire, giving in particular a list of the castles and religious houses to be found in each. The industry of Gervase was greater than his insight. He took a narrow and monastic view of current politics; he was seldom in touch with the leading statesmen of his day. But he appears to be tolerably accurate when dealing with the years 1 188-1209; and sometimes he supplements the information provided by the more important chronicles.

See the introductions and notes in W. Stubbs's edition of the

Historical Works of Gervase of Canterbury (Rolls edition, 2 vols., 1879-1880). (H. W. C. D.)

GERVASE OF TILBURY (fl. 1211), Anglo-Latin writer of the late 1 2th and early 13th centuries, was a kinsman and schoolfellow of Patrick, earl of Salisbury, but lived the life of a scholarly

adventurer, wandering from land to land in search of patrons. Before 1177 he was a student and teacher of law at Bologna; in that year he witnessed the meeting of the emperor Frederic I. and Pope Alexander III. at Venice. He may have hoped to win the favour of Frederic, who in the past had found useful instruments among the civilians of Bologna. But Frederic ignored him; his first employer of royal rank was Henry fitz Henry, the young king of England (d. 1183), for whom Gervase wrote a jest-book which is no longer extant. Subsequently we hear of Gervase as a clerk in the household of William of Champagne, cardinal archbishop of Reims (d. 1202). Here, as he himself confesses, he basely accused of heretical opinions a young girl, who had rejected his advances, with the result that she was burned to death. He cannot have remained many years at Reims; before n 89 he attracted the favour of William II. of Sicily, who had married Joanna, the sister of Henry fitz Henry. William took Gervase into his service and gave him a country-house at Nola. After William's death the kingdom of Sicily offered no attractions to an Englishman. The fortunes of Gervase suffered an eclipse until, some time after 1198, he found employment under the emperor Otto IV., who by descent and political interest was intimately connected with the Plan- tagenets. Though a clerk in orders Gervase became marshal of the kingdom of Aries, and married an heiress of good family. For the delectation of the emperor he wrote, about 1211, his Otia Imperialia in three parts. It is a farrago of history, geography, folklore and political theory — one of those books of table-talk in which the literature of the age abounded. Evidently Gervase coveted but ill deserved a reputation for encyclopaedic learning. The most interesting of his dissertations are contained in the second part of the Otia, where he discusses, among other topics, the theory of the Empire and the geography and history of England. We do not know what became of Gervase after the downfall of Otto IV. But he became a canon; and may perhaps be identified with Gervase, provost of Ebbekesdorf, who died in

See the Otia Imperialia in G. Leibnitz's Scriptores rerum Bruns-vicensium, vols. i. and ii. (Hanover, 1707); extracts in J. Stevenson's edition of Coggeshall (Rolls series, 1875). Of modern accounts the best are those by W. Stubbs in his edition of Gervase of Canterbury, vol. i. introd. (Rolls series, 1879), and by R. Pauli in Nachrichten der Gesellschaft der Wissenschaften zu Gottingen (1882). In the older biographers the Dialogus de scaccario of Richard Fitz Neal (q.v.) is wrongly attributed to Gervase. (H. W. C. D.)

GERVEX, HENRI (1852-), French painter, was born in Paris on the 10th of December 1852, and studied painting under Cabanel, Brisset and Fromentin. His early work belonged almost exclusively to the mythological genre which served as an excuse for the painting of the nude — not always in the best of taste; indeed, his " Rolla " of 1878 was rejected by the jury of the Salon pour immoralM. He afterwards devoted himself to representations of modern life and achieved signal success with his " Dr Pean at the Salpetriere," a modernized paraphrase, as it were, of Rembrandt's " Anatomy Lesson." He was en- trusted with several important official paintings and the decora-tion of public buildings. Among the first are " The Distribution of Awards (1889) at the Palais de l'lndustrie " (now in the Versailles Museum), " The Coronation of Nicolas II." (Moscow, May 14, 1896), " The Mayors' Banquet " (1900), and the portrait group "La Republique Frangaise"; and among the second, the ceiling for the Salle des Fetes at the hotel de ville, Paris, and the decorative panels painted in conjunction with Blanchon for the mairie of the 19th arrondissement, Paris. He also painted, with Alfred Stevens, a panorama, " The History of the Century " (1889). At the Luxembourg is his painting " Satyrs playing with a Bacchante," as well as the large " Members of the Jury ,of the Salon " (1885). Other pictures of importance, besides numerous portraits in oils and pastel, are " Communion at Trinity Church," " Return from the Ball," " Diana and Endy- mion," " Job," " Civil Marriage," " At the Ambassadeurs," " Yachting in the Archipelago," " Nana " and " Maternity."

GERVINUS, GEORG GOTTFRIED (1805-1871), German literary and political historian, was born on the 20th of May

1805 at Darmstadt. He was educated at the gymnasium of the town, and intended for a commercial career, but in 1825 he became a student of the university of Giessen. In 1826 he went to Heidelberg, where he attended the lectures of the historian Schlosser, who

became henceforth his guide and his model. In 1828 he was appointed teacher in a private school at Frankfort-on-Main, and in 1830 Privatdozent at Heidelberg. A volume of his collected Historische Schriften procured him the appointment of professor extraordinarius; while the first volume of his Geschichte der poetischen Nationallitteratur der Deutschen (1835-1842, 5 vols., subsequently entitled Geschichte der deutschen Dichtung; 5th edition, by K. Bartsch, 1871-1874) brought him the appointment to a regular professorship of history and literature at Gottingen. This work is the first comprehensive history of German literature written both with scholarly erudition and literary skill. In the following year he wrote his Grundziige der Historik, which is perhaps the most thoughtful of his philo- sophico-historical productions. The same year brought his expul- sion from Gottingen in consequence of his manly protest, in conjunction with six of his colleagues, against the unscrupulous violation of the constitution by Ernest Augustus, king of Hanover and duke of Cumberland. After several years in Heidelberg, Darmstadt and Rome, he settled permanently in Heidelberg, where, in 1844, he was appointed honorary professor. He zealously took up in the following year the cause of the German Catholics, hoping it would lead to a union of all the Christian confessions, and to the establishment of a national church. He also came forward in 1846 as a patriotic champion of the Schleswig-Holsteiners, and when, in 1847, King Frederick William IV. promulgated the royal decree for summoning the so-called " United Diet " (Vereinigter Landtag), Gervinus hoped that this'event would form the basis of the constitutional develop- ment of the largest German state. He founded, together with some other patriotic scholars, the Deutsche Zeitung, which certainly was one of the best-written political journals ever published in Germany. His appearance in the political arena secured his election as deputy for the Prussian province of Saxony to the National Assembly sittingin 1848 at Frankfort. Disgusted with the failure of that body, he retired from all active political life.

Gervinus now devoted himself to literary and historical studies, and between 1849 and 1852 published his work on Shakespeare (4 vols., 4th ed. 2 vols., 1872; Eng. trans, by F. E. Bunnett, 1863, new ed. 1877). He also revised hisHistory of German Literature, for a fourth edition (1853), and began at the same time to plan his Geschichte des neunzehnten Jahrhunderts (8 vols., 1854-1860), which was preceded by an Einleitung in die Geschichte des neunzehnten Jahrhunderts (1853). The latter caused some stir in the literary and political world, owing to the circumstance that the government of

Baden imprudently instituted a prosecution against the author for high treason. In 1868 appeared Handel und Shakespeare, zur Asthetik der Tonkunst, in which he drew an ingenious parallel between his favourite poet and his favourite composer, showing that their intellectual affinity was based on the Teutonic origin common to both, on their analogous intellectual development and character. The ill-success of this publication, and the indifference with which the latter volumes of his History of the igth Century were received by his countrymen, together with the feeling of disappointment that the unity of Germany had been brought about in another fashion and by other means than he wished to see employed, embittered his later years. He died at Heidelberg on thei8th of March 1871.

Gervinus's autobiography (G. G. Gervinus' Leben, von ihm selbst) was published by his widow in 1893. It does not, however, go beyond the year 1836. See E. Lehmann, Gervinus, Versuch einer Charakteristik (1871); R. Gosche, Gervinus (1871); J. Dorfel, Gervinus als historischer Denker (1904).

GERYON (Geryones, Geryonetjs), in Greek mythology, the son of Chrysaor and Callirrhoe, daughter of Oceanus, and king of the island of Erytheia. He is represented as a monster with three heads or three bodies (triformis, trigeminus) , sometimes with wings, and as the owner of herds of red cattle, which were

tended by the giant shepherd Eurytion and the two-headed dog Orthrus. To carry off these cattle to Greece was one of the twelve " labours " imposed by Eurystheus upon Heracles. In order to get possession of them, Heracles travelled through Europe and Libya, set up the two pillars in the Straits of Gibraltar to show the extent of his journey, and reached the great river Oceanus. Having crossed Oceanus and landed on the island, Heracles slew Orthrus together with Eurytion, who in vain strove todefendhim,anddroveoffthecattle. Geryon started in pursuit, but fell a victim to the arrows of Heracles, who, after various adventures, succeeded in getting the cattle safe to Greece, where they were offered in sacrifice to Hera by Eurystheus. The geographical position of Erytheia is unknown, but all ancient authorities agree that it was in the far west. The name itself (= red) and the colour of the cattle suggest the fiery aspect of the disk of the setting sun; further, Heracles crosses Oceanus in the golden cup or boat of the sun-god Helios. Geryon (from 7Tjpi)oj,the howler or

roarer) is supposed to personify the storm, his father Chrysaor the lightning, his mother Callirrhoe the rain. The cattle are the rain-clouds, and the slaying of their keepers typifies the victory of the sun over the clouds, or of spring over winter. The euhemeristic explanation of the struggle with the triple monster was that Heracles fought three brothers in succession.

See Apollodorus ii. 5. 10; Hesiod, Theogony, 287; Diod. Sic. iv. 17; Herodotus iv. 8; F. Wieseler in Ersch and Gruber, Allge- meine Encyclopadie; F. A. Voigt in Roscher's Lexikon der Mythologie; L. Preller, Griechische Mythologie; article " Hercules " in Daremberg and Saglio, Dictionnaire des antiquites.

GESENIUS, HEINRICH FRIEDRICH WILHELM (1786-1842), German orientalist and biblical critic, was born atNordhausen, Hanover, on the 3rd of February 1786. In 1803 he became a student of philosophy and theology at the university of Helm- stadt, where Heinrich Henke (1752-1809) was his most influential teacher; but the latter part of his university course was taken at Gottingen, where J.«G. Eichhorn and T. C. Tychsen (1758- 1834) were then at the height of their popularity. In 1806, shortly after graduation, he became Repetent and Privatdozent in that university; and, as he was fond of afterwards relating, had Neander for his first pupil in Hebrew. In 1810 he became professor extraordinarius in theology, and in 181 1 ordinarius, at the university of Halle, where, in spite of many offers of high preferment elsewhere, he spent the rest of his life. He taught with great regularity for upward of thirty years, the only in- terruptions being that of 1813-1814 (occasioned by the War of Liberation, during which the university was closed) and those occasioned by two prolonged literary tours, first in 1820 to Paris, London and Oxford with his colleague Johann Karl Thilo (1794-1853) for the examination of rare oriental manuscripts, and in 1835 to England and Holland in connexion with his Phoenician studies. He soon became the most popular teacher of Hebrew and of Old Testament introduction and exegesis in Germany; during his later years his lectures were attended by nearly five hundred students. Among his pupils the most eminent were Peter von Bohlen (1 796-1 840), A. G. Hoffmann (1 769-1 864), Hermann Hupfeld, Emil Rodiger (1801-1874), J. F. Tuch (1806- 1867), W. Vatke (1806-1882) and Theodor Benfey (1809-1881). In 1827, after declining an invitation to take Eichhorn's place at Gottingen, Gesenius was made a Consistorialrath; but, apart from the violent attacks to which he, along with his friend and colleague Julius Wegscjieider, was in 1830 subjected by E. W. Hengstenberg and his party in the Evangelische Kircheneeitung, on account of his

rationalism, his life was uneventful. He died at Halle on the 23rd of October 1842. To Gesenius belongs in a large measure the credit of having freed Semitic philology from the trammels of theological and religious prepossession, and of inaugurating the strictly scientific (and comparative) method which has since been so fruitful. As an exegete he exercised a powerful, and on the whole a beneficial, influence on theological investigation.

Of his many works, the earliest, published in 1810, entitled Versuch iiber die maltesische Sprache, was a successful refutation of the widely current opinion that the modern Maltese was of Punic origin. In the

same year appeared the first volume of the Hebrdisches u. Chalddisches Handworterbuch,ˆ completed in 1812. Revised editions of this appear periodically in Germany, e.g. that of H. Zimmern and F. Buhl (1905). The publication of a new English edition was started in 1892 under the editorship of Professors C. A. Briggs, S. R. Driver and F. Brown. The Hebrdische Grammatik, published in 1813 (27th edition by E. Kautzsch; English translation from 25th and 26th German editions by G. W. Collins and A. E. Cowley, 1898), was followed in 1815 by the Geschichte der hebrdischen Sprache (now very rare), and in 1817 by the Ausfiihrliches Lehrgebdude der hebrdischen Sprache. The first volume of his well-known commentary on Isaiah (Der Prophet Jesaja), with a translation, appeared in 1821 ; but the work was not completed until 1829. The Thesaurus philologico-criticus linguae Hebraicae et Chaldaicae V. T., begun in 1829, he did not live to complete; the latter part of the third volume is edited by E. Rodiger (1858). Other works: De Pentateuchi Samaritani origine, indole, et auctoritate (1815), supplemented in 1822 and 1824 by the treatise De Samaritanorum theologia, and by an edition of Carmina Samaritana; Paldographische Studien uber phonizische u. punische Schrift (1835), a pioneering work which he followed up in 1837 by his collection of Phoenician monuments (Scripturae linguaeque Phoeniciae monumenla quotquot supersunt) ; an Aramaic lexicon (1 834-1 839); and a treatise on the Himyaritic language written in conjunction with E. Rodiger in 1841. Gesenius also contributed extensively to Ersch and Gruber's Encyclopadie, and enriched the German translation of J. L. Burckhardt's Travels in Syria and the Holy Land with valuable geographical notes. For many years he also edited the Halle Allgemeine Litteraturzeitung. A sketch of his life was published anonymously in 1843 (Gesenius: eine Erinnerung filr seine Freunde), and another by H. Gesenius, Wilhelm Gesenius, ein Erinnerungsblall an den hundertjdhrigen Geburtstag, in 1886. See also the article in the Allgemeine deutsche Biographie.

GESNER, ABRAHAM (1797-1864), Canadian geologist, was born in Nova Scotia in 1 797. He qualified as a doctor of medicine in London in 1827. Returning to the Dominion, he published in 1836 Remarks on the Geology and Mineralogy of Nova Scotia, and continuing his researches he was enabled in 1843 to bring before the Geological Society of London " A Geological Map of Nova Scotia, with an accompanying Memoir " (Proc. Geol. Soc. iv. 186). In 1849 he issued a volume on the industrial resources of the country. He dealt also with the geology and mineralogy of New Brunswick and Prince Edward's Island. Devoting himself to the economic side of geology in various parts of North America, he was enabled to bring out in 1861 A Practical Treatise on Coal, Petroleum and other Distilled Oils. He died at Halifax, N.S., on the 29th of April 1864.

GESNER, JOHANN MATTHIAS (1691-1761), German classical scholar and schoolmaster, was born at Roth near Ansbach on the 9th of April 1691. He studied at the university of Jena, and in 1 7 14 published a work on the Philopatris ascribed to Lucian. In 17 1 5 he became librarian and conrector (vice-principal) at Weimar, in 1729 rector of the gymnasium at Ansbach, and in 1 730 rector of the Thomas school at Leipzig. On the foundation of the university of Gottingen he became professor of rhetoric (1734) and subsequently librarian. He died at Gottingen on the 3rd of August 1 76 1. His special merit lies in the attention he devoted to the explanation and illustration of the subject matter of the classical authors.

His principal works are: editions of the Scriptores rei rusticae, of Quintilian, Claudian, Pliny the Younger, Horace and the Orphic poems (published after his death) ; Primae- lineae isagoges in eruditionem universalem (1756); an edition of B. Faber's Thesaurus eruditionis scholasticae (1726), afterwards continued under the title Novus linguae et eruditionis Romanae thesaurus (1749); Opuscula minora varii argumenti (1 743-1 745); Thesaurus epistolicus Gesnerianus (ed. Klotz, 1768-1770); Index etymologicus latinilatis (1749). See J. A. Ernesti, Opuscula oratoria (1762), p. 30S; H. Sauppe, Gbttinger Professoren (1872) ; C. H. Pohnert, J. M, Gesner und sein Vcrhdltnis zum Philanihropinismus und Neuhumanismus (1898), a contribution to the history of pedagogy in the 1 8th century; articles by F. A. Eckstein in Allgemeine deutsche Biographie ix. ; and Sandys, Hist, of Class. Schol. iii. (1908), 5-9.

GESNER [improperly Gessner; in Latin, Gesnertjs], KONRAD VON (1516-1565), German-Swiss writer and naturalist, called " the German Pliny " by Cuvier, was born at Zurich on the 26th of March 1516. The son of a poor furrier, he was educated in that town, but

fell into great need after the death of his father at the battle of Kappel (1531). He had good friends, however, in his old master, Myconius, and subsequently in Heinrich Bullinger, and he was enabled to continue his studies at the

universities of Strassburg and Bourges (1532-1533); he found also a generous patron in Paris (1534), in the person of Joh. Steiger of Berne. In 1535 the religious troubles drove him back to Zurich, where he made an imprudent marriage. His friends again came to his aid, enabled him to study at Basel (1536), and in 1537 procured for him the professorship of Greek at the newly founded academy of Lausanne (then belonging to Berne). Here he had leisure to devote himself to scientific studies, especially botany. In 1 540-1 541 he visited the famous medical university of Montpellier, took his degree of doctor of medicine (1541) at Basel, and then settled down to practise at Zurich, where he obtained the post of lecturer in physics at the Carolinum. There, apart from a few journeys to foreign countries, and annual summer botanical journeys in his native land, he passed the remainder of his life. He devoted himself to preparing works on many subjects of different sorts. He died of the plague on the 13th of December 1565. In the previous year he had been ennobled.

To his contemporaries he was best known as a botanist, though his botanical MSS. were not published till long after his death (at Nuremberg, 1751-1771, 2 vols, folio), he himself issuing only the Enchiridion historiae plantarum (1541) and the Catalogus plantarum (1542) in four tongues. In 1545 he published his remarkable Bibliotheca universalis (ed. by J. ■ Simler, 1574), a catalogue (in Latin, Greek and Hebrew) of all writers who had ever lived, with the titles of their works, &c. A second part, under the title of Pandeclarium sive partitionum universalium Conradi Gesneri Ligurini libri xxi., appeared in 1548; only nineteen books being then concluded. The 21st book, a theo- logical encyclopaedia, was published in 1549, but the 20th, intended to include his medical work, was never finished. His great zoological work, Historic, animalium, appeared in 4 vols, (quadrupeds, birds, fishes) folio, 1551-1558, at Zurich, a fifth (snakes) being issued in 1587 (there is a German translation, entitled Thierbuch, of the first 4 vols., Zurich, 1563): this work is the starting-point of modern zoology. Not content with such vast works, Gesner put forth in 1555 his book entitled

Mithridates de diferentiis Unguis, an account of about 130 known languages, with the Lord's Prayer in 22 tongues, while in 1556 appeared his edition of the works of Aelian. To non – scientific readers, Gesner will be best known for his love of mountains (below the snow-line) and for his many excursions among them, undertaken partly as a botanist, but also for the sake of mere exercise and enjoyment of the beauties of nature. In 1541 he prefixed to a singular little work of his (Libellus de lade et operibus lactariis) a letter addressed to his friend, J. Vogel, of Glarus, as to the wonders to be found among the mountains, declaring his love for them, and his firm resolve to climb at least one mountain every year, not only to collect flowers, but in order to exercise his body. Ini555 Gesner issued his narrative (Descriptio Montis Fracti sive Montis Pilati) of bis excursion to the Gnepfstein (6299 ft.), the lowest point in the Pilatus chain, and therein explains at length how each of the senses of man is refreshed in the course of a mountain excursion.

Lives by J. Hanhart (Winterthur, 1824) and J. Simler (Zurich, 1566); see also Lebert's Gesner als Arzt (Zurich, 1854). A part of his unpublished writing, edited by Prof. Schmiedel, was published at Nuremberg in 1753.

GESSNER, SOLOMON (1730-1788), Swiss painter and poet, was born at Zurich on the 1st of April 1730. With the exception of some time (1749-1750) spent in Berlin and Hamburg, where he came under the influence of Ramler and Hagedorn, he passed the whole of his life in his native town, where he carried on the business of a bookseller. He died on the 2nd of March 1788ˆ The first of his writings that attracted attention was his Lied ■ eines Schweizers an sein bewaffnetes Mddchen (1751). Then followed Daphnis (1754), Idyllen (1756 and 1772), Inkel and Yariko (1756), a version of a story borrowed from the Spectator (No. 11, 13th of March 1711) and already worked out by Gellert and Bodmer, and Der Tod Abels (1758), a sort of idyllic pastoral. It is somewhat difficult for us now to understand the reason of Gessner's universal popularity, unless it was the taste of the

period for the conventional pastoral. His writings are marked by sweetness and melody, qualities which were warmly appre- ciated by Lessing, Herder and Goethe. As a painter Gessner represented the conventional classical landscape.

Collected editions of Gessner's works were repeatedly published (2 vols. 1777-1778, finally 2 vols. 1841, both at Zurich). They were translated into French (3 vols., Paris, 1 786-1 793), and versions of

the Idyllen appeared in English, Dutch, Portuguese, Spanish, Swedish and Bohemian. Gessner's life was written by Hottinger (Zurich, 1796), and by H. Wolfflin (Frauenfeld, 1889); see also his Briefwechsel mil seinem Sohn (Bern and Zurich, 1 801).

GESSO, an Italian word (Lat. gypsum), for " plaster of Paris " especially when used as a ground for painting, or for modelling or sculpture.

GESTA ROMANORUM, a Latin collection of anecdotes and tales, probably compiled about the end of the 13th century or the beginning of the 14th. It still possesses a twofold literary interest, first as one of the most popular books of the time, and secondly as the source, directly or indirectly, of later literature, in Chaucer, Gower, Shakespeare and others. Of its authorship nothing certain is known; and there is little but gratuitous conjecture to associate it either wdth the name of Helinandus or with that of Petrus Berchorius (Pierre Bercheure). It is even a matter of debate whether it took its rise in England, Germany or France. The work was evidently intended as a manual for preachers, and was probably written by one who himself be- longed to the clerical profession. The name, Deeds of the Romans, is only partially appropriate to the collection in its present form, since, besides the titles from Greek and Latin history and legend, it comprises fragments of very various origin, oriental and European. The unifying element of the book is its moral purpose. The style is barbarous, and the narrative ability of the compiler seems to vary with his source; but he has managed to bring together a considerable variety of excellent material. He gives us, for example, the germ of the romance of " Guy of Warwick "; the story of " Darius and his Three Sons," versified by Occleve; part of Chaucer's " Man of Lawes' Tale "; a tale of the emperor Theodosius, the same in its main features as that of Shakespeare's Lear; the story of the " Three Black Crows "; the " Hermit and the Angel," well known from Parnell's version, and a story identical with the Fridolin of Schiller. Owing to the loose structure of the book, it was easy for a transcriber to insert any additional story into his own copy, and consequently the MSS. of the Gesta Romanorum exhibit considerable variety. Oesterley recognizes an English group of MSS. (written always in Latin), a German group (sometimes in Latin and sometimes in German) , and a group which is represented by the vulgate or common printed text. The earliest editions are supposed to be those of Ketelaer and de Lecompt at Utrecht, of Arnold Ter Hoenen at Cologne, and of Ulrich Zell at Cologne; but the exact date is in all three cases uncertain.

An English translation, probably based directly on the MS. Harl. 5369, was published by Wynkyn de Worde about 1510-1515, the only copy of which now known to exist is preserved in the library of St John's College, Cambridge. In 1577 Richard Robin- son published a revised edition of Wynkyn de Worde, and the book proved highly popular. Between 1648 and 1703 at least eight impressions were issued. In 1703 appeared the first vol. of a trans- lation by B. P., probably Bartholomew "Pratt, " from the Latin edition. of 1514." A translation by the Rev. C. Swan, first pub- lished in 2 vols, in 1824, forms part of Bohn's antiquarian library, and was re-edited by Wynnard Hooper in 1877 (see also the latter's edition in 1894). The German translation was first printed at Augs- burg, 1489. A French version, under the title of Le Violier des histoires romaines moralisez, appeared in the early part of the 16th century, and went through a number of editions; it has been re- printed by G. Brunet (Paris, 1858). Critical editions of the Latin text have been produced by A. Keller (Stuttgart, 1842) and Oesterley (Berlin, 1872). See also Warton, " On the Gesta Romanorum," dissertation iii., prefixed to the History of English Poetry; Douce, Illustrations of Shakespeare, vol. ii.; Frederick Madden, Introduction to the Roxburghe Club edition of The Old English Versions of the Gesta Romanorum (1838).

GETA, PUBLIUS SEPTIMIUS (180-212), younger son of the Roman emperor Septimius Severus, was born at Mediolanum (Milan). In 198 he received the title of Caesar, and in 209 those of Imperator and Augustus. Between him and his brother Caracal!?,

there existed from their early years a keen rivalry and antipathy. On the death of their father in 211 they were proclaimed joint emperors; and after the failure of a proposed arrangement for the division of the empire, Caracalla pretended a desire for reconciliation. He arranged a meeting with his brother in his mother's apartments, and had him murdered in her arms by some centurions.

Dio Cassius lxxvii. 2; Spartianus, Caracalla, 2; Herodian iv. I.

GETAE, an ancient people of Thracian origin ; closely akin to the Daci (see Dacia). Their original home seems to have been the district on the right bank of the Danube between the rivers Oescus (Iskr) and Iatrus (Yantra). The view that the Getae were identical with the Goths has found distinguished supporters, but it is not generally

accepted. Their name first occurs in con- nexion with the expedition of Darius Hystaspis (51 5 B.C.) against the Scythians, in the course of which they were brought under his sway, but they regained their freedom on his return to the East. During the 5th century, they appear as furnishing a contingent of cavalry to Sitalces, king of the Odrysae, in his attack on Perdiccas II., king of Macedon, but the decay of the Odrysian kingdom again left them independent. When Philip II. of Macedon in 342 reduced the Odrysae to the condition of tributaries, the Getae, fearing that their turn would come next, made overtures to the conqueror. Their king Cothelas undertook to supply Philip with soldiers, and his daughter became the wife of the Macedonian. About this time, perhaps being hard pressed by the Triballi and other tribes, the Getae crossed the Danube. Alexander the Great, before transporting his forces into Asia, decided to make his power felt by the Macedonian dependencies. His operations against the Triballi not having met with complete success, he resolved to cross the Danube and attack the Getae. The latter, unable to withstand the phalanx, abandoned their chief town, and fled to the steppes (Verio, tj ipquos, north of the Danube delta), whither Alexander was unwilling to follow them. About 326, an expedition conducted by Zopyrion, a Macedonian governor of Thrace, against the Getae, failed disastrously. In 292, Lysimachus declared war against them, alleging as an excuse that they had rendered assistance to certain barbarous Macedonian tribes. He penetrated to the plains of Bessarabia, where his retreat was cut off and he was forced to surrender. Although the people clamoured for his execution, Dromichaetes, king of the Getae, allowed him to depart un- harmed, probably on payment of a large ransom, great numbers of gold coins having been found near Thorda, some of them bearing the name of Lysimachus. When the Gauls made their way into eastern Europe, they came into collision with the Getae, whom they defeated and sold in large numbers to the Athenians as slaves. From this time the Getae seem to have been usually called Daci; for their further history see Dacia.

The Getae are described by Herodotus as the most valiant and upright of the Thracian tribes; but what chiefly struck Greek inquirers was their belief in the immortality of the soul (hence they were called adavariˆovTa) and their worship of Zalmoxis (or Zamolxis),, whom the euhemerists of the colonies on the Euxine made a pupil of Pythagoras. They were very fond of music, and it was the custom for their ambassadors the priests to present themselves clad in white, playing the lyre and singing songs. They were experts in the use of the bow and arrows while on horseback.

See E. R. Rosier, " Die Geten und ihre Nachbarn," in Sitzungs-berichle der k. Akad. der Wissenschaften, phihsophisch-historische Classe, xliv. (1863), and Romdnische Studien (Leipzig, 1871); W. Tomaschek, " Die alten Thraker," in above Sitzungsberichte, exxviii. (Vienna, 1893); W. Bessel, De rebus Geticis (Gottingen, 1854); C. Mullenhoff in Ersch and Gruber's Allgemeine Encyclopddie ; T. Mommsen, Hist, of Rome (Eng. trans.), bk. v. ch. 7.

GETHSEMANE (Hebr. for "oil-press"), the place to which Jesus and His disciples withdrew on the eve of the Crucifixion. It was evidently an enclosed piece of ground, a plantation rather than a garden in our sense of the word. It lay east of the Kidron and on the lower slope of the mount of Olives, at the foot of which is the traditional site dating from the 4th century and now possessed by the Franciscans. The Grotto of the Agony, a few

hundred yards farther north, is an ancient cave-cistern, now a Latin sanctuary. (See further Jerusalem.)

GETTYSBURG, a borough and the county-seat of Adams county, Pennsylvania, U.S.A., about 35 m. S.W. of Harrisburg. Pop. (1900) 3495; (1910) 4030. It is served by the Western Marylarid and the Gettysburg & Harrisburg railways. The site of the borough is a valley about 15 m. wide; the neighbouring country abounds in attractive scenery. Katalysine Spring in the vicinity was once a well-known summer resort; its waters contain lithia in solution. Gettysburg has several small manu- facturing establishments and is the seat of Pennsylvania College (opened in 1832, and the oldest Lutheran college in America), which had 312 students (68 in the preparatory department) in 1 907- 1 908, and of a Lutheran theological seminary, opened in 1826 on Seminary Ridge; but the borough is best known as the scene of one of the most important battles of the Civil War. Very soon after the battle a soldiers' national cemetery was laid out here, in which the bodies of about 3600 Union soldiers have been buried; and at the dedication of this cemetery, in November 1863, President Lincoln delivered his celebrated " Gettysburg Address." In 1864 the Gettysburg Battle-Field Memorial Association was incorporated, and the work of this association resulted in the conversion of the battle-field into a National Park, an act for the purpose being passed by Congress in 1895. Within the park the lines of battle have been carefully marked, and about 600 .monuments, 1000 markers, and 500 iron tablets have been erected by states and regimental associations. Hundreds of cannon have been mounted, and five observation towers have been built. From 18 16 to 1840 Gettysburg was the home of Thaddeus Stevens. Gettysburg was

settled about 1740, was laid out in 1787, was made the county-seat in 1800, and was incorporated as a borough in 1806.

Battle of Gettysburg. — The battle of the 1st, 2nd and 3rd of July 1863 is often regarded as the turning-point of the American Civil War (q.v.) although it arose from a chance encounter. Lee, the commander of the Confederate Army of Northern Virginia, had merely ordered his scattered forces to concentrate there, while Meade, the Federal commander, held the town with a cavalry division, supported by two weak army corps, to screen the concentration of his Army of the Potomac in a selected position on Pipe Creek to the south-eastward. On the 1st of July the leading troops of General A. P. Hill's Confederate corps ap- proached Gettysburg from the west to meet Ewell's corps, which was to the N. of the town, whilst Longstreet's corps followed Hill. Lee's intention was to close up Hill, Longstreet and Ewell before fighting a battle. But Hill's leading brigades met a strenuous resistance from the Federal cavalry division of General John Buford, which was promptly supported by the infantry of the I. corps under General J. F. Reynolds. The Federals so far held their own that Hill had to deploy two-thirds of his corps for action, and the western approaches of Gettysburg were still held when Ewell appeared to the northward. Reynolds had already fallen, and the command of the Federals, after being held for a time by Gen. Abner Doubleday, was taken over by Gen. 0. 0. Howard, the commander of the XI. corps, which took post to bar the way to Ewell on the north side. But Ewell's attack, led by the fiery Jubal Early, swiftly drove back the XL corps to Gettys- burg; the I. corps, with its flank thus laid open, fell back also, and the remnants of both Federal corps retreated through Gettysburg to the Cemetery Hill position. They had lost severely in the struggle against superior numbers, and there had been some disorder in the retreat. Still a formidable line of defence was taken up on Cemetery Hill and both Ewell and Lee refrained from further attacks, for the Confederates had also lost heavily during the day and their concentration was not complete. In the meanwhile Meade had sent forward General W. S. Hancock, the commander of the Federal II. corps, to examine the state of affairs, and on Hancock's report he decided to fight on the Cemetery Hill position. Two corps of his army were still distant, but the XII. arrived before night, the III. was near, and Han- cock moved the II. corps on his own initiative. Headquarters and the artillery reserve started for Gettysburg on the night of the 1st.

On the other side, the last divisions of Hill's and Ewell's corps formed up opposite the new Federal position, and Longstreet's corps prepared to attack its left.

Owing, however, to misunderstandings between Lee and Longstreet (q.v.), the Confederates did not attack early on the morning of the 2nd, so that Meade's army had plenty of time to make its dispositions. The Federal line at this time occupied the horse-shoe ridge, the right of which was formed by Culp's Hill, and the centre by the Cemetery hill, whence the left wing stretched southward, the III. corps on the left, however, being thrown forward considerably. The XII. held Culp's, the remnant of the I. and XI. the Cemetery hills. On the left was the II., and in its advanced position — the famous " Salient " — the III., soon to be supported by the V. ; the VI., with the reserve artillery, formed the general reserve. It was late in the day when the Confederate attack was made, and valuable time had been lost, but Longstreet's troops advanced with great spirit. The III.

'A U i Mile i i i

E.W.sl.

corps Salient was the scene of desperate fighting; and the " Peach Orchard " and the " Devil's Den " became as famous as the "Bloody Angle" of Spottsylvania or the "Hornets' Nest " of Shiloh. While the Confederate attack was developing, the important positions of Round Top and Little Round Top were unoccupied by the defenders— an omission which was repaired only in the nick of time by the commanding engineer of the army, General G. K. Warren, who hastily called up troops of the V. corps. The attack of a Confederate division was, after a hard struggle, repulsed, and the Federals retained possession of the Round Tops. The III. corps in the meantime, furiously attacked by troops of Hill's and Longstreet's corps, was steadily pressed back, and the Confederates actually pene- trated the main line of the defenders, though for want of support the brigades which achieved this were quickly driven out. Ewell, on the Confederate left, waited for the sound of Longstreet's guns, and thus no attack was made by him until late in the day. Here Culp's Hill was carried with ease by one of Ewell's divisions, most of the Federal XII. corps having been withdrawn to aid in the fight on the other wing; but Early's division was re- pulsed in its efforts to storm Cemetery Hill, and the two divi- sions of the centre (one of Hill's, one of Ewell's corps) remained inactive. .

That no decisive success had been obtained by Lee was clear to all, but Ewell's men on Culp's Hill, and Longstreet's corps below Round Top, threatened to turn both flanks of the Federal position, which was no longer a compact horsehoe but had been considerably prolonged to the left; and many of the units in the Federal army had been severely handled in the two days' fighting. Meade, however, after discussing the eventuality of a retreat with his corps commanders, made up his mind to hold his ground. Lee now decided to alter his tactics. The broken ground near Round Top offered so many obstacles that he decided not to press Longstreet's attack further. Ewell was to resume his attack on Meade's extreme right, while the decisive blow was to be given in the centre (between Cemetery Hill and Trostle's) by an assault delivered in the Napoleonic manner by the fresh troops of Pickett's division (Longstreet's corps). Meade, however, was not dis- posed to resign Culp's Hill, and with it the command of the Federal line of retreat, to Ewell, and at early dawn on the 3rd a division of the XII. corps, well supported by artillery, opened the Federal counter-attack; the Confederates made a strenuous resistance, but after four hours' hard fighting the other division of the XII. corps, and a brigade of the VI., intervened with decisive effect, and the Confederates were driven off the hill. The defeat of Ewell did not, however, cause Lee to alter his plans. Pickett's division was to lead in the great assault, supported by part of Hill's corps (the latter, however, had already been engaged). Colonel E. P. Alexander, Longstreet's chief of ar- tillery, formed up one long line of seventy-five guns, and sixty- five guns of Hill's corps came into action on his left. To the con- verging fire of these 140 guns the Federals, cramped for space, could only oppose seventy-seven. The attacking troops formed up before 9 a.m., yet it was long before Longstreet could bring himself to order the advance, upon which so much depended, and it was not till about 1 p.m. that the guns at last opened fire to pre- pare the grand attack. The Federal artillery promptly replied, but after thirty minutes' cannonade its commander, Gen. H. J. Hunt, ordered his batteries to cease fire in order to reserve their ammunition to meet the infantry attack. Ten minutes later Pickett asked and received permission to advance, and the infantry moved forward to cross the 1800 yds. which separated them from the Federal line. Their own artillery was short of ammunition, the projectiles of that day were not sufficiently effective to cover the advance at long ranges, and thus the Confederates, as they came closer to the enemy, met a tremendous fire of unshaken infantry and artillery.

The charge of Pickett's division is one of the most famous episodes of

*military history. In the teeth of an appalling fire from the rifles of the defending infantry, who were well sheltered, and from the guns which Hunt had reserved for the crisis, the Virginian regiments pressed on, and with a final effort broke Meade's first line. But the strain was too great for the support- ing brigades, and Pickett was left without assistance. Hancock made a fierce counterstroke, and the remnant of the Confederates retreated. Of Pickett's own division over three-quarters, 3393 officers and men out of 4500, were left on the field, two of his three brigadiers were killed and the third wounded, and of fifteen regimental commanders ten were killed and five wounded. One regiment lost 90% of its numbers. The failure of this assault practically ended the battle; but Lee's line was so formidable that Meade did not in his turn send forward the Army of the Potomac. By the morning of the 5th of July Lee's army was in full retreat for Virginia. He had lost about 30,000 men in killed, wounded and missing out of a total force of perhaps 75,000. Meade's losses were over 23,000 out of about 82,000 on the field. The main body of the cavalry on both sides was absent from the field, but a determined cavalry action was fought on the 3rd of July between the Confederate cavalry under J. E. B. Stuart and that of the Federals under D. McM. Gregg some miles E. of the battlefield, and other Federal cavalry made a dashing charge in the broken ground south-west of Round Top on the third day, inflicting thereby, though at great loss to them- selves, a temporary check on the right wing of Longstreet's infantry. . * ■*

GEULINCX— GEYSER

GEULINCX, ARNOLD (1624-1669), Belgian philosopher, was born at Antwerp on the 31st of January 1624. He studied philosophy and medicine at the university of Louvain, where he remained as a lecturer for several years. Having given offence by his unorthodox views, he left Louvain, and took refuge in Leiden where he appears to have been in the utmost distress. He entered the Protestant Church, and in 1663, through the influence of his friend Abranam Heidanus, who had assisted him in his greatest need he obtained a poorly paid lectureship at the university He died at Leiden in November 1669. His most important works were published posthumously. The Metaphysica vera (itgi , and the Tvcoft aeavrdv, she Ethica (under the pseudonym

Philaretus, 1675), are the works by which he is chiefly known. Mention may also be made of Physica vera (1688) Logica reshtuta (1662) and Annotata in Principia philosophise R. Cartesn (1691).

Geulincx principally deals with the question, left in an obscure and unsatisfactory state by Descartes, of the relation between soul and body. Whereas Descartes made the union between them a violent collocation, Geulincx practically called it a miracle Extension and thought, the essences of corporeal and spiritual natures, are absolutely distinct, and cannot act upon one another External facts are not the causes of mental states, nor are mental states the causes of physical facts. So far as the physical universe is concerned, we are merely spectators; the only action that remains for us is contemplation. The influence we seem to exer- cise over bodies by will is only apparent; volition and action only accompany one another. Since true activity consists in knowing what one does and how one does it, I cannot be the author of any state of which I am unconscious; I am not con- scious of the mechanism by which bodily motion is produced hence I am not the author of bodily motion (" Quod nescis quomodo fiat, id non facis »). Body and mind are like two clocks which act together, because both have been set together by God A physical occurrence is but the occasion (opportunity, occasional cause) on which God excites in me a corresponding mental state- the exercise of my will is the occasion on which God moves my body. Every operation in which mind and matter are both concerned is an effect of neither, but the direct act of God Oeulmcx was thus the first definitely to systematize the theory called Occasionalism, which had. already been propounded by berauld de Cordemoy (d. 1684), a Parisian lawyer, and Louis de la Forge, a physician of Saumur. But the principles on which the theory was founded compelled a further advance Cod, who is the cause of the concomitance of bodily and mental tacts, is m truth the sole cause in the universe. No fact contains in itself the ground of any other; the existence of the facts is due to God, their sequence and coexistence are also due to him He is the ground of all that is. My desires, volitions and thoughts are thus the desires, volitions and thoughts of God Apart from God, the finite being has no reality, and we only have the idea of it from God. Descartes had left untouched or nearly so, the difficult problem of the relation between the universal element or thought and the particular desires or in- clinations. All these are regarded by Geulincx as modes of the divine thought and action, and accordingly the end of human endeavour is the end of the divine will or the realization of reason the love of right reason is the supreme virtue, whence flow the cardinal virtues, diligence, obedience, justice and humility Since it is impossible for us to make any alteration in the world ot matter all we can do is to submit. Chief of the cardinal virtues is humility, a confession of our own helplessness and sub- mission to God. Geulincx's idea of life is " a resigned optimism."

Geulincx carried out to their extreme consequences the irreconcilable elements in the Cartesian metaphysics, and his works have the peculiar value attaching to the vigorous development of a one-sided principle. The abrupt contradictions to which such development leads of necessity compels revision of the principle itself. He was thus important as the precursor of Malebranche and Spinoza.

Edition of His philosophical works by J. P. N. Land (1801-180 for wh.ch a recently discovered MS. was consulted)? s£ -also ?&*

same editor's Arnold Geulincx und seine Philosophie (i8qs) and article (translated) in Mind, xvi. 223 seq. ; V. van der Haeghen ˆeuhncx Etude sur so, vie, sa philosophie, et ses ouvrages (Ghent, 188b,); h. Grimm, A Geulincx' Erkenntnisstheorie und Occasionalisms (1875); E Pfleiderer, A. G. als Hauptvertreler der okkasionalishschen Metaphysik und Ethik (1882); G. Samtleben, Geulincx, e l n ., V °n' m ˆ r Spmozas (1885); also Falckenberg, Hist of Mod Philos. (Eng. trans., 1895), ch. hi.; G. Monchamp, Hist, du Cartesianisme en Belgique (Brussels, 1886) ; H. Hoffding, Hist, of Mod. Philos. (Eng. trans., 1900), 1. 245.

GEUM, in botany, a genus of hardy perennial herbs (natural order Rosaceae) containing about thirty species, widely dis- tributed in temperate and arctic regions. The erect flowering shoots spring from a cluster of radical leaves, which are deeply cut or lobed, the largest division being at the top of the leaf The flowers are borne singly on long stalks at the end of the stem or its branches. They are white, yellow or red in colour, and shallowly cup-shaped. The fruit consists of a number of dry achenes, each of which bears a hook formed from the persistent lower portion of the style, and admirably adapted for ensuring distnbution. Two species occur in Britain under the popular name avens." G. urbanum is a very common hedge-bank plant with small yellow flowers; G. rivale (water avens) is a rarer plant found by streams, and has larger yellow flowers an inch or more across. The species are easy to cultivate and well adapted for borders or the rock-garden. They are propagated by seeds or by division. The most popular garden species are G. chiloense and its varieties, G. coccineum and G. montanum.

GEVELSBERG, a town of Germany, in the Prussian Rhine Province, 6 m. S.W. from Hagen, on the railway to Dusseldorf ' It has two churches, schools and a hospital, and considerable manufactures of cutlery. Pop. (1905) 15,838.

GEX, a town of eastern France, chief town of an arrondisse- ment in the department of Ain, 10 m. N.W. of Geneva and 3 m. from the Swiss frontier. Pop. (1906) town, 1385; commune, 2727 The town is beautifully situated 2000 ft. above sea-level at the base of the most easterly and highest chain of the Jura It is the seat of a subprefect and has a tribunal of first instance and carries on considerable trade in wine, cheese and other provisions chiefly with Geneva. It gives its name to the old Pays de Gex, situated between the Alps and the Jura which was at various times under the protection of the Swiss the Genevese and the counts of Savoy, until in 1601 it came' into the possession of France, retaining, however, until the Revolu- tion its old independent jurisdiction, with Gex as its chief town I he Pays de Gex is isolated by the Jura from the rest of French territory, and comes within the circumscription of the Swiss customs, certain restrictions being imposed on its products by the French customs. J

GEYSER Geiser, or Geisir, a natural spring or fountain which discharges into the air, at more or less regular intervals of time, a column of heated water and steam; it may conse- quently be regarded as an intermittent hot spring. The word is the Icelandic geysir, gusher or rager, from the verb geysa, a derivative of gjosa, to gush. In native usage it is the proper name of the Great Geyser, and not an appellative-the general term hver, a hot spring, making the nearest approach to the European^ense of the word (see Cleasby and Vigfusson, Icelandic English Dictionary, s.v.).

Any hot spring capable of depositing siliceous material by the evaporation of its water may in course of time transform itself into a geyser, a tube being gradually built up as the level ol the basin is raised, much in the same manner as a volcanic cone is produced. Every geyser continuing to deposit siliceous material is preparing its own destruction; for as soon as the tube becomes deep enough to contain a column of water sufficiently heavy to prevent the lower strata attaining their boilmg points, the whole mechanism is deranged. The deposition ot the sinter is due in part to the cooling and evaporation of the siliceous waters, and in part to the presence of living algae. In geyser districts it is easy to find thermal springs busy with the construction of the tube; warm pools, or hugs, as the Icelanders call them, on the top of siliceous mounds, with the mouth of

the shaft still open in the middle; and dry basins from which the water has receded with their shafts now choked with rubbish. Geysers exist at the present time in many volcanic regions, as in the Malay Archipelago, Japan and South America; but the three localities where they attain their highest development are Iceland, New Zealand and the Yellowstone Park, U.S.A. The very name by which we call them indicates the historical priority of the Iceland group.

The Iceland geysers, mentioned by Saxo Grammaticus, are situated about 30 m. N.W. of Hecla, in a broad valley at the foot of a range of hills from 300 to 400 ft. in height. Within a circuit of about 2 m., upwards of one hundred hot springs may be counted, varying greatly both in character and dimensions. The Great Geyser in its calm periods appears as a circular pool about 60 ft. in diameter and 4 ft. in depth, occupying a basin on the summit of a mound of siliceous concretion; and in the centre of the basin is a shaft, about 10 ft. in diameter and 70 ft. in depth, lined with the same siliceous material. The clear sea-green water flows over the eastern rim of the basin in little runnels. On the surface it has a temperature of from 76° to 89° C, or from 1 68° to 1 88° F. Within the shaft there is of course a continual shifting both of the average temperature of the column and of the relative temperatures of the several strata. The results of the observations of Bunsen and A. L. O. Descloizeaux in 1847 were as follows (cf. Pogg. Ann., vol. 72 and Comptes rendus, vol. 19): About three hours after a great eruption on July 6, the tem- perature 6 metres from the bottom of the shaft was 121-6° C; at 9-50 metres, 121-1°; at 16-30 metres, 109° (?); and at 19-70 metres, 95° (?). About nine hours after a great eruption on July 6, at about 0-3 metres from the bottom, it was 123°; at 4-8 metres it was 122-7°; at 9 – 6 metres, 113°; at 14-4 metres, 85-8°; at 19-2 metres, 82-6°. On the 7th, there having been no eruption since the previous forenoon, the temperature at the bottom was 127-5°; at 5 metres from the bottom, 123°; at 9 metres, 120-4°; at 14-75 metres, 106-4°; and at 19 metres, 55°. About three hours after a small eruption, which took place at forty minutes past three o'clock in the afternoon of the 7th, the temperature at the bottom was 126-5°; at 6-85 metres up it was 121-8°; at 14-75 metres, 110°; and at 19 metres, 55°. Thus, continues Bunsen, it is evident that the temperature of the column diminishes from the bottom upwards ; that, leaving out of view small irregularities, the temperature in all parts of the column is found to be steadily on the increase in proportion to the time that has elapsed since the previous eruption; that even a few minutes before the great eruption the temperature at no point of the water column reached the

boiling point corresponding to the atmospheric pressure at that part; and finally, that the temperature about half-way up the shaft made the nearest approach to the appropriate boiling point, and that this approach was closer in proportion as an eruption was at hand. The Great Geyser has varied very much in the nature and frequency of its eruptions since it began to be observed. In 1809 and 1810, according to Sir W. J. Hooker and Sir George S. Mackenzie, its columns were 100 or 90 ft. high, and rose at intervals of 30 hours, while, according to Henderson, in 1815 the intervals were of 6 hours and the altitude from 80 to 150 ft. About 100 paces from the Great Geyser is the Strokkr or churn, which was first described by Stanlay in 1789. The shaft in this case is about 44 ft. deep, and, instead of being cylindrical, is funnel-shaped, having a width of about 8 ft. at the mouth, but contracting to about 10 in. near the centre. By casting stones or turf into the shaft so as to stopper the narrow neck, eruptions can be accelerated, and they often exceed in. magnitude those of the Great Geyser itself. During quiescence the column of water fills only the lower part of the shaft, its surface usually lying from 9 to 12 ft. below the level of the soil. Unlike that of the Great Geyser, it is always in ebullition, and its temperature is subject to comparatively slight differences. On the 8th of July 1847 Bunsen found the temperature at the bottom 112-9° C.; at 3 metres from the bottom, 111-4°; and at 6 metres, 108°; the whole depth of water was on that occasion 10-15 metres. On the 6th, at 2-90 metres from the bottom it was 114-2°; and

Fig. 1.

at 6-20 metres, 109-3°. On the 10th, at 0-35 metres from the bottom, the reading gave 113-9°; at 4-65 metres, 113-7°; and at 8-85 metres, 99-9°.

The great geyser-district of New Zealand is situated in the south of the province of Auckland in or near the upper basin of the Waikato river, to the N.E. of Lake Taupo. The scene presented in various parts of the districts is far more striking and beautiful than anything of the same kind to be found in Iceland, but this is due not so much to the grandeur of the geysers proper as to the bewilder- ing profusion of boiling springs, steam-jets and mud-volcanoes, and to the fantastic effects pro- duced on the rocks by the siliceous deposits and by the action of the boiling water. In about 1880 the geysers were no longer active, and this condition prevailed until the Tarawera eruption of 1886, when seven gigantic geysers came into existence; water, steam, mud and stones were discharged to a height of 600 to 800 ft. for a period of about four hours, when quieter conditions set in. Waikite

near Lake Rotorua throws the column to a height of 30 or 35 ft.

In the Yellowstone National Park, in the north-west corner of Wyoming, the various phenomena of the geysers can be observed on the most portentous scale. The geysers proper are about one hundred in number; the non-eruptive hot springs are much more numerous, there being more than 3000. The dimensions and activity of several of the geysers render those of Iceland and New Zealand almost insignificant in comparison. The principal groups are situated along the course of that tributary of the Upper Madison which bears the name of Fire Hole River. Many of the individual geysers have very distinctive characteristics in the form and colour of the mound, in the style of the eruption and in the shape of the column. The " Giantess " lifts the main column to a height of only 50 or 60 ft., but shoots a thin spire to no less than 250 ft. The " Castle " varies in height from 10 or 15 to 250 ft.; and on the occasions of greatest effort the noise is appalling, and shakes the ground like an earthquake. " Old Faithful " owes its name to the regu- larity of its action. Its eruptions, which raise the water to a height of 100 or 150 ft., last for about five minutes, and recur every hour or thereabouts. The " Beehive " sometimes attains a height of 219 ft.; and the water, instead of falling back into the basin, is dissipated in spray and vapour. Very various accounts are given of the " Giant." F. V. Hayden saw it playing for an hour and twenty minutes, and reaching a height of 140 ft., and Doane says it continued in action for three hours and a half, and had a maxi- mum of 200 ft.; but at the earl of Dunraven's visit the eruption lasted only a few minutes.

Theory of Geysers. — No satisfactory ex- planation of the phenomena of geysers was advanced till near the middle of the 19th cen- tury, when Bunsen elucidated their nature. Sir George Mackenzie, in his Travels in Iceland (2nd ed., 1812), submitted a theory which partially explained the phenomena met with. " Let us suppose a cavity C (fig. 1), communicating with the pipe PQ, filled with boiling water to the height AB, and that the steam above this line is con- fined so that it sustains the water to the Fig. 2. height P. If we suppose a sudden addition

of heat to be applied under the cavity C, a quantity of steam will be produced which, owing to the great pressure, will be evolved in starts, causing the noises like discharges of artillery and the shaking of the ground." He admitted that this could be only a partial explanation of the facts of the case, and that he was unable

*9*5*

Observed. A Calculated.

186°

230

C

251°

D 255° 259°

•

225

241 ° 249° 255°

266

278°

B

to account for the frequent and periodical production of the necessary heat; but he has the credit of hitting on what is certainly the proximate cause — the sudden evolution of steam. By Bunsen's theory the whole difficulty is solved, as is beautifully demonstrated by the artificial geyser designed by J. H. J. Miiller of Freiburg (fig. 2). If the tube ab be filled with water and heated at two points, first at a and then at b, the following succession of changes is pro- duced. The water at a beginning to boil, the superincumbent column is consequently raised, and the stratum of water which was on the point of boiling at 6 being raised to d is there subjected to a diminished pressure; a sudden evolution of steam accordingly takes place at d, and the superincumbent water is violently ejected. Received in the basin c, the air-cooled water sinks back into the tube, and the temperature of the whole column is consequently lowered ; but the under strata of water are naturally those which are least affected by the cooling process; the boiling begins again at a, and the same succession of events is the result (see R. Bunsen, " Physikalische Beobachtungen iiber die hauptsachlichsten Geisire Islands," Pogg. Ann., 1847, vol. 72; and Miiller, " tlber Bunsen's Geysertheorie," ibid., 1850, vol. 79).

The principal difference between the artificial and the natural geyser-tube is that in the latter the effect is not necessarily produced by two distinct sources of heat like the two fires of the experimental apparatus, but by the continual influx of heat from the bottom of the shaft, and the differences between the boiling-points of the different parts of the column owing to the different pressures of the superincum- bent mass. This may be thus illustrated: AB is the column of water; on the right side the figures represent approximately the boiling-points (Fahr.) calculated accord- ing to the ordinary laws, and the figures on the left the actual temperature of the same places. Both gradually increase as we descend, but the relation between the two is very different at different heights. At the top the water is still 39° from its boiling- point, and even at the bottom it is 19°; but at D the deficiency is only 4 . If, then, the "stratum at D be suddenly lifted as high as C, it will be 2° above the boiling-point there, and will consequently expend those 2° in the formation of steam.

GEZER (the Razir of Tethmosis [Thothmes] III.'s list of Palestinian cities and the Gazri of the Amarna tablets), a royal Canaanite city on the boundary of Ephraim, in the maritime plain (Josh. xvi. 3-10), and near the Philistine border (2 Sam. v. 25). It was allotted to the Levites, but its original inhabitants were not driven out until the time of Solomon, when " Pharaoh, king of Egypt " took the city and gave it as a dowry to his daughter, Solomon's wife (1 Kings ix. 16). Under the form Gazera it is mentioned (1 Mace. iv. 15) as being in the neighbour- hood of Emmaus-Nicopolis ("Am was) and Jamnia (Yebnah). Throughout the history of the Maccabean wars Gezer or Gazara plays the part of an important frontier post. It was first taken from the Syrians by Simon the Asmonean (1 Mace. xiv. 7). Josephus also mentions that the city was " naturally strong " (Antiq. viii. 6. 1). The position of Gezer is defined by Jerome (Onomasticon, s.v.) as four Roman miles north (contra septen- trionem) of Nicopolis ("Amwas). This points to the mound of debris called T ell-el- J ezari near the village of Abu Shusheh. The site is naturally very strong, the town standing on an isolated hill, commanding the western road to Jerusalem just where it begins to enter the mountains of Judea. This identification has been confirmed by the discovery of a series of boundary inscrip- tions, apparently marking the limit of the city's lands, which have been found cut in rock — outcrops partly surrounding the site. They read in every case "iu 'onrˆ " the boundary of Gezer," with the name Alkios in Greek, probably that of the governor under whom the inscriptions were cut. The site has been partially excavated by the Palestine Exploration Fund, and an

enormous mass of material for the history of Palestine recovered from it, including remains of a pre-Semitic aboriginal race, a remarkably perfect High Place, the castle built by Simon, and other remains of the first importance.

See R. A. S. Macalister's reports in Palestine Exploration Fund Quarterly Statement (October 1902 onwards). Also Bible Sidelights from the Mound of Gezer, by the same writer. (R. A. S. M.)

GFRORER, AUGUST FRIEDRICH (1803-1861), German historian, was born at Calw, Wiirttemberg, on the 5th of March 1 So written, with a medial mem (d) instead of the final (d).

1803, and at the close of his preliminary studies at the seminary of Blaubeuren entered the university of Tubingen in i82iasa student of evangelical theology. After passing his final examina- tions in 1825, he spent a year in Switzerland, during part of the time acting as companion and secretary to C. von Bonstetten (174 5-1832); the year 1827 was spent chiefly in Rome. Re- turning to Wiirttemberg in 1828, he first undertook the duties of repetent or theological tutor in Tubingen, and afterwards accepted a curacy in Stuttgart; but having in 1830 received an appoint- ment in the royal public library at Stuttgart, he thenceforth gave himself exclusively to literature and historical science. His first work on Philo (Philo u. die jiidisch-alexandrinische Theo- sophie, Stuttgart, 1831) was rapidly followed by an elaborate biography, in two volumes, of Gustavus Adolphus (Gustav Adolf, Konig von Sckweden, und seine Zeit, Stuttgart, 1835-1837), and by a critical history of primitive Christianity (Kritische Geschichte des Urchristentkums, 3 vols., Stuttgart, 1838). Here Gfrorer had manifested opinions unfavourable to Protestantism, which, however, were not openly avowed until fully developed in his church history (Allgemeine Kirchengeschichte bis Beginn des I4ten Jahrhunderts, Stuttgart, 1841-1846). In the autumn of 1846 he was appointed to the chair of history in the university of Freiburg, where he continued to teach until his death at Carlsbad on the 6th of July 1861. In 1848 he sat as a repre- sentative in the Frankfort parliament, where he supported the " High German " party, and in 1853 he publicly went over to the Church of Rome. He was a bitter opponent of Prussia and an ardent controversialist.

Among his later historical works the most important is the Ge- schichte der ost- u. westfrdnkischen Karolinger (Freiburg, 1 848) ; but those on the pseudo-Isidorian Decretals (Untersuchung iiber Alter, Ur sprung, u. Werth der Decretalen des falschen Isidorus,

1848), on the primitive history of mankind (Vr geschichte des menschlichen Ge- schlechts, 1855), on Hildebrand {Papst Gregorius VII. u. sein Zeitalter, 7 vols., 1859-1861), on the history of the 18th century {Geschichte des i8ten Jahrhunderts, 1 862-1 873), on German popular rights (Zur Geschichte deutscher Volksrechte im Mittelalter, Basel, 1865-1866) and on Byzantine history (Byzantinische Geschichten, 1872-1874), are also of real value.

GHADAMES, Gadames or Rhadames, a town in an oasis of the same name, in that part of the Sahara which forms part of the Turkish vilayet of Tripoli. It is about 300 m. S.W. of the city of Tripoli and some 10 m. E. of the Algerian frontier. According to Gerhard Rohlfs, the last form given to the word most correctly represents the Arabic pronunciation, but the other forms are more often used in Europe. The streets of the town are narrow and vaulted and have been likened to the bewildering galleries of a coalpit. The roofs are laid out as gardens and preserved for the exclusive use of the women. The Ghadamsi merchants have been known for centuries as keen and adventurous traders, and their agents are to be found in the more important places of the western and central Sudan, such as Kano, Katsena, Kanem, Bornu, Timbuktu, as well as at Ghat and Tripoli. Ghadames itself is the centre of a large number of caravan routes, and in the early part of the 19th century about 30,000 laden camels entered its markets every year. The caravan trade was created by the Ghadamsi merchants who, aided by their superior intelli- gence, capacity and honesty, long enjoyed a monopoly. In 1873 Tripolitan merchants began to compete with them. In 1893 came the invasion ofBornuby Rabah,and the total stoppage of this caravan route for nearly ten years to the great detriment of the merchants of Ghadames. The caravans from Kano were also frequently pillaged by the Tuareg, so that the prosperity of the town declined. Later on, the opening of rapid means of transport from Kano and other cities to the Gulf of Guinea also affected Ghadames, which, however, maintains a considerable trade. The chief articles brought by the caravans are ostrich feathers, skins and ivory and one of the principal imports is tea. In 1845 the population was estimated at 3000, of whom about 500 were slaves and strangers, and upwards of 1200 children; in 1905 it amounted in round numbers to 7000. The inhabitants are chiefly Berbers and Arabs. A Turkish garrison is maintained in the town.

Before the Christian era Ghadames was a stronghold of the

Garamantes whose power was overthrown in the days of Augustus by L. Cornelius Balbus Minor,who captured Ghadames(Cydamus) . It is not unlikely that Roman settlers may have been attracted to the spot by the presence of the warm springs which still rise in the heart of the town, and spread fertility in the surrounding gardens. In the 7th century Ghadames was conquered by the Arabs. It appears afterwards to have fallen under the power of the rulers of Tunisia, then to a native dynasty which reigned at Tripoli, and in the 16th century it became part of the Turkish vilayet of Tripoli. It has since then shared the political fortunes of that country. In the first half of the 19th century it was visited by several British explorers and later by German and French travellers.

See J. Richardson, Travels in the Great Desert of Sahara in 1845-1846 . . . including a Description of . . . Ghadames (London, 1848); G. Rohlfs, Reise durch Marokko . . . und Reise durch die Grosse Wiiste iiber Rhadames nach Tripoli (Bremen, 1868).

GHAT, or Rhat, an oasis and town, forming part of the Turkish vilayet of Tripoli. Ghat is an important centre of the caravan trade between the Nigerian states and the seaports of the Mediterranean (see Tripoli).

GHATS, or Ghauts (literally " the Landing Stairs " from the sea, or " Passes "), two ranges of mountains extending along the eastern and western shores of the Indian peninsula. The word properly applies to the passes through the mountains, but from an early date was transferred by Europeans to the mountains themselves.

The Eastern Ghats run in fragmentary spurs and ranges down the Madras coast. They begin in the Orissa district of Balasore, pass southwards through Cuttack and Puri, enter the Madras presidency in Ganjam, and sweep southwards through the districts of Vizagapatam, Godavari, Nellore, Chingleput, South Arcot, Trichinopoly and Tinnevelly. They run at a distance of 50 to 150 m. from the coast, except in Ganjam and Vizagapatam, where in places they almost abut on the Bay of Bengal. Their geological formation is granite, with gneiss and mica slate, with clay slate, hornblende and primitive limestone overlying. The average elevation is about 1300 ft., but several hills in Ganjam are between 4000 and 5000 ft. high. For the most part there is a broad expanse of low land between their base and the sea, and their line is pierced by the Godavari, Kistna and Cauvery rivers.

The Western Ghats (Sahyadri in Sanskrit) start from the south of the Tapti valley, and run south through the districts of Khandesh, Nasik, Thana, Satara, Ratnagiri, Kanara and Malabar, and the states of Cochin and Travancore, meeting the Eastern Ghats at an angle near Cape Comorin. The range of the Western Ghats extends uninterruptedly, with the exception of a gap or valley 25 m. across, known as the Palghat gap, through which runs the principal railway of the south of India. The length of the range is 800 m. from the Tapti to the Palghat gap, and south of this about 200 m. to the extreme south of the peninsula. In many parts there is only a narrow strip of coast between the hills and the sea; at one point they rise in magnifi- cent precipices and headlands out of the ocean. The average elevation is 3000 ft., precipitous on the western side facing the sea, but with a more gradual slope on the east to the plains below. The highest peaks in the northern section are Kalsubai, 5427 ft.; Harischandragarh, 4691 ft.; and Mahabaleshwar, where is the summer capital of the government of Bombay, 4700 ft. South of Mahabaleshwar the elevation diminishes, but again increases, and attains its maximum towards Coorg, where the highest peaks vary from 5500 to 7000 ft., and where the main range joins the interior Nilgiri hills. South of the' Palghat gap, the peaks of the Western Ghats rise as high as 8000 ft. The geological, formation is trap in the northern and gneiss in the southern ■ section.

GHAZAlJ [Muhammad ibn Muhammad Abu Hamid al- Ghazali] (1058-nn), Arabian philosopher and theologian, was born at Tus, and belonged to a family of Ghazala (near Tus) distinguished for its knowledge of canon law. Educated at first in Tus, then in Jorjan, and again in Tus, he went to college at Nlshapur, where he studied under Juwaini (known as the

Imam ul-IJaramain) until 1085, when he visited the celebrated vizier Nizam ul-Mulk, who appointed him to a professorship in his college at Bagdad in 1091. Here he was engaged in writing against the Isma'ilites (Assassins). After four years of this work he suddenly gave up his chair, left home and family and gave himself to an ascetic life. This was due to a growing scepti- cism, which caused him much mental unrest and which gradually gave way to mysticism. Having secured his chair for his brother he went to Damascus, Jerusalem, Hebron, Mecca, Medina and Alexandria, studying, meditating and writing in these cities. In 1 106 he was tempted to go to the West, where the Moravid (Almoravid) reformation was being led by Yusuf ibn Tashfin, with whom he had been in correspondence earlier. Yusuf, however, died in this year, and Ghaza.ll abandoned his idea. At the wish of the sultan Malik Shah he again undertook

pro- fessorial werk, this time in the college of Nizam ul-Mulk at Nlshapur, but returned soon after to Tus, where he died in December 1111.

Sixty-nine works are ascribed to Ghazali (cf. C. Brockelmann's Gesch. d. arabischen Litteratur, i. 421-426, Weimar, 1898). The most important of those which have been published are: a treatise on eschatology called Ad-durra ul-fdkhira (" The precious pearl "), ed. L. Gautier (Geneva, 1878); the great work, Ihya ul-'Ulum ("Revival of the sciences") (Bulaq, 1872; Cairo, 1889); see a commentary by al-Murtada called the Ithaf, published in 13 vols, at Fez, 1885-1887, and in 10 vols, at Cairo, 1893; the Bidayat ul- Hidaya (Bulaq, 1870, and often at Cairo) ; a compendium of ethics, Mizan ul-'Amal, translated into Hebrew, ed. J. Goldenthal (Paris, 1839); a more popular treatise on ethics, the Kimiya us-Sa'ada, published at Lucknow, Bombay and Constantinople, ed. H. A. Homes as The Alchemy of Happiness (Albany, N.Y., 1873); the ethical work O Child, ed. by Hammer-Purgstall in Arabic and German (Vienna, 1838) ; the Destruction of Philosophers (Tahafut ul-Falasifa) (Cairo, 1885, and Bombay, 1887). Of this work a French translation was begun by Carra de Vaux in Museon, vol. xviii. (1899); the Maqasid ul-Falasifa, of which the first part on logic was translated into Latin by Dom. Gundisalvi (Venice, 1506), ed. with notes by G. Beer (Leiden, 1888); the Kitab ul-Munqid, giving an account of the changes in his philosophical ideas, ed. by F. A. Schmolders in his Essai sur les ecoles philosophiques chez les Arabes (Paris, 1842), also printed at Constantinople, 1876, and translated into French by Barbier de Meynard in the Journal asiatique (1877, l – I_ 93); answers to questions asked of him ed. in Arabic and Hebrew, with German translation and notes by H. Maker (Frankfort, 1896) ; Eng. trans., Confessions of al-Ghazzali, by Claud Field (1909).

For Ghazali's life see McG. de Slane's translation of Ibn Khallikan, ii. 621 ff. ; R. Gosche's Xjber Ghazzali's Leben und Werke (Berlin, 1859); D. B. Macdonald's "Life of al-Ghazzali," in Journal of American Oriental Society, vol. xx. (i'899), and Carra de Vaux's Gazali (Paris, 1902) ; see Arabian Philosophy. (G. W. T.)

GHAZI (an Arabic word, from ghaza, to fight), the name given to Mahommedans who have vowed to exterminate un- believers by the sword. It is also used as a title of honour, generally translated " the Victorious," in the Ottoman empire for military officers of high rank, who have distinguished them- selves in the field against non-Moslem enemies; thus it was conferred on Osman Pasha after his famous defence of Plevna.

GHAZIABAD, a town of British India in Meerut district of the United Provinces, 12 m. from Delhi and 28 m. from Meerut. Pop. (1901) 11,275. The town was founded in 1740 by Ghazi-ud- din, son of Azaf Jah, first nizam of the Deccan, and takes its name from its founder. It has considerably risen in importance as the point of junction of the East Indian, the North- Western and the Oudh & Rohilkhand railway systems. The town has a trade in grain and hides.

GHAZIPUR, a town and district of British India, in the Benares division of the United Provinces. The town stands on the left bank of the Ganges, 44 m. E. of Benares. It is the headquarters of the government opium department, where all the opium from the United Provinces is collected and manu- factured under a monopoly. There are also scent distilleries, using the produce of the rose-gardens in the vicinity. Lord Cornwallis, governor-general of India, died at Ghazipur in 1805, and a domed monument and marble statue (by Flaxman) are erected over his grave. Pop. (1901) 39,429.

The district of Ghazipur has an area of 1389 sq. m. It forms

part of the great alluvial plain of the Ganges, which divides

I it into two unequal portions. The northern subdivision lies

between the Gumti and the Gogra, whose confluences with the main stream mark its eastern and western limits respectively. The southern tract is a much smaller strip of country, enclosed between the Karamnasa and the great river itself. There are no hills in the district. A few lakes are scattered here and there, formed where the rivers have deserted their ancient channels. The largest is that of Suraha, once a northern bend of the Ganges, but now an almost isolated sheet of water, 5 m. long by about 4 broad. Ghazipur is said to be one of the hottest and dampest districts in the United Provinces. In 1901 the population was 913,818, showing a decrease of 11% in the decade. Sugar refining is the chief industry, and provides the principal article of export. The main line of the East Indian railway traverses the southern portion of the district, with a branch to the Ganges bank opposite Ghazipur town; the northern portion is served by the Bengal & North- Western system.

GHAZNI, a famous city in Afghanistan, the seat of an extensive

empire under two medieval dynasties, and again of prominent interest in the modern history of British India. Ghazni stands on the high tableland of central Afghanistan, in 68° 18′ E. long., 33° 44′ N. lat., at a height of 7280 ft. above the sea, and on the direct road between Kandahar and Kabul, 221 m. by road N.E. from the former, and 92 m. S.W. from the latter. A very considerable trade in fruit, wool, skins, &c.,is carried on between Ghazni and India by the Povindah kafilas, which yearly enter India in the late autumn and pass back again to the Afghan highlands in the early spring. The Povindah merchants in- variably make use of the Gomal pass which leads to the British frontier at Dera Ismail Khan. The opening up of this pass and the British occupation of Wana, by offering protection to the merchants from Waziri blackmailing, largely increased the traffic.

Ghazni, as it now exists, is a place in decay, and probably does not contain more than 4000 inhabitants. It stands at the base of the terminal spur of a ridge of hills, an offshoot from the Gul-Koh, which forms the watershed between the Arghandab, and Tarnak rivers. The castle stands at the northern angle of the town next the hills, and is about 150 ft. above the plain. The town walls stand on an elevation, partly artificial, and form an irregular square, close on a mile in circuit (including the castle) , the walls being partly of stone or brick laid in mud, and partly of clay built in courses. They are flanked by numerous towers. There are three gates. The town consists of dirty and very irregular streets of houses several stories high, but with two straighter streets of more pretension, crossing near the middle of the town. Of the strategical importance of Ghazni there can hardly be a question. The view to the south is ex- tensive, and the plain in the direction of Kandahar stretches to the horizon. It is bare except in the vicinity of the river, where villages and gardens are tolerably numerous. Abundant crops of wheat and barley are grown, as well as of madder, besides minor products. The climate is notoriously cold, — snow lying 2 or 3 ft. deep for about three months, and tradition speaks of the city as having been more than once overwhelmed by snowdrift. Fuel is scarce, consisting chiefly of prickly shrubs. In summer the heat is not like that of Kandahar or Kabul, but the radiation from the bare heights renders the nights oppressive, and constant dust-storms occur. It is evident that the present restricted walls cannot have contained the vaunted city of Mahmud. Probably the existing site formed the citadel only of his city. The remarks of Ibn Batuta (c. 1332) already suggest the present state of things, viz. a small town occupied, a large space of ruin; for a considerable area to the N.E. is covered with ruins, or rather with a vast extent of

shapeless mounds, which are pointed out as Old Ghazni. The only remains retaining architectural character are two remarkable towers ‘ rising to the height of about 140 ft., and some 40c yds. apart from each other. They are similar, but whether identical, in design, is not clearly recorded. They belong, on a smaller and far less elaborate scale, to the same class as the Kutb Minar at Delhi (?.».). Arabic inscriptions in Cufic characters show the most northerly to have been the work of Mahmud himself, the

other that of his son Masa’ud. On the Kabul road, a mile beyond the Minaret of Mahmud, is a village called Rauzah (” the Garden,” a term often applied to garden-mausoleums). Here, in a poor garden, stands the tomb of the famous conqueror. It is a prism of white marble standing on a plinth of the same, and bearing a Cufic inscription praying the mercy of God on the most noble Amir, the great king, the lord of church and state, Abul Kasim Mahmud, son of Sabuktagin. The tomb stands in a rude chamber, covered with a dome of clay, and hung with old shawls, ostrich eggs, tiger-skins and so forth. The village stands among luxuriant gardens and orchards, watered by a copious aqueduct. Sultan Baber celebrates the excellence of the grapes of Rauzah.

There are many holy shrines about Ghazni surrounded by orchards and vineyards. Baber speaks of them, and tells how he detected and put a stop to the imposture of a pretended miracle at one of them. These sanctuaries make Ghazni a place of Moslem pilgrimage, and it is said that at Constantinople much respect is paid to those who have worshipped at the tomb of the great Ghazi. To test the genuineness of the boast, professed pilgrims are called on to describe the chief notabilia of the place, and are expected to name all those detailed in certain current Persian verses. \ ;

History. — The city is not mentioned by any narrator of Alexander’s expedition, nor by any ancient author so as to admit of positive recognition. But it is very possibly the Gazaca which Ptolemy places among the Paropamisadae, and this may not be inconsistent with Sir H. Rawlinson’s identification of it with Gazos, an Indian city spoken of by two obscure Greek poets as an impregnable place of war. The name is probably con- nected with the Persian and Sanskrit ganj and ganja, a treasury (whence the Greek and Latin Gaza). We seem to have positive evidence of the existence of the city before the Mahommedan times (644) in the travels of the Chinese pilgrim, Hsuan Tsang, who speaks of Ho-si-na {i.e. probably Ghazni) as one of the capitals of Tsaukuta or Arachosia, a place of great strength. In early Mahommedan times the country adjoining Ghazni was called

Zabul. When the Mahommedans first invaded that region Ghazni was a wealthy entrepot of the Indian trade. Of the extent of this trade some idea is given by Ibn Haukal, who states that at Kabul, then a mart of the same trade, there was sold yearly indigo to the value of two million dinars (£1,000,000). The enterprise of Islam underwent several ebbs and flows over this region. The provinces on the Helmund and about Ghazni were invaded as early as the caliphate of Moaiya (662-680). The arms of Yaqub b. Laith swept over Kabul and Arachosia (Al-Rukhaj) about 871, and the people of the latter country were forcibly converted. Though the Hindu dynasty of Kabul held a part of the valley of Kabul river till the time of Mahmud, it is probably to the period just mentioned that we must refer the permanent Mahommedan occupation of Ghazni. , Indeed, the building of the fort and city is ascribed by a Mahom- medan historian to Amr b. Laith, the brother and successor of Ya'kub (d. 901), though the facts already stated discredit this. In the latter part of the 9th century the family of the Samanid, sprung from Samarkand, reigned in splendour at Bokhara. Alptagin, originally a Turkish slave, and high in the service of the dynasty, about the middle of the 10th century, losing the favour of the court, wrested Ghazni from its chief (who is styled Abu Bakr Lawik, wali of Ghazni), and established himself there. His government was recognized from Bokhara, and held till his death. In 977 another Turk slave, Sabuktagin, who had married the daughter of his master Alptagin, obtained rule in Ghazni. He made himself lord of nearly all the present territory of Afghanistan and of the Punjab. In 997 Mahmud, son of Sabuktagin, succeeded to the government, and with his name Ghazni and the Ghaznevid dynasty have beome perpetu- ally associated. Issuing forth year after year from that capital, Mahmud (q.v .) carried fully seventeen expeditions of devastation through northern India and Gujarat, as well as others to the north and west. From the borders of Kurdistan to Samarkand, from the Caspian to the Ganges, his authority was acknowledged.

The wealth brought back to Ghazni was enormous, and con- temporary historians give glowing descriptions of the magnifi- cence of the capital, as well as of the conqueror's munificent support of literature. Mahmud died in 1030, and some fourteen kings of his house came after him; but though there was some revival of importance under Ibrahim (1059-1099), the empire never reached anything like the same splendour and power. It was overshadowed by

the Seljuks of Persia, and by the rising rivalry of Ghor (?.».), the hostility of which it had repeatedly provoked. Bahram Shah (1118-1152) put to death Kutbuddin, one of the princes of Ghor, called king of the Jibal or Hill country, who had withdrawn to Ghazni. This prince's brother, Saifuddin Suri, came to take vengeance, and drove out Bahram. But the latter recapturing the place (1149) paraded Saifuddin and his vizier ignominiously about the city, and then hanged them on the bridge. Ala-uddin of Ghor, younger brother of the two slain princes, then gathered a great host, and came against Bahram, who met him on the Helmund. The Ghori prince, after repeated victories, stormed Ghazni, and gave it over to fire and sword. The dead kings of the house of Mahmud, except the conqueror himself and two others, were torn from their graves and burnt, whilst the bodies of the princes of Ghor were solemnly dis-interred and carried to the distant tombs of their ancestors. It seems certain that Ghazni never recovered the splendour that perished then (1152). Ala-uddin, who from this deed became known in history as Jahan-soz (Br&lemonde), returned to Ghor, and Bahram reoccupied Ghazni; he died in n 57. In the time of his son Khusru Shah, Ghazni was taken by the Turkish tribes called Ghuzz (generally believed to have been what are now called Turkomans) . The king fled to Lahore, and the dynasty ended with his son. In 11 73 the Ghuzz were expelled by Ghiyasuddin sultan of Ghor (nephew of Ala-uddin Jahansoz), who made Ghazni over to his brother Muizuddin. This famous prince, whom the later historians call Mahommed Ghori, shortly afterwards (1174-1175) invaded India, taking Multan and Uchh. This was the first of many successive inroads on western and northern India, in one of which Lahore was wrested from Khusru Malik, the last of Mahmud's house, who died a captive in the hills of Ghor. In 1192 Prithvi Rai or Pithora (as the Moslem writers call him), the Chauhan king of Ajmere, being defeated and slain near Thanewar, the whole country from the Himalaya to Ajmere became subject to the Ghori king of Ghazni. On the death of his brother Ghiyasuddin, with whose power he had been constantly associated, and of whose conquests he had been the chief instrument, Muizuddin became sole sovereign over Ghor and Ghazni, and the latter place was then again for a brief period the seat of an empire nearly as extensive as that of Mahmud the son of Sabuktagin. Muizuddin crossed the Indus once more to put down a rebellion of the Khokhars in the Punjab, and on his way back was murdered by a band of them, or, as some say, by one of the Mulahidah or Assassins. The slave lieutenants of Muizuddin carried on the conquest of India, and as the rapidly succeeding events broke their dependence on any master, they established at Delhi that monarchy of which, after it had

endured through many dynasties, and had culminated with the Mogul house of Baber, the shadow perished in 1857. The death of Muizuddin was followed by struggle and anarchy, ending for a time in the annexation of Ghazni to the empire of Khwarizm by Mahommed Shah, who conferred it on his famous son, Jelaluddin, and Ghazni became the headquarters of the latter. After Jenghiz Khan had extinguished the power of his family in Turkestan, Jelaluddin defeated the army sent against him by the Mongol at Parwan, north of Kabul. Jenghiz then advanced and drove Jelaluddin across the Indus, after which he sent Ogdai his son to besiege Ghazni. Henceforward Ghazni is much less prominent in Asiatic history. It continued subject to the Mongols, sometimes to the house of Hulagu in Persia, and sometimes to that of Jagatai in Turkestan. In 1326, after a battle between Amir Hosain, the viceroy of the former house in Khorasan, and Tarmashirin, the reigning khan of Jagatai, the former entered Ghazni and once more subjected it to devastation, and this time the tomb of Mahmud to desecration.

Ibn Batuta (c. 1332) says the greater part of the city was in ruins, and only a small part continued to be a town. Timur seems never to have visited Ghazni, but we find him in 1401 bestowing the government of Kabul, Kandahar, and Ghazni on Pir Mahommed, the son of his son Jahangir. In the end of the century it was still in the hands of a descendant of Timur, Ulugh Beg Mirza, who was king of Kabul and Ghazni. The illustrious nephew of this prince, Baber, got peaceful possession of both cities in 1504, and has left notes on both in his own inimitable Memoirs. His account of Ghazni indicates how far it had now fallen. " It is," he says, " but a poor mean place, and I have always wondered how its princes, who possessed also Hindustan and Khorasan, could have chosen such a wretched country for the seat of their government, in preference to Khorasan." He commends the fruit of its gardens, which still contribute largely to the markets of Kabul. Ghazni remained in the hands of Baber's descendants, reigning at Delhi and Agra, till the invasion of Nadir Shah (1738), and became after Nadir's death a part of the new kingdom of the Afghans under Ahmad Shah Durani. We know of but two modern travellers who have recorded visits to the place previous to the war of 1839. George Forster passed as a disguised traveller with a qafila in 1783. " Its slender existence," he says, " is now maintained by some Hindu families, who support a small traffic, and supply the wants of the few Mahommedan residents." Vigne visited it in 1836, having reached it from Multan with a caravan of Lohani merchants,' travelling by the Gomal pass. The historical name of Ghazni was brought back from the dead, as it were, by the news of

its capture by the British army under Sir John Keane, 23rd July 1839. The siege artillery had been left behind at Kandahar; escalade was judged impracticable; but the project of the commanding engineer, Captain George Thomson, for blow- ing in the Kabul gate with powder in bags, was adopted, and carried out successfully, at the cost of 182 killed and wounded. Two years and a half later the Afghan outbreak against the British occupation found Ghazni garrisoned by a Bengal regiment of sepoys, but neither repaired nor provisioned. They held out under great hardships from the 16th of December 1841 to the 6th of March 1842, when they surrendered. In the autumn of the same year General Nott, advancing from Kandahar upon Kabul, reoccupied Ghazni, destroyed the defences of the castle and part of the town, and carried away the famous gates of Somnath (q.v.).

GHEE (Hindostani ghi), a kind of clarified butter made in the East. The best is prepared from butter of the milk of cows, the less esteemed from that of buffaloes. The butter is melted over a slow fire, and set aside to cool; the thick, opaque, whitish, and more fluid portion, or ghee, representing the greater bulk of the butter, is then removed. The less liquid residue, mixed with ground-nut oil, is sold as an inferior kind of ghee. It may be obtained also by boiling butter over a clear fire, skimming it the while, and, when all the water has evaporated, straining it through a cloth. Ghee which is rancid or tainted, as is often that of the Indian bazaars, is said to be rendered sweet by boiling with leaves of the Moringa pterygosperma or horse-radish tree. In India ghee is one of the commonest articles of diet, and indeed enters into the composition of everything eaten by the Brahmans. It is also extensively used in Indian religious ceremonies, being offered as a sacrifice to idols, which are at times bathed in it. Sanskrit treatises on therapeutics describe ghee as cooling, emollient and stomachic, as capable of increasing the mental powers, and of improving the voice and personal appearance, and as useful in eye-diseases, tympanitis, painful dyspepsia, wounds, ulcers and other affections. Old ghee is in special repute among the Hindus as a medicinal agent, and its efficacy as an external application is believed by them to increase with its age. Ghee more than ten years old, the purana ghrita of Sanskrit materia medicas, has a strong odour and the colour of lac. Some specimens which have been much longer preserved — and " clarified butter a hundred years old is often heard of " — have an earthy look, and are quite dry and hard, and nearly inodorous. Medicated ghee is made by warming ordinary ghee

to remove contained water, melting, after the addition of a little turmeric juice, in a metal pan at a gentle heat, and then boiling with the prepared drugs till all moisture is expelled, and straining through a cloth.

GHEEL, or Geel, a town of Belgium, about 30 m. E. of Antwerp and in the same province. Pop. (1904) 14,087. It is remarkable on account of the colony of insane persons which has existed there for many centuries. The legend reads that in the year 600 Dymphna, an Irish princess, was executed here by her father, and in consequence of certain miracles she had effected she was canonized and made the patron saint of the insane. The old Gothic church is dedicated to her, and in the choir is a shrine, enclosing her relics, with fine panel paintings representing incidents in her life by, probably, a contemporary of Memling. The colony of the insane is established in the farms and houses round the little place within a circumference of 30 m. and is said to have existed since the 13th century. This area is divided into four sections, each having a doctor and a superintendent attached to it. The Gheel system is regarded as the most humane method of dealing with the insane who have no homicidal tendencies, as it keeps up as long as possible their interest in life.

GHENT (Flem. Gent, Fr. Gand), the capital of East Flanders, Belgium, at the junction of the Scheldt and the Lys (Ley). Pop. (1880) 131,431, (1904) 162,482. The city Is divided by the rivers (including the small streams Lieve and Moere) and by canals, some navigable, into numerous islands connected by over 200 bridges of various sorts. Within the limits of the town, which is 6 m. in circumference, are many gardens, meadows and promenades; and, though its characteristic lanes are gloomy and narrow, there are also broad new streets and fine quays and docks. The most conspicuous building in the city is the cathedral of St Bavon 1 (Sint Baafs), the rich interior of which contrasts strongly with its somewhat heavy exterior. Its crypt dates from 941, the choir from 1274-1300, the Late Gothic choir chapels from the 15th century, and the nave and transept from 1 533-1 554. Among the treasures of the church is the famous " Worship of the Lamb " by Hubert and Jan van Eyck. Of the original 12 panels, taken to France during the Revolutionary Wars, only 4 are now here, 6 being in the Berlin museum and two in that of Brussels. Among the other 55 churches may be mentioned that of St Nicholas, an Early Gothic building, the oldest church in date of foundation in Ghent, and that of St Michael, completed in 1480, with an unfinished tower. In the centre of the city stands the

unfinished Belfry (Beffroi), a square tower some 300 ft. high, built 1 183-1339. It has a cast-iron steeple (restored in 1854), on the top of which is a gold dragon which, according to tradition, was brought from Con- stantinople either by the Varangians or by the emperor Baldwin after the Latin conquest. Close to it is the former Cloth-hall, a Gothic building of 1325. The hotel-de-ville consists of two distinct parts. The northern facade, a magnificent example of Flamboyant Gothic, was erected between 1518 and 1533, restored in 1829 and again some fifty years later. The eastern facade overlooking the market-place was built in 1595-1628, in the Renaissance style, with three tiers of columns. It contains a valuable collection of archives, from the 13 th century onwards. On the left bank of the Lys is the Oudeburg (s'Gravenstein, Chateau des Contes), the former castle of the first counts of Flanders, dating from 11 80 and now restored. The chateau of the later counts, in which the emperor Charles V. was born, is commemorated only in the name of a street, the Cours des Princes.

To the north of the Oudeburg, on the other side of the Lys, is the Marche du Vendredi, the principal square of the city. This was the centre of the life of the medieval city, the scene of all ' great public functions, such as the homage of the burghers to

1 Bavo, or Allowin (c. 589-c. 653), patron saint of Ghent, was a nobleman converted by St Amandus, the apostle of Flanders. He lived first as an anchorite in the forest of Mendonk, and after- wards in the monastery founded with his assistance by Amandus at Ghent.

the counts, and of the auto-da-fes under the Spanish regime. In it stands a bronze statue of Jacob van Artevelde, by Devigne- Quyo, erected in 1863. At a corner of the square is a remarkable cannon, known as Dulle Griete (Mad Meg), 19 ft. long and n ft. in circumference. It is ornamented with the arms of Philip the Good, duke of Burgundy, and must have been cast between 1419 and 1467. On the Scheldt, near the Place Laurent, is the Geerard-duivelsteen (chateau of Gerard the Devil), a 13th-century tower formerly belonging to one of the patrician families, now restored and used as the office of the provincial records. Of modern buildings may be mentioned the University (1826), the Palais de Justice (1844), and the new theatre (1848), all designed by Roelandt, and the Institut des Sciences (1890) by A. Pauli. In the park on the site of the citadel erected by Charles V. are some ruins of the ancient abbey of St Bavon and of a 1 2th-century octagonal chapel dedicated to St Macharius. In the park is also situated the Museum of Fine Arts, completed in 1902.

One of the most interesting institutions of Ghent is the great Beguinage (Begynhof) which, originally established in 1234 by the Bruges gate, was transferred in 1874 to the suburb of St Amandsberg. It constitutes a little town of itself, surrounded by walls and a moat, and contains numerous small houses, 18 convents and a church. It is occupied by some 700 Beguines, women devoted to good works (see Beguines). Near the station is a second Beguinage with 400 inmates. In addition to these there were in Ghent in 1901 fifty religious houses of various orders. As a manufacturing centre Ghent, though not so conspicuous as it was in the middle ages, is of considerable importance. The main industries are cotton-spinning, flax-spinning, cotton- printing, tanning and sugar refining; in addition to which there are iron and copper foundries, machine-building works, breweries and factories of soap, paper, tobacco, &c. As a trading centre the city is even more important. It has direct communica- tion with the sea by a ship-canal, greatly enlarged and deepened since 1895, which connects the Grand Basin, stretching along the north side of the city, with a spacious harbour excavated 'at Terneuzen on the Scheldt, 215 m. to the north, thus making Ghent practically a sea-port; while a second canal, from the Lys, connects the city via Bruges with Ostende.

Among the educational establishments is the State University, founded by King William I. of the Netherlands in 1816. With it are connected a school of engineering, a school of arts and industries and the famous library (about 300,000 printed volumes and 2000 MSS.) formerly belonging to the city. In addition there are training schools for teachers, an episcopal seminary, a conservatoire and an art academy with a fine collection of pictures mainly taken from the religious houses of the city on their suppression in 1795. The oldest Belgian newspaper, the Gazet van Gent, was founded here in 1667.

History. — The history of the city is closely associated with that of the countship of Flanders (q.v.), of which it was the seat. It is mentioned so early as the 7th century and in 868 Baldwin of the Iron Arm, first count of Flanders, who had been entrusted by Charles the Bald with the defence of the northern marches, built a castle here against the Normans raiding up the Scheldt. This was captured in 949 by the emperor Otto I. and was occupied by an imperial burgrave for some fifty years, after which it was retaken by the counts of Flanders. Under their protection, and favoured by its site, the city rapidly grew in wealth and population, the zenith of its power and prosperity being reached between the 13th and 15th centuries, when it was the emporium of the trade of Germany and the Low Countries, the centre of a great cloth industry, and could put

some 20,000 armed citizens into the field. The wealth of the burghers during this period was equalled by their turbulent spirit of independence; feuds were frequent, — against the rival city of Bruges, against the counts, or, within the city itself, between the plebeian crafts and the patrician governing class. Of these risings the most notable was that, in the earlier half of the 14th century, against Louis de Crecy, count of Flanders, under the leadership of Jacob van Artevelde (q.v.).

g2o

GHETTO

The earliest charter to the citizens of Ghent was that granted by Count Philip of Flanders between 1160 and n 91. It did little more than arrange for the administration of justice by nominated jurats {scabini) under the count's bailli. Far more compre- hensive was the second charter, granted by Philip's widow Mathilda, after his death on crusade in 1191, as the price paid for the faithfulness of the city to her cause. The magistrates of the city were still nominated scabini (fixed at thirteen), but their duties and rights were strictly defined and the liberties of the citizens safe-guarded; the city, moreover, received the right to fortify itself and even individuals within it to fortify their houses. This charter was confirmed and extended by Count Baldwin VIII. when he took over the city from Mathilda, an important new provision being that general rules for the government of the city were only to be made by arrangement between the count or his officials and the common council of the citizens. The burghers thus attained to a very considerable measure of self-government. A charter of 1212 of Count Ferdinand (of Portugal) and his wife Johanna introduced a modified system of election for the scabini; a further charter (1228) fixed the executive at 39 members, including scabini and members of the commune, and ordained that the bailli of the count and his servientes, like the podesl&s of Italian cities, were not to be natives of Ghent.

Thus far the constitution of the city had been wholly aristo- cratic; in the 13th century the patricians seem to have been united into a gild (Commans-gulde) from whose members the magistrates were chosen. By the 14th century, however, the democratic craft gilds, notably that of the weavers, had asserted themselves; the citizens were divided for civic and military purposes into three classes; the rich {i.e. those living on capital), the weavers and the members of the 52 other gilds. In the civic executive, as it existed to the time of Charles V., the deans of the two lower classes sat with the scabini and

councillors.

The constitution and liberties of the city, which survived its incorporation in Burgundy, were lost for a time as a result of the unsuccessful rising against Duke Philip the Good (1450). The citizens, however, retained their turbulent spirit. After the death of Mary of Burgundy, who had resided in the city, they forced her husband, the archduke Maximilian, to conclude the treaty of Arras (1482). They were less fortunate in their opposi- tion to Maximilian's son, the emperor Charles V. In 1539 they refused, on the plea of their privileges, to contribute to a general tax laid on Flanders, and when Charles's sister Mary, the governess of the Netherlands, seized some merchants as bail for the pay- ment, they retaliated by driving out the nobles and the adherents of Charles's government. The appearance of Charles himself, however, with an overwhelming force quelled the disturbance; the ringleaders were executed, and all the property and privileges of the city were confiscated. In addition, a fine of 150,000 golden gulden was levied on the city, and used to build the " Spanish Citadel " on the site of what is now the public park.

In the long struggle of the Netherlands against Spain, Ghent took a conspicuous part, and it was here that, on the 8th of November 1576, was signed the instrument, known as the Pacification of Ghent, which established the league against Spanish tyranny. In 1584, however, the city had to surrender on onerous terms to the prince of Parma.

The horrors of war and of religious persecution, and the conse- quent emigration or expulsion of its inhabitants, had wrecked the prosperity of Ghent, the recovery of which was made impossible by the closing of the Scheldt. The city was captured by the French in 1698, 1708 and 1745. After 1714 it formed part of the Austrian Netherlands, and in 1794 became the capital of the French department of the Scheldt. In 1814 it was incorporated in the kingdom of the United Netherlands, and it was here that^ Louis XVIII. of France took refuge during the Hundred Days. .Here too was signed (December 24, 1814) the treaty of peace between Great Britain and the United States of America. After 1 81 5 Ghent was for a time the centre of Catholic opposition to Dutch rule, as it is now that of the Flemish movement in Belgium. During the 19th century its prosperity rapidly increased. Im866- 1867, however, a serious outbreak of cholera again threatened

it with ruin; but improved sanitation, the provision of a supply of

pure water and the demolition of a mass of houses unfit for habitation soon effected a radical cure.

See L. A. Warnkonig, Flandrische Staats- und Rechtsgeschichte bis I 3< >5 (3 vols., Tubingen, 1835-1842), and Gueldorf, Hist, de Cand, translated from Warnkonig, with corrections and additions (Brussels, 1846); F. de Potter, Gent van den oudsten tijd lot heden (6 vols., Ghent, 1883-1891); Van Duyse, Gand monumental et pittoresque (Brussels, 1886); de Vlaminck, Les Origines de la ville de Gand (Brussels, 1891); Annates Gandenses, ed. G. Funck-Brentano (Paris, 1895); Vuylsteke, Oorkondenboek der stad Gent (Ghent,' 1900, &c); Karl Hegel, Stadte und Gilden (Leipzig, 1891), vol. ii. p. 175, where further authorities are cited. For a comprehensive bibliography, including monographs and published documents, see Ulysse Chevalier, Repertoire des sources hist. Topo-bibliogr., s.v.< " Gand."

GHETTO, formerly the street or quarter of a city in which Jews were compelled to live, enclosed by walls and gates which were locked each night. The term is now used loosely of any locality in a city or country where Jews congregate. The derivation of the word is doubtful. In documents of the nth century the Jew- quarters in Venice and Salerno are styled " Judaea " or " Juda- caria." At Capua in 1375 there was a place called San Nicolo ad Judaicam, and later elsewhere a quarter San Martino ad Judaicam. Hence it has been suggested Judaicam became Italian Giudeica and thence became corrupted into ghetto. Another theory traces it to " gietto," the common foundry at Venice near which was the first Jews' quarters of that city. More probably the word is an abbreviation of Italian borghetto diminutive of borgo a " borough."

The earliest regular ghettos were established in Italy in the nth century, though Prague is said to have had one in the previous century. The ghetto at Rome was instituted by Paul IV. in 1556. It lay between the Via del Pianto and Ponte del Quattro Capi, and comprised a few narrow and filthy streets. It lay so low that it was yearly flooded by the Tiber. The Jews had to sue annually for permission to live there, and paid a yearly tax for the privilege. This formality and tax survived till 1850. During three centuries there were constant changes in the op- pressive regulations imposed upon the Jews by the popes. In 1814 Pius VII. allowed a few Jews to live outside the ghetto, and in 1847 Pius IX. decided to destroy the gates and walls, but public opinion hindered him from carrying out his plans. In 1870 the Jews petitioned Pius IX. to abolish the ghetto; but it was to Victor Emmanuel that this reform was finally due. The

walls remained until 1885.

During the middle ages the Jews were forbidden to leave the ghetto after sunset when the gates were locked, and they were also imprisoned on Sundays and all Christian holy days. Where the ghetto was too small for the carrying on of their trades, a site beyond its wall was granted them as a market, e.g. the Jewish Tandelmarkt at Prague. Within their ghettos the Jews were left much to their own devices, and the more important ghettos, such as that at Prague, formed cities within cities, having their own town halls and civic officials, hospitals, schools and rabbinical courts. Fires were common in ghettos and, owing to the narrowness of the streets, generally very destructive, especially as from fear of plunder the Jews themselves closed their gates on such occasions and refused assistance. On the 14th of June 1 71 1 a. fire, the largest ever known in Germany, destroyed within twenty-four hours the ghetto at Frankfort-on-Main. Other notable ghetto fires are that of Bari in 1030 and Nikols- burg in 17 19. The Jews were frequently expelled from their ghettos, the most notable expulsions being those of Vienna (1670) and Prague (1744-1745). This latter exile was during the war of the Austrian Succession, when Maria Theresa, on the ground that " they were fallen into disgrace," ordered Jews to leave Bohemia. The empress was, however, induced by the protests of the powers, especially of England and Holland, to revoke the decree. Meantime the Jews, ignorant of the revoca- tion, petitioned to be allowed to return in payment of a yearly tax. This tax the Bohemian Jews paid until 1846. The most important ghettos were those at Venice, Frankfort, Prague and Trieste. By the middle of the 19th century the ghetto system

was moribund, and with the disappearance of the ghetto at Rome in 1870 it became obsolete.

See D. Philipson, Old European Jewries (Philadelphia, 1894); Israel Abrahams, Jewish Life in the Middle Ages (1896); S. Kahn, article " Ghetto " in Jewish Encyclopedia, v. 652.

GHIBERTI, LORENZO (1378-1455), Italian sculptor, was born at Florence in 1378. He learned the trade of a goldsmith under his father Ugoccione, commonly called Cione, and his stepfather Bartoluccio; but the goldsmith's art at that time included all varieties

of plastic arts, and required from those who devoted themselves to its higher branches a general and profound know- ledge of design and colouring. In the early stage of his artistic career Ghiberti was best known as a painter in fresco, and when Florence was visited by the plague he repaired to Rimini, where he executed a highly prized fresco in the palace of the sovereign Pandolfo Malatesta. He was recalled from Rimini to his native city by the urgent entreaties of his stepfather Bartoluccio, who informed him that a competition was to be opened for designs of a second bronze gate in the baptistery, and that he would do wisely to return to Florence and take part in this great artistic contest. The subject for the artists was the sacrifice of Isaac; and the competitors were required to observe in their work a certain conformity to the first bronze gate of the baptistery, executed by Andrea Pisano about 100 years previously. Of the six designs presented by different Italian artists, those of Donatello, Brunelleschi and Ghiberti were pronounced the best, and of the three Brunelleschi's and Ghiberti's superior to the third, and of such equal merit that the thirty-four judges with whom the decision was left entrusted the execution of the work to the joint labour of the two friends. Brunelleschi, however, withdrew from the contest. The first of his two bronze gates for the baptistery occupied Ghiberti twenty years.

Ghiberti brought to his task a deep religious feeling and the striving after a high poetical ideal which are not to be found in the works of Donatello, though in power of characterization the second sculptor often stands above the first. Like Donatello, he seized every opportunity of studying the remains of ancient art; but he sought and found purer models for imitation than Donatello, through his excavations and studies in Rome, had been able to secure. The council of Florence, which met during the most active period of Ghiberti's artistic career, not only secured him the patronage of the pontiff, who took part in the council, but enabled him, through the important connexions which he then formed with the Greek prelates and magnates assembled in Florence, to obtain from many quarters of the Byzantine empire the precious memorials of old Greek art, which he studied with untiring zeal. The unbounded admira- tion called forth by Ghiberti's first bronze gate led to his receiv- ing from the chiefs of the Florentine gilds the order for the second, of which the subjects were likewise taken from the Old Testament. The Florentines gazed with especial pride on these magnificent creations, which must still have shone with all the brightness of their original gilding when, a century later, Michel- angelo pronounced them worthy to be the gates of paradise. Next to the gates of the baptistery

Ghiberti's chief works still in existence are his three statues of St John the Baptist, St Matthew and St Stephen, executed for the church of Or San Michele. In the bas-relief of the coffin of St Zenobius, in the Florence cathedral, Ghiberti put forth much of his peculiar talent, and though he did not, as. is commonly stated, execute entirely the painted glass windows in that edifice, he furnished several of the designs, and did the same service for a painted glass window in the church of Or San Michele. He. died at the age of 77.

We are better acquainted with Ghiberti's theories of art than with those of most of his contemporaries, for he left behind him a commentary, in which, besides his notices of art, he gives much insight into his own personal character and views. Every page attests the religious spirit in which he lived and worked. Not only does he aim at faithfully reflecting Christian truths in his creations, he regards the old Greek statues with a kindred feeling, as setting forth the highest intellectual and moral attributes of

human nature. He appears to have cared as little as Donatello for money.

Benvenuto Cellini's criticism on Ghiberti that in his creations of plastic art he was more successful in small than in large figures, and that he always exhibited in his works the peculiar excellences of the goldsmith's quite as much as those of the sculptor's art, is after all no valid censure, for it merely affirms that Ghiberti faithfully complied with the peculiar conditions of the task im- posed upon him. More frequent have been the discussions as to the part played by perspective in his representations of natural scenery. These acquired a fresh importance since the discovery of the data, from which it appeared that Paolo Uccello, who had commonly been regarded as the first great master of perspective, worked for several years in the studio or workshop of Ghiberti, so that it became difficult to determine to ,what extent Uccello's successful innovations in perspective were due to Ghiberti's teaching.

Cicognara's criticism on Ghiberti, in his History of Sculpture, has supplied the chief materials for the illustrative text of Lasinio's series of engravings of the three bronze gates of the baptistery. They consist of 42 plates in folio, and were published at Florence by Bardi in 1 82 1. Still more vivid representations are the repro- ductions on a very large scale by the photographic establishment of Alinari. Both C. C. Perkins, in his History of Tuscan Sculpture (1864), and A. F. Rio, in his Art Chretien (1861-1867), have treated Ghiberti's works with much fulness, and in a spirit of sound apprecia- tion. See also the

chapter expressly devoted to the history of the competition for the baptistery gates in Hans Semper, Donatello (1887); the articles by Adolf Rosemberg in Dohme's Kunst und Kunsller des Mittelalters (Leipzig, 1877); Leader Scott, Ghiberti and Donatello (1882). In the Sammlung ausgewdhlter Biographien Vasari, ed. Carl Frey, vol. iii. (1886), is given Ghiberti's commentary on art.

GHICA, Ghika or Ghyka, a family which played a great part in the modern development of Rumania, many of its members being princes of Moldavia and Walachia. According to Rumanian historians the Ghicas were of very humble origin, and came from Kiupru in Albania.

1. George or Gheorghe (c. 1600- 1664), the founder of the family, is said to have been a playmate of another Albanian known in history as Kiipruli Aga, the famous vizier, who re- cognized George while he was selling melons in the streets of Constantinople, and helped him on to high positions. George became prince of Moldavia in 1658 and prince of Walachia in 1659-1660. He moved the capital from Tirgovishtea to Bucharest. From him are derived the numerous branches of the family which became so conspicuous in the history of Moldavia and Walachia.

2. The Walachian branch starts afresh from the great ban Demetrius or Dumitru Ghica (1718-1803), who was twice married and had fourteen children (see Rumania: History). One of these, Gregory (Grigorie), prince of Walachia 1822-1828, starts a new era of civilization, by breaking with the traditions of the Phanariot (Greek) period and assisting in the development of a truly national Rumanian literature. His brother, Prince Alexander Ghica, appointed jointly by Turkey and Russia (1834-1842) as hospodar of Walachia, died in 1862. Under him the so-called reglement organique had been promulgated; an attempt was made to codify the laws in conformity with the institutions of the country and to secure better administration of justice. Prince Demetrius Ghica, who died as president of the Rumanian senate in 1897, was the son of the Walachian prince Gregory.

3. Another Gregory Ghica, prince of Moldavia from i775to 1777, paid with his life for the opposition he offered when the Turks ceded the province of Bukovina to Austria.

4. Michael (Michail) (1794-1850) was the father of Elena (1827-1888), a well-known novelist, who wrote under the name of Dora dTstria. Brought up, as was customary at the time, under Greek

influences, she showed premature intelligence and literary power. She continued her education in Germany and married a Russian prince, Koltsov Mazalskiy, in 1849, but the marriage was an unhappy one, and in 1855 she left St Petersburg for Florence, where she died in 1888. In that city she developed her literary talent and published a number of works characterized by lightness of touch and brilliance of description, such as

Pelerinage au tombeau de Dante, La Vie monastique dans les eglises orientates (1844), La Suisse allemande, &c. One of her last works was devoted to the history of her own family, Gli Albanesi in Roumenia: Storia dei Principi Ghika nei secoli XVII-XIX (Florence, 1873). Her sister was Sophia, Countess O'Rourke.

5. Scarlat Ghica (1750-1802) was twice prince of Walachia. His grandson John (loan) Ghica (1817-1897), a lifelong friend of Turkey, was educated in Bucharest and in the West, and studied engineering and mathematics in Paris from 1837 to 1840; returning to Moldavia he was involved in the conspiracy of 1 84 1, which was intended to bring about the union of Walachia and Moldavia under one native prince (Michael Sturdza). The conspiracy failed and John Ghica became a lecturer on mathe- matics at the university which was founded by Prince Sturdza in Jassy. In 1848 he joined the party of revolution and in the name of a provisional government then established in Bucharest went to Constantinople to approach the Turkish government. Whilst there he was appointed Bey of Samos (1853-1859), where he extirpated piracy, rampant in that island. In 1859 after the union of Moldavia and Walachia had been effected Prince Cuza induced John Ghica to return. He was the first prime minister under Prince (afterwards King) Charles of Hohen- zollern. His restless nature made him join the anti-dynastic movement of 1870-1871. In 1881 he was appointed Rumanian minister in London and retained this office until 1889. He died on the 7th of May 1897 in Gherghani. Besides his political distinction John Ghica earned a literary reputation by his " Letters to Alexandri " (2nd edition, 1887), his lifelong friend, written from London and describing the ancient state of Rumanian society, fast fading away. He was also the author of Amintiri din pribegie, " Recollections of Exile in 1848 " (Buchar- est, 1890) and of Convorbiri Economice, discussions on economic questions (Bucharest, 1866-1873). He was the first to advocate the establishment. of national industry and commerce, and also, to a certain extent, principles of " exclusive dealing." (M. G.)

GHILZAI, a large and widespread Afghan tribe, who extend from Kalat-i-Ghilzai on the S. to the Kabul river on the N., and from the Gul Koh range on the W. to the Indian border on the E., in many places overflowing these boundaries. The popular theory of the origin of the Ghilzais traces them to the Turkish tribe of Kilji, once occupying districts bordering the upper course of the Syr Darya (Jaxartes), and affirms that they were brought into Afghanistan by

the Turk Sabuktagin in the 10th century. However that may be, the Ghilzai clans now rank collectively as second to none in strength of military and commercial enterprise. They are a fine, manly race of people, and it is from some of their most influential clans (Suliman Khel, Nasir Khel, Kharotis, &c.) that the main body of povindah merchants is derived.

GHIRLANDAJO, DOMENICO (1440-1494), Florentine painter. His full name is given as Domenico di Tommaso Curradi di Doffo Bigordi; it appears therefore that his father's surname was Curradi, and his grandfather's Bigordi. The painter is generally termed Domenico Bigordi, but some authors give him, and apparently with reason, the paternal surname Curradi. Ghirlandajo (garland-maker) was only a nickname, coming to Domenico from the employment of his father (or else of his earliest instructor), who was renowned for fashioning the metallic garlands worn by Florentine damsels; he was not, however, as some have said, the inventor of them. Tommaso was by vocation a jeweller on the Ponte Vecchio, or perhaps a broker. Domenico, the eldest of eight children, was at first apprenticed to a jeweller or goldsmith, probably enough his own father; in his shop he was continually making portraits of the passers-by, and it was thought expedient to place him with Alessio Baldo- . vinetti to study painting and mosaic. His youthful years were, however, entirely undistinguished, and at the age of thirty-one he had not a fixed abode of his own. This is remarkable, as immediately afterwards, from 1480 onwards to his death at a comparatively early age in 1494, he became the most proficient painter of his time, incessantly employed, and condensing into

that brief period of fourteen years fully as large an amount of excellent work as any other artist that could be named; indeed, we should properly say eleven years, for nothing of his is known of a later date than 1491.

In 1480 Ghirlandajo painted a " St Jerome " and other frescoes in the church of Ognissanti, Florence, and a life-sized " Last Supper " in its refectory, noticeable for individual action and expression. From 1481 to 1485 he was employed upon frescoes in the Sala dell' Orologio in the Palazzo Vecchio; he painted the apotheosis of St Zenobius, a work beyond the size of life, with much architectural framework, figures of Roman heroes and other detail, striking in perspective and structural propriety. While still occupied here, he was summoned to Rome by Pope Sixtus IV. to paint in the Sixtine chapel; he went thither in 1483. In the Sixtine he executed, probably before 1484, a fresco which has few rivals in that series, " Christ

calling Peter and Andrew to their Apostleship," — a work which, though somewhat deficient in colour, has greatness of method and much excellence of finish. The landscape background, in especial, is very superior to anything to be found in the works, which had no doubt been zealously studied by Ghirlandajo, of Masaccio and others in the Brancacci chapel. He also did some other works in Rome, now perished. Before 1485 he had likewise produced his frescoes in the chapel of S. Fina, in the Tuscan town of S. Gimignano, remarkable for grandeur and grace, — ■ two pictures of Fina, dying and dead, with some accessory work. Sebastian Mainardi assisted him in these productions in Rome and in S. Gimignano; and Ghirlandajo was so well pleased with his co-operation that he gave him his sister in marriage.

He now returned to Florence, and undertook in the church of the Trinita, and afterwards in S. Maria Novella, the works which have set the seal on his celebrity. The frescoes in the Sassetti chapel of S. Trinita are six subjects from the life of St Francis, along with some classical accessories, dated 1485. Three of the principal incidents are " St Francis obtaining from Pope Honorius the approval of the Rules of his Order"; his " Death and Obsequies," and the Resuscitation, by the inter- position of the beatified saint, of a child of the Spini family, who had been killed by falling out of a window. In the first work is a portrait of Lorenzo de' Medici ; and in the third the painter's own likeness, which he introduced also into one of the pictures in S. Maria Novella, and in the " Adoration of the Magi " in the hospital of the Innocenti. The altar-piece of the Sassetti chapel, the "Adoration of the Shepherds," is now in the Florentine Academy. Immediately after disposing of this commission, Ghirlandajo was asked to renew the frescoes in the choir of S. Maria Novella. This choir formed the chapel of the Ricci family, but the Tornabuoni and Tornaquinci families, then much more opulent than the Ricci, undertook the cost of the restoration, under conditions, as to preserving the arms of the Ricci, which gave rise in the end to some amusing incidents of litigation. The frescoes, in the execution of which Domenico had many assistants, are in four courses along the three walls, — the leading subjects being the lives of the Madonna and of the Baptist. Besides their general richness and dignity of art, these works are particularly interesting as containing many historical portraits — a method of treatment in which Ghirlandajo was pre-eminently skilled.

There are no less than twenty-one portraits of the Tornabuoni and Tornaquinci families; in the subject of the " Angel appearing to Zacharias," those of Politian, Marsilio Ficino and others; in the "

Salutation of Anna and Elizabeth," the beautiful Ginevra de' Benci; in the " Expulsion of Joachim from the Temple," Mainardi and Baldovinetti (or the latter figure may perhaps be Ghirlandajo's father) . The Ricci chapel was reopened and completed in 1490; the altar-piece, now removed from the chapel, was probably executed with the assistance of Domenico's brothers, David and Benedetto, painters of ordinary calibre; the painted window was from Domenico's own design. Other distinguished works from his hand are an altar-piece in tempera of the " Virgin adored by Sts Zenobius, Justus and others," painted for the church of St Justus, but now in the Uffizi gallery, a remarkable masterpiece; " Christ in glory with Romuald and

other Saints," in the Badia of Volterra; the " Adoration of the Magi," in the church of the Innocenti (already mentioned), perhaps his finest panel-picture (1488); and the " Visitation," in the Louvre, bearing the latest ascertained date (1491) of all his works. Ghirlandajo did not often attempt the nude; one of his pictures of this character, " Vulcan and his Assistants forging Thunderbolts," was painted for Lo Spedaletto, but (like several others specified by Vasari) it exists no longer. Two portraits by him are in the National Gallery, London. The mosaics which he produced date before 149 1; one, of especial celebrity, is the " Annunciation," on a portal of the cathedral of Florence.

In general artistic attainment Ghirlandajo may fairly be regarded as exceeding all his precursors or competitors; though the names of a few, particularly .Giotto, Masaccio, Lippo Lippi and Botticelli, stand higher for originating power. His scheme of composition is grand and decorous; his chiaroscuro excellent, and especially his perspectives, which he would design on a very elaborate scale by the eye alone; his colour is more open to criticism, but this remark applies much less to the frescoes than the tempera-pictures, which are sometimes too broadly and crudely bright. He worked in these two methods alone — never in oils; and his frescoes are what the Italians term " buon fresco," without any finishing in tempera. A certain hardness of outline, not unlike the character of bronze sculpture, may attest his early training in metal work. He first introduced into Florentine art that mixture of the sacred and the profane which had already been practised in Siena. His types in figures of Christ, the Virgin and angels are not of the highest order; and a defect of drawing, which

has been often pointed out, is the meagreness of his hands and feet. It was one of his maxims that " painting is designing." Ghirlandajo was an insatiate worker, and expressed a wish that he had the entire circuit of the walls of Florence to paint upon. He told his shop-assistants not to refuse any commission that might offer, were it even for a lady's petticoat-panniers: if they would not execute such work, he would. Not that he was in any way giasping or sordid in money-matters, as is proved by the anecdote of the readiness with which he gave up a bonus upon the stipulated price of the Ricci chapel frescoes, offered by the wealthy Tornabuoni in the first instance, but afterwards begrudged. Vasari says that Ghirlandajo was the first to abandon in great part the use of gilding in his pictures, representing by genuine painting any objects supposed to be gilded; yet this does not hold good without some considerable exceptions — the high lights of the landscape, for instance, in the " Adoration of the Shepherds," now in the Florence Academy, being put in in gold. Many drawings and sketches by this painter are in the Uffizi gallery, remarkable for vigour of outline. One of the great glories of Ghirlandajo is that he gave some early art-education to Michelangelo, who cannot, however, have remained with him long. F. Granacci was another of his pupils.

This renowned artist died of pestilential fever on the nth of January 1494, and was buried in S. Maria Novella. He had been twice married, and left six children, three of them being sons. He had a long and honourable line of descendants, which came to a close in the 17th century, when the last members of the race entered monasteries. It is probable that Domenico died poor; he appears to have been gentle, honourable and con- scientious, as well as energetically diligent.

The biography of Ghirlandajo is carefully worked out in Crowe and Cavalcaselle's book. A recent German work on the subject is that of Ernst Steinmann (1897). See also Codex Escurialensis, ein Skizzenbuch aus der Werkstatt Domenico Ghirlandaios (texts and plates), by Chr. Hiilsen, Adolf Michaelis and Hermann Egger in the Sonderschriften des osterr. archaol. Instituts in Wien (2 vols., 1906), and cf. T. Ashby in Classical Quarterly (April 1909). (W. M. R.)

GHIRLANDAJO, RIDOLFO (1483-1560), son of Domenico Ghirlandajo, Florentine painter, was born on the 14th of February 1483, and, being less than eleven years old when his father died, was brought up by his uncle David. To this second-rate artist he owed less in the way of professional training than to Granacci, Piero di Cosimo and perhaps Cosimo Rosselli. It has been said that Ridolfo studied

also under Fra Bartolommeo, but this is

not clearly ascertained. He was certainly one of the earliest students of the famous cartoons of Leonardo da Vinci and Michelangelo. His works between the dates 1504 and 1508 show a marked influence from Fra Bartolommeo and Raphael, with the latter of whom he was on terms of familiar friendship; hence he progressed in selection of form and in the modelling and relief of his figures. Raphael, on reaching Rome in 1508, wished Ridolfo to join him; but the Florentine painter was of a particularly home-keeping humour, and he neglected the oppor- tunity. He soon rose to the head of the Florentine oil-painters of his time; and, like his father, accepted all sorts of commissions, of whatever kind. He was prominent in the execution of vast scenic canvases for various public occasions, such as the wedding of Giuliano de' Medici, and the entry of Leo X. into Florence in 1 51 5. In his prime he was honest and conscientious as an artist; but from about 1527 he declined, having already accumulated a handsome property, more than sufficient for maintaining in affluence his large family of fifteen children, and his works became comparatively mannered and self-repeating. His sons traded in France and in Ferrara; he himself took a part in com- mercial affairs, and began paying some attention to mosaic work, but it seems that, after completing one mosaic, the " Annuncia- tion " over the door of the Annunziata, patience failed him for continuing such minute labours. In his old age Ridolfo was greatly disabled by gout. He appears to have been of a kindly, easy-going character, much regarded by his friends and patrons.

The following are some of his leading works, the great majority of them being oil-pictures: —

" Christ and the Maries on the road to Calvary," now in the Palazzo Antinori, Florence, an early example, with figures of half life-size. An " Annunciation " in the Abbey of Montoliveto near Florence, Leonardesque in style. In 1504, the " Coronation of the Virgin," now in the Louvre. A " Nativity," very carefully executed, now in the Hermitage, St Petersburg, and ascribed in the catalogue to Granacci. A " Predella," in the oratory of the Bigallo, Florence, five panels, representing the Nativity and other subjects, charmingly finished. In 1514, on the ceiling of the chapel of St Bernard in the Palazzo Pubblico, Florence, a fresco of the " Trinity," with heads of the twelve apostles and other accessories, and the " Annunciation " ; also the " Assumption of the Virgin, who bestows her girdle on St Thomas," in the choir loft of Prato cathedral. Towards the same date, a picture showing his highest skill, replete with expression,

vigorous life, and firm accomplished pictorial method, now in the gallery of the Uffizi, " St Zenobius resuscitating a child "; also the translation of the remains of the same Saint. The " Virgin and various saints," at S. Pier Maggiore, Pistoja. In 1521, the " Pieta," at S. Agostino, Colle di Valdelsa, life-sized. Towards 1526, the " Assumption," now in the Berlin Museum, containing the painter's own portrait. An excellent portrait of " Cosimo de' Medici " (the Great) in youth. In 1543, a series of frescoes in the monastery of the Angeli. In the National Gallery, London, is " The Procession to Calvary." A great number of altar-pieces were executed by Ghirlandajo, with the assistance of his favourite pupil, currently named Michele di Ridolfo. Another of his pupils was Mariano da Pescia. (W. M. R.)

GHOR, or Ghtjr, an ancient kingdom of Afghanistan. The name of Ghor was in the middle ages, and indeed locally still is, applied to the highlands east of Herat, extending eastward to the upper Helmund valley, or nearly so. Ghor is the southern portion of that great peninsula of strong mountain country which forms the western part of modern Afghanistan. The northern portion of the peninsula was in the middle ages com- prehended under the names of Gharjistan (on the west), and Juzjand (on the east), whilst the basin of the Herat river, and all south of it, constituted Ghor. The name as now used does not include the valley of the Herat river; on the south the limit seems to be the declivity of the higher mountains dominating the descent to the lower Helmund, and the road from Farah to Kandahar. It is in Ghor that rise all those affluents of the 'closed basin of Seistan, the Hari-rud, the Farah-rud, the Khash- rud, besides other considerable streams joining the Helmund above Girishk.

Ghor is mentioned in the Shahnama of Firdousi (a.d. ioio), and in the Arab geographers of that time, though these latter fail in details almost as much as we moderns, thus indicating how little accessible the country has been through all ages. Ibn Haukal's map of Khorasan (c. 976) shows Jibal-al-Ghur, "the

hill-country of Ghor," as a circle ring-fenced with mountains. His brief description speaks of it as a land fruitful in crops, cattle and flocks, inhabited by infidels, except a few who passed for Mahommedans, and indicates that, like other pagan countries

surrounded by Moslem populations, it was regarded as a store of slaves for the faithful. The boundary of Ghor in ascending the valley of the Hari-rud was six and a half easy marches from Herat, at Chist, two marches above Obeh.

The chief part of the present population of Ghor are Taimanis, belonging to the class of nomad or semi-nomad clans called Aimak, intermingled with Zuris and Tajiks.

The people and princes of Ghor first become known to us in connexion with the Ghaznevid dynasty, and the early medieval histories of Ghor and Ghazni are so intertwined that little need be added on that subject to what will be found under Ghazni (g.v.). What we read of Ghor shows it as a country of lofty mountains and fruitful valleys, and of numerous strongholds held by a variety of hill-chieftains ruling warlike clans whose habits were rife with feuds and turbulence, — indeed, in character strongly resembling the tribes of modern Afghanistan, though there seems no good reason to believe that they were of Afghan race. It is probable that they were of old Persian blood, like the older of those tribes which still occupy the country. It is possibly a corroboration of this that, in the 14th century, when one of the Ghori kings, of the Kurt dynasty reigning in Herat, had taken to himself some of the insignia of independent sovereignty, an incensed Mongol prince is said to have reviled him as " an insolent Tajik." Sabuktagin of Ghazni, and his famous son Mahmud, repeatedly invaded the mountain country which so nearly adjoined their capital, subduing its chiefs for the moment, and exacting tribute; but when the immediate pressure was withdrawn, the yoke was thrown off and the tribute withheld. In 1020 Masa'ud, the son of Mahmud, being then governor of Khorasan, made a systematic invasion of Ghor from the side of Herat, laying siege to its strongholds one after the other, and subduing the country more effectually than ever before. About a century later one of the princely families of Ghor, deriving the appellation of Shansabi, or Shansabaniah, from a certain ancestor Shansab, of local fame, and of alleged descent from Zohak, acquired predominance in all the country, and at the time mentioned Malik Tzzuddin al Hosain of this family came to be recognized as lord of Ghor. He was known afterwards as " the Father of Kings," from the further honour to which several of his seven sons rose. Three of these were — (1) Amir Kutbuddin Mahommed, called the lord of the Jibal or mountains; (2) Sultan Saifuddin Suri, for a brief period master of Ghazni, — both of whom were put to death by Bahram the Ghaznevid; and (3) Sultan Alauddin Jahansoz, who wreaked such terrible vengeance upon Ghazni. Alauddin began the con- quests which were afterwards

immensely extended both in India and in the west by his nephews Ghiyasuddin Mahommed b. Sam and Mahommed Ghori (Muizuddin b. Sam or Shahabuddin b. Sam), and for a brief period during their rule it was boasted, with no great exaggeration, that the public prayer was read in the name of the Ghori from the extremity of India to the borders of Babylonia, and from the Oxus to the Straits of Ormus. After the death of Mahommed Ghori, Mahmud the son of Ghiyasuddin was proclaimed sovereign (1200) throughout the territories of Ghor, Ghazni and Hindustan. But the Indian dominion, from his uncle's death, became entirely independent, and his actual authority was confined to Ghor, Seistan and Herat. The whole kingdom fell to pieces before the power of Mahommed Shah of Khwarizm and his son Jelaluddin (c. 1214-1215), a power in its turn to be speedily shattered by the Mongol flood.

Besides the thrones of Ghor and Ghazni, the Shansabaniah family, in the person of Fakhruddin, the eldest of the seven sons of Malik Tzzuddin, founded a kingdom in the Oxus basin, having its seat at Bahian (q.v.), which endured for two or three genera- tions, till extinguished by the power of Khwarizm (1214). And the great Mussulman empire of Delhi was based on the conquests of Muizuddin the Ghorian, carried out and consolidated by his Turki freedmen, Kutbuddin Aibak and his successors. The

princes of Ghor experienced, about the middle of the 13 th century, a revival of power, which endured for 140 years. This later dynasty bore the name of Kurt or Kart. The first of historical prominence was Malik Shamsuddin Kurt, descended by his mother from the great king Ghiyasuddin Ghori, whilst his other grandfather was that prince's favourite minister. In 1245 Shamsuddin held the lordship of Ghor in some kind of alliance with, or subordination to, the Mongols, who had not yet defini- tively established themselves in Persia; and in 1248 he received from the Great Khan Mangu an investiture of all the provinces from Merv to the Indus, including by name Sijistan (or Seistan), Kabul, Tirah (adjoining the Khyber pass), and Afghanistan (a very early occurrence of this name), which he ruled from Herat. He stood well with Hulagu, and for a long time with his son Abaka, but at last incurred the latter's jealousy, and was poisoned when on a visit to the court at Tabriz (1276) . His son Ruknuddin Kurt was, however, invested with the government of Khorasan (1278), but after some years, mistrusting his Tatar suzerains, he withdrew into Ghor, and abode in his strong fortress of Kaissar till his death there in 1305. The family held on through a succession of eight kings in all, sometimes submissive to the Mongol, sometimes aiming at independence, sometimes for a series of prosperous years adding to

the strength and splendour of Herat, and sometimes sorely buffeted by the hosts of masterless Tatar brigands that tore Khorasan and Persia in the decline of the dynasties of Hulagu and Jagatai. It is possible that the Kurts might have established a lasting Tajik kingdom at Herat, but in the time of the last of the dynasty, Ghiyasuddin Pir-'Ali, Tatardom, reorganized and re-embodied in the person of Timur, came against Herat, and carried away the king and the treasures of his dynasty (1380). A revolt and massacre of his garrison provoked Timur's vengeance; he put the captive king to death, came against the city a second time, and showed it no mercy (1383). Ghor has since been obscure in history.

The capital of the kingdom of Ghor, when its princes were rising to dominion in the 12th century, was Firoz Koh, where a city and fortress were founded by Saifuddin Suri. The exact position of Firoz Koh is difficult to determine, unless it be represented by the ruins of one or other of the ancient cities in the upper Murghab valley, the habitat of the Firoz Kohi section of the Chahar Aimak, which were visited by the sur- veyors of the Russo- Afghan boundary delimitation of 1884-1885. Extensive ruins were also found at Taiwara on one of the main affluents of the Farah Rud, where walls and terraces still existing supported the local tradition that this place was the ancient capital of Ghor. The valleys of the Taimani tribes though narrow are fertile and well cultivated, and there are many walled villages and forts about Parjuman and Zarni in the south- eastern districts. The peak of " Chalap Dalan " (described by Ferrier as " one of the highest in the world ") is the Koh-i-Kaisar, which is a trifle over 13,000 ft. in height. All the country now known as Ghor was mapped during the progress of the Russo- Afghan boundary delimitation.

See the "Tabakat-i-Nasiri," in the Bibl. Indica, transl. by Raverty ; Journal asiatique, ser. v. torn. xvii. ; " Ibn Haukal," in /. As. Soc. Beng. vol. xxii. ; Ferrier's Caravan Journeys ; Hammer's Ilkhans, &c.

GHOST (a word common to the W. Teutonic languages; O.E. gast, Dutch, geest, Ger. Geist), in the sense now prevail- ing, the spirit of a dead person considered as appearing in some visible or sensible form to the living (see Apparitions; Psychical Research, "Phantasms of the Dead " ; Spiritualism). In the earlier and wider sense of spirit in general, or of the principle of life, the word is practically obsolete. The language of the Authorized Version of the Bible, however, has preserved the phrase " to give up the ghost," still sometimes used of dying. The Spirit of God, too, the third person of the Trinity, is still called, not in the technical language of theology only, the Holy Ghost. The adjective " ghostly " is still occasionally used for "

spiritual ” (cf. the Ger. geistlich) as contrasted with ” bodily,” especially in such combinations as ” ghostly counsel,” ” ghostly comfort.” We may even speak of a ” ghostly adviser,” though not without a touch of affectation; on the other hand, the phrase

” ghostly man ” for a clergyman (cf. the Ger. Geistlicher) is an archaism the use of which could only be justified by poetic licence, as in Tennyson’s Elaine (1094). The word “ghost,” from the shadowy and unsubstantial quality attributed to the apparitions of the dead, has come also to be commonly used to emphasize the want of force or substance generally, in such phrases as ” not the ghost of a chance,” ” not the ghost of an idea.” It is also applied to those literary and artistic ” hacks ” who are paid to do work for which others get the credit.

GHOST DANCE, an American-Indian ritual dance, sometimes called the Spirit Dance, the dancers wearing a white cloak. It is connected with the doctrine of a Messiah, which arose in Nevada among the Paiute Indians in 1888 and spread to other tribes. A young Paiute Indian medicine-man, known as Wovoka, and called Jack Wilson by the whites, proclaimed that he had had a revelation, and that, if this ghost dance and other ceremonies were duly performed, the Indians would be rid of the white men. The movement led to a sort of craze among the Indian tribes, and in 1890 it was one of the causes of the Sioux outbreak.

See J. Mooney, i4thReport (1896) of Bureau of American Ethnology.

GIACOMETTI, PAOLO (1816-1882), Italian dramatist, born at Novi Ligure, was educated inlaw at Genoa, but at the age of twenty had some success with his play Rosilda and then de- voted himself to the stage. Depressed circumstances made him attach himself as author to various touring Italian companies, and his output was considerable; moreover, such actors as Ristori, Rossi and Salvini made many of these plays great successes. Among the best of them were La Donna (1850), La Donna in seconde nozze (1851), Giuditla (1857), Sofocle (i860). La Morte civile (1880). A collection of his works was published at Milan in eight volumes (1859 et seq.).

GIAMBELLI (or Gianibelli), FEDERIGO, Italian military engineer, was born at Mantua about the middle of the 16th century. Having

had some experience as a military engineer in Italy, he went to Spain to offer his services to Philip II. His proposals were, however, lukewarmly received, and as he could obtain from the king no immediate employment, he took up his residence at Antwerp, where he soon gained considerable reputa- tion for his knowledge in various departments of science. He is said to have vowed to be revenged for his rebuff at the Spanish court; and when Antwerp was besieged by the duke of Parma in 1 584, he put himself in communication with Queen Elizabeth, who, having satisfied herself of his abilities, engaged him to aid by his counsels in its defence. His plans for provision- ing the town were rejected by the senate, but they agreed to a modification of his scheme for destroying the famous bridge which closed the entrance to the town from the side of the sea, by the conversion of two ships of 60 and 70 tons into infernal machines. One of these exploded, and, besides destroying more than 1000 soldiers, effected a breach in the structure of more than 200 ft. in width, by which, but for the hesitation of Admiral Jacobzoon, the town might at once have been relieved. After the surrender of Antwerp Giambelli went to England, where he was engaged for some time in fortifying the river Thames; and when the Spanish Armada was attacked by fire- ships in the Calais roads, the panic which ensued was very largely due to the conviction among the Spaniards that the fire- ships were infernal machines constructed by Giambelli. He is said to have died in London, but the year of his death is unknown. See Motley's History of the United Netherlands, vols. i. and ii.

GIANNONE, PIETRO (1676-1748), was born at Ischitella, in the province of Capitanata, on the 7th of May 1676. Arriving in Naples at the age of eighteen, he devoted himself to the study of law, but his legal pursuits were much surpassed in importance by his literary labours. He devoted twenty years to the composi- tion of his great work, the Storia civile del regno di Napoli, which was ultimately published in 1723. Here in his account of the rise and progress of the Neapolitan laws and government, he warmly espoused the side of the civil power in its conflicts with the Roman Catholic hierarchy. His merit lies in the fact that he was the first to deal systematically with the question of Church and State, and the position thus taken up by him, and the manner

in which that position was assumed, gave rise to a lifelong con- flict between Giannone and the Church; and in spite of his retractation in prison at Turin, he deserves the palm — as he cer- tainly endured the sufferings — of a confessor and martyr in the cause of what he deemed historical truth. Hooted by the mob of Naples, and

excommunicated by the archbishop's court, he was forced to leave Naples and repair to Vienna. Meanwhile the Inquisition had attested after its own fashion the value of his history by putting it on the Index. At Vienna the favour of the emperor Charles VI. and of many leading personages at the Austrian court obtained for him a pension and other facilities for the prosecution of his historical studies. Of these the most important result was II Triregno, ossia del regno del cielo, della terra, e del papa. On the transfer of the Neapolitan crown to Charles of Bourbon, Giannone lost his Austrian pension and was compelled to remove to Venice. There he was at first most favourably received. The post of consulting lawyer to the re- public, in which he might have continued the special work of Fra Paolo Sarpi, was offered to him, as well as that of professor of public law in Padua; but he declined both offers. Unhappily there arose a suspicion that his views on maritime law were not favourable to the pretensions of Venice, and this suspicion, notwithstanding all his efforts to dissipate it, together with clerical intrigues, led to his expulsion from the state. On the 23rd of September 1735 he was seized and conveyed to Ferrara. After wandering under an assumed name for three months through Modena, Milan and Turin, he at last reached Geneva, where he enjoyed the friendship of the most distinguished citizens, and was on excellent terms with the great publishing firms. But in an evil hour he was induced to visit a Catholic village within Sardinian territory in order to hear mass on Easter day, where he was kidnapped by the agents of the Sardinian government, conveyed to the castle of Miolans and thence successively trans- ferred to Ceva and Turin. In the fortress of Turin he remained immured during the last twelve years of his life, although part of his time was spent in composing a defence of the Sardinian interests as opposed to those of the papal court, and he was led to sign a retractation of the statements in his history most obnoxious to the Vatican (1738). But after his recantation his detention was made less severe and he was allowed many alleviations. He died on the 7 th of March 1748, in his seventy-second year.

Giannone's style as an Italian writer has been pronounced to be below a severe classical model; he is often inaccurate as to the facts, for he did not always work from original authorities (see A. Manzoni, Storia della colonna infame), and he was sometimes guilty of unblushing plagiarism. But his very ease and free- dom have helped to make his volumes more popular than many works of greater classical renown. In England the just apprecia- tion of his labours by Gibbon, and the ample use made of them in the later

volumes of Tfye Decline and Fall, early secured him his rightful place in the estimation of English scholars.

The story of his life has been recorded in the Vita by L. Panzini, which is based on Giannone's unpublished Autobiografia and printed in the Milan edition of the historian's works (1823); whilst a more complete estimate of his literary and political importance may be formed by the perusal of the collected edition of the works written by him in his Turin prison, published in Turin in 1859 — under the care of the distinguished statesman Pasquale Stanislao Mancini, universally recognized as one of the first authorities in Italy on questions relating to the history of his native Naples, [and especially of the conflicts between the civil power and the Church. See also R. Mariano, " Giannone e Vico," in the Rivista contemporanea (1869) ; G. Ferrari, La Mente di Pietro Giannone (1868). G. Bonacci's Saggio sulla Storia civile del Giannone (Florence, 1903) is a bitter attack on Giannone, and although the writer's remarks' on the plagiarisms in the Storia civile are justified, the charge of servility is greatly exaggerated.

GIANNUTRI (Gr. 'Aprenicnov, Lat. Dianium), an island of Italy, about 1 sq. m. in total area, 10 m. S.E. of Giglio and about 10 m. S. of the promontory of Monte Argentario (see Orbetello). The highest point is 305 ft. above sea-level. It contains the ruins of a large Roman villa, near the Cala Maestra on the E. coast of the island. The buildings may be divided into five groups: (1) a large cistern in five compartments, each measuring 39 by 17 ft.; (2) habitations both for the owners and for slaves, and

store-rooms; (3) baths; (4) habitations for slaves; (5) belvedere. The brick-stamps found begin in the Flavian and end with the Hadrianic period. The villa may have belonged to the Domitii Ahenobarbi, who certainly under the republic had property in the island of Igilium (Giglio) and near Cosa.

See G. Pellegrini in Nolizie degli scavi (1900), 669 seq.

GIANT (O.E. geant, through Fr. giant, O.Fr. gaiant, jaiant, jeant, med. pop. Lat. gagante — cf. Ital. gigante — by assimilation from gigantem, ace. of Lat. gigas, Gr. 717 as). The idea conveyed by the word in classic mythology is that of beings more or less manlike, but

monstrous in size and strength. Figures like the Titans and the Giants whose birth from Heaven and Earth is sung by Hesiod in the Theogony, such as can heap up mountains to scale the sky and war beside or against the gods, must be treated, with other like monstrous figures of the wonder-tales of the world, as belonging altogether to the realms of mythology. But there also appear in the legends of giants some with historic significance. The ancient and commonly repeated explanation of the Greek word 7170,5, as connected with or derived from yrryevi]S, or " earth-born," is etymologically doubtful, but at any rate the idea conveyed by it was familiar to the ancient Greeks, that the giants were earth-born or indigenous races (see Welcker, Griechische Gotterlehre, i. 787). The Bible (the English reader must be cautioned that the word giant has been there used ambiguously, from the Septuagint downwards) touches the present matter in so far as it records the traditions of the Israelites of fighting in Palestine with tall races of the land such as the Anakim (Numb. xiii. 33 ; Deut. ii. 10, iii. 1 1 ; 1 Sam. xvii. 4). When reading in Homer of " the Cyclopes and the wild tribes of the Giants," or of the adventures of Odysseus in the cave of Polyphemus (Homer, Odyss. vii. 206; ix.), we seem to come into view of dim traditions, exaggerated through the mist of ages, of pre-Hellenic barbarians, godless, cannibal, skin-clothed, hurling huge stones in their rude warfare. Giant- legends of this class are common in Europe and Asia, where the big and stupid giants would seem to have been barbaric tribes exaggerated into monsters in the legends of those who dis-possessed and slew them. In early times it was usual for cities to have their legends of giants. Thus London had Gog and Magog, whose effigies (14 ft. high) still stand in the Guildhall (see Gog); Antwerp had her Antigonus, 40 ft. high; Douai had Gayant, 22 ft. high, and so on.

Besides the conception of giants, as special races distinct from mankind, it was a common opinion of the ancients that the human race had itself degenerated, the men of primeval ages having been of so far greater stature and strength as to be in fact gigantic. This, for example, is received by Pliny {Hist. Nat. vii. 16), and it becomes a common doctrine of theologians such as Augustine (De civitate Dei, xv. 9), lasting on into times so modern that it may be found in Cruden's Concordance. Yet so far as can be judged from actual remains, it does not appear that giants, in the sense of tribes of altogether superhuman stature, ever existed, or that the men of ancient time were on the whole taller than those now living. It is now usual to apply the word giant not to superhuman beings but merely to unusually tall men and women. In every race of mankind the great

*mass of individuals do not depart far from a certain mean or average height, while the very tall or very short men become less and less numerous as they depart from the mean standard, till the utmost divergence is reached in a very few giants on the one hand, and a very few dwarfs on the other. At both ends of the scale, the body is usually markedly out of the ordinary proportions; thus a giant's head is smaller and a dwarf's head larger than it would be if an average man had been magnified or diminished. The principle of the distribution of individuals of different sizes in a race or nation has been ably set forth by Quetelet {Physique sociale, vol. ii.; Anthropomitrie, books iii. and iv.). Had this principle been understood formerly, we might have been spared the pains of criticizing assertions as to giants 20 ft. high, or even more, appearing among mankind. The appearance of an individual man 2*0 ft. high involves the existence of the race he is an extreme member of, whose mean*

stature would be at least' 12 to 14 ft., which is a height no human being has been proved on sufficient evidence to have approached {Anthropom. p. 302). Modern statisticians cannot accept the loose conclusion in Buffon {Hist, not., ed. Sonnini, iv. 134) that there is no doubt of giants having been 10, 12, and perhaps 15 ft. high. Confidence is not even to be placed in ancient asserted measurements, as where Pliny gives to one Gabbaras, an Arabian, the stature of 9 ft. 9 in. (about 9 ft. 55 in. English), capping this with the mention of Posio and Secundilla, who were half a foot higher. That two persons should be described as both having this same extraordinary measure suggests to the modern critic the notion of a note jotted down on the philo- sopher's tablets, and never tested afterwards.

Under these circumstances it is worth while to ask how it is that legend and history so abound in mentions of giants outside all probable dimensions of the human frame. One cause is that, when the story-teller is asked the actual stature of the huge men who figure in his tales, he is not sparing of his inches and feet. What exaggeration can do in this way may be judged from the fact that the Patagonians, whose average height (5 ft. n in.) is really about that of the Chirnside men in Berwickshire, are described in Pigafetta's Voyage round the World as so monstrous that the Spaniards' heads hardly reached their waists. It is reasonable to suppose, with Professor Nilsson {Primitive In- habitants of Scandinavia, chap, vi.), that in the traditions of early Europe tribes of savages may have thus, if really tall, expanded into giants, or, if short, dwindled into dwarfs. Another cause which is clearly proved to have given rise to

giant-myths of yet more monstrous type has been the discovery of great fossil bones, as of mammoth or mastodon, which were formerly supposed to be bones of giants (see Tylor, Early History oj Mankind, chap, xi.; Primitive Culture, chap. x.). A tooth weighing 4! lb and a thigh-bone 17 ft. long having been found in New England in 171 2 (they were probably mastodon), Dr Increase Mather thereupon communicated to the Royal Society of London his theory of the existence of men of prodigious stature in the antediluvian world (see the Philosophical Transactions, xxiv. 85; D. Wilson, Prehistoric Man, i. 54). The giants in the streets of Basel and supporting the arms of Lucerne appear to have originated from certain fossil bones found in 1577, examined by the physician Felix Plater, and pronounced to have belonged to a giant some 16 or 19 ft. high. These bones have since been referred to a very different geological genus, but Plater's giant skeleton was accepted early in the 19th century as a genuine relic of the giants who once inhabited the earth. Of giants in real life whose stature has been authentic- ally recorded Quetelet gives the palm to Frederick the Great's Scotch giant, who measured about 8 ft. 3 in. But since his time there have been several giants who have equalled or surpassed this figure. Patrick Cotler, an Irishman, who died at Clifton, Bristol, in 1802, was 8 ft. 7 in. high. The famous " Irish giant " O'Brien (Charles Byrne), whose skeleton is preserved in the museum of the Royal College of Surgeons, London, was 8 ft. 4 in. Chang (Chang- woo-goo), who appeared in London in 1865-1866 and again in 1880, was 8 ft. 2 in. Josef Winkelmaier, an Austrian, exhibited in London on the 10th of January 1887, was 8 ft. 9 in.; while Elizabeth Lyska, a Russian child of twelve, when shown in London in 1889, had already reached 6 ft. 8 in. Machnow, a Russian, born at Charkow, was exhibited in London in his twenty-third year in 1905; he then stood 9 ft. 3 in., and weighed 360 lb (25 st. 10 lb). From his wrist to the top of his second finger he measured 2 ft. (see The Times, 10th February 1905).

The whole subject of giant myths and the now entirely exploded theory that mankind has, as far as stature is concerned, degenerated since prehistoric times, has been ably dealt with in a volume published by MM. P. E. Launois and P. Roy, entitled &udes biologiques sur les geans (Paris, 1904). See also E. J. Wood, Giants and Dwarfs (i860).

GIANT'S CAUSEWAY, a promontory of columnar basalt, situated on the north coast of county Antrim, Ireland. It is divided by whin-dykes into the Little Causeway, the Middle Causeway or "Honeycomb," as it is locally termed, and the Larger or Grand Causeway. The pillars composing it are

close-fitting and for the most part somewhat irregular hexagons, made up of articulated portions varying from a few inches to some feet in depth, and concave or convex at the upper and lower surfaces. In diameter the pillars vary from 15 to 20 in., and in height some are as much as 20 ft. The Great Causeway is chiefly from 20 to 30, and for a few yards in some places nearly 40 ft. in breadth, exclusive of outlying broken pieces of rock. It is highest at its narrowest part. At about half a dozen yards from the cliff, widening and becoming lower, it extends outwards into a platform, which has a slight seaward inclination, but is easy to walk upon, and for nearly 100 yds. is always above water. At the distance of about 150 yds. from the cliff it turns a little to the eastward for 20 or 30 yds., and then sinks into the sea. The neighbouring cliffs exhibit in many places columns similar to those of the Giant's Causeway, a considerable exposure of them being visible at a distance of 500 to 600 yds. in the bay to the east. A group of these columns, from their arrangement, have been fancifully named the " Giant's Organ." The most remarkable of the cliffs is the Pleaskin, the upper pillars of which have the appearance of a colonnade, and are 60 ft. in height; beneath these is a mass of coarse black amygdaloid, of the same thickness, underlain by a second range of basaltic pillars, from 40 to 50 ft. in height. The view eastward over Bengore and towards Fair Head is magnificent. Near the Giant's Causeway are the ruins of the castles of Dunseverick and Dunluce, situated high above the sea on isolated crags, and the swinging bridge of Carrick-a-Rede, spanning a chasm 80 ft. deep, and connecting a rock, which is used as a salmon-fishing station, with the mainland. In 1883 an electric railway, the first in the United Kingdom, was opened for traffic, connect- ing the Causeway with Portrush and Bushmills. After a pro- tracted lawsuit (1807-1808) the Causeway, and certain land in the vicinity, were declared to be private property, and a charge is made for admission.

GIANT'S KETTLE, Giant's Cauldron or Pot-Hole, in physical geography, the name applied to cavities or holes which appear to have been drilled in the surrounding rocks by eddying currents of water bearing stones, gravel and other detrital matter. The size varies from a few inches to several feet in depth and diameter. The commonest occurrence is in regions where glaciers exist or have existed; a famous locality is the Gletscher Garten of Lucerne, where there are 32 giant's kettles, the largest being 26 ft. wide and 30 ft. deep; they are also common in Germany, Norway and in the United

States. It appears that water, produced by the thawing of the ice and snow, forms streams on the surface of the glacier, which, having gathered into their courses a certain amount of morainic debris, are finally cast down a crevasse as a swirling cascade or moulin. The sides of the crevasse are abraded, and a vertical shaft is formed in the ice. The erosion may be continued into the bed of the glacier,' and, the ice having left the district, the giant's kettle so formed is seen as an empty shaft, or as a pipe filled with gravel, sand or boulders. Such cavities and pipes afford valuable evidence as to the former extent of glaciers (see J. Geikie, The Great Ice Age). Similar holes are met with in river beds at the foot of cascades, and under some other circumstances. The term " pot-hole " is also sometimes used synonymously with " swallow-hole" (q.v.).

GIAOUR (a Turkish adaptation of the Pers. gdwr or gor, an infidel), a word used by the Turks to describe all who are not Mahommedans, with especial reference to Christians. The word, first employed as a term of contempt and reproach, has become so general that in most cases no insult is intended in its use; similarly, in parts of China, the term "foreign devil" has become void of offence. A strict analogy to giaour is found in the Arabic kaffir, or unbeliever, which is so commonly in use as to have become the proper name of peoples and countries.

GIB, ADAM (1714-1788), Scottish divine and leader of the Antiburgher section of the Scottish Secession Church, was born on the T4th of April 17 14 in the parish of Muckhart, Perthshire, and, on the completion of his literary and theological studies at Edinburgh and Perth, was licensed as a preacher in 1740.

His eldest brother being a prodigal he succeeded to the paternal estate, but threw the will into the fire on his brother's promising to reform. In 1741 he was ordained minister of the large Seces- sion congregation of Bristo Street, Edinburgh. In 1745 he was almost the only minister of Edinburgh who continued to preach against rebellion while the troops of Charles Edward were in occupation of the town. When in 1747 " the Associate Synod," by a narrow majority, decided not to give full immediate effect to a judgment which had been passed in the previous year against the lawfulness of the " Burgess Oath," Gib led the protesting minority, who separated from their brethren and formed the Antiburgher Synod (April 10th) in his own house in Edinburgh. It was chiefly under his influence that it was agreed by this ecclesiastical body at subsequent meetings to summon to the bar their " Burgher " brethren, and finally to depose and excommunicate them for contumacy. Gib's action in forming the

Antiburgher Synod led, after prolonged litigation, to his exclusion from the building in Bristo Street where his congrega- tion had met. In 1765 he made a vigorous and able reply to the General Assembly of the Church of Scotland, which had stigmatized the Secession as " threatening the peace of the country." From 1753 till within a short period of his death, which took place on the r8th of June 1788, he preached regularly in Nicolson Street church, which was constantly filled with an audience of two thousand persons. His dogmatic and fearless attitude in controversy earned for him the nickname " Pope

Gib."

Principal publications: Tables for the Four Evangelists (1770, and with author's name, 1800) ; The Present Truth, a Display of the Secession Testimony (2 vols., 1774); Vindiciae dominicae (Edin., 1780). See Chambers's Eminent Scotsmen; also article United Presbyterian Church.

GIBARA, or Jibara (once " Punta del Yarey " and " Yarey de Gibara "), a north-coast city of Oriente Province, Cuba, 80 m. N.W. of Santiago de Cuba. Pop. (1907) 6170. ' It is served by railway to the S.S.W., to Holguin and Cacocum (where it connects with the main line between Santiago and Havana), and is a port of call for the American Munson Line. It lies on a circular harbour, about 1 m. in diameter, which, though open to the N., affords fair shelter. At the entrance to the harbour is San Fernando, an old fort (1817), and the city is very quaint in appearance. At the back of the city are three stone-topped hills, Silla, Pan and Tabla, reputed to be those referred to by Columbus in his journal of his first voyage. Enclosing the town is a stone wall, built by the Spaniards as a defence against attack during the rebellion of i868-i878. Gibara is the port of Holguin. It exports cedar, mahogany, tobacco, sugar, tortoise-shell, Indian corn, cattle products, coco-nuts and bananas; and is the centre of the banana trade with the United States. Gibara is an old settlement, but it did not rise above the status of a petty village until after 181 7; its importance dates from the opening of the port to commerce in 1827.

GIBBON, EDWARD (1 737-1 794), English historian, was descended, he tells us in his autobiography, from a Kentish family of considerable antiquity; among his remoter ancestors he reckons the lord high treasurer Fiennes, Lord Say and Sele, whom Shakespeare has immortalized in his Henry VI. His grandfather was a man of ability, an enterprising merchant of London,' one of the commissioners of customs under the Tory ministry during the last four years of Queen Anne, and, in the judgment of Lord Bolingbroke,

as deeply versed in the " com- merce and finances of England " as any man of his time. He was not always wise, however, either for himself or his country; for he became deeply involved in the South Sea Scheme, in the disastrous collapse of which (1720) he lost the ample wealth he had amassed. As a director of the company, moreover, he was suspected of fraudulent complicity, taken into custody and heavily fined; but £10,000 was allowed him out of the wreck of his estate, and with this his skill and enterprise soon constructed a second fortune. He died at Putney in 1736, leaving the bulk of his property to his two daughters — nearly disinheriting his only son, the father of the historian, for having married against his wishes. This son (by name Edward) was educated

at Westminster 1 and Cambridge, but never took a degree, travelled, became member of parliament, first for Petersfield (1734), then for Southampton (1741), joined the party against Sir Robert Walpole, and (as his son confesses, not much to his father's honour) was animated in so doing by " private revenge " against the supposed " oppressor " of his family in the South Sea affair. If so, revenge, as usual, was blind; for Walpole had sought rather to moderate than to inflame public feeling against the projectors.

The historian was born at Putney, Surrey, April 27 (Old Style), 1737. His mother, Judith Porten, was the daughter of a London merchant. He was the eldest of a family of six sons and a daughter, and the only one who survived childhood; his own life in youth hung by so mere a thread as to be again and again despaired of. His mother, between domestic cares and constant infirmities (which, however, did not prevent an occasional plunge into fashionable dissipation in compliance with her husband's wishes), did but little for him. The " true mother of his mind as well as of his health " was a maiden aunt — Catherine Porten by name — with respect to whom he expresses himself in language of the most grateful remembrance. " Many anxious and solitary days," says Gibbon, " did she consume with patient trial of every mode of relief and amusement. Many wakeful nights did she sit by my bedside in trembling expectation that each hour would be my last." As circumstances allowed, she appears to have taught him reading, writing and arithmetic — acquisitions made with so little of remembered pain that " were not the error corrected by analogy," he says, " I should be tempted to conceive them as innate." At seven he was committed for eighteen

months to the care of a private tutor, John Kirkby by name, and the author, among other things, of a " philosophical fiction " entitled the Life of Automathes. Of Kirkby, from whom he learned the rudiments of English and Latin grammar, he speaks gratefully, and doubtless truly, so far as he could trust the impressions of childhood. With reference to Automathes he is much more reserved in his praise, denying alike its originality, its depth and its elegance; but, he adds, " the book is not devoid of entertainment or instruction." In his ninth year (1746), during a "lucid interval of com- parative health," he was sent to a school at Kingston-upon- Thames; but his former infirmities soon returned, and his progress, by his own confession, was slow and unsatisfactory. " My timid reserve was astonished by the crowd and tumult of the school; the want of strength and activity disqualified me for the sports of the play-field. . . . By the common methods of discipline, at the expense of many tears and some blood, I purchased the knowledge of the Latin syntax," but manifestly, in his own opinion, the Arabian Nights, Pope's Homer, and Dryden's Virgil, eagerly read, had at this period exercised a much more powerful influence on his intellectual development than Phaedrus and Cornelius Nepos, "painfully construed and darkly understood."

In December 1747 his mother died, and he was taken home. After a short time his father removed to the " rustic solitude " of Buriton (Hants), but young Gibbon lived chiefly at the house of his maternal grandfather at Putney, where, under the care of his devoted aunt, he developed, he tells us, that passionate love of reading " which he would not exchange for all the treasures of India," and where his mind received its most decided stimulus. Of 1 748 he says, " This year, the twelfth of my age, I shall note as the most propitious to the growth of my intellectual stature." After detailing the circumstances which unlocked for him the door of his grandfather's " tolerable library," fie says, " I turned over many English pages of poetry and romance, of history and travels. Where a title attracted my eye, without fear or aw£ I snatched the volume from the shelf." In 1749, in his twelfth ' year, he was sent to Westminster, still residing, however, with his aunt, who, rendered destitute by her father's bankruptcy, but unwilling to live a life of dependence, had opened a boarding-

1 The celebrated William Law had been for some time the private tutor of this Edward Gibbon, who is supposed to have been the original of the rather clever sketch of " Flatus " in the Serious Call.

house for Westminster school. Here in the course of two years (1749-17 50), interrupted by danger and debility, he " painfully

climbed into the third form "; but it was left to his riper age to " acquire the beauties of the Latin and the rudiments of the Greek tongue." The continual attacks of sickness which had retarded his progress induced his aunt, by medical advice, to take him to Bath; but the mineral waters had no effect. He then resided for a time in the house of a physician at Winchester; the physician did as little as the mineral waters; and, after a further trial of Bath, he once more returned to Putney, and made a last futile attempt to study at Westminster. Finally, it was concluded that he would never be able to encounter the discipline of a school; and casual instructors, at various times and places, were provided for him. Meanwhile his indiscriminate appetite for reading had begun to fix itself more and more decidedly upon history; and the list of historical works devoured bv him during this period of chronic ill-health is simply astonishing. It included, besides Hearne's Ductor historicus and the successive volumes of the Universal History, which was then in course of publication, Littlebury's Herodotus, Spelman's Xenophon, Gordon's Tacitus, an anonymous translation of Procopius; "many crude lumps of Speed, Rapin, Mezeray, Davila, Machiavel, Father Paul, Bower, &c, were hastily gulped. I devoured them like so many novels; and I swallowed with the same voracious appetite the descriptions of India and China, of Mexico and Peru." His first introduction to the historic scenes the study of which afterwards formed the passion of his life took place in 1751, when, while along with his father visiting a friend in Wiltshire, he discovered in the library " a common book, the continuation of Echard's Roman History." " To me the reigns of the successors of Constantine were absolutely new; and I was immersed in the passage of the Goths over the Danube, when the summons of the dinner bell reluctantly dragged me from my intellectual feast." Soon afterwards his fancy kindled with the first glimpses into Oriental history, the wild " barbaric " charm of which he never ceased to feel. Ockley's book on the Saracens " first opened his eyes " to the striking career of Mahomet and his hordes; and with his characteristic ardour of literary research, after exhausting all that could be learned in English of the Arabs and Persians, the Tatars and Turks, he forthwith plunged into the French of D'Herbelot, and the Latin of Pocock's version of Abulfaragius, sometimes understanding them, but oftener only guessing their meaning. He soon learned to call to his aid the subsidiary sciences of geography and chronology, and before he was quite capable of reading them had already attempted to weigh in his childish balance the competing systems of Scaliger and Petavius, of Marsham and Newton. At this early period he seems already to have adopted in some degree the plan of study he followed in after life and

recom- mended in his Essai sur I'etude — that is, of letting his subject rather than his author determine his course, of suspending the perusal of a book to reflect, and to compare the statements with those of other authors — so that he often read portions of many volumes while mastering one.

Towards his sixteenth year he tell us " nature displayed in his favour her mysterious energies," and all his infirmities suddenly vanished. Thenceforward, while never possessing or abusing the insolence of health, he could say " few persons have been more exempt from real or imaginary ills." His unexpected recovery revived his father's hopes for his education, hitherto so much neglected if judged by ordinary standards; and accord- ingly in January 1752 he was placed at Esher, Surrey, under the care of Dr Francis, the well-known translator of Horace. But Gibbon's friends in a few weeks discovered that the new tuto preferred the pleasures of London to the instruction of his pupils, and in this perplexity decided to send him prematurely to Oxford, where he was matriculated as agentleman commoner of Magdalen College, 3rd April 1752. According to his own testimony he arrived at the university " with a stock of information which might have puzzled a doctor, and a degree of ignorance of which a schoolboy might be ashamed." And indeed his huge wallet of scraps stood him in little stead at the trim banquets to which*

ne was invited at Oxford, while the wandering habits by which he had filled it absolutely unfitted him to be a guest. He was not well grounded in any of the elementary branches, which are essential to university studies and to all success in their prosecu- tion. It was natural, therefore, that he should dislike the university, and as natural that the university should dislike him. Many of his complaints of the system were certainly just; but it may be doubted whether any university system would have been profitable to him, considering his antecedents. He com- plains especially of his tutors, and in one case with abundant reason; but, by his own confession, they might have recriminated with justice, for he indulged in gay society, and kept late hours. His observations, however, on the defects of the English univer- sity system, some of which have only very recently been removed, are acute and well worth pondering, however little relevant to his own case. He remained at Magdalen about fourteen months. " To the university of Oxford," he says, " I

acknowledge no obligation; and she will as cheerfully renounce me for a son as I am willing to disclaim her for a mother. I spent fourteen months at Magdalen College; they proved the fourteen months the most idle and unprofitable of my whole life."

But thus " idle " though he may have been as a " student," he already meditated authorship. In the first long vacation — during which he, doubtless with some sarcasm, says that " his taste for books began to revive " — he contemplated a treatise on the age of Sesostris, in which (and it was characteristic) his chief object was to investigate not so much the events as the probable epoch of the reign of that semi-mythical monarch, whom he was inclined to regard as having been contemporary with Solomon. " Unprovided with original learning, unformed in the habits of thinking, unskilled in the arts of composition, I resolved to write a book "; but the discovery of his own weakness, he adds, was the first symptom of taste. On his first return to Oxford the work was " wisely relinquished," and never afterwards resumed. The most memorable incident, however, in Gibbon's stay at Oxford was his temporary conversion to the doctrines of the church of Rome. The bold criticism of Middleton's recently (1749) published Free Enquiry into the Miraculous Powers which are supposed to have subsisted in the Christian Church appears to have given the first shock to his Protestantism, not indeed by destroying his previous belief that the gift of miraculous powers had continued to subsist in the church during the first four or five centuries of Christianity, but by convincing him that within the same period most of the leading doctrines of popery had been already introduced both in theory and in practice. At this stage he was introduced by a friend (Mr Molesworth) to Bossuet's Variations of Protestantism and Exposition of Catholic Doctrine (see Gibbon, Decline and Fall, c. xv., note 79). " These works," says he, " achieved my conversion, and I surely fell by a noble hand." In bringing about this " fall," however, Parsons the Jesuit appears to have had a considerable share; at least Lord Sheffield has recorded that on the only occasion on which Gibbon talked with him on the subject he imputed the change in his religious views principally to that vigorous writer, who, in his opinion, had urged all the best arguments in favour of Roman Catholicism. But be this as it may, he had no sooner adopted his new creed than he resolved to profess it; "a momentary glow of enthusiasm " had raised him above all temporal considerations, and accordingly, on June 8, 1753, he records that having " privately abjured the heresies " of his childhood before a Catholic priest of the name of Baker, a Jesuit, in London, he announced the same to his father in an elaborate

controversial epistle which his spiritual adviser much approved, and which he himself afterwards described to Lord Sheffield as having been " written with all the pomp, the dignity, and self-satisfaction of a martyr."

The elder Gibbon heard with indignant surprise of this act of juvenile apostasy, and, indiscreetly giving vent to his wrath, precipitated the expulsion of his son from Oxford, a punishment which the culprit, in after years at least, found no cause to deplore. In his Memoirs he speaks of the results of his " childish revolt against the religion of his country " with undisguised self-

gratulation. It had delivered him for ever from the " port and prejudice " of the university, and led him into the bright paths of philosophic freedom. That his conversion was sincere at the time, that it marked a real if but a transitory phase of genuine religious conviction, we have no reason to doubt, notwithstanding the scepticism he has himself expressed. " To my present feelings it seems incredible that I should ever believe that I believed in transubstantiation," he indeed declares; but his incredulous astonishment is not unmixed with undoubting pride. " I could not blush that my tender mind was entangled in the sophistry which had reduced the acute and manly understandings of a Chillingworth or a Bayle." Nor is the sincerity of the Catholicism he professed in these boyish days in any way dis- credited by the fact of his subsequent lack of religion. Indeed, as one of the acutest and most sympathetic of his critics has remarked, the deep and settled grudge he has betrayed towards every form of Christian belief, in all the writings of his maturity, may be taken as evidence that he had at one time experienced in his own person at least some of the painful workings of a positive faith.

But little time was lost by the elder Gibbon in the formation of a new plan of education for his son, and in devising some method which if possible might effect the cure of his "spiritual malady." The result of deliberation, aided by the advice and experience of Lord Eliot, was that it was almost immediately decided to fix Gibbon for some years abroad' under the roof of M. Pavilliard, a Calvinist minister at Lausanne. In as far as regards the instructor and guide thus selected, a more fortunate choice could scarcely have been made. From the testimony of his pupil, and the still more conclusive evidence of his own correspondence with the father, Pavilliard seems to have been a man of singular good sense, temper and tact. At the outset, indeed,

there was one considerable obstacle to the free intercourse of tutor and pupil: M. Pavilliard appears to have known little of English, and young Gibbon knew practically nothing of French. But this difficulty was soon removed by the pupil's diligence; the very exigencies of his situation were of service to him in calling forth all his powers, and he studied the language with such success that at the close of his five years' exile he declares that he " spontaneously thought " in French rather than in English, and that it had become more familiar to " ear, tongue and pen." It is well known that in after years he had doubts whether he should not compose his great work in French; and it is certain that his familiarity with that language, in spite of considerable efforts to counteract its effects, tinged his style to the last.

Under the judicious regulations of his new tutor a methodical course of reading was marked out, and most ardently prosecuted; the pupil's progress was proportionably rapid. With the systematic study of the Latin, and to a slight extent also of the Greek classics, he conjoined that of logic in the prolix system of Crousaz; and he further invigorated his reasoning powers, as well as enlarged his knowledge of metaphysics and juris- prudence, by the perusal of Locke, Grotius and Montesquieu. He also read largely, though somewhat indiscriminately, in French literature, and appears to have been particularly struck with Pascal's Provincial Letters, which he tells us he reperused almost every year of his subsequent life with new pleasure, and which he particularly mentions as having been, along with Bleterie's Life of Julian and Giannone's History of Naples, a book which probably contributed in a special sense to form the historian of the Roman empire. The comprehensive scheme of study included mathematics also, in which he advanced as far as the conic sections in the treatise of L'Hopital. He assures us that his tutor did not complain of any inaptitude on the pupil's part, and that the pupil was as happily unconscious of any on his own; but here he broke off. He adds, what is not quite clear from one who so frankly acknowledges his limited acquaint- ance with the science, that he had reason to congratulate himself that he knew no more. " As soon," he says, " as I understood the principles, I relinquished for ever the pursuit of the mathe- matics; nor can I lament that I desisted before my mind was hardened by the habit of rigid demonstration, so destructive

of the finer feelings of moral evidence, which must, however, determine the action and opinions of our lives."

Under the new influences which were brought to bear on him, he in less than two years resumed his Protestantism. " He is willing," he says, to allow M. Pavilliard a " handsome share in his reconversion," though he maintains, and no doubt rightly, that it was principally due "to his own solitary reflections." He particularly congratulated himself on having discovered the " philosophical argument " against transubstantiation, " that the text of Scripture which seems to inculcate the real presence is attested only by a single sense — our sight, while the real presence itself is disproved by three of our senses — the sight, the touch, and the taste." Before a similar mode of reasoning, all the other distinctive articles of the Romish creed " disappeared like a dream "; and " after a full conviction," on Christmas day, 1754, he received the sacrament in the church of Lausanne. Although, however, he adds that at this point he suspended his religious inquiries, " acquiescing with implicit belief in the tenets and mysteries which are adopted by the general consent of Catholics and Protestants," his readers will probably do him no great injustice if they assume that even then it was rather to the negations than to the affirmations of Protestantism that he most heartily assented.

With all his devotion to study at Lausanne 1 (he read ten or twelve hours a day), he still found some time for the acquisition of some of the lighter accomplishments, such as riding, dancing, drawing, and also for mingling in such society as the place had to offer. In September 1755 he writes to his aunt: " I find a great many agreeable people here, see them sometimes, and can say upon the whole, without vanity, that, though I am the Englishman here who spends the least money, I am he who is most generally liked." Thus his " studious and sedentary life " passed pleasantly enough, interrupted only at rare intervals by boyish excursions of a day or a week in the neighbourhood, and by at least one memorable tour of Switzerland, by Basel, Zurich, Lucerne and Bern, made along with Pavilliard in the autumn of 1755. The last eighteen months of this residence abroad saw the infusion of two new elements — one of them at least of considerable importance — into his life. In 1757 Voltaire came to reside at Lausanne; and although he took but little notice of the young Englishman of twenty, who eagerly sought and easily obtained an introduction, the establishment of the theatre at Monrepos, where the brilliant versifier himself de- claimed before

select audiences his own productions on the stage, had no small influence in fortifying Gibbon's taste for the French theatre, and in at the same time abating that "idolatry for the gigantic genius of Shakespeare which is inculcated from our infancy as the first duty of an Englishman." In the same year — apparently about June — he saw for the first time, and forthwith loved, the beautiful, intelligent and accomplished Mademoiselle-Susan Curchod, daughter of the pasteur of Crassier. That the passion which she inspired in him was tender, pure and fitted to raise to a higher level a nature which in some

1 The Journal for 1755 records that during that year, besides writing and translating a great deal in' Latin and French, he had read, amongst other works, Cicero's Epistolae ad familiares, his Brutus, all his Orations, his dialogues De amicitia and De seneciute, Terence (twice), and Pliny's Epistles. In January 1756 he says: " I determined to read over the Latin authors in order, and read this year Virgil, Sallust, Livy, Velleius Paterculus, Valerius Maximus, Tacitus, Suetonius, Quintus Curtius, Justin, Florus, Plautus, Terence and Lucretius. I also read and meditated Locke Upon the Understanding." Again in January 1757 he writes: " I began to study algebra under M. de Traytorrens, went through the elements of algebra and geometry, and the three fi r st books .of the Marquis de l'Hopital's Conic Sections. I also read Tibullus, Catullus, Propertius, Horace (with Dacier's and Torrentius's notes), Virgil, Ovid's Epistles, with Meziiiac's commentary, the Ars amandi and the Elegies; likewise the Augustus and Tiberius of Suetonius, and a Latin translation of Dion Cassius from the death of J ulius Caesar to the death of Augustus. I also continued my correspondence, begun last year, with M. Allamand of Bex, and the Professor Breitinger of Zurich, and opened a new one with the Professor Gesner of Gottingen. N.B. — Last year and this I read St John's Gospel, with part of Xenophon's Cyrapaedia, the Iliad, and Herodotus ; but, upon the whole, I rather neglected my Greek."

respects was much in need of such elevation will be doubted by none but the hopelessly cynical; and probably there are few readers who can peruse the paragraph in which Gibbon " approaches the delicate subject of his early love " without discerning in it a pathos much deeper than that of which the writer was himself aware. During the remainder of his residence at Lausanne he had good reason to " indulge his dream of felicity"; but on his return to England, "I soon discovered that my father would not hear of this strange alliance, and that without his consent I was myself destitute and helpless. After a painful struggle I yielded to my fate; I sighed as a lover. I

obeyed as a son; my wound was insensibly healed by time, absence, and the habits of a new life." 2

In 1758 he returned with mingled joy and regret to England, and was kindly received at home. But he found a stepmother there; and this apparition on his father's hearth at first rather appalled him. The cordial and gentle manners of Mrs Gibbon, however, and her unremitting care for his happiness, won him from his first prejudices, and gave her a permanent place in his esteem and affection. He seems to have been much indulged, and to have led a very pleasant life of it; he pleased himself in moderate excursions, frequented the theatre, mingled, though not very often, in society; was sometimes a little extravagant, and sometimes a little dissipated, but never lost the benefits of his Lausanne exile; and easily settled into a sober, discreet, calculating Epicurean philosopher, who sought the summum bonum of man in temperate, regulated and elevated pleasure. The first two years after his return to England he spent princi- pally at his father's country seat at Buriton, in Hampshire, only nine months being given to the metropolis. He has left an amusing acccunt of his employments in the country, where his love of study was at once inflamed by a large and unwonted command of books and checked by the necessary interruptions of his otherwise happy domestic life. After breakfast " he was expected," he says, to spend an hour with Mrs Gibbon; after tea his father claimed his conversation; in the midst of an interesting work he was often called down to entertain idle visitors; and, worst of all, he was periodically compelled to return the well-meant compliments. He mentions that he dreaded the " recurrence of the full moon," which was the period generally selected for the more convenient accomplishment of such formidable excursions.

His father's library, though large in comparison with that he commanded at Lausanne, contained, he says, " much trash"; but a gradual process of reconstruction transformed it at length into that " numerous and select " library which was " the foundation of his works, and the best comfort of his life both at home and abroad." No sooner had he returned home than he began the work of accumulation, and records that, on the receipt of his first quarter's allowance, a large share was appro- priated to his literary wants. " He could never forget," he declares, " the joy with which he exchanged a bank note of twenty pounds for the twenty volumes of the Memoirs of the Academy of Inscriptions," an Academy which has been well characterized (by Sainte-Beuve) as Gibbon's intellectual father- land. It may not be uninteresting here to note the principles which guided him both now and afterwards in his literary purchases.

” I am not conscious,” says he, ” of having ever bought a book from a motive of ostentation; every volume, before it was deposited on the shelf, was either read or sufficiently examined “; he also mentions that he soon adopted the tolerating maxim of the elder Pliny, that no book is ever so bad as to be absolutely good for nothing.

In London he seems to have seen but little select society — partly from his father’s taste, “which had always preferred the highest and lowest company,” and partly from his own reserve and timidity, increased by his foreign education, which had made English habits unfamiliar, and the very language

2 The affair, however, was not finally broken off till 1763. Mdlle Curchod soon afterwards became the wife of Necker, the famous financier; and Gibbon and the Neckers frequently afterwards met on terms of mutual friendship and esteem.

in some degree strange. And thus he was led to draw that interesting picture of the literary recluse among the crowds of London: ” While coaches were rattling through Bond Street, I have passed many a solitary evening in my lodging with my books. My studies were sometimes interrupted with a sigh, which I breathed towards Lausanne; and on the approach of spring I withdrew without reluctance from the noisy and extensive scene of crowds without company, and dissipation without pleasure.” He renewed former acquaintance, however, with the ” poet ” Mallet, and through him gained access to Lady Hervey’s circle, where a congenial admiration, not to say affectation, of French manners and literature made him a welcome guest. It ought to be added that in each of the twenty- five years of his subsequent acquaintance with London ” the prospect gradually brightened,” and his social as well as his intellectual qualities secured him a wide circle of friends. In one respect Mallet gave him good counsel in those early days. He advised him to addict himself to an assiduous study of the more idiomatic English writers, such as Swift and Addison — with a view to unlearn his foreign idiom and recover his half- forgotten vernacular — a task, however, which he never per- fectly accomplished. Much as he admired these writers, Hume and Robertson were still greater favourites, as well from their subject as for their style. Of his admiiation of Hume’s style, of its nameless grace of simple elegance, he has left us a strong expression, when he tells us that it often compelled him to close the

historian's volumes with a mixed sensation of delight and despair.

In 1 761 Gibbon, at the age of twenty-four, after many delays, and with many flutterings of hope and fear, gave to the world, in French, his maiden publication, an Essai sur I'ttude de la litteralure, which he had composed two years before. It was published partly in compliance with his father's wishes, who thought that the proof of some literary talent might introduce him favourably to public notice, and secure the recommendation of his friends for some appointment in connexion with the mission of the English plenipotentiaries to the congress at Augsburg which was at that time in contemplation. But in yielding to paternal authority, Gibbon frankly owns that he " complied, like a pious son, with the wish of his own heart."

The subject of this youthful effort was suggested, its author says, by a refinement of vanity — " the desire of justifying and praising the object of a favourite pursuit," namely, the study of ancient literature. Partly owing to its being written in French, partly to its character, the Essai excited more attention abroad than at home. Gibbon has criticized it with the utmost frankness, not to say severity; but, after every abatement, it is unquestionably a surprising effort for a mind so young, and contains many thoughts which would not have disgraced a thinker or a scholar of much maturer age. His account of its first reception and subsequent fortunes in England deserves to be cited as a curious piece of literary history. " In England," he says, " it was received with cold indifference, little read, and speedily forgotten. A small impression was slowly dispersed; the bookseller murmured, and the author (had his feelings been more exquisite) might have wept over the blunders and baldness of the English translation. The publication of my history fifteen years afterwards revived the memory of my first perform- ance, and the essay was eagerly sought in the shops. But I refused the permission which Becket solicited of reprinting it; the public curiosity was imperfectly satisfied by a pirated copy of the booksellers of Dublin; and when a copy of the original edition has been discovered in a sale, the primitive value of half-a-crown has risen to the fanciful price of a guinea or thirty shillings." l

1 The Essai, in a good English translation, now appears in the Miscellaneous Works. Villemain finds in it " peu de vues, nulle originalite surtout, mais une grande passion litteraire, l'amour des recherches savantes et du beau langage." Sainte-Beuve's criticism is almost identical with Gibbon's own; but though he finds that " la lecture en est assez difficile et parfois obscure, la liaison des idees echappe souvent par trop de concision et par le desir qu'a eu le jeune

auteur d'y fairee'ntrer,d'y condenser la plupart deses notes," he adds, " il y a, chemin faisant, des vues neuves et qui sentent l'historien."

Some time before the publication of the essay, Gibbon had entered a new and, one might suppose, a very uncongenial scene of life. In an hour of patriotic ardour he became (June 12, 1759) a captain in the Hampshire militia, and for more than two years (May 10, 1760, to December 23, 1762) led a wandering life of " military servitude." Hampshire, Kent, Wiltshire and Dorsetshire formed the successive theatres of what he calls his " bloodless and inglorious campaigns." He complains of the busy idleness in which his time was spent; but, considering the circumstances, so adverse to study, one is rather surprised that the military student should have done so much, than that he did so little; and never probably before were so many hours of literary study spent in a tent. In estimating the comparative advantages and disadvantages of this wearisome period of his life, he has summed up with the impartiality of a philosopher and the sagacity of a man of the world. Irksome as were his employments, grievous as was the waste of time, uncongenial as were his companions, solid benefits were to be set off against these things; his health became robust, his knowledge of the world was enlarged, he wore off some of his foreign idiom, got rid of much of his reserve; he adds — and perhaps in his estimate it was the benefit to be most prized of all — " the discipline and evolutions of a modern battalion gave me a clearer notion of the phalanx and the legion, and the captain of the Hampshire grenadiers (the reader may smile) has not been useless to the historian of the Roman empire."

It was during this period that he read Homer and Longinus, having for the first time acquired some real mastery of Greek; and after the publication of the Essai, his mind was full of projects for a new literary effort. The Italian expedition of Charles VIII. of France, the crusade of Richard I., the wars of the barons, the lives and comparisons of Henry V. and the emperor Titus, the history of the Black Prince, the life of Sir Philip Sidney, that of Montrose, and finally that of Sir W. Raleigh, were all of them seriously contemplated and successively rejected. By their number they show how strong was the impulse to literature, and by their character, how determined the bent of his mind in the direction of history; while their variety makes it manifest also that he had then at least no special purpose to serve, no preconceived theory to support, no particular prejudice or belief to overthrow.

The militia was disbanded in 1762, and Gibbon joyfully shook off his

bonds; but his literary projects were still to be postponed. Following his own wishes, though with his father's consent, he had early in 1760 projected a Continental tour as the comple- tion " of an English gentleman's education." This had been interrupted by the episode of the militia; now, however, he resumed his purpose, and left England in January 1763. Two years were " loosely defined as the term of his absence," which he exceeded by half a year — returning June 1765. He first visited Paris, where he saw a good deal of d'Alembert, Diderot, Barthelemy, Raynal, Helvetius, Baron d'Holbach and others of that circle, and was often a welcome guest in the saloons of Madame Geoffrin and Madame du Deffand. 2 Voltaire was at Geneva, Rousseau at Montmorency, and Buffon he neglected to visit; but so congenial did he find the society for which his education had so well prepared him, and into which some literary reputation had already preceded him, that he declared, " Had I been rich and independent, I should have prolonged and perhaps have fixed my residence at Paris."

From France he proceeded to Switzerland, and spent nearly a year at Lausanne, where many old friendships and studies were resumed, and new ones begun. His reading was largely designed to enable him fully to profit by the long-contemplated Italian trfur which began in April 1764 and lasted somewhat more than a year. He has recorded one or two interesting notes on Turin, Genoa, Florence and other towns at which halt was made on his route; but Rome was the gieat object of his pilgrimage, and the words in which he has alluded to the feelings with which he

2 Her letters to Walpole about Gibbon contain some interesting remarks by this " aveugle clairvoyante," as Voltaire calls her; but they belong to a later period (1777).

approached it are such as cannot be omitted from any sketch of Gibbon, however brief. " My temper is not very susceptible of enthusiasm, and the enthusiasm which I do not feel I have ever scorned to affect. But at the distance of twenty-five years I can neither forget nor express the strong emotions which agitated my mind as I first approached and entered the Eternal City. After a sleepless night, I trod with a lofty step the ruins of the forum; each memorable spot, where Romulus stood, or Tully spoke, or Caesar fell, was at once present to my eye; and several days of intoxication

were lost or enjoyed before I could descend to a cool and minute investigation." Here at last his long yearning for some great theme worthy of his historic genius was gratified. The first conception of the Decline and Fall arose as he lingered one evening amidst the vestiges of ancient glory. " It was at Rome, on the 15th of October 1764, as I sat musing amidst the ruins of the Capitol, while the bare-footed friars were singing vespers in the temple of Jupiter, that the idea of writing the decline and fall of the city first started to my mind."

The five years and a half which intervened between his return from this tour, in June 1765, and the death of his father, in November 1770, seem to have formed the portion of his life which " he passed with the least enjoyment and remembered with the least satisfaction. 1 ' He attended every spring the meetings of the militia at Southampton, and rose successively to the rank of major and lieutenant-colonel commandant; but was each year " more disgusted with the inn, the wine, the com- pany, and the tiresome repetition of annual attendance and daily exercise." From his own account, however, it appears that other and deeper causes produced this discontent. Sincerely attached to his home, he yet felt the anomaly of his position. At thirty, still a dependant, without a settled occupation, without a definite social status, he often regretted that he had not " embraced the lucrative pursuits of the law or of trade, the chances of civil office or India adventure, or even the fat slumbers of the church." From the emoluments of a profession he " might have derived an ample fortune, or a competent income instead of being stinted to the same narrow allowance, to be increased only by an event which he sincerely deprecated." Doubtless the secret fire of a consuming, but as yet ungratified, literary ambition also troubled his repose. He was still contem- plating " at an awful distance " The Decline and Fall, and meantime revolved some other subjects, that seemed more immediately practicable. Hesitating for some time between the revolutions of Florence and those of Switzerland, he consulted M. Deyverdun, a young Swiss with whom he had formed a close and intimate friendship during his first residence at Lausanne, and finally decided in favour of the land which was his " friend's by birth " and " his own by adoption." He executed the first book in French; it was read (in 1767), as an anonymous produc- tion, before a literary society of foreigners in London, and condemned. Gibbon sat and listened unobserved to their strictures. It never got beyond that rehearsal; Hume, indeed, approved of the performance, only deprecating as unwise the author's preference for French; but Gibbon sided with the majority.

In 1 767 also he joined with M. Deyverdun in starting a literary journal under the title of Memoires litleraires de la Crande-Bretagne. But its circulation was limited, and only the second volume had appeared (1768) when Deyverdun went abroad. The materials already collected for a third volume were sup- pressed. It is interesting, however, to know, that in the first volume is a review by Gibbon of Lord Lyttelton's History of Henry II., and that the second volume contains a contribution by Hume on Walpole's Historic Doubts.

The next appearance of the historian made a deeper impression. ' It was the first distinct print of the lion's foot. " Ex ungue leonem " might have been justly said, for he attacked, and attacked successfully, the redoubtable Warburton. Of the many paradoxes in the Divine Legation, few are more extravagant than the theory that Virgil, in the sixth book of his Aeneid, intended to allegorize, in the visit of his hero and the Sibyl to the

shades, the initiation of Aeneas, as a lawgiver, into the Eleusinian mysteries. This theory Gibbon completely exploded in his Critical Observations (1770) — no very difficult task, indeed, but achieved in a style, and with a profusion of learning, which called forth the warmest commendations both at home and abroad. Warburton never replied; and few will believe that he would not, if he had not thought silence more discreet. Gibbon, however, regrets that the style of his pamphlet was too acrimonious; and this regret, considering his antagonist's slight claims to forbearance, is creditable to him. " I cannot forgive myself the contemptuous treatment of a man who, with all his faults, was entitled to my esteem; and I can less forgive, in a personal attack, the cowardly concealment of my name and character."

Soon after his " release from the fruitless task of the Swiss revolution " in 1768, he had gradually advanced from the wish to the hope, from the hope to the design, from the design to the execution of his great historical work. His preparations were indeed vast. The classics, " as low as Tacitus, Pliny the Younger and Juvenal," had been long familiar. He now " plunged into the ocean of the Augustan history," and "with pen almost always in hand," pored over all the original records, Greek and Latin, between Trajan and the last of the Western Caesars. " The subsidiary rays of medals and inscriptions, of geography and chronology, were thrown on their proper objects; and I applied the collections of Tillemont, whose inimitable accuracy almost assumes the character of genius, to fix and arrange within my reach the loose and scattered atoms of historical information." The

Christian apologists and their pagan assailants; the Theodosian Code, with Godefroy's commentary; the Annals and Antiquities of Muratori, collated with " the parallel or transverse lines" of Sigonius and Maffei, Pagi and Baronius, were all critically studied. Still following the wise maxim which he had adopted as a student, " multum legere potius quam multa," he reviewed again and again the immortal works of the French and English, the Latin and Italian classics. He deepened and extended his acquaintance with Greek, par- ticularly with his favourite authors Homer and Xenophon; and, to crown all, he succeeded in achieving the third perusal of Blackstone's Commentaries.

The course of his study was for some time seriously interrupted by his father's illness and death in 1770, and by the many dis- tractions connected with the transference of his residence from Buriton to London. It wasjiot, indeed, until October 1772 that he found himself at last independent, and fairly settled in his house and library, with full leisure and opportunity to set about the composition of the first volume of his history. Even then it appears from his own confession that he long brooded over the chaos of materials he had amassed before light dawned upon it. At the commencement, he says,." all was dark and doubt- ful"; the limits, divisions, even the title of his work were undetermined; the first chapter was composed three times, and the second and third twice, before he was satisfied with his efforts. This prolonged meditation on his design and its execu- tion was ultimately well repaid by the result: so methodical did his ideas become, and so readily did his materials shape themselves, that, with the above exceptions, the original MS. of the entire six quartos was sent uncopied to the printers. He also says that not a sheet had been seen by any other eyes than those of author and printer, a statement indeed which must be taken with a small deduction; or rather we must suppose that a few chapters had been submitted, if not to the " eyes," to the " ears " of others; for he elsewhere tells us that he was " soon disgusted with the modest practice of reading the manuscript to his friends." Such, however, were his preliminary difficulties that he confesses he was often " tempted to cast away the labour of seven years "; and it was not until February 1776 that the first volume was published. The success was instant, and, for a quarto, probably unprecedented. The entire impression was exhausted in a few days; a second and a third edition were scarcely adequate to the demand. The author might almost have- said, as Lord Byron after the publication of Childe Harold,

that " he awoke one morning and found himself famous." In addition to public applause, he was gratified by the more select praises of the highest living authorities in that branch of literature: " the candour of Dr Robertson embraced his disciple"; Hume's letter of congratulation "overpaid the labour of ten years." The latter, however, with his usual sagacity, anticipated the objections which he saw could be urged against the famous fifteenth and sixteenth chapters. " I think you have observed a very prudent temperament; but it was impossible to treat the subject so as not to give grounds of suspicion against you, and you may expect that a clamour will arise."

The " clamour " thus predicted was not slow to make itself heard. Within two years the famous chapters had elicited what might almost be called a library of controversy. The only attack, however, to which Gibbon deigned to make any reply was that of Davies, who had impugned his accuracy or good faith. His Vindication appeared in February 1779; and, as Milman remarks, " this single discharge from the ponderous artillery of learning and sarcasm laid prostrate the whole dis- orderly squadron " of his rash and feeble assailants. 1

Two years before the publication of this first volume Gibbon was elected member of parliament for Liskeard (1774). His political duties did not suspend his prosecution of his history, except on one occasion, and for a little while, in 1770, when he undertook, on behalf of the ministry, a task which, if well performed, was also, it must be added, well rewarded. The French government had issued a manifesto preparatory to a declaration of war, and Gibbon was solicited by Chancellor Thurlow and Lord Weymouth, secretary of state, to answer it. In compliance with this request he produced the able Mimoire justificatif, composed in French, and delivered to the courts of Europe; and shortly afterwards he received a seat at the Board of Trade and Plantations — little more than a sinecure in itself, but with a very substantial salary of nearly £800 per annum. His acceptance displeased some of his former political associates, and he was accused of "deserting his party." In his Memoir, indeed, Gibbon denies that he had ever enlisted with the Whigs. A note of Fox, however, on the margin of a copy of The Decline and Fall records a very distinct remembrance of the historian's previous vituperation of the ministry; within a fortnight of the date of his acceptance of office, he is there alleged to have said that " there was no salvation for this country until six heads of the principal persons in administration were laid upon the table." Lord Sheffield merely

replies, somewhat weakly it must be said, that his friend never intended the words to be taken literally. More to the point is the often-quoted passage from Gibbon's letter to Deyverdun, where the frank revelation is made: " You have not forgotten that I went into parliament without patriotism and without ambition, and that

1 For a very full list of publications in answer to Gibbon's attack on Christianity reference may be made to the Bibliographer' s Manual, pp. 885-886 (1858). Of these the earliest were Watson's Apology (1776), Salisbury's Strictures (1776) and Chelsum's (anonymous) Remarks (1776). In 1778 the Few Remarks by a Gentleman (Francis Eyre), the Reply of Loftus, the Letters of Apthorpe and the Examination of Davies appeared. Gibbon's Vindication (1779) called forth a Reply by Davies (1779), and A Short Appeal to the Public by Francis Eyre (1779). Laughton's polemical treatise was published in 1780, and those of Milner and Taylor in 1781. Chelsum returned to the attack in 1785 {A Reply to Mr Gibbon's Vindication), and Sir David Dairy mple {An Inquiry into the Secondary Causes, &c.) made his first appearance in the controversy in 1786. Travis's Letters on 1 John v. 7 are dated 1784; and Spedalieri's Confutazione del- V esame del Cristianismo fatto da Gibbon was published at Rome (2 vols. 4to) in the same year. It is impossible not to concur in almost every point with Gibbon's own estimate of his numerous assailants. Their crude productions, for the most part, were conspicuous rather for insolence and abusiveness than for logic or learning. Those of Bishop Watson and Lord Hailes were the best, but simply because they contented themselves with a dispassionate exposition of the general argument in favour of Christianity. The most foolish and discreditable was certainly that of Davies; his unworthy attempt to depreciate the great historian's learning, and his captious, cavilling, acrimonious charges of petty inaccuracies and discreditable falsification gave the object of his attack an easy triumph.

all my views tended to the convenient and respectable place of a lord of trade."

In April 1781 the second and third quartos of his History were published. They excited no controversy, and were com- paratively little talked about — so little, indeed, as to have extorted from him a half murmur about " coldness and pre- judice." The volumes, however, were bought and read with silent avidity. Meanwhile public events were developing in a manner that had a considerable influence upon the manner in which the remaining years of the historian's life were spent. At the general election in 1780 he had lost his seat for Liskeard, but had subsequently been elected for

Lymington. The ministry of Lord North, however, was tottering, and soon after fell; the Board of Trade was abolished by the passing of Burke's bill in 1782, and Gibbon's salary vanished with it — no trifle, for his expenditure had been for three years on a scale somewhat disproportionate to his private fortune. He did not like to depend on statesmen's promises, which are proverbially un- certain of fulfilment; he as little liked to retrench; and he was wearied of parliament, where he had never given any but silent votes. Urged by such considerations, he once more turned his eyes to the scene of his early exile, where he might live on his decent patrimony in a style which was impossible in England, and pursue unembarrassed his literary studies. He therefore resolved to fix himself at Lausanne.

A word only is necessary on his parliamentary career. Neither nature nor acquired habits qualified him to be an orator; his late entrance on public life, his natural timidity, his feeble voice, his limited command of idiomatic English, and even, as he candidly confesses, his literary fame, were all obstacles to success. " After a fleeting, illusive hope, prudence condemned me to acquiesce in the humble station of a mute. 2 … I was not armed by nature and education with the intrepid energy of mind and voice — ' Vincentem strepitus et natum rebus agendis.' Timidity was fortified by pride, and even the success of my pen discouraged the trial of my voice." His repugnance to public life had been strongly expressed to his father in a letter of a very early date, in which he begged that the money which a seat in the House of Commons would cost might be expended in a mode more agreeable to him. Gibbon was eight-and-thirty when he entered parliament; and the obstacles which even at an earlier period he had not had courage to encounter were hardly likely

to be vanquished then. Nor had he much political sagacity. He was better skilled in investigating the past than in divining the future. While Burke and Fox and so many great statesmen proclaimed the consequences of the collision with America, Gibbon saw nothing but colonies in rebellion, and a paternal government justly incensed. His silent votes were all given on that hypothesis. In a similar manner, while he abhorred the French Revolution when it came, he seems to have had no apprehension, like Chesterfield, Burke, or even Horace Walpole, of its approach; nor does he appear to have at all suspected that it bad had anything to do with the speculations of the philosophic coteries in which he had taken such delight. But while it may be doubted whether his presence in parliament was of any direct utility to the legislative business of the country, there can be no question of the present advantage which he derived from it in the prosecution of the great work of his life — an advantage of which he was fully conscious when he wrote: " The eight sessions that I sat in parliament were a school of civil prudence, the first and most essential virtue of an historian."

Having sold all his property except his library — to him equally a necessary and a luxury — Gibbon repaired to Lausantie in September 1783, and took up his abode with his early friend ■ Deyverdun, now a resident there. Perfectly free from every engagement but those which his own tastes imposed, easy in his circumstances, commanding just as much society, and that as select, as he pleased, with the noblest scenery spread out at his feet, no situation can be imagined more favourable for the

2 In 1775 he writes to Holroyd: " I am still a mute; it is more

tremendous than I imagined ; the great speakers fill me with despair; the bad ones with terror."

prosecution of his literary enterprise; a hermit in his study as long as he chose, he found the most delightful recreation always ready for him at the threshold. " In London," says he, " I was lost in the crowd; I ranked with the first families in Lausanne, and my style of prudent expense enabled me to maintain a fair balance of reciprocal civilities. . . . Instead of a small house between a street and a stable-yard, I began to occupy a spacious and convenient mansion, connected on the north side with the city, and open on the south to a beautiful and boundless horizon. A garden of four acres had been laid out by the taste of M. Deyverdun: from the garden a rich scenery of meadows and vineyards descends to the Leman Lake, and the prospect far beyond the lake is crowned by the stupendous mountains of Savoy." In this enviable retreat, it is no wonder that a year should have been suffered to roll round before he vigorously resumed his great work — and with many men it would never have been resumed in such a paradise. We may remark in passing that the retreat was often enlivened, or invaded, by friendly tourists from England, whose " frequent incursions " into Switzerland our recluse seems half to lament as an evil. Among his more valued visitors were M. and Mme Necker; Mr Fox also gave him two welcome " days of free and private society " in 1788. Differing as they did in politics, Gibbon's testimony to the genius and character of the great statesman is highly honourable to both: " Perhaps no human being," he says, " was ever more perfectly exempt from the taint of male- volence, vanity, or falsehood."

When once fairly reseated at his task, he proceeded in this delightful retreat leisurely, yet rapidly, to its completion. The fourth volume, partly written in 1782, was completed in June 1784; the preparation of the fifth volume occupied less than two years; while the sixth and last, begun 18th May 1786, was finished in thirteen months. The feelings with which he brought his labours to a close must be described in his own inimitable words: " It was on the day, or rather night, of the 27th of June 1787, between the hours of eleven and twelve, that I wrote the last lines of the last page in a summer house in my garden. After laying down my pen, I took several turns in a berceau or covered walk of acacias, which commands a prospect of the country, the lake, and the mountains. The air was temperate, the

sky was serene, the silver orb of the moon was reflected from the waters, and all nature was silent. I will not dissemble the first emotions of joy on the recovery of my freedom,, and, perhaps, the establishment of my fame. But my pride was soon humbled, and a sober melancholy was spread over my mind by the idea that I had taken an everlasting leave of an old and agreeable companion, and that whatsoever might be the future date of my History, the life of the historian must be short and precarious."

Taking the manuscript with him, Gibbon, after an absence of four years, once more visited London in 1787; and the 51st anniversary of the author's birthday (27th April 1788) witnessed the publication of the last three volumes of The Decline and Fall. They met with a quick and easy sale, were very extensively read, and very liberally and deservedly praised for the unflagging industry and vigour they displayed, though just exception, if only on the score of good taste, was taken to the scoffing tone he continued to maintain in all passages where the Christian religion was specially concerned, and much fault was found with the indecency of some of his notes. 1

He returned to Switzerland in July 1788, cherishing vague schemes of fresh literary activity; but genuine sorrow caused by the death of his friend Deyverdun interfered with steady work, nor was it easy for him to fix on a new subject which should be at once congenial and proportioned to his powers; while the premonitory mutterings of the great thunderstorm of the French ' Revolution, which reverberated in hollow echoes even through 1 An anonymous pamphlet, entitled Observations on the three last volumes of the Roman History, appeared in 1788; Disney's Sermon, with Strictures, in 1790; and Whitaker's Review, in 179 1. With regard to the second of the above complaints, surprise will probably be felt that it was not extended to portions of the text as well as to the notes.

the quiet valleys of Switzerland, further troubled his repose. For some months he found amusement in the preparation of the delightful Memoirs (1789) from which most of our knowledge of his personal history is derived; but his letters to friends in England, written between 1788 and 1793 occasionally betray a slight but unmistakable tone of ennui. In April 1793 he un- expectedly received tidings of the death of Lady Sheffield; and the motive of friendship thus supplied combined with the pressure of public events to urge him homewards. He arrived in England in the following June, and spent the summer at Sheffield Place, where his presence was even more highly prized than it had ever before been. Returning to London early in November, he found it necessary to consult his physicians for a

symptom which, neglected since 1761, had gradually become complicated with hydrocele, and was now imperatively demand- ing surgical aid; but the painful operations which had to be performed did not interfere with his customary cheerfulness, nor did they prevent him from paying a Christmas visit to Sheffield Place. Here, however, fever made its appearance; and a removal to London (January 6, 1794) was considered imperative. Another operation brought him some relief; but a relapse occurred during the night of the 15th, and oh the following day he peacefully breathed his last. His remains were laid in the burial place of the Sheffield family, Fletching, Sussex, where an epitaph by Dr Parr describes his character and work in the language at once of elegance, of moderation and of truth.

The personal appearance of Gibbon as a lad of sixteen is brought before us somewhat dimly in M. Pavilliard's description of the " thin little figure, with a large head, disputing and arguing, with the greatest ability, all the best arguments that had ever been used in favour of popery." What he afterwards became has been made more vividly familiar by the clever silhouette prefixed to the Miscellaneous Works (Gibbon himself, at least, we know, did not regard it as a caricature), and by Sir Joshua Reynolds's portrait so often engraved. It is hardly fair perhaps to add a reference to Suard's highly-coloured description of the short Silenus-like figure, not more than 56 in. in height, the slim legs, the large turned-in feet, the shrill piercing voice; but almost every one will remember, from Croker's Boswell, Colman's account of the great historian " tapping his snuff-box, smirking and smiling, and rounding his periods " from that mellifluous mouth. It has already been seen that Gibbon's early ailments all left him on the approach of manhood; thenceforward, " till admonished by the gout," he could truly boast of an immunity well-nigh perfect from every bodily complaint; an exceptionally vigorous brain, and a stomach " almost too good," united to bestow upon him a vast capacity alike for work and for enjoyment. This capacity he never abused so as to burden his conscience or depress his spirits. " The madness of superfluous health I have never known." To illustrate the intensity of the pleasure he found alike in the solitude of his study and in the relaxations of genial social intercourse, almost any page taken at random, either from the Life or from the Letters, would suffice; and many incidental touches show that he was not a stranger to the delights of quiet contemplation of the beauties and grandeurs of nature. His manners, if formal, were refined; his conversation, when he felt himself at home, interesting and unaffected; and that he was capable alike of feeling and

inspiring a very constant friend- ship there are many witnesses to show. That his temperament at the same time was frigid and comparatively passionless cannot be denied; but neither ought this to be imputed to him as a fault; hostile criticisms upon the grief for a father's death, that " was soothed by the conscious satisfaction that I had discharged all the duties of filial piety," seem somewhat out of place. His most ardent admirers, however, are constrained to admit that he was deficient in large-hearted benevolence; that he was destitute of any " enthusiasm of humanity "; and that so far as every sort of religious yearning or aspiration is concerned, his poverty was almost unique. Gibbon was such a man as Horace might have been, had the Roman Epicurean

been fonder of hard intellectual work, and less prone than he was to the indulgence of emotion. (H. Ro. ; J. S. Bl.)

Gibbon's literary art, the sustained excellence of his style, his piquant epigrams and his brilliant irony, would perhaps not secure for his work the immortality which it seems likely to enjoy, if it were not also marked by ecumenical grasp, extra- ordinary accuracy and striking acuteness of judgment. It is needless to say that in many points his statements and conclu- sions must now be corrected. He was never content with secondhand accounts when the primary sources were accessible; " I have always endeavoured," he says, " to draw from the fountainhead; my curiosity, as well as a sense of duty, has always urged me to study the originals; and if they have sometimes eluded my search, I have carefully marked the secondary evidence on whose faith a passage or a fact were reduced to depend." Since he wrote, new authorities have been discovered or rendered accessible; works in Greek, Latin, Slavonic, Armenian, Syriac, Arabic and other languages, which he was unable to consult, have been published. Again, many of the authorities which he used have been edited in superior texts. The relative weights of the sources have been more nicely determined by critical investigation. Archaeology has become a science. In the immense region which Gibbon surveyed there is hardly a section which has not been submitted to the microscopic examination of specialists.

But apart from the inevitable advances made in the course of a century during which historical research entered upon a new phase, the reader of Gibbon must be warned against one capital defect. In

judging the Decline and Fall it should carefully be observed that it falls into two parts which are heterogeneous in the method of treatment. The first part, a little more than five-eighths of the work, supplies a very/«// history of 460 years (a.d. 180-641); the second and smaller part is a summary history of about 800 years (a.d. 641-1453) in which certain episodes are selected for fuller treatment and so made prominent. To the first part unstinted praise must be accorded; it may be said that, with the materials at the author's disposition, it hardly admitted of improvement, except in trifling details. But the second, notwithstanding the brilliancy of the narrative and the masterly art in the grouping of events, suffers from a radical defect which renders it a misleading guide. The author designates the story of the later empire at Constantinople (after Heraclius) as " a uniform tale of weakness and misery," a judgment which is entirely false; and in accordance with this doctrine, he makes the empire, which is his proper subject, merely a string for connecting great movements which affected it, such as the Saracen conquests, the Crusades, the Mongol invasions, the Turkish conquests. He failed to bring out the momentous fact that up to the 1 2th century the empire was the bulwark of Europe against the East, nor did he appreciate its importance iii preserving the heritage of Greek civilization. He compressed into a single chapter the domestic history and policy of the emperors from the son of Heraclius to Isaac Angelus; and did no justice to the remarkable ability and the indefatigable industry shown in the service of the state by most of the sovereigns from Leo III. to Basil II. He did not penetrate into the deeper causes underlying the revolutions and palace intrigues. His eye rested only on superficial characteristics which have served to associate the name " Byzantine " with treachery, cruelty, bigotry and decadence. It was reserved for Finlay to depict, with greater knowledge and a juster perception, the lights and shades of Byzantine history. Thus the later part of the Decline and Fall, while the narrative of certain episodes will always be read with profit, does not convey a true idea of the history of the empire or of its significance in the history of Europe. It must be added that the pages on the Slavonic peoples and their relations to the empire are conspicuously insufficient; but it must be taken into account that it was not till many years after Gibbon's death that Slavonic history began to receive due attention, in consequence of the rise of competent scholars among the Slavs themselves.

The most famous chapters of the Decline and Fall are. the

fifteenth and sixteenth, in which the historian traces the early progress of Christianity and the policy of the Roman government

towards it. The flavour of these chapters is due to the irony which Gibbon has employed with consummate art and felicity. There was a practical motive for using this weapon. An attack on Christianity laid a writer open to prosecution and penalties under the statutes of the realm (9 and 10 William III. c. 22, still unrepealed). Gibbon's stylistic artifice both averted the peril of prosecution and rendered the attack more telling. In his Autobiography he alleges that he learned from the Provincial Letters of Pascal " to manage the weapon of grave and temperate irony, even on subjects of ecclesiastical solemnity." It is not easy, however, to perceive much resemblance between the method of Pascal and that of Gibbon, though in particular passages we may discover the influence which Gibbon acknow- ledges. For instance, the well-known description (in chap, xlvii.) of the preposition " in " occurring in a theological dogma as a " momentous particle which the memory rather than the understanding must retain " is taken directly from the first Provincial Letter. The main points in the general conclusions of these chapters have been borne out by subsequent research. The account of the causes of the expansion of Christianity is chiefly to be criticized for its omissions. There were a number of important contributory conditions (enumerated in Harnack's Mission und Ausbreitung des Christentums) which Gibbon did not take into account. He rightly insisted on the facilities of communication created by the Roman empire, but did not emphasize the diffusion of Judaism. And he did not realize the importance of the kinship between Christian doctrine and Hellenistic syncretism, which helped to promote the reception of Christianity. He was ignorant of another fact of great importance (which has only in recent years been fully appreciated through the researches of F. Cumont), the wide diffusion of the Mithraic religion and the close analogies between its doctrines and those of Christianity. In regard to the attitude of the Roman government towards the Christian religion, there are questions still sub judice; but Gibbon had the merit of reducing the number of martyrs within probable limits.

Gibbon's verdict on the history of the middle ages is contained in the famous sentence, " I have described the triumph of barbarism and religion." It is important to understand clearly the criterion which he applied; it is frequently misapprehended. He was a son of the 18th century; he had studied with sym- pathy Locke and Montesquieu; no one appreciated more keenly than he did political liberty and the freedom of an Englishman. This is illustrated by his love of Switzerland, his intense interest in the fortunes of that country, his design of writing " The History of the Liberty of the Swiss " — a

theme, he says " from which the dullest stranger would catch fire." Such views and sentiments are incompatible with the idealization of a benevolent despotism. Yet in this matter Gibbon has been grossly misappre- hended and misrepresented. For instance, Mirabeau wrote thus to Sir Samuel Romilly: " I have never been able to read the work of Mr Gibbon without being astounded that it should ever have been written in English; or without being tempted to turn to the author and say, 'You an Englishman? No, indeed.' That admiration for an empire of more than two hundred millions of men, where not one had the right to call himself free; that effeminate philosophy which has more praise for luxury and pleasures than for all the virtues; that style always elegant and never energetic, reveal at the most the elector of Hanover's slave." This criticism is based on a perverse misreading of the historian's observations on the age of Trajan, Hadrian and the Antonines. He enlarges, as it was his business to do, on the tranquillity and prosperity of the empire in that period, but he does not fail to place his finger on the want of political liberty as a fatal defect. He points out that under this benevolent despotism, though men might be happy, their happiness was unstable, because it de- pended on the character of a single man; and the highest praise he can give to those virtuous princes is that they " deserved the honour of restoring the republic, had the Romans of their days been capable of a rational freedom." The criterion by which

Gibbon judged civilization and progress was the measure in which the happiness of men is secured, and of that happiness he con- sidered political freedom an essential condition. He was essenti- ally humane; and it is worthy of notice that he was in faxour of the abolition of slavery, while humane men like his friend Lord Sheffield, Dr Johnson and Boswell were opposed to the anti- slavery movement.

Bibliography. — Of the original quarto edition of The Decline and Fall, vol. i. appeared, as has already been stated, in 1776, vols. ii. and iii. in 1781 and vols, iv.vi. (inscribed to Lord North) in 1788. In later editions vol. i. was considerably altered by the author; the others hardly at all. The number of modern reprints has been very considerable. For many years the most important and valuable English edition was that ot Milman (1839 and 1845), which was reissued with many critical additions by Dr W. Smith (8 vols. 8vo,

1854 and 1872). This has now been superseded by the edition, with copious notes, by Professor J. B. Bury (7 vols. 8vo, 1896 1900). The edition in Bohn's British Classics (7 vols., 1853) deserves mention. See also the essay on Gibbon in Sir Spencer Wal pole's Essays and Biographies (1907). As a curiosity of literature Bowdler's edition, " adapted to the use of families and young persons," by the expurgation of " the indecent expressions and all allusions of an improper tendency " (5 vols. 8vo, 1825), may be noticed. The French translation of Le Clerc de Septchenes, continued by D6- meunier, Boulard and Cantwell (1788-1795), has been frequently reprinted in France. It seems to be certain that the portion usually attributed to Septch6nes was, in part at least, the work of his dis- tinguished pupil, Louis XVI. A new edition of the complete trans- lation, prefaced by a letter on Gibbon's life and character, from the pen of Suard, and annotated by Guizot, appeared in 1812 (and again in 1828). There are at least two German translations of The Decline and Fall, one by Wenck, Schreiter and Beck (1805- 1807), and a second by Johann C. Sporschil (1837, new ed. 1862). The Italian translation (alluded to by Gibbon himself) was, along with Spedalieri's Confulazione, reprinted at Milan in 1823. There is a Russian trans- lation by Neviedomski (7 parts, Moscow, 1883-1886), and an Hun- garian version of cc. 1-38 by K. Hegyessy (Pest, 1 868-1 869). Gibbon's Miscellaneous Works, with Memoirs of his Lift and Writings, composed by himself; illustrated from his Letters, with occasional Notes and Narrative, published by Lord Sheffield in two volumes in 1796, has been often reprinted. The new edition in five volumes (1814) contained some previously unpublished matter, and in particular the fragment on the revolutions of Switzerland. A French translation of the Miscellaneous Works by Marigne appeared at Paris in 1798. There is also a German translation (Leipzig, 1801). It may be added that a special translation of the chapter on Roman Law (Gibbon's historische Ubersicht des romischen Rechts) was published by Hugo at Gottingen in 1839, and has frequently been used as a text-book in German universities. This chapter has also appeared in Polish (Cracow, 1844) and Greek (Athens, 1840). The centenary of Gibbon's death was celebrated in 1894 under the auspices of the Royal Historical Society : Proceedings of the Gibbon Commemoration, 1794-1894, by R. H. T. Ball (1895). (J. B. B.)

GIBBON, the collective title of the smaller man-like apes of the Indo-Malay countries, all of which may be included in the single genus Hylobates. Till recently these apes have been generally included in the same family (Simiidae) with the chimpanzee, gorilla and orang-utan, but they are now regarded by several naturalists as

representing a family by themselves — the Hylobatidae. One of the distinctive features of this family is the presence of small naked callosities on the buttocks; another being a difference in the number of vertebrae and ribs as compared with those of the Simiidae. The extreme length of the limbs and the absence of a tail are other features of these small apes, which are thoroughly arboreal in their habits, and make the woods resound with their unearthly cries at night. In agility they are unsurpassed; in fact they are stated to be so swift in their movements as to be able to capture birds on the wing with their paws. When they descend to the ground — which they must often do in order to obtain water — they frequently walk in the upright posture, either with the hands crossed behind the neck, or with the knuckles resting on the ground. Their usual food consists of leaves and fruits. Gibbons may be divided into two groups, the one represented by the siamang, Hylobates (Symphalangia) syndactylus, of Sumatra and the Malay Peninsula, and the other by a number of closely allied species. The union of the index and middle fingers by means of a web extending as far as the terminal joints is the distinctive feature of the siamang, which is the largest of the group, and black in colour with a white frontal band. Black or puce-grey is the prevailing

colour in the second group, of which the hulock (H. hulock) of

Assam, H. lar of Arakan and Pegu, H. entelloides of Tenasserim (fig.), and H. agilis of Sumatra are well-known representatives. A female of the Hainan gibbon (H. hainanus) in confinement changed from uniform sooty-black (without the white frontal

The Tenasserim Gibbon (Hylobates entelloides).

band of the black phase of the hulock) to puce-grey; but it is probable that this was only an individual, or at most a sexual, peculiarity. The range of the genus extends from the southern bank of the Bramaputra in Assam to southern China, the Malay Peninsula, Java, Sumatra and Borneo. (R. L.)*

GIBBONS, GRINLING (1648-1721), English wood-carver, was born in 1648, according to some authorities of Dutch parents at Rotterdam, and according to others of English parents at London. By the former he is said to have come to London after the great fire in 1666. He early displayed great cleverness and ingenuity in his art, on the strength of which he was recommended by Evelyn to Charles II., who employed him in the execution both of statuary and of ornamental carving in wood. In the early part of the 18th century he

worked for Sir Christopher Wren. In statuary one of his principal works is a life-size bronze statue in the court of Whitehall, representing James II. in the dress of a Roman emperor, and he also designed the base of the statue of Charles I. at Charing Cross. It is, however, chiefly as a sculptor in wood that he is famous. He was employed to execute the ornamental carving for the chapel at Windsor, the foliage and festoons in the choir of St Paul's, the baptismal fonts in St James's, and an immense quantity of ornamental work at Burleigh, Chatsworth, and other aristocratic mansions. The finest of all his productions in this style is believed to be the ceiling which he devised for a room at Petworth. His subjects are chiefly birds, flowers, foliage, fruit and lace, and many of his works, for delicacy and elaboration of details, and truthfulness of imitation, have never been surpassed. He, however, some- times wasted his ingenuity on trifling subjects; many of his flowers used to move on their stems like their natural prototypes when shaken by a breeze. In 17 14 Gibbons was appointed master carver in wood to George I. He died at London on the 3rd of August 1 721.

GIBBONS, JAMES (1834-), American Roman Catholic cardinal and archbishop, was born in Baltimore, Maryland, on the 23rd of July 1834, and was educated at St Charles College, Ellicott City, Maryland, and St Mary's Seminary, Baltimore, where he finished his theological training and was ordained priest

on the 30th of June 1861. After a short time spent on the missions of Baltimore, he was called to be secretary to Arch- bishop Martin J. Spalding and assistant at the cathedral. When in 1866 the Second Plenary Council of Baltimore considered the matter of new diocesan developments, he was selected to organize the new Vicariate Apostolic of North Carolina; and was con- secrated bishop in August 1868. During the four successful years spent in North Carolina he wrote, for the benefit of his mission work, The Faith of our Fathers, a brief presentation of the doctrines of the Roman Catholic Church, especially intended to reach Protestants; the books passed through more than forty editions in America and about seventy in England, and an answer was made to it in Faith of our Forefathers (1879), by Edward J. Stearns. Gibbons was transferred to the see of Richmond, Virginia, in 1872, and in 1877 was made coadjutor, with the right of succession, to the Archbishop (James R. Bayley) of Baltimore. In October of the same year he succeeded to the archbishopric. Pope

Leo XIII. in 1883 selected him to preside over the Third Plenary Council in Baltimore (1884), and on the 30th of June 1886 created him a cardinal priest, with the title of Santa Maria Trastevere. His simplicity of life, foresight and prudence made him a power in the church. Thoroughly American, and a lover of the people, he greatly altered the atti- tude of the Roman Catholic Church toward the Knights of Labor and other labour organizations, and his public utterances dis- played the true instincts of a popular leader. He contributed frequently to periodicals, but as an author is known principally by his works on religious subjects, including Our Christian Heritage (1889) and The Ambassador of Christ (1896). For many years an ardent advocate of the establishment of a Catholic university, at the Third Plenary Council of Baltimore (1884) he saw the realization of his desires in the establish- ment of the Catholic University of America at Washington, of which he became first chancellor and president of the board of trustees.

GIBBONS, ORLANDO (1583-1625), English musical composer, was the most illustrious of a family of musicians all more or less able. We know of at least three generations, for Orlando's father, William Gibbons, having been one of the waits of Cam- bridge, may be assumed to have acquired some proficiency in the art. His three sons and at least one of his grandsons inherited and further developed his talent. The eldest, Edward, was made bachelor of music at Cambridge, and successively held important musical appointments at the cathedrals of Bristol and Exeter; Ellis, the second son, was organist of Salisbury cathedral, and is the composer of two madrigals in the collection known as the The Triumphs of Oriana. Orlando Gibbons, the youngest and by far the most celebrated of the brothers, was born at Cambridge in 1583. Where and under whom he studied is not known, but in his twenty-first year he was sufficiently advanced and cele- brated to receive the important post of organist of the Chapel Royal. His first published composition " Fantasies in three parts, composed for viols," appeared in 1610. It seems to have been the first piece of music printed in England from engraved plates, or " cut in copper, the like not heretofore extant." In 1622 he was created doctor of music by the university of Oxford. For this occasion he composed an anthem for eight parts, Oclap your Hands, still extant. In the following year he became organist of Westminster Abbey. Orlando Gibbons died before the beginning of the civil war, or it may be supposed that, like his eldest brother, he would have been a staunch royalist. In a different sense, however, he died in the cause of his master; for having been summoned to Canterbury to produce a com- position written in celebration of Charles's marriage,

he there fell a victim to smallpox on the 5th of June 1625.

For a full list of his compositions, see Grove's Dictionary of Music. His portrait may be found in Hawkins's well-known History. His vocal pieces, madrigals, motets, canons, &c, are admirable, and prove him to have been a great master of pure polyphony. We have also some specimens of his instrumental music, such as the six pieces for the virginals published in Parthenia, a collection of in- strumental music produced by Gibbons in conjunction with Dr Bull and Byrd.

GIBBS, JOSIAH WILLARD (1839-1903), American mathe- matical physicist, the fourth child and only son of Josiah Willard Gibbs (1790-1861), who was professor of sacred literature in Yale Divinity School from 1824 till his death, was born at New Haven on the nth of February 1839. Entering Yale College in 1854 he graduated in 1858, and continuing his studies there was appointed tutor in 1863. He taught Latin in the first two years, and natural philosophy in the third. He then went to Europe, studying in Paris in 1866-1867, in Berlin in 1867 and in Heidelberg in 1868. Returning to New Haven in 1869, he was appointed professor of mathematical physics in Yale College in 1871, and held that position till his death, which occurred at New Haven on the 28th of April 1903. His first contributions to mathematical physics were two papers published in 1873 in the Transactions of the Connecticut Academy on " Graphical Methods in the Thermodynamics of Fluids," and " Method of Geometrical Representation of the Thermodynamic Properties of Substances by means of Surfaces." His next and most im- portant publication was his famous paper " On the Equilibrium of Heterogeneous Substances " (in two parts, 1876 and 1878), which, it has been said, founded a new department of chemical science that is becoming comparable in importance to that created by Lavoisier. This work was translated into German by W. Ostwald (who styled its author the " founder of chemical energetics ") in 1891 and into French by H. le Chatelier in 1899. In 1.881 and 1884 he printed some notes on the elements of vector analysis for the use of his students; these were never formally published, but they formed the basis of a text-book on Vector Analysis which was published by his pupil, E. B. Wilson, in 1901. Between 1882 and 1889 a series of papers on certain points in the electromagnetic theory of light and its relation to the various elastic solid theories appeared in the American Journal of Science, and his last work, Elementary Principles in Statistical Mechanics, was issued in 1902. The name of Willard Gibbs, who was the most distinguished American mathematical physicist of his day, is especially associated with the " Phase Rule," of which some account, will be found in the

article Energetics. In 1901 the Copley medal of the Royal Society of London was awarded him as being " the first to apply the second law of thermodynamics to the exhaustive discussion of the relation between chemical, electrical and thermal energy and capacity for external work."

A biographical sketch will be found in his collected Scientific Papers (2 vols,, 1906).

GIBBS, OLIVER WOLCOTT (1822-1908), American chemist, was born at New York on the 21st of February 1822. His father, Colonel George Gibbs, was an ardent mineralogist; the mineral gibbsite was named after him, and his collection was finally bought by Yale College. Entering Columbia College in 1837, Wolcott (the Oliver he dropped at an early date) graduated in 1841, and, having assisted Robert Hare at Penn- sylvania University for several months, he next entered the College of Physicians and Surgeons in New York, qualifying as a doctor of medicine in 1845. Leaving America he studied in Germany with K. F. Rammelsberg, H. Rose and J. von Liebig, and in Paris with A. Laurent, J.B. Dumas, and H. V. Regnault, returning in 1848. In that year he became professor of chemistry at the Free Academy, now the College of the City of New York, and in 1863 he obtained the Rumford professorship in Harvard University, a post retained until his retirement in 1887 as pro- fessor emeritus. He died on the 9th of December 1908. Gibbs' researches were mainly in analytical and inorganic chemistry, the cobaltammines, platinum metals and complex acids being especially investigated. He was an excellent teacher, and contributed many articles to scientific journals.

See the Memorial Lecture by F. W. Clarke in the J.C.S. (1909), p. 1299.

GIBEON, a town in Palestine whose inhabitants wrested a truce from Joshua by a trick (Josh, ix., x.); where the champions of David fought those of Ish-bosheth (2 Sam. ii. 12-32); where Joab murdered Amasa (ib. xx. 8-10); and where Johanan went against Ishmael to avenge the murder of Gedaliah (Jer. xli. 12).

Here was an important high place (i Kings iii. 4) where for a time the tabernacle was deposited (2 Chron. i. 3). The present name is El- J

lb; this is a small village about 5 m. N.W. of Jerusalem, standing on an isolated hill above a fiat corn valley. The village is famous for its springs, and the reputation seems ancient (cf. 2 Sam. ii. 13; Jer. xli. 12). The principal spring issues from under a cliff on the south-east side of the hill, and the water runs to a reservoir lower down. The sides of the hill are rocky, and remarkable for the regular stratification of the limestone, which gives the hill at a distance the appear- ance of being terraced. Scattered olive groves surround the place. (R. A. S. M.)

GIBEONITES, the inhabitants of Gibeon, an Amorite or Hivite stronghold, the modern El-Jib, 5 m. N.W. from Jerusalem. According to Joshua xviii. 2 5 it was one of the cities of Benjamin. When the Israelites, under Joshua, invaded Canaan, the Gibeonites by a crafty ruse escaped the fate of Jericho and Ai and secured protection from the invaders (Joshua ix.). Cheyne thinks this story the attempt of a later age to explain the long independence of Gibeon and the use of the Gibeonites as slaves in Solomon's temple. An attempt on the part of Saul to exter- minate the clan is mentioned in 2 Sam. xxi., and this slaughter may possibly be identified with the massacre at Nob recorded in 1 Sam. xxii. 17-19 (see Ency. Bib. col. 1717), The place is also associated with the murders of Asahel (2 Sam. ii. 12), Amasa (2 Sam. xx. 8) and Gedaliah (Jer. xli. 12), and with the wrathful intervention of Yahweh referred to by Isaiah (xxviii. 21), which we may identify with the memorable victory of David over the Philistines recorded in 2 Sam. v. 25 (reading Gibeon for Geba). Gibeon was the seat of an old Canaanitish sanctuary afterwards used by the Israelites; it was here that Solomon, immediately after his coronation, went to consult the oracles and had the dream in which he chose the gift of wisdom (1 Kings iii.).

GIBRALTAR, a British fortress and crown colony at the western entrance to the Mediterranean. The whole territory is rather less than 3 m. in length from north to south and varies in width from \ to \ m. Gibraltar is called after Tariq (or Tarik) ben Zaid, its name being a corruption of Jebel Tariq (Mount Tariq). Tariq invaded Andalusia in a.d. 711 with an army of 12,000 Arabs and Berbers, and in the last days of July of that year destroyed the Gothic power in a three days' fight on the banks of the river Guadalete near where Jerez de la Frontera now stands. In order to secure his communications with Africa he ordered the building of a strong castle upon the Rock, known to the Romans as Mons Calpe. This work, begun in the year of the great battle, was completed in 742. It covered a wide area, reaching from the shores of the bay to a point half-way up the north- western slope of the rock; here the keep, a

massive square tower, still stands and is known as the Moorish castle.

The Rock itself is about i\ m. in length, and at its northern end rises almost perpendicularly from the strip of flat sandy ground which connects it with the Spanish mainland. At the north end, on the crest of the Rock 1200 ft. above sea-level, is the Rock gun, famous in the great siege. Some six furlongs to the south is the signal station (1255 ft.), through which the names and messages of passing ships are cabled to all parts of the world. Rather less than \ m. south of the signal station is O'Hara's Tower(i4o8ft.),thehighestpointof theRock. Southof O'Hara's Tower the ground falls steeply to Windmill Hill, a fairly even surface about \ of a sq. m. in area, and sloping from 400 to 300 ft. above the sea-level. South of Windmill Hill are Europa Flats, a wall-like cliff 200 ft. or more in height dividing them. Europa Flats, sloping south, end in cliffs 50 ft. high, which at and around Europa Point plunge straight down into deep water. Europa Point is the most southern point of the Rock, and is distant n| nautical miles from the opposite African coast. On Europa Point is the lighthouse in 5° 21′ W. and 36° 6′ 30″ N. On the Mediterranean side the Rock is almost as steep and inaccessible as it is from the north. Below the signal station, at the edge of the Mediterranean, lies Catalan Bay, where there is a little village chiefly inhabited by fishermen and others who make their living upon the waters; but Catalan Bay can only be approached

by land from the north or by a tunnel through the Rock from the dockyard; from Catalan Bay to Europa Point the way is barred by impassable cliffs. On the west side of the Rock the slopes are less steep, especially as they near the sea, and on this side lie the town, the Alameda or public gardens, the barracks and the dockyard. Geology. — The rock of Gibraltar consists, for the most part, of pale grey limestone of compact and sometimes crystalline structure, generally stratified but in places apparently amorphous. Above the limestone are found layers of dark grey-blue shales with intercalated beds of grit, mudstone and limestone. Both limestone and shales are of the Lower Jurassic age. Professors A. C. Ramsay and James

Neutral Ground I ?, T- HE.-BR ;>. /

GIBRALTAR

HMiie

1. Convent a. Cathedral 3. Garrison Library ; 4. Civil Hospital

5. Court House

6. Exchange

7. Presbyterian Church

8. Westeuan Church

"Lighthouse turopa Point

Emery Walker sc.

Geikie (Quarterly Journal of the Geological Society, London, August 1878) found also in the superficial formations of the Rock various features of interest to the students of Pleistocene geology, including massive accumulations of limestone breccia or agglomerate, bone breccias, deposits of calcareous sandstone, raised beaches and loose sands. The oldest of these superficial formations is the limestone breccia of Buena Vista, devoid of fossils and apparently formed under the stress of hard frosts, indicating conditions of climate of great severity. To account for frosts like these, it is suggested that the surface of the Rock must have been raised to an elevation much greater than its present height. In that case Europe and Africa would probably have been connected by an isthmus across some part of the present site of the Straits, and there would have been a wider area of low ground round the base of the Rock. The low ground at this, and probably at a later period, must have been clothed with a rich vegetation, necessary for the support of a varied mammalian fauna, whose remains have been found in the Genista caves. After this there would seem to have been a subsidence to a depth of some

700 ft. below the existing level. This would account for the ledges and platforms which have been formed by erosion of the sea high above the present sea-level, and for the deposits of calcareous sandstone containing sea shells of existing Mediterranean species. The extent of some of these eroded ledges shows that pauses of long duration intervened between the periods of depression. The Rock seems after this to have been raised to a level considerably above that at which it now stands; Europe and Africa would then again have been united. At a later date still the Rock sank once more to its present level.

Many caves, some of them of great extent, penetrate the interior of the rock ; the best known of these are the Genista and St Michael's caves. St Michael's cave, about 1 100 ft. above sea-level at its mouth, slopes rapidly down and extends over 400 ft. into the Rock; its extreme limits have not, however, been fully explored. It consists of a series of five or more chambers of considerable extent, connected by narrow and crooked passages. The outermost cave is 70 ft. in height and 200 in length, with massive pillars of stalactite reaching from roof to floor. The second cave was named the Victoria cave by its discoverer Capcain Brome; beyond these are three caves known as the Leonora caves. " Nothing," writes Captain Brome, " can exceed the beauty, of the stalactites; they form clusters of every imaginable shape — statuettes, pillars, foliages, figures," and he adds that American visitors have admitted that even the Mammoth cave itself could not rival these giant stalactites in picturesque beauty. The mammalian remains of the Genista cave have been described by G. Busk (" Quaternary Fauna of Gibraltar " in Trans, of Zool. Soc. vol. x. p. 2, 1877). They were found to contain remains of a bear, probably Ursus fossilis of Goldf uss ; of a hyena, H. crocuta or spclaea; of cats varying from a leopard to a wild cat in size; of a rhinoceros, resembling in species remains found in the Thames valley; two forms of ibex; the hare and rabbit. No trace has been found as yet of Rhinoceros tichorinus, of Ursus spelaeus or of the reindeer; and of the elephant only a molar tooth of Elephas antiquus. Further details may be found in the Quarterly Journ. of Geol. Soc. (James Smith of Jordanhill), vol. ii. and in vol. xxi. {Fossil Contents of the Genista Cave, G. Busk and Hugh Falconer; reprinted in P alaeontological Memoirs, H. Falconer, London, 1868).

Flora. — The upper part of the Rock is in summer burnt up and brown, but after the first autumn rains and during the winter, spring and early summer, it abounds in wild flowers and shrubs. In the public and other gardens on the lower ground, where there is a greater depth of soil, the vegetation is luxuriant and is only limited by the supply of water available for summer irrigation. Dr E. F. Kelaart {Flora Calpensis, London, 1846) enumerates more than four hundred varieties of plants and ferns indigenous to Gibraltar, and about fifty more which have been introduced from abroad. Of the former a few are said to be species peculiar to the Rock. The stone-pine and wild-olive are perhaps the only trees found growing in a natural state. In the public and private gardens and by the roadside may be seen the pepper tree, the plane, the white poplar, the acacia, the bella-sombra {Phytolacca dioica), the eucalyptus or blue gum tree, and palms of different species; and, of fruit trees, the orange,

lemon, fig, pomegranate, loquat and almond. The aloe, flowering aloe and prickly pear are common, and on the eastern side of the Rock the palmito or dwarf palm {Chamaerops humilis) is abundant. Fauna. — The fauna of Gibraltar, from want of space, is necessarily scanty. The Barbary apes, said to be the only wild monkeys in Europe, are still to be found on the upper part of the Rock, but in very reduced numbers; about the beginning of the 20th century four or five only remained, which were said to be all females; a young male, however, was brought from Africa. The last male of the original stock, an old patriarch, who had died shortly before this, is believed to have killed and, it is said, eaten all the young ones. A small variety of pigeon breeds in the steep cliffs at the north end of the Rock. A few red-legged partridges, some rabbits, two or three foxes and a badger or two will complete the list.

Climate. — The climate of Gibraltar is pleasant and healthy, mild in winter, and only moderately hot in summer; but the heat, though not excessive, is lasting. The three months of June, July and August are almost always without rain, and it is not often that rain falls in the months of May and September. The first autumn rains, however, which sometimes begin in September, are usually heavy. From October to May the climate is for the most part delightful, warm sunshine prevailing, tempered by cool breezes; the spells of bad weather, although blustering enough at times, are seldom of more than a few days' duration. The thermometer in summer does not often reach 90 F. in the shade ; from 83 to 85 may be taken to be the average maximum for July and August, and these are the hottest months of the year. The average yearly rainfall is 34-4 in., and in fifty years from 1857 to 1906 the greatest recorded rainfall was 59-35 in., and the smallest 16-75 in. The water-supply for drinking and cooking purposes is almost wholly derived from rain-water stored chiefly in underground tanks; there are very few good

wells. Many of the better class of houses have their own rain- water tanks, and there are large tanks belonging to the naval and military authorities. Large storage tanks have been con- structed by the sanitary commissioners with specially prepared collecting areas high up the Rock. The collecting areas cover 16 acres, and the storage tanks have a capacity of over six million gallons. The tanks are excavated in the solid rock, whereby the water is kept in the dark and cool. A large quantity of brackish water for flushing purposes and baths is pumped from the sandy flats of the north front on the Spanish side of the Rock. The Town. — The modern town of Gibraltar is of comparatively recent date, nearly all the older buildings having been destroyed during the great siege (1779-1783).

The town lies, with most of its buildings crowded together, at the north-western corner of the Rock, and covers only about one-ninth part of the whole area; only a small part of it is on level ground, and those of its narrow streets and lanes which are at right angles to the line wall, or sea front, are for the most part, except at their western ends, little more than ramps or rough stairs formed of rubble stones, contracting in places into stone steps.

The public buildings present few, if any, features of general interest. The " Convent " rebuilt upon the remains of an old Franciscan monastery is the official residence of the governor. The Anglican cathedral is a poor imitation of Moorish archi- tecture. The garrison library has excellent reading rooms and a large number of volumes of miscellaneous interest. The civil hospital is a well-planned and roomy modern building. The court- house and exchange buildings are suited to the needs of the town. The antiquary may here and there find the remains of a Moorish bath forming part of a stable, or fragments of a sculptured stone gateway bearing the arms of Castile or of Aragon built into the wall of a modern barrack. In a small disused graveyard, near Southport gate, lie buried a number of those who fell at Trafalgar. To the south of the town are the Alameda parade and gardens, a lunatic asylum, the dockyard, graving docks and the naval and military hospitals.

Population. — The inhabitants of Gibraltar are of mixed race; after the capture of the town by the British nearly the whole of the former Spanish population emigrated in a body and founded, 6 m. away, the little town of San Roque. Most of the native inhabitants are of Italian or Genoese descent; there are also a number of Maltese, and between two and three thousand Jews. The Jews never intermarry with other races and form a distinct society of their own. The language of the people is Spanish, not very correctly spoken. English is learnt as a foreign language and is rarely, if ever, spoken by the people in their own homes. Gibraltar being primarily a fortress and naval base, every effort, in view of war contingencies, is made by the authorities to prevent the natural increase of the population. Sanitary and building regulations, modelled upon English statutes designed with quite different objects, are administered with some ingenuity and not a little severity. In this way the house room available for the poorer classes is steadily reduced. The poor are thus being gradually pushed across the frontier into the neighbouring Spanish town of La Linea de la Concepcion, itself a mere suburb of Gibraltar, whose population, however, is nearly double that of the parent city. A large army of workers come daily from " the Lines " into Gibraltar, returning at " first evening gunfire " shortly after

sunset, at which time the gates are closed and locked for the night. Aliens are not allowed to reside in Gibraltar without a special permit, which must be renewed at short in- tervals. By an order in council, taking effect from November 1900, the like disabilities were extended to British subjects not previously resident.

The recorded births, marriages and deaths over a period of 23 years are as follows : — E

Yearly Average.

Births.

Marriages.

Deaths.

1 883-1 885 . . 1886-1890 . . 1891-1895 . . 1 896- 1 900 . 1901-1905 . .

621 603 626 641 629

177 167 186 201 201

513

5H

460 498 472

94°

GIBRALTAR

The numbers of the population from causes which have been referred to are almost stationary, showing a slight tendency to decrease. There are no available statistics later than those of a census taken in 1901, from which it appeared that the population then numbered 27,460, of whom the garrison and its families amounted to 6595, the civil population, being British subjects, to 17,818, and aliens resident under permits to 3047. The latter are chiefly working men and domestic servants.

Constitution. — Gibraltar is a crown colony. Of local govern- ment properly so called there is none. There is a sanitary commission which is vested with large powers of spending and with the control of buildings and streets and other matters managed by local authorities

in England. Its members are appointed by the governor. An appeal from their decisions, so far as they affect individuals, lies to the supreme court. Apart from the garrison and civil officials there are comparatively few members of the Anglican Church. The great majority of the people belong to the Church of Rome. The Jews have four synagogues. The Protestant dissenters have two places of worship, Presbyterian and Wesleyan. Education is not compulsory for the civil population, but most of the children, if not all, receive a fair education in private or private aided schools. The number of the children on the rolls of the private and private aided schools was in 1905: boys, 1504; girls, 1733; total 3237.

Commerce. — Except in respect of alcoholic liquors and tobacco Gibraltar has been a free port since the year 1705 — a distinction due, it is said, to the refusal of a sultan of Morocco to allow of much- needed exports from Morocco to Gibraltar if full liberty of trade were not granted to his subjects. During the great wars of the beginning of the 19th century trade was most active in Gibraltar, and some large fortunes were made; but trade on a large scale has almost disappeared. At the point of contact of two continents, on the direct line of ocean trade with the far East, in regular steam communication with all the great ports of Europe and with North and South America, Gibraltar, by its position, is fitted to be a trade centre of the world, but the unrest and suspicion engendered in Morocco by the intrigues and designs of the European powers, and excessive protective duties and maladministration in Spain, have done much to extinguish the trade of Gibraltar. There are, however, no trustworthy statistics of imports and exports. Before the year 1898 wine, beer and spirits were the only goods which paid duty. In that year a duty of id. per lb was for the first time put upon tobacco and produced £1444; the duty was, however, in force only for a part of the year; in 1899 the duty, at the same rate, produced £7703, In 1902 the duty on tobacco was raised to 2d. per lb and produced £29,311. In 1905 this duty produced £24,575. The chief business of Gibraltar is the coaling of passing steamers; this gives work to several thousand men. Goods are also landed for re- export to Morocco, but the bulk of the Morocco trade, much of which formerly came to Gibraltar, is now done by lines of steamers trading to and from Morocco direct to British, German or French ports. Nearly all the fresh meat consumed in Gibraltar comes from Morocco, also large quantities of poultry and eggs. A fair amount of retail business is done with the passengers of ocean steamers which call on their way to and from the East and from North and South America.

The steam- tonnage cleared annually since 1883 is shown in the

following table : —

Yearly Average.

British.

Foreign.

Total.

1 883-1 885 . . 1 886-1 890 . . 1 891-1895 . . 1896-1900 . 1901-1905 . .

3,525,135

4,507,ioi

3,710,856 3,281,165 2,810,849

817,926

908,419

975,390

1,063,367

1,309,649

4,343,061 5,415,520 4,686,246 4,344,532 4,120,498

The main sources of revenue are (i.) duties upon wine, spirits, malt liquors and tobacco; (ii.) port and harbour dues; (iii.) tavern and other licences; (iv.) post and telegraph; (v.) ground and other rents; (vi.) stamps and miscellaneous. The returns before 1898 were made in pesetas (5 = $l). In the following table these have been converted into sterling at an average of exchange 30 = £1.

Yearly Average.

i.

ii.

iii.

iv.

v.

vi.

Total.

1 886-1 890 1891-1895 1 896-1 900 1901-1905

Year 1905

9,692

9,250

14,071

35-9O0

36,554

17,070

13,157

8,435

6,028

5,872

5387 4275 4136 3905 4050

6,805

7,833 10,016 12,091 16,551

6485 6208 5924 6945 7489

2,873 10,113 14,460

15,859 17,007

48,312 50,836 57,042 80,728

87,523

The money, weights and measures in legal use are British. Before 1898 Spanish money only was in use. The great depreciation of the

Spanish currency during the war with the United States led in 1898 to the reintroduction of British currency as the legal tender money of Gibraltar. Notwithstanding this change the Spanish dollar still remains in current use; much of the retail business of the town being done with persons resident in Spain, the dollar fully holds its own.

Harbour and Fortifications. — Great changes were made in the defences of Gibraltar early in the 20th century. Guns of the newest types replaced those of older patterns. The heavier pieces instead of being at or near the sea-level, are now high up, many of them on the crest line of the Rock; their lateral range and fire area has thereby been greatly increased and their efficiency improved in combination with an elaborate system of range finding.

With the completion of the new dockyard works the value . of Gibraltar as a naval base has greatly increased. It can now undertake all the ordinary repairs and coaling of a large fleet. There is an enclosed harbour in which a fleet can safely anchor secure from the attacks of torpedo boats. A mole, at first intended for commercial purposes, closes the north end of the new harbour. The Admiralty, however, soon found that their needs had outgrown the first design and the so-called Commercial Mole has been taken over for naval purposes, plans for a new commercial mole being prepared. The funds for these extensive works were provided by the Naval Works Loan Acts of 1895 and subsequent years.

The land space available for the purposes of dockyard exten- sion being very limited, a space of about 64 acres was reclaimed from the sea in front of the Alameda and the road to Rosia; some of the land reclaimed was as much as 40 ft. under water. The large quantity of material required for this purpose was obtained by tunnelling the Rock from W. to E. and from quarries above Catalan Bay village, to which access was gained through the tunnel. The graving docks occupy the dug-out site of the former New Mole Parade. There are three of these docks, 850,550 and 450 ft. in length respectively. The largest dock is divisible by a central caisson so that four ships can be docked at one time. The docks are all 95 ft. wide at the entrance with 35J ft. of water over the sills at low- water spring tides. The pumping machinery can empty the largest dock, 105,000 tons of water, in five hours. There are two workshops for the chief constructor's and chief engineer's departments, each 407 ft. long and 322 broad. For the staff captain's department and stores there are buildings with 250,000 ft. of floor space. At the north end of the yard are the administrative offices, slipways for destroyers, a slip for small craft, an ordnance wharf and a boat camber. The reclaimed

area is faced with a wharf wall of con- crete blocks for an unbroken length of 1600 ft. with 33 ft. of water alongside at low tide; on this wharf are powerful shears and cranes.

The enclosed harbour covers 440 acres, 250 of which have a minimum depth of 30 ft. at low water. It is closed on the S. and S. W. by the New Mole (1400 ft.) and the New Mole extension (2700 ft.), together 4100 ft.; on the W. by the Detached Mole (2720 ft.) and on the N. by the Commercial Mole.

The New Mole, so called to distinguish it from the Old Mole and its later extension the Devil's Tongue at the north end of the town, is said to have been begun by the Spaniards in 1620. It was successfully assaulted by landing parties from the British fleet under Sir George Rooke at the capture of Gibraltar by the British in 1704. It was extended at different times, and before the beginning of the new works was 1400 ft. in length. The New Mole, with its latest extension, has a width at top of 102 ft. It is formed of rubble stone floated into position in barges. It has a continuous wharf wall on the harbour side 3500 ft. long, with water alongside 30 to 35 ft. deep. On the outer side coal is stacked in sheds extending nearly the whole length of the mole.

The Detached Mole is a vertical wall formed of concrete blocks, each block weighing 28 tons. These blocks were built together on the sloping block system upon a rubble

foundation of stone deposited by bargbs and levelled by divers for the reception of the concrete blocks.

The Commercial Mole is now chiefly used by the navy as a convenient wharf for destroyers. It encloses the harbour to the north and extends westward from the end of the Devil's Tongue. At the end nearest the town are large stores; there is also a small wharf on its outer side which is used by the tenders of ocean steamers and by the small boats which ply to Algeciras. This mole is built of rubble, and at its western end it has an arm about 1600 ft. long running S. in the direction of the Detached Mole. Parallel with and inside the western arm are five jetties. The jetties and western arm have extensive coal sheds and are faced with a concrete wharf wall of a total length of 7000 ft. with 20 to 30 ft. of water alongside. The Devil's Tongue was

*an extension of the Old Mole, constructed during the great siege 1 7 79-1 783 in order to bring a flanking fire to bear upon part of the Spanish lines. It owes its name to the success with which it played its destined part. (H. M. *)*

History. — Gibraltar was known to the Greek and Roman geographers as Calpe or Alybe, the two names being probably corruptions of the same local (perhaps Phoenician) word. The eminence on the African coast near Ceuta which bears the modern English name of Apes' Hill was then designated Abyla; and Calpe and Abyla, at least according to an ancient and widely current interpretation, formed the renowned Pillars of Hercules (Herculis columnae, 'HpaicKeovs orfjXai), which for centuries were the limits of enterprise to the seafaring peoples of the Mediterranean world. The military history of the Rock begins with its capture and fortification by Tariq in 711. In 1309 it was retaken by Alonzo Perez de Guzman for Ferdinand IV. of Castile and Leon, who, in order to attract inhabitants to the spot, offered an asylum to thieves and murderers, and promised to levy no taxes on the import or export of goods. The attack of Ismail ben Ferez in 1315 (2nd siege) was frustrated; but in 1333 Vasco Perez de Meyra, having allowed the fortifications and garrison to decay, was obliged to capitulate to Mahomet IV. (3rd siege) after a defence of five months. Alonzo's attempts to recover possession (4th siege) were futile, though pertinacious and heroic; but after his successful attack on Algeciras in 1344 he was encouraged to try his fortune again at Gibraltar. In 1349 he invested the Rock, but the siege (5th siege) was brought to an untimely close by his death in March 1350. The next or 6th siege resulted simply in the transference of the position from the hands of the king of Morocco to those of Yussef III. of Granada (1411), and the 7th, undertaken by the Spanish count of Niebla, Enrique de Guzman, proved fatal to the besieger and his forces (1435). In 1462, however, success attended the efforts of Alonzo de Arcos (8th siege), and in August the Rock passed once more under Christian sway. The duke of Medina Sidonia, a powerful grandee who had assisted in its capture, was anxious to get possession of the fortress, and though Henry IV. at first managed to maintain the claims of the crown, the duke ultimately made good his ambition by force of arms (9th siege), and in 1469 the king was constrained to declare his son and his heirs perpetual governors of Gibraltar. In 1479 Ferdinand and Isabella made the second duke marquess of Gibraltar, and in 1492 the third duke, Don Juan, was reluctantly allowed to retain the fortress. At length in 1502 it was formally incorporated with the domains of the crown. Don Juan tried in 1506 to recover possession, and added a

10th to the list of sieges. In 1540 the garrison had to defend itself against a much more formidable attack (nth siege) — the pirates of Algiers having determined to recover the Rock for Mahomet and themselves. The conflict was severe, but resulted in the repulse of the besiegers. After this the Spaniards made great efforts to strengthen the place, and they" succeeded so well that throughout Europe Gibraltar was regarded as impregnable, the engineer Daniel Speckle (1 536-1 589) being chiefly responsible for the design of the fortifications.

Gibraltar was taken by the allied British and Dutch forces, after a three days' siege, on the 24th of July 1704 (see Spanish Succession, War of the). The capture was made, as the war was being fought, in the interests of Charles, archduke of

Siege of Gibraltar

(1779- 1783).

Austria, but Sir George Rooke (?.».), the British admiral, on his own responsibility caused the British flag to be hoisted, and took possession in name of Queen Anne, whose government ratified the occupation. A great number of the inhabitants of the town of Gibraltar abandoned their homes rather than recognize the authority of the invaders. The Spaniards quickly assembled an army to recapture the place, and a new siege opened in October 1704 by troops of France and Spain under the marquess of Villadarias. The activity of the British admiral, Sir John Leake, and of the military governor, Prince George of Hesse-Darmstadt (who had commanded the land forces in July), rendered the efforts of the besiegers useless. A notable incident of this siege was the gallant attempt made by 500 chosen volunteers to surprise the garrison (31st of October), an attempt which, at first success- ful, in the end failed disastrously. Finally, in April 1705 the French marshal de Tesse, who had replaced Villadarias, gave up the siege and retired. During the next twenty years there were endless negotiations for the peaceful surrender of the fortress, varied in 1720 by an abortive attempt at a coup de main, which was thwarted by the resourcefulness of the governor of Minorca (Colonel Kane), who threw reinforcements and supplies into Gibraltar at the critical moment. In 1726 the Spaniards again appealed to arms. But the count of las Torres, who had the chief command, succeeded no better than his predecessors. The place had been strengthened since 1705, and the defence of the garrison under Brigadier Clayton, the lieutenant-governor, Brigadier Kane of Minorca, and the governor, the earl of Port- more, who arrived with

reinforcements, was so effective that the armistice of the 12th of June practically put a close to the siege, though two years elapsed before the general pacification ensued. Neither in the War of the Austrian Succession nor in that of 1 762 did Spain endeavour to besiege the rock, but the War of American Independence gave her better opportunities, and the great siege of 17 79-1 783 is justly regarded as one of the most memorable sieges of history. The governor, General Sir George Augustus Elliot (afterwards Lord Heathfield), was informed from England on the 6th of July 1779 that hostilities had begun. A short naval engagement in the straits took place on the nth, and General Elliot made every preparation for resistance. It was not, however, until the month of August that the Spaniards became threatening. The method of the besiegers appeared to be starvation, but the interval between strained relations and war had been well employed by the ships, and supplies were, for the time at any rate, sufficient. While the Spanish siege batteries were being constructed the fortress fired, and many useful artillery experiments were carried out by the garrison at this time and subsequently throughout the siege. On the 14th of November there took place a spirited naval action in which the privateer " Buck," Captain Fagg, forced her way into harbour. This was one of many such incidents, which usually arose from the attempts made from time to time by vessels to introduce supplies from Tangier and elsewhere. December 1779, indeed, was a month of privation for the garrison, though of little actual fighting. In January 1780, on the rumour of an approaching convoy, the price of foods " fell more than two- thirds," and Admiral Sir George Rodney won a great victory over De Langara and entered the harbour. Prince William Henry (afterwards King William IV.) served on board the British fleet as a midshipman during this expedition. Supplies and reinforcements were thrown into the fortress by Rodney, and the whole affair was managed with the greatest address both by the home government and the royal navy. " The garrison, " in spite of the scurvy, " might now be considered in a perfect state of defence," says Drinkwater.

On the 7th of June took place an attack by Spanish fireships, which were successfully dealt with by the naval force in the bay under Captain Lesley of H.M. frigate " Enterprise." Up to October the state of things within the fortress was much what it had been after Rodney's success. " The enemy's operations on the land side had been for many months so unimportant as scarcely to merit our attention" (Drinkwater). Scurvy was, however, prevalent (see Drinkwater, p. 121), and the supply

question had again become acute. Though the enemy's batteries did not open fire, the siege works steadily progressed, in spite of the fire from the fortress, and there were frequent small engage- ments at sea in which the English were not always successful. Further, the expulsion, with great harshness, of the English residents of Barbary territory put an end to a service of supply and information which had been of the greatest value to Elliot (January 1781). Three more months passed in forced inaction, which the garrison, stinted as it was, endured calmly. Then, on the 12th of April 1781, on the arrival of a British relieving squadron under Admiral Darby, the whole of the Spanish batteries opened fire. Stores were landed in the midst of a heavy bombardment, and much damage was done both to the fortifications and military buildings and to the town. At this time there was a good deal of indiscipline in the garrison, with which General Elliot dealt severely. This was in the last degree necessary, for the bom- bardment continued up to the 1st of June, after which the rate of the enemy's fire decreased to 500 rounds per day. By the 1 2th of July it had almost ceased. In September the firing again became intense and the casualties increased, the working parties suffering somewhat heavily. In October there was less ex- penditure of ammunition, as both sides were now well covered, and in November the governor secretly prepared a great counter- stroke. The sortie made on the night of the 26th-2 7th of November was brilliantly successful, and the Spanish siege works were mostly destroyed. At the close of the year the garrison was thus again in an excellent position.

Early in 1782 a new form of gun-carriage wheel, allowing of a large angle of depression being given, was invented by an officer of the Royal Artillery, and indeed throughout the siege many experiments (such as would nowadays be carried out at a school of gunnery) were made with guns, mountings, ammuni- tion, methods of fire, &c, both in Gibraltar and in the Spanish camp. The gun : carriage referred to enabled 93% of hits to be obtained at 1400 yds. range. In April grates for heating shot were constructed by order of the governor; these were destined to be famous. At the same time it was reported that the due de Crillon was now to command the besiegers (French and Spaniards) with D'Arcon as his chief engineer. The grand attack was now imminent, and preparations were made to repel it (July 1782). The chief feature of the attack was to be, as reported on the 26th of July, ten ships " fortified 6 or 7 ft. thick . . . with green timber bolted with iron, cork and raw hides; which were to carry guns of heavy metal and be bomb- proof on the top with a

descent for the shells to slide off; that these vessels . . . were to be moored within half gunshot of the walls," &c. On the other side many of the now existing rock galleries were made about this time. The count of Artois and another French prince arrived in the French lines in August to witness the culminating effort of the besiegers, and some polite correspondence passed between Crillon and the governor (reprinted in Drinkwater, p. 267). The garrison made a pre- liminary trial of the red-hot shot on the 8th of September, and the success of the experiment not only elated the garrison but was partly instrumental in causing Crillon to hasten the main attack. After a preliminary bombardment the famous battering ships took up their positions in broad daylight on the 13th and opened fire. The British solid shot seem to have failed absolutely to penetrate the massive wooden armour on the sides and the roofs of the battering ships, and about noon the ships had settled down to their work and were shooting coolly and accur- ately. But between 1 and 2 p.m. the British artillerymen began to use the red-shot freely. All day the artillery duel went on, the shore guns, though inferior in number, steadily gaining the upper hand, and the battering ships were in great distress by nightfall. The struggle continued in the dark, the garrison now shooting rapidly and well, and one by one the ten ships were set on fire. Before noon on the 14th the attack had come to an end by the annihilation of the battering fleet, every ship having been blown up or burnt to the water's edge. Upwards of 8300 rounds were expended by the garrison though less than a hundred pieces were in action. The enemy's bombardment

was, however, resumed and partial engagements continued up to the third naval relief of the fortress by Lord Howe, who won a great victory at sea over the Spaniards. The long siege came to an end on the 6th of February 1783, when the due de Crillon informed Elliot that the preliminaries of peace had been signed. On the 31st of March the duke visited the fortress, and many courtesies passed between the late enemies. Captain (after- wards Colonel) John Drinkwater (1 762-1844), the historian of the siege, first published his work in 1785. A new edition of A History of the Siege of Gibraltar was published in 1905. The history of the four eventful years' siege is fully detailed also in the Memoir, attached to Green's Siege of Gibraltar (1784), of its gallant defender Sir George Augustus Elliot, afterwards Lord Heathfield, whose military skill and moral courage place him among the best soldiers and noblest men of his time.

Since 1783 the history of Gibraltar has been comparatively uneventful. In the beginning of 1801 there were rumours of a

Spanish and French attack, but the Spanish ships were defeated off Algeciras in June by Admiral Saumarez. Improvements in the fortifications, maintenance of military discipline and legislation in regard to trade and smuggling, are the principal matters of recent interest.

Bibliography. — To the works which have been already mentioned may be added : I. L. de Ayala, Historia de Gibraltar (Madrid, 1792) ; J as. Bell, translation of Ayala's history (London, 1845); F. Carter, Gibraltar to Malaga (London, 1 777-1 780); G. Cockburn, Gibraltar, Cadiz, &c. (London, 1815) ; O. Debeaux and G. Dautez, Synopsis de la flore de Gibraltar (1889) ; E. D. Fenton, Sorties from Gibraltar, (1872); H. M. Field, Gibraltar (New York, 1888); J. Gait, Gibraltar, Sardinia, &c. (London, 1813); J. Heriot, Historical Sketch of Gibraltar (London, 1792) ; R. Hort, The Rock of Gibraltar (London, 1839); L. W. L. Irby, Ornithology of the Straits (London, 1875); Trios. James, History of the Herculean Straits (London, 1771); J. H. Mann, Gibraltar and its Sieges (London, 1870); Montero, Historia de Gibraltar (Cadiz, i860); A. M. Monti, Historia de Gibraltar (Seville, 1851) ; J. Navarrete, Las Llaves del Estrecho (Madrid, 1882) ; M. S. Pasley, Wild Flowers of Gibraltar (Portsmouth, 1887); John Purdy, Gibraltar and Mediterranean Sailing Directions (London, 1840); H. J. M. Rey, Essai sur la topographie medicate de Gibraltar (Paris, 1833); Captain Sayer, History of Gibraltar (London, 1862);; D. Sutherland, Gibraltar to Constantinople (London, 1790); Walker, A Year's Insect Hunting in Gibraltar (London, 1888). (C. F. A.)

GIBSON, CHARLES DANA (1867-), American artist and illustrator, was born at Roxbury, Massachusetts, on the 14th of September 1867. After a year's study at the schools of the Art Students' League, he began with some modest little drawings for the humorous weekly Life. These he followed up with more serious work, and soon made a place for himself as the delineator of the American girl, at various occupations, particularly those out of doors. These obtained an enormous vogue, being after- wards published in book form, running through many editions. The " Gibson Girl " stood for a type of healthy, vigorous, beautiful and refined young womanhood. Some book illustra- tions followed, notably for The Prisoner of Zenda. He was imitated by many of the younger draughtsmen, copied by amateurs, and his popularity was shown in his engagement by Collier's Weekly to furnish weekly for a year a double page, receiving for the fifty-two drawings the sum of $50,000, said to have been the largest amount ever paid to an illustrator for such a commission. These drawings covered various local themes and were highly successful, being drawn with pen and ink with masterly

facility and great directness and economy of line. So popular was one series, " The Adventures of Mr Pipp," that a successful play was modelled on it. In 1906, although besieged with commissions, Gibson withdrew from illustrative work, determining to devote himself to portraiture in oil, in which direction he had already made some successful experi- ments; but in a few years he again returned to illustration.

GIBSON, EDMUND (1669-1748), English divine and jurist, was born at Bampton in Westmorland in 1669. In 1686 he was entered a scholar at Queen's College, Oxford, where in 1692 he published a valuable edition of the Saxon Chronicle with a Latin translation, indices and notes. This was followed in 1693 by an annotated edition of the De institulione oratoria of Quintilian, and in 1695 by a translation in two volumes folio

of Camden's Britannia, " with additions and improvements," in the preparation of which he had been largely assisted by William Lloyd, John Smith and other English antiquaries. Shortly after Thomas Tenison's elevation to the see of Canterbury in 1694 Gibson was appointed chaplain and librarian to the arch- bishop, and in 1703 and 17 10 respectively he became rector of Lambeth and archdeacon of Surrey. In the discussions which arose during the reigns of William and Anne relative to the rights and privileges of the Convocation, Gibson took a very active part, and in a series of pamphlets warmly argued for the right of the archbishop to continue or prorogue even the lower house of that assembly. The controversy suggested to him the idea of those researches which resulted in the famous Codex juris eccksiastici Anglicani, published in two volumes folio in 1713, — a work which discusses more learnedly and comprehensively than any other the legal rights and duties of the English clergy, and the constitution, canons and articles of the English Church. In 1 7 16 Gibson was presented to the see of Lincoln, whence he was in 1720 translated to that of London, where for twenty-five years he exercised an immense influence, being regularly consulted by Sir Robert Walpole on all ecclesiastical affairs. While a conserva- tive in church politics, and declaredly opposed to methodism, he was no persecutor, and indeed broke with Walpole on the Quakers' Relief Bill of 1736. He exercised a vigilant over- sight over the morals of his diocese; and his fearless denunciation of the licentious masquerades which were popular at court finally lost him the royal

favour. Among the literary efforts of his later years the principal were a series of Pastoral Letters in defence of the " gospel revelation," against " lukewarmness " and " enthusiasm," and on various topics of the day; also the Preservative against Popery, in 3 vols, folio (1738), a compilation of numerous controversial writings of eminent Anglican divines, dating chiefly from the period of James II. Gibson died on the 6th of September 1748.

A second edition of the Codex juris, " revised and improved, with large additions by the author," was published at Oxford in 1 76 1. Besides the works already mentioned, Gibson published a number of Sermons, and other works of a religious and devotional kind. The Vita Thomae Bodleii with the Historia Bibliothecae Bodleianae in the Catalogi librorum manuscriptorum (Oxford, 1697), and the Reliquiae Spelmannianae (Oxford, 1698), are also from his pen.

GIBSON, JOHN (1790-1866), English sculptor, was born near Conway in 1790, his father being a market gardener. To his mother, whom he described as ruling his father and all the family, he owed, like many other great men, the energy and determina- tion which carried him over every obstacle. When he was nine years old the family were on the point of emigrating to America, but Mrs Gibson's determination stopped this project on their arrival at Liverpool, and there John was sent to school. The windows of the print shops of Liverpool riveted his attention, and, having no means to purchase the commonest print, he acquired the habit of committing to memory the outline of one figure after another, drawing it on his return home. Thus early he formed the system of observing, remembering and noting, sometimes even a month later, scenes and momentary actions from nature. In this way he, by degrees, transferred from the shop window to his paper at home the chief figures from David's picture of Napoleon crossing the Alps, which, by particular request, he copied in bright colours as a frontispiece to a little schoolfellow's new prayer-book, for sixpence. At fourteen years of age Gibson was apprenticed to a firm of cabinetmakers, — portrait and miniature painters in Liverpool requiring a premium which his father could not give. This employment so disgusted him that after a year (being interesting and engaging then apparently as in after-life) he persuaded his masters to change his indentures, and bind him to the wood-carving with which their furniture was ornamented. This satisfied him for another year, when an introduction to the foreman of some marble works, and the sight of a small head of Bacchus, unsettled him again. He had here caught a glimpse of his true vocation, and in his leisure hours began to model with such success that his efforts found their way to the notice of Mr Francis, the

proprietor of the marble works. The wood-carving now, in turn, became

his aversion; and having in vain entreated his masters to set him free, he instituted a strike. He was every day duly at his post, but did no work. Threats, and even a blow, moved him not. At length the offer of £70 from Francis for the rebellious apprentice was accepted, and Gibson found himself at last bound to a master for the art of sculpture. Francis paid the lad 6s. a week, and received good prices for his works, — sundry early works by the youthful sculptor, which exist in Liverpool and the neighbourhood, going by the name of Francis to this day. It was while thus apprenticed that Gibson attracted the notice of William Roscoe, the historian. For him Gibson executed a basso rilievo in terra-cotta, now in the Liverpool museum. Roscoe opened to the sculptor the treasures of his library at Allerton, by which he became acquainted with the designs of the great Italian masters.

A cartoon of the Fall of the Angels marked this period. — now also in the Liverpool museum. We must pass over his studies in anatomy, pursued gratuitously by the kindness of a medical man, and his introductions to families of refinement and culture in Liverpool. Roscoe was an excellent guide to the young aspirant, pointing to the Greeks as the only examples for a sculptor. Gibson here found his true vocation. A basso rilievo of Psyche carried by the Zephyrs was the result. He sent it to the Royal Academy, where Flaxman, recognizing its merits, gave it an excellent place. Again he became unsettled. The ardent young breast panted for " the great university of Art " — Rome; and the first step to the desired goal was to London. Here he stood between the opposite advice and influence of Flaxman and Chantrey — the one urging him to Rome as the highest school of sculpture in the world, the other maintaining that London could do as much for him. It is not difficult to guess which was Gibson's choice. He arrived in Rome in October 1817, at a comparatively late age for a first visit. There he immediately experienced the charm and goodness of the true Italian character in the person of Canova, to whom he had introductions, — the Venetian putting not only his experience in art but his purse at the English student's service. Up to this time, though his designs show a fire and power of imagination in which no teaching is missed, Gibson had had no instruction, and had studied at no Academy. In Rome he first became acquainted with rules and technicalities, in which the merest tyro was before him. Canova introduced him into the Academy supported by Austria, and, as is natural with a mind like Gibson's, the first sense of his deficiencies in common matters of practice was

depressing to him. He saw Italian youths already excelling, as they all do, in the draw- ing of the figure. But the tables were soon turned. His first work in marble — a " Sleeping Shepherd " modelled from a beautiful Italian boy — has qualities of the highest order. Gibson was soon launched, and distinguished patrons, first sent by Canova, made their way to his studio in the Via Fontanella. His aim, from the first day that he felt the power of the antique, was purity of character and beauty of form. He very seldom declined into the prettiness of Canova, and if he did not often approach the masculine strength which redeems the faults of Thorwaldsen, he more than once surpassed him even in that quality. We allude specially to his " Hunter and Dog," and to the grand promise of his " Theseus and Robber," which take rank as the highest productions of modern sculpture. He was essentially classic in feeling and aim, but here the habit of observation we have mentioned enabled him to snatch a grace beyond the reach of a mere imitator. His subjects were gleaned from the free actions of the splendid Italian people noticed in his walks, and afterwards baptized with such mythological names as best fitted them. Thus a girl kissing a child, with a sudden wring of the figure, over her shoulder, became a " Nymph and Cupid "; a woman helping her child with his foot on her hand on to her lap, a " Bacchante and Faun "; his " Amazon thrown from her Horse," one of his most original productions, was taken from an accident he witnessed to a female rider in a circus; and the "Hunter holding in his Dog " was also the result of a street scene. The prominence he gave among his favourite subjects to the little god " of soft tribulations" was no less owing to his facilities

for observing the all but naked Italian children, in the hot summers he spent in Rome.

In monumental and portrait statues for public places, necessarily represented in postures of dignity and repose, Gibson was very happy. His largest effort of this class — the group of Queen Victoria supported by Justice and Clemency, in the Houses of Parliament — was his finest work in the round. Of noble character also in execution and expression of thought is the statue of Huskisson with the bared arm; and no less, in effect of aristocratic ease and refinement, the seated figure of Dudley North. But great as he was in the round, Gibson's chief excellence lay in basso rilievo, and in this less-disputed sphere he obtained his greatest triumphs. His thorough

knowledge of the horse, and his constant study of the Elgin marbles — casts of which are in Rome — resulted in the two matchless bassi rilievi, the size of life, which belong to Lord Fitzwilliam — the " Hours leading the Horses of the Sun," and " Phaethon driving the Chariot of the Sun." Most of his monumental works are also in basso rilievo. Some of these are of a truly refined and pathetic character, such as the monument to the countess of Leicester, that to his friend Mrs Huskisson in Chichester cathedral, and that of the Bonomi children. Passion, either indulged or repressed, was the natural impulse of his art: repressed as in the " Hours leading the Horses of the Sun," and as in the " Hunter and Dog "; indulged as in the meeting of Hero and Leander, a drawing executed before he left England. Gibson was the first to intro- duce colour on his statues, — first, as a mere border to the drapery of a portrait statue of the queen, and by degrees extended to the entire flesh, as in his so-called " tinted " Venus, and in the " Cupid tormenting the Soul," in the Holford collection.

Gibson's individuality was too strongly marked to be affected by any outward circumstances. In all worldly affa irs and business of daily life he was simple and guileless in the extreme; but he was resolute in matters of principle, determined to walk straight at any cost of personal advantage. Unlike most artists, he was neither nervous nor irritable in temperament. It was said of him that he made the heathen mythology his religion; and indeed in serenity of nature, feeling for the beautiful, and a certain philosophy of mind, he may be accepted as a type of what a pure-minded Greek pagan, in the zenith of Greek art, may have been. Gibson was elected R.A. in 1836, and bequeathed all his property and the contents of his studio to the Royal Academy, where his marbles and casts are open to the public. He died at Rome on the 27th of January 1866.

The letters between Gibson and Mrs Henry Sandbach, grand-daughter cf Mr Roscoe, and a sketch of his life that lady induced him to write, furnish the chief materials for his biography. See his Life, edited by Lady Eastlake. . (E. E.)

GIBSON, THOMAS MILNER (1806-1884), English politician, who came of a good Suffolk family, was born in Trinidad, where his father, an officer in the army, was serving. He went to Trinity College, Cambridge, and in 1837 was elected to parlia- ment as Conservative member for Ipswich, but resigned two years later, having adopted Liberal views, and became an

ardent supporter of the free-trade movement. As one of Cobden's

chief allies, he was elected for Manchester in 1841, and from 1846 to 1848 he was vice-president of the board of trade in Lord John Russell's ministry. Though defeated in Manchester in 1857, he found another seat for Ashton-under-Lyne; and he sat in the cabinets from 1859 to 1866 as president of the board of trade. He was the leading spirit in the movement for the repeal of " taxes on knowledge," and his successful efforts on behalf of journalism and advertising were recognized by a public testimonial in 1862. He retired from political life in 1868, but he and his wife, whose salon was a great Liberal centre, were for many years very influential in society. Milner Gibson was a sportsman and a typical man of the world, who enjoyed life and behaved liberally to those connected with him.

GIBSON, WILLIAM HAMILTON (1850-1896), American illustrator, author and naturalist, was born in Sandy Hook, Connecticut, on the 5th of October 1850. The failure and (in 1868) death of his father, a New York broker, put an end to his studies in the Brooklyn Polytechnic Institute and made it necessary for him to earn his own living. From the life insurance business, in Brooklyn, he soon turned to the study of natural history and illustration, — he had sketched flowers and insects when he was only eight years old, had long been interested in botany and entomology, and had acquired great skill in making wax flowers, — and his first drawings, of a. technical character, were published in 1870. He rapidly became an expert illustrator and a remarkably able wood-engraver, while he also drew on stone with great success. He drew for The American Agri-culturist, Hearth and Home, and Appleton's American Cyclo- paedia; for The Youth's Companion and St Nicholas; and then for various Harper publications, especially Harper's Monthly Magazine, where his illustrations first gained popularity. He died of apoplexy, brought on by overwork, on the 16th of July 1896 at Washington, Connecticut, where he had had a summer studio, and where in a great boulder is inset a relief portrait of him by H. K. Bush-Brown. He was an expert photographer, and his drawings had a nearly photographic and almost microscopic accuracy of detail which slightly lessened their artistic value, as a poetic and sometimes humorous quality somewhat detracted from their scientific worth. Gibson was perfectly at home in black-and-white, but rarely (and feebly) used colours. He was a popular writer and lecturer on natural history; in his best-known lecture, on " Cross-Fertilization," he used ingenious charts and models.

Gibson illustrated S. A. Drake's In the Heart of the White Moun-tains, C. D. Warner's New South, and E. P. Roe's Nature's Serial Story; and his own books, The Complete American Trapper (1876;

revised, 1880, as Camp Life in the Woods) ; Pastoral Days: or, Memories of a New England Year (1880); Highways and Byways (1882); Happy Hunting Grounds (1886); Strolls by Starlight and Sunshine (1891); Sharp Eyes: a Rambler's Calendar (1891); Our Edible Mushrooms and Toadstools (1895); Eye Spy: Afield with Nature among Flowers and Animate Things (1897); and My Studio Neighbours (1898).

See John C. Adams, William Hamilton Gibson, Artist, Naturalist Author (New York, 1901).

PRINTED m U.S.A.

VOL12_GICHTEL-_J-HARMONIUM

Britannica

THE

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

FIRST

edition,

published in three

volumes,

1768— 1771.

SECOND

>»

» ten

1777— 1784.

THIRD

»i

„ eighteen

1788 — 1797.

FOURTH

>!

,, twenty

1801 — 1810.

FIFTH

»

,, twenty

1815 — 1817.

SIXTH

>!

„ . twenty

1823 — 1824.

SEVENTH

1)

,, twenty-one

1830 — 1842.

EIGHTH

»

„ twenty-two

1853—1860.

NINTH

»

„ twenty-five

)>

1875—1889.

TENTH

?!

ninth edition and eleven

supplementary volumes,

1902 — 1903.

ELEVENTH

»

published in twenty-nine volumes.

J910 — 1911.

COPYRIGHT

in all countries subscribing to the

Bern Convention

by

THE CHANCELLOR, MASTERS AND SCHOLARS

of the UNIVERSITY OF CAMBRIDGE

All rights reserved

THE

ENCYCLOPEDIA BRITANNICA

DICTIONARY

OF

ARTS, SCIENCES, LITERATURE AND GENERAL

INFORMATION

ELEVENTH EDITION

VOLUME XII

GICHTEL to HARMONIUM

New York

Encyclopaedia Britannica, Inc.

342 Madison Avenue

Copyright, in the United States of America, 1910,

by

The Encyclopaedia Britannica Company.

INITIALS USED IN VOLUME XII. TO IDENTIFY INDIVIDUAL CONTRIBUTORS, WITH THE HEADINGS OF THE ARTICLES IN THE VOLUME SO SIGNED.

A.

A.

R.*

A.

C.

Se.

A.

F.

P.

A.

Gc

.*

A.

G.

B.*

A.

H

-S.

A.

He.

A

H

S.

A

J.

G.

A. J. H.

A. L. A. M. C.

A.N.

A. Ne. A. S. C. A.Sy.

Arthur Alcock Rambaut, M.A., D.Sc, F.R.S., F.R.A.S. f

Radcliffe Observer, Oxford. Professor of Astronomy in the University of Dublin 1 Grant, Robert. and Royal Astronomer of Ireland, 1892-1897. I

Albert Charles Seward, M.A., F.R.S. f

Professor of Botany in the University of Cambridge. Hon. Fellow of Emmanuel “i Gymnosperms. College, Cambridge. President of the Yorkshire Naturalists’ Union, 1910. [

Albert Frederick Pollard, M.A., F.R.Hist.S. – f

Fellow of All Souls College, Oxford. Professor of English History in the University J p r – mi i a i of London. Assistant Editor of the Dictionary of National Biography, 1893-1901. 1 urmttal> Author of England under the Protector Somerset; Life of Thomas Cranmer; &c. I

Rev. Alexander Gordon, M.A. JGrynaeus, Simon;

Lecturer on Church History in the University of Manchester. I Haetzer,

Hon. Archibald Graeme Bell, M.Inst. C.E. f

Director of Public Works and Inspector of Mines, Trinidad. Member of Executive i Guiana, and Legislative Councils, Inst. C.E. I

Sir A. Houtum-Schindler, CLE. /Gilan; Hamadan.

General in the Persian Army. Author of Eastern Persian Irak. L

Arthur Hervey. f

Formerly Musical Critic to Morning Post and Vanity Fair. Author of Masters < Gounod, of French Music ; French Music in the XIX. Century. [

Rev. A. H. Sayce, D.D.

See the biographical article, Sayce, A. H.

Rev. Alexander James Grieve, M.A., B.D.

Professor of New Testament and Church History at the United Independent College, . Bradford. Sometime Registrar of Madras University and. Member of Mysore Educational Service.

Alfred James Hipkins.

. Formerly Member of Council and Hon. Curator of Royal College of Music. Member of Committee of the Inventions and Music Exhibition, 1885; of the Vienna" Exhibition, 1892 ; and of the Paris Exhibition, 1900. Author of Musical Instruments A Description and History of the Pianoforte ; &c.

Andrew Lang.

See the biographical article, Lang, Andrew.

Agnes Mary Clerke.

See the biographical article, Clerke, A. M.

Alfred Newton, F.R.S.

See the biographical article, Newton, Alfred.

■I Grammar; Gyges.

Haggai {in part).

Harmonium (in part).

-I Gurney, Edmund.

■j Halley; Hansen.

Goatsucker; Godwit; Golden-eye; Goldfinch; Goose; Gos-Hawk; Grackle; Grebe; Greenfinch; Greenshank; Grosbeak; Grouse; Guacharo; Guan; Guillemot; Guinea-Fowl; Gull, Hammer-Kop.

Glass: History of

Manufacture (in part)-

Alexander Nesbitt, F.S.A.

Author of the Introduction to A Descriptive' Catalogue of the Glass Vessels in South Kensington Museum.

Alan Summerly Cole, C.B. r

Assistant Secretary for Art, Board of Education, 1900-1908. Author of Ancient \ Gold and Silver Thread,

Needle Point and Pillow Lace ; Embroidery and Lace ; Ornament in European Silks ; &c. [

Arthur Symons. JGoncourt, De;

See the biographical article, Symons, A. \ Hardy, Thomas.

1 A complete list, showing all individual contributors, appears in the final volume.

C. H. C.

INITIALS AND HEADINGS OF ARTICLES

Arthur William Holland. ("Godfrey of Viterbo;

Formerly Scholar of St John's College, Oxford. Bacon Scholar of Gray's Inn, 1900. \ Golden Bull; Habsburg.

Alexander Wood Renton, M.A., LL.B. f Ground Rent*

Puisne Judge of the Supreme Court of Ceylon. Editor of Encyclopaedia of the -{ „ . ... ' Laws of England. [Handwriting.

Adolphus William Ward, LL.D., Litt.D. 1 Rrppnp Rohprt

See the biographical article, Ward, A. W. I ureene > KODen.

Charles Francis Atkinson. f Grand Alliance, War of the;

Formerly Scholar of Queen’s College, Oxford. Captain, 1st City of London (Royals Grant, Ulysses S. {in part); Fusiliers). Author of The Wilderness and Cold Harbour. I Great Rebellion.

C. Gr. Charles Gross, A.M., Ph.D., LL.D. (1857-1000). f

Professor of History at Harvard University, 1888-1909. Author of The Gild -j Gilds. Merchant ; Sources and Literature of English History ; &c. L

C. H.* Sir C. Holroyd.

V]

A.

W.

H.*

A.

w.

R.

A.

w.

W.

C.

F.

A.

See the biographical article; Holroyd, Sir C. \ Haden » Sir » F – C –

Chart ks H Cˆoott** f

Formerly of Map Department, British Museum. . \ HaWuyt (*» Part).

C. H. Ha. Carlton Huntley Hayes, A.M., Ph.D. f Gregory: Popes VIII. to

Assistant Professor of History in Columbia University, New York City. Member A -ˆ. f*_ -Jl J of the American Historical Association. [_ All.,

uUlDeri.

Hamasa.

C. L. K. Charles Lethbridge Kingsford, M.A., F.R.Hist.S., F.S.A.

Assistant Secretary to the Board of Education. Author of Life of Henry V. Editor of Chronicles of London, and Stow's Survey of London.

C. J. L. Sir Charles James Lyall, K.C.S.I., CLE., LL.D (Edin.) ("

Secretary, Judicial and Public Department, India Office. Fellow of King's College, London. Secretary to Government of India in Home Department, 1 889-1 894. Chief Commissioner, Central Provinces, India, 1895-1898. Author of Translations of Ancient Arabic Poetry; &c.

C. L.* Charles Lapworth, M.Sc, LL.D., F.R.S., F.G.S. r

Professor of Geology and Physiography in the University of Birmingham. Editor < GraptoliteS. of Monograph on British Graptolites, Palaeontographical Society, 1900-1908. [

ˆGlendower, Owen; Gloucester, Humphrey,

Duke of; Hallam, Bishop; Hardyng, John.

C. M. Carl Theodor Mirbt, D.Th. j"

Professor of Church History in the University of Marburg. Author of Publizistik < Gregory VII. im Zeitalter Gregor VII. ; Quellen zur Geschichte des Papstthums ; &c. l_

C. Ml. Chedomille Mijatovich. r

Senator of the Kingdom of Servia. Envoy Extraordinary and Minister Pleni- J Gundulich. potentiary of the King of Servia to the Court of St James', 1895-1900 and 1902- 1 1903- I

C. M. W. Sir Charles Moore Watson, K.C.M.G., C.B. r

Colonel, Royal Engineers. Deputy- Inspector-General of Fortifications, 1896-1902. -j Gordon, General. Served under General Gordon in the Soudan, 1 874-1 875. [

C. Pf. Christian Peister, D.-es-L. f ; regorv st o{ Tours-

Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour.

Author-, _ ., «'*, ,. 1. ' of Etudes sur le regne de Robert le Pieux. [Gunther of Schwarzburg.

C. R. B. Charles Raymond Beazley, M.A., D.Litt., F.R.G.S., F.R.Hist.S. r

Professor of Modern History in the University of Birmingham. Formerly Fellow Gomez; Hakluyt of Merton College, Oxford, and University Lecturer in the History of Geography. -J 1 ■ j. nr ,\ Lothian Prizeman, Oxford, 1889. Lowell Lecturer, Boston, 1908. Author of K pan).

Henry the Navigator; The Dawn of Modem Geography; &c.

C. We. Cecil Weatherly. J _ ffit

Formerly Scholar of Queen's College, Oxford. Barrister-at-Law. . i " raml0 >

C. W. E. Charles William Eliot. j' ,

See the biographical article, Eliot, C. W. -[Way, Asa.

D. C. To. Rev. Duncan Crookes Tovey, M.A. J Gray Thomas.

Editor of The Letters of Thomas Gray ; &c. \

D. F. T. Donald Francis Tovey. r

Author of Essays in Musical Analysis: comprising The Classical Concerto, The-l Cnaek; Handel. Goldberg Variations, and analysis ofmany other classical works. I_

D. G. H. David George Hogarth, M.A. t •'

Keeper of the Ashmolean Museum, Oxford. ' Fellow of Magdalen College, Oxford. .

Fellow of the British Academy. Excavated at Paphos, 1888; Naucratis, 1899 and -j HallCamassus.

1903; Ephesus, 1904-1905; Assiut, 1906- 1907; Director, British School at Athens, j

1897-1900; Director, Cretan Exploration Fund, 1899. L

_ „ _. „ fGondomar, Count;

D. H. David Hannay. _ d .,,,' £.. ot

Formerly British Vice-Consul at Barcelona. Author of Short History of Royal Navy, – urana ˆP 11 ? 6 ‘ war . 01 1217-1*88: Life of Emilio Castelar : &c. the: Naval Operations;

iGuichen; Hamilton, Emma.

INITIALS AND HEADINGS OF ARTICLES

vn

D. LI. T. V. Mn.

D. M. W.

E. A. P. E. A. J.

E.B.*

E.Br. E. C. B.

Inn. Stipendiary Magistrate at Pontypridd and 1 Glamorganshire; Gower

E.

C.

Sp.

E.

F.

G.

E.

f.

S. D

E.

G.

E.

H

P.

E.

J.

P.

Author of Constructive

Ed. M.

E. M. W. E. 0.*

E.Pr.

E. R. ”

E. S. G.

F. C. C.

F. G. M. B.

Daniel Lleufer Thomas.

Barrister-at-Law, Lincoln’s Rhondda.

Rev. Dugald Macfadyen, M.A.

Minister of South Grove Congregational Church, Highgate. Congregational Ideals; &c.

Sir Donald Mackenzie Wallace, K.C.I.E., K.C.V.O.

Extra Groom-in-Waiting to H.M. King George V. Director of the Foreign Depart- ment of The Times, 1891-1899. Member of Institut de Droit International and Officier de l’lnstruction Publique of France. Joint-editor of new volumes (10th edition) of the Encyclopaedia Britannica. Author of Russia; Egypt and the Egyptian Question ; The Web of Empire ; &c.

Edward Augustus Freeman, LL.D.

See the biographical article, Freeman, E. A.

E. Alfred Jones.

Author of Old English Gold Plate; Old Church Plate of the Isle of Man; Old Silver Sacramental Vessels of Foreign Protestant Churches in England ; Illustrated Catalogue ‘ of Leopold de Rothschild ‘s Collection of Old Plate; A Private Catalogue of The Royal Plate at Windsor Castle ; &c.

Ernest Charles Francois Babelon.

Professor at the College de France. Keeper of the department of Medals and

Antiquities at the Bibliotheque Nationale. Member of the Academie des Inscrip- J Hadrumetum.

tions et Belles Lettres, Paris. Chevalier of the Legion of Honour. Author of

Descriptions historiques des monnaies de la republique romaine ; TraiUs des monnaies

grecques et romaines ; Catalogue des camees de la bibliotheque nationale.

Ernest Barker, M.A. f

Fellow and Lecturer in Modern History at St John’s College, Oxford. Formerly -i Godfrey Of Bouillon. Fellow and Tutor of Merton College. Craven Scholar, 1895. . |_

Rt. Rev. Edward Cuthbert Butler, O.S.B., M.A., D.Litt. (Dublin). [Gilbert of Sempringham,

Abbot of Downside Abbey, Bath. Author of ” The Lausaic History of Palladius ” “j St;

in Cambridge Texts and Studies, vol. vi. (_ Grandmontines; Groot.

Rev. Edward Clarke Spicer, M.A. J

New College, Oxford. Geographical Scholar, 1900. L

Glas, John; Glasites.

Giers; Gorchakov.

I Goths (in part).

Golden Rose (.in part).

Glacier.

Edwin Francis Gay, Ph.D. _ _ f

Professor of Economics and Dean of the Graduate School of Business Administration, < Hanseatic League. Harvard University. 'I

J Greuze.

Lady Dilke.

See the biographical article, Dilke, Sir C. W., Bart.

Edmund Gosse, LL.D.

See the biographical article, Gosse, E.

{

Gnome.

Haflz.

Edward Henry Palmer, M.A.

See the biographical article, Palmer, E. H.

Edward John Payne, M.A. (1844-1904). f

Formerly Fellow of University College, Oxford. Editor of the Select Works of J . _ .

Burke. Author of History of European Colonies ; History of the New World called] « re y> *" tt *RH. America; The Colonies, in the " British Citizen " Series; &c. t

Eduard Meyer, Ph.D., D.Litt. (Oxon), LL.D. (Chicago). f

Professor of Ancient History in the University of Berlin. Author of Geschichte < GotarzeS. des Alterthums ; Geschichte des alien Aegyptens ; Die Israeliten und ihre Nachbarstdmme. [_

Greece: History, Ancient,

to 146 B.C.

Rev. Edward Mewburn Walker, M.A.

Fellow, Senior Tutor and Librarian of Queen's College, Oxford.

Edmund Owen, M.B., F.R.C.S., LL.D., D.Sc.

Consulting Surgeon to St Mary's Hospital, London, and to the Children's Hospital, Great Ormond Street, London. Chevalier of the Legion of Honour. Late Examiner in Surgery at the Universities of Cambridge, London and Durham. Author of A Manual of Anatomy for Senior Students.

Edgar Prestage.

Special Lecturer in Portuguese Literature in the University of Manchester. Examiner in Portuguese in the Universities of London, Manchester, &c. Commen- dador, Portuguese Order of S. Thiago. Corresponding Member of Lisbon Royal Academy of Sciences, Lisbon Geographical Society, &c. Editor of Letters of a Portuguese Nun; Azurara's Chronicle of Guinea; &c.

Lord Lochee of Cowrie (Edmund Robertson), P.C., LL.D., K.C. f

Civil Lord of the Admiralty, 1892-1895. Secretary to the Admiralty, 1905-1908. < Hallam, Henry. M.P. for Dundee, 1885-1908. Fellow of Corpus Christi College, Oxford. I

Edwin Stephen Goodrich, M.A., F.R.S. f"

Fellow and Librarian of Merton College, Oxford. Aldrichian Demonstrator of -i Haplodrili. Comparative Anatomy, University Museum, Oxford. [

Frederick Cornwallis Conybeare, M.A., D.Th. (Giessen). r

Fellow of the British Academy. Formerly Fellow of University College, Oxford. J Gregory the Illuminator.

Author of The Ancient Armenian Texts of Aristotle; Myth, Magic and Morals; &c. I

Goitre; Haemorrhoids.

Goes, Damiao De; Gonzaga.

Frederick George Meeson Beck, M.A.

Fellow and Lecturer in Classics, Clare College, Cambridge.

S Goths (in part).

Vlll F. G. S.

F. H. D.

INITIALS AND HEADINGS OF ARTICLES

F.

H.

H.

F.

J.

H.

F.

N.

F.

R.

C.

F.

S.

P.

F.

W

.R.*

G

A.

Gr.

G. Stephens. Formerly Art Critic of the Athenaeum. Author of Artists at Home; George Cruik- j (jjihert Sir John. shank; Memorials of W. Mulready; French and Flemish Pictures; i > ir E. Landseer;\ ‘

I

Author of i Gregory I,

G. C. M. G. C. W.

G. F. Z. G. G.

G. Sn.

G. S. C. G. W. E. R.

G. W. T.

H. A. de C. H. B. Wo.

H. Ch.

H. De, H. G. H.

T. C. Hook, R A.; &c.

Rev. Frederick Homes Dudden, D.D.

Fellow, Tutor and Lecturer in Theology, Lincoln College, Oxford. Gregory the Great, his Place in History and Thought; &c.

Franklin Henry Hooper.

Assistant Editor of the Century Dictionary.

Francis John Haverfield, M.A., LL.D., F.S.A.

Camden Professor of Ancient History in the University of Oxford. Fellow of , Brasenose College. Fellow of the British Academy. Author of Monographs on Roman History, especially Roman Britain; &c.

Fridtjof Nansen.

See the biographical article, Nansen, Fridtjof.

Frank R. Cana.

Author of South Africa from the Great Trek to the Union.

Francis Samuel Philbrick, A.M., Ph.D.

Formerly Scholar and Resident Fellow of Harvard University. Member of • American Historical Association.

] Hancock, Winfleld Scott.

Graham's Dyke.

Greenland.

Gold Coast.

Hamilton, Alexander.

Gujarati and Rajasthani.

Gower, John.

Frederick William Rudler, I.S.O., F.G.S. f

Curator and Librarian of the Museum of Practical Geology, London, 1879-1902."! Gypsum; Haematite. President of the Geologists' Association, 1887-1889. L

George Abraham Grierson, G.I.E., Ph.D., D.Litt. (Dublin).

Member of the Indian Civil Service, 1873-1903. In charge of Linguistic Survey of India, 1898-1902. Gold Medallist, Royal Asiatic Society, 1909. Vice-President – of the Royal Asiatic Society. Formerly Fellow of Calcutta University. Author of The Languages of India ; &c.

George Campbell Macaulay, M.A.

Lecturer in English in the University of Cambridge. Formerly Professor of English . Language and Literature in the University of Wales. Editor of the Works of John Gower; &c. ■ *-

George Charles Williamson, Litt.D. f

Chevalier of the Legion of Honour. Author of Portrait Miniatures ; Life of Richard J Greco, EL Cosway, R.A.; George Engleheart; Portrait Drawings; &c. Editor of new edition of I Bryan's Dictionary of Painters

and Engravers. L

George Frederick Zimmer, A.M.Inst.C.E. f

Author of Mechanical Handling of Material. 1

Sir Alfred George Greenhill, M.A., F.R.S.

Formerly Professor of Mathematics in the Ordnance College, Woolwich. Examiner in the University of Wales. Member of the Aeronautical Committee. Author "* of Notes on Dynamics; Hydrostatics; Differential and Integral Calculus, with Applica- tions; &c.

Grant Showerman, A.M., Ph.D.

Professor of Latin in the University of Wisconsin. Member of the Archaeological _ Institute of America. Member of American Philological Association. Author of With the Professor ; The Great Mother of the Gods ; &c.

Sir George Sydenham Clarke, G.C.M.G., G.C.I.E., F.R.S.

Governor of Bombay. Author of Imperial Defence; Russia's Great Sea Power;' The Last Great Naval War; &c.

Rt. Hon. George William Erskine Russell, P.C., M.A., LL.D.

Under-Secretary of State for the Home Department, 1 894-1 895; for India, 1892- . 1894. M.P. for Aylesbury, 1880-1885; for North Beds., 1892-1895. Author of Life of W. E. Gladstone ; Collections and Recollections ; &c.

Rev. Griffiths Wheeler Thatcher, M.A., B.D.

Warden of Camden College, Sydney, N.S.W. Formerly Tutor in Hebrew and Old ' Testament History at Mansfield College, Oxford,

Henry Anselm de Colyar, K.C.

Author of The Law of Guarantees and of Principal and Surety ; &c.

Granaries.

Gyroscope and Gyrostat.

Great Mother of the Gods.

Greco-Turkish War, 1897.

{

Gladstone, W. E.

Hajjl Khalifa; Hamadhanl; HandanT; Hammad ar-Rawiya; Hariri.

Guarantee.

Horace Bolingbroke Woodward, F.R.S., F.G.S.

Formerly Assistant Director of the Geological Survey of England and Wales, dent, Geologists' Association, 1 893-1 894. Wollaston Medallist, 1908.

Presi—ˆ Haidinger, W. K.

Hugh Chisholm, M.A.

Formerly Scholar of Corpus Christi Coilege, Oxford. Editor of the nth edition of the Encyclopaedia Britannica; co-editor of the 10th edition.

Hippolyte Delehaye, S. J.

Assistant in the compilation of the Bollandist publications: Analecta Bollandiana and A eta sanctorum.

Horatio Gordon Hutchinson.

Amateur Golf Champion, 1886-1887. Author of Hints on Golf; Golf (Badminton Library) ; Book of Golf and Golfers ; &c.

Goschen, 1st Viscount; Granville, 2nd Earl; Hamilton, Alexander

{in part); Harcourt, Sir William.

Giles, St; Hagiology. Golf.

INITIALS AND HEADINGS OF ARTICLES

IX

H. J. P.

H. Lb.

Harmonic Analysis.

H.

L. H.

H.

M. C.

H.

M. Wo.

H.

R.

H.

Sw.

H.

S.-K.

H

W. C. D

H

. W. R.*

Harry James Powell, F.C.S.

Of Messrs James Powell & Sons, Whitefriars Glass Works, London. Member of Committee of six appointed by Board of Education to prepare the scheme for the re- 1 Glass. arrangement of the Art Collection of the Victoria and Albert Museum. Author of Glass Making ; &c.

Horace Lamb, M.A., LL.D., D.Sc, F.R.S.

Professor of Mathematics, University of Manchester. Formerly Fellow and Assistant Tutor of Trinity College, Cambridge. Member of Council of Royal ” Society, 1894-1896. Royal Medallist, 1902. President of London Mathematical Society, 1902-1904. Author of Hydrodynamics ; &c.

Harriet L. Hennessy, L.R.C.S.I., L.R.CP.L, M.D. (Brux.) Gynaecology.

Hector Munro Chadwick, M.A. J rwy,,.. anthir Tntipvnt,?

Librarian and Fellow of Clare College, Cambridge. Author of Studies on Anglo- yˆ olDS – L,omc ˆ a nuage- Saxon Institutions.

Harold Mellor Woodcock, D.Sc. f

Assistant to the Professor of Proto-Zoology, London University. Fellow of. University College, London Author of Haemoflagellates in Sir E. Ray Lankes- ter's Treatise of Zoology, and of various scientific papers

Gregarines; Haemosporidia.

Guizot {in part).

Grimm, J. L C; Grimm, Wilhelm Carl.

■I Gun.

I. A.

J. A. F. M.

J. A. H.

J. A. S. J. Bl.

J. Bt.

J. D. B.

J. E. S.*

J.Fi.

J. G. C. A.

J. G. R. J. H. P.

Henry Reeve, D.C.L.

See the biographical article, Reeve, Henry.

Henry Sweet, M.A., Ph.D., LL.D.

University Reader in Phonetics, Oxford. Member of the Academies of

Munich, . Berlin, Copenhagen and Helsingfors. Author of A History of English Sounds since the Earliest Period ; A Handbook of Phonetics ; &c.

Sir Henry Seton-Karr, C.M.G., M.A.

M.P. for St. Helen's, 1885-1906. Author of My Sporting Holidays; &c.

Henry William Carless Davis, M.A. \ Gilbert, Foliot;

Fellow and Tutor of Balliol College, Oxford. Fellow of All Souls College, Oxford, H Gloucester, Robert, Earl of; 1895-1902. Author of England under the Normans and Angevins; Charlemagne. |_ Grosseteste.

Rev. Henry Wheeler Robinson, M.A. f

Professor of Church History in Rawdon College, Leeds. Senior Kennicott Scholar, j H a i,akkuk Oxford University, 1901. Author of Hebrew Psychology in Relation to Pauline aaua Anthropology (in Mansfield College Essays) ; &c. I

Israel Abrahams, M.A. f Graetz; Habdala;

Reader in Talmudic and Rabbinic Literature, University of Cambridge. President, J Halakha; Halevi;

Jewish Historical Society of England. Author of A Short History of Jewish Litera- w ao fc, ra . garizi

lure; Jewish Life in the Middle Ages. I '

John Alexander Fuller Maitland, M.A., F.S.A. (”

Musical Critic of The Times. Author of Life of Schumann ; The Musician's Pilgrim- J r _„„. c,— n „ r ,, isic; English Music in the Nineteenth Century; The Age] urove > B ” worge.

age ; Masters of German Music ;

of Bach and Handel. Editor of new edition of Grove's Dictionary of Music ; &c.

a ., 1 J Glacial Period: Author of j Greensand-

j Guarini.

Graduation.

John Allen Howe, B.Sc.

Curator and Librarian of the Museum of Practical Geology, London. The Geology of Building Stones,

John Addington Symonds, LL.D.

See the biographical article, Symonds, J. A.

James Blyth, M.A., LL.D.

Formerly Professor of Natural Philosophy, Glasgow and West of Scotland Technical College. Editor of Ferguson's Electricity.

James Bartlett. f

Lecturer on Construction, Architecture, Sanitation, Quantities, &c, King's College, J Glazing. London. Member of Society of Architects, Institute of Junior Engineers, Quantity Surveyors' Association. Author of Quantities. ˆ

James David Bourchier, M.A., F.R.G.S. fˆ 06 ; Geog ™* hy and

King's College, Cambridge. Correspondent of The Times in South-Eastern Europe. J History. Modern, Commander of the Orders of Prince Danilo of Montenegro and of the Saviour of 1 Greek Literature: III. Greece, and Officer of the Order of St Alexander of Bulgaria. L Modern.

John Edwin Sandys, M.A., Litt.D., LL.D. f

Public Orator in the University of Cambridge. Fellow of St John's College, Cam- . bridge. Fellow of the British Academy. Author of History of Classical Scholar- ship; &c.

Greek Law.

Grant, Ulysses S.

Gordium,

John Fiske.

See the biographical article, Fiske, J.

John George Clark Anderson, M.A.

Censor and Tutor of Christ Church, Oxford. Formerly Fellow of Lincoln College. – Craven Fellow (Oxford), 1896. Conington Prizeman, 1893. I

John George Robertson, M.A., Ph.D. f

Professor of German Language and Literature, University of London. Author of J Goethe * Grillparzer. History of German Literature; Schiller after a Century; &c. Editor of the Modern | ‘

Language Journal. I

John Henry Freese, M.A. /Gracchus; Gratian;

Formerly Fellow of St John’s College, Cambridge. L Hadrian {in part).

X

J. H. H. J. H. P.

J. HI. R.

J. L. W.

J. M. M.

J. S. F. J. T. Be.

J. T. S.* K. G. J. K. Kr.

K. S.

L. D.* L. F. D.

L. F. V.-H.

L. J. S.

L. R. F.

M. M. G.

M. H. S.

M. Ja. H. M.

INITIALS AND HEADINGS OF ARTICLES ,

{

Gloss; Gutenberg.

John Henry Hessels, M.A.

Author of Gutenberg: an Historical Investigation.

John Henry Poynting, D.Sc, F.R.S. f

Professor of Physics and Dean of the Faculty of Science in the University of Bir- J Gravita ti on (in pari). mingharn. Formerly Fellow of Trinity College, Cambridge. Joint-author of I ext- r

Book of Physics. I

John Holland Rose, M.A., Litt.D. f

Lecturer on Modern History to the Cambridge University Local Lectures Syndicate. \ fioureaud Baron Author of Life of Napoleon I.; Napoleonic Studies; The Development of the European I ° ‘

Nations; The Life of Pitt ; &c. I

Miss Jessie Laidlay Weston.

Author of Arthurian Romances unrepresented in Malory.

John Malcolm Mitchell.

Sometime Scholar of Queen’s College, Oxford. Lecturer in Classics, East London – College (University of London). Joint-editor of .Grote’s History of Greece.

John Smith Flett, D.Sc, F.G.S.

Petrographer to the Geological Survey. Formerly Lecturer on Petrology in Edin- „ burgh University. Neill Medallist of the- Royal Society of Edinburgh. Bigsby Medallist of the Geological Society of London.

John T. Bealby.

Joint author of Stanford’s Europe. Formerly Editor of the Scottish Geographical • Magazine. Translator of Sven Hedin’s Through Asia, Central Asia and Tibet; &c.

James Thomson Shotwell, Ph.D.

Professor of History in Columbia University, New York City.

J Grail, The Holy; I Guenevere.

f Grote; Hamilton, Sir William, Bart, (in pari); Harem.

Glauconite; Gneiss; Granite; Granulite; Gravel; Greisen; Greywacke.

Gobi.

Golden Rose (in part) ; Goliad; [Guizot (in part).

Kingsley Garland Jayne.

Sometime Scholar of Wadham College, Oxford. Author of Vasco da Gama and his Successors.

Matthew Arnold Prizeman, 1903. ‘1 Goa.

Karl Krumbacher.

. See the biographical article, Krumbacher, Carl.

Miss Kathleen Schlesinger.

Editor of the Portfolio of Musical Archaeology. • Orchestra; &c.

Author of The Instruments of the

Louis Duchesne.

See the biographical article, Duchesne, L. M. O.

Lewis Foreman Day, F.S.A. (1845-1909).

Formerly Vice-President of the Society of Arts. Past Master of the Art Workers’ – Gild. Author of Windows, a book about Stained Glass ; &c.

J Greek Literature:

\ II. Byzantine.

Glockenspiel; Gong; Guitar; Guitar Fiddle; Gusla; Harmonica; Harmonichord; . Harmonium (in part).

\ Gregory: Popes, II.-VI.

Glass, Stained.

Harbour.

Goniometer; Gothite; Graphite (in part); Greenockite.

Leveson Francis Vernon-Harcourt, M.A., M.Inst. C.E. (1839-1907).

Formerly Professor of Civil Engineering at University College, London. Author of Rivers and Canals; Harbours and Docks; Civil Engineering as applied in Con- struction; &c.

Leonard James Spencer, M.A.

Assistant in the Department of Mineralogy, British Museum. Formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar. Editor of the Mineralogical Magazine.

Lewis Richard Farnell, M.A., Litt.D. f

Fellow and Senior Tutor of Exeter College, Oxford ; University Lecturer in Classical J (Jjeek Religion Archaeology; Wilde Lecturer in Comparative Religion. Author of Cults of the\ Greek States ; Evolution of Religion. I

Lord Macaulay. /Goldsmith Oliver

See the biographical article, Macaulay, T. B. M., Baron. “< « 0lasnmn > ullver –

Moses Gaster, Ph.D.

Chief Rabbi of the Sephardic Communities of England. Vice-President, Zionist Congress, 1898, 1899, 1900. Ilchester Lecturer at Oxford on Slavonic and Byzantine Literature, 1886 and 1 89 1. President, Folk-lore Society of England. Vice-President, Anglo-Jewish Association. Author of History of Rumanian Popular Literature ; &c.

Marion H. Spielmann, F.S.A. *

Formerly Editor of the Magazine of Art. Member of Fine Art Committee of Inter- national Exhibitions of Brussels, Paris, Buenos Aires, Rome and the Franco- British Exhibition, London. Author of History of “Punch”; British Portrait’ Painting to the opening of the Nineteenth Century ; Works of G. F. Watts, R.A . ; British Sculpture and Sculptors of To-day ; Henriette Ronner ; &c.

Morris Jastrow, Jun., Ph.D.

Professor of Semitic Languages, University of Pennsylvania, U.S.A. Author of Religion of the Babylonians and Assyrians; &c.

Max Arthur Macauliffe. r

Formerly Divisional Judge in the Punjab. Author of The Sikh Religion, its Gurus, \ Sacred Writings and Authors; &c. Editor of Life of Guru Nanak, in the Punjabi] language. I

Gipsies.

Gilbert, Alfred; Greenaway, Kate.

Gilgamesh, Epic of; Gula.

Granth.

INITIALS AND HEADINGS OF ARTICLES

XI

M. N. T.

M.

0. B.

C

M.

P.

M

P.*

0.

Ba.

P.

A.

P.

A. A.

P. C. Y.

P. G. P. Gi.

P. G. K.

P.

G. T.

La.

McC.

R.

A. W

R

A. S.

M

R

C.J.

R. J. M.

R. L.’

R. N. B.

Marcus Niebuhr Tod, M.A.

Fellow and Tutor of Oriel College, Oxford. University Lecturer in Epigraphy. ‘ Joint-author of Catalogue of the Sparta Museum

Lecturer in Greek at Birming-

Auxiliary of the Institute \ Gouffler; Harcourt.

Maximilian Otto Bismarck Caspari, M.A.

Reader in Ancient History at London University, ham University, 1905-1908.

Mark Pattison.

See the biographical article, Pattison, Mark.

Leon Jacques Maxime Prinet.

Formerly Archivist to the French National Archives. of France (Academy of Moral and Political Sciences).

Oswald Barron, F.S.A.

Editor of The Ancestor, 1902-1905. Hon. Genealogist to Standing Council of the * Honourable Society of the Baronetage.

Paul Daniel Alphandery.

Professor of the History of Dogma, Ecole Pratique des Hautes Etudes, Sorbonne, ” Paris. Author of Les Idees morales chez les heterodoxes latines au debut du XUIe Steele,

Philip A. Ashworth, M.A., Doc. Juris.

New College, Oxford. Barrister-at-Law. Translator of H. R. von Gneist’s History ‘ of the English Constitution.

Gythium

Greece: History:

146 B.C. 1800 AJ).\ Hamilcar Barca; . Hannibal.

Grotius.

Girdle.

Gonzalo de Berceo.

Gneist.

Philip Chesney Yorke, M.A. Magdalen College, Oxford.

Percy Gardner, M.A.

See the biographical article, Gardner, Percy.

f Gunpowder Plot;

-j Halifax, 1st Marquess of;

I Hamilton, 1st Duke of.

-I Greek Art.

Peter Giles, M.A., LL.D., Litt.D. f”

Fellow and Classical Lecturer of Emmanuel College, Cambridge, and University J Greek Language; Reader in Comparative Philology. Formerly Secretary of the Cambridge Philo- 1 H. logical Society. Author of Manual of Comparative Philology. I

Paul George Konody. f”

Art Critic of the Observer and the Daily Mail. Formerly Editor of The Artist. 1 Hals, FranS. Author of The Art of Walter Crane; Velasquez, Life and Work; &c. L

Peter Guthrie Tait, LL.D.

See the biographical article, Tait, Peter Guthrie.

(“Hamilton, Sir William \ Rowan.

Greece: Geology.

Philip Lake, M.A., F.G.S.

Lecturer on Physical and Regional Geography in Cambridge University. Formerly of the Geological Survey of India. Author of Monograph of British Cambrian’ Trilobites. Translator and Editor of Kayser’s Comparative Geology. _

Primrose McConnell, F.G.S. r

Member of the Royal Agricultural Society. Author of Diary of a Working Farmef ; &c. “j trass ana Grassland.

Colonel Robert Alexander Wahab, C.B., C.M.G., CLE. f

Formerly H. M. Commissioner, Aden Boundary Delimitation. Served with Tirah Expeditionary Force, 1897-1898, and on the Anglo-Russian Boundary Commission, Pamirs, 1895. I

Robert Alexander Stewart Macalister, M.A., F.S.A. fGilead* Gilzal*

St John's College, Cambridge. Director of Excavations for the Palestine Explora- i _ . ' — ■ Gosnen.

Hadramut.

tion Fund.

Sir Richard Claverhouse Jebb, L.L.D., D.C.L.

See the biographical article, Jebb, Sir R. C.

Ronald John McNeill, M.A.

Christ Church, Oxford. Barrister-at-Law. Gazette, London.

Formerly Editor of the St James's

/Greek Literature:

L I. Ancient. Gowrie, 3rd Earl of; Gratton, Henry; Green Ribbon Club; Gymnastics;

Harcourt, 1st Viscount; lHardwicke, 1st Earl jf.

Richard Lydekker, M.A., F.R.S., F.G.S., F.Z.S. fCiraffe- Glutton-

Member of the Staff of the Geological Survey of India, 1874-1882. Author of J ri v „t n rt ftl1 . p na t'. Catalogues of Fossil Mammals, Reptiles and Birds in British Museum; The Deer of\ ul yP louon » «oai» all Lands; The Game Animals of Africa; &c. [Gorilla; Hamster; Hare.

Golitsuin, Boris, Dmitry,

R. S. T.

Robert Nisbet Bain (d. 1909).

Assistant Librarian, British Museum, 1883-1.909. Author of Scandinavia, the Political History of Denmark, Norway and Sweden, 1513-iQOo; The First Romanovs, 1613-172$; Slavonic Europe, the Political History of Poland and Russia from 1469 to 1769; &c.

Ralph Stockman Tarr.

Professor of Physical Geography, Cornel! University.

and Vasily; Golovin, Count; Golovkin, Count; Gortz, Baron von; Griffenfeldt, Count; Gustavus I., and IV. Gyllenstjerna; Hall, C. C.

j Grand Canyon.

xii

R. We.

S. A. C.

S. Bl. S. C. St. C. S.N. T. As.

T. A. J. T. Ba.

T. E. H.

T. F. C. T. H. H.*

T. K.

T. Se.

V. H. S. W. A. B. C.

W. A. P.

W. Bo. W. Bu. W. F. C.

W. G. M.

Gideon.

INITIALS AND HEADINGS OF ARTICLES

Richard Webster, A.M. (Princeton). J”

Formerly Fellow in Classics, Princeton University. Editor of The Elegies of A Great Awakening, Maximianus ; &c. I

Stanley Arthur Cook, M.A.

Editor for Palestine Exploration Fund. Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904-1908. Author of Glossary of Aramaic Inscrip- tions; The Laws of Moses and the Code of Hammurabi; Critical Notes on Old Testament History; Religion of Ancient Palestine; &c.

Sigfus Blondal.

Librarian of the University of Copenhagen.

Sidney Colvin, LL.D.

See the biographical article, Colvin, Sidney.

Viscount St. Cyres.

See the biographical article, Iddesleigh, ist Earl of.

Simon Newcomb, LL.D., D.Sc.

See the biographical article, Newcomb, Simon.

Thomas Ashby, M.A., D.Litt., F.S.A.

Director of the British School of Archaeology at Rome. Corresponding Member of the Imperial German Archaeological Institute. Formerly Scholar of Christ Church, Oxford. Craven Fellow, Oxford, 1897. Author of The Classical Topo- graphy of the Roman Campagna ; &c.

\ Hallgrimsson.

< Giorgione; Giotto.

j Guyon, Madame.

/Gravitation (in part).

Girgenti; Gnatia; Grottaferrata; Grumentum; Gubbio; Hadria; Halaesa.

Thomas Athol Joyce, M.A. C

Assistant in Department of Ethnography, British Museum. Hon. Sec, Royal -j Hamitic Races (I.). Anthropological Institute. [,

Sir Thomas Barclay, M.P. r

Member of the Institute of International Law. Member of the Supreme Council J _ … of the Congo Free State. Officer of the Legion of Honour. Author of Problems j « uer rilla. of International Practice and Diplomacy; &c. M.P. for Blackburn, 1910. I

Thomas Erskine Holland, K.C., D.C.L., LL.D.

Fellow of the British Academy. Fellow of All Souls College, Oxford.

Professor

of International Law in the University of Oxford, 1874-1910. Bencher of Lincoln's J JJall William E.

Inn. Author of Studies in International Law; The Elements of Jurisprudence; '

Alberici Gentilis dejure belli ; The Laws of War on Land ; Neutral Duties in a Maritime

War; &c.

Theodore Freylinghuysen Collier, Ph.D.

Assistant Professor of History, Williams College, Williamstown, Mass., U.S.A.

Sir Thomas Hungerford Holdich, K.C.M.G., K.C.I.E., D.Sc, F.R.G.S. I"

Colonelin the Royal Engineers. Superintendent Frontier Surveys, India, 1892- J Gilgit;

/Gregory: Popes, \ XIII— XV.

Gold Medallist, R.G.S. (London), 1887. H.M. Commissioner for the Persa- 1 Hari-Rud. " " Author of The Indian Borderland ; The Gates of India ; &c. L

{

Beluch Boundary, 1

Thomas Kirkup, M.A., LL.D.

Author of An Inquiry into Socialism; Primer of Socialism; &c.

Thomas Seccombe, M.A.

Lecturer in History, East London and Birkbeck Colleges, University of London. Stanhope Prizeman, Oxford, 1887. Formerly Assistant Editor of Dictionary of- National Biography, 1891-1901. Author of The Age of Johnson; &c. ; Joint-author of The Bookman History of English Literature.

Rev. Vincent Henry Stanton, M.A., D.D.

Ely Professor of Divinity in the University of Cambridge. Canon of Ely and Fellow Of Trinity College, Cambridge. Author of The Gospels as Historical Documents; The Jewish and the Christian Messiahs ; &c.

Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D. (Bern). Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880- 188 1. Author of Guide du Haul Dauphine; The Range of- the Todi; Guide to Grindelwald; Guide to Switzerland; The Alps in Nature and in History; &c. Editor of The Alpine Journal, 1880-1889; &c.

Hadrian (in part).

Gilbert, Sir W. S.

Gospel.

Glarus; Goldast Ab

Haiminsfeld; Grasse; Grenoble; Grindelwald; Grisons; Gruner. G. S.; Gruyere.

Author of < Gnosticism.

Walter Alison Phillips, M.A. f Girondists; Goethe:

Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, j Descendants of Oxford. Author of Modern Europe; &c. [Greek Independence, War of.

Wilhelm Bousset, D.Th.

Professor of New Testament Exegesis in the University of Gottingen. Das Wesen der Religion; The Antichrist Legend; &c.

William Burnside, M.A., D.Sc, LL.D., F.R.S. r

Professor of Mathematics, Royal Naval College, Greenwich. Hon. Fellow of -J Groups, Theory of. Pembroke College, Cambridge. Author of The Theory of Groups of Finite Order. I

William Fhlden Craies, M.A. r

Barrister-at-LaW, Inner Temple. Lecturer_ on Criminal Law, King's College, |]

London. Author of Craies on Statute Law. (23rd edition).

Editor of Archbold's Criminal Pleading 1

Habeas Corpus; Hanging.

Walter George McMillan, F.C.S., M.I.M.E. (d. 1904). |"

Formerly Secretary of the Institute of Electrical Engineers and Lecturer on Metal- \ Graphite (in part). lurgy, Mason College, Birmingham. Author of A Treatise on Electro- Metallurgy. [

INITIALS AND HEADINGS OF ARTICLES

xiu

W. Hu.

w.

H.

Be.

w.

H.

F.*

w.

J.

F.

w.

McD.

w.

M

M.

w.

M

R.

w.

P.

A

W. P. R.

W. R. W. Ri.

w.

Ri

.

w.

R.

D.

w.

R.

E.

H.

w.

R.

S.

w.

R.

S.

R.

w.

W

R

•

Rev. William Hunt, M.A., Litt.D.

President of Royal Historical Society, 1905-1909. Author of History of English Church, S97-i9o6\ The Church of England in the Middle Ages; Political History of England 1760-1801..

William Henry Bennett, M.A., D.D., D.Litt. (Cantab.).

Professor of Old Testament Exegesis in New and Hackney Colleges, London Formerly Fellow of St John's College, Cambridge. Lecturer in Hebrew at Firth ' College, Sheffield. Author of Religion of the Post-Exilic Prophets ; &c.

William Henry Fairbrother, M.A.,

Formerly Fellow and Lecturer, Lincoln College, Oxford. Author of Philosophy of Thomas Hill Green.

Green, J. R.

Gomer; Ham.

Green, Thomas Hill.

William Justice Ford (d. 1904). r

Formerly Scholar of St John's College, Cambridge. Headmaster of Leamington \ Grace, W. G. College. I

William McDougall, M.A. r

Reader in Mental Philosophy in the University of Oxford. Author of A Primer \ Hallucination. of Physiological Psychology; An Introduction to Social Psychology; Sec. [

Hamitic Races: II. Languages.

Giulio Romano; Gozzoli; Guido Reni.

Grey, Sir George.

-j Greeley, Horace.

r

Hallstatt.

W. Max Muller, Ph.D.

Professor of Exegesis in the R.E. Seminary, Philadelphia. Author of Asien und ■ Europa nach den Aegptischen Denkmdlern; &c.

William Michael Rossetti.

See the biographical article, Rossetti, Dante G.

Lieut.-Colonel William Patrick Anderson, M.Inst.C.E., F.R.G.S.

Chief Engineer, Department of Marine and Fisheries of Canada. Member of the Geographic Board of Canada. Past President of Canadian Society of Civil Engineers.

Hon. William Pember Reeves.

Director of London School of Economics. Agent-General and High Commissioner for New Zealand, 1896-1909. Minister of Education, Labour and Justice, New Zealand, 1 891-1896. Author of The Long White Cloud: a History of New Zealand; &c.

Whitelaw Reid, LL.D.

See the biographical article, Reid, Whitelaw.

William Ridgeway, M.A., D.Sc

Professor of Archaeology, Cambridge University, and Brereton Reader in Classics. Fellow of Gonville and Caius College, Cambridge. Fellow of the British Academy. President of Royal Anthropological Institute, 1908. President of Anthropological Section, British Association, 1908. Author of The Early Age of Greece; &c.

W. Rosenhain, D.Sc.

Superintendent of the Metallurgical Department,

Wyndham Rowland Dunstan, M.A., LL.D., F.R.S., F.C.S.

Director of the Imperial Institute. President of the International

Association of Tropical Agriculture. Member of the Advisory Committee for Tropical Agriculture, Colonial Office.

William Richard Eaton Hodgkinson, Ph.D., F.R.S. (Edin.), F.C.S.

Professor of Chemistry and Physics, Ordnance College, Woolwich. Formerly Professor of Chemistry and Physics, R.M.A., Woolwich. Part-author of Valentin- Hodgkinson's Practical Chemistry; &c.

William Robertson Smith, LL.D.

See the biographical article, Smith, William Robertson.

William Ralston Shedden-Ralston, M.A. r

Assistant in the Department of Printed Books, British Museum. Author of Russian \ Gogol. Folk Tales ; &c. [

William Walker Rockwell, Lic.Theol. ' /Gresorv XVI

Assistant Professor of Church History, Union Theological Seminary, New York. \

National Physical Laboratory. \ GIass {in P art ˆ

Gutta-Pereha.

Gun Cotton; Gunpowder.

/Haggai {in part).

PRINCIPAL UNSIGNED ARTICLES

Gilding.

Goat.

Griqualand East and

Gwalior.

Ginger.

Gold.

West.

Haddingtonshire.

Gironde.

Goldbeating.

Guanches.

Hair.

Gladiators.

Gotland.

Guards.

Haiti.

Glasgow.

Gourd.

Guatemala.

Halo.

Glastonbury.

Government.

Guelphs and Ghibellines.

Hamburg.

Gloucestershire.

Grain Trade.

Guiacum.

Hamlet.

Glove.

Granada.

Guillotine.

Hampshire.

Glueose.

Grasses.

Guise, House of

Hampton Roads

Glue.

Great Salt Lake.

Gum.

Hanover.

Glycerin.

ENCYCLOPAEDIA BRITANNICA

ELEVENTH EDITION

VOLUME XII

GICHTEL, JOHANN GEORG (1638-1710), German mystic, was born at Regensburg, where his father was a member of senate, on the 14th c?f March 1638. Having acquired at school an acquaintance with Greek, Hebrew, Syriac and even Arabic, he proceeded to Strassburg to study theology; but finding the theological prelections of J. S. Schmidt and P. J. Spener distasteful, he entered the faculty of law. He was admitted an advocate, first at Spires, and then at Regensburg; but having become acquainted with the baron Justinianus von Weltz (1621-1668), a Hungarian nobleman who cherished schemes for the reunion of Christendom and the conversion of the world, and having himself become acquainted with another world in dreams and visions, he abandoned all interest in his profession, and became an energetic promoter of the ” Christerbauliche J esusgesellschaft,” or Christian Edification Society of Jesus. The movement in its beginnings provoked at least no active hostility; but when Gichtel began to attack the teaching of the Lutheran clergy and church, especially upon the fundamental doctrine of justification by faith, he exposed him- self to a prosecution which resulted in sentence of banishment and confiscation (1665). After many months of wandering and occasionally romantic adventure, he reached Holland in January 1667, and settled at Zwolle, where he co-operated with Friedrich Breckling (1629-1711), who shared his views and aspirations. Having

become involved in the troubles of this friend, Gichtel, after a period of imprisonment, was banished for a term of years from Zwolle, but finally in 1668 found a home in Amsterdam, where he made the acquaintance of Antoinette Bourignon (1616-1680), and in a state of poverty (which, however, never became destitution) lived out his strange life of visions and day-dreams, of prophecy and prayer. He became an ardent disciple of Jakob Boehme, whose works he published in 1682 (Amsterdam, 2 vols.) ; but before the time of his death, on the 21st of January 17 10, he had attracted to himself a small band of followers known as Gichtelians or Brethren of the Angels, who propagated certain views at which he had arrived independently of Boehme. Seeking ever to hear the authoritative voice of God within them, and endeavouring to attain to a life altogether free from carnal desires, like that of " the angels in heaven, who neither marry nor are given in marriage," they claimed to exercise a priesthood " after the order of Melchizedek," appeasing the wrath of God, and ransoming the souls of the lost by sufferings endured vicariously after the example of Christ. While, however, Boehme " desired to remain a faithful son of the Church," the

Gichtelians became Separatists (cf. J. A. Dorner, History of Protestant Theology, ii. p. 185).

Gichtel's correspondence was published without his knowledge by Gottfried Arnold, a disciple, in 1701 (2 vols.), and again in 1708 (3 vols.). It has been frequently reprinted under the title Theosophia practica. The seventh volume of the Berlin edition (1768) contains a notice of Gichtel's life. See also G. C. A. von Harless, Jakob Bohme und die Alchimisten (1870, 2nd ed. 1882); article in All- gemeine deutsche Biographic

GIDDINGS, JOSHUA REED (1795-1864), American statesman, prominent in the anti-slavery conflict, was born at Tioga Point, now Athens, Bradford county, Pennsylvania, on the 6th of October 1795. In 1806 his parents removed to Ashtabula county, Ohio, then sparsely settled and almost a wilderness. The son worked on his father's farm, and, though he received no systematic education, devoted much time to study and reading. For several years after 1814 he was a school teacher, but in February 182 1 he was admitted to the Ohio bar and soon obtained a large practice, particularly in criminal cases. From 1831 to 1837 he was in partnership with Benjamin F. Wade. He served in the lower house of the state legislature in 1826-1828, and from December 1838 until March 1859 was a member of the national

House of Representatives, first as a Whig, then as a Free-soiler, and finally as a Republican. Recognizing that slavery was a state institution, with which the Federal govern- ment had no authority to interfere, he contended that slavery could only exist by a specific state enactment, that therefore slavery in the District of Columbia and in the Territories was un- lawful and should be abolished, that the coastwise slave-trade in vessels flying the national flag, like the international slave-trade, should be rigidly suppressed, and that Congress had no power to pass any act which in any way could be construed as a recognition of slavery as a national institution. His attitude in the so-called ” Creole Case ” attracted particular attention. In 1841 some slaves who were being carried in the brig ” Creole ” from Hampton Roads, Virginia, to New Orleans, revolted, killed the captain, gained possession of the vessel, and soon afterwards •entered the British port of Nassau. Thereupon, according to British law, they became free. The minority who had taken an active part in the revolt were arrested on a charge of murder, and the others were liberated. Efforts were made by the United States government to recover the slaves, Daniel Webster, then secretary of state, asserting that on an American ship they were under the jurisdiction of the United States and that they were legally property. On the 21st of March 1842, before the case

was settled, Giddings introduced in the House of Representatives a series of resolutions, in which he asserted that ” in resuming their natural rights of personal liberty ” the slaves ” violated no law of the United States.” For offering these resolutions Giddings was attacked with rancour, and was formally censured by the House. Thereupon he resigned, appealed to his constituents, and was immediately re-elected by a large majority. In 1859 he was not renominated, and retired from Congress after a continuous service of more than twenty years. From 1861 until his death, at Montreal, on the 27th of May 1864, he was U.S. consul-general in Canada. Giddings published a series of political essays signed ” Pacificus ” (1843); Speeches in Congress (1853); The Exiles of Florida (1858); and a History of the Rebellion: Its Authors and Causes (1864).

See The Life of Joshua R. Giddings (Chicago, 1892), by his son-in-law, George Washington Julian (1817-1899), a Free-soil leader and a representative in Congress in 1849-1851,3 Republican representative in Congress in 1861-1871, a Liberal Republican in the campaign of

1872, and afterwards a Democrat.

GIDEON (in Hebrew, perhaps ” hewer ” or ” warrior “), liberator, reformer and ” judge ” of Israel, was the son of Joash, of the Manassite clan of Abiezer, and had his home at Ophrah near Shechem. His name occurs in Heb. xi. 32, in a list of those who became heroes by faith; but, except in Judges vi.-viii., is not to be met with elsewhere in the Old Testament. He lived at a time when the nomad tribes of the south and east made inroads upon Israel, destroying all that they could not carry away. Two accounts of his deeds are preserved (see Judges). According to one (Judges vi. 11-24) Yahweh appeared under the holy tree which was in the possession of Joash and summoned Gideon to undertake, in dependence on supernatural direction and help, the work of liberating his country from its long oppres- sion, and, in token that he accepted the mission, he erected in Ophrah an altar which he called ” Yahweh-Shalom ” (Yahweh is peace). According to another account (vi. 25-32) Gideon was a great reformer who was commanded by Yahweh to destroy the altar of Baal belonging to his father and the asherah or sacred post by its side. The townsmen discovered the sacrilege and demanded his death. His father, who, as guardian of the sacred place, was priest of Baal, enjoined the men not to take up Baal’s quarrel, for ” if Baal be a god, let him contend (rib) for himself.” Hence Gideon received the name Jerubbaal. 1 From this latter name appearing regularly in the older narrative (cf. ix.), and from the varying usage in vi.-viii., it has been held that stories of two distinct heroes (Gideon and Jerubbaal) have been fused in the complicated account which follows. 2

The great gathering of the Midianites and their allies on the north side of the plain of Jezreel; the general muster first of Abiezer, then of all Manasseh, and lastly of the neighbouring tribes of Asher, Zebulun and Naphtali; the signs by which the wavering faith of Gideon was steadied; the methods by which an unwieldy mob was reduced to a small but trusty band of energetic and determined men; and the stratagem by which the vast army of Midian was surprised and routed by the handful of Israelites descending from ” above Endor,” are indicated fully in the narratives, and need not be detailed here. The difficulties in the account of the subsequent flight of the Midian- ites appear to have arisen from the composite character of the narratives, and there are signs that in one of them Gideon was accompanied only by his own clansmen (vi. 34). So, when the Midianites are put to flight, according to one representation, the Ephraimites are called out to intercept them, and the two chiefs, Oreb (” raven “) and Zeeb (” wolf “), in making for the fords of the Jordan, are slain at ” the raven’s rock” and ” the wolf’s press ” respectively. As the sequel of this we are

told that the Ephraimites quarrelled with Gideon because therr assistance had not been invoked earlier, and their anger was

1 ” Baal contends ” (or Jeru-baal, ” Baal founds,” cf. Jeru-el), but artificially explained in the narrative to mean ” let Baal contend against him,” or ” let Baal contend for himself,” v. 31. In 2 Sam. xi. 21 he is called Jerubbesheth, in accordance with the custom explained in the article Baal.

2 See, on this, Cheyne, Ency. Bib. col. 1719 seq.; Ed. Meyer, Die Jsraeliten, pp. 482 seq.

only appeased by his tactful reply (viii. 1-3; contrast xii. 1-6). The other narrative speaks of the pursuit of the Midianite chiefs Zebah and Zalmunna 3 across the northern end of Jordan, past Succoth and Penuel to the unidentified place Karkor. Having taken relentless vengeance on the men of Penuel and Succoth, who had shown a timid neutrality when the patriotic struggle was at its crisis, Gideon puts the two chiefs to death to avenge his brothers whom they had killed at Tabor. 4 The overthrow of Midian (cf. Is. ix. 4, x; 26; Ps. lxxxiii. 9-12) induced ” Israel” to offer Gideon the kingdom. It was refused — out of religious scruples (viii. 22 seq.; cf. 1 Sam. viii. 7, x. 19, xii. 12, 17, 19), and the ephod idol which he set up at Ophrah in commemoration of the victory was regarded by a later editor (v. 27) as a cause of apostasy to the people and a snare to Gideon and his house; see, however, Ephod. Gideon’s achievements would naturally give him a more than merely local authority, and after his death the attempt was made by one of his sons to set himself up as chief (see Abimelech).

See further Jews, section I ; and the literature to the book of Judges. (S. A. C.)

GIEBEL, CHRISTOPH GOTTFRIED ANDREAS (1820-1881), German zoologist and palaeontologist, was born on the 13th of September 1820 at Quedlinburg in Saxony, and educated at the university of Halle, where he graduated Ph. D. in 1845. In 1858 he became professor of zoology and director of the museum in the university of Halle. He died at Halle on the 14th of November- 1881. His chief publications were Paldozoologie (1846); Fauna der Vorwelt (1847-1856); Deutschlands Petre- facten (1852); Odontographie (1855); Lehrbuch der Zoologie (1857); Thesaurus ornithologiae (1872-1877).

GIEN, a town of central France, capital of an arrondissement in the department of Loiret, situated on the right bank of the Loire, 39 m.

E.S.E. of Orleans by rail. Pop. (1906) 6325. Gien is a picturesque and interesting town and has many curious old houses. The Loire is here crossed by a stone bridge of twelve arches, built by Anne de Beaujeu, daughter of Louis XL, about the end of the 15th century. Near it stands a statue of Ver- cingetorix. The principal building is the old castle used as a law-court, constructed of brick and stone arranged in geometrical patterns, and built in 1494 by Anne de Beaujeu. The church of St Pierre possesses a square tower dating from the end of the 15th century. Porcelain is manufactured.

GIERS, NICHOLAS KARLOVICH DE (1820-1895), Russian statesman, was born on the 21st of May 1820. Like his pre- decessor, Prince Gorchakov, he was educated at the lyceum of Tsarskoye Selo, near St Petersburg, but his career was much less rapid, because he had no influential protectors, and was handi- capped by being a Protestant of Teutonic origin. At the age of eighteen he entered the service of the Eastern department of the ministry of foreign affairs, and spent more than twenty years in subordinate posts, chiefly in south-eastern Europe, until he was promoted in 1863 to the post of minister pleni- potentiary in Persia. Here he remained for six years, and, after serving as a minister in Switzerland and Sweden, he was appointed in 1875 director of the Eastern department and assistant minister for foreign affairs under Prince Gorchakov, whose niece he had married. No sooner had he entered on his new duties than his great capacity for arduous work was put to a severe test. Besides events in central Asia, to which he had to devote much attention, the Herzegovinian insurrection had broken out, and he could perceive from secret official papers that the incident. had far-reaching ramifications unknown to the general public. Soon this became apparent to all the world. While the Austrian officials in Dalmatia, with hardly a pretence of concealment, were assisting the insurgents, Russian volunteers were flocking to Servia with the connivance of the Russian and Austrian governments, and General Ignatiev, as ambassador in

3 The names are vocalized to suggest the fanciful interpretations ” victim ” and ” protection withheld.”

4 As the account of this has been lost and the narrative is concerned not with the plain of Jezreel but rather with Shechem, it has been inferred that the episode implies the existence of a distinct story

I wherein Gideon’s pursuit is such an act of vengeance.

Constantinople, was urging his government to take advantage of the palpable weakness of Turkey for bringing about a radical solution of the Eastern question. Prince Gorchakov did not want a radical solution involving a great European war, but he was too fond of ephemeral popularity to stem the current of popular excitement. Alexander II., personally averse from war, was not insensible to the patriotic enthusiasm, and halted between two opinions. M. de Giers was one of the few who gauged the situation accurately. As an official and a man of non-Russian extraction he had to be extremely reticent, but to his intimate friends he condemned severely the ignorance and light-hearted recklessness of those around him. The event justified his sombre previsions, but did not cure the recklessness of the so-called patriots. They wished to defy Europe in order to maintain intact the treaty of San Stefaho, and again M. de Giers found himself in an unpopular minority. He had to remain in the back- ground, but all the influence he possessed was thrown into the scale of peace. His views, energetically supported by Count Shuvalov, finally prevailed, and the European congress assembled at Berlin. He was not present at the congress, and consequently escaped the popular odium for the concessions which Russia had to make to Great Britain and Austria. From that time he was practically minister of foreign affairs, for Prince Gorchakov was no longer capable of continued intellectual exertion, and lived mostly abroad. On the death of Alexander II. in 1881 it was generally expected that M. de Giers would be dismissed as deficient in Russian nationalist feeling, for Alexander III. was credited with strong anti-German Slavophil tendencies. In reality the young tsar had no intention of embarking on wild political adventures, and was fully determined not to let his hand be forced by men less cautious than himself. What he wanted was a minister of foreign affairs who would be at once vigilant and prudent, active and obedient, and who would relieve him from the trouble and worry of routine work while allowing him to control the main lines, and occasionally the details, of the national policy. M. de Giers was exactly what he wanted, and accordingly the tsar not only appointed him minister of foreign affairs on the retirement of Prince Gorchakov in 1882, but retained him to the end of his reign in 1894. In accordance with the desire of his august master, M. de Giers followed system-atically a pacific policy. Accepting as a fait accompli the existence of the triple alliance, created by Bismarck for the purpose of resisting any aggressive action on the part of Russia and France, he sought to establish more friendly relations with the cabinets of Berlin, Vienna and Rome. To the advances of the French government he at first

turned a deaf ear, but when the rapproche- ment between the two countries was effected with little or no co-operation on his part, he utilized it for restraining France and promoting Russian interests. He died on the 26th of January 1895, soon after the accession of Nicholas II. (D. M. W.)

GIESEBRECHT, WILHELM VON (1814-1889), German historian, was a son of Karl Giesebrecht (d. 1832), and a nephew of the poet Ludwig Giesebrecht (1792-1873). Born in Berlin on the 5th of March 1814, he studied under Leopold von Ranke, and his first important work, Geschichte Ottos 1 1., was contributed to Ranke's Jahrbiicher des deutschen Reichs unter dem sdchsischen Hause (Berlin, 1837-1840). In 1841 he published his Jahrbiicher des Klosters Altaich, a reconstruction of the lost Annates Alta- henses, a medieval source of which fragments only were known to be extant, and these were obscured in other chronicles. The brilliance of this performance was shown in 1867, when a copy of the original chronicle was found, and it was seen that Giese- brecht's text was substantially correct. In the meantime he had been appointed Oberlehrer in the Joachimsthaler Gymnasium in Berlin; had paid a visit to Italy, and as a result of his re- searches there had published De litterarum studiis apud Italos primis medii aevi seculis (Berlin, 1845), a study upon the survival of culture in Italian cities during the middle ages, and also several critical essays upon the sources for the early history of the popes. In 1851 appeared his translation of the Historiae of Gregory of Tours, which is the standard German translation. Four years later appeared the first volume of his great work,

Geschichte der deutschen Kaiserzeit, the fifth volume of which was published in 1888. This work was the first in which the results of the scientific methods of research were thrown open to the world at large. Largeness of style and brilliance of portrayal were joined to an absolute mastery of the sources in a way hitherto unachieved by any German historian. Yet later German historians have severely criticized his glorification of the imperial era with its Italian entanglements, in which the interests of Germany were sacrificed for idle glory. Giesebrecht's history, however, appeared when the new German empire was in the making, and became popular owing both to its patriotic tone and its intrinsic merits. In 1857 he went to Konigsberg as professor ordinarius, and in 1862 succeeded H. von Sybel as professor of history in the university of Munich. The Bavarian government honoured him in various ways, and he died at Munich on the 17th of December 1889. In addition to the works already mentioned, Giesebrecht published a good monograph on Arnold of Brescia (Munich, 1873), a collection of essays under the title Deutsche

Reden (Munich, 1871), and was an active member of the group of scholars who took over the direction of the Monumenta Germaniae hislorica in 1875. In 1895 B. von Simson added a sixth volume to the Geschichte der deutschen Kaiserzeit, thus bringing the work down to the death of the emperor Frederick I. in 1190.

See S. Riezler, Geddchtnisrede auf Wilhelm von Giesebrecht (Munich, 1 891); and Lord Acton in the English Historical Review, vol. v. (London, 1890).

GIESELER, JOHANN KARL LUDWIG (1792-1854), German writer on church history, was born on the 3rd of March 1792 at Petershagen, near Minden, where his father, Georg Christof Friedrich, was preacher. In his tenth year he entered the orphanage at Halle, whence he duly passed to the university, his studies being interrupted, however, from October 1813 till the peace of 181 5 by a period of military service, during which he was enrolled as a volunteer in a regiment of chasseurs. On the conclusion of peace (181 5) he returned to Halle, and, having in 181 7 taken his degree in philosophy, he in the same year became assistant head master (Conrector) in the Minden gymnasium, and in 1818 was appointed director of the gymnasium at Cleves. Here he published his earliest work (Historisch- krilischer Versuch ilber die Entstehung u. die frilhesten Schicksale der schrifllichen Evangelien), a treatise which had considerable influence on subsequent investigations as to the origin of the gospels. In 1819 Gieseler was appointed a professor ordinarius in theology in the newly founded university of Bonn, where, besides lecturing on church history, he made important con- tributions to the literature of that subject in Ernst Rosenmiiller's Repertorium, K. F. Staudlin and H. G. Tschirner's Archiv, and in various university " programs." The first part of the first volume of his well-known Church History appeared in 1824. In 1 83 1 he accepted a call to Gottingen as successor to J. G. Planck. He lectured on church history, the history of dogma, and dogmatic theology. In 1837 he was appointed a Consistorial rath, and shortly afterwards was created a knight of the Guelphic order. He died on the 8th of July 1854. The fourth and fifth volumes of the Kirchengeschichte, embracing the period sub- sequent to 1814, were published posthumously in 1855 by E. R. Redepenning (1810-1883); and they were followed in 1856 by a Dogmengeschichte, which is sometimes reckoned as the sixth volume of the Church History. Among church historians Gieseler continues to hold a high place. Less vivid and pictur- esque in style than Karl Hase, conspicuously deficient in Neander's deep and sympathetic insight into the more spiritual forces by which church life is pervaded, he excels these and all other contemporaries in the fulness and accuracy of his informa-

tion. His Lehrbuch der Kirchengeschichte, with its copious references to original authorities, is of great value to the student: ” Gieseler wished that each age should speak for itself, since only by this means can the peculiarity of its ideas be fully appreciated ” (Otto Pfleiderer, Development of Theology, p. 284). The work, which has passed through several editions in Germany, has partially appeared also in two English translations. That

published in New York (Text Book of Ecclesiastical History, 5 vols.) brings the work down to the peace of Westphalia, while that published in ” Clark’s Theological Library ” (Compendium of Ecclesiastical History, Edinburgh, 5 vols.) closes with the beginning of the Reformation. Gieseler was not only a devoted student but also an energetic man of business. He frequently held the office of pro-rector of the university, and did much useful work as a member of several of its committees.

GIESSEN, a town of Germany, capital of the province of Upper Hesse, in the grand-duchy of Hesse-Darmstadt, is situated in a beautiful and fruitful valley at the confluence of the Wieseck with the Lahn, 41 m. N.N.W. of Frankfort-on-Main on the railway to Cassel; and at the junction of important lines to Cologne and Coblenz. Pop. (1885) 18,836; (1905) 29,149. In the old part of the town the streets are narrow and irregular. Besides the university, the principal buildings are the Stadt- kirche, the provincial government offices, comprising a portion of the old castle dating from the 12th century, the arsenal (now barracks) and the town-hall (containing an historical collection). The university, founded in 1607 by Louis V , landgrave of Hesse, has a large and valuable library, a botanic garden, an observatory, medical schools, a museum of natural history, a chemical laboratory which was directed by Justus von Liebig, professor here from 1824 to 1852, and an agricultural college. The industries include the manufacture of woollen and cotton cloth of various kinds, machines, leather, candles, tobacco and beer.

Giessen,the name of which is probably derived from the streams which pour (giessen) their waters here into the Lahn, was formed in the 12th century out of the ‘villages Selters, Aster and Kroppach, for whose protection Count William of Gleiberg built the castle of Giessen. Through marriage the town came, in 1 203, into the possession of the count palatine, Rudolph of Tubingen, who sold it in 1265 to the landgrave Henry of Hesse. It was surrounded with fortifications in 1530, which were demolished in 1547, but rebuilt in

1560. In 1805 they were finally pulled down, and their site converted into promenades.

See O. Buchner, FHhrer filr Giessen und das Lahntal (1891); and Aus Giessens Vergangenheit (1885).

GIFFARD, GODFREY (c. 1235-1302), chancellor of England and bishop of Worcester, was a son of Hugh Giffard of Boyton, Wiltshire. Having entered the church he speedily obtained valuable preferments owing to the influence of his brother Walter, who became chancellor of England in 1265. In 1266 Godfrey became chancellor of the exchequer, succeeding Walter as chancellor of England when, in the same year, the latter was made archbishop of York. In 1268 he was chosen bishop of Worcester, resigning the chancellorship shortly afterwards; and both before and after 1279, when he inherited the valuable property of his brother the archbishop, he was employed on public business by Edward I. His main energies, however, were devotedto the affairs of his see. He had one long dispute with the monks of Worcester, another with the abbot of West- minster, and was vigilant in guarding his material interests. The bishop died on the 26th of January 1302, and was buried in his cathedral. Giffard, although inclined to nepotism, was a benefactor to his cathedral, and completed and fortified the episcopal castle at Hartlebury.

See W. Thomas, Survey of Worcester Cathedral; Episcopal Registers ; Register of Bishop Godfrey Giffard, edited by J. W. Willis-Bund (Oxford, 1898-1899); and the Annals of Worcester in the Annates monastics, vol. iv., edited by H. R. Luard (London, 1869).

GIFFARD, WALTER (d. 1279), chancellor of England and archbishop of York, was a son of Hugh Giffard of Boyton, Wiltshire, and after serving as canon and archdeacon of Wells, was chosen bishop of Bath and Wells in May 1264. In August ,1265 Henry III. appointed him chancellor of England, and he was one of the arbitrators who drew up the dictum de Kenilworth in 1266. Later in this year Pope Clement IV. named him arch- bishop of York, and having resigned the chancellorship he was an able and diligent ruler of his see, although in spite of his great wealth he was frequently in pecuniary difficulties. When

Henry III. died in November 1272 the archbishopric of Canter- bury was vacant, and consequently the great seal was delivered to the archbishop of York, who was the chief of the three regents who successfully governed the kingdom until the return of Edward I. in August 1274. Having again acted in this capacity during the king’s

absence in 1275, Giffard died in April 1279, and was buried in his cathedral.

See Fasti Eboracenses, edited by J. Raine (London, 1863). Giffard's Register from 1266 to 1279 has been edited for the Surtees Society by W. Brown.

GIFFARD, WILLIAM (d. n 29), bishop of Winchester, was chancellor of William II. and received his see, in succession to Bishop Walkelin, from Henry I. (1100). He was one of the bishops elect whom Anselm refused to consecrate (1101) as having been nominated and invested by the lay power. During the investi- tures dispute Giffard was on friendly terms with Anselm, and drew upon himself a sentence of banishment through declining to accept consecration from the archbishop of York (1103). He was, however, one of the bishops who pressed Anselm, in 1106, to give way to the king. He was consecrated after the settle- ment of 1 107. He became a close friend of Anselm, aided the first Cistercians to settle in England, and restored Winchester cathedral with great magnificence.

See Eadmer, Historia novorum, edited by M. Rule (London, 1884) ; and S. H. Cass, Bishops of Winchester (London, 1827).

GIFFEN, SIR ROBERT (1837-1910), British statistician and economist, was born at Strathaven, Lanarkshire. He entered a solicitor's office in Glasgow, and while in that city attended courses at the university. He drifted into journalism, and after working for the Stirling Journal he went to London in 1862 and joined the staff of the Globe. He also assisted Mr John (afterwards Lord) Morley, when the latter edited the Fortnightly Review. In 1868 he became Walter Bagehot's assistant-editor on the Economist; and his services were also secured in 1873 as city- editor of the Daily News, and later of The Times. His high reputation as a financial journalist and statistician, gained in these years, led to his appointment in 1876 as head of the statistical department in the Board of Trade, and subsequently he became assistant secretary (1882) and finally controller- general (1892), retiring in 1897. In connexion with his position as chief statistical adviser to the government, he was constantly employed in drawing up reports, giving evidence before commis- sions of inquiry, and acting as a government auditor, besides publishing a number of important essays on financial subjects. His principal publications were Essays on Finance (1879 and 1884), The Progress of the Working Classes (1884), The Growth of Capital (1890), The Case against Bimetallism (1892), and Economic Inquiries and Studies (1904). He was president of the Statistical Society (1882-1884); and after being made a C.B. in 1891

was created K.C.B. in 1895. I n 1892 he was elected a Fellow of the Royal Society. Sir Robert Giffen continued in later years to take a leading part in all public controversies connected with finance and taxation, and his high authority and practical experience were universally recognized. He died somewhat suddenly in Scotland on the 12th of April 1910.

GIFFORD, ROBERT SWAIN (1840-1905), American marine and landscape .painter, was born on Naushon Island, Massa- chusetts, on the 23rd of December 1840. He studied art with the Dutch marine painter Albert van Beest, who had a studio in New Bedford, and in 1864 he opened a studio for himself in Boston, subsequently settling in New York, where he was elected an associate of the National Academy of Design in 1867 and an academician in 1878. He was also a charter member of the American Water Color Society and the Society of American Artists. From 1878 until 1896 he was teacher of painting and chief master of the Woman's Art School of Cooper Union, New York, and from 1896 until his death he was director. Gifford painted longshore views, sand dunes and landscapes generally, with charm and poetry. He was an etcher of consider- able reputation, a member of the Society of American Etchers, and an honorary member of the Society of Painter-Etchers of London. He died in New York on the 13th of January 1905.

GIFFORD, S. R.— GIGLIO

GIFFORD, SANDFORD ROBINSON (1823-1880), American landscape painter, was born at Greenfield, New York, on the 10th of July 1823. He studied (1842-1845) at Brown University, then went to New York, and entered the art schools of the National Academy of Design, of which organization he was elected an associate in 1831, and an academician in 1854. Subsequently he studied in Paris and Rome. He was one of the best known of the Hudson River school group, though it was at Lake George that he found most of his themes. In his day he enjoyed an enormous popularity, and his canvases are in many well-known American collections. He died in New York City on the 29th of August 1880.

GIFFORD, WILLIAM (1756-1826), English publicist and man of letters, was born at Ashburton, Devon, in April 1756. His father was a glazier of indifferent character, and before he was thirteen William had lost both parents. The business was seized by his godfather, on whom William and his brother, a child of two, became entirely dependent. For about three months William was allowed to remain at the free school of the town. He was then put to follow the plough, but after a

day's trial he proved unequal to the task, and was sent to sea with the Brixham fishermen. After a year at sea his godfather, driven by the opinion of the townsfolk, put the boy to school once more. He made rapid progress, especially in mathematics, and began to assist the master. In 1 77 2 he was apprenticed to a shoemaker, and when he wished to pursue his mathematical studies, he was obliged to work his problems with an awl on beaten leather. By the kindness of an Ashburton surgeon, William Cooksley, a subscription was raised to enable him to return to school. Ultimately he proceeded in his twenty-third year to Oxford, where he was appointed a Bible clerk in Exeter College. Leaving the university shortly after graduation in 1 782, he found a generous patron in the first Earl Grosvenor, who undertook to provide for him, and sent him on two prolonged continental tours in the capacity of tutor to his son, Lord Belgrave. Settling in London, Gifford published in 1 794 his first work, a clever satirical piece, after Persius, entitled the Baviad, aimed at a coterie of second- rate writers at Florence, then popularly known as the Delia Cruscans, of which Mrs Piozzi was the leader. A second satire of a similar description, the Maeviad, directed against the corrup- tions of the drama, appeared in 1795. About this time Gifford became acquainted with Canning, with whose help he in August 1797 originated a weekly newspaper of Conservative politics entitled the Anti-Jacobin, which, however, in the following year ceased to be published. An English version of Juvenal, on which he had been for many years engaged, appeared in 1802; to this an autobiographical notice of the translator, reproduced in Nichol's Illustrations of Literature, was prefixed. Two years afterwards Gifford published an annotated edition of the plays of Massinger; and in 1809, when the Quarterly Review was projected, he was made editor. The success which attended the Quarterly from the outset was due in no small degree to the ability and tact with which Gifford discharged his editorial duties. He took, however, considerable liberties with the articles he inserted, and Southey, who was one of his regular contributors, said that Gifford looked on authors as Izaak Walton did on worms. His bitter opposition to Radicals and his onslaughts on new writers, conspicuous among which was the article on Keats's Endymion, called forth Hazlitt's Letter to W. Gijford in 1819. His connexion with the Review continued until within about two years of his death, which took place in London on the 31st of December 1826. Besides numerous contributions to the Quarterly during the last fifteen years of his life, he wrote a metrical translation of Persius, which appeared in 1821. Gifford also edited the dramas of Ben Jonson in i8i6j and his edition of Ford appeared posthumously in 1827. His notes on Shirley were incorporated in Dyce's edition in 1833. His political services were acknowledged by the appointments

of commissioner of the lottery and paymaster of the gentle- man pensioners. He left a considerable fortune, the bulk of which went to the son of his first benefactor, William Cooksley.

GIFT (a common Teutonic word, cf. Ger. die Gift, gift, das Gift, poison, formed from the Teut. stem gab-, to give, cf. Dutch geven, Ger. geben; in O. Eng. the word appears with initial y, the guttural of later English is due to Scandinavian influence) , a general English term for a present or thing bestowed, i.e. an alienation of property otherwise than for a legal consideration, although in law it is often used to signify alienation with or without consideration. By analogy the terms ” gift ” and ” gifted ” are also used to signify the natural endowment of some special ability, or a miraculous power, in a person, as being not acquired in the ordinary way. The legal effect of a gratuit- ous gift only need be considered here. Formerly in English law property in land could be conveyed by one person to another by a verbal gift of the estate accompanied by delivery of posses- sion. The Statute of Frauds required all such conveyances to be in writing, and a later statute (8 & 9 Vict. c. 106) requires them to be by deed. Personal property may be effectually transferred from one person to another by a simple verbal gift accompanied by delivery. If A delivers a chattel to B, saying or signifying that he does so by way of gift, the property passes, and the chattel belongs to B. But unless the actual thing is bodily handed over to the donee, the mere verbal expression of the donor’s desire or intention has no legal effect whatever. The persons are in the position of parties to an agreement which is void as being without consideration. When the nature of the thing is such that it cannot be bodily handed over, it will be sufficient to put the donee in such a position as to enable him to deal with it as the owner. For example, when goods are in a warehouse, the delivery of the key will make a verbal gift of them effectual; but it seems that part delivery of goods which are capable of actual delivery will not validate a verbal gift of the part undelivered. So when goods are in the possession of a warehouseman, the handing over of a delivery order might, by special custom (but not otherwise, it appears), be sufficient to pass the property in the goods, although delivery of a bill of lading for goods at sea is equivalent to an actual delivery of the goods themselves.

GIFU (Imaizumi), a city of Japan, capital of the ken (govern- ment) of Central Nippon, which comprises the two provinces of Mino and Hida. Pop. about 41,000. It lies E. by N. of Lake Biwa, on the Central railway, on a tributary cf the river Kiso, which flows to the Bay of Miya Uro. Manufactures of silk and paper goods are carried on. The ken has an area of about 4000 sq. m. and is thickly peopled, the population exceeding 1 ,000,000. The whole district is subject to

frequent earthquakes. GIG, apparently an onomatopoeic word for any light whirling object, and so used of a top, as in Shakespeare's Love's Labour's Lost, v. i. 70 (" Goe whip thy gigge "), or of a revolving lure made of feathers for snaring birds. The word is now chiefly used of a light two-wheeled cart or carriage for one horse, and of a narrow, light, ship's boat for oars or sails, and also of a clinker-built rowing-boat used for rowing on the Thames. " Gig " is further applied, in mining, to a wooden chamber or box divided in the centre and used to draw miners up and down a pit or shaft, and to a textile machine, the " gig-mill " or " gigging machine," which raises the nap on cloth by means of teazels. A " gig " or " fish-gig " (properly " fiz-gig," possibly an adaptation of Span, fisga, harpoon) is an instrument used for spearing fish.

GIGLIO (anc. Igilium), an island of Italy, off the S.W. coast of Italy, in the province of Grosseto, 1 1 m. to the W. of Monte Argentario, the nearest point on the coast. It measures about S m. by 3 and its highest point is 1634 ft. above sea-level. Pop. (1901) 2062. It is partly composed of granite, which was quarried here by the Romans, and is still used; the island is fertile, and produces wine and fruit, the cultivation of which has taken the place of the forests of which Rutilius spoke {Bin. i. 325, " eminus Igilii silvosa cacumina miror "). Julius Caesar mentions its sailors in the fleet of Domitius Ahenobarbus. In Rutilius's time it served as a place of refuge from the barbarian invaders. Charlemagne gave it to the abbey of Tre Fontane at Rome. In the 14th century it belonged to Pisa, then to Florence,

then, after being seized by the Spanish fleet, it was ceded to Antonio Piccolomini, nephew of Pius II. In 1558 it was sold to the wife of Cosimo I. of Florence.

See Archduke Ludwig Salvator, Die Insel Ciglio (Prague, 1900).

GIJ6N, a seaport of northern Spain, in the province of Oviedo; on the Bay of Biscay, and at the terminus of railways from Aviles, Oviedo and Langreo. Pop. (1900) 47,544- The older parts of Gijon, which are partly enclosed by ancient walls, occupy the upper slopes of a peninsular headland, Santa Catalina Point; while its more modern suburbs extend along the shore to Cape Torres, on the west, and Cape San Lorenzo, on the east. These suburbs contain the town-hall, theatre, markets, and a bull-ring with seats for 12,000 spectators. Few of the buildings of Gijon are noteworthy for any architectural merit, except perhaps the 15th-century parish church of San Pedro, which

has a triple row of aisles on each side, the palace of the mar- quesses of Revillajigedo (or Revilla Gigedo), and the Asturian Institute or Jovellanos Institute. The last named has a very fine collection of drawings by Spanish and other artists, a good library and classes for instruction in seamanship, mathematics and languages. It was founded in 1 797 by the poet and states- man Gaspar Melchor de Jovellanos (1744-1811). Jovellanos, a native of Gijon, is buried in San Pedro.

The Bay of Gijon is the most important roadstead on the Spanish coast between Ferrol and Santander. Its first quay was constructed by means of a grant from Charles V. in 1552- 1554; and its arsenal, added in the reign of Philip II. (1556- 1598), was used in 1588 as a repairing station for the surviving ships of the Invincible Armada. A new quay was built in 1 766-1 768, and extended in 1859; the harbour was further improved in 1864, and after 1892, when the Musel harbour of refuge was created at the extremity of the bay. It was, how- ever, the establishment of railway communication in 1884 which brought the town its modern prosperity, by rendering it the chief port of shipment for the products of Langreo and other mining centres in Oviedo. A rapid commercial development followed. Besides large tobacco, glass and porcelain factories, Gijon possesses iron foundries and petroleum refineries; while its minor industries include fisheries, and the manufacture of pre- served foods, soap, chocolate, candles and liqueurs. In 1903 the harbour accommodated 2189 vessels of 358,375 tons. In the same year the imports, consisting chiefly of machinery, iron, wood and food-stuffs, were valued at £660,889; while the exports, comprising zinc, copper, iron and other minerals, with fish, nuts and farm produce, were valued at £100,941.

Gijon is usually identified with the Gigia of the Romans, which, however, occupied the site of the adjoining suburb of Cima de Villa. Early in the 8th century Gij6n was captured and strengthened by the Moors, who used the stones of the Roman city for their fortifications, but were expelled by King Pelayo (720-737). In 844 Gijon successfully resisted a Norman raid; in 1395 it was burned down; but thenceforward it gradually rose to commercial importance.

GILAN (Ghilan, Guilan), one of the three small but important Caspian provinces of Persia, lying along the south-western shore of the Caspian Sea between 48 50′ and 50 30′ E. with a breadth varying from 15 to 50 m. It has an area of about 5000 sq. m. and a population of about 250,000. It is separated from Russia by the little river Astara, which flows into the Caspian, and bounded W. by Azerbaijan, S. by Kazvin and E. by Mazan- daran. The greater portion of the province is a lowland region extending inland from the sea to the base of the

mountains of the Elburz range and, though the Sefld Rud (White river), which is called Kizil Uzain in its upper course and has its principal sources in the hills of Persian Kurdistan, is the only river of any size, the province is abundantly watered by many .streams and an exceptionally great rainfall (in some years 50 in.).

The vegetation is very much like that of southern Europe, but in consequence of the great humidity and the mild climate almost tropically luxuriant, and the forests from the shore of the sea up to an altitude of nearly 5000 ft. on the mountain slopes facing the sea are as dense as an Indian jungle. The

prevailing types of trees are the oak, maple, hornbeam, beech, ash and elm. The box tree comes to rare perfection, but in consequence of indiscriminate cutting for export during many years, is now becoming scarce. Of fruit trees the apple, pear, plum, cherry, medlar, pomegranate, fig, quince, as well as two kinds of vine, grow wild; oranges, sweet and bitter, and other Aurantiaceae thrive well in gardens and plantations. The fauna also is well represented, but tigers which once were frequently seen are now very scarce; panther, hyena, jackal, wild boar, deer (Cervus maral) are common; pheasant, woodcock, ducks, teal, geese and various waterfowl abound; the fisheries are very productive and are leased to a Russian firm. The ordinary cattle of the province is the small humped kind, Bos indicus, and forms an article of export to Russia, the humps, smoked, being much in demand as a delicacy. Rice of a kind not much appreciated in Persia, but much esteemed in Gilan and Russia, is largely cultivated and a quantity valued at about £120,000 was exported to Russia during 1904-1905. Tea plantations, with seeds and plants from Assam, Ceylon and the Himalayas, were started in the early part of 1900 on the slopes of the hills south of Resht at an altitude of about 1000 ft. The results were excellent and very good tea was produced in 1904 and 1905, but the Persian government gave no support and the enterprise was neglected. The olive thrives well at Rudbar and Manjil in the Sefid Rud valley and the oil extracted from it by a Pro- vencal for some years until 1896, when he was murdered, was of very good quality and found a ready market at Baku. Since then the oil has been, as before, only used for the manufacture of soap. Tobacco from Turkish seed, cultivated since 1875, grows well, and a considerable quantity of it is exported. The most valuable produce of the province is silk. In 1866 it was valued at £743,000 and about two-thirds of it was exported. The silk- worm disease appeared in 1864 and the crops decreased in con- sequence until 1893 when the value of the silk exported was no more than £6500. Since then there has been a steady improve- ment, and in 1905-1906 the value of the produce was

estimated at £300,000 and that of the quantity exported at £200,000. The eggs of the silk-worms, formerly obtained from Japan, are now imported principally from Brusa by Greeks under French protection and from France.

There is only one good road in the province, that from Enzeli to Kazvin by way of Resht; in other parts communication is by narrow and frequently impassable lanes through the thick forest, or by intricate pathways through the dense undergrowth.

The province is divided into the following administrative districts: Resht (with the capital and its immediate neighbour- hood), Fumen (with Tulam and Mesula, where are iron mines), Gesker, Talish (with Shandarman, Kerganrud, Asalim, Gil- Dulab, Talish-Dulab), Enzeli (the port of Resht), Sheft, Manjil (with Rahmetabad and Amarlu), Lahijan (with Langarud, Rudsar and Ranehkuh), Dilman and Lashtnisha. The revenue derived from taxes and customs is about £80,000. The crown lands have been much neglected and the revenue from them amounts to hardly £3000 per annum. The value of the exports and imports from and into Gilan, much of them in transit, is close upon £2,000,000.

Gilan was an independent khanate until 1567 when Khan Ahmed, the last of the Kargia dynasty, which had reigned 205 years, was deposed by Tahmasp I., the second Safawid shah of Persia (1524-1576). It was occupied by a Russian force in the early part of 1723; and Tahmasp III., the tenth Safawid shah (1722-1731), then without a throne and his country occupied by the Afghans, ceded it, together with Mazandaran and Astara- bad, to Peter the Great by a treaty of the 1 2th of September of the same year. Russian troops remained in Gilan until 1734, when they were compelled to evacuate it.

The derivation of the name Gilan from the modern Persian word gil meaning mud (hence ” land of mud “) is incorrect. It probably means ” land of the Gil,” an ancient tribe which classical writers mention as the Gelae. (A. H.-S.)

GILBART, JAMES WILLIAM (1794-1863), English writer on banking, was born in London on the 21st of March 1794. From

1813 to 1825 he was clerk in a London bank. After a two years’ residence in Birmingham, he was appointed manager of the Kilkenny branch of the Provincial Bank of Ireland, and in 1829 he was

promoted to the Waterford branch. In 1834 he became manager of the London and Westminster Bank; and he did much to develop the system of joint-stock banking. On more than one occasion he rendered valuable services to the joint-stock banks by his evidence before committees of the House of Commons; and, on the renewal of the bank charter in 1844, he procured the insertion of a clause granting to joint-stock banks the power of suing by their public officer, and also the right of accepting bills at less than six months' date. In 1846 he was elected a fellow of the Royal Society. He died in London on the 8th of August 1863. The Gilbart lectures on banking at King's College are called after him.

The following are his principal works on banking, most of which have passed through more than one edition: Practical Treatise on Banking (1827); The History and Principles of Banking (1834); The History of Banking in America (1837); Lectures on the History and Principles of Ancient Commerce (1847) ; Logic for the Million (1851); and Logic of Banking (1857).

GILBERT, ALFRED (1854-), British sculptor and goldsmith, born in London, was the son of Alfred Gilbert, musician. He received his education mainly in Paris (Ecole des Beaux- Arts, under Cavelier), and studied in Rome and Florence where the significance of the Renaissance made a lasting impression upon him and his art. He also worked in the studio of Sir J. Edgar Boehm, R.A. His first work of importance was the charming group of the " Mother and Child," then " The Kiss of Victory," followed by " Perseus Arming " (1883), produced directly under the influence of the Florentine masterpieces he had studied. Its success was great, and Lord Leighton forthwith commissioned " Icarus," which was ex- hibited at the Royal Academy in 1884, along with a remarkable " Study of a Head," and was received with general applause. Then followed " The Enchanted Chair," which, along with many other works deemed by the artist incomplete or unworthy of his powers, was ultimately broken by the sculptor's own hand. The next year Mr Gilbert was occupied with the Shaftesbury Memorial Fountain, in Piccadilly, London, a work of great originality and beauty, yet shorn of some of the intended effect through restrictions put upon the artist. In 1888 was produced the statue of H.M. Queen Victoria, set up at Winchester, in its main design and in the details of its ornamentation the most remarkable work of its kind produced in Great Britain, and perhaps, it may be added, in any other country in modern times. Other statues of great beauty, at once novel in treatment and fine in design, are those set up to Lord Reay in Bombay, and John Howard at Bedford (1898), the highly original pedestal of which did much to direct into a better channel

what are apt to be the eccentricities of what is called the ” New Art ” School. The sculptor rose to the full height of his powers in his ” Memorial to the Duke of Clarence,” and his fast developing fancy and imagination, which are the main characteristics of all his work, are seen in his “Memorial Candelabrum to Lord Arthur Russell ” and ” Memorial Font to the son of the 4th Marquess of Bath.” Gilbert’s sense of decoration is paramount in all he does, and although in addition to the work already cited he pro- duced busts of extraordinary excellence of Cyril Flower, John R. Clayton (since broken up by the artist — the fate of much of his admirable work), G. F. Watts, Sir Henry Tate, Sir George Birdwood, Sir Richard Owen, Sir George Grove and various others, it is on his goldsmithery that the artist would rest his reputation; on his mayoral chain for Preston, the epergne for Queen Victoria, the figurines of ” Victory ” (a statuette designed for the orb in the hand of the Winchester statue), ” St Michael “.- and “St George,” as well as smaller objects such as seals, keys . and the like. Mr Gilbert was chosen associate of the Royal Academy in 1887, full member in 1892 (resigned 1909), and professor of sculpture (afterwards resigned) in 1900. In 1889 he won the Grand Prix at the Paris International Exhibition. He was created a member of the Victorian Order in 1897. (See Sculpture.)

See The Life and Work of Alfred Gilbert, R.A., M.V.O., D.C.L., by Joseph Hatton (Art Journal Office, 1903). (M. H. S.)

GILBERT, ANN (1821-1904), American actress, was born at Rochdale, Lancashire, on the 21st of October 1821, her maiden name being Hartley. At fifteen she was a pupil at the ballet school connected with the Haymarket theatre, conducted by Paul Taglioni, and became a dancer on the stage. In 1846 she married George H. Gilbert (d. 1866), a performer in the company of which she was a member. Together they filled many engagements in English theatres, moving to America in 1849. Mrs Gilbert’s first success in a speaking part was in 1857 as Wichavenda in Brougham’s Pocahontas. In 1869 she joined Daly’s company, playing for many years wives to James Lewis’s husbands, and old women’s parts, in which she had no equal. Mrs. Gilbert held a unique position on the American stage, on account of the admiration, esteem and affection which she enjoyed both in front and behind the footlights. She died at Chicago on the 2nd of December 1904.

See Mrs Gilbert’s Stage Reminiscences (1901). GILBERT, GROVE KARL (1843-), American geologist, was born at Rochester, N.Y., on the 6th of May 1843. In 1869 he was attached to the Geological Survey of Ohio and in 1879 he became a member of the United States Geological Survey, being engaged on parts of the Rocky Mountains, in

Nevada, Utah, California and Arizona. He is distinguished for his researches on mountain-structure and on the Great Lakes, as well as on glacial phenomena, recent earth movements, and on topographic features generally. His report on the Geology of the Henry Mountains (1877), in which the volcanic structure known as a laccolite was first described; his History of the Niagara River (1890) and Lake Bonneville (1891 — the first of the Monographs issued by the United States Geological Survey) are specially important. He was awarded the Wollaston medal by the Geological Society of London in 1900.

GILBERT, SIR HUMPHREY (c. 1539-1583), English soldier, navigator and pioneer colonist in America, was the second son of Otho Gilbert, of Compton, near Dartmouth, Devon, and step- brother of Sir Walter Raleigh. He was educated at Eton and Oxford; intended for the law; introduced at court by Raleigh's aunt, Catherine Ashley, and appointed (July 1566) captain in the army of Ireland under Sir Henry Sidney. In April 1566 he had already joined with Antony Jenkinson in a petition to Elizabeth for the discovery of the North-East Passage; in November following he presented an independent petition for the "discovering of a passage by the north to goto Cataia." In October 1569 he became governor of Munster; on the 1st of January 1570 he was knighted; in 1571 he was returned M.P. for Plymouth; in 1572 he campaigned in the Netherlands against Spain without much success; from 1573 to 1578 he lived in retirement at Limehouse, devoting himself especially to the advocacy of a North- West Passage (his famous Discourse on this subject was published in 1576). Gilbert's arguments, widely circulated even before 1575, were apparently of weight in promoting the Frobisher enterprises of 1576-1578. On the nth of June 1578, Sir Humphrey obtained his long-coveted charter for North- Western discovery and colonization, authoriz- ing him, his heirs and assigns, to discover, occupy and possess such remote " heathen lands not actually possessed of any Christian prince or people, as should seem good to him or them." Disposing not only of his patrimony but also of the estates in Kent which he had through his wife, daughter of John Aucher of Ollerden, he fitted out an expedition which left Dartmouth on the 23rd of September 1578, and returned in May 1579, having accomplished nothing. In 1579 Gilbert aided the government in Ireland; and in 1583, after many struggles — illustrated by his appeal to Walsingham on the nth of July 1582, for the payment of moneys due to him from government, and by his agreement with the Southampton venturers — he succeeded in equipping another fleet for " Western Planting." On the nth of June 1583, he sailed from Plymouth with five ships and the queen's blessing; on the 13th of July the " Ark Raleigh," built and manned at

his brother's expense, deserted

the fleet; on the 30th of July he was off the north coast of Newfoundland; on the 3rd of August he arrived off the present St John's, and selected this site as the centre of his operations; on the 5th of August he began the plantation of the first English colony in North America. Proceeding southwards with three vessels, exploring and prospecting, he lost the largest near Cape Breton (20th of August); immediately after (31st of August) he started to return to England with the " Golden Hind " and the " Squirrel," of forty and ten tons respectively. Obstinately refusing to leave the " frigate " and sail in his " great ship," he shared the former's fate in a tempest off the Azores. " Monday the 9th of September," reports Hayes, the captain of the " Hind,"

"the frigate was near cast away, yet at that time recovered;

and, giving forth signs of joy, the general, sitting abaft with a book in his hand, cried out unto us in the ' Hind,' 'We are as near to heaven by sea as by land. '. . . . The same Monday night, about twelve, the frigate being ahead of us in the ' Golden Hind,' suddenly her lights were out, ... in that moment the frigate was devoured and swallowed up of the sea."

See Hakluyt, Principal Navigations (i599)» vol. Hi. pp. 135-181; Gilbert's Discourse of a Discovery for a New Passage to Cataia, published by George Gascoigne in 1576, with additions, probably without Gilbert's authority; Hooker's Supplement to Holinshed's Irish Chronicle; Roger Williams, The Actions of the Low Countries (1618); State Papers, Domestic (1577-1583); Wood's Athenae Oxonienses; North British Review, No. 45; Fox Bourne's English Seamen under the Tudors; Carlos Slafter, Sir H. Gylberte and his Enterprise (Boston, 1903), with all important documents. Gilbert's interesting writings on the need of a university for London, anticipat- ing in many ways not only the modern London University but also the British Museum library and its compulsory sustenance through the provisions of the Copyright Act, have been printed by Furniyall (Queen Elizabeth's Achademy) in the Early English Text Society Publications, extra series, No. viii.

GILBERT, JOHN (1810-1889), American actor, whose real name was

Gibbs, was born in Boston, Massachusetts, on the 27th of February 1810, and made his first appearance there as Jaffier in Venice Preserved. He soon found that his true vein was in comedy, particularly in old-men parts. When in London in 1847 he was well received both by press and public, and played with Macready. He was the leading actor at Wallack's from 1861-1888. He died on the 17th of June 1889.

See William Winter's Life of John Gilbert (New York, 1890).

GILBERT, SIR JOHN (1817-1897), English painter and illustrator, one of the eight children of George Felix Gilbert, a member of a Derbyshire family, was born at Blackheath on the 2 1 st of July 181 7. He went to school there, and even in childhood displayed an extraordinary fondness for drawing and painting. Nevertheless, his father's lack of means compelled him to accept employment for the boy in the office of Messrs Dickson & Bell, estate agents, in Charlotte Row, London. Yielding, however, to his natural bent, his parents agreed that he should take up art in his own way, which included but little advice from others, his only teacher being Haydon's pupil, George Lance, the fruit painter. This artist gave him brief instructions in the use of colour. In 1836 Gilbert appeared in public for the first time. This was at the gallery of the Society of British Artists, where he sent drawings, the subjects of which were characteristic, being " The Arrest of Lord Hastings," from Shakespeare, and "Abbot Boniface," from The Monastery of Scott. "Inez de Castro" was in the same gallery in the next year; it was the first of a long series of works in the same medium, representing similar themes, and was accompanied, from 1837, by a still greater number of works in oil which were exhibited at the British Institution. These included "Don Quixote giving advice to Sancho Panza," 1841; "Brunette and Phillis," from The Spectator, 1844; " The King's Artillery at Marston Moor," i860; and " Don Quixote comes back for ' the last time to his Home and Family," 1867. In that year the Institution was finally closed. Gilbert exhibited at the Royal Academy from 1838, beginning with the " Portrait of a Gentleman," and continuing, except between 1851 and 1867, till his death to exhibit there many of his best and more ambitious works. These included such capital instances as "Holbein

painting the Portrait of Anne Boleyn," " Don Quixote's first Interview with the Duke and Duchess," 1842, " Charlemagne visiting the Schools," 1846. "Touchstone and the Shepherd," and " Rembrandt," a very fine piece, were both there in 1867; and in 1873 " Naseby," one of his finest and most picturesque designs, was also at the Royal Academy. Gilbert was elected A.R.A. 29th January 1872, and R.A.

29th June 1876. Besides these mostly large and powerful works, the artist's true arena of display was undoubtedly the gallery of the Old Water Colour Society, to which from 1852, when he was elected an Associate exhibitor, till he died forty-five years later, he contributed not fewer than 270 drawings, most of them admirable because of the largeness of their style, massive coloration, broad chiaroscuro, and the surpassing vigour of their designs. These qualities induced the leading critics to claim for him opportunities for painting mural pictures of great historic themes as decorations of national buildings. " The Trumpeter," " The Standard-Bearer," " Richard II. resigning his Crown " (now at Liverpool), " The Drug Bazaar at Constantinople," " The Merchant of Venice " and " The Turkish Water-Carrier " are but examples of that wealth of art which added to the attractions of the gallery in Pall Mall. There Gilbert was elected a full Member in 1855, and president of the Society in 187 1, shortly after which he was knighted. As an illustrator of books, magazines and periodicals of every kind he was most prolific. To the success of the Illustrated London News his designs lent powerful aid, and he was eminently serviceable in illustrating the Shakespeare of Mr Howard Staunton. He died on the 6th of October 1897.

(F.G.S.) • GILBERT, SIR JOSEPH HENRY (1817-1901), English chemist, was born at Hull on the 1st of August 1817. He studied chemistry first at Glasgow under Thomas Thomson; then at University College, London, in the laboratory of A. T. Thomson (1 778-1849), the professor of medical jurisprudence, also attending Thomas Graham's lectures; and finally at Giessen under Liebig. On his return to England from Germany he acted for a year or so as assistant to his old master A. T. Thomson at University College, and in 1843, after spending a short time in the study of calico dyeing and printing near Manchester, accepted the directorship of the chemical laboratory at the famous experimental station established by Sir J. B. Lawes at Rothamsted, near St Albans, for the systematic and scientific study of agriculture. This position he held for fifty-eight years, until his death on the 23rd of December 1901. The work which he carried out during that long period in collaboration with Lawes was of a most comprehensive character, involving the application of many branches of science, such as chemistry, meteorology, botany, animal and vegetable physiology, and geology; and its influence in improving the methods of practical agriculture extended all over the civilized world. Gilbert was chosen a fellow of the Royal Society in i860, and in 1867 was awarded a royal medal jointly with Lawes. In 1880 he presided over the Chemical Section of the British Association at its meeting at Swansea, and in 1882 he was president of the London Chemical Society, of which he

had been a member almost from its foundation in 1841. For six years from 1884 he filled the Sibthorpian chair of rural economy at Oxford, and he was also an honorary professor at the Royal Agricultural College, Ciren- cester. He was knighted in 1893, the year in which the jubilee of the Rothamsted experiments was celebrated.

GILBERT, MARIE DOLORES ELIZA ROSANNA ["Lola Montez "] (1818-1861), dancer and adventuress, the daughter of a British army officer, was born at Limerick, Ireland, in 1818. Her father dying in India when she was seven years old, and her mother marrying again, the child was sent to Europe to be educated, subsequently joining her mother at Bath. In 1837 she made a runaway match with a Captain James of the Indian army, and accompanied him to India. In 1842 she returned to England, and shortly afterwards her husband obtained a decree nisi for divorce. She then studied dancing, making an unsuccessful first appearance at Her Majesty's theatre, London, in 1843, billed as " Lola Montez, Spanish dancer." Subsequently

she appeared with considerable success in Germany, Poland and Russia. Thence she went "to Paris, and in 1847 appeared at Munich, where she became the. mistress of the old king of Bavaria, Ludwig I.; she was naturalized, created comtesse de Landsfeld, and given an income of £2000 a year. She soon proved herself the real ruler of Bavaria, adopting a liberal and anti-Jesuit policy. Her political opponents proved, however, too strong for her, and in 1848 she was banished. In 1849 she came to England, and in the same year was married to George Heald, a young officer in the Guards. Her husband's guardian instituted a prosecution for bigamy against her on the ground that her divorce from Captain James had not been made absolute, and she fled with Heald to Spain. In 1851 she appeared at the Broadway theatre, New York, and in the following year at the Walnut Street theatre, Philadelphia. In 1853 Heald was drowned at Lisbon, and in the same year she married the proprietor of a San Francisco newspaper, but did not live long with him. Subsequently she appeared in Australia, but returned, in 1857, to act in America, and to lecture on gallantry. Her health having broken down, she devoted the rest of her life to visiting the outcasts of her own sex in New York, where, stricken with paralysis, she died on the 17th of January 1861. See E. B. D'Auvergne, Lola Montez (New York, 1909). GILBERT, NICOLAS JOSEPH LAURENT (1751-1780), French poet, was born at Fontenay-le-Chateau in Lorraine in 1751. Having completed his education at the college of Dole, he devoted himself for a time to a half-scholastic, half-literary life at Nancy, but in 1774 he found his

way to the capital. As an opponent of the Encyclopaedists and a panegyrist of Louis XV., he received considerable pensions. He died in Paris on the 1 2th of November 1780 from the results of a fall from his horse. The satiric force of one or two of his pieces, as Mon Apologie (1778) and Le Dix-huitieme Siecle (1775), would alone be sufficient to preserve his reputation, which has been further increased by modern writers, . who, like Alfred de Vigny in his Stello (chaps. 7-13), considered him a victim to the spite of his philosophic opponents. His best-known verses are the Ode imitee de plusieurs psaumes, usually entitled Adieux d la vie.

Among his other works may be. mentioned Les Families de Darius et d'Eridame,, histoire persane (1770), Le Camaval des auteurs (J 773)i Odes nouvelles et patriotiques (1775)- Gilbert's CEuvres completes were first published in 1788, and they have since been edited by Mastrella (Paris, 1823), by Charles Nodier (1817 or 1825), and by M. de Lescure (1882).

GILBERT (or Gylberde), WILLIAM (1544-1603), the most distinguished man of science in England during the reign of Queen Elizabeth, and the father of electric and magnetic science, was a member of an ancient Suffolk family, long resident in Clare, and was born on the 24th of May 1544 at Colchester, where his father, Hierome Gilbert, became recorder. Educated at Colchester school, he entered St John's College, Cambridge, in 1558, andafter taking the degrees of B.A. and MA. in due course, graduated M.D. in 1569, in which year he was elected a senior fellow of his college. Soon afterwards he left Cambridge, and after spending three years in Italy and other parts of Europe, settled in 1573 in London, where he practised as a physician with " great success and applause." He was admitted to the College of Physicians probably about 1576, and from 1581 to 1590 was one of the censors. In 1587 he became treasurer, holding the

office till 1592, and in 1589 he was one of the committee appointed to superintend the preparation of the Pharmacopoeia Londinensis which the college in that year decided to issue, but which did not actually appear till 1618. In 1597 he was again chosen treasurer, becoming at the same time consiliarius, and in 1599 he succeeded to the presidency. Two years later he was appointed physician to Queen Elizabeth, with the usual emolument of £100 a year, After this time be seems to have removed to the court, vacating ■ his residence, Wingfield House, which was on Peter's Hill, between Upper Thames Street and Little Knightrider Street, and close to the house of the College of Physicians. On the death of the queen in 1603 he was reappointed by her successor; but he did not long enjoy the honour, for he died, probably of the plague, on the 30th of November (10th of December, N.S.) 1603, either in London or in Colchester. He was buried in the latter town, in the chancel of Holy Trinity church, where a monument was erected to his memory. To the College of Physicians he left his books, globes, instruments and minerals, but they were destroyed in the great fire of London.

Gilbert's principal work is his treatise on magnetism, entitled De magnete, magneticisque corporibus, et de magno magnete tellure (London, 1600; later editions — Stettin, 1628, 1633; Frankfort, 1629, 1638). This work, which embodied the results of many years' research, was distinguished by its strict adherence to the scientific method of investigation by experiment, and by the originality of its matter, containing, as it does, an account of the author's experiments on magnets and magnetical bodies and on electrical attractions, and also his great conception that the earth is nothing but a large magnet, and that it is this which explains, not only the direction of the magnetic needle north and south, but also the variation and dipping or inclination of the needle. Gilbert's is therefore not merely the first, but the most important, systematic contribution to the sciences of

electricity and magnetism. A posthumous work of Gilbert's was edited by his brother, also called William, from two MSS. in the posses- sion of Sir William Boswell ; its title is De mundo nostro sublunari philosophia nova (Amsterdam, 1651). He is the reputed inventor besides of two instruments to enable sailors " to find out the latitude without seeing of sun, moon or stars," an account of which is given in Thomas Blondeville's Theoriques of the Planets (London, 1602). He was also the first advocate of Copernican views in England, and he concluded that the fixed stars are not all at the same distance from the earth.

It is a matter of great regret for the historian of chemistry that Gilbert left nothing on that branch of science, to which he was deeply devoted," attaining to great exactness therein." So at least says Thomas Fuller, who in his Worthies of England pro- phesied truly how he would be afterwards known: " Mahomet's tomb at Mecca," he says, "is said strangely to hang up, attracted by some invisible loadstone; but the memory of this doctor will never fall to the ground, which his incomparable book De magnete will support to eternity."

An English translation of the De magnete was published by P. F. Mottelay in 1893, and another, with notes by S. P. Thompson, was issued by the Gilbert Club of London in 1900.

GILBERT, SIR WILLIAM SCHWENK (1836-), English playwright and humorist, son of William Gilbert (a descendant of Sir Humphrey Gilbert), was born in London on the 1 8th of November 1836. His father was the author of a number of novels, the best-known of which were Shirley Hall Asylum (1863) and Dr Austin's Guests (1866). Several of these novels — which were characterized by a singular acuteness and lucidity of style, by a dry, subacid humour, by a fund of humanitarian feeling and by a considerable medical knowledge, especially in regard to the psychology of lunatics and monomaniacs — were illustrated by his son, who developed a talent for whimsical draughtsmanship. W. S. Gilbert was educated at Boulogne, at Ealing and at King's College, graduating B.A. from the university of London in 1856. The termination of the Crimean War was fatal to his project of competing for a commission in the Royal Artillery, but he obtained a post in the education department of the privy council office (1857-1861). Disliking the routine work, he left the Civil Service, entered the Inner Temple, was called to the bar in November 1864, and joined the northern circuit. His practice was inconsiderable, and his military and legal ambitions were eventually satisfied by a captaincy in the volunteers and appoint- ment as a magistrate for Middlesex (June 1891). In 1861 the comic journal Fun was started by

H. J. Byron, and Gilbert became from the first a valued contributor. Failing to obtain an entree to Punch, he continued sending excellent comic verse to Fun, with humorous illustrations, the work of his own pen, over the signature of ” Bab.” A collection of these lyrics, in which deft craftsmanship unites a titillating satire on the deceptiveness of appearances with the irrepressible nonsense of a Lewis Carroll, was issued separately in 1869 under the title of Bab Ballads, and was followed by More Bab Ballads. The

two collections and Songs of a Savoyard were united in a volume issued in 1898, with many new illustrations. The best of the old cuts, such as those depicting the ” Bishop of Rum-ti-Foo ” and the ” Discontented Sugar Broker,” were preserved intact.

While remaining a staunch supporter of Fun, Gilbert was soon immersed in other journalistic work, and his position as dramatic critic to the Illustrated Times turned his attention to the stage. He had not to wait long for an opportunity. Early in December 1866 T. W. Robertson was asked by Miss Herbert, lessee of the St James’s theatre, to find some one who could turn out a bright Christmas piece in a fortnight, and suggested Gilbert; the latter promptly produced Dulcamara, a burlesque of L’Elisire d’amore, written in ten days, rehearsed in a week, and duly performed at Christmas. He sold the piece outright for £30, a piece of rashness which he had cause to regret, for it turned out a commercial success. In 1870 he was commissioned by Buckstone to write a blank verse fairy comedy, based upon Le Palais de la veriti, the novel by Madame de Genlis. The result was The Palace of Truth, a fairy drama, poor in structure but clever in workman- ship, which served the purpose of Mr and Mrs Kendal in 1870 at the Haymarket. This was followed in 1871 by Pygmalion andGalatea, another three-act “mythological comedy,” a clever and effective but artificial piece. Another fairy comedy, The Wicked World, written for Buckstone and the Kendals, was followed in March 1873 by a burlesque version, in collaboration with Gilbert a. Beckett, entitled The Happy Land. Gilbert’s next dramatic ventures inclined more to the conventional pattern, combining sentiment and a cynical humour in a manner strongly reminiscent of his father’s style. Of these pieces, Sweethearts was given at the Prince of Wales’s theatre, 7th November 1874; Tom Cobb at the St James’s, 24th April 1875; Broken Hearts at the Court, 9th December 1875; Dan’l Druce (a drama in darker vein, suggested to some extent by Silas Marner) at the

Haymarket, nth September 1876; and Engaged at the Haymarket, 3rd October 1877. The first and last of these proved decidedly popular. Gretchen, a verse drama in four acts, appeared in 1879. A one-act piece, called Comedy and Tragedy, was produced at the Lyceum, 26th January, 1884. Two dramatic trifles of later date were Foggerty's Fairy and Rozenkrantz and Guildenstern, a travesty of Hamlet, performed at the Vaudeville in June 1891. Several of these dramas were based upon short stories by Gilbert, a number of which had appeared from time to time in the Christmas numbers of various periodicals. The best of them have been collected in the volume entitled Foggerty's Fairy, and other Stories. In the autumn of 1 87 1 Gilbert commenced his memorable collaboration (which lasted over twenty years) with Sir Arthur Sullivan. The first two comic operas, Thespis; or The Gods grown Old (26th September 187 1) and Trial by Jury (Royalty, 25th March 1875) were merely essays. Like one or two of their successors, they were, as regards plot, little more than extended " Bab Ballads." Later (especially in the Yeomen of the Guard), much more elabora- tion was attempted. The next piece was produced at the Opera Comique (17th November 1877) as The Sorcerer. At the same theatre were successfully given H.M.S. Pinafore (25th May 1878), The Pirates of Penzance; or The Slave of Duty (3rd April 1880), and Patience; or Bunthorne's Bride (23rd April 1881). In October 1881 the successful Patience was removed to a new theatre, the Savoy, specially built for the Gilbert and Sullivan operas by Richard D'Oyly Carte. Patience was followed, on 25th November 1882, by Iolanthe; or The Peer and the Peri; and then came, on 5th January 1884, Princess Ida; or Castle Adamant, a re-cast of a charming and witty fantasia which Gilbert had written some years previously, and had then described as a " respectful perversion of Mr. Tennyson's exquisite poem." The impulse reached its fullest development in the operas that followed next in order — The Mikado; or The Town of Titipu (14th March 1885); Ruddigore (22nd January 1887); The Yeomen of the Guard (3rd October 1888) ; and The Gondoliers (7th December 1889). After the appearance of The Gondoliers a coolness occurred between the composer and librettist, owing to Gilbert's considering that Sullivan had not supported him in

a business disagreement with D'Oyly Carte. But the estrange- ment was only temporary. Gilbert wrote several more librettos, and of these Utopia Limited (1893) and the exceptionally witty Grand Duke (1896) were written in conjunction with Sullivan. As a master of metre Gilbert had shown himself consummate, as a dealer in quips and paradoxes and ludicrous dilemmas, unrivalled. Even for the music of the operas he deserves some credit, for the rhythms were frequently

his own (as in ” I have a Song to Sing, O “), and the metres were in many cases invented by himself. One or two of his librettos, such as that of Patience, are virtually flawless. Enthusiasts are divided only as to the comparative merit of the operas. Princess Ida and Patience are in some respects the daintiest. There is a genuine vein of poetry in The Yeomen of the Guard. Some of the drollest songs are in Pinafore and Ruddigore. The Gondoliers shows the most charming lightness of touch, while with the general public The Mikado proved the favourite. The enduring popularity of the Gilbert and Sullivan operas was abundantly proved by later revivals. Among the birthday honours in June 1907 Gilbert was given a knighthood. In 1909 his Fallen Fairies (music by Edward German) was produced at the Savoy. (T. Se.)

GILBERT DE LA PORREE, frequently known as Gilbertus Porretanus or Pictaviensis (1070-1154), scholastic logician and theologian, was born at Poitiers. He was educated under Bernard of Chartres and Anselm of Laon. After teaching for about twenty years in Chartres, he lectured on dialectics and theology in Paris (from 1137), and in 1141 returned to Poitiers, being elected bishop in the following year. His heterodox opinions regarding the doctrine of the Trinity drew upon his works the condemnation of the church. The synod of Reims in 1 1 48 procured papal sanction for four propositions opposed to certain of Gilbert’s tenets, and his works were condemned until they should be corrected in accordance with the principles of the church. Gilbert seems to have submitted quietly to this judgment; he yielded assent to the four propositions, and remained on friendly terms with his antagonists till his death on the 4th of September 1154. Gilbert is almost the only logician of the 12th century who is quoted by the greater scholastics of the succeeding age. His chief logical work, the treatise De sex principiis, was regarded with a reverence almost equal to that paid to Aristotle, and furnished matter for numerous commentators, amongst them Albertus Magnus. Owing to the fame of this work, he is mentioned by Dante as the Magister sex principiorum. The treatise itself is a discussion of the Aristotelian categories, specially of the six subordinate modes. Gilbert distinguishes in the ten categories two classes, one essential, the other derivative. Essential or inhering (Jormae inhaerentes) in the objects themselves are only substance, quantity, quality and relation in the stricter sense of that term. The remaining six, when, where, action, passion, position and habit, are relative and subordinate (formae assistentes). This suggestion has some interest, but is of no great value, either in logic or in the theory of knowledge. More important in the history of scholasticism are the theological consequences to which Gilbert’s realism led him. In the commentary on the treatise De Trinitate (erroneously attributed to

Boetius) he proceeds from the metaphysical notion that pure or abstract being is prior in nature to that which is. This pure being is God, and must be distin- guished from the triune God as known to us. God is incompre- hensible, and the categories cannot be applied to determine his existence. In God there is no distinction or difference, whereas in all substances or things there is duality, arising from the element of matter. Between pure being and substances stand the ideas or forms, which subsist, though they are not substances. These forms, when materialized, are called formae substantiales or formae nativae; they are the essences of things, and in them- selves have no relation to the accidents of things. Things are temporal, the ideas perpetual, God eternal. The pure form of existence, that by which God is God, must be distin- guished from the three persons who are God by participation in this form. The form or essence is one, the persons or substances three. It was this distinction between Deitas or

Divinitas and Deus that led to the condemnation of Gilbert’s

doctrine.

De sex principiis and commentary on the De Trinitate in Migne, Patrologia Latina, lxiv. 1255 and clxxxviii. 1257; see also Abb < 5 Berthaud, Gilbert de la Porree (Poitiers, 1892) ; B. Haurˆau, De la philosophic scolastique, pp. 294-318; R. Schmid's article "Gilbert Porretanus " in Herzog-Hauck, Realencyk. f. protest. Theol. (vol. 6, 1899); Prantl, Geschichte d. Logik, ii. 215; Bach, Dogmengeschichte, ii. 133; article Scholasticism.

GILBERT OF SEMPRINGHAM, ST, founder of the Gilbertines, the only religious order of English origin, was born at Sempring- ham in Lincolnshire, c. 1083-1089. He was educated in France, and ordained in 11 23, being presented by his father to the living of Sempringham. About 1 135 he established there a convent for nuns; and to perform the heavy work and cultivate the fields he formed a number of labourers into a society of lay brothers attached to the convent. Similar establishments were founded elsewhere, and in 1147 Gilbert tried to get them incorporated in the Cistercian order. Failing in this, he proceeded to form communities of priests and clerics to perform the spiritual ministrations needed by the nuns. The women lived according to the Benedictine rule as interpreted by the Cistercians; the men according to the rule of St Augustine, and were canons regular.

The special constitutions of the order were largely taken from those of the Premonstratensian canons and of the Cistercians. Like Fontevrault {q.v.) it was a double order, the communities of men and women living side by side; but, though the property all belonged to the nuns, the superior of the canons was the head of the whole establishment, and the general superior was a canon, called ” Master of Sempringham,” The general chapter was a mixed assembly composed of two canons and two nuns from each house; the nuns had to travel to the chapter in closed carts. The office was celebrated together in the church, a high stone screen separating the two choirs of canons and nuns. • The order received papal approbation in 1148. By Gilbert’s death (1189) there, were nine double monasteries and four of canons only, containing about 700 canons and 1000 nuns in all. At the dissolution there were some 25 monasteries, whereof 4 ranked among the greater monasteries (see list in F. A. Gasquet’s English Monastic Life) . The order never spread beyond England. The habit of the Gilbertines was black, with a white cloak.

See Bollandists’ Acta Sanctorum (4th of Feb.) ; William Dugdale, Monasticon (1846); Helyot, Hist, des ordres religieux (1714), ii. c. 29. The best modern account is St Gilbert of Sempringham, and the Gilbertines, by Rose Graham (1901). The art. in Dictionary of National Biography gives abundant information on St Gilbert, but is unsatisfactory on the order, as it might easily convey the impression that the canons and nuns lived together, whereas they were most carefully separated; and altogether undue prominence is given to a single scandal. M iss Graham declares that the reputation of the order was good until the end. (E. C. B.)

GILBERT FOLIOT (d. 1187), bishop of Hereford, and of London, is first mentioned as a monk of Cluny, whence he was called in 1136 to plead the cause of the empress Matilda against Stephen at Uie Roman court. Shortly afterwards he became prior of Cluity; then prior of Abbeville, a house dependent upon Cluny. In 1139 he was elected abbot of Gloucester. The appointment was confirmed by Stephen, and from the ecclesi- astical point of view was unexceptionable. But the new abbot proved himself a valuable ally of the empress, and her ablest controversialist. Gilbert’s reputation grew rapidly. He was respected at Rome; and he acted as the representative of the primate, Theobald, in the supervision of the Welsh church. In 1 148, on being nominated by the pope to the see of Hereford, Gilbert with characteristic wariness sought confirmation both from Henry of Anjou and from Stephen. But he was an Angevin at heart, and after 1 1 54 was treated by Henry II. with every mark of consideration. He was Becket’s rival for the primacy, and the only bishop who protested against the king’s choice.

Becket, with rare forbearance, endeavoured to win his friendship by procuring for him the see of London (1163). But Gilbert evaded the customary profession of obedience to the primate, and apparently aspired to make his see independent of Canterbury. On the questions raised by the Constitutions of Clarendon he sided with the king, whose confessor he had now

become. He urged Becket to yield, and, when this advice was rejected, encouraged his fellow-bishops to repudiate the authority of the archbishop. In the years of controversy which followed Becket's flight the king depended much upon the bishop's skill as a disputant and diplomatist. Gilbert was twice ex- communicated by Becket, but both on these and on other occasions he showed great dexterity in detaching the pope from the cause of the exile. To him it was chiefly due that Henry avoided an open conflict with Rome of the kind which John afterwards provoked. Gilbert was one of the bishops whose excommunica- tion in 1 1 70 provoked the king's knights to murder Becket; but he cannot be reproached with any share in the crime. His later years were uneventful, though he enjoyed great influence with the king and among his fellow-bishops. Scholarly, dignified, ascetic in his private life, devoted to the service of the Church, he was nevertheless more respected than loved. His nature was cold; he made few friends; and the taint of a calculating ambition runs through his whole career. He died in the spring of 1 187.

See Gilbert's Letters, ed. J. A. Giles (Oxford, 1845); Materials for the History of Thomas Becket, ed. J. C. Robertson (Rolls series, 1875-1885); and Miss K. Norgate's England under the Angevin Kings (1887). (H. W. C. D.) -•

GILBERT (Kingsmiix) ISLANDS, an extensive archipelago belonging to Great Britain in the mid-western Pacific Ocean, lying N. and S. of the equator, and between 170 and 180° E. There are sixteen islands, all coral reefs or atolls, extending in crescent form over about five degrees of latitude. The principal is Taputenea or Drummond Island. The soil, mostly of coral sand, is productive of little else than the coco- nut palm, and the chief source of food supply is the sea. The population of these islands presents a remarkable phenomenon; in spite of adverse conditions of environment and complete barbarism it is exceed- ingly dense, in strong contradistinction to that of many other more favoured islands. The land area of the group is only 166 m., yet the population is about 30,000. The Gilbert islanders are a dark and coarse type of the Polynesian race, and show signs of much crossing. They are tall and stout, with an average height of s ft. 8 in., and are of a vigorous, energetic temperament. They are nearly always

naked, but wear a conical hat of pandanus leaf. In war they have an armour of plaited coco-nut fibres. They are fierce fighters, their chief weapon being a sword armed with sharks' teeth. Their canoes are well made of coco-nut wood boards sewn neatly together and fastened on frames. British and American missionary work has been prosecuted with some success. The large population led to the introduction of natives from these islands into Hawaii as labourers in 1878-1884, but they were not found satisfactory. The islands were discovered by John Byron in 1765 (one of them bearing his name) ; Captains Gilbert and Marshall visited them in 1788; and they were annexed by Great Britain in 1892.

GILBEY, SIR WALTER, ist Bart. (1831-), English wine-merchant, was born at Bishop Stortford, Hertfordshire, in 1 83 1. His father, the owner and frequently the driver of the daily coach between Bishop Stortford and London, died when he was eleven years old, and young Gilbey was shortly afterwards placed in the office of an estate agent at Tring, subsequently obtaining a clerkship in a firm of parliamentary agents in London. On the outbreak of the Crimean War, Walter Gilbey and his younger brother, Alfred, volunteered for civilian service at the front, and were employed at a convalescent hospital on the Dardanelles. Returning to London on the declaration of peace, Walter and Alfred Gilbey, on the advice of their eldest brother, Henry Gilbey, a wholesale wine-merchant, started in the retail 'wine and spirit trade. The heavy duty then levied by the British government on French, Portuguese and Spanish wines was prohibitive of a sale among the English middle classes, and especially lower middle classes, whose usual alcoholic beverage was accordingly beer. Henry Gilbey was of opinion that these classes would gladly drink wine if they could get it at a moderate price, and by his advice Walter and Alfred determined to push the sales of colonial, and particularly of Cape, wines, on which

the duty was comparatively light. Backed by capital obtained through Henry Gilbey, they accordingly opened in 1857 a small retail business in a basement in Oxford Street, London. The Cape wines proved popular, and within three years the brothers had 20,000 customers on their books. The creation of the off-licence system by Mr Gladstone, then chancellor of the exchequer, in i860, followed by the large reduction in the duty on French wines effected by the commercial treaty between England and France in 1861, revolutionized their trade and laid the foundation of their fortunes. Three provincial grocers,

who had been granted the new off-licence, applied to be appointed the Gilbeys' agents in their respective districts, and many similar applications followed. These were granted, and before very long a leading local grocer was acting as the firm's agents in every district in Englandˆ The grocer who dealt in the Gilbeys' wines and spirits was not allowed to sell those of any other firm, and the Gilbeys in return handed over to him all their existing customers in his district. This arrangement was of mutual advantage, and the Gilbeys' business increased so rapidly that in 1864 Henry Gilbey abandoned his own under- taking to join his brothers. In 1867 the three brothers secured the old Pantheon theatre and concert hall in Oxford Street for their headquarters. In 1875 the firm purchased a large claret- producing estate in Medoc, on the banks of the Gironde, and became also the proprietors of two large whisky-distilleries in Scotland. In 1893 the business was converted, for family reasons, into a private limited liability company, of which Walter Gilbey, who in the same year was created a baronet, was chair- man. Sir Walter Gilbey also became well known as a breeder of shire horses, and he did much to improve the breed of English horses (other than race-horses) generally, and wrote extensively on the subject. He became president of the Shire Horse Society, of the Hackney Horse Society, and of the Hunters' Improve- ment Society, and he was the founder and chairman of the London Cart Horse Parade Society. He was also a practical agriculturist, and president of the Royal Agricultural Society.

GILDAS, or Gildus (c. 516-570), the earliest of British historians (see Celt: Literature, " Welsh"), surnamed by some Sapiens, and by others Badonicus, seems to have been born in the year 516. Regarding him little certain is known, beyond some isolated particulars that may be gathered from hints dropped in the course of his work. Two short treatises exist, purporting to be lives of Gildas, and ascribed respectively to the nth and 12th centuries; but the writers of both are believed to have confounded two, if not more, persons that had borne the name. It is from an incidental remark of his own, namely, that the year of the siege of Mount Badon — one of the battles fought between the Saxons and the Britons — was also the year of his own nativity, that the date of his birth has been derived; the place, however, is not mentioned. His assertion that he was moved to undertake his task mainly by "zeal for God's house and for His holy law," and the very free use he has made of quotations from the Bible, leave scarcely a doubt that he was an ecclesiastic of some order or other. In addition, we learn that he went abroad, probably to France, in his thirty-fourth year, where, after 10 years of hesitation and preparation, he composed, about 560, the work bearing his name. His materials, he

tells us, were collected from foreign rather than native sources, the latter of which had been put beyond his reach by circumstances. The Cambrian Annals. give 570 as the year of his death.

The writings of Gildas have come down to us under the title of Gildae Sapientis de excidio Britanniae liber querulus. Though at first written consecutively, the work is now usually divided into three portions, — a preface, the history proper, and an epistle,— the last, which is largely made up of passages ancT texts of Scripture brought together for the purpose of condemning the vices of his countrymen and their rulers, being the least important, though by far the longest of the three. In the second he passes in brief review the history of Britain from its invasion by the Romans till his own times. Among other matters refer- ence is made to the introduction of Christianity in the reign of Tiberius; the persecution under Diocletian; the spread of the

Arian heresy; the election of Maximus as emperor by the legions in Britain, and his subsequent death at Aquileia; the incursions of the Picts and Scots into the southern part of the island; the temporary assistance rendered to the harassed Britons by the Romans; the final abandonment of the island by the latter; the coming of the Saxons and their reception by Guortigern (Vortigern); and, finally, the conflicts between the Britons, led by a noble Roman, Ambrosius Aurelianus, and the new invaders. Unfortunately, on almost every point on which he touches, the statements of Gildas are vague and obscure. With one excep- tion already alluded to, no dates are given, and events are not always taken up in the order of their occurrence. These faults are of less importance during the period when Greek and Roman writers notice the affairs of Britain; but they become more serious when, as is the case from nearly the beginning of the 5th century to the date of his death, Gildas's brief narrative is our only authority for most of what passes current as the history of our island during those years. Thus it is on his sole, though in this instance perhaps trustworthy, testimony that the famous letter rests, said to have been sent to Rome in 446 by the despair- ing Britons, commencing: — " To Agitius (Aetius), consul for the third time, the groans of the Britons."

Gildas's treatise was first published in 1525 by Polydore Vergil, but with many avowed alterations and omissions. In 1568 John Josseline, secretary to Archbishop Parker, issued a new edition of it more in conformity with manuscript authority; and in 1691 a still more carefully revised edition appeared at Oxford by Thomas Gale. It was frequently reprinted on the Continent during the 16th century, and once or twice since. The next English edition, described by Potthast as editio pessima, was that published by the English Historical Society in

1838, and edited by the Rev. J. Steven- son. The text of Gildas founded on Gale's edition collated with two other MSS., with elaborate introductions, is included in the Monumenta historica Britannica, edited by Petrie and Sharpe .(London, 1848). Another edition is in A. W. Haddan and W. Stubbs, Councils and Eccles. Documents relating to Great Britain (Oxford, 1869); the latest edition is that by Theodor Mommsen in Monum. Germ. hist. auct. antiq. xiii. (Chronica min. iii.), 1894.

GILDER, RICHARD WATSON (1 844-1 909), American editor and poet, was born in Bordentown, New Jersey, on the 8th of February 1844, a brother of William Henry Gilder (183 8- 1900), the Arctic explorer. He was educated at Bellevue Seminary, an institution conducted by his father, the Rev. William Henry Gilder (1812-1864), in Flushing, Long Island. After three years (1865-1868) on the Newark, New Jersey, Daily Advertiser, he founded, with Newton Crane, the Newark Morning Register. In 1869 he became editor of Hours at Home, and in 1870 assistant editor of Scribner's Monthly (eleven years later re-named The Century Magazine), of which he became editor in 1881. He was one of the founders of the Free Art League, of the International Copyright League, and of the Authors' Club; was chairman of the New York Tenement House Commission in 1894; and was a prominent member of the National Institute of Arts and Letters, of the Council of the National Civil Service Reform League, and of the executive committee of the Citizens' Union fit New York City. His poems, which are essentially lyrical, have been collected in various volumes, including Five Books of Song (1894), In Palestine and other Poems (1898), Poems and Inscriptions(igoi) , and In the Heights (1905). A complete edition of his poems was published in 1908. He also edited " Sonnets from the Portuguese " and other Poems by Elizabeth Barrett Browning; " One Word More" and other Poems by Robert Browning (1905). He died in New York on the 18th of November 1909. His wife, Helena de Kay, a grand-daughter of Joseph Rodman Drake, assisted, with Saint Gaudcns and others, in founding the Society of American Artists, now merged in the National Academy, and the Art Students' League of New York. She translated Sensier's biography of Millet, and painted, before her marriage in 1874, studies in flowers and ideal heads, much admired for their feeling and delicate colouring.

GILDERSLEEVE, BASIL LANNEAU (183 1-), American classical scholar, was born in Charleston, South Carolina, on the 23rd of October 1831, son of Benjamin Gildersleeve (1791-1875,) a Presbyterian evangelist, and editor of the Charleston Christian Observer in 1826-1845, of the Richmond (Va.) Watchman and

Observer in 1845-1856, and of The Central Presbyterian in 1856-1860. The son graduated at Princeton in 1849, studied under Franz in Berlin, under Friedrich Ritschl at Bonn and under Schneidewin at Gottingen, where he received his doctor's degree in 1853. From 1856 to 1876 he was professor of Greek in the University of Virginia, holding the chair of Latin also in 1861- 1866; and in 1876 he became professor of Greek in the newly founded Johns Hopkins University. In 1880 The American Journal of Philology, a quarterly published by the Johns Hopkins University, was established under his editorial charge, and his strong personality was expressed in the department of the Journal headed " Brief Report " or " Lanx Satura," and in the earliest years of its publication every petty detail was in his hands. His style in it, as elsewhere, is in striking contrast to that of the typical classical scholar, and accords with his conviction that the true aim of scholarship is " that which is." He published a Latin Grammar (1867; revised with the co-operation of Gonzalez B. Lodge, 1894 and 1899) and a Latin Series for use in secondary schools (1875), both marked by lucidity of order and mastery of grammatical theory and methods. His edition of Persius (1875) is of great value. But his bent was rather toward Greek than Latin. His special interest in Christian Greek was partly the cause of his editing in 1877 The Apologies of Justin Martyr, " which " (to use his own words) " I used unblushingly as a repository for my syntactical formulae." Gildersleeve's studies under Franz had no doubt quickened his interest in Greek syntax, and his logic, untrammelled by previous categories, and his marvellous sympathy with the language were displayed in this most unlikely of places. His Syntax of Classic Greek (Part I., 1900, with C. W. E. Miller) collects these formulae. Gildersleeve edited in 1885 The Olympian and Pythian Odes of Pindar, with a brilliant and valuable introduction. His views on the function of grammar were summarized in a paper on The Spiritual Rights of Minute Research delivered at Bryn Mawr on the 16th of June 1895. His collected contributions to literary periodicals appeared in 1890 under the title Essays and Studies Educational and Literary.

GILDING, the art of spreading gold, either by mechanical or by chemical means, over the surface of a body for the purpose of ornament. The art of gilding was known to the ancients. According to Herodotus, the Egyptians were accustomed to gild wood and metals ; and gilding by means of gold plates is frequently mentioned in the Old Testament. Pliny informs us that the first gilding seen at Rome was

after the destruction of Carthage, under the censorship of Lucius Mummius, when the Romans began to gild the ceilings of their temples and palaces, the Capitol being the first place on which this enrichment was bestowed. But he adds that luxury advanced on them so rapidly that in a little time you might see all, even private and poor persons, gild the walls, vaults, and other parts of their dwellings. Owing to the comparative thickness of the gold-leaf used in ancient gilding, the traces of it which yet remain are remarkably brilliant and solid. Gilding has in all times occupied an important place in the ornamental arts of Oriental countries; and the native processes pursued in India at the present day may be taken as typical of the arts as practised from the earliest periods. For the gilding of copper, employed in the decoration of temple domes and other large works, the following is an outline of the processes employed. The metal surface is thoroughly scraped, cleaned and polished, and next heated in a fire sufficiently to remove any traces of grease or other impurity which may remain from the operation of polishing. It is then dipped in an acid solution prepared from dried unripe apricots, and rubbed with pumice or brick powder. Next, the surface is rubbed over with mercury which forms a superficial amalgam with the copper, after which it is left some hours in clean water, again washed with the acid solution, and dried. It is now ready for receiving the gold, which is laid on in leaf, and, on adhering, assumes a grey appearance from combining with the mercury, but on the application of heat the latter metal volatilizes, leaving the gold a dull greyish hue. The colour is brought up by means of rubbing with agate burnishers. The weight of mercury used in this process is double that of the gold laid on,

and the thickness of the gilding is regulated by the circumstances or necessities of the case. For the gilding of iron or steel, the surface is first scratched over with chequered lines, then washed in a hot' solution of green apricots, dried and heated just short of red-heat. The gold-leaf is then laid on, and rubbed in with agate burnishers, when it adheres by catching into the prepared scratched surface.

Modern gilding is applied to numerous and diverse surfaces and by various distinct processes, so that the art is prosecuted in many ways, and is part of widely different ornamental and useful arts. It forms an important and essential part of frame- making (see Carving and Gilding); it is largely employed in connexion with cabinet-work, decorative painting and house ornamentation; and it also bulks largely in bookbinding and ornamental leather work. Further, gilding is much employed for coating baser metals, as in button-making, in the gilt toy trade, in electro-gilt reproductions and in electro-plating; and it is also a characteristic feature in the decoration of pottery, porcelain and

glass. The various processes fall under one or other of two heads — mechanical gilding and gilding by chemical agency.

Mechanical Gilding embraces all the operations by which gold- leaf is prepared (see Goldbeating), and the several processes by which it is mechanically attached to the surfaces it is intended to cover. It thus embraces the burnish or water-gilding and the oil-gilding of the carver and gilder, and the gilding operations of the house decorator, the sign-painter, the bookbinder, the paper- stainer and several others. Polished iron, steel and other metals are gilt mechanically by applying gold-leaf to the metallic surface at a temperature just under red-heat, pressing the leaf on with a burnisher and reheating, when additional leaf may be laid on. The process is completed by cold burnishing.

Chemical Gilding embraces those processes in which the gold used is at some stage in a state of chemical combination. Of these the following are the principal : —

Cold Gilding. — In this process the gold is obtained in a state of extremely fine division, and applied by mechanical means. Cold gilding on silver is performed by a solution of gold in aqua-regia, applied by dipping a linen rag into the solution, burning it, and rubbing the black and heavy ashes on the silver with the finger or a piece of leather or cork. Wet gilding is effected by means of a dilute solution of chloride of gold with twice its quantity of ether. The liquids are agitated and allowed to rest, when the ether separates and floats on the surface of the acid. The whole mixture is then poured into a funnel with a small aperture, and allowed to rest for some time, when the acid is run off and the ether separated. The ether will be found to have taken up all the gold from the acid, and may be used for gilding iron or steel, for which purpose the metal is polished with the finest emery and spirits of wine. The ether is then applied with a small brush, and as it evaporates it

deposits the gold, which can now be heated and polished. For small delicate figures a pen or a fine brush may be used for laying on the ether solution. Fire-gilding or Wash-gilding is a process by which an amalgam of gold is applied to metallic surfaces, the mercury being subsequently volatilized, leaving a film of gold or an amalgam containing from 13 to 16% of mercury. In the preparation of the amalgam the gold must first be reduced to thin plates or grains, which are heated red hot, and thrown into mercury previously heated, till it begins to smoke. Upon stirring the mercury with an iron rod, the gold totally disappears. The proportion of mercury to gold is generally as six or eight to one. When the amalgam is cold it is squeezed through chamois leather for the purpose of separating the superfluous mercury; the gold, with about twice its weight of mercury, remains behind, forming a yellowish silvery mass of the consistence of butter. When the metal to be gilt is wrought or chased, it ought to be covered with mercury before the amalgam is applied, that this may be more easily spread ; but when the surface of the metal is plain, the amalgam may be applied to it direct. When no such preparation is applied, the surface to be gilded is simply bitten and cleaned with nitric acid. A deposit of mercury is obtained on a metallic surface by means of ” quicksilver water,” a solution of nitrate of mercury, — the nitric acid attacking the metal to which it is applied, and thus leaving a film of free metallic mercury. The amalgam being equally spread over the

prepared surface of the metal, the mercury is then sublimed by a heat just sufficient for that purpose; for, if it is too great, part of the gold may be driven off, or it may run together and leave some of the surface of the metal bare. When the mercury has evaporated, which is known by the surface having entirely become of a dull yellow colour, the metal must undergo other operations, by which the fine gold colour is given to it. First, the gilded surface is rubbed with a scratch brush of brass wire, until its surface be smooth ; then it is covered over with a composition called ” gilding wax,” and again exposed to the fire until the wax is burnt off. This wax is composed of beeswax mixed with some of the following substances,

viz. red ochre, verdigris, copper scales, alum, vitriol, borax. By this operation the colour of the gilding is heightened; and the effect seems to be produced by a perfect dissipation of some mercury remaining after the former operation. The dissipation is well effected by this equable application of heat. The gilt surface is then covered over with nitre, alum or other salts, ground together, and mixed up into a paste with water or weak ammonia. The piece of metal thus covered is exposed to a certain degree of heat, and then quenched in water. By this method its colour is further improved and brought nearer to that of gold, probably by removing any particles of copper that may have been on the gilt surface. This process, when skilfully carried out, produces gilding of great solidity and beauty ; but owing to the exposure of the workmen to mercurial fumes, it is very unhealthy, and further there is much loss of mercury. Numerous contrivances have been introduced to obviate these serious evils. Gilt brass buttons used for uniforms are gilt by this process, and there is an act of parliament (1796) yet unrepealed which pre- scribes 5 grains of gold as the smallest quantity that may be used for the gilding of 12 dozen of buttons 1 in. in diameter.

Gilding of Pottery and Porcelain. — The quantity of gold consumed

for these purposes is very large. The gold used is dissolved in aqua-regia, and the acid is driven off by heat, or the gold may be precipitated by means of sulphate of iron. In this pulverulent state the gold is mixed with j'jth of its weight of oxide of bismuth, together with a small quantity of borax and gum water. The mixture is applied to the articles with a camel's hair pencil, and after passing through the fire the gold is of a dingy colour, but the lustre is brought out by burnishing with agate and bloodstone, and afterwards cleaning with vinegar or white-lead.

GILDS, or Guilds. Medieval gilds were voluntary associations formed for the mutual aid and protection of their members. Among the gildsmen there was a strong spirit of fraternal co- operation or Christian brotherhood, with a mixture of worldly and religious ideals — the support of the body and the salvation of the soul. Early meanings of the root gild or geld were expiation, penalty, sacrifice or worship, feast or banquet, and contribution or payment; it is difficult to determine which is the earliest meaning, and we are not certain whether the gildsmen were originally those who contributed to a common fund or those who worshipped or feasted together. Their fraternities or societies may be divided into three classes: religious or benevolent, merchant and craft gilds. The last two categories, which do not become prominent anywhere in Europe until the 12th century, had, like all gilds, a religious tinge, but their aims were primarily worldly, and their functions were mainlyof an economic character. 1. Origin. — Various theories have been advanced concerning the origin of gilds. Some writers regard them as a continuation of the Roman collegia and sodalitates, but there is little evidence to prove the unbroken continuity of existence of the Roman and Germanic fraternities. A more widely accepted theory derives gilds wholly or in part from the early Germanic or Scandinavian sacrificial banquets. Much influence is ascribed to this heathen element by Lujo Brentano, Karl Hegel, W. E. Wilda and other writers. This view does not seem to be tenable, for the old sacrificial carousals lack two of the essential elements of the gilds, namely corporative solidarity or permanent association and the spirit of Christian brotherhood. Dr Max Pappenheim has ascribed the origin of Germanic gilds to the northern " foster- brotherhood " or " sworn-brotherhood," which was an artificial bond of union between two or more persons. After intermingling their blood in the earth and performing other peculiar ceremonies, the two contracting parties with grasped hands swore to avenge any injury done to either of them. The objections to this theory are fully stated by Hegel (Stadte und Gilden, i. 250-253). The foster-brotherhood seems to have been unknown to the Franks and the

Anglo-Saxons, the nations in which medieval gilds first appear; and hence Dr Pappenheim's conclusions, if tenable at all, apply only to Denmark or Scandinavia.

No theory on this subject can be satisfactory which wholly ignores the influence of the Christian church. Imbued with the idea of the brotherhood of man, the church naturally fostered the early growth of gilds and tried to make them displace the old heathen banquets. The work of the church was, however, directive rather than creative. Gilds were a natural manifesta- tion of the associative spirit which is inherent in mankind. The same needs' produce in different ages associations which have striking resemblances, but those of each age have peculiarities

which indicate a spontaneous growth. It is not necessary to seek the germ of gilds in any antecedent age or institution. When the old kin-bond or maegth was beginning to weaken or dissolve, and the state did not yet afford adequate protection to its citizens, individuals naturally united for mutual help.

Gilds are first mentioned in the Carolingian capitularies of 779 and 789, and in the enactments made by the synod of Nantes early in the 9th century, the text of which has been preserved in the ecclesiastical ordinances of Hincmar of Rheims (A.D.852). The capitularies of 805 and 821 also contain vague references to sworn unions of some sort, and a capitulary of 884 prohibits villeins from forming associations " vulgarly called gilds " against those who have despoiled them. The Carolingians evidently regarded such " conjurations " as " conspirations " dangerous to the state. The gilds of Norway, Denmark and Sweden are first mentioned in the nth, 12th and 14th centuries respectively; those of France and the Netherlands in the nth.

Many writers believe that the earliest references to gilds come from England. The laws of Ine speak of gegildan who help each other pay the wergeld, but it is not entirely certain that they were members of gild fraternities in the later sense. These are more clearly referred to in England in the second half of the 9th century, though we have little information concerning them before the nth century. To the first half of that century belong the statutes of the fraternities of Cambridge, Abbotsbury and Exeter. They are important because they form the oldest body of gild ordinances extant in Europe. The thanes' gild at Cambridge afforded help in blood-feuds, and provided for the payment of the wergeld in case a member killed any one. The religious element was more prominent in Orcy's gild at Abbots- bury and in the fraternity at Exeter; their ordinances exhibit much

solicitude for the salvation of the brethren's souls. The Exeter gild also gave assistance when property was destroyed by fire. Prayers for the dead, attendance at funerals of gildsmen, periodical banquets, the solemn entrance oath, fines for neglect of duty and for improper conduct, contributions to a common purse, mutual assistance in distress, periodical meetings in the gildhall, — in short, all the characteristic features of the later gilds already appear in the statutes of these Anglo-Saxon fraternities. Some continental writers, in dealing with the origin of municipal government throughout western Europe, have, however, ascribed too much importance to the Anglo-Saxon gilds, exaggerating their prevalence and contending that they form the germ of medieval municipal government. This view rests almost entirely on conjecture; there is no good evidence to show that there was any organic connexion between gilds and municipal government in England before the coming of the Normans. It should also be noted that there is no trace of the existence of either craft or merchant gilds in England before the Norman Conquest. Commerce and industry were not yet sufficiently developed to call for the creation of such associations. 2. Religious Gilds after the Norman Conquest. — Though we have not much information concerning the religious gilds in the 1 2th century, they doubtless flourished under the Anglo- Norman kings, and we know that they were numerous, especially in the boroughs, from the 13th century onward. In 1388 parliament ordered that every sheriff in England should call upon the masters and wardens of all gilds and brotherhoods to send to the king's council in Chancery, before the 2nd of February 1389, full returns regarding their foundation, ordin- ances and property. Many of these returns were edited by J. Toulmin Smith (1816-1869), and they throw much light on the functions of the gilds. Their ordinances are similar to those of the above-mentioned Anglo-Saxon fraternities. Each member took an oath of admission, paid an entrance-fee, and made a small annual contribution to the common fund. The brethren were aided in old age, sickness and poverty, often also in cases of loss by robbery, shipwreck and conflagration; for example, any member of the gild of St Catherine, Aldersgate, was to be assisted if he " fall into poverty or be injured through age, or through fire or water, thieves or sickness." Alms were often

given even to non-gildsmen; lights were supported at certain altars; feasts and processions were held periodically; the funerals of brethren were attended; and masses for the dead were provided from the

common purse or front special contribu- tions made by the gildsmen. Some of the religious gilds supported schools, or helped to maintain roads, bridges and town-walls, or even came, in course of time, to be closely con- nected with the government of the borough; but, as a rule, they were simply private societies with a limited sphere of activity. They are important because they played a prominent role in the social life of England, especially as eleemosynary institutions, down to the time of their suppression in 1547. Religious gilds, closely resembling those of England, also flourished on the continent during the middle ages.

3. The Gild Merchant. — The merchant and craft fraternities are particularly interesting to students of economic and municipal history. The gild merchant came into existence in England soon after the Norman Conquest, as a result of the increasing importance of trade, and it may have been transplanted from Normandy. Until clearer evidence of foreign influence is found, it may, however, be safer to regard it simply as a new application of the old gild principle, though this new application may have been stimulated by continental example. The evidence seems to indicate the pre-existence of the gild merchant in Normandy, but it is not mentioned anywhere on the continent before the nth century. It spread rapidly in England, and from the reign of John onward we have evidence of its existence in many English boroughs. But in some prominent towns, notably London, Colchester, Norwich and the Cinque Ports, it seems never to have been adopted. In fact it played a more conspicuous role in the small boroughs than in the large ones. It was regarded by the townsmen as one of their most important privileges. Its chief function was to regulate the trade monopoly conveyed to the borough by. the royal grant of gilda mercatoria. A grant of this sort implied that the gildsmen had the right to trade freely in the town, and to impose payments and restrictions upon others who desired to exercise that privilege. The ordin- ances of a gild merchant thus aim to protect the brethren from the commercial competition of strangers or non-gildsmen. More freedom of trade was allowed at all times in the selling of wares by wholesale, and also in retail dealings during the time of markets and fairs. The ordinances were enforced by an alderman with the assistance of two or more deputies, or by one or two masters, wardens or keepers. The Morwenspeches were periodical meetings at which the brethren feasted, revised their ordinances, admitted new members, elected officers and trans- acted other business.

It has often been asserted that the gild merchant and the borough were identical, and that the former was the basis of the whole

municipal constitution. But recent research has dis- credited this theory both in England and on the continent. Much evidence has been produced to show that gild and borough, gildsmen and burgesses, were originally distinct conceptions, and that they continued to be discriminated in most towns throughout the middle ages. Admission to the gild was not restricted to burgesses; nor did the brethren form an aristocratic body having control over the whole municipal polity. No good evidence has, moreover, been advanced to prove that this or any other kind of gild was the germ of the municipal constitution. On the other hand, the gild merchant was certainly an official organ or department of the borough administration, and it exerted considerable influence upon the economic and corporative growth of the English municipalities.

Historians have expressed divergent views regarding the, early relations of the craftsmen and their fraternities to the gild merchant. One of the main questions in dispute is whether artisans were excluded from the gild merchant. Many of them seem to have been admitted to membership. They were regarded as merchants, for they bought raw material and sold the manu- factured commodity; no sharp line of_ demarcation was drawn between the two classes in the 1 2th and 13th centuries. Separate societies of craftsmen were formed in England soon after the

gild merchant came into existence; but at first they were few in number. The gild merchant did not give birth to craft fraternities or have anything to do with their origin; nor did it delegate its authority to them. In fact, there seems to have been little or no organic connexion between the two classes of gilds. As has already been intimated / however, many artisans probably belonged both to their own craft fraternity and to the gild merchant, and the latter, owing to its great power in the town, may have exercised some sort of supervision over the craftsmen and their societies. When the king bestowed upon the tanners or weavers or any other body of artisans the right to have a gild, they secured the monopoly of working and trading in their branch of industry. Thus with every creation of a craft fraternity the gild merchant was weakened and its sphere of activity was diminished, though the new bodies were subsidiary to the older and larger fraternity. The greater the commercial and industrial prosperity of a town, the more rapid was the multiplication of craft gilds, which was a natural result of the ever-increasing division of labour. The old gild merchant remained longest intact and powerful in the smaller boroughs, in which, owing to the predominance of agriculture, few or no craft gilds were, formed. In some of the larger towns the crafts were prominent already in the 13th century, but they

became much more pro- minent in the first half of the 14th century. Their increase in number and power was particularly rapid in the time of Edward III., whose reign marks an era of industrial progress. Many master craftsmen now became wealthy employers of labour, dealing extensively in the wares which they produced. The class of dealers or merchants, as distinguished from trading artisans, also greatly increased and established separate fraternities. When these various unions of dealers and of craftsmen embraced all the trades and branches of production in the town, little or no vitality remained in the old gild merchant; it ceased to have an independent sphere of activity. The tendency was for the single organization, with a general monopoly of trade, to be replaced by a number of separate organizations representing the various trades and handicrafts. In short, the function of guarding and supervising the trade monopoly split up into various fragments, the aggregate of the crafts superseding the old general gild merchant. This transference of the authority of the latter to a number of distinct bodies and the consequent disintegration of the old organization was a gradual spontaneous movement, — a process of slow displacement, or natural growth and decay, due to the play of economic forces, — which, generally speaking, may be assigned to the 14th and 15th centuries, the very period in which the craft gilds attained the zenith of their power. While in most towns the name and the old organization of the gild merchant thus disappeared and the institution was displaced by the aggregate of the crafts towards the close of the middle ages, in some places it survived long after the 15th century either as a religious fraternity, shorn of its old functions, or as a periodical feast, or as a vague term applied to the whole municipal corporation.

On the continent of Europe the medieval gild merchant played a less important role than in England. In Germany, France and the Netherlands it occupies a less prominent place in the town charters and in the municipal polity, and often corresponds to the later fraternities of English dealers established either to carry on foreign commerce or to regulate a particular part of the local trade monopoly.

4. Craft Gilds. — A craft gild usually comprised all the artisans in a single branch of industry in a particular town. Such a fraternity was commonly called a ” mistery ” or ” company ” in the 15th and 16th centuries, though the old term “gild” was not yet obsolete. ” Gild” was also a common designation in north Germany, while the corresponding term in south Germany was Zunft, and in France metier. These societies are not clearly visible in England or on the continent before the early part of the 12th century. With the expansion of trade and industry the number of artisans increased, and

they banded together for mutual protection. Some German writers have maintained that these craft organizations emanated from

manorial groups of workmen, but strong arguments have been advanced against the validity of this theory (notably by F. Keutgen). It is unnecessary to elaborate any profound theory regarding the origin of the craft gilds. The union of men of the same occupation was a natural tendency of the age. In the 13th century the trade of England continued to expand and the number of craft gilds increased. In the 14th century they were fully developed and in a flourishing condition; by that time each branch of industry in every large town had its gild. The development of these societies was even more rapid on the continent than in England.

Their organization and aims were in general the same through- out western Europe. Officers, commonly called wardens in England, were elected by the members, and their chief function was to supervise the quality of the wares produced, so as to secure good and honest workmanship. Therefore, ordinances were made regulating the hours of labour and the terms of admission to the gild, including apprenticeship. Other ordin- ances required members to make periodical payments to a common fund, and to participate in certain common religious observances, festivities and pageants. But the regulation of industry was always paramount to social and religious aims; the chief object of the craft gild was to supervise the processes of manufacture and to control the monopoly of working and dealing in a particular branch of industry.

We have already called attention to the gradual displacement of the gild merchant by the craft organizations. The relations of the former to the latter must now be considered more in detail. There was at no time a general struggle in England between the gild merchant and the craft gilds, though in a few towns there seems to have been some friction between merchants and artisans. There is no exact parallel in England to the conflict between these two classes in Scotland in the 16th century, or to the great continental revolution of the 13th and 14th centuries, by which the crafts threw off the yoke of patrician government and secured more independence in the management of their own affairs and more participation in the civic administration. The main causes of these conflicts on the continent were the monopoly of power by the patricians, acts of violence committed by

them, their bad management of the finances and their partisan admini- stration of justice. In some towns the victory of the artisans in the 14th century was so complete that the whole civic con- stitution was remodelled with the craft fraternities as a basis. A widespread movement of this sort would scarcely be found in England, where trade and industry were less developed than on the continent, and where the motives of a class conflict between merchants and craftsmen were less potent. Moreover, borough government in England seems to have been mainly democratic until the 14th or 15th century; there was no oligarchy to be depressed or suppressed. Even if there had been motives for uprisings of artisans such as took place in Germany and the Netherlands, the English kings would probably have intervened. True, there were popular uprisings in England, but they were usually conflicts between the poor and the rich; the crafts as such seldom took part in these tumults. While many continental municipalities were becoming more democratic in the 14th century, those of England were drifting towards oligarchy, towards government by a close " select body." As a rule the craft gilds secured no dominant influence in the boroughs of England, but remained subordinate to the town government. Whatever power they did secure, whether as potent subsidiary organs of the municipal polity for the regulation of trade, or as the chief or sole medium for the acquisition of citizenship, or as integral parts of the common council, was, generally speaking,,- the logical sequence of a gradual economic development, and ■ not the outgrowth of a revolutionary movement by which oppressed craftsmen endeavoured to throw off the yoke of an arrogant patrician gild merchant.

Two new kinds of craft fraternities appear in the 14th century and become more prominent in the 15th, namely, the merchants' and the journeymen's companies. The misteries or companies of merchants traded in one or more kinds of wares. They were

pre-eminently dealers, who sold what others produced. Hence they should not be confused with the old gild merchant, which originally comprised both merchants and artisans, and had the whole monopoly of the trade of the town. In most cases, the company of merchants was merely one of the craft organizations which superseded the gild merchant.

In the 14th century the journeymen or yeomen began to set up fraternities in defence of their rights. The formation of these societies marks a cleft within the ranks of some particular class of artisans — a conflict between employers, or master artisans, and workmen. The journeymen combined to protect their special interests, notably as

regards hours of work and rates of wages, and they fought with the masters over the labour question in all its aspects. The resulting struggle of organized bodies of masters and journeymen was widespread throughout western Europe, but it was more prominent in Germany than in France or England. This conflict was indeed one of the main features of German industrial life in the 15th century. In England the fraternities of journeymen, after struggling a while for complete independence, seem to have fallen under the supervision and control of the masters' gilds; in other words, they became subsidiary or affiliated organs of the older craft fraternities.

An interesting phenomenon in connexion with the organiza- tion of crafts is their tendency to amalgamate, which is occasion- ally visible in England in the 15 th century, and more frequently in the 16th and 17th. A similar tendency is visible in the Netherlands and in some other parts of the continent already in the 14th century. Several fraternities — old gilds or new companies, with their respective cognate or heterogeneous branches of industry and trade — were fused into one body. In some towns all the crafts were thus consolidated into a single fraternity; in this case a body was reproduced which regulated the whole trade monopoly of the borough, and hence bore some resemblance to the old gild merchant.

In dealing briefly with the modern history of craft gilds, we may confine our attention to England. In the Tudor period the policy of the crown was to bring them under public or national control. Laws were passed, for example in 1503, requiring that new ordinances of " fellowships of crafts or misteries " should be approved by the royal justices or by other crown officers; and the authority of the companies to fix the price of wares was thus restricted. The statute of 5 Elizabeth, c. 4, also curtailed their jurisdiction over journeymen and apprentices (see Apprentice- ship).

The craft fraternities were not suppressed by the statute of 1547 (1 Edward VI.). They were indeed expressly exempted from its general operation. Such portions of their revenues as were devoted to definite religious observances were, however, appropriated by the crown. The revenues confiscated were those used for " the finding, maintaining or sustentation of any priest or of any anniversary, or obit, lamp, light or other such things." This has been aptly called " the disendowment of the religion of the misteries." Edward VI. 's statute marks no break of continuity in the life of the craft organizations. Even before the Reformation, however, signs of decay had already begun to appear, and these multiplied in the 16th and 17th centuries. The old gild system was breaking down under the action of new economic forces.

Its dissolution was due especially to the introduction of new industries, organized on a more modern basis, and to the extension of the domestic system of manufacture. Thus the companies gradually lost control over the regulation of industry, though they still retained their old monopoly in the 17th century, and in many cases even in the 18th. In fact, many craft fraternities still survived in the second half of the 18th century, but their usefulness had disappeared. The medieval form of association was incompatible with the new ideas of individual liberty and free competition, with the greater separation of capital and industry, employers and workmen, and with the introduction of the factory system. Intent only on promoting their own interests and disregarding the welfare of the community, the old companies had become an unmitigated evil. Attempts have been made to find in them the progenitors of the trades

unions, but there seems to be no immediate connexion between the latter and the craft gilds. The privileges of the old frater- nities were not formally abolished until 1835; and the sub- stantial remains or spectral forms of some are still visible in other towns besides London.

Bibliography. — W. E. Wilda, Das Gildenwesen im Miltelalter (Halle, 1831); E. Levasseuf, Histoire des classes ouvrieres en France (2 vols., Paris, 1859, new e d- 1900); Gustav von Schonberg, ” Zur wirthschaftlichen Bedeutung des deutschen Zunftwesens im Mittel- alter,” in Jahrbiicher fur Nationalokonomie und Statistik, ed. B. Hildebrand, vol. ix. pp. 1-72, Q7-169 (Jena, 1867); Joshua Toulmin Smith, English Gilds, with Lujo Brentano’s introductory essay on the History and Development of Gilds (London, 1870); Max Pappen- heim, Die altdiinischen Schutzgilden (Breslau, 1885) ; W. J. Ashley, Introduction to English Economic History (2 vols., London, 1888- •893; 3rd ed. of vol. i., 1894); C. Gross, The Gild Merchant (2 vols., Oxford, 1890); Karl Hegel, Stadte und Gilden der germanischen Volker (2 vols., Leipzig, 1891); J. Malet Lambert, Two Thousand Years of Gild Life (Hull, 1891); Alfred Doren, Untersuchungen zur Geschichte der Kaufmanns gilden (Leipzig, 1893); H. Vander Linden, Les Glides marchandes dans les Pays-Bas au moyen dge (Ghent, 1896); E. Martin Saint-Leon, Histoire des corporations de metiers (Paris, 1897) ; C. Nyrop, Danmarks Gilde- og Lavsskraaer fra middel- alderen (2 vols., Copenhagen, 1899-1904); F. Keutgen, Amter und Zilnfte (Jena, 1903) ; George Unwin, Industrial Organization in the Sixteenth and Seventeenth Centuries (Oxford, 1904). For biblio- graphies of gilds,

see H. Blanc, Bibliographie des corporations ouvrieres (Paris, 1885); G. Gonetta, Bibliografia delle corporazioni d' arti e mestieri (Rome, 1891); C. Gross, Bibliography of British Municipal History, including Gilds (New York, 1897); W. Stieda, in Handwbrterbuch der Staatswissenschaften, ed. J. Conrad (2nd ed., Jena, 1901, under " Zunftwesen "). (C. Gr.)

GILEAD {i.e. " hard " or " rugged," a name sometimes used, both in earlier and in later writers, to denote the whole of the territory occupied by the Israelites eastward of Jordan, extending from the Arnon to the southern base of Hermon (Deut. xxxiv. 1 ; Judg. xx. 1; Jos. Ant. xii. 8. 3, 4). More precisely, however, it was the usual name of that picturesque hill country which is bounded on the N by the Hieromax (Yarmuk), on the W. by the Jordan, on the S. by the Arnon, and on the E. by a line which may be said to follow the meridian of Amman (Philadelphia or Rabbath-Ammon). It thus lies wholly within 31 25′ and 32 42′ N. lat. and 35 34′ and 36° E. long., and is cut in two by the Jabbok. Excluding the narrow strip of low-lying plain along the Jordan, it has an average elevation of 2500 ft. above the Mediterranean; but, as seen from the west, the relative height is very much increased by the depression of the Jordan valley. The range from the same point of view presents a singularly uni- form outline, having the appearance of an unbroken wall; in reality, however, it is traversed by a number of deep ravines (wadis), of which the most important are the Yabis, the Ajlun, the Rajib, the Zerka (Jabbok), the Hesban, and the Zerka Ma'In. The great mass of the Gilead range is formed of Jura limestone, the base slopes being sandstone partly covered by white marls. The eastern slopes are comparatively bare of trees; but the western are well supplied with oak, terebinth and pine. The pastures are everywhere luxuriant, and the wooded heights and winding glens, in which the tangled shrubbery is here and there broken up by open glades and flat meadows of green turf, exhibit a beauty of vegetation such as is hardly to be seen in any other district of Palestine.

The first biblical mention of " Mount Gilead " occurs in connexion with the reconcilement of Jacob and Laban (Genesis xxxi.). The composite nature of the story makes an identifica- tion of the exact site difficult, but one of the narrators (E) seems to have in mind the ridge of what is now known as Jebel Ajlun, probably not far from Mahneh (Mahanaim), near the head of the wadi Yabis. Some investigators incline to SGf, or to the Jebel Kafkafa. At the period of the Israelite conquest the portion of Gilead northward of the Jabbok (Zerka) belonged to the dominions of Og, king of Bashan, while the southern half was ruled by Sihon, king of the Amorites, having been at

an earlier date wrested from Moab (Numb. xxi. 24; Deut. iii. 12-16). These two sections were allotted respectively to Manasseh and to Reuben and Gad, both districts being peculiarly suited to the pastoral and nomadic character of these tribes. A somewhat wild Bedouin disposition, fostered by their surroundings, was retained by the Israelite in-

habitants of Gilead to a late period of their history, and seems to be to some extent discernible in what we read alike of Jephthah, of David's Gadites, and of the prophet Elijah. As the eastern frontier of Palestine, Gilead bore the first brunt of Syrian and Assyrian attacks.

After the close of the Old Testament history the word Gilead seldom occurs. It seems to have soon passed out of use as a precise geographical designation; for though occasionally mentioned by Apocryphal writers, by Josephus, and by Eusebius, the allusions are all vague, and show that those who made them had no definite knowledge of Gilead proper. In Josephus and the New Testament the name Peraea or irkpav rod 'lopbavov is most frequently used; and the country is sometimes spoken of by Josephus as divided into small provinces called after the capitals in which Greek colonists had established themselves during the reign of the Seleucidae. At present Gilead south of the Jabbok alone is known by the name of Jebel Jilad (Mount Gilead), the northern portion between the Jabbok and the Yarmuk being called – Jebel Ajlun. Jebel Jilad includes Jebel Osha, and has for its capital the town of Es-Salt. The cities of Gilead expressly mentioned in the Old Testament are Ramoth, Jabesh and Jazer. The first of these has been variously identified with Es-Salt, with Reimun, with Jerash or Gerasa, with er-Remtha, and with Salhad. Opinions are also divided on the question of its identity with Mizpeh-Gilead (see Encyc. Biblica, art. " Ramoth-Gilead "). Jabesh is perhaps to be found at Meriamin, less probably at ed-Deir; Jazer, at Yajuz near Jogbehah, rather than at Sar. The city named Gilead (Judg. x. 17, xii. 7; Hos. vi. 8, xii. n) has hardly been satisfactorily explained; perhaps the text has suffered.

The " balm " (Heb. sort) for which Gilead was so noted (Gen. xlvii. n; Jer. viii. 22, xlvi. n; Ezek. xxvii. 17), is probably to be identified with mastic (Gen. xxxvii. 25, R.V. marg.) i.e. the resin yielded by the Pistachio. Lentiscus. The modern " balm of Gilead " or " Mecca balsam," an aromatic gum produced by the Balsamodendron opobalsamum, is more likely the Hebrew mor, which the English Bible wrongly renders " myrrh."

See G. A. Smith, Hist. Geog. xxiv. foil. (R. A. S. M.)

GILES (Gil, Gilles), ST, the name given to an abbot whose festival is celebrated on the 1st of September. According to the legend, he was an Athenian (AryiSios, Aegidius) of royal descent. After the death of his parents he distributed his possessions among the poor, took ship, and landed at Marseilles. Thence he went to Aries, where he remained for two years with St Caesarius. He then retired into a neighbouring desert, where he lived upon herbs and upon the milk of a hind which came to him at stated hours. He was discovered there one day by Flavius, the king of the Goths, who built a monastery on the place, of which he was the first abbot. Scholars are very much divided as to the date of his life, some holding that he lived in the 6th century, others in the 7th or 8th. It may be regarded as certain that St Giles was buried in the hermitage which he had founded in a spot which was afterwards the town of St- Gilles (diocese of Nimes, department of Gard). His reputation for sanctity attracted many pilgrims. Important gifts were made to the church which contained his body, and a monastery grew up hard by. It is probable that the Visigothic princes who were in possession of the country protected and enriched this monastery, and that it was destroyed by the Saracens at the time of their invasion in 721. But there are no authentic data before the 9th century concerning his history. In 808 Charle- magne took the abbey of St-Gilles under his protection, and it is mentioned among the monasteries from which only prayers for the prince and the state were due. In the 12th century the pilgrimages to St-Gilles are cited as among the most celebrated of the time. The cult of the saint, who came to be regarded as the special patron of lepers, beggars and cripples, spread very extensively over Europe, especially in England, Scotland, France, Belgium and Germany. The church of St Giles, Cripplegate, London, was built about 1090, while the hospital for lepers at St Giles-in-the-Fields (near New Oxford Street) was

founded by Queen Matilda in 1117. In England alone there are about 150 churches dedicated to this saint. In Edinburgh the church of St Giles could boast the possession of an arm-bone of its patron. Representations of St Giles are very frequently met with in early French and German art, but are much less common in Italy and Spain.

See Acta Sanctorum (September), i. 284-299; Devic and Vaissete, Histoire generate de Languedoc, pp. 514-522 (Toulouse, 1876); E. Rembry, Saint Gilles, sa vie, ses reliques, son culle en Belgique et dans le nord de la Trance (Bruges, 1881); F. Arnold-Forster, Studies in

Church Dedications, or England's Patron Saints, ii. 46-51, iii. 15, 363-365 (1899); A. Jameson, Sacred and Legendary Art, 768-770 (1896) ; A. Bell, Lives and Legends of the English Bishops and Kings, Medieval Monks, and other later Saints, pp. 61, 70, 74-78, 84, 197 (1904). (H. De.)

GILFILLAN, GEORGE (1813-1878), Scottish author, was born on the 30th of January 1813, at Comrie, Perthshire, where his father, the Rev. Samuel Gilfillan, the author of some theo- logical works, was for many years minister of a Secession con- gregation. After an education at Glasgowˆ University, in March 1836 he was ordained pastor of a Secession congregation in Dundee. He published a volume of his discourses in 1839, and shortly afterwards another sermon on " Hades," which brought him under the scrutiny of his co-presbyters, and was ultimately withdrawn from circulation. Gilfillan next contri- buted a series of sketches of celebrated contemporary authors to the Dumfries Herald, then edited by Thomas Aird; and these, withseveral new ones, formed his first Gallery of Literary Portraits, which appeared in 1846, and had a wide circulation. It was quickly followed by a Second and a Third Gallery. In 185 1 his most successful work, the Bards of the Bible, appeared. His aim was that it should be " a poem on the Bible "; and it was far more rhapsodical than critical. His Martyrs and Heroes of the Scottish Covenant appeared in 1832, and in 1856 he produced a partly autobiographical, partly fabulous, History of a Man. For thirty years he was engaged upon a long poem, on Night, which was published in 1867, but its theme was too vast, vague and unmanageable, and the result was a failure. He also edited an edition of the British Poets. As a lecturer and as a preacher he drew large crowds, but his literary reputation has not proved permanent. He died on the 13th of August 1878. He had just finished a new life of Burns designed to accompany a new edition of the works of that poet.

GILGAL (Heb. for "circle" of sacred stones), the name of several places in Palestine, mentioned in the Old Testament. The name is not found east of the Jordan.

1. The first and most important was situated ” in the east border of Jericho ” (Josh. iv. 19), on the border between Judah and Benjamin (Josh. xv. 7). Josephus (Ant. v. 1. 4) places it 50 stadia from Jordan and 10 from Jericho (the New Testament site). Jerome (Onomasticon, s.v. ” Galgal “) places Gilgal 2 Roman miles from Jericho, and speaks of it as a deserted place held in wonderful veneration (” miro cultu ”) by the natives. This site, which in the middle ages appears to have been lost — Gilgal being shown farther north — was in 1865 recovered by a German traveller (Hermann Zschokke), and fixed by the English survey party, though not beyond dispute. It is about 2 m. east of the site of Byzantine Jericho, and 1 m. from modern er-Riha. A fine tamarisk, traces of a church (which is mentioned in the 8th century), and a large reservoir, now filled up with mud, remain. The place is called Jiljulieh, and its position north of the valley of Achor (Wadi Kelt) and east of Jericho agrees well with the biblical indications above mentioned. A tradition connected with the fall of Jericho is attached to the site (see C. R. Conder, Tent Work, 203 ff.). This sanctuary and camp of Israel held a high place in the national regard, and is often mentioned in Judges and Samuel. But whether this is the Gilgal spoken of by Amos and Hosea in connexion with Bethel is by no means certain [see (3) below].

2. Gilgal, mentioned in Josh. xii. 23 in connexion with Dor, appears to have been situated in the maritime plain. Jerome (Onomasticon, s.v. ” Gelgel “) speaks of a town of the name

6 Roman miles north of Antipatris (Ras el ‘Ain). This is apparently the modern Kalkilia, but about 4 m. north of Anti- patris is a large village called Jiljulieh, which is more probably the biblical town.

3. The third Gilgal (2 Kings iv. 38) was in the mountains (compare 1 Sam. vii. 16, 2 Kings ii. 1-3) near Bethel. Jerome mentions this place also (Onomasticon, s.v. “Galgala”). It appears to be the present village of Jiljilia, about 7 English miles north of Beitin (Bethel). It may have absorbed the old shrine of Shiloh and been the sanctuary famous in the days of Amos and Hosea.

4. Deut. xi. 30 seems to imply a Gilgal near Gerizim, and there is still a place called Juleijil on the plain of Makhna, 2h m. S. E. of Shechem. This may have been Amos’s Gilgal and was almost certainly that of 1 Mace. ix. 2.

5. The Gilgal described in Josh. xv. 7 is the same as the Beth-Gilgal of Neh. xii. 29; its site is not known. (R. A. S. M.)

GILGAMESH, EPIC OF, the title given to one of the most important literary products of Babylonia, from the name of the chief personage in the series of tales of which it is composed.

Though the Gilgamesh Epic is known to us chiefly from the fragments found in the royal collection of tablets made by Assur-bani-pal, the king of Assyria (668-626 B.C.) for his palace at Nineveh, internal evidence points to the high antiquity of at least some portions of it, and the discovery of a fragment of the epic in the older form of the Babylonian script, which can be dated as 2000 B.C., confirms this view. Equally certain is a second observation of a generalcharacter that the epic originating as the greater portion of the literature in Assur-bani-pal's collec- tion in Babylonia is a composite product, that is to say, it consists of a number of independent stories or myths originating at different times, and united to form a continuous narrative with Gilgamesh as the central figure. This view naturally raises the question whether the independent stories were all told of Gilgamesh or, as almost always happens in the case of ancient tales, were transferred to Gilgamesh as a favourite popular hero. Internal evidence again comes to our aid to lend its weight to the latter theory.

While the existence of such a personage as Gilgamesh may be admitted, he belongs to an age that could only have preserved a dim recollection of his achievements and adventures through oral traditions. The name 1 is not Babylonian, and what evidence as to his origin there is points to his having come from Elam, to the east of Babylonia. He may have belonged to the people known as the Kassites who at the beginning of the 18th century B.C. entered Babylonia from Elam, and obtained control of the Euphrates valley. Why and how he came to be a popular hero in Babylonia cannot with our present material be deter- mined, but the epic indicates that he came as a conqueror and established himself at Erech. In so far we have embodied in the first part of the epic dim recollections of actual events, but we soon leave the solid ground of fact and find ourselves soaring to the heights of genuine myth. Gilgamesh becomes a god, and in certain portions of the epic clearly plays the part of the sun- god of the spring-time, taking the place apparently of Tammuz or Adonis, the youthful sun-god, though the story shows traits that differentiate it from the ordinary Tammuz myths. A separate stratum in the Gilgamesh epic is formed by the story of Eabani — introduced as the friend of Gilgamesh, who joins him in his adventures. There can be no doubt that Eabani, who symbolizes primeval man, was a figure originally entirely inde- pendent of Gilgamesh, but his story was incorporated into the epic by that natural process to be observed in the national epics of other peoples, which tends to connect the

favourite hero with all kinds of tales that for one reason or the other become em- bedded in the popular mind. Another stratum is represented by the story of a favourite of the gods known as Ut-Napishtim, who is saved from a destructive storm and flood that destroys

1 The name of the hero, written always ideographically, was for a long time provisionally read Izdubar; but a tablet discovered by T. G. Pinches gave the equivalent Gilgamesh (see Jastrow, Religion of Babylonia and Assyria, p. 468).

his fellow-citizens of Shurippak. Gilgamesh is artificially brought into contact with Ut-Napishtim, to whom he pays a visit for the purpose of learning the secret of immortal life and perpetual youth which he enjoys. During the visit Ut-Napishtim tells Gilgamesh the story of the flood and of his miraculous escape. Nature myths have been entwined with other episodes in the epic and finally the theologians took up the combined stories and made them the medium for illustrating the truth and force of certain doctrines of the Babylonian religion. In its final form, the outcome of an extended and complicated literary process, the Gilgamesh Epic covered twelve tablets, each tablet devoted to one adventure in which the hero plays a direct or indirect part, and the whole covering according to the most plausible estimate about 3000 lines. Of all twelve tablets portions have been found among the remains of Assur-bani-pal's library, but some of the tablets are so incomplete as to leave even their general contents in some doubt. The fragments do not all belong to one copy. Of some tablets portions of two, and of some tablets portions of as many as four, copies have turned up, pointing therefore to the great popularity of the production. The best preserved are Tablets VI. and XI., and of the total about 1500 lines are now known, wholly or in part, while of those partially preserved quite a number can be restored. A brief summary of the contents of the twelve may be indicated as follows:

In the 1st tablet, after a general survey of the adventures of Gilgamesh, his rule at Erech is described, where he enlists the services of all the young able-bodied men in the building of the great wall of the city. The people sigh under the burden im- posed, and call upon the goddess Aruru to create a being who might act as a rival to Gilgamesh, curb his strength, and dispute his tyrannous control. The goddess consents, and creates Eabani, who is described as a wild man,

living with the gazelles and the beasts of the field. Eabani, whose name, signifying ” Ea creates,” points to the tradition which made Ea (q.v.) the creator of humanity, symbolizes primeval man. Through a hunter, Eabani and Gilgamesh are brought together, but instead of becoming rivals, they are joined in friendship. Eabani is induced by the snares of a maiden to abandon his life with the animals and to proceed to Erech, where Gilgamesh, who has been told in several dreams of the coming of Eabani, awaits him. Together they proceed upon several adventures, which are related in the following four tablets. At first, indeed, Eabani curses the fate which led him away from his former life, and Gilgamesh is represented as bewailing Eabani’s dissatisfaction. The sun-god Shamash calls upon Eabani to remain with Gilga- mesh, who pays him all honours in his palace at Erech. With the decision of the two friends to proceed to the forest of cedars in which the goddess Irnina — a form of Ishtar — dwells, and which is guarded by Khumbaba, the 2nd tablet ends. In the 3rd tablet, very imperfectly preserved, Gilgamesh appeals through a Shamash priestess Rimat-Belit to the sun-god Shamash for his aid in the proposed undertaking. The 4th tablet contains a description of the formidable Khumbaba, the guardian of the cedar forest. In the 5th tablet Gilgamesh and Eabani reach the forest. Encouraged by dreams, they proceed against Khumbaba, and despatch him near a specially high cedar over which he held guard. This adventure against Khumbaba belongs to the Eabani stratum of the epic, into which Gilgamesh is artificially introduced. The basis of the 6th tablet is the familiar nature-myth of the change of seasons, in which Gilgamesh plays the part of the youthful solar god of the springtime, who is wooed by the goddess of fertility, Ishtar. Gilgamesh, recalling to the goddess the sad fate of those who fall a victim to her charms, rejects the offer. In the course of his recital snatcheS of other myths are referred to, including he famous Tammuz- Adonis tale, in which Tammuz, the youthful bridegroom, is slain by his consort Ishtar. The goddess, enraged at the insult, asks her father Anu to avenge her. A divine bull is sent to wage a contest against Gilgamesh, who is assisted by his friend Eabani. This scene of the fight with the bull is often depicted on seal cylinders. The two friends by their united force succeed in

killing the bull, and then after performing certain votive and purification rites return to Erech, where they are hailed with joy In this adventure it is clearly Eabani who is artificially intro- duced in order to maintain the association with Gilgamesh. The 7 th tablet continues the Eabani stratum. The hero is smitten with sore disease, but the fragmentary condition of this and the succeeding tablet is such

as to envelop in doubt the accompanying circumstances, including the cause and nature of his disease. The 8th tablet records the death of Eabani. The 9th and 10th tablets, exclusively devoted to Gilgamesh, describe his wanderings in quest of Ut-Napishtim, from whom he hopes to learn how he may escape the fate that has overtaken his friend Eabani. He goes through mountain passes and encounters lions. At the entrance to the mountain Mashu, scorpion-men stand guard, from one of whom he receives advice as to how to pass through the Mashu district. He succeeds in doing so, and finds himself in a wonderful park, which lies along the sea coast. In the 10th tablet the goddess Sabitu, who, as guardian of the sea, first bolts her gate against Gilgamesh, after learning of his quest, helps him to pass in a ship across the sea to the " waters of death." The ferry-man of Ut-Napishtim brings him safely through these waters, despite the difficulties and dangers of the voyage, and at last the hero finds himself face to face with Ut-Napishtim. In the nth tablet, Ut-Napish-tim tells the famous story of the Babylonian flood, which is so patently attached to Gilgamesh in a most artificial manner. Ut-Napishtim and his wife are anxious to help Gilgamesh to new life. He is sent to a place where he washes himself clean from impurity. He is told of a weed which restores youth to the one grown old. Scarcely has he obtained the weed when it is snatched away from him, and the tablet closes somewhat obscurely with the prediction of the destruction of Erech. In the 12th tablet Gilgamesh succeeds in obtaining a view of Eabani's shade, and learns through him of the sad fate endured by the dead. With this description, in which care of the dead is inculcated as the only means of making their existence in Aralu, where the dead are gathered, bearable, the epic, so far as we have it, closes.

The reason why the flood episode and the interview with the dead Eabani are introduced is quite clear. Both are intended as illustrations of doctrines taught in the schools of Babylonia; the former to explain that only the favourites of the gods can hope under exceptional circumstances to enjoy life everlasting; the latter to emphasize the impossibility for ordinary mortals to escape from the inactive shadowy existence led by the dead, and to inculcate the duty of proper care for the dead. That the astro-theological system is also introduced into the epic is clear from the division into twelve tablets, which correspond to the yearly course of the sun, while throughout there are indications that all the adventures of Gilgamesh and Eabani, including those which have an historical background, have been submitted to the influence of this system and projected on to the heavens. This interpretation of the popular tales, according to which the career of the hero can be followed in its entirety and in detail in the movements

in the heavens, in time, with the growing predominance of the astral-mythological system, overshadowed the other factors involved, and it is in this form, as an astral myth, that it passes through the ancient world and leaves its traces in the folk-tales and myths of Hebrews, Phoenicians, Syrians, Greeks and Romans throughout Asia Minor and even in India.

Bibliography. — The complete edition of the Gilgamesh Epic by Paul Haupt under the title Das babylonische Nimrodepos (Leipzig, 1884-1891), with the 12th tablet in the Beitrage zur Assyriologie, i. 48-79; German translation by Peter Jensen in vol. vi. of Schrader's Keilinschriftliche Bibliothek (Berlin, 1900), pp. 116-273. See also the same author's comprehensive work, Das Gilgamesch- Epos in der Weltliteratur (vol. i. 1906, vol. ii. to follow). An English translation of the chief portions in Jastrow, Religion of Babylonia and Assyria (Boston, 1898), ch. xxiii. (M. Ja.)

GILGIT, an outlying province in the extreme north-west of India, over which Kashmir has reasserted her sovereignty. Only a part of the basin of the river Gilgit is included within its political boundaries. There is an intervening width of

mountainous country, represented chiefly by glaciers and ice-fields, and intersected by narrow sterile valleys, measuring some ioo to 150 m. in width, to the north and north-east, which separates the province of Gilgit from the Chinese frontier beyond the Muztagh and Karakoram. This part of the Kashmir borderland includes Kanjut (or Hunza) and Ladakh. To the north-west, beyond the sources of the Yasin and Ghazar in the Shandur range (the two most westerly tributaries of the Gilgit river) is the deep valley of the Yarkhun or Chitral. Since the formation of the North- West Frontier Province in 1 001, the political charge of Chitral, Dir and Swat, which was formerly included within the Gilgit agency, has been transferred to the chief commissioner of the new province, with his capital at Peshawar. Gilgit proper now forms a wazarat of the Kashmir state, administered by a wazir. Gilgit is also the headquarters of a British political agent, who exercises some supervision over the wazir, and is directly responsible to the government of India for the adminis- tration of the outlying districts or petty states of Hunza, Nagar, Ashkuman, Yasin and Ghizar, the little republic of Chilas, &c. These states acknowledge the suzerainty of Kashmir, paying an annual tribute in gold or grain, but

they form no part of its territory.

Within the wider limits of the former Gilgit agency are many mixed races, speaking different languages, which have all been usually classed together under the name Dard. The Dard, however, is unknown beyond the limits of the Kohistan district of the Indus valley to the south of the Hindu Koh, the rest of the inhabitants of the Indus valley belonging to Shin republics, or Chilas. The great mass of the Chitral population are Kho (speaking Khowar), and they may be accepted as representing the aboriginal population of the Chitral valley. (See Hindu Kush.) Between Chitral and the Indus the ” Dards ” of Dardistan are chiefly Yeshkuns and Shins, and it would appear from the proportions in which these people occupy the country that they must have primarily moved up from the valley of the Indus in successive waves of conquest, first the Yeshkuns, and then the Shins. No one can put a date to these invasions, but Biddulph is inclined to class the Yeshkuns with the Yuechi who conquered the Bactrian kingdom about 120 B.C. The Shins are obviously a Hindu race (as is testified by their veneration for the cow), who spread themselves northwards and eastwards as far as Baltistan, where they collided with the aboriginal Tatar of the Asiatic highlands. But the ethnography of ” Dardistan,” or the Gilgit agency (for the two are, roughly speaking, synonymous), requires further investigation, and it would be premature to attempt to frame anything like an ethno- graphical history of these regions until the neighbouring pro- vinces of Tangir and Darel have been more fully examined. The wazarat of Gilgit contains a population (1901) of 60,885, all Mahommedans, mostly of the Shiah sect, but not fanatical. The dominant race is that of the Shins, whose language is uni- versally spoken. This is one of the so-called Pisacha languages, an archaic Aryan group intermediate between the Iranian and the Sanskritic.

In general appearance and dress all the mountain-bred peoples extending through these northern districts are very similar. Thick felt coats reaching below the knee, loose ” pyjamas ” with cloth ‘■’ putties ” and boots (often of English make) are almost universal, the distinguishing feature in their costume being the felt cap worn close to the head and rolled up round the edges. They are on the whole a light-hearted, cheerful race of people, but it has been observed that their temperament varies much with their habitat — those who live on the shadowed sides of mountains being distinctly more morose and more serious in disposition than the dwellers in valleys which catch the winter sunlight. They are, at the same time, bloodthirsty and treacher- ous to a degree which would appear incredible to a casual observer of their happy and genial manners, exhibiting a strange combination (as

has been observed by a careful student of their ways) of ” the monkey and the tiger.” Addicted to sport of every kind, they pursue no manufacturing industries whatsoever, but they are excellent agriculturists, and show great ingenuity

in their local irrigation works and in their efforts to bring every available acre of cultivable soil within the irrigated area. Gold washing is more or less carried on in most of the valleys north of the river Gilgit, and gold dust (contained in small packets formed with the petals of a cup-shaped flower) is an invariable item in their official presents and offerings. Gold dust still constitutes part of the annual tribute which, strangely enough, is paid by Hunza to China, as well as to Kashmir.

Routes in the Gilgit Agency. — One of the oldest recorded routes through this country is that which connects Mastuj in the Chitral valley with Gilgit, passing across the Shandur range (12,250). It now forms the high-road between Gilgit and Chitral, and has been engineered into a passable route. From the north three great glacier-bred affluents make their way to the river of Gilgit, joining it at almost equal intervals, and each of them affords opportunity for a rough passage northwards. (1) The Yasin river, which follows a fairly straight course from north to south for about 40 m. from the foot of the Dark6t pass across the Shandur range (15,000) to its junction with the river Gilgit, close to the little fort of Gupis, on the Gilgit-Mastuj road. Much of this valley is cultivated and extremely picturesque. At the head of it is a grand group of glaciers, one of which leads up to the well-known pass of Darkot. (2) 25 m. (by map measurement) below Gupis the Gilgit receives the Ashkuman affluent from the north. The little Lake of Karumbar is held to be its source, as it lies at the head of the river. The same lake is sometimes called the source of the river Yarkhun or Chitral ; and it seems possible that a part of its waters may be deflected in each direction. The Karumbar, or Ashkuman, is nearly twice the length of the Yasin, and the upper half of the valley is encompassed by glaciers, rendering the route along it uncertain and difficult. (3) 40 m. or so below the Ashkuman junction, and nearly opposite the little station of Gilgit, the river receives certain further contributions from the north which are collected in the Hunza and Nagar basins. These basins include a system of glaciers of such gigantic proportions that they are probably unrivalled in any pact of the world. The glacial head of the Hunza is not far from that of the Karumbar, and, like the Karumbar, the river commences with a wide sweep eastwards, following a course roughly parallel to the crest of the Hindu Kush (under whose southern slopes it lies close) for about 40 m. Then striking south for another 40 m., it twists amidst the

barren feet of gigantic rock-bound spurs which reach up- wards to the Muztagh peaks on the east and to a mass of glaciers and snow-fields on the west, hidden amidst the upper folds of moun- tains towering to an average of 25,000 ft. The next great bend is again to the west for 30 m., before a final change of direction to the south at the historical position of Chalt and a comparatively straight run of 25 m. to a junction with the Gilgit. The valley of Hunza lies some 10 m. from the point of this westerly bend, and 20 (as the crow flies) from Chalt. Much has been written of the magnificence of Hunza valley scenery, surrounded as it is by a stupendous ring of snow-capped peaks and brightened with all the radiant beauty that cultivation adds to these mountain valleys; but such scenery must be regarded as exceptional in these northern regions.

Glaciers and Mountains. — Conway and Godwin Austen have described the glaciers of Nagar which, enclosed between the Muztagh spurs on the north-east and the frontier peaks of Kashmir (terminat- ing with Rakapushi) on the south-west, and massing themselves in an almost uninterrupted series from the Hunza valley to the base of those gigantic peaks which stand about Mount Godwin Austen, seem to be set like an ice-sea to define the farthest bounds of the Himalaya. From its uttermost head to the foot of the Hispar, overhanging the valley above Nagar, the length of the glacial ice- bed known under the name of Biafo is said to measure about 90 m. Throughout the mountain region of Kanjut (or Hunza) and Nagar the valleys are deeply sunk between mountain ranges, which are nowhere less than 15,000 ft. in altitude, and which must average above 20,000 ft. As a rule, these valleys are bare of vegetation. Where the summits of the loftier ranges are not buried beneath snow and ice they are bare, bleak and splintered, and the nakedness of the rock scenery extends down their rugged spurs to the very base of them. On.the lower slopes of tumbled debris the sun in summer beats with an intensity which is unmitigated by the cloud drifts which form in the moister atmosphere of the monsoon-swept sum- mits of the Himalaya. Sun-baked in summer and frost-riven in winter, the mountain sides are but immense ramps of loose ropk debris, only awaiting the yearly melting of the upper snow-fields, or the advent of a casual rainstorm, to be swept downwards in an avalanche of mud and stones into the gorges below. Here it becomes piled and massed together, till the pressure of accumulation forces it out into the main valleys, where it spreads in alluvial fans and silts up the plains. This formation is especially marked throughout the high level valleys cf the Gilgit basin.

Passes. — Each of these northern affluents of the main stream is headed by a pass, or a group of passes, leading either to the Pamif

region direct, or into the upper Yarkhun valley from which a Pamir route diverges. The Yasin valley is headed by the Darkfit pass (15,000 ft.), which drops into the Yarkhun not far from the foot of

the Baroghil group over the main Hindu Kush watershed. The Ashkuman is headed by the Gazar and Kora Bohrt passes, leading to the valley of the Ab-i-Punja; and the Hunza by the Kilik and Mintaka, the connecting links between the Taghdumbash Pamir and the Gilgit basin. They are all about the same height — 15,000 ft. All are passable at certain times of the year to small parties, and all are uncertain. In no case do they present insuperable difficulties in themselves, glaciers and snow-fields and mountain staircases being common to all; but the gorges and precipices which distin- guish the approaches to them from the south, the slippery sides of shelving spurs whose feet are washed by raging torrents, the perpetual weary monotony of ascent and descent over successive ridges multiplying the gradient indefinitely — these form the real obstacles blocking the way to these northern passes.

Gilgit Station. — The pretty little station of Gilgit (4890 ft. above sea) spreads itself in terraces above the right bank of the river nearly opposite the opening leading to Hunza, almost nestling under the cliffs of the Hindu Koh, which separates it on the south from the savage mountain wilderness of Darel and Kohistan. It includes a residency for the British political officer, with about half a dozen homes for the accommodation of officials, barracks suitable for a battalion of Kashmir troops, and a hospital. Evidences of Buddhist occupation are not wanting in Gilgit, though they are few and un- important. Such as they are, they appear to prove that Gilgit was once a Buddhist centre, and that the old Buddhist route between Gilgit and the Peshawar plain passed through the gorges and clefts of the unexplored Darel valley to Thakot under the northern spurs of the Black Mountain.

Connexion with India. — The Gilgit river joins the Indus a few miles above the little post of Bunji, where an excellent suspension bridge spans the river. The valley is low and hot, and the scenery betweei. Gilgit and Bunji is monotonous; but the road is now maintained in excellent condition. A little below Bunji the Astor river joins the Indus from the south-east, and this deep pine-clad valley indicates the continuation of the highroad from Gilgit to Kashmir via the Tragbal and Burzil passes. Another well-known route connecting Gilgit with

the Abbottabad frontier of the Punjab lies across the Babusar pass (13,000 ft.), linking the lovely Hazara valley of Kaghan to Chilas; Chilas (4150 ft.) being on the Indus, some 50 m. below Bunji. This is a more direct connexion between Gilgit and the plains of the Punjab than that afforded by the Kashmir route via Gurais and Astor, which latter route involves two con- siderable passes — the Tragbal (11,400) and the Burzil (13,500); but the intervening strip of absolutely independent territory (in- dependent alike of Kashmir and the Punjab), which includes the hills bordering the road from the Babusar pass to Chilas, renders it a risky route for travellers unprotected by a military escort. Like the Kashmir route, it is now defined by a good military road.

History. — The Dards are located by Ptolemy with surprising accuracy (Daradae) on the west of the Upper Indus, beyond the head-waters of the Swat river (Soastus), and north of the Gandarae, i.e. the Gandharis, who occupied Peshawar and the country north of it. The Dardas and Chinas also appear in many of the old Pauranic lists of peoples, the latter probably representing the Shin branch of the Dards. This region was traversed by two of the Chinese pilgrims of the early centuries of our era, who have left records of their journeys, viz. Fahien, coming from the north, c. 400, and Hsiian Tsang, ascending from Swat, c. 631. The latter says: ” Perilous were the roads, and dark the gorges. Sometimes the pilgrim had to pass by loose cords, sometimes by light stretched iron chains. Here there were ledges hanging in mid-air; there flying bridges across abysses; elsewhere paths cut with the chisel, or footings to climb by.” Yet even in these inaccessible regions were found great convents, and miraculous images of Buddha. How old the name of Gilgit is we do not know, but it occurs in the writings of the great Mahommedan savant al-Biruni, in his notices of Indian geography. Speaking of Kashmir, he says: ” Leaving the ravine by which you enter Kashmir and entering the plateau, then you have for a march of two more days on your left the mountains of Bolor and Shamilan, Turkish tribes who are called Bhattavaryan. Their king has the title Bhatta-Shah. Their towns are Gilgit, Aswira and Shiltash, and their language is the Turkish. Kashmir suffers much from their inroads ” (Trs. Sachau, i. 207). There are difficult matters for discussion here. It is impossible to say what ground the writer had for calling the people Turks. But it is curious that the Shins say they are all of the same race as the Moguls of India, whatever they may mean by that. Gilgit, as far back as tradition goes, was ruled by rajas of a family called Trakane. When this family became extinct the valley was desolated by successive invasions

of neighbouring rajas, and in the 20 or 30 years ending with 1842

there had been five dynastic revolutions. The most prominent character in the history was a certain Gaur Rahman or Gauhar Aman, chief of Yasin, a cruel savage and man-seller, of whom many evil deeds are told. Being remonstrated with for selling a mullah, he said, ” Why not ? The Koran, the word of God, is sold; why not sell the expounder thereof ?” The Sikhs entered Gilgit about 1842, and kept a garrison there. When Kashmir was made over to Maharaja Gulab Singh of Jammu in 1846, by Lord Hardinge, the Gilgit claims were transferred with it. And when a commission was sent to lay down boundaries of the tracts made over, Mr Vans Agnew (afterwards murdered at Multan) and Lieut. Ralph Young of the Engineers visited Gilgit, the first Englishmen who did so. The Dogras (Gulab Singh’s race) had much ado to hold their ground, and in 1852 a cata- strophe occurred, parallel on a smaller scale to that of the English troops at Kabul. Nearly 2000 men of theirs were exterminated by Gaur Rahman and a combination of the Dards; only one person, a soldier’s wife, escaped, and the Dogras were driven away for eight years. Gulab Singh would not again cross the Indus, but after his death (in 1857) Maharaja Ranbir Singh longed to recover lost prestige. In i860 he sent a force into Gilgit. Gaur Rahman just then died, and there was little re- sistance. The Dogras after that took Yasin twice, but did not hold it. They also, in 1866, invaded Darel, one of the most secluded Dard states, to the south of the Gilgit basin, but with- drew again. In 1880, in order to guard against the advance of Russia, the British government, acting as the suzerain power of Kashmir, established the Gilgit agency; in 1001, on the forma- tion of the North-West Frontier province, the rearrangement was made as stated above.

Authorities. — Biddulph, The Tribes of the Hindu Kush (Calcutta, 1880); W. Lawrence, The Kashmir Valley (London, 1895); Tanner, ” Our Present Knowledge of the Himalaya,” Proc. R.G.S. vol. xiii., 1891; Durand, Making a Frontier (London, 1899); Report of Lockhart’s Mission (Calcutta, 1886); E. F. Knight, Where Three Empires Meet (London, 1892); F. Tounghusband, ” Journeys in the Pamirs and Adjacent Countries,” Proc. R.G.S. vol. xiv., 1892; Curzon, ” Pamirs,” Jour. R.G.S. vol. viii., 1896; Leitner, Dardistan (1877)- (T. H. H.*)

GILL, JOHN (1697-1771), English Nonconformist divine, was born at Kettering, Northamptonshire. His parents were poor and he owed his education chiefly to his own perseverance. In November 1716 he was baptized and began to preach at Higham Ferrers and Kettering, until the beginning of 1719, when he became pastor of the Baptist congregation at Horsley- down in Southwark. There he continued till 1757, when he removed to a chapel near London Bridge. From 1729 to 1756 he was Wednesday evening lecturer in Great Eastcheap. In 1

748 he received the degree of D.D. from the university of Aberdeen. He died at Camberwell on the 14th of October 1771. Gill was a great Hebrew scholar, and in his theology a sturdy Calvinist.

His principal works are Exposition of the Song of Solomon (1728); The Prophecies of the Old Testament respecting the Messiah (1728); The Doctrine of the Trinity (1731); The Cause of God and Truth (4 vols., 1731); Exposition of the Bible, in 10 vols. (1746-1766), in preparing which he formed a large collection of Hebrew and Rab- binical books and MSS. ; The Antiquity of the Hebrew Language — Letters, Vowel Points, and Accents (1767); A Body of Doctrinal Divinity (1767); A Body of Practical Divinity (1770); and Sermons and Tracts, with a memoir of his life (1773). An edition of his Exposition of the Bible appeared in 1816 with a memoir by John Rippon, which has also appeared separately.

GILL. (1) One of the branchiae which form the breathing apparatus of fishes and other animals that live in the water. The word is also applied to the branchiae of some kinds of worm . and arachnids, and by transference to objects resembling the branchiae of fishes, such as the wattles of a fowl, or the radiating films on the under side of fungi. The word is of obscure origin. Danish has giaelle, and Swedish gal with the same meaning. The root which appears in ” yawn,” ” chasm,” has been suggested. If this be correct, the word will be in origin the same as ” gill,” often spelled ” ghyll,” meaning a glen or ravine, common in northern English dialects and also in Kent and Surrey. The g in both these words is hard. (2) A liquid measure usually holding

one-fourth of a pint. The word comes through the O. Fr. gelle, from Low Lat. gello or gillo, a measure, for wine. It is thus con- nected with ” gallon.” The g is soft. (3) An abbreviation of the feminine name Gillian, also often spelled Jill, as it is pronounced. Like Jack for a boy, with which it is often coupled, as in the nursery rhyme, it is used as a homely generic name for a girl.

GILLES DE ROYE, or Egidius de Roya (d. 1478), Flemish chronicler, was born probably at Montdidier, and became a Cistercian monk. He was afterwards professor of theology in Paris and abbot of the monastery of Royaumont at Asnieres- sur-Oise, retiring about 1458 to the convent of Notre Dame des Dunes, near Furnes, and devoting his time to study. Gilles wrote the Chronicon Dunense or Annates Belgici,

a resume and continuation of the work of another monk, Jean Brandon (d. 1428), which deals with the history of Flanders, and also with events in Germany, Italy and England from 792 to 1478.

The Chronicle was published by F. R. Sweert in the Rerum Belgicarum annates (Frankfort, 1620) ; and the earlier part of it by C. B. Kervyn de Lettenhove in the Chroniques relatives a Vhistoire de la Belgique (Brussels, 1870).

GILLES LI MUISIS, or le Muiset (c. 1272-1352), French chronicler, was born probably at Tournai, and in 1289 entered the Benedictine abbey of St Martin in his native city, becoming prior of this house in 1327, and abbot four years later. He only secured the latter position after a contest with a competitor, but he appears to have been a wise ruler of the abbey. Gilles wrote two Latin chronicles, Chronicon majus and Chronicon minus, dealing with the history of the world from the creation until 1349. This work, which was continued by another writer to 1352, is valuable for the history of northern France, and Flanders during the first half of the 14th century. It is published by J. J. de Senet in the Corpus chronicorum Flandriae, tome ii. (Brussels, 1841). Gilles also wrote some French poems, and these Poesies de Gilles li Muisis have been published by Baron Kervyn de Lettenhove (Louvain, 1882).

See A. Molinier, Les Sources de Vhistoire de France, tomeiii. (Paris, I9°3)-

GILLESPIE, GEORGE (1613-1648), Scottish divine, was born at Kirkcaldy, where his father, John Gillespie, was parish minister, on the 21st of January 1613, and entered the university of St Andrews as a ” presbytery bursar ” in 1629. On the completion of a brilliant student career, he became domestic chaplain to John Gordon, 1st Viscount Kenmure (d. 1634), and afterwards to John Kennedy, earl of Cassillis, his conscience not permitting him to accept the episcopal ordination which was at that time in Scotland an indispensable condition of induction to a parish. While with the earl of Cassillis he wrote his first work, A Dispute against the English Popish Ceremonies obtruded upon the Church of Scotland, which, opportunely published shortly after the ” Jenny Geddes ” incident (but without the author’s name) in the summer of 1637, attracted considerable attention, and within a few months had been found by the privy council to be so damaging that by their orders all available copies were called in and burnt. In April 1638, soon after the authority of the bishops had been set aside by the nation, Gillespie was ordained minister of Wemyss (Fife) by the presbytery of Kirkcaldy, and in the

same year was a member of the famous Glasgow Assembly, before which he preached (November 21st) a sermon against royal interference in matters ecclesiastical so pronounced, as to call for some remonstrance on the part of Argyll, the lord high commissioner. In 1642 Gillespie was translated to Edinburgh; but the brief remainder of his life was chiefly spent in the conduct of public business in London. Already, in 1640, he had accompanied the commis- sioners of the peace to England as one of their chaplains; and in 1643 he was appointed by the Scottish Church one of the four commissioners to the Westmins er Assembly. Here, though the youngest member of the Assembly, he took a prominent part in almost all the protracted discussions on church govern- ment, discipline and worship, supporting Presbyterianism by numerous controversial writings, as well as by an unusual fluency and readiness in debate. Tradition long preserved and probably enhanced the record of his victories in debate, and

especially of his encounter, with John Selden on Matt, xviii. 15-17. In 1645 he returned to Scotland, and is said to have drawn the act of assembly sanctioning the directory of public worship. On his return to London he had a hand in drafting the Westminster confession of faith, especially chap. i. Gillespie was elected moderator of the Assembly in 1648, but the laborious duties of that office (the court continued to sit from the 12th of July to the 12th of August) told fatally on an overtaxed constitution; he fell into consumption, and, after many weeks of great weakness, he died at Kirkcaldy on the 1 7th of December 1648. In acknowledgment of his great public services, a sum of £1000 Scots was voted, though destined never to be paid, to his widow and children by the committee of estates. A simple tombstone, which had been erected to his memory in Kirkcaldy parish church, was in 1661 publicly broken at the cross by the hand of the common hangman, but was restored in 1746.

His principal publications were controversial and chiefly against Erastianism : Three sermons against Thomas Coleman ; A Sermon before the House of Lords (August 27th), on Matt. iii. 2, Nihil Re- spondent and Male Audis; Aaron's Rod Blossoming, or the Divine Ordinance of Church-government vindicated (1646), which is de- servedly regarded as a really able statement of the case for an exclusive spiritual jurisdiction in the church; One Hundred and Eleven Propositions concerning the Ministry and Government of the Church (Edinburgh, 1647). The following were posthumously published by his brother: A Treatise of Miscellany Questions (1649) ; The Ark of the New Testament (2 vols., 1661-1667) ; Notes of Debates and Proceedings of the Assembly of Divines at Westminster, from February

1644 to January 164$. See Works, with memoir, published by Hetherington (Edinburgh, 1843-1846).

GILLESPIE, THOMAS (1708-17 74), Scottish divine, was born at Clearburn, in the parish of Duddingston, Midlothian, in 1708. He was educated at the university of Edinburgh, and studied divinity first at a small theological seminary at Perth, and afterwards for a brief period under Philip Doddridge at Northampton, where he received ordination in January 1741. In September of the same year he was admitted minister of the parish of Carnock, Fife, the presbytery of Dunfermline agreeing not only to sustain as valid the ordination he had received in England, but also to allow a qualification of his subscription to the church's doctrinal symbol, so far as it had reference to the sphere of the civil magistrate in matters of religion. Having on conscientious grounds persistently absented himself from the meetings of presbytery held for the purpose of ordaining one Andrew Richardson, an unacceptable presentee, as minister of Inverkeithing, he was, after an unobtrusive but useful ministry of ten years, deposed by the Assembly of 1752 for maintaining that the refusal of the local presbytery to act in this case was justified. He continued, however, to preach, first at Carnock, and afterwards in Dunfermline, where a large congregation gathered round him. His conduct under the sentence of deposi- tion produced a reaction in his favour, and an effort was made to have him reinstated; this he declined unless the policy of the church were reversed. In 1761, in conjunction with Thomas Boston of Jedburgh and Collier of Colinsburgh, he formed a dis- tinct communion under the name of " The Presbytery of Relief," — relief, that is to say, " from the yoke of patronage and the tyranny of the church courts." The Relief Church eventually became one of the communions combining to form the United Presbyterian Church. He died on the 19th of January 1774, His only literary efforts were an Essay on the Continuation of Immediate Revelations in the Church, and a Practical Treatise on Temptation. Both works appeared posthumously (1774). In the former he argues that immediate revelations are no longer vouchsafed to the church, in the latter he traces temptation to the work of a personal devil.

See Lindsay's Life and Times of the Rev. Thomas Gillespie; Smithers's History of the Relief Church ; for the Relief Church see United Presbyterian Church.

GILLIE (from the Gael, gille, Irish gille or giolla, a servant or boy), an attendant on a Gaelic chieftain; in this sense its use, save historically, is rare. The name is now applied in the Highlands of Scotland to the man-servant who attends a sports- man in shooting or fishing. A gillie-

wetfoot, a term now obsolete (a translation of gillie-casfliuch, from the Gaelic cas, foot, and

fliuch, wet), was the gillie whose duty it was to carry his master over streams. It became a term of contempt among the Low- landers for the “tail” (as his- attendants were called) of a Highland chief.

GILLIES, JOHN (1747-1836), Scottish historian and classical scholar, was born at Brechin, in Forfarshire, on the 18th of January 1747. He was educated at Glasgow University, where, at the age of twenty, he acted for a short time as substitute for the professor of Greek. In 1784 he completed his History of Ancient Greece, its Colonies and Conquests (published 1786). This work, valuable at a time when the study of Greek history was in its infancy, and translated into French and German, was written from a strong Whig bias, and is now entirely super- seded (see Greece: Ancient History, ” Authorities “). On the death of William Robertson (1721-1793), Gillies was appointed historiographer-royal for Scotland. In his old age he retired to Clapham, where he died on the 15th of February 1836.

Of his other works, none of which are much read, the principal are: View of the Reign of Frederic II. of Prussia, with a Parallel between that Prince and Philip II. of Macedon (1789), rather a pane- gyric than a critical history; translations of Aristotle’s Rhetoric (1823) and Ethics and Politics (1786-1797); of the Orations of Lysiasand Isocrates (i778);and History of the World from Alexander to Augustus (1807), which, although deficient in style, was com- mended for its learning and research.

GILLINGHAM, a market town in the northern parliamentary division of Dorsetshire, England, 105 m. W.S.W. from London by the London & South-Western railway. Pop. (1901) 3380. The church of St Mary the Virgin has a Decorated chancel. There is a large agricultural trade, and manufactures of bricks and tiles, cord, sacking and silk, brewing and bacon-curing are carried on. The rich undulating district in which Gillingham is situated was a forest preserved by King John and his successors, and the site of their lodge is traceable near the town,

GILLINGHAM, a municipal borough of Kent, England, in the parliamentary borough of Chatham and the mid-division of the county, on the Medway immediately east of Chatham, on the South-

Eastern & Chatham railway. Pop. (1891) 27,809; (1901) 42,530. Its population is largely industrial, employed in the Chatham dockyards, and in cement and brick works in the neighbourhood. The church of St Mary Magdalene ranges in date from Early English to Perpendicular, retaining also traces of Norman work and some early brasses. A great battle between Edmund Ironside and Canute, c. 1016, is placed here; and there was formerly a palace of the archbishops of Canterbury. Gilling- ham was incorporated in 1903, and is governed by a mayor, 6 aldermen and 18 councillors. The borough includes the populous districts of Brompton and New Brompton. Area, 4355 acres.

GILLOT, CLAUDE (1673-1722), French painter, best known as the master of Watteau and Lancret, was born at Langres. His sportive mythological landscape pieces, with such titles as ” Feast of Pan ” and “Feast of Bacchus,” opened the Academy of Painting at Paris to him in 1715; and he then adapted his art to the fashionable tastes of the day, and introduced the decorative fetes champetres, in which he was afterwards surpassed by his pupils. He was also closely connected with the opera and theatre as a designer of scenery and costumes.

GILLOTT, JOSEPH (1799-1873), English pen-maker, was born at Sheffield on the nth of October 1799. For some time he was a working cutler there, but in 1821 removed to Birmingham, where he found employment in the ” steel toy ” trade, the 1 technical name for the manufacture of steel buckles, chains and light ornamental steel- work generally. About 1830 he turned his attention to the manufacture of steel pens by machinery, and in 1831 patented a process for placing elongated points on the nibs of pens. Subsequently he invented other improvements, getting rid of the hardness and lack of flexibility, which had been a serious defect in nibs, by cutting, in addition to the centre slit, side slits, and cross grinding the points. By 1859 he had built up a very large business. Gillott was a liberal art-patron, and one of the first to recognize the merits of J. M. W. Turner. He died at Birming’oam on the 5th of January 1873. His collection of pictures, sold after his death, realized £170,000.

GILLOW, ROBERT (d. 1773), the founder at Lancaster of a distinguished firm of English cabinet-makers and furniture designers whose books begin in 173 1. He was succeeded by his eldest son Richard (1734-1811), who after being educated at the Roman Catholic seminary at Douai was taken into partnership about 1757, when the firm became Gillow & Barton, and his younger sons Robert and Thomas, and the business was continued by his grandson Richard (1778-1866). In its early days the firm of Gillow were architects as well as cabinet-makers, and the first Richard Gillow designed the

classical Custom House at Lancaster. In the middle of the 18th century the business was extended to London, and about 1761 premises were opened in Oxford Street on a site which was continuously occupied until 1906. For a long period the Gillows were the best-known makers of English furniture — Sheraton and Heppelwhite both designed for them, and replicas are still made of pieces from the drawings of Robert Adam. Between 1760 and 1770 they invented the original form of the billiard-table; they were the patentees (about 1800) of the telescopic dining- table which has long been universal in English houses; for a Captain Davenport they made, if they did not invent, the first writing-table of that name. Their vogue .is indicated by references to them in the works of Jane Austen, Thackeray and the first Lord Lytton, and more recently in one of Gilbert and Sullivan's comic operas.

GILLRAY, JAMES (1757-1815), English caricaturist, was born at Chelsea in 1757. His father, a native of Lanark, had served as a soldier, losing an arm at Fontenoy, and was admitted first as an inmate, and afterwards as an outdoor pensioner, at Chelsea, hospital. Gillray commenced life by learning letter-engraving, in which he soon became an adept. This employment, however, proving irksome, he wandered about for a time with a company of strolling players. After a very checkered experience he returned to London, and was admitted a student in the Royal Academy, supporting himself by engraving, and probably issuing a considerable number of caricatures under fictitious names. Hogarth's works were the delight and study of his early years. " Paddy on Horseback," which appeared in 1779, is the first caricature which is certainly his. Two caricatures on Rodney's naval victory, issued in 1782, were among the first of the memor- able series of his political sketches. The name of Gillray's publisher and printseller, Miss Humphrey — whose shop was first at 227 Strand, then in New Bond Street, then in Old Bond Street, and finally in St James's Street — is inextricably associated with that of the caricaturist. Gillary lived with Miss (often called Mrs) Humphrey during all the period of his fame. It is believed that he several times thought of marrying her, and that on one occasion the pair were on their way to the church, when Gillray said: " This is a foolish affair, methinks, Miss Humphrey. We live very comfortably together; we had better let well alone." There-is no evidence, however, to support the stories which scandalmongers invented about their relations. Gillray's plates were exposed in Humphrey's shop window, where eager crowds examined them. A number of his most trenchant satires are directed against George III., who, after examining some of Gillray's sketches, said, with characteristic ignorance and blind- ness to merit, " I don't understand

these caricatures." Gillray revenged himself for this utterance by his splendid caricature entitled,' "A Connoisseur Examining a Cooper," which he is doing by means of a candle on a " save-all "; so that the sketch satirizes at once the king's pretensions to knowledge of art and his miserly habits.

The excesses of the French Revolution made Gillray conserva- tive; and he issued caricature after caricature, ridiculing the French and Napoleon, and glorifying John Bull. He is not, however, to be thought of as a keen political adherent of either the Whig or the Tory party; he dealt his blows pretty freely all round. His last work, from a design by Bunbury, is entitled " Interior of a Barber's Shop in Assize Time," and is dated 181 1. While he was engaged on it he became mad, although he had occasional intervals of sanity, which he employed on his last work. The approach of madness must have been hastened by his intemperate habits. Gillray died on

the ist of June 1815, and was buried in St James's churchyard, Piccadilly.

The times in which Gillray lived were peculiarly favourable to the growth of a great school of caricature. Party warfare. was carried on with great vigour and not a little bitterness; and personalities were freely indulged in on both sides. Gillray's incomparable wit and humour, knowledge of life, fertility of resource, keen sense of the ludicrous, and beauty of execution, at once gave him the first place among caricaturists. He is honourably distinguished in the history of caricature by the fact that his sketches are real works of art. The ideas embodied in some of them are sublime and poetically magnificent in their intensity of meaning; while the coarseness by which others are disfigured is to be explained by the general freedom of treatment common in all intellectual departments in the 18th century. The historical value of Gillray's work has been recognized by accurate students of history. As has been well remarked: " Lord Stanhope has turned Gillray to account as a veracious reporter of speeches, as well as a suggestive illustrator of events." His contemporary political influence is borne witness to in a letter from Lord Bateman, dated November 3, 1798. " The Opposi- tion," he writes to Gillray, " are as low as we can wish them. You have been of infinite service in lowering them, and making them ridiculous." Gillray's extraordinary industry may be inferred from the fact that nearly 1000 caricatures

have been attributed to him; while some consider him the author of 1600 or 1700. He is invaluable to the student of English manners as well as to the political student. He attacks the social follies of the time with scathing satire; and nothing escapes his notice, not even a trifling change of fashion in dress. The great tact Gillray displays in hitting on the ludicrous side of any subject is only equalled by the exquisite finish of his sketches — the finest of which reach an epic grandeur and Miltonic sublimity of con- ception.

Gillray's caricatures are divided into two classes, the political series and the social. The political caricatures form really the best history extant of the latter part of the reign of George III. They were circulated not only over Britain but throughout Europe, and exerted a powerful influence. In this series, George III., the queen, the prince of Wales, Fox, Pitt, Burke and Napoleon are the most prominent figures. In 1788 appeared two fine caricatures by Gillray. " Blood on Thunder fording the Red Sea " represents Lord Thurlow carrying Warren Hastings through a sea of gore: Hastings looks very comfortable, and is carrying two large bags of money. " Market-Day " pictures the ministerialists of the time as horned cattle for sale. Among Gillray's best satires on the king are : " Farmer George and his Wife," two companion plates, in one of which the king is toasting muffins for breakfast, and in the other the queen is frying sprats; "The Anti-Saccharites," where the royal pair propose to dispense with sugar, to the great horror of the family; "A Connoisseur Examining a Cooper"; "Temperance enjoying a Frugal Meal"; "Royal Affability"; "A Lesson in Apple Dumplings "; and " The Pigs Possessed." Among his other political caricatures may be mentioned: " Britannia between Scylla and Charybdis," a picture in which Pitt, so often Gillray's butt, figures in a favourable light; " The Bridal Night "; " The Apothe- osis of Hoche," which concentrates the excesses of the French Revolution in one view; " The Nursery with Britannia reposing in Peace "; " The First Kiss these Ten Years " (1803), another satire on the peace, which is said to have greatly amused Napoleon; " The Handwriting upon the Wall"; "The Confederated Coalition," a fling at the coalition which superseded the Addington ministry; "Uncorking Old Sherry"; "The Plum-Pudding in Danger"; " Making Decent," i.e. " Broad-bottomites getting into the Grand Costume "; " Comforts of a Bed of Roses "; " View of the Hustings in Covent Garden"; " Phaethon Alarmed"; and "Pandora opening her Box." The miscellaneous series of caricatures, although they have scarcely the historical importance of the political series, are more readily intelligible, and are even more amusing. Among the finest are: " Shakespeare Sacrificed "; " Flemish Characters " (two plates); "Twopenny Whist"; "Oh! that this too solid flesh would

melt “; ” Sandwich Carrots “; ” The Gout “; ” Comfort to the Corns “; ” Begone Dull Care “; ” The Cow-Pock,” which . gives humorous expression to the popular dread of vaccination; ” Dilletanti Theatricals”; and “Harmony before Matrimony” and ” Matrimonial Harmonics ” — two exceedingly good sketches in violent contra-st to each other.

A selection of Gillray’s works appeared in parts in 1818; but the first good edition was Thomas M ‘Lean’s, which was published, with a key, in 1830. A somewhat bitter attack, not only on Gillray’s character, but even on his genius, appeared in the Athenaeum for

October 1, 1831, which was successfully refuted by J. Landseer in the Athenaeum a fortnight later. In 1851 Henry G. Bohn put out an edition, from the original platesj in a handsome folio, the coarser sketches being published in a separate volume. For this edition Thomas Wright and R. H. Evans wrote a valuable com- mentary, which is a good history of the times embraced by the caricatures. The next edition, entitled The Works of James Gillray, the Caricaturist: with the Story of his Life and Times (Chatto & Windus, 1874), was the work of Thomas Wright, and, by its popular exposition and narrative, introduced Gillray to a very large circle formerly ignorant of him. This edition, which is complete in one volume, contains two portraits of Gillray, and upwards of 400 illustrations. Mr J. J. Cartwright, in a letter to the Academy (Feb. 28, 1874), drew attention to the existence of a MS. volume, in the British Museum, containing letters to and from Gillray, and other illustrative documents. The extracts he gave were used in a valuable article in the Quarterly Review for April 1874. See also the Academy for Feb. 21 and May 16, 1874.

There is a good account of Gillray in Wright’s History of Cari- cature and Grotesque in Literature and Art (1865). See also the article Caricature.

GILLYFLOWER, a popular name applied to various flowers, but principally to the clove, Dianthus Caryophyllus, of which the carnation is a cultivated variety, and to the stock, Matthiola incana, a well-known garden favourite. The word is sometimes written gilliflower or gilloflower, and is reputedly a corruption of July-flower, ” so called from the month they blow in.” Henry Phillips (1775-1838), in his Flora historica, remarks that Turner (1568) ” calls it gelouer, to which he adds the word stock, as we would .say gelouers that grow on a stem or stock, to distin- guish them from the clove-gelouers and the wall-gelouers. Gerard, who succeeded Turner, and after him Parkinson, calls it gillo- flower, and thus it travelled from its original

orthography until it was called July-flower by those who knew not whence it was derived." Dr Prior, in his useful volume on the Popular Names of British Plants, very distinctly shows the origin of the name. He remarks that it was " formerly spelt gyllofer and gilofre with the long, from the French giroflee, Italian garofalo (M. Lat. gariofilum), corrupted from the Latin Caryophyllum, and referring to the spicy odour of the flower, which seems to have been used in flavouring wine and other liquors to replace the more costly clove of India. The name was originally given in Italy to plants of the pink tribe, especially the carnation, but has in England been transferred of late years to several cruciferous plants." The gillyflower of Chaucer and Spenser and Shakespeare was, as in Italy, Dianthus Caryophyllus; that of later writers and of gardeners, Matthiola. Much of the confusion in the names of plants has doubtless arisen from the vague use of the French terms giroflee, ceillet and violette, which were all applied to flowers of the pink tribe, but in England were subsequently extended and finally restricted to very different plants. The use made of the flowers to impart a spicy flavour to ale and wine is alluded to by Chaucer, who writes:

" And many a clove gilofre To put in ale ";

also by Spenser, who refers to them by the name of sops in wine, which was applied in consequence of their being steeped in the liquor. In both these cases, however, it is the clove-gillyflower which is intended, as it is also in the passage from Gerard, in which he states that the conserve made of the flowers with sugar " is exceeding cordiall, and wonderfully above measure doth comfort the heart, being eaten now and then." The principal other plants which bear the name are the wallflower, Cheiranthus Cheiri, called wall-gillyflower in old books; the dame's violet, Hesperis matronalis, called variously the queen's, the rogue's and the winter gillyflower; the ragged-robin, Lychnis Flos-cuculi, called marsh-gillyflower and cuckoo-gillyflower; the water- violet, Hottonia palustris, called water-gillyflower; and the thrift, Armeria vulgaris, called sea-gillyflower. As a separate designation it is nowadays usually applied to the wallflower.

GILMAN, DANIEL COIT (1831-1908), American education- ist, was born in Norwich, Connecticut, on the 6th of July 1831. He graduated at Yale in 1852, studied in Berlin, was assistant librarian of Yale in 1856-1858 and librarian in 1858-1865, and was professor of physical and political geography in the Sheffield Scientific School of Yale University and a member of the

Governing Board of this School in 1863-1872. From 1856 to i860 he was a member of the school board of New Haven, and from August 1865 to January 1867 secretary of the Connecticut Board of Education. In 1872 he became president of the University of California at Berkeley. On the 30th of December 1874 he was elected first president of Johns Hopkins University (q.v.) at Baltimore. He entered upon his duties on the 1st of May 1875, and was formally inaugurated on the 22nd of February 1876. This post he filled until 1001. From 1901 to 1904 he was the first president of the Carnegie Institution at Washington, D.C. He died at Norwich, Conn., on the 13th of October 1908. He received the honorary degree of LL.D. from Harvard, St John's, Columbia, Yale, North Carolina, Princeton, Toronto, Wisconsin and Clark Universities, and William and Mary College. His influence upon higher education in America was great, especially at Johns Hopkins, where many wise details of ad- ministration, the plan of bringing to the university as lecturers for a part of the year scholars from other colleges, the choice of a singularly brilliant and able faculty, and the marked willing- ness to recognize workers in new branches of science were all largely due to him. To the organization of the Johns Hopkins hospital, of which he was made director in 188,9, he contributed greatly. He was a singularly good judge of men and an able administrator, and under him Johns Hopkins had an immense influence, especially in the promotion of original and productive research. He was always deeply interested in the researches of the professors at Johns Hopkins,, and it has been said of him that his attention as president was turned inside and not outside the university. He was instrumental in determining the policy of the Sheffield Scientific School of Yale University while he was a member of its governing board; on the 28th of October 1897 he delivered at New Haven a semi-centennial discourse on the school, which appears in his University Problems. He was a prominent member of the American Archaeological Society and of the American Oriental Society; was one of the original trustees of the John F. Slater Fund (for a time he was secretary, and from 1893 until his death was president of the board); from 1891 until his death was a trustee of the Peabody Educa- tional Fund (being the vice-president of the board); and was an original member of the General Education Board (1902) and a trustee of the Russell Sage Foundation for Social Better- ment (1907). In 1896-1897 he served on the Venezuela Boundary Commission appointed by President Cleveland. In 1901 he succeeded Carl Schurz as president of the National Civil Service Reform League and served until 1907. Some of his papers and addresses are collected in a volume

entitled University Problems in the United States (1888). He wrote, besides, James Monroe (1883), in the American Statesmen Series; a Life of James D. Dana, the geologist (1899); Science and Letters at Yale (i9oi),.and The Launching of a University (1906), an account of the early years of Johns Hopkins.

GILMORE, PATRICK SARSFIELD (1829-1892), American bandmaster, was born in Ireland, and settled in America about 1850. He had been in the band of an Irish regiment, and he had great success as leader of a military band at Salem, Massachu- setts, and subsequently (1859) in Boston. He increased his reputation during the Civil War, particularly by organizing a monster orchestra of massed bands for a festival at New Orleans in 1864; and at Boston in 1869 and 1872 he gave similar per- formances. He was enormously popular as a bandmaster, and composed or arranged a large variety of pieces for orchestra. He died at St Louis on the 24th of September 1892

GILPIN, BERNARD (1517-1583), the ” Apostle of the North,” was descended from a Westmorland family, and was born at Kentmere in 1517. He was educated at Queen’s College,” . Oxford, graduating B.A. in 1540, M.A. in 1542 and B.D. in 1549. He was elected fellow of Queen’s and ordained in 1542; subse- quently he was elected student of Christ Church. At Oxford he first adhered to the conservative side, and defended the doctrines of the church against Hooper; but his confidence was somewhat shaken by another public disputation which he had with Peter Martyr. In 1552 he preached before Bang Edward VI. a sermon

on sacrilege, which was duly published, and displays the high ideal which even then he had formed of the clerical office; and about the same time he was presented to the vicarage of Norton, in the diocese of Durham, and obtained a licence, through William Cecil, as a general preacher throughout the kingdom as long as the king lived. On Mary’s accession he went abroad to pursue his theological investigations at Louvain, Antwerp and Paris; and from a letter of his own, dated Louvain, 1554, we get a glimpse of the quiet student rejoicing in an ” excellent library belonging to a monastery of Minorites.” Returning to England towards the close of Queen Mary’s reign, he was invested by his mother’s uncle, Tunstall, bishop of Durham, with the archdeaconry of Durham, to which the rectory of Easington was annexed. The freedom of his attacks on the vices, and especially the clerical vices, of his times excited hostility against him, and he was formally brought before the bishop on a charge consisting of thirteen articles. Tunstall, however, not only dismissed the case, but presented the offender with the rich living of Houghton-le-Spring; and

when the accusation was again brought forward, he again protected him. Enraged at this defeat, Gilpin's enemies laid their complaint before Bonner, bishop of London, who secured a royal warrant for his apprehen- sion. Upon this Gilpin prepared for martyrdom; and, having ordered his house-steward to provide him with a long garment, that he might " goe the more comely to the stake," he set out for London. Fortunately, however, for him, he broke his leg on the journey, and his arrival was thus delayed till the news of Queen Mary's death freed him from further danger. He at once returned to Houghton, and there he continued to labour till his death on the 4th of March 1583. When the Roman Catholic bishops were deprived he was offered the see of Carlisle; but he declined this honour and also the provostship of Queen's, which was offered him in 1560. At Houghton his course of life was a ceaseless round of benevolent activity. In June 1560 he entertained Cecil and Dr Nicholas Wotton on their way to Edinburgh. His hospitable manner of living was the admiration of all. His living was a comparatively rich one, his house was better than many bishops' palaces, and his position was that of a clerical magnate. In his household he spent " every fortnight 40 bushels of corn, 20 bushels of malt and an ox, besides a proportional quantity of other kinds of provisions." Strangers and travellers found a ready reception; and even their horses were treated with so much care that it was humor- ously said that, if one were turned loose in any part of the country, it would immediately make its way to the rector of Houghton. Every Sunday from Michaelmas till Easter was a public day with Gilpin. For the reception of his parishioners he had three tables well covered — one for gentlemen, the second for husband- men, the third for day-labourers; and this piece of hospitality he never omitted, even when losses or scarcity made its continu- ance difficult. He built and endowed a grammar-school at a cost of upwards of £500, educated and maintained a large number of poor children at his own charge, and provided the more promising pupils with means of studying at the universities. So many young people, indeed, flocked to his school that there was not accommodation for them in Houghton, and he had to fit up part of his house as a boarding establishment. Grieved at the ignorance and superstition which the remissness of the clergy permitted to flourish in the neighbouring parishes, he used every year to visit the most neglected parts of Northumberland, Yorkshire, Cheshire, Westmorland and Cumberland; and that his own flock might not suffer, he was at the expense of a constant assistant. Among his parishioners he was looked up to as a judge, and did great service in preventing law-suits amongst them. If an industrious man suffered a loss, he delighted to make it good; if the harvest was bad, he was liberal in the remission of tithes. The boldness which he could display

at need is well illustrated by his action in regard to duelling. Find- ing one day a challenge-glove stuck up on the door of a church where he was to preach, he took it down with his own hand, and proceeded to the pulpit to inveigh against the unchristian custom. His theological position was not in accord with any of

the religious parties of his age, and Gladstone thought that the catholicity of the Anglican Church was better exemplified in his career than in those of more prominent ecclesiastics (pref. to A. W. Button's edition of S. R. Maitland's Essays on the Reformation). He was not satisfied with the Elizabethan settlement, had great respect for the Fathers, and was with difficulty induced to subscribe. Archbishop Sandys' views on the Eucharist horrified him ; but on the other hand he main- tained friendly relations with Bishop Pilkington and Thomas Lever, and the Puritans had some hope of his support.

A life of Bernard Gilpin, written by George Carleton, bishop of Chichester, who had been a pupil of Gilpin's at Houghton, will be found in Bates's Vitae selectorum aliquot virorum, &c. (London, 1681). A translation of this sketch by William Freake, minister, was published at London, 1629; and in 1852 it was reprinted in Glasgow, with an introductory essay by Edward Irving. It forms one of the lives in Christopher Wordsworth's Ecclesiastical Biography (vol. iii., 4th ed.), having been compared with Carleton's Latin text. Another biography of Gilpin, which, however, adds little to Bishop Carleton's, was written by William Gilpin, M.A., prebendary of Ailsbury (London, 1753 and 1854). See also Diet. Nat. Biog.

GILSONITE (so named after S. H. Gilson of Salt Lake City), or Uintahite, or Uintaite, a description of asphalt occurring in masses several inches in diameter in the Uinta (or Uintah) valley, near Fort Duchesne, Utah. It is of black colour; its fracture is conchoidal, and it has a lustrous surface. When warmed it becomes plastic, and on further beating fuses perfectly. It has a specific gravity of 1-065 to 1-070. It dissolves freely in hot oil of turpentine. The output amounted to 10,916 short tons for the year 1905, and the value was $4-31 per ton.

GILYAKS, a hybrid people, originally widespread throughout the Lower Amur district, but now confined to the Amur delta and the north of Sakhalin. They have been affiliated by some authorities to the

Ainu of Sakhalin and Yezo; but they are more probably a mongrel people, and Dr A. Anuchin states that there are two types, a Mongoloid with sparse beard, high cheek- bones and flat face, and a Caucasic with bushy beard and more regular features. The Chinese call them Yupitatse, ” Fish-skin- clad people,” from their wearing a peculiar dress made from

salmon skin.

See E. G. Ravenstein, The Russians on the Amur (1861); Dr A. Anuchin, Mem. Imp. Soc. Nat. Sc. xx., Supplement (Moscow, 1877); H. von Siebold, Uber die Aino (Berlin, 1881); J. Deniker in Revue A’ ethnographic (Paris, 1884); L. Schrenck, Die Volker des Amur- landes (St Petersburg, 1891).

GIMBAL, a mechanical device for hanging some object so that it should keep a horizontal and constant position, while the body from which it is suspended is in free motion, so that the motion of the supporting body is not communicated to it. It is thus used particularly for the suspension of compasses or chronometers and lamps at sea, and usually consists of a ring freely moving on an axis, within which the object swings on an axis at right angles to the ring.

The word is derived from the 0. Fr. getnel, from Lat. gemellus, diminutive of geminus, a twin, and appears also in gimmel or jimbel and as gemel, especially as a term for a ring formed of two hoops linked together and capable of separation, used in the 1 6th and 17 th centuries as betrothal and keepsake rings. They sometimes were made of three or more hoops linked together.

GIMLET (from the 0. Fr. guimbelet, probably a diminutive of the O.E. wimble, and the Scandinavian wammle, to bore or twist; the modern French is gibelet), a tool used for boring small holes. It is made of steel, with a shaft having a hollow side, and a screw at the end for boring the wood; the handle of wood is fixed transversely to the shaft. A gimlet is always a small tool. A similar tool of large size is called an ” auger ” (see Tool).

GIMLI, in Scandinavian mythology, the great hall of heaven whither the righteous will go to spend eternity.

GIMP, or Gymp. (1) (Of somewhat doubtful origin, but prob- ably a nasal form of the Fr. guipure, from guiper, to cover or ” whip ” a cord over with silk), a stiff trimming made of silk or cotton woven around a firm cord, often further ornamented by a metal cord running through

it. It is also sometimes covered with bugles, beads or other glistening ornaments. The

trimming employed by upholsterers to edge curtains, draperies, the seats of chairs, &c, is also called gimp; and in lace work it is the firmer or coarser thread which outlines the pattern and strengthens the material. (2) A shortened form of gimple (the O.E. wimple), the kerchief worn by a nun around her throat, sometimes also applied to a nun's stomacher.

GIN, an aromatized or compounded potable spirit, the char- acteristic flavour of which is derived from the "juniper berry. The word " gin " is an abbreviation of Geneva, both being primarily derived from the Fr. genievre (juniper). The use of the juniper for flavouring alcoholic beverages may be traced to the invention, or perfecting, by Count de Morret, son of Henry IV. of France, of juniper wine. It was the custom in the early days of the spirit industry, in distilling spirit from fermented liquors, to add in the working some aromatic ingredients, such as ginger, grains of paradise, &c, to take off the nauseous flavour of the crude spirits then made. The invention of juniper wine, no doubt, led some one to try the juniper berry for this purpose, and as this flavouring agent was found not only to yield an agreeable beverage, but also to impart a valuable medicinal quality to the spirit, it was generally made use of by makers of aromatized spirits thereafter. It is probable that the use of grains of paradise, pepper and so on, in the early days of spirit manufacture, for the object mentioned above, indirectly gave rise to the statements which are still found in current text- bocks and works of reference as to the use of Cayenne pepper, cocculus indicus, sulphuric acid and so on, for the purpose of adulterating spirits. It is quite certain that such materials are not used nowadays, and it would indeed, in view of modern conditions of manufacture and of public taste, be hard to find a reason for their use. The same applies to the suggestions that such substances as acetate of lead, alum or sulphate of zinc are employed for the fining of gin.

There are two distinct types of gin, namely, the Dutch geneva or Hollands and the British gin. Each of these types exists in the shape of numerous sub-varieties. Broadly speaking, British gin is prepared with a highly rectified spirit, whereas in the manufacture of Dutch gin a preliminary rectification is not an integral part of the process. The cld-fashioned Hollands is prepared much after the following fashion. A mash consisting of about one-third of malted barley or bere and two-thirds rye- meal is prepared, and infused at a somewhat high temperature. After cooling, the whole is set to ferment with a small quantity of yeast. After two to three days the attenuation is complete,

and the wash so obtained is distilled, and the resulting distillate (the low wines) is redistilled, with the addition of the flavouring matter (juniper berries, &c.) and a little salt. Originally the juniper berries were ground with the malt, but this practice no longer obtains, but some distillers, it is believed, still mix the juniper berries with the wort and subject the whole to fermenta- tion. When the redistillation over juniper is repeated, the product is termed double (geneva, &c). There are numerous variations in the process described, wheat being frequently employed in lieu of rye. In the manufacture of British gin, 1 a highly rectified spirit (see Spirits) is redistilled in the presence of the flavouring matter (principally juniper and coriander), and frequently this operation is repeated several times. The product so obtained constitutes the ” dry ” gin of commerce. Sweetened or cordialized gin is obtained by adding sugar and

1 The precise origin of the term ” Old Tom,” as applied to un-sweetened gin, appears to be somewhat obscure. In the English case of Boord & Son v. Huddart (1903), in which the plaintiffs estab- lished their right to the ” Cat Brand ” trade-mark, it was proved before Mr Justice Swinfen Eady that this firm had first adopted about 1849 the punning association of the picture of a Tom cat on a barrel with the name of ” Old Tom “; and it was at one time supposed that this was due to a tradition that a cat had fallen into one of the vats, the gin from which was highly esteemed. But the term ” Old Tom ” had been known before that, and Messrs Boord & Son inform us that previously ” Old Tom ” had been a man, namely ” old Thomas Chamberlain of Hodge’s distillery ” ; an old label book in their possession (1909) shows a label and bill-head with a picture of ” Old Tom ” the man on it, and another label shows a picture of a sailor lad on shipboard described as ” Young Tom.”

flavouring matter (juniper, coriander, angelica, &c.) to the dry variety. Inferior qualities of gin are made by simply adding essential oils to plain spirit, the distillation process being omitted. The essential oil of juniper is a powerful diuretic, and gin is frequently prescribed in affections of the urinary organs.

GINDELY, ANTON (1829-1892), German historian, was the son of a German father and a Slavonic mother, and was born at Prague on the 3rd of September 1829. He studied at Prague and at Olmiitz, and, after travelling extensively in search of historical material, became

professor of history at the university of Prague and archivist for Bohemia in 1862. He died at Prague on the 24th of October 1892. Gindely's chief work is his Geschichte des dreissigjahrigen Kriegss (Prague, 1869-1880), which has been translated into English (New York, 1884); and his historical work is mainly concerned with the period of the Thirty Years' War. Perhaps the most important of his numerous other works are: Geschichte der bbhmischen Briider (Prague, 1857-1858); Rudolf II. tmd seine Z«r(i862-i868), and a criticism of Wallenstein, Waldstein wdhrend seines ersten Generalats (1886). He wrote a history of Bethlen Gabor in Hungarian, and edited the Monumenta historiae Bohemica. Gindely's posthumous work, Geschichte der Gegenreformation in Bohmen, was edited by T. Tupetz (1894).

See the Allgemeine deutsche Biographie, Band 49 (Leipzig, 1904).

GINGALL, or Jingal (Hindostani janjal), a gun used by the

natives throughout the East, usually a light piece mounted on

a swivel; it sometimes takes the form of a heavy musket fired

from a rest.

GINGER (Fr. gingembre, Ger. Ingwer), the rhizome or under- ground stem of Zingiber officinale (nat. ord. Zingiberaceae), a perennial reed-like plant growing from 3 to 4 ft. high. The flowers and leaves are borne on separate stems, those of the former being shorter than those of the latter, and averaging from 6 to 1 2 in. The flowers themselves are borne at the apex of the stems in dense ovate-oblong cone-like spikes from 2 to 3 in. long, composed of obtuse strongly-imbricated bracts with membranous margins, each bract enclosing a single small sessile flower. The leaves are alternate and arranged in two rows, bright green, smooth, tapering at both ends, with very short stalks and long sheaths which stand away from the stem and end in two small rounded auricles. The plant rarely flowers and the fruit is unknown. Though not found in a wild state, it is considered with very good reason to be a native of the warmer parts of Asia, over which it has been cultivated from an early period and the rhizome imported into England. From Asia the plant has spread into the West Indies, South America, western tropical Atnca, and Australia. It is commonly grown in botanic gardens in Britain.

The use of ginger as a spice has been known from very early times; it was supposed by the Greeks and Romans to be a product of southern

Arabia, and was received by them by way of the Red Sea; in India it has also been known from a very remote period, the Greek and Latin names being derived from- the Sanskrit. Fltickiger and Hanbury, in their Pharmacographia, give the following notes on the history of ginger. On the authority of Vincent's Commerce and Navigation of the Ancients, it is stated that in the list of imports from the Red Sea into Alexandria, which in the second century of our era were there liable to the Roman fiscal duty, ginger occurs among other Indian spices. So frequent is the mention of ginger in similar lists during the middle ages, that it evidently constituted an important item in the commerce between Europe and the East. It thus appears in the tariff of duties levied at Acre in Palestine about 1 1 73, in that of Barcelona in 12 21, Marseilles in 1228 and Paris in 1296. Ginger seems to have been well known in England even before the Norman Conquest, being often referred to in the Anglo-Saxon leech-books of the nth century. It was very common in the 13th and 14th centuries, ranking next in value to pepper, which was then the commonest of all spices, and costing on an average about is. 7d. per lb. Three kinds of ginger were- known among the merchants of Italy about the middle of the 14th century: (1) Belledi or Baladi, an Arabic

name, which, as applied to ginger, would signify country or wild, and denotes common ginger; (2) Colombino, which refers to Columbum, Kolam or Quilon, a port in Travancore, fre- quently mentioned in the middle ages; and (3) Micchino, a name which denoted that the spice had been brought from or by way of Mecca. Marco Polo seems to have seen the ginger plant both in India and China between 1 280 and 1 290. John of Montecorvino, a missionary friar who visited India about 1292, gives a description of the plant, and refers to the fact of the root being dug up and transported. Nicolo di Conto, a Venetian merchant in the early part of the 15th century, also describes the plant and the collection of the root, as seen by him in India. Though the Venetians received ginger by way of Egypt, some of the superior kinds were taken from India overland by the Black Sea. The spice is said to have been introduced into America

From Bentley & Trimen's Medicinal Plants, by permission of J. & A. Churchill.

Ginger {Zingiber officinale) , about J nat. size, with leafy and flowering

stem ; the former cut off short.

1. Flower. I, Labellum, representing two

2. Flower in vertical section. barren stamens.

3. Fertilestamen,envelopingthe st v Fertile stamen, style which projects above it. y, Staminode.

4. Piece of leafy stem. 1-3 x, Tip of style bearing the

enlarged. stigma,

s, Sepals. z, Style.

p, Petals. gl, Honey-secreting glands.

by Francisco de Mendoca, who took it from the East Indies to New Spain. It seems to have been shipped for commercial pur- poses from San Domingo as early as 1585, and from Barbados in 1654; so early as 1547 considerable quantities were sent from the West Indies to Spain.

Ginger is known in commerce in two distinct forms, termed respectively coated and uncoated ginger, as having or wanting the epidermis. For the first, the pieces, which are called ” races ” or ” hands,” from their irregular palmate form, are washed and simply dried in the sun. In this form ginger presents a brown, more or less irregularly wrinkled or striated surface, and when broken shows a dark brownish fracture, hard, and sometimes horny and resinous. To produce uncoated ginger the rhizomes are washed, scraped and sun-dried, and are often subjected to a system of bleaching, either from the fumes of burning sulphur or by immersion for a short time in a solution of chlorin- ated lime. The whitewashed appearance that much of the ginger has, as seen in the shops, is due to the fact of its being washed in whiting and water, or even coated with sulphate of

lime. This artificial coating is supposed by some to give the ginger a better appearance; it often, however, covers an inferior quality, and can readily be detected by the ease with which it rubs off, or by its leaving a white powdery substance at the bottom of the jar in which it is contained. Uncoated ginger, as seen in trade, varies from single joints an inch or less in length to flattish irregularly branched pieces of several joints, the <: races " or " hands," and from 3 to 4 in. long; each branch has a depres- sion at its summit showing the former attachment of a leafy stem. The colour, when not whitewashed, is a pale buff; it is somewhat rough of fibrous, breaking with a short mealy

fracture, and presenting on the surfaces of the broken parts numerous short bristly fibres.

The principal constituents of ginger are starch, volatile oil (to which the characteristic odour of the spice is due) and resin (to which is attributed its pungency). Its chief use is as a condiment or spice, but as an aromatic and stomachic medicine it is also used internally. ” The stimulant, aromatic and carminative properties render it of much value in atonic dyspepsia, especially if accom- panied with much flatulence, and as an adjunct to purgative medi- cines to correct griping.” Externally applied as a rubefacient, it has been found to relieve headache and toothache. The rhizomes, collected in a young green state, washed, scraped and preserved in syrup, form a delicious preserve, which is largely exported both from the West Indies and from China, Cut up into pieces like lozenges and preserved in sugar, ginger also forms a very agreeable sweetmeat.

GINGHAM, a cotton or linen cloth, for the name of which several origins are suggested. It is said to have been made at Guingamp, a town in Brittany; the New English Dictionary derives the word from Malay ging-gang, meaning ” striped.” The cloth is now of a light or medium weight, and woven of dyed or white yarns either in a single colour or different colours, and in stripes, checks or plaids. It is made in Lancashire and in Glasgow, and also to a large extent in the United States. Imitations of it are obtained by calico-printing. It is used for dresses, &c.

GINGI, or Gingee, a rock fortress of southern India, in the South Arcot district of Madras. It consists of three hills, con- nected by walls enclosing an area of 7 sq. m., and practically impregnable to assault. The origin of the fortress is shrouded in legend. When occupied by the Mahrattas at the end of the 17 th century, it withstood a siege of eight years against the armies of Aurangzeb. In 1750 it was captured by the French, who held it with a strong force for eleven years. It surrendered to the English in 1761, in the words of Orme, ” terminated the long hostilities between the two rival European powers in Coromandel, and left not a single ensign of the French nation avowed by the authority of its government in any part of India.”

GINGUENfc, PIERRE LOUIS (1748-1815), French author, was born on the 27th of April 1748 at Rennes, in Brittany. He was educated at a Jesuit college in his native town, and came to Paris in 1772. He wrote criticisms for the Mercure de France, and composed a comic opera, Pomponin (1777). The Satire des satires (1778) and the Confession de Zulme (1779) followed. The Confession was claimed by six or seven

different authors, and though the value of the piece is not very great, it obtained great success. His defence of Piccini against the partisans of Gluck made him still more widely known. He hailed the first symptoms of the Revolution, joined Giuseppe Cerutti, the author of the Memoire pour le peuple franQais (1788), and others in producing the Feuille villageoise, a weekly paper addressed to the villages of France. He also celebrated in an indifferent ode the opening of the states-general. In his Lettres sur les confessions de J, -J. Rousseau (1791) he defended the life and principles of his author. He was imprisoned during the Terror, and only escaped with life by the downfall of Robespierre. Some time after his release' he assisted, as director-general of the " commission executive • de l'instruction publique," in reorganizing the system of public instruction, and he was an original member of the Institute of France. In 1797 the directory appointed him minister pleni- potentiary to the king of Sardinia. After fulfilling his duties for seven months, very little to the satisfaction of his employers, Ginguene retired for a time to his country house of St Prix, in

the valley of Montmorency. He was appointed a member of the tribunate, but Napoleon, finding that he was not sufficiently tractable, had him expelled at the first " purge," and Ginguene' returned to his literary pursuits. He was one of the commission charged to continue the Histoire litteraire de la France, and he contributed to the volumes of this series which appeared in 1814, 1817 and 1820. Ginguene's most important work is the Histoire litteraire d'ltalie (14 vols., 1811-1835). He was putting the finishing touches to the eighth and ninth volumes when he died on the nth of November 1815. The last five volumes were written by Francesco Salfi and revised by Pierre Daunou.

In the composition of his history of Italian literature he was guided for the most part by the great work of Girolamo Tiraboschi, but he avoids the prejudices and party views of his model.

Ginguene edited the Decade philosophique, politique et litteraire till it was suppressed by Napoleon in 1807. He contributed largely to the Biographie universelle, the Mercure de France and the En- cyclopMie methodique ; and he edited the works of Chamfort and of Lebrun. Among his minor productions are an opera, Pomponin ou le tuteur mystijie (1777); La Satire des satires (1778); De I'autorite de Rabelais dans la revolution presente (1791); De M. Neckar (1795); Fables nouvelles (1810); Fables inedites (1814). See " Eloge de Ginguene " by Dacier, in the Memoires de I'inslitut, torn, vii. ; " Discours " by M. Daunou, prefixed to the 2nd ed. of the Hist. litt. d'ltalie; [D. J. Garat,

Notice sur la vie et les ouvrages de P. L. Guingene, prefixed to a catalogue of his library (Paris, 1817).

GINKEL, GODART VAN (1630-1703), 1st earl of Athlone, Dutch general in the service of England, was born at Utrecht in 1630. He came of a noble family, and bore the title of Baron van Reede, being the eldest son of Godart Adrian van Reede, Baron Ginkel. In his youth he entered the Dutch army, and in 1688 he followed William, prince of Orange, in his expedition to England. In the following year he distinguished himself by a memorable exploit — the pursuit, defeat and capture of a Scottish regiment which had mutinied at Ipswich, and was marching northward across the fens. It was the alarm excited by this mutiny that facilitated the passing of the first Mutiny Act. In 1690 Ginkel accompanied William III. to Ireland, and com- manded a body of Dutch cavalry at the battle of the Boyne. On the king's return to England General Ginkel was entrusted with the conduct of the war. He took the field in the spring of 1691, and established his headquarters at Mullingar. Among those who held a command under him was the marquis of Ruvigny, the recognized chief of the Huguenot refugees. Early in June Ginkel took the fortress of Ballymore, capturing the whole garrison of 1000 men. The English lost only 8 men. After reconstructing the fortifications of Ballymore the army marched to Athlone, then one of the most important of the fortified towns of Ireland. The Irish defenders of the place were commanded by a distinguished French general, Saint-Ruth. The firing began on June 19th, and on the 30th the town was stormed, the Irish army retreating towards Gal way, and taking up their position at Aughrim. Having strengthened the fortifications of Athlone and left a garrison there, Ginkel led the English, .on July 1 2th, to Aughrim. An immediate attack was resolved on, and, after a severe and at one time doubtful contest, the crisis was precipitated by the fall of Saint-Ruth, and the disorganized Irish were defeated and fled. A horrible slaughter of the Irish followed the struggle, and 4000 corpses were left unburied on the field, besides a multitude of others that lay along the line of the retreat. Galway next capitulated, its garrison being permitted to retire to Limerick. There the viceroy Tyrconnel was in command of a large force, but his sudden death early in August left the command in the hands of General Sars- field and the Frenchman D'Usson. The English came in sight of the town on the day of Tyrconnel's death, and the bombardment was immediately begun. Ginkel, by a bold device, crossed the Shannon and captured the camp of the Irish cavalry. A few days later he stormed the fort on Thomond Bridge, and after difficult negotiations a capitulation was signed, the terms of which were divided into a civil and a military treaty. Thus was completed the

conquest or pacification of Ireland, and the services of the Dutch general were amply recognized and rewarded. He re- ceived the formal thanks of the House of Commons, and was

created by the king 1st earl of Athlone and baron of Aughrim. The immense forfeited estates of the earl of Limerick were given to him, but the grant was a few years later revoked by the English parliament. The earl continued to serve in the English army, and accompanied the king to the continent in 1693. He fought at the sieges of Namur and the battle of Neerwinden, and assisted in destroying the French magazine at Givet. In 1702, waiving his own claims to the position of commander-in-chief, he commanded the Dutch serving under the duke of Marlborough. He died at Utrecht on the nth of February 1703, and was succeeded by his son the 2nd earl (1668-1719), a distinguished soldier in the reigns- of William III. and Anne. On the death of the 9th earl without issue in 1844, the title became extinct.

GINSBURG, CHRISTIAN DAVID (1831-), Hebrew scholar, was born at Warsaw on the 25th of December 1831. Coming to England shortly after the completion of his education in the Rabbinic College at Warsaw, Dr Ginsburg continued his study of the Hebrew Scriptures, with special attention to the Megilloth. The first result of these studies was a translation of the Song of Songs, with a commentary historical and critical, published in 1857. A similar translation of Ecclesiastes, followed by treatises on the Karaites, on the Essenes and on the Kabbala, kept the author prominently before biblical students while he was preparing the first sections of his magnum opus, the critical study of the Massorah. Beginning in 1867 with the publication of Jacob ben Chajim's Introduction to the Rabbinic Bible, Hebrew and English, with notices, and the Massoreth Ha- Massoreth of Elias Levita, in Hebrew, with translation and commentary, Dr Ginsburg took rank as an eminent Hebrew scholar. In 1870 he was appointed one of the first members of the committee for the revision of the English version of the Old Testament. His life-work culminated in the publication of the Massorah, in three volumes folio (1880-1886), followed by the Masoretico-critical edition of the Hebrew Bible (1894), and the elaborate introduction to it (1897). Dr Ginsburg had one predecessor in the field, the learned Jacob ben Chajim, who in 1524-1325 published the second Rabbinic Bible, containing what has ever since been known as the Massorah; but neither were the materials available nor was criticism sufficiently advanced for a complete edition. Dr

Ginsburg took up the subject almost where it was left by those early pioneers, and collected portions of the Massorah from the countless MSS. scattered throughout Europe and the East. More recently Dr Ginsburg has published Facsimiles of Manuscripts of the Hebrew Bible (1897 and 1898), and The Text of the Hebrew Bible in Abbreviations (1903), in addition to a critical treatise ” on the relationship of the so-called Codex Babylonicus of a.d. 9r6 to the Eastern Recension of the Hebrew Text ” (1899, for private circulation). In the last-mentioned work he seeks to prove that the St Petersburg Codex, for so many years accepted as the genuine text of the Babylonian school, is in reality a Palestinian text carefully altered so as to render it conformable to the Babylonian recension. He subsequently undertook the prepara- tion of a new edition of the Hebrew Bible for the British and Foreign Bible Society. He also contributed many articles to J. Kitto’s Encyclopaedia, W. Smith’s Dictionary of Christian Biography and the Encyclopaedia Britannica.

GINSENG, the root of a species of Panax (P. Ginseng), native of Manchuria and Korea, belonging to the natural order Araliaceae, used in China as a medicine. Other roots are substituted for it, notably that of Panax quinquefolium, distinguished as American ginseng, and imported from the United States. At one time the ginseng obtained from Manchuria was considered to be the finest quality, and in consequence became so scarce that an imperial edict was issued prohibiting its collection. That prepared in Korea is now the most esteemed variety. The root of the wild plant is preferred to that of cultivated ginseng, and the older the plant the better is the quality of the root considered to be. Great care is taken in the preparation of the drug. The account given by Koempfer of the preparation of nindsin, the root of Siumninsi, in Korea, will give a good idea of the prepara- tion of ginseng, ninsi being a similar drug of supposed weaker

virtue, obtained from a different plant, and often confounded with ginseng. ” In the beginning of winter nearly all the population of Sjansai turn out to collect the root, and make preparations for sleeping in the fields. The root, when collected, is macerated for three days in fresh water, or water in which rice has been boiled twice; it is then suspended in a closed vessel over the fire, and afterwards dried, until from the base to the middle it assumes a hard, resinous and translucent appear- ance, which is considered a proof of its good quality.”

Ginseng of good quality generally occurs in hard, rather brittle, translucent pieces, about the size of the little finger, and varying in length from 2 to 4 in. The taste is mucilaginous, sweetish and slightly

bitter and aromatic. The root is frequently forked, and it is probably owing to this circumstance that medicinal properties were in the first place attributed to it, its resemblance to the body of a man being supposed to indicate that it could restore virile power to the aged and impotent. In price it varies from 6 or 12 dollars to the enormous sum of 300 or 400 dollars an ounce.

Lockhart gives a graphic description of a visit to a ginseng mer- chant. Opening the outer box, the merchant removed several paper parcels which appeared to fill the box, but under them was a second box, or perhaps two small boxes, which, when taken out, showed the bottom of the large box and all the intervening space filled with more paper parcels. These parcels, he said, ” contained quicklime, for the purpose of absorbing any moisture and keeping the boxes quite dry, the lime being packed in paper for the sake of cleanliness. The smaller box, which held the ginseng, was lined with sheet-lead; the ginseng further enclosed in silk wrappers was kept in little silken- covered boxes. Taking up a piece, he would request his visitor not to breathe upon it, nor handle it; he would dilate upon the many merits of the drug and the cures it had effected. The cover of the root, according to its quality, was silk, either embroidered or plain, cotton cloth or paper.” In China the ginseng is often sent to friends as a valuable present; in such cases, “accompanying the medicine is usually given a small, beautifully-finished double kettle, in which the ginseng is prepared as follows. The inner kettle is made of silver, and between this and the outside vessel, which is a copper jacket, is a small space for holding water. The silver kettle, which fits on a ring near the top of the outer covering, has a cup-like cover in which rice is placed with a little water; the ginseng is put in the inner vessel with water, a cover is placed over the whole, and the apparatus is put on the fire. When the rice in the cover is suffi- ciently cooked, the medicine is ready, and is then eaten by the patient, who drinks the ginseng tea at the same time.” The dose of the root is from 60 to 90 grains. During the use of the drug tea- drinking is forbidden for at least a month, but no other change is made in the diet. It is taken in the morning before breakfast, from three to eight days together, and sometimes it is taken in the evening before going to bed.

The action of the drug appears to be entirely psychic, and com- parable to that of the mandrake of the Hebrews. There is no evidence that it possesses any pharmacological or therapeutic properties.

See Porter Smith, Chinese Materia Medica, p. 103; Reports on Trade at the Treaty Ports of China (1868), p. 63; Lockhart, Med. Missionary in China (2nd ed.), p. 107; Bull, de la Societe Impiriale de Nat. de

Moscou (1865), No. I, pp. 70-76; Pharmaceutical Journal (2), vol. iii. pp. 197, 333, (2), vol. ix.p. 77; Lewis, Materia Medica, p. 324 ; Geoffroy, Tract, de matiere medicate, t. ii. p. 112; Kaempfer, Amoenitates exoticae, p. 824.,

GIOBERTI, VINCENZO (1801-1852), Italian philosopher, publicist and politician, was born in Turin on the 5th of April 1 801. He was educated by the fathers of the Oratory with a view to the priesthood and ordained in 1825. At first he led a very retired life; but gradually took more and more interest in the affairs of his country and the new political ideas as well as in the literature of the day. Partly under the influence of Mazzini, the freedom of Italy became his ruling motive in life, — its emancipation, not only from foreign masters, but from modes of thought alien to its genius, and detrimental to its European authority. This authority was in his mind connected with papal supremacy, though in a way quite novel — intellectual rather than political. This must be remembered in considering nearly all his writings, and also in estimating his position, both in relation to the ruling clerical party — the Jesuits — and also to the politics of the court of Piedmont after the accession of Charles Albert in 1831. He was now noticed by the king and made one of his chaplains. His popularity and private influence, however, were reasons enough for the court party to mark him

for exile; he was not one of them, and could not be depended on. Knowing this, he resigned his office in 1833, but was suddenly arrested on a charge of conspiracy, and, after an imprisonment of four months, was banished without a trial. Gioberti first went to Paris, and, a year later, to Brussels, where he remained till 1845, teaching philosophy, and assisting a friend in the work of a private school. He nevertheless found time to write many works of philosophical importance, with special reference to his country and its position. An amnesty having been declared by Charles Albert in 1846, Gioberti (who was again in Paris) was at liberty to return to Italy, but refused to do so till the end of 1847. On his entrance into Turin on the 29th of April 1848 he was received with the greatest enthusiasm. He refused the dignity of senator offered him by Charles Albert, preferring to represent his native town in the Chamber of Deputies, of which he was soon elected president. At the close of the same year, a new ministry was formed, headed by Gioberti; but with the accession of Victor Emmanuel in March 1849, his active life came to an end. For a

short time indeed he held a seat in the cabinet, though without a portfolio; but an irreconcilable disagreement soon followed, and his removal from Turin was accomplished by his appointment on a mission to Paris, whence he never returned. There, refusing the pension which had been offered him and all ecclesiastical preferment, he lived frugally, and spent his days and nights as at Brussels in literary labour. He died suddenly, of apoplexy, on the 26th of October 1852.

Gioberti's writings are more important than his political career. In the general history of European philosophy they stand apart. As the speculations of Rosmini-Serbati, against which he wrote, have been called the last link added to medieval thought, so the system of Gioberti, known as " Ontologism," more especially in his greater and earlier works, is unrelated to other modern schools of thought. It shows a harmony with the Roman Catholic faith which caused Cousin to declare that "Italian philosophy was still in the bonds of theology," and that Gioberti was no philosopher. Method is with him a synthetic, subjective and psychological instrument. He re- constructs, as he declares, ontology, and begins with the " ideal formula," " the Ens creates ex nihilo the existent." God is the only being (Ens) ; all other things are merely existences. God is the origin of all human knowledge (called I'idea, thought), which is one and so to say identical with God himself. It is directly beheld (intuited) by reason, but in order to be of use it has to be reflected on, and this by means of language. A knowledge of being and existences (concrete, not abstract) and their mutual relations, is necessary as the beginning of philosophy. Gioberti is in some respects a Platonist. He identifies religion with civilization, and in his treatise Del primato morale e civile degli Italiani arrives at the conclusion that the church is the axis on which the well-being of human life revolves. In it he affirms the idea of the supremacy of Italy, brought about by the restoration of the papacy as a moral dominion, founded on religion and public opinion. In his later works, the Rinnovamento and the Protologia, he is thought by some to have shifted his ground under the influence of events. His first work, written when he was thirty-seven, had a personal reason for its existence. A young fellow-exile and friend, Paolo Pallia, having many doubts and misgivings as to the reality of revelation and a future life, Gioberti at once set to work with La Teorica del sovran-naturale, which was his first publication (1838). After this, philo-sophical treatises followed in rapid succession. The Teorica was followed by Introduzione alio studio della filosofia in three volumes (1839-1840). In this work he states his reasons for requiring a new method and new terminology. Here he brings out the doctrine that

religion is the direct expression of the idea in this life, and is one with true civilization in history. Civilization is a conditioned mediate tendency to perfection, to which religion is the final com- pletion if carried out ; it is the end of the second cycle expressed by the second formula, the Ens redeems existences. Essays (not pub- lished till 1846) on the lighter and more popular subjects, Del hello and Del buono, followed the Introduzione. Del primato morale e civile degli Italiani and the Prolegomeni to the same, and soon after- wards his triumphant exposure of the Jesuits, II Gesuita moderno, no doubt hastened the transfer of rule from clerical to civil hands. It was the popularity of these semi-political works, increased by other occasional political articles, and his Rinnovamento civile d' Italia? that caused Gioberti to be welcomed with such enthusiasm on his , return to his native country. All these works were perfectly or- thodox, and aided in drawing the liberal clergy into the movement which has resulted since his time in the unification of Italy. The Jesuits, however, closed round the pope more firmly after his return to Rome, and in the end Gioberti's writings were placed on the Index (see J. Kleutgen, liber die Verurtheilung des Ontologismus durck den heiligen Stuhl, 1867). The remainder of his works, especi- ally La Filosofia della Rivelazione and the Protologia, give his mature

views on many points. The entire writings of Gioberti, including those left in manuscript, have been edited by Giuseppe Massari (Turin, 1856-1861).

See Massari, Vita de V. Gioberti (Florence, 1848); A. Rosmini- Serbati, V. Gioberti e il panteismo (Milan, 1848); C. B. Smyth, Christian Metaphysics (1851); B. Spaventa, La Filosofia di Gioberti (Naples, 1854); A. Mauri, Delia vita e delle opere di V. Gioberti (Genoa, 1853); G. Prisco, Gioberti e I' ontologismo (Naples, 1867) ; P. Luciani, Gioberti e la filosofia nuova italiana (Naples, 1 866-1872); D. Berti, Di V. Gioberti (Florence, 1881) ; see also L. Ferri, L'Histoire de la philosophic en Italie au XIX" siecle (Paris, 1869) ; C. Werner, Die ilalienische Philosophic des 19. Jahrhunderls, ii. (1885) ; appendix to Ueberweg's Hist, of Philosophy (Eng. tr.) ; art. in Brownson's Quarterly Review (Boston, Mass.), xxi.; R. Mariano, La Philosophic contemporaine en Italie (1866); R. Seydel's exhaustive article in Ersch and Gruber's Allgemeine Encyclopadie. The centenary of Gioberti called forth several monographs in Italy.

GIOIOSA-IONICA, a town of Calabria, Italy, in the province of Reggio Calabria, from which it is 65 m. N.E. by rail, and 38 m. direct, 492 ft. above sea-level. Pop. (1901) town, 9072 ; commune, 11,200. Near the station, which is on the E. coast of Calabria 3 m. below the town to

the S.E., the remains of a theatre belonging to the Roman period were discovered in 1883; the orchestra was 46 ft. in diameter (Notizie degli scavi, 1883, p. 423). The ruins of an ancient building called the Naviglio, the nature of which does not seem clear, are described (ib. 1884, p. 252).

GIOJA, MELCHIORRE (1 767-1829), Italian writer on philo- sophy and political economy, was born at Piacenza, on the 20th of September 1767. Originally intended for the church, he took orders, but'renounced them in 1796 and went to Milan, where he devoted himself to the study of political economy. Having obtained the prize for an essay on " the kind of free government best adapted to Italy " he decided upon the career of a publicist. The arrival of Napoleon in Italy drew him into public life. He advocated a republic under the dominion of the French in a pamphlet / Tedeschi, i Francesi, ed i Russi in Lombardia, and under the Cisalpine Republic he was named historiographer and director of statistics. He was several times imprisoned, once for eight months in 1820 on a charge of being implicated in a conspiracy with the Carbonari. After the fall of Napoleon he retired into private life, and does not appear to have held office again. He died on the 2nd of January 1829. Gioja's fundamental idea is the value of statistics or the collection of facts. Philosophy itself is with him classification and consideration of ideas. Logic he regarded as a practical art, and his Esercizioni logici has the further title, Art of deriving benefit from ill-con- structed books. In ethics Gioja follows Bentham generally, and his large treatise Del merito e delle recompense (1818) is a clear and systematic view of social ethics from the utilitarian principle. In political economy this avidity for facts produced better fruits. The Nuovo Prospetto delle scienze economiche (1815-1817), although long to excess, and overburdened with classifications and tables, contains much valuable material. The author prefers large properties and large commercial undertakings to small ones, and strongly favours association as a means of pro- duction. He defends a restrictive policy and insists on the necessity of the action of the state as a regulating power in the industrial world. He was an opponent of ecclesiastical domina- tion. He must be credited with the finest and most original treatment of division of labour since the Wealth of Nations. Much of what Babbage taught later on the subject of combined work is anticipated by Gioja. His theory of production is also deserving of attention from the fact that it takes into account and gives due prominence to immaterial goods. Throughout the work there is continuous opposition to Adam Smith. Gioja's latest work Filosofia della statistica (2 vols., 1826; 4 vols., 1829- 1830) contains in brief compass the essence of his ideas on

human life, and affords the clearest insight into his aim and method in philosophy both theoretical and practical.

See monographs by G. D. Romagnosi (1829), F. Falco (1866); G. Pecchio, Storia dell' economia pubblica in Italia (1829), and article in Ersch and Gruber's Allgemeine Encyclopadie; for Gioja's philo- sophy, L. Fcrri, Essai sur Vhistoire de la philosophic en Italie au XIX' siecle (1869); Ueberweg's Hist, of Philosophy (Eng. tr., appendix ii.) ; A. Rosmini-Serbati, Opuscoli filosofici, iii. (1844) (containing an attack on Gioja's "sensualism"); for his political

economy, list of works in J. Conrad's Handworterbuch der Staals- wissenschaften (1892); L. Cossa, Introd. to Pol. Econ. (Eng. trans., p. 488). Gioja's complete works were published at Lugano (1832- 1849). He was one of the founders of the Annali universali di s talis tica.

GIOLITTI, GIOVANNI (1842-), Italian statesman, was born at Mondovi on the 27th of October 1842. After a rapid career in the financial administration he was, in 1882, appointed councillor of state and elected to parliament. As deputy he chiefly acquired prominence by attacks on Magliani, treasury minister in the Depretis cabinet, and on the 9th of March 1889 was himself selected as treasury minister by Crispi. On the fall of the Rudini cabinet in May 1892, Giolitti, with the help of a court clique, succeeded to the premiership. His term of office was marked by misfortune and misgovernment. The building crisis and the commercial rupture with France had impaired the situation of the state banks, of which one, the Banca Romana, had been further undermined by maladministration. A bank law, passed by Giolitti failed to effect an improvement. More- over, he irritated public opinion by raising to senatorial rank the director-general of the Banca Romana, Signor Tanlongo, whose irregular practices had become a byword. The senate declined to admit Tanlongo, whom Giolitti, in consequence of an inter- pellation in parliament upon the condition of the Banca Romana, was obliged to arrest and prosecute. During the prosecution Giolitti abused his position as premier to abstract documents bearing on the case. Simultaneously a parliamentary commission of inquiry investigated the condition of the state banks. Its report, though acquitting Giolitti of personal dishonesty, proved disastrous to his political position, and obliged him to resign. His fall left the finances of the state disorganized, the pensions fund depleted, diplomatic relations with France strained in consequence of the

massacre of Italian workmen at Aigues- Mortes, and Sicily and the Lunigiana in a state of revolt, which he had proved impotent to suppress. After his resignation he was impeached for abuse of power as minister, but the supreme court quashed the impeachment by denying the competence of the ordinary tribunals to judge ministerial acts. For several years he was compelled to play a passive part, having lost all credit. But by keeping in the background and giving public opinion time to forget his past, as well as by parliamentary intrigue, he gradually regained much of his former influence. He made capital of the Socialist agitation and of the repression to which other statesmen resorted, and gave the agitators to understand that were he premier they would be allowed a free hand. Thus he gained their favour, and on the fall of the Pelloux cabinet he became minister of the Interior in Zanardelli's administration, of which he was the real head. His policy of never interfering in strikes and leaving even violent demonstra- tions undisturbed at first proved successful, but indiscipline and disorder grew to such a pitch that Zanardelli, already in bad health, resigned, and Giolitti succeeded him as prime minister (November 1903). But during his tenure of office he, too, had to resort to strong measures in repressing some serious disorders in various parts of Italy, and thus he lost the favour of the Socialists. In March 1905, feeling himself no longer secure, he resigned, indicating Fortis as his successor. When Sonnino became premier in February 1906, Giolitti did not openly oppose him, but his followers did, and Sonnino was defeated in May, Giolitti becoming prime minister once more.

GIORDANO, LUCA (1632-1705), Italian painter, was born in Naples, son of a very indifferent painter, Antonio, who imparted to him the first rudiments of drawing. Nature predestined him for the art, and at the age of eight he painted a cherub into one of his father's pictures, a feat which was at once noised abroad, and induced the viceroy of Naples to recommend the child to Ribera. His father afterwards took him to Rome, to study under , Pietro da Cortona. He acquired the nickname of Luca Fa-presto (Luke Work-fast). One might suppose this nickname to be derived merely from the almost miraculous celerity with which from an early age and throughout his life he handled the brush; but it is said to have had a more express origin. The father, we are told, poverty-stricken and greedy of gain, was perpetually

urging his boy to exertion with the phrase, " Luca, fa presto." The youth obeyed his parent to the letter, and would actually not so much as pause to snatch a hasty meal, but received into his mouth, while he still worked on, the food which his father's hand supplied. He copied nearly twenty times the " Battle of Constantine" by Julio Romano, and with proportionate frequency several of the great works of Raphael

and Michelangelo. His rapidity, which belonged as much to invention as to mere handi- work, and his versatility, which enabled him to imitate other painters deceptively, earned for him two other epithets, ” The Thunderbolt ” (Fulmine), and ” The Proteus,” of Painting. He shortly visited all the main seats of the Italian school of art, and formed for himself a style combining in a certain measure the ornamental pomp of Paul Veronese and the contrasting com- positions and large schemes of chiaroscuro of Pietro da Cortona. He was noted also for lively and showy colour. Returning to Naples, and accepting every sort of commission by which money was to be made, he practised his art with so much applause that Charles II. of Spain towards 1687 invited him over to Madrid, where he remained thirteen years. Giordano was very popular at the Spanish court, being a sprightly talker along with his other marvellously facile gifts, and the king created him a cavaliere. One anecdote of his rapidity of work is that the queen of Spain having one day made some inquiry about his wife, he at once showed Her Majesty what the lady was like by painting her portrait into the picture on which he was engaged. Soon after the death -of Charles in 1700 Giordano, gorged with wealth, returned to Naples. He spent large sums in acts of munificence, and was particularly liberal to his poorer brethren of the art. He again visited various parts of Italy, and died in Naples on the 1 2th of January 1705, his last words being ” O Napoli, sospiro mio ” (O Naples, my heart’s love!). One of his maxims was that the good painter is the one whom the public like, and that the public are attracted more by colour than by design.

Giordano had an astonishing readiness and facility, in spite of the general commonness and superficiality of his performances. He left many works in Rome, and far more in Naples. Of the latter one of the most renowned is ” Christ expelling the Traders from the Temple,” in the church of the Padri Girolamini, a colossal work, full of expressive lazzaroni; also the frescoes of S. Martino, and those in the Tesoro della Certosa, including the subject of ” Moses and the Brazen Serpent “; and the cupola- paintings in the Church of S. Brigida, which contains the artist’s own tomb. In Spain he executed a surprising number of works, — continuing in the Escorial the series commenced by Cambiasi, and painting frescoes of the ” Triumphs of the Church,” the ” Genealogy and Life of the Madonna,” the stories of Moses, Gideon, David and Solomon, and the ” Celebrated Women of Scripture,” all works of large dimensions. His pupils, Aniello Rossi and Matteo Pacelli, assisted him in Spain. In Madrid he worked more in oil-colour, a Nativity there being one of his best productions. Other superior examples are the ” Judgment of Paris ” in the Berlin Museum, and ”

Christ with the Doctors in the Temple," in the Corsini Gallery of Rome. In Florence, in his closing days, he painted the Cappella Corsini, the Galleria Riccardi and other works. In youth he etched with considerable skill some of his own paintings, such as the " Slaughter of the Priests of Baal." He also painted much on the crystal borderings of looking-glasses, cabinets, &c, seen in many Italian palaces, and was, in this form of art, the master of Pietro Garofolo. His best pupil, in painting of the ordinary kind, was Paolo de Matteis.

Bellori, in his Vite de' pittori moderni, is a leading authority regarding Luca Giordano. P. Benvenuto (1882) has written a work on the Riccardi paintings. , , _.

GIORGIONE (1477-1510), Italian painter, was born at Castel- franco in 1477. In contemporary documents he is always called (according to the Venetian manner of pronunciation and spelling) Zorzi, Zorzo or Zorzon of Castelfranco. A tradition, having its origin in the 17 th century, represented him as the natural son of some member of the great local family of the Barbarelli, by a peasant girl of the neighbouring village of Vedelago; consequently he is commonly referred to in histories and

catalogues under the name of Giorgio Barbarelli or Barbarella. This tradition has, however, on close examination been proved baseless. " On the other hand mention has been found in a contemporary document of an earlier Zorzon, a native of Vedelago, living in Castelfranco in 1460. Vasari, who wrote before the Barbarella legend had sprung up, says that Giorgione was of very humble origin. It seems probable that he was simply the son or grandson of the afore- mentioned Zorzon the elder; that the after-claim of the Barbarelli to kindred with him was a mere piece of family vanity, very likely suggested by the analogous case of Leonardo da Vinci; and that, this claim once put abroad, the peasant-mother of Vedelago was invented on the ground of some dim knowledge that his real progenitors came from that village.

Of the facts of his life we are almost as meagrely informed as of the circumstances of his birth. The little city, or large fortified village, for it is scarcely more, of Castelfranco in the Trevisan stands in the midst of a rich and broken plain at some distance from the last spurs of the Venetian Alps. From the natural surroundings of Giorgione's

childhood was no doubt derived his ideal of pastoral scenery, the country of pleasant copses, glades, brooks and hills amid which his personages love to wander or recline with lute and pipe. How early in boyhood he went to Venice we do not know, but internal evidence supports the statement of Ridolfi that he served his apprentice- ship there under Giovanni Bellini; and there he made his fame and had his home. That his gifts were early recognized we know from the facts, recorded in contemporary documents, that in 1500, when he was only twenty-three (that is if Vasari gives rightly the age at which he died), he was chosen to paint portraits of the Doge Agostino Barberigo and the condottiere Consalvo Ferrante; that in 1504 he was commissioned to paint an altarpiece in memory of Matteo Costanzo in the cathedral of his native town, Castelfranco; that in 1507 he received at the order of the Council of Ten part payment for a picture (subject not mentioned) on which he was engaged for the Hall of the Audience in the ducal palace; and that in 1507-1508 he was employed, with other artists of his own generation, to decorate with frescoes the exterior of the newly rebuilt Fondaco dei Tedeschi or German merchants' hall at Venice, having already done similar work on the exterior of the Casa Soranzo, the Casa Grimani alii Servi and other Venetian palaces. Vasari gives also as an important event in Giorgione's life, and one which had influence on his work, his meeting with Leonardo da Vinci on the occasion of the Tuscan master's visit to Venice in 1 500. In September or October 1510 he died of the plague then raging in the city, and within a few days of his death we find the great art-patroness and amateur, Isabella d'Este, writing from Mantua and trying in vain to secure for her collection a night-piece by his hand of which the fame had reached her.

All accounts agree in representing Giorgione as a personage of distinguished and romantic charm, a great lover, a great musician, made to enjoy in life and to express in art to the uttermost the delight, the splendour, the sensuous and imaginative grace and fulness, not untinged with poetic melancholy, of the Venetian existence of his time. They represent him further as having made in Venetian painting an advance analogous to that made in Tuscan painting by Leonardo more than twenty years before; that is as having released the art from the last shackles of archaic rigidity and placed it in possession of full freedom and the full mastery of its means. He also introduced a new range of subjects. Besides altarpieces and portraits he painted pictures that told no story, whether biblical or classical, or if they professed to tell such, neglected the -action and simply embodied in form and colour moods of lyrical or romantic feeling, much as a musician might embody them in sounds. Innovating with the courage and felicity of

genius, he had for a time an overwhelming influence on his contemporaries and immediate successors in the Venetian school, including Titian, Sebastian del Piombo, the elder Palma, Cariani and the two Campagnolas, and not a little even on seniors of long-standing fame such as Giovanni Bellini. His name and work have

exercised, and continue to exercise, no less a spell on posterity. But to identify and define, among the relics of his age and school, precisely what that work is, and to distinguish it from the kindred work of other men whom his influence inspired, is a very difficult matter. There are inclusive critics who still claim for Giorgione nearly every painting of the time that at all resembles his manner, and there are exclusive critics who pare down to some ten or a dozen the list of extant pictures which they will admit to be actually his.

To name first those which are either certain or command the most general acceptance, placing them in something like an approximate and probable order of date. In the Uffizi at Florence are two companion pieces of the ” Trial of Moses ” and the ” Judgment of Solomon,” the latter the finer and better preserved of the two, which pass, no doubt justly, as typical works of Giorgione’s youth, and exhibit, though not yet ripely, his special qualities of colour-richness and landscape romance, the peculiar facial types of his predilection, with the pure form of forehead, fine oval of cheek, and somewhat close-set eyes and eyebrows, and the intensity of that still and brooding sentiment with which, rather than with dramatic life and movement, he instinctively invests his figures. Probably the earliest of the portraits by common consent called his is the beautiful one of a young man at Berlin. His earliest devotional picture would seem to be the highly finished ” Christ bearing his Cross ” (the head and shoulders only, with a peculiarly serene and high-bred cast of features) formerly at Vicenza and now in the collection of Mrs Gardner at Boston. Other versions of this picture exist, and it has been claimed that one in private possession at Vienna is the true original: erroneously in the judgment of the present writer. Another ” Christ bearing the Cross,” with a Jew dragging at the rope round his neck, in the church of San Rocco at Venice, is a ruined but genuine work, quoted by Vasari and Ridolfi, and copied with the name of Giorgione appended, by Van Dyck in that master’s Chatsworth sketch-book. (Vasari gives it to Giorgione in his first and to Titian in his second edition.) The composition of a lost early picture of the birth of Paris is preserved in an engraving of the ” Teniers Gallery ” series, and an old copy of part of the same picture is at Budapest. In the Giovanelli Palace at Venice is that fascinating and enigmatical mythology or allegory, known to the Anonimo Morelliano, who saw it in 1 530 in

the house of Gabriel Vendramin, simply as ” the small landscape with the storm, the gipsy woman and the soldier”; the picture is conjecturally interpreted by modern authorities as illustrating a passage in Statius which describes the meeting of Adrastus with Hypsipyle when she was serving as nurse with the king of Nemea. Still belonging to the earlier part of the painter’s brief career is a beautiful, virginally pensive Judith at St Peters- burg, which passed under various alien names, as Raphael, Moretto, &c, until its kindred with the unquestioned work of Giorgione was in late years firmly established. The great Castelfranco altarpiece, still, in spite of many restorations, one of the most classically pure and radiantly impressive works of Renaissance painting, may be taken as closing the earlier phase of the young master’s work (1504). It shows the Virgin loftily enthroned on a plain, sparely draped stone structure with St Francis and a warrior saint (St Liberale) standing in attitudes of great simplicity on either side of the foot of the throne, a high parapet behind them, and a beautiful landscape of the master’s usual type seen above it. Nearly akin to this master- piece, not in shape or composition but by the type of the Virgin and the very Bellinesque St Francis, is the altarpiece of the Madonna with St Francis and St Roch at Madrid. Of the master’s fully ripened time is the fine and again enigmatical picture formerly in the house of Taddeo Contarini at Venice, described by contemporary witnesses as the “Three Philosophers,” and now, on slender enough grounds, supposed to represent Evander showing Aeneas the site of Troy as narrated in the eighth Aeneid. The portrait of a knight of Malta in the Uffizi at Florence has more power and authority, if less sentiment, than the earlier example at Berlin, and may be taken to be of the

master’s middle time. Most entirely central and typical of all Giorgione’s extant works is the Sleeping Venus at Dresden, first recognized by Morelli, and now universally accepted, as being the same as the picture seen by the Anonimo and later by Ridolfi in the Casa Marcello at Venice. An exquisitely pure and severe rhythm of line and contour chastens the sensuous richness of the presentment: the sweep of white drapery on which the goddess lies, and of glowing landscape that fills the space behind her, most harmoniously frame her divinity. It is recorded that the master left this piece unfinished and that the landscape, with a Cupid which subsequent restoration has removed, were completed after his death by Titian. The picture is the prototype of Titian’s own Venus at the Uffizi and of many more by

other painters of the school; but none of them attained the quality of the first exemplar. Of such small scenes of mixed classical mythology and landscape as early writers attribute in considerable number to Giorgione, there have survived at least two which bear strong evidences of his handiwork, though the action is in both of unwonted liveliness, namely the Apollo and Daphne of the Seminario at Venice and the Orpheus and Eurydice of Bergamo. The portrait of Antonio Grocardo at Budapest represents his fullest and most penetrating power in that branch of art. In his last years the purity and relative slenderness of form which mark his earlier female nudes, including the Dresden Venus, gave way to ideals of ampler mould, more nearly approach- ing those of Titian and his successors in Venetian art; as is proved by those last remaining fragments of the frescoes on the Grand Canal front of the Fondaco dei Tedeschi which were seen and engraved by Zanetti in 1760, but have now totally dis- appeared. Such change of ideal is apparent enough in the famous ” Concert ” or ” Pastoral Symphony ” of the Louvre, probably the latest, and certainly one of the most characteristic and harmoniously splendid, of Giorgione’s creations that has come down to us, and has caused some critics too hastily to doubt its authenticity.

We pass now to pictures for which some affirm and others deny the right to bear Giorgione’s name. As youthful in style as the two early pictures in the Uffizi, and closely allied to them in feeling, though less so in colour, is an unexplained subject in the National Gallery, sometimes called for want of a better title the ” Golden Age “; this is officially and by many critics givenonly to the ” school of ” Giorgione, but may not unreasonably be claimed for hisown work (No. 1173). There is also in England a group of three paintings which are certainly by one hand, and that a hand very closely related to Giorgione if not actually his own, namely the small oblong ” Adoration of the Magi ” in the National Gallery (No. 11 60), the “Adoration of the Shepherds ” belonging to Lord Allendale (with its somewhat inferior but still attractive replica at Vienna), and the small ” Holy Family ” in the collection of Mr R. H. Benson. The type of the Madonna in all these three pieces is different from that customary with the master, but there seems no reason why he should not at some particular moment have changed his model. The sentiment and gestures of the figures, the cast of draperies, the technical handling, and especially, in Lord Allen- dale’s picture, the romantic richness of the landscape, all incline us to accept the group as original, notwithstanding the deviation of type already mentioned and certain weaknesses of drawing and proportion which we should have hardly looked for. Better known to European students in general are the two fine pictures commonly

given to the master at the Pitti gallery in Florence, namely the ” Three Ages ” and the ” Concert.” Both are very Giorgionesque, the ” Three Ages ” leaning rather towards the early manner of Lorenzo Lotto, to whom by’ some critics it is actually given. The ” Concert ” is held on technical grounds Dy some of the best judges rather to bear the character of Titian ,at the moment when the inspiration of Giorgione was strongest on him, at least so far as concerns the extremely beautiful and expressive central figure of the monk playing on the clavichord with reverted head, a very incarnation of musical rapture and yearning — the other figures are too much injured to judge. There are at least two famous single portraits as to which

critics will probably never agree whether they are among the later works of Giorgione or among the earliest of Titian under his influence: these are the jovial and splendid half-length of Catherine Cornaro (or a stout lady much resembling her) with a bas-relief, in the collection of Signor Crespi at Milan, and the so-called ” Ariosto ” from Lord Darnley’s collection acquired for the National Gallery in 1904. Ancient and half-effaced inscriptions, of which there is no cause to doubt the genuineness, ascribe them both to Titian; both, to the mind of the present writer at least, are more nearly akin to such undoubted early Titians as the ” Man with the Book ” at Hampton Court and the ” Man with the Glove ” at the Louvre than to any authen- ticated work of Giorgione. At the same time it should be remembered that Giorgione is known to have actually enjoyed the patronage of Catherine Cornaro and to have painted her portrait. The Giorgionesque influence and feeling, to a degree almost of sentimental exaggeration, encounter us again in another beautiful Venetian portrait at the National Gallery which has sometimes been claimed for him, that of a man in crimson velvet with white pleated shirt and a background of bays, long attributed to the elder Palma (No. 636). The same qualities are present with more virility in a very striking portrait of a young man at Temple Newsam, which stands indeed nearer than any other extant example to the Brocardo portrait at Budapest. The full-face portrait of a woman in the Borghese gallery at Rome has the marks of the master’s design and inspiration, but in its present sadly damaged condition can hardly be claimed for his handiwork. The head of a boy with a pipe at Hampton Court, a little over life size, has been enthusiastically claimed as Gior- gione’s workmanship, but is surely too slack and soft in handling to be anything more than an early copy of a lost work, analogous to, though better than, the similar copy at Vienna of a young man with an arrow, a subject he is known to have painted. The early records prove indeed that not a few such copies of Giorgione’s

more admired works were produced in his own time or shortly afterwards. One of the most interesting and un- mistakable such copies still extant is the picture formerly in the Manfrin collection at Venice, afterwards in that of Mr Barker in London, and now at Dresden, which is commonly called ” The Horoscope,” and represents a woman seated near a classic ruin with a young child at her feet, an armed youth standing looking down at them, and a turbaned sage seated near with compasses, disk and book. Of important subject pictures belonging to the debatable borderland between Giorgione and his imitators are the large and interesting unfinished ” Judgment of Solomon ” at Kingston Lacy, which must certainly be the same that Ridolfi saw and attributed to him in the Casa Grimani at Venice, but has weaknesses of design and drawing sufficiently baffling to criticism; and the ” Woman taken in Adultery ” in the public gallery at Glasgow, a picture truly Giorgionesque in richness of colour, but betraying in its awkward composition, the relative coarseness of its types and the insincere, mechanical animation of its movements, the hand of some lesser master of the school, almost certainly (by comparison with his existing engravings and woodcuts) that of Domenico Campagnola. It seems un- necessary to refer, in the present notice, to any of the numerous other and inferior works which have been claimed for Giorgione by a criticism unable to distinguish between a living voice and its echoes.

Bibliography. — Morelli, Notizie, &c. (ed. Frizzoni, 1884) : Vasari (ed. Milanesi), vol. iv. ; Ridolfi, Le Maraviglie dell’ arte, vol. i. ; Zanetti, Varie Pitture (1760) ; Crowe-Cavalcaselle, History of Painting in North Italy; Morelli, Kunstkritische Studien; Gronau, Zorzon da Castelfranco, la sua origine, &c. (1894); Herbert Cook, Giorgione (in ” Great Masters ” series, 1900) ; Ugo Monneret de Villard, Giorgione da Castelfranco (1905). The two last-named works are critically far too inclusive, but useful as going over the whole ground of discussion, with full references to earlier authorities, &c. ”’ (S. C.)

GIOTTINO (1324-1357), an early Florentine painter. Vasari is the principal authority in regard to this artist; but it is not by any means easy to bring the details of his narrative into harmony with such facts as can now be verified. It would appear that there was a painter of the name of Tommaso (or Maso) di Stefano

termed Giottino; and the Giottino of Vasari is said to have been born in 1324, and to have died early, of consumption, in 1357, — dates which must be regarded as open to considerable doubt. Stefano, the father of Tommaso, was himself a celebrated painter in the early revival of art; his naturalism was indeed so highly appreciated by contemporaries as to earn him the appellation of ” Scimia della Natura ” (ape of nature). He, it seems, instructed his son, who, however, applied himself with greater predilection to studying the works of the great Giotto, formed his style on these, and hence was called Giottino. It is even said that Giottino was really the son (others say the great-grandson) of Giotto. To this statement little or no importance can be attached. To Maso di Stefano, or Giottino, Vasari and Ghiberti attribute the frescoes in the chapel of S. Silvestro (or of the Bardi family) in the Florentine church of S. Croce; these represent the miracles of Pope S. Silvestro as narrated in the ” Golden Legend,” one conspicuous subject being the sealing of the lips of a malignant dragon. These works are animated and firm in drawing, with naturalism carried further than by Giotto. From the evidence of style, some modern connoisseurs assign to the same hand the paintings in the funerat vault of the Strozzi family, below the Cappella degli Spagnuoli in the church of S. Maria Novella, representing the crucifixion and other subjects. Vasari ascribes also to his Giottino the frescoes of the life of St Nicholas in the lower church of Assisi. This series, however, is not really in that part of the church which Vasari designates, but is in the chapel of the Sacrament; and the works in that chapel are understood to be by Giotto di Stefano, who worked in the second half of the 14th century — very excellent productions of their period. They are much damaged, and the style is hardly similar to that of the Sylvester frescoes. It might hence be inferred that two different men produced the works which are unitedly fathered upon the half-legendary ” Giottino,” the consumptive youth, solitary and melancholic, but passionately devoted to his art. A large number of other works have been attributed to the same hand; we need only mention an ” Apparition of the Virgin to St Bernard,” in the Florentine Academy; a lost painting, very popular in its day, commemorating the expulsion, which took place in 1343, of the duke of Athens from Florence; and a marble statue erected on the Florentine campanile. Vasari particularly praises Giottino for well-blended chiaroscuro.’

GIOTTO [Giotto di Bondone 1] (1267 ?i337), Italian painter, was born at Vespignano in the Mugello, a few miles north of Florence, according to one account in 1276, and according to another, which from the few known circumstances of his life seems more likely to be correct, in 1 266 or 1 267. His father was a land owner at Colle in the

commune of Vespignano, described in a contemporary document as vir praeclarus, but by biographers both early and late as a poor peasant; probably therefore a peasant proprietor of no large possessions but of reputable stock and descent.. It is impossible to tell whether there is any truth in the legend of Giotto's boyhood which relates how he first showed his disposition for art, and attracted the attention of Cimabue, by being found drawing one of his father's sheep with, a sharp stone on the face of a smooth stone or slate. With his father's consent, the story goes on, Cimabue carried off the boy to be his apprentice, and it was under Cimabue's tuition that Giotto took his first steps in the art of which he was afterwards to be the great emancipator and renovator. The place where these early steps can still, according to tradition, be traced, is in the first and second, reckoning downwards, of the three courses of frescoes which adorn the walls of the nave in the Upper Church of St Francis at Assisi. These frescoes represent subjects of the Old and New Testament, and great labour, too probably futile, has been spent in trying to pick out those in which the youthful handiwork of Giotto can be discerned, as it is imagined, , among that of Cimabue and his other pupils. But the truth is that the figure of Cimabue himself , in spite of Dante's testimony to his having been the foremost painter of Italy until Giotto arose, has under the search-light of modern criticism melted into

1 Not to be confused with Giotto di Buondone, a contemporary citizen and politician of Siena.

almost mythical vagueness. His accepted position as Giotto's instructor and the pioneer of reform in his art has been attacked from several sides as a mere invention of Florentine writers for the glorification of their own city. One group of critics maintain that the real advance in Tuscan painting before Giotto was the work of the Sienese school and not of the Florentine. Another group contend that the best painting done in Italy down to the last decade of the 13th century was not done by Tuscan hands at all, but by Roman craftsmen trained in the inherited principles of Italo-Byzantine decoration in mosaic and fresco, and that from such Roman craftsmen alone could Giotto have learnt anything worth his learning. The debate thus opened is far from closed, and considering how scanty, ambiguous and often defaced are the materials existing for discussion, it is perhaps never likely to be closed. But there is no debate as to the general nature of the reform effected by the genius of Giotto himself. He was the great humanizer of painting; it is his glory to have been the first among his countrymen to breathe life into wall- pictures and altar-pieces, and to quicken the dead conventional- ism of inherited practice with the fire of natural action and natural feeling. Upon yet another point there is no

question; and that is that the reform thus effected by Giotto in painting had been anticipated in the sister art of sculpture by nearly a whole generation. About the middle of the 13th century Nicola Pisano had renewed that art, first by strict imitation of classical models, and later by infusing into his work a fresh spirit of nature and humanity, perhaps partly caught from the Gothic schools of France. His son Giovanni had carried the same re- vitalising of sculpture a great deal further; and hence to some critics it would seem that the real inspirer and precursor of Giotto was Giovanni Pisano the sculptor, and not any painter or wall- decorator, whether of Florence, Siena or Rome.

In this division of opinion it is safer to regard the revival of painting in Giotto's hands simply as part of the general awaken- ing of the time, and to remember that, as of all Italian com- munities Florence was the keenest in every form of activity both intellectual and practical, so it was natural that a son of Florence should be the chief agent in such an awakening. And in considering his career the question of his possible participation in the primitive frescoes of the upper courses at Assisi is best left out of account, the more so because of the deplorable condition in which they now exist. But with reference to the lowest course of paintings on the same walls, those illustrating the life of St Francis according to the narrative of St Bonaventura, no one has any doubt, at least in regard to nineteen or twenty of the twenty-eight subjects which compose the series, that Giotto himself was their designer and chief executant. In these, sadly as they too have suffered from time and wholesale repair, there can nevertheless be discerned the unmistakable spirit of the young Florentine master as we know him in his other works — his shrewd realistic and dramatic vigour, the deep sincerity and humanity of feeling which he knows how to express in every gesture of his figures without breaking up the harmony of their grouping or the grandeur of their linear design, qualities in- herited from the earlier schools of impressive but lifeless hieratic decoration. The " Renunciation of the Saint by his Father," the " Pope's Dream of the Saint upholding the tottering Church," the " Saint before the Sultan," the " Miracle of the Spring of Water," the " Death of the Nobleman of Celano," the " Saint preaching before Pope Honorius " — these are some of the most noted and best preserved examples of the painter's power in this series. Where doubt begins again is as to the relations of date and sequence which the series bears to other works by the master executed at Assisi and at Rome in the same early period of his career, that is, probably between 1295 and 1300. Giotto's remaining undisputed works at Assisi are the four celebrated allegorical compositions in honour of St Francis in the vaulting of the Lower Church, — the " Marriage of St

Francis to Poverty," the " Allegory of Chastity," the " Allegory of Obedience " and the " Vision of St Francis in Glory." These works are scarcely at all retouched, and relatively little dimmed by time; they are of a singular beauty, at once severe and tender, both

in colour and design; the compositions, especially the first three, fitted with admirable art into the cramped spaces of the vaulting, the subjects, no doubt in the main dictated to the artist by his Franciscan employers, treated in no cold or mechanical spirit but with a full measure of vital humanity and original feeling. Had the career and influence of St Francis had no other of their vast and far-reaching effects in the world than that of inspiring these noble works of art, they would still have been entitled to no small gratitude from mankind. Other works at Assisi which most modern critics, but not all, attribute to Giotto him- self are three miracles of St Francis and portions of a group of frescoes illustrating the history of Mary Magdalene, both in the Lower Church; and again, in one of the transepts of the same Lower Church, a series of ten frescoes of the Life of the Virgin and Christ, concluding with the- Crucifixion. It is to be remarked as to this transept series that several of the frescoes present not only the same subjects, but with a certain degree of variation the same compositions, as are found in the master's great series executed in the Arena chapel at Padua in the fullness of his powers about 1306; and that the versions in the Assisi transept show a relatively greater degree of technical accomplishment than the Paduan versions, with a more attractive charm and more abundance of accessory ornament, but a proportionately less degree of that simple grandeur in composition and direct strength of human motive which are the special notes of Giotto's style. Therefore a minority of critics refuse to accept the modern attribution of this transept series to Giotto himself, and see in it later work by an accomplished pupil softening and refining upon his master's original creations at Padua. Others, insisting that these unquestionably beautiful works must be by the hand of Giotto and none but Giotto, maintain that in comparison with the Paduan examples they illustrate a gradual progress, which can be traced in other of his extant works, from the relatively ornate and soft to the austerely grand and simple. This argument is enforced by comparison with early work of the master's at Rome as to the date of which we have positive evidence. In 1298 Giotto completed for Cardinal Stefaneschi for the price of 2200 gold ducats a mosaic of Christ saving St Peter from the waves (the celebrated " Navicella ") ;

this is still to be seen, but in a completely restored and transformed state, in the vestibule of St Peter's. For the same patron he executed, probably just before the " Navicella," an elaoorate ciborium or altar-piece for the high altar of St Peter's , for which he received 800 ducats. It represents on the principal face a colossal Christ enthroned with adoring angels beside him and a kneeling donor at his feet, and the martyrdoms of St Peter and St Paul on separate panels to right and left; on the reverse is St Peter attended by St George and other saints, receiving from the donor a model of his gift, with stately full-length figures of two apostles to right and two to left, besides various accessory scenes and figures in the predellas and the margins. The separated parts of this altar-piece are still to be seen, in a quite genuine though somewhat tarnished condition, in the sacristy of St Peter's. A third work by the master at Rome is a repainted fragment at the Lateran of a fresco of Pope Boniface VIII. proclaiming the jubilee of 1300. The " Navicella " and the Lateran fragment are too much ruined to argue from; but the ciborium panels, it is contended, combine with the aspects of majesty and strength a quality of ornate charm and suavity such as is remarked in the transept frescoes of Assisi. The sequence proposed for these several works is accordingly, first the St Peter's ciborium, next the allegories in the vaulting of the Lower Church, next the three frescoes of St Francis' miracles in the north transept, next the St Francis series in the Upper Church; and last, perhaps after an interval and with the help of pupils, the scenes from the life of Mary Magdalene in her chapel in the Lower Church. This involves a complete reversal of the prevailing view, which regards the unequal and sometimes clumsy compositions of this St Francis series as the earliest independent work of the master. It must be admitted that there is something paradoxical in the idea of a progress from the manner of the Lower Church transept series of the life of

Christ to the much ruder manner of the Upper Church series of St Francis.

A kindred obscurity and little less conflict of opinion await the inquirer at almost all stages of Giotto's career. In 1841 there were partially recovered from the whitewash that had overlain them a series of frescoes executed in the chapel of the Magdalene, in the Bargello or Palace of the Podesta. at Florence, to celebrate (as was supposed) a pacification between the Black and White parties in the state effected by the Cardinal d'Acqua- sparta as delegate of the pope in 1302. In them are depicted a series of Bible scenes, besides great compositions of Hell and Paradise, and in the Paradise are introduced portraits of Dante, Brunetto Latini and Corso Donate These recovered

fragments, freely ” restored ” as soon as they were disclosed, were acclaimed as the work of Giotto and long held in especial regard for the sake of the portrait of Dante. Latterly it has been shown that if Giotto ever executed them at all, which is doubtful, it must have been at a later date than the supposed pacification, and that they must have suffered grievous injury in the fire which destroyed a great part of the building in 1332, and been after- wards repainted by some well-trained follower of the school. To about 1302 or 1303 would belong, if there is truth in it, the familiar story of Giotto’s O. Pope Benedict XL, the successor of Boniface VIII., sent, as the tale runs, a messenger to bring him proofs of the painter’s powers. Giotto would give no other sample of his talent than an O drawn with a free sweep of the brush from the elbow; but the pope was satisfied and engaged him at a great salary to go and adorn with frescoes the papal residence at Avignon. Benedict, however, dying at this time (1305), nothing came of this commission; and the remains of Italian 14th-century frescoes still to be seen at Avignon are now recognized as the work, not, as was long supposed, of Giotto, but of the Sienese Simone Martini and his school.

At this point in Giotto’s life we come to the greatest by far of his undestroyed and undisputed enterprises, and one which can with some certainty be dated. This is the series of frescoes with which he decorated the entire internal walls of the chapel built at Padua in honour of the Virgin of the Annunciation by a rich citizen of the town, Enrico Scrovegni, perhaps in order to atone for the sins of his father, a notorious usurer whom Dante places in the seventh circle of hell. The building is on the site of an ancient amphitheatre, and is therefore generally called the chapel of the Arena. Since it is recorded that Dante was Giotto’s guest at Padua, and since we know that it was in 1306 that the poet came from Bologna to that city, we may conclude that to the same year, 1306, belongs the beginning of Giotto’s great undertaking in the Arena chapel. The scheme includes a Saviour in Glory over the altar, a Last Judgment, full of various and impressive incident, occupying the whole of the entrance wall, with a series of subjects from the Old and New Testament and the apocryphal Life of Christ painted in three tiers on either side wall, and lowest of all a fourth tier with emblematic Virtues and Vices in monochrome; the Virtues being on the side of the chapel next the incidents of redemption in the entrance fresco of the Last Judgment, the Vices on the side next the incidents of perdi- tion. A not improbable tradition asserts that Giotto was helped by Dante in the choice and disposition of the subjects. The frescoes,. though not free from injury and retouching, are upon the whole in good condition, and nowhere else

can the highest powers of the Italian mind and hand at the beginning of the 14th century be so well studied as here. At the close of the middle ages we find Giotto laying the foundation upon which all the progress of the Renaissance was afterwards securely based. In his day the knowledge possessed by painters of the human . frame and its structure rested only upon general observation and not upon detailed or scientific study; while to facts other than those of humanity their observation had never been closely directed. Of linear perspective they possessed but elementary and empirical ideas, and their endeavours to express aerial per- spective and deal with the problems of light and shade were rare and partial. As far as painting could possibly be carried under these conditions, it was carried by Giotto. In its choice of

subjects, his art is entirely subservient to the religious spirit of his age. Even in its mode of conceiving and arranging those subjects it is in part still trammelled by the rules and consecrated traditions of the past. Many of those truths of nature to which the painters of succeeding generations learned to give accurate and complete expression, Giotto was only able to express by way of imperfect symbol and suggestion. But among the elements of art over which he has control he maintains so just a balance that his work produces in the spectator less sense of imperfection than that of many later and more accomplished masters. In some particulars his mature painting, as we see it in the Arena chapel, has never been surpassed — in mastery of concise and expressive generalized line and of inventive and harmonious decorative tint; in the judicious division of the field and massing and scattering of groups; in the combination of high gravity with complete frankness in conception, and the union of noble dignity in the types with direct and vital truth in the gestures of the personages.

The frescoes of the Arena chapel must have been a labour of years, and of the date of their termination we have no proof. Of many other works said to have been executed by Giotto at Padua, all that remains consists of some scarce recognizable traces in the chapter-house of the great Franciscan church of St Antonio. For twenty years or more we lose all authentic data as to Giotto's doings and movements. Vasari, indeed, sends him on a giddy but in the main evidently fabulous round of travels, including a sojourn in France, which it is certain he never made. Besides Padua, he is said to have resided and left great

works at Ferrara, Ravenna, Urbino, Rimini, Faenza, Lucca and other cities; in some of them paintings of his school are still shown, but nothing which can fairly be claimed to be by his hand. It is recorded also that he was much employed in his native city of Florence; but the vandalism of later generations has effaced nearly all that he did there. Among works whitewashed over by posterity were the frescoes' with which he covered no less than five chapels in the church of Santa Croce. Two of these, the chapels of the Bardi and the Peruzzi families, were scraped in the early part of the 19th century, and very important remains were uncovered and immediately subjected to a process of restoration which has robbed them of half their authenticity. But through the ruins of time we can trace in some of these Santa Croce frescoes all the qualities of Giotto's work at an even higher and more mature development than in the best examples at Assisi or Padua. The frescoes of the Bardi chapel tell again the story of St Francis, to which so much of his best power had already been devoted; those of the Peruzzi chapel deal with the lives of St John the Baptist and St John the Evangelist. Such scenes as the Funeral of St Francis, the Dance of Herodias's Daughter, and the Re- surrection of St John the Evangelist, which have to some extent escaped the disfigurements of the restorer, are among acknow- ledged classics of the world's art. The only clues to the dates of any of these works are to be found in the facts that among the figures in the Bardi chapel occurs that of St Louis of Toulouse, who was not canonized till 13 r 7, therefore the painting must be subsequent to that year, and that the " Dance of Salome " must have been painted before r33r, when it was copied by the Loren- zetti at Siena. The only other extant works of Giotto at Florence are a fine " Crucifix," not undisputed, at San Marco, and the majestic but somewhat heavy altar-piece of the Madonna, prob- ably an early work, which is placed in the Academy beside a more primitive Madonna supposed to be the work of Cimabue.

Towards the end of Giotto's life we escape again from confused legend, and from the tantalizing record of works which have not survived for us to verify, into the region of authentic docu- ment and fact. It appears that Giotto had come under the notice of Duke Charles of CalabriS., son of King Robert of Naples, during the visits of the duke to Florence which took place between 1326 and 1328, in which year he died. Soon afterwards Giotto must have gone to King Robert's court at Naples, where he was enrolled as an honoured guest and member of the household by a royal decree dated the 20th of January 1330. Another docu- ment . shows him to have been still at Naples two years later.

Tradition says much about the friendship of the king for the painter

and the freedom of speech and jest allowed him; much also of the works he carried out at Naples in the Castel Nuovo, the Castel dell' Uovo, and the church and convent of Sta Chiara. Not a trace of these works remains; and others which later criticism have claimed for him in a hall which formerly belonged to the convent of Sta Chiara have been proved not to be his.

Meantime Giotto had been advancing, not only in years and worldly fame, but in prosperity. He was married young, and had, so far as is recorded, three sons, Francesco, Niccola and Donato, and three daughters, Bice, Caterina and Lucia. He had added by successive purchases to the plot of land inherited from his father at Vespignano. His fellow-citizens of all occupa- tions and degrees delighted to honour him. And now, in his sixty- eighth year (if we accept the birth-date 1266/7), on his return from Naples by way of Gaeta, he received the final and official testimony to the esteem in which he was held at Florence. By a solemn decree of the Priori on the 12th of April 1334, he was appointed master of the works of the cathedral of Sta Reparata (later and better known as Sta Maria del Fiore) and official architect of the city walls and the towns within her territory. What training as a practical architect his earlier career had afforded him we do not know, but his interest in the art from the beginning is made clear by the carefully studied architectural backgrounds of many of his frescoes. Dying on the 8th of January ˆ36 (old style 1337), Giotto only enjoyed his new dignities for two years. But in the course of them he had found time not only to make an excursion to Milan, on the invitation of Azzo Visconti and with the sanction of his own government, but to plan two great architectural works at Florence and superintend the beginning of their execution, namely the west front of the cathedral and its detached campanile or bell-tower. The unfinished enrichments of the cathedral front were stripped away in a later age. The foundation-stone of the Campanile was laid with solemn ceremony in the presence of a great concourse of magistrates and people on the 18th of July 1334. Its lower courses seem to have been completed from Giotto's design, and the first course of its sculptured ornaments (the famous series of primitive Arts and Industries) actually by his own hand, before his death. It is not clear what modifications of his design were made by Andrea Pisano, who was appointed to succeed him, or again by Francesco Talenti, to whom the work was next entrusted; but the incomparable structure as we now see it stands justly in the world's esteem as the most fitting monument to the genius who first conceived and directed it.

The art of painting, as re-created by Giotto, was carried on throughout Italy by his pupils and successors with little change or development

for nearly a hundred years, until a new impulse was given to art by the combined influences of naturalism and classicism in the hands of men like Donatello and Masaccio. Most of the anecdotes related of the master are probably in- accurate in detail, but the general character both as artist and man which tradition has agreed in giving him can never be assailed. He was from the first a kind of popular hero. He is celebrated by the poet Petrarch and by the historian Villani. He is made the subject of tales and anecdotes by Boccaccio and by Franco Sacchetti. From these notices, as well as from Vasari, we gain a distinct picture of the man, as one whose nature was in keeping with his country origin; whose sturdy frame and plain features corresponded to a character rather distinguished for shrewd and genial strength than for sublimer or more ascetic qualities; a master craftsman, to whose strong combining and inventing powers nothing came amiss; conscious of his own deserts, never at a loss either in the things of art or in the things of life, and equally ready and efficient whether he has to design the scheme of some great spiritual allegory in colour or imperishable monument in stone, or whether he has to show his wit in the encounter of practical jest and repartee. From his own hand we have a contribution to literature which helps to substantiate this conception of his character. A large part of Giotto's fame as painter was won in the service of the Franciscans, and in the pictorial celebration of the life and ordinances of

their founder. As is well known, it was a part of the ordinances of Francis that his disciples should follow his own example in worshipping and being wedded to poverty, — poverty idealized and personified as a spiritual bride and mistress. Giotto, having on the commission of the order given the noblest pictorial embodiment to this and other aspects of the Franciscan doctrine, presently wrote an ode in which his own views on poverty are expressed; and in this he shows that, if on the one hand his genius was at the service of the ideals of his time, and his imagina- tion open to their significance, on the other hand his judgment was shrewdly and humorously awake to their practical dangers and exaggerations.

Authorities. — Ghiberti, Commentari; Vasari, Le Vite, vol. i. ; Crowe-Cavalcaselle, History of Painting in Italy, ed. Langton Douglas (-1903); H. Thodc, Giotto (1899); M. G. Zimmermann, Giotto und die Kunst Italiens im Mittelalter (1899); B. Berenson, Florentine Painters of the Renaissance; F. Mason Perkin, Giotto (in "Great Masters" series)

(1902); Basil de Sdlincourt. Giotto (1905). (S. C.)

GIPSIES, or Gypsies, a wandering folk scattered through every European land, over the greater part of western Asia and Siberia; found also in Egypt and the northern coast of Africa, in America and even in Australia. No correct estimate of their numbers outside of Europe can be given, and even in Europe the information derived from official statistics is often contradictory and unreliable. The only country in which the figures have been given correctly is Hungary. In 1893 there weje 274,940 in Transleithania, of whom 243,432 were settled, 20,406 only partly settled and 8938 nomads. Of these 91,603 spoke the Gipsy language in 1890, but the rest had already been assimilated. Next in numbers stands Rumania, the number varying between 250,000 and 200,000 (1895). Turkey in Europe counted 117,000 (1903), of whom 51,000 were in Bulgaria and Eastern Rumelia, 22,000 in the vilayet of Adrianople and 2500 in the vilayet of Kossovo. In Asiatic Turkey the estimates vary between 67,000 and 200,000. . Servia has 41,000; Bosnia and Herzegovina, 18,000; Greece, 10,000; Austria (Cisleithania), 16,000, of whom 13,500 are in Bohemia and Moravia; Germany, 2000; France, 2000 (5000?); Basque Provinces, 500 to 700; Italy, 32,000; Spain, 40,000; Russia, 58,000; Poland, 15,000; Sweden and Norway, 1500; Denmark and Holland, 5000; Persia, 15,000; Transcaucasia, 3000. The rest is mere guesswork. For Africa, America and Australia the numbers are estimated between 135,000 and 166,000. The estimate given by Miklosich (1878) of 700,000 fairly agrees with the above statistics. No statistics are forthcoming for the number in the British Isles. Some estimate their number at 12,000.

■ The Gipsies are known principally by two names, which have been modified by the nations with whom they came in contact, but which can easily be traced to either the one or the other of these two distinct stems. The one group, embracing the majority of Gipsies in Europe, the compact masses living in the Balkan Peninsula, Rumania and Transylvania and extending also as far as Germany and Italy, are known by the name Atzigan or Atsigan, which becomes in time Tshingian (Turkey and Greece), Tsigan (Bulgarian, Servian, Rumanian), Czigany (Hungarian), Zigeuner (Germany), Zingari (Italian), and it is not unlikely that the English word Tinker or Tinkler (the latter no doubt due to a popular etymology connecting the gaudy gipsy with the tinkling coins or the metal wares which he carried on his back as a smith and tinker) may be a local transformation of the German Zigeuner. The second name, partly known in the East, where the word, however, is used as an expression of contempt, whilst Zigan is not felt by the gipsies as an insult, is Egyptian; in England, Gipsy; in

some German documents of the 16th century Aegypter; Spanish Gitano; modern Greek Gyphtos. They are also known by the parallel expressions Faraon (Rumanian) and Phdrao Nephka (Hungarian) or Pharaoh's people, which are only variations connected with the Egyptian origin. In France they are known as Bohemiens, a word the importance of which will appear later. To the same category belong other names bestowed upon them, such as Walachi, Saraceni, Agareni, Nubiani, &c. They were also known

by the name of Tartars, given to them in Germany, or as " Heathen," Heydens. All these latter must be considered as nicknames without thereby denoting their probable origin. The same may have now been the case with the first name with which they appear in history, Atzigan. Much ingenuity has been displayed in attempts to explain the name, for it was felt that a true explanation might help to settle the question of their origin and the date of their arrival in Europe. Here again two extreme theories have been propounded, the one supported by Bataillard, who connected them with the Sigynnoi of Herodotus and identified them with the Komodromoi of the later Byzantine writers, known already in the 6th century. Others bring them to Europe as late as the 14th century; and the name has also been explained by de Goeje from the Persian Chang, a kind of harp or zither, or the Persian Zang, black, swarthy. Rienzi (1832) and Trumpp (1872) have connected the name with the Changars of North-East India, but all have omitted to notice that the real form was Atzigan or (more correct) Atzingan and not Tsigan. The best explanation remains that sug- gested by Miklosich, who derives the word from the Athinganoi, a name originally belonging to a peculiar heretical sect living in Asia Minor near Phrygia and Lycaonia, known also as the Melki-Zedekites. The members of this sect observed very strict rules of purity, as they were afraid to be defiled by the touch of other people whom they considered unclean. They therefore acquired the name of Athinganoi {i.e. " Touch-me-nots ").

Miklosich has collected seven passages where the Byzantine historians of the 9th century describe the Athinganoi as sooth- sayers, magicians and serpent-charmers. From these descrip- tions nothing definite can be proved as to the identity of the Athinganoi with the Gipsies, or the reason why this name was given to soothsayers, charmers, &c. But the inner history of the Byzantine empire of that period may easily give a clue to it and explain how it came about that such a nickname was given to a new sect or to a new race which suddenly appeared in the Greek Empire at that period. In the history of the Church we find them mentioned in one breath with the Paulicians and other heretical sects which were transplanted in their tens of thousands from Asia

Minor to the Greek empire and settled especially in Rumelia, near Adrianople and Philippopolis. The Greeks called these heretical sects by all kinds of names, derived from ancient Church traditions, and gave to each sect such names as first struck them, on the scantiest of imaginary similarities. One sect was called Paulician, another Melki-Zedekite; so also these were called Athinganoi, probably being considered the descendants of the outcast Samer, who, according to ancient tradition, was a goldsmith and the maker of the Golden Calf in the desert. For this sin Samer was banished and compelled to live apart from human beings and even to avoid their touch (Athinganos: ” Touch-me-not “). Travelling from East to West these heretical sects obtained different names in different countries, in accord- ance with the local traditions or to imaginary origins. The Bogomils and Patarenes became Bulgarians in France, and so the gypsies Bohemiens, a name which was also connected with the heretical sect of the Bohemian brothers (Bbhmische Briider). Curiously enough the Kutzo-Vlachs living in Macedonia (q.v.) and Rumelia are also known by the nickname Tsintsari, a word that has’ not yet been explained. Very likely it stands in close connexion with Zingari, the name having been transferred from one people to the other without the justification of any common ethnical origin, except that the Kutzo-Vlachs, like the Zingari, differed from their Greek neighbours in race, as in language, habits and customs; while they probably followed similar pursuits to those of the Zingari, as smiths, &c. As to the other name, Egyptians, this is derived from a peculiar tale which the gipsies spread when appearing in the west of Europe. They alleged that they had come from a country of their own called Little Egypt, either a confusion between Little Armenia and Egypt or the Peloponnesus.

Attention may be drawn to a remarkable passage in the Syriac version of the apocryphal Book of Adam, known as the Cave of Treasures and compiled probably in the 6th century: “And

of the seed of Canaan were as I said the Aegyptians; and, lo, they were scattered all over the earth and served as slaves of slaves ” (ed. Bezold, German translation, p. 25). No reference to such a scattering and serfdom of the Egyptians is mentioned anywhere else. This must have been a legend, current in Asia Minor, and hence probably transferred to the swarthy Gipsies.

A new explanation may now be ventured upon as to the name which

the Gipsies of Europe give to themselves, which, it must be emphasized, is not known to the Gipsies outside of Europe. Only those who starting from the ancient Byzantine empire have travelled westwards and spread over Europe, America and Australia call themselves by the name of Rom, the woman being Romni and a stranger Gazi. Many etymologies have been sug- gested for the word Rom. Paspati derived it from the word Droma (Indian), and Miklosich had identified it with Doma or Domba, a ” low caste musician,” rather an extraordinary name for a nation to call itself by. Having no home and no country of their own and no political traditions and no literature, they would naturally try to identify themselves with the people in whose midst they lived, and would call themselves by the same name as other inhabitants of the Greek empire, known also as the Empire of New Rom, or of the Romaioi, Romeliots, Romanoi, as the Byzantines used to call themselves before they assumed the prouder name of Hellenes. The Gipsies would therefore call themselves also Rom, a much more natural name, more flattering to their vanity, and geographically and politically more correct than if they called themselves “low caste musicians.” This Greek origin of the name would explain why it is limited to the European Gipsies, and why it is not found among that stock of Gipsies which has migrated from Asia Minor southwards and taken a different route to reach Egypt and North Africa.

Appearance in Europe. — Leaving aside the doubtful passages in the Byzantine writers where the Athinganoi are mentioned, the first appearance of Gipsies in Europe cannot be traced positively further back than the beginning of the 14th century. Some have hitherto believed that a passage in what was errone- ously called the Rhymed Version of Genesis of Vienna, but which turns out to be the work of a writer before the year n 22, and found only in the Klagenfurt manuscript (edited by Ditmar, 1862), referred to the Gipsies. It runs as follows: Gen. xiii. 15 — ” Hagar had a son from whom were born the Chaltsmide. When Hagar had that child, she named it Ismael, from whom the Ismaelites descend who journey through the land, and we call them Chaltsmide, may evil befall them! They sell only things with blemishes, and for whatever they sell they always ask more than its real value. They cheat the people to whom they sell. They have no home, no country, they are satisfied to live in tents, they wander over the country, they deceive the people, they cheat men but rob no one noisily.”

This reference to the Chaltsmide (not goldsmiths, but very likely ironworkers, smiths) has wrongly been applied to the Gipsies. For it is important to note that at least three centuries before historical

evidence proves the immigration of the genuine Gipsy, there had been wayfaring smiths, travelling from country to country, and practically paving the way for their successors, the Gipsies, who not only took up their crafts but who probably have also assimilated a good proportion of these vagrants of the west of Europe. The name given to the former, who pro- bably were Oriental or Greek smiths and pedlars, was then transferred to the new-comers. The Komodromoi mentioned by Theophanes (758-818), who speaks under the date 554 of one hailing from Italy, and by other Byzantine writers, are no doubt the same as the Chaltsmide of the German writer of the 1 2 th century translated by Ducange as Chaudroneurs. WS are on surer ground in the 14th century. Hopf has proved the existence of Gipsies in Corfu before 1326. Before 1346 the empress Catherine de Valois granted to the governor of Corfu authority to reduce to vassalage certain vagrants who came from the mainland; and in 1386, under the Venetians, they formed the Feudum Acindanorum, which lasted for many centuries. About 1378 the Venetian governor of Nauplia

confirmed to the " Acingani " of that colony the privileges granted by his predecessor to their leader John. It is even possible to identify the people described by Friar Simon in his Ilinerarium, who, speaking of his stay in Crete in 1322, says: " We saw there a people outside the city who declare themselves to be of the race of Ham and who worship according to the Greek rite. They wander like a cursed people from place to place, not stopping at all or rarely in one place longer than thirty days; they live in tents like the Arabs, a little oblong black tent." But their name is not mentioned, and although the similarity is great between these " children of Ham " and the Gipsies, the identification has only the value of an hypothesis. By the end of the 15th century they must have been settled for a sufficiently long time in the Balkan Peninsula and the countries north of the Danube, such as Transylvania and Walachia, to have been reduced to the same state of serfdom as they evidently occupied in Corfu in the second half of the 14th century. The voivode Mircea I. of Walachia confirms the grant made by his uncle Vladislav Voivode to the monastery of St Anthony of Voditsa as to forty families of " Atsigane," for whom no taxes should be paid to the prince. They were considered crown property. The same gift is renewed in the year 1424 by the voivode Dan, who repeats the very same words (i Acigane, m, celiudi. da su slobodni ot vstkih rabot i dankov) (Hajdau, Arhiva, i. 20). At that time there must already have been in Walachia settled Gipsies treated as serfs, and migrating Gipsies plying their trade as smiths, musicians, dancers, sooth- sayers, horse-dealers, &c, for we find the voivode Alexander of Moldavia granting these Gipsies in the year 1478 "

freedom of air and soil to wander about and free fire and iron for their smithy. ” But a certain portion, probably the largest, became serfs, who could be sold, exchanged, bartered and inherited. It may be mentioned here that in the 17th century a family when sold fetched forty Hungarian florins, and in the 18th century the price was sometimes as high as 700 Rumanian piastres, about £8, 10s. As late as 1845 an auction of 200 families of Gipsies took place in Bucharest, where they were sold in batches of no less than 5 families and offered at a ” ducat ” cheaper per head than elsewhere. The Gipsies followed at least four distinct pursuits in Rumania and Transylvania, where they lived in large masses. A goodly proportion of them were tied to the soil; in consequence their position was different from that of the Gipsies who had started westwards and who are nowhere found to have obtained a permanent abode for any length of time, or to have been treated, except for a very short period, with any consideration of humanity.

Their appearance in the West is first noted by chroniclers early in the 1 5th century. In 1414 they are said to have already arrived in Hesse. This date is contested, but for 141 7 the reports are unanimous of their appearance in Germany. Some count their number to have been as high as 1400, which of course is exaggeration. In 1418 they reached Hamburg, 1419 Augsburg, 1428 Switzerland. In 1427 they had already entered France (Provence). A troupe is said to have reached Bologna in 1422, whence they are said to have gone to Rome, on a pilgrimage alleged to have been undertaken for some act of apostasy. After this first immigration a second and larger one seems to have followed in its wake, led by Zumbel. The Gipsies spread over Germany, Italy and France between the years 1438 and 1512. About 1500 they must have reached England. On the 5th of July 1505 James IV. of Scotland gave to ” Antonius Gaginae,” count of Little Egypt, letters of recommendation to the king of Denmark; and special privileges were granted by James V. on the 15th of February 1540 to ” oure louit johnne Faw Lord and Erie of Litill Egypt,” to whose son and successor he granted authority to hang and punish all Egyptians within the realm (May 26, 1540).

It is interesting to hear what the first writers who witnessed their appearance have to tell us; for ever since the Gipsies have remained the same. Albert Krantzius (Krantz), in his Saxonia (xi. 2), was the first to give a full description, which was afterwards repeated by Munster in his Cosmographia (iii. 5).

He says that in the year 141 7 there appeared for the first time in Germany a people uncouth, black, dirty, barbarous, called in Italian ” Ciani,” who indulge specially in thieving and cheat- ing. They had among them a count and a few knights well dressed, others followed afoot. The women and children travelled in carts. They also carried with them letters of safe- conduct from the emperor Sigismund and other princes, and they professed that they were engaged on a pilgrimage of expiation for some act of apostasy.

The guilt of the Gipsies varies in the different versions of the story, but all agree that the Gipsies asserted that they came from their own country called ” Litill Egypt,” and they had to go to Rome, to obtain pardon for that alleged sin of their fore- fathers. According to one account it was because they had not shown mercy to Joseph and Mary when they had sought refuge in Egypt from the persecution of Herod (Basel Chronicle). According to another, because they had forsaken the Christian faith for a while (Rhaetia, 1656), &c. But these were fables, no doubt connected with the legend of Cartaphylus or the Wandering Jew.

Krantz’s narrative continues as follows: This people have no country and travel through the land. They live like dogs and have no religion although they allow themselves to be baptized in the Christian faith. They live without care and gather unto themselves also other vagrants, men and women. Their old women practise fortune-telling, and whilst they are telling men of their future they pick their pockets. Thus far Krantz. It is curious that he should use the name by which these people were called in Italy, ” Ciani.” Similarly Crusius, the author of the Annates Suevici, knows their Italian name Zigani and the French Bohemiens. Not one of these oldest writers mentions them as coppersmiths or farriers or musicians. The immunity which they enjoyed during their first appearance in western Europe is due to the letter of safe-conduct of the emperor. As it is of extreme importance for the history of civilization as well as the history of the Gipsies, it may find a place here. It is taken from the compilation of Felix Oefelius, Rerum Boicarum scriptores (Augsburg, 1763), ii. 15, who reproduces the ” Diarium sexennale ” of “Andreas Presbyter,” the contemporary of the first appearance of the Gipsies in Germany.

” Sigismundus Dei gratia Romanorum Rex semper Augustus, ac Hungariae, Bohemiae, Dalmatiae, Croatiae, &c. Rex Fidelibus nostris universis Nobilibus, Militibus, Castellanis, Officialibus, Tributariis, civitatibus liberis, opidis et eorum iudicibus in Regno et sub domino

nostro constitutis ex existenti- bus salutem cum dilectione. Fideles nostri adierunt in prae- sentiam personaliter Ladislaus Wayuoda Ciganorum cum aliis ad ipsum spectantibus, nobis humilimas porrexerunt supplicationes, hue in sepus in nostra praesentia supplicationum precum cum instantia, ut ipsis gratia nostra uberiori providere dignaremur. Unde nos illorum supplicatione illecti eisdem hanc libertatem duximus concedendam, qua re quandocunque idem Ladislaus Wayuoda et sua gens ad dicta nostra dominia videlicet civitates vel oppida pervenerint, ex tunc vestris fidelitatibus praesentibus firmiter committimus et mandamus ut eosdem Ladislaum Wayuodam et Ciganos sibi subiectos omni sine impedimento ac perturbatione aliquali fovere ac conservare debeatis, immo ab omnibus impetitionibus seu offensionibus tueri velitis: Si autem inter ipsos aliqua Zizania seu perturbatio evenerit ex parte, quorumcunque ex tunc non vos nee aliquis alter vestrum, sed idem Ladislaus Wayuoda iudicandi et liberandi habeat facultatem. Praesentes autem post earum lecturam semper reddi iubemus praesentanti.

“Datum in Sepus Dominica die ante festum St Georgii Martyris Anno Domini MCCCCXXIIL, Regnorum nostrorum anno Hungar. XXXVI. , Romanorum vero XII., Bohemiae tertio.”

Freely translated this reads: ” We Sigismund by the grace of God emperor of Rome, king of Hungary, Bohemia, &c. unto all true and loyal subjects, noble soldiers, commanders, castellans, open districts, free towns and their judges in our kingdom established- and under our sovereignty, kind greetings. Our faithful voivode of the Tsigani with others belonging to him has

humbly requested us that we might graciously grant them our abundant favour. We grant them their supplication, we have vouchsafed unto them this liberty. Whenever therefore this voivode Ladislaus and his people should come to any part of our realm in any town, village or place, we commit them by these presents, strongly to your loyalty and we command you to pro- tect in every way the same voivode Ladislaus and the Tsigani his subjects without hindrance, and you should show kindness unto them and you should protect them from every trouble and persecution. But should any trouble or discord happen among them from whichever side it may be, then none of you nor any- one else belonging to you should interfere, but this voivode Ladislaus alone should have the right of punishing and pardoning. And we moreover command you to return these presents always after having read them. Given in our court on Sunday the day before the Feast of St George in the year of our Lord 1423. The 36th year of our kingdom of Hungary, the 12 th of our being emperor of Rome and the

3rd of our being king of Bohemia.”

There is no reason to doubt the authenticity of this document, which is in no way remarkable considering that at that time the Gipsies must have formed a very considerable portion of the inhabitants of Hungary, whose king Sigismund was. They may have presented the emperor’s grant of favours to Alexander prince of Moldavia in 1472, and obtained from him safe-conduct and protection, as mentioned above.

No one has yet attempted to explain the reason why the Gipsies should have started in the 14th and especially in the first half of the 15th century on their march westwards. But if, as has been assumed above, the Gipsies had lived for some length of time in Rumelia, and afterwards spread thence across the Danube and the plains of Transylvania, the incursion of the Turks into Europe, their successive occupation of those very provinces, the overthrow of the Servian and Bulgarian kingdoms and the dislocation of the native population, would account to a remark- able degree for the movement of the Gipsies: and this movement increases in volume with the greater successes of the Turks and with the peopling of the country by immigrants from Asia Minor. The first to be driven from their homes would no doubt be the nomadic element, which felt itself ill at ease in its new surround- ings, and found it more profitable first to settle in larger numbers in Walachia and Transylvania and thence to spread to the western countries of Europe. But their immunity from persecution did not last long.

Later History. — Less than fifty years from the time that they emerge out of Hungary, or even from the date of the Charter of the emperor Sigismund, they found themselves exposed to the fury and the prejudices of the people whose good faith they had abused, whose purses they had lightened, whose barns they had emptied, and on whose credulity they had lived with ease and comfort. Their inborn tendency to roaming made them the terror of the peasantry and the despair of every legislator who tried to settle them on the land. Their foreign appearance, their unknown tongue and their unscrupulous habits forced the legis- lators of many countries to class them with rogues and vagabonds, to declare them outlaws and felons and to treat them with extreme severity. More than one judicial murder has been com- mitted against them. In some places they were suspected as Turkish- spies and treated accordingly, and the murderer of a Gipsy was often regarded as innocent of any crime.

Weissenbruch describes the wholesale murder of a group of Gipsies, of

whom five men were broken on the wheel, nine perished on the gallows, and three men and eight women were decapitated. This took place on the 14th and 15th of November 1726. Acts and edicts were issued in many countries from the end of the 15th century onwards sentencing the ” Egyptians ” to exile under pain of death. Nor was this an empty threat. In Edinburgh four “Faas” were hanged in 1611 “for abyding within the kingdome, they being Egiptienis,” and in 1636 at Haddington the Egyptians were ordered ” the men to be hangied and the weomen to be drowned, and suche of the weomen as hes children to be scourgit throw the burg and burnt in the cheeks.” The burning on the cheek or on the back was a common penalty.

GIPSIES

In 1692 four Estremadura Gipsies caught by the Inquisition were charged with cannibalism and made to own that they had eaten a friar, a pilgrim and even a woman of their own tribe, for which they suffered the penalty of death. And as late as 1782, 45 Hungarian Gipsies were charged with a similar monstrous crime, and when the supposed victims of a supposed murder could not be found on the spot indicated by the Gipsies, they owned under torture and said on the rack, ” We ate them.” Of course they were forthwith beheaded or hanged. The emperor Joseph II., who was also the author of one of the first edicts in favour of the Gipsies, and who abolished serfdom throughout the Empire, ordered an inquiry into the incident; it was then discovered that no murder had been committed, except that of the victims of this monstrous accusation.

The history of the legal status of the Gipsies, of their treatment in various countries and of the penalties and inflictions to which they have been subjected, would form a remarkable chapter in the history of modern civilization. The materials are slowly accumulating, and it is interesting to note as one of the latest instances, that not further back than the year 1907 a ” drive ” was undertaken in Germany against the Gipsies, which fact may account for the appearance of some German Gipsies in England in that year, and that in 1904 the Prussian Landtag adopted unanimously a proposition to examine anew the question of granting peddling licences to German Gipsies; that on the 17th of February 1906 the Prussian minister issued special instructions to combat the Gipsy nuisance; and that in various parts of Germany and Austria a special register is kept for the tracing of the genealogy of vagrant and sedentary Gipsy families.

Different has been the history of the Gipsies in what originally formed the Turkish empire of Europe, notably in Rumania, i.e. Walachia and Moldavia, and a careful search in the archives of Rumania would offer rich materials for the history of the Gipsies in a country where they enjoyed exceptional treatment almost from the beginning of their settlement. They were divided mainly into two classes, (1) Robi or Serfs, who were settled on the land and deprived of all individual liberty, being the property of the nobles and of churches or monastic establish- ments, and (2) the Nomadic vagrants. They were subdivided into four classes according to their occupation, such as the Linguraii (woodcarvers; lit. “spoonmakers”), Caldarari (tinkers, coppersmiths and ironworkers), Ursari (lit. ” bear drivers “) and Rudari (miners), also called Aurari (gold- washers), who used formerly to wash the gold out of the auriferous river-sands of Walachia. A separate and smaller class consisted of the Gipsy L&eshi or V&trashi (settled on a homestead or ” having a fireplace ” of their own). Each shatra or Gipsy community was placed under the authority of a judge or leader, known in Rumania as jude, in Hungary as aga; these officials were subordinate to the bulubasha or voivod, who was himself under the direct control of the yuzbasha (or governor appointed by the prince from among his nobles). The yuzbasha was responsible for the regular income to be derived from the vagrant Gipsies, who were considered and treated as the prince’s property. These voivodi or yuzbashi who were not Gipsies by origin often treated the Gipsies with great tyranny. In Hungary down to 1648 they belonged to the aristocracy. The last Polish Krolestvo cyganskie or Gipsy king died in 1790. The Robi could be bought and sold, freely exchanged and inherited, and were treated as the negroes in America down to 1856, when their final freedom in Moldavia was proclaimed. In Hungary and in Transylvania the abolition of servitude in 1 781-1782 carried with it the freedom of the Gipsies. In the 18th and 19th centuries many attempts were made to settle and to educate the roaming Gipsies; in Austria this was undertaken by the empress Maria Theresa , and the emperor Francis II. (1761-1783), in Spain by Charles III. (1788). In Poland (1791) the attempt succeeded. In England (1827) and in Germany (1830) societies were formed for the reclamation of the Gipsies, but nothing was accomplished in either case. In other countries, however, definite progress was made. Since 1866 the Gipsies have become Rumanian citizens, and the latest official statistics no longer distinguish between

the Rumanians and the Gipsies, who are becoming thoroughly assimilated, forgetting their language, and being slowly absorbed by the native population. In Bulgaria the Gipsies were declared citizens, enjoying equal political rights in accordance with the treaty of Berlin

in 1878, but through an arbitrary interpretation they were deprived of that right, and on the 6th of January 1906 the first Gipsy Congress was held in Sofia, for the purpose of claiming political rights for the Turkish Gipsies or Gopti as they call themselves. Ramadan Alief, the tzari-bashi (i.e. the head of the Gipsies in Sofia), addressed the Gipsies assembled; they decided to protest and subsequently sent a petition to the Sobranye, demanding the recognition of their political rights. A curious reawakening, and an interesting chapter in the history of this peculiar race.

Origin and Language of the Gipsies. — The real key to their origin is, however, the Gipsy language. The scientific study of that language began in the middle of the 19th century with the work of Pott, and was brought to a high state of perfection by Miklosich. From that time on monographs have multiplied and minute researches have been carried on in many parts of the world, all tending to elucidate the true origin of the Gipsy language. It must remain for the time being an open question whether the Gipsies were originally a pure race. Many a strange element has contributed to swell their ranks and to introduce discordant elements into their vocabulary. Ruediger (1782), Grellmann (1783) and Marsden (1783) almost simultaneously and independently of one another came to the same conclusion, that the language of the Gipsies, until then considered a thieves' jargon, was in reality a language closely allied with some Indian speech. Since then the two principal problems to be solved have been, firstly, to which of the languages of India the original Gipsy speech was most closely allied, and secondly, by which route the people speaking that language had reached Europe and then spread westwards. Despite the rapid increase in our knowledge of Indian languages, no solution has yet been found to the first problem, nor is it likely to be found. For the language of the Gipsies, as shown now by recent studies of the Armenian Gipsies, has undergone such a profound change and involves so many difficulties, that it is impossible to compare the modern Gipsy with any modern Indian dialect owing to the inner developments which the Gipsy language has undergone in the course of centuries. All that is known, moreover, of the Gipsy language, and all that rests on reliable texts, is quite modern, scarcely earlier than the middle of the 19th century. Followed up in the various dialects into which that language has split, it shows such a thorough change from dialect to dialect, that except as regards general outlines and principles of inflexion, nothing would be more misleading than to draw conclusions from apparent similarities between Gipsy, or any Gipsy dialect, and any Indian language; especially as the Gipsies must have been separated from the Indian races for a much longer period

than has elapsed since their arrival in Europe and since the formation of their European dialects. It must also be borne in mind that the Indian languages have also undergone profound changes of their own, under influences totally different from those to which the Gipsy language has been subjected. The problem would stand differently if by any chance an ancient vocabulary were discovered representing the oldest form of the common stock from which the European dialects have sprung; for there can be no doubt of the unity of the language of the European Gipsies. The question whether Gipsy stands close to Sanskrit or Prakrit, or shows forms more akin to Hindi dialects, specially those of the North- West frontier, or Dardestan and Kafiristan, to which may be added now the dialects of the Pisaca language (Grierson, 1906), is affected by the fact established by Fink that the dialect cf the Armenian Gipsies shows much closer resemblance to Prakrit than the language of the European Gipsies, and that the dialects of Gipsy spoken throughout Syria and Asia Minor differ profoundly in every respect from the European Gipsy, taken as a whole spoken. The only explanation possible is that the European Gipsy represents the first wave of the Westward movement of an Indian tribe or caste which, dislocated

at a certain period by political disturbances, had travelled through Persia, making a very short stay there, thence to Armenia staying there a little longer, and then possibly to the Byzantine Empire at an indefinite period between 1100 and 1200; and that another clan had followed in their wake, passing through Persia, settling in Armenia and then going farther down to Syria, Egypt and North Africa. These two tribes though of a common remote Indian origin must, however, be kept strictly apart from one another in our investigation, for they stand to each other in the same relation as they stand to the various dialects in India. The linguistic proof of origin can therefore now not go further than to establish the fact that the Gipsy language is in its very essence an originally Indian dialect, enriched in its vocabulary from the languages of the peoples among whom the Gipsies had sojourned, whilst in its grammatical inflection it has slowly been modified, to such an extent that in some cases, like the English or the Servian, barely a skeleton has remained.

Notwithstanding the statements to the contrary, a Gipsy from Greece or Rumania could no longer understand a Gipsy of England or Germany, so profound is the difference. But the words which have

entered into the Gipsy language, borrowed as they were from the Greeks, Hungarians, Rumanians, &c, are not only an indication of the route taken — and this is the only use that has hitherto been made of the vocabulary — but they are of the highest importance for fixing the time when the Gipsies had come in contact with these languages. The absence of Arabic is a positive proof that not only did the Gipsies not come via Arabia (as maintained by De Goeje) before they reached Europe, but that they could not even have been living for any length of time in Persia after the Mahommedan conquest, or at any rate that they could not have come in contact with such elements of the population as had already adopted Arabic in addition to Persian. But the form of the Persian words found among European Gipsies, and similarly the form of the Armenian words found in that language, are a clear indication that the Gipsies could not have come in contact with these languages before Persian had assumed its modern form and before Armenian had been changed from the old to the modern form of language. Still more strong and clear is the evidence in the case of the Greek and Rumanian words. If the Gipsies had livedin Greece, assome contend, from very ancient times, some at least of the old Greek words would be found in their language, and similarly the Slavonic words would be of an archaic character, whilst on the contrary we find medieval Byzantine forms, nay, modern Greek forms, among the Gipsy vocabulary collected from Gipsies in Germany or Italy, England or France; a proof positive that they could not have been in Europe much earlier than the approximate date given above of the nth or 12th century. We then find from a grammatical point of view the same deterioration, say among the English or Spanish Gipsies, as has been noticed in the Gipsy dialect of Armenia. It is no longer Gipsy, but a corrupt English or Spanish adapted to some remnants of Gipsy inflections. The purest form has been preserved among the Greek Gipsies and to a certain extent among the Rumanian. Notably through Miklosich's researches and comparative studies, it is possible to follow the slow change step by step and to prove, at any rate, that, as far as Europe is concerned, the language of these Gipsies was one and the same, and that it was slowly split up into a number of dialects (13 Miklosich, 14 Colocci) which shade off into one another, and which by their transitional forms mark the way in which the Gipsies have travelled, as also proved by historical evidence. The Welsh dialect, known by few, has retained, through its isolation, some of the ancient forms.

Religion, Habits and Customs. — Those who have lived among the Gipsies will readily testify that their religious views are a strange medley of the local faith, which they every where embrace, and some

old-world superstitions which they have in common with many nations. Among the Greeks they belong to the Greek Church, among the Mahommedans they are Mahommedans, in Rumania they belong to the National Church. In Hungary they are mostly Cathplics, according to the faith of the inhabitants of

that country. They have no ethical principles and they do not recognize the obligations of the Ten Commandments. There is extreme moral laxity in the relation of the two sexes, and on the whole they take life easily, and are complete fatalists. At the same time they are great cowards, and they play the role of the fool or the jester in the popular anecdotes of eastern Europe. There the poltroon is always a Gipsy, but he is good-humoured and not so malicious as those Gipsies who had endured the hardships of outlawry in the west of Europe.

There is nothing specifically of an Oriental origin in their religious vocabulary, and the words Devla (God), Bang (devil) or Trushul (Cross), in spite of some remote similarity, must be taken as later adaptations, and not as remnants of an old Sky- worship or Serpent-worship. In general their beliefs, customs, tales, &c. belong to the common stock of general folklore, and many of their symbolical expressions find their exact counterpart in Rumanian and modern Greek, and often read as if they were direct translations from these languages. Although they love their children, it sometimes happens that a Gipsy mother will hold her child by the legs and beat the father with it. In Rumania and Turkey among the settled Gipsies a good number are carriers and bricklayers; and the women take their full share in every kind of work, no matter how hard it may be. The nomadic Gipsies carry on the ancient craft of coppersmiths, or workers in metal; they also make sieves and traps, but in the East they are seldom farriers or horse-dealers. They are far-famed for their music, in which art they are unsurpassed. The Gipsy musicians belong mostly to the class who originally were serfs. They were retained at the courts of the boyars for their special talent in reciting old ballads and love songs and their deftness in playing, notably the guitar and the fiddle. The former was used as an accompaniment to the singing of either love ditties and popular songs or more especially in recital or heroic ballads and epic songs; the latter for dances and other amusements. They were the troubadours and minstrels of eastern Europe; the largest collection of Rumanian popular ballads and songs was gathered by G. Dem. Teodorescu from a Gipsy minstrel, Petre Sholkan; and not a few of the songs of the guslars among the Servians and other Slavonic nations in the Balkans come also from the Gipsies. They have also retained the ancient tunes and airs, from the dreamy ” doina ” of the Rumanian to the fiery ” czardas ” of the Hungarian or the stately ”

hora ” of the Bulgarian. Liszt went so far as to ascribe to the Gipsies the origin of the Hungarian national music. This is an exaggeration, as seen by the comparison of the Gipsy music in other parts of south-east Europe; but they undoubtedly have given the most faithful expression to the national temperament. Equally famous is the Gipsy woman for her knowledge of occult practices. She is the real witch; she knows charms to injure the enemy or to help a friend. She can break the charm if made by others. But neither in the one case nor in the other, and in fact as little as in their songs, do they use the Gipsy language. It is either the local language of the natives as in the case of charms, or a slightly Romanized form of Greek, Rumanian or Slavonic. The old Gipsy woman is also known for her skill in palmistry and fortune-telling by means of a special set of cards, the well-known Tarokof the Gipsies. They have also a large stock of fairy tales resembling in each country the local fairy tales, in Greece agreeing with the Greek, and in Rumania with the Rumanian fairy tales. It is doubtful, however, whether they have contributed to the dissemination of these tales throughout Europe, for a large number of Gipsy tales can be shown to have been known in Europe long before the appearance of the Gipsies, and others are so much like those of other nations that the borrowing may be by the Gipsy from the Greek, Slav or Rumanian. It is, however, possible that playing-cards might have been introduced to Europe through the Gipsies. The oldest reference to cards is found in the Chronicle of Nicolaus of Cavellazzo, who says that the cards were first brought into Viterbo in 1379 from the land of the Saracens, probably from Asia Minor or the Balkans. They spread very quickly, but no one has been able as yet to trace definitely the source whence they were first brought. Without

entering here into the history of the playing-cards and of the different forms of the faces and of the symbolical meaning of the different designs, one may assume safely that the cards, before they were used for mere pastime or for gambling, may originally have had a mystical meaning and been used as sortes in various combinations. To this very day the oldest form is known by the hitherto unexplained name of Tarock, played in Bologna at the beginning of the 15th century and retained by the French under the form Tarot, connected direct with the Gipsies, ” Le Tarot des Bohemiens.” It was noted above that the oldest chronicler (Presbyter) who describes the appearance of the Gipsies in 14 16 in Germany knows them by their Italian name ” Cianos,” so evidently he must have known of their existence in Italy

previous to any date recorded hitherto anywhere, and it is there- fore not impossible that coming from Italy they brought with them also their book of divination.

Physical Characteristics. — As a race they are of small stature, varying in colour from the dark tan of the Arab to the whitish hue of the Servian and the Pole. In fact there are some white- coloured Gipsies, especially in Servia and Oalmatia, and these are o f ten not easily distinguishable from the native peoples, except that they are more lithe and sinewy, better proportioned and more agile in their movements than the thick-set Slavs and the mixed race of the Rumanians. By one feature, however, they are easily distinguishable and recognize one another, viz. by the lustre of their eyes and the whiteness of their teeth. Some are well built; others have the features of a mongrel race, due no doubt, to intermarriage with outcasts of other races. The women age very quickly and the mortality among the Gipsies is great, especially among children; among adults it is chiefly due to pulmonary diseases. They love display and Oriental showiness, bright-coloured dresses, ornaments, bangles, &c; red and green are the colours mostly favoured by the Gipsies in the East. Along with a showy handkerchief or some shining gold coins round their necks, they will wear torn petticoats and no covering on their feet. And even after they have been assimilated and have forgotten their own language they still retain some of the prominent features of their character, such as the love of inordinate display and gorgeous dress; and their moral defects not only remain for a long time as glaring as among those who live the life of vagrants, but even become more pro- nounced. The Gipsy of to-day is no longer what his fore- fathers have been. The assimilation with the nations in the near East and the steps taken for the suppression of vagrancy in the West, combine to denationalize the Gipsy and to make ” Romani Chib ” a thing of the past.

Bibliography. — The scientific study of the Gipsy language and its origin, as well as the critical history of the Gipsy race, dates (with the notable exception of Grellmann) almost entirely from Pott’s researches in 1844.

I. Collections of Documents, &c— Lists of older publications appeared in the books of Pott, Miklosich and the archduke Joseph; Pott adds a critical appreciation of the scientific value of the books enumerated. See also Verzeichnis von Werken und Aufsatgen . . . iiber die Geschichteund Sprache der Zigeuner, &c, 248 entries ‘(Leipzig, 1886) ; J. Tipray, ” Adalˆkok a cziganyokrol szolo irodalpmhoz,” in Magyar Konyvszemle (Budapest, 1877) ; Ch. G. Leland, A Collection of

Cuttings … relating to Gypsies (1874-1891), bequeathed by him to the British Museum. See also the Orientalischer Jahresberichl, ed. Miiller (Berlin, 1887 ff.).

II. History. — (a) The first appearance of the Gipsies in Europe. Sources: A. F. Oefelius, Rerum Boicarum scriptores, &c. (Augsburg, 1763); M. Freher, Andreae Presbyteri . . . chronicon de ducibus Bavariae . . . (1602); S. Munster, Cosmographia . . . &fc. (Basel, T 545); J- Thurmaier, Annalium Boiorum libri septem, ed. T. Zie- glerus (Ingolstad, 1554); M. Crusius, Annates Suevici, &c. (Frank- furt, 1595-1596), Schwabische Chronik . . .' (Frankfurt, 1733); A. Krantz, Saxonia (Cologne, 1520); Simon Simeon, Itinera,ria, &c., ed. J. Nasmith (Cambridge, 1778). (b) Origin and spread of the Gipsies: H. M. G. Grellmann, Die Zigeuner, &c (1st ed., Dessau and

■ Leipzig, 1783; 2nd ed., Gottingen,. 1787); English by M. Roper (London, 1787; 2nd ed., London, 1807), entitled Dissertation on the Gipsies, &c; Carl von Heister, Ethnographische . . . Notizen iiber die Zigeuner (Konigsberg, 1842), a third and greatly improved edition of Grellmann and the best book of its kind up to that date; A. F. Pott, Die Zigeuner in Europa und Asien (2 vols., Halle, 1844- 1845), the first scholarly work with complete and critical biblio- graphy, detailed grammar, etymological dictionary and important

texts; C. Hopf, Die Einwanderung der Zigeuner in Europa (Gotha, 1870); F. von Miklosich, " Beitrage zur Kenntnis der Zigeuner-Mundarten," i.-iv., in Sitzungsber. d. Wiener Akad. d. Wissenschaften (Vienna, 1874-1878), " Ober die Mundarten und die Wanderungen der Zigeuner Europas," i.-xii., in Denkschriften d. Wiener Akad. d. Wissenschaften (1872-1880); M.' J. de Goeje, Bijdrage tot de ge- schiedenis der Zigeuner s (Amsterdam, 1875), English translation by MacRitchie, Account of the Gipsies of India (London, 1886) ; Zedler, Universal-Lexicon, vol. lxii., s.v. " Zigeuner," pp. 520-544 con- taining a rich bibliography; many publications of P. Bataillard from 1844 to 1885; A. Colocci, Storia d' un popolo errante, with illustrations, map and Gipsy-Ital. and Ital.Gipsy glossaries (Turin, 1889); F. H. Groome, "The Gypsies," in E. Magnusson, National Life and Thought (1891), and art. " Gipsies " in Encyclopaedia Britannica (9th ed., 1879); C. Amero, BoMmiens, Tsiganes et Gypsies (Paris, 1895); M. Kogalnitschan, Esquisse sur Vhistoire, les mceurs el la langue des Cigains (Berlin, 1837; German trans., Stutt gart, 1840) — valuable more for the historical part than for the linguistic; J. Czacki, Dziela, vol. iii. (1844-1845) — for historic data about Gipsies in Poland; I. Kopernicki and J. Moyer, Charaktery- styka fizyczna ludrosci galicyjskiej (1876) — for the history and customs of Galician gipsies;

Ungarische statistische Mitteilungen, vol. ix. (Budapest, 1895), containing the best statistical information on the Gipsies; V. Dittrich, A nagy-idai czigdnyok (Budapest, 1898); T. H. Schwicker, ” Die Zigeuner in Ungarn u. Sieben- btirgen,” in vol. xii. of Die V biker Osterreich-Ungarns (Vienna, 1883), and in Mitteilungen d. K. K. geographischen Gesellschaft (Vienna, 1896) ; Dr J. Polek, Die Zigeuner in der Bukowina (Czerno- witz, 1908); Ficker, “Die Zigeuner der Bukowina,” in Statist. Monatschrift, v. 6, Hundert Jahre 1775-1875: Zigeuner in d. Buko- wina (Vienna, 1875), Die Volkerstdmme der Osterr.-ungar. Monarchic, &c. (Vienna, 1869); V. S. Morwood, Our Gipsies (London, 1885); D. MacRitchie, Scottish Gypsies under the Stewarts (Edinburgh, 1894) ; F. A. Coelho, ” Os Ciganos de Portugal,” in Bol. Soc. Geog. (Lisbon, 1892); A. Dumbarton, Gypsy Life in the Mysore Jungle (London,

1902).

III. Linguistic. — [Armenia], F. N. Finck, ” Die Sprache der armenischen Zigeuner,” in Memoires de I’Acad. Imp. des Sciences, viii. (St Petersburg, 1907). [Austria-Hungary], R. von Sowa, Die Mundart der slovakischen Zigeuner (Gottingen, 1887), and Die mahrische Mundart der Romsprache (Vienna, 1893) ; A. J . Puchmayer, Romani Cib (Prague, 1821); P. Josef Jesina, Romani Cib (in Czech, 1880; in German, 1886); G. Ihnatko, Czigdny nyelvtan (Losoncon, 1877); A. Kalina, La Langue des Tsiganes slovaques (Posen, 1882); the archduke Joseph, Czigdny nyelvtan (Budapest, 1888) ; H. von Wlislocki, Die Sprache der transsilvanischen Zigeuner (Leipzig, 1884). [Brazil], A. T. de Mello Moraes, Os ciganos no Brazil (Rio de Janeiro, 1886). [France, the Basques], A. Baudrimont, Vocabulaire de la langue des Bohemiens habitant les pays basques-frangais (Bordeaux, 1862). [Germany], R. Pischel, Beitrage zur Kenntnis der deutschen Zigeuner (Halle, 1894) ; R. von Sowa, ” Worterbuch des Dialekts der deutschen Zigeuner,” in Abhandlungen f. d. Kunde d. Morgenlandes, xi. I, very valuable (Leipzig, 1898); F- N. Finck, Lehrbuch des Dialekts der deutschen Zigeuner — very valuable (Marburg, 1903). [Great Britain, &c], Ch. G. Leland, The English Gipsies and their Language (London and New York, 1873; 2nd ed., 1874), The Gipsies of Russia, Austria, England, America, &c. (London, 1882) — the validity of Leland’s conclusions is often doubtful; B. C. Smart and H. J. Croftdn, The Dialect of the English Gypsies (2nd ed., London, 1875); G. Borrow, Romano lavo-lil (London, 1874, 1905), Lavengro, ed. F. H. Groome (London, 1899). [Rumania], B. Constantinescu, Probe de Limba.si liter atura tiganilor din Romdnia (Bucharest, 1878). [Russia, Bessarabia], O. Boethlingk, Uber die Sprache der Zigeuner in Russland (St Petersburg, 1852; supplement, 1854)/ [Russia, Caucasus], K.

Badganian, Cygany. Mskoliko slovw. narilî jahU zakavkazskihu cyganii (St Petersburg, 1887); Istomin, Ciganskij Jazyku (1900). [Spain], G. H. Borrow, The Zincali, or an Account of the Gipsies of Spain (London, 1 841, and numerous later editions) ; R. Campuzano, Origen . . . de los Gitanos, y diccionario de su dialecto (2nd ed., Madrid, 1857); A. de C, Diccionario del dialecto gitano, &c. (Barcelona, 1851); M. de Sales y Guindale, Historia, costumbres y dialecto de los Gitanos (Madrid, 1870); M. de Sales, El Gitanismo (Madrid, 1870); J. Tineo Rebolledo, ” A Chipicalh” la lengua gitana: ‘diccionario gitano-espanol (Granada, 1900). [Turkey], A. G. Paspati, Etudes sur les Tchinghianes, ou BoMmiens de I’empire ottoman (Constantinople, 1870), with grammar, vocabu- lary, tales and French glossary; very important. [General], John Sampson, ” Gypsy Language and Origin,” in Journ. Gypsy Lore Soc. vol. 1. (2nd ser., Liverpool, 1907) ; J. A. Decourdemanche, Gram- maire du Tchingane, &c. (Paris, 1908) — fantastic in some of its philology; F. Kluge, Rotwelsche Quellen (Strassburg, 1901); L. Gunther, Das Rotwelsch des deutschen Gauners (Leipzig, 1905), for the influence of Gipsy on argot; L. Besses, Diccionario de argot espanol (Barcelona); G. A. Grierson, The Pi’saca Languages of North-Western India (London, 1906), for parallels in Indian dialects; G. Borrow, Criscote e majaro Lucas . . . El evangeho segun S. Lucas . . . (London, 1837; 2nd ed., 1872)— this is the only complete translation of any one of the gospels into Gipsy. For older fragments I of such translations, see Pott ii. 464-521. 1 IV. Folklore, Tales, Songs, &c,— Many songs and tales are found

in the books enumerated above, where they are mostly accompanied by literal translations. See also Ch. G. Leland, E. H. Palmer and T. Tuckey, English Gipsy Songs in Romany, with Metrical English Translation (London, 1875) ; G. Smith, Gipsy Life, &c. (London, 1880); M. Rosenfeld, Lieder der Zigeuner (1882); Ch. G. Leland, The Gypsies (Boston, Mass., 1882), Gypsy Sorcery and Fortune- Telling (London, 1891) ; H. von Wlislocki, Marchen und Sagen der transsilvanischen Zigeuner (Berlin, 1886) — containing 63 tales, very freely translated; Volksdichtungen der siebenbiirgischen und sudungarischen Zigeuner (Vienna, 1890) — songs, ballads, charms, proverbs and 100 tales; Vom wandernden Zigeunervolke (Hamburg, 1890); Wesen und Wirkungskreis der Zauberfrauen bei den sieben- burgischen Zigeuner (1891) ; ” Aus dem inneren Leben der Zigeuner,” in Ethnologische Mitteilungen (Berlin, 1892); R. Pischel, Berichl iiber Wlislocki vom wandernden Zigeunervolke (Gottingen, 1890) — a strong criticism of Wlislocki’s method, &c. ; F. H. Groome, Gypsy Folk- Tales (London, 1 899) , with historical introduction and a complete and trustworthy

collection of 76 gipsy tales from many countries ; Katada, Contes gitanos (Logrono, 1907) ; M. Gaster, Zigeuner- marchen aus Rumdnien (1881); ” Tiganii, &c,” in Revista pentru Istorie, &c, i. p. 469 ff. (Bucharest, 1883); ” Gypsy Fairy-Tales ” in Folklore. The Journal of the Gipsy-Lore Society (Edinburgh, 1888- 1892) was revived in Liverpool in 1907.

V. Legal Status. — A few of the books in which the legal status of the Gipsies (either alone or in conjunction with ” vagrants “) is treated from a juridical point of view are here mentioned, also the history of the trial in 1726. J. B. Weissenbruch, Ausfuhrliche Relation von der famosen Zigeuner-Diebes-Mord und Rauber (Frank- furt and Leipzig, 1727); A. Ch. Thomasius, Tractatio juridica de vagabundo, &c. (Leipzig, 1731); F. Ch. B. Ave-Lallemant, Das deutsche Gaunertum, &c. (Leipzig, 1858-1862); V. de Rochas, Les Farias de France et d’Espagne (Paris, 1876); P. Chuchul, Zum Kampfe gegen Landstreicher und Bettler (Kassel, 1881) ; R. Breithaupt, Die Zigeuner und der deutsche Staat (Wiirzburg, 1907) ; G. Stein- hausen, Geschichte der deutschen Kultur (Leipzig and Vienna, 1904).

(M. G.)

GIRAFFE, a corruption of Zardfah, the Arabic name for the tallest of all mammals, and the typical representative of the family Giraffidae, the distinctive characters of which are given in the article Pecora, where the systematic position of the group is indicated. The classic term ” camelopard,” probably introduced when these animals were brought from North Africa to the Roman amphitheatre, has fallen into complete disuse.

In common with the okapi, giraffes have skin-covered horns on the head, but in these animals, which form the genus Girajfa, these appendages are present in both sexes; and there is often an unpaired one in advance of the pair on the forehead. Among other characteristics of these animals may be noticed the great length of the neck and limbs, the complete absence of lateral toes and the long and tufted tail. The tongue is remarkable for its great length, measuring about 17 in. in the dead animal, and for its great elasticity and power of muscular contraction while living. It is covered with numerous large papillae, and forms, like the trunk of the elephant, an admirable organ for the examination and prehension of food. Giraffes are inhabit- ants of open country, and owing to their length of neck and long flexible tongues are enabled to browse on tall trees, mimosas being favourites. To drink or graze they are obliged to straddle the fore-legs apart; but they seldom feed on grass and are capable of going

long without water. When standing among mimosas they so harmonize with their surroundings that they are difficult of detection. Formerly giraffes were found in large herds, but persecution has reduced their number and led to their extermination from many districts. Although in late Tertiary times widely spread over southern Europe and India, giraffes are now confined to Africa south of the Sahara.

Apart from the distinct Somali giraffe (Girajfa reticulata), characterized by its deep liver-red colour marked with a very coarse network of fine white lines, there are numerous local forms of the ordinary giraffe (Girajfa camelopardalis) . The northern races, such as the Nubian G. c. typica and the Kordofan G. c. antiquorum, are characterized by the large frontal horn of the bulls, the white legs, the network type of coloration and the pale tint. The latter feature is specially developed in the Nigerian G. c. peralta, which is likewise of the northern type. The Baringo G. c. rothschildi also has a large frontal horn and white legs, but the spots in the bulls are very dark and those of the females jagged. . In the Kilimanjaro G. c. tippelskirchi the frontal horn

is often developed in the bulls, but the legs are frequently spotted to the fetlocks. Farther south the frontal horn tends to dis- appear more or less completely, as in the Angola G. c. angolensis. the Transvaal G. c. wardi and the Cape G. c. capensis, while the legs are fully spotted and the colour-pattern on the body (especially in the last-named) is more of a blotched type, that

The North African or Nubian Giraffe (Giraffa camelopardalis).

is to say, consists of dark blotches on a fawn ground, instead of a network of light lines on a dark ground.

For details, see a paper on the subspecies of Giraffa camelopardalis, by R. Lydekker in the Proceedings of the Zoological Society of London for 1904. (R. L.*)

GIRALDI, GIGLIO GREGORIO [Lilius Gregorius Gyral- dus] (1479-1552), Italian scholar and poet, was born on the 14th of June 1479, at Ferrara, where he early distinguished himself by his talents and acquirements. On the completion of his literary course he removed to Naples, where he lived on familiar terms with Jovianus Pontanus and Sannazaro; and subsequently to Lombardy, where he

enjoyed the favour of the Mirandola family. At Milan in 1507 he studied Greek under Chalcondylas; and shortly afterwards, at Modena, he became tutor to Ercole (afterwards Cardinal) Rangone. About the year 1 5 14 he removed to Rome, where, under Clement VII., he held the office of apostolic protonotary; but having in the sack of that city (1527), which almost coincided with the death of his patron Cardinal Rangone, lost all his property, he returned in poverty once more to Mirandola, whence again he was driven by the troubles consequent on the assassination of the reigning prince in 1533. The rest of his life was one long struggle with ill-health, poverty and neglect; and he is alluded to with sorrowful regret by Montaigne in one of his Essais (i. 34), as having, like Sebastian Castalio, ended his days in utter destitution. He died at Ferrara in February 1552; and his epitaph makes touching and graceful allusion to the sadness of his end. G \raldi was a man of very

extensive erudition; and numerous testimonies to his profundity and accuracy have been given both by contemporary and by later scholars. His Historia de diis gentium marked a distinctly forward step in the systematic study of classical mythology; and by his treatises De annis et mensibus, and on the Calen- darium Romanum et Graecum, he contributed to bring about the reform of the calendar, which was ultimately effected by Pope Gregory XIII. His Progymnasma adversus literas et literatos deserves mention at least among the curiosities of literature; and among his other works to which reference is still occasionally made are Historiae pcetarum Graecorum ac Latinorum; De poetis suorum temporum; and De sepultura ac vario sepeliendi rilu. Giraldi was also an elegant Latin poet. His Opera omnia were published at Leiden in 1696.

GIRALDI, GIOVANNI BATTISTA (1504-1573), surnamed Cynthius, Cinthio or Cintio, Italian novelist and poet, born at Ferrara in November 1504, was educated at the university of his native town, where in 1525 he became professor of natural philosophy, and, twelve years afterwards, succeeded Celio Calcagnini in the chair of belles-lettres. Between 1542 and 1560 he acted as private secretary, first to Ercole II. and afterwards to Alphonso II. of Este; but having, in connexion with a literary quarrel in which he had got involved, lost the favour of his patron in the latter year, he removed to Mondovi, where he remained as a teacher of literature till 1568. ‘ Subsequently, on the invitation of the senate of Milan, he occupied the chair of

rhetoric at Pavia till 1573, when, in search of health, he returned to his native town, where on the 30th of December he died. Besides an epic entitled Ercole (1557), in twenty-six cantos, Giraldi wrote nine tragedies, the best known of which, Orbecche, was produced in 1541. The sanguinary and disgusting character of the plot of this play, and the general poverty of its style, are, in the opinion of many of its critics, almost fully redeemed by occasional bursts of genuine and impassioned poetry; of one scene in the third act in particular it has even been affirmed that, if it alone were sufficient to decide the question, the Orbecche would be the finest play in the world. Of the prose works of Giraldi the most important is the Hecatom- milhi or Ecatomili, a collection of tales told somewhat after the manner of Boccaccio, but still more closely resembling the novels of Giraldi's contemporary Bandello, only much inferior in work- manship to the productions of either author in vigour, liveliness and local colour. Something, but not much, however, may be said in favour of their professed claim to represent a higher standard of morality. Originally published at Monteregale, Sicily, in 1565, they were frequently reprinted in Italy, while a French translation by Chappuys appeared in 1583 and one in Spanish in 1590. They have a peculiar interest to students of English literature, as having furnished, whether directly or in- directly, the plots of Measure for Measure and Othello. That of the latter, which is to be found in the Hecatommithi (iii. 7), is conjectured to have reached Shakespeare through the French translation; while that of the former (Hecat. viii. 5) is probably to be traced to Whetstone's Promos and Cassandra (1578), an adaptation of Cinthio's story, and to his Heptamerone (1582), which contains a direct English translation. To Giraldi also must be attributed the plot of Beaumont and Fletcher's Custom of the Country.

GIRALDUS CAMBRENSIS (1146 ?-i22o), medieval historian, also called Gerald de Barri, was born in Pembrokeshire. He was the son of William de Barri and Augharat, a daughter of Gerald, the ancestors of the Fitzgeralds and the Welsh princess, Nesta, formerly mistress of King Henry I. Falling under the influence of his uncle, David Fitzgerald, bishop of St David's, he determined to enter the church. He studied at Paris, and his works show that he had applied himself closely to the study cf ■the Latin poets. In n 72 he was appointed to collect tithe in Wales, and showed such vigour that he was made archdeacon. In 1 1 76 an attempt was made to elect him bishop of St David's, but Henry II. was unwilling to see any one with powerful native connexions a bishop in Wales. In 1180, after another visit to Paris, he was appointed commissiary to the bishop of St David's,

who had ceased to reside. But Giraldus threw up his post, indignant at

the indifference of the bishop to the welfare of his see. In n 84 he was made one of the king's chaplains, and was elected to accompany Prince John on his voyage to Ireland. While there he wrote a Topographia Hibernica, which is full of information, and a strongly prejudiced history of the conquest, the Expugnatio Hibernica. In n 86 he read his work with great applause before the masters and scholars of Oxford. In 1188 he was sent into Wales with the primate Baldwin to preach the Third Crusade. Giraldus declares that the mission was highly successful; in any case it gave him the material for his Itinerarium Cambrense, which is, after the Expugnatio, his best known work. He accompanied the archbishop, who intended him to be the historian of the Crusade, to the continent, with the intention of going to the Holy Land. But in 1189 he was sent back to Wales by the king, who knew his influence was great, to keep order among his countrymen. Soon after he was absolved from his crusading vow. According to his own statements, which often tend to exaggeration, he was offered both the sees of Bangor and Llandaff, but refused them. From 1192 to 1198 he lived in retirement at Lincoln and devoted himself to literature. It is probably during this period that he wrote the Gemma ecclesiastica (discussing disputed points of doctrine, ritual, &c.) and the Vita S. Remigii. In 1198 he was elected bishop of St David's. But Hubert Walter, the archbishop of Canterbury, was determined to have in that position no Welshman who would dispute the metropolitan pretensions of the English primates. The king, for political reasons, supported Hubert Walter. For four years Giraldus exerted himself to get his election confirmed, and to vindicate the independence of St David's from Canterbury. He went three times to Rome. He wrote the De jure Meneviensis ecclesiae in support of the claims of his diocese. He made alliances with the princes of North and South Wales. He called a general synod of his diocese. He was accused of stirring up rebellion among the Welsh, and the justiciar proceeded against him. At length in 1202 the pope annulled all previous elections, and ordered a new one. The prior of Llanthony was finally elected. Gerald was immediately reconciled to the king and archbishop; the utmost favour was shown to him; even the expenses of his unsuccessful election were paid. He spent the rest of his life in retirement, though there was some talk of his being made a cardinal. He certainly survived John.

The works of Giraldus are partly polemical and partly historical. His value as a historian is marred by his violent party spirit; some of his historical tracts, such as the Liber de instructione principum and the VJta Galfridi Archiepiscopi Eborecensis, seem to have been designed as political pamphlets. Henry II., Hubert Walter and William

Longchamp, the chancellor of Richard I., are the objects of his worst invectives. His own pretensions to the see of St David are the motive of many of his misrepresentations. But he is one of the most vivid and witty of our medieval historians.

See the Rolls edition of his works, ed. J. S. Brewer, J. F. Dimock and G. F. Warner in 8 vols. (London, 1861-1891), some of which have valuable introductions.

GIRANDOLE (from the Ital. girandola), an ornamental branched candlestick of several lights. It came into use about the second half of the 17th century, and was commonly made and used in pairs. It has always been, comparatively speaking, a luxurious appliance for lighting, and in the great 18th-century period of French house decoration the famous ciseleurs designed some exceedingly beautiful examples. A great variety of metals has been used for the purpose — sometimes, as in the case of the candlestick, girandoles have been made in hard woods. Gilded bronze has been a very frequent medium, but for table purposes silver is still the favourite material.

GIRARD, JEAN BAPTISTE [known as ” Le Pere Girard ” or” Le Pere Gregoire “] (1765-1850), French-Swiss educationalist, was born at Fribourg and educated for the priesthood at Lucerne. He was the fifth child in a family of fourteen, and his gift for teaching was early shown at home in helping his mother with the

younger children; and after passing through his noviciate he spent some time as an instructor in convents, notably at Wiirz- burg (1785-1788). Then for ten years he was busy with religious duty. In 1798, full of Kantian ideas, he published an essay outlining a scheme of national Swiss education; and in 1804 he began his career as a public teacher, first in the elementary school at Fribourg (1805-1823), then (being driven away by Jesuit hostility) in the gymnasium at Lucerne till 1834, when he retired to Fribourg and devoted himself with the production of his books on education, De I’enseignement regulier de la langue matemelle (1834, 9th ed. 1894; Eng. trans, by Lord Ebrington, The Mother Tongue, 1847), and Cours educatif (1844-1 846) . Father Girard’s reputation and influence as an enthusiast in the cause of education became potent not only in Switzerland, where he was hailed as a second Pestalozzi, but in other countries. He had a genius for teaching, his method of stimulating the intelligence of the

children at Fribourg and interesting them actively in learning, and not merely cramming them with rules and facts, being warmly praised by the Swiss educationalist Frangois Naville (1784-1846) in his treatise on public education (1832). His undogmatic method and his Liberal Christianity brought him into conflict with the Jesuits, but his aim was, in all his teaching, to introduce the moral idea into the minds of his pupils by familiarizing them with the right or wrong working of the facts he brought to their attention, and thus to elevate character all through the educational curriculum.

GIRARD, PHILIPPE HENRI DE (1775-1845), French mechanician, was born at Lourmarin, Vaucluse, on the 1st of February 1775. He is chiefly known in connexion with flax- spinning machinery. Napoleon having in 1810 decreed a reward of one million francs to the inventor of the best machine for spinning flax, Girard succeeded in producing what was required. But he never received the promised reward, although in 1853, after his death, a comparatively small pension was voted to his heirs, and having relied on the money to pay the expenses of his invention he got into serious financial difficulties. He was obliged, in 181 5, to abandon the flax mills he had established in France, and at the invitation of the emperor of Austria founded a flax mill and a factory for his machines at Hirtenberg. In 1825, at the invitation of the emperor Alexander I. of Russia, he went to Poland, and erected near Warsaw a flax manufactory, round which grew up a village which received the name of Girardow. In 1818 he built a steamer to run on the Danube. He did not return to Paris till 1844, where he still found some of his old creditors ready to press their claims, and he died in that city on the 26th of August 1845. He was also the author of numerous minor inventions.

GIRARD, STEPHEN (17 50-1 831), American financier and philanthropist, founder of Girard College in Philadelphia, was born in a suburb of Bordeaux, France, on the 20th of May 1750. He lost the sight of his right eye at the age of eight and had little education. His father was a sea captain, and the son cruised to the West Indies and back during 1764-17 73, was licensed captain in 1773, visited New York in 1774, and thence with the assistance of a New York merchant began to trade to and from New Orleans and Port au Prince. In May 1776 he was driven into the port of Philadelphia by a British fleet and settled there as a merchant; in June of the next year he married Mary (Polly) Lum, daughter of a shipbuilder, who, two years later, after Girard's becoming a citizen of Pennsylvania (1778), built for him the " Water Witch," the first of a fleet trading with New Orleans and the West Indies — most of Girard's ships being named after his favourite French authors, such as " Rousseau," " Voltaire," " Helvetius " and "

Montesquieu." His beautiful young wife became insane and spent the years from 1790 to her death in 181 5 in the Pennsylvania Hospital. In 1810 Girard used about a million dollars deposited by him with the Barings of London for the purchase of shares of the much depreciated stock of the Bank of the United States — a purchase of great assistance to the United States government in bolstering European confi- dence in its securities. When the Bank was not rechartered the building and the cashier's house in Philadelphia were purchased

at a third of the original cost by Girard, who in May 1812 established the Bank of Stephen Girard. He subscribed in 1814 for about 95% of the government's war loan of $5,000,000, of which only $20,000 besides bad been taken, and he generously offered at par shares which upon his purchase had gone to a premium. He pursued his business vigorously in person until the 1 2th of February 1830, when he was injured in the street by a truck; he died on the 26th of December 1831. His public spirit had been shown during his life not only financially but personally; in 1703, during the plague of yellow fever in Phil- adelphia, he volunteered to act as manager of the wretched hospital at Bush Hill, and with the assistance of Peter Helm had the hospital cleansed and its work systematized; again during the yellow fever epidemic of 1797-1798 he took the lead in relieving the poor and caring for the sick. Even more was his philanthropy shown in his disposition by will of his estate, which was valued at about $7,500,000, and doubtless the greatest fortune accumulated by any individual in America up to that time. Of his fortune he bequeathed $116,000 to various Philadelphia charities, $500,000 to the same city for the im- provement of the Delaware water front, $300,000 to Pennsyl- vania for internal improvements, and the bulk of his estate to Philadelphia, to be used in founding a school or college, in providing a better police system, and in making municipal improvements and lessening taxation. Most of his bequest to the city was to be used for building and maintaining a school " to provide for such a number of poor male white orphan children … a better education as well as a more comfortable maintenance than they usually receive from the application of the public funds." His will planned most minutely for the erection of this school, giving details as to the windows, doors, walls, &c; and it contained the following phrase: "I enjoin and require that no ecclesiastic, missionary or minister of any sect whatsoever, shall ever hold or exercise any duty whatsoever in the said college; nor shall any such person ever be admitted for any purpose, or as a visitor, within the premises appropriated to the purposes of the said college. ... I desire to keep the tender minds of orphans . . . free from the excitements which clashing doctrines and sectarian controversy

are so apt to produce." Girard's heirs-at-law contested the will in 1836, and they were greatly helped by a public prejudice aroused by the clause cited; in the Supreme Court of the United States in 1844 Daniel Webster, appearing for the heirs, made a famous plea for the Christian religion, but Justice Joseph Story handed down an opinion adverse to the heirs (Vidals v. Girard's Executors). Webster was opposed in this suit by John Sergeant and Horace Binney. Girard specified that those admitted to the college must be 'white male orphans, of legitimate birth and good character, between the ages of six and ten; that no boy was to be permitted to stay after his eighteenth year; and that as regards admissions preference was to be shown, first to orphans born in Philadelphia, second to orphans born in any other part of Pennsylvania, third to orphans born in New York City, and fourth to orphans born in New Orleans. Work upon the build- ings was begun in 1833, and the college was opened on the 1st of January 1848, a technical point of law making instruction conditioned upon the completion of the five buildings, of which the principal one, planned by Thomas Ustick Walter (1804-1887), has been called " the most perfect Greek temple in existence." To a sarcophagus in this main building the remains of Stephen Girard were removed in 185 1. In the 40 acres of the college grounds there were in 1909 18 buildings (valued at $3,350,000), 1513 pupils, and a total "population," including students, teachers and all employes, of 1907. The value of the Girard estate in the year 1907 was $35,000,000, of which $550,000 was devoted to other charities than Girard College. The control of the college was under a board chosen by the city councils until 1869, when by act of the legislature it was transferred to trustees appointed by the Common Pleas judges of the city of Philadelphia. The course of training is partly industrial — for a long time graduates were indentured till they came of age — but it is also preparatory to college entrance.

See H. A. Ingram, The Life and Character of Stephen Girard (Philadelphia, 1884), an d George P. Rupp, ” Stephen Girard — ■ Merchant and Mariner,” in 1848-1898: Semi- Centennial of Girard College (Philadelphia, 1898).

GIRARDIN, DELPHINE DE (1804-1855), French author, was born at Aix-la-Chapelle on the 26th of January 1804. Her mother, the well-known Madame Sophie Gay, brought her up in the midst of a brilliant literary society. She published two volumes of miscellaneous pieces, Essais poeliques (1824) and Nouveaux Essais poetiques (1825). A visit to Italy in 1827, during which she vas enthusiastically welcomed by the literati of Rome and even crowned in the capitol, was productive of various poems, of which the most ambitious was Napoline (1833). Her marriage in 1831 to Emile de Girardin (see below) opened up a new literary career. The contemporary sketches which she contributed from 1836 to 1839 to the feuilleton of La Presse, under the nom de plume of Charles de Launay, were collected under the title of Lettres parisiennes (1843), and obtained a brilliant success. Conies d’une vieille fille a ses nevcux (1832), La Canne de Monsieur de Balzac (1836) and II ne faut pas jouer avec la douleur (1853) are among the best-known of her romances; and her dramatic pieces in prose and verse include L’Ecole des journalistcs (1840), Judith (1843), Cleopdtre (1847), Lady Tartuje (1853), and the one-act comedies, C’esl la faute du mari (1851), La Joiefait peur (1854), Le Chapeau d’un horloger (1854) and U ne Femme qui deleste son mari, which did not appear till after the author’s death. In the literary society of her time Madame Girardin exercised no small personal influence, and among the frequenters of her drawing-room were Theophile Gautier and Balzac, Alfred de Musset and Victor Hugo. She died on the 29th of June 1855. Her collected works were published in six volumes (1860-1861).

See Sainte-Beuve, Causeries du lundi, t. iii. ; G. de Molenes, ” Les Femmes poetes,” in Revue des deux monies (July 1842); Taxile Delord, Les Matinees litteraires (i860); L’Esprit de Madame Girardin, avec une preface par M. Lamartine (1862); G. d’Heilly, Madame de Girardin, sa vie et ses osuvres (1868); Imbert de Saint Amand, Mme de Girardin (1875).

GIRARDIN, EMILE DE (1802-1881), French publicist, was born, not in Switzerland in 1806 of unknown parents, but (as was recognized in 1837) in Paris in 1802, the son of General Alexandre de Girardin and of Madame Dupuy, wife of a Parisian advocate. His first publication was a novel, Emile, dealing with his birth and early life, and appeared under the name of Girardin in 1827. He became inspector of fine arts

under the Martignac ministry just before the revolution of 1830, and was an energetic and passionate journalist. Besides his work on the daily press he issued miscellaneous publications which attained an enormous circulation. His Journal des cdnnais- sances utiles had 1 20,000 subscribers, and the initial edition of his Almanack de France (1834) ran to a million copies. In 1836 he inaugurated cheap journalism in a popular Conservative organ, La Presse, the subscription to which was only forty francs a year. This undertaking involved him in a duel with Armand Carrel, the fatal result of which made him refuse satis- faction to later opponents. In 1839 he was excluded from the Chamber of Deputies, to which he had been four times elected, on the plea of his foreign birth, but was admitted in 1842. He resigned early in February 1847, and on the 24th of February 1848 sent a note to Louis Philippe demanding his resignation and the regency of the duchess of Orleans. In the Legislative Assembly he voted with the Mountain. He pressed eagerly in his paper for the election of Prince Louis Napoleon, of whom he afterwards became one of the most violent opponents. In 1856 he sold La Presse, only to resume it in 1862, but its vogue was over, and Girardin started a new journal, La LiberU, the sale of which was forbidden in the. public streets. He supported Emile Ollivier and the Liberal Empire, but plunged into vehement journalism again to advocate war against Prussia. Of his many subsequent enterprises the most successful was the purchase of Le Petit Journal, which served to advocate the policy of Thiers, though he himself did not contribute. The crisis of the 16th of May 1877, when Jules Simon fell from power, made him

resume his pen to attack MacMahon and the party of reaction in La France and in Le Petit Journal. Emile de Girardin married in 1831 Delphine Gay (see above), and after her death in 1855 Guillemette Jos6phine Brunold, countess von Tieffenbach, widow of Prince Frederick of Nassau. He was divorced from his second wife in 1872.

The long list of his social and political writings includes: De la presse periodique au XIX” siecle (1837); De I’ instruction publique (1838); Ittudes politiques (1838); De la liberie de la presse et du journalisme (1842) ; Le Droit au travail au Luxembourg et a VAssemblee Nationale (2 vols., 1848); Les Cinquante-deux (1849, &c), a series of articles on current parliamentary questions; La Politique uni- verselle, decrets de I’avenir (Brussels, 1852); Le Condamne du 6 mars (1867), an account of his own differences with the government in 1867 when he was fined 5000 fr. for an article in La Liberie; Le Dossier de la guerre (1877), a collection of official documents; Ques- tions de mon temps, 1836 a 1856, articles extracted from the daily and weekly press (12 vols., 1858).

GIRARDON, FRANCOIS (1628-17 15), French sculptor, was born at Troyes on the 17th of March 1628. As a boy he had for master a joiner and wood-carver of his native town, named Baudesson, under whom he is said to have worked at the chateau of Liebault, where he attracted the notice of Chancellor Seguier. By the chancellor's influence Girardon was first removed to Paris and placed in the studio of Francois Anguier, and afterwards sent to Rome. In 1652 he was back in France, and seems at once to have addressed himself with something like ignoble subserviency to the task of conciliating the court painter Charles Le Brun. Girardon is reported to have declared himself incap- able of composing a group, whether with truth or from motives of policy it is impossible to say. This much is certain, that a very large proportion of his work was carried out from designs by Le Brun, and shows the merits and defects of Le Brun's manner— a great command of ceremonial pomp in presenting his subject, coupled with a large treatment of forms which if it were more expressive might be imposing. The court which Girardon paid to the " premier peintre du roi " was rewarded. An immense quantity of work at Versailles was entrusted to him, and in recognition of the successful execution of four figures for the Bains d'Apollon, Le Brun induced the king to present his protege personally with a purse of 300 louis, as a distinguishing mark of royal favour. In 1650 Girardon was made member of the Academy, in 1659 professor, in 1674 " adjoint au recteur," and finally in 1695 chancellor. Five years before (1690), on the death of Le Brun, he had also been appointed " inspecteur general des ouvrages de sculpture " — a place of power and profit. In 1699 he completed the bronze equestrian statue of Louis XIV., erected by the town of Paris on the Place Louis le Grand. This statue was melted down during the Revolution, and is known to us only by a small bronze model (Louvre) finished by Girardon himself. His Tomb of Richelieu (church of the Sorbonne) was saved from destruction by Alexandre Lenoir, who received a bayonet thrust in protecting the head of the cardinal from mutilation. It is a capital example of Girardon's work, and the theatrical pomp of its style is typical of the funeral sculpture of the reigns of Louis XIV. and Louis XV.; but amongst other important specimens yet remaining may also be cited the Tomb of Louvois (St Eustache), that of Bignon, the king's librarian, executed in 1656 (St Nicolas du Chardonneret) , and decorative sculptures in the Galerie d'Apollon and Chambre du roi in the Louvre. Mention should not be omitted of the group, signed and dated 1699, " The Rape of Proserpine " at Versailles, which also contains the " Bull of Apollo." Although chiefly occupied at Paris Girardon never forgot his native Troyes, the museum of which town contains some of his best works, including the marble busts of Louis XIV. and Maria Theresa. In the

h6tel de ville is still shown a medallion of Louis XIV., and in the church of St Remy a bronze crucifix of some importance — both works by his hand. He died in Paris in 1 7 1 5.

See Corrard de Breban, Notice sur la vie et les osuvres de Girardon

(1850).

GIRART DE ROUSSILLON, an epic figure of the Carolingian j cycle of romance. In the genealogy of romance he is a son of I Doon de Mayence, and he appears in different and irreconcilable

circumstances in many of the chansons de geste. The legend of Girart de Roussillon is contained in a Vita Girardi de Roussillon (ed. P. Meyer, in Romania, 1878), dating from the beginning of the 1 2th century and written probably by a monk of the abbey of Pothieres or of Vezelai, both of which were founded in 860 by Girart; in Girart de Roussillon, a chanson de geste written early in the 12th century in a dialect midway between French and Provencal, and apparently based on an earlier Burgundian poem; in a 14th century romance in alexandrines (ed. T. J. A. P. Mignard, Paris and Dijon, 1878); and in a prose romance by Jehan Wauquelin in 1447 (ed. L. de Montille, Paris, 1880). The historical Girard, son of Leuthard and Grimildis, was a Burgundian chief who was count of Paris in 837, and embraced the cause of Lothair against Charles the Bald. He fought at Fontenay in 841, and doubtless followed Lothair to Aix. In 855 he became governor of Provence for Lothair's son Charles, king of Provence (d. 863). His wife Bertha defended Vienne unsuccessfully against Charles the Bald in 870, and Girard, who had perhaps aspired to be the titular ruler of the northern part of Provence, which he had continued to administer under Lothair II. until that prince's death in 869, retired with his wife to Avignon, where he died probably in 877, certainly before 879. The tradition of his piety, of the heroism of his wife Bertha, and of his wars with Charles passed into romance; but the historical facts are so distorted that in Girart de Roussillon the trouvlre makes him the opponent of Charles Martel, to whom he stands in the relation of brother-in-law. He is nowhere described in authentic historic sources as of Roussillon. The title is derived from his castle built on Mount Lassois, near Chatillon-sur-Seine. Southern traditions concerning Count Girart, in which he is made the son of Garin de Monglane, are embodied in Girart de Viane (13th century)

by Bertrand de Bar-sur-1'Aube, and in the Aspramonte of Andrea da Barberino, based on the French chanson of Aspremonl , where he figures as Girart de Frete or de Fratte. 1 Girart de Viane is the recital of a siege of Vienne by Charlemagne, and in Aspramonte Girart de Fratte leads an army of infidels against Charlemagne. Girart de Roussillon was long held to be of Provencal origin, and to be a proof of the existence of an independent Provencal epic, but its Burgundian origin may be taken as proved.

See F. Michel, Gerard de Rossillon . . . publie en frangais et en Provencal d'apres les MSS. de Paris et de Londres (Paris, 1856); P. Meyer, Girart de Roussillon (1884), a translation in modern French with a comprehensive introduction. For Girart de Viane (ed. P. Tarb6, Reims, 1850) see L. Gautier, Epopees francaises, vol. iv. ; F. A. WulfT, Notice sur les sagas de Magus et de Geirard (Lund, 1874).

GIRAUD, GIOVANNI, Count (1776-1834), Italian dramatist, of French origin, was born at Rome, and showed a precocious passion for the theatre. His first play, L'Onesta non si vince, was successfully produced in 1798. He took part in politics as an active supporter of Pius VI., but was mainly occupied with the production of his plays, and in 1809 became director-general of the Italian theatres. He died at Naples in 1834. Count Giraud's comedies, the best of which are Gelosie per equhoco (1807) a.ndL'AjoneW imbarazzo (1824), were bright and amusing on the stage, but of no particular literary quality.

His collected comedies were published in 1823 and his Teatro domestico in 1825.

GIRDLE (O. Eng. gyrdel, from gyrdan, to gird; cf. Ger. Gilrtel, Dutch gordel, from giirlen and gorden ; " gird " and its doublet " girth " together with the other Teutonic cognates have been referred by some to the root ghar — to seize, enclose, seen in Gr. x e '<-P> hand, Lat. hortus, garden, and also English yard, garden, garth, &c), a band of leather or other material worn round the waist, either to confine the loose and flowing outer robes so as to allow freedom of movement, or to fasten and support the garments of the wearer. Among the Romans it was used to confine the tunica, and.it formed part of the dress of the soldier; when a man quitted military service he was said,

1 It is of interest to note that Freta was the old name for the town of Saint Remy, and that it is close to the site of the ancient town of Glanum, the name of which is possibly preserved in Garin de Monglane, the ancestor of the heroes of the cycle of Guillaume d'Orange.

cingulum deponere, to lay aside the girdle. Money being carried in the girdle, zonam perdere signified to lose one's purse, and, among the Greeks, to cut the girdle was to rob a man of his money.

Girdles and girdle-buckles are not often found in Gallo-Roman graves, but in the graves of Franks and Burgundians they are constantly present, often ornamented with bosses of silver or bronze, chased or inlaid. Sidonius Apollinaris speaks of the Franks as belted round the waist, and Gregory of Tours in the 6th century says that a dagger was carried in the Frankish girdle.

In the Anglo-Saxon dress the girdle makes an unimportant figure, and the Norman knights, as a rule, wore their belts under their hauberks. After the Conquest, however, the artificers gave more attention to a piece whose buckle and tongue invited the work of the goldsmith. Girdles of varying richness are seen on most of the western medieval effigies. That of Queen Beren- garia lets the long pendant hang below the knee, following a fashion which frequently reappears.

In the latter part of the 13th century the knight's surcoat is girdled with a narrow cord at the waist, while the great belt, which had become the pride of the well-equipped cavalier, loops across the hips carrying the heavy sword aslant over the thighs or somewhat to the left of the wearer.

But it is in the second half of the following century that the knightly belt takes its most splendid form. Under the year 1356 the continuator of the chronicle of Nangis notes that the increase of jewelled belts had mightily enhanced the price of pearls. The belt is then worn, as a rule, girdling the hips at some distance below the waist, being probably supported by hooks as is the belt of a modern infantry soldier. The end of the belt, after being drawn through the buckle, is knotted or caught up after the fashion of the tang of the Garter. The waist girdle either disappears from sight or as a narrow and ornamented strap is worn diagonally to help in the support of the belt. A mass of beautiful ornament covers the whole belt, commonly seen as an unbroken line of bosses enriched with curiously worked roundels or lozenges which, when the loose strap-end is abandoned, meet in a splendid morse or clasp on which the enameller and jeweller had wrought their best. About 1420 this fashion tends to disappear, the loose tabards worn over armour in the jousting-yard hindering its display. The belt never regains its importance as an ornament, and, at the beginning of the 16th century, sword and dagger are sometimes seen hanging at the knight's sides without visible support.

In civil dress the magnificent belt of the 14th century is worn by men of rank over the hips of the tight short -skirted coat, and in that century and in the 15th and 16th there are sumptuary laws to check the extravagance of rich girdles worn by men and women whose humble station made them unseemly. Even priests must be rebuked for their silver girdles with baselards hanging from them. Purses, daggers, keys, penners and inkhorns, beads and even books, dangled from girdles in the 15th and early 16th centuries. Afterwards the girdle goes on as a mere strap for holding up the clothing or as a sword-belt. At the Restoration men contrasted the fashion of the court, a light rapier hung from a broad shoulder-belt, with the fashion of the countryside, where a heavy weapon was supported by a narrow waistbelt. Soon afterwards both fashions disappeared. Sword- hangers were concealed by the skirt, and the belt, save in certain military and sporting costumes, has no more been in sight in England. Even as a support for breeches or trousers, the use of braces has gradually supplanted the girdle during the past century.

In most of those parts of the Continent — Brittany, for example — where the peasantry maintains old fashions in clothing, the belt or girdle is still an important part of the clothing. Italian non-commissioned officers find that the Sicilian recruit's main objection to the first bath of his life-time lies in the fact that he must lay down the cherished belt which carries his few valuables. With the Circassian the belt still buckles on an arsenal of pistols and knives.

Folklore and ancient custom are much concerned with the girdle. Bankrupts at one time put it off in open court; French law refused courtesans the right to wear it; Saint Guthlac casts out devils by buckling his girdle round a possessed man; an earl is " a belted earl " since the days when the putting on of a girdle was part of the ceremony of his creation; and fairy tales of half the nations deal with girdles which give invisibility to the wearer. (O. Ba.)

GIRGA, or Girgeh, a town of Upper Egypt on the W. bank of the Nile, 313 m. S.S.E. of Cairo by rail and about 10 m. N.N.E. of the ruins of Abydos. Pop. (1907) 19,893, of whom about one-third are Copts. The town presents a picturesque appearance from the Nile, which at this point makes a sharp bend. A ruined mosque with a tall minaret stands by the river-brink. Many of the houses are of brick decorated with glazed tiles. The town is noted for the excellence of its pottery. Girga

is the seat of a Coptic bishop. It also possesses a Roman Catholic monastery, considered the most ancient in the country. As lately as the middle of the 18th century the town stood a quarter of a mile from the river, but is now on the bank, the intervening space having been washed away, together with a large part of the town, by the stream continually encroaching on its left bank.

GIRGENTI (anc. Agrigentum, q.v.), a town of Sicily, capital of the province which bears its name, and an episcopal see, on the south coast, 58 m. S. by E. of Palermo direct and 84J m. by rail. Population (1901) 25,024. The town is built on the western summit of the ridge which formed the northern portion of the ancient site; the main street runs from E. to W. on the level, but the side streets are steep and narrow. The cathedral occupies the highest point in the town; it was not founded till the 13th century, taking the place of the so-called temple of Concord. The campanile still preserves portions of its original architecture, but the interior has been modernized. In the chapter-house a famous sarcophagus, with scenes illustrating the myth of Hippolytus, is preserved. There are other scattered remains of 13th-century architecture in the town, while, in the centre of the ancient city, close to the so-called oratory of Phalaris, is the Norman church of S. Nicolo. A small museum in the town contains vases, terra-cottas, a few sculptures, &c. The port of Girgenti, 55 m. S.W. by rail, now known as Porto Empedocle (population in 1901, 11,529), as the principal place of shipment for sulphur, the mining district beginning immedi- ately north of Girgenti. (T. As.)

GIRISHK, a village and fort of Afghanistan. It stands on the right bank of the Helmund 78 rn. W. of Kandahar on the road to Herat; 3641 ft. above the sea. The fort, which is garrisoned from Kandahar and is the residence of the governor of the district (Pusht-i-Rud), has little military value. It commands the fords of the Helmund and the road to Seistan, from which it is about 190 m. distant; and it is the centre of a rich agricultural district. Girishk was occupied by the British during the first Afghan War; and a small garrison of sepoys, under a native officer, successfully withstood a siege of nine months by an overwhelming Afghan force. The Dasht-i-Bakwa stretches beyond Girishk towards Farah, a level plain of consider- able width, which tradition assigns as the field of the final contest for supremacy between Russia and England.

GIRNAR, a sacred hill in Western India, in the peninsula of Kathiawar, 10 m. E. of Junagarh town. It consists of five peaks, rising about 3500 ft. above the sea, on which are numerous old Jain temples, much frequented by pilgrims. At the foot of the hill is a rock, with an

inscription of Asoka (2nd century b.c), and also two other inscriptions (dated 150 and 455 a.d.) of great historical importance.

GIRODET DE ROUSSY, ANNE LOUIS (1767-1824), French painter, better known as Girodet-Trioson, was born at Montargis on the 5th of January 1767. He lost his parents in early youth, and the care of his fortune and education fell to the lot of his guardian, M. Trioson, ” medecindemesdames,” by whom he was in later life adopted. After some preliminary studies under a painter named Luquin, Girodet entered the school of David,

and at the age of twenty-two he successfully competed for the Prix de Rome. At Rome he executed his ” Hippocrate refusant les presents d’Artaxerxes “and” Endymion dormant ” (Louvre), a work which was hailed with acclamation at the Salon of 1792. The peculiarities which mark Girodet’s position as the herald of the romantic movement are already evident in his ” Endymion.” The firm-set forms, the grey cold colour, the hardness of the execution are proper to one trained in the school of David, but these characteristics harmonize ill with the literary, sentimental and picturesque suggestions which the painter has sought to render. The same incongruity marks Girodet’s ” Danae ” and his ” Quatre Saisons,” executed for the king of Spain (repeated for Compiegne) , and shows itself to a ludicrous extent in his ” Fingal ” (St Petersburg, Leuchtenberg collection), executed for Napoleon I. in 1802. This work unites the defects of the classic and romantic schools, for Girodet’s imagination ardently and ex- clusively pursued the ideas excited by varied reading both of classic and of modern literature, and the impressions which he received from the external world afforded him little stimulus or check; he consequently retained the mannerisms of his master’s practice whilst rejecting all restraint on choice of subject. The credit lost by ‘ ‘ Fingal “Girodet regained in 1 806, when he exhibited ” Scene de Deluge ” (Louvre), to which (in competition with the “Sabines” of David) was awarded the decennial prize. This success was followed up in 1808 by the production of the ” Reddition de Vienne ” and ” Atala au Tombeau ” — a work which went far to deserve its immense popularity, by a happy choice of subject, and remarkable freedom from the theatricality of Girodet’s usual manner, which, however, soon came to the front again in his ” Revoke de Gaire ” (1810). His pcwers now began to fail, and his habit of working at night and other excesses told upon his constitution; in the Salon of 1812 he exhibited only a ” Tete de Vierge ” ; in 1819 ” Pygmalion et Galatee ” showed a still further decline of strength; and in 1824 — the year in which he produced his portraits of Cathelineau and Bonchamps — Girodet died on the 9th of December.

He executed a vast quantity of illustrations, amongst which may be cited those to the Didot Virgil (1798) and to the Louvre Racine (1801-1805). Fifty-four of his designs for Anacreon were engraved by M . Chatillon. Girodet wasted much time on literary composition, his poem Le Peintre (a string of commonplaces), together with poor imitations of classical poets, and essays on Le Genie and La Grdce, were published after his death (1829), with a biographical notice by his friend M. Coupin de la Couperie; and M. Delecluze, in his Louis David et son temps, has also a brief life of Girodet.

GIRONDE, a maritime department of south-western France, formed from four divisions of the old province of Guyenne, viz. Bordelais, Bazadais, and parts of Perigord and Agenais. Area, 4140 sq. m. Pop. (1906) 823,925. It is bounded N. by the department of Charente-Inferieure, E. by those of Dordogne and Lot-et-Garonne, S. by that of Landes, and W. by the Bay of Biscay. It takes its name from the river or estuary of the Gironde formed by the union of the Garonne and Dordogne. The department divides itself naturally into a western and an eastern portion. The former, which is termed the Landes (q.v.), occupies more than a third of the department, and consists chiefly of morass or sandy plain, thickly planted with pines and divided from the sea by a long line of dunes. These dunes are planted with pines, which, by binding the sand together with their roots, prevent it from drifting inland and afford a barrier against the sea. On the east the dunes are fringed for some distance by two extensive lakes, Carcans and Lacanau, communi- cating with each other and with the Bay of Arcachon, near the southern extremity of the department. The Bay of Arcachon contains numerous islands, and on the land side forms a vast shallow lagoon, a considerable portion of which, however, has been drained and converted into arable land. The eastern portion of the department consists chiefly of a succession of hill and dale, and, especially in the valley of the Gironde, is very fertile. The estuary of the Gironde is about 45 m. in length, and varies in breadth from 2 to 6 m. It presents a succession of islands and mud banks which divide it into two channels and render navigation somewhat difficult. It is, however, well

buoyed and lighted, and has a mean depth of 21 ft. There are extensive marshes on the right bank to the north of Blaye, and the shores on the left are characterized, especially towards the mouth, by low-lying polders protected by dikes and composed of fertile salt

marshes. At the mouth of the Gironde stands the famous tower of Cordouan, one of the finest lighthouses of the French coast. It was built between the years 1585 and .161 1 by the architect and engineer Louis de Foix, and added to towards the end of the 18th century. The principal affluent of the Dordogne in this department is the Isle. The feeders of the Garonne are, with the exception of the Dropt, all small. West of the Garonne the only river of importance is the Leyre, which flows into the Bay of Arcachon. The climate is humid and mild and very hot in summer. Wheat, rye, maize, oats and tobacco are grown to a considerable extent. The corn produced, however, does not meet the wants of the inhabitants. The culture of the vine is by far the most important branch of industry carried on (see Wine) , the vineyards occupying about one-seventh of the surface of the department. The wine-growing districts are the Medoc, Graves, Cotes, Palus, Entre-deux-Mers and Sauternes. The Medoc is a region of 50 m. in length by about 6 m. in breadth, bordering the left banks of the Garonne and the Gironde between Bordeaux and the sea. The Graves country forms a zone 30 m. in extent, stretching along the left bank of the Garonne from the neighbourhood of Bordeaux to Barsac. The Sauternes country lies to the S.E. of the Graves. The Cotes lie on the right bank of the Dordogne and Gironde, between it and the Garonne, and on the left bank of the Garonne. The produce of the Palus, the alluvial land of the valleys, and of the Entre-deux-Mers, situated on the left bank of the Dordogne, is inferior. Fruits and vegetables are extensively cultivated, the peaches and pears being especially fine. Cattle are exten- sively raised, the Bazadais breed of oxen and the Bordelais breed of milch-cows being well known. Oyster-breeding is carried on on a large scale in the Bay of Arcachon. Large supplies of resin, pitch and turpentine are obtained from the pine woods, which also supply vine-props, and there are well-known quarries of limestone. The manufactures are various, and, with the general trade, are chiefly carried on at Bordeaux (q.v.), the chief town and third port in France. Pauillac, Blaye, Libourne and Arcachon are minor ports. Gironde is divided into the arrondissements of Bordeaux, Blaye, Lesparre, Libourne, Bazas and La Reole, with 49 cantons and 554 communes. The department is served by five railways, the chief of which are those of the Orleans and Southern companies. It forms part of the circumscription of the archbishopric, the appeal-court and the acadimie (educational division) of Bordeaux, and of the region of the XVIII. army corps, the headquarters of which are at that city. Besides Bordeaux, Libourne, La Reole, Bazas, Blaye, Arcachon, St Emilion and St Macaire are the most noteworthy towns and receive separate treatment. Among the other places of interest the chief are Cadillac, on the right bank of the Garonne, where there is a castle of the 16th century, surrounded by

fortifications of the 14th century; Labrede, with a feudal chateau in which Montesquieu was born and lived; Villandraut, where there is a ruined castle of the 13th century; Uzeste, which has a church begun in 1310 by Pope Clement V.; Mazeres with an imposing castle of the 14th century; La Sauve, which has a church (nth and 12th centuries) and other remains of a Benedictine abbey; and Ste Foy-la-Grande, a bastide created in 1255 and afterwards a centre of Protestantism, which is still strong there. La Teste (pop. in 1906, 5699) was the capital in the middle ages of the famous lords of Buch.

GIRONDISTS (Fr. Girondins), the name given to a political party in the Legislative Assembly and National Convention during the French Revolution (1791-1793). The Girondists were, indeed, rather a group of, individuals holding certain opinions and principles in common than an organized political party, and the name was at first somewhat loosely applied to them owing to the fact that the most brilliant exponents of their point of view were deputies from the Gironde. These deputies were twelve in number, six of whom — the lawyers Vergniaud,

Guadet, Gensonne, Grangeneuve and Jay, and the tradesman Jean Francois Ducos— sat both in the Legislative Assembly and the National Convention. In the Legislative Assembly these represented a compact body of opinion which, though not as yet definitely republican, was considerably more advanced than the moderate royalism of the majority of the Parisian deputies. Associated with these views was a group of deputies from other parts of France, of whom the most notable were Condorcet, Fauchet, Lasource, Isnard, Kersaint, Henri Lariviere, and, above all, Jacques Pierre Brissot, Roland and Petion, elected mayor of Paris in succession to Bailly on the 16th of November 1 79 r . On the spirit and policy of the Girondists Madame Roland, whose salon became their gathering-place, exercised a powerful influence (see Roland); but such party cohesion as they possessed they owed to the energy of Brissot (q.v.), who came to be regarded as their mouthpiece in the Assembly and the Jacobin Club. Hence the name Brissotins, coined by Camille Desmoulins, which was sometimes substituted for that of Girondins, sometimes closely coupled with it. As strictly party designations these first came into use after the assembling of the National Convention (September 20th, 1792), to which a large proportion of the deputies from the Gironde who had sat in the Legislative Assembly were returned. Both were used as terms of opprobrium by the orators of the Jacobin Club, who freely denounced ” the Royalists, the Federalists, the Brissotins, the Girondins and all the enemies of the democracy ” (F. Aulard, Soc. des Jacobins, vi. 531).

In the Legislative Assembly the Girondists represented the principle of democratic revolution within and of patriotic defiance to the European powers without. They were all- powerful in the Jacobin Club (see Jacobins), where Brissot's influence had not yet been ousted by Robespierre, and they did not hesitate to use this advantage to stir up popular passion and intimidate those who sought to stay the progress of the Revolution. They compelled the king in 1 792 to choose a ministry composed of their partisans — among them Roland, Dumouriez, Claviere and Servan; and it was they who forced the declaration of war against Austria. In all this there was no apparent line of cleavage between " La Gironde " and the Mountain. Montagnards and Girondists alike were fundamentally opposed to the monarchy; both were democrats as well as republicans; both were prepared to appeal to force in order to realize their ideals; in spite of the accusation of " federalism " freely brought against them, the Girondists desired as little as the Montagnards to break up the unity of France. Yet from the first the leaders of the two parties stood in avowed opposition, in the Jacobin Club as in the Assembly. It was largely a question of tempera- ment. The Girondists were idealists, doctrinaires and theorists rather than men of action; they encouraged, it is true, the " armed petitions " which resulted, to their dismay, in the entente of the 20th of June; but Roland, turning the ministry of the interior into a publishing office for tracts on the civic virtues, while in the provinces riotous mobs were burning the chateaux unchecked, is more typical of their spirit. With the ferocious fanaticism or the ruthless opportunism of the future organizers of the Terror they had nothing in common. As the Revolution developed they trembled at the anarchic forces they had helped to unchain, and tried in vain to curb them. The overthrow of the monarchy on the 10th of August and the massacres of September were not their work, though they claimed credit for the results achieved.

The crisis of their fate was not slow in coming. It was they who proposed the suspension of the king and the summoning of the National Convention; but they had only consented to overthrow the kingship when, they found that Louis XVI. was impervious to their counsels, and, the republic once established, they were anxious to arrest the revolutionary movement which they had helped to set in motion. As Daunou shrewdly observes in his Memoires, they were too cultivated and too polished to retain their popularity long in times of disturbance, and were therefore the more inclined to work for the establishment of order, which would mean the guarantee of their own

power. 1 Thus the Girondists, who had been the Radicals of the Legislative Assembly, became the Conservatives of the Conven- tion. But they were soon to have practical experience of the fate that overtakes those who attempt to arrest in mid-career a revolu- tion they themselves have set in motion. The ignorant populace, for whom the promised social millennium had by no means dawned, saw in an attitude seemingly so inconsistent obvious proof of corrupt motives, and there were plenty of prophets of misrule to encourage the delusion — orators of the clubs and the street corners, for whom the restoration of order would have meant well-deserved obscurity. Moreover, the Septembriseurs — ■ Robespierre, Danton, Marat and their lesser satellites — realized that not only their influence but their safety depended on keeping the Revolution alive. Robespierre, who hated the Girondists, whose lustre had so long obscured his own, had proposed to include]them in the proscription lists of September; the Mountain to a man desired their overthrow.

The crisis came in March 1793. The Girondists, who had a majority in the Convention, controlled the executive council and filled the ministry, believed themselves invincible. Their orators had no serious rivals in the hostile camp; their system was established in the purest reason. But the Montagnards made up by their fanatical, or desperate, energy and boldness for what they lacked in talent or in numbers. They had behind them the revolutionary Commune, the Sections and the National Guard of Paris, and they had gained control of the Jacobin club, where Brissot, absorbed in departmental work, had been super- seded by Robespierre. And as the motive power of this formid- able mechanism of force they could rely on the native suspicious- ness of the Parisian populace, exaggerated now into madness by famine and the menace of foreign invasion. The Girondists played into their hands. At the trial of Louis XVI. the bulk of them had voted for the ” appeal to the people,” and so laid themselves open to the charge of ” royalism “; they denounced the domination of Paris and summoned provincial levies to their aid, and so fell under suspicion of ” federalism,” though they rejected Buzot’s proposal to transfer the Convention to Versailles. They strengthened the revolutionary Commune by decreeing its abolition, and then withdrawing the decree at the first sign of popular opposition; they increased the prestige of Marat by prosecuting him before the Revolutionary Tribunal, where his acquittal was a foregone conclusion. In the suspicious temper of the times this vacillating policy was doubly fatal. Marat never ceased his denunciations of the “faction des hommes d’Elat,” by which France was being betrayed to her ruin, and his parrot cry of “Nous sommes

Irakis I" was re-echoed from group to group in the streets of Paris. The Girondists, for all their fine phrases, were sold to the enemy, as Lafayette, Dumouriez and a hundred others — once popular favourites — had been sold.

The hostility of Paris to the Girondists received a fateful advertisement by the election, on the 15th of February 1793, of the ex-Girondist Jean Nicolas Pache (1746-1823) to the mayoralty. Pache had twice been minister of war in the Girondist government; but his incompetence had laid him open to strong criticism, and on the 4th of February he had been superseded by a vote of the Convention. This was enough to secure him the suffrages of the Paris electors ten days later, and the Mountain was strengthened by the accession of an ally whose one idea was to use his new power to revenge himself on his former colleagues. Pache, with Chaumette, procureur of the Commune, and Hebert, deputy procureur, controlled the armed organization of the Paris Sections,- and prepared to turn this against the Convention. The abortive imeute of the 10th of March warned the Girondists of their danger, but th% Commission of Twelve appointed on the 18th of May, the arrest of Marat and Hebert, and other precautionary measures, were defeated by the popular risings of the 27th and 31st of May, and, finally, on the 2nd of June, Hanriot with the National

1 Daunou, " Mfimoires pour servir a l'hist. de la Convention Nationale," p. 409, vol. xii. of M. Fr. BarriSre, Bibl. des mim. rel & l'hist. de la France, &c. (Paris, 1863).

Guards purged the Convention of the Girondists. Isnard's threat, uttered on the 25th of May, to march France upon Paris had been met by Paris marching upon the Convention.

The list drawn up by Hanriot, and endorsed by a decree of the intimidated Convention, included twenty-two Girondist deputies and ten members of the Commission of Twelve, who were ordered to be detained at their lodgings " under the safe- guard of the people." Some submitted, among them Gensonne, Guadet, Vergniaud, Petion, Birotteau and Boyer-Fonfrede. Others, including Brissot, Louvet, Buzot, Lasource, Grangeneuve, Lariviere and Bergoing, escaped from Paris and, joined later by Guadet, Petion and Birotteau, set to work to organize a movement of the provinces against the capital. This attempt to stir up civil war determined the wavering and frightened Convention. On the 13th of June it voted that the city of Paris had deserved well of the country, and ordered the imprison- ment of the detained deputies, the filling up of their places in the Assembly by

their suppleants, and the initiation of vigorous measures against the movement in the provinces. The excuse for the Terror that followed was the imminent peril of France, menaced on the east by the advance of the armies of the Coalition, on the west by the Royalist insurrection of La Vendee, and the need for preventing at all costs the outbreak of another civil war. The assassination of Marat by Charlotte Corday (q.v.) only served to increase the unpopularity of the Girondists and to seal their fate. On the 28th of July a decree of the Convention proscribed, as traitors and enemies of their country, twenty-one deputies, the final list of those sent for trial comprising the names of Antiboul, Boilleau the younger, Boyer-Fonfrede, Brissot, Carra, Duchastel, the younger Ducos, Dufriche de Valaze, Duprat, Fauchet, Gardien, Gensonne, Lacaze, Lasource, Lauze-Deperret, Lehardi, Lesterpt-Beauvais, the elder Minvielle, Sillery, Vergniaud and Viger, of whom five were deputies from the Gironde. The names of thirty-nine others were included in the final acte d' accusation, accepted by the Convention on the 24th of October, which stated the crimes for which they were to be tried as their perfidious ambition, their hatred of Paris, their " federalism " and, above all, their responsibility for the attempt of their escaped colleagues to provoke civil war.

The trial of the twenty-one, which began before the Revolu- tionary Tribunal on the 24th of October, was a mere farce, the verdict a foregone conclusion. On the 31st they were borne to the guillotine in five tumbrils, the corpse of Dufriche de Valaze — who had killed himself — being carried with them. They met death with great courage, singing the refrain " Plutdt la mort que I'esclavage! " Of those who escaped to the provinces the greater number, after wandering about singly or in groups, were either captured and executed or committed suicide, among them Barbaroux, Buzot, Condorcet, Grangeneuve, Guadet, Kersaint, Petion, Rabaut de Saint-fitienne and Rebecqui. Roland had killed himself at Rouen on the 15th of November, a week after the execution of his wife. Among the very few who finally escaped was Jean Baptiste Louvet, whose Memoires give a thrilling picture of the sufferings of the fugitives. In- cidentally they prove, too, that the sentiment of France was for the time against the Girondists, who were proscribed even in their chief centre, the city of Bordeaux. The survivors of the party made an effort to re-enter the Convention after the fall of Robespierre, but it was not until the 5th of March 1795 that they were formally reinstated. On the 3rd of October of the same year (n Vendemiaire, year III.) a solemn fete in honour of the Girondist " martyrs of liberty " was celebrated in the Convention. See also the article French Revolution and separate biographies.

Of the special works on the Girondists Lamartine's Histoire des

Girondins (2 vols., Paris, 1847, new ed. 1902, in 6 vols.) is rhetoric rather than history and is untrustworthy ; the Histoire des Girondins, by A. Gramier de Cassagnac (Paris, i860) led to the publicaton of a Protestation by J. Guadet, a nephew of the Girondist orator, which was followed by his Les Girondins, leur vie privee, leur vie publique, leur proscription el leur mort (2 vols., Paris, 1861, new ed. 1890); with which cf. Alary, Les Girondins par Guadet (Bordeaux, 1863); also Charles Vatel, Charlotte de Corday et les Girondins: pieces classees et annoties (3 vols., Paris, 1 864-1872) ; Recherches historiques

sur les Girondins (2 vols., ib. 1873); Ducos, Les Trois Girondines (Madame Roland, Charlotte Corday, Madame Bouquey) et les Girondins (ib. 1896); Edmond Bire, La Legende des Girondins" (Paris, 1 88 1, new ed. 1896); also Helen Maria Williams, State of Manners and Opinions in the French Republic towards the close of the 18th Century (2 vols., London, 1801), Memoirs or fragments of memoirs also exist by particular Girondists, e.g. Barbaroux, Petion, Louvet, Madame Roland. See, further, the bibliography to the article French Revolution. (W. A. P.)

GIRTIN, THOMAS (1775-1802), English painter and etcher, was the son of a well-to-do cordage maker in Southwark, London. His father died while Thomas was a child, and his widow married Mr Vaughan, a pattern-draughtsman. Girtin learnt drawing as a boy, and was apprenticed to Edward Doyes (1763-1804), the mezzotint engraver, and he soon made J. M. W. Turner's acquaintance. His architectural and topographical sketches and drawings soon established his reputation, his use of water- colour for landscapes being such as to give him the credit of having created modern water-colour painting, as opposed to mere " tinting." His etchings also were characteristic of his artistic genius. His early death from consumption (9th of November 1802) led indeed to Turner saying that " had Tom Girtin lived I should have starved." From 1794 to his death he was an exhibitor at the Royal Academy; and some fine examples of his work have been bequeathed by private owners to the British Museum and the Victoria and Albert Museum.

GIRVAN, a police burgh, market and fishing town of Ayrshire, Scotland, at the mouth of the Girvan, 21 m. S.W. of Ayr, and 63 m. S.W. of Glasgow by the Glasgow & South- Western railway. Pop. (1001) 4024. The principal industry was weaving, but the substitution

of the power-loom for the hand-loom nearly put an end to it. The herring fishery has developed to considerable proportions, the harbour having been enlarged and protected by piers and a breakwater. Moreover, the town has grown in repute as a health and holiday resort, its situation being one of the finest in the west of Scotland. There is excellent sea- bathing, and a good golf-course. The vale of Girvan, one of the most fertile tracts in the shire, is made so by the Water of Girvan, which rises in the loch of Girvan Eye, pursues a very tortuous course of 36 m. and empties into the sea. Girvan is the point of communication with Ailsa Craig. About 13 m. S.W. at the mouth of the Stinchar is the fishing village of Ballantrae (pop. 511).

GIRY (Jean Marie Joseph), ARTHUR (1848-1899), French historian, was born at Trevoux (Ain) on the 29th of February 1848. After rapidly completing his classical studies at the lycee at Chartres, he spent some time in the administrative service and in journalism. He then entered the ficole des Chartes, where, under the influence of J. Quicherat, he developed a strong inclination to the study of the middle ages. The lectures at the Ecole des Hautes Etudes, which he attended from its foundation in 1868, revealed his true bent; and henceforth he devoted himself almost entirely to scholarship. He began modestly by the study of the municipal charters of St Omer. Having been appointed assistant lecturer and afterwards full lecturer at the Ecole des Hautes Etudes, it was to the town of St Omer that he devoted his first lectures and his first important work, Histoire de la ville de Saint-Omer et de ses institutions jusqu'au XI V e siecle (1877). He, however, soon realized that the charters of one town can only be understood by comparing them with those of other towns, and he was gradually led to continue the work which Augustin Thierry had broadly outlined in his studies on the Tiers Etal. A minute knowledge of printed books and a methodical examination of departmental andcommunal archives furnished him with material for a long course of successful lectures, which gave rise to some important works on municipal history and led to a great revival of interest in the origins and significance of the urban communities in France. Giry himself published Les Etablissements de Rouen (1883-1885)ˆ study, based on very minute researches, of the charter granted to the capital of Normandy by Henry II., king of England, and of the diffusion of similar charters throughout the French dominions of the Plantagenets; a collection of Documents sur les relations de

la royaute avec les villes de France de 1180 a 1314 (1885); and Htude sur les origines de la commune de Saint-Quentin (1887).

About this time personal considerations induced Giry to devote the

greater part of his activity to the study of diplomatic, which had been much neglected at the ficole des Chartes, but had made great strides in Germany. As assistant (1883) and successor (1885) to Louis de Mas Latrie, Giry restored the study of diplomatic, which had been founded in France by Dom Jean Mabillon, to its legitimate importance. In 1894 he published his Manuel de diplomatique, a monument of lucid and well- arranged erudition, which contained the fruits of his long experience of archives, original documents and textual criticism; and his pupils, especially those at the Ecole des Hautes Etudes, soon caught his enthusiasm. With their collaboration he under- took the preparation of an inventory and, subsequently, of a critical edition of the Carolingian diplomas. By arrangement with E. Miihlbacher and the editors of the Monumenta Germaniae historica, this part of the joint work was reserved for Giry. Simultaneously with this work he carried on the publication of the annals of the Carolingian epoch on the model of the German Jahrbiicher, reserving for himself the reign of Charles the Bald. Of this series his pupils produced in his lifetime Les Derniers Carolingiens (by F. Lot, 1891), Eudes, comte de Paris et roi de France (by E. Favre, 1893), and Charles le Simple (by Eckel, 1899). The biographies of Louis IV. and Hugh Capet and the history of the kingdom of Provence were not published until after his death, and his own unfinished history of Charles the Bald was left to be completed by his pupils. The preliminary work on the Carolingian diplomas involved such lengthy and costly researches that the Academie des Inscriptions et Belles- Lettres took over the expenses after Giry's death.

In the midst of these multifarious labours Giry found time for extensive archaeological researches, and made a special study of the medieval treatises dealing with the technical processes employed in the arts and industries. He prepared a new edition of the monk Theophilus's celebrated treatise, Diversarum artium schedula, and for several years devoted his Saturday mornings to laboratory research with the chemist Aime Girard at the Conservatoire des Arts et Metiers, the results of which were utilized by Marcellin Berthelot in the first volume (1 894) of his Chimie au moyen dge. Giry took an energetic part in the Collection de textes relatifs a I'histoire du moyen dge, which was due in great measure to his initiative. He was appointed director of the section of French history in La Grande Encyclo- pedie, and contributed more than a hundred articles, many of which, e.g. " Archives " and " Diplomatique," were original works. In collaboration with his pupil Andr6 Reville, he wrote the chapters on " L'Emancipation des villes, les communes et les bourgeoisies " and " Le Commerce et l'industrie au moyen age " for the Histoire generate of

Lavisse and Rambaud. Giry took a keen interest in politics, joining the republican party and writing numerous articles in the republican newspapers, mainly on historical subjects. He was intensely interested in the Dreyfus case, but his robust constitution was undermined by the anxieties and disappointments occasioned by the Zola trial and the Rennes court-martial, and he died in Paris on the 13th of November 1899.

For details of Giry's life and works see the funeral orations pub- lished in the Bibliotheque de VEcole des Chartes, and afterwards in a pamphlet (1899). See also the biography by Ferdinand Lot in the Annuaire de VEcole des Hautes Etudes for 1901 ; and the bibliography of his works by Henry Maistre in the Correspondance historique et archeologique (1899 and 1900).

GISBORNE, a seaport of New Zealand, in Cook county, provincial district of Auckland, on Poverty Bay of the east coast of North Island. Pop. (1901) 2733; (1906)5664. Wool, frozen mutton and agricultural produce are exported from the rich district surrounding. Petroleum has been discovered in the neighbourhood, and about 40 m. from the town there are warm medicinal springs. Near the site of Gisborne Captain Cook landed in 1769, and gave Poverty Bay its name from his inability to obtain supplies owing to the hostility of the natives. Young Nick's Head, the southern horn of the bay, was named from Nicholas Young, his ship's boy, who first observed it.

GISLEBERT (or Gilbert) OF MONS (c. 1150-1225), Flemish chronicler, became a clerk, and obtained the positions of provost of the churches of St Germanus at Mons and St Alban at Namur, in addition to several other ecclesiastical appointments. In official documents he is described as chaplain, chancellor or notary, of Baldwin V., count of Hainaut (d. 1195), who employed him on important business. After 1200 Gislebert wrote the Chronicon Hanoniense, a history of Hainaut and the neighbouring lands from about 1050 to 1195, which is specially valuable for the latter part of the 1 2th century, and for the life and times of Baldwin V.

The chronicle is published in Band xxi. of the Monumenta Ger- maniae historical (Hanover, 1826 fol.); and separately with intro- duction by W. Arndt (Hanover, 1869). Another edition has been published by L. Vanderkindere in the Recueil de textes pour servir a V elude de

I'histoire de Belgique (Brussels, 1904) ; and there is a French translation by G. Menilglaise (Tournai, 1874).

See W. Meyer, Das Werk des Kanzlers Gislebert von Mons als verfassungsgeschichtliche Quelle (Konigsberg, 1888) ; K. Huygens, Sur la valeur historique de la chronique Gislebert de Mons (Ghent, 1889); and VV. Wattenbach, Deutschlands Geschichtsquellen, Band ii. (Berlin, 1894).

GISORS, a town of France, in the department of Eure, situated in the pleasant valley of the Epte, 44. m. N.W. of Paris on the railway to Dieppe. Pop. (1906) 4345. Gisors is dominated by a feudal stronghold built chiefly by the kings of England in the nthand 12th centuries. The outer enceinte, to which is attached a cylindrical donjon erected by Philip Augustus, king of France, embraces an area of over 7 acres. On a mound in the centre of this space rises an older donjon, octagonal in shape, protected by another enceinte. The outer ramparts and the ground they enclose have been converted into promenades. The church of St Gervais dates in its oldest parts — the central tower, the choir and parts of the aisles — from the middle of the 13th century, when it was founded by Blanche of Castile. The rest of the church belongs to. the Renaissance period. The Gothic and Renaissance styles mingle in the west facade, which, like the interior of the building, is adorned with a profusion of sculptures; the fine carving on the wooden doors of the north and west portals is particularly noticeable. The less interesting buildings of the town include a wooden house of the Renaissance era, an old convent now used as an hotel de ville, and a handsome modern hospital. There is a statue of General de Blanmont, born at Gisors in 1770. Among the industries of Gisors are felt manufacture, bleaching, dyeing and leather-dressing.

In the middle ages Gisors was capital of the Vexin. Its position on the frontier of Normandy caused its possession to be hotly contested by the kings of England and France during the 1 2th century, at the end of which it and the dependent fortresses of Neaufles and Dangu were ceded by Richard Cceur de Lion to Philip Augustus. During the wars of religion of the 1 6th century it was occupied by the duke of Mayenne on behalf of the League, and in the 17th century, during the Fronde, by the duke of Longue ville. Gisors was given to Charles Auguste Fouquet in 1718 in exchange for Belle-Ile-en-Mer and made a duchy in 1742. It afterwards came into the possession of the count of Eu and the duke of Penthievre.

GISSING, GEORGE ROBERT (1857-1903), English novelist, was born at Wakefield on the 22nd of November 1857. He was educated at the

Quaker boarding-school of Alderley Edge and at Owens College, Manchester. His life, especially its earlier period, was spent in great poverty, mainly in London, though he was for a time also in the United States, supporting him- self chiefly by private teaching. He published his first novel, Workers in the Dawn, in 1880. The Unclassed (1884) and Isabel Clarendon (1886) followed. Demos (1886), a novel dealing with, socialistic ideas, was, however, the first to attract attention. It ■ was followed by a series of novels remarkable for their pictures of lower middle class life. Gissing's own experiences had pre- occupied him with poverty and its brutalizing effects on char- acter. He made no attempt at popular writing, and for a long time the sincerity of his work was appreciated only by a limited public. Among his more characteristic novels were: Thyrza (1887), A Life's Morning (1888) , The Nether World (1889), New

Grub Street (1891), Born in Exile (1892), The Odd Women (1893), In the Year of Jubilee (1894), The Whirlpool (1897). Others, e.g. The Town Traveller (1901), indicate a humorous faculty, but the prevailing note of his novels is that of the struggling life of the shabby-genteel and lower classes and the conflict between education and circumstances. The quasi-autobio- graphical Private Papers of Henry Ryecroft (1903) reflects throughout Gissing's studious and retiring tastes. He was a good classical scholar and had a minute acquaintance with the late Latin historians, and with Italian antiquities; and his posthumous Veranilda (1904), a historical romance of Italy in the time of Theodoric the Goth, was the outcome of his favourite studies. Gissing's powers as a literary critic are shown in his admirable study on Charles Dickens (1898). A book of travel, By the Ionian Sea, appeared in 1901. He died at St Jean de Luz in the Pyrenees on the 28th of December 1903.

See also the introductory essay by T. Seccombe to The House of Cobwebs (1906), a posthumous volume of Gissing's short stories.

GITSCHIN (Czech Jicin), a town of Bohemia, Austria, 65 m. N.E. of Prague by rail. Pop. (1900) 9790, mostly Czech. The parish church was begun by Wallenstein after the model of the pilgrims' church of Santiago de Compostela in Spain, but not completed till 1655. The castle, which stands next to the church, was built by Wallenstein and finished in 1630. It was here that the emperor Francis I. of Austria signed the treaty of 1 8 1 3 by which he threw in his lot with the Allies against Napoleon. Wallenstein was interred at the neighbouring Carthusian mon- astery, but in 1639 the head and right hand were taken by General Baner to Sweden, and in 1702 the other remains were removed by Count Vincent of Waldstein to his hereditary

burying ground at Miinchengratz. Gitschin was originally the village of Zidineves and received its present name when it was raised to the dignity of a town by Wenceslaus II. in 1302. The place belonged to various noble Bohemian families, and in the 17 th century came into the hands of Wallenstein, who made it the capital of the duchy of Friedland and did much to improve and extend it. His murder, and the miseries of the Thirty Years' War, brought it very low; and it passed through several hands before it was bought by Prince Trauttmannsdorf, to whose family it still belongs. On the 29th of June 1866 the Prussians gained here a great victory over the Austrians. This victory made possible the junction of the first and second Prussian army corps, and had as an ultimate result the Austrian defeat at Koniggratz. «

GIUDICI, PAOLO EMILIANO (1812-1872), Italian writer, was born in Sicily. His History of Italian Literature (1844) brought him to the front, and in 1848 he became professor of Italian literature at Pisa, but after a few months was deprived of the chair on account of his liberal views in politics. On the re-establishment of the Italian kingdom he became professor of aesthetics (resigning 1862) and secretary of the Academy of Fine Arts at Florence, and in 1867 was elected to the chamber of deputies. He held a prominent place as an historian, his works including a Storia del teatro (i860), and Storia dei comuni italiani (1861), besides a translation of Macaulay's History of England (1856). He died at Tonbridge in England, on the 8th of September 1872.

A Life appeared at Florence in 1874.

GIULIO ROMANO, or Giulio Pippi (c. 1492-1546), the head of the Roman school of painting in succession to Raphael. This prolific painter, modeller, architect and engineer receives his common appellation from the place of his birth — Rome, in the Macello de' Corbi. His name in full was Giulio di Pietro de Filippo de' Giannuzzi — Giannuzzi being the true family name, and Pippi (which has practically superseded Giannuzzi) being an abbreviation from the name of his grandfather Filippo. The date of Giulio's birth is a little uncertain. Vasari (who knew him personally) speaks of him as fifty-four years old at the date of his death, 1st November 1546; thus he would have been born in 1492. Other accounts assign 1498 as the date of birth. This would make Giulio young indeed in the early and in such case most precocious stages of his artistic career, and

would show him as dying, after an infinity of hard work, at the comparatively early age of forty-eight.

Giulio must at all events have been quite youthful when he first became the pupil of Raphael, and at Raphael's death in 1520 he was at the utmost twenty-eight years of age. Raphael had loved him as a son, and had employed him in some leading works, especially in the Loggie of the Vatican; the series there popularly termed " Raphael's Bible " is done in large measure by Giulio, — as for instance the subjects of the " Creation of Adam and Eve," " Noah's Ark," and " Moses in the Bulrushes." In the saloon of the " Incendio del Borgo," also, the figures of " Benefactors of the Church " (Charlemagne, &c.) are Giulio's handiwork. It would appear that in subjects of this kind Raphael simply furnished the design, and committed the execu- tion of it to some assistant, such as Giulio, — takingheed, however, to bring it up, by final retouching, to his own standard of style and type. Giulio at a later date followed out exactly the same plan; so that in both instances inferiorities of method, in the general blocking-out and even in the details of the work, are not to be precisely charged upon the caposcuola. Amid the multitude of Raphael's pupils, Giulio was eminent in pursuing his style, and showed universal aptitude; he did, among other things, a large amount of architectural planning for his chief. Raphael be- queathed to Giulio, and to his fellow-pupil Gianfrancesco Penni ("II Fattore"), his implements and works of art; and upon them it devolved to bring to completion the vast fresco-work of the " Hall of Constantine " in the Vatican — consisting, along with much minor matter, of the four large subjects, the " Battle of Constantine," the " Apparition of the Cross," the " Baptism of Constantine " and the " Donation of Rome to the Pope." The two former compositions were executed by Pippi, the two latter by Penni. The whole of this onerous undertaking was com- pleted within a period of only three years, — which is the more remarkable as, during some part of the interval since Raphael's decease, the Fleming, Adrian VI., had been pope, and his anti- aesthetic pontificate had left art and artists almost in a state of inanition. Clement VII. had now, however, succeeded to the popedom. By this time Giulio was regarded as the first painter in Rome; but his Roman career was fated to have no further sequel.

Towards the end of 1524 his friend the celebrated writer Baldassar Castiglione seconded with success the urgent request of the duke of Mantua, Federigo Gonzaga, that Giulio should migrate to that city, and enter the duke's service for the purpose of carrying out his

projects in architecture and pictorial decora- tion. These projects were already considerable, and under Giulio's management they became far more extensive still. The duke treated his painter munificently as to house, table, horses and whatever was in request; and soon a very cordial attachment sprang up between them. In Pippi's multifarious work in Mantua three principal undertakings should be noted. (1) In the Castello he painted the " History of Troy," along with other subjects. (2) In the suburban ducal residence named the Palazzo del Te (this designation being apparently derived from the form of the roads which led towards the edifice) he rapidly carried out a rebuilding on a vastly enlarged scale, — the materials being brick and terra-cotta, as there is no local stone, — and decorated the rooms with his most celebrated works in oil and fresco painting — the story of Psyche, Icarus, the fall of the Titans, and the portraits of the ducal horses and hounds. The foreground figures of Titans are from 12 to 14 ft. high; the room, even in its structural details, is made to subserve the general artistic purpose, and many of its architectural features are distorted accordingly. Greatly admired though these pre-eminent works have always been, and at most times even more than can now be fully ratified, they have suffered severely at the hands of restorers, and modern eyes see them only through a dull and deadening fog of renovation. The whole of the work on the Palazzo del Te, which is of the Doric order of architecture, occupied about five years. (3) Pippi recast and almost rebuilt the cathedral of Mantua; erected his own mansion, replete with numerous antiques and other articles of vertu; reconstructed

the street architecture to a very large extent, and made the city, sapped as it is by the shallows of the Mincio, comparatively healthy; and at Marmiruolo, some 5 m. distant from Mantua, he worked out other important buildings and paintings. He was in fact, for nearly a quarter of a century, a sort of Demiurgus of the arts of design in the Mantuan territory.

Giulio's activity was interrupted but not terminated by the death of Duke Federigo. The duke's brother, a cardinal who became regent, retained him in full employment. For a while he went to Bologna, and constructed the facade of the church of S. Petronio in that city. He was afterwards invited to succeed Antonio Sangallo as architect of St Peter's in Rome, — a splendid appointment, which, notwithstanding the strenuous opposition of his wife and of the cardinal regent, he had almost resolved to accept, when a fever overtook him, and, acting upon a con- stitution somewhat enfeebled by worry and labour, caused his death on the 1st of November 1 546. He was buried in the church of S. Barnaba in Mantua. At the time of his death Giulio

enjoyed an annual income of more than 1000 ducats, accruing from the liberalities of his patrons. He left a widow, and a son and daughter. The son, named Raffaello, studied painting, but died before he could produce any work of importance; the daughter, Virginia, married Ercole Malatesta.

Wide and solid knowledge of design, combined with a prompti- tude of composition that was never at fault, formed the chief motive power and merit of Giulio Romano's art. Whatever was wanted, he produced it at once, throwing off, as Vasari says, a large design in an hour; and he may in that sense, though not equally so when an imaginative or ideal test is applied, be called a great inventor. It would be difficult to name any other artist who, working as an architect, and as the plastic and pictorial embellisher of his architecture, produced a total of work so fully and homogeneously his own; hence he has been named " the prince of decorators." He had great knowledge of the human frame, and represented it with force and truth, though some- times with an excess of movement; he was also learned in other matters, especially in medals, and in the plans of ancient buildings. In design he was more strong and emphatic than graceful, and worked a great deal from his accumulated stores of knowledge, without consulting nature direct. As a general rule, his designs are finer and freer than his paintings, whether in fresco or in oil — his easel pictures being comparatively few, and some of them the reverse of decent; his colouring is marked by an excess of blackish and heavy tints.

Giulio Romano introduced the style of Raphael into Mantua, and established there a considerable school of art, which surpassed in development that of his predecessor Mantegna, and almost rivalled that of Rome. Very many engravings — more than three hundred are mentioned — were made contemporaneously from his works; and this not only in Italy, but in France and Flanders as well. His plan of entrusting principally to assistants the pictorial execution of his cartoons has already been referred to; Primaticcio was one of the leading coadjutors. Rinaldo Mantovano, a man of great ability who died young, was the chief executant of the " Fall of the Giants "; he also co-operated with Benedetto Pagni da Pescia in painting the remarkable series of horses and hounds, and the story of Psyche. Another pupil was Fermo Guisoni, who remained settled in Mantua. The oil pictures of Giulio Romano are not generally of high importance; two leading ones are the " Martyrdom of Stephen," in the church of that saint in Genoa, and a "Holy Family" in the Dresden Gallery. Among his architectural works not already mentioned is the Villa Madama in Rome, with a fresco of Polyphemus, and boys and satyrs; the Ionic facade of this building may have been sketched out

by Raphael.

Vasari gives a pleasing impression of the character of Giulio. He was very loving to his friends, genial, affable, well-bred, temperate in the pleasures of the table, but liking fine apparel and a handsome scale of living. He was good-looking, of middle height, with black curly hair and dark eyes, and an ample beard; his portrait, painted by himself, is in the Louvre.

Besides Vasari, Lanzi and other historians of art, the following works may be mentioned: C. D. Arco, Vita di G. Pippi (1828); G. C. von Murr, Notice sur les estampes gravies apres dessins de Jules Romain (1865); R. Sanzio, two works on Etchings and Paintings (1800, 1836). (W. M. R.)

GIUNTA PISANO, the earliest Italian painter whose name is found inscribed on an extant work. He is said to have exercised his art from 1202 to 1236. He may perhaps have been born towards 1180 in Pisa, and died in or soon after 1236; but other accounts give 1202 as the date of his birth, and 1258 or there- abouts for his death. There is some ground for thinking that his family name was Capiteno. The inscribed work above referred to, one of his earliest, is a ” Crucifix,” long in the kitchen of the convent of St Anne in Pisa. Other Pisan works of like date are very barbarous, and some of them may be also from the hand of Giunta. It is said that he painted in the upper church of Assisi, — in especial a “Crucifixion ” dated i236,with a figure of Father Elias, the general of the Franciscans, embracing the foot of the cross. In the sacristy is a portrait of St Francis, also ascribed to Giunta; but it more probably belongs to the close of the 13th century. He was in the practice of painting upon cloth stretched on wood, and prepared with plaster.

GIURGEVO (Giurgiu), the capital of the department of Vlashca, Rumania; situated amid mud-flats and marshes on the left bank of the Danube. Pop. (1900) 13,077. Three small islands face the town, and a larger one shelters its port, Smarda, 2\ m. E. The rich corn-lands on the north are traversed by a railway to Bucharest, the first line opened in Rumania, which was built in 1869 and afterwards extended to Smarda. Steamers ply to Rustchuk, 25 m. S.W. on the Bulgarian shore, linking the Rumanian railway system to the chief Bulgarian line north of the Balkans (Rustchuk- Varna). Thus Giurgevo, besides having a

considerable trade with the home ports lower down the Danube, is the headquarters of commerce between Bulgaria and Rumania. It exports timber, grain, salt and petroleum; importing coal, iron and textiles. There are also large saw-mills. Giurgevo occupies the site of Theodorapolis, a city built by tie Roman emperor Justinian (a.d. 483-565). It was founded in the 14th century by Genoese merchant adventurers, who established a bank, and a trade in silks and velvets. They called the town, after the patron saint of Genoa, San Giorgio (St George) ; and hence comes its present name. As a fortified town, Giurgevo figured often in the wars for the conquest of the lower Danube; especially in the struggle of Michael the Brave (1 593-1601) against the Turks, and in the later Russo-Turkish Wars. It was burned in 1659. In 1829, its fortifications were finally razed, the only defence left being a castle on the island of Slobosia, united to the shore by a bridge.

GIUSTI, GIUSEPPE (1809-1850), Tuscan satirical poet, was born at Monsummano, a small village of the Valdinievole, on the 12th of May 1809. His father, a cultivated and rich man, accustomed his son from childhood to study, and himself taught him, among other subjects, the first rudiments of music. After- wards, in order to curb his too vivacious disposition, he placed the boy under the charge of a priest near the village, whose severity did perhaps more evil than good. At twelve Giusti was sent to school at Florence, and afterwards to Pistoia and to Lucca; and during those years he wrote his first verses. In 1826 he went to study law at Pisa; but, disliking the study, he spent eight years in the course, instead of the customary four. He lived gaily, however, though his father kept him short of money, and learned to know the world, seeing the vices of society, and the folly of certain laws and customs from which his country was suffering. The experience thus gained he turned to good account in the use he made of it in his satire.

His father had in the meantime changed his place of abode to Pescia; but Giuseppe did worse there, and in November 1832, his father having paid his debts, he returned to study at Pisa, seriously enamoured of a woman whom he could not marry, but now commencing to write in real earnest in behalf of his country. With the poem called La Ghigliottina (the guillotine) , Giusti began to strike out a path for himself, and thus revealed his” great genius. From this time he showed himself the Italian

Beranger, and even surpassed the Frenchman in richness of language, refinement of humour and depth of satirical conception. In Beranger there is more feeling for what is needed for popular poetry. His poetry

is less studied, its vivacity perhaps more boisterous, more spontaneous; but Giusti, in both manner and conception, is perhaps more elegant, more refined, more pene- trating. In 1834 Giusti, having at last entered the legal profes- sion, left Pisa to go to Florence, nominally to practise with the advocate Capoquadri, but really to enjoy life in the capital of Tuscany. He fell seriously in love a second time, and as before was abandoned by his love. It was then he wrote his finest . verses, by means of which, although his poetry was not yet collected in a volume, but for some years passed from hand to hand, his name gradually became famous. The greater part of his poems were published clandestinely at Lugano, at no little risk, as the work was destined to undermine the Austrian rule in Italy. After the publication of a volume of verses at Bastia, Giusti thoroughly established his fame by his Gingillino, the best in moral tone as well as the most vigorous and effective of his poems. The poet sets himself to represent the vileness of the treasury officials, and the base means they used to conceal the necessities of the state. The Gingillino has all the character of a classic satire. When first issued in Tuscany, it struck all as too impassioned and personal. Giusti entered heart and soul into the political movements of 1847 and 1848, served in the national guard, sat in the parliament for Tuscany; but finding that there was more talk than action, that to the tyranny of princes had succeeded the tyranny of demagogues, he began to fear, and to express the fear, that for Italy evil rather than good had resulted. He fell, in consequence, from the high position he had held in public estimation, and in 1848 was regarded as a reactionary. His friendship for the marquis Gino Capponi, who had taken him into his house during the last years of his life, and who published after Giusti's death a volume of illustrated proverbs, was enough to compromise him in the eyes of such men as Guerrazzi, Montanelli and Niccolini. On the 31st of May 1850 he died at Florence in the palace of his friend.

The poetry of Giusti, under a light trivial aspect, has a lofty civilizing significance. The type of his satire is entirely original, and it had also the great merit of appearing at the right moment, of wounding judiciously, of sustaining the part of the comedy that " castigat ridendo mores." Hence his verse, apparently jovial, was received by the scholars and politicians of Italy in all seriousness. Alexander Manzoni in some of his letters showed a hearty admiration of the genius of Giusti; and the weak Austrian and Bourbon governments regarded them as of the gravest importance.

His poems have often been reprinted, the best editions being those of Le Monnier, Carducci (1859; 3rd ed., 1879), Fioretti (1876) and Bragi (1890). Besides the poems and the proverbs already men- tioned, we

have a volume of select letters, full of vigour and written in the best Tuscan language, and a fine critical discourse on Giuseppe Parini, the satirical poet. In some of his compositions the elegiac rather than the satirical poet is seen. Many of his verses have been excellently translated into German by Paul Heyse. Good English translations were published in the Athenaeum by Mrs T. A. Trollope, and some by W. D. Howells are in his Modern Italian Poets (1887).

GIUSTINIANI, the name of a prominent Italian family which originally belonged to Venice, but established itself subsequently in Genoa also, and at various times had representatives in Naples, Corsica and several of the islands of the Archipelago. In the Venetian line the following are most worthy of mention : — 1. Lorenzo (1380-1465), the Laurentius Justinianus of the Roman calendar, at an early age entered the congregation of the canons of St George in Alga, and in 1433 became general of that order. About the same time he was made by Eugenius IV. bishop of Venice; and his episcopate was marked by con- siderable activity in church extension and reform. On the removal of the patriarchate from Grado to Venice by Nicholas V. in 1451, Giustiniani was promoted to that' dignity, which he held for fourteen years. He died on January 8, 1465, was canonized by Pope Alexander VIII., his festival (semi-duplex)

being fixed by Innocent XII. for September 5th, the anni- versary of his elevation to the bishopric. His works, consisting of sermons, letters and ascetic treatises, have been frequently reprinted, — the best edition being that of the Benedictine P. N. A. Giustiniani, published at Venice in 2 vols, folio, 1751. They are wholly devoid of literary merit. His life has been written by Bernard Giustiniani, by Maffei and also by the Bollandists.

2. Leonardo (1388-1446), brother of the preceding, was for some years a senator of Venice, and in 1443 was chosen procurator of St Mark. He translated into Italian Plutarch's Lives of Cinna and Lucullus, and was the author of some poetical pieces, amatory and religious — slrambotti and canzonetti — as well as of rhetorical prose compositions. Some of the popular songs set to music by him became known as Giustiniani.

3. Bernardo (1408-1489), son of Leonardo, was a pupil of Guarino and of George of Trebizond, and entered the Venetian senate at an early

age. He served on several important diplo- matic missions both to France and Rome, and about 1485 became one of the council of ten. His orations and letters were published in 1492; but his title to any measure of fame he possesses rests upon his history of Venice, De origine urbis Venetiarum rebusque ab ipsa gestis historia (1492), which was translated into Italian by Domenichi in 1545, and which at the time of its appearance was undoubtedly the best work upon the subject of which it treated. It is to be found in vol. i. of the Thesaurus of Graevius.

4. Pietro, also a senator, lived in the 16th century, and wrote on Historia rerum Venetarum in continuation of that of Bernardo. He was also the author of chronicles De gestis Petri Mocenigi and De bello Venetorum cum Carolo VIII. The latter has been reprinted in the Script, rer. Ital. vol. xxi.

Of the Genoese branch of the family the most prominent members were the following: —

5. Paolo, di M'oniglia (1444-1502), a member of the order of Dominicans, was, from a comparatively early age, prior of their convent at Genoa. As a preacher he was very successful, and his talents were fully recognized by successive popes, by whom he was made master of the sacred palace, inquisitor- general for all the Genoese dominions, and ultimately bishop of Scio and Hungarian legate. He was the author of a number of Biblical commentaries (no longer extant), which are said to have been characterized by great erudition.

6. Agostino (1470-1536) was born at Genoa, and spent some wild years in Valencia, Spain. Having in 1487 joined the Dominican order, he gave himself with great energy to the study of Greek, Hebrew, Chaldee and Arabic, and in 1514 began the preparation of a polyglot edition of the Bible. As bishop of Nebbio in Corsica, he took part in some of the earlier sittings of the Lateran council (1 516-15 17), but, in consequence of party complications, withdrew to his diocese, and ultimately to France, where he became a pensioner of Francis I., and was the first to occupy a chair of Hebrew and Arabic in the university of Paris. After an absence from Corsica for a period of five years, during which he visited England and the Low Countries, and became acquainted with Erasmus and More, he returned to Nebbio, about 1522, and there remained, with comparatively little intermission, till in 1536, when, while returning from a visit to Genoa, he perished in a storm at sea. He was the possessor of a very fine library, which he bequeathed to the republic of Genoa. Of his projected polyglot only

the Psalter was published (Psalterium Hebraeum, Graecum, Arabicum, el Chaldaicum, Genoa, 1616). Besides the Hebrew text, the LXX. translation, the Chaldee paraphrase, and an Arabic version, it., contains the Vulgate translation, a new Latin translation by the editor, a Latin translation of the Chaldee, and a collection of scholia. Giustiniani printed 2006 copies at his own expense, including fifty in vellum for presentation to the sovereigns of Europe and Asia; but the sale of the work did not encourage him to proceed with the New Testament, which he had also prepared for the press. Besides an edition of the book of Job, containing the original text, the Vulgate, and a new translation,

he published a Latin version of the Moreh Nevochim of Maimonides {Director dubitantium aut perplexorum, 1520), and also edited in Latin the Aureus libellus of Aeneas Platonicus, and the Timaeus of Chalcidius. His annals of Genoa (Castigatissimi annali di Genova) were published posthumously in 1537. The following are also noteworthy: —

7. Pompeio (1569-1616), a native of Corsica, who served under Alessandro Farnese and the marquis of Spinola in the Low Countries, where he lost an arm, and, from the artificial substitute which he wore, came to be known by the sobriquet Bras de Fer. He also defended Crete against the Turks; and subsequently was killed in a reconnaissance at Friuli. He left in Italian a personal narrative of the war in Flanders, which has been repeatedly published in a Latin translation (Bellum Belgicum, Antwerp,

1609).

8. Giovanni (1513-1556), born in Candia, translator of Terence's Andria and Eunuchus, of Cicero's In V err em, and of Virgil's Aeneid, viii.

o. Orsatto (1538-1603), Venetian senator, translator of the Oedipus Tyrannus of Sophocles and author of a collection of Rime, in imitation of Petrarch. He is regarded as one of the latest representatives of the classic Italian school.

10. Geronimo, a Genoese, flourished during the latter half of the 1 6th century. He translated the Alcestis of Euripides and three of the plays of Sophocles; and wrote two original tragedies, lephte and Christo in Passione.

11. Vincenzo, who in the beginning of .the 17th century built the

Roman palace and made the art collection which are still associated with his name (see Galleria Giustiniana, Rome, 163 1). The collection was removed in 1807 to Paris, where it was to some extent broken up. In 181 5 all that remained of it, about 170 pictures, was purchased by the king of Prussia and removed to Berlin, where it forms a portion of the royal museum.

GIUSTO DA GUANTO [Jodocus, or Justus, of Ghent] (fl. 1465-1475), Flemish painter. The public records of the city of Ghent have been diligently searched, but in vain, for a clue to the history of Justus or Jodocus, whom Vasari and Guicciardini called Giusto da Guanto. Flemish annalists of the 16th century have enlarged upon the scanty statements of Vasari, and described Jodocus as a pupil of Hubert Van Eyck. But there is no source to which this fable can be traced. The registers of St Luke's gild at Ghent comprise six masters of the name of Joos or Jodocus who practised at Ghent in the 15th century. But none of the works of these masters has been preserved, and it is impossible to compare their style with that of Giusto. It was between 1465 and 1474 that this artist executed the " Communion of the Apostles " which Vasari has described, and modern critics now see to the best advantage in the museum of Urbino. It was painted for the brotherhood of Corpus Christi at the bidding of Frederick of Montefeltro, who was introduced into the picture as the companion of Caterino Zeno, a Persian envoy at that time on a mission to the court of Urbino. From this curious production it may be seen that Giusto, far from being a pupil of Hubert Van Eyck, was merely a disciple of a later and less gifted master, who took to Italy some of the peculiarities of his native schools, and forthwith commingled them with those of his adopted country. As a composer and draughtsman Giusto compares unfavourably with the better-known painters of Flanders; though his portraits are good, his ideal figures are not remarkable for elevation of type or for subtlety of character and expression. His work is technically on a level with that of Gerard of St John, whose pictures are preserved in the Belvedere at Vienna. Vespasian, a Florentine bookseller who contributed much to form the antiquarian taste of Frederick of Montefeltro, states that this duke sent to the Netherlands for a capable artist to paint a series of " ancient worthies " for a library recently erected in the palace of Urbino. It has been conjectured that the author of these " worthies," which are still in existence at the Louvre and in the Barberini palace at Rome, was Giusto. Yet there are notable divergences betweeen these pictures and the " Communion of the Apostles." Still, it is not beyond the range of probability that Giusto should have been able, after a certain

time, to temper his Flemish style by studying the masterpieces of Santi and Melozzo, and so to acquire the mixed manner of the Flemings and Italians which these portraits of worthies display. Such an assimilation, if it really took place, might justify the Flemings in the indulgence of a certain pride, considering that Raphael not only admired these worthies, but copied them in the sketch-book which is now the ornament of the Venetian Academy. There is no ground for presuming that Giusto ad Guanto is identical with Justus d'Allamagna who painted the " Annunciation " (1451) in the cloisters of Santa Maria di Castello at Genoa. The drawing and colouring of this wall painting shows that Justus d'Allamagna was as surely a native of south Germany as his homonym at Urbino was a born Netherlander.

QIVET, a town of northern France, in the department of Ardennes, 40 m. N. by E. of Mezieres on the Eastern railway between the town and Namur. Pop. (1906) town, 51 10; commune, 7468. Givet lies on the Meuse about 1 m. from the Belgian frontier, and was formerly a fortress of considerable importance. It is divided into three portions — the citadel called Charlemont and Grand Givet on the left bank of the river, and on the opposite bank Petit Givet, connected with Grand Givet by a stone bridge of five arches. The fortress of Charle- mont, situated at the top of a precipitous rock 705 ft. high, was founded by the emperor Charles V. in the 16th century, and further fortified by Vauban at the end of the 17th century; it is the only survival of the fortifications of the town, the rest of which were destroyed in 1892. In Grand Givet there are a church and a town-hall built by Vauban, and a statue of the composer Etienne Mehul stands in the fine square named after him. Petit Givet, the industrial quarter, is traversed by a small tributary of the Meuse, the Houille, which is bordered by tanneries and glue factories. Pencils and tobacco-pipes are also manufactured. The town has considerable river traffic, consisting chiefly of coal, copper and stone. There is a chamber of arts and manufactures.

GIVORS, a manufacturing town of south-eastern France, in the department of Rh6ne, on the railway between Lyons and St Etienne, 14 m. S. of Lyon. Pop. (1906) 11,444. It is situated on the right bank of the Rhone, here crossed by a suspension bridge, at its confluence with the Gier and the canal of Givors, which starts at Grand Croix on the Gier, some 13 m. distant. The chief industries are metal-working, engineering-construction and glass-working. There are coal mines in the vicinity. On the hill overlooking the town are the ruins of the chateau of St Gerald and of the convent of St Ferreol, remains of the old town destroyed in 1594.

GJALLAR, in Scandinavian mythology, the horn of Heimdall, the guardian of the rainbow bridge by which the gods pass and repass between earth and heaven. This horn had to be blown whenever a stranger approached the bridge.

GLABRIO. 1. Manius Acilius Glabrio, Roman statesman and general, member of a plebeian family. When consul in 191 B.C. he defeated Antiochus the Great of Syria at Thermopylae, and compelled him to leave Greece. He then turned his attention to the Aetolians, who had persuaded Antiochus to declare war against Rome, and was only prevented from crushing them by the intercession of T. Quinctius Flamininus. In 189 Glabrio was a candidate for the censorship, but was bitterly opposed by the nobles. He was accused by the tribunes of having concealed a portion of the Syrian spoils in his own house; his legate gave evidence against him, and he withdrew his candi- dature. It is probable that he was the author of the law which left it to the discretion of the pontiffs to insert or omit the intercalary month of the year.

Censorinus, De die natali, xx. ; Macrobius, Saturnalia, i. 13; index to Livy; Appian, Syr. 17-21.

2. Manius Acilius Glabrio, Roman statesman and general, grandson of the famous jurist P. Mucius Scaevola. When praetor urbanus (70 B.C.) he presided at the trial of Verres. According to Dio Cassias (xxxvi. 38), in conjunction with L. Calpurnius Piso, his colleague in the consulship (67), he brought forward a severe law (Lex Acilia Calpurnia) against

illegal canvassing at elections. In the same year he was ap- pointed to supersede L. Lucullus in the government of Cilicia and the command of the war against Mithradates, but as he did absolutely nothing and was unable to control the soldiery, he was in turn superseded by Pompey according to the provisions of the Manilian law. Little else is known of him except that he declared in favour of the death punishment for the Catilinarian conspirators.

Dio Cassius xxxvi. 14, 16. 24; Cicero, Pro lege Manilia, 2. 9; Appian, Mithrid. 90.

GLACE BAY, a city and port of entry of Cape Breton county, Nova Scotia, Canada, on the Atlantic Ocean, 14 m. E. of Sydney, with which it is connected both by steam and electric railway. It is the centre of the properties of the Dominion Coal Company (founded 1893), which produce most of the coal of Nova Scotia. Though it has a fair harbour, most of the shipping is done from Sydney in summer and from

Louisburg in winter. Pop. (1892)

2000; (1901) 6945; (1906) 13,000.

GLACIAL PERIOD, in geology, the name usually given, by English and American writers, to that comparatively recent time when all parts of the world suffered a marked lowering of temperature, accompanied in northern Europe and North America by glacial conditions, not unlike those which now characterize the Polar regions. This period, which is also known as the ” Great Ice Age ” (German Die Eiszeit), is synchronous with the Pleistocene period, the earlier of the Post-Tertiary or Quaternary divisions of geological time. Although ” Glacial period ” and ” Pleistocene ” (q.v.) are often used synonymously it is convenient to consider them separately, inasmuch as not a few Pleistocene formations have no causal relationship with conditions of glaciation. Not until the begin- ning of the 19th century did the deposits now generally recog- nized as the result of ice action receive serious attention; the tendency was to regard such superficial and irregular material as mere rubbish. Early ideas upon the subject usually assigned floods as the formative agency, and this view is still not without its supporters (see Sir H. H. Howorth, The Glacial Nightmare and the Flood). Doubtless this attitude was in part due to the comparative rarity of glaciers and ice-fields where the work of ice could be directly observed. It was natural therefore that the first scientific references to glacial action should have been stimulated by the Alpine regions of Switzerland, which called forth the writings of J. J. Scheuchzer, B. F. Kuhn, H. B. de Saussure, F. G. Hugi, and particularly those of J. Venetz, J. G. von Charpentier and L. Aggasiz. Canon Rendu, J. Forbes and others had studied the cause of motion of glaciers, while keen observers, notably Sir James Hall, A. Brongniart and J. Playfair, had noted the occurrence of travelled and scratched stones.

The result of these efforts was the conception of great ice-sheets flowing over the land, grinding the rock surfaces and transporting rock debris in the manner to be observed in the existing glaciers. However, before this view had become established Sir C. Lyell evolved the ” drift theory ” to explain the widely spread pheno- menon of transported blocks, boulder clay and the allied deposits; in this he was supported by Sir H. de la Beche, Charles Darwin, Sir R. I. Murchison and many others. According to the drift theory; the transport and distribution of ” erratic blocks,” &c, had been effected by floating icebergs; this view naturally involved a considerable and widespread submergence of the land, an assumption which appeared to receive support from the occasional presence of marine shells at high levels in

the ” drift ” deposits. So great was the influence of those who favoured the drift theory that even to-day it cannot be said to have lost complete hold; we still speak of ” drift ” deposits in England and America, and the belief in one or more great sub- mergences during the Glacial period is still held more firmly by certain geologists than the evidence would seem to warrant. The case against the drift theory was most clearly expressed by Sir A. C. Ramsay for England and Scotland, and by the Swedish scientist Otto Torell. Since then the labours of Professor James Geikie, Sir Archibald Geikie, Professor P. Kendall and

others in England; von Verendt, H. Credner, de Geer, E. Geinitz, A. Helland, Jentzsch, K. Keilhack, A. Penck, H. Schroder, F. Wahnschaffe in Scandinavia and Germany; T. C. Chamberlin, W. Upham, G. F. Wright in North America, have all tended to confirm the view that it is to the movement of glaciers and ice-sheets that we must look as the predominant agent of transport and abrasion in this period. The three stages through which our knowledge of glacial work has advanced may thus be summarized: (i) the diluvial hypothesis, deposits formed by floods; (2) the drift hypothesis, deposits formed mainly by icebergs and floating ice; (3) the ice-sheet hypothesis, deposits formed directly or indirectly through the agency of flowing ice.

Evidences. — The evidence relied upon by geologists for the former existence of the great ice-sheets which traversed the northern regions of Europe and America is mainly of two kinds: (1) the peculiar erosion of the older rocks by ice and ice-borne stones, and (2) the nature and disposition of ice-borne rock debris. After having established the criteria by which the work of moving ice is to be recognized in regions cf active glaciation, the task of identifying the results of earlier glaciation elsewhere has been carried on with unabated energy.

1. Ice Erosion. — Although there are certain points of difference between the work of glaciers and broad ice-sheets, the former

Map showing the

maximum extension of the* Ice Sheets in the

Glacial Period /

■«*•

BˆU Areas not affected by extreme ataciation-~ =ˆ

S =: The Scandinauian Centrr T “ˆ

C ■= 7ht Cordilleran Centre , ˆ

K = The Keewatin Centre ■ — · v

L = The Labrador or Lavrent’ide Centre »— o

Arrou/s indicate the direction of Ice-flow E.tr.«o

being more or less restricted laterally by the valleys in which they flow, the general results of their passage over the rocky floor are essentially similar. Smooth rounded outlines are imparted to the rocks, markedly contrasting with the pinnacled and irregular surfaces produced by ordinary weathering; where these rounded surfaces have been formed on a minor scale the well-known features of roches moutonnees (German Rundhocker) are created; on a larger scale we have the erosion-form known as ” crag and tail,” when the ice-sheet has overridden ground with more pronounced contours, the side of the hill facing the advancing ice being rounded and gently curved (German Stossseile), and the opposte side (Leeseite) steep, abrupt and much less smooth. Such features are never associated with the erosion of water. The rounding of rock surfaces is regularly accompanied by grooving and striation (German Schrammen, Schlife) caused by the grinding action of stones and boulders embedded in the moving ice. These ” glacial striae ” are of great value in determining the latest path of .the vanished ice- sheets (see map). Several other erosion-features are generally associated with ice action; such are the circular-headed valleys, ” cirques ” or ” corries ” (German Zirkus) of mountain districts; the pot-holes, giants’ kettles (Strudellocher, Riesentopfe) , familiarly exemplified in the Gletschergarten near Lucerne; the ” rock-basins ” (Felsseebecken) of mountainous regions are also believed to be assignable to this cause on account of their frequent association with other glacial phenomena, but it is more than probable that the action of running water (waterfalls, &c.) —

influenced no doubt by the disposition of the ice— has had much to do with these forms of erosion. As regards rock-basins, geologists are still divided in opinion: Sir A. C. Ramsay, J. Geikie, Tyndall, Heiland, H. Hess, A. Penck, and others have expressed themselves in favour of a glacial origin; while A. Heim, F. Stapff, T. Kjerulf, L. Riitimeyer and many others have strongly opposed this view.

2. Glacial deposits may be roughly classified in two .groups: those that

have been formed directly by the action of the ice, and those formed through the agency of water flowing under, upon, and from the ice-sheets, or in streams and lakes modified by the presence of the ice. To differentiate in practice between the results of these two agencies is a matter of some difficulty in the case of unstratified deposits; but the boulder clay may be taken as the typical formation of the glacier or ice-sheet, whether it has been left as a terminal moraine at the limit of glaciation or as a ground moraine beneath the ice. A stratified form of boulder clay, which not infrequently rests upon, and is therefore younger than, the more typical variety, is usually regarded as a deposit formed by water from the material (englacial, innenmordn) held in suspension within the ice, and set free during the process of melting. Besides the innumerable boulders, large and small, embedded in the boulder clay, isolated masses of rock, often of enormous size, have been borne by ice- sheets far from their original home and stranded when the ice melted. These ” erratic blocks,” ” perched blocks ” (German Findlinge) are familiar objects in the Alpine glacier districts, where they have frequently received individual names, but they are just as easily recognized in regions from which the glaciers that brought them there have long since been banished. Not only did the ice transport blocks of hard rock, granite and the like, but huge masses of stratified rock were torn from their bed by the same agency; the masses of chalk in the cliffs near Cromer are well known; near Berlin, at Firkenwald, there is a transported mass of chalk estimated to be at least 2,000,000 cubic metres in bulk, which has travelled probably 1 5 kilometres from its original site; a block of Lincolnshire oolite is recorded by C. Fox-Strangways near Melton in Leicestershire, which is 300 yds. long and 100 yds. broad if no more; and instances of a similar kind might be multiplied.

When we turn to the ” fluvio-glacial ” deposits we find a bewildering variety of stratified and partially bedded deposits of gravel, sand and clay, occurring separately or in every conceivable condition of association. Some of these deposits have received distinctive names; such are the ” Karnes ” of Scotland, which are represented in Ireland by ” Eskers,” and in Scandinavia by ” Asar.” Another type of hillocky deposit is exemplified by the ” drums ” or ” drumlins.” Everywhere beyond the margin of the advancing or retreating ice-sheets these deposits were being formed; streams bore away coarse and fine materials and spread them out upon alluvial plains or upon the floors of innumerable lakes, many of which were directly caused by the damming of the ordinary water-courses by the ice. As the level of such lakes was changed new beach-lines were produced, such as are still evident in the great lake region of North America, in the parallel roads

of Glen Roy, and the ” Strandlinien ” of many parts of northern Europe.

Viewed in relation to man’s position on the earth, no geological changes have had a more profound importance than those of the Glacial period. The whole of the glaciated region bears evidence of remarkable modification of topographic features; in parts of Scotland or Norway or Canada the old rocks are bared of soil, rounded and smoothed as far as the eye can see. The old soil and subsoil, the product of ages of ordinary weathering, were removed from vast areas to be deposited and concentrated in others. Old valleys were filled — often to a great depth, 300-400 ft.; rivers were diverted from their old courses, never to return; lakes of vast size were caused by the damming of old outlets (Lake Lahontan, Lake Agassiz, &c, in North America), while an infinite number of shifting lakelets — with their deposits — played an important part along the ice-front at all stages of its career. The influence of this period upon the present

distribution of plant and animal life in northern latitudes can hardly be overestimated.

Much stress has been laid upon supposed great changes in the level of the land in northern regions during the Glacial period. The occurrence of marine shells at an elevation of 1350 ft. at Moel Tryfaen in north Wales, and at 1200 ft. near Macclesfield in Cheshire, has been cited as evidence of profound submergence by some geologists, though others see in these and similar occurrences only the transporting action of ice-sheets that have traversed the floor of the adjoining seas. Marine shells in stratified materials have been found on the coast of Scotland at 100 ft. and over, in S. Scandinavia at 600 to 800 ft., and in the ” Champlain ” deposits of North America at various heights. The dead shells of the ” Yoldia clay ” cover wide areas at the bottom of the North Atlantic at depths from 500 to 1300 fathoms, though the same mollusc is now found living in Arctic seas at the depth of 5 to 1 5 fathoms. This has been looked upon as a proof that in the N.W. European region the lithosphere stood about 2600 ft. higher than it does now (Brogger, Nansen, &c), and it has been suggested that a union of the mainland of Europe with that of North America — forming a northern con- tinental mass, ” Prosarctis ” — may have been achieved by way of Iceland, Jan Mayen Land and Greenland. The pre-glacial valleys and fjords of Norway and Scotland, with their

deeply submerged seaward ends, are regarded as proofs of former elevation. The great depth of alluvium in some places (236 metres at Bremen) points in the same direction. Evidences of changes of level occur in early, middle and late Pleistocene formations, and the nature of the evidence is such that it is on the whole safer to assume the existence only of the more moderate degree of change.

The Cause of the Glacial Period. — Many attempts have been made to formulate a satisfactory hypothesis that shall conform with the known facts and explain the great change in climatic conditions which set in towards the close of the Tertiary era, and culminated during the Glacial period. Some of the more prominent hypotheses may be mentioned, but space will not permit of a detailed analysis of theories, most of which rest upon somewhat unsubstantial ground. The principal facts to be taken into consideration are (1) the great lowering of temperature over the whole earth; (2) the localization of extreme glaciation in north-west Europe and north-east America; and (3) the local retrogression of the ice-sheets, once or more times repeated.

Some have suggested the simple solution of a change in the earth's axis, and have indicated that the pole may have travelled through some 15° to 20° of latitude; thus, the polar glaciation, as it now exists, might have been in this way transferred to include north-west Europe and North America; but modern views on the rigidity of the earth's body, together with the lack of any evidence of the correlative movement of climatic zones in other parts of the world, render this hypothesis quite untenable. On similar grounds a change in the earth's centre of gravity is unthinkable. Theories based upon the variations in the obliquity of the ecliptic or eccentricity of the earth's orbit, or on the passage of the solar system through cold regions of space, or upon the known variations in the heat emitted by the sun, are all insecure and unsatisfactory. The hypothesis elaborated by James Croll {Phil. Mag., 1864, 28, p. 121; Climate and Time, 1875; and Discussion on Climate and Cosmology, 1889) was founded upon the assumption that with the earth's eccentricity at its maximum and winter in the north at aphelion, there would be a tendency in northern latitudes for the accumulation of snow and ice, which would be accentuated indirectly by the formation of fogs and a modification of the trade winds. The shifting d'f the thermal equator, and with it the direction of the trade winds, would divert some of the warm ocean currents from the cold regions, and this effect was greatly enhanced, he considered, by the configuration of the Atlantic Ocean. Croll's hypothesis was supported by Sir R. Ball {The Cause of the Great Ice Age, 1893), and it met with very general acceptance; but it has been destructively criticized by

Professor S. Newcomb {Phil.

Mag., 1876, 1883, 1884) and by E. P. Culverwell {Phil. Mag., 1894, p. 541, and Geol. Mag., 1895, pp. 3 and 55). The difficulties in the way of Croll's theory are: (1) the fundamental assump- tion, that midwinter and midsummer temperatures are directly proportional to the sun's heat at those periods, is not in accord- ance with observed facts; (2) the glacial periods would be limited in duration to an appropriate fraction of the precessional period (21,000 years), which appears to be too short a time for the work that was actually done by ice agency; and (3) Croll's glacial periods would alternate between the northern and southern hemispheres, affecting first one then the other. Sir C. Lyell and others have advocated the view that great elevation of the land in polar regions would be conducive to glacial condi- tions; this is doubtless true, but the evidence that the Glacial period was primarily due to this cause is not well established. Other writers have endeavoured to support the elevation theory by combining with it various astronomical and meteorological agencies. More recently several hypotheses have been advanced to explain the glacial period as the result of changes in the atmosphere; F. W. Harmer (" The Influence of Winds upon the Climate during the Pleistocene Epoch," Q.J.G.S., 1901, 57, p. 405) has shown the importance of the influence of winds in certain circumstances; Marsden Manson (" The Evolution of Climate," American Geologist, 1899, 24, p. 93) has laid stress upon the influence of clouds; but neither of these theories grapples successfully with the fundamental difficulties. Others again have requisitioned the variability in the amount of the carbon dioxide in the atmosphere — hypotheses which depend upon the efficiency of this gas as a thermal absorbent. The supply of carbon dioxide may be increased from time to time, as by the emanations from volcanoes (S. Arrhenius and A. G. Hogbom), or it may be decreased by absorption into sea- water, and by the carbonation of rocks. Professor T. C. Chamberlin based a theory of glaciation on the depletion of the carbon dioxide of the air (" An Attempt to frame a Working Hypothesis of the cause of Glacial Periods on an Atmospheric Basis," Jl. Geol., 1899, vii. 752-771; see also Chamberlin and Salisbury, Geology, 1906, ii. 674 and iii. 432). The outline of this hypothesis is as follows: The general conditions for glaciation were (1) that the oceanic circulation was interrupted by the existence of land; (2) that vertical circulation of the atmosphere was accelerated by continental and other influences; (3) that the thermal blanketing of the earth was reduced by a depletion of the moisture and carbon dioxide in the atmosphere, and that hence the average temperature of the surface of the earth and of the body of the ocean was reduced, and diversity in

the distribution of heat and moisture introduced. The localization of glaciation is assignable to the two great areas of permanent atmospheric depression that have their present centres near Greenland and the Aleutian Islands respectively. The periodicity of glacial advances and retreats, demanded by those who believe in the validity of so-called ” interglacial ” epochs, is explained by a series of complicated processes involving the alternate depletion and completion of the normal charge of carbon dioxide in the air.

Whatever may be the ultimate verdict upon this difficult subject, it is tolerably clear that no simple cause of glacial conditions is likely to be discovered, but rather it will appear that these conditions resulted from the interaction of a compli- cated series of factors; and further, until a greater degree of unanimity can be approached in the interpretation of observed facts, particularly as regards the substantiality of interglacial epochs, the very foundations of a sound working hypothesis are wanting.

Classification of Glacial Deposits — Interglacial Epochs. — Had the deposits of glaciated regions consisted solely of boulder clay little difficulty might have been experienced in dealing with their classification. But there are intercalated in the boulder clays those irregular stratified and partially stratified masses of sand, gravel and loam, frequently containing marine or freshwater shells and layers of peat with plant remains, which have given rise to the conception of H Interglacial epochs” —

pauses in the rigorous conditions of glaciation, when the ice- sheets dwindled almost entirely away, while plants and animals re-established themselves on the newly exposed soil. Glacialists may be ranged in two schools: those who believe that one or more phases of milder climatic conditions broke up the whole Glacial period into alternating epochs of glaciation and “de- glaciation”; and those who believe that the intercalated deposits represent rather the localized recessional movements of the ice-sheets within one single period of glaciation. In addition to the stratified deposits and their contents, important evidence in favour of interglacial epochs occurs in the presence of weathered surfaces on the top of older boulder clays, which are themselves covered by younger glacial deposits.

The cause of the interglacial hypothesis has been most ardently

championed in England by Professor James Geikie; who has endeavoured to show that there were in Europe six distinct glacial epochs within the Glacial period, separated by five epochs of more moderate temperature. These are enumerated below :

6th Glacial epoch, Upper Turbarian, indicated by the deposits of peat which underlie the lower raised beaches. 5th Interglacial epoch, Upper Forestian.

5th Glacial epoch, Lower Turbarian, indicated by peat deposits overlying the lower forest-bed, by the raised beaches and carse- clays of Scotland, and in part by the Littorina-c\a.ys of Scandinavia. 4th Interglacial epoch, Lower Forestian, the lower forests under peat beds, the Ancylus-beds of the great freshwater Baltic lake and the Liltorina-clays of Scandinavia.

4th Glacial epoch, Mecklenburgian, represented by the moraines of the last great Baltic glacier, which reach their southern limit in Mecklenburg; the 100-ft. terrace of Scotland and the Yoldia-beds of Scandinavia.

3rd Interglacial epoch, Neudechian, intercalations of marine and

freshwater deposits in the boulder clays of the southern Baltic coasts.

3rd Glacial epoch, Polandian, glacial and fluvio-glacial formations

of the minor Scandinavian ice-sheet; and the ” upper boulder clay”

of northern and western Europe.

2nd Interglacial epoch, Helvetian, interglacial beds of Britain and lignites of Switzerland.

2nd Glacial epoch, Saxonian, deposits of the period of maximum jlaciation when the northern ice-sheet reached the low ground of Saxony, and the Alpine glaciers formed the ou termost moraines. 1st Interglacial epoch, Norfolkian, the forest-bed series of Norfolk. 1st Glacial epoch, Scanian, represented only in the south of Sweden, svhich was overridden by a large Baltic glacier. The Chillesford clay and Weybourne crag of Norfolk and the oldest moraines and fluvio-glacial gravels of the Arctic lands may belong to this epoch.

In a similar manner Professor Chamberlin and other American geologists have recognized the following stages in the glaciation of North America :

The Champlain, marine substage. The Glacio-lacustrine substage. The later Wisconsin (6th glacial). The fifth interglacial. The earlier Wisconsin (5th glacial). The Peorian (4th inter-glacial). The Iowan (4th glacial). The Sangamon (3rd interglacial). The Illinoian (3rd glacial). The Yarmouth or Buchanan (2nd interglacial). The Kansan (2nd glacial). The Aftonian (1st interglacial). The sub-Aftonian or Jerseyan (1st glacial). Although it is admitted that no strict correlation of the European and North American stages is possible, it has been suggested that the Aftonian may be the equivalent of the Helvetian; the Kansan may represent the Saxonian; the Iowan, the Poiandian; the Jerseyan, the Scanian; the early Wisconsin, the Mecklenburgian. But considering how fragmentary is much of the evidence in favour of these stages both in Europe and America, the value of such attempts at correlation jnust be infinitesimal. This is the more evident when it is observed that there are other geologists of equal eminence who are unable to accept so large a number of epochs after a close study of the local circumstances; thus, in the sub- joined scheme for north Germany, after H. W. Munthe, there are three glacial and two interglacial epochs.

fThe My a time = beech-time. Post-Glacial epoch -j The Litlorina time = oak-time.

[The Ancylus time = pine- and birch-time.

flncluding the upper boulder clay,

■ r i • , ,1 J ” younger Baltic moraine ” with the

3rd Ulaciai < Y oldia or Dryas phase in the retro-

(. gressive stage. 2nd Interglacial epoch including the Cyprina-c\a.y. 2nd Glacial epoch, the maximum glaciation. 1st Interglacial epoch. 1st Glacial epoch, ” older boulder clay.”

Again, in the Alps four interglacial epochs have been recognized ; while in England there are many who are willing to concede one such epoch, though even for this the evidence is not enough to satisfy all glacialists (G. W. Lamplugh, Address, Section C, Brit. Assoc, York, 1906).

This great diversity of opinion is eloquent of the difficulties of the subject ; it is impossible not to see that the discovery of interglacial epochs bears a close relationship to the origin of certain hypotheses of the cause of glaciation; while it is significant that those who have had to do the actual mapping of glacial deposits have usually greater

difficulty in finding good evidence of such definite ameliora- tions of climate, than those who have founded their views upon the examination of numerous but isolated areas.

Extent of Glacial Deposits. — From evidence of the kind cited above, it appears that during the glacial period a series of great ice-sheets covered enormous areas in North America and north-west Europe. The area covered during the maximum extension of the ice has been reckoned at 26 million square kilometres (nearly 8 million sq. m.) in North America and 6J million square kilometres (about 2j million sq. m.) in Europe.

In Europe three great centres existed from which the ice-streams radiated; foremost in importance was the region of Fennoscandia (the name for Scandinavia with Finland as a single geological region) ; from this centre the ice spread out far into Germany and Russia and westward, across the North Sea, to the shores of Britain. The southern boundary of the ice extended from the estuary of the Rhine in an irregular series of lobes along the Schiefergebirge, Harz, Thuringerwald, Erzgebirge and Riesengebirge, and the northern flanks of the Carpathians towards Cracow. Down the valley of the Dnieper a lobe of the ice-sheet projected as far as 40 50′ N. ; another lobe extended down the Don valley as far as 48 N. ; thence the boundary runs north-easterly towards the Urals and the Kara Sea. The British Islands constituted the centre second in import- ance; Scotland, Ireland and all but the southern part of England were covered by a moving ice-cap. On the west the ice-sheets reached out to sea; on the east they were conterminous with those from Scandinavia. The third European centre was the Alpine region; it is abundantly clear from the masses of morainic detritus and perched blocks that here, in the time of maximum glaciation, the ice-covered area was enormously in excess of the shrivelled remnants, which still remain in the existing glaciers. All the valleys were filled with moving ice; thus the Rhone glacier at its maximum filled Lake Geneva and the plain between the Bernese Oberland and the Jura ; it even overrode the latter and advanced towards Besanoon. Ex- tensive glaciation was not limited to the aforesaid regions, for all the areas of high ground had their independent glaciers strongly developed; the Pyrenees, the central highlands of France, the Vosges, Black Forest, Apennines and Caucasus were centres of minor but still important glaciation.

The greatest expansion of ice-sheets was located on the North American continent; here, too, there were three principal centres of outflow: the ” Cordilleran ” ice-sheet in the N.W., the ” Kee- watin ” sheet, radiating from the central Canadian plains, and the eastern ”

Labrador ” or ” Laurentide ” sheet. From each of these centres the ice poured outwards in every direction, but the principal flow in each case was towards the south-west. The southern boundary of the glaciated area runs as an irregular line along the 49° parallel in the western part of the continent, thence it follows the Mississippi valley down to its junction with the Ohio (southern limit 37 30′ N.), eastward it follows the direction of that river and turns north-eastward in the direction of New Jersey. As in Europe, the mountainous regions of North America produced their own local glaciers; in the Rockies, the Olympics and Sierras, the Bighorn Mountains of Wyoming, the Uinta Mountains of Utah, &c. Although it was in the northern hemisphere that the most extensive glaciation took place, the effects of a general lowering of temperature seem to have been felt in the mountainous regions of all parts ; thus in South America, New Zealand, Australia and Tasmania glaciers reached down the valleys far below the existing limits, and even where none are now to be found. In Asia the evidences of a former extension of glaciation are traceable in the Himalayas, and northward in the high ranges of China and Eastern Siberia. The same is true of parts of Turkestan and Lebanon. InAfricaalso, in British East Africa moraines are discovered 5400 ft. below their modern limit. In Iceland and Greenland, and even in the Antarctic, there appears to be evidence of a former greater extension of the ice. It is of interest to note that Alaska seems to be free from excessive glaciation, and that a remark- able ” driftless ” area lies in Wisconsin. The maximum glaciation of the Glacial period was clearly centred around the North Atlantic.

Glacial Epochs in the Older Geological Periods. — Since Ramsay drew attention to the subject in 1855 (” On the occurrence of angular, subangular, polished and striated fragments and boulders in the Permian Breccia of Shropshire, Worcestershire, &c, and on the probable existence of glaciers and icebergs in the Permian epoch,” Q.J.G.S., 1855, pp. 185-205), a good deal of attention has been paid to such formations. It is now generally acknowledged that the Permo-carboniferous conglomerates with striated boulders and

eolished rock surfaces, such as are found in the Karoo formation of outh Africa, the Talkir conglomerate of the Salt Range in India, and the corresponding formations in Australia, represent undeniable

glacial conditions at that period on the great Indo-Australian

continent. A glacial origin has been suggested for numerous other conglomeratic formations, such as the Pre-Cambrian Torridonian of Scotland, and ” Geisaschichten ” of Norway ; the basal Carboniferous conglomerate of parts of England ; the Permian breccias of England and parts of Europe; the Trias of Devonshire; the coarse conglomerates in the Tertiary Flysch in central Europe ; and the Miocene conglomerates of the Ligurian Apennines. In regard to the glacial nature of all these formations there is, however, great divergence of opinion (see A. Heim, ” Zur Frage der exotischen Blocke in Flysch,” Eclogae geologicae Helvetiae, vol. ix. No. 3, 1907, pp. 413-424).

Authorities. — The literature dealing directly with the Glacial period has reached enormous dimensions; in addition to the works already mentioned the following may be taken as a guide to the general outline of the subject: J. Geikie, The Great Ice Age (3rd ed., London, 1904), also Earth Sculpture (1898); G. F. Wright, The Ice Age in North America (4th ed., New York, 1905) and Man and the Glacial Period (1892) ; F. E. Geinitz, Die Eiszeit (Braunschweig, 1906) ; A. Penck and E. Bruckner, Die Alpen im Eiszeitalter (Leipzig, 1901-1906, uncompleted). Many references to the literature will be found in Sir A. Geikie’s Textbook of Geology, vol. ii. (4th ed., 1903) ; Chamberlin and Salisbury, Geology, vol. iii. (1906). As an example of glacial theories carried beyond the usual limits, see M. Gugenhan, Die Ergletscherung der Erde von Pol zu Pol (Berlin, 1906). See also Zeitschrift fur Gletscherkunde (Berlin, 1906 and onwards quarterly); Sir H. H. Howorth (opposing accepted glacial theories), The Glacial Nightmare and the Flood, i., ii. (London, 1893), Ice and Water, i., ii. (London, 1905), The Mammoth and the Flood (London, 1887).

(J.A.H.)

GLACIER (adopted from the French; from glace, ice, Lat. glacies), a mass of compacted ice originating in a snow-field. Glaciers are formed on any portion of the earth’s surface that is permanently above the snow-line. This line varies locally in the same latitudes, being in some places higher than in others, but in the main it may be described as an elliptical shell surround- ing the earth with its longest diameter in the tropics and its shortest in the polar regions, where it touches sea-level. From the extreme regions of the Arctic and Antarctic circles this cold shell swells upwards into a broad dome, from 15,000 to 18,000 ft. high over the tropics, truncating, as it rises, a number of peaks and mountain ranges whose upper portions like all regions above this thermal shell receive all their moisture in the form of snow. Since the temperature above the snow-line is below freezing point evaporation is very slight, and as the snow is solid it tends to accumulate in snow-

fields, where the snow of one year is covered by that of the next, and these are wrapped aver many deeper layers that have fallen in previous years. If these piles of snow were rigid and immovable they would increase in height until the whole field rose above the zone of ordinary atmospheric precipitation, and the polar ice-caps would add a load to these regions that would produce far-reaching results. The mountain regions also would rise some miles in height, and all their features would be buried in domes of snow some miles in thickness. When, however, there is sufficient weight the rnass yields to pressure and flows outwards and downwards. Thus a balance of weight and height is established, and the ice-field is disintegrated principally at the edges, the surplus in polar regions being carried off in the form of icebergs, and in mountain regions by streams that flow from the melting ends of the glaciers.

Formation. — The formation of glaciers is in all cases due to similar causes, namely, to periodical and intermittent falls of snow. After a snow-fall there is a period of rest during which the snow becomes compacted by pressure and assumes the well-known granular character seen in banks and patches of ordinary snow that lie longest upon the ground when the snow is melting. This is the firn or nivi. The next fall of snow covers and conceals the neve, but the light fresh crystals of this new snow in turn become compacted to the coarsely crystalline granular form of the underlying layer and become neve in turn. The process goes on continually; the lower layers become subject to greater and greater pressure, and in consequence become gradually compacted into dense clear ice, which, however, retains its granular crystalline texture throughout. The upper layers of neve are usually stratified, owing to some individual peculiarity in the fall, or to the accumulation of dust or debris upon the surface before it is covered by fresh snow. This stratification

is often visible on the emerging glacier, though it is to be distinguished from the foliation planes caused by shearing movement in the body of the glacier ice.

Types. — The snow-field upon which a glacier depends is always formed when snow-fall is greater than snow-waste. This occurs under varying conditions with a differently resulting type of glacier. There are limited fields of snow in many mountain regions giving rise to long tongues of ice moving slowly down the valleys and therefore called ” valley glaciers.” The greater part of Greenland is covered by an ice-cap extending over nearly 400,000 sq. m., forming a kind of enormous continuous glacier on its lower slopes. The Antarctic ice region is believed to extend over more than 3,000,000 sq. m. Each of

these continental fields, besides producing block as distinguished from tongue glaciers, sends into the sea a great number of ice- bergs during the summer season. These ice-caps covering great regions are by far the most important types. Between these ” polar ” or ” continental glaciers ” and the ” alpine ” type there are many grades. Smaller detached ice-caps may rest upon high plateaus as in Iceland, or several tongues of ice coming down neighbouring valleys may splay out into convergent lobes on lower ground and form a ” piedmont glacier ” such as the Malaspina Glacier in Alaska. When the snow-field lies in a small depression the glacier may remain suspended in the hollow and advance no farther than the edge of the snow-field. This is called a ” cliff -glacier,” and is not uncommon in mountain regions. The end of a larger glacier, or the edge of an ice-sheet, may reach a precipitous cliff, where the ice will break from the edge of the advancing mass and fall in blocks to the lower ground, where a ” reconstructed glacier ” will be formed from the frag- ments and advance farther down the slope.

When a glacier originates upon a dome-shaped or a level surface the ice will deploy radially in all directions. When a snow-field is formed above steep valleys separated by high ridges the ice will flow downwards in long streams. If the valleys under the snow-fields are wide and shallow the resultant glaciers will broaden out and partially fill them, and in all cases, since the conditions of glacier formation are similar, the resultant form and the direction of motion will depend upon the amount of ice and the form of the surface over which the glacier flows. A glacier flowing down a narrow gorge to an open valley, or on to a plain, will spread at its foot into a fan-shaped lobe as the ice spreads outwards while moving downwards. An ice-cap is in the main thickest at the centre, and thins out at the edges. A valley glacier is thickest at some point between its source and its end, but nearer to its source than to its termination, but its thickness at various portions will depend upon the contour of the valley floor over which the glacier rides, and may reach many hundreds of feet. At its centre the Greenland ice-cap is estimated to be over 5000 ft. thick. In all cases the glacier ends where the waste of ice is greater than the supply, and since the relationship varies in different years, or cycles of years, the end of a glacier may advance or retreat in harmony with greater or less snow-fall or with cooler or hotter summers. There seems to be a cycle of inclusive contraction and expansion of from 35 to 40 or 50 years. At present the ends of the Swiss glaciers are cradled in a mass of moraine-stuff due to former extension of the glaciers, and investigations in India show that in some parts of the Himalayas the glaciers are retreating as they are in North America and even in the

southern hemisphere {Nature, January 2, 1908, p. 201).

Movement. — The fact that a glacier moves is easily demon- strated; the cause of the movement is pressure upon a yielding mass; the nature of the movement is still under discussion. Rows of stakes or stones placed in line across a glacier are found to change their position with respect to objects on the bank and also with regard to each other. The posts in the centre of the ice-stream gradually move away from those at the side, proving that the centre moves faster than the sides. It has also been proved that the surface portions move more rapidly than the deeper layers and that the motion is slowest at the sides and bottom where friction is greatest.

The rate of motion past the same spot is not uniform. Heat accelerates it, cold arrests it, and the pressure of a large amount of water stimulates the flow. The rate of flow under the same conditions varies at different parts of the glacier directly as the thickness of ice, the steepness of slope and the smoothness of rocky floor. Generally speaking, the rate of motion depends upon the amount of ice that forms the ” head ” pressure, the slope of the under surface and of the upper surface, the nature of the floor, the temperature and the amount of water present in the ice. The ordinary rate of motion is very slow. In Switzer- land it is from i or 2 in. to 4 ft. per day, in Alaska 7 ft., in Green- land 50 to 60 ft., and occasionally 100 ft. per day in the height of summer under exceptional conditions of quantity of ice and of water and slope. Measurements of Swiss glaciers show that near the ice foot where wastage is great there is very little movement, and observations upon the inland border of Greenland ice show that it is almost stationary over long distances. In many aspects the motion of a body of ice resembles that of a body of water, and an alpine glacier is often called an ice-river, since like a river it moves faster in the centre than at the sides and at the top faster than at the bottom. A glacier follows a curve in the same way as a river, and there appear to be ice swirls and eddies as well as an upward creep on shelving curves recalling many features of stream action. Th6 rate of motion of both ice-stream and river is accelerated by quantity and steepness of slope and retarded by roughness of bed, but here the comparison ends, for temperature does not affect the rate of water motion, nor will a liquid crack into crevasses as a glacier does, or move upwards over an adverse slope as a glacier always does when there is sufficient ” head ” of ice above it. So that although in many respects ice behaves as a

viscous fluid the comparison with such a fluid is not perfect. The cause of glacier motion must be based upon some more or less complex considera- tions. The flakes of snow are gradually transformed into granules because ‘ the points and angles of the original flakes melt and evaporate more readily than the more solid central portions, which become aggregated round some master flake that continues to grow in the neve at the expense of its smaller neighbours, and increases in size until finally the glacier ice is composed of a mass of interlocked crystalline granules, some as large as a walnut, closely compacted under pressure with the principal crystalline axes in various directions. In the upper portions of the glacier movement due to pressure probably takes place by the gliding of one granule over another. In this connexion it must be noted that pressure lowers the melting point of ice while tension raises it, and at all points of pressure there is therefore a tendency to momentary melting, and also to some evaporation due to the heat caused by pressure, and at the intermediate tension spaces between the points of pressure this resultant liquid and vapour will be at once re-frozen and become solid.’ The granular movement is thus greatly facilitated, while the body of ice remains in a crystalline solid condition. In this connexion it is well to remember that the pressure of the glacier upon its floor will have the same result, but the effect here is a mass-effect and facilitates the gliding of the ice over obstacles, since the friction produces heat and the pressure lowers the melting point, so that the two causes tend to liquefy the portion where pressure is greatest and so to ” lubricate ” the prominences and enable the glacier to slide more easily over them, while the liquid thus produced is re-frozen when the pressure is removed.

In polar regions of very low temperature a very considerable amount of pressure must be necessary before the ice granules yield to momentary liquefaction at the points of pressure, and this probably accounts for the extreme thickness of the Arctic and Antarctic ice-caps where the slopes are moderate, for although equally low temperatures are found in high Alpine snow-fields the slopes there are exceedingly steep and motion is therefore more easily produced.

Observations made upon the Greenland glaciers indicate a considerable amount of ” shearing ” movement in the lower portions of a glacier. Where obstacles in the bed of the glacier

arrest the movement of the ice immediately above it, or where the lower portion of the glacier is choked by debris, the upper ice glides over the lower in shearing planes that are sometimes strongly marked by debris caught and pushed forwards along these planes of foliation.

It must be remembered that there is a solid push from behind upon the lower portion of a glacier, quite different from the pressure of a body of water upon any point, for the pressure of a fluid is equal in all directions, and also that this push will tend to set the crystalline granules in positions in which their crystalline axes are parallel along the gliding planes. The production of gliding planes is in some cases facilitated by the descent into the glacier of water melted during summer, where it expands in freezing and pushes the adjacent ice away from it, forming a surface along which move- ment is readily established.

If under all circumstances the glacier melted under pressure at the bottom, glacial abrasion would be nearly impossible, since every small stone and fragment of rock would rotate in a liquid shell as the ice moved forward, but since the pressure is not always sufficient to produce melting, the glacier sometimes remains dry at its base; rock fragments are held firmly; and a dry glacier may thus become a graving tool of enormous power. Whatever views may be adopted as to the causes of glacier motion, the peculiar character of glacier ice as distinct from homogeneous river or pond ice must be kept in view, as well as the. characteristic tendency of water to expand in freezing, the lowering of the melting point of ice under pressure, the raising of the melting point under tension, the production of gliding or shearing planes under pressure from above, the presence in summer of a considerable quantity of water in the lower portions of the glacier which are thus loosened, the cracking of ice (as into crevasses), under sudden strain, and the regelation of ice in contact. A result of this last process is that fissures are not permanent, but having been produced by the passage of ice over an obstruction, they subsequently become healed when the ice proceeds over a flatter bed. Finally it must be remembered that although glacier ice behaves in some sense like a viscous fluid its condition is totally different, since ” a glacier is a crystalline rock of the purest and simplest type, and it never has other than the crystalline state.”

Characteristics. — The general appearance of a glacier varies according to its environment of position and temperature. The upper portion is hidden by neve and often by freshly fallen snow, and is smooth and unbroken. During the summer, when little snow falls, the body of the glacier moves away from the snow-field and a gaping crevasse of great depth is usually established called the bergschrund, which is sometimes taken as the upper limit of the glacier. The glacier as it moves down the valley may become ” loaded ” in various ways. Rock-falls send periodical showers of stones upon it from the heights, and these are spread out into long lines at the glacier sides as the ice

moves downwards carrying the rock fragments with it. These are the ” lateral moraines.” When two or more glaciers descend- ing adjacent valleys converge into one glacier one or more sides of the higher valleys disappear, and the ice that was contained in several valleys is now carried by one. In the simplest case where two valleys converge into one the two inner lateral moraines meet and continue to stream down the larger valley as one ” median moraine.” Where several valleys meet there are several such parallel median moraines, and so long as the ice remains unbroken these will be carried upon the surface of the glacier and finally tipped over the end. There is, however, differential heating of rock and ice, and if the stones carried are thin they tend to sink into the ice because they absorb heat readily and melt the ice under them. Dust has the same effect and produces ” dust wells ” that honeycomb the upper surface of the ice with holes into which the dust sinks. If the moraine rocks are thick they prevent the ice under them from melting in sunlight, and isolated blocks often remain supported upon ice-pillars in the form of ice tables, which finally collapse, so that such rocks may be scattered out of the line of the moraine. As the glacier descends into

the lower valleys it is more strongly heated, and surface streams are established in consequence that flow into channels caused by unequal melting of the ice and finally plunge into crevasses. These crevasses are formed by strains established as the central parts drag away from the sides of the glacier and the upper surface from the lower, and more markedly by the tension due to a sudden bend in the glacier caused by an in- equality in its bed which must be over-ridden. These crevasses are developed at right angles to the strain and often produce intersecting fissures in several directions. The morainic material is gradually dispersed by the inequalities produced, and is further distributed by the action of superficial streams until the whole surface is strewn with stones and debris, and presents, as in the lower portions of the Mer de Glace, an exceedingly dirty appearance. Many blocks of stone fall into the gaping crevasses and much loose rock is carried down as ” englacial material ” in the body of the glacier. Some of it reaches the bottom and becomes part of the ” ground moraine ” which underlies the glacier, at least from the bergschrund to the ” snout,” where much of it is carried away by the issuing stream and spread finally on to the plains below. It appears that a very considerable amount of degradation is caused under the berg- schrund by the mass of ice ” plucking ” and dragging great blocks of rock from the side of

the mountain valley where the great head of ice rests in winter and whence it begins to move in summer. These blocks and many smaller fragments are carried downwards wedged in the ice and cause powerful abrasion upon the rocky floor, rasping and scoring the channel, producing conspicuous striae, polishing and rounding the rock surfaces, and grinding the. contained fragments as well as the surface over which it passes into small fragments and fine powder, from which ” boulder clay ” or ” till ” is finally produced. Emerging, then, from the snow-field as pure granular ice the glacier gradually becomes strewn and filled with foreign material, not only from above but also, as is very evident in some Greenland glaciers, occasionally from below by masses of fragments that move upwards along gliding planes, or are forced upwards by slow swirls in the ice itself.

As a glacier is a very brittle body any abrupt change in gradient will produce a number of crevasses, and these, together with those produced by dragging strains, will frequently wedge the glacier into a mass of pinnacles or sSracs that may be partially healed but are usually evident when the melting end of the glacier emerges suddenly from a steep valley. Here the streams widen the weaker portions and the moraine rocks fall from the end to produce the ” terminal ” moraine, which usually lies in a crescentic heap encircling the glacier snout, whence it can only be moved by a further advance of the glacier or by the ordinary slow process of atmospheric denudation.

In cases where no rock falls upon the surface there is a con- siderable amount of englacial material due to upturning either over accumulated ground debris or over structural inequalities in the rock floor. This is well seen at the steep sides and ends of Greenland glaciers, where material frequently comes to the surface of the melting ice and produces median and lateral moraines, besides appearing in enormous ” eyes ” surrounded in the glacial body by contorted and foliated ice and sometimes producing heaps and embankments as it is pushed out at the end of the melting ice.

The environment of temperature requires consideration. At the upper or dorsal portion of the glacier there is a zone of variable (winter and summer) temperature, beneath which, if the ice is thick enough, there is a zone of constant temperature which will be about the mean annual temperature of the region ofthe snow-field. Underlying this there is a more or less constant ventral or ground temperature, depending mainly upon the internal heat of the earth, which is conducted to the under surface of the glacier where it slowly melts the ice, the more readily because the pressure lowers the melting point consider- ably, so that streams of water run constantly from beneath

many glaciers, adding their volume to the springs which issue from the rock. The middle zone of constant temperature is wedge-shaped

in ” alpine ” glaciers, the apex pointing downwards to the zone of waste. The upper zone of variable temperature is thinnest in the snow-field where the mean temperature is lowest, and entirely dominant in the snout end of the glacier where the zone of constant temperature disappears. Two temperature wedges are thus superposed base to point, the one being thickest where the other is thinnest, and both these lie upon the basal film of temperature where the escaping earth-heat is strengthened by that due to friction and pressure. The cold wave of winter may pass right through a thin glacier, or the constant temperature may be too low to permit of the ice melting at the base, in which cases the glacier is ” dry ” and has great eroding power. But in the lower warmer portions water running through crevasses will raise the temperature, and increase the strength of the downward heat wave, while the mean annual temperature being there higher, the combined result will be that the glaciei will gradually become ” wet ” at the base and have little eroding power, and it will become more and more wet as it moves down the lower valley zone of ice-waste, until at last the balance is reached between waste and supply and the glacier finally disappears.

If the mean annual temperature be 20° F., and the mean winter temperature be – 12° F., as in parts of Greenland, all the ice must be’ considerably below the melting point, since the pressure of ice a mile in depth lowers the melting point only to 30° F.,. and the earth-heat is only sufficient to melt \ in. of ice in a year. Therefore in these regions, and in snow-fields and high glaciers with an equal or lower mean temperature than 20 F., the glacier will be ” dry ” throughout, which may account for the great eroding power stated to exist near the bergschrund in glaciers of an alpine type, which usually have their origin on precipitous slopes.

A considerable amount of ice-waste takes place by water- drainage, ‘though much is the result of constant evaporation from the ice surface. The lower end of a glacier is in summer flooded by streams of water that pour along cracks and plunge into crevasses, often forming ” pot-holes ” or moulins where stones are swirled round in a glacial ” mill ” and wear holes in the solid rock below. Some of these streams issue in a spout half way up the glacier’s end wall, but the majority find their way through it and join the water running along the glacier floor and emerging where the glacier ends in a large glacial stream.

Results of Glacial Action. — A glacier is a degrading and an aggrading

agent. Much difference of opinion exists as to the potency of a glacier to alter surface features, some maintaining that it is extraordinarily effective, and considering that a valley glacier forms a pronounced cirque at the region of its origin and that the cirque is gradually cut backward until a long and deep valley is formed (which becomes evident, as in the Rocky Mountains, in an upper valley with ” reversed grade ” when the glacier disappears), and also that the end of a glacier plunging into a valley or a fjord will gouge a deep basin at its region of impact. The Alaskan and Norwegian fjords and the rock basins of the Scottish lochs are adduced as examples. Other writers maintain that a glacier is only a modifying and not a dominant agent in its effects upon the land-surface, considering, for example, that a glacier coming down a lateral valley will preserve the valley from the atmospheric denudation which has produced the main valley over which the lateral valley ” hangs,” a result which the believers in strong glacial action hold to be due to the more powerful action of the main glacier as contrasted with the weaker action of that in the lateral valley. Eoth the advocates and the opponents of strenuous ice action agree that a V-shaped valley of stream erosion is converted to a U-shaped valley of glacial modification, and that rock surfaces are rounded into roches moutonnees, and are grooved and striated by the passage of ice shod with fragments of rock, while the subglacial material is ground into finer and finer fragments until it becomes mud and ” rock-flour ” as the glacier proceeds. In any case striking results are manifest in any formerly glaciated region. The high peaks rise into pinnacles, and ridges with ” house-roof ” structure,

above the former glacier, while below it the contours are all rounded and typically subdued. A landscape that was formerly completely covered by a moving ice-cap has none but these rounded features of dome-shaped hills and U-shaped valleys that at least bear evidence to the great modifying power that a glacier has upon a landscape.

There is no conflict of opinion with regard to glacial aggradation and the distribution of superglacial, englacial and subglacial material, which during the active existence of a glacier is finally distributed by glacial streams that produce very considerable alluviation. In many regions which were covered by the Pleistocene ice-sheet the work of the glacier was arrested by melting before it was half done. Great deposits of till and boulder clay that lay beneath the glaciers were abandoned in situ, and remain as an unsorted mixture of large

boulders, pebbles and mingled fragments, embedded in clay or sand. The lateral, median and terminal moraines were stranded where they sank as the ice disappeared, and together with perched blocks (roches perchees) remain as a permanent record of former conditions which are now found to have existed temporarily in much earlier geological times. In glaciated North America lateral moraines are found that are 500 to 1000 ft. high and in northern Italy 1500 to 2000 ft. high. The surface of the ground in all these places is modified into the characteristic glaciated landscape, and many formerly deep valleys are choked with glacial debris either completely changing the local drainage systems, or compel- ling the reappearing streams to cut new channels in a superposed drainage system. Kames also and eskers (q.v.) are left under certain conditions, with many puzzling deposits that are clearly due to some features of ice-work not thoroughly understood.

See L. Agassiz, Etudes stir Us glaciers (Neuch&tel, 1840) and Nouvelles Etudes . . . (Paris, 1847); N. S. Shaler and W. M. Davis, Glaciers (Boston, 1881); A. Penck, Die Begletscherung der deutschen Alpen (Leipzig, 1882) ; J. Tyndall, The Glaciers of the Alps (London, 1896); T. G. Bonney, Ice-Work, Past and Present (London, 1896); I. C. Russell, Glaciers' of North America (Boston, 1897); E. Richter, Neue Ergebnisse und Probleme der Gletscherforschung (Vienna, 1 899) ; F. Forel, Essai sur les variations periodiques des glaciers (Geneva, 1 88 1 and 1900) ; H. Hess, Die Gletscher (Brunswick, 1904). (E. C. Sp.)

GLACIS, in military engineering (see Fortification and Siegecraft), an artificial slope of earth in the front of works, so constructed as to keep an assailant under the fire of the defenders to the last possible moment. On the natural ground- level, troops attacking any high work would be sheltered from its fire when close up to it; the ground therefore is raised to form a glacis, which is swept by the fire of the parapet. More generally, the term is used to denote any slope, natural or artificial, which fulfils the above requirements.

GLADBACH, the name of two towns in Germany distinguished as Bergisch-Gladbach and Munchen-Gladbach.

1. Bergisch-Gladbach is in Rhenish Prussia, 8 m. N.E. of Cologne by rail: Pop. (1905) 13,410. It possesses four large paper mills and among its other industries are paste-board, powder, percussion caps, nets and machinery. Ironstone, peat and lime are found in the vicinity. The town has four Roman Catholic churches and one Protestant. The Stunden- thalshohe, a popular resort, is in the neighbourhood, and near Gladbach is Altenberg, with a remarkably fine church, built for

the Cistercian abbey at this place.

2. Munchen-Gladbach, also in Rhenish Prussia, 16 m. W.S.W. of Diisseldorf on the main line of railway to Aix-la- Chapelle. Pop. (1885) 44,230; (1905) 60,7^. It is one of the chief manufacturing places in Rhenish Prussia, its principal industries being the spinning and weaving of cotton, the manufacture of silks, velvet, ribbon and damasks, and dyeing and bleaching. There are also tanneries, tobacco manufactories, machine works and foundries. The town possesses a fine park and has statues of the emperor William I. and of Prince Bismarck. There are ten Roman Catholic churches here, among them being the beautiful minster, with a Gothic choir dating from 1250, a nave dating from the beginning of the 13th century and a crypt of the 8th century. The town has two hospitals, several schools, and is the headquarters of important insurance societies.

Gladbach existed before the time of Charlemagne, and a Bene- dictine monastery was founded near it in 793. It was thus called Munchen-Gladbach or Monks' Gladbach, to distinguish it from another town of the same name. The monastery was suppressed in 1802. It became a town in 1336; weaving was introduced here towards the end of the 18th century, and having belonged for a long time to the duchy of Juliers it came into the possession of Prussia in 1815.

See Strauss, Geschichte der Stadt Munchen-Gladbach (1895) ; and G. Eckertz, Das Verbruderungs- und Todtenbuch der Abtei Gladbach

(1881).

GLADDEN, WASHINGTON (1836-), American Congrega- tional divine, was born in Pottsgrove, Pennsylvania, on the nth of February 1836. He graduated at Williams College in 1859, preached in churches in Brooklyn, Morrisania (New York City), North Adams, Massachusetts, and Springfield, Massachusetts, and in 1882 became pastor of the First Congregational Church of Columbus, Ohio. He was an editor of the Independent in 1871-1875, and a frequent contributor to it and other periodicals. He consistently and earnestly urged in pulpit and press the need of personal, civil and, particularly, social righteousness, and in 1900-1902 was a member of the city council of Columbus. Among his many publications, which include sermons, occasional addresses, &c, are: Plain Thoughts on the Art of Lining (1868); Workingmen and their Employers (1876); The Christian Way (1877); Things New and Old (1884); Applied Christianity (1887); Tools and the Man — Property and Industry under the Christian Law (1893); The Church and the Kingdom (1894), arguing against a

confusion and misuse of these two terms; Seven Puzzling Bible Books (1897) ; How much is Left of the Old Doctrines (1899); Social Salvation (1901); Witnesses of the Light (1903); the William Belden Noble Lectures (Harvard), being addresses on Dante, Michelangelo, Fichte, Hugo, Wagner and Ruskin; The New Idolatry (1905); Christianity and Social- ism (1906), and The Church and Modern Life (1908). In 1909 he published his Recollections.

GLADIATORS (from Lat. gladius, sword), professional com- batants who fought to the death in Roman public shows. That this form of spectacle, which is almost peculiar to Rome and the Roman provinces, was originally borrowed from Etruria is shown by various indications. On an Etruscan tomb dis- covered at Tarquinii there is a representation of gladiatorial games; the slaves employed to carry off the dead bodies from the arena wore masks representing the Etruscan Charon; and we learn from Isidore of Seville (Origines, x.) that the name for a trainer of gladiators (lanista) is an Etruscan word meaning butcher or executioner. These gladiatorial games are evidently a survival of the practice of immolating slaves and prisoners on the tombs of illustrious chieftains, a practice recorded in Greek, Roman and Scandinavian legends, and traceable even as late as the 19th century as the Indian suttee. Even at Rome they were for a long time confined to funerals, and hence the older name for gladiators was bustuarii; but in the later days of the republic their original significance was forgotten, and they formed as indispensable a part of the public amusements as the theatre and the circus.

The first gladiators are said, on the authority of Valerius Maximus (ii. 4. 7), to have been exhibited at Rome in the Forum Boarium in 264 B.C. by Marcus and Decimus Brutus at the funeral of their father. On this occasion only three pairs fought, but the taste for these games spread rapidly, and the number of combatants grew apace. In 1 74 Titus Flamininus celebrated his father's obsequies by a three-days' fight, in which 74 gladiators took part. Julius Caesar engaged such extravagant numbers for his aedileship that his political opponents took fright and carried a decree of the senate imposing a certain limit of numbers, but notwithstanding this restriction he was able to exhibit no less than 300 pairs. During the later days of the republic the gladiators were a constant element of danger to the public peace. The more turbulent spirits among the nobility had each his band of gladiators to act as a bodyguard, and the I armed troops of Clodius, Milo and Catiline played the same part

in Roman history as the armed retainers of the feudal barons or the condottieri of the Italian republics. Under the empire, notwithstanding sumptuary enactments, the passion for the arena steadily increased. Augustus, indeed, limited the shows to two a year, and forbade a praetor to exhibit more than 120 gladiators, yet allusions in Horace (Sat. ii. 3. 85) and Persius (vi. 48) show that 100 pairs was the fashionable number for private entertainments; and in the Marmor Ancyranum the emperor states that more than 10,000 men had fought during his reign. The imbecile Claudius was devoted to this pastime, and would sit from morning till night in his chair of state, descending now and then to the arena to coax or force the reluctant gladiators to resume their bloody work. Under Nero senators and even well-born women . appeared as combatants; and Juvenal (viii. 199) has handed down to eternal infamy the descendant of the Gracchi who appeared without disguise as a retiarius, and begged his life from the secutor, who blushed to conquer one so noble and so vile. 1 Titus, whom his countrymen surnamed the Clement, ordered a show which lasted 100 days; and Trajan, in celebration of his triumph over Decebalus, exhibited 5000 pairs of gladiators. Domitian at the Saturnalia of a.d. 90 arranged a battle between dwarfs and women. Even women of high birth fought in the arena, and it was not till a.d. 200 that the practice was forbidden by edict. How widely the taste for these sanguinary spectacles extended throughout the Roman provinces is attested by monuments, inscriptions and the remains of vast amphitheatres. From Britain to Syria there was not a town of any size that could not boast its arena and annual games. After Italy, Gaul, North Africa and Spain were most famous for their amphitheatres; and Greece was the only Roman province where the institution never thoroughly took root.

Gladiators were commonly drawn either from prisoners of war, or slaves or criminals condemned to death. Thus in the first class we read of tattooed Britons in their war chariots, Thracians with their peculiar bucklers and scimitars, Moors from the villages round Atlas and negroes from central Africa, exhibited in the Colosseum. Down to the time of the empire only greater malefactors, such as brigands and incendiaries, were condemned to the arena; but by Caligula, Claudius and Nero this punishment was extended to minor offences, such as fraud and peculation, in order to supply the growing demand for victims. For the first century of the empire it was lawful for masters to sell their slaves as gladiators, but this was forbidden by Hadrian and Marcus Aurelius. Besides these three regular classes, the ranks were recruited by a considerable number of freedmen and Roman citizens who had squandered their estates and voluntarily took the auctor

amentum gladiatorium, by which for a stated time they bound themselves to the lanisla. Even men of birth and fortune not seldom entered the lists, either for the pure love of fighting or to gratify the whim of some dissolute emperor; and one emperor, Commodus, actually appeared in person in the arena.

Gladiators were trained in schools (ludi) owned either by the state or by private citizens, and though the trade of a lanisla was considered disgraceful, to own gladiators and let them out for hire was reckoned a legitimate branch of commerce. Thus Cicero, in his letters to Atticus, congratulates his friend on the good bargain he had made in purchasing a band, and urges that he might easily recoup himself by consenting to let them out twice. Men recruited mainly from slaves and criminals, whose lives hung on a thread, must have been more dangerous characters than modern galley slaves or convicts; and, though highly fed and carefully tended, they were of necessity subject to an iron discipline. In the school of gladiators discovered at Pompeii, of the sixty-three skeletons buried in the cells many were in irons. But hard as was the gladiators' lot, — so hard that special precautions had to be taken to prevent suicide, — it had its consolations. A successful gladiator enjoyed far greater fame than any modern prize-fighter or athlete. . He was

1 See A. E. Housman on the passage in Classical Review (November

1904).

presented with broad pieces, chains and jewelled helmets, such as may be seen in the museum at Naples; poets like Martial sang his prowess; his portrait was multiplied on vases, lamps and gems; and high-born ladies contended for his favours. Mixed, too, with the lowest dregs of the city, there must have been many noble barbarians condemned to the vile trade by the hard fate of war. There are few finer characters in Roman history than the Thracian Spartacus, who, escaping with seventy of his comrades from the school of Lentulus at Capua, for three years defied the legions of Rome; and after Antony's defeat at Actium, the only part of his army that remained faithful to his cause were the gladiators whom he had enrolled at Cyzicus to grace his anticipated victory.

There were various classes of gladiators, distinguished by their arms or modes of fighting. The Samnites fought with the national weapons — a large oblong shield, a vizor, a plumed helmet and a short sword. The Thraces had a small round buckler and a dagger curved like a scythe; they were generally pitted against the Mirmillones, who were

armed in Gallic fashion with helmet, sword and shield, and were so called from the fish (fj.opfj.vKos or fiopfivpos) which served as the crest of their helmet. In like manner the Retiarius was matched with the Secutor: the former had nothing on but a short tunic or apron, and sought to entangle his pursuer, who was fully armed, with the cast-net (jaculum) that he carried in his right hand; and if successful, he despatched him with the trident (tridens, Juscina) that he carried in his left. We may also mention the Andabatae who are generally believed to have fought on horseback and wore helmets with closed vizors; the Dimachaeri of the later empire, who carried a short sword in each hand; the Essedarii, who fought from chariots like the ancient Britons; the Hoplomachi, who wore a complete suit of armour; and the Laquearii, who tried to lasso their antagonists.

Gladiators also received special names according to the time or circumstances in which they exercised their calling. The Bustuarii have already been mentioned; the Catervarii fought, not in pairs, but in bands; the Meridiani came forward in the middle of the day for the entertainment of those spectators who had not left their seats; the Ordinarii fought only in pairs, in the regular way; the Fiscales were trained and supported at the expense of the imperial treasury; the Paegniarii used harmless weapons, and their exhibition was a sham one; the Postulaticii were those whose appearance was asked as a favour from the giver of the show, in addition to those already exhibited.

The shows were announced some days before they took place by bills affixed to the walls of houses and public buildings, copies of which were also sold in the streets. These bills gave the names of the chief pairs of competitors, the date of the show, the name of the giver and the different kinds of combats. The spectacle began with a procession of the gladiators through the arena, after which their swords were examined by the giver of the show. The proceedings opened with a sham fight (praelusio, prolusio) with wooden swords and javelins. The signal for real fighting was given by the sound of the trumpet, those who showed fear being driven on to the arena with whips and red-hot irons. When a gladiator was wounded, the spectators shouted Habet (he is wounded) ; if he was at the mercy of his adversary, he lifted up his forefinger to implore the clemency of the people, with whom (in the later times of the republic) the giver left the decision as to his life or death. If the spectators were in favour of mercy, they waved their handkerchiefs; if they desired the death of the conquered gladiator, they turned their thumbs downwards. 2 The reward of victory consisted of branches of palm, sometimes of money. Gladiators who had exercised their calling for a long time, or such as displayed special

skill and bravery, were presented with a wooden sword (rudis), and discharged from further service.

2 A different account is given by Mayor on Juvenal iii. 36, who

says: “Those who wished the death of the conquered gladiator

turned their thumbs towards their breasts, as a signal to hisopponents

to stab him ; those who wished him to be spared, turned their thumbs

I downwards, as a signal for dropping the sword.”

GLADIOLUS

&5

Both the estimation in which gladiatorial games were held by Roman moralists, and the influence that they exercised upon the morals and genius of the nation, deserve notice. The Roman was essentially cruel, not so much from spite or vindictiveness as from callousness and defective sympathies. This element of inhumanity and brutality must have been deeply ingrained in the national character to have allowed the games to become popular, but there can be no doubt that it was fed and fostered by the savage form which their amusements took. That the sight of bloodshed provokes a love of bloodshed and cruelty is a commonplace of morals. To the horrors of the arena we may attribute in part, not only the brutal treatment of their slaves and prisoners, but the frequency of suicide among the Romans. On the other hand, we should be careful not to exaggerate the effects or draw too sweeping infer- ences from the prevalence of this degrading amusement. Human nature is happily illogical; and we know that many of the Roman statesmen who gave these games, and themselves enjoyed these sights of blood, were in every other department of life irreproachable — indulgent fathers, humane generals and mild rulers of provinces. In the present state of society it is difficult to conceive how a man of taste can have endured to gaze upon a scene of human butchery. Yet we should remember that it is not so long since bear-baiting was prohibited in England, and we are only now attaining that stage of morality in respect of cruelty to animals that was reached in the 5th century, by the help of Christianity, in respect of cruelty to men. We shall not then be greatly surprised if hardly one of the Roman moralists is found to raise his voice against this amusement, except on the score of extravagance. Cicero in a well-known passage com- mends the gladiatorial games as the best discipline against the fear of death and suffering that can be presented to the eye. The

younger Pliny, who perhaps of all Romans approaches nearest to our ideal of a cultured gentleman, speaks approvingly of them. Marcus Aurelius, though he did much to mitigate their horrors, yet in his writings condemns the monotony rather than the cruelty. Seneca is indeed a splendid exception, and his letter to Lentulus is an eloquent protest against this inhuman sport. But it is without a parallel till we come to the writings of the Christian fathers, Tertullian, Lactantius, Cyprian and Augustine. In the Confessions of the last there occurs a narrative which is worth quoting as a proof of the strange fascination which the games exercised even on a religious man and a Christian. He tells us how his friend Alipius was dragged against his will to the amphitheatre, how he strove to quiet his conscience by closing his eyes, how at some exciting crisis the shouts of the whole assembly aroused his curiosity, how he looked and was lost, grew drunk with the sight of blood, and returned again and again, knowing his guilt yet unable to abstain. The first Christian emperor was persuaded to issue an edict abolishing gladiatorial games (325), yet in 404 we read of an exhibition of gladiators to celebrate the triumph of Honorius over the Goths, and it is said that they were not totally extinct in the West till the time of Theodoric.

Gladiators formed admirable models for the sculptor. One of the finest pieces of ancient sculpture that has come down to us is the ” Wounded Gladiator” of the National Museum at Naples. The so-called ” Fighting Gladiator” of the Borghese collection, now in the Museum of the Louvre, and the ” Dying Gladiator ” of the Capitoline Museum, which inspired the famous stanza of Childe Harold, have been pronounced by modern antiquaries to represent, not gladiators, but warriors. In this connexion we may mention the admirable picture of Gerome which bears the title, ” Ave, Caesar, morituri te salutant.”

The attention of archaeologists has been recently directed to the tesserae of gladiators. These tesserae, of which about sixty exist in various museums, are small oblong tablets of ivory or bone, with an inscription on each of the four sides. The first line contains a name in the nominative case, presumably that of the gladiator ; the second line a name in the genitive, that of the patronus or dominus; the third line begins with the letters SP (for spectatus = approved), which shows that the gladiator had passed his pre- liminary trials; this is followed by a day of a Roman month; and in the fourth line are the names of the consuls of a particular year.

Authorities. — All needful information on the subject will be found in L. Friedlander’s Darsteilungen aus der Sittengeschichte Roms, (part ii., 6th ed., 1889), and in the section by him on ” The Games ” in

Marquardt's Rbmische Staatsverwallung, iii. (1885) p. 554; see also article by G. Lafaye in Daremberg and Saglio, Dictionnaire des antiquites. See also F. W. Ritschl, Tesserae gladialoriae (1864) and P. J. Meier, De gladiatura Romana quaestiones selectae (1881). The articles by Lipsius on the Saturnalia and amphitheatrum in Graevius, Thesaurus antiquitatum Romanarum, ix., may still be consulted with advantage.

GLADIOLUS, a genus of monocotyledonous plants, belonging to the natural order Iridaceae. They are herbaceous plants growing from a solid fibrous-coated bulb (or corm), with long narrow plaited leaves and a terminal one-sided spike of generally bright-coloured irregular flowers. The segments of the limb of the perianth are very unequal, the perianth tube is curyed, f unnel-

shaped and widening upwards, the segments equalling or exceeding the tube in length. There are about 150 known species, a large number of which are South African, but the genus extends into tropical Africa, forming a characteristic feature of the mountain vegetation, and as far north as central Europe and western Asia. One species G. illyricus (sometimes regarded as a variety of G. communis) is found wild in England, in the New Forest and the Isle of Wight. Some of the species have been cultivated for a long period in English flower-gardens, where both the introduced species and the modern varieties bred from them are very ornamental and popular. G. segetum has been cultivated since 1596, and G. byzantinus since 1629, while many additional species were introduced during the latter half of the 18th century. One of the earlier of the hybrids originated in gardens was the beautiful G. Colvillei, raised in the nursery of Mr Colville of Chelsea in 1823 from G. tristis fertilized by G. cardinalis. In the first decade of the 19th century, however, the Hon. and Rev. W. Herbert had successfully crossed the showy G. cardinalis with the smaller but more free-flowering G. blandus, and the result was the production of a race of great beauty and fertility. Other crosses were made with G. tristis, G. oppositiftorus, G. hirsutus, G. alalus and G. psiltacinus; but it was not till after the production of G. gandavensis that the gladiolus really became a general favourite in gardens. This fine hybrid was raised in 1837 by M. Bedinghaus, gardener to the due d'Aremberg, at Enghien, crossing G. psiltacinus and G. cardinalis. There can, however, be little doubt that before the gandavensis type had become fairly fixed the services of other species were brought into force, and the most likely of these were G. oppositiftorus (which shows in the white forms), G. blandus and G. ramosus. Other species may also have been

used, but in any case the gandavensis gladiolus, as we now know it, is the result of much crossing and inter-crossing between the best forms as they developed (J. Weathers, Practical Guide to Garden Plants). Since that time innumerable varieties have appeared only to sink into oblivion upon being replaced by still finer productions.

The modern varieties of gladioli have almost completely driven the natural species out of gardens, except in botanical collections. The most gorgeous groups — in addition to the gandavensis type — are those known under the names of Lemoinei, Childsi, nanceianus and brenchleyensis. The last-named was raised by a Mr Hooker at Brenchley in 1848, and although quite distinct in appearance from gandavensis, it undoubtedly had that variety as one of its parents. Owing to the brilliant scarlet colour of the flowers, this is always a great favourite for planting in beds. The Lemoinei forms originated at Nancy, in France, by fertilizing G. purpureo-auratus with pollen from G. gandavensis, the first flower appearing in 1877, and the plants being put into commerce in 1880. The Childsi gladioli first appeared in 1882, having been raised at Baden-Baden by Herr Max Leichtlin from the best forms of G. gandavensis and G. Saundersi. The flowers of the best varieties are of great size and substance, often measuring 7 to 9 in. across, while the range of colour is marvellous, with shades of grey, purple, scarlet, salmon, crimson, rose, white, pink, yellow, &c, often beautifully mottled and blotched in the throat. The plants are vigorous in growth, often reaching a height of 4 to 5 ft. G. nanceianus was raised at Nancy by MM. Lemoine and were first-put into commerce in 1889. Next to .the Childsi group they are the most beautiful, and have the blood of the best forms of G. Saundersi and G. Lemoinei in their veins. The plants are quite as hardy as the gandavensis hybrids, and the colours of the flowers are almost as brilliant and varied in hue as those of the Childsi section.

A deep and rather stiff sandy loam is the best soil for the gladiolus, and this should be trenched up in October and enriched with well-decomposed manure, consisting partly of cow dung, the manure being disposed altogether below the corms, a layer at the bottom of the upper trench, say 9 in. from the surface, and another layer at double that depth. The corms should be planted in succession at intervals of two or three weeks through the months of March, April and May ; about 3 to 5 in. deep and at least 1 ft. apart, a little pure soil or sand being laid over each before the earth is closed in about them, an

arrangement which may be advantageously followed with bulbous plants generally. In hot summer weather they should have a good mulching of well-decayed manure, and, as soon as the flower spikes are produced, liquid manure may occasionally be given them with advantage.

The gladiolus is easily raised from seeds, which should be sown in March or April in pots of rich soil placed in slight heat, the pots being kept near the glass after they begin to grow, and the plants being gradually hardened to permit their being placed out-of-doors in a sheltered spot for the summer. Modern growers of ten grow the seeds in the open in April on a nicely prepared bed in drills about 6 in. apart and J in. deep, covering them with finely sifted gritty mould. The seed bed is then pressed down evenly and firmly, watered occasionally and kept free from weeds during the summer. In October they will have ripened off, and must be taken out of the soil, and stored in paper bags in a dry room secure from frost. They will have made little bulbs from the size of a hazel nut downwards, according to their vigour. In the spring they should be planted like the old bulbs, and the larger ones will flower during the season, while the smaller ones must be again harvested and planted out as before. The time occupied from the sowing of the seed until the plant attains its full strength is from three to four years. The approved sorts, which are identified by name, are multiplied by means of bulblets or offsets or ” spawn,” which form around the principal bulb or corm; but in this they vary greatly, some kinds furnishing abundant increase and soon becoming plentiful, while others persistently refuse to yield offsets. The stately habit and rich glowing colours of the modern gladioli render them exceedingly valuable as decorative plants during the late summer months. They are, moreover, very desirable and useful flowers for cutting for the purpose of room decoration, for while the blossoms themselves last fresh for some days if cut either early in the morning or late in the evening, the undeveloped buds open in succession, if the stalks are kept in water, so that a cut spike will go on blooming for some time.

GLADSHEIM (Old Norse Gladsheimr), in Scandinavian mythology, the region of joy and home of Odin. Valhalla, the paradise whither the heroes who fell in battle were escorted, was situated there.

GLADSTONE, JOHN HALL (1827-1902), English chemist, was born at Hackney, London, on the 7th of March 1827. From childhood he showed great aptitude for science; geology was his favourite subject, but since this in his father’s opinion did not afford a career of promise,

he devoted himself to chemistry, which he studied under Thomas Graham at University College, London, and Liebig at Giessen, where he graduated as Ph.D. in 1847. In 1850 he became chemical lecturer at St Thomas's hospital, and three years later was elected a fellow of the Royal Society at the unusually early age of twenty-six. From 1858 to 1 86 1 he served on the royal commission on lighthouses, and from 1864 to 1868 was a member of the war office committee on gun-cotton. From 1874 to 1877 he was Fullerian professor of chemistry at the Royal Institution, in 1874 he was chosen first president of the Physical Society, and in 1877-1870 he was president of the Chemical Society. In 1897 the Royal Society recognized his fifty years of scientific work by awarding him the Davy medal. Dr Gladstone's researches were large in number and wide in range, dealing to a great extent with problems that lie on the border-line between physics and chemistry. Thus a number of his inquiries, and those not the least important, were partly chemical, partly optical. He determined the optical constants of hundreds of substances, with the object of discover- ing whether any of the elements possesses more than one atomic refraction. Again, he investigated the connexion between the optical behaviour, density and chemical composition of ethereal oils, and the relation between molecular magnetic rotation and the refraction and dispersion of nitrogenous compounds. So early as 1856 he showed the importance of the spectroscope in chemical research, and he was one of the first to notice that the Fraunhofer spectrum at sunrise and sunset differs irom that at midday, his conclusion being that the earth's atmosphere must be responsible for many of its absorption lines, which indeed were subsequently traced to the oxygen and water-vapour in the air. Another portion of his work was of an electro-chemical character. His studies, with Alfred Tribe (1840-1885) and W. Hibbert, in the chemistry of the storage battery, have added largely to our knowledge, while the " copper-zinc couple," with which his name is associated together with that of Tribe, among other things, afforded a simple means of preparing certain

organo-metallic compounds, and thus promoted research in branches of organic chemistry where those bodies are especially useful. Mention may also be made of his work on phosphorus, on explosive substances, such as iodide of nitrogen, gun-cotton and the fulminates, on the influence of mass in the process of chemical reactions, and on the effect of carbonic acid on the germination of plants. Dr Gladstone always took a great interest in educational questions, and from 1873 to 1894 he was a member of the London School Board. He was also a member of the Christian Evidence Society, and an early supporter of the Young Men's Christian Association. His death occurred suddenly in

London on the 6th of October 1902.

GLADSTONE, WILLIAM EWART (1809-1898), British statesman, was born on the 29th of December 1809 at No. 62 Rodney Street, Liverpool. His forefathers were Gledstanes of Gledstanes, in the upper ward of Lanarkshire; or in Scottish phrase, Gledstanes of that Ilk. As years went on their estates dwindled, and by the beginning of the 17th century Gledstanes was sold. The adjacent property of Arthurshiel remained in the hands of the family for nearly a hundred years longer. Then the son of the last Gledstanes of Arthurshiel removed to Biggar, where he opened the business of a maltster. His grandson, Thomas Gladstone (for so the name was modified), became a corn-merchant at Leith. He happened to send his eldest son, John, to Liverpool to sell a cargo of grain there, and the energy and aptitude of the young man attracted the favourable notice of a leading corn-merchant of Liverpool, who recommended him to settle in that city. Beginning his commercial career as a clerk in his patron's house, John Gladstone lived to become one of the merchant-princes of Liverpool, a baronet and a member of parliament. He died in 1851 at the age of eighty-seven. Sir John Gladstone was a pure Scotsman, a Lowlander by birth and descent. He married Anne, daughter of Andrew Robertson of Stornoway, sometime provost of Dingwall. Provost Robertson belonged to the Clan Donachie, and by this marriage the robust and business-like qualities of the Lowlander were blended with the poetic imagination, the sensibility and fire of the Gael.

John and Anne Gladstone had six children. The fourth son, William Ewart, was named after a merchant of Liverpool who was his father's friend. He seems to have been a remarkably good child, and much beloved at home. CMJdhood In 1818 or 1819 Mrs Gladstone, who belonged to the Evangelical school, said in a letter to a friend, that she believed her son William had been " truly converted to God." After some tuition at the vicarage of Seaforth, a watering-place near Liverpool, the boy went to Eton in 1821. His tutor was the Rev. Henry Hartopp Knapp. His brothers, Thomas and Robertson Gladstone, were already at Eton. Thomas was in the fifth form, and William, who was placed in the middle remove of the fourth form, became his eldest brother's fag. He worked hard at his classical lessons, and supplemented the ordinary business of the school by studying mathematics in the holidays. Mr Hawtrey, afterwards headmaster, commended a copy of his Latin verses, and " sent him up for good "; and this ex- perience first led the young student to associate intellectual work with the ideas of ambition and success. He was not a fine scholar, in that restricted sense of the term which implies a special aptitude for turning English into Greek and Latin, or for

original versification in the classical languages. ” His composition,” we read, ” was stiff,” but he was imbued with the substance of his authors; and a contemporary who was in the sixth form with him recorded that ” when there were thrilling passages of Virgil or Homer, or difficult passages in the Scriptores Graeci, to translate, he or Lord Arthur Hervey was generally called up to edify the class with quotation or translation.” By common consent he was pre-eminently God-fearing, orderly and conscientious. ” At Eton,” said Bishop Hamilton of Salisbury, ” I was a thoroughly idle boy, but I was saved from some worse things by getting to know Gladstone.” His most intimate friend was Arthur Hallam, by universal acknowledg- ment the most remarkable Etonian of his day; but he was not

generally popular or even widely known. He was seen to the greatest advantage, and was most thoroughly at home, in the debates of the Eton Society, learnedly called ” The Literati,” and vulgarly ” Pop,” and in the editorship of the Eton Miscellany. He left Eton at Christmas 1827. He read for six months with private tutors, and in October 1828 went up to Christ Church, where, in the following year, he was nominated to a studentship. At Oxford Gladstone read steadily, but not laboriously, till he neared his final schools. During the latter part of his undergraduate career he took a brief but brilliant share in the proceedings of the Union, of which he was successively secretary and president. He made his first speech on the nth of February 1830. Brought up in the nurture and admonition of Canning, he defended Roman Catholic emancipation, and thought the duke of Wellington’s government unworthy of national confidence. He opposed the removal of Jewish disabilities, arguing, we are told by a contemporary, ” on the part of the Evangelicals,” and pleaded for the gradual extinction, in preference to the immediate abolition, of slavery. But his great achievement was a speech against the Whig Reform Bill. One who heard this famous discourse says: ” Most of the speakers rose, more or less, above their usual level, but when Mr Gladstone sat down we all of us felt that an epoch in our lives had occurred. It certainly was the finest speech of his that I ever heard.” Bishop Charles Wordsworth said that his experience of Gladstone at this time ” made me (and I doubt not others also) feel no less sure than of my own existence that Gladstone, our then Christ Church undergraduate, would one day rise to be prime minister of England.” In December 1831 Gladstone crowned his career by taking a double first-class. Lord Halifax (1800-1885) used to say, with reference to the increase in the amount

of reading requisite for the highest honours: ” My double-first must have been a better thing than Peel’s; Gladstone’s must have been better than mine.”

Now came the choice of a profession. Deeply anxious to make the best use of his life, Gladstone turned his thoughts to holy orders. But his father had determined to make him entry into a politician. Quitting Oxford in the spring of 1832, Gladstone spent six months in Italy, learning the language and studying art. In the following September he was suddenly recalled to England, to undertake his first parliamentary campaign. The fifth duke of Newcastle was one of the chief potentates of the High Tory party. His frank claim to ” do what he liked with his own ” in the representation of Newark has given him a place in political history. But that claim had been rudely disputed by the return of a Radical lawyer at the election of 1831. The Duke was anxious to obtain a capable candidate to aid him in regaining his ascendancy over the rebellious borough. His son, Lord Lincoln, had heard Gladstone’s speech against the Reform Bill delivered in the Oxford Union, and had written home that ” a man had uprisen in Israel.” At his suggestion the duke invited Gladstone to stand for Newark in the Tory interest against Mr Serjeant Wilde, afterwards Lord Chancellor Truro. The last of the Unreformed parliaments was dissolved on the 3rd of December

1832. Gladstone, addressing the electors of Newark, said that he was bound by the opinions of no man and no party, but felt it a duty to watch and resist that growing desire for change which threatened to produce ” along with partial good a melan- choly preponderance of mischief.” The first principle to which he looked for national salvation was, that the”dutiesof governors are strictly and peculiarly religious, and that legislatures, like individuals, are bound to carry throughout their acts the spirit of the high truths they have acknowledged.” The condition of the poor demanded special attention; labour should receive adequate remuneration; and he thought favourably of the ” allotment of cottage grounds.” He regarded slavery as sanctioned by Holy Scripture, but the slaves ought to be educated and gradually emancipated. The contest resulted in his return at the head of the poll.

The first Reformed parliament met on the 29th of January

1833, and the young member for Newark took his seat for the first

parlla* meat.

time in an assembly which he was destined to adorn, delight and

astonish for more than half a century. His maiden speech was delivered on the 3rd of June in reply to what was almost a personal challenge. The colonial secretary, J ae Q” es – Mr Stanley, afterwards Lord Derby, brought forward s / are ™ a series of resolutions in favour of the extinction of slavery in the British colonies. On the first night of the debate Lord Howick, afterwards Lord Grey, who had been under-secretary for the Colonies, and who opposed the resolutions as proceeding too gradually towards abolition, cited certain occurrences on Sir John Gladstone’s plantation in Demerara to illustrate his contention that the system of slave-labour in the West Indies was attended by great mortality among the slaves. Gladstone in his reply — his first speech in the House — avowed that he had a pecuniary interest in the question, ” and, if he might say so much without exciting suspicion, a still deeper interest in it as a question of justice, of humanity and of religion.” If there had recently been a high mortality on his father’s planta- tion, it was due to the age of the slaves rather than to any peculiar hardship in their lot. It was true that the particular system of cultivation practised in Demerara was more trying than some others; but then it might be said that no two trades were equally conducive to health. Steel-grinding was notoriously unhealthy, and manufacturing processes generally were less favourable to life than agricultural. While strongly condemning cruelty, he declared himself an advocate of emancipation, but held that it should be effected gradually, and after due prepara- tion. The slaves must be religiously educated, and stimulated to profitable industry. The owners of emancipated slaves were entitled to receive compensation from parliament, because it was parliament that had established this description of property. ” I do not,” said Gladstone, ” view property as an abstract thing; it is the creature of civil society. By the legislature it is granted, and by the legislature it is destroyed. ” On the following day King William IV. wrote to Lord Althorp: ” The king rejoices that a young member has come forward in so promis- ing a manner as Viscount Althorp states Mr W. E. Gladstone to have done.” In the same session Gladstone spoke on the question of bribery and corruption at Liverpool, and on the temporalities of the Irish Church. In the session of 1834 his most important performance was a speech in opposition to Hume’s proposal to throw the universities open to Dissenters.

On the 10th of November 1834 Lord Althorp succeeded to his father’s peerage, and thereby vacated the leadership of the House of Commons. The prime minister, Lord Melbourne, submitted to the king a choice of names for the chancellorship of the exchequer and leadership of the House of Commons; but his majesty announced that,

having lost the services of Lord Althorp as leader of the House of Commons, he could feel no confidence in the stability of Lord Melbourne's government, and that it was his intention to send for the duke of Wellington. The duke took temporary charge of affairs, but Peel was felt to be indispensable. He had gone abroad after the session, and was now in Rome. As soon as he could be brought back he formed an administration, and appointed Gladstone to a junior lordship of the treasury. Parliament was dissolved on the 29th of December. Gladstone was returned unopposed, this time in conjunction with the Liberal lawyer whom he had beaten at the last election. The new parliament met on the 19th of February 1835. The elections had given the Liberals a considerable majority. Immediately after the meeting of parliament Glad- stone was promoted to the under-secretaryship for the colonies, where his official chief was Lord Aberdeen. The administration was not long-lived. On the 30th of March Lord John Russell moved a resolution in favour of an inquiry into the temporalities of the Irish Church, with the intention of applying the surplus to general education without distinction of religious creed. This was carried against ministers by a majority of thirty-three. On the 8th of April Sir Robert Peel resigned, and the under- secretary for the colonies of course followed his chief into private life.

Literary work.

Released from the labours of office, Gladstone, living in chambers in the Albany, practically divided his time between his parliamentary duties and study. Then, as always, his constant companions were Homer and Dante, and it is recorded that he read the whole of St Augustine, in twenty-two octavo volumes. He used to frequent the services at St James's, Piccadilly, and Margaret chapel, since better known as All Saints', Margaret Street. On the 20th of June 1837 King William IV. died, and Parliament, having been prorogued by the young queen in person, was dissolved on the 17th of the following month. Simply on the strength of his parliamentary reputation Gladstone was nominated, without his consent, for Manchester, and was placed at the bottom of the poll; but, having been at the same time nominated at Newark, was again returned. The year 1838 claims special note in a record of Gladstone's life, because it witnessed the appearance of his famous work on The State in its Relations with the Church. He had left Oxford just before the beginning of that Catholic

revival which has transfigured both the inner spirit and the outward aspect of the Church of England. But the revival was now in full strength. The Tracts for the Times were saturating England with new influences. The movement counted no more enthusiastic or more valuable disciple than Gladstone. Its influence had reached him through his friendships, notably with two Fellows of Merton — Mr James Hope, who became Mr Hope- Scott of Abbotsford, and the Rev. H. E. Manning, afterwards cardinal archbishop. The. State in its Relations with the Church was his practical contribution to a controversy in which his deepest convictions were involved. He contended that the Church, as established by law, was to be ” maintained for its truth,” and that this principle, if good for England, was good also for Ireland.

On the 25th of July 1839 Gladstone was married at Hawarden to Miss Catherine Glynne, sister, and in her issue heir, of Sir Stephen Glynne, ninth and last baronet of that name. In 1840 he published Church Principles considered in their Results.

Parliament was dissolved in June 1841. Gladstone was again returned for Newark. The general election resulted in a Tory majority of eighty. Sir Robert Peel became cabinet. prime minister, and made the member for Newark vice-president of the Board of Trade. An inevitable change is from this time to be traced in the topics of Gladstone’s parliamentary speaking. Instead of discoursing on the corporate conscience of the state and the endowments of the Church, the importance of Christian education, and the theological unfitness of the Jews to sit in parliament, he is solving business-like problems about foreign tariffs and the exportation of machinery; waxing eloquent over the regulation of railways, and a graduated tax on corn; subtle on the monetary merits of half-farthings, and great in the mysterious lore of quassia and cocculus indicus. In 1842 he had a principal hand in the preparation of the revised tariff, by which duties were abolished or sensibly diminished in the case of 1200 duty-paying articles. In defending the new scheme he spoke incessantly, and amazed the House by his mastery of detail, his intimate acquaintance with the commercial needs of the country, and his inexhaustible power of exposition. In 1843 Gladstone, succeeding Lord Ripon as president of the Board of Trade, became a member of the cabinet at the age of thirty-three. He has recorded the fact that ” the very first opinion which he ever was called upon to give in cabinet ” was an opinion in favour of withdrawing the bill providing education for children in factories, to which vehement opposition was offered by the Dissenters, on the ground that it- was too favourable to the Established Church.

At the opening of the session of 1845 the government, in pursuance of a promise made to Irish members that they would Mayaooth deal with the question of academical education in grant: Ireland, proposed to establish non-sectarian colleges ™ S * M ” in that country and to make a large addition to the grant to the Roman Catholic College of Maynooth. Gladstone resigned office, in order, as he announced in the debate on the address, to form ” not only an honest, but likewise an

independent and an unsuspected judgment,” on the plan to be submitted by the government with respect to Maynooth. His subsequent defence of the proposed grant, on the ground that it would be improper and unjust to exclude the Roman Catholic Church in Ireland from a ” more indiscriminating support ” which the state might give to various religious beliefs, was regarded by men of less sensitive conscience as only proving that there had been no adequate cause for his resignation. Before he resigned he completed a second revised tariff, carrying considerably further the principles on which he had acted in the earlier revision of 1842.

In the autumn of 1845 the failure of the potato crop in Ireland threatened a famine, and convinced Sir Robert Peel that all restrictions on the importation of food must be at once suspended. He was supported by only three trade. members of the cabinet, and resigned on the 5th of December. Lord John Russell, who had just announced his conversion to total and immediate repeal of the Corn Laws, declined the task of forming an administration, and on the 20th of December Sir Robert Peel resumed office. Lord Stanley refused to re-enter the government, and his place as secretary of state for the colonies was offered to and accepted by Gladstone. He did not offer himself for re-election at Newark, and remained outside the House of Commons during the great struggle of the coming year. It was a curious irony of fate which excluded him from parliament at this crisis, for it seems unquestionable that he was the most advanced Free Trader in Sir Robert Peel’s Cabinet. The Corn Bill passed the House of Lords on the 28th of June 1846, and on the same day the government were beaten in the House of Commons on an Irish Coercion Bill. Lord John Russell became prime minister, and Gladstone retired for a season into private life. Early in 1847 it was announced that one of the two members for the university of Oxford intended to retire at the general election, and Gladstone was proposed for the vacant seat. The representation of the university had been pronounced by Canning to be the most coveted prize of public life, and Gladstone himself confessed that he ” desired it with an almost passionate fondness.” Parliament was dissolved on the 23rd of July 1847. The nomination at

Oxford took place on the 29th of July, and at the close of the poll Sir Robert Inglis stood at the head, with Gladstone as his colleague.

The three years 1847, 1848, 1849 were for Gladstone a period of mental growth, of transition, of development. A change was silently proceeding, which was not completed for twenty years. ” There have been,” he wrote in later prisons. days to Bishop Wilberforce, ” two great deaths, or transmigrations of spirit, in my political existence — one, very slow, the breaking of ties with my original party.” This was now in progress. In the winter of 1850-1851 Gladstone spent between three and four months at Naples, where he learned that more than half the chamber of deputies, who had followed the party of Opposition, had been banished or imprisoned; that a large number, probably not less than 20,000, of the citizens had been imprisoned on charges of political disaffection, and that in prison they were subjected to the grossest cruelties. Having made careful investigations, Gladstone, on the 7th of April 1851, addressed an open letter to Lord Aberdeen, bringing an elaborate, detailed and horrible indictment against the rulers of Naples, especially as regards the arrangements of their prisons and the treatment of persons confined in them for political offences. The publication of this letter caused a wide sensation in England and abroad, and profoundly agitated the court of Naples. In reply to a question in the House of Commons, Lord Palmerston accepted and adopted Gladstone’s statement, expressed keen sympathy with the cause which he had espoused, and sent a copy of his letter to the queen’s representative at every court of Europe. A second letter and a third followed, and their effect, though for a while retarded, was unmistakably felt in the subsequent revolution which created a free and united Italy.

In February 1852 the Whig government was defeated on a Militia Bill, and Lord John Russell was succeeded by Lord Derby, formerly Lord Stanley, with Mr Disraeli, who now

and Disraeli.

entered office for the first time, as chancellor of the exchequer and leader of the House of Commons. Mr Disraeli introduced and carried a makeshift budget, and the government oiadstone tided over the session, and dissolved parliament on the istof July 1852. There was some talk of inducing Glad- stone to join the Tory government, and on

the 29th of November Lord Malmesbury dubiously remarked, ” I cannot make out Gladstone, who seems to me a dark horse.” In the following month the chancellor of the exchequer produced his second budget. The government redeemed their pledge to do something for the relief of the agricultural interest by reducing the duty on malt. This created a deficit, which they repaired by doubling the duty on inhabited houses. The voices of criticism were heard simultaneously on every side. The debate waxed fast and furious. In defending his proposals Mr Disraeli gave full scope to his most characteristic gifts; he pelted his opponents right and left with sarcasms, taunts and epigrams. Gladstone delivered an unpremeditated reply, which has ever since been celebrated. Tradition says that he ” foamed at the mouth.” The speech of the chancellor of the exchequer, he said, must be answered ” on the moment.” It must be ” tried by the laws of decency and propriety.” He indignantly rebuked his rival’s language and demeanour. He tore his financial scheme to ribbons. It was the beginning of a duel which lasted till death removed one of the combatants from the political arena. ” Those who had thought it impossible that any impression could be made upon the House after the speech of Mr Disraeli had to acknowledge that a yet greater impression was produced by the unprepared reply of Mr Gladstone.” The House divided, and the government were left in a minority of nineteen. Lord Derby resigned.

The new government was a coalition of Whigs and Peelites. Lord Aberdeen became prime minister, and Gladstone chancellor of the exchequer. Having been returned again for chancellor t he university of Oxford, he entered on the active exchequer, duties of a great office for which he was pre-eminently fitted by an unique combination of financial, adminis- trative and rhetorical gifts. His first budget was introduced on the 18th of April 1853. It tended to make life easier and cheaper for large and numerous classes; it promised wholesale remissions of taxation; it lessened the charges on common processes of business, on locomotion, on postal communication, and on several articles of general consumption. The deficiency thus created was to be met by a ” succession-duty,” or application of the legacy-duty to real property; by an increase of the duty on spirits; and by the extension of the income-tax, at sd. in the pound, to all incomes between £100 and £150. The speech in which these proposals were introduced held the House spell- bound. Here was an orator who could apply all the resources of a burnished rhetoric to the elucidation of figures; who could sweep the widest horizon of the financial future, and yet stoop to bestow the minutest attention on the microcosm of penny stamps and post-horses. Above all, the chancellor’s mode of handling the

income-tax attracted interest and admiration. It was a searching analysis of the financial and moral grounds on which the impost rested, and a historical justification and eulogy of it. Yet, great as had been the services of the tax at a time of national danger, Gladstone could not consent to retain it as a part of the permanent and ordinary finances of the country. It was objectionable on account of its unequal incidence, of the harassing investigation into private affairs which it entailed, and of the frauds to which it inevitably led. Therefore, having served its turn, it was to be extinguished in i860. The scheme astonished, interested and attracted the country. The queen and Prince Albert wrote to congratulate the chancellor of the exchequer. Public authorities and private friends joined in the chorus of eulogy. The budget, demonstrated at once its author's absolute mastery over figures and the persuasive force of his expository gift. It established the chancellor of the exchequer as the paramount financier of his day, and it was only the first of a long series of similar performances, different, of course, in detail, but alike in their bold outlines and brilliant

handling. Looking back on a long life of strenuous exertion, Gladstone declared that the work of preparing his proposals about the succession-duty and carrying them through Parlia- ment was by far the most laborious task which he ever performed. War between Great Britain and Russia was declared on the 27th of March 1854, and it thus fell to the lot of the most pacific of ministers, the devotee of retrenchment, and the anxious cultivator of all industrial arts, to prepare a war budget, and to meet as well as he might the exigencies of a conflict which had so cruelly dislocated all the ingenious devices of financial optimism. No amount of skill in the manipulation of figures, no ingenuity in shifting fiscal burdens, could prevent the addition of forty-one millions to the national debt, or could countervail the appalling mismanagement at the seat of war. Gladstone declared that the state of the army in the Crimea was a " matter for weeping all day and praying all night." As soon as parliament met in January 1855 J. A. Roebuck, the Radical member for Sheffield, gave notice that he would move for a select committee " to inquire into the condition of our army before Sevastopol, and into the conduct of those departments of the government whose duty it has been to minister to the wants of that army." On the same day Lord John Russell, without announcing his inten- tion to his colleagues, resigned his office as president of the council sooner than attempt the defence of the government. Gladstone, in defending the government against Roebuck, rebuked in dignified and significant terms the conduct of men who, " hoping to escape from punishment, ran away

from duty.” On the division on Mr Roebuck’s motion the government was beaten by the unexpected majority of 157.

Lord Palmerston became prime minister. The Peelites joined him, and Gladstone resumed office as chancellor of the exchequer. A shrewd observer at the time pronounced him indispensable. ” Any other chancellor of the exchequer would be torn in bits by him.” The government was formed on the understanding that Mr Roebuck’s proposed committee was to be resisted. Lord Palmerston soon saw that further resistance was useless; his Peelite colleagues stuck to their text, and, within three weeks after resuming office, Gladstone, Sir James Graham and Mr Sidney Herbert resigned. Gladstone once said of himself and his Peelite colleagues, during the period of political isolation, that they were like roving icebergs on which men could not land with safety, but with which ships might come into perilous collision. He now applied himself specially to financial criticism, and was perpetually in conflict with the chancellor of the exchequer, Sir George Cornewall Lewis.

In 1858 Lord Palmerston was succeeded by Lord Derby at the head of a Conservative administration, and Gladstone accepted the temporary office of high commissioner extraordinary to the Ionian Islands. Returning to England for the session of 1859, he found himself involved in the controversy which arose over a mild Reform Bill introduced by the government. They were defeated on the second reading of the bill, Gladstone voting with them. A dissolution immediately followed, and Gladstone was again returned unopposed for the university of Oxford. As soon as the new parliament met a vote of want of confidence in the ministry was moved in the House of Commons. In the critical division which ensued Gladstone voted with the govern- ment, who were left in a minority. Lord Derby resigned. Lord Palmerston became prime minister, and asked Gladstone to join him as chancellor of the exchequer. To vote confidence in an imperilled ministry, and on its defeat to take office with the rivals who have defeated it, is a manoeuvre which invites the reproach of tergiversation. But Gladstone risked the re- proach, accepted the office and had a sharp tussle for his seat. He emerged from the struggle victorious, and entered on his duties with characteristic zeal. The prince consort wrote: ” Gladstone is now the real leader in the House of Commons, and works with an energy and vigour altogether incredible.”

The budget of i860 was marked by two distinctive features. It asked the sanction of parliament for the commercial treaty which Cobden had privately arranged with the emperor Napoleon, and it proposed to

abolish the duty on paper. The French treaty

was carried, but the abolition of the paper-duty was defeated in the House of Lords. Gladstone justly regarded the refusal to remit a duty as being in effect an act of taxation, and of i860. therefore as an infringement of the rights of the House of Commons. The proposal to abolish the paper- duty was revived in the budget of 1861, the chief proposals of which, instead of being divided, as in previous years, into several bills, were included in one. By this device the Lords were obliged to acquiesce in the repeal of the paper-duty.

During Lord Palmerston's last administration, which lasted from 1859 to 1865, Gladstone was by far the most brilliant and most conspicuous figure in the cabinet. Except in finance, he was not able to accomplish much, for he was met and thwarted at every turn by his chief's invincible hostility to change; but the more advanced section of the Liberal party began to look upon him as their predestined leader. In 1864, in a debate on a private member's bill for extending the suffrage, he declared that the burden of proof lay on those " who would exclude forty-nine fiftieths of the working-classes from the franchise." In 1865, in a debate on the condition of the Irish Church Establishment, he declared that the Irish Church, as it then stood, was in a false position, inasmuch as it ministered only to one-eighth or one- ninth of the whole community. But just in proportion as Gladstone advanced in favour with the Radical party he lost the confidence of his own constituents. Parliament was dissolved in July 1865, and the university elected Mr Gathorne Hardy in his place.

Gladstone at once turned his steps towards South Lancashire, where he was returned with two Tories above him. The result of the general election was to retain Lord Palmerston's Leader of government in power, but on the 18th of October the Commons. °W prime minister died. He was succeeded by Lord Russell, and Gladstone, retaining the chancellorship of the exchequer, became for the first time leader of the House of Commons. Lord Russell, backed by Gladstone, persuaded his colleagues to consent to a moderate Reform Bill, and the task of piloting this measure through the House of Commons fell to Gladstone. The speech in which he wound up the debate on the second reading was one of the finest, if not indeed the very finest, which he ever delivered. But it was of no practical avail. The government were defeated on an amendment in committee, and

thereupon resigned. Lord Derby became prime minister, with Disraeli as chancellor of the exchequer and leader of the House of Commons. On the 18th of March 1867 the Tory Reform Bill, which ended in establishing Household Suffrage in the boroughs, was introduced, and was read a second time without a division. After undergoing extensive alterations in committee at the hands of the Liberals and Radicals, the bill became law in August.

At Christmas 1867 Lord Russell announced his final retirement from active politics, and Gladstone was recognized by acclama- tion as leader of the Liberal party. Nominally he was L/6

a Chapter of Autobiography, in which he explained and justified his change of opinion with regard to the Irish Church.

On the 2nd of December Disraeli, who had succeeded Lord Derby as premier in the preceding February, announced tl&t he and his colleagues, recognizing their defeat, had resigned without waiting for a formal vote of the new Minister: parliament. On the following day Gladstone was Irish summoned to Windsor, and commanded by the Church queen to form an administration. The great task to ? s ff* \

, . , , ... , . , , , , lishment.

which the new prime minister immediately addressed himself was the disestablishment of the Irish Church. The queen wrote to Archbishop Tait that the subject of the Irish Church ” made her very anxious,” but that Mr Gladstone ” showed the most conciliatory disposition.” ” The government can do nothing that would tend to raise a suspicion of their sincerity in proposing to disestablish the Irish Church, and to withdraw all state endowments from all religious communions in Ireland; but, were these conditions accepted, all other matters connected with the question might, the queen thinks, become the subject of discussion and negotiation.” The bill was drawn and piloted on the lines thus indicated, and became law on the 26th of July. In the session of 1870 Gladstone’s principal work was the Irish Land Act, of which the object was to protect the tenant against eviction as long as he paid his rent, and to secure to him the value of any improvements which his own industry had made. In the following session Religious Tests in the universities were abolished, and a bill to establish secret voting was carried through the House of Commons. This was thrown out by the Lords, but became law a year later. The House of Lords threw out a bill to abolish the purchase of commissions in the army. Gladstone found that purchase existed only by royal sanction, and advised the queen to issue a royal warrant cancelling, on and after the

1st of November following, all regulations authorizing the purchase of commissions. In 1873 Gladstone set his hand to the third of three great Irish reforms to which he had pledged himself. His scheme for the establishment of a university which should satisfy both Roman Catholics and Protestants met with general disapproval. The bill was thrown out by three votes, and Gladstone resigned. The queen sent for Disraeli, who declined to take office in a minority of the House of Commons, so Gladstone was compelled to resume. But he and his colleagues were now, in Disraelitish phrase, ” exhausted volcanoes.” Election after election went wrong. The government had lost favour with the public, and was divided against itself. There were resignations and rumours of resignations. When the session of 1873 had come to an end Gladstone took the chancellorship of the exchequer, and, as high authorities contended, vacated his seat by doing so. The point was obviously one of vital importance ; and we learn from Lord Selborne, who was lord chancellor at the time, that Glad- stone ” was sensible of the difficulty of either taking his seat in the usual manner at the opening of the session, or letting …. the necessary arrangements for business in the House of Commons be made in the prime minister’s absence. A dissolution was the only escape.” On the 23rd of January 1874 Gladstone announced the dissolution in an address to his constituents, declaring that the authority of the government had n 8 74. now ” sunk below the point necessary for the due de- fence and prosecution of the public interest.” He promised that, if he were returned to power, he would repeal the income-tax. This bid for popularity failed, the general election resulting in a Tory majority of forty-six. Gladstone kept his seat for Greenwich, but was only second on the poll. Following the example of Disraeli in 1868, he resigned without meeting parliament.

For some years he had alluded to his impending retirement from public life, saying that he was “strong against going on in politics to the end.” He was now sixty-four, and his life had been a continuous experience of exhausting ^^meat labour. On the 12th of March 1874 he informed Lord Granville that he could give only occasional attendance in the House of Commons during the current session, and that he must ” reserve his entire freedom to divest himself of all the

responsibilities of leadership at no distant date.” His most important intervention in the debates of 1874 was when he opposed Archbishop Tait’s Public Worship Bill. This was read a second time without a

division, but in committee Gladstone enjoyed some signal triumphs over his late solicitor-general, Sir William Harcourt, who had warmly espoused the cause of the government and the bill. At the beginning of 1875 Gladstone carried into effect the resolution which he had announced a year before, and formally resigned the leadership of the Liberal party. He was succeeded by Lord Hartington, afterwards duke of Devonshire. The learned leisure which Gladstone had promised himself when released from official responsibility was not of long duration. In the autumn of 1875 an insurrection broke out in Bulgaria, and the suppression of it by the Turks was marked by massacres and outrages. Public indignation was aroused by what were known as the ” Bulgarian atrocities,” and Gladstone flung himself into the agitation against Turkey with characteristic zeal. At public meetings, in the press, and in parliament he denounced the Turkish government and its champion, Disraeli, who had now become Lord Beaconsfield. Lord Hartington soon found himself pushed aside from his position of titular leadership. For four years, from 1876 to 1880, Gladstone maintained the strife with a courage, a persistence and a versatility which raised the enthusiasm of his followers to the highest pitch. The county of Edinburgh,’ or Midlothian, which he contested against the dominant influence of campaign” t ˆ ie duke of Buccleuch, was the scene of the most astonishing exertions. As the general election approached the only question submitted to the electors was — Do you approve or condemn Lord Beaconsfield’s foreign policy? The answer was given at Easter 1880, when the Liberals were returned by an overwhelming majority over Tories and Home Rulers combined. Gladstone was now member for Midlothian, having retired from Greenwich at the dissolution.

When Lord Beaconsfield resigned, the queen sent for Lord Hartington, the titular leader of the Liberals, but he and Lord Granville assured her that no other chief than Gladstone would satisfy the party. Accordingly, on the 23rd of April he became prime minister for the second time. His second administration, of which the main achievement was the extension of the suffrage to the agricultural labourers, was harassed by two controversies, relating to Ireland and Egypt, which proved disastrous to the Liberal party. Gladstone alienated considerable masses of English opinion by his efforts to reform the tenure of Irish land, and provoked the Irish people by his attempts to establish social order and to repress crime. A bill to provide compensation for tenants who had been evicted by Irish landlords passed the Commons, but was shipwrecked in the Lords, and a ghastly record of outrage and murder stained the following winter. A Coercion Bill and a Land Bill passed in 1881 proved unsuccessful.

On the 6th of May 1882 the newly appointed chief secretary for Ireland, Lord Frederick Cavendish, and his under-secretary, Mr Burke, were stabbed to death in the Phoenix Park at Dublin. A new Crimes Act, courageously administered by Lord Spencer and Sir George Trevelyan, abolished exceptional crime in Ireland, but completed the breach between the British government and the Irish party in parliament.

The bombardment of the forts at Alexandria and the occupa- tion of Egypt in 1882 were viewed with great disfavour by the bulk of the Liberal party, and were but little congenial to Gladstone himself. The circumstances of General Gordon's untimely death awoke an outburst of indignation against those who were, or seemed to be, responsible for it. Frequent votes of censure were proposed by the Opposition, and on the 8th of June 1885 the government were beaten on the budget. Gladstone resigned. The queen offered him the dignity of an earldom, which he declined. He was succeeded by Lord Salisbury.

The general election took place in the following November. When it was over the Liberal party was just short of the numerical strength which was requisite to defeat the combination of Tories and Parnellites. A startling surprise was at hand. Gladstone had for some time been convinced of the expediency of conceding

Home Rule to Ireland in the event of the Irish constituencies giving unequivocal proof that they desired it. His intentions were made known only to a privileged few, and these, curiously, were not his colleagues. The general JJ£ˆ e election of 1885 showed that Ireland, outside Ulster, Rule BUI. was practically unanimous for Home Rule. On the 17th of December an anonymous paragraph was published, stating that if Mr Gladstone returned to office he was prepared to " deal in a liberal spirit with the demand for Home Rule." It was clear that if Gladstone meant what he appeared to mean, the Parnellites would support him, and the Tories must leave office. The government seemed to accept the situation. When parliament met they executed, for form's sake, some confused manoeuvres, and then they were beaten on an amendment to the address in favour of Municipal Allotments. On the 1st of February 1886 Gladstone became, for the third time, prime minister. Several of his former colleagues declined to join him, on the ground of their absolute hostility to the policy of Home Rule; others joined on the express understanding that they were only pledged to consider the policy, and did not fetter their further liberty of action. On the 8th of April Gladstone brought in his bill for establishing Home Rule, and eight days later the bill for buying out the Irish landlords. Meanwhile two members of his cabinet, feeling

themselves unable to support these measures, resigned. Hostility to the bills grew apace. Gladstone was implored to withdraw them, or substitute a resolution in favour of Irish autonomy; but he resolved to press at least the Home Rule Bill to a second reading. In the early morning of the 8th of June the bill was thrown out by thirty. Gladstone immediately advised the queen to dissolve parliament. Her Majesty strongly demurred to a second general election within seven months; but Gladstone persisted, and she yielded. Parliament was dissolved on the 26th of June. In spite of Gladstone's skilful appeal to the constituencies to sanction the principle of Home Rule, as distinct from the practical provisions of his late bill, the general election resulted in a majority of considerably over 100 against his policy, and Lord Salisbury resumed office. Throughout the existence of the new parliament Gladstone never relaxed his extraordinary efforts, though now nearer eighty than seventy, on behalf of the cause of self-government for Ireland. The fertility of argumentative resource, the copiousness of rhetoric, and the physical energy which he threw into the enterprise, would have been remarkable at any stage of his public life; continued into his eighty-fifth year they were little less than miraculous. Two incidents of domestic interest, one happy and the other sad, belong to that period of political storm and stress. On the 25th of July r889 Gladstone celebrated the fiftieth anniversary of his marriage, and on the 4th of July T891 his eldest son, William Henry, a man of fine character and accomplishments, died, after a lingering illness, in his fifty-second year.

The crowning struggle of Gladstone's political career was now approaching its climax. Parliament was dissolved on the 28th of June 1892. The general election resulted in a majority of forty for Home Rule, heterogeneously Heme Rule composed of Liberals, Labour members and Irish. BUI. As soon as the new parliament met a vote of want of confidence in Lord Salisbury's government was moved and carried. Lord Salisbury resigned, and on the 15th of August T892 Gladstone kissed hands as first lord of the treasury. He was the first English statesman that had been four times prime minister. Parliament reassembled in January 1893. Gladstone brought in his new Home Rule Bill on the 13th of February. It passed the House of Commons, but was thrown out by the House of Lords on the second reading on the 8th of September 1893. Gladstone's political work was now, in his own judgment, ended. He made his last speech in the House of Commons on the 1st of March 1894, acquiescing in some amendments introduced by the Lords into the Parish Councils Bill; and on the 3rd of March he placed his resignation in the queen's hands. He never set foot again in the House of Commons, though he re- mained a member

of it till the dissolution of 1895. He paid

Death.

occasional visits to friends in London, Scotland and the south of France; but the remainder of his life was spent for the most part at Hawarden. He occupied his leisure by writing a rhymed translation of the Odes of Horace, and preparing an elaborately annotated edition of Butler's Analogy and Sermons. He had also contemplated some addition to the Homeric studies which he had always loved, but this design was never carried into effect, for he was summoned once again from his quiet life of study and devotion to the field of public controversy. The Armenian massacres in 1894 and 1895 revived all his ancient hostility to " the governing Turk." He denounced the massacres and their perpetrators at public meetings held at Chester on the 6th of August 1895, and at Liverpool on the 24th of September 1896. In March 1897 he recapitulated the hideous history in an open letter to the duke of Westminster.

But the end, though not yet apprehended, was at hand. Since his retirement from office Gladstone's physical vigour, up to that time unequalled, had shown signs of impairment. Towards the end of the summer of 1897 he began to suffer from an acute pain, which was attributed to facial neuralgia, and in November he went to Cannes. In February 1898 he returned to England and went to Bournemouth. There he was informed that the pain had its origin in a disease which must soon prove fatal. He received the information with simple thankfulness, and only asked that he might die at home. On the 22nd of March he returned to Hawarden, and there he died on the 19th of May 1898. During the night of the 25th of May his body was conveyed from Hawarden to London and the coffin was placed on a bier in Westminster Hall. Through- out the 26th and 27th a vast train of people, officially estimated at 250,000, and drawn from every rank and class, moved in unbroken procession past the bier. On the 28th of May the coffin, preceded by the two Houses of Parliament and escorted by the chief magnates of the realm, was carried from Westminster Hall to Westminster Abbey. The heir-apparent and his son, the prime minister and the leader of the House of Commons, were among those who bore the pall. The body was buried in the north transept of the abbey, where, on the 19th of June 1900, Mrs Gladstone's body was laid beside it.

Mr and Mrs Gladstone had four sons and four daughters, of whom one died in infancy. The eldest son, W. H. Gladstone Family. (1840-1891), was a member of parliament for many years, and married the daughter of Lord Blantyre, his son William (b. 1885) inheriting the family estates. The fourth son, Herbert John (b. 1854), sat in parliament for Leeds from 1880 to 1910, and filled various offices, being home secretary 1905-1910; in 1910 he was created Viscount Gladstone, on being appointed governor-general of united South Africa. The eldest daughter, Agnes, married the Rev. E. C.Wickham, headmaster of Wellington, 1 873-1 893, and later Dean of Lincoln. Another daughter married the Rev. Harry Drew, rector of Hawarden. The youngest, Helen, was for some years vice-principal of Newnham College, Cambridge.

After a careful survey of Mr Gladstone's life, enlightened by personal observation, it is inevitable to attempt some analysis of his character. First among his moral attributes must be placed his religiousness. From those early days when a fond mother wrote of him as having been " truly converted to God," down to the verge of ninety years, he lived in the habitual contemplation of the unseen world, and regulated his private and public action by reference to a code higher than that of mere prudence or worldly wisdom. A second characteristic, scarcely less prominent than the first, was his love of power. His ambition had nothing in common with the vulgar eagerness for place and pay and social standing. Rather it was a resolute determination to possess that control over the machine of state which should enable him to fulfil without let or hindrance the political mission with which he believed that Providence had charged him. The love of power was supported by a splendid fearlessness. No dangers were too threatening for him to face, no obstacles too formidable, no tasks too laborious, no heights too steep. The love of power and the supporting

Character.

courage were allied with a marked imperiousness. Of this quality there was no trace in his manner, which was courteous, conciliatory and even deferential; nor in his speech, which breathed an almost exaggerated humility. But the imperious- ness showed itself in the more effectual form of action; in his sudden resolves, his invincible insistence, his recklessness of consequences to himself and his friends, his habitual assumption that the civilized world and all its units must agree with him, his indignant astonishment at the bare thought of dissent or resistance, his incapacity to believe that an overruling Provid- ence would permit him to be frustrated or defeated. He had by nature what lie himself called a " vulnerable temper and impetuous

moods.” But so absolute was his lifelong self-mastery that he was hardly ever betrayed into saying that which, on cooler reflection, needed to be recalled. It was easy enough to see the ” vulnerable temper ” as it worked within, but it was never suffered to find audible expression. It may seem paradoxical, but it is true, to say that Mr Gladstone was by nature conservative. His natural bias was to respect things as they were. In his eyes, institutions, customs, systems, so long as they had not become actively mischievous, were good because they were old. It is true that he was sometimes forced by conviction or fate or political necessity to be a revolutionist on a large scale; to destroy an established Church; to add two millions of voters to the electorate; to attack the parliamentary union of the kingdoms. But these changes were, in their in- ception, distasteful to their author. His whole life was spent in unlearning the prejudices in which he was educated. His love of freedom steadily developed, and he applied its principles more and more courageously to the problems of government. But it makes some difference to the future of a democratic state whether its leading men are eagerly on the look-out for something to revolutionize, or approach a constitutional change by the gradual processes of conviction and conversion.

Great as were his eloquence, his knowledge and his financial skill, Gladstone was accustomed to say of himself that the only quality in which, so far as he knew, he was distinguished from his fellow-men was his faculty of concentration. Whatever were the matter in hand, he so concentrated himself on it, and absorbed himself in it, that nothing else seemed to exist for him.

A word must be said about physical characteristics. In his prime Gladstone was just six feet high, but his inches diminished as his years increased, and in old age the unusual size of his head and breadth of his shoulders gave him a slightly top-heavy appearance. His features were strongly marked; the nose trenchant and hawk-like, and the mouth severely lined. His flashing eyes were deep-set, and in colour resembled the onyx with its double band of brown and grey. His com- plexion was of an extreme pallor, and, combined with his jet-black hair, gave in earlier life something of an Italian aspect to his face. His dark eyebrows were singularly flexible, and they per- petually expanded and contracted in harmony with what he was saying. He held himself remarkably upright, and even from his school-days at Eton had been remarked for the rapid pace at which he habitually walked. His voice was a baritone, singularly clear and far-reaching. In the Waverley Market at Edinburgh, which is said to hold 20,000 people, he could be heard without difficulty; and as late as 1895 he said to the present writer: ” What difference does it make to me

whether I speak to 400 or 4000 people?" His physical vigour in old age earned him the popular nickname of the Grand Old Man.

Lord Morley of Blackburn's Life of Gladstone was published in 1903. (G. W. E. R.)

GLADSTONE, a seaport of Clinton county, Queensland, Australia, 328 m. by rail N.E. of Brisbane. Pop. (1901) 1566. It possesses a fine, well-sheltered harbour reputed one of the best in Queensland, at the mouth of the river Boyne. Gold, manganese, copper and coal are found in the neighbourhood. Gladstone, founded in 1847, became a municipality in 1863.

See J. F., Hogan, The Gladstone Colony (London, 1898).

GLAGOLlTIC, an early Slavonic alphabet: also the liturgy written therein, and the people (Dalmatians and Roman Catholic

Montenegrins) among whom it has survived by special licence of the Pope (see Slavs for table of letters).

GLAIR (from Fr. glaire, probably from Lat. clarus, clear, bright), the white of an egg, and hence a term used for a prepara- tion made of this and used, in bookbinding and in gilding, to retain the gold and as a varnish. The adjective " glairy " is used of substances having the viscous and transparent consistency of the white ol an egg.

GLAISHER, JAMES (1800-1903), English meteorologist and aeronaut, was born in London on the 7th of April 1809. After serving for a few years on the Ordnance Survey of Ireland, he acted as an assistant at the Cambridge and Greenwich ob- servatories successively, and when the department of meteorology and magnetism was formed at the latter, he was entrusted with its superintendence, which he continued to exercise for thirty-four years, until his retirement from the public service. In 1845 he published his well-known dew-point tables, which have gone through many editions. In 1850 he established the Meteoro- logical Society, acting as its secretary for many years, and in 1866 he assisted in the foundation of the Aeronautical Society of Great Britain. He was appointed a member of the royal commission on, the warming and ventilation of dwellings in 1875, and for twelve years from 1880 acted as chairman of the executive committee of the Palestine Exploration Fund. But his name is best known in connexion with the

series of balloon ascents which he made between 1862 and 1866, mostly in company with Henry Tracey Coxwell. Many of these ascents were arranged by a committee of the British Association, of which he was a member, and were strictly scientific in character, the object being to carry out observations on the temperature, humidity, &c, of the atmosphere at high elevations. In one of them, that which took place at Wolverhampton on the 5th of September 1862, Glaisher and his companion attained the greatest height that had been reached by a balloon carrying passengers. As no automatically recording instruments were available, and Glaisher was unable to read the barometer at the highest point owing to loss of consciousness, the precise altitude can never be known, but it is estimated at about 7 m. from the earth. He died on the 7th of February 1903 at Croydon.

GLAMIS, a village and parish of Forfarshire, Scotland, si rn. W. by S. of Forfar by the Caledonian railway. Pop. of parish (1901) 1351. The name is sometimes spelled Glammis and the i is mute: it is derived from the Gaelic, glamhus, ” a wide gap,” ” a vale.” The chief object in the village is the sculptured stone, traditionally supposed to be a memorial of Malcolm II., although Fordun’s statement that the king was slain in the castle is now rejected. About a mile from the station stands Glamis Castle, the seat of the earl of Strathmore and Kinghorne, a fine example of the Scottish Baronial style, enriched with certain features of the French chateau. In its present form it dates mostly from the 17th century, but the original structure was as old as the nth century, for Macbeth was Thane of Glamis. Several of the early Scots kings, especially Alexander III., used it occasionally as a residence. Robert II. bestowed the thanedom on John Lyon, who had married the king’s second daughter by Elizabeth Mure and was thus the founder of the existing family. Patrick Lyon became hostage to England for James I. in 1424. When, in 1537, Janet Douglas, widow of the 6th Lord Glamis, was burned at Edinburgh as a witch, for conspiring to procure James V.‘s death, Glamis was forfeited to the crown, but it was restored to her son six years later when her innocence had been established. The 3rd earl of Strathmore entertained the Old Chevalier and eighty of his immediate followers in 1715. After discharging the duties of hospitality the earl joined tKe Jacobites at Sheriffmuir and fell on the battlefield. Sir Walter Scott spent a night in the ” hoary old pile ” when he was about twenty years old, and gives a striking relation of his experiences in his Demonology and Witchcraft. The hall has an arched ceiling and several historical portraits, including those of Claver- house, Charles II. and James II. of England. At Cossans, in the parish of Glamis, there is a remarkable sculptured monolith,

and other examples occur at the Hunters’ Hill and in the old kirkyard

of Eassie.

GLAMORGANSHIRE (Welsh Morganwg), a maritime county occupying the south-east corner of Wales, and bounded N.W. by Carmarthenshire, N. by Carmarthenshire and Breconshire, E. by Monmouthshire and S. and S.W. by the Bristol Channel and Carmarthen Bay. The contour of the county is largely determined by the fact that it lies between the mountains of Breconshire and the Bristol Channel. Its extreme breadth from the sea inland is 29 m., while its greatest length from east to west is 53 m. Its chief rivers, the Rhymney, Taff, Neath (or Nedd) and Tawe or Tawy, have their sources in the Breconshire mountains, the two first trending towards the south-east, while the two last trend to the south-west, so that the main body of the county forms a sort of quarter-circle between the Taff and the Neath. Near the apex of the angle formed by these two rivers is the loftiest peak in the county, the great Pennant scarp of Craig y Llyn or Cam Moesyn, 1970 ft. high, which in the Glacial period diverted the ice-flow from the Beacons into the valley on either side of it. To the south and south-east of this peak extend the great coal-fields of mid-Glamorgan, their surface forming an irregular plateau with an average elevation of 600 to 1200 ft. above sea-level, but with numerous peaks about 1500 ft. high, or more; Mynydd y Caerau, the second highest being 1823 ft. Out of this plateau have been carved, to the depth of 500 to 800 ft. below its general level, three distinct series of narrow valleys, those in each series being more or less parallel. The rivers which give their names to these valleys include the Cynon, the Great and Lesser Rhondda (tributaries of the Taff) and the Ely flowing to the S.E., the Ogwr or Ogmore (with its tributaries the Garw and Llynfi) flowing south through Bridgend, and the Avan bringing the waters of the Corwg and Gwynfi to the south-west into Swansea Bay at Aberavon. To the south of this central hill country, which is wet, cold and sterile, and whose steep slopes form the southern edge of the coal-field, there stretches out to the sea a gently undulating plain, compendiously known as the ” Vale of Glamorgan,” but in fact consisting of a succession of small vales of such fertile land and with such a mild climate that it has been styled, not inaptly, the ” Garden of Wales.” To the east of the central area referred to and divided from it by a spur of the Brecknock mountains culminating in Cam Bugail, 1570 ft. high, is the Rhymney, which forms the county’s eastern boundary. On the west other spurs of the Beacons divide the Neath from the Tawe (which enters the sea at Swansea), and the Tawe from the Loughor, which, with its tributary the Amman, separates the county on the N.W. from Carmarthenshire, in which it rises, and falling into Car- marthen Bay forms what is

known as the Burry estuary, so called from a small stream of that name in the Gower peninsula. The rivers are all comparatively short, the Taff, in every respect the chief river, being only ˆ m. long.

Down to the middle of the 19th century most of the Glamorgan valleys were famous for their beautiful scenery, but industrial operations have since destroyed most of this beauty, except in the so-called ” Vale of Glamorgan,” the Vale of Neath, the ” combes ” and limestone gorges of Gower and the upper reaches of the Taff and the Tawe. The Vale of Neath is par excellence the waterfall district of South Wales, the finest falls being the Cilhepste fall, the Sychnant and the three Clungwyns on the Mellte and its tributaries near the Vale of Neath railway from Neath to Hirwaun, Scwd Einon Gam and Scwd Gladys on the Pyrddin on the west side of the valley close by, with Melin Court and Abergarwed still nearer Neath. There are also several cascades on the Dulais, and in the same district, though in Breconshire, is Scwd Henrhyd on the Llech near Colbren Junction. Almost the only part of the county which is now well timbered is the Vale of Neath. There are three small lakes, Llyn Fawr and Llyn Fach near Craig y Llyn and Kenfig Pool amid the sand-dunes of Margam. The rainfall of the county varies from an average of about 25 in. at Porthcawl and other parts of the Vale of Glamorgan to about 37 in. at Cardiff, 40 in. at Swansea and to upwards of 70 in. in the northern part of the county,

the fall being still higher in the adjoining parts of Breconshire whence Cardiff, Swansea, Merthyr and a large area near Neath draw their main supplies of water.

The county has a coast-line of about 83 m. Its two chief bays are the Burry estuary and Swansea, one on either side of the Gower Peninsula, which has also a number of smaller inlets with magnificent cliff scenery. The rest of the coast is fairly regular, the chief openings being at the mouths of the Ogmore and the Taff respectively. The most conspicuous headlands are Whitef ord Point, Worms Head and Mumbles Head in Gower, Nash Point and Lavernock Point on the eastern half of the coast.

Geology. — The Silurian rocks, the oldest in the county, form a small inlier about 2 sq. m. in area at Rumney and Pen-y-lan, north of Cardiff, and consist of mudstones and sandstones of Wenlock and

Ludlow age ; a feeble representative of the Wenlock Limestone also is present. They are conformably succeeded by the Old Red Sand- stone which extends westwards as far as Cowbridge as a deeply- eroded anticline largely concealed by Trias and Lias. The Old Red Sandstone consists in the lower parts of red marls and sand- stones, while the upper beds are quartzitic and pebbly, and form bold scarps which dominate the low ground formed by the softer beds below. Cefn-y-bryn, another anticline of Old Red Sandstone (including small exposures of Silurian rocks), forms the prominent backbone of the Gower peninsula. The next formation is the Carboniferous Limestone which encircles and underlies the great South Wales coal-field, on the south of which, west of Cardiff, it forms a bold escarpment of steeply-dipping beds surrounding the Old Red Sandstone anticline. It shows up through the Trias and Lias in extensive inliers near Bridgend, while in Gower it dips away from the Old Red Sandstone of Cefn-y-bryn. On the north of the coal-field it is just reached near Merthyr Tydfil. The Millstone Grit, which consists of grits, sandstones and shales, crops out above the limestone and serves to introduce the Coal Measures, which lie in the form of a great trough extending east and west across the county and occupying most of its surface. The coal seams are most numerous in the lower part of the series; the Pennant Sandstone succeeds and occupies the inner parts of the basin, forming an elevated moorland region deeply trenched by the teeming valleys (e.g. the Rhondda) which cross the coal-field from north to south. Above the Pennant Sandstone still higher coals come in. Taken generally, the coals are bituminous in the south-east and anthracitic in the north-west.

After the Goal Measures had been deposited, the southern part of the region was subjected to powerful folding; the resulting anticlines were worn down during a long period of detrition, and then sub- merged slowly beneath a Triassic lake in which accumulated the Keuper conglomerates and marls which spread over the district west of Cardiff and are traceable on the coast of Gower. The succeeding Rhaetic and Lias which form most of the coastal plain (the fertile Vale of Glamorgan) from Penarth to near Bridgend were laid down by the Jurassic sea. A well-marked raised beach is traceable in Gower. Sand-dunes are present locally around Swansea Bay. Moraines, chiefly formed of gravel and clay, occupy many of the Glamorgan valleys; and these, together with the striated surfaces which may be observed at higher levels, are clearly glacial in origin. In the Coal Measures and the newer Limestones and Triassic, Rhaetic and Liassic conglomerates, marls and shales, many interesting fossils have been disinterred: these include the remains of an air-breathing reptile (Anthracespeton) .

Bones of the cave-bear, lion, mammoth, reindeer, rhinoceros, along with flint weapons and tools, have been discovered in some caves of the Gower peninsula.

Agriculture. — The low-lying land on the south from Caerphilly to Margam is very fertile, the soil being a deep rich loam; and here the standard of agriculture is fairly high, and there prevails a well-defined tenant-right custom, supposed to be of ancient origin but probably dating only from the beginning of the 19th century. Everywhere on the Coal Measures the soil is poor, while vegetation is also injured by the smoke from the works, especially copper smoke. Leland (c. 1535) describes the lowlands as growing good corn and grass but little wood, while the mountains had ” redde dere, kiddes plenty, oxen and sheep.” The land even in the ” Vale ” seems to have been open and unenclosed till the end of the 15th or beginning of the 16th century, while enclosure spread to the uplands still later. About one-fifth of the total area is still common land, more than half of which is unsuitable for cultivation. The total area under culti- vation in 1905 was 269,271 acres or about one-half of the total are a of the county. The chief crops raised (giving them in the order of their respective acreages) are oats, barley, turnips and swedes,’ wheat, potatoes and mangolds. A steady decrease of the acreage ■ under grain-crops, green-crops and clover has been accompanied by an increase in the area of pasture. Dairying has been largely abandoned for stock-raising, and very little ” Caerphilly cheese ” is now made in that district. In 1905 Glamorgan had the largest number of horses in agriculture of any Welsh county except those of

Carmarthen and Cardigan. Good sheep and ponies are reared in the

hill-country. Pig-keeping is much neglected, and despite the mild climate very little fruit is grown. The average size of holdings in

1905 was 47-3 acres, there being only 46 holdings above 300 acres, and 1 7 19 between 50 and 500 acres.

Mining and Manufactures. — Down to the middle of the 1 8th century the county had no industry of any importance except agriculture. The coal which underlies practically the whole surface of the county except the Vale of Glamorgan and West Gower was little worked till about 1755, when it began to be used instead of charcoal for the smelting- of iron. By 1811, when there were 25 blast furnaces in the county, the demand for coal for this purpose had much increased, but it was in the most active period of railway construction that it reached its maximum. Down to about 1850, if not later, the chief collieries

were owned by the ironmasters and were worked for their own requirements, but when the suitability of the lower seams in the district north of Cardiff for steam purposes was realized, an export trade sprang up and soon assumed enormous proportions, so that ” the port of Cardiff ” (including Barry and Penarth), from which the bulk of the steam coal was shipped, became the first port in the world for the shipment of coal. The development of the anthracite coal-field lying to the north and west of Swansea (from which port it is mostly shipped) dates mainly from the closing years of the 19th century, when the demand for this coal grew rapidly. There are still large areas in the Rhymney Valley on the east, and in the districts of Neath and Swansea on the west, whose development has only recently been undertaken. In connexion with the coal industry, patent fuel (made from small coal and tar) is largely manufactured at Cardiff, Port Talbot and Swansea, the ship- ments from Swansea being the largest in the kingdom. Next in importance to coal are the iron, steel and tin-plate industries, and in the Swansea district the smelting of copper and a variety of other ores.

The manufacture of iron and steel is carried onat Dowlais, Merthyr Tydfil, Cardiff, Port Talbot, Briton Ferry, Pontardawe, Swansea, Gorseinon and Gowerton. During the last quarter of the 19th cen- tury the use of the native ironstone was almost wholly given up, and the necessary ore is now imported, mainly from Spain. As a result several of the older inland works, such as those of Aberdare, Ystalyfera and Brynaman have been abandoned, and new works have been established on or near the sea-board; e.g. the Dowlais company in 1891 opened large works at Cardiff. The tin-plate industry is mainly confined to the west of the county, Swansea being the chief port for the shipment of tin-plates, though there are works near Llantrisant and at Melin Griffith near Cardiff, the latter being the oldest in the county. Copper-smelting is carried on on a large scale in the west of the county, at Port Talbot, Cwmavon, Neath and Swansea, and on a small scale at Cardiff, the earliest works having been established at Neath in 1584 and at Swansea in 1717. There are nickel works at Clydach near Swansea, the nickel being imported in the form of ” matte ” from Canada. Swansea has almost a monopoly of the manufacture of spelter or zinc. Lead, silver and a number of other metals or their by-products are treated in or near Swansea, which is often styled the ” metallurgical capital of Wales.” Limestone and silica quarries are worked, while sandstone and clay are also raised. Swansea and Nantgarw were formerly famous for their china, coarse ware is still made chiefly at Ewenny and terra- cotta at Pencoed. Large numbers of people are employed in engineering works and in the

manufacture of machines, chains, conveyances, tools, paper and chemicals. The textile factories are few and unimportant.

Fisheries. — Fisheries exist all along the coast; by lines, draught- nets, dredging, trawling, fixed nets and by hand. There is a fleet of trawlers at Swansea. The principal fish caught are cod, herring, pollock, whiting, flukes, brill, plaice, soles, turbot, oysters, mussels, limpets, cockles, shrimps, crabs and lobsters. There are good fish- markets at Swansea and Cardiff.

Communications. — -The county has ample dock accommodation. The various docks of Cardiff amount to 210 acres, including timber ponds ; Penarth has a dock and basin of 26 acres and a tidal harbour of 55 acres. Barry docks cover 114 acres; Swansea has 147 acres, including its new King's Dock; and Port Talbot 90 acres. There are also docks at Briton Ferry and Porthcawl, but they are not capable of admitting deep-draft vessels.

Besides its ports, Glamorgan has abundant means of transit in many railways, of which the Great Western is the chief. Its trunk line traversing the country between the mountains and the sea passes through Cardiff, Bridgend and Landore (on the outskirts of Swansea) , and throws off numerous branches to the north. The Taff Vale railway serves all the valley of the Taff and its tributaries, and has also extensions to Barry and (through Llantrisant and Cowbridge) to Aberthaw. The Rhymney railway likewise serves the Rhymney Valley, and has a joint service with the Great Western between Cardiff and Merthyr Tydfil — the latter town being also the terminus of the Brecon and Merthyr and a branch of the North-Western from Abergavenny. The Barry railway visits Cardiff and then travels in a north-westerly direction to Pontypridd and Porth, while it sends another branch along the coast through Llantwit Major to Bridgend. Swansea is connected with Merthyr by the Great Western, with Brecon by the Midland, with Craven Arms and Mid-Wales generally by the London & North-Western, with the Rhondda Valley by the Rhondda and Swansea Bay (now worked by the Great Western) and with Mumbles by the Mumbles railway. The Port Talbot

railway runs to Blaengarw, and the Neath and Brecon railway (starting from Neath) joins the Midland at Colbren Junction. The canals of the county are the Glamorgan canal from Cardiff to Merthyr

Tydfil (25I m.), with a branch (7 m.) to Aberdare, the Neath canal (13 m.) from Briton Ferry to Abernant, Glyn Neath (whence a tramway formerly connected it with Aberdare), the Tennant canal connecting the rivers Neath and Tawe, and the Swan- sea canal (16J m.), running up the Swansea Valley from Swansea to Abercrave in Breconshire. Comparatively little use is now made of these canals, excepting the lower portions of the Glamorgan canal.

Population and Administration. — The area of the ancient county with which the administrative county is conterminous is 518,863 acres, with a population in 1901 of 859,931 persons. In the three decades between 1831 and 1861 it increased 35‘2, 35ˆ4 and 3yi % respectively, and in 1881-1891, 34‘4, its average increase in the other decennial periods subsequent to 1861 being about 25%. The county is divided into five parliamentary divisions (viz. Glamorgan- shire East, South and Middle, Gower and Rhondda) ; it also includes the Cardiff district of boroughs (consisting of Cardiff, Cowbridge and Llantrisant), which has one member; the greater part of the parlia- mentary borough of Merthyr Tydfil (which mainly consists of the county borough of Merthyr, the urban district of Aberdare and part of Mountain Ash), and returns two members; and the two divisions of Swansea District returning one member each, one division con- sisting of the major part of Swansea town, the other comprising the remainder of Swansea and the boroughs of Aberavon, Kenfig, Llwchwr and Neath. There are six municipal boroughs: Aberavon (pop. in 1901, 7553), Cardiff (164,333), Cowbridge (1202), Merthyr Tydfil (69,228), Neath (13,720) and Swansea (94,537). Cardiff (which in 1905 was created a city), Merthyr Tydfil and Swansea are county boroughs. The following are urban districts: Aberdare (43,365), Barry (27,030), Bridgend (6062), Briton Ferry (6973), Caerphilly (15,835), Glyncorrwg (6452), Maesteg (15,012), Margam (9014), Mountain Ash (31,093), Ogmore and Garw (19,907), Oyster- mouth (4461), Penarth (14,228), Pontypridd (32,316), Porthcawl (1872) and Rhondda, previously known as Ystradyfodwg (113,735). Glamorgan is in the S. Wales circuit, and both assizes and quarter- sessions are held at Cardiff and Swansea alternately. All the municipal boroughs have separate commissions of the peace, and Cardiff and Swansea have also separate courts of quarter-sessions. The county has thirteen other petty sessional divisions, Cardiff, the Rhondda (with Pontypridd) and the Merthyr and Aberdare district have stipendiary magistrates. There are 165 civil parishes. Ex- cepting the districts of Gower and Kilvey, which are in the diocese of St David’s, the whole county is in the diocese of Llandaff . There are 159 ecclesiastical parishes or districts situated wholly or partly within the county.

History. — The earliest known traces of man within the area of the present county are the human remains found in the famous bone-caves of Gower, though they are scanty as compared with the huge deposits of still earlier animal remains. To a later stage, perhaps in the Neolithic period, belongs a numberof com- plete skeletons discovered in 1903 in sand-blown tumuli at the mouth of the Ogmore, where many flint implements were also found. Considerably later, and probably belonging to the Bronae Age (though finds of bronze implements have been scanty) , are the many cairns and tumuli, mainly on the hills, such as on Garth Mountain near Cardiff, Crug-yr-avan and a number east of the Tawe; the stone circles often found in association with the tumuli, that of Cam Llecharth near Pontardawe being one of the most complete in Wales; and the fine cromlechs of Cefn Bryn in Gower (known as Arthur's Stone), of St Nicholas and of St Lythan's near Cardiff.

In Roman times the country from the Neath to the Wye was occupied by the Silures, a pre-Celtic race, probably governed at that time by Brythonic Celts. West of the Neath and along the fringe of the Brecknock Mountains were probably remnants of the earlier Goidelic Celts, who have left traces in the place-names of the Swansea valley (e.g. llwch, " a lake ") and in the illegible Ogham inscription at Loughor, the only other Ogham stone in the county being at Kenfig, a few miles to the east of the Neath estuary. The conquest of the Silures by the Romans was begun about a.d. 50 by Ostorius Scapula and completed some 25 years later by Julius Frontinus, who probably constructed the great military road, called Via Julia Maritima, from Gloucester to St David's, with stations at Cardiff, Bdvium (variously identified with Boverton, Cowbridge and Ewenny), Nidum (identified with Neath) and Leucarum or Loughor. The important station of Gaer on the Usk near Brecon was connected by two branch roads, one running from Cardiff through Gelligaer (where there was a strong hill fort) and Merthyr Tydfil, and another from Neath

through Capel Colbren. Welsh tradition credits Glamorgan with being the first home of Christianity, and Llandaff the earliest bishopric in Britain, the name of three reputed missionaries of the 2nd century being preserved in the names of parishes in south Glamorgan. What is certain, however, is that the first two bishops of Llandaff, St Dubricius and St Teilo, lived during the first half of the 6th century, to which period also belongs the establish- ment of the great monastic settlements of Llancarvan by Cadoc, of Llandough by Oudoceus and of Llantwit Major by Illtutus, the last of which flourished as a seat of learning down to the 12th century. A few moated mounds such as at Cardiff indicate that, after the withdrawal of the Romans, the coasts

were visited by sporadic bands of Saxons, but the Scandinavians who came in the 9th and succeeding centuries left more abundant traces both in the place-names of the coast and in such camps as that on Sully Island, the Bulwarks at Porthkerry and Hardings Down in Gower. Meanwhile the native tribes of the district had regained their independence under a line of Welsh chieftains, whose domain was consolidated into a principality known as Glywyssing, till about the end of the 10th century when it acquired the name of Morganwg, that is the territory of Morgan, a prince who died in a.d. 980; it then comprised the whole country from the Neath to the Wye, practically corresponding to the present diocese of Llandaff. Gwlad Morgan, later softened into Glamorgan, never had much vogue and meant precisely the same as Morganwg, though the two terms became differentiated a few centuries later.

The Norman conquest of Morganwg was effected in the closing years of the nth century by Robert Fitzhamon, lord of Gloucester. His followers settled in the low-lying lands of the ” Vale,” which became known as the ” body ” of the shire, while in the hill country, which consisted of ten ” members,” corresponding to its ancient territorial divisions, the Welsh retained their customary laws and much of their independence. Glamorgan, whose bounds were now contracted between the Neath and the Rhymney, then became a lordship marcher, its status and organization being that of a county palatine; its lord possessed jura regalia, and his chief official was from the first a vice-comes, or sheriff, who presided over a county court composed of his lord’s principal tenants. The inhabitants of Cardiff in which, as the caput baroniae, this court was held (though sometimes ambulatory), were soon granted municipal privileges, and in time Cowbridge, Kenfig, Llantrisant, Aberavon and Neath also became chartered market-towns. The manorial system was introduced throughout the ” Vale,” the manor in many cases becoming the parish, and the owner building for its protection first a castle and then a church. The church itself became Normanized, and monasteries were established — the Cistercian abbey of Neath and Margam in n 29 and 1147 re- spectively, the Benedictine priory of Ewenny in 1 141 and that of Cardiff in 1147. Dominican and Franciscan houses were also founded at Cardiff in the following century.

Gower (with Kilvey) or the country westof themorassbetween Neath and Swansea had a separate history. It was conquered about 1 1 00 by Henry de Newburgh, 1st earl of Warwick, by whose descendants and the powerful family of De Breos it was successively held as a marcher lordship, organized to some extent on county lines, till 1469. Swansea (which was the caput baroniae of Gower) and Loughor received their

earlier charters from the lords of Gower (see Gower).

For the first two centuries after Fitzhamon's time the lordship of Glamorgan was held by the earls of Gloucester, a title con- ferred by Henry I. on his natural son Robert, who acquired Glamorgan by marrying Fitzhamon's daughter. To the 1st earl's patronage of Geoffrey of Monmouth and other men of letters, at Cardiff Castle of which he was the builder, is probably due the large place which Celtic romance, especially theArthurian cycle, won for itself in medieval literature. The lordship passed by descent through the families of Clare (who held it from 12 17 to 1317), Despenser, Beauchamp and Neville to Richard III., on whose fall it escheated to the crown. From time to time, the Welsh of the hills, often joined by their countrymen from other

parts, raided the Vale, and even Cardiff Castle was seized about 1 1 53 by Ivor Bach, lord of Senghenydd, who for a time held its lord a prisoner. At last Caerphilly Castle was built to keep them in check, but this provoked an invasion in 1270 by Prince Llewelyn ap Griffith, who besieged the castle and refused to retire except on conditions. In 13 16 Llewelyn Bren headed a revolt in the same district, but being defeated wasput to death by Despenser, whose great unpopularity with the Welsh made Glamorgan less safe as a retreat for Edward II. a few years later. In 1404 Glendower swept through the county, burning castles and laying waste the possessions of the king's supporters. By the Act of Union of 1535 the county of Glamorgan was incorporated as it now exists, by the addition to the old county of the lordship of Gower and Kilvey, west of. the Neath. By another act of 1542 the court of great sessions was established, and Glamorgan, with the counties of Brecon and Radnor, formed one of its four Welsh circuits from thence till 1830, when the English assize system was introduced into Wales. In the same year the county was given one parliamentary representative, increased to two in 1832 and to five in 1885. The boroughs were also given a member. In 1832 Cardiff (with Llantrisant and Cowbridge), the Swansea group of boroughs and the parliamentary borough of Merthyr Tydfil were given one member each, increased to two, in the case of Merthyr Tydfil in 1867. In 1885 the Swansea group was divided into two constituencies with a member each. The lordship of Glamorgan, shorn of its quasi-regal status, was granted by Edward VI. to William Herbert, afterwards 1st earl of Pembroke, from whom it has descended to the present

marquess of Bute.

The rule of the Tudors promoted the rapid assimilation of the inhabitants of the county, and by the reign of Elizabeth even the descendants of the Norman knights had largely become Welsh both in speech and sentiment. Welsh continued to be the prevalent speech almost throughout the county, except in the peninsular part of Gower and perhaps Cardiff, till the last quarter of the 19th century. Since then it has lost ground in the mari- time towns and the south-east corner of the county generally, while fairly holding its own, despite much English migration, in the industrial districts to the north. In 1001 about 56% of the total population above three years of age was returned as speaking English only, 37% as speaking both English and Welsh, and about 65 % as speaking Welsh only.

In common with the rest of Wales the county was mainly Royalist in the Civil War, and indeed stood foremost in its readiness to pay ship-money, but when Charles I. visited Cardiff in July 1645 ne failed to recruit his army there, owing to the dissatisfaction of the county, which a few months later declared for the parliament. There was, however, a subsequent Royalist revolt in Glamorgan in 1648, but it was signally crushed by Colonel Horton at the battle of St Fagan's (8th of May).

The educational gap caused by final disappearance of the great university of Llantwit Major, founded in the 6th century, and by the dissolution of the monasteries was to some extent filled by the foundation, by the Stradling family, of a grammar school at Cowbridge which, refounded in 1685 by Sir Leoline Jenkins, is still carried on as an endowed school. The only other ancient grammar school is that of Swansea, founded by Bishop Gore in 1682, and now under the control of the borough council. Besides the University College of South Wales and Monmouth- shire established at Cardiff in 1883, and a technical college at Swansea, there is a Church of England theological college (St Michael's) at Llandaff (previously at Aberdare), a training college for school-mistresses at Swansea, schools for the blind at Cardiff and Swansea and for the deaf at Cardiff, Swansea and Pontypridd.

Antiquities. — The antiquities of the county not already, mentioned include an unusually large number of castles, all of which, except the castles of Morlais (near Merthyr Tydfil), Castell Coch and Llantrisant, are between the hill country and the sea. The finest specimen is that of Caerphilly, but there are also more or less imposing ruins at Oystermouth, Coity, Newcastle (at Bridgend), Llanblethian, Pennard

and Swansea.

Among the restored castles, resided in by their present owners, are St Donat's, " the latest and most complete of the structures built for defence," Cardiff, the residence of the marquess of Bute, St Fagan's, Dunraven, Fonmon and Penrice. Of the monastic buildings, that of Ewenny is best preserved, Neath and Margam are mere ruins, while all the others have disappeared. Almost all the older churches possess towers of a somewhat military character, and most of them, except in Gower, retain Borne Norman masonry. Coity, Coychurch and Ewenny (all near Bridgend) are fine examples of cross churches with embattled towers characteristic of the county. There are interesting monumental effigies at St Mary's, Swansea, Oxwich, Ewenny, Llantwit Major, Llantrisant, Coity and other churches in the Vale. There are from twenty-five to thirty sculptured stones, of which some sixteen are both ornamented and inscribed, five of the latter being at Margam and three at Llantwit Major, and dating from the 9th century if not earlier.

Authorities. — The records of the Curia comitatus or County Court of Glamorgan are supposed to have perished, so also have the records of Neath. With these exceptions, the records of the county have been well preserved. A collection edited by G. T. Clark under the title Cartae el alia munimenta quae ad dominium de Glamorgan pertinent was privately printed by him in four volumes (1885-1893). A Descriptive Catalogue of the Penrice and Margam Abbey MSS. in the Possession of Miss Talbot of Margam (6 vols.) was privately issued (1893-1905) under the editorship of Dr de Gray Birch, who has also published histories of the Abbeys of Neath and Margam. The Book of Llan Ddf (edited by Dr Gweno- gvryn Evans, 1903) contains documents illustrative of the early history of the diocese of Llandaff. Cardiff has published its Records in 5 vols., and there is a volume of Swansea charters. There is no complete history of the county, except a modest but useful one in Welsh — Hanes Morganwg, by D. W. Jones (Dafydd Morganwg) (1874) ; the chief contributions are Rice Merrick's Bookeof Glamorgan- shire's Antiquities, written in 1578; The Land of Morgan (1883) (a history of the lordship of Glamorgan), by G. T. Clark, whose Genealogies of Glamorgan (1886) and Medieval Military Architecture (1884) are also indispensable; see also T. Nicholas, Annals and Antiquities of the Counties and County Families of Wales (2 vols., 1872). For Gower, see Gower. (D. Ll. T.)

GLANDERS, or Farcy (Equinia), a specific infective and contagious disease, caused by a tissue parasite (Bacillus mallei), to which certain animals, chiefly the horse, ass and mule, are liable, and which is communicable from them to man. Glanders in the domesticated

animals is dealt with under Veterinary Science; it is happily a rare form of disease in man, there being evidently less affinity for its development in the human subject than in the equine species. For the pathology see the article Parasitic Diseases. It occurs chiefly among those who from their occupation are frequently in contact with horses, such as grooms, coachmen, cavalry soldiers, veterinary surgeons, &c. ; the bacillus is communicated from a glandered animal either through a wound or scratch or through application to the mucous mem- brane of the nose or mouth. A period of incubation, lasting from three to five days, generally follows the introduction of the virus into the human system. This period, however, appears sometimes to be of much longer duration, especially where there has been no direct inoculation of the poison. The first symptoms are a general feeling of illness, accompanied with pains in the limbs and joints resembling those of acute rheumatism. If the disease has been introduced by means of an abraded surface, pain is felt at that point, and inflammatory swelling takes place there, and extends along the neighbouring lymphatics. An ulcer is formed at the point of inoculation which discharges an offensive ichor, and blebs appear in the inflamed skin, along with diffuse abscesses, as in phlegmonous erysipelas. Sometimes the disease stops short with these local manifestations, but more commonly goes on rapidly accompanied with symptoms of grave constitutional disturbance. Over the whole surface of the body there appear numerous red spots or pustules, which break and discharge a thick mucous or sanguineous fluid. Besides these there are larger swellings lying deeper in the subcutaneous tissue, which at first are extremely hard and painful, and to which the term farcy ” buds ” or ” buttons ” is applied. These ultimately open and become extensive sloughing ulcers.

The mucous membrane’s participate in the same lesions as

are present in the skin, and this is particularly the case with the interior of the nose, where indeed, in many instances, the disease first of all shows itself. This organ becomes greatly swollen and inflamed, while from one or both nostrils there exudes a copious discharge of highly offensive purulent or sanguineous matter. The lining membrane of the nostrils is covered with papules similar in character to those on the skin, which form ulcers, and may lead to the destruction of the cartilaginous and bony textures of the nose. The diseased action extends into the throat, mouth and eyes, while the whole face

becomes swollen and erysipelatous, and the lymphatic glands under the jaws inflame and suppurate. Not unfrequently the bronchial tubes become affected, and cough attended with expectoration of matter similar to that discharged from the nose is the consequence. The general constitutional symptoms are exceedingly severe, and advance with great rapidity, the patient passing into a state of extreme prostration. In the acute form of the disease recovery rarely if ever occurs, and the case generally terminates fatally in a period varying from two or three days to as many weeks.

A chronic form of glanders and farcy is occasionally met with, in which the symptoms, although essentially the same as those above described, advance much more slowly, and are attended with relatively less urgent constitutional disturbance. Cases of recovery from this form are on record; but in general the disease ultimately proves fatal by exhaustion of the patient, or by a sudden supervention, which is apt to occur, of the acute form. On the other hand, acute glanders is never observed to become chronic.

In the treatment of this malady in human beings reliance is mainly placed on the maintenance of the patient's strength by strong nourishment and tonic remedies. Cauterization should be resorted to if the point of infection is early known. Abscesses may be opened and antiseptic lotions used. In all cases of the outbreak of glanders it is of the utmost consequence to prevent the spread of the disease by the destruction of affected animals and the cleansing and disinfection of infected localities.

GLANVILL (or Glanvil), JOSEPH (1636-1680), English philosopher, was born at Plymouth in 1636, and was educated at Exeter and Lincoln colleges, Oxford, where he graduated as M.A. in 1658. After the Restoration he was successively rector of Wimbush, Essex, vicar of Frome Selwood, Somersetshire, rector of Streat and Walton. In 1666 he was appointed to the abbey church, Bath; in 1678 he became prebendary of Wor- cester Cathedral, and acted as chaplain in ordinary to Charles II. from 1672. He died at Bath in November 1680. Glanvill's first work (a passage in which suggested the theme of Matthew Arnold's Scholar Gipsy), The Vanity of Dogmatizing, or Con- fidence in Opinions, manifested in a Discourse of the shortness and uncertainty of our Knowledge, and its Causes, with Reflexions on Peripateticism, and an Apology for Philosophy (1661), is interesting as showing one special direction in which the new method of the Cartesian philosophy might be developed. Pascal had already shown how philosophical scepticism might be employed as a bulwark for faith, and Glanvill follows in the same track. The philosophic

endeavour to cognize the whole system of things by referring all events to their causes appears to him to be from the outset doomed to failure. For if we inquire into this causal relation we find that though we know isolated facts, we cannot perceive any such connexion between them as that the one should give rise to the other. In the words of Hume, ” they seem conjoined but never connected.” All causes then are but secondary, i.e. merely the occasions on which the one first cause operates. It is singular enough that Glanvill who had not only shown, but even exaggerated, the infirmity of human reason, himself provided an example of its weakness; for, after having combated scientific dogmatism, he not only yielded to vulgar superstitions, but actually en- deavoured to accredit them both in his revised edition of the Vanity of Dogmatizing, published as Scepsis scientifica (1665, ed. Rev. John Owen, 1885), and in his Philosophical Considera- tions concerning the existence of Sorcerers and Sorcery (1666).

The latter work appears to have been based on the story of the drum which was alleged to have been heard every night in a house in Wiltshire (Tedworth, belonging to a Mr Mompesson), a story which made much noise in the year 1663, and which is supposed to have furnished Addison with the idea of his comedy the Drummer. At his death Glanvill left a piece entitled Saddu- cismus Triumphatus (printed in 1681, reprinted with some additions in 1682, German trans. 1701). He had there collected twenty-six relations or stories of the same description as that of the drum, in order to establish, by a series of facts, the opinion which he had expressed in his Philosophical Considerations. Glanvill supported a much more honourable cause when he undertook the defence of the Royal Society of London, under the title of Plus Ultra, or the Progress and Advancement of Science since the time of Aristotle (1668), a work which shows how thoroughly he was imbued with the ideas of the empirical method.

Besides the works already noticed, Glanvill wrote Lux orientalis (1662); Philosophia pia (1671); Essays on Several Important Subjects in Philosophy and Religion (1676); An Essay concerning Preaching; and Sermons. See C. R6musat, Hist, de la phil. en Angleterre, bk. iii. ch. xi.; W. E. H. Lecky, Rationalism in Europe (1865), i. 120-128; Hallam’s Literature of Europe, iii. 358-362; Tulloch’s Rational Theology, ii. 443-455.

GLANVILL, RANULF DE (sometimes written Glanvil, Glanville) (d. 1100), chief justiciar of England and reputed author of a book on English law, was born at Stratford in Suffolk, but in what year is

unknown. There is but little information regarding his early life. He first comes to the front as sheriff of Yorkshire from 1163 to 11 70. In n 73 he became sheriff of Lancashire and custodian of the honour of Richmond. In 1 1 74 he was one of the English leaders at the battle of Alnwick, and it was to him that the king of the Scots, William the Lion, surrendered. In 1175 he was reappointed sheriff of Yorkshire, in 1 1 76 he became justice of the king's court and a justice itinerant in the northern circuit, and in 1180 chief justiciar of England. It was with his assistance that Henry II. completed his judicial reforms, though the principal of them had been carried out before he came into office. He became the king's right-hand man, and during Henry's frequent absences was in effect viceroy of England. After the death of Henry in n 89, Glanvill was removed from his office by Richard I., and im- prisoned till he had paid a ransom, according to one authority, of £15,000. Shortly after obtaining his freedom he took the cross, and he died at the siege of Acre in 1190. At the instance, it may be, of Henry II., Glanvill wrote or superintended the writing of the Tractatus de legibus et consueludinibus regni Angliae, which is a practical treatise on the forms of procedure in the king's court. As the source of our knowledge regarding the earliest form of the curia regis, and for the information it affords regarding ancient customs and laws, it is of great value to the student of English history. It is now generally agreed that the work of Glanvill is of earlier date than the Scottish law book known from its first words as Regiam Majestatem, a work which bears a close resemblance to his.

The treatise of Glanvill was first printed in 1554. An English translation, with notes and introduction by John Beames, was published at London in 1812. A French version is found in various MSS., but has not yet been printed. (See also English Law: History of.)

GLAPTHORNE, HENRY (fl. 1635-1642), English poet and dramatist, wrote in the reign of Charles I. All that is known of him is gathered from his own work. He published Poems (1639), many of them in praise of an unidentified " Lucinda "; a poem in honour of his friend Thomas Beedome, whose Poems Divine and Humane he edited in 1641; and Whitehall (1642), dedicated to his " noble friend and gossip, Captain Richard Lovelace." The first volume contains a poem in honour of the duke of York, and Whitehall is a review of the past glories of the English court, containing abundant evidences of the writer's devotion to the royal cause. Argalus and Parthenia (1639) is a pastoral tragedy founded on an episode in Sidney's Arcadia; Albertus Wallenstein (1639) , his only attempt at historical tragedy, represents Wallenstein as a monster of pride and cruelty. His

other plays are The Hollander (written 1635; printed 1640), a romantic comedy of which the scene is laid in Genoa; Wit in a Constable (1640), which is probably a version of an earlier play, and owes something to Shakespeare's Much Ado about Nothing; and The Ladies Priviledge (1640). The Lady Mother (1635) has been identified (Fleay, Biog. Chron, of the Drama) with The Noble Trial, one of the plays destroyed by Warburton's cook, and Mr A. H. Bullen prints it in vol. ii. of his Old English Plays as most probably Glapthorne's work. The Paraside, or Revenge for Honour (1654), entered at Stationers' Hall in 1653 as Glap- thorne's, was printed in the next year with George Chapman's name on the title-page. It should probably be included among Glapthorne's plays, which, though they hardly rise above the level of contemporary productions, contain many felicitous isolated passages.

The Plays and Poems of Henry Glapthorne (1874) contains an unsigned memoir, which, however, gives no information about the dramatist's life. There is no reason for supposing that the George Glapthorne of whose trial details are given was a relative of the poet.

GLARUS (Fr. Glaris), one of the Swiss cantons, the name being taken from that of its chief town. Its area is 266-8 sq. m., of which 173-1 sq. m. are classed as "productive" (forests covering 41 sq. m.), but it also contains 13-9 sq. m. of glaciers, ranking as the fifth Swiss canton in this respect. It is thus a mountain canton, the loftiest point in it being the Todi (1 1 ,887 ft.), the highest summit that rises to the north of the upper Aar and Vorder Rhine valleys. It is composed of the upper valley of the Linth, that is the portion which lies to the south of a line drawn from the Lake of Zurich to the Walensee. This river rises in the glaciers of the Todi, and has carved out for itself a deep bed, so that the floor of the valley is comparatively level, and therefore is occupied by a number of considerable villages. Glacier passes only lead from its head to the Grisons, save the rough footpath over the Kisten Pass, while a fine new carriage road over the Klausen Pass gives access to the canton of Uri. The upper Linth valley is sometimes called the Grossthal (main valley) to distinguish it from its chief (or south-eastern) tributary, the Sernf valley or Kleinthal, which joins it at Schwanden, a little above Glarus itself. At the head of the Kleinthal a mule track leads to the Grisons over the Panixer Pass, as also a foot-path over the Segnes Pass. Just below Glarus town, another glen (coming from the south-west) joins the main valley, and is watered by

the Klon, while from its head the Pragel Pass (a mule path, converted into a carriage road) leads over to the canton of Schwyz. The Klbn glen (uninhabited save in summer) is separated from the main glen by the fine bold mass of the Glarnisch (9580 ft.), while the Sernf valley is similarly cut off from the Grossthal by the high ridge running northwards from the Hausstock (10,342 ft.) over the Karpfstock (9177 ft.). The principal lakes, the Klonthalersee and the Muttensee, are of a thoroughly Alpine character, while there are several fine waterfalls near the head of the main valley, such as those formed by the Sandbach, the Schreienbach and the Fatschbach. The Pantenbriicke, thrown over the narrow cleft formed by the Linth, is one of the grandest sights of the Alps below the snow- line. There is a sulphur spring at Stachelberg, near Linthal village, and an iron spring at Elm, while in the Sernf valley there are the Plattenberg slate quarries, and just south of Elm those of the Tschingelberg, whence a terrific landslip descended toElm(nth September 1 88 1) , destroying many houses and killing 115 persons. A railway runs through the whole canton from north to south past Glarus to Linthal village (i6j m.), while from Schwanden there is an electric line (opened in 1905) up to Elm (8J m.).

In 1900 the population of the canton was 32,349 (a decrease on the 33,825 of 1888, this being the only Swiss canton which shows a decrease), of whom 31,797 were German-speaking, while there were 24,403 Protestants, 7918 Romanists (many in Nafels) and 3 Jews. After the capital, Glarus (q.v.), the largest villages are Nafels (2557 inhabitants), Ennenda (2494 inhabitants, opposite Glarus, of which it is practically a suburb), Netstal (2003 inhabitants), Mollis (1912 inhabitants) and Linththal

(1894 inhabitants). The slate industry is now the most important as the cotton manufacture has lately very greatly fallen off, this being the real reason of the diminution in the number of the population. There is little agriculture, for it is a pastoral region (owing to its height) and contains 87 mountain pastures (though the finest of all within the limits of the canton, the Urnerboden, or the Glarus side of the Klausen Pass, belongs to Uri), which can support 8054 cows, and are of an estimated capital value of about £246,000. One of the most characteristic products (though inferior qualities are manufactured elsewhere in Switzer- land) is the cheese called Schabzieger, Krauterkase, or green cheese, made of skim milk (Zieger or sirac), whether of goats or cows, mixed with buttermilk and coloured with powdered Steinklee (Melilotus officinalis) or blauer Honigklee (Melilotus caerulea). The curds are brought down from the huts on the pastures, and, after being mixed with the dried powder, are ground in

a mill, then put into shapes and pressed. The cheese thus produced is ripe in about a year, keeps a long time and is largely exported, even to America. The ice formed on the surface of the Klon- thalersee in winter is stored up on its shore and exported. A certain number of visitors come to the canton in the summer, either to profit by one or other of the mineral springs men- tioned above, or simply to enjoy the beauties of nature, especially at Obstalden, above the Walensee. The canton forms but a single administrative district and contains 28 communes. It sends to the Federal Standerath 2 representatives (elected by the Lands gemeinde) and 2 also to the Federal Nationalrath. The canton still keeps its primitive democratic assembly or Lands- gemeinde (meeting annually in the open air at Glarus on the first Sunday in May), composed of all male citizens of 20 years of age. It acts as the sovereign body, so that no ” referendum ” is required, while any citizen can submit a proposal. It names the executive of 6 members, besides the Landammann or president, all holding office for three years. The communes (forming 18 electoral circles) elect for three years the Landrath, a sort of standing committee composed of members in the proportion of 1 for every 500 inhabitants or fraction over 250. The present constitution dates from 1887. (W. A. B. C.)

GLARUS (Fr. Glaris), the capital of the Swiss canton of the same name. It is a clean, modern little town, built on the left bank of the Linth (opposite it is the industrial suburb of Ennenda on the right bank), at the north-eastern foot of the imposing rock peak of the Vorder Glarnisch (7648 ft.), while on the east rises the Schild (6400 ft.). It now contains but few houses built before 1861, for on the 10/n May 1861 practically the whole town was destroyed by fire that was fanned by a violent Fohn or south wind, rushing down from the high mountains through the natural funnel formed by the Linth valley. The total loss is estimated at about half a million sterling, of which about £100,000 were made up by subscriptions that poured in from every side. It possesses the broad streets and usual buildings of a modern town, the parish church being by far the most stately and well-situated building; it is used in common by the Protestants and Romans. Zwingli, the reformer, was parish priest here from 1506 to 1516, before he became a Pro- testant. The town is 1578 ft. above the sea-level, and in 1900 had a population of 4877, almost all German-speaking, while 1248 were Romanists. For the Linth canals (181 1 and 18 16) see Linth.

The District of Glarus is said to have been converted to Christianity in the 6th century by the Irish monk, Fridolin, whose special protector was St Hilary of Poitiers; the former was the founder, and both were patrons, of the Benedictine nunnery of Sackingen, on the Rhine

between Constance and Basel, that about the 9th century became the owner of the district which was then named after St Hilary. The Habsburgs, protectors of the nunnery, gradually drew to themselves the exercise of all the rights of the nuns, so that in 1352 Glarus joined the Swiss Confederation. But the men of Glarus did not gain their complete freedom till after they had driven back the Habsburgs in the glorious battle of Nafels (1388), the comple- ment of Sempach, so that the Habsburgers gave up their rights

in 1398, while those of Sackingen were bought up in 1395, on condition of a small annual payment. Glarus early adopted Protestantism, but there were many struggles later on between the two parties, as the chief family, that of Tschudi, adhered to the old faith. At last it was arranged that, besides the common Lands gemeinde, each party should have its separate Lands- gemeinde (1623) and tribunals (1683), while it was not till 1798 that the Protestants agreed to accept the Gregorian calendar. The slate-quarrying industry appeared early in the 17th century, while cotton-spinning was introduced about 17 14, and calico- printing by 1750. In 1798, in consequence of the resistance of Glarus to the French invaders, the canton was united to other districts under the name of canton of the Linth, though in 1803 it was reduced to its former limits. In 1799 it was traversed by the Russian army, under Suworoff, coming over the Pragel Pass, but blocked by the French at Nafels, and so driven over the Panixer to the Grisons. The old system of government was set up again in 1814. But in 1836 by the new Liberal con- stitution one single Lands gemeinde was restored, despite the resistance (1837) of the Romanist population at Nafels.

Authorities. — J. Babler, Die Alpwirtschaft im Kant. G. (Soleure. 1898); J. J. Blumer, article on the early history of the canton in vol. iii. (Zurich, 1844) of the Archiv f. schweiz. Geschichte; E. Buss and A. Heim, Der Bergsturz von Elm (1881) (Zurich, 1881) ; W. A. B. Coolidge, The Range of the Todi (London, 1894) ; J'. G. Ebel, Schilde-rung der Gebirgsvolker d. Schweiz, vol. ii. (Leipzig, 1798); Gottfried Heer, Geschichte d. Landes Glarus (to 1830) (2 vols., Glarus, 1898-1899), Glarnerische Reformationsgeschichte (Glarus, 1900), Zur 500 jdhrigen Geddchtnisfeier der Schlacht bei Nafels (1388) (Glarus, 1888) and Die Kirchen d. Kant. Glarus (Glarus, 1890); Oswald Heer and J.J. Blumer-Heer, Der Kant. Glarus (St Gall, 1846) ; J. J. Hottinger, Conrad Escher von der Linth (Zurich, 1852) ; Jahrbuch, published annually since 1865 by the Cantonal Historical Society; A. Jenny- Triimpy, " Handel u. Industrie d. Kant. G." (article in vol. xxxiii., 1899, of the

Jahrbuch); M. Schuler, Geschichte d. Landes Glarus (Zurich, 1836) ; E. Naf-Blumer, Clubfiihrer durch die Glarner-Alpen (Schwanden, 1902) ; Aloys Schulte, article on the true and legendary early history of the Canton, published in vol. xviii., 1893, of the Jahrbuch f. schweiz. Geschichte (Zurich) ; J. J. Blumer, Staats- und Rechtsgeschichte d. schweiz. Demokratien (3 vols., St Gall, 1850- 1859); H. Ryffel, Die schweiz. Lands gemeinden (Zurich, 1903); R. von Reding-Biberegg, Der Zug Suworoffs durch die Schweiz in 1799 (Stans, 1895). (W. A. B. C.)

GLAS, GEORGE (1725-1765), Scottish seaman and merchant adventurer in West Africa, son of John Glas the divine, was born at Dundee in 1725, and is said to have been brought up as a surgeon. He obtained command of a ship which traded between Brazil, the N.W. coasts of Africa and the Canary Islands. During his voyages he discovered on the Saharan seaboard a river navigable for some distance inland, and here he proposed to found a trading station. The exact spot is not known with certainty, but it is plausibly identified with Gueder, a place in about 29 10′ N., possibly the haven where the Spaniards had in the 1 5th and 16th centuries a fort called Santa Cruz de Mar Pequena. Glas made an arrangement with the Lords of Trade whereby he was granted £15,000 if he obtained free cession of the port he had discovered to the British crown; the proposal was to be laid before parliament in the session of 1765. Having chartered a vessel, Glas, with his wife and daughter, sailed for Africa in 1764, reached his destination and made a treaty with the Moors of the district. He named his settle- ment Port Hillsborough, after Wills Hill, earl of Hillsborough (afterwards marquis of Downshire), president of the Board of Trade and Plantations, 1763-1765. In November 1764 Glas and some companions, leaving his ship behind, went in the longboat to Lanzarote, intending to buy a small barque suitable for the navigation of the river on which was his settle- ment. From Lanzarote he forwarded to London the treaty he had concluded for the acquisition of Port Hillsborough. A , few days later he was seized by the Spaniards, taken to Teneriffe and imprisoned at Santa Cruz. In a letter to the Lords of Trade from Teneriffe, dated the 15th of December 1764, Glas said be believed the reason for his detention was the jealousy of the Spaniards at the settlement at Port Hillsborough ” because from thence in time of war the English might ruin their fishery and effectually stop the whole commerce of the Canary Islands.”

The Spaniards further looked upon the settlement as a step towards

the conquest of the islands. ” They are therefore contriving how to make out a claim to the port and will forge old manuscripts to prove their assertion ” {Calendar of Home Office Papers, 1760-1765). In March 1765 the ship’s company at Port Hillsborough was attacked by the natives and several members of it killed. The survivors, including Mrs and Miss Glas, escaped to Teneriffe. ” In October following, through the representations of the British government, Glas was released from prison. With his wife and child he set sail for England on board the barque ” Earl of Sandwich.” On the 30th of November Spanish and Portuguese members of the crew, who had learned that the ship contained much treasure, mutinied, killing the captain and passengers. Glas was stabbed to death, and his wife and daughter thrown overboard. (The murderers were afterwards captured and hanged at Dublin.) After the death of Glas the British government appears to have taken no steps to carry out his project.

In 1764 Glas published in London The History of the Discovery and Conquest of the Canary Islands, which he had translated from the MS. of an Andalusian monk named Juan Abreu de Galindo, then recently discovered at Palma. To this Glas added a description of the islands, a continuation of the history and an account of the manners, customs, trade, &c, of the inhabitants, displaying con- siderable knowledge of the archipelago.

GLAS, JOHN (1695-1773), Scottish divine, was born at Auchtermuchty, Fife, where his father was parish minister, on the 5th of October 1695. He was educated at Kinclaven and the grammar school, Perth, graduated A.M. at the university of St Andrews in 17 13, and completed his education for the ministry at Edinburgh. He was licensed as a preacher by the presbytery of Dunkeld, and soon afterwards ordained by that of Dundee as minister of the parish of Tealing (17 19), where his effective preaching soon secured a large congregation. Early in his ministry he was ” brought to a stand ” while lecturing on the ” Shorter Catechism ” by the question ” How doth Christ execute the office of a king ? ” This led to an examination of the New Testament foundation of the Christian Church, and in 1725, in a letter to Francis Archibald, minister of Guthrie, Forfarshire, he repudiated the obligation of national covenants. In the same year his views found expression in the formation of a society ” separate from the multitude ” numbering nearly a hundred, and drawn from his own and neighbouring parishes. The members of this ecclesiola in ecclesia pledged themselves ” to join together in the Christian profession, to follow Christ the Lord as the righteousness of his people, to walk together in brotherly love, and in the duties of it, in subjection to Mr Glas as their overseer in the Lord, to observe the ordinance of the

Lord's Supper once every month, to submit themselves to the Lord's law for removing offences," &c. (Matt, xviii. 15-20). From the scriptural doctrine of the essentially spiritual nature of the kingdom of Christ, Glas in his public teaching drew the conclusions: (1) that there is no warrant in the New Testament for a national church; (2) that the magistrate as such has no function in the church; (3) that national covenants are without scriptural grounds; (4) that the true Reformation cannot be carried out by political and secular weapons but by the word and spirit of Christ only.

This argument is most fully exhibited in a treatise entitled The Testimony of the King of Martyrs (1729). For the promulga- tion of these views, which were confessedly at variance with the doctrines of the standards of the national church of Scotland, he was summoned (1726) before his presbytery, where in the course of the investigations which followed he affirmed still more explicitly his belief that " every national church established by the laws of earthly kingdoms is antichristian in its constitution and persecuting in its spirit," and further declared opinions upon the subject of church government which amounted to a repudiation of Presbyterianism and an acceptance of the puritan type of Independency. For these opinions he was in 1728 suspended from the discharge of ministerial functions, and finally deposed in 1730. The members of the society already referred to, however, for the most part continued to adhere

to him, thus constituting the first " Glassite " or " Glasite " church. The seat of this congregation was shortly afterwards transferred to Dundee (whence Glas subsequently removed to Edinburgh), where he officiated for some time as an " elder." He next laboured in Perth for a few years, where he was joined by Robert Sandeman (see Glasites) , who became his son-in-law, and eventually was recognized as the leader and principal exponent of Glas's views; these he developed in a direction which laid them open to the charge of antinomianism. Ulti- mately in 1730 Glas returned to Dundee, where the remainder of his life was spent. He introduced in his church the primitive custom of the " osculum pacis " and the " agape " celebrated as a common meal with broth. From this custom his congrega- tion was known as the " kail kirk." In 1739 the General Assembly, without any application from him, removed the sentence of deposition which had been passed against him, and restored him to the character and function of a minister of the gospel of Christ, but not that of a minister of the

Established Church of Scotland, declaring that he was not eligible for a charge until he should have renounced principles inconsistent with the constitution of the church.

A collected edition of his works was published at Edinburgh in 1761 (4 vols., 8vo), and again at Perth in 1782 (5 vols., 8vo). He died in 1773.

Glas's published works bear witness to his vigorous mind and scholarly attainments. His reconstruction of the True Discourse ef Celsus (1753), from Origen's reply to it, is a competent and learned piece of work. The Testimony of the King of Martyrs concerning His Kingdom (1729) is a classic repudiation of erastianism and defence of the spiritual autonomy of the church under Jesus Christ. His common sense appears in his rejection of Hutchinson's attempt to prove that the Bible supplies a complete system of physical science, and his shrewdness in his Notes on Scripture Texts (1747). He published a volume of Christian Songs (Perth, 1784). (D. Mn.)

GLASER, CHRISTOPHER, a pharmaceutical chemist of the 17th century, was a native of Basel, became demonstrator of chemistry at the Jardin du Roi in Paris and apothecary to Louis XIV. and to the duke of Orleans. He is best known by his Traile de la chymie (Paris, 1663), which went through some ten editions in about five-and-twenty years, and was translated into both German and English. It has been alleged that he was an accomplice in the notorious poisonings carried out by the marchioness de Brinvilliers, but the extent of his complicity is doubtful. He appears to have died some time before 1676. The sal polychrestum Glaseri is normal potassium sulphate which he prepared and used medicinally.

GLASGOW, a city, county of a city, royal burgh and port of Lanarkshire, Scotland, situated on both banks of the Clyde, 4015 m. N.W. of London by the West Coast railway route, and 47 m. W.S.W. of Edinburgh by the North British railway. The valley of the Clyde is closely confined by hills, and the city extends far Over these, the irregularity of its site making for picturesqueness. The commercial centre of Glasgow, with the majority of important public buildings, lies on the north bank of the river, which traverses the city from W.S.W. to E.N.E., and is crossed by a number of bridges. The uppermost is Dalmarnock Bridge, dating from 1891, and next below it is Rutherglen Bridge, rebuilt in 1896, and superseding a structure of 1775. St Andrew's suspension bridge gives access to the Green to the inhabitants of Hutchesontown, a district which is ap- proached also by Albert Bridge, a handsome erection, leading from the Saltmarket.

Above this bridge is the tidal dam and weir. Victoria Bridge, of granite, was opened in 1856, taking the place of the venerable bridge erected by Bishop Rae in 1345, which was demolished in 1847. Then follows a suspension bridge (dating from 1853) by which foot-passengers from the south side- obtain access to St Enoch Square and, finally, the most important ‘ bridge of all is reached, variously known as Glasgow, Jamaica Street, or Broomielaw Bridge, built of granite from Telford’s designs and first used in 1835. Towards the close of the century it was reconstructed, and reopened in 1899. At the busier periods of the day it bears a very heavy traffic. The stream is spanned between Victoria and Albert Bridges by a bridge belonging to the Glasgow & South- Western railway and by two

bridges carrying the lines of the Caledonian railway, one below Dalmarnock Bridge and the other a massive work immediately west of Glasgow Bridge.

Buildings. — George Square, in the heart of the city, is an open space of which every possible advantage has been taken. On its eastern side stand the municipal buildings, a palatial pile in Venetian renaissance style, from the designs of William Young, a native of Paisley. They were opened in 1889 and cost nearly £600,000. They form a square block four storeys high and carry a domed turret at each end of the western facade, from the centre of which rises a massive tower. The entrance hall and grand staircase, the council chamber, banqueting hall and reception rooms are decorated in a grandiose style, not unbecoming to the commercial and industrial metropolis of Scotland. Several additional blocks have been built or rented for the accommodation of the municipal staff. Admirably equipped sanitary chambers were opened in 1897, including a bacteriological and chemical laboratory. Up till 1810 the town council met in a hall adjoining the old tolbooth. It then moved to the fine classical structure at the foot of the Saltmarket, which is now used as court-houses. This was vacated in 1842 for the county buildings in Wilson Street. Growth of business compelled another migration to Ingram Street in 1875, and, fourteen years later, it occupied its present quarters. On the southern side of George Square the chief structure is the massive General Post Office. On the western side stand two ornate Italian buildings, the Bank of Scotland and the Merchants’ House, the head of which (the dean of gild), along with the head of the Trades’ House (the deacon-convener of trades) has been de facto member of the town council since 171 1, an arrangement devised with a view to adjusting the frequent disputes between the two gilds. The Royal Exchange, a Corinthian building with a fine portico of columns in two rows, is an admired example of the work of David Hamilton (1768-1843), a

native of Glasgow, who designed several of the public buildings and churches, and gained the second prize for a design for the Houses of Parliament. The news-room of the exchange is a vast apartment, 130 ft. long, 60 ft. wide, 130 ft. high, with a richly-decorated roof supported by Corinthian pillars. Buchanan Street, the most important and handsome street in the city, contains the Stock Exchange, the Western Club House (by David Hamilton) and the offices of the Glasgow Herald. In Sauchiehall Street are the Fine Art Institute and the former Corporation Art Gallery. Argyll Street, the busiest thoroughfare, mainly occupied with shops, leads to Trongate, where a few remains of the old town are now carefully preserved. On the south side of the street, spanning the pavement, stands the Tron Steeple, a stunted spire dating from 1637. It is all that is left of St Mary's church, which was burned down in 1793 during the revels of a notorious body known as the Hell Fire Club. On the opposite side, at the corner of High Street, stood the ancient tolbooth, or prison, a turreted building, five storeys high, with a fine Jacobean crown tower. The only remnant of the structure is the tower known as the Cross Steeple.

Although almost all the old public buildings of Glasgow have been swept away, the cathedral remains in excellent preservation. It stands in the north-eastern quarter of the city at a height of 104 ft. above the level of the Clyde. It is a ff , beautiful example of Early English work, impressive cathedral. in its simplicity. Its form is that of a Latin cross, with imperfect transepts. Its length from east to west is 319 ft., and its width 63 ft.; the height of the choir is 93 ft., and of the nave 85 ft. At the centre rises a fine tower, with a short octagonal spire, 225 ft. high. The choir, locally known as the High Church, serves as one of the city churches, and the extreme east end of it forms the Lady chapel. The rich western doorway is French in design but English in details. The chapter-house projects from the north-eastern corner and somewhat mars the harmony of the effect. It was built in the 15th century and has a groined roof supported by a pillar 20 ft. high. Many citizens have contributed towards filling the windows with stained glass, executed at Munich, the government providing the eastern

“lydeban

Tem P l Sd/»

nA…

I*

j . ˆ Bishopbrigg £} A bj jm’ (‘. Auchinairn

Braehead

Inc human

t Wag

GˆgTˆ

ˆ South n – j; -•.

M i » i ‘wˆ_gaˆayhoufe.

Ajv Hurt*

SheddenslvOˆl

I. flwcAanon Street Stat;

4. St.Enoch Station ~ 16. Royal Botanic Garden* J. Bridge Street Station. 17. Tne/zlre Hogal

6. Bridgeton Cross Station i& Oaimcrnodi Bridge

7. George Square 19. ftutherglen Bridge

5. Municipal Buildings – ao. St Andreu’s Bridge 9- Post 0//A.* . – ai. */6ert Sr/rfoc 10. ffoua/ Ixonange «. eVctona Bridge

I I. StocA Exchange 2.,, Suspension Bridge 12. Tron Steeple -”” 34. C/ qsoow Bridge

laform.HoB tiabo4i«] “era ih« OrJa.Bt* iur»«y. hj ptrminion at the CooirulWr ot H.M.StBiJvocr/ Ottiee-

Einery Walker sc

window in recognition of their enterprise. The crypt beneath the choir is not the least remarkable part of the edifice, being without equal. in Scotland. It is borne on 65 pillars and lighted by 41 windows. The sculpture of the capitals of the columns and bosses of the groined vaulting is exquisite and the whole is in excellent preservation. Strictly speaking, it is not a crypt, but a lower church adapted to the sloping ground of the right bank of the Molendinar burn. The dripping aisle is

so named from the constant dropping of water from the roof. St Mungo's Well in the south-eastern corner was considered to possess therapeutic virtues, and in the crypt a recumbent effigy, headless and handless, is faithfully accepted as the tomb of Kentigern. The cathedral contains few monuments of exceptional merit, but the surrounding graveyard is almost completely paved with tombstones. In n 15 an investigation was ordered by David, prince of Cumbria, into the lands and churches belonging to the bishopric, and from the deed then drawn up it is clear that at that date a cathedral had already been endowed. When David ascended the throne in n 24 he gave to the see of Glasgow the lands of Partick, besides restoring many possessions of which it had been deprived. Jocelin (d. 1100), made bishop in 1174, was the first great bishop, and is memorable for his efforts to replace the cathedral built in 1136 by Bishop John Achaius, which had been destroyed by fire. The crypt is his work, and he began the choir, Lady chapel, and central tower. The new structure

was sufficiently advanced to be dedicated in 1107. Other famous bishops were Robert Wishart (d. 1316), appointed in 1272, who was among the first to join in the revolt of Wallace, and received Robert Bruce when he lay under the ban of the church for the murder of Comyn; John Cameron (d. 1446), appointed in 1428, under whom the building as it stands was completed; and William Turnbull (d. 1454), appointed in 1447, who founded the university in 1450. James Beaton or Bethune (1517-1603) was the last Roman Catholic archbishop. He fled to France at the reformation in 1560, and took with him the treasures and records of the see, including the Red Book of Glasgow dating from the reign of Robert III. The documents were deposited in the Scots College in Paris, were sent at the outbreak of the Revolution for safety to St Omer, and were never recovered. This loss explains the paucity of the earlier annals of the city. The zeal of the Reformers led them to threaten to mutilate the cathedral, but the building was saved by the prompt action of the craftsmen, who mustered in force and dispersed the fanatics. Excepting the cathedral, none of the Glasgow churches possesses historical interest; and, speaking generally, it is I only the buildings that have been erected since the I beginning of the 19th century that have pronounced I architectural merit. This was due largely to the long survival of the severe sentiment of the Covenanters, who discouraged,' I if they did not actually forbid, the raising of temples of beautiful

Churches.

design. Representative examples of later work are found in the United Free churches in Vincent Street, in Caledonia Road and at Queen's Park, designed by Alexander Thomson (1817-1875), an architect of distinct originality; St George's church, in West George Street, a remarkable work by William Stark, erected in the beginning of the 19th century; St Andrew's church in St Andrew's Square off the Saltmarket, modelled after St Martin's-in-the-Fields, London, with a fine Roman portico; some of the older parish churches, such as St Enoch's, dating from 1780, with a good spire (the saint's name is said to be a corruption of Tanew, mother of Kentigern); the episcopal church of St Mary (1870), in Great Western Road, by Sir G. G. Scott; the Roman Catholic cathedral of St Andrew, on the river-bank between Victoria and Broomielaw bridges; the Barony church, replacing the older kirk in which Norman Macleod ministered; and several admirable structures, well situated, on the eastern confines of Kelvingrove Park.

The principal burying-ground is the Necropolis, occupying Fir Park, a hill about 300 ft. high in the northern part of the city. It provides a not inappropriate background to the cathe- dral, from which it is approached by a bridge, known as the " Bridge of Sighs," over the Molendinar ravine. The ground, which once formed portion of the estate of Wester Craigs, belongs to the Merchants' House, which purchased it in 1650 from Sir Ludovic Stewart of Minto. A Doric column to the memory of Knox, surmounted by a colossal statue of the reformer, was erected by public subscription on the crown of the height in 1824, and a few years later the idea arose of utilizing the land as a cemetery. The Jews have reserved for their own people a detached area in the north-western corner of the cemetery.

Education. — The university, v founded in 1450 by Bishop Turnbull under a bull of Pope Nicholas V., survived in its old quarters till far in the 19th century. The paedagogium, Glasgow or co ii e g e f ar t S; was a t fi rs t housed in Rottenrow, versify. ˆ ut was moved in 1460 to a site in High Street, where Sir James Hamilton of Cadzow, first Lord Hamilton (d. 1479), gave it four acres of land and some buildings. Queen Mary bestowed upon it thirteen acres of contiguous ground, and her son granted it a new charter and enlarged the endowments. Prior to the Revolution its fortunes fluctuated, but in the 18th century it became very famous. By the middle of the 19th century, however, its surroundings had deteriorated, and in i860 it was decided to rebuild it elsewhere. The ground had enormously increased in value and a railway company purchased it for £100,000. In 1864 the

university bought the Gilmore Hill estate for £65,000, the adjacent property of Dowan Hill for £16,000 and the property of Clayslaps for £17,400. Sir G. G. Scott was appointed architect and selected as the site of the university buildings the ridge of Gilmore Hill — the finest situation in Glasgow. The design is Early English with a suggestion in parts of the Scots-French style of a much later period. The main structure is 540 ft. long and 300 ft. broad. The principal front faces southwards and consists of a lofty central tower with spire and corner blocks with turrets, between which are buildings of lower height. Behind the tower lies the Bute hall, built on cloisters, binding together the various departments and smaller halls, and dividing the massive edifice into an eastern and western quadrangle, on two sides of which are ranged the class-rooms in two storeys. The northern facade comprises two corner blocks, besides the museum, the library and, in the centre, the students' reading-room on one floor and the Hunterian museum on the floor above. On the south the ground falls in terraces towards Kelvingrove Park and the Kelvin. On the west, but apart from the main structure, stand, the houses of the principal and professors. The foundation stone was laid in 1868 and the opening ceremony was held in 1870. The total cost of the university buildings amounted to £500,000, towards which government contributed £120,000 and public subscription £250,000. The third marquess of Bute (1847-1900) gave £40,000 to provide the Bute or common hall, a room of fine proportions fitted in Gothic style and divided by a beautiful Gothic screen from the Randolph hall, named

after another benefactor, Charles Randolph (1809-1878), a native of Stirling, who had prospered as shipbuilder and marine engineer and left £60,000 to the university. The graceful spire surmounting the tower was provided from the bequest of £5000 by Mr A. Cunningham, deputy town-clerk, and Dr John MTntyre erected the Students' Union at a cost of £5000, while other donors completed the equipment so generously that the senate was enabled to carry on its work, for the first time in its history, in almost ideal circumstances. The library includes the collec- tion of Sir William Hamilton, and the Hunterian museum, bequeathed by William Hunter, the anatomist, is particularly rich in coins, medals, black-letter books and anatomical prepara- tions. The observatory on Dowan Hill is attached to the chair of astronomy. An interesting link with the past are the exhibi- tions founded by John Snell (1629-1679), a native of Colmonell in Ayrshire, for the purpose of enabling students of distinction to continue their career at Balliol College, Oxford. Amongst distinguished exhibitioners have been Adam Smith, John Gibson Lockhart, John Wilson (" Christopher North"), Arch- bishop Tait, Sir William Hamilton and

Professor Shairp. The curriculum of the university- embraces the faculties of arts, divinity, medicine, law and science. The governing body includes the chancellor, elected for life by the general council, the principal, also elected for life, and the lord rector elected triennially by the students voting in ” nations ” according to their birthplace {Glottiana, natives of Lanarkshire; Trans- forthana, of Scotland north of the Forth; Rothseiana, of the shires of Bute, Renfrew and Ayr; and Loudonia, all others). There are a large number of well-endowed chairs and lectureships and the normal number of students exceeds 2000. The uni- versities of Glasgow and Aberdeen unite to return one member to parliament. Queen Margaret College for women, established in 1883, occupies a handsome building close to the botanic gardens, has an endowment of upwards of £25,000, and was incorporated with the university in 1893. Muirhead College is another institution for women.

Elementary instruction is supplied at numerous board schools. Higher, secondary and technical education is provided at several well-known institutions. There are two educational endowments boards which apply a revenue of about Schools £10,000 a year mainly to the foundation of bursaries. aa * Anderson College in George Street perpetuates the co eges ‘ memory of its founder, John Anderson (1 726-1 796), professor of natural philosophy in the university, who opened a class in physics ■ for working men, which he conducted to the end of his life. By his will he provided for an institution for the instruction of artisans and others unable to attend the university. The college which bears his name began in 1 796 with lectures on natural philosophy and chemistry by Thomas Garnett (1766-1802). Two years later mathematics and geography were added. In 1799 Dr George Birkbeck (1776-1841) succeeded Garnett and began those lectures on mechanics and applied science which, continued elsewhere, ultimately led to the foundation of mechanics’ institutes in many towns. In later years the college was further endowed and its curriculum enlarged by: the inclusion of literature and languages, but ultimately it was determined to limit the scope of its work to medicine (comprising, however, physics, chemistry and botany also). The lectures of its medical school, incorporated in 1887 and situated near theWestern Infirmary, are accepted by Glasgow and other universities. The Glasgow and West of Scotland Technical College, formed in 1886 out of a com- bination of the arts side of Anderson College, the College of Science and Arts, Allan Glen’s Institution and the Atkinson Institution, is subsidized by the corporation and the endowments board, and is especially concerned with students desirous of following an in- dustrial career. St Mungo’s College, which has developed from an

extra-mural school in connexion with the Royal Infirmary, was incorporated in 1889, with faculties of medicine and law. The United Free Church College, finely situated near Kelvingrove Park, the School of Art and Design, and the normal schools for the training of teachers, are institutions with distinctly specialized objects.

The High school in Elmbank is the successor of the grammar school (long housed in John Street) which was founded in the 14th century as an appanage of the cathedral. It was placed under the jurisdiction of the school board in 1873. Other secondary schools include Glasgow Academy, Kelvinside Academy and the girls' and boys' schools endowed by the Hutcheson trust. Several of the schools under the board are furnished with secondary departments or equipped as science schools, and the Roman Catholics maintain elementary schools and advanced academies.

Art Galleries , Libraries and Museums. — Glasgow merchants and

manufacturers alike have been constant patrons of art, and their liberality may have had some influence on the younger painters who, towards the close of the 19th century, broke away from tradition and, stimulated by training in the studios of Paris, became known as the "Glasgow school." The art gallery and museum in Kelvin- grove Park, which was built at a cost of £250,000 (partly derived from the profits of the exhibitions held in the park in 1888 and 1901), is exceptionally well appointed. The collection originated in 1854 in the purchase of the works of art belonging to Archibald M'Lellan, and was supplemented from time to time by numerous bequests of important pictures. It was housed for many years in the Corpora- tion galleries in Sauchiehall Street. The Institute of Fine Arts, in Sauchiehall Street, is mostly devoted to periodical exhibitions of modern art. There are also pictures on exhibition in the People's Palace on Glasgow Green, which was built by the corporation in 1898 and combines an art gallery and museum with a conservatory and winter garden, and in the museum at Camphill, situated within the bounds of Queen's. Park. The library and Hunterian museum in the university are mostly reserved for the use of students. The faculty of procurators possess a valuable library which is housed in their hall, an Italian Renaissance building, in West George Street. In Bath Street there are the Mechanics' and the Philosophical Society's libraries, and the Physicians' is in St Vincent Street. Miller Street contains the headquarters of the public libraries.

The premises once occupied by the water commission have been converted to house the Mitchell library, which grew out of a bequest of £70,000 by Stephen Mitchell, largely reinforced by further gifts of libraries and funds, and now contains upwards of 100,000 volumes. It is governed by the city council and has been in use since 1877. Another building in this street accommodates both the Stirling and Baillie libraries. The Stirling, with some 50,000 volumes, is particularly rich in tracts of the 16th and 17th centuries, and the Baillie was endowed by George Baillie, a solicitor who, in 1863, gave £18,000 for educational objects. The Athenaeum in St George's Place, an institution largely concerned with evening classes in various subjects, contains an excellent library and reading-room.

Charities. — The old Royal Infirmary, designed by Robert Adam and opened in 1794, adjoining the cathedral, occupies the site of the archiepiscopal palace, the last portion of which was removed towards the close of the 1 8th century. The chief architectural feature of the infirmary is the central dome forming the roof of the operating theatre. On the northern side are the buildings of the medical school attached to the institution. The new infirmary commemor- ates the Diamond Jubilee of Queen Victoria. A little farther north, in Castle Street, is the blind asylum. The Western Infirmary is to some extent used for the purposes of clinical instruction in connexion with the university, to which it stands in immediate proximity. Near it is the Royal hospital for sick children. To the south of Queen's Park is Victoria Infirmary, and close to it the deaf and dumb institution. On the bank of the river, not far from the south-eastern boundary of the city, is the Belvedere hospital for infectious diseases, and at Ruchill, in the north, is another hospital of the same character opened in 1900. The Royal asylum at Gartnavel is situated near Jordanhill station, and the District asylum at Gartloch (with a branch at West Muckroft) lies in the parish of Cadder beyond the north-eastern boundary. There are numerous hospitals exclusively devoted to the treatment of special diseases, and several nursing institutions and homes. Hutcheson's Hospital, designed by David Hamilton and adorned with statues of the founders, is situated in I ngram Street, and by the increase in the value of its lands has become a very wealthy body. George Hutcheson (1580-1639), a lawyer in the Trongate near the tolbooth, who afterwards lived in the Bishop's castle, which stood close to the spot where the Kelvin enters the Clyde, founded the hospital for poor old men. His brother Thomas (1589- 1641) established in connexion with it a school for the lodging and education of orphan boys, the sons of burgesses. The trust, through the growth of its funds, has been enabled to extend its educational scope and to subsidize schools apart from the

charity.

Monuments. — Most of the statues have been erected in George Square. They are grouped around a fluted pillar 80 ft. high, surmounted by a colossal statue of Sir Walter Scott by John Ritchie (1809-1850), erected in 1837, and include Queen Victoria and the Prince Consort (both equestrian) by Baron Marochetti; James Watt by Chantrey; Sir Robert Peel, Thomas Campbell the poet, who was born in Glasgow, and David Livingstone, all by John Mossman ; Sir John Moore, a native of Glasgow, by Flaxman, erected in 1819; James Oswald, the first member returned to parliament for the city after the Reform Act of 1832; Lord Clyde (Sir Colin Campbell), also a native, by Foley, erected in 1868; Dr Thomas Graham, master of the mint, another native, by Brodie; Robert Burns by G. E. Ewing, erected in 1877, subscribed for in shillings by the work- ing men of Scotland; and William Ewart Gladstone by Hamo Thornycroft, unveiled by Lord Rosebery in 1902. In front of the Royal Exchange stands the equestrian monument of the duke of Wellington. In Cathedral Square are the statues of Norman Macleod, James White and James Arthur, and in front of the Royal infirmary is that of Sir James Lumsden, lord provost and benefactor. Nelson is commemorated by an obelisk 143 ft. high on the Green, which was erected in 1806 and is said to be a copy of that in the Piazza del Popolo at Rome. One of the most familiar statues is the

equestrian figure of William III. in the Trongate, which was presented to the town in 1735 by James Macrae (1677-1744), a poor Ayrshire lad who had amassed a fortune in India, where he was governor of Madras from 1725 to 1730.

Recreations. — Of the theatres the chief are the King's in Bath Street, the Royal and the Grand in Cowcaddens, the Royalty and Gaiety in Sauchiehall Street, and the Princess's in Main Street. Variety theatres, headed by the Empire in Sauchiehall Street, are found in various parts of the town. There is a circus in Waterloo Street, a hippodrome in Sauchiehall Street and a zoological garden in New City Road. The principal concert halls are the great hall of the St Andrew's Halls, a group of rooms belonging to the corpora- tion ; the City Hall in Candleriggs, the People's Palace on the Green, and Queen's Rooms close to Kelvingrove Park. Throughout winter enormous crowds throng the football grounds of the Queen's Park, the leading amateur club, and the Celtic, the Rangers, the Third Lanark and other prominent professional clubs.

Parks and Open Spaces. — The oldest open space is the Green (140

acres), on the right bank of the river, adjoining a densely- populated district. It once extended farther west, but a portion was built over at a time when public rights were not vigilantly guarded. It is a favourite area for popular demonstrations, and sections have been reserved for recreation or laid out in flower-beds. Kelvingrove Park, in the west end, has exceptional advantages, for the Kelvin burn flows through it and the ground is naturally terraced, while the situation is beautified by the adjoining Gilmore Hill with the university on its summit. The park was laid out under the direction of Sir Joseph Paxton, and contains the Stewart fountain, erected to commemorate the labours of Lord Provost Stewart and his colleagues in the promotion of the Loch Katrine water scheme. The other parks on the right bank are, in the north, Ruchill (53 acres), acquired in 1891, and Springburn (53I acres), acquired in 1892, and, in the east, Alexandra Park (120 acres), in which is laid down a nine-hole golf-course, and Tollcross (82 j acres), beyond the municipal boundary, acquired in 1 897. On the left bank Queen's Park (130 acres), occupying a commanding site, was laid out by Sir Joseph Paxton, and considerably enlarged in 1894 by the enclosure of the grounds of Camphill. The other southern parks are Richmond (44 acres), acquired in 1898, and named after Lord Provost Sir David Richmond, who opened it in 1899; Maxwell, which was taken over on the annexation of Pollokshields in 1891; Bellahouston (176 acres), acquired in 1895 ; and Cathkin Braes (50 acres), 3£m. beyond the south-eastern boundary, presented to the city in 1886 by James Dick, a manufacturer, containing " Queen Mary's stone," a point which commands a view of the lower valley of the Clyde. In the north-western district of the town 40 acres between Great Western Road and the Kelvin are devoted to the Royal Botanic Gardens, which became public property in 1891. They are beautifully laid out, and contain a great range of hothouses. The gardens owed much to Sir William Hooker, who was regius professor of botany in Glasgow University before his appointment to the directorship of Kew Gardens.

Communications. — The North British railway terminus is situated in Queen Street, and consists of a high-level station (main line) and a low-level station, used in connexion with the City & District line, largely underground, serving the northern side of the town, opened in 1886. The Great Northern and North-Eastern railways use the high-level line of the N.B.R., the three companies forming the East Coast Joint Service. The Central terminus of the Caledonian railway in Gordon Street, served by the West Coast system (in which the London & North- Western railway shares), also comprises a high-level station for the main line traffic and a low-level station for the Cathcart

District railway, completed in 1886 and made circular for the southern side and suburbs in 1894, and also for the connexion between Maryhill and Rutherglen, which is mostly under- ground. Both the underground lines communicate with certain branches of the main line, either directly or by change of carriage. The older terminus of the Caledonian railway in Buchanan Street now takes the northern and eastern traffic. The terminus of the Glasgow & South-Western railway company in St Enoch Square serves the country indicated in its title, and also gives the Midland railway Of England access to the west coast and Glasgow. The Glasgow Subway — an underground cable passenger line, 6J m. long, worked in two tunnels and passing below the Clyde twice — was opened in 1896. Since no more bridge-building will be sanctioned west of the railway bridge at the Broomielaw, there are at certain points steam ferry boats or floating bridges for conveying vehicles across the harbour, and at Stobcross there is a subway for foot and wheeled traffic. Steamers, carrying both goods and passengers, constantly leave the Broomielaw quay for the piers and ports on the river and firth, and the islands and sea lochs of Argyllshire. The city is admirably served by tramways which penetrate every populous district and cross the river by Glasgow and Albert bridges. Trade. — Natural causes, such as proximity to the richest field of coal and ironstone in Scotland and the vicinity of hill streams of pure water, account for much of the great development of trade in Glasgow. It was in textiles that the city showed its earliest predominance, which, however, has not been maintained, owing, it is alleged, to the shortage of female labour. Several cotton mills are still worked, but the leading feature in the trade has always been the manufacture

of such light textures as plain, striped and figured muslins, ginghams and fancy fabrics. Thread is made on a considerable scale, but jute and silk are of comparatively little importance. The principal varieties of carpets are woven. Some factories are exclusively devoted to the making of lace curtains. The allied industries of bleaching, printing and dyeing, on the other hand, have never declined. The use of chlorine in bleaching was first introduced in Great Britain at Glasgow in 1787, on the suggestion of James Watt, whose father-in-law was a bleacher; and it was a Glasgow bleacher, Charles Tennant, who first discovered and made bleaching powder (chloride of lime). Turkey-red dyeing was begun at Glasgow by David Dale and George MTntosh, and the colour was long known locally as Dale's red. A large quantity

of grey cloth continues to be sent from Lancashire and other mills to be bleached and printed in Scottish works. These industries gave a powerful impetus to the manufacture of chemicals, and the works at St Rollox developed rapidly. Among prominent chemical industries are to be reckoned the alkali trades — including soda, bleaching powder and soap- making — the preparation of alum and prussiates of potash, bichro- mate of potash, white lead and other pigments, dynamite and gun- powder. Glass-making and paper-making are also carried on, and there are several breweries and distilleries, besides factories for the making of aerated waters, starch, dextrine and matches. Many miscellaneous trades flourish, such as clothing, confectionery, cabinet-making, bread and biscuit making, boot and shoe making, flour mills and saw mills, pottery and indiarubber. Since the days of the brothers Robert Foulis (1 705-1 776) and Andrew Foulis (171 2-1775), printing, both letterpress and colour, has been identified with Glasgow, though in a lesser degree than with Edinburgh. The tobacco trade still flourishes, though much lessened. But the great industry is iron-founding. The discovery of the value of blackband ironstone, till then regarded as useless " wild coal," by David Mushet (1772-1847), and Neilson's invention of the hot-air blast threw the control of the Scottish iron trade into the hands of Glasgow ironmasters, although the furnaces themselves were mostly erected in Lanarkshire and Ayrshire. The expansion of the industry was such that, in 1859, one-third of the total output in the United Kingdom was Scottish. During the following years, however, the trade seemed to have lost its elasticity, the annual production averaging about one million tons of pig-iron. Mild steel is manu- factured extensively, and some crucible cast steel is made. In addi- tion to brass foundries there are works for the extraction of copper and the smelting, of lead and zinc. With such resources every branch of engineering is well represented. Locomotive engines are built for every country where railways are employed, and all kinds of builder's ironwork is forged in enormous quantities, and the sewing- machine factories in the neighbourhood are important. Boiler- making and marine engine works, in many cases in direct connexion with the shipbuilding yards, are numerous. Shipbuilding, indeed, is the greatest of the industries of Glasgow, and in some years more than half of the total tonnage in the United Kingdom has been launched on the Clyde, the yards of which extend from the harbour to Dumbarton on one side and Greenock on the other side of the river and firth. Excepting a trifling proportion of wooden ships, the Clyde-built vessels are of iron and steel, the trade having owed its i mmense expansion to the prompt adoption of this material. Every variety of craft is turned out, from battleships and great liners to dredging-plant and hopper barges.

The Port. — The harbour extends from Glasgow Bridge to the point where the Kelvin joins the Clyde, and occupies 206 acres. For the most part it is lined by quays and wharves, which have a total length of 8| m., and from the harbour to the sea vessels drawing 26 ft. can go up or down on one tide. It is curious to remember that in the middle of the 18th century the river was fordable on foot at Dumbuck, 12 m. below Glasgow and i|m. S.E. of Dum- barton. Even within the limits of the present harbour Smeaton reported to the town council in 1740 that at Pointhouse ford, just east of the mouth of the Kelvin, the depth at low water was only 15 in. and at high water 39 in. The transformation effected within a century and a half is due to the energy and enterprise of the Clyde Navigation Trust. The earliest shipping-port of Glasgow was Irvine in Ayrshire, but lighterage was tedious and land carriage costly, and in 1658 the civic authorities endeavoured to purchase a site for a spacious harbour at Dumbarton. Being thwarted by the magistrates of that burgh, however, in 1662 they secured 13 acres on the southern bank at a spot some 2 m. above Greenock, which became known as Port Glasgow, where they built harbours and constructed the first graving dock in Scotland. Sixteen years later the Broomielaw quay was built, but it was not until the tobacco merchants appreciated the necessity of bringing their wares into the heart of the city that serious consideration was paid to schemes for deepening the water- way. Smeaton's suggestion of a lock and dam 4 m. below the Broomielaw was happily not accepted. In 1768 John Golborne advised the narrowing of the river and the increasing of the scour by the construction of rubble jetties and the dredging of sandbanks and shoals. After James Watt's report in 1769 on the ford at Dumbuck, Golborne succeeded in 1775 in deepening the ford to 6 ft. at low water with a width of 300 ft. By Rennie's advice in 1799, following up Golborne's recommendation, as many as 200 jetties were built between Glasgow and Bowling, some old ones were

shortened and low rubble walls carried from point to point of the jetties, and thus the channel was made more uniform and much land reclaimed. By 1836 there was a depth of 7 or 8 ft. at the Broomielaw at low water, and in 1840 the whole duty of improving the navigation was devolved upon the Navigation Trust. Steam dredgers were kept constantly at work, shoals were removed and rocks blasted away. Two million cubic yards of matter are lifted every year and dumped in Loch Long. By 1900 the channel had been deepened to a minimum of 22 ft., and, as already indicated, the largest vessels make the open sea in one tide, whereas in 1840 it took ships drawing only 15 ft. two and even three tides to reach the sea. The debt of the Trust amounts to

£6,000,000, and the annual revenue to £450,000. Long before these great results had been achieved, however, the shipping trade had been revolutionized by the application of steam to navigation, and later by the use of iron for wood in shipbuilding, in both respects enormously enhancing the industry and commerce of Glasgow. From 1812 to 1820 Henry Bell's " Comet," 30 tons, driven by an engine of 3 horse-power, plied between Glasgow and Greenock, until she was wrecked, being the first steamer to run regularly on any river in the Old World. Thus since the appearance of that primitive vessel phenomenal changes had taken place on the Clyde. When the quays and wharves ceased to be able to accom- modate the growing traffic, the construction of docks became imperative. In 1867 Kingston Dock on the south side, of 5! acres, was opened, but soon proved inadequate, and in 1880 Queen's Dock (two basins) at Stobcross, on the north side, of 30 acres, was com- pleted. Although this could accommodate one million tons of shipping, more dock space was speedily called for, and in 1897 Prince's Dock (three basins) on the opposite side, of 72 acres, was opened, fully equipped with hydraulic and steam cranes and all the other latest appliances. There are, besides, three graving docks, the longest of which (880 ft.) can be made at will into two docks of 417 ft. and 457 ft. in length. The Caledonian and Glasgow & South-Western railways have access to the harbour for goods and minerals at Terminus Quay to the west of Kingston Dock, and a mineral dock has been constructed by the Trust at Clydebank, about 3! m. below the harbour. The shipping attains to colossal proportions. The imports consist chiefly of flour, fruit, timber, iron ore, live stock and wheat ; and the exports principally of cotton manufactures, manufactured iron and steel, machinery, whisky, cotton yarn, linen fabrics, coal, jute, jam and foods, and woollen manufactures.

Government. — By the Local Government (Scotland) Act 1889 the city was placed entirely in the county of Lanark, the districts then transferred having previously belonged to the shires of Dumbarton and Renfrew. In 1 891 the boundaries were enlarged to include six suburban burghs and a number of suburban districts, the area being increased from 61 1 1 acres to 11,861 acres. The total area of the city and the conterminous burghs of Govan, Partick and Kinning Park — which, though they successfully resisted annexation in 1891, are practically part of the city — is 15,659 acres. The extreme length from north to south and from east to west is about 5 m. each way, and the circumference measures 27 m. In 1893 the municipal burgh was constituted a county of a city. Glasgow is governed by a corporation consisting of 77 members, including 14 bailies and the lord provost. In 1895 all the powers which the town council exercised as police

commissioners and trustees for parks, markets, water and the like were consolidated and conferred upon the corporation. Three years later the two parish councils of the city and barony, which administered the poor law over the greater part of the city north of the Clyde, were amalgamated as the parish council of Glasgow, with 31 members. As a county of a city Glasgow has a lieutenancy (successive lords provost holding the office) and a court of quarter sessions, which is the appeal court from the magis- trates sitting as licensing authority. Under the corporation municipal ownership has reached a remarkable development, the corporation owning the supplies of water, gas and electric power, tramways and municipal lodging-houses. The enterprise of the corporation has brought its work prominently into notice, not only in the United Kingdom, but in the United States of America and elsewhere. In 1859 water was conveyed by aqueducts and tunnels from Loch Katrine (364 ft. above sea-level, giving a pressure of 70 or 80 ft. above the highest point in the city) to the reservoir at Mugdock (with a capacity of 500,000,000 gallons), a distance of 27 m., whence after filtration it was distributed by pipes to Glasgow, a further distance of 7 m., or 34 m. in all. During the next quarter of a cen- tury it became evident that this supply would require to be aug- mented, and powers were accordingly obtained in 1895 to raise Loch Katrine 5 ft. and to connect with it by tunnel Loch Arklet (455 ft. above the sea), with storage for 2,050,000,000 gallons, the two lochs together possessing a capacity of twelve thousand million gallons. The entire works between the loch and the city were duplicated over a distance of 23ˆ m., and an additional reservoir, holding 694,000,000 gallons, was constructed, increasing the supply held in reserve from I2|days' to 30ˆ days'. In 1909 the building of a dam was undertaken l\ m. west of the lower end of Loch Arklet, designed to create a sheet of water 25 m. long and to increase the water-supply of the city by ten million gallons a day. The water committee supplies hydraulic power to manufacturers and merchants. In 1869 the corporation acquired the gasworks, the productive capacity

of which exceeds 70 million cub. ft. a day. In 1893 the supply of electric light was also undertaken, and since that date the city has been partly lighted by electricity. The corporation also laid down the tramways, which were leased by a company for twenty-three years at a rental of £150 a mile per annum. When the lease expired in 1894 the town council took over the working of the cars, substitut- ing overhead electric traction for horse-power. One of the most difficult problems that the corporation has had to deal with was the housing of

the poor. By the lapse of time and the congestion of population, certain quarters of the city, in old Glasgow especially, had become slums and rookeries of the worst description. The condition of the town was rapidly growing into a byword, when the municipality obtained parliamentary powers in 1866 enabling it to condemn for purchase over-crowded districts, to borrow money and levy rates. The scheme of reform contemplated the demolition of 10,000 insanitary dwellings occupied by 50,000 persons, but the corporation was required to provide accommodation for the dis- lodged whenever the numbers exceeded 500. In point of fact they never needed to build, as private enterprise more than kept pace with the operations of the improvement. The work was carried out promptly and effectually, and when the act expired in 1881 whole localities had been recreated and nearly 40,000 persons properly housed. Under the amending act of 1881 the corporation began in 1888 to build tenement houses in which the poor could rent one or more rooms at the most moderate rentals; lodging-houses for men and women followed, and in 1896 a home was erected for the accom- modation of families in certain circumstances. The powers of the improvement trustees were practically exhausted in 1896, when it appeared that during twenty-nine years £1,955,550 had been spent in buying and improving land and buildings, and £231,500 in building tenements and lodging-houses; while, on the other side, ground had been sold for £1,072,000, and the trustees owned heritable property valued at £692,000, showing a deficiency of £423,050. Assessment of ratepayers for the purposes of the trust had yielded £593,000, and it was estimated that these operations, beneficial to the city in a variety of ways, had cost the citizens £24,000 a year. In 1897 an act was obtained for dealing in similar fashion with in- sanitary and congested areas in the centre of the city, and on the south side of the river, and for acquiring not more than 25 acres of land, within or without the city, for dwellings for the poorest classes. Along with these later improvements the drainage system was entirely remodelled, the area being divided into three sections, each distinct, with separate works for the disposal of its own sewage. One section (authorized in 1891 and doubled in 1901) comprises n sq. m. — one-half within the city north of the river, and the other in the district in Lanarkshire — with works at Dalmarnock; another section (authorized in 1896) includes the area on the north bank not provided for in 1 891, as well as the burghs of Partick and Clyde- bank and intervening portions of the shires of Renfrew and Dum- barton, the total area consisting of 14 sq. m., with works at Dalmuir, 7 m. below Glasgow; and the third section (authorized in 1898) embraces the whole municipal area on the south side of the river, the burghs of Rutherglen, Pollokshaws, Kinning Park and

Govan, and certain districts in the counties of Renfrew and Lanark — 14 sq. m. in all, which may be extended by the inclusion of the burghs of Renfrew and Paisley — with works at Braehead, I m. east of Renfrew. Among other works in which it has interests there may be mentioned its representation on the board of the Clyde Navigation Trust and the governing body of the West of Scotland Technical College. In respect of parliamentary representation the Reform Act of 1832 gave two members to Glasgow, a third was added in 1868 (though each elector had only two votes), and in 1885 the city was split up into seven divisions, each returning one member.

Population. — Throughout the 19th century the population grew prodigiously. Only 77,385 in 1801, it was nearly doubled in twenty years, being 147,043 in 1821, already outstripping Edinburgh. It had become 395,503 in 1861, and in 1881 it was 511,415. In 1891, prior to extension of the boundary, it was 565,839, and, after ex- tension, 658,198, and in 1901 it stood at 761,709. The birth-rate averages 33, and the death-rate 21 per 1000, but the mortality before the city improvement scheme was carried out was as high as 33 per 1000. Owing to its being convenient of access from the High- lands, a very considerable number of Gaelic-speaking persons live in Glasgow, while the great industries attract an enormous number of persons from other parts of Scotland. The valuation of the city, which in 1878-1879 was £3,420,697, now exceeds £5,000,000.

History. — There are several theories as to the origin of the name of Glasgow. One holds that it comes from Gaelic words meaning ” dark glen,” descriptive of the narrow ravine through which the Molendinar flowed to the Clyde. But the more generally accepted version is that the word is the Celtic Cleschu, afterwards written Glesco or Glasghu, meaning ” dear green spot ” (glas, green; cu or ghu, dear), which is supposed to have been the name of the settlement that Kentigern found here when he came to convert the Britons of Strathclyde. Mungo became the patron-saint of Glasgow, and the motto and arms

of the city are wholly identified with him — ” Let Glasgow Flourish by. the Preaching of the Word,” usually shortened to ” Let Glasgow Flourish.” It is not till the 12th century, however, that the history of the city becomes clear. About 11 78 William the Lion made the town by charter a burgh of barony, and gave it a market with freedom and customs. Amongst more or less isolated episodes of which record has been preserved may be mentioned the battle of the Bell o’ the Brae, on the site of High Street, in which Wallace routed the English under

Percy in 1300; the betrayal of Wallace to the English in 1305 in a barn situated, according to tradition, in Robroyston, just beyond the north-eastern boundary of the city; the ravages of the plague in 1350 and thirty years later; the regent Arran's siege, in 1544, of the bishop's castle, garrisoned by the earl of Glencairn, and the subsequent fight at the Butts (now the Gallowgate) when the terms of surrender were dishonoured, in which the regent's men gained the day. Most of the inhabitants were opposed to Queen Mary and many actively supported Murray in the battle of Langside — the site of which is now occupied by the Queen's Park — on the 13th of May 1568, in which she lost crown and kingdom. A memorial of the conflict was erected on the site in 1887. Under James VI. the town became a royal burgh in 1636, with freedom of the river from the Broomielaw to the Cloch. But the efforts to establish episcopacy aroused the fervent anti-prelatical sentiment of the people, who made common cause with the Covenanters to the end of their long struggle. Montrose mulcted the citizens heavily after the battle of Kilsyth in 1645, and three years later the provost and bailies were deposed for contumacy to their sovereign lord. Plague and famine devast- ated the town in 1649, and in 1652 a conflagration laid a third of the burgh in ashes. Even after the restoration its sufferings were acute. It was the headquarters of the Whiggamores of the west and its prisons were constantly filled with rebels for conscience' sake. The government scourged the townsfolk with an army of Highlanders, whose brutality only served to strengthen the resistance at the battles of Drumclog and Bothwell Brig. With the Union, hotly resented as it was at the time, the dawn of almost unbroken prosperity arose. By the treaty of Union Scottish ports were placed, in respect of trade, on the same footing as English ports, and the situation of Glasgow enabled it to acquire a full share of the ever-increasing Atlantic trade. Its commerce was already considerable and in population it was now the second town in Scotland. It enjoyed a practical monopoly of the sale of raw and refined sugars, had the right to distil spirits from molasses free of duty, dealt largely in cured herring and salmon, sent hides to English tanners and manu- factured soap and linen. It challenged the supremacy of Bristol in the tobacco trade — fetching cargoes from Virginia, Maryland and Carolina in its own fleet — so that by 1772 its importations of tobacco amounted to more than half of the whole quantity brought into the United Kingdom. The tobacco merchants built handsome mansions and the town rapidly extended west- wards. With the surplus profits new industries were created, which helped the city through the period of the American \Var. Most, though not all, of the manufactures in which Glasgow has always held a foremost place date from this period. It was in 1764 that James Watt succeeded in

repairing a hitherto unworkable model of Newcomen's fire (steam) engine in his small workshop within the college precincts. Shipbuilding on a colossal scale and the enormous developments in the iron in- dustries and engineering were practically the growth of the 19th century. The failure of the Western bank in 1857, the Civil War in the United States, the collapse of the City of Glasgow bank in 1878, among other disasters, involved heavy losses and distress, but recovery was always rapid.

Authorities. — J. Cleland, Annals of Glasgow (Glasgow, 1816); Duncan, Literary History of Glasgow (Glasgow, 1886); Registrant Episcopatus Glasgow (Maitland Club, 1843); Pagan, Sketch of the History of Glasgow (Glasgow, 1847); Sir J. D. Marwick, Extracts from the Burgh Records of Glasgow (Burgh Records Society) ; Charters relating to Glasgow (Glasgow, 1891); River Clyde and Harbour of Glasgow (Glasgow, 1898) ; Glasgow Past and Present (Glasgow, 1884) ; Munimenta Universitatis Glasgow (Maitland Club, 1854); J- Strang,

Glasgow and its Clubs (Glasgow, 1864) ; Reid (" Senex "), Old Glasgow (Glasgow, 1864); A. Macgeorge, Old Glasgow (Glasgow, 1888); Deas, The River Clyde (Glasgow, 1881); Gale, Loch Katrine Water- works (Glasgow, 1883); Mason, Public and Private Libraries of Glasgow (Glasgow, 1885); J. Nicol, Vital, Social and Economic Statistics of Glasgow (1881) ; J.B.Russell, Life in One Room (Glasgow, 1888); Ticketed Houses (Glasgow, 1889); T. Somerville, George Square (Glasgow, 1891); J. A. Kilpatrick, Literary Landmarks of Glasgow (Glasgow, 1898); J. K. M'Dowall, People's History of Glasgow (Glasgow, 1899) ; Sir J. Bell and J. Paton, Glasgow: Its Municipal Organization and Administration (Glasgow, 1896); Sir D. Richmond, Notes on Municipal Work (Glasgow, 1899) ; J. M. Lang, Glasgow and the Barony (Glasgow, 1 895) ; Old Glasgow (Glasgow, 1896); J. H. Muir, Glasgow in igoi.

GLASITES, or Sandemanians, 1 a Christian sect, founded in Scotland by John Glas (q.v.). It spread into England and America, but is now practically extinct. Glas dissented from the Westminster Confession only in his views as to the spiritual nature of the church and the functions of the civil magistrate. But his son-in-law Robert Sandeman added a distinctive doctrine as to the nature of faith which is thus stated on his tombstone: " That the bare death of Jesus Christ without a thought or deed on the part of man, is sufficient to present the chief

of sinners spotless before God.” In a series of letters to James Hervey, the author of Theron and Aspasia, he maintained that justifying faith is a simple assent to the divine testimony concerning Jesus Christ, differing in no way in its character from belief in any ordinary testimony. In their practice the Glasite churches aimed at a strict conformity with the primitive type of Christianity as understood by them. Each congregation had a plurality of elders, pastors or bishops, who were chosen according to what were believed to be the instructions of Paul, without regard to previous education or present occupation, and who enjoy a perfect equality in office. To have been married a second time disqualified for ordination, or for continued tenure of the office of bishop. In all the action of the church unanimity was con- sidered to be necessary; if any member differed in opinion from the rest, he must either surrender his judgment to that of the church, or be shut out from its communion. To join in prayer with any one not a member of the denomination was regarded as unlawful, and even to eat or drink with one who had been excommunicated was held to be wrong. The Lord’s Supper was observed weekly; and between forenoon and afternoon service every Sunday a love feast was held at which every member was required to be present. Mutual exhortation was practised at all the meetings for divine service, when any member who had the gift of speech {xapLo-fxa.) was allowed to speak. The practice of washing one another’s feet was at one time observed; and it was for a long time customary for each brother and sister to receive new members, on admission, with a holy kiss. ” Things strangled ” and ” blood ” were rigorously ab- stained from; the lot was regarded as sacred; the accumulation of wealth they held to be unscriptural and improper, and each member considered his property as liable to be called upon at any time to meet the wants of the poor and the necessities of the church. Churches of this order were founded in Paisley, Glasgow, Edinburgh, Leith, Arbroath, Montrose, Aberdeen, Dunkeld, Cupar, Galashiels, Liverpool and London, where Michael Faraday was long an elder. Their exclusiveness in practice, neglect of education for the ministry, and the antinomian tendency of their doctrine contributed to their dissolution. Many Glasites joined the general body of Scottish Congregationalists, and the sect may now be considered extinct. The last of the Sandemanian churches in America ceased to exist in 1890.

See James Ross, History of Congregational Independency in Scotland (Glasgow, 1900). (D. Mn.)

GLASS (O.E. glees, cf. Ger. Glas, perhaps derived from an old Teutonic root gla-, a variant of glo-, having the general sense of shining, cf. ” glare,” ” glow “), a hard substance, usually trans- parent or

translucent, which from a fluid condition at a high temperature has passed to a solid condition with sufficient rapidity to prevent the formation of visible crystals. There

‘The name Glasites or Glassites was generally used in Scotland; in England and America the name Sandemanians was more common.

are many varieties of glass differing widely in chemical com- position and in physical qualities. Most varieties, however, have certain qualities in common. They pass through a viscous stage in cooling from a state of fluidity; they develop effects of colour when the glass mixtures are fused with certain metallic oxides; they are, when cold, bad conductors both of electricity and heat, they are easily fractured by a blow or shock and show a conchoidal fracture; they are but slightly affected by ordinary solvents, but are readily attacked by hydrofluoric acid.

The structure of glass has been the subject of repeated in- vestigations. The theory most widely accepted at present is that glass is a quickly solidified solution, in which silica, silicates, borates, phosphates and aluminates may be either solvents or solutes, and metallic oxides and metals may be held either in solution or in suspension. Long experience has fixed the mixtures, so far as ordinary furnace temperatures are con- cerned, which produce the varieties of glass in common use. The essential materials of which these mixtures are made are, for English flint glass, sand, carbonate of potash and red lead; for plate and sheet glass, sand, carbonate or sulphate of soda and carbonate of lime; and for Bohemian glass, sand, carbonate of potash and carbonate of lime. It is convenient to treat these glasses as ” normal ” glasses, but they are in reality mixtures of silicates, and cannot rightly be regarded as definite chemical compounds or represented by definite chemical formulae.

The knowledge of the chemistry of glass-making has been considerably widened by Dr F. O. Schott’s experiments at the Jena glass-works. The commercial success of these works has demonstrated the value of pure science to manufactures.

The recent large increase in the number of varieties of glass has been chiefly due to developments in the manufacture of optical glass. Glasses possessing special qualities have been required, and have been supplied by the introduction of new combinations of materials. The range of the specific gravity of glasses from 2-5 to 5-0 illustrates the effect of modified compositions. In the same way glass can be rendered more or less fusible, and its stability can be increased both in

relation to extremes of temperature and to the chemical action of solvents. . «

The fluidity of glass at a high temperature renders possible the processes of ladelling, pouring, casting and stirring. A mass of glass in a viscous state can be rolled with an iron roller like dough; can be rendered hollow by the pressure of the human breath or by compressed air; can be forced by air pressure, or by a mechanically driven plunger, to take the shape and im- pression of a mould; and can be almost indefinitely extended as solid rod or as hollow tube. So extensible is viscous glass that it can be drawn out into a filament sufficiently fine and elastic to be woven into a fabric. . > ;

Glasses are generally transparent but may be translucent or opaque. Semi-opacity due to crystallization may be induced in many glasses by maintaining them for a long period at a temperature just insufficient to cause fusion. In this way is pro- duced the crystalline, devitrified material, known as Reaumur's porcelain. Semi-opacity and opacity are usually produced by the addition to the glass-mixtures of materials which will remain in suspension in the glass, such as oxide of tin, oxide of arsenic, phosphate of lime, cryolite or a mixture of felspar and fluorspar.

Little is known about the actual cause of colour in glass beyond the fact that certain materials added to and melted with certain glass-mixtures will in favourable circumstances produce effects of colour. The colouring agents are generally 'metallic oxides. The same oxide may produce different colours with different glass-mixtures, and different oxides of the same metal may produce different colours. The purple-blue of cobalt, the chrome green or yellow of chromium, the dichroic canary- colour of uranium and the violet of manganese, are constant. Ferrous oxide produces an olive green or a pale blue according to the glass with which it is mixed. Ferric oxide gives a yellow colour, but requires the presence of an oxidizing agent to prevent

reduction to the ferrous state. Lead gives a pale yellow colour. Silver oxide, mixed as a paint and spread on the surface of a piece of glass and heated, gives a permanent yellow stain. Finely divided vegetable charcoal added to a soda-lime glass gives a yellow colour. It has been suggested that the colour is due to sulphur, but the effect can be

produced with a glass mixture containing no sulphur, free or combined, and by increasing the proportion of charcoal the intensity of the colour can be increased until it reaches black opacity. Selenites and selenates give a pale pink or pinkish yellow. Tellurium appears to give a pale pink tint. Nickel with a potash-lead glass gives a violet colour, and a brown colour with a soda-lime glass. Copper gives a peacock-blue which becomes green if the pro- portion of the copper oxide is increased. If oxide of copper is added to a glass mixture containing a strong reducing agent, a glass is produced which when first taken from the crucible is colourless but on being re- heated develops a deep crimson – ruby colour. A similar glass, if its cooling

source of heat, or by placing them in a heated kiln and allowing the heat gradually to die out.

The furnaces (fig. 15) employed for melting glass are usually heated with gas on the ” Siemens,” or some similar system of regenerative heating. In the United States natural gas is used wherever it is available. In some English works coal is still employed for direct heating with various forms of mechanical stokers. Crude petroleum and a thin tar, resulting from the process of enriching water-gas with petroleum, have been used

Fig. 15. — Siemens’s Continuous Tank Furnace.

is greatly retarded, produces throughout its substance minute crystals of metallic copper, and closely resembles the mineral called avanturine. There is also an intermediate stage in which the glass has a rusty red colour by reflected light, and a purple- blue colour by transmitted light. Glass containing gold behaves in almost precisely the same way, but the ruby glass is less crimson than copper ruby glass. J. E. C. Maxwell Garnett, who has studied the optical properties of these glasses, has suggested that the changes in colour correspond with changes effected in the structure of the metals as they pass gradually from solution in the glass to a state of crystallization.

Owing to impurities contained in the materials from which glasses are made, accidental coloration or discoloration is often produced. For this reason chemical agents are added to glass mixtures to remove or neutralize accidental colour. Ferrous oxide is the usual cause of discoloration. By converting ferrous into ferric oxide the green tint is changed to yellow, which is less noticeable. Oxidation may be effected by the addition to the glass mixture of a substance which gives up oxygen at a high temperature, such as manganese dioxide or arsenic trioxide. With the same object, red lead and saltpetre are used in the

mixture for potash-lead glass. Manganese dioxide not only acts as a source of oxygen, but develops a pink tint in the glass, which is complementary to and neutralizes the green colour due to ferrous oxide.

Glass is a bad conductor of heat. When boiling water is poured into a glass vessel, the vessel frequently breaks, on account of the unequal expansion of the inner and outer layers. If in the process of glass manufacture a glass vessel is suddenly cooled, the constituent particles are unable to arrange themselves and the vessel remains in a state of extreme tension. The surface of the vessel may be hard, but the vessel is liable to fracture on receiving a trifling shock. M. de la Bastie's process of "toughening" glass consisted in dipping- glass, raised to a temperature slightly below the melting-point, into molten tallow. The surface of the glass was hardened, but the inner layers remained in unstable equilibrium. Directly the crust was pierced the whole mass was shattered into minute fragments. In all branches of glass manufacture the process of " annealing," i.e. cooling the manufactured objects sufficiently slowly to allow the constituent particles to settle into a condition of equilibrium, is of vital importance. The desired result is obtained either by moving the manufactured goods gradually away from a constant

both with compressed air and with steam with considerable success. Electrical furnaces have not as yet been employed for ordinary glass-making on a commercial scale, but the electrical plants which have been erected for melting and moulding quartz suggest the possibility of electric heating being employed for the manufacture of glass. Many forms of apparatus have been tried for ascertaining the temperature of glass furnaces. It is usually essential that some parts of the apparatus shall be made to acquire a temperature identical with the temperature to be measured. Owing to the physical changes produced in the material exposed prolonged observations of temperature are impossible. In the Fery radiation pyrometer this difficulty is obviated, as the instrument may be placed at a considerable distance from the furnace. The radiation passing out from an opening in the furnace falls upon a concave mirror in a telescope and is focused upon a thermoelectric couple. The hotter the furnace the greater is the rise of temperature of the couple. The electromotive force thus generated is measured by a galvano- meter, the scale of which is divided and figured so that the temperature may be directly read. (See Thermometry.)

In dealing with the manufacture of glass it is convenient to group the various branches in the following manner: Manufactured Glass.

I. Optical Glass

II. Blown Glass

A. Table glass.

I B. Tube. Special glasses for thermo- meters, and other special glasses.

C. Sheet and crown glass.

D. Bottles.

III. Mechanically Pressed Glass

A. Plate and rolled plate glass. B. Pressed table glass.

I. Optical Glass. — As regards both mode of production and essential properties optical glass differs widely from all other varieties. These differences arise primarily from the fact that glass for optical uses is required in comparatively large and thick pieces, while for most other purposes glass is used in the form of comparatively thin sheets; when, therefore, as a consequence

of Dollond's invention of achromatic telescope objectives in 1757, a demand first arose for optical glass, the industry was unable to furnish suitable material. Flint glass particularly, which appeared quite satisfactory when viewed in small pieces, was found to be so far from homogeneous as to be useless for lens construction. The first step towards overcoming this vital defect in optical glass was taken by P. L. Guinand, towards the end of the 18th century, by introducing the process of stirring the molten glass by means of a cylinder of fireclay. Guinand was induced to migrate from his home in Switzerland to Bavaria, where he worked at the production of homogeneous flint glass, first with Joseph von Utzschneider and then with J. Fraunhofer; the latter ultimately attained considerable success and produced telescope disks up to 28 centimetres (n in.) diameter. Fraunhofer further initiated the specification of refraction and dispersion in terms of certain lines of the spectrum, and even attempted an investigation of the effect of chemical composition on the relative dispersion produced by glasses in different parts of the spectrum. Guinand's

process was further developed in France by Guinand's sons and subsequently by Bontemps and E. Feil. In 1848 Bontemps was obliged to leave France for political reasons and came to England, where he initiated the optical glass manufacture at Chance's glass works near Birmingham, and this firm ultimately attained a considerable reputation in the production of optical glass, especially of large disks for telescope objectives. Efforts at improving optical glass had, however, not been confined to the descendants and successors of Guinand and Fraunhofer. In 1824 the Royal Astronomical Society of London appointed a committee on the subject, the experimental work being carried out by Faraday. Faraday independently recognized the necessity for mechanical agitation of the molten glass in order to ensure homogeneity, and to facilitate his manipulations he worked with dense lead borate glasses which are very fusible, but have proved too unstable for ordinary optical purposes. Later Maes of Clichy (France) exhibited some " zinc crown " glass in small plates of optical quality at the London Exhibition of 1851; and another French glass-maker, Lamy, produced a dense thallium glass in 1867. In 1834 W. V. Harcourt began experiments in glass-making, in which he was subsequently joined by G. G. Stokes. Their object was to pursue the inquiry begun by Fraunhofer as to the effect of chemical composition on the distribution of dispersion. The specific effect of boric acid in this respect was correctly ascertained by Stokes and Harcourt, but they mistook the effect of titanic acid. J. Hopkinson, working at Chance's glass works, subsequently made an attempt to produce a titanium silicate glass, but nothing further resulted.

The next and most important forward step in the progress of optical glass manufacture was initiated by Ernst Abbe and carried out jointly by him and O. Schott at Jena in Germany. Aided by grants from the Prussian government, these workers systematically investigated the effect of introducing a large number of different chemical substances (oxides) into vitreous fluxes. As a result a whole series of glasses of novel composition and optical properties were produced. A certain number of the most promising of these, from the purely optical point of view, had unfortunately to be abandoned for practical use owing to their chemical instability, and the problem of Fraunhofer, viz. the production of pairs of glasses of widely differing refraction and dispersion, but having a similar distribution of dispersion in the various regions of the spectrum, was not in the first instance solved. On the other hand, while in the older crown and flint glasses the relation between refraction and dispersion had been practically fixed, dispersion and refraction increasing regularly with the density of the glass, in some of the new glasses introduced by Abbe and Schott this

relation is altered and a relatively low refractive index is accompanied by a relatively high disper- sion, while in. others a high refractive index is associated with low dispersive power.

The initiative of Abbe and Schott, which was greatly aided by the resources for scientific investigation available at the Physikalische Reichsanstalt (Imperial Physical Laboratory),

led to such important developments that similar work was undertaken in France by the firm of Mantois, the successors of Feil, and somewhat later by Chance in England. The manu- facture of the new varieties of glass, originally known as ” Jena ” glasses, is now carried out extensively and with a considerable degree of commercial success in France, and also to a less extent in England, but none of the other makers of optical glass has as yet contributed to the progress of the industry to anything like the same extent as the Jena firm.

The older optical glasses, now generally known as the ” ordinary ” crown and flint glasses, are all of the nature of pure silicates, the basic constituents being, in the case of crown glasses, lime and soda or lime and potash, or a mixture of both, and in the case of flint glasses, lead and either (or both) soda and potash. With the exception of the heavier flint (lead) glasses, these can be produced so as to be free both from noticeable colour and from such defects as bubbles, opaque inclusions or ” striae,” but extreme care in the choice of all the raw materials and in all the manipulations is required to ensure this result. Further, these glasses, when made from properly proportioned materials, possess a.very considerable degree of chemical stability, which is amply sufficient for most optical purposes. The newer glasses, on the other hand, contain a much wider variety of chemical constituents, the most important being the oxides of barium, magnesium, aluminium and zinc, used either with or without the addition of the bases already named in reference to the older glasses, and — among acid bodies — boric anhydride (B2O3) which replaces the silica of the older glasses to a varying extent. It must be admitted that, by the aid of certain of these new constituents, glasses can be produced which, as regards purity of colour, freedom from defects and chemical stability are equal or even superior to the best of the ” ordinary ” glasses, but it is a remarkable fact that when this is the case the optical properties of the new glass do not fall very widely outside the limits set by the older glasses. On the other hand, the more extreme the optical properties of these new glasses, i.e. the further they depart from the ratio of refractive index to dispersive power found in the older glasses, the greater the difficulty found in obtaining them of either sufficient purity or stability to be of practical use. It is,

in fact, admitted that some of the glasses, most useful optically, the dense barium crown glasses, which are so widely used in modern photographic lenses, cannot be produced entirely free either from noticeable colour or from numerous small bubbles, while the chemical nature of these glasses is so sensitive that considerable care is required to protect the surfaces of lenses made from them if serious tarnishing is to be avoided. In practice, however, it is not found that the presence either of a decidedly greenish-yellow colour or of numerous small bubbles interferes at all seriously with the successful use of the lenses for the majority of purposes, so that it is preferable to sacrifice the perfection of the glass in order to secure valuable optical properties.

It is a further striking fact, not unconnected with those just enumerated, that the extreme range of optical properties covered even by the relatively large number of optical glasses now available is in reality very small. The refractive indices of all glasses at present available lie between 1-46 and 1-90, whereas transparent minerals' are known having refractive indices lying considerably outside these limits; at least one of these, fluorite (calcium fluoride), is actually used by opticians in the construction of certain lenses, so that probably progress is to be looked for in a considerable widening of the limits of available optical materials; possibly such progress may lie in the direction of the artificial production of large mineral crystals.

The qualities required in optical glasses have already been partly referred to, but may now be summarized: —

1. Transparency and Freedom from Colour. — These qualities can be readily judged by inspection of the glass in pieces of considerable thickness, and they may be quantitatively measured by means of the spectro-photometer.

2. Homogeneity. — The optical desideratum is uniformity of refractive index and dispersive power throughout the mass of the glass. This is probably never completely attained, variations in the sixth

significant figure of the refractive index being observed in different parts of single large blocks of the most perfect glass. While such minute and gradual variations are harmless for most optical purposes, sudden variations which generally take the form of striae or veins are fatal defects in all optical glass. In their coarsest forms such striae are

readily visible to the unaided eye, but finer ones escape detection unless special means are taken for rendering them visible ; such special means conveniently take the form of an apparatus for examining the glass in a beam of parallel light, when the striae scatter the light and appear as either dark or bright lines according to the position of the eye. Plate glass of the usual quality, which appears to be perfectly homogeneous when looked at in the ordinary way, is seen to be a mass of fine striae, when a considerable thickness is examined in parallel light. Plate glass is, nevertheless, consider- ably used for the cheaper forms of lenses, where the scattering of the light and loss of definition arising from these fine striae is not readily recognized.

Bubbles and enclosures of opaque matter, although more readily observed, do not constitute such serious defects; their presence in a lens, to a moderate extent, does not interfere with its performance (see above).

3. Hardness and Chemical Stability. — These properties contribute to the durability of lenses, and are specially desirable in the outer members of lens combinations which are likely to be subjected to frequent handling or are exposed to the weather. As a general rule, to which, however, there are important exceptions, both these qualities are found to a greater degree, the lower the refractive index of the glass. The chemical stability, i.e. the power of resisting the disintegrating effects of atmospheric moisture and carbonic acid, depends largely upon the quantity of alkalis contained in the glass and their proportion to the lead, lime or barium present, the stability being generally less the higher the proportion of alkali. A high silica-content tends towards both hardness and chemical stability, and this can be further increased by the addition of small proportions of boric acid; in larger quantities, however, the latter constituent produces the opposite effect.

4. Absence of Internal Strain. — Internal strain in glass arises from the unequal contraction of the outer and inner portions of masses of glass during cooling. Processes of annealing, or very gradual cooling, are intended to relieve these strains, but such processes are only completely effective when the cooling, particularly through those ranges of temperature where the glass is just losing the last traces of plasticity, is extremely gradual, a rate measured in hours per degree Centigrade being required. The existence of internal strains in glass can be readily recognized by examination in polarized light, any signs of double refraction indicating the existence of strain. If the glass is very badly annealed, the lenses made from it may fly to pieces during or after manufacture, but apart from such extreme cases the optical

effects of internal strain are not readily observed except in large optical apparatus. Very perfectly annealed optical glass is now, however, readily obtainable.

5. Refraction and Dispersion. — The purely optical properties of refraction and dispersion, although of the greatest importance, cannot be dealt with in any detail here ; for an account of the optical properties required in glasses for various forms of lenses see the articles Lens and Aberration: II. In Optical Systems. As typical of the range of modern optical glasses Table I. is given, which constituted the list of optical glasses exhibited by Messrs Chance at the Optical Convention in London in 1905. In this table n is the

refractive index of the glass for sodium light (the D line of the solar spectrum), while the letters C, F and G' refer to lines in the hydrogen spectrum by which dispersion is now generally specified. The symbol v represents the inverse of the dispersive power, its value being (» D - l)/(C-F). The very much longer lists of German and French firms contain only a few types not represented in this table. Manufacture of Optical Glass. — In its earlier stages, the process for the production of optical glass closely resembles that used in the production of any other glass of the highest quality. The raw materials are selected with great care to assure chemical purity, but whereas in most glasses the only impurities to be dreaded are those that are either infusible or produce a colouring effect upon the glass, for optical purposes the admixture of other glass-forming bodies than those which are intended to be present must be avoided on account of their effect in modifying the optical constants of the glass. Constancy of composition of the raw materials and their careful and thorough admixture in constant proportions are therefore essential to the production of the required glasses. The materials are generally used in the form either of oxides (lead, zinc, silica, &c.) or of salts readily decom- posed by heat, such as the nitrates or carbonates. Fragments of glass of the same composition as that aimed at are generally incorporated to a limited extent with the mixed raw materials to facilitate their fusion. The crucibles or pots used for the production of optical glass very closely resemble those used in the manufacture of flint glass for other purposes; they are " covered " and the molten materials are thus protected from the action of the furnace gases by the interposition of a wall of fireclay, but as crucibles for optical glass are used for only one fusion and are then broken up, they are not made so thick and heavy as those used in flint-glass making, since the latter remain in the furnace for many weeks. On the other hand, the chemical and physical nature of the fireclays used in the manufacture of such crucibles requires careful attention in order to secure the best results. The

furnace used for the production of optical glass is generally constructed to take one crucible only, so that the heat of the furnace may be accurately adjusted to the requirements of the particular glass under treatment. These small furnaces are frequently arranged for direct coal firing, but regenerative gas- fired furnaces are also employed. The empty crucible, having first been gradually dried and heated to a bright red heat in a subsidiary furnace, is taken up by means of massive iron tongs and introduced into the previously heated furnace, the tempera- ture of which is then gradually raised. When a suitable tempera- ture for the fusion of the particular glass in question has been attained, the mixture of raw materials is introduced in com- paratively small quantities at a time. In this way the crucible is gradually filled with a mass of molten glass, which is, however ;

Table I. — Optical Properties.

Partial and Relative Partial Dispersions.

Factory

Medium

Number.

Name.

“D.

V.

Dispersion. C-F.

C-D.

C-D

C-F.

D-F. j

)-F

:-f.

F-G’.

F-G’ C-F.

C.

644

Extra Hard Crown

t-4959

64-4

•00770

•00228

•296

•00542

704

•00431

•560

B.

646

Boro-silicate Crown

1-5096

63-3

•00803

•00236

•294

•00562

700

■00446

•555

A.

605

Hard Crown

I-5I75

60-5

•00856

■00252

•294

■00604

706

■00484

•554

C.

577

Medium Barium Crown

1-5738

57-9

•00990

•00293

•296

•00697

704

■00552

•557

C.

579

Densest Barium Crown

1-6065

57-9

•01046

•00308

•294

•00738

705

•00589

•563

A.

569

Soft Crown .

1-5152

56-9

•00906

•00264

•291

•00642

708

•00517

•57o

B.

563

Medium Barium Crown

1-5660

56-3

•01006

•00297

•295

•00709

704

•00576

•572

B.

535

Barium Light Flint

1-5452

53-5

•01020

■00298

•292

•00722

701

•00582

•570

A.

490

Extra Light Flint

i-53i6

49-o

•01085

•00313

•288

■00772

711

■00630

•580

A.

485

Extra Light Flint

1-5333

48-5

•01099

•00322

•293

•00777

707

•00640

•582

C.

474

Boro-silicate Flint

1-5623

47-4

•01187

•00343

•289

•00844

711

•00693

•584

B.

466

Barium Light Flint

I-5833′

46-6

■01251

•00362

•288

•00889

711

•00721

■576

B.

458

Soda Flint

I-5482

45-8

•01 195

•00343

•287

•00852

713

■00690

•577

A.

458

Light Flint .

1-5472

45-8

■0H9”6

■00348

•291

•00848

709

•00707

•591

A.

43 2

Light Flint .

1-5610

43-2

•01299

•00372

•287

•00927

713

■00770

•593

A.

410

Light Flint .

1-5760

41-0

•01404

•00402

•286

•01002

713

•0084.0

•598

B.

407

Light Flint .

I-5787

40-7

•01420

•00404

•284

•01016

715

•00840

•591

A.

370

Dense Flint .

i-6ii8

36-9

•01657

•00470

•284

•01187

716

•01004

■606

A.

361

Dense Flint .

1-6214

36-1

■01722

•00491

•285

•01231

•715

•01046

•608

A.

360

Dense Flint .

1-6225

36-0

•01729

•00493

•286

•01236

•715

•01054

•609

A.

337

Extra Dense Flint

1-6469

33-7

| 29-9

•01917

•00541

•285

•01376

•720

•01 170

•655

A.

299

Densest Flint

1-7129

•02384

1 -00670

•281

•01714

•789

■01661

•678

full of bubbles of all sizes. These bubbles arise partly from the air enclosed between the particles of raw materials and partly from the gaseous decomposition products of the materials themselves. In the next stage of the process, the glass is raised to a high temperature in order to render it sufficiently fluid to allow of the complete elimination of these bubbles; the actual temperature required varies with the chemical composition of the glass, a bright red heat sufficing for the most fusible glasses, while with others the utmost capacity of the best furnaces is required to attain the necessary temperature. With these latter glasses there is, of course, considerable risk that the partial fusion and consequent contraction of the fireclay of the crucible may result in its destruction and the entire loss of the glass. The stages of the process so far described generallyoccupy from 36 to 60 hours, and during this time the constant care and watchfulness of those attending the furnace is required. This is still more the case in the next stage. The examination of small test-pieces of the glass withdrawn from the crucible by means of an iron rod having shown that the molten mass is free from bubbles, the stirring process may be begun, the object of this manipulation being to render the glass as homogeneous as possible and to secure the absence of veins or striae in the product. For this purpose a cylinder of fireclay, provided with a square axial hole at the upper end, is heated in a small subsidiary furnace and is then introduced into the molten glass. Into the square axial hole fits the square end of a hooked iron bar which projects several yards beyond the mouth of the furnace; by means of this bar a workman moves the fireclay cylinder about in the glass with a steady circular sweep. Although the weight of the iron bar is carried by a support, such as an overhead chain or a swivel roller, this operation is very laborious and trying, more especially during the earlier stages when the heat radiated from the open mouth of the crucible is intense. The men who manipulate the stirring bars are therefore changed at short intervals, while the bars themselves have also to be changed at somewhat longer intervals, as they rapidly become oxidized, and accumulated scale would tend to fall off them, thus contaminating the glass below. The stirring process is begun when the glass is perfectly fluid at a temperature little short of the highest attained in its fusion, but as the stirring proceeds the glass is allowed to cool gradually and thus becomes more and more viscous until finally the stirring cylinder can scarcely be moved. When the glass has acquired this degree of consistency it is supposed that no fresh movements can occur within its mass, so that if homogeneity has been attained the glass will

preserve it permanently. The stirring is therefore discontinued and the clay cylinder is either left embedded in the glass, or by the exercise of considerable force it may be gradually withdrawn. The crucible with the semi-solid glass which it contains is now allowed to cool considerably in the melting furnace, or it may be removed to another slightly heated furnace. When the glass has cooled so far as to become hard and solid, the furnace is hermetic- ally sealed up and allowed to cool very gradually to the ordinary temperature. If the cooling is very gradual — occupying several weeks — it sometimes happens that the entire contents of a large crucible, weighing perhaps 1000 lb, are found intact as a single mass of glass, but more frequently the mass is found broken up into a number of fragments of various sizes. From the large masses great lenses and mirrors may be produced, while the smaller pieces are used for the production of the disks and slabs of moderate size, in which the optical glass of commerce is usually supplied. In order to allow of the removal of the glass, the cold crucible is broken up and the glass carefully separated from the fragments of fire- clay. The pieces of glass are then examined for the detection of the grosser defects, and obviously defective pieces are rejected. As the fractured surfaces of the glass in this condition are un-suitable for delicate examination a good deal of glass that passes this inspection has yet ultimately to be rejected. The next stage in the preparation of the glass is the process of moulding and

are chosen, and are heated to a temperature just sufficient to soften the glass, when the lumps are caused to assume the shape of moulds made of iron or fireclay either by the natural flow of the softened glass under gravity, or by pressure from suitable tools or presses. The glass, now in its approximate form, is placed in a heated chamber where it is allowed to cool very gradually — the minimum time of cooling from a dull red heat being six days, while for ” fine annealing ” a much longer period is required (see above). At the end of the annealing process the glass issues in the shape of disks or slabs slightly larger than required by the optician in each case. The glass is, however, by no means ready for delivery, since it has yet to be examined with scrupulous care, and all defective pieces must be rejected entirely or at least the defective part must be cut out and the slab remoulded or ground down to a smaller size. For the purpose of rendering this minute examination possible, opposite plane surfaces of the glass are ground approximately flat and polished, the faces to be polished being so chosen as to allow of a view through the greatest possible thickness of glass; thus in slabs the narrow edges are polished.

It will be readily understood from the above account of the process of

production that optical glass, relatively to other kinds of glass, is very expensive, the actual price varying from 3s. to 30s. per lb in small slabs or disks. The price, however, rapidly increases with the total bulk of perfect glass required in one piece, . so that large disks of glass suitable for telescope objectives of wide aperture, or blocks for large prisms, become exceedingly costly. The reason for this high cost is to be found partly in the fact that the yield of optically perfect glass even in large and successful meltings rarely exceeds 20% of the total weight of glass melted. Further, all the subsequent processes of cutting, moulding and annealing become increasingly difficult, owing to the greatly increased risk of breakage arising from either external injury or internal strain, as the dimensions of the individual piece of glass increase. Nevertheless, disks of optical glass, both crown and flint, have been produced up to 39 in. in diameter.

II. Blown Glass. (A) Table-ware and Vases. — The varieties of glass used for the manufacture of table-ware and vases are the potash-lead glass, the soda-lime glass and the potash-lime glass. These glasses may be colourless or coloured. Venetian glass is a soda-lime glass; Bohemian glass is a potash-lime glass. The potash-lead glass, which was first used on a com- mercial scale in England for the manufacture of table-ware, and which is known as ” flint ” glass or ” crystal,” is also largely used in France, Germany and the United States. Table II. shows the typical composition of these glasses.

Table II.

Si0 2 .

K 2 0.

PbO.

Na 2 0.

CaO.

MgO.

Fe 2 3

and

AW) 3 .

Potash-lead (flint) glass . Soda-lime (Venetian) glass . Potash-lime

(Bohemian) glass

53-17 73-40 71-70

13-88 12-70

32-95

18-58 2-50

5-06 10-30

2-48 0-90

For melting the leadless glasses, open, bowl-shaped crucibles are used, ranging from 1 2 to 40 in. in diameter. Glass mixtures containing lead are melted in covered, beehive-shaped crucibles holding from 12 to 18 cwt. of glass. They have a hooded open- ing on one side near the top. This opening serves for the intro- duction of the glass-mixture, for the removal of the melted glass and as a source of -heat for the processes of manipulation.

The Venetian furnaces in the island of Murano are small low structures heated with wood. The heat passes from the melting furnace into the annealing kiln. In Germany, Austria and the United States, gas furnaces are generally used. In England directly-heated coal furnaces are still in common use, which in many cases are stoked by mechanical feeders. There are two systems of annealing. The manufactured goods are either removed gradually from a constant source of heat by means annealing. Lumps of glass of approximately the right weight] of a train of small iron trucks drawn along a tramway by an

endless chain, or are placed in a heated kiln in which the fire is allowed gradually to die out. The second system is especially used for annealing large and heavy objects. The manufacture of table-ware is carried on by small gangs of men and boys. In England each ” gang ” or ” chair ” consists of three men and one boy. In works, however, in which most of the goods are moulded, and where less skilled labour is required, the proportion of boy labour is increased. There are generally two shifts of workmen, each shift working six hours, and the work is carried on continu- ously from Monday morning until Friday

morning. Directly work is suspended the glass remaining in the crucibles is ladled into water, drained and dried. It is then mixed with the glass mixture and broken glass (" cullet "), and replaced in the

Fig. i 6.— Pontils and Blowing Iron. a, Puntee ; b, spring puntee ; c, blowing iron.

crucibles. The furnaces are driven to a white heat in order to fuse the mixture and expel bubbles of gas and air. Before work begins the temperature is lowered sufficiently to render the glass viscous. In the viscous state a mass of glass can be coiled upon the heated end of an iron rod, and if the rod is hollow can be blown into a hollow bulb. The tools used are extremely primitive — hollow iron blowing-rods, solid rods for holding vessels during manipulation, spring tools, resembling sugar-tongs in shape, with steel or wooden blades for fashioning the viscous glass, callipers, measure-sticks, and a variety of moulds of wood, carbon, cast iron, gun-metal and plaster of Paris (figs. 16 and 17). The most important tool, however, is the bench or " chair " on which the workman sits, which serves as his lathe. He sits

Fig. 17. — Shaping and Measuring Tools.

' Sugar-tongs '

' tool with wooden /, Pincers.

ends.

g, Scissors.

' Sugar-tongs '

' tools with cutting h, Battledore.

edges.

i, Marking compacs.

e, e,

between two rigid parallel arms, projecting forwards and back- wards and sloping slightly from back to front. Across the arms he balances the iron rod to which the glass bulb adheres, and rolling it backwards and forwards with the fingers of his left hand fashions the glass between the blades of his sugar-tongs tool, grasped in his right hand. The hollow bulb is worked into the shape it is intended to assume,

partly by blowing, partly by gravitation, and partly by the workman's tool. If the blowing, iron is held vertically with the bulb uppermost the bulb becomes ■flattened and shallow, if the bulb is allowed to hang downwards it becomes elongated and reduced in diameter, and if the end of the bulb is pierced and the iron is held horizontally and sharply trundled, as a mop is trundled, the bulb opens out into a flattened disk.

During the process of manipulation, whether on the chair

or whilst the glass is being reheated, the rod must be constantly and gently trundled to prevent the collapse of the bulb or vessel. Every natural development of the spherical form can be obtained by blowing and fashioning by hand. A non-spherical form can only be produced by blowing the hollow bulb into a mould of the required shape. Moulds are used both for giving shape to vessels and also for impressing patterns on their suface. Although spherical forms can be obtained without the use of moulds, moulds are now largely used for even the simplest kinds of table- ware in order to economize time and skilled labour. In France, Germany and the United States it is rare to find a piece of table- ware which has not received its shape in a mould. The old and the new systems of making a wine-glass illustrate almost all the ordinary processes of glass working. Sufficient glass is first " gathered " on the end of a blowing iron to form the bowl of the wine-glass. The mere act of coiling an exact weight of molten glass round the end of a rod 4 ft. in length requires considerable skill. The mass of glass is rolled on a polished slab of iron, the " marvor," to solidify it, and it is then slightly hollowed by blowing. Under the old system the form of the bowl is gradually developed by blowing and by shaping the bulb with the sugar-tongs tool. The leg is either pulled out from the substance of the base of the bowl, or from a small lump of glass added to the base. The foot starts as a small independent bulb on a separate blowing iron. One extremity of this bulb is made to adhere to the end of the leg, and the other extremity is broken away from its blowing iron. The fractured end is heated, and by the combined action of heat and centrifugal force opens out into a flat foot. The bowl is now severed from its blowing iron and the unfinished wine-glass is supported by its foot, which is attached to the end of a working rod by a metal clip or by a seal of glass. The fractured edge of the bowl is heated, trimmed with scissors and melted so as to be perfectly smooth and even, and the bowl itself receives its final form from the sugar-tongs tool.

Under the new system the bowl is fashioned by blowing the slightly hollowed mass of glass into a mould. The leg is formed and a small

lump of molten glass is attached to its extremity to form the foot. The blowing iron is constantly trundled, and the small lump of glass is squeezed and flattened into the shape of a foot, either between two slabs of wood hinged together, or by pressure against an upright board. The bowl is severed from the blowing iron, and the wine-glass is sent to the an- nealing oven with a bowl, longer than that of the finished glass, and with a rough fractured edge. When the glass is cold the surplus is removed either by grinding, or by applying heat to a line scratched with a diamond round the bowl. The fractured edge is smoothed by the impact of a gas flame.

In the manufacture of a wine-glass the ductility of glass is illustrated on a small scale by the process of pulling out the leg. It is more strikingly illustrated in the manufacture of glass cane and tube. Cane is produced from a solid mass of molten glass, tube from a mass hollowed by blowing. One workman holds the blowing iron with the mass of glass attached to it, and another fixes an iron rod by means of a seal of glass to the extremity of the mass. The two workmen face each other and walk backwards. The diameter of the cane or tube is regulated by the weight of glass carried, and by the distance covered by the two workmen. It is a curious property of viscous glass that whatever form is given to the mass of glass before it is drawn out is retained by the finished cane or tube, however small its section may be. Owing to this property, tubes or canes can be produced with a square, oblong, oval or triangular section. Exceedingly fine canes of milk-white glass play an important part in the masterpieces produced by the Venetian glass-makers of. the 16th century. Vases and drinking cups were produced of extreme lightness, in the walls of which were embedded patterns rivalling lace-work in fineness and intricacy. The canes from which the patterns are formed are either simple or complex. The latter are made by dipping a smaii mass of molten colourless glass into an iron cup around the inner wall of which short lengths of white cane' have been arranged at

regular intervals. ' The canes adhere to the molten glass, and the mass is first twisted and then drawn out into fine cane, which contains white threads arranged in endless spirals. The process can be almost indefinitely repeated and canes formed of extreme complexity. A vase decorated with these simple or complex canes is produced by embedding short lengths of the cane on the surface of a mass of molten glass and blowing and fashioning the mass into the required

shape.

Table-ware and vases ,may be wholly coloured or merely decorated with colour. Touches of colour may be added to vessels in course of manufacture by means of seals of molten glass, applied like sealing-wax; or by causing vessels to wrap themselves round with threads or coils of coloured glass. By the application of a pointed iron hook, while the glass is still ductile, the parallel coils can be distorted into bends, loops or zigzags. The surface of vessels may be spangled with gold or platinum by rolling the hot glass on metallic leaf, or iridescent, by the deposition of metallic tin, or by the corrosion caused by the chemical action of acid fumes. Gilding and enamel decoration are applied to vessels when cold, and fixed by heat.

Cutting and engraving are mechanical processes for producing decorative effects by abrading the surface of the glass when cold. The abrasion is effected by pressing the glass against the edge of wheels, or disks, of hard material revolving on horizontal spindles. The spindles -of cutting wheels are driven by steam or electric power. The wheels for making deep cuts are made of iron., and are fed with sand and water. The wheels range ap .diamfrter 1mm jj? in. to j? in. Wheels of carborundum are also used. Wheels of fine sandstone fed with water are used for making slighter cuts and for smoothing the rough surface left by the iron wheels. Polishing is effected by wooden wheels fed with wet pumice-powder and rottenstone and by brushes fed with moistened putty-powder. Patterns are produced by combining straight and curved cuts. Cutting brings out the brilliancy of glass, which is one of its intrinsic qualities. At the end of the 18th century English cut glass was unrivalled for design and beauty. Gradually, however, the process was applied without restraint and the products lost all artistic quality. At the present time cut glass is steadily regaining favour.

Engraving is a process of drawing on glass by means of small copper wheels. The wheels range from i in. to 2 in. in diameter, and are fed with a mixture of fine emery and oil. The spindles to which the wheels are attached revolve in a lathe worked by a foot treadle. The true use of engraving is to add interest to vessels by means of coats of arms, crests, monograms, inscriptions and graceful outlines. The improper use of engraving is to hide defective material. There are two other processes of marking patterns on glass, but they possess no artistic value. In the ” sandblast ” process the surface of the glass is exposed to a stream of sharp sand driven by compressed air. The parts of the surface which are not to be blasted are covered by adhesive paper. In the ” etching ” process the surface of the glass is etched by the chemical action of hydrofluoric acid, the parts which are not to be attacked being covered with a resinous paint. The glass is first dipped

in this protective liquid, and when the paint has set the pattern is scratched through it with a sharp point. The glass is then exposed to the acid.

Glass stoppers are fitted to bottles by grinding. The mouth of the bottle is ground by a revolving iron cone, or mandrel, fed with sand and water and driven by steam. The head of the stopper is fastened in a chuck and the peg is ground to the size of the mouth of the bottle by means of sand and water pressed against the glass by bent strips of thin sheet iron. The mouth of the bottle is then pressed by hand on the peg of the stopper, and the mouth and peg are ground together with a medium of very fine emery and water until an air-tight joint is secured.

The revival in recent years of the craft of glass-blowing in England must be attributed to William Morris and T.G. Jackson, R.A. (PI. II. figs, n and 12). They, at any rate, seem to have been the first to grasp the idea that a wine-glass is not merely

a bowl, a stem and a foot, but that, whilst retaining simplicity of form, it may nevertheless possess decorative effect. They, moreover, suggested the introduction for the manufacture of table-glass of a material similar in texture to that used by the Venetians, both colourless and tinted.

The colours previously available for English table-glass were ruby, canary-yellow, emerald-green, dark peacock-green, light peacock-blue, dark purple-blue and a dark purple. About 1870 the ” Jackson ” table-glass was made in a light, dull green glass. The dull green was followed successively by amber, white opal, blue opal, straw opal, sea-green, horn colour and various pale tints of soda-lime glass, ranging from yellow to blue. Ex- periments were also tried with a violet-coloured glass, a violet opal, a transparent black and with glasses shading from red to blue, red to amber and blue to green.

In the Paris Exhibition of 1900 surface decoration was the prominent feature of all the exhibits of table-glass. The carved or ” cameo ” glass, introduced by Thomas Webb of Stourbridge in 1878, had been copied with varying success by glass-makers of all nations. In many specimens there were three or more layers of differently coloured glass, and curious effects of blended colour were obtained by cutting through, or partly through, the different layers. The surface of the glass had usually been treated with hydrofluoric acid so as to have a satin-like gloss. Some vases of this character, shown by Emile Galle and Daum Freres of Nancy, possessed considerable beauty. The ”

Favrile ” glass of Louis C. Tiffany of New York (PI. II. fig. 13) owes its effect entirely to surface colour and lustre. The happiest speci- | mens of this glass almost rival the wings of “butterflies “in the brilliancy of their iridescent colours. The vases of Karl Koepping of Berlin are so fantastic and so fragile that they appear to be creations of the lamp rather than of the furnace. An illustration is also given of some of Powell’s ” Whitefriars ” glass, shown at the St Louis Exhibition, 1004 (PI. II. fig. 14)- The specimens of ” pate de verre ” exhibited by A. L. Dammouse, of Sevres, in the Musee des Arts decoratifs in Paris, and at the London Franco-British Exhibition in 1908, deserve attention. They have a semi-opaque body with an “egg-shell” surface and are delicately tinted with colour. The shapes are exceedingly simple, but some of the pieces possess great beaut}’. The material and technique suggest a close relationship to porcelain.

(B) Tube. — The process of making tube has already been described. Although the bore of the thermometer-tube is exceedingly small, it is made in the same way as ordinary tube. The white line of enamel, which is seen in some thermo- meters behind the bore, is introduced before the mass of glass is pulled out. A flattened cake of viscous glass-enamel is welded on to one side of the mass of glass after it has been hollowed by blowing. The mass, with the enamel attached, is dipped into the crucible and covered with a layer of transparent glass; the whole mass is then pulled out into tube. If the section of the finished tube is to be a triangle, with the enamel and bore at the base, the molten mass is pressed into a V-shaped mould before it is pulled out.

In modern thermometry instruments of extreme accuracy are required, and researches have been made, especially in Germany and France, to ascertain the causes of variability in mercurial thermometers, and how such variability is to be removed or reduced. In all mercurial thermometers there is a slight depression of the ice-point after exposure to high temperatures; it is also not uncommon to find that the readings of two thermometers between the ice- and boiling-points fail to agree at any intermediate temperature, although the ice- and boiling-points of both have been determined together with perfect accuracy, and the intervening spaces have been equally divided. It has been proved that these variations depend to a great extent on the chemical nature of the glass of which the thermometer is made. Special glasses have therefore been produced by Tonnelot in France and at the Jena glass- works in Germany expressly for the manufacture of thermometers for accurate physical measurements; the analyses of these are shown in Table III.

Table III.

Si0 2 .

Na 2 0.

K 2 0.

CaO.

AUO s .

MgO.

B 2 3 .

ZnO.

Depression

of Ice-point.

Tonnelot's " Verre dur " Jena glass —

XVI. -in . ...

59-1″

70-96

67-5 72-0

12-02

I40 II-O

0-56

14-40

7-0

5-o

1-44

2-5

5-o

0-40

2-0 12-0

7-0

0-07 0-05

0-02

Since the discovery of the Rontgen rays, experiments have been made to ascertain the effects of the different constituents of glass on the transparency of glass to X-rays. The oxides of lead, barium, zinc and antimony are found perceptibly to retard the rays. The glass tubes, therefore, from which the X-ray bulbs are to be fashioned, must not contain any of these oxides, whereas the glass used for making the funnel-shaped shields, which direct the rays upon the patient and at the same time protect the hands of the operator from the action of the rays, must contain a large proportion of lead.

Among the many developments of the Jena Works, not the least important are the glasses made in the form of a tube, from which gas-chimneys, gauge-glasses and chemical apparatus are fashioned, specially adapted to resist sudden changes of temperature. One method is to form the tube of two layers of glass, one being considerably more expansible than the other. (C) Sheet and Crown-glass. — Sheet-glass is almost wholly a soda-lime-silicate glass, containing only small quantities of iron, alumina and other impurities. The raw materials used in this manufacture are chosen with considerable care, since the requirements as to the colour of the product are somewhat stringent. The materials ordinarily employed are the following: sand, of good quality, uniform in grain and free from any notable quantity of iron oxide; carbonate of lime, generally in the form of a pure variety of powdered limestone; and sulphate of soda. A certain proportion of soda ash (carbonate of soda) is also used in some works in sheet-glass mixtures, while ” decolorizers ” (substances intended to remove or reduce the colour of the glass) are also sometimes added, those most generally used being manganese dioxide and arsenic. Another essential ingredient of all glass mixtures containing sulphate of soda is some form of carbon, which is added

either as coke, charcoal or anthracite coal; the carbon so introduced aids the reducing substances contained in the atmosphere of the furnace in bringing about the reduction of the sulphate of soda to a condition in which it combines more readily with the silicic acid of the sand. The proportions in which these ingredients are mixed vary according to the exact quality of glass required and with the form and temperature of the melting furnace employed. A good quality of sheet-glass should show, on analysis, a composi- tion approximating to the following: silica ($Si0_2$), 72%; lime (CaO), 13%; soda ($Na_2 0$), 14%; and iron and alumina ($Fe_2 3$,$Al20_3$), 1%. The actual composition, however, of a mixture that will give a glass of this composition cannot be directly calculated from these figures and the known composition of the raw materials, owing to the fact that considerable losses, particularly of alkali, occur during melting.

The fusion of sheet-glass is now generally carried out in gas-fired regenerative tank furnaces. The glass in process of fusion is contained in a basin or tank built up of large blocks of fire-clay and is heated by one or more powerful gas frames which enter the upper part of the furnace chamber through suitable apertures or ” ports.” In Europe the gas burnt in these furnaces is derived from special gas-producers, while in some parts of America natural gas is utilized. With producer gas it is necessary to pre-heat both the gas and the air which’ is supplied for its combustion by passing both through heated regenerators (for an account of the principles of the regenerative furnace see article Furnace). In many respects the glass- melting tank resembles the open-hearth steel furnace, but there are certain interesting differences. Thus the dimensions of the largest glass tanks greatly exceed those of the largest steel furnaces; glass furnaces containing up to 250 tons of molten

glass have been successfully oper- ated, and owing to the relatively low density of glass this involves very large dimensions. The tem- perature required in the fusion of sheet-glass and of other glasses produced in tank furnaces is much lower than that attained in steel furnaces, and it is consequently pos- sible to work glass-tanks continuously for many months together; on the other hand, glass is not readily freed from foreign bodies that may become admixed with it, so that the absence of detach- able particles is much more essential in glass than in steel melting. Finally, fluid steel can be run or poured off, since it is perfectly fluid, while glass cannot be thus treated, but is withdrawn from the furnace by means of either a ladle or a gatherer’s pipe, and the temperature required for this purpose is much lower than that at which the glass is melted. In a sheet-glass tank there is therefore a gradient of temperature and a continuous passage of

material from the hotter end of the furnace where the raw materials are introduced to the cooler end where the glass, free from bubbles and raw material, is withdrawn by the gatherers. For the purpose of the removal of the glass, the cooler end of the furnace is provided with a number of suitable openings, provided with movable covers or shades. The " gatherer " approaches one of these openings, removes the shade and introduces his previously heated " pipe." This instrument is an iron tube, some 5 ft. long, provided at one end with an enlarged butt and at the other with a wooden covering acting as handle and mouthpiece. The gatherer dips the butt of the pipe into the molten " metal " and withdraws upon it a small ball of viscous glass, which he allows to cool in the air while constantly rotating it so as to keep the mass as nearly spherical in shape as he can. When the first ball or " gathering " has cooled sufficiently, the whole is again dipped into the molten glass and a further layer adheres to the pipe-end, thus forming a larger ball. This process is repeated, with slight modifications, until the gathering is of the proper size and weight to yield the sheet which is to be blown. When this is the case the gathering is carried to a block or half-open mould in which it is rolled and blown until it acquires, roughly, the shape of a hemisphere, the flat side being towards the pipe and the convexity away from it; the diameter of this hemisphere is so regulated as to be approximately that of the cylinder which is next to be formed of the viscous mass. From the hemispherical shape the mass of glass is now gradually blown into the form of a short cylinder, and then the pipe with the adherent mass of glass is handed over to the blower proper. This workman stands upon a platform in front of special furnaces which, from their shape and purpose, are called " blowing holes." The blower repeatedly heats the lower part of the mass of glass and keeps it distended by blowing while he swings it over a deep trench which is provided next to his working platform. In this way the glass is extended into the form of a long cylinder closed at the lower end. The size of cylinder which can be produced in this way depends chiefly upon the dimensions of the working platform and the weight which a man is able to handle freely. The lower end of the cylinder is opened, in the case of small and thin cylinders, by the blower holding his thumb over the mouthpiece of the pipe and simultaneously warming the end of the cylinder in the furnace, the expansion of the imprisoned air and the softening of the glass causing the end of the cylinder to burst open. The blower then heats the end of the cylinder again and rapidly spins the pipe about its axis; the centrifugal effect is sufficient to spread the soft glass at the end to a radius equal to that of the rest of the cylinder. In the case of large and thick cylinders, however, another process of opening the ends is generally employed: an

assistant attaches a small lump of hot glass to the domed end, and the heat of this added glass softens the cylinder sufficiently to enable the assistant to cut the end open with a pair of shears; subsequently the open end is spun out to the I diameter of the whole as described above. The finished cylinder

is next carried to a rack and the pipe detached from it by applying a cold iron to the neck of thick hot glass which connects pipe-butt and cylinder, the neck cracking at the touch. Next, the rest of the connecting neck is detached from the cylinder by the application of a heated iron to the chilled glass. This leaves a cylinder with roughly parallel ends; these ends are cut by the use of a diamond applied internally and then the cylinder is split longitudinally by the same means. The split cylinder is passed to the flattening furnace, where it is exposed to a red heat, sufficient to soften the glass; when soft the cylinder is laid upon a smooth flat slab and flattened down upon it by the careful application of pressure with some form of rubbing implement, which frequently takes the form of a block of charred wood. When flattened, the sheet is moved away from the working opening of the furnace, and pushed to a system of movable grids, by means of which it is slowly moved along a tunnel, away from a source of heat nearly equal in temperature to that of the flattening chamber. The glass thus cools gradually as it passes down the tunnel and is thereby adequately annealed.

The process of sheet-glass manufacture described above is typical of that in use in a large number of works, but many modifications are to be found, particularly in the furnaces in which the glass is melted. In some works, the older method of melting the glass in large pots or crucibles is still adhered to, although the old-fashioned coal-fired furnaces have nearly everywhere given place to the use of producer gas and re- generators. For the production of coloured sheet-glass, however, the employment of pot furnaces is still almost universal, prob- ably because the quantities of glass required of any one tint are insufficient to employ even a small tank furnace continuously; the exact control of the colour is also more readily attained with the smaller bulk of glass which has to be dealt with in pots. The general nature of the colouring ingredients employed, and the colour effects produced by them, have already been mentioned. In coloured sheet-glass, two distinct kinds are to be recognized; in one kind the colouring matter is contained in the body of the glass itself, while in

the other the coloured sheet consists of ordinary white glass covered upon one side with a thin coating of intensely coloured glass. The latter kind is known as ” flashed,” and is universally employed in the case of colouring matters whose effect is so intense that in any usual thickness of glass they would cause almost entire opacity. Flashed glass is produced by taking either the first or the last gathering in the production of a cylinder out of a crucible containing the coloured ” metal,” the other gatherings being taken out of ordinary white sheet-glass. It is important that the thermal expansion of the two materials which are thus incorporated should be nearly alike, as otherwise warping of the finished sheet is liable to result.

Mechanical Processes for the Production of Sheet-glass. — The complicated ‘ and indirect process of sheet-glass manufacture has led to numerous inventions aiming at a direct method of production by more or less mechanical means. All the earlier attempts in this direction failed on account of the difficulty of bringing the glass to the machines without introducing air-bells, which are always formed in molten glass when it is ladled or poured from one vessel into another. More modern inventors have therefore adopted the plan of drawing the glass direct from the furnace. In an American process the glass is drawn direct from the molten mass in the tank in a cylindrical form by means of an iron ring previously immersed in the glass, and is kept in shape by means of special devices for cooling it rapidly as it leaves the molten bath. In this process, however, the entire operations of splitting and flattening are retained, and although the mechanical process is said to be in successful commercial operation, it has not as yet made itself felt as a formidable rival to hand-made sheet-glass. An effort at a more direct mechanical process is embodied in the inventions of Foucault which are at present being developed in Germany and Belgium; in this process the glass is drawn from the molten bath in the shape of flat sheets, by the aid of a bar of iron, previously immersed in the glass, the glass receiving its form by being drawn through slots

in large fire-bricks, and being kept in shape by rapid chilling produced by the action of air-blasts. The mechanical operation is quite successful for thick sheets, but it is not as yet available for the thinner sheets required for the ordinary purposes of sheet-glass, since with these excessive breakage occurs, while the sheets generally show grooves or lines derived from small irregularities of the drawing orifice. For the production of thick sheets which are subsequently to be polished the process may thus claim considerable success, but it is not as yet possible to produce satisfactory sheet-glass by such means.

Crown-glass has at the present day almost disappeared from the market, and it has been superseded by sheet-glass, the more modern processes described above being capable of producing much larger sheets of glass, free from the knob or ” bullion ” which may still be seen in old crown-glass windows. For a few isolated purposes, however, it is desirable to use a glass which has not been touched upon either surface and thus pre- serves the lustre of its ” fire polish ” undiminished; this can be attained in crown-glass but not in sheet, since one side of the latter is always more or less marked by the rubber used in the process of flattening. One of the few uses of crown-glass of this kind is the glass slides upon which microscopic specimens are mounted, as well as the thin glass slips with which such preparations are covered. A full account of the process of blowing crown-glass will be found in all older books and articles on the subject, so that it need only be mentioned here that the glass, instead of being blown into a cylinder, is blown into a flattened sphere, which is caused to burst at the point opposite the pipe and is then, by the rapid spinning of the glass in front of a very hot furnace-opening, caused to expand into a flat disk of large diameter. This only requires to be annealed and is then ready for cutting up, but the lump of glass by which the original globe was attached to the pipe remains as the bullion in the centre of the disk of glass.

Coloured Glass for Mosaic Windows. — The production of coloured glass for ” mosaic ” windows has become a separate branch of glass-making. Charles Winston, after prolonged study of the coloured windows of the 13th, 14th and 15th centuries, convinced himself that no approach to the colour effect of these windows could be made with glass which is thin and even in section, homogeneous in texture, and made and coloured with highly refined materials. To obtain the effect it was necessary to reproduce as far as possible the conditions under which the early craftsmen worked, and to create scientifically glass which is impure in colour, irregular in section, and non-homogeneous in texture. The glass is made in cylinders and in ” crowns ” or circles. The cylinders measure about 14 in. in length by 8 in. in diameter, and vary in thickness from f to f in. The crowns are about 15 in. in diameter, and vary in thickness from f to § in., the centre being the thickest. These cylinders and crowns may be either solid colour or flashed. Great variety of colour may be obtained by flashing one colour upon another, such as blue on green, and ruby on blue, green or yellow.

E. J. Prior has introduced an ingenious method of making small oblong and square sheets of coloured glass, which are thick in the centre and taper towards the edges, and which have one surface

slightly roughened and one brilliantly polished. Glass is blown into an oblong box-shaped iron mould, about 12 in. in depth and 6 in. across. A hollow rectangular bottle is formed, the base and sides of which are converted into sheets. The outer surface of these sheets is slightly roughened by contact with the iron mould.

(D) Bottles and mechanically blown Glass. — The manufacture of bottles has become an industry of vast proportions. The demand constantly increases, and, owing to constant improve- ments in material in the moulds and in the methods of working, the supply fully keeps pace with the demand. Except for making bottles of special colours, gas-heated tank furnaces are in general use. Melting and working are carried on continuously. The essential qualities of a bottle are strength and power to resist chemical corrosion. The materials are selected with a view to secure these qualities. For the highest quality of bottles, which

are practically colourless, sand, limestone and sulphate and carbonate of soda are used. The following is a typical analysis of high quality bottle-glass: $Si0_2$, 69-15%; Na_20, 13-00%; CaO, 15-00%; $A1_23$, 2-20%; and Fe_23, 0-65%. For the commoner grades of dark-coloured bottles the glass mixture is cheapened by substituting common salt for part of the sulphate of soda, and by the addition of felspar, granite, granulite, furnace slag and other substances fusible at a high temperature. Bottle moulds are made of cast iron, either in two pieces, hinged together at the base or at one side, or in three pieces, one forming the body and two pieces forming the neck.

A bottle gang or ” shop ” consists of five persons. The

” gatherer ” gathers the glass from the tank furnace on the end

of the blowing-iron, rolls it on a slab of iron or stone, slightly

expands the glass by blowing, and hands the blowing iron and

glass to the ” blower.” The blower places the glass in the mould,

closes the mould by pressing a lever with his foot, and either

blows down the blowing iron or attaches it to a tube connected

with a supply of compressed air. When the air has forced the glass to take the form of the mould, the mould is opened and the blower gives the blowing iron with the bottle attached to it to the ” wetter off.” The wetter off touches the top of the neck of the bottle with a moistened piece of iron and by tapping the blowing iron detaches the bottle and drops it into a wooden trough. He then grips the body of the bottle with a four-pronged clip, attached to an iron rod, and passes it to the ” bottle maker.” The bottle maker heats the fractured neck of the bottle, binds a band of molten glass round the end of it and simultaneously shapes the inside and the outside of the neck by using the tool shown in fig. 18.

moulding the inside The finished bottle is taken by the ” taker and outside of the in ” to the annealing furnace. The bottles neck of a bottle. are stacked in iron trucks, which, when

A’ Conical piece of * u ˆ> are moved slowly away from a constant iron to form the source of heat.

inside of the The processes of manipulation which have r R eC

Fig. 18.— Tool for

close upon the molten glass, and the compressed air forces the glass to take the form of the mould. After removal from the machine, the tumbler is severed from the blowing iron, and its fractured edge is trimmed.

Compressed air or steam is also used for fashioning very large vessels, baths, dishes and reservoirs by the ” Sievert ” process. Molten glass is spread upon a large iron plate of the required shape and dimensions. The flattened mass of glass is held by a rim, connected to the edge of the plate. The plate with the glass attached to it is inverted, and compressed air or steam is intro- duced through openings in the plate. The mass of glass, yielding to its own weight and the pressure of air or steam, sinks down- wards and adapts itself to any mould or receptacle beneath it.

The processes employed in the manufacture of the glass bulbs for incandescent electric lamps, are similar to the old-

of’iron?whicWn are verv ra P idI y performed, are destined be pressed upon to be replaced by the automatic working the outside of of a machine. Bottle-making machines, the neck by the b asec i on Ashley’s original patent, are spring-handle H. already being largely used _ They ensure

absolute regularity in form and save both time and labour. A bottle-making machine combines the process of pressing with a plunger with that of blowing by compressed air. The neck of the bottle is first formed by the plunger, and the body is subsequently blown by compressed air admitted through the plunger. A sufficient weight of molten glass to form a bottle is gathered and placed in a funnel-shaped vessel which serves as a measure, and gives access to the mould which shapes the outside of the neck. A plunger is forced upwards into the glass in the neck-mould and forms the neck. The funnel is removed, and the plunger, neck-mould and the mass of molten glass attached to the neck are inverted. A bottle mould rises and envelops the mass of molten glass. Com- pressed air admitted through the plunger forces the molten glass to take the form of the bottle mould and completes the bottle.

In the case of the machine patented by Michael Owens of Toledo, U.S.A., for making tumblers, lamp-chimneys, and other goods of similar character, the manual operations required are

(1) gathering the molten glass at the end of a blowing iron;

(2) placing the blowing iron with the glass attached to it in the machine; (3) removing the blowing iron with the blown vessel attached. Each machine (fig. 19) consists of a revolving table carrying five or six moulds. The moulds are opened and closed by cams actuated by compressed air. As soon as a blowing iron is in connexion with an air jet, the sections of the mould

Fig. 19. — Owens's Glass-blowing Machine. g,g,g, Blowing-irons.

fashioned processes of bottle making. The mould is in two pieces hinged together; it is heated and the inner surface is rubbed over with finely powdered plumbago. When the glass is being blown in the mould the blowing iron is twisted round and round so that the finished bulb may not be marked by the joint of the mould.

III. Mechanically Pressed Glass. (A) Plate-glass. — The glass popularly known as " plate-glass " is made by casting and rolling. The following are typical analyses:

Si0 2 .

CaO.

Na 2 0.

Al 2 O s .

Fe 2 O s .

French . English .

71-80 70-64

15-7°

16-27

II-IO

n-47

1-26 0-70

0-14% 0-49%

The raw materials for the production of plate-glass are chosen with great care so as to secure a product as free from colour as possible,

since the relatively great thickness of the sheets

would render even a faint tint conspicuous. The substances employed are the same as those used for the manufacture of sheet-glass, viz. pure sand, a pure form of carbonate of lime, and sulphate of soda, with the addition of a suitable proportion of carbon in the form of coke, charcoal or anthracite coal.

The glass to be used for the production of plate is universally melted in pots or crucibles and not in open tank furnaces. When the glass is completely melted and ” fine,” i.e. free from bubbles, it is allowed to cool down to a certain extent so as to become viscous or pasty. The whole pot, with its contents of viscous glass, is then removed bodily from the furnace by means of huge tongs and is transported to a crane, which grips the pot, raises it, and ultimately tips it over so as to pour the glass upon the slab of the rolling-table. In most modern works the greater part of these operations, as well as the actual rolling of the glass, is carried out by mechanical means, steam power and subsequently electrical power having been successfully applied to this purpose; the handling of the great weights of glass required for the largest sheets of plate-glass which are produced at the present time would, indeed, be impossible without the aid of machinery. The casting-table usually con- sists of a perfectly smooth cast-iron slab, frequently built up of a number of pieces carefully fitted together, mounted upon a low, massive truck running upon rails, so that it can be readily moved to any desired position in the casting-room. The viscous mass having been thrown on the casting-table, a large and heavy roller passes over it and spreads it out into a sheet. Rollers up to 5 tons in weight are employed and are now generally driven by power. The width of the sheet or plate is regulated by moving guides which are placed in front of the roller and are pushed along by it, while its thickness is regulated by raising or lowering the roller relatively to the surface of the table. Since the surfaces produced by rolling have subsequently to be ground and polished, it is essential that the glass should leave the rolling-table with as smooth a surface as possible, so that great care is required in this part of the process. It is, however, equally important that the glass as a whole should be flat and remains flat during the process of gradual cooling (annealing), otherwise great thicknesses of glass would have to be ground away at the pro- jecting parts of the sheet. The annealing process is therefore carried out in a manner differing essentially from that in use for any

other variety of flat glass and nearly resembling that used for optical glass. The rolled sheet is left on the casting- table until it has set sufficiently to be pushed over a flat iron plate without risk of distortion; meanwhile the table has been placed in front of the opening of one of the large annealing kilns and the slab of glass is carefully pushed into the kiln. The annealing kilns are large fire-brick chambers of small height but with sufficient floor area to accommodate four or six large slabs, and the slabs are placed directly upon the floor of the kiln, which is built up of carefully dressed blocks of burnt fire- clay resting upon a bed of sand; in order to avoid any risk of working or buckling in this floor these blocks are set slightly apart and thus have room to expand freely when heated. Before the glass is introduced, the annealing kiln is heated to dull red by means of coal fires in grates which are provided at the ends or sides of the kiln for that purpose. When the floor of the kiln has been covered with slabs of glass the opening is carefully built up and luted with fire-bricks and fire-clay, and the whole is then allowed to cool. In the walls and floor of the kiln special cooling channels or air passages are provided and by gradually opening these to atmospheric circulation the cooling is con- siderably accelerated while a very even distribution of tempera- ture is obtained; by these means even the largest slabs can now be cooled in three or four days and are nevertheless sufficiently well annealed to be free from any serious internal stress. From the annealing kiln the slabs of glass are transported to the cutting room, where they are cut square, defective slabs being rejected or cut down to smaller sizes. The glass at this stage has a comparatively dull surface and this must now be replaced by that brilliant and perfectly polished surface which is the chief

beauty of this variety of glass. The first step in this process is that of grinding the surface down until all projections are removed and a close approximation to a perfect plane is obtained. This operation, like all the subsequent steps in the polishing of the glass, is carried out by powerful machinery. By means of a rotating table either two surfaces of glass, or one surface of glass and one of cast iron, are rubbed together with the inter- position of a powerful abrasive such as sand, emery or carbor- undum. The machinery by which this is done has undergone numerous modifications and improvements, all tending to pro- duce more perfectly plane glass, to reduce the risk of breakage, and to lessen the expenditure of time and power required per sq. yd. of glass to be worked. It is impossible to describe this machinery within the limits of this article, but it is notable that the principal difficulties to be overcome arise from the necessity of providing the glass with a perfectly continuous and unyielding support to which it

can be firmly attached but from which it can be detached without undue difficulty.

When the surface of the glass has been ground down to a plane, the surface itself is still ” grey,” i.e. deeply pitted with the marks of the abrasive used in grinding it down; these marks are re- moved by the process of smoothing, in which the surface is successively ground with abrasives of gradually increasing fine- ness, leaving ultimately a very smooth and very minutely pitted ” grey ” surface. This smooth surface is then brilliantly polished by the aid of friction with a rubbing tool covered with a soft substance- like leather or felt and fed with a polishing material, such as rouge. A few strokes of such a rubber are sufficient to produce a decidedly ” polished ” appearance, but prolonged rubbing under considerable pressure and the use of a polishing paste of a proper consistency are required in order to remove the last trace of pitting from the surface. This entire process must, obviously, be applied in turn to each of the two surfaces of the slab of glass. Plate-glass is manufactured in this manner in thicknesses varying from ˆg- in. to 1 in. or even more, while single sheets are produced measuring more than 27 ft. by 13 ft. ” Rolled Plate ” and figured ” Rolled Plate.” — Glass for this purpose, with perhaps the exception of the best white and tinted varieties, is now universally produced in tank-furnaces, similar in a general way to those used for sheet-glass, except that the furnaces used for ” rolled plate ” glass of the roughest kinds do not need such minutely careful attention and do not work at so high a temperature. The composition of these glasses is very similar to that of sheet-glass, but for the ordinary kinds of rolled plate much less scrupulous selection need be made in the choice of raw materials, especially of the sand.

The glass is taken from the furnace in large iron ladles, which are carried upon slings running on overhead rails; from the ladle the glass is thrown upon the cast-iron bed of a rolling-table; and is rolled into sheet by an iron roller, the process being similar to that employed in making plate-glass, but on a smaller scale. The sheet thus rolled is roughly trimmed while hot and soft, so as to remove those portions of glass which have been spoilt by immediate contact with the ladle, and the sheet, still soft, is pushed into the open mouth of an annealing tunnel or ” lear,” down which it is carried by a system of moving grids.

The surface of the glass produced in this way may be modified by altering the surface of the rolling-table; if the table has a smooth surface, the glass will also be more or less smooth, but much dented and buckled on the surface and far from having the smooth face of

blown sheet. If the table has a pattern engraved upon it the glass will show the same pattern in relief, the most frequent pattern of the kind being either small parallel ridges or larger ribs crossing to form a lozenge pattern.

The more elaborate patterns found on what is known as ” figure rolled plate ” are produced in a somewhat different manner; the glass used for this purpose is considerably whiter in colour and much softer than ordinary rolled plate, and instead of being rolled out on a table it is produced by rolling between two moving rollers from which the sheet issues. The pattern is impressed upon the soft sheet by a printing roller which is brought down upon the glass as it leaves the main rolls. This

glass shows a pattern in high relief and gives a very brilliant effect.

The various varieties of rolled plate-glass are now produced for- some purposes with a reinforcement of wire netting which is embedded in the mass of the glass. The wire gives the glass great advantages in the event of fracture from a blow or from fire, but owing to the difference in thermal expansion between wire and glass, there is a strong tendency for such ” wired glass ” to crack spontaneously.

Patent Plate-glass. — This term is applied to blown sheet-glass, whose surface has been rendered plane and brilliant by a process of grinding and polishing. The name ” patent plate ” arose from the fact that certain patented devices originated by James Chance of Birmingham first made it possible to polish com- paratively thin glass in this way.

(B) Pressed Glass. — The technical difference between pressed and moulded glass is that moulded glass-ware has taken its form from a mould under the pressure of a workman’s breath, or of com- pressed air, whereas pressed glass-ware has taken its form from a mould under the pressure of a plunger. Moulded glass receives

the form of the mould on its in- terior as well as on its exterior surface. In pressed glass the exterior surface is modelled by the mould, whilst the interior surface is modelled by the plunger (fig. 20).

The process of pressing glass was introduced to meet the demand for cheap table-ware. Pressed glass, which is necessarily thick and service- able, has well met this legitimate de- mand, but it also caters for the

less legitimate taste for cheap imitations of hand-cut glass. An American writer has expressed his satisfaction that the day-labourer can now have on his table at a nominal price glass dishes of elaborate design, which only an expert can dis- tinguish from hand-cut crystal. The deceptive effect is in some cases heightened by cutting over and polishing by hand the pressed surface.

The glass for pressed ware must be colourless, and, when molten, must be sufficiently fluid to adapt itself readily to the intricacies of the moulds, which are often exceedingly complex. The materials employed are sand, sulphate of soda, nitrate of soda, calcspar and in some works carbonate of barium. The following is an analysis of a specimen of English pressed glass ; SiO,, 70-68%; Na 2 0, 18-38%; CaO, 5-45%; BaO, 4-17%; AI2O3, 0-33%; and Fe 3 3 , 0-20%. Tanks and pots are both used for melting the glass. The moulds are made of cast iron. They are usually in two main pieces, a base and ah upper part or collar of hinged sections. The plunger is generally worked by a hand lever. The operator knows by touch when the plunger has pressed the glass far enough to exactly fill the mould. Although the moulds are heated, the surface of the glass is always slightly ruffled by contact with the mould. For this reason every piece of pressed glass-ware, as soon as it is liberated from the mould, is exposed to a sharp heat in a small subsidiary furnace in order that the ruffled surface may be removed by melting. These

Fig. 20. — Modern American Glass-Press.

small furnaces are usually heated by an oil spray under the pressure of steam or compressed air.

See Antonio Neri, Ars vitraria, cum Merritti observationibus (Amsterdam, 1668) (Neri's work was translated into English by C. Merritt in 1662, and the translation, The Art of making Glass, was privately reprinted by Sir T. Phillipps, Bart., in 1826); Johann Kunkel, Voltstdndige Glasmacher-Kunst (Nuremberg, 1785); Apsley Pellatt, Curiosities of Glass-making (London, 1849); A. Sauzay, Marvels of Glass-making (from the French) (London, 1869); G. Bontemps, Guide du verrier (Paris, 1868); E. Peligot, Le Verre, son histoire, sa fabrication (Paris, 1878); W. Stein, " Die Glasfabri- kation," in Bollcy's Technologie, vol. iii. (Brunswick, 1862); H. E. Benrath, Die Glasfabrikation (Brunswick, 1875); J. Falck and L. Lobmeyr, Die Glasindustrie (Vienna, 1875); D. H. Hovestadt, Jenaer Glas (Jena, 1900 ; Eng. trans, by J. D. and A. Everett, Macmillan, 1907); J.

Henrivaux, Le Verre et le cristal (Paris, 1887), and La Verrerie au XX" siecle (1903) ; Chance, Harris and Powell, Principles of Glass-making (London, 1883); Moritz V. Rohr, Theorie und Geschichte der photographischen Objektive (Berlin, 1899); C. E. Guillaume, Traite pratique de la thermometrie de precision (Paris, 1889); Louis Coffignal, Verres et emaux (Paris, 1900); R. Gerner, Die Glasfabrikation (Vienna, 1897) ; C. Wetzel, Herstellung grosser Glaskorper (Vienna, 1900) ; C. Wetzel, Bearbeitung von Glaskorpern (Vienna, 1901); E. Tscheuschner, Handbuch der Glasfabrikation (Weimar, 1885); R. Dralle, Anlage und Betrieb der Glasfabriken (Leipzig, 1886); G. Tammann, Kristallisieren und Schmelzen (Leipzig, 1903); W. Rosenhain, " Some Properties of Glass," Trans. Optical Society (London, 1903), " Possible Directions of Progress in Optical Glass," Proc. Optical Convention (London, 1905) and Glass Manufacture (London, 1908); Introduction to section 1, Catalogue of the Optical Convention (London, 1905). ,* (H. J. P. ; W. Rn.)

History of Glass Manufacture.

The great similarity in form, technique and decoration of the earliest known specimens of glass-ware suggests that the craft of glass-making originated from a single centre. It has been generally assumed that Egypt was the birthplace of the glass industry. It is true that many conditions existed in Egypt favourable to the development of the craft. The Nile supplied a waterway for the conveyance of fuel and for the distribution of the finished wares. Materials were available providing the essential ingredients of glass. The Egyptian potteries afforded experience in dealing with vitreous glazes and vitreous colours, and from Egyptian alabaster-quarries veined vessels were wrought, which may well have suggested the decorative arrange- ment of zigzag lines (see Plate I. figs. 1, 2, 4 d) so frequently found on early specimens of glass-ware. In Egypt, however, no traces have at present been found of the industry in a rudi- mentary condition, and the vases which have been classified as " primitive " bear witness to an elaboration of technique far in advance of the experimental period. The earliest specimens of glass-ware which can be definitely claimed as Egyptian productions, and the glass manufactory discovered by Dr Flinders Petrie at Tell el Amarna, belong to the period of the XVIIIth dynasty. The comparative lateness of this period makes it difficult to account for the wall painting at Beni Hasan, which accurately represents the process of glass-blowing, and which is attributed to the period of the Xlth dynasty. Dr Petrie surmounts the difficulty by saying that the process depicted is not glass-blowing, but some metallurgical process in which reeds were used tipped with lumps of clay. It is possible that the picture does not represent Egyptian glass-blowers, but is a

traveller's record of the process of glass-blowing seen in some foreign or subject country. The scarcity of specimens of early glass-ware actually found in Egypt, and the advanced technique of those which have been found, lead to the supposition that glass-making was exotic and not a native industry. The tradition, recorded by Pliny (Nat. Hist, xxxvi. 65), assigns the discovery of glass to Syria, and the geographical position of that country, its forests as a source of fuel, and its deposits of sand add probability to the tradition. The story that Phoenician merchants found a glass-like substance under their cooking pots, which had been supported on blocks of natron, need not be discarded as pure fiction. The fire may well have caused the natron, an impure form of carbonate of soda, to combine with the surrounding sand to form silicate of soda, which, although not a permanent glass, is sufficiently glass-like to suggest the

possibility of creating a permanent transparent material. More- over, Pliny (xxxvi. 66) actually records the discovery which effected the conversion of deliquescent silicate of soda into permanent glass. The words are " Coeptus addi magnes lapis." There have been many conjectures as to the meaning of the words " magnes lapis." The material has been considered by some to be magnetic iron ore and by others oxide of manganese. Oxides of iron and manganese can only be used in glass manu- facture in comparatively small quantities for the purpose of colouring or neutralizing colour in glass, and their introduction would not be a matter of sufficient importance to be specially recorded. In chapter 25 of the same book Pliny describes five varieties of " magnes lapis." One of these he says is found in magnesia, is white in colour, does not attract iron and is like pumice stone. This variety must certainly be magnesian limestone. Magnesian limestone mixed and fused with sand and an alkaline carbonate produces a permanent glass. The scene of the discovery of glass is placed by Pliny on the banks of the little river Belus, under the heights of Mount Carmel, where sand suitable for glass-making exists and wood for fuel is abundant. In this neighbourhood fragments and lumps of glass are still constantly being dug up, and analysis proves that the glass contains a considerable proportion of magnesia. The district was a glass-making centre in Roman times, and it is probable that the Romans inherited and perfected an indigenous industry of remote antiquity. Pliny has so accurately recorded the stages by which a permanent glass was developed that it may be assumed that he had good reason for claiming for Syria the discovery of glass. Between

Egypt and Syria there was frequent intercourse both of conquest and commerce. It was customary for the victor after a successful raid to carry off skilled artisans as captives. It is recorded that Tahutmes III. sent Syrian artisans to Egypt. Glass-blowers may have been amongst their captive craftsmen, and may have started the industry in Egypt. The claims of Syria and Egypt are at the present time so equally balanced that it is advisable to regard the question of the birthplace of the glass industry as one that has still to be settled.

The “primitive” vessels which have been found in Egypt are small in size and consist of columnar stibium jars, flattened bottles and amphorae, all decorated with zigzag lines, tiny wide-mouthed vases on feet and minute jugs. The vessels of later date which have been found in considerable quantities, principally in the coast towns and islands of the Mediterranean, are amphorae and alabastra, also decorated with zigzag lines. The amphorae (Plate I. figs. 1 and 2) terminate with a point, or with an unfinished extension from the terminal point, or with a knob. The alabastra have short necks, are slightly wider at the base than at the shoulder and have rounded bases. Dr Petrie has called attention to two technical peculiarities to be found in almost every specimen of early glass-ware. The inner surface is roughened (Plate I. fig. 4 c), and has particles of sand adhering to it, as if the vessel had been filled with sand and subjected to heat, and the inside of the neck has the impres- sion of a metal rod (Plate I. fig. 4 a), which appears to have been extracted from the neck with difficulty. From this evidence Dr Petrie has assumed that the vessels were not blown, but formed upon a core of sandy paste, modelled upon a copper rod, the rod being the core of the neck (see Egypt: Art and Archaeology). The evidence, however, hardly warrants the abandonment of the simple process of blowing in favour of a process which is so difficult that it may almost be said to be impossible, and of which there is no record or tradition except in connexion with the manufacture of small beads. The technical difficulties to which Dr Petrie has called attention seem io admit of a somewhat less heroic explanation. A modern glass- blower, when making an amphora-shaped vase, finishes the base first, fixes an iron rod to the finished base with a seal of glass, severs the vase from the blowing iron, and finishes the mouth, whilst he holds the vase by the iron attached to its base. The ” primitive ” glass-worker reversed this process. Having blown the body of the vase, he finished the mouth and neck part, and

fixed a small, probably hollow, copper rod inside the finished neck by pressing the neck upon the rod (Plate I. fig. 4 b). Having severed the body of the vase from the blowing iron, he heated and closed the

fractured base, whilst holding the vase by means of the rod fixed in the neck. Nearly every specimen shows traces of the pressure of a tool on the outside of the neck, as well as signs of the base having been closed by melting. Occasion- ally a knob or excrescence, formed by the residue of the glass beyond the point at which the base has been pinched together, remains as a silent witness of the process.

If glass-blowing had been a perfectly new invention of Graeco-Egyptian or Roman times, some specimens illustrating the transition from core-moulding to blowing must have been discovered. The absence of traces of the transition strengthens the supposition that the revolution in technique merely consisted in the discovery that it was more convenient to finish the base of a vessel before its mouth, and such a revolution would leave no trace behind. The roughened inner surface and the adhering particles of sand may also be accounted for. The vessels, especially those in which many differently coloured glasses were incorporated, required prolonged annealing. It is probable that when the metal rod was withdrawn the vessel was filled with sand, to prevent collapse, and buried in heated ashes to anneal. The greater the heat of the ashes the more would the sand adhere to and impress the inner surface of the vessels. The decoration of zigzag lines was probably applied directly after the body of the vase had been blown. Threads of coloured molten glass were spirally coiled round the body, and, whilst still viscid, were dragged into zigzags with a metal hook.

Egypt. — The glass industry flourished in Egypt in Graeco- Egyptian and Roman times. All kinds of vessels were blown, both with and without moulds, and both moulding and cutting were used as methods of decoration. The great variety of these vessels is well shown in the illustrated catalogue of Graeco- Egyptian glass in the Cairo museum, edited by C. C. Edgar.

Another species of glass manufacture in which the Egyptians would appear to have been peculiarly skilled is the so-called mosaic glass, formed by the union of rods of various colours in such a manner as to form a pattern; the rod so formed was then reheated and drawn out until reduced to a very small size, 1 sq. in. or less, and divided into tablets by being cut trans- versely, each of these tablets presenting the pattern traversing its substance and visible on each face. This process was no doubt first practised in Egypt, and is never seen in such per- fection as in objects of a decidedly Egyptian character. Very beautiful pieces of ornament of an architectural character are met with, which probably once served as decorations of caskets or other small pieces of furniture or of trinkets; also tragic masks, human faces and birds.

Some of the last-named are represented with such truth of colouring and delicacy of detail that even the separate feathers of the wings and tail are well distinguished, although, as in an example in the British Museum, a human-headed hawk, the piece which contains the figure may not exceed J in. in its largest dimension. Works of this description probably belong to the period when Egypt passed under Roman domination, as similar objects, though of inferior delicacy, appear to have been made in Rome.

Assyria. — Early Assyrian glass is represented in the British Museum by a vase of transparent greenish glass found in the north-west palace of Nineveh. On one side of this a lion is engraved, and also a line of cuneiform characters, in which is the name of Sargon, king of Assyria, 722 B.C. Fragments of coloured glasses were also found there, but our materials are too scanty to enable us to form any decided opinion as to the degree of perfection to which the art was carried in Assyria. Many of the specimens discovered by Layard at Nineveh have all the appearance of being Roman, and were no doubt derived from the Roman colony, Niniva Claudiopolis, which occupied the same site.

Roman Glass. — In the first centuries of our era the art of glass-making was developed at Rome and other cities under Roman rule in a most remarkable manner, and it reached a point of

GLASS

Plate I.

XII. 08.

Fig. 7.

Fig. g.

Plate II.

GLASS

Fig, ii.— TABLE GLASS. Designed by T. G. Jackson in 1ˆ70

Fig. 12— TABLE GLASS. Designed for Wm. Morris about 1872 by Philip Webb.

■ ; ■ .’■.;■.

fife: – ■•:,&•£$

:

i : “ff ; !^^^Bv 5

*■’■’■ | .•”•

&¥~ ■’■’•“z^’-$M0***&i^ •

^SllllllSflf

i

-

{ft*

K >

n^. # j

► /”’

Fig. 13.— TIFFANY GLASS.

Fig. 14— WHITEFRIARS GLASS, 1906.

excellence which in some respects has never been excelled or even perhaps equalled. It may appear a somewhat exaggerated assertion that glass was used for more purposes, and in one sense more extensively, by the Romans of the imperial period than by ourselves in the present day; but it is one which can be borne out by evidence. It is true that the use of glass for windows was only gradually extending itself at the time when Roman civilization sank under the torrent of German and Hunnish barbarism, and that its employment for optical instruments was only known in a rudimentary stage; but for domestic purposes, for architectural decoration and for personal orna- ments glass was unquestionably much more used than at the present day. It must be remembered that the Romans possessed no fine procelain decorated with lively colours and a beautiful glaze; Samian ware was the most decorative kind of pottery which was then made. Coloured and ornamental glass held among them much the same place for table services, vessels for toilet use and the like, as that held among us by porcelain. Pliny (Nat. Hist, xxxvi. 26, 67) tells us that for drinking

vessels it was even preferred to gold and silver.

Glass was largely used in pavements, and in thin plates as a coating for walls. It was used in windows, though by no means exclusively, mica, alabaster and shells having been also em- ployed. Glass, in flat pieces, such as might be employed for windows, has been found in the ruins of Roman houses, both in England and in Italy, and in the house of the faun at Pompeii a small pane in a bronze frame remains. Most of the pieces have evidently been made by casting; but the discovery of fragments of sheet-glass at Silchester proves that the process of making sheet -glass was known to the Romans. When the window openings were large, as was the case in basilicas and other public buildings, and even in houses, the pieces of glass were, doubtless, fixed in pierced slabs of marble or in frames of wood or bronze. The Roman glass-blowers were masters of all the ordinary methods of manipulation and decoration. Their craftsmanship is proved by the large cinerary urns, by the jugs with wide, deeply ribbed, scientifically fixed handles, and by vessels and vases as elegant in form and light in weight as any that have been since produced at Murano. Their moulds, both for blowing hollow vessels and for pressing ornaments, were as perfect for the purposes for which they were intended as those of the present time. Their decorative cutting (Plate I. figs. 5 and 6), which took the form of simple, incised lines, or bands of shallow oval or hexagonal hollows, was more suited to the material than the deep prismatic cutting of comparatively recent times.

The Romans had at their command, of transparent colours, blue, green, purple or amethystine, amber, brown and rose; of opaque colours, white, black, red, blue, yellow, green and orange. There are many shades of transparent blue and of opaque blue, yellow and green. In any large collection of fragments it would be easy to find eight or ten varieties of opaque blue, ranging from lapis lazuli to turquoise or to lavender and six or seven of opaque green. Of red the varieties are fewer; the finest is a crimson red of very beautiful tint, and there are various gradations from this to a dull brick red. One variety forms' the ground of a very good imitation of porphyry; and there is a dull semi-transparent red which, when light is passed through it, appears to be of a dull green hue. With these colours the Roman vitrarius worked, either using them singly or blending them in almost every conceivable combination, sometimes, it must be owned, with a rather gaudy and inharmo- nious effect.

The glasses to which the Venetians gave the name " mille fiori " were formed by arranging side by side sections of glass"' cane, the canes themselves being built up of differently coloured rods of glass, and

binding them together by heat. A vast quantity of small cups and paterae were made by this means in patterns which bear considerable resemblance to the surfaces of madrepores. In these every colour and every shade of colour seem to have been tried in great variety of combination with effects more or less pleasing, but transparent violet or purple

appears to have been the most common ground colour. Although most of the vessels of this mille fiori glass were small, some were made as large as 10 in. in diameter. Imitations of natural stones were made by stirring together in a crucible glasses of different colours, or by incorporating fragments of differently coloured glasses into a mass of molten glass by rolling. One variety is that in which transparent brown glass is so mixed with opaque white and blue as to resemble onyx. This was sometimes done with great success, and very perfect imitations of the natural stone were produced. Sometimes purple glass is used in place of brown, probably with the design of imitating the precious murrhine. Imitations of porphyry, of serpentine, and of granite are also met with, but these were used chiefly in pavements, and for the decoration of walls, for which pur- poses the onyx-glass was likewise employed.

The famous cameo glass was formed by covering a mass of molten glass with one or more coatings of a differently coloured glass. The usual process was to gather, first, a small quantity of opaque white glass; to coat this with a thick layer of trans- lucent blue glass; and, finally, to cover the blue glass with a coating of the white glass. The outer coat was then removed from that portion which was to constitute the ground, leaving the white for the figures, foliage or other ornamentation; these were then sculptured by means of the gem-engraver's tools. Pliny no doubt means to refer to this when he says (Nat. Hist. xxxvi. 26. 66), " aliud argenti modo caelatur," contrasting it with the process of cutting glass by the help of a wheel, to which he refers in the words immediately preceding, " aliud torno teritur."

The Portland or Barberini vase in the British Museum is the finest example of this kind of work which has come down to us, and was entire until it was broken into some hundred pieces by a madman. The pieces, however, were joined together by Mr Doubleday with extraordinary skill, and the beauty of design and execution may still be appreciated. The two other most remarkable examples of this cameo glass are an amphora at Naples and the Auldjo vase. The amphora measures 1 ft. f in. in height, 1 ft. 7J in. in circumference; it is shaped like the earthern amphoras with a foot far too small to

support it, and must no doubt have had a stand, probably of gold; the greater part is covered with a most exquisite design of garlands and vines, and two groups of boys gathering and treading grapes and playing on various instruments of music; below these is a line of sheep and goats in varied attitudes. The ground is blue and the figures white. It was found in a house in the Street of Tombs at Pompeii in the year 1839, and is now in the Royal Museum at Naples. It is well engraved in Richardson's Studies of Ornamental Design. The Auldjo vase, in the British Museum, is an oenochoe about 9 in. high; the ornament consists mainly of a most beautiful band of foliage, chiefly of the vine, with bunches of grapes; the ground is blue and the ornaments white; it was found at Pompeii in the house of the faun. It also has been engraved by Richardson. The same process was used in producing large tablets, employed, no doubt, for various decorative purposes. In the South Kensington Museum is a fragment of such a tablet or slab; the figure, a portion of which remains, could not have been less than about 14 in. high. The ground of these cameo glasses is most commonly transparent blue, but sometimes opaque blue, purple or dark brown. The superimposed layer, which is sculptured, is generally opaque white. A very few specimens have been met with in which several colours are employed.

At a long interval after these beautiful objects come those vessels which were ornamented either by means of coarse threads trailed over their surfaces and forming rude patterns, or by coloured enamels merely placed on them in lumps; and these, doubtless, were cheap and common wares. But a modification of the first-named process was in use in the 4th and succeeding centuries, showing great ingenuity and manual dexterity, — that, namely, in which the added portions of glass are united to the body of the cup, not throughout, but only at points, and then shaped either by the wheel or by the hand (Plate I. fig. 3).' The

attached portions form in some instances inscriptions, as on a cup found at Strassburg, which bears the name of the emperor Maximian (a.d. 286-310), on another in the Vereinigte Samm- lungen at Munich, and on a third in the Trivulzi collection at Milan, where the cup is white, the inscription green and the network blue. Probably, however, the finest example is a situla, io| in. high by 8 in. wide at the top and 4 in. at the bottom, preserved in the treasury of St Mark at Venice. This is of glass of a greenish hue; on the upper part is represented, in

relief, the chase of a lion by two men on horseback accompanied by dogs; the costume appears to be Byzantine rather than Roman, and the style is very bad. The figures are very much undercut. The lower part has four rows of circles united to the vessel at those points alone where the circles touch each other. All the other examples have the lower portion covered in like manner by a network of circles standing nearly a quarter of an inch from the body of the cup. An example connected with the specimens just described is the cup belonging to Baron Lionel de Rothschild; though externally of an opaque greenish colour, it is by transmitted light of a deep red. On the outside, in very high relief, are figures of Bacchus with vines and panthers, some portions being hollow from within, others fixed on the exterior. The changeability of colour may remind us of the ” calices versicolores ” which Hadrian sent to Servianus.

So few examples of glass vessels of this period which have been painted in enamel have come down to us that it has been questioned whether that art was then practised; but several specimens have been described which can leave no doubt on the point; decisive examples are afforded by two cups found at Vaspelev, in Denmark, engravings of which are published in the Annaler for Nordisk Oldkyndeghed for 1861, p. 305. These are small cups, 3 in. and 23 in. high, 3! in. and 3 in. wide, with feet and straight sides; on the larger are a lion and a bull, on the smaller two birds with grapes, and on each some smaller ornaments. On the latter are the letters DVB. R. The colours are vitrified and slightly in relief; green, blue and brown may be distinguished. They are found with Roman bronze vessels and other articles.

The art of glass-making no doubt, like all other art, deteriorated during the decline of the Roman empire, but it is probable that it continued to be practised, though with constantly decreasing skill, not only in Rome but in the provinces. Roman technique was to be found in Byzantium and Alexandria, in Syria, in Spain, in Germany, France and Britain.

Early Christian and Byzantine Glass. — The process of embed- ding gold and silver leaf between two layers of glass originated as early as the 1st century, probably in Alexandria. The process consisted in spreading the leaf on a thin film of blown glass and pressing molten glass on to the leaf so that the molten glass cohered with the film of glass through the pores of the metallic leaf. If before this application of the molten glass the metallic leaf, whilst resting on the thin film of blown glass, was etched with a sharp point, patterns, emblems, inscriptions and pictures could be embedded and rendered permanent

by the double coating of glass. The plaques thus formed could be reheated and fashioned into the bases of bowls and drinking vessels. In this way the so-called ” fondi d’oro “of the catacombs in Rome were made. They are the broken bases of drinking vessels containing inscriptions, emblems, domestic scenes and portraits etched in gold leaf. Very few have any reference to Christianity, but they served as indestructible marks for indicating the position of interments in the catacombs. The fondi d’oro suggested the manufacture of plaques of gold which could be broken up into tesserae for use in mosaics.

Some of the Roman artificers in glass no doubt migrated* to Constantinople, and it is certain that the art was practised there to a very great extent during the middle ages. One of the gates near the port took its name from the adjacent glass houses. St Sofia when erected by Justinian had vaults covered with mosaics and immense windows filled with plates of glass fitted into pierced marble frames; some of the plates, 7 to 8 in. wide and 9 to 10 in. high, not blown but cast, which

are in the windows may possibly date from the building of the church. It is also recorded that pierced silver disks were sus- pended by chains and supported glass lamps ” wrought by fire.” Glass for mosaics was also largely made and exported. In the 8th century, when peace was made between the caliph Walid and the emperor Justinian II., the former stipulated for a quantity of mosaic for the decoration of the new mosque at Damascus, and in the 10th century the materials for the decora- tion of the niche of the kibla at Cordova were furnished by Romanus II. In the nth century Desiderius, abbot of Monte Casino, sent to Constantinople for workers in mosaic.

We have in the work of the monk Theophilus, Diversarum arlium schedula, and in the probably earlier work of Eraclius, about the nth century, instructions as to the art of glass-making in general, and also as to the production of coloured and enamelled vessels, which these writers speak of as being practised by the Greeks. The only entire enamelled vessel which we can con- fidently attribute to Byzantine art is a small vase preserved in the treasury of St Mark’s at Venice. This is decorated with circles of rosettes of blue, green and red enamel, each surrounded by lines of gold; within the circles are little figures evidently suggested by antique originals, and precisely like similar figures found on carved ivory boxes of Byzantine origin dating from the nth or 12th century. Two inscriptions in Cufic characters surround the vase, but they, it would seem, are merely ornamental and destitute of meaning. The presence of these inscriptions may perhaps lead to the inference that the vase was made in Sicily, but by Byzantine

workmen. The double-handled blue-glass vase in the British Museum, dating from the 5th century, is probably a chalice, as it closely resembles the chalices re- presented on early Christian monuments.

Of uncoloured glass brought from Constantinople several examples exist in the treasury of St Mark's at Venice, part of the plunder of the imperial city when taken by the crusaders in 1204. The glass in all is greenish, very thick, with many bubbles, and has been cut with the wheel; in some instances circles and cones, and in one the outlines of the figure of a leopard, have been left standing up, the rest of the surface having been laboriously cut away. The intention would seem to have been to imitate vessels of rock crystal. The so-called " Hedwig " glasses may also have originated in Constantinople. These are small cups deeply and rudely cut with conventional representa- tions of eagles, lions and griffins. Only nine specimens are known. The specimen in the Rijks Museum at Amsterdam has an eagle and two lions. The specimen in the Germanic Museum at Nuremberg has two lions and a griffin.

Saracenic Glass. — The Saracenic invasion of Syria and Egypt did not destroy the industry of glass-making. The craft survived and flourished under the Saracenic regime in Alexandria, Cairo, Tripoli, Tyre, Aleppo and Damascus. In inventories of the 14th century both in England and in France mention may frequently be found of glass vessels of the manufacture of Damascus. A writer in the early part of the 15th century states that " glass- making is an important industry at IJaleb (Aleppo)." Edward Dillon (Glass, 1902) has very properly laid stress on the import- ance of the enamelled Saracenic glass of the 13th, 14th and 15th centuries, pointing out that, whereas the Romans and Byzantine Greeks made some crude and ineffectual experiments in enamelling, it was under Saracenic influence that the processes of enamelling and gilding on glass vessels were perfected. An analysis of the glass of a Cairene mosque lamp shows that it is a soda-lime glass and contains as much as 4 % of magnesia. This large proportion of magnesia undoubtedly supplied the stability required to withstand the process of enamelling. The enamelled Saracenic glasses take the form of flasks, vases, goblets, beakers and mosque lamps. The enamelled decoration on the lamps is restricted to lettering, scrolls and conventional foliage; on other objects figure-subjects of all descriptions are freely used. C. H. Read has pointed out a curious feature in the construction of the enamelled beakers. The base is double but the inner lining has an opening in the centre. Dillon has suggested that this central recess may have served to support a wick. It is possible, however

that it served no useful purpose, but that the construction is a survival from the manufacture of vessels with fondi d'oro. The bases containing the embedded gold leaf must have been welded to the vessels to which they belonged, in the same way as the bases are welded to the Saracenic beakers. The enamelling process was probably introduced in the early part of the 13th century; most of the enamelled mosque lamps belong to the 14th century.

Venetian Glass. — Whether refugees from Padua, Aquileia or other Italian cities carried the art to the lagoons of Venice in the 5th century, or whether it was learnt from the Greeks of Constantinople at a much later date, has been a disputed question. It would appear not improbable that the former was the case, for it must be remembered that articles formed of glass were in the later days of Roman civilization in constant daily use, and that the making of glass was carried on, not as now in large establishments, but by artisans working on a small scale. It seems certain that some knowledge of the art was preserved in France, in Germany and in Spain, and it seems improbable that it should have been lost in that archipelago, where the traditions of ancient civilization must have been better preserved than in almost any other place. In 523 Cassiodorus writes of the " innumerosa navigia " belonging to Venice, and where trade is active there is always a probability that manufactures will flourish. However this may be, the earliest positive evidence of the existence at Venice of a worker in glass would seem to be the mention of Petrus Flavianus, phiolarius, in the ducale of Vitale Falier in the year 1090. In 1224 twenty-nine persons are mentioned as friolari {i.e. phiolari), and in the same century " mariegole," or codes of trade regula- tions, were drawn- up (Monografia della vetraria Veneziana e Muranese,p. 219). The manufacture had then no doubt attained considerable proportions: in 1268 the glass- workers became an incorporated body; in their processions they exhibited decanters, scent-bottles and the like; in 1279 they made, among other things, weights and measures. In the latter part of this century the glass-houses were almost entirely transferred to Murano. Thenceforward the manufacture continued to grow in importance; glass vessels were made in large quantities, as well as glass for windows. The earliest example which has as yet been described — a cup of blue glass, enamelled and gilt — is, however, not earlier than about 1440. A good many other examples have been preserved which may be assigned to the same century: the earlier of these bear a resemblance in form to the vessels of silver made in the

west of Europe; in the later an imitation of classical forms becomes apparent. Enamel and gilding were freely used, in imitation no doubt of the much- admired vessels brought from Damascus. Dillon has pointed out that the process of enamelling had probably been derived from Syria, with which country Venice had considerable com- mercial intercourse. Many of the ornamental processes which we admire in Venetian glass were already in use in this century, as that of mille fiori, and the beautiful kind of glass known as ” vitro di trina ” or lace glass. An elaborate account of the processes of making the vitro di trina and the vasi a reticelli (Plate I., fig. 7) is given in Bontemps’s Guide du verrier, pp. 602-612. Many of the examples of these processes exhibit surprising skill and taste, and are among the most beautiful objects produced at the Venetian furnaces. That peculiar kind of glass usually called schmelz, an imperfect imitation of calcedony, was also made at Venice in the 15th century. Avan- turine glass, that in which numerous small particles of copper are diffused through a transparent yellowish or brownish mass, was not invented until about 1600.

The peculiar merits of the Venetian manufacture are the- elegance of form and the surprising lightness and thinness of ■ the substance of the vessels produced. The highest perfection with regard both to form and decoration was reached in the 16th century; subsequently the Venetian workmen somewhat abused their skill by giving extravagant forms to vessels, making drinking glasses in the forms of ships, lions, birds, whales and the like.

Besides the making of vessels of all kinds the factories of Murano had for a long period almost an entire monopoly of two other branches of the art — the making of mirrors and of beads. Attempts to make mirrors of glass were made as early as a.d. 13 1 7, but even in the 16th century mirrors of steel were still in use. To make a really good mirror of glass two things are required — a plate free from bubbles and striae, and a method of applying a film of metal with a uniform bright surface free from defects. The principle of applying metallic films to glass seems to have been known to the Romans and even to the Egyptians, and is mentioned by Alexander Neckam in the i2th century, but it would appear that it was not until the 16th century that the process of ” silvering ” mirrors by the use of an amalgam of tin and mercury had been perfected. During the 16th and 17th centuries Venice exported a prodigious quantity of mirrors, but France and England gradually acquired knowledge and skill in the art, and in 1772 only one glass-house at Murano continued to make mirrors.

The making of beads was probably practised at Venice from a very

early period, but the earliest documentary evidence bearing on the subject does not appear to be of earlier date than the 14th century, when prohibitions were directed against those who made of glass such objects as were usually made of crystal or other hard stones. In the 16th century it had become a trade of great importance, and about 1764 twenty-two furnaces were employed in the production of beads. Towards the end of the same century from 600 to 1000 workmen were, it is stated, employed on one branch of the art, that of ornamenting beads by the help of the blow-pipe. A very great variety of patterns was produced; a tariff of the year 1800 contains an enumeration of 562 species and a vast number of sub-species.

The efforts made in France, Germany and England, in the 17th and 18th centuries, to improve the manufacture of glass in those countries had a very injurious effect on the industry of Murano. The invention of colourless Bohemian glass brought in its train the practice of cutting glass, a method of ornamenta- tion for which Venetian glass, from its thinness, was ill adapted. One remarkable man, Giuseppe Briati, exerted himself, with much success, both in working in the old Venetian method and also in imitating the new fashions invented in Bohemia. He was especially successful in making vases and circular dishes of vitro di trina; one of the latter in the Correr collection at Venice, believed to have been made in his glass-house, measures 55 centimetres (nearly 23 in.) in diameter. The vases made by him are as elegant in form as the best of the Cinquecento period, but may perhaps be distinguished by the superior purity and brilliancy of the glass. He also made with great taste and skill large lustres and mirrors with frames of glass ornamented either in intaglio or with foliage of various colours. He obtained a knowledge of the methods of working practised in Bohemia by disguising himself as a porter, and thus worked for three years in a Bohemian glass-house. In 1736 he obtained a patent at Venice to manufacture glass in the Bohemian manner. He died in 1772.

The fall of the republic was accompanied by interruption of trade and decay of manufacture, and in the last years of the 18th and beginning of the 19th century the glass-making of Murano was at a very low ebb. In the year 1838 Signor Bussolin revived several of the ancient processes of glass-working, and this revival was carried on by C. Pietro Biguglia in 1845, and by others, and later by Salviati, to whose successful efforts the modern renaissance of Venetian art glass is principally due.

The fame of Venice in glass-making so completely eclipsed that of other Italian cities that it is difficult to learn much respecting their

progress in the art. Hartshorne and Dillon have drawn attention to the important part played by the little Ligurian town, Altare, as a centre from which glass-workers migrated to all parts of Europe. It is said that the glass industry was established at Altare, in the nth century, by French craftsmen. In the 14th century Muranese glass-workers settled there and developed the industry. It appears that as early as 1295 furnaces had been established at Treviso, Vicenza,

Padua, Mantua, Ferrara, . Ravenna and Bologna. In 1634 there were two glass-houses in Rome and one in Florence; but whether any of these produced ornamented vessels, or only articles of common use and window glass, would not appear to have as yet been ascertained.

Germany — Glass-making in Germany during the Roman period seems to have been carried on extensively in the neighbour- hood of Cologne. The Cologne museum contains many specimens of Roman glass, some of which are remarkable for their cut decoration. The craft survived the downfall of the Roman power, and a native industry was developed. This industry must have won some reputation, for in 758 the abbot of Jarrow appealed to the bishop of Mainz to send him a worker in glass. There are few records of glass manufacture in Germany before the beginning of the 16th century. The positions of the factories were determined by the supply of wood for fuel, and subse- quently, when the craft of glass-cutting was introduced, by the accessibility of water-power. The vessels produced by the 16th-century glass- workers in Germany, Holland and the Low Countries are closely allied in form and decoration. The glass is coloured (generally green) and the decoration consists of glass threads and glass studs, or prunts (” Nuppen “). The use of threads and prunts is illustrated by the development of the ” Roemer,” so popular as a drinking-glass, and as a feature in Dutch studies of still life. The ” Igel,” a squat tumbler covered with prunts, gave rise to the ” Krautsrunk,” which is like the ” Igel,” but longer and narrow- waisted. The ” Roemer” itself consists of a cup, a short waist studded with prunts and a foot. The foot at first was formed by coiling a thread of glass round the base of the waist; but, subsequently, an open glass cone was joined to the base of the waist, and a glass thread was coiled upon the surface of the cone. The ” Passglas,” another popular drinking-glass, is cylindrical in form and marked with horizontal rings of glass, placed at regular intervals, to indicate the quantity of liquor to be taken at a draught. S: ■

In the edition of 1581 of the De re metallica by Georg Agricola, there is a woodcut showing the interior of a German glass factory, and glass vessels both finished and unfinished.

In 1428 a Muranese glass- worker set up a furnace in Vienna, and another furnace was built in the same town by an Italian in i486. In 1 53 1 the town council of Nuremberg granted a subsidy to attract teachers of Venetian technique. Many specimens exist of German winged and enamelled glasses of Venetit.a character. The Venetian influence, however, was indirect rather than direct. The native glass-workers adopted the process of enamelling, but applied it to a form of decoration characteristically German. On tall, roomy, cylindrical glasses they painted portraits of the emperor and electors of Germany, or the imperial eagle bearing on its wings the arms of the states composing the empire. The earliest-known example of these enamelled glasses bears the date 1553. They were immensely popular and the fashion for them lasted into the 18th century. Some of the later specimens have views of cities, battle scenes and processions painted in grisaille.

A more important outcome, however, of Italian influence was the production, in emulation of Venetian glass, of a glass made of refined potash, lime and sand, which was more colourless than the material it was intended to imitate. This colourless potash-lime glass has always been known as Bohemian glass. It was well adapted for receiving cut and engraved decoration, and in these processes the German craftsmen proved themselves to be exceptionally skilful. At the end of the 16th century Rudolph II. brought Italian rock-crystal . cutters from Milan to take control of the crystal and glass-cutting works he had established at Prague. It was at Prague that Caspar Lehmatin and Zachary Belzer learnt the craft of cutting glass. George Schwanhart, a pupil of Caspar Lehmann, started glass-cutting at Ratisbon, and about 1690 Stephen Schmidt and Hermann Schwinger introduced the crafts of cutting and engraving glass in Nuremberg. To the Germans must be credited the discovery, or development, of colourless potash-lime glass, the reintroduction of the crafts of cutting and engraving on

glass, the invention by H. Schwanhart of the process of etching on glass by means of hydrofluoric acid, and the rediscovery by J. Kunkel, who was director of the glass-houses at Potsdam in 1679, of the method of making copper-ruby glass.

Low Countries and the United Provinces. — The glass industry of the Low Countries was chiefly influenced by Italy and Spain, whereas German influence and technique predominated in the United

Provinces. The history of glass-making in the provinces is almost identical with that of Germany. In the 17th and 18th centuries the processes of scratching, engraving and etching were brought to great perfection.

The earliest record of glass-making in the Low Countries consists in an account of payments made in 1453-1454 on behalf of Philip the Good of Burgundy to ” Gossiun de Vieuglise, Maitre Vomer de Lille ” for a glass fountain and four glass plateaus. Schuermans has traced Italian glass-workers to Antwerp, Liege, Brussels and Namur. Antwerp appears to have been the headquarters of the Muranese, and Liege the headquarters of the Altarists. Guicciardini in his description of the Netherlands, in 1563, mentions glass as among the chief articles of export to England.

In 1599 the privilege of making ” Voires de cristal a. la faschon Venise,” was granted to Philippe de Gridolphi of Antwerp. In 1623 Anthony Miotti, a Muranese, addressed a petition to Philip IV. of Spain for permission to make glasses, vases and cups of fine crystal, equal to those of Venice, but to be sold at one-third less than Venetian glasses. In 1642 Jean Savonetti ” gentilhomme Verrier de Murano ” obtained a patent for making glass in Brussels. The Low Country glasses are closely copied from Venetian models, but generally are heavier and less elegant. Owing to the fashion of Dutch and Flemish painters introducing glass vases and drinking-glasses into their paintings of still life, interiors and scenes of conviviality, Holland and Belgium at the present day possess more accurate records of the products of their ancient glass factories than any other countries.

Spain. — During the Roman occupation Pliny states that glass was made ” per Hispanias ” (Nat. Hist, xxxvi. 26. 66). Traces of Roman glass manufactories have been found in Valencia and Murcia, in the valleys which run down to the coast of Cata- lonia, and near the mouth of the Ebro. Little is known about the condition of glass-making in Spain between the Roman period and the 13th century. In the 13th century the craft of glass-making was practised by the Moors in Almeria, and was probably a survival from Roman times. The system of decorat- ing vases and vessels by means of strands of glass trailed upon the surface in knots, zigzags and trellis work, was adopted by the Moors and is characteristic of Roman craftsmanship. Glass- making was continued at Pinar de la Vidriera and at Al Castril de la Pena into the 17th century. The objects produced show no sign of Venetian influence, but are distinctly Oriental in form. Many of the vessels have four or as many as eight handles, and are decorated with serrated ornamentation, and with the trailed strands of glass already referred

to. The glass is generally of a dark-green colour.

Barcelona has a long record as a centre of the glass industry. In 1324 a municipal edict was issued forbidding the erection of glass-furnaces within the city. In 1455 the glass-makers of B arcelona were permitted to form a gild. Jeronim o Paulo, writing in 1 49 1, says that glass vessels of various sorts were sent thence to many places, and even to Rome. Marineus Siculus, writing early in the 16th century, says that the best glass was made at Barcelona; and Gaspar Baneiros, in his Chronographia, published in 1562, states that the glass made at Barcelona was almost equal to that of Venice and that large quantities were exported.

The author of the Atlante espanol, writing at the end of the 18th century, says that excellent glass was still made at Barcelona on Venetian models. The Italian influence was strongly felt in Spain, but Spanish writers have given no precise information as to when it was introduced or whence it came. Schuermans has, however, discovered the names of more than twenty Italians who found their way into Spain, in some cases by way of Flanders,

either from Altare or from Venice. The Spanish glass-makers were very successful in imitating the Venetian style, and many specimens supposed to have originated from Murano are really Spanish. In addition to the works at Barcelona, the works which chiefly affected Venetian methods were those of Cadalso in the province of Toledo, founded in the 16th century, and the works established in 1680 at San Martin de Valdeiglesias in Avila. There were also works at Valdemaqueda and at Villa- franca. In 1680 the works in Barcelona, Valdemaqueda and Villafranca are named in a royal schedule giving the prices at which glass was to be sold in Madrid. In 1772 important glass works were established at Recuenco in the province of Cuenca, mainly to supply Madrid. The royal glass manufactory of La Granja de San Ildefonso was founded about 1725; in the first instance for the manufacture of mirror plates, but subsequently for the production of vases and table-ware in the French style. The objects produced are mostly of white clear glass, cut, engraved and gilded. Engraved flowers, views and devices are often combined with decorative cutting. Don Sigismundo Brun is credited with the invention of permanent gilding fixed by heat. Spanish glass is well represented in the Victoria and Albert Museum.

France. — Pliny states that glass was made in Gaul, and there is reason to believe that it was made in many parts of the country and on a considerable scale. There were glass-making districts both in Normandy and in Poitou.

Little information can be gathered concerning the glass industry between the Roman period and the 14th century. It is recorded that in the 7th century the abbot of Wearmouth in England obtained artificers in glass from France; and there is a tradition that in the nth century glass- workers migrated from Normandy and Brittany and set up works at Altare near Genoa.

In 1302 window glass, probably crown-glass, was made at Beza le Foret in the department of the Eure. In 1416 these works were in the hands of Robin and Leban Guichard, but passed subsequently to the Le Vaillants.

In 1338 Humbert, the dauphin, granted a part of the forest of Chamborant to a glass-worker named Guionet on the condition that Guionet should supply him with vessels of glass.

In 1466 the abbess of St Croix of Poitiers received a gross of glasses from the glass-works of La Ferriere, for the privilege of gathering fern for the manufacture of potash.

In France, as in other countries, efforts were made to intro- duce Italian methods of glass-working. Schuermans in his researches discovered that during the 15th and 16th centuries many glass-workers left Altare and settled in France, — the Saroldi migrated to Poitou, the Ferri to Provence, the Massari to Lorraine and the Bormioli to Normandy. In 1551 Henry II. of France established at St Germain en Laye an Italian named Mutio; he was a native of Bologna, but of Altare origin. In 1598 Henry IV. permitted two ” gentil hommes verriers ” from Mantua to settle at Rouen in order to make “verres de cristal, verres doree emaul et autres ouvrages qui se font en Venise.”

France assimilated the craft of glass-making, and her crafts- men acquired a wide reputation. Lorraine and Normandy appear to have been the most important centres. To Lorraine belong the well-known names Hennezel, de Thietry, du Thisac, de Houx; and to Normandy the names de Bongar, de Cacqueray le Vaillant and de Brossard.

In the 17th century the manufacture of mirror glass became an important branch of the industry. In 1665 a manufactory was established in the Faubourg St Antoine in Paris, and another at Tour-

la- Ville near Cherbourg.

Louis Lucas de Nehou, who succeeded de Cacqueray at the"' works at Tour-la- Ville, moved in 1675 to the works in Paris. Here, in 1688, in conjunction with A. Thevart, he succeeded in perfecting the process of casting plate-glass. Mirror plates previous to the invention had been made from blown " sheet " glass, and were consequently very limited in size. De Nehou's process of rolling molten glass poured on an iron table rendered the manufacture of very large plates possible.

The Manufactoire Royale des Glaces was removed in 1693 to the Chateau de St Gobain.

In the 1 8th century the manufacture of vases de verre had become so neglected that the Academy of Sciences in 1759 offered a prize for an essay on the means by which the industry might be revived (Labarte, Histoire des arts industriels) .

The famous Baccarat works, for making crystal glass, were founded in 18 18 by d'Artigues.

English Glass. — The records of glass-making in England are exceedingly meagre. There is reason to believe that during the Roman occupation the craft was carried on in several parts of the country. Remains of a Roman glass manufactory of con- siderable extent were discovered near the Manchester Ship Canal at Warrington. Wherever the Romans settled glass vessels and fragments of glass have been found. There is no evidence to prove that the industry survived the withdrawal of the Roman garrison.

It is probable that the glass drinking-vessels, which have been found in pre-Christian Anglo-Saxon tombs, were introduced from Germany. Some are elaborate in design and bear witness to advanced technique of Roman character. In 675 Benedict Biscop, abbot of Wearmouth, was obliged to obtain glass-workers from France, and in 758 Cuthbert, abbot of Jarrow, appealed to the bishop of Mainz to send him artisans to manufacture " windows and vessels of glass, because the English were ignorant and helpless." Except for the statement in Bede that the French artisans, sent by Benedict Biscop, taught their craft to the English, there is at present no evidence of glass having been made in England between the Roman period and the 13th century. In some deeds relating to the parish of Chiddingfold, in Surrey, of a date not later than 1230, a grant is recorded of twenty acres of land to Lawrence " vitrearius," and in another deed, of about 1280, the " ovenhusveld " is mentioned as a boundary. This field has been

identified, and pieces of crucible and fragments of glass have been dug up. There is another deed, dated 1300, which mentions one William " le verir " of Chiddingfold.

About 1350 considerable quantities of colourless flat glass were supplied by John Alemayn of Chiddingfold for glazing the windows in St George's chapel, Windsor, and in the chapel of St Stephen, Westminster. The name Alemayn (Aleman) suggests a foreign origin. In 1380 John Glasewryth, a Stafford- shire glass-worker, came to work at Shuerewode, Kirdford, and there made brode-glas and vessels for Joan, widow of John Shertere.

There were two kinds of flat glass, known respectively as " brode-glas " and " Normandy " glass. The former was made, as described by Theophilus, from cylinders, which were split, reheated and flattened into square sheets. It was known as Lorraine glass, and subsequently as " German sheet " or sheet- glass. Normandy glass was made from glass circles or disks. When, in after years, the process was perfected, the glass was known as " crown " glass. In 1447 English flat glass is mentioned in the contract for the windows of the Beauchamp chapel at Warwick, but disparagingly, as the contractor binds himself not to use it. In i486, however, it is referred to in such a way as to suggest that it was superior to " Dutch, Venice or Normandy glass." The industry does not seem to have prospered, for when in 1567 an inquiry was made as to its condition, it was ascertained that only small rough goods were being made.

In the 1 6th century the fashion for using glass vessels of ornamental character spread from Italy into France and England. Henry VIII. had a large collection of glass drinking-vessels chiefly of Venetian manufacture. The increasing demand for Venetian drinking-glasses suggested the possibility of making similar glass in England, and various attempts were made to introduce Venetian workmen and Venetian methods of manu- facture. In 1550 eight Muranese glass-blowers were working in or near the Tower of London. They had left Murano owing to slackness of trade, but had been recalled, and appealed to the Council of Ten in Venice to be allowed to complete their contract in London. Seven of these glass-workers left London in the following year, but one, Josepho Casselari, remained and joined

Thomas Cavato, a Dutchman. In 1574 Jacob Verzellini, a fugitive

Venetian, residing in Antwerp, obtained a patent for making drinking-glasses in London ” such as are made in Murano.” He established works in Crutched Friars, and to him is probably due the introduction of the use of soda-ash, made from seaweed and seaside plants, in place of the crude potash made from fern and wood ashes. His manufactory was burnt down in 1575, but was rebuilt. He afterwards moved his works to Winchester House, Broad Street. There is a small goblet (PI. I., fig. 8) in the British Museum which is attributed to Verzellini. It is Venetian in character, of a brownish tint, with two white enamel rings round the body. It is decorated with diamond or steel-point etching, and bears on one side the date 1586, and on the opposite side the words ” In God is al mi trust.” Verzellini died in 1606 and was buried at Down in Kent. In 1592 the Broad Street works had been taken over by Jerome Bowes. They afterwards passed into the hands of Sir R. Mansel, and in 1618 James Howell, author of Epistolae Ho-elianae, was acting as steward. The works continued in operation until 1641. During excavations in Broad Street in 1874 many fragments of glass were found.; amongst them were part of a wine-glass, a square scent-bottle and a wine-glass stem containing a spiral thread of white enamel.

A greater and more lasting influence on English glass-making came from France and the Low Countries. In 1567 James Carre of Antwerp stated that he had erected two glass-houses at ” Fernefol ” (Fernfold Wood in Sussex) for Normandy and Lorraine glass for windows, and had brought over workmen. From this period began the records in England of the great glass-making families of Hennezel, de Thietry, du Thisac and du Houx from Lorraine, and of de Bongar and de Cacqueray from Normandy. About this time glass-works were established at Ewhurst and Alford in Surrey, Loxwood, Kirdford, Wisborough and Petworth in Sussex, and Sevenoaks and Penshurst in Kent. Beginning in Sussex, Surrey and Kent, where wood for fuel was plentiful, the foreign glass-workers and their descendants migrated from place to place, always driven by the fuel-hunger of their furnaces. They gradually made their way into Hamp- shire, Wiltshire, Gloucestershire, Staffordshire, Northumberland, Scotland and Ireland. They can be traced by cullet heaps and broken-down furnaces, and by their names, often mutilated, recorded in parish registers.

In 1610 a patent was granted to Sir W. Slingsby for burning coal in furnaces, and coal appears to have been used in the Broad Street works. In 1615 all patents for glass-making were revoked and a new patent issued for making glass with coal as fuel, in the names of Mansel, Zouch, Thelwall, Kellaway and Percival. To the last is credited the first introduction of covered crucibles to protect the molten glass

from the products of burning coal.

Simultaneously with the issue of this patent the use of wood for melting glass was prohibited, and it was made illegal to import glass from abroad. About 1617 Sir R. Mansel, vice-admiral and treasurer of the navy, acquired the sole rights of making glass in England. These rights he retained for over thirty years. During the protectorate all patent rights virtually lapsed, and mirrors and drinking-glasses were once more imported from Venice. In 1663 the duke of Buckingham, although unable to obtain a renewal of the monopoly of glass-making, secured the prohibition of the importation of glass for mirrors, coach plates, spectacles, tubes and lenses, and contributed to the revival of the glass industry in all its branches. Evelyn notes in his Diary a visit in 1673 to the Italian glass-house at Greenwich, ” where glass was blown of finer metal than that of Murano,” and a visit in 1677 to the duke of Buckingham’s glass-works, where they made huge ” vases of mettal as cleare, ponderous and thick as chrystal; also looking-glasses far larger and better than any that came from Venice.”

Some light is thrown on the condition of the industry at the end of the 17th century by the Houghton letters on the improve- ment of trade and commerce, which appeared in 1696. A few of these letters deal with the glass trade, and in one a list is

given of the glass-works then in operation. There were 88 glass

factories in England which are thus classified :

Bottles 39

Looking-glass plates …. 2

Crown and plate-glass …. 5

Window glass 15

Flint and ordinary glass … 27

It is probable that the flint-glass of that date was very different from the flint-glass of to-day. The term flint-glass is now understood to mean a glass composed of the silicates of potash and lead. It is the most brilliant and the most colourless of all glasses, and was undoubtedly first perfected in England. Hartshorne has attributed its discovery to a London merchant named Tilson, who in 1663 obtained a patent for making ” crystal glass.” E. W. Hulme, however, who has carefully investigated the subject, is of opinion that flint-glass in its

present form was introduced about 1730. The use of oxide of lead in glass-making was no new thing; it had been used, mainly as a flux, both by Romans and Venetians. The invention, if it may be regarded as one, consisted in eliminating lime from the glass mixture, substituting refined potash for soda, and using a very large proportion of lead oxide. It is probable that flint- glass was not invented, but gradually evolved, that potash-lead glasses were in use during the latter part of the 17th century, but that the mixture was not perfected until the middle of the following century.

The 1 8th century saw a great development in all branches of glass-making. Collectors of glass are chiefly concerned with the drinking-glasses which were produced in great profusion and adapted for every description of beverage. The most noted are the glasses with stout cylindrical legs (Plate I. fig. 9), con- taining spiral threads of air, or of white or coloured enamel. To this type of glass belong many of the Jacobite glasses which commemorate the old or the young Pretender.

In 1 746 the industry was in a sufficiently prosperous condition to tempt the government to impose an excise duty. The report of the commission of excise, dealing with glass, published in 1835 is curious and interesting reading. So burdensome was the duty and so vexatious were the restrictions that it is a matter for wonder that the industry survived. In this respect England was more fortunate than Ireland. Before 1825, when the excise duty was introduced into Ireland, there were flourishing glass- works in Belfast, Cork, Dublin and Waterford. By 1850 the Irish glass industry had been practically destroyed. Injurious as the excise duty undoubtedly was to the glass trade generally, and especially to the flint-glass industry, it is possible that it may have helped to develop the art of decorative glass-cutting. The duty on flint-glass was imposed on the molten glass in the crucibles and on the unfinished goods. The manufacturer had, therefore, a strong inducement to enhance by every means in his power the selling value of his glass after it had escaped the exciseman's clutches. He therefore employed the best available art and skill in improving the craft of glass-cutting. It is the development of this craft in connexion with the perfecting of flint-glass that makes the 18th century the most important period in the history of English glass-making. Glass-cutting was a craft imported from Germany, but the English material so greatly surpassed Bohemian glass in brilliance that the Bohemian cut-glass was eclipsed. Glass-cutting was carried on at works in Birmingham, Bristol, Belfast, Cork, Dublin, Glas- gow, London, Newcastle, Stourbridge, Whittington and Water- ford. The most important centres of the craft were London, Bristol, Birmingham and Waterford (see Plate I., fig. 10, for oval cut-glass Waterford bowl). The

finest specimens of cut- glass belong to the period between 1780 and 18 10. Owing to the sacrifice of form to prismatic brilliance, cut-glass gradually lost its artistic value. Towards the middle of the 19th century it became the fashion to regard all cut-glass as barbarous, and services of even the best period were neglected and dispersed. At the present time scarcely anything is known about the origin of the few specimens of 18th-century English cut-glass

which have been preserved in public collections. It is strange that so little interest has been taken in a craft in which for some thirty years England surpassed all competitors, creating a wave of fashion which influenced the glass industry throughout the whole of Europe.

In the report of the Excise Commission a list is given of the glass manufactories which paid the excise duty in 1833. There were 105 factories in England, 10 in Scotland and 10 in Ireland. In England the chief centres of the industry were Bristol, Birmingham, London, Manchester, Newcastle, Stourbridge and York. Plate-glass was made by Messrs Cookson of New- castle, and by the British Plate Glass Company of Ravenhead. Crown and German sheet-glass were made by Messrs Chance & Hartley of Birmingham. The London glass-works were those of Apsley Pellatt of Blackfriars, Christie of Stangate, and William Holmes of Whitefriars. In Scotland there were works in Glasgow, Leith and Portobello. In Ireland there were works in Belfast, Cork, Dublin and Waterford. The famous Waterford works were in the hands of Gatchell & Co.

India. — Pliny states {Nat. Hist, xxxvi. 26. 66) that no glass was to be compared to the Indian, and gives as a reason that it was made from broken crystal; and in another passage (xii. iq, 42) he says that the Troglodytes brought to Ocelis (Ghella near Bab-el-Mandeb) objects of glass. We have, however, very little knowledge of Indianglass of any considerable antiquity. A few small vessels have been found in the ” topes,” as in that at Manikiala in the Punjab, which probably dates from about the Christian era; but they exhibit no remarkable character, and fragments found at Brahmanabad are hardly distinguishable from Roman glass of the imperial period. The chronicle of the Sinhalese kings, the Mahavamsa, however, asserts that mirrors of glittering glass were carried in procession in 306 B.C., and beads like gems, and windows with ornaments like jewels, are also mentioned at about the same date. If there really was an

important manufacture of glass in Ceylon at this early time, that island perhaps furnished the Indian glass of Pliny. In the later part of the 17th century some glass decorated with enamel was made at Delhi. A specimen is in the Indian section of the South Kensington Museum. Glass is made in several parts of India — as Patna and Mysore — by very simple and primitive methods, and the results are correspondingly defective. Black, green, red, blue and yellow glasses are made, which contain a large proportion of alkali and are readily fusible. The greater part is worked into bangles, but some small bottles are blown (Buchanan, Journey through Mysore, i. 147, iii. 369).

Persia. — No very remarkable specimens of Persian glass are known in Europe, with the exception of some vessels of blue glass richly decorated with gold. These probably date from the 17th century, for Chardin tells us that the windows of the tomb of Shah Abbas II. (06. 1666), at Kum, were ” de cristal peint d’or et d’azur.” At the present day bottles and drinking- vessels are made in Persia which in texture and quality differ little from ordinary Venetian glass of the 16th or 17th centuries, while in form they exactly resemble those which may be seen in the engravings in Chardin’s Travels.

, China. — The history of the manufacture of glass in China is obscure, but the common opinion that it was learnt from the Europeans in the 17th century seems to be erroneous. A writer in the Memoires concernant les Chinois (ii. 46) states on the authority of the annals of the Han dynasty that the emperor Wu-ti (140 B.C.) had a manufactory of the kind of glass called ” lieou-li ” (probably a form of opaque glass), that in the beginning of the 3rd century of our era the emperor Tsaou-tsaou received from the West a considerable present of glasses of all colours, and that soon after a glass-maker came into the country”’ who taught the art to the natives.

The Wei dynasty, to which Tsaou-tsaou belonged, reigned in northern China, and at this day a considerable manufacture of glass is carried on at Po-shan-hien in Shantung, which it would seem has existed for a long period. The Rev. A. William- son (Journeys in North China, i. 131) says that the glass is extremely pure, and is made from the rocks in the neighbourhood.

The rocks are probably of quartz, i.e. rock crystal, a correspond- ence with Pliny’s statement respecting Indian glass which seems deserving of attention.

Whether the making of glass in China was an original dis- covery of

that ingenious people, or was derived via Ceylon from Egypt, cannot perhaps be now ascertained; the manufacture has, however, never greatly extended itself in China. The case has been the converse of that of the Romans; the latter had no fine pottery, and therefore employed glass as the material for vessels of an ornamental kind, for table services and the like. The Chinese, on the contrary, having from an early period had excellent porcelain, have been careless about the manufacture of glass. A Chinese writer, however, mentions the manufacture of a huge vase in a.d. 627, and in 1154 Edrisi (first climate, tenth section) mentions Chinese glass. A glass vase about a foot high is preserved at Nara in Japan, and is alleged to have been placed there in the 8th century. It seems probable that this is of Chinese manufacture. A writer in the Mimoires concernant les Chinois (ii. 463 and 477), writing about 1770, says that there was then a glass-house at Peking, where every year a good number of vases were made, some requiring great labour because nothing was blown (rien n'est souffle), meaning no doubt that the ornamentation was produced not by blowing and mould- ing, but by cutting. This factory was, however, merely an appendage to the imperial magnificence. The earliest articles of Chinese glass the date of which has been ascertained, which have been noticed, are some bearing the name of the emperor Kienlung (1735-1795), on e of which is in the Victoria and Albert Museum.

In the manufacture of ornamental glass the leading idea in China seems to be the imitation of natural stones. The coloured glass is usually not of one bright colour throughout, but semi-transparent and marbled; the colours in many instances are singularly fine and harmonious. As in 1770, carving or cut- ting is the chief method by which ornament is produced, the vessels being blown very solid.

Bibliography. — Georg Agricola, De re metallica (Basel, 1556); Percy Bate, English Table Glass (n.d.) ; G. Bontemps, Guide du verrier (Pans, 1868) ; Edward Dillon, Glass (London, 1907) ; C. C. Edgar, " Graeco-Egyptian Glass," Catalogue du Musee du Caire (1905); Sir A. W. Franks, Guide to Glass Room in British Museum (1888) ; Rev. A. Hallen, " Glass-making in Sussex," Scottish Antiquary, No. 28 (1893); Albert Hartshorne, Old English Glasses (London); E. W. Hulme, " English Glass-making in XVI. andXVII. Centuries," The Antiquary, Nos. 59, 60, 63, 64, 65; Alexander Nesbitt, " Glass," Art Handbook, Victoria and Albert Museum; E. Peligot, Le Verre, son histoire, sa fabrication (Paris, 1878) ; Apsiey Pellatt, Curiosities of Glass-making (London, 1849) ; F. Petrie, Tell-el-Amarna, Egypt Exploration Fund (1894); "Egypt," sect. Art; H. J. Powell, " Cut Glass," Journal Society of Arts, No. 2795; C. H. Read, " Sara- cenic Glass," Archaeologia, vol. 58, part

1.; Juan F. Riano, “Spanish Arts,” Art Handbook, Victoria and Albert Museum; H. Schuermans, ” Muranese and Altarist Glass Workers,” eleven letters: Bulletins des commissions royales (Brussels, 1883, 1891). For the United States, see vol. x. of Reports of the 12th Census, pp. 949-1000, and Special Report of Census of Manufactures (1905), Part III., pp. 837-935. (A. NE.;H. J. P.)

GLASS, STAINED. All coloured glass is, strictly speaking, ” stained ” by some metallic oxide added to it in the process of manufacture. But the term ” stained glass ” is popularly, as well as technically, used in a more limited sense, and is under- stood to refer to stained glass windows. Still the words ” stained glass ” do not fully describe what is meant; for the glass in coloured windows is for the most part not only stained but painted. Such painting was, however, until comparatively modern times, used only to give details of drawing and to define form. The colour in a stained glass window was not painted on the glass but incorporated in it, mixed with it in the making — whence the term ” pot-metal ” by which self-coloured glass is known, i.e. glass coloured in the melting pot.

A medieval window was consequently a patchwork of variously coloured pieces. And the earlier its date the more surely was it a mosaic, not in the form of tesserae, but in the manner known as ” opus sectile.” Shaped pieces of coloured glass were, that is to say, put together like the parts of a puzzle. The

nearest approach to an exception to this rule is a fragment at the Victoria and Albert Museum, in which actual tesserae are fused together into a solid slab of many-coloured glass, in effect a window panel, through which the light shines with all the brilliancy of an Early Gothic window. But apart from the fact that the design proves in this case to be even more effective with the light upon it, the use of gold leaf in the tesserae con- firms the presumption that this work, which (supposing it to be genuine) would be Byzantine, centuries earlier than any coloured windows that we know of, and entirely different from them in technique, is rather a specimen of fused mosaic that happens to be translucent than part of a window designedly executed in tesserae.

The Eastern (and possibly the earlier) practice was to set chips of coloured glass in a heavy fretwork of stone or to imbed them in

plaster. In a medieval window they were held together by strips of lead, in section something like the letter H , the upright strokes of which represent the ” tapes ” extending on either side well over the edges of the glass, and the crossbar the connecting ” core ” between them. The leading was soldered together at the points of junction, cement or putty was rubbed into the crevices between glass and lead, and the window was attached (by means of copper wires soldered on to the leads) to iron saddle-bars let into the masonry.

Stained glass was primarily the art of the glazier; but the painter, called in to help, asserted himself more and more, and eventually took it almost entirely into his own hands. Between the period when it was glazier’s work eked out by painting and when it was painter’s work with the aid of the glazier lies the entire development of stained and painted window-making. With the eventual endeavour of the glass painter to do without the glazier, and to get the colour by painting in translucent enamel upon colourless glass, we have the beginning of a form of art no longer monumental and comparatively trivial.

This evolution of the painted window from a patchwork of little pieces of coloured glass explains itself when it is remembered that coloured glass was originally not made in the big sheets produced nowadays, but at first in jewels to look as much as possible like rubies, sapphires, emeralds and other precious stones, and afterwards in rounds and sheets of small dimensions. Though some of the earliest windows were in the form of pure glazing (” leaded-lights “), the addition of painting seems to have been customary from the very first. It was a means of render- ing detail not to be got in lead. Glazing affords by itself scope for beautiful pattern work; but the old glaziers never carried their art as far as they might have done in the direction of ornament ; their aim was always in the direction of picture; the idea was to make windows serve the purpose of coloured story books. That was beyond the art of the glazier. It was easy enough to repre- sent the drapery of a saint by red glass, the ground on which he stood by green, the sky above by blue, his crown by yellow, the scroll in his hand by white, and his flesh by brownish pink; but when it came to showing the folds of red drapery, blades of green grass, details of goldsmith’s work, lettering on the scroll, the features of the face — the only possible way of doing it was by painting. The use of paint was confined at first to an opaque brown, used, not as colour, but only as a means of stopping out light, and in that way defining comparatively delicate details within the lead lines. These themselves outlined and defined the main forms of the design. The pigment used by the glass painter was of course vitreous: it consisted of powdered glass and sundry metallic oxides (copper, iron, manganese, &c), so that, when the pieces of painted

glass were made red hot in the kiln, the powdered glass became fused to the surface, and with it the dense colouring matter also. When the pieces of painted glass were afterwards glazed together and seen against the light, the design appeared in the brilliant colour of the glass, its forms drawn in the uniform black into which, at a little distance, leadwork and painting lines became merged.

It needed solid painting to stop out the light entirely: thin paint only-obscured it. And, even in early glass, thin paint was used, whether to subdue crude colour or to indicate what little

shading a 13th-century draughtsman might desire. In the present state of old glass, the surface often quite disintegrated, it is difficult to determine to what extent thin paint was used for either purpose. There must always have been the temptation to make tint do instead of solid lines; but the more workmanlike practice, and the usual one, was to get difference of tint, as a pen-draughtsman does, by lines of solid opaque colour. In comparatively colourless glass (grisaille) the pattern was often made to stand out by cross-hatching the background; and another common practice was to coat the glass with paint all over, and scrape the design out of it. The effect of either proceeding was to lower the tone of the glass without dirtying the colour, as a smear of thin paint would do.

Towards the 14th century, when Gothic design took a more naturalistic direction, the desire to get something like modelling made it necessary to carry painting farther, and they got rid to some extent of the ill effect of shading-colour smeared on the glass by stippling it. This not only softened the tint and allowed of gradation according to the amount of stippling, but let some light through, where the bristles of the stippling-tool took up the pigment. Shading of this kind enforced by touches of strong brushwork, cross-hatching and some scratching out of high lights was the method of glass painting adopted in the 14th century.

Glass was never at the best a pleasant surface to paint on; and glass painting, following the line of least resistance, developed in the later Gothic and early Renaissance periods into something unlike any other form of painting. The outlines continued to be traced upon the glass and fixed in the fire; but, after that, the process of painting consisted mainly in the removal of paint. The entire surface of the glass was coated with an even ” matt ” of pale brown; this was allowed to dry; and then the high lights were rubbed off, and the modelling was got by scrubbing away the paint with a dry hog-hair brush, more or less, according to the gradations required. Perfect modelling was got by

repeating the operation — how often depended upon the dexterity of the painter. A painter's method is partly the outcome of his individuality. One man would float on his colour and manipulate it to some extent in the moist state; another would work entirely upon the dry matt. Great use was made of the pointed stick with which sharp lines of light were easily scraped out; and in the 16th century Swiss glass painters, working upon a relatively small scale, got their modelling entirely with a needle-point, scraping away the paint just as an etcher scratches away the varnish from his etching plate. The practice of the two craftsmen is, indeed, identical, though the one scratches out what are to be black lines and the other lines of light. In the end, then, though a painter would always use touches of the brush to get crisp lines of dark, the manipulation of glass painting consisted more in erasing lights than in painting shadows, more in rubbing out or scraping off paint than in putting it on in brush strokes.

So far there was no thought of getting colour by means of paint. The colour was in the glass itself, permeating the mass (" pot-metal "). There was only one exception to this — ruby glass, the colour of which was so dense that red glass thick enough for its purpose would have been practically obscure; and so they made a colourless pot-metal coated on one side only with red glass. This led to a practice which forms an ex- ception to the rule that in "pot-metal" glass every change of colour, or from colour to white, is got by the use of a separate piece of glass. It was possible in the case of this " flashed " ruby to grind away portions of the surface and thus obtain white on red or red on white. Eventually they made coated glass of blue and other colours, with a view to producing similar effects by abrasion. (The same result is arrived at nowadays by means of etching. The skin of coloured glass, in old days laboriously ground or cut away, is now easily eaten off by fluoric acid.) One other exceptional expedient in colouring had very considerable effect upon the development of glass design from about the beginning of the 14th century. The discovery that a solution of silver applied to glass would under the action of the

fire stain it yellow enabled the glass painter to get yellow upon colourless glass, green upon grey-blue, and (by staining only the abraded portions) yellow upon blue or ruby. This yellow was neither enamel nor pot-metal colour, but stain — the only staining actually done by the glass painter as distinct from the glass maker. It varied in colour from pale lemon to deep orange, and was singularly pure in

quality. As what is called ” white ” glass became purer and was employed in greater quantities it was lavishly used; so much so that a brilliant effect of silvery white and golden yellow is characteristic of later Gothic windows.

The last stage of glass painting was the employment of enamel not for stopping out light but to get colour. It began to be used in the early part of the 16th century — at first only in the form of a flesh tint ; but it was not long before other colours were introduced. This use of colour no longer in the glass but upon it marks quite a new departure in technique. Enamel colour was finely powdered coloured glass mixed with gum or some such substance into a pigment which could be applied with a brush. When the glass painted with it was brought to a red heat in the oven, the powdered glass melted and was fused to it, just like the opaque brown employed from the very beginning of glass-painting.

This process of enamelling was hardly called for in the interests of art. Even the red flesh-colour (borrowed from the Limoges enamellers upon copper) did not in the least give the quality of flesh, though it enabled the painter to suggest by contrast the whiteness of a man’s beard. As for the brighter enamel colours, they had nothing like the depth or richness of “stained ” glass. What enamel really did was to make easy much that had been impossible in mosaic, as, for example, to represent upon the very smallest shield of arms any number of ” charges ” all in the correct tinctures. It encouraged the minute workmanship characteristic of Swiss glass painting; and, though this was not altogether inappropriate to domestic window panes, the painter was tempted by it to depart from the simplicity and breadth of design inseparable from the earlier mosaic practice. In the end he introduced coloured glass only where he could hardly help it, and glazed the great part of his window in rectangular panes of clear glass, upon which he preferred to paint his picture in opaque brown and translucent enamel colours.

Enamel upon glass has not stood the test of time. Its presence is usually to be detected in old windows by specks of light shining through the colour. This is where the enamel has crumbled off. There is a very good reason for that. Enamel must melt at a temperature at which the glass it is painted on keeps its shape. The lower the melting point of the powdered glass the more easily it is fused. The painter is consequently inclined to use enamel of which the contraction and expansion is much greater than that of his glass — with the result that, under the action of the weather, the colour is apt to work itself free and expose the bare white glass beneath. The only enamel which

has held its own is that of the Swiss glass-painters of the 16th and 17th centuries. The domestic window panes they painted may not in all cases have been tried by the sudden changes of atmosphere to which church windows are subject; but credit must be given them for ex- ceptionally skilful and conscientious workmanship.

The story of stained glass is bound up with the history of architecture, to which it was subsidiary, and of the church, which was its patron. Its only possible course of development was in the wake of church building. From its very inception it was Gothic and ecclesiastical. And, though it survived the upheaval of the Renaissance and was turned to civil and domestic use, it is to church windows that we must go to see what stained glass really was — or is; for time has been kind to it. The charm of medieval glass lies to a great extent in the material, and especi- ally in the inequality of it. Chemically impure and mechanic- ally imperfect, it was rarely crude in tint or even in texture. It shaded off from light to dark according to its thickness; it was speckled with air bubbles; it was streaked and clouded; and all these imperfections of manufacture went to perfection of colour. And age has improved it: the want of homogeneousness in the material has led to the disintegration of its surface; soft particles

in it have been dissolved away by the action of the weather, and the surface, pitted like an oyster-shell, refracts the light in a way which adds greatly to the effect; at the same time there is roothold for the lichen which (like the curtains of black cobwebs) veils and gives mystery to the colour. An appreciable part of the beauty of old glass is the result of age and accident. In that respect no new glass can compare with it. There is, however, no such thing as ” the lost secret ” of glass-making. It is no secret that age mellows.

Stained and painted glass is commonly apportioned to its ” period,” Gothic or Renaissance, and further to the particular phase of the style to which it belongs. C. Winston, who was the first to inquire thoroughly into English glass, adopting T. Rickman’s classification, divided Gothic windows into Early English (to c. 1280), Decorated (to c. 1380) and Perpendicular (to c. 1530). These dates will do. But the transition from one phase of design to another is never so sudden, nor so easily defined, as any table of dates would lead us to suppose. The old style lingered in one district long after the new fashion was flourishing in another. Besides, the English periods do not quite coincide with those of other countries. France, Germany and the Low Countries count for much in the history of stained glass; and in no two places was the pace of progress quite the same. There was, for example, scarcely any 13th-century Gothic in Germany, where the ”

geometric ” style, equivalent to our Decorated, was preceded by the Romanesque period; in France the Flamboyant took the place of our Perpendicular; and in Italy Gothic never properly took root at all. All these con- sidered, a rather rough and ready division presents the least difficulty to the student of old glass; and it will be found con- venient to think of Gothic glass as (1) Early, (2) Middle and (3) Late, and of the subsequent windows as (1) Renaissance and (2) Late Renaissance. The three periods of Gothic correspond approximately to the 13th, 14th and 15th centuries. The limits of the two periods of the Renaissance are not so easily defined. In the first part of the 16th century (in Italy long before that) the Renaissance and Gothic periods overlapped; in the latter part of it, glass painting was already on the decline; and in the 17th and 18th centuries it sank to deeper depths of degradation.

The likeness of early windows to translucent enamel (which is also glass) is obvious. The lines of lead glazing correspond absolutely to the ” cloisons ” of Byzantine goldsmith’s work. Moreover, the extreme minuteness of the leading (not always either mechanically necessary or architecturally desirable) suggests that the starting point of all this gorgeous illumination was the idea of reproducing on a grandiose scale, the jewelled effect produced in small by cloisonn6 enamellers. In other respects the earliest glass shows the influence of Byzantine tradition. It is mainly according to the more or less Byzantine character of its design and draughtsmanship that archaeologists ascribe certain remains of old glass to the 1 2th or the nth century. Apart from documentary or direct historic evidence, it is not possible to determine the precise date of any particular fragment. In the ” restored ” windows at St Denis there are remnants of glass belonging to the year 1 108. Elsewhere in France (Reims, Anger, Le Mans, Chartres, &c.) there is to be found very early- glass, some of it probably not much later than the end of the 10th century, which is the date confidently ascribed to certain windows at St Remi (Reims) and at Tegernsee. The rarer the specimen the greater may be its technical and antiquarian interest. But, even if we could be quite sure of its date, there is not enough of this very early work, and it does not sufficiently r distinguish itself from what followed, to count artistically foi much. The glory of early glass belongs to the 13th century.

The design of windows was influenced, of course, by the con- ditions of the workshop, by the nature of glass, the difficulty of shaping it, the way it could be painted, and the necessity of lead glazing. (The place of glass in the scheme of church decoration led to a certain severity in the treatment of it. The growing desire to get more and more light into the churches, and the consequent manufacture of purer and more

glass, affected the glazier's colour scheme. For all that, the fashion of a window was, mutatis mutandis, that of the painting, carving, embroidery, goldsmith's work, enamel and other crafts- manship of the period. The design of an ivory triptych is very much that of a three-light window. There is a little enamelled shrine of German workmanship in the Victoria and Albert Museum which might almost have been designed for glass; and the famous painted ceiling at Hildesheim is planned precisely on the lines of a medallion window of the 13th century. By that time glass had fallen into ways of its own, and there were already various types of design which we now recognize as characteristic of the first great period, in some respects the greatest of all.

Pre-eminently typical of the first period is the "medallion window." Glaziers began by naively accepting the iron bars across the light as the basis of their composition, and planned a window as a series of panels, one above the other, between the horizontal crossbars and the upright lines of the border round it. The next step was to mitigate the extreme severity of this com- position by the introduction of a circular or other medallion within the square boundary lines. Eventually these were abandoned altogether, the iron bars were shaped according to the pattern, and there was evolved the " medallion window," in which the main divisions of the design are emphasized by the strong bands of iron round them. Medallions were invariably devoted to picturing scenes from Bible history or from the lives of the saints, set forth in the simplest and most straightforward manner, the figures all on one plane, and as far as possible clear-cut against a sapphire-blue or ruby-red ground. Scenery was not so much depicted as suggested. An arch or two did duty for archi- tecture, any scrap of foliated ornament for landscape. Simplicity of silhouette was absolutely essential to the readableness of pictures on the small scale allowed by the medallion. As it is, they are so difficult to decipher, so confused and broken in effect, as to give rise (the radiating shape of " rose windows " aiding) to the misconception that the design of early glass is kaleido- scopic — which it is not. The intervals between subject medallions were filled in England (Canterbury) with scrollwork, in France (Chartres) more often with geometric diaper, in which last sometimes the red and blue merge into an unpleasant purple. Design on this small scale was obviously unsuited to distant windows. Clerestory lights were

occupied by figures, sometimes on a gigantic scale, entirely occupying the window, except for the border and perhaps the slightest pretence of a niche. This arrangement lent itself to broad effects of colour. The drawing may be rude; at times the figures are grotesque; but the general impression is one of mysterious grandeur and solemnity.

The depth and intensity of colour in the windows so far described comes chiefly from the quality of the glass, but partly also from the fact that very little white or pale-coloured glass was used. It was not the custom at this period to dilute the colour of a rich window with white. If light was wanted they worked in white, enlivened, it might be, by colour. Strictly speaking, 13th-century glass was never colourless, but of a greenish tint, due to impurities in the sand, potash or other ingredients; it was of a horny consistency, too; but it is convenient to speak of all would-be-clear glass as ” white.” The greyish windows in which it prevails are technically described as ” in grisaille.” There are examples (Salisbury, Chalons, Bonlieu, Angers) of ” plain glazing ” in grisaille, in which the lead lines make very ingenious and beautiful pattern. In the more usual case of painted grisaille the lead lines still formed the groundwork of the design, though supplemented by foliated or other detail, boldly outlined in strong brown and emphasized by a background of cross-hatching. French grisaille was frequently all in white (Reims, St Jean-aux-Bois, Sens), English work was usually enlivened by bands and bosses of colour (Salisbury); but the general effect of the window was still grey and silvery, even

though there might be distributed about it (the ” five sisters,”

York minster) a fair amount of coloured glass. The use of grisaille

is sufficiently accounted for by considerations of economy

and the desire to get light; but it was also in some sort a protest

(witness the Cistercian interdict of 1 134) against undue indulgence

in the luxury of colour. At this stage of its development it was confined strictly to patternwork; figure subjects were always in colour. For all that, some of the most restful and entirely satisfying work of the 13th century was in grisaille (Salisbury, Chartres, Reims, &c).

The second or Middle period of Gothic glass marks a stage between the work of the Early Gothic artist who thought out his design as glazing, and that of the later draughtsman who con- ceived it as something to be painted. It represents to many the period of greatest interest — probably because of its departure from the severity of Early work. It was the period of more naturalistic design; and a touch of nature is more easily appreciated than architectural fitness. Middle Gothic glass, halting as it does between the relatively rude mosaic of early times and the painter-like accomplishment of fully-developed glass painting, has not the salient merits of either. In the matter of tone also it is intermediate between the deep, rich, sober harmonies of Early windows and the lighter, brighter, gayer colouring of later glass. Now for the first time grisaille ornament and coloured figurework were introduced into the same window. And this was done in a very judicious way, in alternate bands ‘of white and deep rich colour, binding together the long lights into which windows were by this time divided (chapter-house, York minster) . A similar horizontal tendency of design is notice- able in windows in which the figures are enshrined under canopies, henceforth a feature in glass design. The pinnaclework falls into pronounced bands of brassy yellow between the tiers of figures (nave, York minster) and serves to correct the vertical lines of the masonry. Canopywork grew sometimes to such dimensions as quite to overpower the figure it was supposed to frame; but, then, the sense of scale was never a directing factor in Decorated design. A more interesting form of ornament is to be found in Germany, where it was a pleasing custom (Regensburg) to fill windows with conventional foliage without figurework. There is abundance of Middle Gothic glass in England (York, Wells, Ely, Oxford), but the best of it, such as the great East window at Gloucester cathedral, has features more characteristic of the 15th than of the

14th century.

The keynote of Late Gothic glass is brilliancy. It had a silvery quality. The 15th century was the period of white glass, which approached at last to colourlessness, and was employed in great profusion. Canopywork, more universal than ever, was repre- sented almost entirely in white touched with yellow stain, but not in sufficient quantities to impair its silveriness. Whatever the banality of the idea of imitation stonework in glass, the effect of thus framing coloured pictures in delicate white is admirable: at last we have white and colour in perfect combina- tion. Fifteenth-century figurework contains usually a large proportion of white glass; flesh tint is represented by white; there is white in the drapery; in short, there is always white enough in the figures to connect them with the canopywork and make the whole effect one. The preponderance of white will be better appreciated when it is stated that very often not a fifth or sixth part of the glass is coloured. It is no uncommon thing to find figures draped entirely in white with only a little colour in the background; and figurework all in grisaille upon a ground of white latticework is quite characteristic of Perpendicular glass.

One of the most typical forms of Late English Gothic canopy is where (York minster) its slender pinnacles fill the upper part of the window, and its solid base frames a picture in small of some episode in the history of the personage depicted as large as life above. A much less satisfactory continental practice was to enrich only the lower half of the window with stained glass and to make shift above (Munich) with ” roundels ” of plain white glass, the German equivalent for diamond latticework.

A sign of later times is the way pictures spread beyond the confines of a single light. This happened by degrees. At first the connexion between the figures in separate window openings was only in idea, as when a central figure of the crucified Christ was flanked by the Virgin and St John in the side lights. Then the arms of the cross would be carried through, or as it were

Plate I.

III.

IB JWM*I ‘BE MWˆM

1 j 1 ”

k ;r – i *’

>’ ‘ *

■ ,.■■ ” ! «\ .*■■’ V : ” s i ; js-” ■*». Ill

j i- *

K^^^ViiB ■

r-» • S J**

*.’.. – ■ ■’ • III

H i

-.

m tuft

1 “*. -j. P

. IV 1 .%. * t ii

V * s

mil 4 r»>4B t«i

I .» i:_ * 1

i ; . ♦• v *

!%” Ii if, r*%J

■V\ ,, ^ ■ ‘■ .\|

‘ i

I. EARLY GLAZING. From S. Serge, Angers, Grisaille, with colour introduced in the small circles. II. AN EARLY BORDER, From S. Kunibert, Cologne. HI. PORTION OF AN EARLY MEDALLION WINDOW.

From Canterbury, showing the plan of the design and the

ornamental details.

IV. AN EARLY FIGURE FROM LYONS. Showing the leading of the eyes, hair, nimbus, and drapery.

V. DECORATED LIGHTS. From S. Urbain, Troyes, showing both the influence of the early period in the figures, and the beginning of the architectural canopy.

VI. TYPICAL DECORATED CANOPY. From Exeter.

Nos. I., II., 111., IV., VI. are taken from Illustrations in Lewis F. Day, Windows, by permission of Ii. T. Ratsford.

Plate II.

GLASS, STAINED

f ”””””” ” ˆ 1 ‘> fill %*-M* ; WjLlimL* $»€.• t ■• 1 h

%; f – £>

‘V Cˆ

”” **Y* &\ > f C wfl £ˆiˆ**i

I. II.

III. IV.

ˆ T.Xf.‘jfAV, PERPENDICULAR CANOPY (from Lewis F. Day. Windows, by permission of B. T. Batsford).

A WINDOW FROM AUCH. Illustrating the transition from Perpendicular to Renaissance.

A SIXTEENTH-CENTURY JESSE WINDOW. From Beauvais (source as in Fig. I.).

PORTION OF A RENAISSANCE WINDOW. From Montmorency, showing the perfection of glass painting.

From Lucien Magne, Oeuvre del Peinlres Verriers Fran.

, by permission of Firmin-Didot « O*.

GLASS, STAINED

behind, the mullions. The expansion to a picture right across the window was only a question of time. Not that the artist ventured as yet to disregard the architectural setting of his picture — that happened later on — but that he often composed it with such cunning reference to intervening stonework that it did not interfere with it. It has been argued that each separate light of a window ought to be complete in itself. On the other hand it has proved possible to make due acknowledgment of architectural conditions without cramping design in that way. There can be no doubt as to the variety and breadth of treatment gained by accepting the whole window as field for a design. And, when a number of lights go to make a window, it is the window, and no separate part of it, which is the main consideration.

By the end of the Gothic period, glass painters proceeded on an entirely different method from that of the 13th century. The designer of early days began with glazing: he thought in mosaic and leadwork; the lines he first drew were the lines of glazing; painting was only a supplementary process, enabling him to get what lead lines would not give. The Late Gothic draughtsman began with the idea of painting; glazing was to him of secondary importance; he reached a stage (Creation window, Great Malvern) where it is clear that he first sketched out his design, and then bethought him how to glaze it in such wise that the leadwork (which once boldly outlined everything) should not interfere with the picture. The artful way in which he would introduce little bits of colour into a window almost entirely white, makes it certain that he had always at the back of his mind the consideration of the glazing to come. So long as he thought of that, and did not resent it, all was fairly well with glass painting, but there came a point where he found it difficult, if not impossible, to reconcile the extreme delicacy of his painting upon white glass with the comparatively brutal strength of his lead lines. It is here that the conditions of painting and glazing clash at last.

It must not be supposed that Late Gothic windows were never by any chance rich in colour. Local conservatism and personal predilection prevented anything like monotonous progress in a single direction. There is (St Sebald, Nuremberg) Middle Gothic glass as dense in colour as any 13th-century work, and Late Gothic (Troyes cathedral) which, from its colour, one might take at first to be a century earlier than it is. In Italy (Florence) and to some extent in Spain (Seville) it was the custom to make canopywork so rich in colour that it was more like part of the picture than a frame to it. But that was by exception. The tendency was towards lighter windows. Glass itself was less deeply stained when painters depended more upon their power of

deepening it by paint. It was the seeking after delicate effects of painting, quite as much as the desire to let light into the church, which determined the tone of later windows. The clearer the glass the more scope it gave for painting.

It is convenient to draw a line between Gothic art and Renais- sance. Nothing is easier than to say that windows in which crocketed canopywork occurs are Gothic, and that those with arabesque are Renaissance. But that is an arbitrary distinction, which does not really distinguish. Some of the most beautiful work in glass, such for example as that at Auch, is so plainly intermediate between two styles that it is impossible to describe it as anything but " transitional." And, apart from particular instances, we have only to look at the best Late Gothic work to see that it is informed by the new spirit, and at fine Renaissance glass to observe how it conforms to Gothic traditions of workman- ship. The new idea gave a spurt to Gothic art; and it was Gothic impetus which carried Renaissance .glass painting to the summit of accomplishment reached in the first half of the 16th century. When that subsided, and the pictorial spirit of the age at last prevailed, the bright days of glass were at an end. If we have to refer to the early Renaissance as the culminating period of glass painting, it is because the technique of an earlier period found in it freer and fuller expression. With the Renaissance, design broke free from the restraints of tradition.

An interesting development of Renaissance design was the framing of pictures in golden-yellow arabesque ornament,

scarcely architectural enough to be called canopywork, and reminiscent rather of beaten goldsmith's work than of stone carving. This did for the glass picture what a gilt frame does for a painting in oil. Very often framework of any kind was dispensed with. The primitive idea of accepting bars and mullions as boundaries of design, and filling the compartments formed by them with a medley of little subjects, lingered on. The result was delightfully broken colour, but inevitable confusion; for iron and masonry do not effectively separate glass pictures. There was no longer in late glass any pretence of preserving the plane of the window. It was commonly designed to suggest that one saw out of it. Throughout the period of the Renaissance, architectural and landscape backgrounds play an important part in design. An extremely beautiful feature in early 16th-century French glass pictures (Rouen, &c.) is the little peep of distant country delicately painted upon the pale-blue glass which represents the sky. In larger work landscape and architecture were commonly painted upon white (King's College, Cambridge). The landscape effect

was always happiest when one or other of these conventions was adopted. Canopywork never went quite out of fashion. For a long while the plan was still to frame coloured pictures in white. Theoretically this is no less effectually to be done by Italian than by Gothic shrinework. Practically the architectural setting assumed in the 16th century more and more the aspect of background to the figures, and, in order that it should take its place in the picture, they painted it so heavily that it no longer told as white. Already in van Orley's magnificent transept windows at St Gudule, Brussels, the great triumphal arch behind the kneeling donors and their patron saints (in late glass donors take more and more the place of holy personages) tells dark against the clear ground. There came a time, towards the end of the century, when, as in the wonderful windows at Gouda, the very quality of white glass is lost in heavily painted shadow. The pictorial ambition of the glass painter, active from the first, was kept for centuries within the bounds of decoration. Medallion subjects were framed in ornament, standing figures in canopywork, and pictures were conceived with regard to the window and its place in architecture. Severity of treatment in design may have been due more to the limitations of technique than to restraint on the part of the painter. The point is that it led to unsurpassed results. It was by absolute reliance upon the depth and brilliancy of self-coloured glass that all the beautiful effects of early glass were obtained. We need not compare early mosaic with later painted glass; each was in its way admirable; but the early manner is the more peculiar to glass, if not the more proper to it. The ruder and more archaic design gives in fullest measure the glory of glass — for the loss of which no quality of painting ever got in glass quite makes amends. The pictorial effects compatible with glass design are those which go with pure, brilliant and translucent colour. The ideal of a "primitive" Italian painter was more or less to be realized in glass: that of a Dutch realist was not. It is astonishing what glass painters did in the way of light and shade. But the fact remains that heavy painting obscured the glass, that shadows rendered in opaque surface-colour lacked translucency, and that in seeking before all things the effects of shadow and relief, glass painters of the 17th century fell short of the qualities on the one hand of glass and on the other of painting.

The course of glass painting was not so even as this general survey of its progress might seem to imply. It was quickened here, impeded there, by historic events. The art made a splendid start in France; but its development was stayed by the disasters of war, just when in England it was thriving under the Planta- genets. It revived again under Francis I. In Germany it was with the prosperity of the free

cities of the Empire that glass painting prospered. In the Netherlands it blossomed out under the favour of Charles V. In the Swiss Confederacy its direction was determined by civil and domestic instead of church patron- age. In most countries there were in different districts local schools of glass painting, each with some character of its own. To what extent design was affected by national temperament it is not easy to say. The marked divergence of the Flemish from the

French treatment of glass in the 16th century is not entirely due to a preference on the one part for colour and on the other for light and shade, but is partly owing to the circumstance that, whilst in France design remained in the hands of craftsmen, whose trade was glass painting, in the Netherlands it was entrusted by the emperor to his court painter, who concerned himself as little as possible with a technique of which he knew nothing. If in France we come also upon the names of well- known artists, they seem, like Jean Cousin, to have been closely connected with glass painting: they designed so like glass painters that they might have begun their artistic career in the workshop.

The attribution of fine windows to famous artists should not be too readily accepted; for, though it is a foible of modern times to father whatever is noteworthy upon some great name, the masterpieces of medieval art are due to unknown craftsmen. In Italy, where glass painting was not much practised, and it seems to have been the custom either to import glass painters as they were wanted or to get work done abroad, it may well be that designs were supplied by artists more or less distinguished. Ghiberti and Donatello may have had a hand in the cartoons for the windows of the Duomo at Florence; but it is not to any sculptor that we can give the entire credit of design so absolutely in the spirit of colour decoration. The employment of artists not connected with glass design would go far to explain the great difference of Italian glass from that of other countries. The 14th-century work at Assisi is more correctly described as ” Trecento ” than as Gothic, and the ” Quattrocento ” windows at Florence are as different as could be from Perpendicular work. One compares them instinctively with Italian paintings, not with glass elsewhere. And so with the 15th-century Italian glass. The superb 16th-century windows of William of Marseilles at Arezzo, in which painting is carried to the furthest point possible short of sacrificing the pure quality of glass, are

more according to contemporary French technique. Both French and Italian influence may be traced in Spanish glass (Avila, Barcelona, Burgos, Granada, Leon, Seville, Toledo). Some of it is said to have been executed in France. If so it must have been done to Spanish order. The coarse effectiveness of the design, the strength of the colour, the general robustness of the art, are characteristically Spanish; and nowhere this side of the Pyrenees do we find detail on a scale so enormous.

We have passed by, in following the progressive course of craftsmanship, some forms of design, peculiar to no one period but very characteristic of glass. The ” quarry window,” barely referred to, its diamond-shaped or oblong panes painted, richly bordered, relieved by bosses of coloured ornament often heraldic, is of constant occurrence. Entire windows, too, were from first to last given up to heraldry. The ” Jesse window ” occurs in every style. According to the fashion of the time the ” Stem of Jesse ” burst out into conventional foliage, vine branches or arbitrary scrollwork. It appealed to the designer by the scope it gave for freedom of design. He found vent, again, for fantastic imagination in the representation of the “Last Judgment,” to which the west window was commonly devoted. And there are other schemes in which he delighted; but this is not the place to dwell upon them.

The glass of the 17th century does not count for much. Some of the best in England is the work of the Dutch van Linge family (Wadham and Balliol Colleges, Oxford). What glass painting came to in the 18th century is nowhere better to be seen than in the great west window of the ante-chapel at New College, Oxford. That is all Sir Joshua Reynolds and the best china painter of his day could do between them. The very, idea of employing a china painter shows how entirely the art of the glass painter had died out.

It re-awoke in England with the Gothic revival of the 10th century; and the Gothic revival determined the direction

modern glass should take. Early Victorian doings are interesting only as marking the steps of recovery (cf . the work of T.Willement

in the choir, of the Temple church; of Ward and Nixon, lately

removed from the south transept of Westminster Abbey; of

Wailes). Better things begin with the windows at Westminster inspired by A. C. Pugin, who exercised considerable influence over his

contemporaries. John Powell (Hardman & Co.) was an able artist content to walk, even after that master's death, reverently in his footsteps. Charles Winston, whose Hints on Glass Painting was the first real contribution towards the understanding of Gothic glass, and who, by the aid of the Powells (of Whitefriars) succeeded in getting something very like the texture and colour of old glass, was more learned in ancient ways of workmanship than appreciative of the art resulting from them. (He is responsible for the Munich glass in Glasgow cathedral.) So it was that, except for here and there a window entrusted by exception to W. Dyce, E. Poynter, D. G. Rossetti, Ford Madox Brown or E. Burne- Jones, glass, from the beginning of its recovery, fell into the hands of men with a strong bias towards archaeology. The architects foremost in the Gothic revival (W. Butterfield, Sir G. Scott, G. E. Street, &c.) were all inclined that way; and, as they had the placing of commissions for windows, they controlled the policy of glass painters. Designers were constrained to work in the pedantically archaeo- logical manner prescribed by architectural fashion. Unwillingly as it may have been, they made mock-medieval windows, the interest in which died with the popular illusion about a Gothic revival. But they knew their trade; and when an artist like John Clayton (master of a whole school of later glass painters) took a window in hand (St Augustine's, Kilburn; Truro cathedral; King's College Chapel, Cambridge) the result was a work of art from which, tradework as it may in a sense be, we may gather what such men might have done had they been left free to follow their own artistic impulse. It is necessary to refer to this because it is generally supposed that whatever is best in recent glass is due to the romantic movement. The charms of Burne- Jones's design and of William Morris's colour, place the windows done by them among the triumphs of modern decorative art; but Morris was neither foremost in the reaction, nor quite such a master of the material he was working in as he showed himself in less exacting crafts. Other artists to be mentioned in con- nexion with glass design are: Clement Heaton, Bayne, N. H. J. Westlake and Henry Holiday, not to speak of a younger genera- tion of able men.

Foreign work shows, as compared with English, a less just appreciation of glass, though the foremost draughtsmen of their day were enlisted for its design. In Germany, King Louis of Bavaria employed P. von Cornelius and W. von Kaulbach (Aix-la-Chapelle, Cologne, Glasgow); in France the Bourbons employed J. A. D. Ingres, F. V. E. Delacroix, Vernet and J. H. Flandrin (Dreux); and the execution of their designs was entrusted to the most expert painters to be procured at Munich and Sevres; but all to little effect. They either

used potmetal glass of poor quality, or relied upon enamel — with the result that their colour lacks the qualities of glass. Where it is not heavy with paint it is thin and crude. In Belgium happier results were obtained. In the chapel of the Holy Sacrament at Brussels there is one window by J. B. Capronnier not unworthy of the fine series by B. van Orley which it supplements. At the best, however, foreign artists failed to appreciate the quality of glass; they put better draughtsmanship into their windows than English designers of the mid- Victorian era, and painted them better; but they missed the glory of translucent colour.

Modern facilities of manufacture make possible many things which were hitherto out of the question. Enamel colours are richer; their range is extended; and it may be possible, with the improved kilns and greater chemical knowledge we possess, to make them hold permanently fast. It was years ago demon- •\ strated at Sevres how a picture may be painted in colours upon a sheet of plate-glass measuring 4 ft. by 2§ ft. We are now no doubt in a position to produce windows painted on much larger sheets. But the results achieved, technically wonderful as they are, hardly warrant the waste of time and labour upon work so costly, so fragile, so lacking in the qualities of a picture on the one hand and of glass on the other.

In America, John la Farge, finding European material not

in

dense enough, produced potmetal more heavily charged with colour. This was wilfully streaked, mottled and quasi- accidentally varied; some of it was opalescent; much of it was more like agate or onyx than jewels. Other forms of American enterprise were : the making of glass in lumps, to be chipped into flakes; the ruckling it;

restrained from self-expression. Moreover, the recognition of the artistic position of craftsmen in general makes it possible for a man to devote himself to glass without sinking to .the rank of a mechanic; and artists begin to realize the scope glass offers them. What they lack as yet is experience in their craft, and

France. Chartres ˆ Le Mans

Bourges l cathedrals. Reims Auxerre J Ste Chapelle, Paris. Church of St Jcan-aux-Bois.

England. York minster. Ely cathedral. Wells cathedral. Tewkesbury abbey.

Italy. Church of St Francis, Assisi. Church of Or San Michele,

Florence. Church of S. Petronio, Bologna.

England. New College, Oxford. Gloucester cathedral.

York, minster and other churches. Church of Notre Dame, Alencon. Great Malvern abbey.

Church of St Mary, Shrewsbury. Fairford church.

the shaping it in a molten state, or the pulling it out of shape. It takes an artist of some reserve to make judicious use of glass like this. La Farge and L. C. Tiffany have turned it to beautiful account; but even they have put it to purposes more pictorial than it can properly fulfil. The design it calls for is a severely abstract form of ornament verging upon the barbaric.

Of late years each country has been learning so much from the others that the newest effort is very much in one direction. It seems to be agreed that the art of the window-maker begins with glazing, that the all-needful thing is beautiful glass, that painting may be reduced to a minimum, and on occasion (thanks to new developments in the making of glass) dis- pensed with altogether. A tendency has developed itself in the direction not merely of mosaic, but of carrying the glazier's art farther than has been done before and render- ing landscapes and even figure subjects in unpainted glass.

When, however, it comes to

the representation of the human face, the limitations

of simple lead-glazing are at

once apparent. A possible

way out of the difficulty was

shown at the Paris Exhibition

of 1900 by M. Tournel, who,

by fusing together coloured

tesserae on to larger pieces of

colourless glass, anticipated the

discovery of the already men- tioned fragment of Byzantine

mosaic now in the Victoria

and Albert Museum. He may

have seen or heard of some- thing of the sort. There would

be no advantage in building

up whole windows in this

way; but for the rendering of

the flesh and sundry minute

details in a window for the

most part heavily leaded, this

fusing together of tesserae,

and even of little pieces of

glass cut carefully to shape, seems to supply the want of some- thing more in keeping with severe mosaic glazing than painted

flesh proves to be.

Glass painters are allowed to-day a freer hand than formerly.

They are no longer exclusively engaged upon ecclesiastical work ; domestic glass is an important industry; and a workman once comparatively exempt from pedantic control is not so easily

Examples of Important Historical Stained Glass.

There are remains of the earliest known glass : in France — at Le Mans, Chartres, Chalons-sur-Marne, Angers and Poitiers cathedrals, the abbey church of St Denis and at St Remi, Reims : in England — at York minster (fragments) : in Germany — at Augsburg and Strassburg cathedrals : in Austria — in the cloisters of Heiligen Kreuz.

The following is a classified list of some of the most characteristic and

important windows, omitting for the most part isolated examples, and giving by preference the names of churches where there is a fair amount of glass remaining ; the country in which at each period the art throve best is put first.

Early Gothic England. Canterbury) Salisbury \ cathedrals. Lincoln) York minster.

Germany. Church of St Kunibert, Cologne

(Romanesque). Cologne cathedral.

Middle Gothic Germany. Church of St Sebald, Nuremberg. Strassburg ˆ Regensburg

Augsburg I cathedrals. Erfurt

Freiburg J Church of Nieder Haslach.

Late Gothic France. Bourges l cathedrals . 1 royes

Rouen.

France,

St Vincent

St Patrice

St Godard

Church of St Foy, Conches.

Church of St Gervais, Paris.

Church of St £tienne-du-Mont, Paris.

Church of St Martin, Mont- morency.

Church of Ecouen.

Church of St Etienne, Beauvais.

Church of St Nizier, Troyes.

Church of Brou, Bourg-en- Bresse.

The Chateau de Chantilly.

Netherlands. Groote Kirk, Gouda. Choir of Brussels cathedral. Antwerp cathedral.

Italy. The Duomo, Florence.

Transition Period The choir of the cathedral at Auch.

Renaissance Netherlands. Brussels cathedral. Church of St Jacques) Church of St Martin)■ Liege. Cathedral)

Italy. Ar-o lcathedral ,

Certosa di Pavia. Church of S. Petronio, Bologna. Church of Sta Maria Novella, Florence.

Germany. Freiburg cathedral.

Late Renaissance

France.

Church of St Martin-&s-Vignes,

Troyes. Nave and transepts of Auch cathedral.

France. fivreux cathedral. Church of St Pierre, Chartres. Cathedral and church of St

Urbain, Troyes. Church of Ste Radegonde.Poitiers. Cathedral and church of St Ouen,

Rouen.

Spain. Toledo cathedral.

Germany. Cologne)

Ulm v cathedrals- Munich) Church of St Lorenz, Nuremberg.

Spain. Toledo cathedral.

Switzerland. Lucerne and most of the. other principal museums.

Spain. Granada I ra1 .i, p ,4 ra i- Seville i cattleQrals –

England.

King’s College chapel, Cam- bridge.

Lichfield cathedral.

St George's church, Hanover Square, London.

St Margaret's church, West- minster.

England. Wadham)

Balliol > colleges, Oxford. New)

Switzerland. Most museums.

perhaps due workmanlike respect for traditional ways of work-manship. When the old methods come to be superseded it will be only by new ones evolved out of them. At present the conditions of glass painting remain very much what they were. The supreme beauty of glass is still in the purity, the brilliancy, the translucency of its colour. To make the most of this the designer must be master of his trade. The test of window design

is, now as ever, that it should have nothing to lose and everything to gain by execution in stained glass.

Bibliography. — Theophilus, Arts of the Middle Ages (London, 1847); Charles Winston, An Inquiry into the Difference of Style observable in Ancient Glass Painting, especially in England (Oxford, 1847), and Memoirs illustrative of the Art of Glass Painting (London, 1865); N. H. J. Westlake, A History of Design in Painted Glass (4 vols., London, 1881-1894); L. F. Day, Windows, A Book about Stained and Painted Glass (London, 1909), and Stained Glass (London, 1903) ; A. W. Franks, A Book of Ornamental Glazing Quarries (London, 1849); A Booke of Sundry Draughtes, principaly serving for Glasiers (London, 1615, reproduced 1900); F. G. Joyce, The Fairford Windows (coloured plates) (London, 1870); Divers Works of Early Masters in Ecclesiastical Decoration, edited by John Weale (2 vols., London, 1846); Ferdinand de Lasteyrie, Histoire de la peinture sur verre d'apres ses monuments en Prance (2 vols., Paris, 1852), and Quelques mots sur la theorie de la peinture sur verre (Paris, 1853) ; L. Magne, QLuvre des peintres verriers francais (2 vols., Paris, 1885) ; Viollet le Due, " Vitrail," vol. ix. of the Dictionnaire raisonne de I' architecture (Paris, 1868); O. Merson, " Les Vitraux," Biblio- theque de I ' enseignement des beaux-arts (Paris, 1895); E. Levy and J. B. Capronnier, Histoire de la peinture

sur verre (coloured plates) (Brussels, i860); Ottin, Le Vitrail, son histoire & travers les ages (Paris) ; Pierre le Vieil, L 'Art de la peinture sur verre et de la vitrerie (Paris, 1774); C. Cahier and A. Martin, Vitraux peints de Bourges du XIII' siecle (2 vols., Paris, 1841-1844); S. Clement and A. Guitard, Vitraux du XIII' siecle de la cathedrale de Bourges (Bourges, 1900); M. A. Gessert, Geschichte der Glasmalerei in Deutschland und den Niederlanden, Frankreich, England, &c, von ihrem Ursprung bis auf die neueste Zeit (Tubingen and Stuttgart, 1839; also an English translation, London, 1851); F. Geiges, Der alte Fenster- schmuck des Freiburger Milnsters, 5 parts (Freiburg im Breisgau, 1902, &c); A. Hafner, Chefs-d'oeuvre de la peinture Suisse sur verre (Berlin). (L. F. D.)

GLASSBRENNER, ADOLF (1810-1876), German humorist and satirist, was born at Berlin on the 27th of March 1810. After being for a short time in a merchant's office, he took to journalism, and in 1831 edited Don Quixote, a periodical which was suppressed in 1833 owing to its revolutionary tendencies. He next, under the pseudonym Adolf Brennglas, published a series of pictures of Berlin life, under the titles Berlin wie es ist und — trinkt (30 parts, with illustrations, 1833-1849), and Buntes Berlin (14 parts, with illustrations, Berlin, 1837-1858), and thus became the founder of a popular satirical literature associated with modern Berlin. In 1840 he married the actress Adele Peroni (181 3- 189 5), and removed in the following year to Neustrelitz, where his wife had obtained an engagement at the Grand ducal theatre. In 1848 Glassbrenner entered the political arena and became the leader of the democratic party in Mecklenburg-Strelitz. Expelled from that country in 1850, he settled in Hamburg, where he remained until 1858; and then he became editor of the Montagszeitungm. Berlin, where he died on the 25th of September 1876.

Among Glassbrenner's other humorous and satirical writings may be mentioned: Leben und Treiben der feinen Welt (1834); Bilder und Trdume aus Wien (2 vols., 1836); Gedichte (1851, 5th ed. 1870); the comic epics, Neuer Reineke Fuchs (1846, 4th ed. 1870) and Die verkehrte- Welt (1857, 6th ed. 1873); also Berliner Volksleben (3 vols., illustrated; Leipzig, 1 847-1851). Glassbrenner has published some charming books for children, notably Lachende K inder (14th ed., 1884), and Sprechende Tiere (20th ed., Hamburg, 1899).

See R. Schmidt-Cabanis, " Adolf Glassbrenner," in XJnsere Zeit

(1881).

GLASS CLOTH, a textile material, the name of which indicates the use for which it was originally intended. The cloths are in general woven with the plain weave, and the fabric may be all white, striped or checked with red, blue or other coloured threads; the checked cloths are the most common. The real article should be all linen, but a large quantity is made with cotton warp and tow weft, and in some cases they are composed entirely of cotton. The short fibres of the cheaper kind are easily detached from the cloth, and hence they are not so satis- factory for the purpose for which they are intended.

GLASSIUS, SALOMO (1593-1656), theologian and biblical critic, was born at Sondershausen, in the principality of Schwarz- burg-Sondershausen, on the 20th of May 1593. In 161 2 he entered the university of Jena. In 161 5, with the idea of studying law, he moved to Wittenberg. In consequence of an illness, however, he returned to Jena after a year. Here, as a student of theology under Johann Gerhard, he directed his attention

especially to Hebrew and the cognate dialects; in 16 19 he was made an ” adjunctus ” of the philosophical faculty, and some time afterwards he received an appointment to the chair of Hebrew. From 1625 to 1638 he was superintendent in Sonders- hausen; but shortly after the death of Gerhard (1637) he was, in accordance with Gerhard’s last wish, appointed to succeed him at Jena. In 1640, however, at the earnest invitation of Duke Ernest the Pious, he removed to Gotha as court preacher and general superintendent in the execution of important reforms which had been initiated in the ecclesiastical and educational establishments of the duchy. The delicate duties attached to this office he discharged with tact and energy; and in the ” syncretistic ” controversy, by which Protestant Germany was so long vexed, he showed an unusual combination of firmness with liberality, of loyalty to the past with a just regard to the demands of the present and the future. He died on the 27th of July 1656.

His principal work, Philologia sacra (1623), marks the transition from the earlier views on questions of biblical criticism to those of the school of Spener. It was more than once reprinted during his lifetime, and appeared in a new and revised form, edited by J. A. Dathe (1731-1791) and G. L. Bauer at Leipzig. Glassius succeeded Gerhard as editor of the Weimar Bibelwerk, and wrote the commentary on the poetical books of the Old Testament for that publication. A volume of his Opuscula was printed at Leiden in 1700.

See the article in Herzog-Hauck, Realencyklopddie.

GLASSWORT, a name given to Salicornia kerbacea (also known as- marsh samphire), a salt-marsh herb with succulent, jointed, leafless stems, in reference to its former use in glass- making, when it was burnt for barilla. Salsola Kali, an allied plant with rigid, fleshy, spinous-pointed leaves, which was used for the same purpose, was known as prickly glasswort. Both plants are members of the natural order Chenopodiaceae.

GLASTONBURY, a market town and municipal borough in the Eastern parliamentary division of Somersetshire, England, on the main road from London to Exeter, 37 m. S.W. of Bath by the Somerset & Dorset railway. Pop. (1901) 4016. The town lies in the midst of orchards and water-meadows, reclaimed from the fens which encircled Glastonbury Tor, a conical height once an island, but now, with the surrounding flats, a peninsula washed on three sides by the river Brue.

The town is famous for its abbey, the ruins of which are frag- mentary, and as the work of destruction has in many places descended to the very foundations it is impossible to make out the details of the plan. Of the vast range of buildings for the accommodation of the monks hardly any part remains except the abbot's kitchen, noteworthy for its octagonal interior (the ex- terior plan being square, with the four corners filled in with fire- places and chimneys), the porter's lodge and the abbey barn. Considerable portions are standing of the so-called chapel of St Joseph at the west end, which has been identified with the Lady chapel, occupying the site of the earliest church. This chapel, which is the finest part of the ruins, is Transitional work of the 12th century. It measures about 66 ft. from east to west and about 36 from north to south. Below the chapel is a crypt of the 1 5th century inserted beneath a building which had no previous crypt. Between the chapel and the great church is an Early English building which appears to have served as a Galilee porch. The church itself was a cruciform structure with a choir, nave and transepts, and a tower surmounting the centre of intersection. From east to west the length was 410 ft. and the breadth of the nave was about 80 ft. The nave had ten bays and the choir six. Of the nave three bays of the south side are still standing, and the windows have pointed arches externally and semicircular arches internally. Two of the tower piers and a part of one arch give some indication of the grandeur of the building. The foundations of the Edgar chapel, discovered in 1908, make the whole church the longest of cathedral or monastic churches in the country. The old clock, presented to the abbey by Adam de Sodbury (1322-1335), and noteworthy as an early example of a clock striking the hours automatically with a count-wheel, was once in Wells cathedral, but is now preserved in the Victoria and Albert Museum.

“3

The Glastonbury thorn, planted, according to the legend, by Joseph of Arimathea, has been the object of considerable com- ment. It is said to be a distinct variety, flowering twice a year. The actual thorn visited by the pilgrims was destroyed about the Reformation time, but specimens of the same variety are still extant in various parts of the country.

The chief buildings, apart from the abbey, are the church of St John Baptist, Perpendicular in style, with a fine tower and some 15th-century monuments; St Benedict’s, dating from 1493-1524; St John’s hospital, founded 1246; and the George Inn, built in the time of Henry VII. or VIII. The present stone cross replaced a far finer one of great age, which had fallen into decay. The Antiquarian Museum contains an excellent collection, including remains from a prehistoric village of the marshes, discovered in 1892, and consisting of sixty mounds within a space of five acres. There is a Roman Catholic missionaries’ college. In the 16th century the woollen industry was introduced by the duke of Somerset; and silk manufacture was carried on in the 18th century. Tanning and tile-making, and the manufacture of boots and sheep-skin rugs are practised. The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 5000 acres.

The lake-village discovered in 1892 proves that there was a Celtic settlement about 300-200 B.C. on an island in the midst of swamps, and therefore easily defensible. British earthworks and Roman roads and relics prove later occupation. The name of Glastonbury, however, is of much later origin, being a corrup- tion of the Saxon Glcestyngabyrig. By the Britons the spot seems to have been called Ynys yr Afalon (latinized as Avallonia) or Ynysvitrin (see Avalon), and it became the local habitation of various fragments of Celtic romance. According to the legends which grew up under the care of the monks, the first church of Glastonbury was a little wattled building erected by Joseph of Arimathea as the leader of the twelve apostles sent over to Britain from Gaul by St Philip. About a hundred years later, according to the same authorities, the two missionaries, Phaganus and Deruvianus, who came to king Lucius from Pope Eleutherius, established a fraternity of anchorites on the spot, and after three hundred years more St Patrick introduced among them a regular monastic life. The British monastery founded about 601 was succeeded by a Saxon abbey built by Ine in 708. From the decadent state into which Glastonbury was brought by the Danish invasions it

was recovered by Dunstan, who had been educated within its walls and was appointed its abbot about 946. The church and other buildings of his erection remained till the installation, in 1082, of the first Norman abbot, who inaugurated the new epoch by commencing a new church. His successor Herlewin (1101-1120), however, pulled it down to make way for a finer structure. Henry of Blois (1126-1172) added greatly to the extent of the monastery. In 1184 (on 25th May) thewholeof the buildings were laid in ruins by fire; but Henry II. of England, in whose hands the monastery then was, entrusted his chamberlain Rudolphus with the work of restoration, and caused it to be carried out with much magnificence. The great church of which the ruins still remain was then erected. In the end of the 1 2th century, and on into the following, Glastonbury was distracted by a strange dispute, caused by the attempt of Savaric, the ambitious bishop of Bath, to make himself master of the abbey. The conflict was closed by the decision of Innocent III., that the abbacy "should be merged in the new see of Bath and Glastonbury, and that Savaric should have a fourth of the property. On Savaric's death his successor gave up the joint bishopric and allowed the monks to elect their own abbot. From this date to the Reformation the monastery, one of the chief Benedictine abbeys in England, continued to flourish, the chief events in it's history being connected with the maintenance of its claims to the possession of the bodies or tombs of King Arthur and St Dunstan. From early times through the middle ages it was a place of pilgrimage. As early at least as the beginning of the nth century the tradition that Arthur was buried at Glastonbury appears to have taken shape; and in the reign of Henry II., according to Giraldus Cambrensis and others, the abbot Henry de

Blois, causing search to be made, discovered at the depth of 16

ft. a massive oak trunk with an inscription " Hie jacet sepultus inclitus rex Arthurus in insula Avalonia." After the fire of 1184 the monks asserted that they were in possession of the remains of St Dunstan, which had been abstracted from Canterbury after the Danish sack of ion and kept in concealment ever since. The Canterbury monks naturally denied the assertion, and the contest continued for centuries. In 1508 Warham and Goldston having examined the Canterbury shrine reported that it contained all the principal bones of the saint, but the abbot of Glastonbury in reply as stoutly maintained that this was impossible. The day of such disputes was, however, drawing to a close. In 1539 the last and 60th abbot of Glastonbury, Robert Whyting, was lodged in the Tower on account of " divers and sundry treasons." " The ' account ' or ' book ' of his treasons …. seems to be lost, and the nature of the charges …. can only be a matter of specu-

lation ” (Gairdner, Cal. Pap. on Hen. VIII., xiv. ii. pre/, xxxii). He was removed to Wells, where he was ” arraigned and next day put to execution for robbing of Glastonbury church.” The execution took place on Glastonbury Tor. His body was quartered and his head fixed on the abbey gate. A darker passage does not occur in the annals of the English Reformation than this murder of an able and high-spirited man, whose worst offence was that he defended as best he could from the hand of the spoiler the property in his charge.

In 1907, the site of the abbey with the remains of the buildings, which had been in private hands since the granting of the estate to Sir Peter Carew by Elizabeth in 1559, was bought by Mr Ernest Jardine for the purpose of transferring it to the Church of England. Bishop Kennion of Bath and Wells entered into an agreement to raise a sum of £31,000, the cost of the purchase ; this was completed, and the site and buildings were formally transferred at a dedicatory service in 1909 to the Diocesan Trustees of Bath and Wells, who are to hold and manage the property according to a deed of trust. This deed provided for the appointment of an advisory council, consisting of the arch- bishop of Canterbury, the bishop of Bath and Wells and four other bishops, each with power to nominate one clerical and one lay member. The council has the duty of deciding the purpose for which the property is to be used ” in connexion with and for the benefit of the Church of England.” To give time for further collection of funds and deliberation, the property was re-let for five years to the original purchaser.

In the 8th century Glastonbury was already a borough owned by the abbey, which continued to be overlord till the Dissolution. The abbey obtained charters in the 7th century, but the town received its first charter from Henry II., who exempted the men of Glastonbury from the jurisdiction of royal officials and freed them from certain tolls. This was confirmed by Henry III. in 1227, by Edward I. in 1278, by Edward II. in 1313 and by Henry VI. in 1447. The borough was incorporated by Anne in 1706, and the corporation was reformed by the act of 1835. In 13 19 Glastonbury received a writ of summons to parliament, but made no return, and has not since been represented. A fair on the 8th of September was granted in 11 27; another on the 29th of May was held under a charter of 1282. Fairs known as Torr fair and Michaelmas fair are now held on the second Mondays in September and October and are chiefly important for the sale of horses and cattle. The market day every other Monday is noted for the sale of cheese. Glastonbury owed its medieval importance to its connexion with the abbey. At the Dissolution the introduction of woollen manufacture checked the decay of the town. The cloth trade

flourished for a century and was replaced by silk-weaving, stocking-knitting and glove- making, all of which have died out.

See AbbotGasquet, Henry VIII. and the English Monasteries (1906), and The Last Abbot of Glastonbury (1895 and 1908); William of Malmesbury, ” De antiq. Glastoniensis ecclesiae,” in Rerum Anglicarum script, vet. torn. i. (1684) (also printed by Hearne and Migne) ; John of Glastonbury, Chronica sive de hist, de rebus Glast., ed. by Hearne (2 vols., Oxford, 1726); Adam of Domerham, De rebus geslis Glast., ed. by Hearne (2 vols., Oxford, 1727) ; Hist, and Antiq. of Glast. (London, 1807) ; Avalonian Guide to the Town of Glastonbury (8th ed., 1839); Warner, Hist, of the Abbey and Town (Bath, 1826); Rev. F. Warre, ” Glastonbury Abbey,” in Proc. of Somersetshire

Archaeol. and Nat. Hist. Soc, 1849; Rev. F. Warre, ” Notice of Ruins of Glastonbury Abbey,” ib. 1859; Rev. W. A. Jones, ” On the Reputed Discovery of King Arthur’s Remains at Glaston- bury,” ib. 1859; Rev. J. R. Green, ” Dunstan at Glastonbury” and ” Giso and Savaric,” ib. 1863; Rev. Canon Jackson, ” Savaric, Bishop of Bath and Glastonbury,” ib. 1862, 1863; E. A. Free- man, ” King Ine,” ib. 1872 and 1874; Dr W. Beattie, in Journ. of Brit. Archaeol. Ass. vol. xii., 1856; Rev. R. Willis, Architectural History of Glastonbury Abbey (1866); W. H. P. Greswell, Chapters on the Early History of Glastonbury Abbey (1909). Views and plans of the abbey building will be found in Dugdale’s Monasticon (1655); Stevens’s Monasticon (1720) ; Stukeley, Ilinerarium curiosum (1724) ; Grose, Antiquities (1754) ; Carter, Ancient Architecture (1800) ; Storer, Antiq. and Topogr. Cabinet, ii., iv., v. (1807), &c; Britton’s Archi- tectural Antiquities, iv. (1813); Vetusta monumenta, iv. (1815); and New Monasticon, i. (1817).

GLATIGNY, JOSEPH ALBERT ALEXANDRE (1839-1873), French poet, was born at Lillebonne (Seine Inferieure) on the 21st of May 1839. His father, who was a carpenter and after- wards a gendarme, removed in 1844 to Bernay, where Albert received an elementary education. Soon after leaving school he was apprenticed to a printer at Pont Audemer, where he pro- duced a three-act play at the local theatre. He then joined a travelling company of actors to whom he acted as prompter. Inspired primarily by the study of Theodore de Banville, he published his Vignes folles in 1857; his best collection of lyrics, Les Filches d’or, appeared in 1864; and a third volume, Gilles etpasquins, in 1872.

After Glatigny settled in Paris he improvised at cafe concerts and wrote several one-act plays. On an expedition to Corsica with a travelling company he was on one occasion arrested and put in irons for a week through being mistaken by the police for a notorious criminal. His marriage with Emma Dennie brought him great happiness, but the hard- ships of his life. weakened his health and he died at Sevres on the 16th of April 1873.

See Catulle Mendes, Legende du Parnasse contemporain (1884), and Glatigny, drame funambulesque (1906).

GLATZ (Slav. Kladsko), a fortified town of Germany, in the Prussian province of Silesia, in a narrow valley on the left bank of the Neisse, not far from the Austrian frontier, 58 m. S.W. from Breslau by rail. Pop. (1905) 16,051. The town with its narrow streets winds up the fortified hill which is crowned by the old citadel. Across the river, on the Schaferberg, lies a more modern fortress built by the Prussians about 1750. Before the town on both banks of the river there is a fortified camp by which bombardment from the neighbouring heights can be hindered and which affords accommodation for 10,000 men. The inner ceinture of walls was razed in 1891 and their site is now occupied by new streets. There are a Lutheran and two Roman Catholic churches, one of which, the parish church, contains the monuments of seven Silesian dukes. Among the other buildings the principal are the Royal Catholic gymnasium and the military hospital. The industries include machine shops, breweries, and the manufacture of spirits, linen, damask, cloth, hosiery, beads and leather.

Glatz existed as early as the 10th century, and received German settlers about 1250. It was besieged several times during the Thirty Years' War and during the Seven Years' War and came into the possession of Prussia in 1742. In 1821 and 1883 great devastation was caused here by floods. The county of Glatz was long contended for by the kingdoms of Poland and of Bohemia. Eventually it became part of the latter country, and in 1 534 was sold to the house of Habsburg, from whom it was taken by Frederick the Great during his attack on Silesia.

See Ludwig, Die Grafschaft Glatz in Wort und Bild (Breslau, 1897) ; Kutzen, Die Grafschaft Glatz (Glogau, 1873); and Geschichlsquellen der Grafschaft Glatz, edited by F. Volkmer and Hohaus (1883-1891).

GLAUBER, JOHANN RUDOLF (1604-1668), German chemist, was born at Karlstadt, Bavaria, in 1604 and died at Amsterdam in 1668. Little more is known of his life than that he resided successively in

Vienna, Salzburg, Frankfurt and Cologne before settling in Holland, where he made his living chiefly by the sale of secret chemical and medicinal preparations. Though his writings abound in universal solvents and other devices of the alchemists, he made some real contributions to chemical know- ledge. Thus he clearly described the preparation of hydrochloric

acid by the action of oil of vitriol on common salt, the manifold virtues of sodium sulphate— sal mirabile, Glauber's salt— formed in the process being one of the chief themes of his Miraculum mundi; and he noticed that nitric acid was formed when nitre was substituted for the common salt. Further he prepared a large number of substances, including the chlorides and other salts of lead, tin, iron, zinc, copper, antimony and arsenic, and he even noted some of the phenomena of double decomposition. He was always anxious to turn his knowledge to practical account, whether in preparing medicines, or in furthering industrial arts such as dyeing, or in increasing the fertility of the soil by artificial manures. One of his most notable works was his Teulschlands Wohlfarth in which he urged that the natural resources of Germany should be developed for the profit of the country and gave various instances of how this might be done.

His treatises, about 30 in number, were collected and published at Frankfort in 1658-1659, at Amsterdam in 1661, and, in an English translation by Packe, at London in 1689.

GLAUBER'S SALT, decahydrated sodium sulphate, $Na_2SO_4,10H_2O$. It is said by J. Kunkel to have been known as an arcanum or secret medicine to the electoral house of Saxony in the middle of the 16th century, but it was first described by J. R. Glauber {De natura salium, 1658), who prepared it by the action of oil of vitriol or sulphuric acid on common salt, and, ascribing to it many medicinal virtues, termed it sal mirabile Glauberi. As the mineral thenardite or mirabilite, which crystallizes in the rhombic system, it occurs in many parts of the world, as in Spain, the western states of North America and the Russian Caucasus; in the last-named region, about 25 m. E. of Tiflis, there is a thick bed of the pure salt about 5 ft. below the surface, and at Balalpashinsk there are lakes or ponds the waters of which are an almost pure solution. The substance is the active principle of many mineral waters, e.g. Fredericks- hall; it occurs in sea- water and it is a constant constituent of the blood. In combination with calcium sulphate, it con- stitutes the mineral glauberite or brongniartite, $Na_2S0_4CaS0_4$, which assumes forms belonging to the monoclinic system and occurs in Spain and Austria. It has a bitter, saline, but not acrid taste. At ordinary temperatures it crystallizes from aqueous

solutions in large colourless monoclinic prisms, which effloresce in dry air, and at 3 5° C. melt in their water of crystalliza tion. At ioo° they lose all their water, and on further heating fuse at 843 . Its maximum solubility in water is at 34°; above that temperature it ceases to exist in the solution as a deca- hydrate, but changes to the anhydrous salt, the solubility of which decreases with rise of temperature. Glauber's salt readily forms supersaturated solutions, in which crystallization takes place suddenly when a crystal of the salt is thrown in; the same effect is obtained by exposure to the air or by touching the solution with a glass rod. In medicine it is employed as an aperient, and is one of the safest and most innocuous known. For children it may be mixed with common salt and the two be used with the food without the child being conscious of any difference. It? simulation of the taste of common salt also renders it suitable for administration to insane patients and others who refuse to take any drug. If, however, its presence is recognized sodiurr phosphate may be substituted.

GLAUCHAU, a town of Germany, in the kingdom of Saxony, on the right bank of the Mulde, 7 m. N. of Zwickau and 1 7 W. of Chemnitz by rail. Pop. (1875) 21,743; (1905) 24,556. It has important manufactures of woollen and half-woollen goods, in regard to which it occupies a high position in Germany. There are also dye-works, print-works, and manufactories of paper, linen, thread and machinery. Glauchau possesses a high grade school, elementary schools, a weaving school, an orphanage and an infirmary. Some portions of the extensive old castle date from the 1 2th century, and the Gottesacker church contains interesting antiquarian relics. Glauchau was founded by a colony of Sorbs and Wends, and belonged to the lords of Schonburg as early as the 1 2th century.

See R. Hofmann, Ruckblick uber die Geschichte der Stadt Glauchau

(1897).

GLAUCONITE, a mineral, green in colour, and chemically a hydrous silicate of iron and potassium. It especially occurs in the green sands and muds which are gathering at the present time on the sea bottom at many different places. The wide extension of these sands and muds was first made known by the naturalists of the " Challenger," and it is now found that they occur in the Mediterranean as well as in the open ocean, but they have not been found in the Black Sea or in any fresh-

water lakes. These deposits are not in a true sense abyssal, but are of terrigenous origin, the mud and sand being derived from the wear of the con- tinents, transported by marine currents. The greater part of the mass consists in all cases of minerals such as quartz, felspar (often labradorite), mica, chlorite, with more or less calcite which is probably always derived from shells or other organic sources. Many accessory minerals such as tourmaline and zircon have been identified also, while augite, hornblende and other volcanic minerals occur in varying proportion as in all the sediments of the open sea. The depth in which they accumulate varies a good deal, viz. from 200 up to 2000 fathoms, but as a rule is less than 1000 fathoms, and it is believed that the most common situations are where the continental shores slope rathersteeplyinto moderate depths of water. Many of the blue muds, which owe their colour to fine particles of sulphide of iron, contain also a small quantity of glauconite; in Globigerina oozes this substance has also been found, and in fact there exists every gradation between the glauconitic deposits and the other types of sands and muds which are found at similar depths.

The colouring matter is believed in every case to be glauconite. Other ingredients, such as lime, alumina and magnesia are usually shown to be present by the analyses, but may perhaps be regarded as non-essential : it is impossible to isolate this substance in a pure state as it occurs only in fine aggregates, mixed with other minerals. The glauconite, though crystalline, never occurs well crystallized but only as dense clusters of very minute particles which react feebly on polarized light. They have one well-marked characteristic inasmuch as they often form rounded lumps. In many cases it is certain that these are casts, which fill up the interior of empty shells of Foraminifera. They may be seen occupying these shells, and when the shell is dissolved away perfect casts of glauconite are set free. Apparently in some manner not understood, the decaying organic matter in the shell of the dead organism initiated or favoured the chemical reactions by which the glauconite was formed. That the mineral originated on the sea bottom among the sand and mud is quite certainly established by these facts; moreover, since it is so soft and friable that it is easily powdered up by pressure with the fingers, it cannot have been transported from any great distance by currents. Small rounded glauconite lumps, which are common on the sands but show no trace of having filled the chambers of Foraminifera, may have arisen by a re-deposit of broken-down casts such as have been described; probably slight movement of the deposits, occasioned by currents, may have broken up the glauconite casts and scattered the soft material through the water. Films or stains of glauconite on shells, sand grains and

phosphate nodules are explained by a similar deposit of frag- mental glauconite.

In a small number of Tertiary and older rocks glauconite occurs as an essential component. It is found in the Pliocene sands of Holland, the Eocene sands of Paris and the ” Molasse ” of Switzerland, but is much more abundant in the Lower Cret- aceous rocks of N. Europe, especially in the subdivision known as the Greensand. Rounded lumps and casts like those of the green sands of the present day are plentiful in these rocks, and it is obvious that the mode of formation was in all respects the same. The green sand when weathered is brown or rusty coloured, the glauconite being oxidized to limonite. Calcareous sands or impure limestones with glauconite are also by no means rare, an example being the well-known Kentish Rag. In the Chalk-rock and Chalk-marl of some parts of England glauconite is rather frequent, and glauconitic chalk is known also in the north of France. Among the oldest rocks which contain this mineral are the Lower Silurian of the St Petersburg district,

but it is very rare in the Palaeozoic formations, possibly because it undergoes crystalline change and is also liable to be oxidized and converted into other ferruginous minerals. It has been suggested that certain deposits of iron ores may owe their origin to deposits of glauconite, as for example those of the Mesabi range, Minnesota, U.S.A. (J. S. F.)

GLAUCOUS (Gr. yXavnos, bright, gleaming), a word meaning of a sea-green colour, in botany covered with bloom, like a plum or a cabbage-leaf.

GLAUCUS (” bright “), the name of several figures in Greek mythology, the most important of which are the following :

1. Glaucus, surnamed Pontius, a sea divinity. Originally a fisherman and diver of Anthedon in Boeotia, having eaten of a certain magical herb sown by Cronus, he leapt into the sea, where he was changed into a god, and endowed with the gift of unerring prophecy. According to others he sprang into the sea for love of the sea-god Melicertes, with whom he was often identified (Athenaeus vii. 296). He was worshipped not only at Anthedon, but on the coasts of Greece, Sicily and Spain, where fishermen and sailors at certain seasons watched for his arrival during the night in order to consult him (Pausanias ix. 22). In art he is depicted as a vigorous old man with long hair and beard, his body terminating in a scaly tail, his breast covered with shells and sea- weed. He was said to have been the

builder and pilot of the Argo, and to have been changed into a god after the fight between the Argonauts and Tyrrhenians. He assisted the expedition in various ways (Athenaeus, loc. cit.; see also Ovid, M etam. xiii. 904). Glaucus was the subject of a satyric drama by Aeschylus. He was famous for his amours, especially those with Scylla and Circe.

See the exhaustive monograph by R. Gaedechens, Glaukos der Meergott (i860), and article by the same in Roscher's Lexikon der Mythologie; and for Glaucus and Scylla, E. Vinet in Annali del- V Institute di Correspondent! archeologica, xv. (1843).

2. Glaucus, usually surnamed Potnieus, from Potniae near Thebes, son of Sisyphus by Merope and father of Bellerophon. According to the legend he was torn to pieces by his own mares (Virgil, Georgics, iii. 267; Hyginus, Fab. 250, 273). On the isthmus of Corinth, and also at Olympia and Nemea, he was worshipped as Taraxippus (" terrifier of horses "), his ghost being said to appear and frighten the horses at the games (Pausanias vi. 20). He is closely akin to Glaucus Pontius, the frantic horses of the one probably representing the stormy waves, the other the sea in its calmer mood. He also was the subject of a lost drama of Aeschylus.

3. Glaucus, the son of Minos and Pasiphae. When a child, while playing at ball or pursuing a mouse, he fell into a jar of honey and was smothered. His father, after a vain search for him, consulted the oracle, and was referred to the person who should suggest the aptest comparison for one of the cows of Minos which had the power of assuming three different colours. Polyidus of Argos, who had likened it to a mulberry (or bramble), which changes from white to red and then to black, soon after- wards discovered the child; but on his confessing his inability to restore him to life, he was shut up in a vault with the corpse. Here he killed a serpent which was revived by a companion, which laid a certain herb upon it. With the same herb Polyidus brought the dead Glaucus back to life. According to others, he owed his recovery to Aesculapius. The story was the subject of plays by the three great Greek tragedians, and was often represented in mimic dances.

See Hyginus, Fab. 136; Apollodorus iii. 3. 10; C. Hock, Kreta, iii. 1829; C. Eckermann, Melampus, 1840.

4. Glaucus, son of Hippolochus, and grandson of Bellerophon, mythical progenitor of the kings of Ionia. He was a Lycian prince who, along with his cousin Sarpedon, assisted Priam in the Trojan War.

When he found himself opposed to Diomedes, with whom he was connected by ties of hospitality, they ceased fighting and exchanged armour. Since the equipment of Glaucus was golden and that of Diomedes brazen, the expression ” golden for brazen ” (Iliad, vi. 236) came to be used proverbially for a bad exchange. Glaucus was afterwards slain by Ajax.

All the above are exhaustively treated by R. Gaedechens in Ersch I and Gruber’s Allgemeine Encyclopddie.

n6

GLAZING

GLAZING. — The business of the glazier may be confined to the mere fitting and setting of glass (q.v.), even the cutting up of the plates into squares being generally an independent art, requiring a degree of tact and judgment not necessarily possessed by the building artificer. The tools generally used by the glazier are the diamond for cutting, laths or straight edges, tee square, measuring rule, glazing knife, hacking knife and hammer, duster, sash tool, two-foot rule and a glazier’s cradle for carrying the glass. Glaziers’ materials are glass, putty, priming or paint, springs, wash-leather or india-rubber for door panels, size, black. The glass is supplied by the manufacturer and cut to the sizes required for the particular work to be executed. Putty is made of whiting and linseed oil, and is generally bought in iron kegs of I or i cwt.; the putty should always be kept covered over, and when found to be getting hard in the keg a little oil should be put on it to keep it moist. Priming is a thin coat of paint with a small amount of red lead in it. In the majority of cases after the sashes for the windows are fitted they are sent to the glazier’s and primed and glazed, and then returned to the job and hung in their proper positions. When priming sashes it is important that the rebates be thoroughly primed, else the putty will not adhere. All wood that is to be painted requires before being primed to have the knots coated with knotting. When the priming is dry, the glass is cut and fitted into its place; each pane should fit easily with about tVth in. play all round. The glazier runs the putty round the rebates with his hands, and then beds the glass in it, pushing it down tight, and then further secures it by knocking in small nails, called glaziers’ sprigs, on the rebate side. He then trims up the edges of the protruding putty and bevels off the putty on the rebate or outside of the sash with a putty knife. The sash is then ready for painting. Large squares and plate glass are usually inserted when the sashes are hung to avoid risks of breakage. For inside work the panes of glass are generally secured with beads (not with putty), and

in the best work these beads are fixed with brass screws and caps to allow of easy removal without breaking the beads and damaging the paint, &c. In the case of glass in door panels where there is much vibration and slamming, the glass is bedded in wash-leather or india-rubber and secured with beads as before mentioned. The most common glass and that generally used is clear sheet in varying thicknesses, ranging in weight from 15 to 30 oz. per sq. ft. This can be had in several qualities of English of glass. or foreign manufacture. But there are many other varieties — obscured, fluted, enamelled, coloured and ornamental, rolled and rough plate, British polished plate, patent plate, fluted rolled, quarry rolled, chequered rough, and a variety of figured rolled, and stained glass, and crown-glass with bulls'-eyes in the centre.

Lead light glazing is the glazing of frames with small squares of glass, which are held together by reticulations of lead; these are secured by means of copper wire to iron saddle bars, which are let into mortices in the wood frames or stone jambs. This is formed with strips of lead, soldered at the angles; the glass is placed between the strips and the lead flattened over the edges of glass to secure it. This is much used in public build- ings and private residences. In Weldon's method the saddle bars are bedded in the centre of the strips of lead, thus strengthening the frame of lead strips and giving a better appearance.

Wired rolled plate or wired cast plate, usually J in. thick, has wire netting embedded in it to prevent the glass from falling in the case of fire; its use is obligatory in London for all lantern and skylights, screens and doors on the staircases of public and warehouse buildings, in accordance with the London Building Act. It is also used for the decks of ships and for port and cabin lights, as it is much stronger than plain glass, and if fractured is held together by the wire.

Patent prismatic rolled glass, or " refrax" (fig. 1), consists of an effectual application of the well-known properties of the prism; it absorbs all the light that strikes the window opening, and diffuses it in the most efficient manner possible in the darkest

portions of the apartment. It can be fixed in the ordinary way or placed over the existing glass.

Pavement lights (fig. 2) and stallboard lights are constructed with iron frames in small squares and glazed with thick prismatic glass, and are used to light basements. They are placed on the pavement and under shop fronts in the portion called the stallboard, and are also inserted in iron coal plates.

Great skill has of late years been displayed in the ornamentation of glass such as is seen in public saloons, restaurants, &c, as, for instance, in bevelling the edges, silvering, brilliant cutting, embossing, bending, cutting shelving to fancy shapes and polishing, and in glass ventilators.

There are several patent methods of roof glazing, such as are applied to railway stations, studios and printing and other factories requir- „ , ing light. Some of the first patents of B i a °zinir this kind were erected with wood glazing bars; these were unsightly, since they required to be of large sectional area when spanning a distance of 7 or 8 ft., and also required to be constantly painted. This was a source of trouble; the roof was constantly leaking and, moreover, it was not fire-resisting.

Of subsequent patents one includes the use of steel T-bars, in which the glass is bedded and Fig. i.- covered with a capping of copper or zinc secured Window Glass, with bolts, and nuts. Another employs steel bars covered with lead; and this is a very good method, as the bars are of small section, require no painting, and are also fire-resisting. There is one reason for preferring wood to steel, namely, that wood does not expand and contract like steel does. After the sun has been on steel bars, especially those in long lengths, they tend to buckle and then when cold contract, thus getting out of shape; there is also the possibility that when expanding they may break the glass. This is more noticeable in the case of iron ventilating frames in this glazing, which after having weathered for a year or two will begin to get out of shape and so give trouble in opening and closing.

Care should be taken not to fit the glass in iron bars tightly, but

Water

-Prism

Fig. 2. — Section through Prism Pavement Light, the direction of light rays being indicated by arrows.

a good |th in. play all round should be allowed. A few of the systems of patent roof glazing will be described in the following pages, together with illustrations.

The system of glazing known as the ” British Challenge ” (fig. 3), with steel bars encased with a sheeting of 4-lb lead, is very simple and durable, needs no painting, and can be fixed at as much as 8 ft. clear bearings, with the bars spaced 2 ft. apart. The ends of the bars rest on

the wood or steel purlins or plates, and are either notched and screwed down, or simply fitted with a bracket which is screwed. The bar is of T section with condensation grooves, and the lead wings on top are turned down on to the glass after fitting. This lead-covered steel bar is a great improve- ment on the plain steel bar as it is entirely unaffected by smoke, acids or exhaust fumes from steam engines; this is important in the case of a railway station, where the fumes would otherwise eat the steel away and so weaken the bars that in time they would snap. Another somewhat similar system is known as ” Mellowes’ Eclipse Roof Glazing ” (fig. 4). It consists of steel T-bars having lead wings on top to turn on to the glass in a similar manner to the last, the top wings being double and the underside of the bar having an additional wing to catch the con- densation. The Heywood combination system (fig. 5) is composed of galvanized steel T-bars, sometimes encased in lead and sometimes partly encased. It has a capping and condensation gutters of lead,

Fig. 3. — ” British Challenge ” Glazing.

Fig. 4. — Mellowes’ Glazing.

GLAZUNOV— GLEE

Fig. 5. — Heywood’s Glazing.

Fig. 6.— Helliwell’s ” Perfection ‘

Fig. 7.— Rendle’s ” Invincible ‘

and the glass is bedded on asbestos packing to get a better bearing edge so as to be held more securely. Hope’s glazing is very similar, but the bars are either T or cross according to the span. The I erfection glazing used by Messrs Helliwcll & Co. (fig. 6) is com- posed of steel shaped T bars with copper capping, secured with bolts and nuts and having asbestos packing on top of the glass under the edges of the capping. Pennycook’s glazing is composed of steel shaped J bars encased with lead and lead wings. Rendle’s ” Invincible ” glazing (fig. 7) is composed of steel J bars with specially shaped copper water and con- densation channels, all formed in the one piece and resting on top of the J steel- the glass rests on the zinc channel, and a copper capping is fixed over the edges of the glass and secured with bolts and nuts. Deard’s glazing is very similar, and is com- posed of J steel encased with lead; it claims to save all drilling for fixing to iron „ roofs There are also other systems com- Glazing. posed of wood bars with condensation gutter and capping of copper secured with bolts

and nuts, and asbestos packing with slight differences in some minor matters, but these systems are but little used.

Cloisonne, glass is a patent ornamental glass formed by placing two pieces flat against each other enclosing a species of glass mosaic. Designs are worked and shaped in gilt wire and placed on one sheet ˚u ga ? s; the s P a ce between the wire is then filled in with coloured beads, and

„ another sheet of glass is placed on top of

Glazing, it to keep them in position, and the edges

to keep them firmly together 6 ˆ “* b ˚ Und Whh ˆ &C – Glass is now used for decorative purposes, such as wall tiling and ceilings; it is coloured and decorated in almost any shade Use la ˆ nd P re sents a very effective appearance. An invention building. nas been patented for building houses entirely of glass; the walls are. constructed of blocks or bricks of opaque glass, the several walls being varied in thickness according to the constructional requirements.

It is certainly true that daylight has much to do with the sanitary condition of all buildings, and this being so the proper distribution of daylight to a building is of the greatest possible importance, and must be effected by an ample provision of windows judiciously arranged. The heads of aU windows should be kept as near the ceiling as possible, as well to obtain easy ventilation as to ensure good lighting. As far as is practicable a building should be planned so that each room receives the sun's rays for some part of the day. This is rarely an easy matter, especially in towns where the aspect of the building is out of the architect's hands. The best sites for light are found in streets running north and south and east and west and lighting areas or courts in buildings should always if possible be arranged on these lines. The task of adequately lighting lofty city buildings has been greatly minimized by the introduc- tion of many forms of reflecting and intensifying contrivances which are used to deflect light into those apartments into which daylight does not directly penetrate, and which would otherwise require the use of artificial light to render them of any use- the most useful of these inventions are the various forms of prism glass already referred to and illustrated in this article.

See L F Day, Stained and Painted Glass; and W. Eckstein Interior Lighting. q b ™ •. ‘

GLAZUNOV, ALEXANDER CONSTANTINOVICH (1865-), Russian musical composer, was born in St Petersburg on the 10th of August 1865, his father being a publisher and bookseller He showed an early talent for music, and studied for a year or so with Rimsky-Korsakov. At the age of sixteen he composed a symphony (afterwards elaborated and published as op 5) but his opus 1 was a quartet in D, followed by a pianoforte suite on S-a-c-h-a, the diminutive of his name Alexander. In 1884 he was taken up by Liszt, and soon became known as a composer. His first symphony was played that year at Weimar and he appeared as a conductor at the Paris exhibition in 1889′ In 1897 his fourth and fifth symphonies were performed in London

under his own conducting. In 1900 he became professor at the St Petersburg conservatoire. His separate works, including orchestral symphonies, dance music and songs, make a long list. Glazunov is a leading representative of the modern Russian school, and a master of orchestration; his tendency as compared with contemporary Russian composers is towards classical form and he was much influenced by Brahms, though in ” programme music ” he is represented by such

works as his symphonic poems Ike Forest, Stenka Razin, The Kremlin and his suite Aus dem Mitlelalter. His ballet music, as in Raymonda, achieved much popularity.

GLEBE (Lat. glaeba, gleba, clod or lump of earth, hence soil, land), in ecclesiastical law the land devoted to the maintenance of the incumbent of a church. Burn {Ecclesiastical Law, s.v.

Glebe Lands”) says: “Every church of common right is entitled to house and glebe, and the assigning of them at the first was of such absolute necessity that without them no church could be regularly consecrated. The house and glebe are both comprehended under the word manse, of which the rule of the canon law is, sancitum est ut unicuique ecclcsiae unus mansus integer absque ullo servitio tribuatur.” In the technical language of English law the fee-simple of the glebe is said to be in abeyance, that is, it exists ” only in the remembrance, expectation and intendment of the law.” But the freehold is in the parson, although at common law he could alienate the same only with proper consent,— that is, in his case, with the consent of the bishop The disabling statutes of Elizabeth (Alienation by Bishops 1550, and Dilapidations, &c, 1571) made void all alienations by ecclesiastical persons, except leases for the term of twenty- one years or three lives. By an act of 1842 (5 & 6 Vict c 27 Ecclesiastical Leases) glebe land and buildings may be let on lease for farming purposes for fourteen years or on an improving lease for twenty years. But the parsonage house and ten acres of glebe situate most conveniently for occupation must not be leased. By the Ecclesiastical Leasing Acts of 1842 (s & 6 Vict. c. 108) and 1858 glebe lands may be let on building leases for not more than ninety-nine years and on mining leases for not more than sixty years. The Tithe Act 1842, the Glebe Lands Act 1888 and various other acts make provision for the sale, purchase, exchange and gift of glebe lands. In Scots ecclesiastical law, the manse now signifies the minister’s dwelling- house, the glebe being the land to which he is entitled in addition to his stipend. All parish ministers appear to be entitled to a glebe, except the ministers in royal burghs proper, who cannot claim a glebe unless there be a landowner’s district annexed- and even m that case, when there are two ministers, it is only the first who has a claim.

,-” 1 , See I . Ph! i I!m • ore, Ecclesiastical Law (and ed.); Cripps, Law of

GLEE, a musical term for a part-song of a particular kind. The word, as well as the thing, is essentially confined to England I he technical meaning has been explained in different ways- but there is little doubt

of its derivation through the ordinary sense of the word (i.e. merriment, entertainment) from the A S gleov, gleo, corresponding to Lat. gaudium, delectamentum hence ludus musicus; on the other hand, a musical ” glee ” is by no means necessarily a merry composition. Gleeman (A S ” gleo- man “) is translated simply as ” musicus ” or ” cantor,” to which the less distinguished titles of ” mimus, jocista, scurra ” are frequently added in old dictionaries. The accomplishments and social position of the gleeman seem to have been as varied as those of the Provencal « joglar.” There are early examples of trie word glee being used as synonymous with harmony or concerted music. The former explanation, for instance, is given in the Promptorium parvulorum, a work of the 1 5th century Glee in its present meaning signifies, broadly speaking, a piece of concerted vocal music, generally unaccompanied, and for male voices, though exceptions are found to the last two restric- tions. The number of voices ought not to be less than three. As regards musical form, the glee is little distinguished from the catch,— the two terms being often used indiscriminately for the

same song; but there is a distinct difference between it and the madrigal — one of the earliest forms of concerted music known in England. While the madrigal does not show a distinction of contrasted movements, this feature is absolutely necessary in the glee. In the madrigal the movement of the voices is strictly contrapuntal, while the more modern form allows of freer treat- ment and more compact harmonies. Differences of tonality are fully explained by the development of the art, for while the madrigal reached its acme in Queen Elizabeth’s time, the glee proper was little known before the Commonwealth; and its most famous representatives belong to the 18th century and the first quarter of the 19th. Among the numerous collections of the innumerable pieces of this kind, only one of the earliest and most famous may be mentioned, Catch that Catch can, a Choice Collection of Catches, Rounds and Canons, for three and four voices, published by John Hilton in 1652. The name ” glee,” however, appears for the first time in John Playford’s Musical Companion, published twenty-one years afterwards, and reprinted again and again, with additions by later composers — Henry Purcell, William Croft and John Blow among the number. The originator of the glee in its modern form was Dr Arne, born in 17 10. Among later English musicians famous for their glees, catches and part-songs, the following may be mentioned: — Attwood, Boyce, Bishop, Crotch, Callcott,

Shield, Stevens, Horsley, Webb and Knyvett. The convivial character of the glee led, in the 18th century, to the formation of various societies, which offered prizes and medals for the best composi- tions of the kind and assembled for social and artistic purposes. The most famous amongst these — The Glee Club— was founded in 1787, and at first used to meet at the house of Mr Robert Smith, in St Paul's churchyard. This club was dissolved in 1857. A similar society — The Catch Club — was formed in 1761 and is still in existence.

GLEICHEN, two groups of castles in Germany, thus named from their resemblance to each other (Ger. gleich = like, or resembling). The first is a group of three, each situated on a hill in Thuringia between Gotha and Erfurt. One of these called Gleichen, the Wanderslebener Gleiche (1221 ft. above the sea) , was besieged unsuccessfully by the emperor Henry IV. in 1088. It was the seat of a line of counts, one of whom, Ernest III., a crusader, is the subject of- a romantic legend. Having been captured, he was released from his imprisonment by a Turkish woman, who returned with him to Germany and became his wife, a papal dispensation allowing him to live with two wives at the same time (see Reineck, Die Sage von der Doppelehe eines Graf en von Gleichen, 1891). After belonging to the elector of Mainz the castle became the property of Prussia in 1803. The second castle is called Miihlburg (1309 ft. above the sea). This existed as early as 704 and was besieged by Henry IV. in 1087. It came into the hands of Prussia in 1803. The third castle, Wachsenburg (1358 ft.), is still inhabited and contains a collection of weapons and pictures belonging to its owner, the duke of-Saxe-Coburg-Gotha, whose family obtained possession of it in 1368. It was built about 935 (see Beyer, Die drei Gleichen, Erfurt, 1898). The other group consists of two castles, Neuen- Gleichen and Alten- Gleichen. Both are in ruins and crown two hills about 2 m. S.E. from Gottingen.

The name of Gleichen is taken by the family descended from Prince Victor of Hohenlohe-Langenburg through his marriage with Miss Laura. Seymour, daughter of Admiral Sir George Francis Seymour, a branch of the Hohenlohe family having at one time owned part of the county of Gleichen.

GLEIG, GEORGE (1753-1840), Scottish- divine, was born at Boghall, Kincardineshire, on the 12th of May 1753, the son of a farmer. At the age of thirteen he entered King's College, Aberdeen, where the first prize in mathematics and physical and moral sciences fell to him. In his twenty-first year he took orders in the Scottish Episcopal Church, and was ordained to the pastoral charge of a congregation at Pittenweem, Fife, whence he removed in 1 790 to Stirling. He became

a frequent contributor to the Monthly Review, the Gentleman's Magazine, the Anti- Jacobin Review and the British Critic. He also wrote several

articles for the third edition of the Encyclopaedia Brilannica, and on the death of the editor, Colin Macfarquhar, in 1793, was engaged to edit the remaining volumes. Among his principal contributions to this work were articles on ' ' Instinct, " ' ' Theology' ' and " Metaphysics." The two supplementary volumes were mainly his own work. He was twice chosen bishop of Dunkeld, but the opposition of Bishop Skinner, afterwards primus, rendered the election on both occasions ineffectual. In 1808 he was con- secrated assistant and successor to the bishop of Brechin, in 1810 was preferred to the sole charge, and in 1816 was elected primus of the Episcopal Church of Scotland, in which capacity he greatly aided in the introduction of many useful reforms, in fostering a more catholic and tolerant spirit, and in cementing a firm alliance with the sister church of England. He died at Stirling on the 9th of March 1840.

Besides various sermons, Gleig was the author of Directions for the Study of Theology, in a series ofletters from a bishop to his son on his admission to holy orders (1827); an edition of Stackkouse's History of the Bible (1817); and a life of Robertson the historian, prefixed to an edition of his works. See Life of Bishop Gleig, by the Rev. W. Walker (1879). Letters to Henderson of Edinburgh and John Douglas, bishop of Salisbury, are in the British Museum.

His third and only surviving son, George Robert Gleig (1796- 1888), was educated at Glasgow University, whence he passed with a Snell exhibition to Balliol College, Oxford. He abandoned his scholastic studies to enter the army, and served with distinction in the Peninsular War (1813-14), and- in the American War, in which he was thrice wounded. Resuming his work at Oxford, he proceeded B.A. in 1818, M.A. in 1821, and, having been ordained in 1820, held successively curacies at Westwell in Kent and Ash (to the latter the rectory of Ivy Church was added in 1822). He was subsequently appointed chaplain of Chelsea hospital (1824), chaplain-general of the forces (1844-1875) and inspector-general of military schools (1846-1857). From 1848 till his death on the 9th of July 1888 he was prebend of Willesden in St Paul's cathedral. During the last sixty years of his life he was a prolific, if not very scientific, writer; he wrote for Blackwood's Magazine and Eraser's Magazine, and produced a large number of historical works.

Among the latter were (besides histories of the campaigns in which he

served), Life of Sir Thomas Munro (3 vols., 1830); History of India (4 vols., 1830-1835); The Leipsic Campaign and Lives of Military Commanders (1831); Story of the Battle of Waterloo (1847); Sketch of the Military History of Great Britain (1845); Sale's Brigade in Afghanistan (1847); biographies of Lord Clive (1848), the duke of Wellington (1862), and Warren Hastings (1848; the subject of Macaulay's essay, in which it is described as " three big bad volumes full of undigested correspondence and undiscerning panegyric ").

GLEIM, JOHANN WILHELM LUDWIG (1719-1803), German poet, was born on the 2nd of April 1719 at Ermsleben, near Halberstadt. Having studied law at the university of Halle he became secretary to Prince William of Brandenburg-Schwedt at Berlin, where he made the acquaintance of Ewald von Kleist, whose devoted friend he became. When the prince fell at the battle of Prague, Gleim became secretary to Prince Leopold of Dessau; but he soon gave up his position, not being able to bear the roughness of the " Old Dessauer." After residing a few years in Berlin he was appointed, in 1747, secretary of the cathedral chapter at Halberstadt. " Father Gleim " was the title accorded to him throughout all literary Germany on account of his kind-hearted though inconsiderate and undiscriminating patronage alike of the poets and poetasters of the period. He wrote a large number of feeble imitations of Anacreon, Horace and the minnesingers, a dull didactic poem entitled Halladat oder das rote Buch (1774), and collections of fables and romances. Of higher merit are his Preussische Kriegslieder von einem Grenadier (1758). These, which were inspired by the campaigns of Frederick II., are often distinguished by genuine feeling and vigorous force of expression. They are also noteworthy as being the first of that long series of noble political songs in which later German litera- ture is so rich. With this exception, Gleim's writings are for the most part tamely commonplace in thought and expression. He died at Halberstadt on the 18th of February 1803.

Gleim's Samtliche Werke appeared in 7 vols, in the years 1811- I 1813; a reprint of the Lieder eines Grenadiers was published by

A. Sauer in 1882. A good selection of Gleim's poetry will be found in F. Muncker, Anakreontiher und preussisch-patriotische Lyriker (1894). See W. Korte, Gleims Leben aus seinen Briefen und Schriften (181 1). His correspondence with Heinse was published in 2 vols. (1894-1896),

with Uz (1889), in both cases edited by C. Schuddekopf.

GLEIWITZ, a town of Germany, in the Prussian province of Silesia, on the Klodnitz, and the railway between Oppeln and Cracow, 40 m. S.E. of the former town. Pop. (187s) 14,156; (1905) 61,324. It possesses two Protestant and four Roman Catholic churches, a synagogue, a mining school, a convent, a hospital, two orphanages, and barracks. Gleiwitz is the centre of the mining industry of Upper Silesia. Besides the royal foundry, with which are connected machine manufactories and boiler- works, there are other foundries, meal mills and manufactories of wire, gas pipes, cement and paper.

See B. Nietsche, Geschichte der Stadt Gleiwitz (1886); and Seidel, Die konigliche Eisengiesserei zu Gleiwitz (Berlin, 1896).

GLENALMOND, a glen of Perthshire, Scotland, situated to the S.E. of Loch Tay. It comprises the upper two-thirds of the course of the Almond, or a distance of 20 m. For the greater part it follows a direction east by south, but at Newton Bridge it inclines sharply to the south-east for 3 m., and narrows to such a degree that this portion is known as the Small (or Sma') Glen. At the end of this pass the glen expands and runs eastwards as far as the well-known public school of Trinity College, where it may be considered to terminate. The most interesting spot in the glen is that traditionally known as the grave of Ossian. The district east of Buchanty, near which are the remains of a Roman camp, is said to be the Drumtochty of Ian Maclaren's stories. The mountainous region at the head of the glen is dominated by Ben y Hone or Ben Chonzie (3048 ft. high).

GLENCAIRN, EARLS OF. The 1st earl of Glencairn in the Scottish peerage was Alexander Cunningham (d. 1488), a son of Sir Robert Cunningham of Kilmaurs in Ayrshire. Made a lord of the Scottish parliament as Lord Kilmaurs not later than 1469, Cunningham was created earl' of Glencairn in 1488; and a few weeks later he was killed at the battle of Sauchieburn whilst fighting for King James III. against his rebellious son, afterwards James IV. His son and successor, Robert (d. c. 1490), was deprived of his earldom by James IV., but before 1505 this had been revived in favour of Robert's son, Cuthbert (d. c. 1540), who became 3rd earl of Glencairn, and whose son William (c. 1490-1547) was the 4th earl. This noble, an early adherent of the Reformation, was during his public life frequently in the pay and service of England, although he fought on the Scottish side at the battle of Solway Moss (1542), where he was taken prisoner. Upon his release early in 1543 he promised to adhere to Henry VIII. , who was anxious to bring Scotland under his rule, and in 1 544 he entered into

other engagements with Henry, undertaking inter alia to deliver Mary queen of Scots to the English king. However, he was defeated by James Hamilton, earl of Arran, and the project failed; Glencairn then deserted his fellow-conspirator, Matthew Stewart, earl of Lennox, and came to terms with the queen-mother, Mary of Guise, and her party.

William's son, Alexander, the 5th earl (d. 1574), was a more pronounced reformer than his father, whose English sympathies he shared, and was among the intimate friends of John Knox. In March 1557 he signed the letter asking Knox to return to Scotland; in the following December he subscribed the first " band " of the Scottish reformers; and he anticipated Lord James Stewart, afterwards the regent Murray, in taking up arms against the regent, Mary of Guise, in 1558. Then, joined by Stewart and the lords of the congregation, he fought, against the regent, and took part in the attendant negotiations with Elizabeth of England, whom he visited in London in December 1560. When in August 1561 Mary queen of Scots returned to Scotland, Glencairn was made a member of her council; he remained loyal to her after she had been deserted by Murray, but in a few weeks rejoined Murray and the other Protestant lords, returning to Mary's side in 1 566. After the queen had married the earl of Bothwell she was again forsaken by Glen- cairn, who fought against her at Carberry Hill and at Langside.

The earl, who was always to the fore in destroying churches, abbeys and other " monuments of idolatry," died on the 23rd of November 1 574. His short satirical poem against the Grey Friars is printed by Knox in his History of the Reformation.

James, the 7th earl (d. c. 1622), took part in the seizure of James VI., called the raid of Ruthven in 1582. William, the 9th earl (c. 1610-1664), a somewhat lukewarm Royalist during the Civil War, was a party to the " engagement " between the king and the Scots in 1647; for this proceeding the Scottish parliament deprived him of his office as lord justice-general, and nominally of his earldom. In March 1653 Charles II. commissioned the earl to command the Royalist forces in Scotland, pending the arrival of General John Middleton, and the insurrec- tion of this year is generally known as Glencairn's rising. After its failure he was betrayed and imprisoned, but although excepted from pardon he was not executed; and when Charles II. was restored he became lord chancellor of Scotland. After a dispute with his former friend, James Sharp, archbishop of St Andrews, he died at Belton in Haddingtonshire on the 30th of May 1664. This earl's son John (d. 1 703) , who followed his brother Alexander as nth earl in 1670, was a supporter of the Revolution of 1688. His descendant,

James, the 14th earl (1749-1791), is known as the friend and patron of Robert Burns. He performed several useful services for the poet; and when he died on the 30th of January 1791 Burns wrote a Lament beginning, “The wind blew hollow frae the hills,” and ending with the lines, ” But I’ll remember thee, Glencairn, and a’ that thou hast done for me.” The 14th earl was never married, and when his brother and successor, John, died childless in September 1796 the earldom became extinct, although it was claimed by Sir Adam Fergusson, Bart., a descendant of the 10th earl.

GLENCOE, a glen in Scotland, situated in the north of Argyll- shire. Beginning at the north-eastern base of Buchaille Etive, it takes a gentle north-westerly trend for 10 m. to its mouth on Loch Leven, a salt-water arm of Loch Linnhe. On both sides it is shut in by wild and precipitous mountains and its bed is swept by the Coe — Ossian’s ” dark Cona,” — which rises in the hills at its eastern end. About half-way down the glen the stream forms the tiny Loch Triochatan. Towards Invercoe the landscape acquires a softer beauty. Here Lord Strathcona, who, in 1894, purchased the heritage of the Macdonalds of Glencoe, built his stately mansion of Mount Royal. The principal mountains on the south side are the various peaks of Buachaille Etive, Stob Dearg (3345 ft.), Bidean nam Bian (3756 ft.) and Meall Mor (2215 ft.), and on the northern side the Pap of Glencoe (2430 ft.), Sgor nam Fiannaidh (3168 ft.) and Meall Dearg (3 1 18 ft.). Points of interest are the Devil’s Staircase, a steep, boulder-strewn ” cut ” (1754 ft. high) across the hills to Fort William; the Study; the cave of Ossian, where tradition says that he was born, and the Iona cross erected in 1883 by a Macdonald in memory of his clansmen who perished in the massacre of 1692. About 1 m. beyond the head of the glen is Kingshouse, a relic of the old coaching days, when it was customary for tourists to drive from Ballachulish via Tyndrum to Loch Lomond. Now the Glencoe excursion is usually made from Oban — by rail to Achnacloich, steamer up Loch Etive, coach up Glen Etive and down Glencoe and steamer at Ballachulish to Oban. One mile to the west of the Glen lies the village of Ballachulish (pop. 1143). It is celebrated for its slate quarries, which have been worked since 1 760. The industry provides employment for 600 men and the annual output averages 30,000 tons. The slate is of excellent quality and is used throughout the United Kingdom. Ballachulish is a station on the Callander and Oban extension line to Fort William (Caledonian railway). The pier and ferry are some 2 m. W. of the village.

GLENCORSE, JOHN INGLIS, Lord (1810-1891), Scottish judge, son of a minister, was born at Edinburgh on the 21st of August 1 810. From Glasgow University he went to Ballioi College, Oxford. He was

admitted a member of the Faculty of Advocates, and soon became known as an eloquent anfc successful pleader. In 1852 he was made solicitor-general for

Scotland in Lord Derby's first ministry, three months later becoming Lord Advocate. In 1858 he resumed this office in Lord Derby's second administration, being returned to the House of Commons as member for Stamford. He was responsible for the Universities of Scotland Act of 1858, and in the same year he was elevated to the bench as lord justice clerk. In 1867 he was made lord justice general of Scotland and lord president of the court of session, taking the title of Lord Glencorse. Outside his judicial duties he was responsible for much useful public work, particularly in the department of higher education. In 1869 he was elected chancellor of Edinburgh University, having already been rector of the university of Glasgow. He died on the 20th August 1891.

GLENDALOUGH, VALE OF, a mountain glen of Co. Wicklow, Ireland, celebrated and frequently visited both on account of its scenic beauty and, more especially, because of the collection of ecclesiastical remains situated in it. Fortunately for its appearance, it is not approached by any railway, but services of cars are maintained to several points, of which Rathdrum, 85 m. S.E., is the nearest railway station, on the Dublin & South-Eastern. The glen is traversed by the stream of Glenealo, a tributary of the Avonmore, expanding into small loughs, the Upper and the Lower. The former of these is walled by the abrupt heights of Camaderry (2296 ft.) and Lugduff (2176 ft.), and here the extreme narrowness of the valley adds to its grandeur; while lower down, where it widens, the romantic character of the scenery is enhanced by the scattered ruins of the former monastic settlement. These ruins have the collective name of the " Seven Churches." The settlement owed its foundation to the hermit St Kevin, who is reputed to have died on the 3rd of June 618; and it rapidly became a seat of learning of wide fame, but suffered much at the hands of the Danes and the Anglo-Normans. In close proximity to an hotel, and to one another, in an enclosure, are a round tower, one of the finest in Ireland, 11c ft. high and 52 in circumference; St Kevin's kitchen or church (closely resembling the house of St Columba at Kells), which measures 25 ft. by 15, with a high-pitched roof and round belfry — supposed to be the earliest example of its type; and the cathedral, about 73 ft. in total length by 51 in width. This possesses a good

square-headed doorway, and an east window of ornate character (the chancel being of later date than the nave), and there are also some early tombs, but the whole is in a decayed condition. In the enclosure are also a Lady chapel, chiefly remarkable for its doorway of wrought granite, in a style of architecture resembling Greek; a priest's house (restored), and slight remains of St Chiaran's church. Here is also St Kevin's cross, a granite monolith never completed; and the enclosure is entered by a fine though dilapidated gateway. Other neighbouring remains are Trinity or the Ivy Church, towards Laragh, with beautiful detailed work; St Saviour's monastery, carefully restored under the direction of the Board of Works, with a chancel arch of three orders (re-erected); while on the shores of the upper lough are Reefert Church, the burial-place of the O'Toole family, and Teampull-na-skellig, the church of the rock. St Kevin's bed is a cave approachable with difficulty, above the lough, probably a natural cavity artificially enlarged, to which attaches the legend of St Kevin's hermitage. Along the valley there are a number of monuments and stone crosses of various sizes and styles. The whole collec- tion forms, with the possible exception of Clonmacnoise in King's county, the most striking monument of monasticism in Ireland. GLENDOWER, OWEN (c. 1359-1415), the last to claim the title of an independent prince of Wales, more correctly described as Owain ab Gruffydd, lord of Glyndyvrdwy in Merioneth, was a man of good family, with two great houses, Sycharth and Glyndyvrdwy in the north, besides smaller estates in south Wales. His father was called Gruffydd Vychan, and his mother Helen; on both sides he had pretensions to be descended from the old Welsh princes. Owen was probably born about 1359, Studied law at Westminster, was squire to the earl of Arundel, and a witness for Grosvenor in the famous Scrope and Grosvenor lawsuit in 1386. Afterwards he was in the service of Henry of

Bolingbroke, the future king, though by an error it has been commonly stated that he was squire to Richard II. Welsh sympathies were, however, on Richard's side, and combined with a personal quarrel to make Owen the leader of a national revolt.

The lords of Glyndyvrdwy had an ancient feud with their English neighbours, the Greys of Ruthin. Reginald Grey neglected to summon Owen, as was his duty, for the Scottish expedition of 1400, and then charged him with treason for failing to appear. Owen thereupon took up arms, and when Henry IV. returned from Scotland in September he found north Wales ablaze. A hurried campaign under the king's personal command was ineffectual. Owen's estates were declared forfeit and vigorous measures threatened by the English government. Still the revolt gathered strength. In the spring of 1401 Owen was

raiding in south Wales, and credited with the intention of invading England. A second campaign by the king in the autumn was defeated, like that of the previous year, through bad weather and the Fabian tactics of the Welsh. Owen had already been intriguing with Henry Percy (Hotspur), who during 1401 held command in north Wales, and with Percy's brother-in-law, Sir Edmund Mortimer. During the winter of 1401-1402 his plans were further extended to negotiations with the rebel Irish, the Scots and the French. In the spring he had grown so strong that he attacked Ruthin, and took Grey prisoner. In the summer he defeated the men of Hereford under Edmund Mortimer at Pilleth, near Brynglas, in Radnorshire. Mortimer was taken prisoner and treated with such friendliness as to make the English doubt his loyalty; within a few months he married Owen's daughter. In the autumn the English king was for the third time driven " bootless home and weather- beaten back." The few English strongholds left in Wales were now hard pressed, and Owen boasted that he would meet his enemy in the field. Nevertheless, in May 1403 Henry of Mon- mouth was allowed to sack Sycharth and Glyndyvrdwy un- opposed. Owen had a greater plot in hand. The Percies were to rise in arms, and meeting Owen at Shrewsbury, overwhelm the prince before help could arrive. But Owen's share in the undertaking miscarried through his own defeat near Carmarthen on the 1 2th of July, and Percy was crushed at Shrewsbury ten days later. Still the Welsh revolt was never so formidable. Owen styled himself openly prince of Wales, established a regular government, and called a parliament at Machynlleth. As a result of a formal alliance the French sent troops to his aid, and in the course of 1404 the great castles of Harlech and Aberystwith fell into his hands.

In the spring of 1405 Owen was at the height of his power; but the tide turned suddenly. Prince Henry defeated the Welsh at Grosmont in March, and twice again in May, when Owen's son Griffith and his chancellor were made prisoners. Scrope's rebellion in the North prevented the English from following up their success. The earl of Northumberland took refuge in Wales, and the tripartite alliance of Owen with Percy and Mortimer (transferred by Shakespeare to an earlier occasion) threatened a renewal of danger. But Northumberland's plots and the active help of the French proved ineffective. The English under Prince Henry gained ground steadily, and the recovery of Aberystwith, after a long siege, in the autumn of 1408 marked the end of serious warfare. In February 1409 Harlech was also recaptured, and Owen's wife, daughter and grandchildren were taken prisoners. Owen himself still held out and even continued to intrigue with the French. In July 1415 Gilbert Talbot had power to

treat with Owen and his supporters and admit them to pardon. Owen's name does not occur in the document renewing Talbot's powers in February 1416; according to Adam of Usk he died in 1415. Later English writers allege that he died of starvation in the mountains; but Welsh legend represents him as spending a peaceful old age with his sons-in-law at Ewyas and Monington in Herefordshire, till his death and burial at the latter place. The dream of an independent and united Wales was never nearer realization than under Owen's leadership. The disturbed state of England

helped him, but he was indeed a remarkable personality, and has not undeservedly become a national hero. Sentiment and tradition have magnified his achievements, and confused his career with tales of portents and magical powers. Owen left many bastard children; his legitimate representative in 1433 was his daughter Alice, wife of Sir John Scudamore of Ewyas.

The facts of Owen's life must be pieced together from scattered references in contemporary chronicles and documents; perhaps the most important are Adam of Usk's Chronicle and Ellis's Original Letters. On the Welsh side something is given by the bards Iolo Goch and Lewis Glyn Cothi. For modern accounts consult J. H. Wylie's History of England under Henry IV. (4 vols., 1884-1898); A. C. Bradley's popular biography ; and Professor Tout's article in the Dictionary of National Biography. (C. L. K.)

GLENELG, CHARLES GRANT, Baron (1778-1866), eldest son of Charles Grant (q.v.), chairman of the directors of the East India Company, was born in India on the 26th of October 1778, and was educated at Magdalene College, Cambridge, of which he became a fellow in 1802. Called to the bar in 1807, he was elected member of parliament for the Inverness burghs in 1807, and having gained some reputation as a speaker in the House of Commons, he was made a lord of the treasury in December 1813, an office which he held until August 1819, when he became secretary to the lord-lieutenant of Ireland and a privy councillor. In 1823 he was appointed vice-president of the board of trade; from September 1827 to June 1828 he was president of the board and treasurer of the navy; then joining the Whigs, he was president of the board of control under Earl Grey and Lord Melbourne from November 1830 to November 1834. At the board of control Grant was primarily responsible for the act of 1833,

which altered the constitution of the govern- ment of India. In April 1835 he became secretary for war and the colonies, and was created Baron Glenelg. His term of office was a stormy one. His differences with Sir Benjamin d'Urban (q.v.), governor of Cape Colony, were serious; but more so were those with King William IV. and others over the administration of Canada. He was still secretary when the Canadian rebellion broke out in 1837; his wavering and feeble policy was fiercely attacked in parliament; he became involved in disputes with the earl of Durham, and the movement for his supercession found supporters even among his colleagues in the cabinet. In February 1839 he resigned, receiving consolation in the shape of a pension of £2000 a year. From 1818 until he was made a peer Grant represented the county of Inverness in parliament, and he has been called " the last of the Canningites." Living mainly abroad during the concluding years of his life, he died unmarried at Cannes on the 23 rd of April 1866 when his title became extinct.

Glenelg's brother, Sir Robert Grant (1779-1838), who was third wrangler in 1 801 , was, like his brother, a fellow of Magdalene College, Cambridge, and a barrister. From 1818 to 1834 he represented various constituencies in parliament, where he was chiefly prominent for his persistent efforts to relieve the dis- abilities of the Jews. 1 In June 1834 he was appointed governor of Bombay, and he died in India on the 9th of July 1838. Grant wrote a Sketch of the History of the East India Co. (1813), and is also known as a writer of hymns.

GLENELG, a municipal town and watering place of Adelaide county, South Australia, on Holdfast Bay, 65 m. by rail S.S.W. of the city of Adelaide. Pop. (1901) 3949. It is a popular summer resort, connected with Adelaide by two lines of railway. In the vicinity is the " Old Gum Tree " under which South Australia was proclaimed- British territory by Governor Hind- marsh in 1836.

GLENGARRIFF, or Glengariff (" Rough Glen "), a celebrated resort of tourists in summer and invalids in winter, in the west riding of county Cork, Ireland, on Glengarriff Harbour, an inlet on the northern side of Bantry Bay, n m. by coach road from Bantry on the Cork, Bandon & South Coast railway. Beyond its hotels, Glengarriff is only a small village, but the island- studded harbour, the narrow glen at its head and the surrounding 1 Sir S. Walpole (History of England, vol. v.) is wrong in stating that Charles Grant introduced bills to remove Jewish disabilities in 1833 and 1834. They were introduced by his brother Robert.

of mountains, afford most attractive views, and its situation on the ” Prince of Wales’ ” route travelled by King Edward VII. in 1848, and on a fine mountain coach road from Macroom, brings it into the knowledge of many travellers to Killarney. Thackeray wrote enthusiastically of the harbour. The glaciated rocks of the glen are clothed with vegetation of peculiar luxuri ance, flourishing in the mild climate which has given Glengarriff its high reputation as a health resort for those suffering from pulmonary complaints.

GLEN GREY, a division of the Cape province south of the Stormberg, adjoining on the east the Transkeian Territories. Pop. (1904) 55,107. Chief town Lady Frere, 32 m. N.E. of Queens- town. The district is well watered and fertile, and large quantities of cereals are grown. Over 96% of the inhabitants are of the Zulu-Xosa (Kaffir) race, and a considerable part of the district was settled during the Kaffir wars of Cape Colony by Tembu (Tambookies) who were granted a location by the colonial government in recognition of their loyalty to the British. Act No. 25 of 1894 of the Cape parliament, passed at the instance of Cecil Rhodes, which laid down the basis upon which is effected the change of land tenure by natives from communal to individual holdings, and also dealt with native local self-government and the labour question, applied in the first instance to this division, and is known as the Glen Grey Act (see Cape Colony: History). The provisions of the act respecting individual land tenure and local self-government were in 1898 applied, with certain modifica- tions, to the Transkeian Territories. The division is named after Sir George Grey, governor of Cape Colony 1854-1861.

GLENS FALLS, a village of Warren county, New York, U.S.A., 55 m. N. of Troy, on the Hudson river. Pop. (1890) 9509; (1900I 12,613, of whom 1762 were foreign-born; (1910 census) 15,243. Glens Falls is served by the Delaware & Hudson and the Hudson Valley (electric) railways. The village contains a state armoury, the Crandall free public library, a Y.M.C.A. building, the Park hospital, an old ladies’ home, and St Mary’s (Roman Catholic) and Glens Falls (non-sectarian) academies. There are two private parks, open to the public, and a water- works system is maintained by the village. An iron bridge crosses the river just below the falls, connecting Glens Falls and South Glens Falls (pop. in 1910, 2247). The falls of the Hudson here furnish a fine water-power, which is utilized, in connexion with steam and electricity, in the manufacture of lumber, paper and wood pulp, women’s clothing, shirts, collars and cuffs, &c. In 1905 the village’s factory products were valued at $4,780,33ˆ About 12 m. above Glens Falls, on the Hudson, a massive stone dam has been erected; here electric power, distributed to a large area, is generated. In the

neighbourhood of Glens Falls are valuable quarries of black marble and limestone, and lime, plaster and Portland cement works. Glens Falls was settled about the close of the French and Indian War (1763), and was incorporated as a village in 1839.

GLENTILT, a glen in the extreme north of Perthshire, Scotland. Beginning at the confines of Aberdeenshire, it follows a north-westerly direction excepting for the last 4 m., when it runs due S. to Blair Atholl. It is watered throughout by the Tilt, which enters the Garry after a course of 14 m., and receives on its right the Tarff, which forms some beautiful falls just above the confluence, and on the left the Fender, which has some fine falls also. The attempt of the 6th duke of Atholl (1814- 1864) to close the glen to the public was successfully contested by the Scottish Rights of Way Society. The group of mountains — Cam nan Gabhar (3505 ft.), Ben y Gloe (3671) and Carn Liath (3193) — on its ‘eft side dominate the lower half of the glen. Marble of good quality is occasionally quarried in the glen, and the rock formation has attracted the attention of geologists from the time of James Hutton.

GLEYRE, MARC CHARLES GABRIEL (1806-1874), French painter, of Swiss origin, was born at Chevilly in the canton of Vaud on the 2nd of May 1806. His father and mother died while he was yet a boy of some eight or nine years of age; and he was brought up by an uncle at Lyons, who sent him to the industrial school of that city. Going up to Paris a lad of

seventeen or nineteen, he spent four years in close artistic study — in Hersent’s studio, in Suisse’s academy, in the galleries of the Louvre. To this period of laborious application succeeded four years of meditative inactivity in Italy, where he became acquainted with Horace Vernet and Leopold Robert; and six years more were consumed in adventurous wanderings in Greece, Egypt, Nubia and Syria. At Cairo he was attacked with ophthalmia, and in the Lebanon he was struck down by fever; and he returned to Lyons in shattered health. On his recovery he proceeded to Paris, and, fixing his modest studio in the rue de Universite, began carefully to work out the conceptions which had been slowly shaping themselves in his mind. Mention is made of two decorative panels — ” Diana leaving the Bath,” and a “Young Nubian” — as almost the first fruits of his genius; but these did not attract public attention till long after, and the painting by which he

practically opened his artistic career was the ” Apocalyptic Vision of St John,” sent to the Salon of 1840. This was followed in 1843 by ” Evening,” which at the time received a medal of the second class, and afterwards became widely popular under the title of the Lost Illusions. It represents a poet seated on the bank of a river, with drooping head and wearied frame, letting his lyre slip from a careless hand, and gazing sadly at a bright company of maidens whose song is slowly dying from his ear as their boat is borne slowly from his sight.

In spite of the success which attended these first ventures, Gleyre retired from public competition, and spent the rest of his life in quiet devotion to his own artistic ideals, neither seeking the easy applause of the crowd, nor turning his art into a means of aggrandizement ; and wealth. After 184s, when he exhibited the ” Separation of the Apostles,” he contributed nothing to the Salon except the ” Dance of the Bacchantes ” in 1849. Yet he laboured steadily and was abundantly productive. He had an ” infinite capacity of taking pains,” and when asked by what method he attained to such marvellous perfection of workman- ship, he would reply, ” En y pensant toujours.” A long series of years often intervened between the first conception of a piece and its embodiment, and years not unfrequently between the first and the final stage of the embodiment itself. A landscape was apparently finished; even his fellow artists would consider it done; Gleyre alone was conscious that he had not “found his sky.” Happily for French art this high-toned laboriousness became influential on a large number of Gleyre’s younger contemporaries; for when Delaroche gave up his studio of instruction he recommended his pupils to apply to Gleyre, who at once agreed to give them lessons twice a week, and character- istically refused to take any fee or reward. By instinct and principle he was a confirmed celibate: ” Fortune, talent, health, — he had everything; but he was married,” was his lamentation over a friend. Though he lived in almost complete retirement from public life, he took a keen interest in politics, and was a voracious reader of political journals. For a time, indeed, under Louis Philippe, his studio had been the rendezvous of a sort of liberal club. To the last — amid all the disasters that befell his country — he was hopeful of the future, ” la raison finira bien par avoir raison.” It was while on a visit to the Retrospective Exhibition, opened on behalf of the exiles from Alsace and Lorraine, that he died suddenly on the 5th of May 1874. He left unfinished the ” Earthly Paradise,” a noble picture, which Taine has described as ” a dream of innocence, of happiness and of beauty — Adam and Eve standing in the sublime and joyous landscape of a paradise enclosed in mountains,” — a worthy counterpart to the ” Evening.” ‘ Among the other productions of his

genius are the ” Deluge,” which represents two angels speeding above the desolate earth, from which the destroying waters have just begun to retire, leaving visible behind them the ruin they have wrought; the “Battle of the Lemanus,” a piece of elaborate design, crowded but not cumbered with figures, and giving fine expression to the movements of the various bands of combatants and fugitives; the ” Prodigal Son,” in which the artist has ventured to add to the parable the new element of mother’s love, greeting the repentant youth

with a welcome that shows that the mother’s heart thinks less of the repentance than of the return; “Ruth and 3oaz”; ” Ulysses and Nausicaa “;,” Hercules at the feet of Omphale “; the ” Young Athenian,” or, as it is popularly called, ” Sappho “; “Minerva and the Nymphs”; ” Venus iravdrnxos ” ; ” Daphnis and Chloe”; and “Love and the Parcae.” Nor must it be omitted that he left a considerable number of drawings and water- colours, and that we are indebted to him for a number of portraits, among which is the sad face of Heine, engraved in the Revue des deux mondes for April 1852. In Clement’s catalogue of his works there are 683 entries, including sketches and studies.

See Fritz Berthoud in Bibliotheque universelle de Geneve (1874); Albert de Montet, Diet, biographique des Genevois et des Vaudois (1877); and Vie de Charles Gleyre (1877), written by his friend, Charles Clement, and illustrated by 30 plates from his works.

GLIDDON, GEORGE ROBINS (1809-1857), British Egyptolo- gist, was born in Devonshire in 1809. His father, a merchant, was United States consul at Alexandria, and there Gliddon was taken at an early age. He became United States vice- consul, and took a great interest in Egyptian antiquities. Sub- sequently he lectured in the United States and succeeded in rousing considerable attention to the subject of Egyptology generally. He died at Panama in 1857. His chief work was’ Ancient Egypt (1850, ed. 1853). He wrote also Memoir on the Cotton of Egypt (1841); Appeal to the Antiquaries of Europe on the Destruction of the Monuments of Egypt (1841); Discourses on Egyptian Archaeology (1841); Types of Mankind (1854), in conjunction with J. C. Nott and others; Indigenous Rates of the Earth (1857), also in conjunction with Nott and others.

GLINKA, FEDOR NIKOLAEVICH (1788-1849), Russian poet and author, was born at Smolensk in 1788, and was specially educated for the army. In 1803 he obtained a commission as an officer, and two years later took part in the Austrian cam- paign. His tastes for literary pursuits, however, soon induced him to leave the service, whereupon he withdrew to his estates in the government of Smolensk, and

subsequently devoted most of his time to study or travelling about Russia. Upon the invasion of the French in 181 2, he re-entered the Russian army, and remained in active service until the end of the campaign in i 8 14. Upon the elevation of Count Milarodovich to the military governorship of St Petersburg, Glinka was appointed colonel under his command. On account of his suspected revolutionary tendencies he was, in 1826, banished to Petrozavodsk, but he nevertheless retained his honorary post of president of the Society of the Friends of Russian Literature, and was after a time allowed to return to St Petersburg. Soon afterwards he retired completely from public life, and died on his estates in

1849.

Glinka's martial songs have special reference to the Russian military campaigns of his time. He is known also as the author of the descriptive poem Kareliya, &c. (Carelia, or the Captivity of Martha Joanovna) (1830), and of a metrical paraphrase of the book of Job. His fame as a military author is chiefly due to his Pisma Russkago Ofilsera (Letters of a Russian Officer) (8 vols., 1815-1816).

GLINKA, MICHAEL IVANOVICH (1803-1857), Russian musical composer, was born at Novospassky, a village in the Smolensk government, on the 2nd of June 1803. His early life he spent at home, but at the age of thirteen we find him at the Blagorodrey Pension, St Petersburg, where he studied music under Carl Maier and John Field, the Irish composer and pianist, who had settled in Russia. We are told that in his seventeenth year he ha,d already begun to compose romances and other minor vocal pieces; but of these nothing now is known. His thorough musical training did not begin till the year 1830, when he went abroad and stayed for three years in Italy, to study the works of old and modern Italian masters. His thorough knowledge of the requirements of the voice may be connected with this course of study. His training as a composer was finished under the contrapuntist Dehn, with whom Glinka stayed for several months at Berlin. In 1833 he returned to Russia, and devoted himself to operatic composition. On the 27th of September (9th of October) 1836, took place the first representation of his opera Life for the Tsar (the libretto by Baron

de Rosen). This was the turning-point, in Glinka's life, — for the work was not only a great success, but in a manner became the origin and

basis of a Russian school of national music. The story is taken from the invasion of Russia by the Poles early in the 17 th century, and the hero is a peasant who sacrifices his life for the tsar. Glinka has wedded this patriotic theme to inspiring music. His melodies, moreover, show distinct affinity to the popular songs of the Russians, so that the term ” national ” may justly be applied to them. His appointment as imperial chapelmaster and conductor of the opera of St Peters- burg was the reward of his dramatic successes. His second opera Russian and Lyudmila, founded on Pushkin’s poem, did not appear till 1842; it was an advance upon Life for the Tsar in its musical aspect, but made no impression upon the public. In the meantime Glinka wrote an overture and four entre-actes to Kukolnik’s drama Prince Kholmsky. In 1844 he went to Paris, and his Jota Arragonesa (1847), and the symphonic work on Spanish themes, Une Nuit a Madrid, reflect the musical results of two years’ sojourn in Spain. On his return to St Petersburg he wrote and arranged several pieces for the orchestra, amongst which the so-called Kamarinskaya achieved popularity beyond the limits of Russia. He also composed numerous songs and romances. In 1857 he went abroad for the third time; he now wrote his autobiography, orchestrated Weber’s Invitation a la valse, and began to consider a plan for a musical version of Gogol’s Tarass-Boulba. Abandoning the idea and becoming absorbed in a passion for ecclesiastical music he went to Berlin to study the ancient church modes. Here he died suddenly on the 2nd of February 1857.

GLINKA, SERGY NIKOLAEVICH (1774-1847), Russian author, the elder brother of Fedor N. Glinka, was born at Smolensk in 1774. In 1706 he entered the Russian army, but after three years’ service retired with the rank of major. He afterwards employed himself in the education of youth and in literary pursuits, first in the Ukraine, and subsequently at Moscow, where he died in 1847. His poems are spirited and patriotic; he wrote also several dramatic pieces,; and translated Young’s Night Thoughts.

Among his numerous prose works the most important from an historical point of view are: Russkoe Chtenie (Russian Reading: Historical Memorials of Russia in the 18th and igth Centuries) (2 vols., 1845) ; Istoriya Rossii, &c. (History of Russia for the use of Youth) (10 vols., 1817-1819, 2nd ed. 1822, 3rd ed. 1824); Istoriya Armyan, &c. (History of the Migration of the Armenians of Azerbijan from Turkey to Russia) (1831); and his contributions to the Russky Vyestnik (Russian Messenger), a monthly periodical, edited by him from 1808 to 1820.

GLOBE-FISH, or Sea-Hedgehog, the names by which some sea-fishes are known, which have the remarkable faculty of inflating their stomachs with air. They belong to the families Diodontidae and Tetrodontidae. Their jaws resemble the sharp beak of a parrot, the bones and teeth being coalesced into one mass with a sharp edge. In the Diodonts there is no mesial division of the jaws, whilst in the Tetrodonts such a division exists, so that they appear to have two teeth above and two

turns over and floats belly upwards, driving before the wind and waves. Many of these fishes are highly poisonous when eaten, and fatal accidents have occurred from this cause. It appears that they acquire poisonous qualities from their food, which frequently consists of decomposing or poisonous animal matter, such as would impart, and often does impart, similar

Fig. 1. — Diodon maculatus .

below. By means of these jaws they are able to break off branches of corals, and to masticate other hard substances on which they feed. Usually they are of a short, thick, cylindrical shape, with powerful fins (fig. 1).. Their body is covered with thick skin, without scales, but provided with variously formed spines, the size and extent of which vary in the different species. When they inflate their capacious stomachs with air, they assume a globular, form, and the spines protrude, forming a more or less formidable defensive armour (fig. 2). A fish thus blown out

Fig. 2. — Diodon maculatus (inflated).

deleterious qualities to other fish. They are most numerous between the tropics and in the seas contiguous to them, but a few species live in large rivers, as, for instance, the Tetrodon fahaka, a fish well known to all travellers on the Nile. Nearly 100 different species are known.

GLOBIGERINA, A. d'Orbigny, a genus of Perforate Fora- minifera (q.v.) of pelagic habit, and formed of a conical spiral aggregate of spheroidal chambers with a crescentic mouth. The shells accumulate at the bottom of moderately deep seas to form " Globigerina ooze " and are preserved thus in the chalk. Hastigerina only differs in the " flat " or nautiloid spiral.

GLOCKENSPIEL, or Orchestral Bells (Fr. carillon; Ger. Glockenspiel, Stahlharmonika; Ital. campanelli; Med. Lat. tintinnabulum, cymbalum, bombulum), an instrument of percussion of definite musical pitch,

used in the orchestra, and made in two or three different styles. The oldest form of glockenspiel, seen in illuminated MSS. of the middle ages, consists of a set of bells mounted on a frame and played by one performer by means of steel hammers. The name “bell” is now generally a misnomer, other forms of metal or wood having been found more convenient. The pyramid-shaped glockenspiel, formerly used in the orchestra for simple rhythmical effects, consists of an octave of semitone, hemispherical bells, placed one above the other and fastened to an iron rod which passes through the centre of each, the bells being of graduated sizes and diminishing in diameter as the pitch rises. The lyre-shaped glockenspiel, or steel harmonica (Stahlharmonika) , is a newer model, which has instead of bells twelve or more bars of steel, graduating in size according to their pitch. These bars are fastened horizontally across two bars of steel set perpendicularly in a steel frame in the shape of a lyre. The bars are struck by little steel hammers attached to whalebone sticks.

Wagner has used the glockenspiel with exquisite judgment in the fire scene of the last act of Die Walk-tire and in the peasants’ waltz in’ the last scene of Die Meistersinger. When chords are written for the glockenspiel, as in Mozart’s Magic Flute, the keyed harmonica 1 is used. It consists of a keyboard having a little hammer attached to each key, which strikes a bar of glass or steel when the key is depressed. The performer, being able to use both hands, can play a melody with full harmonies, scale and arpeggio passages in single and double notes. A peal of hemispherical bells was specially constructed for Sir Arthur Sullivan’s Golden Legend. It consists of four bells constructed of bell-metal about I in. thick, the largest measuring 27 in. in diameter, the smallest 23. They are fixed on a stand one above the other, with a clearance of about f in. between them; the rim of the lowest and largest bell is 15 in. from the foot of the stand. The bells are struck by mallets, which are of two kinds — a pair of hard wood for forte passages, and a pair covered

1 See ” The Keyed Harmonica improved by H. Klein of Pressburg,” article in the Allg. musik. Ztg., Bd. i. pp. 675-699 (Leipzig, 1798); also Becker, p. 254, Bartel.

with wash-leather for piano effects. The peal was unique at the time it was made for the Golden Legend, but a smaller bell of the same shape, J in. thick, with a diameter measuring about 16 in., specially made for

the performance of Liszt's St Elizabeth, when conducted by the composer in London, evidently suggested the idea for the peal. (K.S.)

GLOGAU, a fortified town of Germany, in the Prussian province of Silesia, 59 m. N.W. from Breslau, on the railway to Frankfort- on-Oder. Pop. (1905) 23,461. It is built partly on an island and partly on the left bank of the Oder; and owing to the fortified enceinte having been pushed farther afield, new quarters have been opened up. Among its most important buildings are the cathedral, in the Gothic, and a castle (now used as a courthouse), in the Renaissance style, two other Roman Catholic and three Protestant churches, a new town-hall, a synagogue, a military hospital, two classical schools (Gymnasien) and several libraries. Owing to its situation on a navigable river and at the junction of several lines of railway, Glogau carries on an extensive trade, which is fostered by a variety of local industries, embracing machinery-building, tobacco, beer, oil, sugar and vinegar. It has also extensive lithographic works, and its wool market is celebrated.

In the beginning of the nth century Glogau, even then a populous and fortified town, was able to withstand a regular siege by the emperor Henry V.; but in n 57 the duke of Silesia, finding he could not hold out against Frederick Barbarossa, set it on fire. In 1252 the town, which had been raised from its ashes by Henry I., the Bearded, became the capital of a princi- pality of Glogau, and in 1482 town and district were united to the Bohemian crown. In the course of the Thirty Years' War Glogau suffered greatly. The inhabitants, who had become Protestants soon after the Reformation, were dragooned into conformity by Wallenstein's soldiery; and the Jesuits received permission to build themselves a church and a college. Captured by the Protestants in 1632, and recovered by the Imperialists in 1633, the town was again captured by the Swedes in 1642, and continued in Protestant hands till the peace of Westphalia in 1648, when the emperor recovered it. In 1741 the Prussians took the place by storm, and during the Seven Years' War it formed an important centre of operations for the Prussian forces. After the battle of Jena (1806) it fell into the hands of the French; and was gallantly held by Laplane, against the Russian and Prussian besiegers, after the battle of Katzbach in August 1813 until the 17th of the following April.

See Minsberg, Geschichte der Stadt und Festung Glogau's (2 vols., Glogau, 1853); and H. von Below, Zur Geschichte des Jahres 1806. Glogau' s Belagerung und Verteidigung (Berlin, 1893).

GLORIOSA, in botany, a small genus of plants belonging to the natural order Liliaceae, native of tropical Asia and Africa. They are bulbous

plants, the slender stems of which support themselves, by tendril-like prolongations of the tips of some of the narrow generally lanceolate leaves. The flowers, which are borne in the leaf-axils at the ends of the stem, are very handsome, the six, generally narrow, petals are bent back and stand erect, and are a rich orange yellow or red in colour; the six stamens project more or less horizontally from the place of insertion of the petals. They are generally grown in cultiva- tion as stove-plants.

GLORY (through the 0. Fr. glorie, modern gloire, from Lat. gloria, cognate with Gr. kX«6$, Kkbtiv), a synonym for fame, renown, honour, and thus used of anything which reflects honour and renown on its possessor. In the phrase ” glory of God ” the word implies both the honour due to the Creator, and His majesty and effulgence. In liturgies of the Christian Church are the Gloria Patri, the doxology beginning ” Glory be to the Father,” the response Gloria tibi, Domine, ” Glory be to Thee, O Lord,” sung or said after the giving out of the Gospel for the day, and the Gloria in excelsis, ” Glory be to God on high,” sung during the Mass and Communion service. A ” glory ” is the term often used as synonymous with halo, nimbus or aureola {q.v.) for the ring of light encircling the head ox figure in a pictorial or other representation of sacred persons.

GLOSS, GLOSSARY, &c. The Greek word yX&oo-a (whence our ” gloss “), meaning originally a tongue, then a language or dialect, gradually came to denote any obsolete,foreign, provincial, technical or otherwise peculiar word or use of a word (see Arist. Rhet. iii. 3. 2). The making of collections and explanations 1 of such yhSxraai was at a comparatively early date a well-recognized form of literary activity. Even in the 5th century B.C., among the many writings of Abdera was included a treatise entitled Hepl ‘Opiipov J) opdoeirtirp ko.1 yˆjjxrokwv. It was not, however, until the Alexandrian period that the yXuaooy p6.‘Chov yhwroSiv) and especially Phrynichus, who flourished towards the close of the 2nd century, and whose Eclogae nominum et verborum Atticorum has frequently been edited. To the 4th century belongs Ammonius of Alexandria (c. 389), who wrote Hepi bpoloiv ko.1 Siav \iˆeuv, a dictionary of words used in senses different from those in which they had

‘ * The history of the literary gloss in its proper sense has given rise to the common English use of the word to mean an interpretation, especially in a disingenuous, sinister or false way; the form ” gloze,” more particularly associated with explaining away, palliating or talking speciously, is simply an alternative spelling. The word has thus to some extent influenced, or been influenced by, the meaning of the

etymologically different ” gloss “ = lustrous surface (from the same root as ” glass ” ; cf. ” glow “), in its extended sense of ” out- ward fair seeming.” 2 See Matthaei, Glossaria Graeca (Moscow, 1774/5).

been employed by older and approved writers. Of somewhat later date is the well-known Hesychius, whose often-edited A«£ikoV superseded all previous works of the kind; Cyril, the celebrated patriarch of Alexandria, also contributed somewhat to the advancement of glossography by his Hvvaycoyri toiv 7rp6s 8ia4 > opov or\j.ojo.a.v 5ia.4 > 6po)S rovovfiivtav \e£ai)v; while Orus, Orion, Philoxenus and the two Philemons also belong to this period. The works of Photius, Suidas and Zonaras, as also the Etymologicum magnum, to which might be added the Lexica Sangermania and the Lexica Segueriana, are referred to in the article Dictionary.

To a special category of technical glossaries belongs a large and important class of works relating to the law-compilations of Justinian. Although the emperor forbade under severe penalties all commentaries (moixvr)p.ara.) on his legislation {Const. Deo Auctore, sec. 12; Const. Tanta, sec. 21), yet indices (tvouccs) and references (irapaTirXa), as well as translations (epp,r)vetai Kara ir68a) and paraphrases (Ipfiriveiai els irKaros), were expressly permitted, and lavishly produced. Among the numerous compilers of alphabetically arranged Xe£e« Tw/iai’/cat or AareiviKai, and y\Sxraai vofuical (glossae nomicae), Cyril and Philoxenus are particularly noted; but the authors of wapaypatbal, or al toiv waKcu&v, combined with vecu irapaypaai on the revised code called t& /9auiX«&, was made about the middle of the 1 2th century by a disciple of Michael Hagiotheodorita. This work is known as the Glossa ordinaria tCiv fJcuriktKwv. 1

In Italy also, during the period of the Byzantine ascendancy, various glossae (glosae) and scholia on the Justinian code were produced 2 ; particularly the Turin gloss (reprinted by Savigny), to which, apart from later additions, a date prior to 1000 is usually assigned. After the total extinction of the Byzantine authority in the West the study of law became one of the free arts, and numerous schools for its cultivation were instituted. Among the earliest of these was that of Bologna, where Pepo (1075) and Irnerius (1100-1118) began to give their expositions. They had a numerous following, who, besides delivering exegetical lectures (” ordinariae ” on the Digest and Code, ”

extraordin- ariae ” on the rest of the Corpus juris civilis), also wrote Glossae, first interlinear, afterwards marginal. 3 The series of these glossators was closed by Accursius (q.v.) with the com- pilation known as the Glossa ordinaria or magistralis, the authority of which soon became very great, so that ultimately it came to be a recognized maxim, ” Quod non agnoscit glossa, pon agnoscit curia.” 4 For some account of the glossators on tne canon law, see Canon Law.

In late classical and medieval Latin, glosa was the vulgar and romanic (e.g. in the early 8th century Corpus Glossary, and the late 8th century Leiden Glossary), glossa the learned form (Varro, De ling Lat. vii. 10; Auson. Epigr. 127. 2 (86. 2), written in Greek, Quint, i. 1. 34). The diminutive glossula occurs in Diom. 426. 26 and elsewhere. The same meaning has glossarium (Gell. xviii. 7. 3 glosariaˆyKoxrcraptov), which also occurs in the modern sense of ” glossary ” (Papias, ” unde glossarium dictum quod omnium fere partium glossas contineat “), as do the words glossa, glossae, glossulae, glossemata (Steinmeyer, Alth. Gloss, iv. 408, 410), expressed in later times by didionarium, dictionarius, vocabularium, vocahularius (see Dictionary). Glossa and

1 See Labb6, Veteres glossae verborum juris quae passim in Basilicis reperiunlur (1606); Otto, Thesaurus juris Romani, iii. (1697); Stephens, Thesaurus linguae Graecae, viii. (1825).

- See Biener, Geschichte der Novellen, p. 229 sqq,

3 Irnerius himself is with some probability believed to have been the author of the Brachylogus (q.v.).

4 Thus Fil. Villani {De ongine civitatis Florentiae, ed. 1847, p. 23), speaking of the Glossator Accursius, says of the Glossae thac ” tantae auctoritatis gratiaeque fuere, ut omnium consensu publice appro- barentur, et reiectis aliis, quibuscumque penitus abolitis, solae juxta textum legum adpositae sunt et ubique terrarum sine contro- vareia pro legibus celebrantur, ita ut nefas sit, non secus quam textui, Glossis Accursii contraire.” For similar testimonies see

feayle’s Dictionnaire, s.v. ” Accursius,” and Rudorff, Rom. Rechts-

■■zxhiehte, i. 338 (1857).

glossema (Varro vii. 34. 107; Asinius Gallus, ap. Suet. De gramm. 22; Fest. i66 b . 8, 181 a . 18; Quint, i. 8. 15, &c.) are synonyms, signifying (a) the word which requires explanation; or (b) such a word (called lemma) together with the interpretation (inter pretamentum); or © the interpretation alone (so first in the Anecd. Helv.).

Latin, like Greek glossography, had its origin chiefly in the practical wants of students and teachers, of whose names we only know a few. No doubt even in classical times collections of glosses (" glossaries ") were compiled, to which allusion seems to be made by Varro (De ling. Lat. vii. 10, " tesca, aiunt sancta esse qui glossas scripserunt ") and Verrius-Festus (166 b . 6, " naucum . . . glossematorum . . . scriptores fabae grani quod haereat in fabulo "), but it is not known to what extent Varro, for instance, used them, or retained their original forms. The scriptores glossematorum were distinguished from the learned glossographers like Aurelius Opilius (cf. his Musae, ap. Suet. De gramm. 6; Gell. i. 25. 17; Varro vii. 50, 65, 67, 70, 79, 106), Servius Clodius (Varro vii. 70. 106), Aelius Stilo, L. Ateius Philol., whose liber glossematorum Fest us mentions (181 ". 18).

Verrius Flaccus and his epitomists, Festus and Paulus, have preserved many treasures of early glossographers who are now lost to us. He copied Aelius Stilo (Reitzenstein, Verr. Forsch.," in vol. i. of Breslauer philol. Abhandl., p. 88; Kriegshammer, Comm. phil. Ien. vii. I. 74 sqq.), Aurelius Opilius, Ateius Philol., the treatise De obscuris Catonis (Reitzenstein, ib. 56. 92). He often made use of Varro (Willers, De Verrio Flacco, Halle, 1898), though not of his ling. lat. (Kriegshammer, 74 sqq.) ; and was also acquainted with later glossographers. Perhaps we owe to him the glossae asbestos (Goetz, Corpus, iv. ; id., Rhein. Mus. xl. 328). Festus was used by Ps.-Philoxenus (Dammann, " De Festo Ps.-Philoxeni auctore, ' Comm. Ien. v. 26 sqq.), as appears from the glossae ab absens (Goetz, " De Astrabae PI. fragmentis," Ind. Ien., 1893, iii. sqq.). The distinct connexions with Nonius need not be ascribed to borrowing, as Plinius and Caper may have been used (P. Schmidt, De Non. Marc, audi, gramm. 145; Nettleship, Led. and Ess. 229; Frohde, De Non. Marc, et Verrio Flacco, 2; W. M. Lindsay, " Non. Marc," Diet, of Repub. Latin, 100, &c).

The bilingual (Gr.-Lat., Lat.Gr.) glossaries also point to an early period, and were used by the grammarians (1) to explain the peculi arities (idiomata) of the Latin language by comparison with the Greek, and (2) for instruction in the two languages (Charts. 254. 9, 291. 7, 292. 16 sqq. ; Marschall, De Q. Remmii P. libris gramm. 22 ; Goetz, Corp. gloss, lat. ii. 6).

For the purposesof grammatical instruction (Greek for the Romans, Latin for the Hellenistic world), we have systematic works, a translation of Dositheus and the so-called Hermeneutica, parts of which may be dated as early as the 3rd century A.D., and lexica (cf. Schoenemann, De lexicis ant. 122; Knaack, in Phil. Rundsch., 1884,

372; Traube, in Byzant. Ztschr. iii. 605; David, Comment. Ien. v. 197 sqq.).

The most important remains of bilingual glossaries are two well-known lexica; one (Latin-Greek), formerly attributed (but wrongly, see Rudorff, in Abh. Akad. Berl., 1865, 220 sq.; Loewe, Prodr. 183, 190; Mommsen, C.I.L. v. 8120; A. Dammann, De Festo Pseudo- philoxeni auctore, 12 sqq.; Goetz, Corp. ii. 1-212) to Philoxenus (consul a.d. 525), clearly consists of two closely allied glossaries (containing glosses to Latin authors, as Horace, Cicero, Juvenal, Virgil, the Jurists, and excerpts from Festus), worked into one by some Greek grammarian, or a person who worked under Greek influence (his alphabet runs A, B, G, D, E, &c.) ; the other (Greek- Latin) is ascribed to Cyril (Stephanus says it was found at the end of some of his writings), and is considered to be a compilation of not later than the 6th century (Macrobius is used, and the Cod. Harl., which is the source of all the other MSS., belongs to the 7th century); cf. Goetz, Corp. ii. 215-483, 487-506, praef. ibid. p. xx. sqq. Furthermore, the bilingual medico-botanic glossaries had their origin in old lists of plants, as Ps.-Apuleius in the treatise De herbarum virtutibus, and Ps.Dioscorides (cf. M. Wellmann, Hermes, xxxiii. 360 sqq., who thinks that the latter work is based on Pamphilus, q.v. ; Goetz, Corp. iii.); the glossary, entitled Herme neuma, printed from the Cod. Vatic, reg. Christ. 1260, contains names of diseases.

Just as grammar developed, so we see the original form of the glosses extend. If massucum edacem in Placidus indicates the original form, the allied gloss of Festus (masucium edacem a man- dendo scilicet) shows an etymological addition. Another extension consists in adding special references to the original source, as e.g. at the gloss Ocrem (Fest. 181”. 17), which is taken from Ateius Philol. In this way collections arose like the priscorum verborum cum exemplis, a title given by Fest. (218”. 10) to a particular work. Further the glossae veterum (Charis. 242. 10) ; the glossae antiquitatum (id. 229. 30) ; the idonei vocum antiquarum enarratores (Gell. xviii. 6. 8) ; the libri rerum verborumque veterum (id. xiii. 24. 25). L.

Cincius, according to Festus (330* . 2), wrote De verbis priscis ; Santra, De antiquitate verborum (Festus 277”. 2).

Of Latin glossaries of the first four centuries of the Roman emperors

few traces are left, if we except Verrius-Festus. Charis, 229. 30, speaks of glossae antiquitatum and 242. 10 of glossae veterum, but it is not known whether these glosses are identic, or in what relation they stand to the glossemata per litteras Laiinas ordine composite., which were incorporated with the works of this grammarian according to the index in Keil, p. 6. Latin glosses occur in Ps.Philoxenus, and Nonius must have used Latin glossaries; there exists a glos sarium Plantinum (Ritschl, Op. ii. 234 sqq.), and the bilingual glossaries have been used by the later grammarian Martyrius; but of this early period we know by name only Fulgentius and Placidus, who is sometimes called Luctatius Placidus, by confusion with the Statius scholiast, with whom the glossae Placidi have no con- nexion. All that we know of him tends to show that he lived in North Africa (like Fulgentius and Nonius and perhaps Charisius) in the 6th century, from whence his glosses came to Spain, and were used by Isidore and the compiler of the Liber glossarum (see below). These glosses we know from (1) Codices Romani (15th and 16th century); (2) the Liber glossarum; (3) the Cod. Paris, nov. acquis. 1298 (saec. xi.), a collection of glossaries, in which the Placidus- glosses are kept separate from the others, and still retain traces of their original order (cf. the editions published by A. Mai, Class, aitct. iii. 427-503, and Deuerling, 1875; Goetz, Corp. v.; P. Karl, ” De Placidi glossis,” Comm. Ien. vii. 2. 99, 103 sqq.; Loewe, Gloss. Nom. 86; F. Bucheler, in Thesaur. gloss, emend.). His collection includes glosses from Plautus and Lucilius.

(Fabius Planciades) Fulgentius (c. a.d. 468-533) wrote Expositio sermonum antiquorum (ed. Rud. Helm, Lips. 1898 ; cf. Wessner, Com- ment. Ien. vi. 2. 135 sqq.) in sixty-two paragraphs, each containing a temma (sometimes twoor three) with anexplanation giving quotations and names of authors. Next to him come the glossae Nonianae, which arose from the contents of the various paragraphs in Nonius Mar- cellus’ work being written in the margin without the words of the text ; these epitomized glosses were alphabetized and afterwards copied for other collections (see Goetz, Corp. v. 637 sqq., id. v. Praef. xxxv. ; Onions and Lindsay, Harvard Stud. ix. 67 sqq. ; Lindsay, Nonii praef. xxi.). In a similar way arose the glossae Eucherii or glossae spiritales secundum Eucherium episcopum found in many MSS. (cf. K. Wotke, Sitz. Ber. Akad. Wien, cxv. 425 sqq. ; = the Corpus Glossary, first part), which are an alphabetical extract from the formulae s.piritalis intelligentiae of St Eucherius, bishop of Lyons, c. 434-450. 1

Other sources were the Differentiae, already known to Placidus and much used in the medieval glossaries; and the Synonyma Ciceronis; cf. Goetz, ” Der Liber glossarum,” in Abhandl. der philol. -hist. CI. der sacks. Gesellsch. d. Wiss., 1893, p. 215; id. in Berl. philol.

Wochenschr., 1890, p. 195 sqq.; Beck, in Wochenschr., p. 297 sqq., and Sittls, ibid. p. 267; Archiv f. lat. Lex. vi. 594; W. L. Mahne, (Leid. 1850, 1851); also various collections of scholia. By the side of the scholiasts come the grammarians, as Charisius, or an ars similar to that ascribed to him; further, treatises de dubiis generibus, the scriptores orthographici (especially Caper and Beda), and Priscianus, the chief grammarian of the middle ages (cf. Goetz in Melanges Boissier, 224).

During the 6th, 7th and 8th centuries glossography developed in various ways; old glossaries were worked up into new forms, or amalgamated with more recent ones. It ceased, moreover, to be exclusively Latin-Latin, and interpretations in Germanic (Old High German, Anglo-Saxon) and Romanic dialects took the place of or were used side by side with earlier Latin ones. The origin and development of the late classic and medieval glossaries preserved

1 The so-called Malberg glosses, found in various texts of the Lex Salica, are not glosses in the ordinary sense of the word, but precious remains of the parent of the present literary Dutch, namely, the Low German dialect spoken by the Salian Franks who conquered Gaul from the Romans at the end of the 5th century. It is supposed that the conquerors brought their Frankish law with them, either written down, or by oral tradition; that they translated it into Latin for the sake of the Romans settled in the country, and that the trans- lators, not always knowing a proper Latin equivalent for certain things or actions, retained in their translations the Frankish technical names or phrases which they had attempted to translate into Latin. E.g. in chapter ii., by the side of ” porcellus lactans ” (a sucking-pig), we find the Frankish ” chramnechaltio,” lit. a stye-porker. The person who stole such a pig (still kept in an enclosed place, in a stye) was fined three times as much as one who stole a ” porcellus de campo qui Sine matre vivere possit,” as the Latin text has it, for which the Malberg technical expression appears to have been ingymus, that is;’ a one year (winter) ol9 animal, i.e. a yearling. Nearly all these ■ glosses are preceded by ” mal ” or ” malb,” which is thought to be a contraction for ” malberg,” the Frankish for ” forum.” The antiquity and importance of these glosses for philology may be realized from the fact that the Latin translation of the Lex Salica probably dates from the latter end of the 5th century. For further information, cf. Jac. Grimm’s preface to J oh. Merkel’s ed. (1850), and H. Kern’s notes to J. H. Hessels’s ed. (London, 1880) of the Lex Salica.

to us can be traced with certainty. While reading the, manuscript texts of classical authors, the Bible or early Christian and profane writers,

students and teachers, on meeting with any obscure or out- of-the-way words which they considered difficult to remember or to require elucidation, wrote above them, or in the margins, interpreta- tions or explanations in more easy or better-known words. The interpretations written above the line are called ” interlinear,” those written in the margins of the MSS.ˆ ” marginal glosses.” Again, MSS. of the Bible or portions of the Bible were often provided with literal translations in the vernacular written above the lines of the Latin version (interlinear versions).

Of such glossed MSS. or translated texts, photographs may be seen in the various palaeographical works published in recent years ; cf. The Palaeogr. Society, 1st ser. vol. ii. pis. 9 (Terentius MS. of 4th or 5th century, interlinear glosses) and 24 (Augustine’s epistles, 6th or 7th century, marginal glosses); see further, plates 10, 12, 33. 40, 50-54, 57, 58, 63, 73, 75, 80; vol. iii. plates 10, 24, 31, 39,

44, 54, 80.

From these glossed or annotated MSS. and interlinear versions glossaries were compiled ; that is, the obscure and difficult Latin words, together with the interpretations, were excerpted and collected in separate lists, in the order in which they appeared, one after the other, in the MSS., without any alphabetical arrangement, but with the names of the authors or the titles of the books whence they were taken, placed at the head of each separate collection or chapter. In this arrangement each article by itself is called a gloss; when reference is made only to the word explained it is called the lemma, while the explanation is termed the inter pretamentum. In most cases the form of the lemma was retained just as it stood in its source, and explained by a single word (tesca: sancta, Varro vii. 10; clucidatus: suavis, id. vii. 1 07; cf. Isid. Etym. i. 30. I, ” quid enim illud sit in uno verbo positum declarat [scil. gldssa] ut conticescere est tacere “), so that we meet with lemmata in the accusative, dative and genitive, likewise explained by words in the same cases; the forms of verbs being treated in the same way. Of this first stage in the making of glossaries, many traces are preserved, for instance, in the late 8th century Leiden Glossary (Voss. 69, ed. J. H. Hessels), where chapter iii. contains words or glosses excerpted from the Life of St Martin by Sulpicius Severus; chs. iv., v. and xxxv. glosses from Rufinus; chs. vi. and xl. from Gildas; chs. vii. to xxv. from books of the Bible (Paralipomenon ; Proverbs,, &c, &c); chs. xxvi. to xlviii, from Isidore, the Vita S. Anlho’nii, Cassiodorus, St Jerome, Cassianus, Orosius, St Augustine 4 St Clement, Eucherius, St Gregory, the grammarians Donatus, Phocas, &c. (See also Goetz, Corp. v. 546. 23-547. 6. and i. 5-40 from Ovid’s

Metam.; v. 657 from Apuleius, De deo Socratis; cf. Landgraf, in Arch. ix. 174).

By a second operation the glosses came to be arranged in alphas betical order according to the first letter of the lemma, but still retained in separate chapters under the names of authors or the titles of books. Of this second stage the Leiden Glossary contains, traces also: ch. i. {Verba de Canonibus) and ii. (Sermones de Regulis); see Goetz, Corp. v. 529 sqq. (from Terentius), iv. 427 sqq. (Virgil).. ,

The third operation collected all the accessible glosses in 'alphabetical order, in the first instance according to the first letters of the lemmata. In this arrangement the names of the authors or the titles of the books could no longer be preserved, and consequently the sources whence the glosses were excerpted became uncertain, especially if the grammatical forms of the lemmata had been normalized.

A fourth arrangement collected the glosses according to the first two letters of the lemmata, as in the Corpus Glossary and in the still earlier Cod. Vat. 3321 (Goetz, Corp. iv. 1 sqq.), .where even many attempts were made to arrange them according to the first three letters of the alphabet. A peculiar arrangement is seen in the Glossae affatim (Goetz, Corp. iv. 471 sqq.), where all words are alphabetized, first according to the initial letter of the word (a, b, c, &c), and then further according to the first vowel in the word (a, e, i, o, u).

No date or period can be assigned to any of the above stages or arrangements. For instance, the first and second are both found in the Leiden Glossary, which dates from the end of the 8th century, whereas the Corpus Glossary, written in the beginning of the same century, represents already the fourth stage.

For the purpose of identification titles have of late years been given to the various nameless collections of glosses, derived partly from their first lemma, partly from other characteristics, as glossae abstrusae; glossae abavus major and minor; g. affatim; g.ababsens; g. abactor; g. Abba Pater; g. a, a; g. Vergilianae; g. nominum (Goetz, Corp. ii. 563, iv.); g. Sangallenses (Warren, Transact. Amer. Philol. Assoc, xv., 1885, p. 141 sqq.).

A chief landmark in glossography is represented by the Origines (Etymologiae) of Isidore (d. 636), an encyclopedia in which he, like Cassiodorus, mixed human and divine subjects together. In many places we can trace his sources, but he also used glossaries. His work became a great mine for later glossographers. In the tenth book he

deals with the etymology of many substantives and adjectives arranged alphabetically according to the first letter of the words, perhaps by himself from various sources. His principal source I is Servius, then the fathers of the Church (Augustine, Jerome,

Lactantius) and Donatus the grammarian. This tenth book was also copied and used separately, and mixed up with other works (cf. Loewe, Prodr. 167. 21). Isidore's Differentiae have also had a great reputation.

Next comes the Liber glossarum, chiefly compiled from Isidore, but all articles arranged alphabetically; its author lived in Spain c. a.d. 690-750; he has been called Ansileubus, but not in any of the MSS., some of which belong to the 8th century; hence this name is suspected to be merely that of some owner of a copy of the book (cf. Goetz, " Der Liber Glossarum," in Abhandl. der philol.-hist. Class, der kon. sacks. Ges. xiii., 1893; id., Corp. v., praef. xx. 161).

Here come, in regard to time, some Latin glossaries already largely mixed with Germanic, more especially Anglo-Saxon interpretations : (1) the Corpus Glossary (ed. J. H. Hessels), written in the beginning of the 8th century, preserved in the library of Corpus Christi College, Cambridge; (2) the Leiden Glossary (end of 8th century, ed. Hessels; another edition by Plac. Glogger), preserved in the Leiden MS. Voss. Q °- 9; (3) the Epinal Glossary, written in the beginning of the 9th century 1 and published in facsimile by the London Philol. Society from a MS. in the town library at Spinal; (4) the Glossae Amplonianae, i.e. three glossaries preserved in the Amplonian library at Erfurt, known as Erfurt 1 , Erfurt 2 and Erfurt 3 . The first, published by Goetz {Corp. v. 337-401; cf. also,Loewe, Prodr. 114 sqq.) with the various readings of the kindred Epinal, consists, like the latter, of different collections of glosses (also some from Aldhelm), some arranged alphabetically according to the first letter of the lemma, others according to the first two letters. The title of Erfurt 2 (incipit II. conscriptio glosarum in unam) shows that it is also a combination of various glossaries; it is arranged alphabetically according to the first two letters of the lemmata, and contains the affatim and abavus maior glosses, also a collection from Aldhelm; Erfurt' are the Glossae nominum, mixed also with Anglo-Saxon interpretations (Goetz, Corp. ii. 563). The form in which the three Erfurt glossaries have come down to us points back to the 8th century.

The first great glossary or collection of various glosses and glossaries is that of Salomon, bishop of Constance, formerly abbot or St Gall, who died A.D. 919. An edition of it in two parts was printed c. 1475 at Augsburg, with the headline Salemonis ecclesie Constantiensis episcopi glosse ex illuslrissimis collecte auctoribus. The oldest MSS. of this work date from the nth century. Its sources are the Liber glossarum (Loewe, Prodr. 234 sqq.), the glossary preserved in the 9th-century MS. Lat. Monae. 14429 (Goetz, " Lib. Gloss." 35 sqq.), and the great Abavus Gloss (id., ibid. p. 37; id., Corp. iv. praef. xxxvii.).

The Lib. glossarum has also been the chief source' for the important (but not original) glossary of Papias, of a.d. 1053 (cf. Goetz in Sitz. Ber. Akad. Munch., 1903, p. 267 sqq., who enumerates eighty-seven MSS. of the 12th tothe 15th centuries), of whom we only know that he lived among clerics and dedicated his work to his two sons. An edition of it was' published at Milan " per Dominicum de Vespolate " on the 12th of December 1476; other editions followed in 1485, 1491, 1496 (at Venice). He also wrote a grammar, chiefly compiled from Priscianus (Hagen, Anecd. Helv. clxxix. sqq.).

The same Lib. gloss, is the source (1) for the Abba Pater Glossary (cf. Goetz, ibid. p. 39), published by G. M. Thomas (Sitz. Ber. Akad. Munch., 1868, ii. 369 sqq.); (2) the Greek glossary Absida lucida (Goetz, ib. p. 41); and (3) the Lat.-Arab. glossary in the Cod. Leid. Seal. Orient. No. 231 (published by Seybold in Semit. Studien, Heft xv.-xvii., Berlin, 1900).

The Paulus-Glossary (cf. Goetz, " Der Liber Glossarum," p. 215) is compiled from the second Salomon-Glossary (abacti magistratus) , the Abavus major and the Liber glossarum, with a mixture of Hebraica. Many of his glosses appear again in other compilations, as in the Cod. Vatic. 1469 (cf. Goetz, Corp. v. 520 sqq.), mixed up with glosses from Beda, Placidus, &c. (cf. a glossary published by Ellis in Amer. Journi of Philol. vi. 4, vii. 3, containing besides Paulus glosses, also excerpts from Isidore; Cambridge Journ. of Philol. viii. 71 sqq., xiv. 81 sqq.).

Osbern of Gloucester (c. 1 123-1200) compiled the glossary entitled Panormia (published by Angelo Mai as Thesaurus novus Latinitatis, from Cod. Vatic, reg. Christ. 1392 ; cf. W. Meyer, Rhein. Mus. xxix., 1874; Goetz in Sitzungsber. sacks. Ges. d. Wiss., 1903, p. 133 sqq.; Berichte ub. die Verhandl. der kon. sacks. Gesellsch. der Wiss., Leipzig, 1902); giving derivations, etymologies, testimonia collected from Paulus, Priscianus, Plautus, Horace, Virgil, Ovid, Mart. Capella, Macrobius, Ambrose, Sidonius, Prudentius, Josephus, Jerome, &c, &c. Osbern's material was also used by Hugucio, whose compendium was

still more extensively used (cf. Goetz, I.e., p. 121 sqq., who enumerates one hundred and three MSS. of his treatise), and contains many biblical glosses, especially Hebraica, some treatises' on Latin numerals, &c. (cf. Hamann, Weitere Mitteil. aus dem Breviloquus Benthemianus, Hamburg, 1882; A. Thomas, V Glosses provencales ined." in Romania, xxxiv. p, 177 sqq; P. Toynbee, ibid. xxv. p. 537 sqq.).

The great work of Johannes de Janua, entitled Summa quae vocatur catholicon, dates from the year 1286, and treats of (1) accent, (2) etymology, (3) syntax, and (4) so-called prosody, i.e. a lexicon,

1 Aˆ!glo-§axon scholars ascribe an earlier date to the text of the MS. on' account of certain archaisms in its Anglo-Saxon words.

which also deals with quantity. It mostly uses Hugucio and Papias; its classical quotations are limited, except from Horace ; it quotes the Vulgate by preference, frequently independently from Hugucio; it excerpts Priscianus, Donatus, Isidore, the fathers of the Church, especially Jerome, Gregory, Augustine, Ambrose; it borrows many Hebrew glosses, mostly from Jerome and the other collections then in use; it mentions the Graecismus of Eberhardus Bethuniensis, the works of Hrabanus Maurus, the Doctrinale of Alexander de Villa Dei, and the Aurora of Petrus de Riga. Many quotations from the Catholicon in Du Cange are really from Hugucio, and may be traced to Osbern. There exist many MSS. of this work, and the Mainz edition of 1460 is well known (cf. Goetz in Berichte lib. die Verhandl. der kon. sacks. Gesellsch. der Wiss., Leipzig, 1902).

The gloss MSS. of the 9th and 10th centuries are numerous, but a diminution becomes visible towards the nth. We then find grammatical treatises arise, for which also glossaries were used. The chief material was (1) the Liber glossarum; (2) the Paulus glosses; (3) the A bavus major ; (4) excerpts from Priscian and glosses to Priscian ; (5) Hebrew-biblical collections of proper names (chiefly from Jerome). After these comes medieval material, as the derivationes which are found in many MSS. (cf. Goetz in Sitzungsber. sacks. Ges. d. Wiss., !9 3) P- 136 sqq.; Traube in Archiv f. lat. Lex. vi. 264), containing quotations from Plautus, Ovid, Juvenal, Persius, Terence, occasionally from Priscian, Eutyches, and other grammarians, with etymological explanations. • These derivationes were the basis for the grammatical works of Osbern, Hugucio and Joannes of Janua.

A peculiar feature of the late middle ages are the medico-botanic glossaries based on the earlier ones (see Goetz, Corp. iii.). The

additions consisted in Arabic words with Latin explanations, while Greek, Latin, Hebrew and Arabic, interchange with English, French, Italian and German forms. Of glossaries of this kind we have (1) the Glossae alpkita (published by S. de Renzi in the 3rd vol. of the Collect. Salemitana, Naples, 1854, from two Paris MSS. of the 14th and 15th centuries, but some of the glosses occur already in earlier MSS.); (2) Sinonoma Bartholomei, collected by John Mirfeld, towards the end of the 14th century, ed. J. L. G. Mowat (Anecd. Oxon. i. I, 1882, cf. Loewe, Gloss. Nom. 116 sqq.); it seems to have used the same or some similar source as No. 1 ; (3) the compilations of Simon de Janua (Clavis sanationis, end of 13th century), and of Matthaeus Silvaticus (Pandectae medicinae, 14th century; cf. H. Stadler, ” Dioscor. Longob.” in Roman. Forsch. x. 3. 371; Steinmeyer, Althochd. Gloss, iii.).

Of biblical glossaries we have a large number, mostly mixed with glosses on other, even profane, subjects, as Hebrew and other biblical proper names, and explanations of the text of the Vulgate in general, and the prologues of Hieronymus. So we have the Glossae veteris ac novi testamenti (beginning ” Prologus graece latine praelocutio sive praefatio “) in numerous MSS. of the 9th to 14th centuries, mostly retaining the various books under separate headings (cf. Areyalo, Isid. vii. 407 sqq.; Loewe, Prodr. 141 ; Steinmeyer iv. 459; S. Berger, De compendiis exegeticis quibusdam medii aevi, Paris, 1879). Special mention should be made of Guil. Brito, who lived about 1250, and compiled a Summa (beginning “difficiles studeo partes quas Biblia gestat Pandere “) , contained in many MSS. especi- ally in French libraries. This Summa gave rise to the Mammotrectus of Joh. Marchesinus, about 1300, of which we have editions printed in 1470, 1476, 1479, &c.

Finally we may mention such compilations as the Summa Heinrici ; the work of Johannes de Garlandia, which he himself calls dictionarius (cf. Scheler in Jahrb.f. rom. u. engl. Philol. vi., 1865, p. 142 sqq.); and that of Alexander Neckam (ib.- vii. p. 60 sqq.), cf. R. Ellis, in Amer. Journ. of Phil. x. 2*); which are, strictly speaking, not glosso- graphic. The Breviloquus drew its chief material from Papias, Hugucio, Brito, &c. (K. Hamann, Mitteil. aus dem Breviloquus Benthemianus, Hamburg, 1879; id., Weitere Mitteil., &c, Hamburg, 1882); so also the Vocabularium Ex quo; the various Gemmae; Vocabularia reriim (cf. Diefenbach, Glossar. Latino-Germanicum) .

After the revival of learning, J. Scaliger (1540-1609) was the first to impart to glossaries that importance which they deserve (cf. Goetz, in Sitzungsber. sacks. Ger. d. Wiss., 1888, p. 219 sqq.), and in his edition

of Festus made great use of Ps.-Philoxenus, which enabled O. Miiller, the later editor of Festus, to follow in his footsteps. Scaliger also planned the publication of a Corpus glossarum, and left behind a collection of glosses known as glossae Isidori (Goetz, Corp. v. p. 589 sqq. ; id. in Sitzungsber. sacks. Ges., 1888, p. 224 sqq. ; Loewe, Prodr. 23 sqq.), which occurs also in old glossaries, clearly in reference to the tenth book of the Etymologiae.

The" study of glosses spread through the publication, in l§73, of the bilingual glossaries by H. Stephanus (Estienne), containing, besides the two great glossaries, also the Hermeneumata Stephani, which is a recension of the Ps.-Dositkeana (republished Goetz, Corp. iii. 438-474), and the glossae Stephani, excerpted from a collection of the Hermeneumata (ib. iii. 438-474).

In 1600 Bonav. Vulcanius republished the same glossaries, adding (1) the, glossae Isidori, which now appeared for the first time; (2) the Onomasticon; (3) notae and castigationes, derived from Scaliger (Loewe, Prodr. 183).

In 1606 Carolus and Petrus Labbaeus published, with the effective help of Scaliger, another collection of glossaries, republished, in 1679 by Du Cange, after which the 17th and 18th centuries prdduced no

further glossaries (Erasm. Nyerup published extracts from the Leiden Glossary, Voss. 69, in 1787, Symbolae ad Literal. TeuL), though glosses were constantly used or referred to by Salmasius, Meursius, Heraldus, Barth, Fabricius and Burman at Leiden, where a rich collection of glossaries had been obtained by the acquisition of the Vossius library (cf. Loewe, Prodr. 168). In the 19th century came Osann's Glossarii Latini specimen (1826); the glossographic publications of Angelo Mai (Classici auclores, vols, iii., vi., vil., viii., Rome, 1831-1836, containing Osbern's Panormia, Placidus and various glosses from Vatican MSS.); Fr. Oehler's treatise (1847) on the Cod. Amplonianus of Osbern, and his edition of the three Erfurt glossaries, so important for Anglo-Saxon philology; in' 1854 G. F. Hildebrand's Glossarium Latinum (an extract from Abavus minor), preserved in a Cod. Paris, lat. 7690; 1857, Thomas Wright's vol. of Anglo-Saxon glosses, which were republished with others in 1884 by R. Paul Wulcker under the title Anglo-Saxon and Old English Vocabularies (London, 2 vols., 1857); L. Diefenbach's supplement to Du Cange, entitled Glossarium Latino-Germanicum mediae et infimae aetatis, containing mostly glosses collected from glossaries,

vocabularies, &c, enumerated in the preface; Ritschl's treatise (1870) on Placidus, which called forth an edition (1875) of Placidus by Deuerling; G. Loewe's Prodromus (1876), and other treatises by him, published after his death by G. Goetz (Leipzig, 1884); 1888, the second volume of Goetz's own great Corpus glossariorum Latinorum, of which seven volumes (except the first) had seen the light by 1907, the last two being separately entitled Thesaurus glossarum emendatarum, containing many emendations and correc- tions of earlier glossaries by the author and other scholars; 1900, Arthur S. Napier, Old English Glosses (Oxford), collected chiefly from Aldhelm MSS., but also from Augustine, Avianus, Beda, Boethius, Gregory, Isidore, Juvencus, Phocas, Prudentius, &e.

There are a very great number of glossaries still in MS. scattered in various libraries of Europe, especially in the Vatican, at Monte Cassino, Pans, Munich, Bern, the British Museum, Leiden, Oxford, Cambridge, &c. Much has already been done to make the material contained in these MSS. accessible in print, and much may yet be done with what is still unpublished, though we may find that the differences between the glossaries which often present themselves at first sight are mere differences in form introduced by successive more or less qualified copyists.

Some Celtic (Breton, Cornish, Welsh, Irish) glossaries have been preserved to us, the particulars of which may be learnt from the publications of Whitley Stokes, Sir John Rhys, Kuno Meyer, L. C. Stern, G. I. Ascoli, Heinr. Zimmer, Ernst Windisch, Nigra, and many others ; these are published separately as books or in Zeuss's Grammatica Celtica, A. Kiihn's Beitrage zur vergleich. Sprachforschung, Zeilschr. fur celtische Philologie, Archiv fur Celtische Lexicographie, the Revue celtique, Transactions of the London Philological Society, &c.

The first Hebrew author known to have used glosses was R. Gershom of Metz (1000) in his commentaries on the Talmud. But he and other Hebrew writers after him mostly used the Old French language (though sometimes also Italian, Slavonic, German) of which an example has been published by Lambert and Brandin, in their Glossaire hebreu-francais du XIII' siecle: recueil de mots hebreux bibliques avec traduction francaise (Paris, 1905). See further The Jewish Encyclopedia (New York and London, 1903), article " Gloss."

Authorities. — For a great part of what has been said above, the writer is indebted to G. Goetz's article on " Latein. Glossographie " in Pauly's Realencyklopddie. By the side of Goetz's Corpus stands the

great collection of Steinmeyer and Sievers, Die althochdeutschen Glossen (in 4 vols., 1879-1898), containing a vast number of (also Anglo-Saxon) glosses culled from Bible MSS. and MSS. of classical Christian authors, enumerated and described in the 4th vol. Besides the works of the editors of, or writers on, glosses, already mentioned, we refer here to a few others, whose writings may be consulted: Hugo Bliimner; Catholicon Anglicum (ed. Hertage) ; De-Vit (at end of Forcellini's Lexicon); F. Deycks; Du Cange; Funck; J. H. Gallee (Altsdchs. Sprachdenkm., 1894); Grober; K. Gruber (Hauptquellen des Corpus, Epin. u. Erfurt Gloss., Erlangen, 1904) ; Hattemer; W. Heraeus (Die Sprache des Petronius und die Glossen, Leipzig, 1899); Kettner; Kluge; Krumbacher; Lagarde; Land- graf; Marx; W. Meyer-Lubke (" Zu den latein. Glossen" in Wiener _ Stud. xxv. 90 sqq.) ; Henry Nettleship; Niedermann, Notes d'elymol. lat. (Macon, 1902), Contribut. a la critique des glosses latines (Neuchatel, 1.905); Pokrowskii ; Quicherat; Otto B. Schlutter (many important articles in Anglia, Englische Studien, Archiv f. latein. Lexicographie, &c); Scholl; Schuchardt; Leo Sommer; Stadler; Stowasser; Strachan; H. Sweet; Usener {Rhein. Mus. xxiii. 496, xxiv. 382) ; A. Way, Promptorium parvulorum sive clericorum (3 vols., London, I 843-1865) ; Weyman; Wilmanns (in Rhein. Mus. xxiv. 363) ; Wolfflin in Arch, filr lat.Lexicogr.; Zupitza.ˆ Cf. further, the various volumes of the following periodicals: .Romania; Zeitschr. filr deutsches Alterthum; Anglia; Englische Studien; Journal of English and German Philology (ed. Cook and Karsten); Archiv filr latein. Lexicogr., and others treating of philo- logy, lexicography, grammar, &c. (J. H. H.)

GLOSSOP, a market town and municipal borough, in the High Peak. parliamentary division of Derbyshire, England, on the extreme northern border of the county; 13 m. E. by S. of

Manchester by the Great Central railway. Pop. (1901) 21,526. It is the chief seat of the cotton manufacture in Derbyshire, and it has also woollen and paper mills, dye and print works, and bleaching greens. The town consists of three main divisions, the Old Town (or Glossop proper), Howard Town (or Glossop Dale) and Mill Town. An older parish church was replaced by that of All Saints in 1830; there is also a very fine Roman Catholic church. In the immediate neighbourhood is Glossop Hall, the seat of Lord Howard, lord of the manor, a picturesque old building with extensive terraced gardens. On a hill near the town is Melandra Castle, the site of a Roman fort guarding Longdendale and the way into the hills of the Peak District. In the neighbourhood also a great railway viaduct spans the Dinting valley with sixteen arches. To the north, in Longden- dale, there are five lakes belonging to the water-supply system of Manchester, formed by

damming the Etherow, a stream which descends from the high moors north-east of Glossop. The town is governed by a mayor, 6 aldermen and 18 councillors. Area, 3052 acres.

Glossop was granted by Henry I. to William Peverel, on the attainder of whose son it reverted to the crown. In 1157 it was gifted by Henry II. to the abbey of Basingwerk. Henry VIII. bestowed it on the earl of Shrewsbury. It was made a municipal borough in 1866.

GLOUCESTER, EARLS AND DUKES OF. The English earldom of Gloucester was held by several members of the royal family, including Robert, a natural son of Henry I., and John, afterwards king, and others, until 1218, when Gilbert de Clare was recognized as earl of Gloucester. It remained in the family of Clare (q.v.) until 13 14, when another Earl Gilbert was killed at Bannockburn; and after this date it was claimed by various relatives of the Clares, among them by the younger Hugh le Despenser (d. 1326) and by Hugh Audley (d. 1347), both of whom had married sisters of Earl Gilbert. In 1397 Thomas le Despenser (I 373-i40o), a descendant of the Clares, was created earl of Gloucester; but in 1399 he was degraded from his earldom and in January 1400 was beheaded.

The dukedom dates from 1385, when Thomas of Woodstock, a younger son of Edward III., was created duke of Gloucester, but his honours were forfeited when he was found guilty of treason in 1397. The next holder of the title was Humphrey, a son of Henry IV., who was created duke of Gloucester in 14 14. He died without sons in 1447, and in 1461 the title was revived in favour of Richard, brother of Edward IV., who became king as Richard III. in 1483.

In 1659 Henry (1639-1660), a brother of Charles II., was formally created duke of Gloucester, a title which he had borne since infancy. This prince, sharing the exile of the Stuarts, had incensed his mother, Queen Henrietta Maria, by his firm ad- herence to the Protestant religion, and had fought among the Spaniards at Dunkirk in 1658. Having returned to England with Charles II., he died unmarried in London on the 13th of September 1660. The next duke was William (1689-1700), son of the princess Anne, who was, after his mother, the heir to the English throne, and who was declared duke of Gloucester by his uncle, William III., in 1689, but no patent for this creation was ever passed. William died on the 30th of July 1700, and again the title became extinct.

Frederick Louis, the eldest son of George II., was known for some time as duke of Gloucester, but when he was raised to the peerage in 1726

it was as duke of Edinburgh only. In 1764 Frederick's third son, William Henry (1 743-1 805), was created duke of Gloucester and Edinburgh by his brother, George III. This duke's secret marriage with Maria (d. 1807), an illegitimate daughter of Sir Edward Walpole and widow of James, 2nd Earl Waldegrave, in 1766, greatly incensed his royal relatives and led to his banishment from court. Gloucester died on the 25th of August 1805, leaving an only son, William Frederick (17 76-1 834), who now became duke of Gloucester and Edinburgh. The duke, who served with the British army in Flanders, married his cousin Mary (1776-1857), a daughter of George III. He died on the 30th of November 1834, leading no children, and his

widow, the last survivor of the family of George III., died on the 30th of April 1857.

GLOUCESTER, GILBERT DE CLARE, Earl of (1243-1295), was a son of Richard de Clare, 7th earl of Gloucester and 8th earl of Clare, and was born at Christchurch, Hampshire, on the 2nd of September 1243. Having married Alice of Angouleme, half-sister of king Henry III., he became earl of Gloucester and Clare on his father's death in July 1262, and almost at once joined the baronial party led by Simon de Montfort, earl of Leicester. With Simon Gloucester was at the battle of Lewes in May 1264, when the king himself surrendered to him, and after this victory he was one of the three persons selected to nominate a council. Soon, however, he quarrelled with Leicester. Leaving London for His lands on the Welsh border he met Prince Edward, afterwards king Edward I., at Ludlow, just after his escape from captivity, and by his skill contributed largely to the prince's victory at Evesham in August 1265. But this alliance was as transitory as the one with Leicester. Glou- cester took up the cudgels on behalf of the barons who had surrendered at Kenilworth in November and December 1266, and after putting his demands before the king, secured possession of London. This happened in April 1267, but the earl quickly made his peace with Henry III. and with Prince Edward, and, having evaded an obligation to go on the Crusade, he helped to secure the peaceful accession of Edward T. to the throne in 1272. Gloucester then passed several years in fighting in Wales, or on the Welsh border; in 1289 when the barons were asked for a subsidy he replied on their behalf that they would grant nothing until they saw the king in person (nisi prius personality viderent in Anglia jaciem regis), and in 1291 he was fined and imprisoned on account of his

violent quarrel with Humphrey de Bohun, earl of Hereford. Having divorced his wife Alice, he married in 1290 Edward's daughter Joan, or Johanna (d. 1307). Earl Gilbert, who is sometimes called the " Red," died at Monmouth on the 7th of December 1295, leaving in addition to three daughters a son, Gilbert, earl of Gloucester and Clare, who was killed at Bannockburn.

See C. Bemont, Simon de Montfort, comte de Leicester (1884), and G. W. Prothero, Simon de Montfort (1877).

Gloucester; Humphrey, duke of (1391-1447), fourth

son of Henry IV. by Mary de Bohun, was born in 1391. He was knighted at his father's coronation on the nth of October 1399, and created duke of Gloucester by Henry V. at Leicester on the 16th of May 1414. He served in the war next year, and was wounded at Agincourt, where he owed his life to his brother's valour. In April 1416 Humphrey received the emperor Sigismund at Dover and, according to a 16th-century story, did not let him land till he had disclaimed all title to imperial authority in England. In the second invasion of France Humphrey commanded the force which during 1418 reduced the Cotentin and captured Cherbourg. Afterwards he joined the main army before Rouen, and took part in subsequent campaigns till January 1420. He then went home to replace Bedford as regent in England, and held office till Henry's own return in February 142 1. He was again regent for his brother from May to September 1422.

Henry V. measured Humphrey's capacity, and by his will named him merely deputy for Bedford in England. Humphrey at once claimed the full position of regent, but the parliament and council allowed him only the title of protector during Bedford's absence, with limited powers. His lack of discretion soon justified this caution. In the autumn of 1422 he married Jacqueline of Bavaria, heiress of Holland, to whose lands Philip of Burgundy had claims. Bedford, in the interest of so important an ally, endeavoured vainly to restrain his brother. Finally in October 1424 Humphrey took up arms in his wife's behalf, but after a short campaign in Hainault went home, and left Jacqueline to be overwhelmed by Burgundy. Return- ing to England in April 1425 he soon entangled himself in a quarrel with the council and his uncle Henry Beaufort, and stirred up a tumult in London. Open war was averted only by Beaufort's prudence, and Bedford's hurried return. Humphrey

had charged his uncle with disloyalty to the late and present kings. With some difficulty Bedford effected a formal reconcilia- tion at Leicester in March 1426, and forced Humphrey to accept Beaufort's disavowal. When Bedford left England next year Humphrey renewed his intrigues. But one complication was removed by the annulling in 1428 of his marriage with Jacqueline. His open adultery with his mistress, Eleanor Cobham, also made him unpopular. To check his indiscretion the council, in November 1429, had the king crowned, and so put an end to Humphrey's protectorate. However, when Henry VI. was soon afterwards taken to be crowned in France, Humphrey was made lieutenant and warden of the kingdom, and thus ruled England for nearly two years. His jealousy of Bedford and Beaufort still continued, and when the former died in 1435 there was no one to whom he would defer. The defection of Burgundy roused English feeling, and Humphrey won popularity as leader of the war party. In 1436 he commanded in a short invasion of Flanders. But he had no real power, and his political im- portance lay in his persistent opposition to Beaufort and the councillors of his party. In 1439 he renewed his charges against his uncle without effect. His position was further damaged by his connexion with Eleanor Cobham, whom he had now married. In 1441 Eleanor was charged with practising sorcery against the king, and Humphrey had to submit to see her condemned, and her accomplices executed. Nevertheless, he continued his political opposition, and endeavoured to thwart Suffolk, who was now taking Beaufort's place in the council, by opposing the king's marriage to Margaret of Anjou. Under Suffolk's influence Henry VI. grew to distrust his uncle altogether. The crisis came in the parliament of Bury St Edmunds in February 1447. Immediately on his arrival there Humphrey was arrested, and four days later, on the 23rd of February, he died. Rumour attributed his death to foul play. But his health had been long undermined by excesses, and his end was probably only hastened by the shock of his arrest.

Humphrey was buried at St Albans Abbey, in a fine tomb, which still exists. He was ambitious and self-seeking, but unstable and unprincipled, and, lacking the fine qualities of his brothers, excelled neither in war nor in peace. Still he was a cultured and courtly prince, who could win popularity. He was long remembered as the good Duke Humphrey, and in his lifetime was a liberal patron of letters. He had been a great collector of books, many of which he presented to the university of Oxford. He contributed also to the building of the Divinity School, and of the room still called Duke Humphrey's library. His books were dispersed at the Reformation and only three volumes of his donation now remain in the Bodleian library. Titus Livius, an

Italian in Humphrey's service, wrote a life of Henry V. at his patron's bidding. Other Italian scholars, as Leonardo Aretino, benefited by his patronage. Amongst English men of letters he befriended Reginald Pecock, Whet- hamstead of St Albans, Capgrave the -historian, Lydgate, and Gilbert Kymer, who was his physician and chancellor of Oxford university. A popular error found Humphrey a fictitious tomb in St Paul's Cathedral. The adjoining aisle, called Duke Humphrey's Walk, was frequented by beggars and needy adventurers. Hence the 16th-century proverb " to dine with Duke. Humphrey," used of those who loitered there dinner- less.

The most important contemporary sources are Stevenson's Wars of the English in France, Whethamstead's Register, and Beckington's Letters (all in Rolls Ser.), with the various London Chronicles, and the works of Waurin and Monstrelet. For his relations with Jacqueline see F. von Loher's Jacobaa von Bayern und ihre Zeit (2 vols., Nordlingen, 1869). For other modern authorities consult W. Stubbs's Constitutional History; J. H. Ramsay's Lancaster and York ; Political History of England, vol. iv. ; R. Fauli, Pictures of Old England, pp. 373-401 (1861); and K. H. Viekers, Humphrey, Duke of Gloucester (1907). For Humphrey's correspondence with Piero Candido Decembrio see the English Historical Review, vols. x., xix., xx. (C. L. K.)

GLOUCESTER, RICHARD DE CLARE, Earl of (1222-1262), was a son of Gilbert de Clare, 6th earl of Gloucester and 7 th earl of Clare, and was born on the 4th of August 1222, succeeding

to his father's earldoms on the death cf the latter in October 1230. His first wife was Margaret, daughter of Hubert de Burgh, and after her death in 1 237 he married Maud, daughter of John de Lacy, earl of Lincoln, and passed his early years in tournaments and pilgrimages, taking for a time a secondary and undecided part in politic?. He refused to help Henry III. on the French expedition of 1250, but was afterwards with the king at Paris; then he went on a diplomatic errand to Scotland, and was sent to Germany to work among the princes for the election of his stepfather, Richard, earl of Cornwall, as king of the Romans. About 1258 Gloucester took up his position as a leader of the barons in their resistance to the king, and he was prominent during the proceedings which followed the Mad Parliament at Oxford in 1258. In 1259, however, he quarrelled with Simon de Montfort, earl of Leicester; the dispute, begun in England, was renewed in France

and he was again in the confidence and company of the king. This attitude, too, was only temporary, and in 1261 Gloucester and Leicester were again working in concord. The earl died at his residence near Canterbury on the 15th of July 1262. A large landholder like his son and successor, Gilbert, Gloucester was the most powerful English baron of his time; he was avaricious and extravagant, but educated and able. He left several children in addition to Earl Gilbert.

GLOUCESTER, ROBERT, Earl of (d. 1147), was a natural son of Henry I. of England. He was born, before his father's accession, at Caen in Normandy; but the exact date of his birth, and his mother's name are unknown. He received from his father the hand of a wealthy heiress, Mabel of Gloucester, daughter of Robert Fitz Hamon, and with her the lordships of Gloucester and Glamorgan. About n 21 the earldom of Gloucester was created for his benefit. His rank and territorial influence made him the natural leader of the western baronage. Hence, at his father's death, he was sedulously courted by the rival parties of his half-sister the empress Matilda and of Stephen. After some hesitation he declared for the latter, but tendered his homage upon strict conditions, the breach of which should be held to invalidate the contract. Robert afterwards alleged that he had merely feigned submission to Stephen with the object of secretly furthering his half-sister's cause among the English barons. The truth appears to be that he was mortified at finding himself excluded from the inner councils of the king, and so resolved to sell his services elsewhere. Robert left England for Normandy in 1137, renewed his relations with the Angevin party, and in 1 138 sent a formal defiance to the king. Returning to England in the following year, he raised the standard of rebellion in his own earldom with such success that the greater part of western England and the south Welsh marches were soon in the possession of the empress. By the battle of Lincoln (Feb. 2, 1141), in which Stephen was taken prisoner, the earl made good Matilda's claim to the whole kingdom. He accom- panied her triumphal progress to Winchester and London; but was unable to moderate the arrogance of her behaviour. Con- sequently she was soon expelled from London and deserted by the bishop Henry of Winchester who, as legate, controlled the policy of the English church. With Matilda the earl besieged the legate at Winchester, but was forced by the royalists to beat a hasty retreat, and in covering Matilda's flight fell into the hands of the pursuers. So great was his importance that his party purchased his freedom by the release of Stephen. The earl renewed the struggle for the crown and continued it until his death (Oct. 31, 1147); but the personal unpopularity of Matilda, and the estrangement of the Church

from her cause, made his efforts unavailing. His loyalty to a lost cause must be allowed to weigh in the scale against his earlier double-dealing! But he hardly deserves the extravagant praise which is lavished upon-‘ him by William of Malmesbury. The sympathies of the chronicler are too obviously influenced by the earl’s munificence towards literary men.

See the Histo’ia novella by William of Malmesbury (Rolls edition) ; the Historia Anglorum by Henry of Huntingdon (Rolls edition) ; j. H. Round’s Geoffrey de Mandeville (1892) ; and O. Rossler’s Kaiserin Mathilde (Berlin, 1897). (H. W. C. D.)

GLOUCESTER, THOMAS OF WOODSTOCK, Duke or (1355- 1397), seventh and youngest son of the English king Edward III., was born at Woodstock on the 7th of January 1355. Having married Eleanor (d. 1399), daughter and co-heiress of Humphrey de Bohun, earl of Hereford, Essex and Northampton (d. 1373), Thomas obtained the office of constable of England, a position previously held by the Bohuns, and was made earl of Buckingham by his nephew, Richard II., at the coronation in July 1377. He took part in defending the English coasts against the attacks of the French and Castilians, after which he led an army through northern and central France, and besieged Nantes, which town, however, he failed to take.

Returning to England early in 1381, Buckingham found that his brother, John of Gaunt, duke of Lancaster, had married his wife’s sister, Mary Bohun, to his own son, Henry, afterwards King Henry IV. The relations between the brothers, hitherto somewhat strained, were not improved by this proceeding, as Thomas, doubtless, was hoping to retain possession of Mary’s estates. Having taken some part in crushing the rising of the peasants in 1381, Buckingham became more friendly with Lancaster; and while marching with the king into Scotland in 1385 was created duke of Gloucester, a mark of favour, however, which did not prevent him from taking up an attitude of hostility to Richard. Lancaster having left the country, Gloucester placed himself at the head of the party which disliked the royal advisers, Michael de la Pole, earl of Suffolk and Robert de Vere, earl of Oxford, whose recent elevation to the dignity of duke of Ireland had aroused profound discontent. The moment was * propitious for interference, and supported by those who were indignant at the extravagance and incompetence, real or alleged, of the king, Gloucester was soon in a position of authority. He forced on the dismissal and impeachment of Suffolk; was a member of the commission appointed in 1386 to reform the kingdom and the royal household; and took up arms when Richard began proceedings against

the commissioners. Having defeated Vere at Radcot in December 1387 the duke and his associates entered London to find the king powerless in their hands. Gloucester, who had previously threatened his uncle with deposition, was only restrained from taking this extreme step by the influence of his colleagues; but, as the leader of the ” lords appellant ” in the ” Merciless Parliament,” which met in February 1388 and was packed with his supporters, he took a savage revenge upon his enemies, while not neglecting to add to his own possessions.

He was not seriously punished when Richard regained his power in May 1389, but he remained in the background, although employed occasionally on public business, and accompanying the king to Ireland in 1394. In 1396, however, uncle and nephew were again at variance. Gloucester disliked the peace with France and Richard’s” second marriage with Isabella, daughter of King Charles VI. ; other causes of difference were not wanting, and it has been asserted that the duke was plotting to seize the king. At all events Richard decided to arrest him. By refusing an invita- tion to dinner the duke frustrated the first attempt, but on the nth of July 1397 he was arrested by the king himself at his residence, Pleshey castle in Essex. He was taken at once to Calais, and it is probable that he was murdered by order of the king on the 9th of September following. The facts seem to be as follows. At the beginning of September it was reported that he was dead. The rumour, probably a deliberate one, was false, and about the same time a justice, Sir William Rickhill (d. 1407), was sent to Calais with instructions dated the 17th of August to obtain a confession from Gloucester. On the 8th of September the duke confessed that he had been guilty of treason, and his death immediately followed this avowal. Unwilling to meet his parliament so soon after his uncle’s death, Richard’s purpose was doubtless to antedate this occurrence, and to foster the impression that the duke had died from natural causes in August. When parliament met in September he was declared guilty of treason and his estates forfeited. Gloucester had one son, Humphrey (c. 1381-1399), who died unmarried, and four daughters, the most notable of whom was Anne (c. 1380-1438), who was

successively the wife of Thomas, 3rd earl of Stafford, Edmund, 5th earl of Stafford, and William Bourchier, count of Eu. Gloucester is supposed to have written L’Ordonnance d’ Angleterre pour le camp a Voutrance, ou gaige de bataille.

Bibliography. — See T. Walsingham, Historia Anglicana, edited by H. T. Riley (London, 1 863-1 864); The Monk of Evesham, Historia vitae et regni Ricardi II., edited by T. Hearne (Oxford, 1729); Chronique de la traison el mort de Richard II, edited by B. Williams (London, 1846); J. Froissart, Chroniques, edited by S. Luce and G. Raynaud (Paris, 1869-1897); W. Stubbs, Constitutional History, vol. ii. (Oxford, 1896); J. Tait in Owens College Historical Essays and S. Armitage-Smith, John of Gaunt (London, 1904).

GLOUCESTER (abbreviated as pronounced Glo'sler), a city, county of a city, municipal and parliamentary borough and port, and the county town of Gloucestershire, England, on the left (east) bank of the river Severn, 114 m. W.N.W. of London. Pop. (1901) 47,955, It is served by the Great Western railway and the west-and-north branch of the Midland railway; while the Berkeley Ship Canal runs S.W. to Sharpness Docks in the Severn estuary (i6| m.). Gloucester is situated on a gentle eminence overlooking the Severn and sheltered by the Cotteswolds on the east, while the Malverns and the hills of the Forest of Dean rise prominently to the west and north-west.

The cathedral, in the north of the city near the river, originates in the foundation of an abbey of St Peter in 681, the foundations of the present church having been laid by Abbot Serlo (1072- 1104); and Walter Froucester (d. 141 2) its historian, became its first mitred abbot in 1381. Until 1541, Gloucester lay in the see of Worcester, but the separate see was then constituted, with John Wakeman, last abbot of Tewkesbury, for its first bishop. The diocese covers the greater part of Gloucestershire, with small parts of Herefordshire and Wiltshire. The cathedral may be succinctly described as consisting of a Norman nucleus, with additions in every style of Gothic architecture. It is 420 ft. long, and 144 ft. broad, with a beautiful central tower of the 15th century rising to the height of 225 ft. and topped by four graceful pinnacles. The nave is massive Norman with Early English roof; the crypt also, under the choir, aisles and chapels, is Norman, as is the chapter-house. The crypt is one of the four apsidal cathedral crypts in England, the others being at Worcester, Winchester and Canterbury. The south porch is Perpendicular, with fan-tracery roof, as also is the north transept, the south being transitional Decorated. The choir jhas Perpendicular tracery over Norman work, with an apsidal chapel on each side. The choir-vaulting is particularly rich, and the modern scheme of colouring is judicious. The splendid late Decorated east window is partly filled with ancient glass. Between the apsidal chapels is a cross Lady chapel, and north of the nave are the cloisters, with very early example of fan-tracery, the carols or stalls for the monks' study and writing lying to the south. The finest monument is the

canopied shrine of Edward II. who was brought hither from Berkeley. By the visits of pilgrims to this the building and sanctuary were enriched. In a side-chapel, too, is a monument in coloured bog oak of Robert Curthose, a great benefactor to the abbey, the eldest son of the Conqueror, who was interred there; and those of Bishop Warburton and Dr Edward Jenner are also worthy of special mention. A musical festival (the Festival of the Three Choirs) is held annually in this cathedral and those of Worcester and Hereford in turn. Between 1873 and 1890 and in 1897 the cathedral was extensively restored, principally by Sir Gilbert Scott. Attached to the deanery is the Norman prior's chapel. In St Mary's Square outside the Abbey gate, Bishop Hooper suffered martyrdom under Queen Mary in

IS55-

Quaint gabled and timbered houses preserve the ancient aspect of the city. At the point of intersection of the four principal- streets stood the Tolsey or town hall, replaced by a modern ' building in 1 894. None of the old public buildings, in fact, is left, but the New Inn in Northgate Street is a beautiful timbered house, strong and massive, with external galleries and courtyards, built in 1450 for the pilgrims to Edward II. 's shrine, by Abbot Sebroke, a traditional subterranean passage leading thence to the cathedral. The timber is principally chestnut. There are a large

number of churches and dissenting chapels, and it may have been the old proverb, " as sure as God's in Gloucester," which provoked Oliver Cromwell to declare that the city had " more churches than godliness." Of the churches four are of special interest: St Mary de Lode, with a Norman tower and chancel, and a monument of Bishop Hooper, on the site of a Roman temple which became the first Christian church in Britain; St Mary de Crypt, a cruciform structure of the 12th century, with later additions and a beautiful and lofty tower; the church of St Michael, said to have been connected with the ancient abbey of St Peter; and St Nicholas church, originally of Norman erection, and possessing a tower and other portions of later date. In the neighbourhood of St Mary de Crypt are slight remains of Grey- friars and Blackfriars monasteries, and also of the city wall. Early vaulted cellars remain under the Fleece and Saracen's Head inns.

There are three endowed schools: the College school, refounded by Henry VIII. as part of the cathedral establishment; the school of St Mary de Crypt, founded by Dame Joan Cooke in the same reign; and Sir Thomas Rich's Blue Coat hospital for 34 boys (1666). At the Crypt school the famous preacher George Whitefield (1 714-17 70) was

educated, and he preached his first sermon in the church. The first Sunday school was held in Gloucester, being originated by Robert Raikes, in 1780.

The noteworthy modern buildings include the museum and school of art and science, the county gaol (on the site of a Saxon and Norman castle), the Shire Hall and the Whitefield memorial church. A park in the south of the city contains a spa, a chaly- beate spring having been discovered in 1814. West of this, across the canal, are the remains (a gateway and some walls) of Llanthony Priory, a cell of the mother abbey in the vale of Ewyas, Monmouthshire, which in the reign of Edward IV. became the secondary establishment.

Gloucester possesses match works, foundries, marble and slate works, saw-mills, chemical works, rope works, flour-mills, manufactories of railway wagons, engines and agricultural implements, and boat and ship-building yards. Gloucester was declared a port in 1882. The Berkeley canal was opened in 1827. The Gloucester canal-harbour and that at Sharpness on the Severn are managed by a board. Principal imports are timber and grain; and exports, coal, salt, iron and bricks. The salmon and lamprey fisheries in the Severn are valuable. The tidal bore in the river attains its extreme height just below the city, and sometimes surmounts the weir in the western branch of the river, affecting the stream up to Tewkesbury lock. The parliamentary borough returns one member. The city is governed by a mayor, 10 aldermen and 30 councillors. Area, 2315 acres.

History. — The traditional existence of a British settlement at Gloucester (Cser Glow, Gleawecastre, Gleucestre) is not confirmed by any direct evidence, but Gloucester was the Roman municipality or colonia of Glevum, founded by Nerva (a.d. 96-98). Parts of the walls can be traced, and many remains and .coins have been found, though inscriptions (as is frequently the case in Britain) are somewhat scarce. Its situation on a navigable river, and the foundation in 681 of the abbey of St Peter by ˆSthelred favoured the growth of the town; and before the Conquest Gloucester was a borough governed by a portreeve, with a castle which was frequently a royal residence, and a mint. The first overlord, Earl Godwine, was succeeded nearly a century later by Robert, earl of Gloucester. Henry II. granted the first charter in n 55 which gave the burgesses the same liberties as the citizens of London and Winchester, and a second charter of Henry II. gave them freedom of passage on the Severn. The first charter was confirmed in n 94 by Richard I. The privileges of the borough were greatly extended by the charter of John (1200) which gave freedom from toll throughout the kingdom and from pleading outside the

borough. Subsequent charters were numerous. Gloucester was incorporated by Richard III. in 1483, the town being made a county in itself. This charter was confirmed in 1489 and 15 10, and other charters of incorpora- tion were received by Gloucester from Elizabeth in 1 560, James I.

in 1604, Charles I. in 1626 and Charles II. in 1672. The chartered port of Gloucester dates from 1580. Gloucester returned two members to parliament from 1275 to 1885, since when it has been represented by one member. A seven days' fair from the 24th of June was granted by Edward I. in 1302, and James I. licensed fairs on the 25th of March and the 17th of November, and fairs under these grants are still held on the first Saturday in April and July and the last Saturday in November. The fair now held on the 28th of September was granted to the abbey of St Peter in 1227. A market on Wednes- day existed in the reign of John, was confirmed by charter in 1227 and is still held. The iron trade of Gloucester dates from before the Conquest, tanning was carried on before the reign of Richard III., pin-making and bell-founding were introduced in the i6th, and the long-existing coal trade became important in the 1 8th century. The cloth trade flourished from the 12th to the 16th century. The sea-borne trade in corn and wine existed before the reign of Richard I.

See W. H. Stevenson, Records of the Corporation of Gloucester (.Gloucester, 1893) ; Victoria County History, Gloucestershire.

GLOUCESTER, a city and port of entry of Essex county, Massachusetts, U.S.A., beautifully situated on Cape Ann. Pop. (1890) 24,651; (1900) 26,121, of whom 8768 were foreign- born, including 4388 English Canadians, 800 French Canadians, 665 Irish, 653 Finns and 594 Portuguese; • (1910 census) 24 398. Area, 53-6 sq. m. It is served by the Boston & Maine railway and by a steamboat line to Boston. The surface is sterile, naked and rugged, with bold, rocky ledges, and a most picturesque shore, the beauties of which have made it a favourite summer resort, much frequented by artists. Included within the city borders are several villages, of which the principal one, also known as Gloucester, has a deep and commodious harbour. Among the other villages, all summer resorts, are Annisquam, Bay View and Magnolia (so called from the Magnolia glauca which grows wild there, this being probably its most northerly habitat) ; near Magnolia are Rafe's Chasm (60 ft. deep and 6-10 ft wide) and Norman's Woe,the scene of

the wreck of the “Hesperus” (which has only tradition as a basis), celebrated in Longfellow’s poem. There is some slight general commerce— in 1909 the imports were valued at $130,098; the exports at $7853— but the principal business is fishing, and has been since early colonial days. The pursuit of cod, mackerel, herring and halibut fills up, with a winter coasting trade, the round of the year. In this industry Gloucester is the most important place in the United States; and is, indeed, one of the greatest fishing ports of the world. Most of the adult males are engaged in it. The ” catch ” was valued in 1895 at $3,212,985 and in 1905 at $3,377,33°- The organization of the industry has undergone many transformations, but a notable feature is the general practice— especially since modern methods have necessi- tated larger vessels and more costly gear, and correspondingly greater capital— of profit-sharing; all the crew entering on that basis and not independently. There are some manufactures, chiefly connected with the fisheries. The total factory product in 1905 was valued at $6,920,984, of which the canning and preserving of fish represented $4,068,571, and glue represented $752,003. An industry of considerable importance is the quarrying of the beautiful, dark Cape Ann granite that underlies the city and all the environs.

Gloucester harbour was probably noted by Champlain (as La Beauport), and a temporary settlement was made by English fishermen sent out by the Dorchester Company of ” merchant adventurers” in 1623-1625; some of these settlers returned to England m 1625, and others, with Roger Conant, the governor removed to what is now Salem. 1 Permanent settlement ante- dated 1639 at least, and in 1642 the township was incorporated. From Gosnold’s voyages onward the extraordinary abundance of cod about Cape Ann was well known, and though the first

1 According to some authorities (e.g. Pringle) a few settlers

SJT 1 °” ,ˆ 6 S l te °i Glo ” ce ? t . er v the Permanent settlement thus dating from 1623 to 1625; of this, however, there is no proof, and rtie contrary opinion is the one generally held.

settlers characteristically enough tried to live by farming, they speedily became perforce a sea-faring folk. The active pursuit of fishing as an industry may be dated as beginning about 1700, for then began voyages beyond Cape Sable. Voyages to the Grand Banks began about 1741. Mackerel was a relatively unimportant catch until about 1821, and since then has been an important but unstable return; halibut fishing has been vigorously pursued since about 1836 and

herring since about 1856. At the opening of the War of Independence Gloucester, whose fisheries then employed about 600 men, was second to Marblehead as a fishing-port. The war destroyed the fisheries, which steadily declined, reaching their lowest ebb from 1820 to 1840. Meanwhile foreign commerce had greatly expanded. The cod take had supported in the 18th century an extensive trade with Bilbao, Lisbon and the West Indies, and though changed in nature with the decline of the Bank fisheries after the War of Independence, it continued large through the first quarter of the 19th century. Throughout more than half of the same century also Gloucester carried on a varied and valuable trade with Surinam, hake being the chief article of export and molasses and sugar the principal imports. ” India Square ” remains, a memento of a bygone day. About 1850 the fisheries revived, especially after i860, under the influence of better prices, improved methods and the discovery of new grounds, becoming again the chief economic interest; and since that time the village of Gloucester has changed from a picturesque hamlet to a fairly modern, though still quaint and somewhat foreign, settlement. Gasoline boats were introduced in 1900. Ship-building is another industry of the past. The first “schooner” was launched at Gloucester in 17 13. From 1830 to 1907, 776 vessels and 5242 lives were lost in the fisheries; but the loss of life has been greatly reduced by the use of better vessels and by improved methods of fishing. Gloucester became a city in 1874.

. (^° uc P ter ,!fe nas be en celebrated in many books; among others in Elizabeth Stuart Phelps- Ward’s Singular Life and Old Maid’s raradtse, in Rudyard Kipling’s Captains Courageous, and in James U. Connolly s Out of Gloucester (1902), The Deep Sea’s Toll (iqo’O and The Crested Seas (1907).

See J. J Babson, History of the Town of Gloucester (Gloucester,

i860; with Notes and Additions, on genealogy, 1876, 1891); and

S ‘1 Htstor y °f the Tmun and City of Gloucester (Gloucester,

GLOUCESTER CITY, a city of Camden county, New Jersey, U.S.A., on the Delaware river, opposite Philadelphia. Pop. (1890) 6564; (1900) 6840, of whom 1094 were foreign-born; (1905) 8055; (1910) 9462. The city is served by the West Jersey & Seashore and the Atlantic City railways, and by ferry to Philadelphia, of which it is a residential suburb. Among its manufactures are incandescent gas-burners, rugs, cotton yarns, boats and drills. The municipality owns and operates the water works. It was near the site of Gloucester City that the Dutch in

1623 planted the short-lived colony of Fort Nassau, the first European settlement on the Delaware river, but it was not until after the arrival of English Quakers on the Delaware, m 1677, that a permanent settlement, at first called Axwamus, was established on the site of the present city. This was surveyed and laid out as a town in 1689. During the War of Independence the place was frequently occupied by troops, and a number of skirmishes were fought in its vicinity. The most noted of these was a successful attack upon a detachment of Hessians on the 25th of November 1777 by American troops under the command of General Lafayette. In 1868 Gloucester City was chartered as a city. In Camden county there is a township named Gloucester (pop. in 1905, 2300), incorporated in 1798, and originally including the present township of Clementon and parts of the present townships of Waterford, Union and Winslow

GLOUCESTERSHIRE, a county of the west midlands of England, bounded N. by Worcestershire, N.E. by Warwickshire, E. by Oxfordshire, S.E. by Berkshire and Wiltshire, S. by Somerset, and W. by Monmouth and Herefordshire. Its area is I243-3 sq- m. The outline is very irregular, but three physical divisions are well marked— the hills, the vale and the forest. (1) The first (the eastern part of the county) lies among the

uplands of the Cotteswold Hills (?.».), whose westward face is a line of heights of an average elevation of 700 ft., but exceeding 1000 ft. at some points. This line bisects the county from S.W. to N.E. The watershed between the Thames and Severn valleys lies close to it, so that Gloucestershire includes Thames Head itself, in the south-east near Cirencester, and most of the upper feeders of the Thames which join the main stream, from narrow and picturesque valleys on the north. (2) The western Cotteswold line overlooks a rich valley, that of the lower Severn, usually spoken of as ” The Vale,” or, in two divisions, as the vale of Gloucester and the vale of Berkeley. This great river receives three famous tributaries during its course through Gloucestershire. Near Tewkesbury, on the northern border, the Avon joins it on the left and forms the county boundary for 4 m. This is the river known variously as the Upper, Worcestershire, Warwickshire, Stratford or Shakespeare’s Avon, which descends a lovely pastoral valley through the counties named. It is to be distinguished from the Bristol Avon, which rises as an eastward flowing stream of the Cotteswolds, in the south-east of Gloucestershire, sweeps southward

and westward through Wiltshire, pierces the hills through a narrow valley which becomes a wooded gorge where the Clifton suspension bridge crosses it below Bristol, and enters the Severn estuary at Avonmouth. For 17 m. from its mouth it forms the boundary between Gloucestershire and Somersetshire, and for 8 m. it is one of the most important commercial waterways in the kingdom, connecting the port of Bristol with the sea. The third great tributary of the Severn is the Wye. From its mouth in the estuary, 8 m. N. of that of the Bristol Avon, it forms the county boundary for 16 m. northward, and above this, over two short reaches of its beautiful winding course, it is again the boundary. (3) Between the Wye and the Severn lies a beautiful and historic tract, the forest of Dean, which, unlike the majority of English forests, maintains its ancient character. Gloucestershire has thus a share in the courses of five of the most famous of English rivers, and covers two of the most interesting physical districts in the country. The minor rivers of the county are never long. The vale is at no point within the county wider than 24 m., and so does not permit the formation of any considerable tributary to the Severn from the Dean Hills on the one hand or the Cotteswolds on the other. The Leadon rises east of Hereford, forms part of the north-western boundary, and joins the Severn near Gloucester, watering the vale of Gloucester, the northern part of the vale. In the southern part, the vale of Berkeley, the Stroudwater traverses a narrow, picturesque and populous valley, and the Little Avon flows past the town of Berkeley, joining the Severn estuary on the left. The Frome runs south- ward to the Bristol Avon at Bristol. The principal northern feeders of the Thames are the Churn (regarded by some as properly the headwater of the main river) rising in the Seven Springs, in the hills above Cheltenham, and forming the southern county boundary near its junction with the Thames at Cricklade; the Coin, a noteworthy trout-stream, joining above Lechlade, and the Lech (forming part of the eastern county boundary) joining below the same town; while from the east of the county there pass into Oxfordshire the Windrush and the Evenlode, much larger streams, rising among the bare uplands of the northern Cotteswolds.

Geology. — No county in England has a greater variety of geological formations. The pre-Cambrian is represented by the gneissic rocks at the south end of the Malvern Hills and by grits at Huntley. At Damory, Charfield and Woodford is a patch of greenstone, the cause of the upheaval of the Upper Silurian basin of Tortworth, in which are the oldest stratified rocks of the county. Of these the Upper Llandovery is the dominant stratum, exposed near Damory mill, Micklewood chase and Purton passage, wrapping round the base of May and Huntley

hills, and reappearing in the vale of Woolhope. The Wenlock limestone is exposed at Falfield mill and Whitfield, and quarried for burning at May hill. The Lower Ludjow shales or mudstones are seen at Berkeley and Purton, where the upper part is probably Aymestry limestone. The series of sandy shales and sandstones which, as Downton sandstones and Ledbury shales, form a transition to the Old Red Sandstone are quarried at Dymock. The " Old Red " itself occurs at Berkeley, Tortworth Green, Thorn- bury, and several places in the Bristol coal-field, in anticlinal folds

forming hills. It forms also the great basin extending from Ross to Monmouth and from Dymock to Mitcheldean, Abenhall, Blakeney, &c, within which is the Carboniferous basin of the forest. It is cut through by the Wye from Monmouth to Woolaston. This formation is over 8000 ft. thick in the forest of Dean. The Bristol and Forest Carboniferous basins lie within the synclinal folds of the Old Red Sandstone ; and though the seams of coal have not yet been correlated, they must have been once continuous, as further appears from the existence of an intermediate basin, recently pierced, under the Severn. The lower limestone shales are 500 ft. thick in the Bristol area and only 165 in the forest, richly fossiliferous and famous for their bone bed. The great marine series known as the Mountain Limestone, forming the walls of the grand gorges of the Wye and Avon, is over 2000 ft. thick in the latter district, but only 480 in the former, where it yields the brown hematite in pockets so largely worked for iron even from Roman times. It is much used too for lime and road metal. Above this comes the Millstone Grit, well seen at Brandon hill, where it is 1000 ft. in thickness, though but 455 in the forest. On this rest the Coal Measures, consisting in the Bristol field of two great series, the lower 2000 ft. thick with 36 seams, the upper 3000 ft. with 22 seams, 9 of which reach 2 ft. in thickness. These two series are separated by over 1700 ft. of hard sandstone (Pennant Grit), containing only 5 coal-seams. In the Forest coal-field the whole series is not 3000 ft. thick, with but 15 seams. At Durdham Down a dolomitic conglomerate, of the age known as Keuper or Upper Trias, rests unconformably on the edges of the Palaeozoic rocks, and is evidently a shore deposit, yielding dinosaurian remains. Above the Keuper clays come the Penarth beds, of which classical sections occur at Westbury, Aust, &c. The series consists of grey marls, black paper shaies containing much pyrites and a celebrated bone bed, the Cotham landscape marble, and the White Lias limestone, yielding Ostrea Liassica and Cardium Rhaeticum. The district of Over Severn is mainly of Keuper marls. The whole vale of Gloucester is occupied by the next formation, the Lias, a warm sea deposit of clays and clayey limestones, characterized by

ammonites, belemnites and gigantic saurians. At its base is the insect-bearing limestone bed. The pastures producing Gloucester cheese are on the clays of the Lower Lias. The more calcareous Middle Lias or marlstone forms hillocks flanking the Oolite escarp- ment of the Cotteswolds, as at Wotton-under-Edge and Churchdown. The Cotteswolds consist of the great limestone series of the Lower Oolite. At the base is a transition series of sands, 30 to 40 ft. thick, well developed at Nailsworth and Frocester. Leckhampton hill is a typical section of the Lower Oolite, where the sands are capped by 40 ft. of a remarkable pea grit. Above this are 147 ft. of freestone, 7ft. of oolite marl, 34 ft. of upper freestone and 38 ft. of ragstone. The Painswick stone belongs to lower freestone. Resting on the Inferior Oolite, and dipping with it to S.E., is the ” fuller’s earth,” a rubbly limestone about 100 ft. thick, throwing out many of the springs which form the head waters of the Thames. Next comes the Great or Bath Oolite, at the base of which are the Stonesfield ” slate ” beds, quarried for roofing, paling, &c, at Sevenhampton and elsewhere. From the Great Oolite Minchinhampton stone is obtained, and at its top is about 40 ft. of flaggy Oolite with bands of clay known as the Forest Marble. Ripple marks are abundant on the flags; in fact all the Oolites seem to have been near shore or in shallow water, much of the limestone being merely comminuted coral. The highest bed of the Lower Oolite is the Cornbrash, about 40 ft. of rubble, productive in corn, forming a narrow belt from Siddington to Fairford. Near the latter town and Lechlade is a small tract of blue Oxford Clay of the Middle Oolite. The county has no higher Secondary or Tertiary rocks; but the Quaternary series is represented by much northern drift gravel in the vale and Over Severn, by accumulations of Oolitic detritus, including post-Glacial extinct mammalian remains on the flanks of the Cotteswolds, and by submerged forests extending from Sharpness to Gloucester.

Agriculture. — The climate is mild. Between three-quarters an

Other Industries. — The manufacture of woollen cloth followed upon the early success in sheep-farming among the Cotteswolds. This industry is not confined to the hill country or even to Gloucestershire itself in the west of England. The description of cloth principally manufactured is broadcloth, dressed with teazles to produce a short

close nap on the face, and made of all shades of colour, but chiefly black, blue and scarlet. The principal centre of the industry lies in and

at the foot of the south-western Cotteswolds. Stroud is the centre for a number of manufacturing villages, and south-west of this are Wotton-under-Edge, North Nibley and others. .Machinery and tools, paper, furniture, pottery and glass are also produced. Ironstone, clay, limestone and sandstone are worked, and the coal-fields in the forest of Dean are important. Of less extent is the field in the south of the county, N.E. of Bristol. Strontium sulphate is dug from shallow pits in the red marl of Gloucestershire and Somersetshire.

Communications. — Railway communications are provided princi- pally by the Great Western and Midland companies. Of the Great Western lines, the main line serves Bristol from London. It divides at Bristol, one section serving the south-western counties, another South Wales, crossing beneath the Severn by the Severn Tunnel, 4$ m. in length, a remarkable engineering work. A more direct route, by this tunnel, between London and South Wales, is provided by a line from Wootton Bassett on the main line, running north of Bristol by Badminton and Chipping Sodbury. Other Great Western lines are that from Swindon on the main line, by the Stroud valley to Gloucester, crossing the Severn there, and continuing by the right bank of the river into Wales, with branches north-west into Hereford- shire ; the Oxford and Worcester trunk line, crossing the north-east of the county, connected with Cheltenham and Gloucester by a branch through the Cotteswolds from Chipping Norton junction; and the line from Cheltenham by Broadway to Honeybourne. The west-and-north line of the Midland railway follows the vale from Bristol by Gloucester and Cheltenham with a branch into the forest of Dean by Berkeley, crossing the Severn at Sharpness by a great bridge 1387 yds. in length, with 22 arches. The coal-fields of the forest of Dean are served by several branch lines. In the north, Tewkesbury is served by a Midland branch from Ashchurch to Malvern. The Midland and South-western Junction railway runs east and south from Cheltenham by Cirencester, affording com- munication with the south of England. The East Gloucester line of the Great Western from Oxford terminates at Fairford. The Thames and Severn canal, rising to a summit level in the tunnel through the Cotteswolds at Sapperton, is continued from Wallbridge (Stroud) by the Stroudwater canal, and gives communication between the two great rivers. The Berkeley Ship Canal (i6j m.) connects the port of Gloucester with its outport of Sharpness on Severn.

Population and Administration. — -The area of the ancient county is 795. 7°9 acres, with a population in 1891 of 599,947 and in 1901 of 634,729. The area of the administrative county is 805,482 acres. The county contains 28 hundreds. The municipal boroughs are — Bristol, a

city and county borough (pop. 328,945) ; Cheltenham (49,439) ; Gloucester, a city and county borough (47,955); Tewkesbury (5419). The other urban districts are — Awre (1096), Charlton Kings (3806), Circenester (7536), Coleford (2541),Kingswood, on the eastern outskirts of Bristol (11,961), Nailsworth (3028), Newnham (1184), Stow-on-the-Wold (1386), Stroud (9153), Tetbury (1989), Westbury-on-Severn (1866). The number of small ancient market towns is large, especially in the southern part of the vale, on the outskirts of the forest, and among the foot hills of the wolds. Those in the forest district are mostly connected with the coal trade, such as Lydney (3559), besides Awre and Coleford; and, to the north, besides Newnham, Cinderford and Mitcheldean. South from Stroud there are Minchinhampton (3737) and Nailsworth; near the south- eastern boundary Tetbury and Marshfield; Stonehouse (2183), Dursley (2372), Wotton-under-Edge (2992) and Chipping Sodbury along the western line of the hills; and between them and the Severn, Berkeley and Thornbury (2594). Among the uplands of the Cotteswolds there are no towns, and villages are few, but in the east of the county, in the upper Thames basin, there are, besides Cirencester, Fairford on the Coin and Lechlade, close to the head of the naviga- tion on the Thames itself. Far up in the Lech valley, remote from railway communication, is Northleach, once a great posting station on the Oxford and Cheltenham road. In the north-east are Stow-on- the-Wold, standing high, and Moreton-in-the-Marsh near the head- waters of the Evenlode. In a northern prolongation of the county, almost detached, is Chipping Campden. Winchcomb (2699) lies 6 m. N.E. of Cheltenham. In the north-west, Newent (2485) is the only considerable town. Gloucestershire is in the Oxford circuit, and assizes are held at Gloucester. It has one court of quarter sessions, and is divided into 24 petty sessional divisions. The boroughs of Bristol, Gloucester and Tewkesbury have separate commissions of the peace and courts of quarter sessions. There are 359 civil parishes. Gloucestershire is principally in the diocese of Gloucester, but part is in that of Bristol, and small parts in those of Worcester and Oxford. There are 408 ecclesiastical parishes or districts wholly. or in part within the county. There are five parliamentary divisions, namely, Tewkesbury or northern, Cirencester or eastern, Stroud or mid, Thornbury or southern, and Forest of Dean, each returning one member. The county also includes the boroughs of Gloucester and Cheltenham, each returning one member; and the greater part of the borough of Bristol, which returns four members.

History. — The English conquest of the Severn valley began in 57 7 with the victory of Ceawlin at Deorham, followed by the

capture of Cirencester, Gloucester and Bath. The Hwiccas who occupied the district were a West Saxon tribe, but their territory had become a dependency of Mercia in the 7th century, and was not brought under West Saxon dominion until the 9th century. No important settlements were made by the Danes in the district. Gloucestershire probably originated as a shire in the 10th century, and is mentioned by name in the Anglo- Saxon Chronicle in 1016. Towards the close of the nth century the boundaries were readjusted to include Winchcomb, hitherto a county by itself, and at the same time the forest district between the Wye and the Severn was added to Gloucestershire. The divisions of the county for a long time remained very unsettled, and the thirty-nine hundreds mentioned in the Domesday Survey and the thirty-one hundreds of the Hundred Rolls of 1274 differ very widely in name and extent both from each other and from the twenty-eight hundreds of the present day.

Gloucestershire formed part of Harold's earldom at the time of the Norman invasion, but it offered slight resistance to the Conqueror. In the wars of Stephen's reign the cause of the empress Maud was supported by Robert of Gloucester who had rebuilt the castle at Bristol, and the castles at Gloucester and Cirencester were also garrisoned on her behalf. In the barons' war of the reign of Henry III. Gloucester was garrisoned for Simon de Montfort, but was captured by Prince Edward in 1265, in which year de Montfort was slain at Evesham. Bristol and Gloucester actively supported the Yorkist cause during the Wars of the Roses. In the religious struggles of the 16th century Gloucester showed strong Protestant sympathy, and in the reign of Mary Bishop Hooper was sent to Gloucester to be burnt as a warning to the county, while the same Puritan leanings induced the county to support the Parliamentary cause in the civil war of the 17th century. In 1643 Bristol and Cirencester were captured by the Royalists, but the latter was recovered in the same year and Bristol in 1645. Gloucester was garrisoned for the parliament throughout the struggle.

On the subdivision of the Mercian diocese in 680 the greater part of modern Gloucestershire was included in the diocese of Worcester, and shortly after the Conquest constituted the arch- deaconry of Gloucester, which in 1290 comprised the deaneries of Campden, Stow, Cirencester, Fairford, Winchcombe, Stom> house, Hawkesbury, Bitton, Bristol, Dursley and Gloucester. The district west of the Severn, with the exception of a few parishes in the deaneries of Ross and Staunton, constituted the deanery of the forest within the archdeaconry and diocese of Hereford. In 1535 the deanery of Bitton had been absorbed in that of Hawkesbury. In 1541 the diocese of

Gloucester was created, its boundaries being identical with those of the county. On the erection of Bristol to a see in 1542 the deanery of Bristol was transferred from Gloucester to that diocese. In 1836 the sees of Gloucester and Bristol were united; the archdeaconry of Bristol was created out of the deaneries of Bristol, Cirencester, Fairford and Hawkesbury; and the deanery of the forest was transferred to the archdeaconry of Gloucester. In 1882 the archdeaconry of Cirencester was constituted to include the deaneries of Campden, Stow, Northleach north and south, Fairford and Cirencester. In 1897 the diocese of Bristol was recreated, and included the deaneries of Bristol, Stapleton and Bitton.

After the Conquest very extensive lands and privileges in the county were acquired by the church, the abbey of Cirencester alone holding seven hundreds at fee-farm, and the estates of the principal lay-tenants were for the most part outlying parcels of baronies having their " caput " in other counties. The large estates held by William Fitz Osbern, earl of Hereford, escheated to the crown on the rebellion of his son Earl Roger in 1074- 1075. The Berkeleys have held lands in Gloucestershire from the time of the Domesday Survey, and the families of Basset, Tracy, Clifton, Dennis and Poyntz have figured prominently in the annals of the county. Gilbert de Clare, earl of Gloucester, and Richard of Cornwall claimed extensive lands and privileges in the shire in the 13th century, and Simon de Montfort owned Minsterworth and Rodley.

GLOVE

■ J 35

Bristol was made a county in 1425, and in 1483 Richard III. created Gloucester an independent county, adding to it the hundreds of Dudston and King's Barton. The latter were reunited to Gloucestershire in 1673, but the cities oi Bristol and Gloucester continued to rank as independent counties, with separate jurisdiction, county rate and assizes. The chief officer of the forest of Dean was the warden, who was generally also constable of St Briavel Castle. The first justice-seat for the forest was held at Gloucester Castle in 1282, the last in 1635. The hundred of the duchy of Lancaster is within the jurisdiction of the duchy of Lancaster for certain purposes.

The physical characteristics of the three natural. divisions of Gloucestershire have given rise in each to a special industry, as already indicated. The forest district, until the development' of the Sussex mines in the 16th century, was the chief iron- producing area

of the kingdom, the mines having been worked in Roman times, while the abundance of timber gave rise to numerous tanneries and to an important ship-building trade. The hill district, besides fostering agricultural pursuits, gradually absorbed the woollen trade from the big towns, which now devoted themselves almost entirely to foreign commerce. Silk- weaving was introduced in the 17th century, and was especially prosperous in the Stroud valley. The abundance of clay and building-stone in the county gave rise to considerable manu- factures of brick, tiles and pottery. Numerous minor industries sprang up in the 17 th and 18th centuries, such as flax-growing and the manufacture of pins, buttons, lace, stockings, rope and sailcloth.

Gloucestershire was first represented in parliament in 1290, when it returned two members. Bristol and Gloucester acquired representation in 1295, Cirencester in 1572 and Tewkesbury in 1620. Under the Reform Act of 1832 the county returned four members in two divisions; Bristol, Gloucester, Cirencester, Stroud and Tewkesbury returned two members each, and Cheltenham returned one member. The act of 1868 reduced the representation of Cirencester andTewkesbury to one member each.

Antiquities. — The cathedrals of Gloucester and Bristol, the magnificent abbey church of Tewkesbury, and the church of Cirencester with its great Perpendicular porch, are described under their separate headings. Of the abbey of Hayles near Winchcomb, founded by Richard, earl of Cornwall, in 1246, little more than the foundations are left, but these have been excavated with great care, and interesting fragments have been brought to light. Most of the old market towns have fine parish churches. At Deerhurst near Tewkesbury, and Cleeve near Cheltenham, there are churches of special interest on account of the pre-Norman work they retain. The Perpendicular church at Lechlade is unusually perfect; and that at Fairford was built (c. 1500), according to tradition, to contain the remarkable series of stained-glass windows which are said to have been brought from the Netherlands. These are, however, adjudged to be of English workmanship, and are one of the finest series in the country. The great Decorated Calcot Barn is an interesting relic of the monastery of Kingswood near Tetbury. The castle at Berkeley is a splendid example of a feudal stronghold. Thorn- bury Castle, in the same district, is a fine Tudor ruin, the pre- tensions of which evoked the jealousy of Cardinal Wolsey against its builder, Edward Stafford, duke of Buckingham, who was beheaded in 152 1. Near Cheltenham is the fine 15th-century mansion of Southam de la Bere, of timber and stone. Memorials of the de la Bere family appear in the church at Cleeve. The mansion contains a tiled floor from Hayles Abbey. Near

Winchcomb is Sudeley Castle, dating from the 15th century, but the inhabited portion is chiefly Elizabethan. The chapel is the burial place of Queen Catherine Parr. At Great Badminton is the mansion and vast domain of the Beauforts (formerly of the Botelers and others), on the south-eastern boundary of the county.

See Victoria County History, Gloucestershire; Sir R. Atkyns, The Ancient and Present State of Gloucestershire (London, 1712; 2nd ed., London, 1768) ; Samuel Rudder, A New History of Gloucestershire (Cirencester, 1779); Ralph Bigland, Historical, Monumental and

Genealogical Collections relative to the County of Gloucester (2 vols,, London, 1791) ;Thomas Rudge, The History of the County of Gloucester (2 vols., Gloucester, 1803); T. D. Fosbroke Abstract of Records and Manuscripts respecting the County of Gloucestershire formed into a History (2 vols., Gloucester, 1807); Legends?, Tales and Songs in the Dialect of the Peasantry of Gloucestershire (London, 1876) ; J. D. Robertson, Glossary of Dialed and Archaic Words of Gloucester (London, 1890); W. Bazeley and F. A. Hyett, Bibliographers' Manual of Gloucestershire (3 vols., London, 1895-1:897); W. H. Hutton, By Thames and Cotswold (London, 1903). See also Trans- actions of the Bristol and Gloucestershire Archaeological Society.

GLOVE (O. Eng. glof, perhaps connected with Gothic Ufa, the palm of the hand), a covering for the hand, commonly with a separate sheath for each finger.

The use of gloves is of high antiquity, and apparently was known even to the pre-historic cave dwellers. In Homer Laertes is described as wearing gloves (xeip«5as «ri X e P^' L) while walking in his garden (Od. xxiv. 230). Herodotus (vi. 7.2) tells how Leotychides filled a glove (x«pis) with the money he received as a bribe, and Xenophon (Cyrop. viij. 8.17) records that the Persians wore fur gloves having separate sheaths for the fingers (x«pi5as daorda.s /cat ScocrfX^pas). Among the Romans also there are occasional references to the use of gloves. According to the younger Pliny (Ep. iii. 5. 15) the secretary whom his uncle had with him when ascending Vesuvius wore gloves (manicae) so that he might not be impeded in his work by the cold, and Varro (R.R. i. 55.1) remarks that olives gathered with the bare fingers are better than those gathered with gloves (digitabula or digitalia). In the northern countries the general use of gloves would be more natural than in the south, and it is not without significance that the most common medieval Latin word for glove (guantus or wantus, Mod. Fr. gant) is. of Teutonic origin (O. H. Ger. want) . Thus in the

life of Columbanus by Jonas, abbot of Bobbio (d. c. 665), gloves for protecting. the hands in doing manual'labour are spoken of as tegumenta manuum quae Galli wantos vocant. Among the Germans and Scandi- navians, in the 8th and 9th centuries, the use of gloves, fingerless at first, would seem to have been all but universal; and in the. case of kings, prelates and nobles they were often elaborately embroidered and bejewelled. This was more particularly the case with the gloves which formed part of the pontifical vestments(see below). In war and in the chase gloves of leather, or with the backs armoured with articulated iron plates, were early worn ; yet in the Bayeux tapestry the warriors on either side fight ungloved. The fact that gloves are not represented by contemporary artists does riot prove their non-existence, since this might easily be an omission due to lack of observation or of skill; but, so far as the records go, there is no evidence to prove that gloves were in general use in England until the 13th century. It was in this century that ladies began to wear gloves as ornaments; they were of linen and sometimes reached to the elbow. It was, however, not till the 16th century that they reached their greatest elaboration, when Queen Elizabeth set the fashion for, wearing them richly embroidered and jewelled.

The symbolic sense of the middle ages early gave to the use of gloves a special significance. Their liturgical use by the Church is dealt with below {Pontifical gloves); this was imitated from the usage of civil life. Embroidered and jewelled gloves formed part of the insignia of the emperors, and also, and that quite early, of the kings of England. Thus Matthew of Paris; in recording the burial of Henry II. in n 89, mentions that he was buried in his coronation robes, with a golden crown on his head and gloves on his hands. Gloves were also found on the hands of King John when his tomb was opened in 1797, and on those of King Edward I. when his tomb was opened in 1774.

See W. B. Redfern, Royal and Historic Gloves and Shoes, with 'numerous examples.

Gages. — Of the symbolical uses of the glove one of the most widespread and important during the middle ages was the practice of tendering a folded glove as a gage for waging one's law. The origin of this custom is probably not far to seek. The promise to fulfil a judgment of a court of law, a promise secured by the delivery of a wed or gage, is one of the oldest, if not the very oldest, of all enforceable contracts. This gage was originally

a chattel of value, which had to be deposited at once by the defendant as security into his adversary's hand; and that the glove became the formal symbol of such deposit is doubtless due to its being the most convenient loose object for the purpose. The custom survived after the contract with the vadium, wed or gage had been superseded by the contract with pledges (per- sonal sureties). In the rules of procedure of a baronial court of the 14th century we find: " He shall wage his law with his folded glove (de son gaunt plyee) and shall deliver it into the hand of the other, and then take his glove back and find pledges for his law." The delivery of the glove had, in fact, become a mere ceremony, because the defendant had his sureties close at hand. 1

Associated with this custom was the use of the glove in the wager of battle {vadium in duello). The glove here was thrown down by the defendant in open court as security that he would defend his cause in arms; the accuser by picking it up accepted the challenge (see Wager). This form is still prescribed for the challenge of the king's champion at the coronation of English sovereigns, and was actually followed at that of George IV. (see Champion). The phrase " to throw down the gauntlet " is still in common use of any challenge.

Pledges of Service. — The use of the glove as a pledge of fulfilment is exemplified also by the not infrequent practice of enfeoffing vassals by investing them with the glove ; similarly the emperors symbolized by the bestowal of a glove the concession of the right to found a town or to establish markets, mints and the like; the " hands " in the armorial bearings of certain German towns are really gloves, reminiscent of this investiture. Conversely, fiefs were held by the render of presenting gloves to the sovereign. Thus the manor of Little Holland in Essex was held in Queen Elizabeth's time by the service of one knight's fee and the rent of a pair of gloves turned up with hare's skin (Blount's Tenures, ed. Beckwith, p. 130). The most notable instance in England, however, is the grand serjeanty of finding for the king a glove for his right hand on coronation day, and supporting his right arm as long as he holds the sceptre. The right to perform this " honourable service " was originally granted by William the Conqueror to Bertram de Verdun, together with the manor of Fernham (Farnham Royal) in Buckinghamshire. The male descendants of Bertram performed this serjeanty at the corona- tions until the death of Theobald de Verdun in 13 16, when the right passed, with the manor of Farnham, to Thomas Lord Furnival by his marriage with the heiress Joan. His son William Lord Furnival performed the ceremony at the coronation of Richard II. He died in 1383, and his daughter and heiress Jean de Furnival having

married Sir Thomas Nevill, Lord Furnival in her right, the latter performed the ceremony at the coronation of Henry IV. His heiress Maud married Sir John Talbot (1st earl of Shrewsbury) who, as Lord Furnival, presented the glove embroidered with the arms of Verdun at the coronation of Henry V. When in 1541 Francis earl of Shrewsbury exchanged the manor of Farnham with King Henry VIII. for the site and precincts of the priory of Worksop in Nottinghamshire he stipulated that the right to perform this serjeanty should be reserved to him, and the king accordingly transferred the obligation from Farnham to Worksop. On the 3rd of April 1838 the manor of Worksop was sold to the duke of Newcastle and with it the right to perform the service, which had hitherto always been carried out by a descendant of Bertram de Verdun. At the coronation of King Edward VII. the earl of Shrewsbury disputed the duke of Newcastle's right, on the ground that the serjeanty was attached not to the manor but to the priory lands at Worksop, and that the latter had been subdivided by sale so that no single person was entitled to perform the ceremony and the right had therefore lapsed. His petition for a regrant to himself as lineal heir of Bertram de Verdun, however, was

1 F. W. Maitland and W. P. Baildon, The Court Baron (Selden Society, London, 1891), p. 17. Maitland wrongly translates gaunt plyee as " twisted " glove, adding " why it should be twisted I cannot say." An earlier instance of the delivery of a folded glove as gage is quoted from the 13th-century Anglo-Norman poem known as The Song of Dermolt and the Earl (ed. G. H. Orpen, Oxford, 1892) in J. H. Round's Commune of London, p. 153.

disallowed by the court of claims, and the serjeanty was declared to be attached to the manor of Worksop (G. Woods Wollaston, Coronation Claims, London, 1903, p. 133).

Presentations. — From the ceremonial and symbolic use of gloves the transition was easy to the custom which grew up of presenting them to persons of distinction on special occasions. When Queen Elizabeth visited Cambridge in 1578 the vice- chancellor offered her a " paire of gloves, perfumed and garnished with embroiderie and goldsmithe's wourke, price 60s.," and at the visit of James I. there in 1615 the mayor and corporation of the town " delivered His Majesty a fair pair of perfumed gloves with gold laces." It was formerly the custom in England for bishops at their consecrations to make presents of gloves to those who came to their consecration dinners and others, but this gift became such a burden to them that by an order in council in 1678 it was commuted for the payment of a sum of £50 towards the rebuilding of St Paul's. Serjeants at law, on their appoint- ment, were

given a pair of gloves containing a sum of money which was termed ” regards “; this custom is recorded as early as 1495, when according to the Black Book of Lincoln’s Inn each of the new Serjeants received £6, 13s. 4d. and a pair of gloves costing 4d., and it persisted to a late period. At one time it was the practice for a prisoner who pleaded the king’s pardon on his discharge to present the judges with gloves by way of a fee. Glove-silver, according to Jacob’s Law Dictionary, was a name used of extraordinary rewards formerly given to officers of courts, &c, or of money given by the sheriff of a county in which no offenders were left for execution to the clerk of assize and judge’s officers; the explanation of the term is that the glove given as a perquisite or fee was in some cases lined with money to increase its value, and thus came to stand for money osten- sibly given in lieu of gloves. It is still the custom in the United Kingdom to present a pair of white gloves to a judge or magis- trate who when he takes his seat for criminal business at the appointed time finds no cases for trial. By ancient custom judges are not allowed to wear gloves while actually sitting on the bench, and a witness taking the oath must remove the glove from the hand that holds the book. (See J. W. Norton-Kyshe, The Law and Customs relating to Gloves, London, 1901.)

Pontifical gloves (Lat. chirothecae) are liturgical ornaments peculiar to the Western Church and proper only to the pope, the cardinals and bishops, though the right to wear them is often granted by the Holy See to abbots, cathedral dignitaries and other prelates, as in the case of the other episcopal insignia. According to the present use the gloves are of silk and of the liturgical colour of the day, the edge of the opening ornamented with a narrow band of embroidery or the like, and the middle of the back with a cross. They may be worn only at the celebra- tion of mass (except masses for the dead). In vesting, the gloves are put on the bishop immediately after the dalmatic, the right hand one by the deacon, the other by the subdeacon. They are worn only until the ablution before the canon of the- mass, after which they may not again be put on.

At the consecration of a bishop the consecrating prelate puts the gloves on the new bishop immediately after the mitre, with a prayer that his hands may be kept pure, so that the sacrifice he offers may be as acceptable as the gift of venison which Jacob, his hands wrapped in the skin of kids, brought to Isaac. This symbolism (as in the case of the other vestments) is, however, of late growth. The liturgical use of gloves itself cannot, according to Father Braun, be traced beyond the beginning of the 10th century, and their introduction was due, perhaps to the simple desire to keep the hands clean for the holy mysteries, but more probably merely as part of the increasing pomp

with which the Carolingian bishops were surrounding themselves. From the Frankish kingdom the custom spread to Rome, where liturgical gloves are first heard of in the earlier half of the nth century. The earliest authentic instance of the right to wear them being granted to a non-bishop is a bull of Alexander IV. in 1070, con- ceding this to the abbot of S. Pietro in Cielo d' Oro.

During the middle ages the occasions on which pontifical gloves (often wanti, guanti, and sometimes manicae in the inventories)

were worn were not so carefully defined as now, the use varying in different churches. Nor were the liturgical colours prescribed. The most characteristic feature of the medieval pontifical glove was the ornament (tasellus, fibula, monile, paratura) set in the middle of the back of the glove. This was usually a small plaque of metal, enamelled or jewelled, generally round, but sometimes square or irregular in shape. Sometimes embroidery was substi- tuted; still more rarely the whole glove was covered, even to the fingers, with elaborate needlework designs.

Liturgical gloves have not been worn by Anglican bishops since the Reformation, though they are occasionally represented as wearing them on their effigies.

See J. Braun,S.J.,Z)ie liturgische Gewandung (Freiburg im Breisgau, 1907), pp. 359-382, where many beautiful examples are illustrated.

Manufacture of Gloves.— Three countries, according to an old proverb, contribute to the making of a good glove — Spain dressing the leather, France cutting it and England sewing it. But the manufacture of gloves was not introduced into Great Britain till the 10th or nth century. The incorporation of glovers of Perth was chartered in 1165, and in 1190 a glove- makers' gild was formed in France, with the object of regulating the trade and ensuring good workmanship. The glovers of London in 1349 framed their ordinances and had them approved by the corporation, the city regulations at that time fixing the price of a pair of common sheepskin gloves aX id. In 1464, when the gild received armorial bearings, they do not seem to have been very strong, but apparently their position improved sub- sequently and in 1638 they were incorporated as a new company. In 1580 it is recorded that both French and Spanish gloves were on sale

in London shops, and in 1661 a company of glovers was incorporated at Worcester, which still remains an important seat of the English glove industry. In America the manufacture of gloves dates from about 1760, when Sir William Johnson brought over several families of glove makers from Perth; these settled in Fulton county, New York, which is now the largest seat of the glove trade in the United States.

Gloves may be divided into two distinct categories, according as these are made of leather or are woven or knitted from fibres such as silk, wool or cotton. The manufacture of the latter kinds is a branch of the hosiery industry. For leather gloves skins of various animals are employed — deer, calves, sheep and lambs, goats and kids, &c. — but kids have had nothing to do with the production of many of the ” kid gloves ” of commerce. The skins are prepared and dressed by special processes (see Leather) before going to the glove-maker to be cut. Owing to the elastic character of the material the cutting is a delicate operation, and long practice is required before a man becomes expert at it. Formerly it was done by shears, the workmen following an outline marked on the leather, but now steel dies are universally employed not only for the bodies of the gloves but also for the thumb-pieces and fourchettes or sides of the fingers. When hand sewing is employed the pieces to be sewn together are placed between a pair of jaws, the holding edges of which are serrated with fine saw-teeth, and the sewer by passing the needle forwards and backwards between each of these teeth secures neat uniform stitching. But sewing machines are now widely employed on the work. The labour of making a glove is much subdivided, different operators sewing different pieces, and others again embroidering the back, forming the button-holes, attaching the buttons, &c. After the gloves are completed, they undergo the process of ” laying off,” in which they are drawn over metal forms, shaped like a hand and heated internally by steam; in this way they are finally smoothed and shaped before being wrapped in paper and packed in boxes.

Gloves made of thin indiarubber or of white cotton are worn by some surgeons while performing operations, on account of the ease with which they can be thoroughly sterilized.

GLOVER, SIR JOHN HAWLEY (1829-1885), captain in the British navy, entered the service in 1841 and passed his examina- tion as lieutenant in 1849, but did not receive a commission till May 185 1. He served on various stations, and- was wounded severely in an action with the Burmese at Donabew (4th February 1853). But his reputation was not gained at sea and as a naval officer, but on shore and as an administrative official in the colonies. During his years of service as

lieutenant in the navy he had had considerable experience of the coast of Africa, and had taken part in the expedition of Dr W. B. Baikie (1824- 1864) up the Niger. On the 21st of April 1863 he was appointed administrator of the government of Lagos, and in that capacity, or as colonial secretary, he remained there till 1872. During this

period he had been much employed in repelling the marauding incursions of the Ashantis. When the Ashanti war broke out in 1873, Captain Glover undertook the hazardous and doubtful task of organizing the native tribes, whom hatred of the Ashantis might be expected to make favourable to the British authorities— to the extent at least to which their fears would allow them to act. His services were accepted, and in September of 1873 he landed at Cape Coast, and, after forming a small trustworthy force of Hausa, marched to Accra. His influence sufficed to gather a numerous native force, but neither he nor anybody else could overcome their abject terror of the ferocious Ashantis to the extent of making them fight. In January 1874 Captain Glover was able to render some assistance in the taking of Kumasi, but it was at the head of a Hausa force. His services were acknowledged by the thanks of parliament and by his creation as G.C.M.G. In 1875 he was appointed governor of Newfound- land and held the post till 1881, when he was transferred to the Leeward Islands. He returned to Newfoundland in 1883, and died in London on the 30th September 1885.

Lady Glover's Life of her husband appeared in 1897.

GLOVER, RICHARD (1712-1785), English poet, son of Richard Glover, a Hamburg merchant, was born in London in 171 2. He was educated at Cheam in Surrey. While there he wrote in his sixteenth year a poem to the memory of Sir Isaac Newton, which was prefixed by Dr Pemberton to his View of Newton's Philosophy, published in 1728. In 1737 he published an epic poem in praise of liberty, Leonidas, which was thought to have a special reference to the politics of the time; and being warmly commended by the prince of Wales and his court, it soon passed through several editions. In 1739 Glover published a poem entitled London, or the Progress of Commerce; and in the same year, with a view to exciting the nation against the Spaniards, he wrote a spirited ballad, Hosier's Ghost, very popular in its day. He was also the author of two tragedies, Boadicea (1753) and Medea (1761), written in close imitation of Greek models. The success of Glover's Leonidas led him to take considerable interest in politics, and in 1761 he entered parliament as member for Weymouth. He died on the 25th of November 1785. The Athenaid, an epic in thirty books, was

published in 1787, and his diary, entitled Memoirs of a distinguished literary and political Character from 1742 to 1757, appeared in 1813. Glover was one of the reputed authors of Junius; but his claims — which were advocated in an Inquiry concerning the author of the Letters of Junius (1815), by R. Duppa — rest on very slight grounds.

GLOVERSVILLE, a city of Fulton county, New York, U.S.A., at the foot-hills of the Adirondacks, about 55 m. N.W. of Albany. Pop. (1890) 13,864; (1900) 18,349, of whom 2542 were foreign-born; (1910 census) 20,642. It is served by the Fonda, Johnstown & Gloversville railway (connecting at Fonda, about 9 m. distant, with the New York Central), and by electric lines connecting with Johnstown, Amsterdam and Schenectady. The city has a public library (26,000 volumes in 1908), the Nathan Littauer memorial hospital, a state armoury and a fine government building. Gloversville is the principal glove-manufacturing centre in the United States. In 1900 Fulton county produced more than 57%, and Gloversville 38-8%, of all the leather gloves and mittens made in the United States; in 1905 Gloversville produced 29-9% of the leather gloves and mittens made in the United States, its products being valued at $5,302,196. Gloversville has more than a score of tanneries and leather-finishing factories, and manufactures fur goods. In 1905 the city's total factory product was valued at $9,340,763. The extraordinary localization of the glove-making industry in Gloversville, Johnstown and other parts of Fulton county, is an incident of much interest in the economic history of the United States. The industry seems to have had its origin among a colony of Perthshire families, including many glove-makers, who were settled in this region by Sir William Johnson about 1760. For many years the entire product seems to have been disposed of in the neighbourhood, but about 1809 the goods began to find more distant markets, and by 1825 the industry was firmly established on a prosperous

basis, the trade being handed down from father to son. An interesting phase of the development is that, in addition to the factory work, a large amount of the industry is in the hands of " home workers " both in the town and country districts. Gloversville, settled originally about 1770, was known for some time as Stump City, its present name being adopted in 1832. It was incorporated as a village in 1851 and was chartered as a city in 1890.

GLOW-WORM, the popular name of the wingless female of the beetle Lampyris noctiluca, whose power of emitting light has been familiar for many centuries. The luminous organs of the glow-worm consist of cells similar to those of the fat-body, grouped into paired masses in the ventral region of the hinder abdominal segments. The light given out by the wingless female insect is believed to serve as an attraction to the flying male, whose luminous organs remain in a rudimentary condition. The common glow-worm is a widespread European and Siberian insect, generally distributed in England and ranging in Scotland northwards to the Tay, but unknown in Ireland. Exotic species of Lampyris are similarly luminous, and light-giving organs are present in many genera of the family Lampyridae from various parts of the world. Frequently — as in the south European Luciola italica — both sexes of the beetle are provided with wings, and both male and female emit light. These luminous, winged Lampyrids are generally known as ” fire-flies. ” In correspondence with their power of emitting light, the insects are nocturnal in habit.

Elongate centipedes of the family Geophilidae, certain species of which are luminous, are sometimes mistaken for the true glow-worm.

GLOXINIA, a charming decorative plant, botanically a species of Sinningia (S. speciosa), a member of the natural order Ges- neraceae and a native of Brazil. The species has given rise under cultivation to numerous forms showing a wonderful variety of colour, and hybrid forms have also been obtained between these and other species- of Sinningia. A good strain of seed will produce many superb and charmingly coloured varieties, and if sown early in spring, in a temperature of 65° at night, they may be shifted on into 6-in. pots, and in these may be flowered during the summer. The bulbs are kept at rest through the wint er in dry sand, in a temperature of 50°, and to yield a succession should be started at intervals, say at the end of February and the beginning of April. To prolong the blooming season, use weak manure water when the flower-buds show themselves.

GLUCINUM, an alternative name for Beryllium (q.v.). When L. N. Vauquelin in 1798 published in the Annates de chimie an account of a new earth obtained by him from beryl he refrained from giving the substance a name, but in a note to his paper the editors suggested glucine, from yhvKvs, sweet, in reference to the taste of its salts, whence the name Glucinum or Glucinium (symbol Gl. or sometimes G). The name beryllium was given to the metal by German chemists and was generally used until recently, when the earlier name was adopted.

GLUCK, 1 CHRISTOPH WILLIBALD (1714-1787), operatic composer, German by his nationality, French by his place in art, was born at Weidenwang, near Neumarkt, in the upper Palatinate, on the 2nd of July 17 14. He belonged to the lower middle class, his father being gamekeeper to Prince Lobkowitz; but the boy's education was not neglected on that account. From his twelfth to his eighteenth year he frequented the Jesuit school of Kommotau in the neighbourhood of Prince Lobkowitz's estate in Bohemia, where he not only received a good general education, but also had lessons in music. At the age of eighteen Gluck went to Prague, where he continued his musical studies under Czernohorsky, and maintained himself by the exercise of his art, sometimes in the very humble capacity of fiddler at village fairs and dances. Through the introductions of Prince Lobkowitz, however, he soon gained access to the best families of the Austrian nobility; and when in 1736 he proceeded to Vienna he was hospitably received at his protector's palace. Here he met Prince Melzi, an ardent lover of music, whom he accompanied to Milan, continuing his education under Giovanni 1 Not, as frequently spelt, Gliick.

Battista San Martini, a great musical historian and contra- puntist, who was also famous in his own day as a composer of church and chamber music. We soon find Gluck producing operas at the rapid rate necessitated by the omnivorous taste of the Italian public in those days. Nine of these works were produced at various Italian theatres between 1741 and 1745. Although their artistic value was small, they were so favourably received that in 1745 Gluck was invited to London to .compose for the Haymarket. The first opera produced there was called La Caduta dei giganti; it was followed by a revised version of one of his earlier operas. Gluck also appeared in London as a performer on the musical glasses (see Harmonica).

The success of his two operas, as well as that of a pasticcio (i.e. a collection of favourite arias set to a new libretto) entitled Piramo e Tisbe, was anything but brilliant, and he accordingly left London. But his stay in England was not without important consequences for his subsequent career. Gluck at this time was rather less than an ordinary producer of Italian opera. Handel's well-known saying that Gluck " knew no more counterpoint than his cook " must be taken in connexion with the less well- known fact that that cook was an excellent bass singer who performed in many of Handel's own operas. But it indicates the musical reason of Gluck's failure, while Gluck himself learnt the dramatic reason through his surprise at finding that arias which in their original setting had been much applauded lost all effect when adapted to new words in the pasticcio. Irrelevant as Handel's criticism appears, it was not without bearing on Gluck's

difficulties. The use of counterpoint has very little necessary connexion with contrapuntal display; its real and final cause is a certain depth of harmonic expression which Gluck attained only in his most dramatic moments, and for want of which he, even in his finest works, sometimes moved very lamely. And in later years his own mature view of the importance of harmony, which he upheld in long arguments with Gretry, who believed only in melody, shows that he knew that the dramatic expression of music must strike below the surface. At this early period he was simply producing Handelian opera in an amateurish style, suggesting an unsuccessful imitation of Hasse; but the failure of his pasticcio is as significant to us as it was to him, since it shows that already the effect of his music depended upon its characteristic treatment of dramatic situations. This characterizing power was as yet not directly evident, and it needed all the influence of the new instrumental resources of the rising sonata-forms before music could pass out of what we may call its architectural and decorative period and enter into dramatic regions at all.

It is highly probable that the chamber music of his master, San Martini, had already indicated to Gluck a new direction which was more or less incompatible with the older art; and there is nothing discreditable either to Gluck or to his con- temporaries in the failure of his earlier works. Had the young composer been successful in the ordinary opera seria, there is reason to fear that the great dramatic reform, initiated by him, might not have taken place. The critical temper of the London public fortunately averted this calamity. It may also be assumed that the musical atmosphere of the English capital, and especially the great works of Handel, were not without beneficial influence upon the young composer. But of still greater importance in this respect was a short trip to Paris, where Gluck became for the first time acquainted with the classic traditions and the declamatory style of the French opera— a sphere of music in which his own greatest, triumphs were to be achieved. Of these great issues little trace, however, is to be found in the works produced by Gluck during the fifteen years after his return from England. In this period Gluck, in a long course of works by no means free from the futile old traditions, gained technical experience and important patronage, though his success was not uniform. His first opera written for Vienna, La Semiramide riconosciuta, is again an ordinary opera seria, and little more can be said of Telemacco, although thirty years later Gluck was able to use most of its overture and an energetic duet in one of his greatest works, Armide.

Gluck settled permanently at Vienna in 1756, having two years previously been appointed court chapel-master, with a salary of 2000 florins, by the empress Maria Theresa. He had already received the order of knighthood from the pope in conse- quence of the successful production of two of his works in Rome. During the long interval from 1756 to 1762 Gluck seems to have matured his plans for the reform of the opera; and, barring a ballet named Don Giovanni, and some airs nouveaux to French words with pianoforte accompaniment, no compositions of any importance have to be recorded. Several later pieces d'occasion, such as II Trionfo di Clelia (T763), are still written in the old manner, though already in 1762 Orfeo ed Euridice shows that the composer had entered upon a new career. Gluck had for the first time deserted Metastasio for Raniero Calzabigi, who, as Vernon Lee suggests, was in all probability the immediate cause of the formation of Gluck's new ideas, as he was a hot-headed dramatic theorist with a violent dislike for Metastasio, who had hitherto dominated the whole sphere of operatic libretto.

Quite apart from its significance in the history of dramatic music, Orpheus is a work which, by its intrinsic beauty, commands the highest admiration. Orpheus's air, Che faro, is known to every one; but still finer is the great scena in which the poet's song softens even the ombre sdegnose of Tartarus. The ascending passion of the entries of the solo (Deh! placatevi; Mille pene; Men tiranne), interrupted by the harsh but gradually softening exclamations of the Furies, is of the highest dramatic effect. These melodies, moreover, as well as every declamatory passage assigned to Orpheus, are made subservient to the purposes of dramatic characterization; that is, they could not possibly be assigned to any other person in the drama, any more than Hamlet's monologue could be spoken by Polonius. It is in this power of musically realizing a character — a power all but un- known in the serious opera of his day-ˆ-that Gluck's genius as a dramatic composer is chiefly shown. After a short relapse into his earlier manner, Gluck followed up his Orpheus by a second classical music-drama (1767) named Alceste. In his dedication of the score to the grand-duke of Tuscany, he fully expressed his aims, as well as the reasons for his total breach with the old traditions. " I shall try," he wrote, " to reduce music to its real function, that of seconding poetry by intensifying the expression of sentiments and the interest of situations without interrupting the action by needless ornament. I have accordingly taken care not to interrupt the singer in the heat of the dialogue, to wait for a tedious ritornel, nor do I allow him to stop on a sonorous vowel, in the middle of a phrase, in order to show the

nimbleness of a beautiful voice in a long cadenza." Such theories, and the stern consistency with which they were carried out, were little to the taste of the pleasure-loving Viennese; and the success of Alceste, as well as that of Paris and Helena, which followed two years later, was not such as Gluck had desired and expected. He therefore eagerly accepted the chance of finding a home for his art in the centre of intellectual and more especially dramatic life, Paris. Such a chance was opened to him through the bailli Le Blanc du Roullet, attache of the French embassy at Vienna, and a musical amateur who entered into Gluck's ideas with enthusiasm. A classic opera for the Paris stage was accordingly projected, and the friends fixed upon Racine's Iphigenie en Aulide. After some difficulties, overcome chiefly by the intervention of Gluck's former pupil the dauphiness Marie Antoinette, the opera was at last accepted and performed at the Academie de Musique, on the 19th of April 1774.

The great importance of the new work was at once perceived by the musical amateurs of the French capital, and a hot con- troversy on the merits of Iphigenie ensued, in which some of the leading literary men of France took part. Amongst the opponents of Gluck were not only the admirers of Italian vocalization and sweetness, but also the adherents of the earlier French school, who refused to see in the new composer the legitimate successor of Lulli and Rameau. Marmontel, Laharpe and D'Alembert were his opponents, the Abbe Arnaud and others his enthusiastic friends. Rousseau took a peculiar position in the struggle.

In his early writings he is a violent partisan of Italian music, but when Gluck himself appeared as the French champion Rousseau acknowledged the great composer's genius; although he did not always understand it, as for example when he suggested that in Alceste, " Divinites du Styx," perhaps the most majestic of all Gluck's arias, ought to have been set as a rondo. Neverthe- less in a letter to Dr Burney, written shortly before his death, Rousseau gives a close and appreciative analysis of Alceste, the first Italian version of which Gluck had submitted to him for suggestions; and when, on the first performance of the piece not being received favourably by the Parisian audience, the composer'exclaimed, " Alceste est tombee," Rousseau is said to have comforted him with the flattering bonmot, " Oui, mais elle est tombee du ciel." The contest received a still more personal character when Piccinni, a celebrated and by no means incapable composer, came to Paris as the champion of the Italian party at the invitation of Madame du Barry, who held a rival court to that of the young princess (see Opera). As a dramatic contro- versy it suggests a parallel with the Wagnerian and anti- Wagnerian warfare of

a later age; but there is no such radical difference between Gluck's and Piccinni's musical methods as the comparison would suggest. Gluck was by far the better musician, but his deficiencies in musical technique were of a kind which contemporaries could perceive as easily as they could perceive Piccinni's. Both composers were remarkable inventors of melody, and both had the gift of making incorrect music sound agreeable. Gluck's indisputable dramatic power might be plausibly dismissed as irrelevant by upholders of music for music's sake, even if Piccinni himself had not chosen, as he did, to assimilate every feature in Gluck's style that he could understand. The rivalry between the two composers was soon developed into a quarrel by the skilful engineering of Gluck's enemies. In 1777 Piccinni was given a libretto by Marmontel on the subject of Roland, to Gluck's intense disgust, as he had already begun an opera on that subject himself. This, and the failure of an attempt to show his command of a lighter style by furbishing up some earlier works at the instigation of Marie Antoinette, inspired Gluck to produce his Armide, which appeared four months before Piccinni's Roland was ready, and raised a storm of controversy, admiration and abuse. Gluck did not anticipate Wagner more clearly in his dramatic reforms than in his caustic temper; and, as in Gluck's own estimation the difference between Armide and Alceste is that " I'un {Alceste) doit j "aire pleurer et I' autre f aire eprowoer une voluptueuse sensation," it was extremely annoying for him to be told by Laharpe that he had made Armide a sorceress instead of an enchantress, and that her part was " une criaillerie monotone et fatiguante." He replied to Laharpe in a long public letter worthy of Wagner in its venomous sarcasm and its tremendous value as an advertise- ment for its recipient.

Gluck's next work was Iphigenie en Tauride, the success of which finally disposed of Piccinni, who produced a work on the same subject at the same time and who is said to have acknowledged Gluck's superiority. Gluck's next work was Echo et Narcisse, the comparative failure of which greatly disappointed him; and during the composition of another opera, Les Danaides, an attack of apoplexy compelled him to give up work. He left Paris for Vienna, where he lived for several years in dignified leisure, disturbed only by his declining health. He died on the 15th of November 1787. (F. H.; D. F. T.)

The great interest of the dramatic aspect of Gluck's reforms is apt to overshadow his merit as a musician, and yet in some ways to idealize it. One is tempted to regard him as condoning for technical musical deficiencies by sheer dramatic power, whereas unprejudiced study of his work shows that where his dramatic power asserts itself there is no lack of musical technique. Indeed only a great musician could so

reform opera as to give it scope for dramatic power at all. Where Gluck differs from the greatest musicians is in his absolute dependence on literature for his inspiration. Where his librettist failed him (as in his last complete work, £.cho et Narcisse), he could hardly write tolerably good music; and, even in the finest works of his French

period, the less emotional situations are sometimes set to music which has little interest except as a document in the history of the art. This must not be taken to mean merely that Gluck could not, like Mozart and nearly all the great song-writers, set good music to a bad text. Such inability would prove Gluck's superior literary taste without casting a slur on his musicianship. But it points to a certain weakness as a musician that Gluck could not be inspired except by the more thrilling portions of his libretti. When he was inspired there was no question that he was the first and greatest writer of dramatic music before Mozart. To begin with, he could invent sublime melodies; and his power of producing great musical effects by the simplest means was nothing short of Handelian. Moreover, in his peculiar sphere he deserves the title generally accorded to Haydn of " father of modern orchestration." It is misleading to say that he was the first to use the timbre of instruments with a sense of emotional effect, for Bach and Handel well knew how to give a whole aria or whole chorus peculiar tone by means of a definite scheme of instrumentation. But Gluck did not treat instruments as part of a decorative design, any more than he so treated musical forms. Just as his sense of musical form is that of Philipp Emmanuel Bach and of Mozart, so is his treatment of instrumental tone-colour a thing that changes with every shade of feeling in the dramatic situation, and not in accordance with any purely decorative scheme. To accompany an aria with strings, oboes and flutes, was, for example, a perfectly ordinary procedure; nor was there anything unusual in making the wind instruments play in unison with the strings for the first part of the aria, and writing a passage for one or more of them in the middle section. But it was an unheard-of thing to make this passage consist of long appoggiaturas once every two bars in rising sequence on the first oboe, answered by deep pizzicato bass notes, while Agamemnon in despair cries: " J'entends retentir dans mon seiti le cri plaintif de la nature." Some of Gluck's most forcible effects are of great subtlety, as, for instance, in Iphigenie en Tauride, where Orestes tries to reassure himself by saying: " Le calme rentre dans mon cceur," while the intensely agitated accompaniment of the strings belies him. Again, the sense of

orchestral climax shown in the oracle scene in Alceste was a thing inconceivable in older music, and unsurpassed in artistic and dramatic spirit by any modern composer. Its influence in Mozart's Idomeneo is obvious at a first glance.

The capacity for broad melody always implies a true sense of form, whether that be developed by skill or not; and thus Gluck, in rejecting the convenient formalities of older styles of opera, was not, like some reformers, without something better to substitute for them. Moreover he, in consultation with his librettist, achieved great skill in holding together entire scenes, or even entire acts, by dramatically apposite repetitions of short arias and choruses. And thus in large portions of his finest works the music, in spite of frequent full closes, seems to move pari passu with the drama in a manner which for natural- ness and continuity is surpassed only by the finales of Mozart and the entire operas of Wagner. This is perhaps most noticeable in the second act of Orfeo. In its original Italian version both scenes, that in Hades and that in Elysium, are indivisible wholes, and the division into single movements, though technically obvious, is aesthetically only a natural means of articulating the structure. The unity of the scene in Hades extends, in the original version, even to the key-system. This was damaged ■when Gluck had to transpose the part of Orpheus from an alto to a tenor in the French version. And here, we have one of many instances in which the improvements his French experience enabled him to make in his great Italian works were not alto- gether unmixed. Little harm, however, was done to Orfeo which has not been easily remedied by transposing Orpheus's part back again; and in a suitable compromise between the two versions Orfeo remains Gluck's most perfect and inspired work. The emotional power of the music is such that the inevitable spoiling of the story by a happy ending has not the aspect of mere conventionality which it had in cases where the

music produced no more than the normal effect upon 18th- century audiences. Moreover Gluck's genius was of too high an order for him to be less successful in portraying a sufficiently intense happiness than in portraying grief. He failed only in what may be called the business capacities of artistic technique; and there is less " business " in Orfeo than in almost any other music-drama. It was Gluck's first great inspiration, and his theories had not had time to take action in paper warfare. Alceste contains his grandest music and is also very free from weak pages; but in its original Italian version the third act did not give Gluck scope for an adequate climax. This difficulty so accentuated itself in the French version that after continual retouchings a part for Hercules was, in Gluck's absence, added by Gossec; and three pages of Gluck's music, dealing with the supreme crisis where Alceste is

rescued from Hades (either by Apollo or by Hercules) were no longer required in performance and have been lost. The Italian version is so different from the French that it cannot help us to restore this passage, in which Gluck's music now stops short just at the point where we realize the full height of his power. The comparison between the Italian and French Alceste is one of the most interesting that can be made in the study of a musician's development. It would have been far easier for Gluck to write a new opera if he had not been so justly attached to his second Italian masterpiece. So radical are the differences that in retranslating the French libretto into Italian for performance with the French music not one line of Calzabigi's original text can be retained.

In IphigSnie en Aulide and Iphigtnie en Tauride, Gluck shows signs that the controversies aroused by his methods began to interfere with his musical spontaneity. He had not, in Orfeo, gone out of his way to avoid rondos, or we should have had no ” Che faro senza Euridice.” We read with a respectful smile Gluck’s assurance to the bailli Le Blanc du Roullet that ” you would not believe Armide to be by the same composer ” as Alceste. But there’is no question that Armide is a very great work, full of melody, colour and dramatic point; and that Gluck has availed himself of every suggestion that his libretto afforded for orchestral and emotional effects of an entirely different type from any that he had attempted before. And it is hardly relevant to blame him for his inability to write erotic music. In the first place, the libretto is not erotic, though the subject would no doubt become so if treated by a modern poet. In the second place a conflict of passions (as, for instance, where Armide summons the demons of Hate to exorcise love from her heart, and her courage fails her as soon as they begin) has never, even in Alceste, been treated with more dramatic musical force. The work as a whole is unequal, partly because there is a little too much action in it to suit Gluck’s methods; but it shows, as does no other opera until Mozart’s Don Giovanni, a sense of the development of characters, as distinguished from the mere presentation of them as already fixed.

In Iphigenie en Aulide and Iphigenie en Tauride, the very subtlety of the finest features indicates a certain self-conscious- ness which, when inspiration is lacking, becomes mannerism. Moreover, in both cases the libretti, though skilfully managed, tell a rather more complicated story than those which Gluck had hitherto so successfully treated; and, where inspiration fails, the musical technique becomes curiously-amateurish without any corresponding naivete. Still these works are immortal, and their finest passages are equal to anything in Alceste and Orfeo. £,cho et Narcisse we must, like Gluck’s contemporaries, regard as a failure. As in Orfeo, the pathetic story is ruined by a violent happy ending, but here this artistic disaster takes place before the pathos has had time to assert ” itself. Gluck had no opportunities in this work for any higher qualities, musical or dramatic, than prettiness; and with him beauty, without visible emotion, was indeed skin-deep. It is a pity that the plan of the great Pelletan-Damcke critical edition de luxe of Gluck’s French operas forbids the inclusion of his Italian Paride e Elena, his third opera to Calzabigi’s libretto, which was never given in a French version ; for there can be no question that, whatever he owed to France, the

period of his greatness began with his collaboration with Calzabigi. (D. F. T.)

GLUCKSBURG, a town of Germany, in the Prussian province of Schleswig-Holstein, romantically situated among pine woods on the Flensburg Fjord off the Baltic, 6 m. N.E. from Flensburg byrail. Pop. (1905) 1551. It has a Protestant church and some small manufactures and is a favourite sea-bathing resort. The castle, which occupies the site of a former Cistercian monastery, was, from 1622 to 1779, the residence of the dukes of Holstein- Sonderburg-Gliicksburg, passing then to the king of Denmark and in 1866 to Prussia. King Frederick VII. of Denmark died here on the 15th of November 1863.

GLUCKSTADT, a town of Germany, in the Prussian province of Schleswig-Holstein, on the right bank of the Elbe, at the confluence of the small river Rhin, and 28 m. N.W. of Altona, on the railway from Itzehoe to Elmshorn. Pop. (1905) 6586. It has a Protestant and a Roman Catholic church, a handsome town-hall (restored in 1873-1874), a gymnasium, a provincial prison and a penitentiary. The inhabitants are chiefly engaged in commerce and fishing; but the frequent losses from inunda- tions have greatly retarded the prosperity of the town. Gliick- stadt was founded by Christian IV. of Denmark in 161 7, and fortified in 1620. It soon became an important trading centre. In 1627-28 it was besieged for fifteen weeks by the imperialists under Tilly, without success. In i8r4 it was blockaded by the allies and capitulated, whereupon its fortifications were de- molished. In 1830 it was made a free port. It came into the possession of Prussia together with the rest of Schleswig-Holstein in 1866.

See Lucht, Gluckstadt. Beitrage zur Geschichte dieser Sladt (Kiel,

1854).

GLUCOSE (from Gr. y\vid>s, sweet), a carbohydrate of the formula C 6 Hi 2 06; it may be regarded as the aldehyde of sorbite. The name is applied in commerce to a complex mixture of carbohydrates obtained by boiling starch with dilute mineral acids; in chemistry, it denotes, with the prefixes d, I and d+l (or i), the dextro-rotatory, laevo-rotatory and inactive forms of the definite chemical compound defined above. The d modification is of the commonest occurrence, the other forms being only known as synthetic products; for this reason it is usually termed glucose, simply; alternative names are dextrose, grape sugar and diabetic sugar, in allusion to its right-

handed optical rotation, its occurrence in large quantity in grapes, and in the urine of diabetic patients respectively. In the vegetable kingdom glucose occurs, always in admixture with fructose, in many fruits, especially grapes, cherries, bananas, &c; and in combination, generally with phenols and aldehydes belonging to the aromatic series, it forms an extensive class of compounds termed glucosides. It appears to be synthesized in the plant tissues from carbon dioxide and water, formaldehyde being an intermediate product; or it may be a hydrolytic product of a glucoside or of a polysaccharose, such as cane sugar, starch, cellulose, &c. In the plant it is freely converted into more complex sugars, poly-saccharoses and also proteids. In the animal kingdom, also, it is very widely distributed, being some- times a normal and sometimes a pathological constituent of the fluids and tissues; in particular, it is present in large amount in the urine of those suffering from diabetes, and may be present in nearly all the body fluids. It also occurs in honey, the white appearance of candied honey being due to its separation.

Pure d-glucose, which may be obtained synthetically (see Sugar) or by adding crystallized cane sugar to a mixture of 80% alcohol and jV volume of fuming hydrochloric acid so long as it dissolves on shaking, crystallizes from water or alcohol' at ordinary temperatures in nodular masses, composed of minute six-sided plates, and containing one molecule of water of crystal- lization. This product melts at 86° C, and becomes anhydrous when heated to no° C. The anhydrous compound can also be prepared, as hard crusts melting at 146 , by crystallizing con- centrated aqueous solutions at 30 to 35°. It is very soluble in water, tut only slightly soluble in strong alcohol. Its taste

is somewhat sweet, its sweetening power being estimated at from 5 to £ that of cane sugar. When heated to above 200° it turns brown and produces caramel, a substance possessing a bitter taste, and used, in its aqueous solution or otherwise, under various trade names, for colouring confectionery, spirits, &c. The specific rotation of the plane of polarized light by glucose solutions is characteristic. The specific rotation of a freshly prepared solution is 105 , but this value gradually diminishes to 52-5°, 2 4 hours sufficing for the transition in the cold, and a few minutes when the solution is boiled. This phenomenon has been called mutarotation by T. M. Lowry. The specific rotation also varies with the concentration; this is due to the dissociation of complex molecules into simpler ones, a view confirmed by cryoscopic measurements.

Glucose may be estimated by means of the polarimeter, i.e. by determining the rotation of the plane of polarization of a solution, or,

chemically, by taking advantage of its property of reducing alkaline copper solutions. If a glucose solution be added to copper sulphate and much alkali added, a yellowish-red precipitate of cuprous hydrate separates, slowly in the cold, but immediately when the liquid is heated; this precipitate rapidly turns red owing to the formation of cuprous oxide. In 1846 L. C. A. Barreswil found that a strongly alkaline solution of copper sulphate and potassium sodium tartrate (Rochelle salt) remained unchanged on boiling, but yielded an immediate precipitate of red cuprous oxide when a solution of glucose was added. He suggested that the method was applicable for quantitatively estimating glucose, but its acceptance only followed after H. von Fehling's investigation. " Fehling's solution " is prepared by dissolving separately 34-639 grammes of copper sulphate, 173 grammes of Rochelle salt, and 71 grammes of caustic soda in water, mixing and making up to 1000 ccs.; 10 ccs. of this solution is completely reduced by 0-05 grammes of hexose. Volumetric methods are used, but the uncertainty of the end of the reaction has led to the suggestion of special indicators, or of determining the amount of cuprous oxide gravimetrically.

Chemistry. — In its chemical properties glucose is a typical oxyaldehyde or aldose. The aldehyde group reacts with hydrocyanic acid to produce two stereo-isomeric cyanhydrins; this isomerism is due to the conversion of an originally non-asymmetric carbon atom into an asymmetric one. The cyanhydrin is hydrolysable to an acid, the lactone of which may be reduced by sodium amalgam to a glucoheptose, a non-fermentable sugar containing seven carbon atoms. By repeating the process a non-fermentable gluco-octose and a fermentable glucononose may be prepared. The aldehyde group also reacts with phenyl hydrazine to form two phenylhydra- zones; under certain conditions a hydroxyl group adjacent to the aldehyde group is oxidized and glucosazone is produced ; this glucosazone is decomposed by hydrochloric acid into phenyl hydrazine and the keto-aldehyde glucosone. These transformations are fully discussed in the article Sugar. On reduction glucose appears to yield the hexahydric alcohol <2-sorbite, and on oxidation (Z-gluconic and d-saccharic acids. Alkalis partially convert it into d-mannose and d-fructose. Baryta and lime yield saccharates, e.g. C 6 Hi2CVBaO, precipitable by alcohol.

The constitution of glucose was established by H. Kiliani in 1885-1887, who showed it to be CH 2 OH-(CH-OH) 4 -CHO. The subject was taken up by Emil Fischer, who succeeded in synthesizing glucose, and also several of its stereo-isomers, there being 16 accord- ing to the Le Bel-van't Hoff theory (see Stereo-Isomerism and Sugar), This open

chain structure is challenged in the views put forward by T. M. Lowry and E. F. Armstrong. In 1895 C. Tanret showed that glucose existed in more than one form, and he isolated a, and y varieties with specific rotations of 105 , 52-5° and 22°. It is now agreed that the variety is a mixture of the o and 7. This discovery explained the mutarotation of glucose. In a fresh solution o-glucose only exists, but on standing it is slowly trans- formed into -y-glucose, equilibrium

being reached when the o and y CH 2 OH CH 2 OH

forms are present in the ratio CH-OH CH-OH

0-368:0-632 (Tanret, Zeit. physikal. pir pu

Chem. 1905, 53, p. 692). It isO<,/. Hn ,0<,A„ nH . convenient to refer to these two ^." un ' 2 (,L.H-Ufi;j

forms as a and 0. Lowry and Arm- HC-OH HO-CH

strong represent these compounds a-glucose /3-glucose

by the following spatial formulae

which postulate a 7-oxidic structure, and 5 asymmetric carbon atoms, i.e. one more than in the Fischer formulae. These formulae are supported by many considerations, especially by the selective

action of enzymes, which follows similar lines with the o- and /3-glucosides, i.e. the compounds formed by the interaction of glucose with substances generally containing hydroxyl groups (see Glucoside).

Fermentation of Glucose. — Glucose is readily fermentable. Of the greatest importance is the alcoholic fermentation brought about by yeast cells (Saccharomyces cerevisiae seu vini) ; this follows the equation C 6 Hi20 6 = 2C2H 6 0+2C0 2 , Pasteur considering 94 to 95 %of the sugar to be so changed. This character is the base of the plan of adding glucose to wine and beer wort before fermenting, the alcohol content of the liquid after fermentation being increased. Some fusel oil, glycerin and succinic acid appear to be formed simultane- ously, but in small amount. Glucose also undergoes fermentation into lactic acid (q.v.) in the presence of the lactic acid bacillus, and into butyric acid if the action of the preceding ferment be continued, or by

other bacilli. It also yields, by the so-called mucous fermenta- tion, a mucous, gummy mass, mixed with mannitol and lactic acid.

We may here notice the frequent production of glucose by the action of enzymes upon other carbohydrates. Of especial note is the transformation of maltose by maltase into glucose, and of cane sugar by invertase into a mixture of glucose and fructose (invert sugar) ; other instances are : lactose by lactase into galactose and glucose ; trehalose by trehalase into glucose; melibiose by melibiase into galactose and glucose; and of melizitose by melizitase into touranose and glucose, touranose yielding glucose also when acted upon by the enzyme touranase.

Commercial Glucose. — The glucose of commerce, which may be regarded as a mixture of grape sugar, maltose and dextrins, is pre- pared by hydrolysing starch by boiling with a dilute mineral acid. In Europe, potato starch is generally employed; in America, corn starch. The acid employed may be hydrochloric, which gives the best results, or sulphuric, which is used in Germany ; sulphuric acid is more readily separated from the product than hydrochloric, since the addition of powdered chalk precipitates it as calcium sulphate, which may be removed by a filter press. The processes of manu- facture have much in common, although varying in detail. The following is an outline of the process when hydrochloric acid is used : Starch (" green " starch in America) is made into a " milk " with water, and the milk pumped into boiling dilute acid contained in a closed " converter," generally made of copper or cast iron; steam is led in at the same time, and the pressure is kept up to about 25 lb to the sq. in. When the converter is full the pressure is raised some- what, and the heating continued until the conversion is complete. The liquid is now run into neutralizing tanks containing sodium carbonate, and, after settling, the supernatant liquid, termed " light liquor," is run through bag filters and then on to bone-char filters, which have been previously used for the " heavy liquor." The colourless or amber-coloured nitrate is concentrated to 27 to 28 B., when it forms the "heavy liquor," just mentioned. This is filtered through fresh bone-char filters, from which it is discharged as a practically colourless liquid. This liquid is concentrated in vacuum pans to a specific gravity of 40 to 44 B., a small quantity of sodium bisulphite solution being added to bleach it, to prevent fermentation, and to inhibit browning. " Syrup glucose " is the commercial name of the product; by continuing the concentration further solid glucose or grape sugar is obtained.

Several brands are recognized: "Mixing glucose" is used by syrup and molasses manufacturers, " jelly glucose " by makers of jellies, "

confectioners' glucose " in confectionery, " brewers' glucose" in brewing, &c.

GLUCOSIDE, in chemistry, the generic name of an extensive group of substances characterized by the property of yielding a sugar, more commonly glucose, when hydrolysed by purely chemical means, or decomposed by a ferment or enzyme. The name was originally given to vegetable products of this nature, in which the other part of the molecule was, in the greater number of cases, an aromatic aldehydic or phenolic compound (exceptions are sinigrin and jalapin or scammonin). It has now been extended to include synthetic ethers, such as those obtained by acting on alcoholic glucose solutions with hydrochloric acid, and also the polysaccharoses, e.g. cane sugar, which appear to be ethers also. Although glucose is the commonest sugar present in glucosides, many are known which yield rhamnose or iso-dulcite; these may be termed pentosides. Much' attention has been given to the non-sugar parts of the molecules; the" constitutions of many have been determined, and the compounds ' synthesized; and in some cases the preparation of the synthetic glucoside effected.

The simplest glucosides are the alkyl esters which E. Fischer (Ber., 28, pp. 1151, 3081) obtained by acting with hydrochloric acid on alcoholic glucose solutions. A better method of pre- paration is due to E. F. Armstrong and S. L. Courtauld (Proc.

Phys. Soc, 1903, July 1), who dissolve solid anhydrous glucose in methyl alcohol containing hydrochloric acid. A mixture of a- and /3-glucose result, which are then etherified, and if the solution be neutralized before the /3-form isomerizes and the solvent removed, a mixture of the a- and /3-methyl ethers is obtained. These may be separated by the action of suitable ferments. Fischer found that these ethers did not reduce Fehling's solution, neither did they combine with phenyl hydra- zine at 100°; they appear to be stereo-isomeric 7-oxidic com- pounds of the formulae I., II. : The difference between the a- and

CH 2 OH CHOH CH s (CHOH) 2 HCOCHa I. a-methyl d-glucoside

<«:

CH2OH "

CHOH

o<^ H

u \(CHOH) 2 CH 3 OCH

II. /3-methyl d-glucoside.

/3-forms is best shown by the selective action of enzymes. Fischer found that maltase, an enzyme occurring in yeast cells, hydrolysed a-glucosides but not the j3; while emulsin, an enzyme occurring in bitter almonds, hydrolyses the but not the a. The ethers of non-fermentable sugars are them- selves non-fermentable. By acting with these enzymes on the natural glucosides, it is found that the majority are of the j3-form; e.g. emulsin hydrolyses salicin, helicin, aesculin, coni-ferin, syringin, &c.

Classification of the glucosides is a matter of some difficulty. One based on the chemical constitution of the non-glucose part of the molecules has been proposed by Umney, who framed four groups: (1) ethylene derivatives, (2) benzene derivatives, (3) styrolene derivatives, (4) anthracene derivatives. A group may also be made to include the cyanogenetic glucosides, i.e. those containing prussic acid. J. J. L. van Rijn (Die Glyko- side, 1900) follows a botanical classification, which has several advantages; in particular, plants of allied genera contain similar compounds. In this article the chemical classification will be followed. Only the more important compounds will be noticed, the reader being referred to van Rijn (loc. cit.) and to Beilstein's Handbuch ier organischen Chemie for further details.

1. Ethylene Derivatives. — These are generally mustard oils, and are characterized by a burning taste ; their principal occurrence is in mustard and Tropaeolum seeds. Sinigrin or the potassium salt of myronic acid, GoHi 6 NS2K0 9 -H 2 0, occurs in black pepper and in horse-radish root. Hydrolysis with baryta, or decomposition by the ferment myrosin, gives glucose, allyl mustard oil and potassium bisulphate. Sinalbin, C30H42N2S2O15, occurs in white pepper; it decomposes to the mustard oil HO-C 6 H 4 -CH 2 -NCS, glucose and sinapin, a compound of choline and sinapinic acid. Jalapin or scammonin, CˆHscOis, occurs in scammony ; it hydrolyses to glucose and jalapinolic acid. The formulae of sinigrin, sinalbin, sinapin and jalapinolic acid are : — •

/-> n r» crxNCjHs r w n q rv' N-CH2-C 6 H.rOH

CeHnOs-S <-<. . S02 . 0K: LiHllUs b C< -.0S0 2 -0Ci 6 H 2 40 6 N

Sinigrin Sinalbin

ˆ CH3 0ˆ>C 6 H 2 CH:CHCOC 2 H40N< (gg 3)3 Sinapin CH 3 > CH

CH (° H) CioH 20 – C0 2 H. Jalapinolic acid (Kramer)

2. Benzene Derivatives. — These are generally oxy and oxyaldehydic compounds. Arbutin, CuHieO;, which occurs in bearberry along with methyl arbutin, hydrolyses to hydroquinone and glucose. Pharmacologically it acts as a urinary antiseptic and diuretic; the benzoyl derivative, cellotropin, has been used for tuberculosis. Salicin, also termed ” saligenin ” and ” glucose,” CuHigOj, occurs in the willow. The enzymes ptyalin and emulsin convert it into glucose and saligenin, ortho-oxybenzylalcohol,.HO-CeH4-CH 2 OH. Oxida- tion gives the aldehyde helicin. Populin, C 2 oH 22 8 , which occurs in the leaves and bark of Populus tremula, is benzoyl salicin.

3. Styrolene Derivatives. — This group contains a benzene and also an ethylene group, being derived from styrolene C 6 H 6 CH:CH 2 . Coniferin, Ci 6 H 22 O s , occurs in the cambium of coniferous woods. Emulsin converts it into glucose and coniferyl alcohol, while oxida tion gives glycovanillin, which yields with emulsin glucose and vanillin (see Eugenol and Vanilla). Syringin, which occurs in the bark of Syringa vulgaris, is methoxyconiferin. Phloridzin, C 2 iH240i < >, occurs in the root-bark of various fruit trees; it hydrolyses to glucose and phloretin, which is the phloroglucin ester of para- oxyhydratropic acid. It is related to the pentosides naringin, C 2 iHa,jOn, which hydrolyses to rhamnose and naringenin, the phloroglucin ester of para-oxycinnamic acid, and hesperidin,

C6oH 60 2 2(?), which hydrolyses to rhamnose and hesperetin, ‘CijHmOb, the phloroglucin ester of meta-oxy-para-methoxycinnaraic acid or isoferulic acid, C10H10O4. We may here include various coumarin and benzo-7-pyione derivatives. Aesculin,Ci 5 Hi 6 9 , occurring in horse-chestnut, and daphnin, occurring in Daphne alpina, are iso- meric; the former hydrolyses to glucose and aesculetin (4-5-dioxy- coumarin), the latter to glucose and daphnetin (3-4-dioxycoumarin). Fraxin, Ci e Hi 8 Oio, occurring in Fraxinus excelsior, and with aesculin in horse-chestnut, hydrolyses to glucose and fraxetin, the mono- methyl ester of a trioxycoumarin. Flavone or benzo-y-pyrone derivatives are very numerous; in many cases they (or the non- sugar part of the molecule) are vegetable dyestuffs. Quercitrin, C21H22O12, is a yellow dyestuff found in Quercus tinctoria; it hydro- lyses to rhamnose and quercetin, a dioxy-/8-phenyl-trioxybenzo- 7-pyrone. Rhamnetin, a splitting product of the

glucosides of Rhamnus, is monomethyl quercetin; fisetin, from Rhus cotinus, is monoxyquercetin ; chrysin is phenyl-dioxybenzo-7-pyrone. Saponarin, a glucoside found- in Saponaria officinalis, is a related compound. Strophanthin is the name given to three different compounds, two obtained from Strophantus Kombe and one from 5. hispidus.

4. Anthracene Derivatives. — These are generally substituted anthraquinones ; many have medicinal applications, being used as purgatives, while one, ruberythric acid, yields the valuable dye- stuff madder, the base of which is alizarin (q.v.). Chrysophanic acid, a dioxymethylanthraquinone, occurs in rhubarb, which also contains emodin, a trioxymethylanthraquinone; this substance occurs in combination with rhamnose in frangula bark.

The most important cyanogenetic glucoside is amygdaHn, which occurs in bitter almonds. The enzyme maltase decomposes it into glucose and mandelic nitrile glucoside; the latter is broken down by emulsin into glucose, benzaldehyde and prussic acid. Emulsin also decomposes amygdalin directly into these compounds without the intermediate formation of mandelic nitrile glucoside. Several other glucosides of this nature have been isolated. The saponins are a group of substances characterized by forming a lather with water; they occur in soap-bark (q.v.). Mention may also be made of indican, the glucoside of the indigo plant ; this is hydrolysed by the indigo ferment, indimulsin, to indoxyl and indiglucin.

GLUE (from the 0. Fr. glu, bird-lime, from the Late Lat. glutem, glus, glue), a valuable agglutinant, consisting of impure gelatin and widely used as an adhesive medium for wood, leather, paper and similar substances. Glues and gelatins merge into one another by imperceptible degrees. The difference is con- ditioned by the degree of purity: the more impure form is termed glue and is only used as an adhesive, the purer forms, termed gelatin, have other applications, especially in culinary operations and confectionery. Referring to the article Gelatin for a general account of this substance, it is only necessary to state here that gelatigenous or glue-forming tissues occur in the bones, skins and intestines of all animals, and that by extraction with hot water these agglutinating materials are removed, and the solution on evaporating and cooling yields a jelly-like substance — gelatin or glue.

Glues may be most conveniently classified according to their sources: bone glue, skin glue and fish glue; these may be regarded severally as impure forms of bone gelatin, skin gelatin and isinglass.

Bone Glue. — For the manufacture of glue the bones are supplied fresh or after having been used for making soups; Indian and South American bones are unsuitable, since, by reason of their previous treatment with steam, both their fatty and glue-forming constituents have been already removed (to a great extent). On the average, fresh bones contain about 50% of mineral matter, mainly calcium and magnesium phosphates, about 12% each of moisture and fat, the remainder being other organic matter. The mineral matter reappears in commerce chiefly as artificial manure; the fat is employed in the candle, soap and glycerin industries, while the other organic matter supplies glue.

The separation of the fat, or ” de-greasing of the bones ” is effected (1) by boiling the bones with water in open vessel’s; (2) by treatment with steam under pressure; or (3) by means of solvents. The last process is superseding the first two, which give a poor return of fat — a valuable consideration — and also involve the loss of a certain amount of glue. Many solvents have_been proposed; the greatest commercial success appears to attend Scottish shale oil and natural petroleum (Russian or American) boiling at aftout ibo° C. The vessels in which the

extraction is carried out consist of upright cylindrical boilers, provided with manholes for charging, a false bottom on which the bones rest, and with two steam coils — one for heating only, the other for leading in ” live ” steam. There is a pipe from the top of the vessel leading to a condensing plant. The vessels are arranged in batteries. In the actual operation the boiler is charged with bones, solvent is run in, and the mixture gradually heated by means of the dry coil; the spirit distils over, carrying with it the water present in the bones; and after a time the extracted fat is run off from discharge cocks in the bottom of the extractor. 1 A fresh charge of solvent is introduced, and the cycle repeated; this is repeated a third and fourth time, after which the bones contain only about 0-2% of fat, and a little of the solvent, which is removed by blowing in live steam under 70 to 80 lb pressure. The de-greased bones are now cleansed from all dirt and flesh by rotation in a horizontal cylindrical drum covered with stout wire gauze. The attrition accompanying this motion suffices to remove the loosely adherent matter, which falls through the meshes of the gauze; this meal contains a certain amount of glue-forming matter, and is generally passed through a finer mesh, the residuum being worked up in the glue-house, and the flour which passes through being sold as a bone-meal, or used as a manure.

The bones, which now contain 5 to 6% of glue-forming nitrogen and about 60% of calcium phosphate, are next treated for glue. The most

economical process consists in steaming the bones' under pressure (15 lb to start with, afterwards 5 lb) in upright cylindrical boilers fitted with false bottoms. The glue-liquors collect beneath the false bottoms, and when of a strength equal to about 20% dry glue they are run off to the clarifiers. The first runnings contain about 65 to 70% of- the total glue; a second steaming extracts another 25 to 30%. For clarifying the solutions, ordinary alum is used, one part being used for 200 parts of dry glue. The alum is added to the hot liquors , and the temperature raised to 100°; it is then allowed to settle, and the surface scum removed by filtering through coarse calico or fine wire filters.

The clear liquors are now concentrated to a strength of about 32 % dry glue in winter and 35 % in summer. This is invariably effected in vacuum pans — open boiling yields a dark-coloured and inferior product. Many types of vacuum plant are in use; the Yaryan form, invented by H. T. Yaryan, is perhaps the best, and the double effect system is the most efficient. After con- centration the liquors are bleached by blowing in sulphur dioxide, manufactured by burning sulphur; by this means the colour can be lightened to any desired degree. The liquors are now run into galvanized sheet-iron troughs, 2 ft. long, 6 in. wide and 5 in. deep, where they congeal to a firm jelly, which is subsequently removed by cutting round the edges, or by warming with hot water, and turning the cake out. The cake is sliced to sheets of convenient thickness, generally by means of a wire knife, i.e. a piece of wire placed in a frame. Mechanical slicers acting on this principle are in use. Instead of allowing the solution to congeal in troughs, it may be " cast " on sheets of glass, the bottoms of which are cooled by running water. After congealing, the tremulous jelly is dried; this is an operation of great nicety: the desiccation must be slow and is generally effected by circulating a rapid current of air about the cakes supported on nets set in frames; it occupies from four to five days, and the cake contains on the average from 10 to 13% of water.

Skin Glue. — In the preparation of skin glue the materials used are the parings and cuttings of hides from tan-yards, the ears of oxen and sheep, the skins of rabbits, hares, cats, dogs and other animals, the parings of tawed leather, parchment and old gloves, and many other miscellaneous scraps of animal matter. Much experience is needed in order to prepare a good

1 This fat contains a small quantity of solvent, which is removed by heating with steam, when the solvent distils off. Hot water is then run in to melt the fat, which rises to the surface of the water and is floated off. Another boiling with water, and again floating off, frees the fat from dirt and mineral matter, and the product is ready for casking.

glue from such heterogeneous materials; one blending may be a success and another a failure. The raw material has been divided into three great divisions: (i) sheep pieces and fleshings (ears, &c); (2) ox fleshings and trimmings; (3) ox hides and pieces; the best glue is obtained from a mixture of the hide, ear and face clippings of the ox and calf. The raw material or ” stock ” is first steeped for from two to ten weeks, according to its nature, in wooden vats or pits with lime water, and after- wards carefully dried and stored. The object of the lime steeping is to remove any blood and flesh which may be attached to the skin, and to form a lime soap with the fatty matter present. The ” screws ” or glue pieces, which may be kept a long time without undergoing change, are washed with a dilute hydro- chloric acid to remove all lime, and then very thoroughly with water; they are now allowed to drain and dry. The skins are then placed in hemp nets and introduced into an open boiler which has a false bottom, and a tap by which liquid may be run off. As the boiling proceeds test quantities of liquid are from time to time examined, and when a sample is found on cooling to form a stiff jelly, which happens when it contains about 32 % dry glue, it is ready to draw off. The solution is then run to a clarifier, in which a temperature sufficient to keep it fluid is maintained, and in this way any impurity is permitted to subside. The glue solution is then run into wooden troughs or coolers in which it sets to a firm jelly. The cakes are removed as in the case of bone glue (see above), and, having been placed on nets, are, in the Scottish practice, dried by exposure to open air. This primitive method has many disadvantages: on a hot day the cake may become unshapely, or melt and slip through the net, or dry so rapidly as to crack; a frost may produce fissures, while a fog or mist may precipitate moisture on the surface and occasion a mouldy appearance. The surface of the cake, which is generally dull after drying, is polished by washing with water. The practice of boiling, clarification, cooling and drying, which has been already described in the case of bone glue, has been also applied to the separation of skin glue.

Fish Glue. — Whereas isinglass, a very pure gelatin, is yielded by the sounds of a limited number of fish, it is found that all fish offals yield a glue possessing considerable adhesive properties. The manufacture consists in thoroughly washing the offal with water, and then discharging it into extractors with live steam. After digestion, the liquid is run off, allowed to stand, the upper oily layer removed, and the lower gluey solution clarified with alum. The liquid is then

filtered, concentrated in open vats, and bleached with sulphur dioxide.[1] Fish glue is a light-brown viscous liquid which has a distinctly disagreeable odour and an acrid taste; these disadvantages to its use are avoided if it be boiled with a little water and 1 % of sodium phosphate, and 0-025 % of saccharine added.

Properties of Glue. — A good quality of glue should be free from all specks and grit, have a uniform, light brownish-yellow, transparent appearance, and should break with a glassy fracture. Steeped for some time in cold water it softens and swells up without dissolving, and when again dried it ought to resume its original properties. Under the influence of heat it entirely dissolves in water, forming a thin syrupy fluid with a not disagreeable smell. The adhesiveness of different qualities of glue varies considerably; the best adhesive is formed by steeping the glue, broken in small pieces, in water until they are quite soft, and then placing them with just sufficient water to effect solution in the glue-pot. The hotter the glue, the better the joint; remelted glue is not so strong as the freshly prepared; and newly manufactured glue is inferior to that which has been long in stock. It is therefore seen that many factors enter into the determination of the cohesive power of glue; a well-prepared joint may, under favourable conditions, withstand a pull of about 700 lb per sq. in. The following table, after Kilmarsch, shows the holding power of glued joints with various kinds of woods.

1 The residue in the extractors is usually dried in steam-heated vessels, and mixed with potassium and magnesium salts; the product is then put on the market as fish-potash guano.

Wood.

lb per sq. in.

With grain.

Across grain.

Beech . Maple . . . Oak … Fir ….

852 484 704 605

434-5 346 302 132

Special Kinds of Glues, Cements, &c. — By virtue of the fact that the word ” glue ” is frequently used to denote many adhesives, which may or may not contain gelatin, there will now be given an account of

some special preparations. These may be conveniently divided into: (1) liquid glues, mixtures containing gelatin which do not jelly at ordinary temperatures but still possess adhesive properties; {2) water-proof glues, including mixtures containing gelatin, and also the ” marine glues,” which contain no glue ; (3) glues or cements for special purposes, e.g. for cementing glass, pottery, leather, &c, for cementing dissimilar materials, such as paper or leather to iron.

Liquid Glues.— The demand for liquid glues is mainly due to the disadvantages — the necessity of dissolving and using while hot — of ordinary glue. They are generally prepared by adding to a warm glue solution some reagent which destroys theproperty of gelatinizing. The reagents in common use are acetic acid ; magnesium chloride, used for a glue employed by printers; hydrochloric acid and zinc sulphate; nitric acid and lead sulphate; and phosphoric acid and ammonium carbonate.

Water-proof Glues. — Numerous recipes for water-proof glues have been published; glue, having been swollen by soaking in water, dissolved in four-fifths its weight of linseed oil, furnishes a good water-proof adhesive; linseed oil varnish and litharge, added to a glue solution, is also used; resin added to a hot glue solu- tion in water, and afterwards diluted with turpentine, is another recipe; the best glue is said to be obtained by dissolving one part of glue in ‘one and a half parts of water, and then adding one-fiftieth part of potassium bichromate. Alcoholic solutions of various gums, and also tannic acid, confer the same property on glue solutions. The ” marine glues ” are solutions of india-rubber, shellac or asphaltum, or mixtures of these substances, in benzene or naphtha. Jeffrey’s marine glue is formed by dissolving india-rubber in four parts of benzene and adding two parts of shellac; it is extensively used, being easily applied and drying rapidly and hard. Another water-proof glue which contains no gelatin is obtained by heating linseed oil with five parts of quicklime ; when cold it forms a hard mass, which melts on heating like ordinary glue.

Special Glues. — There are innumerable recipes for adhesives specially applicable to certain substances and under certain con- ditions. For repairing glass, ivory, &c. isinglass (q.v.), which may be replaced by fine glue, yields valuable cements; bookbinders employ an elastic glue obtained from an ordinary glue solution and glycerin, the water being expelled by heating ; an efficient cement for mounting photographs is obtained by dissolving glue in ten parts of alcohol and adding one part of glycerin; portable or mouth glue — so named because it melts in the mouth — is prepared by dissolving one part of sugar in a solution of four parts of glue. An india-rubber substitute is

obtained by adding sodium tungstate and hydrochloric acid to a strong glue solution; this preparation may be rolled out when heated to 60 °.

For further details see Thomas Lambert, Glue, Gelatine and their Allied Products (London, 1905) ; R. L. Fernbach, Glues and Gelatine (1907); H. C. Standage, Agglutinants of all Kinds for all Purposes

(1907).

GLUTARIC ACID, or Normal Pyrotartaric Acid, H0 2 C-CH 2 -CH 2 -CH 2 -C0 2 H, an organic acid prepared by th? reduction of a-oxyglutaric acid with hydriodic acid, by reducing glutaconic acid, H0 2 C- CH 2 – CH :CH- C0 2 H, with sodium amalgam, by conversion of trimethylene bromide into the cyanide and hydrolysis of this compound, or from acetoacetic ester, which, in the form of its sodium derivative, condenses with /3-iodopropionic ester to form acetoglutaric ester, CH3-CO-CH(C0 2 C 2 H5)-CH 2 -CH 2 C0 2 C 2 H 5 , from which glutaric acid is obtained by hydrolysis. It is also obtained when sebacic, stearic and oleic acids are oxidized with nitric acid. It crystal lizes in large monoclinic prisms which melt at 97-5° C, and distils between 302 and 304 C, practically without decomposition. It is soluble in water, alcohol and ether. By long heating the acid is converted into its anhydride, which, however, is obtained more readily by heating the silver salt of the acid with acetyl chloride. By distillation of the ammonium salt glutarimide, CH 2 (CH 2 -CP) 2 NH, is obtained; it forms small crystals melting at 151 to 152 C. and sublimes unchanged.

On the alkyl glutaric acids, see C. Hell (Ber., 1889, 22, pp. 48, 60), C. A. Bischoff (Ber., 1891, 24, p. 1041), K. Auwers (Ber., 1891, 24, p. 1923) and W. H. Perkin, junr. (Journ. Chem. Soc, 1896, 69, p. 268)ˆ

GLUTEN, a tough, tenacious, ductile, somewhat elastic, nearly tasteless and greyish-yellow albuminous substance, obtained from the flour of wheat by washing in water, in which it is insoluble. Gluten, when dried, loses about two-thirds of its weight, becoming brittle and semi-transparent; when strongly heated it crackles and swells, and burns like feather or horn. It is soluble in strong acetic acid, and in caustic alkalis, which latter may be used for the purification of starch in which it is present. When treated with • i to • 2 % solution of

hydrochloric acid it swells up, and at length forms a liquid resembling a solution of albumin, and laevorotatory as regards polarized light. Moistened with water and exposed to the air gluten putrefies, and evolves carbon dioxide, hydrogen and sulphuretted hydrogen, and in the end is almost entirely resolved into a liquid, which contains leucin and ammonium phosphate and acetate. On analysis gluten shows a composition of about 53 % of carbon, 7 % of hydrogen, and nitrogen 15 to 18%, besides oxygen, and about 1 % of sulphur, and a small quantity of inorganic matter. Accord- ing to H. Ritthausen it is a mixture of glutencasein (J,iebig's vegetable fibrin), glutenfibrin, gliadin (Pflanzenleim), glutin or vegetable gelatin, and mucedin, which are all closely allied to one another in chemical composition. It is the gliadin which confers upon gluten its capacity of cohering to form elastic masses, and of separating readily from associated starch. In the so-called gluten of the flour of barley, rye and maize, this body is absent (H. Ritthausen and U. Kreusler). The gluten yielded by wheat which has undergone fermentation or has begun to sprout is devoid of toughness and elasticity. These qualities can be restored to it by kneading with salt,- lime-water or alum. Gluten is employed in the manufacture of gluten bread and biscuits for the diabetic, and of chocolate, and also in the adulteration of tea and coffee. For making bread it must be used fresh, as otherwise it decomposes, and does not knead well. Granulated gluten is a kind of vermicelli, made in some starch manufactories by mixing fresh gluten with twice its weight of flour, and granu- lating by means of a cylinder and contained stirrer, each armed with spikes, and revolving in opposite directions. The process is.completed by the drying and sifting of the granules.

GLUTTON, or Wolverine (Gulo luscus), a carnivorous mammal belonging to the Mustelidae, or weasel family, and the sole representative of its genus. The legs are short and stout, with large feet, the toes of which terminate in strong, sharp claws considerably curved. The mode of progression is semi- plantigrade. In size and form the glutton is something like the badger, measuring from 2 to 3 ft. in length, exclusive of the thick bushy tail, which is about 8 in. long. The head is broad, the eyes are small and the back arched. The fur consists of an under- growth of short woolly hair, mixed with long straight hairs, to the abundance and length of which on the sides and tail the creature owes its shaggy appearance. The colour of the fur is b'ackish-brown, with a broad band of chestnut stretching from the shoulders along each side of the body, the two meeting near the root of the tail. Unlike the majority of arctic animals, the fur of the glutton in winter grows darker. Like other Mustelidae, the glutton is provided with anal glands, which secrete a yellowish fluid possessing a highly foetid

odour. It is a boreal animal, inhabiting the northern regions of both * hemispheres, but most abundant in the circumpolar area of the New World, where it occurs throughout the British provinces and Alaska, being specially numerous in the neighbourhood of the Mackenzie river, and extending southwards as far as New York and the Rocky Mountains. The wolverine is a voracious animal, and also one with an inquisitive disposition. It feeds on grouse, the smaller rodents and foxes, which it digs from their burrows during the breeding-season; but want of activity renders it dependent for most of its food on dead carcases, which it frequently obtains by methods that have made it peculiarly obnoxious to the hunter and trapper. Should the hunter, after succeeding in killing his game, leave the carcase insufficiently protected for more than a single night, the glutton, whose fear of snares is sufficient to prevent him from touching it during the first night, will, jf possible, get at and devour what he can

on the second, hiding the remainder beneath the snow. It annoys the trapper by following up his lines of marten-traps, often extending to a length of 40 to 50 m., each of which it enters from behind, extracting the bait, pulling up the traps, and devour- ing or concealing the entrapped martens. So persistent is the glutton in this practice, when once it discovers a line of traps, that its extermination along the trapper's route is a necessary preliminary to the success of his business. This is no easy task, as the glutton is too cunning to be caught by the methods success- fully employed on the other members of the weasel family. The trap generally used for this purpose is made to resemble a cache, or hidden store of food, such as the Indians and hunters are in the habit of forming, the discovery and rifling of which is one of the glutton's most congenial occupations — the bait, instead of being paraded as in most traps, being carefully con- cealed, to lull the knowing beast's suspicions. One of the most prominent characteristics of the wolverine is its propensity to steal and hide things, not merely food which it might after- wards need, or traps which it regards as enemies, but articles which cannot possibly have any interest except that of curiosity. The following instance of this is quoted by Dr E. Coues in his work on the Fur-bearing Animals of North America; " A hunter and his family having left their lodge unguarded during

The Glutton, or Wolverine (Gulo luscus).

their absence, on their return found it completely gutted — the walls were there, but nothing else. Blankets, guns, kettles, axes, cans, knives and all the other paraphernalia of a trapper's tent had vanished, and the tracks left by the beast showed who had been the thief. The family

set to work, and, by carefully following up all his paths, recovered, with some triflingjexceptions, the whole of the lost property." The cunning displayed by the glutton in unravelling the snares set for it forms at once the admiration and despair of every trapper, while its great strength and ferocity render it a dangerous antagonist to animals larger than itself, occasionally including man. The rutting-season occurs in March, and the female, secure in her burrow, produces her young — four or five at a birth — in June or July. In defence of these, she is exceedingly bold, and the Indians, according to Dr Coues, " have been heard to say that they would sooner encounter a she-bear with her cubs than a carcajou (the Indian name of the glutton) under the same circumstances." On catching sight of its enemy, man, the wolverine before finally determining on flight, is said to sit on its haunches, and, in order to get a clearer view of the danger, shade its eyes with one of its fore-paws. When pressed for food it becomes fearless, and has been known to come on board an ice-bound vessel, and in presence of the crew seize a can of meat. The glutton is valuable for its fur, which, when several skins are sewn together, forms elegant hearth and carriage rugs. (R. L.*)

GLYCAS, MICHAEL, Byzantine historian (according to some a Sicilian, according to others a Corfiote), flourished during the 1 2th century a.d. His chief work is his Chronicle of events

from the creation of the world to the death of Alexius I.Com- nenus (1118). It is extremely brief and written in a popular style, but too much space is devoted to theological and scientific matters. Glycas was also the author of a theological treatise and a number of letters on theological questions. A poem of some 600 " political " verses, written during his imprisonment on a charge of slandering a neighbour and containing an appeal to the emperor Manuel, is still extant. The exact nature of his offence is not known, but the answer to his appeal was that he was deprived of his eyesight by the emperor's orders.

Editions: " Chronicle and Letters," in J. P. Migne, Patrologia Graeca, clviii. ; poem in E. Legrand, Bibliothbque grecque vulgaire, i. ; see also F. Hirsch, Byzantinische Studien (1876) ; C. Krumbacher in' Sitzungsberichte bayer. Acad., 1894; C. F. Bahr in Ersch and Gruber's AUgemeine Encyklopadie.

GLYCERIN", Glycerine or Glycerol (in pharmacy Gly- cerinutn) (from

Gr. y\vnbs, sweet), a trihydric alcohol, trihydroxypropane, C 3 H 5 (OH) 3 . It is obtainable from most natural fatty bodies by the action of alkalis and similar reagents, whereby the fats are decomposed, water being taken up, and glycerin being formed together with the alkaline salt of some particular acid (varying with the nature of the fat). Owing to their possession of this common property, these natural fatty bodies and various artificial derivatives of glycerin, which behave in the same way when treated with alkalis, are known as glycerides. In the ordinary process of soap-making the glycerin remains dissolved in the aqueous liquors from which the soap is separated.

Glycerin was discovered in 1779 by K. W. Scheele and named Olsilss (principe doux des huiles—Sweet principle of oils), and more fully investigated subsequently by M. E, Chevreul, who named it glycerin, M. P. E. Berthelot, and many other chemists, from whose researches, it results that glycerin is a . trihydric alcohol indicated by the formula C3H 6 (OH)s, the natural fats and oils, and the glycerides generally, being substances of the nature of compound esters formed from glycerin by the replace- ment of the hydrogen of the OH groups by the radicals of certain acids, called for that reason ” fatty acids.” The relation- ship of these glycerides to glycerin is shown by the series of bodies formed from glycerin by replacement of hydrogen by ” stearyl ” (Ci 8 H 35 0), the “radical of stearic acid (Ci 8 H 35 00H):—
Glycerin. Monostearin. Distearin. Tristearin.

CH 2 OH CH 2 0(C 18 H 36 0) CH 2 -0(C I8 H 35 0) CH 2 -0(C 18 H 35 0)

CH-OH CH-OH CH-0(C 18 H 36 0) CH-0(C I8 H 36 0) I I ■. 1 I ‘ ‘

CHrOH CH 2 -OH CH 2 -OH CH 2 -0(C I8 H 38 0)

The process of saponification may be viewed as the gradual progressive transformation of tristearin, or some analogously constituted substance, into distearin, monostearin and glycerin, or as the similar transformation of a substance analogous to distearin or to monostearin into glycerin. If the reaction is brought about in presence of an alkali, the acid set free becomes transformed into the corresponding alkaline salt; but if the decomposition is effected without the presence of an alkali (i.e. by means of water alone or by an acid), the acid set free and the glycerin are obtained together in a form which usually admits of their ready separation. It is noticeable that with few exceptions the fatty and oily matters occurring in nature are substances analogous to tristearin, i.e. they are trebly replaced

glycerins. Amongst these glycerides may be mentioned the following:

Tristearin— C 3 H 6 (0-Ci 8 Hs60)8. The chief constituent of hard animal fats, such as beef and mutton tallow, &c. ; also con- tained in many vegetable fats in smaller quantity. Triolein — C 3 H 6 (0-Ci 8 H 33 0) 3 . Largely present in olive oil and other saponifiable vegetable oils and soft fats ; also present in animal fats, especially hog's lard. Tripalmitin — C 3 H 6 (0-Ci 6 H 3 i0) 3 . The chief constituent of palm oil; also contained in greater or less quantities in human fat, olive oil, and other animal and vegetable fats. Triricinolein — C 3 H 5 (0-Ci 8 H 33 02)j. The main constituent of castor

oil. Other analogous glycerides are apparently contained in greater or smaller quantity in certain other oils. Thus in cows'

butter, tributyrin, C3H 5 (0-C 4 H70)3, and the analogous 'glycerides of other readily volatile acids closely resembling butyric acid, are present in small quantity; the production of these acids on saponification and distillation with dilute sulphuric acid is utilized as a test of a purity of butter as sold. Triacetin, C 3 H 5 (0-C 2 H 3 0)3, is apparently contained in cod-liver oil. Some other glycerides isolated from natural sources are analogous in composition to tristearin, but with this difference, that the three radicals which replace hydrogen in glycerin are not all identical; thus kephalin, myelin and lecithin are glycerides in which two hydrogens are replaced by fatty acid radicals, and the third by a complex phosphoric acid derivative.

Glycerin is also a product of certain kinds of fermentation, especially of the alcoholic fermentation of sugar; consequently it is a constituent of many wines and other fermented liquors. According to Louis Pasteur, about jth of the sugar transformed under ordinary conditions in the fermentation of grape juice and similar saccharine liquids into alcohol and other products become converted into glycerin. In certain natural fatty substances, e.g. palm oil, it exists in the free state, so that it can be separated by washing with boiling water, which dissolves the glycerin but not the fatty glycerides.

Properties. — Glycerin is a viscid, colourless liquid of sp. gr. 1 265 at 1 5 C, possessing a somewhat sweet taste; below o° C. it solidifies to a white crystalline mass, which melts at 17 C. When heated alone it partially volatilizes, but the greater part decomposes; under a pressure of 12 mm. of mercury it boils • at 170 C. In an atmosphere of steam it distils without decom • position under ordinary barometric pressure. It dissolves readily in water and alcohol in all proportions, but is insoluble in ether. It possesses considerable solvent powers, whence it

is employed for numerous purposes in pharmacy and the arts. Its viscid character, and its non-liability to dry and harden by exposure to air, also fit it for various other uses, such as lubrica- tion, &c, whilst its peculiar physical characters, enabling it to blend with either aqueous or oily matters under certain circum- stances, render it a useful ingredient in a large number of products of varied kinds.

Manufacture. — The simplest modes of preparing pure glycerin are based on the saponification of fats, either by alkalis or by superheated steam, and on the circumstance that, although glycerin cannot be distilled by itself under the ordinary pressure without decomposition, it can be readily volatilized in a current of superheated steam. Commercial glycerin is mostly obtained from the ” spent lyes ” of the soap-maker. In the van Ruymbeke process the spent lyes are allowed to settle, and then treated with ” persulphate of iron,”, the exact composition of which is a trade secret, but it is possibly a’ mixture of ferric and ferrous sulphates. Ferric hydrate, iron soaps and all insoluble impurities are precipitated. The liquid is filter- pressed, and any excess of iron in the filtrate is precipitated by the careful addition of caustic soda and then removed. The liquid is then evaporated under a vacuum of 27 to 28 in. of mercury, and, when of specific gravity 1-295 (corresponding to about 80% of glycerin), it is distilled under a vacuum of 28 to 29 in. In the Glatz process the lye is treated with a little milk of lime, the liquid then neutralized with hydrochloric acid, and the liquid filtered. Evaporation and subsequent distillation under a high vacuum gives crude glycerin. The impure glycerin obtained as above is purified by redistillation in steam and evaporation in vacuum pans.

Technical Uses. — Besides its use as a starting-point in the produc- tion of ” nitroglycerin ” (q.v.) and other chemical products, glycerin is largely employed for a number of purposes in the arts, its applica- tion thereto being due to its peculiar physical properties. Thus its non- liability to freeze (when not absolutely anhydrous, which it practically never is when freely exposed to the air) and its non- volatility at ordinary temperatures, combined with its power of always keeping fluid and not drying up and hardening, render it valuable as a lubricating agent for clockwork, watches, &c, as a substitute for water in wet gas-meters, and as an ingredient in cataplasms, plasters, modelling clay, pasty colouring matters, dyeing materials, moist colours for artists, and numerous other analogous substances which are required to be kept in a permanently soft condition. Glycerin acts as a preservative against decomposition, owing to its antiseptic qualities, which also led to its being employed to preserve untanned leather (especially during transit when ex- ported, the hides being,

moreover, kept soft and supple) ; to make solutions of gelatin, albumen, gum, paste, cements, &c. which will keep without decomposition; to preserve meat and other edibles; to mount anatomical preparations; to preserve vaccine lymph un- changed ; and for many similar purposes. Its solvent power is also,

utilized in the production of various colouring fluids, where the colouring matter would not dissolve in water alone; thus aniline violet, the tinctorial constituents of madder, and various allied colouring matters dissolve in glycerin, forming liquids which remain coloured even when diluted with water, the colouring matters being either retained in suspension or dissolved by the glycerin present in the diluted fluid. Glycerin is also employed in the manufacture of formic acid (q.v.). Certain kinds of copying inks are greatly improved by the substitution of glycerin, in part or entirely, for the sugar or honey usually added.

In its medicinal use glycerin is an excellent solvent for such sub- stances as iodine, alkaloids, alkalis, &c, and is therefore used for applying them to diseased surfaces, especially as it aids in their absorption. It does not evaporate or turn rancid, whilst its marked hygroscopic action ensures the moistness and softness of any surface that it covers. Given by the mouth glycerin produces purging if large doses are administered, and has the same action if only a small quantity be introduced into the rectum. For this purpose it is very largely used either as a suppository or in the fluid form (one or two drachms). The result is prompt, safe and painless. Glycerin is useless as a food and is not in any sense a substitute for cod-liver oil. Very large doses in animals cause lethargy, collapse and death.

GLYCOLS, in organic chemistry, the generic name given to the aliphatic dihydric alcohols. These compounds may be obtained by heating the alkylen iodides or bromides (e.g. ethylene dibromide) with silver acetate or with potassium acetate and alcohol, the esters so produced being then hydrolysed with caustic alkalis, thus:

C 2 H 4 Br 2 +2C 2 H30rAg->C 2 H 4 (0-C 2 H 3 0)2-ˆC2H4 2 -r-2K-C 2 H 3 02; by the direct union of water with the alkylen oxides; by oxida- tion of the defines with cold potassium permanganate solution (G. Wagner, Ber., 1888, 21, p. 1231), or by the action of nitrous acid on the diamines.

Glycols may be classified as primary, containing two — CH 2 OH groups; primary-secondary, containing the grouping— CH(OH)- CH 2 OH ; secondary, with the grouping – CH(OH) • CH(OH) – ; and tertiary, with the grouping >C(OH)-(OH)C<. The secondary glycols are prepared by the action of alcoholic potash on alde- hydes, thus:
3(CH 3) 2 CH-CHO + KHO = (CH 3) 2 CHC0 2 K +

(CH 3) 2 CH-CH(OH)-CH(OH)-CH(CH 3) 2 .

The tertiary glycols are known as pinacones and are formed on the reduction of ketones with sodium amalgam.

The glycols are somewhat thick liquids, of high boiling point, the pinacones only being crystalline solids; they are readily soluble in water and alcohol, but are insoluble in ether. By the action of dehydrating agents they are converted into aldehydes or ketones. In their general behaviour towards oxidizing agents the primary glycols behave very similarly to . the ordinary primary alcohols (q.v.), but the secondary and tertiary glycols break down, yielding compounds with a smaller carbon content.

Ethylene glycol, C 2 H 4 (OH)2, was first prepared by A. Wurtz (Ann. chim., 1859 [3], 55, p. 400) from ethylene dibromide and silver acetate. It is a somewhat pleasant smelling liquid, boiling at 197° to 197\5° C.. and having a specific gravity of 1-125 (°°)- O n fusion with solid potash at 250 C. it completely decomposes, giving potassium oxalate and hydrogen,

C 2 H 6 2 + 2KHO = K 2 C 2 4 + 4H 2 .

Two propylene glycols, C 3 H 8 2 , are known, viz. a-propylene glycol, CH 3 -CH(OH)-CH 2 OH, a liquid boiling at 188° to 189°, and obtained by heating glycerin with sodium hydroxide and distilling the mixture; and trimethylene glycol, CH 2 OH-CH2-CH20H, a liquid boiling at 214° C. and prepared by boiling trimethylene bro- mide with potash solution (A. Zander, Ann., 1882, 214, p. 178).

GLYCONIC (from Glycon, a Greek lyric poet), a form of verse, best known in Catullus and Horace (usually in the catalectic variety ˆ uu – u ˆ), with three feet — a spondee and two dac- tyls; or four — three trochees and a dactyl, or a dactyl and three chorees. Sir R. Jebb pointed out that the last form might be varied by placing the dactyl second or third, and according to its' place this verse was called a First, Second or Third Glyconic. , Cf. J. W. White, in Classical Quarterly (Oct. 1909).

GLYPH (from Gr. y\v4>eiv, to carve), in architecture, a vertical channel in a frieze (see Tkiglyph).

GLYPTODON (Greek for ” fluted-tooth “), a name applied by Sir R. Oweu to the typical representative of a group of gigantic, armadillo-like, South American, extinct Edentata,

characterized by having the carapace composed of a Solid piece (formed by the union of a multitude of bony dermal plates) without any movable rings. The facial portion of the skull is very short; a long process of the maxillary bone descends from the anterior part of the zygomatic arch; and the ascending ramus of the mandible is remarkably high. The teeth, f in the later species, are much alike, having two deep grooves or flutings on each side, so as to divide them into three distinct lobes (fig.). They are very tall and grew throughout life. The vertebral column is almost entirely welded into a solid tube, but there is a complex joint at the base of the neck, to allow the head being retracted within the carapace. The limbs are very strong, and the feet short and broad, re- sembling externally those of an elephant or tortoise.

Glyptodonts constitute a family, the Glypto- dontidae, whose position is next to the armadillos (Dasypodidae) ; the group being represented by a number of generic, types. The Pleistocene forms, whose remains occur abundantly in the silt of the Buenos Aires pampas, are by far the largest, the skull and tail-sheath in some instances having a length of from 12 to 16 ft. In Glyptodon (with which Schistopleurum is identical) the tail- sheath consists of a series of coronet-like rings, gradually diminishing in diameter from base to tip. Daedicurus, in which the tail- sheath is in the form of a huge solid club, the largest member of the’ family, in Pano- chthus and Sclerocalyptus (Hoplophorus) the tail-sheath consists basally of a small number of smooth rings, and terminally of a tube. In some specimens of these genera the horny . ˆ

shields covering the bony scutes of the cara- x ° ■* «

pace have been preserved, and since the Two views of the foramina, which often pierce the latter, stop tooth of a Glyptodon; short of the former, it is evident that these the upper figure shoy- were for the passage of blood-vessels and ing one. side, and

became connected with North America, some of the glyptodorits found their way into the latter continent. : Among these northern forms some from Texas and Florida have been referred to Glyptodon.

One large species from Texas has, however, been made the type of a separate genus, under the name of Glypto- therium texanum. In some respects it shows affinity with Pano- chthus, although in the simple structure of the tail-sheath it recalls the undermentioned Propalaeohoplophorus. All the, above are of Pleistocene and perhaps Pliocene age, but in the Santa Cruz beds of Patagonia there occur the two curious genera Propalaeohoplo- phorus and Peltephilus, the former of which is a primitive' and generalized type of glyptodont, while the latter seems to come nearer to the armadillos. Both are represented by species of com- paratively small size. In Propalaeohoplophorus the scutes of the carapace, which are less deeply sculptured than in the larger glypto- donts, are arranged in distinct transverse rows, in three of which they partially overlap near the border of the carapace after ..the fashion of the armadillos. The skull and limb-bones exhibit several features met with in the latter, and the vertebrae of the back are not welded into a continuous tube.' There are eight pairs of teeth, the first four of which are simpler than the rest, and may perhaps there- fore be regarded as premolars. More remarkable is Peltephilus, on account of the fact that the teeth, which are simple, with a chevron- shaped section, form a continuous series from the front of the jaw backwards, the number of pairs being seven. Accordingly, a modification of the character, even of the true Edentata, as given in the earlier article, is rendered necessary. The head bears a pair of horn-like scutes, and the scutes of the carapace and tail, which are loosely opposed or slightly overlapping, form a number of transr verse rows.

Literature.— R. Lydekker, " The Extinct Edentates of Ar- gentina," An. Mus. La Plata — Pal. Argent, vol. hi. p. 2 (1904); H. F. Osborn, " ' Glyptotherium texanum,' a Glyptodont from the Lower Pleistocene of Texas," Bull. Amer. Mus., vol. xvii. p. 491 (1903) ; W. B. Scott, " Mammalia of the Santa Cruz Beds— Edentata," Rep. Princeton Exped. to Patagonia, vol. v. (1903-1904)'. (R. L.*)

GLYPTOTHEK (from Gr. jˆdtttos, carved, and 6ˆ, a place of storage), an architectural term given to a gallery for the exhibition of sculpture, and first employed at Munich, where it was built to exhibit the sculptures from the temple of Aegina.

OMELIN, the name of several distinguished German scientists, of a Tubingen family. Johann Georg Gmelin (1674-1728), an apothecary in

Tubingen, and an accomplished chemist for the times in which he lived, had three sons. The first, Johann Conrad (1702-1759), was an apothecary and surgeon in Tubingen. The second, Johann Georg (1709-1755), was appointed professor of chemistry and natural history in St Petersburg in 1731, and from 1733 to 1743 was engaged in travelling through Siberia. The fruits of his journey were Flora Sibirica (4 vols., 1740- 1750) and Reisen durch Sibirien (4 vols., 1753). He ended his days as professor of medicine at Tubingen, a post to which he was appointed in 1749. The third son, Philipp Friedrich (1721- 1768), was extraordinary professor of medicine at Tubingen in 1750, and in 1755 became ordinary professor of botany and chemistry. In the second generation Samuel Gottlieb (1743- 1774), the son of Johann Conrad, was appointed professor of natural history at St Petersburg in 1766, and in the following year started on a journey through south Russia and the regions round the Caspian Sea. On his way back he was captured by Usmey Khan, of the Kaitak tribe, and died from the ill-treatment he suffered, on the 27th of July 1774. One of his nephews, Ferdinand Gottlob von Gmelin (1782-1848), became professor of medicine and natural shistory at Tubingen in 1805, and another, Christian Gottlob (1792-1860), who in 1828 was one of the first to devise a process for the artificial manufacture of ultra- marine, was professor of chemistry and pharmacy in the same university. In the youngest branch of the family, Philipp Friedrich had a son, Johann Friedrich (1748-1804), who was appointed professor of medicine in Tubingen in 1772, and in 1775 accepted the chair of medicine and chemistry at Gottingen. In 1788 he published the 13th edition of Linnaeus' Syslema Naturae with many additions and alterations. His son Leopold (1788-1853), was the best-known member of the family. He studied medicine and chemistry at Gottingen, Tubingen and Vienna, and in 181 3 began to lecture on chemistry at Heidelberg, where in 1814 he was appointed extraordinary, and in 1817 ordinary, professor of chemistry and medicine. He was the discoverer of potassium ferricyanide (1822), and wrote the Handbuch der Chemie (1st ed. 1817-1819, 4th ed. 1843-1855), an important work in its day, which was translated into English for the Cavendish Society by H. Watts (1815-1884) in 1848- 1859. He resigned his chair in 1852, and died on the 13th of April in the following year at Heidelberg.

GMtiND, a town of Germany, in the kingdom of Wurttemberg, 1 in a charming and fruitful valley on the Rems, here spanned by a beautiful bridge, 31 m. E.N.E. of Stuttgart on the railway to Nordlingen. Pop. (1905) 18,699. It is surrounded by old walls, flanked with towers, and has a considerable number of ancient buildings, among which are the fine church of the Holy Cross; St John's church, which dates from the

time of the Hohenstaufen; and, situated on a height near the town, partly hewn out of the rock, the pilgrimage church of the Saviour. Among the modern buildings are the gymnasium, the drawing and trade schools, the Roman Catholic seminary, the town hall and the industrial art museum. Clocks and watches are manufactured here and also other articles of silver, while the town has a considerable trade in corn, hops and fruit. The scenery in the neighbourhood is very beautiful, near the town being the district called Little Switzerland.

Gmtind was surrounded by walls in the beginning of the 12th century by Duke Frederick of Swabia. It received town rights from Frederick Barbarossa, and after the extinction of the Hohenstaufen became a free imperial town, It retained its independence till 1803, when it came into the possession of Wurttemberg. Gmiind is the birth-place of the painter Hans— Baldung (1475-1545) and of the architect Heinrich Arler or Parler ‘ (fl. 1350). In the middle ages the population was about 10,000.

See Kaiser, Gmiind und seine Umgebung (1

1 There are two places of this name in Austria. (1) Gmiind, a town in Lower Austria, containing a palace belonging to the imperial family, (2) a town in Carinthia, with a beautiful Gothic church and some interesting ruins.

GMUNDEK, a town and summer resort of Austria, in Upper Austria, 40 m. S.S.W. of Linz by rail. Pop. (1900) 7126. It is situated at the efflux of the Traun river from the lake of the same name and is surrounded by high mountains, as the Traun- stein (5446 ft.), the Erlakogel (5150 ft.), the Wilde Kogel (6860 ft.) and the Hollen Gebirge. It is much frequented as a health and summer resort, and has a variety of lake, brine, vegetable and pine-cone baths, a hydropathic establishment, inhalation chambers, whey cure, &c. There are a great number of ex- cursions and points of interest round Gmunden, specially worth mentioning being the Traun Fall, 10 m. N. of Gmunden. It is also an important centre of the salt industry in Salzkammergut. Gmunden was a town encircled with walls already in n 86. On the 14th of November 1626, Pappenheim completely defeated here the army of the rebellious peasants.

See F. Krackowizer, Geschichte der Stadt Gmunden in Oberosterreich (Gmunden, 1898-1901, 3 vols.).

GNAT (0. Eng. gnat), the common English name for the smaller dipterous flies (see Diptera) of the family Culicidae, which are now

included among ” mosquitoes ” (see Mosquito). The distinctive term has no zoological significance, but in England the ” mosquito ” has commonly been distinguished from the ” gnat ” as a variety of larger size and more poisonous bite.

GNATHOPODA, a term in zoological classification, suggested as an alternative name for the group Arthropoda (q.v.). The word, which means ” jaw-footed,” refers to the fact that in the members of the group, some of the lateral appendages or ” feet ” in the region of the mouth act as jaws.

GNATIA (also Egnatia or Ignatia, mod. Anazzo, near Fasano), an ancient city of the Peucetii, and their frontier town towards the Sallentini (i.e. of Apulia towards Calabria), in Roman times of importance for its trade, lying as it did on the sea, at the point where the Via Traiana joined the coast road, 2 38 m. S.E. of Barium. The ancient city walls have been almost entirely destroyed in recent times to provide building material, 3 and the place is famous for the discoveries made in its tombs. A considerable collection of antiquities from Gnatia is preserved at Fasano, though the best are in the museum at Bari. Gnatia was the scene of the prodigy at which Horace mocks (Sat. i. 5. 97). Near Fasano are two small subterranean chapels with paintings of the nth century a.d. (E. Bertaux, V Art dans I’llalie miridionale, Paris, 1904, 135). (T. As.)

GNEISENAU, AUGUST WILHELM ANTON, Count Neit- hardt von (1760-1831), Prussian field marshal, was the son of a Saxon officer named Neithardt. Born in 1760 at Schildau, near Torgau, he was brought up in great poverty there, and subsequently at Wiirzburg and Erfurt. In 1777 he entered Erfurt university; but two years later joined an Austrian regiment there quartered. In 1782 taking the additional name of Gneisenau from some lost estates of his family in Austria, he entered as an officer the service of the margrave of Baireuth- Anspach. With one of that prince’s mercenary regiments in English pay he saw active service and gained valuable experi- ence in the War of American Independence, and returning in 1786, applied for Prussian service. Frederick the Great gave him a commission as first lieutenant in the infantry. Made Stabskapitan in 1790, Gneisenau served in Poland, 1793-1794, and, subsequently to this, ten years of quiet garrison life in Jauer enabled him to undertake a wide range of military studies. In 1796 he married Caroline von Kottwitz. In 1806 he was one of Hohenlohe’s staff-officers, fought at Jena, and a little later commanded a provisional infantry brigade which fought under Lestocq in the Lithuanian campaign. Early in 1807 Major von Gneisenau was sent as commandant to Colberg, which, small and ill-

protected as it was, succeeded in holding out until the peace of Tilsit. The commandant received the much-prized order ” pour le merite,” and was promoted lieutenant-colonel. A wider sphere of work was now opened to him. As chief of

2 There is no authority for calling the latter Via Egnatia.

3 H. Swinburne, Travels in the Two Sicilies (London, I79°)> ii- x 5> mentions the walls as being 8 yds. thick and 16 courses high.

engineers, and a member of the reorganizing committee, he played a great part, along with Scharnhorst, in the work of re- constructing the Prussian army. A colonel in 1809, he soon drew upon himself, by his energy, the suspicion of the dominant French, and Stein’s fall was soon followed by Gneisenau’s retirement. But, after visiting Russia, Sweden and England, he returned to Berlin and resumed his place as a leader of the patriotic party. In open military work and secret machinations his energy and patriotism were equally tested, and with the out- break of the War of Liberation, Major-General Gneisenau became Bliicher’s quartermaster-general. Thus began the connexion between these two soldiers which has furnished military history with its best example of the harmonious co- operation between the general and his chief-of-staff. With Blucher, Gneisenau served to the capture of Paris; his military character was the exact complement of Bliicher’s, and under this happy guidance the young troops of Prussia, often defeated but never discouraged, fought their way into the heart of France. The plan of the march on Paris, which led directly to the fall of Napoleon, was specifically the work of the chief-of-staff. In reward for his distinguished service he was in 1814,- along with York, Kleist and Bttlow, made count at the same time as Blucher became prince of Wahlstatt; an annuity was also assigned to him.

In 1815, once’ more chief of Bliicher’s staff, Gneisenau played a very conspicuous part in the Waterloo campaign (q.v.). Senior generals, such as York and Kleist, had been set aside in order that the chief-of-staff should have the command in case of need, and when on the field of Ligny the old field marshal was disabled, Gneisenau at once assumed the control of the Prussian army. Even in the light of the evidence that many years’ research has collected, the precise part taken by Gneisenau in the events which followed is much debated. It is known that Gneisenau had the deepest distrust of the British

commander, who, he considered, had left the Prussians in the lurch at Ligny, and that to the hour of victory he had grave doubts as to whether he ought not to fall back on the Rhine. Blucher, however, soon recovered from his injuries, and, with Grolmann, the quartermaster- general, he managed to convince Gneisenau. The relations of the two may be illustrated by Brigadier- General Hardinge's report. Blucher burst into Hardinge's room at Wavre, saying " Gneisenau has given way, and we are to march at once to your chief."

On the field of Waterloo, however, Gneisenau was quick to realize the magnitude of the victory, and he carried out the pursuit with a relentless vigour which has few parallels in history. His reward was further promotion and the insignia of the " Black Eagle " which had been taken in Napoleon's coach. In 1816 he was appointed to command the VIHth Prussian Corps, but soon retired from the service, both because of ill-health and for political reasons. For two years he lived in retirement on his estate, Erdmannsdorf in Silesia, but in 1818 he was made governor of Berlin in succession to Kalkreuth, and member of the Staatsrath. In 1825 he became general field marshal. In 1831 he was appointed to the command of the Army of Observation on the Polish frontier, with Clausewitz as his chief-of-staff. At Posen he was struck down by cholera and died on the 24th of August 1831, soon followed by his chief-of staff ,ˆwho fell a victim to the same disease in November.

As a soldier, Gneisenau was the greatest Prussian general since Frederick; as a man, his noble character and virtuous life secured him the affection and reverence, not only of his superiors and subordinates in the service, but of the whole Prussian nation. A statue by Rauch was erected in Berlin in 1855, and in memory of the siege of 1807 the Colberg grenadiers received his name in 1889. One of his sons led a brigade of the VIII th Army Corps in the war of 1870.

See G. H. Pertz, Das Leben des Feldmarschalls Grafen Neithardt von Gneisenau, vols. 1-3 (Berlin, 1864-1869); vols. 4 and 5, G. Delbriick (ib. 1879, 1880), with numerous documents and letters; H. Delbriick, Das Leben des G. F. M. Grafen von Gneisenau (2 vols., 2nd edi, Berlin, 1894), based on Pertz's work, but containing much

new material; Frau von Beguelin, Denhwilrdigkeiten (Berlin, 1892); Hormayr, Lebensbilder aus den Bejreiungskriegen (Jena, 1841); Pick, Aus dem brieflichen Nachlass Gneisenaus; also the histories of the campaigns of 1807 and 1813-15.

GNEISS, a term long used by the miners of the Harz Mountains to designate the country rock in which the mineral veins occur; it is believed to be a word of Slavonic origin meaning ” rotted ” or ” decomposed.” It has gradually passed into acceptance as a generic term signifying a large and varied series of metamorphic rocks, which mostly consist of quartz and felspar (orthoclase and plagioclase) with muscovite and biotite, hornblende or augite, iron oxides, zircon and apatite. There is also a long list of accessory minerals which are present in gneisses with more or less frequency, but not invariably, as garnet, sillimanite, cordierite, graphite and graphitoid, epidote, calcite, orthite, tourmaline and andalusite. The gneisses all possess a more or less marked parallel structure or foliation, which is the main feature by which many of them are separated from the granites, a group of rocks having nearly the same mineralogical composi- tion and closely allied to many gneisses.

The felspars of the gneisses are predominantly orthoclase (often perthitic), but microcline is common in the more acid types and oligoclase occurs also very frequently, especially in certain sedimentary gneisses, while more basic varieties of plagioclase are rare. Quartz is very seldom absent and may be blue or milky and opalescent. Muscovite and biotite may both occur in the same rock; in other cases only one of them is present. The commonest and most important types of gneiss are the mica- gneisses. Hornblende is green, rarely brownish; augite pale green or nearly colourless; enstatite appears in some granulite- gneisses. Epidote, often with enclosures of orthite, is by no means rare in gneisses from many different parts of the world. Sillimanite and andalusite are not infrequent ingredients of gneiss, and their presence has been accounted for in more than one way. Cordierite-gneisses are a special group of great interest and possessing many peculiarities; they are partly, if not entirely, foliated contact-altered sedimentary rocks. Kyanite and staurolite may also be mentioned as occasionally occurring. Many varieties of gneiss have received specific names according to the minerals they consist of and the structural peculiarities they exhibit. Muscovite-gneiss, biotite-gneiss and muscovite- biotite-gneiss, more common perhaps than all the others taken together, are grey or pinkish rocks according to the colour of their prevalent felspar, not unlike granites, but on the whole more often fine-grained (though coarse-grained types occur) and possessing a gneissose or foliated structure. The latter consists in the arrangement of the flakes of mica in such a way that their faces are parallel, and hence the rock has the property of splitting more readily in the direction in which the mica plates are disposed. This fissility, though usually marked, is not so great as in the schists or slates, and

the split faces are not so smooth as in these latter rocks. The films of mica may be continuous and are usually not flat, but irregularly curved. In some gneisses the parallel flakes of mica are scattered through the quartz and felspar; in others these minerals form discrete bands, the quartz and felspar being grouped into lenticles separated by thin films of mica. When large felspars, of rounded or elliptical form, are visible in the gneiss, it is said to have augen structure (Ger. Augen — eyes,). It should also be remarked that the essential component minerals of the rocks of this family •are practically always determinable by naked eye inspection or with the aid of a simple lens. If the rock is too fine grained for this it is generally relegated to the schists. W T hen the bands of folia are very fine and tortuous the structure is called helizitic.

In mica-gneisses sillimanite, kyanite, andalusite and garnet may occur. The significance of these minerals is variously interpreted; they may indicate that the gneiss consists wholly or in part of sedimentary material which has been contact- altered, but they have also been regarded as having been developed by metamorphic action out of biotite or other primary ingredients of the rock.

Hornblende-gneisses are usually darker in colour and less fissile than mica-gneisses; they contain more plagioclase, less orthoclase and microcline, and more sphene and epidote. Many of them are rich in hornblende and thus form transitions to amphibolites. Pyroxene-gneisses are less frequent but occur in many parts of both hemispheres. The ” charnockite ” series are very closely allied to the pyroxene-gneisses. Hypersthene and scapolite both may occur in these rocks and they are some- times garnetiferous.

In every country where the lowest and oldest rocks have come to the surface and been exposed by the long.continued action of denuda- tion in stripping away the overlying formations, gneisses are found in great abundance and of many different kinds. They are in fact the typical rocks of the Archean (Lewisian, Laurentian, &c.) series. In the Alps, Harz, Scotland, Norway and Sweden, Canada, South America, Peninsular India, Himalayas (to mention only a few localities) they occupy wide areas and exhibit a rich diversity of types. From this it has been inferred that they are of great geological age, and in fact this can be definitely proved in many cases, for the oldest known fossiliferous formations may be seen to rest uncon- formably en these

gneisses and are made up of their debris. It was for a long time believed that they represented the primitive crust of the earth, and while this is no longer generally taught there are still geologists who hold that these gneisses are necessarily of pre- Cambrian age. Others, while admitting the general truth of this hypothesis, consider that there are localities in which typical gneisses can be shown to penetrate into rocks which may be as recent as the Tertiary period, or to pass into these rocks so gradually and in such a way as to make it certain that the gneisses are merely altered states of comparatively recent sedimentary or igneous rocks. Much controversy has arisen on these points; but this is certain, that gneisses are far the most common among Archean rocks, and where their age is not known the presumption is strong that they are at least pre-Cambrian.

Many gneisses are undoubtedly sedimentary rocks that have been brought to their present state by such agents of metamorphism as heat, movement, crushing and recrystallization. This may be demonstrated partly by their mode of occurrence : they accompany limestones, graphitic schists, quartzites and other rocks of sedimentary type; some of them where least altered may even show remains of bedding or of original pebbly character (conglomerate gneisses). More conclusive, however, is the chemical composition of these rocks, which often is such as no igneous masses possess, but resembles that of many impure argillaceous sediments. These sedimentary gneisses (or paragneisses, as they are often called) are often rich in biotite and garnet and may contain kyanite and sillimanite,orlessfrequently calcite. Some of them, however, are rich in felspar and quartz, with muscovite and biotite; others may even contain hornblende and augite, and all these may bear so close a resemblance to gneisses of igneous origin that by no single character, chemical or mineralogical, can their original nature be definitely established. In these cases, however, a careful study of the relations of the rock in the field and of the different types which occur together will generally lead to some positive conclusion.

Other gneisses are igneous (orthogneisses). These have very much the same composition as acid igneous rocks such as granite, aplite, hornblende granite, or intermediate rocks such as syenite and quartz diorite. Many of these orthogneisses are not equally well foliated throughout, but are massive or granitoid in places. They are sometimes subdivided into granite gneiss, diorite gneiss, syenite gneiss and so on. The sedimentary schists into which these rocks have been intruded may show contact alteration by the development of such minerals as cordierite, andalusite and sillimanite. In many of these orthogneisses the foliation is primitive, being an original ■ character

of the rock which was produced either by fluxion move- ments in a highly viscous, semi-solid mass injected at great pressure into the surrounding strata, or by folding stresses acting immediately after consolidation. That the foliation in other orthogneisses is subsequent or superinduced, having been occasioned by pressure and deformation of the solid mass long after it had consolidated and cooled, admits of no doubt, but it is very difficult to establish criteria by which these types may be differentiated. Those gneisses in which the minerals have been crushed and broken by fluxion or injection movements have been called protoclastic, while those which have attained their gneissose state by crushing long after consolidation are distinguished as cataclastic. There are also .many examples of gneisses of mixed or synthetic origin. They may be metamorphosed sediments (granulites and schists) into which tongues and thin veins of granitic character have been intruded, following the more or less parallel foliation planes already present in the country rock. These veinlets produce that alternation in mineral composition and banded structure which are essential in gneisses. This intermixture of igneous and sedimentary material may take place on the finest scale and in the most intricate manner. Often there has been resorption of the older rocks, whether sedimentary or igneous, by those which have invaded them, and movement has gone on both during injection and at a later period, so that the whole complex becomes amalgamated

and its elements are so completely confused that the geologist can no longer disentangle them.

When we remember that in the earlier stages of the earth's history, to which most gneisses belong, and in the relatively deep parts of the earth's crust, where they usually occur, there has been most igneous injection and greatest frequency of earth movements, it is not difficult to understand the geological distribution of gneissose rocks. All the factors which are required for their production, heat, movement, plutonic intrusions, contact alteration, interstitial moisture at high temperatures, are found at great depths and have acted most frequently and with greatest power on the older rock masses. But locally, where the conditions were favourable, the same processes may have gone on in comparatively recent times. Hence, though most gneisses are Archean, all gneisses are not necessarily so. (J. S. F.)

GNEIST, HEINRICH RUDOLF HERMANN FRIEDRICH VON (1816-1895), German jurist and politician, was born at Berlin on the 13th of August 1816, the son of a judge attached to the " Kammergericht " (court of appeal) in that city. After receiving his school education at the gymnasium at Eisleben in Prussian Saxony, he

entered the university of Berlin in 1833 as a student of jurisprudence, and became a pupil of the famous Roman law teacher von Savigny. Proceeding to the degree of doctor juris in 1838, young Gneist immediately established himself as a Privatdozent in the faculty of law. He had, however, already chosen the judicial branch of the legal profession as a career, and having while yet a student acted as Ausculiator, was admitted Assessor in 1841. He soon found leisure and opportunity to fulfil a much-cherished wish, and spent the next few years on a lengthened tour in Italy, France and England. He utilized his W anderjahre for the purposes of comparative study, and on his return in 1844 was appointed extraordinary professor of Roman law in Berlin; university, and thus began a professorial connexion which ended only with his death. The first-fruits of his activity as a teacher were seen in his brilliant work, Die jormellen Vertrdge des heutigen romiscken Obligationen-Rechtes (Berlin, 1845). Pari passu with his academic labours he continued his judicial career, and became in due course successively assistant judge of the superior court and of the supreme tribunal. But to a mind constituted such as his, the want of elasticity in the procedure of the courts was galling. ” Brought up,” he tells, in the preface to his Englische Verjassungsgeschichte, ” in the laborious and rigid school of Prussian judges, at a time when the duty, of formulating the matter in litigation was entailed upon the judge who personally conducted the pleadings, I became acquainted both with the advantages possessed by the Prussian bureau system as also with its weak points.” Feeling the necessity for fundamental reforms in legal procedure, he published, in 1849, his Trial by Jury, in which, after pointing out that the origin of that institution was common to both Germany and England, and showing in a masterly way the benefits which had accrued to the latter country through its more extended applica- tion, he pleaded for its freer admission in the tribunals of his own country.

The period of ” storm and stress ” in 1848 afforded Gneist an opportunity for which he had yearned, and he threw himself with ardour into the constitutional struggles of Prussia. Al- though his candidature for election to the National Assembly of that year was unsuccessful, he felt that ” the die was cast,” and deciding for a political career, retired in 1 850 from his judicial position. Entering the ranks of the National Liberal party, he began both in writing and speeches actively to champion their cause, now busying himself pre-eminently with the study of constitutional law and history. In 1853 appeared his Add und Ritterschajt in England, and in 1857 the Geschichte und heutige Gestalt der Amter in England, a pamphlet primarily written to combat the Prussian abuses of administration, but

for which the author also claimed that it had not been without its effect in modifying certain views that had until then ruled in England itself. In 1858 Gneist was appointed ordinary professor of Roman law, and in the same year commenced his parliamentary career by his election for Stettin to the Abgeord- netenhaus (House of Deputies) of the Prussian Landtag, in which assembly he sat thenceforward uninterruptedly until 1893.

Joining the Left, he at once became one of its leading spokesmen. His chief oratorical triumpns are associated with the early period of his membership of the House; two noteworthy occasions being his violent attack (September 1862) upon the government budget in connexion with the reorganization of the Prussian army, and his defence (1864) of the Polish chiefs of the (then) grand-duchy of Posen, who were accused of high treason. In 1857-1863 was published Das heutige englische Verfassungs- und Verwaltungsrecht, a work which, contrasting English and German constitutional law and administration, aimed at exercis- ing political pressure upon the government of the day. In 1868 Gneist became a member of the North German parliament, and acted as a member of the commission for organizing the federal army, and also of that for the settlement of ecclesiastical controversial questions. On the establishment of German unity his mandate was renewed for the Reichstag, and in this he sat, an active and prominent member of the National Liberal party, until 1884. In the Kulturkampf he sided with the government against the attacks of the Clericals, whom he bitterly denounced, and whose implacable enemy he ever showed himself. In 1879, together with his colleague, von Hanel, he violently attacked the motion for the prosecution of certain Socialist members, which as a result of the vigour of his opposition was almost unanimously rejected. He was parliamentary reporter for the committees on all great financial and administrative questions, and his profound acquaintance with constitutional law caused his advice to be frequently sought, not only in his own but also in other countries. In Prussia he largely influenced legislation, the reform of the judicial and penal systems and the new constitution of the Evangelical Church being largely his work. He was also consulted by the Japanese government when a constitution was being introduced into that country. In 1875 he was appointed a member of the supreme administrative court (Oberoerwaltungsgericht) of Prussia, but only held office for two years. In 1882 was published his Englische Verfassungs- gesckichte

(trans. History of the English Constitution, London, 1886), which may perhaps be described as his magnum opus. It placed the author at once on the level of such writers on English constitutional history as Hallam and Stubbs, and supplied English literature with a text-book almost unrivalled in point of historical research. In 1888 one of the first acts of the ill-fated emperor Frederick III., who had always, as crown prince, shown great admiration for him, was to ennoble Gneist, and attach him as instructor in constitutional law to his son, the emperor William II., a charge of which he worthily acquitted himself. The last years of his life were full of energy, and, in the possession of all his faculties, he continued his wonted academic labours until a short time before his death, which occurred at Berlin on the 22nd of July 1895.

As a politician, Gneist's career cannot perhaps be said to have been entirely successful. In a country where parliamentary institutions are the living exponents of the popular will he might have risen to a foremost position in the state; as it was, the party to which he allied himself could never hope to become more than what it remained, a parliamentary faction, and the influence it for a time wielded in the counsels of the state waned as soon as the Social-Democratic party grew to be a force to be reckoned with. It is as a writer and a teacher that Gneist is best known to fame. He was a jurist of a special type. To him law was not mere theory, but living force; and this conception of its power animates all his schemes of practical reform. As a teacher he exercised a magnetic influence, not only by reason of the clearness and cogency of his exposition, but also because of the success with which he developed the talents and guided the aspirations of his pupils. He was a man of noble bearing,'" religious, and imbued with a stern sense of duty. He was proud of being a " Preussischer Junker " (a member of the Prussian squirearchy), and throughout his writings, despite their liberal tendencies, may be perceived the loyalty and affection with which he clung to monarchical institutions. A great admirer and a true friend of England, to which country he was attached by many personal ties, he surpassed all other Germans in his efforts t©

make her free institutions, in which he found his ideal, the common heritage of the two great nations of the Teutonic race.

Gneist was a prolific writer, especially on the subject he had made peculiarly his own, that of constitutional law and history, and among his works, other than those above named, may be mentioned the following: Budget und Geseiz nach dem constitutionellen Staatsrecht Englands (Berlin, 1867); Freie Advocatur (ib., 1867); Der Rechts- staat

{ib., 1872, and 2nd edition, 1879); Zur Verwaltungsreform in Preussen (Leipzig, 1880); Das englische Parlament (Berlin, 1886); in English translation, The English Parliament (London, 1886; 3rd edition, 1889); Die Militar-Vorlage von 1892 und der preussische Verfassungsconflikt von 1862 bis 1866 (Berlin, 1893); Die nationale Rechtsidee von den Stdnden und das preussische Dreiklassenwahl-system (ib., 1895); Die verfassungsmdssige Stellung des preussischen Gesamtministeriums (ib:, 1895). See O. Gierke, Rudolph von Gneist, Geddchtnisrede (Berlin, 1895), an In Memoriam address delivered in Berlin. (P. A. A.)

GNESEN (Polish, Gniezno) , a town of Germany, in the Prussian province of Posen, in an undulating and fertile country, on the Wrzesnia, 30 m. E.N.E. of Posen by the railway to Thorn. Pop. (1905) 23,727. Besides the cathedral, a handsome Gothic edifice with twin towers, which contains the remains of St Adalbert, there are eight Roman Catholic churches, a Protestant church, a synagogue, a clerical seminary and a convent of the Franciscan nuns. Among the industries are cloth and linen weaving, brewing and distilling. A great horse and cattle market is held here annually. Gnesen is one of the oldest towns in the former kingdom of Poland. Its name, Gniezno, signifies ” nest,” and points to early Polish traditions. The cathedral is believed to have been founded towards the close of the 9th century, and, having received the bones of St Adalbert, it was visited in 1000 by the emperor Otto III., who made it the seat of an archbishop. Here, until 1320, the kings of Poland were’ crowned; and the archbishop, since 1416 primate of Poland, acted as protector pending the appointment of a new king. In 182 1 the see of Posen was founded and the archbishop removed his residence thither, though its cathedral chapter still remains at Gnesen. After a long period of decay the town revived after 18 15, when it came under the rule of Prussia. See S. Karwowski, Gniezno (Posen, 1892).

GNOME, and GNOMIC POETRY. Sententious maxims, put into verse for the better aid of the memory, were known by the Greeks as gnomes, yv&fiai, from yv&firi, an opinion. A gnome is defined by the Elizabethan critic Henry Peacham (1576?- 1643 ?) as ” a saying pertaining to the manners and common practices of men, which declareth, with an apt brevity, what in this our life ought to be done, or not done.” The Gnomic Poets of Greece, who flourished in the 6th century B.C., were those who arranged series of sententious maxims in verse. These were collected in the 4th century, by Lobon of Argos, an orator, but his collection has disappeared. The chief gnomic poets were Theognis, Solon, Phocylides, Simonides of Amorgos, Demodocus, Xenophanes and Euenus. With the exception of Theognis, whose

gnomes were fortunately preserved by some schoolmaster about 300 B.C., only fragments of the Gnomic Poets have come down to us. The moral poem attributed to Phocylides, long supposed to be a masterpiece of the school, is now known to have been written by a Jew in Alexandria. Of the gnomic movement typified by the moral works of the poets named above, Prof. Gilbert Murray has remarked that it receives its special expression in the conception of the Seven Wise Men, to whom such proverbs as ” Know thyself ” and ” Nothing too much ” were popularly attributed, and whose names differed in different lists. These gnomes or maxims were extended and put into literary shape by the poets. Fragments of Solon, Euenus and Mimnermus have been pre- served, in a very confused state, from having been written, for purposes of comparison, on the margins of the MSS. of Theognis, whence they have often slipped into the text of that poet. Theognis enshrines his moral precepts in his elegies, and this was probably the custom of the rest; it is improbable that there ever existed a species of poetry made up entirely of successive gnomes. But the title ” gnomic ” came to be given to all poetisy which dealt in a sententious way with questions

of ethics. It was, unquestionably, the source from which moral philosophy was directly developed, and theorists upon life and infinity, such as Pythagoras and Xenophanes, seem to have begun their career as gnomic poets. By the very nature of things, gnomes, in their literary sense, belong exclusively to the dawn of literature; their naivete and their simplicity in moraliz- ing betray it. But it has been observed that many of the ethical reflections of the great dramatists, and in particular of Sophocles and Euripides, are gnomic distiches expanded. It would be an error to suppose that the ancient Greek gnomes are all of a solemn character; some are voluptuous and some chivalrous; those of Demodocus of Leros had the reputation of being droll. In modern times, the gnomic spirit has occasionally been dis- played by poets of a homely philosophy, such as Francis Quarles (1592-1644) in England and Gui de Pibrac (1520-1584) in France. The once-celebrated Quatrains of the latter, published in 1574, enjoyed an immense success throughout Europe; they were composed in deliberate imitation of the Greek gnomic writers of the 6th century B.C. These modern effusionsˆare rarely literature and perhaps never poetry. With the gnomic writings of Pibrac it was long customary to bind up those of Antoine Favre (or Faber) (1557-1624) and of Pierre Mathieu (1563-1621). Gnomes are frequently to be found in the

ancient literatures of Arabia, Persia and India, and in the Icelandic staves. The priamd, a brief, sententious kind of poem, which was in favour in Germany from the 12 th to the 16th century, belonged to the true gnomic class, and was cultivated with particular success by Hans Rosenblut, the lyrical goldsmith of Nuremberg, in the 15th century. (E. G.)

GNOMES (Fr. gnomes, Ger. Gnomen), in folk-lore, the name now commonly given to the earth and mountain spirits who are supposed to watch over veins of precious metals and other hidden treasures. They are usually pictured as bearded dwarfs clad in brown close-fitting garments with hoods. The word ” gnome ” as applied to these is of comparatively modern and somewhat uncertain origin. By some it is said to have been coined by Paracelsus (so Hatzfeld and Darmesteter, Dictionnaire) , who uses Gnomi as a synonym of Pygmaei, from the Greek yvufirj, intelligence. The New English Dictionary, however, suggests a derivation from genomus, i.e. a Greek type yrjvofws, ” earth-dweller,” on the analogy of daKacraovofios, ” dwelling in the sea,” adding, however, that though there is no evidence that the term was not used before Paracelsus, it is possibly ” a mere arbitrary invention, like so many others found in Paracelsus ” (N.E.D. s.v.).

GNOMON, the Greek word for the style of a sundial, or any object, commonly a vertical column, the shadow of which was r- ■ observed in former times in order to learn — the altitude of the sun, especially when on the meridian. The art of constructing a sundial is sometimes termed gnomonics. In geometry, a gnomon is a plane figure formed by removing a parallelogram from a corner of a larger parallelogram; in the figure ABCDEFA is a gnomon. Gnomonic projection is a pro-jection of a sphere in which the centre of sight is the centre of the sphere.

GNOSTICISM (Gr. yvuais, knowledge), the name generally applied, to that spiritual movement existing side by side with genuine .Christianity, as it gradually crystallized into the old Catholic Church, which may roughly be defined as a distinct religi- ous syncretism bearing the strong impress of Christian influences. I. The term ” Gnosis” first appears in a. technical sense in 1 Tim. vi. 20 (ri \f/ (v56 > vvfios yvGxns). It seems to have at first been applied exclusively, or at any rate principally, to a particular tendency within the movement as a whole, i.e. to those sections of (the Syrian) Gnostics otherwise generally known as Ophites or Naasseni (see Hippolytus, Philosophumena, v. 2: tiaaacrivol ... oi iavrovs TvocmKovs a-iroKakovvres ; Irenaeus i. n. 1; Epiphanius, Haeres. xxvi. Cf. also the

self-assumed name of the Carpocratiani, Iren. i. 25. 6). But in Irenaeus the term has already come to designate the whole movement. This first came

into prominence in the opening decades of the 2nd century a.d., but is certainly older; it reached its height in the second third of the same century, and began to wane about the 3rd century, and from the second half of the 3rd century onwards was replaced by the closely-related and more powerful Manichaean movement. Offshoots of it, however, continued on into the 4th and 5th centuries. Epiphanius still had the opportunity of making personal acquaintance with Gnostic sects.

II. Of the actual writings of the Gnostics, which were extra- ordinarily numerous, 1 very little has survived; they were sacrificed to the destructive zeal of their ecclesiastical opponents. Numerous fragments and extracts from Gnostic writings are to be found in the works of the Fathers who attacked Gnosticism. Most valuable of all are the long extracts in the 5th and 6th books of the Philosophumena of Hippolytus. The most accessible and best critical edition of the fragments which have been preserved word for word is to be found in Hilgenfeld's Ketzergeschichte des Urchristentums. One of the most important of these fragments is the letter of Ptolemaeus to Flora, preserved in Epiphanius, Haeres. xxxiii. 3-7 (see on this point Harnack in the Sitzungsberichte der Berliner Akademie, 1902, pp. 507-545). Gnostic fragments are certainly also preserved for us in the Acts of Thomas. Here we should especially mention the beautiful and much-discussed Song of the Pearl, or Song of the Soul, which is generally, though without absolute clear proof, attributed to the Gnostic Bardesanes (till lately it was known only in the Syrian text; edited and translated by Bevan, Texts and Studies? v. 3, 1897; Hofmarm, Zeitschrift fur neutestamentliche Wissenschafl, iv.; for the newly-found Greek text see Acta apostolorum, ed. Bonnet, ii. 2, c. 108, p. 219). Generally also much Gnostic matter is contained in the apocryphal histories of the Apostles. To the school of Bardesanes belongs the " Book of the Laws of the Lands," which does not, however, contribute much to our knowledge of Gnos- ticism. Finally, we should mention in this connexion the text on which are based the pseudo-Clementine Homilies and Recogni- tions (beginning of the 3rd century). It is, of course, already permeated with the Catholic spirit, but has drawn so largely upon sources of a Judaeo- Christian Gnostic character that it comes to a great extent within the category of sources for Gnosticism. Complete original Gnostic works have unfortunately survived to us only from the period of the decadence of Gnosticism. Of these we should mention the comprehensive work called the Pistis-

Sophia, probably belonging to the second half of the 3rd century. 3 Further, the Coptic- Gnostic texts of the Codex Brucianus; both the books of leu, and an anonymous third work (edited and translated by C. Schmidt, Texte und Unter- suchungen, vol. viii. , 1892; and a new translation by the same in Koptische-gnostische Schriften, i.) which, contrary to the opinion of their editor and translator, the present writer believes to represent, in their existing form, a still later period and a still more advanced stage in the decadence of Gnosticism. For other and older Coptic- Gnostic texts, in one of which is con- tained the source of Irenaeus's treatises on the Barbelognostics, but which have unfortunately not yet been made completely accessible, see C. Schmidt in Sitzungsberichte der Berl. Akad. (1896), p. 839 seq., and " Philotesia," dedicated to Paul Kleinert (1907), p. 315 seq.

On the whole, then, for an exposition of Gnosticism we are thrown back upon the polemical writings of the Fathers in their controversy with heresy. The most ancient of these is Justin, who according to his Apol. i. 26 wrote a Syntagma against all heresies (c. a.d. 150), and also, probably, a special polemic against

1 See the list of their titles in A. Harnack, Geschichte der altchrist- lichen Literatur, Teil I. v. 171; ib. Teil II. Chronologie der altchristl. Literature i. 533 seq.; also Liechtenhahn, Die Offenbarung im Gnosticismus (1901).

2 For the text see A. Merx, Bardesanes von Edessa (1863), and A. Hilgenfeld, Bardesanes der letzte Gnostiher (1864).

3 Ed. Petermann-Schwartze ; newly translated by C. Schmidt, Koptisch-gnostische Schriften, i. (1905), in the series Die griechischen christlichen Schriftsteller der ersten drei Jahrhunderte; see also A. Harnack, Texte und Untersuchungen, Bd. vii. Heft 2 (1891), and Chronologie der altchristlichen Literatur, ii. 193-195.

Marcion (fragment in Irenaeus iv. 6. 2) . Both these writings are lost. He was followed by Irenaeus, who, especially in the first book of his treatise Adversus haereses (eX«7xou /cat bvaTpowijs 7-17S \j/tvhu>v \jfjx>v 7jw«os j3i/3Xia nevTt, c. a.d. 180), gives a detailed account of the Gnostic heresies. He founds his work upon that of his master Justin, but adds from his own knowledge among many other things, notably the detailed account of Valentinianism at the beginning of the

book. On Irenaeus, and probably also on Justin, Hippolytus drew for his Syntagma (beginning of the 3rd century), a work which is also lost, but can, with great certainty, be reconstructed from three recensions of it: in the Panarion of Epiphanius (after 374), in Philaster of Brescia, Adversus haereses, and the Pseudo-Tertullian, Liber adversus omnes haereses. A second work of Hippolytus (Kara iraa&v aipiaeuv tXeyxos) is preserved in the so-called Philosophumena which survives under the name of Origen. Here Hippolytus gave a second exposition supplemented by fresh Gnostic original sources with which he had become acquainted in the meanwhile. These sources quoted in Hippolytus have lately met with very unfavourable criticisms. The opinion has been advanced that Hippolytus has here fallen a victim to the mystification of a forger. The truth of the matter must be that Hippolytus probably made use of a collection of Gnostic texts, put together by a Gnostic, in which were already represented various secondary developments of the genuine Gnostic schools. It is also possible that the compiler has himself attempted here and there to harmonize to a certain extent the various Gnostic doctrines, yet in no case is this collection of sources given by Hippolytus to be passed over; it should rather be considered as important evidence for the beginnings of the decay of Gnosticism. Very noteworthy references to Gnosticism are also to be found scattered up and down the Stromateis of Clement of Alexandria. Especially important are the Excerpia ex Theodoto, the author of which is certainly Clement, which are verbally extracted from Gnostic writings, and have almost the value of original sources. The writings of Origen also contain a wealth of material. In the first place should be mentioned the treatise Contra Celsum, in which the expositions of Gnosticism by both Origen and Celsus are of interest (see especially v. 61 seq. and vi. 25 seq.). Of Tertullian's works should be mentioned: De praescriptione haereticorum, especially Adversus Marcionem, Adversus Hermo-genem, and finally Adversus V almtinianos (entirely founded on Irenaeus). Here must also be mentioned the dialogue of Ada- mant' us with the Gnostics, De recta in deumfide (beginning of 4th century) . Among the followers of Hippolytus, Epiphanius in his Panarion gives much independent and valuable information from his own knowledge of contemporary Gnosticism. But Theodoret of Cyrus (d. 455) is already entirely dependent on previous works and has nothing new to add. With the 4th century both Gnosticism and the polemical literature directed against it die out. 1

III. If we wish to grasp the peculiar character of the great Gnostic movement, we must take care not to be led astray by the catchword " Gnosis." It is a mistake to regard the Gnostics as pre-eminently

therepresentativesof intellectamongChristians, and Gnosticism as an intellectual tendency chiefly concerned with philosophical speculation, the reconciliation of religion with philosophy and theology. It is true that when Gnosticism was at its height it numbered amongst its followers both theo- logians and men of science, but that is not its main characteristic. Among the majority of the followers of the movement ” Gnosis ” was understood not as meaning ” knowledge ” or ” understand- ing,” in our sense of the word, but ” revelation.” These little Gnostic sects and groups all lived in the conviction that they

1 See R. A. Lipsius, Die Quellen der altesten Ketzergeschichte (1875) ; A. Harnack, Zur Quellenkritik der Geschichte des Gnosticismus (1873) ; A. Hilgenfeld, Ketzergeschichte, pp. I-83 ; Harnack, Geschichte der altchristlich. Literatur, i. 171 seq., ii. 533 seq., 712 seq.; J. Kunze, De historiae Gnostic, fontibus (1894). On the Philosophumena of Hippolytus see G. Salmon, the cross-references in the Philo- sophumena, Hermathena, vol. xi. (1885) p. 5389 seq. ; H. Staehelin, Die gnostischen Quellen Hippolyts, Texte und Unters. Bd. vi. Hft.

3 (1890),

possessed a secret and mysterious knowledge, in no way accessible to those outside, which was not to be proved or propagated, but believed in by the initiated, and anxiously guarded as a secret. This knowledge of theirs was not based on reflection, on scientific inquiry and proof, but on revelation. It was derived directly from the times of primitive Christianity; from the Saviour himself and his disciples and friends, with whom they claimed to be connected by a secret tradition, or else from later prophets, of whom many sects boasted. It was laid down in wonderful mystic writings, which were in the possession of the various circles (Liechtenhahn, Die Offenbarung im Gnosticismus,

1901).

In short, Gnosticism, in all its various sections, its form and its character, falls under the great category of mystic religions, which were so characteristic of the religious life of decadent antiquity. In Gnosticism as in the other mystic religions we find the same contrast of the initiated and the uninitiated, the same loose organization, the same kind of petty sectarianism ‘ and mystery-mongering. All alike boast a mystic revelation and a deeply-veiled wisdom. As in many mystical religions, so in Gnosticism, the ultimate object is individual salvation, the assurance of a fortunate destiny for the soul after death. As in the others, so in this the central object of worship is a redeemer-

deity who has already trodden the difficult way which the faithful have to follow. And finally, as in all mystical religions, so here too, holy rites and formulas, acts of initiation and consecration, all those things which we call sacraments, play a very prominent part. The Gnostic religion is full of such sacraments. In the accounts of the Fathers we find less about them; yet here Irenaeus' account of the Marcosians is of the highest significance (i. 21 seq.). Much more material is to be found in the original Gnostic writings, especially in the Pistis- Sophia and the two books of leu, and again in the Excerpia ex Theodoto, the Acts of Thomas, and here and there also in the pseudo-Clementine writings. Above all we can see from the original sources of the Mandaean religion, which also represents a branch of Gnosticism, how great a part the sacraments played in the Gnostic sects (Brandt, Manddische Religion, p. 96 seq.). Everywhere we are met with the most varied forms of holy rites — the various baptisms, by water, by fire, by the spirit, the baptism for protection against demons, anointing with oil, sealing and stigmatizing, piercing the ears, leading into the bridal chamber, partaking of holy food and drink. Finally, sacred formulas, names and symbols are of the highest import- ance among the Gnostic sects. We constantly meet with the idea that the soul, on leaving the body, finds its path to the highest heaven opposed by the deities and demons of the lower realms of heaven, and only when it is in possession of the names of these demons, and can repeat the proper holy formula, or is prepared with the right symbol, or has been anointed with the holy oil, finds its way unhindered to the heavenly home. Hence the Gnostic must above all things learn the names of the demons, and equip himself with the sacred formulas and symbols, in order to be certain of a good destiny after death. The exposition of the system of the Ophites given by Celsus (in Origen vi. 25 seq.), and, in connexion with Celsus, by Origen, is particularly instruc- tive on this point. The two " Coptic leu " books unfold an immense system of names and symbols. This system again was simplified, and as the supreme secret was taught in a single name or a single formula, by means of which the happy possessor was able to penetrate through all the spaces of heaven (cf. the name " Caulacau " among the Basilidians; Irenaeus, Adv. haer. i. 24. 5, and among other sects). It was taught that even the redeemer-god, when he once descended on to this earth, to rise from it again, availed himself of these names and formulas on his descent and ascent through the world of demons. Traces of ideas of this kind are to be met with almost everywhere. They have been most carefully collected by Anz (Ursprung des Gnosti- cismus, Texte und Untersuchungen xv. 4 passim) who would see in them the central doctrine of Gnosticism.

IV. All these investigations point clearly to the fact that Gnosticism belongs to the group of mystical religions. We must

now proceed to define more exactly the peculiar and distinctive character of the Gnostic system. The basis of the Gnostic religion and world-philosophy lies in a decided Oriental dualism. In sharp contrast are opposed the two worlds of the good and of the evil, the divine world and the material world (iJXij), the worlds of light and of darkness. In many systems there seems to be no attempt to derive the one world from the other. The true Basilides (q.v.), perhaps also Satornil, Marcion and a part of his disciples, Bardesanes and others, were frankly dualists. In the case of other systems, owing to the inexactness of our information, we are unable to decide; the later systems of Mandaeism and Manichaeanism, so closely related to Gnosticism, are also based upon a decided dualism. And even when there is an attempt at reconciliation, it is still quite clear how strong was the original dualism which has to be overcome. Thus the Gnostic systems make great use of the idea of a fall of the Deity himself; by the fall of the Godhead into the world of matter, this matter, previously insensible, is animated into life and activity, and then arise the powers, both partly and wholly hostile, who hold sway over this world. Such figures of fallen divinities, sinking down into the world of matter are those of Sophia (i.e. Ahamoth) among the Gnostics (Ophites) in the narrower sense of the word, the Simoniani (the figure of Helena), the Barbelognostics, and in the system of the Pistis- Sophia or the Primal Man, among the Naasseni and the sect, related to them, as described byHippolytus. 1 A further weaken- ing of the dualism is indicated when, in the systems of the Valentinian school, the fall of Sophia takes place within the godhead, and Sophia, inflamed with love, plunges into the Bythos, the highest divinity, and when the attempt is thus made genetic- ally to derive the lower world from the sufferings and passions of fallen divinity. Another attempt at reconciliation is set forth in the so-called ” system of emanations ,; in which it is assumed that from the supreme divinity emanated a somewhat lesser world, from this world a second, and so on, until the divine element (of life) became so far weakened and attenuated, that the genesis of a partly, or even wholly, evil world appears both possible and comprehensible. A system of emanations of this kind, in its purest form, is set forth in the expositions coming from the school of Basilides, which are handed down by Irenaeus, while the propositions which are set forth in the Philosophumena of Hippolytus

as being doctrines of Basilides represent a still closer approach to a monistic philosophy. Occasionally, too, there is an attempt to establish at any rate a threef6ld division of the world, and to assume between the worlds of light and darkness a middle world connecting the two; this is clearest among the Sethiani mentioned by Hippolytus (and cf. the Gnostics in Irenaeus i. 30. 1). Quite peculiar in this connexion are the accounts in Books xix. and xx. of the Clementine Homilies. After a preliminary examination of all possible different attempts at a solution of the problem of evil, the attempt is here made to represent the devil as an instrument of God. Christ and the devil are the two hands of God, Christ the right hand, and the devil the left, the devil having power over this world-epoch and Christ over the next. The devil here assumes very much the characteristics of the punishing and just God of the Old Testament, and the prospect is even held out of his ultimate pardon. All these efforts at reconciliation show how clearly the problem of evil was realized in these Gnostic and half-Gnostic sects, and how deeply they meditated on the subject; it was not altogether without reason that in the ranks of its opponents Gnosticism was judged to have arisen out of the question, irbBtv to nanbv;

This dualism had not its origin in Hellenic soil, neither is it related to that dualism which to a certain extent existed also in late Greek religion. For the lower and imperfect world, which in that system too is conceived and assumed, is the nebulous world of the non-existent and the formless, which is the

1 Cf. the same idea of the fall of mankind in the pagan Gnosticism of ” Poimandres ” ; see Reitzenstein, Poimandres (1904); and the position of the Primal Man (Urmensch) among the Manichaeans is similar.

necessary accompaniment of that which exists, as shadow is of light.

In Gnosticism, on the contrary, the world of evil is full of active energy and hostile powers. It is an Oriental (Iranian) dualism which here finds expression, though in one point, it is true, the mark of Greek influence is quite Clear. When Gnosticism recognizes in this corporeal and material world the true seat of evil, consistently treating the bodily existence of mankind as essentially evil and the separation of the spiritual from the corporeal being as the object of salvation, this is an outcome of the contrast in Greek dualism between spirit and matter, soul and body. For in Oriental (Persian) dualism it is within this material world that the good and evil powers are at war, and this world beneath the stars is by no means conceived as entirely subject to the influence of evil. Gnosticism has combined the two, the Greek opposition between spirit and matter, and the sharp Zoroastrian

dualism, which, where the Greek mind con- ceived of a higher and a lower world, saw instead two hostile worlds, standing in contrast to each other like light and darkness. And out of the combination of these two dualisms arose the teaching of Gnosticism, with its thoroughgoing pessimism and fundamental asceticism.

Another characteristic feature of the Gnostic conception of the universe is the role played in almost all Gnostic systems by the seven world-creating powers. There are indeed certain exceptions; for instance, in the systems of the Valentinian schools there is the figure of the one Demiurge who takes the place of the Seven. But how widespread was the idea of seven powers, who created this lower material world and rule over it, has been clearly proved, especially by the systematic examination of the subject by Anz (Ursprung des Gnosticismus) . These Seven, then, are in most systems half-evil, half-hostile powers; they are frequently characterized as ” angels,” and are reckoned as the last and lowest emanations of the Godhead; below them — and frequently considered as derived from them — comes the world of the actually devilish powers. On the other hand, among the speculations of the Mandaeans, we find a different and perhaps more primitive conception of the Seven, according to which they, together with their mother Namrus (Ruha) and their father (Ur), belong entirely to the world of darkness. They and their family are looked upon as captives of the god of light (Manda-d’hayye, Hibil-Ziva), who pardons them, sets them’ on chariots of light, and appoints them as rulers of the world (cf. chiefly Genza, in Tractat 6 and 8; W. Brandt, Mandaische Schrijten, 125 seq. and 137 seq.; Mandaische Religion, 34 seq., &c). In the Manichaean system it is related how the helper of the Primal Man, the spirit of life, captured the evil archontes, and fastened them to the firmament, or according to another account, flayed them, and formed the firmament from their skin (F. C. Baur, Das manichaische Religionssystem,v. 65) , and this conception is closely related to the other, though in this tradition the number (seven) of the archontes is lost. Similarly, the last book of the Pistis-Sophia contains the myth of the capture of the rebellious archontes, whose leaders here appear as five in number (Schmidt, Koptisch-gnostische Schrijten, p. 234 seq.). 2 There can scarcely be any doubt as to the origin of these seven (five) powers; they are the seven planetary divinities, the sun, moon and five planets.

In the Mandaean speculations the Seven are introduced with the Babylonian names of the planets. The connexion of the Seven with the planets is also clearly established by the exposi- tionsof CelsusandOrigen (ContraCelsum,\i. 22seq.) andsimilarly by the above-quoted passage in the Pistis-Sophia, where the archontes, who are

here mentioned as five, are identified with the five planets (excluding the sun and moon). This collective grouping of the seven (five) planetary divinities is derived from the late Babylonian religion, which can definitely be indicated as the home of these ideas (Zimmern, Keilinschriften in dem alten Testament, ii. p. 620 seq.; cf. particularly Diodorus ii. 30). And if in the old sources it is only the first beginnings of this development that can be traced, we must assume that at a later

2 These ideas may possibly be traced still further back* and perhaps even underlie St Paul's exposltib'ri in Gol-. ii. 15.

period the Babylonian religion centred in the adoration of the seven planetary deities. Very instructive in this connexion is the later (Arabian) account of the religion of the Mesopotamian Sabaeans. The religion of the Sabaeans, evidently a later offshoot from the stock of the old Babylonian religion, actually consists in the cult of the seven planets (cf. the great work of Daniel Chwolsohn, Die Ssabier u. der Ssabismus). But this reference to Babylonian religion does not solve the problem which is here in question. For in the Babylonian religion the planetary constellations are reckoned as the supreme deities. And here the question arises, how it came about that in the Gnostic systems the Seven appear as subordinate, half-daemonic powers, or even completely as powers of darkness. This can only be explained on the assumption that some religion hostile to, and stronger than the Babylonian, has superimposed itself upon this, and has degraded its principal deities into daemons. Which religion can this have been ? We are at first inclined to think of Christianity itself, but it is certainly most improbable that at the time of the rise of Christianity the Babylonian teaching about the seven planet-deities governing the world should have played so great a part throughout all Syria, Asia Minor and Egypt, that the most varying sections of syncretic Christianity should over and over again adopt this doctrine and work it up into their system. It is far more probable that the combination which we meet with in Gnosticism is older than Christianity, and was found already in existence by Christianity and its sects. We must also reject the theory that this degradation of the planetary deities into daemons is due to the influence of Hebrew monotheism, for almost all the Gnostic sects take up a definitely hostile attitude towards the Jewish religion, and almost always the highest divinity among the Seven is actually the creator-God of the Old Testament. There

remains, then, only one religion which can be used as an explanation, namely the Persian, which in fact fulfils all the necessary conditions. The Persian religion was at an early period brought into contact with the Babylonian, through the triumphant progress of Persian culture towards the West; at the time of Alexander the Great it was already the prevailing religion in the Babylonian plain (cf. F. Cumont, Textes et monuments rel. aux mysteres ds Miikra, i. 5, 8-10, 14, 223 seq., 233). It was characterized by a main belief, tending towards monotheism, in the Light-deity Ahuramazda and his satellites, who appeared in contrast with him as powers of the nature of angels. <

A combination of the Babylonian with the Persian religion could only be effected by the degradation of the Babylonian deities into half-divine, half-daemonic beings, infinitely remote from the supreme God of light and of heaven, or even into powers of darkness. Even the characteristic dualism of Gnostic- ism has already proved to be in part of Iranian origin; and now it becomes clear how from that mingling of late Greek and Persian dualism the idea could arise that these seven half- daemonic powers are the creators or rulers of this material world, which is separated infinitely from the light-world of the good God. Definite confirmation of this conjecture is afforded us by later sources of the Iranian religion, in which we likewise meet with the characteristic fundamental doctrine of Gnosticism. Thus the Bundahish (iii. 25, v. 1) is able to inform us that in the primeval strife of Satan against the light-world, seven hostile powers were captured and set as constellations in the heavens, where they are guarded by good star-powers and prevented from doing harm. Five of the evil powers are the planets, while here the sun and moon are of course not reckoned among the evil powers — for the obvious reason that in the Persian official religion they invariably appear as good divinities (cf

derived from the same period in which the underlying idea of the Gnostic systems also originated, namely, the time at which the ideas of the Persian and Babylonian religions came into contact, the remarkable results of which have thus partly found their way into the official documents of Parsiism.

With this fundamental doctrine of Gnosticism is connected, as Anz has shown in his book which we have so often quoted, a side of their religious practices to which we have already alluded. Gnosticism is to a great extent dominated by the idea that it is above all and in the highest degree important for the Gnostic's soul to be enabled to find its way back through the lower worlds and spheres of heaven ruled by the Seven to the kingdom of light of the supreme deity of heaven. Hence, a principal item in their religious practice consisted in

communica- tions about the being, nature and names of the Seven (or of any other hostile daemons barring the way to heaven), the formulas with which they must be addressed, and the symbols which must be shown to them. But names, symbols and formulas are not efficacious by themselves: the Gnostic must lead a life having no part in the lower world ruled by these spirits, and by his knowledge he must raise himself above them to the God of the world of light. Throughout this mystic religious world it was above all the influence of the late Greek religion, derived from Plato, that also continued to operate; it is filled with the echo of the song, the first note of which was sounded by the Platonists, about the heavenly home of the soul and the homeward journey of the wise to the higher world of light.

But the form in which the whole is set forth is Oriental, and it must be carefully noted that the Mithras mysteries, so closely connected with the Persian religion, are acquainted with this doctrine of the ascent of the soul through the planetary spheres (Origen, Contra Celsum, vi. 22).

V. We cannot here undertake to set forth and explain in detail all the complex varieties of the Gnostic systems; but it will be useful to take a nearer view of certain principal figures which have had an influence upon at least one series of Gnostic systems, and to examine their origins in the history of religion. In almost all systems an important part is played by the Great Mother (pˆrrip) who appears under the most varied forms (cf. Great Mother oe the Gods). At an early period, and notably in the older systems of the Ophites (a fairly exact account of which has been preserved for us by Epiphanius and Hippolytus), among the Gnostics in the narrower sense of the word, the Archon- tici, the Sethites (there are also traces among the Naasseni, cf. the Philosophumena of Hippolytus), the juˆnjp is the most prominent figure in the light-world, elevated above the eftdofias, and the great mother of the faithful. The sect of the Barbelo- gnostics takes its name from the female figure of the Barbelo (perhaps a corruption of Hapdivos; cf. the form Bapdev&s for ” virgin ” in Epiphanius, Haer. xxvi. 1). But Gnostic speculation gives various accounts of the descent or fall of this goddess of heaven. Thus the ” Helena ” of the Simoniani descends to this world in order by means of her beauty to provoke to sensual passion and mutual strife the angels who rule the world, and thus again to deprive them of the powers of light, stolen from heaven, by means of which they rule over the world. She is then held captive by them in extreme degradation. Similar ideas are to be found among the ” Gnostics ” of Epiphanius. The kindred idea of the light-maiden, who, by exciting the sensual passions of the rulers (apxopres), takes from them those powers of light which still remain to them, has also a

central place in the Manichaean scheme of salvation (F. C. Baur, Das mani' chdische Religions system, pp. 219, 315, 321). The light-maiden

similar ideas in the Arabic treatise on Persian religion Ulema-i- ' also plays a prominent part in the Pistis-Sophia (cf . the index

Islam, Vullers, Fragmente iiber die Religion Zoroasters, p. 49, and in other later sources for Persian religion, put together in Spiegel, Eranische Altertumskunde, Bd. ii. p. 180). These Persian fancies can hardly be borrowed from the Christian Gnostic systems, their definiteness and much more strongly dualistic character recalling the exposition of the Mandaean (and Manichaean) system, are proofs to the contrary. They are

to the translation by C. Schmidt) . With this figure of the mother-goddess who descends into the lower world seems to be closely connected the idea of the fallen Sophia, which is so widespread among the Gnostic systems. This Sophia then is certainly no longer the dominating figure of the light-world, she is a lower aeon at the extreme limit of the world of light, who sinks down into matter (Barbelognostics, the anonymous Gnostic of Irenaeus,

Bardesanes, Pistis-Sophia), or turns in presumptuous love to- wards the supreme God (Bu06s), ancl thus brings the Fall into the world of the aeons (Valentinians). This Sophia then appears as the mother of the " seven " gods (see above).

The origin of this figure is not far to seek. It is certainly not derived from the Persian religious system, to the spirit of which it is entirely opposed. Neither would it be correct to identify her entirely with the great goddess Ishtar of the old Babylonian religion. But there can hardly be any doubt that the figure of the great mother-goddess or goddess of heaven, ' who was worshipped throughout Asia under various forms and names (Astarte, Beltis, Atargatis, Cybele, the Syrian Aphrodite), was the prototype of the p.rfrr\p of the Gnostics (cf. Great Mother of the Gods). The character of the great goddess of heaven is still in many places fairly exactly preserved in the Gnostic speculations. Hence we are able to understand how the Gnostic HT \ri)p, the Sophia, appears as the mother of the Heb- domas (e/35o/ xas). The great goddess of heaven is the mother of the stars. Particularly instructive in this connexion is the fact that in those very

sects, in the systems of which the figure of the jui)T7jp plays a special part, unbridled prostitution appears as a distinct and essential part of the cult (cf. the accounts of par- ticular branches of the Gnostics, Nicolaitans/Philionites, Bor- borites, &c. in Epiphanius, Haer. xxv., xxvi.)-. The meaning of this cult is, of course, reinterpreted in the Gnostic sense: by this unbridled prostitution the Gnostic sects desired to prevent the sexual propagation of mankind, the origin of all evil. But the connexion is clear, and hence it also explained the curious Gnostic myth mentioned above, namely that the p.rrrr\p (the light-maiden) by appearing to the archontes (apxovres), the lower powers of this world, inflames them to sexual lusts, in order to take from them that share of light which they have stolen from the upper world. This is a Gnostic interpretation of the various myths of the great mother-goddess's many loves and love-adventures with other gods and heroes. And when the pagan legend of the Syrian Astarte tells how she lived for ten years in Tyre as a prostitute, this directly recalls the Gnostic myth of how Simon found Helena in a brothel in Tyre (Epiphanius, Ancoratus, c. 104). From the same group of myths must be derived the idea of the goddess who descends to the under- world, and is there taken prisoner against her will by the lower powers; the direct proto- type of this myth is to be found, e.g. in Ishtar's journey to hell. And finally, just as the mother-goddess of south-western Asia stands in particularly intimate connexion with the youthful god of spring (Tammuz, Adonis, Attis), so we ought perhaps to compare here as a parallel the relation of Sophia with the Soter in certain Gnostic systems (see below).

Another characteristic figure of Gnosticism is that of the Primal Man (it/kotos avdponros). In many systems, certainly, it has already been forced quite into the background. But on closer examination we can clearly see that it has a wide influence on Gnosticism. Thus in the system of the Naasseni (see Hip- poly tus, Philosophumena) , and in certain related sects there enumerated, the Primal Man has a central and predominant position. Again, in the text on which are based the pseudo- Clementine writings {Recognitions, i. 16, 32, 45-47, 52, ii. 47; and Homilies, iii. 17 seq. xviii. 14), as in the closely related system of the Ebionites in Epiphanius {Haer. xxx. 3-16; cf. liii. 1), we meet with the man who existed before the world, the prophet who goes through the world in various forms, and finally reveals himself in Christ. Among the Barbelognostics (Irenaeus i. 29. 3), the Primal Man (Adamas, homo perfectus et verus) and Gnosis appear as a pair of aeons, occupying a prominent place in the whole series. In the Valentinian systems the pay- of aeons, Anthropos and Ekklesia, occupy the third or fourth place within the Oydods, but incidentally we learn

that with some representatives of this school the Anthropos took a still more prominent place (first or second; Hilgenfeld, Ketzer- geschichte, p. 294 seq.). And even in the Pistis-Sophia the Primal Man ” leu ” is frequently alluded to as the King of the Luminaries (cf. index to C. Schmidt’s translation). We also

of non-Christian Gnosis. Thus in the Poimandres of Hermes man is the most prominent figure in the speculation; numerous pagan and half-pagan parallels (the ” Gnostics ” of Plotinus, Zosimus, Bitys) have been collected by Reitzenstein in his work Poimandres (pp. 81-116). Reitzenstein has shown (p. 81 seq.) that very probably the system of the Naasseni described by Hippolytus was originally derived from purely pagan circles, which are probably connected in some way with the mysteries of the Attis cult. The figure in the Mandaean system most closely corresponding to the Primal Man, though this’ figure also actually occurs in another part of the system (cf. the figure of Adakas Mana; Brandt, Manddische Religion, p. 36 seq.) is that of Manda d’hayye {yvSxns rrjs fcorjs; cf. the pair of aeons, Adamas and Gnosis, among the Barbelognostics, in Irenaeus i. 29. 3). Finally, in the Manichaean system, as is well known, the Primal Man again assumes the predominant place (Baur, Manich. Religionssystem, 49 seq.).

This figure of the Primal Man can particularly be compared with that of the Gnostic Sophia. Wherever this figure has not become quite obscure, it represents that divine power which, whether simply owing to a fall, or as the hero who makes war on, and is partly vanquished by darkness, descends into the darkness of the material world, and with whose descent begins the great drama of the world’s development. From this power are derived those portions of light existing and held prisoner in this lower world. And as he has raised himself again out of the material world, or has been set free by higher powers, so shall also the members of the Primal Man, the portions of light still imprisoned in matter, be set free.

The question of the derivation of the myth of the Primal Man is still one of the unsolved problems of religious history. It is worthy of notice that according to the old Persian myth also, the development of the world begins with the slaying of the primal man Gayomart by Angra-Mainyu (Ahriman); further, that the Primal Man (“son of man ” = man) also plays a part in Jewish apocalyptic literature (Daniel, Enoch, iv. Ezra), whence this figure passes into the Gospels; and again, that the dogma of Christ’s descent into hell is directly connected with this myth. But these parallels do not carry us much further. Even the Persian myth is entirely obscure, and has hitherto defied interpretation. It is certainly true that in some way an essential part in

the formation of the myth has been played by the sun-god, who daily descends into darkness, to rise from it again victoriously. But how to explain the combination of the figure of the sun-god with that of the Primal Man is an unsolved riddle. The meaning of this figure in the Gnostic speculations is, however, clear. It answers the question: how did the portions of light to be found in this lower world, among which certainly belong the souls of the Gnostics, enter into it?

A parallel myth to that of the Primal Man are the accounts to be found in most of the Gnostic systems of the creation of the first man. In all these accounts the idea is expressed that so far as his body is concerned man is the work of the angels who created the world. So e.g. Satornil relates (Irenaeus i. 24. 1) that a brilliant vision appeared from above to the world- creating angels; they were unable to hold it fast, but formed man after its image. And as the man thus formed was unable to move, but could only crawl like a worm, the supreme Power put into him a spark of life, and man came into existence. Imaginations of the same sort are also to be found, e.g. in the genuine fragments of Valentinus (Hilgenfeld, Ketzergeschichte, p. 293), the Gnostics of Irenaeus i. 30. 6, the Mandaeans (Brandt, Religion der Mandaer, p. 36), and the Manichaeans (Baur, Religionssystem, p. 118 seq.). The Naasseni (Hippolytus, Philosophumena, v. 7) expressly characterize the myth as Chaldean (cf. the passage from Zosimus, in Reitzenstein's Poimandres, p. 104). Clearly then the question which the myth of the Primal Man is intended to answer in relation to the whole universe is answered in relation to the nature of man by this account of the coming into being of the first man, which may, moreover, have been influenced by the account in the Old

meet with speculations of this kind about man in the circles I Testament. That question is: how does it happen that in this

inferior body of man, fallen a prey to corruption, there dwells a higher spark of the divine Being, or in other words, how are we to explain the double nature of man?

VI. Of all the fundamental ideas of Gnosticism of which we have so far treated, it can with some certainty be assumed that they were in existence before the rise of Christianity and the influence of Christian ideas on the development of Gnosticism. The main question with which we have now to deal is that of whether the dominant figure of

the Saviour (S wrrip) in Gnosticism is of specifically Christian derivation, or whether this can also be explained apart from the assumption of Christian influence. And here it must be premised that, intimately as the conception of salvation is bound up with the Gnostic religion, the idea of salvation accomplished in a definite historical moment to a certain extent remained foreign to it. Indeed, nearly all the Christian Gnostic systems clearly exhibit the great difficulty with which they had to contend in order to reconcile the idea of an historical redeemer, actually occurring in the form of a definite person, with their conceptions of salvation. In Gnosticism salvation always lies at the root of all existence and all history. The fundamental conception varies greatly. At one time the Primal Man, who sank down into matter, has freed himself and risen out of it again, and like him his members will rise out of darkness into the light {Poimandres); at another time the Primal Man who was conquered by the powers of darkness has been saved by the powers of light, and thus too all his race will be saved (Manichaeism); at another time the fallen Sophia is purified by her passions and sorrows and has found her Syzygos, the Soter, and wedded him, and thus all the souls of the Gnostics who still languish in matter will become the brides of the angels (5f the Soter (Valentinus). In fact salvation, as conceived in Gnosticism, is always a myth, a history of bygone events, an allegory or figure, but not an historical event. And this decision is not affected by the fact that in certain Gnostic sects figured historical personages such as Simon Magus and Menander. The Gnostic ideas of salvation were in the later schools and sects transferred to these persons whom we must consider as rather obscure charlatans and miracle-mongers, just as in other cases they were transferred to the person of Christ. The ” Helena ” of the Simonian system was certainly not an historical but a mythical figure. This explains the laborious and artificial way in which the person of Jesus is connected in many Gnostic systems with the original Gnostic conception of redemption. In this patchwork the joins are everywhere still clearly to be recognized. Thus, e.g. in the Valentinian system, the myth of the fallen Sophia and the Soter, of their ultimate union, their marriage and their 70 sons (Irenaeus i. 4. 5; Hippolytus, Philos. vi. 34), has absolutely nothing to do with the Christian conceptions of salvation. The subject is here that of a high goddess of heaven (she has 70 sons) whose friend and lover finds her in the misery of deepest degradation, frees her, and bears her home as his bride. To this myth the idea of salvation through the earthly Christ can only be attached with difficulty. And it was openly maintained that the Soter only existed for the Gnostic, the Saviour Jesus who appeared on earth only for the ” Psychicus ” (Irenaeus i. 6. 1).

VII. Thus the essential part of most of the conceptions of what we call Gnosticism was already in existence and fully developed before the rise of Christianity. But the fundamental ideas of Gnosticism and of early Christianity had a kind of magnetic attraction for each other. What drew these two forces together was the energy exerted by the universal idea of salvation in both systems. Christian Gnosticism actually introduced only one new figure into the already existing Gnostic theories, namely that of the historical Saviour Jesus Christ. This figure afforded, as it were, a new point of crystallization for the existing Gnostic ideas, which now grouped themselves round this point in all their manifold diversity. Thus there came into the fluctuating mass a strong movement and formative impulse, and the individual systems and sects sprang up like mushrooms from this soil.

It must now be our task to make plain the position of Gnosti-

cism within the Christian religion, and its significance for the development of the latter. Above all the Gnostics represented and developed the distinctly anti-Jewish tendency in Christianity. Paul was the apostle whom they reverenced, and his spiritual influence on them is quite unmistakable. The Gnostic Marcion has been rightly characterized as a direct disciple of Paul. Paul's battle against the law and the narrow national conception of Christianity found a willing following in a movement, the syncretic origin of which directed it towards a universal religion. St Paul's ideas were here developed to their extremest conse- quences, and in an entirely one-sided fashion such as was far from being in his intention. In nearly all the Gnostic systems the doctrine of the seven world-creating spirits is given an anti- Jewish tendency, the god of the Jews and of the Old Testament appearing as the highest of the seven. The demiurge of the Valentinians always clearly bears the features of the Old Testament creator-God.

The Old Testament was absolutely rejected by most of the Gnostics. Even the so-called Judaeo-Christian Gnostics (Cerinthus), the Ebionite (Essenian) sect of the Pseudo- Clementine writings (the Elkesaites), take up an inconsistent attitude towards Jewish antiquity and the Old Testament. In this repect the opposition to Gnosticism led to a reactionary movement. If the growing Christian Church, in quite a different fashion from Paul, laid stress on the literal authority of the Old Testament, interpreted, it is true, allegorically; if it took up a much more friendly and definite attitude towards the Old Testament, and gave wider scope to the legal conception of religion, this must be in part ascribed to the involuntary reaction upon it of Gnosticism.

The attitude of Gnosticism to the Old Testament and to the creator-god proclaimed in it had its deeper roots, as we have already seen, in the dualism by which it was dominated. With this dualism and the recognition of the worthlessness and absolutely vicious nature of the material world is combined a decided spiritualism. The conception of a resurrection of the body, of a further existence for the body after death, was unattain- able by almost all of the Gnostics, with the possible exception of a few Gnostic sects dominated by Judaeo-Christian tendencies. With the dualistic philosophy is further connected an attitude of absolute indifference towards this lower and material world, and the practice of asceticism. Marriage and sexual propagation are considered either as absolute Evil or as altogether worthless, and carnal pleasure is frequently looked upon as forbidden. Then again asceticism sometimes changes into wild libertinism. Here again Gnosticism has exercised an influence on the develop- ment of the Church by way of contrast and opposition. If here a return was made to the old material view of the resurrection (the apostolic dvaorcuns rijs trap/cos), entirely abandoning the more spiritual conception which had been arrived at as a com- promise by Paul, this is probably the result of a reaction from the views of Gnosticism. It was just at this point, too, that Gnosticism started a development which was followed later by the Catholic Church. In spite of the rejection of the ascetic attitude of the Gnostics, as a blasphemy against the Creator, a part of this ascetic principle became at a later date dominant throughout all Christendom. And it is interesting to observe how, e.g.; St Augustine, though desperately combating the dualism of the Manichaeans, yet afterwards introduced a number of dualistic ideas into Christianity, which are distinguishable from those of Manichaeism only by a very keen eye, and even then with difficulty.

The Gnostic religion also anticipated other tendencies. As we have seen, it is above all things a religion of sacraments and mysteries. Through its syncretic origin Gnosticism introduced for the first time into Christianity a whole mass of sacramental, mystical ideas, which had hitherto existed in it only in its earliest phases. But in the long run even genuine Christianity has been unable to free itself from the magic of the sacraments; and the Eastern Church especially has taken the same direction as Gnosticism. Gnosticism was also the pioneer of the Christian Church in the strong emphasis laid on the idea of salvation in

religion. And since the Gnostics were compelled to draw the figure of the Saviour into a world of quite alien myths, their Christology became so complicated in character that it frequently recalls the Christology of the later dogmatic of the Greek Fathers. Finally, it was Gnosticism which gave the most decided impulse to the consolidation of the Christian Church as a church. Gnosticism itself is a free, naturally-growing religion, the religion of isolated minds, of separate little circles and minute sects. The homogeneity of wide circles, the sense of responsibility engendered by it, and continuity with the past are almost entirely lacking in it. It is based upon revelation, which even at the present time is imparted to the individual, upon the more or less convincing force of the religious imagination and specula- tions of a few leaders, upon the voluntary and unstable grouping of the schools round the master. Its adherents feel themselves to be the isolated, the few, the free and the enlightened, as opposed to the sluggish and inert masses of mankind degraded into matter, or the initiated as opposed to the uninitiated, the Gnostics as opposed to the ” Hylici ” (vKikoL); at most in the later and more moderate schools a middle place was given to the adherents of the Church as Psychici (xjajxˆol) .

This freely-growing Gnostic religiosity aroused in the Church an increasingly strong movement towards unity and a firm and inelastic organization, towards authority and tradition. An organized hierarchy, a definitive canon of the Holy Scriptures, a confession of faith and rule of faith, and unbending doctrinal discipline, these were the means employed. A part was also played in this movement by a free theology which arose within the Church, itself a kind of Gnosticism which aimed at holding fast whatever was good in the Gnostic movement, and obtaining its recognition within the limits of the Church (Clement of Alexandria, Origen). But the mightiest forces, to which in the end this theology too had absolutely to give way, were outward organization and tradition.

It must be considered as an unqualified advantage for the further development of Christianity, as a universal religibn, that at its very outset it prevailed against the great movement of Gnosticism. In spite of the fact that in a few of its later repre- sentatives Gnosticism assumed a more refined and spiritual aspect, and even produced blossoms of a true and beautiful piety, it is fundamentally and essentially an unstable religious syn- cretism, a religion in which the determining forces were a fantastic oriental imagination and a sacramentalism which degenerated into the wildest superstitions, a weak dualism fluctuating unsteadily between asceticism and libertinism. Indirectly, how- ever. Gnosticism was certainly one of the

most powerful factors in the development of Christianity in the ist century.

VIII. This sketch may be completed by a short review of the various separate sects and their probable connexion with each other. As a point of departure for the history of the develop- ment of Gnosticism may be taken the numerous little sects which were apparently first included under the name of ” Gnos- tics ” in the narrower sense. Among these probably belong the Ophites of Celsus (in Origen), the many little sects included by Epiphanius under the name of Nicolaitans and Gnostics (Haer. 25. 26); the Archontici (Epiphanius, Haer. xl.), Sethites (Cain- ites) should also here be mentioned, and finally the Carpocratians. Common to all these is the dominant position assumed by the ” Seven ” (headed by Ialdabaoth) ; the heavenly world lying above the spheres of the Seven is occupied by comparatively few figures, among which the most important part is played by the /xrjT-qp, who is sometimes enthroned as the supreme goddess in heaven, but in a few systems has already descended from there into matter, been taken prisoner, &c. Numerous little groups are distinguished from the mass, sometimes by one peculiarity, sometimes by another. On the one hand we have sects with a strongly ascetic tendency, on the other we find some characterized by unbridled libertinism; in some the most abandoned prostitution has come to be the most sacred mystery; in others again appears the worship of serpents, which here appears to be connected in various and often very loose ways with the other ideas of these Gnostics — hence the names of the

” Ophites,” ” Naasseni.” To this class also fundamentally belong the Simoniani, who have included the probably historical figure of Simon Magus in a system which seems to be closely connected with those we have mentioned, especially if we look upon the ” Helena ” of this system as a mythical figure. A particular branch of the ” Gnostic ” sects is represented by those systems in which the figure of Sophia sinking down into matter already appears. To these belong the Barbelognostics (in the description given by Irenaeus the figure of the Spirit takes the place of that of Sophia), and the Gnostics whom Irenaeus (i. 30) describes (cf. Epiphanius, Haer. xxvi.). And here may best be included Bardesanes, a famous leader of a Gnostic school of the end of the 2nd century. Most scholars, it is true, following an old tradition, reckon Bardesanes among the Valentinians. But from the little we know of Bardesanes, his system bears no trace of relationship with the complicated Valentinian system, but is rather completely derived from the ordinary Gnosticism, and is distinguished from it apparently only by its more strongly dualistic character. The systems

of Valentinus and his disciples must be considered as a further development of what we have just characterized as the popular Gnosticism, and especially Of that branch of it to which the figure of Sophia is already known. In them above all the world of the higher aeons is further ex- tended and filled with a throng of varied figures. They also exhibit a variation from the characteristic dualism of Gnosticism into monism, in their conception of the fall of Sophia and their derivation of matter from the passions of the fallen Sophia. The figures of the Seven have here entirely disappeared, the remem- brance of them being merely preserved in the name of the Ariniovpyos (e/36ojuds). In general, Valentinianism displays a particular resemblance to the dominant ideas of the Church", both in its complicated Christology, its triple division of mankind into Trvevfia.Ti.Koi, ipvxt-Koi and vKlkoI, and its far-fetched interpretation of texts. 1 A quite different position from those mentioned above is taken by Basilides (?.».). From What little we know of him he was an uncompromising dualist. Both the systems which are handed down under his name by Irenaeus and Hippolytus, that of emanations and the monistic-evolutionary system, represent further developments of his ideas with a tendency away from dualism towards monism. Characteristic- ally, in these Basilidian systems the figure of the " Mother " or of Sophia does not appear. This peculiarity the Basilidian system shares with that of Satornil of Antioch, which has only come down to us in a very fragmentary state, and in other respects recalls in many ways the popular Gnosticism. By itself, on the other hand, stands the system preserved for us by Hippolytus in the Philosophumena under the name of the Naasseni, with its central figure of "the Man," which, as we have seen, is very closely related with certain specifically pagan Gnostic speculations which have come down to us (in the Poi- mandres, in Zosimus and Plotinus, Ennead ii. 9). With the Naasseni, moreover, are related also the other sects of which Hippolytus alone gives us a notice in his Philosophumena (Docetae, Perates, Sethiani, the adherents of Justin, the Gnostic of Monoimos). Finally, apart from all other Gnostics stands Marcion. With him, as far as we are able to conclude from the scanty notices of him, the manifold Gnostic speculations are reduced essentially to the one problem of the good and the just God, the God of the Christians and the God of the Old Testament. Between these two powers Marcion affirms a sharp and, as it appears, originally irreconcilable dualism which with him rests moreover on a speculative basis. Thanks to the noble simplicity and specifically religious character of his ideas, Marcion was able to found not only schools, but a community, a church of his own, which gave trouble to the Church longer than any other Gnostic sect. Among his disciples the speculative and fantastic

element of Gnosticism again became more apparent. As we have already intimated, Gnosticism had such a power

1 For the disciples of Valentinus, especially Marcus, after whom was named a separate sect, the Marcosians, with their Pythagorean theories of numbers and their strong tincture of the mystical, magic, i and sacramental, see Valentinus and Valentinians^

of attraction that it now drew within its limits even Judaeo- Christian sects. Among these we must mention the Judaeo- Christian Gnostic Cerinthus, also the Gnostic Ebionites, of whom Epiphanius (Haer.) gives us an account, and whose writings are to be found in a recension in the collected works of the Pseudo-Clementine Recognitions and Homilies; to the same class belong the Elkesaites with their mystical scripture, the Elxai, extracts of which are given by Hippolytus in the Philos. (ix. 13). Later evidence of the decadence of Gnosticism occurs in the Pistis-Sophia and the Coptic Gnostic writings discovered and edited by Schmidt. In these confused records of human imagina- tion gone mad, we possess a veritable herbarium of all possible Gnostic ideas, which were once active and now rest peacefully side by side. None the less, the stream of the Gnostic religion is not yet dried up, but continues on its way; and it is beyond a doubt that the later Mandaeanism and the great religious movement of Mani are most closely connected with Gnosticism. These manifestations are all the more characteristic since in them we meet with a Gnosticism which remained essentially more untouched by Christian influences than the Gnostic systems of the 2nd century a.d. Thus these systems throw an important light on the past, and a true perception of the nature and purpose of Gnosticism is not to be obtained without taking them into consideration.

Bibliography. — A. Neander, Genetische Entwicklung d. vornehm- sten gnostischen Systeme (Berlin, 1818); F. Chr. Baur, Die christl. Gnosis in ikrer geschichtl. Entwicklung (Tubingen, 1835); E. W. Moller, Gesch. der Kosmologie in der griechischen Kirche bis Origenes (Halle, i860); R. A. Lipsius, Der Gnoslicismus (Leipzig, i860; originally in Ersch and Gruber's Encyclopddie) ; H. L. Mansel, The Gnostic Heresies of the 1st and 2nd Centuries (London, 1875); K. Kepler, tjber Gnosis und altbabylonische Religion, a lecture delivered at the Congress of Orientalists (Berlin, 1881); A. Hilgen- feld, Ketzergeschichte des Urchristentums (Leipzig, 1884); and in Ztschr.

fur wissenschaftl. Theol. 1890, i. “Der Gnosticismus ” ; A. Harnack, Dogmengeschichte, i. 271 seq. (cf. the corresponding sections of the Dogmengeschichten of Loofs and Seeberg) ; W. Anz, ” Zur Frage nach dem Ursprung des Gnosticismus,” Texte u. Unter- suchungen, xv. 4 (Leipzig, 1897); R. Liechtenhahn, Die Offenbarung im Gnosticismus (Gottingen, 1901); C. Schmidt, ” Plotins Stellung zum Gnosticismus u. kirchl. Christentum ” Texte u. Untersuch. xx. 4 (1902) ; E. de Faye, Introduction ct V etude du Gnosticisme (Paris, 1903) ; R. Reitzenstein, Poimandres (Leipzig, 1904) ; G. Kriiger, article ” Gnosticismus ” in Herzog-Hauck’s Realencyklopadie (3rd ed.) vi. 728 ff . ; Bousset, ” Hauptprobleme der Gnosis,” Forschungen z. Relig. u. Lit. d. alien u. neuen Testaments, 10 (1907); T. Wendland, Hellenistisch-romische Kultur in ihren Beziehungen zu Judentum und Christentum (1907), p. 161 seq. See further among important monographs on the individual Gnostic systems, R. A. Lipsius, ” Die ophitischen Systeme,” Ztschr. f. wissensch. Theologie (1863); G. Heinrici, Die valentinianische Gnosis u. d. Heilige Schrift (Berlin, 1871); A. Merx, Bardesanes von Edessa (Halle, 1863); A. Hilgenfeld, Bardesanes, der letzte Gnostiker (Leipzig, 1864); A. Harnack, ” fiber das gnostische Buch Pistis-Sophia,” Texte u. Untersuch. vii. 2; C. Schmidt, ” Gnostische Schriften,” Texte u. Untersuch. viii. I, 2; and also the works mentioned under § II. of this article. (W. Bo.)

S0U&IV-

^^,^

White-tailed Gnu, or Black Wildebeest {Connochaetes gnu).

GNU, the Hottentot name for the large white-tailed South African antelope (?.».), now nearly extinct, know to the Boers as the black wildebeest, and to naturalists as Connochaetes (or Catoblepas) gnu. A second and larger species is the brindled gnu or blue wildebeest (C. taurinus or Catoblepas gorgon), also known by the Bechuana name kokon or kokoon; and there are several East African forms more or less closely related to the latter which have received distinct names.

GO, or Go-Bang (Jap. Go-ban, board for playing Go), a popular table game. It is of great antiquity, having been invented in Japan, according to tradition, by the emperor Yao, 2350 B.C., but it is probably of Chinese origin. According to Falkener the first historical mention of it was made about the year 300 B.C., but there is abundant evidence that it was a popular game long before that period. The original Japanese Go is played on a board divided into squares by 19 horizontal and 19 vertical lines, making 361 intersections, upon which

the flat round men, 181 white and 181 black, are placed one by one as the game proceeds. The men are placed by the two players on any inter- sections (me) that may seem advantageous, the object being to surround with one's men as many unoccupied intersections as possible, the player enclosing the greater number of vacant points being the winner. Completely surrounded men are captured and removed from the board. This game is played in England upon a board divided into 361 squares, the men being placed upon these instead of upon the intersections.

A much simpler variety of Go, mostly played by foreigners, has for its object to get five men into line. This may have been the earliest form of the game, as the word go means five. Except in Japan it is often played on an ordinary draughts-board, and the winner is he who first gets five men into line, either vertically, horizontally or diagonally.

See Go-Bang, by A. Howard Cady, in Spalding's Home Library (New York, 1896) ; Games Ancient and Oriental, by Edward Falkener (London, 1892) ; Das japan.-chinesische Spiel Go, by O. Korschelt (Yokohama, 1881); Das Nationalspiel der Japanesen, by G. Schurig (Leipzig, 1888).

GOA, the name of the past and present capitals of Portuguese India, and of the surrounding territory more exactly described as Goa settlement, which is situated on the western coast of India, between 15° 44′ and 14° 53′ N., and between 73° 45′ and 74 26′ E. Pop. (1900) 475,513, area 1301 sq. m.

Goa Settlement. — With Damaun (q.v.) and Diu (g.v.) Goa settlement forms a single administrative province ruled by a governor-general, and a single ecclesiastical province subject to the archbishop of Goa; for judicial purposes the province includes Macao in China, and Timor in the Malay Archipelago. It is bounded on the N. by the river Terakhul or Araundem, which divides it from the Sawantwari state, E. by the Western Ghats, S. by Kanara district, and W. by the Arabian Sea. It comprises the three districts of Ilhas, Bardez and Salsette, conquered early in the 16th century and therefore known as the Velhas Conquistas (Old Conquests), seven districts acquired later and known as the Novas Conquistas, and the island of Anjidiv or Anjadiva. The settlement, which has a coast-line of 62 m., is a hilly region, especially the Novas Conquistas; its distinguishing features are the Western Ghats, though the highest summits nowhere reach an altitude of 4000 ft., and the island of Goa; Numerous short but navigable rivers water the lowlands skirting the coast. The two largest rivers are the Mandavi and the Juari, which together encircle the island of Goa

(Ilhas), being connected on the landward side by a creek. The island (native name Tisvadi, Tissuvaddy, Tissuary) is a triangular territory, the apex of which, called the cabo or cape, is a rocky headland separating the harbour of Goa into two anchorages — Agoada or Aguada at the mouth of the Mandavi, on the north, and Mormugao or Marmagao at the mouth of the Juari, on the south. The northern haven is exposed to the full force of the south-west monsoon, and is liable to silt up during the rains. The southern, sheltered by the promontory of Salsette, is always open, but is less used, owing to its greater distance from the city of Goa, which is built on the island. A railway connects Mor- magao, south of the Juari estuary, with Castle Rock on the

Western Ghats. Goa imports textiles and foodstuffs, and exports coco-nuts, areca-nuts, spices, fish, poultry and timber. Its trade is carried on almost entirely with Bombay, Madras, Kathiawar and Portugal. Manganese is mined in large quantities, some iron is obtained, and other products are salt, palm-spirit, betel and bananas.

Cities of Goa. — i. The ancient Hindu city of Goa, of which hardly a fragment survives, was built at the southernmost point of the island, and was ˆfamous in early Hindu legend and history for its learning, wealth and beauty. In the Puranas and certain inscriptions its name appears as Gove, Govapurl, Gomant, &c; the medieval Arabian geographers knew it as Sindabur or Sanda- bur, and the Portuguese as Goa Velha. It was ruled by the Kadamba dynasty from the 2nd century a.d. to 13 12, and by Mahommedan invaders of the Deccan from 13 12 until about 1370, during which period it was visited and described by Ibn Batuta. It was then annexed to the Hindu kingdom of Vijayanagar, of which, according to Ferishta, it still formed part in 1469, when it was conquered by the Bahmani sultan of the Deccan; but two of the best Portuguese chroniclers state that it became independent in 1440, when the second city (Old Goa) was founded.

2. Old Goa is, for the most part, a city of ruins without inhabitants other than ecclesiastics and their dependents. The chief surviving buildings are the cathedral, founded by Albu- querque in 1 51 1 to commemorate his entry into Goa on St Catherine's day 1510, and rebuilt in 1623, and still used for public worship; the convent of St Francis (1517), a converted mosque rebuilt in 1661, with a portal of carved black stone, which is the only relic of Portuguese architecture

in India dating from the first quarter of the 16th century; the chapel of St Catherine (1551); the church of Bom Jesus (1594-1603), a superb example of Renaissance architecture as developed by the Jesuits, containing the magnificent shrine and tomb of St Francis Xavier (see Xavier, Francisco de) ; and the 1 7th-century convents of St Monica and St Cajetan. The college of St Paul (see below) is in ruins.

3. Panjim, Pangim or New Goa originally a suburb of Old Goa, is, like the parent city, built on the left bank of the Mandavi estuary, in 15° 30′ N. and 73 33′ E. Pop. (1901) 9500. It is a modern port with few pretensions to architectural beauty. Ships of the largest size can anchor in the river, but only small vessels can load or discharge at the quay. Panjim became the residence of the viceroy in 1759 and the capital of Portuguese India in 1843. It possesses a lyceum, a school for teachers, a seminary, a technical school and an experimental agricultural station.

Political History. — With the subdivision of the Bahmani kingdom, after 1482, Goa passed into the power of Yusuf Adil Shah, king of Bijapur, who was its ruler when the Portuguese first reached India. At this time Goa was important as the starting-point of pilgrims from India to Mecca, as a mart with no rival except Calicut on the west coast, and especially as the centre of the import trade in horses (Gulf Arabs) from Hormuz, the control of which was a vital matter to the kingdoms warring in the Deccan. It was easily defensible by any power with command of the sea, as the encircling rivers could only be forded at one spot, and had been deliberately stocked with crocodiles. It was attacked on the 10th of February 15 10 by the Portuguese under Albuquerque. As a Hindu ascetic had foretold its downfall and the garrison of Ottoman mercenaries was outnumbered, the city surrendered without a struggle, and Albuquerque entered it in triumph, while the Hindu townsfolk strewed filagree flowers of gold and silver before his feet. Three months later Yusuf Adil Shah returned with 60,000 troops, forced the passage of tfi'e ford, and blockaded the Portuguese in their ships from May to August, when the cessation of the monsoon enabled them to put to sea. In November Albuquerque returned with a larger force, and after overcoming a desperate resistance, recaptured the city, permitted his soldiers to plunder it for three days, and massacred the entire Mahommedan population.

Goa was the first territorial possession of the Portuguese in

Asia. Albuquerque intended it to be a colony and a naval base, as distinct from the fortified factories which had been established in certain Indian seaports. He encouraged his men to marry native

women, and to settle in Goa as farmers, retail traders or artisans. These married men soon became a privileged caste, and Goa acquired a large Eurasian population. Albuquerque and his successors left almost untouched the customs and con- stitutions of the 30 village communities on the island, only abolishing the rite of suttee. A register of these customs (Foral de usos e costumes) was published in 1526, and is an historical document of much value; an abstract of it is given in R. S. Whiteway's Rise of the Portuguese Empire in India (London,

1898).

Goa became the capital of the whole Portuguese empire in the East. It was granted the same civic privileges as Lisbon. Its senate or municipal chamber maintained direct communications with the king and paid a special representative to attend to its interests at court. In 1563 the governor even proposed to make Goa the seat of a parliament, in which all parts of the Portuguese east were to be represented; this was vetoed by the king.

In 1542 St Francis Xavier mentions the architectural splendour of the city; but it reached the climax of its prosperity between 1575 and 1625. Goa Dourada, or Golden Goa, was then the wonder of all travellers, and there was a Portuguese proverb, " He who has seen Goa need not see Lisbon." Merchandise from all parts of the East was displayed in its bazaar, and separate streets were set aside for the sale of different classes of goods — Bahrein pearls and coral, Chinese porcelain and silk, Portuguese velvet and piece-goods, drugs and spices from the Malay Archi- pelago. In the main street slaves were sold by auction. The houses of the rich were surrounded by gardens and palm groves; they were built of stone and painted red or white. Instead of glass, their balconied windows had thin polished oyster-shells set in lattice-work.

The social life of Goa was brilliant, as befitted the headquarters of the viceregal court, the army and navy, and the church; but the luxury and ostentation of all classes had become a byword before the end of the 1 6th century. Almost all manual labour was done by slaves; common soldiers assumed high-sounding titles, and it was even customary for the poor noblemen who congregated together in boarding-houses to subscribe for a few silken cloaks, a silken umbrella and a common man-servant, so that each could take his turn to promenade the streets, fashionably attired and with a proper escort. There were huge gambling saloons, licensed by the municipality, where determined players lodged for weeks together; and every form

of vice, except drunkenness, was practised by both sexes, although European women were forced to lead a kind of zenana life, and never ventured unveiled into the streets; they even attended at church in their palanquins, so as to avoid observation.

The appearance of the Dutch in Indian waters was followed by the gradual ruin of Goa. In 1603 and 1639 the city was blockaded by Dutch fleets, though never captured, and in 1635 it was ravaged by an epidemic. Its trade was gradually monopolized by the Jesuits. Thevenot in 1666, Baldaeus in 1672, Fryer in 1675 describe its ever-increasing poverty and decay. In 1 683 only the timely appearance of a Mogul army saved it from capture by a horde of Mahratta raiders, and in 1739 the whole territory was attacked by the same enemies, and only saved by the unexpected arrival of a new viceroy with a fleet. This peril was always imminent until 1759, when a peace with the Mahrattas was con- cluded. In the same year the proposal to remove the seat of government to Panjim was carried out ; it had been discussed as early as 1684. Between 1695 and 1775 the population dwindled from 20,000 to 1600, and in 1835 Goa was only inhabited by a few priests, monks and nuns.

Ecclesiastical History. — Some Dominican friars came out to Goa in 1510, but no large missionary enterprise was undertaken before the arrival of the Franciscans in 151 7. From their head- quarters in Goa the Franciscan preachers visited many parts of western India, and even journeyed to Ceylon, Pegu and the Malay Archipelago. For nearly twenty-five years they carried on

the work of evangelization almost alone, with such success that in 1534 Pope Paul III. made Goa a bishopric, with spiritual jurisdic- tion over all Portuguese possessions between China and the Cape of Good Hope, though itself suffragan to the archbishopric of Funchal in Madeira. A Franciscan friar, Joao de Albuquerque, came to Goa as its first bishop in 1538. In 1542 St Francis Xavier came to Goa, and took over the Franciscan college of Santa Fe, for the training of native missionaries; this was re- named the College of St Paul, and became the headquarters of all Jesuit missions in the East, where the Jesuits were commonly styled Paulistas. By a Bull dated the 4th of February 1557 Goa was made an archbishopric, with jurisdiction over the sees of Malacca and Cochin, to which were added Macao (1575), Japan (1588), Angamale or Cranganore (1600), Meliapur (Mylapur) (1 606)

, Peking and Nanking (1 6 1 o) , together with the bishopric of Mozambique, which included the entire coast of East Africa. In 1606 the archbishop received the title of Primate of the East, and the king of Portugal was named Patron of the Catholic Missions in the East; his right of patronage was limited by the Concordat of 1857 to Goa, Malacca, Macao and certain parts of British India. The Inquisition was introduced into Goa in 1 560 : a vivid account of its proceedings is given by C. Dellon, Relation de I' inquisition de Goa (1688). Five ecclesiastical councils, which dealt with matters of discipline, were held at. Goa — in 1567, 1 575, 1585, 1592 and 1606; the archbishop of Goa also presided over the more important synod of Diamper (Udayamperur, about 12 m. S.E. of Cochin), which in 1599 condemned as heretical the tenets and liturgy of the Indian Nestorians, or Christians of St Thomas (q.v.). In 1675 Fryer described Goa as " a Rome in India, both for absoluteness and fabrics," and Hamilton states that early in the 18th century the number of ecclesiastics in the settlement had reached the extraordinary total of 30,000. But the Jesuits were expelled in 1759 , and by 1800 Goa had lost much even of its ecclesiastical importance. The Inquisition was abolished in 1814 and the religious orders were secularized in 1835.

Bibliography. — J. N. da Fonseca, An Historical and Archaeo- logical Sketch of Goa (Bombay, 1 878) is a minute study of the city from the earliest times, illustrated. For the early history of Portu- guese rule the chief authorities are The Commentaries . . . of Dalboquerque (Hakluyt Society's translation, London, 1877), the Cartas of Albuquerque (Lisbon, 1884), the Historia . . . da India of F. L. de Castanheda (Lisbon, 1833, written before 1552), the Lendas da India of G. Correa (Lisbon, 1860, written 1514-1566), and the Decadas da India of Joao de Barros and D. do Couto (Lisbon, 1 778-1 788, written about 1530-1616). Couto's Soldado pratico (Lisbon, 1790) and S. Botelho's Cartas and Tombo, written 1547-1554, published in "Subsidios" of the Lisbon Academy (1868), are valuable studies of military life and administration. The Archivo Portuguez oriental (6 parts, New Goa, 1857-1877) is a most useful collection of documents dating from 1515 ; part 2 contains the privileges, &c. of the city of Goa, and part 4 contains the minutes of the ecclesiasti- cal councils and of the synod of Diamper. The social life of Goa has been graphically described by many writers; see especially the travels of Varthema (c. 1505), Linschoten (c. 1580), Pyrard (1608) in the Hakluyt Society's translations; J. Mocquet, Voyages (Paris, 1830, written 1608-1610); P. Baldaeus, in Churchill's Voyages, vol. 3 (London, 1732); J. Fryer, A New Account of East India and Persia (London, 1698) ; A. de Mandelslo, Voyages (London, 1669) ; Les Voyages de M. de Thevenot

aux Indes Orientates (Amster- dam, 1779), and A. Hamilton, A New Account of the East Indies (London, 1774). For Goa in the 20th century see The Imperial Gazetteer of India. (K. G. J.)

GOAL, originally an object set up as the place where a race ends, the winning-post, and so used figuratively of the end to which any effort is directed. It is thus used to translate the Lat. meta, the boundary pillar, set one at each end of the circus to mark the turning-point. The word was quite early used in various games for the two posts, with or without a cross-bar, through or over which the ball has to be driven to score a point' towards winning the game. The New English Dictionary quotes the use in Richard Stanyhurst's Description of Ireland (1577); but the word gol in the sense of a boundary appears as early as the beginning of the 14th century in the religious poems of William de Shoreham (c. 1315)- The origin of the word is obscure. It is usually taken to be derived from a French word gaule, meaning a pole or stick, but this meaning does not appear in the English

xn. 6

usage, nor does the usual English meaning appear in the French. There is an O. Eng. gatlan, to hinder, which may point to a lost gdl, barrier, but there is no evidence in other Teutonic languages for such a word.

GOALPARA, a town and district of British India, in the Brahmaputra valley division of eastern Bengal and Assam. The town (pop. 6287) overlooks the Brahmaputra. It was the frontier outpost of the Mahommedan power, and has long been a flourishing seat of river trade. The civil station is built on the summit of a small hill commanding a magnificent view of the valley of the Brahmaputra, bounded on the north by the snowy ranges of the Himalayas and on the south by the Garo hills. The native town is built on the western slope of the hill, and the lower portion is subject to inundation from the marshy land which extends in every direction. It has declined in importance since the district headquarters were removed to Dhubri in 1879, and it suffered severely from the earthquake of the 12th of June

1897.

The District comprises an area of 3961 sq. m. It is situated along the Brahmaputra, at the corner where the river takes its southerly course from Assam into Bengal. The scenery is striking. Along the banks of the river grow clumps of cane and reed; farther back stretch fields of rice cultivation, broken only by the fruit trees surrounding the villages, and in the background rise the forest-clad hills overtopped by

the white peaks of the Himalayas. The soil of the hills is of a red ochreous earth, with blocks of granite and sandstone interspersed; that of the plains is of alluvial formation. Earthquakes are common and occasionally severe shocks have been experienced. The Brahma- putra annually inundates vast tracts of country. Numerous extensive forests yield valuable timber. Wild animals of all kinds are found. In 1901 the population was 462,083, showing an increase of 2% in the decade. Rice forms the staple crop. Mustard and jute are also largely grown. The manufactures consist of the making of brass and iron utensils and of gold and silver ornaments, weaving of silk cloth, basket-work and pottery. The cultivation of tea has been introduced but does not flourish anywhere in the district. Local trade is in the hands of Marwari merchants, and is carried on at the bazars, weekly hats or markets and periodical fairs. The chief exports are mustard-seed, jute, cotton, timber, lac, silk cloth, india-rubber and tea; the imports, Bengal rice, European piece goods, salt, hardware, oil and tobacco.

Dhubri (pop. 3737), the administrative headquarters of the district, stands on the Brahmaputra where that river takes its great bend south. It is the termination of the emigration road from North Bengal and of the river steamers that connect with the North Bengal railway. It is also served by the eastern Bengal State railway.

GOAT (a common Teut. word; O. Eng. gdt, Goth, gaits, Mod. Ger. Geiss, cognate with Lat. haedus, a kid), properly the name of the well-known domesticated European ruminant (Capra hircus), which has for all time been regarded as the emblem of everything that is evil, in contradistinction to the sheep, which is the symbol of excellence and purity. Although the more typical goats are markedly distinct from sheep, there is, both as regards wild and domesticated forms, an almost complete gradation from goats to sheep, so that it is exceedingly difficult to define either group. The position of the genus Capra (to all the members of which, as well as some allied species, the name ” goat ” in its wider sense is applicable) in the family Bovidae is indicated in the article Bovidae, and some of the distinctions between goats and sheep are mentioned in the article Sheep. Here then it will suffice to mention that goats are characterized by the strong and offen- sive odour of the males, which are furnished with a beard on the chin; while as a general rule glands are present between the middle toes of the fore feet only.

Goats, in the wild state, are an exclusively old-world group, of which the more typical forms are confined to Europe and south-western and central Asia, although there are two outlying species in northern Africa The wild goat, or pasang, is repre- sented in Europe in the Cyclades and Crete by rather small races.

more or less mingled with domesticated breeds, the Cretan animal being distinguished as Capra hircus creticus; but the large typical race C. h. aegagrus is met with in the mountains of Asia Minor and Persia, whence it extends to Sind, where it is represented by a somewhat different race known as C. h. blythi. The horns of the old bucks are of great length and beauty, and characterized by their bold scimitar-like backward sweep and sharp front edge, interrupted at irregular intervals by knots or bosses. Domesticated goats have run wild in many islands, such as the Hebrides, Shetland, Canaries, Azores, Ascension and Juan Fernandez. Some of these reverted breeds have developed horns of considerable size, although not showing that regularity of curve distinctive oi the wild race. In the Azores the horns are remarkably upright and straight, whence the name of ” antelope-goat ” which has been given to these animals. The concretions known as bezoar-stones, formerly much used in medicine and as antidotes of poison, are obtained from the stomach of the wild goat.

Although there have in all probability been more or less important local crosses with other wild species, there can be no doubt that domesticated goats generally are descended from the wild goat. It is true that many tame goats show spirally twisted horns recalling those of the under-mentioned Asiatic markhor; but in nearly all such instances it will be found that the spiral twists in the opposite direction. Among the domesti- cated breeds the following are some of the more important.

Firstly, we have the common or European goats, of which there are several more or less well-marked breeds, differing from each other in length of hair, in colour and slightly in the configuration of the horns. The ears are more or less upright, sometimes horizontal, but never actually pendent, as in some Asiatic breeds. The horns are rather flat at the base and not unfrequently corrugated; they rise vertically from the head, curving to the . rear, and are more or less laterally inclined. The colour varies from dirty white to dark-brown, but when pure-bred is never black, which indicates eastern blood. Most European countries possess more than one description of the common goat. In the British Isles there are two distinct types, one short and the other long haired. In the former the hair is thick and close, with frequently an under-coat resembling wool. The horns are large in the male, and of moderate size in the female, flat at the base and inclining outwards. The head is short and tapering, the forehead flat and wide, and the nose small; while the legs are strong, thick and well covered with hair. The colour varies from white or grey to black, but is frequently fawn, with a dark line down the spine and another across the shoulders. The other variety has a shaggy coat, generally reddish-black, though sometimes grey or pied and occasionally white. The head is long, heavy and ugly, the nose coarse and prominent, with the horns situated close together, often continuing parallel almost to the extremities, being also large, corrugated and pointed. The legs are long and the sides flat, the animal itself being gener- ally gaunt and thin. This breed is peculiar to Ireland, the Welsh being of a similar type, but more often white. The short- haired goat is the English goat proper. Both British breeds, as well as those from abroad, are frequently ornamented with two tassel-like appendages, hanging near together under the throat. It has been supposed by many that these are traceable to foreign blood; but although there are foreign breeds that possess them, they appear to pertain quite as much to the English native breeds as to those of distant countries, the peculiarity being mentioned in very old works on the goats of the British Islands. The milk-produce in the common goat as well as other kinds varies greatly with individuals. Irish goats often yield a quantity of milk, but the

quality is poor. The goats of France are similar to those of Britain, varying in length of hair, colour and character of horns. The Norway breed is frequently white with long hair; it is rather small in size, with small bones, a short rounded body, head small with a prominent forehead, and short, straight, corrugated horns. The facial line is concave. The horns of the males are very large, and curve round after the manner of the wild goat, with a tuft of hair between and in front.

The Maltese goat has the ears long, wide and hanging down below the jaw. The hair is long and cream-coloured. The breed is usually hornless.

The Syrian goat is met with in various parts of the East, in Lower Egypt, on the shores of the Indian Ocean and in Mada- gascar. The hair and ears are excessively long, the latter so much so that they are sometimes clipped to prevent their being torn by stones or thorny shrubs. The horns are somewhat erect and spiral, with an outward bend.

The Angora goat is often confounded with the Kashmir, but is in reality quite distinct. The principal feature of this breed, of which there are two or three varieties, is the length and quantity of the hair, which has a particularly soft and silky texture, covering the whole body and a great part of the legs with close matted ringlets. The horns of the male differ from those of the female, being directed vertically and in shape spiral, whilst in the female they have a horizontal tendency, somewhat like those of a ram. The coat is composed of two kinds of hair, the one short and coarse and of the character of hair, which lies close to the skin, the other long and curly and of the nature of wool, forming the outer covering. Both are used by the manu- facturer, but the exterior portion, which makes up by far the greater bulk, is much the more valuable. The process of shearing takes place in early spring, the average amount of wool yielded

Fig. i. — Male Angora Goat.

by each animal being about 2§ lb. The best quality comes from castrated males, females producing the next best.

The breed was introduced at the Cape about 1864. The Angora is a bad milker and an indifferent mother, but its flesh is better than that of any other breed, and in its native country is preferred to mutton. The kids are born small, but grow fast, and arrive early at maturity. The Kashmir, or rather Tibet, goat has a delicate head, with semi- pendulous ears, which are both long and wide. The hair varies in

length, and is coarse and of different colours according to the individual. The horns are very erect, and sometimes slightly spiral, inclining inwards and to such an extent in some cases as to cross. The coat is composed, as in the Angora, of two materials; but in this breed it is the under-coat that partakes of the nature of wool and is valued as an article of commerce. This under-coat, or pushm, which is of a uniform greyish-white tint, whatever the colour of the hair may be, is beautifully soft and silky, and of a fluffy description resembling down. It makes its appearance in the autumn, and continues to grow until the following spring, when, if not removed, it falls off naturally; its collection then commences, occupying from eight to ten days. The animal undergoes during that time a process of combing by which all the wool and a portion of the hair, which of necessity comes with it, is removed. The latter is afterwards carefully separated, when the fleece in a good specimen weighs about half a pound. This is the material of which the far-famed and costly, shawls are made, which at one time had such a demand that, it is stated, 16,000 looms were kept in constant work at Kashmir in their manufacture. Those goats having a short, neat head, long, thin, ears, a delicate skin, small bones, and a long heavy coat, are I for this purpose deemed the best. There are several varieties

possessing this valuable quality, but those of Kashmir, Tibet and Mongolia are the most esteemed.

The Nubian goat, which is met with in Nubia, Upper Egypt and Abyssinia, differs greatly in appearance from those previously described. The coat of the female is extremely short, almost like that of a race-horse, and the legs are long. This breed therefore stands considerably higher than the common goat. One of its peculiarities is the convex profile of the face, the forehead being prominent and the nostrils sunk in, the nose itself extremely small, and the lower lip projecting from the upper. The ears are long, broad and thin, and hang down by the side

Fig. 2. — Nubian Goat.

of the head like a lop-eared rabbit. The horns are black, slightly twisted and very short, flat at the base, pointed at the tips, and recumbent on the head. Among goats met with in England a good many show signs of a more or less remote cross with this breed,

derived probably from specimens brought from the East on board ships for supplying milk during the voyage.

The Theban goat, of the Sudan, which is hornless, displays the characteristic features of the last in an exaggerated degree, and in the form of the head and skull is very sheep-like.

The Nepal goat appears to be a variety of the Nubian breed, having the same arched facial line, pendulous ears and long legs. The horns, however, are more spiral. The colour of the hair, which is longer than in the Nubian, is black, grey or white, with black blotches.

Lastly the Guinea goat is a dwarf breed originally from the coast whence its name is derived. There are three varieties. Besides the commonest Capra recurva, there is a rarer breed, Capra depressa, inhabiting the Mauritius and the islands of Bourbon and Madagascar. The other variety is met with along the White Nile, in Lower Egypt, and at various points on the African coast of the Mediterranean.

As regards wild goats other than the representatives of Capra hircus, the members of the ibex-group are noticed under Ibex, while another distinctive type receives mention under Markhor. The ibex are connected with the wild goat by means of Capra nubiana, in which the front edge of the horns is thinner than in either the European C. ibex or the Asiatic C. sibirica; while the Spanish C. pyrenaica shows how the ibex-type of horn may pass into the spirally twisted one distinctive of the markhor, C. falconeri. In the article Ibex mention is made of the Caucasus ibex, or tur, C. caucasica, as an aberrant member of that group! but beside this animal the Caucasus is the home of another very ‘ remarkable goat, or tur, known as C. pallasi. In this ruminant, which is of a dark-brown colour, the relatively smooth black horns diverge outwards in a manner resembling those of the bharal among the sheep rather than in goat-fashion; and, in fact, this tur, which has only a very short beard, is so bharal-like that it is commonly called by sportsmen the Caucasian bharal.

It is one of the species which render it so difficult to give a precise definition of either sheep or goats.

The short-horned Asiatic goats of the genus Hemitragus receive mention in the article Tahr; but it may be added that fossil species of the same genus are known from the Lower Pliocene formations Of India, which have also yielded remains of a goat allied to the markhor of the Himalayas. The Rocky Mountain goat (q-v.) of America has no claim to be regarded as a member of the goat-group.

For full descriptions of the various wild species, see R. Lydekker, Wild Oxen, Sheep, and Goats (London, 1898). (R. L.*)

GOATSUCKER, a bird from very ancient times absurdly believed to have the habit implied by the common name it bears in many European tongues besides English — as testified by the Gr. alyodrfKas, the Lat. caprirmdgus, Ital. succiacapre, Span, chotacabras, Fr. tettechevre, and Ger. Ziegenmelker. The common goatsucker (Caprimulgus europaeus, Linn.), is admittedly the type of a very peculiar and distinct family, Caprimulgidae, a group remarkable for the flat head, enormously wide mouth, large eyes, and soft, pencilled plumage of its members, which vary in size from a lark to a crow. Its position has been variously assigned by systematists. Though now judiciously removed from the Passeres, in which Linnaeus placed all the species known to him, Huxley considered it to form, with two other families — the swifts (Cypselidae) and humming-birds (Trochilidae) — the division Cypselomorphae of his larger group Aegithogndthae, which is equivalent in the main to the Linnaean Passeres. There are two ways of regarding the Caprimulgidae- one including the genus Podargus and its allies, the other recogniz- ing them as a distinct family, Podargidae. As a matter of convenience we shall here comprehend these last in the Capri — mulgidat, which will then contain two subfamilies, Caprimulginae and Podarginae; for what, according to older authors, constitutes a third, though represented only by Steatornis, the singular oil-bird, or guacharo, certainly seems to require separation as an independent family (see Guacharo).

Some of the differences between the Caprimulginae and Podarginae have been pointed out by Sclater (Proc. Zool. Soc, 1866, p. 123), and are very obvious. In the former, the outer toes have four phalanges only, thus presenting a very uncommon character among birds, and the middle claws are pectinated; while in the latter the normal number of five phalanges is found,

Common Goatsucker, and the claws are smooth, and other distinctions more recondite have also been indicated by him (torn. cit. p. 582). The Capri- mulginae may be further divided into those having the gape thickly beset by strong bristles, and those in which there are few such bristles or none — the former containing the genera Capri- mulgus, Antrostomus, Nyctidromus and others, and the latter Podargus, Chordiles, Lyncornis and a few more.

The common goatsucker of Europe (C. europaeus) arrives late in spring from its winter-retreat in Africa, and its presence is soon made

known by its habit of chasing its prey, consisting chiefly of moths and cockchafers, in the evening-twilight. As

the season advances the song of the cock, from its singularity, attracts attention amid all rural sounds. This song seems to be always uttered when the bird is at rest, though the contrary has been asserted, and is the continuous repetition of a single burring note, as of a thin lath fixed at one end and in a state of vibration at the other, and loud enough to reach in still weather a distance of half-a-mile or more. On the wing, while toying with its mate, or performing its rapid evolutions round the trees where it finds its food, it has the habit of occasionally producing another and equally extraordinary sound, sudden and short, but some- what resembling that made by swinging a thong in the air, though whether this noise proceeds from its mouth is not ascer- tained. In general its flight is silent, but at times when disturbed from its repose, its wings may be heard to smite together. The goatsucker, or, to use perhaps its commoner English name, nightjar, 1 passes the day in slumber, crouching on the ground or perching on a tree — in the latter case sitting not across the branch but lengthways, with its head lower than its body. In hot weather, however, its song may sometimes be heard by day and even at noontide, but it is then uttered, as it were, drowsily, and without the vigour that characterizes its crepuscular or nocturnal performance. Towards evening the bird becomes active, and it seems to pursue its prey throughout the night uninterruptedly, or only occasionally pausing for a few seconds to alight on a bare spot — a pathway or road — and then resuming its career. It is one of the few birds that absolutely make no nest, but lays its pair of beautifully-marbled eggs on the ground, generally where the herbage is short, and often actually on the soil. So light is it that the act of brooding, even where there is some vegetable growth, produces no visible depression of the grass, moss or lichens on which the eggs rest, and the finest sand equally fails to exhibit a trace of the parental act. Yet scarcely any bird shows greater local attachment, and the precise site chosen one year is almost certain to be occupied the next. The young, covered when hatched with dark-spotted down, are not easily found, nor are they more easily discovered on becoming fledged, for their plumage almost entirely resembles that of the adults, being a mixture of reddish-brown, grey and black, blended and mottled in a manner that passes description. They soon attain their full size and power of flight, and then take to the same manner of life as their parents. In autumn

all leave their summer haunts for the south, but the exact time of their departure has hardly been ascertained. The habits of the nightjar, as thus described, seem to be more or less essentially those of the whole subfamily — the differences observable being apparently less than are found in other groups of birds of similar extent.

A second species of goatsucker (C. ruficollis), which is some- what larger, and has the neck distinctly marked with rufous, is a summer visitant to the south-western parts of Europe, and especially to Spain and Portugal. The occurrence of a single example of this bird at Killingworth, near Newcastle-on-Tyne, in October 1856, has been recorded by Mr Hancock (Ibis, 1862, p. 39) ; but the season of its appearance argues the probability of its being but a casual straggler from its proper home. Many other species of Caprimulgus inhabit Africa, Asia and their islands, while one (C. macrurus) is found in Australia. Very nearly allied to this genus is Antrostomus, an American group containing many species, of which the chuck- will's-widow (A. carolinensis) and the whip-poor-will (A. vociferus) of the eastern United States (the latter also reaching Canada) are familiar examples. Both these birds take their common name from the cry they utter, and their habits seem to be almost identical, with those of the old world goatsuckers. Passing over some other forms which need not here be mentioned, the genus Nyclidromus, thouglr consisting of only one species (N. albicollis) which inhabits Central and part of South America, requires remark, since it has tarsi of sufficient length to enable it to run swiftly on the ground, while the legs of most birds of the family are so short that they can

1 Other English names of the bird are evejar, fern-owl, churn-owl and wheel-bird — the last from the bird's song resembling the noise made by a spinning-wheel in motion.

make but a shuffling progress. Heleothreptes, with the unique form of wing possessed by the male, needs mention. Notice must also be taken of two African species, referred by some ornithologists to as many genera {Macrodipteryx and Cos- metornis), though probably one genus would suffice for both. The .males of each of them are characterized by the wonderful development of the ninth primary in either wing, which reaches in fully adult specimens the extraordinary length of 17 in. or more. The former of these birds, the Caprimulgus macrodipterus of Adam Afzelius, is considered to belong to the west coast of Africa, and the shaft of the elongated remiges is bare for the greater part of its length, retaining the web, in a spatulate form, only near the tip. The latter, to which the specific name of vexillarius was given by John Gould, has been found on the east coast of that

continent, and is reported to have occurred in Madagascar and Socotra. In this the remigial streamers do not lose their barbs, and as a few of the next quills are also to some extent elongated, the bird, when flying, is said to look as though it had four wings. Specimens of both are rare in collec- tions, and no traveller seems to have had the opportunity of studying the habits of either so as to suggest a reason for this marvellous sexual development.

The second group of Caprimulginae, those which are but poorly or not at all furnished with rictal bristles, contains about five genera, of which we may particularize Lyncornis of the old world and Chordiles of the new. The species of the former are remarkable for the tuft of feathers which springs from each side of the head, above and behind the ears, so as to give the bird an appearance like some of the " horned " owls — those of the genus Scops, for example; and remarkable as it is to find certain forms of two families, so distinct as are the Strigidae and the Capri- mulgidae, resembling each other in this singular external feature, it is yet more remarkable to note that in some groups of the latter, as in some of the former, a very curious kind of dimorphism takes place. In either case this has been frequently asserted to be sexual, but on that point doubt may fairly be entertained. Certain it is that in some groups of goatsuckers, as in some groups of owls, individuals of the same species are found in plumage of two entirely different hues — rufous and grey. The only explana- tion as yet offered of this fact is that the difference is sexual, but evidence to that effect is conflicting. It must not, however, be supposed that this common feature, any more than that of the existence of tufted forms in each group, indicates any close relationship between them. The resemblances may be due to the same causes, concerning which future observers may possibly enlighten us, but at present we must regard them as analogies, not homologies. The species of Lyncornis inhabit the Malay Archipelago, one, however, occurring also in China. Of Chordiles the best-known species is the night-hawk of North America (C. virginianus or C. popetue), which has a wide range from Canada to Brazil. Others are found in the Antilles and in South America. The general habits of all these birds agree with those of the typical goatsuckers.

We have next to consider the birds forming the genus Podargus and those allied to it, whether they be regarded as a distinct family, or as a subfamily of Caprimulgidae. As above stated, they have feet constructed as those of birds normally are, and their sternum seems to present the constant though compara- tively trivial difference of having its posterior margin elongated into two pairs of processes, while only one pair is found in the true goatsuckers. Podargus

includes the bird (P. cuvieri) known from its cry as morepork to the Tasmanians, 2 and several other species, the number of which is doubtful, from Australia and N&w Guinea. They have comparatively powerful bills, and it would seem feed to some extent on fruits and berries, though they mainly subsist on insects, chiefly Cicadae and Phasmidae. They also differ from the true goatsuckers in having the outer toes partially reversible, and they build a flat nest on the horizontal branch of a tree for the reception of their eggs, which are of a spotless white. Apparently allied to Podargus, but differing

2 In New Zealand, however, this name is given to an owl (Sceloglaux novae-zelandiae) .

among other respects in its mode of nidification, is Aegolheles, which belongs also to the Australian sub-region; and farther to the northward, extending throughout the Malay Archipelago and into India, comes Batrachostomus, wherein we again meet with species having aural tufts somewhat like Lyncornis. The Podarginae are thought by some to be represented in the new world by the genus Nyctibius, of which several species occur from the Antilles and Central America to Brazil. Finally, it may be stated that none of the Caprimulgidae seem to occur in Polynesia or in New Zealand, though there is scarcely any other part of the world suited to their habits in which members of the family are not found. (A. N.)

GOBAT, SAMUEL (1799-1879), bishop of Jerusalem, was born at Cremine, Bern, Switzerland, on the 26th of January 1799. After serving in the mission house at Basel from 1823 to 1826, he went to Paris and London, whence, having acquired some knowledge of Arabic and Ethiopic, he went out to Abyssinia under the auspices of the Church Missionary Society. The unsettled state of the country and his own ill health prevented his making much headway; he returned to Europe in 1835 an d from 1839 to 1842 lived in Malta, where he supervised an Arabic translation of the Bible. In 1846 he was consecrated Protestant bishop of Jerusalem, under the agreement between the British and Prussian governments (1841) for the establishment of a joint bishopric for Lutherans and Anglicans in the Holy Land. He carried on a vigorous mission as bishop for over thirty years, his diocesan school and orphanage on Mount Zion being specially noteworthy. He died on the nth of May 1879.

A record of his life, largely autobiographical, was published at Basel in 1884, and an English translation at London in the same year.

GOBEL, JEAN BAPTISTE JOSEPH (1727-1704), French ecclesiastic and politician, was born at Thann, in Alsace, on the 1st of September 1727. He studied theology in the German College at Rome, and then became successively a member of the chapter of Porrentruy, bishop in partibus of Lydda, and finally suffragan of Basel for that part of the diocese situated in French territory. His political life began when he was elected deputy to the states-general of 1789 by the clergy of the bailliage of Huningue. The turning-point of his life was his action in taking the oath of the civil constitution of the clergy (Jan. 3rd, 1791); in favour of which he had declared himself since the 5th of May 1790. The civil constitution of the clergy gave the appointment of priests to the electoral assemblies, and since taking the oath Gobel had become so popular that he was elected bishop in several dioceses. He chose Paris, and in spite of the difficulties which he had to encounter before he could enter into possession, was consecrated on the 27th of March 1791 by eight bishops, including Talleyrand. On the 8th of November 1792, Gobel was appointed administrator of Paris. He was careful to flatter the politicians by professing anti-clerical opinions, declaring himself, among other things, opposed to the celibacy of the clergy; and on the 17th Brumaire in the year II. (7th November 1793), he came before the bar of the Convention, and, in a famous scene, resigned his episcopal functions, proclaiming that he did so for love of the people, and through respect for their wishes. The followers of Hebert, who were then pursuing their anti-Christian policy, claimed Gobel as one of themselves; while, on the other hand, Robespierre looked upon him as an atheist, though apostasy cannot strictly speaking be laid to the charge of the ex-bishop, nor did he ever make any actual pro- fession of atheism. Robespierre, however, found him an obstacle to his religious schemes, and involved him in the fate of the Hebertists. Gobel was condemned to death', with Chaumette, Hebert and Anacharsis Cloots, and was guillotined on the 12th of April 1794.

See E. Charavay, Assemblee electorate de Paris (Paris, 1890); H, Monin, La Chanson el 1'P.glise sous la Revolution (Paris, 1892); A. Aulard, " La Culte de la raison " in the review, La Revolution Francaise (1891). For a bibliography of documents relating to his episcopate see " £piscopat de Gobel " in vol. iii. (1900) of M. Tourneux's Bibliographie de Vhistoire de Paris pendant la Riv. Fr.

GOBELIN, the name of a family of dyers, who in all probability came originally from Reims, and who in the middle of the 15th

century established themselves in the Faubourg Saint Marcel, Paris, on the banks of the Bievre. The first head of the firm was named Jehan (d. 1476). He discovered a peculiar kind of scarlet dyestuff, and he expended so much money on his establishment that it was named by the common people la folie Gobelin. To the dye-works there was added in the 16th century a manufactory of tapestry (q.v.). So rapidly did the wealth of the family increase, that in the third or fourth generation some of them forsook their trade and purchased titles of nobility. More than one of their number held offices of state, among others Balthasar, who became successively treasurer general of artillery, treasurer extraordinary of war, councillor secretary of the king, chancellor of the exchequer, councillor of state and president of the chamber of accounts, and who in 1601 received from Henry IV. the lands and lordship of Briecomte-Robert. He died in 1603. The name of the Gobelins as dyers cannot be found later than the end of the 17th century. In 1662 the works in the Faubourg Saint Marcel, with the adjoining grounds, were purchased by Colbert on behalf of Louis XIV., and transformed into a general upholstery manufactory, in which designs both in tapestry and in all kinds of furniture were executed under the superintendence of the royal painter, Le Brun. On account of the pecuniary embarrassments of Louis XIV., the establishment was closed in 1694, but it was reopened in 1697 f° r the manu- facture of tapestry, chiefly for royal use and for presentation. During the Revolution and the reign of Napoleon the manufacture was suspended, but it was revived by the Bourbons, and in 1826 the manufacture of carpets was added to that of tapestry. In 1871 the building was partly burned by the Communists. The manufacture is still carried on under the state.

See Lacordaire, Notice historique sur les manufactures imperiales de tapisserie des Gobelin et de tapis de la Savonnerie, precedee du cata- logue des tapisseries qui y sont exposes (Paris, 1853) ; Genspach, Repertoire detailli des tapisseries executees aux Gobelins, Z662-18Q2 (Paris, 1893) ; Guiffrey, Histoire de la tapisserie en France (Paris, 1878-1885). The two last-named authors were directors of the manufactory.

GOBI (for which alternative Chinese names are Sha-mo, ” sand desert,” and Han-hai, ” dry sea “), a term which in its widest significance means the long stretch of desert country that extends from the foot of the Pamirs, in about 77 E., eastward to the Great Khingan Mountains, in ii6°-ii8° E., on the border of Manchuria, and from the foothills of the Altai, the Sayan and the Yablonoi Mountains on the N. to the Astin-tagh or Altyn-tagh and the Nan-shan, the northernmost constituent ranges of the Kuen-lun Mountains, on the

south. By conven- tional usage a relatively small area on the east side of the Great Khingan, between the upper waters of the Sungari and the upper waters of the Liao-ho, is also reckoned to belong to the Gobi. On the other hand, geographers and Asiatic explorers prefer to regard the W. extremity of the Gobi region (as defined above), namely, the basin of the Tarim in E. Turkestan, as forming a separate and independent desert, to which they have given the name of Takla-makan. The latter restriction governs the present article, which accordingly excludes the Takla-makan, leaving it for separate treatment. The desert of Gobi as a whole is only very imperfectly known, information being confined to the observations which individual travellers have made from their respective' itineraries across the desert. Amongst the explorers to whom we owe such knowledge as we possess about the Gobi, the most important have been Marco Polo (1273-1275), Gerbillon (1688-1698), Ijsbrand Ides (1692-1694), Lange (1727-1728 and 1736), Fuss and Bunge (1830-1831), Fritsche (1868-1873), Pavlinov and Matusovski (1870), Ney Elias (1872-1873), N. M. Przhevalsky (1870-1872 and 1876-1877), Zosnovsky (1875), M. V. Pjevtsov (1878), G. N. Potanin (1877 and 1884-1886), Count Szechenyi and L. von Loczy (1879-1880), the brothers Grum-Grzhimailo (1889-1890), P. K. Kozlov (1893-1894 and 1899-1900), V. I. Roborovsky (1894), V. A. Obruchev (1894- 1896), Futterer and Holderer (1896), C. E. Bonin (1896 and 1899), Sven Hedin (1897 and 1900-1901), K. Bogdanovich (1898), Ladyghin (1899-1900) and Katsnakov (1899-1900).

Geographically the Gobi (a Mongol word meaning " desert ")

is the deeper part of the gigantic depression which fills the interior of the lower terrace of the vast Mongolian plateau, and measures over iooo m. from S.W. to N.E. and 450 to 600 m. from N. to S., being widest in the west, along the line joining the Baghrash-kol and the Lop-nor (87°-8o° E.). Owing to the immense area covered, and the piecemeal character of the information, no general description can be made applicable to the whole of the Gobi. It will be more convenient, therefore, to describe its principal distinctive sections seriatim, beginning in the west.

Ghashiun-Gobi and Kuruk-tagh. — The Yulduz valley or valley of the Khaidyk-gol (83°-86° E., 43° N.) is enclosed by two prominent members of the Tian-shan system, namely the Chol-tagh and the

Kuruk-tagh, running parallel and close to one another. As they proceed eastward they diverge, sweeping back on N. and S. respectively so as to leave room for the Baghrash-kol. These two ranges mark the northern and the southern edges respectively of a great swelling, which extends eastward for nearly twenty degrees of longitude. On its northern side the Chol-tagh descends steeply, and its foot is fringed by a string of deep depressions, ranging from Lukchun (425 ft. below the level of the sea) to Hami (2800 ft. above sea-level). To the south of the Kuruk-tagh lie the desert of Lop, the desert of Kum-tagh, and the valley of the Bulunzir-gol. To this great swelling, which arches up between the two border-ranges of the Chol-tagh and Kuruk-tagh, the Mongols give the name of Ghashiun-Gobi or Salt Desert. It is some 80 to 100 m. across from N. to S., and is traversed by a number of minor parallel ranges, ridges and chains of hills, and down its middle runs a broad stony valley, 25 to 50 m. wide, at an elevation of 3000 to 4500 ft. The Chol-tagh, which reaches an average altitude of 6000 ft., is absolutely sterile, and its northern foot rests upon a narrow belt of barren sand, which leads down to the depressions mentioned above.

The Kuruk-tagh is the greatly disintegrated, denuded and wasted relic of a mountain range which formerly was of incomparably greater magnitude. In the west, between Baghrash-kol and the Tarim, it consists of two, possibly of three, principal ranges, which, although broken in continuity, run generally parallel to one another, and embrace between them numerous minor chains of heights. These minor ranges, together with the principal ranges, divide the region into a series of long, narrow valleys, mostly parallel to one another and to the enclosing mountain chains, which descend like terraced steps, on the one side towards the depression of Lukchun and on the other towards the desert of Lop. In many cases these latitudinal valleys are barred transversely by ridges or spurs, generally elevations en masse of the bottom of the valley. Where such elevations exist, there is generally found, on the E. side of the transverse ridge, a £auldron-shaped depression, which some time or other has been the bottom of a former lake, but is aow nearly a dry salt-basin. The surface configuration is in fact markedly similar to that which occurs in the inter-mont latitudinal valleys of the Kuen-lun. The hydrography of the Ghashiun-Gobi and the Kuruk-tagh is determined by these chequered arrangements of the latitudinal valleys. Most of the principal streams, instead of flowing straight down these valleys, cross them diagonally and only turn west after they have cut their way through one or more of the trans- verse barrier ranges. 1 To the highest range on the great swelling Gruni-Grzhimailo gives the name of Tuge-tau, its altitude being 9000 ft. above the level of the sea and

some 4000 ft. above the crown of the swelling itself. This range he considers to belong to the Chol- tagh system, whereas Sven Hedin would assign it to the Kuruk-tagh. This last, which is pretty certainly identical with the range of Khara- teken-ula (also known as the Kyzyl-sanghir, Sinir, and Singher Mountains), that overlooks the southern shore of the Baghrash-kol, though parted from it by the drift-sand desert of Ak-bel-kum (White Pass Sands), has at first a W.N.W. to E.S.E. strike, but it gradually curves round like a scimitar towards the E.N.E. and at the same time gradually decreases in elevation. In 91 ° E., while the principal range of the Kuruk-tagh system wheels to the E.N.E., four of its subsidiary ranges terminate, or rather die away somewhat suddenly, on the brink of a long narrow depression (in which Sven Hedin sees a N.E. bay of the former great Central Asian lake of Lop-nor), having over against them the echeloned terminals of similar subordinate ranges of the Pe-shan (Bey-san) system (see below) . The Kuruk-tagh is throughout a relatively low, but almost completely barren range, being entirely destitute of animal life, save for hares, antelopes and wild camels, which frequent its few small, widely scattered oases. The vegetation, which is confined to these same relatively favoured spots, is of the scantiest and is mainly confined to bushes of saxaul {Anabasis Ammodendron), reeds {kamish), tamarisks, poplars, Kalidium and Ephedra.

Desert of Lop. — This section of the Gobi extends south-eastward from the foot of the Kuruk-tagh as far as the present terminal basin of the Tarim, namely Kara-koshun (Przhevalsky'sLop-nor),andisan almost perfectly horizontal expanse, for, while the Baghrash-kol in the N. lies at an altitude of 2940 ft., the Kara-koshun, over 200 m.

1 Cf. G. E. Grum-Grzhimailo, Opisaniye Puteshestviya, i. 381-417.

to the S., is only 300 ft. lower. The characteristic features of this almost dead level or but slightly undulating region are: (i.) broad, unbroken expanses of clay intermingled with sand, the clay (shor) being indurated and saliferous and often arranged in terraces; (ii.) hard, level, clay expanses, more or less thickly sprinkled with fine gravel (say), the clay being mostly of a yellow or yellow-grey colour; (iii.) benches, flattened ridges and tabular masses of consolidated clay (jardangs), arranged in distinctly defined laminae, three stories being sometimes superimposed one upon the other, and their vertical faces being abraded, and often undercut, by the wind, while the formations themselves are separated by parallel gullies or wind- furrows, 6 to 20 ft. deep, all sculptured in the direction of the pre- vailing wind, that is, from N.E. to S.W. ; and (iv.) the absence of drift-sand and sand-dunes, except in the south, towards the out- lying foothills of the Astin-tagh.

Perhaps the most striking character- istic, a”fter the jardangs or clay terraces, is the fact that the whole of this region is not only swept bare of sand by the terrific sand- storms (burans) of the spring months, the particles of sand with which the wind is laden acting like a sand-blast, but the actual substantive materials of the desert itself are abraded, filed, eroded and carried bodily away into the network of lakes in which the Tarim loses itself,- or are even blown across the lower, constantly shifting watercourses of that river and deposited on or among the gigantic dunes which choke the eastern end of the desert of Takla-makan. Numerous indications, such as salt-stained depressions of a lacustrine appearance, traces of former lacustrine shore-lines, more or less parallel and concentric, the presence in places of vast quantities of fresh- water mollusc shells (species of Limnaea and Planorbis), the existence of belts of dead poplars, patches of dead tamarisks and extensive beds of withered reeds, all these always on top of the jardangs, never in the wind-etched furrows, together with a few scrubby poplars and Elaeagnus, still struggling hard not to die, the presence of ripple marks of aqueous origin on the leeward sides of the clay terraces aind in other wind-sheltered situations, all testify to the former existence in this region of more or less extensive fresh- water lakes, now of course completely desiccated. During the prevalence of the spring storms the atmosphere that overhangs the immediate surface of the desert is so heavily charged with dust as to be a veritable pall of desolation. Except for the wild camel which frequents the reed oases on the N. edge of the desert, animal life is even less abundant than in the Ghashiun-Gobi, and the same is true as regards the vegetation.

Desert of Kum-tagh. — This section lies E.S.E. of the desert of Lop, ort the other side of the Kara-koshun and its more or less temporary continuations, and reaches north-eastwards as far as the vicinity of the town of Sa-chow and the lake of Kara-nor or Kala-chi. Its southern rim is marked by a labyrinth of hills, dotted in groups and irregular clusters, but evidently survivals of two parallel ranges which are now worn down as it were to mere fragments of their former skeletal structure. Between these and the Astin-tagh inter- venes a broad latitudinal valley, seamed with watercourses which come down from the foothills of the Astin-tagh and beside which scrubby desert plants of the usual character maintain a precarious existence, water reaching them in some instances at intervals of years only. This part of the desert has a general slope N.W. towards the relative depression of the Kara-koshun. A noticeable feature of the Kum-tagh is the presence of large accumulations of drift-sand, especially along the foot of the crumbling desert ranges, where it rises into dunes sometimes as much

as 250 ft. in height and climbs half-way up the flanks of ranges themselves. The prevailing winds in this region would appear to blow from the W. and N.W. during the summer, winter and autumn, though in spring, when they certainly are more violent, they no doubt come from the N.E., as in the desert of Lop. Anyway, the arrangement of the sand here ” agrees per- fectly with the law laid down by Potanin, that in the basins of Central Asia the sand is heaped up in greater mass on the south, all along the bordering mountain ranges where the floor of the depressions lies at the highest level.” 2 The country to the north of the desert ranges is thus summarily described by Sven Hedin: 3 ” The first zone of drift-sand is succeeded by a region which exhibits proofs of wind- modelling on an extraordinarily energetic and well developed scale, the results corresponding to the jardangs and the wind-eroded gullies of the desert of Lop. Both sets of phenomena lie parallel to one another ; from this we may infer that the winds which prevail in the two deserts are the same. Next comes, sharply demarcated from the zone just described, a more or less thin kamish steppe growing on level ground ; and this in turn is followed by another very

narrow belt of sand, immediately south of Achik-kuduk

Finally in the extreme north we have the characteristic and sharply defined belt of kamish steppe, stretching from E.N.E. to W.S.W. and bounded on N. and S. by high, sharp-cut clay terraces. . . . At the points where we measured them the northern terrace was 113 ft. high and the southern 85J ft. . . . Both terraces belong to the same level, and would appear to correspond to the shore lines of a big bay of the last surviving remnant of the Central Asian Mediter- ranean. At the point where I crossed it the depression was 6 to 7 m. wide, and thus resembled a flat valley or immense river-bed.”

2 Quoted in Sven Hedin, Scientific Results, ii. 499.

3 Op. cit. ii. 499-500.

Desert of Hami and the Pe-shan Mountains. — This section occupies the space between the Tian-shan system on the N. and the Nan-shan Mountains on the S., and is connected on the W. with the desert of Lop. The classic account is that of Przhevalsky, who crossed the desert from Hami (or Khami) to Su-chow (not Sa-chow) in the summer of 1879. In the middle this desert rises into a vast swelling, 80 m. across,

which reaches an average elevation of 5000 ft. and a maximum elevation of 5500 ft. On its northern and southern borders it is overtopped by two divisions of the Bey-san (= Pe-shan) Mountains, neither of which attains any great relative altitude. Between the northern division and the Karlyk-tagh range or E. Tian-shan intervenes a somewhat undulating barren plain, 3900 ft. in altitude and 40 m. from N. to S., sloping downwards from both N. and S. towards the middle, where lies the oasis of Hami (2800 ft.). Similarly from the southern division of the Bey-san a second plain slopes down for 1000 ft. to the valley of the river Bulunzir or Su-lai-ho, which comes out of China, from the south side of the Great Wall, and finally empties itself into the lake of Kalachi or Kara-nor. From the Bulunzir the same plain continues southwards at a level of 3700 ft. to the foot of the Nan-shan Mountains. The total breadth of the desert from N. to S. is here 200 m. Its general character is that of an undulating plain, dotted over with occasional elevations of clay, which present the appearance of walls, table-topped mounds and broken towers {jardangs), the surface of the plain being strewn with gravel and absolutely destitute of vegetation. Generally speaking, the Bey-san ranges consist of isolated hills or groups of hills, of low relative elevation (100 to 300 ft.), scattered without any regard to order over the arch of the swelling. They nowhere rise into well- defined peaks. Their axis runs from W.S.W. to E.N.E. But whereas Przhevalsky and Sven Hedin consider them to be a continuation of the Kuruk-tagh, though the latter regards them asseparated from the Kuruk-tagh by a well-marked bay of the former Central Asian Mediterranean (Lop-nor), Futterer declares they are a continuation of the Chol-tagh. The swelling or undulating plain between these two ranges of the Bey-san measures about 70 m. across and is traversed by several stretches of high ground having generally an east-west direction. 1 Futterer, who crossed the same desert twenty years after Przhevalsky, agrees generally in his description of it, but supplements the account of the latter explorer with several particulars. He observes that the ranges in this part of the Gobi are much worn down and wasted, like the Kuruk-tagh farther west and the tablelands of S.E. Mongolia farther east, through the effects of century-long insolation, wind erosion, great and sudden changes of temperature, chemical action and occasional water erosion. Vast areas towards the N. consist of expanses of gently sloping (at a mean slope of 3) clay, intermingled with gravel. He points out also that the greatest accumulations of sand and other products of aerial denudation do not occur in the deepest parts of the depressions but at the outlets of the valleys and glens, and along the foot of the ranges which flank the depressions on the S. Wherever water has been, desert scrub is found, such as tamarisks, Dodartia orientalis, Agriophyllum gobicum,

Calligonium sinnex, and Lycium ruthenicum, but all with their roots elevated on little mounds in the same way as the tamarisks grow in the Takla-makan and desert of Lop.

Farther east, towards central Mongolia, the relations, says Futterer, are the same as along the Hami-Su-chow route, except that the ranges have lower and broader crests, and the detached hills are more denuded and more disintegrated. Between the ranges occur broad, flat, cauldron-shaped valleys and basins, almost destitute of life except for a few hares and a few birds, such as the crow and the pheasant, and with scanty vegetation, but no great accumulations of drift-sand. The rocks are severely weathered on the surface, a thick layer of the coarser products of denudation covers the flat parts and climbs a good way up the flanks of the mountain ranges, but all the finer material, sand and clay has been blown away partly S.E. into Ordos, partly into the Chinese provinces of Shen-si and Shan-si, where it is deposited as loess, and partly W., where it chokes all the southern parts of the basin of the Tarim. In these central parts of the Gobi, as indeed in all other parts except the desert of Lop and Ordos, the prevailing winds blow from the W. and N.W. These winds are warm in summer, and it is they which in the desert of Hami bring the fierce sandstorms or burans. The wind does blow also from the N.E., but it is then cold and often brings snow, though it speedily clears the air of the everlasting dust haze. In summer great heat is encountered here on the relatively low (3000-4600 ft.), gravelly expanses (say) on the N. and on those of the S. (4000-5000 ft.) ; but on the higher swelling between, which in the Pe-shan ranges ascends to 7550 ft., there is great cold even in summer, and a wide daily range of tempera- ture. Above the broad and deep accumulations of the products of denudation which have been brought down by the rivers from the Tian-sharj ranges (e.g. the Karlyk-tagh) on the N. and from the Nan- shan on the S., and have filled up the cauldron-shaped valleys, there rises a broad swelling, built up of granitic rocks, crystalline schists and metamorphosed sedimentary rocks of both Archaic and Palaeo- zoic age, all greatly folded and tilted up, and shot through with numerous irruptions of volcanic rocks, predominantly porphyrinic and dioritic. On this swelling rise four more or less parallel mountain

1 Przhevalsky, Is Zayana cherez Hami v Tibet na Vershovya Sholtoy Reki; pp. 84-91.

ranges of the Pe-shan system, together with a fifth chain of hills farther S., all having a strike from W.N.W. to E.N.E. The range farthest N. rises to 1000 ft. above the desert and 7550 ft. above sea-level, the next two ranges reach 1300 ft. above the general level of the desert,

and the range farthest south 1475 ft. or an absolute altitude of 7200 ft., while the fifth chain of hills does not exceed 650 ft. in relative elevation. All these ranges decrease in altitude from W. to E. In the depressions which border the Pe-shan swelling on N. and S. are found the sedimentary deposits of the Tertiary sea of the Han-hai ; but no traces of those deposits have been found on the swelling itself at altitudes of 5600 to 5700 ft. Hence, Futterer infers, in recent geological times no large sea has occupied the central part of the Gobi. Beyond an occasional visit from a band of nomad Mongols, this region of the Pe-shan swelling is entirely uninhabited. 2 And yet it was from this very region, avers G. E. Grum-Grzhimailo, that the Yue-chi, a nomad race akin to the Tibetans, proceeded when, towards the middle of the 2nd century B.C., they moved westwards and settled near Lake Issyk-kul ; and from here proceeded also the Shanshani, or people who some two thousand years ago founded the state of Shanshan or Lofl-lan, ruins of the chief town of which Sven Hedin discovered in the desert of Lop in 1901. Here, says the Russian explorer, the Huns gathered strength, as also did the Tukiu (Turks) in the 6th century, and the Uighur tribes and the rulers of the Tangut kingdom. But after Jenghiz Khan in the 12th century drew away the peoples of this region, and no others came to take their place, the country went out of cultivation and eventu- ally became the barren desert it now is. 3

Ala-shan. — This division of the great desert, known also as the Hsi-tau and the Little Gobi, fills the space between the great N. loop of the Hwang-ho or Yellow river on the E., the Edzin-gol on the W. , and the Nan-shan Mou ntains on the S. W. , where it is separated from the Chinese province of Kan-suh by the narrow rocky chain of Lung-shan. (Ala-shan), 10,500 to 1 1,600 ft. in altitude. It belongs to the middle basin of the three great depressions into which Potanin divides the Gobi as a whole. ” Topographically,” says Przhevalsky, ” it is a perfectly level plain, which in all probability once formed the bed of a huge lake or inland sea.” The data upon which he bases this conclusion are the level area of the region as a whole, the hard saline clay and the sand-strewn surface, and lastly the salt lakes which occupy its lowest parts. For hundreds of miles there is nothing to be seen but bare sands; in some places they continue so far without a break that the Mongols call them Tyngheri {i.e. sky). These vast expanses are absolutely waterless, nor do any oases relieve the un-broken stretches of yellow sand which alternate with equally vast areas of saline clay or, nearer the foot of the mountains, with barren shingle. Although on the whole a level country with a general altitude pi 3300 to 5000 ft., this section, like most other parts of the Gobi, is

crowned by a chequered network of hills and broken ranges going up 1000 ft. higher. The vegetation is confined to a few varieties of bushes and a dozen kinds of grasses, the most conspicuous being saxaul and Agriophyllum gobicum* (a grass). The others include prickly convolvulus, field wormwood, acacia, Inula ammo- phila, Sophora flavescens, Convolvulus Ammani, Peganum and Astragalus, but all dwarfed, deformed and starved. Thefauna consists of little else except antelopes, the wolf, fox, hare, hedge- hog, marten, numerous lizards and a few birds, e.g. the sand- grouse, lark, stonechat, sparrow, crane, Poioces Hendersoni, Otocorys albigula and Galerita cristata.** The only human inhabitants of Ala-shan are the Torgod Mongols.

Ordos. — East of the desert of Ala-shan, and only separated from it by the Hwang-ho, is the desert of Ordos or Ho-tau, “a level steppe, partly bordered by low hills. The soil is altogether sandy or a mixture of clay and sand, ill adapted for agriculture. The absolute height of this country is between 3000 and 3500 ft., so that Ordos forms an intermediate step in the descent to China from the Gobi, separated from the latter by the mountain ranges lying on the N. and E. of the Hwang-ho or Yellow river.” 6 Towards the south Ordos rises to an altitude of over 5000 ft., and in the W., along the right bank of the Hwang-ho, the Arbus or Arbiso Mountains, which overtop the steppe by some 3000 ft., serve to link the Ala-shan Mountains with the In-shan. The northern part of the great loop of the river is filled with the sands of Kuzupchi, a succession of dunes, 40 to 50 ft. high. Amongst them in scattered patches grow the shrub Hedysarum and the trees Calligonium Tragopyrum and Pugionium cornutum. In some places these sand-dunes approach close to the great river, in others they are parted from it by a belt of sand, intermingled with clay, which terminates in a steep escarpment, 50 ft. and in some localities 100 ft. above. the river. This belt is studded with little mounds (7 to 10 ft. high), mostly overgrown with wormwood (Artemisia campestris) and the Siberian pea-tree (Cara- .gorea) ; and here too grows one of the most characteristic plants of Ordos, the liquorice root (Glycyrrhiza uralensis). Eventually

2 Futterer, Dutch Asien, i. pp. 206-211.

3 G. E. Grum-Grzhimailo, Opisanie Puteshestviya v Sapadniy Kitai, ii. p. 127.

4 Its seeds are pounded by the Mongols to flour and mixed with their tea.

6 Przhevalsky, Mongolia(Eng. trans, ed. by Sir H. Yule). 6

Przhevalsky, op. cii. p. 183.

the sand-dunes cross over to the left bank of the Hwang-ho, and are threaded by the beds of dry watercourses, while the level spaces amongst them are studded with little mounds (3 to 6 ft. high), on which grow stunted Nitraria Scoberi and Zygophyllum. Ordos, which was anciently known as Ho-nan (" the country south of the ') and still farther back in time as Ho-tau, was occupied by the

Hiong-nu in the 1st and 2nd centuries A.D., but was almost de populated during and after the Dungan revolt of 1 869. North of the big loop of the Hwang-ho Ordos is separated from the central Gobi by a succession of mountain chains, the Kara-naryn-ula, the Sheiten- ula, and the In-shan Mountains, which link on to the south end of the Great Khingan Mountains. The In-shan Mountains, which stretch from 108° tc 112° E., have a wild Alpine character and are dis- tinguished from other mountains in the S.E. of Mongolia by an abundance of both water and vegetation. In one of their constituent ranges, the bold Munni-ula, 70 m. long and nearly 20 m. wide, they attain elevations of 7500 to 8500 ft., and have steep flanks, slashed with rugged gorges and narrow glens. Forests begin on them at 5300 ft. and wild flowers grow in great profusion and variety in summer, though with a striking lack of brilliancy in colouring. In this same border range there is also a much greater abundance and variety of animal life, especially amongst the avifauna.

Eastern Gobi. — Here the surface is extremely diversified, although there are no great differences in vertical elevation. Between Urga (48°N. and I07°E.) and the little lake of Iren-dubasu-nor (1 1 1 °5o' E. and 43 45′ N.) the surface is greatly eroded, and consists of broad flat depressions and basins separated by groups of flat-topped mountains of relatively low elevation (500 to 600 ft.), through which archaic rocks crop out as crags and isolated rugged masses. The floors of the depressions lie mostly between 2900 and 3200 ft. above sea-level. Farther south, between Iren-du+jasu-nor and the Hwang-ho comes a region of broad tablelands alternating with flat plains, the latter ranging at altitudes of 3300 to 3600 ft. and the former at 3500 to 4000 ft. The slopes of the plateaus are more or less steep, and are sometimes penetrated by " bays " of the low- lands. As the border-range of the Khingan is approached the country steadily rises up to 4500 ft. and then to 5350 ft. Here small lakes frequently fill the

depressions, though the water in them is generally salt or' brackish. And both here, and for 200 m. south of Urga, streams are frequent, and grassgrowsmoreorlessabundantly. There is, however, through all the central parts, until the bordering mountains are reached, an utter absence of trees and shrubs. Clay and sand are the predominant formations, the watercourses, especi- ally in the north, being frequently excavated 6 to 8 ft. deep, and in- many places in the flat, dry valleys or depressions farther south beds of loess, 15 to 20 ft. thick, are exposed. West of the route from Urga to Kalgan the country presents approximately the same general features, except that the mountains are not so irregularly scattered in groups but have more strongly defined strikes, mostly E. to W., W.N.W. to E.S.E., and W.S.W. to E.N.E. The altitudes too are higher, those of the lowlands ranging from 3300 to 5600 ft., and those of the ranges from 650 to 1650 ft. higher, though in a few cases they reach altitudes of 8000 ft. above sea-level. The elevations do not, however, as a rule form continuous chains, but make up a congeries of short ridges and groups rising from a common base and intersected by a labyrinth of ravines, gullies, glens and basins. But the tablelands, built up of the horizontal red deposits of the Han-hai (Obruchev's Gobi formation) which are characteristic of the southern parts of eastern Mongolia, are absent here or occur only in one locality, near the Shara-muren river, and are then greatly intersected by gullies or dry watercourses. 1 Here there is, however, a great dearth of water, no streams, no lakes, no wells, and precipita- tion falls but seldom. The prevailing winds blow from the W. and N.W. and the pall of dust overhangs the country as in the Takla- makan and the desert of Lop. Characteristic of the flora are wild garlic, Kalidium gracile, wormwood, saxaul, Nitraria Scoberi, Caragana, Ephedra, saltwort and dirisun (Lasiagrostis splendens).

This great dtsert country of Gobi is crossed by several trade routes, some of which have been in use for thousands of years. Among the most important are those from Kalgan on the frontier of China to Urga (600 m.), from Su-chow (in Kan-suh) to Hami (420 m.) from Hami to Peking (1300 m.), from Kwei-hwa-cheng (or Kuku-khoto) to Hami and Barkul, and from Lanchow (in Kan-suh) to Hami.

Climate — The climate of the Gobi is one of great extremes, com- bined with rapid changes of temperature, not only at all seasons of the year but even within 24 hours (as much as 58°F.). For instance, at Urga (3770 ft.) the annual mean is 27-5°F., the January mean -15-7°, and the July mean 63-5°, the extremes being 100-5° and -44-5°; while at Sivantse (3905 ft.) the annual mean is 37°, the January mean 2-3°, and the July mean 66-3°, the range being from a recorded maximum of 93° to a recorded minimum of -53°. Ev«n in southern Mongolia the

thermometer goes down as low as -27 °, and in Ala-shan it rises day after day in July as high as 99°. Although the south-east monsoons reach the S.E. parts of the Gobi, the air generally throughout this region is characterized by extreme dryness, especially during the winter. Hence the icy sandstorms and snow- storms of spring and early summer. The rainfall at Urga for the year amounts to only 9-7 in.

1 Obruchev. in Izvestia of Russ. Geogr. Soc. (1895).

Sands of the Gobi Deserts. — With regard to the origin of the masses of sand out of which the dunes and chains of dunes (barkhans) are built up in the several deserts of the Gobi, opinions differ. While some explorers consider them to be the product of marine, or at any rate lacustrine, denudation (the Central Asian Mediterranean), others — and this is not only the more reasonable view, but it is the view which is gaining most ground — consider that they are the pro- ducts of the aerial denudation of the border ranges (e.g. Nan-shan, Karlyk-tagh, &c), and more especially of the terribly wasted ranges and chains of hills, which, like the gaunt fragments of montane skeletal remains, lie littered all over the swelling uplands and tablelands of the Gobi, and that they have been transported by the prevailing winds to the localities in which they are now accumulated, the winds obeying similar transportation laws to the rivers and streams which carry down sediment in moister parts of the world. Potanin points out 2 that ” there is a certain amount of regularity observable in the distribution of the sandy deserts over the vast uplands of central Asia. Two agencies are represented in the dis- tribution of the sands, though what they really are is not quite clear; and of these two agencies one prevails in the north-west, the other in the south-east, so that the whole of Central Asia may be divided into two regions, the dividing line between them being drawn from north-east to south-west, from Urga via the eastern end of the Tian-shan to the city of Kashgar. North-west of this line the sandy masses are broken up into detached and disconnected areas, and are almost without exception heaped up around the lakes, and con- sequently in the lowest parts of the several districts in which they exist. Moreover, we find also that these sandy tracts always occur on the western or south-western shores of the lakes; this is the case with the lakes of Balkash, Ala-kul, Ebi-nor, Ayar-nor (or Telli-nor), Orku-nor, Zaisan-nor, Ulungur-nor, Ubsa-nor, Durga-nor and Kara-nor lying E. of Kirghiz-nor. South-east of the line the arrange- ment of the sand is quite different. In that part of Asia we have three gigantic but disconnected basins. The first, lying farthest east, is embraced on the one side by the ramifications of the Kentei and Khangai Mountains and on the other by the In-shan Mountains. The second or middle division is contained between the Altai of the

Gobi and the Ala-shan. The third basin, in the west, lies between the Tian-shan and the border ranges of western Tibet. . . . The deepest parts of each of these three depressions occur near their northern borders; towards their southern boundaries they are all alike very much higher. . . . However, the sandy deserts are not found in the low-lying tracts but occur on the higher uplands which foot the southern mountain ranges, the In-shan and the Nan-shan. Our maps show an immense expanse of sand south of the Tarim in the western basin ; beginning in the neighbourhood of the city of Yarkent (Yarkand) , it extends eastwards past the towns of Khotan, Keriya and Cherchen to Sa-chow. Along this stretch there is only one locality which forms an exception to the rule we have indicated, namely, the region round the lake of Lop-nor. In the middle basin the widest expanse of sand occurs between the Edzin-gol and the range of Ala-shan. On the south it extends nearly as far as a line drawn through the towns of Lian-chow, Kan-chow and Kao-tai at the foot of the Nan-shan ; but on the south it does not approach anything like so far as the latitude (42° N.) of the lake of Ghashiun-nor. Still farther east come the sandy deserts of Ordos, extending south- eastward as far as the mountain range which separates Ordos from the (Chinese) provinces of Shan-si and Shen-si. In the eastern basin drift-sand is encountered between the district of Ude in the north (44° 30′ N.) and the foot of the In-shan in the south.” In two regions, if not in three, the sands have overwhelmed large tracts of once cultivated country, and even buried the cities in which men formerly dwelt. These regions are the southern parts of the desert of Takla-makan (where Sven Hedin and M. A. Stein * have discovered the ruins under the desert sands), along the N. foot of the Nan-shan, and probably in part (other agencies having helped) in the north of the desert of Lop, where Sven Hedin discovered the ruins of Lou-Ian and of other towns or villages. For these vast accumulations of sand are constantly in movement ; though the movement is slow, it has nevertheless been calcu- lated that in the south of the Takla-makan the sand-dunes travel bodily at the rate of roughly something like 160 ft. in the course of a year. The shape and arrangement of the individual sand-dunes, and of the barkhans, generally indicate from which direction tHte predominant winds blow. On the windward side of the dune the slope is long and gentle, while the leeward side is steep and in outline concave like a horse-shoe. The dunes vary in height from 30 up to 300 ft., and in some places mount as it were upon one another’s shoulders, and in some localities it is even said that a third tier is sometimes superimposed.

Authorities. — See N. M. Przhevalsky, Mongolia, the Tangut Country, &c. (Eng. trans., ed. by Sir H. Yule, London, 1876), and From Kulja

across the Tian Shan to Lob Nor (Eng. trans, by Delmar Morgan, London, 1879); G. N. Potanin, Tangutsko-Tibetskaya Okraina Kitaya i Centralnaya Mongoliya, 1884-1886 (1893, &c); M. V. Pjevtsov, Sketch of a Journey to Mongolia (in Russian, Omsk,

2 In Tangutsko-Tibetskaya Okraina Kitaya i Centralnaya Mon- goliya, i. pp. 96, &c.

3 See Sand-buried Cities of Khotan (London, 1902).

1883); G. E. Grum-Grzhimailo, Opisanie Puteshestviya v Sapadniy Kitai (1898-1899); V. A. Obruchev, Centralnaya Asiya, Severniy Kilai i Nan-schan, 18(12-1894 (1900-1901); V. I. Roborovsky and P. K. Kozlov, Trudy Ekspeditsiy Imp, Russ. Geog. Obshchestva Po Cenlralnoy Asiy, 1893-1895 (1900, &c); Roborovsky, Trudy Tibetskoi Ekspeditsiy, 1889-1890; Sven Hedin, Scientific Results

GOBLET, REN6 (1828-1905), French politician, was born at Aire-sur-la-Lys, in the Pas de Calais, on the 26th of November 1828, and was educated for the law. Under the Second Empire, he helped to found a Liberal journal, Le Progres de la Somme, and in July 1871 was sent by the department of the Somme to the National Assembly, where he took his place on the extreme left. He failed to secure election in 1876, but next year was returned for Amiens. He held a minor government office in 1879, and in 1882 became minister of the interior in the Freycinet cabinet. He was minister of education, fine arts and religion in Henri Brisson's first cabinet in 1885, and again under Freycinet in 1886, when he greatly increased his reputation by an able defence of the government's education proposals. Meanwhile his extreme independence and excessive candour had alienated him from many of his party, and all through his life he was frequently in conflict with his political associates, from Gambetta downwards. On the fall of the Freycinet cabinet in December he formed a cabinet in which he reserved for himself the portfolios of the interior and of religion. The Goblet cabinet was unpopular from the outset, and it was with difficulty that anybody could be found to accept the ministry of foreign affairs, which was finally given to M. Flourens. Then came what is known as the Schnaebele incident, the arrest on the German frontier of a P'rench official named Schnaebele, which caused immense excite- ment in France. For some days Goblet took no definite decision, but left Flourens, who stood for peace, to fight it out

with General Boulanger, then minister of war, who was for the despatch of an ultimatum. Although he finally intervened on the side of Flourens, and peace was preserved, his weakness in face of the Boulangist propaganda became a national danger. Defeated on the budget in May 1887, his government resigned; but he returned to office next year as foreign minister in the radical administration of Charles Floquet. He was defeated at the polls by a Boulangist candidate in 1889, and sat in the senate from 1 89 1 to 1893. when he returned to the popular chamber. In association with MM. E. Lockroy, Ferdinand Sarrien and P. L. Peytral he drew up a republican programme which they put forward in the Petite Republique franc_aise. At the elections of 1898 he was defeated, and thenceforward took little part in public affairs. He died in Paris on the 13th of September

1905-

GOBLET, a large type of drinking-vessel, particularly one shaped like a cup, without handles, and mounted on a shank with a foot. The word is derived from the O. Fr. gobelet, diminu- tive of gobel, gobeau, which Skeat takes to be formed from Low Lat. cupellus, cup, diminutive of cupa, tub, cask (see Drinking- Vessels).

GOBY. The gobies (Gobius) are small fishes readily recognized by their ventrals (the fins on the lower surface of the chest) being united into one fin, forming a suctorial disk, by which these fishes are enabled to attach themselves in every possible position to a rock or other firm substances. They are essentially coast-fishesy inhabiting nearly all seas, but disappearing towards the Arctic ■ and Antarctic Oceans. Many enter, or live exclusively in, such fresh waters as are at no great distance from the sea. Nearly 500 different kinds are known. The largest British species, Gobius capito, occurring in the rock-pools of Cornwall, measures 10 in. Gobius alcocki, from brackish and fresh waters of Lower Bengal, is one of the very smallest of fishes, not measuring over

16 millimetres (= 7 lines). The males are usually more brilliantly coloured than the females, and guard the eggs, which are often placed in a sort of nest made of the shell of some bivalve or of the carapace of a crab, with the convexity turned upwards and

Fig. 1. — Gobius lenliginosus. Fig. 2. — United

Ventrals of Goby.

covered with sand, the eggs being stuck to the inner surface of this roof.

Close allies of the gobies are the walking fish or jumping fish (Periophthalmus) , of which various species are found in great

Fig. 3. — Periophthalmus koelreuteri.

numbers on the mud fiats at the mouths of rivers in the tropics, skipping about by means of the muscular, scaly base of their pectoral fins, with the head raised and bearing a pair of strongly projecting versatile eyes close together.

GOCH, a town of Germany, in the Prussian Rhine province, on the Niers, 8 m. S. of Cleves at the junction of the railways Cologne-Zevenaar and Boxtel-Wesel. Pop. (1905) 10,232. It has a Protestant and a Roman Catholic church and manufactures of brushes, plush goods, cigars and margarine. In the middle ages it was the seat of a large trade in linen. Goch became a town in 1 23 1 and belonged to the dukes of Gelderland and later to the dukes of Cleves.

GOD, the common Teutonic word for a personal object of religious worship. It is thus, like the Gr. 8t6s and Lat. deus, applied to all those superhuman beings of the heathen mythologies who exercise power over nature and man and are often identified with some particular sphere of activity; and also to the visible material objects, whether an image of the supernatural being or a tree, pillar, &c. used as a symbol, an idol. The word ” god,” on the conversion of the Teutonic races to Christianity, was adopted as the name of the one Supreme Being, the Creator of the universe, and of the Persons of the Trinity. The New English Dictionary points out that whereas the old Teutonic type of the word is neuter, corresponding to the Latin numen, in the Christian applications it becomes masculine, and that even where the earlier neuter form is still kept, as in Gothic and Old Norwegian, the construction is masculine. Popular etymology has connected the word with ” good “; this is exemplified by the corruption of ” God be with you ” into ” good-bye.” ” God ” is a word common to all Teutonic languages. In Gothic it is Guth; Dutch has the same form as English; Danish and Swedish have Gud, German Gott. According to the New English Dictionary, the original may be found in two Aryan roots, both of the form gheu, one of which means ” to invoke,” the other ” to pour ” (cf. Gr. XMtJ’); the last is used of sacrificial offerings. The word would thus mean the object either of religious invocation or of religious worship by sacrifice. It has been also suggested that the word might mean a ” molten image ” from the sense of ” pour.”

See Religion; Hebrew Religion; Theism, &c.

GODALMING, a market-town and municipal borough in the Guildford parliamentary division of Surrey, England, 34 m. S.W. of London by the London & South- Western railway. Pop. (1901) 8748. It is beautifully situated on the right bank of the Wey,

which is navigable thence to the Thames, and on the high road between London and Portsmouth. Steep hills, finely wooded, enclose the valley. The chief public buildings are the church of SS. Peter and Paul, a cruciform building of mixed architecture, but principally Early English and Perpendicular; the town-hall, Victoria hall, and market-house, and a technical institute and school of science and art. Charterhouse School, one of the principal English public schools, originally founded in 1611, was transferred from Charterhouse Square, London, to Godalmingin 1872. It stands within grounds 92 acres in extent, half a mile north of Godalming, and consists of spacious buildings in Gothic style, with a chapel, library and hall, besides boarding-houses, masters' houses and sanatoria. (See Charterhouse.) Godalming has manufactures of paper, leather, parchment and hosiery, and some trade in corn, malt, bark, hoops and timber; and the Bargate stone, of which the parish church is built, is still quarried. The borough is under a mayor, 6 aldermen and 18 councillors. Area, 812 acres.

Godalming (Godelminge) belonged to King Alfred, and was a royal manor at the time of Domesday. The manor belonged to the see of Salisbury in the middle ages, but reverted to the crown in the time of Henry VIII. Godalming was incorporated by Elizabeth in 1574, when the borough originated. The charter was confirmed by James I. in 1620, and a fresh charter was granted by Charles II. in 1666. The borough was never repre- sented in parliament. The bishopof Salisburyin 1300 received the grant of a weekly market to be held on Mondays: the day was altered to Wednesday by Elizabeth's charter; The bishop's grant included a fair at the feast of St Peter and St Paul (29th of June). Another fair at Candlemas (2nd of February) was granted by Elizabeth. The market is still held. The making of cloth, particularly Hampshire kerseys, was the staple industry of Godalming in the middle ages, but it began to decay early in the 17th century and by 1850 was practically extinct. As in other cases, dyeing was subsidiary to the cloth industry. Tanning, introduced in the 15th

century, survives. The present manu- facture of fleecy hosiery dates from the end of the 18th century.

GODARD, BENJAMIN LOUIS PAUL (1849-1895), French composer, was born in Paris, on the 18th of August 1849. He studied at the Conservatoire, and competed for the Prix de Rome without success in 1866 and 1867. He began by publishing a number of songs, many of which are charming, such as ” Je ne veux pas d’autres choses,” ” Ninon,” ” Chanson de Florian,” also a quantity of piano pieces, some chamber music, including several violin sonatas, a trio for piano and strings, a quartet for strings, a violin concerto and a second work of the same kind entitled ” Concerto Romantique.” Godard’s chance arrived in the year 1878, when with his dramatic cantata, Le Tasse, he shared with M. Theodore Dubois the honour of winning the musical competition instituted by the city of Paris. From that time until his death Godard composed a surprisingly large number of works, including four operas, Pedro de Zalamea, produced at Antwerp in 1884; Jocelyn, given in Paris at the Theatre du Chateau d’Eau, in 1888; Dante, played at the Opera Comique two years later; and La Vivandiere, left unfinished and partly scored by another hand. This last work was heard at the Opera Comique in 189s, and has been played in England by the Carl Rosa Opera Company. His other works include the ” Symphonie legendaire,” ” Symphonie gothique,” ” Diane ” and various orchestral works. Godard’s productivity was enormous, and his compositions are, for this reason only, decidedly unequal. He was at his best in works of smaller dimensions, and has left many exquisite songs. Among his more ambitious works the ” Sym- phonie legendaire ” may be singled out as being one of the most distinctive. He had a decided individuality, and his premature death at Cannes on the 10th of January 1895 was a loss to French art.

GODAVARI, a river of central and western India. It flows across the Deccan from the Western to the Eastern Ghats; its total length is 900 m., the estimated area of its drainage basin, 112,200 sq. m. Its traditional source is on the side of a hill behind the village of Trimb’ak in Nasik district; Bombay, where

the water runs into a reservoir from the lips of an image. But according to popular legend it proceeds from the same ultimate source as the Ganges, though underground. Its course is gener- ally south-easterly. After passing through Nasik district, it crosses into the dominions of the nizam of Hyderabad. When it again strikes British territory it is joined by the Pranhita, with its tributaries the Wardha, the Penganga and Wainganga. For some distance it flows between the nizam’s dominions and the Upper Godavari district, and receives the

Indravati, the Tal and the Sabari. The stream has here a channel varying from 1 to 2 m, in breadth, occasionally broken by alluvial islands. Parallel to the river stretch long ranges of hills. Below the junction of the Sabari the channel begins to contract. The flanking hills gradually close in on both sides, and the result is a magnificent gorge only 200 yds. wide through which the water flows into the plain of the delta, about 60 m. from the sea. The head of the delta is at the village of Dowlaishweram, where the main stream is crossed by the irrigation anicut. The river has seven mouths, the largest being the Gautami Godavari. The Godavari is regarded as peculiarly sacred, and once every twelve years the great bathing festival called Pushkaram is held on its banks at Rajahmundry.

The upper waters of the Godavari are scarcely utilized for irrigation, but the entire delta has been turned into a garden of perennial crops by means of the anicut at Dowlaishweram, constructed by Sir Arthur Cotton, from which three main canals are drawn off. The river channel here is 3! m. wide. The anicut is a substantial mass of stone, bedded in lime cement, about 2 j m. long, 130 ft. broad at the base, and 12 ft. high. The stream is thus pent back so as to supply a volume of 3000 cubic ft. of water per second during its low season, and 12,000 cubic ft. at time of flood. The main canals have a total length of 493 m., irrigating 662,000 acres, and all navigable; and there are 1929 m. of distributary channels. In 1864 water-communication was opened between the deltas of the Godavari and Kistna. Rocky barriers and rapids obstruct navigation in the upper portion of the Godavari. Attempts have been made to construct canals round these barriers with little success, and the undertaking has been abandoned.

GODAVARI, a district of British India, in the north-east of the Madras presidency. It was remodelled in 1907-1908, when part of it was transferred to Kistna district. Its present area is 5634 sq. m. Its territory now lies mainly east of the Godavari river, including the entire delta, with a long narrow strip extending up its valley. The apex of the delta is at Dowlaishweram, where a great dam renders the waters available for irrigation. Between this point and the coast there is a vast extent of rice fields. Farther inland, and enclosing the valley of the great river, are low hills, steep and forest-clad. The north-eastern part, known as the Agency tract, is occupied by spurs of the Eastern Ghats. The coast is low, sandy and swampy, the sea very shallow, so that vessels must lie nearly 5 m. from Cocanada, the chief port. The Sabari is the principal tributary of the Godavari within the district. The Godavari often rises in destructive floods. The population of the present area in 1901 Was 1,445,961. In the old district the increase during the last decade was 11%. The chief towns are

Cocanada and Rajahmundry. The forests are of great value; coal is known, and graphite is worked. The population is principally occupied in agriculture, the principal crops being rice, oil-seeds, tobacco and sugar. The cigars known in England as Lunkas are partly made from tobacco grown on lankas or islands in the river Godavari. Sugar (from the juice of the palmyra palm) and rum are made by European processes at Samalkot. The administrative headquarters are now at Coca- nada, the chief seaport; but Rajahmundry, at the head of the delta, is the old capital. A large but decreasing trade is conducted at Cocanada, rice being shipped to Mauritius and Ceylon, and cotton and oil-seeds to Europe. Rice-cleaning mills have been established here and at other places. The district is traversed by the main line of the East Coast railway, with a branch to Co'canadU; the iron girder bridge of forty-two spans over the

Godavari river near Rajahmundry was opened in 1900. There is a government college at Rajahmundry, with a training college attached, and an aided college at Cocanada.

The Godavari district formed part of the Andhra division of Dravida, the north-west portion being subject to the Orissa kings, and the south-western belonging to the Vengi kingdom. For centuries it was the battlefield on which various chiefs fought for independence with varying success till the beginning of the 1 6th century, when the whole country may be said to have passed under Mahommedan power. At the conclusion of the struggle with the French in the Carnatic, Godavari with the Northern Circars was conquered by the English, and finally ceded by imperial sanad in 1765. The district was constituted in 1859, by the redistribution of the territory comprising the former districts of Guntur, ' Rajahmundry and Masulipatam, into what are now the Kistna and Godavari districts.

See H. Morris, District Manual (1878); District Gazetteer (1906).

GODEFROY (Gothofredus), a French noble family, which numbered among its members several distinguished jurists and historians. The family claimed descent from Symon Godefroy, who was born at Mons about 1320 and was lord of Sapigneulx near Berry-au-bac, now in the department of Aisne.

Denis Godefroy (Dionysius Gothofredus) (1549-1622), jurist, son of

Leon Godefroy, lord of Guigneco.urt, was born in Paris on the 17th of October 1549. He was educated at the College de Navarre, and studied law at Louvain, Cologne and Heidelberg, returning to Paris in 1573. He embraced the reformed religion, and in 1579 left Paris, where his abilities and connexions promised a brilliant career, to establish himself at Geneva. He became professor of law there, received the freedom of the city in 1580; and in 1587 became a member of the Council of the Two Hundred. Henry IV. induced him to return to France by making him grand bailli of Gex,but no sooner had he installed himself than the town was sacked and his library burnt by the troops of the duke of Savoy. In 1591 he became professor of Roman law at Strassburg, where he remained until April 1600, when in response to an invitation' from Frederick IV., elector palatine, he removed to Heidelberg. The difficulties of his position led to his return to Strassburg for a short time, but in November 1604 he definitely settled at Heidelberg. He was made head of the faculty of law in the university, and was from time to time employed on missions to the French court. His repeated refusal of offers of advancement in his own country was due to his Calvinism. He died at Strassburg on the 7th of September 1622, having left Heidelberg before the. city was sacked by the imperial troops in 1621. His most important work was the Corpus juris civilis, originally published at Geneva in 1583, which went through some twenty editions, the most valuable of them being that printed by the Elzevirs at Amster- dam in 1633 and the Leipzig edition of 1740.

Lists of his other learned works may be found in Senebier's Hist, litt. de Geneve, vol. ii., and in Niceron's Memoires, vol. xvii. Some of his correspondence with his learned friends, with his kinsman President de Thou, Isaac Casaubon, Jean Jacques Grynaeus and others, is preserved in the libraries of the British Museum, of Basel and Paris.

His eldest son, Theodore Godefroy (1 580-1649), was born at Geneva on the 14th of July 1580. He abjured Calvinism, and was called to the bar in Paris. He became historiographer of France in 1613, and was employed from time to time on diplomatic missions. He was employed at the congress of Miinster, where he remained after the signing of peace in 1648 as charge d'affaires until his death on the 5th of October of the next year. His most important work is Le Ceremonial de France . . . (16 19), a work which became a classic on the subject o| royal ceremonial, and was re-edited by his son in an enlarged edition in 1649.

Besides his printed works he made vast collections of historical material which remains in MS. and fills the greater part of the

Godefroy collection of over five hundred portfolios in the Library of the Institute in Paris. These were catalogued by Ludovic Lalanne in the Annuaire Bulletin (1865-1866 and 1892) of the Societe de I'histoire de France.

The second son of Denis, Jacques Godefroy (1 587-1652), jurist, was born at Geneva on the 13th of September 1587. He was sent to France in 161 1, and studied law and history at Bourges and Paris. He remained faithful to the Calvinist persuasion, and soon returned to Geneva, where he became active in public affairs. He was secretary of state from 1632 to 1636, and syndic or chief magistrate in 1637, 1641, 1645 and 1649. He died on the 23rd of June 1652. In addition to his civic and political work he lectured on law, and produced, after thirty years of labour, his edition of the Codex Theodosianus. This code formed the principal, though not the only, source of the legal systems of the countries formed from the Western Empire. Godefroy's edition was enriched with a multitude of important notes and historical comments, and became a standard authority on the decadent period of the Western Empire. It was only printed thirteen years after his death under the care of his friend Antoine Marville at Lyons (4 vols. 1665), and was reprinted at Leipzig (6 vols.) in 1 736-1 745. Of his numerous other works the most important was the reconstruction of the twelve tables of early Roman law.

See also the dictionary of Moreri, Niceron's Memoires (vol. 17) and a notice in the Bibliotheque universelle de Geneve (Dec. 1837).

Denis Godefroy (1615-1681), eldest son of Theodore, succeeded his father as historiographer of France, and re-edited various chronicles which had been published by him. He was entrusted by Colbert with the care and investigation of the records concerning the Low Countries preserved at Lille, where great part of his life was spent. He was also the historian of the reigns of Charles VII. and Charles VIII.

Other members of the family who attained distinction in the same branch of learning were the two sons of Denis Godefroi — Denis (1653-1719), also an historian, and Jean, sieur d'Aumont (1656-1732), who edited the letters of Louis XII., the memoirs of Marguerite de Valois, of Castelnau and Pierre de l'Estoile, and left some useful material for the history of the Low Countries; Jean Baptiste Achille Godefroy, sieur de Maillart (1697-1759), and Denis Joseph Godefroy, sieur de Maillart (1740-1819), son and grandson of Jean Godefroy, who were both officials at Lille, and left valuable historical documents which have remained in MS. .

For further details see Les Savants Godefroy (Paris, 1873) by the marquis de Godefroy-Menilglaise, son of Denis Joseph Godefroy.

GODESBERG, aspaof Germany, in the Prussian Rhine province, on the left bank of the Rhine, almost opposite Kbnigswinter, and 4 m. S. of Bonn, on the railway to Coblenz. It is a fashion- able summer resort, and contains numerous pretty villas, the residences of merchants from Cologne, Elberfeld, Crefeld and other Rhenish manufacturing centres. It has an Evangelical and three Roman Catholic churches, a synagogue and several educational establishments. Its chalybeate springs annually attract a large number of visitors, and the pump-room, baths and public grounds are arranged on a sumptuous scale. On a Conical basalt hill, close by, are the ruins, surmounted by a picturesque round tower, of Godesberg castle. Built by Arch- bishop Dietrich I. of Cologne in the 13th century, it was destroyed by the Bavarians in 1583.

See Dennert, Godesberg, eine Perle des Rheins (Godesberg, 1900).

GODET, FREDERIC LOUIS (1812-1900), Swiss Protestant theologian, was born at Neuchatel on the 25th of October 1812. After studying theology at Neuchatel, Bonn and Berlin, he was in 1850 appointed professor of theology at Neuchatel. From 1851 to 1866 he also held a pastorate. In 1873 he became one of the founders of the free Evangelical Church of Neuchatel, and professor in its theological faculty. He died there on the 29th of October 1900. A conservative scholar, Godet was the author of some of the most noteworthy French commentaries published in recent times.

His commentaries are on the Gospel of St John (2 vols., 1863-1865-, 3rd ed., 1881-1888; Eng. trans. 1886, &c.); St Luke (2 vols., 1871; 3rd ed., 1888; Eng. trans. 1875, &c.); the Epistle to the Romans (2 vols., 1879-11880; 2nd ed., 1883-1890; Eng. trans., 1880, &c.); Corinthians (2 vols., 1886-1887; Eng. trans. 1886, &c). His other

works include Htudes bibliques (2 vols., 1873-1874; 4th ed., 1889; Eng. trans. 1 875 f.), and Introduction au Nouveau Testament (1893 I. ; Eng. trans., 1894. &c); Lectures in Defence of the Christian Faith (Eng. trans. 4th ed., 1900).

GODFREY, SIR EDMUND BERRY (1621-1678), English magistrate and politician, younger son of Thomas Godfrey (1 586-1 664), a member

of an old Kentish family, was born on the 23rd of December 1621. He was educated at Westminster school and at Christ Church, Oxford, and after entering Gray's Inn became a dealer in wood. His business prospered. He was made a -justice of the peace for the city of Westminster, and in September 1666 was knighted as a reward for his services as magistrate and citizen during the great plague in London; but in 1669 he was imprisoned for a few days for instituting the arrest of the king's physician, Sir Alexander Fraizer (d. 1681), who owed him money. The tragic events in Godfrey's life began in September 1678 when Titus Oates and two other men appeared before him with written information about the Popish Plot, and swore to the truth of their statements. During the intense excitement which followed the magistrate expressed a fear that his life was in danger, but took no extra precautions for safety. On the 1 2th of October he did not return home as usual, and on the 17th his body was found on Primrose Hill, Hampstead. Medical and other evidence made it certain that he had been murdered, and the excited populace regarded the deed as the work of the Roman Catholics. Two committees investigated the occurrence without definite result, but in December 1678 a certain Miles Prance, who had been arrested for conspiracy, confessed that he had shared in the murder. According to Prance the deed was instigated by some Roman Catholic priests, three of whom witnessed the murder, and was committed in the courtyard of Somerset House, where Godfrey was strangled by Robert Green, Lawrence Hill and Henry Berry, the body being afterwards taken to Hampstead. The three men were promptly arrested; the evidence of the informer William Bedloe, although contradictory, was similar on a few points to that of Prance, and in February 1679 they were hanged. Soon afterwards, however, some doubt was cast upon this story; a war of words ensued between Prance and others, and it was freely asserted that Godfrey had committed suicide. Later the falsehood of Prance's confession was proved and Prance pleaded guilty to perjury; but the fact remains that Godfrey was murdered. Godfrey was an excellent magistrate, and was very charitable both in public and in private life. Mr John Pollock, in the Popish Plot (London, 1903), confirms the view that the three men, Green, Hill and Berry, were wrongfully executed, and thinks the murder was committed by some Jesuits aided by Prance. Godfrey was feared by the Jesuits because he knew, through Oates, that on the 24th of April 1678 a Jesuit congregation had met at the residence of the duke of York to concert plans for the king's murder. He concludes thus: " The success of Godfrey's murder as a political move is indubitable. The duke of York was the pivot of the Roman Catholic scheme in England, and Godfrey's death saved both from utter ruin." On the other hand Mr Alfred Marks in his Who killed

Sir E. B. Godfrey? (1905) maintains that suicide was the cause of Godfrey's death.

See the article Oates, Titus, also R. Tuke, Memoirs of the Life and Death of Sir Edmondbury Godfrey (London, 1682) ; and G. Burnet, History of my Own Time; The Reign of Charles II., edited by O. Airy (Oxford, 1900).

GODFREY OF BOUILLON (c. 1060-1100), a leader in the First Crusade, was the second son of Eustace II., count of Boulogne, by his marriage with Ida, daughter of Duke Godfrey II. of Lower Lorraine. He was designated by Duke Godfrey as his successor; but the emperor Henry IV. gave him only the mark of Antwerp, in which the lordship of Bouillon was included (1076). He fought for Henry, however, both on the Elster and in the siege of Rome; and he was invested in 1082 with the duchy of Lower Lorraine. Lorraine had been penetrated by Cluniac influences, and Godfrey would seem to have been a man of notable piety. Accordingly, though he had himself served as ah imperialist, and though the Germans in general had little sympathy with the Crusaders (subsannabant . . . quasi delir antes),

Godfrey, nevertheless, when the call came " to follow Christ," almost literally sold all that he had, and followed. Along with his brothers Eustace and Baldwin (the future Baldwin I. of Jerusalem) he led a German contingent, some 40,000 strong, along " Charlemagne's road," through Hungary to Constantinople, starting in August 1096, and arriving at Constantinople, after some difficulties in Hungary, in November. He was the first of the crusading princes to arrive, and on him fell the duty of deciding what the relations of the princes to the eastern emperor Alexius were to be. Eventually, after several disputes and some fighting, he did homage to Alexius in January 1097; and his example was followed by the other princes. From this time until the beginning of 1099 Godfrey appears as one of the minor princes, plodding onwards, and steadily fighting, while men like Bohemund and Raymund, Baldwin and Tancred were determining the course of events.

In 1099 he came once more to the front. The mass of the crusaders became weary of the political factions which divided some of their leaders; and Godfrey, who was more of a pilgrim than a politician, becomes the natural representative of this feeling. He was thus able to force the reluctant Raymund to march southward to Jerusalem; and he took a prominent part in the siege, his division being the first to enter when the city was captured. It was natural therefore that, when Raymund of Provence refused the offered dignity, Godfrey should be

elected ruler of Jerusalem (July 22, 1099). He assumed the title not of king, but of ” advocate ” 1 of the Holy Sepulchre. The new dignity proved still more onerous than honourable; and during his short reign of a year Godfrey had to combat the Arabs of Egypt, and the opposition of Raymund and the patriarch Dagobert. He was successful in repelling the Egyptian attack at the battle of Ascalon (August 1099) ; but he failed, owing to Raymund’s obstinacy and greed, to acquire the town of Ascalon after the battle. Left alone, at the end of the autumn, with an army of some 2000 men, Godfrey was yet able, in the spring of 1 100, probably with the aid of new pilgrims, to exact tribute from towns like Acre, Ascalon, Arsuf and Caesarea. But already, at the end of 1099 Dagobert, archbishop of Pisa, had been substituted as patriarch for Arnulf (who had been acting as vicar) by the influence of Bohemund; and Dagobert, whose vassal Godfrey had at once piously acknowledged himself, seems to have forced him to an agreement in April 1100, by which he promised Jerusalem and Jaffa to the patriarch, in case he should acquire in their place Cairo or some other town, or should die without issue. Thus were the foundations of a theocracy laid in Jerusalem; and when Godfrey died (July 1100) he left the question to be decided, whether a theocracy or a monarchy should be the government of the Holy Land.

Because he had been the first ruler in Jerusalem Godfrey was idolized in later saga. He was depicted as the leader of the crusades, the king of Jerusalem, the legislator who laid down the assizes of Jerusalem. He was none of these things. Bohemund was the leader of the crusades; Baldwin was first king; the assizes were the result of a gradual development. In still other ways was the figure of Godfrey idealized by the grateful tradition of later days; but in reality he would seem to have been a quiet, pious, hard-fighting knight, who was chosen to rule in Jerusalem because he had no dangerous qualities, and no obvious defects.

Literature. — The narrative of Albert of Aix may be regarded as presenting the Lotharingian point of view, as the Gesta presents the Norman, and Raymund of Agiles the Provencal. The career of Godfrey has been discussed in modern times by R. Rohricht, Die Deutschen im heiligen Lande, Band ii., and Geschichte des ersten Kreuzzuges, passim (Innsbruck, 1901). (E. Br.)

Romances. — Godfrey was the principal hero of two French chansons de geste dealing with the Crusade, the Chanson d’ Antioche (ed. P. Paris, 2 vols., 1848) and the Chanson de Jerusalem (ed. C. Hippeau, 1868), and other poems, containing less historical

1 An ” advocate ” was a layman who had been invested with part of an ecclesiastic estate, on condition that he defended the rest, and exercised the blood-ban in lieu of the ecclesiastical owner (see Advocate, sec. Advocatus ecclesiae).

material, were subsequently added. In addition the parentage and early exploits of Godfrey were made the subject of legend. His grandfather was said to be Helias, knight of the Swan, one of the brothers whose adventures are well known, though with some variation, in the familiar fairytale of “The Seven Swans.” Helias, drawn by the swan, one day disembarked at Nijmwegen, and reconquered her territory for the duchess of Bouillon. Marrying her daughter he exacted a promise that his wife should not inquire into his origin. The tale, which is almost identical with the Lohengrin legend, belongs to the class of the Cupid and Psyche narratives. See Lohengrin.

See also C. Hippeau, Le Chevalier au cygne (Paris, 2 vols., 1874-1877); H. Pigeonneau, Le Cycle de la croisade et de la famille de Bouillon (1877); W. Golther, ” Lohengrin,” in Roman. Forsch. (vol. v., 1889); Hist. lilt, de la France, vol. xxii. pp. 350-402; the English romance of Helyas, Knyghte of the Swanne was printed by W. Copland about 1550.

GODFREY OF VITERBO (c. 1120-c. 1106), chronicler, was probably an Italian by birth, although some authorities assert that he was a Saxon. He evidently passed some of his early life at Viterbo, where also he spent his concluding days, but he was educated at Bamberg, gaining a good knowledge of Latin. About 1140 he became chaplain to the German king, Conrad III.; but the greater part of his life was spent as secretary (notarius) in the service of the emperor Frederick I., who appears to have thoroughly trusted him, and who employed him on many diplomatic errands. Incessantly occupied, he visited Sicily, France and Spain, in addition to many of the German cities, in the emperor’s interests, and was by his side during several of the Italian campaigns. Both before and after Frederick’s death in 1 190 he enjoyed the favour of his son, the emperor Henry VI., for whom he wrote his Speculum regum, a work of very little value. Godfrey also wrote Memoria seculorum, or Liber memo- rialis, a chronicle dedicated to Henry VI., which professes to record the history of the world from the creation until 1185. It is written partly in prose and

partly in verse. A revision of this work was drawn up by Godfrey himself as Pantheon, or Universitatis libri qui chronici appellantur. The author borrowed from Otto of Freising, but the earlier part of his chronicle is full of imaginary occurrences. Pantheon was first printed in 1559, and extracts from it are published by L. A. Muratori in the Rerum Italicatum scriptores, tome vii. (Milan, 1725). The only part of Godfrey's work which is valuable is the Gesta Friderici I., verses relating events in the emperor's career from 1155 to 11 80. Concerned mainly with affairs in Italy, the poem tells of the sieges of Milan, of Frederick's flight to Pavia in 1167, of the treaty with Pope Alexander III. at Venice, and of other stirring episodes with which the author was intimately acquainted, and many of which he had witnessed. Attached to the Gesta Friderici is the Gesta Heinrici VI., a shorter poem which is often attributed to Godfrey, although W. Wattenbach and other authorities think it was not written by him. The Memoria seculorum was very popular during the middle ages, and has been continued by several writers.

Godfrey's works are found in the Monumenta Germaniae historica, Band xxii. (Hanover, 1872). The Gesta Friderici I. et Heinrici VI. is published separately with an introduction by G. Waitz (Hanover, 1872). See also H. Ulmann, Gotfried von Viterbo (Gottingen, 1863), and W. Wattenbach, Deutschlands Geschichtsquellen, Band ii. (Berlin, 1894). (A. W. H.*)

GODHRA, a town of British India, administrative head- quarters of the Panch Mahals district of Bombay, and also of the Rewa Kantha political agency; situated 52 m. N.E. of Baroda on the railway from Anand to Ratlam. Pop. (1901) 20,915. It has a trade in timber from the neighbouring forests.

GODIN, JEAN BAPTISTE ANDRE (1817-1888), French socialist, was born on the 26th of January 181 7 at Esqueheries (Aisne). The son of an artisan, he entered an iron- works at an ■ early age, and at seventeen made a tour of France as journeyman. Returning to Esqueheries in 1837, he started a small factory for the manufacture of castings for heating-stoves. The business increased rapidly, and for the purpose of railway facilities was transferred to Guise in 1846. At the time of Godin's death in 1888 the annual output was over four millions of francs (£160,000),

and in 1908 the employees numbered over 2000 and the output was over £280,000. An ardent disciple of Fourier, he advanced a considerable sum of money towards the disastrous Fourierist experiment of V. P. Considerant (q.v.) in Texas. He profited, however,

by its failure, and in 1859 started the familistere or community settlement of Guise on more carefully laid plans. It comprises, in addition to the workshops, three large buildings, four storeys high, capable of housing all the work-people, each family having two or three rooms. Attached to each building is a vast central court, covered with a glass roof, under which the children can play in all weathers. There are also creches, nurseries, hospital, refreshment rooms and recreation rooms of various kinds, stores for the purchase of groceries, drapery and every necessity, and a large theatre for concerts and dramatic entertainments. In 1880 the whole was turned into a co-opera- tive society, with provision by which it eventually became the property of the workers. In 1871 Godin was elected deputy for Aisne, but retired in 1876 to devote himself to the management of the familistere. In 1882 he was created a knight of the legion of honour.

Godin was the author of Solutions sociales (1871); Les Socialistes et les droits du travail (1874); Mutualite sociale (1880); La R6- publique du travail et la reforme parlementaire (1889). See Bernardot, Le Familistere de Guise et son fondateur (Paris, 1887); Fischer, Die Familistere Godin's (Berlin, 1890); Lestelle, &ude sur le familis- tere de Guise (Paris, 1904) ; D. F. P., Le Familistere illustre, resultats de vingt ans d' association, 1880-1900 (Eng. trans., Twenty-eight years of co-partnership at Guise, by A. Williams, 1908).

GODIVA, a Saxon lady, who, according to the legend, rode naked through the streets of Coventry to gain from her husband a remission of the oppressive toll imposed on his tenants. The story is that she was the beautiful wife of Leofric, earl of Mercia and lord of Coventry. The people of that city suffering griev- ously under the earl's oppressive taxation, Lady Godiva appealed again and again to her husband, who obstinately refused to remit the tolls. At last, weary of her entreaties, he said he would grant her request if she would ride naked through the streets of the town. Lady Godiva took him at his word, and after issuing a proclamation that all persons should keep within doors or shut their windows, she rode through, clothed only in her long hair. One person disobeyed her proclamation, a tailor, ever afterwards known as Peeping Tom. He bored a hole in his shutters that he might see Godiva pass, and is said to have been struck blind. Her husband kept his word and abolished the obnoxious taxes.

The oldest form of the legend makes Godiva pass through Coventry market from one end to the other when the people were assembled, attended only by two soldiers, her long hair down so that none saw her, " apparentibus cruribus tamen candidissimis." This version is given in Flores historiarum by Roger of Wendover, who quoted from

an earlier writer. The later story, with its episode of Peeping Tom, has been evolved by later chroniclers. Whether the lady Godiva of this story is the Godiva or Godgifu of history is undecided. That a lady of this name existed in the early part of the nth century is certain, as evidenced by several ancient documents, such as the Stow charter, the Spalding charter and the Domesday survey, though the spelling of the name varies considerably. It would appear from Liber Eliensis (end of 1 2th century) that she was a widow when Leofric married her in 1040. In or about that year she aided in the founding of a monastery at Stow, Lincolnshire. In 1043 she persuaded her husband to build and endow a Bene- dictine monastery at Coventry. Her mark, ” »J« Ego Godiva Comitissa diu istud desideravi,” was found on the charter given by her brother, Thorold of Bucknall — sheriff of Lincolnshire — to the Benedictine monastery of Spalding in 10.51; and she is commemorated as benefactress of other monasteries at Leo- minster, Chester, Wenlock, Worcester and Evesham. She probably died a few years before the Domesday survey (1085- 1086), and was buried in one of the porches of the abbey church. Dugdale (1656) says that a window, with representations of Leofric and Godiva, was placed in Trinity Church, Coventry, about the time of Richard II. The Godiva procession, a com- memoration of the legendary ride instituted on the 31st of May

1678 as part of Coventry fair, was celebrated at intervals until 1826. From 1848 to 1887 it was revived, and recently further attempts have been made to popularize the pageant. The wooden effigy of Peeping Tom which, since 1812, has looked out on the world from a house at the north-west corner of Hertford Street, Coventry, represents a man in armour, and was probably an image of St George. It was removed from another part of the town to its present position.

GODKIN, EDWIN LAWRENCE (1831-1902), American publicist, was born in Moyne, county Wicklow, Ireland, on the 2nd of October 1831. His father, James Godkin, was a Presby- terian minister and a journalist, and the son, after graduating in 1851 at Queen’s College, Belfast, and studying law in London, was in 1853-1855 war correspondent for the London Daily News in Turkey and Russia, being present at the capture of Sevastopol, and late in 1856 went to America and wrote letters to the same journal, giving his impressions of a tour of the southern states of the American Union. He studied law in New York City, was admitted to the bar in 1859, travelled in Europe in

1860-1862, wrote for the London News and the New York Times in 1862- 1865, and in 1865 founded in New York City the Nation, a weekly projected by him long before, for which Charles Eliot Norton gained friends in Boston and James Miller McKim (1810- 1874) in Philadelphia, and which Godkin edited until the end of the year 1899. In 1881 he sold the Nation to the New York Evening Post, and became an associate editor of the Post, of which he was editor-in-chief in 1 883-1 899, succeeding Carl Schurz. In the 'eighties he engaged in a controversy with Goldwin Smith over the Irish question. Under his leadership the Post broke with the Republican party in the presidential cam- paign of 1884, when Godkin's opposition to Blaine did much to create the so-called Mugwump party (see Mugwump), and his organ became thoroughly independent, as was seen when it attacked the Venezuelan policy of President Cleveland, who had in so many ways approximated the ideal of the Post and Nation. He consistently advocated currency reform, the gold basis, a tariff for revenue only, and civil service reform, rendering the greatest aid to the last cause. His attacks on Tammany Hall were so frequent and so virulent that in 1894 he was sued for libel because of biographical sketches of certain leaders in that organization— cases which never came up for trial. His opposi- tion to the war with Spain and to imperialism was able and forcible. He retired from his editorial duties on the 30th of December 1899, and sketched his career in the Evening Post of that date. Although he recovered from a severe apoplectic stroke early in 1900, his health was shattered, and he died in Greenway, Devonshire, England, on the 21st of May 1902. Godkin shaped the lofty and independent policy of the Post and the Nation, which had a small but influential and intellectual class of readers. But as editor he had none of the personal magnetism of Greeley, for instance, and his superiority to the influence of popular feeling made Charles Dudley Warner style the Nation the "weekly judgment day." He was an economist of the school of Mill, urged the necessity of the abstraction called " economic man," and insisted that Socialism put in practice would not improve social and economic conditions in general. In politics he was an enemy of sentimentalism and loose theories in government. He published A History of Hungary, A.D. 300-1850 (1856), Government 1(1871, in the American Science Series), Reflections and Comments (1895), Problems of Modern Democracy (1896) and Unforeseen Tendencies of Democracy (1898).

See Life andLetlers ofE. L. Godkin, edited by Rollo Ogden (2 vols., New York, 1907).

GODMANCHESTER, a municipal borough in the southern, parliamentary division of Huntingdonshire, England, on the right bank

of the Ouse, 1 m. S.S.E. of Huntingdon, on a branch of the Great Eastern railway. Pop. (1901) 2017. It has a beautiful Perpendicular church (St Mary's) and an agricultural trade, with flour mills. The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 4907 acres.

A Romano-British village occupied the site of Godmanchester.

The town (Gumencestre, Gomecestre) belonged to the king before the Conquest and at the time of the Domesday survey, in 1213 King John granted the manor to the men of the town at a fee- farm of £120 yearly, and confirmation charters were granted by several succeeding kings, Richard II. in 1391-1392 adding exemption from toll, pannage, &c. James I. granted an in- corporation charter in 1605 under the title of bailiffs, assistants and commonalty, but under the Municipal Reform Act of 183 J the corporation was changed to a mayor, 4 aldermen and 1 2 councillors. Godmanchester was formerly included for parlia- mentary purposes in the borough of Huntingdon, which has ceased to be separately represented since 1885. The incorpora- tion charter of 1605 recites that the burgesses are chiefly engaged in agriculture, and grants them a fair, which still continues every year on Tuesday in Easter week.

See Victoria County History, Huntingdon; Robert Fox, The History of Godmanchester (1831).

GODOLLO, a market town of Hungary, in the county of Pest- Pilis-Solt-Kiskun, 23 m. N.E. of Budapest by rail. Pop. (1900) 5875. Godollo is the summer residence of the Hungarian royal family, and the royal castle, built in the second half of the 18th century by Prince Anton Grassalkovich, was, with the beautiful domain, presented by the Hungarian nation to King Francis Joseph I. after the coronation in 1867. In its park there are a great number of stags and wild boars. Godollo is a favourite summer resort of the inhabitants of Budapest. In its vicinity is the famous place of pilgrimage Maria-Besnyo, with a fine Franciscan monastery, which contains the tombs of the Grassal-kovich family.

GODOLPHIN, SIDNEY GODOLPHIN, Earl of (c. 1645- 171 2), was a cadet of an ancient family of Cornwall. At the Restoration he was introduced into the royal household by Charles II., with whom he had previously become a favourite, and he also at the same period entered the House of Commons as member for Helston. Although he very seldom addressed the House, and, when he did so, only in the briefest manner, he gradually acquired a reputation as its chief if not its only

financial authority. In March 1679 he was appointed a member of the privy council, and in the September following he was promoted, along with Viscount Hyde (afterwards earl of Rochester) and the earl of Sunderland, to the chief management of affairs. Though he voted for the Exclusion Bill in 1680, he was continued in office after the dismissal of Sunderland, and in September 1684 he was created Baron Godolphin of Rialton, and succeeded Rochester as first lord of the treasury. After the accession of James II. he was made chamberlain to the queen, and, along with Rochester and Sunderland, enjoyed the king's special confidence. In 1687 he was named commissioner of the treasury. He was one of the council of five appointed by King James to represent him in London, when he went to join the army after the landing of William, prince of Orange, in England, and, along with Halifax and Nottingham, he was afterwards appointed a commissioner to treat with the prince. On the accession of William, though he only obtained the third seat at the treasury board, he had virtually the chief control of affairs. He retired in March 1690, but was recalled on the November following and appointed first lord. While holding this office he for several years continued, in conjunction with Marlborough, a treacherous intercourse with James II., and is said even to have anticipated Marlborough in disclosing to James intelligence regarding the intended expedition against Brest. Godolphin was not only a Tory by inheritance, but had a romantic admiration for the wife of James II. He also wished to be safe whatever happened, and his treachery in this case was mostly due to caution. After Fenwick's confession in 1696 regarding the attempted assassina- tion of William III., Godolphin, who was compromised, was in- duced to tender his resignation; but when the Tories came into power in 1700, he was again appointed lord treasurer arid retained office for about a year. Though not a favourite with Queen Anne, he was, after her accession, appointed to his old office, on the strong recommendation of Marlborough. He also in 1704 received the honour of knighthood, and in December

1706 he was created Viscount Rialton and earl of Godolphin. Though a Tory he had an active share in the intrigues which gradually led to the predominance of the Whigs in alliance with Marlborough. The influence of the Marlboroughs with the queen was, however, gradually supplanted by that of Mrs Masham and Harley, earl of Oxford, and with the fortunes of the Marlboroughs those of Godolphin were indissolubly united. The services of both were so appreciated by

the nation that they were able for a time to regard the loss of the queen's favour with indifference, and even in 1708 to procure the expulsion of Harley from office; but after the Tory reaction which followed the impeachment of Dr Sacheverel, who abused Godolphin under the name of Volpone, the queen made use of the opportunity to take the initiatory step towards delivering herself from the irksome thraldom of Marlborough by abruptly dismissing Godolphin from office on the 7th of August 17 10. He died on the 15th of September 1712.

Godolphin owed his rise to power and his continuance in it under four sovereigns chiefly to his exceptional mastery of financial matters; for if latterly he was in some degree indebted for his promotion to the support of Marlborough, he received that support mainly because Marlborough recognized that for the prosecution of England's foreign wars his financial abilities were an indispensable necessity. He was cool, reserved and cautious, but his prudence was less associated with high sagacity than traceable to the weakness of his personal antipathies and pre- judices, and his freedom from political predilections. Perhaps it was his unlikeness to Marlborough in that moral characteristic which so tainted Marlborough's greatness that rendered possible between them a friendship so intimate and undisturbed: he was, it would appear, exceptionally devoid of the passion of avarice; and so little advantage did he take of his opportunities of aggrandizement that, though his style of living was un- ostentatious, — and in connexion with his favourite pastimes of horse-racing,' card-playing and cock-fighting he gained perhaps more than he lost, — all that he left behind him did not, according to the duchess of Marlborough, amount to more than £12,000.

Godolpnin married Margaret Blagge, the pious lady whose life was written by Evelyn, on the i6thof May 1675, and married again after her death in 1678. His son and successor, Francis (1678-1766), held various offices at court, and was lord privy seal from 173 5 to 1740. He married Henrietta Churchill (d. 1733), daughter of the duke of Marlborough, who in 1722 became in her own right duchess of Marlborough. He died without male issue in January 1766, when the earldom became extinct, and the estates passed to Thomas Osborne, 4th duke of Leeds, the husband of the earl's daughter Mary, whose descendant is the present representative of the Godolphins.

A life of Godolphin was published in 1888 in London by the Hon. H. Elliot.

GODOY, ALVAREZ DE FARIA, RIOS SANCHEZ Y ZARZOSA, MANUEL

DE (1767-1851), duke of El Alcudia and prince of the Peace, Spanish royal favourite and minister, was born at Badajoz on the 1 2th of May 1767. His father, Don Jose de Godoy, was the head of a very ancient but impoverished family of nobles in Estremadura. His mother, whose maiden name was Maria Antonia Alvarez de Faria, belonged to a Portuguese noble family. Manuel boasts in his memoirs that he had the best masters, but it is certain that he received only the very slight education usually given at that time to the sons of provincial nobles. In 1 784 he entered the Guardia de Corps, a body of gentlemen who acted as the immediate body-guard of the king. His well- built and stalwart person, his handsome foolish face, together with a certain geniality of character which he must have possessed, earned him the favour of Maria Luisa of Parma, the princess of Asturias, a coarse, passionate woman who was much neglected by her husband, who on his part cared for nothing but hunting.

When King Charles III. died in 1788, Godoy's fortune was soon made. The princess of Asturias, now queen, understood how to manage her husband Charles IV. Godoy says in his

memoirs that the king, who had been carefully kept apart from affairs during his father's life, and who disliked his father's favourite minister Floridablanca, wished to have a creature of his own. This statement is no doubt true as far as it goes. But it requires to be completed by the further detail that the queen put her lover in her husband's way, and that the king was guided by them, when he thought he was ruling for himself through a subservient minister. In some respects King Charles was obstinate, and Godoy is probably right in saying that he never was an absolute "viceroy," and that he could not always secure the removal of colleagues whom he knew to be his enemies. He could only rule by obeying. Godoy adopted without scruple this method of pushing his fortunes. When the king was set on a particular course, he followed it; the execution was left to him and the queen. His pliability endeared him to his master, whose lasting affection he earned. In practice he commonly succeeded in inspiring the wishes which he then proceeded to gratify. From the very beginning of the new reign he was promoted in the army with scandalous rapidity, made duke of El Alcudia, and in 1792 minister under the premiership of Aranda, whom he succeeded in displacing by the close of the year.

His official life is fairly divided by himself into three periods. From 1792 to 1798 he was premier. In the latter year his un- popularity and the intrigues of the French government, which had taken a dislike to him, led to his temporary retirement, without, however, any diminution of the king's personal favour. He asserts that he had no

wish to return to office, but letters sent by him to the queen show that he begged for employment. They are written in a very unpleasant mixture of gush and vulgar familiarity. In 1801 he returned to office, and until 1807 he was the executant of the disastrous policy of the court. The third period of his public life is the last year, 1807-1808, when he was desperately striving for his place between the aggressive intervention of Napoleon on the one hand, and the growing hatred of the nation, organized behind, and about, the prince of Asturias, Ferdinand. On the 17th of March 1808 a popular outbreak at Aranjuez drove him into hiding. When driven out by hunger and thirst he was recognized and arrested. By Ferdinand's order he was kept in prison, till Napoleon demanded that he should be sent to Bayonne. Here he rejoined his master and mistress. He remained with them till Charles IV. died at Rome in 1819, having survived his queen. The rest of Godoy's life was spent in poverty and obscurity. After the death of Ferdinand VIL, in 1833, he returned to Madrid, and endeavoured to secure the restoration of his property confiscated in 1808. Part of it was the estate of the Soto de Roma, granted by the cortes to the duke of Wellington. He failed, and during his last years lived on a small pension granted him by Louis Philippe. He died in Paris on the 4th of October 1851.

As a favourite Godoy is remarkable for the length of his hold on the affection of his sovereigns, and for its completeness. Latterly he was supported rather by the husband than by the wife. He got rid of Aranda by adopting, in order to please the king, a policy which tended to bring on war with France. When the war proved disastrous, he made the peace of Basel, and was created prince of the Peace for his services. Then he helped to make war with England, and the disasters which followed only made him dearer to the king. Indeed it became a main object with Charles IV. to protect " Manuelito " from popular hatred, and if possible secure him a principality. The queen endured his infidelities to her, which were flagrant. The king arranged a marriage for him with Dona Teresa de Bourbon, daughter of the infante Don Luis by a morganatic marriage, though he was probably already married to Dona Josefa Tudo, and certainly continued to live with her. Godoy, in his memoirs, lays claim to have done much for Spanish agriculture and industry, but he did little more than issue proclamations and appoint officers. His intentions may have been good, but the policy of his govern- ment was financially ruinous. In his private life he was not only profligate and profuse, but childishly ostentatious. The best that can be said for him is that he was good-natured, and

did his best to restrain the Inquisition and the purely reactionary parties.

Authorities. — Godoy's Memoirs were published in Spanish, English and French in 1836. A general account of his career will be found in the Memoires sur la Resolution d'Espagne, by the Abbe de Pradt (1816).

GODROON, or Gadroon (Fr. godron, of unknown etymology), in architecture, a convex decoration (said to be derived from raised work on linen) applied in France to varieties of the bead and reel, in which the bead is often carved with ornament. In England the term is constantly used by auctioneers to describe the raised convex decorations under the bowl of stone or terra- cotta vases. The godroons radiate from the vertical support of the vase and rise half-way up the bowl.

GODWIN, FRANCIS (1562-1633), English divine, son of Thomas Godwin, bishop of Bath and Wells, was born at Hanning- ton, Northamptonshire, in 1562. He was elected student of Christ Church, Oxford, in 1578, took his bachelor's degree in 1580, and that of master in 1383. After holding two Somerset- shire livings he was in 1587 appointed subdean of Exeter. In 1590 he accompanied William Camden on an antiquarian tour through Wales. He was created bachelor of divinity in 1 593 , and doctor in 1595. In 1601 he published his Catalogue of the Bishops of England since the first planting of the Christian .Religion in this Island, a work which procured him in the same year the bishopric of Llandaff. A second edition appeared in 1615, and in 1616 he published an edition in Latin with a dedication to King James, who in the following year conferred upon him the bishopric of Hereford. The work was republished, with a continuation by William Richardson, in 1743. In 16 16 Godwin published Rerum Anglicarum, Henrico VIII., Edwardo VI. el Maria regnantibus, Annates, which was afterwards translated and published by his son Morgan under the title Annates of England (1630). He is also the author of a somewhat remarkable story, published posthum- ously in 1638, and' entitled The Man in the Moone, or a Discourse of a Voyage thither, by Domingo Gonsales, written apparently some time between the years 1599 and 1603. In this production Godwin not only declares himself a believer in the Copernican system, but adopts so far the principles of the law of gravitation as to suppose that the earth's attraction diminishes with the distance. The work, which displays considerable fancy and wit,

was translated into French, and was imitated in several important particulars by Cyrano de Bergerac, from whom (if not from Godwin direct) Swift obtained valuable hints in writing of Gulliver's voyage to Laputa. Another work of Godwin's, Nuncius inanimatus Ulopiae, originally published in 1629 and again in 1657, seems to have been the prototype of John Wilkins's Mercury, or the Secret and Swift Messenger, which appeared in 1641. He died, after a lingering illness, in April 1633.

GODWIN, MARY WOLLSTONECRAFT (1759-1797), English miscellaneous' writer, was born at Hoxton, on the 27th of April 1759. Her family was of Irish extraction, and Mary's grand- father, who was a respectable manufacturer in Spitalfields, realized the property' which his son squandered. Her mother, Elizabeth Dixon, was Irish, and of good family. Her father, Edward John Wollstonecraft, after dissipating the greater part of his patrimony, tried to earn a living by farming, which only plunged him into deeper difficulties, and he led a wandering, shifty life. The family roamed from Hoxton to Edmonton, to Essex, to Beverley in Yorkshire, to Laugharne, Pembrokeshire, and back to London again.

After Mrs Wollstonecraft's death in 1780, soon followed by her husband's second marriage, the three daughters, Mary, Everina and Eliza, sought to earn their own livelihood. The sisters were all clever women — Mary and Eliza far above the average' — but their opportunities of culture had been few. Mary, the eldest, went in the first instance to live with her friend Fanny Blood, a girl of her own age, whose father, like Wollstonecraft, was addicted to drink and dissipation. As long as she lived with the Bloods, Mary helped Mrs Blood to earn money by taking in needlework, while Fanny painted in water- colours. . Everina went to live with her brother Edward, and

Eliza made a hasty and, as it proved, unhappy marriage with a Mr Bishop. A legal separation was afterwards obtained, and the sisters, together with Fanny Blood, took a house, first at Islington, afterwards at Newington Green, and opened a school, which was carried on with indifferent success for nearly two years. During their residence at Newington Green, Mary was introduced to Dr Johnson, who, as Godwin tells us, " treated her with particular kindness and attention."

In 1 785 Fanny Blood married Hugh Skeys, a merchant, and went with him to Lisbon, where she died in childbed after sending for Mary to nurse her. "The lossof Fanny, "as she said in a letter to Mrs Skeys 's brother, George Blood, " was sufficient of itself to have cast a cloud over my brightest days. ... I have lost all relish for pleasure, and life

seems a burden almost too heavy to be endured.” Her first novel, Mary, a Fiction (1788), was intended to com- memorate her friendship with Fanny. After closing the school at Newington Green, Mary became governess in the family of Lord Kingsborough, in Ireland. Her pupils were much attached to her, especially Margaret King, afterwards Lady Moimtcashel; and indee.d, Lady Kingsborough gave the reason for dismissing her after one year’s service that the children loved their governess better than their mother. Mary now resolved to devote herself to literary work, and she was encouraged by Johnson, the publisher in St Paul’s churchyard, for whom she acted as literary adviser. She also undertook translations, chiefly from the French. The Elements of Morality (1790) from the German of Salzmann, illustrated by Blake, an old-fashioned book for children, and Lavater’s Physiognomy were among her translations. Her Original Stories from Real Life were published in 1791, and, with illustrations by Blake, in 1796. In 1792 appeared A Vindication of the Rights of Woman, the work with which her name is always associated.

It is not among the least oddities of this book that it is dedicated to M. Talleyrand Pengord, late bishop of Autun. Mary Wollstone- craft still believed him to be sincere, and working in the same direction as herself. In the dedication she states the ” main argument ” of the work, ” built on this simple principle that, if woman be not prepared by education to become the companion of man, she will stop the progress of knowledge, for truth must be common to all, or it will be inefficacious with respect to its influence or general practice.” In carrying out this argument she used great plainness of speech, and it was this that caused all, or nearly all, the outcry. For she did not attack the institution of marriage, nor assail orthodox religion; her book was really a plea for equality of education, passing into one for state education and for the joint education of the sexes. It was a protest against the assumption that woman was only the plaything of man, and she asserted that intellectual companionship was the chief, as it is the lasting, happiness of marriage. She thus directly opposed the teaching of Rousseau, of whom she was in other respects an ardent disciple.

Mrs Wollstonecraft, as she now styled herself, desired to watch the progress of the Revolution in France, and went to Paris in 1792. Godwin, in his memoir of his wife, considers that the change of residence may have been prompted by the discovery that she was becoming attached to Henry Fuseli, but there is little to confirm this surmise; indeed, it was first proposed that she should go to Paris in company with him and his wife, nor was there any subsequent breach in their friendship. She re- mained in Paris during the Reign of Terror,

when communication with England was difficult or almost impossible. Some time in the spring or summer of 1 793 Captain Gilbert Imlay, an American, became acquainted with Mary — an acquaintance which ended in a more intimate connexion. There was no legal ceremony of marriage, and it is doubtful whether such a marriage would have been valid at the time; but she passed as Imlay ‘s wife, and Imlay himself terms her in a legal document, ” Mary Imlay, my best friend and wife.” In August 1 793 Imlay was called to Havre on business, and was absent for some months, during which time most rjf the letters published after her death by Godwin were written. Towards the end of the year she joined Imlay at Havre, and there in the spring of 1 794 she gave birth to a girl,

who received the name of Fanny, in memory of the dear friend of her youth. In this year she published the first volume of a never completed Historical and Moral View of the French Revolution. Imlay became involved in a multitude of speculations, and his affection for Mary and their child was already waning. He left Mary for some months at Havre. In June 1795, after joining him in England, Mary left for Norway on business for Imlay. Her letters from Norway, divested of all personal details, were afterwards published. She returned to England late in 1795, and found letters awaiting her from Imlay, intimating his inten- tion to separate from her, and offering to settle an annuity on her and her child. For herself she rejected this offer with scorn: ” From you,” she wrote, ” I will not receive anything more. I am not sufficiently humbled to depend on your beneficence.” They met again, and for a short time lived together, until the discovery that he was carrying on an intrigue under her own roof drove her to despair, and she attempted to drown herself by leaping from Putney bridge, but was rescued by watermen. Imlay now completely deserted her, although she continued to bear his name.

In 1796, when Mary Wollstonecraft was living in London, supporting herself and her child by working, as before, for Mr Johnson, she met William Godwin. A friendship sprang up between them, — a friendship, as he himself says, .which ” melted into love.” Godwin states that ” ideas which he is now willing to denominate prejudices made him by no means willing to conform to the ceremony of marriage “; but these prejudices were overcome, and they were married at St Pancras church on the 29th of March 1797. And now Mary had a season of real calm in her stormy existence. Godwin, for

once only in his life, was stirred by passion, and his admiration for his wife equalled his affection. But their happiness was of short duration. The birth of her daughter Mary, afterwards the wife of Percy Dysshe Shelley, on the 30th of August 1797, proved fatal, and Mrs Godwin died on the 10th of September following. She was buried in the churchyard of Old St Pancras, but her remains were afterwards removed by Sir Percy Shelley to the churchyard of St Peter's, Bournemouth.

Her principal published works are as follows: — Thoughts on the Education of Daughters,. . . (1787); The Female Reader (selections) (1789); Original Stories from Real Life (1791); An Historical and Moral View of the Origin and Progress of the French Revolution, and the effects it has produced in Europe, vol. i. (no more published) (1790): Vindication of the Rights of Woman (1792); Vindication of the Rights of Man (1793); Mary, a Fiction (1788); Letters written during a Short Residence in Sweden, Norway and Denmark (1796); Posthumous Works (4 vols. ,1798). 1 1 is impossible to trace the many articles contributed by her to periodical literature.

A memoir of her life was published by Godwin in 1798. A large portion of C. Kegan Paul's work, William Godwin, his Friends and Contemporaries, was devoted to her, and an edition of the Letters to Imlay (1879), of which the first edition was published by Godwin, is prefaced by a somewhat fuller memoir. See also E. Dowden, The French Revolution and English Literature (1897) pp. 82 et seq.; E. R. Pennell, Mary Wollstonecraft Godwin (1885), in the Eminent Women Series; E. R. Clough, A Study of Mary Wollstonecraft and the Rights of Woman (1898) ; an edition of her Original Stories (1906), with William Blake's illustrations and an introduction by E. V. Lucas; and the Love Letters of Mary Wollstonecraft to Gilbert Imlay (1908), with an introduction by Roger Ingpen.

GODWIN, WILLIAM .(1756-1836), English political and miscellaneous writer, son of a Nonconformist minister, was born on the 3rd of March 1756, at Wisbeach in Cambridgeshire. His family came on both sides of middle-class people, and it was probably only as a joke that Godwin, a stern political reformer and philosophical radical, attempted to trace his pedigree to a time before the Norman conquest and the great earl .Godwine. Both parents were strict Calvinists. The father died young, and never inspired love or much regret in his son; but in spite of wide differences of opinion, tender affection always subsisted between William Godwin and his mother, until her death at an advanced age. " ,

William Godwin was educated for his father's profession at Hoxton Academy, where he was under Andrew Kippis the biographer and Dr Abraham Rees of the Cyclopaedia, and was at first more Calvinistic than his teachers, becoming a Sande-

manian, or follower of John Glas (q.v.), whom he describes as " a celebrated north-country apostle who, after Calvin had damned ninety-nine in a hundred of mankind, has contrived a scheme for damning ninety-nine in a hundred of the followers of Calvin." He then acted as a minister at Ware, Stowmarket and Beaconsfield. At Stowmarket the teachings of the French philosophers were brought before him by a friend, Joseph Fawcet, who held strong republican opinions. He came to London in 1782, still nominally a minister, to regenerate society with his pen — a real enthusiast, who shrank theoretically from no con- clusions from the premises which he laid down. He adopted the principles of the Encyclopaedists, and his own aim was the complete overthrow of all existing institutions, political, social and religious. He believed, however, that calm discussion was the only thing needful to carry every change, and from the beginning to the end of his career he deprecated every approach to violence. He was a philosophic radical in the strictest sense of the term.

His first published work was an anonymous Life of Lord Chatham (1783). Under the inappropriate title Sketches of History (1784) he published under his own name six sermons on the characters of Aaron, Hazael and Jesus, in which, though writing in the character of an orthodox Calvinist, he enunciates the proposition " God Himself has no right to be a tyrant." Introduced by Andrew Kippis, he began to write in 1785 for the Annual Register and other periodicals, producing also three novels now forgotten. The " Sketches of English History " written for the Annual Register from 1785 onward still deserve study. He joined a club called the " Revolutionists," and associated much with Lord Stanhope, Home Tooke and Hol- croft. His clerical character was now completely dropped.

In 1793 Godwin published his great work on political science, The Inquiry concerning Political Justice, and its Influence on General Virtue and Happiness. Although this work is little known and less read now, it marks a phase in English thought. Godwin could never have been himself a worker on the active stage of life. But he was none the less a power behind the workers, and for its political effect, Political Justice takes its place with Milton's Areopagitica, with Locke's Essay on Educa- tion and with Rousseau's Amile. By the words " political justice " the author meant " the adoption of any principle of morality and truth into the practice of a community," and the work was

therefore an inquiry into the principles of society, of government and of morals. For many years Godwin had been ” satisfied that monarchy was a species of government unavoid- ably corrupt,” and from desiring a government of the simplest construction, he gradually came to consider that “government by its very nature counteracts the improvement of original mind.” Believing in the perfectibility of the race, that there are no innate principles, and therefore no original propensity to evil, he considered that ” our virtues and our vices may be traced to the incidents which make the history of our lives, and if these incidents could be divested of every improper tendency, vice would be extirpated from the world.” All control of man by man was more or less intolerable, and the day would come when each man, doing what seems right in his own eyes, would also be doing what is in fact best for the community, because all will be guided by principles of pure reason. But all was to be done by discussion, and matured change resulting from discussion. Hence, while Godwin thoroughly approved of the philosophic schemes of the precursors of the Revolution, he was as far removed as Burke himself from agreeing with the way in which they were carried out. So logical and uncompromising a thinker as Godwin could not go far in the discussion of abstract questions without exciting the most lively opposition in matters of detailed opinion. An affectionate son, and ever ready to give of his hard-earned income to more than one ne’er-do-well brother, he maintained that natural relationship had no claim on man, nor was gratitude to parents or benefactors any part of justice or virtue. In a day when the penal code was still extremely severe, he argued gravely against all punishments, not only that of death. Property was to belong to him who most wanted it;

accumulated property was a monstrous injustice. Hence marriage, which is law, is the worst of all laws, and as property the worst of all properties. A man so passionless as Godwin could venture thus to argue without suspicion that he did so only to gratify his wayward desires. Portions of this treatise, and only portions, found ready acceptance in those minds which were prepared to receive them. Perhaps no one received the whole teaching of the book. But it gave cohesion and voice to philo- sophic radicalism; it was the manifesto of a school without which liberalism of the present day had not been. Godwin himself in after days modified his communistic views, but his strong feeling for individualism, his hatred of all restrictions on liberty, his trust in man, his faith in the power of reason remained ; it

was a manifesto which enunciated principles modifying action, even when not wholly ruling it.

In May 1794 Godwin published the novel of Caleb Williams, or Things as they are, a book of which the political object is overlooked by many readers in the strong interest of the story. The book was dramatized by the younger Colman as The Iron Chest. It is one of the few novels of that time which may be said still to live. 1 A theorist who lived mainly in his study, Godwin yet came forward boldly to stand by prisoners arraigned of high treason in that same year — 1794. The danger to persons so charged was then great, and he deliberately put himself into this same danger for his friends. But when his own trial was discussed in the privy council, Pitt sensibly held that Political Justice, the work on which the charge could best have been founded, was priced at three guineas, and could never do much harm among those who had not three shillings to spare.

From this time Godwin became a notable figure in London society, and there was scarcely an important person in politics, on the Liberal side, in literature, art or science, who does not appear familiarly in the pages of Godwin's singular diary. For forty-eight years, beginning in 1788, and continuing to the very end of his life, Godwin kept a record of every day, of the work he did, the books he read, the friends he saw. Condensed in the highest degree, the diary is yet easy to read when the style is once mastered, and it is a great help to the understanding of his cold, methodical, unimpassioned character. He carried his method into every detail of life, and lived on his earnings with extreme frugality. Until he made a large sum by the publication of Political Justice, he lived on an average of £120 a year.

In 1797, the intervening years having been spent in strenuous literary labour, Godwin married Mary Wollstonecraft (see Godwin, Mary Wollstonecraft). Since both held the same views regarding the slavery of marriage, and since they only married at all for the sake of possible offspring, the marriage was concealed for some time, and the happiness of the avowed married life was very brief; his wife's death on the 10th of September left Godwin prostrated by affliction, and with a charge for which he was wholly unfit — his infant daughter Mary, and her stepsister, Fanny Imlay, who from that time bore the name of Godwin. His unfitness for the cares of a family, far more than love, led him to contract a second marriage with Mary Jane Clairmont in 1801. She was a widow with two children, one of whom, Clara Mary Jane Clairmont, became the mistress of Lord Byron. The second Mrs Godwin was energetic and painstaking, but a harsh stepmother; and it may be doubted whether the children were not worse off under

her care than they would have been under Godwin's neglect.

The second novel which proceeded from Godwin's pen was called St Leon, and published in 1799. It is chiefly remarkable for the beautiful portrait of Marguerite, the heroine, drawn from the character of his own wife. His opinions underwent a change in the direction of theism, influenced, he says, by his acquaintance . with Coleridge. He also became known to Wordsworth and Lamb. Study of the Elizabethan dramatists led to the produc- tion in 1800 of the Tragedy of Antonio. Kemble brought it out at Drury Lane, but the failure of this attempt made him refuse

? For an analysis of Caleb Williams see the chapter on " Theorists of Revolution " in Professor E. Dowden's The French Revolution and English Literature (1897).

Abbas, King of Persia, which Godwin offered him in the next year. He was more successful with his Life of Chaucer, for which he received £600.

The events of Godwin's life were few. Under the advice of the second Mrs Godwin, and with her active co-operation, he carried on business as a bookseller under the pseudonym of Edward Baldwin, publishing several useful school books and books for children, among them Charles and Mary Lamb's Tales from Shakespeare. But the speculation was unsuccessful, and for many years Godwin struggled with constant pecuniary difficulties, for which more than one subscription was raised by the leaders of the Liberal party and by literary men. He became bankrupt in 1822, but during the following years he accomplished one of his best pieces of work, The History of the Commonwealth, founded on pamphlets and original documents, which still retains considerable value. In 1833 the government of Earl Grey conferred upon him the office known as yeoman usher of the exchequer, to which were attached apartments in Palace Yard, where he died on the 7th of April 1836.

In his own time, by his writings and by his conversation, Godwin had a great power of influencing men, and especially young men. Though his character would seem, from much which is found in his writings, and from anecdotes told by those who still remember him, to have been unsympathetic, it was not so understood by enthusiastic young people, who hung on his words as those of a prophet. The most remarkable of these was Percy Bysshe Shelley, who in the glowing dawn of his genius turned to Godwin as his teacher and guide. The last of the long series of young men who sat at Godwin's feet was

Edward Lyttdn Bulwer, afterwards Lord Lytton, whose early romances were formed after those of Godwin, and who, in Eugene Aram, succeeded to the story as arranged, and the plan to a considerable extent sketched out, by Godwin, whose age and failing health prevented him from completing it. Godwin's character appears in the worst light in connexion with Shelley. His early corre- spondence with Shelley, which began in 181 1, is remarkable for its genuine good sense and kindness; but when Shelley carried out the principles of the author of Political Justice in eloping with Mary Godwin, Godwin assumed a hostile attitude that would have been unjustifiable in a man of ordinary views, and was ridiculous in the light of his professions. He was not, more- over, too proud to accept £1000 from his son-in-law, and after the reconciliation following on Shelley's marriage in 1816, he continued to demand money until Shelley's death. His character had no doubt suffered under his long embarrassments and his unhappy marriage.

Godwin's more important works are — The Inquiry concerning Political Justice, and its Influence on General Virtue and Happiness 0793); Things as they are, or the Adventures of Caleb Williams (1794); The Inquirer, a series of Essays (1797); Memoirs of the Author of the Rights of Woman (1798) ; St Leon, a Tale of the Sixteenth Century (1799); Antonio, a Tragedy (1800); The Life of Chaucer (1803); Fleetwood, a Novel (1805); Faulkner, a Tragedy (1807); Essay on Sepulchres (1809); Lives of Edward and John Philips, the Nephews of Milton (1815); Mandeville, a Tale of the Times of Crom- well (1817); Of Population, an answer to Malthus (1820); History of the Commonwealth (1824-1828); Cloudesley, a Novel (1830); Thoughts on Man, a series of Essays (1 83 1) ; Lives of the Necromancers (1834). A volume of essays was also collected from his papers and published in 1873, as left for publication by his daughter Mrs Shelley. Many other short and anonymous works proceeded from his ever busy pen, but many are irrecoverable, and all are forgotten. Godwin's life was published in 1876 in two volumes, under the title William Godwin, his Friends and Contemporaries, by C. Kegan Paul. The best estimate of his literary position is that given by Sir Leslie Stephen in his English Thought in the 18th Century (ii. 264-281 ; ed., 1902). See also the article on William Godwin in W. Hazlitt's The Spirit of the Age (1825), and " Godwin and Shelley " in Sir L. Stephen's Hours in a Library (vol. iii., ed. 1892).

GODWIN-AUSTEN, ROBERT ALFRED CLOYNE (1808-1884), English geologist, the eldest son of Sir Henry E. Austen, was born on the 17th of March 1808. He was educated at Oriel College, Oxford, of which he became a fellow in 1830. He afterwards entered Lincoln's Inn. In 1833

he married the only daughter and heiress of General Sir Henry T. Godwin, K.C.B., and he took the additional name of Godwin by Royal licence

in 18154. At Oxford as a pupil of William Buckland he became deeply interested in geology, and soon afterwards becoming acquainted with De la Beche, he was inspired by that great master, and assisted him by making a geological map of the neighbourhood of Newton Abbot, which was embodied in the Geological Survey map. He also published an elaborate memoir ” On the Geology of the South-East of Devonshire” {Trans. Geol. Soc. ser. 2, vol. viii.). His attention was next directed to the Cretaceous rocks of Surrey, his home-county, his estates being situated at Chilworth and Shalford near Guildford. Later he dealt with the superficial accumulations bordering the English Channel, and with the erratic boulders of Selsea. In 1855 he brought before the Geological Society of London his celebrated paper ” On the possible Extension of the Coal-Measures beneath the South-Eastern part of England,” in which he pointed out on well-considered theoretical grounds the likelihood of coal- measures being some day reached in that area. In this article he also advocated the freshwater origin of the Old Red Sand- stone, and discussed the relations of that formation, and of the Devonian, to the Silurian and Carboniferous. He was elected F.R.S. in 1849, and in 1862 he was awarded the Wollaston medal by the Geological Society of London, on which occasion he was styled by Sir R. I. Murchison ” pre-eminently the physical geographer of bygone periods.” He died at Shalford House near Guildford on the 25th of November 1884. .’

His son, Lieut. -Colonel Henry Haversham Godwin-Austen (b. 1834), entered the army in 1851, and served for many years on the Trigonometrical Survey of India, retiring in 1877. He gave much attention to geology, but is more especially dis- tinguished for his researches on the natural history of India and as the author of The Land and Freshwater Mollusca of India

(1882-1887).

GODWINE (d. 1053), son of Wulfnoth, earl of the West- Saxons, the leading Englishman in the first half of the nth century. His birth and origin are utterly uncertain; but he rose to power early in Canute’s reign and was an earl in 1018, He received in marriage Gytha, a

connexion of the king's, and in 1 020 became earl of the West-Saxons. On the death of Canute in 1035 he joined with Queen Emma in supporting the claim of Hardicanute, the son of Canute and Emma, to the crown of his father, in opposition to Leofric and the northern party who supported Harold Harefoot (see Hardicanute). While together they held Wessex for Hardicanute, the astheling Alfred; son of Emma by her former husband ˆEthelred II., landed in England in the hope of winning back his father's crown; but falling into the iiands of Godwine, he and his followers were cruelly done to death. On the death of Hardicanute in 1042 Godwine was ■foremost in promoting the election of Edward (the Confessor) to the vacant throne. He was now the first man in the kingdom, though his power was still balanced by that of the other great earls, Leofric. of Mercia and Siward of Northumberland. His sons Sweyn and Harold were promoted to earldoms; and his daughter Eadgyth was married to the king (1045). His policy was strongly national in opposition to the marked Normanizing tendencies of the king. Between him and Edward's foreign favourites, particularly Robert of Jumieges, there was deadly feud. The appointment of Robert to the archbishopric of Canter- bury in 1051 marks the decline of Godwine's power; and in the same year a series of outrages committed by one of the king's foreign favourites led to a breach between the king and the earl, which culminated in the exile of the latter with all his family (see Edward the Confessor). But next year Godwine returned in triumph; and at a great meeting held outside London he and his family were restored to all their offices and possessions, and the archbishop and many other Normans were banished.' In the following year Godwine was smitten with a fit at the . king's table, and died three days later on the 15th of April 1053. Godwine appears to have had seven sons, three of whom — King Harold, Gyrth and Leofwine — were killed at Hastings; two others, Wulfnoth and yElfgar, are of little importance; another was Earl Tostig (q.v.). The eldest son was Sweyn, or Swegen (d. 1052), who was outlawed for seducing Eadgifu

abbess of Leominster. After fighting for the king of Denmark he returned to England in 1040, when his murder of his cousin Beorn compelled him to leave England for the second time. In 1050, however, he regained his earldom, and in 1051 he shared his father's exile. To atone for the murder of Beorn, Sweyn went on a pilgrimage to Jerusalem, and on the return journey he died on the 29th of September 1052, meeting his death, according to one account, at the hands of the Saracens.

GODWIT, a word of unknown origin, the name commonly applied to a marsh-bird in great repute, when fattened, for the table, and formerly

abundant in the fens of Norfolk, the Isle of Ely and Lincolnshire. In Turner's days (1544) it was worth three times as much as a snipe, and at the same peroid Belon said of it — " C'est vn Oyseau es delices des Francoys." Casaubon, who Latinized its name " Dei ingenium (Ephemerides, 19th September 1611), was told by the " ornithotrophaeus " he visited at Wisbech that in London it fetched twenty pence. Its fame as a delicacy is perpetuated by many later writers, Ben Jonson among them, and Pennant says that in his time (1766) it sold for half-a-crown or five shillings. Under the name godwit two perfectly distinct species of British birds were included, but that which seems to have been especially prized is known to modern ornithologists as the black-tailed godwit, Limosa aegocephala, formerly called, from its loud cry, a yarwhelp, 1 shrieker or barker, in the districts it inhabited. The practice of netting this bird in large numbers during the spring and summer, coupled with the gradual reclamation of the fens, to which it resorted, has now rendered it but a visitor in England; and it probably ceased from breeding regularly in England in 1824 or thereabouts, though under favourable conditions it may have occasionally laid its eggs for some thirty years later or more (Stevenson, Birds of Norfolk, ii. 250). This godwit is a species of wide range, reaching Iceland, where it is called Jardraeka (= earth- raker), in summer, and occurring numerously in India in winter. Its chief breeding-quarters seem to extend from Holland east- wards to the south of Russia. The second British species is that which is known as the bar-tailed godwit, L. lapponica, and this seems to have never been more than a bird of double passage in the United Kingdom, arriving in large flocks on the south coast about the 12 th of May, and, after staying a few days, proceeding to the north-eastward. It is known to breed in Lapland, but its eggs are of great rarity. Towards autumn the young visit the English coasts, and a few of them remain, together with some of the other species, in favourable situations throughout the winter. One of the local names by which the bar-tailed godwit is known to the Norfolk gunners is scamell, a word which, in the mouth of Caliban {Tempest, 11. ii.), has been the cause of much perplexity to Shakespearian critics.

The godwits belong to the group Limicolae, and are about as big as a tame pigeon, but possess long legs, and a long bill with a slight upward turn. It is believed that in the genus Limosa the female is larger than the male. While the winter plumage is of a sober greyish-brown, the breeding-dress is marked by a predominance of bright bay or chestnut, rendering the wearer a very beautiful object. The black-tailed godwit, though varying a good deal in size, is constantly larger than the bar-tailed, and especially longer in the legs. The species may

be further distin- guished by the former having the proximal third of the tail-quills pure white, and the distal two-thirds black, with a narrow white margin, while the latter has the same feathers barred with black and white alternately for nearly their whole length.

America possesses two species of the genus, the very large marbled godwit or marlin, L. fedoa, easily recognized by its size and the buff colour of its axillaries, and the smaller Hudsonian godwit, L. hudsonica, which has its axillaries of a deep black. This last, though less numerous than its congener, seems to range over the whole of the continent, breeding in the extreme north, while it has been obtained also in the Strait of Magellan and the Falkland Islands. The first seems not to go farther southward than the Antilles and the Isthmus of Panama.

1 This name seems to have survived in Whelp Moor, near Brandon, in Suffolk.

From Asia, or at least its eastern part, two species have been described. One of them, L. melanuroides, differs only from L. aegocephala in its smaller size, and is believed to breed in Amurland, wintering in the islands of the Pacific, New Zealand and Australia. The other, L. uropygialis, is closely allied to and often mistaken for L. lapponica, from which it chiefly differs by having the rump barred like the tail. This was found breeding in the extreme north of Siberia by Dr von Middendorff, and ranges to Australia, whence it was, like the last, first described by Gould. (A. N.)

GOEBEN, AUGUST KARL VON (1816-1880), Prussian general of infantry, came of old Hanoverian stock. Born at Stade on the 10th of December 1816, he aspired from his earliest years to the Prussian service rather than that of his own country, and at the age of seventeen obtained a commission in the 24th regiment of Prussian infantry. But there was little scope there for the activities of a young and energetic subaltern, and, leaving the service in 1836, he entered the Carlist army campaigning in Spain. In the five campaigns which he made in the service of Don Carlos he had many and various vicissitudes of fortune. He had not fought for two months when he fell, severely wounded, into the hands of the Spanish Royal troops. After eight months' detention he escaped, but it was not long before he was captured again. This time his imprisonment was long and

painful, and on two occasions he was compelled to draw lots for his life with his fellow-captives. When released, he served till 1840 with distinction. In that year he made his way back, a beggar without means or clothing, to Prussia. The Carlist lieutenant- colonel was glad to be re-admitted into the Prussian service as a second lieutenant, but he was still young, and few subalterns could at the age of twenty-four claim five years' meritorious war service. In a few years we find him serving as captain on the Great General Staff, and in 1848 he had the good fortune to be transferred to the staff of the IV. army corps, his immediate superior being Major von Moltke. The two " coming men " became fast friends, and their mutual esteem was never disturbed. In the Baden insurrection Goeben served with distinction on the staff of Prince William, the future emperor. Staff and regimental duty (as usual in the Prussian service) alternated for some years after this, till in 1863 he became major-general commanding the 26th infantry brigade. In i860, it should be mentioned, he was present with the Spanish troops in Morocco, and took part in the battle of Tetuan.

In the first of Prussia's great wars (1864) he distinguished himself at the head of his brigade at Rackebiill and Sonderburg. In the war of 1866 Lieutenant-General von Goeben commanded the 13th division, of which his old brigade formed part, and, in this higher sphere, once more displayed the qualities of a born leader and skilful tactician. He held almost independent command with conspicuous success in the actions of Dermbach, Laufach, Kissingen, Aschaffenburg, Gerchsheim, Tauber- Bischofsheim and Wiirzburg. The mobilization of 1870 placed him at the head of the VIII. (Rhineland) army corps, forming part of the First Army under Steinmetz. It was his resolute and energetic leading that contributed mainly to the victory of Spicheren (6th August), and won the only laurels gained on the Prussian right wing at Gravelotte (1 8th August) . Under Manteuff el the VIII. corps took part in the operations about Amiens and Bapaume, and on the 8th of January 187 1 Goeben succeeded that general in the command of the First Army, with which he had served throughout the campaign as a corps commander. A fortnight later he had brought the war in northern France to a brilliant conclusion, by the decisive victory of St Quentin (18th and 10th January 187 1). The close of the Franco-German War left Goeben one of the most distinguished men in the victorious army. He was colonel of the 28th infantry, and had the grand cross of the Iron Cross. He commanded the VIII. corps at Coblenz until his death in 1880.

General von Goeben left many writings. His memoirs are to be found in his works Vier Jahre in Spanien (Hanover, 1841), Reise-und Lagerbriefe aus Spanien und vom spanischen Heere in Marokko

(Hanover, 1863) and in the Darmstadt Allgemeine

Mililarzeitung. The former French port (Queuleu) at Metz was renamed Goeben after him, and the 28th infantry bears his name. A statue of Goeben by Schaper was erected at Coblenz in 1884. See G. Zemin, Das Leben des Generals August von Goeben (2 vols., Berlin, 1895-1897); H. Barth, A. von Goeben (Berlin, 1906); and, for his share in the war of 1870-71; H. Kunz, Der Feldzug im N. und N.W. Frankreichs 1870-1871 (Berlin, 1889), and the 14th Monograph of the Great General Staff (1891).

GOEJE, MICHAEL JAN DE (1836-1909), Dutch orientalist, was born in Friesland in 1836. He devoted himself at an early age to the study of oriental languages and became especially proficient in Arabic, under the guidance of Dozy and Juynboll, to whom he was afterwards an intimate friend and colleague. He took his degree of doctor at Leiden in i860, and then studied for a year in Oxford, where he examined and collated the Bodleian MSS. of Idrisi (part being published in 1866, in collaboration with R. P. Dozy, as Description de V Afrique et de I'Espagne). About the same time he wrote Mimoires de Vhistoire et de la giographie orientates, and edited Expugnalio regionum. In 1883, on the death of Dozy, he became Arabic professor at Leiden, retiring in 1906. He died on the 17th of May 1909. Though perhaps not a teacher of the first order, he wielded a great influence during his long professoriate not only over his pupils, but over theologians and eastern administrators who attended his lectures, and his many editions of Arabic texts have been of the highest value to scholars, the most important being his great edition of Tabarl. Though entirely averse from politics, he took a keen interest in the municipal affairs of Leiden and made a special study of elementary education. He took the leading part in the International Congress of Orientalists at Algiers in 1905. He was a member of the Institut de France, was awarded the German Order of Merit, and received an honorary doctorate of Cambridge University. At his death he was president of the newly formed International Association of Academies of Science. Among his chief works are Fragmenta historicorum Arabicorum (1869-1871); Diwan of Moslim ibn al-Walid (1875); Bibliotheca geographorum Arabicorum (1870-1894); Annals of Tabari (1879-1901); edition of Ibn Qutaiba's biographies (1904); of the travels of Ibn Jubaye (1907, 5th vol. of Gibb Memorial). He was also the chief editor of the Encyclopaedia of Islam (vols, i.-iii.), and contributed many articles to periodicals. He wrote for the 9th and the present edition of the Encyclopaedia Britannica.

GOES, DAMIAO DE (1502-1574), Portuguese humanist, was born of a

patrician family at Alemquer, in February 1502. Under King John III. he was employed abroad for many years from 1523 on diplomatic and commercial missions, and he travelled over the greater part of Europe. He was intimate with the leading scholars of the time, was acquainted with Luther and other Protestant divines, and in 1532 became the pupil and friend of Erasmus. Goes took his degree at Padua in 1538 after a four years' course. In 1 537, at the instance of his friend Cardinal Sadoleto, he undertook to mediate between the Church and the Lutherans, but failed through the attitude of the Protestants, He married in Flanders a rich and noble Dutch lady, D. Joanna de Hargen, and settled at Louvain, then the literary centre of the Low Countries, where he was living in 1542 when the French besieged the town. He was given the command of the defending forces, and saved Louvain, but was taken prisoner and confined for nine months in France, till he obtained his freedom by a heavy ransom. He was rewarded, however, by a grant of arms from Charles V. He finally returned to Portugal in 1545, with a view of becoming tutor to the king's son, but he failed to obtain this post, owing to the denunciations of Father Simon Rodriguez, provincial of the Jesuits, who accused Goes of favouring the Lutheran doctrines and of being a disciple of Erasmus. Nevertheless in 1548 he was appointed chief keeper of the archives and royal chronicler, and at once introduced some much-needed reforms into the administration of his office.

In 1558 he was given a commission to write a history of the reign of King Manoel, a task previously confided to Joao de Barros, but relinquished by him. It was an onerous undertaking for a conscientious historian, since it was necessary to expose

the miseries as well as relate the glories of the period, and so to offend some of the most powerful families. Goes had already written a Chronicle of Prince John (afterwards John II.), and when, after more than eight years' labour, he produced the First Part of his Chronicle of King Manoel (1566), a chorus of attacks greeted it, the edition was destroyed, and he was compelled to issue a revised version. He brought out the three other parts in 1 566-1 567, though chapters 23 to 27 of the Third Part were so mutilated by the censorship that the printed text differs largely from the MS. Hitherto Goes, notwithstanding his Liberal- ism, had escaped the Inquisition, though in 1540 his Fides, religio, moresque Aethiopum had been prohibited by the chief inquisitor, Cardinal D. Henrique; but the denunciation of

Father Rodriguez in 1545, which had been vainly renewed in 1550, was now brought into action, and in 1571 he was arrested to stand his trial. There seems to be no doubt that the Inquisi- tion made itself on this occasion, as on others, the instrument of private enmity; for eighteen months Goes lay ill in prison, and then he was condemned, though he had lived for thirty years as a faithful Catholic, and the worst that could be proved against him was that in his youth he had spoken against Indulgences, disbelieved in auricular confession, and consorted with heretics. He was sentenced to a term of reclusion, and his property was confiscated to the crown. After he had abjured his errors in private, he was sent at the end of 1572 to do penance at the monastery of Batalha. Later he was allowed to return home to Alemquer, where he died on the 30th of January 1574. He was buried in the church of Nossa Senhora da Varzea.

Damiao de Goes was a man of wide culture and genial and courtly manners, a skilled musician and a good linguist. He wrote both Portuguese and Latin with classic strength and simplicity, and his style is free from affectation and rhetorical ornaments. His portrait by Albrecht Dilrer shows an open, intelligent face, and the record of his life proves him to have been upright and- fearless. His prosperity doubtless excited ill-will, but above all, his ideas, advanced for Portugal, his foreign ways, outspokenness and honesty contributed to the tragedy of his end, at a time when the forces of ignorant reaction held the ascendant. He had, it may be presumed, given some um- brage to the court by condemning, in the Chronicle of King Manoel, the royal ingratitude to distinguished public servants, though he received a pension and other rewards for that work, and he had certainly offended the nobility by his administration of the archive office and by exposing false genealogical claims in his Nobiliario. He paid the penalty for telling the truth, as he knew it, in an age when an historian had to choose between flattery of the great and silence. The Chronicle of King Manoel was the first official history of a Portuguese reign to be written in a critical spirit, and Damiao de Goes has the honour of having been the first Portuguese royal chronicler to deserve the name of an historian.

His Portuguese works include Chronica do felicissimo rei Dom Emanuel (parts i. and ii., Lisbon, 1566, parts iii. and iv., ib, 1567). Other editions appeared in Lisbon in 1619 and 1749 and in Coimbra in 1790. Chronica do principe Dom Joain (Lisbon, 1558), with subsequent editions in 1567 and 1724 in Lisbon and in 1790 in Coimbra. Livro de Marco Tullio Ciceram chamado Catam Mayor (Venice, 1538). This is a translation of Cicero’s De senectute. His Latin works, published separately, comprise: (1) Legatio magni im- peratoris

Presbiteri Joannis, &c. (Antwerp, 1532) ; (2) Legatio Davidis Ethiopiae regis, &c. (Bologna, 1533); (3) Commentarii rerum gestarum in India (Louvain, 1 539); (4) Fides, religio, moresque Aethiopum (Louvain, 1540), incorporating Nos.(i) and (2) ;(s)TIispania{Louvain, 1542); (6) Aliquot epistolae Sadoleti Bembi et aliorum clarissimorum virorum, cfc. (Louvain, 1544); (7) Damiani a Goes equitis Lusilani aliquot opuscula (Louvain, 1544) ; (8) Urbis Lovaniensis obsidia(Lisbon, 1546) ; (9) De bello Cambaico ultimo (Louvain, 1549) ; (10) Urbis Olisi- ponensis descriptio (Evora, 1554) ; (11) Epistola ad Hieronymum Cardo- sum (Lisbon, 1556). Most of the above went through several editions, and many were afterwards included with new works in such collections as No. (7), and seven sets of Opuscula appeared, all incomplete. Nos. (3), (4) and (5) suffered mutilation in subsequent editions, at the hands of the censors, because they offended against religious orthodoxy or family pride.

Authorities. — (A) Joaquim de Vasconcellos, Goesiana (5 vols.), with the following sub-titles: (1) O Retrato de Albrecht Diirer (Porto, 1879); (2) Bibliographia (Porto, 1879), which describes 67

numbers of books by Goes; (3) As Variantes das Chronicas Portu- guezas (Porto, 1881); (4) Damiao de Goes: Novos Estudos (Porto, ‘897) ; (5) As Cartas Latinas — in the press (1906). Snr. Vasconcellos only printed a very limited number of copies of these studies for distribution among friends, so that they are rare. (B) Guilherme J. C. Henriques, Ineditos Goesianos, vol. i. (Lisbon, 1896), vol. ii. (containing the proceedings at the trial by the Inquisition) (Lisbon, 1898). (C) A. P. Lopes de Mendonga, Damiao de Goes e a Inquisiqao de Portugal (Lisbon, 1859). (D) Dr Sousa Viterbo, Damiao de Goes e D. Antonio Pinheiro (Coimbra, 1895). (E) Dr Theophilo Braga, Historia da Universida.de de Coimbra (Lisbon, 1892), i. 374-380. (F) Menendez y Pelayo, Historia de los Heter. Espanoles, ii. 129-143. (E. Pr.)

GOES, HUGO VAN DER (d. 1482), a painter of consider- able celebrity at Ghent, was known to Vasari, as he is known to us, by a single picture in a Florentine monastery. At a period when the family of the Medici had not yet risen from the rank of a great mercantile firm to that of a reigning dynasty, it em- ployed as an agent at the port of Bruges Tommaso Portinari, a lineal descendant, it was said, of Folco, the father of Dante’s Beatrix. Tommaso, at that time patron of a chapel in the hospital of Santa Maria Nuova at Florence, ordered an altar- piece of Hugo van der Goes, and commanded him to illustrate the sacred theme of ” Quern genuit adoravit.” In the centre of a vast triptych, comprising numerous figures of life size, Hugo repre- sented

the Virgin kneeling in adoration before the new-born Christ attended by Shepherds and Angels. On the wings he portrayed Tommaso and his two sons in prayer under the pro- tection of Saint Anthony and St Matthew, and Tommaso's wife and two daughters supported by St Margaret and St Mary Magdalen. The triptych, which has suffered much from decay and restoring, was for over 400 years at Santa Maria Nuova, and is now- in the Uffizi Gallery. Imposing because composed of figures of unusual size, the altar-piece is more remarkable for portrait character than for charms of ideal beauty.

There are also small pieces in public galleries which claim to have been executed by Van der Goes. One of these pictures in the National Gallery in London is more nearly allied to the school of Memling than to the triptych of Santa Maria Nuova; another, a small and very beautiful " John the Baptist," at the Pina- kothek of Munich, is really by Memling; whilst numerous frag- ments of an altarpiece in the Belvedere at Vienna, though assigned to Hugo, are by his more gifted countryman of Bruges. Van der Goes, however, was not habitually a painter of easel pieces. He made his reputation at Bruges by producing coloured hangings in distemper. After he settled at Ghent, and became. a master of his gild in 1465, he designed cartoons for glass windows. He also made decorations for the wedding of Charles the Bold and Margaret of York in 1468, for the festivals of the Rhetoricians and papal jubilees on repeated occasions, for the solemn entry of Charles the Bold into Ghent in 1470-1471, and for the funeral of Philip the Good in 1474. The labour which he expended on these occasions might well add to his fame without being the less ephemeral. About the year 1475 he retired to the monastery of Rouge Cloitre near Ghent, where he took the cowl. There, though he still clung to his profession, he seems to have taken to drinking, and at one time to have shown decided symptoms of insanity. But his superiors gradually cured him of his intemperance, and he died in the odour of sanctity in

1482.

GOES, a town in the province of Zeeland, Holland, on the island of South Beveland, 115 m. by rail E. of Middelburg. Pop. (1900) 6919. It is connected by a short canal with the East Scheldt, and has a good harbour (1819) defended by a fort. The principal buildings are the interesting Gothic church (1423) and the picturesque old town hall (restored 1771). There are various educational and charitable institutions. Goes has preserved for centuries its prosperous position as the market-town of the island. The chief industries are boat-building, brewing, book- binding and cigar-making. The town had its origin in

the castle of Oostende, built here by the noble* family of Borssele. It received a charter early in the 15th century from the countess Jacoba of Holland, who frequently stayed at the castle.

GOETHE, JOHANN WOLFGANG VON (1749-183 2), German poet, dramatist and philosopher, was born at Frankfort-on-Main on the 28th of August 1749. He came, on his father's side, of Thuringian stock, his great-grandfather, Hans Christian Goethe, having been a farrier at Artern-on-the-Unstrut, about the middle of the 17th century. Hans Christian's son, Friedrich Georg, was brought up to the trade of a tailor, and in this capacity settled in Frankfort in 1686. A second marriage, however, brought him into possession of the Frankfort inn, " Zum Weidenhof," and he ended his days as a well-to-do inn- keeper. His son, Johann Kaspar, the poet's father (17 10-1782), studied law at Leipzig, and, after going through the prescribed courses of practical training at Wetzlar, travelled in Italy. He hoped, on his return to Frankfort, to obtain an official position in the government of the free city, but his personal influence with the authorities was not sufficiently strong. In his disappointment he resolved never again to offer his services to his native town, and retired into private life, a course which his ample means facilitated. In 1742 he acquired, as a consola- tion for the public career he had missed, the title of kaiserlicher Rat, and in 1748 married Katharina Elisabeth (1731-1808), daughter of the Schultheiss or Bur germeister of Frankfort, Johann Wolfgang Textor. The poet was the eldest son of this union. Of the later children only one, Cornelia, born in 1750, survived the years of childhood; she died as the wife of Goethe's friend, J. G. Schlosser, in 1777. The best elements in Goethe's genius came from his mother's side; of a lively, impulsive disposition, and gifted with remarkable imaginative power, Frau Rat was the ideal mother of a poet; moreover, being hardly eighteen at the time of her son's birth, she was herself able to be the companion of his childhood. From his father, whose stern, somewhat pedantic nature repelled warmer feelings on the part of the children, Goethe inherited that "holy earnest- ness " and stability of character which brought him unscathed through temptations and passions, and held the balance to his all too powerful imagination.

Unforgettable is the picture which the poet subsequently drew of his childhood spent in the large house with its many nooks and crannies, in the Grosse Hirschgraben at Frankfort. Books, pictures, objects of

art, antiquities, reminiscences of Rat Goethe's visit to Italy, above all a marionette theatre, kindled the child's quick intellect and imagination. His training was conducted in its early stages by his father, and was later supplemented by tutors. Meanwhile the varied and picturesque life of Frankfort was in itself an education. In 1759, during the Seven Years' War, the French, as Maria Theresa's allies, occupied the town, and, much to the irritation of Goethe's father, who was a stanch partisan of Frederick the Great, a French lieu- tenant, Count Thoranc, was quartered on the Goethe household. The foreign occupation also led to the establishment of a French troupe of actors, and to their performances the boy, through his grandfather's influence, had free access. Goethe has also recorded his memories of another picturesque event, the coronation of the emperor Joseph II. in the Frankfort R6mer or town hall in 1764; but these memories were darkened by being associated in his mind with the tragic denouement of his first love affair. The object of this passion was a certain Gretchen, who seems to have taken advantage of the boy's interest in her to further the dishonest ends of one of her friends. The discovery of the affair and the investigation that followed cooled Goethe's ardour and caused him to turn his attention seriously to the studies which were to prepare him for the university. . Meanwhile the literary instinct had begun to show itself; we hear of a novel in letters — a kind of linguistic exercise, in which the characters earned on the correspondence in different languages — of a prose epic on the subject of Joseph, and various religious poems of which one, Die Hullcnfahrt Christi, found its way in a revised form into the poet's complete works.

In October 1765? Goethe, then a little over sixteen, left Frank- fort for Leipzig, where a wider and, in many respects, less provincial life awaited him. He entered upon his university studies with zeal, but his own education in Frankfort had not

been the best preparation for the scholastic methods which still dominated the German universities; of his professors, only Gellert seems to have won his interest, and that interest was soon exhausted. The literary beginnings he had made in Frankfort now seemed to him amateurish and trivial; he felt that he had to turn over a new leaf, and, under the guidance of E. W. Behrisch, a genial, original comrade, he learned the art of writing those light Anacreontic lyrics which harmonized with the tone of polite Leipzig society. Artificial as this poetry is, Goethe was, neverthe- less, inspired by a real passion in Leipzig, namely, for Anna Katharina Schonkopf, the daughter of a wine-merchant at whose house he dined. She is the " Annette " after whom the recently discovered collection of lyrics was named, although it must be added that neither these lyrics nor the Neue

Lieder, published in 1770, express very directly Goethe's feelings for Kathchen Schonkopf. To his Leipzig student-days belong also two small plays in Alexandrines, Die Laune des Verliebten, a pastoral comedy in one act, which reflects the lighter side of the poet's love affair, and Die Mitschuldigen (published in a revised form, 1769), a more sombre picture, in which comedy is incongruously mingled with tragedy. In Leipzig Goethe also had time for what remained one of the abiding interests of his life, for art; he re- garded A. F. Oeser (17 17-1799), the director of the academy of painting in the Pleissenburg, who had given him lessons in drawing, as the teacher who in Leipzig had influenced him most. His art studies were also furthered by a short visit to Dresden. His stay in Leipzig came, however, to an abrupt conclusion; the dis- tractions of student life proved too much for his strength; a sudden haemorrhage supervened, and he lay long ill, first in Leipzig, and, after it was possible to remove him, at home in Frankfort. These months of slow recovery were a time of serious introspection for Goethe. He still corresponded with his Leipzig friends, but the tone of his letters changed ; life had become graver and more earnest for him. He pored over books on occult philosophy; he busied himself with alchemy and astrology. A friend of his mother's, Susanne Katharina von Klettenberg, who belonged to pietist circles in Frankfort, turned the boy's thoughts to religious mysticism. On his recovery his father resolved that he should complete his legal studies at Strassburg, a city which, although then outside the German empire, was, in respect of language and culture, wholly German. From the first moment Goethe set foot in the narrow streets of the Alsatian capital, in April 1770, the whole current of his thought seemed to change. The Gothic architecture of the Strassburg minster became to him the symbol of a national and German ideal, directly anta- gonistic to the French tastes and the classical and rationalistic atmosphere that prevailed in Leipzig. The second moment of importance in Goethe's Strassburg period was his meeting with Herder, who spent some weeks in Strassburg undergoing an opera- tion of the eye. In this thinker, who was his senior by five years, Goethe found the master he sought; Herder taught him the significance of Gothic architecture, revealed to him the charm of nature's simplicity, and inspired him with enthusiasm for Shakespeare and the Volkslied. Meanwhile Goethe's legal studies were not neglected, and he found time to add to knowledge of other subjects, notably that of medicine. Another factor of importance in Goethe's Strassburg life was his love for Friederike Brion, the daughter of an Alsatian village pastor in Sesenheim. Even more than Herder's precept and example, this passion showed Goethe how trivial and artificial had been the Anacreontic and pastoral poetry with which he had occupied himself in Leipzig ; and the lyrics

inspired by Friederike, such as Kleine Blumen, Heine Blatter and Wie herrlich leuchtet mi* die Natur I mark the beginning of a new epoch in German lyric poetry. The idyll of Sesenheim, as described in Dichtung und Wahrheit, is one of the most beautiful love-stories in the literature of the world. From the first, however, it was clear that Friederike Brion could never become the wife of the Frankfort patrician's son; an unhappy ending to the romance was unavoidable, and, as is to be seen in passionate outpourings like the Wanderers Sturmlied, and in the bitter self-accusations of Clavigo, it left deep wounds on the poet's sensitive soul.

GOETHE

183

To Strassburg we owe Goethe's first important drama, Gotz von Berlichingen, or, as it was called in its earliest form, Geschichte Gottfriedens von Berlichingen dramatisiert (not published until 183 1). Revised under the now familiar title, it appeared in 1773, after Goethe's return to Frankfort. In estimating this drama We must bear in mind Goethe's own Strassburg life, and the turbulent spirit of his own age, rather than the historical facts, which the poet found in the autobiography of his hero published in 1 73 1. The latter supplied only the rough materials; the Gotz von Berlichingen whom Goethe drew, with his lofty ideals of right and wrong, and his enthusiasm for freedom, is a very different personage from the unscrupulous robber-knight of the 16th century, the rough friend of Franz von Sickingen and of the revolting peasants. Still less historical justification is to be found for the vacillating Weisslingen in whom Goethe executed poetic justice on himself as the lover of Friederike, or in the women of the play, the gentle Maria, the. heartless Adelheid. But there is genial, creative power in the very subjectivity of these characters, and a vigorous dramatic life, which is irresistible in its appeal. With Gotz von Berlichingen, Shakespeare's art first triumphed on the German stage, and the literary movement known as Sturm und Drang was inaugurated.

Having received his degree in Strassburg, Goethe returned home in August 1771, and began his initiation into the routine of an advocate's profession. In the following year, in order to gain insight into another side of his calling, he spent four months at Wetzlar, where the imperial law-courts were established. But Goethe's professional duties had only a small share in the eventful years which lay between his return from Strassburg and that visit to Weimar at the end of 1775, which turned the whole course of his career, and resulted in his

permanent attachment to the Weimar court. Goethe's life in Frankfort was a round of stimulat- ing literary intercourse; in J. H. Merck (1741-1ˆ91), an army official in the neighbouring town of Darmstadt, he found a friend and mentor, whose irony and common-sense served as a corrective to his own exuberance of spirits. Wetzlar brought new friends and another passion, that for Charlotte Buff, the daughter of the Atntmann there— a love-story which has been immortalized in Wert hers Leiden— and again the young poet's nature was obsessed by a love which was this time strong enough to bring him to the brink of that suicide with which the novel ends. A visit to the Rhine, where new interests and the attractions of Maximiliane von Laroche, a daughter of Wieland's friend, the novelist Sophie von Laroche, brought partial healing; his intense preoccupation with literary work on his return to Frankfort did the rest. In 1775 Goethe was attracted by still another type of woman, Lili Schonemann, whose mother was the widow of a wealthy Frankfort banker. A formal betrothal took place, and the beauty of the lyrics which Lili inspired leaves no room for doubt that here was a passion no less genuine than that for Friederike or Charlotte. But Goethe — : more worldly wise than on former occasions — felt instinctively that the gay, social world in which Lili moved was not really congenial to him. A visit to Switzerland in the summer of 1775 may not have weakened his interest in her, but it at least allowed him to regard her objectively; and, without tragic consequences on either side, the passion was ultimately allowed to yield to the dictates of common-sense. Goethe's departure for Weimar in November made the final break less difficult.

The period from 1771 to 1775 was, in literary respects, the most productive of the poet's life. It had been inaugurated with Gotz von Berlichingen, and a few months later this tragedy was followed by another, Clavigo, hardly less convincing in its character-drawing, and reflecting even more faithfully than the former the experiences Goethe had gone through in Strassburg. Again poetic justice is effected on the unfortunate hero who has chosen his own personal advancement in preference to his duty to the woman he loves; more pointedly than in Gotz is the moral enforced by Clavigo's worldly friend Carlos, that the ground of Clavigo's tragic end lies not so much in the defiance of a moral law as in the hero's vacillation and want of character. With Die Leiden des jungen Werthers (1774), the literary precipitate of the author's own experiences in Wetzlar, Goethe

succeeded in attracting, as no German had done before him, the attention of Europe. Once more it was the gospel that the world belongs to the strong, which lay beneath the surface of this romance. This, however, was not the lesson which was drawn from it by

Goethe's contemporaries; they shed tears of sympathy over the lovelorn youth whose burden becomes too great for him to bear. While Gotz inaugurated the manlier side of the Sturm und Drang literature, Werther was responsible for its sentimental excesses. And to the sentimental rather than to the heroic side belongs also Stella, " a drama for lovers," in which the poet again reproduced, if with less fidelity than in Werther, certain aspects of his own love troubles. A lighter vein is to be observed in various dramatic satires written at this time, such as Gotter, Helden und Wieland (1774), Hanswursts Hochzeit, Faslnachtsspiel vom Pater Brey, Satyros, and in the Singspiele, Erwin und Elmire (1775) and Claudine von Villa Bella (1776); while in the Frankfurter Gelehrte Anzeiger (1772- 1773), Goethe drove home the principles of the new movement of Sturm und Drang in terse and pointed criticism. The exuber- ance of the young poet's genius is also to be seen in the many unfinished fragments of this period; at one time we find him occupied with dramas on Caesar and Mahomet, at another with an epic on Der ewige Jude, and again with a tragedy on Prometheus, of which a magnificent fragment has passed into his works. Greatest of all the torsos of this period, however, was the drama- tization of Faust. Thanks to a manuscript copy of the play in its earliest form — discovered as recently as 1887 — we are now able to distinguish how much of this tragedy was the immediate product of the Sturm und Drang, and to understand the intentions with which the young poet began his masterpiece. Goethe's hero changed with the author's riper experience and with his new conceptions of man's place and duties in the world, but the Gretchen tragedy was taken over into the finished poem, practi- cally unaltered, from the earliest Faust of the Sturm und Drang. With these wonderful scenes, the most intensely tragic in all German literature, Goethe's poetry in this period reaches its climax. Still another important work, however, was conceived, and in large measure written at this time, the drama of Egmont, which was not published until 1788. This work may, to some extent, be regarded as supplementary to Faust; it presents the lighter, more cheerful and optimistic side of Goethe's philosophy in these years; Graf Egmont, the most winning and fascinating of the poet's heroes, is endowed with that " demonic " power over the sympathies of men and women, which Goethe himself possessed in so high a degree. But Egmont depends for its interest almost solely on two characters, Egmont himself and Klarchen, Gretchen's counterpart; regarded as a drama, it demonstrates the futility of that defiance of convention and rules with which the Sturm und Drang set out. It remained for Goethe, in the next period of his life, to construct on classic models a new vehicle for German dramatic poetry.

In December 1774 the young ” hereditary prince ” of Weimar, Charles Augustus, passing through Frankfort on his way to Paris, came into personal touch with Goethe, and invited the poet to visit Weimar when, in the following year, he took up the reins of government. In October 1775 the invitation was repeated, and on the 7th of November of that year Goethe arrived in the little Saxon capital which was to remain his home for the rest of his life. During the first few months in Weimar the poet gave himself up to the pleasures of the moment as unreservedly as his patron; indeed, the Weimar court even looked upon him for a time as a tempter who led the young duke astray. But the latter, although himself a mere stripling, had implicit faith in Goethe, and a firm conviction that his genius could be utilized in other fields besides literature. Goethe was not long in Weimar before he was entrusted with responsible state duties, and events soon justified the duke’s confidence. Goethe proved the soul of the Weimar government, and a minister of state of energy and foresight. He interested himself in agriculture, horticulture and mining, which were of paramount importance to the welfare of the duchy, and out of these interests sprang his own love for the natural sciences, which took up so much of his time in later

years. The inevitable love-interest was also not wanting. As Friederike had fitted into the background of Goethe’s Strassburg life, Lotte into that of Wetzlar, and Lili into the gaieties of Frankfort, so now Charlotte von Stein, the wife of a Weimar official, was the personification of the more aristocratic ideals of Weimar society. We possess only the poet’s share of his corre- spondence with Frau von Stein, but it is possible to infer from it that, of all Goethe’s loves, this was intellectually the most worthy of him. Frau von Stein was a woman of refined literary taste and culture, seven years older than he and the mother of seven children. There was something more spiritual, something that partook rather of the passionate friendships of the 18th century than of love in Goethe’s relations with her. Frau von Stein dominated the poet’s life for twelve years, until his journey to Italy in 1 786-1 788. Of other events of this period the most notable were two winter journeys, the first in 1777, to the Harz Mountains, the second, two years later, to Switzerland — journeys which gave Goethe scope for that introspection and reflection for which his Weimar life left him little time. On the second of these journeys he revisited Friederike in Sesenheim, saw Lili, who had married and settled in Strassburg, and made the personal acquaintance of Lavater

in Zurich.

The literary results of these years cannot be compared with those of the preceding period; they are virtually limited to a few wonderful lyrics, such as Wanderers Nachtlied, An den Mond, Gesang der Geister tiber den Wassern, or ballads, such as Der Erlkonig, a charming little drama, Die Geschwister (1776), in which the poet's relations to both Lili and Frau von Stein seem to be reflected, a dramatic satire, Der Triumph der Empfindsamkeit (1778), and a number of Singspiele, Lila (1777), Die Fischerin, Scherz, List und Rache, and Jery und Bdtely (1780). But greater works were in preparation. A religious epic, Die Geheimnisse, and a tragedy Elpenor, did not, it is true, advance much further than plans; but in 1777, under the influence of the theatrical experiments at the Weimar court, Goethe conceived and in great measure wrote a novel of the theatre, which was to have borne the title Wilhelm Meisters theatralische Sendung; and in 1779 himself took part in a representation before the court at Etters- burg, of his drama Iphigenie auf Tauris. This Iphigenie was, however, in prose; in the following year Goethe remoulded it in iambics, but it was not until he went to Rome that the drama finally received the form in which we know it.

In September, 1786 Goethe set out from Karlsbad — secretly and stealthily, his plan known only to his servant — on that memorable journey to Italy, to which he had looked forward with such intense longing; he could not cross the Alps quickly enough, so impatient was he to set foot in Italy. He travelled by way of Munich, the Brenner and Lago di Garda to Verona and Venice, and from thence to Rome, where he arrived on the 29th of October 1786. Here he gave himself up unreservedly to the new impressions which crowded on him, and he was soon at home among the German artists in Rome, who welcomed him warmly. In the spring of 1787 he extended his journey as far as Naples and Sicily, returning to Rome in June 1787, where he remained until his final departure for Germany on the 2nd of April 1788. It is difficult to exaggerate the importance of Goethe's Italian journey. He himself regarded it as a kind of climax to his life; never before had he attained such complete understanding of his genius and mission in the world; it afforded him a vantage-ground from which he could renew the past and make plans for the future. In Weimar he had felt that he was no longer in sympathy with the Sturm und Drang, but it was Italy which first taught him clearly what might take the place of that movement in German poetry. To the modern reader, who may well be impressed by Goethe's extraordinary receptivity, it may seem strange that his interests in Italy were so limited; for, after all, he saw comparatively little of the art treasures of Italy. He went to Rome in

Winckelmann’s footsteps; it was the antique he sought, and his interest in the artists of the Renaissance was virtually restricted to their imitation of classic models. This search for the classic ideal is reflected in the works he completed or wrote under the Italian sky. The calm beauty

of Greek tragedy is seen in the new iambic version of Iphigenit auf Tauris (1787); the classicism of the Renaissance gives the ground-tone to the wonderful drama of Torquato Tasso (1790), in which the conflict of poetic genius with the prosaic world is transmuted into imperishable poetry. Classic, too, in this sense, were the plans of a drama on Iphigenie auf Delphos and of an epic, Nausikaa. Most interesting of all, however, is the reflection of the classic spirit in works already begun in earlier days, such as Egmont and Faust. The former drama was finished in Italy and appeared in 1788, the latter was brought a step further forward, part of it being published as a Fragment in 1790.

Disappointment in more senses than one awaited Goethe on his return to Weimar. He came back from Italy with a new philosophy of life, a philosophy at once classic and pagan, and with very definite ideas of what constituted literary excellence. But Germany had not advanced; in 1788 his countrymen were still under the influence of that Sturm und Drang from which the poet had fled. The times seemed to him more out of joint than ever, and he withdrew into himself. Even his relations to the old friends were changed. Frau von Stein had not known of his flight to Italy until she received a letter from Rome; but he looked forward to her welcome on his return. The months of absence, however, the change he had undergone, and doubtless those lighter loves of which the Romische Elegien bear evidence, weakened the Weimar memories; if he left Weimar as Frau von Stein’s loyer he returned only as her friend; and she naturally resented the change. Goethe, meanwhile, satisfied to continue the freer customs to which he had adapted himself in Rome, found a new mistress in Christiane Vulpius (1765-1816), the least interesting of all the women who attracted him. But Christiane gradually filled up a gap in the poet’s life; she gave him, quietly, unobtrusively, without making demands on him, the comforts <#a home. She was not accepted by court society; it did not matter to her that even Goethe's intimate friends ignored her; and she, who had suited the poet's whim when he desired to shut himself off from all that might dim the recollection of Italy, became with the years an indispensable helpmate to him. On the birth in 1789 of his son, Goethe had some thought of legalizing his relations with Christiane, but this intention was not realized until 1806, when the invasion of Weimar by the French made him fear for both life and

property.

The period of Goethe's life which succeeded his return from Italy was restless and unsettled; relieved of his state duties, he returned in 1790 to Venice, only to be disenchanted with the Italy he had loved so intensely a year or two before. A journey with the duke of Weimar to Breslau followed, and in 1792 he accompanied his master on that campaign against France which ended so ingloriously for the German arms at Valmy. In later years Goethe published his account both of this Campagne in Frankreich and of the Belagerung von Mainz, at which he was also present in 1793. His literary work naturally suffered under these distractions. Tasso, and the edition of the Schrifien in which it was to appear, had still to be completed on his return from Italy; the Romische Elegien, perhaps the most Latin of all his works, were published in 1795, and the V enetianische Epigramme, the result of the second visit to Italy, in 1796. The French Revolution, in which all Europe was engrossed, was in Goethe's eyes only another proof that the passing of the old regime meant the abrogation of all law and order, and he gave voice to his antagonism to the new democratic principles in the dramas Der Grosskophta (1792), Der Biirgergeneral (1793), and in the unfinished fragments Die Aufgeregten and Das Madchen von Oberkirch. The spirited translation of the epic of Reinecke Fuchs (1794) he took up as a relief and an antidote to the social disruption of the time. Two new interests, however, strengthened the ties between Goethe and Weimar, — ties which the Italian journey had threatened to sever: his appointment in 1791 as director of the ducal theatre, a post which he occupied for twenty-two years, and his absorption in scientific studies. In 1790 he published his important Versuch, die Metamorphose der Pflanzen zu erkldren, which was an even more fundamental achievement for the new science of comparative morphology

than his discovery some six years earlier of the existence of a formation in the human jaw-bone analogous to the intermaxillary bone in apes; and in 1791 and 1792 appeared two parts of his Beitrage zur Optik.

Meanwhile, however, Goethe had again taken up the novel of the theatre which he had begun years before, with a view to finishing it and including it in the edition of his Neue Schriften (1 792-1800). Wilhelm Meisters theatralische Sendung became Wilkelm Meisters

Lehrjahre; the novel of purely theatrical interests was widened out to embrace the history of a young man's apprenticeship to life. The change of plan explains, although it may not exculpate, the formlessness and loose construction of the work, its extremes of realistic detail and poetic allegory. A hero, who was probably originally intended to demonstrate the failure of the vacillating temperament when brought face to face with the problems of art, proved ill-adapted to demonstrate those precepts for the guidance of life with which the Lehrjahre closes; unstable of purpose, Wilhelm Meister is not so much an illustration of the author's life-philosophy as a lay-figure on which he demonstrates his views. Wilhelm Meister is a work of extraordinary variety, ranging from the commonplace realism of the troupe of strolling players to the poetic romanticism of Mignon and the harper; its flashes of intuitive criticism and its weighty apothegms add to its value as a Bildungsroman in the best sense of that word. Of all Goethe's .works, this exerted the most immediate and lasting influence on German literature; it served as a model for the best fiction of the next thirty years. In completing Wilhelm Meister, Goethe found a sympathetic and encouraging critic in Schiller, to whom he owed in great measure his renewed interest in poetry. After years of tentative approaches on Schiller's part, years in which that poet concealed even from himself his desire for a friendly understanding with Goethe, the favourable moment arrived; it was in June 1794, when Schiller was seeking collaborators for his new periodical Die Horen; and his invitation addressed to Goethe was the beginning of a friendship which continued unbroken until the younger poet's death. The friendship of Goethe and Schiller, of which their correspondence is a priceless record, had its limitations; it was purely intellectual in character, a certain barrier of personal reserve being maintained to the last. But for the literary life of both poets the gain was incommensurable. As far as actual work was concerned, Goethe went his own way as he had always been accustomed to do; but the mere fact that he devoted himself with increasing interest to literature was due to Schiller's stimulus. It was Schiller, too, who induced him to undertake those studies on the nature of epic and dramatic poetry which resulted in the epic of Hermann und Dorothea and the fragment of the Achilleis; without the friendship there would have been no Xenien and no ballads, and it was his younger friend's encouragement which induced Goethe to betake himself once more to the "misty path" of Faust, and bring the first part of that drama to a conclusion.

Goethe's share in the Xenien (179s) may be briefly dismissed. This collection of distichs, written in collaboration with Schiller, was prompted by the indifference and animosity of contemporary

criticism, and its disregard for what the two poets regarded as the higher interests of German poetry. The Xenien succeeded as a retaliation on the critics, but the masterpieces which followed them proved in the long run much more effective weapons against the prevailing mediocrity. Prose works like the Unter- haltungen deutscher Ausgcwanderten (1795) were unworthy of the poet's genius, and the translation of Benvenuto Cellini's Life (1796-1797) was only a translation. But in 1798 appeared Hermann und Dorothea, one of Goethe's most perfect poems. It is indeed remarkable — when we consider by how much re- flection and theoretic discussion the composition of the poem was preceded and accompanied — that it should make upon the reader so simple and "naive" an impression; in this respect it is the triumph of an art that conceals art. Goethe has here taken a simple story of village life, mirrored in it the most pregnant ideas of his time, and presented it with a skill which may well be called Homeric; but he has discriminated with

the insight of genius between the Homeric method of reproduc- ing the heroic life of primitive Greece and the same method as adapted to the commonplace happenings of 18th-century Germany. In this respect he was undoubtedly guided by a forerunner who has more right than he to the attribute "naive," by J. H. Voss, the author of Luise. Hardly less imposing in their calm, placid perfection are the poems with which, in friendly rivalry, Goethe seconded the more popular ballads of his friend; Der Zauberlehrling, Der Gott und die Bayadere, Die Braul von Korinth, Alexis und Dora, Der neue Pausias and Die schone Mullerin — a cycle of poems in the style of the Volkslied — are among the masterpieces of Goethe's poetry. On the other hand, even the friendship with Schiller did not help him to add to his reputation as a dramatist. Die natilrliche Tochter (1803), in which he began to embody his ideas of the Revolution on a wide canvas, proved impossible on the stage, and the remaining dramas, which were to have formed a trilogy, were never written. Goethe's classic principles, when applied to the swift, direct art of the theatre, were doomed to failure, and Die natilrliche Tochter, notwithstanding its good theoretic in- tention, remains the most lifeless and shadowy of all his dramas. Even less in touch with the living present were the various prologues and Festspiele, such as Palaophron und Neotcrpe (1800), Was wir bringen (1802), which in these years he composed for the Weimar theatre.

Goethe's classicism brought him into inevitable antagonism with the new Romantic movement which had been inaugurated in 1798 by the Athenaeum, edited by the brothers Schlegel. The sharpness of the conflict was, however, blunted by the fact that, without exception, the

young Romantic writers looked up to Goethe as its master; they modelled their fiction on Wilhelm Meister; they regarded his lyrics as the high-water mark of German poetry; Goethe, Novalis declared, was the " Statthalt'er of poetry on earth." With regard to painting and sculpture, however, Goethe felt that a protest was necessary, if the insidious ideas propounded in works like Wackenroder's Herzensergiessungen were not to do irreparable harm, by bringing back the confusion of the Sturm und Drang; and, as a rejoinder to the Romantic theories, Goethe, in conjunction with his friend Heinrich Meyer (1760-1832), published from 1798 to 1800 an art review, Die Propylaen. Again, in Winckelmann und seine Zeit (1805) Goethe vigorously defended the classical ideals of which Winckelmann had been the founder. But in the end he proved himself the greatest enemy to the strict classic doctrine by the publication in 1808 of the completed first part of Faust, a work which was accepted by contemporaries as a triumph of Romantic art. Faust is a patchwork of many colours. With the aid of the vast body of Faust literature which has sprung up in recent years, and the many new documents bearing on its history — above all, the so-called Urfaust, to which reference has already been made — we are able now to ascribe to their various periods the component parts of the work; it is possible to discriminate between the Sturm und Drang hero of the opening scenes and of the Gretchen tragedy — the contemporary of Gotz and Clavigo — and the superimposed Faust of calmer moral and intellectual ideals — a Faust who corresponds to Hermann and Wilhelm Meister. In its original form the poem was the dramatization of a specific and individualized story; in the years of Goethe's friendship with Schiller it was extended to embody the higher strivings of 18th-century humanism; ultimately, as we shall see, it became, in the second part, a vast allegory of human life and activity. Thus the elements of which Faust is composed were even more difficult to blend than were those of Wilhelm Meister; but the very want of uniformity is one source of the perennial fascination of the tragedy, and has made it in a peculiar degree the national poem of the German people, the mirror which reflects the national life and poetry from the outburst of Sturm und Drang to the well-weighed and tranquil classicism of Goethe's old age.

The third and final period of Goethe's long life may be said to have begun after Schiller's death. He never again lost touch with literature as he had done in the years which preceded his

friendship with Schiller; but he stood in no active or immediate connexion with the literary movement of his day. His life moved on comparatively uneventfully. Even the Napoleonic regime of 1806-1813 disturbed but little his equanimity. Goethe, the cosmopolitan Weltbitrger of the 18th century, had himself no very intense feelings of patriotism, and, having seen Germany flourish as a group of small states under enlightened despotisms, he had little confidence in the dreamers of 1813 who hoped to see the glories of Barbarossa's empire revived. Napoleon, moreover, he regarded not as the scourge of Europe, but as the defender of civilization against the barbarism of the Slavs; and in the famous interview between the two men at Erfurt the poet's admiration was reciprocated by the French conqueror. Thus Goethe had no great sympathy for the war of liberation which kindled young hearts from one end of Germany to the other; and when the national enthusiasm rose to its highest pitch he buried himself in those optical and morphological studies, which, with increasing years, occupied more and more of his time and interest.

The works and events of the last twenty-five years of Goethe's life may be briefly summarized. In 1805, as we have seen, he suffered an irreparable loss in the death of Schiller; in 1806, Christiane became his legal wife, and to the same year belongs the magnificent tribute to his dead friend, the Epilog zu Schillers Glocke. Two new friendships about this time kindled in the poet something of the juvenile fire and passion of younger days. Bettina von Arnim came into personal touch with Goethe in 1807, and her Briefwechsel Goethes mit einem Kinde (published in 1835) is, in its mingling of truth and fiction, one of the most delightful products of the Romantic mind; but the episode was of less importance for Goethe's life than Bettina would have us believe. On the other hand, his interest in Minna Herzlieb, foster-daughter of the publisher Frommann in Jena, was of a warmer nature, and has left its traces on his sonnets.

In 1808, as we have seen, appeared the first part of Faust, and in 1809 it was followed by Die Waklverwandtschaften. The novel, hardly less than the drama, effected a change in the public attitude towards the poet. Since the beginning of the century the conviction had been gaining ground that Goethe's mission was accomplished, that the day of his leadership was over; but here were two works which not merely re-established his ascendancy, but proved that the old poet was in sympathy with the movement of letters, and keenly alive to the change of ideas which the new century had brought in its train. The intimate psychological study of four minds, which forms the subject of the Waklverwandtschaften, was an essay in a new type of fiction, and

pointed out the way for developments of the German novel after the stimulus of Wilhelm Meisler had exhausted itself. Less important than Die Waklverwandtschaften was Pandora (1810), the final product of Goethe's classicism, and the most uncompromisingly classical and allegorical of all his works. And in 1810, too, appeared his treatise on Farbenlehre. In the following year the first volume of his autobiography was pub- lished under the title Aus meinem Leben, Dichtung und Wahrheit. The second and third volumes of this work followed in 181 2 and 1814; the fourth, bringing the story of his life up to the close of the Frankfort period in 1833, after his death. Goethe felt, even late in life, too intimately bound up with Weimar to discuss in detail his early life there, and he shrank from carrying his biography beyond the year 1775. But a number of other publications — descriptions of travel, such as the Italienische Reise (1816-1817), the materials for a continuation of Dichtung und Wahrheit collected in Tag- und Jahreshefte (1830) — have also to be numbered among the writings which Goethe has left us as documents of his life. Meanwhile no less valuable biographical materials were accumulating in his diaries, his voluminous correspondence and his conversations, as recorded by J. P. Eckermann, the chancellor Millier and F. Soret. Several periodical publications, fiber Kunst und Altertum (1816-1832), Zur Naturwissenschaft ilberhaupt (1817-1824), Zur Morphologie (1817-1824), bear witness to the extraordinary breadth of Goethe's interests in these years. Art, science, literature — little

escaped his ken — and that not merely in Germany: English writers, Byron, Scott and Carlyle, Italians like Manzoni, French scientists and poets, could all depend on friendly words of appreciation and encouragement from Weimar.

In West-bstlicher Diwan (1819), a collection of lyrics — matchless in form and even more concentrated in expression than those of earlier days — which were suggested by a German translation of Hafiz, Goethe had another surprise in store for his contem- poraries. And, again, it was an actual passion — that for Marianne von Willemer, whom he met in 1814 and 181 5 — which rekindled in him the lyric fire. Meanwhile the years were thinning the ranks of Weimar society: Wieland, the last of Goethe's greater literary contemporaries, died in 1813, his wife in 1816, Charlotte von Stein in 1827 and Duke Charles Augustus in 1828. Goethe's retirement from the direction of the theatre in 181 7 meant for him a break with the literary life of the day. In 1822 a passion for a young girl, Ulrike von Levetzow, whom he met at Marien- bad, inspired the fine Trilogie der Leidenschaft, and between 182T and 1829 appeared the long-expected and long-promised continuation of Wilhelm Meister, Wilhelm Meisters

Wanderjahre. The latter work, however, was a disappointment: perhaps it could not have been otherwise. Goethe had lost the thread of his romance and it was difficult for him to resume it. Problems of the relation of the individual to society and industrial questions were to have formed the theme of the Wanderjahre; but since the French Revolution these problems had themselves entered on a new phase and demanded a method of treatment which it was not easy for the old poet to learn. Thus his intentions were only partially carried out, and the volumes were filled out by irrelevant stories, which had been written at widely different periods.

But the crowning achievement of Goethe's literary life was the completion of Faust. The poem had accompanied him from early manhood to the end and was the repository for the fullest " confession " of his life; it is the poetic epitome of his experience. The second part is, in form, far removed from the impressive realism of the Urfaust. It is a phantasmagory; a drama the actors in which are not creatures of flesh and blood, but the shadows of an unreal world of allegory. The lover of Gretchen had, as far as poetic continuity is concerned, disappeared with the close of the first part. In the second part it is virtually a new Faust who, at the hands of a new Mephistopheles, goes out into a world that is not ours. Yet behind these unconvincing shadows of an imperial court with its financial difficulties, of the classical Walpurgisnacht, of the fantastic creation of the Homunculus, the noble Helena episode and the impressive mystery-scene of the close, where the centenarian Faust finally triumphs over the powers of evil, there lies a philosophy of life, a ripe wisdom born of experience, such as no European poet had given to the world since the Renaissance. Faust has been well called the " divine comedy " of 18th-century humanism.

The second part of Faust forms a worthy close to the life of Germany's greatest man of letters, who died in Weimar on the 22nd of March 1832. He was the last of those universal minds which have been able to compass all domains of human activity and knowledge; for he stood on the brink of an era of rapidly expanding knowledge which has made for ever impossible the universality of interest and sympathy which distinguished him. As a poet, his fame has undergone many vicissitudes since his death, ranging from the indifference of the " Young German " school to the enthusiastic admiration of the closing decades of the 19th century — an enthusiasm to which we owe the Weimar Goethe-Gesellschaft (founded in 1885) and a vast literature dealing with the poet's life and work; but the fact of his being Germany's greatest poet and the master of her classical literature has never been seriously put in question. The intrinsic value of his poetic

work, regarded apart from his personality, is smaller in propor- tion to its bulk than is the case with many lesser German poets and with the greatest poets of other literatures. But Goethe was a type of literary man hitherto unrepresented among the leading writers of the world's literature; he was a poet whose supreme greatness lay in his subjectivity. Only a small fraction

of Goethe's work was written in an impersonal and objective spirit, and sprang from what might be called a conscious artistic impulse; by far the larger — and the better — part is the im- mediate reflex of his feelings and experiences.

It is as a lyric poet that Goethe's supremacy is least likely to be challenged; he has given his nation, whose highest literary expression has in all ages been essentially lyric, its greatest songs. No other German poet has succeeded in attuning feeling, senti- ment and thought so perfectly to the music of words as he; none has expressed so fully that spirituality in which the quintessence of German lyrism lies. Goethe's dramas, on the other hand, have not, in the eyes of his nation, succeeded in holding their own beside Schiller's; but the reason is rather because Goethe, from what might be called a wilful obstinacy, refused to be bound by the conventions of the theatre, than because he was deficient in the cunning of the dramatist. For, as an interpreter of human character in the drama, Goethe is without a rival among modern poets, and there is not one of his plays that does not contain a few scenes or characters which bear indisputable testimony to his mastery. Faust is Germany's most national drama, and it remains perhaps for the theatre of the future to prove itself capable of popularizing psychological masterpieces like Tasso and Iphigenie. It is as a novelist that Goethe has suffered most by the lapse of time. The Sorrows of Werther no longer moves us to tears, and even Wilhelm Meister and Die W ahiverwandtschaften require more understanding for the conditions under which they were written than do Faust or Egmont. Goethe could fill his prose with rich wisdom, but he was only the perfect artist in verse.

Little attention is nowadays paid to Goethe's work in other fields, work which he himself in some cases prized more highly than his poetry. It is only as an illustration of his many-sidedness and his manifold activity that we now turn to his work as a statesman, as a theatre-director, as a practical political economist. His art-criticism is- symptomatic of a phase of European taste which tried in vain to check the growing individualism of Romanticism. His scientific studies and discoveries awaken only an historical interest. We marvel at the obstinacy with which he, with inadequate mathematical knowledge, opposed the Newtonian theory of light and colour; and at his champion- ship of " Neptunism," the theory of aqueous origin, as

opposed to ” Vulcanism,” that of igneous origin of the earth’s crust. Of far-reaching importance was, on the other hand, his fore- shadowing of the Darwinian theory in his works on the meta- morphosis of plants and on animal morphology. Indeed, the deduction to be drawn from Goethe’s contributions to botany and anatomy is that he, as no other of his contemporaries, possessed that type of scientific mind which, in the 19th century, has made for progress; he was Darwin’s predecessor by virtue of his enunciation of what has now become one of the common- places of natural science — organic evolution. Modern, too, was the outlook of the aging poet on the changing social conditions of the age, wonderfully sympathetic his attitude towards modern industry, which steam was just beginning to establish on a new basis, and towards modern democracy. The Europe of his later years was very different from the idyllic and enlightened autocracy of the 18th century, in which he had spent his best years and to which he had devoted his energies; yet Goethe was at home in it.

From the philosophic movement, in which Schiller and the Romanticists were so deeply involved, Goethe stood apart. Comparatively early in life he had found in Spinoza the philo- sopher who responded to his needs; Spinoza taught him to see in nature the ” living garment of God,” and more he did not seek or need to know. As a convinced realist he took his standpoint on nature and experience, and could afford to look on objectively at the controversies of the metaphysicians. Kant he by no means ignored, and under Schiller’s guidance he learned much from him; but of the younger thinkers, only Schelling, whose mystic nature-philosophy was a development of Spinoza’s ideas, touched a sympathetic chord in his nature. As a moralist and a guide to the conduct of life — an aspect of Goethe’s work

which Carlyle, viewing him through the coloured glasses of Fichtean idealism, emphasized and interpreted not always justly — Goethe was a powerful force on German life in years of political and intellectual depression. It is difficult even still to get beyond the maxims of practical wisdom he scattered so liberally through his writings, the lessons to be learned from Meister and Faust, or even that calm, optimistic fatalism which never deserted Goethe, and was so completely justified by the tenor of his life. If the philosophy of Spinoza provided the poet with a religion which made individual creeds and dogmas unnecessary and impossible, so Leibnitz’s doctrine of pre- destinism supplied the foundations for his faith in the divine mission of human life.

This many-sided activity is a tribute to the greatness of Goethe’s mind

and personality; we may regard him merely as the embodiment of his particular age, or as a poet ” for all time “; but with one opinion all who have felt the power of Goethe’s genius are in agreement — the opinion which was con- densed in Napoleon’s often cited words, uttered after the meeting at Erfurt: Voild un hommel Of all modern men, Goethe is the most universal type of genius. It is the full, rich humanity of his life and personality — not the art behind which the artist disappears, or the definite pronouncements of the thinker or the teacher — that constitutes his claim to a place in the front rank of men of letters. His life was his greatest work.

Bibliography. — (a) Collected Works, Diaries, Correspondence, Conversations. The following authorized editions of Goethe’s writings appeared in the poet’s lifetime: Schriften (8 vols., Leipzig, 1787-1790); Neue Schriften (7 vols., Berlin, 1792-1800); Werke (13 vols., Stuttgart, 1806-1810); Werke (20 vols., Stuttgart, 1815- 1819); to which six volumes were added in 1820-1822; Werke (Vollstandige Ausgabe letzter Hand) (40 vols., Stuttgart, 1827-1830). Goethe’s Nachgelassene Werke appeared as a continuation of this edition in 15 volumes (Stuttgart, 1 832-1 834), to which five volumes were added in 1842. These were followed by several editions of Goethe’s Samtliche Werke, mostly in forty volumes, published by Cotta of Stuttgart. The first critical edition with notes was published by Hempel, Berlin, in thirty-six volumes, 1868-1879; that in Kurschner’s Deutsche Nalionalliteratur, vols. 82-117 (1882-1897) is also important. In 1887 the monumental Weimar edition, which is now approaching completion, began to appear; it is divided into four sections: I. Werke (c. 56 vols.); II. Naturwissenschaftliche Werke (12 vols.); III. Tagebucher (13 vols.); IV.Briefe (c. 45 vols.). Of other recent editions the most noteworthy are: Samtliche Werke (Jubilaums- Ausgabe) , edited by E. von der Hellen (40 vols. , Stuttgart, 1902 ff. ; Werke, edited by K. Heinemann (30 vols., Leipzig, 1900 ff.), and the cheap edition of the Samtliche Werke, edited by L. Geiger (44 vols., Leipzig, 1901). There are also innumerable editions of selected works; reference need only be made here to the useful collection of the early writings and letters published by S. Hirzel with an introduction by M. Bernays, Der junge Goethe (3 vols., Leipzig, 1875, 2nd ed., 1887). A French translation of Goethe’s CEuvres computes, by J. Porchat, appeared in 9 vols., at Paris, in 1 860-1 863. There is, as yet, no uniform English edition, but Goethe’s chief works have all been frequently translated and a number of them will be found in Bohn’s standard library.

The definitive edition of Goethe’s diaries and letters is that forming Sections III. and IV. of the Weimar edition. Collections of selected

letters based on the Weimar edition have been published by E. von der Hellen (6 vols., 190 1 ff.), and by P. Stein (8 vols., 1902 ff.). Of the many separate collections of Goethe's correspondence mention may be made of the Briefwechsel zwischen Schiller und Goethe, edited by Goethe himself (1828-1829; 4th ed., 1881; also several cheap reprints. English translation by L. D. Schmitz, 1877-1879); Briefwechsel zwischen Goethe und Zelter (6 vols., 1833-1834; reprint in Reclam's Universalbibliothek, 1904; English translation by A. D. Coleridge, 1887); Bettina von Arnim, Goethes Briefwechsel mit einem Kinde (1835; 4th ed., 1890; English translation, 1838); Brief e von und an Goethe, edited by F. W. Riemer (1846); Goethes Briefe an Frau von Stein, edited by A. Scholl (1848-1851 ; 3rd ed. by J. Wahle, 1899-1900) ; Briefwechsel zwischen Goethe und K. F. von Reinhard (1850); Briefwechsel zwischen Goethe und Knebel (2 vols., 1851); Briefwechsel zwischen Goethe und Staatsrat Sckultz (1853); 'Briefwechsel des Herzogs Karl August mit Goethe (2 vols., 1863); Briefwechsel zwischen Goethe und Kaspar Graf von Sternberg (1866) ; Goethes naturwissenschaftliche Korrespondenz, and Goethes Briefwechsel mit den Gebrudern von Humboldt, edited by F. T. Bratranek (1874-1876); Goethes und Carlyles Briefwechsel (1887), also in English ; Goethe und die Romanlik, edited by C. Schiiddekopf and O. Walzel (2 vols., 1898-1899); Goethe und Lavater, edited by H. Funck (1901); Goethe und Osterreich, edited by A. Sauer (2 vols., 1902-1903). Besides the correspondence with Schiller and Zelter, Bohn's library contains a translation of Early and Miscellaneous

Letters, by E. Bell (1884). The chief collections of Goethe's conversations are: J. P. Eckermann, Gesprdche mit Goethe (1836; vol. iii., also containing conversations with Soret, 1848; 7th ed. by H. Diintzer, 1899; also new edition by L. Geiger, 1902; English translation by J. Oxenford, 1850). The complete conversations with Soret have been published in German translation by C. A. H. Burkhardt (1905); Goethes Unterhaltungen mit dem Kanzler F. von Midler (1870). Goethe's collected Gesprdche were published by W. von Biedermann in 10 vols. (1889-1896).

(b) Biography. — Goethe's autobiography, Aus meinem Leben: Dichtung und Wahrheit, appeared in three parts between 181 1 and 1814, a fourth part, bringing the history of his life as far as his departure for Weimar in 1775, in 1833 (English translation by J . Oxenford, 1846) ; it is supplemented by other biographical writings,

as the Italienische Reise, Aus einer Reise in die Schweiz im Jahre J 797; Aus einer Reise am Rhein, Main und Neckar in den Jahren 1814 und 1815, Tag- und Jahreshefte, &c, and especially by his diaries and correspondence. The following are the more important biographies: H. Doring, Goethes Leben (1828; subsequent editions, 1833, 1849, 1856); H. Viehoff, Goethes Leben (4 vols., 1847-1854; 5th ed., 1887); J. W. Schiifer, Goethes Leben (2 vols., 1851; 3rd ed., 1877); G. H. Lewes, The Life and Works of Goethe (2 vols., 1855; 2nd ed., 1864; 3rd ed., 1875; cheap reprint, 1906; the German translation by J. Frese is in its 18th edition, 1900 ; a shorter biography was published by Lewes in 1873 under the title The Story of Goethe's Life); W. Mezieres, W. Goethe, les ceuvres expliquees par la vie (1872-1873); A. Bossert, Goethe (1872-1873); K. Goedeke, Goethes Leben und Schriften (1874; 2nd ed., 1877); H. Grimm, Goethe: Vorlesungen (1876; 8th ed., 1903; English translation, 1880); A. Hayward, Goethe (1878) ; H. H. Boyesen, Goethe and Schiller, their Lives and Works (1879); H. Diintzer, Goethes Leben (1880; 2nd ed., 1883; English translation, 1883); A. Baumgartner, Goethe, sem Leben und seme Werke (1885); J. Sime, Life of Goethe (1888); K. Heinemann, Goethes Leben und Werke (1889; 3rd ed., 1903)- R. M. Meyer, Goethe (1894; 3rd ed., 1904); A. Bielschowsky', Goethe, sem Leben und seine Werke (vol. i., 1895; 5th ed., 1904- vol. ii., 1903; English translation by W. A. Cooper, 1905 ff) : G. Witkowsky, Goethe (1899); H. G. Atkins, /. W. Goethe (1904); P. Hansen and R. Meyer, Goethe, hans Liv og Vaerker (1906).

Of writings on special periods and aspects of Goethe's life the more important are as follows (the titles are arranged as far as possible in the chronological sequence of the poet's life) : H. Diintzer Goethes Stammbaum (1894); K. Heinemann, Goethes Mutter (1891- 6th ed., 1900); P. Bastier, La Mire de Goethe (1902); Briefe der Frau Rat (2 vols., 2nd ed., 1905); F. Ewart, Goethes Vater (1899); O. Witkowski, Cornelia die Schwester Goethes (1903); P. Besson Goethe, sa sceur et ses amies (1898); H. Diintzer, Frauenbilder aus Goethes Jugendzeit (1852); W. von Biedermann, Goethe und Leipzig (1865); P. F. Lucius, Friederike Brion (1878; 3rd ed., 1904)- A. Bielschowsky, Friederike Brion (1880); F. E. von Durckheim| Lilt's Bild geschichtlich entworfen (1879; 2nd ed., 1894) • W Herbst' Goethe in Wetzlar (1881); A. Diezmann, Goethe und die lusliee Zei't m Weimar (1857; 2nd ed., 1901); H. Diintzer, Goethe und Karl August (1859-1864; 2nd ed., 1888); also, by the same author, Aus Goethes Freundeskreise (1868) and Charlotte von Stein (2 vols., 1874); J. Haarhuus, Auf Goethes Spuren in Italien (1896-1898)' O. Harnack, Zur Nachgeschichte der italienischen Reise (1890); H.' Grimm, Schiller und Goethe (Essays, 1858; 3rd ed., 1884); G Beriit, Goethe und Schiller im personlichen

Verkehre, nach brief lichen Mitleilungen von H. Voss (1895); E. Pasque, Goethes Theaterleitung m Weimar (2 vols., 1863); C. A. H. Burkhards, Das Repertoire des weimarischen Theaters unler Goethes Leitung (1891); J. Wahle Das Weimarer Hoftheater unler Goethes Leitung (1892) ; O. Harnack! Goethe in der Epoche seiner Vollendung (2nd ed., 1901)- J Barbey d'Aurevilly, Goethe et Diderot (1880) ; A Fischer, Goethe und Napoleon (1899; 2nd ed., 1900); R. Steig, Goethe und die Gebriider Grimm

(1892).

(c) Criticism. — H. G. Graef, Goethe ilber seine Dichtungen (1901 ff .) ; J. W. Braun, Goethe im Urteile seiner Zeitgenossen (3 vols , 1883-1885); T. Carlyle, Essays on Goethe (1828-1832); X. Marmier Etudes sur Goethe (1835) ; W. von Biedermann, Goethe- Forschungen. ,ll 9 { I if 'iV* Mlnor and A – Sauer, Studien zur Goethe-Philologie /oon ac Df« Vortrage (1905); R. Saitschik, Goethes Charakler (1898); W. Bode, Goethes Lebenskunst (1900; 2nd ed., 1902)- by the : same Goethes Asthetik (1901); T. Vollbehr, Goethe und die bildende Kunst (1895); E. Lichtenberger, ttudes sur les poesies lyriques de Goethe (1878); T. Achelis, Grundziige der Lyrik Goethes (1900) ; B Litzmann, Goethes Lyrik (1903) ; R. Riemann, Goethes Komantechnik (1901); R. Virchow, Goethe als Naturforscher (1861)- ^' ,? TO l,r? Philosophic de Goethe (1866; 2nd ed., 1870); R. Steiner! Goethes Weltanschauung (1897) ; F. Siebeck, Goethe als Denker (1002) ■

•j "fldengperger Goe/Ae en France (1904); S. Waetzoldt, Goethe und die Romantik (1888).

More special treatises dealing with individual works are the

following: W. Scherer, Aus Goethes Frilhzeit (1879); R. Weissen- fels, Goethe in Sturm und Drang, vol. i. (1894); W. Wilmanns, Quellenstudien zu Goethes Gbtz von Berlichingen (1874) ; J. Baechtold', Goethes Gbtz von Berlichingen in dreifacher Gestalt (1882); J. w' Appell, Werlher und seine Zeit (1855; 4th ed., 1896); E. Schmidt Richardson, Rousseau und Goethe (1875); M. Herrmann, Das Jahr- marktsfest zu Plunder sweilen (1900); E. Schmidt, Goethes Faust in ursprunghcher Gestalt (1887; 5th ed., 1901); J. Collin, Goethes Faust m seiner dltesten Gestalt (1896) ; H. Hettner, Goethes Iphigenie in ihrem Verhdltnis zur Bildungsgeschichte des Dichters (1861; in Kleme Schriften, 1884); K. Fischer, Goethes Iphigenie (1888); F. T. Bratranek, Goethes Egmont und Schillers Wallenstein (1862); C. Schuchardt, Goethes italienische Reise (1862); H. Diintzer, Iphigenie auf Tauris; die drei dltesten Bearbeitungen (1854); f! Kern, Goethes

Tasso (1890); J. Schubart, Die philosophis'chen Grundgedanken m Goethes Wilhelm Meister (1896); E. Boas, Schiller und Goethe in Xenienkampf (1851); E. Schmidt and B. Suphan, Xenien 1796, nach den Handschriflen (1893); W. von. Humboldt, Asthetische Versuche: Hermann und Dorothea (1799); V. Hehn| Uber Goethes Hermann und Dorothea (1893); A. Fries, Quellen und Komposition der Achilleis (1901); K. Alt, Studien zur Entstehungs- geschichte von Dichtung und Wahrheit (1898); A. Jung, Goethes Wander jahre und die wichtigsten Fragen des 19. Jahrhunderts (1854)- F. Kreyssig, Vorlesungen uber Goethes Faust (1866); the editions of Faust by G. von Loeper (2 vols., 1879), and K. J. Schroer (2 vols., 3rd and 4th ed., 1898-1903); K. Fischer, Goethes Faust (3 vols., 1893, 1902, 1903) ; O. Pniower, Goethes Faust, Zeugnisse und Excurse zu seiner Enlstehungsgeschichte (1899); J. Minor, Goethes Faust, Entstehungsgeschichte und Erkldrung (2 vols., 1 901).

(d) Bibliographical Works, Goethe-Societies, &c. — L. Unflad, Die Goethe-Literatur in Deutschland (1878); S. Hirzel, Verzeichnis einer Goethe-Bibliothek (i884)„to which G. von Loeper and W. von Biedermann have supplied supplements. F. Strehlke, Goethes Briefe: Verzeichnis unter Angabe der Quelle (1 882-1 884); British Museum Catalogue of Printed Books: Goethe (1888); Goedeke 's Grundriss zur Geschichte der deutschen Dichtung (2nd ed., vol. iv. 1891); and the bibliographies in the Goethe- J ahrbuch (since 1880). Also K. Hoyer, Zur Einfuhrung in die Goethe-Literatur (1904). On Goethe in England see E. Oswald, Goethe in England and America (1899; 2nd ed., 1909) ; W. Heinemann, A Bibliographical List of the English Translations and Annotated Editions of Goethe's Faust (1886). Reference may also be made here to F. Zarncke's Verzeichnis der Origmalaufnahmen von Goethes Bildnissen (1888).

A Goethe-Gesellschaft was founded at Weimar in 1885, and numbers over 2800 members; its publications include the annual Goethe- J ahrbuch (since 1880), and a series of Goethe-Schriften. A Goethe-Verem has existed in Vienna since 1887, and an English Goethe society, which has also issued several volumes of publications, since l8 * 6 – , (J- G. R.)

Goethe's Descendants. — Goethe's only son, August, born on the 25th of December 1789 at Weimar, married in 181 7 Ottilie von Pogwisch (1796-1872), who had come as a child to Weimar with her mother (nee Countess Henckel von Donnersmarck). The marriage was a very unhappy one, the husband having no qualities that could appeal to a woman who, whatever the censorious might say of her moral character, was distinguished to the last by a lively intellect and a

singular charm. August von Goethe, whose sole distinction was his birth and his position as grand-ducal chamberlain, died in Italy, on the 27th of October 1830, leaving three children: Walthek Wolfgang, born on April 9, 1818, died on April 15, 1885; Wolfgang Maximilian, born on September 18, 1820, died on January 20, 1883; Alma, born on October 22, 1827, died on September 29, 1844.

Of Walther von Goethe little need be said. In youth he had musical ambitions, studied under Mendelssohn and Weinlig at Leipzig, under Loewe at Stettin, and afterwards at Vienna. He published a few songs of no great merit, and had at his death no more than the reputation among his friends of a kindly and accomplished man.

Wolfgang or, as he was familiarly called, Wolf von Goethe, was by far the more gifted of the two brothers, and his gloomy destiny by so much the more tragic. A sensitive and highly imaginative boy, he was the favourite of his grandfather, who made him his constant companion. This fact, instead of being to the boy's advantage, was to prove his bane. The exalted atmosphere of the great man's ideas was too rarefied for the child's intellectual health, and a brain well fitted to do excellent work in the world was ruined by the effort to live up to an impossible ideal. To maintain himself on the same height as his grandfather, and to make the name of Goethe illustrious in his descendants also, became Wolfgang's ambition; and his incapacity to realize this, very soon borne in upon him, paralyzed

his efforts and plunged him at last into bitter revolt against his fate and gloomy isolation from a world that seemed to have no use for him but as a curiosity. From the first, too, he was hampered by wretched health; at the age of sixteen he was subjected to one of those terrible attacks of neuralgia which were to torment him to the last; physically and mentally alike he stood in tragic contrast with his grandfather, in whose gigantic personality the vigour of his race seems to have been exhausted.

From 1839 to 1845 Wolfgang studied law at Bonn, Jena, Heidelberg and Berlin, taking his degree of doctor juris at Heidel- berg in 1845. During this period he had made his first literary efforts. His Studenten- Brief e (Jena, 1842), a medley of letters and lyrics, are wholly conventional. This was followed by Der Mensch und die elementarische Natur (Stuttgart and Tubingen, 1845), in three parts

(Beitrage): (1) an historical and philosophical dissertation on the relations of mankind and the “soul of nature,” largely influenced by Schelling, (2) a dissertation on the juridical side of the question, De fragmento Vegoiae, being the thesis presented for his degree, (3) a lyrical drama, Erlinde. In this last, as in his other poetic attempts, Wolfgang showed a consider- able measure of inherited or acquired ability, in his wealth of language and his easy mastery of the difficulties of rhythm and rhyme. But this was all. The work was characteristic of his self-centred isolation: ultra-romantic at a time when Romanti- cism was already an outworn fashion, remote alike from the spirit of the age and from that of Goethe. The cold reception it met with shattered at a blow the dream of Wolfgang’s life; henceforth he realized that to the world he was interesting mainly as ” Goethe’s grandson,” that anything he might achieve would be measured by that terrible standard, and he hated the legacy of his name.

The next five years he spent in Italy and at Vienna, tormented by facial neuralgia. Returning to Weimar in 1850, he was made a chamberlain by the grand-duke, and in 1852, his health being now somewhat restored, he entered the Prussian diplomatic service and went as attache to Rome. The fruit of his long years of illness was a slender volume of lyrics, Gedichte (Stuttgart and Tubingen, 1851), good in form, but seldom inspired, and showing occasionally the influence of a morbid sensuality. In 1854 he was appointed secretary of legation; but the aggressive ultramontanism of the Curia became increasingly intolerable to his overwrought nature, and in 1856 he was transferred, at his own request, as secretary of legation to Dresden. This post he resigned in 1859, in which year he was raised to the rank of Freiherr (baron). In 1866 he received the title of councillor of legation; but he never again occupied any diplomatic post.

The rest of his life he devoted to historical research, ultimately selecting as his special subject the Italian libraries up to the year 1500. The outcome of all his labours was, however, only the first part of Studies and Researches in the Times and Life of Cardinal Bessarion, embracing the period of the council of Florence (privately printed at Jena, 1871), a catalogue of the MSS. in the monastery of Sancta Justina at Padua (Jena, 1873), and a mass of undigested material, which he ultimately bequeathed to the university of Jena.

In 1870 Ottilie von Goethe, who had resided mainly at Vienna, returned to Weimar and took up her residence with her two sons in the Goethehaus. So long as she lived, her small salon in the attic storey of the great house was a centre of attraction for many of the

most illustrious personages in Europe. But after her death in 1872 the two brothers lived in almost complete isolation. The few old friends, including the grand-duke Charles Alexander, who continued regularly to visit the house, were entertained with kindly hospitality by Baron Walther; Wolf- gang refused to be drawn from his isolation even by the advent of royalty. “Tell the empress,” he cried on one” occasion, ” that I am not a wild beast to be stared at ! ” In 1879, his increasing illness necessitating the constant presence of an attendant, he went to live at Leipzig, where he died.

Goethe’s grandsons have been so repeatedly accused of having displayed a dog-in-the-manger temper in closing the Goethehaus

to the public and the Goethe archives to research, that the charge has almost universally come to be regarded as proven. It is true that the house was closed and access to the archives only very sparingly allowed until Baron Walther’s death in 1885. But the reason for this was not, as Herr Max Hecker rather absurdly suggests, Wolfgang’s jealousy of his grandfather’s oppressive fame, but one far more simple and natural. From one cause or another, principally Ottilie von Goethe’s extrava- gance, the family was in very straitened circumstances; and the brothers, being thoroughly unbusinesslike, believed themselves to be poorer than they really were. 1 They closed the Goethehaus and the archives, because to have opened them would have needed an army of attendants. 2 If they deserve any blame it is for the pride, natural to their rank and their generation, which prevented them from charging an entrance fee, an expedient which would not only have made it possible for them to give access to the house and collections, but would have enabled them to save the fabric from falling into the lamentable state of disrepair in which it was found after their death. In any case, the accusation is ungenerous. With an almost exaggerated Pietdt Goethe’s descendants preserved his house untouched, at great inconvenience to themselves, and left it, with all its treasures intact, to the nation. Had they been the selfish misers they are sometimes painted, they could have realized a fortune by selling its contents. 1

Wolf Goethe (Weimar, 1889) is a sympathetic appreciation by Otto Mejer, formerly president of the Lutheran consistory in Hanover. See also Jenny v. Gerstenbergk, Ottilie von Goethe und ihre Sohne Walther und Wolf (Stuttgart, 1901), and the article on Maximilian Wolfgang von Goethe by Max F. Hecker in Allgem. deutsche Bio- graphie, Bd. 49, Nachtrage (Leipzig, 1904). (W. A. P.)

GOETZ, HERMANN (1840-1876), German musical composer, was

born at Konigsberg in Prussia, on the 17th of December 1840, and began his regular musical studies at the comparatively advanced age of seventeen. He entered the music-school of Professor Stern at Berlin, and studied composition chiefly under Ulrich and Hans von Biilow. In 1863 he was appointed organist at Winterthur in Switzerland, where he lived in obscurity for a number of years, occupying himself with composition during his leisure hours. One of his works Was an opera, The Taming of the Shrew, the libretto skilfully adapted from Shakespeare's play. After much delay it was produced at Mannheim (in October 1874), and its success was as instantaneous as it has up to the present proved lasting. It rapidly made the round of the great German theatres, and spread its composer's fame over all the land. But Goetz did not live to enjoy this happy result for long. In December 1876 he died at Zurich from overwork. A second opera, Francesco da Rimini, on which he was engaged, remained a fragment; but it was finished according to his directions, and was performed for the first time at Mannheim a few months after the composer's death on the 4th of December 1876. Besides his dramatic work, Goetz also wrote various compositions for chamber-music, of which a trio (Op. 1) and a quintet (Op. 16) have been given with great success at the London Monday Popular Concerts. Still more important is the Symphony in F. As a composer of comic opera Goetz lacks the sprightliness and artistic savoir faire so rarely found amongst Germanic nations. His was essentially a serious nature, and passion and pathos were to him more congenial than humour. The more serious sides of the subject are therefore insisted upon more successfully than Katherine's ravings and Petruchio's eccentricities. There are, however, very graceful passages, e.g. the singing lesson Bianca receives from her disguised lover. Goetz's style, although influenced by Wagner and other masters, shows signs of a distinct individuality. The design of his music is essentially of a polyphonic character, and the working out and interweaving of his themes betray the musician of high scholar- ship. But breadth and beautiful flow of melody also were his,

•After Walther's death upwards of £10,000 in bonds, &c., were discovered put away and forgotten in escritoires and odd corners.

2 This was the reason given by Baron Walther himself to the writer's mother, an old friend of Frau von Goethe, who lived with her family in the Goethehaus for some years after 1871.

as is seen in the symphony, and perhaps still more in the quintet for pianoforte and strings above referred to. The most important of Goetz's posthumous works are a setting of the 137th Psalm for soprano solo, chorus and orchestra, a " Spring " overture (Op. 15), and a pianoforte sonata for four hands (Op. 17).

GOFFE (or Gough), WILLIAM (fi. 1 642-1 660), English parliamentarian, son of Stephen Goffe, puritan rector of Stanmer in Essex, began life as an apprentice to a London Salter, a zealous parliamentarian, but on the outbreak of the civil war he joined the army and became captain in Colonel Harley's regiment of the new model in 1645. He was imprisoned in 1642 for his share in the petition to give the control of the militia to the parliament. By his marriage with Frances, daughter of General Edward Whalley, he became connected with Oliver Cromwell's family and one of his most faithful followers. He was a member of the deputation which on the 6th of July 1647 brought up the charge against the eleven members. He was active in bringing the king to trial and signed the death warrant. In 1649 he received the honorary degree of M.A. at Oxford. He distin- guished himself at Dunbar, commanding a regiment there and at Worcester. He assisted in the expulsion of Barebone's parliament in 1653, took an active part in the suppression of Pen- ruddock's rising in July 1654, and in October 1655 was appointed major-general for Berkshire, Sussex and Hampshire. Meanwhile he had been elected member for Yarmouth in the parliament of 1654 and for Hampshire in that of 1656. He supported the proposal to bestow a royal title upon Cromwell, who greatly esteemed him, was included in the newly-constituted House of Lords, obtained Lambert's place as major-general of the Foot, and was even thought of as a fit successor to Cromwell. As a member of the committee of nine appointed in June 1658 on public affairs, he was witness to the protector's appointment of Richard Cromwell as his successor. He supported the latter during his brief tenure of power and his fall involved his own loss of influence. In November 1 6 59 he took part in the futile mission sent by the army to Monk in Scotland, and at the Restoration escaped with his father-in-law General Edward Whalley to Massachusetts. Goffe's political aims appear not to have gone much beyond fighting " to pull down Charles and set up Oliver "; and he was no doubt a man of deep religious feeling, who acted throughout according to a strict sense of duty as he conceived it. He was destined to pass the rest of his life in exile, separated from his wife and children, dying, it is supposed, about 1679.

GOFFER, to give a fluted or crimped appearance to anything, particularly to linen or lace frills or trimmings by means of heated

irons of a special shape, called goffering-irons or tongs. ” Goffering,” or the French term gaufrage, is also used of the wavey or crimped edging in certain forms of porcelain, and also of the stamped or embossed decorations on the edges of the binding of. books. The French word gaufre, from which the English form is adapted, means a thin cake marked with a pattern like a honeycomb, a ” wafer,” which is etymologically the same word. Waufre appears in the phrase un fer a waufres, an iron for baking cakes on (quotation of 1433 in J. B. Roque- fort’s Glossaire de la langue romane). The word is Teutonic, cf. Dutch wafel, Ger. Waff el, a form seen in ” waffle,” the name given to the well-known batter-cakes of America. The ” wafer ” was so called from its likeness to a honeycomb, Wabe, ultimately derived from the root wab-, to weave, the cells of the comb appearing to be woven together.

GOG (possibly connected with the Gentilic Gagaya, ” of the land of Gag,” used in Amarna Letters i. 38, as a synonym for ” barbarian,” or with Ass. Gagu, a ruler of the land of Sahi, N. of Assyria, or with Gyges, Ass. Gugu, a king of Lydia)ˆ a Hebrew name found in Ezek. xxxviii.-xxxix. and in Rev. xx., and denoting an antitheocratic power that is to manifest itself in the world immediately before the final dispensation. In the later passage, Gog and Magog are spoken of as co-ordinate; in the earlier, Gog is given as the name of the person or people and Magog as that of the land of origin. Magog is perhaps a contracted form of Mat-gog, mat being the common Assyrian word for ” land.” The passages are, however, intimately related

and both depend upon Gen. x. 2, though here Magog alone is mentioned. He is the second “son” of Japhet, and the order of the names here and in Ezekiel xxxviii. 2, indicates a locality between Cappadocia and Media, i.e. in Armenia. According to Josephus, who is followed by Jerome, the Scythians were primarily intended by this designation; and this plausible opinion has been generally followed. The name 2kii0cu, it is to be observed, however, is often but a vague word for any or all of the numerous and but partially known tribes of the north ; and any attempt to assign a more definite locality to Magog can only be very hesitatingly made. According to some, the Maiotes about the Palus Maeotis are meant; according to others, the Massagetae; according to Kiepert, the inhabitants of the northern and eastern parts of Armenia. The imagery employed in Ezekiel’s prophetic description was no doubt suggested by the Scythian invasion which about the time of Josiah, 630 B.C., had devastated Asia (Herodotus i. 104-106; Jer. iv. 3-vi. 30). Following on this description, Gog figures largely in Jewish and Mahommedan as well as in Christian eschatology. In the district of Astrakhan a legend is still to be met

with, to the effect that Gog and Magog were two great races, which Alexander the Great subdued and banished to the inmost recesses of the Caucasus, where they are meanwhile kept in by the terror of twelve trumpets blown by the winds, but whence they are destined ultimately to make their escape and destroy the world.

The legends that attach themselves to the gigantic effigies (dating from 1708 and replacing those destroyed in the Great Fire) of Gog and Magog in Guildhall, London, are connected only remotely, if at all, with the biblical notices. According to the Recuyell des histoires de Troye, Gog and Magog were the survivors of a race of giants descended from the thirty-three wicked daughters of Diocletian; after their brethren had been slain by Brute and his companions, Gog and Magog were brought to London (Troy-novant) and compelled to officiate as porters at the gate of the royal palace. It is known that effigies similar to the present existed in London as early as the time of Henry V. ; but when this legend began to attach to them is uncertain. They may be compared with the giant images formerly kept at Antwerp (Antigomes) and Douai (Gayant). According to Geoffrey of Monmouth (Chronicles, i. 16), Goemot or Goemagot (either corrupted from or corrupted into ” Gog and Magog “) was a giant who, along with his brother Corineus, tyrannized in the western horn of England until slain by foreign invaders.

GOGO, or Gogha, a town of British India in Ahmedabad district, Bombay, 193 m. N.W. of Bombay. Pop. (1901) 4798. About J m. east of the town is an excellent anchorage, in some measure sheltered by the island of Piram, which lies still farther east. The natives of this place are reckoned the best sailors in India; and ships touching here may procure water and supplies, or repair damages. The anchorage is a safe refuge during the south-west monsoon, the bottom being a bed of mud and the water always smooth. Gogo has lost its commercial importance and has steadily declined in population and trade since the time of the American Civil War, when it was an important cotton-mart.

GOGOL, NIKOLAI VASILIEVICH (1809-1852),. Russian novelist, was born in the province of Poltava, in South Russia, on the 31st of March 1809. Educated at the Niezhin gymnasium, he there started a manuscript periodical, ” The Star,” and wrote several pieces including a tragedy, The Brigands. Having completed his course at Niezhin, he went in 1829 to St Petersburg, where he tried the stage but failed. Next year he obtained a clerkship in the department of appanages, but he soon gave it up. In literature, however, he found his true vocation. In 1829 he published anonymously a poem called Italy, and, under the

pseudonym of V. Alof, an idyll, Hans Kuchel Garten, which he had written while still at Niezhin. The idyll was so ridiculed by a reviewer that its author bought up all the copies he could secure, and burnt them in a room which he hired for the purpose at an inn. Gogol then fell back upon South Russian popular literature, and especially the tales of Cossackdom on which his boyish fancy had been nursed, his father having occupied the

post of ” regimental secretary,” one of the honorary officials in the Zaporogian Cossack forces.

In 1830 he published in a periodical the first of the stories which appeared next year under the title of Evenings in a Farm near Dikanka: by Rudy Panko. This work, containing a series of attractive pictures of that Little-Russian life which lends itself to romance more readily than does the monotony of ” Great-Russian ” existence, immediately obtained a great success — its light and colour, its freshness and originality being hailed with enthusiasm by the principal writers of the day in Russia. Whereupon Gogol planned, not only a history of Little- Russia, but also one of the middle ages, to be completed in eight or nine volumes. This plan he did not carry out, though it led to his being appointed to a professorship in the university of St Petersburg, a post in which he met with small success and which he resigned in 1835. Meanwhile he had published his Arabesques, a collection of essays and stories; his Taras Bulba, the chief of the Cossack Tales translated into English by George Tolstoy; and a number of novelettes, which mark his transition from the romantic to the realistic school of fiction, such as the admirable sketch of the tranquil life led in a quiet country house by two kindly specimens of Old-world Gentlefolks, or the description of the petty miseries endured by an ill-paid clerk in a government office, the great object of whose life is to secure the ” cloak ” from which his story takes its name. To the same period belongs his celebrated comedy, the Revizor, or government inspector. His aim in writing it was to drag into light ” all that was bad in Russia,” and to hold it up to contempt. And he succeeded in rendering contemptible and ludicrous the official life of Russia, the corruption universally prevailing throughout the civil service, the alternate arrogance and servility of men in office. The plot of the comedy is very simple. A traveller who arrives with an empty purse at a provincial town is taken for an inspector whose arrival is awaited with fear, and he receives all the attentions and

bribes which are meant to pro- pitiate the dreaded investigator of abuses. The play appeared on the stage in the spring of 1836, and achieved a full success, in spite of the opposition attempted by the official classes whose malpractices it exposed. The aim which Gogol had in view when writing the Revizor he afterwards fully attained in his great novel, Mertvuiya Dushi, or Dead Souls, the first part of which appeared in 1842. The hero of the story is an adventurer who goes about Russia making fictitious purchases of ” dead souls,” i.e. of serfs who have died since the last census, with the view of pledging his imaginary property to the government. But his adventures are merely an excuse for drawing a series of -pictures, of an unfavourable kind, of Russian provincial life, and of introducing on the scene a number of types of Russian society. Of the force and truth with which these delineations are executed the universal consent of Russian critics in their favour may be taken as a measure. From the French version of the story a general idea of its merits may be formed, and some knowledge of its plot and its principal characters may be gathered from the English adaptation published in 1854, as an original work, under the title of Home Life in Russia. But no one can fully appreciate Gogol’s merits as a humorist who is not intimate with the language in which he wrote as well as with the society which he depicted.

In 1836 Gogol for the first time went abroad. Subsequently he spent a considerable amount of time out of Russia, chiefly in Italy, where much of his Dead Souls was written. His residence there, especially at Rome, made a deep impression on his mind, which, during his later years, turned towards mysticism. The last works which he published, his Confession and Corre- spondence with Friends, offer a painful contrast to the light, bright, vigorous, realistic, humorous writings which had gained and have retained for him his immense popularity in his native land. Asceticism and mystical exaltation had told upon his nervous system, and its feeble condition showed itself in his literary compositions. In 1848 he made a pilgrimage to Jerusalem, and on his return settled down at Moscow, where he died on the 3rd of March 1852.

See Materials for the Biography of Gogol (in Russian) (1897), by Shenrok; ” Illness and Death of Gogol,” by N. Bazhenov, Russkaya Muisl, January 1902. (W. R. S.-R.)

GOGRA, or Ghagra, a river of northern India. It is an important tributary of the Ganges, bringing down to the plains more water than the Ganges itself. It rises in Tibet near Lake Manasarowar, not far from the sources of the Brahmaputra and the Sutlej, passes through Nepal where it is known as the Kauriala, and after entering British territory

becomes the most important waterway in the United Provinces. It joins the Ganges at Chapra after a course of 600 m. Its tributary, the Rapti, also has considerable commercial importance. The Gogra has the alternative name of Sarju, and in its lower course is also known as the Deoha.

GOHIER, LOUIS JEROME (1746-1830), French politician, was born at Semblancay (Indre-et-Loire) on the 27th of February 1 746, the son of a notary. He was called to the bar at Rennes, and practised there until he was sent to represent the town in the states-general. In the Legislative Assembly he represented Ille-et-Vilaine. He took a prominent part in the deliberations; he protested against the exaction of a new oath from priests (Nov. 22, 1791), and demanded the sequestration of the emigrants' property (Feb. 7, 1792). He was minister of justice from March 1793 to April 1794, and in June 1799 he succeeded Treilhard in the Directory, where he represented the republican interest. His wife was intimate with Josephine Bonaparte, and when Bonaparte suddenly returned from Egypt in October 1799 he repeatedly protested his friendship for Gohier, who was then president of the Directory, and tried in vain to gain him over. After the coup d'Slat of the 18th Brumaire (Nov. 9, 1799), he refused to abdicate his functions, and sought out Bonaparte at the Tuileries " to save the republic," as he boldly expressed it. He was escorted to the Luxembourg, and on his release he retired to his estate at Eaubonne. In 1802 Napoleon made him consul-general at Amsterdam, and on the union of the Netherlands with France he was offered a similar post in the United States. His health did not permit of his taking up a new appointment, and he died at Eaubonne on the 29th of May 1830.

His MSmoires d'un vittran irriprochable ~de la Resolution was published in 1824, his report on the papers of the civil list preparatory to the trial of Louis XVI. is printed in Le Proces de Louis XVI (Paris, an III) and elsewhere, while others appear in the Moniteur.

GOHRDE, a forest of Germany, in the Prussian province of Hanover, immediately W. of the Elbe, between Wittenberg and Ltineburg. It has an area of about 85 sq. m. and is famous for its oaks, beeches and game preserves. It is memorable for the victory gained here, on the 16th of September 1813, by the allies, under Wallmoden, over the French forces commanded by Pecheur. The hunting-box situated in the forest was built in 1689 and was restored by Ernest Augustus, King of Hanover. It is known to history on account of the constitution of Gohrde, promulgated here in 17 19.

GOITO, a village of Lombardy , Italy, in the province of Mantua, from

which it is n m. N.W., on the road to Brescia. Pop. (village) 737; (commune) 5712. It is situated on the right bank of the Mincio near the bridge. Its position has given it a certain military importance in various campaigns and it has been repeatedly fortified as a bridge-head. The Piedmontese forces won two actions (8th of April and 30th of May 1848) over the Austrians here.

GOITRE (from Lat. guttur, the throat; synonyms, Bronchocele, Derbyshire Neck), a term applied to a swelling in the front of the neck caused by enlargement of the thyroid gland. This structure, which lies between the skin and the anterior surface of the wind- ■pipe, and in health is not large enough to give rise to any external prominence (except in the pictures of certain artists), is liable to variations in size, more especially in females, a temporary enlargement of the gland being not uncommon at the catamenial periods, as well as during pregnancy. In goitre the swelling is conspicuous and is not only unsightly but may occasion much discomfort from its pressure upon the windpipe and other important parts of the neck. J. L. Alibert recorded cases of

goitre where the tumour hung down over the breast, or reached as low as the middle of the thigh.

Goitre usually appears in early life, often from the eighth to the twelfth year; its growth is at first slow, but after several years of comparative quiescence a sudden increase is apt to occur. In the earlier stages the condition of the gland is simply an enlargement of its constituent parts, which retain their normal soft consistence ; but in the course of time other changes supervene, and it may become cystic, or acquire hardness from increase of fibrous tissue or from calcareous deposits. Occasionally the enlargement is uniform, but more commonly one of the lobes, generally the right, is the larger. In rare instances the disease is limited to the isthmus which connects the two lobes of the gland. The growth is unattended with pain, and is not inconsistent with good health. Goitre is a marked example of an endemic disease. There are few parts of the world where it is not found prevailing in certain localities, these being for the most part valleys and elevated plains in mountainous districts (see Cretinism) . The malady is generally ascribed to the use of drinking water impregnated with the salts of lime and magnesia, in which ingredients the water of goitrous districts abounds. But in localities not far

removed from those in which goitre prevails, and where the water is of the same chemical composition, the disease may be entirely unknown. The disease may be the result of a combination of causes, among which local telluric or malarial influences concur with those of the drinking water. Goitre is sometimes cured by removal of the individual from the district where it prevails, and it is apt to be acquired by previously healthy persons who settle in goitrous localities; and it is only in such places that the disease exhibits hereditary tendencies.

In the early stages, change of air, especially to the seaside, is desirable, and small doses of iron and of iodine should be given; if this fails small doses of thyroid extract should be tried. If palliative measures prove unsuccessful, operation must be under- taken for the removal of one lateral lobe and the isthmus of the tumour. This may be done under chloroform or after the sub- cutaneous injection of cocaine. If chloroform is used, it must be given very sparingly, as the breathing is apt to become seriously embarrassed during the operation. After the successful per- formance of the operation great improvement takes place, the remaining part of the gland slowly decreasing in size. The whole of the gland must not be removed during the operation, lest the strange disease known as Myxoedema should be produced (see Metabolic Diseases).

In exophthalmic goitre the bronchocele is but one of three phenomena, which together constitute the disease, viz. palpitation of the heart, elargement of the thyroid gland, and protrusion of the eyeballs. This group of symptoms is known by the name of ” Graves’s disease ” or ” Von Basedow’s disease ” — the physicians by whom the malady was originally described. Although occasionally observed in men, this affection occurs chiefly in females, and in comparatively early life. It is generally preceded by impoverishment of blood, and by nervous or hysterical disorders, and it is occasionally seen in cases of organic heart disease. It has been suddenly developed as the effect of fright or of violent emotion. The first symptom is usually the palpitation of the heart, which is aggravated by slight exertion, and may be so severe as not only to shake the whole frame but even to be audible at some distance. A throbbing is felt throughout the body, and many of the larger blood-vessels are, like the heart, seen to pulsate strongly. The enlargement of the thyroid is gradual, and rarely increases to any great size, thus differing from the commoner form of goitre. The enlarged gland is of soft consistence, and .communicates a thrill to the touch from its dilated and pulsating blood-vessels. Accompanying the goitre* a remarkable change is observed in the eyes, which attract attention by their prominence, and by the startled

expression thus given to the countenance. In extreme cases the eyes protrude from their sockets to such a degree that the eyelids cannot be closed, and injury may thus arise to the constantly exposed eyeballs. Apart from such risk, however, the vision is rarely affected. It occasion- ally happens that in undoubted cases of the disease one or other of

the three above-named phenomena is absent, generally either the goitre or the exophthalmos. The palpitation of the heart is the most constant symptom. Sleeplessness, irritability, disorders of digestion, diarrhoea and uterine derangements, are frequent accompaniments. It is a serious disease and, if unchecked, may end fatally. Some cases are improved by general hygienic measures, others by electric treatment, or by the administration of animal extracts or of sera. Some cases, on the other hand, may be considered suitable for operative treatment. (E. O.*)

GOKAK, a town of British India, in the Belgaum district of Bombay, 8 m. from a station on the Southern Mahratta railway. Pop. (1901) 9860. It contains old temples with inscriptions, and is known for a special industry of modelled toys. About 4 m. N.W. are the Gokak Falls, where the Ghatprabha throws itself over a precipice 170 ft. high. Close by, the water has been impounded for a large reservoir, which supplies not only irrigation but also motive power for a cotton-mill employing 2000 hands.

60KCHA, (Gok-Chai; Armenian Sevanga; ancient Haosra- vagha), the largest lake of Russian Transcaucasia, in the govern- ment of Erivan, in 40 9′ to 40 38′ N. and 45 1′ to 45° 40′ E. Its altitude is 6345 ft., it is of triangular shape, and measures from north-west to south-east 45 m., its greatest width being 25 m., and its maximum depth 67 fathoms. Its area is 540 sq. m. It is surrounded by barren mountains of volcanic origin, 12,000 ft. high. Its outflow is the Zanga, a left bank tributary of the Aras (Araxes) ; it never freezes, and its level undergoes periodical oscillations. It contains four species of Salmonidae, and two of Cyprinidae, which are only met with in the drainage area of this lake. A lava island in the middle is crowned by an Armenian monastery. \

GOLCONDA, a fortress and ruined city of India, in the Nizam's Dominions, 5 m. W. of Hyderabad city. In former times Golconda was the capital of a large and powerful kingdom of the Deccan, ruled by the Kutb Shahi dynasty which was founded in 1 51 2 by a Turkoman adventurer on the downfall of the Bahmani dynasty, but the city was subdued by Aurangzeb in 1687, and annexed to the Delhi empire. The

fortress of Golconda, situated on a rocky ridge of granite, is extensive, and contains many enclosures. It is strong and in good repair, but is com- manded by the summits of the enormous and massive mausolea of the ancient kings about 600 yds. distant. These buildings, which are now the chief characteristics of the place, form a vast group, situated in an arid, rocky desert. They have suffered considerably from the ravages of time, but more from the hand of man, and nothing but the great solidity of their walls has preserved them from utter ruin. These tombs were erected at a great expense, some of them being said to have cost as nmch as £150,000. Golconda fort is now used as the Nizam's treasury, and also as the state prison. Golconda has given its name in English literature to the diamonds which were found in other parts of the dominions of the Kutb Shahi dynasty, not near Golconda itself.

GOLD [symbol Au, atomic weight 1 95-7 (H = 1), 197- 2(0 = 16)], a metallic chemical element, valued from the earliest ages on account of the permanency of its colour and lustre. Gold ornaments of great variety and elaborate workmanship have been discovered on sites belonging to the earliest known civiliza- tions, Minoan, Egyptian, Assyrian, Etruscan (see Jewelry, Plate, Egypt, Crete, Aegean Civilization, Numismatics), and in ancient literature gold is the universal symbol of the highest purity and value (cf. passages in the Old Testament, e.g. Ps. xix. 10 " More to be desired are they than gold, yea, than much fine gold "). With regard to the history of the metallurgy of gold, it may be mentioned that, according to Pliny, mercury was employed in his time both as a means of separating the precious metals and for the purposes of gilding. Vitruvius also gives a detailed account of the means of recovering gold, by amalgamation, from cloth into which it had been woven.

Physical Properties. — Gold has a characteristic yellow colour, which is, however, notably affected by small quantities of other metals; thus the tint is sensibly lowered by small quantities of silver, and heightened by copper. When the gold is finely

divided, as in " purple of Cassius," or when it is precipitated from solutions, the colour is ruby-red, while in very thin leaves it transmits a greenish light. It is nearly as soft as lead and softer than silver. When pure, it is the most malleable of all metals (see Goldbeating). It is also extremely ductile; a single grain may be drawn into a wire 500

ft. in length, and an ounce of gold covering a silver wire is capable of being extended more than 1300 m. The presence of minute quantities of cadmium, lead, bismuth, antimony, arsenic, tin, tellurium and zinc renders gold brittle, -j-oVffth part of one of the three metals first named being sufficient to produce that quality. Gold can be readily welded cold; the finely divided metal, in the state in which it is precipitated from solution, may be compressed between dies into disks or medals. The specific gravity of gold obtained by precipitation from solution by ferrous sulphate is from 19-55 to 20-72. The specific gravity of cast gold varies from 18-29 to 19-37, and by compression between dies the specific gravity may be raised from 19-37 to 19-41; by annealing, however, the previous density is to some extent recovered, as it is then found to be 19-40. The melting-point has been variously given, the early values ranging from 1425° C. to 1035° C. Using improved methods, C. T. Heycock and F. H. Neville determined it to be 1061-7° C.; Daniel Berthelot gives 1064° C, while Jaquerod and Perrot give 1066-1-1067-4° C. At still higher temperatures it volatilizes, forming a reddish vapour. Macquer and Lavoisier showed that when gold is strongly heated, fumes arise which gild a piece ef silver held in them. Its vola- tility has also been studied by L. Eisner, and, in the presence of other metals, by Napier and others. The volatility is barely appreciable at 1075°; at 1250° it is four times as much as at 1100°. Copper and zinc increase the volatility far more than lead, while the greatest volatility is induced, according to T. Kirke Rose, by tellurium. It has also been shown that gold volatilizes when a gold-amalgam is distilled. Gold is dissipated by sending a powerful charge of electricity through it when in the form of leaf or thin wire. The electric conductivity is given by A. Matthiessen as 73 at 0° C, pure silver being 100; the value of this coefficient depends greatly on the purity of the metal, the presence of a few thousandths of silver lowering it by 10%. Its conductivity for heat has been variously given as 103 (C. M. Despretz), 98 (F. Crace-Calvert and R. Johnson), and 60 (G. H. Wiedemann and R. Franz), pure silver being 100. Its specific heat is between 0-0298 (Dulong and Petit) and 0-03244 (Reg- nault). Its coefficient of expansion for each degree between o° and ioo° C. is 0-000014661, or for gold which has been annealed 0-000015136 (Laplace and Lavoisier). The spark spectrum of gold has been mapped by A. Kirchhoff, R. Thalen, Sir William Huggins and H. Kriiss; the brightest lines are 6277, 5960, 5955 and 5836 in the orange and yellow, and 5230 and 4792 in the green and blue.

Chemical Properties. — Gold is permanent in both dry and moist air at ordinary or high temperatures. It is insoluble in hydrochloric, nitric and sulphuric acids, but dissolves in aqua regia — a mixture of

hydrochloric and nitric acids — and when very finely divided in a heated mixture of strong sulphuric acid and a little nitric acid; dilution with water, however, precipitates the metal as a violet or brown powder from this solution. The metal is soluble in solutions of chlorine, bromine, thiosulphates and cyanides; and also in solutions which generate chlorine, such as mixtures of hydrochloric acid with nitric acid, chromic acid, antimonious acid, peroxides and nitrates, and of nitric acid with a chloride. Gold is also attacked when strong sulphuric acid is submitted to electrolysis with a gold positive pole. W. Skey showed that in substances which contain small quantities of gold the precious metal may be > removed by the solvent action of iodine or bromine in water. Filter paper soaked with the clear, solution is burnt, and the presence of gold is indicated by the purple colour of the ash". In solution minute quantities of gold may be detected by the formation of " purple of Cassius," a bluish-purple precipitate thrown down by a mixture of ferric and stannous chlorides. The atomic weight of gold was first determined with accuracy

mi. 7

by Berzeliiis, who deduced the value 195-7 (H = i) from the amount of mercury necessary to precipitate it from the chloride, and 195-2 from the ratio between gold and potassium chloride in potassium aurichloride, $KAuCl_4$. Later determinations were made by Sir T. E. Thorpe and A. P. Laurie, Kriiss and J. W. Mallet. Thorpe and Laurie converted potassium auri- bromide into a mixture of metallic gold and potassium bromide by careful heating. The relation of the gold to the potassium bromide, as well as the amounts of silver and silver bromide which are equivalent to the potassium bromide, were determined. The mean value thus adduced was 195-86. Kriiss worked with the same salt, and obtained the value 195-65; while Mallet, by analyses of gold chloride and bromide, and potassium auri- bromide, obtained the value 195-77.

Occlusion of Gas by Gold. — T. Graham showed that gold is capable of occluding by volume 0-48% of hydrogen, 0-20% of nitrogen, 0-29% of carbon monoxide, and 0-16% of carbon dioxide. Varrentrapp pointed out that " cornets " from the assay of gold may retain gas if they are not strongly heated.

Occurrence and Distribution. — Gold is found in nature chiefly in the metallic state, i.e. as " native gold," and less frequently in combination with tellurium, lead and silver. These are the only certain examples of natural combinations of the metal, the minute, though economically valuable, quantity often found in pyrites and other sulphides being

probably only present in mechanical suspension. The native metal crystallizes in the cubic system, the octahedron being the commonest form, but other and complex combinations have been observed. Owing to the softness of the metal, large crystals are rarely well defined, the points being commonly rounded. In the irregular crystalline aggregates branching and moss-like forms are most common, and in Transylvania thin plates or sheets with diagonal structures are found. More characteristic, however, than the crystallized are the irregular forms,which, when large, are known as “nuggets” or ” pepites,” and when in pieces below \ to \ oz. weight as gold dust, the larger sizes being distinguished as coarse or nuggety gold, and the smaller as gold dust proper. Except in the larger nuggets, which may be more or less angular, or at times even masses of crystals, with or without associated quartz or other rock, gold is generally found bean-shaped or in some other flattened form, the smallest particles being scales of scarcely appreciable thickness, which, from their small bulk as compared with their surface, subside very slowly when suspended in water, and are therefore readily carried away by a rapid current. These form the ” float gold ” of the miner. The physical properties of native gold are generally similar to that of the melted metal.

Of the minerals containing gold the most important are sylvanite or graphic tellurium (Ag, Au) Te 2 , with 24 to 26%; calaverite, AuTe 2 , with 42%; nagyagite or foliate tellurium (Pb, Au) u Sbs(S, Te) 2 4, with 5 to 9% of gold; petzite, (Ag, Au) 2 Te, and white tellurium. These are confined to a few localities, the oldest and best known being those of Nagyag and Offenbanya in Transylvania ; they have also been found at Red Cloud, Colorado, in Calaveras county, Cali- fornia, and at Perth and Boulder, West Australia. The minerals of the second class, usually spoken of as ” auriferous,” are compara- tively numerous. Prominent among these are galena and iron pyrites, the former being almost invariably gold-bearing. Iron pyrites, however, is of greater practical importance, being in some districts exceedingly rich, and, next to the native metal, is the most prolific source of gold. Magnetic pyrites, copper pyrites, zinc blende and arsenical pyrites are other and less important examples, the last constituting the gold ore formerly worked in Silesia. A native gold amalgam is found as a rarity in California, and bismuth from South America is sometimes rich in gold. Native arsenic and antimony are also very frequently found to contain gold and silver.

The association and distribution of gold may be considered under two different heads, namely, as it occurs in mineral veins—” reef gold,” and in alluvial or other superficial deposits which are derived from

the waste of the former — ” alluvial gold.” Four distinct types of reef gold deposits may be distinguished: (1) Gold may occur disseminated through metalliferous veins, generally with sulphides and more particularly with pyrites. These deposits seem to be the primary sources of native gold. (2) More common are the auriferous quartz-reefs — veins or masses of quartz containing gold in flakes visible to the naked eye, or so finely divided as to be invisible. (3) The ” banket ” formation, which characterizes the goldfields of South Africa, consists of a quartzite conglomerate throughout which gold is very finely disseminated. (4) T he sil-ceous sinter at

Mount Morgan, Queensland, which is obviously associated with hydrothermal action, is also gold-bearing. The genesis of the last three types of deposit is generally assigned to the simultaneous percolation of solutions of gold and silica, the auriferous solution being formed during the disintegration of the gold-bearing metalli- ferous veins. But there is much uncertainty as to the mechanism of the process; some authors hold that the soluble chloride is first formed, while others postulate the intervention of a soluble aurate.

In the alluvial deposits the associated minerals are chiefly those of great density and hardness, such as platinum, osmiridium and other metals of the platinum group, tinstone, chromic, magnetic and brown iron ores, diamond, ruby and sapphire, zircon, topaz, garnet, &c. which represent the more durable original constituents of the rocks whose distintegration has furnished the detritus.

Statistics of Gold Production. — The supply of gold, and also its relation to the supply of silver, has, among civilized nations, always been of paramount importance in the economic questions concerning money (see Money and Bimetallism) ; in this article a summary of the modern gold-producing areas will be given, and for further details reference should be made to the articles on the localities named. The chief sources of the European supply during the middle ages were the mines of Saxony and Austria, while Spain also contributed. The supplies from Mexico and Brazil were important during the 16th and 17th centuries. Russia became prominent in 1823, and for fourteen years contributed the bulk of the supply. The United States (California) after 1848, and Australia after 1851, -yvere responsible for enormous increases in the total production, which has been subsequently enhanced by discoveries in Canada, South Africa, India,

China and other countries.

The average annual world's production for certain periods from 1801 to 1880 in ounces is given in Table I. The average Table I.

Period.

Oz.

Period.

Oz.

1801-1810

590.750

1 856-1 860

6,350,180

1811-1820

380,300

1861-1865

5,951,770

1821-1830

472,400

1866-1870

6,169,660

1 831-1840

674,200

1871-1875

5,487,400

1841-1850

1,819,600

1876-1880

5,729,300

1851-1855

6,35°. 1 80

—

—

production of the five years 1881-1885 was the smallest since the Australian and Californian mines began to be worked in 1848- 1849; tne minimum 4,614,588 oz., occurred in 1882. It was not until after 1885 that the annual output of the world began to expand. Of the total production in 1876, 5,016,488 oz., almost the whole was derived from the United States, Australasia and Russia. Since then the proportion furnished by these countries has been greatly lowered by the supplies from South Africa, Canada, India and China. The increase of production has not been uniform, the greater part having occurred most notably since 1895. Among the regions not previously important as gold-producers which now contribute to the annual output, the most remarkable are the goldfields of South Africa (Transvaal and Rhodesia, the former of which were discovered in 1885). India likewise has been added to the list, its active production having begun at about the same time as that of South Africa. The average annual product of India for the period 1886 to 1899 inclusive was £698,208, and its present annual product averages about 550,000 oz., or about £2,200,000, obtained almost wholly from the free-milling quartz veins of the Colar goldfields in Mysore, southern India. In 1900 the output was valued at £1,891,804, in 1905 at £2,450,536, and in 1908 at £2,270,000. Canada, too, assumed an important rank, having contributed in 1900 £5,583,300; but the output has since steadily declined to £1,973,000 in 1908. The great increase during the few years preceding 1899 was due to the development of the goldfields of the North-Western Territory, especially British Columbia.' From the district of Yukon (Klondike, &c.) £2,800,000 was ■ obtained in 1899, wholly from alluvial workings, but the progress made since has been slower than was expected by sanguine people. It is, however, probable that the North-Western Territory will continue to yield gold in important quantities for some time to come.

The output of the United States increased from £7,050,000

in 1881 to £16,085,567 in 1900, £17,916,000 in 1905, and to

£20,065,000 in 1908. This increase was chiefly due to the exploitation of new goldfields. The fall in the price of silver stimulated the discovery and development of gold deposits, and many states formerly regarded as characteristically silver districts have become important as gold producers. Colorado is a case in point, its output having increased from about £600,000 in 1880 to £6,065,000 in 1900; it was £5,139,800 in 1905. Some- what more than one-half of the Colorado gold is obtained from the Cripple Creek district. Other states also showed a largely augmented product. On the other hand, the output of California, which was producing over £3,000,000 per annum in 1876, has fallen off, the average annual output from 1876 to 1900 being £2,800,000; in 1905 the yield was £3,839,000. This decrease was largely caused by the practical suspension for many years of the hydraulic mining operations, in preparation for which millions of dollars had been expended in deep tunnels, flumes, &c, and the active continuance of which might have been expected to yield some £2,000,000 of gold annually. This inter- ruption, due to the practical prohibition of the industry by the United States courts, on the ground that it was injuring, through the deposit of tailings, agricultural lands and navigable streams, was lessened, though not entirely removed, by compromises and regulations which permit, under certain restrictions, the renewed exploitation of the ancient river-beds by the hydraulic method. On the other hand, the progressive reduction of mining and metallurgical costs effected by improved transportation and machinery, and the use of high explosives, compressed air, electric-power transmission, &c, resulted in California (as elsewhere) in a notable revival of deep mining. This was especially the case on the " Mother Lode," where highly promising results were obtained. Not only is vein-material formerly regarded as unremunerative now extracted at a profit, but in many instances increased gold-values have been encountered below zones of relative barrenness, and operators have been encouraged to make costly preparations for really deep mining — more than 3000 ft. below the surface. The gold product of California, therefore, may be fairly expected to maintain itself, and, indeed, to show an advance. Alaska appeared in the list of gold-producing countries in 1886, and gradually increased its annual output until 1897, when the country attracted much atten- tion with a production valued at over £500,000; the opening up of new workings has increased this figure immensely, from about £1,400,000 in 1901 to £3,006,500 in 1905. The Alaska gold was derived almost wholly from the large low-grade quartz mines of Douglas Island prior to 1899, but in that year an important district was discovered at Cape Nome, on the north-western coast. The result of a few months' working during that year was more than £500,000 of gold, and a very

much larger annual output may reasonably be anticipated in the future; in 1905 it was about £900,000. The gold occurs in alluvial deposits designated as gulch-, bar-, beach-, tundra- and bench-placers. The tundra is a coastal plain, swampy and covered with under- growth and underlaid by gravel. The most interesting and, thus far, the most productive are the beach deposits, similar to those on the coast of Northern California. These occur in a strip of comparatively fine gravel and sand, 150 yds. wide, extending along the shore. The gold is found in stratified layers, with ” ruby ” and black sand. The ” ruby ” sand consists chiefly of fine garnets and magnetites, with a few rose-quartz grains. Further exploration of the interior will probably result in the discovery of additional gold districts.

Mexico, from a gold production of £200,000 in 1891, advanced to about £1,881,800 in 1900 and to about £3,221,000 in 1905. Of this increase, a considerable part was derived from gold-quartz mining, though much was also obtained as a by-product in the working of the ores of other metals. The product of Colombia, Venezuela, the Guianas, Brazil, Uruguay, Argentina, Chile, Bolivia, Peru and Ecuador amounted in 1900 to £2,481,000 and to £2,046,000 in 1905.

In 1876 Australasia produced £7,364,000, of which Victoria contributed £3,984,000. The annual output of Victoria declined

until the year 1892, when it began to increase rapidly, but not to its former level, the values for 1900 and 1905 being £3,142,000 and £3,138,000. There has been an important increase in Queensland, which advanced from £1,696,000 in 1876 to £2,843,000 in 1900, and subsequently declined to £2,489,000 in 1905. There has been no increase, and, indeed, no large fluctuation until quite recently in the output of New Zealand, which averaged £1,054,000 per annum from 1876 to 1898, but the production of the two years 1900 and igosrose to £1,425,459 and £2,070,407 respectively. By far the most important addition to the Australasian product has come fromWest Australia, which began its production in 1887 — • about the time of the inception of mining at Witwaters- rand (“the Rand”) in South Africa — and by continuous in- crease, which assumed large proportions towards the close of the 1 9th century, was £6,426,000 in 1899, £6,1 79,000 in 1900, and £8,212,000 in 1905. The total Australasian production in 1908 was valued at £14,708,000.

Undoubtedly the greatest of the gold discoveries made in the latter half of the 19th century was that of the Witwatersrand district in the Transvaal. By reason of its unusual geological character and great economic importance this district deserves a more extended description. The gold occurs in conglomerate beds, locally known as "banket." There are several series of parallel beds, interstratified with quartzite and schist, the most important being the "main reef" series. The gold in this con- glomerate reef is partly of detrital origin and partly of the genetic character of ordinary vein-gold. The formation is noted for its regularity as regards both the thickness and the gold-tenor of the ore-bearing reefs, in which respect it is unparalleled in the geology of the auriferous formations. The gold carries, on an average, £2 per ton, and is worked by ordinary methods of gold- mining, stamp-milling and cyaniding. In 1899, 5762 stamps were in operation, crushing 7,331,446 tons of ore, and yielding £15,134,000, equivalent to 25-5% of the world's production. Of this, 80% came from within 12 m. of Johannesburg. After September 1899 operations were suspended, almost entirely owing to the Boer War, but on the 2nd of May 1901 they were started again. In 1905 the yield was valued at £20,802,074, and in 1909 at £30,925,788. So certain is the ore-bearing formation that engineers in estimating its auriferous contents feel justified in assuming, as a factor in their calculations, a vertical extension limited only by the lowest depths at which mining is feasible. On such a basis they arrived at more than £600,000,000 as the available gold contained in the Witwaters- rand conglomerates. This was a conservative estimate, and was made before the full extent of the reefs was known; in 1904 Lionel Phillips stated that the main reef series had been proved for 61 m., and he estimated the gold remaining to be mined to be worth £2,500,000,000. Deposits similar to the Witwatersrand banket occur in Zululand, and also on the Gold Coast of Africa. In Rhodesia, the country lying north of the Transvaal, where gold occurs in well-defined quartz- veins, there is unquestionable evidence of extensive ancient workings. The economic importance of the region generally has been fully proved. Rhodesia produced £386,148 in 1900 and £722,656 in 1901, in spite of the South African War; the product for 1905 was valued at £1,480,449, and for 1908 at £2ˆ526,000.

The gold production of Russia has been remarkably constant, averaging £4,899,262 per annum; the gold is derived chiefly from placer workings in Siberia.

The gold production of China was estimated for 1899 at £1,328,238 and for 1900 at £860,000; it increased in 1901 to about £1,700,000, to fall to £340,000 in 1905; in 1906 and 1907 it recovered to about

£1,000,000.

Table II. — Gold Production

of Certain

Countries,

i88i-igo8 {in oz.).

Year.

Australasia.

Africa.

Canada.

India.

Mexico.

Russia.

United States.

Totals.

1881

i,475-i6i

52,483

41,545

1,181,853

1,678,612

4,976,980

1882

1,438,067

52,000

45,289

1,154,613

1,572,187

4,825,794

1883

1,333,849

46,150

46,229

1,132,219

1,451,250

4,614,588

1884

1,352,761

46,000

57,227

1,055,642

1,489,950

4,902,889

1885

1,309,804

53,987

46,941

1,225,738

1,538,325

5,002,584

1886

1,257,670

66,061

29,702

922,226

1,693,125

5,044,363

1887

1,290,202

28,754

59,884

15,403

39,86i

971,656

1,596,375

5,061,490

1888

1,344,002

240,266

53,150

35,034

47,U7

1,030,151

1,604,841

5,175,623

1889

1,540,607

366,023

62,658

78,649

33,862

1,154,076

1,587,000

5,611,245

1890

1,453,172

497,8i7

55,625

107,273

37,104

1,134,590

1,588,880

5,726,966

1891

1,518,690

729,268

45.022

I3L776

48,375

1,168,764

1,604,840

6,287,591

1892

1,638,238

1,210,869

43.905

164,141

54,625

1,199,809

1,597,098

7,102,172

1893

1,711,892

1,478,477

44-853

207,152

63,H4

1,345,224

1,739,323

7,772,585

1894

2,020,180

2,024,164

50,4H

210,412

217,688

i,i67,455

1,910,813

8,813,848

1895

2,170,505

2,277,640

92,440

257,830

290,250

1,397,767

2,254,760

9,814,505

1896

2,185,872

2,280,892

136,274

323,501

314,437

1,041,794

2,568,132

9,950,861

1897

2,547,704

2,832,776

294,582

350,585

362,812

1,124,511

2,774,935

11,420,068

1898

3,137,644

3,876,216

669,445

376,431

411,187

1,231,791

3,n8,398

13,877,806

1899

3,837,i8i

3,532,488

1,031,563

-418,869

411,187

1,072,333

3,437,210

14,837,775

1900

3,555,506

419,503

1,348,720

456,444

435,375

974,537

3,829,897

12,315,135

1901

3,719,080

439,704

1,167,216

454,527

497,527

1,105,412

3,805,500

12,698,089

1902

3,946,374

1,887,773

1.003,355

463,824

49i,i56

1,090,053

3,870,000

14,313,660

1903

4,315,538

3,289,409

911,118

552,873

516,524

1,191,582

3,560,000

15,852,620

1904

4,245,744

4,156,084

793.350

556,097

609,781

1. 199.857

3,892,480

16,790,351

1905

4,159,220

5,477,841

700,863

576,889

779,181

1,063,883

4,265,742

18,360,945

1906

3,984,538

6,449,749

581,709

525,527

896,615

1,087,056

4,565,333

19,620,272

1907

3-659,693

7,270,464

399,844

495,965

903,672

1,282,635

4,374,827

19,988,144

1908

3,557,705

7,983,348

462,467

504,309

1,182,445

i,497,o76 | 4.659.360

21,529,300

Alloys. — Gold forms alloys with most metals, and of these many are of great importance in the arts. The alloy with mercury — gold amalgam — is so readily formed that mercury is one of the most powerful agents for extracting the precious metal. With 10% of gold present the amalgam is fluid, and with 12-5 % pasty, while with 13 % it consists of yellowish-white crystals. Gold readily alloys with silver

and copper to form substances in use from remote times for money, jewelry and plate. Other metals which find application in the metallurgy of gold by virtue of their property of extracting the gold as an alloy are lead, which combines very readily when molten, and which can afterwards be separated by cupellation, and copper, which is separated from the gold by solution in acids or by electro- lysis; molten lead also extracts gold from the copper-gold alloys. The relative amount of gold in an alloy is expressed in two ways :

(1) as ” fineness,” i.e. the amount of gold in 1000 parts of alloy;

(2) as ” carats,” i.e. the amount of gold in 24 parts of alloy. Thus, pure gold is 1000 ” fine ” or 24 carat. In England the following standards are used for plate and jewelry: 375, 500, 625, 750 and 916-6, corresponding to 9, 12, 15, 18 and 22 carats, the alloying metals being silver and copper in varying proportions. In France three alloys of the following standards are used for jewelry, 920, 840 and 750. A greenish alloy used by goldsmiths contains 70 % of silver and 30% of gold. ” Blue gold ” is stated to contain 75% of gold and 25 % of iron. The Japanese use for ornament an alloy of gold and silver, the standard of which varies from 550 to 500, the colour of the precious metal being developed by ” pickling “in a mixture of plum-juice, vinegar and copper sulphate. They may be said to possess a series of bronzes, in which gold and silver replace tin and zinc, all these alloys being characterized by patina having a wonderful range of tint. The common alloy, Shi-ya-ku-Do, con- tains 70% of copper and 30% of gold; when exposed to air it becomes coated with a fine black patina, and is much used in Japan for sword ornaments. Gold wire may be drawn of any quality, but it is usual to add 5 to 9 dwts. of copper to the pound. The ” solders ” used for red gold contain I part of copper and 5 of gold; for light gold, 1 part of copper, I of silver and 4 of gold.

Gold and Silver. — Electrum is a natural alloy of gold and silver. Matthiessen observed that the density of alloys, the composition of which varies from AuAg 6 to Au 6 Ag, is greater than that calculated from the densities of the constituent metals. These alloys are harder, more fusible and more sonorous than pure gold. The alloys of the formulae AuAg, AuAg 2 , AuAg 4 and AuAg 2 o are perfectly homogeneous, and have been studied by Levol. Molten alloys con- taining more than 80 % of silver deposit on cooling the alloy AuAg 9 , little gold remaining in the mother liquor.

Gold and Zinc. — When present in small quantities zinc renders gold

brittle, bsst it may be added to gold in larger quantities without defraying the ductility of the precious metal ; Pehgot proved that a triple alloy of gold, copper and zinc, which contains 5-8 % of the last-named, is perfectly ductile. The alloy of 11 parts gold and 1 part of zinc is, however, stated to be brittle.

Gold and Jin. — Alchorne showed that gold alloyed with jVth part of tin is sufficiently ductile to be rolled and stamped into coin, pro- vided the metal is not annealed at a high temperature. The alloys of tin and gold are hard and brittle, and the combination of the metals is attended with contraction; thus the alloy SnAu has a density 14-243, instead of 14-828 indicated by calculation. Matthiessen and Bose obtained large crystals of the alloy AˆSns, having the colour of tin, which changed to a bronze tint by oxidation.

Gold and Iron. — Hatchett found that the alloy of 11 parts gold and 1 part of iron is easily rolled without annealing. In these pro- portions the density of the alloy is less than the mean of its con- stituent metals.

Gold and Palladium. — These metals are stated to alloy in all pro- portions. According to Chenevix, the alloy composed of equal parts of the two metals is grey, is less ductile than its constituent metals and has the specific gravity 1 1 -08. The alloy of 4 parts of gold and 1 part of palladium is white, hard and ductile. Graham showed that a wire of palladium alloyed with from 24 to 25 parts of gold does not exhibit the remarkable retraction which, in pure palladium, attends its loss of occluded hydrogen.

Gold and Platinum. — Clarke states that the alloy of equal parts of the two metals is ductile, and has almost the colour of gold.

Gold and Rhodium. — Gold alloyed with jth or \th of rhodium is, according to Wollaston,very ductile,inf usible and of the colour of gold. Gold and Iridium. — Small quantities of iridium do not destroy the ductility of gold, but this is probably because the metal is only dis- seminated through the mass, and not alloyed, as it falls to the bottom of the crucible in which the gold is fused.

Gold and Nickel. — Eleven parts of gold and I of nickel yield an alloy resembling brass.

Gold and Cobalt. — Eleven parts of gold and 1 of cobalt form a brittle alloy of a dull yellow colour.

Compounds. — Aureus oxide, Au 2 0, is obtained by cautiously adding potash to a solution of aurous bromide, or by boiling mixed solutions of auric chloride and mercurous nitrate. It forms a dark-violet precipitate which dries to a greyish-violet powder. When freshly prepared it dissolves in cold water to form an indigo- coloured solution with a brownish fluorescence of colloidal aurous oxide; it is insoluble in hot water. This oxide is slightly basic. Auric oxide, Au 2 3 , is a brown powder, decomposed into its elements when heated to about 250° or on exposure to light. When a con- centrated solution of auric chloride is treated with caustic potash, a brown precipitate of auric hydrate, Au(OH)3, is obtained, which, on heating, loses water to form auryl hydrate, AuO(OH), and auric oxide, AU2O3. It functions chiefly as an acidic oxide, being less basic than aluminium oxide, and forming no stable oxy-salts. It dissolves in alkalis to form well-defined crystalline salts ; potassium aurate, KAu0 2 3H 2 0, is very soluble in water, and is used in electro gilding. With concentrated ammonia auric oxide forms a black, highly explosive compound of the composition AuN 2 H 3 -3H 2 0, named ” fulminating gold “; this substance is generally considered to be Au(NH 2)NH-3H 2 0, but it may be an ammine of the formula [Au(NH 3) 2 (0H) 2]0H. Other oxides, e.g. Au 2 2 , have been„described. Aurous chloride, AuCl, is obtained as a lemon-yellow, amorphous powder, insoluble in water, by heating auric chloride to 185 . It begins to decompose into gold and chlorine at 185°, the decomposition being complete at 230 ; water decomposes it into gold and auric chloride. Auric chloride, or gold trichloride, AuCl 3 , is a dark ruby- red or reddish-brown, crystalline, deliquescent powder obtained by dissolving the metal in aqua regia. It is also obtained by carefully evaporating a solution of the metal in chlorine water. The gold chloride of commerce, which is used in photography, is really a hydrochloride, chlorauric or aurichloric acid, HAuCl 4 3H 2 0, and is obtained in long yellow needles by crystallizing the acid solution. Corresponding to this acid, a series of salts, named chloraurates or aurichlorides, are known. The potassium salt is obtained by crys tallizing equivalent quantities of potassium and auric chlorides. Light-yellow monoclinic needles of 2KAuCU-H 2 are deposited from warm, strongly acid solutions, and transparent rhombic tables of KAu0 4 -2H 2 from neutral solutions. By crystallizing an aqueous solution, red crystals of AuCl 3 -2H 2 are obtained. Auric chloride combines with the hydrochlorides of many organic bases — amines, alkaloids, &c. — to form characteristic compounds. Gold dichloride, probably Au 2 Cl 4 , =Au.AuCL, aurous chloraurate, is said to be obtained as a dark-red mass by heating finely divided gold to 140 °- 1 70 in chlorine. Water decomposes it into gold and auric chloride. The bromides and iodides resemble the chlorides.

Aurous bromide, AuBr, is a yellowish-green powder obtained by heating the tri- bromide to 140 ; auric bromide, AuBr 3 , forms reddish-black or scarlet-red leafy crystals, which dissolve in water to form a reddish- brown solution , and combines with bromides to form bromaurates corre- sponding to the chloraurates. Aurous iodide, AuI, is a light-yellow, sparingly soluble powder obtained, together with free iodine, by adding potassium iodide to auric chloride; auric iodide, AuI 3 , is formed as a dark-green powder at the same time, but it readily

decomposes to aurous iodide and iodine. Aurous iodide is also obtained as a green solid by acting upon gold with iodine. The iodaurates correspond to the chlor- and bromaurates ; the potassium salt, KAuIi, forms highly lustrous, intensely black, four-sided prisms.

Aurous cyanide, AuCN, forms yellow, microscopic, hexagonal tables, insoluble in water, and is obtained by the addition of hydro- chloric acid to a solution of potassium aurocyanide, KAu(CN) 2 . This salt is prepared by precipitating a solution of gold in aqua regia by ammonia, and then introducing the well-washed precipitate into a boiling solution of potassium cyanide. The solution is filtered and allowed to cool, when colourless rhombic pyramids of the aurocyanide separate. It is also obtained in the action of potassium cyanide on gold in the presence of air, a reaction utilized in the MacArthur-Forrest process of gold extraction (see below). Auric cyanide, Au(CN) 3 , is not certainly known; its double salts, how- ever, have been frequently described. Potassium auricyanide, 2KAu(CN)4-3H 2 0, is obtained as large, colourless, efflorescent tablets by crystallizing concentrated solutions of auric chloride and potassium cyanide. Theacid,auricyanicacid,2HAu(CN)4-3H 2 0, is obtained by treating the silver salt (obtained by precipitating the potassium salt with silver nitrate) with hydrochloric acid; it forms tabular crystals, readily soluble in water, alcohol and ether.

Gold forms three sulphides corresponding to the oxides; they readily decompose on heating. Aurous sulphide, Au 2 S, is a brownish- black powder formed by passing sulphuretted hydrogen into a solution of potassium aurocyanide and then acidifying. Sodium aurosulphide, NaAuS-4H 2 0, is prepared by fusing gold with sodium sulphide and sulphur, the melt being extracted with water, filtered in an atmosphere of nitrogen, and evaporated in a vacuum over sulphuric acid. It forms colourless, monoclinic prisms, which turn brown on exposure to air. This method of bringing gold into solution is mentioned by Stahl in his Observationes Chymico- Physico-Medicae; he there remarks that Moses probably destroyed the golden calf by

burning it with sulphur and alkali (Ex. xxxii. 20). Auric sulphide, Au_2S_3, is an amorphous powder formed when lithium aurichloride is treated with dry sulphuretted hydrogen at — 10°. It is very unstable, decomposing into gold and sulphur at 200 °.

Oxy-salts of gold are almost unknown, but the sulphite and thio-sulphate form double salts. Thus by adding acid sodium sulphite to, or by passing sulphur dioxide at 50 into, a solution of sodium aurate, the salt, $3Na_2SO_3 \cdot Au_2SO_3 \cdot 3H_2$ is obtained, which, when precipitated from its aqueous solution by alcohol, forms a purple powder, appearing yellow or green by reflected light. Sodium aurothiosulphate, $3Na_2S_2O_3 \cdot Au_2S_2O_3 \cdot 4H_2O$, forms colourless needles; it is obtained in the direct action of sodium thiosulphateongoldinthe presence of an oxidizing agent, or by the addition of a dilute solution of auric chloride to a sodium thiosulphate solution.

Mining and Metallurgy.

The various deposits of gold may be divided into two classes — “veins “and “placers.” The vein mining of gold does not greatly differ from that of similar deposits of metals (see Mineral Deposits). In the placer or alluvial deposits, the precious metal is found usually in a water-worn condition imbedded in earthy matter, and the method of working all such deposits is based on the disintegration of the earthy matter by the action of a stream of water, which washes away the lighter portions and leaves the denser gold. In alluvial deposits the richest ground is usually found in contact with the “bed rock”; and, when the overlying cover of gravel is very thick, or, as sometimes happens, when the older gravel is covered with a flow of basalt, regular mining by shafts and levels, as in what are known as tunnel-claims, may be required to reach the auriferous ground.

The extraction of gold may be effected by several methods; we may distinguish the following leading types:

1. By simple washing, i.e. dressing aurif eroussands,gravels,&c. ;

2. By amalgamation, i.e. forming a gold amalgam, afterwards removing the mercury by distillation;

3. By chlorination, i.e. forming the soluble gold chloride and then precipitating the metal;

4. By the cyanide process, i.e. dissolving the gold in potassium cyanide solution, and then precipitating the metal;

5. Electrolytically, generally applied to the solutions obtained , in processes (3) and (4).

I. Extraction of Gold by Washing. — In the early days of gold- washing in California and Australia, when rich alluvial deposits were common at the surface, the most simple appliances sufficed. The most characteristic is the ” pan,” a circular dish of sheet- iron or ” tin,” with sloping sides about 13 or 14 in. in diameter. The pan, about two-thirds filled with the ” pay dirt ” to be washed, is held in the stream or in a hole filled with water. The larger stones having been removed by hand, gyratory motion is given to the pan by a combination of shaking and twisting movements

so as to keep its contents suspended in the stream of water, which carries away the bulk of the lighter material, leaving the heavy minerals, together with any gold which may have been present. The washing is repeated until enough of the enriched sand is collected, when the gold is finally recovered by careful washing or ” panning out ” in a smaller pan. In Mexico and South America, instead of the pan, a wooden dish or trough, known as ” batea,” is used.

The ” cradle ” is a simple appliance for treating somewhat larger quantities, and consists essentially of a box, mounted on rockers, and provided with a perforated bottom of sheet iron in which the ” pay dirt ” is placed. Water is poured on the dirt, and the rocking motion imparted to the cradle causes the finer particles to pass through the perforated bottom on to a canvas screen, and thence to the base of the cradle, where the auriferous particles accumulate on transverse bars of wood, called ” riffles.”

The ” torn ” is a sort of cradle with an extended sluice placed on an incline of about 1 in 12. The upper end contains a perforated riddle plate which is placed directly over the riffle box, and under certain circumstances mercury may be placed behind the riffles. Copper plates amalgamated with mercury are also used when the gold is very fine, and in some instances amalgamated silver coins have been used for the same purpose. Sometimes the stuff is disintegrated with water in a ” puddling machine,” which was used, especially in Australia, when the earthy matters are tenacious and water scarce. The machine frequently resembles a brickmaker’s wash-mill, and is worked by horse or steam power.

In workings on a larger scale, where the supply of water is abundant, as in California, sluices were generally employed. They are shallow troughs about 12 ft. long, about 16 to 20 in. wide and I ft. in depth. The troughs taper slightly so that they can be joined in series, the total length often reaching several hundred feet. The incline of the sluice varies with the conformation of the ground and the tenacity of the stuff to be washed, from I in 16 to 1 in 8. A rectangular trough of boards, whose dimensions depend chiefly on the size of the planks available, is set up on the higher part of the ground at one side of the claim to be worked, upon trestles or piers of rough stone- work, at such an inclination that the stream may carry off all but the largest stones, which are kept back by a grating of boards about 2 in. apart. The gravel is dug by hand and thrown in at the upper end, the stones kept back being removed at intervals by two men with four-pronged steel forks. The floor of the sluice is laid with riffles made of strips of wood 2 in. square laid parallel to the direction of the current, and at other points with boards having transverse notches filled with mercury. These were known originally as Hungarian riffles.

In larger plant the upper ends of the sluices are often cut in rock or lined with stone blocks, the grating stopping the larger stones being known as a ” grizzly.” In order to save very fine and especially rusty particles of gold, so-called ” under-current sluices ” are used; these are shallow wooden tanks, 50 sq. yds. and upwards in area, which are placed somewhat below the main sluice, and communicate with it above and below, the entry being protected by a grating so that only the finer material is admitted. These are paved with stone blocks or lined with mercury riffles, so that from the greatly reduced velocity of flow, due to the sudden increase of surface, the finer particles of gold may collect. In order to save finely divided gold, amalgamated copper plates are sometimes placed in a nearly level position, at a considerable distance from the head of the sluice, the gold which is retained in it being removed from time to time. Sluices are often made double, and they are usually cleaned up — that is, the deposit rich in gold is removed from them — once a week.

The ” pan ” is now only used by prospectors, while the ” cradle ” and ” torn ” are practically confined to the Chinese; the sluice is considered to be the best contrivance for washing gold gravels.

2. The Amalgamation Process. — This method is employed to extract gold from both alluvial and reef deposits: in the first case it is combined with ” hydraulic mining,” i.e. disintegrating auriferous gravels by powerful jets of water, and the sluice system described above; in the second case the vein stuff is prepared by crushing and

the amalgamation is carried out in mills.

Hydraulic mining has for the most part been confined to the country of its invention, California, and the western territories of America, where the conditions favourable for its use are more fully developed than elsewhere — notably the presence of thick banks of gravel that cannot be utilized by other methods, and abundance of water, even though considerable work may be required at times to make it available. The general conditions to be observed in such workings may be briefly stated as follows: (1) The whole of the auriferous gravel, down to the " bed rock," must be removed, — that is, no selection of rich or poor parts is possible; (2) this must be accom- plished by the aid of water alone, or at times by water supplemented by blasting ; (3) the conglomerate must be mechanically disintegrated without interrupting the whole system; (4) the gold must be saved without interrupting the continuous flow of water; and (5) arrange- ments must be made for disposing of the vast masses of impoverished gravel.

The water is brought from a ditch on the high ground, and through a line of pipes to the distributing box, whence the branch pipes

supplying the jets diverge. The stream issues through a nozzle, termed a " monitor " or " giant," which is fitted with a ball and socket joint, so that the direction of the jet may be varied through considerable angles by simply moving a handle. The material of the bank being loosened by blasting and the cutting action of the water, crumbles into holes, and the superincumbent mass, often with large trees and stones, falls into the lower ground. The stream, laden with stones and gravel, passes into the sluices, where the gold is recovered in the manner already described. Under the most advantageous conditions the loss of gold may be estimated at 15 or 20%, the amount recovered representing a value of about two shillings per ton of gravel treated. The loss of mercury is about the same, from 5 to 6 cwt. being in constant use per mile of sluice.

In working auriferous river-beds, dredges have been used with considerable success in certain parts of New Zealand and on the Pacific slope in America. The dredges used in California are almost exclusively of the endless-chain bucket or steam-shovel pattern. Some dredges have a capacity under favourable conditions of over 2000 cub. yds. of gravel daily. The gravel is excavated as in the ordinary form of endless-chain bucket dredge and dumped on to the deck of the dredge. It then passes through screens and grizzlies to retain the coarse gravel, the finer material passing on to sluice boxes provided with riffles, supplied with mercury. There are belt conveyers for

discharging the gravel and tailings at the end of the vessel remote from the buckets. The water necessary to the process is pumped from the river; as much as 2000 gallons per minute is used on the larger dredges.

The dressing or mechanical preparation of vein stuff containing gold is generally similar to that of other ores (see Ore-dressing), except that the precious metal should be removed from the waste substances as quickly as possible, even although other minerals of value that are subsequently recovered may be present. In all cases the quartz or other vein stuff must be reduced to a very fine powder as a preliminary to further operations. This may be done in several ways, e.g. either (1) by the Mexican crusher or arrastra, in which the grinding is effected upon a bed of stone, over which heavy blocks of stone attached to cross arms are dragged by the rotation of the arms about a central spindle, or (2) by the Chilean mill or trapiche, also known as the edge-runner, where the grinding stones roll upon the floor, at the same time turning about a central upright — contrivances which are mainly used for the preparation of silver ores; but by far the largest proportion of the gold quartz of California, Australia and Africa is reduced by (3) the stamp mill, which is similar in principle to that used in Europe for the preparation of tin and other ores.

The stamp mill was first used in California, and its use has since spread over the whole world. In the mills of the Californian type the stamp is a cylindrical iron pestle faced with a chilled cast iron shoe, removable so that it can be renewed when necessary, attached to a round iron rod or lifter, the whole weighing from 600 to 900 lb ; stamps weighing 1320 lb are in use in the Transvaal. The lift is effected by cams acting on the under surface of tappets, and formed by cylindrical boxes keyed on to the stems of the lifter about one-fourth of their length from the top. As, however, the cams, unlike those of European stamp mills, are placed to one side of the stamp, the latter is not only lifted but turned partly round on its own axis, whereby the shoes are worn down uniformly. The height of lift may be between 4 and 18 in., and the number of blows from 30 to over 100 per minute. The stamps are usually arranged in batteries of five ; the order of working is usually 1, 4, 2, 5, 3, but other arrangements, e S 1, 3> 5, 2 , 4, an d 1, 5, 2, 4, 3, are common. The stuff, previously broken to about 2-in. lumps in a rock-breaker, is fed in through an aperture at the back of the ” battery box,” a constant supply of water is admitted from above, and mercury in a finely divided state is added at frequent intervals. The discharge of the comminuted material takes place through an aperture, which is covered by a thin steel plate perforated with numerous slits about ˆth in. broad and 5 in. long, a

certain volume being discharged at every blow and carried forward by the flushing water over an apron or table in front, covered by copper plates filled with mercury. Similar plates are often used to catch any particles of gold that may be thrown back, while the main operation is so conducted that the bulk of the gold may be reduced to the state of amalgam by bringing the two metals into intimate contact under the stamp head, and remain in the battery. The tables in front are laid at an incline of about 8° and are about 13 ft. long; they collect from 10 to 15% of the whole gold; a further quantity is recovered by leading the sands through a gutter about 16 in. broad and 120 ft. long, also lined with amalgamated copper plates, after the pyritic and other heavy minerals have been separated by depositing in catch pits and other similar contrivances. When the ore does not contain any considerable amount of free gold mercury is not, as a rule, used during the crushing, but the amalgama- tion is carried out in a separate plant. Contrivances of the most diverse constructions have been employed. The most primitive is the rubbing together of the concentrated crushings with mercury in iron mortars. Barrel amalgamation, i.e. mixing the crushings with mercury in rotating barrels, is rarely used, the process being wasteful, since the mercury is specially apt to be ” floured ” (see below).

At Schemnitz, Kerpenyes, Kreuzberg and other localities in Hungary, quartz vein stuff containing a little gold, partly free and partly associated with pvrites and galena, is, after stamping in mills, similar to those described above, but without rotating stamps, passed through the so-called ” Hungarian gold mill ” or ” quick-mill. This consists of a cast-iron pan having a shallow cylindrical bottom holding mercury, in which a wooden muller, nearly of the same shape as the inside of the pan, and armed below with several pro- jecting blades, is made to revolve by gearing wheels. The stuff from the stamps is conveyed to the middle of the muller, and is distributed over the mercury, when the gold subsides, while the quartz and lighter materials are guided by the blades to the cir- cumference and are discharged, usually into a second similar mill, and subsequently pass over blanket tables, i.e. boards covered with canvas or sacking, the gold and heavier particles becoming en- tangled in the fibres. The action of this mill is really more nearly analogous to that of a centrifugal pump, as no grinding action takes place in it. The amalgam is cleaned out periodically — fortnightly or monthly — and after filtering through linen bags to remove the excess of mercury, it is transferred to retorts for

distillation (see below).

Many other forms of pan-amalgamators have been devised. The Laszlo is an improved Hungarian mill, while the Piccard is of the same type. In the Knox and Boss mills, which are also employed for the amalgamation of silver ores, the grinding is effected between flat horizontal surfaces instead of conical or curved surfaces as in the previously described forms.

One of the greatest difficulties in the treatment of gold by amalgamation, and more particularly in the treatment of pyrites, arises from the so-called ” sickening ” or ” flouring ” of the mercury ; that is, the particles, losing their bright metallic surfaces, are no longer capable of coalescing with or taking up other metals. Of the numerous remedies proposed the most efficacious is perhaps sodium amalgam. It appears that amalgamation is often impeded by the tarnish found on the surface of the gold when it is associated with sulphur, arsenic, bismuth, antimony or tellurium. Henry Wurtz in America (1 864) and Sir William Crookes in England (1865) made independently the discovery that, by the addition of a small quantity of sodium to the mercury, the operation is much facilitated. It is also stated that sodium prevents both the ” sickening ” and the ” flouring ” of the mercury which is produced by certain associated minerals. The addition of potassium cyanide has been suggested to assist the amalgamation and to prevent ” flouring,” but Skey has shown that its use is attended with loss of gold.

Separation of Gold from the Amalgam. — The amalgam is first pressed in wetted canvas or buckskin in order to remove excess of mercury. Lumps of the solid amalgam, about 2 in. in diameter, are introduced into an iron vessel provided with an iron tube that leads into a condenser containing water. The distillation is then effected by heating to dull redness. The amalgam yields about 30 to 40% of gold. Horizontal cylindrical retorts, holding from 200 to 1200 lb of amalgam, are used in the larger Calif ornian mills, pot retorts being used in the smaller mills. The bullion left in the retorts is then melted in black-lead crucibles, with the addition of small quantities of suitable fluxes, e.g. nitre, sodium carbonate, &c. The extraction of gold from auriferous minerals by fusion, except as an incident in their treatment for other metals, is very rarely practised. It was at one time proposed to treat the concentrated black iron obtained in the Ural gold washings, which consists chiefly of mag- netite, as an iron ore, by smelting it with charcoal for auriferous pig- iron, the latter metal possessing the property of dissolving gold in considerable quantity. By subsequent treatment with sulphuric acid the gold could be recovered.

Experiments on this point were made by Anossow in 1835, but they have never been followed in practice. Gold in galena or other lead ores is invariably recovered in the refining or treatment of the lead and silver obtained. Pyritic ores containing copper are treated by methods analogous to those of the copper smelter. In Colorado the pyritic ores containing gold and silver in association with copper are smelted in reverberatory furnaces for regulus, which, when desilverized by Ziervogel's method, leaves a residue containing 20 or 30 oz. of gold per ton. This is smelted with rich gold ores, notably those containing tellurium, for white metal or regulus; and by a following process of partial reduc- tion analogous to that of selecting in copper smelting, " bottoms " of impure copper are obtained in which practically all the gold is concentrated. By continuing the treatment of these in the ordinary way of refining, poling and granulating, all the foreign matters other than gold, copper and silver are removed, and, by exposing the granulated metal to a high oxidizing heat for a considerable time the copper may be completely oxidized while the precious metals are unaltered. Subsequent treatment with sulphuric acid renders the copper soluble in water as sulphate, and the final residue contains only gold and silver, which is parted or refined in the ordinary way. This method of separating gold from copper, by converting the latter into oxide and sulphate, is also used at Oker in the Harz.

Extraction by Means of Aqueous Solutions. — Many processes have been suggested in which the gold of auriferous deposits is converted into products soluble in water, from which solutions the gold may be precipitated. Of these processes, two only are

of special importance, viz. the chlorination or Plattner process, in which the metal is converted into the chloride, and the cyanide or MacArthur-Forrest process, in which it is converted into potassium aurocyanide.

(3) Chlorination or Plattner Process. — In this process moistened gold ores are treated with chlorine gas, the resulting gold chloride dis- solved out with water, and the gold precipitated with ferrous sulphate, charcoal, sulphuretted hydrogen or otherwise. The process originated in 1848 with C. F. Plattner, who suggested that the residues from certain mines at Reichenstein, in Silesia, should be treated with chlorine after the arsenical products had been extracted by roasting. It must be noticed, however, that Percy independently made the same discovery, and stated his results at the meeting of the British Association (at Swansea) in 1849, but the Report was not published until 1852. The process was introduced in 1858 by Deetken at Grass

Valley, California, where the waste minerals, principally pyrites from tailings, had been worked for a considerable time by amalgamation. The process is rarely applied to ores direct; free-milling ores are generally amalgamated, and the tailings and slimes, after concentration, operated upon. Three stages in the process are to be distinguished: (i.) calcination, to convert all the metals, except gold and silver, into oxides, which are unacted upon by chlorine; (ii.) chlorinating the gold and lixiviating the product; (iii.) precipitating the gold.

The calcination, or roasting, is conducted at a low temperature in some form of reverberatory furnace. Salt is added in the roasting to convert any lime, magnesia or lead which may be present, into the corresponding chlorides. The auric chloride is, however, de- composed at the elevated temperature into finely divided metallic gold, which is then readily attacked by the chlorine gas. The high volatility of gold in the presence of certain metals must also be considered. According to Egleston the loss may be from 40 to 90 % of the total gold present in cupriferous ores according to the tem- perature and duration of calcination. The roasted mineral, slightly moistened, is introduced into a vat made of stoneware or pitched planks, and furnished with a double bottom. Chlorine, generally prepared by the interaction of pyrolusite, salt and sulphuric acid, is led from a suitable generator beneath the false bottom, and rises through the moistened ore, which rests on a bed of broken quartz ; the gold is thus converted into a soluble chloride, which is afterwards removed by washing with water. Both fixed and rotating vats are employed, the chlorination proceeding more rapidly in the latter case; rotating barrels are sometimes used. There have also been introduced processes in which the chlorine is generated in the chloridizing vat, the reagents used being dilute solutions of bleaching powder and an acid. Munktell's process is of this type. In the Thies process, used in many districts in the United States, the vats are rotating barrels made, in the later forms, of iron lined with lead, and provided with a filter formed of a finely perforated leaden • grating running from one end of the barrel to the other, and rigidly held in place by wooden frames. Chlorine is generated within the barrel from sulphuric acid and chloride of lime. After charging, the barrel is rotated, and when the chlorination is complete the contents are emptied on a filter of quartz or some similar material, and the filtrate led to settling tanks.

After settling the solution is run into the precipitating tanks. The precipitants in use are: ferrous sulphate, charcoal and sulphuretted hydrogen, either alone or mixed with sulphur dioxide; the use of copper and iron sulphides has been suggested, but apparently these

substances have achieved no success.

In the case of ferrous sulphate, prepared by dissolving iron in dilute sulphuric acid, the reaction follows the equation $AuCl_3 + 3FeSO_4 = FeCl_3 + Fe_2(SO_4)_3 + Au$. At the same time any lead, calcium, barium and strontium present are precipitated as sulphates; it is therefore advantageous to remove these metals by the preliminary addition of sulphuric acid, which also serves to keep any basic iron salts in solution. The precipitation is carried out in tanks or vats made with wooden sides and a cement bottom. The solutions are well mixed by stirring with wooden poles, and the gold allowed to settle, the time allowed varying from 12 to 72 hours. The super- natant liquid is led into settling tanks, where a further amount of gold is deposited, and is then filtered through sawdust or sand, the sawdust being afterwards burnt and the gold separated from the ashes and the sand treated in the chloridizing vat. The precipitated gold is washed, treated with salt and sulphuric acid to remove iron salts, roughly dried by pressing in cloths or on filter paper, and then melted with salt, borax and nitre in graphite crucibles. Thus prepared it has a fineness of 800-960, the chief impurities usually being iron and lead.

Charcoal is used as the precipitant at Mount Morgan, Australia. Its use was proposed as early as 1818 and 1819 by Hare and Henry; Percy advocated it in 1869, and Davis adopted it on the large scale at a works in Carolina in 1880. The action is not properly under- stood; it may be due to the reducing gases (hydrogen, hydrocarbons, &c.) which are invariably present in wood charcoal. The process consists essentially in running the solution over layers of charcoal, the charcoal being afterwards burned. It has been found that the reaction proceeds faster when the solution is heated.

Precipitation with sulphur dioxide and sulphuretted hydrogen proceeds much more rapidly, and has been adopted at many works. Sulphur dioxide, generated by burning sulphur, is forced into the solution under pressure, where it interacts with any free chlorine present to form hydrochloric and sulphuric acids. Sulphuretted hydrogen, obtained by treating iron sulphide or a coarse matte with dilute sulphuric acid, is forced in similarly. The gold is precipitated as the sulphide, together with any arsenic, antimony, copper, silver and lead which may be present. The precipitate is collected in a filter-press, and then roasted in muffle furnaces with nitre, borax and

sodium carbonate. The fineness of the gold so obtained is 900 to 950.

4. Cyanide Process. — This process depends upon the solubility of gold in a dilute solution of potassium cyanide in the presence of air (or some other oxidizing agent), and the subsequent precipita- tion of the gold by metallic zinc or by electrolysis. The solubility of gold in cyanide solutions was known to K. W. Scheele in 1782; and M. Faraday applied it to the preparation of extremely thin films of the metal. L. Eisner recognized, in 1846, the part played by the atmosphere, and in 1879 Dixon showed that bleaching powder, manganese dioxide, and other oxidizing agents, facilitated the solution. S. B. Christy (Trans. A.I.M.E., 1896, vol. 26) has shown that the solution is hastened by many oxidizing agents, especially sodium and manganese dioxides and potassium ferricyanide. According to G. Bodlander (Zeit. f. angew. Chem., 1896, vol. 19) the rate of solu- tion in potassium cyanide depends upon the subdivision of the gold — the finer the subdivision the quicker the solution, — and on the concentration of the solution — the rate increasing until the solution contains 0-25% of cyanide, and remaining fairly stationary with increasing concentration. The action proceeds in two stages; in the first hydrogen peroxide and potassium aurocyanide are formed, and in the second the hydrogen peroxide oxidizes a further quantity of gold and potassium cyanide to aurocyanide, thus (1) 2Au + 4KCN + 0 2 + 2H 2 0 = 2KAu(CN) a + 4KOH + H20 2 ;(2)2Au + 4KCN-|-2H !! 0, = 2KAu(CN) 2 + 4KOH. Theendreactionmaybewritten4Au-|-8KCN + 2H 2 0 + 0 2 = 4KAu(CN)2-f-4KOH.

The commercial process was patented in 1890 by MacArthur and Forrest, and is now in use all over the world. It is best adapted for free-milling ores, especially after the bulk of the gold has been re- moved by amalgamation. It has been especially successful in the Transvaal. In the Witwatersrand the ore, which contains about 9 dwts. of gold to the metric ton (2000 lb), is stamped and amalgam- ated, and the slimes and tailings, containing about 3I dwts. per ton, are cyanided, about 2′ dwts. more being thus extracted. The total cost per ton of ore treated is about 6s., of which the cyaniding costs from 2s. to 4s.

The process embraces three operations: (1) Solution of the gold; (2) precipitation of the gold; (3) treatment of the precipitate.

The ores, having been broken and ground, generally in tube mills, until they pass a 150 to 200-mesh sieve, are transferred to the leaching vats, which are constructed of wood, iron or masonry; steel vats, coated inside and out with pitch, of circular section and holding

up to 1000 tons, have come into use. The diameter is generally 26 ft., but may be greater; the best. depth is considered to be a quarter of the diameter. The vats are fitted with filters made of coco-nut matting and jute cloth supported on wooden frames. The leaching is gener- ally carried out with a strong, medium, and with a weak liquor, in the order given ; sometimes there is a preliminary leaching with a weak liquor. The strengths employed depend also upon the mode of precipitation adopted, stronger solutions (up to 0-25 % KCN) being used when zinc is the precipitant. For electrolytic precipitation the solution may contain up to o-i% KCN. The liquors are run off from the vats to the electrolysing baths or precipitating tanks, and the leached ores are removed by means of doors in the sides of the vats into wagons. In the Transvaal the operation occupies 33 to 4 days for fine sands, and up to 14 days for coarse sands; the quantity of cyanide per ton of tailings varies from 0-26 to 0-28 lb, for electrolytic precipitation, and 0-5 lb for zinc precipitation.

The precipitation is effected by zinc in the form of bright turnings, or coated with lead, or by electrolysis. According to Christy, the precipitation with zinc follows equations lor 2 according as potassium cyanide is present or not:

(1) $4\ KAu(C\backslash)_2 + 4Zn + 2H_2 = 2Zn(CN)_2 +$

$K_2Zn(CN)_4 + Zn(OK)_2 + 4H + 4Au'$

(2) $2KAu(CN)_2 + 3Zn + 4KCN + 2H_2 =$

$2K_2Zn(CN)_4 + Zn(OK)_2 + 4H + 2Au$; one part of zinc precipitating 3-1 parts of gold in the first case, and 2-06 in the second. It may be noticed that the potassium zinc cyanide is useless in gold extraction, for it neither dissolves gold nor can potassium cyanide be regenerated from it.

The precipitating boxes, generally made of wood but sometimes of steel, and set on an incline, are divided by partitions into alternately wide and narrow compartments, so that. the liquor travels upwards in its passage through the wide divisions and downwards through the narrow divisions. In the wider compartments are placed sieves having sixteen holes to the square inch and bearing zinc turnings. The gold and other metals are precipitated on the under surfaces of the turnings a-nd fall to the bottom of the compartment as a black slime. The slime is cleaned out fortnightly or monthly, the zinc

turnings being cleaned by rubbing and the supernatant liquor allowed

to settle in the precipitating boxes or in separate vessels. The slime so obtained consists of finely divided gold and silver (5-5°%). zinc (30-60%), lead (10%), carbon (10%), together with tin, copper, antimony, arsenic and other impurities of the zinc and ores. After well washing with water, the slimes are roughly dried in bag-filters or filter-presses, and then treated with dilute sulphuric acid, the solution being heated by steam. This dissolves out the zinc. Lime is added to bring down the gold, and the sediment, after washing and drying, is fused in graphite crucibles.

5. Electrolytic Processes. — The electrolytic separation of the gold from cyanide solutions was first practised in the Transvaal. The process, as elaborated by Messrs. Siemens and Halske, essentially consists in the electrolysis of weak solutions with iron or steel plate anodes, and lead cathodes, the latter, when coated with gold, being fused and cupelled. Its advantages overthe zinc process are that the deposited gold is purer and more readily extracted, and that weaker solutions can be employed, thereby effecting an economy in cyanide. In the process employed at the Worcester Works in the Transvaal, the liquors, containing about 150 grains of gold per ton and from 0-08 to o-oi % of cyanide, are treated in rectangular vats in which is placed a series of iron and leaden plates at intervals of 1 in. The cathodes, which are sheets of thin lead foil weighing 1 \ lb to the sq. yd., are removed monthly, their gold content being from 0-5 to 10%, and after folding are melted in reverberatory furnaces to ingots containing 2 to 4 % of gold. Cupellation brings up the gold to about 900 fine. Many variations of the electrolytic process as above outlined have been suggested. S. Cowper Coles has suggested aluminium cathodes; Andreoli has recommended cathodes of iron and anodes of lead coated with lead peroxide, the gold being removed from the iron cathodes by a brief immersion in molten lead ; in the Pelatan-Cerici process the gold is amalgamated at a mercury cathode (see also below). t

Refining or Parting of Gold. — Gold is almost always silver- bearing, and it may be also noticed that silver generally contains some gold. Consequently the separation of these two metals is one of the most important metallurgical processes. In addition to the separation of the silver the operation extends to the elimination of the last traces of lead, tin, arsenic, &c. which have resisted the preceding cupellation.

The ” parting ” of gold and silver is of considerable antiquity. Thus Strabo states that in his time a process was employed for re- fining and purifying gold in large quantities by cementing or burning it with an aluminous earth, which, by destroying the silver, left the gold in a state of purity. Pliny shows that for this purpose the gold was placed

on the fire in an earthen vessel with treble its weight of salt, and that it was afterwards again exposed to the fire with two parts of salt and one of argillaceous rock, which, in the presence of moisture, effected the decomposition of the salt ; by this means the silver became converted into chloride.

The methods of parting can be classified into “dry,” “wet” and electrolytic methods. In the ” dry ” methods the silver is converted into sulphide or chloride, the gold remaining unaltered; in the ” wet ” methods the silver is dissolved by nitric acid or boiling sulphuric acid ; and in the electrolytic processes advantage is taken of the fact that under certain current densities and other circum- stances silver passes from an anode composed of a gold-silver alloy to the cathode more readily than gold. Of the dry methods only F. B. Miller’s chlorine process is of any importance, this method, and the wet process of refining by sulphuric acid, together with the electrolytic process, being the only ones now practised.

The conversion of silver into the sulphide may be effected by heating with antimony sulphide, litharge and sulphur, pyrites, or with sulphur alone. The antimony, or Guss und Fluss, method was practised up till 1846 at the Dresden mint; it is only applicable to alloys containing more than 50% of gold. The fusion results in the formation of a gold-antimony alloy, from which the antimony is removed by an oxidizing fusion with nitre. The sulphur and litharge, or Pfannenschmied, process was used to concentrate the gold in an alloy in order to make it amenable to ” quartation,” or parting with nitric acid. Fusion with sulphur was used for the same purpose as the Pfannenschmied process. It was employed in 1797 at the St Petersburg mint.

The conversion of the silver into the chloride may be effected by means of salt — the ” cementation ” process — or other chlorides, or by free chlorine — Miller’s process. The first process consists essentially in heating the alloy with salt and brickdust; the latter absorbs the chloride formed, while the gold is recovered by washing. It is no longer employed. The second process depends upon the fact that, if chlorine be led into the molten alloy, the base metals and the silver are converted into chlorides. It was proposed in 1838 by Lewis Thompson, but it was only applied commercially after Miller’s improvements in 1867, when it was adopted at the Sydney mint. Sir W. C. Roberts-Austen introduced it at the London mint; and it has also been used at Pretoria. It is especially suitable to gold containing little silver and base metals — a character of Australian gold — but it yields to the sulphuric acid and electrolytic methods in point of economy.

The separation of gold from silver in the wet way may be effected by nitric acid, sulphuric acid or by a mixture of sulphuric acid and aqua regia.

Parting by nitric acid is of considerable antiquity, being mentioned by Albertus Magnus (13th cent.), Biringuccio (1540) and Agricola (1556). It is now rarely practised, although in some refineries both the nitric acid and the sulphuric acid processes are combined, the alloy being first treated with nitric acid. It used to be called ” quar- tation ” or ” inquartation,” from the fact that the alloy best suited for the operation of refining contained 3 parts of silver to 1 of gold. The operation may be conducted in vessels of glass or platinum, and each pound of granulated metal is treated with a pound and a quarter of nitric acid of specific gravity 1-32. The method is sometimes employed in the assay of gold.

Refining by sulphuric acid, the process usually adopted for separating gold from silver, was first employed on the large scale by d’Arcet in Paris in 1802, and was introduced into the Mint refinery, London, by Mathison in 1829. It is based upon the facts that con- centrated hot sulphuric acid converts silver and copper into soluble sulphates without attacking the gold, the silver sulphate being subsequently reduced to the metallic state by copper plates with the formation of copper sulphate. It is applicable to any alloy, and is the best method for parting gold with the exception of the electro- lytic method.

The process embraces four operations: (1) the preparation of an alloy suitable for parting; (2) the treatment with sulphuric acid; (3) the treatment of the residue for gold; (4) the treatment of the solution for silver.

It is necessary to remove as completely as possible any lead, tin, bismuth, antimony, arsenic and tellurium, impurities which impair the properties of gold and silver, by an oxidizing fusion, e.g. with nitre. Over 10% of copper makes the parting difficult; conse- quently in such alloys the percentage of copper is diminished by the addition of silver free from copper, or else the copper is removed by a chemical process. Other undesirable impurities are the platinum metals, special treatment being necessary when these substances are present. The alloy, after the preliminary refining, is granulated by being poured, while molten, in a thin stream into cold water which is kept well

agitated.

The acid treatment is generally carried out in cast iron pots; platinum vessels used to be employed, while porcelain vessels are only used for small operations, e.g. for charges of 190 to 225 oz. as at Oker in the Harz. The .pots, which are usually cylindrical with a hemi- spherical bottom, may hold as much as 13,000 to 16,000 oz. of alloy. They are provided with lids, made either of lead ot of wood lined with lead, which have openings to serve for the introduction of the alloy and acid, and a vent tube to lead off the vapours evolved during the operation. The bullion with about twice its weight of sulphuric acid of 66° B6 is placed in the pot, and the whole gradually heated. Since the action is sometimes very violent, especially when the bullion is treated in the granulated form (it is steadier when thin plates are operated upon), it is found expedient to add the acid in several portions. The heating is continued for4to 12 hoursaccording to the amount of silver present; the end of the reaction is known by the absence of any hissing. Generally the reaction mixture is allowed to cool, and the residue, which settles to the bottom of the pot, consists of gold together with copper, lead and iron sulphates, which are insoluble in strong sulphuric acid; silver sulphate may also separate if present in sufficient quantity and the solution be sufficiently cooled. The solution is removed by ladles or by siphons, and the residue is leached out with boiling water; this removes the sulphates. A certain amount of silver is still present and, according to M. Pettenkofer, it is impossible to remove all the silver by means of sulphuric acid. Several methods are in use for removing the silver. Fusion with an alkaline bisulphate converts the silver into the sulphate, which may be extracted by boiling with sulphuric acid and then with water. Another process consists in treating a mixture of the residue with one-quarter of its weight of calcined sodium sulphate with sulphuric acid, the residue being finally boiled with a large quantity of acid. Or the alloy is dissolved in aqua regia, the solution filtered from the insoluble silver chloride, and the gold precipitated by ferrous chloride.

The silver present in the solution obtained in the sulphuric acid boiling is recovered by a variety of processes. The solution maybe directly precipitated with copper, the copper passing into solution as copper sulphate, and the silver separating as a mud, termed ” cement silver.” Or the silver sulphate may be separated from the solution by cooling and dilution, and then mixed with iron clippings, the interaction being accompanied with a considerable evolution of heat. Or Gutzkow’s method of precipitating the metal with ferrous sulphate may be employed.

The electrolytic parting of gold and silver has been shown to be ‘ more economical and free from the objections — such as the poisonous fumes — of the sulphuric acid process. One process depends upon the fact that, with a suitable current density, if a very dilute solution of silver nitrate be electrolysed between an auriferous silver anode and a silver cathode, the silver of the anode is dissolved out and deposited at the cathode, the gold remaining at the anode. The silver is quite free from gold, and the gold after boiling with nitric acid has a fine- ness of over 999.

Gold is left in the anode slime when copper or silver are refined by the usual processes, but if the gold preponderate in the anode these processes are inapplicable. A cyanide bath, as used in electroplating, would dissolve the gold, but is not suitable for refining, because other metals (silver, copper, &c.) passing with gold into the solution would deposit with it. Bock, however, in 1 880 (Berg- und huttenmdnnische Zeitung, 1880, p. 411) described a process used at the North German Refinery in Hamburg for the refining of gold containing platinum with a small proportion of silver, lead or bismuth, and a subsequent patent specification (1896) and a paper by Wohlwill (Zeits. f. Rlek- trochem., 1898, pp. 379, 402, 421) have thrown more light upon the process. The electrolyte is gold chloride (2-5-3 parts of pure gold per 100 of solution) mixed with from 2 to 6 % of the strongest hydrochloric acid to render the gold anodes readily soluble, which they are not in the neutral chloride solution. The bath is used at 65° to 70° C. (150° to 158 F.), and if free chlorine be evolved, which is known at once by its pungent smell, the temperature is raised, or more acid is added, to promote the solubility of the gold. The bath is used with a current-density of 100 amperes per sq. ft. at 1 volt (or higher), with electrodes about 1-2 in. apart. In this process all the anode metals pass into solution except iridium and other re- fractory metals of that group, which remain as metals, and silver, which is converted into insoluble chloride; lead and bismuth form chloride and oxychloride respectively, and these dissolve until the bath is saturated with them, and then precipitate with the silver in the tank. But if the gold-strength of the bath be maintained, only gold is deposited at the cathode — in a loose powdery condition from pure solutions, but in a smooth detachable deposit from impure liquors. Under good conditions the gold should contain 99-98 % of the pure metal. The tank is of porcelain or glazed earthenware, the electrodes for impure solutions are J in. apart (or more with pure solutions), and are on the multiple system, and the potential differ- ence at the terminals of the bath is I volt. A high current-density being employed, the turn-over of gold is rapid — an essential factor of success when the costliness of

the metal is taken into account. Platinum and palladium dissolved from the anode accumulate in the solution, and are removed at intervals of, say, a few months by chemical precipitation. It is essential that the bath should not contain more than 5 % of palladium, or some of this metal will deposit with the gold. The slimes are treated chemically for the separation of the metals contained in them.

Authorities. — Standard works on the metallurgy of gold are the treatises of T. Kirke Rose and of M. Eissler. The cyanide process is especially treated by M. Eissler, Cyanide Process for the Extraction of Gold, which pays particular attention to the Witwatersrand methods; Alfred James, Cyanide Practice; H. Forbes Julian and Edgar Smart, Cyaniding Gold and Silver Ores. Gold milling is treated by Henry Louis, A Handbook of Gold Milling; C. G. Warnford Lock, Gold Milling; T. A. Rickard, Stamp Milling of Gold Ores. Gold dredging is treated by Captain C. C. Longridge in Gold Dredging, and hydraulic mining is discussed by the same author in his Hydraulic Mining. For operations in special districts see J. M. Maclaren, Gold (1908); J. H. Curie, Gold Mines of the World; Africa: F. H. Hatch and J. A. Chalmers, Gold Mines of the Rand; S. J. Truscott,Witwaters rand Goldfields Banket and Mining Practice; Australasia: D. Clark, Australian Mining and Metallurgy; Karl Schmeisser, Goldfields of Australasia; A. G. Charleton, Gold Mining and Milling in Western Australia; India: F. H. Hatch, The Kolar Gold-Field.

GOLD AND SILVER THREAD. Under this heading some general account may be given of gold and silver strips, threads and gimp used in connexion with varieties of weaving, embroidery and twisting and plaiting or lace work. To this day, in many oriental centres where it seems that early traditions of the knowledge and the use of fabrics wholly or partly woven, orna- mented, and embroidered with gold and silver have been main- tained, the passion for such brilliant and costly textiles is still strong and prevalent. One of the earliest mentions of the use of gold in a woven fabric occurs in the description of the ephod made for Aaron (Exod. xxxix. 2, 3), ” And he made the ephod of, gold, blue, and purple, and scarlet, and fine twined linen. And they did beat the gold into thin plates, and cut it into wires (strips), to work it in the blue, and in the purple, and in the scarlet, and in the fine linen, with cunning work.” This is suggestive of early Syrian or Arabic in-darning or weaving with gold strips or tinsel. In both the Iliad and the Odyssey allusion is frequently made to inwoven and embroidered golden textiles. Assyrian sculpture gives an elaborately designed ornament upon the robe of King Assur-nasir-pal (884 B.C.) which was probably an interweaving of gold and coloured threads, and testifies to the consummate skill of Assyrian or

Babylonian workers at that date. From Assyrian and Babylonian weavers the conquering Persians of the time of Darius derived their celebrity as weavers and users of splendid stuffs. Herodotus describes

the corselet given by Amasis king of Egypt to the Minerva of Lindus and how it was inwoven or embroidered with gold. Darius, we are told, wore a war mantle on which were figured (probably inwoven) two golden hawks as if pecking at each other. Alex- ander the Great is said to have found Eastern kings and princes arrayed in robes of gold and purple. More than two hundred years later than Alexander the Great was the king of Pergamos (the third bearing the name Attalus) who gave much attention to working in metals and is mentioned by Pliny as having invented weaving with gold, hence the historic Attalic cloths. There are several references in Roman writings to costumes and stuffs woven and embroidered with gold threads and the Graeco-Roman chryso-phrygium and the Roman auri-phrygium are evidences not only of Roman work with gold threads but also of its indebtedness to Phrygian sources. The famous tunics of Agrippina and those of Heliogabalus are said to have been of tissues made entirely with gold threads, whereas the robes which Marcus Aurelius found in the treasury of Hadrian, as well as the costumes sold at the dispersal of the wardrobe of Commodus, were different in character, being of fine linen and possibly even of silken stuffs inwoven or embroidered with gold threads. The same description is perhaps correct of the reputedly splendid hangings with which King Dagobert decorated the early medieval oratory of St Denis. Reference to these and many such stuffs is made by the respectively contemporary or almost contemporary writers; and a very full and interesting work by Monsieur Francisque Michel (Paris, 1852) is still a standard bock for consultation in respect of the history of silk, gold and silver stuffs.

From indications such as these, as well as those of later date, one sees broadly that the art of weaving and embroidering with gold and silver threads passed from one great city to another, travelling as a rule westward. Babylon, Tarsus, Bagdad, Damascus, the islands of Cyprus and Sicily, Constantinople, Venice and southern Spain appear successively in the process of time as famous centres of these much-prized manufactures. During the middle ages European royal personages and high ecclesiastical dignitaries used cloth and tissues of gold and silver for their state and ceremonial robes, as well as for costly hangings and decoration; and various names — ciclatoun,

tartarium, naques or nac, baudekin or baldachin (Bagdad) and tissue — were applied to textiles in the making of which gold threads were almost always introduced in combination with others. The thin flimsy paper known as tissue paper is so called because it originally was placed between the folds of gold ” tissue ” (or weaving) to prevent the contiguous surfaces from fraying each other. Under the articles dealing with carpets, embroidery, lace and tapestry will be found notices of the occasional use in such productions of gold and silver threads. Of early date in the history of European weaving are rich stuffs produced in Southern Spain by Moors, as well as by Saracenic and Byzantine weavers at Palermo and Constantinople in the 12th century, in which metallic threads were freely used. Equally esteemed at about the same period were corresponding stuffs made in Cyprus, whilst for centuries later the merchants in such fabrics eagerly sought for and traded in Cyprus gold and silver threads. Later the actual manufacture of them was not confined to Cyprus, but was also carried on by Italian thread and trimming makers from the 14th century onwards. For the most part the gold threads referred to were of silver gilt. In rare instances of middle-age Moorish or Arabian fabrics the gold threads are made with strips of parchment or paper gilt and still rarer are instances of the use of real gold wire.

In India the preparation of varieties of gold and silver threads is an ancient and important art. The ” gold wire ” of the* manufacturer has been and is as a rule silver wire gilt, the silver ‘ wire being, of course, composed of pure silver. The wire is drawn by means of simple draw-plates, with rude and simple appliances, from rounded bars of silver, or gold-plated silver, as the case may be. The wire is flattened into strip, tinsel or ribbon-like form, by passing fourteen or fifteen strands simultaneously, over a fine, smooth, round-topped anvil and

beating each as it passes with a heavy hammer having a slightly convex surface. Such strips or tinsel of wire so flattened are woven into Indian soniri, tissue or cloth of gold, the web or warp being composed entirely of golden strips, and ruperi, similar tissue of silver. Other gold and silver threads suitable for use in embroidery, pillow and needlepoint lace making, &c, consist of fine strips of flattened wire wound round cores of orange (in the case of silver, white) silk thread so as to completely cover them. Wires flattened or partially flattened are also twisted into exceedingly fine spirals and much used for heavy embroideries. Spangles for embroideries, &c, are made from spirals of compara- tively stout wire, by cutting them down ring by ring, laying each C-like ring on an anvil, and by a smart blow with a hammer flattening it out into a thin round disk with a slit extending from the centre to one edge. The demand for many kinds of loom-

woven and embroidered gold and silver work in India is immense, and the variety of textiles so ornamented is also very great, chief amongst which are the golden or silvery tinsel fabrics known as kincobs.

Amongst Western communities the demand for gold and silver embroideries and braid lace now exists chiefly in connexion with naval, military and other uniforms, masonic insignia, court costumes, public and private liveries, ecclesiastical robes and draperies, theatrical dresses, &c.

The proportions of gold and silver in the gold thread for the woven braid lace or ribbon trade varies, but in all cases the proportion of gold is exceedingly small. An ordinary gold braid wire is drawi; from a bar containing 90 parts of silver and 7 of copper, ancl plated with 3 of gold. On an average each ounce troy of a bar so plated is drawn into 1500 yds. of wire; and there- fore about 16 grains of gold cover 1 m. of wire. (A. S. C.)

GOLDAST AB HAIMINSFELD, MELCHIOR (1576-1635),

Swiss writer, an industrious though uncritical collector of documents relating to the medieval history and Constitution of Germany, was born on the 6th of January 1576 (some say 1578), of poor Protestant parents, near Bischofszell, in the Swiss Canton of Thurgau. His university career, first at Ingolstadt (1585-1 586) , then at Altdorf near Nuremberg (1 597-1 598) , was cut short by his poverty, from which he suffered all his life, and which was the main cause of his wanderings. In 1598 he found a rich protector in the person of Bartholomaeus Schobinger, of St Gall, by whose liberality he was enabled to study at St Gall (where he first became interested in medieval documents, which abound in the conventual library) and elsewhere in Switzerland. Before his patron's death (1604) he became (1603) secretary to Henry, duke of Bouillon, with whom he went to Heidelberg and

Frankfort. But in 1604 he entered the service of the Baron von Hohensax, then the possessor of the precious MS. volume of old German poems, returned from Paris to Heidelberg in 1888, and, partially published by Goldast. Soon he was back in Switzerland, and by 1606 in Frankfort, earning his living by preparing and correcting books for the press. In 161 1 he was appointed councillor at the court of Saxe- Weimar, and in 161 5 he entered the service of the count of Schaumburg at Buckeburg. In 1624 he was forced by the war to retire to Bremen; there in 1625 he deposited his library in that of the town (his books were bought by the town in 1646, but many of his MSS. passed to Queen Christina of Sweden, and hence are now in the Vatican library), he himself returning to Frankfort. In 1627 he became councillor to the emperor and to the archbishop-elector of Treves, and in 1633 passed to the service of the landgrave of Hesse-Darmstadt. He died at Giessen early in 1635.

His immense industry is shown by the fact that his biographer, Senckenburg, gives a list of 65 works published or written by him, some extending to several substantial volumes. Among the more important are his Paraeneticorum veterum pars i. (1604), which contained the old German tales of Kunig Tyrol von Schotten, the Winsbcke and the Winsbekin; Suevicarum rerum scriptores (Frankfort, 1605, new edition, 1727); Rerum Alamannicarum scriptores (Frankfort, 1606, new edition by Senckenburg, 1730); Constitutiones imperiales (Frankfort, 1607-1613, 4 vols.); Mortr archia s. Romani imperii (Hanover and Frankfort, 1612-1614,

3 vols.); Commentarii de regni Bohemiae juribus (Frankfort, 1627, new edition by Schmink, 1719). He also edited De Thou's History (1600-1610) and Willibald Pirckheimer's works (1610). In 1688 a volume of letters addressed to him by his learned friends was published.

Life by Senckenburg, prefixed tc his 1730 work. See also R. von Raumer's Geschichte d. germanischen Philologie (Munich, 1870).

(W. A. B. C.)

GOLDBEATING. — The art of goldbeating is of great antiquity, being referred to by Homer; and Pliny {N.H. 33. 19) states that 1 oz. of gold was extended to 750 leaves, each leaf being four fingers (about 3 in.) square; such a leaf is three times as thick as the ordinary leaf gold of the present time. In all probability the art originated among the Eastern nations, where the working of gold and the use of gold ornaments have been distinguishing characteristics from the most remote periods. On Egyptian mummy cases specimens of original leaf-gilding are met with, where the gold is so thin that it resembles modern gilding (q.v.). The minimum thickness to which gold can be beaten is not known with certainty. According to Mersenne (1621) 1 oz. was spread out over 105 sq. ft.; Reaumur (1711) obtained 1465 sq. ft.; other values are 189 sq. ft. and 300 sq. ft. Its malleability is greatly diminished by the presence of other metals, even in very minute quantity. In practice the average degree of tenuity to which the gold is reduced is not nearly so great as the last example quoted above. A " book of gold " containing 25 leaves measuring each 3J in., equal to an area of 264 sq. in., generally weighs from 4 to 5 grains.

The gold used by the goldbeater is variously alloyed, according to the colour required. Fine gold is commonly supposed to be incapable of being reduced to thin leaves. This, however, is not the case, although its use for ordinary purposes is undesirable on account of its greater cost. It also adheres on one part of a leaf touching another, thus causing a waste of labour by the leaves being spoiled; but for work exposed to the weather it is much preferable, as it is more durable, and does not tarnish or change colour. The external gilding on many public buildings, e.g. the Albert Memorial in Kensington Gardens, London, is done with pure gold. The following is a list of the principal classes of leaf recognized and ordinarily prepared by British beaters, with the proportions of alloy per oz. they contain.

Name of Leaf.

Proportion of Gold.

Proportion of Silver.

Proportion of Copper.

Red …. Pale red Extra deep

Yellow

Pale yellow . •

Lemon

Green or pale .

White ….

Grains.

456-460 464 456.

444 440 408

384 360 312 240

Grains.

12

24

3°

72

96 120 168 240

Grains.

20-24 16 12 12 10

The process of goldbeating is as follows: The gold, having been alloyed according to the colour desired, is melted in a crucible at a higher temperature than is simply necessary to fuse it, as its malleability is improved by exposure to a greater heat; sudden cooling does not interfere with its malleability, gold differing in this respect from some other metals. It is then cast into an ingot, and flattened, by

rolling between a pair of powerful smooth steel rollers, into a ribbon of ij in. wide and 10 ft. in length to the oz. After being flattened it is annealed and cut into pieces of about 65 grs. each, or about 75 per oz., and placed between the leaves of a ” cutch,” which is about i in. thick and 3j in. square, containing about 180 leaves of a tough paper. Formerly fine vellum was used for this purpose, and generally still it is interleaved in the proportion of about one of vellum to six of paper. The cutch is beaten on for about 20 minutes with a 17-lb hammer, which rebounds by the elasticity of the skin, and saves the labour of lifting, by which the gold is spread to the size of the cutch; each leaf is then taken out, and cut into four pieces, and put between the skins of a ” shoder,” 4! in. square and I in. thick, containing about 720 skins, which have been worn out in the finishing or ” mould ” process. The shoder requires about two hours’ beating upon with a 9-lb hammer. As the gold will spread unequally, the shoder is beaten upon after the larger leaves have reached the edges. The effect of this is that the margins of

larger leaves come out of the edges in a state of dust. This allows time for the smaller leaves to reach the full size of the shoder, thus producing a general evenness of size in the leaves. Each leaf is again cut into four pieces, and placed between the leaves of a ” mould,’ composed of about 950 of the finest gold-beaters’ skins, 5 in. square and J in. thick, the contents of one shoder filling three moulds. The material has now reached the last and most difficult stage of the process; and on the fineness of the skin and judgment of the workman the perfection and thinness of the leaf of gold depend. During the first hour the hammer is allowed to fall principally upon the centre of the mould. This causes gaping cracks upon the edges of the leaves, the sides of which readily coalesce and unite without leaving any trace of the union after being beaten upon. At the second hour, when the gold is about the 150,000th part of an inch in thickness, it for the first time permits the transmission of the rays of light. Pure gold, or gold but slightly alloyed, transmits green rays; gold highly alloyed with silver transmits pale violet rays. The mould requires in all about four hours’ beating with a 7-lb hammer, when the ordinary thinness for the gold leaf of commerce will be reached. A single ounce of gold will at this stage be extended to 75 X4 X4 = 1200 leaves, which will trim to squares of about 3 \ in. each. The finished leaf is then taken out of the mould, and the rough edges are trimmed off by slips of the ratan fixed in parallel grooves of an instrument called a waggon, the leaf being laid upon a leathern cushion. The leaves thus prepared are placed into ” books ” capable of holding 25 leaves each, which have been rubbed over with red ochre to prevent the gold clinging to the paper. Dentist

gold is gold leaf carried no farther than the cutch stage, and should be perfectly pure

S old – . .

By the above process also silver is beaten, but not so thin, the

inferior value of the metal not rendering it commercially desirable to

bestow so much labour upon it. Copper, tin, zinc, palladium, lead,

cadmium, platinum and aluminium can be beaten into thin leaves,

but not to the same extent as gold or silver.

The fine membrane called goldbeater's skin, used for making up the shoder and mould, is the outer coat of the caecum or blind gut of the ox. It is stripped off in lengths about 25 or 30 in., and freed from fat by dipping in a solution of caustic alkali and scraping with a blunt knife. It is afterwards stretched on a frame; two membranes are glued together, treated with a solution of aromatic substances or camphor in isinglass, and subsequently coated with white of egg. Finally they are cut into squares of 5 or 5 J in.; and to make up a mould of 950 pieces the gut of about 380 oxen is required, about 2§ skins being got from each animal. A skin will endure about 200 beatings in the mould, after which it is fit for use in the shoder alone.

The dryness of the cutch, shoder and mould is a matter of extreme delicacy. They require to be hot-pressed every time they are used, although they may be used daily, to remove the moisture which they acquire from the atmosphere, except in extremely frosty weather, when they acquire so little moisture that a difficulty arises from their over-dryness, whereby the brilliancy of the gold is diminished, and it spreads very slowly under the hammer. On the contrary, if the cutch or shoder be damp, the gold will become pierced with innumer- able microscopic holes; and in the moulds in its more attenuated state it will become reduced to a pulverulent state. This condition is more readily produced in alloyed golds than in fine gold. It is necessary that each skin of the mould should be rubbed over with calcined gypsum each time the mould may be used, in order to pre- vent the adhesion of the gold to the surface of the skin in beating.

GOLDBERG, a town of Germany, in the Prussian province of Silesia, 1 14 m. by ra;l S.W. of Liegnitz, on the Katzbach, an affluent of the Oder. Pop. (1905) 6804. The principal buildings are an old church dating from the beginning of the 13th century, the Schwabe-

Priesemuth institution, completed in 1876, for the board and education of orphans, and the classical school or gymnasium (founded in 1524 by Duke Frederick II. of Liegnitz), which in the 1 7th century enjoyed great prosperity, and numbered Wallenstein among its pupils. The chief manufactures are woollen cloth, flannel, gloves, stockings, leather and beer, and there is a considerable trade in corn and fruit, Goldberg owes its origin and name to a gold mine in the neighbourhood, which, however, has been wholly abandoned since the time of the Hussite wars. The town obtained civic rights in 121 1. It suffered heavily from the Tatars in 1241, from the plague in 1334, from the Hussites in 1428, and from the Saxon, Imperial and Swedish forces during the Thirty Years' War. On the 27th of May 1813 a battle took.place near it between the French and the

1 Goldberg is also the name of a small town in the grand-duchy of Mecklenburg-Schwerin.

Russians; and on the 23rd and the 27th of August of the same year fights between the allies and the French.

See Sturm, Geschichte der Stadt Goldberg in Schlesien (1887).

GOLD. COAST, that portion of the Guinea Coast (West Africa) which extends from Assini upon the west to the river Volta on the east. It derives its name from the quantities of grains of gold mixed with the sand of the rivers traversing the district. The term Gold Coast is now generally identified with the British Gold Coast colony. This extends from 3 7′ W. to 1° 14′ E., the length of the coast-line being about 370 m. It is bounded W. by the Ivory Coast colony (French), E. by Togoland (German). On the north the British possessions, including Ashanti (q.v.) and the Northern Territories, extend to the nth degree of north latitude. The frontier separating the colony from Ashanti (fixed by order

Bmcry Walker sc

in council, 22nd of October 1906) is in general 130 m. from the coast, but in the central portion of the colony the southern limits of Ashanti project wedge-like to the confluence of the rivers Ofin and Prah, which point is but 60 m. from the sea at Cape Coast. The combined area of the Gold Coast, Ashanti and the Northern Territories, is about 80,000 sq. m., with a total population officially estimated in 1908 at 2,700,000; the Gold Coast colony alone has an area of 24,200 sq. m., with a population of over a million, of whom about 2000 are Europeans.

Physical features. — Though the lagoons common to the West African coast are found both at the western and eastern extremities of the colony (Assini in the west and Kwitta in the east) the greater part of the coast-Une is of a different character. Cape Three Points" (4 44 4°" N. 2° 5′ 45″ W.) juts boldly into the sea, forming the most •southerly point of the colony. Thence the coast trends E. by N., and is but slightly indented. The usually low sandy beach is, however diversified by bold, rocky headlands. The flat belt of country does not extend inland any considerable distance, the spurs of the great plateau which forms the major part of West Africa advancing in the east in the Akwapim district, near to the coast. Here the hills reach an altitude of over 2000 ft. Out of the level plain rise many isolated peaks, generally of conical formation. Numerous rivers descend

from the hills, but bars of sand block their mouths, and the Gold Coast possesses no harbours. Great Atlantic rollers break unceas- ingly upon the shore. The chief rivers are the Volta (q.v.), the Ankobra and the Prah. The Ankobra or Snake river traverses auriferous country, and reaches the sea some 20 m. west of Cape Three Points. It has a course of about 150 m., and is navigable in steam launches for about 80 m. The Prah (" Busum Prah," sacred river) is regarded as a fetish stream by the Fanti and Ashanti. One of its sub-tributaries has its rise near Kumasi. The Prah rises in the N.E. of the colony and flows S.W. Some 60 m. from its mouth it is joined by the Ofin, which comes from the north-west. The united stream flows S. and reaches the sea in i° 35'W. As a waterway the river, which has a course of 400 m., is almost useless, owing to the many cataracts in its course. Another river is the Tano, which for some distance in its lower course forms the boundary between the colony and the Ivory Coast.

Geology. — Cretaceous rocks occur at intervals along the coast belt, but are mostly hidden under an extensive development of superficial deposits. Basalt occurs at Axim. Inland is a broad belt of sand- stone and marl with an occasional band of auriferous conglomerate, best known and most extensively worked for gold in the Wasaw district.

Though the conglomerates bear some resemblance to the

Banket of South Africa they are most probably of more recent date. The alluvial silts and gravels also carry gold.

Climate.— The climate on the coast is hot, moist and unhealthy, especially for Europeans. The mean temperature in the shade in the coast towns is 78 to 8o° F. Fevers and dysentery are the diseases most to be dreaded by the European. The native inhabitants, although they enjoy tolerable health and live to an average age, are subject in the rainy season to numerous chest complaints. There are two wet seasons. From April to August are the greater rains, whilst m October and November occur the ” smalls ” or second rains from the end of December to March the dry harmattan wind blows from the Sahara. In consequence of the prevalence of the sea breeze from the south-west the western portion of the colony, up to the mouth of the Sekum river (a small stream to the west of Accra) is called the windward district, the eastward portion being known as the leeward. The rainfall at Accra, in the leeward district averages 27 in. in the year, but at places in the windward district is much greater, averaging 79 in. at Axim.

Flora.— The greater part (probably three-fourths) of the colony is covered with primeval forest. Here the vegetation is so luxuriant that for great distances the sky is shut out from view. As a result of the struggle to reach the sunlight the forest growths are almost entirely vertical. The chief trees are silk cottons, especially the bombax, and gigantic hard- wood trees, such as the African mahogany ebony, odum and camwood. The bombax rises for over 100 ft a straight column-like shaft, 25 to 30 ft. in circumference, and then throws out horizontally a large number of branches. The lowest growth in the forest consists of ferns and herbaceous plants Of the ferns some are climbers reaching 30 to 40 ft. up the stems of the trees they entwine. Flowering plants are comparatively rare; they include orchids and a beautiful white lily. The ” bush ” or inter- mediate growth is made up of smaller trees, the rubber vine and other creepers, some as thick as hawsers, bamboos and sensitive mimosa, and has a height of from 30 to 60 ft. The creepers are found not only in the bush, but on the ground and hanging from the branches ot the highest trees. West of the Prah the forest comes down to the edge of the Atlantic. East of that river the coast land is covered with bushes 5 to 12 ft. high, occasional large trees and groves of oil palms. Still farther east, by Accra, are numerous arborescent Euphorbias, and immediately west of the lower Volta forests of oil palms and grassy plains with fan palms. Behind all these eastern regions is a belt of thin forest country before the denser forest is reached. In the north-east are stretches of orchard-like

country with wild plum, shea-butter and kola trees, baobabs, dwarf date and fan palms. The cotton and tobacco plants grow wild At the mouths of the rivers and along the lagoons the mangrove is the characteristic tree. There are numerous coco-nut palms along the coast. 1 he fruit trees and plants also include the orange, pineapple mango', papaw, banana and avocado or alligator pear.

Fauna.— The fauna includes leopards, panthers, hyenas, Potto lemurs, jackals, antelopes, buffaloes, wild-hogs and many kinds of monkey, including the chimpanzee and the Colobus vellerosus, whose skin with long black silky hair, is much prized in Europe. The elephant has been almost exterminated by ivory hunters The snakes include pythons, cobras, horned and puff adders and the venomous water snake. Among the lesser denizens of the forest are the squirrel and porcupine. Crocodiles and in fewer numbers manatees and otters frequent the rivers and lagoons and hippopotami are found in the Volta. Lizards of brilliant hue, tortoises and great snails are common. Birds, which are not very numerous, include parrots and hornbills, kingfishers, ospreys, herons, crossbills, curlews woodpeckers, doves, pigeons, storks, pelicans, swallows, vultures and the spur plover (the last-named rare). Shoals of herrings frequent the coast, and the other fish include mackerel, sole, skate, mullet bomto, flying fish, fighting fish and shynose. Sharks abound at the mouths of all the rivers, edible turtle are fairly common, as are the sword fish, dolphin and sting ray (with poisonous caudal spine) Oysters are numerous on rocks running into the sea and on the

Native Lan- guages.

exposed roots of mangrove trees. Insect life is multitudinous ; beetles, spiders, ants, fireflies, butterflies and jiggers abound. The earth- worm is rare. The mosquitos include the Culex or ordinary kind, the Anopheles, which carry malarial fever, and the Stegomyia, a striped white and black mosquito which carries yellow-fever.

Inhabitants. — The natives are all of the Negro race. The most important tribe is the Fanti (q.v.), and the Fanti language is generally understood throughout the colony. The Fanti and Ashanti are believed to have a common origin. It is certain that the Fanti came originally from the north and conquered many of the coast tribes, who anciently had owned the rule of the king of Benin. The districts in general are

named after the tribes inhabiting them. Those in the western part of the colony are mainly of Fanti stock ; the Accra and allied tribes inhabit the eastern portion and are believed to be the aboriginal inhabitants. The Akim (Akem), who occupy the north- east portion of the colony, have engaged in gold-digging from time immemorial. The capital of their country is Kibbi. The Akwapim (Aquapem), southern neighbours of the Akim, are extensively en- gaged in agriculture and in trade. The Accra, a clever race, are to be found in all the towns of the West African coast as artisans and sailors. They are employed by the interior tribes as middlemen and interpreters. On the right bank of the Volta occupying the low marshy land near the sea are the Adangme. The Krobos live in little villages in the midst of the palm tree woods which grow round about the Kroboberg, an eminence about iooo ft. high. Their country lies between that of the Akim and the Adangme. In the west of the colony is the Ahanta country, formerly an independent kingdom. The inhabitants were noted for their skill in war. They are one of the finest and most intelligent of the tribes of Accra stock. The Apollonia, a kindred race, occupy the coast region nearest the Ivory Coast.

The Tshi, Tchwi or Chi language, 1 which is that spoken on the Cold Coast, belongs to the great prefix-pronominal group. It com- prises many dialects, which may, however, be reduced to two classes or types. Akan dialects are spoken in Assini, Amanahia (Apollonia), Awini, Ahanta, Wasaw, Tshuforo (Juffer or Tufel), and Denkyera in the west, and in Asen, Akim, .and Akwapim in the east, as well as in the different parts of Ashanti. Fanti dialects are spoken, not only in Fanti proper, but in Afutu or the country round Cape Coast, in Abora, Agymako, Akomfi, Gomoa and Agona. The difference between the two types is not very great; a Fanti, for example, can converse without much difficulty with a native of Akwapim or Ashanti, his language being in fact a deteriorated form of the same original. Akim is considered the finest and purest of all the Akan dialects. The Akwapim, which is based on the Akim but has im- bibed Fanti influences, has been made the book-language by the Basel missionaries. They had reduced it to writing before 1850. About a million people in all, it is estimated, speak dialects of the Tshi.

The south-eastern corner of the Gold Coast is occupied by another language known as the Ga or Accra, which comprises the Ga proper and the Adangme and Krobo dialects. Ga proper is spoken by about 40,000 people, including the inhabitants of Ga and Kinka (i.e. Accra, in Tshi, Nkran and Kankan), Osu (i.e. Christiansborg), La, Tessi, Ningua and numerous inland villages. It has been reduced to writing by the missionaries. The Adangme and Krobo dialects are spoken by about 80,000 people. They differ very considerably from Ga proper, but books printed in Ga ean be used by both the Krobo and Adangme natives. Another language known as Guan is used in parts of Akwapim and in Anum beyond the Volta ; but not much is known either about it or the Obutu tongue spoken in a few towns in Agona, Gomoa and Akomfi.

Fetishism (q.v.) is the prevailing religion of all the tribes. Belief in a God is universal, as also is a belief in a future state. Christi- Rellsrlon anity and Mahommedanism are both making progress. ˆ The natives professing Christianity number about 40,000.

education. A Moravian mission was started at Christiansborg about 1736; the Basel mission (Evangelical) was begun in 1828, the missionaries combining manual training and farm labour with purely religious work; the Wesleyans started a mission among the Fanti in 1835, and the Anglican and Roman Catholic Churches are also represented, as well as the Bremen Missionary Society. Elementary education is chiefly in the hands of the Wesleyan, Basel, Bremen and

Roman Catholic missions, who have schools at many towns along the coast and in the interior. There are also government and Mahommedan schools. The natives generally are extremely intelligent. They obtain easily the means of subsistence, and are disinclined to unaccustomed labour, such as working in mines. They are keen traders. The native custom of burying the dead under the floors of the houses prevailed until 1874, when it was prohibited by the British authorities. • Towns. — Unlike the other British possessions on the west coast of Africa, the colony has many towns along the shore, this being due to the multiplicity of traders of rival nations who went thither in quest of gold. Beginning at the west, Newtown, on the Assini or Eyi lagoon, is just within the British frontier. The first place of im-

1 This name appears in a great variety of forms — Kwi, Ekwi, Okwi, Oji, Odschi, Otsui, Tyi, Twi, Tschi, Chwee or Chee.

portance reached is Axim (pop., 1901, 2189), the site of an old Dutch fort built near the mouth of the Axim river, and in the pre-railway days the port of the gold region. Rounding Cape Three Points, whose vicinity is marked by a line of breakers nearly 2j m. long, Dixcove is reached. Twenty miles farther east is Sekondi (q.v.), (pop. about 5000), the starting-point of the railway to the gold-fields and Kumasi. Elmina (q.v.), formerly one of the most important posts of European settlement, is reached some distance after passing the mouth of the Prah. Eight miles east of Elmina is Cape Coast (q.v.), pop. (1901) 28,948. Anamabo is 9 m. farther east. Here, in 1807, a handful of English soldiers made a heroic and successful defence of its fort against the whole Ashanti host. Saltpond, towards the end of the 19th century, diverted to itself the trade formerly done by Anamabo, from which it is distant 9 m. Saltpond is a well-built, flourishing town, and is singular in possessing no ancient fort. Between Anamabo and Saltpond is Kormantine(Cormantyne), noted as the place whence the English first exported slaves from this coast. Hence the general name Coromantynes given in the West Indies to slaves from the Gold Coast. Eighty miles from Cape Coast is Accra (q.v.) (pop. 17,892), capital of the colony. (Winnebah is passed 30 m. before Accra is reached. It is an old town noted for the manu- facture of canoes.) There is no station of much importance in the 60 m. between Accra and the Volta, on the right bank of which river, near its mouth, is the town of Addah (pop. 13,240). Kwitta (pop. 3018) lies beyond the Volta not far from the German frontier. Of the inland towns Akropong, the residence of the king of Akwapim, is one of the best known. It is 39 m. N.E. of Accra, stands on a ridge 1400 ft. above sea-level, and is a healthy place for European residents. At Akropong are the headquarters of the Basel

Missionary Society. Akuse is a large town on the banks of the Volta. Tarkwa is the centre of the gold mining industry in the Wasaw district. Its im- portance dates from the beginning of the 20th century. Accra, Cape Coast and Sekondi possess municipal government.

A griculture and Trade. — The soil is everywhere very fertile and the needs of the people being few there is little incentive to work. The forests alone supply an inexhaustible source of wealth, notably in the oil palm. Among vegetable products cultivated are cocoa, cotton, Indian corn, yams, cassava, peas, peppers, onions, tomatoes, ground-nuts (Arachis hypogaea), Guinea corn (Sorghum vulgare) and Guinea grains (Amomum grana-paradisi). The most common article of cultivation is, however, the kola nut (Sterculia acuminata), the favourite substitute in West Africa for the betel nut. In 1890 efforts were made by the establishment of a government botanical station at Aburi in the Accra district to induce the natives to improve their methods of cultivation and to enlarge the number of their crops. This resulted in the formation of hundreds of cocoa plantations, chiefly in the district immediately north of Accra. Subsequently the cultivation of the plant extended to every district of the colony. The industry had been founded in 1879 by a native of Accra, but it was not until 1901, as the result of the government's fostering care, that the export became of importance. In that year the quantity exported slightly exceeded 2,000,000 lb and fetched £42,000. In 1907 the quantity exported was nearly 21,000,000 lb and in value exceeded £515,000. In 1904 efforts were begun by the government and the British Cotton Growing Association in co-operation to foster the growing of cotton for export and by 1907 the cotton industry had become firmly established. Tobacco and coffee are grown at some of the Basel missionary stations.

The chief exports are gold, palm oil and palm kernels, cocoa, rubber, timber (including mahogany) and kola nuts. Of these articles the gold and rubber are shipped chiefly to England, whilst Germany, France and America, take the palm products and ground- nuts. The rubber comes chiefly from Ashanti. The imports consist of cotton goods, rum, gin and other spirits, rice, sugar, tobacco, beads, machinery, building materials and European goods generally.

The value of the trade increased from £1,628,309 in 1896 to £4,055,351 in 1906. In the last named year the imports were valued at £2,058,839 and the exports at £1,996,412. While the value of imports had remained nearly stationary since 1902 the value of exports had nearly trebled in that period. In the five years 1903- 1907 the total trade increased from £3,063,486 to £5,007,869. Great Britain

and British colonies take 66% of the exports and supply over 60% of the imports. In both import and export trade Germany is second, followed by France and the United States. Specie is in- cluded in these totals, over a quarter of a million being imported in

1904.

Hshing is carried on extensively along the coast, and salted and sun-dried fish from Addah and Kwitta districts find a ready sale inland. Cloths are woven by the natives from home-grown and imported yarn; the making of canoes, from the silk-cotton trees, is a flourishing industry, and salt from the lagoons near Addah is roughly prepared. There are also native artificers in gold and other metals, the workmanship in some cases being of conspicuous merit. Odum wood is largely used in building and for cabinet work.

Gold Mining. — Gold is found in almost every part of the colony, but only in a few districts in paying quantities. Although since the discovery of the coast gold had been continuously exported to Europe from its ports, it was not until the last twenty years of the 19th century that efforts were made to extract gold according to modern methods. The richness of the Tarkwa main reef was first

discovered by a French trader, M. J. Bennat, about 1880. During the period 1880 to 1900 the value of the gold exported varied from a minimum of £32,000 to a maximum (1889) of £103.000. The increased interest shown in the industry led to the construction of a railway (see below) to the chief gold-fields, whereby the difficulties of transport were largely overcome. Consequent upon the taking up of a number of concessions, a concessions ordinance was issued in August 1900. This was followed in 1901 by the grant of 2825 con- cessions, and a ” boom ” in the West African market on the London stock exchange. Many concessions were speedily abandoned and in 1901 the export of gold dropped to its lowest point, 6162 oz., worth £22,186, but in 1902 a large company began crushing ore and the output of gold rose to 26,911 oz., valued at £96,880. In 1907 the export was 292 125 oz., wotht £1,164,676. It should be noted that one of the principal gold mines is not in the colony proper, but at Obuassi in Ashanti. Underground labour is performed mainly by Basas and Krumen from Liberia. Of native tribes the Apollonia have proved the best for underground work, as they have mining traditions dating from Portuguese times. . A good deal of alluvial gold is obtained b? dredging apparatus. The use of dredging apparatus is modern, but the

natives have worked the alluvial soil and the sand of the sea- shore for generations to get the gold they contain.

Communications.— The colony possesses a railway, built and owned by the government, which serves the gold mines, and has its sea terminus at Sekondi. Work was begun in August 1898 but owing to the disturbance caused by the Ashanti rising of 1900 the rails only reached Tarkwa (39 m.) in May 1901. Thence the line is carried to Kumasi, the distance to Obuassi (124 m.) being completed by December 1902 whilst the first train entered the Ashanti capital on the 1st of October 1903. The total length of the line is 168 m. Ihe cost of construction was £1,820,000. The line has a gauge 3 tt. 6 in. I here is a branch line, 20 m. long, from Tarkwa N W to Frestea on the Ankobra nver. Another railway, built 1907-10 35 m. in length, runs from Accra to Mangoase, in the centre of the chief cocoa plantations. An extension to Kumasi has been surveyed . l ort H,° us bush , tra cks are the usual means of internal communica- tion. 1 hese are kept in fair order in the neighbourhood of govern- ment stations. There is a well-constructed road 141 m. long from Lape Loast to Kumasi, and roads connecting neighbouring towns are maintained by the government. Systematic attempts to make use ot the upper Volta as a means of conveying goods to the interior were first tried in 1900. The rapids about 60 m. from the mouth of the nver effectually prevent boats of large size passing up the stream. Where railways or canoes are not available goods are generally carried on the heads of porters, 60 lb being a full load. Telegraphs introduced in 1882, connect all the important towns in the colony' and a line starting at Cape Coast stretches far inland, via Kumasi to VVa in the Northern Territories. Accra and Sekondi are in telegraphic communication with Europe, the Ivory Coast, Lagos and the Cape of Uood Hope. 1 here is regular and frequent steamship communica- tion with Europe by British, Belgian and German lines

Administration, Revenue, &° c .— The country is governed as a crown colony, the governor being assisted by a legislative council composed ot officials and nominated unofficial members. Laws, called ordin- ances, are enacted by the governor with the advice and consent of this council. The law of the colony is the common law and statutes of general application in force in England in 1874, modified by local ordinances passed since that date. The governor is also governor of Ashanti and the Northern Territories, but in those dependencies the legislative council has no authority.

Native laws and customs— which are extremely elaborate and complicated— are not interfered with " except when repugnant to

natural justice. Those relating to land tenure and succession may be thus summarized. Individual tenure is not unknown, but most and is held by the tribe or by the family in common, each member having the right to select a part of the common land for his own use Permanent alienation can only take place with the unanimous consent ot the family and is uncommon, but long leases are granted Succession is through the female, i.e. when a man dies his property goes to his sister s children. The government of the tribes is by thefr own kings and chiefs under the supervision of district commissioners. Slavery has been abolished in the colony. In the Northern Terri- tories the dealing in slaves is unlawful, neither can any person be put in pawn for debt; nor will any court give effect to the relations between master and slave except in so far as those relations may be in accordance withthe English laws relating to master and servant hor administrative purposes the colony is divided into three provinces under provincial commissioners, and each province is sub- divided into districts presided over by commissioners, who exercise judicial as well as executive functions. The supreme court consists, of a chief justice and three puisne judges. The defence of the colony is entrusted to the Gold Coast regiment of the West African Frontier ‘ 1- orce, a force of natives controlled by the Colonial Office but officered iT™) Bntlsh arm y- Th ere is also a corps of volunteers (formed

The chief source of revenue is the customs and (since 1902) railway receipts, whilst the heaviest items of expenditure are transport (in- cluding railways) and mine surveys, medical and sanitary services and maintenance of the military force. The revenue, which in the period 1894-1898 averaged £244,559 yearly, rose in 1898-1903 to an

average of £556,316 a year. For the five years 190ˆ-1907 the average annual revenue was £647,557 and the average annual expenditure £615,696. Save for municipal purposes there is no direct taxation in the colony and no poor-houses exist. There is a public debt of (December 1907) £2,206,964. It should be noted that the expenditure on Ashanti and the Northern Territories is included in the Gold Coast budget.

History.— It is a debated question whether the Gold Coast was discovered by French or by Portuguese sailors. The evidence available is insufficient to prove the assertion, of which there is no contemporary record, that a company of Norman merchants established themselves about 1364 at a place they named La Mma (Elmina),and that they traded with the natives for nearly fifty years,

when the enterprise was abandoned. It is well estab lished that a Portuguese expedition under Diogo d'Azambuja accompanied probably by Christopher Columbus, took possession of (or founded) Elmina in 1481-1482. By the Portuguese it was called variously Sao Jorge da Mina or Ora del Mina— the mouth of the (gold) mines. That besides alluvial washings they also worked the gold mines was proved by discoveries in the latter part of the 1 9th century. The Portuguese remained undisturbed in their trade until the Reformation, when the papal bull which had given the country, with many others, to Portugal ceased to have a binding power. English ships in 1 5 53 brought back from Guinea gold to the weight of 1 50 lb. The fame of the Gold Coast thereafter attracted to it adventurers fromalmost every European nation. The English were followed by French, Danes, Branden- burgers, Dutch and Swedes. The most aggressive were the Dutch, who from the end of the 16th century sought to oust the Portuguese from the Gold Coast, and in whose favour the Portu- guese did finally withdraw in 1642, in return for the withdrawal on the part of the Dutch of their claims to Brazil. The Dutch henceforth made Elmina their headquarters on the coast. Traces of the Portuguese occupation, which lasted 160 years, are still to be found, notably in the language of the natives. Such familiar words as palaver, fetish, caboceer and dash {i.e. a gift) have all a Portuguese origin.

An English company built a fort at Kormantine previously to 165 1 , and some ten years later Cape Coast Castle was built The settlements made by the English provoked the hostility Appear of the Dutch and led to war between England and anceot Holland, during which Admiral de Ruyter destroyed the (1664-1665) all the English forts save Cape Coast Bn * llsb – castle. The treaty of Breda in 1667 confirmed the Dutch in the possession of their conquests, but the English speedily opened other trading stations. Charles II. in 1672 granted a charter to the Royal African Company, which built forts at Dixcove, Sekondi, Accra, Whydah and other places, besides repairing Cape Coast Castle. At this time the trade both in slaves and gold was very great, and at the beginning of the 18th century the value of the gold exported annually was estimated by Willem Bosman, the chief Dutch factor at Elmina, to be over £200,000. The various European traders were constantly quarrelling among themselves and exercised scarcely any controloverthenatives. Piracy was rife along the coast, and was not indeed finally stamped out until the middle of the 19th century. The Royal African Company, which lost its monopoly of trade with England in 1700, was succeeded by another, the African Company of Merchants, which was con- stituted in 1750 by act of parliament and received an annual subsidy from government. The

slave trade was then at its height and some 10,000 negroes were exported yearly. Many of the slaves were prisoners of war sold to the merchants by the Ashanti, who had become the chief native power. The aboli- tion of the slave trade (1807) crippled the company, which was dissolved in 1821, when the crown took possession of the forts.

Since the beginning of the 19th century the British had begun to exercise territorial rights in the towns where they held forts, and in 1 8 1 7 the right of the British to control the natives living in the coast towns was recognized by Ashanti. In 1824 the first step towards the extension of British authority beyond the coast region was taken by Governor Sir Charles M'Carthy, who incited the Fanti to rise against their oppressors, the Ashanti. (The Fanti's country had been conquered by the Ashanti in 1807.)

forts purchased.

Sir Charles and the Fanti army were defeated, the governor losing his life, but in 1826 the English gained a victory over the Ashanti at Dodowah. At this period, however, the home government, disgusted with the Gold Coast by reason of the perpetual dis- turbances in the protectorate and the trouble it occasioned, determined to abandon the settlements, and sent instructions for the forts to be destroyed and the Europeans brought home. The merchants, backed by Major Rickets, 2nd West India regiments, the administrator, protested, and as a compromise the forts were handed over to a committee of merchants (Sept. 1828), who were given a subsidy of £4000 a year. The merchants secured (1830) as their administrator Mr George Maclean — a gentleman with military experience on the Gold Coast and not engaged in trade. To Maclean is due the consolidation of British interests in the interior. Heconcluded, i83i,atreaty'withtheAshantiadvantage- ous to the Fanti, whilst with very inadequate means he contrived to extend British influence over the whole region of the present colony. In the words of a Fanti trader Maclean understood the people, " he settled things quietly with them and the people also loved him." 1 Complaints that Maclean encouraged slavery reached England, but these were completely disproved, the governor being highly commended on his administration by the House of Commons Committee. It was decided, nevertheless, that the Colonial Office should resume direct control of the forts, which was done in 1843, Maclean continuing to direct

native affairs until his death in 1847. The jurisdiction of England on the Gold Coast was defined by the bond of the 6th of March 1844, Danish an agreement with the native chiefs by which the and crown received the right of trying criminals, repressing

Dutch human sacrifice, &c. The limits of the protectorate

inland were not defined. The purchase of the Danish forts in 1850, and of the Dutch forts and territory in 1 87 1, led to the consolidation of the British power along the coast; and the Ashanti war of 1873-74 resulted in the extension of the area of British influence. Since that time the colony has been chiefly engaged in the development of its material resources, a development accompanied by a slow but substantial advance in civilization among the native population. (For further historical information see Ashanti.)

For a time the Gold Coast formed officially a limb of the ” West African Settlements ” and was virtually a dependency of Sierra Leone. In 1874 the settlements on the Gold Coast and Lagos were created a separate crown colony, this arrangement lasting until 1886 when Lagos was cut off from the Gold Coast administration.

Northern Territories.

The Northern Territories of the Gold Coast form a British protectorate to the north of Ashanti. They are bounded W. and N. — where 11° N. is the frontier line except at the eastern extremity — by the French colonies of the Ivory Coast and Upper Senegal and Niger, E. by the German colony of Togoland. The southern frontier, separating the protectorate from Ashanti, is the Black Volta to a point a little above its junction with the White Volta. Thence the frontier turns south and afterwards east so as to include the Brumasi district in the protectorate, the frontier gaining the main Volta below Yeji. The Territories include nearly all the country from the meridian of Greenwich to 3 W. and between 8° and n° N., and cover an area of about 33,000 sq.m.

Lying north of the great belt of primeval forest which extends parallel to the Guinea coast, the greater part of the protectorate consists of open country ,well timbered, and much of it presenting a park-like appearance. There are also large stretches of grassy plains, and in the south-east an area of treeless steppe. The flora and fauna resemble those of Ashanti. The country is well watered, the Black Volta forming the west and southern frontier for some distance, while the White Volta traverses its central regions. Both rivers, and also the united

stream, contain rapids which impede but do not prevent navigation (see Volta). The climate is much healthier than that of the coast districts, and the

1 Blue Book on Africa {Western Coast) (1865), p. 233.

fever experienced is of a milder type. The rainfall is less than on the coast; the dry season lasts from November (when the harmattan begins to blow) to March. The mean temperature at Gambaga is 80° F., the mean annual rainfall 43 in. The inhabi- tants were officially estimated in 1907 to number ” at least 1,000,000.” The Dagomba, Dagarti, Grunshi, Kangarga, Moshi and Zebarima, Negro or Negroid tribes, constitute the bulk of the people, and Fula, Hausa and Yoruba have settled as traders or cattle raisers. A large number of the natives are Moslems, the rest are fetish worshippers. The tribal organization is maintained by the British authorities, who found comparatively little difficulty in putting an end to slave-raiding and gaining the confidence of the chiefs. Trained by British officers, the natives make excellent soldiers.

Agriculture and Trade. — The chief crops are maize, guinea-corn, millet, yams, rice, beans, groundnuts, tobacco and cotton. Cotton is grown in most parts of the protectorate, the soil and climate in many-districts being very suitable for its cultivation. Rubber is found in the north-western regions. When the protectorate was assumed by Great Britain the Territories were singularly destitute of fruit trees. The British have introduced the orange, citron, lime, guava, mango and soursop, and among plants the banana, pine-apple and papaw. A large number of vegetables and flowers have also been introduced by the administration.

Stock-raising is carried on extensively, and besides oxen and sheep there are large numbers of horses and donkeys in the Territories. The chief exports are cattle, dawa-dawa (a favourite flavouring matter for soup among the Ashanti and other tribes) and shea- butter — the latter used in cooking and as an illuminant. The principal imports are kola-nuts, salt and cotton goods. A large proportion of the European goods imported is German and comes through Togoland. The administration levies a tax on traders’ caravans, and in return ensures the safety of the roads. This tax is the chief local source of revenue. The revenue and expenditure of the Territories, as well as statistics of trade, are included in those of the Gold Coast.

Gold exists in quartz formation, chiefly in the valley of the Black Volta, and is found equally on the British and French sides of the

frontier.

Towns. — The headquarters of the administration are at Tamale (or Tamari), a town in the centre of the Dagomba country east of the White Volta and 200 m. N.E. of Kumasi. Its inhabitants are keen traders, and it forms a distributing centre for the whole protectorate. Gambaga, an important commercial centre and from 1897 to 1907 the seat of government, is in Mamprusi, the north-east corner of the protectorate and is 85 m. N.N.E. of Tamale. A hundred and forty miles due south of Gambaga is Salaga. This town is situated on the caravan route from the Hausa states to Ashanti, and has a consider- able trade in kola-nuts, shea-butter and salt. On the White Volta, midway between Gambaga and Salaga, is the thriving town of Daboya. On the western frontier are Bole (Baule) and Wa. They carry on an extensive trade with Bontuku, the capital of Jaman, and other places in the Ivory Coast colony. In all the towns the popula- tion largely consists of aliens — Hausa, Ashanti, Mandingos, &c.

Communications. — Lack of easy communication with the sea hinders the development of the country. The ancient caravan routes have been, however, supplemented by roads built by the British, who have further organized a service of boats on the Volta. Large cargo boats, chiefly laden with salt, ascend that river from Addah to Yeji and Daboya. From Yeji, the port of Salaga, a good road, 150 m. long, has been made to Gambaga. There is also a river service from Yeji to Longoro on the Black Volta, the port of Kintampo, in northern Ashanti. There is a complete telegraphic system connect- ing the towns of the protectorate with Kumasi and the Gold Coast ports.

History. — It was not until the last quarter of the 19th century that the .country immediately north of Ashanti became known to Europeans. The first step forward was made by Monsieur M. J. Bonnat (one of the Kumasi captives, see Ashanti) who, ascending the Volta, reached Salaga (1875-1876). In 1882 Captain R. La Trobe Lonsdale, an officer in British colonial service, went farther, visiting Yendi in the north and Bontuku in the west. Two years later Captain Brandon Kirby made his ■way to Kintampo. In 1887-1889 Captain L. G. Binger, a French officer, traversed the country from north to south. Thereafter the whole region was visited by British, French and German political missions. Prominent among the British agents was Mr George E. Ferguson, a native of West Africa, who had previously explored northern Ashanti. Between 1892 and 1897 Ferguson concluded several treaties guarding British interests. In 1897 Lieutenant Henderson and Ferguson occupied Wa, where they were attacked by the sofas of Samory (see Senegal, § 3).

Henderson, who had gone to the sofa camp to parley, was held prisoner for some time, while Ferguson was killed. Mean- time negotiations were opened in Europe to settle the spheres of influence of the respective countries. (The Anglo-French agreement of 1889 had fixed the boundaries of the hinterlands of the French colony of the Ivory Coast and the British colony of the Gold Coast as far as 9 N. only.) A period of considerable tension, arising from the proximity of British and French troops in the disputed territory, was ended by the signature of a conven- tion in Paris (14th of June 1898), in which the western and northern boundaries were defined. The British abandoned their claim to the important town and district of Wagadugu in the north. In the following year (14th of November 1899) an agreement defining the eastern frontier was concluded with Germany. Previously a square block of territory to the north of 8° N. had been regarded as neutral, both by Britain and Germany. This was in virtue of an arrangement made in 1888. By the 1899 convention the neutral zone was parcelled out between the two powers. The delimitation of the frontiers agreed upon took place during 1900-1904.

In 1897 the Northern Territories were constituted a separate district of the Gold Coast hinterland, and were placed in charge of a chief commissioner. Colonel H. P. Northcott (killed in the Boer War, 1899-1902) was the first commissioner and com- mandant of the troops. He was succeeded by Col. A. H. Morris. In 1901 the Territories were made a distinct administration, under the jurisdiction of the governor of the Gold Coast colony. The government was at first of a semi-military character, but in 1907 a civilian staff was appointed to carry on the administration, and a force of armed constabulary replaced the troops which had been stationed in the protectorate and which were then disbanded. The prosperity of the country under British ad- ministration has been marked.

Bibliography.ˆA good summary of the condition and history of the colony to the close of the 19th century will be found in vol. 3, ” West Africa,” of the Historical Geography of the British Empire by C. P. Lucas (2nd ed., Oxford, 1900). For current information see the Gold Coast Civil Service List (London, yearly), the annual Blue Books published in the colony, and the annual Report issued by the Colonial Office, London. For fuller information consult the Report from the Select Committee on Africa {Western Coast) (London, 1865), a mine of valuable information; The Gold Coast, Past and Present, by G.

Macdonald (London, 1898) ; History of the Gold Coast and Ashanti, by C. C. Reindorf, a native pastor (Basel, 1895) ; A History of the Gold Coast, by Col. A. B. Ellis (London, 1893) ; Wanderings in West Africa (London, 1863) and To the Gold Coast for Gold (London, 1883), both by Sir Richard Burton. Of the earlier books the most notable are The Golden Coast or a Description of Guinney together with a relation of such persons as got wonderful estates by their trade thither (London, 1665), and A New and Accurate Description of the Coast of Guinea written (in Dutch) by Willem Bosman, chief factor for the Dutch at Elmina (Eng. trans., 2nd ed., 1721). For a complete survey of the Gold Coast under Dutch control see ” Die Niederliindisch West-Indische Compagnie an der Gold-Kiiste ” by J. G. Doorman in Tijds Indische Taal-, Land- en Volkenk, vol. 40 (1898). For ethnography, religion, law, &c, consult The Land of Fetish (London, 1883) and The Tshi-speaking Peoples of the West Coast of Africa (London, 1887), both by Col. A. B. Ellis; Fanti Customary Law (2nd ed., London, 1904) and Fanti Law Report (London, 1904), both by J . M . Sarbah. The Sketch of the Forestry of West Africa by Sir Alfred Moloney (London, 1887) contains a comprehensive list of economic plants. See also Report on Economic Agriculture on the Gold Coast (Colonial Office Reports, No. no, 1890), and Papers relating to the Construction of Railways in . . . the Gold Coast (London, 1904). The best map is that of Major F. G. Guggisberg, over 70 sheets, scale 1 : 125,000 (London, 1907-1909). There is a War Office map on the scale 1 : 1 ,000,000 in one sheet. See also the works quoted under Ashanti.

For the Northern Territories see L. G. Binger, Du Niger au Golfe de Guinee (Paris, 1892), a standard authority; H. P. Northcott, Report on the Northern Territories of the Gold Coast (War Office,. London, 1899), a valuable compilation summarizing the then avail- able information. Annual Reports on the protectorate arc issued by ‘ the British Colonial Office. A map on the scale of 1 : 1,000,000 is issued by the War Office. (F. R. C.)

GOLDEN, a city and the county-seat of Jefferson county, Colorado, U.S.A., on Clear Creek- (formerly called the Vasquez fork of the South Platte), about. 14 m. W. by N. of Denver. Pop. (1900) 2152; (1910) 2477. Golden is a residential suburb of Denver, served by the Colorado & Southern, the Denver &

Intermountain (electric), and the Denver & North- Western Electric railways. It is about 5700 ft. above sea-level. About 600 ft. above the city is Castle Rock, with an amusement park, and W. of Golden is Lookout Mountain, a natural park of 3400 acres. About 1 m. S. of the city is a state industrial school for boys, and in Golden is the Colorado

State School of Mines (opened 1874), which offers courses in mining engineering and metallurgical engineering. The Independent Pyritic Smelter is at Golden, and among the city's manufactures are pottery, firebrick and tile, made from clays found near by, and flour. There are deposits of coal, copper and gold in the vicinity. Truck-farming and the growing of fruit are important industries in the neighbourhood. The first settlement here was a gold mining camp, established in 1859, and named in honour of Tom Golden, one of the pioneer prospectors. The village was laid out in i860, and Golden was incorporated as a town in 1865 and was chartered as a city in 1870. Golden was made the capital of Colorado Territory in 1862, and several sessions (or parts of sessions) of the Assembly were held here between 1864 and 1868, when the seat of government was formally established at Denver; the territorial offices of Colorado, however, were at Golden only in 1866-1867.

GOLDEN BULL (Lat. Bulla Aurea), the general designation of any charter decorated with a golden seal or bulla, either owing to the intrinsic importance of its contents, or to the rank and dignity of the bestower or the recipient. The custom of thus giving distinction to certain documents is said to be of Byzantine origin, though if this be the case it is somewhat strange that the word employed as an equivalent for golden bull in Byzantine Greek should be the hybrid xP m °fiovK\ov (cf. Codinus Curo- palates, 6 ixiyas \oyo6'enns Stararret to. irapa tov |3acriX«a» airoareXKoixtva irpocrTa.yiJ.aTa Kal xpwbPovXKa irpos re ' Priyas, SouXraras, Kal Torrapxovs; and Anna Comnena, ˆ4/e»'a(/,lib.iii.5ia. Xpi>; lib. viii., xP vff bˆov\ov \6yov). In Germany a Golden Bull is mentioned under the reign of Henry I. the Fowler in Chronica Cassin. ii. 31, and the oldest German example, if it be genuine, dates from 983. At first the golden seal was formed after the type of a solid coin, but at a later date, while the golden surface presented to the eye was greatly increased, the seal was really composed of two thin metal plates filled in with wax. The number of golden bulls issued by the imperial chancery must have been very .large; the city of Frankfort, for example, preserves no fewer than eight.

The name, however, has become practically restricted to a few documents of unusual political importance, the golden bull of the Empire, the golden bull of Brabant, the golden bull of Hungary and the golden bull of Milan — and of these the first is undoubtedly the Golden Bull par excellence. The main object of the Golden Bull was to provide a set of rules for the election of the German kings, or kings of the Romans, as they are called in this document. Since the informal establishment of the electoral college about a century before (see

Electors) , various disputes had taken place about the right of certain princes to vote at the elections, these and other difficulties having arisen owing to the absence of any authoritative ruling. The spiritual electors, it is true, had exercised their votes without challenge, but far different was the case of the temporal electors. The families ruling in Saxony and in Bavaria had been divided into two main branches and, as the German states had not yet accepted the principles of primogeniture, it was uncertain which member of the divided family should vote. Thus, both the prince ruling in Saxe-Lauenburg and the prince ruling in Saxe- Wittenberg claimed the vote, and the two branches of the family of Wittelsbach, one settled in Bavaria and the other in the Rhenish palatinate, were similarly at variance, while the duke of Bavaria also claimed the vote at the expense of the king of Bohemia. Moreover, there had been several disputed and double elections to the German crown during the past century. In more than one instance a prince, chosen by a minority of the electors, had claimed to exercise the functions of king, and as often civil war had been the result. Under these circumstances the emperor Charles IV. determined by an

authoritative pronouncement to make such proceedings impossible in the future, and at the same time to add to his own power and prestige, especially in his capacity as king of Bohemia.

Having arranged various disputes in Germany, and having in April 1355 secured his coronation in Rome, Charles gave instruc- tions for the bull to be drawn up. It is uncertain who is respon- sible for its actual composition. The honour has been assigned to Bartolo of Sassoferrato, professor of law at Pisa and Perugia, to the imperial secretary, Rudolph of Friedberg, and even to the emperor himself, but there is no valid authority for giving it to any one of the three in preference to the others. In its first form the bull was promulgated at the diet of Nuremberg on the 10th of January 1356, but it was not accepted by the princes until some modifications had been introduced, and in its final form it was issued at the diet of Metz on the 25th of December following.

The text of the Golden Bull consists of a prologue and of thirty-one chapters. Some lines of verse invoking the aid of Almighty God are followed by a rhetorical statement of the evils which arise from discord and division, illustrations being taken from Adam, who was

divided from obedience and thus fell, and from Helen of Troy who was divided from her husband. The early chapters are mainly concerned with details of the elaborate ceremonies which are to be observed on the occasion of an election. The number of electors is fixed at seven, the duke of Sax e- Wittenberg, not the duke of Saxe-Lauenburg, receiving the Saxon vote, and the count palatine, not the duke of Bavaria, obtaining the vote of the Wittelsbachs. The electors were ar- ranged in order of precedence thus: the archbishops of Mainz, of Trier and of Cologne, the king of Bohemia, qui inter electores laicos ex rcgiae dignitatis fastigio jure et merito obtinet primatiam, the count palatine of the Rhine, the duke of Saxony and the margrave of Brandenburg. The three archbishops were respec- tively arch-chancellors of the three principal divisions of the Empire, Germany,' Aries and Italy, and the four secular electors each held an office in the imperial household, the functions of which they were expected to discharge on great occasions. The king of Bohemia was the arch-cupbearer, the count palatine was the arch-steward (dapifer), the duke of Saxony was arch- marshal, and the margrave of Brandenburg was arch-chamber- lain. The work of summoning the electors and of presiding over their deliberations fell to the archbishop of Mainz, but if he failed to discharge this duty the electors were to assemble without summons within three months of the death of a king. Elections were to be held at Frankfort; they were to be decided by a majority of votes, and the subsequent coronation at Aix-la- Chapelle was to be performed by the archbishop of Cologne. During a vacancy in the Empire the work of administering the greater part of Germany was entrusted to the count palatine of the Rhine, the duke of Saxony being responsible, however, for the government of Saxony, or rather for the districts ubi Saxonica jura servantur.

The chief result of the bull was to add greatly to the power of the electors; for, to quote Bryce (Holy Roman Empire), it ” confessed and legalized the independence of the electors and the powerlessness of the crown.” To these princes were given sovereign rights in their dominions, which were declared in- divisible and were to pass according to the rule of primogeniture. Except in extreme cases, there was to be no appeal from the sentences of their tribunals, and they were confirmed in the right of coining money, of taking tolls, and in other privileges, while conspirators against their lives were to suffer the penalties of treason. One clause gave special rights and immunities to the king of Bohemia, who, it musLbe remembered, at this time was Charles himself , and others enjoined the observance of the public peace. Provision was made for an annual meeting of the electors, to be held at Metz four weeks after • Easter, when matters pro bono et

salute communi were to be discussed. This arrangement, however, was not carried out, although the electors met occasion- ally. Another clause forbade the cities to receive Pfahlbiirger, i.e. forbade them to take men dwelling outside their walls under their protection. It may be noted that there is no admission

whatever that the election of a king needs confirmation from the pope.

The Golden Bull was thus a great victory for the electors, but it weakened the position of the German king and was a distinct humiliation for the other princes and for the cities. The status of those rulers who did not obtain the electoral privilege was lowered by this very fact, and the regulations about the Pfahl- biirger, together with the prohibition of new leagues and associa- tions, struck a severe blow at the cities. The German kings were elected according to the conditions laid down in the bull until the dissolution of the Empire in 1806. At first the document was known simply as the Lex Carolina; but gradually the name of the Book with the Golden Bull came into use, and the present elliptical title was sufficiently established by 141 7 to be officially employed in a charter by King Sigismund. The original auto- graph was committed to the care of the elector of Mainz, and it was preserved in the archives at Mainz till 1789. Official tran- scripts were probably furnished to each of the seven electors at the time of the promulgation, and before long many of the other members of the Empire secured copies for themselves., The transcript which belonged to the elector of Trier is preserved in the state archives at Stuttgart, that of the elector of Cologne in the court library at Darmstadt, and that of the king of Bohemia in the imperial archives at Vienna. Berlin, Munich and Dresden also boast the possession of an electoral transcript; and the town of Kitzingen has a contemporary copy in its municipal archives. There appears, however, to be good reason to doubt the genuineness of most of these so-called original transcripts. But perhaps the best known example is that of Frankfort- on- Main, which was procured from the imperial chancery in 1366, and is adorned with a golden seal like the original. Not only was it regularly quoted as the indubitable authority in regard to the election of the emperors in Frankfort itself, but it was from time to time officially consulted by members of the Empire.

The manuscript consists of 43 leaves of parchment of medium quality, each measuring about io| in. in height by 7I in breadth. The seal is of the plate and wax type. On the obverse appears a figure of the emperor seated on his throne, with the sceptre in his right hand and the globe in his left; a shield, with the crowned imperial eagle,

occupies the space on the one side of the throne, and a corresponding shield, with the crowned Bohemian lion with two tails, occupies the space on the other side; and round the margin runs the legend, Karolus quartus divina favente dementia, Romanorum imperator semper Augustus et Boemiae rex. On the reverse is a castle, with the words Aurea Roma on the gate, and the circumscription reads, Roma caput mundi regit orbis frena rotundi. The original Latin text of the bull was printed at Nuremberg by Friedrich Creussner in 1474, and a second edition by Anthonius Koburger (d. 1532) appeared at the same place in 1477. Since that time it has been frequently reprinted from various manuscripts and collections. M. Goldast gave the Palatine text, compared with those of Bohemia and Frankfort, in his Collectio constitution-urn et legum imperialium (Frankfort, 1613). Another is to be found in De comitiis imperii of O. Panvinius, and a third, of unknown history, is prefixed to the Codex recessuum Imperii (Mainz, 1599, and again 1615). The Frankfort text appeared in 1742 as Aurea Bulla secundum exemplar originate Frankfurtense, edited by W. C. Multz, and the text is also found in J. J. Schmauss, Corpus juris publici, edited by R. von Hommel (Leipzig, 1 794), and in the Ausgewdhlte Urkunden zur Erlduterung der Verfassungs- geschichte Deutschlands im Mittelalter, edited by W. Altmann and E. Bernheim (Berlin, 1891, and again 1895).” German translations, none of which, however, had any official authority, were published at Nuremberg about 1474, at Venice in 1476, and at Strassburg in 1485. Among the earlier commentators on the document are H.Canisiusand J. Limnaeuswho wrote In Auream Bullam(Stra.ssburg, 1662). The student will find a good account; of the older literature on the subject in C. G. Biener’s Commentarii de origine et progressu legum juriumque Germaniae (1787-1795). See also J. D. von Olenschlager, Neue Erlduterungen der.Guldenen Bulle (Frankfort and Leipzig, 1766) ; H. G. von Thulemeyer, De Bulla Aurea, Argentea, &c. (Heidelberg, 1682) ; J. St Putter, Historische Entwickelung der heutigen Staatsverfassung des teutschen Reichs (Gottingen, 1786- 1787), and O. Stobbe, Geschichte der deutschen RechtsqueUen (Bruns- wick, 1 860-1 864). Among the more modern works may be mentioned: E. Nerger, Die Goldne Bulle nach ihrem Ur sprung (Gottingen, 1877), O. Hahn, Ur sprung und Bedeutung der Goldnen Bulle (Breslau, 1903); and M. G. Schmidt, Die staatsrechtliche Anwendung der Goldnen Bulle (Halle, 1894). There is a valuable contribution to the subject in the Queliensammlung zur Geschichte dzr deutschen Reichsverfassung, edited by K. Zeumer (Leipzig,*l904), and

another by O. Harnack in his Das Kurfiirsten Kollegium bis zur Mitte des I4ten Jahrhunderts (Giessen, I 883) . There is an English translation of the bull in E. F. Henderson's Select Historical Documents of the Middle Ages (London, 1903). (A. W. H.*)

GOLDEN-EYE, a name indiscriminately given in many parts of Britain to two very distinct species of ducks, from the rich yellow colour of their irides. The commonest of them — the A nas fuligula of Linnaeus and Fuligula cristata of most modern ornithologists — is, however, usually called by English writers the tufted duck, while " golden-eye " is reserved in books for the A. clangula and A. glaucion of Linnaeus, who did not know that the birds he so named were but examples of the same species, differing only in age or sex; and to this day many fowlers perpetuate a like mistake, deeming the " Morillon," which is the female or young male, distinct from the " Golden-eye " or " Rattle-wings " (as from its noisy flight they oftener call it), which is the adult male. This species belongs to the group known as diving ducks, and is the type of the very well-marked genus Clnngula of later systematists, which, among other differences, has the posterior end of the sternum prolonged so as to extend considerably over, and, we may not unreasonably suppose, protect the belly — a character possessed in a still greater degree by the mergansers (Merginae), while the males also exhibit in the extraordinarily developed bony labyrinth of their trachea and its midway enlargement another resemblance to the members of the same subfamily. The golden-eye, C. glaucion of modern writers, has its home in the northern parts of both hemispheres, whence in winter it migrates southward; but as it is one of the ducks that constantly resorts to hollow trees for the purpose of breeding it hardly transcends the limit of the Arctic forests on either continent. So well known is this habit to the people of the northern districts of Scandinavia, that they very commonly devise artificial nest-boxes for its accommodation and their own profit. Hollow logs of wood are prepared, the top and bottom closed, and a hole cut in the side. These are affixed to the trunks of living trees in suitable places, at a convenient distance from the ground, and, being readily occupied by the birds in the breed- ing-season, are regularly robbed, first of the numerous eggs, and finally of the down they contain, by those who have set them up. The adult male golden-eye is a very beautiful bird, mostly black above, but with the head, which is slightly crested, reflect- ing rich green lights, a large oval white patch under each eye and elongated white scapulars; the lower parts are wholly white and the feet bright orange, except the webs, which are dusky. In the female and young male, dark brown replaces the black, the cheek-spots are indistinct and the elongated white scapulars wanting. The

golden-eye of North America has been by some authors deemed to differ, and has been named C. amrricana. but apparently on insufficient grounds. North America, however, has, in common with Iceland, a very distinct sjvn'es. C. islandica, often called Barrow's duck, which is but a rare straggler to the continent of Europe, and never, so far as known, to Britain. In Iceland and Greenland it is the only habitual representative of the genus, and it occurs from thence to the Rocky Mountains. In breeding-habits it differs from the commoner species, not placing its eggs in tree-holes; but how far this difference is voluntary may be doubted, for in the countries it frequents trees are wanting. It is a larger and stouter bird, and in the male the white cheek-patches take a more crescentic form, while the head is glossed with purple rather than green, and the white scapulars are not elongated. The New World also possesses a third and still more beautiful species of the genus in C. albeola, known in books as the buff el-headed duck, and to American fowlers as the " spirit-duck " and " butter-ball " — the former name being applied from its rapidity in diving, and the latter from its exceeding fatness in autumn. This is of small size, but the lustre of the feathers in the male is most brilliant., exhibiting a deep plum-coloured gloss on the head. It breeds in trees, and is supposed to have occurred more than once in Britain. (A. N.)

GOLDEN FLEECE, in Greek mythology, the fleece of the ram on which Phrixus and Helle escaped, for which see

Argonauts. For tue modern order of the Golden Fleece, see Knighthood and Chivalry, section Orders of Knighthood.

GOLDEN HORDE, the name of a body of Tatars who in the middle of the 13th century overran a great portion of eastern Europe and founded in Russia the Tatar empire of khanate known as the Empire of the Golden Horde or Western Kipchaks. They invaded Europe about 1237 under the leadership of Batu Khan, a younger son of Juji, eldest son of Jenghiz Khan, passed over Russia with slaughter and destruction, and penetrated into Silesia, Poland and Hungary, finally defeating Henry II., duke of Silesia, at Liegnitz in the battle known as the Wahlstatt on the 9th of April 1241. So costly was this victory, however, that Batu, finding he could not reduce Neustadt, retraced his steps and established himself in his magnificent tent (whence the name " golden") on the Volga. The new settlement was known as Sir Orda (" Golden Camp," whence " Golden Horde "). Very rapidly the powers of Batu extended over the Russian princes, and so long as the khanate remained in the direct descent from Batu nothing occurred to check the growth of the empire. The names of Batu's successors are

Sartak (1256), Bereke (Baraka) (1256-1266), Mangu-Timur (1266-1280), Tuda Mangu (1280-1287), (?) Tula Bugha (128,7-1290), Toktu (1290- 1312), Uzbeg (1312-1340), Tin-Beg (1340), Janl-Beg (1340- 1357). The death of Janl-Beg, however, threw the empire into confusion. Birdi-Beg (Berdi-Beg) only reigned for two years, after which two rulers, calling themselves sons of Janl-Beg occupied the throne during one year. From that time (1359) till 1378 no single ruler held the whole empire under control, various members of the other branches of the old house of Juji assuming the title. At last in 1378 Toktamish, of the Eastern Kipchaks, succeeded in ousting all rivals, and establishing himself as ruler of eastern and western Kipchak. For a short time the glory of the Golden Horde was renewed, until it was finally crushed by Timur in 1395.

See further Mongols and Russia ; Sir Henry Howorth's History of the Mongols; S. Lane- Poole's Mohammadan Dynasties (1894), pp. 222-231 ; for the relations of the various descendants of Jenghiz, see Stockvis, Manuel d'histoire, vol. i. chap. ix. table 7.

GOLDEN ROD, in botany, the popular name for Solidago virgaurea (natural order Compositae), a native of Britain and widely distributed in the north temperate region. It is an old- fashioned border-plant flowering from July to September, with an erect, sparingly-branched stem and small bright-yellow clustered heads of flowers. It grows well in common soil and is readily propagated by division in the spring or autumn.

GOLDEN ROSE (rosa aurea), an ornament made of wrought gold and set with gems, generally sapphires, which is blessed by the pope on the fourth (Laetare) Sunday of Lent, and usually afterwards sent as a mark of special favour to some distinguished individual, to a church, or a civil community. Formerly it was a single rose of wrought gold, coloured red, but the form finally adopted is a thorny branch with leaves and flowers, the petals of which are decked with gems, surmounted by one principal rose. The origin of the custom is obscure. From very early times popes have given away a rose on the fourth Sunday of Lent, whence the name Dominica Rosa, sometimes given to this feast. The practice of blessing and sending some such symbol (e.g. eulogiae) goes back to the earliest Christian antiquity, but the use of the rose itself does not seem to go farther back than the nth century. According to some authorities it was used by Leo IX. (1049-1054), but in any case Pope Urban II. sent one to Fulk of Anjou during the preparations for the first crusade. Pope Urban V., who sent a golden rose to Joanna of Naples in J366, is alleged to have been the first to determine that one should be consecrated annually. Beginning with

the 16th century there went regularly with the rose a letter relating the reasons why it was sent, and reciting the merits and virtues of the receiver. When the change was made from the form of the simple rose to the branch is uncertain. The rose sent by Innocent IV. in 1244 to Count Raymond Berengar IV. of Provence was a simple flower without any accessory ornamenta- tion, while the one given by Benedict XI. in 1303 or 1304 to the

church of St Stephen at Perugia consisted of a branch garnished with five open and two closed roses enriched with a sapphire, the whole having a value of seventy ducats. The value of the gift varied according to the character or rank of the recipient. John XXII. gave away some weighing 12 oz., and worth from £250 to £325. Among the recipients of this honour have been Henry VI. of England, 1446; James III. of Scotland, on whom the rose (made by Jacopo Magnolio) was conferred by Innocent VIII.; James IV. of Scotland; Frederick the Wise, elector of Saxony, who received a rose from Leo X. in 1518; Henry VIII. of England, who received three, the last from Clement VII. in 1524 (each had nine branches, and rested on different forms of feet, one on oxen, the second on acorns, and the third on lions); Queen Mary, who received one in 1555 from Julius III.; the republic of Lucca, so favoured by Pius IV., in 1564; the Lateran Basilica by Pius V. three years later; the sanctuary of Loreto by Gregory XIII. in 1584; Maria Theresa, queen of France, who received it from Clement IX. in 1668; Mary Casimir, queen of Poland, from Innocent XL in 1684 in recogni- tion of the deliverance of Vienna by her husband, John Sobieski; Benedict XIII. (1726) presented one to the cathedral of Capua, and in 1833 it was sent by Gregory XVI. to the church of St Mark's, Venice. In more recent times it was sent to Napoleon III. of France, the empress Eugenie, and the queens Isabella II., Christina (1886) and Victoria (1906) of Spain. The gift of the golden rose used almost invariably to accompany the coronation of the king of the Romans. If in any particular year no one is considered worthy of the rose, it is laid up in the Vatican.

Some of the most famous Italian goldsmiths have been employed in making the earlier roses; and such intrinsically valuable objects have, in common with other priceless historical examples of the goldsmiths' art, found their way to the melting- pot. It is, therefore, not surprising that the number of existing historic specimens is very small. These include one of the 14th century in the Cliiny Museum, Paris, believed

to have been sent by Clement V. to the prince-bishop of Basel; another conferred in 1458 on his native city of Siena by Pope Pius II.; and the rose bestowed upon Siena by Alexander VII., a son of that city, which is depicted in a procession in a fresco in the Palazzo Pubblico at Siena. The surviving roses of more recent date include that presented by Benedict XIII. to Capua cathedral; the rose conferred on the empress Caroline by Pius VII., 1810, at Vienna; one of 1833 (Gregory XVI.) at St Mark's, Venice; and Pope Leo XIII. 's rose sent to Queen Christina of Spain, which is at Madrid.

Authorities. — Angelo Rocca, Aurea Rosa, &c. (1719); Busenelli, De Rosa Aurea. Epistola (1759); Girbal, La Rosa de oro (Madrid, 1820) ; C. Joret, La Rose d'or dans Vantiquite el au moyen dge (Paris, 1892), pp. 432-435; Eugene Muntz in Revue d'art chretien (1901), series v. vol. 12 pp. 1-11; De F. Mely, Le Tresor de Chartres (1886); Marquis de Mac Swiney Mashanaglass, Le Portugal et le Saint Siege:' Les Roses d'or envoyees par les Papes aux rois de Portugal au XVI' Steele (1904): Sir C. Young, Ornaments and Gift consecrated by the Roman Pontiffs: the Golden Rose, the Cap and Swords presented to Sovereigns of England and Scotland (1864).

(J. T. S.*; E. A. J.)

GOLDEN RULE, the term applied in all European languages to the rule of conduct laid down in the New Testament (Matthew vii. 12 and Luke vi. 31). " whatsoever ye would that men should do to you, do ye even so to them, for this is the law and the prophets." This principle has often been stated as the funda- mental precept of social morality. It is sometimes put negatively or passively, " do not that to another which thou wouldst not have done to thyself " (cf. Hobbes, Leviathan, xv. 79, xvii. 85), but it should be observed that in this form it implies merely abstention from evil doing. In either form the precept in ordinary application is part of a hedonistic system of ethics, the criterion , of action being strictly utilitarian in character.

See H. Sidgwick, History of Ethics (5th ed., 1902), p. 167; James Seth, Ethical Principles, p. 97 foil.

GOLDFIELD, a town and the county-seat of Esmeralda county, Nevada, U.S.A., about 170 m. S.E. of Carson City. Pop. (1910, U. S. census) 4838. It is served by the Tonopah & Croldfield, Las Vegas & Tonopah, anil Tonopah A- Tidewater

railways. The town lies in the midst of a desert abounding in high-grade gold ores, and is essentially a mining camp. The discovery of

gold at Tonopah, about 28 m. N. of Goldfield, in 1900 was followed by its discovery at Goldfield in 1902 and 1903; in 1904 the Goldfield district produced about 800 tons of ore, which yielded $2,300,000 worth of gold, or 30% of that of the state. This remarkable production caused Goldfield to grow rapidly, and it soon became the largest town in the state. In addition to the mines, there are large reduction works. In 1907 Goldfield became the county-seat. The gold output in 1907 was $8,408,396; in 1908, $4,880,251. Soon after mining on an extensive scale began, the miners organized themselves as a local branch of the Western Federation of Miners, and in this branch were included many labourers in Goldfield other than miners. Between this branch and the mine-owners there arose a series of more or less serious differences, and there were several set strikes — -in December 1906 and January 1907, for higher wages; in March and April 1907, because the mine-owners refused to discharge carpenters who were members of the American Federa- tion of Labour, but did not belong to the Western Federation of Miners or to the Industrial Workers of the World affiliated with it, this last organization being, as a result of the strike, forced out of Goldfield; in August and September 1907, because a rule was introduced at some of the mines requiring miners to change their clothing before entering and after leaving the mines, — a rule made necessary, according to the operators, by the wholesale stealing (in miners' parlance, " high-grading ") of the very valuable ore (some of it valued at as high as $20 a pound); and in November and December 1907, because some of the mine-owners, avowedly on account of the hard times, adopted a system of paying in cashier's checks. Excepting occasional attacks upon non-union workmen, or upon persons supposed not to be in sympathy with the miners' union, there had been no serious disturbance in Goldfield; but in December 1907, Governor Sparks, at the instance of the mine-owners, appealed to President Roosevelt to send Federal troops to Goldfield, on the ground that the situation there was ominous, that destruction of life and property seemed probable, and that the state had no militia and would be powerless to maintain order. President Roosevelt thereupon (December 4th) ordered General Frederick Funston, commanding the Division of California, at San Francisco, to proceed with 300 Federal troops to Goldfield. The troops arrived in Goldfield on the 6th of December, and immediately afterwards the mine-owners reduced wages and announced that no members of the Western Federation of Miners would thereafter be employed in the mines. President Roosevelt, becoming convinced that conditions had not warranted Governor Sparks's appeal for Federal assistance, but that the immediate withdrawal of the troops might nevertheless lead to serious disorders, consented that they should remain for a short time on

condition that the state should immediately organize an adequate militia or police force. Accordingly, a special meeting of the legislature was immediately called, a state police force was organized, and on the 7th of March 1908 the troops were withdrawn. Thereafter work was gradually resumed in the mines, the contest having been won by the mine-owners.

GOLDFINCH (Ger. Goldfink 1), the Fringilla carduelis of Linnaeus and the Carduelis elegans of later authors, an extremely well-known bird found over the greater parts of Europe and North Africa, and eastwards to Persia and Turkestan. Its gay plumage is matched by its sprightly nature; and together they make it one of the most favourite cage-birds among all classes. As a songster it is indeed surpassed by many other species, but its docility and ready attachment to its master or mistress make up for any defect in its vocal powers. In some parts of England the trade in goldfinches is very considerable. In i860 Mr Hussey reported (Zool., p. 7144) the average annual captures near Worthing to exceed 11,000 dozens — nearly all being cock- birds; and a witness before a committee of the House of Commons in 1873 stated that, when a boy, he could take forty

1 The more common German name, however, is Distelfink (Thistle-Finch) or Stieglitz.

dozens in a morning near Brighton. In these districts and others the number has become much reduced, owing doubtless in part to the fatal practice of catching the birds just before or during the breeding-season; but perhaps the strongest cause of their growing scarcity is the constant breaking-up of waste lands, and the extirpation of weeds (particularly of the order Compositae) essential to the improved system of agriculture; for in many parts of Scotland, East Lothian for instance, where goldfinches were once as plentiful as sparrows, they are now only rare stragglers, and yet there they have not been thinned by netting. Though goldfinches may occasionally be observed in the coldest weather, incomparably the largest number leave Britain in autumn, returning in spring, and resorting to gardens and orchards to breed, when the lively song of the cock, and the bright yellow wings of both sexes, quickly attract notice. The nest is a beautifully neat structure, often placed at no great height from the ground, but generally so well hidden by the leafy bough on which it is built as not to be easily found, until, the young being hatched, the constant visits

of the parents reveal its site. When the broods leave the nest they move into the more open country, and frequenting pastures, commons, heaths and downs, assemble in large flocks towards the end of summer. Eastward of the range of the present species its place is taken by its congener C. caniceps, which is easily recognized by wanting the black hood and white ear-coverts of the British bird. Its home seems to be in Central Asia, but it moves southward in winter, being common at that season in Cashmere, and is not unfrequently brought for sale to Calcutta. The position of the genus Carduelis in the family Fringillidae is not very clear. Structurally it would seem to have some relation to the siskins {Chrysomitris) , though the members of the two groups have very different habits, and perhaps its nearest kinship lies with the hawfinches (Coccothraustes) . See Finch. (A.N.)

GOLDFISH (Cyprinus or Carassius auratus), a small fish belonging to the Cyprinid family, a native of China but natur-

ae*”

Telescope-fish.

alized in other countries. In the wild state its colours do not differ from those of a Crucian carp, and like that fish it is tenacious of life and easily domesticated. Albinos seem to be rather common; and as in other fishes (for instance, the tench, carp, eel, flounder), the colour of most of these albinos is a bright orange or golden yellow; occasionally even this shade of colour is lost, the fish being more or less pure white or silvery. The< Chinese have domesticated these albinos for a long time, and by careful selection have succeeded in propagating all those strange varieties, and even monstrosities, which appear in every domestic animal. In some individuals the dorsal fin is only half its normal length, in others entirely absent; in others the anal fin has a double spine; in others all the fins are of nearly double the usual length. The snout is frequently malformed, giving the head of the fish an appearance similar to that of a bull-dog. The variety most highly prized has an extremely short snout, eyes which almost wholly project beyond the orbit, no dorsal fin, and a very long three- or four-lobed caudal fin (Telescope-fish).

The domestication of the goldfish by the Chinese dates back from the highest antiquity, and they were introduced into Japan at the beginning of the 16th century; but the date of their importation into Europe is still uncertain. The great German ichthyologist, M. E. Bloch, thought he could trace it back in England to the reign of James I., whilst other authors fix the date at 1691. It appears certain that they

were brought to France, only much later, as a present to Mme de Pompadour, although the de Goncourts, the historians of the mistresses of Louis XV., have failed to trace any records of this event. The fish has since spread over a considerable part of Europe, and in many places it has reverted to its wild condition. In many parts of south-eastern Asia, in Mauritius, in North and South Africa, in Madagascar, in the Azores, it has become thoroughly acclima- tized, and successfully competes with the indigenous fresh-water fishes. It will not thrive in rivers; in large ponds it readily reverts to the coloration of the original wild stock. It flourishes best in small tanks and ponds, in which the water is constantly changing and does not freeze; in such localities, and with a full supply of food, which consists of weeds, crumbs of bread, bran, worms, small crustaceans and insects, it attains to a length of from 6 to 12 in., breeding readily, sometimes at different times of the same year.

GOLDFUSS, GEORG AUGUST (1 782-1848), German palaeon- tologist, born at Thurnau near Bayreuth on the 18th of April 1782, was educated at Erlangen, where he graduated Ph.D. in 1804 and became professor of zoology in 1818. He was sub- sequently appointed professor of zoology and mineralogy in the university of Bonn. Aided by Count G. Minister he issued the important Petrefacta Germaniae (1826-1844), a work which was intended to illustrate the invertebrate fossils of Germany, but it was left incomplete after the sponges, corals, crinoids, echinids and part of the mollusca had been figured. Goldf uss died at Bonn on the 2nd of October 1848.

GOLDIE, SIR GEORGE DASHWOOD TAUBMAN (1846-), English administrator, the founder of Nigeria, was born on the 20th of May 1846 at the Nunnery in the Isle of Man, being the youngest son of Lieut.-Colonel John Taubman Goldie-Taubman, speaker of the House of Keys, by his second wife Caroline, daughter of John E. Hoveden of Hemingford, Cambridgeshire. Sir George resumed his paternal name, Goldie, by royal licence in 1887. He was educated at the Royal Military Academy, Wool- wich, and for about two years held a commission in the Royal Engineers. He travelled in all parts of Africa, gaining an ex- tensive knowledge of the continent, and first visited the country of the Niger in 1877. He conceived the idea of adding to the British empire the then little known regions of the lower and middle Niger, and for over twenty years his efforts were devoted to the realization of this conception. The method by which he ‘ determined to work was the revival of government by chartered companies within the empire — a method supposed to be buried with the East India Company. The first step was to combine all British commercial interests in the Niger, and this he accomplished in 1879 when the

United African Company was formed. In 1881 Goldie sought a charter from the imperial government (the 2nd Gladstone ministry). Objections of various kinds were raised. To meet them the capital of the company (renamed the National African Company) was increased from £125,000 to £1,000,000, and great energy was displayed in founding stations on the Niger. At this time French traders, encouraged by Gambetta, established themselves on the lower river, thus rendering it difficult for the company to obtain territorial rights; but the Frenchmen were bought out in 1884, so that at the Berlin conference on West Africa in 1885 Mr Goldie, present as an expert on matters relating to the river, was able to announce that on the lower Niger the British flag alone flew. Meantime the Niger coast line had been placed under British protection. Through Joseph Thomson, David Mcintosh, D. W. Sargent, J. Flint, William Wallace, E. Dangerfield and numerous other agents, over 400 political treaties — drawn up by Goldie — were made with the chiefs of the lower Niger and the Hausa states. The scruples of the British government being overcome, a charter was at length granted

(July 1886), the National African Company becoming the Royal Niger Company, with Lord Aberdare as governor and Goldie as vice-governor. In 1895, on Lord Aberdare's death, Goldie became governor of the company, whose destinies he had guided throughout.

The building up of Nigeria as a British state had to be carried on in face of further difficulties raised by French travellers with political missions, and also in face of German opposition. From 1884 to 1890, Prince Bismarck was a persistent antagonist, and the strenuous efforts he made to secure for Germany the basin of the lower Niger and Lake Chad were even more dangerous to Goldie's schemes of empire than the ambitions of France. Herr E. R. Flegel, who had travelled in Nigeria during 1882-1884 under the auspices of the British company, was sent out in 1885 by the newly-formed German Colonial Society to secure treaties for Germany, which had established itself at Cameroon. After FlegePs death in 1886 his work was continued by his companion Dr Staudinger, while Herr Hoenigsbcrg was despatched to stir up trouble in the occupied portions of the Company's territory, — or, as he expressed it, " to burst up the charter." He was finally arrested at Onitsha, and, after trial by the company's supreme court at Asaba, was expelled the country. Prince Bismarck then sent out his nephew, Herr von Puttkamer, as German consul- general to Nigeria, with orders to

report on this affair, and when this report was published in a White Book, Bismarck demanded heavy damages from the company. Meanwhile Bismarck main- tained constant pressure on the British government to compel the Royal Niger Company to a division of spheres of influence, where- by Great Britain would have lost a third, and the most valuable part, of the company's territory. But he fell from power in March 1890, and in July following Lord Salisbury concluded the famous " Heligoland " agreement with Germany. After this event the aggressive action of Germany in Nigeria entirely ceased, and the door was opened for a final settlement of the Nigeria-Cameroon frontiers. These negotiations, which resulted in an agreement in 1893, were initiated by Goldie as a means of arresting the advance of France into Nigeria from the direction of the Congo. By conceding to Germany a long but narrow strip of territory between Adamawa and Lake Chad, to which she had no treaty claims, a barrier was raised against French expeditions, semi- military and semi-exploratory, which sought to enter Nigeria from the east. Later French efforts at aggression were made from the western or Dahomeyan side, despite an agreement concluded with France in 1890 respecting the northern frontier.

The hostility of certain Fula princes led the company to despatch, in 1897, an expedition against the Mahommedan states of Nupe and Illorin. This expedition was organized and personally directed by Goldie and was completely successful. Internal peace was thus secured, but in the following year the differences with France in regard to the frontier line became acute, and compelled the intervention of the British government. In the negotiations which ensued Goldie was instrumental in preserving for Great Britain the whole of the navigable stretch of the lower Niger. It was, however, evidently impossible for a chartered company to hold its own against the state-supported protectorates of France and Germany, and in consequence, on the 1st of January T900, the Royal Niger Company transferred its territories to the British government for the sum of £865,000. The ceded territory together with the small Niger Coast Protectorate, already under imperial control, was formed into the two protectorates of northern and southern Nigeria (see further Nigeria).

In 1 903-1 904, at the request of the Chartered Company of South Africa, Goldie visited Rhodesia and examined the situation in connexion with the agitation for self-government by the, Rhodesians. In 1902-1903 he was one of the royal commissioners , who inquired into the military preparations for the war in South Africa (1890-1902) and into the operations up to the occupation of Pretoria, and in 1905-1906 was a member of the royal com- mission which

investigated the methods of disposal of war stores after peace had been made. In 1905 he was elected president of the Royal Geographical Society and held that office for three years. In 1908 he was chosen an alderman of the London County

Council. Goldie was created K.C.M.G. in 1887, and a privy councillor in 1898. He became an F.R.S., honorary D.C.L. of Oxford University (1897) and honorary LL.D. of Cambridge (1897). He married in 1870 Matilda Catherine (d. 1898), daughter of John William Elliott of Wakefield.

GOLDING, ARTHUR (c. 1536-c. 1605), English translator, son of John Golding of Belchamp St Paul and Halsted, Essex, one of the auditors of the exchequer, was born probably in London about 1536. His half-sister, Margaret, married John de Vere, 1 6th earl of Oxford. In 1549 he was already in the service of Protector Somerset, and the statement that he was educated at Queen's College, Cambridge, lacks corroboration. He seems to have resided for some time in the house of Sir Wiiliam Cecil, in the Strand, with his nephew, the poet, the 17th earl of Oxford, whose receiver he was, for two of his dedications are dated from Cecil House. His chief work is his translation of Ovid. The Fyrst Fower Bookes of P. Ovidius Nasos worke, entitled Metamorphosis, translated oute of Latin into Englishe meter (1565), was supplemented in 1567 by a translation of the fifteen books. Strangely enough the translator of Ovid was a man of strong Puritan sympathies, and he translated many of the works of Calvin. To his version of the Metamorphoses he prefixed a long metrical explanation of his reasons for considering it a work of edification. He sets forth the moral which he supposes to underlie certain of the stories, and shows how the pagan machinery may be brought into line with Christian thought. It was from Golding's pages that many of the Elizabethans drew their knowledge of classical mythology, and there is little doubt that Shakespeare was well acquainted with the book. Golding translated also the Commentaries of Caesar (1565), Calvin's commentaries on the Psalms (1 571), his sermons on the Galatians and Ephesians, on Deuteronomy and the book of Job, Theodore Beza's Tragedie of Abrahams Sacrifice (1577) and the De Beneficiis of Seneca (1578). He completed a translation begun by Sidney from Philippe de Mornay, A Worke concerning the Trewnesse of the Christian Religion (1604). His only original work is a prose Discourse on the earthquake of 1580, in which he saw a judgment of God on the wickedness of his time. He inherited three con- siderable estates in Essex, the greater part of which he sold in 1 595. The last trace we have of Golding is contained in an order dated the 25th of July 1605, giving him licence to print certain of his works.

GOLDINGEN (Lettish, Kuldiga), a town of Russia, in the government of Courland, 55 m. by rail N.E. of Libau, and on Windau river, in 56° 58′ N. and 22° E. Pop. (1897) 9733. It has woollen mills, needle and match factories, breweries and distilleries, a college for teachers, and ruins of a castle of the Teutonic Knights, built in 1 248 and used in the 1 7th century as the residence of the dukes of Courland.

GOLDMARK, KARL (1832-), Hungarian composer, was born at Keszthely-am-Plattensee, in Hungary, on the 18th of May 1832. His father, a poor cantor in the local Jewish syna- gogue, was unable to assist to any extent financially in the development of his son's talents. Yet in the household much music was made, and on a cheap violin and home-made flute, constructed by Goldmark himself from reeds cut from the river- bank, the future composer gave rein to his musical ideas. His talent was fostered by the village schoolmaster, by whose aid he was able to enter the music-school of the Oedenburger Verein. Here he remained but a short time, his success at a school concert finally determining his parents to allow him to devote himself entirely to music. In 1844, then, he went to Vienna, where Jansa took up his cause and eventually obtained for him admis- sion to the conservatorium. For two years Goldmark worked under Jansa at the violin, and on the outbreak of the revolution, after studying all the orchestral instruments he obtained an engagement in the orchestra at Raab. There, on the capitulation of Raab, he was to have been shot for a spy, and was only saved at the eleventh hour by the happy arrival of a former colleague. In 1850 Goldmark left Raab for Vienna, where from his friend Mittrich he obtained his first real knowledge of the classics. There, too, he devoted himself to composition. In 1857 Goldmark,

wbo was then engaged in the Karl-theater band, gave a concert of his own works with such success that his first quartet attracted very general attention. Then followed the " Sakun- tala " and " Penthesilea " overtures, which show how Wagner's influence had supervened upon his previous domination by- Mendelssohn, and the delightful " Landliche Hochzeit " sym- phony, which carried his fame abroad. Goldmark's reputation was now made, and very largely increased by the production at Vienna in 1875 of his first and best opera, Die Konigin von Saba. Over this opera he spent seven years. Its popularity is still almost as great as ever. It was followed in November 1886. also at Vienna, by Merlin, much of which has been re- written since then.

A third opera, a version of Dickens's Cricket on the Hearth, was given by the Royal Carl Rosa Company in London in 1900. Goldmark's chamber music has not made much lasting impression, but the overtures " Im Friihling," " Prometheus Bound," and " Sapho " are fairly well known. A " programme " seems essential to him. In opera he is most certainly at his best, and as an orchestral colourist he ranks among the very highest.

GOLDONI, CARLO (1 707-1 793), Italian dramatist, the real founder of modern Italian comedy, was born at Venice, on the 25th of February 1707, in a fine house near St Thomas's church. His father Giulio was a native of Modena. The first playthings of the future writer were puppets which he made dance; the first books he read were plays, — among others, the comedies of the Florentine Cicognini. Later he received a still stronger impression from the Mandragora of Machiavelli, At eight years old he had tried to sketch a play. His father, meanwhile, had taken his degree in medicine at Rome and fixed himself at Perugia, where he made his son join him; but, having soon quarrelled with his colleagues in medicine, he departed for Chioggia, leaving his son to the care of a philosopher, Professor Caldini of Rimini. The young Goldoni soon grew tired of his life at Rimini, and ran away with a Venetian company of players. He began to study law at Venice, then went to continue the same pursuit at Pavia, but at that time he was studying the Greek and Latin comic poets much more and much better than books about law. " I have read over again," he writes in his own Memoirs, "the Greek and Latin poets, and I have told to myself that I should like to imitate them in their style, their plots, their precision; but I would not be satisfied unless I succeeded in giving more interest to my works, happier issues to my plots, better drawn characters and more genuine comedy." For a satire entitled II Colosso, which attacked the honour of several families of Pavia, he was driven from that town, and went first to study with the jurisconsult Morelli at Udine, then to take his degree in law at Modena. After having worked some time as clerk in the chanceries of Chioggia and Feltre, his father being dead, he went to Venice, to exercise there his profession as a lawyer. But the wish to write for the stage was always strong in him, and he tried to do so; he made, however, a mistake in his choice, and began with a tragedy, Amalasunta, which was represented at Milan and proved a failure. In 1734 he wrote another tragedy, Belisario, which, though not much better, chanced nevertheless to please the public. This first success encouraged him to write other tragedies, some of which were well received; but the author himself saw clearly that he had not yet found his proper sphere, and that a radical dramatic reform was absolutely

necessary for the stage. He wished to create a characteristic comedy in Italy, to follow the example of Moliere, and to delineate the realities of social life in as natural a manner as possible. His first essay of this kind was Momolo Cortesan (Momolo the Courtier), written in the Venetian dialect, and based on his own experience. Other plays followed — some interesting from their subject, others from the characters; the best of that period are — Le Trentadue Disgrazie d' Arlecchino, La Notte critica, La Bancarotta, La Donna di Garbo. Having, while consul of Genoa at Venice, been cheaied by a captain of Ragusa, he founded on this his play L'Impostbre. At Leghorn he made the acquaintance of the comedian Medebac, and followed him to Venice, with his company,

for which he began to write his best plays. Once he premised to write sixteen comedies in a year, and kept his word; among the sixteen are some of his very best, such as II Cafe, II Bugiardo, La Pamela. When he left the company of Medebac, he passed over to that maintained by the patrician Vendramin, continuing to write with the greatest facility. In 1761 he was called to Paris, and before leaving Venice he wrote Una delle ultime sere di Carnevale (One of the Last Nights of Carnival), an allegorical comedy in which he said good-bye to his country. At the end of the representation of this play, the theatre resounded with applause, and with shouts expressive of good wishes. Goldoni, at this proof of public sympathy, wept as a child. At Paris, during two years, he wrote comedies for the Italian actors; then he taught Italian to the royal princesses; and for the wedding of Louis XVI. and of Marie Antoinette he wrote in French one of his best comedies, Le Bourru bienfaisant, which was a great success. When he retired from Paris to Versailles, the king made him a gift of 6000 francs, and fixed on him an annual pension of 1 200 francs. It was at Versailles he wrote his Memoirs, which occupied him till he reached his eightieth year. The Revolution deprived him all at once of his modest pension, and reduced him to extreme misery; he dragged on his unfortunate existence till 1793, and died on the 6th of February. The day after, on the proposal of Andre Chenier, the Convention agreed to give the pension back to the poet; and as he had already died, a reduced allowance was granted to his widow.

The best comedies of Goldoni are : La Donna di Garbo, La Bottega di Cafe, Pamela nubile, Le Baruffe chiozzotte, I Rusteghi, Todero Bronlolon, Gli Innamorati, II Ventaglio, II Bugiardo, La Casa nova, II Burbero benefico, La Locandiera. A collected edition (Venice, 1788) was republished at Florence in 1827. See P. G. Molmenti, Carlo Goldoni (Venice, 1875); Rabany, Carlo Goldoni (Paris, 1896). The Memoirs were translated into English by John Black (Boston, 1877),

with preface by W. D. Howells.

GOLDS, a Mongolo-Tatar people, living on the Lower Amur in south-eastern Siberia. Their chief settlements are on the right bank of the Amur and along the Sungari and Usuri rivers. In physique they are typically Mongolic. Like the Chinese they wear a pigtail, and from them, too, have learnt the art of silk embroidery. The Golds live almost entirely on fish, and are excellent boatmen. They keep large herds of swine and dogs, which live, like themselves, on fish. Geese, wild duck, eagles, bears, wolves and foxes are also kept in menageries. There is much reverence paid to the eagles, and hence the Manchus call the Golds ” Eaglets.” Their religion is Shamanism.

See L. Schrenck, Die V biker des Amurlandes (St Petersburg, 1 891) ; Laufer, ” The Amoor Tribes,” in American Anthropologist (New York, 1900); E. G. Ravenstein, The Russians on the Amur (1861).

GOLDSBORO, a city and the county-seat of Wayne county, North Carolina, U.S.A., on the Neuse river, about 50 m. S.E. of Raleigh. Pop. (1890) 4017; (1900) 5877 (2520 negroes); (1910) 6107. It is served by the Southern, the Atlantic Coast Line and the Norfolk & Southern railways. The surrounding country produces large quantities of tobacco, cotton and grain, and trucking is an important industry, the city being a distributing point for strawberries and various kinds of vegetables. The city’s manufactures include cotton goods, knit goods, cotton- seed oil, agricultural implements, lumber and furniture. Goldsboro is the seat of the Eastern insane asylum (for negroes) and of an Odd Fellows’ orphan home. The municipality owns and operates its water-works and electric-lighting plant. Goldsboro was settled in 1838, and was first incorporated in 1841. In the campaign of 1865 Goldsboro was the point of junction of the Union armies under generals Sherman and Schofield, previous to the final advance to Greensboro.

., GOLDSCHMIDT, HERMANN (1802-1866), German painter and astronomer, was the son of a Jewish merchant, and was born at Frankfort on the 1 7 th of June 1802. He for ten years assisted his father in his business; but, his love of art having been awakened while journeying in Holland, he in 1832 began the study of painting at Munich under Cornelius and Schnorr, and in 1836 established himself at Paris, where he painted a number of pictures of more than average merit, among which may be mentioned the ” Cumaean Sibyl” (1844); an “Offering to

Venus ” (1845); a ” View of Rome ” (1849); the ” Death of Romeo and Juliet” (1857); and several Alpine landscapes. In 1847 he began to devote his attention to astronomy; and from 1852 to 1 86 1 he discovered fourteen asteroids between Mars and Jupiter, on which account he received the grand astronomical prize from the Academy of Sciences. His observa- tions of the protuberances on the sun, made during the total eclipse on the 10th of July i860, are included in the work of Madler on the eclipse, published in 1861. Goldschmidt died at Fontainebleau on the 26th of August 1866.

GOLDSMID, the name of a family of Anglo-Jewish bankers sprung from Aaron Goldsmid (d. 1782), a Dutch merchant who settled in England about 1763. Two of his sons, Benjamin Goldsmid (c. 1753-1808) and Abraham Goldsmid (c. 1756-1810), begap business together about 1777 as bill-brokers in London, and soon became great powers in the money market, during the Napoleonic war, through their dealings with the government. Abraham Goldsmid was in 1810 joint contractor with the Barings for a government loan, but owing to a depreciation of the scrip he was forced into bankruptcy and committed suicide. His brother, in a fit of depression, had similarly taken his own life two years before. Both were noted for their public and private generosity, and Benjamin had a part in founding the Royal Naval Asylum. Benjamin left four sons, the youngest being Lionel Prager Goldsmid; Abraham a daughter, Isabel.

Their nephew, Sir Isaac Lyon Goldsmid, Bart. (1778-1859), was born in London, and began in business with a firm of bullion brokers to the Bank of England and the East India Company. He amassed a large fortune, and was made Baron da Palmeira by the Portuguese government in 1846 for services rendered in settling a monetary - dispute between Portugal and Brazil, but he is chiefly known for his efforts to obtain the emancipation of the Jews in England and for his part in founding University College, London. The Jewish Disabilities Bill, first introduced in Parliament by Sir Robert Grant in 1830, owed its final passage to Goldsmid’s energetic work. He helped to establish the University College hospital in 1834, serving as its treasurer for eighteen years, and also aided in the efforts to obtain reform in the English penal code. Moreover he assisted by his capital and his enterprise to build part of the English southern railways and also the London docks. In 1841 he became the first Jewish baronet, the honour being conferred upon him by Lord Melbourne. He had married his cousin Isabel (see above), and their second son was Sir Francis Henry Goldsmid, Bart. (1808-1878), born in London, and called to the bar at

Lincoln's Inn in 1833 (the first Jew to become an English barrister; Q.C. 1858). After the passing of the Jewish Disabilities Bill, in which he had aided his father with a number of pamphlets that attracted great attention, he entered Parliament in i860 (having succeeded to the baronetcy) as member for Reading, and represented that constituency until his death. He was strenuous on behalf of the Jewish religion, and the founder of the great Jews' Free School. He was a munificent contributor to charities and especially to the endowment of University College. He, like his father, married a cousin, and, dying without issue, was succeeded in the baronetcy by his nephew Sir Julian Goldsmid, Bart. (1838-1896), son of Frederick David Goldsmid (1812-1866), long M.P. for Honiton. Sir Julian was for many years in Parliament, and his wealth, ability and influence made him a personage of consider- able importance. He was eventually made a privy councillor. He had eight daughters, but no son, and his entailed property passed to his relation, Mr d'Avigdor, his house in Piccadilly being converted into the Isthmian Club.

Another distinguished member of the same family, Sir Frederic John Goldsmid (1818-1908), son of Lionel Prager Goldsmid (see above), was educated at King's College, London, and entering the Madras army in 1839 served in the China War of 1840-41, with the Turkish troops in eastern Crimea in 1855-56, and was given political employment by the Indian government. He received the thanks of the commander-in-chief and of the war office for services during the Egyptian campaign, and was retired a major-general in 1875. Sir Frederic Goldsmid's name

is, however, associated less with military service than with much valuable work in exploration and in surveying, for which he repeatedly received the thanks of government. From 1865 to 1870 he was director-general of the Indo-European telegraph, and carried through the telegraph convention with Persia; and between 1870 and 1872, as commissioner, he settled with Persia the difficult questions of the Perso-Baluch and Perso-Afghan boundaries. In the course of his work he had to travel exten- sively, and he followed this up by various responsible missions connected with emigration questions. In 1881-1882 he was in Egypt, as controller of the Daira Sanieh, and doing other mis- cellaneous military work; and in 1883 he went to the Congo, on behalf of the king of the Belgians, as one of the organizers of the new state, but had to return on account of illness. From his early years he had made studies of several Eastern languages, and he ranked among the foremost Orientalists of his day. In 1886 he was president of the geographical section of the British Association meeting held at Birmingham. He had married in 1849, and had two

sons and four daughters. In 187 1 he was made a K.C.S.I. Besides important contributions to the 9th edition of the Encyclopaedia Britannica and many periodicals, he wrote an excellent and authoritative biography of Sir James Outram (2 vols., 1880).

A sister of the last-named married Henry Edward Goldsmid (181 2-1855), an eminent Indian civil servant, son of Edward Goldsmid; his reform of the revenue system in Bombay, and introduction of a new system, established after his death, through his reports in 1840-1847, and his devoted labour in land-surveys, were of the highest importance to western India, and established his memory there as a public benefactor.

GOLDSMITH, LEWIS (c. 1 763-1 846), Anglo-French publicist, of Portuguese- Jewish extraction, was born near London about 1763. Having published in 1801 The Crimes of Cabinets, or a Review of the Plans and Aggressions for Annihilating the Liberties of France, and the Dismemberment of her Territories, an attack on the military policy of Pitt, he moved, in 1802, from England to Paris. Talleyrand introduced him to Napoleon, who arranged for him to establish in Paris an English tri- weekly, the Argus, which was to review English affairs from the French point of view. According to his own account, he was in 1803 entrusted with a mission to obtain from the head of the French royal family, afterwards Louis XVIII. , a renunciation of his claims to the throne of France, in return for the throne of Poland. The offer was declined, and Goldsmith says that he then received instructions to kidnap Louis and kill him if he resisted, but, instead of executing these orders, he revealed the plot. He was, nevertheless, employed by Napoleon on various other secret service missions till 1807, when his Republican sympathies began to wane. In 1809 he returned to England, where he was at first imprisoned but soon released; and he became a notary in London. In 1 8 1 1 , being no w violently anti-republican, he founded a Sunday newspaper, the Anti-Gallican Monitor and Anti- Corsican Chronicle, subsequently known as the British Monitor, in which he denounced the French Revolution. In 181 1 he proposed that a public subscription should be raised to put a price on Napoleon's head, but this suggestion was strongly repro-bated by the British government. In the same year he published Secret History of the Cabinet of Bonaparte and Recueil des rrtani- festes, or a Collection of the Decrees of Napoleon Bonaparte, and in 1 8 1 2 Secret History of Bonaparte' s Diplomacy. Goldsmith alleged that in the latter year he was offered £200,000 by Napoleon to discontinue his attacks. In 1815 he published An Appeal to the Governments of Europe on the Necessity of bringing Napoleon Bonaparte to a Public Trial. In 1825 he again settled down in Paris, and in 1832 published his Statistics of

France. His only child, Georgiana, became, in 1837, the second wife of Lord Lyndhurst. He died in Paris on the 6th of January 1846.

GOLDSMITH, OLIVER (1728-1774), English poet, playwright, novelist and man of letters, came of a Protestant and Saxon family which had long been settled in Ireland., He is usually said to have been born at Pallas or Pallasmore, Co. Longford; but recent investigators have contended, with much

show of probability, that his true birthplace was Smith-Hill House, Elphin, Roscommon, the residence of his mother's father, the Rev. Oliver Jones. His father, Charles Goldsmith, lived at Pallas, supporting with difficulty his wife and children on what he could earn, partly as a curate and partly as a farmer.

While Oliver was still a child his father was presented to the living of Kilkenny West, in the county of West Meath. This was worth about £200 a year. The family accordingly quitted their cottage at Pallas for a spacious house on a frequented road, near the village of Lissoy. Here the boy was taught his letters by a relative and dependent, Elizabeth Delap, and was sent in his seventh year to a village school kept by an old quartermaster on half-pay, who professed to teach nothing but reading, writing and arithmetic, but who had an inexhaustible fund of stories about ghosts, banshees and fairies, about the great Rapparee chiefs, Baldearg O'Donnell and galloping Hogan, and about the exploits of Peterborough and Stanhope, the surprise of Monjuich and the glorious disaster of Brihuega. This man must have been of the Protestant religion; but he was of the aboriginal race, and not only spoke the Irish language, but could pour forth unpre- meditated Irish verses. Oliver early became, and through life continued to be, a passionate admirer of the Irish music, and especially of the compositions of Carolan, some of the last notes of whose harp he heard. It ought to be added that Oliver, though by birth one of the Englishry, and though connected by numerous lies with the Established Church, never showed the least sign of that contemptuous antipathy with which, in his days, the ruling minority in Ireland too generally regarded the subject majority. So far indeed was he from sharing in the opinions and feelings of the caste to which he belonged that he conceived an aversion to the Glorious and Immortal Memory, and, even when George III. was on the throne, maintained that nothing but the restoration of the banished dynasty could save the

country.

From the humble academy kept by the old soldier Goldsmith was removed in his ninth year. He went to several grammar- schools, and acquired some knowledge of the ancient languages. His life at this time seems to have been far from happy. He had, as appears from the admirable portrait of him by Reynolds at Knole, features harsh even to ugliness. The small-pox had set its mark on him with more than usual severity. His stature was small, and his limbs ill put together. Among boys little tender- ness is shown to personal defects; and the ridicule excited by poor Oliver's appearance was heightened by a peculiar simplicity and a disposition to blunder which he retained to the last. He became the common butt of boys and masters, was pointed at as a fright in the play-ground, and flogged as a dunce in the school- room. When he had risen to eminence, those who had once derided him ransacked their memory for the events of his early years, and recited repartees and couplets which had dropped from him, and which, though little noticed at the time, were supposed, a quarter of a century later, to indicate the powers which produced the Vicar of Wakefield and the Deserted Village. On the nth of June 1744, being then in his sixteenth year, Oliver went up to Trinity College, Dublin, as a sizar. The sizars paid nothing for food and tuition, and very little for lodging; but they had to perform some menial services from which they have long been relieved. Goldsmith was quartered, not alone, in a garret of what was then No. 35 in a range of buildings which has long since disappeared. His name, scrawled by himself on one of its window-panes is still preserved in the college library. From such garrets many men of less parts than his have made their way to the woolsack or to the episcopal bench. But Goldsmith, while he suffered all the humiliations, threw away all the advantages of his situation. He neglected the studies of the place, stood low at the examinations, was turned down to the bottom of his class for playing the buffoon in the lecture-room, was severely reprimanded for pumping on a constable, and was caned by a brutal tutor for giving a ball in the attic storey of the college to some gay youths and damsels from the city.

While Oliver was leading at Dublin a life divided between squalid distress and squalid dissipation, his father died, leaving a mere pittance. In February 1749 the youth obtained his

bachelor's degree, and left the university. During some time the humble dwelling to which his widowed mother had retired was his home. He was now in his twenty-first year; it was necessary that he should do something; and his education seemed to have fitted him to do nothing but to dress himself in gaudy colours, of which he was as

fond as a magpie, to take a hand at cards, to sing Irish airs, to play the flute, to angle in summer and to tell ghost stories by the fire in winter. He tried five or six professions in turn without success. He applied for ordination; but, as he applied in scarlet clothes, he was speedily turned out of the episcopal palace. He then became tutor in an opulent family, but soon quitted his situation in consequence of a dispute about pay. Then he determined to emigrate to America. His relations, with much satisfaction, saw him set out for Cork on a good horse, with £30 in his pocket. But in six weeks he came back on a miserable hack, without a penny, and informed his mother that the ship in which he had taken his passage, having got a fair wind while he was at a party of pleasure, had sailed without him. Then he resolved to study the law. A generous uncle, Mr Contarine, advanced £50. With this sum Goldsmith went to Dublin, was enticed into a gaming-house and lost every shilling. He then thought of medicine. A small purse was made up; and in his twenty -fourth year he was sent to Edinburgh. At Edinburgh he passed eighteen months in nominal attendance on lectures, and picked up some superficial information about chemistry and natural history. Thence he went to Leiden, still pretending to study physic. He left that celebrated university, the third university at which he had resided, in his twenty-seventh year, without a degree, with the merest smattering of medical knowledge, and with no property but his clothes and his flute. His flute, however, proved a useful friend. He rambled on foot through Flanders, France and Switzerland, playing tunes which everywhere set the peasantry dancing, and which often procured for him a supper and a bed. He wandered as far as Italy. His musical performances, indeed, were not to the taste of the Italians; but he contrived to live on the alms which he obtained at the gates of convents. It should, however, be observed that the stories which he told about this part of his life ought to be received with great caution; for strict veracity was never one of his virtues; and a man who is ordinarily inaccurate in narration is likely to be more than ordinarily inaccurate when he talks about his own travels. Goldsmith,' indeed, was so regardless of truth as to assert in print that he was present at a most interesting conversation between Voltaire and Fontenelle, and that this conversation took place at Paris. Now it is certain that Voltaire never was within a hundred leagues of Paris during the whole time which Goldsmith passed on the continent.

In February 1756 the wanderer landed at Dover, without a shilling, without a friend and without a calling. He had indeed, if his own unsupported evidence may be trusted, obtained a doctor's degree on the continent; but this dignity proved utterly useless to him. In England his flute was not in request; there were no convents; and he

was forced to have recourse to a series of desperate expedients. There is a tradition that he turned strolling player. He pounded drugs and ran about London with phials for charitable chemists. He asserted, upon one occasion, that he had lived “among the beggars in Axe Lane.” He was for a time usher of a school, and felt the miseries and humiliations of this situation so keenly that he thought it a promotion to be permitted to earn his bread as a bookseller’s hack; but he soon found the new yoke more galling than the old one, and was glad to become an usher again. He obtained a medical appointment in the service of the East India Company; but the appointment was speedily revoked. Why it was revoked we are not told. The subject was one on which he never liked to talk. It is probable that he was incompetent to perform the duties of the place. Then he presented himself at Surgeons’ Hall for examination, as ” mate to an hospital.” Even to so humble a post he was found unequal. Nothing remained but to return to the lowest drudgery of literature. Goldsmith took a room in a tiny square off Ludgate Hill, to which he had to climb

from Sea-coal Lane by a dizzy ladder of flagstones called Break- neck Steps. Green Arbour Court and the ascent have long diasppeared. Here, at thirty, the unlucky adventurer sat down to toil like a galley slave. Already, in 1 758, during his first bondage to letters, he had translated Marteilhe’s remarkable Memoirs of a Protestant, Condemned to the Galleys of France for his Religion. In the years that now succeeded he sent to the press some things which have survived, and many which have perished. He produced articles for reviews, magazines and newspapers; children’s books, which, bound in gilt paper and adorned with hideous woodcuts, appeared in the window of Newbery’s once far-famed shop at the corner of Saint Paul’s churchyard; An Inquiry into the State of Polite Learning in Europe, which, though of little or no value, is still reprinted among his works; a volume of essays entitled The Bee; a Life of Beau Nash; a superficial and incorrect, but very readable, History of England, in a series of letters purporting to be addressed by a nobleman to his son; and some very lively and amusing sketches of London Society in another series of letters purporting to be addressed by a Chinese traveller to his friends. All these works were anonymous; but some of them were well known to be Goldsmith’s; and he gradually rose in the estimation of the booksellers for whom he drudged. He was, indeed, emphatically a popular writer. For accurate research or grave disquisition he was not well qualified by nature or by education. He knew nothing accurately;

his reading had been desultory; nor had he meditated deeply on what he had read. He had seen much of the world; but he had noticed and retained little more of what he had seen than some grotesque incidents and characters which had happened to strike his fancy. But, though his mind was very scantily stored with materials, he used what materials he had in such a way as to produce a wonderful effect. There have been many greater writers; but perhaps no writer was ever more uniformly agree- able. His style was always pure and easy, and, on proper occasions, pointed and energetic. His narratives were always amusing, his descriptions always picturesque, his humour rich and joyous, yet not without an occasional tinge of amiable sadness. About everything that he wrote, serious or sportive, there was a certain natural grace and decorum, hardly to be expected from a man a great part of whose life had been passed among thieves and beggars, street-walkers and merryandrews, in those squalid dens which are the reproach of great capitals.

As his name gradually became known, the circle of his acquaint- ance widened. He was introduced to Johnson, who was then considered as the first of living English writers; to Reynolds, the first of English painters; and to Burke, who had not yet entered parliament, but had distinguished himself greatly by his writings and by the eloquence of his conversation. With these eminent men Goldsmith became intimate. In 1763 he was one of the nine original members of that celebrated fraternity which has sometimes been called the Literary Club, but which has a i ways disclaimed that epithet, and still glories in the simple name of the Club.

By this date Goldsmith bad quitted his miserable dwelling at the top of Breakneck Steps, and, after living for some time at No. 6 Wine Office Court, Fleet Street, had moved into the Temple. But he was stili often reduced to pitiable shifts, the most popular of which is connected with the sale of his solitary novel, the Vicar of Wakefield. Towards the close of 1764(F) his rent is alleged to have been so long in arrear that his landlady one morning called in the help of a sheriff's officer. The debtor, in great perplexity, despatched a messenger to Johnson ; and Johnson, always friendly, though often surly, sent back the messenger with a guinea, and promised to follow speedily.. He came, and found that Goldsmith had changed the guinea, and was railing at the landlady over a bottle of Madeira. Johnson put the cork into the bottle, and entreated his friend to consider calmly how money was to be procured. Goldsmith said that he had a novel ready for the press. Johnson glanced at the manu- script, saw that there were good things in it, took it to a bookseller, sold it for £60 and soon returned with the money. The rent was paid; and the sheriff's officer withdrew.

(Unfortunately,

however, for this time-honoured version of the circumstances, it has of late years been discovered that as early as October 1762 Goldsmith had already sold a third of the Vicar to one Benjamin Collins of Salisbury, a printer, by whom it was eventu- ally printed for F. Newbery, and it is difficult to reconcile this fact with Johnson's narrative.)

But before the Vicar of Wakefield appeared in 1766, came the great crisis of Goldsmith's literary life. In Christmas week 1764 he published a poem, entitled the Traveller. It was the first work to which he had put his name, and it at once raised him to the rank of a legitimate English classic. The opinion of the most skilful critics was that nothing finer had appeared in verse since the fourth book of the Dunciad. In one respect the Traveller differs from all Goldsmith's other writings. In general his designs were bad, and his execution good. In the Traveller the execution, though deserving of much praise, is far inferior to the design. No philosophical poem, ancient or modern, has a plan so noble, and at the same time so simple. An English wanderer, seated on a crag among the Alps, near the point where three great countries meet, looks down on the boundless prospect, reviews his long pilgrimage, recalls the varieties of scenery, of climate, of government, of religion, of national character, which he has observed, and comes to the conclusion, just or unjust, that our happiness depends little on political institutions, and much on the temper and regulation of our own minds.

While the fourth edition of the Traveller was on the counters of the booksellers, the Vicar of Wakefield appeared, and rapidly obtained a popularity which has lasted down to our own time, and which is likely to last as long as our language. The fable is indeed one of the worst that ever was constructed. It wants, not merely that probability which ought to be found in a tale of common English life, but that consistency which ought to be found even in the wildest fiction about witches, giants and fairies. But the earlier chapters have all the sweetness of pastoral poetry, together with all the vivacity of comedy. Moses and his spectacles, the vicar and his monogamy, the sharper and his cosmogony, the squire proving from Aristotle that relatives are related, Olivia preparing herself for the arduous task of converting a rakish lover by studying the controversy between Robinson Crusoe and Friday, the great ladies with their scandal about Sir Tomkyn's amours and Dr Burdock's verses, and Mr Burchell with his " Fudge," have caused as much harmless mirth as has ever been caused by matter packed into so small a number of pages. The latter part of the

tale is unworthy of the beginning. As we approach the catastrophe, the absurdities lie thicker and thicker, and the gleams of pleasantry become rarer and rarer.

The success which had attended Goldsmith as a novelist emboldened him to try his fortune as a dramatist. He wrote the Good Natur'd Man, a piece which had a worse fate than it deserved. Garrick refused to produce it at Drury Lane. It was acted at Covent Garden in January 1768, but was coldly received. The author, however, cleared by his benefit nights, and by the sale of the copyright, no less than £500, five times as much as he had made by the Traveller and the Vicar of Wakefield together. The plot of the Good Natur'd Man is, like almost all Goldsmith's plots, very ill constructed. But Some passages are exquisitely ludicrous, — much more ludicrous indeed than suited the taste of the town at that time. A canting, mawkish play, entitled False Delicacy, had just been produced, and sentimentality was all the mode. During some years more tears were shed at comedies than at tragedies; and a pleasantry which moved the audience to anything more than a grave smile was reprobated as low. It is not strange, therefore, that the very best scene in the Good Natur'd Man, that in which Miss Richland finds her lover attended by the bailiff and the bailiff's follower in full court dresses, should have been mercilessly hissed, and should have been omitted after the first night, not to be restored for several years.

In May 1770 appeared the Deserted Village. In mere diction and versification this celebrated poem is fully equal, perhaps superior, to the Traveller; and it is generally preferred to the

Traveller by that large class of readers who think, with Bayes in the Rehearsal, that the only use of a plot is to bring in fine things. More discerning judges, however, while they admire the beauty of the details, are shocked by one unpardonable fault which pervades the whole. The fault which we mean is not that theory about wealth and luxury which has so often been censured by political economists. The theory is indeed false; but the poem, considered merely as a poem, is not necessarily the worse on that account. The finest poem in the Latin language — indeed, the finest didactic poem in any language— was written in defence of the silliest and meanest of all systems of natural and moral philosophy. A poet may easily be pardoned for reasoning ill; but he cannot be pardoned for describing ill, for

observing the world in which he lives so carelessly that his portraits bear no resemblance to the originals, for exhibiting as copies from real life monstrous combinations of things which never were and never could be found together. What would be thought of a painter who should mix August and January in one landscape, who should introduce a frozen river into a harvest scene ? Would it be a sufficient defence of such a picture to say that every part was exquisitely coloured, that the green hedges, the apple-trees loaded with fruit, the waggons reeling under the yellow sheaves, and the sun-burned reapers wiping their fore- heads were very fine, and that the ice and the boys sliding were also very fine ? To such a picture the Deserted Village bears a great resemblance. It is made up of incongruous parts. The village in its happy days is a true English village. The village in its decay is an Irish village. The felicity and the misery which Goldsmith has brought close together belong to two different countries and to two different stages in the progress of society. He had assuredly never seen in his native island such a rural paradise, such a seat of plenty, content and tranquillity, as his Auburn. He had assuredly never seen in England all the inhabitants of such a paradise turned out of their homes in one day and forced' to emigrate in a body to America. The hamlet he had probably seen in Kent; the ejectment he had probably seen in Munster; but by joining the two, he has produced something which never was and never will be seen in any part of the world.

In 1773 Goldsmith tried his chance at Covent Garden with a second play, She Stoops to Conquer. The manager was, not without great difficulty, induced to bring this piece out. The sentimental comedy still reigned, and Goldsmith's comedies were not sentimental. The Good Natur'd Man had been too funny to succeed; yet the mirth of the Good Natur'd Man was sober when compared with the rich drollery of She Stoops to Conquer, which is, in truth, an incomparable farce in five acts. On this occasion, however, genius triumphed. Pit, boxes and galleries were in a constant roar of laughter. If any bigoted admirer of Kelly and Cumberland ventured to hiss or groan, he was speedily silenced by a general cry of " turn him out," or " throw him over." Later generations have confirmed the verdict which was pronounced on that night.

While Goldsmith was writing the Deserted Village and She Stoops to Conquer, he was employed on works of a very different kind — works from which he derived little reputation but much profit. He compiled for the use of schools a History of Rome, by which he made £250; a History of England, by which he made £500; a History of Greece, for which he received £250; a Natural History, for which the booksellers covenanted to pay him 800 guineas. These works he produced without

any elaborate research, by merely selecting, abridging and translating into his own clear, pure and flowing language, what he found in books well known to the world, but too bulky or too dry for boys and girls. He committed some strange blunders, for he knew nothing with accuracy. Thus, in his History of England, he tells us that Naseby is in Yorkshire; nor did he correct this mistake when the book was reprinted. He was very nearly hoaxed into putting into the History of Greece an account of a battle between Alexander the Great and Montezuma. In his Animated Nature he relates, with faith and with perfect gravity, all the most absurd lies which he eould find in books of travels about gigantic

Patagonians, monkeys that preach sermons, nightingales that repeat long conversations. ” If he can tell a horse from a cow,” said Johnson, ” that is the extent of his knowledge of zoology.” How little Goldsmith was qualified to write about the physical sciences is sufficiently proved by two anecdotes. He on one occasion denied that the sun is longer in the northern than in the southern signs. It was vain to cite the authority of Maupertuis. ” Maupertuis!” he cried, “I understand those matters better than Maupertuis.” On another occasion he, in defiance of the evidence of his own senses, maintained obstinately, and even angrily, that he chewed his dinner by moving his upper jaw.

Yet, ignorant as Goldsmith was, few writers have done more to make the first steps in the laborious road to knowledge easy and pleasant. His compilations are widely distinguished from the compilations of ordinary bookmakers. He was a great, perhaps an unequalled, master of the arts of selection and con- densation. In these respects his histories of Rome and of England, and still more his own abridgments of these histories, well deserved to be studied. In general nothing is less attrac- tive than an epitome; but the epitomes of Goldsmith, even when most concise, are always amusing; and to read them is considered by intelligent children not as a task but as a pleasure.

Goldsmith might now be considered as a prosperous man. He had the means of living in comfort, and even in what to one who had so often slept in barns and on bulks must have been luxury. His fame was great and was constantly rising. He lived in what was intellectually far the best society of the king- dom, in a society in which no talent or accomplishment was wanting, and in which the art of conversation was cultivated with splendid success. There probably were never four talkers more admirable in four different ways than Johnson, Burke, Beauclerk and Garrick; and Goldsmith was on terms of intimacy with all the four. He aspired to share in their colloquial renown, but never was ambition more unfortunate. It may seem strange that a man who

wrote with so much perspicuity, vivacity and grace should have been, whenever he took a part in conversation, an empty, noisy, blundering rattle. But on this point the evidence is overwhelming. So extraordinary was the contrast between Goldsmith's published works and the silly things which he said, that Horace Walpole described him as an inspired idiot. " Noll," said Garrick, " wrote like an angel, and talked like poor Poll." Chamier declared that it was a hard exercise of faith to believe that so foolish a chatterer could have really written the Traveller. Even Boswell could say, with contemptuous compassion, that he liked very well to hear honest Goldsmith run on. " Yes, sir," said Johnson, " but he should not like to hear him- self." Minds differ as rivers differ. There are transparent and sparkling rivers from which it is delightful to drink as they flow; to such rivers the minds of such men as Burke and Johnson may be. compared. But there are rivers of which the water when first drawn is turbid and noisome, but becomes pellucid as crystal and delicious to the taste, if it be suffered to stand till it has deposited a sediment; and such a river is a type of the mind of Goldsmith. His first thoughts on every subject were confused even to absurdity, but they required only a little time to work themselves clear. When he wrote they had that time, and therefore his readers pronounced him a man of genius; but when he talked he talked nonsense and made himself the laughing-stock of his hearers. He was painfully sensible of his inferiority in conversation ; he felt every failure keenly; yet he had not sufficient judgment and self-command to hold his tongue. His animal spirits and vanity were always impelling "nim to try to do the one thing which he could not do. After every attempt he felt that he had exposed himself, and writhed with shame and vexation; yet the next moment he began again.

His associates seem to have re-garded him with kindness, which, in spite of their admiration of his writings, was not unmixed with contempt. In truth,- there was in his character much to love, but very little to respect. His heart was soft even to weakness;

he was so generous that he quite forgot to be just; he forgave injuries so readily that he might be said to invite them, and was so liberal to beggars that he had nothing left for his tailor and his butcher. He was vain, sensual, frivolous, profuse, improvident. One vice of a darker shade was imputed to him, envy. But there is not the least reason to believe that this bad passion, though it sometimes made him wince

and utter fretful exclamations, ever impelled him to injure by wicked arts the reputation of any of his rivals. The truth probably is that he was not more envious, but merely less prudent, than his neighbours. His heart was on his lips. All those small jealousies, which are but too common among men of letters, but which a man of letters who is also a man of the world does his best to conceal, Goldsmith avowed with the simplicity of a child. When he was envious, instead of affecting indifference, instead of damning with faint praise, instead of doing injuries slyly and in the dark, he told everybody that he was envious. ” Do not, pray, do not, talk of Johnson in such terms,” he said to Boswell; ” you harrow up my very soul.” George Steevens and Cumberland were men far too cunning to say such a thing. They would have echoed the praises of the man whom they envied, and then have sent to the newspapers anonymous libels upon him. Both what was good and what was bad in Goldsmith’s character was to his associates a perfect security that he would never commit such villainy. He was neither ill-natured enough, nor long-headed enough, to be guilty of any malicious act which required contrivance and disguise.

Goldsmith has sometimes been represented as a man of genius, cruelly treated by the world, and doomed to struggle with difficulties, which at last broke his heart. But no representation can be more remote from the truth. He did, indeed, go through much sharp misery before he had done anything considerable in literature. But after his name had appeared on the title-page of the Traveller, he had none but himself to blame for his dis- tresses. His average income, during the last seven years of his life, certainly exceeded £400 a year, and £400 a year ranked, among the incomes of that day, at least as high as £800 a year would rank at present. A single man living in the Temple, with £400 a year, might then be called opulent. Not one in ten of the young gentlemen of good families who were studying the law there had so much. But all the wealth which Lord Clive had brought from Bengal and Sir Lawrence Dundas from Germany, joined together, would not have sufficed for Goldsmith. He spent twice as much as he had. He wore fine clothes, gave dinners of several courses, paid court to venal beauties. He had also, it should be remembered, to the honour of his heart, though not of his head, a guinea, or five, or ten, according to the state of his purse, ready for any tale of distress, true or false. But it was not in dress or feasting, in promiscuous amours or promiscuous charities, that his chief expense lay. He had been from boyhood a gambler, and at once the most sanguine and the most unskilful of gamblers. For a time he put off the day of inevitable ruin by temporary expedients. He obtained advances from booksellers by promising to execute works which he never began. But at length this

source of supply failed. He owed more than £2000; and he saw no hope of extrication from his embarrassments. His spirits and health gave way. He was attacked by a nervous fever, which he thought himself competent to treat. It would have been happy for him if his medical skill had been appreciated as justly by himself as by others. Notwithstanding the degree which he pretended to have received on the continent, he could procure no patients. “I do not practise,” he once said; “I make it a rule to prescribe only for my friends.” ” Pray, dear Doctor,” said Beauclerk, ” alter your rule; and prescribe only for your enemies.” Goldsmith, now, in spite of this excellent , advice, prescribed for himself. The remedy aggravated the malady. The sick man was induced to call in real physicians; and they at one time imagined that they had cured the disease. Still his weakness and restlessness continued. He could get no sleep. He could take no food. ” You are worse,” said one of his medical attendants, ” than you should be from the degree of fever which you have. Is your mind at ease?” “No; it is

not,” were the last recorded words of Oliver Goldsmith. He died on the 4th of April 1774, in his forty-sixth year. He was laid in the churchyard of the Temple; but the spot was not marked by any inscription and is now forgotten. The coffin was followed by Burke and Reynolds. Both these great men were sincere mourners. Burke, when he heard of Goldsmith’s death, had burst into a flood of tears. Reynolds had been so much moved by the news that he had flung aside his brush and palette for the day.

A short time after Goldsmith’s death, a little poem appeared, which will, as long as our language lasts, associate the names of his two illustrious friends with his own. It has already been mentioned that he sometimes felt keenly the sarcasm which his wild blundering talk brought upon him. He was, not long before his last illness, provoked into retaliating. He wisely betook himself to his pen; and at that weapon he proved himself a match for all his assailants together. Within a small compass he drew with a singularly easy and vigorous pencil the characters of nine or ten of his intimate associates. Though this little work did not receive his last touches, it must always be regarded as a masterpiece. It is impossible, however, not to wish that four or five likenesses which have no interest for posterity were wanting to that noble gallery, and that their places were supplied by sketches of Johnson and Gibbon, as happy and vivid as the sketches of Burke and Garrick.

Some of Goldsmith’s friends and admirers honoured him with a cenotaph in Westminster Abbey. Nollekens was the sculptor, and

Johnson wrote the inscription. It is much to be lamented that Johnson did not leave to posterity a more durable and a more valuable memorial of his friend. A life of Goldsmith would have been an inestimable addition to the Lives of the Poets. No man appreciated Goldsmith's writings more justly than Johnson; no man was better acquainted with Goldsmith's character and habits; and no man was more competent to delineate with truth and spirit the peculiarities of a mind in which great powers were found in company with great weaknesses. But the list of poets to whose works Johnson was requested by the booksellers to furnish prefaces ended with Lyttelton, who died in 1773. The line seems to have been drawn expressly for the purpose of excluding the person whose portrait would have most fitly closed the series. Goldsmith, however, has been fortunate in his biographers. (M.)

Goldsmith's life has been written by Prior (1837), by Washington Irving (1844-1849), and by John Forster (1848, 2nd ed. 1854). The diligence of Prior deserves great praise ; the style of Washington Irving is always pleasing; but the highest place must, in justice, be assigned to the eminently interesting work of Forster. Subsequent biographies are by William Black (1878), and Austin Dobson (1888, American ed. 1899). The above article by Lord Macaulay has been slightly revised for this edition by Mr Austin Dobson, as regards questions of fact for which there has been new evidence.

GOLDSTtiCKER, THEODOR (1821-1872), German Sanskrit scholar, was born of Jewish parents at Konigsberg on the 18th of January 1821, and, after attending the gymnasium of that town, entered the university in 1836 as a student of Sanskrit. In 1838 he removed to Bonn, and, after graduating at Konigsberg in 1840, proceeded to Paris; in 1842 he edited a German trans- lation of the Prabodha Chandrodaya. From 1847 to 1850 he resided at Berlin, where his talents and scholarship were recog- nized by Alexander von Humboldt, but where his advanced political views caused the authorities to regard him with suspicion. In the latter year he removed to London, where in 1852 he was appointed professor of Sanskrit in University College. He now worked on a new Sanskrit dictionary, of which the first instal- ment appeared in 1856. In 1861 he published his chief work: Pdnini: his place in Sanskrit Literature; and he was one of the founders and chief promoters of the Sanskrit Text Society; he was also an active member of the Philological Society, and of other learned bodies. He died in London on the 6th of March

1872.

As Literary Remains some of his writings were published in two volumes (London, 1879), but his papers were left to the India Office with the request that they were not to be published until 1920.

GOLDWELL, THOMAS (d. 1585), English ecclesiastic, began his career as vicar of Cheriton in 1531, after graduating M.A. at All Souls College, Oxford. He became chaplain to Cardinal Pole and lived with him at Rome, was attainted in 1539, but returned to England on Mary's accession, and in 1555 became bishop of St Asaph, a diocese which he did much to win back to the old faith. On the death of Mary, Goldwell escaped from England and in 1 561 became superior of the Theatines at Naples. He was the only English bishop at the council of Trent, and in 1562 was again attainted. In the following year he was appointed vicar-general to Carlo Borromeo, archbishop of Milan. He died in Rome in 1585, the last of the English bishops who had refused to accept the Reformation.

GOLDZIHER, IGNAZ (1850-), Jewish Hungarian orient- alist, was born in Stuhlweissenburg on the 22nd of June 1850. He was educated at the universities of Budapest, Berlin, Leipzig and Leiden, and became privat docent at Budapest in 1872. In the next year, under the auspices of the Hungarian government, he began a journey through Syria, Palestine and Egypt, and took the opportunity of attending lectures of Mahommedan sheiks in the mosque of el-Azhar in Cairo. He was the first Jewish scholar to become professor in the Budapest University (1894), and represented the Hungarian government and the Academy of Sciences at numerous international con- gresses. He received the large gold medal at the Stockholm Oriental Congress in 1889. He became a member of several Hungarian and other learned societies, was appointed secretary of the Jewish community in Budapest. He was made Litt. D. of Cambridge(i904)and LL.D. of Aberdeen (1906) . His eminence in the sphere of scholarship is due primarily to his careful in- vest igationofpre-MahommedanandMahommedanlaw,tradition, religion and poetry, in connexion with which he published a large number of treatises, review articles and essays contributed to the collections of the Hungarian Academy.

Among his chief works are: Beitrdge zur Literaturgeschichte der Schi'a (1874); Beitrdge zur Geschichte der Sprachgelehrsamkeit bei den Arabern (Vienna, 1871-1873); Der Mythos bei den Hebrdern und seine

geschichtliche Entwickelung (Leipzig, 1876; Eng. trans., R. Martineau, London, 1877); Muhammedanische Studien (Halle, 1889-1890, 2 vols.) ; Abkandlungen zur arabischen Philologie (Leiden, 1 896-1899, 2 vols.) ; Buchv. Wesen d. Seele (ed. 1907).

GOLETTA [La Goulette], a town on the Gulf of Tunis in 36 50′ N. io° 19′ E., a little south of the ruins of Carthage, and on the north side of the ship canal which traverses the shallow Lake of Tunis and leads to the city of that name. Built on the narrow strip of sand which separates the lake from the gulf, Goletta is defended by a fort and battery. The town contains a summer palace of the bey, the old seraglio, arsenal and custom- house, and many villas, gardens and pleasure resorts, Goletta being a favourite place for sea-bathing. A short canal, from which the name of the town is derived (Arab. Halk-el-Wad, ” throat of the canal “), 40 ft. broad and 8ˆ ft. deep, divides the town- and affords communication between the ship canal and a dock or basin, 1082 ft. long and 541 ft. broad. An electric tramway which runs along the north bank of the ship canal connects Goletta with the city of Tunis (q.v.). Pop. (1907) about 5000, mostly Jews and Italian fishermen.

Beyond Cape Carthage, 5 m. N. of Goletta, is La Marsa, a summer resort overlooking the sea. The bey has a palace here, and the French resident-general, the British consul, other officials, and many Tunisians have country-houses, surrounded by groves of olive trees.

Before the opening of the ship canal in 1893 Goletta, as the port of Tunis, was a place of considerable importance. The basin at the Goletta end of the canal now serves as a subsidiary harbour to that of Tunis. The most stirring events in the history of the town are connected with the Turkish conquest of the Barbary states. Khair-ed-Din’ Barbarossa having made himself master of Tunis and its port, Goletta was attacked in 1535 by the emperor Charles V., who seized the pirate’s fleet, which was sheltered in the small canal, his arsenal, and 300 brass cannon. The Turks regained possession in 1574. (See Tunisia : History.)

GOLF (in its older forms Goff, Gotjff or Gowff, the last of which gives the genuine old pronunciation), a game which probably derives its name from the Ger. kolbe, a club — in Dutch, kolf — which last is nearly in sound identical and might suggest a Dutch origin, 1 which many pictures and other witnesses further support.

History. — One of the most ancient and most interesting of the pictures in which the game is portrayed is the tailpiece to an

illuminated Book of Hours made at Bruges at the beginning of the 16th century. The original is in the British Museum. The players, three in number, have but one club apiece. The heads of the clubs are steel or steel covered. They play with a ball each. That which gives this picture a peculiar interest over the many pictures of Dutch schools that portray the game in progress is that most of them show it on the ice, the putting being at a stake. In this Book of Hours they are putting at a hole in the turf, as in our modern golf. It is scarcely to be doubted that the game is of Dutch origin, and that it has been in favour since very early days. Further than that our knowledge does not go. The early Dutch- men played golf, they painted golf, but they did not write it.

It is uncertain at what date golf was introduced into Scotland, but in 1457 the popularity of the game had already become so great as seriously to interfere with the more important pursuit of archery. In March of that year the Scottish parliament " decreted and ordained that wapinshawingis be halden be the lordis and baronis spirituale and temporale, four times in the zeir; and that the fute-ball and golf be utterly cryit down, and nocht usit; and that the bowe-merkis be maid at ilk paroche kirk a pair of buttis, and schuttin be usit ilk Sunday." Fourteen years afterwards, in May 147 1, it was judged necessary to pass another act " anent wapenshawings," and in 1491 a final and evidently angry fulmination was issued on the general subject, with pains and penalties annexed. It runs thus — " Futeball and Golfe forbidden. Item, it is statut and ordainit that in na place of the realme there be usit fute-ball, golfe, or uther sik unprofitabill sportis," &c. This, be it noted, is an edict of James IV.; and it is not a little curious presently to find the monarch himself setting an ill example to his commons, by practice of this " unprofitabill sport," as is shown by various entries in the accounts of the lord high treasurer of Scotland (1503-1506).

About a century later, the game again appears on the surface of history, and it is quite as popular as before. In the year 1592 the town council of Edinburgh "ordanis proclamation to be made threw this burgh, that na inhabitants of the samyn be seen at ony pastymes within or without the toun, upoun the Sabboth day, sic as golfe, &c." 2 The following year the edict was re-announced, but with the modification that the prohibition was " in tyme of sermons."

Golf has from old times been known in Scotland as " The Royal and Ancient Game of Goff." Though no doubt Scottish monarchs handled the club before him, James IV. is the first who figures formally in the golfing record. James V. was also very partial to the game

distinctively known as ” royal “; and there is some scrap of evidence to show that his daughter, the unhappy Mary Stuart, was a golfer. It was alleged by her enemies that, as showing her shameless indifference to the fate of her husband, a very few days after his murder, she ” was seen playing golf and pallmall in the fields beside Seton.” 3 That her son, James VI. (afterwards James I. of England), was a golfer, tradition con- fidently asserts, though the evidence which connects him with the personal practice of the game is slight. Of the interest he took in it we have evidence in his act — already alluded to — ” anent golfe ballis,” prohibiting their importation, except under certain

1 From an enactment of James VI. (then James I. of England), ■bearing date 1618, we find that a considerable importation of golf balls at that time took place from Holland, and as thereby ” na small quantitie of gold and silver is transported zierly out of his Hienes' kingdome of Scoteland ” (see letter of His Majesty from Salisbury, the 5th of August 1618), he issues a royal prohibition, at once as a wise economy of the national moneys, and a protection to native industry in the article. From this it might almost seem that the game was at that date still known and practised in Holland.

2 Records of the City of Edinburgh.

3 Inventories of Mary Queen of Scots, preface, p. lxx. (1863).

restrictions. Charles I. (as his brother Prince Henry had been >) was devotedly attached to the game. Whilst engaged in it on the links of Leith, in 1642, the news reached him of the Irish rebellion of that year. He had not the equanimity to finish his match, but returned precipitately and in much agitation to Holyrood. ~ Afterwards, while prisoner to the Scots army at Newcastle, he found his favourite diversion in ” the royal game.” ” The King was nowhere treated with more honour than at New- castle, as he himself confessed, both he and his train having liberty to go abroad and play at goff in the Shield Field, without the walls.” 3 Of his son, Charles II., as a golfer, nothing whatever is ascertained, but James II. was a known devotee. 4 After the Restoration, James, then duke of York, was sent to Edinburgh in 1 68 1/2 as commissioner of the king to parliament, and an historical monument of his prowess as a golfer remains there to this day in the ” Golfer's Land,” as it is still called, 77 Canongate. The duke having

been challenged by two English noblemen of his suite, to play a match against them, for a very large stake, along with any Scotch ally he might select, chose as his partner one ” JohnePatersone,” a shoemaker. The duke and the said Johne won easily, and half of the large stake the duke made over to his humble coadjutor, who therewith built himself the house men- tioned above. In 1834 William IV. became patron of the St Andrews Golf Club (St Andrews being then, as now, the most famous seat of the game), and approved of its being styled ” The Royal and Ancient Golf Club of St Andrews.” In 1837, as further proof of royal favour, he presented to it a magnificent gold medal, which ” should be challenged and played for annually “; and in 1838 the queen dowager, duchess of St Andrews, became patroness of the club, and presented to it a handsome gold medal — ” The Royal Adelaide ” — with a request that it should be worn by the captain, as president, on all public occasions. In June 1863 the prince of Wales (afterwards Edward VII.) signified his desire to become patron of the club, and in the following September was elected captain by acclamation. His engagements did not admit of his coming in person to undertake the duties of the office, but his brother Prince Leopold (the duke of Albany), having in 1876 done the club the honour to become its captain, twice visited the ancient city in that capacity.

In more recent days, golf has become increasingly popular in a much wider degree. In 1880 the man who travelled about England with a set of golf clubs was an object of some astonish- ment, almost of alarm, to his fellow-travellers. In those days the commonest of questions in regard to the game was, ” You have to be a fine rider, do you not, to play golf ? ” so confounded was it in the popular mind with the game of polo. At Blackheath a few Scotsmen resident in London had long played golf. In 1864 the Royal North Devon Club was formed at Westward Ho, and this was the first of the seaside links discovered and laid out for golf in England. In 1869 the Royal Liverpool Club established itself in possession of the secondEnglish course of this quality atHoylake, in Cheshire. A golf club was formed in connexion with the London Scottish Volunteers corps, which had its house on the Putney end of Wimbledon Common on Putney Heath; and, after making so much of a start, the progress of the game was slow, though steady, for many years. A few more clubs were formed; the numbers of golfers grew; but it could not be said that the game was yet in any sense popular in England. All at once, for no very obvious reason, the qualities of the ancient Scottish game seemed to strike home, and from that moment its popularity has been wonderfully and increasingly great. The English links that rose into most immediate

favour was the fine course of the St George's Golf Club, near Sandwich, on the coast of Kent. To the London golfer it was the first course of the first class that was reasonably accessible, and the fact made something like an epoch in English golf. A very considerable increase, it is true, in the number of English golfers and English golf clubs had taken place before the discovery for golfing purposes of the links at Sandwich.

1 Anonymous author of MS. in the Harleian Library.

2 See History of Leith, by A. Campbell (1827).

3 Local Records of Northumberland, by John Sykes (Newcastle,

I833)-

4 Robertson's Historical Notices of Leith.

Already there was a chain of links all round the coast, besides numerous inland courses; but since 1890 their increase has been extraordinary, and the number which has been formed in the colonies and abroad is very large also, so that in the Golfer's Year Book for 1906 a space of over 300 pages was allotted to the Club Directory alone, each page containing, on a rough average, six clubs. To compute the average membership of these clubs is very difficult. There is not a little overlapping, in the sense that a member of one club will often be a member of several others; but probably the average may be placed at something like 200 members for each club.

The immense amount of golf-playing that this denotes, the large industry in the making of clubs and balls, in the upkeep of links, in the actual work of club-carrying by the caddies, and in the instruction given by the professional class, is obvious. Golf has taken a strong hold on the affections of the people in many parts of Ireland, and the fashion for golf in England has reacted strongly on Scotland itself, the ancient home of the game, where since 1880 golfers have probably increased in the ratio of forty to one. Besides the. industry that such a growth of the game denotes in the branches immediately connected with it, as mentioned above, there is to be taken into further account the visiting population that it brings to all lodging-houses and hotels within reach of a tolerable golf links, so that many a fishing village has risen into a moderate watering-place by virtue of no other attractions than those which are offered by its golf course. Therefore to the Briton, golf has developed from something of which he had a vague idea — as of " curling " — to something in the nature of an

important business, a business that can make towns and has a considerable effect on the receipts of railway companies.

Moreover, ladies have learned to play golf. Although this is a crude and brief sentence, it does not state the fact too widely nor too forcibly, for though it is true that before 1885 many played on the short links of St Andrews, North Berwick, Westward Ho and elsewhere, still it was virtually unknown that they should play on the longer courses, which till then had been in the undisputed possession of the men. At many places women now have their separate links, at others they play on the same course as the men. But even where links are set apart for women, they are far different from the little courses that used to be assigned to them. They are links only a little less formidable in their bunkers, a little less varied in their features than those of men. The ladies have their annual championship, which they play on the long links of the men, sometimes on one, sometimes on another, but always on courses of the first quality, demanding the finest display of golfing skill. The claim that England made to a golfing fellowship with Scotland was conceded very strikingly by the admission of three English greens, first those of Hoylake and of Sandwich, and in 1909 Deal, into the exclusive list of the links on which the open championship of the game is decided. Before England had so fully assimilated Scotland's game this great annual contest was waged at St Andrews, Musselburgh and Prestwick in successive years. Now the ancient green of Musselburgh, somewhat worn out with length of hard and gallant service, and moreover, as a nine-holes course inadequately accommodating the numbers who compete in the championships to-day, has been superseded by the course at Muirfield as a championship arena. While golf had been making itself a force in the southern kingdom, the professional element — men who had learned the game from childhood, had become past-masters, were capable of giving instruction, and also of making clubs and balls and looking after the greens on which golf was played — had at first **been taken from the northern side of the Border. But when golf had been started long enough in England for the little boys who were at first employed as " caddies " — in carrying the players' clubs — to grow to sufficient strength to drive the ball as far as their masters, it was inevitable that out of the number who thus began to play in their boyhood some few** should develop an exceptional talent for the game. This, in fact, actually happened, and English golfers, both of the amateur

and the professional classes, have proved themselves so adept at Scotland's game, that the championships in either the Open or the Amateur competitions have been won more often by English than by Scottish players of late years. Probably in the United Kingdom to-day there are as many English as Scottish professional golf players, and their relative number is increasing. Golf also " caught on," to use the American expression, in the United States. To the American of 1890 golf was largely an unknown thing. Since then, however, golf has become perhaps a greater factor in the life of the upper and upper-middle classes in the United States than it ever has been in England or Scotland. Golf to the English and the Scots meant only one among several of the sports and pastimes that take the man and the woman of the upper and upper-middle classes into the country and the fresh air. To the American of like status golf came as the one thing to take him out of his towns and give him a reason for exercise in the country. To-day golf has become an interest all over North America, but it is in the Eastern States that it has made most difference in the life of the classes with whom it has become fashionable. Westerners and Southerners found more excuses before the coming of golf for being in the open country air. It is in the Eastern States more especially that it has had so much influence in making the people live and take exercise out of doors. In a truly democratic spirit the American woman golfer plays on a perfect equality with the American man. She does not compete in the men's championships; she has championships of her own; but she plays, without question, on the same links. There is no suggestion of relegating her, as a certain cynical writer in the Badminton volume on golf described it, to a waste corner, a kind of " Jews' Quarter," of the links. And the Americans have taken up golf in the spirit of a sumptuous and opulent people, spending money on magnificent clubhouses beyond the finest dreams of the Englishman or the Scot. The greatest success achieved by any American golfer fell to the lot of Mr Walter Travis of the Garden City club, who in 1904 won the British amateur championship.

So much enthusiasm and so much golf in America have not failed to make their influence felt in the United Kingdom. Naturally and inevitably they have created a strong demand for professional instruction, both by example and by precept, and for professional advice and assistance in the laying-out and upkeep of the many new links that have been created in all parts of the States, sometimes out of the least promising material. By the offer of great prizes for exhibition matches, and of wages that are to the British rate on the scale of the dollar to the shilling, they have attracted many of the best Scottish and English professionals to pay them longer or shorter visits as the

case may be, and thus a new opening has been created for the energies of the professional golfing class.

The Game. — The game of golf may be briefly defined as consisting in hitting the ball over a great extent of country, preferably of that sand-hill nature which is found by the sea-side, and finally hitting or " putting " it into a little hole of some 4 in. diameter cut in the turf. The place of the hole is commonly marked by a flag. Eighteen is the recognized number of these holes on a full course, and they are at varying distances apart, from 100 yds. up to anything between a \ and \ m. For the various strokes required to achieve the hitting of the ball over the great hills, and finally putting it into the small hole, a number of different " clubs " has been devised to suit the different positions in which the ball may be found and the different directions in which it is wished to propel it. At the start for each hole the ball may be placed on a favourable position (e.g. " tee'd " on a small mound of sand) for striking it, but after that it may not be touched, except with the club, until it is hit into the next hole. A " full drive," as the farthest distance that' the ball can be hit is called, is about 200 yds. in length, of which some three-fourths will be traversed in the air, and the rest by bounding or running over the ground. It is easily to be understood that when the ball is lying on the turf behind a tall sand-hill, or in a bunker, a differently-shaped club is required for raising it over such an obstacle from that which is needed

when it is placed on the tee to start with; and again, that another club is needed to strike the ball out of a cup or out of heavy grass. It is this variety that gives the game its charm. Each player plays with his own ball, with no interference from his opponent, and the object of each is to hit the ball from the starting-point into each successive hole in the fewest strokes. The player who at the end of the round (i.e. of the course of eighteen holes) has won the majority of the holes is the winner of the round; or the decision may be reached before the end of the round by one side gaining more holes than there remain to play. For instance, if one player be four holes to the good, and only three holes remain to be played, it is evident that the former must be the winner, for even if the latter win every remaining hole, he still must be one to the bad at the finish.

The British Amateur Championship is decided by a tourna- ment in matches thus played, each defeated player retiring, and his opponent passing on into the next round. In the case of the Open Championship, and in most medal competitions, the scores are differently reckoned — each man's total score (irrespective of his relative merit at each hole) being reckoned at the finish against the total score of the other players

in the competition. There is also a species of competition called ” bogey ” play, in which each man plays against a ” bogey ” score — a score fixed for each hole in the round before starting — and his position in the competition relatively to the other players is determined by the number of holes that he is to the good or to the bad of the “bogey ” score at the end of the round. The player who is most holes to the good, or fewest holes to the bad, wins the competition. It may be mentioned incidentally that golf occupies the almost unique position of being the only sport in which even a single player can enjoy his game, his opponent in this event being ” Colonel Bogey ” — more often than not a redoubtable adversary.

The links which have been thought worthy, by reason of their geographical positions and their merits, of being the scenes on which the golf championships are fought out, are, as we have already said, three in Scotland — St Andrews, Prestwick and Muirfield — and three in England — Hoylake, Sandwich and Deal. This brief list is very far from being complete as regards links of first-class quality in Great Britain. Besides those named, there are in Scotland — Carnoustie, North Berwick, Cruden Bay, Nairn, Aberdeen, Dornoch, Troon, Machrihanish, South Uist, Islay, Gullane, Luffness and many more. In England there are — Westward Ho, Bembridge, Littlestone, Great Yarmouth, Brancaster, Seaton Carew, Formby, Lytham, Harlech, Burnham, among the seaside ones; while of the inland, some of them of very fine quality, we cannot even attempt a selection, so large is their number and so variously estimated their comparative merits. Ireland has Portrush, Newcastle, Portsalon, Dotlymount and many more of the first class; and there are excellent courses in the Isle of Man. In America many fine courses have been constructed. There is not a British colony of any standing that is without its golf course — Australia, India, South Africa, all have their golf championships, which are keenly contested. Canada has had courses at Quebec and Montreal for many years, and the Calcutta Golf Club, curiously enough, is the oldest established (next to the Blackheath Club), the next oldest being the club at Pau in the Basses-Pyr6nees.

The Open Championship of golf was started in i860 by the Prestwick Club giving a belt to be played for annually under the condition that it should become the property of any who could win it thrice in succession. The following is the list of the champions : —

i860. W. Park, Musselburgh . .

1 86 1. Tom Morris, sen., Prestwick

1862. Tom Morris, sen., Prestwick

1863. -W. Park, Musselburgh . .

1864. Tom Morris, sen., Prestwick

1865. A. Strath, St Andrews . .

1866. W. Park, Musselburgh . .

1867. Tom Morris, sen., St Andrews

1868. Tom Morris, jun., St Andrews

1869. Tom Morris, jun., St Andrews

1870. Tom Morris, jun., St Andrews

174— at 163 — at 163— at 168 — at 160 — at 162 — at 169 — at 170 — at 154— at 157— at 149 — at

Prestwick. Prestwick. Prestwick. Prestwick. Prestwick. Prestwick. Prestwick. Prestwick. Prestwick. Prestwick. Prestwick.

Tom Morris, junior, thus won the belt finally, according to the conditions. In 1871 there was no competition; but by 1872 the three clubs of St Andrews, Prestwick and Musselburgh had sub- scribed for a cup which should be played for over the course of each subscribing club successively, but should never become the property of the winner. In later years the course at Muirfield was substituted for that at Musselburgh, and Hoylake and Sandwich were admitted into the list of championship courses. Up to 1891, inclusive, the play of two rounds, or thirty-six holes, determined the cha:mpionship, but from 1 892 the result has been determined by the play of 72 holes.;

the interregnum of 1871, the following were the champions: —

After

1872. Tom Morris, jun., St Andrews

1873. Tom Kidd, St Andrews

1874. Mungo Park, Musselburgh

1875. Willie Park, Musselburgh

1876. Bob Martin, St Andrews

1877. Jamie Anderson, St Andrews

1878. Jamie Anderson, St Andrews

1879. Jamie Anderson, St Andrews

1880. Bob Fergusson, Musselburgh

1 88 1. Bob Fergusson, Musselburgh

1882. Bob Fergusson, Musselburgh

1883. W. Fernie, Dumfries

1884. Jack Simpson, Carnoustie

1885. Bob Martin, St Andrews

1886. D. Brown, Musselburgh . .

1887. Willie Park, jun., Musselburgh

1888. Jack Burns, Warwick

1889. Willie Park, jun., Musselburgh

1890. Mr John Ball, jun., Hoylake

1 89 1. Hugh Kirkaldy, St Andrews

1892. Mr H. H. Hilton, Hoylake .

1893. W. Auchterlonie, St Andrews

1894. J. H. Taylor, Winchester

1895. J. H. Taylor, Winchester

1896. H. Vardon, Scarborough

1897. Mr H. H. Hilton, Hoylake

1898. H. Vardon, Scarborough

1899. H. Vardon, Scarborough

1900. J. H. Taylor, Richmond

1901. J. Braid, Romford

1902. A. Herd, Huddersfield

1903. H. Vardon, Ganton

1904. J. White, Sunningdale

1905. J. Braid, Walton Heath

1906. J. Braid, Walton Heath

1907. Arnaud Massey, La Boulie

1908. J. Braid, Walton Heath

1909. J. H. Taylor, Richmond .

1910. J. Braid, Walton Heath .

The Amateur Championship is of far

166— at 179— at 159— at 166— at 176 — at 160 — at 157— at 170 — at 162 — at 170 — at 171 — at 159— at 160 — at 171 — at 157— at 161 — at 171 — at 155— at 164 — at 166— at 305— at 322 — at 326 — at 322 — at 316 — at 314— at 307— at 310 — at 309— at 309 — at 307— at 300 — at 296 — at 318— at 300 — at 312— at 291 — at 295— at 298 — at

Prestwick.

St Andrews.

Musselburgh.

Prestwick.

St Andrews.

Musselburgh.

Prestwick.

St Andrews.

Musselburgh.

Prestwick.

St Andrews.

Musselburgh.

Prestwick.

St Andrews.

Musselburgh.

Prestwick.

St Andrews.

Musselburgh.

Prestwick.

St Andrews.

Muirfield.

Prestwick.

Sandwich.

St Andrews.

Muirfield.

Hoylake.

Prestwick.

Sandwich.

St Andrews.

Muirfield.

Hoylake.

Prestwick.

Sandwich.

St Andrews.

Muirfield.

Hoylake.

Prestwick.

Deal.

St Andrews.

1886. 1887. 1888. 1889. 1890. 1891. 1892.

1893. 1894. 1895. 1896. 1897. 1898. 1899. 1900. 1901. 1902. 1903. 1904. 1905. 1906. 1907. 1908. 1909. 1910.

The Ladies’

1893. 1894. 1895. 1896.

1897. 1898. 1899. 1900. 1901. 1902. 1903. 1904. 1905. 1906. 1907. 1908. 1909. 1910.

Mr Horace Hutchinson Mr Horace Hutchinson Mr John Ball Mr J. E. Laidlay Mr John Ball Mr J. E. Laidlay Mr John Ball Mr P. Anderson Mr John Ball Mr L. Balfour-Melville Mr F. G. Tait Mr J. T. Allan Mr John Ball Mr F. G. Tait Mr H. H. Hilton Mr H. H. Hilton Mr C. Hutchings Mr R. Maxwell . Mr W. J. Travis Mr A. G. Barry Mr J. Robb . . ‘ Mr John Ball Mr E. A. Lassen Mr Robert Maxwell Mr John Ball

more recent institution.

at St Andrews.

at Hoylake.

at Prestwick. . at St Andrews.

at Hoylake. . at St Andrews.

at Sandwich.

at Prestwick. . at Hoylake.

at St Andrews.

at Sandwich. . at Muirfield.

at Prestwick.

at Hoylake.

at Sandwich.

at St Andrews.

at Hoylake. . at Muirfield.

at Sandwich.

at St Andrews. . at Hoylake.

at St Andrews.

at Sandwich.

at Muirfield.

at Hoylake.

Championship was started in Lady M. Scott Lady M. Scott Lady M. Scott

ss A. B. Pascoe ss E. C. Orr ss L. Thompson Iss M. Hezlet . ss R. K. Adair ss M. A. Graham ss M. Hezlet . ss R. K. Adair ss L. Dod . ss B. Thompson rs Kennion ss M. Hezlet . ss M. Titterton ss D. Campbell ss Grant Suttie

1893.

at St Annes. at Littlestone. at Portrush. at Hoylake. ‘ at Gullane. at Yarmouth, at Newcastle, at Westward Ho. at Aberdovy. at. Deal, at Portrush. at Troon, at Cromer, at Burnham. at Newcastle (Co. Down), at St Andrews, at Birkdale. at Westward Ho.

There have been some slight changes of detail and arrangement as time has gone on, in the rules of the game (the latest edition

of the Rules should be consulted). A new class of golfer has arisen, requiring a code of rules framed rather more exactly than the older code. The Scottish golfer, who was ” teethed ” on a golf club, as Mr Andrew Lang has described it, imbibed all the traditions of the game with his natural sustenance. Very few rules sufficed for him. But when the Englishman, and still more the American (less in touch with the traditions), began to play golf as a new game, then they began to ask for a code of rules that should be lucid and illuminating on every point — an ideal perhaps impossible to realize. It was found, at least, that the code put forward by the Royal and Ancient Club of St Andrews did not realize it adequately. Nevertheless the new golfers were very loyal indeed to the club that had ever of old held, by tacit consent, the position of fount of golfing legislation. The Royal and Ancient Club was appealed to by English golfers to step into the place, analogous to that of the Marylebone Cricket Club in cricket, that they were both willing and anxious to give it. It was a place that the Club at St Andrews did not in the least wish to occupy, but the honour was thrust so insist- ently upon it, that there was no declining. The latest effort to meet the demands for some more satisfactory legislation on the thousand and one points that continually must arise for decision in course of playing a game of such variety as golf, consists of the appointment of a standing committee, called the ” Rules of Golf Committee.” Its members all belong to the Royal and Ancient Club; but since this club draws its membership from all parts of the United Kingdom, this restriction is quite con- sistent with a very general representation of the views of north, south, east and west — from Westward Ho and Sandwich to Dornoch, and all the many first-rate links of Ireland — on the committee. Ireland has, indeed, some of the best links in the kingdom, and yields to neither Scotland nor England in en- thusiasm for the game. This committee, after a general revision of the rules into the form in which they now stand, consider every month, either by meeting or by correspondence, the questions that are sent up to it by clubs or by individuals; and the committee’s answers to these questions have the force of law until they have come before the next general meeting of the Royal and Ancient Club at St Andrews, which may confirm or may reject them at will. The ladies of Great Britain manage otherwise. They have a Golfing Union which settles questions for them; but since this union itself accepts as binding the answers given by the Rules of Golf Committee, they really arrive at the same conclusions by a slightly different path. Nor does the American Union, governing the play of men and women alike in the States, really act differently. The Americans naturally reserve to themselves freedom to make their own rules, but in practice they conform to the legislation of Scotland, with the exception of a more

drastic definition of the status of the amateur player, and certain differences as to the clubs used.

A considerable modification has been effected in the implements of the game. The tendency of the modern wooden clubs is to be short in the head as compared with the clubs of, say, 1880 or 1885. The advantage claimed (probably with justice) for this shape is that it masses the weight behind the point on which the ball is struck. Better material in the wood of the club is a consequence of the increased demand for these articles and the increased competition among their makers." Whereas under the old conditions a few workers at the few greens then in existence were enough to supply the golfing wants, now there is a very large industry in golf club and ball making, which not only employs workers in the local club-makers' shops all the kingdom over, but is an important branch of the commerce of the stores and of the big athletic outfitters, both in Great Britain and in the United States. By far the largest modification in the game since the change to gutta-percha balls from balls of leather-covering stuffed with feathers, is due to the American invention of the india-rubber cased balls. Practically it is as an American invention that it is still regarded, although the British law courts decided, after a lengthy trial (1905), that there had been " prior users " of the principle of the balls' manufacture, and therefore that the patent of Mr Haskell, by whose name the

first balls of the kind were called, was not good. It is singular to remark that in the first introduction of the gutta-percha balls, superseding the leather and feather compositions, they also were called by the name of their first maker, " Gourlay." The general mode of manufacture of the rubber-cored ball, which is now everywhere in use, is interiorly, a hard core of gutta-percha or some other such substance; round this is wound, by machinery, india-rubber thread or strips at a high tension, and over all is an outer coat of gutta-percha. Some makers have tried to dispense with the kernel of hard substance, or to sub- stitute for it kernels of some fluid or gelatinous substance, but in general the above is a sufficient, though rough, description of the mode of making all tfyese balls. Their superiority over the solid gutta-percha lies in their superior resiliency. The effect is that they go much more lightly off the club. It is not so much in the tee-shots that this superiority is observed, as in the second shots, when the ball is lying badly, balls of the rubber- cored kind, with their greater

liveliness, are more easy to raise in the air from a lie of this kind. They also go remarkably well off the iron clubs, and thus make the game easier by placing the player within an iron shot of the hole at a distance at which he would have to use a wooden club if he were playing with a solid gutta-percha ball. They also tend to make the game more easy by the fact that if they are at all mis-hit they go much better than a gutta-percha ball similarly inaccurately struck. As a slight set- off against these qualities, the ball, because of the greater liveliness, is not quite so good for the short game as the solid ball; but on the whole its advantages distinctly overbalance its disadvantages. When these balls were first put on the market they were sold at two shillings each and even, when the supply was quite unequal to the demand, at a greater deal higher price, rising to as much as a guinea a ball. But the normal price, until about a year after the decision in the British courts of law affirming that there was no patent in the balls, was always two shillings for the best quality of ball. Subsequently there was a reduction down to one shilling for the balls made by many of the manufacturing companies, though in 1910 the rise in the price of rubber sent up the cost. The rubber-cored ball does not go out of shape so quickly as the gutta-percha solid ball and does not show other marks of ill-usage with the club so obviously. It has had the effect of making the game a good deal easier for the second- and third-class players, favouring especially those who were short drivers with the old gutta-percha ball. To the best players it has made the least difference, nevertheless those who were best with the old ball are also best with the new; its effect has merely been to bring the second, third and fourth best closer to each other and to the best.

Incidentally, the question of the expense of the game has been touched on in this notice of the new balls. There is no doubt that the balls themselves tend to a greater economy, not only because of their own superior durability but also because, as a consequence of their greater resiliency, they are not nearly so hard on the clubs, and the clubs themselves being perhaps made of better material than used to be given to their manu- facture, the total effect is that a man's necessary annual expendi- ture on them is very small indeed even though he plays pretty constantly. Four or five rounds are not more than the average of golfers will make an india-rubber cored ball last them, so that the outlay on the weapons is very moderate. On the other hand the expenditure of the clubs on their courses has increased and tends to increase. Demands are more insistent than they used to be for a well kept course, for perfectly mown greens, renewed teeing grounds and so on, and probably. the modern golfer is a good deal more luxurious in his clubhouse wants than his father used to be. This

means a big staff of servants and workers on the green, and to meet this a rather heavy subscription is required. Such a subscription as five guineas added to a ten or fifteen guinea entrance fee is not uncommon, and even this is very moderate compared with the subscriptions to some of the clubs in the United States, where a hundred dollars a year, or twenty pounds of our money, is not unusual. But on the whole golf is a very economical pastime, as compared with almost

any other sport or pastime which engages the attention of Britons, and it is a pastime for all the year round, and for all the life of a man or woman.

Glossary of Technical Terms used in the Game. Addressing the Ball. — Putting oneself in position to strike the ball. All Square. — Term used to express that the score stands level, neither side being a hole up.

Bag. — To strike the ground with the club when playing, and so loft the ball unduly.

Baffy. — A short wooden club, with laid-back face, for lofting shots. Bogey. — The number of strokes which a good average player should take to each hole. This imaginary player is usually known as ” Colonel Bogey,” and plays a fine game. Brassy. — A wooden club with a brass sole.

Bulger. — A driver in which the face ” bulges ” into a convex shape. The head is shorter than in the older-fashioned driver. Bunker. — A sand-pit.

Bye. — The holes remaining after one side has become more holes up than remain for play.

Caddie. — The person who carries , the clubs. Diminutive of ” cad “; cf. laddie (from Fr. cadet).

Cleek. — The iron-headed club that is capable of the farthest drive of any of the clubs with iron heads.

Cup. — A depression in the ground causing the ball to lie badly. Dead. — A ball is said to be ” dead ” when so near the hole that the putting it in in the next stroke is a ” dead ” certainty. A ball is said to ” fall dead ” when it pitches with hardly any run.

Divot. — A piece of turf cut out in the act of playing, which, be it noted, should always be replaced before the player moves on.

Dormy. — One side- is said to be ” dormy ” when it is as many holes to the good as remain to be played — so that it cannot be beaten.

Driver. — The longest driving club, used when the ball lies very well and a long shot is needed.

Foozle. — Any very badly missed or bungled stroke. ” Fore! ” — -A cry of warning to people in front. Foursome. — A match in which four persons engage, two on each side playing alternately with the same ball.

Green. — (a) The links as a whole; (b) the “putting-greens” around the holes.

Grip. — (a) The part of the club-shaft which is held in the hands while playing; (b) the grasp itself — e.g. “a firm grip,” “a loose grip,” are common expressions.

Half-Shot. — A shot played with something less than a full swing. Halved. — A hole is ” halved ” when both sides have played it in the same number of strokes. A round is ” halved ” when each side has won and lost the same number of holes.

Handicap. — The strokes which a player receives either in match play or competition.

Hanging. — Said of a ball that lies on a slope inclining downwards in regard to the direction in which it is wished to drive.

Hazard. — A general term for bunker, whin, long grass, roads and all kinds of bad ground.

Heel. — To hit the ball on the ” heel ” of the club, i.e. the part of the face nearest the shaft, and so send the ball to the right, with the same result as from a slice.

Honour. — The privilege (which its holder is not at liberty to decline) of striking off first from the tee.

Iron. — An iron-headed club intermediate between the cleek and lofting mashie. There are driving irons and lofting irons according to the purposes for which they are intended.

Lie. — (a) The angle of the club-head with the shaft (e.g. a ” flat lie,” ” an upright lie “); (b) the position of the ball on the ground (e.g. ” a good lie,” ” a bad lie “).

Like, The. — The stroke which makes the player's score equal to his opponent's in course of playing a hole.

Like-as-we-Lie. — Said when both sides have played the same number of strokes.

Line. — The direction in which the hole towards which the player is progressing lies with reference to the present position of his ball.

Mashie. — Ah iron club with a short head. The lofting mashie has the blade much laid back, for playing a short lofting shot. The driving mashie has the blade less laid back, and is used for longer, less lofted shots.

Match-Play. — Play in which the score is reckoned by holes won and lost.

Medal-Play. — Play in which the score is reckoned by the total of strokes taken on the round.

Niblick. — A short stiff club with a short, laid back, iron head, used for getting the ball out of a very bad lie.

Odd, The. — A stroke more than the opponent has played. Press. — To strive to hit harder than you can hit with accuracy. Pull. — To hit the ball with a pulling movement of the club, so as to make it curve to the left.

Putt. — To play the short strokes near the hole (pronounced as in "but").

Putter. — The club used for playing the short strokes near the hole. Some have a wooden head, some an iron head.

Rub-of-the-Green. — Any chance deflection that the ball receives as it goes along.

Run Up.— To send the ball low and close to the ground in approaching the hole — opposite to lofting it up.

Scratch Player. — Player who receives no odds in handicap competitions.

Slice. — To hit the ball with a cut across it, so that it flies curving to the right.

Stance. — (a) The place on which the player has to stand when playing — e.g.” a bad stance,” ” a good stance,” are common expressions ; (b) the position relative to each other of the player’s feet.

Stymie. — When one ball lies in a straight line between another and the hole the first is said to ” stymie,” or ” to be a stymie to ” the other — from an old Scottish word given by Jamieson to mean ” the faintest form of anything.” The idea probably was, the “stymie” only left you the ” faintest form ” of the hole to aim at.

Tee. — The little mound of sand on which the ball is generally placed for the first drive to each hole.

Teetng-Ground. — The place marked as the limit, outside of which it is not permitted to drive the ball off. This marked-out ground is also sometimes called ” the tee.”

Top. — To hit the ball above the centre, so that it does not rise much from the ground.

Up. — A player is said to be ” one up,” ” two up,” &c, when he is so many holes to the good of his opponent.

Wrist-Shot. — A shot less in length than a half-shot, but longer than a putt.

Bibliography. — The literature of the game has grown to some considerable bulk. For many years it was practically comprised in the fine work by Mr Robert Clark, Golf: A Royal and Ancient Game, together with two handbooks on the game by Mr Chambers and by Mr Forgan respectively, and the Golfiana Miscellanea of Mr Stewart. A small book by Mr Horace Hutchinson, named Hints on Golf, was very shortly followed by a much more important work by Sir Walter Simpson, Bart., called The Art of Golf, a title which sufficiently explains itself. The Badminton Library book on Golf attempted to collect into one volume the most interesting historical facts known about the game, with obiter dicta and advice to learners, and, on similar didactic lines, books have been written by Mr H. C. S. Everard, Mr Garden Smith and W. Park, the professional player. Mr H. J. Whigham, sometime amateur champion golfer of the United States, has given us a book about the game in that country. The Book of Golf and Golfers, compiled, with assistance, by Mr Horace Hutchinson, is in the first place a picture-gallery of famous golfers in their respective

attitudes of play. Taylor, Vardon and Braid have each contributed a volume of instruction, and Mr G. W. Beldam has published a book with admirable photographs of players in action, called Great Golfers: their Methods at a Glance. A work intended for the use of green committees is among the volumes of the Country Life Library of Sport. Much interesting lore is contained in the Golfing Annual, in the Golfer's Year Book and in the pages of Golf, which has now become Golf Illustrated, a weekly paper devoted to the game. Among works that have primarily a local interest, but yet contain much of historical value about the game, may be cited the Golf Book of East Lothian, by the Rev. John Kerr, and the Chronicle of Black- heath Golfers, by Mr W. E. Hughes. (H. G. H.)

GOLIAD, an unincorporated village and the county-seat of Goliad county, Texas, U.S.A., on the N. bank of the San Antonio river, 85 m. S.E. of San Antonio. Pop. (1900) about 1700. It is served by the Galveston, Harrisburg & San Antonio railway (Southern Pacific System). Situated in the midst of a rich farming and stock-raising country, Goliad has flour mills, cotton gins and cotton-seed oil mills. Here are the interesting ruins of the old Spanish mission of La Bahia, which was removed to this point from the Guadaloupe river in 1747. During the struggle between Mexico and Spain the Mexican leader Bernardo Gutierrez (1 778-1814) was besieged here. The name Goliad, probably an anagram of the name of the Mexican patriot Hidalgo (17 53-1 8 n), was first used about 1829. On the outbreak of the Texan War of Liberation Goliad was garrisoned by a small force of Mexicans, who surrendered to the Texans in October 1835, and on the 20th of December a preliminary " declaration of independence " was published here, antedating by several months the official Declaration issued at Old Washington, Texas, on the 2nd of March 1836. In 1836, when Santa Anna began his advance against the Texan posts, Goliad was occupied by a force of about 350 Americans under Colonel James W. Fannin (c. 1 800-1 836), who was overtaken on the Coletto Creek while attempting to carry out orders to withdraw from Goliad and to unite with General Houston; he surrendered after a sharp fight (March 19-20) in which he inflicted a heavy loss on the Mexicans, and was marched back with his force to Goliad, where on the morning of the 27th of March they were shot down by Santa Anna's

orders. Goliad was nearly destroyed by a tornado on the 19th of May 1903.

GOLIARD, a name applied to those wandering students (vagantes) and clerks in England, France and Germany, during the 1 2th and 13th centuries, who were better known for their rioting, gambling and

intemperance than for their scholarship. The derivation of the word is uncertain. It may come from the Lat. gula, gluttony (Wright), but was connected by them with a mythical ” Bishop Golias,” also called ” arckipoeta ” and ” primas ” — especially in Germany — in whose name their satirical poems were mostly written. Many scholars have accepted Biidinger’s suggestion (ifber einige Reste der Vagantenpoesie in Osterreich, Vienna, 1854) that the title of Golias goes back to the letter of St Bernard to Innocent II., in which he referred to Abelard as Goliath, thus connecting the goliards with the keen-witted student adherents of that great medieval critic. Giesebrecht and others, however, support the derivation of goliard from gailliard, a gay fellow, leaving ” Golias ” as the imaginary ” patron ” of their fraternity.

Spiegel has ingeniously disentangled something of a biography of an archipoeta who flourished mainly in Burgundy and at Salzburg from 1160 to beyond the middle of the 13th century; but the proof of the reality of this individual is not convincing. It is doubtful, too, if the jocular references to the rules of the ” gild ” of goliards should be taken too seriously, though their aping of the ” orders ” of the church, especially their contrasting them with the mendicants, was too bold for church synods. Their satires were almost uniformly directed against the church, attacking even the pope. In 1227 the council of Treves forbade priests to permit the goliards to take part in chanting the service. In 1229 they played a conspicuous part in the disturbances at the university of Paris, in connexion with the intrigues of the papal legate. During the century which followed they formed a subject for the deliberations of several church councils, notably in 1289 when it was ordered that ” no clerks shall be jongleurs, goliards or buffoons,” and in 1300 (at Cologne) when they were forbidden to preach or engage in the indulgence traffic. This legislation was only effective when the ” privileges of clergy ” were withdrawn from the goliards. Those historians who regard the middle ages as completely dominated by ascetic ideals, regard the goliard movement as a protest against the spirit of the time. But it is rather indicative of the wide diversity in temperament among those who crowded to the universities in the 13 th century, and who found in the privileges of the clerk some advantage and attraction in the student life. The goliard poems are as truly ” medieval ” as the monastic life which they despised; they merely voice another section of humanity. Yet their criticism was most keenly pointed, and marks a distinct step in the criticism of abuses in the church.

Along with these satires went many poems in praise of wine and riotous living. A, remarkable collection of them, now at Munich, from

the monastery at Benedictbeuren in Bavaria, was published by Schmeller (3rd ed., 1895) under the title Carmina Bur ana. Many of these, which form the main part of song-books of German students to-day, have been delicately translated by John Addington Symonds in a small volume, Wine, Women and Song (1884). As Symonds has said, they form a prelude to the Renaissance. The poems of ” Bishop Golias ” were later attributed to Walter Mapes, and have been published by Thomas Wright in The Latin Poems commonly attributed to Walter Mapes (London, 1841).

The word ” goliard ” itself outlived these turbulent bands which had given it birth, and passed over into French and English literature of the 14th century in the general meaning of jongleur or minstrel, quite apart from any clerical association. It is thus used in Piers Plowman, where, however, the goliard still rhymes in Latin, and in Chaucer.

See, besides the works quoted above, M. Haezner, Goliardendich- tung und die Satire im iˆten Jahrhundert in England (Leipzig, 1905) ; Spiegel, Die Vaganten und ihr ” Orden ” (Spires, 1892); Hubatsch, Die lateinischen Vagantenlieder des Mittelalters (Gorlitz, 1870); and the article in La grande Encyclopedie. All of these have biblio- graphical apparatus. (J. T. S.*)

GOLIATH, the name of the giant by slaying whom David achieved renown (1 Sam. xvii.). The Philistines had come up to make war against Saul and, as the rival camps lay opposite each other, this warrior came forth day by day to challenge to single combat. Only David ventured to respond, and armed with a sling and pebbles he overcame Goliath. The Philistines, seeing their champion killed, lost heart and were easily put to flight. The giant’s arms were placed in the sanctuary, and it was his famous sword which David took with him in his flight from Saul (1 Sam. xxi. 1-9). From another passage we learn that Goliath of Gath, ” the shaft of whose spear was like a weaver’s beam,” was slain by a certain Elhanan of Bethlehem in one of David’s conflicts with the Philistines (2 Sam. xxi. 18-22) — the parallel 1 Chron. xx. 5, avoids the contradiction by reading the ” brother of Goliath.” But this old popular story has probably preserved the more original tradition, and if Elhanan is the son of Dodo in the list of David’s mighty men (2 Sam. xxiii. 9, 24), the resemblance between the two names may have led to the trans- ference. The narratives of David’s early life point to some exploit by means of which he gained

the favour of Saul, Jonathan and Israel, but the absence of all reference to his achieve- ment in the subsequent chapters (1 Sam. xxi. n, xxix. 5) is evidence of the relatively late origin of a tradition which in course of time became one of the best-known incidents in David's life (Ps. cxliv., LXX. title, the apocryphal Ps. cli., Ecclus. xlvii. 4).

See David; Samuel (Books) and especially Cheyne, Aids and Devout Study of Criticism, pp. 80 sqq., 125 sqq. In the old Egyptian romance of Sinuhit (ascribed to about 2000 B.C.), the story of the slaying of the Bedouin hero has several points of resemblance with that of David and Goliath. See L. B. Paton, Hist, of Syr. and Pal. p. 60 ; A. Jeremias, Das A.T. im Lichte d. alien Orients, 2nd ed. pp. 299, 491 ; A. R. S. Kennedy, Century Bible: Samuel, p. 122, argues that David's Philistine adversary was originally nameless, in I Sam. xvii. he is named only in v. 4.

GOLITSUIN, BORIS ALEKSYEEVICH (1634-1714), Russian statesman, came of a princely family, claiming descent from Prince Gedimin of Lithuania. Earlier members of the family were Mikhail (d.c.1552), a famous soldier, and his great-grandson Vasily Vasilevich (d. 16 19), who was sent as ambassador to Poland to offer the Russian crown to Prince Ladislaus. Boris became court chamberlain in 1676. He was the young tsar Peter's chief supporter when, in 1689, Peter resisted the usurpations of his elder sister Sophia, and the head of the loyal council which assembled at the Troitsa monastery during the crisis of the struggle. Golitsuin it was who suggested taking refuge in that strong fortress and won over the boyars of the opposite party. In 1690 he was created a boyar and shared with Lev Naruishkin, Peter's uncle, the conduct of home affairs. After the death of the tsaritsa Natalia, Peter's mother, in 1694, his influence increased still further. He accompanied Peter to the White Sea (1694- 1695); took part in the Azov campaign (1695); an d was one of the triumvirate who ruled Russia during Peter's first foreign tour (1697-1698). The Astrakhan rebellion (1706), which affected all the districts under his government, shook Peter's confidence in him, and seriously impaired his position. In 1707 he was superseded in the Volgan provinces by Andrei Matvyeev. A year before his death he entered a monastery. Golitsuin was a typical representative of Russian society of the end of the 17 th century in its transition from barbarism to civilization. In many respects he was far in advance of his age. He was highly educated, spoke Latin with graceful fluency, frequented the society of scholars and had his children carefully educated according to the best European models. Yet this eminent, this superior personage was an habitual drunkard, an uncouth savage who intruded upon the hospitality of wealthy foreigners, and was not ashamed to seize upon

any dish he took a fancy to, and send it home to his wife. It was his reckless drunkenness which ultimately ruined him in the estimation of Peter the Great, despite his previous inestimable services.

See S. Solovev, History of Russia (Rus.), vol. xiv. (Moscow, 1858) ; R. N. Bain, The First Romanovs (London, 1905). (R. N. B.)

GOLITSUIN, DMITRY MIKHAILOVICH (1665-1737), Russian statesman, was sent in 1697 to Italy to learn ” military

xn.S

affairs”; in 1704 he was appointed to the command of an auxiliary corps in Poland against Charles XII.; from 1711 to 1 7 18 he was governor of Byelogorod. In 1718 he was appointed president of the newly erected Kammer Kollegium and a senator. In May 1723 he was implicated in the disgrace of the vice- chancellor ShafiroV and was deprived of all his offices and dignities, which he only recovered through the mediation of the empress Catherine I. After the death of Peter the Great, Golitsuin became the recognized head of the old Conservative party which had never forgiven Peter for putting away Eudoxia and marrying the plebeian Martha Skavronskaya. But the reformers, as represented by Alexander Menshikov and Peter Tolstoi, prevailed; and Golitsuin remained in the background till the fall of Menshikov, 1727. Duringthe last years of Peter II. (1728-1730), Golitsuin was the most prominent statesman in Russia and his high aristocratic theories had full play. On the death of Peter II. he conceived the idea of limiting the autocracy by subordinating it to the authority of the supreme privy council, of which he was president. He drew up a form of constitution which Anne of Courland, the newly elected Russian empress, was forced to sign at Mittau before being permitted to proceed to St Petersburg. Anne lost no time in repudiating this constitution, and never forgave its authors. Golitsuin was left in peace, how- ever, and lived for the most part in retirement, till 1736, when he was arrested on suspicion of being concerned in the conspiracy of his son-in-law Prince Constantine Cantimir. This, however, was a mere pretext, it was for his anti-monarchical sentiments that he was really prosecuted. A court, largely composed of his antagonists, condemned him to death, but the empress reduced the sentence to lifelong imprisonment in Schliisselburg and confiscation of all his estates. He died in his prison on the 14th of April 1737, after three months of confinement. See R. N. Bain, The Pupils of Peter the Great (London, 1897).

(R. N. B.)

GOLITSUIN, VASILY VASILEVICH (1643-1714), Russian statesman, spent his early days at the court of Tsar Alexius where he gradually rose to the rank of boyar. In 1676 he was sent to the Ukraine to keep in order the Crimean Tatars and took part in the Chigirin campaign. Personal experience of the inconveniences and dangers of the prevailing system of prefer- ment; the so-called myestnichestvo, or rank priority, which had paralysed the Russian armies for centuries, induced him to pro- pose its abolition, which was accomplished by Tsar Theodore III. (1678). The May revolution of 1682 placed Golitsuin at the head of the Posolsky Prikaz, or ministry of foreign affairs, and during the regency of Sophia, sister of Peter the Great, whose lover he became, he was the principal minister of state (1682-1689) and " keeper of the great seal," a title bestowed upon only two Russians before him, Athonasy Orduin-Nashchokin and Artamon Matvyeev. In home affairs his influence was insignificant, but his foreign policy was distinguished by the peace with Poland in 1683, whereby Russia at last recovered Kiev. By the terms of the same treaty, he acceded to the grand league against the Porte, but his two expeditions against the Crimea (1687 and 1689), " the First Crimean War," were unsuccessful and made him extremely unpopular. Only with the utmost difficulty could Sophia get the young tsar Peter to decorate the defeated commander-in-chief as if he had returned a victor. In the civil war between Sophia and Peter (August- September 1689), Golitsuin half-heartedly supported his mistress and shared her ruin. His life was spared owing to the supplica- tions of his cousin Boris, but he was deprived of his boyardom, his estates were confiscated and he was banished successively to Kargopol, Mezen and Kologora, where he died on the 21st of April 1 7 14. Golitsuin was unusually well educated. He under- stood German and Greek as well as his mother-tongue, and could express himself fluently in Latin. He was a great friend of foreigners, who generally alluded to him as " the great Golitsuin."

His brother Mikhail (1674-1730) was a celebrated soldier, who is best known for his governorship of Finland (17 14-17 21), where his admirable qualities earned the remembrance of the people whom he had conquered. And Mikhail's son Alexander (1718-

1783) was a diplomat and soldier, who rose to be field-marshal and

governor of St Petersburg.

See R. N. Bain, The First Romanovs (London, 1905) ; A. Bruckner, Fiirst Golizin (Leipzig, 1887); S. Solovev, History of Russia (Rus.), vols, xiii.-xiv. (Moscow, 1858, &c). (R. N. B.)

GOLIUS or (Gohl), JACOBUS (1596-1667), Dutch Orientalist, was born at the Hague in 1596 , and studied at the university of Leiden, where in Arabic and other Eastern languages he was the most distinguished pupil of Erpenius. In 1622 he accompanied the Dutch embassy to Morocco, and on his return he was chosen to succeed Erpenius (1624). In the following year he set out on a Syrian and Arabian tour from which he did not return until 1629. The remainder of his life was spent at Leiden where he held the chair of mathematics as well as that of Arabic. He died on the 28th of September 1667.

His most important work is the Lexicon Arabico-Latinum, fol., Leiden, 1653, which, based on the Sihah of Al-Jauhari, was only superseded by the corresponding work of Freytag. Among his earlier publications may be mentioned editions of various Arabic texts (Proverbia quaedam Alis, imperatoris Muslemici, et Carmen Tograi- poetae doctissimi, necnon dissertatio quaedam Aben Synae, 1629; and Ahmedis Arabsiadae vitae et rerum gestarum Timuri, qui vulgo Tamer, lanes dicitur, historia, 1636). In 1656 he published a new edition, with considerable additions, of the Grammatica Arabica of Erpenius. After his death, there was found among his papers a Dictionarium Persico-Latinum which was published, with additions, by Edmund Castell in his Lexicon heptaglolton (1669). Golius also edited, trans- lated and annotated the astronomical treatise of Alfragan (Muham- medis, filii Ketiri Ferganensis, qui vulgo Alfraganus dicitur, elementa astronomica Arabice et Latine, 1669).

GOLLNOW, a town of Germany, in the Prussian province of Pomerania, on the right bank of the Ihna, 14 m. N.N.E. of Stettin, with which it has communication by rail and steamer. Pop. (1905) 8539. It possesses two Evangelical churches, a synagogue and some small manufactures. Gollnow was founded in n 90, and was raised to the rank of a town in 1268. It was for a time a Hanse town, and came into the possession of Prussia in 1720, having belonged to Sweden since 1648.

GOLOSH, or Galosh (from the Fr. galoche, Low Lat. calopedes, a wooden shoe or clog; an adaptation of the Gr. KaKorodiov, a diminutive formed of koKov, wood, anduoOs, foot), originally a wooden shoe or patten, or merely a wooden sole fastened to the foot

by a strap or cord. In the middle ages ” galosh ” was a general term for a boot or shoe, particularly one with a wooden sole. In modern usage, it is an outer shoe worn in bad weather to protect the inner one, and keep the feet dry. Goloshes are now almost universally made of rubber, and in the United States they are known as ” rubbers ” simply, the word golosh being rarely if ever used. In the bootmakers' trade, a ” golosh ” is the piece of leather, of a make stronger than, or different from that of the ” uppers, ” which runs around the bottom part of a boot or shoe, just above the sole.

GOLOVIN, FEDOR ALEKSYEEVICH, Count (d. 1706), Russian statesman, learnt, like so many of his countrymen in later times, the business of a ruler in the Far East. During the regency of Sophia, sister of Peter the Great, he was sent to the Amur to defend the new Muscovite fortress of Albazin against the Chinese. In 1689 he concluded with the Celestial empire the treaty of Nerchinsk, by which the line of the Amur, as far as its tributary the Gorbitsa, was retroceded to China because of the impossibility of seriously defending it. In Peter's grand embassy to the West in 1697 Golovin occupied the second place immediately after Lefort. It was his chief duty to hire foreign sailors and obtain everything necessary for the construction and complete equipment of a fleet. On Lefort's death, in March 1699, he succeeded him as admiral-general. The same year he was created the first Russian count, and was also the first to be decorated with the newly-instituted Russian order of St Andrew. The conduct of foreign affairs was at the same time entrusted to him, and from 1699 to his death he was “the premier minister of the tsar.” Golovin's first achievement as foreign minister was to supplement the treaty of Carlowitz, by which peace with Turkey had only been secured for three years, by concluding with the Porte a new treaty at Constantinople (June 13, 1700), by which the term of the peace was extended to thirty years and,

besides other concessions, the Azov district and a strip of territory extending thence to Kuban were ceded to Russia. He also controlled, with consummate ability, the operations of the brand-new Russian diplomatists at the various foreign courts. His superiority over all his Muscovite contemporaries was due to the fact that he was already a statesman, in the modern sense, while they were still learning the elements of statesmanship. His death was an irreparable loss to the tsar, who wrote upon the despatch announcing it, the words ” Peter filled with grief.” See R. N. Bain, The First Romanovs (London, 1905). (R. N. B.) GOLOVKIN, GAVRIIL IVANOVICH, Count (1660-1734), Russian statesman, was attached (1677), while still a lad, to the court of the tsarevitch Peter, afterwards Peter the Great, with whose mother

Natalia he was connected, and vigilantly guarded hfm during the disquieting period of the regency of Sophia, sister of Peter the Great (1682-1689). He accompanied the young tsar abroad on his first foreign tour, and worked by his side in the dockyards of Saardam. In 1 706 he succeeded Golovin in the direction of foreign affairs, and was created the first Russian grand-chancellor on the field of Poltava (1709). Golovkin held this office for twenty-five years. In the reign of Catherine I. he became a member of the supreme privy council which had the chief conduct of affairs during this and the succeeding reigns. The empress also entrusted him with her last will whereby she appointed the young Peter II. her successor and Golovkin one of his guardians. On the death of Peter II. in 1 730 he declared openly in favour of Anne, duchess of Courland, in opposition to the aristocratic Dolgorukis and Golitsuins, and his determined attitude on behalf of autocracy was the chief cause of the failure of the proposed constitution, which would have converted Russia into a limited monarchy. Under Anne he was a member of the first cabinet formed in Russia, but had less influence in affairs than Ostermann and Miinnich. In 1707 he was created a count of the Holy Roman empire, and in 17 10 a count of the Russian empire. He was one of the wealthiest, and at the same time one of the stingiest, magnates of his day. His ignorance of any language but his own made his intercourse with foreign ministers very inconvenient.

See R. N. Bain, The Pupils of Peter the Great (London, 1897).

(R. N. B.) GOLOVNIN, VASILY MIKHAILOVICH (1776-1831), Russian vice-admiral, was born on the 20th of April 1776 in the village of Gulynki in the province of Ryazan, and received his education at the Cronstadt naval school. From 1801 to 1806 he served as a volunteer in the English navy. In 1807 he was commissioned by the Russian government to survey the coasts of Kamchatka and of Russian America, including also the Kurile Islands. Golovnin sailed round the Cape of Good Hope, and on the 5th of October 1809, arrived in Kamchatka. In 1810, whilst attempting to survey the coast of the island of Kunashiri, he was seized by the Japanese, and was retained by them as a prisoner, until the 13th of October 1813, when he was liberated, and in the following year he returned to St Petersburg. Soon after this the govern- ment planned another expedition, which had for its object the circumnavigation of the globe by a Russian ship, and Golovnin was appointed to the command. He started from St Petersburg on the 7th of September 1817, sailed round Cape Horn, and arrived in Kamchatka in the following May. He returned to Europe by way of the Cape of Good Hope, and landed at St Petersburg on the 17th of September 1819. He died on the 12th of July 183 1.

Golovnin published several works, of which the following are the most important: — Journey to Kamchatka (2 vols., 18 19); Journey Round the World (2 vols., 1822); and Narrative of my Captivity in Japan, 1811-1813 (2 vols., 1816). The last has been translated into French, German and English, the English edition being in three volumes (1824). A complete edition of his works was published at St Petersburg in five volumes in 1864, with maps and charts, and a biography of the author by N. Grech.

GOLTZ, BOGUMIL (1801-1870), German humorist and satirist, was born at Warsaw on the 20th of March 1801. After attending the classical schools of Marienwerder and Konigsberg, he learnt farming on an estate near Thorn, and in 1821 entered the university of Breslau as a student of philosophy. But he

soon abandoned an academical career, and, after returning for a while to country life, retired to the small town of Gollub where he devoted himself to literary studies. In 1847 he settled at Thorn, ” the home of Copernicus,” where he died on the 12th of November 1870. Goltz is best known to literary fame by his Buck der Kindheit (Frankfort, 1847; 4 th ed., Berlin, 1877), in which, after the style of Jean Paul, and Adalbert Stifter, but with a more modern realism, he gives a charming and idyllic description of the impressions of his own childhood. Among his other works must be noted Ein Jugendleben (1852); Der Mensch und die Leute (1858); Zur Charakterisiik und Nalurgeschichte der Frauen (1850) ; Zur Geschichte und Charakterisiik des deutschen Genius (1864), and Die Weltklugheit und die Lebensweisheit

(1869).

• ˆ olt f ‘ s * or j” have n°t ; been collected, but a selection will be found XueSSSSa- ˆ ‘901 and I9 o6, GOLTZ, COLMAR, Freiherr Von Der (1843-) Prussian soldier and military writer, was born at Bielkenfeld’ East Prussia, on the 12th of August 1843, and entered the Prussian infantry m 1861. In 1864 he entered the Berlin Military Academy, but was temporarily withdrawn in 1866 to serve in the Austrian war, in which he was wounded at Trautenau In 1867 he joined the topographical section of the general staff and at the beginning of the Franco-German War of 1870-71 was attached to the staff of Prince Frederick Charles He took part in the battles of Vionville and Gravelotte and in the siege of Metz. After its fall he served under the Red Prince in the campaign of the Loire, including the battles of Orleans and Le Mans. He was appointed in 187 1 professor at the military school at Fotsdam, and the same year was promoted captain and placed in the historical section of the general staff. It was then he

T°, te D ? e °P<; rationen d er II. Armee bis zur Capitulation von Metz and Die Sieben Tage von Le Mans, both published in 187s In 1874 he was appointed to the staff of the 6th division, and while so employed wrote Die Operationen der II. Armee an der Loire and Leon Gambetta und seine Armeen, published in 187=; and 1877 respectively. The latter was translated into French the same year, and both are impartially written. The views expressed in the latter work led to his being sent back to regi- mental duty for a time, but it was not long before he returned to the military history section. In 1878 von der Goltz was appointed lecturer in military history at the military academy at Berhn, where he remained for five years and attained the rank of major. He published, in 1883, Rossbach und Jena (new and revised edition, Von Rossbach bis Jena und Auerstadt, 1006) Das V oik in Wafen (English translation The Nation in Arms) both of which quickly became military classics, and during his residence m Berlin contributed many articles to the military journals. In June 1883 his services were lent to Turkey to reorganize the military establishments of the country He spent twelve years in this work, the result of which appeared in the Greco-Turkish War of 1897, and he was made a pasha and in

1895 a mushir or field-marshal. On his return to Germany in

1896 he became a lieutenant-general and commander of the sth division, and in 1898, head of the Engineer and Pioneer Corps and inspector-general of fortifications. In 1900 he was made general of infantry and in 1902 commander of the I. army corps In 1907 he was made inspector-general of the newly created sixth army inspection established at Berlin, and in 1908 was given the rank of colonel-general (Generaloberst).

In addition to the works already named and frequent contribu- tions to military periodical literature, he wrote Kriehˆjlhrungi Xˆ ofWaˆSefZK U fˆpˆung, 1901 ; Eng. tranl T™ Conduct oj war), Uer thessahsche Krieg (Berl n, 1808V Fin Au

GOLTZIUS, HENDRIK (i S s&-i6i7), Dutch painter and engraver, was born in 1558 at Mulebrecht, in the duchy of julich After studying painting on glass for some years under his lather, he was taught the use of the burin by Dirk Volkertsz i.oornlert, a Dutch engraver of mediocre attainment, whom he

soon surpassed, but who retained his services for his own advantage. He was also employed by Philip Galle to engrave a set of prints of the history of Lucretia. At the age of twenty-one he married a widow somewhat advanced in years, whose money enabled him to establish at Haarlem an independent business- but his unpleasant relations with her so affected his health that he found it advisable in 1590 to make a tour through Germany t0 c Vf-^' 7 heTe he acc l uired an intense admiration for the works" of Michelangelo, which led him to surpass that master in the grotesqueness and extravagance of his designs. He returned to Haarlem considerably improved in health, and laboured there at his art till his death, on the 1st of January 1617. Goltzius ought not to be judged chiefly by the works he valued most his eccentric imitations of Michelangelo. His portraits, though mostly mimatures, are master-pieces of their- kind, both on account of their exquisite finish, and as fine studies of individual character Of his larger heads, the life-size portrait of himself is Probably the most striking example. His " master-pieces," so called from their being attempts to imitate the style of the old masters, have perhaps been overpraised. In his command ot the burm Goltzius is not surpassed even by Diirer; but his technical skill is often unequally aided by higher artistic qualities Even, however, his eccentricities and extravagances are greatly counterbalanced by the beauty and freedom of his execution He began painting at the age of forty-two, but none of his works in this branch of art-some of which are in the imperial collection at Vienna— display any special excellences. He also executed a few pieces in chiaroscuro.

in 1 k!£1 [v S a ^° U , nt *° m0re than 3°° P'ates, and are fully described work? S Peintre -Z raveur ' Md Weigel's supplement to the same

GOLUCHOWSKI, AGENOR, Count (i849 –), Austrian statesman, was born on the 25th of March 1849. His father descended from an old and noble Polish family, was governor of Gahcia._ Entering the diplomatic service, the son was in 1872 appointed attache to the Austrian embassy at Berlin where he became secretary of legation, and thence he was' transferred to Paris. After rising to the rank of counsellor of legation he was m 1887 made minister at Bucharest, where he remained till 1893. In these positions he acquired a great reputation as a firm and skilful diplomatist, and on the retirement ot Count Kalnoky m May i& 95 was chosen to succeed him as Austro-Hunganan minister for foreign affairs. The appointment ot a Pole caused some surprise in view of the importance of Austrian relations with Russia(then rather strained)and Germany but the choice was justified by events. In his speech of that year to the delegations he

declared the maintenance of the Triple Alliance and in particular the closest intimacy with Germany to be the keystone of Austrian policy; at the same time he- dwelt on the traditional friendship between Austria and Great Britain, and expressed his desire for a good understanding with all the powers In pursuance of this policy he effected an under- standing with Russia, by which neither power was to exert any separate influence in the Balkan peninsula, and thus removed

LTI I rˆ T USe ° f frkti0n – This understanding was formally ratified during a visit to St Petersburg on which he accompanied the emperor in April ig 97 . He took the lead in establishing the European concert during the Armenian troubles ol !8 9 6, and again resisted isolated action on the part of any of

t? C i gr fL P ° WerS du ” ng the Cretan troub les and the Greco-Turkish War In November 1897, when the Austro-Hungarian flag was insulted at Mersina, he threatened to bombard the town it instant reparation were not made, and by his firm attitude greatly enhanced Austrian prestige in the East. In his -speech to the delegations in 1808 he dwelt on the necessity of expanding Austria’s mercantile marine, and of raising the fleet to a strength which, while not vying with the fleets of the great naval powers, would ensure respect for the Austrian flag wherever her interests needed protection. He also hinted at the necessity tor European combination to resist American competition. I he understanding with Russia in the matter of the Balkan btates temporarily endangered friendly relations with Italy

who thought her interests threatened, until Goluchowski guaranteed in 1898 the existing order. He further encouraged a good understanding with Italy by personal conferences with the Italian foreign minister, Tittoni, in 1904 and 1905. Count Lamsdorff visited Vienna in December 1902, when arrangements were made for concerted action in imposing on the sultan reforms in the government of Macedonia. Further steps were taken after Goluchowski’s interview with the tsar at Murzsteg in 1903, and two civil agents representing the countries were appointed for two years to ensure the execution of the promised reforms. This period was extended in 1905, when Goluchowski was the chief mover in forcing the Porte, by an international naval demonstra- tion at Mitylene, to accept financial control by the powers in Macedonia. At the conference assembled at

Algeciras to settle the Morocco Question, Austria supported the German position, and after the close of the conferences the emperor William II. telegraphed to Goluchowski: ” You have proved yourself a brilliant second on the duelling ground and you may feel certain of like services from me in similar circumstances.” This pledge was redeemed in 1908, when Germany’s support of Austria in the Balkan crisis proved conclusive. By the Hungarians, however, Goluchowski was hated; he was suspected of having inspired the emperor’s opposition to the use of Magyar in the Hungarian army, and was made responsible for the slight offered to the Magyar deputation by Francis Joseph in September 1905. So long as he remained in office there was no hope of arriving at a settlement of a matter which threatened the dis- ruption of the Dual monarchy, and on the nth of October 1906 he was forced to resign.

GOMAL, or Gumal, the name of a river of Afghanistan, and of a mountain pass on the Dera Ismail Khan border of the North- West Frontier Province of British India. The Gomal river, one of the most important rivers in Afghanistan, rises in the un- explored regions to the south-east of Ghazni. Its chief tributary is the Zh’ob. Within the limits of British territory the Gomal forms the boundary between the North- West Frontier Province and Baluchistan, and more or less between the Pathan and Baluch races. The Gomal pass is the most important pass on the Indian frontier between the Khyber and the Bolan. It connects Dera Ismail Khan with the Gomal valley in Afghanistan, and has formed for centuries the outlet for the povindah trade. Until the year 1889 this pass was almost unknown to the Anglo-Indian official; but in that year the government of India decided that, in order to maintain the safety of the railway as well as to perfect communication between Quetta and the Punjab, the Zhob valley should, like the Bori valley, be brought under British protection and control, and the Gomal pass should be opened. After the Waziristan expedition of 1894 Wana was occupied by British troops in order to dominate the Gomal and Waziristan; but on the formation of the North- West Frontier Province in 1901 it was decided to replace these troops by the South Waziristan militia, who now secure the safety of the pass.

GOMARUS, FRANZ (1563-1641), Dutch theologian, was born at Bruges on the 30th of January 1563. His parents, having embraced the principles of the Reformation, emigrated to the Palatinate in 1578, in order to enjoy freedom to profess their new faith, and they sent their son to be educated at Strassburg under Johann Sturm (1507-1589). He remained there three years, and then went in 1580 to Neustadt, whither the professors of Heidelberg had been driven by the elector-

palatine because they were not Lutherans. Here his teachers in theology were Zacharius Ursinus (1534-1583), Hieronymus Zanchius (1560- 1590), and Daniel Tossanus (1541-1602). Crossing to England towards the end of 1 582, he attended the lectures of John Rainolds (1 549-1607) at Oxford, and those of William Whitaker (1548- 1595) at Cambridge. He graduated at Cambridge in 1584, and then went to Heidelberg, where the faculty had been by this time re-established. He was pastor of a Reformed Dutch church in Frankfort from 1587 till 1593, when the congregation was dispersed by persecution. In 1594 he was appointed professor of theology at Leiden, and before going thither received from

the university of Heidelberg the degree of doctor. He taught quietly at Leiden till 1603, when Jakobus Arminius came to be one of his colleagues in the theological faculty, and began to teach Pelagian doctrines and to create a new party in the uni- versity. Gomarus immediately set himself earnestly to oppose these views in his classes at college, and was supported by Johann B. Bogermann (1570-1637), who afterwards became professor of theology at Franeker. Arminius " sought to make election dependent upon faith, whilst they sought to enforce absolute predestination as the rule of faith, according to which the whole Scriptures are to be interpreted " (J. A. Dorner, History of Protestant Theology, i. p. 41 7). Gomarus then became the leader of the opponents of Arminius, who from that circum- stance came to be known as Gomarists. He engaged twice in personal disputation with Arminius in the assembly of the estates of Holland in 1608, and was one of five Gomarists who met five Arminians or Remonstrants in the same assembly of 1609. On the death of Arminius shortly after this time, Konrad Vorstius (1569-1622), who sympathized with his views, was appointed to succeed him, in spite of the keen opposition of Gomarus and his friends; and Gomarus took his defeat so ill that he resigned his post, and went to Middleburg in 161 1, where he became preacher at the Reformed church, and taught theology and Hebrew in the newly founded Illustre Schule. From this place he was called in 1614 to a chair of theology at Saumur, where he remained four years, and then accepted a call as professor of theology and Hebrew to Groningen, where he stayed till his death on the nth of January 1641. He took a leading part in the synod of Dort, assembled in 1618 to judge of the doctrines of Arminius. He was a man of ability, enthusiasm and learning, a considerable Oriental scholar, and also a keen controversialist. He took part in revising the Dutch translation of the Old Testament in 1633, and after his death a book by him, called the Lyra Davidis, was published, which sought to explain the principles of Hebrew metre, and which created some con- troversy at

the time, having been opposed by Louis Cappel. His works were collected and published in one volume folio, in Amsterdam in 1645. He was succeeded at Groningen in 1643 by his pupil Samuel Maresius (1599-1673).

GOMBERVILLE, MARIN LE ROY, Sieur du Parc et de (1600-1674), French novelist and miscellaneous writer, was born at Paris in 1600. At fourteen years of age he wrote a volume of verse, at twenty a Discours sur I'histoire and at twenty-two a pastoral, La Carithie, which is really a novel. The persons in it, though still disguised as shepherds and shepherdesses, repre- sent real persons for whose identification the author himself provides a key. This was followed by a more ambitious attempt, Polexandre (5 vols. 1632-1637). The hero wanders through the world in search of the island home of the princess Alcidiane. It contains much history and geography; the travels of Polex- andre extending to such unexpected places as Benin, the Canary Islands, Mexico and the Antilles, and incidentally we learn all that was then known of Mexican history. Cythere'e (4 vols.) appeared in 1630-1642, and in 1651 the Jeune Alcidiane, intended to undo any harm the earlier novels may have done, for Gomberville became a Jansenist and spent the last twenty-five years of his life in pious retirement. He was one of the earliest and most energetic members of the Academy. He died in Paris on the 14th of June 1674.

GOMER, the biblical name of a race appearing in the table of nations (Gen. x. 2), as the " eldest son " of Japheth and the " father " of Ashkenaz, Riphath and Togarmah; and in Ezek. xxxviii. 6 as a companion of " the house of Togarmah in the uttermost parts of the north," and an ally of Gog; both Gomer and Togarmah being credited with " hordes," x E.V., i.e. " bands " or " armies." The " sons " of Gomer are probably tribes of north-east Asia Minor and Armenia, and Gomer is identified with the Cimmerians. These are referred to in cunei- form inscriptions under the Assyrian name gimmira (gimirrai) as raiding Asia Minor from the north and north-east of the Black

1 'm Agaph, a word peculiar to Ezekiel, Clarendon Press Heb. Lex.

Sea, and overrunning Lydia in the 7th century b. c. (see Cimmerii, Scythia, Lydia). They do not seem to have made any permanent settlements, unless some such are indicated by the fact that the Armenians called Cappadocia Gamir. It is, however, suggested that

this name is borrowed from the Old Testament. 1

The name Corner (Gomer bath Diblaim) was also borne by the unfaithful wife of Hosea, whom he pardoned and took back (Hosea i. 3). Hosea uses these incidents as symbolic of the sin, punishment and redemption of Israel, but there is no need to regard Gomer as a purely imaginary person. (W. H. Be.)

GOMERA, an island in the Atlantic Ocean, forming part of the Spanish archipelago of the Canary Islands (q.v.). Pop. (1900) 15,358; area 144 sq. m. Gomera lies 20 m. W.S.W. of Teneriffe. Its greatest length is about 23 m. The coast is precipitous and the interior mountainous, but Gomera has the most wood and is the best watered of the group. The inhabitants are very poor. Dromedaries are bred on Gomera in large numbers. San Sebastian (3187) is the chief town and a port. It was visited by Columbus on his first voyage of discovery in

1402.

GOMEZ, DI0G0 (Diego) (fl. 1440-1482), Portuguese seaman, explorer and writer. We first trace him as a cavalleiro of the royal household; in 1440 he was appointed receiver of the royal customs — in 1466 judge — at Cintra (Juiz das causas e feitorias contadas de Cintra); on the 5th of March 1482 he was confirmed in the last-named office. He wrote, especially for the benefit of Martin Behaim, a Latin chronicle of great value, dealing with the life and discoveries of Prince Henry the Navigator, and divided into three parts: (1) De prima inventione Guineae; (2) De insults primo inventis in mare (sic) Occidentis; (3) De inventione insular um de A cores. This chronicle contains the only contemporary account of the rediscovery of the Azores by the Portuguese in Prince Henry's service, and is also note- worthy for its clear ascription to the prince of deliberate scientific and commercial purpose in exploration. For, on the one hand, the infante sent out his caravels to search for new lands (ad quacrendas terras) from his wish to know the more distant parts of the western ocean, and in the hope of finding islands or terra firma beyond the limits laid down by Ptolemy (ultra descrip- tionem Tolomei); on the other hand, his information as to the native trade from Tunis to Timbuktu and the Gambia helped to inspire his persistent exploration of the West African coast — " to seek those lands by way of the sea." Chart and quadrant were used on the prince's vessels, as by Gomez himself on reach- ing the Cape Verde Islands; Henry, at the time of Diogo's first voyage, was in correspondence with an Oran merchant who kept him informed upon events even in the Gambia hinterland) and, before the discovery of the Senegal and Cape Verde in 1445, Gomez' royal patron

had already gained reliable information of some route to Timbuktu. In the first part of his chronicle Gomez tells how, no long time after the disastrous expedition of the Danish nobleman ” Vallarte ” (Adalbert) in 1448, he was sent out in command of three vessels along the West African coast, accompanied by one Jacob, an Indian interpreter, to be employed in the event of reaching India. After passing the Rio Grande, beyond Cape Verde, strong currents checked his course; his officers and men feared that they were approaching the extremity of the ocean, and he put back to the Gambia. He ascended this river a considerable distance, to the negro town of ” Cantor,” whither natives came from ” Kukia ” and Timbuktu for trade; he gives elaborate descriptions of the negro world he had now penetrated, refers to the Sierra Leone (” Serra Lyoa “) Mountains, sketches the course of this range, and says much of Kukia (in the upper Niger basin?), the centre of the West African gold trade, and the resort of merchants and caravans from Tunis, Fez, Cairo and ” all the land of the Saracens.” Mahommedan- ism was already dominant at the Cambria estuary, but Gomez seems to have won over at least one important chief, with his court, to Christianity and Portuguese allegiance. Another African voyage, apparently made in 1462, two years after Henry 1 A. Jeremias, Das A.T. im Lichte des alten Orients, pp. 145 f.

the Navigator’s death (though assigned by some to 1460), resulted in a fresh discovery of the Cape Verde Islands, already found by Cadamosto (q.v.). To the island of Santiago Gomez, like his Venetian forerunner, claims to have given its present name. His narrative is a leading authority on the last illness and death of Prince Henry, as well as on the life, achievements and pur- poses of the latter; here alone is recorded what appears to have been the earliest of the navigator’s exploring ventures, that which under Joao de Trasto reached Grand Canary in 141 5.

Of Gomez’ chronicle there is only one MS., viz. Coi.TJ.isp. 27, in the Hof- und Staats-Bibliothek, Munich; the original Latin text was printed by Schmeller ” fiber Valentim Fernandez Alemao ” in the Abhandlungen der philosoph.-philolog. Kl. der bayerisch. Akademie der Wissenschaften, vol. iv., part iii. (Munich, 1847) ; see also Sophus Ruge, ” Die Entdeckung der Azoren,” pp. 149-180 (esp. 178-179) in the 27th Jahresbericht des Vereins fur Erdkunde (Dresden, 1901); Jules Mees, Histoire de la decouverte des ilesAcores, pp. 44-45, 125-127 (Ghent, 1901); R. H. Major, Life of Prince Henry the Navigator, pp. xviii., ■ xix., 64-65, 287-299, 303-305 (London, 1868); C. R. Beazley, Prince Henry the Navigator, 289-298, 304-305 ; and Introduction to Azurara’s Discovery and Conquest of Guinea, ii., iv., xiv., xxv.-xxvii., xcii.-xcvi. (London, 1899). (C. R. B.)

GOMEZ DE AVELLANEDA, GERTRUDIS (1814-1873), Spanish dramatist and poet, was born at Puerto Principe (Cuba) on the 23rd of March 1814, and removed to Spain in r836. Her Poesias liricas (1841), issued with a laudatory preface by Gallego, made a most favourable impression and were republished with additional poems in 1850. In 1846 she married a diplo- matist named Pedro Sabater, became a widow within a year, and in 1853 married Colonel Domingo Verdugo. Meanwhile she had published Sab (1839), Guatimozin (1846), and other novels of no great importance. She obtained, however, a series of successes on the stage with Alfonso Munio (1844), a tragedy in the new romantic manner; with Saul (1849), a biblical drama indirectly suggested by Alfieri; and with Baltasar (1858), a piece which bears some resemblance to Byron's Sardanapalus. Her commerce with the world had not diminished her natural piety, and, on the death of her second husband, she found so much consolation in religion that she had thoughts of entering a convent. She died at Madrid on the 2nd of February 1873, * full of mournful forebodings as to the future of her adopted country. It is impossible to agree with Villemain that " le genie de don Luis de Leon et de sainte Therese a reparu sous le voile funebre de Gomez de Avellaneda," for she has neither the monk's mastery of poetic form not the nun's sublime simplicity of soul. She has a grandiose tragical vision of life, a vigorous eloquence rooted in pietistic pessimism, a dramatic gift effective in isolated acts or scenes; but she is deficient in constructive power and in intellectual force, and her lyrics, though instinct with melancholy beauty, or the tenderness of resigned devotion, too often lack human passion and sympathy. The edition of her Obras literarias (5 vols., 1869-1871), still incomplete, shows a scrupulous care for minute revision uncommon in Spanish writers; but her emendations are seldom happy. But she is interesting as a link between the classic and romantic schools of poetry, and, whatever her artistic shortcomings, she has no rivals of her own sex in Spain during the 19th century.

GOMM, SIR WILLIAM MAYNARD (1784-1875), British soldier, was gazetted to the 9th Foot at the age of ten, in recog- nition of the services of his father, Lieut. -Colonel William Gomm, who was killed in the attack on Guadaloupe (1794). He joined his regiment as a lieutenant in 1799, and fought in Holland under the duke of York, and subsequently was with Pulteney's Ferrol expedition. In 1803 he became Captain, and shortly afterwards qualified as a staff officer at the High Wycombe military college. On the general staff he was with Cathcart at Copenhagen, with .Wellington in the Peninsula, and on Moore's staff at Corunna. He was also on Chatham's staff in the disastrous Walcheren expedition of 1809. In 1810 he rejoined the

Peninsular army as Leith's staff officer, and took part in all the battles of 1810, 181 1 and 181 2, winning his majority after Fuentes d'Onor and his lieutenant-colonelcy at Salamanca. His careful reconnaissances and skilful leading were invaluable to Wellington in the Vittoria campaign, and to the end of the war he was one of the

most trusted men of his staff. His reward was a transfer to the Coldstream Guards and the K.C.B. In the Waterloo campaign he served on the staff of the 5th British Division. From the peace until 1839 he was employed on home service, becoming colonel in 1829 and major-general in 1837. From 1839 to 1842 he commanded the troops in Jamaica. He became lieutenant- general in 1846, and was sent out to be commander-in-chief in India, arriving only to find that his appointment had been cancelled in favour of Sir Charles Napier, whom, howeve:, he eventually succeeded (1850-1855). In 1854 he became general and in 1868 field marshal. In 1872 he was appointed constable of the Tower, and he died in 1875. He was twice married, but had no children. His Letters and Journals were published by F. C. Carr-Gomm in 1881. . Five " Field Marshal Gomm " scholarships were afterwards founded in his memory at Keble College, Oxford.

GOMPERS, SAMUEL (1850-), American labour leader, was born in London on the 27th of January 1850. He was put to work in a shoe-factory when ten years old, but soon became apprenticed to a cigar-maker, removed to New York in 1863, became a prominent member of the International Cigar-makers' Union, was its delegate at the convention of the Federation of Organized Trade and Labor Unions of the United States and Canada, later known as the American Federation of Labor, of which he became first president in 1882. He was, successively re-elected up to 1895, when the opposition of the Socialist Labor Party, then attempting to incorporate the Federation into itself, secured his defeat; he was re-elected in the following year. In 1894 he became editor of the Federa- tion's organ, The American Federationist.

GOMPERZ, THEODOR (1832-), German philosopher and classical scholar, was born at Briinn on the 29th of March 1832. He studied at Briinn and at Vienna under Herman Bonitz. Graduating at Vienna in 1867 he became Privatdozent, and subsequently professor of classical philology (1873). In 1882 he was elected a member of the Academy of Science. He received the degree of Doctor of Philosophy honoris causa

from the university of Konigsberg, and Doctor of Literature from the universities of Dublin and Cambridge, and became corre- spondent for several learned societies. His principal works are: Demosthenes der Staatsmann (1864), Philodemi de ira liber (1864), Traumdeulung und Zauberei (1866), Herkulanische Studien (1865-1866), Beitrdge zur Krilik und Erkldrung griech. Schrift- steller (7 vols., 1875-1900), Neue Bruchstilcke Epikurs (1876), Die Bruchstilcke der griech. Tragiker und Cobets neueste kritische Manier (1878), Herodoteische Studien (1883), Ein bisher unbe- kannles griech. Schriftsystem (1884), Zu Philodems Buchern von der Musik (1885), Uber den Abschluss • des herodoteischen Geschichlswerkes (1886), Platonische Aufsdtze (3 vols., 1887-1905), Zu Heraklits Lehre und den Uberresten seines Werkes (1887), Zu Aristoteles' Po'etik (2 parts, 1888-1896), Uber die Charaktere Theophrasts (1888), Nachlese zu den Bruchstucken der griech. Tragiker (1888), Die Apologie der Heilkunst (1890), Philodem und die dsthetischen Schriflen der herculanischen Bibliolhek (1891), DieSchriftvomStaatswesenderAthener(i&gi),Diejungstentdeckten Uberreste einer den Platonischen Phddon enthaltenden Papyrus- rolle (1892), Aus der Hekale des Kallimachos (1893), Essays und Erinnerungen (1905). He supervised a translation of J. S. Mill's complete works (12 vols., Leipzig, 1869-1880), and wrote a life (Vienna, 1889) of Mill. His Griechische Denker: Geschichte der antiken Philosophie (vols. i. and ii., Leipzig, 1893 and 1902) was translated into English by L.Magnus (vol. i., 1901). GONAGUAS (" borderers "), descendants of a very old cross between the Hottentots and the Kaffirs, on the " ethnical divide " between the two races, apparently before the arrival of the whites in South Africa. They have been always a despised race and regarded as outcasts by the Bantu peoples. They were threatened with extermination during the Kaffir wars, but were protected by the British. At present they live in settled com- munities under civil magistrates without any tribal organization, and in some districts could be scarcely distinguished from the other natives but for their broken Hottentot-Dutch-English speech.

GONCALVES DIAS, ANTONIO (1823-1864), Brazilian lyric poet, was born near the town of Caxias, in Maranhao. From the university of Coimbra, in Portugal, he returned in 1845 to his native province, well-equipped with legal lore, but the. literary tendency which was strong within him led him to try his fortune as an author at Rio de Janeiro. Here he wrote for the newspaper press, ventured to appear as a dramatist, and in 1846 established his reputation by a volume of poems — Primeiros Cantos — which appealed to the national feelings of his Brazilian readers, were remarkable for their autobiographic impress, and by their beauty of expression and rhythm placed their

author at the head of the lyric poets of his country. In 1848 he followed up his success by Segundos Cantos e sextilhas de Frei Antao, in which, as the title indicates, he puts a number of the pieces in the mouth of a simple old Dominican friar; and in the following year, in fulfilment of the duties of his new post as professor of Brazilian history in the Imperial College of Pedro II. at Rio de Janeiro, he published an edition of Berredo's Annaes historicos do Maranhao and added a sketch of the migrations of the Indian tribes. A third volume of poems, which appeared with the title of Ultimos Cantos in 1851, was practically the poet's farewell to the service of the muse, for he spent the next eight years engaged under government patronage in studying the state of public instruction in the north and the educational institutions of Europe. On his return to Brazil in i860 he was appointed a member of an expedition for the explora- tion of the province of Ceara, was forced in 1862 by the state of his health to try the effects of another visit to Europe, and died in September 1864, the vessel that was carrying him being wrecked off his native shores. While in Germany he published at Leipzig a complete collection of his lyrical poems, which went through several editions, the four first cantos of an epic poem called Os Tymbiras (1857) and a Diccionario da lingua Tupy (1858).

A complete edition of the works of Dias has made its appearance at Rio de Janeiro. See Wolf, Bresil litteraire (Berlin, 1863) ; Inno- cencio de Silva, Diccionario bibliographico portuguez, viii. 157; Sotero dos Reis, Curso de litteratura portugueza e brazileira, iv. (Maranhao, 1868) ; Jose Verissimo, Estudos de literatura brazileira, segunda serie (Rio, 1901).

GONCHAROV, IVAN ALEXANDROVICH (1812-1891), Rus- sian novelist, was born 6/18 July 181 2, being the son of a rich merchant in the town of Simbirsk. At the age of ten he was placed in one of the gymnasiums at Moscow, from which he passed, though not without some difficulty on account of his ignorance of Greek, into the Moscow University. He read many French works of fiction, and published a translation of one of the novels of Eugene Sue. During his university career he devoted himself to study, taking no interest in the political and Socialistic agitation among his fellow-students. He was first employed as secretary to the governor of Simbirsk, and afterwards in the ministry of finance at St Petersburg. Being absorbed in bureaucratic work, Goncharov paid no attention to the social questions then ardently discussed by such men as Herzen, Aksakov and Bielinski. He began his literary career by publishing translations from Schiller, Goethe and English novelists. His first original work was Obuiknovennaya Istoria, " A Common Story " (1847). In 1856 he

sailed to Japan as secretary to Admiral Putiatin for the purpose of negotiating a commercial treaty, and on his return to Russia he published a description of the voyage under the title of ” The Frigate Pallada. ” His best work is Oblomov (1857), which exposed the laziness and apathy of the smaller landed gentry in Russia anterior to the reforms of Alexander II. Russian critics have pronounced this work to be a faithful characterization of Russia and the Russians. Dobrolubov said of it, ” Oblomofka [the country-seat of the Oblomovs] is our fatherland: something of Oblomov is to be found in every one of us.” Peesarev, another celebrated critic, declared that ” Oblomovism,” as Goncharov called the sum total of qualities with which he invested the hero of his story, ” is an illness fostered by the nature of the Slavonic character and the life of Russian society.” In 1858 Goncharov was appointed a censor, and in 1868 he published another novel called Obreev. He was not a voluminous writer, and during the latter part of his life produced nothing of any importance. His death occurred on 15/27 September 1891.

GONCOURT, DE, a name famous in French literary history. Edmond Louis Antoine Huot de Goncourt was born at Nancy on the 26th of May 1822, and died at Champrosay on the 16th of July 1896. Jules Alfred Huot de Goncourt, his brother, was born in Paris on the 17th of December 1830, and died in Paris on the 20th of June 1870.

Writing always in collaboration, until the death of the younger, it was their ambition to be not merely novelists, inventing a new kind of novel, but historians; not merely historians, but the historians of a particular century, and of what was intimate and what is unknown in it ; to be also discriminating, indeed innovating, critics of art, but of a certain section of art, the 18th century, in France and Japan; and also to collect pictures and bibelots, always of the French and Japanese 18th century. Their histories (Portraits intimes du X VIII” siecle (1857) , La Femme au X VIII” siecle (1862), La du Barry (1878), &c.) are made entirely out of documents, autograph letters, scraps of costume, engravings, songs, the unconscious self -revelations of the time; their three volumes on V Art du XVIII” siecle (1850-1875) deal with Watteau and his followers in the same scrupulous, minutely enlightening way, with all the detail of unpublished documents; and when they came to write novels, it was with a similar attempt to give the inner, undiscovered, minute truths of contemporary existence, the inedit of life. The same morbidly sensitive noting of the inedit, of

whatever came to them from their own sensations of things and people around them, gives its curious quality to the nine volumes of the Journal, 1887-1896, which will remain, perhaps, the truest and most poignant chapter of human history that they have written. Their novels, Sasur Philomene (1861), Renee Mauperin (1864), Germinie Lacerteux (1865), Manelte Salomon (1865), Madame Gervaisais (1869), and, by Edmond alone, La Fille Elisa (1878), Les Freres Zemganno (1879), La Faustin (1882), Cherie (1884), are, however, the work by which they will live as artists. Learning something from Flaubert, and teaching almost everything to Zola, they invented a new kind of novel, and their novels are the result of a new vision of the world, in which the very element of sight is decomposed, as in a picture of Monet. Seen through the nerves, in this conscious abandonment to the tricks of the eyesight, the world becomes a thing of broken patterns and conflicting colours, and uneasy movement. A novel of the Goncourts is made up of an infinite number of details, set side by side, every detail equally prominent. While a novel of Flaubert, for all its detail, gives above all things an impression of unity , a novel of the Goncourts deliberately dispenses with unity in order to give the sense of the passing of life, the heat and form of its moments as they pass. It is written in little chapters, sometimes no longer than a page, and each chapter is a separate notation of some significant event, some emotion or sensa- tion which seems to throw sudden light on the picture of a soul. To the Goncourts humanity is as pictorial a thing as the world it moves in; they do not search further than ” the physical basis of life,” and they find everything that can be known of that unknown force written visibly upon the sudden faces of little incidents, little expressive moments. The soul, to them, is a series of moods, which succeed one another, certainly without any of the too arbitrary logic of the novelist who has conceived of character as a solid or consistent thing. Their novels are hardly stories at all, but picture-galleries, hung with pictures of the momentary aspects of the world. French critics have complained that the language of the Goncourts is no longer French, no longer the French of the past ; and this is true. It is their distinction — the finest of their inventions — that, in order to render new sensations, a new vision of things, they .invented a new language. (A. Sy.)

In his will Edmond de Goncourt left his estate for the endowment’ of an academy, the formation of which was entrusted to MM. . Alphonse Daudet and Leon Hennique. The society was to consist of ten members, each of whom was to receive an annuity of 6000 francs, and a yearly prize of 5000 francs was to be awarded to the author of some work of fiction. Eight of the members of the new academy were

nominated in the will. They were: Alphonse Daudet, J. K. Huysmans, ,L6on Hennique, Octave Mirbeau, the two brothers J. H. Rosny, Gustave Geffroy and Paul Margueritte. On the 19th of January 1903, after much litigation, the academy was constituted,

with EliSmir Bourges, Lucien Descaves and L6on Daudet as members in addition to those mentioned in de Goncourt's will, the place of Alphonse Daudet having been left vacant by his death in 1897.

On the brothers de Goncourt see the Journal des Goncourt already cited; also M. A. Belloc (afterwards Lowndes) and M. L. Shedlock, Edmond and Jules de Goncourt, with Letters and Leaves from their Journals (1895) ; Alidor Delzant, Les Goncourt (1889) which contains a valuable bibliography; Lettres de Jules de Goncourt (1888), with preface by H. Ceard; R. Doumic, Portraits d'Scrivains (1892); Paul Bourget, Nouveaux Essais de psychologie contemporaine (1886); Emile Zola, Les Romanciers naturalistes (1881), &c.

GONDA, a town and district of British India, in the Fyzabad division of the United Provinces. The town is 28 m. N.W. of Fyzabad, and is an important junction on the Bengal & North- western railway. The site on which it stands was originally a jungle, in the centre of which was a cattle-fold (Gontka or Gothah), where the cattle were enclosed at night as a protection against wild beasts, and from this the town derives its name. Pop. (1901) 15,811. The cantonments were abandoned in 1863.

The district of Gonda has an area of 2813 sq. m. It consists of a vast plain with very slight undulations, studded with groves of mango trees. The surface consists of a rich alluvial deposit which is naturally divided into three great belts known as the tarai or swampy tract, the uparhar or uplands, and the tarhar or wet lowlands, all three being marvellously fertile. Several rivers flow through the district, but only two, the Gogra and Rapti, are of any commercial importance, the first being navigable throughout .the year, and the latter during the rainy season. The country is dotted with small lakes, the water of which is largely used for irrigation. On the outbreak of the Mutiny in 1857, the raja of Gonda, after honourably escorting the govern- ment treasure to Fyzabad, joined the rebels. His estates, along with those of the rani of Tulsipur, were confiscated, and conferred as rewards upon the maharajas of Balrampur and Ajodhya, who had remained loyal. In 1901 the population was 1,403,195, showing a decrease of 4 % in one decade. The district is traversed by the main line and three branches of the Bengal & North- western railway.

GONDAL, a native state of India, in the Kathiawar political agency of Bombay, situated in the centre of the peninsula of Kathiawar. Its area is 1024 sq. m.; pop. (1901) 162,859. The estimated gross revenue is about £100,000, and the tribute £7000. Grain and cotton are the chief products. The chief, whose title is Thakur Sahib, is a Jadeja Rajput, of the same clan as the Rao of Cutch. The Thakur Sahib, Sir Bhagvat Sinhji (b. 1865), was educated at the Rajkot college, and afterwards, graduated in arts and medicine at the university of Edinburgh. He published (in English) a Journal of a Visit to England and A Short History of Aryan Medical Science. In 1892 he received the honorary degree of D.C.L. of Oxford University. He was created K.C.I.E. in 1887 and G.C.I.E. in 1897. The state has long been conspicuous for its progressive administration. It is traversed by a railway connecting it with Bhaunagar, Rajkot and the sea-board. The town of Gondal is 23 m. by rail S. of Rajkot; pop. (1901) 19,592.

GONDAR, properly Guendar, a town of Abyssinia, formerly the capital of the Amharic kingdom, situated on a basaltic ridge some 7500 ft. above the sea, about 21 m. N.E. of Lake Tsana, a splendid view of which is obtained from the castle. Two streams, the Angreb on the east side and the Gaha or Kaha on the west, flow from the ridge, and meeting below the town, pass onwards to the lake. In the early years of the 20th century the town was much decayed, numerous ruins of castles, palaces and churches indicating its former importance. It was never a compact city, being divided into districts separated from each other by open spaces. The chief quarters were those of the Abun-Bed or bishop, the Etchege-Bed or chief of the monks, the Debra Berhan or Church of the Light, and the Gemp or castle. There was also a quarter for the Mahommedans. Gondar was a small village when at the beginning of the 16th century it was chosen by the Negus Sysenius (Seged I.) as the capital of his kingdom. His son Fasilidas, or A'lem-Seged (1633-1667), was the builder of the castle which bears his name. Later emperors built other castles and palaces, the latest in date being

that of the Negus Yesu II. This was erected about 1736, at which time Gondar appears to have been at the height of its prosperity. Thereafter it suffered greatly from the civil wars which raged in Abyssinia, and was more than once sacked. In 1868 it was much injured by the emperor Theodore, who did not spare either the castle or the churches. After the defeat of the Abyssinians at Debra Sin in August

1887 Gondar was looted and fired by the dervishes under Abu Anga. Although they held the town but a short time they inflicted very great damage, destroying many churches, further damaging the castles and carrying off much treasure. The population, estimated by James Bruce in 1770 at 10,000 families, had dwindled in 1905 to about 7000. Since the pacification of the Sudan by the British (1886-1889) there has been some revival of trade between Gondar and the regions of the' Blue Nile. Among the inhabitants are numbers of Mahommedans, and there is a settlement of Falashas. Cotton, cloth, gold and silver ornaments, copper wares, fancy articles in bone and ivory, excellent saddles and shoes are among the products of the local industry.

Unlike any other buildings in Abyssinia, the castles and palaces of Gondar resemble, with some modifications, the medieval fortresses of Europe, the style of architecture being the result of the presence in the country of numbers of Portuguese. The Portuguese were expelled by Fasilidas, but his castle was built, by Indian workmen, under the superintendence of Abyssinians who had learned something of architecture from the Portuguese adventurers, helped possibly by Portuguese still in the country. The castle has two storeys, is 90 ft. by 84 ft., has a square tower and circular domed towers at the corners. The most extensive ruins are a group of royal buildings enclosed in a wall. These ruins include the palace of Yesu II., which has several fine chambers. Christian Levantines were employed in its construction and it was decorated in part with Venetian mirrors, &c. In the same enclosure is a small castle attributed to Yesu I. The exterior walls of the castles and palaces named are little damaged and give to Gondar a unique character among African towns. Of the forty-four churches, all in the circular Abyssinian style, which are said to have formerly existed in Gondar or its immediate neighbourhood, Major Powell-Cotton found only one intact in 1900. This church contained some well-executed native paintings of St George and the Dragon, The Last Supper, &c. Among the religious observances of the Christians of Gondar is that of bathing in large crowds in the Gaha on the Feast of the Baptist, and again, though in more •orderly fashion, on Christmas day.

See E. Ruppell, Reise in Abyssinien (Frankfort-on-the-Main, 1838-1840); T. von Heuglin, Reise nach Abessinien (Jena, 1868); G. Lejean, Voyage en Abyssinie (Paris, 1872); Achille Raffray, Afrique orientale; Abyssinie (Paris, 1876); P. H. G. Powell-Cotton, A Sporting Trip through Abyssinia, chaps. 27-30 (London, 1902); and Boll. Soc. Geog. Italiana for 1909. Views of the castle are given by Heuglin, Raffray and Powell-Cotton.

GONDOKORO, a government station and trading-place on the east bank of the upper Nile, in 4° 54′ N., 31° 43′ E. It is the headquarters of the Northern Province of the (British) Uganda protectorate, is 1070 m. by river S. of Khartum and 350 m. N.N.W. in a direct line of Entebbe on Victoria Nyanza. The station, which is very unhealthy, is at the top of a cliff 25 ft. above the river-level. Besides houses for the civil and military authorities and the lines for the troops, there are a few huts inhabited by Bari, the natives of this part of the Nile. The importance of Gondokoro lies in the fact that it is within a few miles of the limit of navigability of the Nile from Khartum up stream. From this point the journey to Uganda is continued overland.

Gondokoro was first visited by Europeans in 1841-1842, when expeditions sent out by Mehemet Ali, pasha of Egypt, ‘ ascended the Nile as far as the foot of the rapids above Gondokoro. It soon became an ivory and slave-trading centre. In 1851 an Austrian Roman Catholic mission was established here, but it was abandoned in 1859. It was at Gondokoro that J. H. Speke and J. A. Grant, descending the Nile after their discovery of its source, met, pn the 15th of February 1863, Mr (afterwards Sir)

Samuel Baker and his wife who were journeying up the river. In 187 1 Baker, then governor-general of the equatorial provinces of Egypt, established a military post at Gondokoro which he named Ismailia, after the then khedive. Baker made this post his headquarters, but Colonel (afterwards General) C. G. Gordon, who succeeded him in 1874, abandoned the station on account of its unhealthy site, removing to Lado. Gondokoro, however, remained a trading-station. It fell into the hands of the Mahdists in 1885. After the destruction of the Mahdist power in 1898 Gondokoro was occupied by British troops and has since formed the northernmost post on the Nile of the Uganda protectorate (see Sudan; Nile; and Uganda).

GONDOMAR, DIEGO SARMIENTO DE ACUNA, Count of (1 567-1626), Spanish diplomatist, was the son of Garcia Sarmiento de Sotomayor, corregidor of Granada, and governor of the Canary Islands, by his marriage with Juana de Acuna, an heiress. Diego Sarmiento, their eldest son, was born in the parish of Gondomar, in the bishopric of Tuy, Galicia, Spain, on the 1st of November 1567. He inherited wide estates both in Galicia and in Old Castile. In 1583 he was appointed by Philip II. to the military command of the Portuguese frontier and sea coast of Galicia. He is said to have taken an active part in the repulse of an English coast-raid in 1585, and in the defence of the country during the unsuccessful English attack on Corunna in 1589. In 1593 he was named corregidor of Toro. In 1603 he was sent

from court to Vigo to superintend the distribution of the treasure brought from America by two galleons which were driven to take refuge at Vigo, and on his return was named a member of the board of finance. In 1609 he was again employed on the coast of Galicia, this time to repel a naval attack made by the Dutch. Although he held military commands, and administrative posts, his habitual residence was at Valladolid, where he owned the Casa del Sol and was already collecting his fine library. He was known as a courtier, and apparently as a friend of the favourite, the duke of Lerma. In 161 2 he was chosen as ambassador in England, but did not leave to take up his appointment till May 1613.

His reputation as a diplomatist is based on his two periods of service in England from 1613 to 1618 and from 1619 to 1622. The excellence of his latinity pleased the literary tastes of James I., whose character he judged with remarkable insight. He flattered the king's love of books and of peace, and he made skilful use of his desire for a matrimonial alliance between the prince of Wales and a Spanish infanta. The ambassador's task was to keep James from aiding the Protestant states against Spain and the house of Austria, and to avert English attacks on Spanish possessions in America. His success made him odious to the anti-Spanish and puritan parties. The active part he took in promoting the execution of Sir Walter Raleigh aroused particular animosity. He was attacked in pamphlets, and the dramatist Thomas Middleton made him a principal person in the strange political play A Game of Chess, which was suppressed by order of the council. In 161 7 Sarmiento was created count of Gondomar. In 1618 he obtained leave to come home for his health, but was ordered to return by way of Flanders and France with a diplomatic mission. In 1619 he returned to London, and remained till 1622, when he was allowed to retire. On his return he was named a member of the royal council and governor of one of the king's palaces, and was appointed to a complimentary mission to Vienna. Gondomar was in Madrid when the prince of Wales — afterwards Charles I. — made his journey there in search of a wife. He died at the house of the constable of Castile, near Haro in the Rioja, on the 2nd of October 1626.

Gondomar was twice married, first to his niece Beatrix Sarmiento, by whom he had no children, and then to his cousin Constanza de Acuna, by whom he had four sons and three daughters. The hatred he aroused in England, which was shown by constant jeers at the intestinal complaint from which he suffered for years, was the best tribute to the zeal with which he served his own master. Gondomar collected, both before he came to London and during his residence there, a very fine

library of printed books and manuscripts. Orders for the arrangement, binding and storing of his books in his house at Valladolid take a prominent place in his voluminous correspond- ence. In 1785 the library was ceded by his descendant and representative the marquis of Malpica to King Charles III., and it is now in the Royal Library at Madrid. A portrait of Gondomar, attributed to Valazquez, was formerly at Stowe. It was mezzotinted by Robert Cooper.

Authorities. — Gondomar's missions to England are largely dealt with in S. R. Gardiner's History of England (London, 1883-1884). In Spanish, Don Pascual de Gayangos wrote a useful biographical introduction to a publication of a few of his letters — Cinco Cartas politico-literarias de Don Diego Sarmiento de Acuna, Conde de Gondomar, issued at Madrid 1869 by the Sociedad de Bibliofilos of the Spanish Academy; and there is a life in English by F. H. Lyon (1910). (D. H.)

GONDOPHARES, or Gondop'hernes, an Indo-Parthian king who ruled over the Kabul valley and the Punjab. By means of his coins his accession may be dated with practical certainty at a.d. 21, and his reign lasted for some thirty years. He is notable for his association with St Thomas in early Christian tradition. The legend is that India fell to St Thomas, who showed unwillingness to start until Christ appeared in a vision and ordered him to serve King Gondophares and build him a palace. St Thomas accordingly went to India and suffered martyrdom there. This legend is not incompatible with what is known of the chronology of Gondophares' reign.

GONDWANA, the historical name for a large tract of hilly country in India which roughly corresponds with the greater part of the present Central Provinces. It is derived from the aboriginal tribe of Gonds, who still form the largest element in the population and who were at one time the ruling power. From the 12th to as late as the 18th century three or four Gond dynasties reigned over this region with a degree of civilization that seems surprising when compared with the existing condition of the people. They built large walled cities, and accumulated immense treasures of gold and silver and jewels. On the whole, they maintained their independence fairly well against the Mahommedans, being subject only to a nominal submission and occasional payment of tribute. But when the Mahratta invaders appeared, soon after the beginning of the 18th century, the Gond

kingdoms offered but a feeble resistance and the aboriginal population fled for safety to the hills. Gondwana was thus included in the dominions of the Bhonsla raja of Nagpur, from whom it finally passed to the British in 1853.

The Gonds, who call themselves Koitur or ” highlanders,” are the most numerous tribe of Dravidian race in India. Their total number in 1901 was 2,286,913, of whom nearly two millions were enumerated in the Central Provinces, where they form 20% of the population. They have a language of their own, with many dialects, which is intermediate between the two great Dravidian languages, Tamil and Telugu. It is unwritten and has no literature, except a little provided by the missionaries. More than half the Gonds in the Central Provinces have now abandoned their own dialects, and have adopted Aryan forms of speech. This indicates fhe extent to which they have become Hinduized. The higher class among them, called Raj Gonds, have been definitely admitted into Hinduism as a pure cultivating caste; but the great majority still retain the animistic beliefs, ceremonial observances and impure customs of food which are common to most of the aboriginal tribes of India.

GONFALON (the late French and Italian form, also found in other Romanic languages, of gonfanon, which is derived from the O.H. Ger. gundfano, guild, war, and fano, flag, cf. Mod. Ger. Fahne, and English ” vane “), a banner or standard of the middle ages. It took the form of a small pennon attached below’ the head of a knight’s lance, or when used in religious processions ‘ and ceremonies, or as the banner of a city or state or military order, it became a many-streamered rectangular ensign, fre- quently swinging from a cross-bar attached to a pole. This is the most frequent use of the word. The title of ” gonfalonier,” the bearer of the gonfalon, was In the middle ages both military and civil. It was borne by the counts of Vexin, as leaders of the

men of Saint Denis, and when the Vexin was incorporated in the kingdom of France the title of Gonfalonier de Sant Denis passed to the kings of France, who thus became the bearers of the ” oriflamme,” as the banner of St Denis was called. ” Gon- falonier ” was the title of civic magistrates of various degrees of authority in many of the city republics of Italy, notably of Florence, Sienna and Lucca. At Florence the functions of the office varied. At first the gonfaloniers were the leaders of the various military divisions of the inhabitants. In 1293 was created the office of gonfalonier of justice, who carried out the orders of the signiory. By the end of the 14th century the gonfalonier was the chief of the signiory. At Lucca he was the chief magistrate of

the republic. At Rome two gonfaloniers must be distinguished, that of the church and that of the Roman people; both offices were conferred by the pope. The first was usually granted to sovereigns, who were bound to defend the church and lead her armies. The second bore a standard with the letters S.P.Q.R. on any enterprise undertaken in the name of the church and the people of Rome, and also at ceremonies, processions, &c. This was granted by the pope to distinguished families. Thus the Cesarini held the office till the end of the 17th century. The Pamphili held it from 1686 till 1764.

GONG (Chinese, gong-gong or tam-tam), a sonorous or musical instrument of Chinese origin and manufacture, made in the form of a broad thin disk with a deep rim. Gongs vary in diameter from about 20 to 40 in., and they are made of bronze containing a maximum of 22 parts of tin to 78 of copper; but in many cases the proportion of tin is considerably less. Such an alloy, when cast and allowed to cool slowly, is excessively brittle, but it can be tempered and annealed in a peculiar manner. If suddenly cooled from a cherry-red heat, the alloy becomes so soft that it can be hammered and worked on the lathe, and afterwards it may be hardened by re-heating and cooling it slowly. In these properties it will be observed, the alloy behaves in a manner exactly opposite to steel, and the Chinese avail themselves of the known peculiari- ties for preparing the thin sheets of which gongs are made. They cool their castings of bronze in water, and after hammering out the alloy in the soft state, harden the finished gongs by heating them to a cherry-red and allowing them to cool slowly. These properties of the alloy long remained a secret, said to have been first discovered in Europe by Jean Pierre Joseph d'Arcet at the beginning of the 19th century. Riche and Champion are said to have succeeded in producing tam-tams having all the qualities and timbre of the Chinese instruments. The composition of the alloy of bronze used for making gongs is stated to be as follows ■} Copper, 76-52; Tin, 22-43; Lead, 0-62; Zinc, 0-23; Iron, 0-18. The gong is beaten with a round, hard, leather-covered pad, fitted on a short stick or handle. It emits a peculiarly sonorous sound, its complex vibrations bursting into a wave-like succession of tones, sometimes shrill, sometimes deep. In China and Japan it is used in religious ceremonies, state processions, marriages and other festivals; and it is said that the Chinese can modify its tone variously by particular ways of striking the disk.

The gong has been effectively used in the orchestra to intensify the impression of fear and horror in melodramatic scenes. The tam-tam was first introduced into a western orchestra by Frangois Joseph Gossec in the funeral march composed at the death of Mirabeau in 1791. Gaspard Spontini used it in La Vestale (1807), in the finale of

act II., an impressive scene in which the high pontiff pronounces the anathema on the faithless vestal. It was also used in the funeral music played when the remains of Napoleon the Great were brought back to France in 1840. Meyerbeer made use of the instrument in the scene of the resurrection of the three nuns in Robert le diable. Four tam-tams are now used at Bayreuth in Parsifal to reinforce the bell instruments, although there is no indication given in the score (see Parsifal). The tam-tam has been treated from its ethnographical side by Franz Heger. 2 (K. S.)

G6NG0RA Y ARGOTE, LUIS DE (1 561-1627), Spanish lyric poet, was born at Cordova on the nth of July 1561. His father, Francisco de Argote, was corregidor of that city; the poet early adopted the surname of his mother, Leonora de Gongora, who

1 See La grande Encyclopedic, vol. viii. (Paris), ” Bronze,” p. 146a.

2 Alte Metalltrommeln aus Siidost-Asien (Leipzig, 1902), Bd. i., Text; BH. ii., Tafeln.

was descended from an ancient family. At the age of fifteen he entered as a student of civil and canon law at the university of Salamanca; but he obtained no academic distinctions and was content with an ordinary pass degree. He was already known as a poet in 1585 when Cervantes praised him in the Galatea; in this same year he took minor orders, and shortly afterwards was nominated to a canonry at Cordova. About 1605-1606 he was ordained priest, and thenceforth resided principally at Valladolid and Madrid, where, as a contemporary remarks, he ” noted and stabbed at everything with his satirical pen.” His circle of admirers was now greatly enlarged; but the acknowledg- ment accorded to his singular genius was both slight and tardy. Ultimately indeed, through the influence of the duke of Sandoval, he obtained an appointment as honorary chaplain to Philip III., but even this slight honour he was not permitted long to enjoy. In 1626 a severe illness, which seriously impaired his memory, compelled his, retirement to Cordova, where he died on the 24th of May 1627. An edition of his poems was published almost immediately after his death by Juan Lopez de Vicuna; the frequently reprinted edition by Hozes did not appear till 1633. The collection consists of numerous sonnets, odes, ballads, songs for the guitar, and of certain larger poems, such as the Soledades and the Polifemo. Too many of

them exhibit that tortuous elaboration of style {estilo culto) with which the name of Gongora is inseparably associated; but though Gongora has been justly censured for affected Latinisms, unnatural transpositions, strained metaphors and frequent obscurity, it must be admitted that he was a man of rare genius, — a fact cordially acknowledged by those of his contemporaries who were most capable of judging. It was only in the hands of those who imitated Gongora's style without inheriting his genius that culteranismo became absurd. Besides his lyrical poems Gongora is the author of a play entitled Las Firmezas de Isabel and of two incomplete dramas, the Comedia venatoria and El Doctor Carlino. The only satisfactory edition of his works is that published by R. Foulche-Delbose in the Bibliotheca Hispanica.

See Edward Churton, Gongora (London, 1862, 2 vols.); M. Gonzalez y Frances, Gongora racionero (C6rdoba, 1895) ; M. Gonzalez y Frances, Don Luis de Gongora vindicando su jama ante el propio obispo (Cordoba, 1899) ; " Vingt-six Lettres de Gongora " in the Revue hispanique, vol. x. pp. 184-225 (Paris, 1903).

GONIOMETER (from Gr. ycovla, angle, and fxhpov, measure), an instrument for measuring the angles of crystals; there are two kinds — the contact goniometer and the reflecting goniometer. Nicolaus Stena in 1669 determined the interfacial angles of quartz crystals by cutting sections perpendicular to the edges, the plane angles of the sections being then the angles between the faces which are perpendicular to the sections. The earliest instru- ment was the contact goniometer devised by Carahgeot in 1783. The Contact Goniometer (or Hand-Goniometer). — This consists of two metal rules pivoted together at the centre of a graduated semi- circle (fig. 1). The instrument is placed with its plane perpendicular

to an edge between two faces of the crystal to be meas- ured, and the rules are brought into contact with the faces; this is best done by holding the crystal up against the light with the edge in the line of sight. The angle between the rules, as read on the graduated semi-circle, then gives,, the angle between the two faces. The Tules are slotted, so that they may be shortened and their tips applied to a crystal partly embedded in its matrix. The instrument repre- sented in fig. I is practically the same in all its details as that made for Carangeot, and it is employed at the present day for the approxi- mate measurement of large crystals with dull and rough faces. S. L. Penfield (1900) has devised some cheap and simple forms of contact goniometer, consisting of jointed arms and protractors made of cardboard or celluloid-

Contact Goniometer.

The Reflecting Goniometer.— This is an instrument of far greater precision, and is always used for the accurate measurement of the angles when small crystals with bright faces are available. As a rule, the smaller the crystal the more even are its faces, and when these are smooth and bright they reflect sharply defined images of a bright object. By turning the crystal about an axis parallel to the edge between two faces, the image reflected from a second face may be brought into the same position as that formerly occupied by the image reflected from the first face; the angle through which the crystal has been rotated, as determined by a graduated circle to which the crystal is fixed, is the angle between the normals to the two faces.

Several forms of instruments depending on this principle »have been devised, the earliest being the vertical-circle gonio- meter of W. H. Wollaston, made in 1809. This consists of a circle m (fig. 2), graduated to degrees of arc and reading with the vernier h to minutes, which turns with the milled head t about a horizontal

axis. The crystal is attached „ ,..,„.,„.

with wax (a mixture of bees- FlG – 2.— Vertical-Circle Goniometer, wax and pitch) to the holder

q, and by means of the pivoted arcs it may be adjusted so that the edge between two faces (a zone-axis) is parallel to, and coincident with, the axis of the instrument. The crystal-holder and adj ustment-arcs, together with the milled head s, are carried on an axis which passes through the hollow axis of the graduated circle, and may thus be rotated independently of the circle. In use, the goniometer is placed directly opposite to a window, with its axis parallel to the horizontal window-bars, and as far distant as possible. The eye is placed quite close to the crystal, and the image of an upper window- bar (or better still a slit in a dark screen) as seen in the crystal-face is made to coincide with a lower window-bar (or chalk mark on the floor) as seen directly: this is done by turning the milled head s, the reading of the graduated circle having previously been observed. Without moving the eye, the milled head /, together with the crystal, is then rotated until the image from a second face is brought intothe same position; the difference between the first and second readings of the graduated circle will then give the angle between the normals of the two faces.

Several improvements have been made on Wollaston's gonio- meter. The adjustment-arcs have been modified; a mirror of black glass fixed

to the stand beneath the crystal gives a reflected image of the signal, with

which the reflec- ,<*£_ 11 j

tion from the crystal can be more conveni- ently made to co- incide; a telescope p rovided with cross-wires gives greater precision to the direction of the reflected rays of light; and with the telescope a collimator has sometimes been used.

A still greater improvement was effected by plac- ing the graduated circle in a hori- zontal position, as in the instru- ments of E. L. Malus (1810), F. C. von Riese (1829)

Fig. 3.— Horizontal-Circle Goniometer,

and J. Babinet (1839). Many forms* of the horizontal-circle goniometer have been constructed; they are provided with a telescope and collimator, and in construction are essentially the same as a spectrometer, with the addition of arrange- ments for adjusting and centring the crystal. The instrument shown in fig. 3 is made by R. Fuess of Berlin. It has four concentric axes, which enable the crystal-holder A, together with the adjustment- arcs B and centring-slides D, to be raised or lowered, or to be rotated independently of the circle H; further, either the crystal-holder or the telescope T may be rotated with the circle, while the other

remains fixed. The crystal is placed on the holder and adjusted so that the edge (zone-axis) between two faces is coincident with the axis of the instrument. Light from an incandescent gas-burner passes through the slit of the collimator C, and the image of the slit (signal) reflected from the crystal face is viewed in the telescope. The clamp a and slow-motion screw F enable the image to be brought exactly on the cross-wires of the telescope, and the position of the circle with respect to the vernier is read through the lens. The crystal and the circle are then rotated together until the image from a second face is brought on the cross- wires of the telescope, and the angle through which they have been turned is the angle between the normals to the two faces. While measuring the angles between the faces of crystals the telescope remains fixed by the clamp /?, but when this is released the instrument may be used as a spectrometer or refractometer for determining, by the method of minimum deviation, the indices of

refraction of an artificially cut prism or of a transparent crystal when the faces are suitably inclined to one another.

With a one-circle goniometer, such as is described above, it is necessary to mount and re-adjust the crystal afresh for the measurement of each zone of faces (i.e. each set of faces intersecting in parallel edges) ; with very small crystals this operation takes a considerable time, and the minute faces are not readily identified again. Further, in certain cases, it is not possible to measure the angles between zones, nor to determine the position of small faces which do not lie in pro- minent zones on the crystal. These difficulties have been overcome by the use of a two-circle goniometer or theodolite-goniometer, which as a combination of a vertical-circle goniometer and one with a horizontal-circle was first employed by W. H. Miller in 1874. Special forms have been designed by E. S. Fedorov (1889), V. Goldschmidt (1893), S. Czapski (1893) and F. Stoeber (1898), which differ mainly in the arrangement of the optical parts. In these instruments the crystal is set up and adjusted once for all, with the axis of a prominent zone parallel to the axis of either the horizontal or the vertical circle. As a rule, only in this zone can the angles bet ween the faces be measured directly; the positions of all the other faces, which need be observed only once, are fixed by the simultaneous readings of the two circles. These readings, corresponding to the polar distance and azimuth, or latitude and longitude readings of astronomical tele- scopes, must be plotted on a projection before th« symmetry of the crystal is apparent; and laborious calculations are necessary in order to determine the indices of the faces and the angles between them, and the other. constants of.the crystal, or to test whether any three faces are accurately in a zone.

These disadvantages are overcome by adding still another gradu- ated circle to the instrument, with its axis perpendicular to the axis of the vertical circle, thus forming a three-circle goniometer. With such an instrument measurements may be made in any zone or between any two faces without re-adjusting the crystal; further the troublesome calculations are avoided, and, indeed, the instrument may be used for solving spherical triangles. Different forms of three-circle goniometers have been designed by G. F. H. Smith (1899 and 1904), E. S. Fedorov (1900) and J. F. C. Klein (1900). Besides being used as a one-, two-, or three-circle goniometer for the measurement of the interfacial angles of crystals, and as a re- fractometer for determining refractive indices by the prismatic method or by total reflection, Klein's instrument, which is called a polymeter, is fitted with accessory optical apparatus which enables it to be used for examining a crystal in parallel or convergent polar- ized light and for measuring the optic axial angle.

Goniometers of special construction have been devised for certain

furposes; for instance, the inverted horizontal-circle goniometer of I. A. Miers (1903) for measuring crystals during their growth in the mother-liquid. A. E. Tutton (1894) has combined a goniometer with lapidaries' appliances for cutting section-plates and prisms from crystals accurately in any desired direction. The instrument commonly employed for measuring the optic axial angle of biaxial crystals is really a combination of a goniometer with a polariscope. For the optical investigation of minute crystals under the microscope, various forms of stage-goniometer with one, two or three graduated circles have been constructed. An ordinary microscope fitted with cross-wires and a rotating graduated stage serves the purpose of a goniometer for measuring the plane angles of a crystal face or section, being the same in principle as the contact goniometer.

For fuller descriptions of goniometers reference may be made to the text-books of Crystallography and Mineralogy, especially to P. H. Groth, Physikalische Krystallographie (4th ed., Leipzig, 1905). See also C. Leiss, Die optischen Instrumente der Firpia R. fuess, deren Beschreibung, Justierung und Anwendung (Leipzig, 1899). (L. J. S.)

GONTAUT, MARIE JOSEPHINE LOUISE, Duchesse de (1773-1857), was born in Paris on the 3rd of August 1773, daughter of Augustin Francois, comte de Montaut-Navailles, who had been governor of Louis XVI. and his two brothers when children. The count of Provence (afterwards Louis XVIII.) and his wife stood sponsors to Josephine de Montaut, and she shared the lessons given by Madame de Genlis to the Orleans family, with whom her mother broke off relations after the out-

break of the Revolution. Mother and daughter emigrated to Coblenz in 1792; thence they went to Rotterdam, and finally to England, where Josephine married the marquis Charles Michel de Gontaut-Saint-Blacard. They returned to France at the Restoration, and resumed their place at court. Madame de Gontaut became lady-in-waiting to Caroline, duchess of Berry, and, on the birth of the princess Louise (Mile d'Artois, afterwards duchess of Parma), governess to the children of France. Next year the birth of Henry, duke of Bordeaux (afterwards known as the comte de Chambord), added to her charge the heir of the Bourbons. She remained faithful to his cause all her life. Her husband died in 1822, and in 1827 she was created duchesse de Gontaut. She followed the exiled royal family in 1830 to Holyrood Palace, and then to Prague, but in 1834, owing to differences with Pierre Louis, due de Blacas, who thought her comparatively liberal

views dangerous for the prince and princess, she received a brusque conge from Charles X. Her twin daughters, Josephine (1 796-1844) and Charlotte (1796- 18 1 8), married respectively Ferdinand de Chabot, prince de Leon and afterwards due de Rohan, and Francois, comte de Bourbon- Busset. She herself wrote in her old age some naive memoirs, which throw an odd light on the pretensions of the " governess of the children of France." She died in Paris in 1857.

See her Memoirs (Eng. ed.,2 vols., 1 894), and Lettres inedites (1895).
GONVILE, EDMUND (d. 1351), founder of Gonville Hall, now Gonville and Caius College, at Cambridge, England, is thought to have been the son of William de Gonvile, and the brother of Sir Nicholas Gonvile. In 1320 he was rector of Thelnetham, Suffolk, and steward there for William, earl Warren and the earl of Lancaster. Six years later he was rector of Rushworth, and in 1342 rector of Terrington St John and com- missioner for the marshlands of Norfolk. In this year he founded and endowed a collegiate church at Rushworth, sup- pressed in 1 54 1. The foundation of Gonville Hall at Cambridge was effected by a charter granted by Edward III. in 1348. It was called, officially, the Hall of the Annunciation of the Blessed Virgin, but was usually known as Gunnell or Gonville Hall. Its original site was in Free-school Lane, where Corpus Christi College now stands. Gonvile apparently wished it to be devoted to training for theological study, but after his death the foundation was completed by William Bateman, bishop of Norwich and founder of Trinity Hall, on a different site and with considerably altered statutes. (See also Caius, John.)

GONZAGA, an Italian princely family named after the town where it probably had its origin. Its known history begins with the 13th century, whenLuigil. (1267-1360), after fierce struggles supplanted his brother-in-law Rinaldo (nicknamed Passerino) Bonacolsi as lord of Mantua in August 1328, with the title of captain-general, and afterwards of vicar-general of the empire, adding the designation of count of Mirandola and Concordia, which fief the Gonzagas held from 1328 to 1354. In July 1335 his son Guido, with the help of Filippino and Feltrino Gonzaga, wrested Reggio from the Scaligeri and held it until 1371. Luigi was succeeded by Guido (d. 1369); the latter's son Luigi II. came next in succession (d. 1382), and then Giovan Francesco I. (d. 1407), who, although at one time allied with the treacherous Gian Galeazzo Visconti, incurred the latter's enmity and all but lost his estates and his life in consequence; eventually he joined the Florentines and Bolognese, enemies of Visconti. He pro- moted commerce and wisely developed the prosperity of his dominions. His son Giovan Francesco II. (d. 1444) succeeded him under the regency of his uncle Carlo Malatesta and the protection of the Venetians. He

became a famous general, and was rewarded for his services to the emperor Sigismund with the title of marquess of Mantua for himself and his descendants (1432), an investiture which legitimatized the usurpations of the house of Gonzaga. His son Luigi III. ” il Turco ” (d. 1478) likewise became a celebrated soldier, and was also a learned and liberal prince, a patron of literature and the arts. His son Federigo I. (d. 1484) followed in his father’s footsteps, and served under various foreign sovereigns, including Bona of Savoy and Lorenzo de’ Medici; subsequently he upheld the rights of the house of

Este against Pope Sixtus IV. and the Venetians, whose ambitious claims were a menace to his own dominions of Ferrara and Mantova. His son Giovan Francesco III. (d. 1519) continued the military traditions of the family, and commanded the allied Italian forces against Charles VIII. at the battle of Fornovo; he afterwards fought in the kingdom of Naples and in Tuscany, until captured by the Venetians in 1509. On his liberation he adopted a more peaceful and conciliatory policy, and with the help of his wife, the famous Isabella d’Este, he promoted the fine arts and letters, collecting pictures, statues and other works of art with intelligent discrimination. He was succeeded by his son Federigo II. (d. 1540), captain-general of the papal forces. After the peace of Cambrai (1529) his ally and protector, the emperor Charles V., raised his title to that of duke of Mantua in 1530; in 1536 the emperor decided the controversy for the succession of Monferrato between Federigo and the house of Savoy in favour of the former. His son Francesco I. succeeded him, and, being a minor, was placed under the regency of his uncle Cardinal Ercole; he was accidentally drowned in 155©, leaving his possessions to his brother Guglielmo. The latter was an extravagant spendthrift, but having subdued a revolt in Monferrato was presented with that territory by the emperor Maximilian II. At his death in 1587 he was succeeded by his son Vincenzo I. (d. 161 2), who was more addicted t.o amusements than to warfare. Then followed in succession his sons Francesco II. (d. 161 2), Ferdinando (d. 1626), and Vincenzo II. (d. 1627), all three incapable and dissolute princes. The last named appointed as his successor Charles, the son of Henriette, the heiress of the French family of Nevers-Rethel, who was only able to take possession of the ducal throne after a bloody struggle; his dominions were laid waste by foreign invasions and he himself was reduced to the sorest straits. He died in 1637, leaving his possessions to his grandson Charles (Carlo) II. under the regency of the latter’s mother Maria Gonzaga, which

lasted until 1647. Charles died in consequence of his own profligacy and was succeeded by his son Ferdinand Charles (Ferdinando Carlo), who was likewise for some years under the regency of his mother Isabella of Austria. Ferdinand Charles, another extravagant and dissolute prince, acquired the county of Guastalla by marriage in 1678, but lost it soon afterwards; he involved his country in useless warfare, with the result that in 1708 Austria annexed the duchy. On the 5th of July of the same year he .died in Venice, and with him the Gonzagas of Mantua came to an end.

Of the cadet branches of the house one received the lordship of Bozzolo, another the counties of Novellara and Bagnolo, a third, of which the founder was Ferrante I. (d. 1557), retained the county of Guastalla, raised to a duchy in 1621, and came to an end with the death of Giuseppe Maria on the 16th of August

1746.

Bibliography. — S. Maflfei, Annali di Mantova (Tortona, 1675); G. Veronesi, Quadro storico della Mirandola (Modena, 1847) ; T. Aff6, Storia di Guastalla (Guastalla, 1875, 4 vols.); Alessandro Luzio, I Precattori d Isabella d'Este (Ancona, 1887) ; A. Luzio and R. Renier, " Francesco Gonzaga alia battaglia di Fornovo (1495), secondo i documenti Mantovani " (in Archivio storico italiano, ser. v. vol. vi., 205-246) ; id., Mantova e Urbino, Isabella d'Este e Elisabeth Gonzaga nelle relazioni famigliari e nelle vicende politiche (Turin, 1893) ; L. G., Pelissier, " Les Relations de Frangois de Gonzague, marquis de Mantoue, avec Ludovico Sforza et Louis XII " (in Annates de la faculte de Lettres de Bordeaux, 1893); Antonino Bertolotti, " Lettere del duca di Savoia Emanuele Filiberto a Guglielmo Gonzaga, duca di Mantova" (A rch. stor. it., ser. v., vol. ix. pp. 250-283) ; Edmondo Solari, Lettere inedite del card. Gasparo Contarini nel carteggio del card. Ercole Gonzaga (Venice, 1904) ; Arturo Segre, 27 Richiamo di Don Ferrante Gonzaga dal governo di Milano, e sue conseguenze (Turin,

1904).

GONZAGA, THOMAZ ANTONIO (1744-1809), Portuguese poet, was a native of Oporto and the son of a Brazilian-born judge. He spent a part of his boyhood at Bahia, where his father was disembargador of the appeal court, and returning to Portugal he went to the university of Coimbra and took his law degree at the age of twenty-four. He remained on there for some years and compiled a treatise of natural law on regalist lines, dedicating it to Pombal, but the fall of the marquis led him to

leave Coimbra and become a candidate for a magistracy, and in 1 782 he obtained the posts of ouvidor and provedor of the goods of deceased and absent persons at Villa Rica in the province of Minas Geraes in Brazil. In 1786 he was named disembargador of the appeal court at Bahia, and three years later, as he was about to marry a young lady of position, D. Maria de Seixas Brandao, the Marilia of his verses, he suddenly found himself arrested on the charge of being the principal author of a Republican conspiracy in Minas. Conducted to Rio, he was imprisoned in a fortress and interrogated, but constantly asserted his innocence. However, his friendship with the conspirators compromised him in the eyes of his absolutist judges, who, on the ground that he had known of the plot and not denounced it, sentenced him in April 1792 to perpetual exile in Angola, with the confiscation of his property. Later, this penalty was commuted into one of ten years of exile to Mozambique, with a death sentence if he should return to America. After having spent three years in prison, Gonzaga sailed in May 1792 for Mozambique and shortly after his arrival a violent fever almost ended his life. A wealthy Portuguese gentleman, married to a lady of colour, charitably received him into his house, and when the poet recovered, he married their young daughter who had nursed him through the attack. He lived in exile until his death, practising advocacy at intervals, but his last years were embittered by fits of melancholia, deepening into madness, which were brought on by the remembrance of his misfortunes. His reputation as a poet rests on a little volume of bucolics entitled Marilia, which includes all his published verses and is divided into two parts, corresponding with those of his life. The first extends to his imprisonment and breathes only love and pleasure, while the main theme of the second part, written in prison, is his saudade for Marilia and past happiness. Gonzaga borrowed his forms from the best models, Anacreon and Theocritus, but the matter, except for an occasional imitation of Petrarch, the natural, elegant style and the harmonious metrification, are all his own. The booklet comprises the most celebrated collection of erotic poetry dedicated to a single person in the Portuguese tongue; indeed its popularity is so great as to exceed its intrinsic merit.

Twenty-nine editions had appeared up to 1854, but the Paris edition of 1862 in 2 vols, is in every way the best, although the authenticity of the verses in its 3rd part, which do not relate to Marilia, is doubtful. A popular edition of the first two parts was published in 1888 (Lisbon, Corazzi). A French version of Marilia by Monglave and Chalas appeared in Paris in 1825, an Italian by Vegezzi Ruscalla at Turin in 1844, a Latin by Dr Castro Lopes at Rio in 1868, and there is a Spanish one by Vedia.

See Innocencio da Silva, Diccionario bibliographico portug-uez, vol. vii. p. 320, also Dr T. Braga, Filinto Elysio e os Dissidentas da Arcadia (Oporto, 1901). (E. Pr.)

GONZALEZ-CARVAJAL, TOMAS JOSE (i753-r8 3 4), Spanish; poet and statesman, was born at Seville in 1753. He studied at the university of Seville, and took the degree of LL.D. at Madrid. He obtained an office in the financial department of the govern- ment; and in 1795 was made intendant of the colonies which had just been founded in Sierra Morena and Andalusia. During 1809-1811 he held an intendancy in the patriot army. He became, in 181 2, director of the university of San Isidro ; but having offended the government by establishing a chair of inter- national law, he was imprisoned for five years (1815-1820). The revolution of 1820 reinstated him, but the counter-revolution of three years later forced him into exile. After four years he was allowed to return, and he died, in 1834, a member of the supreme council of war. Gonzalez-Carvajal enjoyed European fame as author of metrical translations of the poetical books of the Bible. To fit himself for this work he commenced the study of Hebrew at the age of fifty-four. He also wrote other works in verse and prose, avowedly taking Luis de Leon as his model.

See biographical notice in Biblioteca de Rivadeneyra, vol. lxvii., Poetas del siglo 18.

GONZALO DE BERCEO (c. 1180-c. 1246), the earliest Castilian poet whose name is known to us, was born at Berceo, a village in the neighbourhood of Calahorra in the province of Logrofio. In 1 221 he became a deacon and was attached, as a secular priest, to the Benedictine monastery of San Millan de la Cogolla, in the

diocese of Calahorra. His name is to be met with in a number of documents between the years 1237 and 1246. He wrote upwards of 13,000 verses, all on devotional subjects. His best work is a life of St Oria; others treat of the life of St Millan, of St Dominic of Silos, of the Sacrifice of the Mass, the Martyrdom of St Laurence, the visible signs preceding the Last Judgment, the Praises of Our Lady, the Miracles of Our Lady and the Lamentations of the Virgin on the Passion of her Son. He writes in the common tongue, the roman paladino, and his claim to the name of poet rests on his use of the cuaderna via (single-rhymed quatrains, each verse being of fourteen syllables). Sometimes,

however, he takes the more modest title of juglar (jongleur), when claiming payment for his poems. His literary attainments are not great, and he lacks imagination and animation of style, but he has a certain eloquence, and in speaking of the Virgin and the saints a certain charm, while his verse bears at times the imprint of a passionate devotion, recalling the lyrical style of the great Spanish mystics. There is, however, a very strong popular element in his writings, which explains his long vogue. The great majority of his legends of the Virgin are obviously borrowed from the collection of a Frenchman, Gautier de Coinci; but he has succeeded in making this material entirely his own by reason of a certain conciseness and a realism in detail which make his work far superior to the tedious and colourless narrative of his model.

His Poesias are in the Biblioteca de autores espanoles of Rivadeneyra, vol. lvii. (1864) ; La Vida de San Domingo de Silos has been edited by J. D. FitzGerald (Paris, 1904; see the Biblioth'eque de I'ltcole des Hautes Etudes, part 149) ; see also F. Fernandez y Gonzalez in the Razon (vol. i., Madrid, i860) ; N. Hergueta, " Documentos referentes a Gonzalo de Berceo," in the Revista de archivos, (3rd series, Feb.-March, 1904, pp. 178-179). (P. A.)

GOOCH, SIR DANIEL, Bart. (1816-1889), English mechanical engineer, was born at Bedlington, in Northumberland, on the 16th of August 1816. At the age of fifteen, having shown a taste for mechanics, he was put to work at the Tredegar Ironworks, Monmouthshire. In 1834 he went to Warrington, where, at the Vulcan foundry, under Robert Stephenson, he acquired the principles of locomotive design. Subsequently, after passing a year at Dundee, he was engaged by the Stephensons at their Gateshead works, where he seems to have conceived that predilec- tion for the broad gauge for which he was afterwards distinguished, through having to design some engines for a 6-foot gauge in Russia and noticing the advantages it offered in allowing greater space for the machinery, &c, as compared with the standard gauge favoured by Stephenson. In 1837, on I. K. Brunei's recommendation, he was appointed locomotive superintendent to the Great Western railway at a time when the engines possessed by the railway were very poor and inefficient. He soon improved this state of affairs, and gradually provided his employers with locomotives which were unsurpassed for general excellence and economy of working. One of the most famous, the " Lord of the Isles," was awarded a gold medal at the Great Exhibition of 1851, and when, thirty years afterwards, it was withdrawn from active service it had run more than three-quarters of a million miles, all with its original boiler. In 1864 he left the Great Western and

interested himself in the problem of laying a telegraph cable across the Atlantic. At this time the ” Great Eastern ” was in the hands of the bondholders, of whom he himself was one of the most important, and it occurred to him that she might advan- tageously be utilized in the enterprise. Accordingly, at his instance she was chartered by the Telegraph Construction Company, of which also he was a director, and in 1865 was employed in the attempt to lay a cable, Gooch himself super- intending operations. The cable, however, broke in mid-ocean, and the attempt was a failure. Next year it was renewed with more success, for not only was a new cable safely put in place, but the older one was picked up and spliced, so that there were two complete lines between England and America. For this achieve- ment Gooch was created a baronet. Meanwhile the Great Western railway had fallen on evil days, being indeed on the verge of bankruptcy, when in 1866 the directors appealed to him to accept . the chairmanship of the board and undertake the

rehabilitation of the company. He agreed to the proposal, and was so successful in restoring its prosperity that in 1889, at the last meeting over which he presided, a dividend was declared at the rate of 7 J %. Under his administration the system was greatly enlarged and consolidated by the absorption of various smaller lines, such as the Bristol and Exeter and the Cornwall railways; and his appreciation of its strategic value caused him to be a strenuous supporter of the construction of the Severn Tunnel. His death occurred on the 15th of October 1889 at his residence, Clewer Park, near Windsor.

GOOD, JOHN MASON (1764-1827), English writer on medical, religious and classical subjects, was born on the 25th of May 1764 at Epping, Essex. After attending a school at Romsey kept by his father, the Rev. Peter Good, who was a Nonconformist minister, he was, at about the age of fifteen, apprenticed to a surgeon-apothecary at Gosport. In 1783 he went to London to prosecute his medical studies, and in the autumn of 1784 he began to practise as a surgeon at Sudbury in Suffolk. In 1793 he removed to London, where he entered into partnership with a surgeon and apothecary. But the partnership was soon dissolved, and to increase his income he began to devote attention to literary pursuits. Besides contributing both in prose and verse to the Analytical and Critical Reviews and the British and Monthly Magazines, and other periodicals, he wrote a large number of works relating chiefly to medical and religious subjects. In 1794 he .became a member of the British Pharmaceutical Society, and in that connexion, and especially by the publication of his work, A History of Medicine (1795), he did much to effect a greatly needed reform in the profession of the apothecary. In 1820 he took the diploma of M.D. at

Marischal College, Aberdeen. He died at Shepperton, Middlesex, on the 2nd of January 1827. Good was not only well versed in classical literature, but was acquainted with the principal European languages, and also with Persian, Arabic and Hebrew. His prose works display wide erudition; but their style is dull and tedious. His poetry never rises above pleasant and well-versified commonplace. His translation of Lucretius, The Nature of Things (1805-1807), contains elaborate philological and ex- planatory notes, together with parallel passages and quotations from European and Asiatic authors.

GOOD FRIDAY (probably "God's Friday "),," the English name for the Friday before Easter, kept as the anniversary of the Crucifixion. In the Greek Church it has been or is known as 7ra

The origin of the custom of a yearly commemoration of the Crucifixion is somewhat obscure. It may be regarded as certain that among Jewish Christians it almost imperceptibly grew out of the old habit of annually celebrating the Passover on the 14th of Nisan, and of observing the " days of unleavened bread " from the 1 5th to the 2 1st of that month. In the Gentile churches, on the other hand, it seems to be well established that originally no yearly cycle of festivals was known at all. (See Easter.)

From its earliest observance, the day was marked by a specially rigorous fast, and also, on the whole, by a tendency to greater simplicity in the services of the church. Prior to the 4th century there is no evidence of non-celebration of the eucharist on Good Friday; but after that date the prohibition of communion

1 See Johnson's Collection of Ecclesiastical Laws (vol. i., anno 957) : " Housel ought not to be hallowed on Long Friday, because Christ suffered for us on that day."

became common. In Spain, indeed, it became customary to close the churches altogether as a sign of mourning; but this practice was condemned by the council of Toledo (633). In the Roman Catholic Church the Good Friday ritual at present observed is marked by many special features, most of which can be traced back to a date at least prior to the close of the 8th century (see the Ordo Romanus in Muratori's Liturg. Rom. Vet.). The altar and officiating clergy are draped in black, this being the only day on which that colour is

permitted. Instead of the epistle, sundry passages from Hosea, Habakkuk, Exodus and the Psalms are read. The gospel for the day consists of the history of the Passion as recorded by St John. This is often sung in plain-chaunt by three priests, one representing the ” narrator,” the other two the various characters of the story. The singing of this is followed by bidding prayers for the peace and unity of the church, for the pope, the clergy, all ranks and conditions of men, the sovereign, for catechumens, the sick and afflicted, heretics and schismatics, Jews and heathen. Then follows the ” adoration of the cross ” (a ceremony derived from the church of Jerusalem and said to date back to near the time of Helena’s “invention of the cross”); the hymns Pange lingua and Vexilla regis are sung, and then follows the ” Mass of the Presanctified.” The name is derived from the fact that it is celebrated with elements consecrated the ‘day before, the liturgy being omitted on this day. The priest merely places the Sacrament on the altar, censes it, elevates and breaks the host, and communicates, the prayers and responses interspersed being peculiar to the day. This again is followed by vespers, with a special anthem; after which the altar is stripped in silence. In many Roman Catholic countries — in Spain, for example — it is usual for the faithful to spend much time in the churches in meditation on the ” seven last words ” of the Saviour; no carriages are driven through the streets; the bells and organs are silent ; and in every possible way it is sought to deepen the impression of a profound and universal grief. In the Greek Church also the Good Friday fast is excessively strict; as in the Roman Church, the Passion history is read and the cross adored; towards evening a dramatic representation of the entombment takes place, amid open demonstrations of contempt for Judas and the Jews. In Lutheran churches the organ is silent on this day, and altar, font and pulpit are draped in black, as indeed throughout Holy Week. In the Church of England the history of the Passion from the gospel according to John is also read; the collects for the day are based upon the bidding prayers which are found in the Ordo Romanus. The ” three hours ” service, borrowed from Roman Catholic usage and consisting of prayers, addresses on the ” seven last words from the cross ” and intervals for meditation and silent prayer, has become very popular in the Anglican Church, and the observance of the day is more marked than formerly among Nonconformist bodies, even in Scotland.

GOODMAN, GODFREY (1583-1656), bishop of Gloucester, was born at Ruthin, Denbighshire, and educated at Westminster and Cambridge. He took orders in 1603, and in 1606 obtained the living of Stapleford Abbots, Essex, which he held together with several other livings. He was canon of Windsor from 161 7 and dean of Rochester 1620-162 1,

and became bishop of Gloucester in 1625. P'rom this time his tendencies towards Roman Catholicism constantly got him into trouble. He preached an unsatisfactory sermon at court in 1626, and in 1628 incurred charges of introducing popery at Windsor. In 1633 he secured the see of Hereford by bribery, but Archbishop Laud persuaded the king to refuse his consent. In 1-638 he was said to be converted to Rome, and two years later he was im- prisoned for refusing to sign the new canons denouncing popery and affirming the divine right of kings. He afterwards signed and was released on bail, but next year the bishops who had signed were all imprisoned in the Tower, by order of parliament, on the charge of treason. After eighteen weeks' imprisonment Goodman was allowed to return to his diocese. About 1650 he settled in London, where he died a confessed Roman Catholic. His best known book is The Fall of Man (London, 1616).

GOODRICH, SAMUEL GRISWOLD (1793-1860), American author, better known under the pseudonym of-" Peter Parley," was born, the son of a Congregational minister, at Ridgefield, Connecticut, on the 19th of August 1793. He was largely self-educated, became an assistant in a country store at Danbury, Conn., in 1808, and at Hartford, Conn., in 181 1, and from 1816 to 1822 was a bookseller and publisher at Hartford. He visited Europe in 1823-1824, and in 1826 removed to Boston, where he continued in the publishing business, and from 1828 to 1842 he published an illustrated annual, the Token, to which he was a frequent contributor both in prose and verse. A selection from these contributions was published in 1841 under the title Sketches from a Student's Window. The Token also contained some of the earliest work of Nathaniel Hawthorne, N. P. Willis, Henry W. Longfellow and Lydia Maria Child. In 1841 he established Merry's Museum, which he continued to edit till 1854. In 1827 he began, under the name of " Peter Parley," his series of books for the young, which embraced geography, biography, history, science and miscellaneous tales. Of these he was the sole author of only a few, but in 1857 he wrote that he was "the author and editor of about 170 volumes," and that about seven millions had been sold. In 1857 he published Recollections of a Lifetime, which contains a list both of the works of which he was the author or editor and of the spurious works published under his name. By his writings and publica- tions he amassed a large fortune. He was chosen a member of the Massachusetts House of Representatives in 1836, and of the state Senate in 1837, his competitor in the last election being Alexander H. Everett, and in 1851-1853 he was consul at Paris, where he remained till 1855, taking advantage of his stay to have several of his works

translated into French. After his return to America-, he published, in 1859, Illustrated History of the Animal Kingdom. He died, in New York, on the 9th of May i860.

His brother, Charles Augustus Goodrich (1790-1862), a Congregational clergyman, published various ephemeral books, and helped to compile some of the ” Peter Parley ” series.

GOODRICH, or Goodricke, THOMAS (d. 1554), English ecclesiastic, was a son of Edward Goodrich of East Kirkby, Lincolnshire, and was educated at Corpus Christi College, Cambridge, afterwards becoming a fellow of Jesus College in the same university. He was among the divines consulted about the legality of Henry VIII. ‘s marriage with Catherine of Aragon, became one of the royal chaplains about 1530, and was conse- crated bishop of Ely in 1 534. He was favourable to the Reforma- tion, helped in 1537 to draw up the Institution of a Christian Man (known as the Bishops’ Book), and translated the Gospel of St John for the revised New Testament. On the accession of Edward VI. in 1547 the bishop was made a privy councillor, and took a conspicuous part in public affairs during the reign. ” A busy secular spirited man,” as Burnet calls him, he was equally opposed to the zealots of the ” old ” and the ” new religion.” He assisted to compile the First Prayer Book of Edward VI., was one of the commissioners for the trial of Bishop Gardiner, and in January 1551-1552 succeeded Rich as lord high chancellor. This office he continued to hold during the nine days’ reign of ” Queen Jane ” (Lady Jane Grey); but he con- tinued to make his peace with Queen Mary, conformed to the restored religion, and, though deprived of the chancellorship, was allowed to keep his bishopric until his death on the 10th of May 1554.

See the Diet. Nat. Biog., where further authorities are cited.

GOODSIR, JOHN (1814-1867), Scottish anatomist, born at Anstruther, Fife, on the 20th of March 1814, was the son of Dr John Goodsir, and grandson of Dr John Goodsir of Largo. He was educated at the burgh and grammar-schools of his native place and at the university of St Andrews. In 1830 he was apprenticed to a surgeon-dentist in Edinburgh, where he studied anatomy under Robert Knox, and in 1835 he joined his father in practice at Anstruther. Three years later he communicated to the British Association a paper on the pulps and sacs of the human teeth, his researches on the whole process of dentition

being at this time distinguished by their completeness; and about the same date, on the nomination of Edward Forbes, he was elected to the famous coterie called the ” Universal Brother- hood of the Friends of Truth,” which comprised artists, scholars, naturalists and others, whose relationship became a potent influence in science. With Forbes he worked at marine zoology, but human anatomy, pathology and morphology formed his chief study. In 1840 he moved to Edinburgh, where in the following year he was appointed conservator of the museum of the College of Surgeons, in succession to William Macgillivray. Much of his reputation rested on his knowledge of the anatomy of tissues. In his lectures in the theatre of the college in 1842-1843 he evidenced the largeness of his observation of cell-life, both physiologically and pathologically, insisting on the importance of the cell as a centre of nutrition, and pointing out that the organism is subdivided into a number of departments. R. Virchow recognized his indebtedness to these discoveries by dedicating his Cellular Pathologie to Goodsir, as ” one of the earliest and most acute observers of cell-life.” In 1843 Goodsir obtained the post of curator in the university of Edinburgh; the following year he was appointed demonstrator of anatomy, and in 1845 curator of the entire museum. A year later he was elected to the chair of anatomy in the university, and devoted all his energies to anatomical research and teaching.

Human myology was his strong point; no one had laboured harder at the dissecting-table; and he strongly emphasized the necessity of practice as a means of research. He believed that anatomy, physiology and pathology could never be properly advanced without daily consideration and treatment of disease. In 1848 he became a fellow of the Royal College of Surgeons, and in the same year he joined the Highland and Agricultural Society, acting as chairman of the veterinary department, and advising on strictly agricultural matters. In 1847 he delivered a series of systematic lectures on the comparative anatomy of the invertebrata; and, about this period, as member of an aesthetic club, he wrote papers on the natural principles of beauty, the aesthetics of the ugly, of smell, the approbation or disapprobation of sounds, &c. Owing to the failing health of Professor Robert Jameson, Goodsir was induced to deliver the course of lectures on natural history during the summer of 1853.

The lectures were long remembered for their brilliancy, but the infinite amount of thought and exertion which they cost broke down the health of the lecturer. Goodsir, nevertheless, persevered in his labours, writing in 1855 on organic electricity, in 1856 on

morphological subjects, and afterwards on the structure of organized forms. His speculations in the latter domain gave birth to his theory of a triangle as the mathematical figure upon which nature had built up both the organic and inorganic worlds, andhehoped to complete this triangle theory of formation and law as the greatest of his works. In his lectures on the skull .and brain he held the doctrine that symmetry of brain had more to do with the higher faculties than bulk or form. He died at Wardie, near Edinburgh, on the 6th of March 1867, in the same cottage in which his friend Edward Forbes died. His anatomical lectures were remarkable for their solid basis of fact; and no one in Britain took so wide a field for survey or marshalled so many facts for anatomical tabulation and synthesis.

See Anatomical Memoirs of John Goodsir, F.R.S., edited by W. Turner, with Memoir by II. Lonsdale (2 vols., Edinburgh, 1868), in which Goodsir's lectures, addresses and writings are epitomized ; Proc. Roy. Soc. vol. iv. (1868) ; Trans. Bot. Soc. Edin. vol. ix. (1868).

GOODWILL, in the law of property, a term of somewhat vague significance. It has been defined as every advantage which has been acquired in carrying on a business, whether connected with the premises in which the business has been carried on, or with the name of the firm by whom it has been conducted {Churton v. Douglas, 1859, Johns, 174). Goodwill may be either professional or trade. Professional goodwill usually takes the form of the recommendation by a retiring professional man, doctor, solicitor, &c, to his clients of the suc- cessor or purchaser coupled generally with an undertaking not to compete with him. Trade goodwill varies with the nature of

the business with which it is connected, but there are two rights which, whatever the nature of the business may be, are invariably associated with it, viz. the right of the purchaser to represent himself as the owner of the business, and the right to restrain competition. For the purposes of the Stamp Act, the goodwill of a business is property, and the proper duty must be paid on the conveyance of such. (See also Partnership; Patents.)

GOODWIN, JOHN (c. 1594-1665), English Nonconformist divine, was born in Norfolk and educated at Queens' College, Cambridge, where he was elected fellow in 1617. He was vicar of St Stephen's, Coleman Street, London, from 1633 to 1645, when he was ejected by parliament for his attacks on Presbyterian- ism, especially in his Qeofxaxio. (1644). He thereupon established an independent congregation, and put his literary gifts at Oliver Cromwell's service. In 1648 he justified the proceedings of the army against the parliament

(” Pride’s Purge “) in a pamphlet Might and Right Well Met, and in 1649 defended the proceedings against Charles I. (to whom he had offered spiritual advice) in ‘T /3piaro5U

Life by T. Jackson (London, 1839).

GOODWIN, NATHANIEL CARL (1857-), American actor, was born in Boston on the 25th of July 1857. While clerk in a large shop he studied for the stage, and made his first appearance in 1873 in Boston in Stuart Robson’s company as the newsboy in Joseph Bradford’s Law. He made an immediate success by his imitations of popular actors. A hit in the burlesque Black-eyed Susan led to his taking part in Rice and Goodwin’s Evangeline company. It was at this time that he married Eliza Weathersby (d. 1887), an English actress with whom he played in B. E. Woollf’s Hobbies. It was not until 1889, however, that Nat Goodwin’s talent as a comedian of the ” legitimate ” type began to be recognized. From that time he appeared in a number of plays designed to display his drily humorous method, such as Brander Matthews’ and George H. Jessop’s A Gold Mine, Henry Guy Carleton’s A Gilded Fool and Ambition, Clyde Fitch’s Nathan Hale, H. V. Esmond’s When we were Twenty-one, , &c. Till 1903 he was associated in his performances with his third wife, the actress Maxine Elliott (b. 1873), whom he married in 1898; this marriage was dissolved in 1908.

GOODWIN, THOMAS (160C-1680), English Nonconformist divine, was born at Rollesby, Norfolk, on the 5th of October 1600, and was educated at Christ’s College, Cambridge, where in 1616 he graduated B.A. In 1619 he removed to Catharine Hall, where in 1620 he was elected fellow. In 1625 he was licensed a preacher of the university; and three years afterwards he became lecturer of Trinity Church, to the vicarage of which he was presented by the king in 1632. Worried by his bishop, who was a zealous adherent of Laud, he resigned all his preferments and left the university in 1634. He lived for some time in London, where in 1638 he married the daughter of an alderman ; but in the following year he withdrew to Holland, and for some time was pastor of a small congregation of English merchants and refugees atArnheim. Returning to London soon after Laud’simpeachment by the Long Parliament, he ministered for some years to the

Independent congregation meeting at Paved Alley Church, Lime

Street, in the parish of St Dunstan's-in-the-East, and rapidly rose to considerable eminence as a preacher; in 1643 ne was chosen a member of the Westminster Assembly, and at once identified himself with the Congregational party, generally referred to in contemporary documents as " the dissenting brethren." He frequently preached by appointment before the Commons, and in January 1650 his talents and learning were rewarded by the House with the presidentship of Magdalen College, Oxford, a post which he held until the Restoration. He rose into high favour with the protector, and was one of his intimate advisers, attending him on his death-bed. He was also a commissioner for the inventory of the Westminster Assembly, 1650, and for the approbation of preachers, 1653, and together with John Owen (q.v.) drew up an amended Westminster Confession in 1658. From 1660 until his death on the 23rd of February 1680 he lived in London, and devoted himself exclusively to theological study and to the pastoral charge of the Fetter Lane Independent Church.

The works published by Goodwin during his lifetime consist, chiefly of sermons printed by order of the House of Commons; but he was also associated with Philip Nye and others in the preparation of the Apologeticall Narration (1643). His collected writings, which include expositions of the Epistle to the Ephesians and of the Apocalypse, were published in five folio volumes between 1 68 1 and 1704, and were reprinted in twelve 8vo volumes (Edin., 1861-1866). Characterized by abundant yet one-sided reading, remarkable at once for the depth and for the narrowness of theirobservation and spiritual experience, often admirably thorough in their workmanship, yet in style intolerably prolix — they fairly exemplify both the merits and the defects of the special school of religious thought to which they belong. Calamy's estimate of Goodwin's qualities may be quoted as both friendly and just. " He was a considerable scholar and an eminent divine, and had a very happy faculty in descanting upon Scripture so as to bring forth surprising remarks, which yet generally tended to illustration." A memoir, derived from his own papers, by his son (Thomas Goodwin, "the younger," l650?i7l6?, Inde pendent minister at London and Pinner, and author of the History of the Reign of Henry- V.) is prefixed to the fifth volume of his collected works; as a "patriarch and Atlas of Independency" he is also noticed by Anthony Wood in the Atkenae Oxonienses. An amusing sketch, from Addison's point of view, of the austere and somewhat fanatical president of Magdalen is preserved in No. 494 of the Spectator.

GOODWIN, WILLIAM WATSON (1831-), American classical scholar, was born in Concord, Massachusetts, on the oth of May 1831. He graduated at Harvard in 1851, studied in Germany, was tutor in Greek

at Harvard in 1856-1860, and Eliot professor of Greek there from i860 until his resignation in 1901. He became an overseer of Harvard in 1903. In 1882- 1883 he was the first director of the American School for Classical Studies at Athens. Goodwin edited the Panegyricus of Isocrates (1864) and Demosthenes On The Crown (1901); and assisted in preparing the seventh edition of Liddell and Scott's Greek- English Lexicon. He revised an English version by several writers of Plutarch's Morals (5 vols., 1871; 6th ed., 1889), and published the Greek text with literal English version of Aeschylus' Agamemnon (1906) for the Harvard production of that play in June 1906. As a teacher he did much to raise the tone of classical reading from that of a mechanical exercise to literary study. But his most important work was his Syntax of the Moods and Tenses of the Greek Verb (i860), of which the seventh revised edition appeared in 1877 and another (enlarged) in 1890. This was " based in part on Madvig and Kriiger," but, besides making accessible to American students the works of these continental grammarians, it presented original matter, including a " radical innovation in the classification of conditional sentences," notably the " distinction between particular and general suppositions." Goodwin's Greek Grammar (elementary edition, 1870;. enlarged 1879; revised and enlarged 1892) gradually superseded in most American schools the Grammar of Hadley and Allen. Both the ,Moods and Tenses and the Grammar in later editions are largely dependent on the theories of Gildersleeve for additions and changes. Goodwin also wrote a few elaborate syntactical studies, to be found in Harvard Studies in Classical Philology, the twelfth volume of which was dedicated to him upon the completion of fifty years as an alumnus of Harvard and forty-one years as Eliot professor.

GOODWIN SANDS, a dangerous line of shoals at the entrance to the Strait of Dover from the North Sea, about 6 m. from the Kent coast of England, from which they are separated by the anchorage of the Downs. For this they form a shelter. They are partly exposed at low water, but the sands are shifting, and in spite of lights and bell-buoys the Goodwins are frequently the scene of wrecks, while attempts to erect a lighthouse or beacon have failed. Tradition finds in the Goodwins the remnant of an island called Lomea, which belonged to Earl God wine in the first half of the nth century, and was afterwards submerged, when the funds devoted to its protection were diverted to build the church steeple at Tenterden {q.v.). Four lightships mark the limits of the sands, and also signal by rockets to the lifeboat stations on the coast when any vessel is in distress on the sands. Perhaps the most terrible catastrophe recorded here was the wreck of thirteen ships of war during a great storm in November

1703.

GOODWOOD, a mansion in the parish of Boxgrove, in the Chichester parliamentary division of Sussex, England, 4 m. N.E. of Chichester. It was built from designs of Sir William Chambers with additions by Wyatt, after the purchase of the property by the first duke of Richmond in 1720. The park is in a hilly district, and is enriched with magnificent trees of many varieties, including some huge cedars. In it is a building con- taining a Roman slab recording the construction of a temple to Minerva and Neptune at Chichester. There is mention of a British tributary prince named Cogidubnus, who perhaps served also as a Roman official. A reference to early Christianity in Britain has been erroneously read into this inscription. On the racecourse a famous annual meeting, dating from 1802, is held in July. The parish church of SS. Mary and Blaize, Boxgrove, is almost entirely a rich specimen of Early English work.

GOODYEAR, CHARLES (1800-1860), American inventor, was born at New Haven, Connecticut, on the 29th of December 1800, the son of Amasa Goodyear, an inventor (especially of farming implements) and a pioneer in the manufacture of hard- ware in America. The family removed to Naugatuck, Conn., when Charles was a boy; he worked in his father's button factory and studied at home until 1816, when he apprenticed himself to a firm of hardware merchants in Philadelphia. In 182 1 he returned to Connecticut and entered into a partnership with his father at Naugatuck, which continued till 1830, when it was terminated by business reverses. Already he was interested in an attempt to discover a method of treatment by which india- rubber

could be made into merchandizable articles that would stand extremes of heat and cofd. To the solution of this problem the next ten years of his life were devoted. With ceaseless energy and unwavering faith in the successful outcome of his labours, in the face of repeated failures and hampered by poverty, which several times led him to a debtor's prison, he persevered in his endeavours. For a time he seemed to have succeeded with a treatment (or " cure ") of the rubber with aquafortis. In 1836 he secured a contract for the manufacture by this process of mail bags for the U.S. government, but the rubber fabric was useless at high temperatures. In 1837 he met and worked with Nathaniel Hayward (1808-1865), who had been an employee of a rubber factory in Roxbury and had made experiments with sulphur mixed with rubber. Goodyear bought from Hayward the right to use this imperfect process. In 1839, by dropping on a hot stove some indiarubber mixed with sulphur, he discovered accidentally the process for the vulcanization of rubber. Two years more passed before he could find any one who had faith enough in his discovery to invest money in it. At last, in 1844, by which time he had perfected his process, his first patent was granted, and in the subsequent years more than sixty patents were granted to him for the application of his original process to various uses. Numerous infringements had to be fought in the courts, the decisive victory coming in 1852 in the case of Goodyear v. Day, in which his rights were defended by Daniel Webster and opposed by Rufus Choate. In 1852 he went to England, where articles made under his patents had been displayed at the International Exhibition of 1851, but he

was unable to establish factories there. In France a company for the manufacture of vulcanized rubber by his process failed, and in December 1855 he was arrested and imprisoned for debt in Paris. Owing to the expense of the litigation in which he was engaged and to bad business management, he profited little from his inventions. He died in New York City on the 1st of July i860. He wrote an account of his discovery entitled Gum- Elastic and its Varieties (2 vols., New Haven, 1853-1855).

See also B. K. Peirce, Trials of an Inventor, Life and Discoveries of Charles Goodyear (New York, 1866); James Parton, Famous Americans of Recent Times (Boston, 1867); and Herbert L. Terry, India Rubber and its Manufacture (New York, 1907).

GOOGE, BARNABE (1540-1594), English poet, son of Robert Googe, recorder of Lincoln, was born on the nth of June 1540 at Alvingham, Lincolnshire. He studied at Christ's College, Cambridge, and at New College, Oxford, but does not seem to have taken a degree at either university. He afterwards removed to Staple's Inn, and was attached to the household of his kinsman, Sir William Cecil. In 1563 he became a gentleman pensioner to Queen Elizabeth. He was absent in Spain when his poems were sent to the printer by a friend, L. Blundeston. Googe then gave his consent, and they appeared in 1563 as Eglogs, Epytaphes, and Soneltes. There is extant a curious correspondence on the subject of his marriage with Mary Darrell, whose father refused Googe 's suit on the ground that she was bound by a previous contract. The matter was decided by the intervention of Sir William Cecil with Archbishop Parker, and the marriage took place in 1564 or 1565. Googe was provost-marshal of the court of Connaught, and some twenty letters of his in this capacity are preserved in the record office. He died in February 1594. He was an ardent Protestant, and his poetry is coloured by his religious and political views. In the third " Eglog," for instance, he laments the decay of the old nobility and the rise of a new aristocracy of wealth, and he gives an indignant account of the sufferings of his co-religionists under Mary. The other eclogues deal with the sorrows of earthly love, leading up to a dialogue between Corydon and Cornix, in which the heavenly love is extolled. The volume includes epitaphs on Nicholas Grimald, John Bale and on Thomas Phaer, whose translation of Virgil Googe is uncritical enough to prefer to the versions of Surrey and of Gavin Douglas. A much more charming pastoral than any of those contained in this volume, " Phyllida was a fayer maid " (Totlel's Miscellany) has been ascribed to Barnabe Googe. He was one of the earljest English pastoral poets, and the first who was inspired by Spanish romance, being consider- ably indebted to the Diana Enamomda of Montemayor.

His other works include a translation from Marcellus Palingenius (said to be an anagram for Pietro Angelo Manzolli) of a satirical Latin poem, Zodiacus vitae (Venice, 1531?), in twelve books, under the title of The Zodyakeof Life (1560); The Popish Kingdome, or reign of Antichrist (1570), translated from Thomas Kirchmayer or Naogeorgus; The Spiritual Husbandrie from the same author, printed with the last; Foure Bookes of Husbandrie (1577), collected by Conradus Heresbachius; and The Proverbes of . . . Lopes de Mendoza (1579).

GOOLE, a market town and port in the Osgoldcross parlia- mentary division of the West Riding of Yorkshire, England, at the confluence of the Don and the Ouse, 24 m. W. by S. from Hull, served by the North Eastern, Lancashire & Yorkshire, Great Central and Asholme joint

railways. Pop. of urban district (1901) 16,576. The town owes its existence to the construction of the Knottingley canal in 1826 by the Aire and Calder Navigation Company, after which, in 1829, Goole was made a bonding port. Previously it had been an obscure hamlet. The port was administratively combined with that of Hull in 1885. It is 47 m. from the North Sea (mouth of the Humber), and a wide system of inland navigation opens from it. There are eight docks supplied with timber ponds, quays, warehouses and other accommodation. The depth of water is 21 or 22 ft. at high water, spring tides. Chief exports are coal, stone, woollen goods and machinery; imports, butter, fruit, indigo, logwood, timber and wool. Industries include the manufacture of alum, sugar, rope and agricultural instruments, and iron-founding. Ship- building is also carried on, and there is a large dry dock and a

patent slip for repairing vessels. Passenger steamship services are worked in connexion with the Lancashire & Yorkshire railway to Amsterdam, Antwerp, Bruges, Copenhagen, Rotterdam and other north European ports. The handsome church of St John the Evangelist, with a lofty tower and spire, dates from 1844.

GOOSE (a common Teut. word, 0. Eng. g6s, pi. ges, Ger. Cans, 0. Norse gas, from Aryan root, ghans, whence Sans, hansd, Lat. anser (for hanser), Gr. xh v > & c -)> the general English name for a considerable number of birds, belonging to the family Anatidae of modern ornithologists, which are mostly larger than ducks and less than swans. Technically the word goose is reserved for the female, the male being called gander (A.-S. gandra).

The most important species of goose, and the type of the genus Anser, is undoubtedly that which is the origin of the well-known domestic race (see Poultry), the Anser ferus or A . cinereus of most naturalists, commonly called in English the grey or grey lag 1 goose, a bird of exceedingly wide range in the Old World, apparently breeding where suitable localities are to be found in most European countries from Lapland to Spain and Bulgaria. Eastwards it extends to China, but does not seem to be known in Japan. It is the only species indigenous to the British Islands, and in former days bred abundantly in the English Fen-country, where the young were caught in large numbers and kept in a more or less reclaimed condition with the vast flocks of tame-bred geese that at one time formed so valuable a property to the dwellers in and around the Fens. It is im- possible to determine when the wild grey lag goose ceased from breeding in England, but it certainly did so towards the end of the 18th century, for Daniell mentions (Rural Sports, iii. 242) his having obtained two broods in one season. In Scotland this goose continues to breed sparingly in several parts of the

High- lands and in certain of the Hebrides, the nests being generally placed in long heather, and the eggs seldom exceeding five or six in number. It is most likely the birds reared here that are from time to time obtained in England, for at the present day the grey lag goose, though once so numerous, is, and for many years has been, the rarest species of those that habitually resort to the British Islands. The domestication of this species, as Darwin remarks (Animals and Plants under Domestication, i. 287), is of very ancient date, and yet scarcely any other animal that has been tamed for so long a period, and bred so largely in captivity, has varied so little. It has increased greatly in size and fecundity, but almost the only change in plumage is that tame geese commonly lose the browner and darker tints of the wild bird, and are more or less, marked with white — being often indeed wholly of that colour. 2 The most generally recognized breeds of domestic geese are those to which the distinctive names of Emden and Toulouse are applied; but a singular breed, said to have come from Sevastopol, was introduced into western Europe about the year 1856. In this the upper plumage is elongated, curled and spirally twisted, having their shaft transparent, and so thin that it often splits into fine filaments, which, remaining free for an inch or more, often coalesce again; 3 while the quills are aborted, so that the birds cannot fly.

1 The meaning and derivation of this word lag had long been a puzzle until Skeat suggested (Ibis, 1870, p. 301) that it signified late, last, or slow, as in laggard, a loiterer, lagman, the last man, lagteeth, the posterior molar or ” wisdom ” teeth (as the last to appear), and lagclock, a clock that is behind time. Thus the grey lag goose is the grey goose which in England when the name was given was not migratory but lagged behind the other wild species at the season when they betook themselves to their northern breeding- quarters. In connexion with this word, however, must be noticed the curious fact mentioned by Rowley (Orn. Miscell., iii. 213), that the flocks of tame geese in Lincolnshire are urged on by their drivers with the cry of ” lag’em, lag’em.”

2 From the times of the Romans white geese have been held in great estimation, and hence, doubtless, they have been preferred as breeding stock, but the practice of plucking geese alive, continued for so many centuries, has not improbably also helped to perpetuate this variation, for it is well known to many bird-keepers that a white feather is often produced in place of one of the natural colour that has been pulled out.

3 In some English counties, especially Norfolk and Lincoln, it was no uncommon thing formerly for a man to keep a stock of a thousand

geese, each of which might be reckoned to rear on an

The other British species of typical geese are the bean-goose (A. segetum), the pink-footed {A. brachyrhynchus) and the white- fronted (.4. albifrons). On the continent of Europe, but not yet recognized as occurring in Britain, is a small form of the last (A. ery thro pus) which is known to breed in Lapland. All these, for the sake of discrimination, may be divided into two groups — (i) those having the “nail ” at the tip of the bill white, or of a very pale flesh colour, and (2) those in which this “nail” is black. To the former belong the grey lag goose, as well as A. albifrons and A. erythropus, and to the latter the other two. A. albifrons and A. erythropus, which differ little but in size, — the last being not much bigger than a mallard {Anas boschas), — may be readily distinguished from the grey lag goose by their bright orange legs and their mouse-coloured upper wing-coverts, to say nothing of their very conspicuous white face and the broad black bars which cross the belly, though the last two characters are occasionally observable to some extent in the grey lag goose, which has the bill and legs flesh-coloured, and the upper wing-coverts of a bluish-grey. Of the second group, with the black ” nail,” A. segetum has the bill long, black at the base and orange in the middle; the feet are also orange, and the upper wing-coverts mouse-coloured, as in A. albifrons and A. erythropus, while A. brachyrhynchus has the bill short, bright pink in the middle, and the feet also pink, the upper wing-coverts being nearly of the same bluish-grey as in the grey lag goose. Eastern Asia possesses in A. grandis a third species of this group, which chiefly differs from A . segetum in its larger size. In North America there is only one species of typical goose, and that belongs to the white-” nailed ” group. It very nearly resembles A . albifrons, but is larger, and has been described as distinct under the name of A . gambeli. Central Asia and India possess in the bar-headed goose (A. indicus) a bird easily distinguished from any of the foregoing by the character implied by its English name; but it is. certainly somewhat abnormal, and, indeed, under the name of Eulabia, has been separated from the genus Anser, which has no other member indigenous to the Indian Region, nor any at all to the Ethiopian, Australian or Neotropical Regions.

America possesses by far the greatest wealth of Anserine forms. Beside others, presently to be mentioned, its northern portions are the home of all the species of snow-geese belonging to the genus Chen. The first

of these is C. hyperboreus, the snow-goose proper, a bird of large size, and when adult of a pure white, except the primaries, which are black. This has long been deemed a visitor to the Old World, and sometimes in considerable numbers, but the later discovery of a smaller form, C. albatus, scarcely differing except in size, throws some doubt on the older records, especially since examples which have been obtained in the British Islands undoubtedly belong to this lesser bird, and it would be satisfactory to have the occurrence in the Old World of the true C. hyperboreus placed on a surer footing. So nearly allied to the species last named as to have been often confounded with it, is the blue-winged goose, C. coerulescens, which is said never to attain a snowy plumage. Then we have a very small species, long ago described as distinct by Samuel Hearne, the Arctic traveller, but until 1861 discredited by ornithologists. Its distinctness has now been fully recognized, and it has received, somewhat unjustly, the name of C. rossi. Its face is adorned with numerous papillae, whence it has been removed by Elliot to a separate genus, Exanthemops, and for the same reason it has long been known to the European residents in the fur countries as the ” horned wavey ” — the last word being a rendering of a native name, Wawa, which signifies goose. Finally, average seven goslings. The flocks were regularly taken to pasture and water, just as sheep are, and the man who tended them was called the gooseherd, corrupted into gozzerd. The birds were plucked five times in the year, and in autumn the flocks were driven to London or other large markets. They travelled at the rate of about a mile an hour, and would get over nearly 10 m. in the day. For further particulars the reader may be referred to Pennant’s British Zoology; Montagu’s Ornithological Dictionary; Latham’s General History of Birds; and Rowley’s Ornithological Miscellany (iii. 206-215), where some account also may be found of the goose- fatting at Strassburg.

there appears to belong to this section, though it has been frequently referred to another (Chloephaga), and has also been made the type of a distinct genus (Philacte), the beautiful emperor goose, P. canagica, which is almost peculiar to the Aleutian Islands, though straying to the continent in winter, and may be recognized by the white edging of its remiges.

The southern portions of the New World are inhabited by about half a dozen species of geese not nearly akin to the fore- going, and separated as the genus Chloephaga. The most noticeable of them are the rock or kelp goose, C. antarctica, and the upland goose, C. magellanica. In both of these the sexes are totally unlike in colour, but in others a greater similarity obtains. 1 Formerly erroneously associated with the birds of this group comes one which belongs to the

northern hemisphere, and is common to the Old World as well as the New. It contains the geese which have received the common names of bernacles or brents, 2 and the scientific appellations of Bernicla and Branta — for the use of either of which much may be said by nomenclaturists. All the species of this section are distinguished by their general dark sooty colour, relieved in some by white of greater or less purity, and by way of distinction from the members of the f genus Anser, which are known as grey geese, are frequently called by fowlers black geese. Of these, the best known both in Europe and North America is the brent-goose— the Anas bernicla of Linnaeus, and the B. torquata of many modern writers — a truly marine bird, seldom (in Europe at least) quitting salt-water, and coming southwards in vast flocks towards autumn, frequenting bays and estuaries on the British coasts, where it lives chiefly on sea-grass (Zostera maritime). It is known to breed in Spitsbergen and in Greenland. A form which is by some ornithologists deemed a good species, and called by them B. nigricans, occurs chiefly on the Pacific coast of North America. In it the black of the neck, which in the common brent terminates just above the breast, extends over most of the lower parts. The true bernacle-goose, 3 the B. leucopsis of most authors, is but a casual visitor to North America, but is said to breed in Iceland, and occasionally in Norway. Its usual incunabula, however, still form one of the puzzles of the ornitho- logist, and the difficulty is not lessened by the fact that it will breed freely in semi-captivity, while the brent-goose will not. From the latter the bernacle-goose is easily distinguished by its larger size and white cheeks. Hutchins's goose (B. Hutchinsi) seems to be its true representative in the New World. In this the face is dark, but a white ■ crescentic or triangular patch extends from the throat on either side upwards behind the eye. Almost exactly similar in coloration to the last, but greatly superior in size, and possessing 18 rectrices, while all the fore- going have but 16, is the common wild goose of America, B. canadensis, which, for more than two centuries has been intro- duced into Europe, where it propagates so freely that it has been included by nearly all the ornithologists of this quarter of the globe as a member of its fauna. An allied form, by some deemed a species, is B. leucopareia, which ranges over the western part of North America, and, though having 18 rectrices, is distinguished by a white collar round the lower part of the neck. The most diverse species of this group of geese are the beautiful B. ruficollis, a native of north-eastern Asia, which occasionally strays to western Europe, and has been obtained more than once in Britain, and that which is peculiar to the Hawaian archipelago, B. sandvicensis.

The largest living goose is that called the Chinese, Guinea or swan-goose, Cygnopsis cygnoides, and this is the stock whence the domestic geese of several eastern countries have sprung. It may often be seen in English parks, and it is found to cross readily with the common tame goose, the offspring being fertile,

1 See Sclater and Salvin, Proc. Zool. Society (1876), pp. 361-369.

2 The etymology of these two words is exceedingly obscure. The ordinary spelling bernicle seems to be wrong, if we may judge from the analogy of the French Bernache. In both words the e should be sounded as a.

3 The old fable, perhaps still believed by the uneducated in some parts of the world, was that bernacle-geese were produced from the barnacles (Lepadidae) that grow on timber exposed to salt-water.

and Blyth has said that these crosses are very abundant in India. The true home of the species is in eastern Siberia or Mongolia. It is distinguished by its long smooth neck, marked dorsally by a chocolate streak. The reclaimed form is usually distin- guished by the knob at the base of the bill, but the evidence of many observers shows that this is not found in the wild race. Of this bird there is a perfectly white breed.

We have next to mention a very curious form, Cereopsis novae-hollandiae, which is peculiar to Australia, and is a more terrestrial type of goose than any other now existing. Its short, decurved bill and green cere give it a very peculiar expression, and its almost uniform grey plumage, bearing rounded black spots, is also remarkable. It bears captivity well, breeding in confinement, but is now seldom seen. It appears to have been formerly very abundant in many parts of Australia, from which it has of late been exterminated. Some of its peculiarities seem to have been still more exaggerated in a bird that is wholly extinct, the Cnemiornis calcitrans of New Zealand, the remains of which were described in full by Sir R. Owen in 1873 (Trans. Zool. Society, ix. 253). Among the first portions of this singular bird that were found were the tibiae, presenting an extraordinary development of the patella, which, united with the shank-bone, gave rise to the generic name applied. For some time the affinity of the owner of this wonderful . structure was in doubt, but all hesitation was dispelled by

the discovery of a nearly perfect skeleton, now in the British Museum, which proved the bird to be a goose, of great size, and unable, from the shortness of its wings, to fly. In correlation with this loss of power may also be noted the dwindling of the keel of the sternum. Generally, however, its osteological characters point to an affinity to Cere- opsis, as was noticed by Dr Hector (Trans. New Zeal. Institute, vi. 76-84), who first determined its Anserine character.

Birds of the genera Chenalopex (the Egyptian and Orinoco geese), Plectropterus, Sarcidiornis, Chlamydochen and some others, are commonly called geese. It seems uncertain whether they should be grouped with the Anserinae. The males of all, like those of the above-mentioned genus Chloephaga, appear to have that curious enlargement at the junction of the bronchial tubes and the trachea which is so characteristic of the ducks or Anatinae. (A. N.)

GOOSE (Game of), an ancient French game, said to have been derived from the Greeks, very popular at the close of the middle ages. It was played on a piece of card-board upon which was drawn a fantastic scroll, called the jardin de I'Oie (goose-garden) , divided into 63 spaces marked with certain emblems, such as dice, an inn, a bridge, a labyrinth, &c. The emblem inscribed on 1 and 63, as well as every ninth space between, was a goose. The object was to land one's counter in number 63, the number of spaces moved through being determined by throwing two dice. The counter was advanced or retired according to the space on which it was placed. For instance if it rested on the inn it must remain there until each adversary, of which there might be several, had played twice; if it rested on the death's head the player must begin over again; if it went beyond 63 it must be retired a certain number of spaces. The game was usually played for a stake, and special fines were exacted for resting on certain spaces. At the end of the 18th century a variation of the game was called the jeu de la Revolution Franqaise.

GOOSEBERRY, Ribes Grossularia, a well-known fruit-bush of northern and central Europe, placed in the same genus of the natural order to which it gives name (Ribesiaceae) as the closely allied currants. It forms a distinct section Grossularia, the members of which differ from the true currents chiefly in their spinous stems, and in their flowers growing on short foot- stalks, solitary, or two or three together, instead of in racemes.

The wild gooseberry is a small, straggling bush, nearly re- sembling the cultivated plant, — the branches being thickly set with sharp spines, standing out singly or in diverging tufts of two or three from

the bases of the short spurs or lateral leaf shoots, on which the bell-shaped flowers are produced, singly or in pairs, from the groups of rounded, deeply-crenated 3- or 5- lobed leaves. The fruit is smaller than in the garden kinds,

but is often of good flavour; it is generally hairy, but in one variety smooth, constituting the R. Uva-crispa of writers; the colour is usually green, but plants are occasionally met with having deep purple berries. The gooseberry is indigenous in Europe and western Asia, growing naturally in alpine thickets and rocky woods in the lower country, from France eastward, perhaps as far as the Himalaya. In Britain it is often found in copses and hedgerows and about old ruins, but has been so long a plant of cultivation that it is difficult to decide upon its claim to a place in the native flora of the island. Common as it is now on some of the lower slopes of the Alps of Piedmont and Savoy, it is uncertain whether the Romans were acquainted with the gooseberry, though it may possibly be alluded to in a vague passage of Pliny: the hot summers of Italy, in ancient times as at present, would be unfavourable to its cultivation. Abundant in Germany and France, it does not appear to have been much grown there in the middle ages, though the wild fruit was held in some esteem medicinally for the cooling properties of its acid juice in fevers; while the old English name, Fea-berry, still surviving in some provincial dialects, indicates that it was similarly valued in Britain, where it was planted in gardens at a comparatively early period. William Turner describes the gooseberry in his Herball, written about the middle of the 16th century, and a few years later it is mentioned in one of Thomas Tusser's quaint rhymes as an ordinary object of garden culture. Improved varieties were probably first raised by the skilful gardeners of Holland, whose name for the fruit, Kruisbezie, may have been easily corrupted into £he present English vernacular word. 1 Towards the end of the 18th century the gooseberry became. a favourite object of cottage-horticulture, especially in Lancashire, where the working cotton-spinners have raised numerous varieties from seed, their efforts having been chiefly directed to increasing the size of the fruit. Of the many hundred sorts enumerated in recent horticultural works, few perhaps equal in flavour some of the older denizens of the fruit-garden, such as the " old rough red " and " hairy amber." The climate of the British Islands seems peculiarly adapted to bring the goose-berry to perfection, and it may be grown successfully even in the most northern parts of Scotland; indeed, the flavour of the fruit is said to improve with increasing latitude. In Norway even, the bush flourishes in gardens on the west coast nearly up to the Arctic circle, and it is found wild as far north as 63°. The dry summers of the French and

German plains are less suited to it, though it is grown in some hilly districts with tolerable success. The gooseberry in the south of England will grow well in cool situations, and may be sometimes seen in gardens near London flourishing under the partial shade of apple trees; but in the north it needs full exposure to the sun to bring the fruit to perfection. It will succeed in almost any soil, but prefers a rich loam or black alluvium, and, though naturally a plant of rather dry places, will do well in moist land, if drained.

The varieties are most easily propagated by cuttings planted in the autumn, which root rapidly, and in a few years form good fruit-bearing bushes. Much difference of opinion prevails regarding the mode of pruning this valuable shrub ; it is probable that in different situations it may require varying treatment. The fruit being borne on the lateral spurs, and on the shoots of the last year, it is the usual practice to shorten the side branches in the winter, before the buds begin to expand; some reduce the longer leading shoots at the same time, while others prefer to nip off the ends of these in the summer while they are still

1 The first part of the word has been usually treated as an etymological corruption either of this Dutch word or the allied Ger. ■' Krausbeere, or of the earlier forms of the Fr. groseille. The New English Dictionary takes the obvious derivation from ” goose ” and “berry” as probable; “the grounds on which plants and fruits have received names associating them with animals are so commonly inexplicable, that the want of appropriateness in the meaning afford? no sufficient ground for assuming that the word is an etymologizin' corruption.” Skeat (Etym. Diet., 1898) connects the French, Dut. and German words, and finds the origin in the M.H.G. krus, curj' f crisped, applied here to the hairs on the fruit. The French was latinized as grossularia and confused with groseus, thick. ‘ °

succulent. When large fruit is desired, plenty of manure should be supplied to the roots, and the greater portion of the berries picked off while still small. If standards are desired, the goose- berry may be with advantage grafted or budded on stocks of some other species of Ribes, R. aureum, the ornamental golden currant of the flower garden, answering well for the purpose. The giant gooseberries of the Lancashire ” fanciers ” are obtained by the careful culture of varieties specially raised with this object, the growth being encouraged by

abundant manuring, and the removal of all but a very few berries from each plant. Single gooseberries of nearly 2 oz. in weight have been occasionally exhibited; but the produce of such fanciful horticulture is generally insipid. The bushes at times suffer much from the ravages of the caterpillars of the gooseberry or magpie moth, Abraxas grossulariata, which often strip the branches of leaves in the early summer, if not destroyed before the mischief is accomplished. The most effectual way of getting rid of this pretty but destructive insect is to look over each bush carefully, and pick off the larvae by hand; when larger they may be shaken off by striking the branches, but by that time the harm is generally done — the eggs are laid on the leaves of the previous season. Equally annoying in some years is the smaller larva of the V-moth, Halias vanaria, which often appears in great numbers, and is not so readily removed. The gooseberry is sometimes attacked by the grub of the gooseberry sawfly, Nematus ribesii, of which several broods appear in the course of the spring and summer, and are very destructive. The grubs bury themselves in the ground to pass into the pupal state; the first brood of flies, hatched just as the bushes are coming into leaf in the spring,, lay their eggs on the lower side of the leaves, where the small greenish larvae soon after emerge. For the destruction of the first broods it has been recommended to syringe the bushes with tar-water; perhaps a very weak solution of carbolic acid might prove more effective. The powdered root of white hellebore is said to destroy both this grub and the caterpillars of the gooseberry moth and V-moth; infusion of foxglove, and tobacco-water, are likewise tried by some growers. If the fallen leaves are carefully removed from the ground in the autumn and burnt, and the surface of the soil turned over with the fork or spade, most eggs and chrysalids will be destroyed.

The gooseberry was introduced into the United States by the early settlers, and in some parts of New England large quantities of the green fruit are produced and sold for culinary use in the towns; but the excessive heat of the American summer is not adapted for the healthy maturation of the berries, especially of the English varieties. Perhaps if some of these, or those raised in the country, could be crossed with one of the indigenous species, kinds might be obtained better fitted for American conditions of culture, although the gooseberry does not readily hybridize. The attacks of the American gooseberry mildew

have largely con- tributed to the failure of the crop in America.

Occasionally the gooseberry is at- tacked by the fungus till recently called A ecidium Grossulariae, which forms little cups with white torn

edges clus- tered together ˆon reddish spots on the leaves or fruits (fig. 1). It has recently been dis- covered that the spores contained in these cups will not reproduce the disease on the gooseberry, but infect species of Carex (sedges) on which they produce a fungus of a totally different appearance. This

Fig. 1. — A Fungal Disease of the Gooseberry

(Aecidium Grossulariae.)

I, Leaf showing patches of cluster-cups on surface; 2, Fruit, showing same; 3, Cluster- cups much enlarged.

stage in the life-history of the parasite gives its name to the whole fungus, so that it is now known as Puccinia Pringsheimiana. Both uredospores and teleutospores are formed on the sedge, and the latter live through the winter and produce the disease on the goose- berry in the succeeding year. In cases where the disease proves troublesome the sedges in the neighbourhood should be destroyed.

A much more pre- valent disease is that caused by Micro- sphaeria Grossulariae. This is a mildew grow- ing on the surface of the leaf and sending suckers into the epi- dermis. The white

mycelium gives the From George Massee's Tcxi-Booi 0) Plant Diseases, leaves Of the plant the by permission of Duckworth & Co.

appearance of having Fig. 2. — Gooseberry Mildew (Microsphaeria been whitewashed T r Grossulariae.)

(fig. 2). Numerous "Leaf attacked W the fungus; 2 v °. ' Fructification or perithecrum; the end of

White spores are pro- one f ; ts numerous appendages is shown duced in the summer more highly magnified in 3, 4, 5, spore which are able to ger- sacs (asci) from the perithecium, con- minate immediately, tainin 8 s P ores –

and later small blackish fruits (peritkecia) are produced that pass uninjured through the winter liberating the spores they contain in the spring, which infect the young developing leaves of the bush. In bad cases the plants are greatly in- jured but fre- quently little harm is done. Attacked plants should be sprayed with potassium sulphide.

An allied fun- gus, Sphaerotheca mors-uvae, of much greater vir- ulence, has re- cently appeared in England, causing the disease known

as “American gooseberry mil- dew ” (fig. 3 a). In the main the mode of attack is simi- lar to that of the last – mentioned, but not only are

trip Iphvps flt-

From the Journal of the Board of Agriculture (May 1907), tacked, but the by permission of the Dept. of Agriculture and Technical

tips of the young J™*™*” £or Ireland –

shoots and the F1G.3A. — American GooseberryMildew(5ˆ>/iaer- c ■ . 1 „ „ otheca mors-uvae). Plant with leaves and fruit

fruits become attacked by the ; fungus .

covered by the ‘

cobweb-like mycelium, the attack frequently resulting in the

death of the shoots and the destruction of the fruits. After a

time the mycelium becomes rusty brown and produces the winter form of the fungus. Through the winter the shoots are covered thickly with the brown mycelium and in the spring the spores contained in the perithecia germinate and start the infection anew, as in the case of the European mildew. This fungus has recently been the subject of legislation, and when it appears in a district strong repressive measures are called for. In bad cases the attacked bushes should be destroyed, while in milder attacks frequent spraying with potassium sulphide and the pruning off and immediate destruction by fire of all the young shoots showing the mildew should be resorted to.

The gooseberry, when ripe, yields a fine wine by the fermenta- tion of the juice with water and sugar, the resulting sparkling liquor retaining much of the flavour of the fruit. By similarly treating the juice of the green fruit, picked just before it ripens, an effervescing wine is produced, nearly resembling some kinds of champagne, and, when skilfully prepared, far superior to

Fig. 3b. — I, Fructification (perithecium) bursting, ascus containing spores protruding; 2, Ascus with spores more highly magnified.

much of the liquor sold under that name. Brandy has been made from

ripe gooseberries by distillation; by exposing the juice with sugar to the acetous fermentation a good vinegar may be obtained. The gooseberry, when perfectly ripe, contains a large quantity of sugar, most abundant in the red and amber varieties; in the former it amounts to from 6 to upwards of 8 %. The acidity of the fruit is chiefly due to malic acid.

Several other species of the sub-genus produce editjle fruit, though none have as yet been brought under economic culture. Among them may be noticed R. oxyacanthoides and R. Cynosbati, abundant in Canada and the northern parts of the United States, and R. gracile, common along the Alleghany range. The group is a widely distributed one in the north temperate zone, — one species is found in Europe extending to the Caucasus and North Africa (Atlas Mountains), five occur in Asia and nineteen in North America, the range extending southwards to Mexico and Guatemala.

GOOTY, a town and hill fortress in southern India, in the Anantapur district of Madras, 48 m. E. of Bellary. Pop. (1001) 9682. The town is surrounded by a circle of rocky hills, connected by a wall. On the highest of these stands the citadel, 2100 ft. above sea-level and 1000 ft. above the surrounding country. Here was the stronghold of Morari Rao Ghorpade, a famous Mahratta warrior and ally of the English, who was ultimately starved into surrender by Hayder Ali in 1775.

GOPHER (Testudo polyphemus), the only living representative on the North American continent of the genus Testudo of the family Testudinidae or land tortoises; it occurs in the south- eastern parts of the United States, from Florida in the south to the river Savannah in the north. Its carapace, which is oblong and remarkably compressed, measures from 12-18 in. in extreme length, the shields which cover it being grooved, and of a yellow- brown colour. It is characterized by the shape of the front lobe of the plastron, which is bent upwards and extends beyond the carapace. The gopher abounds chiefly in the forests, but occasionally visits the open plains, where it does great damage, especially to the potato crops, on which it feeds. It is a nocturnal animal, remaining concealed by day in its deep burrow, and coming forth at night to feed. The eggs, five in number, almost

round and ij in. in diameter, are laid in a separate cavity near the entrance. The flesh of the gopher or mungofa, as it is also called, is considered excellent eating.

The name ” gopher ” is more commonly applied to certain small rodent mammals, particularly the pocket-gopher.

GOPPINGEN, a town of Germany, in the kingdom of Wiirttem- berg, on the right bank of the Fils, 22 m. E.S.E. of Stuttgart on the railway to Friedrichshafen. Pop. (1905) 20,870. It possesses a castle built, partly with stones from the ruined castle of Hohen- staufen, by Duke Christopher of Wurttemberg in the 16th century and now used as public offices, two Evangelical churches, a Roman Catholic church, a synagogue, a classical school, and a modern school. The manufactures are considerable and include linen and woollen cloth, leather, glue, paper and toys. There are machine shops and tanneries in the town. Three m. N. of the town are the ruins of the castle of Hohenstaufen. Goppingen originally belonged to the house of Hohenstaufen, and in 1270 came into possession of the counts of Wurttemberg. It was surrounded by walls in 11 29, and was almost entirely rebuilt after a fire in 1782.

See Pfeiffer, Beschreibung und Gesckichte der Stadt Goppingen

(1885).

GORAKHPUR, a city, district and division of the United Provinces of British India. The city is situated on the left bank of the river Rapti. Pop. (1901) 64,148. It is believed to have been founded about 1400 a.d. It is the civil headquarters of the district and was formerly a military cantonment. It consists of a number of adjacent village sites, sometimes separated by cultivated land, and most of the inhabitants are agriculturists.

The District or Gorakhpur has an area of 4535 sq. m. It lies immediately south of the lower Himalayan slopes, but itself forms a portion of the great alluvial plain. Only a few sandhills break the monotony of its level surface, which is, however, inter- sected by numerous rivers studded with lakes and marshes. In the north and centre dense forests abound, and the whole country has a verdant appearance. The principal rivers are the Rapti, the Gogra, the Gandak and Little Gandak, the Kuana, the Rohin, the Ami and the Gunghi. Tigers are found in the north, and many other wild animals abound throughout the district. The lakes are well stocked with fish. The district is not subject to very intense heat, from which it is secured by its vicinity to the hills and the moisture of its soil. Dust-storms are rare, and cool breezes from the north, rushing down the gorges of the Himalayas, succeed each short interval of warm weather. The climate is, however, relaxing. The southern and eastern portions are as healthy as most parts of the province, but the tarai and forest- tracts are still subject to malaria.

Gautama Buddha, the founder of the religion bearing his name, was born, and died near the boundaries of the district. From the beginning of the 6th century the country was the scene of a con- tinuous struggle between the Bhars and their Aryan antagonists, the Rathors. About 900 the Domhatars or military Brahmans appeared, and expelled the Rathors from the town of Gorakhpur, but they also were soon driven back by other invaders. During the 15th and 16th centuries, after the district had been desolated by incessant war, the descendants of the various conquerors held parts of the territory, and each seems to have lived quite isolated, as no bridges or roads attest any intercourse with each other. Towards the end of the 16th century Mussulmans occupied Gorakhpur town, but they interfered very little with the district, and allowed it to be controlled by the native rajas. In the middle of the 18th century a formidable foe, the Banjaras from the west, so weakened the power of the rajas that they could not resist the fiscal exactions of the Oudh officials, who plundered the country to a great extent. The district formed part of the territory ceded by Oudh to the British under the treaty of 1801. During the Mutiny it was lost for a short time, but under the friendly Gurkhas the rebels were driven out. The population in 1901 was 2,957,074, showing a decrease of 3% in the decade. The district is traversed by the main line and several branches of the Bengal & North- Western railway, and the Gandak, the Gogra and the Rapti are navigable.

The Division has an area of 9534 sq. m. The population in 1001 was 6,333,012, giving an average density of 664 persons per sq. m., being more than one to every acre, and the highest for any large tract in India.

GORAL, the native name of a small Himalayan rough-haired and cylindrical-horned ruminant classed in the same group as the chamois. Scientifically this animal is known as Urotragus (or Cemas) gored; and the native name is now employed as the designation of all the other members of the same genus. In addition to certain peculiarities in the form of the skull, gorals are chiefly distinguished from serows (q.v.) by not possessing a gland below the eye, nor a corresponding depression in the skull. Several species are known, ranging from the Himalaya to Burma, Tibet and North China. Of these, the two Himalayan gorals (U. goral and U. bedfordi) are usually found in small parties, but less commonly in pairs. They generally frequent grassy hills, or rocky ground clothed with forest; in fine weather

feeding only in the mornings and evenings, but when the sky is cloudy grazing throughout the day.

GORAMY, or Gouramy (Osphromenus olfax), reputed to be one of the best-flavoured freshwater fishes in the East Indian archi- pelago. Its original home is Java, Sumatra, Borneo and several other East Indian islands, but thence it has been transported to and acclimatized in Penang, Malacca, Mauritius and even Cayenne. Being an almost omnivorous fish and tenacious of life,

Goramy.

it seems to recommend itself particularly for acclimatization in other tropical countries; and specimens kept in captivity become as tame as carps. It attains the size of a large turbot. Its shape is fiat and short, the body covered with large scales; the dorsal and anal fins are provided with numerous spines, and the ventral fins produced into long filaments. Like Anabas, the climbing perch, it possesses a suprabranchial accessory respiratory organ.

GORBERSDORF, a village and climatic health resort of Germany, in the Prussian province of Silesia, romantically situated in a deep and well-wooded valley of the Waldenburg range, 1900 ft. above the sea, 60 m. S.W. of Breslau by the railway to Friedland and 3 m. from the Austrian frontier. Pop. 700. It has four large sanatoria for consumptives, the earliest of which was founded in 1854 by Hermann Brehmer (T826-1889).

GORBODUC, a mythical king of Britain. He gave his kingdom away during his lifetime to his two sons, Ferrex and Porrex. The two quarrelled and the younger stabbed the elder. Their mother, loving the latter most, avenged his death by murdering her son, and the people, horrified at her act, revolted and murdered both her and King Gorboduc. This legend was the subject of the earliest regular English tragedy which in 1561 was played before Queen Elizabeth in the Inner Temple hall. It was written by Thomas Sackville, Lord Buckhurst and Thomas Norton in collaboration. Under the title of Gorboduc it was published first very corruptly in 1565, and in better form as The Tragedy of Ferrex and Porrex in 1570.

GORCHAKOV, or Gortchakoff, a noble Russian family, descended from Michael Vsevolodovich, prince of Chernigov, who, in 1 246, was assassinated by the Mongols. Prince Andrey Ivanovich (1768-1855), general in the Russian army, took a conspicuous part in the final campaigns against Napoleon. Alexander Ivanovich (1769-1825) served

with distinction

under his relative Suvarov in the Turkish Wars, and took part as a general officer in the Italian and Swiss operations of 1799, and in the war against Napoleon in Poland in 1806-1807 (battle of Heilsberg). Petr Dmitrievich (i79o-r868) served under Kamenski and Kutusov in the campaign against Turkey, and afterwards against France in 1813-1814. In 1820 he suppressed an insurrection in the Caucasus, for which service he was raised to the rank of major-general. In 1828-1829 he fought under Wittgenstein against the Turks, won an action at Aidos, and signed the treaty of peace at Adrianople. In 1839 he was made governor of Eastern Siberia, and in i8sr retired into private life. When the Crimean War broke out he offered his services to the emperor Nicholas, by whom he was appointed general of the VI. army corps in the Crimea. He commanded the corps in the battles of Alma and Inkerman. He retired in 1855 and died at Moscow, on the 18th of March 1868.

Prince Mikhail Dmitrievich (1795-1861), brother of the last named, entered the Russian army in 1807 and took part in the campaigns against Persia in 18 10, and in 1812-1815 against France. During the Russo-Turkish War of 1828-1829 he was present at the sieges of Silistria and Shumla. After being appointed, in 1830, a general officer, he was present in the campaign in Poland, and was wounded at the battle of Grochow, on the 25th of February 1831. He also distinguished himself at the battle of Ostrolenka and at the taking of Warsaw. For these services he was promoted to the rank of lieutenant-general. In 1846 he was nominated military governor of Warsaw. In 1849 he commanded the Russian artillery in the war against the Hungarians, and in 1852 he visited London as a representative of the Russian army at the funeral of the duke of Wellington. At this time he was chief of the staff of the Russian army and adjutant-general to the tsar. Upon Russia declaring war against Turkey in 1853, he was appointed commander-in-chief of the troops which occupied Moldavia and Wallachia. In 1854 he crossed the Danube and besieged Silistria, but was superseded in April by Prince Paskevich, who, however, resigned on the 8th of June, when Gorchakov resumed the command. In July the siege of Silistria was raised, and the Russian armies recrossed the Danube; in August they withdrew to Russia. In 1855 he was appointed commander-in-chief of the Russian forces in the Crimea in place of Prince Menshikov. Gorchakov's defence of Sevastopol, and final retreat to the northern part of the town, which he continued to defend till peace was signed in Paris, were conducted with skill and energy. In 1856 he was appointed governor-general of Poland in succession to Prince Paskevich. He died at Warsaw on the 30th of May

1861, and was buried, in accordance with his own wish, at Sevastopol.

Prince Gorchakov, Alexander Mikhailovich (1798-1883), Russian statesman, cousin of Princes Petr and Mikhail Gorchakov, was born on the 16th of July 1798, and was educated at the lyceum of Tsarskoye Selo, where he had the poet Pushkin as a school-fellow. He became a good classical scholar, and learnt to speak and write in French with facility and elegance. Pushkin in one of his poems described young Gorchakov as " Fortune's favoured son," and predicted his success. On leaving the lyceum Gorchakov entered the foreign office under Count Nesselrode. His first diplomatic work of importance was the negotiation of a marriage between the grand duchess Olga and the crown prince Charles of Wurttemberg. He remained at Stuttgart for some years as Russian minister and confidential adviser of the crown princess. He foretold the outbreak of the revolutionary spirit in Germany and Austria, and was credited with counselling the abdication of Ferdinand in favour of Francis Joseph. When the German confederation was re-established in 1850 in place of the parliament of Frankfort, Gorchakov was appointed Russian minister to the diet. It was here that he first met Prince Bismarck, with whom he formed a friendship which was after- wards renewed at St Petersburg. The emperor Nicholas found that his ambassador at Vienna, Baron Meyendorff, was not a sympathetic instrument for carrying out his schemes in the East. He therefore transferred Gorchakov to Vienna, where the latter remained through the critical period of the Crimean War.

Gorchakov perceived that Russian designs against Turkey, supported by Great Britain and France, were impracticable, and he counselled Russia to make no more useless sacrifices, but to accept the bases of a pacification. At the same time, although he attended the Paris conference of 1856, he purposely abstained from affixing his signature to the treaty of peace after that of Count Orlov, Russia's chief representative. For the time, however, he made a virtue of necessity, and Alexander II., recognizing the wisdom and courage which Gorchakov had exhibited, appointed him minister of foreign affairs in place of Count Nesselrode. Not long after his accession to office Gorcha- kov issued a circular to the foreign powers, in which he announced that Russia proposed, for internal reasons, to keep herself as free as possible from complications abroad, and he added the now historic phrase, " La Russie ne boude pas; elk se recueille." During the

Polish insurrection Gorchakov rebuffed the sugges- tions of Great Britain, Austria and France for assuaging the severities employed in quelling it, and he was especially acrid in his replies to Earl Russell's despatches. In July 1863 Gorchakov was appointed chancellor of the Russian empire expressly in reward for his bold diplomatic attitude towards an indignant Europe. The appointment was hailed with enthusiasm in Russia, and at that juncture Prince Chancellor Gorchakov was unquestionably the most powerful minister in Europe.

An approchement now began between the courts of Russia and Prussia; and in 1863 Gorchakov smoothed the way for the occupation of Holstein by the Federal troops. This seemed equally favourable to Austria and Prussia, but it was the latter power which gained all the substantial advantages; and when the conflict arose between Austria and Prussia in 1866, Russia remained neutral and permitted Prussia to reap the fruits and establish her supremacy in Germany. When the Franco-German War of 1870-71 broke out Russia answered for the neutrality of Austria. An attempt was made to form an anti-Prussian coalition, but it failed in consequence of the cordial understanding between the German and Russian chancellors. In return for Russia's service in preventing the aid of Austria from being given to France, Gorchakov looked to Bismarck for diplomatic support in the Eastern Question, and he received an instalment of the expected support when he successfully denounced the Black Sea clauses of the treaty of Paris. This was justly regarded by him as an important service to his country and one of the triumphs of his career, and he hoped to obtain further successes with the assistance of Germany, but the cordial relations between the cabinets of St Petersburg and Berlin did not subsist much longer. In 1875 Bismarck was suspected of a design of again attacking France, and Gorchakov gave him to understand, in a way which was not meant to be offensive, but which roused the German chancellor's indignation, that Russia would oppose any such scheme. The tension thus produced between the two statesmen was increased by the political complications of 1875- 1878 in south-eastern Europe, which began with the Herze- govinian insurrection and culminated at the Berlin congress. Gorchakov hoped to utilize the complications in such a way as to recover, without war, the portion of Bessarabia ceded by the treaty of Paris, but he soon lost control of events, and the Slavophil agitation produced the Russo-Turkish campaign of 1877-78. By the preliminary peace of San Stefano the Slavophil aspirations seemed to be realized, but the stipulations of that peace were considerably modified by the congress of Berlin (13th June to 13th July 1878), atwhich the aged chancellor held nominally the post of first plenipotentiary, but left to the second plenipotentiary, Count

Shuvalov, not only the task of defending Russian interests, but also the responsibility and odium for the concessions which Russia had to make to Great Britain and Austria. He had the satisfaction of seeing the lost portion of Bessarabia restored to his country by the Berlin treaty, but at the cost of greater sacrifices than he anticipated. After the congress he continued to hold the post of minister for foreign affairs, but lived chiefly abroad, and resigned formally in 1882, when he was succeeded by M. de Giers. He died at Baden- Baden on the nth of March 1883. Prince Gorchakov devoted

himself entirely to foreign affairs, and took no part in the great internal reforms of Alexander II. ‘s reign. As a diplomatist he displayed many brilliant qualities — adroitness in negotiation, incisiveness in argument and elegance in style. His statesman- ship, though marred occasionally by personal vanity and love of popular applause, was far-seeing and prudent. In the latter part of his career his main object was to raise the prestige of Russia by undoing the results of the Crimean War, and it may fairly be said that he in great measure succeeded. (D. M. W.) GORDIAN, or Gordianus, the name of three Romaji emperors. The first, Marcus Antonius Gordianus Sempronianus Romanus Africanus (a.d. 159-238), an extremely wealthy man, was descended from the Gracchi and Trajan, while his wife was the great-granddaughter of Antoninus Pius. While he gained unbounded popularity by his magnificent games and shows, his prudent and retired life did not excite the suspicion of Caracalla, in whose honour he wrote a long epic called A ntoninias. Alexander Severus called him to the dangerous honours of government in Africa, and during his proconsulship occurred the usurpation of Maximin. The universal discontent roused by the oppressive rule of Maximin culminated in a revolt in Africa in 238, and Gordian reluctantly yielded to the popular clamour and assumed the purple. His son, Marcus Antonius Gordianus (192-238), was associated with him in the dignity. The senate confirmed the choice of the Africans, and most of the provinces gladly sided with the new. emperors; but, even while their cause was so successful abroad, they had fallen before the sudden inroad of Cappellianus, legatus of Numidia and a supporter of Maximin. They had reigned only thirty-six days. Both the Gordians had deserved by their amiable character their high reputation; they were men of great accomplishments, fond of literature, and voluminous authors; but they were rather intellectual voluptu- aries than able statesmen or powerful rulers. Having embraced the cause of Gordian, the senate was obliged to continue the revolt against Maximin, and appointed Pupienus Maximus and Caelius Balbinus, two of its noblest and most esteemed members, as joint emperors. At their inauguration a sedition arose,

and the popular outcry for a Gordian was appeased by the association with them of M. Antonius Gordianus Pius (224-244), grandson of the elder Gordian, then a boy of thirteen. Maximin forthwith invaded Italy, but was murdered by his own troops while besieging Aquileia, and a revolt of the praetorian guards, to which Pupienus and Balbinus fell victims, left Gordian sole emperor. For some time he was under the control of his mother's eunuchs, till Timesitheus, 1 his father-in-law and praefect of the praetorian guard, persuaded him to assert his independence. When the Persians under Shapur (Sapor) I. invaded Mesopotamia, the young emperor opened the temple of Janus for the last time recorded in history, and marched in person to the East. The Persians were driven back over the Euphrates and defeated in the battle of Resaena (243), and only the death of Timesitheus (under suspicious circumstances) prevented an advance into the enemy's territory. Philip the Arabian, who succeeded Timesitheus, stirred up discontent in the army, 'and Gordian was murdered by the mutinous soldiers in Mesopotamia. See lives of the Gordians by Capitolinus in the Scriptores historiae Augustae; Herodian vii. viii.; Zosimus i. 16, 18; Ammianus Marcellinus. xxiii. 5 ; Eutropius ix. 2 ; Aurelius Victor, Caesares, 27; article Shapur (I.); Pauly-Wissowa, Realencyclopadie, i. 2619 f. (von Rohden).

GORDIUM, an ancient city of Phrygia situated on the Persian " Royal road " from Pessinus to Ancyra, and not far from the Sangarius. It lies opposite the village Pebi, a little north of the point where the Constantinople-Angora railway crosses the Sangarius. It is not to be confused with Gordiou-kome, refounded as Juliopolis, a Bithynian town on a small tributary of the Sangarius, about 47 m. in an air-line N.W. of Gordium. Accord- ing to the legend, Gordium was founded by Gordius, a Phrygian peasant who had been called to the throne by his countrymen in obedience to an oracle of Zeus commanding them to select the first person that rode up to the temple of the god in a wagon. The king afterwards dedicated his car to the god, and another

1 For this name see footnote to Shapur.

oracle declared that whoever succeeded in untying the strangely entwined knot of cornel bark which bound the yoke to the pole should reign over all Asia. Alexander the Great, according to the story, cut the knot by a stroke of his sword. Gordium was captured and destroyed by the Gauls soon after 189 B.C. and disappeared from history. In imperial times only a small village existed on the site.

Excavations made in 1900 by two German scholars, G. and A. Koerte, revealed practically no remains later than the middle of the 6th century B.C. (when Phrygia fell under Persian power).

See Jahrbuch des Instituts, Erganzungsheft v. (1904). (J. G. C. A.)
GORDON, the name of a Scottish family, no fewer than 157 main branches of which are traced by the family historians. A laird of Gorden, in Berwickshire, near the English border, is said to have fallen in the battle of the Standard (1138). The families of the two sons ascribed to him by tradition, Richard Gordon of Gordon and Adam Gordon of Huntly, were united by the marriage of their great-grandchildren Alicia and Sir Adam, whose grandson Sir Adam (killed at Halidon Hill, 1333) at first took the English side in the Scottish struggle for independence, and is the first member of the family definitely to emerge into history. He was justiciar of Scotland in 13 10, but after Bannockburn he attached himself to Robert Bruce, who granted him in 1318 the lordship of Strathbogie in Aberdeenshire, to which Gordon gave the name of Huntly from a village on the Gordon estate in Berwickshire. He had two sons, Adam and William. The younger son, laird of Stitchel in Roxburghshire, was the ancestor of William de Gordon of Stitchel and Lochinvar, founder of the Galloway branch of the family represented in the Scottish peerage by the dormant viscounty of Kenmure (q.v.), created in 1633; most of the Irish and Virginian Gordons are offshoots of this stock. The elder son, Adam, inherited the Gordon-Huntly estates. He had two grandsons, Sir John (d. 1394) and Sir Adam (slain at Homildon Hill, 1403). Sir John had two illegitimate sons, Jock of Scur- dargue, the ancestor of the earls of Aberdeen, and Tarn of Ruthven. From these two stocks most of the northern Gordon families are derived. Sir Adam's daughter and heiress, Elizabeth, married Sir Alexander Seton, and with her husband was confirmed in 1408 in the possession of the barony of Gordon and Huntly in Berwickshire and of the Gordon lands in Aberdeen. The Seton- Gordons are their descendants. Their son Alexander was created earl of Huntly (see Huntly, Earls and Marquesses of), probably in 1445; and his heirs became dukes of Gordon, George Gordon (c. 1650-1716), 4th marquess of Huntly, being created duke of Gordon in 1684. He had been educated in a French Catholic seminary, and served in the French army in the cam- paigns of 1673 to 1675. Under James II. he was made keeper of Edinburgh Castle on account of his religion, but he refused to support James's efforts to impose Roman Catholicism on his subjects. He offered little active resistance when the castle was besieged by William III.'s forces. After his submission he was more than once imprisoned on suspicion of Jacobite leanings, and was ordered by George I. to reside on parole in Edinburgh. For

some time before his death he was separated from his wife Elizabeth Howard, daughter of the 6th duke of Norfolk. His son Alexander, 2nd duke of Gordon (c. 1678-1728), joined the Old Pretender, but gained the royal pardon after the surrender of Gordon Castle in 1 7 16. Of his children by his wife Henrietta Mordaunt, second daughter of Charles Mordaunt, earl of Peterborough, Cosmo George (c. 1 7 20-1 752) succeeded as 3rd duke ; Lord Lewis Gordon (d. 1754) took an active part in the Jacobite rising of 1745; and General Lord Adam Gordon (c. 1726-1801) became commander of the forces in Scotland in 1782, and governor of Edinburgh Castle in 1786. Lord George Gordon (g.v.) was a younger son of the 3rd duke.

The title, with the earldom of Norwich and the barony of Gordon Huntly, became extinct on the death of George, 5th duke (1770-1836), a distinguished soldier who raised the corps now known as the 2nd battalion of the Gordon Highlanders. The marquessate of Huntly passed to his cousin and heir-male, George, 5th earl of Aboyne. Lady Charlotte Gordon, sister of and co-heiress with the 5th duke, married Charles Lennox, 4th

duke of Richmond, whose son took the name of Gordon-Lennox. The dukedom of Gordon was revived in 1876 in favour of the 6th duke of Richmond, who thenceforward was styled duke of Richmond and Gordon. Adam Gordon of Aboyne (d. 1537) took the courtesy title of earl of Sutherland in right of his wife Elizabeth, countess of Sutherland in her own right, sister of the 9th earl. The lawless and turbulent Gordons of Gight were the maternal ancestors of Lord Byron.

Among the many soldiers of fortune bearing the name of Gordon was Colonel John Gordon, one of the murderers of Wallenstein. Patrick Gordon (163 5-1 699) was born at Auch- leuchries in Aberdeenshire, entered the service of Charles X. of Sweden in 165 1 and served against the Poles. He changed sides more than once before he found his way to Moscow in 1661 and took service under the tsar Alexis. He became general in 1687; in 1688 he helped to secure Peter the Great's ascendancy; and later he crushed the revolt of the Streltzi. His diary was published in German (3 vols., 1849-1853, Moscow and St Peters-burg), and selections from the English original by the Spalding Club (Aberdeen, 1859).

The Gordons fill a considerable place in Scottish legend and ballad. " Captain Car," or" Edom (Adam) of Gordon" describes an incident in the struggle between the Forbeses and Gordons in Aberdeenshire in 1571; " The Duke of Gordon's Daughter " has apparently no

foundation in fact, though ” Geordie ” of the ballad is sometimes said to have been George, 4th earl of Huntly; ” The Fire of Frendraught ” goes back to a feud (1630) between James Crichton of Frendraught and William Gordon of Rothie- may; the ” Gallant Gordons Gay ” figure in ” Chevy Chase “; William Gordon of Earlston, the Covenanter, appears in ” Both- well Bridge ” &c.

See William Gordon (of old Aberdeen), The History of the Ancient, Noble, and Illustrious House of Gordon (2 vols., Edinburgh, 1726-1727), of which A Concise History of the . . . House of Gordon, by C. A. Gordon (Aberdeen, 1754) is little more than an abridgment; The Records of Aboyne, 1230-1681, edited by Charles, nth marquess of Huntly, &c. (New Spalding Club, Aberdeen, 1894); The Gordon Book, ed. J. M. Bulloch (1902); The House of Gordon, ed. J. M. Bulloch (Aberdeen, vol. i., 1903) ; and Mr Bulloch’s The First Duke of Gordon (1909).

GORDON, ADAM LINDSAY (1833-1870), Australian poet, was born at Fayal, in the Azores, in 1833, the son of a retired Indian officer who taught Hindustani at Cheltenham College. Young Gordon was educated there and at Merton College, Oxford, but a youthful indiscretion led to his being sent in 1853 to South Australia, where he joined the mounted police. He then became a horsebreaker, but on his father’s death he inherited a fortune and obtained a seat in the House of Assembly. At this time he had the reputation of being the best non-professional steeplechase rider in the colony. In 1867 he moved to Victoria and set up a livery stable at Ballarat. Two volumes of poems, Sea Spray and Smoke Drift and Ashtaroth, were published in this year, and two years later he gave up his business and settled at New Brighton, near Melbourne. A second volume of poetry, Bush Ballads and Galloping Rhymes, appeared in 1870. It brought him more praise than emolument, and, thoroughly discouraged by his failure to make good his claim to some property in Scotland to which he believed himself entitled, he committed suicide on the 24th of June 1870. His reputation rose after his death, and he became the best known and most widely popular of Australian poets. Much of Gordon’s poetry might have been written in England; when, however, it is really local, it is vividly so; his genuine feeling frequently kindles into passion; his versification is always elastic and sonorous, but sometimes too reminiscent of Swinburne. His compositions are almost entirely lyrical, and their merit is usually in proportion to the degree in which they partake of the character of the ballad.

Gordon’s poems were collected and published in 1880 with a biographical introduction by Marcus Clarke.

GORDON, ALEXANDER (c. 1692-c. 1754), Scottish antiquary, is believed to have been born in Aberdeen in 1692. He is the ” Sandy Gordon ” of Scott’s Antiquary. Of his parentage and early history nothing is known. He appears to have

distinguished himself in classics at Aberdeen University, and to have made a living at first by teaching languages and music. When still young he travelled abroad, probably in the capacity of tutor. He returned to Scotland previous to 1726, and devoted himself to antiquarian work. In 1726 appeared the Itinerarium Septentrionale, his greatest and best-known work. He was already the friend of Sir John Clerk, of Penicuik, better known as Baron Clerk (a baron of the exchequer); and the baron and Roger Gale (vice-president of the Society of Antiquaries) are the ” two gentlemen, the honour of their age and country,” whose letters were published, without their consent it appears, as an appendix to the Itinerarium. Subsequently Gordon was appointed secre- tary to the Society for the Encouragement of Learning, with an annual salary of £50. Resigning this post, or, as there seems reason for believing, being dismissed for carelessness in his accounts, he succeeded Dr Stukeley as secretary to the Society of Antiquaries, and also acted for a short time as secretary to the Egyptian Club, an association composed of gentlemen who had visited Egypt. In 1741 he accompanied James Glen (after- wards governor) , to South Carolina. Through his influence Gor- don, besides receiving a grant of land in South Carolina, became registrar of the province and justice of the peace, and filled several other offices. From his will, dated the 22nd of August 1754, it appears he had a son Alexander and a daughter Frances, to whom he bequeathed most of his property, among which were portraits of himself and of friends painted by his own hand.

See Sir Daniel Wilson, Alexander Gordon, the Antiquary; and his Papers in the Proceedings of the Society of Antiquaries of Scotland, with Additional Notes and an Appendix of Original Letters by Dr David Laing (Proc. Soc. of Antiq. of Scot. x. 363-382).

GORDON, CHARLES GEORGE (1833-1885), British soldier and administrator, fourth son of General H. W. Gordon, Royal Artillery, was born at Woolwich on the 28th of January 1833. He received his early education at Taunton school, and was given a cadetship in- the Royal Military Academy, Woolwich, in 1848. He was commissioned as

second lieutenant in the corps of Royal Engineers on the 23rd of June 1852. After passing through a course of instruction at the Royal Engineers' establishment, Chatham, he was promoted lieutenant in 1854, and was sent to Pembroke dock to assist in the construction of the fortifications then being erected for the defence of Milford Haven. The Crimean War broke out shortly afterwards, and Gordon was ordered on active service, and landed at Balakjava on the 1st of January 1855. The siege of Sevastopol was in progress, and he had his full share of the arduous work in the trenches. He was attached to one of the British columns which assaulted the Redan on the 18th of June, and was also present at the capture of that work on the 8th of September. He took part in the expedition to Kinburn, and then returned to Sevas- topol to superintend a portion of the demolition of the Russian dockyard. After peace with Russia had been concluded, Gordon was attached to an international commission appointed to de- limit the new boundary, as fixed by treaty, between Russia and Turkey in Bessarabia; and on the conclusion of this work he was ordered to Asia Minor on similar duty, with reference to the eastern boundary between the two countries. While so employed Gordon took the opportunity to make himself well acquainted with the geography and people of Armenia, and the knowledge of dealing with eastern nations then gained was of great use to him in after life.

He returned to England towards the end of 1858, and was then selected for the appointment of adjutant and field-works instructor at the Royal Engineers', establishment, and took up his new duties at Chatham after promotion to the rank of captain in April 1859. But his stay in England was brief, for in i860 war was declared against China, and Gordon was ordered out there, arriving at Tientsin in September. He was too late for the attack on the Taku forts, but was present at the occupation of Peking and destruction of the Summer Palace. He remained with the British force of occupation in northern China until April 1862, when the British troops, under the command of General Staveley, proceeded to Shanghai,

la China.

in order to protect the European settlement at that place from the Taiping rebels. The Taiping revolt, which had some remark- able points of similarity with the Mahdist rebellion in the Sudan, had commenced in 1850 in the province of Kwangsi. The leader, Hung Sin Tsuan, a semi-political, semi-religious en- thusiast, assumed the title of Tien Wang, or Heavenly King, and by playing on the feelings of the lower class of people gradu- ally collected a considerable force. The Chinese authorities endeavoured to arrest him, but the imperialist

troops were defeated. The area of revolt extended northwards through the provinces of Hunan and Hupeh, and down the valley of the Yangtsze-kiang as far as the great city of Nanking, which was captured by the rebels in 1853. Here the Tien Wang established his court, and while spending his own time in heavenly contemplation and earthly pleasures, sent the assistant Wangs on warlike expeditions through the adjacent provinces. For some years a constant struggle was maintained between the Chinese imperialist troops and the Taipings, with varying success on both sides. The latter gradually advanced eastwards, and ap- proaching the important city of Shanghai, alarmed the European inhabitants, who subscribed to raise a mixed force of Europeans and Manila men for the defence of the town. This force, which was placed under the command of an American, Frederick Townsend Ward (1831-1862), took up a position in the country west of Shanghai to check the advance of the rebels. Fighting continued round Shanghai for about two years, but Ward's force was not altogether successful, and when General Staveley arrived from Tientsin affairs were in a somewhat critical con- dition. He decided to clear the district of rebels within a radius of 30 m. from Shanghai, and Gordon was attached to his staff as engineer officer. A French force, under the command of Admiral Protet, co-operated with Staveley and Ward, with his little army, also assisted. Kahding, Singpo and other towns were occupied, and the country was fairly cleared of rebels by the end of 1862. Ward was, unfortunately, killed in the assault of Tseki, and his successor, Burgevine, having had a quarrel with the Chinese authorities, Li Hung Chang, the gover- nor of the Kiang-su province, requested General Staveley to appoint a British officer to command the contingent. Staveley selected Gordon, who had been made a brevet-major in December 1862 for his previous services, and the nomination was approved by the British government. The choice was judicious as further events proved. In March 1863 Gordon proceeded to Sungkiang to take command of the force, which had received the name of " The Ever- Victorious Army," an encouraging though somewhat exaggerated title, considering its previous history. Without waiting to reorganize his troops he marched at once to the relief of Chansu, a town 40 m. north-west of Shanghai, which was invested by the rebels. The relief was successfully accomplished, and the operation established Gordon in the confidence of his troops. He then reorganized his force, a matter of no small difficulty, and advanced against Quinsan, which was captured, though with considerable loss. Gordon then marched through the country, seizing town after town from the rebels until at length the great city of Suchow was invested by his army and a body of Chinese imperialist troops. The city was taken on the 29th of November, and after its capture Gordon had a

serious dispute with Li Hung Chang, as the latter had beheaded certain of the rebel leaders whose lives the former had promised to spare if they surrendered. This action, though not opposed to Chinese ethics, was so opposed to Gordon's ideas of honour that he withdrew his force from Suchow and remained inactive at Quinsan until February 1864. He then came to the conclusion that the subjugation of fhe rebels was more important than his dispute with Li, and visited the latter in order to arrange for further operations. By mutual consent no allusion was made to the death of the Wangs. This was a good example of one of Gordon's marked characteristics, that, though a man of strong personal feelings, he was always prepared to subdue them for the public benefit. He declined, however, to take any decoration or reward from the emperor for his services at the capture of Suchow. After

the meeting with Li Hung Chang the " Ever-Victorious Army " again advanced and took a number of towns from the rebels, ending with Chanchufu, the principal military position of the Taipings. This fell in May, when Gordon returned to Quinsan and disbanded his force. In June the Tien Wang, seeing his cause was hopeless, committed suicide, and the capture of Nan- king by the imperialist troops shortly afterwards brought the Taiping revolt to a conclusion. The suppression of this serious movement was undoubtedly due in great part to the skill and energy of Gordon, who had shown remarkable qualities as a leader of men. The emperor promoted him to the rank of Titu, the highest grade in the Chinese army, and also gave him the Yellow Jacket, the most important decoration in China. He wished to give him a large sum of money, but this Gordon refused. He was promoted lieutenant-colonel for his Chinese services, and made a Companion of the Bath. Henceforth he was often familiarly spoken of as " Chinese " Gordon.

Gordon was appointed on his return to England Commanding Royal Engineer at Gravesend, where he was employed in super- intending the erection of forts for the defence of the Thames. He devoted himself with energy to his official duties, and his leisure hours to practical philanthropy. All the acts of kindness which he did for the poor during the six years he was stationed at Gravesend will never be fully known. In October 1871 he was appointed British representative on the international commission which had been constituted after the Crimean War to maintain the navigation of the mouth of the river

Danube, with headquarters at Galatz. During 1872 Gordon was sent to inspect the British military cemeteries in the Crimea, and when passing through Constantinople on his return to Galatz he made the acquaintance of Nubar Pasha, prime minister of Egypt, who sounded him as to whether he would take service under the khedive. Nothing further was settled at the time, but the following year he received a definite offer from the khedive, which he accepted with the consent of the British government, and proceeded to Egypt early in 1874. He was then a colonel in the army, though still only a captain in the corps of Royal Engineers.

To understand the object of the appointment which Gordon accepted in Egypt, it is necessary to give a few facts with refer- ence to the Sudan. In 1820-22 Nubia, Sennar and Kordofan had been conquered by Egypt, and the authority of the Egyptians was subsequently extended southward, eastward to the Red Sea and westward over Darfur (conquered by Zobeir Pasha in 1874). One result of the Egyptian occupation of the country was that the slave trade was largely developed, especially in the White Nile and Bahr-el-Ghazal districts. Captains Speke and Grant, who had travelled through Uganda and came down the White Nile in 1863, and Sir Samuel Baker, who went Up the same river as far as Albert Nyanza, brought back harrowing tales of the misery caused by the slave-hunters. Public opinion was considerably moved, and in 1869 the khedive Ismail decided to send an expedition up the White Nile, with the double object of limiting the evils of the slave trade and opening up the district to commerce. The command of the expedition was given to Sir Samuel Baker, who reached Khartum in February 1870, but, owing to the obstruction of the river by the sudd or grass barrier, did not reach Gondokoro, the centre of his province, for fourteen months. He met with great difficulties, and when his four years' service came to an end little had been effected beyond establishing a few posts along the Nile and placing some steamers on the river. It was to succeed Baker as governor of the equatorial regions that the khedive asked for Gordon's services, having come to the conclusion that the latter was the most likely person to bring the affair to a satisfactory conclusion. After a short stay 81 Cairo, Gordon proceeded to Khartum by way of Suakin and Berber, a route which he ever afterwards regarded as the best mode of access to the Sudan. From Khartum he proceeded up the White Nile to Gondokoro, where he arrived in twenty-four days, the sudd, which had proved such an obstacle to Baker, having been removed since the departure of the latter by the Egyptian governor-general. Gordon remained in the equatorial

provinces until October 1876, and then returned to Cairo. The two

years and a half thus spent in Central Africa was a time of incessant toil. A line of stations was established from the Sobat confluence on the White Nile to the frontier of Uganda — to which country he proposed to open a route from Mombasa — and considerable progress was made in the suppression of the slave trade. The river and Lake Albert were mapped by Gordon and his staff, and he devoted himself with wonted energy to improving the condition of the people. Greater results might have been obtained but for the fact that Khartum and the whole of the Sudan north of the Sobat were in the hands of an Egyptian governor, independent of Gordon, and not too well disposed towards his proposals for diminishing the slave trade. On arriving in Cairo Gordon informed the khedive of his reasons for not wishing to return to the Sudan, but did not definitely resign the appointment of governor of the equatorial provinces. But on reaching London he telegraphed to the British consul- general in Cairo, asking him to let the khedive know that he would not go back to Egypt. Ismail Pasha, feeling, no doubt, that Gordon's resignation would injure his prestige, wrote to him saying that he had promised to return, and that he expected him to keep his word. Upon this Gordon, to whom the keeping of a promise was a sacred duty, decided to return to Cairo, but gave an assurance to some friends that he would not go back to the Sudan unless he was appointed governor-general of the entire country. After some discussion the khedive agreed, and made him governor-general of the Sudan, inclusive of Darfur and the equatorial provinces.

One of the most important questions which Gordon had to take up on his appointment was the state of the political relations between Egypt and Abyssinia, which had been in an . unsatisfactory condition for some years. The dispute 0enera / # " centred round the district of Bogos, lying not far inland from Massawa, which both the khedive and King John of Abyssinia claimed as belonging to their respective dominions. War broke out in 1875, when an Egyptian expedition was despatched to Abyssinia, and was completely defeated by King John near Gundet. A second and larger expedition, under Prince Hassan, the son of the khedive, was sent the following year from Massawa. The force was routed by the Abyssinians at Gura, but Prince Hassan and his staff got back to Massawa. Matters then remained quiet until March 1877, when Gordon proceeded to Massawa to endeavour to make peace with King John. He went up to Bogos, and had an interview with Walad Michael, an Abyssinian chief and the hereditary ruler of Bogos, who had joined the Egyptians with a view to raiding on his own account. Gordon, with his usual powers of diplomacy, persuaded Michael to remain quiet, and wrote to the king proposing

terms of peace. But he received no reply at that time, as John, feeling pretty secure on the Egyptian frontier after his two successful actions against the khedive's troops, had gone southwards to fight with Menelek, king of Shoa. Gordon, seeing that the Abyssinian difficulty could wait for a few months, proceeded to Khartum. Here he took up the slavery question, and proposed to issue regulations making the registration of slaves compulsory, but his proposals were not approved by the Cairo government. In the meantime an insurrection had broken out in Darfur, and Gordon proceeded to that province to relieve the Egyptian garrisons, which were considerably stronger than the force he had available, the insurgents also being far more numerous than his little army. On coming up with the main body of rebels he saw that diplomacy gave a better chance of success than fighting, and, accompanied only by an interpreter, rode into the enemy's camp to discuss the situation. This bold move, which probably no one but Gordon would have attempted, proved quite success- ful, as part of the insurgents joined him, and the remainder retreated to the south. The relief of the Egyptian garrisons was successfully accomplished, and Gordon visited the provinces of Berber and Dongola, whence he had again to return to the Abyssinian frontier to treat with King John. But no satisfactory settlement was arrived at, and Gordon came back to Khartum in January 1878. There he had scarcely a week's rest when the

khedive summoned him to Cairo to assist in settling the financial affairs of Egypt. He reached Cairo in March, and was at once appointed by Ismail as president of a commission of inquiry into the finances, on the understanding that the European com- missioners of the debt, who were the representatives of the bond- holders, and whom Ismail regarded as interested parties, should not be members of the commission. Gordon accepted the post on these terms, but the consuls-general of the different powers refused to agree to the constitution of the commission, and it fell to the ground, as the khedive was not strong enough to carry his point. The attempt of the latter to utilize Gordon as a counterpoise to the European financiers having failed, Ismail fell into the hands of his creditors, and was deposed by the sultan in the following year in favour of his son Tewfik. After the conclusion of the financial episode, Gordon proceeded to the province of Harrar, south of Abyssinia, and, finding the adminis- tration in a bad condition, dismissed Raouf Pasha, the governor. He then returned to Khartum, and in 1879 went again into

Darfur to pursue the slave traders, while his subordinate, Gessi Pasha, fought them with great success in the Bahr-el-Ghazal district and killed Suleiman, their leader and a son of Zobeir. This put an end to the revolt, and Gordon went back to Khartum. Shortly afterwards he went down to Cairo, and when there was requested by the new khedive to pay a visit to King John and make a definite treaty of peace with Abyssinia. Gordon had an interesting interview with the king, but was not able to do much, as the king wanted great concessions from Egypt, and the khedive's instructions were that nothing material was to be conceded. The matter ended by Gordon being made a prisoner and sent back to Massawa. Thence he returned to Cairo and resigned his Sudan appointment. He was considerably ex- hausted by the three years' incessant work, during which he had ridden no fewer than 8500 m. on camels and mules, and was constantly engaged in the task of trying to reform a vicious system of administration.

In March 1880 Gordon visited the king of the Belgians at Brussels, and King Leopold suggested that he should at some future date take charge of the Congo Free State. In April the government of the Cape Colony telegraphed to him offering the position of commandant of the Cape local forces, but he declined the appointment. In May the marquess of Ripon, who had been given the post of governor- general of India, asked Gordon to go with him as private secretary. This he agreed to do, but a few days later, feeling that he was not suitable for the position, asked Lord Ripon to release him. The latter refused to do so, and Gordon accompanied him to India, but definitely resigned his post on Lord Ripon's staff shortly afterwards. Hardly had he resigned when he received a telegram from Sir Robert Hart, inspector-general of customs in China, inviting him to go to Peking. He started at once and arrived at Tientsin in July, where he met Li Hung Chang, and learnt that affairs were in a critical condition, and that there was risk of war with Russia. Gordon proceeded to Peking- and used all his influence in favour of peace. His arguments, which were given with much plainness of speech, appear to have convinced the Chinese government, and war was avoided. Gordon returned to England, and in April 1881 exchanged with a brother officer, who had been ordered to Mauritius as Commanding Royal Engineer, but who for family reasons was unable to accept the appointment. He remained in Mauritius until the March following, when, on promotion to the rank of major-general, he had to vacate the position of Commanding Royal Engineer. Just at the same time the Cape ministry telegraphed to him to ask if he would go to the Cape to consult with the government as regards settling affairs in Basutoland. The telegram stated that the position of matters was grave, and that it was of the utmost

importance that the colony should secure the services of someone of proved ability, firmness and energy v . Gordon sailed at once for the Cape, and saw the governor, Sir Hercules Robinson, Mr Thos. Scanlen, the premier, and Mr. J. X. Merriman, a member of the ministry, who, for political reasons, asked him not to go to Basutoland, but to take the

1880-

1884.

appointment of commandant of the colonial forces at King William's Town. After a few months, which were spent in reorganizing the colonial forces, Gordon was requested to go up to Basutoland to try to arrange a settlement with the chief Masupha, one of the most powerful of the Basuto leaders. Greatly to his surprise, at the very time he was with Masupha, Mr. J. W. Sauer, a member of the Cape government, was taking steps to induce Lerethodi, another chief, to advance against Masupha. This not only placed Gordon in a position of danger, but was regarded by him as an act of treachery. He advised Masupha not to deal with the Cape government until the hostile force was withdrawn, and resigned his appointment. He con- sidered that the Basuto difficulty was due to the bad system of administration by the Cape government. That Gordon's views were correct is proved by the fact that a few years later Basutoland was separated from Cape Colony and placed directly under the imperial government. After his return to England from the Cape, being unemployed, Gordon decided to go to Palestine, a country he had long desired to visit. Here he remained for a year, and devoted his time to the study of Biblical history and of the antiquities of Jerusalem. The king of the Belgians then asked him to take charge of the Congo Free State, and he accepted the mission and returned to London to make the necessary preparations. But a few days after his arrival he was requested by the British government to proceed immediately to the Sudan, To understand the reasons for this, it is necessary briefly to recapitulate the course of events in that country since Gordon had left it in 1879.

After his resignation of the post of governor-general, Raouf Pasha, an official of the ordinary type, who, as already mentioned, had been dismissed by Gordon for misgovernment in 1878, was appointed to succeed him. As Raouf was instructed to increase the receipts and diminish the expenditure, the system of govern- ment naturally reverted to the old methods, which Gordon had endeavoured to improve. The fact that justice and firmness were succeeded by injustice and weakness tended naturally to the outbreak of revolt, and

unfortunately there was a leader ready to head a rebellion — one Mahommed Ahmed, already known for some years as a holy man, who was insulted by an Egyptian official, and retiring with some followers to the island of Abba on the White Nile, proclaimed himself as the mahdi, a successor of the prophet. Raouf endeavoured to take him prisoner but without success, and the revolt spread rapidly. Raouf was recalled, and succeeded by Abdel Kader Pasha, a much stronger governor, who had some success, but whose forces were quite insufficient to cope with the rebels. The Egyptian government was too busily engaged in suppressing Arabi's revolt to be able to send any help to Abdel Kader, and in September 1882, when the British troops entered Cairo, the position in the Sudan was very perilous. Had the British government listened to the representations then made to them, that, having conquered Egypt, it was imperative at once to suppress the revolt in the Sudan, the rebellion could have been crushed, but unfortunately Great Britain would do nothing herself, while the steps she allowed Egypt to take ended in the disaster to Hicks Pasha's expedition. Then, in December 1883, the British government saw that something must be done, and ordered Egypt to abandon the Sudan. But abandonment was a policy most difficult to carry out, as it involved the withdrawal of thousands of Egyptian soldiers, civilian employes and their families. Abdel Kader Pasha was asked to undertake the work, and he agreed on the understanding that he would be supported, and that the policy of abandonment was not to be announced. But the latter condition was refused, and he declined the task. "The British government then asked General Gordon to proceed to Khartum to report on the best method of carrying out the evacuation. The mission was highly popular in England. Sir Evelyn Baring (Lord Cromer) was, however, at first opposed to Gordon's appointment. His objections were overcome, and Gordon received his instructions in London on the 18th of January 1884, and started at once for Cairo, accompanied by Lieut.-Colonel J. D. H. Stewart.

At Khar- tum.

At Cairo he received further instructions from Sir Evelyn Baring, and was appointed by the khedive as governor-general, with executive powers. Travelling by Korosko and Berber, he arrived at Khartum on the 18th of February, and was well received by the inhabitants, who believed that he had come to save the country from the rebels. Gordon at once commenced the task of sending the women and children and

the sick and wounded to Egypt, and about two thousand five hundred had been removed before the mahdi's forces closed upon Khartum. At the same time he was impressed with the necessity of making some arrangement for the future government of the country, and asked for the help of Zobeir (q.v.), who had great influence in the Sudan, and had been detained in Cairo for some years. This request was made on the very day Gordon reached Khartum, and was in accordance with a similar proposal he had made when at Cairo. But, after delays which involved the loss of much precious time, the British government refused (13th of March) to sanction the appointment, because Zobeir had been a notorious slave-hunter. With this refusal vanished all hope of a peaceful retreat of the Egyptian garrisons. Waver- ing tribes went over to the mahdi. The advance of the rebels against Khartum was combined with a revolt in the eastern Sudan, and the Egyptian troops in the vicinity of Suakin met with constant defeat. At length a British force was sent to Suakin under the command of General Sir Gerald Graham, and routed the rebels in several hard-fought actions. Gordon telegraphed to Sir Evelyn Baring urging that the road from Suakin to Berber should be opened by a small force. But this request, though strongly supported by Baring and the British military authorities in Cairo, was refused by the government in London. In April General Graham and his forces were withdrawn from Suakin, and Gordon and the Sudan were seemingly abandoned to their fate. The garrison of Berber, seeing that there was no chance of relief, surrendered a month later and Khartum was completely isolated. Had it not been for the presence of Gordon the city would also soon have fallen, but with an energy and skill that were almost miraculous, he so organized the defence that Khartum held out until January 1885. When it is remembered that Gordon was of a different nationality and religion to the garrison and population, that he had only one British officer to assist him, and that the town was badly fortified and insufficiently provided with food, it is just to say that the defence of Khartum is one of the most remarkable episodes in military history. The siege commenced on the 18th of March, but it was not until August that the British govern- ment under the pressure of public opinion decided to take steps to relieve Gordon. General Stephenson, who was in command of the British troops in Egypt, wished to send a brigade at once to Dongola, but he was overruled, and it was not until the beginning of November that the British relief force was ready to start from Wadi Haifa under the command of Lord Wolseley. The force reached Korti towards the end of December, and from that place a column was despatched across the Bayuda desert to Metemma on the Nile. After some severe fighting in which the leader of the column, Sir Herbert Stewart, was mortally wounded, the force reached the river

on the 20th of January, and the following day four steamers, which had been sent down by Gordon to meet the British advance, and which had been waiting for them for four months, reported to Sir Charles Wilson, who had taken command after Sir Herbert Stewart was wounded. On the 24th Wilson started with two of the steamers for Khartum, but on arriving there on the 28th he found that the place had been captured by the rebels and Gordon killed two days before. A belief has been entertained that Wilson might have started earlier and saved the town, but thiS is quite groundless. In the first place, Wilson could not have started sooner than he did ; and in the second, even if he had been able to do so, it would have made no difference, as the rebels could have taken Khartum any time they pleased after the 5th of January, when the provisions were exhausted. Another popular notion, that the capture of the place was due to treachery on the part of the garrison, is equally without foundation. The

Death.

attack was made at a point in the fortifications where the rampart and ditch had been destroyed by the rising of the Nile, and when the mahdi's troops entered the soldiers were too weak to make any effectual resistance. Gordon himself expected the town to fall before the end of December, and it is really difficult to understand how he succeeded in holding out until the 26th of January. Writing on the 14th of December he said, " Now, mark this, if the expeditionary force — and I ask for no more than two hundred men — does not come in ten days, the town may fall, and I have done my best for the honour of my country." He had indeed done his best, and far more than could have been regarded as possible. To understand what he went through during the latter months of the siege, it is only necessary to read his own journal, a portion of which, dating from 10th September to 14th December 1884, was fortunately preserved and published. Gordon was not an author, but he wrote many short memoranda on subjects that interested him, and a considerable number of these have been utilized, especially in the work by his brother, Sir Henry Gordon, entitled Events in the Life of Charles George Gordon, from its Beginning to its End. He was a voluminous letter-writer, and much of his correspondence has been published. His character was remarkable, and the influence he had over those with whom he came in contact was very striking. His power to command men of non-European races was probably unique. He had no fear of death, and cared but little for the opinion of others, adhering tenaciously to the course he believed to be right in the face of all opposition. Though not holding to outward forms of religion, he was a truly religious man in the highest sense of the word, and was a constant student of the Bible. To serve

God and to do his duty were the great objects of his life, and he died as he had lived, carrying out the work that lay before him to the best of his ability. The last words of his last letter to his sister, written when he knew that death was very near, sum up his character: ” I am quite happy, thank God, and, like Lawrence, I have tried to do my duty.” 1

1 With this estimate of Gordon’s character may be contrasted those of Lord Cromer (the most severe of Gordon’s critics), and of Lord Morley of Blackburn; in their strictures as in their praise they help to explain both the causes of the extraordinary influence wielded by Gordon over all sorts and conditions of men and also his difficulties. Lord Cromer’s criticism, it should be remembered, does not deal with Gordon’s career as a whole but solely with his last mission to the Sudan; Lord Morley’s is a more general judgment.

Lord Cromer {Modern Egypt, vol. L, ch. xxyii., p. 565-571) says: ” We may admire, and for my own part I do very much admire General Gordon’s personal courage, his disinterestedness and his chivalrous feeling in favour of the beleaguered garrisons, but ad- miration of these qualities is no sufficient plea against a condemna- tion of his conduct on the ground that it was quixotic. In his last letter to his sister, dated December 14, 1884, he wrote: ‘ I am quite happy, thank God, and, like Lawrence, I have tried to do my duty “... I am not now dealing with General Gordon’s character, which was in many respects noble, or with his military defence of Khartoum, which was heroic, but with the political conduct of his mission, and from this point of view I have no hesitation in saying that General Gordon cannot be considered to have tried to do his duty unless a very strained and mistaken view be taken of what his duty was. ... As a matter of public morality I cannot think that General Gordon’s process of reasoning is defensible. ... I do not think that it can be held that General Gordon made any serious effort to carry out the main ends of British and Egyptian policy in the Sudan. He thought more of his personal opinions than of the interests of the state. ... In fact, except personal courage, great fertility in military resource, a lively though some- times ill-directed repugnance to injustice, oppression and meanness of every description, and a considerable power of acquiring influence over those, necessarily limited in numbers, with whom he was brought into personal contact, General Gordon does not appear to have possessed any of the qualities which would have fitted him to undertake the difficult task he had in hand.”

Lord Morley (Life of Gladstone, vol. iii., 1st ed., 1903, ch. 9, p. 151) says: ” Gordon, as Mr Gladstone said, was a hero of heroes. He was a

soldier of infinite personal courage and daring, of striking military energy, initiative and resource; a high, pure and single character, dwelling much in the region of the unseen. But as all who knew him admit, and as his own records testify, notwithstand- ing an undercurrent of shrewd common sense, he was the creature, almost the sport, of impulse; his impressions and purposes changed with the speed of lightning; anger often mastered him; he went very often by intuitions and inspirations rather than by cool

Authorities. — The Journals of Major-General Gordon at Khartoum (1885) ; Lord Cromer, Modern Egypt (2 vols., 1908) ; F. R. Wingate, Mahdiism and the Egyptian Sudan (1891); the British Parlia- mentary Paper on Egypt (1884-1885); C. G. Gordon, Reflections in Palestine (1884); edited by D. C. Boulger, General Gordon's

Letters from the Crimea, the Danube, and Armenia (1884); edited by G. B. Hill, Colonel Gordon in Central Africa (1881); Letters of General C. G. Gordon to his Sister (1888); H. W. Gordon, Events in the Life of C. G. Gordon (1886); Commander L. Brine, The Taeping Rebellion in China (1862); A. Wilson, Gordon's Campaigns and the Taeping Rebellion (1868); D. C. Boulger, Life of Gordon (1896); A. Egmont Hake, The Story of Chinese Gordon (1st vol. 1884, 2nd vol. 1885); Colonel Sir W. F. Butler, Charles George Gordon (1889); Archibald Forbes, Chinese Gordon (1884) ; edited by A. Egmont Hake, Events in the Taeping Rebellion (1891) ; S. Mossman, General Gordon's Diary in China (1885); Lieutenant T. Lister, R.E., With Gordon in the Crimea (1891); Lieutenant-General Sir G. Graham, Last Words with Gordon (1887); " War Correspondent," Why Gordon Perished (1896). (C. M. W.)

GORDON, LORD GEORGE (1751-1793), third and youngest son of Cosmo George, duke of Gordon, was born in London on the 26th of December 1751. After completing his education at Eton, he entered the navy, where he rose to the rank of lieutenant in 1772, but Lord Sandwich, then at the head of the admiralty, would not promise him the command of a ship, and he resigned his commission shortly before the beginning of the American War. In 1774 the pocket borough of Ludgershall was bought for him by General Fraser, whom he was opposing in Inverness- shire, in order to bribe him not to contest the county. He was considered flighty, and was not looked upon as being of any importance. In 1779 he organized, and made himself head of

the Protestant associations, formed to secure the repeal of the Catholic Relief Act of 1778. On the 2nd of June 1780 he headed the mob which marched in procession from St George's Fields to the Houses of Parliament in order to present the monster petition against the acts. After the mob reached Westminster a terrific riot ensued, which continued several days, during which the city was virtually at their mercy. At first indeed they dispersed after threatening to make a forcible entry into the House of Commons, but reassembled soon afterwards and destroyed several Roman Catholic chapels, pillaged the private dwellings of many Roman Catholics, set fire to Newgate and broke open all the other prisons, attacked the Bank of England and several other public buildings, and continued the work of violence and conflagration until the interference of the military, by whom no fewer than 450 persons were killed and wounded before the riots were quelled. For his share in instigating the riots Lord Gordon was apprehended on a charge of high treason; but, mainly through the skilful and eloquent defence of Erskine, he was acquitted on the ground that he had no treasonable intentions. His life was henceforth full of crack-brained schemes, political and financial. In 1786 he was excommunicated by the archbishop of Canterbury for refusing to bear witness in an ecclesiastical suit; and in 1787 he was convicted of libelling the queen of France, the French ambassador and the administration of justice in England. He was, however, permitted to withdraw from the court without bail, and made his escape to Holland; but on account of representations from the court of Versailles he was commanded to quit that country, and, returning to England, was apprehended, and in January 1788 was sentenced

inference from carefully surveyed fact; with many variations of mood he mixed, as we often see in people less famous, an invincible faith in his own rapid prepossessions while they lasted. Everybody now discerns that to despatch a soldier of this temperament on a piece of business [the mission to the Sudan in 1884] that was not only difficult and dangerous, as Sir E. Baring said, but profoundly obscure, and needing vigilant sanity and self-control, was little better than to call in a wizard with his magic. Mr Gladstone always professed perplexity in understanding why the violent end of th» gallant Cavagnari in Afghanistan stirred the world so little in comparison with the fate of Gordon. The answer is that Gordon seized the imagination of England, and seized it on its higher side. His religion was eccentric, but it was religion; the Bible was the rock on which he founded himself, both old dispensation and new; he was known to hate forms, ceremonies and all the ' solemn plausi- bilities '; his speech was sharp, pithy, rapid and ironic; above all, he knew the ways of war and would not bear the

sword for nought.”

to five years’ imprisonment in Newgate, where he lived at his ease, giving dinners and dances. As he could not obtain securities for his good behaviour on the termination of his term of imprison- ment, he was not allowed to leave Newgate, and there he died of delirious fever on the 1st of November 1 793. Some time before his apprehension he had become a convert to Judaism, and had undergone the initiatory rite.

A serious defence of most of his eccentricities is undertaken in The Life of Lord George Gordon, with a Philosophical Review of his Political Conduct, by Robert Watson, M.D. (London, 1795). The best accounts of Lord George Gordon are to be found in the Annual Registers from 1780 to the year of his death.

GORDON, SIR JOHN WATSON (1788-1864), Scottish painter, was the eldest son of Captain Watson, R.N., a cadet of the family of Watson of Overmains, in the county of Berwick. He was born in Edinburgh in 1788, and was educated specially with a view to his joining the Royal Engineers. He entered as a student in the government school of design, under the manage- ment of the Board of Manufactures. His natural taste for art quickly developed itself, and his father was persuaded to allow him to adopt it as his profession. Captain Watson was himself a skilful draughtsman, and his brother George Watson, after- wards president of the Scottish Academy, stood high as a portrait painter, second only to Sir Henry Raeburn, who also was a friend of the family. In the year 1808 John sent to the exhibition of the Lyceum in Nicolson Street a subject from the Lay of the Last Minstrel, and continued for some years to exhibit fancy subjects; but, although freely and sweetly painted, they were altogether without the force and character which stamped his portrait pictures as the works of a master. After the death of Sir Henry Raeburn in 1823, he succeeded to much of his practice. He assumed in 1826 the name of Gordon. One of the earliest of his famous sitters was Sir Walter Scott, who sat for a first portrait in 1820. Then came J. G. Lockhart in 182 1; Professor Wilson, 1822 and 1850, two portraits; Sir Archibald Alison, 1839; Dr Chalmers, 1844; a little later De Quincey, and Sir David Brewster, 1864. Among his most important works may be mentioned the earl of Dalhousie (1833), in the Archers’ Hall, Edinburgh; Sir Alexander Hope (1835), in the county buildings, Linlithgow; Lord President Hope, in the Parliament House; and Dr Chalmers. These, unlike his later works, are gener- ally rich in colour. The full length of Dr Brunton (1844), and Dr Lee, the principal of the university (1846), both on the staircase of the college library, mark a modification of his style, which

ultimately resolved itself into extreme simplicity, both of colour and treatment.

During the last twenty years of his life he painted many distinguished Englishmen who came to Edinburgh to sit to him. And it is significant that David Cox, the landscape painter, on being presented with his portrait, subscribed for by many friends, chose to go to Edinburgh to have it executed by Watson Gordon, although he neither knew the painter personally nor had ever before visited the country. Among the portraits painted during this period, in what may be termed his third style, are De Quincey, in the National Portrait Gallery, London; General Sir Thomas Macdougall Brisbane, in the Royal Society; the prince of Wales, Lord Macaulay, Sir M. Packington, Lord Murray, Lord Cockburn, Lord Rutherford and Sir John Shaw Lefevre, in the Scottish National Gallery. These latter pictures are mostly clear and grey, sometimes showing little or no positive colour, the flesh itself being very grey, and the handling extremely masterly, though never obtruding its cleverness. He was very successful in rendering acute observant character. A good example of his last style, showing pearly flesh-painting' freely handled, yet highly finished, is his head of Sir John Shaw Lefevre.

John Watson Gordon was one of the earlier members of the Royal Scottish Academy, and was elected' its president in 1850; he was at the same time appointed limner for Scotland to the queen, and received the honour of knighthood. Since 1841 he had been an associate of the Royal Academy, and in 1851 he was elected a royal academician. He died on the 1st of June

1864.

GORDON, LEON, originally Judah Loeb ben Asher (1831- 1892), Russian-Jewish poet and novelist (Hebrew), was born at Wilna in 1831 and died at St Petersburg in 1892. He took a leading part in the modern revival of the Hebrew language and culture. His satires did much to rouse the Russian Jews to a new sense of the reality of life, and Gordon was the apostle of enlightenment in the Ghettos. His Hebrew style is classical and pure. His poems were collected in four volumes, Kol Shire Yehudah (St Petersburg, 1883-1884); his novels in Kol Kithbe Yehuda (Odessa, 1889).

For his works see Jewish Quarterly Review, xviii. 437 seq.

GORDON, PATRICK (1635-1699), Russian general, was descended from a Scottish family of Aberdeenshire, who possessed the small estate of Auchleuchries, and were connected with the house of Haddo. He was born in 1635, and after completing his education at the parish schools of Cruden and Ellon, entered, in his fifteenth year, the Jesuit college at Brauns- berg, Prussia; but, as ” his humour could not endure such a still and strict way of living,” he soon resolved to return home. He changed his mind, however, before re-embarking, and after journeying on foot in several parts of Germany, ultimately, in 1655, enlisted at Hamburg in the Swedish service. In the course of the next five years he served alternately with the Poles and Swedes as he was taken prisoner by either. In 1661, after further experience as a soldier of fortune, he took service in the Russian army under Alexis I., and in 1665 he was sent on a special mission to England. After his return he distin- guished himself in several wars against the Turks and Tatars in southern Russia, and in recognition of his services he in 1678 was made major-general, in 1679 was appointed to the chief command at Kiev, and in 1683 was made lieutenant-general. He visited England in 1686, and in 1687 and 1689 took part as quarter- master-general in expeditions against the Crim Tatars in the Crimea, being made full general for his services, in spite of the denunciations of the Greek Church to which, as a heretic, he was exposed. On the breaking out of the revolution in Moscow in 1689, Gordon with the troops he commanded virtually decided events in favour of the tsar Peter I., and against the tsaritsa Sophia. He was therefore during the remainder of his life in high favour with the tsar, who confided to him the command of his capital during his absence from Russia, employed him in organizing his army according to the European system; and latterly raised him to the rank of general-in-chief. He died on the 29th of November 1699. The tsar, who had visited him frequently during his illness, was with him when he died, and with his own hands closed his eyes.

General Gordon left behind him a diary of his life, written in English. This is preserved in MS. in the archives of the Russian foreign office. A complete German translation, edited by Dr Maurice Possalt (Tagebuchdes Generals Patrick Gordon) was published, the first volume at Moscow in 1849, the second at St Petersburg in 1851, and the third at St Petersburg in 1853; and Passages from the Diary of General Patrick Gordon of Auchleuchries (1635-1699), was printed, under the editorship of Joseph Robertson, for the Spalding Club, Aberdeen, 1859.

GORDON-CUMMING, ROUALEYN GEORGE (1820-1866), Scottish traveller and sportsman, known as the ” lion hunter,” was born on the 15th of March 1820. He was the second son of Sir William G. Gordon-Cumming, 2nd baronet of Altyre and Gordo nstown, Elginshire. From his early years he was distin- guished by his passion for sport. He was educated at Eton, and at eighteen joined the East India Co.‘s service as a cornet in the Madras Light Cavalry. The climate of India not suiting him, after two years’ experience he retired from the service and returned to Scotland. During his stay in the East he had laid the foundation of his collection of hunting trophies and specimens’ of natural history. In 1843 he joined the Cape Mounted Rifles, but for the sake of absolute freedom sold out at the end of the year and with an ox wagon and a few native followers set out for the interior. He hunted chiefly in Bechuanaland and the • Limpopo valley, regions then swarming with big game. In 1848 he returned to England. The story of his remarkable exploits is vividly told in his book, Five Years of a Hunter’s

Life in the Far Interior of South Africa (London, 1850, 3rd ed. 1851). Of this volume, received at first with incredulity by stay-at-home critics, David Livingstone, who furnished Gordon-Cumming with most of his native guides, wrote: ” I have no hesitation in saying that Mr Cumming’s book conveys a truthful idea of South African hunting ” {Missionary Travels, chap. vii.). His collection of hunting trophies was exhibited in London in 1851 at the Great Exhibition, and was illustrated by a lecture delivered by Gordon-Cumming. The collection, known as ” The South Africa Museum,” was afterwards exhibited in various parts of the country. In 1858 Gordon-Cumming went to live at Fort Augustus on the Caledonian Canal, where the exhibition of his trophies attracted many visitors. He died there on the 24th of March 1866.

An abridgment of his book was published in 1856 under the title of The Lion Hunter of South Africa, and in this form was frequently reprinted, a new edition appearing in 1904.

GORE, CATHERINE GRACE FRANCES (1799-1861), English novelist and dramatist, the daughter of Charles Moody, a wine- merchant, was born in 1799 at East Retford, Nottinghamshire. In 1823 she was married to Captain Charles Gore; and, in the next year, she published her first work, Theresa Marchmont, or the Maid of Honour. Then followed, among others, the Lettre de Cachet (1827), The Reign of Terror (1827), Hungarian Tales (1829), Manners of the Day (1830) , Mothers and Daughters (1831), and The Fair of May Fair (1832), Mrs Armytage (1836). Every succeeding year saw several volumes from

her pen: The Cabinet Minister and The Courtier of the Days of Charles II., in 1839; Preferment in 1840. In 1841 Cecil, or the Adventures of a Cox- comb, attracted considerable attention. Greville, or a Season in Paris appeared in the same year; then Ormington, or Cecil a Peer, Fascination, The Ambassador's Wife; and in 1843 The Banker's Wife. Mrs Gore continued to write, with unfailing fertility of invention, till her death on the 29th of January 1861. She also wrote some dramas of which the most successful was the School for Coquettes, produced at the Haymarket (1831). She was a woman of versatile talent, and set to music Burns's " And ye shall walk in silk attire," one of the most popular songs of her day. Her extraordinary literary industry is proved by the existence of more than seventy distinct works. Her best novels are Cecil, or the Adventures of a Coxcomb, and The Banker's Wife. Cecil gives extremely vivid sketches of London fashionable life, and is full of happy epigrammatic touches. For the know- ledge of London clubs displayed in it Mrs Gore was indebted to William Beckford, the author of Vathek. The Banker's Wife is distinguished by some clever studies of character, especially in the persons of Mr Hamlyn, the cold calculating money-maker, and his warm-hearted country neighbour, Colonel Hamilton.

Mrs Gore's novels had an immense temporary popularity; they were parodied by Thackeray in Punch, in his " Lords and Liveries by the author of Dukes and Dejeuners "; but, tedious as they are to present-day readers, they presented on the whole faithful pictures of the contemporary life and pursuits of the English upper classes.

GORE, CHARLES (1853-), English diyine, was born in 1853, the 3rd son of the Hon. Charles Alexander Gore, brother of the 4th earl of Arran. His mother was a daughter of the 4th earl of Bessborough. He was educated at Harrow and at Balliol College, Oxford, and was elected fellow of Trinity College in 1875. From 1880 to 1883 he was vice-principal of the theological college at Cuddesdon, and, when in 1884 Pusey House was founded at Oxford as a home for Dr Pusey's library and a centre for the propagation of his principles, he was appointed principal, a position which he held until 1893. As principal of Pusey House Mr Gore exercised a wide influence over undergraduates and the younger clergy, and it was largely, if not mainly, under this influence that the " Oxford Movement " underwent a change which to the survivors of the old school of Tractarians seemed to involve a break with its basic principles. " Puseyism " had been in the highest degree conservative, basing itself on authority and tradition, and repudiating any compromise with the modern critical and liberalizing spirit. Mr Gore, starting from the same

basis of faith and authority, soon found from his practical experi- ence in dealing with the ” doubts and difficulties ” of the younger generation that this uncompromising attitude was untenable, and set himself the task of reconciling the principle of authority in religion with that of scientific authority by attempting to define the boundaries of their respective spheres of influence. To him the divine authority of the Catholic Church was an axiom, and in r889 he published two works, the larger of which, The Church and the Ministry, is a learned vindication of the principle of Apostolic Succession in the episcopate against the Presbyterians and other Protestant bodies, while the second, Roman Catholic Claims, is a defence, couched in a more popular form, of the Anglican Church and Anglican orders against the attacks of the Romanists.

So far his published views had been in complete consonance with those of the older Tractarians. But in 1890 a great stir was created by the publication, under his editorship, of Lux Mundi, a series of essays by different writers, being an attempt ” to succour a distressed faith by endeavouring to bring the Christian Creed into its right relation to the modern growth of knowledge, scientific, historic, critical; and to modern problems of politics and ethics.” Mr Gore himself contributed an essay on ” The Holy Spirit and Inspiration.” The book, which ran through twelve editions in a little over a year, met with a some- what mixed reception. Orthodox churchmen, Evangelical and Tractarian alike, were alarmed by views on the incarnate nature of Christ that seemed to them to impugn his Divinity, and by concessions to the Higher Criticism in the matter of the inspira- tion of Holy Scriptures which appeared to them to convert the ” impregnable rock,” as Gladstone had called it, into a founda^ tion of sand; sceptics,, on the other hand, were not greatly impressed by a system of defence which seemed to draw an artificial line beyond which criticism was not to advance. None the less the book produced a profound effect, and that far beyond the borders of the English Church, and it is largely due to its influence, and to that of the school it represents, that the High Church movement developed thenceforth on ” Modernist ” rather than Tractarian lines.

In 1891 Mr Gore was chosen to deliver the Bampton lectures before the university, and chose for his subject the Incarnation. In these lectures he developed the doctrine, the enunciation of which in Lux Mundi had caused so much heart-searching. This is an attempt to

explain how it came that Christ, though incarnate God, could be in error, e.g. in his citations from the Old Testa- ment. The orthodox explanation was based on the principle of accommodation (q.v.). This, however, ignored the difficulty that if Christ during his sojourn on earth was not subject to human limitations,. especially of knowledge, he was not a man as other men, and therefore not subject to their trials and temptations. This difficulty Gore sought to meet through the doctrine of the mvojctis. Ever since the Pauline epistles had been received into the canon theologians had, from various points of view, at- tempted to explain what St Paul meant when he wrote of Christ (2 Phil. ii. 7) that ” he emptied himself and took upon him the form of a servant ” (eavrov ktcevaxrev ixopv). According to Mr Gore this means that Christ, on his incarnation, became subject to all human limitations, and had, so far as his life on earth was concerned, stripped himself of all the attributes of the Godhead, including the Divine omniscience, the Divine nature being, as it were, hidden under the human. 1

Lux Mundi and the Bampton lectures led to a situation of some tension which was relieved when in 1893 Dr Gore resigned his principalship and became vicar of Radley, a small parish near Oxford. In 1894 he became canon of Westminster. Here he gained commanding influence as a preacher and in 1898 was appointed one of the court chaplains. In 1902 he succeeded

1 Cf. the Lutheran theologian Ernst Sartorius in his Lehre von der heiligen Liebe (1844), Lehre ii. pp. 21 et seq. : ” the Son of God veils his all-seeing eye and descends into human darkness and as child of man opens his eye as the gradually growing light of the world of humanity, until at the right hand of the Father he allows

it to shine forth in all its glory.” See Loofs, Art ” v •’ ” ””

Herzog-Hauck, Realencyklopddie (ed. 1901), x. 247.

J. J. S. Perowne as bishop of Worcester and in 1905 was installed bishop of Birmingham, a new see the creation of which had been mainly due to his efforts. While adhering rigidly to his views on the divine institution of episcopacy as essential to the Christian Church, Dr Gore from the first cultivated friendly relations with the ministers of other denominations, and advo- cated co-operation with them in all matters when agreement was possible. In social questions he became one of the leaders of the considerable group of High Churchmen

known, somewhat loosely, as Christian Socialists. He worked actively against the sweating system, pleaded for European intervention in Mace- donia, and was a keen supporter of the Licensing Bill of 1908. In 1892 he founded the clerical fraternity known as the Com- munity of the Resurrection. Its members are priests, who are bound by the obligation of celibacy, live under a common rule and with a common purse. Their work is pastoral, evangelistic, literary and educational. In 1898 the House of the Resurrection at Mirfield, near Huddersfield, became the centre of the com- munity; in 1903 a college for training candidates for orders was established there, and in the same year a branch house, for missionary work, was set up in Johannesburg in South Africa.

Dr Gore's works include The Incarnation (Bampton Lectures, 1891), The Creed of the Christian (1895), The Body of Christ (1901), The New Theology and the Old Religion (1908), and expositions of The Sermon on the Mount (1896), Ephesians (1898), and Romans (1899), while in 1910 he published Orders and Unity.

GORE. (1) (O. Eng. gor, dung or filth), a word formerly used in the sense of dirt, but now confined to blood that has thickened after being shed. (2) (O. Eng. gdra, probably con- nected with gare, an old word for "spear"), something of triangular shape, resembling therefore a spear-head. The word is used for a tapering strip of land, in the " common or open field " system of agriculture, where from the shape of the land the acre or half-acre strips could not be portioned out in straight divisions. Similarly " gore " is used in the United States, especially in Maine and Vermont, for a strip of land left out in surveying when divisions are made and boundaries marked. The triangular sections of material used in forming the covering of a balloon or an umbrella are also called " gores," and in dressmaking the term is used for a triangular piece of material inserted in a dress to adjust the difference in widths. To gore, i.e. to stab or pierce with any sharp instrument, but more particularly used of piercing with the horns of a bull, is probably directly connected with gare, a spear.

GOREE, an island off the west coast of Africa, forming part of the French colony of Senegal. It lies at the entrance of the large natural harbour formed by the peninsula of Cape Verde. The island, some 900 yds. long by 330 broad, and 3 m. distant fr6m the nearest point of the mainland, is mostly barren rock. The greater part of its surface is occupied by a town, formerly a thriving commercial entrepot and a strong military post. Until 1906 it was a free port. With the rise of Dakar (q.v.), c. i860, on the adjacent coast, Goree lost its trade and its inhabitants, mostly Jolofs, had dwindled in 1905 to about 1500. Its

healthy climate, however, makes it useful as a sanatorium. The streets are narrow, and the houses, mainly built of dark- red stone, are flat-roofed. The castle of St Michael, the gover- nor's residence, the hospital and barracks, testify to the former importance of the town. Within the castle is an artesian well, the only water-supply, save that collected in rain tanks, on the island. Goree was first occupied by the Dutch, who took posses- sion of it early in the 17th century and called it Goeree or Goede- reede, in memory of the island on their own coast now united with Overflakkee. Its native name is Bir, i.e. a belly, in allusion to its shape. It was captured by the English under Commodore (afterwards Admiral Sir Robert) Holmes in 1663, but retaken in the following year by de Ruyter. The Dutch were finally expelled in 1677 by the French under Admiral d'Estrees. Goree subsequently fell again into the hands of the English, but was definitely occupied by France in 1817 (see Senegal: History).

GORGE, strictly the French word for the throat considered externally. Hence it is applied in falconry to a hawk's crop,

and thus, with the sense of something greedy or ravenous, to food given to a hawk and to the contents of a hawk's crop or stomach. It is from this sense that the expression of a person's " gorge rising at " anything in the sense of loathing or disgust is derived. " Gorge," from analogy with " throat," is used with the meaning of a narrow opening as of a ravine or valley between hills; in fortification, of the neck of an outwork or bastion; and in architecture, of the narrow part of a Roman Doric column, between the echinus and the astragal. From " gorge " also comes a diminutive " gorget," a portion of a woman's costume in the middle ages, being a close form of wimple covering the neck and upper part of the breast, and also that part of the body armour covering the neck and collar- bone (see Gorget). The word " gorgeous," of splendid or magnificent appearance, comes from the O. Fr. gorgias, with the same meaning, and has very doubtfully been connected with gorge, a ruffle or neck-covering, of a supposed elaborate kind.

GORGEI, ARTHUR (1818-), Hungarian soldier, was born at Toporcz, in Upper Hungary, on the 30th of January 1 818. He came of a Saxon noble family who were converts to Protestantism. In 1837 he entered the Bodyguard of Hungarian Nobles at Vienna, where he combined military service with a course of study at the university. In 1845, on-

the death of his father, he retired from the army and devoted himself to the study of chemistry at Prague, after which he retired to the family estates in Hungary. On the outbreak of the revolutionary War of 1 848, Gorgei offered his sword to the Hungarian govern- ment. Entering the Honved army with the rank of captain, he was employed in the purchase of arms, and soon became major and commandant of the national guards north of the Theiss. Whilst he was engaged in preventing the Croatian army from crossing the Danube, at the island of Csepel, below Pest, the wealthy Hungarian magnate Count Eugene Zichy fell into his hands, and Gorgei caused him to be arraigned before a court- martial on a charge of treason and immediately hanged. After various successes over the Croatian forces, of which the most remarkable was that at Ozora, where 10,000 prisoners fell into his hands, Gorgei was appointed commander of the army of the Upper Danube, but, on the advance of Prince Windischgratz across the Leitha, he resolved to fall back, and in spite of the remonstrances of Kossuth he held to his resolution and retreated upon Waitzen. Here, irritated by what he considered undue interference with his plans, he issued (January 5th, 1849) a pro- clamation throwing the blame for the recent want of success upon the government, thus virtually revolting against their authority. Gorgei retired to the Hungarian Erzgebirge and conducted operations on his own initiative. Meanwhile the supreme command had been conferred upon the Pole Dembinski, but the latter fought without success the battle of Kapolna, at which action Gorgei's corps arrived too late to take an effective part, and some time after this the command was again conferred upon Gorgei. The campaign in the spring of 1849 was brilliantly conducted by him, and in a series of engagements, he defeated Windischgratz. In April he won the victories of Godollo Izaszeg and Nagy Sarl6, relieved Komorn, and again won a battle at Acs or Waitzen. Had he followed up his successes by taking the offensive against the Austrian frontier, he might perhaps have dictated terms in the Austrian capital itself. As it was, he contented himself with reducing Ofen, the Hungarian capital, in which he desired to re-establish the diet, and after effecting this capture he remained inactive for some weeks. Meanwhile, at a diet held at Debreczin, Kossuth had formally proposed the dethronement of the Habsburg dynasty and Hungary had been proclaimed a republic. Gorgei had refused the field-marshal's baton offered him by Kossuth and was by no means in sympathy with the new regime. However, he accepted the portfolio of minister of war, while retaining the command of the troops in the field. The Russians had now intervened in the struggle and made common cause with the Austrians; the allies were advanc- ing into Hungary on all sides, and GSrgei was defeated by Haynau at Pered (20th-2ist of June). KcDsut.h,

perceiving

the impossibility of continuing the struggle and being unwilling himself to make terms, resigned his position as dictator, and was succeeded by Gorgei, who meanwhile had been fighting hard against the various columns of the enemy. Gorgei, convinced that he could not break through the enemy's lines, surrendered, with his army of 20,000 infantry and 2000 cavalry, to the Russian general Riidiger at Vilagos. Gorgei was not court- martialled, as were his generals, but kept in confinement at Klagenfurt, where he lived, chiefly employed in chemical work, until 1867, when he was pardoned and returned to Hungary. The surrender, and particularly the fact that his life was spared while his generals and many of his officers and men were hanged or shot, led, perhaps naturally, to his being accused of treason by public opinion of his countrymen. After his release he played no further part in public life. Even in 1885 an attempt which was made by a large number of his old comrades to re- habilitate him was not favourably received in Hungary. After some years' work as a railway engineer he retired to Visegrad, where he lived thenceforward in retreat. (See also Hungary: History.)

General Gorgei wrote a justification of his operations (Mein Leben und Wirken in Ungarn 1848-1859, Leipzig, 1852), an anonymous paper under the title Was verdanken wir der Revolu- tion? (1875), and a reply to Kossuth's charges (signed " Joh. Demar ") in Budapesti Szemle, 1881, 25-26. Amongst those who wrote in his favour were Captain Stephan Gorgei (1848 is 1849 bbl, Budapest, 1885), and Colonel Aschermann (Ein offenes Wort in der Sache desHonved-Generals A rthur Gorgei, Klausenburg,

1867).

See also A. G. Horn, Gorgei, Oberkommandant d. ung. Armee (Leipzig, 1850) ; Kinety, Gorgei's Life and Work in Hungary (London, 1853) ; Szinyei, in Magyar Irok (iii. 1378), Hentaller, Gorgei as a Statesman (Hungarian) ; Elemar, Gorgei in 1848-1849 (Hungarian, Budapest, 1886).

GORGES, SIR FERDINANDO (c. 1566-1647), English colonial pioneer in America and the founder of Maine, was born in Somersetshire, England, probably in 1566. From youth both a soldier and a sailor, he was a prisoner in Spain at the age of twenty-one, having been captured by a ship of the Spanish Armada. In 1589 he was in command of a small body of troops fighting for Henry IV. of France, and after distinguishing him- self at the siege of Rouen was knighted

there in 1591. In 1596 he was commissioned captain and keeper of the castle and fort at Plymouth and captain of St Nicholas Isle; in 1597 he accom- panied Essex on the expedition to the Azores; in 1599 assisted him in the attempt to suppress the Tyrone rebellion in Ireland, and in 1600 was implicated in Essex's own attempt at rebellion in London. In 1603, on the accession of James I., he was suspended from his post at Plymouth, but was restored in the same year and continued to serve as " governor of the forts and island of Plymouth" until 1629, when, his garrison having been without pay for three and a half years, his fort a ruin, and all his applications for aid having been ignored, he resigned. About 1605 he began to be greatly interested in the New World; in 1606 he became a member of the Plymouth Company, and he laboured zealously for the founding of the Popham colony at the mouth of the Sagadahoc (now the Kennebec) river in 1607. For several years following the failure of that enterprise in 1608 he continued to fit out ships for fishing, trading and exploring, with colonization as the chief end in view. He was largely instrumental in procuring the new charter of 1620 for the Plymouth Company, and was at all times of its existence perhaps the most influential member of that body. He was the recipient, either solely or jointly, of several grants of territory from it, for one of which he received in 1639 the royal charter of Maine (see Maine). In 1635 he sought to be appointed governor-general of all New England, but the English Civil War— in which he espoused the royal cause — prevented him from ever actually holding that office. A short time before his death at Long Ashton in 1647 he wrote his Brief e Narration of the Originall Undertakings of the Advancement of Plantations into the Parts of America. He was an advocate, especially late in life, of the feudal type of colony.

See J. P. Baxter (ed.), Sir Ferdinando Gorges and his Province of Maine (3 vols., Boston, 1890; in the Prince Society Publications), the first volume of which is a memoir of Gorges, and the other volumes contain a reprint of the Briefe Narration, Gorges's letters, and other documentary material.

GORGET (O. Fr. gorgete, dim. of gorge, throat), the name applied after about 1480 to the cellar-piece of a suit of armour. It was generally formed of small overlapping rings of plate, and attached either to the body armour or to the armet. It was worn in the 16th and 17th centuries with the half-armour, with the plain cuirass, and even

occasionally without any body armour at all. During these times it gradually became a distinctive badge for officers, and as such it survived in several armies — in the form of a small metal plate affixed to the front of the collar of the uniform coat— until after the Napoleonic wars. In the German army to-day a gorget-plate of this sort is the distinctive mark of military police, while the former officer's gorget is represented in British uniforms by the red patches or tabs worn on the collar by staff officers and by the white patches of the midshipmen in the Royal Navy.

GORGIAS (c. 483-375 B.C.), Greek sophist and rhetorician, was a native of Leontini in Sicily. In 427 he was sent by his fellow-citizens at the head of an embassy to ask Athenian protection against the aggression of the Syracusans. He subse- quently settled in Athens, and supported himself by the practice of oratory and by teaching rhetoric. He died at Larissa in Thessaly. His chief claim to recognition coDsists in the fact that he transplanted rhetoric to Greece, and contributed to the diffusion of the Attic dialect as the language of literary prose. He was the author of a lost work On Nature or the Non-existent (Ilept toD jui? ovtos t} irepl (pvaeois, fragments edited by M. C. Valeton, 1876), the substance of which may be gathered from the writings of Sextus Empiricus, and also from the treatise (ascribed to Theophrastus) De Melisso, Xenophane, Gorgia. Gorgias is the central figure in the Platonic dialogue Gorgias. The genuineness of two rhetorical' exercises {The Encomium of Helen and The Defence of Palamedes, edited with Antiphon by F. Blass in the Teubner series, 1881), which have come down under his name, is disputed.

For his philosophical opinions see Sophists and Scepticism. See also Gomperz, Greek Thinkers, Eng. trans, vol. i. bk. iii. chap, vii.; Jebb's Attic Orators, introd. to vol. i. (1893); F. Blass, Die attische Beredsamkeit, i. (1887) ; and article Rhetoric.

GORGON, GORGONS (Gr. Topyco, Topybvts, the "terrible," or, according to some, the " loud-roaring "), a figure or figures in Greek mythology. Homer speaks of only one Gorgon, whose head is represented in the Iliad (v. 741) as fixed in the centre of the aegis of Zeus. In the Odyssey (xi. 633) she is a monster of the under-world. Hesiod increases the number of Gorgons to three — Stheno (the mighty), Euryale (the far-springer) and Medusa (the queen), and makes them the daughters of the sea-god Phorcys and of Keto. Their home is on the farthest side of the western ocean; according to later authorities, in Libya (Hesiod, Theog. 274; Herodotus ii. 91; Pausanias ii. 21). The Attic tradition, reproduced in Euripides {Ion 1002), regarded the Gorgon as a monster, produced by Gaea to aid her sons

the giants against the gods and slain by Athena (the passage is a locus classicus on the aegis of Athena).

The Gorgons are represented as winged creatures, having the form of young women; their hair consists of snakes; they are round-faced, flat-nosed, with tongues lolling out and large projecting teeth. Sometimes they have wings of gold, brazen claws and the tusks of boars. Medusa was the only one of the three who was mortal; hence Perseus was able to kill her by cutting off her head. From the blood that spurted from her neck sprang Chrysaor and Pegasus, her two sons by Poseidon. The* head, which had the power of turning into stone all who looked upon it, was given to Athena, who placed it in her shield; according to another account, Perseus buried it in the market- place of Argos. The hideously grotesque original type of the Gorgoneion, as the Gorgon's head was called, was placed on the walls of cities, and on shields and breastplates to terrify an enemy (cf. the hideous faces on Chinese soldiers' shields), and used Xii. 9

generally as an amulet, a protection against the evil eye. Heracles is said to have obtained a lock of Medusa's hair (which possessed the same powers as the head) from Athena and given it to Sterope, the daughter of Cepheus, as a protection for the town of Tegea against attack (Apollodorus ii. 7. 3). According to Roscher, it was supposed, when exposed to view, to bring on a storm, which put the enemy to flight. Frazer {Golden Bough, i. 378) gives examples of the superstition that cut hair caused storms. According to the later idea of Medusa as a beautiful maiden, whose hair had been changed into snakes by Athena, the head was represented in works of art with a wonderfully handsome face, wrapped in the calm repose of death. The Rondanini Medusa at Munich is a famous specimen of this conception. Various accounts of the Gorgons were given by later ancient writers. According to Diod. Sic. (iii. 54. 55) they were female warriors living near Lake Tritonis in Libya, whose queen was Medusa; according to Alexander of Myndus, quoted in Athenaeus (v. p. 221), they were terrible wild animals whose mere look turned men to stone. Pliny {Nat. Hist. vi. 36 [31]) describes them as savage women, whose persons were covered with hair, which gave rise to the story of their snaky hair and girdle. Modern authorities have explained them as the personification of the waves of the sea or of the barren, un- productive coast of Libya; or as the awful darkness of the storm-cloud, which comes from the west and is scattered by the sun-god Perseus. More recent is the explanation of anthro- pologists that Medusa, whose virtue is really in her head, is derived from the ritual mask common to primitive cults.

See Jane E. Harrison, Prolegomena to the Study of Greek Religion (1903); W. H. Roscher, Die Gorgonen und Verwandtes (1879); J. Six, De Gorgone (1885), on the types of the Gorgon's head; articles by Roscher and Furtwangler in Roscher's Lexikon der Mythologie, by G. Glotz in Daremberg and Saglio's Dictionnaire des antiquitis, and by R. Gadechens in Ersch and Gruber's Allgemeine Encyclopddie', N. G. Polites ('0 irepl tuiv Topybvup [ifflos irapd. Tip 'EWtˆikc'? Xcujj, 1 878) gives an account of the Gorgons, and of the various superstitions connected with them, from the modern Greek point of view, which regards them as malevolent spirits of the sea.

GORGONZOLA, a town of Lombardy, Italy, in the province of Milan, from which it is 11 m. E.N.E. by steam tramway. Pop. (1901) 5134. It is the centre of the district in which is produced the well-known Gorgonzola cheese.

GORI, a town of Russian Transcaucasia, in the government of Tiflis and 49 m. by rail N.W. of the city of Tiflis, on the river Kura; altitude, 2010 ft. Pop. (1897) 10,457. The surrounding country is very picturesque. Gori has a high school for girls, tnd a school for Russian and Tatar teachers. At one time celebrated for its silk and cotton stuffs, it is now famous for corn, reputed the best in Georgia, and the wine is also esteemed. The climate is excellent, delightfully cool in summer, owing to the refreshing breezes from the mountains, though these are, however, at times disagreeable in winter. Gori was founded (n 23) by the Georgian king David II., the Renovater, for the Armenians who fled their country on the Persian invasion. The earliest remains of the fortress are Byzantine; it was thoroughly restored in 1634- 1658, but destroyed by Nadir Shah of Persia in the 18th century. There is a church constructed in the 17th century by Capuchin missionaries from Rome. Five miles east of Gori is the remark- able roek-cut town of Uplis-tsykhe, which was a fortress in the time of Alexander the Great of Macedon, and an inhabited city in the reign of the Georgian king Bagrat III. (980-1014).

GORILLA (or Pongo), the largest of the man-like apes, and a native of West Africa from the Congo to Cameroon, whence it extends eastwards across the continent to German East Africa. Many naturalists regard the gorilla as best included in the same genus as the chimpanzee, in which case it should be known as Anthropopithecus gorilla, but by others it is regarded as the representative of a genus by itself, when its title will be Gorilla savagei, or G. gorilla. That there are local forms of gorilla is quite certain: but whether any of these are entitled to rank as distinct species may be a matter of opinion. It was long supposed that the apes encountered on an island off the west

coast of Africa by Hanno, the Carthaginian, were gorillas, but in the

opinion of some of those best qualified to judge, it is probable that the creatures in question were really baboons. The first real account of the gorilla appears to be the one given by an English sailor, Andrew Battel, who spent some time in the wilds of West Africa during and about the year 1590; his account being presented in Purchas's Pilgrimage, published in the year 1613. From this it appears that Battel was familiar with both the chimpanzee and the gorilla, the former of which he terms engeco and the latter pongo— names which ought apparently to be adopted for these two species in place of those now in use. Between Battel's time and 1846 nothing appears to have been heard of the gorilla or pongo, but in that year a missionary at the Gabun accidentally discovered a skull of the huge ape; and in 1847 a sketch of that specimen, together with two others, came into the hands of Sir R. Owen, by whom the name Gorilla savagei was proposed for the new ape in 1848. Dr Thomas Savage, a missionary at the Gabun, who sent Owen information with regard to the original skull, had, however, himself proposed the name Troglodytes gorilla in 1847. The first complete skeleton of a gorilla sent to Europe was received at the museum of the Royal College of Surgeons in 1851, and the first complete skin appears to have reached the British Museum in 1858. Paul B. du Chaillu's account (1861) of his journeys in the Gabun region popularized the knowledge of the existence of the gorilla. Male gorillas largely exceed the females in size,' and attain a height of from 55 ft. to 65 ft., or perhaps even more. Some of the features distinguishing the gorilla from the mere gorilla-like chimpanzees will be found mentioned in the article Primates. Among them are the small ears, elongated head, the presence of a deep groove alongside the nostrils, the small size of the thumb, and the great length of the arm, which reaches half-way down the shin-bone (tibia) in the erect posture. In old males the eyes are overhung by a beetling penthouse of bone, the hinder half of the middle line of the skull bears a wall-like bony ridge for the attachment of the powerful jaw-muscles, and the tusks, or canines, are of monstrous size, recalling those of a carnivorous animal. The general colour is blackish, with a more or less marked grey or brownish tinge on the hair cf the shoulders, and sometimes of chestnut on the head. Mr G. L. Bates (in Proc. Zool. Soc, 1905, vol. i.) states that gorillas only leave the depths of the forest to

enter the outlying clearings in the neighbourhood of human settlements when they are attracted by some special fruit or succulent plant; the favourite being the fruit of the ” mejom,” a tall cane-like plant (perhaps a kind of Amomum) which grows abundantly on deserted clearings. At one isolated village the natives, who were unarmed, reported that they not unfrequently saw and heard the gorillas, which broke down the stalks of the plantains in the rear of the habitations to tear out and eat the tender heart. On the old clearings of another village Mr Bates himself, although he did net see a gorilla, saw the fresh tracks of these great apes and the torn stems and discarded fruit rinds of the ” mejoms,” as well as the broken stalks of the latter, which had been used for beds. On another occasion he came across the bed of an old gorilla which had been used only the night before, as was proved by a negro woman, who on the previous evening had heard the animal breaking and treading down the stalks to form its couch. According to native report, the gorillas sleep on these beds, which are of sufficient thickness to raise them a foot or two above the ground, in a sitting posture, with the head inclined forwards on the breast. In the first case Mr Bates states that the tracks and beds indicated the presence of three or four gorillas, some of which were small. This account does not by any means accord with one given by von Koppenf els, in which it is stated that while the old male gorilla sleeps in a sitting posture at the base of a tree-trunk (no mention being made of a bed), the female and young ones pass the night in a nest in the tree several yards above the ground, made by bending the boughs together and covering them with twigs and moss. Mr Bates’s account, as being based on actual inspection of the beds, is probably the more trustworthy. Even when asleep and snoring, gorillas are difficult to approach, since they awake at the slightest rustle, and an attempt to surround the one heard

making his bed by the woman resulted in failure. Most gorillas killed by natives are believed by Mr Bates to have been en- countered suddenly in the daytime on the ground or in low trees in the outlying clearings. Many natives, even if armed, refuse, however, to molest an adult male gorilla, on account of its ferocity when wounded. Mr Bates, like Mr Winwood Reade, refused to credit du Chaillu’s account of his having killed gorillas, and stated that the only instance he knew of one of these animals being slain by a European was an old male (now in Mr Walter Rothschild’s museum at Tring) shot by the German trader Paschen in the Yaunde district, of which an illustrated account was published in 1901. Mr E. J. Corns states, however, that two European traders, apparently in the ” ‘eighties ” of the 19th century, were in the habit of surrounding and capturing these animals as

occasion offered. 1 Fully adult gorillas have never been seen alive in captivity — and perhaps never will be, as the creature is ferocious and morose to a degree. So long ago as the year 1855, when the species was known to zoologists only by its skeleton, a gorilla was actually living in England. This animal, a young female, came from the Gabun, and was kept for some months in WombwjelPs travelling menagerie, where it was treated as a pet. On its death, the body was sent to Mr Charles Waterton, of Walton Hall, by whom the skin was mounted in a grotesque manner, and the skeleton given to the Leeds museum. Appar- ently, however, it was not till several years later that the skin was recognized by Mr A. D. Bartlett as that of a gorilla; the animal having probably been regarded by its owner as a chim- panzee. A young male was purchased by the Zoological Society in October 1887, from Mr Cross, the Liverpool dealer in animals. At the time of arrival it was supposed to be about three years old, and stood 2J ft. high. A second, a male, supposed to be rather older, was acquired in March 1896, having been brought to Liverpool from the French Congo. It is described as having been thoroughly healthy at the date of its arrival, and of an amiable and tractable disposition. Neither survived long. Two others were received in the Zoological Society's menagerie in 1904, and another was housed there for a short time in the following year, while a fifth was received in 1906. Falkenstein's gorilla, exhibited at the Westminster aquarium under the name of pongo, and afterwards at the Berlin aquarium, survived for eighteen months. " Pussi," the gorilla of the Breslau Zoological Gardens, holds a record for longevity, with over seven years of menagerie life. Writing in 1903 Mr W. T. Hornaday stated that but one live gorilla, and that a tiny infant, had ever landed in the United States; and it lived only five days after arrival. (R. L.*)

GORINCHEM, or Gorcum, a fortified town of Holland in the province of south Holland, on the right bank of the Merwede at the confluence of the Linge, 16 m. by rail W. of Dordrecht. It is connected by the Zederik and Merwede canals with Amster- dam, and steamers ply hence in every direction. Pop. (1900) 11,987. Gorinchem possesses several interesting old houses, and overlooking the river are some fortified gateways of the 17th century. The principal buiidings are the old church of St Vincent, containing the monuments of the lords of Arkel; the town hall, a prison, custom-house, barracks and a military hospital. The charitable and benevolent institutions are numerous, and there are also a library and several learned associations. Gorinchem possesses a good harbour, and besides working in gold and silver, carries on a considerable trade in grain, hemp, cheese, potatoes, cattle and fish, the salmon fishery being noted. Woerkum, or Woudrichem, a

little below the town on the left bank of the Merwede, is famous for its quaint old buildings, which are decorated with mosaics. – GORING, GEORGE GORING, Lord (1608-1657), English Royalist soldier, son of George Goring, earl of Norwich, was born on the 14th of July 1608. He soon became famous at court for his prodigality and dissolute manners. His father-in-law, Richard Boyle, earl of Cork, procured for him a post in the Dutch

1 In 1905 the Rev. Geo. Grenfell reported that he had that summer shot a gorilla in the Bwela country, east of the Mongala affluent of the Congo.

army with the rank of colonel. He was permanently lamed by a wound received at Breda in 1637, and returned to England early in 1639, when he was made governor of Portsmouth. IJe served in the Scottish war, and already had a considerable reputation when he was concerned in the ” Army Plot.” Officers of the army stationed at York proposed to petition the king and parliament for the maintenance of the royal authority. A second party was in favour of more violent measures, and Goring, in the hope of being appointed lieutenant-general, proposed to march the army on London and overawe the parlia- ment during Strafford’s trial. This proposition being rejected by his fellow officers, he betrayed the proceedings to Mountjoy Blount, earl of Newport, who passed on the information in- directly to Pym in April. Colonel Goring was thereupon called on to give evidence before the Commons, who commended him for his services to the Commonwealth. This betrayal of his comrades induced confidence in the minds of the parliamentary leaders, who sent him back to his Portsmouth command. Never- theless he declared for the king in August. He surrendered Portsmouth to the parliament in September 1642 and went to Holland to recruit for the Royalist army, returning to England in December. Appointed to a cavalry command by the earl of Newcastle, he ‘defeated Fairfax at Seacroft Moor near Leeds in March 1643, but in May he was taken prisoner at Wakefield on the capture of the town by Fairfax. In April 1644 he effected an exchange. At Marston Moor he commanded the Royalist left, and charged with great success, but, allowing his troopers to disperse in search of plunder, was routed by Cromwell at the close of the battle. In November 1644, on his father’s elevation to the earldom of Norwich, he became Lord Goring. The parliamentary authorities, however, refused to recognize the creation of the earldom, and continued to

speak of the father as Lord Goring and the son as General Goring. In August he had been despatched by Prince Rupert, who recognized his ability, to join Charles in the south, and in spite of his dissolute and insubordinate character he was appointed to supersede Henry, Lord Wilmot, as lieut. -general of the Royalist horse (see Great Rebellion). He secured some successes in the west, and in January 1645 advanced through Hampshire and occupied Farnham; but want of money compelled him to retreat to Salisbury and thence to Exeter. The excesses committed by his troops seriously injured the Royalist cause, and his exactions made his name hated throughout the west. He had himself prepared to besiege Taunton in March, yet when in the next month he was desired by Prince Charles, who was at Bristol, to send reinforcements to Sir Richard Grenville for the siege of Taunton, he obeyed the order only with ill-humour. Later in the month he was summoned with his troops to the relief of the king at Oxford. Lord Goring had long been intriguing for an independent command, and he now secured from the king what was practically supreme authority in the west. It was alleged by the earl of Newport that he was willing to transfer his allegiance once more to the parliament. It is not likely that he meditated open treason, but he was culpably negligent and occupied with private ambitions and jealousies. He was still engaged in desultory operations against Taunton when the main campaign of 1645 opened. For the part taken by Goring's army in the operations of the Naseby campaign see Great Rebellion. After the decisive defeat of the king, the army of Fairfax marched into the west and defeated Goring in a disastrous fight at Langport on the 10th of July. He made no further serious resistance to the parliamentary general, but wasted his time in frivolous amusements, and in November he obtained leave to quit his disorganized forces and retire to France on the ground of health. His father's services secured him the command of some English regiments in the Spanish service. He died at Madrid in July or August 1657. Clarendon gives him a very unpleasing character, declaring that " Goring . . . would, without hesitation, have broken any trust, or done any act of treachery to have satisfied an ordinary passion or appetite; and in truth wanted nothing but industry (for he had wit, and courage, and understanding and ambition, uncontrolled by any

fear of God or man) to have been as eminent and successful in the highest attempt of wickedness as any man in the age he lived in or before. Of all his qualifications dissimulation was his masterpiece; in which he so much excelled, that men were not ordinarily ashamed, or out of countenance, with being deceived but twice by him."

See the life by C. H. Firth in the Dictionary of National Biography; Dugdale's Baronage, where there are some doubtful stories of his life

in Spain; the Clarendon State Papers; Clarendon's History of the Great Rebellion ; and S. R. Gardiner's History of the Great Civil War.

GORKI, MAXIM (1868-), the pen-name of the Russian novelist Alexei Maximovich Pyeshkov, who was born at Nizhni- Novgorod on the 26th of March 1868. His father was a dyer, but he lost both his parents in childhood, and in his ninth year' was sent to assist in a boot-shop. We find him afterwards in a variety of callings, but devouring books of all sorts greedily, whenever they fell into his hands. He ran away from the boot- shop and went to help a land-surveyor. He was then a cook on board a steamer and afterwards a gardener. In his fifteenth year he tried to enter a school at Kazan, but was obliged to betake himself again to his drudgery. He became a baker, than hawked about kvas, and helped the barefooted tramps and labourers at the docks. From these he drew some of his most striking pictures, and learned to give sketches of humble life generally with the fidelity of a Defoe. After a long course of drudgery he had the good fortune to obtain the place of secretary to a barrister at Nizhni-Novgorod. This was the turning-point of his fortunes, as he found a sympathetic master who helped him. He also became acquainted with the novelist Korolenko, who assisted him in his literary efforts. His first story was Makar Chudra, which was published in the journal Kavkaz. He con- tributed to many periodicals and finally attracted attention by his tale called Chelkash, which appeared in Russkoe Bogatsvo (" Russian wealth "). This was followed by a series of tales in which he drew with extraordinary vigour the life of the bosniaki, or tramps. He has sometimes described other classes of society, tradesmen and the educated classes, but not with equal success. There are some vigorous pictures, however, of the trading class in his Foma Gordeyev. But his favourite type is the rebel, the man in revolt against society, and him he describes from personal knowledge, and enlists our sympathies with him. We get such a type completely in Konovalov. Gorki is always preaching that we must have ideals — something better than everyday life, and this view is brought out in his play At the Lowest Depths, which had great success at Moscow, but was coldly received at St Petersburg.

For a good criticism of Gorki see Ideas and Realities in Russian Literature, by Prince Kropotkin. Many of his works have been translated into English.

GORLITZ, a town of Germany, in the Prussian province of Silesia, on the left bank of the Neisse, 62 m. E. from Dresden on the railway to Breslau, and at the junction of lines to Berlin, Zittau and Halle. Pop. (1885) 55,702, (1905) 80,931. The Neisse at this point is crossed by a

railway bridge 1650 ft. long and 120 ft. high, with 32 arches. Gorlitz is one of the hand- somest, and, owing to the extensive forests of 70,000 acres, which are the property of the municipality, one of the wealthiest towns in Germany. It is surrounded by beautiful walks and fine gardens, and although its old walls and towers have now been demolished, many of its ancient buildings remain to form a picturesque contrast with the signs of modern industry. From the hill called Landskrone, about 1500 ft. high, an extensive prospect is obtained of the surrounding country. The principal buildings are the fine Gothic church of St Peter and St Paul, dating from the 15th century, with two stately towers, a famous qrgan and a very heavy bell; the Frauen Kirche, erected about the end of the 15th century, and possessing a fine portal and choir in pierced work; the Kloster Kirche, restored in 1868, with handsome choir stalls and a carved altar dating from 1383 ; and the Roman Catholic church, founded in 1853, in the Roman style of architecture, with beautiful glass windows and oil-paint- ings. The old town hall (Rathaus) contains a very valuable library, having at its entrance a fine flight of steps. There is

also a new town hall which was erected in 1904-1906. Other buildings are: the old bastion, named Kaisertrutz, now used as a guardhouse and armoury; the gymnasium buildings in the Gothic style erected in 1851; the Ruhmeshalle with the Kaiser Friedrich museum, the house of the estates of the province (Standehaus), two theatres and the barracks. Near the town is the chapel of the Holy Cross, where there is a model of the Holy Sepulchre at Jerusalem made during the 15th century. In the public park there is a bust of Schiller, a monument to Alexander von Humboldt, and a statue of the mystic Jakob Bohme (1575-1624); a monument has been erected in the town in commemoration of the war of 1870-71, and also one to the emperor William I. and a statue of Prince Frederick Charles. In connexion with the natural history society there is a valuable museum, and the scientific institute possesses a large library and a rich collection of antiquities, coins and articles of virtu. Gorlitz, next to Breslau, is the largest and most flourishing commercial town of Silesia, and is also regarded as classic ground for the study of German Renaissance architecture. Besides cloth, which forms its staple article of commerce, it has. manu- factories of various linen and woollen wares, machines, railway wagons, glass, sago, tobacco, leather, chemicals and tiles.

Gorlitz existed as a village from a very early period, and at the

beginning of the 12th century received civic rights. It was then known as Drebenau, but on being rebuilt after its destruc- tion by fire in 1131 it received the name of Zgorzelice. About the end of the 12th century it was strongly fortified, and for a short time it was the capital of a duchy of Gorlitz. It was several times besieged and taken during the Thirty Years' War, and it also suffered considerably in the Seven Years' War. In the battle which took place near it between the Austrians and Prussians on the 7th of September 1757, Hans Karl von Winter- feldt, the general of Frederick the Great, was slain. In 1815 the town, with the greater part of Upper Lusatia, came into the possession of Prussia.

See Neumann, Geschichte von Gorlitz (1850).

GORRES, JOHANN JOSEPH VON (1776-1848), German writer, was born on the 25th of January 1776, at Coblenz. His father was a man of moderate means, who sent his son to a Latin college under the direction of the Roman Catholic clergy. The sympathies of the young Gorres were from the first strongly with the French Revolution, and the dissoluteness and irreligion of the French exiles in the Rhineland confirmed him in his hatred of princes. He harangued the revolutionary clubs, and insisted on the unity of interests which should ally all civilized states to one another. He then commenced a republican journal called Das rote Blatt, and afterwards Riibezahl, in which he strongly con- demned the administration of the Rhenish provinces by France.

After the peace of Campo Formio (1797) there was some hope that the Rhenish provinces would be constituted into an inde- pendent republic. In 1799 the provinces sent an embassy, of which Gorres was a member, to Paris to put their case before the directory. The embassy reached Paris on the 20th of November 1799; two days before this Napoleon had assumed the supreme direction of affairs. After much delay the embassy was received by him; but the only answer they obtained was " that they might rely on perfect justice, and that the French government would never lose sight of their wants." Gorres on his return published a tract called Resultate meiner Sendung nach Paris, in which he reviewed the history of the French Revolution. During the thirteen years of Napoleon's dominion Gorres lived a retired life, devoting himself chiefly to art or science. In 1801 he married Catherine de Lasaulx, and was for some years teacher at a secondary school in Coblenz; in 1806 he moved to Heidel- berg, where he lectured at the university. As a leading member of the Heidelberg Romantic group, he edited together with K. Brentano and L. von Arnim the famous Zeitungfiir Einsiedler (subsequently re-named Trost-

Einsamkeit), and in 1807 he published Die teutschen Volksbilcher. He returned to Coblenz in 1808, and again found occupation as a teacher in a secondary school, supported by civic funds. He now studied Persian, and in two years published a Mythengeschichte der asiatischen Welt,

which was followed ten years later by Das Heldenbuch von Iran, a translation of part of the Shahnama, the epic of Firdousi. In 1813 he actively took up the cause of national independence, and in the following year founded Der rheinische Merkur. The intense earnestness of the paper, the bold outspokenness of its hostility to Napoleon, and its fiery eloquence secured for it almost instantly a position and influence unique in the history of German newspapers. Napoleon himself called it la cinquieme puissance. The ideal it insisted on was a united Germany, with a representative government, but under an emperor after the fashion of other days, — for Gorres now abandoned his early advocacy of republicanism. When Napoleon was at Elba, Gorres wrote an imaginary proclamation issued by him to the people, the intense irony of which was so well veiled that many Frenchmen mistook it for an original utterance of the emperor. He inveighed bitterly against the second peace of Paris (1815), declaring that Alsace and Lorraine should have been demanded back from France.

Stein was glad enough to use the Merkur at the time of the meeting of the congress of Vienna as a vehicle for giving expres- sion to his hopes. But Hardenberg, in May 1815, warned Gorres to remember that he was not to arouse hostility against France, but only against Bonaparte. There was also in the Merkur an antipathy to Prussia, a continual expression of the desire that an Austrian prince should assume the imperial title, and'also a tendency to pronounced liberalism — all of which made it most distasteful to Hardenberg, and to his master King Frederick William III. Gorres disregarded warnings sent to him by the censorship and continued the paper in all its fierceness. Accord- ingly it was suppressed early in 18 16, at the instance of the Prussian government ; and soon after Gorres was dismissed from his post as teacher at Coblenz. From this time his writings were his sole means of support, and he became a most diligent political pamphleteer. In the wild excitement which followed Kotzebue's assassination, the reactionary decrees of Carlsbad were framed, and these were the subject of Gorres's celebrated pamphlet Teutschland und die Revolution (1820). In this work he reviewed the circumstances which had led to the murder of Kotzebue, and, while expressing all possible horror at the deed itself, he urged that it was impossible and undesirable to repress the free utterance of public

opinion by reactionary measures. The success of the work was very marked, despite its ponderous style. It was suppressed by the Prussian government, and orders were issued for the arrest of Gorres and the seizure of his papers. He escaped to Strassburg, and thence went to Switzer- land. Two more political tracts, Europa und die Revolution (1821) and In Sachen der Rheinprovinzen und in eigener Angele- genheit (1822), also deserve mention.

In Gorres's pamphlet Die heilige Allianz und die Volker auf dem Kongress zu Verona he asserted that the princes had met together to crush the liberties of the people, and that the people must look elsewhere for help. The " elsewhere " was to Rome; and from this time Gorres became a vehement Ultramontane writer. He was summoned to Munich by King Ludwig of Bavaria as Professor of History in the university, and there his writing enjoyed very great popularity. His Christliche Mystik (1836- 1842) gave a series of biographies of the saints, together with an exposition of Roman Catholic mysticism. But his most cele- brated ultramontane work was a polemical one. Its occasion was the deposition and imprisonment by the Prussian govern- ment of the archbishop Clement Wenceslaus, in consequence of the refusal of that prelate to sanction in certain instances the marriages of Protestants and Roman Catholics. Gorres in his Athanasius (1837) fiercely upheld the power of the church, although the liberals of later date who have claimed Gorres as one of their own school deny that he ever insisted on the absolute supremacy of Rome. Athanasius went through several editions, and originated a long and bitter controversy. In the Hisiorisch- politische Blatter, a Munich journal, Gorres and his son Guido (1805-1852) continually upheld the claims of the church. Gorres received from the king the order of merit for his services. He died on the 29th of January 1848.

Gorres's Gesammelte Schriften (only his political writings) appeared in six volumes (1854-1860), to which three volumes of Gesammelte Briefe were subsequently added (1858-1874). Cp. J. Galland, Joseph von Gorres (1876, 2nd ed. 1877) ; J. N. Sepp, Gorres und seine Zeitgenossen (1877), and by the same author, Gorres, in the series Geisteshelden (1896). A Gorres-Gesellschaft was founded in 1876.

GORSAS, ANTOINE JOSEPH (1752-1793), French publicist and politician, was born at Limoges (Haute- Vienne) on the 24th of March 1752, the son of a shoemaker. He established himself as a private

tutor in Paris, and presently set up a school for the army at Versailles, which was attended by commoners as well as nobles. In 1781 he was imprisoned for a short time in the Bicetre on an accusation of corrupting the morals of his pupils, his real offence being the writing of satirical verse. These circumstances explain the violence of his anti-monarchical sentiment. At the opening of the states-general he began to publish the Courrier de Versailles a Paris et de Paris a Versailles, in which appeared on the 4th of October 1789 the account of the banquet of the royal bodyguard. Gorsas is said to have himself read it in public at the Palais Royal, and to have headed one of the columns that marched on Versailles. He then changed the name of his paper to the Courrier des quatre-vingt-trois diparte- ments, continuing his incendiary propaganda, which had no small share in provoking the popular insurrections of June and August 1792. During the September massacres he wrote in his paper that the prisons were the centre of an anti-national conspiracy and that the people exercised a just vengeance on the guilty. On the 10th of September 1792 he was elected to the Convention for the department of Seine-et-Oise, and on the 10th of January 1793 was elected one of its secretaries. He sat at first with the Mountain, but having been long associated with Roland and Rrissot, his agreement with the Girondists became gradually more pronounced; during the trial of Louis XVI. he dissociated himself more and more from the principles of the Mountain, and he voted for the king's detention during the war and subsequent banishment. A violent attack on Marat in the Courrier led to an armed raid on his printing establishment on the 9th of March 1793. The place was sacked, but Gorsas escaped the popular fury by flight. The facts being reported to the Convention, little sympathy was shown to Gorsas, and a resolution (which was evaded) was passed forbidding repre- sentatives to occupy themselves with journalism. On the 2nd of June he was ordered by the Convention to hold himself under arrest with other members of his party. He escaped to Nor- mandy to join Buzot, and after the defeat of the Girondists at Pacy-sur-Eure he found shelter in Brittany. He was imprudent enough to return to Paris in the autumn, where he was arrested on the 6th of October and guillotined the next day.

See the Moniteur, No. 268 (1792), Nos. 20, 70 new series 18 (1793) ; M. Tourneux, Bibl. de I'hist. de Paris, 10,291 seq. (1894).

GORST, SIR JOHN ELDON (1835-). English statesman, was born at Preston in 1835, the son of Edward Chaddock Gorst, who took the name of Lowndes on succeeding to the family estate in 1853. He graduated third wrangler from St John's College, Cambridge, in 1857, and was admitted to a fellowship. After beginning to read for the bar in London, his father's illness and death led to his sailing to New

Zealand, where he married in i860 Mary Elizabeth Moore. The Maoris had at that time set up a king of their own in the Waikato district and Gorst, who had made friends with the chief Tamihana (William Thomson), acted as an intermediary between the Maoris and the government. Sir George Grey made him inspector of schools, then resident magistrate, and eventually civil com- missioner in Upper Waikato. Tamihana's influence secured his safety in the Maori outbreak of 1863. In 1908 he published a volume of recollections, under the title of New Zealand Revisited: Recollections of the Days of my Youth. He then returned to England and was called to the bar at the Inner Temple in 1865, becoming Q.C. in 1875. He stood unsuccessfully for Hastings in the Conservative interest in 1865, and next year entered parliament as member for the borough of Cambridge, but failed to secure re-election at the dissolution of 1868. After the Conservative defeat of that year he was entrusted by Disraeli

with the reorganization of the party machinery, and in five years of hard work he paved the way for the Conservative success at the general election of 1874. At a bye-election in 1875 he re- entered parliament as member for Chatham, which he continued to represent until 1892. He joined Sir Henry Drummond- Wolff, Lord Randolph Churchill and Mr Arthur Balfour in the " Fourth Party," and he became solicitor-general in the ad- ministration of 1885-1886 and was knighted. On the formation of the second Salisbury administration (1886) he became under- secretary for India and in 1891 financial secretary to the Treasury. At the general election of 1892 he became member for Cambridge University. He was deputy chairman of com- mittees in the House of Commons from 1888 to 1891, and on the formation of the third Salisbury administration in 1895 he became vice-president of the committee of the council on educa- tion (until 1902). Sir John Gorst adhered to the principles of Tory democracy which he had advocated in the days of the fourth party, and continued to exhibit an active interest in the housing of the poor, the education and care of their children, and in social questions generally, both in parliament and in the press. But he was always exceedingly " independent " in his political action. He objected to Mr Chamberlain's proposals for tariff reform, and lost his seat at Cambridge at the general election of 1906 to a tariff reformer. He then withdrew from the vice-chancellorship of the Primrose League, of which he had been one of the founders, on the ground that it no longer represented the policy of Lord Beaconsfield. In 1910 he con- tested Preston as a Liberal, but failed to secure election.

His elder son, Sir J. Eldon Gorst (b. 1861), was financial adviser to the Egyptian government from 1898 to 1904, when he became assistant

under-secretary of state for foreign affairs. In 1907 he succeeded Lord Cromer as British agent and consul- general in Egypt.

An account of Sir John Gorst's connexion with Lord Randolph Churchill will be found in the Fourth Party (1906), by his younger son, Harold E. Gorst.

GORTON, SAMUEL (c. 1600-1677), English sectary and founder of the American sect of Gortonites, was born about 1600 at Gorton, Lancashire. He was first apprenticed to a clothier in London, but, fearing persecution for his religious convictions, he sailed for Boston, Massachusetts, in 1636. Con- stantly involved in religious disputes, he fled in turn to Ply- mouth, and (in 1637-1638) to Aquidneck (Newport), where he was publicly whipped for insulting the clergy and magistrates. In 1643 he bought land from the Narraganset Indians at Shawomet — now Warwick— where he was joined by a number of his followers; but he quarrelled with the Indians and the authorities at Boston sent soldiers to arrest Gorton and six of his companions. He served a term of imprisonment for heresy at Charlestown, after which he was ejected from the colony. In England in 1646 he published the curious tract " Simpli- cities Defence against Seven Headed Policy " (reprinted in 1835), giving an account of his grievances against the Massa- chusetts government. In 1648 he returned to New England with a letter of protection from the earl of Warwick, and joining his former companions at Shawomet, which he named Warwick, in honour of the earl, he remained there till his death at the end of 1677. He is chiefly remembered as the founder of a small sect called the Gortonites, which survived till the end of the 1 8th century. They had a great contempt for the regular clergy and for all outward forms of religion, holding that the true believers partook of the perfection of God.

Among his quaint writings are: An Incorruptible Key composed of the CX. Psalms wherewith you may open the rest of the Scriptures (1647), and Saltmarsh returned from the Dead, with its sequel, An Antidote against the Common Plague of the World (1657). See L. G. Jones, Samuel Gorton: a forgotten Founder of our Liberties (Providence,

1896).

GORTON, an urban district in the Gorton parliamentary division of Lancashire, England, forming an eastern suburb of Manchester. Pop. (1901) 26,564. It is largely a manufactur- ing district, having cotton mills and iron, engineering and chemical works.

GORTYNA, or Gortyn, an important ancient city on the southern side of the island of Crete. It stood on the banks of the small river Lethaeus (Mitropolipotamo), about three hours distant from the sea, with which it communicated by means of its two harbours, Metallum and Lebena. It had temples of Apollo Pythius, Artemis and Zeus. Near the town was the famous fountain of Sauros, inclosed by fruit-bearing poplars; and not far from this was another spring, overhung by an ever- green plane tree which in popular belief marked the scene of the amours of Zeus and Europa. Gortyna was, next to Cnossus, the largest and most powerful city of Crete. The two cities combined to subdue the rest of the island; but when they had gained their object they quarrelled with each other, and the history of both towns is from this time little more than a record of their feuds. Neither plays a conspicuous part in the history of Greece. Under the Romans Gortyna became the metropolis of the island. Extensive ruins may still be seen at the modern village of Hagii Deka, and here was discovered the great inscrip- tion containing chapters of its ancient laws. Though partly ruinous, the church of St Titus is a very interesting monument of early Christian architecture, dating from about the 4th century.

See also Crete, and for a full account of the laws see Greek Law.

GdRTZ, GEORG HEINRICH VON, Baron von Schlitz (1668-17 1 9), Holstein statesman, was educated at Jena. He entered the Holstein-Gottorp service, and after the death of the duchess Hedwig Sophia, Charles XII. ‘s sister, became very influential during the minority of her son Duke Charles Frederick. His earlier policy aimed at strengthening Holstein-Gottorp at the expense of Denmark. With this object, during Charles XII. ‘s stay at Altranstadt (1706-1707), he tried to divert the king’s attention to the Holstein question, and six years later, when the Swedish commander, Magnus Stenbock, crossed the Elbe, Gortz rendered him as much assistance as was compatible with not openly breaking with Denmark, even going so far as to surrender the fortress of Tonning to the Swedes. Gortz next attempted to undermine the grand alliance against Sweden by negotiating with Russia, Prussia and Saxony for the purpose of isolating Denmark, or even of turning the arms of the allies against her, a task by no means impossible in view of the strained relations between Denmark and the tsar. The plan foundered, however, on the refusal of Charles XII. to save the rest of his German domains by ceding Stettin to Prussia. Another simul- taneous plan of procuring the Swedish crown for Duke

Charles Frederick also came to nought. Gortz first suggested the marriage between the duke of Holstein and the tsarevna Anne of Russia, and negotiations were begun in St Petersburg with that object. On the arrival of Charles XII. from Turkey at Stralsund, Gortz was the first to visit him, and emerged from his presence chief minister or " grand-vizier " as the Swedes preferred to call the bold and crafty satrap, whose absolute devotion to the Swedish king took no account of the intense wretchedness of the Swedish nation. Gortz, himself a man of uncommon audacity, seems to have been fascinated by the heroic element in Charles's nature and was determined, if possible, to save him from his difficulties. He owed his extra- ordinary influence to the fact that he was the only one of Charles's advisers who believed, or pretended to believe, that Sweden was still far from exhaustion, or at any rate had a sufficient reserve of power to give support to an energetic diplomacy — Charles's own opinion, in fact. Gortz's position, however, was highly peculiar. Ostensibly, he was only the Holstein minister at Charles's court, in reality he was everything in Sweden except a Swedish subject — finance minister, plenipotentiary to foreign powers, factotum, and responsible to the king alone, though he had not a line of instructions. But he was just the man for a hero in extremities, and his whole course of procedure was, of necessity, revolutionary. His chief financial expedient was to debase, or rather ruin, the currency by issuing copper tokens redeemable in better times; but it was no fault of his that Charles XII., during his absence, flung upon the market too enormous an amount of this copper money for Gortz to deal

with. By the end of 1718 it seemed as if Gortz's system could not go on much longer, and the hatred of the Swedes towards him was so intense and universal that they blamed him for Charles XII. 's tyranny as well as for his own. Gortz hoped, however, to conclude peace with at least some of Sweden's numerous enemies before the crash came and then, by means of fresh combinations, to restore Sweden to her rank as a great power. It must be admitted that, in pursuance of his " system," Gortz displayed a genius for diplomacy which would have done honour to a Metternich or a Talleyrand. He desired peace with Russia first of all, and at the congress of Aland even obtained relatively favourable terms, only to have them rejected by his obstinately optimistic master. Simultaneously, Gortz was negoti- ating with Cardinal Alberoni and with the whigs in England; but all his ingenious combinations collapsed like a house of cards on the sudden death of Charles XII. The whole fury of the Swedish nation instantly fell upon Gortz. After a trial before a special commission which was a parody of justice — the accused was not permitted to have any legal

assistance or the use of writing materials — he was condemned to decapitation and promptly executed. Perhaps Gortz deserved his fate for " unnecessarily making himself the tool of an unheard-of despotism," but his death was certainly a judicial murder, and some historians even regard him as a political martyr.

See R. N. Bain, Charles XII. (London, 1895), an d Scandinavia, chap. 12 (Cambridge, 1905) ; B. von Beskow, Freherre Georg Heinrich von Gortz (Stockholm, 1868). (R. N. B.)

GORZ (Ital. Gorizia ; Slovene, Gorica), the capital of the Austrian crownland of Gorz and Gradisca, about 390 m. S.W. of Vienna by rail. Pop (1900) 25,432, two-thirds Italians, the remainder mostly Slovenes and Germans. It is picturesquely situated on the left bank of the Isonzo in a fertile valley, 35 m. N.N.W. of Trieste by rail. It is the seat of an archbishop and possesses an interesting cathedral, built in the 14th century and the richly decorated church of St Ignatius, built in the 17th century by the Jesuits. On an eminence, which dominates the town, is situated the old castle, formerly the seat of the counts of Gorz, now partly used as barracks. Owing to the mildness of its climate Gorz has become a favourite winter- resort, and has received the name of the Nice of Austria. Its mean annual temperature is 55° F.; while the mean winter temperature is 38-7° F. It is adorned with several pretty gardens with a luxuriant southern vegetation. On a height to the N. of the town is situated the Franciscan convent of Castagnavizza, in whose chapel lie the remains of Charles X. of France(d. 1836), the last Bourbon king, of the duke of Angouleme (d. 1844), his son, and of the duke of Chambord:(d. 1883). Seven miles to the north of Gorz is the Monte Santo (2275 ft.), a much- frequented place on which stands a pilgrimage church. The industries include cotton and silk weaving, sugar refining, brewing, the manufacture of leather and the making of rosoglio. There is also a considerable trade in wooden work, vegetables, early fruit and wine. Gorz is mentioned for the first time at the beginning of the nth century, and received its charter as a town in 1307. During the middle ages the greater part of its population was German.

GORZ AND GRADISCA, a county and crownland of Austria, bounded- E. by Carniola, S. by Istria, the Triestine territory and the Adriatic, W. by Italy and N. by Carinthia. It has an area of 1140 sq. m. The coast line, though extending for 25m., does not present any harbour of importance. It is fringed by alluvial deposits and lagoons, which are for the most part of very modern formation, for as late as the 4th or 5th centuries Aquileia was a great seaport. The harbour of Grado is the only one accessible to the larger kind of coasting craft. On all

sides, except towards the south-west where it unites with the Friulian lowland, it is surrounded by mountains, and about four-sixths of its area is occupied by mountains and hills. From the Julian Alps, which traverse the province in the north, the country descends in successive terraces towards the sea, and may roughly be divided into the upper highlands, the lower highlands, the hilly district and the lowlands. The principal peaks in the

Julian Alps are the Monte Canin (8469 ft.), the Manhart (8784 ft.), the Jalouc (8708 ft.), the Km (7367 ft.), the Matajur (5386 ft.), and the highest peak in the whole range, the Triglav or Terglou (9394 ft.). The Julian Alps are crossed by the Predil Pass (381 1 ft.), through which passes the principal road from Carinthia to the Coastland. The southern part of the province belongs to the Karst region, and here are situated the famous cascades and grottoes of Sankt Kanzian, where the river Reka begins its subterranean course. The principal river of the province is the Isonzo, which rises in the Triglav, and pursues a strange zigzag course for a distance of 78 m. before it reaches the Adriatic. At Gorz the Isonzo is still 138 ft. above the sea, and it is navigable only in its lowest section, where it takes the name of the Sdobba. Its principal affluents are the Idria, the Wippach and the Torre with its tributary the Judrio, which forms for a short distance the boundary between Austria and Italy. Of special interest not only in itself but for the frequent allusions to it in classical literature is the Timavus or Timavo, which appears near Duino, and after a very short course flows into the Gulf of Trieste. In ancient times it appears, according to the well-known description of Virgil (Aen. i. 244) to have rushed from the mountain by nine separate mouths and with much nofce and commotion, but at present it usually issues from only three mouths and flows quiet and still. It is strange enough, however, to see the river coming out full formed from the rock, and capable at its very source of bearing vessels on its bosom. According to a probable hypothesis it is a continuation of the above-mentioned river Reka, which is lost near Sankt Kanzian.

Agriculture, and specially viticulture, is the principal occupa- tion of the population, and the vine is here planted not only in regular vineyards, but is introduced in long lines through the ordinary fields and carried up the hills in terraces locally called ronchi. The rearing of the silk-worm, especially in the lowlands, constitutes another great source of revenue, and furnishes the material for the only extensive

industry of the country. The manufacture of silk is carried on at Gorz, and in and around the village of Haidenschaft. Gorz and Gradisca had in 1900 a population of 232,338, which is equivalent to 203 inhabitants per square mile. According to nationality about two-thirds were Slovenes, and the remainder Italians, with only about 2200 Germans. Almost the whole of the population (99-6%) belongs to the Roman Catholic Church. The local diet, of which the archbishop of Gorz is a member ex-officio, is composed of 22 members, and the crownland sends 5 deputies to the Reichsrat at Vienna. For administrative purposes the province is divided into 4 districts and an autonomous munici- pality, Gorz (pop. 25,432), the capital. Other principal places are Cormons (5824), Monfalcone (5.536), Kirchheim (5699), Gradisca (3843) and Aquileia (2319).

Gorz' first appears distinctly in history about the close of the 10th century, as part of a district bestowed by the emperor Otto III. on John, patriarch of Aquileia. In the nth century it became the seat of the Eppenstein family, who frequently bore the title of counts of Gorizia; and in the beginning of the 1 2 th century the countship passed from them to the Lurngau family which continued to exist till the year 1500, and acquired possessions in Tirol, Carinthia, Friuli and Styria. On the death of Count Leonhard (12th April 1500) the fief reverted to the house of Habsburg. The countship of Gradisca was united with it in 1754. The province was occupied by the French in 1809, but reverted again to Austria in i8r5. It formed a district of the administrative province of Trieste until 1861, when it became a separate crownland under its actual name.

GOSCHEN, GEORGE JOACHIM GOSCHEN, 1st Viscount (1831-1907), British statesman, son of William Henry Goschen, a London merchant of German extraction, was born in London on the 10th of August 1831. He was educated at Rugby under Dr Tait, and at Oriel College, Oxford, where he took a first- class in classics. He entered his father's firm of Friihling & Goschen, of Austin Friars, in 1853, and three years later became a director of the Bank of England. His entry into public life

took place in 1863, when he was returned without opposition as member for the city of London in the Liberal interest, and this was followed by his re-election, at the head of the poll, in the general election of 1865. In November of the same year he was appointed vice-president of the Board of Trade and paymaster-general, and in January 1866 he was made chancellor of the duchy of Lancaster, with a seat in the cabinet. When Mr Gladstone became prime minister in December 1868, Mr Goschen joined the cabinet as president of the

Poor Law Board, and continued to hold that office until March 187 1, when he succeeded Mr Childers as first lord of the admiralty. In 1874 he was elected lord rector of the university of Aberdeen. Being sent to Cairo in 1876 as delegate for the British holders of Egyptian bonds, in order to arrange for the conversion of the debt, he succeeded in effecting an agreement with the Khedive.

In 1878 his views upon the county franchise question pre- vented him from voting uniformly with his party, and he in- formed his constituents in the city that he would not stand again at the forthcoming general election. In 1880 he was elected for Ripon, and continued to represent that constituency until the general election of 1885, when he was returned for the Eastern Division of Edinburgh. Being opposed to the extension of the franchise, he was unable to join Mr Gladstone's govern- ment in 1880; declining the post of viceroy of India, he accepted that of special ambassador to the Porte, and was successful in settling the Montenegrin and Greek frontier questions in 1880 and 1881. He was made an ecclesiastical commissioner in 1882, and when Sir Henry Brand was raised to the peerage in 1884, the speakership of the House of Commons was offered to him, but declined. During the parliament of 1880-1885 he frequently found himself unable to concur with his party, especially as regards the extension of the franchise and questions of foreign policy; and when Mr Gladstone adopted the policy of Home Rule for Ireland, Mr Goschen followed Lord Hartington (after- wards duke of Devonshire) and became one of the most active of the Liberal Unionists. His vigorous and eloquent opposition to Mr Gladstone's Home Rule Bill of 1886 brought him into greater public prominence than ever, but he failed to retain his seat for Edinburgh at the election in July of that year. On the resigna- tion of Lord Randolph Churchill in December 1886, Mr Goschen, though a Liberal Unionist, accepted Lord Salisbury's invitation to join his ministry, and became chancellor of the exchequer. Being defeated at Liverpool, 26th of January 1887, by seven votes, he was elected for St George's, Hanover Square, on the 9th of February. His chancellorship of the exchequer during the ministry of 1886 to 1892 was rendered memorable by his successful conversion of the National Debt in 1888 (see National Debt). With that financial operation, under which the new af % Consols became known as " Goschens," his name will long be connected. Aberdeen University again conferred upon him the honour of the lord rectorship in 1888, and he received a similar honour from the University of Edinburgh in 1890. In the Unionist opposition of 1893 to 1895 Mr Goschen again took a vigorous part, his speeches both in and out of the House of Commons being remarkable for their eloquence and

debating power. From 1895 to 1900 Mr Goschen was first lord of the admiralty, and in that office he earned the highest reputation for his businesslike grasp of detail and his statesmanlike outlook on the naval policy of the country. He retired in 1900, and was raised to the peerage by the title of Viscount Goschen of Hawk- hurst, Kent. Though retired from active politics he continued to take a great interest in public affairs; and when Mr Chamber- lain started his tariff reform movement in 1903, Lord Goschen "was one of the weightiest champions of free trade on the Unionist side. He died on the 7th of February 1907, being succeeded in the title by his son George Joachim (b. 1866), who was Con- servative M.P. for East Grinstead from 1895 to 1900, and married a daughter of the 1st earl of Cranbrook.

In educational subjects Goschen had always taken the greatest interest, his best known, but by no means his only, contribution to popular culture being his participation in the University

Extension Movement; and his first efforts in parliament were devoted to advocating the abolition of religious tests and the admission of Dissenters to the universities. His published works indicate how ably he combined the wise study of econo- mics with a practical instinct for business-like progress, without neglecting the more ideal aspects of human life. In addition to his well-known work on The Theory of the Foreign Exchanges, he published several financial and political pamphlets and addresses on educational and social subjects, among them being that on Cultivation of the Imagination, Liverpool, 1877, and that on Intellectual Interest, Aberdeen, 1888. He also wrote The Life and Times of Georg Joachim Goschen, publisher and printer of Leipzig (1903). (H. Ch.)

GOS-HAWK, i.e. goose-hawk, the Astur palumbarius of ornithologists, and the largest of the short-winged hawks used in falconry. Its English name, however, has possibly been transferred to this species from one of the long-winged hawks or true falcons, since there is no tiadition of the gos-hawk, now so called, having ever been used in Europe to take geese or other large and powerful birds. The genus Astur may be readily distinguished from Falco by the smooth edges of its beak, its short wings (not reaching beyond about the middle of the tail), and its long legs and toes — though these last are stout and com- paratively shorter than in the sparrow-hawks (Accipiter). In plumage the gos-hawk has a general resemblance to the pere- grine falcon, and it

undergoes a corresponding change as it advances from youth to maturity — the young being longitudin- ally streaked beneath, while the adults are transversely barred. The irides, however, are always yellow, or in old birds orange, while those of the falcons are dark brown. The sexes differ greatly in size. There can be little doubt that the gos-hawk, nowadays very rare in Britain, was once common in England, and even towards the end of the 18th century Thornton obtained a nestling in Scotland, while Irish gos-hawks were of old highly celebrated. Being strictly a woodland-bird, its disappearance may be safely connected with the disappearance of the ancient forests in Great Britain, though its destructiveness to poultry and pigeons has doubtless contributed to its present scarcity. In many parts of the continent of Europe it still abounds. It ranges eastward to China and is much valued in India. In North America it is represented by a very nearly allied species, A. atricapillus, chiefly distinguished by the closer barring of the breast. Three or four examples corresponding with this form have been obtained in Britain. A good many other species of Astur (some of them passing into Accipiter) are found in various parts of the world, but the only one that need here be mentioned is the A. novae-hollandiae of Australia, which is remarkable for its dimorphism — one form possessing the normal dark-coloured plumage of the genus and the other being perfectly white, with crimson irides. Some writers hold these two forms to be distinct species and call the dark-coloured one A. cinereus or A. raii. (A. N.)

GOSHEN, a division of Egypt settled by the Israelites between Jacob's immigration and the Exodus. Its exact delimitation is a difficult problem. The name may possibly be of Semitic, or at least non-Egyptian origin, as in Palestine we meet with a district (Josh. x. 41) and a city (ib. xv. 51) of the same name. The Septuagint reads Tko-en 'Apaj3£as in Gen. xlv. 10, and xlvi. 34, elsewhere simply Teaen. In xlvi. 28 " Goshen . . . the land of Goshen " are translated respectively " Heroopolis . . . the land of Rameses." This represents a late Jewish identification. Ptolemy defines " Arabia " as an Egyptian nome on the eastern border of the delta, with capital Phacussa, corresponding to the Egyptian nome Sopt and town Kesem. It is doubtful whether Phacussa be situated at the mounds of Fakus, or at another place, Saft-el-Henneh, which suits Strabo's description of its locality rather better. The extent of Goshen, according to the apocryphal book of Judith (i. 9, 10), included Tanis and Memphis; this is probably an overstatement. It is indeed impossible to say more than that it was a place of good pasture, on the frontier of Palestine, and fruitful in edible vegetables and in fish (Numbers xi. 5). (R. A. S. M.)

GOSHEN, a city and the county-seat of Elkhart county, Indiana,

U.S.A., on the Elkhart river, about 95 m. E. by S. of Chicago, at an altitude of about 800 ft. Pop. (1890) 6033; (1900) 7810 (462 foreign-born); (1910) 8514. Goshen is served by the Cleveland. Cincinnati, Chicago & St Louis, and the Lake Shore & Michigan Southern railways, and is connected by electric railway with Warsaw and South Bend. The city has a Carnegie library, and is the seat of Goshen College (under Mennonite control), chartered as Elkhart Institute, at Elkhart, Ind., in 1895, and removed to Goshen and opened under its present name in 1903. The college includes a collegiate depart- ment, an academy, a Bible school, a normal school, a summer school and correspondence courses, and schools of business, of music and of oratory, and in 1908-1909 had 331 students, 73 of whom were in the Academy. Goshen is situated in a good farming region and is an important lumber market. There is a good water-power. Among the city's manufactures are wagons and carriages, furniture, wooden-ware, veneer- ing, sash and doors, ladders, lawn swings, rubber goods, flour, foundry products and agricultural machinery. The municipality owns its water works and its electric-lighting system. Goshen was first settled in 1828 and was first chartered as a city in 1868.

GOSLAR, a town of Germany, in the Prussian province of Hanover, romantically situated on the Gose, an affluent of the Oker, at the north foot of the Harz, 24 m. S.E. of Hildesheim and 31 m. S'.W. from Brunswick, by rail. Pop. (1905) 17,817. It is surrounded by walls and is of antique appearance. Among the noteworthy buildings are the " Zwinger," a tower with walls 23 ft. thick; the market church, in the Romanesque style, restored since its partial destruction by fire in 1844, and containing the town archives and a library in which are some of Luther's manuscripts; the old town hall (Rathaus), possessing many interesting antiquities; the Kaiserworth (formerly the hall of the tailors' • gild and now an inn) with the statues of eight of the German emperors; and the Kaiserhaus, the oldest secular building in Germany, built by the emperor Henry III. before 1050 and often the residence of his successors. This was restored in 1867-1878 at the cost of the Prussian government, and was adorned with frescoes portraying events in German history. Other buildings of interest are: — the small chapel which is all that remains since 1820 of the old and famous cathedral of St Simon and St Jude founded by Henry III. about 1040, containing among other relics of the cathedral . an old altar supposed to be that of the idol Krodo which formerly stood on the Burgberg near Neustadt-Harzburg; the church of the former Benedictine monastery of St Mary, or Neuwerk, of the 1 2th century, in the Romanesque style, with wall-paintings of considerable merit; and the house of the bakers' gild now an hotel, the birthplace of Marshal Saxe.

There are four Evangelical churches, a Roman Catholic church, a synagogue, several schools, a natural science museum, containing a collection of Harz minerals, the Fenkner museum of antiquities ‘ and a number of small foundations. The town has equestrian statues of the emperor Frederick I. and of the German emperor William I. The population is chiefly occupied in connexion with the sulphur, copper, silver and other mines in the neighbourhood. The town has also been long noted for its beer, and possesses some small manufactures and a considerable trade in fruit.

Goslar is believed to have been founded by Henry the Fowler about 920, and when in the time of Otto the Great the mineral treasures in the neighbourhood were discovered it increased rapidly in prosperity. It was often the meeting-place of German diets, twenty-three of which are said to have been held here, and was frequently the residence of the emperors. About 1350 it joined the Hanseatic League. In the middle of the 14th century, the famous Goslar statutes, a code of laws, which was adopted by many other towns, was published. The town was unsuccessfully besieged in 1625, during the Thirty Years’ War, but was taken by the Swedes in 1632 and nearly destroyed by fire. Further conflagrations in 1728 and 1780 gave a severe blow to its prosperity. It was a free town till 1802, when it

came into the possession of Prussia. In 1807 it was joined to Westphalia, in 1816 to Hanover and in 1866 it was, along with Hanover, re-united to Prussia.

See T. Erdmann, Die alte Kaiserstadt Goslar und ihre Umgebung in Geschichte, Sage und Bild (Goslar, 1892); Crusius, Geschichte der vormals kaiserlichen freien Reichstadt Goslar (1842-1843); A. Wolfstieg, Verfassungsgeschichte von Goslar (Berlin, 1885); T. Asche, Die Kaiserpfalz zu Goslar (1892); Neuburg, Goslars Bergbau bis 1552 (Hanover, 1892); and the Urkundenbuch der Stadt Goslar, edited by G. Bode (Halle, 1893-1900). For the Goslarische Statuten see the edition published by Goschen (Berlin, 1840).

GOSLICKI, WAWRZYNIEC (? 1533-1607), Polish bishop, better known under his Latinized name of Laurentius Grimalius Goslicius, was born about 1 533. After having studied at Cracow and Padua, he entered the church, and was successively appointed bishop of Kaminietz and of Posen. Goslicki was an active man of business, was

held in high estimation by his contemporaries and was frequently engaged in political affairs. It was chiefly through his influence, and through the letter he wrote to the pope against the Jesuits, that they were prevented from establish- ing their schools at Cracow. He was also a strenuous advocate of religious toleration in Poland. He died on the 31st of October

1607.

His principal work is De Optimo senator e, &c. (Venice, 1568). There are two English translations published respectively under the titles A commonwealth of good counsaile, &c. (1607), and The Accomplished Senator, done into English by Mr Oldisworth (1733).

GOSLIN, or Gauzlinus (d. c. 886), bishop of Paris and defender of the city against the Northmen (885), was, according to some authorities, the son of Roricon II., count of Maine, according to others the natural son of the emperor Louis I. In 848 he became a monk, and entered a monastery at Reims, later he became abbot of St Denis. Like most of the prelates of his time he took a prominent part in the struggle against the Northmen, by whom he and his brother Louis were taken prisoners (858), and he was released only after paying a heavy ransom (Prudentii Trecensis episcopi Annales, ann. 858). From 855 to 867 he held intermittently, and from 867 to 881 regularly, the office of chancellor to Charles the Bald and his successors. In 883 or 884 he was elected bishop of Paris, and foreseeing the dangers to which the city was to be exposed from the attacks of the Northmen, he planned and directed the strengthening of the defences, though he also relied for security on the merits of the relics of St Germain and St Genevieve. When the attack finally came (885), the defence of the city was entrusted to him and to Odo, count of Paris, and Hugh, abbot of St Germain l'Auxerrois. The city was attacked on the 26th of November, and the struggle for the possession of the bridge (now the Pont- au-Change) lasted for two days; but Goslin repaired the destruc- tion of the wooden tower overnight, and the Normans were obliged to give up the attempt to take the city by storm. The siege lasted for about a year longer, while the emperor Charles the Fat was in Italy. Goslin died soon after the preliminaries of the peace had been agreed on, worn out by his exertions, or killed by a pestilence which raged in the city.

See Amaury Duval, L'Svique Gozlin ou le siege de Paris par les Normands, chronique du IX' siecle (2 vols., Paris, 1832, 3rd ed. ib.

1835)-

GOSNOLD, BARTHOLOMEW (d. 1607), English navigator. Nothing is known of his birth, parentage or early life. In 1602, in command of the " Concord," chartered by Sir Walter Raleigh and others, he crossed the Atlantic; coasted from what is now Maine to Martha's Vineyard, landing at and naming Cape Cod and Elizabeth Island (now Cuttyhunk) and giving the name Martha's Vineyard to the island now called No Man's Land; and returned to England with a cargo of furs, sassafras and other commodities obtained in trade with the Indians about Buzzard's Bay. In London he actively promoted the colonization of the regions he had visited and, by arousing the interest of Sir Ferdinando Gorges and other influential persons, contributed toward securing the grants of the charters to the London and Plymouth Companies in 1606. In 1606-1607 he was associated with Christopher Newport in command of the three vessels by which the first Jamestown colonists were carried to Virginia.

As a member of the council he took an active share in the affairs of the colony, ably seconding the efforts of John Smith to intro- duce order, industry and system among the motley array of adventurers and idle " gentlemen " of which the little band was composed. He died from swamp fever on the 22nd of August 1607.

See The Works of John Smith (Arber's Edition, London, 1884); and J. M. Brereton, Brief and True Relation of the North Part of Virginia (reprinted by B. F. Stevens, London, 1901), an account of Gosnold's voyage of 1602.

GOSPATRIC (fl. 1067), earl of Northumberland, belonged to a family which had connexions with the royal houses both of Wessex and Scotland. Before the Conquest he accompanied Tostig on a pilgrimage to Rome (1061); and at that time was a landholder in Cumberland. About 1067 he bought the earldom of Northumberland from William the Conqueror; but, repenting of his submission, fled with other Englishmen to the court of Scotland (1068). He joined the Danish army of in- vasion in the next year; but was afterwards able, from his possession of Bamburgh castle, to make terms with the con- queror, who left him undisturbed till 1072. The peace concluded in that year with Scotland left him at William's mercy. He lost his earldom and took refuge in Scotland, where Malcolm seems to have provided for him.

See E. A. Freeman, Norman Conquest, vol. i. (Oxford, 1877), and the English Hist. Review, vol. xix. (London, 1904).

GOSPEL (0. Eng. godspel, i.e. good news, a translation of Lat. bona

annuntiatio, or evangelium, Gr. evayyeXiov; cf. Goth. iu spillon, ” to announce good news,” Ulfilas’ translation of the Greek, from iu, that which is good, and spellon to announce), primarily the ” glad tidings ” announced to the world by Jesus Christ. The word thus came to be applied to the whole body of doctrine taught by Christ and his disciples, and so to the Christian revelation generally (see Christianity); by analogy the term ” gospel ” is also used in other connexions as equivalent to ” authoritative teaching.” In a narrower sense each of the records of the life and teaching of Christ preserved in the writings of the four ” evangelists ” is described as a Gospel. The many more or less imaginative lives of Christ which are not accepted by the Christian Church as canonical are known as ” apocryphal gospels ” (see Apocryphal Literature). The present article is concerned solely with general considerations affecting the four canonical Gospels; see for details of each, the articles under Matthew, Mark, Luke and John.

The Four Gospels. — The disciples of Jesus proclaimed the Gospel that He was the Christ. Those to whom this message was first delivered in Jerusalem and Palestine had seen and heard Jesus, or had heard much about Him. They did not require to be told who He was. But more and more as the work of preaching and teaching extended to such as had not this knowledge, it became necessary to include in the Gospel delivered some account of the ministry of Jesus. Moreover, alike those who had followed Him during His life on earth, and all who joined themselves to them, must have felt the need of dwelling on His precepts, so that these must have been often repeated, and also in all probability from an early time grouped together according to their subjects, and so taught. For some time, probably for upwards of thirty years, both the facts of the life of Jesus and His words were only related orally. This would be in accordance with the habits of mind of the early preachers of the Gospel. Moreover, they were so absorbed in the expecta- tion of the speedy return of Christ that they did not feel called to make provision for the instruction of subsequent generations. The Epistles of the New Testament contain no indications of the existence of any written record of the life and teaching of Christ. Tradition indicates a.d. 60-70 as the period when .written accounts of the life and teaching of Jesus began to be made (see Mark, Gospel of, and Matthew, Gospel of). This may be accepted as highly probable. We cannot but suppose that at a time when the number of the original band of disciples of Jesus who survived must have been becoming noticeably smaller, and all these were advanced in life, the importance of writing down that which had been orally delivered concerning the Gospel-history must have been realized. We also

gather from Luke's preface (i. 1-4) that the work of writing was undertaken in these circumstances and under the influence of this feeling, and that various records had already in con- sequence been made.

But do our Gospels, or any of them, in the form in which we actually have them, belong to the number of those earliest records ? Or, if not, what are the relations in which they severally stand to them ? These are questions which in modern criticism have been greatly debated. With a view to obtaining answers to them, it is necessary to consider the reception of the Gospels in the early Church, and also to examine and compare the Gospels themselves. Some account of the evidence supplied in these two ways must be given in the present article, so far as it is common to all four Gospels, or to three or two of them, and in the articles on the several Gospels so far as it is especial to each.

1. The Reception of the Gospels in the Early Church. — The question of the use of the Gospels and of the manner in which they were regarded during the period extending from the latter years of the 1st century to the beginning of the last quarter of the 2nd is a difficult one. There is a lack of explicit references to the Gospels; 1 and many of the quotations which may be taken from them are not exact. At the same time these facts can be more or less satisfactorily accounted for by various circumstances. In the first place, it would be natural that the habits of thought of the period when the Gospel was delivered orally should have continued to exert influence even after the tradition had been committed to writing. Although documents might be known and used, they would not be regarded as the • authorities for that which was independently remembered, and would not, therefore, necessarily be mentioned. Consequently, it is not strange that citations of sayings of Christ — and these are the only express citations in writings of the Subapostolic Age — should be made without the source whence they were derived being named, and (with a single exception) without any clear indication that the source was a document. The exception is in the little treatise commonly called the Epistle of Barnabas, probably composed about a.d. 130, where (c. iv. 14) the words " many are called but few chosen " are intro- duced by the formula " as it is written."

For the identification, therefore, of the source or sources used we have to rely upon the amount of correspondence with our Gospels in the quotations made, and in respect to other parallelisms of statement and

of expression, in these early Christian writers. The correspondence is in the main full and true as regards spirit and substance, but it is rarely complete in form. The existence of some differences of language may, however, be too readily taken to disprove derivation. Various forms of the same saying occurring in different documents, or remembered from oral tradition and through catechetical instruction, would sometimes be purposely combined. Or, again, the memory might be confused by this variety, and the verification of quotations, especially of brief ones, was difficult, not only from the comparative scarcity of the copies of books, but also because ancient books were not provided with ready means of reference to particular passages. On the whole there is clearly a presumption that where we have striking expressions which are known to us besides only in one of our Gospel-records, that particular record has been the source of it. And where there are several such coincidences the ground for the supposition that the writing in question has been used may become very strong. There is evidence of this kind, more or less clear in the several cases, that all the four Gospels were known in the first two or three decades of the 2nd century. It is fullest as to our first Gospel and, next to this one, as to our third.

After this time it becomes manifest that, as we should expect,

, documents were the recognized authorities for the Gospel history;

but there is still some uncertainty as to the documents upon

which reliance was placed, and the precise estimation in which

1 For the only two that can be held to be such in the first half of the 2nd century, and the doubts whether they refer to our present Gospels, see Mark, Gospel of, and Matthew, Gospel of.

they were severally held. This is in part at least due to the circumstance that nearly all the writings which have remained of the Christian literature belonging to the period circa a.d. 130-180 are addressed to non-Christians, and that for the most part they give only summaries of the teaching of Christ and of the facts of the Gospel, while terms that would not be under- stood by, and names that would not carry weight with, others than Christians are to a large extent avoided. The most im- portant of the writings now in question are two by Justin Martyr {circa a.d. 145-160), viz. his Apology and his Dialogue with Trypho. In the former of these works he shows plainly his intention of adapting his language and reasoning to Gentile, and in the latter to Jewish, readers. In both his name for the Gospel-records

is ” Memoirs of the Apostles.” After a great deal of controversy there has come to be very wide agreement that he reckoned the first three Gospels among these Memoirs. In the case of the second and third there are indications, though slight ones, that he held the view of their composition and authorship which was common from the last quarter of the century onwards (see Mark, Gospel or, and Luke, Gospel of), but he has made the largest use of our first Gospel. It is also generally allowed that he was acquainted with the fourth Gospel, though some think that he used it with a certain reserve. Evidence may, however, be adduced which goes far to show that he regarded it, also, as of apostolic authority. There is a good deal of difference of opinion still as to whether Justin reckoned other sources for the Gospel-history besides our Gospels among the Apostolic Memoirs. In this connexion, however, as well as on other grounds, it is a significant fact that within twenty years or so after the death of Justin, which prob- ably occurred circa a.d. 160, Tatian, who had been a hearer of Justin, produced a continuous narrative of the Gospel-history which received the name Diatessaron (” through four “), in the main a compilation from our four Gospels. 1

Before the close of the 2nd century the four Gospels had attained a position of unique authority throughout the greater part of the Church, not different from that which they have held since, as is evident from the treatise of Irenaeus Against Heresies (c. a.d. 180; see esp. iii. i. 1 f. and x., xi.) and from other evidence only a few years later. The struggle against Gnosticism, which had been going on during the middle part of the century, had compelled the Church both to define her creed and to draw a sharper line of demarcation than heretofore between those writings whose authority she regarded as absolute and all others. The effect of this was no doubt to enhance the sense generally entertained of the value of the four Gospels. At the same time in the formal statements now made it is plainly implied that the belief expressed is no new one. And it is, indeed, difficult to suppose that agreement on this subject between different portions of the Church could have manifested itself at this time in the spontaneous manner that it does, except as the consequence of traditional feelings and convictions, which went back to the early part of the century, and which could hardly have arisen without good foundation, with respect to the special value of these works as embodiments of apostolic testimony, although all that came to be supposed in regard to their actual authorship cannot be considered proved.

2. The Internal Criticism of the Gospels. — In the middle of the 19th century an able school of critics, known as the Tubingen school,

sought to show from indications in the several Gospels that they were composed well on in the 2nd century in the interests of various strongly marked parties into which the Church was supposed to have been divided by differences in regard to the Judaic and Pauline forms of Christianity. These theories are now discredited. It may on the contrary be confidently asserted with regard to the first three Gospels that the local colouring in them is predominantly Palestinian, and that they

1 The character of Tatian's Diatessaron has been much disputed in the past, but there can no longer be any reasonable doubt on the subject after recent discoveries and investigations. (An account of these may be seen most conveniently in The Diatessaron of Tatian, by S. Hemphill; see under Tatian.)

show no signs of acquaintance with the questions and the circumstances of the 2nd century; and that the character even of the Fourth Gospel is not such as to justify its being placed, at furthest, much after the beginning of that century.

We turn to the literary criticism of the Gospels, where solid results have been obtained. The first three Gospels have in consequence of the large amount of similarity between them in contents, arrangement, and even in words and the forms of sentences and paragraphs, been called Synoptic Gospels. It has long been seen that, to account for this similarity, relations of interdependence between them, or of common derivation, must be supposed. And the question as to the true theory of these relations is known as the Synoptic Problem. Reference has already been made to the fact that during the greater part of the Apostolic age the Gospel history was taught orally. Now some have held that the form of this oral teaching was to a great extent a fixed one, and that it was the common source of our first three Gospels. This oral theory was for a long time the favourite one in England; it was never widely held in Germany, and in recent years the majority of English students of the Synoptic Problem have come to feel that it does not satisfactorily explain the phenomena. Not only are the resemblances too close, and their character in part not of a kind, to be thus accounted for, but even many of the differences between parallel contexts are rather such as would arise through' the revision of a document than through the freedom of oral delivery.

It is now and has for many years been widely held that a document which is most nearly represented by the Gospel of Mark, or which (as some would say) was virtually identical with it, has been used in the composition of our first and third Gospels. This source has supplied the Synoptic Outline, and in the main also the narratives common to all three. Questions connected with the history of this document are treated in the article on Mark, Gospel of.

There is also a considerable amount of matter common to Matthew and Luke, but not found in Mark. It is introduced into the Synoptic Outline very differently in those two Gospels, which clearly suggests that it existed in a separate form, and was independently combined, by the first and third evangelists with their other document. This common matter has also a character of its own; it consists mainly of pieces of discourse. The form in which it is given in the two Gospels is in several passages so nearly identical that we must suppose these pieces at least to have been derived immediately or ultimately from the same Greek document. In other cases there is more diver- gence, but in some of them this is accounted for by the consideration that in Matthew passages from the source now in question have been interwoven with parallels in the other chief common source before mentioned. There are, however, instances in which no such explanation will serve, and it is possible that our first and third evangelists may have used two documents which were not in all respects identical, but which corresponded very closely on the whole. The ultimate source of the subject matter in question, or of the most distinctive and larger part of it, was in all probability an Aramaic one, and in some parts different translations may have been used.

This second source used in the composition of Matthew and Luke has frequently been called ” The Logia ” in order to signify that it was a collection of the sayings and discourses of Jesus. This name has been suggested by Schleiermacher’s interpretation of Papias’ fragment on Matthew (see Matthew, Gospel of). But some have maintained that the source in question also contained a good many narratives, and in order to avoid any premature assumption as to its contents and character several recent critics have named it ” Q.” It may, however, fairly be called ” the Logian document,” as a convenient way of indicating the character of the greater part of the matter which our first and third evangelists have taken from it, and this designation is used in the articles on the Gospels of Luke and Matthew. The reconstruction of this document has been attempted by several critics. The arrangement of its contents can, it seems, best be learned from Luke.

3. One or two remarks may here be added as to the bearing of the results of literary criticism upon the use of the Gospels. Their effect is to lead us, especially when engaged in historical inquiries, to look beyond our Gospels to their sources, instead of treating the testimony of the Gospels severally as independent and ultimate. Nevertheless it will still appear that each Gospel has its distinct value, both historically and in regard to the moral and spiritual instruction afforded. And the fruits of much of that older study of the Gospels, which was largely employed in pointing out the special characteristics of each, will still prove serviceable.

Authorities. — 1. German Books: Introductions to the New Testament — H. J. Holtzmann (3rd ed., 1892), B. Weiss (Eng. trans., 1887), Th. Zahn (2nd ed., 1900), G. A. Jiilicher (6th ed., 1906; Eng. trans., 1904) ; H. v. Soden, Urchristliche Literaturgeschichte, vol. i. (1905; Eng. trans., 1906). Books on the Synoptic Gospels, especi- ally the Synoptic Problem: H. J. Holtzmann, Die synoptischen Evangelien (1863); Weizsacker, Untersuchungen liber die evangelische Geschichte (1864); B. Weiss, Das Marcus-Evangelium und seine synoptischen Parallelen (1872); Das Matthdus-Evangelium und seine Lucas-Par allelen (1876); H. H. Wendt, Die Lehre Jesu (1886); A. Resch, Agrapha (1889); &c. ; P. Wernle, Die synoplische Frage (1899); W. Soltau, Unsere Evangelien, ihre Quellen una ihr Quellen wert (1901); H. J. Holtzmann, Hand-Commentar zum N.T., vol. i. (1889); J. Wellhausen, Das Evangelium Marci, Das Evangelium Matthdi, Das Evangelium Lucas (1904), Einleitung in die drei ersten Evangelien (1905) ; A. Harnack, Spriiche und Reden Jesu, die zweite Quelle des Matthdus und Lukas (1907).

2. French Books: A. Loisy, Les Evangiles synoptiques (1907-1908).

3. English Books: G. Salmon, Introduction to the New Testament (1st ed., 1885; 9th ed., 1904); W. Sanday, Inspiration (Lect. vi., 3rd ed., 1903) ; B. F. Westcott, An Introduction to the Study of the Gospels (1st ed., 1851; 8th ed., 1895); A. Wright, The Composition of the Four Gospels (1890); J. E. Carpenter, The First Three Gospels, their Origin and Relations (1890) ; A. J. Jolley, The Synoptic Problem (1893); J. C. Hawkins, Horae synopticae (1899); W. Alexander, Leading Ideas of the Gospels (new ed., 1892); E. A. Abbott, Clue (1900); J. A. Robinson, The Study of the Gospels (1902); F. C. Burkitt, The Gospel History and its Transmission (1906) ; G. Salmon, The Human Element in the Gospels (1907); V. H. Stanton, The Gospels as Historical Documents: Pt. I., The Early Use of the Gospels (1903); Pt. II., The Synoptic Gospels (1908).

4. Synopses. — W. G. Rushbrooke, Synopticon, An Exposition of the Common Matter of the Synoptic Gospels (1880); A. Wright, The Synopsis of the Gospels in Greek (2nd ed., 1903).

See also the articles on each Gospel, and the article Bible, section New Testament. (V. H. S.)

GOSPORT, a seaport in the Fareham parliamentary division of Hampshire, England, facing Portsmouth across Portsmouth harbour, 81 m. S.W. from London by the London & South- western railway. Pop. of urban district of Gosport and Alver- stoke (1901), 28,884. A ferry and a floating bridge connect it with Portsmouth. It is enclosed within a double line of fortifica- tions, consisting of the old Gosport lines, and, about 3000 yds. to the east, a series of forts connected by strong lines with occasional batteries, forming part of the defence works of Ports- mouth harbour. The principal buildings are the town hall and market hall, and the church of Holy Trinity, erected in the time of William III. To the south at Haslar there is a magnificent naval hospital, capable of containing 2000 patients, and adjoin- ing it a gunboat slipway and large barracks. To the north is the Royal Clarence victualling yard, with brewery, cooperage, powder magazines, biscuit-making establishment, and store- houses for various kinds of provisions for the royal navy.

Gosport (Goseporte, Gozeport, Gosberg, Godsport) was originally included in Alverstoke manor, held in 1086 by the bishop and monks of Winchester under whom villeins farmed the land. In 1284 the monks agreed to give up Alverstoke with Gosport to the bishop, whose successors continued to hold them until the lands were taken over by the ecclesiastical commis- Bioners. After the confiscation of the bishop's lands in 1641, however, the manor of Alverstoke with Gosport was granted to George Withers, but reverted to the bishop at the Restoration. In the 16th century Gosport was " a little village of fishermen." It was called a borough in 146 1, when there are also traces of burgage tenure. From 1462 one bailiff was elected annually in the borough court, and government by a bailiff continued until 1682, when Gosport was included in Portsmouth borough

under the charter of Charles II. to that town. This was annulled in 1688, since which time there is no evidence of the election of bailiffs. With this exception no charter of incorporation is known, although by

the 16th century the inhabitants held common property in the shape of tolls of the ferry. The importance of Gosport increased during the 16th and 17th centuries owing to its position at the mouth of Portsmouth harbour, and its con- venience as a victualling station. For this reason also the town was particularly prosperous during the American and Peninsular Wars. About 1540 fortifications were built there for the defence of the harbour, and in the 17th century it was a garrison town under a lord-lieutenant.

GOSS, SIR JOHN (1800-1880), English composer, was born at Fareham, Hampshire, on the 27th of December 1800. He was elected a chorister of the Chapel Royal in 1811, and in 1816, on the breaking of his voice, became a pupil of Attwood. A few early compositions, some for the theatre, exist, and some glees were published before 1825. He was appointed organist of St Luke's, Chelsea, in 1824, and in 1838 became organist of St Paul's in succession to Attwood; he kept the post until 1872, when he resigned and was knighted. His position in the London musical world of the time was an influential one, and he did much by his teaching and criticism to encourage the study and appreciation of good music. In 1876 he was given the degree of Mus.D. at Cambridge. Though his few orchestral works have very small importance, his church music includes some fine compositions, such as the anthems " O taste and see," " O Saviour of the world " and others. He was the last of the great English school of church composers who devoted themselves almost exclusively to church music; and in the history of the glee his is an honoured name, if only on account of his finest work in that form, the five-part glee, Ossian's " Hymn to the sun." He died at Brixton, London, on the 10th of May 1880.

GOSSAMER, a fine, thread like and filmy substance spun by small spiders, which is seen covering stubble fields and gorse bushes, and floating in the air in clear weather; especially in the autumn. By transference anything light, unsubstantial or flimsy is known as "gossamer." A thin gauzy material used for trimming and millinery, resembling the " chiffon " of to-day, was formerly known as gossamer; and in the early Victorian period it was a term used in the hat trade, for silk hats of very light weight.

The word is obscure in origin, it is found in numerous forms in English, and is apparently taken from gose, goose and somere, summer. The Germans have Madchensommer, maidens' summer, and Altweibersommer, old women's summer, as well as Sommerfaden, summer-threads, as equivalent to the English gossamer, the connexion apparently being that gossamer is seen most frequently in the warm

days of late autumn (St Martin's summer) when geese are also in season. Another suggestion is that the word is a corruption of gaze a Marie (gauze of Mary) through the legend that gossamer was originally the threads which fell away from the Virgin's shroud on her Assumption.

GOSSE, EDMUND (1840-), English poet and critic, was born in London on the 21st of September 1849, son of the zoolo- gist P. H. Gosse. In 1867 he became an assistant in the depart- ment of printed books in the British Museum, where he remained until he became in 1875 translator to the Board of Trade. In 1904 he was appointed librarian to the House of Lords. In 1 884-1 890 he was Clark Lecturer in English literature at Trinity College, Cambridge. Himself a writer of literary verse of much grace, and master of a prose style admirably expressive of a wide and appreciative culture, he was conspicuous for his valuable work in bringing foreign literature home to English readers-. Northern Studies (1879), a collection of essays on the literature ' of Holland and Scandinavia, was the outcome of a prolonged visit to those countries, and was followed by later work in the same direction. He translated Ibsen's Hedda Gabler (1891), and, with W. Archer, The Master- Builder (1893), and in 1907 he wrote a life of Ibsen for the " Literary Lives " series. He also edited the English translation of the works of Bjornson.

His services to Scandinavian letters were acknowledged in 1901, when he was made a knight of the Norwegian order of St Olaf of the first class. Mr Gosse's published volumes of verse include On Viol and Flute (1873), King Erik (1876), New Poems (1879), Firdausi in Exile (1885), In Russet and Silver (1894), Collected Poems (1896). Hypolympia, or the Gods on the Island (1901), an " ironic phantasy," the scene of which is laid in the 20th century, though the personages are Greek gods, is written in prose, with some blank verse. His Seventeenth Century Studies (1883), Life of William Congreve (1888), The Jacobean Poets (1894), Life and Letters of Dr John Donne, Dean of St Paul's (1899), Jeremy Taylor (1904, " English Men of Letters "), and Life of Sir Thomas Browne (1905) form a very considerable body of critical work on the English 17th-century writers. He also wrote a life of Thomas Gray, whose works he edited (4 vols., 1884); A History of Eighteenth Century Literature (1889); a History of Modern English Literature (1897), and vols. iii. and iv. of an Illustrated Record of English Literature (T903-1904) under- taken in connexion with Dr Richard Garnett. Mr Gosse was always a sympathetic student of the younger school of French and Belgian writers, some of his papers on the subject being collected as French Profiles (1905). Critical Kit-Kats (1896) contains an admirable criticism of J. M. de Heredia,

reminiscences of Lord de Tabley and others. He edited Heinemann's series of " Literature of the World " and the same publisher's " International Library." To the 9th edition of the Encyclopaedia Britannica' he contributed numerous articles, and his services as chief literary adviser in the preparation of the 10th and nth editions incidentally testify to the high position held by him in the contemporary world of letters. In 1905 he was entertained in Paris by the leading litterateurs as a representative of English literary culture. In 1907 Mr Gosse published anonymously Father and Son, an intimate study of his own early family life. He married Ellen, daughter of Dr G. W. Epps, and had a son and two daughters.

GOSSE, PHILIP HENRY (1810-1888), English naturalist, was born at Worcester on the 6th of April 18 10, his father, Thomas Gosse (1765-1844) being a miniature painter. In his youth the family settled at Poole, where Gosse's turn for natural history was noticed and encouraged by his aunt, Mrs Bell, the mother of the zoologist, Thomas Bell (1792-1880). He had, however, little opportunity for developing it until, in 1827, he found himself clerk in a whaler's office at Carbonear, in Newfoundland, where he beguiled the tedium of his life by observations, chiefly with the microscope. After a brief and unsuccessful interlude of farming in Canada, during which he wrote an unpublished work on the entomology of Newfoundland, he travelled in the United States, was received and noticed by men of science, was employed as a teacher for some time in Alabama, and returned to England in 1839. His Canadian Naturalist (1840), written on the voyage home, was followed in 1843 by ms Introduction to Zoology. His first widely popular book was The Ocean (1844). In 1844 Gosse, who had meanwhile been teaching in London, was sent by the British Museum to collect specimens of natural history in Jamaica. He spent nearly two years on that island, and after his return published his Birds of Jamaica (1847) ar >d his Naturalist's Sojourn in Jamaica (1851). He also wrote about this time several zoological works for the S.P.C.K., and laboured to such an extent as to impair his health. While recovering at Ilfracombe, he was attracted by the forms of marine life so abundant on that shore, and in 1853 published A Naturalist's Rambles on the Devonshire Coast, accompanied by a description of the marine aquarium invented by him, by means of which he succeeded in preserving zoophytes and other marine animals of the humbler grades alive and in good condition away from the sea. This arrange- ment was more fully set forth and illustrated in his Aquarium (1854), succeeded in 185 5-1856 by A Manual of Marine Zoology, in two volumes, illustrated by nearly 700 wood engravings after the author's drawings. A volume on the marine fauna of Tenby succeeded

in 1856. In June of the same year he was elected F.R.S. Gosse, who was a most careful observer, but who

lacked the philosophical spirit, was now tempted to essay work of a more ambitious order, publishing in 1857 two books, Life and Omphalos, embodying his speculations on the appearance of life on the earth, which he considered to have been instan- taneous, at least as regarded its higher forms. His views met with no favour from scientific men, and he returned to the field of observation, which he was better qualified to cultivate. Taking up his residence at St Marychurch, in South Devon, he produced from 1858 to i860 his standard work on sea-anemones, the Actinologia Britannica. The Romance of Natural History and other popular works followed. In 1865 he abandoned authorship, and chiefly devoted himself to the cultivation of orchids. Study of the Rotifera, however, also engaged his attention, and his results were embodied in a monograph by Dr C. T. Hudson (1886). He died at St Marychurch on the 23rd of August 1888.

His life was written by his son, Edmund Gosse. GOSSEC, FRANCOIS JOSEPH (1734-1829), French musical composer, son of a small farmer, was born at the village of Vergnies, in Belgian Hainaut, and showing early a taste for music became a choir-boy at Antwerp. He went to Paris in 1 751 and was taken up by Rameau. He became conductor of a private band kept by La Popeliniere, a wealthy amateur, and gradually determined to do something to revive the study of instrumental music in France. He had his own first symphony performed in 1754, and as conductor to the Prince de Conde's orchestra he produced several operas and other compositions of his own. He imposed his influence upon French music with remarkable success, founded the Concert des Amateurs in 1770, organized the Ecole de Chant in 1784, was conductor of the band of the Garde Nationale at the Revolution, and was appointed (with Mehul and Cherubini) inspector of the Conservatoire de Musique when this institution was created in 1705- He was an original member of the Institute and a chevalier of the legion of honour. Outside France he was but little known, and his own numerous compositions, sacred and secular, were thrown into the shade by those of men of greater genius; but he has a place in history as the inspirer of others, and as having powerfully stimulated the revival of instrumental music. He died at Passy on the 16th of February 1829.

See the Lives by P. Hedouin (1852) and E. G. J. Gregoir (1878).
GOSSIP (from the O.E. godsibb, i.e. God, and sib, akin, standing in relation to), originally a god-parent, i.e. one who by taking a sponsor's vows at a baptism stands in a spiritual relationship to the child baptized. The common modern meaning is of light personal or social conversation, or, with an invidious sense, of idle tale-bearing. " Gossip" was early used with the sense of a friend or acquaintance, either of -the parent of the child* baptized or of the other god-parents, and thus came to be used, with little reference to the position of sponsor, for women friends of the mother present at a birth; the transition of meaning to an idle chatterer or talker for talking's sake is easy. The application to the idle talk of such persons does not appear to be an early one.

GOSSNER, JOHANNES EVANGELISTA (1773-1858), German divine and philanthropist, was born at Hausen near Augsburg on the 14th of December 1773, and educated at the university of Dillingen. Here like Martin Boos and others he came under the spell of the Evangelical movement promoted by Johann Michael Sailer, the professor of pastoral theology. After taking priest's orders, Gossner held livings at Dirlewang (1804-1811) and Munich (1811-1817), but his evangelical tendencies brought about his dismissal and in 1826 he formally left the Roman Catholic for the Protestant communion. As minister of the Bethlehem church in Berlin (1829-1846) he was conspicuous not only for practical and effective preaching, but for the founding of schools, asylums and missionary agencies. He died on the 20th of March 1858.

Lives by Bethmann-Hollweg (Berlin, 1858) and H. Dalton (Berlin, 1878).

GOSSON, STEPHEN (1 554-1624), English satirist, was

baptized at St George's, Canterbury, on the 17th of April 1554.

He entered Corpus Christi College, Oxford, 1572, and on leaving the university in 1576 he went to London. In 1598 Francis Meres in his Palladis Tamia mentions him with Sidney, Spenser, Abraham Fraunce and others among the " best for pastorall," but no pastorals of his are extant. He is said to have been an actor, and by his own confession he wrote plays, for he speaks of Catilines Conspiracies as a " Pig of mine own Sowe." To this play and some others, on account of their moral intention, he extends indulgence in the general condemnation of stage plays contained in his Schoole of Abuse, containing a pleasant invective against Poets, Pipers, Platers, Jesters and such like Caterpillars of the Commonwealth (1579). The euphuistic style of this

pamphlet and its ostentatious display of learning were in the taste of the time, and do not necessarily imply insincerity. Gosson justified his attack by considerations of the disorder which the love of melodrama and of vulgar comedy was intro- ducing into the social life of London. It was not only by extremists like Gosson that these abuses were recognized. Spenser, in his Teares of the Muses (1591), laments the same evils, although only in general terms. The tract was dedicated to Sir Philip Sidney, who seems not unnaturally to have resented being connected with a pamphlet which opened with a comprehensive denunciation of poets, for Spenser, writing to Gabriel Harvey (Oct. 16, 1579) of the dedication, says the author ” was for hys labor scorned.” He dedicated, however, a second tract, The Ephemerides of Phialo . . . and A Short Apologie of the Schoole of Abuse, to Sidney on Oct. 28th, 1579. Gosson’s abuse of poets seems to have had a large share in inducing Sidney to write his Apologie for Poetrie, which probably dates from 1581. After the publication of the Schoole of Abuse Gosson retired into the country, where he acted as tutor to the sons of a gentleman (Plays Confuted. ” To the Reader,” 1582). Anthony a, Wood places this earlier and assigns the termination of his tutorship indirectly to his animosity against the stage, which apparently wearied his patron of his company. The publication of his polemic provoked many retorts, the most formidable of which was Thomas Lodge’s Defence of Playes (1580). The players themselves retaliated by reviving Gosson’s own plays. Gosson replied to his various opponents in 1582 by his Playes Confuted in Five Actions, dedicated to Sir Francis Walsingham. Meanwhile he had taken orders, was made lecturer of the parish church at Stepney (1585), and was pre- sented by the queen to the rectory of Great Wigborough, Essex, which he exchanged in 1600 for St Botolph’s, Bishopsgate. He died on the 13th of February 1624. Pleasant Quippes for Upstart New-fangled Gentlewomen (1595), a coarse satiric poem, is also ascribed to Gosson.

TheSchoole of Abuse and Apologie were edited (1868) by Prof. E. Arber in his English Reprints. Two poems of Gosson’s are included.

GOT, FRANgOIS JULES EDMOND (1822-1901), French actor, was born at Lignerolles on the 1st of October 1822, and entered the Conservatoire in 1841, winning the second prize for comedy that year and the first in 1842. After a year of military service he made his debut at the Comedie Francaise on the 17th of July 1844, as Alexis in Les Heritiers and Mascarelles in Les Precieuses ridicules. He was immediately admitted pensionnaire, and be- came societaire in 1850. By special permission of. the emperor in 1866 he played at the Odeon in Emile Augier’s Contagion. His golden jubilee at the Theatre

Francais was celebrated in 1894, and he made his final appearance the year after. Got was a fine representative of the grand style of French acting, and was much admired in England as well as in Paris. He wrote the libretto of the opera Francois Villon (1857) and also gf L'Esclave (1874). In 1881 he was decorated with the cross of the Legion of Honour.

GOTA, a river of Sweden, draining the great Lake Vener. The name, however, is more familiar in its application to the canal which affords communication between Gothenburg and Stockholm. The river flows out of the southern extremity of the lake almost due south to the Cattegat, which it enters by two arms enclosing the island of Hisingen, the eastern forming the harbour and bearing the heavy sea-traffic of the port of

Gothenburg. The Gota river is 50 m. in length, and is navigable for large vessels, a series of locks surmounting the famous falls of Trollhattan (q.v.). Passing the abrupt wooded Halleberg and Hunneberg (royal shooting preserves) Lake Veneris reached at Venersborg. Several important ports lie on the north, east and south shores (see Vener). From Sjotorp, midway on the eastern shore, the western Gota canal leads S.E. to Karlsborg. Its course necessitates over twenty locks to raise it from the Vener level (144 ft.) to its extreme height of 300 ft., and lower it over the subsequent fall through the small lakes Viken and Botten to Lake Vetter (q.v.; 289 ft.), which the route crosses to Motala. The eastern canal continues eastward from this point, and a descent is followed through five locks to Lake Boren, after which the canal, carried still at a considerable elevation, overlooks a rich and beautiful plain. The picturesque Lake Roxen with its ruined castle of Stjernarp is next traversed. At Norsholm a branch canal connects Lake Glan to the north, giving access to the important manufacturing centre of Norrko- ping. Passing Lake Asplangen, the canal follows a cut through steep rocks, and then resumes an elevated course to the old town of Soderkoping, after which the Baltic is reached at Mem. Vessels plying to Stockholm run N.E. among the coastal island- fringe (skargard), and then follow the Sodertelge canal into Lake Malar. The whole distance from Gothenburg to Stockholm is about 360 m., and the voyage takes about 25 days. The length of artificial work on the Gota canal proper is 54 m., and there are 58 locks. The scenery is not such as will bear adverse weather conditions; that of the western canal is without any interest save in the

remarkable engineering work. The idea of a canal dates from 1516, but the construction was organized by Baron von Platteh and engineered by Thomas Telford in 1810-1832. The falls of Trollhattan had already been locked successfully in 1800.

GOTARZES, or Goterzes, king of Parthia (c. a.d. 42-51). In an inscription at the foot of the rock of Behistun 1 he is called ToirLpˆrft Teoirodpos, i.e. ” son of Ggw,” and seems to be designated as ” satrap of satrap.” This inscription therefore probably dates from the reign of Artabanus II. (a.d. 10-40), to whose family Gotarzes must have belonged. From a very barbarous coin of Gotarzes with the inscription j3aci- \eois /SacriXecoe Apcrarof uos KeKaXovpxvos Aprafiavov rcorepfijs (Wroth, Catalogue of the Coins of Parthia, p. 165; Numism. Chron., 1900, p. 95; the earlier readings of this inscription are wrong), which must be translated ” king of kings Arsakes, named son of Artabanos, Gotarzes,” it appears that he was adopted by Artabanus. When the troublesome reign of Arta- banus II. ended in a.d. 39 or 40, he was succeeded by Vardanes, probably his son; but against him in 41 rose Gotarzes (the dates are fixed by the coins). He soon made himself detested by his cruelty — among many other murders he even slew his brother Artabanus and his whole family (Tac. Ann. xi. 8) — and Vardanes regained the throne in 42; Gotarzes fled to Hyrcania and gathered an army from the Dahan nomads. The war between the two kings was at last ended by a treaty, as both were afraid of the conspiracies of their nobles. Gotarzes returned to Hyrcania. But when Vardanes was assassinated in 45, Gotarzes was acknowledged in the whole empire (Tac. Ann. xi. 9 ff.; Joseph. Antiq. xx. 3, 4, where Gotarzes is called Kotardes). He now takes on his coins the usual Parthian titles, ” king of kings Arsaces the benefactor, the just, the illustrious (Epiphanes), the friend of the Greeks (Philhellen),” without mentioning his proper name. The discontent excited by his cruelty and luxury induced the hostile party to apply to the emperor Claudius and fetch from Rome an Arsacid prince Meherdates (i.e. Mithra.r dates), who lived there as hostage. He crossed the Euphrates • in 49, but was beaten and taken prisoner by Gotarzes, who cut off his ears (Tac. Ann. xii. 10 ff.). Soon after Gotarzes died, according to Tacitus, of an illness; Josephus says that he was murdered. His last coin is dated from June 51.

1 Rawlinson, Journ. Roy. Geog. Soc. ix. 114; Flandin and Coste, La Perse ancienne, i. tab. 19; Dittenberger, Orientis Graeci inscr.

An earlier ” Arsakes with the name Gotarzes,” mentioned on some

astronomical tablets from Babylon (Strassmaier in Zeitschr. fiir Assyriologie, vi. 216; Mahler in Wiener Zeitschr. fur Kunde des Morgenlands, xv. 63 ff.), appears to have reigned for some time in Babylonia about 87 B.C. (Ed. M.)

GOTHA, a town of Germany, alternately with Coburg the residence of the dukes of Saxe-Coburg-Gotha, in a pleasant situation on the Leine canal, 6 m. N. of the slope of the Thuringian forest, 17 m. W. from Erfurt, on the railway to Bebra-Cassel. Pop. (1905) 36,906. It consists of an old inner town and encircling suburbs, and is dominated by the castle of Friedenstein, lying on the Schlossberg at an elevation of 1 100 ft. With the exception of those in the older portion of the town, the streets are hand- some and spacious, and the beautiful gardens and promenades between the suburbs and the castle add greatly to the town's attractiveness. To the south of the castle there is an extensive and finely adorned park. To the north-west of the town the Galberĝon which there is a public pleasure garden — and to the south-west the Seeberg rise to a height of over 1300 ft. and afford extensive views. The castle of Friedenstein, begun by Ernest the Pious, duke of Saxe-Coburg-Gotha, in 1643 and completed in 1654, occupies the site of the old fortress of Grim- menstein. It is a huge square building flanked with two wings, having towers rising to the height of about 140 ft. It contains the ducal cabinet of coins and the ducal library of nearly 200,000 volumes, among which are several rare editions and about 6900 manuscripts. The picture gallery, the cabinet of engravings, the natural history museum, the Chinese museum, and the cabinet of art, which includes a collection of Egyptian, Etruscan, Roman and German antiquities, are now included in the new museum, completed in 1878, which stands on a terrace to the south of the castle. The principal other public buildings are the church of St Margaret with a beautiful portal and a lofty tower, founded in the 12th century, twice burnt down, and rebuilt in its present form in 1652 ; the church of the Augustinian convent, with an altar-piece by the painter Simon Jacobs; the theatre; the fire insurance bank and the life insurance bank; the ducal palace, in the Italian villa style, with a winter garden and picture gallery; the buildings of the ducal legislature; the hospital; the old town-hall, dating from the nth century; the old residence of the painter Lucas Cranach, now used as a girls' school; the ducal stable; and the Friedrichsthal palace, now used as public offices. The educational establishments include a gymnasium (founded in 1524, one of the most famous in Germany), two training schools for teachers, conservatoires of music and several scientific institutions. Gotha is remarkable for its insurance societies and for the support it has given to cremation. The crematorium was long regarded as a

model for such establishments.

Gotha is one of the most active commercial towns of Thuringia, its manufactures including sausages, for which it has a great reputation, porcelain, tobacco, sugar, machinery, mechanical and surgical instruments, musical instruments, shoes, lamps and toys. There are also a number of nurseries and market gardens. The book trade is represented by about a dozen firms, including that of the great geographical house of Justus Perthes, founded in 1785.

Gotha (in old chronicles called Gotegewe and later Gotaha) existed as a village in the time of Charlemagne. In 930 its lord Gothard abbot of Hersfeld surrounded it with walls. It was known as a town as early as 1200, about which time it came into the possession of the landgraves of Thuringia. On the extinction of that line Gotha came into the possession of the electors of Saxony, and it fell later to the Ernestine line of dukes. After the battle of Miihlberg in 1547 the castle of Grimmenstein was partly destroyed, but it was again restored in 1554. In 1567 the town was taken from Duke John Frederick by the elector Augustus of Saxony. After the death of John Frederick's sons, it came into the possession of Duke Ernest the Pious, the founder of the line of the dukes of Gotha; and on the extinction of this family it was united in 1825 along with the dukedom to Coburg.

See Gotha und seine Umgebung (Gotha, 1851); Kiihne, Beitrdge zur Geschichte der Entwickelung der socialen Zustande der Stadt und des Herzogtums Gotha (Gotha, 1862); Humbert, Les Villes de la Thuringe (Paris, 1869), and Beck, Geschichte der Stadt Gotha (Gotha, 1870).

GOTHAM, WISE MEN OF, the early name given to the people of the village of Gotham, Nottingham, in allusion to their reputed simplicity. But if tradition is to be believed the Gothamites were not so very simple. The story is that King John intended to live in the neighbourhood, but that the villagers, foreseeing ruin as the cost of supporting the court, feigned imbecility when the royal messengers arrived. Wherever the latter went they saw the rustics engaged in some absurd task. John, on this report, determined to have his hunting lodge elsewhere, and the " wise men " boasted, " we ween there are more fools pass through Gotham than remain in it." The " foles of Gotham " are mentioned as early as the 15th century in the Towneley Mysteries; and a collection of their "jests" was published in

the 1 6th century under the title Merrie Tales of the Mad Men of Gotham, gathered together by A.B., of Phisicke Doctour. The ” A.B.” was supposed to represent Andrew Borde or Boorde (i400?-i54o), famous among other things for his wit, but he probably had nothing to do with the compilation. As typical of the Gothamite folly is usually quoted the story of the villagers joining hands round a thornbush to shut in a cuckoo so that it would sing all the year. The localizing of fools is common to most countries, and there are many other reputed ” imbecile ” centres in England besides Gotham. Thus there are the people of Coggeshall, Essex, the ” carles of Austwick,” Yorkshire, ” the gowks of Gordon,” Berwickshire, and for many centuries the charge of folly has been made against ” silly ” Suffolk and Norfolk (Descriptio N orfolciensium about 12th century, printed in Wright’s Early Mysteries and other Latin Poems). In Germany there are the Schildburgers, in Holland the people of Kampen. Among the ancient Greeks Boeotia was the home of fools; among the Thracians, Abdera; among the ancient Jews, Nazareth.

See W. A. Clouston, Booh of Noodles (London, 1888); R. H. Cunningham, Amusing Prose Chap-books (1889).

GOTHENBURG (Swed. Goteborg), a city and seaport of Sweden, on the river Gota, 5 m. above its mouth in the Cattegat, 285 m. S.W. of Stockholm by rail, and 360 by the Gota canal- route. Pop. (1900) 130,619. It is the chief town of the district {Ian) of Goteborg och Bohus, and the seat of a bishop. It lies on the east or left bank of the river, which is here lined with quays on both sides, those on the west belonging to the large island of Hisingen, contained between arms of the Gota. On this island are situated the considerable suburbs of Lindholmen and Lundby.

The city itself stretches east and south from the river, with extensive and pleasant residential suburbs, over a wooded plain enclosed by low hills. The inner city, including the business quarter, is contained almost entirely between the river and the Rosenlunds canal, continued in the Vallgraf, the moat of the old fortifications; and is crossed by the Storahamn, Ostrahamn and Vestrahamn canals. The Storahamn is flanked by the handsome tree-planted quays, Norra and Sodra Hamngatan. The first of these, starting from the Stora Bommenshamn, where the sea-going passenger-steamers lie, leads past the museum to the Gustaf-Adolfs-Torg. The museum, in the old East India Company’s house, has fine collections in natural history, entomology, botany, anatomy, archaeology and ethnography, a picture and sculpture gallery, and exhibits of coins and in- dustrial art. Gustaf-Adolfs-Torg is the business centre, and contains the town-hall (1670) and exchange

(1849). Here are statues by B. E. Fogelberg of Gustavus Adolphus and of Odin, and of Oscar I. by J. P. Molin. Among several churches in this quarter of the city is the cathedral (Gustavii Domkyrka), a cruciform church founded in 1633 and rebuilt after fires in 1742 and 1815. Here are also the customs-house and residence of the governor. of the liin. On the north side, closely adjacent, are the Lilla Bommenshamn, where the Gota canal steamers lie, and the two principal railway stations, Statens and Bergslafs

Bangard. Above the Rosenlunds canal rises a low, rocky eminence, Lilla Otterhalleberg. The inner city is girdled on the south and east by the Kungspark, which contains Molin ‘s famous group of statuary, the Belt-bucklers (Bdltespdnnare) , and by the beautiful gardens of the Horticultural Society (Trddgardsforeningen). These grounds are traversed by the broad Nya Alle, a favourite promenade, and beyond them lies the best residential quarter, the first houses facing Vasa Street, Vasa Park and Kungsport Avenue. At the north end of the last are the university and the New theatre. At the west end of Vasa Street is the city library, the most important in the country except the royal library at Stockholm and the university libraries at Upsala and Lund. The suburbs are extensive. To the south-west are Majorna and Masthugget, with numerous factories. Beyond these lie the fine Slottskog Park, planted with oaks, and picturesquely broken by rocky hills commanding views of the busy river and the city. The suburb of Annedal is the workmen’s quarter; others are Landala, Garda and Stampen. All are connected with the city by electric tramways. Six railways leave the city from four stations. The principal lines, from the Statens and Bergslafs stations, run N. to Trollhattan, and into Norway (Christiania) ; N.E. between Lakes Vener and Vetter to Stockholm, Falun and the north; E. to Boras and beyond, and S. by the coast to Helsingborg, &c. From the Vestgota station a narrow-gauge line runs N.E. to Skara and the southern shores of Vener, and from Saro station near Slottskog Park a line serves Saro, a seaside watering-place on an island 20 m. S. of Gothenburg.

The city has numerous important educational establishments. The university (Hogskola) was a private foundation (1891), but is governed by a board, the members of which are nominated by the state, the town council, Royal Society of Science and Literature, directors of the museum, and the staffs of the various local colleges. There are several boys’ schools, a college for girls, a scientific college, a commercial college (1826), a school of navigation, and Chalmers’ Polytechnical College, founded by William Chalmers (1748-1811), a native of Gothenburg of English parentage. He bequeathed half his fortune to this institution, and the remainder to the Sahlgrenska

hospital. A people's library was founded by members of the family of Dickson, several of whom have taken a prominent part in philanthropical works in the city. The connexion of the family with Gothenburg dates from 1802, when Robert Dickson, a native of Montrose in Scotland, founded the business in which he was joined in 1807 by his brother James.

In respect of industry and commerce as a whole Gothenburg ranks as second to Stockholm in the kingdom; but it is actually the principal centre of export trade and port of register; and as a manufacturing town it is slightly inferior to Malmo. Its principal industrial establishments are mechanical works (both in the city and at Lundby), saw-mills, dealing with the timber which is brought down the G6ta, flour-mills, margarine factories, breweries and distilleries, tobacco works, cotton mills, dyeing and bleaching works (at Levanten in the vicinity), furniture factories, paper and leather works, and shipbuilding yards. The vessels registered at the port in 1901 were 247 of 120,488 tons. There are about 3 m. of quays approachable by vessels drawing 20 ft., and slips for the accommodation of large vessels. Gothen- burg is the principal port of embarkation of Swedish emigrants for America.

The city is governed by a council including two mayors, and returns nine members to the second chamber of the Riksdag (parliament).

-Founded by Gustavus Adolphus in 1619, Gothenburg was from the first designed to be fortified, a town of the same name founded on Hisingen in 1603 having been destroyed by the Danes during the Calmar war. From 1621, when it was first chartered, ifc steadily increased, though it suffered greatly in the Danish wars of the last half of the 17th and the beginning of the 18th centuries, and from several extensive conflagrations (the last in 1813), which have destroyed important records of its history. The great development of its herring fishery in the latter part

of the 1 8th century gave a new impulse to the city's trade, which was kept up by the influence of the " Continental System," under which Gothenburg became a depot for the colonial mer- chandise of England. After the fall of Napoleon it began to decline, but after its closer connexion with the interior of the country by the Gota canal (opened 1832) and Western railway it rapidly advanced both in population and

trade. Since the demolition of its fortifications in 1807, it has been defended only by some small forts. Gothenburg was the birthplace of the poet Bengt Lidner (1757-1793) and two of Sweden's greatest sculptors, Bengt Erland Fogelberg (1786-1854) and Johann Peter Molin (1814-1873). After the French Revolution Gothen- burg was for a time the residence of the Bourbon family. The name of this city is associated with the municipal licensing system known as the Gothenburg System (see Liquor Laws).

See W. Berg, Samlingar till Goteborgs historia (Gothenburg, 1 893) ; Lagerberg, Goteborg i dldre och nyare tid (Gothenburg, 1902) ; Froding, Detforna Goteborg (Stockholm, 1903).

GOTHIC, the term generally applied to medieval architecture, and more especially to that in which the pointed arch appears. The style was at one time supposed to have originated with the warlike people known as the Goths, some of whom (the East Goths, or Ostrogoths) settled in the eastern portion of Europe, and others (the West Goths, or Visigoths) in- the Asturias of Spain; but as no buildings or remains of any description have ever been found, in which there are any traces of an independent construction in either brick or stone, the title is misleading; since, however, it is now so generally accepted it would be difficult to change it. The term when first employed was one of reproach, as Evelyn (1702). when speaking of the faultless building (i.e. classic) says, " they were demolished by the Goths or Vandals, who introduced their own licentious style now called modern or Gothic." The employment of the pointed arch in Syria, Egypt and Sicily, from the 8th century onwards by the Mahom- medans for their mosques and gateways, some four centuries before it made its appearance in Europe, also makes it advisable to adhere to the old term Gothic in preference to Pointed Architecture. (See Architecture)

GOTHITE, or Goethite, a ' mineral composed of an iron hydrate, Fe203.H 2 0, crystallizing in the orthorhombic system and isomorphous with diaspore and manganite (q.v.). It was first noticed in 1789, and in 1806 was named after the poet Goethe. Crystals are prismatic, acicular or scaly in habit; they have a perfect cleavage parallel to the brachypinacoid (M in the figure). Reniform and stalactitic masses with a radiated fibrous structure also occur. The colour varies from yellowish or reddish to blackish-brown, and by trans- mitted light it is often blood-red; the streak is brownish-yellow; hardness, 5; specific gravity, 4-3. The best crystals are the brilliant, blackish-brown prisms with terminal pyramidal planes (fig.) from the Restormel iron mines at Lostwithiel, and the Botallack mine at St Just in Cornwall. A variety occurring as thin red scales at Siegen in

Westphalia is known as Rubinglimmer or pyrrhosiderite (from Gr. irvppbs, flame- coloured, and ciSr/pos, iron): a scaly-fibrous variety from the same locality is called lepidocrocite (from Xejus, scale, and Kpods, fibre) . Sammet blende or przibramite is a variety, from Przibram in Bohemia, consisting of delicate acicular or capillary crystals arranged in radiating groups with a velvety surface and yellow colour.

Gothite occurs with other iron oxides, especially limonite and hematite, and when found in sufficient quantity is mined with these as an ore of iron. It often occurs also as an enclosure in other minerals. Acicular crystals, resembling rutile in ap- pearance, sometimes penetrate crystals of pale-coloured amethytt, for instance, at Wolf's Island in Lake Onega in Russia: this form of the mineral has long been known as onegite, and the crystals enclosing it are cut for ornamental purposes under the name of " Cupid's darts " (fleches A' amour). The metallic glitter

of avanturine or sun-stone (q.v.) is due to the enclosed scales of gothite and certain other minerals. (L. J. S.)

GOTHS (Gotones, later Gothis), a Teutonic people who in the 1 st century of the Christian era appear to have inhabited the middle part of the basin of the Vistula. They were probably the easternmost of the Teutonic peoples. history. According to their own traditions as recorded by Jordanes, they had come originally from the island Scandza, i.e. Skane or Sweden, under the leadership of a king named Berig, and landed first in a region called Gothiscandza. Thence they invaded the territories of the Ulmerugi (the Holmryge of Anglo-Saxon tradition) , probably in the neighbourhood of Riigenwalde in eastern Pomerania, and conquered both them and the neighbouring Vandals. Under their sixth king Filimer. they migrated into Scythia and settled in a district which they called Oium. The rest of their early history, as it is given by Jordanes following Cassiodorus, is due to an erroneous identifica- tion of the Goths with the Getae, and ancient Thracian people.

The credibility of the story of the migration from Sweden has been much discussed by modern authors. The legend was not peculiar to the Goths, similar traditions being current among the Langobardi, the Burgundians, and apparently several other Teutonic nations. It has been observed with truth that so many populous nations can hardly have sprung from the Scandinavian peninsula; on the other hand, the existence of these traditions certainly requires some explanation. Possibly, however, many of the royal families may have contained an

element of Scandinavian blood, a hypothesis which would well accord with the social conditions of the migration period, as illustrated, e.g., in Volsunga Saga and in Hervarar Saga ok HeiSreks Konungs. In the case of the Goths a connexion with Gotland is not unlikely, since it is clear from archaeological evidence that this island had an extensive trade with the coasts about the mouth of the Vistula in early times. If, however, there was any migration at all, one would rather have expected it to have taken place in the reverse direction. For the origin of the Goths can hardly be separated from that of the Vandals, whom according to Procopius they resembled in language and in all other respects. Moreover the Gepidae, another Teutonic people, who are said to have formerly inhabited the delta of the Vistula, also appear to have been closely connected with the Goths. According to Jordanes they participated in the migration from Scandza.

Apart from a doubtful reference by Pliny to a statement of the early traveller Pytheas, the first notices we have of the Goths go back to the first years of the Christian era, at which time they seem to have been subject to the Marcomannic king Maroboduus. They do not enter into Roman history, however, until after the beginning of the 3rd century, at which time they appear to have come in conflict with the emperor Caracalla, During this century their frontier seems to have been advanced considerably farther south, and the whole country as far as the: lower Danube was frequently ravaged by them. The emperor Gordianus is called ” victor Gothorum ” by Capitolinus, though we have no record of the ground for the claim, and further conflicts are recorded with his successors, one of whom, Decius, was slain by the Goths in Moesia. According to Jordanes the kings of the Goths during these campaigns were Ostrogotha and after- wards Cniva, the former of whom is praised also in the Anglo- Saxon poem Widsith. The emperor Gallus was forced to pay tribute to the Goths. By this time they had reached the coasts of the Black Sea, and during the next twenty years they frequently ravaged the maritime regions of Asia Minor and Greece. Aurelian is said to have won a victory over them, but the province of Dacia had to be given up. In the time of Constantine the Great Thrace and Moesia were again plundered by the Goths, a.d. 321. Constantine drove them back and concluded peace with their king Ariaric in 336. From the end of the 3rd century we hear of subdivisions of the nation called Greutungi, Teruingi, Austrogothi (Ostrogothi) , Visigothi, Taifali, though it is not clear whether these were all distinct. Though by this time the Goths had extended their territories,

far to the south and east, it must not be assumed that they had evacuated their old lands on the Vistula. Jordanes records several traditions of their conflicts with other Teutonic tribes, in particular a victory won by Ostrogotha over Fastida, king of the Gepidae, and another by Geberic over Visimar, king of the Vandals, about the end of Constantine's reign, in consequence of which the Vandals sought and obtained permission to settle in Pannonia. Geberic was succeeded by the most famous of the Gothic kings, Hermanaric (Eormenric, Iormunrekr), whose deeds are recorded in the traditions of all Teutonic nations. According to Jordanes he conquered the Heruli, the Aestii, the Venedi, and a number of other tribes who seem to have been settled in the southern part of Russia. From Anglo-Saxon sources it seems probable that his supremacy reached westwards as far as Holstein. He was of a cruel disposition, and is said to have killed his nephews Embrica (Emerca) and Fritla (Fridla) in order to obtain the great treasure which they possessed. Still more famous is the story of Suanihilda (Svanhildr), who according to Northern tradition was his wife and was cruelly put to death on a false charge of unfaithfulness. An attempt to avenge her death was made by her brothers Ammius (HamSir) and Sarus (Sorli) by whom Hermanaric was severely wounded. To his time belong a number of other heroes whose exploits are recorded in English and Northern tradition, amongst whom we may mention Wudga (Vidigoia), Hama and several others, who in Widsith are represented as defending their country against the Huns in the forest of the Vistula. Hermanaric committed suicide in his distress at an invasion of the Huns about a.d. 370, and the portion of the nation called Ostrogoths then came under Hunnish supremacy. The Visigoths obtained permission to cross the Danube and settle in Moesia. A large part of the nation became Christian about this time (see below). The exactions of the Roman governors, however, soon led to a quarrel, which ended in the total defeat and death of Valens at Adrianople in the year 378. ■ (F. G. M. B.)

From about 370 the history of the East and West Goths parts asunder, to be joined together again only incidentally and for a season. The great mass of the East Goths stayed north of the Danube, and passed under the overlordship of the Hun. They do not for the present play any important part in the affairs of the Empire. The great mass of the West Goths crossed the Danube into the Roman provinces, and there played a most important part in various characters of alliance and enmity. The great migration was in 376, when they were allowed to pass as peaceful settlers under their chief Frithigern. His rival Athanaric seems to have tried to maintain his party for a while north

of the Danube in defiance of the Huns; but he had presently to follow the example of the great mass of the nation. The peaceful designs of Frithigern were meanwhile thwarted by the ill-treatment which the Goths suffered from the Roman officials, which led first to disputes and then to open war. In 378 the Goths won the great battle of Adrianople, and after this Theodosius the Great, the successor of Valens, made terms with them in 381, and the mass of the Gothic warriors entered the Roman service as foederati. Many of their chiefs were in high favour; but it seems that the orthodox Theodosius showed more favour to the still remaining heathen party among the Goths than to the larger part of them who had embraced Arian Christianity. Athanaric himself came to Con- stantinople in 381; he was received with high honours, and had a solemn funeral when he died. His saying is worth recording, as an example of the effect which Roman civilization had on the Teutonic mind. ” The emperor,” he said, ” was a god upon earth, and he who resisted him would have his blood on his own head.” *

The death of Theodosius in 395 broke up the union between ‘ the West Goths and the Empire. Dissensions arose between them and the ministers of Arcadius; the Goths threw off their allegiance, and chose Alaric as their king. This was a restoration alike of national unity and of national independence. The royal title had not been borne by their leaders in the Roman service. Alaric’s position is quite different from that of several

Later history.

Goths in the Roman service, who appear as simple rebels. He was of the great West Gothic house of the Balthi, or Bold-men, a house second in nobility only to that of the Amali. His whole career was taken up with marchings to and fro within the lands, first of the Eastern, then of the Western empire. The Goths are under him an independent people under a national king; their independence is in no way interfered with if the Gothic king, in a moment of peace, accepts the office and titles of a Roman general. But under Alaric the Goths make no lasting settlement. In the long tale of intrigue and warfare between the Goths and the two imperial courts which fills up this whole time, cessions of territory are offered to the Goths, provinces are occupied by them, but as yet they do not take root anywhere; no Western land as yet becomes Gothia. Alaric’s designs of settlement seem in his first stage to have still kept east of the Adriatic, in Illyricum, possibly in Greece. Towards the end of his career his eyes seem fixed on Africa.

Greece was the scene of his great campaign in 395-96, the second Gothic invasion of that country. In this campaign the religious position of the Goths is strongly marked. The Arian appeared as an enemy alike to the pagan majority and the Catholic minority; but he came surrounded by monks, and his chief wrath was directed against the heathen temples {vide G. F. Hertzberg, Geschichte Griechenlands, iii. 391). His Italian canir paigns fall into two great divisions, that of 402-3, when he was driven back by Stilicho, and that of 408-10, after Stilicho's death. In' this second war he thrice besieged Rome (408, 409, 410). The second time it suited a momentary policy to set up a puppet emperor of his own, and even to accept a military commission from him. The third time he sacked the city, the first time since Brennus that Rome had been taken by an army of utter foreigners. The intricate political and military details of these campaigns are of less importance in the history of the Gothic nation than the stage which Alaric's reign marks in the history of that nation. It stands between two periods of settlement within the Empire and of service under the Empire. Under Alaric there is no settlement, and service is quite secondary and precarious; after his death in 410 the two begin again in new shapes.

Contemporary with the campaigns of Alaric was a barbarian invasion of Italy, which, according to one view, again brings the East and West Goths together. The great mass of the East Goths, as has been already said, became one of the many nations which were under vassalage to the Huns; but their relation was one merely of vassalage. They remained a distinct peop'i* under kings of their own, kings of the house of the Amali and of the kindred of Ermanaric (Jordanes, 48) . They had to follow the lead of the Huns in war, but they were also able to carry on wars of their own; and it has been held that among these separate East Gothic enterprises we are to place the invasion of Italy in 405 by Radagaisus (whom R. Pallmann 1 writes Ratiger, and takes him for the chief of the heathen part of the East Goths). One chronicler, Prosper, makes this invasion preceded by another in 400, in which Alaric and Radagaisus appear as partners. The paganism of Radagaisus is certain. The presence of Goths in his army is certain, but it seems dangerous to infer that his invasion was a national Gothic enterprise.

Under Ataulphus, the brother-in-law and successor of Alaric, another era opens, the beginning of enterprises which did in the end lead to the establishment of a settled Gothic monarchy in the West. The position of Ataulphus is well marked by the speech put into his mouth by Orosius. He had at one time dreamed of destroying the Roman power, of turning Romania into Gothia, and putting Ataulphus in the

stead of Augustus; but he had learned that the world could be governed only by the laws of Rome and he had determined to use the Gothic arms for the support of the Roman power. ■ And in the confused and contradictory accounts of his actions (for the story in Jordanes cannot be reconciled with the accounts in Olympiodorus and the chroniclers), we can see something of this principle at worK throughout. Gaul and Spain were overrun both by barbarian 1 Geschichte der Volkerwanderung (Gotha, 1 863-1 864).

invaders and by rival emperors. The sword of the Goth was to win back the last lands for Rome. And, amid many shif tings of allegiance, Ataulphus seems never to have wholly given up the position of an ally of the Empire. His marriage with Placidia, the daughter of the great Theodosius, was taken as the seal of the union between Goth and Roman, and, had their son Theo- dosius lived, a dynasty might have arisen uniting both claims. But the career of Ataulphus was cut short at Barcelona in 415, by his murder at the hands of another faction of the Goths. The reign of Sigeric was momentary. Under Wallia in 418 a more settled state of things was established. The Empire re- ceived again, as the prize of Gothic victories, the Tarraconensis in Spain, and Novempopulana and the Narbonensis in Gaul. The ” second Aquitaine,” with the sea-coast from the mouth of the Garonne to the mouth of the Loire, became the West Gothic kingdom of Toulouse. The dominion of the Goths was now strictly Gaulish; their lasting Spanish dominion does not yet begin.

The reign of the first West Gothic Theodoric (419-451) shows a shifting state of relations between the Roman and Gothic powers; but, after defeats and successes both ways, the older relation of alliance against common enemies was again estab- lished. At last Goth and Roman had to join together against the common enemy of Europe and Christendom, Attila the Hun. But they met Gothic warriors in his army. By the terms of their subjection to the Huns, the East Goths came to fight for Attila against Christendom at Chalons, just as the Servians came to fight for Bajazet against Christendom at Nicopolis. Theodoric fell in the battle (451). After this momentary meeting, the history of the East and West Goths again separates for a while. The kingdom of Toulouse grew within Gaul at the expense of the Empire, and in Spain at the expense of the Suevi. Under Euric (466-485) the West Gothic power again became largely a Spanish power. The kingdom of Toulouse took in nearly all Gaul south of the Loire and

west of the Rhone, with all Spain, except the north-west corner, which was still held by the Suevi. Provence alone remained to the Empire. The West Gothic kings largely adopted Roman manners and culture; but, as they still kept to their original Arian creed, their rule never became thoroughly acceptable to their Catholic subjects. They stood, therefore, at a great disadvantage when a new and aggres- sive Catholic power appeared in Gaul through the conversion of the Frank Clovis or Chlodwig. Toulouse was, as in days long after, the seat of an heretical power, against which the forces of northern Gaul marched as on a crusade. In 507 the West Gothic king Alaric II. fell before the Frankish arms at Campus Vogladensis, near Poitiers, and his kingdom, as a great power north of the Alps, fell with him. That Spain and a fragment of Gaul still remained to form a West Gothic kingdom was owing to the intervention of the East Goths under the rule of the greatest man in Gothic history.

When the Hunnish power broke in pieces on the death of Attila, the East Goths recovered their full independence. They now entered into relations with the Empire, and were settled on lands in Pannonia. During the greater part of the latter half of the 5th century, the East Goths play in south-eastern Europe nearly the same part which the West Goths played in the century before. They are seen going to and fro, in every conceivable relation of friendship and enmity with the Eastern Roman power, till, just as the West Goths had done before them, they pass from the East to the West. They are still ruled by kings of the house of the Amali, and from that house there now steps forward a great figure, famous alike in history and in romance, in the person of Theodoric, son of Theodemir. Born about 454, his childhood was spent at Constantinople as a hostage, where he was carefully educated. The early part of his life is taken up with various disputes, intrigues and wars within the Eastern empire, in which he has as his rival another Theodoric, son of Triarius, and surnamed Strabo. This older but lesser Theodoric seems to have been the chief, not the king, of that branch of the East Goths which had settled within the Empire at an earlier time. Theodoric the Great, as he is some-

times distinguished, is sometimes the friend, sometimes the enemy, of the Empire. In the former case he is clothed with various Roman titles and offices, as patrician and consul; but in all cases alike he remains the national East Gothic king. It was in both characters together that he set out in 488, by com- mission from the emperor Zeno, to recover Italy from Odoacer. By 493 Ravenna was taken; Odoacer was killed by Theodoric's own hand; and the East Gothic power was fully established over Italy, Sicily, Dalmatia and the lands to the north of Italy. In this war the history of the East and West Goths begins again

to unite, if we may accept the witness of one writer that Theo- doric was helped by West Gothic auxiliaries. The two branches of the nation were soon brought much more closely together, when, through the overthrow of the West Gothic kingdom of Toulouse, the power of Theodoric was practically extended over a large part of Gaul and over nearly the whole of Spain. A time of confusion followed the fall of Alaric II., and, as that prince was the son-in-law of Theodoric, the East Gothic king stepped in as the guardian of his grandson Amalaric, and pre- served for him all his Spanish and a fragment of his Gaulish dominion. Toulouse passed away to the Frank; but the Goth kept Narbonne and its district, the land of Septimania — the land which, as the last part of Gaul held by the Goths, kept the name of Gothia for many ages. While Theodoric lived, the West Gothic kingdom was practically united to his own dominion. He seems also to have claimed a kind of protect- orate over the Teutonic powers generally, and indeed to have practically exercised it, except in the case of the Franks.

The East Gothic dominion was now again as great in extent and far more splendid than it could have been in the time of Ermanaric. But it was now of a wholly different character. The dominion of Theodoric was not a barbarian but a civilized power. His twofold position ran through everything. He was at once national king of the Goths, and successor, though without any imperial titles, of the Roman emperors of the West. The two nations, differing in manners, language and religion, lived side by side on the soil of Italy; each was ruled according to its own law, by the prince who was, in his two separate characters, the common sovereign of both. The picture of Theodoric's rule is drawn for us in the state papers drawn up in his name and in the names of his successors by his Roman minister Cassio- dorus. The Goths seem to have been thick on the ground in northern Italy; in the south they formed little more than garrisons. In Theodoric's theory the Goth was the armed pro- tector of the peaceful Roman; the Gothic king had the toil of government, while the Roman consul had the honour. All the forms of the Roman administration went on, and the Roman polity and Roman culture had great influence on the Goths themselves. The rule of the prince over two distinct nations in the same land was necessarily despotic; the old Teutonic freedom was necessarily lost. Such a system as that which Theodoric established needed a Theodoric to carry it on. It broke in pieces after his death.

On the death of Theodoric (526) the East and West Goths were again separated. The few instances in which they are found acting together after this time are as scattered and incidental as they were before. Amalaric succeeded to the West Gothic kingdom in Spain and

Septimania. Provence was added to the dominion of the new East Gothic king Athalaric, the grandson of Theodoric through his daughter Amalasuntha. The weakness of the East Gothic position in Italy now showed itself. The long wars of Justinian's reign (535-555) recovered Italy for the Empire, and the Gothic name died out on Italian soil. The chance of forming a national state in Italy by the urrion of Roman and Teutonic elements, such as those which arose in Gaul, in Spain, and in parts of Italy under Lombard rule, was thus lost. The East Gothic kingdom was destroyed before Goths and Italians had at all mingled together. The war of course made the distinction stronger; under the kings who were chosen for the purposes of the war national Gothic feeling had revived. The Goths were now again, if not a wandering people, yet an armed host, no longer the protectors but the

enemies of the Roman people of Italy. The East Gothic dominion and the East Gothic name wholly passed away. The nation had followed Theodoric. It is only once or twice after his expedition that we hear of Goths, or even of Gothic leaders, in the eastern provinces. From the soil of Italy the nation passed away almost without a trace, while the next Teutonic conquerors stamped their name on the two ends of the land, one of which keeps it to this day.

The West Gothic kingdom lasted much longer, and came much nearer to establishing itself as a national power in the lands which it took in. But the difference of race and faith between the Arian Goths and the Catholic Romans of Gaul and Spain influenced the history of the West Gothic kingdom for a long time. The Arian Goths ruled over Catholic subjects, and were surrounded by Catholic neighbours. The Franks were Catholics from their first conversion; the Suevi became Catholics much earlier than the Goths. The African conquests of Belisarius gave the Goths of Spain, instead of the Arian Vandals, another Catholic neighbour in the form of the restored Roman power. The Catholics everywhere preferred either Roman, Suevian or Frankish rule to that of the heretical Goths; even the unconquerable mountaineers of Cantabria seem for a while to have received a Frankish governor. In some other mountain districts the Roman inhabitants long maintained their independence, and in 534 a large part of the south of Spain, including the great cities of Cadiz, Cordova, Seville and New Carthage, was, with the good will of its Roman inhabitants, reunited to the Empire, which kept some points on the coast as late as 624. That is to say, the same work which the Empire was carrying on in

Italy against the East Goths was at the same moment carried on in Spain against the West Goths. But in Italy the whole land was for a while won back, and the Gothic power passed away for ever. In Spain the Gothic power outlived the Roman power, but it outlived it only by itself becoming in some measure Roman. The greatest period of the Gothic pcwer as such was in the reign of Leovigild (568-586). He reunited the Gaulish and Spanish parts of the kingdom which had been parted for a moment; he united the Suevian dominion to his own; he overcame some of the independent districts, and won back part of the recovered Roman province in southern Spain. He further established the power of the crown over the Gothic nobles, who were beginning to grow into territorial lords. The next reign, that of his son Recared (586-601), was marked by a change which took away the great hindrance which had thus far stood in the way of any national union between Goths and Romans. The king and the greater part of the Gothic people embraced the Catholic faith. A vast degree of influence now fell into the hands of the Catholic bishops; the two nations began to unite; the Goths were gradually romanized and the Gothic language began to go out of use. In short, the Romance nation and the Romance speech of Spain began to be formed. The Goths supplied the Teutonic infusion into the Roman mass. The kingdom, however, still remained a Gothic kingdom. ” Gothic,” not ” Roman ” or ” Spanish,” is its formal title; only a single late instance of the use of the formula ” regnum Hispaniae ” is known. In the first half of the 7th century that name became for the first time geographically applicable by the conquest of the still Roman coast of southern Spain. The Empire was then engaged in the great struggle with the Avars and Persians, and, now that the Gothic kings were Catholic, the great objection to their rule on the part of the Roman inhabitants was taken away. The Gothic nobility still remained a distinct class, and held, along with the Catholic prelacy, the right of choosing the king. Union with the Catholic Church was accompanied by the introduction of the ecclesi- astical ceremony of anointing, a change decidedly favourable to elective rule. The growth of those later ideas which tended again to favour the hereditary doctrine had not time to grow up in Spain before the Mahommedan conquest (711). The West Gothic crown therefore remained elective till the end. The modern Spanish nation is the growth of the long struggle with the Mussulmans; but it has a direct connexion with the West

Gothic kingdom. We see at once that the Goths hold altogether a different place in Spanish memory from that which they hold in Italian memory. In Italy the Goth was but a momentary invader and ruler; the Teutonic element in Italy comes from other sources. In Spain

the Goth supplies an important element in the modern nation. And that element has been neither forgotten nor despised. Part of the unconquered region of northern Spain, the land of Asturia, kept for a while the name of Gothia, as did the Gothic possessions in Gaul and in Crim. The name of the people who played so great a part in all southern Europe, and who actually ruled over so large a part of it has now wholly passed away; but it is in Spain that its historical impress is to be looked for.

Of Gothic literature in the Gothic language we have the Bible of Ulfilas, and some other religious writings and fragments (see Gothic Language below). Of Gothic legislation in Latin we have the edict of Theodoric of the year 500, edited by F. Bluhme in the Monumenta Germaniae historica; and the books of Variae of Cassiodorus may pass as a collection of the state papers of Theodoric and his immediate successors. Among the West Goths written laws had already been put forth by Euric. The second Alaric (484-507) put forth a Breviarium of Roman law for his Roman subjects; but the great collection of West Gothic laws dates from the later days of the monarchy, being put forth by King Recceswinth about 654. This code gave occasion to some well-known comments by Montesquieu and Gibbon, and has been discussed by Savigny (Geschichte des rbmischen Rechts, ii. 65) and various other writers. They are printed in the Monumenta Germaniae, leges, tome i. (1902). Of special Gothic histories, besides that of Jordanes, already so often quoted, there is the Gothic history of Isidore, archbishop of Seville, a special source of the history of the West Gothic kings down to Svinthala (621-631). But all the Latin and Greek writers contemporary with the days of Gothic predominance make their constant contributions. Not for special facts, but for a general estimate, no writer is more instructive than Salvian of Marseilles in the 5 th century, whose work De Gubernatione Dei is full of passages contrasting the vices of the Romans with the virtues of the barbarians, especially of the Goths. In all such pictures we must allow a good deal for exaggeration both ways, but there must be a ground-work of truth. The chief virtues which the Catholic presbyter praises in the Arian Goths are their chastity, their piety according to their own creed, their tolerance towards the Catholics under their rule, and their general good treatment of their Roman subjects. He even ventures to hope that such good people may be saved, notwith-standing their heresy. All this must have had some ground- work of truth in the 5th century, but it is not very wonderful if the later West Goths of Spain had a good deal fallen away from the doubtless somewhat ideal picture of Salvian. (E. A. F.)

There is now an extensive literature on the Goths, and among the

principal works may be mentioned: T. Hodgkin, Italy and her Invaders (Oxford, 1880-1899); J. Aschbach, Geschichte der West- goten (Frankfort, 1827) ; F. Dahn, Vie Konige der Germanen (1861- 1899); E. von Wietersheim, Geschichte der Volkerwanderung (1880- 1881); R. Pallmann, Die Geschichte der Volkerwanderung (Gotha, 1863-186ˆ); B. Rappaport, Die Einfdlle der Goten in das rbmische Reich (Leipzig, 1899), and K. Zeuss, Die Deutschen und die Nachbar-stdmme (Munich, 1837). Other works which may be consulted are: E. Gibbon, Decline and Fall of the Roman Empire, edited by J. B. Bury (1896-1900); H. H. Milman, History of Latin Christianity (1867); J. B. Bury, History of the Later Roman Empire (1889); P. Villari, Le Invasions barbariche in Italia (Milan, 1901); and E. Martroye, L 'Occident d I'ipoque byzantine: Goths et Vandales (Paris, 1903). There is a popular history of the Goths by H. Bradley in the " Story of the Nations " series (London, 1888). For the laws see the Leges in Band I. of the Monumenta Germaniae historica, leges (1902). -A. Helfferich, Entstehung und Geschichte des Westgotenrechts (Berlin, 1858); F. Bluhme, Zur Textkritik des Westgotenrechts (1872); F. Dahn, Lex Visigoihorum. Westgotische Studien (Wiirzburg, 1874); C. Rinaudo, Leggidei Visigote, studio (Turin, 1878); and K. Zeumer, " Geschichte der westgotischen Gesetzgebung " in the Neues Archiv der Gesellschaftfur dltere deutsehe Geschichtskunde. See also the article on Theodoric. . , ...

Gothic Language. — Our knowledge of the Gothic language is derived almost entirely from the fragments of a translation

of the Bible which is believed to have been made by the Arian bishop Wulfila or Ulfilas (d. 383) for the Goths who dwelt on the lower Danube. The MSS. which have come down to us and which date from the period of Ostrogothic rule in Italy (480-5 s 5) contain the Second Epistle to the Corinthians complete, together with more or less considerable fragments of the four Gospels and of all the other Pauline Epistles. The only remains of the Old Testament are three short fragments of Ezra and Nehemiah. There is also an incomplete commentary (skeireins) on St John's Gospel, a fragment of a calendar, and two charters (from Naples and Arezzo, the latter now lost) which contain some Gothic sentences. All these texts are written in a special character, which is said to have been invented by Wulfila. It is based chiefly on the uncial Greek alphabet, from which indeed most of the letters are obviously derived, and several orthographical peculiarities,

e.g. the use of ai for e and ei for i reflect the Greek pronunciation of the period. Other letters, however, have been taken over from the Runic and Latin alphabets. Apart from the texts mentioned above, the only remains of the Gothic language are the proper names and occasional words which occur in Greek and Latin writings, together with some notes, including the Gothic alphabet, in a Salzburg MS. of the 10th century, and two short inscriptions on a torque and a spear-head, discovered at Buzeo (Walachia) and Kovel (Volhynia) respectively. The language itself, as might be expected from the date of Wulfila's translation, is of a much more archaic type than that of any other Teutonic writings which we possess, except a few of the earliest Northern inscriptions. This may be seen, e.g. in the better preservation of final and unaccented syllables and in the retention of the dual and the middle (passive) voice in verbs. It would be quite erroneous, however, to regard the Gothic fragments as represent- ing a type of language common to all Teutonic nations in the 4th century. Indeed the distinctive characteristics of the language are very marked, and there is good reason for believing that it differed considerably from the various northern and western languages, whereas the differences among the latter at this time were probably comparatively slight (see Teutonic Languages). On the other hand, it must not be supposed that the language of the Goths stood quite isolated. Procopius (Vand. i. 2) states distinctly that the Gothic language was spoken not only by the Ostrogoths and Visigoths but also by the Vandals and the Gepidae; and in the former case there is sufficient evidence, chiefly from proper names, to prove that his statement is not far from the truth. With regard to the Gepidae we have less information; but since the Goths, according to Jordanes (cap. 17), believed them to have been originally a branch of their own nation, it is highly probable that the two languages were at least closely related. Procopius elsewhere (Vand. i. 3; Goth. i. 1, iii. 2) speaks of the Rugii, Sciri and Alani as Gothic nations. The fact that the two former were sprung from the north-east of Germany renders it probable that they had Gothic affinities, while the Alani, though non-Teutonic in origin, may have become gothicized in the course of the migration period. Some modern writers have included in the same class the Burgundians, a nation which had apparently come from the basin of the Oder, but the evidence at our disposal on the whole hardly justifies the supposition that their language retained a close affinity with Gothic.

In the 4th and 5th centuries the Gothic language— using the term in its widest sense— must have spread over the greater part of Europe together with the* north coast of Africa. It disappeared, however, with

surprising rapidity. There is no evidence for its survival in Italy or Africa after the fall of the Ostrogothic and Vandal kingdoms, while in Spain it is doubtful whether the Visigoths retained their language until the Arabic conquest. In central Europe it may have lingered somewhat longer in view of the evidence of the Salzburg MS. mentioned above. Possibly the information there given was derived from southern Hungary or Transylvania where remains of the Gepidae were to be found shortly before the Magyar invasion (880). According to Walafridus Strabo (de Reb. Eccles. cap. 7) also

Gothic was still used in his time (the 9th century) in some churches in the region of the lower Danube. Thenceforth the language seems to have survived only among the Goths (GoH Tetraxitae) of the Crimea, who are mentioned for the last time by Ogier Ghislain de Busbecq, an imperial envoy at Constanti- nople about the middle of the 16th century. He collected a number of words and phrases in use among them which show clearly that their language, though not unaffected by Iranian influence, was still essentially a form of Gothic.

See H. C. von der Gabelentz and J. Loebe, Ulfilas (Altenburg and Leipzig, 1 836-1 846); E. Bernhardt, Vulfila oder die gotische Bibel (Halle, 1875). For other works on the Gothic language see J . Wright, A Primer of the Gothic Language (Oxford, 1892), p. 143 f. To the references there given should be added: C. C. Uhlenbeck, Etymo-logtschesWbrterbuchd.got.Sprache(Amsterda.m,2nded.igoi);F.Klugs, ‘ Geschichte d. got. Sprache ” in H. Paul’s Grundriss d. germ. Philo-logie (2nd ed., vol. i., Strassburg, 1897); W. Streitberg, Gotisches Elementarbuch (Heidelberg, 1897) ; Th. von Grienberger, Beitrdge zur Geschichte a. deutschen Sprache u. Literatur, xxi. 185 ff. ; L. F. A Wimmer, Die Runenschrift (Berlin, 1887), p. 61 ff.; G.’ Stephens! Handbook to the Runic Monuments (London, 1884), p. 203; F. Wrede! Uber die Sprache der Wandalen (Strassburg, 1886). For further references see K. Zeuss, Die Deutschen, p. 432 f. (where earlier refer-ences to the Crimean Goths are also given) ; F. Kluge, op. cit., p. 515 ff. ; and O. Bremer, ib. vol. iii., p. 822. (H. M. C.)

GOTLAND, an island in the Baltic Sea belonging to Sweden, lying between 57 and 58° N., and having a length from S. S. W. to N.N.E. of 75 m., a breadth not exceeding 30 m., and an area of 1 142 sq. m. The nearest point on the mainland is 50 m. from the westernmost point of the island. With the island Faro, off the northern extremity, the Karlsoe, off the west coast, and Gotska Sando, 25 m. N. by E., Gotland forms the admini- strative district (Ian) of Gotland. The island is a level plateau of Silurian limestone, rising gently eastward, of an average height of 80 to 100 ft., with steep coasts fringed with

tapering, free-standing columns of limestone (raukar). A few low isolated hills rise inland. The climate is temperate, and the soil, although in parts dry and sterile, is mostly fertile. Former marshy moors have been largely drained and cultivated. There are extensive sand-dunes in the north. As usual in a limestone formation, some of the streams have their courses partly below the surface, and caverns are not infrequent. Less than half the total area is under forest, the extent of which was formerly much greater. Barley, rye, wheat and oats are grown, especially the first, which is exported to the breweries on the mainland. The sugar-beet is also produced and exported, and there are beet-sugar works on the island. Sheep and cattle are kept; there is a government sheep farm at Roma, and the cattle may be noted as belonging principally to an old native breed, yellow and horned. Some lime-burning, cement-making and sea-fishing are carried on. The capital of the island is Visby, on the west coast. There are over 80 m. of railways. Lines run from Visby N.E. to Tingstade and S. to Hofdhem, with branches from Roma to Klintehamn, a small watering-place on the west coast, and to Slitehamn on the east. Excepting along the coast the island has no scenic attraction, but it is of the highest archaeological interest. Nearly every village has its ruined church, and others occur where no villages remain. The shrunken walled town of Visby was one of the richest commercial centres of the Baltic from the nth to the 14th century, and its prosperity was shared by the, whole island. It retains ten churches besides the cathedral. The massive towers of the village churches are often detached, and doubtless served purposes of defence. The churches of Roma, Hemse, with remarkable mural paintings, Othen and Larbo may be specially noted. Some contain fine stained glass, as at Dalhem near Visby. The natives of Gotland speak a dialect distinguished from that of any part of the Swedish mainland. Pop. of Ian (1900) 52,781.

Gotland was subject to Sweden before 890, and in 1030 was christianized by St Olaf, king of Norway, when returning from his exile at Kiev. He dedicated the first church in the island to St Peter at Visby. At that time Visby had long been one of the most important trading towns in the Baltic, and the chief distributing centre of the oriental commerce which came to Europe along the rivers of Russia. In the early years of the

Hanseatic League, or about the middle of the 13th century, it became

the chief depot for the produce of the eastern Baltic countries, including, in a commercial sense, its daughter colony (nth century or earlier) of Novgorod the Great. Although Visby was an independent member of the Hanseatic League, the influence of Lubeck was paramount in the city, and half its governing body were men of German descent. Indeed, Bjorkander endeavours to prove that the city was a German (Hanseatic) foundation, dating principally from the middle of the 1 2th century. However that may be, the importance of Visby in the sea trade of the North is conclusively attested by the famous code of maritime law which bears its name. This Waterrecht dat de Kooplude en de Schippers gemakt kebben to Visby (" sea-law which the merchants and seamen have made at Visby ") was a compilation based upon the Lubeck code, the Oleron code and the Amsterdam code, and was first printed in Low German in 1 505, but in all probability had its origin about 1240, or not much later (see Sea Laws). By the middle of the 14th century the reputation of the wealth of the city was so great that, according to an old ballad, " the Gotlanders weighed out gold with stone weights and played with the choicest jewels. The swine ate out of silver troughs, and the women spun with distaffs of gold." This fabled wealth was too strong a temptation for the energetic Valdemar Atterdag of Denmark.. In 1361 he invaded the island, routed the defenders of Visby under the city walls (a monolithic cross marks the burial-place of the islanders who fell) and plundered the city. From this blow it never recovered, its decay being, however, materially helped by the fact that for the greater part of the next 1 50 years it was the stronghold of successive freebooters or sea-rovers — first, of the Hanseatic privateers called Vitalienbrodre or Viktualien- bruder, who made it their stronghold during the last eight years of the 14th century; then of the Teutonic Knights, whose Grand Master drove out the " Victuals Brothers," and kept the island until it was redeemed by Queen Margaret. There too Erik XIII. (the Pomeranian), after being driven out of Denmark by his own subjects, established himself in 1437, and for a dozen years waged piracy upon Danes and Swedes alike. After him came Olaf and Ivar Thott, two Danish lords, who down to the year 1487 terrorized the seas from their pirates' stronghold of Visby. Lastly, the Danish admiral Soren Norrby, the last supporter of Christian I. of Denmark, when his master's cause was lost, waged a guerrilla war upon the Danish merchant ships and others from the same convenient base. But this led to an expedition by the men of Lubeck, who partly destroyed Visby in 1525. By the peace of Stettin (1570) Gotland was confirmed to the Danish crown, to which it had been given by Queen Margaret. But at the peace of Bromsebro in 1645 it was at length restored to Sweden, to which it has since belonged, except for the three years.

1676-1679, when it was forcibly occupied by the Danes, and a few weeks in 1808, when the Russians landed a force. The extreme wealth of the Gotlanders naturally fostered a spirit of independence, and their relations with Sweden were curious. The island at one period paid an annual tribute of 60 marks of silver to Sweden, but it was clearly recognized that it was paid by the desire of the Gotlanders, and not enforced by Sweden. The pope recognized their independence, and it was by their own free will that they came under the spiritual charge of the bishop of Linkoping. Their local government was republican in form, and a popular assembly is indicated in the written Gotland Law, which dates not later than the middle of the 13 th century. Sweden had no rights of objection to the measures adopted by this body, and there was no Swedish judge or other official in the island. Visby had a system of government and rights independent of, and in some measure opposed to, that of the rest of the island. It seems clear that there were at one time two separate corporations, for the native Gotlanders and the foreign traders respectively, and that these were subsequently fused. The rights and status of native Gotlanders were not enjoyed by foreigners as a whole — even intermarriage was illegal— but Germans, on account of their commercial pre-eminence in the island, were excepted.

See C. H. Bergman, Gotlands geografi och historia (Stockholm, 1898) and Gotldndska skildringar och minnen (Visby, 1902); A. T. Snobohm, Gotlands land och folk (Visby, 1897 et seq.); W. Moler, Bidrag till en Gotldndsk bibliografi (Stockholm, 1890); Hans Hilde- brand, Visby och dess Minnesmdrken (Stockholm, 1892 et seq.); A. Bjorkander, Till Visby Stads Aeldsta Historia (1898), where most of the literature dealing with the subject is mentioned; but some of the author's arguments require criticism. For local government and rights see K. Hegel, Stddier und Gilden im Mittelalter (book iii. ch. iii., Leipzig, 1891).

GOTO ISLANDS [Goto Retto, Gotto], a group of islands belonging to Japan, lying west of Kiushiu, in 33 N., 129 E. The southern of the two principal islands, Fukae-shima, measures 17 m. by 13J; the northern, Nakaori-shima, measures 23 m. by 75. These islands lie almost in the direct route of steamers plying between Nagasaki and Shanghai, and are distant some 50 m. from Nagasaki. Some dome-shaped hills command the old castle- town of Fukae. The islands are highly cultivated; deer and other game abound, and trout are plentiful in the mountain streams. A majority of the inhabitants are Christians.

GOTTER, FRIEDRICH WILHELM (1746-1797), German poet and dramatist, was born on the 3rd of September 1746, at Gotha. After the

completion of his university career at Gottingen, he was appointed second director of the Archive of his native town, and subsequently went to Wetzlar, the seat of the imperial law courts, as secretary to the Saxe-Coburg-Gotha legation. In 1768 he returned to Gotha as tutor to two young noblemen, and here, together- with H. C. Boie, he founded the famous Gottinger Musenalmanach. In 1770 he was once more in Wetzlar; where he belonged to Goethe's circle of acquaintances. Four years later he took up his permanent abode in Gotha, where he died on the 18th of March 1797. Gotter was the chief representative of French taste in the German literary life of his time. His own poetry is elegant and polished, and in great measure free from the trivialities of the Anacreontic lyric of the earlier generation of imitators of French literature; but he was lacking in the imaginative depth that characterizes the German poetic temperament. His plays, of which Merope (1774), an adaptation in admirable blank verse of the tragedies of Maffei and Voltaire, and Medea (1775), a melodrame, are best known, were mostly based on French originals and had considerable influence in counteracting the formlessness and irregularity of the Sturm und Drang drama.

Gotter's collected Gedichte appeared in 2 vols, in 1787 and 1788; a third volume (1802) contains his Literarischer Nachlass. See B. Litzmann, Schroder und Gotter (1887), and R. Schlosser, F. W. Gotter, sein Leben und seine Werke (1894).

GOTTFRIED VON STRASSBURG, one of the chief German poets of the middle ages. The dates of his birth and death are alike unknown, but he was the contemporary of Hartmann von Aue, Wolfram von Eschenbach and Walther von der Vogelweide, and his epic Tristan was written about the year 1 210. In all probability he did not belong to the nobility, as he is entitled Meister, never Herr, by his contemporaries; his poem — the only work that can with any certainty be attributed to him — bears witness to a learned education. The story of Tristan had been evolved from its shadowy Celtic origins by the French trouveres of the early 12th century, and had already found its way into Germany before the close of that century, in the crude, unpolished version of Eilhart von Oberge. It was Gottfried, however, who gave it its final form. His version is based not on that of Chretien de Troyes, but on that of a trouvere Thomas, who seems to have been more popular with contemporaries. A comparison of the German epic with the French original is, however, impossible, as Chretien's Tristan is entirely lost, and of Thomas's only a few fragments have come down to us. The story centres in the fatal voyage which Tristan, "a vassal to the court of his uncle King Marke of Kurnewal (Cornwall), makes to Ireland to bring back Isolde as the

king's bride. On the return voyage Tristan and Isolde drink by mistake a love potion, which binds them irrevocably to each other. The epic resolves itself into a series of love intrigues in which the two lovers ingeniously outwit the trusting king. They are ultimately discovered, and Tristan flees to Normandy where he marries another Isolde — " Isolde with the white hands "—

without being able to forget the blond Isolde of Ireland. At this point Gottfried's narrative breaks off and to learn the close of the story we have to turn to two minor poets of the time, Ulrich von Turheim and Heinrich von Freiberg — the latter much the superior — who have supplied the conclusion. After further love adventures Tristan is fatally wounded by a poisoned spear in Normandy; the " blond Isolde," as the only person who has power to cure him, is summoned from Cornwall. The ship that brings her is to bear a white sail if she is on board, a black one if not. Tristan's wife, however, deceives him, announcing that the sail is black, and when Isolde arrives, she finds her lover dead. Marke at last learns the truth concern- ing the love potion, and has the two lovers buried side by side in Kurnewal.

It is difficult to form an estimate of Gottfried's independence of his French source; but it seems clear that he followed closely the narrative of events he found in Thomas. He has, however, introduced into the story an astounding fineness of psychological motive, which, to judge from a general comparison of the Arthurian epic in both lands, is German rather than French; he has spiritualized and deepened the narrative; he has, above all, depicted with a variety and insight, unusual in medieval literature, the effects of an overpowering passion. Yet, glowing and seductive as Gottfried's love-scenes are, . they are never for a moment disfigured by frivolous hints or innuendo; the tragedy is unrolled with an earnestness that admits of no touch of humour, and also, it may be added, with a freedom from moralizing which was easier to attain in the 13th than in later centuries. The mastery of style is no less conspicuous. Gottfried had learned his best lessons from Hartmann von Aue, but he was a more original and daring artificer of rhymes and rhythms than that master; he delighted in the sheer music of words, and indulged in antitheses and allegorical conceits to an extent that proved fatal to his imitators. As far as beauty of expression is concerned, Gottfried's Tristan is the masterpiece of the German court epic.

Gottfried's Tristan has been frequently edited: by H. F. Massman (Leipzig, 1843); by R. Bechstein (2 vols., 3rd ed., Leipzig, 1890-1891); by W. Gokher (2 vols., Stuttgart, 1889); by K. Marold (1906). Translations into modern German have been made by H. Kurz (Stuttgart, 1844); by K. Simrock (Leipzig, 1855); and, best of all, by W. Hertz (Stuttgart, 1877). There is also an abbreviated English translation by Jessie L. Weston (London, 1899). The continuation of Ulrich von Turheim will be found in Massman's edition ; that by Heinrich von Freiberg has been separately edited by R. Bechstein (Leipzig, 1877). See also R. Heinzel, " Gottfrieds von Strassburg Tristan und seine Quelle " in the Zeit. fur deut. Alt. xiv. (1869), pp. 272 ff. ; W. Golther, Die Sage von Tristan und Isolde (Munich, 1887); F. Piquet, L'Originalite de Gottfried de Strasbourg dans son po'eme de Tristan et Isolde (Lille, 1905). K. Immermann (q.v.) has written an epic of Tristan und Isolde (1840), R. Wagner (q.v.) a musical drama (1865). Cp. R. Bechstein, Tristan und Isolde in der deutschen Dichtung der Neuzeit (Leipzig, 1877).

G6TTINGEN, a town of Germany, in the Prussian province of Hanover, pleasantly situated at the west foot of the Hainberg (1200 ft.), in the broad and fertile valley of the Leine, 67 m. S. from Hanover, on the railway to Cassel. Pop. (1875) 17,057, (1905) 34,030. It is traversed by the Leine canal, which separates the Altstadt from the Neustadt and from Masch, and is surrounded by ramparts, which are planted with lime-trees and form an agreeable promenade. The streets in the older part of the town are for the most part crooked and narrow, but the newer portions are spaciously and regularly built. Apart from the Protestant churches of St John, with twin towers, and of St James, with a high tower (290 ft.), the medieval town hall, built in the 14th century and restored in 1880, and the numerous university buildings, Gottingen possesses few structures of any public importance. There are several thriving industries, including^ besides the various branches of the publishing trade, the manu- ' facture of cloth and woollens and of mathematical and other scientific instruments.

The university, the famous Georgia Augusta, founded by George II. in 1734 and opened in 1737, rapidly attained a leading position, and in 1823 its students numbered 1547- Political disturbances, in which both professors and students were im-

plicated, lowered the attendance to 860 in 1834. The expulsion in 1837 of the famous seven professors — Die Gottinger Sieben — viz. the Germanist, Wilhelm Eduard Albrecht (1800-1876); the historian, Friedrich Christoph Dahlmann (1785-1860); the orientalist, Georg Heinrich August Ewald (1803-1875); the historian, Georg Gottfried

Gervinus (1805-1875); the physicist, Wilhelm Eduard Weber (1804-1891); and the philo- logists, the brothers Jacob Ludwig Karl Grimm (1785-1863), and Wilhelm Karl Grimm (1 786-1 859), — for protesting against the revocation by King Ernest Augustus of Hanover of the liberal constitution of 1833, further reduced the prosperity of the university. The events of 1848, on the other hand, told somewhat in its favour; and, since the annexation of Hanover in 1866, it has been carefully fostered by the Prussian government. In 1903 its teaching staff numbered 121 and its students 1529. The main university building lies on the Wilhelmsplatz, and, adjoining, is the famous library of 500,000 vols, and 5300 MSS., the richest collection of modern literature in Germany. There is a good chemical laboratory as well as adequate zoological, ethnographical and mineralogical collections, the most remark- able being Blumenbach's famous collection of skulls in the anatomical institute. There are also a celebrated observatory, long under the direction of Wilhelm Klinkerfues (1827-1884), a botanical garden, an agricultural institute and various hospitals, all connected with the university. Of the scientific societies the most noted is the Royal Society of Sciences {Konigliche Sozietdt der Wissenschaften) founded by Albrecht von Haller, which is divided into three classes, the physical, the mathematical and the historical-philological. It numbers about 80 members and publishes the well-known Gbtiingische gelehrie Anzeigen. There are monuments in the town to the mathematicians K. F. Gauss and W. E. Weber, and also to the poet G. A. Burger.

The earliest mention of a village of Goding or Gutingi occurs in documents of about 950 a.d. The place received municipal rights from the German king Otto IV. about 1210, and from 1286 to 1463 it was the seat of the princely house of Brunswick- Gottingen. During the 14th century it held a high place among the towns of the Hanseatic League. In 1531 it joined the Reformation movement, and in the following century it suffered considerably in the Thirty Years' War, being taken by Tilly in 1626, after a siege of 25 days, and recaptured by the Saxons in 1632. After a century of decay, it was anew brought into importance by the establishment of its university; and a marked increase in its industrial and commercial prosperity has again taken place in recent years. Towards the end of the 1 8th century Gottingen was the centre of a society of young poets of the Sturm und Drang period of German literature, known as the Gottingen Dichterbund or Hainbund (see Germany: Literature).

See Freusdorff, Gottingen in Vergangenheit und Gegenwart (Gottin- gen, 1887); the Urkundenbuch der Stadt Gottingen, edited by G. Schmidt, A. Hasseiblatt and G. Kastner; Unger, Gottingen und die

Georgia Augusta (1861); and Gottinger Professoren (Gotha, 1872); and O. Mejer, Kulturgeschichtliche Bilder aus Gottingen (1889).

GOTTLING, CARL WILHELM (1793-1869), German classical scholar, was born at Jena on the 19th of January 1793. He studied at the universities of Jena and Berlin, took part in the war against France in 18 14, and finally settled down in 1822 as professor at the university of his native town, where he continued to reside till his death on the 20th of January 1869. In his early years Gottling devoted himself to German literature, and published two works on the Nibelungen: Uber das Geschichtliche im Nibelungenliede (1814) and Nibelungen und Gibelinen (181 7). The greater part of his life, however, was devoted to the study of classical literature, especially the elucida- tion of Greek authors. The contents of his Gesammelte Abhand- lungen aus dem klassischen Altertum (1851-1863) and Opuscula Academica (published in 1869 after his death) sufficiently indicate the varied nature of his studies. He edited the Texvy (gram- matical manual) of Theodosius of Alexandria (1822), Aristotle's Politics (1824), and Economics (1830) and Hesiod (1831; 3rd ed. by J. Flach, 1878). Mention may also be made of his Allgemeine Lehre vom Accent der griechischen Sprache (1835), enlarged from a

smaller work, which was translated into English (1831) as the Elements of Greek Accentuation; and of his Correspondence with Goethe (published 1880).

See memoirs by C. Nipperdey, his colleague at Jena (1869), G. Lothholz (Stargard, 1876), K. Fischer (preface to the Opuscula Academica) , and C. Bursian in Allgemeine deutsche Biographie, ix.

GOTTSCHALK [Godescalus, Gottescale], (c. 808-867?), German theologian, was born near Mainz, and was devoted (oblatus) from infancy by his parents, — his father was a Saxon, Count Bern, — to the monastic life. He was trained at the monastery of Fulda, then under the abbot Hrabanus Maurus, and became the friend of Walafrid Strabo and Loup of Ferrieres. In June 829, at the synod of Mainz, on the pretext that he had been unduly constrained by his abbot, he sought and obtained his liberty, withdrew first to Corbie, where he met Ratramnus, and then to the monastery of Orbais in the diocese of Soissons. There he studied St Augustine, with the result that he became an enthusiastic believer in the doctrine of absolute

predestination, in one point going beyond his master — Gottschalk believing in a predestination to condemnation as well as in a predestination to salvation, while Augustine had contented himself with the doctrine of pretention as complementary to the doctrine of elec- tion. Between 835 and 840 Gottschalk was ordained priest, without the knowledge of his bishop, by Rigbold, chorepiscopus of Reims. Before 840, deserting his monastery, he went to Italy, preached there his doctrine of double predestination, and entered into relations with Notting, bishop of Verona, and Eberhard, count of Friuli. Driven from Italy through the influence of Hrabanus Maurus, now archbishop of Mainz, who wrote two violent letters to Notting and Eberhard, he travelled through Dalmatia, Pannonia and Norica, but continued preaching and writing. In October 848 he presented to the synod at Mainz a profession of faith and a refutation of the ideas expressed by Hrabanus Maurus in his letter to Notting. He was convicted, however, of heresy, beaten, obliged to swear that he would never again enter the territory of Louis the German, and handed over to Hincmar, archbishop of Reims, who sent him back to his monastery at Orbais. The next year at a provincial council at Quierzy, presided over by Charles the Bald, he attempted to justify his ideas, but was again condemned as a heretic and disturber of the public peace, was degraded from the priesthood, whipped, obliged to burn his declaration of faith, and shut up in the monastery of Hautvilliers. There Hincmar tried again to induce him to retract. Gottschalk however continued to defend his doctrine, writing to his friends and to the most eminent theo- logians of France and Germany. A great controversy resulted. Prudentius, bishop of Troyes, Wenilo of Sens, Ratramnus of Corbie, Loup of Ferrieres and Florus of Lyons wrote in his favour. Hincmar wrote De praedestinatione and De una non trina deitate against his views, but gained little aid from Johannes Scotus Erigena, whom he had called in as an authority. The question was discussed at the councils of Kiersy (853), of Valence (855) and of Savonnieres (859). Finally the pope Nicolas I. took up the case, and summoned Hincmar to the council of Metz (863). Hincmar either could not or would not appear, but declared that Gottschalk might go to defend himself before the pope. Nothing came of this, however, and when Hincmar learned that Gottschalk had fallen ill, he forbade him the sacraments or burial in consecrated ground unless he would recant. This Gottschalk refused to do. He died on the 30th of October between 866 and 870.

Gottschalk was a vigorous and original thinker, but also of a violent temperament, incapable of discipline or moderation in his ideas as in his conduct. He was less an innovator than a reactionary. Of his many

works we have only the two pro- fessions of faith (cf. Migne, Patrologia Latina, cxxi. c. 347 et seq.), and some poems, edited by L. Traube in Monumenta Gertnaniae historica: Poelae Latini aevi Carolini (t. iii. 707-738). Some fragments of his theological treatises have been preserved in the writings of Hincmar, Erigena, Ratramnus and Loup of Ferrieres. From the 17th century, when the Jansenists exalted Gottschalk, much has been written on him. Mention may be made of two recent studies, F. Picavet, ” Les Discussions sur la liberty au temps

de Gottschalk, de Raban Maur, d’Hincmar, et de Jean Scot,” in Comptes renins de I’acad. des sciences morales et politiques (Paris, 1896); and A. Freystedt, ” Studien zu Gottschalks Leben und Lehre,” in Zeitschrift fur Kirchengeschichte (1897), vol. xviii.

GOTTSCHALL, RUDOLF VON (1823-1909), German man of letters, was born at Breslau on the 30th of September 1823, the son of a Prussian artillery officer. He received his early educa- tion at the gymnasia in Mainz and Coburg, and subsequently at Rastenburg in East Prussia. In 1841 he entered the university of Konigsberg as a student of law, but, in consequence of his pronounced liberal opinions, was expelled. The academic authorities at Breslau and Leipzig were not more tolerant towards the young fire-eater, and it was only in Berlin that he eventually found himself free to prosecute his studies. During this period of unrest he issued Lieder der Gegenwart (1842) and Zensurfliichtlinge (1843) — the poetical fruits of his political enthusiasm. He completed his studies in Berlin, took the degree of doctor juris in Konigsberg, and endeavoured to obtain there the venia legendi. His political views again stood in the way, and forsaking the legal career, Gottschall now devoted himself entirely to literature. He met with immediate success, and beginning as dramaturge in Konigsberg with Der Blinde von Alcala (1846) and Lord Byron in Italien (1847) proceeded to Hamburg where he occupied a similar position. In 1852 he married Marie, baroness von Seherr-Thoss, and for the next few years lived in Silesia. In 1862 he took over the editorship of a Posen newspaper, but in 1864 removed’to Leipzig. Gottschall was raised, in 1877, by the king of Prussia to the hereditary nobility with the prefix ” von,” having been previously made a Geheimer H of rat by the grand duke of Weimar. Down to 1887 Gottschall edited the Brockhaus’sche Blatter fiir litterarische Unterhaltung and the monthly periodical Unsere Zeit. He died at Leipzig on the 21st of March 1909.

GottschalTs prolific literary productions cover the fields of poetry, novel- writing and literary criticism. Among his volumes of lyric poetry are Sebastopol (1856), Janus (1873), Bunte Bliiten (1891).

Among his epics, Carlo Zeno (1854), Maja (1864), dealing with an episode in the Indian Mutiny, and Merlins Wande- rungen (1887). The comedy Pittund Fox (1854), first produced on the stage iii Breslau, was never surpassed by the other lighter pieces of the author, among which may be mentioned Die Welt des Schwindels and Der Spion von Rheinsberg. The tragedies, Mazeppa, Catharine Howard, Amy Robsart and Der Gotze von Venedig, were very successful; and the historical novels, Im Banne des schwarzen Adlers (1875; 4th ed., 1884), Die Erbschaft des Blutes (1881), Die Tochter Riibezahls (1889) , and Verkiimmerte Existenzen (1892), enjoyed a high degree of popularity. As a critic and historian of literature Gottschall has also done excellent work. His Die deutsche Nationalliteratur des ig. Jahrhunderts (1855; 7th ed., 1901-1902), and Poelik (1858; 6th ed., 1903) command the respect of all students of literature.

Gottschall's collected Dramatische Werke appeared in 12 vols, in 1880 (2nd ed., 1884); he has also, in recent years, published many

volumes of collected essays and criticisms. See his autobiography, Aus meiner Jugend (1898).

GOTTSCHED, JOHANN CHRISTOPH (1700-1766), German author and critic, was born on the 2nd of February 1700, at Judithenkirch near Konigsberg, the son of a Lutheran clergyman. He studied philosophy and history at the university of his native town, but immediately on taking the degree of M agister in 1723, fled to Leipzig in order to evade impressment in the Prussian military service. Here he enjoyed the protection of J. B. Mencke (1674-1732), who, under the name of " Philander von der Linde," was a well-known poet and also president of the Deutschilbende poetische Gesettschaft in Leipzig. Of this society Qottsched was elected " Senior" in 1726, and in the next year reorganized it under the title of the Deutsche Gesettschaft. In 1730 he was appointed extraordinary professor of poetry, and, in 1734, ordinary professor of logic and metaphysics in the university. He died at Leipzig on the 12th of December 1766.

Gottsched's chief work was his Versuch einer kritischen Dichtkunst fiir die Deutschen (1730), the first systematic treatise in German on the art of poetry from the standpoint of Boileau. His Ausfuhrliche Redekunst (1728) and his Grundlegung einer

deutschen Sprachkunst (1748) were of importance for the development of German style and the purification of the language. He wrote several plays, of which Der sterbende Cato (1732), an adaptation of Addison's tragedy and a French play on the same theme, was long popular on the stage. In his Deutsche Schau- biihne (6 vols., 1740-1745), which contained mainly translations from the French, he provided the German stage with a classical repertory, and his bibliography of the German drama, Notiger Vorrat zur Geschichte der deutschen dramatischen Dichtkunst (1757-1765), is still valuable. He was also the editor of several journals devoted to literary criticism. As a critic, Gottsched insisted on German literature being subordinated to the laws of French classicism; he enunciated rules by which the playwright must be bound, and abolished bombast and buffoonery from the serious stage. While such reforms obviously afforded a healthy corrective to the extravagance and want of taste which were rampant in the German literature of the time, Gottsched went too far. In 1740 he came into conflict with the Swiss writers Johann Jakob Bodmer (q.v.) and Johann Jakob Breitinger (1701-1776), who, under the influence of Addison and contemporary Italian critics, demanded that the poetic imagination should not be hampered by artificial rules; they pointed to the great English poets, and especially to Milton. Gottsched, although not blind to the beauties of the English writers, clung the more tenaciously to his principle that poetry must be the product of rules, and, in the fierce controversy which for a time raged between Leipzig and Zurich, he was inevitably defeated. His influence speedily declined, and before his death his name became proverbial for pedantic folly.

His wife, Luise Adelgunde Victorie, nee Kulmus (1713-1762), in some respects her husband's intellectual superior, was an author of some reputation. She wrote several popular comedies, of which Das Testament is the best, and translated the Spectator (9 vols., 1730-1743), Pope's' Rape of the Lock (1744) and other English and French works. After her death her husband edited her Samtliche kleinere Gedichte with a memoir (1 763) .

See T. W. Danzel, Gottsched und seine Zeit (Leipzig, 1848); J. Criiger, Gottsched, Bodmer, und Breitinger (with selections from their writings) (Stuttgart, 1884) ; F. Servaes, Die Poetik Gottscheds und der Schvxizer (Strassburg, 1887); E. Wolff, Gottscheds Stellung im deutschen Bildungsleben (2 vols., Kiel, 1895-1897), and G. Waniek, Gottsched und die deutsche Literatur seiner Zeit (Leipzig, 1897). On Frau Gottsched, see P. Schlenther, Frau Gottsched und die burgerliche Komodie (Berlin, 1886).

GOTZ, JOHANN NIKOLAUS (1721-1781), German poet, was born at Worms on the 9th of July 1721. He studied theology at Halle (1 739-1 742), where he became intimate with the poets Johann W. L. Gleim and Johann Peter Uz, acted for some years as military chaplain, and afterwards filled various other ecclesi- astical offices. He died at Winterburg on the 4th of November 1781. The writings of Gotz consist of a number of short lyrics and several translations, of which the best is a rendering of Anacreon. His original compositions are light, lively and sparkling, and are animated rather by French wit than by German depth of sentiment. The best known of his poems is Die Mddcheninsel, an elegy which met with the warm approval of Frederick the Great.

Gotz's Vermischle Gedichte were published with biography by K. W. Ramler (Mannheim, 1785; new ed., 1807), and a collection of his poems, dating from the years 1 745-1 765, has been edited by C. Schuddekopf in the Deutsche Literaturdenkmale des 18. und IQ. Jahrhunderts (1893). See also Brief e von und an J. N. Gotz, edited by C. Schuddekopf (1893).

GOUACHE, a French word adapted from the Ital. guazzo (probably in origin connected with " wash "), meaning literally a " ford," but used also for a method of painting in opaqtie water-colour. The colours are mixed with or painted in a vehicle of gum or honey, and whereas in true water-colours the high lights are obtained by leaving blank the surface of the paper or other material used, or by allowing it to show through a translucent wash in " gouache," these are obtained by white or other light colour. " Gouache " is frequently used in miniature painting.

GOUDA (or Ter Gouwe), a town of Holland, in the province of South Holland, on the north side of the Gouwe at its confluence with the Ysel, and a junction station 1 25m. by rail N.E. of Rotter- dam. Pop. (1900) 22,303. Tramways connect it with Bodegraven (s£m. N.) on the old Rhine and with Oudewater (8 m. E.) on the Ysel; and there is a regular steamboat service in various directions, Amsterdam being reached by the canalized Gouwe; Aar, Drecht and Amstel. The town of Gouda is laid out in a fine open manner and, like other Dutch towns, is intersected by numerous canals. On its outskirts pleasant walks and fine trees have replaced the old fortifications. The Groote Markt is the largest market-square in Holland. Among the numerous churches belonging to various denominations, the first place must be given to the Groote Kerk of St John. It was founded in 1485, but rebuilt after a fire in 1552, and is remarkable for its dimensions (345 ft. long and 150 ft. broad), for a large and celebrated organ, and a splendid series of over forty stained-glass windows presented by cities and princes

and executed by various well-known artists, including the brothers Dirk (d. c.1577) and Wouter (d. c. 1590) Crabeth, between the years 1555 and 1603 (see Explanation of the Famous and Renowned Glass Works, &*c, Gouda, 1876, reprinted from an older volume, 1718). Other noteworthy buildings are the Gothic town hall, founded in 1449 and rebuilt in 1690, and the weigh-house, built by Pieter Post of Haarlem (1608-1669) and adorned with a fine relief by Barth. Eggers (d. c. 1690). The museum of antiquities (1874) contains an exquisite chalice of the year 1425 and some pictures and portraits by Wouter Crabeth the younger, Corn. Ketel (a native of Gouda, 1548-1616) and Ferdinand Bol (1616-1680). Other buildings are the orphanage, the hospital, a house of correction for women and a music hall.

In the time of the counts the wealth of Gouda was mainly derived from brewing and cloth- weaving; but at a later date the making of clay tobacco pipes became the staple trade, and, although this industry has somewhat declined, the churchwarden pipes of Gouda are still well known and largely manufactured. In winter-time it is considered a feat to skate hither from Rotterdam and elsewhere to buy such a pipe and return with it in one's mouth without its being broken. The mud from the Ysel furnishes the material for large brick-works and potteries; there are also a celebrated manufactory of stearine candles, a yarn factory, an oil refinery and cigar factories. The transit and shipping trade is considerable, and as one of the principal markets of South Holland, the round, white Gouda cheeses are known throughout Europe. Boskoop, 5 m. N. by W. of Gouda on the Gouwe, is famous for its nursery gardens; and the little old-world town of Oudewater as the birthplace of the famous theologian Arminius in 1 560. The town hall (1 588) of Oudewater contains a picture by Dirk Stoop (d. 1686), commemorating the capture of the town by the Spaniards in 1575 and the subsequent sack and massacre.

GOUDIMEL, CLAUDE, muscial composer of the 16th century, was born about 15 10. The French and the Belgians claim him as their countryman. In all probability he was born at Besanjon, for in his edition of the songs of Arcadelt, as well as in the mass of 1554, he calls himself " natif de Besancon " and " Claudius Godimellus Vescontinus." This discountenances the theory of Ambros that he was born at Vaison near Avignon. As to his early education we know little or nothing, but the excellent Latin in which some of his letters were written proves that, in addition to his musical knowledge, he also acquired a good classical training. It is supposed that he was in Rome in 1540 at the head of a music-school, and that besides many other celebrated musicians, Palestrina was amongst his pupils. About the middle of the century he seems to have left Rome for Paris, where, in

conjunction with Jean Duchemin, he published, in 1555, a musical setting of Horace's Odes. Infinitely more important is another collection of vocal pieces, a setting of the celebrated French version of the Psalms by Marot and Beza published in 1565. It is written in four parts, the melody being assigned to the tenor. The invention of the melodies was long ascribed to Goudimel, but- they have now definitely been proved

to have originated in popular tunes found in the collections of this period. Some of these tunes are still used by the French Protestant Church. Others were adopted by the German Lutherans, a German imitation of the French versions of the Psalms in the same metres having been published at an early date. Although the French version of the Psalms was at first used by Catholics as well as Protestants, there is little doubt that Goudimel had embraced the new faith. In Michel Brenet's Biographie (Annales franc-cuntoises, Besancon, 1898, P. Jacquin) it is established that in Metz, where he was living in 1565, Goudi- mel moved in Huguenot circles, and even figured as godfather to the daughter of the president of Senneton. Seven years later he fell a victim to religious fanaticism during the St Bartholomew massacres at Lyons from the 27th to the 28th of August 1572, his death, it is stated, being due to " les ennemis de la gloire de Dieu et quelques mechants envieux de l'honneur qu'il avait acquis." Masses and motets belonging to his Roman period are found in the Vatican library, and in the archives of various churches in Rome; others were published. Thus the work entitled Missae tres a Claudio Goudimel praestantissimo musico auctore, nunc primum in lucem edilae, contains one mass by the learned editor himself, the other two being by Claudius Sermisy and Jean Maillard respectively. Another collection, La Fleur des chansons dcs deux plus excellens musiciens de nostre temps, consists of part songs by Goudimel and Orlando di Lasso. Burney gives in his history a motet of Goudimel's Domine quid multiplicali sunt.

GOUFFIER, the name of a great French family, which owned the estate of Bonnivet in Poitou from the 14th century. Guil- laume Gouffier, chamberlain to Charles VII., was an inveterate enemy of Jacques Coeur, obtaining his condemnation and after- wards receiving his property (1401). He had a great number of children, several of whom played a part in history. Artus, seigneur de Boisy (c. 147 5-1 5 20) was entrusted with the education of the young count of Angouleme (Francis I.), and on the acces- sion of this prince to the

throne as Francis I. became grand master of the royal household, playing an important part in the government; to him was given the task of negotiating the treaty of Noyon in 15 16; and shortly before his death the king raised the estates of Roanne and Boisy to the rank of a duchy, that of Roannais, in his favour. Adrien Gouffier (d. 1523) was bishop of Coutances and Albi, and grand almoner of France. Guillaume Gouffier, seigneur de Bonnivet, became admiral . of France (see Bonnivet). Claude Gouffier, son of Artus, was created comte de Maulevrier (1542) and marquis de Boisy

(1564).

There were many branches of this family, the chief of them being the dukes of Roannais, the counts of Caravas, the lords of Crevecceur and of Bonnivet, the marquises of Thois, of Brazeux, and of Espagny. The name of Gouffier was adopted in the 18th century by a branch of the house of Choiseul. (M. P.*)

GOUGE, MARTIN (c. 1360-1444), surnamed de Charpaigne, French chancellor, was born at Bourges about 1360. A canon of Bourges, in 1402 he became treasurer to John, duke of Berri, and in 1406 bishop of Chartres. He was arrested by John the Fearless, duke of Burgundy, with the hapless Jean de Montaigu (1340-1400) in 1409, but was soon released and then banished. Attaching himself to the dauphin Louis, duke of Guienne, he became his chancellor, the king's ambassador in Brittany, and a member of the grand council; and on the 13th of May 1415, he was transferred from the see of Chartres to that of Clermont-Ferrand. In May 1418, when the Burgundians re-entered Paris, he only escaped death at their hands by taking refuge in the Bastille. He then left Paris, but only to fall into the hands of his enemy, the duke de la Tremoille, who imprisoned him in ' the castle of Sully. Rescued by the dauphin Charles, he was appointed chancellor of France on the 3rd of February 1422. He endeavoured to reconcile Burgundy and France, was a party to the selection of Arthur, earl of Richmond, as constable, but had to resign his chancellorship in favour of Regnault of Chartres; first from March 25th to August 6th 1425, and again when La Tremoille had supplanted Richmond. After the fall of La

Tremoille in 1433 he returned to court, and exercised a powerful influence over affairs of state almost till his death, which took place at the castle of Beaulieu (Puy-de-D6me) on the 25th or 26th of November 1444.

See Hiver's account in the Memoires de la Societe des Antiquaires du Centre, p. 267 (1869); and the Nouvelle Biographie generate, vol. xxi.

GOUGE (adopted from the Fr. gouge, derived from the Late Lat. gubia or gulbia, in Ducange gulbium, an implement ad hortum excolendum, and also instrumentum ferreum in usu fabrorum; according to the New English Dictionary the word is probably of Celtic origin, gylf, a beak, appearing in Welsh, and gilb, a boring tool, in Cornish), a tool of the chisel type with a curved blade, used for scooping a groove or channel in wood, stone, &c. (see Tool). A similar instrument is used in surgery for operations involving the excision of portions of bone. " Gouge " is also used as the name of a bookbinder's tool, for impressing a curved line on the leather, and for the line so im- pressed. In mining, a " gouge " is the layer of soft rock or earth sometimes found in each side of a vein of coal or ore, which the miner can scoop out with his pick, and thus attack the vein more easily from the side. The verb " to gouge " is used in the sense of scooping or forcing out.

GOUGH, HUGH GOUGH, Viscount (1779-1869), British field-marshal* a descendant of Francis Gough who was made bishop of Limerick in 1626, was born at Woodstown, Limerick, on the 3rd of November 1779. Having obtained a commission in the army in August 1794, he served with the 78th Highlanders at the Cape of Good Hope, taking part in the capture of Cape Town and of the Dutch fleet in Saldanha Bay in 1796. His next service was in the West Indies, where, with the 87th (Royal Irish Fusiliers), he shared in the attack on Porto Rico, the capture of Surinam, and the brigand war in St Lucia. In 1809 he was called to take part in the Peninsular War, and, joining the army under Wellington, commanded his regiment as major in the operations before Oporto, by which the town was taken from the French. At Talavera he was severely wounded, and had his horse shot under him. For his conduct on this occasion he was afterwards promoted lieutenant-colonel, his commission, on the recommendation of Wellington, being antedated from the day of the duke's despatch. He was thus the first officer who ever received brevet rank for services performed in the field at the head of a regiment. He was next engaged at the battle of Barrosa, at which his regiment captured a French eagle. At the defence of Tarifa the post of danger was assigned to him, and he compelled the enemy to raise the siege. At Vitoria, where Gough again distinguished himself, his regiment captured the baton of Marshal Jourdan. He was again severely wounded at Nivelle, and was soon after created a knight of St Charles by the king of Spain. At the close of the war he returned home and enjoyed a respite of some years from active service. He next took command of a regiment stationed in the south of Ireland, discharging at the same time the duties of a magistrate during a period of agitation. Gough was pro- moted major-general in 1830. Seven years later he was sent to India to take

command of the Mysore division of the army. But not long after his arrival in India the difficulties which led to the first Chinese war made the presence of an energetic general on the scene indispensable, and Gough was appointed commander- in-chief of the British forces in China. This post he held during all the operations of the war; and by his great achievements and numerous victories in the face of immense difficulties, he at length enabled' the English plenipotentiary, Sir H. Pottinger, to dictate peace on his own terms. After the conclusion of the treaty of Nanking in August 1842 the British forces were with-drawn; and before the close of the year Gough, who had been made a G.C.B. in the previous year for his services in the capture of the Canton forts, was created a baronet. In August 1843 he was appointed commander-in-chief of the British forces in India, and in December he took the command in person against the Mahrattas, and defeated them at Maharajpur, capturing more than fifty guns. In 1845 occurred the rupture with the Sikhs,

who crossed the Sutlej in large numbers, and Sir Hugh Gough conducted the operations against them, being well supported by Lord Hardinge, the governor-general, who volunteered to serve under him. Successes in the hard-fought battles of Mudki and Ferozeshah were succeeded by the victory of Sobraon, and shortly afterwards the Sikhs sued for peace at Lahore. The services of Sir Hugh Gough were rewarded by his elevation to the peerage of the United Kingdom as Baron Gough (April 1846). The war broke out again in 1848, and again Lord Gough took the field; but the result of the battle of Chillianwalla being equivocal, he was superseded by the home authorities in favour of Sir Charles Napier; before the news of the supersession arrived Lord Gough had finally crushed the Sikhs in the battle of Gujarat (February 1849). His tactics during the Sikh wars were the subject of an embittered contro- versy (see Sikh Wars) . Lord Gough now returned to England, was raised to a viscountcy, and for the third time received the thanks of both Houses of Parliament. A pension of £2000 per annum was granted to him by parliament, and an equal pension by the East India Company. He did not again see active service. In 1854 he was appointed colonel of the Royal Horse Guards, and two years later he was sent to the Crimea to invest Marshal Pelissier and other officers with the insignia of the Bath. Honours were multiplied upon him during his latter years, • He was made a knight of St Patrick, being the first knight of the order who did not hold an Irish peerage, was sworn a privy councillor, was named a

G.C.S.L, and in November 1862 was made field- marshal. He was twice married, and left children by both his wives. He died on the 2nd of March 1869.

See R. S. Rait, Lord Gough (1903) ; and Sir W. Lee Warner, Lord Dalhousie (1904).

GOUGH, JOHN BARTHOLOMEW (181 7-1886), American temperance orator, was born at Sandgate, Kent, England, on the 22nd of August 181 7. He was educated by his mother, a schoolmistress, and at the age of twelve was sent to the United States to seek his fortune. He lived for two years with family friends on a farm in western New York, and then entered a book-bindery in New York City to learn the trade. There in 1833 his mother joined him, but after her death in 1835 he fell in with dissolute companions, and became a confirmed drunkard. He lost his position, and for several years supported himself as a ballad singer and story-teller in the cheap theatres and concert-halls of New York and other eastern cities. Even this means of livelihood was being closed to him, when in Worcester, Massachusetts, in 1842 he was induced to sign a temperance pledge. After several lapses and a terrific struggle, he determined to devote his life to lecturing in behalf of temperance reform. Gifted with remarkable powers of pathos and of description, he was successful from the start, and was soon known and sought after throughout the entire country, his appeals, which were directly personal and emotional, being attended with extra- ordinary responses. He continued his work until the end of his life, made several tours of England, where his American success was repeated, and died at his work, being stricken with apoplexy on the lecture platform at Frankford, Pennsylvania, where he passed away two days later, on the 18th of February 1886. He published an Autobiography (1846); Orations (1854); Tem- perance Addresses (1870); Temperance Lectures (1879); and Sun- light and Shadow, or Gleanings from My Life Work (1880).

GOUGH, RICHARD (1735-1809), English antiquary, was born in London on the 21st of October 1735. His father was a wealthy M.P. and director of the East India Company. Gough was a precocious child, and at twelve had translated from the French a history of the Bible, which his mother printed for private circulation. When fifteen he translated Abbe Fleury's work on the Israelites; and at sixteen he published an elaborate work entitled Atlas Renovatus, or Geography modernized. In 1752 he entered Corpus Christi College, Cambridge, where he began his work on British topography, published in 1768. Leaving Cambridge in 1756, he began a series of antiquarian excursions in various parts of Great Britain. In 1773 he began an

edition

Meantime he published, in 1786, the first volume of his splendid work, the Sepulchral Monuments of Great Britain, applied to illustrate the history of families, manners, habits, and arts at the different periods from the Norman Conquest to the Seventeenth Century. This volume, which contained the first four centuries, was followed in 1796 by a second volume containing the 15th century, and an introduction to the second volume appeared in 1799. Gough was chosen a fellow of the Society of Antiquaries of London in 1767, and from 1771 to 1791 he was its director. He was elected F.R.S. in 1775- He died at Enfield on the 20th of February 1809. His books and manuscripts relating to Anglo-Saxon and northern literature, all his collections in the department of British topography, and a large number of his drawings and engravings of other archaeological remains, were bequeathed to the university of Oxford.

Among the minor works of Gough are An Account of the Bedford Missal (in MS.) ; A Catalogue of the Coins of Canute, King of Denmark (1777); History of Fleshy in Essex (1803); An Account of the Coins of the Seleucidae, Kings of Syria (1804) ; and ” History of the Society of Antiquaries of London,” prefixed to their Archaeologia.

GOUJET, CLAUDE PIERRE (1697-1767), French abbe and litterateur, was born in Paris on the 19th of October 1697. He studied at the College of the Jesuits, and at the College Mazarin, but he nevertheless became a strong Jansenist. In 1705 he assumed the ecclesiastical habit, in 1719 entered the order of Oratorians, and soon afterwards was named canon of St Jacques l’Hopital. On account of his extreme Jansenist opinions he suffered considerable persecution from the Jesuits, and several of his works were suppressed at their instigation. In his latter years his health began to fail, and he lost his eyesight. Poverty compelled him to sell his library, a sacrifice which hastened his death, which took place at Paris on the 1st of February 1767.

He Is the author of Supplement au dictionnaire de Moreri (1735), and a Nouveau Supplement to a subsequent edition of the work; he collaborated in Bibliotheque francaise, . ou histoire litteraire de la France (18 vols., Paris, 1740-1759); and in the Vies des saints (7 vols., 1730); he also wrote Memoir es historiques el litteraires sur le college royal de France (1758); Histoire des Inquisitions (Paris, 1752); and supervised an edition of Richelet’s Dictionnaire, of which he has also given an abridgment. He helped the abbe Fabre in his continuation of Fleury’s Histoire ecclesiastique.

See Memoir es hist, et litt. de I' abbe Goujet (1767).

GOUJON, JEAN (c. 1520-c. 1566), French sculptor of the 16th century. Although some evidence has been offered in favour of the date 1520 (Archives de I'art franc,ais, iii. 350), the time and place of his birth are still uncertain. The first mention of his name occurs in the accounts of the church of St Maclou at Rouen in the year 1 540, and in the following year he was employed at the cathedral of the same town, where he added to the tomb of Cardinal d'Amboise a statue of his nephew Georges, afterwards removed, and possibly carved portions of the tomb of Louis de Breze, executed some time after 1545. On leaving Rouen, Goujon was employed by Pierre Lescot, the celebrated architect of the Louvre, on the restorations of St-Germain l'Auxerrois; the building accounts — some of which for the years 1 542-1 544 were discovered by M. de Laborde on a piece of parchment binding — specify as his work, not only the carvings of the pulpit (Louvre), but also a Notre Dame de Piete, now lost. In 1547 appeared Martin's French translation of Vitruvius, the illustrations of which were due, the translator tells us in his " Dedication to the King," to Goujon, " nagueres architecte de Monseigneur le Connetable, et maintenant un des votres." We learn from this statement not only that Goujon had been taken into the royal service on the accession of Henry II., but also that he had, been previously employed under Bullant on the chateau of Ecouen. Between 1547 and 1549 he was employed in the decoration of the Loggia ordered from Lescot for the entry of Henry II. into Paris, which took place on the 1 6th of June 1549. Lescot's edifice was reconstructed at the end of the 18th century by Bernard Poyet into the Fontaine des Innocents, this being a considerable variation of the original design. At the Louvre, Goujon, under the direction of Lescot,

in English of Camden's Britannia, which appeared in 1789. | executed the carvings of the south-west angle of the court, the

reliefs of the Escalier Henri II., and the Tribune des Gariatides, for which he received 737 livres on the 5th of September 1550. Between 1548 and 1554 rose the chateau d'Anet, in the embel- lishment of which Goujon was associated with Philibert Delorme in the service of Diana of Poitiers. Unfortunately the building accounts of Anet have disappeared, but Goujon executed a vast number of other works of equal importance, destroyed or lost in the great Revolution. In 1555

his name appears again in the Louvre accounts, and continues to do so every succeeding year up to 1562, when all trace of him is lost. In the course of this year an attempt was made to turn out of the royal employ- ment all those who were suspected of Huguenot tendencies. Goujon has always been claimed as a Reformer; it is consequently possible that he was one of the victims of this attack. We should therefore probably ascribe the work attributed to him in the Hotel Carnavalet (in situ), together with much else executed in various parts of Paris — but now dispersed or destroyed — to a period intervening between the date of his dismissal from the Louvre and his death, which is computed to have taken place between 1564 and 1568, probably at Bologna. The researches of M. Tomaso Sandonnini /see Gazette des Beaux Arts, 2 e periode, vol. xxxi.) have finally disposed of the supposition, long entertained, that Goujon died during the St Bartholomew massacre in 1572.

List of authentic works of Jean Goujon: Two marble columns supporting the organ of the church of St Maclou (Rouen) on right and left of porch on entering; left-hand gate of the church of St Maclou; bas-reliefs for decoration of screen of St Germain l'Auxerrois (now in Louvre); "Victory" over chimney-piece of Salle des Gardes at ficouen; altar at Chantilly; illustrations for Jean Martin's translation of Vitruvius; bas-reliefs and sculptural decoration of Fontaine des Innocents; bas-reliefs adorning entrance of Hotel Carnavalet, also series of satyrs' heads on keystones of arcade of courtyard; fountain of Diana from Anet (now in Louvre); internal decoration of chapel at Anet; portico of Anet (now in courtyard of Ecole des Beaux Arts) ; bust of Diane de Poigtiers (now at Versailles) ; Tribune of Caryatides in the Louvre; decoration of " Escalier Henri II., " Louvre; ceils de bceuf and decoration of Henri II. facade, Louvre; groups for pediments of facade now placed over entrance to Egyptian and Assyrian collections, Louvre.

See A. A. Pottier, CEuvres de Goujon (1844); Reginald Lister, Jean Goujon (London, 1903).

GOUJON, JEAN MARIE CLAUDE ALEXANDRE (1766-1795), French publicist and statesman, was born at Bourg on the 13th of April 1766, the son of a postmaster. The boy went early to sea, and saw fighting when he was twelve years old; in 1790 he settled at Meudon, and began to make good his lack of education. As procureur-general-syndic of the department of Seine-et-Oise, in August, 1 792, he had to supply the inhabitants with food, and fulfilled his difficult functions with energy and tact. In the Convention, which he entered on the death of Herault de Sechelles, he took his seat on the benches of the

Mountain. He conducted a mission to the armies of the Rhine and the Moselle with creditable moderation, and was a con- sistent advocate of peace within the republic. Nevertheless, he was a determined opponent of the counter-revolution, which he denounced in the Jacobin Club and from the Mountain after his recall to Paris, following on the revolution of the 9th Thermidor (July 27, 1794). He was one of those who protested against the readmission of Louvet and other survivors of the Girondin party to the Convention in March 1795; and, when the populace invaded the legislature on the 1st Prairial (May 20, 1795) and compelled the deputies to legislate in accordance with their desires, he proposed the immediate establishment of a special commission which should assure the execution of the proposed changes and assume the functions of the various committees. The failure of the insurrection involved the fall of those deputies who had supported the demands of the populace. Before the close of the sitting, Goujon, with Romme, Duroi, Duquesnoy, Bourbotte, Soubrany and others were put under arrest by their colleagues, and on their way to the chateau

of Taureau in Brittany had a narrow escape from a mob at Avranches. They were brought back to Paris for trial before a military commission oh the 17th of June, and, though no proof of their complicity in organizing the insurrection could be found — they were, in fact, with the exception of Goujon and Bourbotte, strangers to one another — they were condemned. In accordance with a pre-arranged plan, they attempted suicide on the stair- case leading from the court-room with a knife which Goujon had successfully concealed. Romme, Goujon and Duquesnoy succeeded, but the other three merely inflicted wounds which did not prevent their being taken immediately to the guillotine. With their deaths the Mountain ceased to exist as a party.

See J. Claretie, Les Dernier s Montagnards, histoire de V insurrection de Prairial an III d'apres les documents (1867); Defense du repre- sentant du peuple Goujon (Paris, no date), with the letters and a hymn written by Goujon during his imprisonment. For other documents see Maurice Tourneux (Paris, 1890, vol. i., pp. 422-425).

GOULBURN, EDWARD MEYRICK (1818-1897), English churchman, son of Mr Serjeant Goulburn, M.P., recorder of Leicester, and nephew of the Right Hon. Henry Goulburn, chancellor of the exchequer in the ministries of Sir Robert Peel and the duke of Wellington, was born in London on the nth of February 1818, and was educated at Eton and at Balliol College, Oxford. In 1839 he became fellow and tutor of Merton, and in 1 841 and 1843 was ordained deacon and priest respectively. For some years he held the living of Holywell, Oxford,

and was chaplain to- Samuel Wilberforce, bishop of the diocese. In 1849 ne succeeded Tait as headmaster of Rugby, but in 1857 he resigned, and accepted the charge of Quebec Chapel, Maryle- bone. In 1858 he became a prebendary of St Paul's, and in 1859 vicar of St John's, Paddington. In 1866 he was made dean of Norwich, and in that office exercised a long and marked influence on church life. A strong Conservative and a churchman of traditional orthodoxy, he was a keen antagonist of " higher criticism" and of all forms of rationalism. His Thoughts on Personal Religion (1862) and The Pursuit of Holiness were well received; and he wrote the Life (1892) of his friend Dean Burgon, with whose doctrinal views he was substantially in agreement. He resigned the deanery in 1889, and died at Tunbridge Wells on the 3rd of May 1897. See Life by B. Compton (1899).

GOULBURN, HENRY (1784-1856), English statesman, was born in London on the 19th of March 1784 and was educated at Trinity College, Cambridge. In 1808 he became member of parliament for Horsham; in 18 10 he was appointed under- secretary for home affairs and two and a half years later he was made under-secretary for war and the colonies. Still retaining office in the Tory government he became a privy councillor in 1 82 1, and just afterwards was appointed chief secretary to the lord-lieutenant of Ireland, a position which he held until April 1827. Here although frequently denounced as an Orangeman, his period of office was on the whole a successful one, and in 1823 he managed to pass the Irish Tithe Composition Bill. In January 1828 he was made chancellor of the exchequer under the duke of Wellington; like his leader he disliked Roman Catholic emancipation, which he voted against in 1828. In the domain of finance Goulburn's chief achievements were to reduce the rate of interest on part of the national debt, and to allow any one to sell beer upon payment of a small annual fee, a com- plete change of policy with regard to the drink traffic. Leaving office with Wellington in November 1830, Goulburn was home secretary under Sir Robert Peel for four months in 1835, and when this statesman returned to office in September 1841 he became chancellor of the exchequer for the second time. Although Peel himself did some of the chancellor's work, Goulburn was responsible for a further reduction in the rate of interest on the national debt, and he aided his chief in the struggle which ended in the repeal of the corn laws. With his colleagues he left office in June 1846. After representing Horsham in the House of Commons for over four years Goulburn was successively member for St Germans, for West Looe, and for the city of Armagh. In May 1 83 1 he was elected for Cambridge University, and he retained this seat until his death on the 12th of January 1856

at Betchworth House, Dorking. Goulburn was one of Peel's firmest supporters and most intimate friends. His eldest son, Henry (1813-1843), was senior classic and second wrangler at Cambridge in 1835.

See S. Walpole, History of England (1878-1886). GOULBURN, a city of Argyle county, New South Wales, Australia, 134 m. S.W. of Sydney by the Great Southern railway. Pop. (iqoi) 10,618. It lies in a productive agricultural district, at an altitude of 2129 ft., and is a place of great importance, being the chief depot of the inland trade of the southern part of the state. There are Anglican and Roman Catholic cathedrals. Manufactures of boots and shoes, flour and beer, and tanning are important. The municipality was created in 1859; and Goulburn became a city in 1864.

GOULD, AUGUSTUS ADDISON (1805-1866), American conchologist, was born at New Ipswich, New Hampshire, on the 23rd of April 1805, graduated at Harvard College in 1825, and took his degree of doctor of medicine in 1830. Thrown from boyhood on his own exertions, it was only by industry, per- severance and self-denial that he obtained the means to pursue his studies. Establishing himself in Boston, he devoted himself to the practice of medicine, and finally rose to high professional rank and social position. He became president of the Massachu- setts Medical Society, and was employed in editing the vital statistics of the state. As a conchologist his reputation is world-wide, and he was one of the pioneers of the science in America. His writings fill many pages of the publications of the Boston Society of Natural History (see vol. xi. p. 197 for a list) and other periodicals. He published with L. Agassiz the Principles of Zoology (2nd ed. 1851); he edited the Terrestrial and Air- breathing Mollusks (1851-1855) of Amos Binney (1803-1847); he translated Lamarck's Genera of Shells. The two most important monuments to his scientific work, however, are Mollusca and Shells (vol. xii., 1852) of the United States exploring expedition (1838-1842) under Lieutenant CharlesWilkes(i833), published by the government, and the Report on the Invertebrata published by order of the legislature of Massachusetts in 1841. A second edition of the latter work was authorized in 1865, and published in 1870 after the author's death, which took place at Boston on the 15th of September 1866. Gould was a corresponding member of all the prominent American scientific societies, and of many of those of Europe, including the London Royal Society. GOULD,

BENJAMIN APTHORP (1824-1896),' American astronomer, a son of Benjamin Apthorp Gould (1787-1859), principal of the Boston Latin school, was born at Boston, Massa- chusetts, on the 27th of September 1824. Having graduated at Harvard College in 1844, he studied mathematics and as- tronomy under C. F. Gauss at Gottingen, and returned to America in 1848. From 1852 to 1867 he was in charge of the longitude department of the United States coast survey; he developed and organized the service, was one of the first to determine longitudes by telegraphic means, and employed the Atlantic cable in 1866 to establish longitude-relations between Europe and America. The Astronomical Journal was founded by Gould in 1849; and its publication, suspended in 1861, was resumed by him in 1885. From 1855 to 1859 he acted as director of the Dudley observatory at Albany, New York; and published in 1859 a discussion of the places and proper motions of circumpolar stars to be used as standards by the United States coast survey. Appointed in 1862 actuary to the United States sanitary commission, he issued in 1869 an important volume of Military and Anthropological Statistics. He fitted up in 1864 a private observatory at Cambridge, Mass.; but undertook in 1868, on behalf of the Argentine republic, to organize a national observatory at Cordoba; began to observe"' there with four assistants in 1870, and completed in 1874 his Uranometria Argentina (published 1879) for which he received in 1883 the gold medal of the Royal Astronomical Society. This was followed by a zone-catalogue of 73,160 stars (1884), and a general catalogue (1885) compiled from meridian observations of 32,448 stars. Gould's measurements of L. M. Rutherfurd's photographs of the Pleiades in 1866 entitle him to rank as a

pioneer in the use of the camera as an instrument of precision; and he secured at Cordoba 1400 negatives of southern star- clusters, the reduction of which occupied the closing years of his life. He returned in 1885 to his home at Cambridge, where he died on the 26th of November 1896.

See Astronomical Journal, No. 389; Observatory, xx. 70 (same notice abridged); Science (Dec. 18, 1896, S. C. Chandler); Astro- physical Journal, v. 50; Monthly Notices Roy. Astr. Society, lvii.

218.

GOULD, SIR FRANCIS CARRUTHERS (1844-), English caricaturist and politician, was born in Barnstaple on the 2nd of December 1844. Although in early youth he showed great love of drawing, he began life in a bank and then joined the London Stock Exchange, where he constantly sketched the members and illustrated important events in

the financial world; many of these drawings were reproduced by lithography and published for private circulation. In 1879 he began the regular illustration of the Christmas numbers of Truth, and in 1887 he became a contributor to the Pall Mall Gazette, trans- ferring his allegiance to the Westminster Gazette on its foundation and subsequently acting as assistant editor. Among his inde- pendent publications are Who killed Cock Robin? (1897), Tales told in the Zoo (1900), two volumes of Froissarl's Modern Chronicles, told and pictured by F. C. Gould (1902 and 1903), and Picture Politics — a periodical reprint of his Westminster Gazette cartoons, one of the most noteworthy implements of political warfare in the armoury of the Liberal party. Frequently grafting his ideas on to subjects taken freely from Uncle Remus, Alice in Wonderland, and the works of Dickens and Shakespeare, Sir F. C. Gould used these literary vehicles with extraordinary dexterity and point, but with a satire that was not unkind and with a vigour from which bitterness, virulence and cynicism were notably absent. He was knighted in 1906.

GOULD, JAY (1836-1892), American financier, was born in Roxbury, Delaware county, New York, on the 27th of May 1836. He was brought up on his father's farm, studied at Hobart Academy, and though he left school in his sixteenth year, devoted himself assiduously thereafter to private study, chiefly of mathe- matics and surveying, at the same time keeping books for a blacksmith for his board. For a short time he worked for his father in the hardware business; in 1852-1856 he worked as a surveyor in preparing maps of Ulster, Albany and Delaware counties in New York, of Lake and Geauga counties in Ohio, and of Oakland county in Michigan, and of a projected railway line between Newburgh and Syracuse, N.Y. An ardent anti-renter in his boyhood and youth, he wrote A History of Delaware County and the Border Wars of New York, containing a Sketch of the Early Settlements in the County, and A History of the Late Anti-Rent Difficulties in Delaware (Roxbury, 1856). He then engaged in the lumber and tanning business in western New York, and in banking at Stroudsburg, Pennsylvania. In 1863 he married Miss Helen Day Miller, and through her father, Daniel S. Miller, he was appointed manager of the Rensselaer & Saratoga railway, which he bought up when it was in a very bad condition, and skilfully reorganized; in the same way he bought and reorganized the Rutland & Washington railway, from which he ultimately realized a large profit. In 1859 he removed to New York City, where he became a broker in railway stocks, and in 1868 he was elected president of the Erie railway, of which by shrewd strategy he and James Fisk, Jr.(q.v.), had gained control in July of that year. The management of the road

under his control, and especially the sale of $5,000,000 of fraudulent stock in 1868-1870, led to litigation begun by English bond- holders, and Gould was forced out of the company in March 1872 and compelled to restore securities valued at about $7,500,000. It was during his control of the Erie that he and Fisk entered into a league with the Tweed Ring, they admitted Tweed to the directorate of the Erie, and Tweed in turn arranged favourable legislation for them at Albany. With Tweed, Gould was cartooned by Nast in 1869. In October 1871 Gould was the chief bondsman of Tweed when the latter was held in $1,000,000 I bail. With Fisk in August 1869 he began to buy gold in a daring

attempt to ” corner ” the market, his hope being that, with the advance in price of gold, wheat would advance to such a price that western farmers would sell, and there would be a consequent great movement of breadstuffs from West to East, which would result in increased freight business for the Erie road. His speculations in gold, during which he attempted through President Grant’s brother-in-law, A. H. Corbin, to influence the president and his secretary General Horace Porter, culminated in the panic of ” Black Friday,” on the 24th of September 1869, when the price of gold fell from 162 to 135.

Gould gained control of the Union Pacific, from which in 1883 he withdrew after realizing a large profit. Buying up the stock of the Missouri Pacific he built up, by means of consolida- tions, reorganizations, and the construction of branch lines, the ” Gould System ” of railways in the south-western states. In 1880 he was in virtual control of io,ooo.miles of railway, about one-ninth of the railway mileage of the United States at that time. Besides, he obtained a controlling interest in the Western. Union Telegraph Company, and after 1881 in the elevated railways in New York City, and was intimately connected with many of the largest railway financial operations in the United States for the twenty years following 1868. Hedied of consump- tion and of mental strain on the 2nd of December 1892, his fortune at that time being estimated at $72,000,000; all of this he left to his own family.

His eldest son, George Jay Gould (b. 1864), was prominent also as an owner and manager of railways, and became president of the Little Rock & Fort Smith railway (1888), the St Louis, Iron Mountain & Southern railway (1893), the International & Great Northern railway

(1893), the Missouri Pacific railway (1893), the Texas & Pacific railway (1893), and the Manhattan Railway Company (1892); he was also vice-president and director of the Western Union Telegraph Company. It was under his control that the Wabash system became transconti- nental and secured an Atlantic port at Baltimore; and it was he who brought about a friendly alliance between the Gould and the Rockefeller interests.

The eldest daughter, Helen Miller Gould (b. 1868), became widely known as a philanthropist, and particularly for her generous gifts to American army hospitals in the war with Spain in 1898 and for her many contributions to New York University, to which she gave $250,000 for a library in 1895 and $100,000 for a Hall of Fame in 1900.

GOUNOD, CHARLES FRANCOIS (1818-1893), French com- poser, was born in Paris on the 17th of June 1818, the son of F. L. Gounod, a talented painter. He entered the Paris Con- servatoire in 1836, studied under Reicha, HaleVy and Lesueur, and won the ” Grand Prix de Rome ” in 1839. While residing in the Eternal City he devoted much of his time to the study of sacred music, notably to the works of Palestrina and Bach. In 1843 he went to Vienna, where a ” requiem ” of his composi- tion was performed. On his return to Paris he tried in vain to find a publisher for some songs he had written in Rome. Having become organist to the chapel of the ” Missions Etrangeres,” he turned his thoughts and mind to religious music. At that time he even contemplated the idea of entering into holy orders. His thoughts were, however, turned to more mundane matters when, through the intervention of Madame Viardot, the celebrated singer, he received a commission to compose an opera on a text by Emile Augier for the Academie Nationale de Musique. Sapho, the work in question, was produced in 1 85 1, and if its success was not very great, it at least sufficed to bring the composer ‘s name to the fore. Some critics appeared to consider this work as evidence of a fresh departure in the style of dramatic music, and Adolphe Adam, the composer, who was also a musical critic, attributed to Gounod the wish to revive the system of musical declamation invented by Gluck. The fact was that Sapho differed in some respects from the operatic works of the period, and was to a certain extent in advance of the times. When it was revived at the Paris Opera in 1884, several additions were made by the composer to the original score, not altogether to its advantage, and Sapho once

more failed to attract the public. Gounod’s second dramatic attempt was again in connexion with a classical subject, and consisted in some

choruses written for Ulysse, a tragedy by Ponsard, played at the Theatre Francais in 1852, when the orchestra was conducted by Offenbach. The composer's next opera, La Nonne sanglante, given at the Paris Opera in 1854, was a failure.

Goethe's Faust had for years exercised a strong fascination over Gounod, and he at last determined to turn it to operatic account. The performance at a Paris theatre of a drama on the same subject delayed the production of his opera for a time. In the meanwhile he wrote in a few months the music for an operatic version of Moliere's comedy, Le Medecin malgri lui, which was produced at the Theatre Lyri que in 1858. Berlioz well described this charming little work when he wrote of it, " Every- thing is pretty, piquant, fluent, in this ' opera comique '; there is nothing superfluous and nothing wanting." The first performance of Faust took place at the Theatre Lyrique on the 19th of March 1859. Goethe's masterpiece had already been utilized for operatic purposes by various composers, the most celebrated of whom was Spohr. The subject had also inspired Schumann, Berlioz, Liszt, Wagner, to mention only a few, and the enormous success of Gounod's opera did not deter Boito from writing his Mefistofele. Faust is without doubt the most popular French opera of the second half of the 19th century. Its success has been universal, and nowhere has it achieved greater vogue than in the land of Goethe. For years it remained the recognized type of modern French opera. At the time of its production in Paris it was scarcely appreciated according to its merits. Its style was too novel, and its luscious harmonies did not altogether suit the palates of those dilettanti who still looked upon Rossini as the incarnation of music. Times have indeed changed, and French composers have followed the road opened by Gounod, and have further developed the form of the lyrical drama, adopting the theories of Wagner in a manner suitable to their national temperament. Although in its original version Faust contained spoken dialogue, and was divided into set pieces according to custom, yet it differed greatly from the operas of the past. Gounod had not studied the works of German masters such as Mendelssohn and Schumann in vain, and although his own style is eminently Gallic, yet it cannot be denied that much of its charm emanates from a certain poetic sentimentality which seems to have a Teutonic origin. Certainly no music such as his had previously been produced by any French composer. Auber was a gay trifier, scattering his bright effusions with absolute insouciance, teeming with melodious ideas, but lacking depth. Berlioz, a musical Titan, wrestled against fate with a superhuman energy, and, Jove-like, subjugated his hearers with his thunderbolts. It was, however, reserved for Gounod to introduce la

note tendre, to sing the tender passion in accents soft and languorous. The musical language em- ployed in Faust was new and fascinating, and it was soon to be adopted by many other French composers, certain of its idioms thereby becoming hackneyed. Gounod's opera was given in London in 1863, when its success, at first doubtful, became enormous, and it was heard concurrently at Covent Garden and Her Majesty's theatres. Since then it has never lost its popularity.

Although the success of Faust in Paris was at first not so great as might have been expected, yet it gradually increased and set the seal on Gounod's fame. The fortunate composer now experienced no difficulty in finding an outlet for his works, and the succeeding decade is a specially important one in his career. The opera from his pen which came after Faust was ■Philemon et Baucis, a setting of the mythological tale in which the composer followed the traditions of the Opera Comique, employing spoken dialogue, while not abdicating the in- dividuality of his own style. This work was produced at the Theatre Lyrique in i860. It has repeatedly been heard in London. La Reine de Saba, a four-act opera, produced at the Grand Opera on the 28th of February 1862, was altogether a far more ambitious work. For some reason it did not meet

with success, although the score contains some of Gounod's choicest inspirations, notably the well-known air, " Lend me your aid." La Reine de Saba was adapted for the English stage under the name of Irene. The non-success of this work proved a great disappointment to Gounod, who, however, set to work again, and this time with better results, Mireille, the fruit of his labours, being given for the first time at the Th6atre Lyrique on the 19th of March 1864. Founded upon the Mireio of the Provencal poet Mistral, Mireille contains much charming and characteristic music. The libretto seems to have militated against its success, and although several revivals have taken place and various modifications and alterations have been made in the score, yet Mireille has never enjoyed a very great vogue. Certain portions of this opera have, however, been popularized in the concert-room. La Colombo, a little opera in two acts without pre- tension, deserves mention here. It was originally heard at Baden in i860, and subsequently at the Opera Comique. A suavely melodious entr'acte from this little work has survived and been repeatedly performed.

Animated with the desire to give a pendant to his Faust, Gounod now

sought for inspiration from Shakespeare, and turned his attention to Romeo and Juliet. Here, indeed, was a subject particularly well calculated to appeal to a composer who had so eminently qualified himself to be considered the musician of the tender passion. The operatic version of the Shakespearean tragedy was produced at the Theatre Lyrique on the 27th of April 1867. It is generally considered as being the composer's second best opera. Some people have even placed it on the same level as Faust, but this verdict has not found general acceptance. Gounod himself is stated to have expressed his opinion of the relative value of the two operas enigmatically by saying, " Faust is the oldest, but I was younger; Romio is the youngest, but I was older." The luscious strains wedded to the love scenes, if at times somewhat cloying, are generally in accord with the situations, often irresistibly fascinating, while always absolutely individual. The success of Romto in Paris was great from the outset, and eventually this work was transferred to the Grand Opera, after having for some time formed part of the repertoire of the Opera Comique. In London it was not until the part of Romeo was sung by Jean de Reszke that this opera obtained any real hold upon the English public.

After having so successfully sought for inspiration from Moliere, Goethe and Shakespeare, Gounod now turned to another famous dramatist, and selected Pierre Corneille's Polyeucle as the subject of his next opera. Some years were, however, to elapse before this work was given to the public. The Franco- German War had broken out, and Gounod was compelled to take refuge in London, where he composed the " biblical elegy " Gallia for the inauguration of the Royal Albert Hall. During his stay in London Gounod composed a great deal and wrote a number of songs to English words, many of which have attained an enduring popularity, such as " Maid of Athens," "There is a green hill far away," " Oh that we two were maying," " The fountain mingles with the river." His sojourn in London was not altogether pleasant, as he was embroiled in lawsuits with publishers. On Gounod's return to Pans he hurriedly set to music an operatic version of Alfred de Vigny's Cinq-Mars, which was given at the Opera Comique on the 5th of April 1877 (and in London in 1900), without obtaining much success. Polyeucte, his much-cherished work, appeared at the Grand Opera the following year on the 7 th of October, and did not meet with a better fate. Neither was Gounod more fortunate with Le Tribut de Zamora, his last opera, which, given on the same stage in 1881, speedily vanished, never to reappear. In his later dramatic works he had, unfortunately, made no attempt to keep up with the times, preferring to revert to old-fashioned methods.

The genius of the great composer was, however, destined to assert

itself in another field — that of sacred music. His friend Camille Saint-Saens, in a volume entitled Portraits et Souvenirs, writes:

Gounod did not cease all his life to write for the church, to accumulate masses and motetts; but it was at the commencement of his career, in the Messe de Sainte Cecile, and at the end, in the oratorios The Redemption and Mors et vita, that he rose highest.

Saint-Saens, indeed, has formulated the opinion that the three above-mentioned works will survive all the master's operas. Among the many masses composed by Gounod at the outset of his career, the best is the M esse de Sainte Cecile, written in 1855. He also wrote the Messe du Sacre Cceur (1876) and the Messe a la memoire de Jeanne d' Arc (1887). This last work offers certain peculiarities, being written for solos, chorus, organ, eight trumpets, three trombones, and harps. In style it has a certain affinity with Palestrina. The Redemption, which seems to have acquired a permanent footing in Great Britain, was produced at the Birmingham Festival of 1882. It was styled a sacred trilogy, and was dedicated to Queen Victoria. The score is prefixed by a commentary written by the composer, in which the scope of the oratorio is explained. It cannot be said that Gounod has altogether risen to the magnitude of his task. The music of The Redemption bears the unmistakable imprint of the composer's hand, and contains many beautiful thoughts, but the work in its entirety is not exempt from monotony. Mors et vita, a sacred trilogy dedicated to Pope Leo XIII. , was also produced for the first time in Birmingham at the Festival of 1885. This work is divided into three parts, " Mors," " Judicium," " Vita." The first consists of a Requiem, the second depicts the Judgment, the third Eternal Life. Although quite equal, if not superior to The Redemption, Mors et vita has not obtained similar success.

Gounod was a great worker, an indefatigable writer, and it would occupy too much space to attempt even an incomplete catalogue of his compositions. Besides the works already mentioned may be named two symphonies which were played during the 'fifties, but have long since fallen into neglect. Symphonic music was not Gounod's forte, and the French master evidently recognized the fact, for he made no further attempts in this style. The incidental music he wrote to the dramas Les Deux Reines and Jeanne d' Arc must not be forgotten. He also attempted to set Moliere's comedy, Georges Dandin, to music, keeping to the original prose. This work has never been brought out. Gounod composed a large number of songs, many of which are very beautiful. One of the vocal pieces that have contri- buted most to his popularity is the celebrated Meditation on the First Prelude of Bach,

more widely known as the Ave Maria. The idea of fitting a melody to the Prelude of Bach was original, and it must be admitted that in this case the experiment was successful.

Gounod died at St Cloud on the 18th of October 1893. His influence on French music was immense, though during the last years of the 19th century it was rather counterbalanced by that of Wagner. Whatever may be the verdict of posterity, it is unlikely that the quality of individuality will be denied to Gounod. To be the composer of Faust is alone a sufficient title to lasting fame. (A. He.)

GOURD, a name given to various plants of the order Cucur- bitaceae, especially those belonging to the genus Cucurbita, monoecious trailing herbs of annual duration, with long succulent stems furnished with tendrils, and large, rough, palmately-lobed leaves; the flowers are generally large and of a bright yellow or orange colour, the barren ones with the stamens united; the fertile are followed by the large succulent fruit that gives the gourds their chief economic value. Many varieties of Cucurbita are under cultivation in tropical and temperate climates, especially in southern Asia; but it is extremely difficult to refer them to definite specific groups, on account of the facility with which they hybridize; while it is very doubtful whether any of the original forms now exist in the wild state. Charles Naudin, who made a careful and interesting series of observations upon this genus, came to the conclusion that all varieties known in European gardens might be referred to six original species; probably three, or at most four, have furnished the edible kinds in ordinary cultivation. Adopting the specific

names usually given to the more familiar forms, the most im- portant of the gourds, from an economic point of view, is perhaps C. maxima, the Potiron Jaune of the French, the red and yellow gourd of British gardeners (fig. 6), the spheroidal fruit of which is remarkable for its enormous size: the colour of the somewhat rough rind varies from white to bright yellow, while in some kinds it remains green; the fleshy interior is of a deep yellow or orange tint. This valuable gourd is grown extensively in southern Asia and Europe. In Turkey and Asia Minor it yields, at some periods of the year, an important article of diet to the people; immense quantities are sold in the markets of Constantinople, where in the winter the heaps of one variety with a white rind are described as resembling mounds of snowballs. The

yellow kind attains occasionally a weight of upwards of 240 lb. It grows well in Central Europe and the United States, while in the south of England it will produce its gigantic fruit in perfection in hot summers. The yellow flesh of this gourd and its numerous varieties yields a considerable amount of nutriment, and is the more valuable as the fruit can be kept, even in warm climates, for a long time. In France and in the East it is much used in soups and ragouts, while simply boiled it forms a substitute for other table vegetables; the taste has been compared to that of a young carrot. In some countries the larger kinds are employed as cattle food. The seeds yield by expression a large quantity of a bland oil, which is used for the same purposes as that of the poppy and olive. The ” mammoth ” gourds of English and American gardeners (known in America as squashes) belong to this species. The pumpkin (summer squash of America) is Cucurbita Pepo. Some of the varieties of C. maxima and Pepo contain a considerable quantity of sugar, amounting in the sweetest kinds to 4 or 5 %, and in the hot plains of Hungary efforts have been made to make use of them as a commercial source of sugar. The young shoots of both these large gourds may be given to cattle, and admit of being eaten as a green vegetable when boiled. The vegetable marrow is a variety (ovifera) of C. Pepo. Many smaller gourds are cultivated in India and other hot climates, and some have been introduced into English gardens, rather for the beauty of their fruit and

foliage than for their escu- lent qualities. Among these is C. Pepo var. auranlia, the orange gourd, bearing a spheroidal fruit, like a large orange in form and colour; in Britain it is generally too bitter to be palatable, though applied to culinary purposes in Turkey and the Levant. C. Pepo var. pyri- f or mis and var. verrucosa, the warted gourds, are likewise occasionally eaten, especially in the immature state; and C. moschata (musk melon) is very exten- sively cultivated throughout India by the natives, the yellow flesh being cooked and eaten. The bottle-gourds are

Photographed from specimens in the British Pˆced in a separate genus.

s 4 3 * r a 1

Lagenaria, chiefly differing from Cucurbita in the an-

Museum.

Group of Gourds.

1-5. Various forms of bottle gourd, thers being free instead of

Lagenaria vulgaris adherent. The bottle-gourd

6. Giant gourd, Cucurbita maxima. . ,, . _ ° ,

properly so-called, L. vul- garis, is a climbing plant with downy, heart-shaped leaves and beautiful white flowers: the remarkable fruit (figs. 1-5) first begins to grow in the form of an elongated cylinder, but gradually widens towards the extremity, until, when ripe, it resembles a flask with a narrow neck and large rounded bulb; it sometimes attains a length of 7 ft. When ripe, the pulp is removed from

the neck, and the interior cleared by leaving water standing in it; the woody rind that remains is used as a bottle: or the lower part is cut off and cleared out, forming a basin-like vessel applied to the same domestic purposes as the calabash (Cres- centia) of the West Indies: the smaller varieties, divided length- wise, form spoons. The ripe fruit is apt to be bitter and cathartic, but while immature it is eaten by the Arabs and Turks. When about the size of a small cucumber, it is stuffed with rice and minced meat, flavoured with pepper, onions, &c, and then boiled, forming a favourite dish with Eastern epicures. The elongated snake-gourds of India and China (Trichosanthes) are used in curries and stews.

All the true gourds have a tendency to secrete the cathartic principle colocynthin, and in many varieties of Cucurbita and the allied genera it is often elaborated to such an extent as to render them unwholesome, or even poisonous. The seeds of several species therefore possess some anthelmintic properties; those of the common pumpkin are frequently administered in America as a vermifuge.

The cultivation of gourds began far beyond the dawn of history, and the esculent species have become so modified by culture that the original plants from which they have descended can no longer be traced. The abundance of varieties in India would seem to indicate that part of Asia as the birthplace of the present edible forms; but some appear to have been cultivated in all the hotter regions of that continent, and in North Africa, from the earliest ages, while the Romans were familiar with at least certain kinds of Cucurbita, and with the bottle-gourd. Cucurbita Pepo, the source of many of the American forms, is probably a native of that continent.

Most of the annual gourds may be grown successfully in Britain. They are usually raised in hotbeds or under frames, and planted out in rich soil in the early summer as soon as the nights become warm. The more ornamental kinds may be trained over trellis- work, a favourite

mode of displaying them in the East; but the situation must be sheltered and sunny. Even Lagenaria will sometimes pro- duce fine fruit when so treated in the southern counties.

. For an account of these cultivations in England see paper by Mr J. W. Odell, ” Gourds and Cucurbits,” in Journ. Royal Hort. Soc. xxix. 450 (i9°4)-

GOURGAUD, GASPAR, Baron (1783-1852), French soldier, was born at Versailles on the 14th of September 1783; his father was a musician of the royal chapel. At school he showed talent in mathematical studies and accordingly entered the artillery. In 1802 he became junior lieutenant, and thereafter served with credit in the campaigns of 1803-1805, being wounded at Austerlitz. He was present at the siege of Saragossa in 1808, but returned to service in Central Europe and took part in nearly all the battles of the Danubian campaign of 1800. In 181 1 he was chosen to inspect and report on the fortifications of Danzig. Thereafter he became one of the ordnance officers attached to the emperor, whom he followed closely through the Russian campaign of 181 2; he was one of the first to enter the Kremlin and discovered there a quantity of gunpowder which might have been used for the destruction of Napoleon. For his services in this campaign he received the title of baron, and became first ordnance officer. In the campaign of 1813 in Saxony he further evinced his courage and prowess, especially at Leipzig and Hanau; but it was in the first battle of 1814, near to Brienne, that he rendered the most signal service by killing the leader of a small band of Cossacks who were riding furiously towards Napoleon’s tent. Wounded at the battle of Montmirail, he yet recovered in time to share in several of the conflicts which followed, distinguishing himself especially at Laon and Reims. Though enrolled among the royal guards of Louis XVIII. in the summer of 1814, he yet embraced the cause of Napoleon during the Hundred Days (1815), was named general and aide-de-camp by the emperor, and fought at Waterloo.

After the second abdication of the emperor (June 22nd, 1815) Gourgaud retired with him and a few other companions to Rochefort. It was to him that Napoleon entrusted the letter of appeal to the prince regent for an asylum in England. Gour- gaud set off in H.M.S. ” Slaney,” but was not allowed to land

in England. He determined to share Napoleon's exile and sailed with him on H.M.S. " Northumberland " to St Helena. The ship's secretary, John R. Glover, has left an entertaining account of some of Gourgaud's gasconnades at table. His extreme sensitiveness and vanity soon brought him into collision with Las Cases and Montholon at Longwood. The former he styles in his journal a " Jesuit " and a scribbler who went thither in order to become famous. With Montholon, his senior in rank, the friction became so acute that he challenged him to a duel, for which he suffered a sharp rebuke from Napoleon. Tiring of the life at Longwood and the many slights which he suffered from Napoleon, he desired to depart, but before he could sail he spent two months with Colonel Basil Jackson, whose account of him throws much light on his character, as also on the " policy" adopted by the exiles at Longwood. In England he was gained over by members of the Opposition and thereafter made common cause with O'Meara and other detractors of Sir Hudson Lowe, for whose character he had expressed high esteem to Basil Jack- son. He soon published his Campagne de 1815, in the preparation of which he had had some help from Napoleon; but Gourgaud's Journal de Ste-HMene was not destined to be published till the year 1899. Entering the arena of letters, he wrote, or colla- borated in, two well-known critiques. The first was a censure of Count P. de Segur's work on the campaign of. 1812, with the result that he fought a duel with that officer and wounded him. He also sharply criticized Sir Walter Scott's Life of Napoleon. He returned to active service in the army in 1830; and in 1840 proceeded with others to St Helena to bring back the remains of Napoleon to France. He became a deputy to the Legislative Assembly in 1849;. ne died in 1852.

Gourgaud's works are La Campagne de iS/J (London and Paris, 181 8); Napoleon el la Grande Armee en Russie; examen critique de Vouvrage de M. le comte P. de Segur (Paris, 1824); Refutation de la vie de Napoleon par Sir Walter Scott (Paris, 1827). He collaborated with Montholon in the work entitled Memoires pour servir & I'histoire de France sous Napoleon (Paris, 1822-1823), and with Belliard and others in the work entitled Bourrienne et ses erreurs (2 vols., Paris, 1830) ; but his most important work is the Journal inedil de Sle-Helene (2 vols., Paris, 1899), which is a remarkably naif and lifelike record of the life at Longwood. See, too, Notes and Reminiscences of a Staff Officer, by Basil Jackson (London, 1904), and the bibliography to the article Lowe, Sir Hudson. (J. Hl. R.)

GOURKO, JOSEPH VLADIMIROVICH, Count (1828-1901), Russian general, was born, of Lithuanian extraction, on the 15th of November 1828. He was educated in the imperial corps of pages, entered the

hussars of the imperial bodyguard as sub-lieutenant in 1846, became captain in 1857, adjutant to the emperor in i860, colonel in 1861, commander of the 4th Hussar regiment of Mariupol in 1866, and major-general of the emperor's suite in 1867. He subsequently commanded the grenadier regiment, and in 1873 the 1st brigade, 2nd division, of the cavalry of the guard. Although he took part in the Crimean War, being stationed at Belbek, his claim to distinction is due to his services in the Turkish war of 1877. He led the van of the Russian invasion, took Trnovo on the 7th July, crossed the Balkans by the Hain Bogaz pass, debouching near Hainkioi, and, notwithstanding considerable resistance, captured Uflani, Maglish and Kazanlyk; on the 18th of July he attacked Shipka, which was evacuated by the. Turks on the following day. Thus within sixteen days of crossing the Danube Gourko had secured three Balkan passes and created a panic at Constantinople. He then made a series of successful reconnaissances of the Tunja valley, cut the railway in two places, occupied Stara Zagora (Turkish, Eski Zagra) and Nova Zagora (YeniZagra), checked the advance of Suleiman's army., and returned again over the Balkans. In October he was appointed commander of the allied cavalry, and attacked the Plevna line of communication to Orkhanie with a large mixed force, captured Gorni-Dubnik, Telische and Vratza, and, in the middle of November, Orkhanie itself. Plevna was isolated, and after its fall in December Gourko led the way amidst snow and ice over the Balkans to the fertile valley beyond, totally defeated Suleiman, and occupied Sophia, Philippopolis and Adrianople, the armistice at the end of January 1878 stopping further operations (see Russo-

Ttjrkish Wars). Gourko was made a count, and decorated with the and class of St George and other orders. In 1879-1880 he was governor of St Petersburg, andfromi883toi894 governor- general of Poland. He died on the 29th of January 1901.

GOURMET, a French term for one who takes a refined and critical, or even merely theoretical pleasure in good cooking and the delights of the table. The word has not the disparaging sense attached to the Fr. gourmand, to whom the practical pleasure of good eating is the chief end. The O. Fr. groumel or gromet meant a servant, or shop-boy, especially one employed in a wine-seller's shop, hence an expert taster of wines, from which the modern usage has developed. The etymology of gourmet is obscure; it may be ultimately connected with the English " groom " (g.».). The origin of gourmand is unknown. In English, in the form " grummet," the word was early applied to a cabin or ship's boy. Ships of the Cinque Ports were obliged to carry one " grummet"; thus in a charter of 1229 (quoted in the New English Dictionary) it is laid down servitia inde debita Domino Regi, xxi. naves, et in qualibet

nave xxi. homines, cum uno gartione qui dicitur gromet.

GOUROCK, a police burgh and watering-place of Renfrew- shire, Scotland, on the southern shore of the Firth of Clyde, 31 m. W. by N. of Greenock by the Caledonian railway. Pop. (1901) 5261. It is partly situated on a fine bay affording good anchorage, for which it is largely resorted to by the numerous yacht clubs of the Clyde. The extension of the railway from Greenock (in 1889) to the commodious pier, with a tunnel 1$ m. long, the longest in Scotland, affords great facilities for travel to the ports of the Firth, the sea lochs on the southern Highland coast and the Crinan Canal. The eminence called Barrhill (480 ft. high) divides the town into two parts, the eastern known as Kempoch, the western as Ashton. Near Kempoch point is a monolith of mica-schist, 6 ft. high, called ” Granny Kempoch,” which the superstitious of other days regarded as possessing influence over the winds, and which was the scene, in 1662, of certain rites that led to the celebrants being burned as witches. Gamble Institute (named after the founder) contains halls, recreation rooms, a public library and baths. It is said that Gourock was the first place on the Clyde where herrings were cured. There is tramway communication with Greenock and Ashton. About 3 m. S.W. there stands on the shore the familiar beacon of the Cloch. Gourock became a burgh of barony in 1694.
GOURVILLE, JEAN HERAULD (1625-1703), French adven- turer, was born at La Rochefoucauld. At the age of eighteen he entered the house of La Rochefoucauld as a servant, and in 1646 became secretary to Francois de la Rochefoucauld, author of the Maximes. Resourceful and quick-witted, he rendered services to his master during the Fronde, in his intrigues with the parliament, the court or the princes. In these negotiations he made the acquaintance of Conde, whom he wished to help to escape from the chateau of Vincennes; of Mazarin, for whom he negotiated the reconciliation with the princes; and of Nicolas Fouquet. After the Fronde he engaged in financial affairs, thanks to Fouquet. In 1658 he farmed the tattle in Guienne. He bought depreciated rentes and had them raised to their nominal value by the treasury; he extorted gifts from the financiers for his protection, being Fouquet’s confidant in many operations of which he shared the profits. In three years he accumulated an enormous fortune, still further increased by his unfailing good fortune at cards, playing even with the king. He was involved in the trial of Fouquet, and in April 1663 was condemned to death for peculation and embezzlement of public funds; but escaping, was executed in effigy. He sent a valet one night to take the effigy down from the gallows in the court of the Palais de Justice, and then fled the country. He re- mained five years abroad, being excepted in 1665 from the amnesty accorded by Louis XIV. to the

condemned financiers. Having returned secretly to France, he entered the service of Conde, who, unable to meet his creditors, had need of a clever manager to put his affairs in order. In this way he was able to reappear at court, to assist at the campaigns of the war with Holland, and to offer himself for all the delicate negotiations

for his master or the king. He received diplomatic missions in Germany, in Holland, and especially in Spain, though it was only in 1694, that he was freed from the condemnation pro- nounced against him by the chamber of justice. From 1696 he fell ill and withdrew to his estate, where he dictated to his secretary, in four months and a half, his Mimoires, an important source for the history of his time. In spite of several errors, introduced purposely, they give a clear idea of the life and morals of a financier of the age of Fouquet, and throw light on certain points of the diplomatic history. They were first published in

1724.

There is a modern edition, with notes, an introduction and ap- pendix, by Lecestre (Paris, 1894-1895, 2 vols.).

GOUT, the name rather vaguely given, in medicine, to a constitutional disorder which manifests itself by inflammation of the joints, with sometimes deposition of urates of soda, and also by morbid changes in various important organs. The term gout, which was first used about the end of the 13th century, is derived through the Fr. goutte from the Lat. gutta, a drop, in allusion to the old pathological doctrine of the dropping of a morbid material from the blood within the joints. The disease was known and described by the ancient Greek physicians under various terms, which, however, appear to have been applied by them alike to rheumatism and gout. The general term arthritis (apdpov, a joint) was employed when many joints were the seat of inflammation; while in those instances where the disease was limited to one part the terms used bore reference to such locality; hence podagra (jrodkypa., from irovs, the foot, and Hypa, a seizure), chiragra (x«P, the hand), gonagra {ybvv, the knee), &c.

Hippocrates in his Aphorisms speaks of gout as occurring most commonly in spring and autumn, and mentions the fact that women are less liable to it than men. He also gives directions as to treatment.

Celsus gives a similar account of the disease. Galen regarded gout- as an unnatural accumulation of humours in a part, and the chalk-stones as the concretions of these, and he attributed the disease to over-indulgence and luxury. Gout is alluded to in the works of Ovid and Pliny, and Seneca, in his. 95th epistle, mentions the prevalence of gout among the Roman ladies of his day as one of the results of their high living and debauchery. Lucian, in his Tragopodagra, gives an amusing account of the remedies employed for the cure of gout.

In all times this disease has engaged a large share of the atten- tion of physicians, from its wide prevalence and from the amount of suffering which it entails. Sydenham, the famous English physician of the 17th century, wrote an important treatise on the subject, and his description of the gouty paroxysm, all the more vivid from his having himself been afflicted with the disease for thirty-four years, is still quoted by writers as the most graphic and exhaustive account of the symptomatology of gout. Subsequently Cullen, recognizing gout as capable of manifesting itself in various ways, divided the disease into regular gout, which affects the joints only, and irregular gout, where the gouty disposition exhibits itself in other forms; and the latter variety he subdivided into atonic gout, where the most prominent symptoms are throughout referable to the stomach and ali- mentary canal; retrocedent gout, where the inflammatory attack suddenly disappears from an affected joint and serious disturb- ance takes place in some internal organ, generally the stomach or heart; and misplaced gout, where from the first the disease does not appear externally, but reveals itself by an inflammatory attack of some internal part. Dr Garrod, one of the most eminent authorities on gout, adopted a division somewhat similar to, though simpler than that of Cullen, namely, regular gout, which affects the joints alone, and is either acute or chronic, and irregular gout, affecting non-articular tissues, or disturbing tlie functions of various organs.

It is often stated that the attack of gout comes on without any previous warning; but, while this is true in many instances, the reverse is probably as frequently the case, and the pre- monitory symptoms, especially in those who have previously suffered from the disease, may be sufficiently precise to indicate MI. 19

the impending seizure. Among the more common of these may be mentioned marked disorders of the digestive organs, with a feeble and capricious appetite, flatulence and pain after eating, and uneasiness in the right side in the region of the liver. A remarkable tendency to gnashing of the teeth is sometimes observed. This symptom was first noticed by Dr Graves, who connected it with irritation in the urinary

organs, which also is present as one of the premonitory indications of the gouty attack. Various forms of nervous disturbance also present themselves in the form of general discomfort, extreme irritability of temper, and various perverted sensations, such as that of numbness and coldness in the limbs. These symptoms may persist for many days and then undergo amelioration immediately before the impending paroxysm. On the night of the attack the patient retires to rest apparently well, but about two or three o'clock in the morning awakes with a painful feeling in the foot, most commonly in the ball of the great toe, but it may be in the instep or heel, or in the thumb. With the pain there often occurs a distinct shivering followed by feverishness. The pain soon becomes of the most agonizing character: in the words of Sydenham, " now it is a violent stretching and tearing of the ligaments, now it is a gnawing pain, and now a pressure and tightening; so exquisite and lively meanwhile is the part affected that it cannot bear the weight of the bedclothes, nor the jar of a person walking in the room."

When the affected part is examined it is found to be swollen and of a deep red hue. The superjacent skin is tense and glisten- ing, and the surrounding veins are more or less distended. After a few hours there is a remission of the pain, slight perspiration takes place, and the patient may fall asleep. The pain may continue moderate during the day but returns as night advances, and the patient goes through a similar experience of suffering to that of the previous night, followed with a like abatement towards morning. These nocturnal exacerbations occur with greater or less severity during the continuance of the attack, which generally lasts for a week or ten days. As the symptoms decline the swelling and tenderness of the affected joint abate, but the skin over it pits on pressure for a time, and with this there is often associated slight desquamation of the cuticle. During the attacks there is much constitutional disturbance. The patient is restless and extremely irritable, and suffers from cramp in the limbs and from dyspepsia, thirst and constipation. The urine is scanty and high-coloured, with a copious deposit, consisting chiefly of urates. During the continuance of the symptoms the inflammation may leave the one foot and affect the other, or both may suffer at the same time. After the attack is over the patient feels quite well and fancies himself better than he had been for a long time before; hence the once popular notion that a fit of the gout was capable of removing all other ailments. Any such idea, however, is sadly belied in the ex- perience of most sufferers from this disease. It is rare that the first is the only attack of gout, and another is apt to occur within a year, although by care and treatment it may be warded off. The disease,

however, undoubtedly tends to take a firmer hold on the constitution and to return. In the earlier recurrences the same joints as were formerly the seat of the gouty inflam- mation suffer again, but in course of time others become im- plicated, until in advanced cases scarcely any articulation escapes, and the disease thus becomes chronic. It is to be noticed that when gout assumes this form the frequently recurring attacks are usually attended with less pain than the earlier ones, but their disastrous effects are evidenced alike by the disturbance of various important organs, especially the stomach, liver, kidneys and heart, and by the remarkable changes which take -place in the joints from the formation of the so-called chalk- stones or tophi. These deposits, which are highly characteristic of gout, appear at first to take place in the form of a semifluid material, consisting for the most part of urate of soda, which gradually becomes more dense, and ultimately quite hard. When any quantity of this is deposited in the structures of a joint the effect is to produce stiffening, and, as deposits appear to take place to a greater or less amount in connexion with every

attack, permanent thickening and deformity of the parts is apt to be the consequence. The extent of this depends, of course, on the amount of the deposits, which, however, would seem to be in no necessary relation to the severity of the attack, being in some cases even of chronic gout so slight as to be barely appreciable externally, but on the other hand occasionally causing great enlargement of the joints, and fixing them in a flexed or extended position which renders them entirely useless. Dr Garrod describes the appearance of a hand in an extreme case of this kind, and likens its shape to a bundle of French carrots with their heads forward, the nails corresponding to the stalks. Any of the joints may be thus affected, but most commonly those of the hands and feet. The deposits take place in other structures besides those of joints, such as along the course of tendons, underneath the skin and periosteum, in the sclerotic coat of the eye, and especially on the cartilages of the external ear. When largely deposited in joints an abscess sometimes forms, the skin gives way, and the concretion is exposed. Sir Thomas Watson quotes a case of this kind where the patient when playing at cards was accustomed to chalk the score of the game upon the table with his gouty knuckles.

The recognition of what is termed irregular gout is less easy than that form above described, where the disease gives abundant external

evidence of its presence; but that other parts than joints suffer from gouty attacks is beyond question. The diag- nosis may often be made in cases where in an attack of ordinary gout the disease suddenly leaves the affected joints and some new series of symptoms arises. It has been often observed when cold has been applied to an inflamed joint that the pain and inflammation in the part ceased, but that some sudden and alarming seizure referable to the stomach, brain, heart or lungs supervened. Such attacks, which correspond to what is termed by Cullen retrocedent gout, often terminate favourably, more especially if the disease again returns to the joints. Further, the gouty nature of some long-continued internal or cutaneous disorder may be rendered apparent by its disappearance on the outbreak of the paroxysm in the joints. Gout, when of long standing, is often found associated with degenerative changes in the heart and large arteries, the liver, and especially the kidneys, which are apt to assume the contracted granular condition characteristic of one of the forms of Bright's disease. A variety of urinary calculus — the uric acid — formed by concretions of this substance in the kidneys is a not unfrequent occurrence in connexion with gout; hence the well-known association of this disease and gravel.

The pathology of gout is discussed in the article on Metabolic Diseases. Many points, however, still remain unexplained. As remarked by Trousseau, " the production in excess of uric acid and urates is a pathological phenomenon inherent like all others in the disease; and like all the others it is dominated by a specific cause, which we know only by its effects, and which we term the gouty diathesis." This subject of diathesis (habit, or organic predisposition of individuals), which is regarded as an essential element in the pathology of gout, naturally suggests the question as to whether, besides being inherited, such a peculiarity may also be acquired, and this leads to a considera- tion of the causes which are recognized as influential in favouring the occurrence of this disease.

It is beyond dispute that gout is in a marked degree hereditary, fully more than half the number of cases being, according to Sir C. Scudamore and Dr Garrod, of this character. But it is no less certain that there are habits and modes of life the observ- ance of which may induce the disease even where no hereditary tendencies can be traced, and the avoidance of which may, on the other hand, go far towards weakening or neutralizing the influence of inherited liability. Gout is said to affect the sedentary more readily than the active. If, however, inadequate exercise be combined with a luxurious manner of living, with habitual over-indulgence in animal food and rich dishes, and especially in alcoholic beverages, then undoubtedly the chief factors

in the production of the disease are present.

Much has been written upon the relative influence of various

forms of alcoholic drinks in promoting the development of gout. It is generally stated that fermented are more injurious than distilled liquors, and that, in particular, the stronger wines, such as port, sherry and madeira, are much more potent in their gout-producing action than the lighter class of wines, such as hock, moselle, &c, while malt liquors are fully as hurtful as strong wines. It seems quite as probable, however,that over-indulgence in any form of alcohol, when associated with the other conditions already adverted to, will have very much the same effect in developing gout. The comparative absence of gout in countries where spirituous liquors are chiefly used, such as Scotland, is cited as showing their relatively slight effect in encouraging that disease; but it is to be noticed that in such countries there is on the whole a less marked tendency to excess in the other pleasures of the table, which in no degree less than alcohol are chargeable with inducing the gouty habit. Gout is not a common disease among the poor and labouring classes, and when it does occur may often be connected even in them with errors in living. It is not very rare to meet gout in butlers, coachmen, &c, who are apt to live luxuriously while leading comparatively easy lives. Gout, it must ever be borne in mind, may also affect persons who observe the strictest temperance in living, and whose only excesses are in the direction of over-work, either physical or intellectual. Many of the great names in history in all times have had their existence embittered by this malady, and have died from its effects. The influence of hereditary tendency may often be traced in such instances, and is doubtless called into activity by the depressing consequences of over-work. It may, notwith- standing, be affirmed as generally true that those who lead regular lives, and are moderate in the use of animal food and alcoholic drinks, or still better abstain from the latter altogether, are less likely to be the victims of gout even where an undoubted inherited tendency exists.

Gout is more common in mature age than in the earlier years of life, the greatest number of cases in one decennial period being between the ages of thirty and forty, next between twenty and thirty, and thirdly between forty and fifty. It may occasionally affect very young persons; such cases are generally regarded as hereditary, but, so far as diet is concerned, it has to be remembered that their home life has probably been a predisposing cause. After middle life gout rarely appears for the first time. Women are much less the subjects of gout than men, apparently from their less exposure to the influences

(excepting, of course, that of heredity) which tend to develop the disease, and doubtless also from the differing circumstances of their physical constitu- tion. It most frequently appears in females after the cessation of the menses. Persons exposed to the influence of lead poisoning, such as plumbers, painters, &c, are apt to suffer from gout; and it would seem that impregnation of the system with this metal markedly interferes with the uric acid excreting function of the kidneys.

Attacks of gout are readily excited in those predisposed to the disease. Exposure to cold, disorders of digestion, fatigue, and irritation or injuries of particular joints will often precipitate the gouty paroxysm.

With respect to the treatment of gout the greatest variety of opinion has prevailed and practice been pursued, from the numerous quaint nostrums detailed by Lucian to the ” expectant ” or do-nothing system recommended by Sydenham. But gout, although, as has been shown, a malady of a most severe and intractable character, may nevertheless be successfully dealt with by appropriate medicinal and hygienic measures. The general plan of treatment can be here only briefly indicated. During the acute attack the affected part should be kept at perfect rest, and have applied to it warm opiate fomentations or poultices, or, what answers quite as well, be enveloped in cotton wool covered in with oil silk. The diet of the patient should be light, without animal food or stimulants. The adminis- tration of some simple laxative will be of service, as well as the free use of alkaline diuretics, such as the bicarbonate or acetate of potash. The medicinal agent most relied on for the relief of pain is colchicum, which manifestly exercises a powerful

action on the disease. This drug (Colchicum autumnale), which is believed to correspond to the hermodactyl of the ancients, has proved of such efficacy in modifying the attacks that, as observed by Dr Garrod, ” we may safely assert that colchicum possesses as specific a control over the gouty inflammation as cinchona barks or their alkaloids over intermittent fever.” It is usually administered in the form of the wine in doses of 10 to 30 drops every four or six hours, or in pill as the acetous extract (gr. |-gr. i.). The effect of colchicum in subduing the pain of gout is generally so prompt and marked that it is un- necessary to have recourse to opiates; but its action requires to be carefully watched by the physician from its well-known nauseating

and depressing consequences, which, should they appear, render the suspension of the drug necessary. Otherwise the remedy may be continued in gradually diminishing doses for some days after the disappearance of the gouty inflammation. Should gout give evidence of its presence in an irregular form by attacking internal organs, besides the medicinal treatment above mentioned, the use of frictions and mustard applications to the joints is indicated with the view of exciting its appearance there. When gout has become chronic, colchicum, although of less service than in acute gout, is yet valuable, particularly when the inflammatory attacks recur. More benefit, however, appears to be derived from potassium iodide, guaiacum, the alkalis potash and lithia, and from the administration of aspirin and sodium salicylate. Salicylate of menthol is an effective local application, painted on and covered with a gutta-percha bandage. Lithia was strongly recommended by Dr Garrod from its solvent action upon the urates. It is usually administered in the form of the carbonate (gr. v., freely diluted).

The treatment and regimen to be employed in the intervals of the gouty attacks are of the highest importance. These bear reference for the most part to the habits and mode of life of the patient. Restriction must be laid upon the amount and quality of the food, and equally, or still more, upon the alcoholic stimulants. ” The instances,” says Sir Thomas Watson, ” are not few of men of good sense, and masters of themselves, who, being warned by one visitation of the gout, have thenceforward resolutely abstained from rich living and from wine and strong drinks of all kinds, and who have been rewarded for their prudence and self-denial by complete immunity from any return of the disease, or upon whom, at any rate, its future assaults have been few and feeble.” The same eminent authority adds: ” I am sure it is worth any young man’s while, who has had the gout, to become a teetotaller.” By those more advanced in life who, from long continued habit, are unable entirely to relinquish the use of stimulants, the strictest possible temperance must be observed. Regular but moderate exercise in the form of walking or riding, in the case of those who lead sedentary lives, is of great advantage, and all over-work, either physical or mental, should be avoided. Fatigues la bete, et reposez la tUe is the maxim of an experienced French doctor (Dr- Debout d’Estrees of Con- trexeville). Unfortunately the complete carrying out of such directions, even by those who feel their importance, is too often rendered difficult or impossible by circumstances of occupation and otherwise, and at most only an approximation can be made. Certain mineral waters and baths (such as those of Vichy, Royat, Contrexeville, &c.) are of undoubted value in cases of gout and

arthritis. The particular place must in each case be determined by the physician, and special caution must be observed in recommending this plan of treatment in persons whose gout is complicated by organic disease of any kind.

Dr Alexander Haig's " uric acid free diet " has found many ad- herents. His view as regards the pathology is that in gouty persons the blood is less alkaline than in normal, and therefore less able to hold in solution uric acid or its salts, which are retained in the joints. Assuming gout to be a poisoning by animal food (meat, fish, eggs), and. by tea, coffee, cocoa and other vegetable alkaloid-containing sub- stances, he recommends an average daily diet excluding these, and containing 24 oz. of breadstuffs (toast, bread, biscuits and puddings) together with 24 oz. of fruit and vegetables (excluding peas, beans, lentils, mushrooms and asparagus) ; 8 oz. of the breadstuffs may be replaced by 2 1 oz. of milk or 2 oz. of cheese, butter and oil being taken as required, so that it is not strictly a vegetarian diet.

Precisely the opposite view as to diet has recently been put forward by Professor A. Robin of the H6pital Beaujon, who says serious mistakes are made in ordering patients to abstain from red meats and take light food, fish, eggs, &c. The common object in view is the diminished output of uric acid. This output is chiefly obtained from food rich in nucleins and in collagenous matters, i.e. young white meats, eggs, &c. Consequently the gouty subject ought to restrict himself to the consumption of red meat, beef and mutton, and leave out of his dietary all white meat and internal organs. He should take little hydrocarbons and sugars, and be moderate in fats. Vegetarian diet he regards as a mistake, likewise milk diet, as they tend to weaken the patient. To prevent the formation of uric acid Robin prescribes quinic acid combined with formine or urotropine.

GOUTHIERE, PIERRE (1740-1806), French metal worker, was born at Troyes and went to Paris at an early age as the pupil of Martin Cour. During his brilliant career he executed a vast quantity of metal work of the utmost variety, the best of which was unsurpassed by any of his rivals in that great art period. It was long believed that he received many commissions for furniture from the court of Louis XVI., and especially from Marie Antoinette, but recent searches suggest that his work for the queen was confined to bronzes. Gouthiere can, however, well bear this loss, nor will his reputation suffer should those critics ultimately be justified who believe that many of the furniture mounts attributed to him were from the hand of Thomire. But if he did not work for the court he unquestionably produced many of the most splendid belongings of the due d'Aumont, the duchesse de Mazarin

and Mme du Barry. Indeed the custom of the beautiful mistress of Louis XV. brought about the financial ruin of the great artist, who accomplished more than any other man for the fame of her chateau of Louveciennes, When the collection of the due d'Aumont was sold by auction in Paris in 1782 so many objects mounted by Gouthiere were bought for Louis XVI. and Marie Antoinette that it is not difficult to perceive the basis of the belief that they were actually made for the court. The due's sale catalogue is, however, in existence, with the names of the purchasers and the prices realized. The auction was almost an apotheosis of Gouthiere. The precious lacquer cabinets, the chandeliers and candelabra, the tables and cabinets in marquetry, the columns and vases in porphyry, jasper and choice marbles, the porcelains of China and Japan were nearly all mounted in bronze by him. More than fifty of these pieces bore Gouthiere's signature. The due d'Aumont's cabinet represented the high-water mark of the chaser's art, and the great prices which were paid for Gouthiere's work at this sale are the most conclusive criterion of the value set upon his achievement in his own day. Thus Marie Antoinette paid 12,000 livres for a red jasper bowl or brule-parfums mounted by him, which was then already famous. Curiously enough it commanded only one-tenth of that price at the Fournier sale in 1831; but in 1865, when the marquis of Hertford bought it at the prince de Beauvais's sale, it fetched 31,900 francs. It is now in the Wallace Collection, which contains the finest and most representative gathering of Gouthiere's undoubted work. The mounts of gilt bronze, cast and elaborately chased, show satyrs' heads, from which hang festoons of vine leaves, while within the feet a serpent is coiled to spring. A smaller cup is one of the treasures of the Louvre. There too is a bronze clock, signed by " Gouthiere, cizileur et doreur du Roy a Paris," dated 1 77 1, with a river god, a water nymph symbolizing the Rhdne and its tributary the Durance, and a female figure typifying the city of Avignon. Not all of Gouthiere's work is of the highest quality, and much of what he executed was from the designs of others. At his best his delicacy, refinement and finish are exceedingly delightful — in his great moments he ranks with the highest alike as artist and as craftsman. The tone of soft dead gold which is found on some of his mounts he is believed to have invented, but indeed the gilding of all his superlative work possesses a remarkable quality. This charm of tone is admirably seen in the bronzes and candelabra which he executed for the chimneypiece of Marie Antoinette's boudoir at Fontaine- bleau. He continued to embellish Louveciennes for Madame du Barry until the Revolution, and then the guillotine came for her and absolute ruin for him. When her property was seized

she owed him 756,000 livres, of which he never received a sol, despite repeated applications to the administrators. ” Riduit a solliciter une place a I’hospice, il mourut dans la misere.” So it was stated in a lawsuit brought by his sons against du Barry’s heirs.

GOUVION SAINT-CYR, LAURENT, Marquis de (1 764-1 830), French marshal, was born at Toul on the 13th of April 1764. At the age of eighteen he went to Rome with the view of pro- secuting the study of painting, but although he continued his artistic studies after his return to Paris in 1784 he never definitely adopted the profession of a painter. In 1792 he was chosen a captain in a volunteer battalion, and served on the staff of General Custine. Promotion rapidly followed, and in the course of two years he had become a general of division. In 1796 he commanded the centre division of Moreau's army in the campaign of the Rhine, and by coolness and sagacity greatly aided him in the celebrated retreat from Bavaria to the Rhine. In 1798 he succeeded Massena in the command of the army of Italy. In the following year he commanded the left wing of Jourdan's army in Germany; but when Jourdan was succeeded by Massena, he joined the army of Moreau in Italy, where he distinguished himself in face of the great difficulties that followed the defeat of Novi. When Moreau, in 1800, was appointed to the command of the army of the Rhine, Gouvion St-Cyr was named his principal lieutenant, and on the 9th of May gained a victory over General Kray at Biberach. He was not, however, on good terms with his commander and retired to France after the first operations of the campaign. In 1801 he was sent to Spain to command the army intended for the invasion of Portugal, and was named grand officer of the Legion of Honour. When a treaty of peace was shortly afterwards concluded with Portugal, he succeeded Lucien Bonaparte as ambassador at Madrid. In 1803 he was appointed to the command of an army corps in Italy, in 1805 he served with distinction under Massena, and in 1806 was engaged in the campaign in southern Italy. He took part in the Prussian and Polish campaigns of 1807, and in 1808, in which year he was made a count, he commanded an army corps in Catalonia; but, not wishing to comply with certain orders he received from Paris (for which see Oman, Peninsular War, vol. iii.), he resigned his command and remained in disgrace till 1811. He was still a general of division, having been excluded from the first list of marshals owing to his action in refusing to influence the troops in favour of the establishment of the Empire. On the opening of the Russian campaign he received command of an army corps, and on the 18th of August 181 2 obtained a victory over the Russians at Polotsk, in recognition of which he was created a marshal of France. He received a severe wound in one of the actions during the general retreats St-Cyr distinguished himself at the battle of Dresden (August 26-27, I 8i3), and in the defence of that place against the Allies after the battle of Leipzig, capitulating only on the nth of November, when Napoleon had retreated to the Rhine. On the

restoration of the Bourbons he was created a peer of France, and in July 1815 was appointed war minister, but resigned his office in the November following. In June 1817 he was appointed minister of marine, and in September following again resumed the duties of war minister, which he continued to discharge till November 1819. During this time he effected many reforms, particularly in respect of measures tending to make the army a national rather than a dynastic force. He exerted himself also to safeguard the rights of the old soldiers of the Empire, organized the general staff and revised the code of military law and the pension regulations. He was made a marquess in 1817. He died at Hyeres (Var) on the 17th of March 1830: Gouvion St-Cyr would doubtless have obtained better opportunities of acquiring distinction had he shown himself more blindly devoted to the interests of Napoleon, but Napoleon paid him the high compliment of referring to his ” military genius,” and entrusted him with independent commands in secondary theatres of war. It is doubtful, however, if he possessed energy commensurate with his skill, and in Napoleon’s modern conception of war, as three parts moral to one technical, there was more need for

the services of a bold leader of troops whose ” doctrine ” — to use the modern phrase — predisposed him to self-sacrificing and vigorous action, than for a savant in the art of war of the type of St-Cyr. Contemporary opinion, as reflected by Marbot, did justice to his ” commanding talents,” but remarked the indolence which was the outward sign of the vague complexity of a mind that had passed beyond the simplicity of mediocrity without attaining the simplicity of genius.

He was the author of the following works, all of the highest value: Journal des operations de Varmee de Catalogue en 1808 et 1809 (Paris, 1821); Memoires sur les campagnes des armies de Rhin et de Rhin-et- Moselle de 1794 a 1797 (Paris, 1829); and Memoires pour servir d, I’histoire militaire sous le Directoire, le Consulat, et I’Empire (1831).

See Gay de Vernon’s Vie de Gouvion Saint-Cyr (1857).

GOVAN, a municipal and police burgh of Lanarkshire, Scotland. It lies on the south bank of the Clyde in actual contact with Glasgow, and in a parish of the same name which includes a large part of the city on both sides of the river. Pop. (1891) 61,589; (1901) 76,532. Govan remained little more than a village till i860, when the growth of shipbuilding and allied trades gave its development an enormous impetus. Among its public build- ings are the municipal chambers,

combination fever hospital, Samaritan hospital and reception houses for the poor. Elder Park (40 acres) presented to the burgh in 1885 contains a statue of John Elder (1824-1869), the pioneer shipbuilder, the husband of the donor. A statue of Sir William Pearce (1833-1888), another well-known Govan shipbuilder, once M.P. for the burgh, stands at Govan Cross. The Govan lunacy board opened in 1896 an asylum near Paisley. Govan is supplied with Glasgow gas and water, and its tramways are leased by the Glasgow corporation; but it has an electric light installation of its own, and performs all other municipal functions quite independently of the city, annexation to which it has always strenuously resisted. Prince's Dock lies within its bounds and the ship- building yards have turned out many famous ironclads and liners. Besides shipbuilding its other industries are match- making, silk-weaving, hair-working, copper-working, tube- making, weaving, and the manufacture of locomotives and electrical apparatus. The town forms the greater part of the Govan division of Lanarkshire, which returns one member to parliament.

GOVERNMENT (O. Fr. governement, mod. gouvernement, O. Fr. governer, mod. gouverner, from Lat. gubernare, to steer a ship, guide, .rule; cf. Gr. Kvffepvdv), in its widest sense, the ruling power in a political society. In every society of men there is a determinate body (whether consisting of one individual or a few or many individuals) whose commands the rest of the community are bound to obey. This sovereign body is what in more popular phrase is termed the government of the country, and the varieties which may exist in its constitution are known as forms of government. For the opposite theory of a community with " tio government," see Anarchism.

How did government come into existence? Various answers to this question have at times been given, which may be dis- tinguished broadly into three classes. The first class would comprehend the legendary accounts which nations have given in primitive times of their own forms of government. These are always attributed to the mind of a single lawgiver. The government of Sparta was the invention of Lycurgus. Solon, Moses, Numa and Alfred in like manner shaped the government of their respective nations. There was no curiosity about the institutions of other nations — about the origin of governments in general; and each nation was perfectly ready to accept the traditional vonoOercu of any other.

The second rnay be called the logical or metaphysical account of the origin of government. It contained no overt reference to any particular form of government, whatever its covert references may have been. It answered the question, how government in general came into

existence; and it answered it by a logical analysis of the elements of society. The phenome- non to be accounted for being government and laws, it abstracted government and laws, and contemplated mankind as existing

Without them. The characteristic feature of this kind of specula- tion is that it reflects how contemporary men would behave if all government were removed, and infers that men must have behaved so before government came into existence. Society without government resolves itself into a number of individuals each following his own aims, and therefore, in the days before government, each man followed his own aims. It is easy to see how this kind of reasoning should lead to very different views of the nature of the supposed original state. With Hobbes, it is a state of war, and government is the result of an agreement among men to keep the peace. With Locke, it is a state of liberty and equality, — it is not a state of war; it is governed by its own law, — the law of nature, which is the same thing as the law of reason. The state of nature is brought to an end by the voluntary agreement of individuals to surrender their natural liberty and submit themselves to one supreme govern- ment. In the words of Locke, ” Men being by nature all free, equal and independent, no one can be put out of this estate and subjected to the political power of another without his own consent. The only way whereby any one divests himself of his natural liberty, and puts on the bonds of civil society, is by agree- ing with other men to join and unite into a community ” {On Civil Government, c. viii.). Locke boldly defends his theory as founded on historical fact, and it is amusing to compare his demonstration of the baselessness of Sir R; Filmer’s speculations with the scanty and doubtful examples which he accepts as the foundation of his own. But in general the various forms of the hypothesis eliminate the question of time altogether. The original contract from which government sprang is likewise the subsisting contract on which civil society continues to be based. The historical weakness of the theory was probably always recognized. Its logical inadequacy was conclusively demon- strated by John Austin. But it still clings to speculations on the principles of government.

The ” social compact ” (see Rousseau) is the most famous of the metaphysical explanations of government. It has had the largest history, the widest influence and the most complete development. To the same class belong the various forms of the theory that

governments exist by divine appointment. Of all that has been written about the divine right of kings, a great deal must be set down to the mere flatteries of courtiers and ecclesiastics. But there remains a genuine belief that men are bound to obey their rulers because their rulers have been appointed by God. Like the social compact, the theory of divine appointment avoided the question of historical fact.

The application of the historical method to the phenomena of society has changed the aspect of the question and robbed it of its political interest. The student of the history of society has no formula to express the law by which government is born. All that he can do is to trace governmental forms through various stages of social development. The more complex and the larger the society, the more distinct is the separation between the governing part and the rest, and the more elaborate is the subdivision of functions in the government. The primitive type of ruler is king, judge, priest and general. At the same time, his way of life differs little from that of his followers and subjects. The metaphysical theories were so far right in imputing greater equality of social conditions to more primitive times. Increase of bulk brings with it a more complex socialorganization. War tends to develop the strength of the governmental organiza- tion; peace relaxes it. All societies of men exhibit the germs of government; but there would appear to be races of men so low that they cannot be said to live together in society at all. Modern investigations have illustrated very fully the importance of the family (q.v.) in primitive societies, and the belief in a common descent has much to do with the social cohesion of a tribe. The government of a tribe resembles the government of a household; the head of the family is the ruler. But we cannot affirm that political government has its origin in family govern- ment, or that there may not have been states of society in which government of some sort existed while the family did not.

I. Forms of Government

Three Standard Forms. — Political writers from the time of Aristotle have been singularly unanimous in their classification of the forms of government. There are three ways in which states may be governed. They may be governed by one man, or by a number of men, small in proportion to the whole number of men in the state, or by a number large in proportion to the whole number of men in the state. The government may be a monarchy, an aristocracy or a democracy. The same terms are used by John Austin as were used by Aristotle, and in very nearly the same sense. The determining quality in governments in both writers, and it may safely be said in all intermediate writers, is the numerical relation between the constituent members of the

government and the population of the state. There were, of course, enormous differences between the state- systems present to the mind of the Greek philosopher and the English jurist. Aristotle was thinking of the small independent states of Greece, Austin of the great peoples of modern Europe. The unit of government in the one case was a city, in the other a nation. This difference is of itself enough to invalidate all generalization founded on the common terminology. But on one point there is a complete parallel between the politics of Aristotle and the politics of Austin. The Greek cities were to the rest of the world very much what European nations and European colonies are to the rest of the world now. They were the only communities in which the governed visibly took some share in the work of government. Outside the European system, as outside the Greek system, we have only the stereotyped uniformity of despotism, whether savage or civilized. The question of forms of government, therefore, belongs character- istically to the European races. The virtues and defects of monarchy, aristocracy and democracy are the virtues and defects manifested by the historical governments of Europe. The generality of the language used by political writers must not blind us to the fact that they are thinking only of a compara- tively small portion of mankind.

Greek Politics. — Aristotle divides governments according to two principles. In all states the governing power seeks either its own advantage or the advantage of the whole state, and the government is bad or good accordingly. In all states the governing power is one man, or a few men or many men. Hence six varieties of government, three of which are bad and three good. Each excellent form has a corresponding depraved form ; thus : —

The good government of one (Monarchy) corresponds to the

depraved form (Tyranny). The good government of few (Aristocracy) corresponds to

the depraved form (Oligarchy). The good government of many (Commonwealth) corresponds

to the depraved form (Democracy). The fault of the depraved forms is that the governors act unjustly where their own interests are concerned. The worst of the depraved forms is tyranny, the next oligarchy and the least bad democracy. 1 Each of the three leading types exhibits a number of varieties. Thus in monarchy we have the heroic, the barbaric, the elective dictatorship, the Lacedemonian (hereditary generalship, arparriyia), and absolute monarchy. So democracy and oligarchy exhibit four corresponding varieties. The

best type of democracy is that of a community mainly agricultural, whose citizens, therefore, have not leisure for political affairs, and allow the law to rule. The best oligarchy is that in which a considerable number of small proprietors have the power; here, too, the laws prevail. The worst democracy consists of a larger citizen class having leisure for politics; and the worst oligarchy is that of a small number of very rich and influential men. In both the sphere of law is reduced to a minimum. A good government is one in which as much as possible is left to the laws, and as little as possible to the will of the governor.

1 Aristotle elsewhere speaks of the error of those who think that any one of the depraved forms is better than any other.

The Politics of Aristotle, from which these principles are taken, presents a striking picture of the variety and activity of political life in the free communities of Greece. The king and council of heroic times had disappeared, and self-government in some form or other was the general rule. It is to be noticed, however, that the governments of Greece were essentially unstable. The political philosophers could lay down the law of development by which one form of government gives birth to another. Aristotle devotes a large portion of his work to the consideration of the causes of revolutions. The dread of tyranny was kept alive by the facility with which an over- powerful and unscrupulous citizen could seize the whole machinery of government. Communities oscillated between some form of oligarchy and some form of democracy. The security of each was constantly imperilled by the conspiracies of the opposing factions. Hence, although political life exhibits that exuberant variety of form and expression which characterizes all the in- tellectual products of Greece, it lacks the quality of persistent progress. Then there was no approximation to a national government, even of the federal type. The varying confederacies and hegemonies are the nearest approach to anything of the kind. What kind of national government would ultimately have arisen if Greece had not been crushed it is needless to conjecture; the true interest of Greek politics lies in the fact that the free citizens were, in the strictest sense of the word, self-governed. Each citizen took his turn at the common business of the state. He spoke his own views in the agora, and from time to time in his own person acted as magistrate or judge. Citizenship in Athens was a liberal education, such as it never can be made under any representative system.

The Government of Rome. — During the whole period of freedom the government of Rome was, in theory at least, municipal self-government. Each citizen had a right to vote laws in his own person in the comitia of the centuries or the tribes. The administrative powers of government were, however, in the hands of a bureaucratic assembly, recruited from the holders of high public office. The senate represented capacity and experience rather than rank and wealth. Without some such instrument the city government of Rome could never have made the conquest of the world. The gradual extension of the citizenship to other Italians changed the character of Roman government. The distant citizens could not come to the voting booths; the device of representation was not discovered; and the comitia fell into the power of the town voters. In the last stage of the Roman republic, the inhabitants of one town wielded the resources of a world-wide empire. We can imagine what would be the effect of leaving to the people of London or Paris the supreme control of the British empire or of France, — irresistible temptation, inevitable corruption. The rabble of the capital learn to live on the rest of the empire. 1 The favour of the effeminate masters of the world is purchased by panem et circenses. That capable officers and victorious armies should long be content to serve such masters was impossible. A conspiracy of generals placed itself at the head of affairs, and the most capable of them made himself sole master. Under Caesar, Augustus and Tiberius, the Roman people became habituated to a new form of govern- ment, which is best described by the name of Caesarism. The outward forms of republican government remained, but one man united in his own person all the leading offices, and used them to give a seemingly legal title to what was essentially military despotism. There is no more interesting constitutional study than the chapters in which Tacitus traces the growth of the new system under the subtle and dissimulating intellect of Tiberius. The new Roman empire was as full of fictions as the English constitution of the present day. The master of the world posed as the humble servant of a menial senate. Depre-

1 None of the free states of Greece ever made extensive or per-manent conquests; but the tribute sometimes paid by one state to another (as by the Aeginetans to the Athenians) was a manifest source of corruption. Compare the remarks of Hume (Essays, part i. 3, That Politics may be reduced to a Science) , ‘ ‘ free governments are the most ruinous and oppressive for their provinces.”

eating the outward symbols of sovereignty, he was satisfied with the modest powers of a consul or a tribunus plebis. The reign of Tiberius, little capable as he was by personal character of captivating the favour

of the multitude, did more for imperialism than was done by his more famous predecessors. Henceforward free government all over the world lay crushed beneath the military despotism of Rome. Caesarism remained true to the character imposed upon it by its origin. The Caesar was an elective not an hereditary king. The real foundation of his power was the army, and the army in course of time openly assumed the right of nominating the sovereign. The character- istic weakness of the Roman empire was the uncertainty of the succession. The nomination of a Caesar in the lifetime of the emperor was an ineffective remedy. Rival emperors were elected by different armies; and nothing less than the force of arms could decide the question between them.

Modern Governments. — Feudalism. — The Roman empire be- queathed to modern Europe the theory of universal dominion. The nationalities which grew up after its fall arranged themselves on the basis of territorial sovereignty. Leaving out of account the free municipalities of the middle ages, the problem of govern- ment had now to be solved, not for small urban communities, but for large territorial nations. The medieval form of govern- ment was feudal. One common type pervaded all the relations of life. The relation of king and lord was like the relation between lord and vassal (see Feudalism). The bond between them was the tenure of land. In England there had been, before the Norman Conquest, an approximation to a feudal system. In the earlier English constitution, the most striking features were the power of the witan, and the common property of the nation in a large portion of the soil. The steady development of the power of the king kept pace with the aggregation of the English tribes under one king. The conception that the land belonged primarily to the people gave way to the conception that everything belonged primarily to the, king. 2 The Norman Conquest imposed on England the already highly developed feudalism of France, and out of this feudalism the free govern- ments of modern Europe have grown. One or two of the leading steps in this process may be indicated here. The first, and perhaps the most important, was the device of representation. For an account of its origin, and for instances of its use in England before its application to politics, we must be content to refer to Stubbs's Constitutional History, vol. ii. The problem of com- bining a large area of sovereignty with some degree of self- government, which had proved fatal to ancient commonwealths, was henceforward solved. From that time some form of repre- sentation has been deemed essential to every constitution professing, however remotely, to be free.

The connexion between representation and the feudal system of

estates must be shortly noticed. The feudal theory gave the king a limited right to military service and to certain aids, both of which were utterly inadequate to meet the expenses of the government, especially in time of war. The king therefore had to get contributions from his people, and he consulted them in their respective orders. The three estates were simply the three natural divisions of the people, and Stubbs has pointed out that, in the occasional treaties between a necessitous king and the order of merchants or lawyers, we have examples of inchoate estates or sub-estates of the realm. The right of repre- sentation was thus in its origin a right to consent to taxation. The pure theory of feudalism had from the beginning been broken by William the Conqueror causing all free-holders to take an oath of direct allegiance to himself. The institution of parliaments, and the association of the king's smaller tenants in capite with other commoners, still further removed the

2 Ultimately, in the theory of English law, the king may be said to have become the universal successor of the people. Some of the peculiarities of the prerogative rights seem to be explainable only on this view, e.g. the curious distinction between wrecks come to land and wrecks still on water. The common right to wreckage was no doubt the origin of the prerogative right to the former. Every ancient common right has come to be a right of the crown or a right held of the crown by a vassal.

government from the purely feudal type in which the mesne lord stands between the inferior vassal and the king.

Parliamentary Government. — The English System. — The right of the commons to share the power of the king and lords in legislation, the exclusive right of the commons to impose taxes, the disappearance of the clergy as a separate order, were all important steps in the movement towards popular government. The extinction of the old feudal nobility in the dynastic wars of the 15th century simplified the question by leaving the crown face to face with parliament. The immediate result was no doubt an increase in the power of the crown, which probably never stood higher than it did in the reigns of Henry VIII. and Elizabeth; but even these powerful monarchs were studious in their regard for parliamentary conventionalities. After a long period of speculative controversy and civil war, the settle- ment of 1688 established limited monarchy as the government of England. Since

that time the external form of government has remained unchanged, and, so far as legal description goes, the constitution of William III. might be taken for the same system as that which still exists. The silent changes have, however, been enormous. The most striking of these, and that which has produced the most salient features of the English system, is the growth of cabinet government. Intimately connected with this is the rise of the two great historical parties of English politics. The normal state of government in England is that the cabinet of the day shall represent that which is, for the time, the stronger of the two. Before the Revolution the king's ministers had begun to act as a united body; but even after the Revolution the union was still feeble and fluctuating, and.each individual minister was bound to the others only by the tie of common service to the king. Under the Hanoverian sovereigns the ministry became consolidated, the position of the cabinet became definite, and its dependence on parliament, and more particularly on the House of Commons, was established. Ministers were chosen exclusively from one house or the other, and they assumed complete responsibility for every act done in the name of the crown. The simplicity of English politics has divided parliament into the representatives of two parties, and the party in opposition has been steadied by the conscious- ness that it, too, has constitutional functions of high importance, because at any moment it may be called to provide a ministry. Criticism is sobered by being made responsible. Along with this movement went the withdrawal of the personal action of the sovereign in politics. No king has attempted to veto a bill since the Scottish Militia Bill was vetoed by Queen Anne. No ministry has been dismissed by the sovereign since 1834. Whatever the power of the sovereign may be, it is unquestionably limited to his personal influence over his ministers. And it must be remembered that since the Reform Act of 1832 ministers have become, in practice, responsible ultimately, not to parlia- ment, but to the House of Commons. Apart, therefore, from democratic changes due to a wider suffrage, we find that the House of Commons, as a body, gradually made itself the centre of the government. Since the area of the constitution has been enlarged, it may be doubted whether the orthodox descriptions of the government any longer apply. The earlier constitutional writers, such as Blackstone and J. L. Delolme, regard it as a wonderful compound of the three standard forms, — monarchy, aristocracy and democracy. Each has its place, and each acts as a check upon the others. Hume, discussing the question " Whether the British government inclines more to absolute monarchy or to a republic," decides in favour of the former alternative. " The tide has run long and with some rapidity to the side of popular government, and is just beginning to turn toward monarchy." And he

gives it as his own opinion that absolute monarchy would be the easiest death, the true euthanasia of the British constitution. These views of the English government in the 18th century may be contrasted with Bagehot's sketch of the modern government as a working instrument. 1

1 See Bagehot's English Constitution; or, for a more recent analysis, Sidney Low's Governance of England.

Leading Features of Parliamentary Government. — The parliamentary government developed by England out of feudal materials has been deliberately accepted as the type of constitu- tional government all over the world. Its leading features are popular representation more or less extensive, a bicameral legislature, and a cabinet or consolidated ministry. In connexion with all of these, numberless questions of the highest practical importance have arisen, the bare enumeration of which would surpass the limits of our space. We shall confine_ ourselves to a few very general considerations.

The Two Chambers. — First, as to the douDle chamber. This, which is perhaps more accidental than any other portion of the British system, has been the most widely imitated. In most European countries, in the British colonies, in the United States Congress, and in the separate states of the Union, 2 there are two houses of legislature. This result has been brought about partly by natural imitation of the accepted type of free government, partly from a conviction that the second chamber will moderate the democratic tendencies of the first. But the elements of the British original cannot be reproduced to order under different conditions. There have, indeed, been a few attempts to imitate the special character of hereditary nobility attaching to the British House of Lords. In some countries, where the feudal tradition is still strong (e.g. Prussia, Austria, Hungary), the hereditary element in the upper chambers has survived as truly representative of actual social and economic relations. But where these social conditions do not obtain (e.g. in France after the Revolution) the attempt to establish an hereditary peerage on the British model has always failed. For the peculiar solidarity between the British nobility and the general mass of the people, the outcome of special conditions and tendencies, is a result beyond the power of constitution- makers to attain. The British system too, after its own way, has for a long period worked without any serious collision between the Houses, — the standing and obvious danger of the bicameral system. The actual ministers of the day must possess the confidence of the House of Commons; they need not — in fact they often do not — possess the confidence of the House of Lords. It is only in legislation that the Lower House really shares its

powers with the Upper; and (apart from any such change in the constitution as was suggested in 1907 by Sir H. Campbell-Bannerman) the constitution possesses, in the unlimited power of nominating peers, a well-understood last resource should the House of Lords persist in refusing important measures demanded by the representatives of the people. In the United Kingdom it is well understood that the real sovereignty lies with the people (the electorate), and the House of Lords recognizes the principle that it must accept a measure when the popular will has been clearly expressed. In all but measures of first-class importance, however, the House of Lords is a real second chamber, and in these there is little danger of a collision between the Houses. There is the widest possible difference between the British and any other second chamber. In the United States the Senate (constituted on the system of equal representation of states) is the more important of the two Houses, and the only one whose control of the executive can be compared to that exercised by the British House of Commons. The real strength of popular government in England lies in the ultimate supremacy of the House of Commons. That supremacy had been acquired, perhaps to its full extent, before the extension of the suffrage made the constituencies democratic. Foreign imitators, it may be observed, have been more ready to accept a wide basis of representation than to confer .real power on the representative body. In all the monarchical countries of Europe, however unrestricted the right of suffrage may be, the real victory of constitutional government has yet to be won. Where the suffrage means little or nothing, there is little or no reason for guarding it against abuse. The independence of the executive in the United States brings that country, from one

2 For an account of the double chamber system in the state legislatures see United States: Constitution and Government, and also S. G. Fisher, The Evolution of the Constitution (Philadelphia, 1897).

point of view, more near to the state system of the continent of Europe than to that of the United Kingdom. The people make a more complete surrender of power to the government (State or Federal) than is done in England.

Cabinet Government. — The peculiar functions of the English cabinet are not easily matched in any foreign system. They are a mystery even to most educated Englishmen. The cabinet (q.v.) is much more than a

body consisting of chiefs of depart- ments. It is the inner council of the empire, the arbiter of national policy, foreign or domestic, the sovereign in commission. The whole power of the House of Commons is concentrated in its hands. At the same time, it has no place whatever in the legal constitution. Its numbers and its constitution are not fixed even by any rule of practice. It keeps no record of its proceedings. The relations of an individual minister to the cabinet, and of the cabinet to its head and creator, the premier, are things known only to the initiated. With the doubtful exception of France, no other system of government presents us with anything like its equivalent. In the United States, as in the European monarchies, we have a council of ministers surrounding the chief of the state.

Change of Power in the English System. — One of the most difficult problems of government is how to provide for the devolution of political power, and perhaps no other question is so generally and justly applied as the test of a working con- stitution. If the transmission works smoothly, the constitution, whatever may be its other defects, may at least be pronounced stable. It would be tedious to enumerate all the contrivances which this problem has suggested to political societies. Here, as usual, oriental despotism stands at the bottom of the scale. When sovereign power is imputed to one family, and the law of succession fails to designate exclusively the individual entitled to succeed, assassination becomes almost a necessary measure of precaution. The prince whom chance or intrigue has pro- moted to the throne of a father or an uncle must make himself safe from his relatives and competitors. Hence the scenes which shock the European conscience when ” Amurath an Amurath succeeds.” The strong monarchical governments of Europe have been saved from this evil by an indisputable law of succession, which marks out from his infancy the next successor to the throne. The king names his ministers, and the law names the king. In popular or constitutional governments far more elaborate precautions are required. It is one of the real merits of the English constitution that it has solved this problem — in a roundabout way perhaps, after its fashion — but with per- fect success. The ostensible seat of power is the throne, and down to a time not long distant the demise of the crown suspended all the other powers of the state. In point of fact, however, the real change of power occurs on a change of ministry. The con- stitutional-practice of the 19th century settled, beyond the reach of controversy, the occasions on which a ministry is bound to retire. It must resign or dissolve when it is defeated 1 in the House of Commons, and if after a dissolution it is beaten again, it must resign without alternative. It may resign if it thinks its majority in the House of Commons not

sufficiently large. The dormant functions of the crown now come into existence. It receives back political power from the old ministry in order to transmit it to the new. When the new ministry is to be formed, and how it is to be formed, is also clearly settled by established practice. The outgoing premier names his successor by recom- mending the king to consult him; and that successor must be the recognized leader of his successful rivals. All this is a matter of .custom, not of law; and it is doubtful if any two authorities could agree in describing the custom in language of precision. In theory the monarch may send for any one he pleases, and charge him with the formation of a government; but the ability to form a government restricts this liberty to the recognized head of a party, subject to there being such an individual. It is certain that the intervention of the crown

1 A government ” defeat ” may, of course, not really represent a hostile vote in exceptional cases, and in some instances a government has obtained a reversal of the vote and has not resigned.

facilitates the transfer of power from one party to another, by giving it the appearance of a mere change of servants. The real disturbance is that caused by the appeal to the electors. A general election is always a struggle between the great political parties for the possession of the powers of government. It may be noted that modern practice goes far to establish the rule that a ministry beaten at the hustings should resign at once without waiting for a formal defeat in the House of Commons.

The English custom makes the ministry dependent on the will of the House of Commons; and, on the other hand, the House of Commons itself is dependent on the will of the ministry. In the last result both depend on the will of the constituencies, as expressed at the general election. There is no fixity in either direction in the tenure of a ministry. It may be challenged at any moment, and it lasts until it is challenged and beaten. And that there should be a ministry and a House of Commons in harmony with each other but out of harmony with the people is rendered all but impossible by the law and the practice as to the duration of parliaments.

Change of Power in the United States. — The United States offers a very different solution of the problem. The American president is at once king and prime minister; and there is no titular superior to act as a conduit-pipe between him and his successor. His crown is rigidly fixed; he can be removed only by the difficult method of impeachment. No hostile vote on matters of legislation can affect his

position. But the end of his term is known from the first day of his government; and almost before he begins to reign the political forces of the country are shaping out a new struggle for the succession. Further, a change of government in America means a considerable change in the administrative staff (see Civil Service). The com- motion caused by a presidential election in the United States is thus infinitely greater and more prolonged than that caused by a general election in England. A change of power in England affects comparatively few personal interests, and absorbs the attention of the country for a comparatively short space of time. In the United States it is long foreseen and elaborately prepared for, and when it comes it involves the personal fortunes of large numbers of citizens. And yet the British constitution is more democratic than the American, in the sense that the popular will can more speedily be brought to bear upon the government. Change of Power in France. — The established practice of England and America may be compared with the constitutional- ism of France. Here the problem presents different conditions. The head of the state is neither a premier of the English, nor a president of the American type. He is served by a prime minister and a cabinet, who, like an English ministry, hold office on the condition of parliamentary confidence; but he holds office himself on the same terms, and is, in fact, a minister like the others. So far as the transmission of power from cabinet to cabinet is concerned, he discharges the functions of an English king. But the transmission of power between himself and his successor is protected by no constitutional devices whatever, and experience would seem to show that no such devices are really necessary. Other European countries professing con- stitutional government appear to follow the English practice. The Swiss republic is so peculiarly situated that it is hardly fair to compare it with any other. But it is interesting to note that, while the rulers of the states are elected annually, the same persons are generally re-elected.

The Relation between Government and Laws. — It might be supposed that, if any general proposition could be established about government, it would be one establishing some constant relation between the form of a government and the character of the laws which it enforces. The technical language of the English school of jurists is certainly of a kind to encourage such a supposition. The entire body of law in force in a country at any moment is regarded as existing solely by the fiat of the governing power. There is no maxim more entirely in the spirit of this jurisprudence than the following: — ” The real legislator is not he by whom the law was first ordained, but he by whose will it continues to be law.” The whole of the vast repertory

of rules which make up the law of England — the rules of practice in the courts, the local customs of a county or a manor, the principles formulated by the sagacity of generations of judges, equally with the statutes for the year, are conceived of by the school of Austin as created by the will of the sovereign and the two Houses of Parliament, or so much of them as would now satisfy the definition of sovereignty. It would be out of place to examine here the difficulties which embarrass this definition, but the statement we have made carries on its face a demonstra- tion of its own falsity in fact. There is probably no government in the world of which it could be said that it might change at will the substantive laws of the country and still remain a government. However well it may suit the purposes of analytical jurisprudence to define a law as a command set by sovereign to subject, we must not forget that this is only a definition, and that the assumption it rests upon is, to the student of society, any- thing but a universal fact. From his point of view the cause of a particular law is not one but many, and of the many the deliber- ate will of a legislator may not be one. Sir Henry Maine has illustrated this point by the case of the great tax-gathering empires of the east, in which the absolute master of millions of men never dreams of making anything in the nature of a law at all. This view is no doubt as strange to the English statesman as to the English jurist. The most conspicuous work of govern- ment in his view is that of parliamentary legislation. For a large portion of the year the attention of the whole people is bent on the operations of a body of men who are constantly engaged in making new laws. It is natural, therefore, to think of law as a factitious thing, made and unmade by the people who happen for the time being to constitute parliament. It is forgotten how small a proportion the laws actually devised by parliament are of the law actually prevailing in the land. No European country has undergone so many changes in the form of government as France. It is surprising how little effect these political revolutions have had on the body of French law. The change from empire to republic is not marked by greater legislative effects than the change from a Conservative to a Liberal ministry in England would be.

These reflections should make us cautious in accepting any general proposition about forms of government and the spirit of their laws. We must remember, also, that the classification of governments according to the numerical proportion between governors and governed supplies but a small basis for generaliza- tion. What parallel

can be drawn between a small town, in which half the population are slaves, and every freeman has a direct voice in the government, and a great modern state, in which there is not a single slave, while freemen exercise their sovereign powers at long intervals, and through the action of delegates and representatives ? Propositions as vague as those of Montes- quieu may indeed be asserted with more or less plausibility. But to take any leading head of positive law, and to say that monarchies treat it in one way, aristocracies and democracies in another, is a different matter.

II. Sphere or Government

The action of the state, or sovereign power, or government in a civilized community shapes itself into the threefold functions of legislation, judicature and administration. The two first are perfectly well-defined, and the last includes all the kinds of state action not included in the other two. It is with reference to legislation and administration that the line of permissible state-action requires to be drawn. There is no doubt about the province of the judicature, and that function of government may therefore be dismissed with a very few observations.

The complete separation of the three functions marks a high point of social organization. In simple societies the same officers discharge all the duties which we divide between the legislator, the administrator and the judge. The acts them- selves are not consciously recognized as being of different kinds. The evolution of all the parts of a highly complex government from one original is illustrated in a striking way by the history of English institutions. All the conspicuous parts of the modern

government, however little they may resemble each other now, can be followed back without a break to their common origin. Parliament, the cabinet, the privy council, the courts of law, all carry us back to the same nidus in the council of the feudal king.

Judicature. — The business of judicature, requiring as it does the possession of a high degree of technical skill and knowledge, is generally entrusted by the sovereign body or people to a separate and independent class of functionaries. In England the appellate jurisdiction of the House of Lords still maintains in theory the connexion between the supreme legislative and the supreme judicial functions. In some states of the American Union certain judicial functions of the upper house were for a time main- tained after the example of the English constitution as it existed when the states were

founded. In England there is also still a considerable amount of judicial work in which the people takes its share. The inferior magistracies, except in populous places, are in the hands of private persons. And by the jury system the ascertainment of fact has been committed in very large measure to persons selected indiscriminately from the mass of the people, subject to a small property qualification. But the higher functions of the judicature are exercised by persons whom the law has jealously fenced off from external interference and control. The independence of the bench distinguishes the English system from every other. It was established in principle as a barrier against monarchical power, and hence has become one of the traditional ensigns of popular government. In many of the American states the spirit of democracy has demanded the subjection of the judiciary to popular control. The judges are elected directly by the people, and hold office for a short term, instead of being appointed, as in England, by the respons- ible executive, and removable only by a vote of the two Houses. At the same time the constitution of the United States has assigned to the supreme court of the Union a perfectly unique position. The supreme court is the guardian of the constitution (as are the state courts of the constitution of the states: see United States). It has to judge whether a measure passed by the legislative powers is not Void by reason of being uncon- stitutional, and it may therefore have to veto the deliberate resolutions of both Houses of Congress and the president. It is admitted that this singular experiment in government has been completely justified by its success.

Limits of State Interference in Legislation and Administration. — The question of the limits of state action does not arise with reference to the judiciary. The enforcement of the laws is a duty which the sovereign power must of absolute necessity take upon itself. But to what conduct of the citizens the laws shall extend is the most perplexing of all political questions. The correlative question with regard to the executive would be what works of public convenience should the state undertake through its own servants. The whole question of the sphere of government may be stated in these two questions: What should the state do for its citizens ? and How far should the state interfere with the action of its citizens ? These questions are the direct outcome of modern popular government; they are equally unknown to the small democracies of ancient times and to despotic governments at all times. Accordingly ancient political philosophy, rich as it is in all kinds of suggestions, has very little to say that has any bearing on the sphere of government. The conception that the power of the state can be and ought to be limited belongs to the times of ” government by discussion,” to use Bagehot’s expression,

— to the time when the sovereign number is divided by class interests, and when the action of the majority has to be carried out in the face of strong minorities, capable of making themselves heard. Aristotle does indeed dwell on one aspect of the question. He would limit the action of the government in the sense of leaving as little as possible to the personal will of the governors, whether one or many. His maxim is that the law should reign. But that the sphere of law itself should be restricted, otherwise than by general principles of morality, is a consideration wholly foreign I to ancient philosophy, The state is conceived as acting like

a just man, and justice in the state is the same thing as justice in the individual. The Greek institutions which the philosophers are unanimous in commending are precisely those which the most state-ridden nations of modern times would agree in repudiating. The exhaustive discussion of all political measures, which for over two centuries has been a fixed habit of English public life, has of itself established the principle that there are assignable limits to the action of the state. Not that the limits ever have been assigned in terms, but popular sentiment has more or less vaguely fenced off departments of conduct as sacred from the interference of the law. Phrases like ” the liberty of the subject,” the ” sanctity of private property,” an Englishman’s house is his castle,” ” the rights of conscience,” are the common- places of political discussion, and tell the state, ” Thus far shalt thou go and no further.”

The two contrasting policies are those of laissez-faire (let alone) and Protection, or individualism and state-socialism, the one a policy of non-interference with the free play of social forces, the other of their regulation for the benefit of the com- munity. The laissez-faire theory was prominently upheld by John Stuart Mill, whose essay on Liberty, together with the concluding chapters of his treatise on Political Economy, gives a tolerably complete view of the principles of government. There is a general presumption against the interference of govern- ment, which is only to be overcome by very strong evidence of necessity. Governmental action is generally less effective than voluntary action. The necessary duties of government are so burdensome, that to increase them destroys its efficiency. Its powers are already so great that individual freedom is constantly in danger. As a general rule, nothing which can be done by the voluntary agency of individuals should be left to the state. Each man is the best judge of

his own interests. But, on the other hand, when the thing itself is admitted to be useful or necessary, and it cannot be effected by voluntary agency, or when it is of such a nature that the consumer cannot be considered capable of judging of the quality supplied, then Mill would allow the state to interpose. Thus the education of children , and even of adults, would fairly come within the province of the state. Mill even goes so far as to admit that, where a restriction of the hours of labour, or the establishment of a periodical holiday, is proved to be beneficial to labourers as a class, but cannot be carried out voluntarily on account of the refusal of individuals to co-operate, government may justifi- ably compel them to co-operate. Still further, Mill would desire to see some control exercised by the government over the opera- tions of those voluntary associations which, consisting of large numbers of shareholders, necessarily leave their affairs in the hands of one or a few persons. In short, Mill's general rule against state action admits of many important exceptions, founded on no principle less vague than that of public expediency. The essay on Liberty is mainly concerned with freedom of individual character,and its arguments apply to control exercised, not only by the state, but by society in the form of public opinion. The leading principle is that of Humboldt, " the absolute and essential importance of human development in its richest diversity." Humboldt broadly excluded education, religion and morals from the action, direct and indirect, of the state. Mill, as we have seen, conceives education to be within the pro- vince of the state, but he would confine its action to compelling parents to educate their children.

The most thoroughgoing opponent of state action, however, is Herbert Spencer. In his Social Statics, published in 1850, he holds it to be the essential duty of government to protect — to maintain men's rights to life, to personal liberty and Jo property; and the theory that the government ought to under- take other offices besides that of protector he regards as an untenable theory. 'Each man has a right to the fullest exercise of all his faculties, compatible with the same right in others. This is the fundamental law of equal freedom, which it is the duty and the only duty of the state to enforce. If the state goes beyond this duty, it becomes, not a protector, but an aggressor. Thus all state regulations of commerce, all religious

establishments, all government relief of the poor, all state systems of education and of sanitary superintendence, even the state currency and the post-office, stand condemned, not only as ineffective for their respective purposes, but as involving violations of man's natural liberty.

The tendency of modern legislation is more a question of political practice than of political theory. In some cases state interference has been abolished or greatly limited. These cases are mainly two — in matters of opinion (especially religious opinion), and in matters of contract.

The mere enumeration of the individual instances would occupy a formidable amount of space. The reader is referred to such articles as England, Church of; Establishment; Marriage; Oath; Roman Catholic Church, &c, and Company; Contract; Partnership, &c. In other cases the state has interfered for the protection and assistance of definite classes of persons. For example, the education and protection of children (see Children, Law Re- lating to; Education; Technical Education); the regulation of factory labour and dangerous employment (see Labour Legisla- tion); improved conditions of health (see Adulteration; Hous- ing; Public Health, Law of, &c); coercion for moral purposes (see Bet and Betting; Criminal Law; Gaming and Wagering; Liquor Laws; Lotteries, &c). Under numerous other headings in this work the evolution of existing forms of government is dis- cussed ; see also the bibliographical note to the article Constitution and Constitutional Law.

GOVERNOR (from the Fr. gouverneur, from gouverner, O. Fr. governer, Lat. gubernare, to steer a ship, to direct, guide), in general, one who governs or exercises authority; specifically, an official appointed to govern a district, province, town, &c. In British colonies or dependencies the representative of the crown is termed a governor. Colonial governors are classed as governors-general, governors and lieutenant-governors, according to the status of the colony or group of colonies over which they preside. Their powers vary according to the position which they occupy. In all cases they represent the authority of the crown. In the United States (q.v.) the official at the head of every state government is called a governor.

GOW, NIEL (1727-1807), Scottish musician of humble parent- age, famous as a violinist and player of reels, but more so for the part he played in preserving the old melodies of Scotland. His compositions, and those of his four sons, Nathaniel, the most famous (1763-1831), William (1751-1791), Andrew (1760- 1803), and John (1764-1826), formed the ” Gow Collection,” comprising various volumes edited by Niel and his sons, a valuable repository of Scottish traditional airs. The most im- portant of Niel’s sons was Nathaniel, who is remembered as the author of the well-known ” Caller Herrin,” taken from the fishwives’ cry, a tune to which words were afterwards written byLadyNairne. Nathaniel’s son, Niel Gow junior (1795-1823), was the

author of the famous songs ” Flora Macdonald’sLament ” and ” Cam’ ye by Athol.”

GOWER, JOHN (d. 1408), English poet, died at an advanced age in 1408, so that he may be presumed to have been born about 1330. He belonged to a good Kentish family, but the suggestion of Sir Harris Nicolas that the poet is to be identified with a John Gower who was at one time possessed of the manor of Kentwell is open to serious objections. There is no evidence that he ever lived as a country gentleman, but he was undoubtedly possessed of some wealth, and we know that he was the owner of the manors of Feltwell in Suffolk and Moulton in Norfolk. In a document of 1382 he is called an ” Esquier de Kent,” and he was certainly not in holy orders. That he was acquainted with Chaucer we know, first because Chaucer in leaving England for Italy in 1378 appointed Gower and another to represent him in his absence, secondly because Chaucer addressed his Troilus and Criseide to Gower and Strode (whom he addresses as ” moral Gower ” and ” philosophical Strode “) for criticism and correction, and thirdly because of the lines in the first edition of Gower’s Confessio amantis, ” And gret wel Chaucer whan ye mete,” &c. There is no sufficient ground for the suggestion, based partly on the subsequent omission of these lines and partly on the humorous reference of Chaucer to Gower’s Confessio amantis in the introduction to the Man of Law’s Tale, that the friendship was broken by a quarrel, j From his Latin poem

Vox clamantis we know that he was deeply and painfully interested in the peasants’ rising of 1381; and by the alterations which the author made in successive revisions of this work we can trace a gradually increasing sense of disappointment in the youthful king, whom he at first acquits of all responsibility for the state of the kingdom on account of his tender age. That he became personally known to the king we learn from his own statement in the first edition of the Confessio amantis, where he says that he met the king upon the river, was invited to enter the royal barge, and in the conversation which followed received the suggestion which led him to write his principal English poem. At the same time we know, especially from the later revisions of the Confessio amantis, that he was a great admirer of the king’s brilliant cousin, Henry of Lancaster, afterwards Henry IV., whom he came eventually to regard as a possible saviour of society from the misgovernment of Richard II. We have a. record that in 1393

he received a collar from his favourite political hero, and it is to be observed that the effigy upon Gower's tomb is wearing a collar of SS. with the swan badge which was used by Henry.

The first edition of the Confessio amantis is dated 1390, and this contains, at least in some copies, a secondary dedication to the then earl of Derby. The later form, in which Henry became the sole object of the dedication, is of the year 1393. Gower's political opinions are still more strongly expressed in the Cronica tripartita.

In 1398 he was married to Agnes Groundolf, and from the special licence granted by the bishop of Winchester for the celebration of this marriage in John Gower's private oratory we gather that he was then living in lodgings assigned to him within the priory of St Mary Overy, and perhaps also that he was too infirm to be married in the parish church. It is probable that this was not his first marriage, for there are indications in his early French poem that he had a wife at the time when that was written. His will is dated the 15th of August 1408, and his death took place very soon after this. He had been blind for some years before his death. A magnificent tomb with a recumbent effigy was erected over his grave in the chapel of St John the Baptist within the church of the priory, now St Saviour's, Southwark, and this is still to be seen, though not quite in its original state or place. From the inscription on the tomb, as well as from other indications, it appears that he was a considerable benefactor of the priory and contributed largely to the rebuilding of the church.

The effigy on Gower's tomb rests its head upon a pile of three folio volumes entitled Speculum meditantis, Vox clamantis and Confessio amantis. These are his three principal works. The first of these was long supposed to have perished, but a copy of it was discovered in the year 189 s under the title Mir our de I'omme. It is a French poem of about 30,000 lines in twelve- line stanzas, and under the form of an allegory of the human soul describes the seven deadly sins and their opposing virtues, and then the various estates of man and the vices incident to each, concluding with a narrative of the life of the Virgin Mary, and with praise of her as the means of reconciliation between God and man. The work is extremely tedious for the most part, but shows considerable command over the language and a great facility in metrical expression.

Gower's next work was the Vox clamantis in Latin elegiac verse, in which the author takes occasion from the peasants' insurrection of 1381 to deal again with the faults of the various classes of society. In the earlier portion the insurrection itself is described in a rather vivid

manner, though under the form of an allegory: the remainder contains much the same material as we have already seen in that part of the French poem where the classes of society are described. Gower's Latin verse is very fair, as judged by the medieval standard, but in this book he has borrowed very freely from Ovid, Alexander Neckam, Peter de Riga and others.

Gower's chief claim, however, to reputation as a poet rests upon his English work, the Confessio amantis, in which he displays in his native language a real gift as a story-teller. He

is himself the lover of his poem, in spite of his advancing years, and he makes his confession to Genius, the priest of Venus, under the usual headings supplied by the seven deadly sins. These with their several branches are successively described, and the nature of them illustrated by tales, which are directed to the illustration both of the general nature of the sin, and of the particular form which it may take in a lover. Finally he receives at once his absolution, and his dismissal from the service of Venus, for which his age renders him unfit. The idea is ingenious, and there is often much quaintness of fancy in the application of moral ideas to the relations of the lover and his mistress. The tales are drawn from very various sources and are often extremely well told. The metre is the short couplet, and it is extremely smooth and regular. The great fault of the Confessio amantis is the extent of its digressions, especially in the fifth and seventh books.

Gower also wrote in 1397 a short series of French ballades on the virtue of the married state {TraitU pour essampler les amantz maries) , and after the accession of Henry IV. he produced the Cronica tripartita, a partisan account in Latin leonine hexameters of the events of the last twelve years of the reign of Richard II. About the same time he addressed an English poem in seven-line stanzas to Henry IV. {In Praise of Peace), and dedicated to the king a series of French ballades (Cinkante Balades), which deal with the conventional topics of love, but are often graceful and even poetical in expression. Several occasional Latin pieces also belong to the later years of his life.

On the whole Gower must be admitted to have had consider- able literary powers; and though not a man of genius, and by no means to be compared with Chaucer, yet he did good service in helping to establish the standard literary language, which at the end of the 14th century took the place of the Middle English dialects. The Confessio amantis was long regarded as a classic of the language, and Gower and Chaucer were often mentioned side by side as the fathers of English poetry.

A complete edition of Gower's works in four volumes, edited by G. C. Macaulay, was published in 1899-1902, the first volume con- taining the French works, the second and third the English, and the fourth the Latin, with a biography. Before this the Confessio amantis had been published in the following editions : Caxton (1483) ; Berthelette (1532 and 1554); Chalmers, British Poets (1810); Rein- hold Pauli (1857); H. Morley (1889, incomplete). The two series of French ballades and the Praise of Peace were printed for the Roxburghe Club in 1818, and the Vox clamantis and Cronica tripartita were edited by H. O. Coxe for the Roxburghe Club in 1850. The Cronica tripartita, the Praise of Peace and some of the minor Latin poems were printed in Wright's Political Poems (Rolls series, 14). The Praise of Peace appeared in the early folio editions of Chaucer, and has been edited also by Dr Skeat in his Chaucerian and other Pieces. Reference may be made to Todd's Illustrations of the Lives and Writings of Gower and Chaucer; the article (by Sir H. Nicolas) in the Retrospective Review for 1828; Observations on the Language of Chaucer and Gower, by F. J. Child ; H. Morley's English Writers, iv. ; Ten Brink's History of Early English Literature, ii. ; and Courthope's History of English Poetry, i. (G. C. M.)
'

GOWER, a seigniory and district in the county of Glamorgan, lying between the rivers Tawe and Loughor and between Breconshire and the sea, its length from the Breconshire border to Worm's Head being 28 m., and its breadth about 8 m. It corresponds to the ancient commote of Gower (in Welsh Gwyr) which in early Welsh times was grouped with two other commotes stretching westwards to the Towy and so formed part of the principality of Ystrad Tywi. Its early association with the country to the west instead of with Glamorgan is perpetuated by its continued inclusion in the diocese of St Davids, its two rural deaneries, West and East Gower, being in the archdeaconry of Carmarthen. What is meant by Gower in modern popular usage, however, is only the peninsular part or "English Gower " (that is the Welsh Bro-wyr, as distinct from Gwyr proper), roughly corresponding to the hundred of Swansea and lying mainiy to the south of a line drawn from Swansea to Loughor.

The numerous limestone caves of the coast are noted for their immense deposits of animal remains, but their traces of man are far scantier, those found in Bacon Hole and in Paviland cave

being the most important. In the Roman period the river Tawe, or the great morass between it and the Neath, probably formed the boundary between the Silures and the Goidelic population to the west. The latter, reinforced perhaps from Ireland, continued to be the dominant race in Gower till their conquest or partial expulsion in the 4th century by the sons of Cunedda who introduced a Brythonic element into the district. Centuries later Scandinavian rovers raided the coasts, leaving traces of their more or less temporary occupation in such place-names as Burry Holms, Worms Head and Swansea, and probably also in some cliff earthworks. About the year 1100 the conquest of Gower was undertaken by Henry de Newburgh, first earl of Warwick, with the assistance of Maurice de Londres and others. His followers, who were mostly Englishmen from the marches and Somersetshire with perhaps a sprinkling of Flemings, settled for the most part on the southern side of the peninsula, leaving the Welsh inhabitants of the northern half of Gower practically undisturbed. These invaders were probably reinforced a little later by a small detachment of the larger colony of Flemings which settled in south Pembrokeshire. Moated mounds, which in some cases developed into castles, were built for the protection of the various manors into which the district was parcelled out, the castles of Swansea and Loughor being ascribed to the earl of Warwick and that of Oystermouth to Maurice de Londres. These were repeatedly attacked and burnt by the Welsh during the 1 2th and 13th centuries, notably by Griffith ap Rhys in 1 1 13, by his son the Lord Rhys in 1180, by his grandsons acting in concert with Llewelyn the Great in 1215, and by the last Prince Llewelyn in 1257. With the Norman conquest the feudal system was introduced, and the manors were held in capite of the lord by the tenure of castle-guard of the castle of Swansea, the caput baroniae.

About 1 1 89 the lordship passed from the Warwick family to the crown and was granted in 1203 by King John to William de Braose, in whose family it remained for over 120 years except for three short intervals when it was held for a second time by King John (1211-1215), by Llewelyn the Great (1216-1223), and the Despensers (c. 1323-1326). In 1208 the Welsh and English inhabitants who had frequent cause to complain of their treatment, received each a charter, in similar terms, from King John, who also visited the town of Swansea in 1210 and in 1 21 5 granted its merchants liberal privileges. In 1283 a number of de Braose's tenants — unquestionably Welshmen — left Gower for the royal lordship of Carmarthen, declaring that they would live under the king rather than under a lord marcher. In the following year the king visited de Braose at Oystermouth Castle, which seems to have been made the lord's chief

residence, after the destruction of Swansea Castle by Llewelyn. Later on the king's officers of the newly organized county of Carmarthen repeatedly claimed jurisdiction over Gower, thereby endeavour- ing to reduce its status from that of a lordship marcher with semi-regal jurisdiction, into that of an ordinary constituent of the new county. De Braose resisted the claim and organized the English part of his lordship on the lines of a county palatine, with its own comitates and chancery held in Swansea Castle, the sheriff and chancellor being appointed by himself. The inhabitants, who bad no right of appeal to the crown against their lord or the decisions of his court, petitioned the king, who in 1305 appointed a special commission to enquire into their alleged grievances, but in the following year the de Braose of the time, probably in alarm, conceded liberal privileges both to the' burgesses of Swansea and to the English and Welsh inhabitants of his " county " of English Gower. He was the last lord seignior to live within the seigniory, which passed from him to his son-in-law John de Mowbray. Other troubles befelf the de Braose barons and their successors in title, for their right to the lordship was contested by the Beauchamps, representa- tives of the earlier earls of Warwick, in prolonged litigation carried on intermittently from 1278 to 1396, the Beaucnamps being actually in possession from 1354, when a decision was given in their favour, till its reversal in 1396. It then reverted to the Mowbrays and was held by them until the 4th duke of

Norfolk exchanged it in 1489, for lands in England, with William Herbert, earl of Pembroke. The latter's granddaughter brought it to her husband Charles Somerset, who in 1506 was granted her father's subtitle of Baron Herbert of Chepstow, Raglan and Gower, and from him the lordship has descended to the present lord, the duke of Beaufort.

Gower was made subject to the ordinary law of England by its inclusion in 1535 in the county of Glamorgan as then re- organized; its chancery, which from about the beginning of the 14th century had been located at Oystermouth Castle, came to an end, but though the Welsh acts of 1535 and 1542 purported to abolish the rights and privileges of the lords marchers as conquerors, yet some of these, possibly from being regarded as private rights, have survived into modern times. For instance, the seignior maintained a franchise gaol in Swansea Castle till 1858, when it was abolished by act of parliament, the appoint- ment of coroner for Gower is still vested in him, all writs are executed by the lord's officers instead of by the officers of the sheriff for the county, and the lord's rights to the foreshore, treasure trove, felon's goods and wrecks are undiminished.

The characteristically English part of Gower lies to the south and south-west of its central ridge of Cefn y Bryn. It was this part that was declared by Professor Freeman to be ” more Teu- tonic than Kent itself.” The seaside fringe lying between this area and the town of Swansea, as well as the extreme north-west of the peninsula, also became anglicized at a comparatively early date, though the place-names and the names of the in- habitants are still mainly Welsh. The present line of demarca- tion between the two languages is one drawn from Swansea in a W.N.W. direction to Llanrhidian on the north coast. It has remained practically the same for several centuries, and is likely to continue so, as it very nearly coincides with the southern outcrop of the coal measures, .the industrial population to the north being Welsh-speaking, the agriculturists to the south being English. In 1901 the Gower rural district (which includes the Welsh-speaking industrial parish of Llanrhidian, with about three-sevenths of the total population) had 64-5 % of the popula- tion above three years of age that spoke English only, 5-2% that spoke Welsh only, the remainder being bilinguals, as com- pared with 17% speaking English only, 17-7 speaking Welsh only and the rest bilinguals in the Swansea rural district, and 7% speaking English only, 55-2 speaking Welsh only and the rest bilinguals in the Pontardawe rural district, the last two districts constituting Welsh Gower.

More than one-fourth of the whole area of Gower is unenclosed common land, of which in English Gower fully one-half is apparently capable of cultivation. Besides the demesne manors of the lord seignior, six in number, there are some twelve mesne manors and fees belonging to the Penrice estate, and nearly twenty more belonging to various other owners. The tenure is customary freehold, though in some cases described as copyhold, and in the ecclesiastical manor of Bishopston, descent is by borough English. The holdings are on the whole probably smaller in size than in any other area of corresponding extent in Wales, and agriculture is still in a backward state.

In the Arthurian romances Gower appears in the form of Goire as the island home of the dead, a view which probably sprang up among the Celts of Cornwall, to whom the peninsula would appear as an island. It is also surmised by Sir John Rhys that Malory’s Brandegore (i.e. Bran of Gower) represents the Celtic god of the other world (Rhys, Arthurian Legend, 160, 3 29 et seq.) . On Cefn Bryn, almost in the centre of the peninsula, is a cromlech with a large capstone known as Arthur’s Stone. The unusually large number of cairns on this hill, given as eighty by Sir Gardner Wilkinson, suggests that this part of Gower was a favourite burial-place in early British times.

See Rev. J. D. Davies, A History of West Gower (4 vols., 1877- 1894); Col. W. Ll-Morgan, An Antiquarian Survey of Bast Gower (1899); an article (probably by Professor Freeman) entitled ” Anglia Trans-Walliana ” in the Saturday Review for May 20, 1876; “The Signory of Gower” by G. T. Clark in Archaeologia Cambrensis for 1 893-1894; The Surveys of Gower and KUvey, ed. by Baker and Grant-Francis (1 861-1870). (D. Ll. T.)

80WM, properly the term for a loose outer garment formerly worn by either sex but now generally for that worn by women. While ” dress ” is the usual English word, except in such com- binations as ” tea-gown,” ” dressing-gown ” and the like, where the original loose flowing nature of the ” gown ” is referred to, ” gown ” is the common American word. ” Gown ” comes from the O. Fr. goune or gonne. The word appears in various Romanic languages, cf. Ital. gonna. The medieval Lat. gunna is used of a garment of skin or fur. A Celtic origin has been usually adopted, but the Irish, Gaelic and Manx words are taken from the English. Outside the ordinary use of the word, ” gown ” is the name for the distinctive robes worn by holders of particular offices or by members of particular professions or of universities, &c. (see Robes).

GOWRIE, JOHN RUTHVEN, 3RD Earl of (c. 1577-1600), Scottish conspirator, was the second son of William, 4th Lord Ruthven and 1st earl of Gowrie (cr. 1581), by his wife Dorothea, daughter of Henry Stewart, 2nd Lord Methven. The Ruthven family was of ancient Scottish descent, and had owned extensive estates in the time of William the Lion; the Ruthven peerage dated from the year 1488. The 1st earl of Gowrie (? 1541-1584), and his father, Patrick, 3rd Lord Ruthven (c. 1520-1566), had both been concerned in the murder of Rizzio in 1 566 ; and both took an active part on the side of the Kirk in the constant intrigues and factions among the Scottish nobility of the period. The former had been the custodian of Mary, queen of Scots, during her imprisonment in Loch Leven, where, according to the queen, he had pestered her with amorous attentions; he had also been the chief actor in the plot known as the ” raid of Ruthven ” when King James VI. was treacherously seized while a guest at the castle of Ruthven in 1582, and kept under restraint for several months while the earl remained at the head of the government. Though pardoned for this conspiracy he continued to plot against the king in conjunction with the earls of Mar and Angus; and he was executed for

high treason on the 2nd of May 1584; his friends complaining that the confession on which he was convicted of treason was obtained by a promise of pardon from the king. His eldest son, William, 2nd earl of Gowrie, only survived till 1588, the family dignities and estates, which had been forfeited, having been restored to him in 1586.

When, therefore, John Ruthven succeeded to the earldom while still a child, he inherited along with his vast estates family traditions of treason and intrigue. There was also a popular belief, though without foundation, that there was Tudor blood in his veins; and Burnet afterwards asserted that Gowrie stood next in succession to the crown of England after King James VI. Like his father and grandfather before him, the young earl attached himself to the party of the reforming preachers, who procured his election in 1592 as provost of Perth, a post that was almost hereditary in the Ruthven family. He received ah excellent education at the grammar school of Perth and the university of Edinburgh, where he was in the summer of 1593, about the time when his mother, and his sister the countess of Atholl, aided Bothwell in forcing himself sword in hand into the king's bedchamber in Holyrood Palace. A few months later Gowrie joined with Atholl and Montrose in offering to serve Queen Elizabeth, then almost openly hostile to the Scottish king; and it is probable that he had also relations with the rebellious Bothwell. Gowrie had thus been already deeply engaged in treasonable conspiracy when, in August 1594, he proceeded to Italy with his tutor, William Rhynd, to study at the university of Padua. On his way home in 1599 he remained for some months at Geneva with the reformer Theodore Beza; and at Paris he made acquaintance with the English ambassador, who reported him to Cecil as devoted to Elizabeth's service, and a nobleman " of whom there may be exceeding use made." In Paris he may also at this time have had further communication with the exiled Bothwell; in London he was received with marked favour by Queen Elizabeth and her ministers.

These circumstances owe their importance to the light they throw on the obscurity of the celebrated " Gowrie conspiracy,"

which resulted in the slaughter of the earl and his brother by attendants of King James at Gowrie House, Perth, a few weeks after Gowrie's return to Scotland in May 1600. This rfte event ranks among the unsolved enigmas of history. aowrie The mystery is caused by the improbabilities inherent in con- any of the alternative hypotheses suggested to account spiracy. for the unquestionable facts of the occurrence; the discrepancies in the evidence produced at the time; the apparent lack of forethought or plan on the part of the chief

actors, whichever hypothesis be adopted, as well as the thoughtless folly of their actual procedure; and the insufficiency of motive, whoever the guilty parties may have been. The solutions of the mystery that have been suggested are three in number: first, that Gowrie and his brother had concocted a plot to murder, or more probably to kidnap King James, and that they lured him to Gowrie House for this purpose; secondly, that James paid a surprise visit to Gowrie House with the intention, which he carried out, of slaughtering the two Ruthvens; and thirdly, that the tragedy was the outcome of an unpremeditated brawl following high words between the king and the earl, or his brother. To understand the relative probabilities of these hypotheses regard must be had to the condition of Scotland in the year 1600 (see Scotland: History). Here it can only be recalled that plots to capture the person of the sovereign for the purpose of coercing his actions were of frequent occurrence, more than one of which had been successful, and in several of which the Ruthven family had themselves taken an active part; that the relations between England and Scotland were at this time more than usually strained, and that the young earl of Gowrie was reckoned in London among the adherents of Elizabeth; that the Kirk party, being at variance with James, looked upon Gowrie as an hereditary partisan of their cause, and had recently sent an agent to Paris to recall him to Scotland as their leader; that Gowrie was believed to be James's rival for the succession to the English crown. Moreover, as regards the question of motive it is to be observed, on the one hand, that the Ruthvens believed Gowrie's father to have been treacherously done to death, and his widow insulted by the king's favourite minister; while, on the other, James was indebted in a large sum of money to the earl of Gowrie's estate, and popular gossip credited either Gowrie or his brother, Alex- ander Ruthven, with being the lover of the queen. Although the evidence on these points, and on every minute circumstance connected with the tragedy itself, has been exhaustively examined by historians of the Gowrie conspiracy, it cannot be asserted that the mystery has been entirely dispelled; but, while it is improbable that complete certainty will ever be arrived at as to whether the guilt lay with James or with the Ruthven brothers, the most modern research in the light of materials inaccessible or overlooked till the 20th century, points pretty clearly to the conclusion that there was a genuine conspiracy by Gowrie and his brother to kidnap the king. If this be the true solution, it follows that King James was innocent of the blood of the Ruthvens; and it raises the presumption that his own account of the occurrence was, in spite of the glaring improbabilities which it involved, substantially true.

The facts as related by James and other witnesses were, in outline, as follows. On the 5th of August 1600 the king rose early to hunt in the neighbourhood of Falkland Palace, about 14 m. from Perth. Just as he was setting forth in company with the duke of Lennox, the earl of Mar, Sir Thomas Erskine and others, he was accosted by Alexander Ruthven (known as the master of Ruthven), a younger brother of the earl of Gowrie, who had ridden from Perth that morning to inform "the king that he had met on the previous day a man in posses- sion of a pitcher full of foreign gold coins, whom he had secretly locked up in a room at Gowrie House. Ruthven urged the king to ride to Perth to examine this man for himself and to take possession of the treasure. After some hesitation James gave credit to the story, suspecting that the possessor of the coins was one of the numerous Catholic agents at that time moving I about Scotland in disguise. Without giving a positive reply to

Alexander Ruthven, James started to hunt; but later in the morning he called Ruthven to him and said he would ride to Perth when the hunting was over. Ruthven then despatched a servant, Henderson, by whom he had been accompanied from Perth in the early morning, to tell Gowrie that the king was com- ing to Gowrie House. This messenger gave the information to Gowrie about ten o'clock in the morning. Meanwhile Alexander Ruthven was urging the king to lose no time, requesting him to keep the matter secret from his courtiers, and to bring to Gowrie House as small a retinue as possible. James, with a train of some fifteen persons, arrived at Gowrie House about one o'clock, Alexander Ruthven having spurred forward for a mile or so to announce the king's approach. But notwithstand- ing Henderson's warning some three hours earlier, Gowrie had made no preparations for the king's entertainment, thus giving the impression of having been taken by surprise. After a meagre repast, for which he was kept waiting an hour, James, forbidding his retainers to follow him, went with Alexander Ruthven up the main staircase and passed through two chambers and two doors, both of which Ruthven locked behind them, into a turret-room at the angle of the house, with windows looking on the courtyard and the street. Here James expected to find the mysterious prisoner with the foreign gold. He found instead an armed man, who, as appeared later, was none other than Gowrie's servant, Henderson. Alexander Ruthven immedi- ately put on his hat, and drawing Henderson's dagger, presented it to the king's breast with threats of instant death if James opened a window

or called for help. An allusion by Ruthven to the execution of his father, the ist earl of Gowrie, drew from James a reproof of Ruthven's ingratitude for various benefits conferred on his family. Ruthven then uncovered his head, declaring that James's life should be safe if he remained quiet; then, committing the king to the custody of Henderson, he left the turret — ostensibly to consult Gowrie — and locked the door behind him. While Ruthven was absent the king questioned Henderson, who professed ignorance of any plot and of the purpose for which he had been placed in the turret; he also at James's request opened one of the windows, and was about to open the other when Ruthven returned. Whether or not Alexander had seen his brother is uncertain. But Gowrie had meantime spread the report below that the king had taken horse and had ridden away; and the royal retinue were seeking their horses to follow him. Alexander, on re-entering the turret, attempted to bind James's hands; a struggle ensued, in the course of which the king was seen at the window by some of his followers below in the street, who also heard him cry " treason " and call for help to the earl of Mar. Gowrie affected not to hear these cries, but kept asking what was the matter. Lennox, Mar and most of the other lords and gentlemen ran up the main Tbe staircase to the king's help, but were stopped by the

slaughter locked door, which they spent some time in trying of the t Da tter down. John Ramsay (afterwards earl of vens. jjojdernesse), noticing a small dark stairway leading directly to the inner chamber adjoining the turret, ran up it and found the king struggling at grips with Ruthven. Drawing his dagger, Ramsay wounded Ruthven, who was then pushed down the stairway by the king. Sir Thomas Erskine, sum- moned by Ramsay, now followed up the small stairs with Dr Hugh Herri es, and these two coming upon the wounded Ruthven despatched him with their swords. Gowrie, entering the court- yard with his stabler Thomas Cranstoun and seeing his brother's body, rushed up the staircase after Erskine and Herries, followed by Cranstoun and others of his retainers; and in the melee Gowrie was killed. Some commotion was caused in the town by the noise of these proceedings; but it quickly subsided, though' the king did not deem it safe to return to Falkland for some ' hours.

The tragedy caused intense excitement throughout Scotland, and the investigation of the circumstances was followed with much interest in England also, where all the details were reported to Elizabeth's ministers. The preachers of the Kirk, whose influence in Scotland was too extensive for the king to neglect,

were only with the greatest difficulty persuaded to accept James's

account of the occurrence, although he. voluntarily submitted himself to cross-examination by one of their number. Their belief, and that of their partisans, influenced no doubt by political hostility to James, was that the king had invented the story of a conspiracy by Gowrie to cover his own design to extirpate the Ruthven family. James gave some colour to this belief, which has not been entirely abandoned, by the relent- less severity with which he pursued the two younger, and unquestionably innocent, brothers of the earl. Great efforts were made by the government to prove the complicity of others in the plot. One noted and dissolute conspirator, Sir Robert Logan of Restalrig, was posthumously convicted of having been privy to the Gowrie conspiracy on the evidence of certain letters produced by a notary, George Sprot, who swore they had been written by Logan to Gowrie and others. These letters, which are still in existence, were in fact forged by Sprot in imitation of Logan's handwriting; but the researches of Andrew Lang have shown cause for suspecting that the most im- ■

portant of them was either copied by Sprot from a forgeries. genuine original by Logan, or that it embodied the substance of such a letter. If this be correct, it would appear that the conveyance of the king to Fast Castle, Logan's impregnable fortress on the coast of Berwickshire, was part of the plot; and it supplies, at all events, an additional piece of evidence to prove the genuineness of the Gowrie conspiracy.

Gowrie's two younger brothers, William and Patrick Ruthven; fled to England; and after the accession of James to the English throne William escaped abroad, but Patrick was taken and imprisoned for nineteen years in the Tower of London. Released in 1622, Patrick Ruthven resided first at Cambridge and after- wards in Somersetshire, being granted a small pension by the crown. He married Elizabeth Woodford, widow of the ist Lord Gerrard, by whom he had two sons and a daughter, Mary; the latter entered the service of Queen Henrietta Maria, and married the famous painter van Dyck,- who painted several portraits of her. Patrick died in poverty in a cell in the King's Bench in 1652, being buried as " Lord Ruthven." His son, Patrick, presented a petition to Oliver Cromwell in 1656, in which, after reciting that the parliament of Scotland in 1641 had restored his father to the barony of Ruthven, he prayed that his " extreme poverty " might be relieved by the bounty of the Protector.

See Andrew Lang, James VI. and the Gowrie Mystery (London, 1902), and the authorities there cited; Robert Pitcairn, Criminal Trials in Scotland (3 vols., Edinburgh, 1833) ; David Moysie, Memoirs of the Affairs of Scotland, 1577-1603 (Edinburgh, 1830) ; Louis A. Barb6,

The Tragedy of Gowrie House (London, 1887); Andrew Bisset, Essays on Historical Truth (London, 1871); David Calder- wood, History of the Kirk of Scotland (8 vols., Edinburgh, 1842- 1849); P. F. Tytler, History of Scotland (9 vols., Edinburgh, 1828- 1843); John Hill Burton, History of Scotland (7 vols., Edinburgh, 1867-1870). W. A. Craigie has edited as Skotlands Rimur some Icelandic ballads relating to the Gowrie conspiracy. He has also printed the Danish translation of the official account of the con- spiracy, which was published at Copenhagen in 1601. (R. J. M.)

GOWRIE, a belt of fertile alluvial land (Scotice, ” carse “) of Perthshire, Scotland. Occupying the northern shore of the Firth of Tay, it has a generally north-easterly trend and extends from the eastern boundaries of Perth city to the confines of Dundee. It measures 15 m. in length, its breadth from the river towards the base of the Sidlaw Hills varying from 2 to 4 m. Probably it is a raised beach, submerged until a comparatively recent period. Although it contained much bog land and stagnant water as late as the 18th century, it has since been drained and cultivated, and is now one of the most productive tracts in Perthshire. The district is noteworthy for the number of its castles and mansions, almost wholly residential, among which may be mentioned Kinfauns Castle, Inchyra House, Pitfour Castle, Errol Park, Megginch Castle, dating from 1575; Fingask Castle, Kinnaird Castle, erected in the 1 5th century and occupied by James VI. in 1617; Rossie Priory, the seat of Lord Kinnaird; and Huntly Castle, built by the 3rd earl of Kinghorne.

GOYA, a river town and port of Corrientes, Argentine Republic, the commercial centre of the south-western departments of the province and chief town of a department of the same name, on a riacho or side channel of the Parana about 5 m. from the main channel and about 120 m. S. of the city of Corrientes. Pop. (1905, est.) 7000. The town is built on low ground which is subject to inundations in very wet weather, but its streets are broad and the general appearance of its edifices is good. Among its public buildings is a handsome parish church and a national normal school. The productions of the neighbourhood are chiefly pastoral, and its exports include cattle, hides, wool and oranges. Goya had an export of crudely-made cheese long before the modern cheese factories of the Argentine Republic came into existence. The place dates from 1807, and had its origin, it is said, in the trade established there by a ship captain and his wife

Gregoria or Goya, who supplied passing vessels with beef.

GOYANNA, or Goiana, a city of Brazil in the N.E. angle of the state of Pernambuco, about 65 m. N. of the city of Pernam- buco. Pop. (1890) 15,436. It is built on a fertile plain between the rivers Tracunhaem and Capibaribe-mirim near their junction to form the Goyanna river, and is 15 m. from the coast. It is surrounded by, and is the commercial centre for, one of the richest agricultural districts of the state, which produces sugar, rum, coffee, tobacco, cotton, cattle, hides and castor oil. The Goyanna river is navigable for small vessels nearly up to the city, but its entrance is partly obstructed and difficult. Goyanna is one of the oldest towns of the state, and was occupied by the Dutch from 1636 to 1654. It has several old-style churches, an orphans' asylum, hospital and some small industries.

GOYA Y LUCIENTES, FRANCISCO (1746-1828), Spanish painter, was born in 1746 at Fuendetodos, a small Aragonese village near Saragossa. At an early age he commenced his artistic career under the direction of Jose Luzan Martinez, who had studied painting at Naples under Mastroleo. It is clear that the accuracy in drawing Luzan is said to have acquired by diligent study of the best Italian masters did not much influence his erratic pupil. Goya, a true son of his province, was bold, capricious, headstrong and obstinate. He took a prominent part on more than one occasion in those rival religious processions at Saragossa which often ended in unseemly frays; and his friends were led in consequence to despatch him in his nineteenth year to Madrid, where, prior to his departure for Rome, his mode of life appears to have been anything but that of a quiet orderly citizen. Being a good musician, and gifted with a voice, he sallied forth nightly, serenading the caged beauties of the capital, with whom he seems to have been a very general favourite.

Lacking the necessary royal patronage, and probably scandaliz- ing by his mode of life the sedate court officials, he did not receive — perhaps did not seek — the usual honorarium accorded to those students who visited Rome for the purpose of study. Finding in convenient to retire for a time from Madrid, he decided to visit Rome at his own cost ; and being without resources he joined a " quadrilla " of bull-fighters, passing from town to town until he reached the shores of the Mediterranean. We next hear of him reaching Rome, broken in health and financially bankrupt. In 1772 he was awarded the second prize in a competition initiated by the academy of Parma, styling himself " pupil to Bayeu, painter to the king of Spain." Compelled to quit Rome somewhat suddenly, he appears again in Madrid in 1775, the husband of Bayeu's daughter, and father of a son. About this time

he appears to have visited his parents at Fuendetodos, no doubt noting much which later on he utilized in his genre works. On returning to Madrid he commenced painting canvases for the tapestry factory of Santa Barbara, in which the king took much interest. Between 1776 and 1780 he appears to have supplied thirty examples, receiving about £1200 for them. Soon after the revolution of 1868, an official was appointed to take an inventory of all works of art belonging to the nation, and in one of the cellars of the Madrid palace were discovered forty-three of these works of Goya on rolls forgotten and neglected (see Los Tapices de Goya; por Cruzado Villaamil, Madrid, 1870). His originality and talent were soon recognized by Mengs,

the king's painter, and royal favour naturally followed. His career now becomes intimately connected with the court life of his time. He was commissioned by the king to design a series of frescoes for the church of St Anthony of Florida, Madrid, and he also produced works for Saragossa, Valencia and Toledo. Ecclesiastical art was not his forte, and although he cannot be said to have failed in any of his work, his fame was not enhanced by his religious subjects.

In portraiture, without doubt, Goya excelled: his portraits are evidently life-like and unexaggerated, and he disdained flattery. He worked rapidly, and during his long stay at Madrid painted, amongst many others, the portraits of four sovereigns of Spain — Charles III. and IV., Ferdinand VII. and " King Joseph." The duke of Wellington also sat to him; but on his making some remark which raised the artist's choler, Goya seized a plaster cast and hurled it at the head of the duke. There are extant two pencil sketches of Wellington, one in the British Museum, the other in a private collection. One of his best portraits is that of the lovely Andalusian duchess of Alva. He now became the spoiled child of fortune, and acquired, at any rate externally, much of the polish of court manners. He still worked industriously upon his own lines, and, while there is a stiffness almost ungainly in the pose of some of his portraits, the stern individuality is always preserved.

Including the designs for tapestry, Goya's genre works are numerous and varied, both in style and feeling, from his Watteau- like "Al Fresco Breakfast," "Romeriade San Isidro," to the " Curate feeding the Devil's Lamp," the " Meson del Gallo " and the painfully realistic massacre of the " Dos de Mayo " (1808). Goya's versatility is proverbial; in his hands the pencil, brush and graver are equally powerful. Some of his crayon sketches of scenes in the bull ring are full of force and character, slight but full of meaning. He was in his thirty-second year when he commenced his etchings from Velasquez, whose influence

may, however, be traced in his work at an earlier date. A careful examination of some of the drawings made for these etchings indicates a steadiness of purpose not usually discovered in Goya's craft as draughtsman. He is much more widely known by his etchings than his oils; the latter necessarily must be sought in public and private collections, principally in Spain, while the former are known and prized in every capital of Europe. The etched collections by which Goya is best known include " Los Caprichos," which have a satirical meaning known only to the few ; they are bold, weird and full of force. ' ' Los Proverbios " are also supposed to have some hidden intention. "Los Desastres de la Guerra " may fairly claim to depict Spain during the French invasion. In the bull-fight series Goya is evidently at home; he was a skilled master of the barbarous art, and no doubt every sketch is true to nature, and from life.

Goya retired from Madrid, desiring probably during his latter years to escape the trying climate of that capital. He died at Bordeaux on the 16th of April 1828, and a monument has been erected there over his remains. From the deaths of Velasquez and Murillo to the advent of Fortuny, Goya's name is the only important one found in the history of Spanish art.

See also the lives by Paul Lefort (1877), and Yriarte (1867).

GOYAz, an inland state of Brazil, bounded by Matto Grosso and Para on the W., Maranhao, Bahia and Minas Geraes on the E., and Minas Geraes and Matto Grosso on the S. Pop. (1890) 227,572; (1900) 255,284, including many half-civilized Indians and many half-breeds. Area, 288,549 sq. m. The outline of the state is that of a roughly-shaped wedge with the thin edge extending northward between and up to the junction of the rivers Araguaya and Upper Tocantins, and its length is nearly ' 1 5 of latitude. The state lies wholly within the great Brazilian plateau region, but its surface is much broken towards the N. by the deeply eroded valleys of the Araguaya and Upper Tocantins rivers and their tributaries. The general slope of the plateau is toward the N., and the drainage of the state is chiefly through the above-named rivers — the principal tributaries of the Araguaya being the Grande and Vermelho, and of the Upper Tocantins, the Manoel Alves Grande, Somno, Paranan

and Maranhao. A considerable part of southern Goyaz, however,

slopes southward and the drainage is through numerous small streams flowing into the Paranahyba, a large tributary of the Parana. The general elevation of the plateau is estimated to be about 2700 ft., and the highest elevation was reported in 1802 to be the Serra dos Pyreneos (5250 ft.). Crossing the state N.N.E. to S.S.W. there is a well-defined chain of mountains, of which the Pyreneos, Santa Rita and Santa Martha ranges form parts, but their elevation above the plateau is not great. The surface of the plateau is generally open campo and scrubby arboreal growth called caatingas, but the streams are generally bordered with forest, especially in the deeper valleys. Towards the N. the forest becomes denser and of the character of the Amazon Valley. The climate of the plateau is usually described as temperate, but it is essentially sub- tropical. The valley regions are tropical, and malarial fevers are common. The cultivation of the soil is limited to local needs, except in the production of tobacco, which is exported to neighbouring states. The open campos afford good pasturage, and live stock is largely exported. Gold-mining has been carried on in a primitive manner for more than two centuries, but the output has never been large and no very rich mines have been discovered. Diamonds have been found, but only to a very limited extent. There is a considerable export of quartz crystal, commercially known, as ” Brazilian pebbles,” used in optical work. Although the northern and southern extremities of Goyaz lie within two great river systems — the Tocantins and Parana — the upper courses of which are navigable, both of them are obstructed by falls. The only outlet for the state has been by means of mule trains to the railway termini of Sao Paulo and Minas Geraes, pending the extension of railways from both of those states, one entering Goyaz by way of Catalao, near the southern boundary, and the other at some point further N.

The capital of the state is GoyAz, or Villa-Boa de Goyaz, a mining town on the Rio Vermelho, a tributary of the Araguaya rising on the northern slopes of the Serra de Santa Rita. Pop. (1890) 6807. Gold was discovered here in 1682 by Bartholomeu Bueno, the first European explorer of this region, and the settlement founded by him was called Santa Anna, which is still the name of the parish. The site of the town is a barren, rocky mountain valley, 1900 ft. above sea-level, in which the heat is most oppressive at times and the nights are unpleasantly cold. Goyaz is the see of a bishopric founded in 1826, and possesses a small cathedral and some churches.

GOYEN, JAN JOSEPHSZOON VAN (1596-1656), Dutch painter, was born at Leiden on the 13th of January 1596, learned painting under several masters at Leiden and Haarlem, married in 1618 and settled at the Hague about 163 1. He was one of the first to emancipate himself

from the traditions of minute imitation embodied in the works of Breughel and Savery. Though he preserved the dun scale of tone peculiar to those painters, he studied atmospheric effects in black and white with considerable skill. He had much influence on Dutch art. He formed Solomon Ruysdael and Pieter Potter, forced attention from Rembrandt, and bequeathed some of his precepts to Pieter de Molyn, Coelenbier, Saftleven, van der Kabel and even Berghem. His life at the Hague for twenty-five years was very prosperous, and he rose in 1640 to be president of his gild. A friend of van Dyck and Bartholomew van der Heist, he sat to both these artists for his likeness. His daughter Margaret married Jan Steen, and he had steady patrons in the stadtholder Frederick Henry, and the chiefs of the municipality of the Hague. He died at the Hague in 1656, possessed of land and houses to the amount of 15,000 florins.

Between 16 10 and 16 16 van Goyen wandered from one schoof to the other. He was first apprenticed to Isaak Swanenburgh; he then passed through the workshops of de Man, Klok and de Hoorn. In 16 16 he took a decisive step and joined Esaias van der Velde at Haarlem; amongst his earlier pictures, some of 162 1 (Berlin Museum) and 1623 (Brunswick Gallery) show the influence of Esaias very perceptibly. The landscape is minute. Details of branching and foliage are given, and the

figures are important in relation to the distances. After 1625 these peculiarities gradually disappear. Atmospheric effect in landscapes of cool tints varying from grey green to pearl or brown and yellow dun is the principal object which van Goyen holds in view, and he succeeds admirably in light skies with drifting misty cloud, and downs with cottages and scanty shrubbery or stunted trees. Neglecting all detail of foliage he now works in a thin diluted medium, laying on rubbings as of sepia or Indian ink, and finishing without loss of transparence or lucidity. Throwing his foreground into darkness, he casts alternate light and shade upon the more distant planes, and realizes most pleasing views of large expanse. In buildings and water, with shipping near the banks, he sometimes has the strength if not the colour of Albert Cuyp. The defect of his work is chiefly want of solidity. But even this had its charm for van Goyen's contemporaries, and some time elapsed before Cuyp, who imitated him, restricted his method of transparent tinting to the foliage of foreground trees.

Van Goyen's pictures are comparatively rare in English collec- tions, but his work is seen to advantage abroad, and chiefly at the Louvre, and in Berlin, Gotha, Vienna, Munich and Augsburg. Twenty-eight of his works were exhibited together at Vienna in 1873. Though he

visited France once or twice, van Goyen chiefly confined himself to the scenery of Holland and the Rhine. Nine times from 1633 to 1655 he painted views of Dordrecht. Nimeguen was one of his favourite resorts. But he was also fond of Haarlem and Amsterdam, and he did not neglect Arnheim or Utrecht. One of his largest pieces is a view of the Hague, executed in 1651 for the municipality, and now in the town collection of that city. Most of his panels represent reaches of the Rhine, the Waal and the Maese. But he sometimes sketched the downs of Scheveningen, or the sea at the mouth of the Rhine and Scheldt; and he liked to depict the calm inshore, and rarely ventured upon seas stirred by more than a curling breeze or the swell of a coming squall. He often painted winter scenes, with ice and skaters and sledges, in the style familiar to Isaac van Ostade. There are numerous varieties of these subjects in the master's works from 1621 to 1653. One historical picture has been assigned to van Goyen — the " Em- barkation of Charles II." in the Bute collection. But this canvas was executed after van Goyen's death. When he tried this form of art he properly mistrusted his own powers. But he produced little in partnership with his contemporaries, and we can only except the " Watering-place " in the gallery of Vienna, where the landscape is enlivened with horses and cattle by Philip Wouvermans. Even Jan Steen, who was his son-in-law, only painted figures for one of his pictures, and it is probable that this piece was completed after van Goyen's death. More than 250 of van Goyen's pictures are known and accessible. Of this number little more than 70 are undated. None exist without the full name or monogram, and yet there is no painter whose hand it* is easier to trace without the help of these adjuncts. An etcher, but a poor one, van Goyen has only bequeathed to us two very rare plates.

GOZLAN, LEON (1806-1866), French novelist and play- writer, was born on the 1st of September 1806, at Marseilles. When he was still a boy, his father, who had made a large fortune' as a ship-broker, met with a series of misfortunes, and Leon, before completing his education, had to go to sea in order to earn a living. In 1828 we find him in Paris, determined to run the risks of literary life. His townsman, Joseph Mery, who was then making himself famous by his political satires, introduced him to several newspapers, and Gozlan's brilliant articles in the Figaro did much harm to the already tottering government of Charles X. His first novel was Les MSmoires d'un apothicaire (1828), and this was followed by numberless others, among which may be mentioned Washington Levert et Socrate Leblanc (1838), Le Notaire de Chantilly (1836), Aristide Froissart (1843) (one of the most curious and celebrated of his productions), Les Nuits du Pere Lachaise (1846), Le Tapis vert (1855), La Folle du

logis (1857), Les Emotions de Polydore Maras- quin (1857), &c. His best-known works for the theatre are —

La Pluie et le beau temps (1861), and Une TempUe dans tin verre d'eau (1850), two curtain-raisers which have kept the stage; Le Lion empailli (1848), La Queue du chien d'Alcibiade (1849), Louise de Nanteuil (1854), Le Gateau des reines (1855), Les Paniers de la comtesse (1852); and he adapted several of his own novels to the stage. Gozlan also wrote a romantic and picturesque description of the old manors and mansions of his country entitled Les Chdteaux de France (2 vols., 1844), originally published (1836) as Les Tourelles, which has some archaeological value, and a biographical essay on Balzac {Balzac chez lui, 1862). He was made a member of the Legion of Honour in 1846, and in 1859 an officer of that order. Gozlan died on the 14th of September 1866, in Paris. See also P. Audebrand, Leon Gozlan (1887). GOZO (Gozzo), an island of the Maltese group in the Medi- terranean Sea, second in size to Malta. It lies N.W. and 31 m. from the nearest point of Malta, is of oval form, 8| m. in length and 4! m. in extreme breadth, and has an area of nearly 25 m. Its chief town, Victoria, formerly called Rabato (pop. in 1901, 5057) stands near the middle of the island on one of a cluster of steep conical hills, 32 m. from the port of Migiarro Bay, on the south-east shore, below Fort Chambray. The character of the island is similar to that of Malta. The estimated popula- tion in 1907 was 21,911.

GOZZI, CARLO, Count (1722-1806), Italian dramatist,

was descended from an old Venetian family, and was born at

Venice in March 1722. Compelled by the embarrassed condition

of his father's affairs to procure the means of self-support, he,

at the age of sixteen, joined the army in Dalmatia; but three

years afterwards he returned to Venice, where he soon made

a reputation for himself as the wittiest member of the Granel-

leschi society, to which the publication of several satirical

pieces had gained him admission. This society, nominally

devoted to conviviality and wit, had also serious literary aims, and was especially zealous to preserve the Tuscan literature pure and untainted by foreign influences. The displacement of the old Italian comedy by the dramas of Pietro Chiari (1700-1788) and Goldoni, founded on French models, threatened defeat to all their efforts; and in 1757 Gozzi came to the rescue by publishing a satirical poem, Tartana degli influssi per V anno bisestile, and in i76r by his comedy, Fiaba dell' amore delle tre melarancie, a parody of the manner of the two obnoxious poets, founded on a fairy tale. For its representation he obtained the services of the Sacchi company of players, who, on account of the popularity of the comedies of Chiari and Goldoni — which afforded no scope for the display of their peculiar talents — had been left without employment; and as their satirical powers were thus sharpened by personal enmity, the play met with extraordinary success. Struck by the effect produced on the audience by the introduction of the supernatural or mythical element, which he had merely used as a convenient medium for his satirical purposes, Gozzi now produced a series of dramatic pieces based on fairy tales, which for a period obtained great popularity, but after the breaking up of the Sacchi company were completely disregarded. They have, however, obtained high praise from Goethe, Schlegel, Madame de Stael and Sismondi; and one of them, Re Turandote, was translated by

Schiller. In his later years Gozzi set himself to the production of tragedies in which the comic element was largely introduced; but as this innovation proved unacceptable to the critics he had recourse to the Spanish drama, from which he obtained models for various pieces, which, however, met with only equivocal success. He died on the 4th of April 1806.

His collected works were published under his own superintend- ence, at Venice, in 1792, in 10 volumes; and his dramatic works, translated into German by Werthes, were published at Bern in 1795. See Gozzi's work, Memorie inutili delta vita di Carlo Gozzi (3 vols., Venice, 1797), translated into French by Paul de Musset (1848), and into English by J. A. Symonds (1889); F. Horn, Ober Gozzis dramatische Poesie (Venice, 1803); Gherardini, Vita di Gasp. Gozzi (1821); "Charles Gozzi," by Paul de Musset, in the Revue des deux mondes for 15th November 1844; Magrini, Carlo Gozzi e la fiabe: saggi storici, biografici, e critici (Cremona, 1876), and the same author's book on Gozzi's life and times (Benevento, 1883).

GOZZI, GASPARO, Count (1713-1786), eldest brother of Carlo Gozzi, was born on the 4th of December 1713. In 1739 he married the poetess Luise Bergalli, and she undertook the management of the theatre of Sant' Angelo, Venice, he supplying the performers with dramas chiefly translated from the French. The speculation proved unfortunate, but meantime he had attained a high reputation for his contributions to the Gazzetta Veneta, and he soon came to be known as one of the ablest critics and purest and most elegant stylists in Italy. For a considerable period he was censor of the press in Venice, and in 1774 he was appointed to reorganize the university system at Padua. He died at Padua on the 26th of December 1786.

His principal writings are Osservatore Veneto periodico (1761), on the model of the English Spectator, and distinguished by its high moral tone and its light and pleasant satire; Lettere famigliari (1755), a collection of short racy pieces in prose and verse, on subjects of general interest ; Sermoni, poems in blank verse after the manner of Horace; // Mondo morale (1760), a personification of human passions with inwoven dialogues in the style of Lucian ; and Giudizio degli antichi poeti sopra la moderna censura di Dante (1755), a defence of the great poet against the attacks of Bettinelli. He also trans- lated various works from the French and English, including Mar- montel's

Tales and Pope's Essay on Criticism. His collected works were published at Venice, 1794-1798, in 12 volumes, and several editions have appeared since.

GOZZOLI, BENOZZO, Italian painter, was born in Florence in 1424, or perhaps 1420, and in the early part of his career assisted Fra Angelico, whom he followed to Rome and worked with at Orvieto. In Rome he executed in Santa Maria in Aracoeli a fresco of " St Anthony and Two Angels." In 1449 he left Angelico, and went to Montefalco, nearFoligno in Umbria. In S. Fortunato, near Montefalco, he painted a " Madonna and Child with Saints and Angels," and three other works. One of these, the altar-piece representing " St Thomas receiving the Girdle of the Virgin," is now in the Lateran Museum, and shows the affinity of Gozzoli's early style to Angelico's. He next painted in the monastery of S. Francesco, Montefalco, filling the choir with a triple course of subjects from the life of the saint, with various accessories, including heads of Dante, Petrarch and Giotto. This work was completed in 1452, and is still marked by the style of Angelico, crossed here and there with a more distinctly Gio'ttesque influence. In the same church, in the chapel of St Jerome, is a fresco by Gozzoli of the Virgin and Saints, the Crucifixion and other subjects. He remained at Montefalco (with an interval at Viterbo) probably till 1456. employing Mesastris as assistant. Thence he went to Perugia, and painted in a church a "Virgin and Saints," now in the local academy, and soon afterwards to his native Florence, the head- quarters of art. By the end of 1459 he had nearly finished his important labour in the chapel of the Palazzo Riccardi, the " Journey of the Magi to Bethlehem," and, in the tribune of this chapel, a composition of " Angels in a Paradise." His picture in the National Gallery, London, a " Virgin and Child with Saints," 1461, belongs also to the period of his Florentine sojourn. Another small picture in the same gallery, the " Rape of Helen," is of dubious authenticity. In 1464 Gozzoli left Florence for S. Gimignano, where he executed some extensive works; in the church of S. Agostino, a composition of St Sebastian protecting the City from the .Plague of this same year, 1464; over the entire choir of the church, a triple course of scenes from the legends of St Augustine, from the time of his entering the school of Tegaste on to his burial, seventeen chief subjects, with some accessories; in the Pieve di S. Gimignano, the "Martyrdom of Sebastian," and other subjects, and some further works in the city and its vicinity. Here his style combined something of Lippo Lippi with its original •elements, and he received co-operation from Giusto d' Andrea. He stayed in this city till 1467, and then began, in the Campo Santo of Pisa, from 1469, the vast series of mural paintings with which his name is specially

identified. There are twenty- four subjects from the Old Testament, from the ” Invention of Wine by Noah ” to the ” Visit of the Queen of Sheba to Solomon.” He contracted to paint three subjects per year for about ten ducats each— a sum which may be regarded as equivalent ta

£100 at the present day. It appears, however, that this contract was not strictly adhered to, for the actual rate of painting was only three pictures in two years. Perhaps the great multitude of figures and accessories was accepted as a set-off against the slower rate of production. By January 1470 he had executed the fresco of” Noah and his Family,” — followed by the ” Curse of Ham,” the “Building of the Tower of Babel ” (which contains portraits of Cosmo de’ Medici, the young Lorenzo Politian and others) , the ” Destruction of Sodom,” the “Victory of Abraham,” the ” Marriages of Rebecca and of Rachel,” the ” Life of Moses,” &c. . In the Cappella Ammannati, facing a gate of the Campo Santo, he painted also an “Adoration of the Magi,” wherein appears a portrait of himself. All this enormous mass of work, in which Gozzoli was probably assisted by Zanobi Macchiavelli, was performed, in addition to several other pictures during his stay in Pisa (we need only specify the ” Glory of St Thomas Aquinas,” now in the Louvre), in sixteen years, lasting up to 1485. This is the latest date which can with certainty be assigned to any work from his hand, although he is known to have been alive up to 1498. In 1478 the Pisan authorities had given him, as a token of their regard, a tomb in the Campo Santo. He had likewise a house of his own in Pisa, and houses and land in Florence. In rectitude of life he is said to have been worthy of his first master, Fra Angelico.

The art of Gozzoli does not rival that of his greatest contem- poraries either in elevation or in strength, but is pre-eminently attractive by its sense of what is rich, winning, lively and abundant in the aspects of men and things. His landscapes, thronged with birds and quadrupeds, especially dogs, are more varied, circumstantial and alluring than those of any predecessor; his compositions are crowded with figures, more characteristically true when happily and gracefully occupied than when the demands of the subject require tragic or dramatic intensity, or turmoil of action; his colour is bright, vivacious and festive. Gozzoli’s genius was, on the whole, more versatile and assimilative than vigorously original; his drawing not free from considerable imperfections, especially in the extremities and

articulations, and in the perspective of his gorgeously-schemed buildings. In fresco-painting he used the methods of tempera, and the decay of his works has been severe in proportion. Of his untiring industry the recital of his labours and the number of works produced are the most forcible attestation.

Vasari, Crowe and Cavakaselle, and the other ordinary authori- ties, can be consulted as to the career of Gozzoli. A separate Life of him, by H. Stokes, was published in 1903 in Newnes's Art

librar y- (W. M. R.)

GRAAFF REINET, a town of South Africa, 185 m. by rail N.W. by N. of Port Elizabeth. Pop. (1904) 10,083, of whom 4055 were whites. The town lies 2463 ft. above the sea and is built on the banks of the Sunday river, which rises a little farther north on the southern slopes of the Sneeuwberg, and here ramifies into several channels. The Dutch church is a handsome stone building with seating accommodation for 1 500 people. The college is an educational centre of some importance; it was rebuilt in 1906. Graaff Reinet is a flourishing market for agricultural produce, the district being noted for its mohair industry, its orchards and vineyards.

The town was founded by the Cape Dutch in 1786, being named after the then governor of Cape Colony, C. J. van de Graaff, and his wife. In 1 795 the burghers, smarting under the exactions of the Dutch East India Company proclaimed a republic. Similar action was taken by the burghers of Swellendam. Before the authorities at Cape Town could take decisive measures against the rebels, they were themselves compelled to capitulate to the British. The burghers having endeavoured, unsuccessfully, to get aid from a French warship at Algoa Bay surrendered to Colonel (afterwards General Sir) J. O. Vandeleur. In January 1799 Marthinus Prinsloo, the leader of the republicans in 1795, again rebelled, but surrendered in April following. Prinsloo and nineteen others were imprisoned in Cape Town castle. After trial, Prinsloo and another commandant were sentenced to death and others to banishment. The sentences were not

carried out and the prisoners were released, March 1803, on the retrocession of the Cape to Holland. In 1801 there had been another revolt in Graaff Reinet, but owing to the conciliatory measures of General F. Dundas (acting governor of the Cape) peace was soon restored. It was this district, where a republican government in South Africa was first proclaimed, which furnished large numbers of the voortrekkers in 1835-1842. It remains a strong Dutch centre.

See J. C. Voight, Fifty Years of the History of the Republic in South Africa 1795-1845, vol. i. (London, 1899).

GRABBE, CHRISTIAN DIETRICH (1801-1836), German dramatist, was born at Detmold on the nth of December 1801. Entering the university of Leipzig in 1 819 as a student of law, he continued the reckless habits which he had begun at Detmold, and neglected his studies. Being introduced into literary circles, he conceived the idea of becoming an actor and wrote the drama Herzog Theodor von Gothland (1822). This, though showing considerable literary talent, lacks artistic form, and is morally repulsive. Ludwig Tieck, while encouraging the young author, pointed out its faults, and tried to reform Grabbe himself. In 1822 Grabbe removed to Berlin University, and in 1824 passed his advocate's examination. He now settled in his native town as a lawyer and in 1827 was appointed a Militar-auditeur. In 1833 he married, but in consequence of his drunken habits was dismissed from his office, and, separating from his wife, visited Dusseldorf, where he was kindly received by Karl Immermann. After a serious quarrel with the latter, he returned to Detmold, where, as a result of his excesses, he died on the 12th of September 1836.

Grabbe had real poetical gifts, and many of his dramas contain fine passages and a wealth of original ideas. They largely reflect his own life and character, and are characterized by cynicism and indelicacy. Their construction also is defective and little suited to the requirements of the stage. The boldly conceived Don Juan und Faust (1829) and the historical dramas Friedrich Barbarossa (1829), Heinrich VI. (1830), and Napoleon oder die Hundert Tage (1831), the last of which places the battle of Waterloo upon the stage, are his best works. Among others are the unfinished tragedies Marius and Sulla (continued by Erich Korn, Berlin, 1890); and Hannibal (1835, supplemented and edited by C. Spielmann, Halle, 1901); and the patriotic Hermannsschlachl or the battle between Arminius and Varus (posthumously published with a biographical notice, bv E Duller, 1838).

Grabbe's works have been edited by O. Blumenthal (4 vols., 1875), and E. Gnsebach (4 vols., 1902). For further notices of his life, see K. Ziegler, Grabbes Leben und Charakler (1855); O. Blumenthal, Beitrdge zur Kenntnis Grabbes (1875); C. A Piper Grabbe (1898), and A. Ploch, Grabbes Stellung in der deutschen Litera- tur (1905).

GRABE, JOHN ERNEST (1666-1711), Anglican divine, was born on the 10th of July 1666, at Konigsberg, where his father, Martin Sylvester Grabe, was professor of theology and history. In his

theological studies Grabe succeeded in persuading himself of the schismatical character of the Reformation, and accordingly he presented to the consistory of Samland in Prussia a memorial in which he compared the position of the evangelical Protestant churches with that of the Novatians and other ancient schis- matics. He had resolved to join the Church of Rome when a commission of Lutheran divines pointed out flaws in his written argument and called his attention to the English Church as apparently possessing that apostolic succession and manifesting that ˆfidelity to ancient institutions which he desired. He came to England, settled in Oxford, was ordained in 1700, and became chaplain of Christ Church. His inclination was towards the party of the nonjurors. The learned labours to which the remainder of his life was devoted were rewarded with an Oxford degree and a royal pension. He died on the 3rd of November 17 1 1, and in 1726 a monument was erected to him by Edward Harley, earl of Oxford, in Westminster Abbey. He was buried in St Pancras Church, London.

Some account of Grabe's life is given in R. Nelson's Life of George Bull, and by George Hickes in a discourse prefixed to the pamphlet against W. Whiston's Collection of Testimonies against the True

Deity of the Son and of the Holy Ghost. His works, which show him to have been learned and laborious but somewhat deficient in critical acumen, include a Spicilegium SS. Patrum et kaereticorum (1698-1699), which was designed to cover the first three centuries of the Christian church, but was not continued beyond the close of the second. A second edition of this work was published in 1714. He brought out an edition of Justin Martyr's Apologia prima (1700), of Irenaeus, Adversus omnes haereses (1702), of the Septuagint, ajid of Bishop Bull's Latin works (1703). His edition of the Septua- gint was based on the Codex Alexandrinus • it appeared in 4 volumes (1707- 1 720), and was completed by Francis Lee and by George Wigan.

GRACCHUS, in ancient Rome, the name of a plebeian family of the Sempronian gens. Its most distinguished representatives were the famous tribunes of the people, Tiberius and Gaius Sempronius Gracchus, (4) and (5) below, usually called simply " the Gracchi."

1. Tiberius Sempronius Gracchus, consul in 238 B.C., carried on successful operations against the Ligurian mountaineers, and, at the conclusion of the Carthaginian mercenary war, was in command of

the fleet which at the invitation of the insurgents took possession of the island of Sardinia.

2. Tiberius Sempronius Gracchus, probably the son of (1), distinguished himself during the second Punic war. Consul in 215, he defeated the Capuans who had entered into an alliance with Hannibal, and in 214 gained a signal success over Hanno near Beneventum, chiefly owing to the volvnes (slave-volunteers), to whom he had promised freedom in the event of victory. In 213 Gracchus was consul a second time and carried cm the war in Lucania; in the following year, while advancing' northward to reinforce the consuls in their attack on Capua, he was betrayed into the hands of the Carthaginian Mago by a Lucanian of rank, who had formerly supported the Roman cause and was connected with Gracchus himself by ties of hospitality. Gracchus fell fighting bravely; his body was sent to Hannibal, who accorded him a splendid burial.

3. Tiberius Sempronius Gracchus (c. 210-151 B.C.), father of the tribunes, and husband of Cornelia, the daughter of the elder Scipio Africanus, was possibly the son of a Publius Sempronius Gracchus who was tribune in 189. Although a determined political opponent of the two Scipios (Asiaticus and Africanus), as tribune in 187 he interfered on their behalf when they were accused of having accepted bribes from the king of Syria after the war. In 185 he was a member of the commission sent to Macedonia to investigate the complaints made by Eumenes II. of Pergamum against Philip V. of Macedon. In his curule aedileship (182) he celebrated the games on so magnificent a scale that the burdens imposed upon the Italian and extra-Italian communities led to the official interference of the senate. In 181 he went as praetor to Hither Spain, and, after gaining signal successes in the field, applied himself to the pacification of the country. His strict sense of justice and sympathetic attitude won the respect and affection of the inhabitants; the land had rest for a quarter of a century. When consul in 177, he was occupied in putting down a revolt in Sardinia, and brought back so many prisoners that Sardi venales (Sardinians for sale) became a proverbial expression for a drug in the market. In 169 Gracchus was censor, and both he and his colleague (C. Claudius Pulcher) showed themselves determined opponents of the capitalists. They deeply offended the equestrian order by forbidding any contractor who had obtained contracts under the previous censors to make fresh offers. Gracchus stringently enforced the limitation of the freedmen to the four city tribes, which completely destroyed their influence in the comitia. In 165 and 161 he went as ambassador to several Asiatic princes, with whom he established friendly relations. Amongst the places visited by him was Rhodes, where he delivered a

speech in Greek, which he afterwards published. In 163 he was again consul.

4. Tiberius Semproniijs Gracchus (163-133 B.C.), son of (3) , was the elder of the two great reformers. He and his brother were brought up by their mother Cornelia, assisted by the rhetorician Diophanes of Mytilene and the Stoic Blossius of Cumae. In 147 he served under his brother-in-law the younger

Scipio in Africa during the last Punic war, and was the first to mount the walls in the attack on Carthage. When quaestor in 137, he accompanied the consul C. Hostiiius Mancinus to Spain. During the Numantine war the Roman army was saved from annihilation only by the efforts of Tiberius, with whom alone the Numantines consented to treat, out of respect for the memory of his father. The senate refused to ratify the agree- ment; Mancinus was handed over to the enemy as a sign that it was annulled, and only personal popularity saved Tiberius himself from punishment. In 133 he was tribune, and cham- pioned the impoverished farmer class and the lower orders. His proposals (see Agrarian Laws) met with violent opposition, and were not carried until he had, illegally and unconstitutionally, secured the deposition of his fellow-tribune, M. Octavius, who had been persuaded by the optimates to veto them. The senate put every obstacle in the way of the three commissioners ap- pointed to carry out the provisions of the law, and Tiberius, in view of the bitter enmity he had aroused, saw that it was necessary to strengthen his hold on the popular favour. The legacy to the Roman people of the kingdom and treasures of Attalus III. of Pergamum gave him an opportunity. He proposed that the money realized by the sale of the treasures should be divided, for the purchase of implements and stock, amongst those to whom assignments of land had been made under the new law. He is also said to have brought forward measures for shortening the period of military service, for extending the right of appeal from the judices to the people, for abolishing the exclusive privilege of the senators to act as jurymen, and even for admit- ting the Italian allies to citizenship. To strengthen his position further, Tiberius offered himself for re-election as tribune for the following year. The senate declared that it was illegal to hold this office for two consecutive years; but Tiberius treated this objection with contempt. To win the sympathy of the people, he appeared in mourning, and appealed for protection for his wife and children, and whenever he left his house he was accom- panied by a bodyguard of 3000 men, chiefly consisting of the city rabble. The meeting of the tribes for the election of tribunes broke up in disorder on two successive days, without any result being attained, although on both occasions the first divisions voted in favour of

Tiberius. A rumour reached the senate that he was aiming at supreme power, that he had touched his head with his hand, a sign that he was asking for a crown. An appeal to the consul P. Mucius Scaevola to order him to be put to death at once having failed, P. Scipio Nasica exclaimed that Scaevola was acting treacherously towards the state, and called upon those who agreed with him to take up arms and follow him. During the riot that followed, Tiberius attempted to escape, but stumbled on the slope of the Capitol and was beaten to death with the end of a bench. At night his body, with those of 300 others, was thrown into the Tiber. The aristocracy boldly assumed the responsibility for what had occurred, and set up a commission to inquire into the case of the partisans of Tiberius, many of whom were banished and others put to death. Even the moderate Scaevola subsequently maintained that Nasica was justified in his action; and it was reported that Scipio, when he heard at Numantia of his brother-in-law's death, repeated the line of Homer — " So perish all who do the like again." '

See Livy, Epit. 58; Appian, Bell. civ. i. 9-17; Plutarch, Tiberius Gracchus; Veil. Pat. ii. 2, 3.

5. Gaius Sempronius Gracchus (153-121 b.c), younger brother of (4), was a man of greater abilities, bolder and more passionate, although possessed of considerable powers of self- control, and a vigorous and impressive orator. When twenty years of age he was appointed one of the commissioners to carry out the distribution of land under the provisions of his brother's agrarian law. At the time of Tiberius's death, Gaius was serving under his brother-in-law Scipio in Spain, but probably returned to Rome in the following year (132). In 131 he supported the bill of C. Papirius Carbo, the object of which was to make it legal for a tribune to offer himself as candi- date for the office in two consecutive years, and thus to remove

one of the chief obstacles that had hampered Tiberius. The bill was then rejected, but appears to have subsequently passed in a modified form, as Gaius himself was re-elected without any disturbance. Possibly, however, his re-election was illegal, and he had only succeeded where his brother had failed. For the next few years nothing is heard of Gaius. Public opinion pointed him out as the man to avenge his brother's death and carry out his plans, and the aristocratic party, warned by the example of Tiberius, were anxious to

keep him away from Rome. In 126 Gaius accompanied the consul L. Aurelius Orestes as quaestor to Sardinia, then in a state of revolt. Here he made himself so popular that the senate in alarm prolonged the command of Orestes, in order that Gaius might be obliged to remain there in his capacity of quaestor. But he returned to Rome without the permission of the senate, and, when called to account by the censors, defended himself so successfully that he was acquitted of having acted illegally. The disappointed aristocrats then brought him to trial on the charge of being implicated in the revolt of Fregellae, and in other ways unsuccess- fully endeavoured to undermine his influence. Gaius then decided to act; against the wishes of his mother he became a candidate for the tribuneship, and, in spite of the determined opposition of the aristocracy, he was elected for the year 123, although only fourth on the list. The legislative proposals 1 brought forward by him had for their object: — the punish- ment of his brother's enemies; the relief of distress and the attachment to himself of the city populace; the diminution of the power of the senate and the increase of that of the equites; the amelioration of the political status of the Italians and provincials.

A law was passed that no Roman citizen should be tried in a matter affecting his life or political status unless the people had

Ereviously given its assent. This was specially aimed at Popilius aenas, who had taken an active part in the prosecution of the adherents of Tiberius. Another law enacted that any magistrate who had been deprived of office by decree of the people should be incapacitated from holding office again. This was directed against M. Octavius, who had been illegally deprived of his tribunate through Tiberius. This unfair and vindictive measure was with- drawn at the earnest request of Cornelia.

He revived his brother's agrarian law, which, although it had not been repealed, had fallen into abeyance. By his Lex Frumentaria every citizen resident in Rome was entitled to a certain amount of corn at about half the usual price; as the distribution only applied to those living in the capital, the natural result was that the poorer country citizens flocked into Rome and swelled the number of Gaius's supporters. No citizen was to be obliged to serve in the army before the commencement of his eighteenth year, and his military outfit was to be supplied by the state, instead of being deducted from his pay. Gaius also proposed the establishment of colonies in Italy (at Tarentum and Capua), and sent out to the site of Carthage 6000 colonists to found the new city of Junonia, the inhabitants of which were to possess the rights of Roman citizens ; this was the first

attempt at over-sea colonization. A new system of roads was constructed which afforded easier access to Rome. Having thus gained over the city proletariat, in order to secure a majority in the comitia by its aid, Gaius did away with the system of voting in the comitia centuriata, whereby the five property classes in each tribe gave their votes one after another, and introduced promiscuous voting in an order fixed by lot.

The judices in the standing commissions for the trial of par- ticular offences (the most important of which was that dealing with the trial of provincial magistrates for extortion, de repetundis) were in future to be chosen from the equites (q.v.), not as hitherto from the senate. The taxes of the new province of Asia were to be let out by the censors to Roman publicani (who belonged to the equestrian order), who paid down a lump sum for the right of collecting them. It is obvious that this afforded the equites ex- tensive opportunities for money-making and extortion, while the alteration in the appointment of the judices gave them the same practical immunity and perpetuated the old abuses, with the differ- ence that it was no longer senators, but equites, who could look forward with confidence to being leniently dealt with by men belonging to their own order; Gaius also expected that this moneyed aristocracy, which had taken the part of the senate against Tiberius, would now support him against it. It was enacted that the pro- vinces to be assigned to the consuls, should be determined before,

1 These measures cannot be arranged in any definite chronological order, nor can it be decided which belong to his first, which to his second tribuneship. See W. Warde Fowler in Eng. Hist. Review,

1905. pp- 209 sqq-> 417 sqq-

instead of after their election; and the consuls themselves had to settle, by lot or other arrangement, which province each of them would take. 2

These measures raised Gaius to the height of his popularity, and during the year of his first tribuneship he may be considered the absolute ruler of Rome. He was chosen tribune for the second time for the year 122. To this period is probably to be assigned his proposal that the franchise should be given to all the Latin communities and that the status of the Latins should be con- ferred upon the Italian allies. In 125 M. Fulvius Flaccus had brought forward a similar measure, but he was got out of the way by the senate, who sent him to fight in Gaul. This proposal, more statesmanlike than any of the

others, was naturally opposed by the aristocratic party, and lessened Gaius's popularity amongst his own supporters, who viewed with disfavour the prospect of an increase in the number of Roman citizens. The senate put up M. Livius Drusus to outbid him, and his absence from Rome while superintending the organization of the newly-founded colony, Junonia-Carthago, was taken advantage of by his enemies to weaken his influence. On his return he found his popularity diminished. He failed to secure the tribuneship for the third time, and his bitter enemy L. Opimius was elected consul. The latter at once decided to propose the abandonment of the new colony, which was to occupy the site cursed by Scipio, while its foundation had been attended by unmistakable manifestations of the wrath of the gods. On the day when the matter was to be put to the vote, a lictor named Antyllius, who had insulted the supporters of Gaius, was stabbed to death. This gave his opponents the desired opportunity. Gaius was declared a public enemy, and the consuls were invested with dictatorial powers. The Gracchans, who had taken up their position in the temple of Diana on the Aventine, offered little resistance to the attack ordered by Opimius. Gaius managed to escape across the Tiber, where his dead body was found on the following day in the grove of Furrina by the side of that of a slave, who had probably slain his master and then himself. The property of the Gracchans was confiscated, and a temple of Concord erected in the Forum from the proceeds. Beneath the inscription recording the occasion on which the temple had been built some one during the night wrote the words: "The work of Discord makes the temple of Concord."

Bibliography. — See Livy, Epit. 60; Appian, Bell. Civ. i. 21; Plutarch, Gaius Gracchus; Orosius v. 12; Aulus Gellius x. 3, xi. 10. For an account of the two tribunes see Mommsen, Hist, of Rome (Eng. trans.), bk. iv., chs. 2 and 3 ; C. Neumann, Geschichte Roms wdhrend des Verfalles der Republik (1881) ; A. H. J. Greenidge, History of Rome (1904) ; E. Meyer, Untersuchungen zur Geschichte der Gracchen (1894); G. E. Underhill, Plutarch's Lives of the Gracchi (1892); W. Warde Fowler in English Historical Review (1905), pp. 209 and 417; Long, Decline of the Roman Republic, chs. 10-13,

17-19, containing a careful examination of the ancient authorities; G. F. Hertzberg in Ersch and Gruber's Allgemeine Encyclopddie ; C. W. Oman, Seven Roman Statesmen of the later Republic (1902) ; T. Lau, Die Gracchen und ihre Zeit (1854). The exhaustive mono- graph by C. W. Nitzsch, Die Gracchen und ihre nachsten Vorgdnger

(1847), also contains an account of the other members of the family,

with full references to ancient authorities in the notes. (J. H. F.)

GRACE, WILLIAM GILBERT (1848-), English cricketer, was born at Downend, Gloucestershire, on the 18th of July 1848. He found himself in an atmosphere charged with cricket, his father (Henry Mills Grace) and his uncle (Alfred Pocock) being as enthusiastic over the game as his elder brothers, Henry, Alfred and Edward Mills; indeed, in E. M. Grace the family name first became famous. A younger brother, George Frederick, also added to the cricket reputation of the family. “W. G.” witnessed his first great match when he was hardly six years old, the occasion being a game between W. Clarke’s All-England Eleven and twenty-two of West Gloucestershire. He was endowed by nature with a splendid physique as well as with powers of self-restraint and determination. At the acme of his career he stood full 6 ft. 2 in., being powerfully proportioned, loose yet strong of limb. A non-smoker, and very moderate

2 It is suggested by W. Warde Fowler that Gracchus proposed to add a certain number of equites to the senate, thereby increasing 1 it to 900, but the plan was never carried out.

in all matters, he kept himself in condition all the year round, shooting, hunting or running with the beagles as soon as the cricket season was over. He was also a fine runner, 440 yds. over 20 hurdles being his best distance; and it may be quoted as proof of his stamina that on the 30th of July 1866 he scored 224 not out for England v. Surrey, and two days later won a race in the National and Olympian Association meeting at the Crystal Palace. The title of ” champion ” was well earned by one who for thirty-six years (1865-1900 inclusive) was actively engaged in first-class cricket. In each of these years he was invited to represent the Gentlemen in their matches against the Players, and, when an Australian eleven visited England, to play for the mother country. As late as 1899 he played in the first of the five international contests; in 1900 he played against the players at the Oval, scoring 58 and 3. At fifty-three he scored nearly 1300 runs in first-class cricket, made 100 runs and over on three different occasions and could claim an average of 42 runs. Moreover, his greatest triumphs were achieved when only the very best cricket grounds received serious atten- tion; when, as some consider, bowling was maintained at a higher standard and when all hits had to be run out. He, with his two brothers, E. M. and G. F., assisted by some fine

amateurs, made Gloucestershire in one season a first-class county; and it was he who first enabled the amateurs of England to meet the paid players on equal terms and to beat them. There was hardly a ” record ” connected with the game which did not stand to his credit. Grace was one of the finest fieldsmen in England, in his earlier days generally taking long-leg and cover-point, in later times generally standing point. He was, at his best, a fine thrower, fast runner and safe ” catch.” As a bowler he was long in the first flight, originally bowling fast, but in later times adopting a slower and more tricky style, frequently very effective. By profession he was a medical man. In later years he became secretary and manager of the London County Cricket Club. He was married in 1873 to Miss Agnes Day, and one of his sons played for two years in the Cambridge eleven. He was the recipient of two national testimonials: the first, amounting to £1500, being presented to him in the form of a clock and a cheque at Lord’s ground by Lord Charles Russell on the 22nd of July 1879; the second, collected by the M.C.C., the county of Gloucestershire, the Daily Telegraph and the Sportsman, amounted to about £10,000, and was presented to him in 1896. He visited Australia in 1873-1874 (captain), and in 1891-1892 with Lord Sheffield’s Eleven (captain); the United States and Canada in 1872, with R. A. Fitzgerald’s team.

Dr Grace played his first great match in 1863. when, being only fifteen years of age, he scored 32 against the All-England Eleven and the bowling of Jackson, Tarrant and Tinley; but the scores which first made his name prominent were made in 1864, viz. 170 and 56 not out for the South Wales Club against the Gentlemen of Sussex. It was in 1865 that he first took an active part in first- class cricket, being then 6 ft. in height, and 11 stone in weight, and playing twice for the Gentlemen v. the Players, but his selection was mainly due to his bowling powers, the best exposition of which was his aggregate of 13 wickets for -84 runs for the Gentlemen of the South v. the Players of the South. His highest score was 400 not out, made in July 1876 against twenty-two of Grimsby; but on three occasions he was twice dismissed without scoring in matches against odds, a fate that never befell him in important cricket. In first-class matches his highest score was 344, made for theM.C.C. v. Kent at Canterbury, in August 1876; two days later he made 177 for Gloucestershire v. Notts, and two days after this 318 not out for Gloucestershire v. Yorkshire, the two last-named opposing counties being possessed of exceptionally strong bowling; thus in three consecutive innings Grace scored 839 runs, and was only got out twice. .His 344 was the third highest individual score made in a big match in England up to the end of 1901. He also scored 301 for Gloucestershire v. Sussex at Bristol, in August 1896. He made

over 200 runs on ten occasions, the most notable perhaps being in 1 87 1, when he performed the feat twice, each time in benefit matches, and each time in the second innings, having been each time got out in the first over of the first innings. He scored over 100 runs on 121 occasions, the hundredth score being 288, made at Bristol for Gloucestershire v. Somersetshire in 1895. He made every figure from o to 100, on one occasion " closing " the innings when he had made 93, the only total he had never made between these limits. In 1871 he made ten " centuries," ranging from 268 to 116. In the matches between the Gentlemen and Players he scored " three

figures " fifteen times, and at every place where these matches have been played. He made over 100 in each of his " first appearances " at Oxford and Cambridge. Three times he made over 100 in each innings of the same match, viz. at Canterbury, in 1868, for South v. North of the Thames, 130 and 102 not out; at Clifton, in 1887, for Gloucestershire v. Kent, 101 and 103 not out; and at Clifton, in 1888, for Gloucestershire v. Yorkshire, 148 and 153. In 1869, playing at the Oval for the Gentlemen of the South v. the Players of the South, Grace and B. B. Cooper put on 283 runs for the first wicket, Grace scoring 180 and Cooper 101. In 1886 Grace and Scotton put on 170 runs for the first wicket of England v. Australia; this occurred at the Oval in August, and Grace's total score was 170. In consecutive innings against the Players from 1871 to 1873 he scored 217, 77 and 112, 117, 163, 158 and 70. He only twice scored over 100 in a big match in Australia, nor did he ever make 200 at Lord's, his highest being 196 for the M.C.C. v. Cambridge University in 1894. His highest aggregates were 2739 (1871), 2622 (1876), 2346 (1895), 2139 (1873), 2135 (1896) and 2062 (1887). He scored three successive centuries in first-class cricket in 1871, 1872, 1873, 1874 and 1876. Playing against Kent at Gravesend in 1895, he was batting, bowling or fielding during the whole time the game was in progress, his scores being 257 and 73 not out. He scored over 1000 runs and took over 100 wickets in seven different seasons, viz. in 1874, 1665 runs and 129 wickets; in 1875, 1498 runs, 192 wickets; in 1876, 2622 runs, 124 wickets; in 1877, 1474 runs, 179 wickets; in 1878, 1151 runs, 153 wickets; in 1885, 1688 runs, 118 wickets; in 1886, 1846 runs, 122 wickets.' He never captured 200 wickets in a season, his highest record being 192 in 1875. Play- ing against Oxford University in 1886, he took all the wickets in the first innings, at a cost of 49 runs. In 1895 he not only made his hundredth century, but actually scored 1000 runs in the month of May alone, his chief scores in that month being 103, 288, 256, 73 and 169, he being then forty-seven years old. He also made during that year scores of 125, 119, 118, 104 and 103

not out, his aggregate for the year being 2346 and his average 51; his innings of 118 was made against the Players (at Lord's), the chief bowlers being Richardson, Mold, Peel and Attewell; he scored level with his partner, A. E. Stoddart (his junior by fifteen years), the pair making 151 before a wicket fell, Grace making in all 118 out of 241. This may fairly be considered one of his most wonderful years. In 1898 the match between Gentlemen v. Players was, as a special compli- ment, arranged by the M.C.C. committee to take place on his birth- day, and he celebrated the event by scoring 43 and 31 not out, though handicapped by lameness and an injured hand. In twenty- six different seasons he scored over 1000 runs, in three of these years being the only man to do so and five times being one out of two.

During the thirty-six years up to and including 1900 he scored nearly 51,000 runs, with an average of 43; and in bowling he took more than 2800 wickets, at an average cost of about 20 runs per wicket. He made his highest aggregate (2739 runs) and had his highest average (78) in 1871 ; his average for the decade 1868-1877 was 57 runs. His style as a batsman was more commanding than graceful, but as to its soundness and efficacy there were never two opinions; the severest criticism ever passed upon his powers was to the effect that he did not play slow bowling quite as well as fast. (W. J. F.)

GRACE (Fr. grdce, Lat. gratia, from gratus, beloved, pleasing; formed from the root era-, Gr. x ao S c f- XO-'-P^t X X < *pis), a word of many shades of meaning, but always connoting the idea of favour, whether that in which one stands to others or that which one shows to others. The New English Dictionary groups the meanings of the word under three main heads: (1) Pleasing quality, gracefulness, (2) favour, goodwill, (3) gratitude, thanks.

It is in the second general sense of " favour bestowed " that the word has its most important connotations. In this sense it means something given by superior authority as a concession made of favour and goodwill, not as an obligation or of right. Thus, a concession may be made by a sovereign or other public authority " by way of grace." Previous to the Revolution of 1688 such concessions on the part of the crown were known in constitutional law as " Graces." " Letters of Grace " {gratiae, gratiosa rescripta) is the name given to papal rescripts granting special privileges, indulgences, exemptions and the like. In the language of the universities the word still survives in a shadow of this sense. The word " grace " was originally a dispensation granted by the congregation of the university, or by one of the faculties, from some statutable conditions re- quired for a degree. In the English universities these conditions ceased to be enforced, and

the ” grace ” thus became an essential preliminary to any degree; so that the word has acquired the meaning of (a) the licence granted by congregation to take a

degree, (6) other decrees of the governing body (originally dispensations from statutes), all such degrees being called ” graces ” at Cambridge, (c) the permission which a candidate for a degree must obtain from his college or hall.

To this general sense of exceptional favour belong the uses of the word in such phrases as ” do me this grace,” ” to be in some one’s good graces ” and certain meanings of ” the grace of God.” The style ” by the grace of God,” borne by the king of Great Britain and Ireland among other sovereigns, though, as implying the principle of ” legitimacy,” it has been since the Revolution sometimes qualified on the continent by the addition of ” and the will of the people,” means in effect no more than the ” by Divine Providence,” which is the style borne by archbishops. To the same general sense of exceptional favour belong the phrases implying the concession of a right to delay in fulfilling certain obligations, e.g. ” a fortnight’s grace.” In law the ” days of grace ” are the period allowed for the payment of a bill of exchange, after the term for which it has been drawn (in England three days), or for the payment of an insurance premium, &c. In religious language the ” Day of Grace ” is the period still open to the sinner in which to repent. In the sense of clemency or mercy, too, ” grace ” is still, though rarely used: ” an Act of Grace ” is a formal pardon or a free and general pardon granted by act of parliament. Since to grant favours is the prerogative of the great, ” Your Grace,” ” His Grace,” &c, became dutiful paraphrases for the simple ” you ” and ” he. ” Formerly used in the royal address (” the King’s Grace,” &c), the style is in England now confined to dukes and archbishops, though the style of ” his most gracious majesty ” is still used. In Germany the equivalent, Euer Gnaden, is the style of princes who are not Durchlaucht (i.e. Serene Highness), and is often used as a polite address to any superior.

In the language of theology, though in the English Bible the word is used in several of the above senses, ” grace ” (Gr. x<*P ts) has special meanings. Above all, it signifies the spontaneous, unmerited activity of the Divine Love in the salvation of sinners, and the Divine influence operating in man for his regeneration and sanctification.

Those thus regenerated and sanctified are said to be in a " state of grace." In the New Testament grace is the forgiving mercy of God, as opposed to any human merit (Rom. xi. 6; Eph. ii. 5; Col. i. 6, &c); it is applied also to certain gifts of God freely bestowed , e.g. miracles, tongues, &c. (Rom. xv. 15; 1 Cor. xv. 10; Eph. iii. 8, &c), to the Christian virtues, gifts of God also, e.g. charity, holiness, &c. (2 Cor. viii. 7; 2 Pet. iii. 18). It is also used of the Gospel generally, as opposed to the Law (John i. 17; Rom. vi. 14; 1 Pet. v. 12, &c); connected with this is the use of the term " year of grace " for a year of the Christian era.

The word ” grace ” is the central subject of three great theological controversies: (1) that of the nature of human depravity and regeneration (see Pelagius), (2) that of the relation between grace and free-will (see Calvin, John, and Arminius, Jacobus), (3) that of the ” means of grace ” between Catholics and Protestants, i.e. whether the efficacy of the sacraments as channels of the Divine grace is ex opere operato or dependent on the faith of the recipient.

In the third general sense, of thanks for favours bestowed, ” grace ” survives as the name for the thanksgiving before or after meals. The word was originally used in the plural, and ” to do, give, render, yield graces ” was said, in the general sense of the French rendre graces or Latin gralias agere, of any giving thanks. The close, and finally exclusive, association of the phrase ” to say grace ” with thanksgiving at meals was possibly due to the formula ” Gratias Deo agamus ” (” Jet us give thanks to God “) with which the ceremony began in monastic refectories. The custom of saying grace, which obtained in pre-Christian times among the Jews, Greeks and Romans, and was adopted universally by Christian peoples, is probably less widespread in private houses than it used to be. It is, however, still maintained at public dinners and also in schools, colleges and institutions generally. Such graces are generally in Latin and of great antiquity: they arc sometimes short, e.g. ” Laus

Deo,” ” Benedictus benedicat,” and sometimes, as at the Oxford and Cambridge colleges, of considerable length. In some countries grace has sunk to a polite formula; in Germany, e.g. it is usual before and after meals to bow to one’s neighbours and say ” Gesegnete Malzeit ! ” (May your meal be blessed), a phrase often reduced in practice to ” Malzeit ” simply.

GRACES, THE, (Gr. X&ptres, Lat. Gratiae), in Greek mythology, the personification of grace and charm, both in nature and in moral action. The transition from a single goddess, Charis, to a number or

group of Charites, is marked in Homer. In the Iliad one Charis is the wife of Hephaestus, another the promised wife of Sleep, while the plural Charites often occurs. The Charites are usually described as three in number — Aglaia (brightness), Euphrosyne (joyfulness), Thalia (bloom) — daughters of Zeus and Hera (or Eurynome, daughter of Oceanus), or of Helios and Aegle; in Sparta, however, only two were known, Cleta (noise) and Phaenna (light), as at Athens Auxo (increase) and Hegemone (queen). They are the friends of the Muses, with whom they live on Mount Olympus, and the companions of Aphrodite, of Peitho, the goddess of persuasion, and of Hermes, the god of eloquence, to each of whom charm is an indispensable adjunct. The need of their assistance to the artist is indicated by the union of Hephaestus and Charis. The most ancient seat of their cult was Orchomenus in Boeotia, where their oldest images, in the form of stones fallen from heaven, were set up in their temple. Their worship was said to have been instituted by Eteocles, whose three daughters fell into a well while dancing in their honour. At Orchomenus nightly dances took place, and the festival Charitesia, accompanied by musical contests, was celebrated; in Paros their worship was celebrated without music or garlands, since it was there that Minos, while sacrificing to the Charites, received the news of the death of his son Androgeus; at Messene they were revered together with the Eumenides; at Athens, their rites, kept secret from the profane, were held at the entrance to the Acropolis. It was by Auxo, Hegemone and Agraulos, the daughter of Cecrops, that young Athenians, on first receiving their spear and shield, took the oath to defend their country. In works of art the Charites were represented in early times as beautiful maidens of slender form, hand in hand or embracing one another and wearing drapery; later, the conception predominated of three naked figures gracefully intertwined. Their attributes were the myrtle, the rose and musical instruments. In Rome the Graces were never the objects of special religious reverence, but were described and represented by poets and artists in accordance with Greek models.

See F. H. Krause, Musen, Gratien, Horen, und Nymphen (1871), and the articles by Stoll and Furtwangler in Roscher's Lexikon der Mythologie, and by S. Gsell in Daremberg and Saglio's Dictionnaire des antiquites, with the bibliography.

GRAClAN Y MORALES, BALTASAR (1601-1658), Spanish prose writer, was born at Calatayud (Aragon) on the 8th of January 1601. Little is known of his personal history except that on May 14, 1619, he entered the Society of Jesus, and that ultimately .he became rector of the Jesuit college at Tarazona, where he died on the 6th of December, 1658. His principal works are El Heroe (1630), which describes in

apophthegmatic phrases the qualities of the ideal man; the Arte de ingenio, tratado de la Agudeza (1642), republished six years afterwards under the title of Agudeza, y arte de ingenio (1648), a system of rhetoric in which the principles of conceptismo as opposed to culteranismo are inculcated; El Discreto (1645), a delineation of the typical courtier; El Oraculo manual y arte de prudencia (1647), a system of rules for the conduct of life; and El Criticdn (1651-1653-1657), an ingenious philosophical allegory of human existence. The only publication which bears Gracian's name is El Comulgatorio (1655); his more important books were issuec under the pseudonym of Lorenzo Gracian (possibly a brothei of the writer) or under the anagram of Gracian de Marlones Gracian was punished for publishing without his superior's permission El Criticdn (in which Defoe is alleged to have founc the germ of Robinson Crusoe) ; but no objection was taken tc

its substance. He has been excessively praised by Schopenhauer, whose appreciation of the author induced him to translate the Ordculo manual, and he has been unduly depreciated by Ticknor and others. He is an acute thinker and observer, misled by his systematic misanthropy and by his fantastic literary theories.

See Karl Borinski, Baltasar Gracian und die Hoflitteratur in Deutschland (Halle, 1894); Benedetto Croce, / Trattatisti italiani del " concettismo" e Baltasar Gracian (Napoli, 1899); Narciso Jose Liflan y Heredia, Baltasar Gracian (Madrid, 1902). Schopenhauer and Joseph Jacobs have respectively translated the Ordculo manual into German and English.

GRACKLE (Lat. Gracculus or Graculus), a word much used in ornithology, generally in a vague sense, though restricted to members of the families Slurnidae belonging to the Old World and Icteridae belonging to the New. Of the former those to which it has been most commonly applied are the species known as mynas, mainas, and minors of India and the adjacent countries, and especially the Gracula religiosa of Linnaeus, who, according to Jerdon and others, was probably led to confer this epithet upon it by confounding it with the Sturnus or Acridotheres lristis, i which is regarded by the Hindus as sacred to Ram Deo, one of their deities, while the true Gracula religiosa does not seem to be anywhere held in veneration. This last is about 10 in.

Gracula religiosa.

in length, clothed in a plumage of glossy black, with purple and green reflections, and a conspicuous patch of white on the quill-feathers of the wings. The bill is orange and the legs yellow, but the bird's most characteristic feature is afforded by the curious wattles of bright yellow, which, beginning behind the eyes, run backwards in form of a lappet on each side, and then return in a narrow stripe to the top of the head. Beneath each eye also is a bare patch of the same colour. This species is common in southern India, and is represented farther to the north, in Ceylon, Burma, and some of the Malay Islands by cognate forms. They are all frugivorous, and, being easily tamed and learning to pronounce words very distinctly, are favourite cage-birds. 2

In America the name Grackle has been applied to several species of the genera Scolecophagus and Quiscalus, though these are more commonly called in the United States and Canada " blackbirds," and some of them " boat-tails." They all belong to the family Icteridae. The best known of these are the rusty grackle, S. ferrugineus, which is found in almost the whole of North America, and Q. purpureus, the purple grackle or crow-

1 By some writers the birds of the genera A cridotheres and Temenuchus are considered to be the true mynas, and the species of Gracula are called " hill mynas " by way of distinction.

2 For a valuable monograph on the various species of Gracula and its allies see Professor Schlegel's " Bijdrage tot de Kennis von het Geschlacht Beo' " (Nederlandsch Tijdschrift voor de Dierkunde i. 1-9).

blackbird, of more limited range, for though abundant in most parts to the east of the Rocky Mountains, it seems not to appear on the Pacific side. There is also Brewer's or the blue-headed grackle, S. cyanocephalus, which has a more western range, not occurring to the eastward of Kansas and Minnesota. A fourth species, Q. major, inhabits the Atlantic States as far north as North Carolina. All these birds are of exceedingly omnivorous habit, and though destroying large numbers of pernicious insects are in many places held in bad repute from the mischief they do to the corn-crops. (A. N.)

GRADISCA, a town of Austria, in the province of Gorz and Gradisca, 10 m. S.W. of Gorz by rail. Pop. (1900) 3843, mostly Italians. It is situated on the right bank of the Isonzo and was formerly a strongly fortified place. Its principal industry is silk spinning. Gradisca

originally formed part of the margraviate of Friuli, came under the patriarchate of Aquileia in 1028, and in 1420 to Venice. Between 147 1 and 1481 Gradisca was fortified by the Venetians, but in 1511 they surrendered it to the emperor Maximilian I. In 1647 Gradisca and its territory, including Aquileia and forty-three smaller places, were erected into a separate countship in favour of Johann Anton von Eggenberg, duke of Krumau. On the extinction of his line in 1 717, it reverted to Austria, and was completely incor- porated with Gorz in 1754. The name was revived by the constitution of 1861, which established the crownland of Gorz and Gradisca.

GRADO, a town of northern Spain, in the province of Oviedo; 11 m. W. by N. of the city of Oviedo, on the river Cubia, a left-hand tributary of the Nalon. Pop. (1900) 17,125. Grado is built in the midst of a mountainous, well-wooded and fertile region. It has some trade in timber, live stock, cider and agricultural produce. The nearest railway station is that of the Fabrica de Trubia, a royal cannon-foundry and small-arms factory, 5 m. S.E.

GRADUAL (Med. Lat. gradualism of or belonging to steps or degrees; gradus, step), advancing or taking place by degrees or step by step; hence used of a slow progress or a gentle de- clivity or slope, opposed to steep or precipitous. As a sub- stantive, ” gradual ” (Med. Lat. graduale or gradale) is used of a service book or antiphonal of the Roman Catholic Church containing certain antiphons, called ” graduals,” sung at the service of the Mass after the reading or singing of the Epistle. This antiphon received the name either because it was sung on the steps of the altar or while the deacon was mounting the steps of the ambo for the reading or singing of the Gospel. For the so-called Gradual Psalms, exx.-exxxiv., the ” songs of degrees,” LXX. co5?) ava fiadix&v, see Psalms, Book of.

GRADUATE (Med. Lat. graduare, to admit to an academical degree, gradus), in Great Britain a verb now only used in the academical sense intransitively, i.e. ” to take or proceed to a university degree,” and figuratively of acquiring knowledge of, or proficiency in, anything. The original transitive sense of ” to confer or admit to a degree ” is, however, still preserved in America, where the word is, moreover, not strictly confined to university degrees, but is used also of those successfully com- pleting a course of study at any educational establishment. As a substantive, a ” graduate ” (Med. Lat. graduatus) is one who has taken a degree in a university. Those who have matriculated at a university, but not yet taken a degree, are known as ” undergraduates.” The word ” student,” used of undergraduates e.g. in Scottish universities, is never applied generally to those of the

English and Irish universities. At Oxford the only ” students ” are the ” senior students ” (i.e. fellows) and ” junior students ” (i.e. undergraduates on the foundation, or ” scholars “) of Christ Church. The verb ” to graduate ” is also used of dividing anything into degrees or parts in accordance with a given scale. For the scientific application see Graduation below. It may also mean ” to arrange in gradations ” or ” to adjust or apportion according to a given scale.” Thus by ” a graduated income-tax ” is meant the system by which the percentage paid differs according to the amount of income on a pre-arranged scale.

GRADUATION

312

GRADUATION (see also Graduate) , the art of dividing straight scales, circular arcs or whole circumferences into any required number of equal parts. It is the most important and difficult part of the work of the mathematical instrument maker, and is required in the construction of most physical, astronomical, nautical and surveying instruments.

The art was first practised by clockmakers for cutting the teeth of their wheels at regular intervals; but so long as it was confined to them no particular delicacy or accurate nicety in its performance was required. This only arose when astronomy began to be seriously studied, and the exact position of the heavenly bodies to be determined, which created the necessity for strictly accurate means of measuring linear and angular magnitudes. Then it was seen that graduation was an art which required special talents and training, and the best artists gave great attention to the perfecting of astronomical instruments. Of these may be named Abraham Sharp (1651-1742), John Bird (1700-1776), John Smeaton (1724-1792), Jesse Ramsden (1735-1800), John Troughton, Edward Troughton (1753-1835), William Simms (1793-1860) and Andrew Ross.

The first graduated instrument must have been done by the hand and eye alone, whether it was in the form of a straight- edge with equal divisions, or a screw or a divided plate; but, once in the possession of one such divided instrument, it was a comparatively easy matter to employ it as a standard. Hence graduation divides itself into two distinct branches, original graduation and copying, which latter may be done either by the hand or by a machine called a dividing engine. Graduation may therefore be treated under the three heads of original graduation, copying and machine graduation.

Original Graduation. — In regard to the graduation of straight scales elementary geometry provides the means of dividing a straight line into any number of equal parts by the method of continual bisection; but the practical realization of the geometrical construction is so difficult as to render the method untrustworthy. This method, which employs the common diagonal scale, was used in dividing a quadrant of 3 ft. radius, which belonged to Napier of Merchiston, and which only read to minutes — a result, according to Thomson and Tait (Nat. Phil.), ” giving no greater accuracy than is now attainable by the pocket sextants of Troughton and Simms, the radius of whose arc is little more than an inch.”

The original graduation of a straight line is done either by the method of continual bisection or by stepping. In continual bisection the entire length of the line is first laid down. Then, as nearly as possible, half that distance is taken in the beam-compass and marked off by faint arcs from each end of the line. Should these marks coincide the exact middle point of the line is obtained. If not, as will almost always be the case, the distance between the marks is carefully bisected by hand with the aid of a magnifying glass. The same process is again applied to the halves thus obtained, and so on in succession, dividing the line into parts represented by 2, 4, 8, 16, &c. till the desired divisions are reached. In the method of stepping the smallest division required is first taken, as accurately as possible, by spring dividers, and that distance is then laid off, by successive steps, from one end of the line. In this method, any error at starting will be multiplied at each division by the number of that division. Errors so made are usually adjusted by the dots being put either back or forward a little by means of the dividing punch guided by a magnifying glass. This is an extremely tedious process, as the dots, when so altered several times, are apt to get insufferably large and shapeless.

The division of circular arcs is essentially the same in principle as the graduation of straight lines.

The first example of note is the 8-ft. mural circle which was graduated by George Graham (1673-1751) for Greenwich Obser- vatory in 1725. In this two concentric arcs of radii 96-85 and 95-8 in. respectively were first described by the beam-compass. On the inner of these the arc of 90° was to be divided into degrees a’nd 1 2 th parts of a degree, while the same on the outer was to be divided into 96 equal parts and these again into 16th parts. The reason for adopting the latter was that, 96 and 16 being both powers of 2, the divisions could be got at by continual bisection alone, which, in Graham’s opinion, who first employed it, is the only accurate method, and would thus serve as a

check upon the accuracy of the divisions of the outer arc. With the same distance on the beam- compass as was used to describe the inner arc, laid off from 0°, the point 60 ° was at once determined. With the points o° and 60 °

as centres successively, and a distance on the beam-compass very nearly bisecting the arc of 6o°, two slight marks were made on the arc; the distance between these marks was divided by the hand aided by a lens, and this gave the point 30 . The chord of 6o° laid off from the point 30° gave the point 90°, and the quadrant was now divided into three equal parts. Each of these parts was similarly bisected, and the resulting divisions again trisected, giving 18 parts of 5 each. Each of these quinquesected gave degrees, the 1 2th parts of which were arrived at by bisecting and trisecting as before. The outer arc was divided by continual bisection alone, and a table was constructed by which the readings of the one arc could be converted into those of the other. After the dots indi- cating the required divisions were obtained, either straight strokes all directed towards the centre were drawn through them by the dividing knife, or sometimes small arcs were drawn through them by the beam-compass having its fixed point somewhere on the line which was a tangent to the quadrantal arc at the point where a division was to be marked.

The next important example of graduation was done by Bird in 1767. His quadrant, which was also 8-ft. radius, was divided into degrees and 12th parts of a degree. He employed the method of continual bisection aided by chords taken from an exact scale of equal parts, which could read to ooi of an inch, and which he had previously graduated by continual bisections. With the beam compass an arc of radius 95-938 in. was first drawn. From this radius the chords of 30°, 15 , io° 20', 4° 40′ and 42 40′ were com- puted, and each of them by means of the scale of equal parts laid off on a separate beam-compass to be ready. The radius laid off from 0° gave the point 60° ; by the chord of 30 the arc of 6o° was bisected; from the point 30° the radius laid off gave the point 90 ; the chord of 15° laid off backwards from 90 8 gave the point 75 ; from 75° was laid off forwards the chord of io ° 20'; and from 90 was laid off backwards the chord of 4 40'; and these were found to coincide in the point 85° 20'. Now 85° 20′ being =5′ X 1024 = 5'X2 10 , the final divisions of 85° 20′ were found by continual bi- sections. For the remainder of the quadrant beyond 85° 20', containing 56 divisions of 5′ each, the chord of 64 such divisions was laid off from the point 85 ° 40', and the corresponding arc divided by continual bisections as before. There was thus a severe check upon the accuracy of the points already found, viz. 15°, 30°, 60°, 75 , 90°, which, however, were found to coincide with the corresponding points

obtained by continual bisections. The short lines through the dots were drawn in the way already mentioned.

The next eminent artists in original graduation are the brothers John and Edward Troughton. The former was the first to devise a means of graduating the quadrant by continual bisection without the aid of such a scale of equal parts as was used by Bird. His method was as follows: The radius of the quadrant laid off from 0° gave the point 60 °. This arc bisected and the half laid off from 6o° gave the point 90°. The arc between 60° and 90° bisected gave 75°; the arc between 75 and 90° bisected gave the point 82 ° 30', •and the arc between 82° 30′ and 90 bisected gave the point 86° 15'. Further, the arc between 82° 30′ and 86° 15′ trisected, and two- thirds of it taken beyond 82° 30', gave the point 85°, while the arc between 85° and 86° 15′ also trisected, and one-third part laid off beyond 85°, gave the point 85° 25'. Lastly, the arc between 85° and 85° 25′ being quinquesected, and four-fifths taken beyond 85°, gave 85° 20', which as before is = 5'X2 10 , and so can be finally divided by continual bisection.

The method of original graduation discovered by Edward Trough- ton is fully described in the Philosophical Transactions for 1809, as employed by himself to divide a meridian circle of 4 ft. radius. The circle was first accurately turned both on its face and its inner and outer edges. A roller was next provided, of such diameter that it revolved 16 times on its own axis while made to roll once round the outer edge of the circle. This roller, made movable on pivots, was attached to a frame-work, which could be slid freely, yet tightly, along the circle, the roller meanwhile revolving, by means of f rictional contact, on the outer edge. The roller was also, after having been properly adjusted as to size, divided as accurately as possible into 16 equal parts by lines parallel to its axis. While the frame carrying the roller was moved once round along the circle, the points of contact of the roller-divisions with the circle were accurately ob- served by two microscopes attached to the frame, one of which (which we shall call H) commanded the ring on the circle near its edge, which was to receive the divisions and the other viewed the roller-divisions. The points of contact thus ascertained were marked with faint dots, and the meridian circle thereby divided into 256 very nearly equal parts.

The next part of the operation was to find out and tabulate the errors of these dots, which are called apparent errors, in conse- quence of the error of each dot being ascertained on the supposition that its neighbours are all correct. For this purpose two micro- scopes (which we shall call A and B) were taken, with cross wires and micrometer adjustments, consisting of a screw and head divided into 100

divisions, 50 of which read in the one and 50 in the opposite direction. These microscopes were fixed so that their cross-wires respectively bisected the dots o and 128, which were supposed to be diametrically opposite. The circle was now turned half-way round on its axis, so that dot 128 coincided with the wire of A,

and, should dot o be found to coincide with B, then the two dots were 180 apart. If not, the cross wire of B was moved till it coin- cided with dot o, and the number of divisions of the micrometer head noted. Half this number gave clearly the error of dot 128, and it was tabulated + or — according as the arcual distance between o and 128 was found to exceed or fall short of the remaining part of the circumference. The microscope B was now shifted, A re- maining opposite dot o as before, till its wire bisected dot 64, and, by giving the circle one quarter of a turn on its axis, the difference of the arcs between dots o and 64 and between 64 and 128 was obtained. The half of this difference gave the apparent error of dot 64, which was tabulated with its proper sign. With the micro- scope A still in the same position the error of dot 192 was obtained, and in the same way by shifting B to dot 32 the errors of dots 32, 96, 160 and 224 were successively ascertained. In this way the apparent errors of all the 256 dots were tabulated.

From this table of apparent errors a table of real errors was drawn up by employing the following formula: — ■

i(,Xa+x c)--z — the real error of dot b, where x a is the real error of dot a, x c the real error of dot c, and z the apparent error of dot b midway between a and c. Having got the real errors of any two dots, the table of apparent errors gives the means of finding the real errors of all the other dots.

The last part of Troughton's process was to employ them to cut the final divisions of the circle, which were to be spaces of 5′ each. Now the mean interval between any two dots is 3607256 = 5′ Xi6|, and hence, in the final division, this interval must be divided into 16J equal parts. To accomplish this a small instrument, called a subdividing sector, was provided. It was formed of thin brass and had a radius about four times that of the roller, but made adjustable as to length. The sector was placed concentrically on the axis, and rested on the upper end of the roller. It turned by frictional adhesion along with the roller, but was sufficiently loose to allow of its being moved back

by hand to any position without affecting the roller. While the roller passes over an angular space equal to the mean interval between two dots, any point of the sector must pass over 16 times that interval, that is to say, over an angle re- presented by 360° X 16/256 = 22° 30'. This interval was therefore divided by 16J, and a space equal to 16 of the parts taken. This was laid off on the arc of the sector and divided into 16 equal parts, each equal to 1° 20'; and, to provide for the necessary fths of a division, there was laid off at each end of the sector, and beyond the 16 equal parts, two of these parts each subdivided into 8 equal parts. A microscope with cross wires, which we shall call I, was placed on the main frame, so as to command a view of the sector divisions, just as the microscope H viewed the final divisions of the circle. Before the first or zero mark was cut, the zero of the sector was brought under I and then the division cut at the point on the circle indicated by H, which also coincided with the dot o. The frame was then slipped along the circle by the slow screw motion provided for the purpose, till the first sector-division, by the action of the roller, was brought under I. The second mark was then cut on the circle at the point indicated by H. That the marks thus obtained are 5′ apart is evident when we reflect that the distance between them must be jˆth of a division on the section which by construction is 1° 20'. In this way the first 16 divisions were cut; but before cutting the 17th it was necessary to adjust the micrometer wires of H to the real error of dot I, as indicated by the table, and bring back the sector, not to zero, but to fth short of zero. Starting from this position the divisions between dots I and 2 were filled in, and then H was adjusted to the real error of dot 2, and the sector brought back to its proper division before commencing the third course. Proceeding in this manner through the whole circle, the microscope H was finally found with its wire at zero, and the sector with its 16th division under its microscope indicating that the circle had been accurately divided.

Copying. — In graduation by copying the pattern must be either an accurately divided straight scale, or an accurately divided circle, commonly called a dividing plate.

In copying a straight scale the pattern and scale to be divided, usually called the work, are first fixed side by side, with their upper faces in the same plane. The dividing square, which closely resembles an ordinary joiner's square, is then laid across both, and the point of the dividing knife dropped into the zero division of the pattern. The square is now moved up close to the point of the knife; and, while it is held firmly in this position by the left hand, the first division on the work is made by drawing the knife along the edge of the square with

the right hand.

,It frequently happens that the divisions required on a scale are either greater or less than those on the pattern. To meet this case, and still use the same pattern, the work must be fixed at a certain angle of inclination with the pattern. This angle is found in the following way. Take the exact ratio of a division on the pattern to the required division on the scale. Call this

ratio o. Then, if the required divisions are longer than those of the pattern, the angle is cos _1 a, but, if shorter, the angle is sec _1 a. In the former case two operations are required before the divisions are cut: first, the square is laid on the pattern, and the corresponding divisions merely notched very faintly on the edge of the work; and, secondly, the square is applied to the work and the final divisions drawn opposite each faint notch. In the second case, that is, when the angle is sec _1 a, the dividing square is applied to the work, and the divisions cut when the edge of the square coincides with the end of each division on the pattern.

In copying circles use is made of the dividing plate. This is a circular plate of brass, of 36 in. or more in diameter, carefully graduated near its outer edge. It is turned quite flat, and has a steel pin fixed in its centre, and at right angles to its plane. For guiding the dividing knife an instrument called an index is employed. This is a straight bar of thin steel of length equal to the radius of the plate. A piece of metal, having a V notch with its angle a right angle, is riveted to one end of the bar in such a position that the vertex of the notch is exactly in a line with the edge of the steel bar. In this way, when the index is laid on the plate, with the notch grasping the central pin, the straight edge of the steel bar lies exactly along a radius. The work to be graduated is laid flat on the dividing plate, and fixed by two clamps in a position exactly concentric with it. The index is now laid on, with its edge coinciding with any required division on the dividing plate, and the corresponding division on the work is cut by drawing the dividing knife along the straight edge of the index.

Machine Graduation: — The first dividing engine was probably that of Henry Hindley of York, constructed in 1 740, and chiefly used by him for cutting the teeth of clock wheels. This was followed shortly after by an engine devised by the due de Chaulnes ;but the first notable engine was that made by Ramsden, of which an account was published by the Board of Longitude in 1777. He was rewarded by that board with a sum of £300, and a further sum of £315 was given to him on condition that he would divide, at a certain fixed rate, the

instruments of other makers. The essential principles of Ramsden's machine have been repeated in almost all succeeding engines for dividing circles.

Ramsden's machine consisted of a large brass prate 45 in. in diameter, carefully turned and movable on a vertical axis. The edge of the plate was ratched with 2160 teeth, into which a tangent screw worked, by means of which the plate could be made to turn through any required angle. Thus six turns of the screw moved the plate through 1°, and jˆth of a turn through slˆth of a degree. On the axis of the tangent screw was placed a cylinder having a spiral groove cut on its surface. A ratchet-wheel containing 60 teeth was attached to this cylinder, and was so arranged that, when the cylinder moved in one direction, it carried the tangent screw with it, and so turned the plate, but when it moved in the opposite direction, it left the tangent screw, and with it the plate, stationary. Round the spiral groove of the cylinder a catgut band was wound, one end of which was attached to a treadle and the other to a counter- poise weight. When the treadle was depressed the tangent screw turned round, and when the pressure was removed it returned, in obedience to the weight, to its former position without affecting the screw. Provision was also made whereby certain stops could be placed in the way of the screw, which only allowed it the requisite amount of .turning. The work to be divided was firmly fixed on the plate, and made concentric with it. The divisions were cut, while the screw was stationary, by means of a dividing knife attached to a swing frame, which allowed it to have only a radial motion. In this way the artist could divide very rapidly by alternately depress- ing the treadle and working the dividing knife.

Ramsden also constructed alinear dividing engine on essentially the same principle. If we imagine the rim of the circular plate with its notches stretched out into a straight line and made movable in a straight slot, the screw, treadle, &c, remaining as before, we get a very good idea of the linear engine.

In 1793 Edward Troughton finished a circular dividing engine, of which the plate was smaller than in Ramsden's, and which differed considerably in simplifying matters of detail. The plate was originally divided by Troughton's own method, already described, and the divisions so obtained were employed

to ratch the edge of the plate for receiving the tangent screw with great accuracy. Andrew Ross (Trans. Soc. Arts, 1830- 1831) constructed a dividing machine which differs considerably from those of Ramsden and Troughton.

The essential point of difference is that, in Ross's engine, the tangent screw does not turn the engine plate; that is done by an independent apparatus, and the function of the tangent screw is only to stop the plate after it has passed through the required angular interval between two divisions on the work to be graduated. Round the circumference of the plate are fixed 48 projections which just look as if the circumference had been divided into as many deep and somewhat peculiarly shaped notches or teeth. Through each of these teeth a hole is bored parallel to the plane of the plate and also to a tangent to its circumference. Into these holes are screwed steel screws with capstan heads and flat ends. The tangent screw consists only of a single turn of a large square thread which works in the teeth or notches of the plate. This thread is pierced by 90 equally distant holes, all parallel to the axis of the screw, and at the same distance from it. Into each of these holes is in- serted a steel screw exactly similar to those in the teeth, but with its end rounded. It is the rounded and flat ends of these sets of screws coming together that stop the engine plate at the desired position, and the exact point can be nicely adjusted by suitably turning the screws.

A description is given of a dividing engine made by William Simms in the Memoirs of the Astronomical Society, 1843. Simms

Dividing Engine.

became convinced that to copy upon smaller circles the divisions which had been put upon a large plate with very great accuracy was not only more expeditious but more exact than original graduation. His machine involved essentially the same prin- ciple as Troughton's. The accompanying figure is taken by permission.

The plate A is 46 in. in diameter, and is composed of gun-metal cast in one solid piece. It has two sets of 5′ divisions — one very faint on an inlaid ring of silver, and the other stronger on the gun- metal. These were put on by original graduation, mainly on the plan of Edward Troughton. One very great improvement in this engine is that the axis B is tubular, as seen at C. The object of this hollow is to receive the axis of the circle to be divided, so that it can be fixed flat to the plate by the clamps E, without having first to be detached from the axis and

other parts to which it has already been carefully fitted. This obviates the necessity for resetting, which can hardly be done without some error. D is the tangent screw, and F the frame carrying it, which turns on carefully polished steel pivots. The screw is pressed against the edge of the plate by a spiral spring acting under the end of the lever G, and by screw- ing the lever down the screw can be altogether removed from contact with the plate. The edge of the plate is ratched by 4320 teeth which were cut opposite the original division by a circular cutter attached to the screw frame. H is the spiral barrel round which the catgut band is wound, one end of which is attached to the crank L on the end of the axis J and the other to a counterpoise weight not seen. On the other end of J is another crank inclined to L and carrying a band and counterpoise weight seen at K. The object of this weight is to balance the former and give steadiness to the motion. On the

axis J is seen a pair of bevelled wheels which move the rod I, which, by another pair of bevelled wheels attached to the box N, gives motion to the axis M, on the end of which is an eccentric for moving the bent lever O, which actuates the bar carrying the cutter. Be- tween the eccentric and the point of the screw P is an undulating plate by which long divisions can be cut. The cutting apparatus is supported upon the two parallel rails which can be elevated or depressed at pleasure by the nuts Q. Also the cutting apparatus can be moved forward or backward upon these rails to suit circles of different diameters. The box N is movable upon the bar R, and the rod I is adjustable as to length by having a kind of telescope joint. The engine is self-acting, and can be driven either by hand or by a steam-engine or other motive power. It can be thrown in or out of gear at once by a handle seen at S.

Mention may be made of Donkin's linear dividing engine, in which a compensating arrangement is employed whereby great accuracy is obtained notwithstanding the inequalities of the screw used to advance the cutting tool. Dividing engines have also been made by Reichenbach, Repsold and others in Germany, Gambey in Paris and by several other astronomical instrument-makers. A machine constructed by E. R. Watts & Son is described by G. T. McCaw, in the Monthly Not. R. A. S., January 1909.

References. — Bird, Method of dividing Astronomical Instruments (London, 1767); Due de Chaulnes, Nouvelle Methode pour diviser les instruments de mathematique et d'astronomie (1768); Ramsden, Description of an Engine for dividing Mathematical Instruments (London, 1777); Troughton's memoir, Phil. Trans. (1809); Memoirs of

the Royal Astronomical Society, v. 325, viii. 141, ix. 17, 35. See also J. E. Watkins, ” On the Ramsden Machine,” Smithsonian Rep. (1890), p. 721; and L. Ambronn, Astronomische Instrumenten- kunde (1899). (J. Bl.)

GRADUS, or Gradus ad Parnasstjm (a step to Parnassus), a Latin (or Greek) dictionary, in which the quantities of the vowels of the words are marked. Synonyms, epithets and poetical expressions and extracts are also included under the more important headings, the whole being intended as an aid for students in Greek and Latin verse composition. The first Latin gradus was compiled in 1702 by the Jesuit Paul Aler (1656-1727), a famous schoolmaster. There is a Latin gradus by C. D. Yonge (1850); English-Latin by A. C. Ainger and H. G. Wintle (1890); Greek by J. Brasse (1828) and E. Maltby (181 5), bishop of Durham.

GRAETZ, HEINRICH (1817-1891), the foremost Jewish historian of modern times, was born in Posen in 181 7 and died at Munich in 1891. He received a desultory education, and was largely self-taught. An important stage in his development was the period of three years that he spent at Oldenburg as assistant and pupil of S. R. Hirsch, whose enlightened orthodoxy was for a time very attractive to Graetz. Later on Graetz proceeded to Breslau, where he matriculated in 1842. Breslau was then becoming the headquarters of Abraham Geiger, the leader of Jewish reform. Graetz was repelled by Geiger’s attitude, and though he subsequently took radical views of the Bible and tradition (which made him an opponent of Hirsch), Graetz remained a life-long foe to reform. He contended for freedom of thought; he had no desire to fight for freedom of ritual practice. He momentarily thought of entering the rabbinate, but he was unsuited to that career. For some years he supported himself as a tutor. He had previously won repute by his published essays, but in 1853 the publication of the fourth volume of his history of the Jews made him famous. This fourth volume (the first to be published) dealt with the Talmud. It was a brilliant resuscitation of the past. Graetz’s skill in piecing together detached fragments of information, his vast learning and extraordinary critical acumen, were equalled by his vivid power of presenting personalities. No Jewish book of the 19th century produced such a sensation as this, and Graetz won at a bound the position he still occupies as recog- nized master of Jewish history. His Geschichte der Juden, begun in 1853, was completed in 1875; new editions of the several volumes were frequent. The work has been translated into many languages; it appeared in English in five volumes in 1891-1895. The History is defective in its lack of objectivity; Graetz’s judgments are sometimes biassed, and in particular he lacks sympathy with mysticism. But the history is a work

of genius. Simultaneously with the publication of vol. iv. Graetz was appointed on the staff of the new Breslau Seminary, of which the first director was Z. Frankel. Graetz passed the remainder of his life in this office; in 1869 he was created pro- fessor by the government, and also lectured at the Breslau University. Graetz attained considerable repute as a biblical critic. He was the author of many bold conjectures as to the date of Ruth, Ecclesiastes, Esther and other biblical books. His critical edition of the Psalms (1882-1883) was his chief con- tribution to biblical exegesis, but after his death Professor Bache'r edited Graetz's Emendationes to many parts of the Hebrew scriptures.

A full bibliography of Graetz's works is given in the Jewish Quarterly Review, iv. 194; a memoir of Graetz is also to be found there. Another full memoir was prefixed to the " index " volume of the History in the American re-issue of the English translation in six volumes (Philadelphia, 1898). (I. A.)

GRAEVIUS (properly Grave or Greffe), JOHANN GEORG (1632-1703), German classical scholar and critic, was born at Naumburg, Saxony, on the 29th of January 1632. He was originally intended for the law, but having made the acquaintance of J. F. Gronovius during a casual visit to Deventer, under his influence he abandoned jurisprudence for philology. He com- pleted his studies under D. Heinsius at Leiden, and under the Protestant theologians A. Morus and D. Blondel at Amsterdam. During his residence in Amsterdam, under Blondel's influence he abandoned Lutheranism and joined the Reformed Church; and in 1656 he was called by the elector of Brandenburg to the chair of rhetoric in the university of Duisburg. Two years afterwards, on the recommendation of Gronovius, he was chosen to succeed that scholar at Deventer; in 1662 he was translated to the university of Utrecht, where he occupied first the chair of rhetoric, and from 1667 until his death (January nth, 1703) that of history and politics. Graevius enjoyed a very high reputation as a teacher, and his lecture-room was crowded by pupils, many of them of distinguished rank, from all parts of the civilized world. He was honoured with special recogni- tion by Louis XIV., and was a particular favourite of William III. of England, who made him historiographer royal.

His two most important works are the Thesaurus antiquitatum Romanarum (1694-1699, in 12 volumes), and the Thesaurus anti- quitatum et historiarum Italiae published after his death, and

continued by the elder Burmann (1704-1725). His editions of the classics, although they marked a distinct advance in scholarship, arc now for the most part superseded. They include Hesiod'(i667), Lucian, Pseudosophista (1668), Justin, Historiae Philippicae (1669), Suetonius (1672), Catullus, Tibullus et Propertius (1680), and several of the works of Cicero (his best production). He also edited many of the writings of contemporary scholars. The Oratio funebris by P. Burmann (1703) contains an exhaustive list of the works of this scholar; see also P. H. Kiilb in Ersch and Gruber's Allgemeine Encyklopddie, and J. E. Sandys, History of Classical Scholarship, ii.

(1908).

GRAF, ARTURO (1848-), Italian poet, of German ex- traction, was born at Athens. He was educated at Naples University and became a lecturer on Italian literature in Rome, till in 1882 he was appointed professor at Turin. He was one of the founders of the Giomale delta letteratura italiana, and his publications include valuable prose criticism; but he is best known as a poet. His various volumes of verse — Poesie e novellc (1874), Dopo il tramonto versi (1893), &c. — give him a high place among the recent lyrical writers of his country.

GRAF, KARL HEINRICH (1815-1869), German Old Testa- ment scholar and orientalist, was born at Mulhausfn in Alsace on the 28th of February 181 5. He studied Biblical exegesis and oriental languages at the university of Strassburg under E. Reuss, and, after holding various teaching posts, was made instructor in French and Hebrew at the Landesschule of Meissen, receiving in 1852 the title of professor. He died on the 16th of July 1869. Graf was one of the chief founders of Old Testament criticism. In his principal work, Die geschichtlichen Biicher des A/ten Testaments (1866), he sought to show that the priestly legislation of Exodus, Leviticus and Numbers is of later origin than the book of Deuteronomy. He still, however, held the accepted view, that the Elohistic narratives formed part of the

Grundschrift and therefore belonged to the oldest portions of the Pentateuch. The reasons urged against the contention that the priestly legislation and the Elohistic narratives were separ- ated by a space of 500 years were so strong as to induce Graf, in an essay, " Die sogenannte Grundschrift des Pentateuchs," published shortly before his death, to regard the whole Grund- schrift as post-exilic and as the latest portion of the Pentateuch. The idea had already been expressed by E. Reuss, but since Graf was the first to introduce it into Germany, the theory, as developed by Julius Wellhausen, has been called the Graf- Wellhausen hypothesis.

Graf also wrote, Der Segen Moses Deut. 33 (1857) and Der Prophet Jeremia erklart (1862). See T. K. Cheyne, Founders of Old Testament Criticism (1893); ar “i Otto Pfleiderer’s book translated into English by J. F. Smith as Development of Theology (1890).

GRAFE, ALBRECHT VON (1828-1870), German oculist, son of Karl Ferdinand von Grafe, was born at Berlin on the 22nd of May 1828. At an early age he manifested a preference for the study of mathematics, but this was gradually superseded by an interest in natural science, which led him ultimately to the study of medicine. After prosecuting his studies at Berlin, Vienna, Prague, Paris, London, Dublin and Edinburgh, and devoting special attention to ophthalmology he, in 1850, began practice as an oculist in Berlin, where he founded a private institution for the treatment of the eyes, which became the model of many similar ones, in Germany and Switzerland. In 1853 he was appointed teacher of ophthalmology in Berlin university; in 1858 he became extraordinary professor, and in 1866 ordinary professor. Grafe contributed largely to the progress of the science of ophthalmology, especially by the establishment in 1855 of his Archiv fur Ophthalmologic, in which he had Ferdinand Arlt (1812-1887) and F. C. Donders (1818-1889) as collaborators Perhaps his two most important discoveries were his method of treating glaucoma and his new operation for cataract. He was also regarded as an authority in diseases of the nerves and brain. He died at Berlin on the 20th of July 1870.

See Kin Wort der Erinnerung an Albrecht von Grafe (Halle, 1870) by his cousin, Alfred Grafe (1830-1899), also a distinguished ophthalmologist, and the author of Das Sehen der Schielenden (Wiesbaden, 1897); and E. Michaelis, Albrecht von Grafe. Sein Leben und Wirken (Berlin, 1877).

GRAFE, HEINRICH (1 802-1 868), German educationist, was born at Buttstadt in Saxe-Weimar on the 3rd of May 1802, He studied mathematics and theology at Jena, and in 1823 obtained a curacy in the town church of Weimar. He was transferred to Jena as rector of the town school in 1825; in 184c he was also appointed extraordinary professor of the science of education (Padagogik) in that university; and in 1842 h« became head of the Burger schule (middle class school) in Cassel. After reorganizing the schools of the town, he became director of the new Realschule in 1843; and, devoting himself to the interests of educational reform in electoral Hesse, he became in 1849 a member of the school commission, and also entered the house of representatives, where he made himself somewhat formidable as an agitator. In 1852 for having been implicated in the September riots

and in the movement against the unpopular minister Hassenpflug, who had dissolved the school commission, he was condemned to three years' imprisonment, a sentence afterwards reduced to one of twelve months. On his release he withdrew to Geneva, where he engaged in educational work till 1855, when he was appointed director of the school of industry at Bremen. He died in that city on the 21st of July 1868.

Besides being the author of many text -books and occasional papers on educational subjects, he wrote Das Rechisverhaltnis der Volksschule von innen und aussen (1829); Die Schulreform (1834); Schule und Unterricht (1839); Allgemeine Padagogik (1845); Die deutsche Volksschule (1847). Together with Naumann, he also edited the Archiv fur das praktische Volksschulwesen (1828-1835).

GRAFE, KARL FERDINAND VON (1787-1840), German surgeon, was born at Warsaw on the 8th of March 1787. He studied medicine at Halle and Leipzig, and after obtaining licence from the Leipzig university, he was in 1807 appointed private physician to Duke Alexius of Anhalt-Bernburg. In 181 1 he became professor of surgery and director of the surgical

clinic at Berlin, and during the war with Napoleon he was superintendent of the military hospitals. When peace was concluded in 181 5, he resumed his professorial duties. He was also appointed physician to the general staff of the army, and he became a director of the Friedrich Wilhelm Institute and of the Medico- Chirurgical Academy. He died suddenly on the 4th of July 1 840 at Hanover, whither he had been called to operate on the eyes of the crown prince. Grafe did much to advance the practice of surgery in Germany, especially in the treatment of wounds. He improved the rhinoplastic process, and its revival was chiefly due to him. His lectures at the university of Berlin attracted students from all parts of Europe.

The following are his principal works: Normen fiir die Ablosung grosser Gliedmassen (Berlin, 1812); Rhinoplastik (1818); Neue Beitrdge zur Kunst Theile des Angesichts organisch zu ersetzen (1821); Die epidemisch-kontagiose Augenblennorrhoe Agyptens in den europdischen Befreiungsheeren (1824) ; and Jahresberichte iiber das klinisch-chirurgisch-augendrztliche Institut der Universitdt zu Berlin (1817-1834). He also edited, with Ph. von Walther, the Journal fiir

Chirurgie und Augenheilkunde. See E. Michaelis, Karl Ferdinand von Grafe in seiner jojdkrigen Wirken fiir Slant, und Wissenschaft (Berlin, 1840)

GRAFFITO, plural graffiti, the Italian word meaning ” scribb- ling ” or ” scratchings ” (graffiare, to scribble, Gr. ypaeiv), adopted by archaeologists as a general term for the casual writings, rude drawings and markings on ancient buildings, in distinction from the more formal or deliberate writings known as ” inscriptions.” These ” graffiti,” either scratched on stone or plaster by a sharp instrument such as a nail, or, more rarely, written in red chalk or black charcoal, are found in great abund- ance, e.g. on the monuments of ancient Egypt. The best-known ” graffiti ” are those in Pompeii and in the catacombs and else- where in Rome. They have been collected by R. Garrucci (Graffiti di Pompei, Paris, 1856), and L. Correra (” Graffiti di Roma ” in BolleMno delta commissione municipale archaeologica, Rome, 1893; see also Corp. Ins. Lat. iv., Berlin, 1871). The subject matter of these scribblings is much the same as that of the similar scrawls made to-day by boys, street idlers and the casual ” tripper.” The schoolboy of Pompeii wrote out lists of nouns and verbs, alphabets and lines from Virgil for memorizing, lovers wrote the names of their beloved, ” sports- men ” scribbled the names of horses they had been ” tipped,” and wrote those of their favourite gladiators. Personal abuse is frequent, and rude caricatures are found, such as that of one Peregrinus with an enormous nose, or of Naso or Nasso with hardly any. Aulus Vettius Firmus writes up his election address and appeals to the pilicrepi or ball-players for their votes for him as aedile. Lines of poetry, chiefly suited for lovers in de- jection or triumph, are popular, and Ovid and Propertius appear to be favourites. Apparently private owners of property felt the nuisance of the defacement of their walls, and at Rome near the Porta Portuensis has been found an inscription begging people not to scribble (scariphare) on the walls.

Graffiti are of some importance to the palaeographer and to the philologist as illustrating the forms and corruptions of the various alphabets and languages used by the people, and occasion- ally guide the archaeologist to the date of the building on which they appear, but they are chiefly valuable for the light they throw on the everyday life of the ” man in the street ” of the period, and for the intimate details of customs and institutions which no literature or formal inscriptions can give. The graffiti dealing with the gladiatorial shows at Pompeii are in this respect particularly noteworthy; the rude drawings such as that of the secutor caught in the net of the retiarius and lying entirely at his mercy, give a more vivid picture of what the

incidents of these shows were like than any account in words (see Garrucci, op. cit., Pis. x.-xiv.; A. Mau, Pompeii in Leben und Kunst, 2nd ed., 1908, ch. xxx.). In 1866 in the Trastevere quarter of Rome, near the church of S. Crisogono, was discovered the guard-house (excubitorium) of the seventh cohort of the city police (vigiles), the walls being covered by the scribblings of the guards, illustrat- ing in detail the daily routine, the hardships and dangers, and the feelings of the, men towards their officers (W. Henzen,

" L' Escubitorio della Settima coorte dei Vigili " in Bull. Inst. 1867, and Annali Inst., 1874; see also R. Lanciani, Ancient Rome in the Light of Recent Discoveries, 230, and Ruins and Excavations of Ancient Rome, 1897, 548). The most famous graffito yet discovered is that generally accepted as representing a caricature of Christ upon the cross, found on the walls of the Domus Gelotiana on the Palatine in 1857, and now preserved in the Kircherian Museum of the Collegio Romano. Deeply scratched in the wall is a figure of a man clad in the short tunica with one hand upraised in salutation to another figure, with the head of an ass, or possibly a horse, hanging on a cross; beneath is written in rude Greek letters " Anaxamenos worships (his) god." It has been suggested that this represents an adherent of some Gnostic sect worshipping one of the animal- headed deities of Egypt (see Ferd. Becker, Das Spottcrucifix der romischen Kaiser paldste, Breslau, 1866; F. X. Kraus, Das Spottcrucifix vom Palatin, Freiburg in Breisgau, 1872; and Visconti and Lanciani, Guida del Palatino) .

There is an interesting article, with many quotations of graffiti, in the Edinburgh Review, October 1859, vol. ex. (C. We.)

GRAFLY, CHARLES (1862-), American sculptor, was born at Philadelphia, Pennsylvania, on the 3rd of December 1862. He was a pupil of the schools of the Pennsylvania Academy of the Fine Arts, Philadelphia, and of Henri M. Chapu and Jean Dampt, and the Ecole des Beaux Arts, Paris. He received an Honorable Mention in the Paris Salon of 1891 for his " Mauvais Presage," now at the Detroit Museum of Fine Arts, a gold medal at the Paris Exposition, in 1900, and medals at Chicago, 1893, Atlanta, 1895, and Philadelphia (the gold Medal of Honor, Pennsylvania Academy of the Fine Arts), 1899. In 1892 he became instructor in sculpture at the Pennsylvania Academy of the Fine Arts, also filling the same chair at the Drexel Institute, Philadelphia. He was elected a full member of the National Academy of Design in 1905. His better-known works include: " General Reynolds," Fairmount Park, Philadelphia; " Foun- tain of Man " (made for the Pan-American Exposition at Buffalo); "From Generation to Generation"; "Symbol of Life "; " Vulture of War," and many portrait

busts.

GRAFRATH, a town in Rhenish Prussia, on the Itterbach, 14 m. E. of Diisseldorf on the railway Hilden-Vohwinkel. Pop. (1905) 9030. It has a Roman Catholic and two Evangelical churches, and there was an abbey here from 1183 to 1803. The principal industries are iron and steel, while weaving is carried on in the town.

GRAFT (a modified form of the earlier ” graft”, ” through the French from the Late Lat. graphium, a stylus or pencil), a small branch, shoot or ” scion,” transferred from one plant or tree to another, the ” stock,” and inserted in it so that the two unite (see Horticulture). The name was adopted from the resemblance in shape of the ” graft ” to a pencil. The transfer of living tissue from one portion of an organism to another part of the same or different organism where it adheres and grows is also known as ” grafting,” and is frequently practised in modern surgery. The word is applied, in carpentry, to an attachment of the ends of timbers, and, as a nautical term, to the ” whipping ” or ” pointing ” of a rope’s end with fine twine to prevent unravelling. ” Graft ” is used as a slang term, in England, for a ” piece of hard work.” In American usage Webster’s Dictionary (ed. 1904) defines the word as ” the act of any one, especially an official or public employe, by which he procures money surreptitiously by virtue of his office or position; also the surreptitious gain thus procured.” It is thus a word embracing blackmail and illicit commission. The origin of the English use of the word is probably an obsolete word ” graft,” a portion of earth thrown up by a spade, from the Teutonic root meaning ” to dig,” seen in German graben, and English ” grave.”

GRAFTON, DUKES OF. The English dukes of Grafton are descended from Henry Fitzroy (1663-1690), the natural son of Charles II. by Barbara Villiers (countess of Castlemaine and duchess of Cleveland). In 1672 he was married to the daughter and heiress of the earl of Arlington and created earl of Euston; in 1675 he was created duke of Grafton. He was brought

up as a sailor, and saw military service at the siege of Luxemburg in 1684. At James II. ‘s coronation he was lord high constable. In the rebellion of the duke of Monmouth he commanded the royal troops in Somersetshire; but later he acted with Churchill (duke of Marlborough), and joined William of Orange against the king. He died

of a wound received at the storming of Cork, while leading William's forces, being succeeded as 2nd duke by his son Charles (1 682-1 757).

Augustus Henry Fitzroy, 3rd duke of Grafton (1735-1811), one of the leading politicians of his time, was the grandson of the 2nd duke, and was educated at Westminster and Cambridge. He first became known in politics as an opponent of Lord Bute; in 1765 he was secretary of state under the marquis of Rockingham; but he retired next year, and Pitt (becoming earl of Chatham) formed a ministry in which Grafton was first lord of the treasury (1766) but only nominally prime minister. Chatham's illness at the end of 1767 resulted in Grafton becoming the effective leader, but political differences and the attacks of " Junius " led to his resignation in January 1770. He became lord privy seal in Lord North's ministry (1771) but resigned in 1775, being in favour of conciliatory action towards the American colonists. In the Rockingham ministry of 1782 he was again lord privy seal. In later years he was a prominent Unitarian.

Besides his successor, the 4th duke (1760-1844), and numerous other children, he was the father of General Lord Charles Fitz- roy (1764-1829), whose sons Sir Charles Fitzroy (1798-1858), governor of New South Wales, and Robert Fitzroy (q.v.), the hydrographer, were notable men. The 4th duke's son, who succeeded as 5th duke, was father of the 6th and 7th dukes.

The 3rd duke left in manuscript a Memoir of his public career, of which extracts have been printed in Stanhope's History, Walpole's Memories of George III. (Appendix, vol. iv.), and Campbell's Lives of the Chancellors.

GRAFTON, RICHARD (d. 1572), English printer and chron- icler, was probably born about 1513. He received the freedom of the Grocers' Company in 1534. Miles Coverdale's version of the Bible had first been printed in 1535. Grafton was early brought into touch with the leaders of religious reform, and in /S37 he undertook, in conjunction with Edward Whitchurch, to produce a modified version of Coverdale's text, generally known as Matthew's Bible (Antwerp, 1537). He went to Paris to reprint Coverdale's revised edition (1538). There Whitchurch and he began to print the folio known as the Great Bible by special licence obtained by Henry VIII. from the French govern- ment. Suddenly, however, the work was officially stopped and the presses seized. Grafton fled, but Thomas Cromwell eventu- ally bought the presses and type, and the printing was completed in England. The Great Bible was reprinted several times under his direction, the last occasion being 1553. In 1544 Grafton and

Whitchurch secured the exclusive right of printing church service books, and on the accession of Edward VI. he was appointed king's printer, an office which he retained throughout the reign. In this capacity he produced The Booke of the Common Praier and Administration of the Sacramentes, and other Rites and Ceremonies of the Churche: after the Use of the Churche of Englande (1549 fol.), and Actes of Parliament (1552 and 1553). In 1553 he jarifUˆd Lady Jane Grey's proclamation and signed himself the qAeprj's printer. For this he was imprisoned for a short time, aˆdghe seems thereafter to have retired from active forical works include a continuation (154.3) idle from the beginning of the reign of Edward ton's own times. He is said to have taken ffies with the original, and may practically be esnbnsible for the whole work. He printed in 1 548 1 – Onion of the . . . Families of Lancastre and

business.

of Hardyng's " IV. down ' " considerably regarded as . .. Edward Halls

Yorke, adding the history of the years from 1532 to 1547. After he retired from the printing business he published An Abridge- ment of the Chronicles of England (1562), Manuell of the Chronicles of England (1565), Chronicle at large and mecre Hislorye of the Afayres of England (1568). In these books he chiefly adapted the work of his predecessors, but in some cases he gives detailed accounts of contemporary events. His name frequently appears

in the records of St Bartholomew's and Christ's hospitals, and in 1553 he was treasurer-general of the hospitals of King Edward's foundation. In 1553-1554 and 1556-1557 he represented the City in Parliament, and in 1 562-1 563 he sat for Coventry.

An elaborate account of Grafton was written in 1901 by Mr J. A. Kingdon under the auspices of the Grocers' Company, with the title Richard Grafton, Citizen and Grocer of London, &c, in continuation of Incidents in the Lives of T. Poyntz and R. Grafton (1895). His Chronicle at large was reprinted by Sir Henry Ellis in 1809.

GRAFTON, a city of Clarence county, New South Wales, lying on both sides of the Clarence river, at a distance of 45 m. from its mouth, 342 m. N.E. of Sydney by sea. Pop. (1901) 4174, South Grafton, 976. The two sections, North Grafton and South Grafton, form separate municipalities. The river is navigable from the sea to the town for ships of moderate burden, and for small vessels to a point 35 m. beyond it. The entrance to the river has been artificially improved.

Grafton is the seat of the Anglican joint-bishopric of Grafton and Armidale, and of a Roman Catholic bishopric created in 1888, both of which have fine cathedrals. Dairy-farming and sugar-growing are important industries, and there are several sugar-mills in the neighbourhood; great numbers of horses, also, are bred for the Indian and colonial markets. Tobacco, cereals and fruits are also grown. Grafton has a large shipping trade with Sydney. There is rail-connexion with Brisbane, &c. The city became a municipality in 1859.

GRAFTON, a township in the S.E. part of Worcester county, Massachusetts, U.S.A. Pop. (1905) 5052 ; (1910) 5705. It is served by the New York, New Haven & Hartford, and the Boston & Albany railways, and by interurban electric lines. The township contains several villages (including Grafton, North Grafton, Saundersville, Fisherville and Farnumsville) ; the principal village, Grafton, is about 7 m. S.E. of Worcester. The villages are residential suburbs of Worcester, and attract many summer residents. In the village of Grafton there is a public library. There is ample water power from the Blackstone river and its tributaries, and among the manufactures of Grafton are cotton-goods, boots and shoes, &c. Within what is now Grafton stood the Nipmuck Indian village of Hassanamesit. John Eliot, the ” apostle to the Indians,” visited it soon after 1651, and organized the third of his bands of ” praying Indians ” there; in 1671 he established a church for them, the second of the kind in New England, and also a school. In 1654 the Massa- chusetts General Court granted to the Indians, for their exclusive use, a tract of about 4 sq. m., of which they remained the sole proprietors until 1718, when they sold a small farm to Elisha Johnson, the first permanent white settler in the neighbourhood. In 1728 a group of residents of Marlboro, Sudbury, Concord and Stowe, with the permission of the General Court, bought from the Indians 7500 acres of their lands, and agreed to establish forty English families on the tract within three years, and to maintain a church and school of which the Indians should have free use. The township was incorporated in 1735, and was named in honour of the 2nd duke of Grafton. The last of the pure-blooded Indians died about 1825.

GRAFTON, a city and the county-seat of Taylor county, West Virginia, U.S.A., on Tygart river, about 100 m. by rail S.E. of Wheeling. Pop. (1890) 3159; (1900) 5650, including 226 foreign- born and 162 negroes; (1910) 7563. It is served by four divisions of the Baltimore & Ohio railway, which maintains extensive car shops here. The city is about 1000 ft. above sea-level. It has a small national cemetery, and about 4 m. W., at Pruntytown, is the West Virginia Reform School. Grafton is situated near large coal-fields, and is supplied with natural

gas. Among its manufactures are machine-shop and foundry products, window gla”ss and pressed glass ware, and grist mill and planing-mill products. The first settlement was made about 1852, and Grafton was incorporated in 1856 and chartered as a city in 1899. In 1903 the population and area of the city were increased by the annexation of the town of Fetterman (pop. in 1900, 796), of Beaumont (unincorporated), and of other territory.

GRAHAM, SIR GERALD (1831-1899), British general, was born on the 27th of June 183 1 at Acton, Middlesex. He was

educated at Dresden and Woolwich Academy, and entered the Royal Engineers in 1850. He served with distinction through the Russian War of 1854 to 1856, was present at the battles of the Alma and Inkerman, was twice wounded in the trenches before Sevastopol, and was awarded the Victoria Cross for gallantry at the attack on the Redan and for devoted heroism on numerous occasions. He also received the Legion of Honour, and was promoted to a brevet majority. In the China War of i860 he took part in the actions of Sin-ho and Tang-ku, the storming of the Taku Forts, where he was severely wounded, and the entry into Peking (brevet lieutenant-colonelcy and C.B.) . Promoted colonel in 1869, he was employed in routine duties until 1877, when he was appointed assistant-director of works for barracks at the war office, a position he held until his promo- tion to major-general in 1881. In command of the advanced force in Egypt in 1882, he bore the brunt of the fighting, was present at the action of Magfar, commanded at the first battle of Kassassin, took part in the second, and led his brigade at Tell-cl-Kebir. For his services in the campaign he received the K.C.B. and thanks of parliament. In 1884 he commanded the expedition to the eastern Sudan, and fought the successful battles of El Teb and Tamai. On his return home he received the thanks of parliament and was made a lieutenant-general for distinguished service in the field. In 1885 he commanded the Suakin expedition, defeated the Arabs at Hashin and Tamai, and advanced the railway from Suakin to Otao, when the expedition was withdrawn (thanks of parliament and G.C.M.G.). In 1896 he was made G.C.B., and in 1899 colonel-commandant Royal Engineers. He died on the 17th of December 1899. He published in 1875 a translation of Goetze’s Operations of the German Engineers in 1870-187 1, and in 1887 Last Words with Gordon.

GRAHAM, SIR JAMES ROBERT GEORGE, Bart. (1792- 1861), British statesman, son of a baronet, was born at Naworth, Cumberland, on the 1st of June 1792, and was educated at Westminster and Oxford. Shortly after quitting the university, while making the ” grand tour ” abroad, he became private secretary to the British minister in Sicily. Returning to England in 1818 he was elected to parliament as member for Hull in the Whig interest; but he was unseated at the election of 1820. In 1824 he succeeded to the baronetcy; and in 1826 he re-entered parliament as representative for Carlisle, a seat whigh he soon exchanged for the county of Cumberland. In the same year he published a pamphlet entitled ” Corn and Currency,” which brought him into prominence as a man of advanced Liberal opinions; and he became one of the most energetic advocates in parliament of the Reform Bill. On the formation of Earl Grey’s administration he received the post of first lord of the admiralty, with a seat in the cabinet. From 1832 to 1837 he sat for the eastern division of the county of Cumberland. Dis- sensions on the Irish Church question led to his withdrawal from the ministry in 1834, and ultimately to his joining the Conservative party. Rejected by his former constituents in 1837, he was in 1838 elected for Pembroke, and in 1841 for Dorchester. In the latter year he took office under Sir Robert Peel as secretary of state for the home department, a post he retained until 1846. As home secretary he incurred considerable odium in Scotland, by his unconciliating policy on the church question prior to the ” disruption ” of 1843; and in 1844 the detention and opening of letters at the post-office by his warrant raised a storm of public indignation, which was hardly allayed by the favourable report of a parliamentary committee of investigation. From 1846 to 1852 he was out of office; but in the latter year he joined Lord Aberdeen’s cabinet as first lord of the admiralty, in which capacity he acted also for a short time in the Palmerston ministry of 1855. The appointment of ■ a select committee of inquiry into the conduct of the Russian war ultimately led to his withdrawal from official life. He continued as a private member to exercise a considerable in- fluence on parliamentary opinion. He died at Netherby, Cumberland, on the 25th of October 1861. His Life, by C. S. Parker, was published in 1907.

GRAHAM, SYLVESTER (1794-1851), American dietarian, was born in Suffield, Connecticut, in 1 794. He studied at Amherst College, and was ordained to the Presbyterian ministry in 1826, but he seems to have preached but little. He became an ardent advocate of temperance reform and of vegetarianism, having persuaded himself that a flesh diet was the cause of abnormal cravings. His last years were spent in retirement and he died at Northampton, Massachusetts, on the nth of

September 1851. His name is now remembered because of his advocacy of unbolted (Graham) flour, and as the originator of " Graham bread." But his reform was much broader than this. He urged, primarily, physiological education, and in his Science of Human Life (1836; republished, with biographical memoir, 1858) furnished an exhaustive text-book on the subject. He had carefully planned a complete regimen including many details besides a strict diet. A Temperance (or Graham) Boarding House was opened in New York City about 1832 by Mrs Asenath Nicholson, who published Nature's Own Book (2nd ed., 1835) giving Graham's rules for boarders; and in Boston a Graham House was opened in 1837 at 23 Brattle Street.

There were many Grahamites at Brook Farm, and the American Physiological Society published in Boston in 1837 and 1838 a weekly called The Graham Journal of Health and Longevity, designed to illustrate by facts and sustain by reason and principles the science of human life as taught by Sylvester Graham, edited by David Campbell. Graham wrote Essay on Cholera (1832); The Esculapian Tablets of the Nineteenth Century (1834); Lectures to Young Men on Chastity (2nd ed., 1837); and Bread and Bread Making; and projected a work designed to show that his system was not counter to the Holy Scriptures.

GRAHAM, THOMAS (1805-1869), British chemist, born at Glasgow on the 20th of December 1805, was the son of a merchant of that city. In 1819 he entered the university of Glasgow with the intention of becoming a minister of the Established Church. But under the influence of Thomas Thomson (1773-1852), the professor of chemistry, he developed a taste for experimental science and especially for molecular physics, a subject which formed his main preoccupation throughout his life. After graduating in 1824, he spent two years in the laboratory of Professor T. C. Hope at Edinburgh, and on returning to Glasgow gave lessons in mathematics, and subsequently chemistry, until the year 1829, when he was appointed lecturer in the Mechanics' Institute. In 1830 he succeeded Dr Andrew Ure (1778-1857) as professor of chemistry in the Andersonian Institution, and in 1837, on the death of Dr Edward Turner, he was transferred to the chair of chemistry in University College, London. There he remained till 1855, when he succeeded Sir John Herschel as Master of the Mint, a post he held until his death on the 16th of September 1869. The onerous duties his work at the Mint entailed severely tried his energies, and in quitting a purely scientific career he was subjected to the cares of official life, for which he was not fitted by temperament. The researches, however, which he conducted between 1861 and 1869 were as brilliant as any of those in which he

engaged. Graham was elected a fellow of the Royal Society in 1836, and a corresponding member of the Institute of France in 1847, while Oxford made him aD. C.L. in 1855. Hetook eadingpart in the foundation of the London Chemical and Cavendish

societies, and served as first president of both, i' t and 1846.

Towards the close of his life the presidency of t 1 Val Society

was offered him, but his failing health cause' /to decline

the honour. '

Graham's work is remarkable at once for * inality and

for the simplicity of the methods employed ining most

important results. He communicated papers ft 'losophical

Society of Glasgow before the work of that sot fe recorded

in Transactions, but his first published paper, he Absorp-

tion of Gases by Liquids," appeared in the An Philosophy

for 1826. The subject with which his name i -ominently

associated is the diffusion of gases. In his per on this

subject (1829) he thus summarizes the kne experiment

had afforded as to the laws which regulate ovement of

gases. " Fruitful as the miscibility of gase. oeen in in-

teresting speculations, the experimental infor 1 we possess

on the subject amounts to little more than the well-established fact that gases of a different nature when brought into contact do not arrange themselves according to their density, but they spontaneously diffuse through each other so as to remain in an intimate state of mixture for any length of time." For the fissured jar of J. W. Dobereiner he substituted a glass tube closed by a plug of plaster of

Paris, and with this simple ap- pliance he developed the law now known by his name ” that the diffusion rate of gases is inversely as the square root of their density.” (See Diffusion.) He further studied the passage of gases by transpiration through fine tubes, and by effusion through a minute hole in a platinum disk, and was enabled to show that gas may enter a vacuum in three different ways: (i) by the molecular movement of diffusion, in virtue of which a gas pene- trates through the pores of a disk of compressed graphite; (2) by effusion through an orifice of sensible dimensions in a platinum disk the relative times of the effusion of gases in mass being similar to those of the molecular diffusion, although a gas is usually carried by the former kind of impulse with a velocity many thousand times as great as is demonstrable by the latter; and (3) by the peculiar rate of passage due to transpiration through fine tubes, in which the ratios appear to be in direct relation with no other known property of the same gases — thus hydrogen has exactly double the transpiration rate of nitrogen, the relation of those gases as to density being as 1:14. He subsequently examined the passage of gases through septa or partitions of india- rubber, unglazed earthenware and plates of metals such as palladium, and proved that gases pass through these septa neither by diffusion nor effusion nor by transpiration, but in virtue of a selective absorption which the septa appear to exert on the gases in contact with them. By this means (” atmolysis “) he was enabled partially to separate oxygen from air.

His early work on the movements of gases led him to examine the spontaneous movements of liquids, and as a result of the experiments he divided bodies into two classes — crystalloids, such as common salt, and colloids, of which gum-arabic is a type — the former having high and the latter low diffusibility. He also proved that the process of liquid diffusion causes partial decomposition of certain chemical compounds, the potassium sulphate, for instance, being separated from the aluminium sulphate in alum by the higher diffusibility of the former salt. He also extended his work on the transpiration of gases to liquids, adopting the method of manipulation devised by J. L. M. Poise- uille. He found that dilution with water does not effect pro- portionate alteration in the transpiration velocities of different liquids, and a certain determinable degree of dilution retards the transpiration velocity.

With regard to Graham’s more purely chemical work, in 1833 he showed that phosphoric anhydride and water form three distinct acids,- and he thus established the existence of polybasic acids, in each of which one or more equivalents of hydrogen are replaceable by certain metals (see Acid). In 1835 he published the results of an

examination of the properties of water of crys- tallization as a constituent of salts. Not the least interesting part of this inquiry was the discovery of certain definite salts with alcohol analogous to hydrates, to which the name of alcoholates was given. A brief paper entitled ” Speculative Ideas on the Constitution of Matter ” (1863) possesses special interest in con- nexion with work done since his death, because in it he ex- pressed the view that the various kinds of matter now recognized as different elementary substances may possess one and the same ultimate or atomic molecule in different conditions of movement. Graham’s Elements of Chemistry, first published in 1833, went through several editions, and appeared also in German, remodelled, under J. Otto’s direction. His Chemical and Physical Researches were collected by Dr James Young and Dr Angus Smith, and printed ” for presentation only ” at Edinburgh in 1876, Dr Smith contributing to the volume a valuable preface and analysis of its contents. See also T. E. Thoroe, Essays in Historical Chemistry

(1902)

GRAHAME, JAMES “(1 765-181 1), Scottisn poet, was born in Glasgow on the 22 nd of April 1765, the son of a successful iawyer. After completing his literary c’o”urs”e at Glasgow univer-

sity, Grahame went in 1784 to Edinburgh, where he qualified as writer to the signet, and subsequently for the Scottish bar, of which he was elected a member in 1795. But his preferences had always been for the Church, and when he was forty-four he took Anglican orders, and became a curate first at Shipton, Gloucestershire, and then at Sedgefield, Durham. His works include a dramatic poem, Mary Queen of Scots (1801), The Sabbath (1804), British Georgics (1804), The Birds of Scotland (1806), and Poems on the Abolition of the Slave Trade (1810). His principal work, The Sabbath, a sacred and descriptive poem in blank verse, is characterized by devotional feeling and by happy delineation of Scottish scenery. In the notes to his poems he expresses enlightened views on popular education, the criminal law and other public questions. He was emphatically a friend of humanity — a philanthropist as well as a poet. He died in Glasgow on the 14th of September 1811.

GRAHAM’S DYKE (or Shetjgh = trench), a local name for the Roman fortified frontier, consisting of rampart, forts and road, which ran across the narrow isthmus of Scotland from the Forth to the Clyde (about 36 m.), and formed from a.d. 140 till about 185 the northern frontier of Roman Britain. The name is locally explained as recording a victorious assault on the defences by one Robert Graham and his

men; it has also been connected with the Grampian Hills and the Latin surveying term groma. But, as is shown by its earliest recorded spelling, Grymisdyke (Fordun, a.d. 1385), it is the same as the term Grim's Ditch which occurs several times in England in connexion with early ramparts — for example, near Wallingford in south Oxfordshire or between Berkhampstead (Herts) and Bradenham (Bucks). Grim seems to be a Teutonic god or devil, who might be credited with the wish to build earthworks in unreasonably short periods of time. By antiquaries the Graham's Dyke is usually styled the Wall of Pius or the Antonine Vallum, after the emperor Antoninus Pius, in whose reign it was constructed. See further Britain: Roman. (F. J. H.)

GRAHAM'S TOWN, a city of South Africa, the administrative centre for the eastern part of the Cape province, 106 m. by rail N.E. of Port Elizabeth and 43 m. by rail N.N.W. of Port Alfred. Pop. (1904) 13,887, of whom 7283 were whites and 1837 were electors. The town is built in a basin of the grassy hills forming the spurs of the Zuurberg, 1760 ft. above sea-level. It is a pleasant place of residence, has a remarkably healthy climate, and is regarded as the most English-like town in the Cape. The streets are broad, and most of them lined with trees. In the High Street are the law courts, the Anglican cathedral of St George, built from designs by Sir Gilbert Scott, and Commemora- tion Chapel, the chief place of worship of the Wesleyans, erected by the British emigrants of 1820. The Roman Catholic cathedral of St Patrick, a Gothic building, is to the left of the High Street. The town hall, also in the Gothic style, has a square clock tower built on arches over the pavement. Graham's Town is one of the chief educational centres in the Cape province. Besides the public schools and the Rhodes University College (which in 1904 took over part of the work carried on since 185s by St Andrew's College), scholastic institutions are maintained by religious bodies. The town possesses two large hospitals, which receive patients from all parts of South Africa, and the govern- ment bacteriological institute. It is the centre of trade for an extensive pastoral and agricultural district. Owing to'the sour quality of the herbage in the surrounding zuurvcld, stock-breeding and wool-growing have been, however, to some extent replaced by ostrich-farming, for which industry Graham's Town is the most important entrepot. Dairy farming is much practised in the neighbourhood.

In 181 2 the site of the town was chosen as the headquarters of the British troops engaged in protecting the frontier of Cape Colony from the inroads of the Kaffirs, and it was named after Colonel John Graham (1778-1821), then commanding the forces. (Graham had commanded the light infantry battalion at the taking of the Cape by

the British in the action of the 6th of January 1806. He also took part in campaigns in Italy and Holland during the Napoleonic wars.) In 1819′ an attempt was

made by the Kaffirs to surprise Graham's Town, and 10,000 men attacked it, but they were repulsed by the garrison, which numbered not more than 320 men, infantry and artillery, under Lieut. -Colonel (afterwards General Sir) Thomas Willshire. In 1822 the town was chosen as the headquarters of the 4000 British immigrants who had reached Cape Colony in 1820. It has maintained its position as the most important inland town of the eastern part of the Cape province. In 1864 the Cape parliament met in Graham's Town, the only instance of the legislature sitting elsewhere than in Cape Town. It is governed by a municipality. The rateable value in 1906 was £891,536 and the rate levied 2§d. in the pound.

See T. Sheffield, The Story of the Settlement . . . (2nd ed., Graham's Town, 1884); C. T. Campbell, British South Africa . . . with notices of some of the British Settlers of 1820 (London, 1897).

GRAIL, THE HOLY, the famous talisman of Arthurian romance, the object of quest on the part of the knights of the Round Table. It is mainly, if not wholly, known to English readers through the medium of Malory's translation of the French Quete du Saint Graal, where it is the cup or chalice of the Last Supper, in which the blood which flowed from the wounds of the crucified Saviour has been miraculously preserved. Students of the original romances are aware that there is in these texts an extraordinary diversity of statement as to the nature and origin of the Grail, and that it is extremely difficult to determine the precise value of these differing versions. 1 Broadly speaking the Grail romances have been divided into two main classes: (1) those dealing with the search for the Grail, the Quest, and (2) those relating to its early history. These latter appear to be dependent on the former, for whereas we may have a Quest romance without any insistence on the previous history of the Grail, that history is never found without some allusion to the hero who is destined to bring the quest to its successful termination. The Quest versions again fall into three distinct classes, differentiated by the personality of the hero who is respectively Gawain, Perceval or Galahad. The most important and interesting group is that connected with Perceval, and he was regarded as the original Grail hero, Gawain being, as it were, his understudy. Recent

discoveries, however, point to a different conclusion, and indicate that the Gawain stories represent an early tradition, and that we must seek in them rather than in the Perceval versions for indications as to the ultimate origin of the Grail.

The character of this talisman or relic varies greatly, as will be seen fromthe following summary.

1. Gawain, included in the continuation to Chretien's Perceval by Wauchier de Denain, and attributed toBleheris the Welshman, who is probably identical with the Bledhericus of Giraldus Cambrensis, and considerably earlier than Chretien de Troyes. Here the Grail is a food-providing, self-acting talisman, the pre- cise nature of which is not specified; it is designated as the " rich " Grail, and serves the king and his court sans serjant et sans seneschal, the butlers providing the guests with wine. In another version, given at an earlier point of the same con- tinuation, but apparently deriving from a later source, the Grail is borne in procession by a weeping maiden, and is called the " holy " Grail, but no details as to its history or character are given. In a third version, that of Diu Crdne, a long and con- fused romance, the origin of which has not been determined, the Grail appears as a reliquary, in which the Host is presented to the king, who once a year partakes alike of it and of the blood which flows from the lance. Another account is given in the prose Lancelot, but here Gawain has been deposed from his post as first hero of the court, and, as is to be expected from the treatment meted out to him in this romance, the visit ends in his complete discomfiture. The Grail is here surrounded with the atmosphere of awe and reverence familiar to us through the 'The etymology of the O. Fr. graal or greal, of which "grail" is an adaptation, has been much discussed. The Low Lat. original, gradale or grasale, a flat dish or platter, has generally been taken to represent a, diminutive cratella of crater, bowl, or a lost cratale, formed from the same word (see W. W. Skeat, Preface to Joseph of Arimathie, Early Eng. Text Soc). — Ed.

Quete, and is regarded as the chalice of the Last Supper. These are the Gawain versions.

2. Perceval. — The most important Perceval text is the Conte del Grael, or Perceval le Galois of Chretien de Troyes. Here the Grail is wrought of gold richly set with precious stones; it is carried in solemn procession, and the light issuing from it extinguishes that of the candles. What it is is not explained, but inasmuch as it is the vehiele in which is conveyed the Host on which the father of the Fisher king depends for nutriment, it seems not improbable that here, as in Diu

Crdne, it is to be understood as a reliquary. In the Parzival of Wolfram von Eschenbach, the ultimate source of which is identical with that of Chretien, on the contrary, the Grail is represented as a precious stone, brought to earth by angels, and committed to the guardian- ship of the Grail king and his descendants. It is guarded by a body of chosen knights, or templars, and acts alike as a life and youth preserving talisman — no man may die within eight days of beholding it, and the maiden who bears it retains perennial youth — and an oracle choosing its own servants, and indicating whom the Grail king shall wed. The sole link with the Christian tradition is the statement that its virtue is renewed every Good Friday by the agency of a dove from heaven. The discrepancy between this and the other Grail romances is most startling.

In the short prose romance known as the ” Didot ” Perceval we have, for the first time, the whole history of the relic logically set forth. The Perceval forms the third and concluding section of a group of short romances, tne two preceding being the Joseph of Arimathea and the Merlin. In the first we have the precise history of the Grail, how it was the dish of the Last Supper, confided by our Lord to the care of Joseph, whom he miraculously visited in the prison to which he had been committed by the Jews. It was subsequently given by Joseph to his brother-in- law Brons, whose grandson Perceval is destined to be the final winner and guardian of the relic. The Merlin forms the con- necting thread between this definitely ecclesiastical romance and the chivalric atmosphere of Arthur’s court; and finally, in the Perceval, the hero, son of Alain and grandson to Brons, is warned by Merlin of the quest which awaits him and which he achieves after various adventures.

In the Perlesvaus the Grail is the same, but the working out of the scheme is much more complex; a son of Joseph of Arimathea, Josephe, is introduced, and we find a spiritual knighthood similar to that used so effectively in the Parzival.

3. Galahad. — The Quete du Saint Graal, the only romance of which Galahad is the hero, is dependent on and a completion of the Lancelot development of the Arthurian cycle. Lancelot, as lover of Guinevere, could not be permitted to achieve so spiritual an emprise, yet as leading knight of Arthur’s court it was impossible to allow him to be surpassed by another. Hence the invention of Galahad, son to Lancelot by the Grail king’s daughter; predestined by his lineage to achieve the quest, foredoomed, the quest achieved, to vanish, a sacrifice to his father’s fame, which, enhanced by connexion with the Grail- winner, could not risk eclipse by his presence. Here the Grail, the chalice of

the Last Supper, is at the same time, as in the Gawain stories, self-acting and food-supplying.

The last three romances unite, it will be seen, the quest and the early history. Introductory to the Galahad quest, and deal- ing only with the early history, is the Grand Saint Graal, a work of interminable length, based upon the Joseph of Arimathea, which has undergone numerous revisions and amplifications: its precise relation to the Lancelot, with which it has now much matter in common, is not easy to determine.

To be classed also under the head of early history are certain interpolations in the MSS. of the Perceval, where we find the Joseph tradition, but in a somewhat different form, e.g. he is said to have caused the Grail to be made for the purpose of re- ceiving the holy blood. With this account is also connected the legend of the Volto Santo of Lucca, a crucifix said to have been carved by Nicodemus. a In the conclusion to Chr6tien's poem, composed by Manessier some fifty years later, the Grail is said to have followed Joseph to Britain, how, is not explained.

Another continuation by Gerbert, interpolated between those of Wauchier and Manessier, relates how the Grail was brought to Britain by Perceval's mother in the companionship of Joseph. It will be seen that with the exception of the Grand Saint Graal, which has now been practically converted into an introduc- tion to the Quite, no two versions agree with each other; indeed, with the exception of the oldest Gawain-Gr&il visit, that due to Bleheris, they do not agree with themselves, but all show, more or less, the influence of different and discordant versions. Why should the vessel of the Last Supper, jealously guarded at Castle Corbenic, visit Arthur's court independently? Why does a sacred relic provide purely material food? What connexion can there be between a precious stone, a baelylus, as Dr Hagen has convincingly shown, and Good Friday? These, and such questions as these, suggest themselves at every turn.

Numerous attempts have been made to solve these problems, and to construct a theory of the origin of the Grail story, but so far the difficulty has been to find an hypothesis which would admit of the practically simultaneous existence of apparently contradictory features. At one time considered as an introduc- tion from the East, the theory of the Grail as an Oriental talisman has now been

discarded, and the expert opinion of the day may be said to fall into two groups: (1) those who hold the Grail to have been from the first a purely Christian vessel which has accidentally, and in a manner never clearly explained, acquired certain folk-lore characteristics; and (2) those who hold, on the contrary, that the Grail is aborigine folk-lore and Celtic, and that the Christian development is a later and accidental rather than an essential feature of the story. The first view is set forth in the work of Professor Birch-Hirschfeld, the second in that of Mr Alfred Nutt, the two constituting the only travaux a 1 ‘ ensemble which have yet appeared on the subject. It now seems probable that both are in a measure correct, and that the ultimate solution will be recognized to lie in a blending of two originally independent streams of tradition. The researches of Professor Mannhardt in Germany and of J. G. Frazer in England have amply demonstrated the enduring influence exercised on popular thought and custom by certain primitive forms of vegetation worship, of which the most noteworthy example is the so-called mysteries of Adonis. Here the ordinary processes of nature and progression of the seasons were symbolized under the figure of the death and resuscitation of the god. These rites are found all over the world, and in his monumental work, The Golden Bough, Dr Frazer has traced a host of extant beliefs and practices to this source. The earliest form of the Grail story, the Gawain- Bleheris version, exhibits a marked affinity with the characteristic features of the Adonis or Tammuz worship; we have a castle on the sea-shore, a dead body on a bier, the identity of which is never revealed, mourned over with solemn rites; a wasted country, whose desolation is mysteriously connected with the dead man* and’ which is restored to fruitfulness when the quester asks the meaning of the marvels he beholds (the two features of the weeping women and the wasted land being retained in versions where they have no significance) ; finally the mysterious food-providing, self-acting talisman of a common feast — one and all of these features may be explained as survivals of the Adonis ritual. Professor Martin long since suggested that a key to the problems of the Arthurian cycle was to be found in a nature myth: Professor Rhys regards Arthur as an agricultural hero; Dr Lewis Mott has pointed out the correspondence between the so-called Round Table sites and the ritual of nature worship; but it is only with the discovery of the existence of Bleheris as reputed authority for Arthurian tradition, and the consequent recogni- tion that the Grail story connected with his name is the earliest form of the legend, that we have secured a solid basis for such theories.

■ With regard to the religious form of the story, recent research has

again aided us — we know now that a legend similar in all respects to the Joseph of Arimathea Grail story was widely current at least a century before our earliest Grail texts. The story with Nicodemus as protagonist is told of the Saint-Sang relic at Fecamp; and, as stated already, a similar origin is

ascribed to the Volto Santo at Lucca. In this latter case the legend professes to date from the 8th century, and scholars who have examined the texts in their present form consider that there may be solid ground for this attribution. It is thus demonstrable that the material for our Grail legend, in its present form, existed long anterior to any extant text, and there is no impro- bability in holding that a confused tradition of pagan mysteries which had assumed the form of a popular folk-tale, became finally Christianized by combination with an equally popular ecclesiastical legend, the point of contact being the vessel of the common ritual feast. Nor can there be much doubt that in this process of combination the Fecamp legend played an important role. The best and fullest of the Perceval MSS. refer to a book written at Fecamp as source for certain Perceval adventures. What this book was we do not know, but in face of the fact that certain special Fecamp relics, silver knives, appear in the Grail procession of the Parzival, it seems most probable that it was a Perceval-Gra.il story. The relations between the famous Bene- dictine abbey and the English court both before and after the Conquest were of an intimate character. Legends of the part played by Joseph of Arimathea in the conversion of Britain are closely connected with Glastonbury, the monks of which founda- tion showed, in the 12th century, considerable literary activity, and it seems a by no means improbable hypothesis that the present form of the Grail legend may be due to a monk of Glaston- bury elaborating ideas borrowed from Fecamp. This much is certain, that between the Saint-Sang of Fecamp, the Volto Santo of Lucca, and the Grail tradition, there exists a connecting link, the precise nature of which has yet to be determined. The two former were popular objects of pilgrimage; was the third originally intended to serve the same purpose by attracting attention to the reputed burial-place of the apostle of the Grail, Joseph of Arimathea?

Bibliography. — For the Gawain Grail visits see the Potvin edition of the Perceval, which, however, only gives the Bleheris version; the second visit is found in the best and most complete MSS., such as 12,576 and 12,577 (Fonds francais) of the Paris library. Diu Crdne, edited by Scholl (Stuttgart, 1852), vol. vi. of Arthurian Romances (Nutt), gives a translation of the Bleheris, Diu Crone and Prose

Lancelot visits.

The Conte del Graal, or Perceval, is only accessible in the edition of M. Potvin (6 vols., 1866-1871). The Mons MS., from which this has been printed, has proved to be an exceedingly poor and untrustworthy text. Parzival, by Wolfram von Eschenbach, has been frequently and well edited; the edition by Bartsch (1875-1877), in Deutsche Classiker des Mittelalters, contains full notes and a glossary. Suitable for the more advanced student are those by K. Lachmann (1891), Leitzmann (1902-1903) and E. Martin (1903). There are modern German translations by Simrock (very close to the original) and Hertz (excellent notes). English translation with notes and appendices by J. L. Weston. ” Didot ” Perceval, ed. Hucher, Le Saint Graal (1 875-1 878), vol. i. Perlesvaus was printed by Potvin, under the title of Perceval le Gallois, in vol. i. of the edition above referred to; a Welsh version from the Hengwert MS. was published with translation by Canon R. Williams (2 vols., 1876-1892). Under the title of The High History of the Holy Grail a fine version was published by Dr Sebastian Evans in the Temple Classics (2 vols., 1898). The Grand Saint Graal was published by Hucher as given above; this edition includes the Joseph of Arimathea. A 15th century metrical English adaptation by one Henry Lovelich, was printed by Dr Furnivall for the Roxburghe Club 1861-1863; a new edition was undertaken for the Early English Text Society. Quite du Saint Graal can best be studied in Malory’s somewhat abridged translation, books xiii.xviii. of the Morte Arthur. It has also been printed by Dr Furnivall for the Roxburghe Club, from a MS. in the British Museum. Neither of these texts is, however, very good, and the student who can decipher old Dutch would do well to read it in the metrical translation published by Joenckbloet, Roman van Lanceloet, as the original here was con siderably fuller.

For general treatment of the subject see Legend of Sir Perceval, by J. L. Weston, Grimm Library, vol. xvii. (1906) ; Studies on the Legend of the Holy Grail, by A. Nutt (1888), and a more concise treatment of the subject by the same writer in No. 14 of Popular Studies (1902) ; Professor Birch-Hirschfeld’s Die Sage vom Gral (1877). The late Professor Heinzel’s Die alt-franzosischen Gral- Romane contains a mass of valuable matter, but is very confused and ill-arranged. For the Fecamp legend see Leroux de Lincey’s Essai sur Vabbaye de Fescamp (1840); for the Volto Santo and kindred legends, Ernest von Dobschtitz, Chrislus-Bilder (Leipzig, 1899). (J. L. W.)

GRAIN (derived through the French from Lat. granum, seed, from an Aryan root meaning ” to wear down,” which also appears in the common Teutonic word “corn”), a word particularly applied to the seed, in botanical language the ” fruit,” of cereals, and hence applied, as a collective term to cereal plants generally, to which, in English, the term ” corn ” is also applied (see Grain Trade). Apart from this, the chief meaning, the word is used of the malt refuse of brewing and distilling, and of many hard rounded small particles, resembling the seeds of plants, such as ” grains ” of sand, salt, gold, gunpowder, &c. ” Grain ” is also the name of the smallest unit of weight, both in the United Kingdom and the United States of America. Its origin is supposed to be the weight of a grain of wheat, dried and gathered from the middle of the ear. The troy grain =1/5760 of a lb, the avoirdupois grain =1/7000 of a lb. In diamond weighing the grain = ; of the carat, = -7925 of the troy grain. The word ” grains ” was early used, as also in French, of the small seed-like insects supposed formerly to be the berries of trees, from which a scarlet dye was extracted (see Cochineal and Kermes). From the Fr. en graine, literally in dye, comes the French verb engrainer, Eng. ” engrain ” or ” ingrain,” meaning to dye in any fast colour. From the further use of ” grain ” for the texture of substances, such as wood, meat, &c, “engrained” or “ingrained” means- ineradicable, impregnated, dyed through and through. The ” grain ” of leather is the side of a skin showing the fibre after the hair has been removed. The imitating in paint of the grain of different kinds of woods is known as ” graining ” (see Painter- Work). ” Grain,” or more commonly in the plural ” grains,” construed as a singular, is the name of an instrument with two or more barbed prongs, used for spearing fish. This word is Scandinavian in origin, and is connected with Dan. green, Swed. gren, branch, and means the fork of a tree, of the body, or the prongs of a fork, &c. It is not connected with ” groin,” the inguinal parts of the body, which in its earliest forms appears as grynde.

GRAINS OF PARADISE, Guinea Grains, or Melegueta Pepper (Ger. Paradieskomer, Fr. graines de Paradis, mani- guette), the seeds of Amomum Melegueta, a reed-like plant of the natural order Zingiberaceae. It is a native of tropical western Africa, and of Prince’s and St Thomas’s islands in the Gulf of Guinea, is cultivated in other tropical countries, and may with ease be grown in hothouses in temperate climates. The plant has a branched horizontal rhizome; smooth, nearly sessile, narrowly lanceolate-oblong alternate leaves;

large, white, pale pink or purplish flowers; and an ovate-oblong fruit, ensheathed in bracts, which is of a scarlet colour when fresh, and reaches under cultivation a length of 5 in. The seeds are contained in the acid pulp of the fruit, are commonly wedge-shaped and bluntly angular, are about 1 j lines in diameter and have a glossy dark-brown husk, with a conical light-coloured membranous caruncle at the base and a white kernel. They contain, accord- ing to Fluckiger and Hanbury, 0-3 % of a faintly yellowish neutral essential oil, having an aromatic, not acrid taste, and a specific gravity at 15-5° C. of 0-825, and giving on analysis the formula C 2 oH 32 0, or CioH 16 +CioH]6 0; also 5-83 % of an intensely pungent, viscid, brown resin.

Grains of paradise were formerly officinal in British phar- macopoeias, and in the 13 th and succeeding centuries were used as a drug and a spice, the wine known as hippocras being flavoured with them and with ginger and cinnamon. In 1629 they were employed among the ingredients of the twenty-four herring pies which were the ancient fee-favour of the city of Norwich, ordained to be carried to court by the lord of the manor of Carleton (Johnston and Church, Chem. of Common Life, p. 355, 1879). Grains of paradise were anciently brought overland from West Africa to the Mediterranean ports of the Barbary states, to be shipped for Italy. They are now exported almost exclusively from the Gold Coast. Grains of paradise are to some extent used illegally to give a fictitious strength to malt liquors, gin and cordials. By 56 Geo. III. c. 58, no brewer or dealer in beer shall have in his possession or use grains of paradise, under a penalty of £200 for each offence; and no druggist shall

sell the same to a brewer under a penalty of £500. They are, however, devoid of any injurious physiological action, and are much esteemed as a spice by the natives of Guinea.

See Bentley.and Trimen, Medicinal Plants, tab. 268; Lanessan, Hist, des Drogues, pp. 456-460 (1878).

GRAIN TRADE. The complexity of the conditions of life in the 20th century may be well illustrated from the grain trade of the world. The ordinary bread sold in Great Britain represents, for example, produce of nearly every country in the world outside the tropics.

Wheat has been cultivated from remote antiquity. In a wild state it is practically unknown. It is alleged to have been found growing wild between the Euphrates and the Tigris ; but the discovery has never been authenticated, Oˆ 6 ™’ and, unless the plant be sedulously cared for, the species t j oaSi dies out in a surprisingly short space of time.

Modern experiments in cross-fertilization in Lancashire by. the Garton Brothers have evolved the most extraordinary ” sports,” showing, it is claimed, that the plant has probably passed through stages of which until the present day there had been no conception. The tales that grains of wheat found in the cerements of Egyptian mummies have been planted and come to maturity are no longer credited, for the vital principle in the wheat berry is extremely evanescent; indeed, it is doubtful whether wheat twenty years old is capable of reproduction. The Garton artificial fertiliza- tion experiments have shown endless deviations from the ordinary type, ranging from minute seeds with a closely adhering husk to big berries almost as large as sloes and about as worthless. It is conjectured that the wheat plant, as now known, is a degenerate form of something much finer which flourished thousands of years ago, and that possibly it may be restored to its pristine excellence, yielding an increase twice or thrice as large as it now does, thus postponing to a distant period the famine doom prophesied by Sir W. Crookes in his presidential address to the British Association in 1898. Wheat well repays careful attention; contrast the produce of a carelessly tilled Russian or Indian field and the bountiful yield on a good Lincoln- shire farm, the former with its average yield of 8 bushels, the latter with its 50 bushels per acre; or compare the quality, as regards the quantity and flavour of the flour from a fine sample of British wheat, such as is on sale at almost every agricultural show in Great Britain, with the produce of an Egyptian or Syrian field; the difference is so great as to cause one to doubt whether the berries are of the same species.

It may be stated roundly that an average quartern loaf in Great Britain is made from wheat grown in the following countries in the proportions named: —

U.S.A.

U.K..

.9

d

1

.a . ■ = •3

a

.2 a

B J > P5a

3

I

<

If

U

Oz.

Oz.

Oz.

Oz.

Oz.

Oz.

Oz.

Oz.

Oz.

26

13

9

sed in

4

3

2

1

I

Or

expres

percent

ages as

follow

s: —

40

20

14

8

6

5

3

2

2

For details connected with grain and its handling see Agri- culture, Corn Laws, Granaries, Flour, Baking, Wheat, &c.

Wheat occupies of all cereals the widest region of any food- stuff. Rice, which shares with millet the distinction of being the principal food-stuff of the greatest number of human beings, is not grown nearly as widely as is wheat, the staple food of the white races. Wheat grows as far south as Patagonia, and as far north as the edge of the Arctic Circle; it flourishes throughout Europe, and across the whole of northern Asia and in Japan; it is cultivated in Persia, and raised largely in India, as far south as the Nizam's dominions. It is grown over nearly the whole of North America. In Canada a very fine wheat crop was raised in the autumn of 1898 as far north as the mission at Fort Providence, on the Mackenzie river, in a latitude above 62 — or less than 200 m. south of the latitude of Dawson City — the period between seed-time and harvest having b*Ben ninety-one

days. In Africa it was an article of commerce in the days of Jacob, whose son Joseph may be said to have run the first and only successful ” corner ” in wheat. For many centuries Egypt was famous as a wheat raiser; it was a cargo of wheat from Alexandria which St Paul helped to jettison on one of his shipwrecks, as was also, in all probability, that of the ” ship of Alexandria whose sign was Castor and Pollux,” named in the same narrative. General Gordon is quoted as having stated that the Sudan if properly settled would be capable of feeding the whole of Europe. Along the north coast of Africa are areas which, if properly irrigated, as was done in the days of Carthage, could produce enough wheat to feed half of the Caucasian race. For instance, the vilayet of Tripoli, with an area of 400,000 sq. m., or three times the extent of Great Britain and Ireland, according to the opinion of a British consul, could raise millions of acres of wheat. The cereal flourishes on all the high plateaus of South Africa, from Cape Town to the Zambezi. Land is being extens- ively put under wheat in the pampas of South America and in the prairies of Siberia.

In the raising of the standard of farming to an English level the volume of the world’s crop would be trebled, another fact which Sir William Cfookes seems to have overlooked. The experiments of the late Sir J. B. Lawes in Hertfordshire have proved that the natural fruitfulness of the wheat plant can be increased threefold by the application of the proper fertilizer. The results of these experiments will be found in a compendium issued from the Rothamsted Agricultural Experimental Station. It is by no means, however, the wheat which yields the greatest number of bushels per acre which is the most valuable from a miller’s standpoint, for the thinness of the bran and the fineness and strength of the flour are with him important considerations, too often overlooked by the farmer when buying his seed. Nevertheless it is the deficient quantity of the wheat raised in the British Islands, and not the quality of the grain, which has been the cause of so much anxiety to economists and statesmen. Sir J. Caird, writing in the year 1880, expressed the opinion that arable land in Great Britain would always command a substantial rent of at least 30s. per acre. His figures were based on the assumption that wheat was imported duty free. He calculated that the cost of carriage from abroad of wheat, or the equivalent of the product of an acre of good wheat land in Great Britain, would not be less than 30s. per ton. But freights had come down by 1900 to half the rates predicated by Caird ; indeed, during a portion of the interval they ruled very close to zero,

as far as steamer freights from America were concerned. In 1900 an all-round freight rate for wheat might be taken at 1 5s. per ton (a ton representing approximately the produce of an acre of good wheat land in England), say from 10s. for Atlantic American and Russian, to 30s. for Pacific American and Australian; about midway between these two extremes we find Indian and Argentine, the greatest bulk coming at about the 15s. rate. Inferior land bearing less than 4! quarters per acre would not be protected to the same extent, and moreover, seeing that a portion of the British wheat crop has to stand a charge as heavy for land carriage across a county as that borne by foreign wheat across a continent or an ocean, the protection is not nearly so substantial as Caird would make out. The compilation showing the changes in the rates of charges for the railway and other transportation services issued by the Division of Statistics, Department of Agriculture, U.S.A. (Miscellaneous series, Bulletin No. 15, 1898), is a valuable reference book. From its pages are culled the following facts relating to the changes in the rates of freight up to the year 1897. 1 In Table 3 the average rates per ton per mile in cents are shown since 1846. For the Fitchburg Railroad the rate for that year was 4-523 cents per ton per mile, since when a great and almost continuous fall has been taking place, until in 1897,

1 Valuable information will afso be found in Bulletin No. 38 (1905), ” Crop Export Movement and Port Facilities on the Atlantic and Gulf Coasts”; in Bulletin No. 49 (1907), ” Cost of Hauling Crops from Farms to Shipping Points”; and in Bulletin No. 69 (1908), ” European Grain Trade.”

the latest year given, the rate had declined to -870 of a cent per ton per mile. The railway which shows the greatest fall is the Chesapeake & Ohio, for the charge has fallen from over 7 cents in 1862 and 1863 to -419 of a cent in 1897, whereas the Erie rates have fallen only from 1-948 in 1852 to -609 in 1897. Putting the rates of the twelve returning railways together, we find the average freight in the two years 1859-1860 was 3-006 cents per ton per mile, and that in 1896-1897 the average rate had fallen to 797 of a cent per ton per mile. This difference is very large compared with the smallness of the unit. Coming to the rates on grain, we find (in Table 2$) a record for the forty years 1858 1897 of the charge on wheat from Chicago to New York, via all rail from 1858, and via lake and rail since 1868, the authority being the secretary of the Chicago Board of Trade. From 1858 to 1862 the rate varied between 42-37 and 34-80 cents per bushel for the whole trip of roundly 1000 rh., the average rate in the

quinquennium being 38-43. In the five years immediately prior to the time at which Sir J. Caird expressed the opinion that the cost of carriage from abroad would always protect the British grower, the average all-rail freight from Chicago to New York was 17-76 cents, while the summer rate (partly by water) was 13-17 cents. These rates in 1897, the last year shown on the table, had fallen to 12-50 and 7-42 respectively. The rates have been as follows in quinquennial periods, via all rail: — Chicago to New York in Cents per Bushel.

1858-

1862.

1863- 1867. .

1868- 1872.

1873- 1877.

1878- 1882.

1883- 1887.

1888- 1892.

1893- 1897.

38-43

31-42

27-91

21-29

16-77

14-67

14-52

12-88

Calculating roundly a cent as equal to a halfpenny, and eight bushels to the quarter, the above would appear in English currency as follows: —

Chicago to New York in Shillings and Pence per Quarter.

1858- 1862.

1863- 1867.

1868- 1872.

1873- 1877.

1878- 1882.

1883- 1887.

1888- 1892.

1893- 1897.

s. d.

12 8

s. d.

10 6

s. d.

9 3

s. d.

7 1

s. d.

5 7

s. d. 4 ioj

s. d.

4 10

s. d.

4 3

Another table (No. 38) shows the average rates from Chicago to New-York by lakes, canal and river. These in their quin- quennial periods are given for the season as follows: — In Cents per Bushel of 60 lb.

1857-1861.

I 876-I 880.

1893-1897.

22-15

10-47

4-92

In Shillings and Pence per Quarter of 480 lb.

1857-1861.

1876-1880.

1893-1897.

s. d.

7 4

s. d.

3 6

s. d.

1 7

In Shillings and Pence per Ton of 2240 lb.

1857-1861.

1876-1880.

1 893-1 897.

s. d.

34 6

s. d.

16 6

s. d.

7 6

This latter mode is the cheapest by which grain can be carried to the eastern seaboard from the American prairies, and it can now be done at a cost of 7s. 6d. per ton. The ocean freight has to be added before the grain can be delivered free on the quay at Liverpool. A rate from New York to Liverpool of 2§d. per bushel, or 7s. iod. per ton, a low rate, reached in Dec. 1900, is yet sufficiently high, it is claimed, to leave a profit; indeed, there have frequently been times when the rate was as low as id. per bushel, or 3s. id. per ton; and in periods of great trade depression wheat is carried from New York to Liverpool as ballast, being paid for by the ship-owner. Another route worked more cheaply than formerly is that by river, from the centre of the winter wheat belt, say at St Louis, to New Orleans, and thence by steamer to Liverpool. The river rate has fallen below five

cents per bushel, or 7s. -per ton, 2240 lb. In Table No. 71 the cost of transportation is compared year by year with the export price of the two leading cereals in the States as follows:— Wheat and Corn— Export Prices and Transportation Rates compared.

Year.

1867 1868 1869

I870

1871

I872

1873

I874

1875 1876

1877 1878

1879 1880 1881 1882 1883

I884

1885 1886 1887 1888 1889 1890 1891 1892

1893 1894

1895 1896

I897

Wheat.

Export Price per Bushel.

$0-92

I- 3 6

1-05

I-I2

1-18

i-3i i-i5

1-29

■97 1 -i 1

I-I2

1-33 1-07 1-25

i- 1 1

1-19

i-i3

1-07

■86

■87

•89

■85 •90

•83 •93

1-03

•80 •67 •58 •65 •75

Rate, Chi- cago to New York by Lake and Canal, perBushel.

Cents.

15-95 16-23 17-20 14-85 17-75 21-55 16-89

12-75 9-90 8-63

10-76 9-10

n-6o

12-27 8-19 7-89 8-37 6-31 5-87 8-71

8-51 5-93 6-89 5-86 5-96

5-6i

6-31 4.44

4-u

5-38 4-35

Number

of Bushels

carried

for Price of One Bushel.

5-77

8- 3 8

6-io

7-54 6-65 6-08

6-8i

IO-I2

9- 80 12-86 10-41 14-62

9-22

10-19

13-55 15-08 13-50 16-96 14-65

9-99 10-46

14-33 13-06 14-16 15-60 18-36 12-68 15-09 14-11 12-08

17-24

Corn.

Export Price per Bushel.

$0-72

■84-1

•72-8

•80.5

•67-9 •6i-8

•54-3 •64-7

•73-8 •60-3 •56-0 •55-8 •47-1 •54-3 •55-2 ■66-8 •68-4 •6i-i •54-0 •49-8 •47.9

•55-0

•47.4

•41-8

•57-4

•55

•53

•46

•53 •38 •31

Rate, Chi- cago to

New York by Lake

and Canal.

perBushel.

Cents.

14-58

13-57 14-98 13-78

16-53 19-62

15-39 11-29

8-93 7-93 9-41 8-27 10-43 11-14 7-26

7-23 7-66

5-64 5-38 7-98 7-88

5-41 6-19

5-io

5-36 5-03 5-71 3-99 3-71 4.94

3-79

Number of Bushels carried for Price of One Bushel.

4-94

6-20

4-86

5-84

4-u

3-15 3-53 5-73 8-26 7-60 5-95 6-75 4-52 4-87 7-60

9-24

8-93

10-83

10-04

6-24

6-o8

10-17

7-66

8-20

10-71

10-93

9-28

n-53

14-29

7-69

8-i8

The farmers of the United States have now to meet a greatly increased output from Canada— the cost of transport from that country to England being much the same as from the United States. So much improved is the position of the farmer in North America compared with what it was about 1870, that the trans- port companies in 1901 carried 17ˆ bushels of his grain to the seaboard in exchange for the value of one bushel, whereas in 1867 he had to give up one bushel in every six in return for the service. As regards the British farmer, it does not appear as if he had improved his position; for he has to send

his wheat to greater distances, owing to the collapse of many country millers or their removal to the seaboard, while railway rates have fallen only to a very small extent; again the farmer's wheat is worth only half of what it was formerly; it may be said that the British farmer has to give up one bushel in nine to the railway company for the purpose of transportation, whereas in the 'seventies he gave up one in eighteen only. Enough has been said to prove that the advantage of position claimed for the British farmer by Caird was somewhat illusory. Speaking broadly, the Kansas or Minnesota farmer's wheat does not have to pay for carriage to Liverpool more than 23. 6d. to 7s. 6d. per ton in excess of the rate paid by a Yorkshire farmer; this, it will be admitted, does not go very far towards enabling the latter to pay rent, tithes and rates and taxes.

The subject of the rates of ocean carriage at different periods requires consideration if a proper understanding of the working of the foreign grain trade is to be obtained. Only a very small proportion of the decline in the price of wheat since 1880 is due. to cheapened transport rates; for while the mileage rate has ,been falling, the length of haulage has been extending, until in 1900 the principal wheat fields of America were 2000 m. farther from the eastern seaboard than was the case in 1870, and consequently, notwithstanding the fall in the mileage rate of 50 to 75%, it still costs the United Kingdom nearly as much to have its quota of foreign wheat fetched from abroad as it did

then. The difference in the cost of the operation is shown in the following tabular statement, both the cost in the aggregate on a year's imports and the cost per quarter:—

Quantity of Wheat and Wheaten Flour (as wheat) imported into the United Kingdom from various sources during the calendar year 1900, together with the average rate of freight.

1900.

Countries of Origin.

Atlantic America . . South Russia . Pacific America

Canada

Rumania …. Argentina and Uruguay

France

Bulgaria and Rumelia

India

Austria-Hungary .

Chile

North Russia . Germany …. Australasia. Minor Countries .

Total ….

Quantities. Qrs. 480 lb.

11,171,100

569,000

2,389,900

1,877,100

176,400

4,322,300

251,900

30,600

2,200

389,300

600

462,700

438,700

883,900

225,100

Ocean Freight to United Kingdom. Per 480 lb.

s. d.

2 3

2 2

8 1

2 8

2 6

4 10

1 3

2 6

4 o

1 9

i”6

1 6 6 5

2 6

Total Cost of Ocean Carriage.

23,190,800 Average 3s. 6d.

£

1,257,100

62,000

966,000

250,000

22,000

1,045,000

16,000

4,000

400

34 > ooo

35,ooo

33,000

284,000

28,000

£4,036,500

Comparing these figures with a similar statement for the year 1872, the most remote year for which similar facts are available, it will be found that the actual total cost per quarter for ocean carriage has not much decreased.

Quantity of Wheat and Wheaten Flour (as wheat) imported into the United Kingdom from various sources during the calendar year 1872, together with the average rate of freight.

1872.

Countries of Origin.

South Russia United States Germany . France . Egypt . . North Russia Canada . Chile . . Turkey . Spain Scandinavia

Total, Chief Countries

Quantities. Qrs.

Ocean Freight

to United

Kingdom.

Per qr.

Total Cost of Carriage.

3,678,000 2,030,000 910,000 660,000 536,000 490,000 400,000 330,000 195,000 130,000 160,000

s. d.

8 6 6 6

2 3 4 2

7 12

7 3 2

9,519,000 Average 6s. 5d.

£

1,563,000

659,000 91,000 99,000

120,000 49,000

150,000

198,000 72,000 23,000 16,000

£3,040,000

N.B.—A trifling quantity of Californian and Australian wheat was imported in the period in question, but the Board of Trade records do not distinguish the quantities, therefore they cannot be given. The freight in that year from those countries averaged about 13s. per quarter. 5

The exact difference between the average freight for the years 1872 and 1900 amounts to about 2s. nd. per quarter (480 lb) a trifle in comparison with the actual fall in the price of wheat during the same years.

The following data bearing upon the subject, for selected periods, are partly taken from the Corn Trade Year-Book:—

Year.

1872 1882 1894

1895 1896 1900

United Kingdom Annual Imports. Wheat and Flour. Qrs.

9,469,000 14,850,000 16,229,000 25,197,000 23,431,000 23,196,000

Ocean Freight to United Kingdom. Per qr.

s. d.

6 5

Aggregate Cost of Carriage.

3,040,000 5,420,000 3,041,000 3,825,000 3,258,000 4,036,000

GRAM

325

In passing, it may be pointed out that for a period of four years, from 1871 to 1874, the price of wheat averaged 56s. per quarter (or 7s. per bushel), with the charge for ocean carriage at 6s. 5d. per quarter, whereas in 1901 wheat was sold in England at 28s. (or 3s. 6d. per bushel), and the charge for ocean carriage was 3s. 6d. per quarter; the ocean transport companies carried eight bushels of wheat across the seas in 1001 for the value of one bushel, or exactly at the same ratio as in 1872.

The contrast between the case of railway freight and ocean freight is to be explained by the greater length of the present ocean voyage, which now extends to 10,000 miles in the case of Europe's importation of white wheat from the Pacific Coast of the United States and Australia, in contrast with the short voyage from the Black Sea or across the English Channel or German Ocean. It is largely due to the overlooking of this phase of the question that an American statistician has fallen into the error of stating that about 16s. per quarter of the fall in the price of wheat, which happened between 1880 and 1894, is attributable to the lessened cost of transport.

Thus, whatever the cause of the decline in the price of wheat may be, it cannot be attributed solely to the fall in the rate of Wheat Prices

The following figures show the fluctuations from year to year of English wheat, chiefly according to a record published by Mr T. Smith, Melford, the period covered being from 1656 to 1905:

Price per Quarter

s. d

.

s. d.

s. d

.

s. d

.

s. d.

1656

38

2

1706

23

1

1756

40

1

1806

79

1

1856

69 2

1657

|i

5

1707

25

4

1757

53

4

1807

75

4

1857

56 4

1658

57

9

1708

36

1758

44

5

1808

84

4

1858

44 2

1659

58

8

1709

5 9

9

1759

35

3

1809

97

4

1859

43 9

1660

50

2

1710

69

4

1760

32

5

1810

106

5

i860

53 3

1661

52

2

17 1 1

48

1761

26

9

1811

95

3

1861

55 4

1662

65

9

1712

41

2

1762

34

8

1812

126

6

1862

55 5

1663

50

8

1713

45

4

1763

36

1

1813

109

9

1863

44 9

1664

36

1714

44

■9

1764

4i

5

1814

74

4

1864

40 2

1665

43

[O

1715

38

2

1765

48

1815

65

7

1865

41 10

1666

32

1716

42

8

1766

43

1

1816

78

6

1866

49 11

1667

32

1717

40

7

1767

57

4

1817

96

[I

1867

64 5

1668

35

6

1718

34

6

1768

53

9

1818

86

3

1868

63 9

1669

39

5

1719

3i

1

1769

40

7

1819

74

6

1869

48 2

1670

37

1720

32

10

1770

43

6

1820

67

10

1870

46 11

1671

37

4

1721

33

4

1771

47

2

1821

56

1

1871

56 8

1672

36

5

1722

32

1772

50

8

1822

44

7

1872

57

1673

41

5

1723

30

10

1773

5i

1823

53

4

1873

58 8

1674

61

1724

32

10

1774

52

8

1824

63

11

1874

55 9

1675

57

5

1725

43

1

1775

48

4

1825

68

6

1875

45 2

1676

33

9

1726

40

10

1776

38

2

1826

58

8

1876

46 2

1677

37

4

1727

37

4

1777

45

6

1827

58

6

1877

56 9

1678

52

5

1728

48

5

1778

42

1828

60

5

1878

46 5

1679

53

4

1729

41

7

1779

33

8

1829

66

3

1879

43 10

1680

40

1730

32

5

1780

35

8

1830

64

3

1880

44 4

1681

41

5

1731

29

2

1781

44

8

1831

66

4

1881

45 4

1682

39

1

1732

23

8

1782

47

10

1832

58

8

1882

45 1

1683

35

6

1733

25

2

1783

52

8

1833

52

11

1883

4i 7

1684

39

1

1734-

34

6

1784

48

10

1834

46

2

1884

35 8

1685

41

5

1735

38

2

1785

5i

10

■835

39

4

1885

32 10

1686

30

2

1736

35

10

1786

38

10

1836

48

6

1886

31 °

1687

22

4

1737

33

9

1787

41

2

1837

55

1887

32 6

1688

40

10

1738

31

6

1788

45

1838

64

7

1888

31 10

1689

26

8

1739

34

2

1789

5i

2

1839

70

8

1889

29 9

1690

30

9

1740

45

1

1790

54

9

1840

66

4

1890

31 11

1691

30

2

1741

41

5

1791

48

7

1841

64

4

1891

37

1692

41

5

1742

30

2

1792

43

1842

57

3

1892

30 3

1693

60

1743

22

1

1793

49

3

1843

5°

1

1893

26 4

1694

56

10

1744

22

1

1794

52

3

1844

5i

3

1894

22 10

1695

47

1

1745

24

5

1795

75

2

1845

50

10

1895

23 1

1696

63

1

1746

34

8

1796

78

7

1846

54

8

1896

26 2

1697

53

4

1747

30

11

1797

53

9

1847

69

9

1897

30 2

1698

60

9

1748

32

10

1798

5i

10

1848

50

6

1898

34

1699

56

10

1749

32

10

1799

69

1849

44

3

1899

25 8

1700

35

6

1750

28

10

1800

113

10

1850

40

3

1900

26 11

1701

33

5

1751

34

2

1801

119

6

1851

38

6

1901

26 9

1702

26

2

1752

37

2

1802

69

10

1852

40

9

1902

28 1

1703

32

1753

39

8

1803

58

10

1853

53

3

1903

26 9

1704

41

4

1754

30

9

1804

62

3

1854

72

5

1904

28 4

1705

26

8

1/55

30

1

1805

89

9

1855

74

8

1905

29 8

tfl

S >■ 5-42

10

36

5i

9

65

10

‘42 7

5 J

Average for 46 years only.

rail or ocean freights. Incidental charges are lower than they were in 1870; handling charges, brokers’ commissions and insurance premiums have been in many instances reduced, but all these economies when combined only amount to about 2s. per quarter. Now if we add together all these savings in the rate of rail and ocean freights and incidental expenses, we arrive at an aggregate economy of 8s. per quarter, or not one-third of the actual difference between the average price of wheat in 1872 and 1900. To what the remaining

difference was due it is difficult to say with certitude; there are some who argue that the tendency of prices to fall is inherent, and that the constant whittling away of intermediaries' profits is sufficient explanation, while bi-metallists have maintained that the phenomenon is clearly to be traced to the action of the German government in demonetizing silver in 1872.

GRAM, or Chick-pea, called also Egyptian pea, or Bengal gram (from Port, grdo, formerly gram, Lat. granum, Hindi Chana, Bengali Chhola, Ital. cece, Span, garbanzo), the Cicer arietinum of Linnaeus, so named from the resemblance of its seed to a ram's head. It is a member of the natural order Leguminosae, largely cultivated as a pulse-food in the south of Europe, Egypt and western Asia as far as India, but is not known undoubtedly wild. The plant is an annual herb with fiexuose branches, and alternately arranged pinnately compound leaves, with small, oval, serrated leaflets and small eared stipules. The flowers are borne singly in the leaf-axils on a stalk about half the length of the leaf and jointed and bent in the middle; the corolla is blue-purple. The inflated pod, 1 to if in. long, contains two roundish seeds. It was cultivated by the Greeks in Homer's time under the name erebinthos, and is also referred to by Dioscorides as krios from the resemblance of the pea to the head of a ram. The Romans called it cicer, from which is derived the modern names given to it in the south of Europe. Names, more or less allied to one another, are in vogue among the peoples of the Caucasus, the Caspian Sea, Armenia and Persia, and there is a Sanskrit name and several others analogous or different in modern Indian languages. The plant has been cultivated in Egypt from the beginning of the Christian era, but there is no proof that it was known to the ancient Egyptians. Alphonse de Candolle {Origin of Cultivated Plants, p. 325) suggests that the plant originally grew wild in the countries to the south of the Caucasus and to the north of Persia. " The western Aryans (Pelasgians, Hellenes) perhaps introduced the plant into southern Europe, where, however, there is some probability 'that it was also indigenous. The western Aryans carried it to India." Gram is largely cultivated in the East, where the seeds are eaten raw or cooked in various ways, both in their ripe and unripe condition, and when roasted and ground subserve the same purposes as ordinary flour. In Europe the seeds are used as an ingredient in soups. They contain, in 100 parts without husks, nitrogenous substances 22-7, fat 3-76, starch 63'i8, mineral matters 2-6 parts, with water (Forbes Watson, quoted in Parkes's Hygiene). The liquid which exudes from the glandular hairs clothing the leaves and stems of the plant, more especially during the cold season when the seeds ripen, contains a notable proportion of oxalic acid. In

Mysore the dew containing it is collected by means of cloths spread on the plant over night, and is used in domestic medicine. The steam of water in which the fresh plant is immersed is in the Deccan resorted to by the Portuguese for the treatment of dysmenorrhoea. The seed of Phaseolus Mungo, or green gram (Hind, and Beng. moong), a form of which plant with black seeds (P. Max of Roxburgh) is termed black gram, is an important article of diet among the labouring classes in India. The meal is an excellent substitute for soap, and is stated by Elliot to be an invariable concomitant of the Hindu bath. A variety, var. radiatus {P. Roxburghii, W. and Arn., or P. radiatus, Roxb.) (vern. urid, mashkalai), also known as green gram, is perhaps the most esteemed of the leguminous plants of India, where the meal of its seed enters into the com- position of the more delicate cakes and dishes. Horse gram, Dolichos biflorus (vern. kulthi), which supplies in Madras the place of the chick-pea, affords seed which, when boiled, is

extensively employed as a food for horses and cattle in South India, where also it is eaten in curries.

See W. Elliot, ” On the Farinaceous Grains and the various kinds of Pulses used in Southern India,” Edin. New Phil. Journ. xvi. (1862) 16 sq.; H. Drury, The Useful Plants of India (1873); U. C. Dutt, Materia Medica of the Hindus (Calcutta, 1877) ‘• G. Watt, Dictionary of the Economic Products of India (1890).

GRAMMAR (from Lat. grammatica, sc. ars; Gr. ypanˆa, letter, from ypatt.v, to write). By the grammar of a language is meant either the relations borne by the words of a sentence and by sentences themselves one to another, or the systematized exposition of these. The exposition may be, and frequently is, incorrect; but it always presupposes the existence of certain customary uses of words when in combination. In what follows, therefore, grammar will be generally employed in its primary sense, as denoting the mode in which words are connected in order to express a complete thought, or, as it is termed in logic, a proposition.

The object of language is to convey thought, and so long as this object is attained the machinery for attaining it is of comparatively slight importance. The way in grammar. which we combine our words and sentences matters little, provided that our meaning is clear to others. The expressions ” horseflesh ” and ” flesh of a horse ” are equally

intelligible to an Englishman and therefore are equally recognized. by English grammar. The Chinese manner of denoting a genitive is by placing the defining word before that which it defines, as in koue jin, ” man of the kingdom,” literally ” kingdom man,” and the only reason why it would be incorrect in French or Italian is that such a combination would be unintelligible to a Frenchman or an Italian. Hence it is evident that the grammatical correctness or incorrectness of an expression depends upon its intelligibility, that is to say, upon the ordinary use and custom of a particular language. Whatever is so unfamiliar as not to be generally understood is also un- grammatical. In other words, it is contrary to the habit of a language, as determined by common usage and consent.

In this way we can explain how it happens that the grammar of a cultivated dialect and that of a local dialect in the same country so frequently disagree. Thus, in the dialect of West Somerset, thee is the nominative of the second personal pronoun, while in cultivated English the plural accusative you (A.S. cow) has come to represent a nominative singular. Both are grammatically correct within the sphere of their respective dialects, but no further. You would be as ungrammatical in West Somerset as thee is in classical English; and both you and thee, as nominatives singular, would have been equally ungram matical in Early English. Grammatical propriety is nothing more than the established usage of a particular body of speakers at a particular time in their history.

It follows from this that the grammar of a people changes, like its pronunciation, from age to age. Anglo-Saxon or Early English grammar is not the grammar of Modern English, any more than Latin grammar is the grammar of modern Italian; and to defend an unusual construction or inflexion on the ground that it once existed in literary Anglo-Saxon is as wrong as to import a peculiarity of some local dialect into the grammar of the cultivated speech. It further follows that different languages will have different grammars, and that the differences will be more or less according to the nearer or remoter relation- ship of the languages themselves and the modes of thought of those who speak them. Consequently, to force the gram- matical framework of one language upon another is to miscon- ceive the whole nature of the latter and seriously to mislead the learner. Chinese grammar, for instance, can never be under- stood until we discard, not only the terminology of European grammar, but the very conceptions which underlie it, while the polysynthetic idioms of America defy all attempts to discover in them ” the parts of speech ” and the various grammatical ideas which occupy so large a place in our school-grammars. The endeavour to find the distinctions of Latin

grammar in that of English has only resulted in grotesque errors, and a total misapprehension of the usage of the English language.

It is to the Latin grammarians — or, more correctly, to the Greek grammarians, upon whose labours those of the Latin writers were based — that we owe the classification of the subjects with which grammar is commonly sup- Sub ‘ posed to deal. The grammar of Dionysius Thrax, mmmar. which he wrote for Roman schoolboys in the time of Pompey, has formed the starting-point for the innumerable school-grammars which have since seen the light, and suggested that division of the matter treated of which they have followed. He defines grammar as a practical acquaintance with the language of literary men, and as divided into six parts — accentuation and phonology, explanation of figurative expressions, definition, etymology, general rules of flexion and critical canons. Of these, phonology and accentuation, or prosody, can properly be included in grammar only in so far as the construction of a sentence and the grammatical meaning of a word are determined by accent or letter-change; the accentual difference in English, for example, between incense and incense belongs to the province of grammar, since it indicates a difference between noun and verb; and the changes of vowel in the Semitic languages, by which various nominal and verbal forms are distinguished from one another, constitute a very important part of their grammatical machinery. But where accent and pronunciation do not serve to express the relations of words in a sentence, they fall into the domain of phonology, not of grammar.. The explanation of figurative expressions, again, must be left to the rhetorician, and definition to the lexicographer; the grammarian has no more to do with them than he has with the canons of criticism.

In fact, the old subdivision of grammar, inherited from the grammarians of Rome and Alexandria, must be given up and a new one put in its place. What grammar really deals with are all those contrivances whereby the relations of words and sentences are pointed out. Sometimes it is position, sometimes phonetic symbolization, sometimes composition, sometimes flexion, sometimes the use of auxiliaries, which enables the speaker to combine his words in such a way that they shall be intelligible to another. Grammar may accordingly be divided into the three departments of composition or ” word-building,” syntax and accidence, by which is meant an exposition of the means adopted by language for expressing the relations of grammar when recourse is not had to composition or simple position.

A systematized exposition of grammar may be intended for the purely

practical purpose of teaching the mechanism of a foreign language. In this case all that is necessary is a correct and complete statement of the facts. But jModes ° f a correct and complete statement of the facts is by no men t. means so easy a matter as might appear at first sight. The facts will be distorted by a false theory in regard to them, while they will certainly not be presented in a complete form if the grammarian is ignorant of the true theory they presuppose. The Semitic verb, for example, remains unintelligible so long as the explanation of its forms is sought in the conjugation of the Aryan verb, since it has no tenses in the Aryan sense of the word, but denotes relation and not time.

A good practical grammar of a language, therefore, should be based on a correct appreciation of the facts which it expounds, and a correct appreciation of the facts is only possible where they are examined and co-ordinated in accordance with the scientific method. A practical grammar ought, wherever it is possible, to be preceded by a scientific grammar.

Comparison is the instrument with which science works, and a scientific grammar, accordingly, is one in which the comparative method has been applied to the relations of speech. If we would understand the origin and real nature of grammatical forms, and of the relations which they represent, we must compare them with similar forms in kindred dialects and languages, as well as with the forms under which they appeared themselves at an earlier period of their history. We shall thus have a comparative grammar and an historical grammar, the latter being devoted to tracing the history of grammatical forms and usages in the

same language. Of course, an historical grammar is only possible where a succession of written records exists; where a language possesses no older literature we must be content with a comparative grammar only, and look to cognate idioms to throw light upon its grammatical peculiarities. In this case we have frequently to leave whole forms unexplained, or at most conjecturally interpreted, since the machinery by means of which the relations of grammar are symbolized is often changed so completely during the growth of a language as to cause its earlier shape and character to be unrecognizable. Moreover, our area of comparison must be as wide as possible; where we have but two or three languages to compare, we

are in danger of building up conclusions on insufficient evidence. The gram- matical errors of the classical philologists of the 18th century were in great measure due to the fact that their area of comparison was confined to Latin and Greek.

The historical grammar of a single language or dialect, which traces the grammatical forms and usages of the language as far back as documentary evidence allows, affords material to the comparative grammarian, whose task it is to compare the grammatical forms and usages of an allied group of tongues and thereby reduce them to their earliest forms and senses. The work thus carried out by the comparative grammarian within a particular family of languages is made use of by universal grammar, the object of which is to determine the ideas that under- lie all grammar whatsoever, as distinct from those that are peculiar to special families of speech. Universal grammar is sometimes known as ” the metaphysics of language,” and it has to decide such questions as the nature of gender or of the verb, the true purport of the genitive relation, or the origin of grammar itself. Such questions, it is clear, can only be answered by comparing the results gained by the comparative treatment of the grammars of various groups of language. What historical grammar is to comparative grammar, comparative grammar is to universal grammar.

Universal grammar, as founded on the results of the scientific study of speech, is thus essentially different from that ” universal grammar ” so much in vogue at the beginning of the 19th century, which consisted of a series of a priori

Universal grammar.

assumptions based on the peculiarities of European grammar and illustrated from the same source. But universal grammar, as conceived by modern science, is as yet in its infancy; its materials are still in the process of being collected. The comparative grammar of the Indo-European languages is alone in an advanced state, those of the Semitic idioms, of the Finno- Ugrian tongues and of the Bantu dialects of southern Africa are stili in a backward condition; and the other families of speech existing in the world, with the exception of the Malayo- Polynesian and the Sonorian of North America, have not as yet been treated scientifically. Chinese, it is true, possesses an historical grammar, and Van Eys, in his comparative grammar of Basque, endeavoured to solve the problems of that interesting language by a comparison of its various dialects; but in both cases the area of comparison is too small for more than a limited success to be attainable. Instead of attempting the questions of universal grammar,

therefore, it will be better to confine our attention to three points — the fundamental differences in the grammatical conceptions of different groups of languages, the main results of a scientific investigation of Indo-European grammar, and the light thrown by comparative philology upon the grammar of our own tongue.

The proposition or sentence is the unit and starting-point of speech, and grammar, as we have seen, consists in the relations Differ- °^ ‘ ts severa l parts one to another, together with the eaces la expression of them. These relations may be regarded grammar from various points of view. In the polysynthetic ofunaiiied i an g Ua g es f America the sentence is conceived as a whole, not composed of independent words, but, like the thought which it expresses, one and indivisible. What we should denote by a series of words is consequently denoted by a single long compound — kuligatchis in Delaware, for instance, signif3’ing ” give me your pretty little paw,” and aglekkigiartor-

asuarnipok in Eskimo, ” he goes away hastily and exerts himself to write.” Individual words can be, and often are, extracted from the sentence; but in this case they stand, as it were, outside it, being represented by a pronoun within the sentence itself. Thus, in Mexican, we can say not only ni-solsi-temoa, ” I look for flowers,” but also ni-k-temoa sotsitl, where the inter- polated guttural is the objective pronoun. As a necessary result of this conception of the sentence the American languages possess no true verb, each act being expressed as a whole by a single word. In Cherokee, for example, while there is no verb signifying ” to wash ” in the abstract, no less than thirteen words are used to signify every conceivable mode and object of washing. In the incorporating languages, again, of which Basque may be taken as a type, the object cannot be conceived except as contained in the verbal action. Hence every verbal form embodies an objective pronoun, even though the object may be separately expressed. If we pass to an isolating language like Chinese, we find the exact converse of that which meets us in the polysynthetic tongues. Here each proposition or thought is analysed into its several elements, and these are set over against one another as so many independent words. The relations of grammar are consequently denoted by position, the particular position of two or more words determining the relation they bear to each other. The analysis of the sentence has not been carried so far in agglutinative languages like Turkish. In these the relations of grammar are represented by individual words, which, however, are subordinated to the words expressing the main ideas intended to be in relation to one another. The defining words, or indices of grammatical relations, are, in a large number of instances, placed after the words which they define; in some cases, however, as, for example, in the

Bantu languages of southern Africa, the relation is conceived from the opposite point of view, the defining words being prefixed. The inflexional languages call in the aid of a new principle. The relations of grammar are denoted symbolically either by a change of vowel or by a change of termination, more rarely by a change at the beginning of a word. Each idea, together with the relation which it bears to the other ideas of a proposition, is thus represented by a single word; that is to say, the ideas which make up the elements of a sentence are not conceived severally and independently, as in Chinese, but as always having a certain connexion with one another. Inflexional languages, however, tend to become analytical by the logical separation of the flexion from the idea to which it is attached, though the primitive point of view is never altogether discarded, and traces of flexion remain even in English and Persian. In fact, there is no example of a language which has wholly forsaken the conception of the sentence and the relation of its elements with which it started, although each class of languages occasionally trespasses on the grammatical usages of the others. In language, as elsewhere in nature, there are no sharp lines of division, no sudden leaps; species passes insensibly into species, class into class. At the same time the several types of speech — polysynthetic, isolating, agglutinative and inflexional — remain clear and fixed; and even where two languages belong to the same general type, as, for instance, an Indo-European and a Semitic language in the inflexional group, or a Bantu and a Turkish language in the agglutinative group, we find no certain example of grammatical interchange. A mixed grammar, in which the grammatical procedure of two distinct families of speech is intermingled, is almost, if not altogether, unknown.

It is obvious, therefore, that grammar constitutes the surest and most important basis for a classification of languages. Words may be borrowed freely by one dialect from another, or, though originally unrelated, may, by the action of phonetic decay, come to assume the same forms, while the limited number of articulate sounds and conceptions out of which language was first developed, and the similarity of the circumstances by which the first speakers were everywhere surrounded, naturally produce a resemblance between the roots of many unconnected tongues. Where, however, the fundamental conceptions of grammar and

the machinery by which they are expressed are the same, we may

have no hesitation in inferring a common origin.

The main results of scientific inquiry into the origin and primitive meaning of the forms of Indo-European grammar Forms at mav be summed up as follows. We start with stems indo- or themes, by which are meant words of two or

European more syllables which terminate in a limited number grammar. o ˆ SO unds. These stems can be classed in groups of two kinds, one in which the groups consist of stems of similar meanings and similar initial syllables, and another in which the final syllables alone coincide. In the first case we have what are termed roots, the simplest elements into which words can be decomposed; in the second case stems proper, which may be described as consisting of suffixes attached to roots. Roots, therefore, are merely the materials out of which speech can be made, the embodiments of isolated conceptions with which the lexicographer alone has to deal, whereas stems present us with words already combined in a sentence and embodying the relations of grammar. If we would rightly understand primitive Indo-European grammar, we must conceive it as having been expressed or implied in the suffixes of the stems, and in the order according to which the stems were arranged in a sentence. In other words, the relations of grammar were denoted partly by juxtaposition or syntax, partly by the suffixes of stems.

These suffixes were probably at first unmeaning, or rather clothed with vague significations, which changed according to the place occupied in the sentence by the stem to which they were joined. Gradually this vagueness of signification dis- appeared, and particular suffixes came to be set apart to represent particular relations of grammar. What had hitherto been expressed by mere position now attached itself to the terminations or suffixes of stems, which accordingly became full-grown words. Some of the suffixes denoted purely grammatical ideas, that is to say, were flexions; others were classificatory, serving to distinguish nouns from verbs, presents from aorists, objects from agents and the like; while others, again, remained un- meaning adjuncts of the root. This origin of the flexions explains the otherwise strange fact that the same suffix may symbolize wholly different grammatical relations. In Latin, for instance, the context and dictionary will alone tell us that mus-as is the accusative plural of a noun, and am-as the second person singular of a verb, or that mus-a is the nominative singular of a feminine substantive, bon-a the accusative plural of a neuter adjective. In short, the flexions were originally merely the terminations of stems which were adapted to express the various relations of words to each other in a sentence, as

these gradually presented themselves to the consciousness and were extracted from what had been previously implied by position. Necessarily, the same suffix might be used sometimes in a classificatory, sometimes in a flexional sense, and sometimes without any definite sense at all. In the Greek dative-locative iroo-to-cn, for example, the suffix -«s is classificatory; in the nominative 7r6o-« it is flexional.

When a particular termination or suffix once acquired a special sense, it would be separated in thought from the stem to which it belonged, and attached in the same sense to other stems and other terminations. Thus in modern English we can attach the suffix -ize to almost any word whatsoever, in order to give the latter a transitive meaning, and the Gr. 7r6oe

to denote the superlative. ” Very warm ” expresses little more than the positive, and to represent the intensity of his feelings the Englishman has recourse to such expressions as ” awfully warm ” like the Ger. ” schrecklich warm.”

Such words as ” very,” ” awfully,” ” schrecklich,” illustrate a second mode in which Indo-European grammar has found means of expression. Words may lose their true signification and become the mere exponents of grammatical ideas. Professor Earle divides all words into presentive and symbolic, the former denoting objects and conceptions, the latter the relations which exist between these. Symbolic words, therefore, are what the Chinese grammarians call ” empty words ” — words, that is, which have been divested of their proper signification and serve a gram- matical purpose only. Many of the classificatory and some of the flexional suffixes of Indo-European speech can be shown to have had this origin. Thus the suffix tar, which denotes names of kinship and agency, seems to come from the same root as the Lat. terminus and trans, our through, the Sans, tar-ami, ” I pass over,” and to have primarily signified ” one that goes through ” a thing. Thus, too, the Eng. head or hood, in words like godhead and brotherhood, is the A.-S. hdd, ” character ” or “rank”; dom, in kingdom, the A.-S. ddm, “judgment”; and lock or ledge, in wedlock and knowledge, the A.-S. Idc, ” sport ” or ” gift.” In all these cases the ” empty words,” after first losing every trace of their original significance, have followed the general analogy of the language and assumed the form and functions of the suffixes with which they had been confused.

A third mode of representing the relations of grammar is by the symbolic use of vowels and diphthongs. In Greek, for instance, the

distinction between the reduplicated present biStofii and the reduplicated perfect 5k8coKa is indicated by a distinction of vowel, and in primitive Aryan grammar the vowel d seems to have been set apart to denote the subjunctive mood just as ya or i was set apart to denote the potential. So, too, according to M. Hovelacque, the change of a into i or u in the parent Indo- European symbolized a change of meaning from passive to active. This symbolic use of the vowels, which is the purest application of the principle of flexion, is far less extensively carried out in the Indo-European than in the Semitic languages. The Semitic family of speech is therefore a much more characteristic type of the inflexional languages than is the Indo-European.

The primitive Indo-European noun possessed at least eight cases — nominative, accusative, vocative, instrumental, dative, genitive, ablative and locative. M. Bergaigne has attempted to show that the first three of these, the ” strong cases ” as they are termed, are really abstracts formed by the suffixes -as (-s), -an, -m, -t, -i, -d and -ya (-»), the plural being nothing more than an abstract singular, as may be readily seen by comparing words like the Gr. ‘ewo-s, and ones, which mean precisely the same. The remaining ” weak ” cases, formed by the suffixes -sma, -sya, -syd, -yd, -i, -an, -t, -bhi, -su, -i, -a and -a, are really adjectives and adverbs. No distinction, for example, can be drawn between ” a cup of gold ” and ” a golden cup,” and the instrumental, the dative, the ablative and the locative are, when closely examined, merely adverbs attached to a verb. The terminations of the strong cases do not displace the accent of the stem to which they are suffixed; the suffixes of the weak cases, • on the other hand, generally draw the accent upon themselves.

According to Hiibschmann, the nominative, accusative and genitive cases are purely grammatical, distinguished from one another through the exigencies of the sentence only, whereas the locative, ablative and instrumental have a logical origin and determine the logical relation which the three other cases bear to each other and the verb. The nature of the dative is left undecided. The locative primarily denotes rest in a place, the ablative motion from a place, and the instrumental the means or concomitance of an action. The dative Hiibschmann regards as ” the case of the participant object.” Like Hiibschmann, Holzweissig divides the cases into two classes — the one grammatical and the other logical; and his analysis of their primitive meaning is the same as that of Hiibschmann, except as regards

the dative, the primary sense of which he thinks to have been motion towards a place. This is also the view of Delbriick, who makes it denote tendency towards an object. Delbriick, how- ever, holds that the primary sense of the ablative was that of separation, the instrumental originally indicating concomitance, while there was a double locative, one used like the ablative absolute in Latin, the other being a locative of the object.

The dual was older than the plural, and after the development of the latter survived as a merely useless encumbrance, of which most of the Indo-European languages contrived in time to get rid. There are still many savage idioms in which the conception of plurality has not advanced beyond that of duality. In the Bushman dialects, for instance, the plural, or rather that which is more than one, is expressed by repeating the word; thus tu is ” mouth,” tutu ” mouths.” It may be shown that most of the suffixes of the Indo-European dual are the longer and more primitive forms of those of the plural which have grown out of them by the help of phonetic decay. The plural of the weak cases, on the other hand (the accusative alone excepted), was identical with the singular of abstract nouns; so far as both form and meaning are concerned, no distinction can be drawn between o7r« and «ros. Similarly, humanity and men signify one and the same thing, and the use of English words like sheep or fish for both singular and plural shows to what an extent our apprecia- tion of number is determined by the context rather than by the form of the noun. The so-called ” broken plurals ” of Arabic and Ethiopic are really singular collectives employed to denote the plural.

Gender is the product partly of analogy, partly of phonetic decay. In many languages, such as Eskimo and Choctaw, its place is taken by a division of objects into animate and inanimate, while in other languages they are separated into rational and irrational. There are many indications that the parent Indo- European in an early stage of its existence had no signs of gender at all. The terminations of the names of father and mother, pater and mater, for example, are exactly the same, and in Latin and Greek many diphthongal stems, as well as stems in i or ya and u (like vavs and ckw, 7r6Xis and Xis), may be indifferently masculine and feminine. Even stems in and a (of the second and first declensions), though the first are generally masculine and the second generally feminine, by no means invariably maintain the rule; and feminines like humus and 656s, or masculines like advena and toKIttis, show that there was a time when these stems also indicated no particular gender, but owed their subsequent adaptation,

the one to mark the masculine and the other to mark the feminine, to the influence of analogy. The idea of gender was first suggested by the difference between man and woman, male and female, and, as in so many languages at the present day, was represented not by any outward sign but by the meaning of the words themselves. When once arrived at, the conception of gender was extended to other objects besides those to which it properly belonged. The primitive Indo-European did not distinguish between subject and object, but personified objects by ascribing to them the motives and powers of living beings. Accordingly they were referred to by different pronouns, one class denoting the masculine and another class the feminine, and the distinction that existed between these two classes of pronouns was after a time transferred to the nouns. As soon as the preponderant number of stems in in daily use had come to be regarded as masculine on account of their mean- ing, other stems in o, whatever might be their signification, were made to follow the general analogy and were similarly classed as masculines. In the same way, the suffix i or ya acquired a feminine sense, and was set apart to represent the feminine gender. Unlike the Semites, the Indo-Europeans were not satisfied with these two genders, masculine and feminine. A,s soon as object and subject, patient and agent, were clearly distinguished from each other, there arose a need for a third gender, which should be neither masculine nor feminine, but denote things without life. This third gender was fittingly expressed either by the objective case used as a nominative {e.g. regnum), or by a stem without any case ending at all {e.g. virus).

The adverbial meaning of so many of the cases explains the readiness with which they became crystallized into adverbs and prepositions. An adverb is the attribute of an attribute — ” the rose smells sweetly,” for example, being resolvable into “the rose has the attribute of scent with the further attribute of sweetness.” In our own language once, twice, needs, are all genitives; seldom is a dative. The Latin and Greek humi and Xa/utu are locatives, facillime (facillumed) and «in-i > xi3s ablatives, wavrr) and ap.a instrumental, -irdpos, eˆfjs and Tr/Xov genitives. The frequency with which particular cases of particular nouns were used in a specifically attributive sense caused them to become, as it were, petrified, the other cases of the nouns in question passing out of use, and the original force of those that were retained being gradually forgotten. Prepositions are adverbs employed to define nouns instead of verbs and adjectives. Their appearance in the Indo-European languages is compara- tively late, and the Homeric poems allow us to trace their growth in Greek. The adverb, originally intended to define the verb, came to be construed with the noun, and

the government of the case with which it was construed was accordingly transferred from the verb to the noun. Thus when we read in the Odyssey (iv. 43), avrovs 8′ tlarjyov Otlov 56/j.ov, we see that ds is still an adverb, and that the accusative is governed by the verb; it is quite otherwise, however, with a line like ‘ArpeiSrjs 5e yepovras doXXeas rjyev ‘Axauov is KXurirjv {II. i. 89) where the adverb has passed into a preposition. The same process of transformation is still going on in English, where we can say indifferently, ” What are you looking at ? ” using ” at ” as an adverb, and governing the pronoun by the verb, and ” At what are you looking? ” where ” at ” has become a preposition. With the growth and increase of prepositions the need of the case-endings diminished, and in some languages the latter disappeared altogether.

Like prepositions, conjunctions also are primarily adverbs used in a demonstrative and relative sense. Hence most of the conjunctions are petrified cases of pronouns. The relation between two sentences was originally expressed by simply setting them side by side, afterwards by employing a demonstrative at the beginning of the second clause to refer to the whole pre- ceding one. The relative pronoun can be shown to have been in the first instance a demonstrative; indeed, we can still use that in English in a relative sense. Since the demonstrative at the beginning of the second clause represented the first clause, and was consequently an attribute of the second, it had to stand in some case, and this case became a conjunction. How closely allied the adverb and the conjunction are may be seen from Greek and Latin, where cbs or quum can be used as either the one or the other. Our own and, it may be observed, has probably the same root as the Greek locative adverb tri, and originally signified ” going further.”

Another form of adverb is the infinitive, the adverbial force of which appears clearly in such a phrase as ” A wonderful thing to see.” Various cases, such as the locative, the dative or the instrumental, are employed in Vedic Sanskrit in the sense of the infinitive, besides the bare stem or neuter formed by the suffixes man and van. In Greek the neuter stem and the dative case were alone retained for the purpose. The first is found in infinitives like 86fiev and 4>kpuv (for an earlier epe-Fev), the second in the infinitives in -at. Thus the Gr. Sovvai answers letter for letter to the Vedic dative ddvdne, ” to give,” and the form ipevbwdai is explained by the Vedic vayodhai, for vayas-dhai, literally ” to do living,” dhai being the dative of a noun from the root dha, ” to place ” or ” do.” When the form ipeiiSecdcu had once come into existence, analogy was ready to create such false imitations as ypa\pao6ai or ypaˆdrjcreadai. The Latin infinitive in -re for -se has the same origin, amare, for instance, being the dative of an old stem amas.

In fieri for fierei or fiesei, from the same root as our English be, the original length of the final syllable is preserved. The suffix in -um is an accusative, like the corresponding infinitive of classical Sanskrit. This origin of the infinitive explains the Latin construction of the accusative and infinitive. When the Roman said, ” Miror te ad me nihil

scribere,” all that he meant at first was, ” I wonder at you for writing nothing to me,” where the infinitive was merely a dative case used adverbially.

The history of the infinitive makes it clear how little distinction must have been felt at the outset between the noun and the verb. Indeed, the growth of the verb was a slow process. There was a time in the history of Indo-European speech when it had not as yet risen to the consciousness of the speaker, and in the period when the noun did not possess a plural there was as yet also no verb. The attachment of the first and second personal pronouns, or of suffixes resembling them, to certain stems, was the first stage in the development of the latter. Like the Semitic verb, the Indo-European verb seems primarily to have denoted relation only, and to have been attached as an attribute to the subject. The idea of time, however, was soon put into it, and two tenses were created, the one expressing a present or continuous action, the other an aoristic or momentary one. The distinction of sense was symbolized by a distinction of pronunciation, the root-syllable of the aorist being an abbreviated form of that of the present. This abbreviation was due to a change in the position of the accent (which was shifted from the stem-syllable to the termination), and this change again was probably occasioned by the prefixing of the so-called augment to the aorist, which survived into his- torical times only in Sanskrit, Zend and Greek, and the origin of which is still a mystery. The weight of the first syllable in the aorist further caused the person-endings to be shortened, and so two sets of person-endings, usually termed primary and secondary, sprang into existence. By reduplicating the root-syllable of the present tense a perfect was formed; but originally no dis- tinction was made between present and perfect, and Greek verbs like 5L5ufj,t, and rjnu are memorials of a time when the difference between ” I am come ” and ” I have come ” was not yet felt. Reduplication was further adapted to the expression of intensity and desire (in the so-called intensive and desiderative forms) . By the side of the aorist stood the imperfect, which differed from the aorist, so far as outward form was concerned, only in

possessing the longer and more original stem of the present. Indeed, as Benfey first saw, the aorist itself was primitively an imperfect, and the distinction between aorist and im- perfect is not older than the period when the stem-syllables of certain imperfects were shortened through the influence of the accent, and this differentiation of forms appropriated to denote a difference between the sense of the aorist and the imperfect which was beginning to be felt. After the analogy of the im- perfect, a pluperfect was created out of the perfect by prefixing the augment (of which the Greek kixtiM)nov is an illustration) ; though the pluperfect, too, was originally an imperfect formed from the reduplicated present.

Besides time, mood was also expressed by the primitive Indo-European verb, recourse being had to symbolization for the purpose. The imperative was represented by the bare stem, like the vocative, the accent being drawn back to the first syllable, though other modes of denoting it soon came into vogue. Possibility was symbolized by the attachment of the suffix -ya to the stem, probability by the attachment of -a and -a, and in this way the optative and conjunctive moods first arose. The creation of a future by the help of the suffix sya seems to belong to the same period in the history of the verb. This suffix is probably identical with that used to form a large class of adjectives and genitives (like the Greek liriroio for vKiroato); in this case future time will have been regarded as an attribute of the subject, no distinction being drawn, for instance, between ” rising sun ” and ” the sun will rise.” It is possible, however, that the auxiliary verb as, ” to be,” enters into the composition of the future; if so, the future will be the product of the second stage in the development of the Indo European verb when new forms were created by means of composition. The sigmatic or first aorist is in favour of this view, as it certainly belongs to the age of Indo-European unity, and may be a compound of the verbal stem with the auxiliary as. After the separation of the Indo-European languages, com- position was largely employed in the formation of new tenses.

Thus in Latin we have perfects like scrip-si and atna-vi, formed by the help of the auxiliaries as (sum) and fuo, while such forms as amaveram (amavi-eram) or amarem (ama-sem) bear their origin on their face. So, too, the future in Latin and Old Celtic (amabo, Irish carub) is based upon the substantive verb fuo, ” to be,” and the English preterite in -ed goes back to a suffixed did, the reduplicated perfect of do. New tenses and moods, however, were created by the aid of suffixes as well as by the aid of composition, or rather were formed from nouns whose stems terminated in the suffixes in question. Thus in Greek we have aorists and perfects in -/ca, and the

characteristics of the two passive aorists, ye and the, are more probably the suffixes of nominal stems than the roots of the two verbs ya, ” to go,” and dhd, ” to place,” as Bopp supposed. How late some of these new formations were may be seen in Greek, where the Homeric poems are still ignorant of the weak future passive, the optative future, and the aspirated perfect, and where the strong future passive occurs but once and the desiderative but twice. On the other hand, many of the older tenses were disused and lost. In classical Sanskrit, for instance, of the modal aorist forms the precative and benedictive almost alone remain, while the pluperfect, of which Delbriick has found traces in the Veda, has wholly disappeared.

The passive voice did not exist in the parent Indo-European speech. No need for it had arisen, since such a sentence as ” I am pleased ” could be as well represented by ” This pleases me,” or ” I please myself.” It was long before the speaker was able to imagine an action without an object, and when he did so, it was a neuter or substantival rather than a passive verb that he formed. The passive, in fact, grew out of the middle or reflexive, and, except in the two aorists, continued to be repre- sented by the middle in Greek. So, too, in Latin the second person plural is really the middle participle with estis understood, and the whole class of deponent or reflexive verbs proves that the characteristic r which Latin shares with Celtic could have had at the outset no passive force.

Much light has been thrown on the character and construction of the primitive Indo-European sentence by comparative syntax. In contradistinction to Semitic, where the defining word follows that which is defined, the Indo-European languages place that which is defined after that which defines it; and Bergaigne has made it clear that the original order of the sentence was (i) object, (2) verb, and (3) subject. Greater complication of thought and its expression, the connexion of sentences by the aid of conjunctions, and rhetorical inversion caused that dis- location of the original order of the sentence which reaches its culminating point in the involved periods of Latin literature. Our own language still remains true, however, to the syntax of the parent Indo-European when it sets both adjective and genitive before the nouns which they define. In course of time a distinction came to be made between an attribute used as a mere qualificative and an attribute used predicatively, and this distinction was expressed by placing the predicate in op- position to the subject and accordingly after it. The opposition was of itself sufficient to indicate the logical copula or sub- stantive verb; indeed, the word which afterwards commonly stood for the latter at first signified ” existence,” and it was only through the wear and tear of time that a phrase like Deus bonus

est, ” God exists as good,” came to mean simply ” God is good.” It is needless to observe that neither of the two articles was known to the parent Indo-European; indeed, the definite article, which is merely a decayed demonstrative pronoun, has not yet been developed in several of the languages of the Indo-European family.

, We must now glance briefly at the results of a scientific in- vestigation of English grammar and the. modifications they necessitate in our conception of it. The idea that i nves tig a – the free use of speech is tied down by the rules of tton of the grammarian must first be given up; all that the English grammarian can do is to formulate the current uses z rammar – of his time, which are determined by habit and custom, and are accordingly in a perpetual state of flux. We must next

get rid of the notion, that English grammar should be modelled after that of ancient Rome; until we do so we shall never understand even the elementary principles upon which it is based. We cannot speak of declensions, since English has no genders except in the pronouns of the third person, and no cases except the genitive and a few faint traces of an old dative. Its verbal conjugation is essentially different from that of an inflexional language like Latin, and cannot be compressed into the same categories. In English the syntax has been enlarged at the expense of the accidence; position has taken the place of forms. To speak of an adjective ” agreeing ” with its sub- stantive is as misleading as to speak of a verb ” governing ” a case. In fact, the distinction between noun and adjective is inapplicable to English grammar, and should be replaced by a distinction between objective and attributive words. In a phrase like ” this is a cannon,” cannon is objective; in a phrase like ” a cannon-ball,” it is attributive; and to call it a sub- stantive in the one case and an adjective in the other is only to introduce confusion. With the exception of the nominative, the various forms of the noun are all attributive; there is no difference, for example, between ” doing a thing ” and ” doing badly.” Apart from the personal pronouns, the accusative of the classical languages can be represented only by position; but if we were to say that a noun which follows a verb is in the accusative case we should have to define ” king ” as an accusative in such sentences as ” he became king ” or ” he is king.” In conversational English ” it is me ” is as correct as ” c’est moi ” in French, or ” det er mig ” in Danish; the literary ” it is I ” is due to the influence of classical grammar. The combination of noun or

pronoun and preposition results in a compound attribute. As for the verb, Sweet has well said that ” the really characteristic feature of the English finite verb is its inability to stand alone without a pronominal prefix.” Thus ” dream ” by itself is a noun; ” I dream ” is a verb. The place of the pronominal prefix may be taken by a noun, though both poetry and vulgar English frequently insert the pronoun even when the noun precedes. The number of inflected verbal forms is but small, being confined to the third person singular and the special forms of the preterite and past participle, though the latter may with more justice be regarded as belonging to the province of the lexicographer rather than to that of the gram- marian. The inflected subjunctive {be, were, save in ” God save the King,” &c.) is rapidly disappearing. New inflected forms, however, are coming into existence; at all events, we have as good a right to consider wont, shant, cant new inflected forms as the French aimer ai {amare habco), aimer ais (amare habebam). If the ordinary grammars are correct in treating forms like ” I am loving,” ” I was loving,” ” I did love,” as separate tenses, they are strangely inconsistent in omitting to notice the equally important emphatic form ” I do love ” or the negative form ” I do not love ” (” I don’t love “), as well as the semi- inflexional ” I’ll love,” ” he’s loving.” It is true that these latter contracted forms are heard only in conversation and not seen in books; but the grammar of a language, it must be remembered, is made by those who speak it and not by the printers.

Our school grammars are the inheritance we have received from Greece and Rome. The necessities of rhetoric obliged the Sophists to investigate the structure of the Greek History of language, and to them was accordingly due the first grammar, analysis of Greek grammar. Protagoras distinguished the three genders and the verbal moods, while Pro- dicus busied himself with the definition of synonyms. Aristotle, taking the side of Democritus, who had held that the meaning of words is put into them by the speaker, and that there is no necessary connexion between sound and sense, laid down that words ” symbolize ” objects according to the will of those who use them, and added to the ovofia or “noun,” and the pij)ia or ” verb,” the aiv5eafios or ” particle.” He also introduced the term tttuiols, ” case,” to denote any flexion whatsoever. He further divided nouns into simple and compound, invented for the neuter another name than that given by Protagoras, and

starting from the termination of the nominative singular, en- deavoured to ascertain the rules for indicating a difference of gender. Aristotle was followed by the Stoics, who separated the apdpov or ” article ” from the particles, determined a fifth part of speech, the

TravdeKTr/s or ” adverb,” confined the term “case” to the flexions of the nouns, distinguishing the four principal cases by names, and divided the verb into its tenses, moods and classes. Meanwhile the Alexandrian critics were studying the language of Homer and the Attic writers, and comparing it with the language of their own day, the result being a minute examination of the facts and rules of grammar. Two schools of grammarians sprang up — the Analogists, headed by Aristarchus, who held that a strict law of analogy existed between idea and word, and refused to admit exceptions to the grammatical rules they laid down, and the Anomalists, who denied general rules of any kind, except in so far as they were consecrated by custom. Foremost among the Anomalists was Crates of Mallos, •the leader of the Pergamenian school, to whom we owe the first formal Greek grammar and collection of the grammatical facts obtained by the labours of the Alexandrian critics, as well as an attempt to reform Greek orthography. The immediate cause of this grammar seems to have been a comparison of Latin with Greek, Crates having lectured on the subject while ambassador of Attalus at Rome in 1 59 B.C. The zeal with which the Romans threw themselves into the study of Greek resulted in the school grammar of Dionysius Thrax, a pupil of Aristarchus, which he published at Rome in the time of Pompey and which is still in existence. Latin grammars were soon modelled upon it, and the attempt to translate the technical terms of the Greek grammarians into Latin was productive of numerous blunders which have been perpetuated to our own day. Thus tenues is a mistranslation of the Greek \pi\a, ” unaspirated “; genetivus of yevt.KT], the case ” of the genus “; accusativus of alriaTiKri, the case ” of the object “; infinitivus of airapenˆaros, “without a secondary meaning ” of tense or person. New names were coined to denote forms possessed by Latin and not by Greek; ablative, for instance, was invented by Julius Caesar, who also wrote a treatise De analogia. By the 2nd century of the Christian era the dispute between the Anomalists and the Analogists was finally settled, analogy being recognized as the principle that underlies language, though every rule admits of exceptions. Two eminent grammarians of Alexandria, Apollonius Dyscolus and his son Herodian, summed up the labours and controversies of their predecessors, and upon their works were based the Latin grammar composed by Aelius Donatus in the 4th century, and the eighteen books on grammar compiled by Priscian in the age of Justinian. The grammar of Donatus dominated the schools of the middle ages, and, along with the productions of Priscian, formed the type and source of the Latin and Greek school- grammars of modern Europe.

A few words remain to be said, in conclusion, on the bearing of a scientific study of grammar upon the practical task of teaching and learning foreign languages. The grammar , eafn /_ of a language is not to be confined within the rules t laid down by grammarians, much less is it the creation grammar of grammarians, and consequently the usual mode ot toret s a of making the pupil learn by heart certain fixed rules and paradigms not only gives a false idea of what grammar really is, but also throws obstacles in the way of acquiring it. The unit of speech is the sentence; and it is with the sentence therefore, and not with lists of words and forms, that the pupil should begin. When once a sufficient number of sentences has been, so to speak, assimilated, it will be easy to analyse them •into their component parts, to show the relations that these bear to one another, and to indicate the nature and varieties of the latter. In this way the learner will be prevented from regarding grammar as a piece of dead mechanism or a Chinese puzzle, of which the parts must be fitted together in accordance with certain artificial rules, and will realize that it is a living organism which has a history and a reason of its own. The method of nature and science alike is analytic; and if we would learn a foreign language properly we must learn it as we did

our mother-tongue, by first mastering the expression of a com- plete thought and then breaking up this expression into its several elements. (A. H. S.)

See Philology, and articles on the various languages. Also Steinthal, Charakteristik der hauptsdchlichsten Typen des Sprach- baues (Berlin, i860); Schleicher, Compendium of the Comparative Grammar of the Indo-European Languages, translated by H. Bendall (London, 1874); Pezzi, Aryan Philology according to the most recent Researches, translated by E. S. Roberts (London, 1879); Sayce, Introduction to the Science of Language (London, 1879); Lersch, Die Sprachphilosophie der Alten (Bonn, 1838-1841) ; Steinthal, Geschichte der Sprachwissenschaft bei den Griechen und Romern mil besonderer Rucksicht auf die Logik (Berlin, 1863, 2nd ed. 1890); Delbriick, Ablativ localis instrumentalis im Altindischen, Lateinischen, Grie- chischen, und Deutschen (Berlin, 1864); Jolly, Kin Kapitel ver- gleichender Syntax (Munich, 1873); Hiibschmann, Zur Casuslehre (Munich. 1875) ; Holzweissig, Wahrheit und Irrthum der localistischen Casustheorie (Leipzig, 1877); Draeger, Historische Syntax der lateinischen Sprache (Leipzig, 1874-1876); Sweet, Words, Logic, and

Grammar (London, 1876) ; P. Giles, Manual of Comp. Philology (1901); C. Abel, Agypt.-indo-eur. Sprachverwandschaft (1903)- Brugmann and Delbriick, Grundriss d. vergl. Gram. d. indogerm. Spr. (1886-1900); Fritz Mauthner, Beitrage zur einer Kritik der Sprache vol. iii. (1902) ; T. G. Tucker, Introd. to a Nat. Hist, of Language

(1908).

GRAMMICHELE, a town of Sicily, in the province of Catania, 55 m. S.W. of it by rail and 31 m. direct. Pop. (1901) 15,075. It was built in 1693, after the destruction by an earthquake of the old town of Occhiala to the north; the latter, on account of the similarity of name, is generally identified with Echetla, a frontier city between Syracusan and Carthaginian territory in the time of Hiero II., which appears to have been originally a Sicel city in which Greek civilization prevailed from the 5th century onwards. To the east of Grammichele a cave shrine of Demeter, with fine votive terra-cottas, has been discovered.

See Mon. Lincei, vii. (1897), 201 ; Not. degli scavi (1902), 223.

GRAMMONT (the Flemish name Gheeraardsbergen more clearly reveals its • etymology . Gerardi-mons) , a town in East Flanders, Belgium, near the meeting point with the provinces of Brabant and Hainaut. It is on the Dender almost due south of Alost, and is chiefly famous because the charter of Grammont given by Baldwin VI., count of Flanders, in a.d. 1068 was the first of its kind. This charter has been styled ” the most ancient written monument of civil and criminal laws in Flanders.” The modern town is a busy industrial centre. Pop. (1904) 12,835.

GRAMONT, ANTOINE AGENOR ALFRED, Due de, Due de Guiche, Prince de Bidache (1819-1880), French diplomatist and statesman, was born at Paris on the 14th of August 1819, of one of the most illustrious families of the old noblesse, a cadet branch of the viscounts of Aure, which took its name from the seigniory of Gramont in Navarre. His grandfather, Antoine Louis Marie, due de Gramont (1755-1836), had emigrated during the Revolution, and his father, Antoine Heraclius Genevieve Agenor (1 789-1 855) , due de Gramont and de Guiche, fought under the British flag in the Peninsular War, became a lieutenant- general in the French army in 1823, and in 1830 accompanied Charles X. to Scotland. The younger generation, however, were Bonapartist in sympathy; Gramont’s cousin Antoine Louis Raymond, comte de Gramont (1787-1825), though also the son of an emigre, served with distinction in Napoleon’s armies, while Antoine Agenor, due de Gramont, owed his career to his early

friendship for Louis Napoleon.

Educated at the Ecole Polytechnique, Gramont early gave up the army for diplomacy. It was not, however, till after the coup d'etat of the 2nd of December 1851, which made Louis Napoleon supreme in France, that he became conspicuous as a diplomat. He was successively minister plenipotentiary at Cassel and Stuttgart (1852), at Turin (1853), ambassador at- Rome (1857) and at Vienna (1861). On the 15th of May 1870 ' he was appointed minister of foreign affairs in the Ollivier cabinet, and was thus largely, though not entirely, responsible for the bungling of the negotiations between France and Prussia arising out of the candidature of Prince Leopold of Hohenzollern for the throne of Spain, which led to the disastrous war of 1870-71. The exact share of Gramont in this responsibility has been the subject, of much controversy. The last word may be

said to have been uttered by M. Emile Ollivier himself in his L'Empire liberal (tome xii., 1909, passim). The famous declara- tion read by Gramont in the Chamber on the 6th of July, the " threat with the hand on the sword-hilt," as Bismarck called it, was the joint work of the whole cabinet; the original draft presented by Gramont was judged to be too " elliptical " in its conclusion and not sufficiently vigorous; the reference to a revival of the empire of Charles V. was suggested by Ollivier; the paragraph asserting that France would not allow a foreign power to disturb to her own detriment the actual equilibrium of Europe was inserted by the emperor. So far, then, as this declaration is concerned, it is clear that Gramont's responsiblity must be shared with his sovereign and his colleagues (Ollivier op. cit. xii. 107; see also the two projets de declaration given on p. 570). It is clear, however that he did not share the " passion " of his colleagues for " peace with honour," clear also that he wholly misread the intentions of the European powers in the event of war. That he reckoned upon the active alliance of Austria was due, according to M. Ollivier, to the fact that for nine years he had been a persona grata in the aristocratic society of Vienna, where the necessity for revenging the humilia- tion of 1866 was an article of faith. This confidence made him less disposed than many of his colleagues to make the best of the renunciation of the candidature made, on behalf of his son, by the prince of Hohenzollern-Sigmaringen. It was Gramont who pointed out to the emperor, on the evening of the 12th, the dubious circumstances of the act of renunciation, and on the same night, without informing M. Ollivier, despatched to Benedetti at Ems the fatal telegram demanding the king of Prussia's guarantee that the candidature would not be revived. The supreme responsibility for this act must rest with the emperor, " who imposed it by an exercise of personal power on

the only one cf his ministers who could have lent himself to such a forgetfulness of the safeguards of a parliamentary regime.” As for Gramont, he had ” no conception of the exigencies of this regime; he remained an ambassador accustomed to obey the orders of his sovereign ; in all good faith he had no idea that this was not correct, and that, himself a parliamentary minister, he had associated himself with an act destructive of the authority of parliament.” ‘ ” On his part,” adds M. Ollivier, ” it was the result only of obedience, not of warlike premeditation ” (op. cit. p. 262). The apology may be taken for what it is worth. To France and to the world Gramont was responsible for the policy which put his country definitely into the wrong in the eyes of Europe, and enabled Bismarck to administer to her the ” slap in the face ” (soufflet) — as Gramont called it in the Chamber — by means of the mutilated ” Ems telegram,” which was the immediate cause of the French declaration of war on the 15th.

After the defeat of Weissenburg (August 4) Gramont resigned office with the rest of the Ollivier ministry (August 9) , and after the revolution of September he went to England, returning after the war to Paris, where he died on the 18th of January 1880. His marriage in 1848 with Miss Mackinnon, a Scottish lady, remained without issue. During his retirement he published various apologies for his policy in 1870, notably La France et la Prusse avant la guerre (Paris, 1872).

Besides M. Ollivier’s work quoted in the text, see L. Thouvenel, Le Secret de I’empereur, correspondance . . . echangee entre M. Thouvenel, le due de Gramont, et le general comte de Flahaut i860-1863 (2nd ed., 2 vols., 1889). A small pamphlet containing his Souvenirs 1848-1830 was published in 1901 by his brother Antoine Leon Philibert Auguste de Gramont, due de Lesparre.

GRAMONT, PHILIBERT, Comte de (1621-1707), the subject of the famous Memoirs, came of a noble Gascon family, said to have been of Basque origin. His grandmother, Diane d’Andouins, comtesse de Gramont, was ” la belle Corisande,” one of the mistresses of Henry IV. The grandson assumed that

1 Compare with this Bismarck’s remarks to Hohenlohe (Hohenlohe, Denkwiirdigkeiten, ii. 71): “When Gramont was made minister, Bismarck said to .Benedetti that this indicated that the emperor was meditating something evil, otherwise he would not have made so stupid a person minister. Benedetti replied that the emperor knew too little of him, whereupon Bismarck said that the emperor had once described Gramont to him as ‘ un ancien bellatre.’ ”

his father Antoine II. de Gramont, viceroy of Navarre, was the son of Henry IV., and regretted that he had not claimed the privileges of royal birth. Philibert de Gramont was the son of Antoine II. by his second marriage with Claude de Montmorency, and was born in 1621, probably at the family seat of Bidache! He was destined for the church, and was educated at the college of Pau, in Beam. He refused the ecclesiastical life, however, and joined the army of Prince Thomas of Savoy, then besieging Trino in Piedmont. He afterwards served under his elder half-brother, Antoine, marshal de Gramont, and the prince of Conde. He was present at Fribourg and Nordlingen, and also served with distinction in Spain and Flanders in 1647 and 1648. He favoured Conde's party at the beginning of the Fronde, but changed sides before he was too severely com- promised. In spite of his record in the army he never received any important commission either military or diplomatic, perhaps because of an incurable levity in his outlook, He was, however, made a governor of the Pays d'Aunis and lieutenant of Beam. During the Commonwealth he visited England, and in 1662 he was exiled from Paris for paying court to Mademoiselle de la Motte Houdancourt, one of the king's mistresses. He went to London, where he found at the court of Charles II. an atmosphere congenial to his talents for intrigue, gallantry and pleasure. He married in London, under pressure from her two brothers, Elizabeth Hamilton, the sister of his future biographer. She was one of the great beauties of the English court, and was, according to her brother's optimistic account, able to fix the count's affections. She was a woman of considerable wit, and held her own at the court of Louis XIV., but her husband pursued his gallant exploits to the close of a long life, being, said Ninon de l'Enclos, the only old man who could affect the follies of youth without being ridiculous. In 1664 he was allowed to return to France. He revisited England in 1670 in connexion with the sale of Dunkirk, and again in 167 1 and 1676. In 1688 he was sent by Louis XIV. to congratulate James II. on the birth of an heir. From all these small diplomatic missions he succeeded in obtaining considerable profits, being destitute of scruples whenever money was in question. At the age of seventy-five he had a dangerous illness, during which he became reconciled to the church. His penitence does not seem to have survived his recovery. He was eighty years old when he supplied his brother-in-law, Anthony Hamilton (?.».), with the materials for his Memoires. Hamilton said that they had been dictated to him, but there is no doubt that he was the real author. The account of Gramont's early career was doubtless provided

by himself, but Hamilton was probably more familiar with the history of the court of Charles II., which forms the most interest- ing section of the book. Moreover Gramont, though he had a reputation for wit, was no writer, and there is no reason to suppose that he was capable of producing a work which remains a masterpiece of style and of witty portraiture. When the Memoires were finished it is said that Gramont sold the MS. for 1 500 francs, and kept most of the money himself. Fontenelle, then censor of the press, refused to license the book from con- siderations of respect to the strange old man, whose gambling, cheating and meannesses were so ruthlessly exposed. But Gramont himself appealed to the chancellor and the prohibition was removed. He died on the 10th of January 1707, and the Memoires appeared six years later.

Hamilton was far superior to the comte de Gramont, but he relates the story of his hero without comment, and no condemna- tion of the prevalent code of morals is allowed to appear, unless in an occasional touch of irony. The portrait is drawn with such skill that the count, in spite of his biographer's candour, imposes by his grand air on the reader much as he appears to have done on his contemporaries. The book is the most entertain- ing of contemporary memoirs, and in no other book is there a description so vivid, truthful, and graceful of the licentious court of Charles II. There are other and less flattering accounts of the count. His scandalous tongue knew no restraint, and he was a privileged person who was allowed to state even the most unpleasing truths to Louis XIV. Saint-Simon in his memoirs

describes the relief that was felt at court when the old man's death was announced.

Memoires de la vie du comte de Grammont contenant particulierement Vhistoire amoureuse de la cour d'Angleterre sous le regne de Charles Ik was printed in Holland with the inscription Cologne, 1713. Other editions followed in 1715 and 1716. Memoirs of the Life of Count de Grammont … translated out of the French by Mr [Abel] Boyer (1714), was supplemented by a " compleat key " in 1719. The Memoires " augmentees de notes et d'eclaircissemens " was edited by Horace Walpole in 1772. In 1793 appeared in London an edition adorned with portraits engraved after originals in the royal collec- tion. An English edition by Sir Walter Scott was published by H. G. Bohn (1846), and this with additions was reprinted in 1889, 1890, 1896, &c. Among other modern editions are an excellent one in the Bihliotheque Charpentier edited by M. Gustave Brunet (1859) ; Memoires . . . (Paris, 1888) with etchings by L. Boisson after C. Delort and an introduction by H. Gausseron; Memoirs (1889), edited by Mr

H. Vizetelly; and Memoirs . . . (1003). edited by Mr Gordon Goodwin. V “”’

GRAMOPHONE (an invented word, formed on an inversion of “phonogram”; 4 > uvh, sound, ypanfia, letter), an instrument for recording and reproducing sounds. It depends on the same general principles as the phonograph (q.v.), but it differs in certain details of construction, especially in having the sound- record cut spirally on a flat disk instead of round a cylinder.

GRAMPIANS, THE, a mass of mountains in central Scotland. Owing to the number of ramifications and ridges it is difficult to assign their precise limits, but they may be described as occupying .the area between a line drawn from Dumbartonshire to the North Sea at Stonehaven, and the valley of the Spey or even Glenmore (the Caledonian Canal). Their trend is from south-west to north-east, the southern face forming the natural division between the Lowlands and Highlands. They lie in the shires of Argyll, Dumbarton, Stirling, Perth, Forfar, Kincardine, Aberdeen, Banff and Inverness. Among the highest summits are Ben Nevis, Ben Macdhui, and Cairngorms, Ben Lawers, Ben More, Ben Alder, Ben Cruachan and Ben Lomond. The principal rivers flowing from the watershed northward are the Findhorn, Spey, Don, Dee and their tributaries, and southward the South Esk, Tay and Forth with their affluents. On the north the mass is wild and rugged; on the south the slope is often gentle, afford- ing excellent pasture in many places, but both sections contain some of the finest deer-forests in Scotland. They are crossed by the Highland, West Highland and Callander to Oban railways, and present some of the finest scenery in the kingdom. The rocks consist chiefly of granite, gneiss, schists, quartzite, porphyry and diorite. Their fastnesses were originally inhabited by the northern Picts, the Caledonians who, under Galgacus, were defeated by Agricola in a.d. 84 at Mons Graupius — the false reading of which, Grampius, has been perpetuated in the name of the mountains — the site of which has not been ascertained. Some authorities place it at Ardoch; others near the junction of the Tay and Isla, or at Dalginross near Comrie; while some, contending for a position nearer the east coast, refer it to a site in west Forfarshire or to Raedykes near Stonehaven.

GRAMPOUND, a small market town in the mid-parliamentary division of Cornwall, England, 9 m. E.N.E. of Truro, and 2 m. from its station (Grampound Road) on the Great Western railway. It is situated on the river Fal, and has some industry in tanning. It retains an ancient town hall; there is a good market cross; and in the neighbourhood, along the Fal, are ‘ several early earthworks.

Grampound (Ponsmure, Graundpont, Grauntpount, Graund- pond) and the hundred, manor and vill of Tibeste were formerly so closely associated that in 1400 the former is found styled the vill of Grauntpond called Tibeste. At the time of the Domesday Survey Tibeste was amongst the most valuable of the manors granted to the count of Mortain. The burgensic character of Ponsmure first appears in 1299. Thirty-five years later John of Eltham granted to the burgesses the whole town of Graunt- pount. This grant was confirmed in 1378 when its extent and jurisdiction were defined. It was provided that the hundred court of Powdershire should always be held there and two fairs at the feasts of St Peter in Cathedra and St Barnabas, both of which are still held, and a Tuesday market (now held on Friday)

and that it should be a free borough rendering a yearly rent to the earl of Cornwall. Two members were summoned to parlia- ment by Edward VI. in 1553. The electors consisted of an indefinite number of freemen, about 50 in all, indirectly nomin- ated by the mayor and corporation, which existed by prescription. The venality of the electors became notorious. In 1780 £3000 was paid for a seat: in 181 2 each supporter of one of the candidates received £100. The defeat of this candidate in 1818 led to a parliamentary inquiry which disclosed a system of wholesale corruption, and in 1821 the borough was disfranchised. A former woollen trade is extinct.

GRAMPUS {Orca gladiator, or Orca orca), a cetacean belonging to the Delphinidac or dolphin family, characterized by its rounded head without distinct beak, high dorsal fin and large conical teeth. The upper parts are nearly uniform glossy black, and the under parts white, with a strip of the same colour over each eye. The O. Fr. word was grapois, graspeis or craspeis, from Med. Lat. crassus piscis, fat fish. This was adapted into English as grapeys, graspeys, &c, and in the 16th century becomes grannie pose as if from grand poisson. The final corruption to ” grampus ” appears in the 18th century and was probably nautical in origin. The animal is also known as the ” killer,” in allusion to its ferocity in attacking its prey, which consists largely of seals, porpoises and the smaller dolphins. Its fierce- ness is only equalled by its voracity, which is such that in a specimen measuring 21 ft. in length, the remains of thirteen seals and thirteen porpoises were found, in a more or less digested state, while the animal appeared to have been choked in the endeavour to swallow another

seal, the skin of which was found entangled in its teeth. These cetaceans sometimes hunt in packs or schools, and commit great havoc among the belugas or white whales, which occasionally throw themselves ashore to escape their persecutors. The grampus is an inhabitant of northern seas, occurring on the shores of Greenland, and having been caught, although rarely, as far south as the Mediterranean. There are numerous instances of its capture on the British coasts. (See Cetacea.)

GRANADA, LUIS DE (1504-1588), Spanish preacher and ascetic writer, born of poor parents named Sarria at Granada. He lost his father at an early age and his widowed mother was supported by the charity of the Dominicans. A child of the Alhambra, he entered the service of the alcalde as page, and, his ability being discovered, received his education with the sons of the house. When nineteen he entered the Dominican convent and in 1525 took the vows; and, with the leave of his prior, shared his daily allowance of food with his mother. He was sent to Valladolid to continue his studies and then was appointed procurator at Granada. Seven years after he was elected prior of the convent of Scala Caeli in the mountains of Cordova, which after eight years he succeeded in restoring from its ruinous state, and there he began his work as a zealous reformer. His preaching gifts were developed by the orator Juan de Avila, and he became one of the most famous of Spanish preachers. He was invited to Portugal in 1555 and became provincial of his order, declining the offer of the archbishopric of Braga but accepting the position of confessor and counsellor to Catherine, the queen regent. At the expiration of his tenure . of the provincialship, he retired to the Dominican convent at Lisbon, where he lived till his death on the last day of 1588. Aiming, both in his sermons and ascetical writings, at develop- ment of the religious view, the danger of the times as he saw it was not so much in the Protestant reformation, which was an outside influence, but in the direction that religion had taken among the masses. He held that in Spain the Catholic faith was not understood by the people, and that their ignorance was the pressing danger. He fell under the suspicion of the In- quisition; his mystical teaching was said to be heretical, and his most famous book, the Guia de Peccadores, still a favourite treatise . and one that has been translated into nearly every European tongue, was put on the Index of the Spanish Inquisi- tion, together with his book on prayer, in 1559. His great opponent was the restless and ambitious Melchior Cano, who

stigmatized the second book as containing grave errors smacking of the heresy of the Alumbrados and manifestly contradicting Catholic

faith and teaching. But in 1576 the prohibition was removed and the works of Luis de Granada, so prized by St Francis de Sales, have never lost their value. The friend of St Teresa, St Peter of Alcantara, and of all the noble minds of Spain of his day, no one among the three hundred Spanish mystics excels Luis de Granada in the beauty of a didactic style, variety of illustration and soberness of statement.

The last collected edition of his works is that published in 9 vols, at Antwerp in 1578. A biography by L. Monoz, La Vida y virtudes de Luis de Granada (Madrid, 1639) ; a study of his system by P. Rousselot in Mystiques espagnoles (Paris, 1867); Ticknor, History of Spanish Literature (vol. iii.), and Fitzmaurice Kelly, History of Spanisn Literature, pp. 200-202 (London, 1898), may also be consulted.

GRANADA, the capital of the department of Granada, Nicaragua; 32 m. by rail S.E. of Managua, the capital of the republic. Pop. (1900) about 25,000. Granada is built on the north-western shore of Lake Nicaragua, of which it is the principal port. Its houses are of the usual central American type, con- structed of adobe, rarely more than one storey high, and sur- rounded by courtyards with ornamental gateways. The suburbs, scattered over a large area, consist chiefly of cane huts occupied by Indians and half-castes. There are several ancient churches and convents, in one of which the interior of the chancel roof is inlaid with mother-of-pearl. An electric tramway connects the railway station and the adjacent wharves with the market, about 1 m. distant. Ice, cigars, hats, boots and shoes are manufactured, but the characteristic local industry is the pro- duction of ” Panama chains,” ornaments made of thin gold wire. In the neighbourhood there are large cocoa plantations; and the city has a thriving trade in cocoa, coffee, hides, cotton, native tobacco and indigo.

Granada was founded in 1523 by Francisco Fernandez de Cordoba. It became one of the wealthiest of central American cities, although it had always a keen commercial rival in Leon, which now surpasses it in size and importance. In the 17th century it was often raided by buccaneers, notably in 1606, when it was completely sacked. In 1855 it was captured and partly burned by the adventurer William Walker (see Central America: History).

GRANADA, a maritime province of southern Spain, formed in 1833 of districts belonging to Andalusia, and coinciding with the central parts of the ancient kingdom of Granada. Pop. (1900) 492,460; area, 4928 sq. m. Granada is bounded on the N. by Cordova, Jaen and Albacete, E. by Murcia and Almeria, S. by the Mediterranean Sea, and W. by

Malaga. It includes the western and loftier portion of the Sierra Nevada (q.v.), a vast ridge rising parallel to the sea and attaining its greatest altitudes in the Cerro de Mulhacen (11,421 ft.) and Picacho de la Veleta (11,148), which overlook the city of Granada. Lesser ranges, such as the Sierras of Parapanda, Alhama, Almijara or Harana, adjoin the main ridge. From this central watershed the three principal rivers of the province take their rise, viz. : the Guadiana Menor, which, flowing past Guadix in a northerly direction, falls into the Guadalquivir in the neighbourhood of Ubeda; the Genii which, after traversing the Vega, or Plain of Granada, leaves the province a little to the westward of Loja and joins the Guadal- quivir between Cordova and Seville; and the Rio Grande or Guadalfeo, which falls into the Mediterranean at Motril. The coast is little indented and none of its three harbours, Almunecar, Albufiol and Motril, ranks high in commercial importance. The climate in the lower valleys and the narrow fringe along the coast is warm, but on the higher grounds of the interior is somewhat severe; and the vegetation varies accordingly from the subtropical to the alpine. The soil of the plains is very productive, and that of the Vega of Granada is considered the richest in the whole peninsula; from the days of the Moors it has been systematically irrigated, and it continues to yield in great abundance and in good quality wheat, barley, maize, wine, oil, sugar, flax, cotton, silk and almost every variety of fruit. In the mountains immediately surrounding the city of Granada

occur many kinds of alabaster, some very fine; there are also quantities of jasper and other precious stones. Mineral waters chiefly chalybeate and sulphurous, are abundant, the most important springs being those of Alhama, which have a tempera- ture of ii2° F. There are valuable iron mines, and small quantities of zinc, lead and mercury are obtained. The cane and beet sugar industries, for which there are factories at Loja, at Motril, and in the Vega, developed rapidly after the loss of the Spanish West Indies and the Philippine Islands in 1898, with the consequent decrease in competition. There are also tanneries, foundries and manufactories of woollen, linen, cotton, and rough frieze stuffs, cards, soap, spirits, gunpowder and machinery. Apart from the great highways traversing the pro- vince, which are excellent, the roads are few and ill-kept. The railway from Madrid enters the province on the north and bifurcates north-west of Guadix; one branch going eastward to Almen'a, the other westward to Loja, Malaga and Algeciras. Baza is the terminus of a railway from Lorca.

The chief towns include Granada, the capital (pop. 1900, 75,900) with Alhama de Granada (7697), Baza (12,770), Guadix (12,652), Loja (19,143), Montefrfo (10,725), and Motril (18,528). These are described in separate articles. Other towns with upwards of 7000 inhabitants are Albunol (8646), Almunecar (8022), Cullar de Baza (8007), Huescar (7763), Mora (9496) and Puebla de' Don Fadrique (7420). The history of the ancient kingdom is inseparable from that of the city of Granada (g.v.).

GRANADA, the capital of the province, and formerly of the kingdom of Granada, in southern Spain; on the Madrid-Granada- Algeciras railway. Pop. (1900) 75,900. Granada is magnifi- cently situated, 2195 ft. above the sea, on the north-western slope of the Sierra Nevada, overlooking the fertile lowlands known as the Vega de Granada on the west and overshadowed by the peaks of Veleta (11,148 ft.) and Mulhacen (11,421 ft.) on the south-east. The southern. limit of the city is the river Genii, the Roman Singilis and Moorish Shenil, a swift stream flowing westward from the Sierra Nevada, with a considerable volume of water in summer, when the snows have thawed. Its tributary the Darro, the Roman Salon and Moorish Hadarro, enters Granada on the east, flows for upwards of a mile from east to west, and then turns sharply southward to join the main river, which is spanned by a bridge just above the point of confluence. The waters of the Darro are much reduced by irrigation works along its lower course, and within the city it has been canalized and partly covered with a roof.

Granada comprises three main divisions, the Antequeruela, the Albaicin (or Albaycin), and Granada properly so-called. The first division, founded by refugees from Antequera in 1410, consists of the districts enclosed by the Darro, besides a small area on its right, or western bank. It is bounded on the east by the gardens and hill of the Alhambra (q.v.) , the most celebrated of all the monuments left by the Moors. The Albaicin (Moorish Rabad al Bayazin, " Falconers' Quarter ") lies north-west of the Antequeruela. Its name is sometimes associated with that of Baeza, since, according to one tradition, it was colonized by citizens of Baeza, who fled hither in 1246, after the capture of their town by the Christians. It was long the favourite abode of the Moorish nobles, but is now mainly inhabited by gipsies and artisans. Granada, properly so-called, is north of the Antequeruela, and west of the Albaicin. The origin of its name is obscure; it has been sometimes, though with little probability, derived from granada, a pomegranate, in allusion to the abundance of pomegranate trees in the neighbourhood. A pomegranate appears on the city arms. The Moors, however, called Granada Kamattah or

Karnattah-al-Yahud, and possibly- the name is composed of the Arabic words kurn, ” a hill,” and .nallah, ” stranger,” — the ” city ” or ” hill of strangers.”

Although the city has been to some extent modernized, the architecture of its more ancient quarters has many Moorish characteristics. The streets are, as a rule, ill-lighted, ill-paved and irregular; but there are several fine squares and avenues, such as the Bibarrambla, where tournaments were held by the Moors; the spacious Plaza del Trionfo, adjoining the bull-ring,

on the north; the Alameda, planted with plane trees, and the Paseo del Salon. The business centre of the city is the Puerta Real, a square named after a gate now demolished.

Granada is the see of an archbishop. Its cathedral, which commemorates the reconquest of southern Spain from the Moors, is a somewhat heavy classical building, begun in 1529 by Diego de Siloe, and only finished in 1703. It is profusely ornamented with jasper and coloured marbles, and surmounted by a dome. The interior contains many paintings and sculptures by Alonso Cano (1601-1667) , the architect of the fine west facade, and other artists. In one of the numerous chapels, known as the Chapel Royal (Capilla Real), is the monument of Philip I. of Castile (1478-1506), and his queen Joanna; with the tomb of Ferdinand and Isabella, the first rulers of united Spain (1452-1516). The church of Santa Maria (1705-1759), which may be regarded as an annexe of the cathedral, occupies the site of the chief mosque of Granada. This was used as a church until 1661. Santa Ana (1541) also replaced a mosque; Nuestra Sefiora de las Angustias (1664-1671) is noteworthy for its fine towers, and the rich decoration of its high altar. The convent of San Geronimo (or Jeronimo), founded in 1492 by Ferdinand and Isabella, was converted into barracks in 1810; its church contains the tomb of the famous captain Gonsalvo or Gonzalo de Cordova (1453-1515). The Cartuja, or Carthusian monastery north of the city, was built in 1516 on Gonzalo’s estate, and in his memory. It contains several fine paintings, and an interesting church of the 17th and 18th centuries.

After the Alhambra, and such adjacent buildings as the Generalife and Torres Bermejas, which are more fitly described in connexion with it, the principal Moorish antiquities of Granada are the 13th-century villa known as the Cuarto Real de San Domingo, admirably preserved, and surrounded by beautiful gardens; the Alcazar de Genii, built in the middle of the 14th century as a palace for the Moorish queens; and the Casa del Cabildo, a university of the same period, converted into a

ware- house in the 19th century. Few Spanish cities possess a greater number of educational and charitable establishments. The university was founded by Charles V. in 1531, and transferred to its present buildings in 1769. It is attended by about 600 students In 1900, the primary schools of Granada numbered 22, in addition to an ecclesiastical seminary, a training-school for teachers, schools of art and jurisprudence, and museums of art and archaeology. There were twelve hospitals and orphanages for both sexes, including a leper hospital in one of the convents. Granada has an active trade in the agricultural produce of the Vega, and manufactures liqueurs, soap, paper and coarse linen and woollen fabrics. Silk-weaving was once extensively carried on, and large quantities of silk were exported to Italy, France, Germany and even America, but this industry died during the 19th century.

History. — The identity of Granada with the Iberian city of Iliberris or Iliberri, which afterwards became a flourishing Roman colony, has never been fully established; but Roman tombs, coins, inscriptions, &c, have been discovered in the neighbourhood. With the rest of Andalusia, as a result of the great invasion from the north in the 5th century, Granada fell to the lot of the Vandals. Under the caliphs of Cordova, onwards from the 8th century, it rapidly gained in importance, and ultimately became the seat of a provincial government, which, after the fall of the Omayyad dynasty in 1031, or, according to some authorities, 1038, ranked with Seville, Jaen and others as an independent principality. The family of the Zeri, Ziri or Zeiri maintained itself as the ruling dynasty until 1090; it was then displaced by the Almohades, who were in turn overthrown by the Almoravides, in n 54. The dominion of the Almoravides continued unbroken, save for an interval of one year (1160-1161), until 1229. From 1229 to 1238 Granada formed part of the kingdom of Murcia; but in the last-named year it passed into the hands of Abu Abdullah Mahommed Ibn Al Ahmar, prince of Jaen and founder of the dynasty of the Nasrides. Al Ahmar was deprived of Jaen in 1246, but united Granada, Almeria and Malaga under his sceptre, and, as the

fervour of the Christian crusade against the Moors had temporarily abated, he made peace with Castile, and even aided the Christians to vanquish the Moslem princes of Seville. At the same time he offered asylum to refugees from Valencia, Murcia and other territories in which the Moors had been overcome. Al Ahmar and his successors

ruled over Granada until 1492, in an unbroken line of twenty-five sovereigns who maintained their independence partly by force, and partly by payment of tribute to their stronger neighbours. Their encouragement of commerce — notably the silk trade with Italy — rendered Granada the wealthiest of Spanish cities; their patronage of art, literature and science attracted many learned Moslems, such as the historian Ibn Khaldun and the geographer Ibn Batuta, to their court, and resulted in a brilliant civilization, of which the Alhambra is the supreme monument.

The kingdom of Granada, which outlasted all the other Moorish states in Spain, fell at last through dynastic rivalries and a harem intrigue. The two noble families of the Zegri and the Beni Serraj (better known in history and legend as the Abencerrages) encroached greatly upon the royal prerogatives during the middle years of the 15th century. A crisis arose in 1462, when an endeavour to control the Abencerrages resulted in the dethronement of Abu Nasr Saad, and the accession of his son, Muley Abu'l Hassan, whose name is preserved in that of Mulhacen, the loftiest peak of the Sierra Nevada, and in a score of legends. Muley Hassan weakened his position by resigning Malaga to his brother Ez Zagal, and incurred the enmity of his first wife Aisha by marrying a beautiful Spanish slave, Isabella de Solis, who had adopted the creed of Islam and taken the name of Zorayah, " morning star." Aisha or Ayesha, who thus saw her sons Abu Abdullah Mahommed (Boabdil) and Yusuf in danger of being supplanted, appealed to the Abencerrages, whose leaders, according to tradition, paid for their sympathy with their lives (see Alhambra). In 1482 Boabdil succeeded in deposing his father, who fled to Malaga, but the gradual advance of the Christians under Ferdinand and Isabella forced him to resign the task of defence into the more warlike hands of Muley Hassan and Ez Zagal (1483-1486). In 1491 after the loss of these leaders, the Moors were decisively beaten; Boabdil, who had already been twice captured and liberated by the Spaniards, was compelled to sign away his kingdom; and on the 2nd of January 1492 the Spanish army entered Granada, and the Moorish power in Spain was ended. The campaign had aroused intense interest throughout Christendom; when the news reached London a special thanksgiving service was held in St Paul's Cathedral by order of Henry VII.

GRANADILLA, the name applied to Passiflora quadrangularis, Linn., a plant of the natural order Passifloreae, a native of tropical America, having smooth, cordate, ovate or acuminate leaves; petioles bearing from 4 to 6 glands; an emetic and narcotic root; scented flowers; and a large, oblong fruit,, containing numerous seeds, imbedded in a subacid edible pulp. The granadilla is sometimes grown in British

hothouses. The fruits of several other species of Passiflora are eaten. P. laurifolia is the ” water lemon,” and P. maliformis the ” sweet calabash ” of the West Indies.

GRANARIES. From ancient times grain has been stored in greater or lesser bulk. The ancient Egyptians made a practice of preserving grain in years of plenty against years of scarcity, and probably Joseph only carried out on a large scale an habitual practice. The climate of Egypt being very dry, grain could be stored in pits for a long time without sensible loss of quality. The silo pit, as it has been termed, has been a favourite way of storing grain from time immemorial in all oriental lands. Ill Turkey and Persia usurers used to buy up wheat or barley when comparatively cheap, and store it in hidden pits against seasons of dearth. Probably that custom is not yet dead. In Malta a relatively large stock of wheat is always preserved in some hundreds of pits (silos) cut in the rock. A single silo will store from 60 to 80 tons of wheat, which, with proper precautions, will keep in good condition for four years or more. The silos are shaped like a cylinder resting on a truncated cone, and

surmounted by the same figure. The mouth of the pit is round and small and covered by a stone slab, and the inside is lined with barley straw and kept very dry. Samples are occasionally taken from the wheat as from the hold of a ship, and at any signs of fermentation the granary is cleared and the wheat turned over, but such is the dryness of these silos that little trouble of this kind is experienced.

Towards the close of the 19th century warehouses specially intended for holding grain began to multiply in Great Britain, but America is the home of great granaries, known there as elevators. There are climatic difficulties in the way of storing grain in Great Britain on a large scale, but these difficulties have been largely overcome. To preserve grain in good condition it must be kept as much as possible from moisture and heat. New grain when brought into a warehouse has a tendency to sweat, and in this condition will easily heat. If the heating is allowed to continue the quality of the grain suffers. An effectual remedy is to turn out the grain in layers, not too thick, on a floor, and to keep turning it over so as to aerate it thoroughly. Grain can thus be conditioned for storage in silos. There is reason to think that grain in a sound and dry condition can be better stored in bins or dry pits than in the open air; from a series of experiments carried out on behalf of the French govern- ment it would seem that grain exposed to the air is decomposed at 35 times the rate of grain stored in silo or other bins.

In comparing the grain-storage system of Great Britain with that of North America it must be borne in mind that whereas Great Britain raises a comparatively small amount of graiu which is more or less rapidly consumed, grain-growing is one of the greatest industries of the United States and of Canada. The enormous surplus of wheat and maize produced in America can only be profitably dealt with by such a system of storage as has grown up there since the middle of the 19th century. The American farmer can store his wheat or maize at a moderate rate, and can get an advance on his warrant if he is in need of money. A holder of wheat in Chicago can withdraw a similar grade of wheat from a New York elevator.

Modern granaries are all built on much the same plan. The mechanical equipment for receiving and discharging grain is very similar in all modern warehouses. A granary is usually erected on a quay at which large vessels can lie and discharge. On the land side railway sidings connect the warehouse with the chief lines in its district; accessibility to a canal is an ad- vantage. Ships are usually cleared by bucket elevators which are dipped into the cargo, though in some cases pneumatic elevators are substituted (see Conveyors) . A travelling band with throw- off carriage will speedily distribute a heavy load of grain. Band conveyors serve equally well for charging or discharging the bins. Bins are invariably provided with hopper bottoms, and any bin can be effectively cleared by the band, which runs underneath, either in a cellar or in a specially constructed tunnel. All granaries should be provided with a sufficient plant of cleaning machinery to take from the grain impurities as would be likely to be detrimental to its storing qualities. Chief among such machines are the warehouse separators which work by sieves and air currents (see Flour and Flour Manufacture).

The typical grain warehouse is furnished with a number of chambers for grain storage which are known as silos, and may be built of wood, brick, iron or ferro-concrete. Wood silos are usually square, made of flat strips of wood nailed one on top of the other, and so overlapping each other at the corners that alternately a longitudinal and a transverse batten extends past the corner. The gaps are filled by short pieces of timber securely nailed, and the whole silo wall is thus solid. This type of bin was formerly in great favour, but it has certain draw-backs, such as the possibility of dry rot, while weevils are apt to harbour in the interstices unless lime washing is practised. Bricks and cement are good materials for constructing silos of hexagonal form, but necessitate deep foundations and sub- stantial walls. Iron silos of circular form are used to some extent in Great Britain, but are more common in North and

South America. In their case the walls are much thinner than with any other material, but the condensation against the inner wall in wet weather is a drawback in damp climates. Cylindrical tank silos have also been made of fire-proof tiles. Ferro-concrete silos have been built on both the Monier and the Hennebique systems. In the earlier type the bin was made of an iron or steel framework filled in with concrete, but more recent struc- tures are composed entirely of steel rods embedded in cement. Granaries built of this material have the great advantage, if properly constructed, of being free from any risk of failure even in case of uneven expansion of the material. With brick silos collapses through pressure of the stored material are not unknown.

One of the largest and most complete grain elevators or ware- houses in the world belongs to the Canadian Northern Railway „ Company, and was erected at Port Arthur, Canada, in

\°f? 1901-1904. It has a total storage capacity of 7,000,000

sj™ j bushels, or 875,000 qrs. of 480 lb. The range of buildings

aa a ‘ and bins forms an oblong, and consists of two storage houses, B and C, placed between two working or receiving houses A and D (fig. 1). The receiving houses are fed by railway sidings. House A, for example, has two sidings, one running through it and

repaired since they can be removed and replaced without affecting the main bin walls. It is claimed that these facers constitute the best possible protection against fire. A steel framework, covered with tiles, crowns these circular bins and contains the conveyors and spouts which are used to fill the bins. Five tunnels in the concrete bedding that supports the bins carry the belt conveyors which bring back the grain to the working house for cleaning or shipment. There are altogether in each of the storage houses 80 circular bins, each 21 ft. in diameter, and so grouped as to form 63 smaller interspace bins, or 143 bins in all. Each bin will store grain in a column 85 ft. deep, and the whole group has a capacity of 2,500,000 bushels. These bins were all constructed by the Barnett & Record Company of Minneapolis, Minnesota, U.S.A., in ac- cordance with the Johnson & Record patent system of fire-proof tile grain storage construction. In case one of the working houses is attacked by fire the fire-proof storage houses

protect not only their own contents but also the other working house, and in the event of its disablement or destruction the remaining one can be easily connected with both the storage houses and handle their contents.

Circular tank silos have not been extensively adopted in Great Britain, but a typical silo tank installation exists at the Walmsley & Smith flour mills which stand beside the Devonshire dock at Barrow-in-Furness. There four circular bins, built of riveted steel

Fig. 1.

the other beside it. Each siding serves five receiving pits, and a receiving elevator of 10,000 fb capacity per minute, or 60,000 bushels per hour, can draw grain from either of two pits. Five elevators of 12,000 bushels per hour on the other side of the house serve five warehouse separators, and all the grain received or dis- charged is weighed, there being ten sets of automatic scales in the upper part of the house, known as the cupola. The hopper of each weigher can take a charge of 1400 bushels (84,000 lb). Grain can be conveyed either vertically or horizontally to any part of the house, into any of the bins in the annex B, or into any truck or lake steamer. This house is constructed of timber and roofed with corrugated iron. The conveyor belts are 36 in. wide; those at the top of the house are provided with throw-off carriages. The dust from the cleaning machinery is carefully collected and spouted to the furnace under the boiler house, where it is consumed. The cylindrical silo bins in the storage houses consist of hollow tiles of burned clay which, it is claimed, are fire-proof. The tiles are laid on end and are about 12 in. by 12 in. and from 4 in. to 6 in. in thick- ness according to the size of the bin. Each alternate course consists of grooved blocks of channel tile forming a continuous groove or belt round the bin. This groove receives a steel band acting as a tension member and resisting the lateral pressure of the grain. The steel bands once in position, the groove is completely filled with cement grout by which the steel is encased and protected. Usually the bottoms of the bins are furnished with self-discharging hoppers of weak cinder or gravel concrete finished with cement mortar. For the foundation or supporting floor reinforced concrete is fre- quently used. The tiles already described are faced with tiles \ to I in. thick, which are laid solid in cement mortar covering the whole exterior of the bin. Any damage to the facing tiles can easily be

plates, stand in a group on a quadrangle close to the mill ware- house. A covered gantry, through which passes a band conveyor, runs from the mill warehouse to the working silo house Barrow- which stands in

the central space amid the four steel fa _ tanks. The tanks are 70 ft. high, with a diameter of 45 ft., Fura ess , and rest on foundations of concrete and steel. Each has a separate conicalroof and they are flat-bottomed, the grain resting directly on the steel and concrete foundation bed. As the load of the full tank is very heavy its even distribution on the bed is con- sidered a point of importance. Each tank can hold about 2500 tons of wheat, which gives a total storage capacity for the four bins of over 45,000 qrs. of 480 lb. Attached to the mill warehouse is a skip elevator with a discharging capacity of 75 tons an hour. The grain- is cleared by this elevator from the hold or holds of the vessel to be unloaded, and is delivered to the basement of the warehouse. Thence it is elevated to an upper storey and passed through an automatic weigher capable of taking a charge of I ton. From the weighing machine it can be taken, with or without a preliminary cleaning, to any floor of the warehouse, which has a total storing capacity of 8000 tons, or it can be carried by the band conveyor through the gantry to the working house of the silo installation and distributed to any one of the four tank silos. There is also a connexion by a band conveyor running through a covered gantry into the mill, which stands immediately in the rear. It is perfectly easy to turn over the contents of any tank into any other tank. The whole intake and wheat handling plant is moved by two electro-motors of 35 H.P. each, one installed in the warehouse and the other in the silo working house. Steel silo tanks have the advantage of storing a heavy stock of wheat at comparatively small capital outlay. On an average an ordinary silo bin will not hold more than 500 to

iooo qrs., but each of the bins at Barrow will contain 2500 tons or over 1 100 qrs. The steel construction also reduces the risk of fire and consequently lessens the fire premium.

The important granaries at the Liverpool docks date from 1868, but have since been brought up to modern requirements. The Liverpool, warehouses on the Waterloo docks have an aggregate

storage area of nf acres, while the sister warehouses on the Birkenhead side, which stand on the margin of the great float, have an area of 1 1 acres. The total capacity of these warehouses is about 200,000 qrs.

The grain warehouse of the Manchester docks at Trafford wharf is

locally known as the grain elevator, because it was built to a

great extent on the model of an American elevator.

Some of the mechanical equipment was supplied by a

Chicago firm. The total capacity is 1,500,000 bushels or 40,000 tons of grain, which is stored in 226 separate bins. The granary proper stands about 340 ft. from the side of the dock, but is directly connected with the receiving tower, which rises at the

Man- chester.

per hour; weighing in the tower; conveying grain into the ware- house and distributing it into any of the 226 bins; moving grain from bin to bin either for aerating or delivery, and simultaneously weighing in bulk at the rate of 500 tons per hour ; sacking grain, weighing and loading the sacks into 40 railway trucks and 10 carts simultaneously; loading grain from the warehouse into barges or coasting craft at the rate of 150 tons per hour in. bulk or of 250 sacks per hour. This warehouse is equipped with a dryer of American construction, which can deal with 50 tons of damp grain at one time, and is connected with the .whole bin system so that grain can be readily moved from any bin to the dryer or conversely.

A grain warehouse at the Victoria docks, London, belonging to the London and India Docks Company (fig. 2) has a storing capacity of about 25,000 qrs. or 200,000 bushels. It is over London. 100 ft. high, and is built on the American plan of interlaced timbers resting on iron columns. The walls are externally cased with steel plates. The grain is stored in 56 silos, most of which are about 10 ft. square by 50 ft. deep. The intake plant has a capacity

Dock Compan ies

^^Mi^^^^K^MM^^i / 0nc t0 ” Hooper f

J . I ‘ – ! ‘■ •. .’ i JH :” i ,1 ‘ ■ ‘ .j ■ t ‘ .■”? “■.■”•’■”,■’ ,

General Plan of Storage & Transit Silos, Victoria Docks, London.

Scale, 140 feet = I inch.

Fig. 2.

water’s edge, by a band conveyor protected by a gantry. The main

building is 448 ft. long by 80 ft. wide ; the whole of the super-structure was constructed of wood with an external casing of brick-work and tiles. The receiving tower is fitted with a bucket elevator capable, within fairly wide limits, of adjustment to the level of the hold to be unloaded. The elevator has the large unloading capacity of 350 tons per hour, assuming it to be working in a full hold. It is supplemented by a pneumatic elevator (Duckham system) which can raise 200 tons per hour and is used chiefly in dealing with parcels of grain or in clearing grain out of holds which the ordinary elevator cannot reach. The power required to work the large elevator as well as the various band conveyors is supplied \>y two sets of hori- zontal-Corliss compound engines of 500 H.P. jointly, which are fed by two Galloway boilers working at 100 lb pressure. The pneumatic elevator is driven by two sets of triple expansion vertical engines of 600 H.P. fed by three boilers working at a pressure of 160 lb. The grain received in the tower is automatically weighed. From the receiving tower the grain is conveyed into the warehouse where it is at once elevated to the top of a central tower, and is thence distributed to any of the bins by band conveyors in the usual way. The mechanical equipment of this warehouse is very complete, and the following several operations can be simultaneously effected : discharging grain from vessels in the dock at the rate of 350 tons

of 100 tons of wheat an hour, and in- cludes six automatic grain scales, each of which can weigh off one sack at a time. The main delivery floor of the warehouse is at a convenient, height above the ground level. Portable automatic weighing machines can be placed under any bin. The whole of the plant is driven by electric motors, one being allotted to each machine.

The transit silos of the London Grain Elevator Company, also at the Victoria docks, consist of four complete and in- dependent installations standing on three tongues of land which project into the water (figs. 2 and 3). Each silo house is furnished with eight bins, each of which, 12 ft. square by 80 ft. deep, has a capacity of 1000 qrs. of grain. A kind of well in the middle of each silo house contains the neces- sary elevators, staircases, &c. The silo bins in each granary are erected on a massive cast iron tank forming a sort of cellar, which rests on a concrete foundation 6 ft. thick. The base of the tank is 30 ft. below the water level. The silos are formed of wooden battens nailed one on top of the other, the pieces interlacing. Rolled steel girders resting on cast iron columns support the silos. To ensure a clean discharge the hopper bottoms were designed so as to avoid joints and

thus to be free from rivets or similar protuber- ances. The exterior of each silo house is covered with corru- gated iron, and the same material is used for the roofing. No conveyors serve the silo bins, as the elevators which rise above the tops of the silos can feed any one of them by gravity. There are three delivery elevators to each granary, one with a capacity of 120 tons and the other two of 100 tons each an hour. Each silo house is served by a large elevator with a capacity of 120 tons per hour, which discharges into the elevator well inside the house. The delivery elevators discharge into a receiving shed in which there is a large hopper feeding six automatic weighing machines. Each charge as it is weighed empties itself automatically into sacks, which are then ready for loading. Each pair of warehouses is pro- vided with a conveyor band 308 ft. long, used either for carrying sacks from the weighing sheds to railway trucks or for carrying grain in bulk to barges or trucks. Each silo house has an identical mechanical equipment apart from the delivery band it shares with its fellow warehouse. All operations in connexion with the silo houses are effected under cover. The silos are normally fed by a fleet of twenty-six of Philip's patent self-discharging lighters. These craft are hopper-bottomed and fitted with band conveyors of the ordinary type, running between the double keelson of the lighter and delivering into an elevator erected at the stern of the lighter. By this means little trimming is required after the barge, which holds

about 200 tons of grain, has been cleared. Ocean steamers of such draft as to preclude their entry into any of the up river docks are cleared at Tilbury by these lighters. It is said that grain loaded at Tilbury into these lighters can be delivered from the transit silos to railway trucks or barges in about six hours. The total storage capacity of the silos amounts to 32,000 qrs. The motive power is furnished by 14 gas engines of a total capacity of 366 H.P.

Two of the largest granaries on the continent of Europe are situated at the mouth of the Danube, at Braila and Galatz, in Rumania. ˆ uma . n ' a > an d serve for both the reception and discharge of grain. At the edge of the quay on which these ware- houses are built there are rails with a gauge of II § ft., upon which run two mechanical loading and unloading appliances. The first consists of a telescopic elevator which raises the grain and delivers it to one of the two band conveyors at the head of the apparatus. Each of these bands feeds automatic weighing machines with an hourly capacity of 75 tons. From these weighers the

grain is either discharged through a manhole in the ground to a band conveyor running in a tunnel parallel to the quay wall, or it is raised by a second elevator (part of the same unloading apparatus), set at an inclined angle, which delivers at a sufficient height to load railway trucks on the siding running parallel to the quay. A turning gear is provided so as to reverse, if required, the operation of the whole apparatus, that the portion overhanging the water can be turned to the land side. The unloading capacity is 150 tons of grain per hour. If it be desired to load a ship the telescopic elevator has only to be turned round and dipped into any one of 15 wells, which

A. Barge Elevator*

B. Receiving Elevator*

C. Site Bine

D. Delivery Elevators

E. Weigh House)

F. Automatic Scalee O. Sacli Band Ocntrg

capacity of the elevators and conveyors is 100 tons of grain per hour. The mechanical equipment is so complete that four distinct operations are claimed as possible. A ship may be unloaded into silos or into the granary floors, and may simultaneously be loaded either from silos or floors with different kinds of grain. Again, a cargo may be discharged either into silos or upon the floors, and simultaneously the grain may be cleaned. Grain may also be cleared from a vessel, mixed with other grain already received, and then distributed to any desired point. With equal facility grain may be cleaned, blended with other varieties, re-stored ih any section of the granary, and transferred from one ship to another.

A granary with special features of interest, erected on the quay at Dortmund, Germany, by a co-operative society, is built of brick on a base of hewn stone, with beams and supports of n — timber. It is 78 ft. high and consists of seven floors, D0rtmua °- including basement and attic. Here again there are two sections, the larger being devoted to the storage of grain in low bins, while the smaller section consists of an ordinary silo house. Grain in sacks may be stored in the basement of the larger section which has a capacity of 1675 tons as compared with 825 tons in the silo depart- ment. Thus the total storage capacity is 2500 tons. In the silo house the bins, constructed of planks nailed one over the other, are of varying size and are capable

of storing grain to a depth of 42 to 47 ft. Some of the bins have been specially adapted for receiving damp grain by being provided internally with transverse wooden arms which form square or lozenge-shaped sections. The object of this arrangement is to break up and aerate the stored grain. The

,. Transit Silos of the

London Grain Elevator Co. Ltd.,

Victoria Docks, London.

fm»m»mˆMmwmmmˆmmmwm’ ‘ >

Longitudinal Elevation looking towards Barge Elevators.

Cross Section through Transit Silos.

Fig. 3-‘

can be filled up with grain from the land side. The capacity of each granary is 233,333 qrs.

Many large granaries have been built, in which grain is stored on open floors, in bulk or in sacks. A notable instance is the ware- house of the city of Stuttgart. This is a structure of Stuttgart, ggygjj fl oorS| including a basement and entresol. An engine house accommodates two gas engines as well as an hydraulic installation for the lifts. The grain is received by an elevator from the railway trucks, and is delivered to a weighing machine from which it is carried by a second elevator to the top storey, where it is fed to a band running the length of the building. A system of pipes runs from floor to floor, and by means of the band conveyor with its movable throw-off carriage grain can be shot to any floor. A second band conveyor is installed in the entresol floor, and serves to convey grain either to the elevator, if it is desired to elevate it to the top floor, or to the loading shed. A second elevator runs through the centre of the building, and is provided with a spout by means of which grain can be delivered into the hopper feeding the cleaning machine, whence the grain passes into a second hopper under which is an automatic weigher; directly under this weigher the grain is sacked.

A good example of a grain warehouse on the combined silo bin and floor storage system is afforded by the granary at Mannheim „ . , on the Rhine, which has the storage capacity of 2100 Mannbelm. tQns The building is 3 -, ft in length, 78 ft. wide and

78 ft. high, and by means of transverse walls it is divided into three sections; of these one contains silos, in another section grain is stored on open floors, while the third, which is situated between the other two, is the grain-cleaning department. This granary stands by the quay side, and a ship elevator of great capacity, which serves the cleaning department, can rapidly clear any ship or barge beneath. The central or screening house section contains machinery specially designed for cleaning barley as well as wheat. The barley plant has a capacity of 5 tons per hour. There are four main elevators in this warehouse, while two more serve the screen house. The usual band conveyors fitted with throw-off carriages are provided, and are supplemented by an elaborate system of pipes which receive grain from the elevators and bands and distribute it at any required point. The plant is operated by electric motors. If desired the floors of the non-silo section can be utilized for storing other goods than grain, and to this end a lift with a capacity of I ton runs from the basement to the top storey. The combined

arms are of triangular section and are slightly hollowed at the base so as to bring a current of air into direct contact with the grain. The air can be warmed if necessary. The other and larger section of the granary is provided with 105 bins of moderate height arranged in groups of 21 on the five floors between the basement and attic. On the intermediate floors and the bottom floor each bin lies exactly under the bin above. Grain is not stored in these bins to a greater depth than 5 ft. The bins are fitted with removable side walls, and damp grain is only stored in certain bins aerated for half the area of their side walls through a wire mesh. The arrangements for distributing grain in this warehouse are very complete. The uncleaned grain is taken by the receiving elevator, with a lifting capacity of 20 tons per hour, to a warehouse separator, whence it is passed through an automatic weigher and is then either sacked or spouted to the main elevator (capacity 25 tons per hour) and ele- vated to the attic. From the head of this main elevator the grain can either be fed to a bin in one or other of the main granary floors, or shot to one of the bins in the silo house. In the attic the grain is carried by a spout and belt conveyor to one or other of the turn- tables, as the appliances may be termed, which serve to distribute through spouts the grain to any one of the floor or silo bins. Alter- natively, the grain may be shot into the basement and there fed back into the main elevator by a band conveyor. In this way the grain may be turned over as often as it is deemed necessary. At the bottom of each bin are four apertures connected by spouts, both with the bin below and with the central vertical pipe which passes down through the centre of each group of

bins. To regulate the course of the grain from bin to bin or from bin to central pipe, the connecting spouts are fitted with valves of ingenious yet simple construction which deflect the grain in any desired direction, so that the contents of two or more bins may be blended, or grain may be transferred from a bin on one floor to a bin on a lower floor, missing the bin on the floor between. The valves are con- trolled by chains from the basement.

With reference to the floor bins used at Dortmund, it may be observed that there are granaries built on a similar principle in the United Kingdom. It is probable that bins of moderate height are more suitable for storing grain containing a considerable amount of moisture than deep silos, whether made of wood, ferro-concrete or other material. For one thing floor bins of the Dortmund pattern can be more effectually aerated than deep silos. German wheat has many characteristics in common with British, and, especially

Amount of stocks.

in north Germany, is not infrequently harvested in a more or less damp condition. In the United Kingdom, Messrs Spencer & Co., of Melksham, have erected several granaries on the floor-bin principle, and have adopted an ingenious system of ” telescopic ” spouting, by means of which grain may be discharged from one bin to another or at any desired point. This spouting can be applied to bins either with level floors or with hoppered bottoms, if they are arranged one above the other on the different floors, and is so constructed that an opening can be effected at certain points by simply sliding upwards a section of the spout.

National Granaries. — Wheat forms the staple food of a large proportion of the population of the British Isles, and of the total amount consumed about four-fifths is sea-borne. The stocks normally held in the country being limited, serious consequences might result from any interruption of the supply, such as might occur were Great Britain involved in war with a power or powers commanding a strong fleet. To meet this contingency it has been suggested that the State should establish granaries contain- ing a national reserve of wheat for use in emergency, or should adopt measures calculated to induce merchants, millers, &c, to hold larger stocks than at present and to stimulate the production of home-grown wheat.

Stocks of wheat (and of flour expressed in its equivalent weight of wheat) are held by merchants, millers and farmers. Merchants' stocks are kept in granaries at ports of importation and are known as first-hand stocks. Stocks of wheat and flour in the hands of millers and of flour held by bakers are termed second-hand stocks, while farmers' stocks only consist of native wheat. Periodical returns are generally made of first-hand or port stocks, nor should a wide margin of error be possible in the case of farmers' stocks, but second-hand stocks are more difficult to gauge. Since the last decade of the 19th century the storage capacity of British mills has considerably increased. As the number of small mills has diminished the capacity of the bigger ones has increased, and proportionately their warehousing accommodation has been enlarged. At the present time first-hand stocks tend to diminish because a larger proportion of millers' holdings are in mill granaries and silo houses. The immense preponderance of steamers over sailing vessels in the grain trade has also had the effect of greatly diminishing stocks. With his cargo or parcel on a steamer a corn merchant can tell almost to a day when it will be due. In fact foreign wheat owned by British merchants is to a great extent stored in foreign granaries in preference to British warehouses. The merchant's risk is thereby lessened to a certain extent. When his wheat has been brought into a British port, to send it farther afield means extra expense. But wheat in an American or Argentine elevator may be ordered wherever the best price can be obtained for it. Options or " futures," too, have helped to restrict the size of wheat stocks in the United Kingdom. A merchant buys a cargo of wheat on passage for arrival at a definite time, and, lest the market value of grain should have depreciated by the time it arrives, he sells an option against it. In this way he hedges his deal, the option serving as insurance against loss. This is why the British corn trade finds it less risky to limit purchases to bare needs, protecting itself by option deals, than to store large quantities which may depreciate and involve their owners in loss.

Varying estimates have been made of the number of weeks' supply of breadstuffs (wheat and flour) held by millers at various seasons of the year. A table compiled by the secretary of the National Association of British and Irish Millers from returns for 1902 made by 170 milling firms showed 4-7, 4-0, 4-9 and 5 weeks' supply at the end of March, June, September and December respectively. These 1 70 mills were said to represent 46 % of the milling capacity of the United Kingdom, and claimed to have ground 12,000,000 qrs. out of 25,349,000 qrs. milled in 1 90c. These were obviously large mills; it is probable that the •other mills would not have shown anything like such a proportion

of stock of either raw or finished material. A fair estimate of the stocks normally held by millers and bakers throughout the United Kingdom would be about four weeks' supply. First-hand stocks vary considerably, but the limits are definite, ranging from 1,000,000 to 3,500,000 qrs., the latter being a high figure. The

tendency is for first-hand stocks to deciine, but two weeks' supply must be a minimum. Farmers' stocks necessarily vary with the size of the crop and the period of the year; they will range from 9 or 10 weeks on the 1st of September to a half week on the 1st of August. Taking all the stocks together, it is very exceptional for the stock of breadstuffs to fall below 7 weeks' supply. Be- tween the cereal years 1893-1894 and 1903-1904, a period of 570 weeks, the stocks of all kinds fell below 7 weeks' supply in only 9 weeks; of these 9 weeks 7 were between the beginning of June and the end of August 1898. This was immediately after the Leiter collapse. In seven of these eleven years there is no instance of stocks falling below 8 weeks' supply. In 21 out of these 570 weeks and in 39 weeks during the same period stocks dropped below 7! and 8 weeks' supply respectively. Roughly speaking the stock of wheat available for bread-making varies from a two to four months' supply and is at times well above the latter figure.

The formation of a national reserve of wheat, to be held at the disposal of the state in case of urgent need during war, is beset by many practical difficulties. The father of the scheme was probably The Miller, a well-known reserve. trade journal. In March and April 1886 two articles appeared in that paper under the heading " Years of Plenty and State Granaries," in which it was urged that to meet the risk of hostile cruisers interrupting the supplies it would be desirable to lay up in granaries on British soil and under govern- ment control a stock of wheat sufficient for 12 or alternatively 6 months' consumption. This was to be national property, not to be touched except when the fortune of war sent up the price of wheat to a famine level or caused severe distress. The State holding this large stock — a year's supply of foreign grain would have meant at least 15,000,000 qrs., and have cost about £25,000,000 exclusive of warehousing — was in peace time to sell no wheat except when it became necessary to part with stock as a precautionary measure. In that case the wheat sold was to be replaced by the same amount of new grain. The idea was to provide the country with a supply of wheat until sufficient wheat-growing soil could be broken up to make it practically self-sufficing in respect of wheat. The original suggestion fell quite flat. Two years later Captain Warren, R.N., read a paper on " Great Britain's Corn Supplies in War," before the London Chamber of Commerce, and accepted national granaries as the only practicable

safeguard against what appeared to him a great peril. The representatives of the shipping interest opposed the scheme, probably because it appeared to them likely to divert the public from insisting on an all-powerful navy. The corn trade opposed the project on account of its great practical difficulties. But constant contraction of the British wheat acreage kept the question alive, and during the earlier half of the ‘nineties it was a favourite theme with agriculturists. Some influential members of parliament pressed the matter on the government, who, acting, no doubt, on the advice of their military and naval experts, refused either a royal commission or a depart- mental committee. While the then technical advisers of the government were divided on the advisability of establishing national granaries as a defensive measure, the balance of expert opinion was adverse to the scheme. Lord Wolseley, then commander-in-chief, publicly stigmatized the theory that Great Britain might in war be starved into submission as ” unmitigated humbug.”

In spite of official discouragement the agitation continued, and early in 1897 the council of the Central and Associated Chambers of Agriculture, at the suggestion to a great extent of Mr R. A. Yerburgh, M.P., nominated ^” rgb a committee to examine the question of national mtttee. wheat stores. This committee held thirteen sittings and examined fifty-four witnesses. Its report, which was published (L. G. Newman & Co., 12 Finsbury Square, London, E.C.) with minutes of the evidence taken, practically recom- mended that a national reserve of wheat on the lines already sketched should be formed and administered by the State, and that the government should be strongly urged to obtain the

appointment of a royal commission, comprising representatives of agriculture, the corn trade, shipping, and the army and navy, to conduct an exhaustive inquiry into the whole subject of the national food-supply in case of war. This recommendation was ultimately carried into effect, but not till nearly five years had elapsed. Of two schemes for national granaries put before the Yerburgh committee, one was formulated by Mr Seth Taylor, a London miller and corn merchant, who reckoned that a store of 10,000,000 qrs. of wheat might be accumulated at an average cost of 40s. per qr. — this was in the Leiter year of high prices — and distributed in six specially constructed granaries to be erected at London, Liverpool, Hull, Bristol, Glasgow and Dublin. The cost of the granaries was put at £7,500,000.

Mr Taylor's scheme, all charges included, such as 25% interest on capital, cost of storage (at 6d. per qr.), and 2s. per qr. for cost of replacing wheat, involved an annual expenditure of £1,250,000. The Yerburgh committee also considered a proposal to stimulate the home supply of wheat by offering a bounty to farmers for every quarter of wheat grown. This proposal has taken different shapes; some have suggested that a bounty should be given on every acre of land covered with wheat, while others would only allow the bounty on wheat raised and kept in good condition up to a certain date, say the beginning of the following harvest. It is obvious that a bounty on the area of land covered by wheat, irrespective of yield, would be a premium oh poor farming, and might divert to wheat-growing land unsuitable for that purpose. The suggestion to pay a bounty of say 3s. to 5s. per qr. for all wheat grown and stacked for a certain time stands on a different basis; it is conceivable that a bounty of 5s. might expand the British production of wheat from say 7,000,000 to 9,000,000 qrs., which would mean that a bounty of £2,250,000 per annum, plus costs of administration, had secured an extra home production of 2,000,000 qrs. Whether such a price would be worth paying is another matter; the Yerburgh committee's conclusion was decidedly in the negative. It has also been suggested that the State might subsidize millers to the extent of 2s. 6d. per sack of 280 lb. per annum on condition that each maintained a minimum supply of two months' flour. This may be taken to mean that for keeping a special stock of flour over and above his usual output a miller would be entitled to an annual subsidy of 2s. 6d. per sack. An extra stock of 10,000,000 sacks might be thus kept up at an annual cost of £1,250,000, plus the expenditure of administration, which would probably be heavy. With regard to this suggestion, it is very probable that a few large mills which have plenty of warehouse accommodation and depots all over the country would be ready to keep up a permanent extra stock of 100,000 sacks. Thus a mill of 10,000 sacks' capacity per week, which habitually maintains a total stock of 50,000 sacks, might bring up its stock to 150,000 sacks. Such a mill, being a good customer to railways, could get from them the storage it required for little or nothing. But the bulk of the mills have no such advantages. They have little or no spare warehousing room, and are not accustomed to keep any stock, sending their flour out almost as fast as it is milled. It is doubtful therefore if a bounty of 2s. 6d. per sack would have the desired effect of keeping up a stock of 10,000,000 sacks, sufficient for two to three months' bread consumption.

The controversy reached a climax in the royal commission appointed

in 1903, to which was also referred the importation of raw material in war time. Its report appeared in mission" 1 ' I00 5- To the question whether the unquestioned 1903~190S. dependence of the United Kingdom on an uninterrupted supply of sea-borne breadstuffs renders it advisable or not to maintain at all times a six months' stock of wheat and flour, it returned no decided answer, or perhaps it would be more correct to say that the commission was hopelessly divided. The main report was distinctly optimistic so far as the liability of the country to harass and distress at the hands of a hostile naval power or combination of powers was concerned. But there were several dissentients, and there was hardly any portion of the report in chief which did not provoke some reservation or another. That a maritime war would cause

freights and insurance to rise in a high degree was freely admitted, and it was also admitted that the price of bread must also rise very appreciably. But, provided the navy did not break down, the risk of starvation was dismissed. Therefore all the proposals for providing national granaries or inducing merchants and millers to carry bigger stocks were put aside as unpractical and unnecessary. The commission was, however, inclined to consider more favourably a suggestion for providing free storage for wheat at the expense of the State. The idea was that if the State would subsidize any large granary company to the extent of 6d. or sd. per qr., grain now warehoused in foreign lands would be attracted to the British Isles. But on the whole the commission held that the main effect of the scheme would be to saddle the government with the rent of all grain stored in public warehouses in the United Kingdom without materially increasing stocks. The proposal to offer bounties to farmers to hold stocks for a longer period and to grow more wheat met with equally little favour.

To sum up the advantages of national granaries, assuming any sort of disaster to the navy, the possession of a reserve of even six months' wheat-supply in addition to ordinary stocks would prevent panic prices. On the other hand, the difficulties in the way of forming arid administering such a reserve are very great. The world grows no great surplus of wheat, and to form a six months', much more a twelve months', stock would be the work of years. The government in buying up the wheat would have' to go carefully if they would avoid sending up prices with a rush. They would have to buy dearly, and when they let go a certain amount of stock they would be bound to sell cheaply. A stock once formed might be held by the State with little or no disturbance of the corn market, although the existence of such an emergency stock would hardly encourage British farmers to grow more wheat. The cost of erecting, equipping and keeping in good

order the necessary warehouses would be, probably, much heavier than the most liberal estimate hitherto made by advocates of national granaries. (G. F. Z.)

GRANBY, JOHN MANNERS, Marquess of (1721-1770), British soldier, was the eldest son of the third duke of Rutland. He was born in 1 7 2 1 and educated at Eton and Trinity College, Cambridge, and was returned as member of parliament for Grantham in 1741. Four years later he received a commission as colonel of a regiment raised by the Rutland interest in and about Leicester to assist in quelling the Highland revolt of 1745. This corps never got beyond Newcastle, but young Granby went to the front as a volunteer on the duke of Cumberland's staff, and saw active service in the last stages of the insurrection. Very soon his regiment was disbanded. He continued in parlia- ment, combining with it military duties, making the campaign of Flanders (1747). Promoted major-general in 1755, three years later he was appointed colonel of the Royal Horse Guards (Blues). Meanwhile he had married the daughter of the duke of Somerset, and in 1754 had begun his parliamentary connexion with Cambridgeshire, for which county he sat until his death. The same year that saw Granby made colonel of the Blues, saw also the despatch of a considerable British contingent to Germany. Minden was Granby's first great battle. At the head of the Blues he was one of the cavalry leaders halted at the critical moment by Sackville, and when in consequence that officer was sent home in disgrace, Lieut. General Lord Granby succeeded to the command of the British contingent in Ferdinand's army, having 32,000 men under his orders at the beginning of 1760. In the remaining campaigns of the Seven Years' War the English contingent was more conspicuous by its conduct than the Prussians themselves. On the 31st of July 1760 Granby brilliantly stormed Warburg at the head of the British cavalry, capturing 1500 men and ten pieces of artillery. A year later (15th of July 1761) the British defended the heights of Vellinghausen with what Ferdinand himself styled " indescrib able bravery." In the last campaign, at Gravenstein und Wilhelmsthal, Homburg and Cassel, Granby's men bore the brunt of the fighting and earned the greatest share of the glory.

Returning to England in 1763 the marquess found himself

the popular hero of the war. It is said that couriers awaited his arrival at all the home ports to offer him the choice of the Ordnance or the

Horse Guards. His appointment to the Ordnance bore the date of the ist of July 1763, and three years later he became commander-in-chief. In this position he was attacked by ” Junius,” and a heated discussion arose, as the writer had taken the greatest pains in assailing the most popular member of the Grafton ministry. In 1770 Granby, worn out by political and financial trouble, resigned all his offices, except the colonelcy of the Blues. He died at Scarborough on the 18th of October 1770. He had been made a privy councillor in 1760, lord lieutenant of Derbyshire in 1762, and LL.D. of Cambridge in

1769.

Two portraits of Granby were painted by Sir Joshua Reynolds, one of which is now in the National Gallery. His contemporary popularity is indicated by the number of inns and public-houses which took his name and had his portrait as sign-board.

GRAN CHACO, an extensive region in the heart of South America belonging to the La Plata basin, stretching from 20° to 29° S. lat., and divided between the republics of Argentine, Bolivia and Paraguay, with a small district of south-western Matto Grosso (Brazil). Its area is estimated at from 250,000 to 425,000 sq. m., but the true Chaco region probably does not exceed 300,000 sq. m. The greater part is covered with marshes, lagoons and dense tropical jungle and forest,- and is still un- explored. On its southern and western borders there are ex- tensive tracts of open woodland, intermingled with grassy plains, while on the northern side in Bolivia are large areas of open country subject to inundations in the rainy season. In general terms the Gran Chaco may be described as a great plain sloping gently to the S.E., traversed in the same direction by two great rivers, the Pikomayo and Bermejo, whose sluggish courses are not navigable because of sand-banks, barriers of overturned trees and floating vegetation, and confusing channels. This excludes that part of eastern Bolivia belonging to the Amazon basin, which is sometimes described as part of the Chaco. The greater part of its territory is occupied by nomadic tribes of Indians, some of whom are still unsubdued, while others, like the Matacos. are sometimes to be found on neighbouring sugar estates and estancias as labourers during the busy season. The forest wealth of the Chaco region is incalculable and apparently inexhaustible, consisting of a great variety of palms and valuable cabinet woods, building timber, &c. Its extensive tracts of ” quebracho Colorado ” {Loxopterygium Lorentzii) are of very great value because of its use in tanning leather. Both the wood and its extract are largely exported. Civilization is slowly gaining footholds in this region along the southern and eastern borders. GRAND ALLIANCE, WAR OF THE

(alternatively called the War of the League of Augsburg), the third 1 of the great aggressive wars waged by Louis XIV. of France against Spain, the Empire, Great Britain, Holland and other states. The two earlier wars, which are redeemed from oblivion by the fact that in them three great captains, Turenne, Conde and Montecucculi, played leading parts, are described in the article Dutch Wars. In the third war the leading figures are: Henri de Montmorency- Boutteville, duke of Luxemburg, the former aide-de-camp of Conde and heir to his daring method of warfare; William of Orange, who had fought against both Conde and Luxemburg in the earlier wars, and was now king of England; Vauban, the founder of the sciences of fortification and siegecraft, and Catinat, the follower of Turenne's cautious and systematic strategy, who was the first commoner to receive high command in the army of Louis XIV. But as soldiers, these men — except Vauban — are overshadowed by the great figures of the preceding generation, and except for a half-dozen outstanding episodes, the war of 1689-97 was an affair of positions and manoeuvres.

It was within these years that the art and practice of war began to crystallize into the form called " linear " in its strategic

1 The name " Grand Alliance " is applied to the coalition against Louis XIV. begun by the League of Augsburg. This coalition not only waged the war dealt with in the present article, but (with only slight modifications and with practically unbroken continuity) the war of the Spanish Succession (q.v.) that followed.

and tactical aspect, and " cabinet-war " in its political and moral aspect. In the Dutch wars, and in the minor wars that pre- ceded the formation of the League of Augsburg, there were still survivals of the loose organization, violence and wasteful barbarity typical of the Thirty Years' War; and even in the War of the Grand Alliance (in its earlier years) occasional brutalities and devastations showed that the old spirit died hard. But outrages that would have been borne in dumb misery in the old days now provoked loud indignation, and when the fierce Louvois disappeared from the scene it became generally understood that barbarity was impolitic, not only as alienating popular sympathies, but also as rendering operations a physical impossibility for want of supplies.

Thus in 1700, so far from terrorizing the country people into submission, armies systematically conciliated them by paying cash and bringing trade into the country. Formerly, wars had been fought to compel a people a f the war. to abjure their faith or to change sides

in some personal or dynastic quarrel. But since 1648 this had no longer been the case. The Peace of Westphalia established the general relationship of kings, priests and peoples on a basis that was not really shaken until the French Revolution, and in the intervening hundred and forty years the peoples at large, except at the highest and gravest moments (as in Germany in 1689, France in 1709 and Prussia in 1757) held aloof from active participation in politics and war. This was the beginning of the theory that war was an affair of the regular forces only, and that intervention in it by the civil population was a punish- able offence. Thus wars became the business of the professional soldiers in the king's own service, and the scarcity and costliness of these soldiers combined with the purely political character of the quarrels that arose to reduce a campaign from an " intense and passionate drama " to a humdrum affair, to which only rarely a few men of genius imparted some degree of vigour, and which in the main was an attempt to gain small ends by a small expenditure of force and with the minimum of risk. As between a prince and his subjects there were still quarrels that stirred the average man — the Dragonnades, for instance, or the English Revolution — but foreign wars were " a stronger form of diplo- matic notes," as Clausewitz called them, and were waged with the object of adding a codicil to the treaty of peace that had closed the last incident.

Other causes contributed to stifle the former ardour of war. Campaigns were no longer conducted by armies of ten to thirty thousand men. Large regular armies had come into fashion, and, as Guibert points out, instead of small armies charged with grand operations we find grand armies charged with small operations. The average general, under the prevailing conditions of supply and armament, was not equal to the«task of commanding such armies. Any real concentration of the great forces that Louis XIV. had created was therefore out of the question, and the field armies split into six or eight independent fractions, each charged with operations on a particular theatre of war. From such a policy nothing remotely resembling the crushing of a great power could be expected to be gained. The one tangible asset, in view of future peace negotiations, was therefore a fortress, and it was on the preservation or capture of fortresses that operations in all these wars chiefly turned. The idea of the decisive battle for its own sake, as a settlement of the quarrel, was far distant; for, strictly speaking, there was no quarrel, and to use up highly trained and exceedingly expensive soldiers in gaining by brute force an advantage that might equally well be obtained by chicanery was regarded as foolish.

The fortress was, moreover, of immediate as well as contingent value

to a state at war. A century of constant warfare had impoverished middle Europe, and armies had to spread over a large area if they desired to ” live on the country.” This was dangerous in the face of the enemy (cf. the Peninsular War), and it was also uneconomical. The only way to prevent the country people from sending their produce into the fortresses for safety was to announce beforehand that cash would be paid, at a high rate, for whatever the army needed. But even promises

rarely brought this about, and to live at all, whether on supplies brought up from the home country and stored in magazines (which had to be guarded) or on local resources, an army had as a rule to maintain or to capture a large fortress. Sieges, therefore, and manoeuvres are the features of this form of war, wherein armies progressed not with the giant strides of modern war, but in a succession of short hops from one foothold to the next. This was the procedure of the average commander, and even when a more intense spirit of conflict was evoked by the Luxemburgs and Marlboroughs it was but momentary and spasmodic.

The general character of the war being borne in mind, nine- tenths of its marches and manoeuvres can be almost ” taken as read”; the remaining tenth, the exceptional and abnormal part of it, alone possesses an interest for modern readers.

In pursuance of a new aggressive policy in Germany LouisXIV. sent his troops, as a diplomatic menace rather than for conquest, into that country in the autumn of 1688. Some of their raiding parties plundered the country as far south as Augsburg, for the political intent of their advance suggested terrorism rather than conciliation as the best method. The league of Augsburg at once took up the challenge, and the addition of new members (Treaty of Vienna, May 1689) converted it into the ” Grand Alliance ” of Spain, Holland, Sweden, Savoy and certain Italian states, Great Britain, the emperor, the elector of Branden- burg, &c.

” Those who condemned the king for raising up so many enemies, admired him for having so fully prepared to defend himself and even to forestall them,” says Voltaire. Louvois had in fact completed the work of organizing the French army on a regular and permanent basis, and had made it not merely the best, but also by far the most

numerous in Europe, for Louis disposed in 1688 of no fewer than 375,000 soldiers and 60,000 sailors. The infantry was uniformed and drilled, and the socket bayonet and the flint-lock musket had been introduced. The only relic of the old armament was the pike, which was retained for one-quarter of the foot, though it had been discarded by the Imperialists in the course of the Turkish wars described below. The first artillery regiment was created in 1684, to replace the former semi-civilian organization by a body of artillerymen susceptible of uniform training and amenable to discipline and orders.

In 1689 Louis had six armies on foot. That in Germany, which had executed the raid of the previous autumn, was not Devasta- m a position to resist the principal army of the coalition tioaofthe so far from support. Louvois therefore ordered it Palatinate, to lay waste the Palatinate, and the devastation of the country around Heidelberg, Mannheim, Spires, Oppenheim and Worms was pitilessly and methodically carried into effect in January and February. There had been devasta- tions in previous wars, even the high-minded Turenne had used the argument of fire and sword to terrify a population or a prince, while the whole story of the last ten years of the great war had been one of incendiary armies leaving traces of their passage that it took a century to remove. But here the devastation was a purely military measure, executed systemati- cally over a given strategic front for no other purpose than to delay the advance of the enemy's army. It differed from the method of Turenne or Cromwell in that the sufferers were not those people whom it was the purpose of the war to reduce to submission, but others who had no interest in the quarrel. It differed from Wellington's laying waste of Portugal in 1810 in that it was not done for the defence of the Palatinate against a national enemy, but because the Palatinate was where it was. The feudal theory that every subject of a prince at war was an armed vassal, and therefore an enemy of the prince's enemy, had in practice been obsolete for two centuries past; by 1690 the organization of war, its causes, its methods and its instru- ments had passed out of touch with the people at large, and it had become thoroughly understood that the army alone was concerned with the army's business. Thus it was that this devastation excited universal reprobation; and that, in the words

of a modern French writer, the " idea of Germany came to birth in the flames of the Palatinate."

As a military measure this crime was, moreover, quite unprofit- able; for it became impossible for Marshal Duras, the French commander, to hold out on the east side of the middle Rhine, and he could think of nothing better to do than to go farther south and to ravage Baden and

the Breisgau, which was not even a military necessity. The grand army of the Allies, coming farther north, was practically unopposed. Charles of Lorraine and the elector of Bavaria — lately comrades in the Turkish war (see below) — invested Mainz, the elector of Brandenburg Bonn. The latter, following the evil precedent of his enemies, shelled the town uselessly instead of making a breach in its walls and overpowering its French garrison, an incident not calculated to advance the nascent idea of German unity. Mainz, valiantly defended by Nicolas du Ble, marquis d'Uxelles, had to surrender on the 8th of September. The governor of Bonn, baron d'Asfeld, not in the least intimidated by the bombardment, held out till the army that had taken Mainz reinforced the elector of Branden- burg, and then, rejecting the hard terms of surrender offered him by the latter, he fell in resisting a last assault on the 12 th of October. Only 850 men out of his 6000 were left to surrender on the 16th, and the duke of Lorraine, less truculent than the elector, escorted them safely to Thionville. Boufflers, with another of Louis's armies, operated from Luxemburg (captured by the French in 1684 and since held) and Trarbach towards the Rhine, but in spite of a minor victory at Kochheim on the 21st of August, he was unable to relieve either Mainz or Bonn.

In the Low Countries the French marshal d'Humieres, being in superior force, had obtained special permission to offer battle to the Allies. Leaving the garrison of Lille and Tournay to amuse the Spaniards, he hurried from Maubeuge to oppose the Dutch, who from Namur had advanced slowly on Philippeville. Coming upon their army (which was commanded by the prince of Waldeck) in position behind the river Heure, with an advanced post in the little walled town of Walcourt, he flung his advanced guard against the bridge and fortifications of this place to clear the way for his deployment beyond the river Heure (27th August). After wasting a thousand brave men in this attempt, he drew back. For a few days the two armies remained face to face, cannonading one another at intervals, but no further fighting occurred. Humieres returned to the region of the Scheldt fortresses, and Waldeck to Brussels. For the others of Louis' six armies the year's campaign passed off quite uneventfully.

Simultaneously with these operations, the Jacobite cause was being fought to an issue in Ireland. War began early in 1689 with desultory engagements between the Orangemen of the north and the Irish regular army, most of which the earl T ew * rln of Tyrconnel had induced to declare for King James, iˆogˆgi The northern struggle after a time condensed itself into the defence of Derry and Enniskillen. The siege of the former place, begun by James himself and carried on by the French general Rosen, lasted 105 days. In marked contrast to the

sieges of the continent, this was resisted by the townsmen themselves, under the leadership of the clergyman George Walker. But the relieving force (consisting of two frigates, a supply ship and a force under Major-general Percy Kirke) was dilatory, and it was not until the defenders were in the last extremity that Kirke actually broke through the blockade (July 31st). Enniskillen was less closely invested, and its inhabitants, organized by Colonel Wolseley and other officers sent by Kirke, actually kept the open field and defeated the Jacobites at Newtown Butler (July 31st). A few days later the Jacobite army withdrew from the north. But it was long before an adequate army could be sent over from England to deal with it. Marshal Schomberg {q.v.), one of the most distinguished soldiers of the time, who had been expelled from the French service as a Huguenot, was indeed sent over in August, but the army he •'brought, some 10,000 strong, was composed of raw recruits, and when it was assembled in camp at Dundalk to be trained for its work, it was quickly ruined by an epidemic of fever. But James failed to take advantage of his opportunity to renew the war in the north, and the relics of Schomberg's army wintered in security, covered by the Enniskillen troops. In the spring of 1690, however, more troops, this time experienced regimentsfrom Holland, Denmark and Brandenburg, were sent, and in June, Schomberg in Ireland and Major-general Scravemore in Chester having thoroughly organized and equipped the field army, King William assumed the command

himself. Five days after his arrival he began his advance from Loughbrickland near Newry, and on the 1st of July he engaged James's main army on the river Boyne, close to Drogheda. Schomberg was killed and William himself wounded, but the Irish army was routed.

No stand was made by the defeated party either in the Dublin or in the Waterford district. Lauzun, the commander of the French auxiliary corps in James's army, and Tyrconnel both discounten- anced any attempt to defend Limerick, where the Jacobite forces had reassembled; but Patrick Sarsfield (earl of Lucan), as the spokesman of the younger and more ardent of the Irish officers, pleaded for its retention. He was left, therefore, to hold Limerick, while Tyrconnel and Lauzun moved northward into Galway. Here, as in the north, the quarrel enlisted the active sympathies of the people against the invader, and Sarsfield not only surprised and destroyed the artillery

train of William's army, but repulsed every assault made on the walls that Lauzun had said " could be battered down by rotten apples." William gave up the siege on the 30th of August. The failure was, however, compensated in a measure by the arrival in Ireland of an expedition under Lord Marlborough, which captured Cork and Kinsale, and next year (1691) the Jacobite cause was finally crushed by William's general Ginckell (afterwards earl of Athlone) in the battle of Aughrim in Galway (July 12th), in which St Ruth, the French commander, was killed and the Jacobite army dissipated. Ginckell, following up his victory, be- sieged Limerick afresh. Tyrconnel died of apoplexy while organizing the defence, and this time the town was invested by sea as well as by land. After six weeks' resistance the defenders offered to capitulate, and with the signing of the treaty of Limerick on the 1st of October the Irish war came to an end. Sarsfield and the most energetic of King James's supporters retired to France and were there formed into the famous " Irish brigade." Sarsfield was killed at the battle of Neerwinden two years later.

The campaign of 1690 on the continent of Europe is marked by two battles, one of which, Luxemburg's victory of Fleurus, belongs to the category of the world's great battles. It is described under Fleurus, and the present article only deals summarily with the conditions in which it was fought. These, though they in fact led to an encounter that could, in itself, fairly be called decisive, were in closer accord with the general spirit of the war than was the decision that arose out of them.

Luxemburg had a powerful enemy in Louvois, and he had consequently been allotted only an insignificant part in the first campaign. But after the disasters of 1689 Louis re-arranged the commands on the north-east frontier so as to allow Humieres, Luxemburg and Boufflers to combine for united action. " I will take care that Louvois plays fair," Louis said to the duke when he gave him his letters of service. Though apparently Luxemburg was not authorized to order such a combination himself, as senior officer he would automatically take command if it came about. The whole force available was probably close on 100,000, but not half of these were present at the decisive battle, though Luxemburg certainly practised the utmost " economy of force " as this was understood in those days (see also Neerwinden). On the remaining theatres of war, the dauphin, assisted by the due de Lorge, held the middle Rhine, and Catinat the Alps, while other forces were in Roussillon, &c, as before. Catinat's operations are briefly described below. Those of the others need no description, for though the Allies formed a plan for a grand concentric advance on Paris, the preliminaries to this advance were so numerous and so closely interdependent that on the most favourable estimate

the winter would necessarily find the Allied armies many leagues short of Paris. In fact, the Rhine offensive collapsed when Charles of Lorraine died (17th April), and the reconquest of his lost duchy ceased to be a direct object of the war.

Luxemburg began operations by drawing in from the Sambre country, where he had hitherto been stationed, to the Scheldt and ” eating up ” the country between Oudenarde 1690. ‘ an d Ghent in the face of a Spanish army concentrated at the latter place (15th May-i2th June). He then left Humieres with a containing force in the Scheldt region and hurried back to the Sambre to interpose between the Allied army under Waldeck and the fortress of Dinant which Waldeck was credited with the intention of besieging. His march from Tournay to Gerpinnes was counted a model of skill — the locus classicus for’ the maxim that ruled till the advent of Napoleon — ” march always in the order in which you encamp, or purpose

to encamp, or fight.” For four days the army marched across country in close order, covered in all directions by reconnoitring cavalry and advanced, flank and rear guards. Under these conditions eleven miles a day was practically forced marching, and on arriving at Jeumont-sur-Sambre the army was given three days’ rest. Then followed a few leisurely marches in the direction of Charleroi, during which a detachment of Boufflers’s army came in, and the cavalry explored the country to the north. On news of the enemy’s army being at Trazegnies, Luxemburg hurried across a ford of the Sambre above Charleroi, but this proved to be a detachment only, and soon information came in that Waldeck was encamped near Fleurus. Thereupon Luxemburg, without consulting his subordinate generals, took his army to Velaine. He knew that the enemy was marking time till the troops of Liege and the Brandenburgers from the Rhine were near enough to co-operate in the Dinant enterprise, and he was determined to fight a battle at once. From Velaine, therefore, on the morning of the 1st of July, the army moved forward to Fleurus and there won one of the most brilliant victories in the history of the Royal army. But Luxemburg was not allowed to pursue his advantage. He was ordered to hold his army in readiness to besiege either Namur, Mons, Charleroi or Ath, according as later orders dictated; and to send back the borrowed regiments to Boufflers, who was being pressed back by the Brandenburg and Liege troops. Thus Waldeck reformed his army in peace at Brussels, where William III. of England soon afterwards assumed command of the Allied forces in the Netherlands, and Luxemburg and the other marshals stood fast for the rest of the campaign, being forbidden to advance until Catinat — in Italy — should have won a battle.

In this quarter the armed neutrality of the duke of Savoy had long disquieted the French court. His personal connexions with the imperial family and his resentment against staffarda Louvois, who had on some occasion treated him with his usual patronizing arrogance, inclined him to join the Allies, while on the other hand he could hope for extensions of his scanty territory only by siding with Louis. In view of this doubtful condition of affairs the French army under Catinat had for some time been maintained on the Alpine frontier, and in the summer of 1690 Louis XIV. sent an ultimatum to Victor Amadeus to compel him to take one side or the other actively and openly. The result was that Victor Emmanuel threw in his lot with the Allies and obtained help from the Spaniards and Austrians in the Milanese. Catinat thereupon advanced into Piedmont, and won, principally by virtue of his own watchful- ness and the high efficiency of his troops, the important victory of Staffarda (August 18th, 1690). This did not, however, enable him to overrun Piedmont, and as the duke was soon reinforced, he had to be content with the methodical conquest of a few frontier districts. On the side of Spain, a small French army under the due de Noailles passed into Catalonia and there lived at the enemy's expense for the duration of the campaign.

In these theatres of war, and on the Rhine, where the disunion of the German princes prevented vigorous action, the following year, 1691, was uneventful. But in the Netherlands there were a siege, a war of manoeuvres and a cavalry combat, each in its way somewhat remarkable. The siege was that of Mons, which was, like many sieges in the former wars, conducted with much pomp by Louis XIV. himself, with Boufflers and Vauban under him. On the surrender of the place, which was hastened by red-hot shot (April 8th), Louis returned to Versailles and divided his army between Boufflers and Luxemburg, the former of whom departed to the Meuse. There he attempted by bombardment to enforce the surrender of Liege, but had to desist when the elector of Brandenburg threatened Dinant. The principal armies on either side faced one another under the command respectively of William III. and of Luxemburg. The Allies were first concentrated to the south of Namur, and Luxemburg hurried thither, but neither party found any tempting opportunity for battle, and when the cavalry had consumed all the forage available in the district, the two armies edged away gradually towards Flanders. The war of manoeuvre continued, with a

slight balance of advantage on Luxemburg's side, until September, when William returned to England, leaving Waldeck in command of the Allied army, with orders to distribute it in winter quarters amongst the garrison towns. This gave the momentary oppor- tunity for which Luxemburg had been watching, and at Leuze (20th Sept.) he fell upon the cavalry of Waldeck's rearguard and drove it back in disorder with heavy losses until the pursuit was checked by the Allied infantry.

In 1692 1 the Rhine campaign was no more decisive than before, although Lorge made a successful raid into Wurttemberg in September and foraged his cavalry in German territory till the approach of winter. The Spanish campaign was unimportant, but on the Alpine side the Allies under the duke of Savoy drove back Catinat into Dauphine, which they ravaged with fire and sword. But the French peasantry were quicker to take arms than the Germans, and, inspired by the local gentry — amongst whom figured the heroine, Philis de la Tour du Pin (1645-1708), daughter of the marquis de la Charce — they beset every road with such success that the small regular army of the invaders was powerless. Brought practically to a standstill, the Allies soon consumed the provisions that could be gathered in, and then, fearing lest the snow should close the passes behind them, they retreated.

In the Low Countries the campaign as before began with a great siege. Louis and Vauban invested Namur on the 26th

of May. The place was defended by the prince de S/eg-e o Barbancon (who had been governor of Luxemburg 1692. ' when that place was besieged in 1684) and Coehoorn

(q-'c), Vauban 's rival in the science of fortification. Luxemburg, with a small army, manoeuvred to cover the siege against William III.'s army at Louvain. The place fell on the 5th of June, 2 after a very few days of Vauban's " regular " attack, but the citadel held out until the 23rd. Then, as before, Louis returned to Versailles, giving injunctions to Luxemburg to " preserve the strong places and the country, while opposing the enemy's enterprises and subsisting the army at his expense." This negative policy, contrary to expectation, led to a hard-fought battle. William, employing a common device, announced his intention of retaking Namur, but set his army in motion for Flanders and the sea-coast fortresses held by the French. Luxemburg, warned in time, hurried towards the Scheldt, and the two armies were soon face to face again, Luxemburg about Steeaklrk Steenkirk, William in front of Hal. William then

formed the plan of surprising Luxemburg's right wing before it could be supported by the rest of his army, relying chiefly on false information that a detected spy at his headquarters was forced to send, to mislead the duke. But Luxemburg had the material protection of a widespread net of outposts as well as a secret service, and although ill in bed when William's advance was reported, he shook off his apathy, mounted his horse and, enabled by his outpost reports to divine his opponent's plan, he met it (3rd August) by a swift concentration of his army, against which the Allies, whose advance and deployment had been mismanaged, were powerless (sec Steenkirk). In this almost accidental battle both sides suffered enormous losses, and neither attempted to bring about, or even to risk, a second resultless trial of strength. Boufflers's army returned to the Sambre and Luxemburg and William established themselves for the rest of the season at Lessines and Ninove respectively, 13 m. apart. After both armies had broken up into their winter quarters, Louis ordered Boufflers to attempt the capture of Charleroi. But a bombard- ment failed to intimidate the garrison, and when the Allies began to re-assemble, the attempt was given up (ioth-2ist Oct.). This failure was, however, compensated by the siege and capture of Furnes (2Sth Dec. i6g2~7th Jan. 1693).

In 1693, the culminating point of the war was reached. It began, as mentioned above, with a winter enterprise that at

1 Louvois died in July 1691.

2 A few days before this the great naval reverse of La Hogue put an end to the projects of invading England hitherto entertained at Versailles.

least indicated the aggressive spirit of the French generals. The king promoted his admiral, Tourville, and Catinat, the roturier, to the marshalship, and founded the military order of St Louis on the 10th of April. The grand army in the Netherlands this year numbered 120,000, to oppose whom William III. had only some 40,000 at hand. But at the very beginning of opera- tions Louis, after reviewing this large force at Gembloux, broke it up, in order to send 30,000 under the dauphin to Germany, where Lorge had captured Heidelberg and seemed able, if re- inforced, to overrun south Germany. But the imperial general Prince Louis of Baden took up a position near Heilbronn so strong that the dauphin. and Lorge did not venture to attack him. Thus King Louis sacrificed a reality to a dream, and for the third time lost the opportunity, for which he always longed, of commanding in chief in a great battle. He himself, to judge by his

letter to Monsieur on the 8th of June, regarded his action as a sacrifice of personal dreams to tangible realities. And, before the event falsified predictions, there was much to be said for the course he took, which accorded better with the prevailing system of war than a Fleurus or a Neerwinden. In this system of war the rival armies, as armies, were almost in a state of equilibrium, and more was to be expected from an army dealing with something dissimilar to itself — a fortress or a patch of land or a convoy — than from its collision with another army of equal force.

Thus Luxemburg obtained his last and greatest opportunity. He was still superior in numbers, but William at Louvain had the advantage of position. The former, authorized by his master this year ” non settlement d’empecher les w iadea cnnemis de rien entreprendre, mais d’emporter quelques avantages sur eux,” threatened Liege, drew William over to its defence and then advanced to attack him. The Allies, however, retired to another position, between the Great and Little Geete rivers, and there, in a strongly entrenched position around Neerwinden, they were attacked by Luxemburg on the 29th of July. The long and doubtful battle, one of the greatest victories ever won by the French army, is briefly described under Neer- winden. It ended in a brilliant victory for the assailant, but Luxemburg’s exhausted army did not pursue; William was as unshaken and determined as ever; and the campaign closed, not with a treaty of peace, but with a few manoeuvres which, by inducing William to believe in an attack on Ath, enabled Luxemburg to besiege and capture Charleroi (October).

Neerwinden was not the only French victory of the year. Catinat, advancing from Fenestrelle and Susa to the relief of Pinerolo (Pignerol), which the duke of Savoy was Marsazaa besieging, took up a position in formal order of battle north of the village of Marsaglia. Here on the 4th of October the duke of Savoy attacked him with his whole army, front to front. But the greatly superior regimental efficiency of the French, and Catinat’s minute attention to details 3 in arraying tnem, gave the new marshal a victory that was a not unworthy pendant to Neerwinden. The Piedmontese arid their allies lost, it is said, 10,000 killed, wounded and prisoners, as against Catinat’s 1800. But here, too, the results were trifling, and this year of victory is remembered chiefly as the year in which ” people perished of want to the accompaniment of Te Deums.”

In 1694 (late in the season owing to the prevailing distress and famine) Louis opened a fresh campaign in the Netherlands. The armies were larger and more ineffective than ever, and William offered no further opportunities to his formidable opponent. In September, after

inducing William to desist from his intention of besieging Dunkirk by appearing on his flank with a mass of cavalry, 4 which had ridden from the Meuse, 100 m., in 4 days, Luxemburg gave up his command. He died on the 4th of January following, and with him the tradition of the Conde school of ‘.warfare dis- appeared from Europe. In Catalonia the marshal de Noailles won a victory (27th May) over the Spaniards at the ford of the Ter

3 Marsaglia is, if not the first, at any rate, one of the first, instances of a bayonet charge by a long deployed line of infantry.

4 Hussars figured here for the first time in western Europe. A regiment of them had been raised in 1692 from deserters from the Austrian service.

(Torroella, 5 m. above the mouth of the river), and in consequence captured a number of walled towns.

fn 1695 William found Marshal Villeroi a far less formidable opponent than Luxemburg had been, and easily succeeded in Later keeping him in Flanders while a corps of the Allies in-

campalgns ves ted Namur. Coehoorn directed the siege-works, and of the war. Boufflers the defence. Gradually, as in 1692, the de- fenders were dislodged from the town, the citadel outworks and the citadel itself, the last being assaulted with success by the ” British grenadiers,” as the song commemorates, on the 30th of August. Boufflers was rewarded for his sixty-seven days’ defence by the grade of marshal.

By 1696 necessity had compelled Louis to renounce his vague and indefinite offensive policy, and he now frankly restricted his efforts to the maintenance of what he had won in the preceding campaigns. In this new policy he met with much success. Boufflers, Lorge, Noailles and even the incompetent Villeroi held the field in their various spheres of operations without allowing the Allies to inflict any material injury, and also (by having recourse again to the policy of living by plunder) preserving French soil from the burden of their own maintenance. In this, as before, they were powerfully assisted by the disunion and divided counsels of their heterogeneous enemies. In Piedmont, Catinat crowned his work by making peace and alliance with the duke of Savoy, and the two late enemies having joined forces captured one of the fortresses of the Milanese. The last campaign was in 1697. Catinat and Vauban besieged Ath. This siege was perhaps the most regular and methodical of the great engineer’s career. It lasted 23 days and cost the assailants only 50 men. King William did not stir from his entrenched position at Brussels, nor did Villeroi dare to attack him there. Lastly, in August 1697 Vendome, Noailles’ successor, captured Barcelona. The peace of Ryswijk, signed on the 30th of October, closed this war by practically restoring the status quo ante; but neither the ambitions of Louis nor the Grand Alliance that

opposed them ceased to have force, and three years later the struggle began anew (see Spanish Succession, Wa r of the) . Concurrently with these campaigns, the emperor had been en- gaged in a much more serious war on his eastern marches against Austro- t ˆ le °'ˆ enemy, the Turks. This war arose in 1682 out Turkish °ˆ mterna l disturbances in Hungary. The campaign of wars, tne following year is memorable for all time as the last

1682-1699. g re at wave of Turkish invasion. Mahommed IV. ad- vanced from Belgrade in May, with 200,000 men, drove back the small imperial army of Prince Charles of Lorraine, and early in July invested Vienna itself. The two months' defence of Vienna by Count Riidiger Starhemberg (1635-1701) and the brilliant victory of the relieving army led by John Sobieski, king of Poland, and Prince Charles on the 12th of September 1683, were events which, besides their intrinsic importance, possess the romantic interest of an old knightly crusade against the heathen.

But the course of the war, after the tide of invasion had ebbed, differed little from the wars of contemporary western Europe. Turkey figured rather as a factor in the balance of power than as the " infidel," and although the battles and sieges in Hungary were characterized by the bitter personal hostility of Christian to Turk vhich had no counterpart in the West, the war as a whole was as methodical and tedious as any Rhine or Low Countries campaign. In 1684 Charles of Lorraine gained a victory at Waitzen on the 27th of June and another at Eperies on the 18th of September, and unsuccessfully besieged Budapest.

In 1685 the Germans were uniformly successful, though a victory at Gran (August 16th) and the storming of Neuhausel (August 19th) were the only outstanding incidents. In 1686 Charles, assisted by the elector Max Emanuel of Bavaria, besieged and stormed Buda- pest (Sept. 2nd). In 1687 they followed up their success by a great victory at Mohacz (Aug. 12th). In 1688 the Austrians advanced still further, took Belgrade, threatened Widin and entered Bosnia. The margrave Louis of Baden, who afterward became one of the most celebrated of the methodical generals of the day, won a victory at Derbent on the 5th of September 1688, and next year, in spite of the outbreak of a general European war, he managed to win another battle at Nisch (Sept. 24th), to capture Widin (Oct. 14th) and to advance to the Balkans, but in 1690, more troops having to be withdrawn for the European war, the imperialist generals lost Nisch, Widin and Belgrade one after the other. There was, however, no repetition of the scenes of 1683, for in 1691 Louis won the battle of Szlankamen (Aug. 19th). After two more

desultory if successful campaigns he was called to serve in western Europe, and for three years more the war dragged on without result, until in 1697 tne young Prince Eugene was appointed to command the imperialists and won a great and decisive victory at Zenta on the Theiss (Sept. nth). This induced a last general advance of the Germans east- ward, which was definitively successful and brought about the peace of Carlowitz (January 1699). (C. F. A.)

Naval Operations

The naval side of the war waged by the powers of western Europe from 1689 to 1697, to reduce the predominance of King

Louis XIV., was not marked by any very conspicuous exhibition of energy or capacity, but it was singularly decisive in its results. At the beginning of the struggle the French fleet kept the sea in face of the united fleets of Great Britain and Holland. It displayed even in 1690 a marked superiority over them. Before the struggle ended it had been fairly driven into port, and though its failure was to a great extent due to the exhaustion of the French finances, yet the inability of the French admirals to make a proper use of their fleets, and the incapacity of the king's ministers to direct the efforts of his naval officers to the most effective aims, were largely responsible for the result.

When the war began in 1689, the British Admiralty was still suffering from the disorders of the reign of King Charles II., which had been only in part corrected during the short reign of James II. The first squadrons were sent out late and in in- sufficient strength. The Dutch, crushed by the obligation to maintain a great army, found an increasing difficulty in preparing their fleet for action early. Louis XIV., a despotic monarch, with as yet unexhausted resources, had it within his power to strike first. The opportunity offered him was a very tempting one. Ireland was still loyal to King James II., and would there- fore have afforded an admirable basis of operations to a French fleet. No serious attempt was made to profit by the advantage thus presented. In March 1689 King James was landed and reinforcements were prepared for him at Brest. A British squadron under the command of Arthur Herbert (afterwards Lord Torrington), sent to intercept them, reached the French port too late, and on returning to the coast of Ireland sighted the convoy off the Old Head of Kinsale on the 10th of May. The French admiral Chateaurenault held on to Bantry Bay, and an indecisive encounter took place on the nth of May. The troops and stores for King James were successfully landed. Then both admirals, the British and the French, returned home, and neither

in that nor in the following year was any serious effort made by the French to gain command of the sea between Ireland and England. On the contrary, a great French fleet entered the Channel, and gained a success over the combined British and Dutch fleets on the 10th of July 1690 (see Beachy Head, Battle of), which was not followed up by vigorous action. In the meantime King William III. passed over to Ireland and won the battle of the Boyne. During the following year, while the cause of King James was being finally ruined in Ireland, the main French fleet was cruising in the Bay of Biscay, principally for the purpose of avoiding battle. During the whole of 1689, 1690 and 1691, British squadrons were active on the Irish coast. One raised the siege of Londonderry in July 1689, and another convoyed the first British forces sent over under the duke of Schomberg. Immediately after Beachy Head in 1690, a part of the Channel fleet carried out an expedition under the earl (afterwards duke) of Marlborough, which took Cork and reduced a large part of the south of the island. In 1691 the French did little more than help to carry away the wreckage of their allies and their own detachments. In 1692 a vigorous but tardy attempt was made to employ their fleet to cover an invasion of England (see La Hogue, Battle of). It ended in defeat, and the allies remained masters of the Channel. The defeat of La Hogue did not do so much harm to the naval power of King Louis as has sometimes been supposed. In the next year, 1693, he was able to strike a severe blow at the Allies. The important Mediterranean trade of Great Britain and Holland, called for convenience the Smyrna convoy, having been delayed during the previous year, anxious measures were taken to see it safe on its road in 1693. But the arrangements of the allied governments and admirals were not good. They made no effort to blockade Brest, nor did they take effective steps to discover whether or not the French fleet had left the port. The convoy was seen beyond the Scilly Isles by the main fleet. But as the French admiral Tourville had left Brest for the Straits of Gibraltar with a powerful force and had been joined by a squadron from Toulon, the whole convoy was scattered or taken by him, in the latter days of June, near Lagos. But though this success was a very fair equivalent for the defeat at La

Hogue, it was the last serious effort made by the navy of Louis XIV”. in this war. Want of money compelled him to lay his fleet up. The allies were now free to make full use of their own, to harass the French coast, to intercept French commerce, and to co-operate with the armies acting against France. Some of the operations undertaken

by them were more remarkable for the violence of the effort than for the magnitude of the results. The numerous bombardments of French Channel ports, and the attempts to destroy St Malo, the great nursery of the active French privateers, by infernal machines, did little harm. A British attack on Brest in June 1694 was beaten off with heavy loss. The scheme had been betrayed by Jacobite correspondents. Yet the inability of the French king to avert these enterprises showed the weakness of his navy and the limitations of his power. The protection of British and Dutch commerce was never com- plete, for the French privateers were active to the end. But French commerce was wholly ruined.

It was the misfortune of the allies that their co-operation with armies was largely with the forces of a power so languid and so bankrupt as Spain. Yet the series of operations directed by Russel in the Mediterranean throughout 1694 and 1695 demonstrated the superiority of the allied fleet, and checked the advance of the French in Catalonia. Contemporary with the campaigns in Europe was a long series of cruises against the French in the West Indies, undertaken by the British navy, with more or less help from the Dutch and a little feeble assistance from the Spaniards. They began with the cruise of Captain Lawrence Wright in 1690-1691, and ended with that of Admiral Nevil in 1696-1697. It cannot be said that they attained to any very honourable achievement, or even did much to weaken the French hold on their possessions in the West Indies and North America. Some, and notably the attack made on Quebec by Sir William Phips in 1690,. A'ith a force raised in the British colonies, ended in defeat. None of them was so triumphant as the plunder of Cartagena in South America by the Frenchman Pointis, in 1697, at the head of a semi-piratical force. Too often there was absolute misconduct. In the buccaneering and piratical atmosphere of the West Indies, the naval officers of the day, who were still infected with the corruption of the reign of Charles II., and who calculated on distance from home to secure them immunity, sank nearly to the level of pirates and buccaneers. The indifference of the age to the laws of health, and its ignorance of them, caused the ravages of disease to be frightful. In the case of Admiral Nevil's squadron, the admiral himself and all his captains except one, died during the cruise, and the ships were unmanned. Yet it was their own vices which caused these expeditions to fail, and not the strength of the French defence. When the war ended, the navy of King Louis XIV. had disappeared from the sea.

See Burchett, Memoirs of Transactions at Sea during the War with France, 1688-1697 (London, 1703); Lediard, Naval History (London,

1735), particularly valuable for the quotations in his notes. For the West Indian voyages, Tronde, Batailles navales de la France (Paris, 1867); De Yonghe, Geschiedenis van het Neder- landsche Zeewezen (Haarlem, i860). (D. H.)

GRAND CANARY (Gran Canaria), an island in the Atlantic Ocean, forming part of the Spanish archipelago of the Canary Islands (q.v.). Pop. (1900) 127,471; area 523 sq. m. Grand Canary, the most fertile island of the group, is nearly circular in shape, with a diameter of 24 m. and a circumference of 75 m. The interior is a mass of mountain with ravines radiating to the shore. Its highest peak, Los Pexos, is 6400 ft. Large tracts are covered with native pine (P. canariensis) . There are several mineral springs on the island. Las Palmas (pop. 44,517), the capital, is described in a separate article. Telde (8978), the second place in the island, stands on a plain, surrounded by palm trees. At Atalaya, a short distance from Las Palmas, the making of earthenware vessels employs some hundreds of people, who inhabit holes made in the tufa.

GRAND CANYON, a profound gorge in the north-west corner of Arizona, in the south-western part of the United States of America, carved in the plateau region by the Colorado river. Of it Captain Dutton says: ” Those who have long and carefully

studied the Grand Canyon of the Colorado do not hesitate for a moment to pronounce it by far the most sublime of all earthly spectacles “; and this is also the verdict of many who have only viewed it in one or two of its parts.

The Colorado river is made by the junction of two large streams, the Green and Grand, fed by the rains and snows of the Rocky Mountains. It has a length of about 2000 m. and a drainage area of 255,000 sq. m., emptying into the head of the Gulf of California. In its course the Colorado passes through a mountain section; then a plateau section; and finally a desert lowland section which extends to its mouth. It is in the plateau section that the Grand Canyon is situated. Here the surface of the country lies from 5000 to 9000 ft. above sea-level, being a table- land region of buttes and mesas diversified by lava intrusions, flows and cinder cones. The region consists in the main of stratified rocks bodily uplifted in a nearly horizontal position, though profoundly faulted here and there, and with some moderate folding. For a thousand miles the river has cut a series of canyons, bearing different names, which reach their culmination in the Marble Canyon, 66 m. long, and the contiguous Grand Canyon which extends for a distance of 217 m. farther down stream, making a total length of

continuous canyon from 2000 to 6000 ft. in depth, for a distance of 283 m., the longest and deepest canyon in the world. This huge gash in the earth is the work of the Colorado river, with accompanying weathering, through long ages; and the river is still engaged in deepening it as it rushes along the canyon bottom.

The higher parts of the enclosing plateau have sufficient rainfall for forests, whose growth is also made possible in part by the cool climate and consequently retarded evaporation; but the less elevated portions have an arid climate, while the climate in the canyon bottom is that of the true desert. Thus the canyon is really in a desert region, as is shown by the fact that only two living streams enter the river for a distance of 500 m. from the Green river to the lower end of the Grand Canyon; and only one, the Kanab Creek, enters the Grand Canyon itself. This, moreover, is dry during most of the year. In spite of this lack of tributaries, a large volume of water flows through the canyon at all seasons of the year, some coming from the scattered tributaries, some from springs, but most from the rains and snows of the distant mountains about the headwaters. Owing to enclosure between steeply rising canyon walls, evaporation is retarded, thus increasing the possibility of the long journey of the water from the mountains to the sea across a vast stretch of arid land.

The river in the canyon varies from a few feet to an unknown depth, and at times of flood has a greatly increased volume. The river varies in width from 50 ft. in some of the narrow Granite Gorges, where it bathes both rock walls, to 500 or 600 ft. in more open places. In the 283 m. of the Marble and Grand Canyons, the river falls 2330 ft., and at one point has a fall of 210 ft. in 10 m. The current velocity varies from 3 to 20 or more miles per hour, being increased in places by low falls and rapids; but there are no high falls below the junction of the Green and Grand.

Besides the canyons of the main river, there are a multitude of lateral canyons occupied by streams at intervals of heavy rain. As Powell says, the region ” is a composite of thousands, and tens of thousands of gorges.” There are ” thousands of gorges like that below Niagara Falls, and there are a thousand Yosemites.” The largest of all, the Grand Canyon, has an average depth of 4000 ft. and a width of 45 to 12 m. For a long distance, where crossing the Kaibab plateau, the depth is 6000 ft. For much of the distance there is an inner narrower gorge sunk in the bottom of a broad outer canyon. The narrow gorge is in some places no more than 3500 ft. wide at the top. To illustrate the depth of the Grand Canyon, Powell writes: ” Pluck up Mount Washington (6293 ft. high) by the roots to the level of the sea, and

drop it head first into the Grand Canyon, and the dam will not force its waters over the wall.”

While there are notable differences in the Grand Canyon from point to point, the main elements are much alike throughout

its length and are due to the succession of rock strata revealed in the canyon walls. At the base, for some 800 ft., there is a complex of crystalline rocks of early geological age, consisting of gneiss, schist, slate and other rocks, greatly plicated and traversed by dikes and granite intrusions. This is an ancient mountain mass, which has been greatly denuded. On it rest a series of durable quartzite beds inclined to the horizontal, forming about 800 ft. more of the lower canyon wall. On this come first 500 ft. of greenish sandstones and then 700 ft. of bedded sandstone and limestone strata, some massive and some thin, which on weathering form a series of alcoves. These beds, like those above, are in nearly horizontal position. Above this comes 1600 ft. of limestone — often a beautiful marble, as in the Marble Canyon, but in the Grand Canyon stained a brilliant red by iron oxide washed from overlying beds. Above this ” red wall ” are 800 ft. of grey and bright red sandstone beds looking ” like vast ribbons of landscape.” At the top of the canyon is 1000 ft. of limestone with gypsum and chert, noted for the pinnacles and towers which denudation has developed. It is these different rock beds, with their various colours, and the differences in the effect of weathering upon them, that give the great variety and grandeur to the canyon scenery. There are towers and turrets, pinnacles and alcoves, cliffs, ledges, crags and moderate talus slopes, each with its characteristic colour and form according to the set of strata in which it lies. The main river has cleft the plateau in a huge gash ; innumerable side gorges have cut it to right and left; and weathering has etched out the cliffs and crags and helped to paint it in the gaudy colour bands that stretch before the eye. There is grandeur here and weirdness in abundance, but beauty is lacking. Powell puts the case graphically when he writes: ” A wall of homo- geneous granite like that in the Yosemite is but a naked wall, whether it be 1000 or 5000 ft. high. Hundreds and thousands of feet mean nothing to the eye when they stand in a meaningless front. A mountain covered by pure snow 10,000 ft. high has but little more effect on the imagination than a mountain of snow 1000 ft. high — it is but more of the same thing; but a facade of seven systems of rock has its sublimity multiplied sevenfold.”

To the ordinary person most of the Grand Canyon is at present inaccessible, for, as Powell states, ” a year scarcely suffices to see it all”; and “it is a region more difficult to traverse than the Alps or the Himalayas.” But a part of the canyon is now easily accessible to tourists. A trail leads from the Atchison, Topeka & Santa Fe railway at Flagstaff, Arizona; and a branch line of the railway extends from Williams, Arizona, to a. hotel on the very brink of the canyon. The plateau, which in places bears an open forest, mainly of pine, varies in elevation, but is for the most part a series of fairly level terrace tops with steep faces, with mesas and buttes here and there, and, especially near the huge extinct volcano of San Francisco mountain, with much evidence of former volcanic activity, including numerous cinder cones. The traveller comes abruptly to the edge of the canyon, at whose bottom, over a mile below, is seen the silvery thread of water where the muddy torrent rushes along on its never-ceasing task of sawing its way into the depths of the earth. Opposite rise the highly coloured and terraced slopes of the other canyon wall, whose crest is fully 12 m. distant. Down by the river are the folded rocks of an ancient mountain system, formed before vertebrate life appeared on the earth, then worn to an almost level condition through untold ages of slow denudation. Slowly, then, the mountains sank beneath the level of the sea, and in the Carboniferous. Period — about the time of the formation of the coal-beds — sediments began to bury the ancient mountains. This lasted through other untord ages until the Tertiary Period — through much of the Palaeozoic and all of the Mesozoic time — and a total of from 12,000 to 16,000 ft. of sediments were deposited. Since then erosion has been dominant, and the river has eaten its way down to, and into, the deeply buried mountains, opening the strata for us to read, like the pages of a book. In some parts of the plateau region as much as 30,000 ft. of rock have been stripped away, and over

an area of 200,000 sq. m. an average of over 6000 ft. has been removed.

The Grand Canyon was probably discovered by G.L. de Cardenas in 1540, but for 329 years the inaccessibility of the region prevented its exploration. Various people visited parts of it or made reports regarding it; and the Ives Expedition of 1858 contains a report upon the canyon written by Prof. J. S. New- berry. But it was not until 1869 that the first real exploration of the Grand Canyon was made. In that year Major J. W. Powell, with five associates (three left the party in the Grand Canyon), made the complete journey by boat from the junction of the Green and Grand rivers to the lower end of the Grand Canyon. This hazardous journey ranks as one of the most daring and

remarkable explorations ever undertaken in North America; and Powell's descriptions of the expedition are among the most fascinating accounts of travel relating to the continent. Powell made another expedition in 1871, but did not go the whole length of the canyon. The government survey conducted by Lieut. George M. Wheeler also explored parts of the canyon, and C. E. Dutton carried on extensive studies of the canyon and the contiguous plateau region. In 1890 Robert B. Stanton, with six associates, went through the canyon in boats, making a survey to determine the feasibility of building a railway along its base. Two other parties, one in 1896 (Nat. Galloway and William Richmond) the other in 1897 (George F. Flavell and companion), have made the journey through the canyon. So far as there is record these are the only four parties that have ever made the complete journey through the Grand Canyon. It has sometimes been said that James White made the passage of the canyon before Powell did; but this story rests upon no real basis.

For accounts of the Grand Canyon of the Colorado see J. W. Powell, Explorations of the Colorado River of the West and its Tribu- taries (Washington, 1875); J. W. Powell, Canyons of the Colorado (Meadville, Pa., 1895); F. S. Dellenbaugh, The Romance of the Colorado River (New York, 1902) ; Capt. C. E. Dutton, Tertiary History of the Grand Canyon District, with Atlas (Washington, 1882), being Monograph No. 2, U.S. Geological Survey. See also the excellent topographic map of the Grand Canyon prepared by F. E. Matthes and published by the U.S. Geological Survey. (R. S. T.)

GRAND-DUKE (Fr. grand-due, Ital. granduca, Ger. Gross- herzog), a title borne by princes ranking between king and duke. The dignity was first bestowed in 1567 by Pope Pius V. on Duke Cosimo I. of Florence, his son Francis obtaining the emperor's confirmation in 1576; and the predicate " Royal Highness " was added in 1699. In 1806 Napoleon created his brother-in-law Joachim Murat, grand-duke of Berg, and in the same year the title was assumed by the landgrave of Hesse-Darmstadt, the elector of Baden, and the new ruler of the secularized bishopric of Wiirzburg (formerly Ferdinand III., grand-duke of Tuscany) on joining the Confederation of the Rhine. At the present time, according to the decision of the Congress of Vienna, the title is borne by the sovereigns of Luxemburg, Saxe-Weimar (grand- duke of Saxony), Mecklenburg-Schwerin, Mecklenburg-Strelitz, and Oldenburg (since 1829), as well as by those of Hesse-Darm- stadt and Baden. The emperor of Austria includes among his titles those of grand-duke of Cracow and Tuscany, and the king of Prussia those of grand-duke of the Lower Rhine and Posen. The title is also retained by the dispossessed Habsburg-Lorraine dynasty of Tuscany.

Grand-duke is also the conventional English equivalent of the Russian velikiy knyaz, more properly ” grand-prince ” (Ger. Grossfiirst), at one time the title of the rulers of Russia, who, as the eldest born of the house of Rurik, exercised overlordship over the udyelniye knyazi or local princes. On the partition of the inheritance of Rurik, the eldest of each branch assumed the title of grand-prince. Under the domination of the Golden Horde the right to bestow the title velikiy knyaz was reserved by the Tatar Khan, who gave it to the prince of Moskow. In Lithuania this title also symbolized a similar overlordship, and it passed to the kings of Poland on the union of Lithuania with the Polish republic. The style of the emperor of Russia now

includes the titles of grand-duke (velikiy knyaz) of Smolensk, Lithuania, Volhynia, Podolia and Finland. Until 1886 this title grand-duke or grand-duchess, with the style ” Imperial Highness,” was borne by all descendants of the imperial house. It is now confined to the sons and daughters, brothers and sisters, and male grandchildren of the emperor. The other members of the imperial house bear the title of prince {knyaz) and princess (knyaginya, if married, knyazhna, if unmarried) with the style of ” Highness.” The emperor of Austria, as king of Hungary, also bears this title as ” grand-duke ” of Transylvania, which was erected into a ” grand-princedom ” (Grossfiirstentum) in 1765 by Maria Theresa.

GRANDEE (Span. Grande), a title of honour borne by the highest class of the Spanish nobility. It would appear to have been originally assumed by the most important nobles to dis- tinguish them from the mass of the ricos hombres, or great barons of the realm. It was thus, as Selden points out, not a general term denoting a class, but ” an additional dignity not only to all dukes, but to some marquesses and condes also ” {Titles of Honor, ed. 1672, p. 478). It formerly implied certain privileges; notably that of sitting covered in the royal presence. Until the time of Ferdinand and Isabella, when the power of the territorial nobles was broken, the grandees had also certain more important rights, e.g. freedom from taxation, immunity from arrest save at the king’s express command, and even — in certain cases — the right to renounce their allegiance and make war on the king. Their number and privileges were further restricted by Charles I. (the emperor Charles V.), who reserved to the crown the right to bestow the title. The grandees of Spain were further divided into three classes: (1) those who spoke to the king and received his reply with their

heads covered; (2) those who addressed him uncovered, but put on their hats to hear his answer; (3) those who awaited the permission of the king before covering themselves. All grandees were addressed by the king as ” my cousin ” {mi primo), whereas ordinary nobles were only qualified as ” my kinsman ” {mi pariente). The title of ” grandee,” abolished under King Joseph Bonaparte, was revived in 1 834, when by the Eslatudo real grandees were given precedence in the Chamber of Peers. The designation is now, however, purely titular, and implies neither privilege nor power.

GRAND FORKS, a city in the Boundary district of British Columbia; situated at the junction of the north and south forks of the Kettle river, 2 m. N. of the international boundary. Pop. (1908) about 2500. It is in a good agricultural district, but owes its importance largely to the erection here of the extensive smelting plant of the Granby Consolidated Company, which smelts the ores obtained from the various parts of the Boundary country, but chiefly those from the Knob Hill and Old Ironsides mines. The Canadian Pacific railway, as well as the Great Northern railway, runs to Grand Forks, which thus has excellent railway communication with the south and east.

GRAND FORKS, a city and the county-seat of Grand Forks county, North Dakota, U.S.A., at the junction of the Red river (of the North) and Red Lake river (whence its name), about 80 m. N. of Fargo. Pop. (1900) 7652, of whom. 2781 were foreign-born; (1905) 10,127; (191°) 27,888. 1 It is served by the Northern Pacific and the Great Northern railways, and has a considerable river traffic, the Red river (when dredged) having a channel 60 ft. wide and 4 ft. deep at low water below Grand Forks. At University, a small suburb, is the University of North Dakota (co-educational; opened 1884). Affiliated with it is Wesley College (Methodist Episcopal), now at Grand Forks (with a campus adjoining that of the University); but formerly the Red River Valley University at Wahpeton, North Dakota. In 1907-1908 the University had 57 instructors and 861 students; its library had 25,000 bound volumes and 5000 pamphlets. At Grand Forks, also, are St Bernard’s Ursuline Academy (Roman Catholic) and Grand Forks College (Lutheran). Among the city’s principal buildings are the public library, the Federal building and a Y.M.C.A. building. As the centre of the great wheat valley of the Red river, it has a busy trade in wheat, flour and agricultural machinery and implements, as well as large

jobbing interests. There are railway car-shops here, and among the manufactures are crackers, brooms, bricks and tiles and cement. The municipality owns its water-works and an electric lighting plant for street lighting. In 1801 John Cameron (d. 1804) ejected a temporary

trading post for the North-West Fur Company on the site of the present city; it afterwards became a trading post of the Hudson's Bay Company. The first per- manent settlement was made in 1871, and Grand Forks was reached by the Northern Pacific and chartered as a city in 1881. GRAND HAVEN, a city, port of entry, and the county-seat of Ottawa county, Michigan, U.S.A., on Lake Michigan, at the mouth of Grand river, 30 m. W. by N. of Grand Rapids and 78 m. E. of Milwaukee. Pop. (1900) 4743, of whom 1277 were foreign-born; (1904) 5239; (1910) 5856. It is served by the Grand Trunk and the Pere Marquette railways, and by steamboat lines to Chicago, Milwaukee and other lake ports, and is connected with Grand Rapids and Muskegon by an electric line. The city manufactures pianos, refrigerators, printing presses and leather; is a centre for the shipment of fruit and celery; and has valuable fisheries near — fresh, salt and smoked fish, especially whitefish, are shipped in considerable quantities. Grand Haven is the port of entry for the Customs District of Michigan, and has a small export and import trade. The municipality owns and operates its water-works and electric-lighting plant. A trading post was established here about 1821 by an agent of the American Fur Company,. but the permanent settlement of the city did not begin until 1834. Grand Haven was laid out as a town in 1836, and was chartered as a city in 1867.

GRANDIER, URBAN (1590-1634), priest of the church of Sainte Croix at Loudun in the department of Vienne, France, was accused of witchcraft in 1632 by some hysterical novices of the Carmelite Convent, where the trial, protracted for two years, was held. Grandier was found guilty and burnt alive at Loudun on the 18th of August 1634.

GRAND ISLAND, a city and the county-seat of Hall county, Nebraska, U.S.A., on the Platte river, about 154 m. W. by S. of Omaha. Pop. (1900) 7554 (1339 foreign-born); (1910) 10,326. It is served by the Union Pacific, the Chicago, Burlington & Quincy, and the St Joseph & Grand Island railways, being the western terminus of the last-named line and a southern terminus of a branch of the Union Pacific. The city is situated on a slope skirting the broad, level bottom-lands of the Platte river, in the midst of a fertile farming region. Grand Island College (Baptist ; co-educational) was established in 1892 and the Grand Island Business and Normal College in 1890; and the city is the seat of a state Sailors' and Soldiers' Home, established in 1888. Grand Island has a large wholesale trade in groceries, fruits, &c; is an important horse-market, and has large stock-yards. There are shops of the Union Pacific in the city, and among its manu- factures are beet-sugar — Grand Island is in one of the principal beet-sugar-growing

districts of the state — brooms, wire fences, confectionery and canned corn. The most important industry of the county is the raising and feeding of sheep and neat cattle. A ” Grand Island ” was founded in 1857, and was named from a large island (nearly 50 m. long) in the Platte opposite its site; but the present city was laid out by the Union Pacific in 1866. It was chartered as a city in 1873.

GRANDMONTINES, a religious order founded by St Stephen of Thiers in Auvergne towards the end of the nth century. St Stephen was so impressed by the lives of the hermits whom he saw in Calabria that he desired to introduce the same manner of life into his native country. He was ordained, and in 1073 obtained the pope’s permission to establish an order. He betook himself to Auvergne, and in the desert of Muret, near Limoges, he made himself a hut of branches of trees and lived there for some time in complete solitude. A few disciples gathered round him, and a community was formed. The rule was not reduced to writing until after Stephen’s death, n 24. The life was eremitical and very severe in regard to silence, diet and bodily austerities; it was modelled after the rule of the Camaldolese, but various regulations were adopted from the Augustinian canons. The superior was called the “Corrector.”

About 1 1 50 the hermits, being compelled to leave Muret, settled in the neighbouring desert of Grandmont, whence the order derived its name. Louis VII. founded a house at Vincennes near Paris, and the order had a great vogue in France, as many as sixty houses being established by n 70, but it seems never to have found favour out of France; it had, however, a couple of cells in England up to the middle of the 15th century. The system of lay brothers was introduced on a large scale, and the management of the temporals was in great measure left in their hands; the arrangement did not work well, and the quarrels between the lay brothers and the choir monks were a constant source of weakness. Later centuries witnessed mitigations and reforms in the life, and at last the order came to an end just before the French Revolution. There were two or three convents of Grandmontine nuns. The order played no great part in history.

See Helyot, Hist, des ordres religieux (1714), vii. cc. 54, 55; Max Heimbucher, Orden und Kongregationen (1896), i. § 31; and the art. in Wetzer and Welte, Kirchenlexicon (ed. 2), and in Herzog, Realencyklopadie (ed. 3). (E. C. B.)

GRAND RAPIDS, a city and the county-seat of Kent county, Michigan, U.S.A., at the head of navigation on the Grand river, about 30 m. from Lake Michigan and 145 m. W.N.W. of Detroit. Pop. (1890) 60,278; (1900) 87,565, of whom 23,896 were foreign-born and 604 were negroes; (1910- census) 112,571. Of the foreign-born population in 1900, 11,137 were Hollanders; 3318 English-Canadians; 3253 Germans; 1137 Irish; 1060 from German Poland; and 1026 from England. Grand Rapids is served by the Michigan Central, the Lake Shore & Michigan Southern, the Grand Trunk, the Pere Marquette and the Grand Rapids & Indiana railways, and by electric interurban railways. The valley here is about 2 m. wide, with a range of hills on either side, and about midway between these hills the river flows over a limestone bed, falling about 18 ft. in 1 m. Factories and mills line both banks, but the business blocks are nearly all along the foot of the E. range of hills; the finest residences command picturesque views from the hills farther back, the residences on the W. side being less pretentious and standing on bottom-lands. The principal business thoroughfares are Canal, Monroe and Division streets. Among the important buildings are the United States Government building (Grand Rapids is the seat of the southern division of the Federal judicial district of western Michigan), the County Court house, the city hall, the public library (presented by Martin A. Ryerson of Chicago), the Manufacturer's building, the Evening Press building, the Michigan Trust building and several handsome churches. The principal charitable institutions are the municipal Tuberculosis Sanatorium; the city hospital; the Union Benevo- lent Association, which maintains a home and hospital for the indigent, together with a training school for nurses; Saint John's orphan asylum (under the superintendence of the Dominican Sisters) ; Saint Mary's hospital (in charge of the Sisters of Mercy); Butterworth hospital (with a training school for nurses) ; the Woman's Home and Hospital, maintained largely by the Woman's Christian Temperance Union; the Aldrich Memorial Deaconess' Home; the D. A. Blodgett Memorial Children's Home, and the Michigan Masonic Home. About 1 m. N. of the city, overlooking the river, is the Michigan Soldiers' Home, with accommodation for 500. On the E. limits of the city is Reed's Lake, a popular resort during the summer season. The city is the see of Roman Catholic and Protestant Episcopal bishops. In 1907-1908, through the efforts of a committee of the Board of Trade, interest was aroused in the improvement of the city, appropriations were made for a " city plan," and flood walls were completed for the protection of the lower parts of the city from inundation. The large quantities of fruit, cereals and vegetables from the surrounding country, and ample facilities for transportation by rail and by the river, which is navigable from below the rapids to its

mouth, make the commerce and trade of Grand Rapids very important. The manufacturing interests are greatly promoted by the fine water-power, and as a furniture centre the city has a world-wide reputation — the value of the furniture manufactured within its

limits in 1904 amounted to $9,409,097, about 5-5% of the value of all furniture manufactured in the United States. Grand Rapids manufactures carpet sweepers — a large proportion of the whole world's product, — flour and grist mill products, foundry and machine-shop products, planing-mill products, school seats, wood-working tools, fly paper, calcined plaster, barrels, kegs, carriages, wagons, agricultural implements and bricks and tile. The total factory product in 1904 was valued at $31,032,589, an increase of 39-6% in four years.

On the site of Grand Rapids there was for a long time a large Ottawa Indian village, and for the conversion of the Indians a Baptist mission was established in 1824. Two years later a trad- ing post joined the mission, in 1833 a saw mill was built, and for the next few years the growth was rapid. The settlement was organized as a town in 1834, was incorporated as a village in 1838, and was chartered as a city in 1850, the city charter being revised in 1857, 1871, 1877 and 1905.

GRAND RAPIDS, a city and the county-seat of Wood county, Wisconsin, U.S.A., on both sides of the Wisconsin river, about 137 m. N.W. of Milwaukee. Pop. (1900) 4493, of whom 1073 were foreign-born; (1905) 6157; (1910) 6521. It is served by the Minneapolis, St Paul & Sault Ste Marie, the Green Bay & Western, the Chicago & North-Western, and the Chicago, Mil- waukee & St Paul railways. It is a railway and distributing centre, and has manufactories of lumber, sash, doors and blinds, hubs and spokes, woodenware, paper, wood-pulp, furniture and flour. The public buildings include a post office, court house, city hall, city hospital and the T. B. Scott Free Public Library (1892). The city owns and operates its water- works; the electric-lighting and telephone companies are co-operative. Grand Rapids was first chartered as a city in 1869. That part of Grand Rapids on the west bank of the Wisconsin river was formerly the city of Centralia (pop. in 1890, 1435); it was annexed in 1900.

GRANDSON (Ger. Grandsee), a town in the Swiss canton of Vaud, near the south-western end of the Lake of Neuchatel, and by rail 20 m. S.W. of Neuchatel and 3 m. N. of Yverdo-n. Its population in 1900 was 1771, mainly French-speaking and Protestant. Its ancient castle was long the home of a noted race of barons, while in the very old church (once belonging to a Benedictine monastery) there are a number of

Roman columns, &c, from Avenches and Yverdon. It has now a tobacco factory. Its lords were vassals of the house of Savoy, till in 1475 the castle was taken by the Swiss at the beginning of their war with Charles the Bold, duke of Burgundy, whose ally was the duchess of Savoy. It was retaken by Charles in February 1476, and the garrison put to death. The Swiss hastened to revenge this deed, and in a famous battle (2nd March 1476) defeated Charles with great loss, capturing much booty. The scene of the battle was between Concise and Corcelles, north-east of the town, and is marked by several columns, perhaps ancient menhirs. Grandson was thence- forward till 1798 ruled in common by Berne and Fribourg, and then was given to the canton du Leman, which in 1803 became that of Vaud.

See F. Chabloz, La Bataille de Grandson (Lausanne, 1897).

GRANET, FRANCOIS MARIUS (1777-1849), French painter, was born at Aix in Provence, on the 17th of December 1777; his father was a small builder. The boy's strong desires led his parents to place him — after some preliminary teaching from a passing Italian artist — in a free school of art directed by M. Constantin, a landscape painter of some reputation. In 1793 Granet followed the volunteers of Aix to the siege of Toulon, at the close of which he obtained employment as a decorator in the arsenal. Whilst a lad he had, at Aix, made the acquaintance of the young comte de Forbin, and upon his invitation Granet, in the year 1797, went to Paris. De Forbin was one of the pupils of David, and Granet entered the same studio. Later he got possession of a cell in the convent of Capuchins, which, having served for a manufactory of assignats during the Revolu- tion, was afterwards inhabited almost exclusively by artists. In the changing lights and shadows of the corridors of the Capuchins, Granet found the materials for that one picture to the painting of which, with varying success, he devoted his life.

In 1802 he left Paris for Rome, where he remained until 1819, when he returned to Paris, bringing with him besides various other works one of fourteen repetitions of his celebrated Choeur des Capucins, executed in 181 1. The figures of the monks celebrating mass are taken in this subject as a substantive part of the architectural effect, and this is the case with all Granet's works, even with those in which the figure subject would seem to assert its importance, and its historical or romantic interest. " Stella painting a Madonna on his

Prison Wall," 1810 (Leuchten- berg collection); " Sodoma a l'hopital," 1815 (Louvre); " Basilique basse de St Francois d'Assise," 1823 (Louvre); " Rachat de prisonniers," 1831 (Louvre); " Mort de Poussin," 1834 (Villa Demidoff, Florence), are among his principal works; all are marked by the same peculiarities, everything is sacrificed to tone. In 1819 Louis Philippe decorated Granet, and after- wards named him Chevalier de l'Ordre St Michel, and Conser- vateur des tableaux de Versailles (1826). He became member of the institute in 1830; but in spite of these honours, and the ties which bound him to M. de Forbin, then director of the Louvre, Granet constantly returned to Rome. After 1848 he retired to Aix, immediately lost his wife, and died himself on the 21st of November 1849. He bequeathed to his native town the greater part of his fortune and all his collections, now exhibited in the Musee, together with a very fine portrait of the donor painted by Ingres in 181 1.

GRANGE (through the A.-Fr. graunge, from the Med. Lat. granea, a place for storing grain, granum), properly a granary or barn. In the middle ages a " grange " was a detached portion of a manor with farm-houses and barns belonging to a lord or to a religious house; in it the crops could be conveniently stored for the purpose of collecting rent or tithe. Thus, such barns are often known as " tithe-barns." In many cases a chapel was included among the buildings or stood apart as a separate edifice. The word is still used as a name for a superior kind of farm-house, or for a country-house which has farm-buildings and agricultural land attached to it.

Architecturally considered, the " grange " was usually a long building with high wooden roof, sometimes divided by posts or columns into a sort of nave and aisles, and with walls strongly buttressed. Sometimes these granges were of very great extent; one at St Leonards, Hampshire, was originally 225 ft. long by 75 ft. wide, and a still larger one (303 ft. long) existed at Chertsey. Ancient granges, or tithe-barns, still exist at Glastonbury, Bradford-on-Avon, St Mary's Abbey, York, and at Coxwold. A fine example at Peterborough was pulled down at the end of the 19th century. In France there are many examples in stone of the 1 2th, 13th and 14th centuries; some divided into a central and two side aisles by arcades in stone. Externally granges are noticeable on -account of their great roofs and the slight elevation of the eaves, from 8 to 10 ft. only in height. In the 15th century they were sometimes protected by moats and towers. At Ardennes in Normandy, where the grange was 154 ft. long; Vauclerc near Laon, Picardy, 246 ft. long and in two storeys; at Perrieres, St Vigor, near Bayeux, and Ouilly near Falaise, all in Normandy; and at St Martin-au-Bois (Oise) are a series of fine examples. Attached to the abbey of

Longchamps, near Paris, is one of the best-preserved granges in France, with walls in stone and internally divided into three aisles in oak timber of extremely fine construction.

In the social economic movement in the United States of America, which began in 1867 and was known as the ” Farmers’ Movement,” ” grange ” was adopted as the name for a local chapter of the Order of the Patrons of Husbandry, and the move- ment is thus often known as the ” Grangers’ Movement “(see Farmers’ Movement). There are a National Grange at Wash- ington, supervising the local divisions, and state granges in most states.

GRANGEMOUTH, a police burgh and seaport of Stirlingshire, Scotland. Pop. (1901) 8386. It is situated on the south shore of the estuary of the Forth, at the mouth of the Carron and also of Grange Burn, a right-hand tributary of the Carron, 3 m. N.E. of Falkirk by the North British and Caledonian railways. It

is the terminus of the Forth and Clyde Canal, from the opening of which (1789) its history may be dated. The principal buildings are the town hall (in the Greek style), public hall, public institute and free library, and there is a public park presented by the marquess of Zetland. Since 1810, when it became a head port, it has gradually attained the position of the chief port of the Forth west of Leith. The first dock (opened in 1846), the second (1859) and the third (1882) cover an area of 28 acres, with timber ponds of 44 acres and a total quayage of 2500 yards. New docks, 93 acres in extent, with an entrance from the firth, were opened in 1905 at a cost of more than £1,000,000. The works rendered it necessary to divert the influx of the Grange from the Carron to the Forth. Timber, pig-iron and iron ore are the lead- ing imports, and coal, produce and iron the chief exports. The industries include shipbuilding, rope and sail making and iron founding. There is regular steamer communication with London, Christiania, Hamburg, Rotterdam and Amsterdam. Experi ments in steam navigation were carried out in 1802 with the ” Charlotte Dundas ” on the Forth and Clyde Canal at Grange- mouth. Kersa House adjoining the town on the S.W. is a seat of the marquess of Zetland.

GRANGER, JAMES (1723-1776), English clergyman and print-collector, was born in Dorset in 1723. He went to Oxford, and then entered holy orders, becoming vicar of Shiplake; but apart from his hobby of portrait-collecting, which resulted in the principal work associated with his name, and the publication of some sermons, his life was uneventful. Yet a new word was added to the language — ” to

grangerize ” — on account of him. In 1769 he published in two quarto volumes a Biographical History of England ” consisting of characters dispersed in different classes, and adapted to a methodical catalogue of engraved British heads”; this was “intended as an essay towards reducing our biography to a system, and a help to the knowledge of portraits.” The work was supplemented in later editions by Granger, and still further editions were brought out by the Rev. Mark Noble, with additions from Granger’s materials. Blank leaves were left for the filling in of engraved portraits for extra illustration of the text, and it became a favourite pursuit to discover such illustrations and insert them in a Granger, so that ” grangerizing ” became a term for such an extra-illustration of any work, especially with cuts taken from other books. The immediate result of the appearance of Granger’s own work was the rise in value of books containing portraits, which were cut out and inserted in collector’s copies.

GRANITE (adapted from the Ital. granito, grained; Lat. granum, grain), the group designation for a family of igneous rocks whose essential characteristics are that they are of acid composition (containing high percentages of silica), consist principally of quartz and felspar, with some mica, hornblende or augite, and are of holocrystalline or ” granitoid ” structure. In popular usage the term is given to almost any crystalline rock which resembles granite in appearance or properties. Thus syenites, diorites, gabbros, diabases, porphyries, gneiss, and even limestones and dolomites, are bought and sold daily as “granites.” True granites are common rocks, especially among the older strata of the earth’s crust. They have great variety in colour and general appearance, some being white or grey, while others are pink, greenish or yellow: this depends mainly on the state of preservation of their felspars, which are their most abundant minerals, and partly also on the relative proportion in which they contain biotite and other dark coloured silicates. Many granites have large rounded or angular crystals of felspar (Shap granite, many Cornish granites), well seen on polished faces. Others show an elementary foliation or banding (e.g. Aberdeen grajiite). Rounded or oval dark patches frequently appear in the granitic matrix of many Cornish rocks of this group.

In the field granite usually occurs in great masses, covering wide areas. These are generally elliptical or nearly circular and may be 20 m. in diameter or more. In the same district separate areas or ” bosses ” of granite may be found, all having much in common in their mineralogical and structural features, and such groups have probably all proceeded from the same

focus or deep-seated source. Towards their margins these granite outcrops often show modifications by which they pass into diorite or syenite, &c; they may also be finer grained (like porphyries) or rich in tourmaline, or intersected by many veins of pegmatite. From the main granite dikes or veins often run out into the surrounding rocks, thus proving that the granite is intrusive and has forced its way upwards by splitting apart the strata among which it lies. Further evidence of this is afforded by the alteration which the granite has produced through a zone which varies from a few yards to a mile or more in breadth around it. In the vicinity of intrusive granites slates become converted into hornfelses containing biotite, chiastolite or andalusite, sillimanite and a variety of other minerals; lime- stones recrystallize as marbles, and all rocks, according to their composition, are more or less profoundly modified in such a way as to prove that they have been raised to a high temperature by proximity to the molten intrusive mass. Where exposed in cliffs and other natural sections many granites have a rudely columnar appearance. Others weather into large cuboidal blocks which may produce structures resembling cyclopean masonry. The tors of the west of England are of this nature. These differences depend on the disposition of the joint cracks which traverse the rock and are opened up by the action of frost and weathering.

The majority of granites are so coarse in grain that their principal component minerals may be identified in the hand specimens by the unaided eye. The felspar is pearly, white or pink, with smooth cleaved surfaces; the quartz is usually transparent, glassy with rough irregular fractures; the micas appear as shining black or white flakes. Very coarse granites are called pegmatite or giant granite, while very fine granites are known as microgranites (though the latter term has also been applied to certain porphyries). Many granites show pearly scales of white mica; others contain dark green or black horn- blende in small prisms. Reddish grains of sphene or of garnet are occasionally visible. In the tourmaline granites prisms of black schorl occur either singly or in stellate groups. The parallel banded structures of many granites, which may be original or due to crushing, connect these rocks with the granite gneisses or orthogneisses.

Under the microscope the felspar is mainly orthoclase with perthite or microcline, while a small amount of plagioclase (ranging from oligoclase to albite) is practically never absent. These minerals are

often clouded by a deposit of fine mica and kaolin, due to weathering. The quartz is transparent, irregular in form, destitute of cleavage, and is filled with very small cavities which contain a fluid, a mobile bubble and sometimes a minute crystal. The micas, brown and white, are often in parallel growth. The hornblende of granites is usually pale green in section, the augite and enstatite nearly colourless. Tourmaline may be brown, yellow or blue, and often the same crystal shows zones of different colours. Apatite, zircon and iron oxides, in small crystals, are always present. Among the less common accessories may be mentioned pinkish garnets; andalusite in small pleochroic crystals; colourless grains of topaz; six-sided compound crystals of cordierite, which weather to dark green pinite; blue-black hornblende (riebeckite), beryl, tinstone, orthite and pyrites.

The sequence of crystallization in the granites is of a normal type, and may be ascertained by observing the perfection with which the different minerals have crystallized and the order in which they enclose one another. Zircon, apatite and iron oxides are the first; their crystals are small, very perfect and nearly free from enclosures; they are followed by hornblende and biotite; if muscovite is present it succeeds the brown mica. Of the felspars the plagioclase separates first and forms well- ■ shaped crystals of which the central parts may be more basic than the outer zones. Last come orthoclase, quartz, microcline and micropegmatite, which fill up the irregular spaces left between the earlier minerals. Exceptions to this sequence are unusual; sometimes the first of the felspars have preceded the hornblende or biotite which may envelop them in ophitic manner.

An earlier generation of felspar, and occasionally also of quartz, may be represented by large and perfect crystals of these minerals giving the rock a porphyritic character.

Many granites have suffered modification^ by the action of vapours emitted during cooling. Hydrofluoric and boric emanations exert a profound influence on granitic rocks; their felspar is resolved into aggregates of kaolin, muscovite and quartz; tourmaline appears, largely replacing the brown mica; topaz also is not uncommon. In this way the rotten granite or china stone, used in pottery, originates; and over considerable areas kaolin replaces the felspar and forms valuable sources of china clay. Veins of quartz, tourmaline and chlorite may traverse the granite, containing tinstone often in workable quantities. These veins are the principal sources of tin in Corn- wall, but the same changes may appear in the body of the granite without being restricted to veins, and tinstone occurs also as an original constituent of some granite pegmatites.

Granites may also be modified by crushing. Their crystals tend to lose their original forms and to break into mosaics of interlocking grains. The latter structure is very well seen in the quartz, which is a brittle mineral under stress. White mica develops in the felspars. The larger crystals are converted into lenticular or elliptical ” augen,” which may be shattered through- out or may .have a peripheral seam of small detached granules surrounding a still undisintegrated core. Streaks of ” granu- litic ” or pulverized material wind irregularly through the rock, giving it a roughly foliated character.

The interesting structural variation of granite in which there are spheroidal masses surrounded by a granitic matrix is known as ” orbicular granite.” The spheroids range from a fraction of an inch to a foot in diameter, and may have a felspar crystal at the centre. Around this there may be several zones, alternately lighter and darker in colour, consisting of the essential minerals of the rock in different proportions. Radiate arrangement is sometimes visible in the crystals of the whole or part of the spheroid. Spheroidal granites of this sort are found in Sweden, Finland, Ireland, &c. In other cases the spheroids are simply dark rounded lumps of biotite, in fine scales. These are probably due to the adhesion of the biotite crystals to one another as they separated from the rock magma at an early stage in its crystallization. The Rapakiwi granites of Finland have many round or ovoidal felspar crystals scattered through a granitic matrix. These larger felspars have no crystalline outlines and consist of orthoclase or microcline surrounded by borders of white oligoclase. Often they enclose dark crystals of biotite and hornblende, arranged zonally. Many of these granites contain tourmaline, fluorite and monazite. In most granite masses, especially near their contacts with the surrounding rocks, it is common to find enclosures of altered sedimentary or igneous materials which are more or less dissolved and permeated by the granitic magma.

The chemical composition ot a few granites from different parts of the world is given below : — ‘ “~

Si0 2 .

A1 2 3 .

Fe 2 3 .

FeO.

MgO.

CaO.

Na 2 0.

K 2 0.

I.

74-69

I6-2I

I-I6

0-48

0-28

1-18

3-64

11.

71-33

ii-i8

3-96

i-45

0-88

2-10

3-5i

3-49

111.

72-93

13-87

1-94

0-79

0-51

0-74

3-68

3-74

IV.

76-12

12-18

I-2I

0-72

I-I2

i-54

2-55

3-21

V.

73-90

13-65

0-28

0-42

0-14

0-23

2-53

7-99

VI.

68-87

16-62

o-43

2-72

I- 60

0-71

i-8o

6-48

I. Cam Brea, Cornwall (Phillips); II. Mazaruni, Brit. Guiana (Harrison); III. Rodo, near Alno, Vesternorrland, Sweden (Holm- quist) ; IV. Abruzzen, a group of hills in the Riesengebirge (Milch) ; V. Pikes Peak, Colorado (Matthews) ; VI. Wilson's Creek, near Omeo, Victoria (Howitt).

Only the most important components are shown in the table, but all granites contain also small amounts of zirconia, titanium oxide, phosphoric acid, sulphur, oxides of barium, strontium, manganese and water. These are in all cases less than 1 %, and usually much less than this, except the water, which may be 2 or 3 % in weathered rocks. From the chemical composition it may be computed that granites contain, on an average, 35 to 55 % of quartz, 20 to 30 % of orthoclase, 20 to 30 % of plagioclase felspar (including 1 the albite of microperthite) and 5 to 10% of ferromagnesian

silicates and minor accessories such as apatite, zircon, sphene and iron oxides. The aplites, pegmatites, graphic granites and musco- vite granites are usually richest in silica, while with increase of biotite and hornblende, augite and enstatite the analyses show the presence of more magnesia, iron and lime.

In the weathering of granite the quartz suffers little change; the felspar passes into dull cloudy, soft aggregates of kaolin, mus- covite and secondary quartz, while chlorite, quartz and calcite replace the biotite, hornblende and augite. The rock often assumes a rusty brown

colour from the liberation of the oxides of iron, and the decomposed mass is friable and can easily be dug with a spade ; where the granite has been cut by joint planes not too close together weathering proceeds from their surfaces and large rounded blocks may be left embedded in rotted materials. The amount of water in the rock increases and part of the alkalis is carried away in solution ; they form valuable sources of mineral food to plants. The chemical changes are shown by the following analyses :

H 2 0.

Si0 2 .

Ti0 2 .

A1 2 3 .

FeO.

Fe 2 3 .

CaO.

MgO.

Na 2 0.

K 2 0.

P2O5.

I.

II. III.

1-22

3-27 4-70

69-33 66-82 65-69

n.d. n.d.

0-31

14-33 15-62

15-23

3-60 1-69

i : 88

4-39

3-21

3-13 2-63

2-44 2-76 2-64

2-70 2-58

2-12

2-67 2-44

2-00

O-IO

n.d.

0-06

Analyses of I., fresh grey granite; II. brown moderately firm granite; III. residual sand, produced by the weathering of the same mass (anal. G. P. Merrill).

The differences are surprisingly small and are principally an increase in the water and a diminution in the amount of alkalis and lime together with the oxidation of the ferrous oxide. (J. S. F.)

GRAN SASSO D'lTALIA (" Great Rock of Italy "), a mountain of the Abruzzi, Italy, the culminating point of the Apennines, 9560 ft. in height. In formation it resembles the limestone Alps of Tirol and there are on its elevated plateaus a number of doline or funnel-shaped depressions into which the melted snow and the rain sink. The summit is covered with snow for the greater part of the year. Seen from the Adriatic, Monte Corno, as it is sometimes called, from its resemblance to a horn, affords a magnificent spectacle ; the Alpine region beneath its summit is still the home of the wild boar, and here and there are dense woods of beech and pine. The group has numerous other lofty peaks, of which the chief are the Pizzo d Intermesole (8680 ft.), the Corno Piccolo (8650 ft.), the Pizzo Cefalone (8307 ft.) and the Monte della Portella (7835 ft.). The most convenient starting-point for the

ascent is Assergi, 10 m. N.E. of Aquila, at the S. foot of the Gran Sasso. The Italian Alpine Club has erected a hut S.W. of the principal summit, and has published a special guidebook (E. Abbate, Guida al Gran. Sasso d' Italia, Rome, 1888). The view from the summit extends to the Tyrrhenian Sea on the west and the mountains of Dalmatia on the east in clear weather. The ascent was first made in 1794 by Orazio Delfico from the Teramo side. In Assergi is the- interesting church of Sta. Maria Assunta, dating from 11 50, with later alterations (see Gavini, in L" 'Arte, 1901, 316, 391).

GRANT, SIR ALEXANDER, 8th Bart. (1826-1884), British scholar and educationalist, was born in New York on the 13th of September 1826. After a childhood spent in the West Indies, he was educated at Harrow and Oxford. He entered Oxford as scholar of Balliol, and subsequently held a fellowship at Oriel from 1849 to i860. He made a special study of the Aristotelian philosophy, and in 1857 published an edition of the Ethics (4th ed. 1885) which became a standard text-book at Oxford. In 1855 he was one of the examiners for the Indian Civil Service, and in 1856 a public examiner in classics at Oxford. In the latter year he succeeded to the baronetcy. In 1859 he went to Madras with Sir Charles Trevelyan, and was appointed inspector of schools; the next year he removed to Bombay, to fill the post of Professor of History and Political Economy in the Elphinstone College. Of this he became Principal in 1862; and, a year later, vice-chancellor of Bombay University, a post he held from 1863 to 1865 and again from 1865 to 1868. In 1865 he took upon himself also the duties of Director of Public Instruction for Bombay Presidency. In 1868 he was appointed a member of the Legislative Council. In the same year, upon the death of Sir David Brewster, he was appointed Principal of Edinburgh

University, which had conferred an honorary LL.D. degree upon him in 1865. From that time till his death (which occurred in Edinburgh on the 30th of November 1884) his energies were entirely devoted to the well-being of the University. The institution of the medical school in the University was almost solely due to his initiative; and the Tercentenary Festival, celebrated in 1884, was the result of his wisely directed enthu- siasm. In that year he published The Story of the University of Edinburgh during its First Three Hundred Years. He was created Hon. D.C.L. of Oxford in i88o v and an honorary fellow of Oriel College in 1882.

GRANT, ANNE (1 755-1838), Scottish writer, generally known as Mrs Grant of Laggan, was born in Glasgow, on the 21st of February 1755.

Her childhood was spent in America, her father, Duncan MacVicar, being an army officer on service there. In 1768 the family returned to Scotland, and in 1779 Anne married James Grant, an army chaplain, who was also minister of the parish of Laggan, near Fort Augustus, Inverness, where her father was barrack-master. On her husband's death in 1801 she was left with a large family and a small income. In 1802 she published by subscription a volume of Original Poems, with some Translations from the Gaelic, which was favourably received. In 1806 her Letters from the Mountains, with their spirited descrip- tion of Highland scenery and legends, awakened much interest. Her other works are Memoirs of an American Lady, with Sketches of Manners and Scenery in America as they existed previous to the Revolution (1808), containing reminiscences of her childhood; Essays on the Superstitions of the Highlanders of Scotland (181 1) ; and Eighteen Hundred and Thirteen, a Poem (181 4). In 1810 she went to live in Edinburgh. For the last twelve years of her life she received a pension from government. She died on the 7th of November 1838.

See Memoir and Correspondence of Mrs Grant of Laggan, edited by her son J. P. Grant (3 vols., 1844).

GRANT, CHARLES (1746-1823), British politician, was born at Aldourie, Inverness-shire, on the 16th of April 1746, the day on which his father, Alexander Grant, was killed whilst fighting for the Jacobites at Culloden. When a young man Charles went to India, where he became secretary, and later a member of the board of trade. He returned to Scotland in 1 790, and in 1802 was elected to parliament as member for the county of Inverness. In the House of Commons his chief interests were in Indian affairs, and he was especially vigorous in his hostility to the policy of the Marquess Wellesley. In 1805 he was chosen chairman of the directors of the East India Company and he retired from parliament in 1818. A friend of William Wilberforce, Grant was a prominent member of the evangelical party in the Church of England; he was a generous supporter of the church's missionary undertakings. He was largely responsible for the establishment of the East India college, which was afterwards erected at Haileybury. He died in London on the 3 1 st of October 1823. His eldest son, Charles, was created a peer in 1835 as Baron Glenelg.

See Henry Morris, Life of Charles Grant (1904).

GRANT, SIR FRANCIS (1803-187S), English portrait-painter, fourth son. of Francis Grant of Kilgraston, Perthshire, was born at Edinburgh in 1803. He was educated for the bar, but at the age of twenty-four he

began at Edinburgh systematically to study the practice of art. On completing a course of instruction he removed to London, and as early as 1843 exhibited at the Royal Academy. At the beginning of his career he utilized his sporting experiences by painting groups of huntsmen, horses and hounds, such as the ” Meet of H.M. Staghounds ” and the ” Melton Hunt “; but his position in society gradually made him a fashionable portrait-painter. In drapery he had the taste of a connoisseur, and rendered the minutest details of costume with felicitous accuracy. In female portraiture he achieved considerable success, although rather in depicting the high- born graces and external characteristicsthan the true personality. Among his portraits of this class may be mentioned Lady

Glenlyon, the marchioness of Waterford, Lady Rodney and Mrs Beauclerk. In his portraits of generals and sportsmen he proved himself more equal to his subjects than in those of states- men and men of letters. He painted many of the principal celebrities of the time, including Scott, Macaulay, Lockhart, Disraeli, Hardinge, Gough, Derby, Palmerston and Russell, his brother Sir J. Hope Grant and his friend Sir Edwin Landseer. From the first his career was rapidly prosperous. In 1842 he was elected an associate of the Royal Academy, and in 1851 an Academician; and in 1866 he was chosen to succeed Sir C. Eastlake in the post of president, for which his chief recom- mendations were his social distinction, tact, urbanity and friendly and liberal consideration of his brother artists. Shortly after his election as president he was knighted, and in 1870 the degree of D.C.L. was conferred upon him by the university of Oxford. He died on the 5th of October 1878.

GRANT, GEORGE MONRO (1835-1902), principal of Queen’s University, Kingston, Ontario, was born in Nova Scotia in 1835. He was educated at Glasgow university, where he had a brilliant academic career; and having entered the ministry of the Presbyterian Church, he returned to Canada and obtained a pastoral charge in Halifax, Nova Scotia, which he held from 1863 to 1877. He quickly gained a high reputation as a preacher and as an eloquent speaker on political subjects. When Canada was confederated in 1867 Nova Scotia was the province most strongly opposed to federal union. Grant threw the whole weight of his great influence in favour of confederation, and

his oratory played an important part in securing the success of the movement. When the consolidation of the Dominion by means of railway construction was under discussion in 1872, Grant travelled from the Atlantic to the Pacific with the engineers who surveyed the route of the Canadian Pacific railway, and his book Ocean to Ocean (1873) was one of the first things that opened the eyes of Canadians to the value of the immense heritage they enjoyed. He. never lost an opportunity, whether in the pulpit or on the platform, of pressing on his hearers that the greatest future for Canada lay in unity with the rest of the British Empire; and his broad statesman-like judgment made him an authority which politicians of all parties were glad to consult. In 1877 Grant was appointed principal of Queen's University, Kingston, Ontario, which through his exertions and influence expanded from a small denominational college into a large and influential educational centre; and he attracted to it an excep- tionally able body of professors whose influence in speculation and research was widely felt during the quarter of a century that he remained at its head. In 1888 he visited Australia, New Zealand and South Africa, the effect of this experience being to strengthen still further the Imperialism which was the guiding principle of his political opinions. On the outbreak of the South African War in 1899 Grant was at first disposed to be hostile to the policy of Lord Salisbury and Mr Chamberlain; but his eyes were soon opened to the real nature of President Kruger's government, and he enthusiastically welcomed and supported the national feeling which sent men from the outlying portions of the Empire to assist in upholding British supremacy in South Africa. Grant did not live to see the conclusion of peace, his death occur- ring at Kingston on the 10th of May 1902. At the time of his death The Times observed that " it is acknowledged on all hands that in him the Dominion has lost one of the ablest men that it has yet produced." He was the author of a number of works, of which the most notable besides Ocean to Ocean are, Advantages of Imperial Federation (1889), Our National Objects and Aims (1890) , Religions of the World in Relation to Christianity (1894) and volumes of sermons and lectures. Grant married in 1872 Jessie, daughter of William Lawson of Halifax.

GRANT, JAMES (1822-1887), British novelist, was born in Edinburgh on the 1st of August 1822. His father, John Grant, was a captain in the 92nd Gordon Highlanders and had served through the Peninsular War. For several years James Grant was in New- foundland with his father, but in 1839 he returned to England, and entered the 62nd Foot as an ensign. In 1843 he resigned his commission and devoted himself to writing, first magazine

articles, but soon a profusion of novels, full of vivacity and incident, and dealing mainly with military scenes and characters. His best stories, perhaps, were The Romance of War (his first, 1845), Both-well (1851), Frank Hilton; or, The Queen's Own (1855), The Phantom Regiment and Harry Ogihie (1856), Lucy Arden (1858), The White Cockade (1867), Only an Ensign (1871), Shall I Win Her? (1874), Playing with Fire (1887). Grant also wrote British Battles on Land and Sea (1873-1875) and valuable books on Scottish history. Permanent value attaches to his great work, in three volumes, on Old and New Edinburgh (1880). He was the founder and energetic promoter of the National Association for the Vindication of Scottish Rights. In 1875 he became a Roman Catholic. He died on the 5th of May 1887.

GRANT, JAMES AUGUSTUS (1827-1892), Scottish explorer of eastern equatorial Africa, was born at Nairn, where his father was the parish minister, on the nth of April 1827. He was educated at the grammar school and Marischal College, Aberdeen, and in 1 846 joined the Indian army. He saw active service in the Sikh War (1848-49), served throughout the mutiny of 1857, and was wounded in the operations for the relief of Lucknow. He returned to England in 1858, and in i860 joined J. H. Speke {q.v.) in the memorable expedition which solved the problem of the Nile sources. The expedition left Zanzibar in October i860 and reached Gondokoro, where the travellers were again in touch with civilization, in February 1863. Speke was the leader, but Grant carried out several investigations independently and made valuable botanical collections. He acted throughout in absolute loyalty to his comrade. In 1864 he published, as supplementary to Speke's account of their journey, A Walk across Africa, in which he dealt particularly with " the ordinary life and pursuits, the habits and feelings of the natives " and the economic value of the countries traversed. In 1864 he was awarded the patron's medal of the Royal Geographical Society, and in 1866 given the Companionship of the Bath in recognition of his services in the expedition. He served in the intelligence department of the Abyssinian expedition of 1868; for this he was made C.S.I, and received the Abyssinian medal. At the close of the war he re- tired from the army with the rank of lieutenant-colonel. He had married in 1865, and he now settled down at Nairn, where he died on the nth of February 1892. He made contributions to the journals of various learned societies, the most notable being the " Botany of the Speke and Grant Expedition " in vol. xxix. of the Transactions of the Linnaean Society.

GRANT, SIR JAMES HOPE (1808-1875), English general, fifth and youngest son of Francis Grant of Kilgraston, Perthshire, and brother of Sir Francis Grant, P.R.A., was born on the 22nd of July 1808. He

entered the army in 1826 as cornet in the 9th Lancers, and became lieutenant in 1828 and captain in 1835. In 1842 he was brigade-major to Lord Saltoun in the Chinese War, and specially distinguished himself at the capture of Chin-Kiang, after which he received the rank of major and the C.B. In the first Sikh War of 1845-46 he took part in the battle of Sobraon; and in the Punjab campaign of 1848-49 he commanded the 9th Lancers, and won high reputation in the battles of Chillianwalla and Guzerat (Gujarat). He was promoted brevet lieutenant-colonel and shortly afterwards to the same substantive rank. In 1854 he became brevet-colonel, and in 1856 brigadier of cavalry. He took a leading part in the suppression of the Indian mutiny of 1857, holding for some time the command of the cavalry division, and afterwards of a movable column of horse and foot. After rendering valuable service in the operations before Delhi and in the final assault on the city, he directed the victorious march of the cavalry and horse artillery despatched in the direction of Cawnpore to open up communication with the commander-in-chief Sir Colin Campbell, whom he met near the Alambagh, and who raised him to the rank of brigadier-general, and placed the whole force under his command during what remained of the perilous march to Lucknow for the relief of the residency. After the retirement towards Cawnpore he greatly aided in effecting there the total rout of the rebel troops, by making a detour which threatened their rear; and following in pursuit with a flying column, he defeated them with the loss of

nearly all their guns at Serai Ghat. He also took part in the operations connected with the recapture of Lucknow, shortly after which he was promoted to the rank of major-general, and appointed to the command of the force employed for the final pacification of India, a position in which his unwearied energy, and his vigilance and caution united to high personal daring, rendered very valuable service. Before the work of pacification was quite completed he was created K.C.B. In 1859 he was appointed, with the local rank of lieutenant-general, to the com- mand of the British land forces in the united French and British expedition against China. The object of the campaign was accomplished within three months of the landing of the forces at Pei-tang (1st of August i860). The Taku Forts had been carried by assault, the Chinese defeated three times in the open and Peking occupied. For his conduct in this, which has been called the ” most successful and the best carried out of England’s little wars,” he received the thanks of parliament and was gazetted G.C.B. In 1861 he was made lieutenant-

general and appointed commander-in-chief of the army of Madras; on his return to England in 1865 he was made quartermaster-general at headquarters; and in 1870 he was transferred to the command of the camp at Aldershot, where he took a leading part in the reform of the educational and training systems of the forces, which followed the Franco-German War. The. introduction of annual army manoeuvres was largely due to Sir Hope Grant. In 1872 he was gazetted general. He died in London on the 7th of March 1875.

Incidents in the Sepoy War of 1857-58, compiled from the Private Journal of General Sir Hope Grant, K.C.B. , together with some ex- planatory chapters by Capt. H. Knotty s. Royal A rtillery, was published in 1873, and Incidents in the China War of i860 appeared posthum- ously under the same editorship in 1875.

GRANT, SIR PATRICK (1804-1895), British field marshal, was the second son of Major John Grant, 97th Foot, of Auchterblair, Inverness-shire, where he was born on the nth of September 1804. He entered the Bengal native infantry as ensign in 1820, and became captain in 1832. He served in Oudh from 1834 to 1838, and raised the Hariana Light Infantry. Employed in the adjutant-general's department of the Bengal army from 1838 until 1854, he became adjutant-general in 1846. He served under Sir Hugh Gough at the battle of Maharajpur in 1843, winning a brevet majority, was adjutant-general of the army at the battles of Moodkee in 1845 (twice severely wounded), and of Ferozshah and Sobraon in 1846, receiving the C.B. and the brevet rank of lieutenant-colonel. He took part in the battles of Chillianwalla and Gujarat in 1849, gaining further promotion, and was appointed aide-de-camp to the queen. He served also in Kohat in 1851 under Sir Charles Napier. Promoted major- general in'1854, he was commander-in-chief of the Madras army from 1856 to 1861. He was made K.C.B. in 1857, and on General Anson's death was summoned to Calcutta to take supreme command of the army in India. From Calcutta he directed the operations against the mutineers, sending forces under Havelock and Outram for the relief of Cawnpore and Lucknow, until the arrival of Sir Colin Campbell from England as com- mander-in-chief, when he returned to Madras. On leaving India in 1861 he was decorated with the G.C.B. He was promoted lieutenant-general in 1862, was governor of Malta from 1867 to 1872, was made G.C.M.G. in 1868, promoted general in 1870, field marshal in 1883 and colonel of the Royal Horse Guards and gold-stick-in-waiting to the queen in 1885. He married as his second wife, in 1844, Frances Maria, daughter of Sir Hugh (afterwards Lord) Gough. He was governor of the Royal Hospital, Chelsea, from 1874 until his death there on the 28th of March 1895.

GRANT, ROBERT (1814-1892), British astronomer, was born at Grantown, Scotland, on the 17th of June 1814. At the age of thirteen the promise of a brilliant career was clouded by a prolonged illness of such a serious character as to incapacitate him from all school-work for six years. At twenty, however, his health greatly improved, and he set himself resolutely, without assistance, to repair his earlier disadvantages by the diligent study of Greek, Latin, Italian and mathematics. Astronomy

also occupied his attention, and it was stimulated by the return of Halley's comet in 1835, as well as by his success in observing the annular eclipse of the sun of the 15th of May 1836. After a short course at King's College, Aberdeen, he obtained in 1841 employment in his brother's counting-house in London. During this period the idea occurred to him of writing a history of physical astronomy. Before definitely beginning the work he had to search, amongst other records, those of the French Academy, and for that purpose took up his residence in Paris in 1845, supporting himself by giving lessons in English. He returned to London in 1847. The History of Physical Astronomy from the Earliest Ages to the Middle of the Nineteenth Century was first published in parts in The Library of Useful Knowledge, but after the issue of the ninth part this mode of publication was discontinued, and the work appeared as a whole in 1852. The main object of the work is, in the author's words, " to exhibit a view of the labours of successive inquirers in establishing a knowledge of the mechanical principles which regulate the movements of the celestial bodies, and in explaining the various phenomena relative to their physical constitution which observa- tion with the telescope has disclosed." The lucidity and complete- ness with which a great variety of abstruse subjects were treated, the extent of research and the maturity of judgment it displayed, were the more remarkable, when it is remembered that this was the first published work of one who enjoyed no special oppor- tunities, either for acquiring materials, or for discussing with others engaged in similar pursuits the subjects it treats of. The book at once took a leading place in astronomical literature, and earned for its author in 1856 the award of the Royal Astronomical Society's gold medal. In 1859 he succeeded John Pringle Nichol as professor of astronomy in the University of Glasgow. From time to time he contributed astronomical papers to the Monthly Notices, Astronomische Nachrichten, Comptes rendus and other scientific serials; but his principal work at Glasgow consisted in determining the places of a large number of stars with the Ertel transit-circle of the Observatory. The results of these labours, extending over twenty-one years, are

contained in the Glasgow Catalogue of 6415 Stars, published in 1883. This was followed in 1892 by the Second Glasgow Catalogue of 2156 Stars, published a few weeks after his death, which took place on the 24th of October 1892.

See Month. Notices Roy. Astr. Society, liii., 210 (E. Dunkin); Nature, Nov. 10, 1892; The Times, Nov. 2, 1892; Roy. Society's Catalogue of Scient. Papers. (A. A. R.*)

GRANT, ULYSSES SIMPSON (1822-1885), American soldier, and eighteenth president of the United States, was born at Point Pleasant, Ohio, on the 27th of April 1822. He was a descendant of Matthew Grant, a Scotchman, who settled in Dorchester, Massachusetts, in 1630. His earlier years were spent in helping his father, Jesse R. Grant, upon his farm in Ohio. In 1839 he was appointed to a place in the military academy at West Point, and it was then that his name assumed the form by which it is generally known. He was christened Hiram, after an ancestor, with Ulysses for a middle name. As he was usually called by his middle name, the congressman who recommended him for West Point supposed it to be his first name, and added thereto the name of his mother's family, Simpson. Grant was the best horseman of his class, and took a respectable place in mathematics, but at his graduation in 1843 he only ranked twenty-first in a class of thirty-nine. In September 1845 he went with his regiment to join the forces of General Taylor in Mexico; there he took part in the battles of Palo Alto, Resaca de la Palma and Monterey, and, after his transfer to General Scott's army, which he joined in March 1847, served at Vera Cruz, Cerro Gordo, Churubusco, Molino del Rey and at the storming of Chapultepec. He was breveted first lieutenant for gallantry at Molino del Rey and captain for gallantry at Chapultepec. In August 1848, after the close of the war, he married Julia T. Dent (1826-1902), and was for a while stationed in California and Oregon, but in 1854 he resigned his commission. His reputation in the service had suffered from allegations of intemperate drinking, which, whether well founded or not,

certainly impaired his usefulness as a soldier. For the next six years he lived in St Louis, Missouri, earning a scanty subsist- ence by farming and dealings in real estate. In i860 he removed to Galena, Illinois, and became a clerk in a leather store kept by his father. At that time his earning capacity seems not to have exceeded $800 a year, and he was

regarded by his friends as a broken and disappointed man. He was living at Galena at the outbreak of hostilities between the North and South.

[For the history of the Civil War, and of Grant's battles and

campaigns, the reader is referred to the article American Civil

War. To the " call to arms " of 1861 Grant promptly

?f*!?i'i/ responded. After some delav he was commissioned Civil War
1 , , , ... ' . , ,

careen. colonel of the 21st Illinois regiment and soon after- wards brigadier-general. He was shortly assigned to a territorial command on the Mississippi, and first won distinction by his energy in seizing, on his own responsibility, the important point of Paducah, Kentucky, situated at the confluence of the two great waterways of the Tennessee and the Ohio (6th Sept. 1861). On the 7th of November he fought his first battle as a commander, that of Belmont (Missouri), which, if it failed to achieve any material result, certainly showed him to be a capable and skilful leader. Early in 1862 he was en- trusted by General H. W. Halleck with the command of a large force to clear the lower reaches of the Cumberland and the Tennessee, and, whatever criticism may be passed on the general strategy of the campaign, Grant himself, by his able and energetic work, thoroughly deserved the credit of his brilliant success of Fort Donelson, where 15,000 Confederates were forced to capitulate. Grant and his division commanders were pro- moted to the rank of major-general U.S.V. soon afterwards, but Grant's own fortunes suffered a temporary eclipse owing to a disagreement with Halleck. When, after being virtually under arrest, he rejoined his army, it was concentrated about Savannah on the Tennessee, preparing for a campaign towards Corinth, Miss. On the 6th of April 1862 a furious assault on Grant's camps brought on the battle of Shiloh (q. v.). After two days' desperate fighting the Confederates withdrew before the com- bined attack of the Army of the Tennessee under Grant and the Army of the Ohio under Buell. But the Army of the Tennessee had been on the verge of annihilation on the evening of the first day, and Grant's leadership throughout was by no means equal to the emergency, though he displayed his usual personal bravery and resolution. In the grand advance of Halleck's armies which followed Shiloh, Grant was relieved of all important duties by his assignment as second in command of the whole force, and was thought by the army at large to be in disgrace. But Halleck soon went to Washington as general-in-

chief, and Grant took command of his old army and of Rosecrans' Army of the Mississippi. Two victories (Iuka and Corinth) were won in the autumn of 1862, but the credit of both fell to Rosecrans, who commanded in the field, and the nadir of Grant's military fortunes was reached when the first advance on Vicksburg (q.v.), planned on an unsound basis, and complicated by a series of political intrigues (which had also caused the adoption of the original scheme), collapsed after the minor reverses of Holly Springs and Chickasaw Bayou (December 1862).

It is fair to assume that Grant would have followed other unsuccessful generals into retirement, had he not shown that, whatever his mistakes or failures, and whether he was or was not sober and temperate in his habits, he possessed the iron determination and energy which in the eyes of Lincoln and Stanton, 1 and of the whole Northern people, was the first requisite of their generals. He remained then with hisarmy near Vicks-

1 President Lincoln was Grant's most unwavering supporter." Many amusing stones are told of his replies to various deputations • which waited upon him to ask for Grant's removal. On one occasion he asked the critics to ascertain the brand of whisky favoured by Grant, so that he could send kegs of it to the other generals. The question of Grant's abstemiousness was and is of little importance. The cause at stake over-rode every prejudice and the people of the United States, since the war, have been in general content to leave the question alone, as was evidenced by the outcry raised in 1908, when President Taft reopened it in a speech at Grant's tomb.

burg, trying one plan after another without result, until at last after months of almost hopeless work his perseverance was crowned with success — a success directly consequent upon a strange and bizarre campaign of ten weeks, in which his daring and vigour were more conspicuous than ever before. On the 4th of July 1863 the great fortress surrendered with 29,491 men, this being one of the most important victories won by the Union arms in the whole war. Grant was at once made a major-general in the regular army. A few months later the great reverse of Chickamauga created an alarm in the North commensurate with the elation that had been felt at the double victory of Vicksburg and Gettysburg, and Grant was at once ordered to Chattanooga, to decide the fate of the Army of the Cumberland in a second battle. Four armies were placed under his command, and three of these concentrated at Chattanooga. On the 25th of November 1863 a great three-days' battle ended with the crushing defeat of the Confederates, who from this day had no foothold in the centre and

west.

After this, in preparation for a grand combined effort of all the Union forces, Grant was placed in supreme command, and the rank of lieutenant-general revived for him (March 1864). Grant's headquarters henceforth accompanied the Army of the Potomac, and the lieutenant-general directed the campaign in Virginia. This, with Grant's driving energy infused into the best army that the Union possessed, resolved itself into a series, almost uninterrupted, of terrible battles. Tactically the Confederates were almost always victorious, strategically, Grant, disposing of greatly superior forces, pressed back Lee and the Army of Northern Virginia to the lines of Richmond and Peters- burg, while above all, in pursuance of his explicit policy of " attrition," the Federal leader used his men with a merciless energy that has few, if any, parallels in modern history. At Cold Harbor six thousand men fell in one useless assault lasting an hour, and after two months the Union armies lay before Richmond and Petersburg indeed, but had lost no fewer than 72,000 men. But Grant was unshaken in his determination. " I purpose to fight it out on this line, if it takes all summer," was his message from the battlefield of Spottsylvania to the chief of staff at Washington. Through many weary months he never relaxed his hold on Lee's army, and, in spite of repeated partial reverses, that would have been defeats for his predeces- sors, he gradually wore down his gallant adversary. The terrible cost of these operations did not check him: only on one occasion of grave peril were any troops sent from his lines to serve else- where, and he drew to himself the bulk of the men whom the Union government was recruiting by thousands for the final effort. Meanwhile all the other campaigns had been closely supervised by Grant, preoccupied though he was with the operations against his own adversary. At a critical moment he actually left the Virginian armies to their own commanders, and started to take personal command in a threatened quarter, and throughout he was in close touch with Sherman and Thomas, who conducted the campaigns on the south-east and the centre. That he succeeded in the efficient exercise of the chief command of armies of a total strength of over one million men, operating many hundreds of miles apart from each other, while at the same time he watched and manoeuvred against a great captain and a veteran army in one field of the war, must be the greatest proof of Grant's powers as a general. In the end complete success rewarded the sacrifices and efforts of the Federals on every theatre of war; in Virginia, where Grant was in personal control, the merciless policy of attrition wore down Lee's army until a mere remnant was left for the final surrender.

Grant had thus brought the great struggle to an end, and was

universally regarded as the saviour of the Union. A careful study of the history of the war thoroughly bears out the popular view. There were soldiers more accomplished, as was McClellan, more brilliant, as was Rosecrans, and more exact, as was Buell, but it would be difficult to prove that these generals, or indeed any others in the service, could have accomplished the task which Grant brought to complete success. Nor must it be sup- posed that Grant learned little from three years' campaigning

in high command. There is less in common than is often supposed between the buoyant energy that led Grant to Shiloh and the grim plodding determination that led him to Vicksburg and to Appomattox. Shiloh revealed to Grant the intensity of the struggle, and after that battle, appreciating to the full the material and moral factors with which he had to deal, he gradually trained his military character on those lines which alone could conduce to ultimate success. Singleness of purpose, and relent- less vigour in the execution of the purpose, were the qualities necessary to the conduct of the vast enterprise of subduing the Confederacy. Grant possessed or acquired both to such a degree that he proved fully equal to the emergency. If in technical finesse he was surpassed by many of his predecessors and his subordinates, he had the most important qualities of a great captain, courage that rose higher with each obstacle, and the clear judgment to distinguish the essential from the minor issues in war. — (C. F. A.)]

After the assassination of President Lincoln a disposition was shown by his successor, Andrew Johnson, to deal severely with the Confederate leaders, and it was understood that indictments for treason were to be brought against General Lee and others. Grant, however, insisted that the United States government was bound by the terms accorded to Lee and his army at Appomattox. He went so far as to threaten to resign his com- mission if the president disregarded his protest. This energetic action on Grant's part saved the United States from a foul stain upon its escutcheon. In July 1866 the grade of general was created, for the first time since the organization of the govern- ment, and Grant was promoted to that position. In the follow- ing year he became involved in the deadly quarrel between President Johnson and Congress. To tie the president's hands Congress had passed the Tenure of Office Act, forbidding the president to remove any cabinet officer without the consent of the Senate; but in August 1867 President Johnson suspended Secretary Stanton and appointed

Grant secretary of war ad interim until the pleasure of the Senate should be ascertained. Grant accepted the appointment under protest, and held it until the following January, when the Senate refused to confirm the president's action, and Secretary Stanton resumed his office. President Johnson was much disgusted at the readiness with which Grant turned over the office to Stanton, and a bitter controversy ensued between Johnson and Grant. Hitherto Grant had taken little part in politics. The only vote which he had ever cast for a presidential candidate was in 1856 for

James Buchanan; and leading Democrats, so late as ˆ resl ' the beginning of 1868, hoped to make him their can-

1868. ' didate in the election of that year; but the effect of

the controversy with President Johnson was to bring Grant forward as the candidate of the Republican party. At the convention in Chicago on the 20th of May 1868 he was unani- mously nominated on the first ballot. The Democratic party nominated the one available Democrat who had the smallest chance of beating him — Horatio Seymour, lately governor of New York, an excellent statesman, but at that time hopeless as a candidate because of his attitude during the war. The result of the contest was at no time in doubt; Grant received 214 electoral votes and Seymour 80.

The most important domestic event of Grant's first term as president was the adoption of the fifteenth amendment to the Constitution on the 30th of March 1870, providing that suffrage throughout the United States should not be restricted on account of race, colour or previous condition of servitude. The most important event in foreign policy was the treaty with Great Britain of the 8th of May 1871, commonly known as the Treaty of Washington, whereby- several controversies between the United States and Great Britain, including the bitter questions as to damage inflicted upon the United States by the "Alabama" and other Confederate cruisers built and equipped in England, were referred to arbitration. In 1869 the government of Santo Domingo (or the Dominican Republic) expressed a wish for annexation by the United States, and such a step was favoured

by Grant, but a treaty negotiated with this end in view failed to obtain the requisite two-thirds vote in the Senate. In May 1872 something was done towards alleviating the odious Recon- struction laws for dragooning the South, which had been passed by Congress in spite of the vetoes of President Johnson. The Amnesty Bill restored civil rights to all persons in the South, save from 300 to 500 who had held high

positions under the Confederacy. As early as 1870 President Grant recommended measures of civil service reform, and succeeded in obtaining an act authorizing him to appoint a Civil Service commission. A commission was created, but owing to the hostility of the politicians in Congress it accomplished little. During the fifty years since Crawford's Tenure of Office Act was passed in 1820, the country had been growing more and more familiar with the spectacle of corruption in high places. The evil rose to alarming proportions during Grant's presidency, partly because of the immense extension of the civil service, partly because of the growing tendency to alliance between spoilsmen and the persons benefited by protective tariffs, and partly because the public attention was still so much absorbed in Southern affairs that little energy was left for curbing rascality in the North. The scandals, indeed, were rife in Washington, and affected persons in close relations with the president. Grant was ill-fitted for coping with the difficulties of such a situation. Along with high intellectual powers in certain directions, he had a simplicity of nature charming in itself, but often calculated to render him the easy prey of sharpers. He found it almost impossible to believe that anything could be wrong in persons to whom he had given his friendship, and on several occasions such friends proved themselves unworthy of him. The feeling was widely prevalent in the spring of 1872 that the interests of pure govern- ment in the United States demanded that President Grant should not be elected to a second term. This feeling led a number of high-minded gentlemen to form themselves into an organization under the name of Liberal Republicans. They held a convention at Cincinnati in May with the intention of nominating for the presidency Charles Francis Adams, who had ably represented the United States at the court of St James's during the Civil War. The convention, was, however, captured by politicians who converted the whole affair into a farce by nominating Horace Greeley, editor of the New York Tribune, who represented almost anything rather than the object for which the convention had been called together. The Democrats had despaired of electing a candidate of their own, and hoped to achieve success by adopting the Cincinnati nominee, should he prove to be an eligible person. The event showed that while their defeat in 1868 had taught them despondency, it had not taught them wisdom; it was still in their power to make a gallant fight by nominating a person for whom Republican reformers could vote. But with almost incredible fatuity, they adopted Greeley as their candidate. As a natural result Grant was re-elected by an overwhelming majority.

The most important event of his second term was his veto of the

Inflation Bill in 1874 followed by the passage of the Resumption Act in the following year. The country was still labouring under the curse of an inconvertible Second paper currency originating with the Legal Tender Act deacyˆ of 1862. There was a considerable party in favour of debasing the currency indefinitely by inflation, and a bill with that object was passed by Congress in April 1874. It was promptly vetoed by President Grant, and two months later he wrote a very sensible letter to Senator J. P. Jones of Nevada advocating a speedy return to specie payments. The passage of the Resumption Act in January 1875 was largely due to his con- sistent advocacy, and for these measures he deserves as high credit as for his victories in the field. In spite of these great services, popular dissatisfaction with the Republican party rapidly increased during the years 1874-1876. The causes were twofold: firstly, there was great dissatisfaction with the troubles in the Southern states, owing to the harsh Reconstruction laws and the robberies committed by the carpet-bag govern- ments which those laws kept in power; secondly, the scandals at

Later life.

Washington, comprising wholesale frauds on the public revenue, awakened lively disgust. In some cases the culprits were so near to President Grant that many persons found it difficult to avoid the suspicion that he was himself implicated, and never perhaps was his hold upon popular favour so slight as in the summer and autumn of 1876.

After the close of his presidency in the spring of 1877 Grant started on a journey round the world, accompanied by his wife and one son. He was received with distinguished honours in England and on the continent of Europe, whence he made his way to India, China and Japan. After his return to America in September 1880 he went back to his old home in Galena, Illinois. A faction among the managers of the Republican party attempted to secure his nomination for a third term as president, and in the convention at Chicago in June 1880 he received a vote exceeding 300 during 36 consecutive ballots. Nevertheless, his opponents made such effective use of the popular prejudice against third terms that the scheme was defeated, and Garfield was named in his stead. In August 1881 General Grant bought a house in the city of New York. His income was insufficient for the proper support of his family, and accordingly he had become

partner in a banking house in which one of his sons was interested along with other persons. The name of the firm was Grant and Ward. The ex-president invested in it all his available property, but paid ho attention to the management of the business. His facility in giving his con- fidence “to unworthy people was now to* be visited with dire calamity. In 1884 the firm became bankrupt, and it was dis- covered that two of the partners had been perpetrating systematic and gigantic frauds. This severe blow left General Grant penniless, just at the time when he was beginning to suffer acutely from the disease which finally caused his death. Down to this time he had never made any pretensions to literary skill or talent, but on being approached by the Century Magazine with a request for some articles he undertook the work in order to keep the wolf from the door. It proved a congenial task, and led to the writing of his Personal Memoirs, a frank, modest and charming book, which ranks among the best standard military biographies. The sales earned for the general and his family something like half a million dollars. The circumstances in which it was written made it an act of heroism comparable with any that Grant ever showed as a soldier. During most of the time he was suffering tortures from cancer in the throat, and it was only four days before his death that he finished the manu- script. In the spring of 1885 Congress passed a bill creating him a general on the retired list; and in the summer he was removed to a cottage at Mount M’Gregor, near Saratoga, where he passed the last five weeks of his life, and where he died on the 23rd of July 1885- His body was placed in a temporary tomb in Riverside Drive, in New York City, overlooking the Hudson river. 1

Grant showed many admirable and lovable traits. There was a charming side to his trustful simplicity, which was at times almost like that of a sailor set ashore. He abounded in kindli- ness and generosity, and if there was anything especially difficult for him to endure, it was the sight of human suffering, as was shown on the night at Shiloh, where he lay out of doors in the icy rain rather than stay in a comfortable room where the surgeons were at work. His good sense was strong, as well as his sense of justice, and these qualities stood him in good service as president, especially in his triumphant fight against the green- back monster. Altogether, in spite of some shortcomings, Grant was a massive, noble and lovable personality, well fit to be remembered as one of the heroes of a great nation. (J. Fi.)

1 The permanent tomb is of white granite and white marble and is 150 ft. high with a circular cupola topping a square building 90 ft. on the side and 72 ft. high ; the sarcophagus, in the centre of the

building, is of red Wisconsin porphyry. The cornerstone was laid by President Harrison in J 892, and the tomb was dedicated on the 27th of April 1897 with a splendid parade and addresses by President McKinley and General Horace Porter, president of the Grant Monument Association, which from 90,000 contributions raised the funds for the tomb.

General Grant's son, Frederick Dent Grant (b. 1850), graduated at the U.S. Military Academy in 1871, was aide-de- camp to General Philip Sheridan in 1873-1881, and resignedirom the army in 1881, after having attained the rank of lieutenant- colonel. He was U.S. minister to Austria in 1889-1893, and police commissioner of New York city in 1 894-1 898. He served as a brigadier-general of volunteers in the Spanish-American War of 1898, and then in the Philippines, becoming brigadier- general in the regular army in February 1901 and major-general in February 1906.

Bibliography. — Adam Badeau's Military History of U. S. Grant (3 vols., New York, 1867-1881), and Grant in Peace (Hartford, 1887), are appreciative but lacking in discrimination. William Conant Church's Ulysses S. Grant and the Period of National Pre- servation and Reconstruction (New York, 1897) is a good succinct account. Hamlin Garland's Ulysses S. Grant, His Life and Char- acter (New York, 1898) gives especial attention to the personal traits of Grant and abounds in anecdote. See also Grant's Personal Memoirs (2 vols.. New York, 1885-1886); J. G. Wilson's Life and Public Services of U. S. Grant (New York, 1886); J. R.Young's Around the World with General Grant (New York, 1880); Horace Porter's Campaigning with Grant (New York, 1897); James Ford Rhodes's History of the United States (vols, iii.vii., New York, 1896 1906) ; James K. fiosmer's Appeal to Arms and Outcome of the Civil War (New York, 1907) ; John Eaton's Grant, Lincoln, and the Freedmen (New York, 1907), and various works mentioned in the articles American Civil War, Wilderness Campaign, &c.

GRANT (from A.Fr. graunter, O. Fr. greanler for creanter, popular Lat. creantare, for credenlare, to entrust, Lat. credere, to believe, trust), originally permission, acknowledgment, hence the gift of privileges, rights, &c, specifically in law, the transfer of property by an instrument in writing, termed a deed of grant. According to the old rule of common law, the immediate freehold in corporeal hereditaments lay in livery (see Feoffment), whereas incorporeal hereditaments, such as a reversion, re mainder, advowson, &c, lay in grant, that is, passed by the delivery of the deed of conveyance or grant without further ceremony. The distinction between property

lying in livery and in grant is now abolished, the Real Property Act 1845 providing that all corporeal tenements and hereditaments shall be trans- ferable as well by grant as by livery (see Conveyancing). A grant of personal property is properly termed an assignment or bill of sale.

GRANTH, the holy scriptures of the Sikhs, containing the spiritual and moral teaching of Sikhism (q.v.). The book is called the Adi Granth Sahib by the Sikhs as a title of respect, because it is believed by them to be an embodiment of the gurus. The title is generally applied to the volume compiled by the fifth guru Arjan, which contains the compositions of Guru Nanak, the founder of the Sikh religion; of his successors, Guru Angad, Amar Das, Ram Das and Arjan; hymns of the Hindu bhagats or saints, Jaidev, Namdev, Trilochan, Sain, Ramanand, Kabir, Rai Das, Pipa, Bhikhan, Beni, Parmanand Das, Sur Das, Sadhna and Dhanna Jat; verses of the Mahommedan saint called Farid; and panegyrics of the gurus by bards who either attended them or admired their characters. The compositions of the ninth guru, Teg Bahadur, were subsequently added to the Adi Granth by Guru Govind Singh. One recension of the sacred volume pre- served at Mangat in the Gujrat district contains a hymn com- posed by Mira Bai, queen of Chitor. The Adi Granth contains passages of great picturesqueness and beauty. The original copy is said to be in Kartarpur in the Jullundur district, but the chief copy in use is now in the Har Mandar or Golden Temple at Amritsar, where it is daily read aloud by the attendant Granthis or scripture readers.

There is also a second Granth which was compiled by the Sikhs in 1734, and popularly known as the Granth of the tenth Guru, but it has not the same authority as the Adi Granth. It contains Guru Govind Singh's Jdpji, the Akal Ustit or Praise of the. Creator, thirty-three sawaias (quatrains containing some of the main tenets of the guru and strong reprobation of idolatry and hypocrisy),' and the Vachitar Natak or wonderful drama, in which the guru gives an account of his parentage, divine mission and the battles in which he was engaged. Then come three abridged translations by different hands of the Devi Mahatamya,

an episode in the Markandeya Puran, in praise of Durga the goddess of war. Then follow the Gyan Parbodh or awakening of knowledge, accounts of twenty-four incarnations of the deity selected because of their warlike character; the Hazarc de Shabd; the Shastar Nam Mala, which is a list of offensive and defensive weapons used in the guru's

time, with special reference to the attributes of the Creator; the Tria Charitar or tales illus- trating the qualities, but principally the deceit of women- the Kabit, compositions of a miscellaneous character; the Zafarnama containing the tenth guru's epistle to the emperor Aurangzeb and several metrical tales in the Persian language. This Granth is only partially the composition of the tenth guru. The greater portion of it was written by bards in his employ.

The two volumes are written in several different languages and dialects. The A di Granth is largely in old Punjabi and Hindi, but Prakrit, Persian, Mahratti and Gujrati are also «,e represented. The Granth of the Tenth Guru is written

Oraath. m the old and very difficult Hindi affected by literary men in the Patna district in the 16th century. In neither of these sacred volumes is there any separation of words As there is no separation of words in Sanskrit, the gyanis or interpreters of the guru's hymns prefer to follow the ancient practice of junction of words. This makes the reading of the Sikh scriptures very difficult, and is one of the causes of the decline of the Sikh religion.

The hymns in the Adi Granth are arranged not according to the gurus or bhagats who compose them, but according to rags or musical measures. There are thirty-one such measures in the Adi Granth, and the hymns are arranged according to the neasures to which they are composed. The gurus who composed hymns, namely the first, second, third, fourth, fifth and ninth gurus, all used the name Nanak as their nom-de-plume. Their compositions are distinguished by mahallas or wards. Thus the compositions of Guru Nanak are styled mahalla one, the com- positions of Guru Angad are styled mahalla two, and so on After the hymns of the gurus are found the hymns of the bhagats under their several musical measures. The Sikhs generally dis- like any arrangement of the Adi Granth by which the composi- tions of each guru or bhagat should be separately shown

All the doctrines of the Sikhs are found set forth in the two Granths and in compositions called Rahit Namas and Tanakhwah The Namas, which are believed to have been the utterances

Sikh ° f tbe t . enth S uru – The cardinal principle of the sacred

doctrines, books is the unity of God, and starting from this premiss the rejection of idolatry and superstition, thus Guru Govind Singh writes: " Some worshipping stones, put them on their heads- home suspend lingams from their necks • Some see the God in the South; some bow

their heads to the

West. , Some fools worship idols, others busy themselves with worshipping the dead. The whole world entangled in false ceremonies hath not found God s secret.

Next to the unity of God comes the equality of all men in His sight, and so the abolition of caste distinctions. Guru Nanak says:

” Caste hath no power in the next world; there is a new order of beings, Those whose accounts are honoured are the good.” The concremation of widows, though practised in later times by Hinduized Sikhs, is forbidden in the Granth. Guru Arian writes:

” She who considereth her beloved as her God, • Is the blessed sati who shall be acceptable in God’s Court.” It is a common belief that the Sikhs are allowed to drink wine and other intoxicants. This is not the case. Guru Nanak wrote:

” By drinking wine man committeth many sins.”

Guru Arjan wrote:

” The fool who drinketh evil wine is involved in sin.”

And in the Rahit Nama of Bhai Desa Singh there is the follow- ing:

A-“ˆ\u Slkh c take , n -° intoxic ant; it maketh the body lazy it

SˆeSfdS? • ttor temporal and spirituaI duties ‘ and k&a

It is also generally believed that the Sikhs are bound to abstain from the flesh of kine. This, too, is a mistake, arising from the Sikh adoption of Hindu usages. The two Granths of the Sikhs and all their canonical works are absolutely silent on the subject. The Sikhs are not bound to abstain from any flesh except that which is obviously unfit for human food, or what is killed m the Mahommedan fashion by jagging an animal’s throat with a knife. This flesh-eating practice is one of the main sources of their physical strength. Smoking is strictly prohibited by the Sikh religion. Guru Teg Bahadur preached to his host as follows:

” Save the people from the vile drug, and employ thyself in the service of Sikhs and ho y men. When the people abandon the degrading

smoke and cultivate their lands, their wealth and pro- spenty shall increase, and they shall want for nothing P b ut

tteir” wealth.” V Ve S etabIe > they shall grow poor and lose

Guru Govind Singh also said:

dei;Seth : I 1 l b g a etS,” eStr0yeth ˆ generad ° n ‘ but tobacc °

In addition to these prohibitions Sikhism inculcates most of the positive virtues of Christianity, and specially loyalty to rulers, a quality which has made the Silths valuable servants of the British crown.

onˆhfˆnf ttTf P tran K at6d by Dr Tr . um PP. a German missionary, on behalf of the Punjab government in 1877, but his renderine is

P„ˆ a h y H- e f Pe , CtS 1 ˆ° r c < ˆ' D °V. ing to ins "fficient knowledge of the Punjab, dialects. The Sikh Religion, &c, in 6 vols. (London iqoq) is an authoritative version prepared by M. Macauliffe, in concert w th the modern leaders of the Sikh sect. (MM)

GRANTHAM, THOMAS ROBINSON, rst Baron (c. 1695ˆ1770) English diplomatist and politician, was a younger son of Sir William Robinson, Bart. (1655-1736) of Newby, Yorkshire who was member of parliament for York from 1697 to 1722′ Having been a scholar and minor fellow of Trinity College” Cambridge, Thomas Robinson gained his earliest diplomatic experience in Paris and then went to Vienna, where he was English ambassador from 1730 to 1748. During 1741 he sought to make peace between the empress Maria Theresa and Frederick the Great, but in vain, and in 1748 he represented his country at the congress of Aix-la-Chapelle. Returning to England he sat m parhament for Christchurch from 1749 to 1761 In 1754 Robinson was appointed a secretary of state and leader of the House of Commons by the prime minister, the duke of Newcastle and it was on this occasion that Pitt made the famous remark to <, the duke might as well have sent us his jackboot to lead us. In November 1755 he resigned, and in April 1761 he was created Baron Grantham. He was master of the wardrobe from 1749 to 1754 and again from 1755 to 1760, and was joint postmaster-general in 1 765 and 1 766. He died in London on the 30th of September 1770.

Grantham’s elder son, Thomas Robinson (1738-1786) who became the 2nd baron, was born at Vienna on the **oth of November 1738. Educated at Westminster School and at Christ’s College, Cambridge, he entered parliament as member for Christ- church**

in 1761, and succeeded to the peerage in 1770 In 1771 he was sent as ambassador to Madrid and retained this post until war broke out between England and Spain in 1770. From 1780 to 1782 Grantham was first commissioner of the board of trade and foreign plantations, and from July 1782 to April 1783 secretary for the foreign department under Lord Shelburne. He died on the 20th of July 1786, leaving two sons, Thoma Philip, who became the 3rd baron, and Frederick John after wards 1st earl of Ripon.

_ Thomas Philip Robinson, 3rd Baron Grantham (1781-1859) in 1803 took the name of Weddell instead of that of Robinson' In May 1833 he became Earl de Grey of Wrest on the death of his maternal aunt, Amabell Hume-Campbell, Countess de Grey (1751-1833), and he now took the name of de Grey He wa« first lord of the admiralty under Sir Robert Peel in 1834- 183 5

and from 1841 to 1844 lord-lieutenant of Ireland. On his death without male issue his nephew, George Frederick Samuel Robin- son, afterwards marquess of Ripon (q.v.), succeeded as Earl de Grey.

GRANTHAM, a municipal and parliamentary borough of Lincolnshire, England; situated in a pleasant undulating country on the river Witham. Pop. (1901) 17,593. It is an important junction of the Great Northern railway, 105 m. N. by W. from London, with branch lines to Nottingham, Lincoln and Boston; while there is communication with Nottingham and the Trent by the Grantham canal. The parish church of St Wulfram is a splendid building, exhibiting all the Gothic styles, but mainly Early English and Decorated. The massive and ornate western tower and spire, about 280 ft. in height, are of early Decorated workmanship. There is a double Decorated crypt beneath the lady chapel. The north and south porches are fine examples of a later period of the same style. The delicately carved font is noteworthy. Two libraries, respectively of the 1 6th and 17th centuries, are preserved in the church. At the King Edward VI. grammar school Sir Isaac Newton received part of his education. A bronze statue commemorates him. The late Perpendicular building is picturesque, and the school was greatly enlarged in 1904. The Angel Hotel is a hostelry of the 1 5th century, with a gateway of earlier date. A conduit dating from 1597 stands in the wide market-place. Modern public buildings are a gild hall, exchange hall, and several churches and chapels. The Queen Victoria Memorial home for nurses was

erected in 1902-1903. The chief industries are malting and the manufacture of agricultural implements. Grantham returns one member to parliament. The borough falls within the S. Kesteven or Stamford division of the county. Grantham was created a suffragan bishopric in the diocese of Lincoln in 1905. The municipal borough is under a mayor, 4 aldermen and 12 councillors. Area, 1726 acres.

Although there is no authentic evidence of Roman occupation, Grantham (Graham, Granham in Domesday Book) from its situation on the Ermine Street, is supposed to have been a Roman station. It was possibly a borough in the Saxon period, and by the time of the Domesday Survey it was a royal borough with in burgesses. Charters of liberties existing now only in the confirmation charter of 1377 were granted by various kings. From the first the town was governed by a bailiff appointed by the lord of the manor, but by the end of the 14th century the office of alderman had come into existence. Finally government under a mayor and alderman was granted by Edward IV. in 1463, and Grantham became a corporate town. Among later charters, that of James II., given in 1685, changed the title to that of government by a mayor and 6 aldermen, but this was afterwards reversed and the old order resumed. Grantham was first represented in parliament in 1467, and returned two members; but by the Redistribution Act of 1885 the number was reduced to one. Richard III. in 1483 granted a Wednesday market and two fairs yearly, namely on the feast of St Nicholas the Bishop, and the two following days, and on Passion Sunday and the day following. At the present day the market is held on Saturday, and fairs are held on the Monday, Tuesday and Wednesday following the fifth Sunday in Lent; a cherry fair on the nth of July and two stock fairs on the 26th of October and the 17th of December.

GRANTLEY, FLETCHER NORTON, ist Baron (1716-1789), English politician, was the eldest son of Thomas Norton of Grantley, Yorkshire, where he was born on the 23rd of June 17 16. He became a barrister in 1739, and, after a period of inactivity, obtained a large and profitable practice, becoming a K.C. iji 1754, and afterwards attorney-general for the county palatine . of Lancaster. In 1756 he was elected member of parliament for Appleby; he represented Wigan from 1761 to 1768, and was appointed solicitor-general for England and knighted in 1762. He took part in the proceedings against John Wilkes, and, having become attorney-general in 1763, prosecuted the 5th Lord Byron for the murder of William Chaworth, losing his office when the marquess of Rockingham came into power in

July 1765. In 1769, being now member of parliament for Guildford,

Norton became a privy councillor and chief justice in eyre of the forests south of the Trent, and in 1770 was chosen Speaker of the House of Commons. In 1777, when presenting the bill for the increase of the civil list to the king, he told George III. that parliament has " not only granted to your majesty a large present supply, but also a very great additional revenue; great beyond example; great beyond your majesty's highest expense." This speech aroused general attention and caused some irritation; but the Speaker was supported by Fox and by the city of London, and received the thanks of the House of Commons. George, however, did not forget these plain words, and after the general election of 1780, the prime minister, Lord North, and his followers declined to support the re-election of the retiring Speaker, alleging that his health was not equal to the duties of the office, and he was defeated when the voting took place. In 1782 he was made a peer as Baron Grantley of Markenfield. He died in London on the ist of January 1789. He was succeeded as Baron Grantley by his eldest son William (1742-1822). Wraxall describes Norton as "a bold, able and eloquent, but not a popular pleader," and as Speaker he was aggressive and indiscreet. Derided by satirists as " Sir Bullface Doublefee," and described by Horace Walpole as one who " rose from obscure infamy to that infamous fame which will long stick to him," his character was also assailed by Junius, and the general impression . is that he was a hot-tempered, avaricious and un-principled man.

See H. Walpole, Memoirs of the Reign of George 777., "edited by G. F. R. Barker (1894); Sir N. W. Wraxall, Historical and Post- humous Memoirs, edited by H. B. Wheatley (1884); and J. A. Manning, Lives of the Speakers (1850).

GRANTOWN, the capital of Speyside, Elginshire, Scotland. Pop. (1901) 1568. It lies on the left bank of the Spey, 235 m. S. of Forres by the Highland railway, with a station on the Great North of Scotland's Speyside line connecting Craigellachie with Boat of Garten. It was founded in 1776 by Sir James Grant of Grant, and became the chief seat of that ancient family, who had lived on their adjoining estate of Freuchie (Gaelic, fraochach, "heathery") since the beginning of the 15th century, and hence were usually described as the lairds of Freuchie. The public buildings include the town hall, court house and orphan hospital; and the industries are mainly connected with the cattle trade and the distilling of whisky. The town, built of grey granite, presents a handsome appearance, and being delightfully situated in the midst of the most beautiful pine and birch woods in Scotland, with pure air and a bracing climate, is an attractive resort. Castle Grant, immediately to the north, is the principal mansion of the

earl of Seafield, the head of the Clan Grant. In a cave, still called ” Lord Huntly’s Cave,” in a rocky glen in the vicinity, George, marquess of Huntly, lay hid during Montrose’s campaign in 1644-45. *

GRANULITE (Lat. granulum, a little grain), a name used by petrographers to designate two distinct classes of rocks. Accord- ing to the terminology of the French school it signifies a granite in which both kinds of mica (muscovite and biotite) occur, and corresponds to the German Granit, or to the English ” muscovite biotite granite.” This application has not been accepted generally. To the German petrologists ” granulite ” means a more or less banded fine-grained metamorphic rock, consisting mainly of quartz and felspar in very small irregular crystals, and containing usually also a fair number of minute rounded pale-red garnets. Among English and American geologists the term is generally employed in this sense. The granulites are very closely allied to the gneisses, as they consist of nearly the same minerals, but they are finer grained, have usually less perfect foliation, are more frequently garnetiferous, and have some special features of microscopic structure. In the rocks of this group the minerals, as seen in a microscopic slide, occur as small rounded grains forming a mosaic closely fitted together. The individual crystals have never perfect form, and indeed rarely any traces of it. In some granulites they interlock, with irregular borders; in others they have been drawn out and

flattened into tapering lenticles by crushing. In most cases they are somewhat rounded with smaller grains between the larger. This is especially true of the quartz and felspar which are the predominant minerals; mica always appears as flat scales (irregular or rounded but not hexagonal). Both muscovite and biotite may be present and vary considerably in abundance; very commonly they have their flat sides parallel and give the rock a rudimentary schistosity, and they may be aggregated into bands — in which case the granulites are indistinguishable from certain varieties of gneiss. The garnets are very generally larger than the above-mentioned ingredients, and easily visible with the eye as pink spots on the broken surfaces of the rock. They usually are filled with enclosed grains of the other minerals. The felspar of the granulites is mostly orthoclase or crypto- perthite; microcline, oligoclase and albite are also common. Basic felspars occur only rarely. Among accessory minerals, in addition to apatite, zircon, and iron oxides, the following may be mentioned: hornblende (not

common), riebeckite (rare), epidote and zoisite, calcite, sphene, andalusite, sillimanite, kyanite, hercynite (a green spinel), rutile, orthite and tourmaline. Though occasionally we may find larger grains of felspar, quartz or epidote, it is more characteristic of these rocks that all the minerals are in small, nearly uniform, imperfectly shaped individuals.

On account of the minuteness with which it has been described and the important controversies on points of theoretical geology which have arisen regarding it, the granulite district of Saxony (around Rosswein, Penig, &c.) may be considered the typical region for rocks of this group. It should be remembered that though granulites are probably the commonest rocks of this country, they are mingled with granites, gneisses, gabbros, amphibolites, mica schists and many other petrographical types. All of these rocks show more or less metamorphism either of a thermal character or due to pressure and crushing. The granites pass into gneiss and granulite; the gabbros into flaser gabbro and amphibolite; the slates often contain andalusite or chiastolite, and show transitions to mica schists. At one time these rocks were regarded as Archean gneisses of a special type. Johannes Georg Lehmann propounded the hypothesis that their present state was due principally to crushing acting on them in a solid condition, grinding them down and breaking up their minerals, while the pressure to which they were subjected welded them together into coherent rock. It is now believed, however, that they are comparatively recent and include sedimentary rocks, partly of Palaeozoic age, and intrusive masses which may be nearly massive or may have gneissose, flaser or granulitic structures. These have been developed largely by the injection of semi-consolidated highly viscous intrusions, and the varieties of texture are original or were produced very shortly after the crystallization of the rocks. Meanwhile, however, Lehmann's advocacy of post-consolidation crushing as a factor in the development of granulites has been so successful that the terms granulitization and granulitic structures are widely employed to indicate the results of dynamometamorphism acting on rocks at a period long after their solidification.

The Saxon granulites are apparently for the most part igneous and correspond in composition to granites and porphyries. There are, however, many granulites which undoubtedly were originally sediments (arkoses, grits and sandstones) . A large part of the highlands of Scotland consists of paragranulites of this kind, which have received the group name of " Moine gneisses." Along with the typical acid granulites above described, in Saxony, India, Scotland and other countries there occur dark- coloured basic granulites ("trap granulites"). These are fine-grained rocks, not usually banded, nearly black in colour with small red spots of garnet. Their essential minerals are pyroxene, plagioclase and garnet: chemically they resemble the gabbros. Green augite and hypersthene form a considerable part of these rocks, they may contain also biotite, hornblende and quartz. Around the garnets there is often a radial grouping of small grains of

pyroxene and hornblende in a clear matrix of felspar: these ” centric ” structures are frequent in granu-

lites. The rocks of this group accompany gabbro and serpen- tine, but the exact conditions under which they are formed and the significance of their structures is not very clearly understood. (J. S. F.)

GRANVELLA, ANTOINE PERRENOT, Cardinal de (1517- 1586), one of the ablest and most influential of the princes of the church during the great political and ecclesiastical movements which immediately followed the appearance of Protestantism in Europe, was born on the 20th of August 151 7 at Besancon, where his father, Nicolas Perrenot de Granvella (1484-15 50), who afterwards became chancellor of the empire under Charles V., was practising as a lawyer. Later Nicolas held an influential position in the Netherlands, and from 1530 until his death he was one of the emperor’s most trusted advisers in Germany. On the completion of his studies in law at Padua and in divinity at Louvain, Antoine held a canonry at Besancon, but he was promoted to the bishopric of Arras when barely twenty-three (r54o). In his episcopal capacity he attended several diets of the empire, as well as the opening meetings of the council of. Trent; and the influence of his father, now chancellor, led to his being entrusted with many difficult and delicate pieces of public business, in the execution of which he developed a rare talent for diplomacy, and at the same time acquired an intimate acquaintance with most of the currents of European politics. One of his specially noteworthy performances was the settlement of the terms of peace after the defeat of the league of Schmalkalden at Miihlberg in 1547, a settlement in which, to say the least, some particularly sharp practice was exhibited. In 155° he succeeded his father in the office of secretary of state; in this capacity he attended Charles in the war with Maurice, elector of Saxony, accompanied him in the flight from Innsbruck, and afterwards drew up the treaty of Passau (August 1552). In the following year he conducted the negotiations for the marriage of Mary of England and Philip II. of Spain, to whom, in 1555, on the abdication of the emperor, he transferred his services, and by whom he was employed in the Netherlands. In April r559 Granvella was one of the Spanish commissioners who arranged the peace of Cateau Cambresis, and on Philip’s with- drawal from the Netherlands in August of the same year he was appointed prime minister to the regent, Margaret of Parma. The policy of repression which in this capacity he pursued during the next five years secured for him many tangible rewards, in 1560 he was elevated to the archiepiscopal see of Malines, and in 1561 he received the cardinal’s hat; but the growing hostility of a people whose religious convictions he had set himself to trample under foot

ultimately made it impossible for him to continue in the Low Countries; and by the advice of his royal master he, in March 1564, retired to Franche Comte. Nominally this withdrawal was only of a temporary character, but it proved to be final. The following six years were spent in comparative quiet, broken, however, by a visit to Rome in r565; but in 1570 Granvella, at the call of Philip, resumed public life by accepting another mission to Rome. Here he helped to arrange the alliance between the Papacy, Venice and Spain against the Turks, an alliance which was responsible for the victory of Lepanto. In the same year he became viceroy of Naples, a post of some difficulty and danger, which for five years he occupied with ability and success. He was summoned to Madrid in 1575 by Philip II. to be president of the council for Italian affairs. Among the more delicate negotiations of his later years were those of 1580, which had for their object the ultimate union of the crowns of Spain and Portugal, and those of 1584, which resulted in a check to France by the marriage of the Spanish infanta Catherine to Charles Emmanuel, duke of Savoy. In the same year he was made archbishop of Besancon, but meanwhile he had been stricken with a lingering disease; he was never enthroned, but died at Madrid on the 21st of September 1586. His body was removed to Besancon, where his father had been buried. Granvella was a man of great learning, which was equalled by his industry, and these qualities made him almost indispensable both to Charles V. and to Philip II. /

Numerous letters and memoirs of Granvella are preserved in the archives of Besancon. These were to some extent made use of by Prosper Leveque in his Memoires pour servir (1753), as well as by the Abbe Boisot in the Tresor de Granvella. A commission for publishing the whole of the letters and memoirs was appointed by Guizot in 1834, and the result has been the issue of nine volumes of the Papiers d'Etat du cardinal de Granvelle, edited by C. Weiss (Paris, 1841-1852). They form a part of the Collection de documents inedits sur I'histoire de France, and were supplemented by the Correspondance du cardinal Granvelle, 1565-1586, edited by M. E. Poullet and G. J. C. Piot (12 vols., Brussels, 1878-1896). See also the anonymous Histoire du cardinal de Granville, attributed to Courchetet D'Esnans (Paris, 1761); J. L. Motley, Rise of the Dutch Republic; M. Philippson, Ein Ministerium unter Philipp II. (Berlin, 1895); and the Cambridge Modern History (vol. iii. 1904).

GRANVILLE, GRANVILLE GEORGE LEVESON-GOWER,

2ND Earl (1815-1891), English statesman, eldest son of the 1st Earl Granville (1773-1846), by his marriage with Lady Harriet, daughter of the duke of Devonshire, was born in London on the nth of May 1815. His father, Granville Leveson-Gower, was a younger son of Granville, 2nd Lord Gower and 1st marquess of Stafford (1720-1803), by his third wife; an elder son by the second wife (a daughter of the 1st duke of Bridgwater) became the 2nd marquess of Stafford, and his marriage with the daughter and heiress of the 17th earl of Sutherland (countess of Sutherland in her own right) led to the merging of the Gower and Stafford titles in that of the dukes of Sutherland (created 1833), who represent the elder branch of the family. As Lord Granville Leveson-Gower, the 1st Earl Granville (created viscount in 18 1 5 and earl in 1833) entered the diplomatic service and was ambassador at St Petersburg (1804-1807) and at Paris (1824- 1841). He was a Liberal in politics and an intimate friend of Canning. The title of Earl Granville had been previously held in the Carteret family.

After being at Eton and Christ Church, Oxford, young Lord Leveson went to Paris for a short time under his father, and in 1836 was returned to parliament in the Whig interest for Morpeth. For a short time he was under-secretary for foreign affairs in Lord Melbourne's ministry. In 1840 he married Lady Acton (Marie Louise Pelline de Dalberg, widow of Sir Richard Acton; see Acton and Dalberg). From 1841 till his father's death in 1846, when he succeeded to the title, he sat for Lichfield. In the House of Lords he signalized himself as a Free Trader, and Lord John Russell made him master of the buckhounds (1846). He proved a useful member of the party, and his influence and amiable character were valuable in all matters needing diplomacy and good breeding. He became vice- president of the Board of Trade in 1848, and took a prominent part in promoting the great exhibition of 1851. In the latter year, having already been admitted to the cabinet, he succeeded Palmerston at the foreign office until Lord John Russell's defeat in 1852; and when Lord Aberdeen formed his government at the end of the year, he became first president of the council, and then chancellor of the duchy of Lancaster (1854). Under Lord Palmerston (1855) he was president of the council. His interest in education (a subject associated with this office) led to his election (1856) as chancellor of the London University, a post he held for thirty-five years; and he was a prominent champion of the movement for the admission of women, and also of the teaching of modern languages. From 1855 Lord Granville led the Liberals in the Upper House, both in office, and, after Palmerston's resignation in 1858, in opposition. He went in 1856 as head of the British mission to the tsar's coronation in Moscow. In June 1859 the queen, embarrassed by the rival ambitions

of Palmerston and Russell, sent for him to form a ministry, but he was unable to do so, and Palmerston again became prime minister, with Lord John as foreign secretary ‘ and Granville as president of the council. In i860 his wife died, and to this heavy loss was shortly added that of his great friends Lord and Lady Canning and of his mother (1862); but he devoted himself to his political work, and retained his office when, on Palmerston’s death in 1865, Lord Russell (now a peer) became prime minister and took over the leadership in the House of Lords. He was made Lord Warden of the Cinque

Ports, and in the same year married again, his second wife being Miss Castalia Campbell. From 1866 to 1868 he was in opposition, but in December 1868 he became colonial secretary in Gladstone’s first ministry. His tact was invaluable to the government in carrying the Irish Church and Land Bills through the House of Lords. On the 27th of June 1870, on Lord Clarendon’s death, he was transferred to the foreign office. Lord Granville’s name is mainly associated with his career as foreign secretary (1870-1874 and 1880-1885); but the Liberal foreign policy of that period was not distinguished by enterprise or ” backbone.” Lord Granville personally was patient and polite, but his courteous and pacific methods were somewhat inadequate in dealing with the new situation then arising in Europe and outside it; and foreign governments had little scruple in creating embarrassments for Great Britain, and rely- ing on the disinclination of the Liberal leaders to take strong measures. The Franco-German War of 1870 broke out within a few days of Lord Granville’s quoting in the House of Lords (nth of July) the curiously unprophetic opinion of the per- manent under-secretary (Mr Hammond) that ” he had never known so great a lull in foreign affairs.” Russia took advantage of the situation to denounce the Black Sea clauses of the treaty of Paris, and Lord Granville’s protest was ineffectual. In 1871 an intermediate zone between Asiatic Russia and Afghanistan was agreed on between him and Shuvalov; but in 1873 Russia took possession of Khiva, within the neutral zone, and Lord Granville had to accept the aggression. When the Conservatives came into power in 1874, his part for the next six years was to criticize Disraeli’s ” spirited ” foreign policy, and to defend his own more pliant methods. He returned to the foreign office in 1880, only to find an anti-British spirit developing in German policy which the temporizing methods of the Liberal leaders were generally powerless to deal with. Lord Granville failed to realize in time the importance of the Angra Pequena question in 1883-1884, and he was forced, somewhat ignominiously, to yield to Bismarck over it. Whether in Egypt, Afghanistan or equatorial and south-west Africa, British foreign policy was dominated by suavity rather than by the

strength which com- mands respect. Finally, when Gladstone took up Home Rule for Ireland, Lord Granville, whose mind was similarly receptive to new ideas, adhered to his chief (1886), and gracefully gave way to Lord Rosebery when the latter was preferred to the foreign office; the Liberals had now realized that they had lost ground in the country by Lord Granville's occupancy of the post. He went to the Colonial Office for six months, and in July 1886 retired from public life. He died in London on the 31st of March 1891, being succeeded in the title by his son, born in 1872. Lord Granville was a man of much charm and many friendships, and an admirable after-dinner speaker. He spoke French like a Parisian, and was essentially a diplomatist; but he has no place in history as a constructive statesman.

The life of Lord Granville (1905), by Lord Fitzmaurice, is full of interesting material for the history of the period, but being written by a Liberal, himself an under-secretary for foreign affairs, it explains rather than criticizes Lord Granville's work in that depart- ment. (H. Ch.)

GRANVILLE, JOHN CARTERET, Earl (1690-1763), English statesman, commonly known by his earlier title as Lord Carteret, born on the 22nd of April 1690, was the son of George, 1st Lord Carteret, by his marriage with Grace Granville, daughter of Sir John Granville, 1st earl of Bath, and great grandson of the Elizabethan admiral, Sir Richard Grenville, famous for his death in the " Revenge." The family of Carteret was settled in the Channel Islands, and was of Norman descent. John Carteret was educated at Westminster, and at Christ Church, Oxford. Swift says that " with a singularity scarce to be justified he carried away more Greek, Latin and philosophy than properly became a person of his rank." Throughout life Carteret not only showed a keen love of the classics, but a taste for, and a knowledge of, modern languages and literatures. He was almost the only Englishman of his time who knew German. Harte, the author of the Life of Gustavus Adolphus. acknowledged the aid which Carteret had given him. On the

17 th of October 1710 he married at Longleat Lady Frances Worsley, grand-daughter of the first Viscount Weymouth. He took his seat in the Lords on the 25th of May 1711. Though his family, on both sides, had been devoted to the house of Stuart, Carteret was a steady adherent of the Hanoverian dynasty. He was a friend of the Whig

leaders Stanhope and Sunderland, took a share in defeating the Jacobite conspiracy of Bolingbroke on the death of Queen Anne, and supported the passing of the Septennial Act. Carteret's interests were however in foreign, and not in domestic policy. His serious work in public life began with his appointment, early in 17 19, as ambassador to Sweden. During this and the following year he was employed in saving Sweden from the attacks of Peter the Great, and in arranging the pacification of the north. His efforts were finally successful. During this period of diplomatic work he acquired an exceptional knowledge of the affairs of Europe, and in particular of Germany, and displayed great tact and temper in dealing with the Swedish senate, with Queen Ulrica, with the king of Denmark and Frederick William I. of Prussia. But he was not qualified to hold his own in the intrigues of court and parliament in London. Named secretary of state for the southern department on his return home, he soon became helplessly in conflict with the intrigues of Townshend and Sir Robert Walpole. To Walpole, who looked upon every able colleague, or subordinate, as an enemy to be removed, Carteret was exceptionally odious. His capacity to speak German with the king would alone have made Sir Robert detest him. When, therefore, the violent agitation in Ireland against Wood's halfpence (see Swift, Jonathan) made it necessary to replace the duke of Grafton as lord lieutenant, Carteret was sent to Dublin. He landed in Dublin on the 23rd of October 1724, and remained there till 1730. In the first months of his tenure of office he had to deal with the furious opposition to Wood's halfpence, and to counteract the effect of Swift's Draper's Letters. The lord lieutenant had a strong personal liking for Swift, who was also a friend of Lady Carteret's family. It is highly doubtful whether Carteret could have reconciled his duty to the crown with his private friendships, if government had persisted in endeavouring to force the detested coinage on the Irish people. Wood's patent was however withdrawn, and Ireland settled down. Carteret was a profuse and popular lord lieutenant who pleased both the " English interest " and the native Irish. He was at all times addicted to lavish hospitality, and according to the testimony of contemporaries was too fond of burgundy. When he returned to London in 1730, Walpole was firmly established as master of the House of Commons, and as the trusted minister of King George II. He had the full confidence of Queen Caroline, whom he prejudiced against Carteret. Till the fall of Walpole in 1742, Carteret could take no share in public affairs except as a leader of opposi- tion of the Lords. His brilliant parts were somewhat obscured by his rather erratic conduct, and a certain contempt, partly aristocratic and partly intellectual, for commonplace men and ways. He endeavoured to please Queen Caroline, who loved literature, and he has the credit, on

good grounds, of having paid the expenses of the first handsome edition of Don Quixote to please her. But he reluctantly, and most unwisely, allowed himself to be entangled in the scandalous family quarrel between Frederick, prince of Wales, and his parents. Queen Caroline was provoked into classing him and Bolingbroke, as ” the two most worthless men of parts in the country.” Carteret took the popular side in the outcry against Walpole for not making war on Spain. When the War of the Austrian Succession ap- proached, his sympathies were entirely with Maria Theresa — mainly on the ground that the fall of the house of Austria would dangerously increase the power of France, even if she gained no accession of territory. These views made him welcome to George II., who gladly accepted him as secretary of state in 1742. In 1743 he accompanied the king of Germany, and was present at the battle of Dettingen on the 27th of June. He held the secretaryship till November 1744. He succeeded in promoting an agreement between Maria Theresa and Frederick. He under-

stood the relations of the European states, and the interests of Great Britain among them. But the defects which had rendered him unable to baffle the intrigues of Walpole made him equally unable to contend with the Pelhams. His support of the king’s policy was denounced as subservience to Hanover. Pitt called him ” an execrable, a sole minister who had renounced the British nation.” A few years later Pitt adopted an identical policy, and professed that whatever he knew he had learnt from Carteret. On the 18th of October 1744 Carteret became Earl Granville on the death of his mother. His first wife died in June 1743 at Aschaffenburg, and in April 1744 he married Lady Sophia Fermor, daughter of Lord Pomfret — a fashionable beauty and ” reigning toast ” of London society, who was younger than his daughters. ” The nuptials of our great Quixote and the fair Sophia,” and Granville’s ostentatious performance of the part of lover, were ridiculed by Horace Walpole. The countess Granville died on the 7th of October 1745, leaving one daughter Sophia, who married Lord Shelburne, 1st marquis of Lansdowne. This marriage may have done something to increase Granville’s reputation for eccentricity. In February 1746 he allowed himself to be entrapped by the intrigues of the Pelhams into accepting the secretaryship, but resigned in forty-eight hours. In June 1 7 5 1 he became president of the council, and was still liked and trusted by the king, but his share in government did not go beyond giving advice, and endeavouring to forward ministerial arrangements. In 1756 he was asked by Newcastle to become prime minister as the alternative to Pitt, but Granville, who perfectly understood why the offer was made, declined and supported Pitt. When in October 1761 Pitt, who had information of the signing of the

” Family Compact ” wished to declare war on Spain, and declared his intention to resign unless his advice was accepted, Granville replied that ” the opinion of the majority (of the Cabinet) must decide.” He spoke in complimentary terms of Pitt, but resisted his claim to be considered as a ” sole minister ” or, in the modern phrase, ” a prime minister.” Whether he used the words attributed to him in the Annual Register for 1761 is more.than doubtful, but the minutes of council show that they express his meaning. Granville remained in office as president till his death. His last act was to listen while on his death-bed to the reading of the preliminaries of the treaty of Paris. He was so weak that the under-secretary, Robert Wood, author of an essay on The Original Genius of Homer, would have post- poned the business, but Granville said that it ” could not pro- long his life to neglect his duty,” and quoted the speech of Sarpedon from Iliad xii. 322-328, repeating the last word (tonev) ” with a calm and determined resignation.” He died in his house in Arlington Street, London, on the 22nd of January 1763. The title of Granville descended to his son Robert, who died without issue in 1776, when the earldom of this creation became extinct.

A somewhat partisan life of Granville was published in 1887, by Archibald Ballantyne, under the title of Lord Carteret, a Political Biography.

GRANVILLE, a town of Cumberland county, New South Wales, 13 m. by rail W. of Sydney. Pop. (1901) 5094. It is an important railway junction and manufacturing town, pro- ducing agricultural implements, tweed, pipes, tiles and bricks; there are also tanneries, flour-mills, and kerosene and meat export works. It became a municipality in 1885.

GRANVILLE, a fortified sea-port and bathing-resort of north- western France, in the department of Manche, at the mouth of the Bosq, 85 m. S. by W. of Cherbourg by rail. Pop. (1906) 10,530. Granville consists of two quarters, the upper town built on a promontory jutting into the sea and surrounded by ramparts, and the lower town and harbour lying below it. The barracks and the church of Notre-Dame, a low building of granite, partly Romanesque, partly late Gothic in style, are in the upper town. The port consists of a tidal harbour, two floating basins and a dry dock. Its fleets take an active part in deep sea fishing, including the cod-fishing off Newfoundland, and oyster-fishing is carried on. It has regular communication

with Guernsey and Jersey, and with the islands of St Pierre and Miquelon. The principal exports are eggs, vegetables and fish; coal, timber and chemical manures are imported. The industries include ship-building, fish-salting, the manufacture of cod-liver oil, the preserving of vegetables, dyeing, metal- founding, rope-making and the manufacture of chemical manures. Among the public institutions are a tribunal and a chamber of commerce. In the commune are included the lies Chausey about 75 m. N.W. of Granville (see Channel Islands). Granville, before an insignificant village, was fortified by the English in 1437, taken by the French in 1441, bombarded and burned by the English in 1695, an d unsuccessfully besieged by the Vendean troops in 1793. It was again bombarded by the English in 1803.

GRANVILLE, a village in Licking county, Ohio, U.S.A., in the township of Granville, about 6 m. W. of Newark and 27 m. E. by N. of Columbus. Pop. of the village (1910) 1394; of the township (1910) 2442. Granville is served by the Toledo & Ohio Central and the Ohio Electric railways, the latter reaching Newark (where it connects with the Pittsburg, Cincinnati, Chicago & St Louis and the Baltimore & Ohio rail ways), Columbus, Dayton, Zanesville and Springfield. Granville is the seat of Denison University, founded in 1831 by the Ohio Baptist Education Society and opened as a manual labour school, called the Granville Literary and Theological Institution. It was renamed Granville College in 1845, and took its present name in 1854 in honour of William S. Denison of Adamsville, Ohio, who had given $10,000 to the college. The university comprised in 1907-1908 five departments: Granville College (229 students), the collegiate department for men; Shepardson College (246 students, including 82 in the preparatory department), the col- legiate department for women, founded as the Young Ladies' Institute of Granville in 1859, given to the Baptist denomination in 1887 by Dr Daniel Shepardson, its principal and owner, and closely affiliated for scholastic purposes, since 1900, with the university, though legally it is still a distinct institution ; Doane Academy (137 students), the preparatory department for boys, established in 1831, named Granville Academy in 1887, and renamed in 1895 in honour of William H. Doane of Cincinnati, who gave to it its building; a conservatory of music (r37 students) ; and a school of art (38 students).

In 1805 the Licking Land Company, organized in the preceding year in Granville, Massachusetts, bought 29,040 acres of land in Ohio, including the site of Granville; the town was laid out, and in the last months of that year settlers from Granville, Mass., began to arrive. By

January 1806 the colony numbered 234 persons; the township was incorporated in 1806 and the village was incorporated in 1831. There are several remarkable Indian mounds near Granville, notably one shaped like an alligator.

SeeHenryBushneM, History of Granville, Ohio (Columbus, O., 1889).

GRAPE, the fruit of the vine (q.v.). The word is adopted from the 0. Fr. grape, mod. grappe, bunch or cluster of flowers or fruit, grappes de raisin, bunch of grapes. The French word meant properly a hook; cf. M.H.G. krapfe, Eng. ” grapnel,” and ” cramp.” The development of meaning seems to be vine-hook, cluster of grapes cut with a hook, and thence in English a single grape of a cluster. The projectile called ” grape ” or ” grape- shot,” formerly used with smooth-bore ordnance, took its name from its general resemblance to a bunch of grapes. It consisted of a number of spherical bullets (heavier than those of the con- temporary musket) arranged in layers separated by thin iron plates, a bolt passing through the centre of the plates binding the whole together. On being discharged the projectile delivered the bullets in a shower somewhat after the fashion of case-shot.
GRAPHICAL METHODS, devices for representing by geometri-‘ cal figures the numerical data which result from the quantitative ‘ investigation of phenomena. The simplest application is met with in the representation of tabular data such as occur in statistics. Such tables are usually of single entry, i.e. to a certain value of one variable there corresponds one, and only one, value of the other variable. To construct the graph, as it is called, of such a table, Cartesian co-ordinates are usually employed.

Two lines or axes at right angles to each other are chosen, inter-secting at a point called the origin; the horizontal axis is the axis of abscissae, the vertical one the axis of ordinates. Along one, say the axis of abscissae, distances are taken from the origin corresponding to the values of one of the variables; at these points perpendiculars are erected, and along these ordinates distances are taken corresponding to the related values of the other variable. The curve drawn through these points is the graph. A general inspection of the graph shows in bold relief the essential characters of the table. For example, if the world’s production of corn over a number of years be plotted, a poor yield is represented by a depression, a rich one by a peak, a uniform one over several years by a horizontal line and so on. Moreover, such graphs permit a convenient comparison of two or more different phenomena, and the curves render apparent at first sight similarities or differences which can be made out from the tables only after close examination. In making graphs for comparison, the scales chosen must

give a similar range of variation, otherwise the correspondence may not be discerned. For example, the scales adopted for the average consumption of tea and sugar must be ounces for the former and pounds for the latter. Cartesian graphs are almost always yielded by automatic recording instruments, such as the barograph, meteorograph, seismometer, &c. The method of polar co-ordinates is more rarely used, being only specially applicable when one of the variables is a direction or recorded as an angle. A simple case is the representation of photometric data, i.e. the value of the intensity of the light emitted in different directions from a luminous source (see Lighting).

The geometrical solution of arithmetical and algebraical problems is usually termed graphical analysis; the application to problems in mechanics is treated in Mechanics, § 5, Graphic Statics, and Diagram. A special phase is presented in Vector Analysis.

GRAPHITE, a mineral species consisting of the element carbon crystallized in the rhombohedral system. Chemically, it is thus indentical with the cubic mineral diamond, but between the two there are very wide differences in physical characters. Graphite is black and opaque, whilst diamond is colourless and transparent; it is one of the softest (H = i) of minerals, and diamond the hardest of all; it is a good conductor of electricity, whilst diamond is a bad conductor. The specific gravity is 2-2, that of diamond is 3-5. Further, unlike diamond, it never occurs as distinctly developed crystals, but only as imperfect six-sided plates and scales. There is a perfect cleavage parallel to the surface of the scales, and the cleavage flakes are flexible but not elastic. The material is greasy to the touch, and soils everything with which it comes into contact. The lustre is bright and metallic. In its external characters graphite is thus strikingly similar to molybdenite (q.v.).

The name graphite, given by A. G. Werner in 1789, is from the Greek ypaei.v, ” to write,” because the mineral is used for making pencils. Earlier names, still in common use, are plum- bago and black-lead, but since the mineral contains no lead these names are singularly inappropriate. Plumbago (Lat. plumbum, lead) was originally used for an artificial product obtained from lead ore, and afterwards for the ore (galena) itself; it was con- fused both with graphite and with molybdenite. The true chemical nature of graphite was determined by K. W. Scheele in 1779.

Graphite occurs mainly in the older crystalline rocks — gneiss, granulite, schist and crystalline limestone — and also sometimes in

granite: it is found as isolated scales embedded in these rocks, or as large irregular masses or filling veins. It has also been observed as a product of contact-metamorphism in carbonaceous clay-slates near their contact with granite, and where igneous rocks have been intruded into beds of coal; in these cases the mineral has clearly been derived from organic matter. The graphite found in granite and in veins in gneiss, as well as that contained in meteoric irons, cannot have had such an origin. As an artificial product, graphite is well known as dark lustrous scales in grey pig-iron, and in the " kish " of iron furnaces: it is also produced artificially on a large scale, together with

carborundum, in the electric furnace (see below). The graphite veins in the older crystalline rocks are probably akin to metalli- ferous veins and the material derived from deep-seated sources; the decomposition of metallic carbides by water and the reduction of hydrocarbon vapours have been suggested as possible modes of origin. Such veins often attain a thickness of several feet, and sometimes possess a columnar structure perpendicular to the enclosing walls; they are met with in the crystalline limestones and other Laurentian rocks of New York and Canada, in the gneisses of the Austrian Alps and the granulites of Ceylon. Other localities which have yielded the mineral in large amount are the Alibert mine in Irkutsk, Siberia and the Borrowdale mine in Cumberland , The Santa Maria mines of Sonora, Mexico, probably the richest deposits in the world, supply the American lead pencil manufacturers. The graphite of New York, Penn- sylvania and Alabama is " flake " and unsuitable for this purpose. Graphite is used for the manufacture of pencils, dry lubricants, grate polish, paints, crucibles and for foundry facings. The material as mined usually does not contain more than 20 to 50% of graphite: the ore has therefore to be crushed and the graphite floated off in water from the heavier impurities. Even the purest forms contain a small percentage of volatile matter and ash. The Cumberland graphite, which is especially suitable for pencils, contains about 12 % of impurities. (L. J. S.)

Artificial Manufacture— The alteration of carbon at high temperatures into a material resembling graphite has long been known. In 1893 Girard and Street patented a furnace and a process by which this transformation could be effected. Carbon powder compressed into a rod was slowly passed through a tube in which it was subjected to the action of one or more electric arcs. E. G. Acheson, in 1896, patented an application of his carborundum process to graphite manufacture,

and in 1899 the International Acheson Graphite Co. was formed, employing electric current from the Niagara Falls. Two procedures are adopted: (1) graphkization of moulded carbons; (2) graphitiza tion of anthracite en masse. The former includes electrodes, lamp carbons, &c. Coke, or some other form of amorphous carbon, is mixed with a little tar, and the required article moulded in a press or by a die. The articles are stacked transversely in a furnace, each being packed in granular coke and covered with carborundum. At first the current is 3000 amperes at 220 volts, increasing to 9000 amperes at 20 volts after 20 hours. In graphi- tizing en masse large lumps of anthracite are treated in the electric furnace. A soft, unctuous form results on treating carbon with ash or silica in special furnaces, and this gives the so-called ” deflocculated ” variety when treated with gallo- tannic acid. These two modifications are valuable lubricants. The massive graphite is very easily machined and is widely used for electrodes, dynamo brushes, lead pencils and the like.

See ” Graphite and its Uses,” Bull. Imperial Institute, (1906) P- 353. (1907) p.- 70; F. Cirkel, Graphite (Ottawa, 1907). (W. G. M.)
GRAPTOLITES, an assemblage of extinct zoophytes whose skeletal remains are found in the Palaeozoic rocks, occasionally in great abundance. They are usually preserved as branching or unbranching carbonized bodies, tree-like, leaf -like or rod-like in shape, their edges regularly toothed or denticulated. Most frequently they occur lying on the bedding planes of black shales; less commonly they are met with in many other kinds of sediment, and when in limestone they may retain much of their original relief and admit of a detailed microscopic study.

Each Graptolite represents the common horny or chitinous investment or supporting structure of a colony of zooids, each tooth-like projection marking the position of the sheath or theca of an individual zooid. Some of the branching forms have a distinct outward resemblance to the polyparies of Sertularia and Plumularia among the recent Hydroida (Calyploblastea); in none of the unbranching forms, however, is the similarity by any means close.

The Graptolite polyparies vary considerably in size: the majority range from 1 in. to about 6 in. in length; few examples have been met with having a length of more than 30 in.

Very different views have been r.eld as to the systematic

place and rank of the Graptolites. Linnaeus included them in his group .of false fossils {Graptolithus = written stone). At one time they were referred by some to the Polyzoa (Bryozoa) and later, by almost general consent, to the Hydroida (Calypto- blastea) among the Hydrozoa (Hydromedusae). Of late years an opinion is gaining ground that they may be regarded as constituting collectively an independent phylum of their own (Graptolithina).

There are two main groups, or sub-phyla: the Graptoloidea or Graptolites proper, and the Dendroidea or tree-like Graptolites- the former is typified by the unbranched genus Monograph's and the latter by the many-branched genus Dendrograptus.

A Monograptus makes its first appearance as a minute dagger-like body (the sicula), which represents the flattened covering of the primary or embryonic zooid of the colony. This sicula, which had originally the shape of a hollow cone, is formed of two portions or regions— an upper and smaller (apical or embryonic) portion, marked by delicate longitudinal lines, and having a fine tabular thread (the nema) proceeding from its apex; and a lower (thecal or apertural) portion, marked by transverse lines of growth and widening in the direction of the mouth, the lip or apertural margin of which forms the broad end of the sicula. This margin is normally furnished with a perpendicular spine (virgella) and occasionally with two shorter lateral spines or lobes.

A bud is given off from the sicula at a variable distance along its length. 1-rom this bud is developed the first zooid and first serial theca of the colony. This theca grows in the direction of the apex of the sicula, to which it adheres by its dorsal wall. Thus while the mouth of the sicula is directed downwards, that of the fir«t serial theca is pointed upwards, making a theoretical angle of about 180° with the direction of that of the sicula.

From this first theca originates a second, opening in the same direction, and from the second a third, and so on, in a continuous linear series until the polypary is complete. Each zooid buds from the one immediately preceding it in the series, and intercommunication is effected by all the budding orifices (including that in the wall of the sicula) remaining permanently open. The sicula itself ceases to grow soon after the earliest theca have been developed ; it remains permanently attached to the dorsal wall of the polypary of which it forms the proximal end, its apex rarely reaching beyond the third or fourth theca.

A fine cylindrical rod or fibre (the so-called solid axis or virgula) becomes developed in a median groove in the dorsal wall of the polypary, and is sometimes continued distally as a naked rod. It was formerly supposed that a virgula was present in all the Graptoloidea; hence the term Rhabdophora sometimes employed for the Graptoloidea in general, and rhabdosome for the individual polypary; but while the virgula is present in many (Axonophora) it is absent as such in others (Axonolipa).

The Graptoloidea are arranged in eight families, each named after a characteristic genus: (1) Dichograptidae; (2) Lepto- graptidae; (3) Dicranograptidae; (4) Diplograptidae; (S) Glossograptidae (sub-family, Lasiograptidae) ; (6) Retiolitidae; (7) Dimorphograptidae; (8) Monograptidae.

In all these families the polypary originates as in Monograptus from a nema-bearing sicula, which invariably opens downwards and gives off only a single bud, such branching as may take place occurring at subsequent stages in the growth of the poly- pary. In some species young examples have been met with in which the nema ends above in a small membranous disk, which has been interpreted as an organ of attachment to the underside of floating bodies, probably sea weeds, from which the young polypary hung suspended.

_ Broadly speaking, these families make their first appearance in time in the order given above, and show a progressive morpho- logical evolution along certain special lines. There is a tendency for the branches to become reduced in number, and for the serial thecae to become directed more and more upwards towards the line of the nema. In the oldest family— Dichograptidae— in winch the branching polypary is bilaterally symmetrical and the thecae uniserial (monoprionidian)— there is a gradation from earlier groups with many branches to later groups with only two; and from species in which all the branches and their thecae are directed downwards, through species in which the branches become bent back more and more outwards and upwards, until in some the terminal thecae open almost vertically. In the genus Phyllograptus the branches have become reduced

1, Diptograptus, young sicula.

2, Monograptus dubius, sicula

and first serial theca (partly restored).

3, Young form (all above after

Wiman). 4a, Older form. 46, Showing virgulafafter Holm).

5, Rastrites distans.)

6, Base of Diptograptus (after Wiman).

D. cakaratus.

Dimorphograptus .

Base of Didymograptus minu- lus (after Holm).

Young Dictyograptus, with primary disk.

Ibid. Diptograptus (after Ruedemann).

a-b, Base and transverse sec- tion, Retiolites Geinitzianus (after Holm).

Bryograptus Kjerulfi.

Dichograptus octobrachiatus, with central disk.

Didymograptus Murchisoni.

D. gibberulus.

a-b, Phyllograptus and trans- verse section.

Nemagraptus gracilis.

Dicranograptus ramosus.

20, Climacograptus Scharenbergi.

21, Glossograptus Hincksii.

22, Lasiograptus costatus (after

Elles and Wood).

23, Dictyonema (graptus) flabelli

forme (-is).

24, Dictyonema (dendron) pel

tatum with base of attach- ment.

25, D. cervicorne, branches (after

Holm).

26, D. rarum (section after

Wiman).

27, Dendrograptus Hallianus.

28, Synrhabdosome of Dipto-

graptus (after Ruedemann). S, Sicula.

u, Upper or apical portion. I, Lower or apertural. m, Mouth. N, Nema. nn, Nemacaulus or virgular tube.

13. 14.

15. 16,

17

19.

V,

vv, zz, T, C,

G,

g. b,

Virgula'. Virgella. Septal strands. Theca. Common canal

lites). _ Gonangium. Gonotheca. Budding theca.

(in Retio-

polypary. In the family of the Diplograptidae the branches are reduced

to two; these also coalesce similarly by their dorsal walls, and the polypary thus becomes biserial {diprionidian) , and the line of the nema is taken by a long axial tube-like structure, the nemacaulus or virgular tube. Finally, in the latest family, the Monograptidae, the branches are theoretically reduced to one, the polypary is uniserial throughout, and all the thecae are directed outwards and upwards.

The thecae in the earliest family — Dichograptidae — are so similar in form to the sicula itself that the polypary has been compared to a colony of siculae; there is the greatest variation in shape in those of the latest family — Monograptidae — in some species of which the terminal portion of each theca becomes isolated (Rastrites) and in some coiled into a rounded lobe. The thecae in several of the families are occasionally provided with spines or lateral processes: the spines are especially conspicuous at the base in some biserial forms: in the Lasiograptidae the lateral processes originate a marginal meshwork surrounding the polypary.

Histologically, the perisarc or test in the Graptoloidea appears to be composed of three layers, a middle layer of variable structure, and an overlying and an underlying layer of remarkable tenuity. The central layer is usually thick and marked by lines of growth; but in Glossograptus and Lasiograptus it is thinned down to a fine membrane stretched upon a skeleton framework of lists and fibres, and in Retiolites this membrane is reduced to a delicate network. The groups typified by these three genera are sometimes referred to, collectively, as the Retioloidea, and the structure as retioloid.

It is the general practice of palaeontologists to regard each graptolite polypary (rhabdosome) developed from a single sicula as an individual of the highest order. Certain American forms, however, which are preserved as stellate groups, have been interpreted as complex umbrella-shaped colonial stocks, indivi- duals of a still higher order (synrhabdosom.es), composed of a number of biserial polyparies (each having a sicula at its outer extremity) attached by their nemacauli to a common centre of origin, which is provided with two disks, a swimming bladder and a ring of capsules.

In the Dendroidea, as a rule, the polypary is non-symmetrical in shape and tree-like or shrub-like in habit, with numerous branches irregularly disposed, and with a distinct stem-like or short basal portion ending below in root-like fibres or in a mem- branous disk or sheet of attachment. An exception, however, is constituted by the comprehensive genus Dictyonema, which embraces species composed of a large number of divergent and sub-parallel branches, united by

transverse dissepiments into a symmetrical cone-like or funnel-shaped polypary, and includes some forms (Dictyograptus) which originate from a nema-bearing sicula and have been claimed as belonging to the Graptoloidea. Of the early development of the polypary in the Dendroidea little is known, but the more mature stages have been fully worked out. In Dictyonema the branches show thecae of two kinds: (1) the ordinary tubular thecae answering to those of the Graptoloidea and occupied by the nourishing zooids; and (2) the so-called bithecae, birdnest-like cups (regarded by their discoverers as gonothecae) opening alternately right and left of the ordinary thecae. Internally, there existed a third set of thecae, held to have been inhabited by the budding individuals. In the genus Dendrograptus the gonothecae open within the walls of the ordinary thecae, and the branches present an outward resemblance to those of the uniserial Graptoloidea. But in striking contrast to what obtains among the Graptoloidea in general, the budding orifices in the Dendroidea become closed, and all the various cells shut off from each other.

The classification of the Dendroidea is as yet unsatisfactory: the families most conspicuous are those typified by the genera Dendrograptus, Dictyonema, Inocaulis and Thamnograptus.

As regards the modes of reproduction among the Graptolites little is known. In the Dendroidea, as already pointed out, the bithecae were possibly gonothecae, but they have been interpreted by some as nematophores. In the Graptoloidea certain lateral and vesicular appendages of the polypary in the Lasiograptidae have been looked upon as connected with the reproductive system; and in the umbrella-shaped synrhabdosomes already referred to, the common centre is surrounded by a ring of what have been regarded as ovarian capsules. The theory of the gonangial nature of the vesicular bodies in the Graptoloidea is, however, disputed by some authorities, and

to four and these coalesce by their dorsal walls along the line of m tue urdploluluell 1Si noW ever, uisputeu oy some autnonties, ana the nema, and the sicula becomes embedded in the base of the I it has been suggested that the zooid of the sicula itself is not the

product of the normal or sexual mode of propagation in the group, but owes its origin to a peculiar type of budding or non-sexual reproduction, in which, as temporary resting or protecting structures,

the vesicular bodies may have had a share.

As respects the mode of life of the Graptolites there can be little doubt that the Dendroidea were, with some exceptions, sessile or benthonic animals, their polyparies, like those of the recent Calyptoblastea, growing upwards, their bases remaining attached to the sea floor or to foreign bodies, usually fixed. The Graptoloidea have also been regarded by some as benthonic organisms. A more prevalent view, however, is that the majority were pseudo-planktonic or drifting colonies, hanging from the underside of- floating seaweeds; their polyparies being each suspended by the nema in the earliest stages of growth, and, in later stages, some by the nemacaulus, while others became adherent above by means of a central disk or by parts of their dorsal walls. Some of these ancient seaweeds may have remained permanently rooted in the littoral regions, while others may have become broken off and drifted, like the recent Sargassum, at the mercy of the winds and currents, carrying the attached Graptolites into all latitudes. The more complex umbrella- shaped colonies of colonies (synrhabdosomes) described as provided with a common swimming bladder (pneumatophore?) may have attained a holo-planktonic or free-swimming mode of existence.

The range of the Graptolites in lime extends from the Cambrian to the Carboniferous. The Dendroidea alone, however, have this extended range, the Graptoloidea becoming extinct at the close of Silurian time. Both groups make their first appearance together near the end of the Cambrian; but while in the succeed- ing Ordovician and Silurian the Dendroidea are comparatively rare, the Graptoloidea become the most characteristic and, locally, the most abundant fossils of these systems.

The species of the Graptoloidea have individually a remarkably short range in geological time; but the geographical distribution of the group as a whole, and that of many of its species, is almost world-wide. This combination of circumstances has given the Graptoloidea a paramount stratigraphical importance aspalaeon- tological indices of the detailed sequence and correlation of the Lower Palaeozoic rocks in general. Many Graptolite zones, showing a constant uniformity of succession, paralleled in this respect only by the longer known Ammonite zones of the Jurassic, have been distinguished in Britain and northern Europe, each marked by a characteristic species. Many British species and associations of genera and species, occurring on corresponding horizons to those on which they are found in Britain, have been met with in the graptolite-bearing Lower Palaeozoic formations uf other parts of Europe, in America, Australia, New Zealand and elsewhere.

Bibliography. — Linnaeus, Systema naturae (12th ed. 1768); Hall, Graptolites of the Quebec Group (1865); Barrande, Graptolites de Boheme (1850); Carruthers, Revision of the British Graptolites (1868); H. A. Nicholson, Monograph of British Graptolites, pt. 1 (1872); id. and J. E. Marr, Phytogeny of the Graptolites (1895); Hopkinson, On British Graptolites (1869); AUman, Monograph of Gymnoblastic Hydroids (1872) ; Lapworth, An Improved Classification of the Rhabdophora (1873); The Geological Distribution of the Rhabdophora (1879. 1880); Walther, Lebensweise fossiler Meerestiere (1897); Tullberg, Shanes Grapioliter (1882, 1883); Tornquist, Graptoliks Scanian Rastrites Beds (1899); Wiman, Die Graptolilhen (1895); Holm, Gotlands Graptoliter (1890); Perner, Graptolites de Boheme (1894-1899); R. Ruedemann, Development and Mode of Growth of Diplograptus (1895-1896); Graptolites of New York, vol. i. (1904), vol. ii. (1908) : Freeh, Lethaea palaeozoica, Graptolithiden (1897) ; Elles and Wood, Monograph of British Graptolites (1901-1909). (C. L.*)

GRASLITZ (Czech, Kraslice), a town of Bohemia, on the Zwodau, 145 m. N.W. of Prague by rail. Pop. (1900) 11,803, exclusively German. Graslitz is one of the most important industrial towns of Bohemia, its specialities being the manu- facture of musical instruments, carried on both as a factory and a domestic industry, and lace-making. Next in importance are cotton-spinning and weaving, machine embroidery, brewing, and the mother-of-pearl industry.

GRASMERE, a village and lake of Westmorland, in the heart of the English Lake District. The village (pop. of urban district

in 1901, 781) lies near the head of the lake, on the small river Rothay and the Keswick- Ambleside road, 12I m. from Keswick and 4 from Ambleside. The scenery is very beautiful; the valley about the lakes of Grasmere and Rydal Water is in great part wooded, while on its eastern flank there rises boldly the range of hills which includes Rydal Fell, Fairfield and Seat Sandal, and, farther north, Helvellyn. On the west side are Loughrigg Fell and Silver How. The village has become a favourite centre for tourists, but preserves its picturesque and sequestered appearance. In a house still standing William Wordsworth lived from 1799 to 1808, and it was subsequently occupied by Thomas de Quincey and by Hartley Coleridge. Wordsworth's tomb, and also that of Coleridge, are in the churchyard of the ancient church of St Oswald, which contains a memorial to Wordsworth with an inscription by John Keble. A festival called the Rushbearing takes place on the Saturday within the octave of St Oswald's day (August 5th), when a holiday is observed and the church decorated with rushes, heather and flowers. The festival is of early origin, and has

been derived by some from the Roman Floralia, but appears also to have been made the occasion for carpeting the floors of churches, unpaved in early times, with rushes. Moreover, in a procession which forms part of the festivities at Grasmere, certain Biblical stories are symbolized, and in this a connexion with the ancient miracle plays may be found (see H. D. Rawnsley, A Rambler's Note-Book at the English Lakes, Glasgow, 1902). Grasmere is also noted for an athletic meeting in August.

The lake of Grasmere is just under 1 m. in length, and has an extreme breadth of 766 yds. A ridge divides the basin from north to south, and rises so high as to form an island about the middle. The greatest depth of the lake (75 ft.) lies to the east of this ridge.

GRASS AND GRASSLAND, in agriculture. The natural vegetable covering of the soil in most countries is " grass " (for derivation see Grasses) of various kinds. Even where dense forest or other growth exists, if a little daylight penetrates to the ground grass of some sort or another will grow. On ordinary farms, or wherever farming of any kind is carried out, the proportion of the land not actually cultivated will either be in grass or will revert naturally to grass in time if left alone, after having been cultivated.

Pasture land has always been an important part of the farm, but since the " era of cheap corn " set in its importance has been increased, and much more attention has been given to the study of the different species of grass, their characteristics, the improvement of a pasture generally, and the " laying down " of arable land into grass where tillage farming has not paid. Most farmers desire a proportion of grass-land on their farms— from a third to a half of the area — and even on wholly arable farms there are usually certain courses in the rotation of crops devoted to grass (or clover) . Thus the Norfolk 4-course rotation is corn, roots, corn, clover; the Berwick 5-course is corn, roots, corn, grass, grass; the Ulster 8-course, corn, flax, roots, corn, flax, grass, grass, grass; and so on, to the point where the grass remains down for 5 years, or is left indefinitely.

Permanent grass may be grazed by live-stock and classed as pasture pure and simple, or it may be cut for hay. In the latter case it is usually classed as " meadow " land, and often forms an alluvial tract alongside a stream, but as grass is often grazed and hayed in alternate years, the distinction is not a hard and fast one.

There are two classes of pasturage, temporary and permanent. The latter again consists of two kinds, the permanent grass natural to land

that has never been cultivated, and the pasture that has been laid down artificially on land previously arable and allowed to remain and improve itself in the course of time. The existence of ridge and furrow on many old pastures in Great Britain shows that they were cultivated at one time, though perhaps more than a century ago. Often a newly laid down pasture will decline markedly in thickness and quality about the fifth and sixth year, and then begin to thicken and improve year by year afterwards. This is usually attributed

to the fact that the unsuitable varieties die out, and the ” natur- ally ” suitable varieties only come in gradually. This trouble can be largely prevented, however, by a judicious selection of seed, and by subsequently manuring with phosphatic manures, with farmyard or other bulky ” topdressings,” or by feeding sheep with cake and corn over the field.

All the grasses proper belong to the natural order Gramineae (see Grasses), to which order also belong all the ” corn ” plants cultivated throughout the world, also many others, such as bamboo, sugar-cane, millet, rice, &c. &c, which yield food, for mankind. Of the grasses which constitute pastures and hay- fields over a hundred species are classified by botanists in Great Britain, with many varieties in addition, but the majority of these, though often forming a part of natural pastures, are worthless or inferior for farming purposes. The grasses of good quality which should form a ” sole ” in an old pasture and pro- vide the bulk of the forage on a newly laid down piece of grass are only about a dozen in number (see below) , and of these there are only some six species of the very first importance and indispensable in a ” prescription ” of grass seeds intended for laying away land in temporary or permanent pasture. Dr W. Fream caused a botanical examination to be made of several of the most cele- brated pastures of England, and, contrary to expectation, found that their chief constituents were ordinary perennial ryegrass and white clover. Many other grasses and legumes were present, but these two formed an overwhelming proportion of the plants.

In ordinary usage the term grass, pasturage, hay, &c, includes many varieties of clover and other members of the natural order Leguminosae as well as other ” herbs of the field,” which, though not strictly ” grasses,” are always found in a grass field, and are included in mixtures of seeds for pasture and meadows. The following is a list

of the most desirable or valuable agri- cultural grasses and clovers, which are either actually sown or, in the case of old pastures, encouraged to grow by draining, liming, manuring, and so on: —

Grasses.

Meadow foxtail.

Sweet vernal grass.

Tall oat-grass.

Alopecurus pratensis Anthoxanthum odoraturr. Avena elatior Avena flavescens Cynosurus cristatus. Dactylis glomerata . Festuca duriuscula . Festuca elatior . Festuca pvina Festuca pratensis Lolium italicum. Phleum pratense Poa nemoralis . Poa pratensis Poa trivialis .

Golden oat-grass. Crested dogstail. Cocksfoot. Hard fescue. Tall fescue. Sheep's fescue. Meadow fescue. Italian ryegrass. Timothy or catstail. Wood meadow-grass. Smooth meadow-grass. Rough meadow-grass.

Medicago lupulina

Medicago sativa.

Trifolium hybridum pratense . pratense) perenne \ incarnatum procumbens repens

Achillea Millefolium.

Anthyllis vulneraria.

Lotus major .

Lotus corniculatus .

Carum petroselinum

Plantago lanceolata.

Cichorium intybus .

Poterium officinale .

Clovers, &c.

Trefoil or " Nonsuch." Lucerne (Alfalfa). Alsike clover. Broad red

clover.

Perennial clover.

Crimson clover or ” Trifolium.”

Yellow Hop-trefoil.

White or Dutch clover.

Yarrow or Milfoil.

Kidney-vetch.

Greater Birdsfoot Trefoil.

Lesser ,, ,,

Field parsley.

Plantain.

Chicory.

Burnet.

basic slag at the rate of from 5 to 10 cwt. per acre has been found to give excellent results on poor clays and peaty soils. Basic slag is a by-product of the Bessemer steel process, and is rich in a soluble form of phosphate of lime (tetra-phosphate) which specially stimulates the growth of clovers and other legumes, and has renovated many inferior pastures.

In the Rothamsted experiments continuous manuring with ” mineral manures ” (no nitrogen) on an old meadow has reduced the grasses from 71 to 64% of the whole, while at the same time it has increased the Leguminosae from 7% to 24%. On the other hand, continuous use of nitrogenous manure in addition to “minerals” has raised the grasses to 94% of the total and reduced the legumes to less than 1 %.

As to the best kinds of grasses, &c, to sow in making a pasture out of arable land, experiments at Cambridge, England, have demonstrated that of the many varieties offered by seedsmen only a very few are of any permanent value. A complex mixture of tested seeds was sown, and after five years an examination of the pasture showed that only a few varieties survived and made the ” sole ” for either grazing or forage. These varieties in the order of their importance were : —

Cocksfoot 26

Perennial rye grass 16

Meadow fescue 13

Hard fescue 9

Crested dogstail . 8

Timothy 6

White clover 4

Meadow foxtail 2

The figures represent approximate percentages.

Before laying down grass it is well to examine the species already growing round the hedges and adjacent fields. An inspection of this sort will show that the Cambridge experiments are very conclusive, and that the above species are the only ones to be depended on. Occasionally some other variety will be pro- minent, but if so there will be a special local reason for this.

On the other hand, many farmers when sowing down to grass like to have a good bulk of forage for the first year or two, and therefore include several of the clovers, lucerne, Italian ryegrass, evergreen ryegrass, &c, knowing that these will die out in the course of years and leave the ground to the more permanent species.

There are also several mixtures of ” seeds ” (the technical name given on the farm to grass-seeds) which have been adopted with success in laying down permanent pasture in some localities.

The predominance of any particular species is largely deter- mined by climatic circumstances, the nature of the soil and the treatment it receives. In limestone regions sheep’s fescue has been found to predominate; on wet clay soil the dog’s bent (Agrostis canina) is common; continuous manuring with nitro- genous manures kills out the leguminous plants and stimulates such grasses as cocksfoot ; manuring with phosphates stimulates the clovers and other legumes; and so on. Manuring with

O

e

3

“3

be ■

E %

General purpose mixture.

>

O

►J

W

U

Cocksfoot

8

4

8

8

4

Perennial ryegrass

2

6

10

Meadow fescue.

.

6

2

5

Hard fescue

1

1

2

3

Crested dogstail

! 2

1

3

Timothy

3

1

2

2

Meadow foxtail

10

1

1

Tall fescue .

3

1

3*

2

Tall oat grass .

1

3

Italian ryegrass

2

5

Smooth meadow grass

1

Rough meadow grass

1

1

Golden oat grass .

1

1

Sheep’s fescue .

1

Broad red clover

1

2

Perennial red clove

r

1

1*

2

Alsike . . .

1

1*

1

2

Lucerne (Alfalfa)

8

White clover

1

\ 1

1

2

2

2

Kidney vetch .

5

2*

Sheep’s parsley.

1

Yarrow .

[I

I

1

Burnet .

8

8

Chicory .

\

2\

\

Total lb per acre

3

40

17

40

30

40 1

Arthur Young more than 100 years ago made out one to suit chalky hillsides; Mr Faunce de Laune (Sussex) in our days was the first to study grasses and advocated, leaving out ryegrass of all kinds; Lord Leicester adopted a cheap mixture suitable for poor land with success; Mr Elliot (Kelso) has introduced many deep-rooted ” herbs ” in his mixture with good results. Typical examples of such mixtures are given on preceding page.

Temporary pastures are commonly resorted to for rotation purposes, and in these the bulky fast-growing and short-lived grasses and clovers are given the preference. Three examples of temporary mixtures are given below.

One

year.

Two years.

Three or four years.

Italian ryegrass

Cocksfoot

Timothy

Broad red clover .

Alsike

Trefoil

Perennial ryegrass Meadow fescue Perennial red clover . White clover …. Meadow foxtail

Total lb per acre .

14 2

8 3 3

10

4

2

5 2 2

5 2 2 1 1

6 6 3 3 2 2

10 2 2 2 2

30

36

40

Where only a one-year hay is required, broad red clover is often grown, either alone or mixed with a little Italian ryegrass, while other forage crops, like trefoil and trifolium, are often grown alone.

In Great Britain a heavy clay soil is usually preferred for pasture, both because it takes most kindly to grass and because the expense of cultivating it makes it unprofitable as arable land when the price of corn is low. On light soil the plant frequently suffers from drought in summer, the want of moisture preventing it from obtaining proper root-hold. On such soil the use of a heavy roller is advantageous, and indesd on any soil excepting heavy clay frequent rolling is beneficial to the grass, as it pro- motes the capillary action of the soil-particles and the consequent ascension of ground-water.

In addition, the grass on the surface helps to keep the moisture from being wasted by the sun's heat.

The graminaceous crops of western Europe generally are similar to those enumerated. Elsewhere in Europe are found certain grasses, such as Hungarian brome, which are suitable for introduction into the British Isles. The grasses of the American prairies also include many plants not met with in Great Britain. Some half-dozen species are common to both countries: Kentucky " blue-grass " is the British Poa pratensis; couch grass (Triticum repens) grows plentifully without its underground runners; bent {Agrostis vulgaris) forms the famous " red-top," and so on. But the American buffalo-grass, the Canadian buffalo-grass, the " bunch " grasses, " squirrel-tail " and many others which have no equivalents in the British Islands, form a large part of the prairie pasturage. There is not a single species of true clover found on the prairies, though cultivated varieties can be intro- duced. (P. McC.)

GRASSE, FRANCOIS JOSEPH PAUL, Marquis de Grasse- tilly, Comte de (1722-1788), French sailor, was born at Bar, in the present department of the Alpes Maritimes. In 1734 he took service on the galleys of the order of Malta, and in 1740 entered the service of France, being promoted to chief of squadron in 1779. He took part in the naval operations of the American War of Independence, and distinguished himself in the battles of Dominica and Saint Lucia (1780), and of Tobago (1781). He was less fortunate at St Kitts, where he was defeated by Admiral Hood. Shortly afterwards, in April 1782, he was defeated and taken prisoner by Admiral Rodney. Some months later he re- turned to France, published a Memoire justificatif, and was acquitted by a court-martial (1 784) . He died at Paris in January

1788.

His son Alexandre de Grasse, published a Notice bibliographique sur Vamiral comte de Grasse d'apres les documents inedits in 1840. See G. Lacour-Gayet, La Marine militaire de la France sous le regne de Louis XV (Paris, 1902).

GRASSE, a town in the French department of the Alpes Maritimes (till i860 in that of the Var), 1 2! m. by rail N. of Cannes. Pop. (1906) town, 13,958; commune, 20,305. It is built in a picturesque situation, in the form of an amphitheatre and at a height of 1066 ft. above the sea, on the southern slope of a hill, facing the Mediterranean. In the older (eastern) part of the town the streets are narrow, steep and winding, but the new portion (western) is laid out in accordance with modern French ideas. It possesses a remarkably mild and salubrious climate, and is well supplied with water. That used for the purpose of the factories comes from the fine spring of Foux. But the drinking water used in the higher portions of the town flows, by means of a conduit, from the Foulon stream, one of the sources of the Loup. Grasse was from 1244 (when the see was transferred hither from Antibes) to 1790 an episcopal see, but was then included in the diocese of Frejus till i860, when politically as well as ecclesiastically, the region was annexed to the newly- formed department of the Alpes Maritimes. It still possesses a 12th-century cathedral, now a simple parish church; while an ancient tower, of uncertain date, rises close by near the town hall, which was formerly the bishop's palace (13th century). There is a good town library, containing the muniments of the abbey of Lerins, on the island of St Honorat opposite Cannes. In the chapel of the old hospital are three pictures by Rubens. The painter J. H. Fragonard (1 732-1806) was a native of Grasse, and some of his best works were formerly to be seen here (now in America). Grasse is particularly celebrated for its perfumery. Oranges and roses are cultivated abundantly in the neighbour- hood. It is stated that the preparation of attar of roses (which costs nearly £100 per 2 lb) requires alone nearly 7,000,000 roses a year. The finest quality of olive oil is also manufactured at Grasse. (W. A. B. C.)

GRASSES, 1 a group of plants possessing certain characters in common and constituting a family (Gramineae) of the class Monocotyledons. It is one of the largest and most widespread and, from an economic point of view, the most important family of flowering plants. No plant is correctly termed a grass which is not a member of this family, but the word is in common language also used, generally in combination, for many plants of widely different affinities which possess some resemblance (often slight) in foliage to true grasses; e.g. knot-grass (Polygonum aviculare), cotton-grass (Eriophorum) , rib-grass (Plantago), scorpion-grass (Myosotis), blue-eyed grass (Sisyrinchium) ,

sea- grass (Zostera). The grass-tree of Australia (Xanthorrhoea) is a remarkable plant, allied to the rushes in the form of its flower, but with a tall, unbranched, soft-woody, palm-like trunk bearing a crown of long, narrow, grass-like leaves and stalked heads of small, densely-crowded flowers. In agriculture the word has an extended signification to include the various fodder-plants, chiefly leguminous, often called ” artificial grasses.” Indeed, formerly grass (also spelt gwrs, gres, gyrs in the old herbals) meant any green herbaceous plant of small size.

Yet the first attempts at a classification of plants recognized and separated a group of Gramina, and this, though bounded by nothing more definite than habit and general appearance, contained the Gramineae of modern botanists. The older group, however, even with such systematists as Ray (1703), Scheuchzer (1719), and Micheli (1729), embraced in addition the Cyperaceae

1 The word ” grass ” (O. Eng. gars, grces) is common to Teutonic languages, cf. Dutch Ger. Goth, gras, Dan. grces; the root is the 0. Teut. gra-, gro-, to increase, whence ” grow,” and ” green,” the typical colour of growing vegetation. The Indo-European root is seen in Lat. gramen. The O. Eng. grasian, formed from grces, gives ” to graze,” of cattle feeding on growing herbage, also ” grazier,” one who grazes or feeds cattle for the market; “to graze,” to abrade, to touch lightly in passing, may be a development of this from the idea of close cropping; if it is to be distinguished a possible connexion may be found with ” glace ” (Fr. glacer, glide, slip, Lat. glacies, ice), to glance off, the change in form being influenced by ” grate,” to scrape, scratch (Fr. gratter, Ger. kratzen).

(Sedge family), Juncaceae (Rush family), and some other mono-cotyledons with inconspicuous flowers. Singularly enough, the sexual system of Linnaeus (1735) served to mark off more dis- tinctly the true grasses from these allies, since very nearly all of the former then known fell under his Triandria Digynia, whilst the latter found themselves under his other classes and orders.

I. Structure. — The general type of true grasses is familiar in the cultivated cereals of temperate climates — wheat, barley, rye, oats, and in the smaller plants which make up pastures and meadows and form a principal factor of the turf of natural downs. Less familiar are the grains of warmer climates — rice, maize, millet and sorgho, or the

sugar-cane. Still farther re- moved are the bamboos of the tropics, the columnar stems of which reach to the height of forest trees. All are, however, formed on a common plan.

Root. — Most cereals and many other grasses are annual, and possess a tuft of very numerous slender root-fibres, much branched and of great length. The majority of the members of the family are of longer duration, and have the roots also fibrous, but fewer, thicker and less branched. In such cases they are very generally given off from just above each node (often in a circle) of the lower part of the stem or rhizome, perforating the leaf-sheaths. In some bamboos they are very numerous from the lower nodes of the erect culms, and pass downwards to the soil, whilst those from the upper nodes shrivel up and form circles of spiny fibres.

Stem. — The underground stem or rootstock (rhizome) of perennial grasses is usually well developed, and often forms very

Fig. I. — Rhizome of Bamboo. A, B, C, D, successive series of axes, the last bearing aerial culms. Much reduced.

long creeping or subterranean rhizomes, with elongated inter- nodes and sheathing scales; the widely-creeping, slender rhizomes in Marram-grass (Psamma), Agropyrum junceum, Elymus arenarius, and other sand-loving plants render them useful as sand-binders. It is also frequently short, with the nodes crowded. The turf-formation, which is characteristic of open situations in cool temperate climates, results from an extensive production of short stolons, the branches and the fibrous roots developed from their nodes forming the dense ” sod.” The very large rhizome of the bamboos (fig. 1) is also a striking example of ” definite ” growth; it is much branched, the short, thick, curved branches being given off below the apex of the older ones and at right angles to them, the whole forming a series of connected arched axes, truncate at their ends, which were formerly continued into leafy culms. The rhizome is always solid, and has the usual internal structure of the monocotyle- donous stem. In the cases of branching just cited the branches break directly through the sheath of the leaf in connexion with which they arise. In other cases the branches grow upwards through the sheaths which they ultimately split from above, and emerging as aerial shoots give a tufted habit to the plant* Good examples are the oat, cock’s-foot (Dactylis) and other ‘ British grasses. This mode of growth is the cause of the ” tiller- ing ” of cereals, or the production of a large number of erect growing branches from the lower nodes of the young stem. Isolated tufts or tussocks are also characteristic of steppe — and savanna — vegetation

and open places generally in the warmer parts of the earth.

The aerial leaf-bearing branches (culms) are a characteristic feature of grasses. They are generally numerous, erect, cylin- drical (rarely flattened) and conspicuously jointed with evident nodes. The nodes are solid, a strong plate of tissue passing across the stem, but the internodes are commonly hollow, although examples of completely solid stems are not uncommon {e.g. maize, many Andropogons, sugar-cane). The swollen nodes are a characteristic feature. In wheat, barley and most o-f the British native grasses they are a development, not of the culm, but of the base of the leaf-sheath. The function of the nodes is to raise again culms which have become bent down; they are composed of highly turgescent tissue, the cells of which elongate on the side next the earth when the culm is placed in a horizontal or oblique position, and thus raise the culm again to an erect position. The internodes continue to grow in length, especially the upper ones, for some time; the increase takes place in a zone at the extreme base, just above the node. The exterior of the culms is more or less concealed by the leaf-sheaths ; it is usually smooth and often highly polished, the epidermal cells containing an amount of silica sufficient to leave after burning a distinct skeleton of their structure. Tabasheer is a white substance mainly composed of silica, found in the joints of several bamboos. A few of the lower internodes may become enlarged and sub- globular, forming nutriment-stores, and grasses so characterized are termed ” bulbous ” {Arrhenatherum, Poa bulbosa, &c). In internal structure grass-culms, save in being hollow, conform to that usual in monocotyledons; the vascular bundles run parallel in the internodes, but a horizontal interlacement occurs at the nodes. In grasses of temperate climates branching is rare at the upper nodes of the culm, but it is characteristic of the bamboos and many tropical grasses. The branches are strictly distichous. In many bamboos they are long and spread- ing or drooping and copiously ramified, in others they are reduced to hooked spines. One genus (Dinochloa, a native of the Malay archipelago) is scandent, and climbs over trees 100 ft. or more in height, Olyra latifolia, a widely-spread tropical species, is also a climber on a humbler scale.

Grass-culms grow with, great rapidity, as is most strikingly seen in bamboos, where a height of over 100 ft. is attained in from two to three months, and many species grow two, three or even more feet in twenty-four hours. Silicic hardening does not begin till the full height is nearly attained. The largest bamboo recorded is 170 ft., and the diameter is usually reckoned at about 4 in. to each 50 ft.

Leaves. — These present special characters usually sufficient for

ordinal determination. They are solitary at each node and arranged in two rows, the lower often crowded, forming a basal tuft. They consist of two distinct portions, the sheath and the blade. The sheath is often of great length, and generally com- pletely surrounds the culm, forming a firm protection for the internode, the younger basal portion of which, including the zone of growth, remains tender for some time. As a rule it is split down its whole length, thus differing from that of Cyperaceae which is almost invariably (Eriospora is an exception) a complete tube; in some grasses, however (species of Poa, Bromus and others), the edges are united. The sheaths are much dilated in Alopecurus vaginatus and in a species of Potamochloa, in the latter, an East Indian aquatic grass, serving as floats. At the summit of the sheath, above the origin of the blade, is the ligule, a usually membranous process of small size (occasionally reaching 1 in. in length) erect and pressed • around the culm. It is rarely quite absent, but may be represented by a tuft of hairs (very conspicuous in Pariana). It serves to prevent rain-water, which has run down the blade, from entering the sheath. Melica uniflora has in addition to the ligule, a green erect tongue-like process, from the line of junction of the edges of the sheath.

The blade is frequently wanting or small and imperfect in the basal leaves, but in the rest is long and set on to the sheath at an angle. The usual form is familiar — sessile, more or less ribbon-shaped, tapering to a point, and entire at the edge. The chief modifications are the articulation of the deciduous

blade on to the sheatK, which occurs in all the Bambuseae (except Planotia) and in Spartina stricta; and the interposition of a petiole between the sheath and the blade, as in bamboos, Leptaspis, Pharus, Pariana, Lophatherum and others. In the latter case the leaf usually becomes oval, ovate or even cordate or sagittate, but these forms are found in sessile leaves also (Olyra, Panicum). The venation is strictly parallel, the midrib usually strong, and the other ribs more slender. In Anomochloa there are several nearly equal ribs and in some broad-leaved grasses {Bambuseae, Pharus, Leptaspis) the venation becomes

tesselated by transverse connecting veins. The tissue is often raised above the veins, form- ing longitudinal ridges, Fig. 2. — Magnified transverse section generally on the upper of one-half of a leaf-blade of Festuca f ace; the stomata are in rubra The dark portions represent j

ines . th i nterv ening supporting and conducting tissue; the , _, , . .

upper face bears furrows, at the bottom furrows. Ine thick, pro- of each of which are seen the motor minent veins in Agro- cells m. pyrum occupy the whole

upper surface of the leaf. Epidermal appendages are rare, the most frequent being marginal, saw-like, cartilaginous teeth, usually minute, but occasionally – (Dantkonia scabra, Panicum serratum) so large as to give the margin a serrate appearance. The leaves are occasionally woolly, as in Alopecurus lanatus and one or two Panicums. The blade is often twisted, frequently so much so that the upper and under faces become reversed. In dry-country grasses the blades are often folded on the midrib, or rolled up. The rolling is effected by bands of large wedge-shaped cells — motor-cells — between the nerves, the loss of turgescence by which, as the air dries, causes the blade to curl towards the face on which they occur. The rolling up acts as a protection from too great loss of water, the exposed surface being specially protected to this end by a strong cuticle, the majority or all of the stomata occurring on the protected surface. The stiffness of the blade, which becomes very marked in dry-country grasses, is due to the development of girders of thick-walled mechanical tissue which follow the course of all or the principal veins (fig. 2).

Inflorescence. — This possesses an exceptional importance in grasses, since, their floral envelopes being much reduced and the sexual organs of very great uniformity, the characters employed for classification are mainly derived from the arrangement of the flowers and their investing bracts. Various interpretations have been given to these glumaceous organs and different terms employed for them by various writers. It may, however, be

so in Anthoxanthum (fig. 7) and in two anomalous genera, Anomochloa and Streptochaeta.

In immediate relation with the flower itself, and often entirely concealing it, is the palea or pale{" upper pale " of most syste- matic agrostologists). This organ (fig. 13, 1) is peculiar to grasses

Fig. 3. — One-flowered spikelct Fig. 4. — Two-flowered spikelet of Agrostis. of Aira.

b, Barren glumes; /, flowering glumes. (Both enlarged.)

considered as settled that the whole of- the bodies known as glumes and paleae, and distichously arranged externally to the flower, form

no part of the floral envelopes, but are of the nature of bracts. These are arranged so as to form spikelets (locustae), and each spikelet may contain one, as in Agrostis (fig. 3) two, as in Aira (fig. 4) three, or a great number of flowers, as in Briza (fig. 5) Triticum (fig. 6) ; in some species of Eragrostis there are nearly 60. The flowers are, as a rule, placed laterally on the axis(rac/ziWa)of_the spikelet, but in one-flowered spikelets they appear to be terminal, and are probably really

Fig. 7. — Spikelet of Antho- xanthum (enlarged) without the two lower barren glumes, show- ing the two upper awned barren glumes (g) and the flower.

Fig. 5. — Spikelet of Briza. Fig. 6. — Spikelet of Triticum. (Both enlarged.)

among Glumiflorae (the series to which belong the two families Gramineae and Cyperaceae), and is almost always present, certain Oryzeae and Phalarideae being the only exceptions. It is of thin membranous consistence, usually obtuse, often bifid, and possesses no central rib or nerve, but has two lateral ones, one on either side; the margins are fre- quently folded in at the ribs, which thus become placed at the sharp angles. This structure was ‘ formerly regarded as pointing to the fusion of two organs, and the pale was considered by Robert Brown to represent two portions soldered together of a trimerous perianth – whorl, the third portion being the ” lower pale.” The pale is now gener- ally considered to represent the single bracteole, characteristic of Monocotyledons, the binerved structure being the result of the pressure of the axis of the spikelet during the development of the pale, as in Iris and others. The flower with its pale is sessile, and is placed in the axil of another bract in such a way that the pale is exactly opposed to it, though at a slightly higher level. It is this second bract or flowering glume which has been generally called by systemat- ists the ” lower pale,” and with the ” upper pale ” was formerly considered to form an outer floral envelope (” calyx,” Jussieu; ” perianthium,” Brown). The two bracts are, however, on different axes, one secondary to the other, and cannot therefore be parts of one whorl of organs. They are usually quite unlike one another, but in some genera (e.g. most Festuceae) are very similar in shape and appearance.

The flowering glume has generally a more or less boat-shaped form, is of firm consistence, and possesses a well-marked central midrib and frequently several lateral ones. The midrib in a large proportion of genera extends into an appendage termed the awn (fig. 4), and the lateral veins more rarely extend beyond the glume as sharp points

{e.g. Pappophorum). The form of the flowering glume is very various, this organ being plastic and extensively modified in different genera. It frequently extends downwards a little on the rachilla, forming with the latter a swollen callus, which is separated from the free portion by a furrow. In Leptaspis it is formed into a closed cavity by the union of its edges, and encloses the flower, the styles projecting through the pervious summit. Valuable characters for dis- tinguishing genera are obtained from the awn. This presents itself variously developed from a mere subulate point to an organ several inches in length, and when complete (as in Andro- pogoneae, Aveneae and Stipeae) consists of two well-marked portions, a lower twisted part and a terminal straight portion,

usually set in at an angle with the former, sometimes trifid and occasionally beautifully feathery (fig. 8). The lower part is most often suppressed, and in the large group of the Paniceae awns of any sort are very rarely seen. The awn may be either terminal or may come off from the back of the flowering glume, and Duval Jouve's observations have shown that it represents the blade of the leaf of which the portion of the flowering glume below its origin is the sheath; the twisted part (so often suppressed) corre- sponds with the petiole, and the portion of the glume extending beyond the origin of the awn (very long in some species, e.g. of Danthonia) with the ligule of the developed foliage-leaf. When terminal the awn has three fibro-vascular bundles, when dorsal only one; it is covered with stomate-bearing epidermis.

The flower with its palea is thus sessile in the axil of a floriferous glume, and in a few grasses (Leersia (fig. 9), Coleanthus, Nardus) the spikelet consists of nothing more, but usually (even in uniflorous spikelets) other glumes are present. Of these the two placed distichously opposite each other at the base of the spikelet never bear any flower in their axils, and are called the empty or barren glumes (figs. 3, 8). They are the " glumes " of most writers, and together form what was called the " gluma " by R. Brown. They rarely differ much from one another, but one may be smaller or quite absent (Panicum, Setaria (fig. 10), Pas- palum, Lolium), or both be altogether suppressed, as above noticed. They are commonly firm and strong, often enclose the spikelet, and are rarely provided with long points or imperfect awns. Gener- ally speaking they do not share in the special modifications of the flowering glumes, and rarely themselves undergo

modification, chiefly in hardening of portions (Sclerachne, Manisuris, Anthe-

Fig. 8.— Spikelet of Stipa pennata. The pair of barren glumes (b) are separated from the flowering glume, which Fig. 9. — Fig. 10. — Spikelet of bears a long awn, Spikelet of Leer- Setaria, with an abortive twisted below the knee sia. f, Flower- branch (h) beneath it. b, and feathery above, ing glume; p, Barren glumes; /.flower- About f nat. size. pale. ing glume ; p, pale.

phora, Peltophorum), so as to afford greater protection to the flowers or fruit. But it is usual to find, besides the basal glumes, a few other empty ones, and these are in two- or more-flowered spikelets (see Triticum, fig. 6) at the top of the rhachilla (numer- ous in Lophatherum) , or in uniflorous ones (fig. 10) below and interposed between the floral glume and the basal pair.

The axis of the spikelet is frequently jointed and breaks up into articulations above each flower. Tufts or borders of hairs are frequently present (Calamagrostis, Phragmites, Andropogon) , and are often so long as to surround and conceal the flowers (fig. 11). The axis is often continued beyond the last flower or glume as a bristle or stalk.

Involucres or organs outside the spikelets also occur, and are

formed in various ways. Thus in Setaria (fig. 10), Penniselum, &c, the one or more circles of simple or feathery hairs represent abortive branches of the inflorescence; in Cenchrus (fig. 12) these become consolidated, and the inner ones flattened so as to form a very hard globular spiny case to the spikelets. The cup-shaped involucre of Cornucopia is a dilatation of the axis into a hollow receptacle with a raised border. In Cynosurus (Dog's tail) the pectinate involucre which con- ceals the spikelet is a barren or abortive spikelet. Bracts of a more general character subtending branches of the inflorescence are singularly rare in Gramineae, in marked con- trast with Cyperaceae, where they are so conspicuous. They however occur in a whole section of Andropogon, in Anomochloa, and at the base of the spike in Sesleria. The remarkable ovoid involucre of Coix, which be- comes of stony hardness, white and polished (then known as " Job's tears," q.v.), is also a modified bract or leaf-sheath. It is closed except at the apex, . and contains the female spikelet, the stalks of the male inflorescence and the long styles emerging through the small apical orifice.

Any number of spikelets may compose the inflorescence, and their

arrangement is very various. In the spicate forms, with sessile spikelets on the main axis, the latter is often dilated and flattened (Paspalum) , or is more or less thickened and hollowed out (Stenotaphrum, Rollboellia, Tripsacum), when the spikelets are sunk and buried within the cavities. Every variety of racemose and paniculate inflorescence obtains, and the number of spikelets composing those of the large kinds is often immense. Rarely the inflorescence consists of very few flowers; thus Lygeum Spartum, the most anomalous of European of Cenchrus echinatus grasses, has but two or three large uni- enclosed in a bristly florous spikelets, which are fused together lnvo ucre ” at the base, and have no basal glumes, but are enveloped in a large, hooded, spathe-like bract.

Flower. — This is characterized by remarkable uniformity. The perianth is represented by very rudimentary, small, fleshy scales arising below the ovary, called lodicules; they are elongated

Fig. 11. — Spikelet of Reed {Phragmites com- munis) opened out. a, b, Barren glumes. c, c, Fertile glumes, each enclosing one flower with its pale d. Note the zigzag axis (rhachilla} bearing long silky hairs.

Fig. 12. — Spikelet

Fig. 13. — Flowers of Grasses (enlarged). 1, Fiptatherum, with the palea p; 2, Poa; 3, Oryza; I, Lodicule.

or truncate, sometimes fringed with hairs, and are in contact with the ovary. Their usual number is two, and they are placed collaterally at the anterior side of the flower (fig. 13,) that is, within the flowering glume. They are generally considered to represent the inner whorl of the ordinary monocotyledonous

(liliaceous) perianth, the outer whorl of these being suppressed as well as the posterior member of the inner whorl. This latter is present almost constantly in Stipeae and Bambuseae, which have three lodicules, and in the latter group they are occasionally more numerous. In AnomoMoa they are represented by hairs. In Slreptochaeta there are six lodicules, alternately arranged in two whorls. Sometimes, as in Anthoxanthum, they are absent. In Melica there is one large anterior lodicule resulting presumably from the union of the two which are present in allied genera. Professor E. Hackel, however, regards this as an undivided second pale, which in

the majority of the grasses is split in halves, and the posterior lodicule, when present, as a third pale. On this view the grass-flower has no perianth. The function of the lodicules is the separation of the pale and glume to allow the protrusion of stamens and stigmas; they effect this by swelling and thus exerting pressure on the base of these two structures. Where, as in Anthoxanthum, there are no lodicules, pale and glume do not become laterally separated, and the stamens and stigmas protrude only at the apex of the floret (fig. 7). Grass-flowers are usually hermaphrodite, but there are very many exceptions. Thus it is common to find one or more imperfect (usually male) flowers in the same spikelet with bisexual ones, and their relative position is important in classification. Holms and Arrhenatherum are examples in English grasses; and as a rule in species of temperate regions separation of the sexes is not carried further. In warmer countries monoecious and dioecious grasses are more frequent. In such cases the male and female spikelets and inflorescence may be very dissimilar, as in maize, Job's tears, Euchlaena, Spinifex, &c; and in some dioecious species this dissimilarity has led to the two sexes being referred to different genera (e.g. Anthephora axilliflora is the female of Buchloe dactyloides, and Neurachne paradoxa of a species of Spinifex). In other grasses, however, with the sexes in different plants {e.g. Brizo-pyrum, Distichlis, Eragrostis capitataˆ Gynerium), no such dimorphism obtains. Amphicarpum is remarkable in having cleistogamic flowers borne on long radical subterranean peduncles which are fertile, whilst the conspicuous upper paniculate ones, though apparently perfect, never produce fruit. Something similar occurs in Leersia oryzoides, where the fertile spikelets are concealed within the leaf-sheaths.

Androecium. — In the vast majority there are three stamens alternating with the lodicules, and therefore one anterior, i.e. opposite the flowering glume, the other two being posterior and in contact with the palea (fig. 13, 1 and 2). They are hypo- gynous, and have long and very delicate filaments, and large, linear or oblong two-celled anthers, dorsifixed and ultimately very versatile, deeply' indented at each end, and commonly exserted and pendulous. Suppression of the anterior stamen sometimes occurs (e.g. Anthoxanthum, fig. 7), or the two posterior ones may be absent (Uniola, Cinna, Phippsia, Fesluca bromoides). There is in some genera (Oryza, most Bambuseae) another row of three stamens, making six in all (fig. 13, 3); and Anomochloa and Tetrarrhena possess four. The stamens become numerous (ten to forty) in the male flowers of a few monoecious genera (Pariana, Luziola). In Ochlandra they vary from seven to thirty, and in Gigantochloa they are monadelphous.

Gynoecium. — The pistil consists of a single carpel, opposite the pale

in the median plane of the spikelet. The ovary is small, rounded to elliptical, and one-celled, and contains a single slightly bent ovule sessile on the ventral suture (that is, springing from the back of the ovary); the micropyle points downwards. It bears usually two lateral styles which are quite distinct or connate at the base, sometimes for a greater length (fig. 14, 1), each ends in a densely hairy or feathery stigma (fig. 14). Occa- sionally there is but a single style, as in Nardus (fig. 14, 7), which corresponds to the midrib of the carpel. The very long and apparently simple stigma of maize arises from the union of two. Many of the bamboos have a third, anterior, style.

Comparing the flower of Gramineae with the general mono- cotyledonous plan as represented by Liliaceae and other families (fig. 1 5) , it will be seen to differ in the absence of the outer row and

the posterior member of the inner row of the perianth-leaves, of the whole inner row of stamens, and of the two lateral carpels,

Fig. 15. — Diagrams of the ordinary Grass- flower. , Actual condition ;

2, Theoretical, with the suppressed organs supplied. Axis.

d, Outer row of peri-

anth leaves.

e, Inner row. /, Outer row

stamens. g, Inner row. h, Pistil.

of

Fig. 14. — Pistils of Grasses (much enlarged). 1, Alopecurus; 2 Bromus; 3, Arrhenatherum; 4, Glyceria; 5, Melica; 6, Mibora; 7, Nardus.

whilst the remaining members of the perianth are in a rudiment- ary condition. But each or any of the usually missing organs are to be found normally in differ- ent genera, or as occasional develop- ments.

Pollination. — Grasses are gener- ally wind – pollin- ated, though self-fertilization some- times occurs. A few species, as we have seen, are mono- ecious or dioecious, while many are

polygamous (having ?■ £P S – . . v . ° , v ,, 0, Flowering elu

unisexual as well c p a i ea .

as bisexual flowers as in many members of the tribes Andropogoneae, fig. 18, and Paniceae), and in these the male flower of a spikelet always blooms later than the hermaphrodite, so that its pollen can only effect cross-fertilization upon other spikelets in the same or another plant. Of those with only bisexual flowers, many are strongly protogynous (the stigmas protrud- ing before the anthers are ripe), such as Alopecurus and Anthoxanthum (fig. 7), but generally the anthers protrude first and discharge the greater part of their pollen before the stigmas appear. The filaments elongate rapidly at flowering-time, and the lightly versatile anthers empty an abundance of finely granular smooth pollen through a longitudinal slit. Some flowers, such as rye, have lost the power of effective self-fertiliza- tion, but in most cases both forms, self- and cross-fertilization, seem to be possible. Thus the species of wheat are usually self- fertilized, but cross-fertilization is possible since the glumes are open above, the stigmas project laterally, and the anthers empty only about one-third of their pollen in their own flower and the rest into the air. In some cultivated races of barley, cross- fertilization is precluded, as the flowers never open. Reference has already been made to cleistogamic species which occur in several genera.

Fruit and Seed. — The ovary ripens into a usually small ovoid »r rounded fruit, which is entirely occupied by the single large seed, from which it is not to be distinguished, the thin pericarp being completely united to its surface. To this peculiar fruit the term caryopsis has been applied (more familiarly ” grain “) ; it is commonly furrowed longitudinally down one side (usually the inner, but in Coix and its allies, the outer), and an additional covering is not unfrequently provided by the adherence of the persistent palea, or even also of the flowering

Fig. 16. — Fruit oiSporo

glume (” chaff ” of cereals). From this type are a few deviations; thus in Sporobolus, &c. (fig. 16), the pericarp is not united with the seed but is quite distinct, dehisces, and allows the loose seed to escape. Sometimes the pericarp is membranous, sometimes hard, forming a nut, as in some genera of Bambuseae, while in other Bambuseae it becomes thick and fleshy, forming a berry often as large as an apple. In Melocanna the berry forms an edible fruit 3 or 4 in. long, with a pointed beak of 2 in. more; it is indehiscent, and the small seed

germinates whilst the fruit is still attached to the tree, putting out a tuft of roots and a shoot, and not falling till the latter is 6 in. long. The position of the embryo is plainly bolus, showing visible on the front side at the base of the grain, the dehiscent On the other, posterior, side of the grain is a seed CarP an more or l ess evident, sometimes punctiform, sometimes elongated or linear mark, the hilum, the place where the ovule was fastened to the wall of the ovary. The form of the hilum is constant throughout a genus, and sometimes also in whole tribes.

The testa is thin and membranous but occasionally coloured, and the embryo small, the great bulk of the seed being occupied by the hard farinaceous endosperm (albumen) on which the nutritive value of the grain depends. The outermost layer of endosperm, the aleuron-layer, consists of regular cells filled with small proteid granules; the rest is made up of large polygonal cells containing numerous starch-grains in a matrix of proteid which may be continuous (horny endosperm) or granular (mealy endosperm). The embryo presents many points of interest. Its position is remarkable, closely applied to the surface of the endosperm at the base of its outer side. This character is absolute for the whole order, and effectually separates Gramineae from Cyperaceae. The part in contact with the endosperm is plate-like, and is known as the scutellum; the surface in contact with the endosperm forms an absorptive epithelium. In some grasses there is a small scale-like appendage opposite the scutel- lum, the epiblast. There is some difference of opinion as to which structure or structures represent the cotyledon. Three must be considered: (1) the scutellum, connected by vascular tissue with the vascular cylinder of the main axis of the embryo which it more or less envelops; it never leaves the seed, serving merely to prepare and absorb the food-stuff in the endosperm; (2) the cellular outgrowth of the axis, the epiblast, small and inconspicuous as in wheat, or larger as in Stipa; (3) the pileole or germ-sheath, arising on the same side of the axis and above the scutellum, enveloping the plumule in the seed and appearing above ground as a generally colourless sheath from the apex of which the plumule ultimately breaks (fig. 17,4,6). The develop- ment of these structures (which was investigated by van Tieghem) ,

Fig. 17. — A Grain of Wheat. 1, back, and 2, front view; 3, vertical section, showing (b) the endosperm, and (a) embryo; 4, beginning of germination, showing (b) the pileole and © the radicle and secondary rootlets surrounded by their coleorrhizae.

especially in relation to the origin of the vascular bundles which supply them, favours the view that the scutellum and pileole arc

highly differentiated parts of a single cotyledon, and this view is in accord with a comparative study of the seedling of grasses and of other monocotyledons. The epiblast has been regarded as representing a second cotyledon, but this is a very doubtful interpretation.

Germination. — In germination the coleorhiza lengthens, ruptures the pericarp, and fixes the grain to the ground by

developing numerous hairs. The radicle then breaks through the coleorhiza, as do also the secondary rootlets where, as in the case of many cereals, these have been formed in the embryo (fig. 17, 4). The germ-sheath grows vertically upwards, its stiff apex pushing through the soil, while the plumule is hidden in its hollow interior. Finally the plumule escapes, its leaves successively breaking through at the tip of the germ-sheath. The scutellum meanwhile feeds the developing embryo from the endosperm. The growth of the primary root is limited; sooner or later adventitious roots develop from the axis above the radicle which they ultimately exceed in growth.

Means of Distribution. — Various methods of scattering the grain have been adopted, in which parts of thespikelet or in- florescence are concerned. Short spikes may fall from the culm as a whole; or the axis of a spike or raceme is jointed so that one spikelet falls with each joint as in many Andropogoneae and Hordeae. In many-flowered spikelets the rachilla is often jointed and breaks into as many pieces as there are fruits, each piece bearing a glume and pale. One-flowered spikelets may fall as a whole (as in the tribes Paniceae and Andropogoneae) , or the axis is jointed above the barren glumes so that only the flowering glume and pale fall with the fruit. These arrange- ments are, with few exceptions, lacking in cultivated cereals though present in their wild forms, so far as these are known. Such arrangements are disadvantageous for the complete gather- ing of the fruit, and therefore varieties in which they are not present would be preferred for cultivation. The persistent bracts (glume and pale) afford an additional protection to the fruit; they protect the embryo, which is near the surface, from too rapid wetting and, when once soaked, from drying up again. They also decrease the specific gravity, so that the grain is more readily carried by the wind, especially when, as in Briza, the glume has a large surface compared with the size of the grain, or when, as in Holcus, empty glumes also take part; in Canary grass (Phalaris) the large empty glumes bear a membranous wing on the keel. In the sugar-cane (Saccharum) and several allied genera the separating joints of the axis bear long hairs below the spikelets; in others, as in Arundo (a reed-grass), the flowering glumes are enveloped in long hairs. The awn which is frequently borne on the

flowering glume is also a very efficient means of distribution, catching into fur of animals or plumage of birds, or as often in Stipa (fig. 8) forming a long feather for wind- carriage. In Tragus the glumes bear numerous short hooked bristles. The fleshy berries of some Bambuseae favour distribu- tion by animals.

The awn is also of use in burying the fruit in the soil. Thus in Stipa, species of Avena, Heteropogon and others the base of the glume forms a sharp point which will easily penetrate the ground; above the point are short stiff upwardly pointing hairs which oppose its withdrawal. The long awn, which is bent and closely twisted below the bend, acts as a driving organ; it is very hygroscopic, the coils untwisting when damp and twisting up when dry. The repeated twisting and untwisting, especi- ally when the upper part of the awn has become fixed in the earth or caught in surrounding vegetation, drives the point deeper and deeper into the ground. Such grasses often cause harm to sheep by catching in the .wool and boring through the skin.

A peculiar method of distribution occurs in some alpine and arctic grasses, which grow under conditions where ripening of the fruit is often uncertain. The entire spikelet, or single flowers, are transformed into small-leaved shoots which fall from the axes and readily root in the ground. Some species, such as Poa stricla, are known only in this viviparous condition; others, like our British species Festuca ovina and Poa alpina, become viviparous under the special climatic conditions.

II. Classification. — Gramineae are sharply defined from all other plants, and there are no genera as to which it is possible to feel a doubt whether they should be referred to it or not. The only family closely allied is Cyperaceae, and the points of difference between the two may be here brought together. The

best distinctions are found in the position of the embryo in relation to the endosperm — lateral in grasses, basal in Cyperaceae — and in the possession by Gramineae of the 2-nerved palea below each flower. Less absolute characters, but generally trustworthy and more easily observed, are the feathery stigmas, the always distichous arrangement of the glumes, the usual absence of more general bracts in the inflorescence, the split leaf-sheaths, and the hollow, cylindrical, jointed culms — some or all of which are wanting in all Cyperaceae. The same char- acters will distinguish grasses from the other

glumiferous orders, Restiaceae, and Eriocaulonaceae, which are besides further removed by their capsular fruit and pendulous ovules. To other monocotyledonous families the resemblances are merely of adaptive or vegetative characters. Some Commelinaceae and Marantaceae approach grasses in foliage; the leaves of Allium, &c., possess a ligule; the habit of some palms reminds one of the bamboos; and Juncaceae and a few Liliaceae possess an inconspicuous scarious perianth. There are about 300 genera containing about 3500 well-defined species.

The great uniformity among the very numerous species of this vast family renders its classification very difficult. The difficulty has been increased by the confusion resulting from the multiplica- tion of genera founded on slight characters, and from the descrip- tion (in consequence of their wide distribution.) of identical plants under several different genera.

No characters for main divisions can be obtained from the flower proper or fruit (with the exception of the character of the hilum), and it has therefore been found necessary to trust to characters derived from the usually less important inflor- escence and bracts.

Robert Brown suggested two primary divisions — Paniceae and Poaceae, according to the position of the most perfect flower in the spikelet; this is the upper (apparently) terminal one in the first, whilst in the second it occupies the lower position, the more imperfect Ones (if any) being above it. Munro supple- mented this by another character easier of verification, and of even greater constancy, in the articulation of the pedicel in the Paniceae immediately below the glumes; whilst in Poaceae this does not occur, but the axis of the spikelet frequently articulates above the pair of empty basal glumes. Neither of these great divisions will well accommodate certain genera allied to Phalaris, for which Brown proposed tentatively a third group (since named Phalarideae); this, or at least the greater part of it, is placed by Bentham under the Poaceae.

The following arrangement has been proposed by Professor Eduard Hackel in his recent monograph on the order.

A. Spikelets one-flowered, rarely two-flowered as in Zea, falling from the pedicel entire or with certain joints of the rachis at maturity. Rachilla not produced beyond the flowers.

a. Hilum a point ; spikelets not laterally compressed.

o Fertile glume and pale hyaline; empty glumes thick, membranous to coriaceous or cartilaginous, the lowest the largest. Rachis generally jointed and breaking up when mature.

1. Spikelets unisexual, male and female in separate

inflorescences or on different parts of the same inflorescence. I. Maydeae.

2. Spikelets bisexual, or male and bisexual, each male

standing close to a bisexual. 2. Andropogoneae. Fertile glume and pale cartilaginous, coriaceous or papery; empty glumes more delicate, usually herbaceous, the lowest usually smallest. Spikelets falling singly from the unjointed rachis of the spike or the ultimate branches of the panicle. 3. Paniceae.

b. Hilum a line; spikelets laterally compressed.

4. Qryzeae.

B. Spikelets one- to indefinite-flowered; in the one-flowered the rachilla frequently produced beyond the flower; rachilla generally jointed above the empty glumes, which remain after the fruiting glumes have fallen. When more than one-flowered, distinct inter-nodes are developed between the flowers.

a. Culm herbaceous, annual; leaf-blade sessile, and not jointed to the sheath. a Spikelets upon distinct pedicels and arranged in panicles or

racemes. I. Spikelets one-flowered.

i. Empty glumes 4. 5. Phalarideae.

ii. Empty glumes 2. 6. Agrostideae.

II. Spikelets more than one-flowered.

i. Fertile glumes generally shorter than the empty glumes, usually with a bent awn on the back.

7. Aveneae.

ii. Fertile glumes generally longer than the empty, un- awned or with a straight, terminal awn.

9. Festuceae. /3 Spikelets crowded in two close rows, forming a one-

sided spike or raceme with a continuous (not jointed) rachi6.

8. Chlorideae.

7 Spikelets in two opposite rows forming an equal-sided s-pike.

10. Hordeae.

b. Culm woody, at any rate at the base, leaf-blade jointed to the sheath, often with a short, slender petiole.

11. Bambuseae. Tribe I. Maydeae (7 genera in the warmer parts of the earth).

Zea Mays (maize, q.v., or Indian corn) (q.v.). Tripsacum, 2 or 3 species in subtropical America north of the equator; Tr. dactyloides (gama grass) extends northwards to Illinois and Connecticut; it is used for fodder and as an ornamental plant. Coix Lacryma- Jobi (Job's tears) q.v.

Tribe 2. Andropogoneae (25 genera, mainly tropical). The spikelets are arranged in spike-like racemes, generally in pairs con- sisting of a sessile and stalked spikelet at each joint of the rachis (fig. 18). Many are savanna grasses, in various parts of the tropics, for instance the large genus Andropogon, Elionurus and others. Saccharum officinarum (sugar-cane) (q.v.). Sorghum, an important tropical cereal known as black millet or durra {q.v.). Miscanthus and Erianthus, nearly allied to Saccharum, are tall reed-like grasses, with large silky flower-panicles, which are grown for ornament. Imperata, another ally, is a widespread tropical genus; one species I. arundinacea is the principal grass of the alang-alang fields in the Malay Archi- pelago; it is used for thatch. Vossia, an aquatic grass, often floating, is found in western India and tropical Africa. In the swampy lands of the upper Nile it forms, along with a species of Saccharum, huge floating grass barriers. Elionurus, a wide- spread savanna grass in tropical and sub-tropical America, and also in the tropics of the old world, is rejected by cattle probably on account of its aromatic character, the spikelets having a strong balsam-like smell. Other aromatic members are Andropogon Nardus, a native of India, but also, cultivated, the rhizome, leaves and especially the spike- lets of which contain a volatile oil, which on distillation yields the citronella oil of com- merce. A closely allied species, A. Schoen- anthus (lemon-grass), yields lemon-grass oil; a variety is used by the negroes in western Africa for haemorrhage. Other species of the same genus are used as stimulants and cosmetics in various parts of the tropics. The species of Hetero-

pogon, a cosmopolitan genus in the warmer parts of the world, have strongly awned spikelets. Themeda Forskalii, which occurs from the Mediterranean region to South Africa and Tasmania, is the kangaroo grass of Australia, where, as in South Africa, it often covers wide tracts.

Tribe 3. Paniceae (about 25 genera, tropical to subtropical; a few temperate), a second flower, generally male, rarely herma- phrodite, is often present below the fertile flower. Paspalum, is a large tropical genus, most abundant in America, especially on the pampas and campos; many species are good forage plants, and the grain is sometimes used for food. Amphicarpum, native in the south- eastern United States, has fertile cleistogamous spikelets on filiform runners at the base of the culm, those on the terminal panicle are sterile. Panicum, a very polymorphic genus, and one of the largest in the order, is widely spread in all warm countries; together with species of Paspalum they form good forage grasses in the South American savannas and campos. Panicum Crus-galli is a poly- morphic cosmopolitan grass, which is often grown for fodder ; in one form (P. frumentaceum) it is cultivated in India for its grain. P. plicatum, with broad folded leaves, is an ornamental greenhouse grass. P. miliaceum is millet {q.v.), and P. altissimum, Guinea grass. In the closely allied genus Digitaria, which is sometimes regarded as a section of Panicum, the lowest ‘barren glume is reduced to a point ; £>. sanguinalis is a very widespread grass, in Bohemia it is cultivated as a food-grain ; it is also the crab-grass of the southern United States, where it is used for fodder.

In Setaria and allied genera the spikelet is subtended by an involucre of bristles or spines which represent sterile branches of the inflorescence. Setaria italica, Hungarian grass, is extensively grown as a food-grain both in China and Japan, parts of India and western Asia, as well as in Europe, where its culture dates from prehistoric times; it is found in considerable quantity in the lake dwellings of the Stone age.

In Cenchrus the bristles unite to form a tough spiny capsule

Fig. 18. — A pair of spikelets of Andro-

fig. 12); C. tribuloides (bur-grass) and other species are troublesome

weeds in North arid South America, as the involucre clings to the wool of sheep and is removed with great difficulty. Pennisetum typhoideum is widely cultivated as a grain in tropical Africa. Spini- fex, a dioecious grass, is widespread on the coasts of Australia and eastern Asia, forming an important sand-binder. The female heads are spinose with long pungent bracts, fall entire when ripe and are carried away by wind or sea, becoming finally anchored in the sand and falling to pieces.

Tribe 4. Oryzeae (16 genera, mainly tropical and subtropical). The spikelets are sometimes unisexual, and there are often six stamens. Leersia is a genus of swamp grasses, one of which L. oryzoides occurs in the north temperate zone of both old and new worlds, and is a rare grass in Surrey, Sussex and Hampshire. Zizania aquatica (Tuscarora or Indian rice) is a reed-like grass growing over large areas on banks of streams and lakes in North America and north- east Asia. The Indians collect the grain for food. Oryza saliva (rice) (q.v.). Lygeum Sparlum, with a creeping stem and stiff rush- like leaves, is common on rocky soil on the high plains bordering the western Mediterranean, and is one of the sources of esparto.

Tribe 5. Phalarideae (6 genera,

Fig. 19. — Phalarideae. Spike- let of Hierochloe.

three of which are South African and Australasian ; the others are more widely distributed, and re- presented in our flora). Phalaris »%ˆss*; wavv ri/i-fMiE arutidinacea, is a reed-grass found

Iˆ—~.ˆMJˆj||MˆVˆˆ~ˆ’ on the banks of British rivers and x*°%S?HklI WMm£m%&’/ lakes ; a variety with striped leaves

known as ribbon-grass is grown for ornament. P. canariensis (Canary grass, a native of southern Europe and the Mediterranean area) is grown for bird-food and some- times as a cereal. Anthoxanthum odoratum, the sweet vernal grassof our flora, owes its scent to the presence of coumarin, which is also present in the closely allied genus Hierochloe (fig. 19), which occurs throughout the temperate and frigid zones.

Tribe 6. Agrostideae (about 35 genera, occurring in all parts of the world; eleven are British). Aristida and Stipa are large and widely distributed genera, occurring especially on open plains and steppes; the conspicuously awned persistent flowering glume forms an efficient means of dispersing the grain. Stipa pennata is a char- acteristic

species of the Russian steppes. St. spartea (porcupine grass) and other species are plentiful on the North American prairies. St. tenacissima is the Spanish esparto grass (q.v.), known in North Africa as halfa or alfa. Phleum has a cylindrical spike-like inflores- cence; P. pratense (timothy) is a valuable fodder grass, as also is Alopecurus pralensis (foxtail). Sporobolus, a large genus in the warmer parts of both hemispheres, but chiefly America, derives its name from the fact that the seed is ultimately expelled from the fruit. Agrostis is a large world-wide genus, but especially developed in the north temperate zone, where it includes important meadow- grasses. Calamagrostis and Deyeuxia are tall, often reed-like grasses, occurring throughout the temperate and arctic zones and upon high mountains in the tropics. Ammophila arutidinacea (or Psamma arenaria) (Marram grass) with its long creeping stems forms a useful sand-binder on the coasts of Europe, North Africa and the Atlantic states of America. , .

Tribe 7. Aveneae (about 24 genera, seven of which are British). Holcus lanatus (Yorkshire fog, soft grass) is a common meadow and wayside grass with woolly or downy leaves. Aira is a genus of delicate annuals with slender hair-like branches of the panicle. Deschampsia and Trisetum occur in temperate and cold regions or on high mountains in the tropics; T. pratense (Avena flavescens) with a loose panicle and yellow shining spikelets is a valuable fodder- grass. Avena fatua is the wild oat and A. sativa the cultivated oat (q.v.). Arrhenatherum avenaceum, a perennial field grass, native in Britain and central and southern Europe, is cultivated in North America.

Tribe 8. Chlorideae (about 30 genera, chiefly in warm countries). The only British representative is Cynodon Dactylon (dog's tooth, Bermuda grass) found on sandy shores in the south-west of England ; it is a cosmopolitan, covering the ground in sandy soils, and forming an important forage grass in many dry climates (Bermuda grass of the southern United States, and known as durba, dub and -other names in India). Species of Chloris are grown as ornamental grasses. Bouteloua with numerous species (mesquite grass, grama grass) on the plains of the south-western United States, afford good grazing. Eleusine indica is a common tropical weed ; the nearly allied species E. Coracana is a cultivated grain in the warmer parts of Asia and ' throughout Africa. Buchloe dactyloides is the buffalo grass of the North American prairies, a valuable fodder.

Tribe 9. Festuceae (about 83 genera, including tropical, temperate, arctic and alpine forms) many are important meadow-grasses; 15 are British. Gvnerium argenteum (pampas grass) is a native of southern Brazil' and Argentina. Arundo and Phragmites are tall reed-grasses

(see Reed). Several species of Triodia cover large areas of the interior of Australia, and from their stiff, sharply pointed leaves

are very troublesome. Eragrostis, one of the larger genera of the order, is widely distributed in the warmer parts of the earth ; many species are grown for ornament and E. abyssinica is an important food-plant in Abyssinia. Koeleria cristata is a fodder-grass. B'riza media (quaking grass) is a useful meadow- grass. Daclylis glo- merata (cock's-foot), a perennial grass with a dense panicle, common in pastures and waste places is a useful meadow-grass. It- has become naturalized in North America, where it is known as orchard grass, as it will grow in shade. Cynosurus cristatus (dog's tail) is a common pasture- grass. Poa, a large genus widely distri- buted in temperate and cold countries, includes many meadow and alpine grasses ; eight species are British; P. annua (fig. 20) is the very common weed in paths and waste places ; P. pralensis and P. tri- vialis are also common grasses of meadows, banks and pastures, the former is the " June grass " or " Kentucky blue grass " of North America ; P. alpina is a mountain grass of the northern hemi- sphere and found also in the Arctic region. The largest species of the genus is Poa flabel- lata which forms great

tufts 6-7 ft. high with leaves arranged like a fan; it is a native of the Falkland and certain antarctic islands where it is known as tussock grass. Glyceria fluitans, manna-grass, so- called from the sweet grain, is one of the best fodder grasses for swampy meadows ; the grain is an article of food in central Europe. Festuca (fescue) is also a large and widely distributed genus, but found especially in the temperate and cold zones ; it includes valuable pasture grasses, such as F. ovina (sheep's fescue), F. rubra; nine species are British. The closely allied genus Bromus (brome grass) is also widely distributed but most abundant in the north temperate zone; B. erectus is a useful forage grass on dry chalky soil.

Tribe 10. Hordeae (about 19 genera, widely distributed; six are British). Nardus stricta (mat- weed), found on heaths and dry pastures, is a small perennial with slender rigid stem and leaves, it is a useless grass, crowding out better sorts. Lolium perenne, ray- (or by corruption rye-) grass, is common in waste places and a valuable pasture- grass; L. italicum is the Italian ray-grass ;_ L. temulentum (darnel) contains a narcotic principle in the grain. Secale cereale, rye (q.v.), is cultivated mainly in northern Europe. Agropyrum repens (couch grass) has a long creeping underground stem, and is a troublesome weed in cultivated land; the widely creeping stem of A. junceum, found on sandy sea-shores, renders it a useful sand-binder. Triticum sativum is wheat (q.v.) (fig. 21), and Hor- deum sativum,

barley (q.v.). H. murinum, wild barley, is a common grass in waste places. Elymus arenarius (lyme grass) occurs on sandy sea-shores in the north temperate zone and is a useful sand-binder. Tribe 11. Bambuseae. Contains 23 genera, mainly tropical. See Bamboo.

III. Distribution. — Grasses are the most universally diffused of all flowering plants. There is no district in which they do not occur, and in nearly all they are a leading feature of the flora. In number of species Gramineae comes considerably after Compositae and

Fig. 20. — Poa annua. Plant in Flower; about 5 nat. size. 1, one spikelet.

Fig. 21. — Spike of Wheat (Triticum sati- vum). About 1 nat. eize.

Leguminosae, the two most numerous orders of phanerogams, I region. The only genus of flowering plants peculiar .to the arctic but in number of individual plants it probably far exceeds regions is the beautiful and rare grass Pleuropogon Sabinii, of

either; whilst from the wide extension of many of its species, the proportion of Gramineae to other orders in the various floras of the world is much higher than its number of species would lead one to expect. In tropical regions, where Leguminosae is the leading order, grasses closely follow as the second, whilst in the warm and temperate regions of the northern hemisphere, in which Compositae takes the lead, Gramineae again occupies the second position.

While the greatest number of species is found in the tropical zone, the number of individuals is greater in the temperate zones, where they form extended areas of turf. Turf- or meadow- formation depends upon uniform rainfall. Grasses also char- acterize steppes and savannas, where they form scattered tufts. The bamboos are a feature of tropical forest vegetation, especially in the monsoon region. As the colder latitudes are entered the grasses become relatively more numerous, and are the leading family in Arctic and Antarctic regions. The only countries where the order plays a distinctly subordinate part are some extra-tropical regions of the southern hemisphere, Australia, the Cape, Chili, &c. The proportion of graminaceous species to the whole phanerogamic flora in different countries is found to vary from nearly jth in the Arctic regions to about -jVth at the Cape; in the British Isles it is about rV'h.

The principal climatic cause influencing the number of gramin- aceous species appears to be amount of moisture. A remarkable feature of the distribution of grasses is its uniformity; there are no great centres for the order, as in Compositae, where a marked preponderance of endemic species exists; and the genera, except some of the smallest or monotypic ones, have usually a wide distribution.

The distribution of the tropical tribe BatrCDuseae is interesting. The species are about equally divided between the Indo-Malayan region and tropical America, only one species being common to both. The tribe is very poorly represented in tropical Africa; one species Oxytenanthera abyssinica has a wide range, and three monotypic genera are endemic in western tropical Africa. None is recorded for Australia, though species may perhaps occur on the northern coast. One species of Arundinaria reaches northwards as far as Virginia, and the elevation attained in the Andes by some species of Chusquea is very remarkable, — one, C. aristata, being abundant from 15,000 ft. up to nearly the level of perpetual snow.

Many grasses are almost cosmopolitan, such as the common reed, Phragmites communis; and many range throughout the warm regions of the globe, e.g. Cynodon Daclylon, Eleusine indica, Imperata arutidinacea, Sporobolus indicus, &c, and such weeds of cultivation as species of Setaria, Echinochloa. Several species of the north temperate zone, such as Poa nemoralis, P. pratensis, Festuca ovina, F. rubra and others, are absent in the tropics but reappear in the antarctic regions; others {e.g. Phleutn alpinum) appear in isolated positions on high mountains in the intervening tropics. No tribe is confined to one hemisphere and no large genus to any one floral region; facts which indicate that the separation of the tribes goes back to very ancient times. The revision of the Australian species by Bentham well exhibits the wide range of the genera of the order in a flora generally so peculiar and restricted as that of Australia. Thus of the 90 indigenous genera (many monotypic or very small) only 14 are endemic, 1 extends to South Africa, 3 are common to Australia and New Zealand, 18 extend also into Asia, whilst no fewer than 54 are found in both the Old arid New Worlds; 26 being chiefly tropical and 28 chiefly extra-tropical.

Of specially remarkable species Lygeum is found on the sea-sand of the eastern half of the Mediterranean basin, and the minute Coleanthus occurs in three or four isolated spots in Europe (Norway, Bohemia, Austria, Normandy), in North-east Asia (Amur) and on the Pacific coast of North America (Oregon, Washington). Many remarkable endemic genera occur in tropical America, including

Anomochloa of Brazil, and most of the large aquatic species with separated sexes are found in this

Melville Island.

Fossil Grasses. — While numerous remains of grass-like leaves are a proof that grasses were widespread and abundantly developed in past geological ages, especially in the Tertiary period, the fossil remains are in most cases too fragmentary and badly preserved for the determination of genera, and conclusions based thereon in explanation of existing geographical distribution are most unsatisfactory. There is, however, justification for referring some specimens to Arundo, Phragmites, and to the Bambuseae.

Bibliography. — E. Hackel, The True Grasses (translated" from Engler and Prantl, Die natiirlichen Pflanzenfamilien, by F. Lamson Scribner and E. A. South worth) ; and Andropogoneae in de Candolle's Monographiae phanerogamarum (Paris, 1889); K. S. Kunth, Revision des graminees (Paris, 1829-1835) and Agrostographia (Stuttgart, 1833) ; J. C. Doll in Martius and Eichler, Flora Brasiliensis, ii. Pts. II. and III. (Munich, 1871-1883); A. W. Eichler, Bluthen- diagramme i. 119 (Leipzig, 1875); Bentham and Hooker, Genera plantarum, iii. 1074 (London, 1883); H. Baillon, Histoire des plantes, xii. 136 (Paris, 1893) ; J. S. Gamble, " Bambuseae of British India" in Annals Royal Botanic Gardens, Calcutta, vii. (1896); John Percival, Agricultural Botany (chapters on " Grasses," 2nd ed., London, 1902). See also accounts of the family in the various great floras, suchaiS Aschersona.ndGraehner, Synopsis dermitteleuropaischen Flora; N. L. Britton and A. Brown, Illustrated Flora of the Northern United States and Canada (New York, 1896); Hooker's Flora of British India; Flora Capensis (edited by W. Thiselton-Dyer) ; Boissier, Flora orientalis, &c. &c.

GRASSHOPPER (Fr. muterelle, Ital. grillo, Ger. GrasMpfer, Heuschrecke, Swed. Grd'shoppa) , names applied to orthopterous insects belonging to the families Locustidae and Acridiidae. They are especially remarkable for their saltatory powers, due to the great development of the hind legs, which are much longer than the others and have stout and powerful thighs, and also for their stridulation, which is not always an attribute of the male only. The distinctions between the two families may be briefly stated as follows: — The Locustidae have very long thread-like antennae, four-jointed tarsi, a long ovipositor, the auditory organs on the tibiae of the first leg and the stridulatory organ in the wings; the Acridiidae have short stout antennae, three- jointed tarsi, a short ovipositor, the auditory organs

on the first abdominal segment, and the stridulatory organ between the posterior leg and the wing. The term ” grasshopper ” is almost synonymous with Locust (q.v.). Under both ” grasshopper ” and ” locust ” are included members of both families above noticed, but the majority belong to the Acridiidae in both cases. In. Britain the term is chiefly applicable to the large green grasshopper (Locusla or Phasgonura viridissima) common in most parts of the south of England, and to smaller and much better-known species of the genera Stenobolhrus, Gomphocerus and Tettix, the latter remarkable for the great extension of the pronotum, which often reaches beyond the extremity of the body. All are vegetable feeders, and, as in all orthopterous insects, have an incomplete metamorphosis, so that their destructive powers are continuous from the moment of emergence from the egg till death. The migratory locust (Pachytylus cinerascens) may be considered only an exaggerated grasshopper, and the Rocky Mountain locust (Caloptenus spretus) is still more entitled to the name. In Britain the species are not of sufficient size, nor of sufficient numerical importance, to do any great damage. The colours of many of them assimilate greatly to those of their habitats; the green of the Locusta viridissima is wonderfully similar to that of the herbage amongst which it lives, and those species that frequent more arid spots are protected in the same manner. Yet many species have brilliantly coloured under-wings (though scarcely so in English forms), and during flight are almost as conspicuous as butterflies. Those that belong to the Acridiidae mostly lay their eggs in more or less cylindrical masses, sur- rounded by a glutinous secretion, in the ground. Some, of the Locustidae also lay their eggs in the ground, but others deposit them in fissures in trees and low plants, in which the female is aided by a long flattened ovipositor, or process at the extremity of the abdomen, whereas in the Acridiidae there is only an

apparatus of valves. The stridulation or ” song ” in the latter is produced by friction of the hind legs against portions of the wings or wing-covers. To a practised ear it is perhaps possible to distinguish the ” song ” of even closely allied species, and some are said to produce a sound differing by day and night.

GRASS OF PARNASSUS, in botany, a small herbaceous plant known as Parnassia palustris (natural order Saxifragaceae) , found on wet moors and bogs in Britain but less common in the south. The white regular flower is rendered very attractive

Grass of Parnassus (Parnassia palustris). bearing scales enlarged.

i, one of the gland-

by a circlet of scales, opposite the petals, each of which bears a fringe of delicate filaments ending in a yellow knob. These glisten in the sunshine and look like a drop of honey. Honey is secreted by the base of each of the scales.

GRATE (from Lat. crates, a hurdle), the iron or steel receptacle for a domestic fire. When coal replaced logs and irons were found to be unsuitable for burning the comparatively small lumps, and for this reason and on account of the more concentrated heat of coal it became necessary to confine the area of the fire. Thus a basket or cage came into use, which, as knowledge of the scientific principles of heating increased, was succeeded by the small grate of iron and fire-brick set close into the wall which has since been in ordinary use in England. In the early part of the 19th century polished steel grates were extensively used, but the labour and difficulty of keeping them bright were considerable, and they were gradually replaced by grates with a polished black surface which could be quickly renewed by an application of black-lead. The most frequent form of the 18th-century grate was rather high from the hearth, with a small hob on each side. The brothers Adam designed many exceedingly elegant grates in the shape of movable baskets ornamented with the paterae

and acanthus leaves, the swags and festoons characteristic of their manner. The modern dog-grate is a somewhat similar basket supported upon dogs or andirons, fixed or movable. In the closing years of the 19th century a ” well-grate ” was invented, in which the fire burns upon the hearth, combustion being aided by an air-chamber below.

GRATIAN (Flavius Gratianus Augustus), Roman emperor 375~3 8 3, son of Valentinian I. by Severa, was born at Sirmium in Pannonia, on the 18th of April (or 23rd of May) 359. On the 24th of August 367 he received from his father the title of Augustus. On the death of Valentinian (1 7th of November 375) the troops in Pannonia proclaimed his infant son (by a second wife Justina) emperor under the title of Valentinian II. (q.v.). Gratian acquiesced in their choice; reserving for himself the administration of the Gallic provinces, he handed over Italy, Illyria and Africa to Valentinian and his mother, who fixed their residence at Milan. The division, however, was merely nominal, and the real authority remained in the hands of Gratian. The eastern portion of the empire was under the rule of his uncle Valens.

In May 378 Gratian completely defeated the Lentienses, the southernmost branch of the Alamanni, at Argentaria, near the site of the modern Colmar. When Valens met his death fighting against the Goths near Adrianople on the 9th of August in the same year, the government of the eastern empire devolved upon Gratian, but feeling himself unable to resist unaided the incursions of the barbarians, he ceded it to Theodosius (January 379). With Theodosius he cleared the Balkans of barbarians. For some years Gratian governed the empire with energy and success, but gradually he sank into indolence, occupied himself chiefly with the pleasures of the chase, and became a tool in the hands of the Frankish general Merobaudes and bishop Ambrose. By taking into his personal service a body of Alani, and appearing in public in the dress of a Scythian warrior, he aroused the contempt and resentment of his Roman troops. A Roman named Maximus took advantage of this feeling to raise the standard of revolt in Britain and invaded Gaul with a large army, upon which Gratian, who was then in Paris, being deserted by his troops, fled to Lyons, where, through the treachery of the governor, he was delivered over to one of the rebel generals and assassinated on the 25th of August 383.

The reign of Gratian forms an important epoch in ecclesiastical history, since during that period orthodox Christianity for the first time became dominant throughout the empire." In dealing with pagans and heretics Gratian, who during his later years was greatly influenced by Ambrose, bishop of Milan, exhibited severity and injustice at variance with his usual character. He prohibited heathen worship at Rome; refused to wear the insignia of the pontifex maximus as unbefitting a Christian; removed the altar of Victory from the senate-house at Rome, in spite of the remonstrance of the pagan members of the senate, and confiscated its revenues; forbade legacies of real property to the Vestals; and abolished other privileges belonging to them and to the pontiffs. For his treatment of heretics see the church histories of the period.

Authorities. — Ammianus Marcellinus xxvii.-xxxi.; Aurelius Victor, Epit. 47; Zosimus iv. vi. ; Ausonius (Gratian's tutor), especially the Gratiarum actio pro consulatu; Symmachus x. epp. 2 and 61; Ambrose, De fide, prolegomena to Epistolae II, 17, 21, Consolatio de obitu Valentiniani; H. Richter, Das westromische Reich, besonders unter den Kaisernˆ Gratian, Valentinian II. und Maximus (1865); A. de Broglie, L'&glise et Vempire romain au IV' siecle (4th ed., 1882) ; H. Schiller, Geschichte der rbmischen Kaiserzeit, iii., iv. 31-33; Gibbon, Decline and Fall, ch. 27; R. Gumpoltsberger, Kaiser Gratian (Vienna, 1879); T. Hodgkin, Italy and her Invaders (Oxford, 1892), vol. i. ; Tillemont,

Hist, des empereurs, v.; J. Words- worth in Smith's Dictionary of Christian Biography. (J. H. F.)

GRATIANUS, FRANCISCUS, compiler of the Concordia dis- cordanlium canonum or Decretum Gratiani, and founder of the science of canon law, was born about the end of the nth century at Chiusi in Tuscany or, according to another account, at Carraria near Orvieto. In early life he appears to have been received into the Camaldulian monastery of Classe near Ravenna, whence he afterwards removed to that of San Felice in Bologna, where he spent many years in the preparation of the Concordia. The

precise date of this work cannot be ascertained, but it contains references to the decisions of the Lateran council of 1139, and there is fair authority for believing that it was completed while Pope Alexander III. was still simply professor of theology at Bologna,— in other words, prior to 1 1 50. The labours of Gratian are said to have been rewarded with the bishopric of Chiusi, but if so he appears never to have been consecrated; at least his name is not in any authentic list of those who have occupied that see. The year of his death is unknown.

For some account of the Decretum Gratiani and its history see Canon Law. The best edition is that of Friedberg (Corpus juris canonici, Leipzig, 1879). Compare Schultze, Zur Geschichte der Lttteratur uber das Decret Gratians (1870), Die Glosse zum Decret Gratians (1872) and Geschichte der Quellen und Litteratur des kano- nischen Rechts (3 vols., Stuttgart, 1875).

GRATRY, AUGUSTE JOSEPH ALPHONSE (1805-1872), French author and theologian, was born at Lille on the 10th of March 1805. He was educated at the Ecole Polytechnique, Paris, and, after a period of mental struggle which he has described in Souvenirs de ma jeunesse, he was ordained priest in 1832. After a stay at Strassburg as professor of the Petit Seminaire, he was appointed director of the College Stanislas in Paris in 1842 and, in 1847, chaplain of the Ecole Normale Supeneure. He became vicar-general of Orleans in 1861, professor of ethics at the Sorbonne in 1862, and, on the death of Barante, a member of the French Academy in 1867, where he occupied the seat formerly held by Voltaire. Together with M. Petetot, curd of Saint Roch, he reconstituted the Oratory of the Immaculate Conception, a society of priests mainly devoted to education. Gratry was one of the principal opponents of the definition of the dogma of papal

infallibility, but in this respect he submitted to the authority of the Vatican Council. He died at Montreux in Switzerland on the 6th of February 1872

His chief works are: De la connaissance de Dieu, opposing Positivism (1855); La Logique (1856); Les Sources, conseils pour la conduite de I esprij. (1861-1862); La Philosophie du credo (1861)- Lommentaire sur Vevangile de Saint Matthieu (1863); Jesus-Christ Mtresd, M Renan (1864) ; Les Sophistes et la critique (in controversy with E Vacherot) (1864); La Morale et la hi de I'histoire, setting orth his social views (1868); Mgr. I'eveque d'Orleans et Mgr larcheyeque de Mahnes (1869), containing a clear exposition of the historical arguments against the doctrine of papal infallibility. 1 here is a selection of Gratry's writings and appreciation of his style y J- I j bb 6 P lchot – ln p Pges choisies des Grands JEcrivains series published by Armand-Colin (1897). See also the critical study by the oratorian A Chauvin, V Abbe Gratry (1901); Le Pere Gratry (1 900) , and Les Derniers Jours du Pere Gratry et son testament spirituel, (1872), by Cardinal Adolphe Perraud, Gratry's friend and disciple.

GRATTAN, HENRY (1 746-1820), Irish statesman, son of James Grattan, for many years recorder of Dublin, was born in Dublin on the 3rd of July 1746. He early gave evidence of exceptional gifts both of intellect and character. At Trinity College, Dublin, where he had a distinguished career, he began a lifelong devotion to classical literature and especially to the great orators of antiquity. He was called to the Irish bar in 1772, but never seriously practised the law. Like Flood, with whom he was on terms of friendship, he cultivated his natural genius for eloquence by study of good models, including Bolingbroke and Junius. A visit to the English House of Lords excited boundless admiration for Lord Chatham, of whose style of oratory Grattan contributed an interesting description to Baratariana (see Flood, Henry). The influence of Flood did much to give direction to Grattan's political aims; and it was through no design on Grattan's part that when Lord Charlemont brought him into the Irish parliament in 1775, in the very session in which Flood damaged his popularity by accepting office, Grattan quickly superseded his friend in the leadership of the national party. Grattan was well qualified for it. His oratorical powers were unsurpassed among his contemporaries. He.-conspicuously lacked, indeed, the grace of gesture which he so much admired in Chatham; he had not the sustained dignity of Pitt; his powers of close reasoning were inferior to those of Fox and Flood. But his speeches were packed with epigram, and expressed with rare felicity of phrase; his terse and telling sentences were richer in profound aphorisms and maxims of political philosophy than those of

any other statesman save

Burke; he possessed the orator's incomparable gift of conveying his own enthusiasm to his audience and convincing them of the loftiness of his aims.

The principal object of the national party was to set the Irish parliament free from constitutional bondage to the English privy council. By virtue of Poyning's Act, a celebrated statute of Henry VII., all proposed Irish legislation had to be submitted to the English privy council for its approval under the great a 68 !-?/ England before bein 8 P assed b y the Irish parliament. A bill so approved might be accepted or rejected, but not amended. More recent English acts had further emphasized the complete dependence of the Irish parliament, and the appellate jurisdiction of the Irish House of Lords had also been annulled. Moreover, the English Houses claimed and exercised the power to legislate directly for Ireland without even the nominal concurrence of the parliament in Dublin. This was the constitution which Molyneux and Swift had denounced which Flood had attacked, and which Grattan was to destroy' The menacing attitude of the Volunteer Convention at Dungannon greatly influenced the decision of the government in 1782 to resist the agitation no longer. It was through ranks of volunteers drawn up outside the parliament house in Dublin that Grattan passed on the 16th of April 1782, amidst unparalleled popular enthusiasm, to move a declaration of the independence of the Irish parliament. " I found Ireland on her knees," Grattan exclaimed, "I watched over her with a paternal solicitude; I have traced her progress from injuries to arms, and from arms to liberty. Spirit of Swift, spirit of Molyneux, your genius has prevailed! Ireland is now a nation!" After a month of negotiation the claims of Ireland were conceded. The gratitude of his countrymen to Grattan found expression in a parliamentary grant of £100,000, which had to be reduced by one half before he would consent to accept it.

One of the first acts of " Grattan's parliament " was to prove its loyalty to England by passing a vote for the support of 20,000 sailors for the navy. Grattan himself never failed in loyalty to the crown and the English connexion. He was however, anxious for moderate parliamentary reform, and' unlike Flood, he favoured Catholic emancipation. It was' indeed, evident that without reform the Irish House of Commons would not be able to make much use of its newly won independence Though now free from constitutional control it was no less subject than before to the influence of corruption, which the

English government had wielded through the Irish borough owners known as the ” undertakers,” or more directly through the great executive officers. “Grattan’s parliament” had no control over the Irish executive. The lord lieutenant and his chief secretary continued to be appointed by the English ministers- their tenure of office depended on the vicissitudes of English’ not Irish party politics; the royal prerogative was exercised m Ireland on the advice of English ministers. The House of Commons was in no sense representative of the Irish people The great majority of the people were excluded as Roman Catholics from the franchise; two-thirds of the members of the House of Commons were returned by small boroughs at the absolute disposal of single patrons, whose support was bought by a lavish distribution of peerages and pensions. It was to give stability and true independence to the new constitution that Grattan pressed for reform. Having quarrelled with Flood over simple repeal ” Grattan also differed from him on the question of maintaining the Volunteer Convention. He opposed the policy of protective duties, but supported Pitt’s famous commercial propositions in 1785 for establishing free trade between Great Britain and Ireland, which, however, had to be abandoned owing to the hostility of the English mercantile classes In general Grattan supported the government for a time after 1782, and in particular spoke and voted for the stringent coercive legislation rendered necessary by the Whiteboy outrages in 1785; but as the years passed without Pitt’s personal favour towards parliamentary reform bearing fruit in legislation, he gravitated towards the opposition, agitated for commutation of tithes in Ireland, and supported the Whigs

on the regency question in 1788. In 1792 he succeeded in carrying an Act conferring the franchise on the Roman Catholics; in 1794 in conjunction with William Ponsonby he introduced a reform bill which was even less democratic than Flood’s bill of 1783. He was as anxious as Flood had been to retain the legislative power in the hands of men of property, for ” he had through the whole of his life a strong conviction that while Ireland could best be governed by Irish hands, democracy in Ireland would inevitably turn to plunder and anarchy.” 1 At the same time he desired to admit the Roman Catholic gentry of property to membership of the House of Commons, a proposal that was the logical corollary of the Relief Act of 1792. The defeat of Grattan’s mild proposals helped to promote more extreme opinions, which, under French revolutionary influence, were now becoming

heard in Ireland.

The Catholic question had rapidly become of the first im- portance, and when a powerful section of the Whigs joined Pitt's ministry in 1794, and it became known that the lord- lieutenancy was to go to Lord Fitzwilliam, who shared Grattan's views, expectations were raised that the question was about to be settled in a manner satisfactory to the Irish Catholics. Such seems to have been Pitt's intention, though there has been much controversy as to how far Lord Fitzwilliam (q.v.) had been authorized to pledge the government. After taking. Grattan into his confidence, it was arranged that the latter should bring in a Roman Catholic emancipation bill, and that it should then receive government support. But finally it appeared that the viceroy had either misunderstood or exceeded his instructions; and on the 19th of February 1795 Fitzwilliam was recalled. In the outburst of indignation, followed by increasing disaffec- tion in Ireland, which this event produced, Grattan acted with conspicuous moderation and loyalty, which won for him warm acknowledgments from a member of the English cabinet. 2 That cabinet, however, doubtless influenced by the wishes of the king, was now determined firmly to resist the Catholic demands, with the result that the country rapidly drifted to- wards rebellion. Grattan warned the government in a series of masterly speeches of the lawless condition to which Ireland had been driven. But he could now count on no more than some forty followers in the House of Commons, and his words were unheeded. He retired from parliament in May 1797, and departed from his customary moderation by attacking the govern- ment in an inflammatory " Letter to the citizens of Dublin."

At this time religious animosity had almost died out in Ireland, and men of different faiths were ready to combine for common political objects. Thus the Presbyterians of the north, who were mainly republican in sentiment, combined with a section of the Roman Catholics to form the organization of the United Irishmen, to promote revolutionary ideas imported from France; and a party prepared to welcome a French invasion soon came into existence. Thus stimulated, the increasing disaffection cul- minated in the rebellion of 1798, which was sternly and cruelly repressed. No sooner was this effected than the project of a legislative union between the British and Irish parliaments, which had been from time to time discussed since the beginning of the 1 8th century, was taken up in earnest by Pitt's govern- ment. Grattan from the first denounced the scheme with implacable hostility. There was, however, much to be said in its favour. The constitution of Grattan's parliament offered no security, as the differences over the regency question had made evident that in

matters of imperial interest the policy of the Irish parliament and that of Great Britain would be in agreement; and at a moment when England was engaged in a life and death struggle with France it was impossible for the ministry to ignore the danger, which had so recently been emphasized by the fac£ that the independent constitution of 1782 had offered no safe- , guard against armed revolt. The rebellion put an end to the growing reconciliation between Roman Catholics and Protestants; religious passions were now violently inflamed, and the Orange- men and Catholics divided the island into two hostile factions.

1 W. E. H. Lecky, Leaders of Public Opinion in Ireland, i. 127 (enlarged edition, 2 vols., 1903). 2 Ibid. i. 204.

It is a curious circumstance, in view of the subsequent history of Irish politics, that it was from the Protestant Established Church, and particularly from the Orangemen, that the bitterest opposition to the union proceeded; and that the proposal found support chiefly among the Roman Catholic clergy and especially the bishops, while in no part of Ireland was it received with more favour than in the city of Cork. This attitude of the Catholics was caused by Pitt's encouragement of the expectation that Catholic emancipation, the commutation of tithes, and the endowment of the Catholic priesthood, would accompany or quickly follow the passing of the measure.

When in 1799 the government brought forward their bill it was defeated in the Irish House of Commons. Grattan was still in retirement. His popularity had temporarily declined, and the fact that his proposals for parliamentary reform and Catholic emancipation had become the watchwords of the rebellious United Irishmen had brought upon him the bitter hostility of the governing classes. He was dismissed from the privy council; his portrait was removed from the hall of Trinity College; the Merchant Guild of Dublin struck his name off their rolls. But the threatened destruction of the constitution of 1782 quickly restored its author to his former place in the affections of the Irish people. The parliamentary recess had been effectually employed by the government in securing by lavish corruption a majority in favour of their policy. On the 15th of January 1800 the Irish parliament met for its last session; on the same day Grattan secured by purchase a seat for Wicklow; and at a late hour, while the debate was proceeding, he appeared to take his seat. "There was a moment's pause, an electric thrill passed through the House, and a long wild cheer burst from the galleries." 3 Enfeebled by illness, Grattan's strength gave way when he rose to speak, and he obtained leave to address the House sitting. Nevertheless his speech was a

superb effort of oratory ; for more than two hours he kept his audience spellbound by a flood of epigram, of sustained reasoning, of eloquent appeal. After prolonged debates Grattan, on the 26th of May, spoke finally against the committal of the bill, ending with an impassioned peroration in which he declared, ” I will remain anchored here with fidelity to the fortunes of my country, faithful to her freedom, faithful to her fall.” 4 These were the last words spoken by Grattan in the Irish parliament.

The bill establishing the union was carried through its final stages by substantial majorities. The people remained listless, giving no indications of any eager dislike of the government policy. “There were absolutely none of the signs which are invariably found when a nation struggles passionately against what it deems an impending tyranny, or rallies around some institution which it really loves.” 5 One of Grattan’s main grounds of opposition to the union had been his dread of seeing the political leadership in Ireland pass out of the hands of the landed gentry; and he prophesied that the time would come when Ireland would send to the united parliament ” a hundred of the greatest rascals in the kingdom.” 6 Like Flood before him, Grattan had no leaning towards democracy; and he anticipated that by the removal of the centre of political interest from Ireland the evil of absenteeism would be intensified.

For the next five years Grattan took no active part in public affairs;, it was not till 1805 that he became a member of the parliament of the United Kingdom. He modestly took his seat on one of the back benches, till Fox brought him forward to a seat near his own, exclaiming, ” This is no place for the Irish Demosthenes ! ” His first speech was on the Catholic question, and though some doubt had been felt lest Grattan, like Flood, should belie at Westminster the reputation made in Dublin, all agreed with the description of his speech by the Annual Register as ” one of the most brilliant and eloquent ever pronounced within the walls of parliament.” When Fox and Grenville came into power in 1806 Grattan was offered, but refused to

3 Ibid. 1. 241. 4 Grattan’s Speeches, iv. 23.

6 W. E. H. Lecky, History of England in the Eighteenth Century, viii. 491. Cf. Cornwallis Correspondence, iii. 250.

6 W. E. H. Lecky, Leaders of Public Opinion in Ireland, i. 270.

accept, an office in the government. In the following year he showed the strength of his judgment and character by supporting, in spite of consequent unpopularity in Ireland, a measure for increasing the powers of the executive to deal with Irish disorder. Roman Catholic emancipation, which he continued to advocate with unflagging energy though now advanced in age, became complicated after 1808 by the question whether a veto on the appointment of Roman Catholic bishops should rest with the crown. Grattan supported the veto, but a more extreme Catholic party was now arising in Ireland under the leadership of Daniel O'Connell, and Grattan's influence gradually declined. He seldom spoke in parliament after 1810, the most notable excep- tion being in 181 5, when he separated himself from the Whigs and supported the final struggle against Napoleon. His last speech of all, in 1819, contained a passage referring to the union he had so passionately resisted, which exhibits the statesmanship and at the same time the equable quality of Grattan's character. His sentiments with regard to the policy of the union remained, he said, unchanged; but "the marriage having taken place it is now the duty, as it ought to be the inclination, of every individual to render it as fruitful, as profitable and as advantageous as possible." In the following summer, after crossing from Ireland to London when out of health to bring forward the Catholic question once more, he became seriously ill. On - his death-bed he spoke generously of Castlereagh, and with warm eulogy of his former rival, Flood. He died on the 6th of June 1820, and was buried in Westminster Abbey close to the tombs of Pitt and Fox. His statue is in the outer lobby of the Houses of Parliament at Westminster. Grattan had married in 1782 Henrietta Fitz- gerald, a lady descended from the ancient family of Desmond, by whom he had two sons and two daughters.

The most searching scrutiny of his private life only increases the respect due to the memory of Grattan as a statesman and the greatest of Irish orators. His patriotism was untainted by self- seeking; he was courageous in risking his popularity for what his sound judgment showed him to be the right course. As Sydney Smith said with truth of Grattan soon after his death: " No government ever dismayed him. The world could not bribe him. He thought only of Ireland; lived for no other object; dedicated to her his beautiful fancy, his elegant wit, his manly courage, and all the splendour of his astonishing eloquence." 1

Bibliography. — Henry Grattan, Memoirs of the Life and Times of the Right Hon. H. Grattan (5 vols., London, 1839-1846); Grattan's

Speeches (ed. by H. Grattan, junr., 1822); Irish Pari. Debates; W. E. H. Lecky, History of England in the Eighteenth Qentury (8 vols., London, 1878-1890) and Leaders of Public Opinion in Ireland (enlarged edition, 2 vols., 1903). For the controversy concerning the recall of Lord FitzwMliam see, in addition to the foregoing, Lord Rosebery, Pitt (London, 1891); Lord Ashbourne, Pitt: Some Chapters of his Life (London, 1898); The Pelham Papers (Brit. Mus. Add. MSS., 331 18); Carlisle Correspondence; Beresford Correspond- ence; Stanhope .Miscellanies; for the Catholic question, W. J. Amhurst, History of Catholic Emancipation (2 vols., London, 1886); Sir Thomas Wyse, Historical Sketch of the late Catholic Association of Ireland (London, 1829) ; W. J. MacNeven, Pieces of Irish History (New York, 1807) containing an account of the United Irishmen; for the volunteer movement Thomas MacNevin, History of the Volunteers of 1782 (Dublin, 1845); Proceedings of the Volunteer Delegates of Ireland 1/84 (Anon. Pamph. Brit. Mus.). See also F. Hardy, Memoirs of Lord Charlemont (London, 1812); Warden Flood, Memoirs of Henry Flood (London, 1838); Francis Plowden, Historical Review of the State of Ireland (London, 1803); Alfred Webb, Compendium of Irish Biography (Dublin, 1878); Sir Jonah Barrington, Rise and Fall of the Irish Nation (London, 1833); W. J. O'Neill Daunt, Ireland and her Agitators; Lord Mountmorres, History of tlie Irish Parliament (2 vols., London, 1792); Horace Walpole, Memoirs of the Reign of George III. (4 vols., London, 1845 and 1894); Lord Stanhope, Life of William Pitt (4 vols., London, 1861); Thomas Davis, Life of J. P. Curran (Dublin, 1846) — this contains a memoir of Grattan by D. O. Madden, and Grattan's reply to Lord Clare on the question of the Union ; Charles Phillips, Recollec- tions of Curran und some of his Contemporaries (London, 1822); j. A. Froude, The English in Ireland (London, 1881) ; J. G. McCarthy, Henry Grattan: an Historical Study (London, 1886); Lord Mahon's History of England, vol. vii. (1858). With special reference to the Union see Castlereagh Correspondence; Cornwallis Correspondence; Westmorland Papers (Irish State Paper Office). (R. J. M.)

1 Sydney Smith's Works, ii. 166-167.

GRATTIUS [FAUSCUS], Roman poet, of the age of Augustus, author of a poem on hunting (Cynegetica) , of which 541 hexa- meters remain. He was possibly a native of Falerii. The only reference to him in any ancient writer is incidental (Ovid, Ex Ponto, iv. 16. 33). He describes various kinds of game, methods of hunting, the best breeds of horses and dogs.

There are editions by R. Stern (1832); E. Bahrens in Poetae Latini Minores (i., 1879) and G. G. Curcio in Poeli Latini Minori (i., 1902),

with bibliography; see also H. Schenkl, Zur Kritik des G. (1898). There is a translation by Christopher Wase (1654).

GRAUDENZ (Polish Grudziadz), a town in the kingdom of Prussia, province of West Prussia, on the right bank of the Vistula, 18 m. S.S.W. of Marienwerder and 37 m. by rail N.N.E. of Thorn. Pop. (1885) 17,336, (1905) 35,988. It has two Pro- testant and three Roman Catholic churches, and a synagogue. It is a place of considerable manufacturing activity. The town possesses a museum and a monument to Guillaume Rene Cour- biere (1733-1811), the defender of the town in 1807. It has fine promenades along the bank of the Vistula. Graudenz is an important place in the German system of fortifications, and has a garrison of considerable size.

Graudenz was founded about 1250, and received civic rights in 1291. At the peace of Thorn in 1466 it came under the lordship of Poland. From 1665 to 1759 it was held by Sweden, and in 1772 it came into the possession of Prussia. The fortress of Graudenz, which since 1873 has been used as a barracks and a military depot and prison, is situated on a steep eminence about 1 1 m. north of the town and outside its limits. It was completed by Frederick the Great in 1776, and was rendered famous through its defence by Courbiere against the French in 1807.

GRAUN, CARL HEINRICH (1701-1759), German musical composer, the youngest of three brothers, all more or less musical, was born on the 7th of May 1701 at Wahrenbriick in Saxony. His father held a small government post and he gave his children a careful education. Graun's beautiful soprano voice secured him an appointment in the choir at Dresden. At an early age he composed a number of sacred cantatas and other pieces for the church service. He completed his studies under Johann Christoph Schmidt (1664-1728), and profited much by the Italian operas which were performed at Dresden under the composer Lotti. After his voice had changed to a tenor, he made his debut at the opera of Brunswick, in a work by Schurmann, an inferior composer of the day; but not being satisfied with the arias assigned him he re-wrote them, so much to the satisfaction of the court that he was commissioned to write an opera for the next season. This work, Polydorus (1726), and five other operas written for Brunswick, spread his fame all over Germany. Other works, mostly of a sacred character, including two settings of the Passion, also belong to the Brunswick period. Frederick the Great, at that time crown prince of Prussia, heard the singer in Brunswick in 1735, and immediately engaged him for his private chapel at Rheinsberg. There Graun remained for five years, and wrote a number of cantatas,

mostly to words written by Frederick himself in French, and translated into Italian by Boltarelli. On his accession to the throne in 1740, Frederick sent Graun to Italy to engage singers for a new opera to be established at Berlin. Graun remained a year on his travels, earning universal applause as a singer in the chief cities of Italy. After his return to .Berlin he was appointed conductor of the royal orchestra {Kapellmeister) with a salary of 2000 thalers (£300). In this capacity he wrote twenty-eight operas, all to Italian words, of which the last, Merope (1756), is perhaps the most perfect. It is probable that Graun was subjected to con- siderable humiliation from the arbitrary caprices of his royal master, who was never tired of praising the operas of Hasse and abusing those of his Kapellmeister. In his oratorio The Death of Jesus Graun shows his skill as a contrapuntist, and his origin- ality of melodious invention. In the Italian operas he imitates the florid style of his time, but even in these the recitatives occasionally show considerable dramatic power. Graun died on the 8th of August 1759, at Berlin, in the same house in which, thirty-two years later, Meyerbeer was born.

GRAVAMEN . (from Lat. gravare, to weigh down; gravis, heavy), a complaint or grievance, the ground of a legal action, and particularly the more serious part of a charge against an accused person. In English the term is used chiefly in ecclesi- astical cases, being the technical designation of a memorial presented from the Lower to the Upper House of Convocation, setting forth grievances to be redressed, or calling attention to breaches in church discipline.

GRAVE, (i) (From a common Teutonic verb, meaning ” to dig “; in O. Eng. grafan; cf. Dutch graven, Ger. graben), a place dug out of the earth in which a dead body is laid for burial, and hence any place of burial, not necessarily an excavation (see Funeral Rites and Burial). The verb ” to grave,” meaning properly to dig, is particularly used of the making of incisions in a hard surface (see Engraving). (2) A title, now obsolete, of a local administrative official for a township in certain parts of Yorkshire and Lincolnshire; it also sometimes appears in the form ” grieve,” which in Scotland and Northumberland is used for sheriff (q.v.), and also for a bailiff or under-steward. The origin of the word is obscure, but it is probably connected with the German graf, count, and thus appears as the second part of many Teutonic titles, such as landgrave, burgrave and margrave. ” Grieve,” on the other hand, seems to be the northern repre- sentative of O.E. gerefa,

reeve; cf. ” sheriff ‘•’ and ” count.” (3) (From the Lat. gravis, heavy), weighty, serious, particularly with the idea of dangerous, as applied to diseases and the like, of character or temperament as opposed to gay. It is also applied to sound, low or deep, and is thus opposed to ” acute.” In music the term is adopted from the French and Italian, and applied to a movement which is solemn or slow. (4) To clean a ship’s bottom in a specially constructed dock, called a ” graving dock.” The origin of the word is obscure; according to the New English Dictionary there is no foundation for the connexion with ” greaves ” or ” graves,” the refuse of tallow, in candle or soap-making, supposed to be used in ” graving ” a ship. It may be connected with an O. Fr. grave, mod. greve, shore.

GRAVEL, or Pebble Beds, the name given to deposits of rounded, subangular, water-worn stones, mingled with finer material such as sand and clay. The word ” gravel ” is adapted from the O. Fr. gravele, mod. gravelle, dim. of grave, coarse sand, sea-shore, Mod. Fr. greve. The deposits are produced by the attrition of rock fragments by moving water, the waves and tides of the sea and the flow of rivers. Extensive beds of gravel are forming at the present time on many parts of the British coasts where suitable rocks are exposed to the attack of the atmosphere and of the sea waves during storms. The flint gravels of the coast of the Channel, Norfolk, &c, are excellent examples. When the sea is rough the lesser stones are washed up and down the beach by each wave, and in this way are rounded, worn down and finally reduced to sand. These gravels are constantly in movement, being urged forward by the shore currents especially during storms. Large banks of gravel may be swept away in a single night, and in this way the coast is laid bare to the erosive action of the sea. Moreover, the movement of the gravel itself wears down the subjacent rocks. Hence in many places barriers have been erected to prevent the drift of the pebbles and preserve the land, while often it has been found necessary to protect the shores by masonry or cement work. Where the pebbles are swept along to a projecting cape they may be carried onwards and form a long spit or submarine bank, which is constantly reduced in size by the currents and tides which flow across it (e.g. Spurn Head at the mouth of the Humber). The Chesil Bank is the best instance in Britain of a great accumulation of pebbles constantly urged forward by storms in a definite direction. In the shallower parts of the North Sea considerable areas are covered with coarse sand and pebbles. In deeper water, however, as in the Atlantic, beyond the 100 fathom line pebbles are very rare, and those which are found are mostly erratics carried southward by floating icebergs, or volcanic rocks ejected by submarine volcanoes.

In many parts of Britain, Scandinavia and North America there are marine gravels, in every essential resembling those of

the sea-shore, at levels considerably above high tide. These gravels often lie in flat-topped terraces which may be traced for great distances along the coast. They are indications that the sea at one time stood higher than it does at present, and are known to geologists as " raised beaches." In Scotland such beaches are known 25, 50 and 100 ft. above the present shores. In exposed situations they have old shore cliffs behind them; although their deposits are mainly gravelly there is much fine sand and silt in the raised beaches of sheltered estuaries and near river mouths.

River gravels occur most commonly in the middle and upper parts of streams where the currents in times of flood are strong enough to transport fairly large stones. In deltas and the lower portions of large rivers gravel deposits are comparatively rare and indicate periods when the volume of the stream was tem- porarily greatly increased. In the higher torrents also, gravels are rare because transport is so effective that no considerable accumulations can form. In most countries where the drainage is of a mature type, river gravels occur in the lower parts of the courses of the rivers as banks or terraces which lie some distance above the stream level. Individual terraces usually do not persist for a long space but are represented by a series of benches at about the same altitude. These were once continuous, and have been separated by the stream cutting away the intervening portions as it deepened and broadened its channel. Terraces of this kind often occur in successive series at different heights, and the highest are the oldest because they were laid down at a time when the stream flowed at their level and mark the various stages by which the valley has been eroded. While marine terraces are nearly always horizontal, stream terraces slope downwards along the course of the river.

The extensive deposits of river gravels in many parts of England, France, Switzerland, North America, &c, would indicate that at some former time the rivers flowed in greater volume than at the present day. This is believed to be connected with the glacial epoch and the augmentation of the streams during those periods when the ice was melting away. Many changes in drainage have taken place since then; consequently wide sheets of glacial and fluvio-glacial gravel lie spread out where at present there is no stream. Often they are commingled with sand, and where there were temporary post-glacial lakes deposits of silt, brick clay and mud have been formed. These may be compared to the similar deposits now forming in Green- land, Spitzbergen and

other countries which are at present in a glacial condition.

As a rule gravels consist mainly of the harder kinds of stone because these alone can resist attrition. Thus the gravels formed from chalk consist almost entirely of flint, which is so hard that the chaik is ground to powder and washed away, while the flint remains little affected. Other hard rocks such as chert, quartzite, felsite, granite, sandstone and volcanic rocks very frequently are largely represented in gravels, while coal, limestone and shale are far less common. The size of the pebbles varies from a fraction of an inch to several feet; it depends partly on the fissility of the original rocks and partly on the strength of the currents of water; coarse gravels indicate the action of powerful eroding agents. In the Tertiary systems gravels occur on many horizons, e.g. the Woolwich and Reading beds, Oldhaven beds and Bagshot beds of the Eocene of the London basin. They do not essentially differ from recent gravel deposits. But in course of time the action of percolating water assisted by pressure tends to convert gravels into firm masses of conglomerate by depositing carbonate of lime, silica and other substances in their interstices. Gravels are not usually so fossiliferous as finer deposits of the same age, partly because their porous texture enables organic remains to be dissolved away by water, and partly because shells and other fossils are comparatively fragile and would be broken up during the accumulation of the pebbles. The rock fragments in conglomerates, however, sometimes contain fossils which have not been found elsewhere. (J. S. F.)

GRAVELINES (Flem. Gravelinghe) , a fortified seaport town of northern France, in the department of Nord and arrondissement

of Dunkirk, 15 m. S.W. of Dunkirk on the railway to Calais. Pop. (1906) town, 1858; commune, 6284. Gravelines is situated on the Aa, ij m. from its mouth in the North Sea. It is surrounded by a double circuit of ramparts and by a tidal moat. The river is canalized and opens out beneath the fortifica- tions into a floating basin. The situation of the port is one of the best in France on the North Sea, though its trade has suffered owing to the nearness of Calais and Dunkirk and the silting up of the channel to the sea. It is a centre for the cod and herring fisheries. Imports consist chiefly of timber from Northern Europe and coal from England, to which eggs and fruit are exported. Gravelines has paper-mariufactories, sugar-works, fish-

curing works, salt-refineries, chicory-roasting factories, a cannery for preserved peas and other vegetables and an important timber-yard. The harbour is accessible to vessels drawing iS ft. at high tides. The greater part of the population of the commune of Gravelines dwells in the maritime quarter of Petit-Fort- Philippe at the mouth of the Aa, and in the village of Les Huttes (to the east of the town), which is inhabited by the fisher-folk.

The canalization of the Aa by a count of Flanders about the middle of the 12th century led to the foundation of Gravelines (grave-linghe, meaning ” count’s canal.”)- In 1558 it was the scene of the signal victory of the Spaniards under the count of Egmont over the French. It finally passed from the Spaniards to the French by the treaty of the Pyrenees in 1659.

GRAVELOTTE, a village of Lorraine between Metz and the French frontier, famous as the scene of the battle of the 18th of August 1870 between the Germans under King William of Prussia and the French under Marshal Bazaine (see Metz and Franco-German War). The battlefield extends from the woods which border, the Moselle above Metz to Roncourt, near the river Orne. Other villages which played an important part in the battle of Gravelotte were Saint Privat, Amanweiler or Amanvillers and Sainte-Marie-aux-Chenes, all lying to the N. of Gravelotte.

GRAVES, ALFRED PERCEVAL (1846-), Irish writer, was born in Dublin, the son of the bishop of Limerick. He was educated at Windermere College, and took high honours at Dublin University. In 1869 he entered the Civil Service as clerk in the Home Office, where he remained until he became in 1874 an inspector of schools. He was a constant contributor of prose and verse to the Spectator, The Athenaeum, John Bull, and Punch, and took a leading part in the revival of Irish letters. He was for several years president of the Irish Literary Society, and is the author of the famous ballad of ” Father O’Flynn ” and many other songs and ballads. In collaboration with Sir C. V. Stanford he published Songs of Old Ireland (1882), Irish Songs and Ballads (1893), the airs of which are taken from the Petrie MSS.; the airs of his Irish Folk-Songs (1897) were arranged by Charles Wood, with whom he also collaborated in Songs of Erin (1901).

His brother, Charles L. Graves (b. 1856), educated at Marl- borough and at Christ Church, Oxford, also became well known as a journalist, author of two volumes of parodies, The Hawarden Horace (1894) and More Hawarden Horace (1896), and of skits in prose and verse. An admirable musical critic, his Life and Letters of Sir George Grove

(1903) is a model biography.

GRAVESEND, a municipal and parliamentary borough, river-port and market town of Kent, England, on the right bank of the Thames opposite Tilbury Fort, 22 m. E. by S. of London by the South-Eastern & Chatham railway. Pop. (1901) 27,196. It extends about 2 m. along the river bank, occupying a slight acclivity which reaches its summit at Windmill Hill, whence extensive views are obtained of the river, with' its windings and shipping. The older and lower part of the town is irregularly built, with narrow and inconvenient streets, but the upper and newer portion contains several handsome streets and terraces. Among several piers are the town pier, erected in 1832, and the terrace pier, built in 1845, at a time when local river-traffic by steamboat was specially prosperous. Gravesend is a favourite resort of the inhabitants of London, both for excursions and as a summer residence; it is also a favourite yachting centre.

The principal buildings are the town-hall, the parish church of Gravesend, erected on the site of an ancient building destroyed by fire in 1727; Milton parish church, a Decorated and Perpen- dicular building erected in the time of Edward II.; and the county courts. Milton Mount College is a large institution for the daughters of Congregational ministers. East of the town are the earthworks designed to assist Tilbury Fort in obstructing the passage up river of an enemy's force. They were originally constructed on Vauban's system in the reign of Charles II. Rosherville Gardens, a popular resort, are in the western suburb of Rosherville, a residential quarter named after James Rosher, an owner of lime works. They were founded in 1843 by George Jones. Gravesend, which is within the Port of London, has some import trade in coal and timber, and fishing, especially of shrimps, is carried on extensively. The principal other industries are boat-building, ironfounding, brewing and soap-boiling. Fruit and vegetables are largely grown in the neighbourhood for the London market. Since 1867 Gravesend has returned a member to parliament, the borough including Northfleet to the west. The town is governed by a mayor, 6 aldermen and 18 councillors. Area, 1259 acres.

In the Domesday Survey " Gravesham " is entered among the bishop of Bayeux's lands, and a " hythe " or landing-place is mentioned. In 1401 Henry IV. granted the men of Gravesend the sole right of conveying in their own vessels all persons travelling between London and Gravesend, and this right was confirmed by Edward IV. in 1462. In 1562 the town was granted a charter of incorporation by Elizabeth, which vested the government in 2 portreeves and 12 jurats, but by a

later charter of 1568 one portreeve was substituted for the two. Charles I. incorporated the town anew under the title of the mayor, jurats and inhabitants of Gravesend, and a further charter of liberties was granted by James II. in 1687. A Thursday market and fair on the 13th of October were granted to the men of Gravesend by Edward III. in 1367; Elizabeth's charters gave them a Wednesday market and fairs on the 24th of June and the 13th of October, with a court of pie-powder; by the charter of Charles I. Thursday and Saturday were made the market days, and these were changed again to Wednesday and Saturday by a charter of 1694, which also granted a fair on the 23rd of April; the fairs on these dates have died out, but the Saturday market is still held.

From the beginning of the 17th century Gravesend was the chief station for East Indiamen; most of the ships outward bound from London stopped here to victual. A customs house was built in 1782. Queen Elizabeth established Gravesend as the point where the corporation of London should welcome in state eminent foreign visitors arriving by water. State proces- sions by water from Gravesend to London had previously taken place, as in 1522, when Henry VIII. escorted the emperor Charles V. A similar practice was maintained until modern times; as when, on the 7th of March 1863, the princess Alexandra was received here by the prince of Wales (King Edward VII.) three days before their marriage. Gravesend parish church contains memorials to " Princess " Pocahontas, who died when preparing to return home from a visit to England in 161 7, and was buried in the old church. A memorial pulpit from the state of Indiana, U.S.A., made of Virginian wood, was provided in 1904, and a fund was raised for a stained-glass window by ladies of the state of Virginia.

GRAVINA, GIOVANNI VINCENZO (1664-17 18), Italian litterateur and jurisconsult, was born at Roggiano, a small town near Cosenza, in Calabria, on the 20th of January 1664. He was descended from a distinguished family, and under the direction of his maternal uncle, Gregorio Caloprese, who possessed some reputation as a poet and philosopher, received a learned educa- tion, after which he studied at Naples civil and canon law. In 1689 he came to Rome, where in 1695 he united with several others of literary tastes in forming the Academy of Arcadians. A schism occurred in the academy in 1711, and Gravina and his followers founded in opposition to it the Academy of Quirina. From Innocent XII. Gravina received the offer of various

ecclesiastical honours, but declined them from a disinclination to enter the clerical profession. In 1699 he was appointed to the chair of civil law in the college of La Sapienza, and in 1 703 he was transferred to the chair of canon law. He died at Rome on the 6th of January 1718. He was the adoptive father of Metastasio.

Gravina is the author of a number of works of great erudition, the principal being his Origines juris civilis, completed in 3 vols. (1713) and his De Romano imperio (1712). A French translation of the former appeared in 1775, of which a second edition was published in 1822. His collected works were published at Leipzig in 1737, and at Naples, with notes by Mascovius, in 1756.

GRAVINA, a town and episcopal see of Apulia, Italy, in the province of Bari, from which it is 63 m. S.W. by rail (29 m. direct), 1 148 ft. above sea-level. Pop. (1901) 18,197. The town is probably of medieval origin, though some conjecture that it occupies the site of the ancient Blera, a post station on the Via Appia. The cathedral is a basilica of the 15th century. The town is surrounded with walls and towers, and a castle of the emperor Frederick II. rises above the town, which later belonged to the Orsini, dukes of Gravina; just outside it are dwellings and a church (S. Michele) all hewn in the rock, and now abandoned.

Prehistoric remains in the district (remains of ancient settlements, tumuli, &c.) are described by V. di Cicco in Notizie degli scavi (1901), p. 217.

GRAVITATION (from Lat. gravis, heavy), in physical science, that mutual action between masses of matter by virtue of which every such mass tends toward every other with a force varying directly as the product of the masses and inversely as the square of their distances apart. Although the law was first clearly and rigorously formulated by Sir Isaac Newton, the fact of the action indicated by it was more or less clearly seen by others. Even Ptolemy had a vague conception of a force tending toward the centre of the earth which not only kept bodies upon its surface, but in some way upheld the order of the universe. John Kepler inferred that the planets move in their orbits under some influence or force exerted by the sun; but the laws of motion were not then sufficiently developed, nor were Kepler's ideas of force sufficiently clear, to admit of a precise statement of the nature of the force. C. Huygens and R. Hooke, contemporaries of Newton, saw that Kepler's third law implied a force tending toward the sun which, acting on the several planets, varied inversely as the square of

the distance. But two requirements necessary to generalize the theory were still wanting. One was to show that the law of the inverse square not only represented Kepler's third law, but his first two laws also. The other was to show that the gravitation of the earth, following one and the same law with that of the sun, extended to the moon. Newton's researches showed that the attraction of the earth on the moon was the same as that for bodies at the earth's surface, only reduced in the inverse square of the moon's distance from the earth's centre. He also showed that the total gravitation of the earth, assumed as spherical, on external bodies, would be the same as if the earth's mass were concentrated in the centre. This led at once to the statement of the law in its most general form. '

The law of gravitation is unique among the laws of nature, not only in its wide generality, taking the whole universe in its scope, but in the fact that, so far as yet known, it is absolutely unmodified by any condition or cause whatever. All other forms of action between masses of matter, vary with circumstances. The mutual action of electrified bodies, for example, is affected by their relative or absolute motion. But no conditions to which matter has ever been subjected, or under which it has ever been observed, have been found to influence its gravitation in the slightest degree. We might conceive the rapid motions of the heavenly bodies to result in some change either in the direction or amount of their gravitation towards each other at each moment; but such is not the case, even in the most rapidly moving bodies of the solar system. The question has also been raised whether the action of gravitation is absolutely instant aneous. If not, the action would not be exactly in the line

adjoining the two bodies at the instant, but would be affected by the motion of the line joining them during the time required by the force to pass from one body to the other. The result of this would be seen in the motions of the planets around the sun; but the most refined observations show no such effect. It is also conceivable that bodies might gravitate differently at different temperatures. But the most careful researches have failed to show any apparent modification produced in this way except what might be attributed to the surrounding conditions. The most recent and exhaustive experiment was that of J. H. Poynting and P. Phillips (Proc. Roy. Soc, 76A, p. 445). The result was that the change, if any, was less than tV of the force for one degree change of temperature, a result too minute to be established by any measures.

Another cause which might be supposed to modify the action of gravitation between two bodies would be the interposition of masses

of matter between them, a cause which materially modifies the action of electrified bodies. The question whether this cause modifies gravitation admits of an easy test from observation. If it did, then a portion of the earth's mass or of that of any other planet turned away from the sun would not be subjected to the same action of the sun as if directly exposed to that action. Great masses, as those of the great planets, would not be attracted with a force proportional to the mass because of the hindrance or other effect of the interposed portions. But not the slightest modification due to this cause is shown. The general conclusion from everything we see is that a mass of matter in Australia attracts a mass in London precisely as it would if the earth were not interposed between the two masses. We must therefore regard the law in question as the broadest and most fundamental one which nature makes known to us.

It is not yet experimentally proved that variation as the inverse square is absolutely true at all distances. Astronomical observations extend over too brief a period of time to show any attraction between different stars except those in each other's neighbourhood. But this proves nothing because, in the case of distances so great, centuries or even thousands of years of accurate observation will be required to show any action. On the other hand the enigmatical motion of the perihelion of Mercury has not yet found any plausible explanation except on the hypothesis that the gravitation of the sun diminishes at a rate slightly greater than that of the inverse square — the most simple modification being to suppose that instead of the exponent of the distance being exactly – 2, it is -2-000 000 161 2.

The argument is extremely simple in form. It is certain that, in the general average, year after year, the force with which Mercury is drawn toward the sun does vary from the exact inverse square of its distance from the sun. The most plausible explanation of this is that one or more masses of matter move around the sun, whose action, whether they are inside or outside the orbit of Mercury, would produce the required modification in the force. From an investigation of all the observations upon Mercury and the other three interior planets, Simon Newcomb found it almost out of the question that any such mass of matter could exist without changing either the figure of the sun itself or the motion of the planes of the orbits of either Mercury or Venus. The qualification " almost " is necessary because so complex a system of actions comes into play, and accurate observations have extended through so short a period, that the proof cannot be regarded as absolute. But the fact that careful and repeated search for a mass of matter sufficient to produce the desired effect has been in vain, affords additional evidence of its non-existence. The

most obvious test of the reality of the required modifications would be afforded by two other bodies, . the motions of whose pericentres should be similarly affected. These are Mars and the moon. Newcomb found an excess of motions in the perihelion of Mars amounting to about 5″ per century. But the combination of observations and theory on which this is based is not sufficient fully to establish so slight a motion. In the case of the motion of the moon around the earth, assuming the gravitation of the latter to be subject to the modification in question, the annual motion of the moon's

perigee should be greater by 1-5″ than the theoretical motion. E. W. Brown is the first investigator to determine the theoretical motions with this degree of precision; and he finds that there is no such divergence between the actual and the computed motion. There is therefore as yet no ground for regarding any deviation from the law of inverse square as more than a possi- bility. (S. N.)

Gravitation Constant and Mean Density of the Earth

The law of gravitation states that two masses Mi and M 2 , distant d from each other, are pulled together each with a force G. Mi M 2 /d 2 , where G is a constant for all kinds of matter — the gravitation constant. The acceleration of M 2 towards Mi or the force exerted on it by Mi per unit of its mass is therefore GMJd 2 . Astronomical observations of the accelerations of different planets towards the sun, or of different satellites towards the same primary, give us the most accurate confirmation of the distance part of the law. By comparing accelerations towards different bodies we obtain the ratios of the masses of those different bodies and, in so far as the ratios are consistent, we obtain confirmation of the mass part. But we only obtain the ratios of the masses to the mass of some one member of the system, say the earth. We do not find the mass in terms of grammes or pounds. In fact, astronomy gives. us the product GM, but neither G nor M. For example, the acceleration of the earth towards the sun is about o-6 cm/sec. 2 at a distance from it about i5Xio 12 cm. The acceleration of the moon towards the earth is about 0-27 cm/sec. 2 at a distance from it about 4X io 10 cm. If S is the mass of the sun and E the mass of the earth we have o-6 = GS/ (15X10 12) 2 and o-27 = GE/ (4X10 10) 2 giving us GS and GE, and the ratio S/E = 300,000 roughly; but we do not obtain either S or E in grammes, and we do not find G.

The aim of the experiments to be described here may be regarded either as' the determination of the mass of the earth in grammes, most conveniently expressed by its mass-=-its volume, that is by its " mean density " A, or the determination of the " gravitation constant " G. Corresponding to these two aspects of the problem there are two modes of attack. Suppose that a body of mass m is suspended at the earth's surface where it is pulled with a force w vertically downwards by the earth — its weight. At the same time let it be pulled with a force p by a measurable mass M which may be a mountain, or some measur- able part of the earth's surface layers, or an artificially prepared mass brought near m, and let the pull of M be the same as if it were concentrated at a distance d. The earth pull may be regarded as the same as if the earth were all concentrated at its centre, distant R. Then K> = G4?rR 3 Am/R 2 = G47rRAm (1)

and

p = GMm/d* (2)

By division

A – 3M w 47rR

If then we can arrange to observe w/p we obtain A, the mean density of the earth.

But the same observations give us G also. For, putting m = w/g in (2), we get

G=ˆi t M ■ w ■ £

In the second mode of attack the pull p between two artificially prepared measured masses Mi, M 2 is determined when they are a distance d apart, and since p — G.MiMˆJ 2 we get at once G = ˆ>(i 2 /MiM2. But we can also deduce A. For putting w=mg.- in (1) we get

A = a£ — 4 G • xR"

Experiments of the first class in which the pull of a known mass is compared with the pull of the earth maybe termed experiments on the mean density of the earth, while experiments of the .second class in which the pull between two known masses is xn. 13

directly measured may be termed experiments on the gravitation constant.

We shall, however, adopt a slightly different classification for the purpose of describing methods of experiment, viz: —

1. Comparison of the earth pull on a body with the pull of a natural mass as in the Schiehallion experiment.

2. Determination of the attraction between two artificial masses as in Cavendish's experiment.

3. Comparison of the earth pull on a body with the pull of an artificial mass as in experiments with the common balance.

It is interesting to note that the possibility of gravitation experiments of this kind was first considered by Newton, and in both of the forms (1) and (2). In the System of the World Qrded., 1737, p. 40) he calculates that the deviation by a hemi- spherical mountain, of the earth's density and with radius 3 m., on a plumb-line at its side will be less than 2 minutes. He also calculates (though with an error in his arithmetic) the accelera- tion towards each other of two spheres each a foot in diameter and of the earth's density, and comes to the conclusion that in either case the effect is too small for measurement. In the Principia, bk. iii., prop, x., he makes a celebrated estimate that the earth's mean density is five or six times that of water. Adopting this estimate, the deviation by an actual mountain or the attraction of two terrestrial spheres would be of the orders calculated, and regarded by Newton as immeasurably small.

Whatever method is adopted the force to be measured is very minute. This may be realized if we here anticipate the results of the experiments, which show that in round numbers A = 5-5 and G= 1/15,000,000 when the masses are in grammes and the distances in centimetres.

Newton's mountain, which would probably have density about A/2 would deviate the plumb-line not much more than half a minute. Two spheres 30 cm. in diameter (about 1 ft.) and of density n (about that of lead) just not touching wojjki pull each other with a force rather less than 2 dynesf^and their acceleration would be such that they would move into contact if starting 1 cm. apart in rather over 400 seconds.

From these examples it will be realized that in gravitation experiments extraordinary precautions must be adopted to eliminate disturbing forces which may easily rise to be com- parable with the forces to be measured. We shall not attempt to give an account of these

precautions, but only seek to set forth the general principles of the different experiments which have been made. •

I. Comparison of the Earth Pull with that of a Natural Mass.

Bouguer's Experiments. — The earliest experiments were made by Pierre Bouguer about 1740, and they are recorded in his Figure de la terre (17 49). They were of two kinds. In the first he determined the length of the seconds pendulum, and thence g at different levels. Thus at Quito, which may be regarded as on a table-land 1466 toises (a toise is about 6-4 ft.) above sea-level, the seconds pendulum was less by 1/1331 than on the Isle of Inca at sea-level. But if there were no matter above the sea-level, the inverse square law would make the pendulum less by 1/1118 at the higher level. The value of g then at the higher level was greater than could be accounted for by the attraction of an earth ending atsea-level by the difference 1/1118-1/1331 = 1/6983, and this was put down to the attraction of the plateau 1466 toises high; or the attraction of the whole earth was 6983 times the attraction of the plateau. Using the rule, now known as " Young's rule," for the attraction of the plateau, Bouguer found that the density of the earth was 4-7 times that of the plateau, a result certainly much too large.

In the second kind of experiment he attempted to measure the horizontal pull of Chimborazo, a mountain about 20,000 ft. high, by the deflection of a plumb-line at a station on its south side. Fig. 1 shows the principle of the method. Suppose that two stations are fixed, one on the side of the mountain due south of the summit, and the other on the same latitude but some distance westward, away from the influence of the mountain. Suppose that at the second station a star is observed to pass the meridian, for simplicity we will say directly overhead, then a

it

I" Stohm Dut.South of SummirOnStoDt

Fig. i. — Bouguer's Plumb line Experiment on the at traction of Chimborazo.

plumb-line will hang down exactly parallel to the observing telescope. If the mountain were away it would also hang parallel to the telescope

at the first station when directed to the same star. But the mountain pulls the plumb-line towards it and the star appears to the north of the zenith and evidently

mountain pull/earth pull = tan- gent of angle of displacement of zenith.

Bouguer observed the meridian altitude of several stars at the two stations. There was still some deflection at the second station, a deflection which he estimated as 1/14 that at the first station, and he found on allowing for this that his observa- tions gave a deflection of 8 seconds at the first station. From the form and size of the mountain he found that if its density were that of the earth the deflection should be 103 seconds, or the earth was nearly 13 times as dense as the mountain, a result several times too large. But the work was carried on under enormous diffi- culties owing to the severity of the weather, and no exactness could be expected. The importance of the experiment lay in its proof that the method was possible.

Maskelyne's Experiment.— hi 1774. Nevil Maskelyne (Phil. Trans., 1775, p. 495) made an experiment on the deflection of the plumb-line by Schiehallion, a mountain in Perthshire, which has a short ridge nearly east and west, and sides sloping steeply on the north and south. He selected two stations on the same meridian, one on the north, the other on the south slope, and by means of a zenith sector, a telescope provided with a plumb-bob, he determined at each station the meridian zenith distances of a number of stars. From a survey of the district made in the years 1 774-1 776 the geographical difference of latitude between the two stations was found to be 42-94 seconds, and this would have been the difference in the meridian zenith difference of the same star at the two stations had the mountain been away. But at the north station the plumb-bob was pulled south and the zenith was deflected northwards, while at the south station the effect was reversed. Hence the angle between the zeniths, or the angle between the zenith distances of the same star at the two stations was greater than the geographical 42-94 seconds. The mean of the observations gave a difference of 54-2 seconds, or the double deflection of, the plumb-line was 54-2-42-94, say 11-26 seconds.

The computation of the attraction of the mountain on the supposition that its density was that of the earth was made by Charles Hutton from the results of the survey (Phil. Trans., 1778, p. 689), a computation carried out by ingenious and important methods. He found that the deflection should have been greater in the ratio 17804 19933 say 9 : 5, whence the density of the earth comes out at 9/5 that

of the mountain. Hutton took the density of the mountain at 2-5, giving the mean density of the earth 4- 5. A revision of the density of the moun- tain from a careful survey of the rocks composing it was made by John Playfair many years later (Phil. Trans., 1811, p. 347), and the density of the earth was given as lying between 4-5588 and 4-867.

Other experiments have been made on the attraction of mountains by Francesco Carlini (Milano Effetn. Ast., 1824", p. 28) on Mt. Blanc in 182 1, using the pendulum method after the manner of Bouguer, by Colonel Sir Henry James and Captain A. R. Clarke (Phil. Trans., 1856, p. 591), using the plumb-line deflection at Arthur's Seat, by T. C. Mendenhall (Amer. Jour, of Sci. xxi. p. 99), using the pendulum method on Fujiyama in Japan, and by E. D. Preston (U.S. Coast and Geod. Survey Rep., 1893, p. 513) in Hawaii, using both methods.

Airy's Experiment. — In 1854 Sir G. B. Airy (Phil. Trans. 1856, p. 297) carried out at Harton pit near South Shields an experiment which he had attempted many years before in con- junction with W. Whewell and R. Sheepshanks at Dolcoath. This consisted in comparing gravity at the top and at the bottom of a mine by the swings of the same pendulum, and thence finding the ratio of the pull of the intervening strata to the pull of the whole earth. The principle of the method may be understood by assuming that the earth consists of concentric spherical shells each homogeneous, the last of thickness h equal to the depth of the mine. Let the radius of the earth to the bottom of the mine be R, and the mean density up to that point be A. This will not differ appreciably from the mean density of the whole. Let the density of the strata of depth h be 5. Denoting the values of gravity above and below by g a and gj we have

irR 3 A

£> = Gˆ|£ = G.£*RA,;i

and

rR 3 A

whence ~J and

ga – Gf/ ft 1 m +G.4irh&

)f a shell h thick on a poii) 2 =G.4tt/*5).

g. =G.JxRA(i-ˆ+ˆD nearly,

(since the attraction of a shell h thick on a point just outside it is

G.MK. + hyh8/(R + hy = G. 4 tt/*5).

Therefore

£° = r 2h _L.3 h 5

»■ R”~TRA’

gi

5 Rl\ l ˆ RjgJ

Stations were chosen in the same vertical, one near the pit bank, another 1250 ft. below in a disused working, and a ” com- parison ” clock was fixed at each station. A third clock was placed at the upper station connected by an electric circuit to the lower station. It gave an electric signal every 15 seconds by which the rates of the two comparison clocks could be accur- ately compared. Two ” invariable ” seconds pendulums were swung, one in front of the upper and the other in front of the lower comparison clock after the manner of Kater, and these invariables were interchanged at intervals. From continuous observations extending over three weeks and after applying various corrections Airy obtained gb/ga = 1-00005185. Making corrections for the irregularity of the neighbouring strata he found A/5 = 2-6266. W. H. Miller made a careful determination of 5 from specimens of the strata, finding it 2-5. The final result taking into account the ellipticity and rotation, of the earth is A = 6-565.

Von Sterneck’s Experiments. — (Mitth. des K. U.K. Mil. Geog. Inst, zu Wien, ii., 1882, p. 77; 1883, p. 59; vi., 1886, p. 97). R. von Sterneck repeated the mine experiment in 1882-1883 at the Adalbert shaft at Pribram in Eohemia and in 1885 at the Abraham shaft near Freiberg. He used two invariable half- seconds pendulums, one swung at the surface, the other below at the same time. The two were at intervals interchanged. Von Sterneck • introduced a most important improvement by comparing the swings of the two invariables with the same clock which by an electric circuit gave a signal at each station each second. This eliminated clock rates. His method, of which it is not necessary to give the details here, began a new era in the determinations of local variations of gravity. The values which von Sterneck obtained for A were not consistent, but increased with the depth of the second station. This was probably due to local irregularities in the strata which could not be directly detected.

All the experiments to determine A by the attraction of natural masses are open to the serious objection that we cannot determine the distribution of density in the neighbourhood with any approach to accuracy. The experiments with artificial masses next to be described give much more consistent results, and the experiments with natural masses are now only of use

in showing the existence of irregularities in the earth's superficial

strata when they give results deviating largely from the accepted

value.

II. Determination of the Attraction between two Artificial Masses.

Cavendish's Experiment {Phil. Trans., 1798, p. 469). — This celebrated experiment was planned by the Rev. John Michell. He completed an apparatus for it but did not live to begin work with it. After Michell's death the apparatus came into the possession of Henry Cavendish, who largely reconstructed it, but still adhered to Michell's plan, and in 1 797-1 798 he carried out the experiment. The essential feature of it consisted in the determination of the attraction of a lead sphere 1 2 in. in diameter on another lead sphere 2 in. in diameter, the distance between the centres being about 9 in,, by means of a torsion balance. Fig. 2 shows how the experiment was carried out. A torsion rod hh 6 ft. long, tied from its ends to a vertical piece mg, was

Fig. 2. — Cavendish's Apparatus. h h, torsion rod hung by wire / g, ; x,x, attracted balls hung from its ends; WW, attracting masses.

hung by a wire Ig. From its ends depended two lead balls xx each 2 in. in diameter. The position of the rod was determined by a scale fixed near the end of the arm, the arm itself carrying a vernier moving along the scale. This was lighted by a lamp and viewed by a telescope T from the outside of the room containing the apparatus. The torsion balance was enclosed in a case and outside this two lead spheres WW each 12 in. in diameter hung from an arm which could turn round an axis Vp in the line of gl. Suppose that first the spheres are placed so that one is just in front of the right-hand ball x and the other is just behind the left-hand ball x. The two will conspire to pull the balls so that the right end of the rod moves forward. Now let the big spheres be moved round so that one is in front of the left ball and the other

behind the right ball. The pulls are reversed and the right end moves backward. The angle between its two positions is (if we neglect cross attractions of right sphere on left ball and left sphere on right ball) four times as great as the deflection of the rod due to approach of one sphere to one ball.

The principle of the experiment may be set forth thus. Let 2a be the length of the torsion rod, m the mass of a ball, M the mass of a large sphere, d the distance between the centres, supposed the same on each side. Let be the angle through which the rod moves round when the spheres WW are moved from the first to the second of the positions described above. Let n be the couple required to twist the rod through I radian. Then ju0 = 4GMma/» = 4ir 2 I/‘P, whence G = ir 3 dH8/ T*Mma, or putting the result in terms of the mean density of the earth A it is easy to show that, if L, the length of the seconds pendulum, is put for gfit 3 , and C for 27rR, the earth’s circumference, then

A = f c

LMrnuT 5

dn e

The original account by Cavendish is still well worth studying

on account of the excellence of his methods. His work was undoubtedly very accurate for a pioneer experiment and has only really been improved upon within the last generation. Making various corrections of which it is not necessary to give a description, the result obtained (after correcting a mistake first pointed out by F. Baily) is A= 5-448. In seeking the origin of the disturbed motion of the torsion rod Cavendish made a very important observation. He found that when the masses were left in one position for a time the attracted balls crept now in one direction, now in another, as if the attraction were varying. Ultimately he found that this was due to convection currents in the case containing the torsion rod, currents produced by temperature inequalities. When a large sphere was heated the ball near it tended to approach and when it was cooled the ball tended to recede. Convection currents constitute the chief disturbance and the chief source of error in all attempts to measure small forces in air at ordinary pressure.

Reich’s Experiments (Versuche tiber die mittlere Dichtigkeit der Erde mittelst der Drehwage, Freiberg, 1838; ” Neue Versuche mit der Drehwage,” Leipzig Abh. Math. Phys. i., 1852, p. 383). — In 1838 F.

Reich published an account of a repetition of the Cavendish experiment carried out on the same general lines, though with somewhat smaller apparatus. The chief differences consisted in the methods of measuring the times of vibration and the deflection, and the changes were hardly improvements. His result after revision was A = 5-49. In 1852 he published an account of further work giving as result A = 5-58. It is noteworthy that in his second paper he gives an account of experiments suggested by J. D. Forbes in which the deflection was not observed directly, but was deduced from observations of the time of vibration when the attracting masses were in different positions.

Let Ti be the time of vibration when the masses are in one of the usual attracting positions. Let d be the distance between the centres of attracting mass and attracted ball, and 8 the distance through which the ball is pulled. If a is the half length of the torsion rod and 8 the deflection, 8 = a9. Now let the attracting masses be put one at each end of the torsion rod with their centres in the line through the centres of the balls and d from them, and let T 2 be the time of vibration. Then it is easy to show that

8/d = ae/d = (T 1 -T 2)/(T l + T 2).

This gives a value of 9 which may be used in the formula. The experiments by this method were not consistent, and the mean result was A = 6-25.

Baily' s Experiment {Memoirs of the Royal Astron. Soc. xiv.).— In 1841-1842 Francis Baily made a long series of determinations by Cavendish's method and with apparatus nearly of the same dimensions. The attracting masses were 12-in. lead spheres and as attracted balls he used various masses, lead, zinc, glass, ivory, platinum, hollow brass, and finally the torsion rod alone without balls. The suspension was also varied, sometimes consisting of a single wire, sometimes being bifilar. There were systematic errors running through Baily's work, which it is impossible now wholly to explain. These made the resulting value of A show a variation with the nature of the attracted masses and a variation with the temperature. His final result A = 5-6747 is not of value compared with later results.

Cornu and Bailie's Experiment {Comptes rendus, lxxvi., !873. P- 954; lxxxvi., 1878, pp. 571, 699, 1001; xcvi., 1883, p. 1493)- — In 1870 MM. A. Cornu and J. Bailie commenced an experiment by the Cavendish method which was never definitely completed, though valuable studies of the behaviour of the torsion apparatus were made.

They purposely departed from the dimensions previously used. The torsion balls were of copper about 100 gm. each, the rod was 50 cm. long, and the suspending wire was 4 metres long. On each side of each ball was a hollow iron sphere. Two of these were filled with mercury weighing 12 kgm., the two spheres of mercury constituting the attracting masses. When the position of a mass was to be changed the mercury was pumped from the sphere on one side to that on the other side of a ball. To avoid counting time a

method of electric registration on a chronograph was adopted. A provisional result was A = 5-56.

Boys's Experiment {Phil. Trans., A., 1895, pt. i., p. 1). — Professor C. V. Boys having found that it is possible to draw quartz fibres of practically any degree of fineness, of great strength and true in their elasticity, determined to repeat the Cavendish experiment, using his newly invented fibres for the suspension of the torsion rod. He began by an inquiry as to the best dimensions for the apparatus. He saw that if the period of vibration is kept constant, that is, if the moment of inertia I is kept proportional to the torsion couple per radian H, then the deflection remains the same however the linear dimensions are altered so long as they are all altered in the same proportion. Hence we are driven to conclude that the dimen- sions should be reduced until further reduction would make the linear quantities too small to be measured with exactness, for reduction in the apparatus enables variations in temperature and the consequent air disturbances to be reduced, and the experiment in other ways becomes more manageable. Professor Boys took as the exactness to be sought for 1 in 10,000. He further saw that reduction in length of the torsion rod with given balls is an advantage. For if the rod be halved the moment of inertia is one-fourth, and if the suspending fibre is made finer so that the torsion couple per radian is also one-fourth the time remains the same. But the moment of the attracting force is halved only, so that the deflection against one-fourth torsion is doubled. In Cavendish's arrangement there would

be an early limit to the advantage in reduction of rod in that the mass opposite one ball would begin seriously to attract the other ball. But Boys avoided this difficulty by sus- pending the balls from the ends of the torsion rod at different levels and by placing the attracting masses at these different levels. Fig. 3 represents diagrammatic- ally a vertical

section of the arrangement used on a scale of about 1/10. The torsion rod was a small rect- angular mirror about 2-4 cm. wide hung by a quartz fibre about 43 cm. long. From the sides of this mirror the balls were hung by quartz fibres at levels differing by 1 5 cm. The balls were of gold either about 5 mm. in diameter and weighing about. 1-3 gm. or about 6-5 mm. in diameter and weighing 2-65 gm. The attracting masses were lead spheres, about 10 cm. in diameter and weighing-‘ about 74 kgm. each. These were suspended from the top of ‘ the case which could be rotated round the central tube, and they were arranged so that the radius to the centre from the axis of the torsion system made 65 with the torsion rod, the position in which the moment of the attraction was a maximum. The torsion rod mirror reflected a distant scale by which the deflection could be vid. The time of vibration was recorded on a chrono-

Fig. 3. — Diagram of a Section of Professor Boys’s Apparatus.

graph. The result of the experiment, probably the best yet made, was A= 5-527; G = 6-658Xio~ 8 .

Braun’s Experiment (Denksckr. Akad. Wiss. Wien, math.- naturw. CI. 64, p. 187, 1896). — In 1896 Dr K. Braun, S.J., gave an account of a very careful and excellent repetition of the Cavendish experiment with apparatus much smaller than was used in the older experiments, yet much larger than that used by Boys. A notable feature of the work consisted in the suspen- sion of the torsion apparatus in a receiver exhausted to about 4 mm. of mercury, a pressure at which convection currents almost disappear while ” radiometer ” forces have hardly begun. For other ingenious arrangements the original paper or a short abstract in Nature, lvi., 1897, p. 127, may be con- sulted. The attracted balls weighed 54 gm. each and were 25 cm. apart. The attracting masses were spheres of mercury each weighing 9 kgm. and brought into position outside the receiver. Braun used both the deflection method and the time of vibration method suggested to Reich by Forbes. The methods gave almost identical results and his final values are to three decimal places the same as those obtained by Boys.

G. K. Burgess’s Experiment {Theses presentees a la jaculte des sciences de Paris pour obtenir le titre de docteur de I’universitS de Paris, 1901). — This was a Cavendish experiment in which the torsion system was buoyed up by a float in a mercury bath. The attracted masses could thus be made large, and yet the suspending wire could be kept fine. The torsion beam was 1 2 cm. long, and the attracted balls were lead spheres each 2 kgm. From the centre of the beam

depended a vertical steel rod with a varnished copper hollow float at its end, entirely immersed in mercury. The surface of the mercury was covered with dilute sulphuric acid to remove irregularities due to varying surface tension acting on the steel rod. The size.of the float was adjusted so that the torsion fibre of quartz 35 cm. long had only to carry a weight of 5 to 10 gm. The time of vibration was over one hour. The torsion couple per radian was determined by pre- liminary experiments. The attracting masses were each 10 kgm. turning in a circle 18 cm. in diameter. The results gave A=5-55 and G = 6-64 Xio -8 .

Eotvos's Experiment {Ann. der Physik und Chemie, 1896, 59, P- 354)-— I n the course of investigations on local variations of gravity by means of the torsion balance, R. Eotvos devised a method for determining G somewhat like the vibration method used by Reich and Braun. Two pillars wers built up of lead blocks 30 cm. square in cross section, 60 cm. high and 30 cm. apart. A torsion rod somewhat less than 30 cm. long with small weights at the ends was enclosed in a double-walled brass case of as little depth as possible, a device which secured great steadiness through freedom from convection currents. The suspension was a platinum wire about 150 cm. long. The torsion rod was fust set in the line joining the centres of the pillars and its time of vibration was taken. Then it was set with its length perpendicular to the line joining the centres and the time again taken. From these times Eotvos was able to deduce G = 6-65Xio~" 8 whence A = 5- 53. This is only a pro- visional value. The experiment was only as it were a by-product in the course of exceedingly ingenious work on the local variation in gravity for which the original paper should be consulted.

Wilsing's Experiment {Publ. des astrophysikalischen Observ. zu Potsdam, 1887, No. 22, vol. vi. pt. ii.; pt. iii. p. 133). — We may perhaps class with the Cavendish type an experiment made by J. Wilsing, in which a vertical " double pendulum " was used in place of a horizontal torsion system. Two weights each 540 gm. were fixed at the ends of a rod 1 metre long. A knife edge was fixed on the rod just above its centre of gravity, and this was supported so that the rod could vibrate about a vertical position. Two attracting masses, cast-iron cylinders each 325 kgm., were placed, say, one in front of the top weight on the pendulum and the other behind the bottom weight, and the position of the rod was observed in the usual mirror and scale way. Then the front attracting mass was dropped to the level of the lower weight and the back mass was raised to that of the upper weight, and the consequent deflection of the rod was

observed. By taking the time of vibration of the pendulum first as used in the deflection experiment and then when a small weight was removed from the upper end a known distance from the knife edge, the restoring couple per radian deflection could be found. The final result gave A = 5-579.

J. Joly's suggested Experiment {Nature xli., 1800, p. 256). — Joly has suggested that G might be determined by hanging a simple pendulum in a vacuum, and vibrating outside the case two massive pendulums each with the same time of swing as the simple pendulum. The simple pendulum would be set swinging by the varying attraction and from its amplitude after a known number of swings of the outside pendulums G could be found.

III. Comparison of the Earth Pull on a body with the Pull of an Artificial Mass by Means of the Common Balance.

The principle of the method is as follows: — Suppose a sphere of mass m and weight w to be hung by a wire from one arm of a balance. Let the mass of the earth be E and its radius be R. Then w = GEm/R 2 . Now introduce beneath m a sphere of mass M and let

Von Jolly's Experiment (Abhand. der k. bayer. Akad. der Wiss. 2 CI. xiii. Bd. 1 Abt. p. 157, and xiv. Bd. 2 Abt. p. 3). — In the first of these papers Ph. von Jolly described an experiment in which he sought to determine the decrease in weight with increase of height from the earth's surface, an experiment suggested by Bacon (Nov. Org. Bk. 2, §36), in the form of comparison of rates of two clocks at different levels, one driven by a spring, the other by weights. The experiment in the form carried out by von Jolly was attempted by H. Power, R. Hooke, and others in the early days of the Royal Society (Mackenzie, The Laws of Gravita- tion). Von Jolly fixed a balance at the top of his laboratory and from each pan depended a wire supporting another pan 5 metres below. Two i-kgm. weights were first balanced in the upper pans and then one was moved from an upper to the lower pan on the same side. A gain of 1-5 mgm. was observed after correction for greater weight of air displaced at the lower level. The inverse square law would give a slightly greater gain and the deficiency was ascribed to the configuration of the land near the laboratory. In the second paper a second experiment was described in which a balance was fixed at the top of a tower and provided as before with one pair of

pans just below the arms and a second pair hung from these by wires 21 metres below. Four glass globes were prepared equal in weight and volume. Two of these were filled each with 5 kgm. of mercury and then all were sealed up. The two heavy globes were then placed in the upper pans and the two light ones in the lower. The two on one side were now interchanged and again in weight of about 31-7 mgm. was observed. Air corrections were eliminated by the use of the globes of equal volume. Then a lead sphere about 1 metre radius was built up of blocks under one of the lower pans and the experiment was repeated. Through the attraction of the lead sphere on the mass of mercury when below the gain was greater by 0-589 mgm. This result gave A = 5-692.

Experiment of Richarz and Krigar-Menzel (Anhang zu den Abhand. der k. preuss. Akad. der Wiss. zu Berlin, 1898). — In 1884 A Konig and F. Richarz proposed a similar experiment which was ultimately carried out by Richarz and O. Krigar- Menzel. In this experiment a balance was supported somewhat more than 2 metres above the floor and with- scale pans above and below as in von Jolly's experiment. Weights each 1 kgm. were placed, say, in the top right pan and the bottom left pan. Then they were shifted to the bottom right and the top left, the result being, after corrections for change in density of air dis- placed through pressure and temperature changes, a gain in weight of 1-2453 mgm. on the right due to change in level of 2.2628 metres. Then a rectangular column of lead 210 cm. square cross section and 200 cm. high was built up under the balance between the pairs of pans. The column was perforated

with two vertical tunnels for the passage of the wires supporting the lower pans. On repeating the weighings there was now a decrease on the right when a kgm. was moved on that side from top to bottom while another was moved on the left from bottom to top. This decrease was 0-1211 mgm. showing a total change due to the lead mass of 1 • 2453 + 0-1211 = 1 -3664 mgm. and this is obviously four times the attraction of the lead mass on one kgm. The changes in the positions of the weights were made automatically. The results gave A = 5-o5andG = 6-685Xio~ 8 . Poynling's Experiment {Phil. Trans., vol. 182, A, 1891, P- 565)- — In 1878 J. H. Poynting published an account of a preliminary experiment which he had made to show that the common balance was available for gravitational work. The experiment was on the same lines as that of von Jolly but on a much smaller scale. In 1891 he gave an account of the full experiment carried out with a larger balance and with much greater care. The balance had a 4-ft. beam. The scale pans were removed, and from the two arms were hung lead spheres each weighing about 20 kgm. at a

level about 120 cm. below the beam. The* alance was supported in a case above a horizontal turn-table with axis vertically below the central knife edge, and on this turn-table was a lead sphere weighing 150 kgm. — the attracting mass. The centre of this sphere was 30 cm. below the level of the centres of the hanging weights. The turn-table could be rotated between stops so that the attracting mass was first immediately below the hanging weight on one side, and then immediately under that on the other side. On the same turn- table but at double the distance from the centre was a second sphere of half the weight introduced merely to balance the larger sphere and keep the centre of gravity at the centre of the turn-table. Before the introduction of this sphere errors were introduced through the tilting of the floor of the balance room when the turn-table was rotated. Corrections of course had to be made for the attraction of this second sphere. The removal of the large mass from left to right made an increase in weight on that side of about 1 mgm. determined by riders in a special way described in the paper. To eliminate the attraction on the beam and the rods supporting the hanging weights another experiment was made in which these weights were moved up the rods through 30 cm. and on now moving the attracting sphere from left to right the gain on the right was only about 5 mgm. The difference, f mgm., was due entirely to change in distance of the attracted masses. After all corrections the results gave A= 5-493 and G = 6-698 X io~ 8 .

Final Remarks. — The earlier methods in which natural masses were used have disadvantages, as already pointed out, which render them now quite valueless. Of later methods the Cavendish appears to possess advantages over the common balance method in that it is more easy to ward off temperature variations, and so avoid convection currents, and probably more easy to determine the actual value of the attracting force. For the present the values determined by Boys and Braun may be accepted as having the greatest weight and we therefore take Mean density of the earth A= 5-527 Constant of gravitation G = 6-658 X io~ 8 . Probably A = 5-53 and G = 6-66 X io~ 8 are correct to 1 in 500.

Authorities. — J. H. Poynting, The Mean Density of the Earth (1894), gives an account of all work up to the date of publication with a bibliography; A. Stanley Mackenzie, The Laws of Gravita- tion (1899), gives annotated extracts from various papers, some historical notes and a bibliography. A Bibliography of Geodesy, Appendix 8, Report for 1 902 of the U.S. Coast and Geodetic Survey in- cludes a very complete bibliography of gravitational work. (J.H.P.)

GRAVY, a word usually confined to the natural juices which come from meat during cooking. In early uses (in the New English Dictionary the quotations date from the end of the 14th to the beginning of the 16th centuries) it meant a sauce of broth flavoured with spices and almonds. The more modern usage seems to date from the end of the 16th century. The word is obscure in origin. It has been connected with “graves” or ” greaves,” the refuse of tallow in the manufacture of soap or candles. The more probable derivation is from the French. In Old French the word is almost certainly grani, and is derived

from grain, ” something used in cooking.” The word was early read and spelled with a. u or v instead of n, and the corruption was adopted in English.

GRAY, ASA (1810-1888), American botanist, was born at Paris, Oneida county, N.Y., on the 18th of November 1810. He was the son of a farmer, and received no formal education except at the Fairfield (N.Y.) academy and the Fairfield medical school. From Dr James Hadley, the professor of chemistry and materia medica he obtained his first instruction in science (1825- 1826). In the spring of 1827 he first began to collect and identify plants. His formal education, such as it was, ended in February 1 83 1, when he took the degree of M.D. His first contribution to descriptive botany appeared in 1835, and thereafter an un- interrupted series of contributions to systematic botany flowed from his peri for fifty-three years. In 1836 his first botanical text-book appeared under the title Elements of Botany, followed in 1839 by his Botanical Text-Book for Colleges, Schools, and Private Students which developed into his Structural Botany. He published later First Lessons in Botany and Vegetable Physi- ology (1857); How Plants Grow (1858); Field, Forest, and Garden Botany (1869); How Plants Behave (1872). These books served the purpose of developing popular interest in botanical studies. His most important work, however, was his Manual of the Botany of the Northern United States, the first edition of which appeared in 1847. This manual has passed through a large number of editions, is clear, accurate and compact to an extraordinary degree, and within its geographical limits is an indispensable book for the student of American botany.

Throughout his life Gray was a diligent writer of reviews of books on natural history subjects. Often these reviews were elaborate essays, for

which the books served merely as texts; often they were clear and just summaries of extensive works; sometimes they were sharply critical, though never ill-natured or unfair; always they were interesting, lively and of literary as well as scientific excellence. The greater part of Gray's strictly scientific labour was devoted to a Flora of North America, the plan of which originated with his early teacher and associate, John Torrey of New York. The second volume of Torrey and Gray's Flora was completed in 1843; but for forty years there- after Gray gave up a large part of his time to the preparation of his Synoptical Flora (1878). He lived at the period when the flora of North America was being discovered, described and systemat- ized; and his enthusiastic labours in this fresh field placed him at the head of American botanists and on a level with the most famous botanists of the world. In 1856 he published a paper on the distribution of plants under the title Statistics of the Flora of the Northern United States; and this paper was followed in 1859 by a memoir on the botany of Japan and its relations to that of North America, a paper of which Sir J. D. Hooker said that " in point of originality and far-reaching results [it] was its author's opus magnum." It was Gray's study of plant distribution which led to his intimate correspondence with Charles Darwin during the years in which Darwin was elaborating the doctrines that later became known as Darwinism. From 1855 to 1875 Gray was both a keen critic and a sympathetic exponent of the Darwinian principles. His religious views were those of the Evangelical bodies in the Protestant Church; so that, when Darwinism was attacked as equivalent to atheism, he was in position to answer effectively the unfounded allegation that it was fatal to the doctrine of design. He taught that " the most puzzling things of all to the old-school teleologists are the principia of the Darwinian." He openly avowed his conviction that the present species are not special creations, but rather derived from previously existing species; and he made his avowal with frank courage, when this truth was scarcely recog-' nized by any naturalists, and when to the clerical mind evolution meant atheism.

In 1842 Gray accepted the Fisher professorship of natural history in Harvard University. On his accession to this chair the university had no herbarium, no botanical library, few plants of any value, and but a small garden, which for lack of money had never been well stocked or well arranged. He soon brought

together, chiefly by widespread exchanges, a valuable herbarium and library, and arranged the garden; and thereafter the development of these botanical resources was part of his regular labours. The herbarium soon became the largest and most valuable in America, and

on account of the numerous type specimens it contains it is likely to remain a collection of national importance. Nothing of what Gray did for the botanical department of the university has been lost; on the contrary, his labours were so well directed that everything he originated and developed has been enlarged, improved and placed on stable foundations. He himself made large contributions to the establishment by giving it all his own specimens, many books and no little money, and by his will he gave it the royalties on his books. During his long connexion with the university he brought up two generations of botanists and he always took a strong personal interest in the researches and the personal prospects of the young men who had studied under him. His scientific life was mainly spent in the herbarium and garden in Cambridge; but his labours there were relieved by numerous journeys to different parts of the United States and to Europe, all of which contributed to his work on the Synoptical Flora. He lived to a good age — long enough, indeed, to receive from learned societies at home and abroad abundant evidence of their profound respect for his attainments and services. He died at Cambridge, Mass., on the 30th of January 1888.

His Letters (1893) were edited by his wife; and his Scientific Papers (1888) by C. S. Sargent. (C. W. E.)

GRAY, DAVID (1838-1861), Scottish poet, the son of a hand- loom weaver, was born at Merkland, near Glasgow, on the 29th of January 1838. His parents resolved to educate him for the church, and through their self-denial and his own exertions as a pupil teacher and private tutor he was able to complete a course of four sessions at the university of Glasgow. He began to write .poetry for The Glasgow Citizen and began his idyll on the Luggie, the little stream that ran through Merkland. His most intimate companion at this time was Robert Buchanan, the poet ; and in May i860 the two agreed to proceed to London, with the idea of finding literary employment. Shortly after his arrival in London Gray introduced himself to Monckton Milnes, after- wards Lord Houghton, with whom he had previously corre- sponded. Lord Houghton tried to persuade him to return to Scotland, but Gray insisted on staying in London. He was unsuccessful in his efforts to place Gray's poem, " The Luggie," in The Comhill Magazine, but gave him some light literary work. He also showed him great kindness when a cold which had seized him assumed the serious form of consumption, and sent him to Torquay; but as the disease made rapid progress, an irresistible longing seized Gray to return to Merkland, where he arrived in January 1861, and died on the 3rd of December following, having the day before had the gratification of seeing a printed specimen copy of his poem " The

Luggie," published eventually by the exertions of Sydney Dobell. He was buried in the Auld Aisle Churchyard, Kirkintilloch, where in 1865 a monument was erected by " friends far and near " to his memory.

" The Luggie," the principal poem of Gray, is a kind of reverie in which the scenes and events of his childhood and his early aspirations are mingled with the music of the stream which he celebrates. The series of sonnets, " In the Shadows," was composed during the latter part of his illness. Most of his poems necessarily bear traces of immaturity, and lines may frequently be found in them which are mere echoes from Thomson, Words- worth or Tennyson, but they possess, nevertheless, distinct individuality, and show a real appreciation of natural beauty.

The Luggie and other Poems, with an introduction by R. Monckton Milnes, and a brief memoir by James Hedderwick, was published in 1862; and a new and enlarged edition of Gray's Poetical Works, edited by Henry Glassford Bell, appeared in 1874. See also David Gray and other Essays, by Robert Buchanan (1868), and the same writer's poem on David Gray, in Idyls and Legends of Inverburn.

GRAY, ELISHA (1835-1901), American electrician, was born in Barnesville, Belmont county, Ohio, on the 2nd of August 1835. He worked as a carpenter and in a machine shop, reading

in physical science at the same time, and for five years studied at Oberlin College, where he taught for a time. He then in- vestigated the subject of telegraphy, and in 1867 patented a telegraphic switch and annunciator. Experimenting in the transmittal of electro-tones and of musical tones by wire, he utilized in 1874 animal tissues in his receivers, and filed, on the 14th of February 1876, a caveat for the invention of a telephone, only a few hours after the filing of an application for a patent by Alexander Graham Bell. (See Telephone.) Thecaveat was disregarded; letters patent No. 174, 465 were granted to Bell, whose priority of invention was upheld in 1888 by the United States Supreme Court (see Molecular Telephone Co. v. American Bell Telephone Co., 126 U.S. 1). Gray's experiments won for him high praise and the decoration of the Legion of Honour at the Paris Exposition of 1878. He was for a time a manufacturer of electrical apparatus, particularly of his own inventions; and was chief electrical expert of the Western Electric Company of Chicago. At the Columbian

Exposition of 1893 Gray was chair- man of the International Congress of Electricians. He died at Newtonville, Massachusetts, on the 21st of January 1901. Among his later inventions were appliances for multiplex telegraphy and the telautograph, a machine for the electric transmission of handwriting. He experimented in the submarine use of electric bells for signalling.

Gray wrote, besides scientific addresses and many monographs, Telegraphy and Telephony (1878) and Electricity and Magnetism

(1900).

GRAY, HENRY PETERS (1819-1877), American portrait and genre painter, was born in New York on the 23rd of June 1819. He was a pupil of Daniel Huntington there, and sub- sequently studied in. Rome and Florence. Elected a member of the National Academy of Design in 1842, he succeeded Huntington as president in 1870, holding the position until 1871. The later years of his life were devoted to portrait work. He was strongly influenced by the old Italian masters, painting in mellow colour with a classical tendency. One of his notable canvases was an allegorical composition called ” The Birth of our Flag ” (1875). He died in New York City on the 12th of November 1877.

GRAY, HORACE (1828-1902), American jurist, was born in Boston, Massachusetts, onthe 24th of March 1828. He graduated at Harvard in 1845; was admitted to the bar in 1851, and in 1854-1861 was reporter to the Supreme Court of Massachusetts. He practised law, first in partnership with Ebenezer Rockwood Hoar, and later with Wilder Dwight (1823-1862) and Charles F.. Blake; was appointed associate justice of the state Supreme Court on the 23rd of August 1864, becoming chief-justice on the 5th of September 1873; and was associate justice of the Supreme Court of the United States from December 1881 to August 1902, resigning only a few weeks before his death at Nahant, Mass., on the 15th of- September 1902. Gray had a fine sense of the dignity of the bench, and a taste for historical study. His judgments were unmistakably clear and contained the essence of earlier opinions. A great case lawyer, he was a much greater judge, the variety of his knowledge and his contributions to admiralty and prize law and to testamentary law being particu- larly striking; in constitutional law he was a ” loose ” rather than a ” strict ” constructionist.

See Francis C. Lowell, ” Horace Gray,” in Proceedings of the American Academy, vol. 39, pp. 627-637 (Boston, 1904).

GRAY, JOHN DE (d. 12 14), bishop of Norwich, entered Prince John's service, and at his accession (1199) was rapidly promoted in the church till he became bishop of Norwich in September 1200. King John's attempt to force him into the primacy in 1205 started the king's long and fatal quarrel with Pope Innocent III. De Gray was a hard-working royal official, in finance, in justice, in action, using his position to enrich himself and his family. In 1209 he went to Ireland to govern it as justiciar. He adopted a forward policy, attempting to extend the English frontier northward and westward, and fought a number of campaigns on the Shannon and in Fermanagh. But in 1 21 2 he suffered a great defeat. He assimilated the coinage of

Ireland to that of England, and tried to effect a similar reform in Irish law. De Gray was a good financier, and could always raise money : this probably explains the favour he enjoyed from King John. In 1213 he is found with 500 knights at the great muster at Barham Downs, when Philip Augustus was threatening to invade England. After John's reconciliation with Innocent he was one of those exempted from the general pardon, and was forced to go in person to Rome to obtain it. At Rome he so completely gained over Innocent that the pope sent him back with papal letters recommending his election to the bishopric of Durham (1213); but he died at St Jean d'Audely in Poitou on his homeward journey (October 1214).

GRAY, JOHN EDWARD (1800-1875), English naturalist, born at Walsall, Staffordshire, in 1800, was the eldest of the three sons of S. F. Gray, of that town, druggist and writer on botany, and author of the Supplement to the Pharmacopoeia, &c, his grandfather being S. F. Gray, who translated the Philosophia Botanica of Linnaeus for the Introduction to , Botany of James Lee (1715-1795). Gray studied at St Bartholomew's and other hospitals for the medical profession, but at an early age was attracted to the pursuit of botany. He assisted his father by collecting notes on botany and comparative anatomy and zoology in Sir Joseph Banks's library at the British Museum, aided by Dr W. E. Leach, assistant keeper, and the systematic synopsis of the Natural Arrangement of British Plants, 2 vols., 182 1, was prepared by him, his father writing the preface and introduction-only. In consequence of his application for member- ship of the Linnaean Society being rejected in 1822, he turned to the study of zoology, writing on zoophytes, shells, Mollusca and Papilionidae, still aided by Dr Leach at the British Museum. In December 1824 he obtained the post of assistant in that institution; and from that date to December 1839, when J. G. Children retired from the keepership, he had so zealously applied himself to the study, classification and improvement of the national collection of zoology that he was selected as the fittest

person to be entrusted with its charge. Immediately on his appointment as keeper, he took in hand the revision of the systematic arrangement of the collections; scientific catalogues followed in rapid succession; the department was raised in importance; its poverty as well as its wealth became known, and whilst increased grants, donations and exchanges made good many deficiencies, great numbers of students, foreign as well as English, availed themselves of its resources to enlarge the knowledge of zoology in all its branches. In spite of numerous obstacles, he worked up the department, within a few years of his appointment as keeper, to such a state of excellence as to make it the rival of the cabinets of Leiden, Paris and Berlin; and later on it was raised under his management to the dignity of the largest and most complete zoological collection in the world. Although seized with paralysis in 1870, he continued to discharge the functions of keeper of zoology, and to contribute papers to the Annals oj Natural History, his favourite journal, and to the transactions of a few of the learned societies; but at Christmas 1874, having completed half a century of official work, he resigned office, and died in London on the 7th of March

1875.

Gray was an exceedingly voluminous writer, and his interests. were not confined to natural history only, for he took an active part in questions of public importance of his day, such as slave emancipation, prison discipline, abolition of imprison- ment for debt, sanitary and municipal organizations, the decimal system, public education, extension of the opening of museums, &c. He began to publish in 1820, and continued till the year of his death.

The titles of the books, memoirs and miscellaneous papers written by him, accompanied by a few notes, fill a privately printed list of 56 octavo pages with 1162 entries.

GRAY, PATRICK GRAY, 6th Baron (d. 161 2), was descended from Sir Andrew Gray (c. 1390-1469) of Broxmouth and Foulis, who was created a Scottish peer as Lord Gray, probably in 1445. Andrew was a leading figure in Scottish politics during the reigns of James I. and his two successors, and visited England as a

hostage, a diplomatist and a pilgrim. The 2nd Lord Gray was his

grandson Andrew (d. 15 14), and the 4th lord was the latter's grandson Patrick (d. 1582), a participant in Scottish politics during the stormy time of Mary, queen of Scots. Patrick's son, Patrick, the 5th lord (d. 1609), married Barbara, daughter of William, 2nd Lord Ruthven, and their son Patrick, known as the " Master of Gray," is the subject of this article. Educated at Glasgow University and brought up as a Protestant, young Patrick was married early in life to Elizabeth Lyon, daughter of Lord Glamis, whom he repudiated almost directly; and afterwards went to France, where he joined the friends of Mary, queen of Scots, became a Roman Catholic, and assisted the French policy of the Guises in Scotland. He returned and took up his residence again in Scotland in 1583, and immediately began a career of treachery and intrigue, gaining James's favour by disclosing to him his mother's secrets, and acting in agreement with James Stewart, earl of Arran, in order to keep Mary a prisoner in England. In 1584 he was sent as ambassador to England, to effect a treaty between James and Elizabeth and to exclude Mary. His ambition incited him at the same time to promote a plot to secure the downfall of Arran. This was supported by Elizabeth, and was finally accomplished by letting loose the lords banished from Scotland for their participation in the rebellion called the Raid of Ruthven, who, joining Gray, took possession of the king's person at Stirling in 1585, the league with England being ratified by the parliament in December. Gray now became the intermediary between the English government and James on the great question of Mary's execution, and in 1587 he was despatched on an embassy to Elizabeth, ostensibly to save Mary's life. Gray had, however, previously advised her secret assassination and had endeavoured to overcome all James's scruples; and though he does not appear to have carried treachery so far as to advise her death on this occasion, no representations made by him could have had any force or weight. The execution of Mary caused his own downfall and loss of political power in Scotland; and after his return he was imprisoned on charges of plots against Protestantism, of endeavouring to prevent the king's marriage, and of having been bribed to consent to Mary's death. He pleaded guilty of sedition and of having obstructed the king's marriage, and was declared a traitor; but his life was spared by James and he was banished from the country, but permitted to return in 1589, when he was restored to his office of master of the wardrobe to which he had been appointed in 1585. His further career was marked by lawlessness and misconduct. In 1592, together with the 5th Lord Bothwell, he made an unsuccessful attempt to seize the king at Falkland, and the same year earned considerable dis- credit by bringing groundless accusations against the Presby- terian minister, Robert Bruce; while after the king's accession to the

English throne he was frequently summoned before the authorities on account of his conduct. Notwithstanding, he never lost James's favour. In 1609 he succeeded his father as 6th Baron Gray, and died in 1612.

Gray was an intimate friend of Sir Philip Sidney, but, if one of the ablest, handsomest and most fascinating, he was beyond doubt one of the most unscrupulous men of his day. He married as his second wife in 1585 Mary Stewart, daughter of Robert, earl of Orkney, and had by her, besides six daughters, a son, Andrew (d. 1663), who succeeded him as 7th Baron Gray. Andrew, who served for a long time in the French army, was a supporter, although not a very prominent one, of Charles I. and afterwards of Charles II. He was succeeded as 8th Lord Gray by Patrick (d. 17 11), a son of his daughter Anne, and Patrick's successor was his kinsman and son-in-law John (d. 1724). On the extinction of John's direct line in 1878 the title of Lord Gray, passed to George Stuart, earl of Moray. In 1606 Gray had been ■ ranked sixth among the Scottish baronies.

Bibliography. — Article in Diet, of Nat. Biog., and authorities there quoted ; Gray's relation concerning the surprise at Stirling (Bannatyne Club Publns. i. 131, 1827); Andrew Lang, History of Scotland, vol. ii. (1902) ; Peter Gray, The Descent and Kinship of Patrick, Muster of Gray (1903) ; Gray Papers (Bannatyne Club, 1835); Hist. MSS. Comm., Marq. of Salisbury's MSS*

GRAY, ROBERT (1809-1872), first bishop of Cape Town and metropolitan of South Africa, was born at Bishop Wearmouth, Durham, and was the son of Robert Gray, bishop of Bristol. He was educated at Eton and Oxford, and took orders in 1833. After holding the livings of Whitworth, Durham, 1834-1845, and Stockton-on-Tees 1845-1847, he was consecrated bishop of Cape Town in 1847; the bishopric having been endowed through the liberality of Miss (afterwards Baroness) Burdett-Coutts. Until 1853 he was a suffragan of Canterbury, but in that year he formally resigned his see and was reappointed by letters patent metropolitan of South Africa in view of the contemplated establishment of the suffragan dioceses of Graham's Town and Natal. In that capacity his coercive jurisdiction was twice called in question, and in each case the judicial committee of the privy council decided against him. The best-known case is that of Bishop Colenso, whom Gray deposed and excommunicated in 1863, The spiritual validity of the sentence was upheld by the convocation of Canterbury and the Pan-Anglican synod of 1867, but legally Colenso remained bishop of Natal. The privy council decisions declared, in effect, that the Anglican body in South Africa was on the footing of a voluntary religious society. Gray, accepting this position, obtained its

recognition by the mother church as the Church of the Province of South Africa, in full communion with the Church of England. The first provincial synod was held in 1870. During his episcopate Bishop Gray effected a much-needed organization of the South African church, to which he added five new bishoprics, all carved out of the original diocese of Cape Town. It was also' chiefly owing to his suggestions that the universities' mission to Central Africa was founded.

GRAY, SIR THOMAS (d. c. 1369), English chronicler, was a son of Sir Thomas Gray, who was taken prisoner by the Scots at Bannockburn and who died about 1344. The younger Thomas was present at the battle of Neville's Cross in 1346; in 1355, whilst acting as warden of Norham Castle, he was made a prisoner, and during his captivity in Edinburgh Castle he devoted his time to studying the English chroniclers, Gildas, Bede, Ranulf Higdon and others. Released in 1357 he was appointed warden of the east marches towards Scotland in 1367, and he died about 1369. Gray's work, the Scalacronica (so called, perhaps, from the scaling-ladder in the crest of the Grays), is a chronicle of English history from the earliest times to about the year 1362. It is, however, only valuable for the reigns of Edward I. and Edward II. and part of that of Edward III., being especially so for the account of the wars between England and Scotland, in which the author's father and the author himself took part. Writing in Norman-French, Gray tells of Wallace and Bruce, of the .fights at Bannockburn, Byland and Dupplin, and makes some mention of the troubles in England during the reign of Edward II. He also narrates the course of the war in France between 1355 and 1361; possibly he was present during some of these campaigns.

The Scalacronica was summarized by John Leland in the 16th century; the part dealing with the period from 1066 to the end, together with the prologue, was edited for the Maitland Club by J. Stevenson (1836) ; and the part from 1274 to 1362 was translated into English by Sir Herbert Maxwell (Glasgow, 1907). In the extant manuscript, which is in Corpus Christi College, Cambridge, there is a gap extending from about 1340 to 1355, and Gray's account of this period is only known from Leland's summary.

GRAY, THOMAS (1716-1771), English poet, the fifth and sole surviving child of Philip and Dorothy Gray, was born in London on the 26th of December 17 16. His mother's maiden name was Antrobus, and in partnership with her sister Mary she kept a millinery shop in Cornhill. This and the house connected with it were the property of Philip Gray, a money-scrivener, who married Dorothy in 1706 and lived with her in the house, the sisters renting the shop from him and

supporting themselves by its profits. Philip Gray had impaired the fortune which he inherited from his father, a wealthy London merchant; yet he was sufficiently well-to-do, and at the close of his life was building a house upon some property of his own at Wanstead. But he was selfish and brutal, and in 1735 his wife took some abortive

steps to obtain a separation from him. At this date she had given birth to twelve children, of whom Thomas was the only- survivor. He owed his life as well as his education to this ” careful, tender mother,” as he calls her. The child was suffocating when she opened one of his veins with her own hand. He went at her expense to Eton in 1727, and was confided to the care of her brother, William Antrobus, one of the assistant- masters, during some part at least of his school-life.

At Eton Gray’s closest friends were Horace Walpole, Richard West (son of the lord chancellor of Ireland and grandson of the famous Bishop Burnet), and Thomas Ashton, afterwards fellow of Eton. This little coterie was dubbed ” the Quadruple Alliance “; its members were studious and literary, and took little part in the amusements of their fellows. In 1734 Gray matriculated at Peterhouse, Cambridge, of which his uncle, Robert Antrobus, had been a fellow. At Cambridge he had once more the companionship of Walpole and Ashton who were at King’s, but West went to Christchurch, Oxford. Gray made at this time the firmest and most constant friendship of his life with Thomas Wharton (not the poet Warton) of Pembroke College. He was maintained by his mother, and his straitened means were eked out by certain small exhibitions from his college. His conspicuous abilities and known devotion to study perhaps atoned in the eyes of the authorities for his indifference to the regular routine of study; for mathematics in particular he had an aversion which was the one exception to his almost limitless curiosity in other directions. During his first Cambridge period he learnt Italian ” like any dragon,” and made translations from Guarini, Dante and Tasso, some of which have been pre- served. In September 1738 he is in the agony of leaving college, nor can we trace his movements with any certainty for a while, though it may be conjectured that he spent much time with Horace Walpole, and made in his company some fashionable acquaintances in London. On the 29th of March 1739, he started with Walpole for a long continental tour, for the expenses of which it is probable that his father, for once, came in some measure to his assistance. In Paris, Gray visited the great with his friend, studied the

picture-galleries, went to tragedies, comedies, operas and cultivated there that taste for the French classical dramatists, especially Racine, whom he afterwards tried to imitate in the fragmentary ” Agrippina.” It is characteristic of him that he travels through France with Caesar eonstantly in his hands, ever noting and transcribing. In the same way, in crossing the Alps and in Piedmont, he has ” Livy in the chaise with him and Silius Italicus too.” In Italy he made a long sojourn, principally at Florence, where Walpole’s life-long correspondent, Horace Mann, was British envoy, and received and treated the travellers most hospitably. But Rome and Naples are also described in Gray’s letters, sometimes vividly, always amusingly, and in his notes are almost catalogued. Herculaneum, an object of intense interest to the young poet and antiquary, had been discovered the year before. At length in April 1741 Gray and Walpole set out northwards for Reggio. Here they quarrelled. Gray, ” never a boy,” was a student, and at times retiring; Walpole, in his way a student too, was at this time a very social being, somewhat too frivolous, and, what was worse, too patronizing. He good-humouredly said at a later date, ” Gray loves to find fault,” and this fault- finding was expressed, no doubt with exaggeration, in a letter to Ashton, who violated Gray’s confidence. The rupture followed, and with two friends, John Chute of the Vyne, Hamp- shire, and the young Francis Whittled, Gray went to Venice to see the doge wed the Adriatic on Ascension Day. Thence he returned home attended only by a laquais de voyage, visiting once more the Grande Chartreuse where he left in the album of the brotherhood those beautiful alcaics, O Tu severa Religio loci, which reveal his characteristic melancholy (enhanced by solitude and estrangement) and that sense of the glory as distinct from the horror of mountain scenery to which perhaps he was the first of Englishmen to give adequate expression. On the 18th of September 1741 we find him in London, astonishing the street boys with his deep ruffles, large bag-wig and long sword,

and ” mortified ” under the hands of the English barber. On the 6th of November his father died; Philip Gray had, it is evident, been less savage and niggardly at last to those who were dependent upon him, and his death left his wife and son some measure of assured peace and comfort.

London was Gray’s headquarters for more than a year, with occasional visits to Stoke Poges, to which his mother and Mary Antrobus had retired from business to live with their sister, Mrs Rogers. At Stoke he heard of the death of West, to whom he had sent the ” Ode on Spring,” which was returned to him unopened. It was an unexpected blow, shocking in all its circumstances, especially if we believe the

story that his friend's frail life was brought to a close by the discovery that the mother whom he tenderly loved had been an unfaithful wife, and, as some say, poisoned her husband. About this tragedy Gray preserved a mournful silence, broken only by the pathetic sonnet, and some Latin lines, in which he laments his loss. The year 1742, was, for him, fruitful in poetic effort, of which, however, much was incomplete. The "Agrippina," the De principiis Cogttandi, the splenetic " Hymn to Ignorance " in which he contemplates his return to the university, remain fragments; but besides the two poems already mentioned, the " Ode on a Distant Prospect of Eton College " and the " Hymn to Adver- sity," perhaps the most faultless of his poems, were written before the close of the summer. After hesitating between Trinity Hall and Peterhouse, he returned to the latter, probably as a fellow-commoner. He had hitherto neglected to read for a degree; he proceeded to that of LL.B. in 1744. In 1745 a reconciliation with Walpole, long desired probably on both sides, was effected through the kind offices of Chute's sister. In 1746 he spent his time between Cambridge, Stoke and London; was much with Walpole; graphically describes the trial of the Scottish rebel lords, and studied Greek with avidity; but " the muse," which by this time perhaps had stimulated him to begin the " Elegy," " has gone, and left him in much worse company." In town he finds his friends Chute and Whithed returned to England, and " flaunts about " in public places with them. The year 1747 produced only the ode on Walpole's cat, and we gather that he is mainly engaged in reading with a very critical eye, and interesting himself more in the troubles of Pembroke College, in which he almost seems to live, than in the affairs of Peterhouse. In this year also he made the acquaintance of Mason, his future biographer. In 1748 he first came before the public, but anonymously, in Dodsley's Miscellany, in which appeared the Eton ode, the ode on spring, and that on the cat. In the same year he sent to Wharton the beginning of the didactic poem, " The Alliance of Education and Government," which remains a fragment. His aunt, Mary Antrobus, died in 1749.

There is little to break the monotony of his days till 1750, when from Stoke he sent Walpole " a thing to which he had at last put an end." The " thing " was the " Elegy." It was shown about in manuscript by his admiring friend; it was impudently pirated, and Gray had it printed by Dodsley in self-defence. Even thus it had "a pinch or two in its cradle," of which it long bore the marks. The publication led to the one incident in Gray's life which has a touch of romance. At Stoke-house had come to live the widowed Lady Cobham, who learnt that the author of the " Elegy " was her neighbour. At her instance, Lady Schaub, her visitor, and Miss Speed, her prot6gee, paid him a call; the

poet was out, and his quiet mother and aunts were somewhat flustered at the apparition of these women of fashion, whose acquaintance Gray had already made in town. Hence the humorous " Long Story." A platonic affection sprang up between Gray and Miss Speed; rumour, upon the death of Lady Cobham, said that they were to be married, but the lady escaped this mild destiny to become the Baroness de la Peyriere, afterwards Countess Viry, and a dangerous political intriguante.

In 1753 all Gray's completed poems, except the sonnet on the death of West, were published by Dodsley in a handsome volume illustrated by Richard Bentley, the son of the celebrated master of Trinity. To these designs we owe the verses to the artist

which were posthumously published from a MS. torn at the end. In the same year Gray's mother died and was buried in the churchyard at Stoke Poges, the scene of the " Elegy," in the same grave with Mary Antrobus. A visit to his friend Dr Wharton at Durham later in the year revives his earlier impres- sions of that bolder scenery which is henceforth to be in the main the framework of his muse. Already in 1752 he had almost completed " The Progress of Poesy," in which, and in " The Bard," the imagery is largely furnished forth by mountain and torrent. The latter poem long held fire; Gray was stimu- lated to finish it by hearing the blind Welsh harper Parry at Cambridge. Both odes were the first-fruits of the press which Walpole had set up at Strawberry Hill, and were printed together there in 1757. They are genuinely Pindaric, that is, with corre- sponding strophes, antistrophes and epodes. As the Greek motto prefixed to them implies, they were vocal to the intelligent only; and these at first were few. But the odes, if they did not attain the popularity of the " Elegy," marked an epoch in the history of English poetry, and the influence of " The Bard " may be traced even in that great but very fruitful imposture, the pseudo-Ossian of Macpherson. Gray yields to the impulse of the Romantic movement; he has long been an admirer of ballad poetry; before he wrote " The Bard " he had begun to study Scandinavian literature, and the two " Norse Odes," written in 1761, were in style and metrical form strangely anticipative of Coleridge and Scott. Meanwhile his Cambridge life had been vexed by the freaks of the fellow-cdmmoners of Peterhouse, a peculiarly riotous set. He had suffered great inconvenience for a time by the burning of his property in Cornhill, and so nervous was he on the subject of fire that he had provided

himself with a rope-ladder by which he might descend from > his college window. Under this window a hunting- party of these rude lads raised in the early morning the cry of fire; the poet's night-capped head appeared and was at once withdrawn. This, or little more than this, was the simple fact out of which arose the legend still current at Cambridge. The servile authorities of Peterhouse treated Gray's complaints with scant respect, and he migrated to Pembroke College. " I left my lodgings," he said, "because the rooms were noisy, and the people of the house dirty."

In 1758 died Mrs Rogers, and Gray describes himself as employed at Stoke in " dividing nothing " between himself and the surviving aunt, Mrs Oliffe, whom he calls " the spawn of Cerberus and the Dragon of Wantley." In 1759 he availed himself of the MS. treasures of the British Museum, then for the first time open to the public, made a very long sojourn in town, and in 1761 witnessed the coronation of George III., of which to his friend Brown of Pembroke he wrote a very vivacious account. In his last years he revealed a craving for a life less sedentary than heretofore. He visited various picturesque districts of Great Britain, exploring great houses and ruined abbeys; he was the pioneer of the modern tourist, noting and describing in the spirit now of the poet, now of the art-critic, now of the antiquary. In 1762 he travelled in Yorkshire and Derbyshire; in 1764 in the Lowlands of Scotland, and thence went to Southampton and its neighbourhood. In 1765 he revisits Scotland; he is the guest of Lord Strathmore at Glamis; and revels in " those monstrous creatures of God," the Highland mountains. His most notable achievement in this direction was his journey among the English lakes, of which he wrote an interesting account to Wharton; and even in 1770, the year before his death, he visited with his young friend Norton Nicholls "five of the most beautiful counties of the kingdom," and descended the Wye for 40 m. In all these quests he displays a physical energy which surprises and even perplexes us. His true academic status was worthily secured in 1768, when the duke of Grafton offered him the professorship of modern history which in 1762 he had vainly endeavoured to obtain from Bute. He wrote in 1769 the " Installation Ode " upon the appointment of Grafton as chancellor of the university. It was almost the only instance in which he successfully executed a task, not, in the strictest sense, self-imposed; the great founders of the

university are tactfully memorized and pass before us in a kind of heraldic splendour. He bore with indifference the taunts to which, from Junius and others, he was exposed for this tribute to his patron. He was contemplating a journey to Switzerland to visit his youthful friend de Bonstetten when, in the summer of 1771, he was conscious

of a great decline in his physical powers. He was seized with a sudden illness when dining in his college hall, and died of gout in the stomach on the 30th of July 1 77 1. His last moments were attended by his cousin Mary Antrobus, postmistress through his influence at Cambridge and daughter of his Eton tutor; and he was laid beside his beloved mother in the churchyard of Stoke Poges.

Owing to his shyness and reserve he had few intimate friends, but to these his loss was irreparable; for to them he revealed himself either in boyish levity and banter, or wise and sympa- thetic counsel and tender and yet manly consolation; to them he imparted his quiet but keen observation of passing events or the stores of his extensive reading in literature ancient, medieval or modern; and with Proteus-like variety he writes at one time as a speculative philosopher, at another as a critic in art or music, at another as a meteorologist and nature-lover. His friendship with the young, after his migration to Pembroke College, is a noteworthy trait in his character. With Lord Strathmore and the Lyons and with William Palgrave he con- versed as an elder brother, and Norton Nicholls of Trinity Hall lost in him a second father, who had taught him to think and feel. The brilliant' young foreigner, de Bonstetten, looked back after a long and chequered career with remembrance still vivid to the days in which the poet so soon to die taught him to read Shake- speare and Milton in the monastic gloom of Cambridge. With the elderly " Levites " of the place he was less in sympathy; they dreaded his sarcastic vein; they were conscious that he laughed at them, and in the polemics of the university he was somewhat of a free lance, fighting for his own hand. Lampoons of his were privately circulated with effect, and that he could be the fiercest of satirists the " Cambridge Courtship " on the candidature of Lord Sandwich for the office of high steward, and the verses on Lord Holland's mimic ruins at Westgate, sufficiently prove. The faculty which he displayed in humour and satire was denied to his more serious muse; there all was the fruit of long delay; of that higher inspiration he had a thin but very precious vein, and the sublimity which he undoubtedly attained was reached by an effort of-which captious and even sympathetic criticism can discover the traces. In his own time he was regarded as an innovator, for like Collins he revived the poetic diction of the past, and the adverse judgments of Johnson and others upon his work are in fact a defence of the current literary traditions. Few men have published so little to so much effect; few have attained to fame with so little ambition. His favourite maxim was " to be employed is to be happy," but he was always employed in the first instance for the satisfaction of his own soul, and to this end and no other he made himself one of the best Greek scholars at

Cambridge in the interval between Bentley and Porson. His genius was receptive rather than creative, and it is to be regretted that he lacked energy to achieve that history of English poetry which he once projected, and for which he possessed far more knowledge and insight than the poet Thomas Warton, to whom he resigned the task. He had a fine taste in music, painting and architecture; and his correspondence includes a wide survey of such European literature as was accessible to him, with criticisms, sometimes indeed a little limited and insular, yet of a singularly fresh and modern cast. In person he was below the middle height, but well-made, and his face, in which the primness of his features was redeemed by his flashing eyes, was the index of his character. There was a touch of affectation in his demeanour, and he was sometimes reticent and secretive even to his best friends. He was a refined Epicurean in his habits, and a deist rather than a Christian in his religious beliefs; but his friend, Mrs Bonfoy, had ” taught him to pray ” and he was keenly alive to the dangers of a flippant scepticism. In a beautiful alcaic stanza he pronounces the man supremely happy who in the depths of the heart is conscious

of the ” fount of tears,” and his characteristic melancholy, except in the few hours when it was indeed black, was not a pitiable state; rather, it was one secret of the charm both of the man and of the poet.

A very complete bibliography of Gray will be found in Dr. Brad- shaw’s edition of the poems in the Aldine series. Dodsley published ten of the poems, exclusive of the ” Long Story,” in 1768. Mason’s Life of Gray (1778) included the poems and some hitherto unpub- lished fragments, with a selection from his letters, much garbled. Mathias in 1814 reprinted Mason’s edition and added much from Gray’s MS. commentaries together with some more of his transla- tions. The most exhaustive edition of Gray’s writings was achieved by the Rev. John Mitford, who first did justice to the correspondence with Wharton and Norton Nicholls (5 vols., Pickering, 1836-1843; correspondence of Gray and Mason, Bentley, 1853) ; see also the edition of the works by Edmund Gosse (4 vols. 1884); the Life by the same in Eng. Men of Letters (2nd ed., 1889) ; some further relics are given in Gray .and His Friends by D. C. Tovey (Cambridge, 1890) ; and a new edition of the letters copiously annotated by D. C. Tovey is in the Standard Library (1900-1907). Nicholl’s Illustrations, vol. vi. p. 805, quoted by Professor Kittredge in the Nation, Sept. 12th, 1900, gives the true story of Gray’s migration to Pembroke College. Matthew Arnold’s

essay on Gray in Ward's English Poets is one of the minor classics of literary criticism.

(D. C. To.)

GRAY (or Grey), WALTER DE (d. 1255), English prelate and statesman, was a nephew of John de Gray, bishop of Norwich, and was educated at Oxford. He owed his early and rapid preferment in church and state to the favour of King J n hn, becoming the king's chancellor in 1205, and being chosen bishop of Lichfield in 1210. He was, however, not allowed to keep this bishopric, but he became bishop of Worcester in 12 14, resigning his office as chancellor in the same year. Gray was with John when the king signed Magna Carta in June 121 5; soon after this event he left England on the king's business, and it was during his absence that he was forced into the archbishopric of York, owing his election to the good offices of John and of Pope Innocent III. He took a leading part in public affairs during the minority of Henry III., and was regarded with much favour by this king, who employed him on important errands to foreign potentates, and left him as guardian of England when he went to France in 1242. Afterwards the archbishop seems to have been less favourably disposed towards Henry, and for a time he absented himself from public business; however, in 1255, he visited London to attend a meeting of parliament, and died at Fulham on the 1st of May 1255. Gray was always anxious to assert his archiepiscopal authority over Scotland,

and to maintain it against the archbishop of Canterbury, but in neither case was he very successful. He built the south transept of the minster at York and bought for his see the village, afterwards called Bishopthorpe, which is still the residence of the archbishop of York. He was also generous to the church at Ripon. Gray was regarded by his contemporaries as an avaricious, but patriotic man.

GRAY, a town of eastern France, capital of an arrondissement in the department of Haute-Saone, situated on the declivity of a hill on the left bank of the Saone, 36 m. S.W. of Vesoul by the Eastern railway. Pop. (1006) 5742. The streets of the town are narrow and steep, but it possesses broad and beautiful quays and has a busy port. Three bridges, one dating from the 18th century, unite it to suburbs on the right bank of the river, on which is the railway-station from which lines branch off to Auxonne, Dijon, Besancon and Culmont-Chalindrey. The principal buildings are the Gothic church, restored in the style of the Renaissance but with a modern portal, and the h6tel de ville, built by the Spaniards in 1568. The latter building has a handsome facade decorated with columns of red granite. Gray is the seat of a subprefect and has tribunals of first instance and of commerce, a chamber of commerce, a communal college and a small museum. It has large flour-mills; among the other industries is the manufacture of machinery and iron goods. There is also a considerable transit traffic in goods from the south of France and the colonies, and trade in iron, corn, pro- visions, vegetables, wine, wood, &c, much of which is carried by river. Gray was founded in the 7th century. Its fortifications were destroyed by Louis XIV. During the Franco-German War

General von Werder concentrated his army corps in the town and held it for a month, making it the point d'appui of move- ments towards Dijon and Langres, as well as towards Besangon. Gray gave its name to the distinguished English family of de Gray, Gray or Grey, Anschitel de Gray being mentioned as an Oxfordshire tenant in Domesday.

GRAYLING (Thymallus), fishes belonging to the family Salmonidae. The best known are the " poisson bleu " of the Canadian voyageurs, and the European species, Thymallus vulgaris (the Asch or Asche of Germany, ombre of France, and temola of Upper Italy). This latter species is esteemed on account of its agreeable colours (especially of

the dorsal fin), its well-flavoured flesh, and the sport it affords to anglers. The grayling differ from the genus Salmo in the smaller mouth with comparatively feeble dentition, in the larger scales, and especially in the much greater development of the dorsal fin, which contains 20 to 24 rays. These beautiful fishes, of which five or six species are known, inhabit the fresh waters of Europe, Siberia and the northern parts of North America. The European species, T. vulgaris or vexillifer, attains, though rarely, a length of 2 ft. The colours during life are remarkably changeable and iridescent ; small dark spots are sometimes present on the body; the very high dorsal fin is beautifully marked with purplish bands and ocelli. In England and Scotland the grayling appears to have had originally a rather irregular distribution, but it has now been introduced into a great number of rivers; it is not found in Ireland. It is more generally distributed in Scandinavia and Russia, and the mountain streams of central Europe southwards to the Alpine water of Upper Italy. Specimens attaining to a weight of 4 lb are very scarce.

GRAYS THURROCK, or Grays, an urban district in the south- eastern parliamentary division of Essex, England, on the Thames, 20 m. E. by S. from London by the London, Tilbury & Southend railway. Pop. (1901) 13,834. The church of St Peter and St Paul, wholly rebuilt, retains some Norman work. The town takes its name from a family of Gray who held the manor for three centuries from 1149. There are an endowed and two training ship schools. Roman remains have been found in the vicinity; and the geological formations exhibiting the process of silting up of a former river channel are exposed in the quarries, and contain large mammalian remains. The town has trade in bricks, lime and cement.

GRAZ [Gratz], the capital of the Austrian duchy and crown- land of Styria, 140 m. S.W. of Vienna by rail. Pop. (1900) 138,370. It is picturesquely situated on both banks of the Mur, just where this river enters a broad and fertile valley, and the beauty of its position has given rise to the punning French description, La Ville des grdces sur la riviere de V amour. The main town lies on the left bank of the river at the foot of the Schloss- berg (1545 ft.) which dominates the town. The beautiful valley traversed by the Mur, known as the Grazer Feld and bounded by the Wildonerberge, extends to the south; to the S.W. rise the Bacher Gebirge and the Koralpen; to the N. the Schockel (4745 ft.), and to the N.W. the Alps of Upper Styria. On the Schlossberg, which can be ascended by a cable tramway, beautiful parks have been laid out, and on its top is the bell-tower, 60 ft. high, and the quaint clock-tower, 52 ft. high, which bears a gigantic clock-dial. At the foot of the Schlossberg is the Stadt- Park.

Among the numerous churches of the city the most important is the cathedral of St Aegidius, a Gothic building erected by the emperor Frederick III. in 1450-1462 on the site of a previous church mentioned as early as 1157. It has been several times modified and redecorated, more particularly in 17 18. The present copper spire dates from 1063. The interior is richly adorned with stained-glass windows of modern date, costly shrines, paintings and tombs. In the immediate neighbourhood of the cathedral is the mausoleum church erected by the emperor Ferdinand II. Worthy of mention also are the parish church, a Late Gothic building, finished in 1520, and restored in 1875, which possesses an altar piece by Tintoretto; the Augustinian church, appropriated to the service of the university since 1827;

the small Leech Kirche, an interesting building in Early Gothic style, dating from the 13th century, and the Herz Jesu-Kirche, a building in Early Gothic style, finished in 1891, with a tower 360 ft. high. Of the secular buildings the most important is the Landhaus, where the local diet holds its sittings, erected in the 1 6th century in the Renaissance style. It possesses an interesting portal and a beautiful arcaded court, and amongst the curiosities preserved here is the Styrian hat. In its neighbourhood is the Zeughaus or arsenal, built in 1644, which contains a very rich collection of weapons of the 15th- 17th centuries, and which is maintained exactly in the same condition as it was 250 years ago. The town hall, built in 1807, and rebuilt in 1892 in the German Renaissance style, and the imperial castle, dating from the nth century, now used as government offices, are also worth notice.

At the head of the educational institutions is the university founded in 1586 by the Austrian archduke Charles Francis, and restored in 181 7 after an interruption of 45 years. It is now housed in a magnificent building, finished in 1895, and is endowed with numerous scientific laboratories and a rich library. It had in 1901 a teaching staff of 161 professors and lecturers, and 1652 students, including many Italians from the Kiistenland and Dalmatia. The Joanneum Museum, founded in 1811 by the j archduke John Baptist, has become very rich in many depart- ments, and an additional huge building in the rococo style was erected in 1895 for its accommodation. The technical college, founded in 1814 by the archduke John Baptist, had in 1901 about 400 pupils.

An active trade, fostered by abundant railway communications, is combined with manufactures of iron and steel wares, paper,

chemicals, vinegar, physical and optical instruments, besides artistic printing and lithography. The extensive workshops of the Southern railway are at Graz, and since the opening of the railway to the rich coal-fields of KSflach the number of industrial establishments has greatly increased.

Amongst the numerous interesting places in the neighbourhood are: the Hilmteich, with the Hilmwarte, about 160 ft. high; and the Rosenberg (1570 ft.), whence the ascent of the Platte (2136 ft.) with extensive view is made. At the foot of the Rosenberg is Maria Grun, with a large sanatorium. All these places are situated to the N. of Graz. On the left bank of the Mur is the pilgrimage church of Maria Trost, built in 17 14; on the right bank is the castle of Eggenberg, built in the 17th century. To the S.W. is the Buchkogel (2130 ft.), with a magnifi- cent view, and a little farther south is the watering-place of Tobelbad.

History. — Graz may possibly have been a Roman site, but the first mention of it under its present name is in a document of a.d. 881, after which it became the residence of the rulers of the surrounding district, known later as Styria. Its privileges were confirmed by King Rudolph L in 1281. Surrounded with walls and fosses in 1435, it was able in 1481 to defend itself against the Hungarians under Matthias Corvinus, and in 1529 and 1532 the Turks attacked it with as little success. As early as 1 530 the Lutheran doctrine was preached in Graz by Seifried and Jacob von Eggenberg, and in 1 540 Eggenberg founded the Paradies or Lutheran school, in which Kepler afterwards taught. But the archduke Charles burned 20,000 Protestant books in the square of the present lunatic asylum, and succeeded by his oppressive measures in bringing the city again under the authority of Rome. From the earlier part of the 15th century Graz was the residence of one branch of the family of Habsburg, a branch which succeeded to the imperial throne in 1619 in the person of Ferdinand II. New fortifications were constructed in the end of the 1 6th century by Franz von Poppendorf, and in 1644 theˆ town afforded an asylum to” the family of Ferdinand III. The French were in possession of the place in 1797 and again in 1805; and in 1809 Marshal Macdonald having, in accordance with the terms of the peace of Vienna, entered the citadel which he had vainly besieged, blew it all up with the exception of the bell- tower and the citizens’ or clock tower. It benefited greatly during the 19th century from the care of the archduke John and received extended civic privileges in i860.

See Ilwof and Peters, Graz, Geschickte und Topographie der Stadi (Graz, 1875); G. Fels, Graz und seine Umgebung (Graz, 1898); L.

Mayer, Die Stadt der Grazien (Graz, 1 897) , and Hofrichter, ˆRuckblicke in die Vergangenheit von Graz (Graz, 1885).

GRAZZINI, ANTONIO FRANCESCO (1503-1583), Italian author, was born at Florence on the 22nd of March 1503, of good family both by his father's and mother's side. Of his youth and education all record appears to be lost, but he probably began early to practise as an apothecary. In 1540 he was one of the founders of the Academy of the Humid (degli Umidi) afterwards called " della Fiorentina," and later took a prominent part in the establishment of the more famous Accademia della Crusca. In both societies he was known as II Lasca or Leuciscus, and this pseudonym is still frequently substituted for his proper name. His temper was what the French happily call a difficult one, and his life was consequently enlivened or disturbed by various literary quarrels. His Humid brethren went so far as to expel him for a time from the society — the chief ground of offence being apparently his ruthless criticism of the " Arameans," a party of the academicians who maintained that the Florentine or Tuscan tongue was derived from the Hebrew, the Chaldee, or some other branch of the Semitic. He was readmitted in 1 566, when his friend Salviati was" consul " . of the academy. His death took place on the 18th of February 1583. II Lasca ranks as one of the great masters of Tuscan prose. His style is copious and flexible; abundantly idiomatic, but without any affectation of being so, it carries with it the force and freshness of popular speech, while it lacks not at the same time a flavour of academic culture. His principal works are Le Cene (1756), a collection of stories in the manner of Boccaccio, and a number of prose comedies, La Gelosia (1568), La Spiritata (1561), I Parentadi, La Arenga, LaSibilla, LaPinzochera, L'Arzigogolo. The stories, though of no special merit as far as the plots are concerned, are told with verve and interest. A number of miscellaneous poems, a few letters and Four Orations to the Cross complete the list of Grazzini's extant works. He also edited the works of Berni, and collected Tutti i trionfi, larri, mascherate, e canti carnascialaschi, andati per Firenze dal tempo del magnifico Lorenzo de' Medici fino all' anno 1559. In 1868 Adamo Rossi published in his Ricerche per le biblioteche di Perugia three " novelle " by Grazzini, from a MS. of the 1 6th century in the "Comunale" of Perugia: and in 1870 a small collection of those poems which have been left unpublished by previous editors appeared at Poggibonsi, Alcune Foesie inedile. See Pietro Fanfani's "Vita del Lasca," prefixed to his edition of the Opere di A, Grazzini (Florence, 1857).

GREAT AWAKENING, the name given to a remarkable religious revival centring in New England in 1 740-1 743, but covering all the

American colonies in 1740-17 50. The word ” awakening ” in this sense was frequently (and possibly first) used by Jonathan Edwards at the time of the Northampton revival of 1734-173 5, which spread through the Connecticut Valley and prepared the way for the work in Rhode Island, Massachusetts and Connecticut (1 740-1 741) of George Whitefield, who had previously been preaching in the South, especially at Savannah, Georgia. He, his immediate follower, Gilbert Tennent (1 703-1 764) , other clergymen, such as James Davenport, and many untrained laymen who took up the work, agreed in the emotional and dramatic character of their preaching, in rousing their hearers to a high pitch of excitement, often amounting to frenzy, in the undue stress they put upon ” bodily effects ” (the physical manifestations of an abnormal psychic state) as proofs of conversion, and in their unrestrained attacks upon the many clergymen who did not join them and whom they called ” dead men,” unconverted, unregenerate and careless of the spiritual condition of their parishes. Jonathan Edwards, Benjamin Colman (1673-1747), and Joseph Bellamy, recognized the viciousness of so extreme a position. Edwards personally reprimanded Whitefield for presuming to say of any one that he was unconverted, and in nis Thoughts Concerning the Present Revival of Religion devoted much space to ” showing what things are to be corrected, or avoided, in promoting this work.” Edwards’ famous sermon at Enfield in 1741 so affected 1 his audience that they cried and groaned aloud, and he found

it necessary to bid them be still that he might go on; but Davenport and many itinerants provoked and invited shouting and even writhing, and other physical manifestations. At its May session in 1742 the General Court of Massachusetts forbade itinerant preaching save with full consent from the resident pastor; in May 1743 the annual ministerial convention, by a small plurality, declared against ” several errors in doctrine and disorders in practice which have of late obtained in various parts of the land,” against lay preachers and disorderly revival meetings; in the same year Charles Chauncy, who disapproved of the revival, published Seasonable Thoughts on the State of Religion in New England; and in 1744-1745 Whitefield, upon his second tour in New England, found that the faculties of Harvard and Yale had officially ” testified ” and ” declared ” against him and that most pulpits were closed to him. Some separatist churches were formed as a result of the Awakening; these either died out or became Baptist congregations. To the reaction against the gross methods of the

revival has been ascribed the religious apathy of New England during the last years of the 18th century; but the martial and political excitement, beginning with King George's War {i.e. the American part of the War of the Austrian Succession) and running through the American War of Independence and the founding of the American government, must be reckoned at the least as contri- buting causes.

See Joseph Tracy, The Great Awakening (B.oston, 1842); Samuel P. Hayes, " An Historical Study of the Edwardean Revivals," in The American Journal of Psychology, vol. 13 (Worcester, Mass., 1902); and Frederick M. Davenport, Primitive Traits in Religious Revivals (New York, 1905), especially chapter viii. pp. 94-131.

(R. WE.)

GREAT BARRIER REEF, a vast coral reef extending for 1200 m. along the north-east coast of Australia (q.v.). The channel within it is protected from heavy seas by the reef, and is a valuable route of communication for coasting steamers. The reef itself is also traversed by a number of navigable passages.

GREAT BARRINGTON, a township of Berkshire county, Massachusetts, U.S.A., on the Housatonic river, in the Berkshire hills, about 25 m. S.W. of Pittsfield. Pop. (1890) 4612; (1900) 5854. of whom 1187 were foreign-born; (1910 census) 5926. Its area is about 45 sq. m. The township is traversed by a branch of the New York, New Haven & Hartford railroad, and the Berkshire Street railway (controlled by the N.Y., N.H. & H.) has its southern terminus here. Within the township are three villages — Great Barrington (the most important), Housatonic and Van Deusenville; the first two are about 5 m. apart. The village of Great Barrington, among the hills, is well known as a summer resort. The Congregational church with its magnifi- cent organ (3954 pipes) is worthy of mention. There is a public library in the village of Great Barrington and another in the village of Housatonic. Monument Mt. (1710 ft.), partly in Stockbridge, commands a fine view of the Berkshires and the Housatonic Valley. The Sedgwick School (for boys) was removed from Hartford, Connecticut, to Great Barrington in 1869. There are various manufactures, including cotton-goods (in the village of Housatonic), and electric meters, paper, knit goods and counterpanes (in the village of Great Barrington) ; and marble and blue stone are quarried here; but the township is primarily given over to farming. The fair of the Housatonic Agricultural Society is held here annually during September; and the district court of South Berkshire sits here. The township was incorporated in 1761, having been, since 1743, the "

North Parish of Sheffield"; the township of Sheffield, earlier known as the " Lower Housatonic Plantation " was incorporated in 1733. Great Barrington was named in honour of John Shute (167S-1734), Viscount Barrington of Ardglass (the adjective " Great " being added to distinguish it from another township of'the same name). In 1761-1787 it was the shire-town. Great Barrington was a centre of the disaffection during Shays's rebellion, and on the 12th of September 1786 a riot here pre- vented the sitting of court. Samuel Hopkins, one of the most eminent of American theologians, was pastor here in 1 743-1 769; General Joseph Dwight (1703-1765), a merchant, lawyer and

brigadier-general of Massachusetts militia, who took part • in the Louisburg expedition in 1745 and later in the French and Indian War, lived here from 1758 until his death; and William Cullen Bryant lived here as a lawyer and town clerk in 1816-1825. See C. J. Taylor, History of Great Barrington (Great Barrington,

1882).

GREAT BASIN, an area in the western Cordilleran region of the United States of America, about 200,000 sq. m. in extent, characterized by wholly interior drainage, a peculiar mountain system and extreme aridity. Its form is approximately that of an isosceles triangle, with the sharp angle extending into Lower California, W. of the Colorado river; the northern edge being formed by the divide of the drainage basin of the Columbia river, the eastern by that of the Colorado, the western by the central part of the Sierra Nevada crest, and by other high mountains. The N. boundary and much of the E. is not con- spicuously uplifted, being plateau, rather than mountain. The W. half of Utah, the S.W. corner of Wyoming, the S.E. corner of Idaho, a large area in S.E. Oregon, much of S. California, a strip along the E. border of the last-named state, and almost the whole of Nevada are embraced within the limits of the Great Basin.

The Great Basin is not, as its name implies, a topographic cup. Its surface is of varied character, with many independent closed basins draining into lakes or " playas," none of which, however, has outlet to- the sea. The mountain chains, which from their peculiar geologic character are known as of the " Basin Range type " (not exactly conterminous in distribution with the Basin), are echeloned in short ranges running from N. to S. Many of them are fault block mountains, the crust having been broken and the blocks tilted so that there is a steep face on one side and a gentle slope on the other. This is the Basin Range type of mountain. These mountains are among the most

recent in the continent, and some of them, at least, are still growing. In numerous instances clear evidence of recent movements along the fault planes has been discovered; and frequent earthquakes testify with equal force to the present uplift of the mountain blocks. The valleys between the tilted mountain blocks are smooth and often trough-like, and are often the sites of shallow salt lakes or playas. By the rain wash and wind action detritus from the mountains is carried to these valley floors, raising their level, and often burying low mountain spurs, so as to cause neighbouring valleys to coalesce. The plateau " lowlands " in the centre of the Basin are approximately 5000 ft. in altitude. Southward the altitude falls, Death valley and Coahuila valley being in part below the level of the sea. The whole Basin is marked by three features of elevation — the Utah basin, the Nevada basin and, between them, the Nevada plateau. , Over the lowlands of the Basin, taken generally, there is an average precipitation of perhaps 6-7 in., while in the Oregon region it is twice as great, and in the southern parts even less. The mountains receive somewhat more. The annual evaporation from water surfaces is from 60 to 1 50 in. (60 to 80 on the Great Salt Lake). The reason for the arid climate differs in different sections. In the north it is due to the fact that the winds from the Pacific lose most of their moisture, especially in winter, on the western slopes of the Sierra Nevada; in the south it is due to the fact that the region lies in a zone of calms, and light, variable winds. Precipitation is largely confined to local showers, often of such violence as to warrant the name " cloud bursts," commonly applied to the heavy down-pours of this desert region. It is these heavy rains, of brief duration, when great volumes of water rapidly run off from the barren slopes, that cause the deep channels, or arroyas, which cross the desert. Permanent streams are rare. Many mountains are quite without perennial streams, and some lack even springs. Few of the mountain creeks succeed in reaching the arid plains, and those that do quickly disappear by evaporation or by seepage into the gravels. In the N.W. there are many permanent lakes without outlet fed by the mountain streams; others, snow fed, occur among the Sierra Nevada; and some in the larger mountain masses of the middle region. Almost all are saline. The largest

of all, Great Salt Lake, is maintained by the waters of the Wasatch and associated plateaus. No lakes occur south of Owens in the W. and Sevier in the E. (39°) ; evaporation below these limits is supreme. Most of the small closed basins, how- ever, contain " playas," or alkali

mud fiats, that are overflowed when the tributary streams are supplied with, storm water.

Save where irrigation has reclaimed small areas, the whole region is a vast desert, though locally only some of the interior plains are known as ” deserts.” Such are the Great Salt Lake and Carson deserts in the north, the Mohave and Colorado and Amargosa (Death Valley) deserts of the south-west. Straggling forests, mainly of conifers, characterize the high plateaus of central Utah. The lowlands and the lower mountains, especially southward, are generally treeless. Cottonwoods line the streams, salt-loving vegetation margins the bare playas, low bushes and scattered bunch-grass grow over the lowlands, especially in the north. Gray desert plants, notably cactuses and other thorny plants, partly replace in the south the bushes of the north. Except on the scattered oases, where irrigation from springs and mountain streams has reclaimed small patches, the desert is barren and forbidding in the extreme. There are broad plains covered with salt and alkali, and others supporting only scattered bunch grass, sage bush, cactus and other arid land plants. There are stony wastes, or alluvial fans, where mountain streams emerge upon the plains, in time of flood, bringing detritus in their torrential courses from the mountain canyons and depositing it along the mountain base. The barrenness extends into the mountains themselves, where there are bare rock cliffs, stony slopes and a general absence of vegetation. With increasing altitude vegetation becomes more varied and abundant, until the tree limit is reached; then follows a forest belt, which in the highest mountains is limited above by cold as it is below by aridity.

The successive explorations of B. L. E. Bonneville, J. C. Fremont and Howard Stansbury (1806-1863) furnished a general knowledge of the hydrographic features and geological lacustrine history of the Great Basin, and this knowledge was rounded out by the field work of the U.S. Geological Survey from 1879 to 1883, under the direction of Grove Karl Gilbert. The mountains are composed in great part of Paleozoic strata, often modified by vulcanism and greatly denuded and sculptured by wind and water erosion. The climate in late geologic time was very different from that which prevails to-day. In the Pleistocene period many large lakes were formed within the Great Basin; especially, by the fusion of small catchment basins, two great confluent bodies of water — Lake Lahontan (in the Nevada basin) and Lake Bonneville (in the Utah basin). The latter, the remnants of which are represented to-day by Great Salt, Sevier and Utah Lakes, had a drainage basin of some 54,000 sq. m.

See G. K. Gilbert in Wheeler Survey, U.S. Geographical Survey West of

the Hundredth Meridian, vol. iii. ; Clarence King and others in the Report of the Fortieth Parallel Survey (U.S. Geol. Exploration of the Fortieth Parallel); G. K. Gilbert's Lake Bonneville (U.S. Geological Survey, Monographs, No. 1, 1890), also I..C. Russell's Lake Lahontan (Same, No. 11, 1885), with references to other publica- tions of the Survey. For reference to later geological literature, and discussion of the Basin Ranges, see J. E. Spurr, Bull. Geol. Soc. Amer. vol. 12, 1901, p. 217; and G. D. Louderback, same, vol. 15, 1904, p. 280; also general bibliographies issued by the U.S. Geol. Survey (e.g. Bull. 301, 372 and 409).

GREAT BEAR LAKE, an extensive sheet of fresh water in the north-west of Canada, between 65 and 67° N., and 117 and 123° W. It is of very irregular shape, has an estimated area of 11,200 sq. m., a depth of 270 ft., and is upwards of 200 ft. above the sea. It is 175 m. in length, and from 25 to 45 in breadth, though the greatest distance between its northern and > southern arms is about 180 m. The Great Bear river discharges . its waters into the Mackenzie river. It is full of fish, and the neighbouring country, though barren and uncultivated, contains quantities of game.

GREAT CIRCLE. The circle in which a sphere is cut by a plane is called a " great circle," when the cutting plane passes through the centre of sphere. Treating the earth as a sphere,

the meridians of longitude are all great circles. Of the parallels of latitude, the equator only is a great circle. The shortest line joining any two points is an arc of a great circle. For " great circle sailing " see Navigation.

GREAT FALLS, a city and the county-seat of Cascade county, Montana, U.S.A., 99 m. (by rail) N.E. of Helena, on the S. bank of the Missouri river, opposite the mouth of the Sun river, at an altitude of about 3300 ft. It is 10 m. above the Great Falls of the Missouri, from which it derives its name. Pop. (1890) 3979; (1900) 14,930, of whom 4692 were foreign-born; (1910 census) 13,948. It has an area of about 8 sq. m. It is served by the Great Northern and the Billings & Northern (Chicago, Burlington & Quincy system) railways. The city has a splendid park system of seven parks (about 530 acres) with 15 m. of boulevards. 1 Among the principal buildings are a city hall, court house, high school, commercial college, Carnegie library, the Columbus Hospital and Training School for Nurses (under the supervision of the Sisters of Charity), and the Montana Deaconess hospital. There is a Federal land office in the city. Great Falls lies in the midst of a region exceptionally rich in minerals — copper, gold,

silver, lead, iron, gypsum, limestone, sapphires and bituminous coal being mined in the neighbourhood. Much grain is grown in the vicinity, and the city is an important shipping point for wool, live-stock and cereals. Near Great Falls the Missouri river, within 7I m., contracts from a width of about 900 to 300 yds. and falls more than 500 ft., the principal falls being'the Black Eagle Falls (50 ft.), from which power is derived for the city's street railway and lighting plant, the beautiful Rainbow Falls (48 ft.) and Great Falls (92 ft.). Giant Spring Fall, about 20 ft. high, is a cascade formed by a spring on the bank of the river near Rainbow Falls. The river furnishes very valuable water-power, partly utilized by large manufactur- ing establishments, including flour mills, plaster mills, breweries, iron works, mining machinery shops, and smelting and reduction works. The Boston & Montana copper smelter is one of the largest in the world; it has a chimney stack 506 ft. high, and in 1908 employed 1200 men in the smelter and 2500 in its mining department. Great Falls ranked second (to Anaconda) among the cities of the state in the value of the factory product of 1905, which was $13,291,979, showing an increase of 42-4% since 1900. The city owns and operates its water-supply system. Great Falls was settled in 1884, and was chartered as a city in 1888.

GREAT HARWOOD, an urban district in the Darwen parlia- mentary division of Lancashire, England, 4I m. N.E. of Black- burn, on the Lancashire and Yorkshire railway. Pop. (1901) 12,015. It is °f modern growth, a township of cotton operatives, with large collieries in the vicinity. An agricultural society is also maintained.

GREATHEAD, JAMES HENRY (1844-1896), British engineer, was born at Grahamstown, Cape Colony, on the 6th of August 1844. He migrated to England in 1859, and in 1864 was a pupil of P. W. Barlow, from whom he became acquainted with the shield system of tunnelling with which his name is especially associated. Barlow, indeed, had a strong belief in the shield, and was the author of a scheme for facilitating the traffic of London by the construction of underground railways running in cast-iron tubes constructed by its aid. To show what the method could do, it was resolved to make a subway under the Thames near the Tower, but the troubles encountered by Sir M. I. Brunei in the Thames Tunnel, where also a shield was employed, made engineers hesitate to undertake the subway, even though it was of very much smaller dimensions (6 ft. 7 in. 1 Great Falls was a pioneer among the cities of the state in the development of a park system. When the city was first settled its site was a " barren tract of sand, thinly covered with_ buffalo-grass and patches of sage brush." The first settler, Paris Gibson, of Minneapolis,

began the planting of trees, which, though not_ indi- genous, grew well. The city's sidewalks are bordered by strips of lawn, in which there is a row of trees, and the city maintains a large nursery where trees are grown for this purpose. A general state law (1901) placing the parking of cities on a sound financial basis is due very largely to the impulse furnished by Great Falls. See an article, " Great Falls, the Pioneer Park City of Montana," by C. H. Forbes- Lindsay, in the Craftsman for November 1908.

internal diameter) than the tunnel. At this juncture Greathead came forward and offered to take up the contract; and he successfully carried it through in 1869 without finding any necessity to resort to the use of compressed air, which Barlow in 1867 had suggested might be employed in water-bearing strata. After this he began to practise on his own account, and mainly divided his time between railway construction and taking out patents for improvements in his shield, and for other inventions such as the " Ejector " fire-hydrant. Early in the 'eighties he began to work in conjunction with a company whose aim was to introduce into London from America the Hallidie system of cable traction, and in 1884 an act of Parliament was obtained authorizing what is now the City & South London Railway — a tube-railway to be worked by cables. This was begun in 1886, and the tunnels were driven by means of the Greathead shield, compressed air being used at those points where water-bearing gravel was encountered. During the progress of the works electrical traction became so far developed as to be superior to cables; the idea of using the latter was therefore abandoned, and when the railway was opened in 1890 it was as an electrical one. Greathead was engaged in two-other important under- ground lines in London — the Waterloo & City and the Central London. He lived to see the tunnels of the former completed under the Thames, but the latter was scarcely begun at the time of his death, which happened at Streatham, in the south of London, on the 21st of October 1896.

GREAT LAKES OF NORTH AMERICA, THE. The connected string of five fresh-water inland seas, Lakes Superior, Michigan, Huron, Erie and Ontario, lying in the interior of North America, between the Dominion of Canada on the north and the United States of America en the south, and forming the head-waters of the St Lawrence river system, are collectively and generally known as " The Great Lakes." From the head of lake Superior these lakes are navigable to Buffalo, at

the foot of lake Erie, a distance of 1023 m., for vessels having a draught of 20 ft.; from Buffalo to Kingston, 191 m. farther, the draught is limited, by the depth in the Welland canal, to 14 ft. ; lake Superior, the largest and most westerly of the lakes, empties, through the river St Mary, 55 m. long, into lake Huron. From Point Iroquois, which may be considered the foot of the lake, to Sault Ste Marie, St Mary's Falls, St Mary's Rapids or the Soo, as it is variously called, a distance of 14 m., there is a single channel, which has been dredged by the United States government, at points which required deepening, to give a minimum width of 800 ft. and a depth of 23 ft. at mean stage water. Below the Sault, the river, on its course to lake Huron, expands into several lakes, and is divided by islands into numerous contracted passages. There are two navigated channels; the older one, following the international boundary-line by way of lake George,

19! ft., the height varying as the lakes change in level. The enormous growth of inter-lake freight traffic has justified the construction of three separate locks, each overcoming the rapids by a single lift — two side by side on the United States and one on the Canadian side of the river. These locks, the largest in the world, are all open to Canadian and United States vessels alike, and are operated free from all taxes or tolls on shipping. The Canadian ship canal, opened to traffic on the 9th of September 1895, was constructed through St Mary Island, on the north side of the rapids, by the Canadian government, at a cost of $3,684,227, to facilitate traffic and to secure to Canadian vessels an entrance to lake Superior without entering United States territory. The canal is 5967 ft. long between the extremities of the entrance piers, has one lock 900 ft. long and 60 ft. wide, with a depth on the sills at the lowest known water- level of 205 ft. The approaches to the canal are dredged to 18 ft. deep, and are well buoyed and lighted. On the United States side of the river the length of the canal is if m., the channel outside the 'locks having a width varying from 108 to 600 ft. and depth of 25 ft. The locks of 1855 were closed in 1886, to give place to the Poe lock. The Weitzel lock, opened to navigation on the 1st of September 1881, was built south of the old locks, the approach being through the old canal. Its chamber is 515 ft. long between lock gates, and 80 ft. wide, narrowing to 60 ft. at the gates. The length of the masonry walls is 717 ft., height 395- ft., with 17 ft. over mitre sills at mean stage of water. The Poe lock, built because the Weitzel lock, large and fully equipped as it is, was insufficient for the rapidly growing traffic, was opened on the 3rd of August 1896. Its length between gates is 800 ft.; width 100 ft.; length of masonry walls 1100 ft.; height 43I to 45 ft., with 22 ft. on the mitre sill at mean stage.

The expenditure by the United States government on the canal, with its several locks, and on improving the channel through the river, aggregated fourteen million dollars up to the end of 1906. 1 Plans were prepared in 1907 for a third United States lock with a separate canal approach.

The canals are closed every winter, the average date of opening up to 1893 being the 1st of May, and of closing the 1st of December. The pressure of business since that time, aided possibly by some slight climatic modification, has extended the season, so that the average date of opening is now ten days earlier and of closing twelve days later. The earliest opening was in 1902 on the 1st of April, and the latest closing in 1904 on the 20th of December.

The table below gives the average yearly commerce for periods of five years, and serves to show the rapid increase in freight growth.

Around the canals have grown up two thriving towns, one on the Michigan, the other on the Ontario side of the river, with manufactories driven by water-power derived from the Sault.

Statement of

he commerce through the several Sault

Ste Marie canals, averaged for every five years. 2

General

Pass-

Registered

Passen-

Coal.

Flour.

Wheat.

Other

Merchan-

Salt.

Iron Ore.

Lumber.

Total

Years.

ages.

Tonnage.

gers.

|Net Tons.

Barrels.

Bushels.

Grains. Bushels.

dise. Net Tons.

Barrels.

Net Tons.

M.ft. B.M.

Freight. Net Tons.

1855-1859 3

387

192,207

6,206

4,672

19.555

None.

34,6i2

2,249

1,248

27,206

320

55,797

1880-1884

4.457

2,267,166

34,6o7

463,431

681,726

5,435,601

936,346

81,966

107,225

867,999

79,H4

2,184,731

1885-1889

7,908

4,901,105

29.434

1,398,44′

1,838,325

18,438,085

1,213,815

74,447

175,725

2,497,403

197,605

5,441,297

1 890-1 894

n.965

9,912,589

24,609

2,678,805

5,764,766

34,875,971

1,738,706

87,540

231,178

4,939,909

510,482

10,627,349

1 895-1 899

18,352

18,451,447

40,289

3,270,842

8,319,699

57,227,269

23,349,134

164,426

282,156

10,728,075

832,968

19,354,974

1900-1904

19,374

26,199,795

54,093

5,457,019

7,021,839

56,269,265

26,760,533

646,277

407,263

20,020,487

999,944

31,245,565

1906 alone

22,155

41,098,324

63,033

8,739,630

6,495,350

84,271,358

54,343,155

1,134,851

468,162

35,357,042

900,63 1

51,751,080

has a width of 150 to 300 ft., and a depth of 17 ft.; it is buoyed but not lighted, and is not capable of navigation by modern large freighters; the other, some 12 m. shorter, an artificial channel dredged by the United States government in their own territory, has a minimum width of 300 ft. and depth of 20 ft. It is elaborately lighted throughout its length. A third channel, west of all the islands, was designed for steamers bound down, the older channel being reserved for upbound boats. ‘

Between lake Superior and lake Huron there is a fall of 20 ft. of which the Sault, in a distance of 5 m., absorbs from 18 to

The outlet of lake Michigan, the only lake of the series lying wholly in United States territory, is at the Strait of Mackinac, near the point where the river St Mary reaches lake Huron. With lake Michigan are connected the Chicago Sanitary and Ship canal, the Illinois and Michigan, and the Illinois and Missis- sippi canals, for which see Illinois. With lake Huron is always

1 Statistical report of lake commerce passing through canals. Col. Chas. E. L. B. Davis, U.S.A., engineer in charge, 1907.

2 Statistical report of lake commerce passing through canals, published annually by the U.S. engineer officer in charge.

3 The first five years of operation.

included Georgian Bay as well as the channel north of Manitoulin Island. As it is principally navigated as a connecting waterway between lakes Superior and Michigan and lake Erie it has no notable harbours on it. It empties into lake Erie through the river St Clair, lake St Clair and the river Detroit. On these con- necting waters are several

important manufacturing and shipping towns, and through this chain passes nearly all the traffic of the lakes, both that to and from lake Michigan ports, and also that of lake Superior. The tonnage of a single short season of navigation exceeds in the aggregate 60,000,000 tons. Extensive dredging and embankment works have been carried on by the United States government in lake St Clair and the river Detroit, and a 20-ft. channel now exists, which is being constantly improved. Lake St Clair is nearly circular, 25 m. in diameter, with the north- east quadrant filled by the delta of the river St Clair. It has a very flat bottom with a general depth of only 21 ft., shoaling very gradually, usually to reed beds that line the low swampy shores. To enter the lake from river St Clair two channels have been provided, with retaining walls of cribwork, one for upward, the other for downward bound vessels. Much dredging has also been necessary at the outlet of the lake into river Detroit. A critical point in that river is at Limekiln crossing, a cut dredged through limestone rock above the Canadian town of Amherstburg. The normal depth here before improvement was 125-15 ft.; by a project of 1902 a channel 600 ft. wide and 21 ft. deep was planned; there are separate channels for up- and down-bound vessels. To prevent vessels from crowding together in the cut, the Canadian government maintains a patrol service here, while the United States government maintains a similar patrol in the St Mary channel. ‘ –

The Grand Trunk railway opened in 1891 a single track tunnel under the river St Clair, from Sarnia to Port Huron. It is 6026 ft. long, a cylinder 20 ft. in diameter, lined with cast iron in flanged sections. A second tunnel was undertaken between Detroit arid Windsor, under the river Detroit.

From Buffalo, at the foot of lake Erie, the river Niagara runs northwards 36 m. into lake Ontario. To overcome the difference of 327 ft. in level between lakes Erie and Ontario, the Welland canal, accommodating vessels of 255 ft. in length, with a draught of 14 ft., was built, and is maintained by Canada. The Murray canal extends from Presqu’ile Bay, on the north shore of lake Ontario, a distance of 6| m., to the headquarters ef the Bay of Quinte. Trent canal is a term applied to a series of water stretches in the interior of Ontario which are ultimately designed to connect lake Huron and lake Ontario. At Peterboro a hydraulic balance-lock with a lift of 65 ft., 140 ft. in length and 33 ft. clear in width, allowing a draught of 8 ft., has been con- structed. The ordinary locks are 134 by 33 ft. with a draught of 6 ft. When the whole route of 200 m. is completed, there will not be more than 15 m. of actual canal, the remaining portion of the waterway being through lakes and rivers. For the Erie canal, between

that lake and the Hudson river, see Erie and New York.

The population of the states and provinces bordering on the Great Lakes is estimated to be over 3 5,000,000. In Pennsylvania and Ohio, south of lake Erie, there are large coal-fields. Sur- rounding lake Michigan and west of lake Superior are vast grain-growing plains, and the prairies of the Canadian north- west are rapidly increasing the area and quantity of wheat grown; while both north and south of lake Superior are the most extensive iron mines in the world, from which 35 million tons of ore were shipped in 1906. The natural highway for the shipment of all these products is the Great Lakes, and over them coal is distributed westwards and grain and iron ore are concentrated eastwards. The great quantity of coarse freights, fhat could only be profitably carried long distances by water, has revolutionized the type of vessel used for its transportation, making large steamers imperative, consolidating interests and cheapening methods. It is usual for the vessels in the grain trade and in the iron-ore trade to make their up trips empty; but in consequence of the admirable facilities provided at terminal points, they make very fast time, and carry freight very

cheaply. The cost of freight per ton-mile fell from 23/100 cent in 1887 to 8/100 cent in 1898; since then the rate has slightly risen, but keeps well below 1/10 cent per ton-mile.

The traffic on the lakes may be divided into three classes, passenger, package freight and bulk freight. Of passenger boats the largest are 380 ft. long by 44 ft. beam, having a speed of over 20 m. an hour, making the round trip between Buffalo and Chicago 1800 m., or Buffalo and Duluth 2000 m., , every week. They carry no freight. The Canadian Pacific railway runs a line of fine Tyne-built passenger and freight steamers between Owen Sound and Fort William, and these two lines equal in accommodation transatlantic passenger steamers. On lake Michigan many fine passenger boats run out of Chicago, and on lake Ontario there are several large and fast Canadian steamers on routes radiating from Toronto. The package freight business, that is, the transportation of goods in enclosed parcels, is principally local; all the through business of this description is controlled by lines run by the great trunk railways, and is done in boats limited in beam to 50 ft. to admit them through bridges over the rivers at Chicago and Buffalo. By far the greatest number of vessels on the lakes are bulk freighters, and the conditions of the service have developed a special type of vessel. Originally sailing vessels were largely used, but these have practically disappeared, giving place to steamers, which have grown steadily in size with every increase in available draught. In 1894 there was no vessel on the lakes with a capacity of over 5000 tons; in 1906

there were 254 vessels of a greater capacity, 12 of them carrying over 12,000 tons each. For a few years following 1890 many large barges were built, carrying up to 8000 tons each, intended to be towed by a steamer. It was found, however, that the time lost by one boat of the pair having to wait for the other made the plan unprofit- able and no more were built. Following 1888 some 40 whale- back steamers and barges, having oval cross-sections without frames or decks, were built, but experience failed to demonstrate any advantage in the type, and their construction has ceased. The modern bulk freighter is a vessel 600 ft. long, 58 ft. beam, capable of carrying 14,000 tons on 20 ft. draught, built with a midship section practically rectangular, the coefficient frequently as high as -98, with about two-thirds of the entire length absolutely straight, giving a block coefficient up to -87. The triple-expansion machinery and boilers, designed to drive the boat at a speed of 12 m. an hour, are in the extreme stern, and the pilot house and quarters in the extreme bow, leaving all the cargo space together. Hatches are spaced at multiples of 12 ft. throughout the length and are made as wide as possible athwartships to facilitate loading and unloading. The vessels are built on girder frames and fitted with double bottoms for strength and water ballast. This type of vessel can be loaded in a few minutes, and unloaded by self-filling grab buckets up to ten tons capacity, worked hydraulically, in six or eight hours. The bulk freight generally follows certain well-defined routes; iron ore is shipped east from ports on both sides of lake Superior and on the west side of lake Michigan to rail shipping points on the south shore of lake Erie. Wheat and other grains from Duluth find their way to Buffalo, as do wheat, corn (maize) and other grains from Chicago. Wheat from the Canadian north-west is distributed from Fort William and Port Arthur to railway terminals on Georgian Bay, to Buffalo, and to Port Colborne for trans-shipment to canal barges for Montreal, and coal is distributed from lake Erie to all western points. The large shipping trade is assisted by both governments by a system of aids to navigation that mark every channel and danger. There are also life-saving stations at all dangerous points.

The Great Lakes never freeze over completely, but the harbours and often the connecting rivers are closed by ice. The navigable season at the Sault is about 7! months; in lake Erie it is somewhat longer. The season of navigation has been slightly lengthened since 1905, by using powerful tugs as ice-breakers in the spring and autumn, the Canadian government undertaking the service at Canadian terminal ports, chiefly at Fort William and Port Arthur, the most northerly ports, where the season

is naturally shortest, and the Lake Carriers' Association, a federation of the freighting steamship owners, acting in the river St Mary. Car ferries run through the winter across lake Michigan and the Strait of Mackinac, across the rivers St Clair and Detroit, and across the middle of lakes Erie and Ontario. The largest of these steamers is 350 ft. long by 36 ft. wide, draught 14 ft., horse power 3500, speed 13 knots. She carries on four tracks 30 freight cars, with i3sotonsof freight. Certain passenger steamers run on lake Michigan, from Chicago north, all the winter.

The level of the lakes varies gradually, and is affected by the general character of the season, and not by individual rainfalls. The variations of level of the several lakes do not necessarily synchronize. There is an annual fluctuation of about 1 ft. in the upper lakes, and in some seasons over 2 ft. in the lower lakes; the lowest point being at the end of winter and the highest in midsummer. In lake Michigan the level has ranged from a maximum in the years 1859, 1876 and 1886, to a minimum nearly 5 ft. lower in 1896. In lake Ontario there is a range of 5 1 ft. between the maximum of May 1870 and the minimum of November 1895. In consequence of the shallowness of lake Erie, its level is seriously disturbed by a persistent storm; a westerly gale lowers the water at its upper end exceptionally as much as 7 ft., seriously interfering with the navigation of the river Detroit, while an easterly gale produces a similar'effect at Buffalo. (For physiographical details see articles on the several lakes, and United States.)

There is geological evidence to show that the whole basin of the lakes has in recent geological times gradually changed in level, rising to the north and subsiding southwards; and it is claimed that the movement is still in gradual progress, the rate assigned being -42 ft. per 100 m. per century. The maintenance of the level of the Great Lakes is a matter of great importance to the large freight boats, which always load to the limit of depth at critical points in the dredged channels or in the harbours. Fears have been entertained that the water power canals at Sault Ste Marie, the drainage canal at Chicago and the dredged channel in the river Detroit will permanently lower the levels respectively of lake Superior and of the Michigan-Huron-Erie group. An international deep-waterway commission exists for the consideration of this question, and army engineers appointed by the United States government have worked on the problem. 1 Wing dams in the rivers St Mary and Niagara, to retard the discharges, have been

proposed as remedial measures. The Great Lakes are practically tideless, though some observers claim to find true tidal pulsations, said to amount to 3! in. at spring tide at Chicago. Secondary undulations of a few minutes in period, ranging from 1 to 4 in., are well marked.

The Great Lakes are well stocked with fish of commercial value. These are largely gathered from the fishermen by steam tenders, and taken fresh or in frozen condition to railway distributing points. In lakes Superior and Huron salmon-trout (Salvelinus namaycush, Walb) are commercially most important. They ordinarily range from 10 to 50 lb in weight, and are often larger. In Georgian Bay the catches of whitefish {Coregonus clupeiformis, Mitchill) are enormous. In lake Erie whitefish, lesser whitefish, erroneously called lake-herring (C. artedi, Le Sueur), and sturgeon (Acipenser rubicundus, Le Sueur) are the most common. There is good angling at numerous points on the lakes and their feeders. The river Nipigon, on the north shore of lake Superior, is famous as a stream abounding in speckled trout {Salvelinus fontinalis, Mitchill) of unusual size. Black bass (Micropterus) are found from Georgian Bay to Montreal, and the maskinonge (Esox nobilior, Le Sueur), plentiful in the same waters, is a very game fish that often attains a weight of 70 lb. Bibliography. — E. Channing and M. F. Lansing, Story of the' Great Lakes (New York, 1909), for an account of the lakes in history; , and for shipping, &c, J. O. Curwood, The Great Lakes (New York, 1909); U.S. Hydrographic office publication, No 108, "Sailing directions for the Great Lakes," Navy Department (Washington, 1901, seqq.); Bulletin No. if, "Survey of Northern and North- western Lakes," Corps of Engineers, U.S. War Department, U.S.

1 Report of the Chief of Engineers, U.S. Army, in Report of War Department, US. 1898, p. 3776.

Lake Survey Office (Detroit, Mich, 1907) r Annual reports of Canadian Department of Marine and Fisheries (Ottawa, 1868 seqq.).

(W. P. A.)

GREAT MOTHER OF THE GODS, the ancient Oriental- Greek- Roman deity commonly known as Cybele {q.v.) in Greek and Latin literature from the time of Pindar. She was also known under many other names, some of which were derived from famous places of worship: as Dindymene from Mt. Dindymon, Mater Idaea from Mt. Ida, Sipylene from Mt. Sipylus, Agdistis from Mt. Agdistis or Agdus, Mater Phrygia from the greatest stronghold of her cult; while others were reflections

of her character as a great nature goddess: e.g. Mountain Mother, Great Mother of the Gods, Mother of all Gods and all Men. As the great Mother deity whose worship extended throughout Asia Minor she was known as Ma or Ammas. Cybele is her favourite name in ancient and modern literature, while Great Mother of the Gods, or Great Idaean Mother of the Gods {Mater Deum Magna, Mater Deum Magna Idaea), the most frequently recurring epigraphical title, was her ordinary official designation. The legends agree in locating the rise of the worship of the Great Mother in Asia Minor, in the region of loosely defined geographical limits which comprised the Phrygian empire of prehistoric times, arid was more extensive than the Roman province of Phrygia (Diod. Sic. iii. 58; Paus. vii. 17; Arnob. v. 5; Firm. Mat. De error., 3; Ovid, Fasti, iv. 223 ff.; Sallust. Phil. De diis et mundo, 4; Jul. Or. v. 165 ff.). Her best-known early seats of worship were Mt. Ida, Mt. Sipylus, Cyzicus, Sardis and Pessinus, the last-named city, in Galatia near the borders of Roman Phrygia, finally becoming the strongest centre of the cult. She was known to the Romans and Greeks as essenti- ally Phrygian, and all Phrygia was spoken of as sacred to her (Schol. Apollon. Rhod. Argonautica, i. 11 26). It is probable, however, that the Phrygian race, which invaded Asia Minor from the north in the gth century B.C., found a great nature goddess already universally worshipped there, and blended her with a deity of their own. The Asiatic-Phrygian worship thus evolved was further modified by contact with the Syrians and Phoenicians, so that it acquired strong Semitic characteristics. The Great Mother known to the Greeks and Romans was thus merely the Phrygian form of the nature deity of all Asia Minor. From Asia Minor the cult of the Great Mother spread first to Greek territory. It found its way into Thrace at an early date, was known in Boeotia by Pindar in the 6th century, and entered Attica near the beginning of the 4th century (Grant Showerman, The Great Mother of the Gods, Bulletin of the Univer- sity of Wisconsin, No. 43, Madison, 1901). At Peiraeus, where it probably atrived by way of the Aegean islands, it existed privately in a fully developed state, .that is, accompanied by the worship of Attis, at the beginning of the 4th century, and publicly two centuries later (D. Comparetti, Annates, 1862, pp. 23 ff.). The Greeks from the first saw in the Great Mother a resemblance to their own Rhea, and finally identified the two completely, though the Asiatic peculiarities of the cult were never universally popular with them (Showerman, p. 294). In her less Asiatic aspect, i.e. without Attis, she was sometimes identified with Gaia and Demeter. It was in this phase that she was worshipped in the Metroon at Athens. In reality, the Mother Goddess appears under three aspects: Rhea, the Homeric and Hesiodic goddess of Cretan origin; the Phrygian Mother, with Attis; and the Greek Great

Mother, a modified form of the Phrygian Mother, to be explained as the original goddess of the Phrygians of Europe, communicated to the Greek stock before the Phrygian invasion of Asia Minor and consequent mingling with Asiatic stocks (cf. Showerman, p. 252).

In 204 B.C., in obedience to the Sibylline prophecy which said that whenever an enemy from abroad should make war on Italy he could be expelled and conquered if the Idaean Mother were brought to Rome from Pessinus, the cult of the Great Mother, together with her sacred symbol, a small meteoric stone reputed to have fallen from the heavens, was transferred to Rome and established in a temple on the Palatine (Livy xxix. 10-14). Her identification by the Romans with Maia, Ops, Rhea, Tellus

and Ceres contributed to the establishment of her worship on a I firm footing. By the end of the Republic it had attained promin- ence, and under the Empire it became one of the three most important cults in the Roman world, the other two being those of Mithras and Isis. Epigraphic and numismatic evidence prove it to have penetrated from Rome as a centre to the remotest provinces (Showerman, pp. 291-293). During the brief revival of paganism under Eugenius in a.d. 394, occurred the last appearance of the cult in history. Besides the temple on the Palatine, there existed minor shrines of the Great Mother near the present church of St Peter, on the Sacra Via on the north slope of the Palatine, near the junction of the Almo and the Tiber, south of the city (ibid. 31 1-3 14).

In all her aspects, Roman, Greek and Oriental, the Great Mother was characterized by essentially the same qualities. Most prominent among them was her universal motherhood. She was the great parent of gods and men, as well as of the lower orders of creation. ” The winds, the sea, the earth and the snowy seat of Olympus are hers, and when from her mountains she ascends into the great heavens, the son of Cronus himself gives way before her ” (Apollon. Rhod. Argonautica, i. 1098). She was known as the All-begetter, the All-nourisher, the Mother of all the Blest. She was the great, fruitful, kindly earth itself. Especial emphasis was placed upon her maternity over wild nature. She was called the Mountain Mother; her sanctuaries were almost invariably upon mountains, and frequently in caves, the name Cybele itself being by some derived from the latter; lions were her faithful companions. Her universal power over the natural world finds

beautiful expression in Apollonius Rhodius, Argonautica, i. 1140 ff. She was also a chaste and beautiful deity. Her especial affinity with wild nature was manifested by the orgiastic character of her worship. Her attendants, the Corybantes, were wild, half demonic beings. Her priests, the Galli, were eunuchs attired in female garb, with long hair fragrant with ointment. Together with priestesses, they celebrated her rites with flutes, horns, castanets, cymbals and tambourines, madly yelling and dancing until their frenzied excitement found its culmination in self-scourging, self -laceration or exhaustion. Self-emasculation sometimes accompanied this delirium of worship on the part of candidates for the priesthood (Showerman, pp. 234-239). The Attis of Catullus (lxiii.) is a brilliant treatment of such an episode.

Though her cult sometimes existed by itself, in its fully developed state the worship of the Great Mother was accom- panied by that of Attis (q.v.). The cult of Attis never existed independently. Like Adonis and Aphrodite, Baal and Astarte, &c, the two formed a duality representing the relations of Mother Nature to the fruits of the ‘earth. There is no positive evidence to prove the existence of the cult publicly in this phase in Greece before the 2nd century B.C., nor in Rome before the Empire, though it may have existed in private (Showerman, ” Was Attis at Rome under the Republic ?” in Transactions of the American Philological Association, vol. 31, 1900, pp. 46-59; Cumont, s.v. “Attis,” De Ruggiero’s Dizionario epigrafico and Pauly- Wissowa’s Realencyclopadie, Supplement; Hepding, Attis, seine Mythen und seine Kult, Giessen, 1903, p. 142).

The philosophers of the late Roman Empire interpreted the Attis legend as symbolizing the relations of Mother Earth to her children the fruits. Porphyrius says that Attis signified the flowers of spring time, and was cut off in youth because the flower falls before the fruit (Augustine, De civ. Dei, vii. 25). Maternus [De error. 3) interprets the love of the Great Mother for Attis as the love of the earth for her fruits; his emasculation as the -cutting of the fruits; his death as their preservation; and his^, resurrection as the sowing of the seed again.

At Rome the immediate direction of the cult of the Great Mother devolved upon the high priest, Archigallus, called Attis, a high priestess, Sacerdos Maxima, and its support was derived, at least in part, from a popular contribution, the slips. Besides other priests, priestesses and minor officials, such as musicians, curator, &c, there were certain colleges connected with the administration of the cult, called cannophori (reed-bearers) arid

dendrophori (branch-bearers). The Quindecimvirs exercised a general

supervision over this cult, as over all other authorized cults, and it was, at least originally, under the special patronage of a club or sodality (Showerman, pp. 269-276). Roman citizens were at first forbidden to take part in its ceremonies, and the ban was not removed until the time of the Empire.

The main public event in the worship of the Great Mother was the annual festival, which took place originally on the 4th of April, and was followed on the 5th by the Megalesia, games instituted in her honour on the introduction of the cult. Under the Empire, from Claudius on, the Megalesia lasted six days, April 4-10, and the original one day of the religious festival became an annual cycle of festivals extending from the 15th to the 27th of March, in the following order. (1) The 15th of March, Canna intrat — the sacrifice of a six-year-old bull in behalf of the mountain fields, the high priest, a priestess and the cannophori officiating, the last named carrying reeds in procession in commemoration of the exposure of the infant Attis on the reedy banks of the stream Gallus in Phrygia. (This may have been originally a phallic procession. Cf. Showerman, American Journal of Philol. xxvii. 1; Classical Journal i. 4.) (2) The 22nd of March, Arbor intrat — the bearing in procession of the sacred pine, emblem of Attis' self-mutilation, death and immortality, to the temple on the Palatine, the symbol of the Mother's cave, by the dendrophori, a gild of workmen who made the Mother, among other deities, a patron. (3) The 24th of March, Dies sanguinis — a day of mourning, fasting and abstin- ence, especially sexual, commemorating the sorrow of the Mother for Attis, her abstinence from food and her chastity. The frenzied dance and self-laceration of the priests in com- memoration of Attis' deed, and the submission to the act of consecration by candidates for the priesthood, was a special feature of the day. The taurobolium (q.v.) was often performed on this day, on which probably took place the initiation of mystics. (4) The 25th of March, Hilaria— one of the great festal days of Rome, celebrated by all the people. All mourning was put off, and good cheer reigned in token of the return of the sun and spring, which was symbolized by the renewal of Attis' life. (5) The 26th of March, Requietio — a day of rest and quiet. (6) The 27th of March, Lavatio — the crowning ceremony of the cycle. The silver statue of the goddess, with the sacred meteoric stone, the Acus, set in its head, was borne in gorgeous procession and bathed in the Almo, the remainder of the day being given up to rejoicing and entertainment, especially dramatic repre- sentation of the legend of the deities of the day. Other cere- monies, not necessarily connected with the annual festival, were the taurobolium (q.v.), the sacrifice of a bull, and the crio- bolium (q.v.), the sacrifice of a ram, the latter being

the analogue ‘ of the former, instituted for the purpose of giving Attis special recognition. The baptism of blood, which was the feature of these ceremonies, was regarded as purifying and regenerating (Showerman, Great Mother, pp. 277-284).

The Great Mother figures in the art of all periods both in Asia and Europe, but is especially prominent in the art of the Empire. No work of the first class, however, was inspired by her. She appears on coins, in painting and in all forms of sculpture, usually with mural crown and veil, well draped, seated on a throne, and accompanied by two lions. Other attributes which often appear are the patera, tympanum, cymbals, sceptre, garlands and fruits. Attis and his attributes, the pine, Phrygian cap, pedum, syrinx and torch, also appear. The Cybele of Formia, now at Copenhagen, is one of the most famous representations of the goddess. The Niobe of Mt. Sipylus is really the Mother. In literature she is the subject of frequent mention, but no work of importance, with the exception of Catullus lxiii., is due to her inspiration. Her importance in the history of religion is very great. Together with Isis and Mithras, she was a great enemy, and yet a great aid to Christianity. The gorgeous rites of her worship, its mystic doctrine of communion with the divine through enthusiasm, its promise of regeneration through baptism of blood in the taurobolium, were features which attracted the masses of the people and made it a strong

rival of Christianity; and its resemblance to the new religion, however superficial, made it, in spite of the scandalous practices which grew up around it, a stepping-stone to Christianity when the tide set in against paganism.

Authorities. — Grant Showerman, ” The Great Mother of the Gods,” Bulletin of the University of Wisconsin, No. 43; Philology and Literature Series, vol. i. No. 3 (Madison, 1901); Hugo Hepding, Attis, seine Mythen und seine Kult (Giessen, 1903); Rapp, Roscher’s Ausfiihrliches Lexicon der griechischen und romischen Mythologie s.v. ” Kybele ” ; Drexler, ibid. s.v. ” Meter.” See Roman Religion, Greek Religion, Attis, Corybantes; for the great ” Hittite ” portrayal of the Nature Goddess at Pteria, see Pteria. (G. Sn.)

GREAT REBELLION (1642-52), a generic name for the civil wars in England and Scotland, which began with the raising of King Charles

I.‘s standard at Nottingham on the 22nd of August 1642, and ended with the surrender of Dunottar Castle to the Parliament’s troops in May 1652. It is usual to classify these wars into the First Civil War of 1642-46, and the Second Civil War of 1648-52. During most of this time another civil war was raging in Ireland. Its incidents had little or no connexion with those of the Great Rebellion, but its results influenced the struggle in England to a considerable extent .

1. First Civil War (1642-46). — It is impossible rightly to under- stand the events of this most national of all English wars without some knowledge of the motive forces on both sides. On the side of the king were enlisted the deep-seated loyalty which was the result of two centuries of effective royal protection, the pure cavalier spirit foreshadowing the courtier era of Charles II., but still strongly tinged with the old feudal indiscipline, the militarism of an expert soldier nobility, well represented by Prince Rupert, and lastly a widespread distrust of extreme Puritanism, which appeared unreasonable to Lord Falkland and other philosophic statesmen and intolerable to every other class of Royalists. The foot of the Royal armies was animated in the main by the first. and last of these motives; in the eyes of the sturdy rustics who followed their, squires to the war the enemy were rebels and fanatics. To the cavalry, which was composed largely of the higher social orders, the rebels were, in addition, bourgeois, while the soldiers of fortune from the German wars felt all the regular’s contempt for citizen militia. Thus in the first episodes of the First Civil War moral superiority tended to be on the side of the king. On the other side, the causes of the quarrel were primarily and apparently political, ultimately and really religious, and thus the elements of resistance in the Parliament and the nation were at first confused, and, later, strong and direct. Democracy, moderate republicanism and the simple desire for constitutional guarantees could hardly make head of themselves against the various forces of royalism, for the most moderate men of either party were sufficiently in sympathy to admit compromise. But the backbone of resistance was the Puritan element, and this waging war at first with the rest on the political issue soon (as the Royalists anticipated) brought the religious issue to the front. The Presbyterian system, even more rigid than that of Laud and the bishops — whom no man on either side supported save Charles himself — was destined to be supplanted by the Independents and their ideal of free conscience, but for a generation before the war broke out it had disciplined and trained the middle classes of the nation (who furnished the bulk of the rebel infantry, and later of the cavalry also) to centre their whole will-power on the attain- ment of their ideals. The ideals changed during the struggle, but not the

capacity for striving for them, and the men capable of the effort finally came to the front and imposed their ideals on the rest by the force of their trained wills.

Material force was throughout on the side of the Parliamentary party. They controlled the navy, the nucleus of an army which was in process of being organized for the Irish war, and nearly all- the financial resources of the country. They had the sympathies of most of the large towns, where the trained bands, drilled once a month, provided cadres for new regiments. Further, by recogniz ing the inevitable, they gained a start in war preparations which they never lost. The earls of Warwick, Essex and Manchester and other nobles and gentry of their party possessed great wealth and territorial influence. Charles, on the other hand, although he

could, by means of the ” press ” and the lords-lieutenant, raise men without authority from Parliament, could not raise taxes to support them, and was dependent on the financial support of his chief adherents, such as the earls of Newcastle and Derby. Both parties raised men when and where they could, each claiming that the law was on its side — for England was already a law-abiding nation — and acting in virtue of legal instruments. These were, on the side of the Parliament, its own recent ” Militia Ordinance”; on that of the king, the old-fashioned “Commissions of Array.” In CoBnwall the Royalist leader, Sir Ralph Hopton, indicted the enemy before the grand jury of the county as disturbers of the peace, and had the posse comitalus called out to expel them. The local forces in fact were everywhere employed by whichever side could, by producing valid written authority, induce them to assemble.

2 . The Royalist and Parliamentarian Armies. — This thread of local feeling and respect for the laws runs through the earlier operations of both sides almost irrespective of the main principles at stake. Many a promising scheme failed because of the reluctance of the militiamen to serve beyond the limits of their own county, and, as the offensive lay with the king, his cause naturally suffered far more therefrom than that of the enemy. But the real spirit of the struggle was very different. Anything which tended to prolong the struggle, or seemed like want of energy and avoidance of a decision, was bitterly resented by the men of both sides, who had their hearts in the quarrel and had not as yet learned by the severe lesson of Edgehill that raw armies cannot bring wars to a speedy issue. In France and Germany the prolongation of a war meant continued employment for the soldiers, but in England ” we never encamped or entrenched … or lay fenced with rivers or defiles. Here were no leaguers in the field, as at the

story of Nuremberg, 1 neither had our soldiers any tents or what they call heavy baggage. 'Twas the general maxim of the war — Where is the enemy? Let us go and fight them. Or … if the enemy was coming . . . Why, what should be done ! Draw out into the fields and fight them." This passage from the Memoirs of a Cavalier, ascribed to Defoe, though not contemporary evidence, is an admirable summary of the character of the Civil War. Even when in the end a regular professional army is evolved — exactly as in the case of Napoleon's army — the original decision-compel- ling spirit permeated the whole organization. From the first the professional soldiers of fortune, be their advice good or bad, are looked upon with suspicion, and nearly all those Englishmen who loved war for its own sake were too closely concerned for the wel- fare of their country to attempt the methods of the Thirty Years' War in England. The formal organization of both armies was based on the Swedish model, which had become the pattern of Europe after the victories of Gustavus Adolphus, and gave better scope for the moral of the individual than the old-fashioned Spanish and Dutch formations in which the man in the ranks was a highly finished automaton.

3. Campaign of 1642. — When the king raised his standard at Nottingham on the 22nd of August 1642, war was already in pro- gress on a small scale in many districts, each side endeavouring to secure, or to deny to the enemy, fortified country-houses, territory, and above all arms and money. Peace negotiations went on in the midst of- these minor events until there came from the Parliament an ultimatum so aggressive as to fix the warlike purpose of the still vacillating court at Nottingham, and, in the country at large, to convert many thousands of waverers to active Royalism. Ere long Charles — who had hitherto had less than 1 500 men — was at the head of an army which, though very deficient in arms and equipment, was not greatly inferior in numbers or enthusiasm to that of the Parliament. The latter (20,000 strong exclusive of detachments) was organized during July, August and September about London, and moved thence to Northampton under the command of Robert, earl of Essex.

At this moment the military situation was as follows. Lord Hertford in south Wales, Sir Ralph Hopton in Cornwall, and the

1 Gustavus Adolphus before the battle of the Alte Veste (see Thirty Years' War).

young earl of Derby in Lancashire, and small parties in almost every county of the west and the midlands, were in arms for the king. North of the Tees, the earl of Newcastle, a great territorial magnate , was raising troops and supplies for the king, while Queen Henrietta Maria was busy in Holland arranging for the importation of war material and money. In Yorkshire opinion wasdivided,the royal cause being strongest in York and the North Riding, that of the Parliamentary party in the clothing towns of the West Riding and also in the important seaport of Hull. The Yorkshire gentry made an attempt to neutralize the county, but a local struggle soon began, and Newcastle thereupon prepared to invade Yorkshire. The whole of the south and east as well as parts of the midlands and the west and the important townsof Bristol and Gloucester were on the side of the Parliament. A small Royalist force was compelled to evacuate Oxford on the 10th of September. i . :

On the 13th of September the main campaign opened. The king — in order to find recruits amongst his sympathizers and arms in the armouries of the Derbyshire and Staffordshire trained bands, and also to be in touch with his disciplined regiments in Ireland by way of Chester— moved westward to Shrewsbury, Essex following suit by marching from Northampton to Worcester. Near the last-named town a sharp cavalry engagement (Powick Bridge) took place on the 23rd between the advanced cavalry of Essex's army and a force under Prince Rupert which was engaged in protecting the retirement of the Oxford detachment. The result of the fight was the in- stantaneous overthrow of the rebel cavalry, and this gave the Royalist troopers a confidence in themselves and in their brilliant leader which was not destined to be shaken until they met Cromwell's Ironsides. Rupert soon withdrew to Shrewsbury, where he found many Royalist officers eager to attack Essex's new position at Worcester. But the road to London now lay open and it was decided to take it. The intention was not to avoid a battle, for the Royalist generals desired to fight Essex before he grew too strong, and the temper of both sides made it impossible to postpone the decision; in Clarendon's words, " it was considered more counsellable to march towards London, it being morally sure that the earl of Essex would put himself in their way," and accordingly the army left Shrewsbury on the 1 2 th of October, gaining two days' start of the enemy, and moved south-east via Bridgnorth, Birmingham and Kenilworth. This had the desired effect. Parliament, alarmed for its own safety, sent repeated orders to Essex to find the king and bring him to battle. Alarm gave place to determination when it was discovered that Charles was enlisting

papists and seeking foreign aid. The militia of the home counties was called out, a second army under the earl of Warwick was formed round the nucleus of the London trained bands, and Essex, straining every nerve to regain touch with the enemy, reached Kineton, where he was only 7 m. from the king's headquarters at Edgecote, on the 22nd. 4. Battle of Edgehill. — Rupert promptly reported the enemy's presence, and his confidence dominated the irresolution of the king and the caution of Lord Lindsey, the nominal commander- in-chief. Both sides had marched widely dispersed in order to live, and the rapidity with which, having the clearer purpose, the Royalists drew together helped considerably to neutralize Essex's superior numbers. During the morning of the 23rd the Royalists formed in battle order on the brow of Edgehill facing towards Kineton. Essex, experienced soldier as he was, had distrusted his own raw army too much to force a decision earlier in the month, when the king was weak; he now found Charles in a strong position with an equal force to his own 14,000, and some of his regiments were still some miles distant. But he advanced beyond Kineton, and the enemy promptly . left their strong position and came down to the foot of the hill, for, situated as they were, they had either to fight wherever they could induce the enemy to engage, or to starve in the midst of hostile garrisons. Rupert was on the right of the king's army with the greater part of the horse, Lord Lindsey and Sir Jacob Astley in the centre with the foot, Lord Wilmot (with whom rode the earl of Forth, the principal military adviser

of the king) with a smaller body of cavalry on the left. In rear of the centre were the king and a small reserve. Essex's order was similar. Rupert charged as soon as his wing was deployed, and before the infantry of either side was ready. Taking ground to his right front and then wheeling inwards at full speed he instantly rode down the Parliamentary horse opposed to him. Some infantry regiments of Essex's left centre shared the same fate as their cavalry. On the other wing Forth and Wilmot likewise swept away all that they could see of the enemy's cavalry, and the undisciplined Royalists of both wings pursued the fugitives in wild disorder up to Kineton, where they were severely handled by John Hampden's infantry brigade (which was escorting the artillery and baggage of Essex's army). Rupert brought back only a few rallied squadrons to the battlefield, and in the meantime affairs there had gone badly for the king. The right and centre of the Parliamentary foot (the left having been brought to a halt by Rupert's charge) advanced with great resolution, and being at least as ardent as, and much better armed than, Lindsey's men, engaged them fiercely and slowly gained grouJjd. Only the best

regiments en either side, however, maintained their order, and the decision of the infantry battle was achieved mainly by a few Parliamentary squadrons. One regiment of Essex's rightwing onlyhad been the target of Wilmot's charge, the other two had been at the moment invisible, and, as every Royalist troop on the ground, even the king's guards, had joined in the mad ride to Kineton, these, Essex's life-guard, and some troops that had rallied from the effect of Rupert's charge — amongst them Captain Oliver Cromwell's — were the only cavalry still present. All these joined with decisive effect in the attack on the left of the royal infantry. The king's line was steadily rolled up from left to right, the Parliamentary troopers captured his guns and regiment after regiment broke up. Charles himself stood calmly in the thick of the fight, but he had not the skill to direct it. The royal standard was taken and retaken, Lindsey and Sir Edmund Verney, the standard-bearer, being killed. By the time that Rupert returned both sides were incapable of further effort and disillusioned as to the prospect of ending the war at a blow.

On the 24th Essex retired, leaving Charles to claim the victory and to reap its results. Banbury and Oxford were reoccupied by the Royalists, and by the 28th Charles was marching down the Thames valley on London. Negotiations were reopened, and a peace party rapidly formed itself in London and West- minster . Yet field fortifications sprang up around London, and when Rupert stormed and sacked Brentford on the 12th of November the trained bands moved out at once and took up a position at Turnham Green, barring the king's advance. Hampden, with something of the fire and energy of his cousin Cromwell, urged Essex to turn both flanks of the Royal army via Acton and Kingston, but experienced professional soldiers urged him not to trust the London men to hold their ground while the rest manoeuvred. Hampden's advice was undoubtedly premature. A Sedan or Worcester was not within the power of the Parliamentarians of 1642, for, in Napoleon's words,-" one only manoeuvres around a fixed point," and the city levies at that time were certainly not, vis-a-vis Rupert's cavalry, a fixed point. As a matter of fact, after a slight cannonade at Turnham Green on the 13th, Essex's two-to-one numerical superiority of itself compelled the king to retire to Reading. Turnham Green has justly been called the Valmy of the English Civil War. Like Valmy, without being a battle, it was a victory, and the tide of invasion came thus far, ebbed, and never returned

5. The Winter of 1642-43. — In the winter, while Essex lay inactive at Windsor, Charles by degrees consolidated his position in the region of Oxford. The city was fortified as a reduit for the whole area, and Reading, Wallingford, Abingdon, Brill, Banbury and Marlborough

constituted a complete defensive ring which was developed by the creation of smaller posts from time to time. In the north and west, winter campaigns were actively carried on. ” It is summer in Yorkshire, summer in Devon, and cold winter at Windsor,” said one of Essex’s critics. At the beginning of December Newcastle crossed the Tees,

defeated Hotham, the Parliamentary commander in the North Riding, then joining hands with the hard-pressed Royalists at York, established himself between that city and Pontefract. Lord Fairfax and his son Sir Thomas, who commanded for the Parliament in Yorkshire, had to retire to the district between Hull and Selby, and Newcastle was free to turn his attention to the Puritan ” clothing towns ” of the West Riding — Leeds, Halifax and Bradford. The townsmen, however, showed a determined front, the younger Fairfax with a picked body of cavalry rode through Newcastle’s lines into the West Riding to help them, and about the end of January 1643 the earl gave up the attempt to reduce the towns. He continued his march southward, however, and gained ground for the king as far as Newark, so as to be in touch with the Royalists of Nottingham- shire, Derbyshire and Leicestershire (who, especially about Newark and Ashby-de-la-Zouch, were strong enough to neutralize the local forces of the Parliament), and to prepare the way for the further advance of the army of the north when the queen’s convoy should arrive from over-seas.

In the west Sir Ralph Hopton and his friends, having obtained a true bill from the grand jury against the Parliamentary dis- turbers of the peace, placed themselves at the head of the county militia and drove the rebels from Cornwall, after which they raised a small force for general service and invaded Devonshire (November 1642). Subsequently a Parliamentary army under the earl of Stamford was withdrawn from south Wales to engage Hopton, who had to retire into Cornwall. There, however, the Royalist general was free to employ the militia again, and thus reinforced he won a victory over a part of Stamford’s forces at Bradock Down near Liskeard (January 19, 1643) and resumed the offensive. About the same time Hertford, no longer opposed by Stamford, brought over the South Wales Royalists to Oxford, and the fortified area around that place was widened by the capture of Cirencester on the 2nd of February. Gloucester and Bristol were now the only important garrisons of the Roundheads in the west. In the midlands, in spite of a Parliamentary victory won by Sir

William Brereton at Nantwich on the 28th of January, the Royalists of Shropshire, Staffordshire and Leicester- shire soon extended their influence through Ashby-de-la-Zouch into Nottinghamshire and joined hands with their friends at Newark. Further, around Chester a new Royalist army was being formed under Lord Byron, and all the efforts of Brereton and of Sir John Gell, the leading supporter of the Parliament in Derbyshire, were required to hold their own, even before New- castle's army was added to the list of their enemies. Lord Brooke, who commanded for the Parliament in Warwickshire and Staffordshire and was looked on by many as Essex's eventual successor, was killed in besieging Lichfield cathedral on the 2nd of March, and, though the cathedral soon capitulated, Gell and Brereton were severely handled in the indecisive battle of Hopton Heath- near Stafford on the 19th of March, and Prince Rupert, after an abortive raid on Bristol (March 7), marched rapidly northward, storming Birmingham en route, and recap- tured Lichfield cathedral. He was, however, soon recalled to Oxford to take part in the main campaign. The position of affairs for the Parliament was perhaps at its worst in January. The Royalist successes of November and December, the ever-present dread of foreign intervention, and the burden of new taxation which the Parliament now found itself compelled to impose, disheartened its supporters. Disorders broke out in London, and, while the more determined of the rebels began thus early to think of calling in the military assistance of the Scots, the majority were for peace on any conditions. But soon the position improved somewhat; Stamford in the west and Brereton and Gell in the midlands, though hard pressed, were at any rate in arms and undefeated, Newcastle had failed to conquer the West Riding, and Sir William Waller, who had cleared Hampshire and Wiltshire of " malignants," entered Gloucestershire early in March, destroyed a small Royalist force at Highnam (March 24), and secured Bristol and Gloucester for the Parliament . Finally, some of Charles's own intrigues opportunely coming to light, the waverers, seeing the impossi-

bility of plain dealing with the court, rallied again to the party of resistance, and the series of negotiations called by the name of the Treaty of Oxford closed in April with no more result than those which had preceded Edgehill and Turnham Green. About this time too, following and improving upon the example of Newcastle in the north, Parliament ordered the formation of the celebrated " associations " or groups of counties banded together by mutual consent for defence. The most powerful and best organized of these was that of the eastern counties (headquarters Cambridge), where the danger of attack from the north was near enough to induce great energy in the preparations

for meeting it, and at the same time too distant effectively to interfere with these preparations. Above all, the Eastern Association was from the first guided and inspired by Colonel Cromwell.

6. The Plan of Campaign, 764 j.-.— The king's plan of operations for the next campaign, which was perhaps inspired from abroad, was more elaborate than the simple "point" of 1642. The king's army, based on the fortified area around Oxford, was counted sufficient to use up Essex's forces. On either hand, therefore, in Yorkshire and in the west, the Royalist armies were to fight their way inwards towards London, after which all three armies, converging on that place in due season, were to cut off its supplies and its sea-borne revenue and to starve the rebellion into surrender. The condition of this threefold advance was of course that the enemy should not be able to defeat the armies in detail, i.e. that he should be fixed and held in the Thames valley; this secured, there was no purely military objection against operating in separate armies from the cir- cumference towards the centre. It was on the rock of local feeling that the king's plan came to grief. Even after the arrival of the queen and her convoy , Newcastle had to allow her to proceed with a small force, and to remain behind with the main body, because of Lancashire and the West Riding, and above all because the port of Hull, in the hands of the Fairfaxes, constituted a menace that the Royalists of the East Riding refused to ignore. Hopton's advance too, undertaken without the Cornish levies, was checked in the action of Sourton Down (Dartmoor) on the 25th of April, and on the same day Waller captured Hereford. Essex had already left Windsor to under- take the siege of Reading, the most important point in the circle of fortresses round Oxford, which after a vain attempt at relief surrendered to him on the 26th of April. Thus the opening operations were unfavourable, not indeed so far as to require the scheme to be abandoned, but at least delaying the develop- ment until the campaigning season was far advanced.

7. Victories of Hopton. — But affairs improved in May. The queen's long-expected convoy arrived at Woodstock on the 13th. The earl of Stamford's army, which had again entered Cornwall, was attacked in its selected position at Stratton and practically annihilated by Hopton (May 16). This brilliant victory was due above all to Sir Bevil Grenville and the lithe Cornishmen, who, though but 2400 against 5400 and destitute of artillery, stormed " Stamford Hill, " killed 300 of the enemy, and captured 1 700 more with all their guns, colours and baggage . Devon was at once overrun by the victors. Essex's army, for want of material resources, had had to be content with the capture of Reading, – and a Royalist force under Hertford and Prince Maurice (Rupert's brother) moved out as far as Salisbury to hold out a hand to

their friends in Devonshire, while Waller, the only Parliamentary commander left in the field in the west, had to abandon his conquests in the Severn valley to oppose the further progress of his intimate friend and present enemy, Hopton. Early in June Hertford and Hopton united at Chard and rapidly moved, with some cavalry skirmishing, towards Bath, where Waller's army lay. Avoiding the barrier of the Mendips, they moved round via Frome to the Avon. But Waller, thus cut off from London and threatened with investment, acted with great skill, and some days of manoeuvres and skirmishing followed, after which Hertford and Hopton found themselves on the north side of Bath facing Waller's entrenched position on the top of Lansdown Hill. This position the Royalists

stormed on the 5th of July. The battle of Lansdown was a second Stratton for the Cornishmen, but this time the enemy was of different quality and far differently led, and they had to mourn the loss of Sir Bevil Grenville and the greater part of their whole force. At dusk both sides stood on the flat summit of the hill, still firing into one another with such energy as was not yet expended, and in the night Waller drew off his men into Bath. " We were glad they were gone," wrote a Royalist officer, " for if they had not, I know who had within the hour." Next day Hop ton was severely injured by the explosion of a wagon containing the reserve ammunition, and the Royalists, finding their victory profitless, moved eastward to Devizes, closely followed by the enemy. On the 10th of July Sir William Waller took post on Roundway Down, overlooking Devizes, and cap- tured a Royalist ammunition column from Oxford. On the nth he came down and invested, Hopton's foot in Devizes itself, while the Royalist cavalry, Hertford and Maurice with them, rode away towards Salisbury. But although the siege was pressed with such vigour that an assault was fixed for the evening of the 13th, the Cornishmen, Hopton directing the defence from his bed, held out stubbornly, and on the afternoon of July 13th Prince Maurice's horsemen appeared on Roundway Down, having ridden to Oxford, picked up reinforcements there, and returned at full speed to save their comrades. Waller's army tried its best, but some of its elements were of doubtful quality and the ground was all in Maurice's favour. The battle did not last long. The combined attack of the Oxford force from Roundway and of Hopton's men from the town practically annihilated Waller's army. Very soon afterwards Rupert came up with fresh Royalist forces, and the combined armies moved westward* Bristol, the second port of the kingdom, was their

objective, and in four days from the opening of the siege it was in their hands (July 26), Waller with the beaten remnant of his army at Bath being powerless to intervene. The effect of this blow was felt even in Dorsetshire. Within three weeks of the surrender Prince Maurice with a body of fast-moving cavalry overran that county almost unopposed.

8. Adwalton Moor. — Newcastle meanwhile had resumed opera- tions against the clothing towns, this time with success. The Fairfaxes had been fighting in the West Riding since January with such troops from the Hull region as they had been able to bring across Newcastle's lines. They and the townsmen together were too weak for Newcastle's increasing forces, and an attempt was made to relieve them by bringing up the Parliament's forces in Nottinghamshire, Derbyshire, Lincolnshire and the Eastern Association. But local interests prevailed again, in spite of Cromwell's presence, and after assembling at Notting- ham, the midland rebels quietly dispersed to their several counties (June 2). The Fairfaxes were left to their fate, and about the same time Hull itself narrowly escaped capture by the queen's forces through the treachery of Sir John Hotham, the governor, and his son, the commander of the Lincolnshire Parlia- mentarians. The latter had been placed under arrest at the instance of Cromwell and of Colonel Hutchinson, the governor of Nottingham Castle; he escaped to Hull, but both father and son were seized by the citizens and afterwards executed. More serious than an isolated act of treachery was the far-reaching Royalist plot that had been detected in Parliament itself, for complicity in which Lord Conway, Edmund Waller the poet, and several members of both Houses were arrested. The safety of Hull was of no avail for the West Riding towns, and the Fairfaxes underwent a decisive defeat at Adwalton (Atherton) Moor near Bradford on the 30th of June. After this, by way of Lincolnshire, they escaped to Hull and reorganized the defence of that place. The West Riding perforce submitted. .,

The queen herself with a second convoy and a small army . under Henry (Lord) Jermyn soon moved via Newark, Ashby- de-la-Zouch, Lichfield and other Royalist garrisons to Oxford, where she joined her husband on the 14th of July. But New- castle (now a marquis) was not yet ready for his part in the programme. The Yorkshire troops would not march on London while the enemy was master of Hull, and by this time there was

a solid barrier between the royal army of the north and the capital. Roundway Down and Adwalton Moor were not after all destined to be fatal, though peace riots in London, dissensions in the Houses, and

quarrels amongst the generals were their immediate consequences. A new factor had arisen in the war — the Eastern Association.

9. Cromwell and the Eastern Association. — This had already intervened to help in the siege of Reading and had sent troops to the abortive gathering at Nottingham, besides clearing its own ground of ” malignants.” From the first Cromwell was the dominant influence. Fresh from’Edgehill, he had told Hampden, “You must get men of a spirit that is likely to go as far as gentlemen will go,” not ” old decayed serving-men, tapsters and such kind of fellows to encounter gentlemen that have honour and courage and resolution in them,” and in January 1643 he had gone to his own county to ” raise such men as had the fear of God before them and made some conscience of what they did.” These men, once found, were willing, for the cause, to submit to a rigorous training and an iron discipline such as other troops, fighting for honour only or for profit only, could not be brought to endure. 1 The result was soon apparent. As early as the 13th of May, Cromwell’s regiment of horse — recruited from the horse-loving yeomen of the eastern counties — ■ demonstrated its superiority in the field in a skirmish near Grantham, and in the irregular fighting in Lincolnshire during June and July (which was on the whole unfavourable to the Parliament), as previously in pacifying the Eastern Association itself, these Puritan troopers distinguished themselves by long and rapid marches that may bear comparison with almost any in the history of the mounted arm. When Cromwell’s second opportunity came at Gainsborough on the 28th of July, the ” Lincolneer ” horse who were under his orders were fired by theexampleof Cromwell’s own regiment, and Cromwell, directing the whole with skill, and above all with energy, utterly routed the Royalist horse and killed their general, Charles Cavendish.

In the meantime the army of Essex had been inactive. After the fall of Reading a serious epidemic of sickness had reduced it to impotence. On the 18th of June the Parliamentary cavalry was routed and John Hampden mortally wounded at Chalgrove Field near Chiselhampton , and when at last Essex, having obtained the desired reinforcements, moved against Oxford from the Aylesbury side, he found his men demoralized by inaction, and before the menace of Rupert’s cavalry, to which he had nothing to oppose, he withdrew to Bedfordshire (July). He made no attempt to intercept the march of the queen’s convoys, he had permitted the Oxford army, which he should have held fast, to intervene effectually in the midlands, the west, and the south-west, and Waller might well complain that Essex, who still held Reading and the Chilterns, had given him neither active nor passive support in the critical days preceding Round- way Down. Still only a

few voices were raised to demand his removal, and he was shortly to have an opportunity of proving his skill and devotion in a great campaign and a great battle. The centre and the right of the three Royalist armies had for a moment (Roundway to Bristol) united to crush Waller, but their concentration was short-lived. Plymouth was to Hopton's men what Hull was to Newcastle's — they would not march on London until the menace to their homes was removed. Further, there were dissensions among the generals which Charles was too weak to crush, and consequently the original plan reappears — the main Royalist army to operate in the centre, Hopton's (now Maurice's) on the right, Newcastle on the left towards London. While waiting for the fall of Hull and Plymouth, Charles naturally decided to make the best use of his time by reducing Gloucester, the one great fortress of the Parliament in the west.

10. Siege and Relief of Gloucester. — This decision quickly brought on a crisis. While the earl of Manchester (with Cromwell as his lieutenant-general) was appointed to head the forces of the Eastern Association against Newcastle, and Waller was

1 " Making not money but that which they took to be the public felicity to 'be their end they were the more engaged to be valiant " (Baxter).

given a new army wherewith again to engage Hopton and Maurice, the task of saving Gloucester from the king's army fell to Essex, who was heavily reinforced and drew his army together for action in the last days of August. Resort was had to the press-gang to fill the ranks, recruiting for Waller's new army was stopped, and London sent six regiments of trained bands to the front, closing the shops so that every man should be free to take his part in what was thought to be the supreme trial of strength.

On the 26th, all being ready, Essex started. Through Ayles- bury and round the north side of Oxford to Stow-on-the-Wold the army moved resolutely, not deterred by want of food and rest, or by the attacks of Rupert's and Wilmot's horse on its flank. On the 5th of September, just as Gloucester was at the end of its resources, the siege was suddenly raised and the Royalists drew off to Painswick, for Essex had reached Chelten- ham and the danger was over. Then, the field armies being again face to face and free to move, there followed a series of skilful

manoeuvres in the Severn and Avon valleys, at the end of which the Parliamentary army gained a long start on its homeward road via Cricklade, Hungerford and Reading. But the Royalist cavalry under Rupert, followed rapidly by Charles and the main body from Evesham, strained every nerve to head off Essex at Newbury, and after a sharp skirmish on Aldbourne Chase on the 18th of September succeeded in doing so. On the 19th the whole Royal army was drawn up, facing west, with its right on Newbury and its left on Enborne Heath. Essex's men knew that evening that they would have to break through by force — there was no suggestion of surrender.

11. First Battle of Newbury, September 20, 1643. — The ground was densely intersected by hedges except in front of the Royalists' left centre (Newbury Wash) and left (Enborne Heath), and, practically, Essex's army was never formed in line of battle, for each unit was thrown into the fight as it came up its own road or lane. On' the left wing, in spite of the Royalist counter- strokes, the attack had the best of it, capturing field after field, and thus gradually gaining ground to the front. Here Lord Falkland was killed. On the Reading road itself Essex did not succeed in deploying on to the open ground on Newbury Wash, but victoriously repelled the royal horse when it charged up to the lanes and hedges held by his foot. On the extreme right of the Parliamentary army, which stood in the open ground of Enborne Heath, took place a famous incident. Here two of the London regiments, fresh to war as they were, were exposed to a trial as severe as that which broke down the veteran Spanish infantry at Rocroi in this same year. Rupert and the Royalist horse again and again charged up to the squares of pikes, and between each charge his guns tried to disorder the Londoners, but it was not until the advance of the royal infantry that the trained bands retired, slowly and in magnificent order, to the edge of the heath . The result of it all was that Essex's army had fought its hardest and failed to break the opposing line. But the Royalists had suffered so heavily, and above all the valour displayed by the rebels had so profoundly impressed them, that they were glad to give up the disputed road and withdraw into Newbury. Essex thereupon pursued his march, Reading was reached on the 22nd after a small rearguard skirmish at Alder- maston, and so ended one of the most dramatic episodes of English history.

12. Hull and Winceby. — Meanwhile the siege of Hull had commenced. The Eastern Association forces under Manchester promptly moved up into Lincolnshire, the foot besieging Lynn (which surrendered on the 16th of September) while the horse rode into the northern part of the county to give a hand to the. Fairfaxes. Fortunately the sea communications of Hull were , open. On the 18th

of September part of the cavalry in Hull was ferried over to Barton, and the rest under Sir Thomas Fairfax went by sea to Saltfleet a few days later, the whole joining Cromwell near Spilsby. In return the old Lord Fairfax, who remained in Hull, received infantry reinforcements and a quantity of ammunition and stores from the Eastern Association. On the nth of October Cromwell and Fairfax together

won a brilliant cavalry action at Winceby, driving the Royalist horse in confusion before them to Newark, and on the same day Newcastle's army around Hull, which had suffered terribly from the hardships of continuous siege work, was attacked by the garrison and so severely handled that next day the siege was given up. Later, Manchester retook Lincoln and Gainsborough, and thus Lincolnshire, which had been almost entirely in Newcastle's hands before he was compelled to under- take the siege of Hull, was added in fact as well as in name to the Eastern Association.

Elsewhere, in the reaction after the crisis of Newbury, the war languished. The city regiments went home, leaving Essex too weak to hold Reading, which the Royalists reoccupied on the 3rd of October. At this the Londoners offered to serve again, and actually took part in a minor campaign around Newport Pagnell, which town Rupert attempted to fortify as a menace to the Eastern Association and its communications with London. Essex was successful in preventing this, but his London regiments again went home, and Sir William Waller's new army in Hampshire failed lamentably in an attempt on Basing House (November 7), the London trained bands deserting en bloc. Shortly afterwards Arundel surrendered to a force under Sir Ralph, now Lord Hopton (December 9).

13. The " Irish Cessation " and the Solemn League and Covenant. — Politically, these months were the turning-point of the war. In Ireland, the king's lieutenant, by order of his master, made a truce with the Irish rebels (Sept. 15). Charles's chief object was to set free his army to fight in England, but it was believed universally that Irish regiments — in plain words, papists in arms — would shortly follow. Under these cir- cumstances his act united against him nearly every class in Protestant England, above all brought into the English quarrel the armed strength of Presbyterian Scotland. Yet Charles, still trusting to intrigue and diplomacy to keep Scotland in check, deliberately rejected the advice of Montrose, his greatest and most faithful lieutenant, who wished to give the Scots employment for their army at home. Only ten days after the " Irish cessation," the Parliament at Westminster swore to the Solemn League and Covenant, and the die was cast. It is true that even a semblance of Presbyterian theocracy

put the ‘ Independents ” on their guard and definitely raised the question of freedom of conscience, and that secret negotiations were opened between the Independents and Charles on that basis, but they soon discovered that the king was merely using them as instruments to bring about the betrayal of Aylesbury and other small rebel posts. All parties found it convenient to inter- pret the Covenant liberally for the present, and at the beginning of 1644 the Parliamentary party showed so united a front that even Pym’s death (December 8, 1643) hardly affected its resolu- tion to continue the struggle.

The troops from Ireland, thus obtained at the cost of an enormous political blunder, proved to be untrustworthy after all. Those serving in Hopton’s army were ” mutinous and shrewdly infected with the rebellious humour of England.” When Waller’s Londoners surprised 1 and routed a Royalist detachment at Alton (December 13, 1643), half the prisoners took the Covenant. Hopton had to retire, and on the 6th of January 1644 Waller recaptured Arundel. Byron’s Cheshire army was in no better case. Newcastle’s retreat from Hull and the loss of Gainsborough had completely changed the situation in the midlands, Brereton was joined by the younger Fairfax from Lincolnshire, and the Royalists were severely defeated for a second time at Nantwich (January 25). As at Alton, the majority of the prisoners (amongst them Colonel George Monk) took the Covenant and entered the Parliamentary army. In Lancashire, as in Cheshire, Staffordshire, Nottinghamshire and Lincolnshire, the cause ol the Parliament was in the ascendant. Resistance revived in the West Riding towns, Lord Fairfax was again in the field in the 1 For the third time within the year the London trained bands turned out in force. It was characteristic of the early years of the war that imminent danger alone called forth the devotion of the citizen soldier. If he was employed in ordinary times (e.g. at Basing House) Ke would neither fight nor march with spirit.

East Riding, and even Newark was closely besieged by Sir John Meldrum. More important news came in from the north. The advanced guard of the Scottish army had passed the Tweed on the 19th of January, and the marquis of Newcastle with the remnant of his army would soon be attacked in front and rear at once.

14. Newark and Cheriton {March 1644). — As in 1643, Rupert was soon on his way to the north to retrieve the fortunes of his side.

Moving by the Welsh border, and gathering up garrisons and recruits snowball-wise as he marched, he went first to Cheshire to give a hand to Byron, and then, with the utmost speed, he made for Newark. On the 20th of March 1644 he bivouacked at Bingham, and on the 21st he not only relieved Newark but routed the besiegers' cavalry. On the 22nd Meldrum's position was so hopeless that he capitulated on terms. But, brilliant soldier as he was, the prince was unable to do more than raid a few Parliamentary posts around Lincoln, after which he had to return his borrowed forces to their various garrisons and go back to Wales — laden indeed with captured pikes and muskets — to raise a permanent field army. But Rupert could not be in all places at once. Newcastle was clamorous for aid. In Lancashire, only the countess of Derby, in Lathom House, held out for the king, and her husband pressed Rupert to go to her relief. Once, too, the prince was ordered back to Oxford to furnish a travelling escort for the queen, who shortly after this gave birth to her youngest child and returned to France. The order was countermanded within a few hours, it is true, but Charles had good reason for avoiding detachments from his own army. On the 29th of March, Hopton had undergone a severe defeat at Cheriton near New Alresford. In the preliminary manoeuvres and in the opening stages of the battle the advantage lay with the Royalists, and the earl of Forth, who was present, was satisfied with what had been achieved and tried to break off the action. But Royalist indiscipline ruined everything., A young cavalry colonel charged in defiance of orders, a fresh engagement opened, and at the last moment Waller snatched a victory out of defeat. Worse than this was the news from Yorkshire and Scotland. Charles had at last assented to Montrose's plan and promised him the title of marquis, but the first attempt to raise the Royalist standard in Scotland gave no omen of its later triumphs. In Yorkshire Sir Thomas Fairfax, advancing from Lancashire through the West Riding, joined his father. Selby was stormed on the nth of April, and thereupon Newcastle, who had been manoeuvring against the Scots in Durham, hastily drew back, sent his cavalry away, and shut himself up with his foot in York. Two days later the Scottish general, Alexander Leslie, Lord Leven, joined the Fairfaxes and prepared to invest that city.

15. Plans of Campaign for 1644. — The original plan of the Parliamentary "Committee of Both Kingdoms," which directed the military and civil policy of the allies after the fashion of a modern cabinet, was to combine Essex's and Manchester's armies in an attack upon the king's army, Aylesbury being appointed as the place of concentration. Waller's troops were to continue to drive back Hopton and to reconquer the west, Fairfax and the Scots to invest Newcastle's

army, while in the midlands Brereton and the Lincolnshire rebels could be counted upon to neutralize, the one Byron, the others the Newark Royalists. But Waller, once more deserted by his trained bands, was unable to profit by his victory of Cheriton, and retired to Farnham. Manchester, too, was delayed because the Eastern Association was still suffering from the effects of Rupert's Newark exploit — Lincoln, abandoned by the rebels on that occasion, was not reoccupied till the 6th of May. Moreover, Essex found himself compelled to defend his conduct and motives to the Committee of Both Kingdoms, and as usual was straitened for men and money. But though there were grave elements of weakness on the other side, the Royalists considered their own position to be hopeless. Prince Maurice was engaged in the fruitless siege of Lyme Regis, Gloucester was again a centre of activity and counterbalanced Newark, and the situation in the north was practically desperate. Rupert himself came

to Oxford (April 25) to urge that his new army should be kept free to march to aid Newcastle, who was now threatened — owing to the abandonment of the enemy's original plan — by Manchester as well as Fairfax and Leven. There was no further talk of the concentric advance of three armies on London. The fiery prince and the methodical earl of Brentford (Forth) were at one at least in recommending that the Oxford area with its own garrison and a mobile force in addition should be the pivot of the field armies' operations. Rupert, needing above all ade- quate time for the development of the northern offensive, was not in favour of abandoning any of the barriers to Essex's advance. Brentford, on the other hand, thought it advisable to contract the lines of defence, and Charles, as usual undecided, agreed to Rupert's scheme and executed Brentford's. Reading, there- fore, was dismantled early in May, and Abingdon given up shortly afterwards.

16. Cropredy Bridge. — It was now possible for the enemy to approach Oxford, and Abingdon was no sooner evacuated than (May 26) Waller's and Essex's armies united there — still, un- fortunately for their cause, under separate commanders. From Abingdon Essex moved direct on Oxford, Waller towards Wantage, where he could give a hand to Massey, the energetic governor of Gloucester. Affairs seemed so bad in the west (Maurice with a whole army was still vainly besieging the single line of low breastworks that constituted the fortress of Lyme) that the king despatched Hopton to take charge of Bristol. Nor were things much better at Oxford; the barriers of time and space and the supply area had been deliberately given up to the enemy, and Charles was practically forced to undertake extensive field operations with no hope of success save in con- sequence of the enemy's mistakes. The enemy, as it happened, did not disappoint him.

The king, probably advised by Brent- ford, conducted a skilful war of manoeuvre in the area defined by Stourbridge, Gloucester, Abingdon and Northampton, at the end of which Essex, leaving Waller to the secondary work, as he conceived it, of keeping the king away from Oxford and reducing that fortress, marched off into the west with most of the general service troops to repeat at Lyme Regis his Gloucester exploit of 1643. At one moment, indeed, Charles (then in Bewdley) rose to the idea of marching north to join Rupert and Newcastle, but he soon made up his mind to return to Oxford. From Bewdley, therefore, he moved to Buckingham — the distant threat on London producing another evanescent citizen army drawn from six counties under Major-General Browne — and Waller followed him closely. When the king turned upon Browne's motley host, Waller appeared in time to avert disaster, and the two armies worked away to the upper Cherwell. Brent- ford and Waller were excellent strategists of the 17th century type, and neither would fight a pitched battle without every chance in his favour. Eventually on the 29th of June the Royalists were successful in a series of minor fights about Cropredy Bridge, and the result was, in accordance with con- tinental custom, admitted to be an important victory, though Waller's main army drew off unharmed. In the meantime, Essex had relieved Lyme (June 15) and occupied Weymouth, and was preparing to go farther. The two rebel armies were now indeed separate. Waller had been left to do as best he could, and a worse fate was soon to overtake the cautious earl.

17. Campaign of Marston Moor. — During these manoeuvres the northern campaign had been fought to an issue. Rupert's courage and energy were more likely to command success in the English Civil War than all the conscientious caution of an Essex or a Brentford. On the 16th of May he left Shrewsbury to fight his way through hostile country to Lancashire, where he hoped to re-establish the Derby influence and raise new forces. Stock- port was plundered on the 25th, the besiegers of Lathom House utterly defeated at Bolton on the 28th. Soon afterwards he received a large reinforcement under General Goring, which included 5000 of Newcastle's cavalry. The capture of the almost defenceless town of Liverpool — undertaken as usual to allay local fears — did not delay Rupert more than three or four days , and he then turned towards the Yorkshire border with

greatly augmented forces. On the 14th of June he received a despatch from the king, the gist of which was that there was a time-limit

imposed on the northern enterprise. If York were lost or did not need his help, Rupert was to make all haste southward via Worcester. ” If York be relieved and you beat the rebels’ armies of both kingdoms, then, but otherways not, I may possibly make a shift upon the defensive to spin out time until you come to assist me.”

Charles did manage to ” spin out time.” But it was of capital importance that Rupert had to do his work upon York and the allied army in the shortest possible time, and that, according to the despatch, there were only two ways of saving the royal cause, ” having relieved York by beating the Scots,” or marching with all speed to Worcester. Rupert’s duty, interpreted through the medium of his temperament, was clear enough. Newcastle still held out, his men having been encouraged by a small success on the 17th of June, and Rupert reached Knaresborough on the 30th. At once Leven, Fairfax and Manchester broke up the siege of York and moved out to meet him. But the prince, moving still at high speed, rode round their right flank via Boroughbridge and Thornton Bridge and entered York on the north side. Newcastle tried to dissuade Rupert from fighting, but his record as a general was scarcely convincing as to the value of his advice. Rupert curtly replied that he had orders to fight, and the Royalists moved out towards Marston Moor (g.v.) on the morning of July 2, 1644. The Parliamentary commanders, fearing a fresh manoeuvre, had already begun to retire towards Tadcaster, but as soon as it became evident that a battle was impending they turned back. The battle of Marston Moor began about four in the afternoon. It was the first real trial of strength between the best elements on either side, and it ended before night with the complete victory of the Parliamentary armies. The Royalist cause in the north collapsed once for all, Newcastle fled to the continent, and only Rupert, resolute as ever, extricated 6000 cavalry from the debacle and rode away whence he had come, still the dominant figure of the war.

18. Independency. — The victory gave the Parliament entire control of the north, but it did not lead to the definitive solution of the political problem, and in fact, on the question of Charles’s place in a new Constitution, the victorious generals quarrelled even before York had surrendered. Within three weeks of the battle the great army was broken up. The Yorkshire troops proceeded to conquer the isolated Royalist posts in their county, the Scots marched off to besiege Newcastle-on-Tyne and to hold in check a nascent Royalist army in Westmorland. Rupert in Lancashire they neglected entirely. Manchester and Cromwell, already estranged, marched away into the Eastern Association. There, for want of an enemy to fight, their army was forced to be idle, and Cromwell and the ever-growing

Independent element quickly came to suspect their commander of lukewarmness in the cause. Waller's army, too, was spiritless and immobile. On the 2nd of July, despairing of the existing military system, he made to the Committee of Both Kingdoms the first suggestion of the New Model, — " My lords," he wrote, " till you have an army merely your own, that you may command, it is. . . impossible to do anything of importance." Browne's trained band army was perhaps the most ill-behaved of all — once the soldiers attempted to murder their own general. Parliament in alarm set about the formation of a new general service force (July 12), but meantime both Waller's and Browne's armies (at Abingdon and Reading respectively) ignominiously collapsed by mutiny and desertion. It was evident that the people at large, with their respect for the law and their, anxiety for their own homes, were tired of the war. Only those men — such as Cromwell — who has set their hearts on fighting out the quarrel of conscience, kept steadfastly to their purpose. Cromwell himself had already decided that the king himself must be deprived of his authority, and his supporters were equally con- vinced. But they were relatively few. Even the Eastern Association trained bands had joined in the disaffection in Waller's army, and that unfortunate general's suggestion of a professional army, with all its dangers, indicated the only means

of enforcing a peace such as Cromwell and his friends desired. There was this important difference, however, between Waller's idea and Cromwell's achievement — that the professional soldiers of the New Model were disciplined, led, and in all things inspired by "godly" officers. Godliness, devotion to the cause, and efficiency were indeed the only criteria Cromwell applied in choosing officers. Long before this he had warned the Scottish major-general Lawrence Crawford that the precise colour of a man's religious opinions mattered nothing compared with his devotion to them, and had told the committee of Suffolk, " I had rather have a plain russet-coated captain that knows what he fights for and loves what he knows than that which you call a ' gentleman ' and is nothing else. I honour a gentleman that is so indeed . . . but seeing it was necessary the work must go on, better plain men than none." If " men of honour and birth " possessed the essentials of godliness, devotion, and capacity, Cromwell preferred them, and as a fact only seven out of thirty-seven of the superior officers of the original New Model were not of gentle birth.

19. Lostwithiel. — But all this was as yet in the future. Essex's military promenade in the west of England was the subject of immediate interest. At first successful, this general penetrated to Plymouth, whence, securely based as he thought, he could overrun Devon.

Unfortunately for him he was persuaded to overrun Cornwall as well. At once the Cornishmen rose, as they had risen under Hopton, and the king was soon on the march from the Oxford region, disregarding the armed mobs under Waller and Browne. Their state reflected the general languishing of the war spirit on both sides, not on one only, as Charles dis- covered when he learned that Lord W-ilmot, the lieutenant- general of his horse, was in correspondence with Essex. Wilmot was of course placed under arrest, and was replaced by the dissolute General Goring. But it was unpleasantly evident that even gay cavaliers of the type of Wilmot had lost the ideals for which they fought, and had come to believe that the realm would never be at peace while Charles was king. Henceforward it will be found that the Royalist foot, now a thoroughly pro- fessional force, is superior in quality to the once superb cavalry, and that not merely because its opportunities for plunder, &c. ; are more limited. Materially, however, the immediate victor* was undeniably with the Royalists. After a brief period 0/ manoeuvre, the Parliamentary army, now far from Plymouth found itself surrounded and starving at Lostwithiel, on thf Fowey river, without hope of assistance. The horse cut its way out through the investing circle of posts, Essex himself escaped by sea, but Major-General Skippon, his second in command, hac to surrender with the whole of the foot on the 2nd of September. The officers and men were allowed to go free to Portsmouth, but their arms, guns and munitions were the spoil of the victors. There was now no trustworthy field force in arms for the Parlia- ment south of the Humber, for even the Eastern Association army was distracted by its religious differences, which had now at last come definitely to the front and absorbed the political dispute in a wider issue. Cromwell already proposed to abolish the peerage, the members of which were inclined to make a hollow peace, and had ceased to pay the least respect to his general, Manchester, whose scheme for the solution of the quarrel was an impossible combination of Charles and Presbyteriahism. Manchester for his part sank into a state of mere obstinacy, refusing to move against Rupert, even to besiege Newark, and actually threatened to hang Colonel Lilburne for capturing a Royalist castle without orders.

20. Operations of Essex's, Waller's and Manchester's Armies. — After the success of Lostwithiel there was little to detain Charles's main army in the extreme west, and meanwhile Banbury, a most important point in the Oxford circle, and Basing House (near Basingstoke) were in danger of capture. Waller, who had organized a small force of reliable troops, had already sent cavalry into Dorsetshire with the idea of assisting Essex, and he now came himself with reinforcements to

prevent, so far as lay in his power, the king's return to the Thames valley. Charles was accompanied of course only by his permanent forces and

by parts of Prince Maurice's and Hopton's armies — the Cornish levies had as usual scattered as soon as the war receded from their borders. Manchester slowly advanced to Reading, Essex gradually reorganized his broken army at Portsmouth, while Waller, far out to the west at Shaftesbury, endeavored to gain the necessary time and space for a general concentration in Wiltshire, where Charles would be far from Oxford and Basing and, in addition, outnumbered by two to one. But the work of rearming Essex's troops proceeded slowly for want of money, and Manchester peevishly refused to be hurried either by his more vigorous subordinates or by the Committee of Both Kingdoms, saying that the army of the Eastern Association was for the guard of its own employers and not for general service. He pleaded the renewed activity of the Newark Royalists as his excuse, forgetting that Newark would have been in his hands ere this had he chosen to move thither instead of lying idle for two months. As to the higher command, things had come to such a pass that, when the three armies at last united, a council of war, consisting of three army commanders, several senior officers, and two civilian delegates from the Committee, was constituted. When the vote of the majority had determined what was to be done, Essex, as lord general of the Parliament's first army, was to issue the necessary orders for the whole. Under such conditions it was not likely that Waller's hopes of a great battle at Shaftesbury would be realized. On the 8th of October he fell back, the royal army following him step by step and finally reaching Whitchurch on the 20th of October. Manchester arrived at Basingstoke on the 17th, Waller on the 19th, and Essex on the 21st. Charles had found that he could not relieve Basing (a mile or two from Basingstoke) without risking a battle with the enemy between himself and Oxford; 1 he therefore took the Newbury road and relieved Donnington Castle near Newbury on the 22nd. Three days later Banbury too was relieved by a force which could now be spared from the Oxford garrison. But for once the council of war on the other side was for fighting a battle, and the Parlia- mentary armies, their spirits revived by the prospect of action and by the news of the fall of Newcastle and the defeat of a sally from Newark, marched briskly. On the 26th they appeared north of Newbury on the Oxford road. Like Essex in 1643, Charles found himself headed off from the shelter of friendly fortresses, but beyond

this fact there is little similarity between the two battles of Newbury, for the Royalists in the first case merely drew a barrier across Essex's path. On the present occasion the eager Parliamentarians made no attempt to force the king to attack them; they were well content to attack him in his chosen position themselves, especially as he was better off for supplies and quarters than they.

21. Second Newbury. — The second battle of Newbury is remarkable as being the first great manceuvre-battle (as distinct from " pitched " battle) of the Civil War. A preliminary reconnaissance by the Parliamentary leaders (Essex was not present, owing to illness) established the fact that the king's infantry held a strong line of defence behind the Lambourn brook from Shaw (inclusive) to Donnington (exclusive), Shaw House and adjacent buildings being held as an advanced post. In rear of the centre, in open ground just north of Newbury, lay the bulk of the royal cavalry. In the left rear of the main line, and separated from it by more than a thousand yards, lay Prince Maurice's corps at Speen, advanced troops on the high ground west of that village, but Donnington Castle, under its energetic governor Sir John Boys, formed a strong post covering this gap with artillery fire. The Parlia mentary leaders had no intention of flinging their men away in a frontal attack on the line of the Lambourn, and a flank" attack from the east side could hardly succeed owing to the obstacle presented by the confluence of the Lambourn and the Kennet, hence they decided on a wide turning movement via Chieveley, Winterbourne and Wickham Heath, against Prince Maurice's position — a decision which, daring and energetic

1 Charles's policy was still, as before Marston Moor, to " spin out time " until Rupert came back from the north.

as it was, led only to a modified success, for reasons which will appear. The flank march, out of range of the castle, was con- ducted with punctuality and precision. The troops composing it were drawn from all three armies and led by the best fighting generals, Waller, Cromwell, and Essex's subordinates Balfour and Skippon. Manchester at Clay Hill was to stand fast until the turning movement had developed, and to make a vigorous holding attack on Shaw House as soon as Waller's guns were heard at Speen. But there was no commander-in-chief to co- ordinate the movements of the two widely separated corps, and consequently no co-operation. Waller's attack was not unex- pected, and Prince Maurice had made ready to meet him. Yet the first rush of the rebels carried the entrenchments of Speen Hill, and Speen itself, though stoutly defended, fell into their hands within an hour, Essex's infantry recapturing here some of the

guns they had had to surrender at Lostwithiel. But mean- time Manchester, in spite of the entreaties of his staff, had not stirred from Clay Hill. He had made one false attack already early in the morning, and been severely handled, and he was aware of his own deficiencies as a general. A year before this he would have asked for and acted upon the advice of a capable soldier, such as Cromwell or Crawford, but now his mind was warped by a desire for peace on any terms, and he sought only to avoid defeat pending a happy solution of the quarrel. Those who sought to gain peace through victory were meanwhile driving Maurice back from hedge to hedge towards the open ground at Newbury, but every attempt to emerge from the lanes and fields was repulsed by the royal cavalry, and indeed by every available man and horse, for Charles's officers had gauged Manchester's intentions, and almost stripped the front of its defenders to stop Waller's advance. Nightfall put an end to the struggle around Newbury, and then — too late — Manchester ordered the attack on Shaw House. It failed completely in spite of the gallantry of his men, and darkness being then complete it was not renewed. In its general course the battle closely resembled that of Freiburg (q.v.), fought the same year on the Rhine. But, if Waller's part in the battle corresponded in a measure to Turenne's, Manchester was unequal to playing the part of Conde, and consequently the results, in the case of the French won by three days' hard fighting, and even then comparatively small, were in the case of the English practically nil. During the night the royal army quietly marched away through the gap between Waller's and Manchester's troops. The heavy artillery and stores were left in Donnington Castle, Charles himself with a small escort rode off to the north-west to meet Rupert, and the main body gained Wallingford unmolested. An attempt at pursuit was made by Waller and Cromwell with all the cavalry they could lay hands on, but it was unsupported, for the council of war had decided to content itself with besieging Donnington Castle. A little later, after a brief and half-hearted attempt to move towards Oxford, it referred to the Committee for further instructions. Within the month Charles, having joined Rupert at Oxford and made him general of the Royalist forces vice Brentford, reappeared in the neighbourhood of Newbury. Donnington Castle was again relieved (November 9) under the eyes of the Parliamentary army, which was in such a miserable condition that even Cromwell was against fighting, and some manoeuvres followed, in the course of which Charles relieved Basing House and the Parliamentary armies fell back, not in the best order, to Reading. The season for field warfare was now far spent, and the royal army retired to enjoy good quarters and plentiful supplies around Oxford.

22. The Self-denying Ordinance. — On the other side, the dissensions between the generals had become flagrant and public, and it was no longer possible for the Houses of Parliament to ignore the fact that the army must be radically reformed. Cromwell and Waller from their places in parliament attacked Manchester's conduct, and their attack ultimately became, so far as Cromwell was concerned, an attack on the Lords, most of whom held the same views as Manchester, and on the Scots, who attempted to bring Cromwell to trial as an " incendiary." At the crisis of their bitter controversy Cromwell suddenly

proposed to stifle all animosities by the resignation of all officers who were members of either House, a proposal which affected himself not less than Essex and Manchester. The first " self- denying ordinance " was moved on the 9th of December, and provided that " no member of either house shall have or execute any office or command . . .," &c. This was not accepted by the Lords, and in the end a second " self-denying ordinance " was agreed to (April 3, 1645), whereby all the persons concerned were to resign, but without prejudice to their reappointment. Simultaneously with this, the formation of the New Model was at last definitely taken into consideration. The last exploit of Sir William Waller, who was not re-employed after the passing of the ordinance, was the relief of Taunton, then besieged by General Goring's army. Cromwell served as his lieutenant-general on this occasion, and we have Waller's own testimony that he was in all things a wise, capable and respectful subordinate. Under a leader of the stamp of Waller, Cromwell was well satisfied to obey, knowing the cause to be in good hands.

23. Decline of the Royalist Cause. — A raid of Goring's horse from the west into Surrey and an unsuccessful attack on General Browne at Abingdon were the chief enterprises undertaken on the side of the Royalists during the early winter. It was no longer " summer in Devon, summer in Yorkshire " as in January 1643. An ever-growing section of Royalists, amongst whom Rupert himself was soon to be numbered, were for peace; many scores of loyalist gentlemen, impoverished by the loss of three years' rents of their estates and hopeless of ultimate victory, were making their way to Westminster to give in their submission to the Parliament and to pay their fines. In such circumstances the old decision-seeking strategy was impossible. The new plan, suggested probably by Rupert, had already been tried with strategical

success in the summer campaign of 1644. As we have seen, it consisted essentially in using Oxford as the centre of a circle and striking out radially at any favourable target— •" manoeuvring about a fixed point," as Napoleon called it. It was significant of the decline of the Royalist cause that the " fixed point " had been in 1643 the king's field army, based indeed on its great entrenched camp, Banbury-Cirencester- Reading-Oxford, but free to move and to hold the enemy wherever met, while now it was the entrenched camp itself, weakened by the loss or abandonment of its outer posts, and without the power of binding the enemy if they chose to ignore its existence, that conditioned the scope and duration of the single remaining field army's enterprises.

24. The New Model Ordinance. — For the present, however, Charles's cause was crumbling more from internal weakness than from the blows of the enemy. Fresh negotiations for peace which opened on the 29th of January at Uxbridge (by the name of which place they are known to history) occupied the attention of the Scots and their Presbyterian friends, the rise of Inde- pendency and of Cromwell was a further distraction, and over the new army and the Self-denying Ordinance the Lords and Commons were seriously at variance. But in February a fresh mutiny in Waller's command struck alarm into the hearts of the disputants. The "treaty" of Uxbridge came to the same end as the treaty of Oxford in 1643, and a settlement as to army reform was achieved on the 15th of February. Though it was only on the 25th of March that the second and modified form of the ordinance was agreed to by both Houses, Sir Thomas Fairfax and Philip Skippon (who were not members of parliament) had been approved as lord general and major-general (of the infantry) respectively of the new army as early as the 21st of January. The post of lieutenant-general and cavalry commander was for the moment left vacant, but there was little doubt as to who would eventually occupy it.

25. Victories of Montrose. — In Scotland, meanwhile, Montrose ' was winning victories which amazed the people of the two

kingdoms. Montrose's royalism differed from that of English- men of the 17th century less than from that of their forefathers under Henry VIII. and Elizabeth. To him the king was the protector of his people against Presbyterian theocracy, scarcely less offensive to him than the Inquisition itself, and the feudal

oppression of the great nobles. Little as this ideal corresponded to the Charles of reality, it inspired in Montrose not merely romantic heroism but a force of leadership which was sufficient to carry to

victory the nobles and gentry, the wild Highlanders and the experienced professional soldiers who at various times and places constituted his little armies. His first unsuccessful enterprise has been mentioned above. It seemed, in the early stages of his second attempt (August 1 644) , as if failure were again inevitable, for the gentry of the northern Lowlands were over- awed by the prevailing party and resented the leadership of a lesser noble, even though he were the king's lieutenant over all Scotland. Disappointed of support where he most expected it, Montrose then turned to the Highlands. At Blair Athol he gathered his first army of Royalist clansmen, and good fortune gave him also a nucleus of trained troops. A force of disciplined experienced soldiers (chiefly Irish Macdonalds and commanded by Alastair of that name) had been sent over from Ireland earlier in the year, and, after ravaging the glens of their hereditary enemies the Campbells, had attempted without success, now here, now there, to gather the other clans in the king's name. Their hand was against every man's, and when he finally arrived in Badenoch, Alastair Macdonald was glad to protect himself by submitting to the authority of the king's lieutenant.

There were three hostile armies to be dealt with, besides — ultimately — the main covenanting army far away in England. The duke of Argyll, the head of the Campbells, had an army of his own clan and of Lowland Covenanter levies, Lord Elcho with another Lowland army lay near Perth, and Lord Balfour of Burleigh was collecting a third (also composed of Lowlanders) at Aberdeen. Montrose turned upon Elcho first, and found him at Tippermuir near Perth on the 1st of September 1644. The Royalists were about 3000 strong and entirely foot, only Montrose himself and two others being mounted, while Elcho had about 7000 of all arms. But Elcho's townsmen found that pike and musket were clumsy weapons in inexperienced hands, and, like Mackay's regulars at Killiecrankie fifty years later, they wholly failed to stop the rush of the Highland swordsmen. Many hundreds were killed in the pursuit, and Montrose slept in Perth that night, having thus accounted for one of his enemies. Balfour of Burleigh was to be his next victim, and he started for Aberdeen on the 4th. As he marched, his Highlanders slipped away to place their booty in security. But the Macdonald regulars remained with him, and as he passed along the coast some of the gentry came in, though the great western clan of the Gordons was at present too far divided in sentiment to take his part. Lord Lewis Gordon and some Gordon horse were even in Balfour's army. On the other hand, the earl of Airlie brought in forty-four horsemen, and Montrose was thus able to constitute two wings of cavalry on the day of battle. The Covenanters

were about 2 500 strong and drawn up on a slope above the How Burn 1 just outside Aberdeen (September 13, 1644). Montrose, after clearing away the enemy's skirmishers, drew up his army in front of the opposing line, the foot in the centre, the forty-four mounted men, with musketeers to support them, on either flank. . The hostile left-wing cavalry charged piecemeal, and some bodies of troops did not engage at all. On the other wing, however, Montrose was for a moment hard pressed by a force of the enemy that attempted to work round to his rear. But he brought over the small band of mounted men that constituted his right wing cavalry, and also some musketeers from the centre, and destroyed the assailants, and when the ill-led left wing of the Covenanters charged again, during the absence of the cavalry, they were mown down by the close-range volleys of Macdonald's musketeers. Shortly afterwards the centre of Balfour's army yielded to pressure and fled in disorder. Aberdeen was sacked by order of Montrose, whose drummer had been murdered while delivering a message under a flag of truce to the magistrates.

26. Inverlochy. — Only Argyll now remained to be dealt with.

The Campbells were fighting men from birth, like Montrose's

own men, and had few townsmen serving with them. Still there

were enough of the latter and of the impedimenta of regular

1 The ground has been entirely built over for many years.

warfare with him to prevent Argyll from overtaking his agile enemy, and ultimately after a " hide-and-seek " in the districts of Rothiemurchus, Blair Athol, Banchory and Strathbogie, Montrose stood to fight at Fyvie Castle, repulsed Argyll's attack on that place and slipped away again to Rothiemurchus. There he was joined by Camerons and Macdonalds from all quarters for a grand raid on the Campbell country; he himself wished to march into the Lowlands, well knowing that he could not achieve the decision in the Grampians, but he had to bow, not for the first time nor the last, to local importunity. The raid was duly executed, and the Campbells' boast, " It's a far cry to Loch Awe," availed them little. In December and January the Campbell lands were thoroughly and mercilessly devastated, and Montrose then retired slowly to Loch Ness, where the bulk of his army as usual dispersed to store away its plunder. Argyll, with such

Highland and Lowland forces as he could collect after the disaster, followed Montrose towards Lochaber, while the Seaforths and other northern clans marched to Loch Ness. Caught between them, Montrose attacked the nearest. The Royalists crossed the hills into Glen Roy, worked thence along the northern face of Ben Nevis, and descended like an avalanche upon Argyll's forces at Inverlochy (February 2, 1645). As usual, the Lowland regiments gave way at once — Montrose had managed in all this to keep with him a few cavalry — and it was then the turn of the Campbells. Argyll escaped in a boat, but his clan, as a fighting force, was practically annihilated, and Montrose, having won four victories in these six winter months, rested his men and exultingly promised Charles that he would come to his assistance with a brave army before the end of the summer.

27. Organization of the New Model Army. — To return to the New Model. Its first necessity was regular pay; its first duty to serve wherever it might be sent. Of the three armies that had fought at Newbury only one, Essex's, was in a true sense a general service force, and only one, Manchester's, was paid with any regularity. Waller's army was no better paid than Essex's and no more free from local ties than Manchester's. It was therefore broken up early in April, and only 600 of its infantry passed into the New Model. Essex's men, on the other hand, wanted but regular pay and strict officers to make them excellent soldiers, and their own major-general, Skippon, managed by tact and his personal popularity to persuade the bulk of the men to rejoin. Manchester's army, in which Cromwell had been the guiding influence from first to last, was naturally the backbone of the New Model. Early in April Essex, Manchester, and Waller re- signed their commissions, and such of their forces as were not embodied in the new army were sent to do local duties, for minor armies were still maintained, General Poyntz's in the north midlands, General Massey's in the Severn valley, a large force in the Eastern Association, General Browne's in Buckinghamshire, &c, besides the Scots in the north.

The New Model originally consisted of 14,400 foot and 7700 horse and dragoons. Of the infantry only 6000 came from the combined armies, the rest being new recruits furnished by the •press. 1 Thus there was considerable trouble during the first months of Fairfax's command, and discipline had to be enforced with unusual sternness. As for the enemy, Oxford was openly contemptuous of " the rebels' new brutish general " and his men, who seemed hardly likely to succeed where Essex and Waller had failed. But the effect of the Parliament's having " an army all its own " was soon to be apparent.

28. First Operations of 1645. — On the Royalist side the cam- paign of

1645 opened in the west, whither the young prince of Wales (Charles II.) was sent with Hyde (later earl of Clarendon), Hopton and others as his advisers. General (Lord) Goring, however, now in command of the Royalist field forces in this quarter, was truculent, insubordinate and dissolute, though on the rare occasions when he did his duty he displayed a certain degree of skill and leadership, and the influence of the prince's

1 The Puritans had by now disappeared almost entirely from the ranks of the infantry. Per contra the officers and sergeants and the troopers of the horse were the sternest Puritans of all, the survivors of three years of a disheartening war.

counsellors was but small. As usual, operations began with the sieges necessary to conciliate local feeling. Plymouth and Lyme were blocked up, and Taunton again invested. The reinforcement thrown into the last place by Waller and Cromwell was dismissed by Blake (then a colonel in command of the fortress and afterwards the great admiral of the Commonwealth), and after many adventures rejoined Waller and Cromwell. The latter generals, who had not yet laid down their commissions, then engaged Goring for some weeks, but neither side having infantry or artillery, and both finding subsistence difficult in February and March and in country that had been fought over for two years past, no results were to be expected. Taunton still remained unrelieved, and Goring's horse still rode all over Dorsetshire when the New Model at last took the field.

29. Rupert's Northern March. — In the midlands and Lanca- shire the Royalist horse, as ill-behaved even as Goring's men, were directly responsible for the ignominious failure with which the king's main army began its year's work. Prince Maurice was joined at Ludlow by Rupert and part of his Oxford army early in March, and the brothers drove off Brereton from the siege of Beeston Castle and relieved the pressure on Lord Byron in Cheshire. So great was the danger of Rupert's again invading Lancashire and Yorkshire that all available forces in the north, English and Scots, were ordered to march against him. But at this moment the prince was called back to clear his line of retreat on Oxford. The Herefordshire and Worcestershire peasantry, weary of military exactions, were in arms, and though they would not join the Parliament, and for the most part dispersed after stating their grievances, the main enterprise was wrecked. This was but one of many ill-armed crowds — " Club- men " as they were called — that assembled to enforce peace on both parties. A few regular soldiers were sufficient to disperse them in all cases, but their attempt to establish a third party in England was morally as significant as it was

materially futile. The Royalists were now fighting with the courage of despair, those who still fought against Charles did so with the full deter- mination to ensure the triumph of their cause, and with the conviction that the only possible way was the annihilation of the enemy's armed forces, but the majority were so weary of the war that the earl of Manchester's Presbyterian royalism — which had contributed so materially to the prolongation of the struggle — would probably have been accepted by four-fifths of all England as the basis of a peace. It was, in fact, in the face of almost universal opposition that Fairfax and Cromwell and their friends at Westminster guided the cause of their weaker comrades to complete victory.

30. Cromwell's Raid. — Having without difficulty rid himself of the Clubmen, Rupert was eager to resume his march into the north. It is unlikely that he wished to join Montrose, though Charles himself favoured that plan, but he certainly intended to fight the Scottish army, more especially as after Inverlochy it had been called upon to detach a large force to deal with Montrose. But this time there was no Royalist army in the north to provide infantry and guns for a pitched battle, and Rupert had perforce to wait near Hereford till the main body, and in particular the artillery train, could come from Oxford and join him. It was on the march of the artillery train to Hereford that the first operations of the New Model centred. The infantry was not yet ready to move, in spite of all Fairfax's and Skippon's efforts, and it became necessary to send the cavalry by itself to prevent Rupert from gaining a start. Cromwell, then under Waller's command, had come to Windsor to resign his commission as required by the Self-denying Ordinance. Instead, he was placed at the head of a brigade of his own old soldiers, with orders to stop the march of the artillery train. On the 23rd of April he started from Watlington north-westward. At dawn on the 24th he routed a detachment of Royalist horse at Islip. On the same day, though he had no guns and only a few firearms in the whole force, he terrified the governor of Bletchingdon House into surrender. Riding thence to Witney, Cromwell won another cavalry fight at Bampton-in-the-Bush on the 27th, and attacked Faringdon House, though without success, on the

29th. Thence he marched at leisure to Newbury. He had done his work thoroughly. He had demoralized the Royalist cavalry, and, above all, had carried off every horse on the country-side. To all Rupert's entreaties Charles could only reply that the guns could not be moved

till the 7th of May, and he even summoned Goring's cavalry from the west to make good his losses.

31. Civilian Strategy. — Cromwell's success thus forced the king to concentrate his various armies in the neighbourhood of Oxford, and the New Model had, so Fairfax and Cromwell hoped, found its target. But the Committee of Both Kingdoms on the one side, and Charles, Rupert and Goring on the other, held different views. On the 1st of May Fairfax, having been ordered to relieve Taunton, set out from Windsor for the long march to that place; meeting Cromwell at Newbury on the 2nd, he directed the lieutenant-general to watch the movements of the king's army, and himself marched on to Blandford, which he reached on the 7th of May. Thus Fairfax and the main army of the Parliament were marching away in the west while Crom- well's detachment was left, as Waller had been left the previous year, to hold the king as best he could. On the very evening that Cromwell's raid ended, the leading troops of Goring's command destroyed part of Cromwell's own regiment near Faringdon, and on the 3rd Rupert and Maurice appeared with a force of all arms at Burford. Yet the Committee of Both Kingdoms, though aware on the 29th of Goring's move, only made up its mind to stop Fairfax on the 3rd, and did not send off orders till the 5th. These orders were to the effect that a detachment was to be sent to the relief of Taunton, and that the main army was to return. Fairfax gladly obeyed, even though a siege of Oxford and not the enemy's field army was the objective assigned him. But long before he came up to the Thames valley the situation was again changed. Rupert, now in possession of the guns and their teams, urged upon his uncle the resumption of the northern enterprise, calculating that with Fairfax in Somersetshire, Oxford was safe. Charles accordingly marched out of Oxford on the 7th towards Stow-on-the-Wold, on the very day, as it chanced, that Fairfax began his return march from Blandford. But Goring and most of the other generals were for a march into the west, in the hope of dealing with Fairfax as they had dealt with Essex in 1644. The armies therefore parted as Essex and Waller had parted at the same place in 1644, Rupert and the king to march northward, Goring to return to his independent command in the west. Rupert, not unnaturally wishing to keep his influence with the king and his authority as general of the king's army unimpaired by Goring's notorious indiscipline, made no attempt to prevent the separation, which in the event proved wholly unprofitable. The flying column from Blandford relieved Taunton long before Goring's return to the west, and Colonel Weldon and Colonel Graves, its commanders, set him at defiance even in the open country. As for Fairfax, he was out of Goring's reach preparing for the siege of

Oxford.

32. Charles in the Midlands. — On the other side also the generals were working by data that had ceased to have any value. Fairfax's siege of Oxford, ordered by the Committee on the 10th of May, and persisted in after it was known that the king was on the move, was the second great blunder of the year and was hardly redeemed, as a military measure, by the visionary scheme of assembling the Scots, the Yorkshiremen, and the midland forces to oppose the king. It is hard to understand how, having created a new model army " all its own " for general service, the Parliament at once tied it down to a local enterprise, and trusted an improvised army of local troops to fight the enemy's main army. In reality the Committee seems to have been misled by false information to the effect that Goring and the governor of Oxford were about to declare for the Parliament, but had they not despatched Fairfax to the relief of Taunton in the first instance the necessity for such intrigues would not have arisen. However, Fairfax obeyed orders, invested Oxford, and, so far as he was able without a proper siege train, besieged it for two weeks, while Charles and Rupert ranged the midlands unopposed. At the end

abdicated their control over military operations and gave Fairfax a free hand. " Black Tom " gladly and instantly abandoned the siege and marched northward to give battle to the king.

Meanwhile Charles and Rupert were moving northward. On the nth of May they reached Droitwich, whence after two days' rest they marched against Brereton. The latter hurriedly raised the sieges he had on hand, and called upon Yorkshire and the Scottish army there for aid. But only the old Lord Fairfax and the Yorkshiremen responded. Leven had just heard of new victories won by Montrose, and could do no more than draw his army and his guns over the Pennine chain into Westmorland in the hope of being in time to bar the king's march on Scotland via Carlisle.

2,2,- Dundee. — After the destruction of the Campbells at Inverlochy, Montrose had cleared away the rest of his enemies without difficulty. He now gained a respectable force of cavalry by the adhesion of Lord Gordon and many of his clan, and this reinforcement was the more necessary as detachments from Leven's army under Baillie and Hurry — disciplined infantry and cavalry— were on the march to meet him. The Royalists marched by Elgin and through the Gordon country to Aberdeen, and thence across the Esk to Coupar-Angus, where Baillie and Hurry • were encountered. A war of manoeuvre followed, in which they thwarted every effort of the Royalists to break through

into the Lowlands, but in the end retired into Fife. Montrose thereupon marched into the hills with the intention of reaching the upper Forth and thence the Lowlands, for he did not disguise from himself the fact that there, and not in the Highlands, would the quarrel be decided, and was sanguine — over-sanguine, as the event proved — as to the support he would obtain from those who hated the kirk and its system. But he had called to his aid the semi-barbarous Highlanders, and however much the Lowlands resented a Presbyterian inquisition, they hated and feared the Highland clans beyond all else. He was equally disappointed in his own army. For a war of positions the Highlanders had neither aptitude nor inclination, and at Dunkeld the greater part of them went home. If the small remnant was to be kept to its duty, plunder must be found, and the best objective was the town of Dundee. With a small force of 750 foot and horse Montrose brilliantly surprised that place on the 4th of April, but Baillie and Hurry were not far distant, and before Montrose's men had time to plunder the prize they were collected to face the enemy. His retreat from Dundee was considered a model operation by foreign students of the art of war (then almost as numerous as now), and what surprised them most was that Montrose could rally his men after a sack had begun. The retreat itself was remarkable enough. Baillie moved parallel to Montrose on his left flank towards Arbroath, constantly heading him off from the hills and attempting to pin him against the sea. Montrose, however, halted in the dark so as to let Baillie get ahead of him and then turned sharply back, crossed Baillie's track, and made for the hills. Baillie soon realized what had happened and turned back also, but an hour too late. By the 6th the Royalists were again safe in the broken country of the Esk valley. But Montrose cherished no illusions as to joining the king at once; all he could do, he now wrote, was to neutralize as many of the enemy's forces as possible.

34. Auldearn. — For a time he wandered in the Highlands seeking recruits. But soon he learned that Baillie and Hurry had divided their forces, the former remaining about Perth and Stirling to observe him, the latter going north to suppress the Gordons. Strategy and policy combined to make Hurry the objective of the next expedition. But the soldier of fortune who commanded the Covenanters at Aberdeen was no mean antagonist. Marching at once with a large army (formed on the nucleus of his own trained troops and for the rest composed of clansmen and volunteers) Hurry advanced to Elgin, took contact with Montrose there, an

of that time came news so alarming that the Committee hastily I earn so successfully that (May 9) Montrose, even though the

indiscipline of some of Hurry's young soldiers during the night march gave him the alarm, had barely time to form up before the enemy was upon him. But the best strategy is of no avail when the battle it produces goes against the strategist, and Montrose's tactical skill was never more conspicuous than at Auldearn. Alastair Macdonald with most of the Royalist infantry and the Royal standard was posted to the right (north) of the village to draw upon himself the weight of Hurry's attack; only enough men were posted in the village itself to show that it was occupied, and on the south side, out of sight, was Montrose himself with a body of foot and all the Gordon horse. It was the prototype, on a small scale, of Austerlitz. Macdonald resisted sturdily while Montrose edged away from the scene of action, and at the right moment and not before, though Macdonald had been driven back on the village and was fighting for life amongst the gardens and enclosures, Montrose let loose Lord Gordon's cavalry. These, abandoning for once the pistol tactics of their time, charged home with the sword. The enemy's right wing cavalry was scattered in an instant, the nearest infantry was promptly ridden down, and soon Hurry's army had ceased to exist.

35. Campaign of Naseby. — If the news of Auldearn brought Leven to the region of Carlisle, it had little effect on his English allies. Fairfax was not yet released from the siege of Oxford, in spite of the protests of the Scottish representatives in London. Massey, the active and successful governor of Gloucester, was placed in command of a field force on the 25th of May, but he was to lead it against, not the king, but Goring. At that moment the military situation once more changed abruptly. Charles, instead of continuing his march on to Lancashire, turned due eastward towards Derbyshire. The alarm at Westminster when this new development was reported was such that Cromwell, in spite jf the Self-Denying Ordinance, was sent to raise an army for the defence of the Eastern Association. Yet the Royalists had no intentions in that direction. Conflicting reports as to the condition of Oxford reached the royal headquarters in the last week of May, and the eastward march was made chiefly to " spin out time " until it could be known whether it would be necessary to return to Oxford, or whether it was still possible to fight Leven in Yorkshire — his move into Westmorland was not yet known — and invade Scotland by the easy east coast route.

Goring's return to the west had already been countermanded and he

had been directed to march to Harborough, while the South Wales Royalists were also called in towards Leicester. Later orders (May 26) directed him to Newbury, whence he was to feel the strength of the enemy's positions around Oxford. It is hardly necessary to say that Goring found good military reasons for continuing his independent operations, and marched off towards Taunton regardless of the order. He redressed the balance there for the moment by overawing Massey's weak force, and his purse profited considerably by fresh opportunities for extortion, but he and his men were not at Naseby. Meanwhile the king, at the geographical centre of England, found an im- portant and wealthy town at his mercy. Rupert, always for action, took the opportunity, and Leicester was stormed and thoroughly pillaged on the night of the 30th-3 1 st of May. There was the usual panic at Westminster, but, unfortunately for Charles, it resulted in Fairfax being directed to abandon the siege of Oxford and given carte blanche to bring the Royal army to battle wherever it was met. On his side the king had, after the capture of Leicester, accepted the advice of those who feared for the safety of Oxford — Rupert, though commander-in-chief, was unable to insist on the northern enterprise — and had marched to Daventry, where he halted to throw supplies into Oxford. Thus Fairfax in his turn was free to move, thanks to the in-subordination of Goring, who would neither relieve Oxford nor join the king for an attack on the New Model. The Parliamentary general moved from Oxford towards Northampton so as to cover the Eastern Association. On the 12th of June the two armies were only a few miles apart,, Fairfax at Kislingbury, Charles at Daventry, and, though the Royalists turned northward again on the 13th to resume the Yorkshire project under the very eyes of the enemy, Fairfax followed close. On the night of

the 13th Charles slept at Lubenham, Fairfax at Guilsborough. Cromwell, just appointed lieutenant-general of the New Model, had ridden into camp on the morning of the 13th with fresh cavalry from the eastern counties, Colonel Rossiter came up with more from Lincolnshire on the morning of the battle, and it was with an incontestable superiority of numbers and an overwhelming moral advantage that Fairfax fought at Naseby (q.v.) on the 14th of June. The result of the battle, this time a decisive battle, was the annihilation of the Royal army. Part of the cavalry escaped, a small fraction of it in tolerable order, but the guns and the baggage train were taken, and, above all, the splendid Royal infantry were killed or taken prisoners to a man.

36. Effects of Naseby. — After Naseby, though the war dragged on for another year, the king never succeeded in raising an army as good as,

or even more numerous than, that which Fairfax's army had so heavily outnumbered on the 14th of June. That the fruits of the victory could not be gathered in a few weeks was due to a variety of hindrances rather than to direct opposi- tion — to the absence of rapid means of communication, the paucity of the forces engaged on both sides relatively to the total numbers under arms, and from time to time to the political exigencies of the growing quarrel between Presbyterians and Independents. As to the latter, within a few days of Naseby, the Scots rejoiced that the " back of the malignants was broken," and demanded reinforcements as a precaution against " the insolence of others," i.e. Cromwell and the Independents — " to whom alone the Lord has given the victory of that day." Leven had by now returned to Yorkshire, and a fortnight after Naseby, after a long and honourable defence by Sir Thomas Glemham, Carlisle fell to David Leslie's besieging corps. Leicester was reoccupied by Fairfax on the 18th, and on the 20th Leven's army, moving slowly southward, reached Mansfield. This move was undertaken largely for political reasons, i.e. to restore the Presbyterian balance as against the victorious New Model. Fairfax's army was intended by its founders to be a specifically English army, and Cromwell for one would have employed it against the Scots almost as readily as against malignants. But for the moment the advance of the northern army was of the highest military importance, for Fairfax was thereby set free from the necessity of undertaking sieges. Moreover, the publication of the king's papers taken at Naseby gave Fairfax's troops a measure of official and popular support which a month before they could not have been said to possess, for it was now obvious that they represented the armed force of England against the Irish, Danes, French, Lorrainers, &c, whom Charles had for three years been endeavouring to let loose on English soil. Even the Presbyterians abandoned for the time any attempt to negotiate with the king, and advocated a vigorous prosecution of the war.

37. Fairfax's Western Campaign. — This, in the hands of Fairfax and Cromwell, was likely to be effective. While the king and Rupert, with the remnant of their cavalry, hurried into South Wales to join Sir Charles Gerard's troops and to raise fresh in- fantry, Fairfax decided that Goring's was the most important Royalist army in the field, and turned to the west, reaching Lechlade on the 26th, less than a fortnight after the battle of Naseby: One last attempt was made to dictate the plan of campaign from Westminster, but the Committee refused to pass on the directions of the Houses, and he remained free to deal with Goring as he desired. Time pressed ; Charles in Monmouth- shire and Rupert at Bristol were well placed for a junction

with Goring, which would have given them a united army 15,000 strong. Taunton, in spite of Massey's efforts to keep the field, was again besieged, and in Wilts and Dorset numerous bands of Clubmen were on foot which the king's officers were doing their best to turn into troops for their master. But the process of collecting a fresh royal army was slow, and Goring and his subordinate, Sir Richard Grenville, were alienating the king's most devoted adherents by their rapacity, cruelty and de- bauchery. Moreover, Goring had no desire to lose the inde- pendent command he had extorted at Stow-on-the-Wold'in May.

Still, it was clear that he must be disposed of as quickly as possible, and Fairfax requested the Houses to take other measures against the king (June 26) . This they did by paying up the arrears due to Leven's army and bringing it to the Severn valley. On the 8th of July Leven reached Alcester, bringing with him a Parliamentarian force from Derbyshire under Sir John Gell. The design was to besiege Hereford.

38. Langport. — By that time Fairfax and Goring were at close quarters. The Royalist general's line of defence faced west along the Yeo and the Parrett between Yeovil and Bridgwater, and thus barred the direct route to Taunton. Fairfax, however, marched from Lechlade via Marlborough and Blandford — ■ hindered only by Clubmen — to the friendly posts of Dorchester and Lyme, and with these as his centre of operations he was able to turn the headwaters of Goring's river-line via Beaminster and Crewkerne. The Royalists at once abandoned the south and west side of the rivers — the siege of Taunton had already been given up — and passed over to the north and east bank. Bridg- water was the right of this second line as it had been the left of the first; the new left was at Ilchester. Goring could thus remain in touch with Charles in south Wales through Bristol, and the siege of Taunton having been given up there was no longer any incentive for remaining on the wrong side of the water-line. But his army was thoroughly demoralized by its own licence and indiscipline, and the swift, handy and resolute regiments of the New Model made short work of its strong positions. On the 7th of July, demonstrating against the points of passage between Ilchester and Langport, Fairfax secretly occupied Yeovil. The post at that place, which had been the right of Goring's first position, had, perhaps rightly, been with- drawn to Ilchester when the second position was taken up, and Fairfax repaired the bridge without interruption. Goring showed himself unequal to the new situation. He might, if sober, make a good plan

when the enemy was not present to disturb him, and he certainly led cavalry charges with boldness and skill. But of strategy in front of the enemy he was in- capable. On the news from Yeovil he abandoned the line of the Yeo as far as Langport without striking a blow, and Fairfax, having nothing to gain by continuing his detour through Yeovil, came back and quietly crossed at Long Sutton, west of Ilchester (July 9) . Goring had by now formed a new plan. A strong rear- guard was posted at Langport and on high ground east and north- east of it to hold Fairfax, and he himself with the cavalry rode off early on the 8th to try and surprise Taunton. This place was no longer protected by Massey's little army, which Fairfax had called up to assist his own. But Fairfax, who was not yet across Long Sutton bridge, heard of Goring's raid in good time, and sent Massey after him with a body of horse. Massey sur- prised a large party of the Royalists at Ilminster on the 9th, wounded Goring himself, and pursued the fugitives up to the south-eastern, edge of Langport. On the 10th Fairfax's ad- vanced guard, led by Major Bethel of Cromwell's own regiment, brilliantly stormed the position of Goring's rearguard east of Langport, and the cavalry of the New Model, led by Cromwell himself, swept in pursuit right up to the gates of Bridgwater, where Goring's army, dismayed and on the point of collapse, was more or less rallied. Thence Goring himself retired to Barnstaple. His army, under the regimental officers, defended itself in Bridgwater resolutely till the 23rd of July, when it capitulated. The fall of Bridgwater gave Fairfax complete con- trol of Somerset and Dorset from Lyme to the Bristol channel. Even in the unlikely event of Goring's raising a fresh army, he would now have to break through towards Bristol by open force, and a battle between Goring and Fairfax could only have one result. Thus Charles had perforce to give up his intention of joining Goring — his recruiting operations in south Wales had not been so successful as he hoped, owing to the apathy of the people and the vigour of the local Parliamentary leaders — and to resume the northern enterprise begun in the spring.

39. Schemes of Lord Digby. — This time Rupert would not be with him. The prince, now despairing of success and hoping only for a peace on the best terms procurable, listlessly returned

to his governorship of Bristol and prepared to meet Fairfax's impending attack. The influence of Rupert was supplanted by that of Lord Digby. As sanguine as Charles and far more energetic, he was for the rest of the campaign the guiding spirit of the Royalists, but being a civilian he proved incapable of judging the military factors in the situation from a military standpoint, and not only did he offend the officers by constituting himself a sort of confidential military secretary

to the king, but he was distrusted by all sections of Royalists for his reckless optimism. The resumption of the northern enterprise, opposed by Rupert and directly inspired by Digby, led to nothing. Charles marched by Bridgnorth, Lichfield and Ashbourne to Doncaster, where on the 18th of August he was met by great numbers of Yorkshire gentlemen with promises of fresh recruits. For a moment the outlook was bright, for the* Derbyshire men with Gell were far away at Worcester with Leven, the Yorkshire Parliamentarians engaged in besieging Scarborough Castle, Pontefract and other posts. But two days later he heard that David Leslie with the cavalry of Leven's army was coming up behind him, and that, the Yorkshire sieges being now ended, Major-General Poyntz's force lay in his front. It was now impossible to wait for the new levies, and reluctantly the king turned back to Oxford, raiding Huntingdonshire and other parts of the hated Eastern Association en route.

40. Montrose's Last Victories. — David Leslie did not pursue him. Montrose, though the king did not yet know it, had won two more battles, and was practically master of all Scotland. After Auldearn he had turned to meet Baillie's army in Strathspey, and by superior mobility and skill forced that commander to keep at a respectful distance. He then turned upon a new army which Lindsay, titular earl of Crawford, was forming in Forfarshire, but that commander betook himself to a safe distance, and Montrose withdrew into the Highlands to find recruits (June). The victors of Auldearn had mostly dispersed on the usual errand, and he was now deserted by most of the Gordons, who were re- called by the chief of their clan, the marquess of Huntly, in spite of the indignant remonstrances of Huntly's heir, Lord Gordon, who was Montrose's warmest admirer. Baillie now approached again, but he was weakened by having to find trained troops to stiffen Lindsay's levies, and a strong force of the Gordons had now been persuaded to rejoin Montrose. The two armies met in battle near Alford on the Don; little can be said of the engage- ment save that Montrose had to fight cautiously and tentatively as at Aberdeen, not in the decision-forcing spirit of Auldearn, and that in the end Baillie's cavalry gave way and his infantry was cut down as it stood. Lord Gordon was amongst the Royalist dead (July 2) . The plunder was put away in the glens before any attempt was made to go forward, and thus the Covenanters had leisure to form a numerous, if not very coherent, army on the nucleus of Lindsay's troops. Baillie, much against his will, was continued in the command, with a council of war (chiefly of nobles whom Montrose had already defeated, such as Argyll, Elcho and Balfour) to direct his every movement. Montrose, when rejoined by the Highlanders, moved to meet him, and in the last

week of July and the early part of August there were manoeuvres and minor engagements round Perth. About the 7th of August Montrose suddenly slipped away into the Lowlands, heading for Glasgow. Thereupon another Covenanting army began to assemble in Clydesdale. But it was clear that Montrose could beat mere levies, and Baillie, though without authority and despairing of success, hurried after him. Montrose then, having drawn Baillie's Fifeshire militia far enough from home to ensure their being discontented, turned upon them on the 14th of August near Kilsyth. Baillie protested against fighting, but his aristo- cratic masters of the council of war decided to cut off Montrose from the hills by turning his left wing. The Royalist general seized the opportunity, and his advance caught them in the very act of making a flank march (August 15). The head of the Covenanters' column was met and stopped by the furious attack of the Gordon infantry, and Alastair Macdonald led the men of his own name and the Macleans against its flank. A breach was made in the centre of Baillie's army at the first rush ; and then

Montrose sent in the Gordon and Ogilvy horse. The leading half of the column was surrounded, broken up and annihilated. The rear half, seeing the fate of its comrades, took to flight, but in vain, for the Highlanders pursued a outrance. Only about one hundred Covenanting infantry out of six thousand escaped. Montrose was now indeed the king's lieutenant in all Scotland.

41. Fall of Bristol. — But Charles was in no case to resume his northern march. Fairfax and the New Model, after reducing Bridgwater, had turned back to clear away the Dorsetshire Clubmen and to besiege Sherborne Castle. On the completion of this task, it had been decided to besiege Bristol, and on the 23rd of August — while the king's army was still in Huntingdon, and Goring was trying to raise a new army to replace the one he had lost at Langport and Bridgwater — the city was invested. In these urgent circumstances Charles left Oxford for the west only a day or two after he had come in from the Eastern Associa- tion raid. Calculating that Rupert could hold out longest, he first moved to the relief of Worcester, around which place Leven's Scots, no longer having Leslie's cavalry with them to find supplies, were more occupied with plundering their immediate neighbour- hood for food than with the siege works. Worcester was relieved on the 1st of September by the king. David Leslie with all his cavalry was already on the march to meet Montrose, and Leven had

no alternative but to draw off his infantry without fighting. Charles entered Worcester on the 8th, but he found that he could no longer expect recruits from South Wales. Worse was to come. A few hours later, on the night of the oth-ioth, Fairfax's army stormed Bristol. Rupert had long realized the hopelessness of further fighting — the very summons to surrender sent in by Fairfax placed the fate of Bristol on the political issue, — the lines of defence around the place were too extensive for his small force, and on the nth he surrendered on terms. He was escorted to Oxford with his men, conversing as he rode with the officers of the escort about peace and the future of his adopted country. Charles, almost stunned by the suddenness of the catastrophe, dismissed his nephew from all his offices and ordered him to leave England, and for almost the last time called upon Goring to rejoin the main army — if a tiny force of raw infantry and disheartened cavalry can be so called — in the neighbourhood of Raglan. But before Goring could be brought to withdraw his objections Charles had again turned northward towards Montrose. A weary march through the Welsh hills brought the Royal army on the 22nd of September to the neighbourhood of Chester. Charles himself with one body entered the city, which was partially invested by the Parliamentarian colonel Michael Jones, and the rest under Sir Marmaduke Langdale was sent to take Jones's lines in reverse. But at the opportune moment Poyntz's forces, which had followed the king's movements since he left Doncaster in the middle of August, appeared in rear of Langdale, and defeated him in the battle of Rowton Heath (September 24), while at the same time a sortie of the king's troops from Chester was repulsed by Jones. Thereupon the Royal army withdrew to Denbigh, and Chester, the only important seaport remaining to connect Charles with Ireland, was again besieged.

42. Philiphaugh. — Nor was Montrose's position, even after Kilsyth, encouraging, in spite of the persistent rumours of fighting in Westmorland that reached Charles and Digby. Glasgow and Edinburgh were indeed occupied, and a parliament summoned in the king's name. But Montrose had now to choose between Highlanders and Lowlanders. The former, strictly kept away from all that was worth plundering, rapidly vanished, even Alastair Macdonald going with the rest. Without the Macdonalds and the Gordons, Montrose's military and political resettlement of Scotland could only be shadowy, and when he. ' demanded support from the sturdy middle classes of the Low- lands, it was not forgotten that he had led Highlanders to the sack of Lowland towns. Thus his new supporters could only come from amongst the discontented and undisciplined Border lords and gentry, and long before these moved to join him the romantic conquest of

Scotland was over. On the 6th of September David Leslie had recrossed the frontier with his cavalry and some

infantry he had picked up on the way through northern England. Early on the morning of the 13th he surprised Montrose at Philiphaugh near Selkirk. The king's lieutenant had only 650 men against 4000, and the battle did not last long. Montrose escaped with a few of his principal adherents, but his little army was annihilated. Of the veteran Macdonald infantry, 500 strong that morning, 250 were killed in the battle and the remainder put to death after accepting quarter. The Irish, even when they bore a Scottish name, were, by Scotsmen even more than English- men, regarded as beasts to be knocked on the head. After Naseby the Irishwomen found in the king's camp were branded by order of Fairfax; after Philiphaugh more than 300 women, wives or followers of Macdonald's men, were butchered. Montrose's Highlanders at their worst were no more cruel than the sober soldiers of the kirk.

43. Digby' s Northern Expedition. — Charles received the news of Philiphaugh on the 28th of September, and gave orders that the west should be abandoned, the prince of Wales should be sent to France, and Goring should bring up what forces he could to the Oxford region. On the 4th of October Charles himself reached Newark (whither he had marched from Denbigh after revictualling Chester and suffering the defeat of Rowton Heath). The intention to go to Montrose was of course given up, at any rate for the present, and he was merely waiting for Goring and the Royalist militia of the west — each in its own way a broken reed to lean upon. A hollow reconciliation was patched up between Charles and Rupert, and the court remained at Newark for over a month. Before it set out to return to Oxford another Royalist force had been destroyed. On the 14th of October, receiving information that Montrose had raised a new army, the king permitted Langdale's northern troops to make a fresh attempt to reach Scotland. At Langdale's request Digby was appointed to command in this enterprise, and, civilian though he was, and disastrous though his influence had been to the discipline of the army, he led it boldly and skilfully. His immediate opponent was Poyntz, who had followed the king step by step from Doncaster to Chester and back to Welbeck ,and he succeeded on the 15th in surprising Poyntz's entire force of foot at Sherburn. Poyntz's cavalry were soon after this reported approaching from the south, and Digby hoped to trap them also. At first all went well and body after body of the rebels was routed. But by a singular mischance the Royalist main body mistook the Parliamentary squadrons in flight through Sherburn for friends, and believing all was lost took to flight also. Thus Digby's cavalry fled as fast as Poyntz's

and in the same direction, and the latter, coming to their senses first, drove the Royalist horse in wild confusion as far as Skipton. Lord Digby was still sanguine, and from Skipton he actually penetrated as far as Dumfries. But whether Montrose's new army was or was not in the Low- lands, it was certain that Leven and Leslie were on the Border, and the mad adventure soon came to an end. Digby, with the mere handful of men remaining to him, was driven back into Cumberland, and on the 24th of October, his army having entirely disappeared, he took ship with his officers for the Isle of Man. Poyntz had not followed him beyond Skipton, and was now watching the king from Nottingham, while Rossiter with the Lincoln troops was posted at Grantham. The king's chances of escaping from Newark were becoming smaller day by day, and they were not improved by a violent dispute between him and Rupert, Maurice, Lord Gerard and Sir Richard Willis, at the end of which these officers and many others rode away to ask the Parliament for leave to go over-seas. The pretext of the quarrel mattered little, the distinction between the views of Charles and Digby on the one hand and Rupert and his friends on the other was fundamental — to the latter peace had become a political as well as a military necessity. Meanwhile south Wales, with the single exception of Raglan Castle, had been overrun by the Parliamentarians. Everywhere the Royalist posts were falling. The New Model, no longer fearing Goring, had divided, Fairfax reducing the garrisons of Dorset and Devon, Cromwell those of Hampshire. Amongst the latter was the famous Basing House, which was stormed at dawn on the

14th of October and burnt to the ground. Cromwell, his work finished, returned to headquarters, and the army wintered in the neighbourhood of Crediton.

44. End of the First War. — The military events of 1646 call for no comment. The only field army remaining to the king was Goring's, and though Hopton, who sorrowfully accepted the command after Goring's departure, tried at the last moment to revive the memories and the local patriotism of 1643, it was of no use to fight against the New Model with the armed rabble that Goring turned over to him. Dartmouth surrendered on January 18, Hopton was defeated at Torrington on February 16, and surrendered the remnant of his worthless army on March 14. Exeter fell on April 13. Elsewhere, Hereford was taken on December 17, 1645, and the last battle of the war was fought and lost at Stow-on-the-Wold by Lord Astley on March

2 1 , U646. Newark and Oxford fell respectively on May 6 and June 24. On August 3 1 Montrose escaped from the Highlands. On the 19th of the same month Raglan Castle surrendered, and the last Royalist post of all, Harlech Castle, maintained the useless struggle until March 13, 1647. Charles himself, after leaving Newark in November 1645, had spent the winter in and around Oxford, whence, after an adventurous journey, he came to the camp of the Scottish army at Southwell on May 5, 1646.

45. Second Civil War {1648-52). — The close of the First Civil War left England and Scotland in the hands potentially of any one of the four parties or any combination of two or more that should prove strong enough to dominate the rest. Armed political Royalism was indeed at an end, but Charles, though practically a prisoner, considered himself and was, almost to the last, considered by the rest as necessary to ensure the success of whichever amongst the other three parties could come to terms with him. Thus he passed successively into the hands of the Scots, the Parliament and the New Model, trying to reverse the verdict of arms by coquetting with each in turn. The Presby- terians and the Scots, after Cornet Joyce of Fairfax's horse seized upon the person of the king for the army (June 3, 1647), began at once to prepare for a fresh civil war, this time against Independency, as embodied in the New Model — henceforward called the Army — and after making use of its sword, its opponents attempted to disband it, to send it on foreign service, to cut off its arrears of pay, with the result that it was exasperated beyond control, and, remembering not merely its grievances but also the principle for which it had fought, soon became the most powerful political party in the realm. From 1646 to 1648 the breach between army and parliament widened day by day until finally the Presbyterian party, combined with the Scots and the remaining Royalists, felt itself strong enough to begin a second civil war.

46. The English War. — In February 1648 Colonel Poyer, the Parliamentary governor of Pembroke Castle, refused to hand over his command to one of Fairfax's officers, and he was soon joined by some hundreds of officers and men, who mutinied, ostensibly for arrears of pay, but really with political objects. At the end of March, encouraged by minor successes, Poyer openly declared for the king. Disbanded soldiers continued to join him in April, all South Wales revolted, and eventually he was joined by Major-General Laugharne, his district com- mander, and Colonel Powel. In April also news came that the Scots were arming and that Berwick and Carlisle had been seized by the English Royalists. Cromwell was at once sent off at the head of a strong detachment to deal with Laugharne and Poyer. But before he

arrived Laugharne had been severely defeated by Colonel Horton at St Fagans (May 8). The English Presbyterians found it difficult to reconcile their principles with their allies when it appeared that the prisoners taken-" at St Fagans bore " We long to see our King " on their hats; very soon in fact the English war became almost purely a Royalist revolt, and the war in the north an attempt to enforce a mixture of Royalism and Presbyterianism on Englishmen by means of a Scottish army. The former were disturbers of the peace and no more. Nearly all the Royalists who had fought in the First Civil War had given their parole not to bear arms against the

xn. 14

Parliament, and many honourable Royalists, foremost amongst them the old Lord Astley, who had fought the last battle for the king in 1646, refused to break their word by taking any part in the second war. Those who did so, and by implication those who abetted them in doing so, were likely to be treated with the utmost rigour if captured, for the army was in a less placable mood in 1648 than in 1645, an d had already determined to " call Charles Stuart, that man of blood, to an account for the blood he had shed." On the 21st of May Kent rose in revolt in the king's name. A few days later a most serious blow to the Independents was struck by the defection of the navy, from command of which they had removed Vice- Admiral Batten, as being a Presbyterian. Though a former lord high admiral, the earl of Warwick, also a Presbyterian, was brought back to the service, it was not long before the navy made a purely Royalist declara- tion and placed itself under the command of the prince of Wales. But Fairfax had a clearer view and a clearer purpose than the distracted Parliament. He moved quickly into Kent, and on the evening of June 1 stormed Maidstone by open force, after which the local levies dispersed to their homes, and the more determined Royalists, after a futile attempt to induce the City of London to declare for them, fled into Essex. In Cornwall, Northampton- shire, North Wales and Lincolnshire the revolt collapsed as easily. Only in South Wales, Essex and the north of England was there serious fighting. In the first of these districts Cromwell rapidly reduced all the fortresses except Pembroke, where Laugharne; Poyer and Powel held out with the desperate courage of deserters. In the north, Pontefract was surprised by the Royalists, and shortly afterwards Scarborough Castle declared for the king. Fairfax, after his success at Maidstone and the pacification of Kent, turned northward to reduce Essex, where, under their ardent, experienced and popular leader Sir Charles Lucas, the Royalists were in arms in great numbers. He soon drove the enemy into Colchester, but the first attack on the town was repulsed and he had to settle down to a long and wearisome

siege en regie. A Surrey rising, remembered only for the death of the young and gallant Lord Francis Villiers in a skirmish at Kingston (July 7), collapsed almost as soon as it had gathered force, and its leaders, the duke of Buckingham and the earl of Holland, escaped, after another attempt to induce London to declare for them, to St Albans and St Neots, where Holland was • taken prisoner. Buckingham escaped over-seas.

47. Lambert in the North. — By the 10th of July therefore the military situation was well defined. Cromwell held Pembroke, Fairfax Colchester, Lambert Pontefract under siege; elsewhere all serious local risings had collapsed, and the Scottish army had crossed the Border. It is on the adventures of the latter that the interest of the war centres. It was by no means the veteran army of Leven, which had long been disbanded. For the most part it consisted of raw levies, and as the kirk had refused to sanction the enterprise of the Scottish parliament, David Leslie and thousands of experienced officers and men declined to serve. The duke of Hamilton proved to be a poor substitute for Leslie; his army, too, was so ill provided that as soon as England was invaded it began to plunder the countryside for the bare means of sustenance. Major-General Lambert, a brilliant young general of twenty-nine, was more than equal to the situation. He had already left the sieges of Pontefract and Scarborough to Colonel Rossiter, and hurried into Cumberland to deal with the English Royalists under Sir Marmaduke Langdale. With his cavalry he got into touch with the enemy about Carlisle and slowly fell back, fighting small rearguard actions to annoy the enemy and gain time, to Bowes and Barnard Castle. Langdale did not follow him into the mountains, but occupied himself in gathering recruits and supplies of material and food for the Scots. Lambert, reinforced from the midlands, reappeared early in June and drove him back to Carlisle with his work half finished. About the same time the local horse of Durham and Northumberland were put into the field by Sir A. Hesilrige, governor of Newcastle, and under the command of Colonel Robert Lilburne won a considerable success (June 30) at the river Coquet. This reverse, coupled with the existence of Langdale's

force on the Cumberland side, practically compelled Hamilton to choose the west coast route for his advance, and his army- began

slowly to move down the long couloir between the mountains and the sea. The campaign which followed is one of the most brilliant in English history.

48. Campaign of Preston. — On the 8th of July the Scots, with Langdale as advanced guard, were about Carlisle, and reinforce- ments from Ulster were expected daily. Lambert's horse were at Penrith, Hexham and Newcastle, too weak to fight and having only skilful leading and rapidity of movement to enable them to gain time. Far away to the south Cromwell was still tied down before Pembroke, Fairfax before Colchester. Elsewhere the rebellion, which had been put down by rapidity of action rather than sheer weight of numbers, smouldered, and Prince Charles and the fleet cruised along the Essex coast. Cromwell and Lambert, however, understood each other perfectly, while the Scottish commanders quarrelled with Langdale and each other. Appleby Castle surrendered to the Scots on the 31st of July, whereat Lambert, who was still hanging on to the flank of the Scottish advance, fell back from Barnard Castle to Rich- mond so as to close Wensleydale against any attempt of the invaders to march on Pontefract. All the restless energy of Langdale's horse was unable to dislodge him from the passes or to find out what was behind that impenetrable cavalry screen. The crisis was now at hand. Cromwell had received the surrender of Pembroke on the nth, and had marched off, with his men unpaid, ragged and shoeless, at full speed through the midlands. Rains and storms delayed his march, but he knew that Hamilton in the broken ground of Westmorland was still worse off. Shoes from Northampton and stockings from Coventry met him. at Nottingham, and, gathering up the local levies as he went, he made for Doncaster, where he arrived on the 8th of August, having gained six days in advance of the time he had allowed himself for the march. He then called up artillery from Hull, exchanged his local levies for the regulars who were besieging Pontefract, and set off to meet Lambert. On the 1 2th he was at Wetherby, Lambert with horse and foot at Otley, Langdale at Skipton and Gargrave, Hamilton at Lancaster, and Sir George Monro with the Scots from Ulster and the Carlisle Royalists (organized as a separate command owing to friction between Monro and the generals of the main army) at Hornby. On the 13th, while Cromwell was marching to join Lambert at Otley, the Scottish leaders were still disputing as to whether they should make for Pontefract or continue through Lancashire so as to join Lord Byron and the Cheshire Royalists. 49. Preston Fight. — On the 14th Cromwell and Lambert were at Skipton, on the 15th at Gisburn, and on the 16th they marched down the valley of the Ribble towards Preston with full knowledge of the enemy's dispositions and full deter-

mination to attack him. They had with them horse and foot not only of . the army, but also of the militia of Yorkshire, Durham, Northumberland and Lancashire, and withal were heavily outnumbered, having only 8600 men against perhaps 20,000 of Hamilton's command. But the latter were scattered for convenience of supply along the road from Lancaster, through Preston, towards Wigan, Langdale's corps having thus become the left flank guard instead of the advanced guard. Langdale called in his advanced parties, perhaps with a view to resuming the duties of advanced guard, on the night of the 13th, and collected them near Longridge. It is not clear whether he reported Cromwell's advance, but, if he did, Hamilton ignored the report, for on the 17th Monro was half a day's march to the north, Langdale east of Preston, and the main army strung out on the Wigan road, Major-GeneralBaillie with a body of foot, the rear of the column, being still in Preston. Hamilton, yielding to the importunity of his lieutenant-general, the earl of . Callendar, sent Baillie across the Ribble to follow the main body just as Langdale, with 3000 foot and 500 horse only, met the first shock of Cromwell's attack on Preston Moor. Hamilton, like Charles at Edgehill, passively shared in, without directing, the battle, and, though Langdale's men fought magnificently, they were after four hours' struggle driven to the Ribble. Baillie

attempted to cover the Ribble and Darwen bridges on the Wigan road, but Cromwell had forced his way across both before night- fall. Pursuit was at once undertaken, and not relaxed until Hamilton had been driven through Wigan and Winwick to Uttoxeter and Ashbourne. There, pressed furiously in rear by Cromwell's horse and held up in front by the militia of the mid- lands, the remnant of the Scottish army laid down its arms on the 25th of August. Various attempts were made to raise the Royalist standard in Wales and elsewhere, but Preston was the death-blow. On the 28th of August, starving and hopeless of relief, the Colchester Royalists surrendered to Lord Fairfax. The victors in the Second Civil War were not merciful to those who had brought war into the land again. On the evening of the surrender of Colchester, Sir Charles Lucas and Sir George Lisle were shot. Laugharne, Poyer and Powel were sentenced to death, but Poyer alone was executed on the 25th of April 1649, being the victim selected by lot. Of five prominent Royalist peers who had fallen into the hands of the Parliament, three, the duke of Hamilton, the earl of Holland, and Lord Capel, one of the Colchester prisoners and a man of high character, were beheaded at Westminster on the 9th of March. Above all, after long hesitations, even after renewal of negotiations, the army and the Independents "purged" the House of their ill-wishers, and

created a court for the trial and sentence of the king. The more resolute of the judges nerved the rest to sign the death-warrant, and Charles was beheaded at Whitehall on the 30th of January.

50. Cromwell in Ireland. — The campaign of Preston was undertaken under the direction of the Scottish parliament, not the kirk, and it needed the execution of the king to bring about a union of all Scottish parties against the English Independents. Even so, Charles II. in exile had to submit to long negotiations and hard conditions before he was allowed to put himself at the head" of the Scottish armies. The marquis of Huntly was executed for taking up arms for the king on the 22nd of March 1649. Montrose, under Charles's directions, made a last attempt to rally the Scottish Royalists early in 1650. But Charles merely used Montrose as a threat to obtain better conditions for himself from the Covenanters, and when the noblest of all the Royalists was defeated (Carbisdale, April 27), delivered up to his pursuers (May 4), and executed (May 21, 1650), he was not ashamed to give way to the demands of the Covenanters, and to place himself at the head of Montrose's executioners. His father, whatever his faults, had at least chosen to die for an ideal, the Church of England. Charles II. now proposed to regain the throne by allowing Scotland to impose Presbyterianism on England, and dismissed all the faithful Cavaliers who had followed him to exile. Meanwhile, Ireland, in which a fresh war, with openly anti-English and anti-Protestant objects, had broken out in 1648, was thoroughly reduced to order by Cromwell, who beat down all resistance by his skill, and even more by his ruthless severity, in a brief campaign of nine months (battle of Rathmines near Dublin, won by Colonel Michael Jones, August 2, 1649; storming of Drogheda, September ir, and of Wexford, October n, by Cromwell; capture of Kilkenny, March 28, 1650, and of Clonmel, May 10). Cromwell returned to England at the end of May 1650, and on June 26 Fairfax, who had been anxious and uneasy since the execution of the king, resigned the com- mand-in-chief of the army to his lieutenant-general. The pretext, rather than the reason, of Fairfax's resignation was his unwillingness to lead an English army to reduce Scotland.

51. The Invasion of Scotland. — This important step had been resolved upon as soon as it was clear that Charles II. would come to terms with the Covenanters. From this point the Second Civil War becomes a war of England against Scotland. Here at least the Independents carried the whole of England with them. No Englishman cared to accept a settlement at the hands of a victorious foreign army, and on the 28th of June, five days after Charles II. had sworn to the Covenant, the new lord-general was on his way to the Border to take

command of the English army. About the same time a new militia act was passed that Was destined to give full and decisive effect to the

national spirit of England in the great final campaign of the war. Meanwhile the motto frappez fort, frappez vite was carried out at once by the regular forces. On the 19th of July 1650 Cromwell made the final arrangements at Berwick-on-Tweed. Major- General Harrison, a gallant soldier and an extreme Independent, was to command the regular and auxiliary forces left in England, and to secure the Commonwealth against Royalists and Presby- terians. Cromwell took with him Fleetwood as lieutenant-general and Lambert as major-general, and his forces numbered about 10,000 foot and 5000 horse. His opponent David Leslie (his comrade of Marston Moor) had a much larger force, but its degree of training was inferior, it was more than tainted by the political dissensions of the people at large, and it was, in great part at any rate, raised by forced enlistment. On the 22nd of July Cromwell crossed the Tweed. He marched on Edinburgh by the sea coast, through Dunbar, Haddington and Musselburgh, living almost entirely on supplies landed by the fleet which accompanied him — for the country itself was incapable of supporting even a small army — and on the 29th he found Leslie's army drawn up and entrenched in a position extending from Leith to Edinburgh.

52. Operations around Edinburgh. — The same day a sharp but indecisive fight took place on the lower slopes of Arthur's Seat, after which Cromwell, having felt the strength of Leslie's line, drew back to Musselburgh. Leslie's horse followed him up sharply, and another action was fought, after which the Scots assaulted Musselburgh without success. Militarily Leslie had the best of it in these affairs, but it was precisely this moment that the kirk party chose to institute a searching three days' examination of the political and religious sentiments of his army. The result was that the army was " purged " of 80 officers and 3000 soldiers as it lay within musket shot of the enemy. Crom- well was more concerned, however, with the supply question than with the distracted army of the Scots. On the 6th of August he had to fall back as far as Dunbar to enable the fleet to land supplies in safety, the port of Musselburgh being unsafe in the violent and stormy weather which prevailed. He soon returned to Musselburgh and prepared to force Leslie to battle. In preparation for an extended manoeuvre three days' rations were served out. Tents were also issued, perhaps for the first time in the civil wars, for it was

a regular professional army, which had to be cared for, made comfortable and economized, that was now carrying on the work of the volunteers of the first war. Even after Cromwell started on his manoeuvre, the Scottish army was still in the midst of its political troubles, and, certain though he was that nothing but victory in the field would give an assured peace, he was obliged to intervene in the confused negotiations of the various Scottish parties. At last, however, Charles II. made a show of agreeing to the demands of his strange supporters, and Leslie was free to move. Cromwell had now entered the hill country, with a view to occupying Queensferry and thus blocking up Edinburgh. Leslie had the shorter road and barred the way at Corstorphine Hill (August 21). Cromwell, though now far from his base, manoeuvred again to his right, Leslie meeting him once more at Gogar (August 27). The Scottish lines at that point were strong enough to dismay even Cromwell, and the manoeuvre on Queensferry was at last given up. It had cost the English army severe losses in sick, and much suffering in the autumn nights on the bleak hillsides.

53. Dunbar. — On the 28th Cromwell fell back on Musselburgh, and on the 31st, after embarking his non-effective men, to Dun- bar. Leslie followed him up, and wished to fight a battle at Dunbar on Sunday, the 1st of September. But again the kirk intervened, this time to forbid Leslie to break the Sabbath, arid the unfortunate Scottish commander could only establish himself on Doon Hill (see Dunbar) and send a force to Cockburnspath to bar the Berwick road. He had now 23,000 men to Cromwell's 11,000, and proposed, faute de mieux, to starve Cromwell into surrender. But the English army was composed of " ragged soldiers with bright muskets," and had a great captain of un- disputed authority at their head. Leslie's, on the other hand,

had lost such discipline as it had ever possessed, and was now, under outside influences, thoroughly disintegrated. Cromwell wrote home, indeed, that he was " upon an engagement very difficult," but, desperate as his position seemed, he felt the pulse of his opponent and steadily refused to take his army away by sea. He had not to wait long. It was now the turn of Leslie's men on the hillside to endure patiently privation and exposure, and after one night's bivouac, Leslie, too readily inferring that the enemy was about to escape by sea, came down to fight. The battle of Dunbar (q.v.) opened in the early morning of the 3rd of September. It was the most brilliant of all Oliver's victories. Before the sun was high in the heavens the Scottish army had ceased to exist.

54. Royalism in Scotland. — After Dunbar it was easy for the victorious army to overrun southern Scotland, more especially as the

dissensions of the enemy were embittered by the defeat of which they had been the prime cause. The kirk indeed put Dunbar to the account of its own remissness in not purging their army more thoroughly, but, as Cromwell wrote on the 4th of September, the kirk had ” done its do.” ” I believe their king will set up on his own score,” he continued, and indeed, now that the army of the kirk was destroyed and they themselves were secure behind the Forth and based on the friendly Highlands, Charles and the Cavaliers were in a position not only to defy Cromwell, but also to force the Scottish national spirit of resistance to the invader into a purely Royalist channel. Cromwell had only received a few drafts and reinforcements from England, and for the present he could but block up Edinburgh Castle (which surrendered on Christmas eve), and try to bring up adequate forces and material for the siege of Stirling — an attempt which was frustrated by the badness of the roads and the violence of the weather. The rest of the early winter of 1650 was thus occupied in semi-military, semi-political operations between detachments of the English army and certain armed forces of the kirk party which still maintained a precarious existence in the western Lowlands, and in police work against the moss-troopers of the Border counties. Early in February 165 1, still in the midst of terrible weather, Cromwell made another resolute but futile attempt to reach Stirling. This time he himself fell sick, and his losses had to be made good by drafts of recruits from England, many of whom came most unwillingly to serve in the cold wet bivouacs that the newspapers had graphically reported. 1

55. The English Militia. — About this time there occurred in England two events which had a most important bearing on the campaign. The first was the detection of a widespread Royalist-Presbyterian conspiracy — how widespread no one knew, for those of its promoters who were captured and executed cer- tainly formed but a small fraction of the whole number. Harrison was ordered to Lancashire in April to watch the north Welsh, Isle of Man and Border Royalists, and military precautions were taken in various parts of England. The second was the revival of the militia. Since 1644 there had been no general employment of local forces, the quarrel having fallen into the hands of the regular armies by force of circumstances. The New Model, though a national army, resembled Wellington’s Peninsular army more than the soldiers of the French Revolution and the American Civil War. It was now engaged in prosecuting a war of aggression against the hereditary foe over the Border — strictly the task of a professional army with a national basis. The militia was indeed raw and untrained. Some of the Essex men ” fell flat on their faces on the sound of a cannon.” In the north of England Harrison

complained to Cromwell of the ” badness ” of his men, and the lord general sympathized, having ” had much such stuff ” sent him to make good the losses in trained men. Even he for a moment lost touch with the spirit of the people. His recruits were unwilling drafts for foreign service, but in England the new levies were trusted to defend

1 The tents were evidently issued for regular marches, not for cross-country manoeuvres against the enemy. These manoeuvres, as we have seen, often took several days. The bon general ordinaire of the 17th and 18th centuries framed his manoeuvres on a smaller scale so as not to expose his expensive and highly trained soldiers to discomfort and the consequent temptation to desert.

their homes, and the militia was soon triumphantly to justify its existence on the day of Worcester.

56. Inverkeithing. — While David Leslie organized and drilled the king’s new army beyond the Forth, Cromwell was, slowly and with frequent relapses, recovering from his illness. The English army marched to Glasgow in April, then returned to Edinburgh. The motives of the march and that of the return are alike obscure, but it may be conjectured that, the forces in England under Harrison having now assembled in Lancashire, the Edinburgh-Newcastle- York road had to be covered by the main army. Be this as it may, Cromwell’s health again broke down and his life was despaired of. Only late in June were operations actively resumed between Stirling and Linlithgow. At first Cromwell sought without success to bring Leslie to battle, but he stormed Callendar House near Falkirk on July 13, and on the 16th of July he began the execution of a brilliant and successful manceuvre. A force from Queensferry, covered by the English fleet, was thrown across the Firth of Forth to North- ferry. Lambert followed with reinforcements, and defeated a detachment of Leslie’s army at Inverkeithing on the 20th. Leslie drew back at once, but managed to find a fresh strong position in front of Stirling, whence he defied Cromwell again. At this juncture Cromwell prepared to pass his whole army across the firth. His contemplated manceuvre of course gave up to the enemy all the roads into England, and before undertaking it the lord general held a consultation with Harrison, as the result of which that officer took over the direct defence of the whole Border. But his mind was made up even before this, for on the day he met Harrison at Linlithgow three-quarters of his whole army

had already crossed into Fife. Burntisland, surrendered to Lambert on the 29th, gave Cromwell a good harbour upon which to base his subsequent movements. On the 30th of July the English marched upon Perth, and the investment of this place, the key to Leslie's supply area, forced the crisis at once. Whether Leslie would have preferred to manceuvre Cromwell from his vantage-ground or not is immaterial; the young king and the now predominant Royalist element at headquarters seized the long-awaited opportunity at once, and on the 31st, leaving Cromwell to his own devices, the Royal army marched southward to raise the Royal standard in England.

57. The Third Scottish Invasion of England. — Then began the last and most thrilling campaign of the Great Rebellion. Charles II. expected complete success. In Scotland, vis-a-vis the extreme Covenanters, he was a king on conditions, and he was glad enough to find himself in England with some thirty solidly organized regi- ments under Royalist officers and with no regular army in front of him. He hoped, too, to rally not merely the old faithful Royalists, but also the overwhelming numerical strength of the English Presbyterians to his standard. His army was kept well in hand, no excesses were allowed, and in a week the Royalists covered 150 m. — in marked contrast to the duke of Hamilton's ill-fated expedition of 1648. On the 8th of August the troops were given a well-earned rest between Penrith and Kendal.

But the Royalists were mistaken in supposing that the enemy was taker\ aback by their new move. Everything had been foreseen both by Cromwell and by the Council of State in West- minster. The latter had called out the greater part of the militia on the 7th. Lieutenant-General Fleetwood began to draw together the midland contingents at Banbury, the London trained bands turned out for field service no fewer than 14,000 strong. Every suspected Royalist was closely watched, and the magazines of arms in the country-houses of the gentry were for the most part removed into the strong places. On his part Cromwell had quietly made his preparations. Perth passed into his hands on the 2nd of August, and he brought back his army to* Leith by the 5th. Thence he despatched Lambert with a cavalry ' corps to harass the invaders. Harrison was already at Newcastle picking the best of the county mounted./roops to add to his own regulars. On the 9th Charles was at Kendal, Lambert hovering in his rear, and Harrison marching swiftly to bar his way at the Mersey. Fairfax emerged for a moment from his retirement to organize the Yorkshire levies, and the best of these as well as of

the Lancashire, Cheshire and Staffordshire militias were directed upon

Warrington, which point Harrison reached on the 1 5th, a few hours in front of Charles's advanced guard. Lambert too, slipping round the left flank of the enemy, joined Harrison, and the English fell back (16th), slowly and without letting themselves be drawn into a fight, along the London road.

58. Campaign of Worcester. — Cromwell meanwhile, leaving Monk with the least efficient regiments to carry on the war in Scotland, had reached the Tyne in seven days, and thence, marching 20 m. a day in extreme heat — with the country people carrying their arms and equipment — the regulars entered Ferrybridge on the 19th, at which date Lambert, Harrison and the north-western militia were about Congleton. 1 It seemed probable that a great battle would take place between Lichfield and Coventry about the 25th or 26th of August, and that Crom- well, Harrison, Lambert and Fleetwood would all take part in it. But the scene and the date of the denouement were changed by the enemy's movements. Shortly after leaving Warrington the young king had resolved to abandon the direct march on London and to make for t,he Severn valley, where his father had found the most constant and the most numerous adherents in the first war, and which had been the centre of gravity of the English Royalist movement of 1648. Sir Edward Massey, formerly the Parlia- mentary governor of Gloucester, was now with Charles, and it was hoped that he would induce his fellow-Presbyterians to take arms. The military quality of the Welsh border Royalists was well proved, that of the Gloucestershire Presbyterians not less so, and, based on Gloucester and Worcester as his father had been based on Oxford, Charles II. hoped, not unnaturally, to deal with an Independent minority more effectually than Charles I. had done with a Parliamentary majority of the people of England. But even the pure Royalism which now ruled in the invading army could not alter the fact that it was a Scottish army, and it was not an Independent faction but all England that took arms against it. Charles arrived at Worcester on the 22nd of August, and spent five days in resting the troops, preparing for further operations, and gathering and arming the few recruits who came in. It is unnecessary to argue that the delay was fatal; it was a necessity of the case foreseen and accepted when the march to Worcester had been decided upon, and had the other course, that of marching on London via Lichfield, been taken the battle would have been fought three days earlier with the same result. As affairs turned out Cromwell merely shifted the area of his concentration two marches to the south-west, to Evesham. Early on the 28th Lambert surprised the passage of the Severn at Upton, 6 m. below Worcester, and in the action which followed Massey was severely wounded. Fleetwood followed Lambert.

The enemy was now only 16,000 strong and disheartened by the apathy with which they had been received in districts formerly all their own. Cromwell, for the first and last time in his military career, had a two-to-one numerical superiority.

59. The ” Crowning Mercy.” — He took his measures deliber- ately. Lilburne from Lancashire and Major Mercer with the Worcestershire horse were to secure Bewdley Bridge on the enemy’s line of retreat. Lambert and Fleetwood were to force their way across the Teme (a little river on which Rupert had won his first victory in 1642) and attack St John’s, the western, suburb of Worcester. Cromwell himself and the main army were to attack the town itself. On the 3rd of September, the anniversary of Dunbar, the programme was carried out exactly. Fleetwood forced the passage of the Teme, and the bridging train (which had been carefully organized for the purpose) bridged both the Teme and the Severn. Then Cromwell on the left bank and Fleetwood on the right swept in a semicircle 4 m. long up to Worcester. Every hedgerow was contested by the stubborn Royalists, but Fleetwood’s men would not be denied, and Cromwell’s extreme right on the eastern side of the town repelled, after three hours’ hard fighting, the last desperate attempt of the Royalists to break

1 The lord general had during his march thrown out successively two flying columns under Colonel Lilburne to deal with the Lanca- shire Royalists under the earl of Derby. Lilburne entirely routed I the enemy at Wigan on the 25th of August.

out. It was indeed, as a German critic 1 has pointed out, the prototype of Sedan. Everywhere the defences were stormed as darkness came on, regulars and militia fighting with equal gallantry, and the few thousands of the Royalists who escaped during the night were easily captured by Lilburne and Mercer, or by the militia which watched every road in Yorkshire and Lanca- shire. Even the country people brought in scores of prisoners, for officers and men alike, stunned by the suddenness of the disaster, offered no resistance. Charles escaped after many adventures, but he was one of the few men in his army who regained a place of safety. The Parliamentary militia were sent home within a week. Cromwell, who had ridiculed ” such stuff ” six months ago, knew them better now. ” Your new raised forces,” he wrote to the House, ” did perform singular good service, for which they deserve a very high estimation and acknowledgment.” Worcester

resembled Sedan in much more than outward form. Both were fought by ” nations in arms,” by citizen soldiers who had their hearts in the struggle, and could be trusted not only to fight their hardest but to march their best. Only with such troops would a general dare to place a deep river between the two halves of his army or to send away detachments beforehand to reap the fruits of victory, in certain anticipation of winning the victory with the remainder. The sense of duty, which the raw militia possessed in so high a degree,. ensured the arrival and the action of every column at the appointed time and place. The result was, in brief, one of those rare victories in which a pursuit is superfluous — a “crowning mercy,” as Cromwell called it. There is little of note in the closing operations. Monk had completed his task by May 1652; and Scotland, which had twice attempted to impose its will on England, found itself reduced to the position of an English province under martial law. The details of its subjection are uninteresting after the tremendous climax of Worcester.

Bibliography. — Earl of Clarendon, The History of the Rebellion (Oxford, 1702-1704, ed. W. D. Macray, Oxford, 1888); R. Baillie, Letters and Journals (Bannatyne Society, 1841); T. Carlyle, Cromwell’s Letters and Speeches (new edition, S. C. Lomas, London, 1904) ; Fairfax Correspondence (ed. R. Bell, London, 1849); E. Borlace, History of the Irish Rebellion (London, 1675) ; R. Beltings, Fragmentum historicum, or the… War in Ireland (London, 1772); J. Heath, Chronicle of the late Intestine War (London, 1676); Military Memoir of Colonel Birch (Camden Society, new series, vol. vii., 1873) ; Autobiography of Captain John Hodgson (edition of 1882); Papers on the earl of Manchester, Camden Society, vol. viii., and English Historical Review, vol. iii. ; J. Ricraft, Survey of England’ s Champions (1647, reprinted, London, 1818); ed. E. Warburton, Memoirs of Prince Rupert and the Cavaliers (London, 1849); J. Vicars, Jehovah- Jireh (1644), and England’s Worthies (1647), the latter reprinted in 1845; Anthony a Wood, History and Antiquities of the University of Oxford (ed. J. Gutch, Oxford, 1792-1795); Margaret, duchess of Newcastle, Life of William Cavendish, duke of Newcastle (ed. C. H. Firth, London, 1886); Lucy Hutchinson, Memoir of the Life of Colonel Hutchinson (ed. C. H. Firth, Oxford, 1896); Memoirs of Edward Ludlow (ed. C. H. Firth, Oxford, 1892); S. Ashe and W. Goode, The Services of the Earl of Manchester’ s Army (London, 1644) ; H. Gary, Memorials of the Great Civil War (London, 1842); Patrick Gordon, Passages from the Diary of Patrick Gordon (Spalding Club, Aberdeen, 1859); J. Gwynne, Military Memoirs of the Civil War (ed. Sir W. Scott, Edinburgh, 1822); Narratives of Hamilton’s Expedition, 1648 (C. H. Firth, Scottish Historical Society, Edinburgh, 1904); Lord Hopton, Helium Civile

(Somerset Record Society, London, 1902) ; Irish War of 1641 (Camden Society, old series, vol. xiv., 1 841); Iter Carolinum, Marches of Charles 1 . 1641-164Q (London, 1660) ; Hugh Peters, Reports from the Armies of Fairfax and Cromwell (London, 1645-1646); ” Journal of the Marches of Prince Rupert ” (ed. C. H. Firth, Engl. Historical Review, 1898); J. Sprigge, Anglia Redkiva (London, 1847, reprinted Oxford, 1854); R. Symonds, Diary of the Marches of the Royal Army, 1644-1645 (ed. C. £. Long, Camden Society, old series, 1859) ; J. Corbet, The Military Govern- ment of Gloucester (London, 1645); M. Carter, Expeditions of Kent, Essex and Colchester (London, 1650) ; Tracts relating to the Civil War in Lancashire (ed. G. Ormerod, Chetham Society, London, 1844) ; Discourse of the War in Lancashire (ed. W. Beament, Chetham Society, London, 1864); Sir M. Langdale, The late Fight at Preston (London, 1648) ; Journal of the Siege of Lathom House (London, 1823) ; J. Rushworth, The Storming of Bristol (London, 1645) ; S. R. Gardiner History of the Great Civil War (London, 1886); and History of the Commonwealth and Protectorate (London, 1903); C. H. Firth, Oliver Cromwell (Xew York and London, 1900) ; Cromwell’s Army (London, 1902); “The Raising of the Ironsides,” Transactions R. Hist.

Society, 1899 and 1 90 1 ; papers in English Historical Review, and memoirs of the leading personages of the period in Dictionary of National Biography; T. S. Baldock, Cromwell as a Soldier (London, 1899); F. Hoenig, Oliver Cromwell (Berlin, 1887-1889); Sir J. Maclean, Memoirs of the Family of Poyntz (Exeter, 1886); Sir C. Markham, Life of Fairfax (London, 1870); M. Napier, Life and Times of Montrose (Edinburgh, 1840); W. B. Devereux, Lives of the Earls of Essex (London, 1853); W. G. Ross, Mil. Engineering in the Civil War (R.E. Professional Papers, 1887); ” The Battle of Naseby,” English Historical Review, 1888; Oliver Cromwell and his Ironsides (Chatham, 1869); F. N. Maude, Cavalry, its Past and Future (London, 1903) ; E. Scott, Rupert, Prince Palatine (London, 1899); M. Stace, Cromwelliana (London, 1870); C. S. Terry, Life and Campaigns of Alexander Leslie, Earl of Leven (London, 1899); Madame H. de Witt, The Lady of Lathom (London, 1869); F. Maseres, Tracts relating to the Civil War (London, 1815); P. A. Charrier, Cromwell (London, 1905), also paper in Royal United Service Institution Journal, 1906; T. Arnold and W. G. Ross, ” Edgehill,” English Historical Review, 1887; The History of Basing House (Basingstoke, 1869); E. Broxap, “The Sieges of Hull,” English Historical Review, 1905; J. Willis Bund, The Civil War in Worcester shire (Birmingham, 1905) ; C. Coates, History of Reading (London, 1802); F. Drake, Eboracum: History of the City of York

(London, 1736); N. Drake, Siege of Pontefracl Castle (Surtees Society Miscel- lanea, London, 1861) ; G. N. Godwin, The Civil War in Hampshire (2nd ed., London, 1904); I. F. Hollings, Leicester during the Civil War (Leicester, 1840) ; R. Holmes, Sieges of Pontefract Castle (Pontefract, 1887); A. Kingston, East Anglia and the Civil War (London, 1897); H. E. Maiden, “Maidstone, 1648,” English Hist. Review, 1892; W. Money, Battles of Newbury (Newbury, 1884); J. R. Phillips, The Civil War in Wales and the Marches (London, 1874); G. Rigaud, Lines round Oxford (1880); G. Roberts, History of Lyme (London, 1 834); [R. Robinson] Sieges of Bristol (Bristol, 1868); [J. H. Round] History of Colchester Castle (Colchester, 1882) and ” The Case of Lucas and Lisle,” Transactions of R. Historical Society, 1894; R. R. Sharpe, London and the Kingdom (London, 1894); I. Tullie, Siege of Carlisle (1840); E. A. Walford, “Edge- hill,” English Hist. Review, 1905; J. Washbourne, Bibliotheca Gloucestrensis (Gloucester, 1825); J. Webb, Civil War in Hereford- shire (London, 1879). (C. F. A.)

GREAT SALT LAKE, a shallow body of highly concentrated brine in the N.W. part of Utah, U.S.A., lying between 118-8° and 113-2° W. long, and between 40-7° and 41-8° lat. Great Salt Lake is 4218 ft. above sea-level. It has no outlet, and is fed chiefly by the Jordan, the Weber and the Bear rivers, all draining the mountainous country to the E. and S.-E. The irregular outline of the lake has been compared to the roughly drawn hand, palm at the S., thumb (exaggerated in breadth) pointing N.E., and the fingers (crowded together and drawn too small) reaching N.

No bathymetric survey of the lake has been made, but the maximum depth is 60 ft. and the mean depth less than 20 ft., possibly as little as 13 ft. The lake in 1906 was approximately 75 m. long., from N.W. to S.E., and had a maximum width of 50 m. and an area of 1750sq.m. This area is not constant, as the water is very shallow at the margins, and the relation between supply from precipitation, &c, and loss by evaporation is variable, there being an annual difference in the height of the water of 15-18 in. between June (highest) and November (lowest), and besides a difference running through longer cycles: in 1850 the water was lower and the lake smaller than by any previous observations (the area and general outline were nearly the same again in 1906); then the water rose until 1873; and between 1886 and 1902 the fall in level was 1 1 -6 ft. The range of rise and fall from 1845 to 1886 was 13 ft., this being the rise in 1865-1886. With the fall of water there is an increase in the specific gravity, which in 1850 was 1-17, and in September 1901 was 1-179; in 1850 the proportion of solids by weight was 22-282%, in September 1901 it was 25-221; at the earlier of these dates the solids in a litre of water weighed 260-69

grams, at the latter date 302-122 grams. The exact cause of this cyclic variation iS unknown: the low level of 1906 is usually regarded as the result of extensive irrigation and ploughing in the surrounding country, which have robbed the lake, in part, of its normal supply of water. It is also to be noted that the rise and fall of the lake level have been coincident, respectively, with con- tinued wet and dry cycles. That the lake will soon dry up entirely seems unlikely, as there is a central trough, 25 to 30 m. I wide, about t* ft deep, running N.W. and S.E. The area and

shore-line of the lake are evidently affected by a slight surface tilt, for during the same generation that has seen the recent fall of the lake level the shore-line is in many cases 2 m. from the old, and fences may be seen a mile or more out in the lake. The lake bed is for the most part clear sand along the margin, and in deeper water is largely coated with crusts of salt, soda and gypsum.

The lake is a novel and popular bathing resort, the specific gravity of the water being so great that one cannot sink or entirely submerge oneself. There are well-equipped bathing pavilions at Garfield and Saltair on the S. shore of the lake about 20 m. from Salt Lake City. The bathing is invigorating; it must be followed by a freshwater bath because of the incrusta- tion of the body from the briny water. The large amount of salt in the water makes both fauna and flora of the lake scanty; there are a few algae, the larvae of an Ephydra and of a Tipula fly, specimens of what seems to be Corixa decolor, and in great quantities, so as to tint the surface of the water, the brine shrimp, Artemia salina (or gracilis or fertilis), notable biologically for the rarity of males, for the high degree of parthenogenesis and for apparent interchangeableness with the Branchipus.

The lake is of interest for its generally mountainous surround- ings, save to the N.W., where it skirts the Great Salt Lake Desert, for the mountainous peninsula, the Promontory, lying between thumb and fingers of the hand, shaped like and resembling in geological structure the two islands S. of it , Fremont and Antelope, 1 and the Oquirrh range S. of the lake. The physiography of the surrounding country shows clearly that the basin occupied by Great Salt Lake is one of many left by the drying up of a large Pleistocene lake, which has been called lake Bonneville. Well- defined wave-cut cliffs and terraces show two distinct shore-lines of this early lake, one the ” Bonneville Shore-

line," about 1000 ft. above Great Salt Lake, and the other, the " Provo Shore- line," about 625 ft. higher than the present lake. These shore-lines and the presence of two alluvial deposits, the lower and the larger of yellow clay 90 ft. deep, and, separated from it by a plane of erosion, the other, a deposit of white marl, 10-20 ft. deep, clearly prove the main facts as to lake Bonneville: a dry basin was first occupied by the shallow waters of a small lake; then, during a long period of excessive moisture (or cold), the waters rose and spread over an area nearly as large as lake Huron with a maximum depth of 1000 ft.; a period of great dryness followed, in which the lake disappeared; then came a second, shorter, but more intense period of moisture, and in this time the lake rose, covered a larger area than before, including W. Utah and a little of S. Idaho and of E. Nevada, about 19,750 sq. m., had a very much broken shore-line of 2550 m. and a maximum depth of 1050 ft. and a mean depth of 800 ft., overflowed the basin at the N., and by a tributary stream through Red Rock Pass at the N. end of the Cache valley poured its waters into the Columbia river system. The great lake was then gradually reduced by evaporation, leaving only shallow bodies of salt water, of which Great Salt Lake is the largest. The cause of the climatic variations which brought about this complex history of the Salt Lake region is not known; but it is worthy of note that the periods of highest water levels were coincident with a great expansion of local valley glaciers, some of which terminated in the waters of lake Bonneville.

Industrially Great Salt Lake is of a certain importance. In early days it was the source of the salt supply of the surrounding country; and the manufacture of salt is now an important industry. The brine is pumped into conduits, carried to large ponds and there evaporated by the sun; during late years the salt has been refined here, being purified of the sulphates and magnesium compounds which formerly rendered it efflorescerft and of a low commercial grade. Mirabilite, or Glauber's salt, is commercially valuable, occurring in such quantities in parts of the lake that one may wade knee-deep in it; it separates

1 Besides these islands there are a few small islands farther N., and W. of Antelope, Stansbury Island, which, like Antelope and Fremont Islands, is connected with the mainland by a bar sometimes uncovered and rarely in more than a foot of water.

from the brine at a temperature between 30 and 20 F. The lake is crossed E. and W. by the Southern Pacific railway's so-called " Lucin Cut-off," which runs from Ogden to Lucin 011 a trestle with more than 20 m. of " fill "; the former route around the N. end of the lake was 43 m. long.

Great Salt Lake was first described in 1689 by Baron La Hontan, who had merely heard of it from the Indians. ” Jim ” Bridger, a famous mountaineer and scout, saw the lake in 1824, apparently before any other white man. Captain Bonneville described the lake and named it after himself, but the name was transferred to the great Pleistocene lake. John C. Fremont gave the first description of any accuracy in his Report of 1845. But comparatively little was known of it before the Mormon settlement in 1847. In 1850 Captain Howard Stansbury completed a survey, whose results were published in 1852. The most extensive and important studies of the region, however, are those by Grove Karl Gilbert of the United States Geological Survey, who in 1879-1890 studied especially the earlier and greater lake.

See J. E. Talmage, The Great Salt Lake, Present and Past (Salt Lake City, 1900) ; and Grove Karl Gilbert, Lake Bonneville, mono- graph 1 of United States Geological Survey (Washington, 1890), containing (pp. 12-19) references to the earlier literature.

GREAT SLAVE LAKE (Athapuscow), a lake of Mackenzie district, Canada. It is situated between 6o° 50′ and 62 55′ N. and 108 40′ and 117° W., at an altitude of 391 ft. above the sea. It is 325 m. long, from 15 to 50 m. wide, and includes an area of 9770 sq. m. The water is very clear and deep. Its coast line is irregular and deeply indented by large bays, and its north-eastern shores are rugged and mountainous. The western shores are well wooded, chiefly with spruce, but the northern and eastern are dreary and barren. It is navigable from about the 1st of July to the end of October. The Yellow-knife, Hoar- frost, Lockhart (discharging the waters of Aylmer, Clinton- Colden and Artillery Lakes), Tchzudezeth, Du Rocher, Hay (400 m. in length), and Slave rivers empty into Great Slave Lake. The bulk of its water empties by the Mackenzie river into the Arctic Ocean, but a small portion finds its way by the Ark-i-linik river into Hudson’s Bay. It was discovered in 1771 by Samuel Hearne.

GREAT SOUTHERN OCEAN, the name given to the belt of water which extends almost continuously round the globe between the parallel of 40 S. and the Antarctic Circle (663 S.). The fact that the southern extremity of South America is the only land extending into this belt gives it special physical importance in relation to tides and currents, and its position with reference to the Antarctic Ocean and continent makes it convenient to regard it as a separate ocean from which the Atlantic, Pacific and Indian Oceans may be said to radiate. (See Ocean.)

GREAVES, JOHN (1602-1652), English mathematician and antiquary,

was the eldest son of John Greaves, rector of Cole- more, near Alresford in Hampshire. He was educated at Balliol College, Oxford, and in 1630 was chosen professor of geometry in Gresham College, London. After travelling in Europe, he visited the East in 1637, where he collected a considerable number of Arabic, Persian and Greek manuscripts, and made a more accurate survey of the pyramids of Egypt than any traveller who had preceded him. On his return to Europe he visited a second time several parts of Italy, and during his stay at Rome instituted inquiries into the ancient weights and measures. In 1643 he was appointed to the Savilian professorship of astronomy at Oxford, but he was deprived of his Gresham professorship for having neglected its duties. In 1645 he essayed a reforma- tion of the calendar, but his plan was not adopted. In 1648 he lost both his fellowship and his Savilian chair on account of his adherence to the royalist party. But his private fortune more than sufficed for all his wants till his death on the 8th of October

1652.

Besides his papers in the Philosophical Transactions, the principal works of Greaves are Pyramidographia, or a Description of the Pyramids in Egypt (1646) ; A Discourse on the Roman Foot and

Denarius (1649); and Elementa linguae Persicae (1649). His miscellaneous works were published in 1737 by Dr Thomas Birch, with a biographical notice of the author. See also Smith's Vita quorundam erudit. virorum and Ward's Gresham Professors.

GREBE (Fr. grebe), the generally accepted name for all the birds of the family Podicipedidae? belonging to the group Pygopodes of Illiger, members of which inhabit almost all parts ot the world. Some systematic writers have distributed them into seveial so-called genera, but, with one exception, these seem to be insufficiently defined, and here it will be enough to allow but two — Latham's Podiceps and the Centropelma of Sclater and Salvin. Grebes are at once distinguishable from

Great Crested Grebe.

all other water-birds by their rudimentary tail and the peculiar structure of their feet, which are not only placed far behind, but have the tarsi flattened and elongated toes furnished with broad lobes of

skin and flat blunt nails.

In Europe are five well-marked species of Podiceps, the commonest and smallest of which is the very well-known dab- chick of English ponds, P. fluviatilis or minor, the little grebe of ornithologists, found throughout the British Islands, and with a wide range in the old world. Next in size are two species known as the eared and horned grebes, the former of which, P. nigricollis , is a visitor from the south, only occasionally showing itself in Britain and very rarely breeding, while the latter, P. auritus, has a more northern range, breeding plentifully in Iceland, and is a not uncommon winter-visitant. Then there is the larger red-necked grebe, P. griseigena, also a northern bird, and a native of the subarctic parts of both Europe and America, while lastly the great crested grebe, P. cristatus or gaunt — known as the loon on the meres and broads of East Anglia and some other parts of England, is also widely spread over the old world. North America is credited with seven species of grebes, of which two (P. griseigena and P. auritus) are admitted to be specifically inseparable from those already named, and two (P. occidentalis and P. californicus) appear to be but local forms; the remaining two (P. dominicus and P. ludovicianus) may, however, be accounted good species, and the last differs so much from other grebes that many systematists make it the type of a distinct genus, Podilymbus. South America seems to possess four or five more species, one of which, the P. microplerus of Gould (Proc. Zool. Society, 1858, p. 220), has been deservedly separated

1 Often, but erroneously, written Podicipidae. The word Podiceps being a contracted form of Podicipes (cf. Gloger, Journal fur Ornithologie, 1854, p. 430, note), a combination of podex, podicis and pes, pedis, its further compounds must be in accordance with its derivation.

from the genus Podiceps under the name Centropelma by Sclater and Salvin (Exot. Ornithology, p. 189, pi. xcv.), owing to the form of its bill, and the small size of its wings, which renders it absolutely flightless. Lake Titicaca in Bolivia is, so far as is known at present, its only habitat. Grebes in general, though averse from taking wing, have much greater power of flight than would seem possible on examination of their alar organs, and are capable of prolonged aerial journeys. Their plumage is short and close. Above it is commonly of some shade of brown, but beneath it is usually white, and so glossy as to be in much request for muffs and the trimming of ladies' dresses. Some species are remarkable for the crests or tippets, generally of a golden-chestnut colour, they assume in the breeding season. P. auritus is particularly remarkable in this respect, and when in its full nuptial

attire presents an extraordinary aspect, the head (being surrounded, as it were, by a nimbus or aureole, such as that with which painters adorn saintly characters), reflecting the rays of light, glitters with a glory that passes description. All the species seem to have similar habits ,of nidification. Water-weeds are pulled from the bottom of the pool, and piled on a convenient foundation, often a seminatant growth of bog- bean (Menyanthes), till they form a large mass, in the centre of which a shallow cup is formed, and the eggs, with a chalky white shell almost equally pointed at each end, are laid — the parent covering them, whenever she has time to do so, before leaving the nest. Young grebes are beautiful objects, clothed with black, white and brown down, disposed in streaks and their bill often brilliantly tinted. When taken from the nest and placed on dry ground, it is curious to observe the way in which they progress — using the wings almost as fore-feet, and suggesting the notion that they must be quadrupeds instead of birds. (A. N.)

GRECO, EL, the name commonly given to Dominico Theoto- copuli (d. 1 6 14), Cretan painter, architect and sculptor. He was born in Crete, between 1545 and 1550, and announces his Cretan origin by his signature in Greek letters on his most im- portant pictures, especially on the ” St Maurice ” in the Escorial. He appears to have studied art first of all in Venice, and on arriving in Rome in 1570 is described as having been a pupil of Titian, in a letter written by the miniaturist, Giulio Clovio, addressed to Cardinal Alessandro Farnesi, dated the 15th of November 1570.

Although a student under Titian, he was at no time an ex- ponent of his master’s spirit, and his early historical pictures were attributed to many other artists, but never to Titian. Of his early works, two pictures of ” The Healing of the Blind Man ” at Dresden and Palma, and the four of ” Christ driving the money-changers out of the Temple ” in the Yarborough collection, the Cork collection, the National Gallery, and the Beruete collection at Madrid, are the chief. His first authentic portrait is that of his fellow-countryman, Giulio Clovio. It was painted between 1570 and 1578, is signed in Greek characters, and preserved at Naples, and the last portrait he painted under the influence of the Italian school appears to be that of a cardinal now in the National Gallery, of which four replicas painted in Spain are known. He appears to have come to Spain in 1577, but, on being questioned two years later in connexion with a judicial suit, as to when he arrived in the country, and for what purpose he came, declined to give any information. He was probably attracted by the prospect of participating in the decoration of the Escorial, and he appears to have settled down in Toledo, where his first works were the

paintings for the high altar of Santo Domingo, and his famous picture of ” The Dis- robing of Christ ” in the sacristy of the cathedral. It was in ‘connexion with this last-named work that he proved refractory, and the records of a law-suit respecting the price to be paid to him give us the earliest information of the artist’s sojourn in Spain. In 1590, he painted the ” History of St Maurice ” for Philip II., and in 1578, his masterpiece, entitled ” The Burial of the Count Orgaz.” This magnificent picture, one of the finest in Spain, is at last being appreciated, and can only be put a. little below the masterpieces of Velazquez. It is a strangely

individual work, representing Spanish character even more truthfully than did any Spanish artist, and it gathers up all the fugitive moods, the grace and charm, the devices and defects of a single race, and gives them complete stability in their wavering expressions.

Between 1595 and 1600, El Greco executed two groups of paintings in the church of San Jose at Toledo, and in the hospital of La Caridad, at Illescas. Besides these, he is known to have painted thirty-two portraits, several manuscripts, and many paintings for altar-pieces in Toledo and the neighbourhood. As an architect he was responsible for more than one of the churches of Toledo, and as a sculptor for carvings both in wood and in marble, and he can only be properly understood in all his varied excellences after a visit to the city where most of his work was executed.

He died on the 7th of April 1614, and the date of his death is one of the very few certain facts which we have respecting him. The record informs us that he made no will, that he received the sacraments, and was buried in the church of Santo Domingo. The popular legend of his having gone mad towards the latter part of his career has no foundation in fact, but his painting became more and more eccentric as his life went on, and his natural perversity and love of strange, cold colouring, increased towards the end of his life. As has been well said, ” Light with him was only used for emotional appeal, and was focussed or scattered at will.” He was haughtily certain of the value of his own art, and was determined to paint in cold, ashen colouring, with livid, startling effect, the gaunt and extraordinary figures that he beheld with his eccentric genius. His pictures have wonderful visionary quality, admirable invention, and are full of passionate fervency. They may be considered extravagant, but are never commonplace, and are exceedingly attractive in their intense emotion, marvellous sincerity, and strange, chilly colour.

El Greco’s work is typically modern, and from it the portrait- painter, J. S. Sargent, claims to have learnt more than from that of any other artist. It immortalizes the character of the people amongst whom he dwelt, and he may be considered as the initiator of truth and realism in art, a precursor and inspirer of Velazquez. In his own time he was exceedingly popular, and held in great repute. Sonnets were written in his honour, and he is himself said to have written several treatises, but these have not come down to our time. For more than a generation his work was hardly known, but it is now gaining rapidly in importance, and its true position is more and more recognized. Some examples of the artist’s own handwriting have been discovered in Toledo, and

Sefior Don Manuel Cossia of Madrid has spent many years collecting information for a work dealing with the artist. (G. C. W.)

GRECO-TURKISH WAR, 1897. This war between Greece and Turkey (see Greece: Modern History) involved two prac- tically distinct campaigns, in Thessaly and in Epirus. Upon the Thessalian frontier the Turks, early in March, had concentrated six divisions (about 58,000 men)/ 1500 sabres and 156 guns, under Edhem Pasha. A seventh division was rendered available a little later. The Greeks numbered about 45,000 infantry, 800 cavalry and 96 guns, under the crown prince. On both sides there was a considerable dispersion of forces along the frontier. The Turkish navy, an important factor in the war of 1877-78, had become paralytic ten years later, and the Greek squadron held complete command of the sea. Expeditionary forces directed against the Turkish line of communications might have influenced the course of the campaign; but for such work the Greeks were quite unprepared, and beyond bombarding one or two insignificant ports on the coast-line, and aiding the transport of troops from Athens to Volo, the navy practically accomplished nothing. On the oth and 10th April Greek irregulars crossed the frontier, either with a view to provoke hostilities or in the hope of fomenting a rising in Mace- donia. On the 1 6th and 17th some fighting occurred, in which Greek regulars took part; and on the 18th Edhem Pasha, whose headauarters had for some time been established at

Elassona, ordered a general advance. The Turkish plan was to turn the Greek left and to bring on a decisive action, but this was not carried out. In the centre the Turks occupied the Meluna Pass on the 19th, and the way was practically open to Larissa. The Turkish right wing, however, moving on Damani and the Reveni Pass, encountered resistance, and the left wing was temporarily checked by the Greeks among the mountains near Nezeros. At Mati, covering the road to Tyrnavo, the Greeks entrenched themselves. Here sharp fighting occurred on the 21st and 22nd, during which the Greeks sought to turn the right flank of the superior Turkish central column. On the 23rd fighting was renewed, and the advance guard of the Turkish left column, which had been reinforced, and had pressed back the Greeks, reached Deliler. The Turkish forces had now drawn together, and the Greeks were threatened on both flanks. In the evening a general retreat was ordered, and the loose discipline of the Greek army was at once manifested. Rumours of disaster spread among the ranks, and wild panic supervened. There was nothing to prevent an orderly retirement upon Larissa, which had been fortified and provisioned, and which offered a good defensive position. The general debacle could not, however, be arrested, and in great disorder the mass of the

Greek army fled southwards to Pharsala. There was no pursuit, and the Turkish commander-in-chief did not reach Larissa till the 27th. Thus ended the first phase of the war, in which the Greeks showed tenacity in defence, which proved, fruitless by reason of initially bad strategic dispositions entailing far too great disper- sion, and also because there was no plan of action beyond a general desire to avoid risking a defeat which might prevent the expected risings in Macedonia and elsewhere. The handling of the Turkish army showed little skill or enterprise; but on both sides political considerations tended to prevent the application of sound military principles. ‘ r

Larissa being abandoned by the Greeks, Velestino, the junction of the Thessalian railways, where there was a strong position covering Volo, seemed to be the natural rallying point for the Greek army. Here the support of the fleet would have been secured, and a Turkish advance across the Othrys range upon Athens could not have taken place until the flanking position had been captured. Whether by direction or by natural impulse, however, the mass of the Greek troops made for Pharsala, where some order was re-established, and preparations were made to resist attack. The importance of Velestino was recognized by sending a brigade thither by railway from Pharsala, and the inferior Greek army was thus split into two portions, separated by nearly 40 m. On 27th April a Turkish reconnaissance on Velestino was repulsed, and further fighting occurred on the 29th and 30th, in which the Greeks under Colonel Smolenski held their own. Meanwhile the Turks made preparations to attack Pharsala, and on 5th May the Greeks were driven from their positions in front of the town by three divisions. Further fighting followed on the 6th, and in the evening the Greek army retired in fair order upon Domokos. It was intended to turn the Greek left with the first division under Hairi Pasha, but the flanking force did not arrive in time to bring about a decisive result. The abandonment of Pharsala involved that of Velestino, where the Turks had obtained no advantage, and on the evening of the 5th Colonel Smolenski began a retirement upon Halmyros. Again delaying, Edhem Pasha did not attack Domokos till the 17th, giving the Greeks time to entrench their positions. The attack was delivered in three columns, of which the right was checked and the centre failed to take the Greek trenches and suffered much loss. The left column, however, menaced the line of retreat, and the Greek army abandoned the whole position during the night. No effective stand was made at the Furka Pass, which was evacuated on the following night. Colonel Smolenski, who arrived on the 18th from Halmyros, was directed to hold the pass of Thermopylae. The Greek forces being much demoralized, the intervention of the tsar was invoked by telegraph; and the latter sent a

personal appeal to the Sultan, who directed a suspension of hostilities. On the 20th an armistice was arranged.

GEOGRAPHY]

GREECE

425

In Epirus at the outbreak of war about 1 5,000 Greeks, including a cavalry regiment and five batteries, the whole under Colonel Manos, occupied a line of defence from Arta to Peta. The Turks, about 28,000 strong, with forty-eight guns, under Achmet Hifsi Pasha, were distributed mainly at Iannina, Pentepagadia, and in front of Arta. On 18th April the Turks commenced a three days' bombardment of Arta; but successive attempts to take the bridge were repulsed, and during the night of the 21st they retired on Philippiada, 26 m. distant, which was attacked and occupied by Colonel Manos on the 23rd. The Greeks then advanced to Pentepagadia, meeting with little resistance. Their difficulties now began. After some skirmishing on the 27th, the position held by their advanced force near Homopulos was attacked on the 28th. The attack was renewed on the 29th, and no Greek reinforcements were forthcoming when needed. The Euzones made a good defence, but were driven back by superior force, and a retreat was ordered, which quickly degenerated into panic-stricken flight to and across the Arta. Reinforcements, including 2500 Epirote volunteers, were sent to Arta from Athens, and on 12th May another incursion into Turkish territory began, the apparent object being to occupy a portion of the country in view of the breakdown in Thessaly and the probability that hostilities would shortly end. The advance was made in three columns, while the Epirote volunteers were landed near the mouth of the Luro river with the idea of cutting off the Turkish garrison of Prevesa. The centre column, consisting of a brigade, three squadrons and two batteries, which were intended to take up and hold a defensive position, attacked the Turks near Strevina on the 13th. The Greeks fought well, and being reinforced by a battalion from the left column, resumed the offensive on the following day, and fairly held their own. On the night of the 15th a retreat was ordered and well carried out. The volunteers landed at the mouth of the Luro, were attacked and routed with heavy loss.

The campaign in Epirus thus failed as completely as that in Thessaly. Under the terms of the treaty of peace, signed on 20th September, and arranged by the European powers, Turkey obtained an indemnity of £T4,000,000, and a rectification of the Thessalian frontier, carrying

with it some strategic advantage. History records few more unjustifiable wars than that which Greece gratuitously provoked. The Greek troops on several occasions showed tenacity and endurance, but discipline and cohesion were manifestly wanting. Many of the officers were incapable; the campaign was gravely mismanaged; and politics, which led to the war, impeded its operations. On the other hand, the fruits of the German tuition, which began in 1880, and received a powerful stimulus by the appointment of General von der Goltz in 1883, were shown in the Turkish army. The mobilization was on the whole smoothly carried out, and the newly completed railways greatly facilitated the con- centration on the frontier. The young school of officers trained by General von der Goltz displayed ability, and the artillery at Pharsala and Domokos was well handled. The superior leading was, however, not conspicuously successful; and while the rank and file again showed excellent military qualities, political conditions and the Oriental predilection for half-measures and for denying full responsibility and full powers to commanders in the field enfeebled the conduct of the campaign. On account of the total want of careful and systematic peace training on both sides, a war which presented several interesting strategic problems provided warnings in place of military lessons. (G. S. C.)

GREECE, 1 an ancient geographical area, and a modern kingdom more or less corresponding thereto, situated at the south-eastern extremity of Europe and forming the most southerly portion of the Balkan Peninsula. The modern kingdom is bounded on the N. by European Turkey and on the E., S. and W. by the Aegean, Mediterranean and Ionian seas. The name Graecia, which was more or less vaguely given to the ancient country by the Romans, seems not to have been employed by any native writer before Aristotle; it was apparently derived

1 See also Greek Art, Greek Language, Greek' Law, Greek Literature, Greek Religj^jj.

by the Romans from the Illyrians, who applied the name of an Epirote tribe (TpcuKol, Graeci) to all their southern neighbours. The names Hellas, Hellenes ("EXXas, "EXXijces), by which the ancient Greeks called their country and their race, and which are still employed by the modern Greeks, originally designated a small district in Phthiotis in Thessaly and its inhabitants, who gradu- ally spread over the lands south of the Cambunian mountains. The name Hellenes was not universally applied to the Greek race until the post-Homeric epoch (Thucyd. i. 3).

1. Geography and Statistics The ancient Greeks had a somewhat vague conception of the northern limits of Hellas. Thessaly was generally included and Epirus excluded; some writers included some of the southern cantons of Epirus, while others excluded not Extent of only all that country but Aetolia and Acarnania. oreece. Generally speaking, the confines of Hellas in the age of its greatest distinction were represented by a line drawn from the northern shore of the Ambracian Gulf on the W. to the mouth of the Peneus on the E. Macedonia and Thrace were regarded as outside the pale of Hellenic civilization till 386 B.C., when after his conquest of Thessaly and Phocis, Philip of Macedon obtained a seat in the Amphictyonic Council. In another sense, however, the name Hellas expressed an ethnological rather than a geographical unity; it denoted every country inhabited by Hellenes. It thus embraced all the Greek settlements on the coasts and islands of the Mediterranean, on the shores of the Hellespont, the Bosporus and the Black Sea. Nevertheless, the Greek peninsula within the limits described above, together with the adjacent islands, was always regarded as Hellas par excellence. The continental area of Hellas proper was no greater than that of the modern Greek kingdom, which comprises but a small portion of the territories actually occupied by the Greek race. The Greeks have always been a maritime people, and the real centre of the national life is now, as in antiquity, the Aegean Sea or Archipelago. Thickly studded with islands and bordered by deeply indented coasts with sheltered creeks and harbours, the Aegean in the earliest days of navigation invited the enter- prise of the mariner; its shores, both European and Asiatic, became covered with Greek settlements and its islands, together with Crete and Cyprus, became Greek. True to their maritime instincts, the Greeks rarely advanced inland to any distance from the sea; the coasts of Macedonia, Thrace and Asia Minor are still mainly Greek, but, except for some isolated colonies, the hinterland in each case lies outside the limits of the race. Con- tinental Greece is divided by its mountain ranges into a number of natural cantons; the existence of physical barriers tended in the earliest times to the growth of isolated political com- munities, and in the epoch of its ancient independence the country was occupied by seventeen separate states, none of them larger than an ordinary English county. These states, which are noticed separately, were: Thessaly, in northern Greece; Acarnania, Aetolia, Locris, Doris, Phocis, Megaris, Boeotia and Attica in central Greece; and Corinthia, Sicyonia, Achaea, Elis, Messenia, Laconia, Argolis and Arcadia in the Peloponnesus. . Modern Greece, which (including the adjacent islands) extends from 35° 50′ to 39° 54′ N. and from io° 20′ to 26 15′ E., com- prises all the area formerly occupied by these states. Under the arrangement concluded

at Constantinople Extent of on the 2 1 st of July 1832 between Great Britain, areece. France, Russia and Turkey, the northern boundary of Greece was drawn from the Gulf of Arta (Sinus Ambracius) to the Gulf of Volo (S. Pagasaeus), the line keeping to the crest of the Othrys range. Thessaly and part of Acarnania were thus left to Turkey. The island of Euboea, the Cyclades and the northern Sporades were added to the new kingdom. In 1864 the Ionian Islands {q.v.) were ceded by Great Britain to Greece, In 1880 the Conference of Berlin proposed a new frontier, which transferred to Greece not only Thessaly but a considerable portion of southern Epirus, extending to the river Kalamas. This, however, was rejected by Turkey, and the existing boundary was traced in 1881. Starting from the Aegean coast at a point

near Platamona, between Mount Olympus and the mouth of the Salambria (Peneus), the line passes over the heights of Kritiri and Zygos (Pindus) and descends the course of the river Arta to its mouth. After the war of 1897 Greece restored to Turkey some strategical points on the frontier possessing no geographical importance. The greatest length of Greece is about 250 m., the greatest breadth 180 m. The country is generally divided into five parts, which are indicated by its natural features: — (i.) Northern Greece, which extends northwards from Mount Othrys and the gulfs of Zeitun(Lamia)and Arta to the Cambunian Mountains, and comprises Thessaly and a small portion of Epirus; (ii.) Central Greece, extending from the southern limits of Northern Greece to the gulfs of Corinth and Aegina; (iii.) the peninsula of the Peloponnesus or Morea, attached to the mainland by the Isthmus of Corinth; (iv.) the Ionian Islands on the west coasts of Epirus and Greece; (v.) The islands of the Aegean Sea, including Euboea, the Cyclades and the northern Sporades.

In the complexity of its contour and the variety of its natural features Greece surpasses every country in Europe, as Europe sur- . . passes every continent in the world. The broken character

f y f a of its coast-line is unique; except a few districts in Thes- es ures. ga jy no p art Q £ t j je countr y ; s more than 50 m. from the

sea. Although the area of Greece is considerably smaller than that of

Portugal, its coast-line is greater than that of Spain and Portugal together. The mainland is penetrated by numerous gulfs and inlets, and the adjoining seas are studded with islands. Another characteristic is the number and complexity of the mountain chains, which traverse every part of the country and which, together with their ramifications, cover four-fifths of its surface. The mountain-chains interlace, the interstices forming small enclosed basins, such as the plain of Boeotia and the plateau of Arcadia; the only plain of any extent is that of Thessaly. The mountains project into the sea, forming peninsulas, and sometimes reappearing in rows or groups of islands; they descend abruptly to the coast or are separated from it by small alluvial plains. The portions of the country suitable for human colonization were thus isolated one from the other, but as a rule possessed easy access to the sea. The earliest settlements were generally situated on or around some rocky elevation, which dominated the surrounding plain and was suitable for fortification as a citadel or acropolis; owing to the danger of piratical attacks they were usually at some little distance from the sea, but in the vicinity of a natural harbour. The physical features of the country played an important part in moulding the character of its inhabitants. Protected against foreign invasion by the mountain barriers and to a great extent cut off from mutual intercourse except by sea, the ancient Greek communities developed a marked individuality and a strong sentiment of local patriotism; their inhabitants were both mountaineers and mariners; they possessed the love of country, the vigour and the courage which are always found in highlanders, together with the spirit of adventure, the versatility and the passion for freedom characteristic of a seafaring people. The great variety of natural products as well as the facility of maritime communication tended to the early growth of commercial enterprise, while the peculiar beauty of the scenery, though little dwelt upon in ancient literature, undoubtedly quickened the poetic and artistic instincts of the race. The effects of physical environment are no less notice- able among the modern Greeks. The rural populations of Attica and Boeotia, though descended from Albanian colonists in the middle ages, display the same contrast in character which marked the inhabitants of those regions in ancient times.

In its general aspect the country presents a series of striking and interesting contrasts. Fertile tracts covered with vineyards, olive groves, corn-fields or forests display themselves in close proximity with rugged heights and rocky precipices; the landscape is never, monotonous; its outlines are graceful, and its colouring, owing to the clearness of the air, is at once brilliant and delicate, while the sea, in

most instances, adds a picturesque feature, enhancing the charm and variety of the scenery.

The ruling feature in the mountain system of northern Greece is the great chain of Pindus, which, extending southwards from the lofty Shar Dagh (Skardos) near Uskub, forms the back- bone of the Balkan peninsula. Reaching the frontier of Greece a little S. of lat. 40 , the Pindus range is inter- sected by the Cambunian Mountains running E. and W. ; the eastern branch, which forms the northern boundary of Thessaly, extends to the Gulf of Salonica and culminates in Mount Olympus (9754 ft.) a little to the N. of the Greek frontier; then bending to the S.E. it follows the coast-line, forming a rampart between the Thessalian plain and the sea ; the barrier is severed at one point only where the river Salambria (anc. Peneus) finds an exit through the narrow defile of Tempe. South of Tempe the mountain ridge, known as the Mavro Vouno, connects the pyramidal Kissovo (anc. Ossa, 6400 ft.) with Plessidi (anc. Pelion, 5310 ft.); it is prolonged in the Magnesian peninsula, which separates the Gulf of Volo from

Moua* tains.

the Aegean, and is continued by the mountains of Euboea (highest summits, Dirphys, 5725 ft., and Ocha, 4830 ft.) and by the islands of Andros and Tenos. West of Pindus, the Cambunian Mountains are continued by several ridges which traverse Epirus from north to south, enclosing the plain and lake of Iannina; the most westerly of these, projecting into the Adriatic, forms the Acroceraunian promontory terminating in Cape Glossa. The principal pass through the Cambunian Mountains is that of Meluna, through which runs the carriage-road connecting the town of Elassona in Macedonia with Larissa, the capital of Thessaly; there are horse-paths at Reveni and elsewhere. The central chain of Pindus at the point where it is intersected by the Cambunian Mountains forms the mass of Zygos (anc. Lacmon, 71 13 ft.) through which a horse-path con- nects the town of Metzovo with Kalabaka in Thessaly; on the declivity immediately N. of Kalabaka are a series of rocky pinnacles on which a number of monasteries are perched. Trending to the S., the Pindus chain terminates in the conical Mount Velouchi (anc. Tymphrestus, 7609 ft.) in the heart of the mountainous region of northern Greece. From this centre-point a number of mountains radiate in all directions. To the E. runs the chain of Helloro (anc. Othrys; highest summit, Hagios Elias, 5558 ft.) separating the plain of Thessaly from the valley of the Spercheios and traversed by the Phourka pass (2789 ft.) ; to the S.E. is Mount Katavothra (anc. Oeta, 7080 ft.) extending to the

southern shore of the Gulf of Lamia at Thermopylae; to the S.E., S. and S.W. are the mountains of Aetolia and Acarnania. The Aetolian group, which may be regarded as the direct continuation of the Pindus range, includes Kiona (8240 ft.), the highest mountain in Greece, and Vardusi (anc. Korax, 8190 ft.). The mountains of Acarnania with “TVtjXi) «opi > <ˆ (5215 ft.) rise to theW. of the valley of the Aspropotamo (anc. Achelous). The Aetolian Mountains are prolonged to the S.E. by the double-crested Liakoura (anc. Parnassus; 8064 ft.) in Phocis; by Palaeo Vouno (anc. Helicon, 5738 ft.) and Elateas (anc. Cilhaeron, 4626 ft.) respect- ively W. and S. of the Boeotian plain; and by the mountains of Attica, — Ozea (anc. Parnes, 4626 ft.), Mendeli (anc. Pentelicus or Brilessos, 3639 ft.), Trellovouno (anc. Hymeltus, 3369 ft.), and Keratia (2136 ft.) — terminating in the promontory of Sunium, but reappearing in the islands of Ceos, Cythnos, Seriphos and Siphnos. South of Cithaeron are Patera in Megaris (3583 ft.) and Makri Plagi (anc. Geraneia, 4495 ft.) overlooking the Isthmus of Corinth. The mountains of the Morea, grouped around the elevated central plateau of Arcadia, form an independent system with ramifications extending through the Argolid peninsula on the E. and the three southern promontories of Malea, Taenaron and Acritas. At the eastern end of the northern chain, separating Arcadia from the Gulf of Corinth, is Ziria (anc. Cyllene, 7789 ft.) ; it forms a counterpart to Parnassus on the opposite side of the gulf. A little to the W. is Chelmos (anc. Aroania, 7725 ft.); farther W., Olonos (anc. Erymanthus, 7297 ft.) and Voidia (anc. Panachaicon, 6322 ft.) overlooking the Gulf of Patras. The highest summit in the Argolid peninsula is Hagios Elias (anc. Arachnaeon, 3930 ft.). The series of heights forming the eastern rampart of Arcadia, including Artemision (5814 ft.) and Ktenia (5246 ft.) is continued to the S. by the Malevo range (anc. Parnon, highest summit 6365 ft.) which ex- tends into the peninsula of Malea and reappears in the island of Cerigo. Separated from Parnon by the Eurotas valley to the W., the chain of Taygetus (mod. Pentedaktylon ; highest summit Hagios Elias, 7874 ft., the culminating point of the Morea) forms a barrier between the plains of Laconia and Messenia ; it is traversed by the Langada pass leading from Sparta to Kalamata. The range is prolonged to the S. through the arid district of Maina and terminates in Cape Matapan (anc. Taenarum). The mountains of western Arcadia are less lofty and of a less marked type; they include Hagios Petros (4777 ft.) and Palaeocastro (anc. Pholoe, 2257 ft.) N. of the Alpheus valley, Diaphorti (anc. Lycaeus, 4660 ft.), the haunt of Pan, and Nomia (4554 ft.) W. of the plain of Megalopolis. Farther south, the mountains of western Messenia form a detached group (Varvara, 4003 ft.; Mathia, 3140 ft.) extending to Cape Gallo (anc. Acritas) and the Oenussae

Islands. In.central Arcadia are Apanokrapa (anc. Maenalus, also sacred to Pan) and Roudia (5072 ft.) ; the Taygetus chain forms the southern continuation of these mountains.

The more noteworthy fortified heights of ancient Greece were the Acrocorinthus, the citadel of Corinth (1885 ft.) ; Ithcme (2631 ft.) at Messene; Larissa (950 ft.) at Argos; the Acropolis of Mycenae (910 ft.); Tiryns (60 ft.) near Nauplia, which also possessed its own citadel, the Palamidhi or Acro-nauplia (705 ft.) ; the Acropolis of Athens (300 ft. above the mean level of the city and 512 ft. above the sea), and the Cadmea of Thebes (715 ft.).

Greece has few rivers ; most of these are small, rapid and turbid, as might be expected from the mountainous configuration of the country. They are either perennial rivers or torrents, the white beds „. of the latter being dry in summer, and only filled with water ers ‘

after the autumn rains. The chief rivers (none ofjwhich is navigable) are the Salambria (Peneus) in Thessaly, the Mavropotamo (Cephisus) in Phocis, the Hellada (Spercheios) in Phthiotis, the Aspropotamo (Achelous) in Aetolia, and the Ruphia (Alpheus) and Vasiliko (Eurotas) in the Morea. Of the famous rivers of Athens, the one, the Ilissus, is only a chain of pools all summer, and the other, the Cephisus, though never absolutely dry, does not reach the sea,

being drawn off in numerous artificial channels to irrigate the neigh- bouring olive groves. A frequent peculiarity of the Greek rivers is their sudden disappearance in subterranean chasms and reappear- ance on the surface again, such as gave rise to the fabled course of the Alpheus under the sea, and its emergence in the fountain of Arethusa in Syracuse. Some of these chasms — ” Katavothras ” — are merely sieves with herbage and gravel in the bottom, but others are large caverns through which the course of the river may some- times be followed. Floods are frequent, especially in autumn, and natural fountains abound and gush out even from the tops of the hills. Aganippe rises high up among the peaks of Helicon, and Peirene flows from the summit of Acrocorinthus. The only note- worthy cascade, however, is that of the Styx in Arcadia, which has a fall of 500 ft. During part of the year it is lost in snow, and it is at all times almost

inaccessible. Lakes are numerous, but few are of considerable size, and many merely marshes in summer. The largest are Karla (Boebeis) in Thessaly, Trichonis in Aetolia, Copais in Boeotia, Pheneus and Stymphalus in Arcadia.

The valleys are generally narrow, and the plains small in extent, deep basins walled in among the hills or more free at the mouths of the rivers. The principal plains are those of Thessaly, Plains. Boeotia, Messenia, Argos, Elis and Marathom The bottom of these plains consists of an alluvial soil, the most fertile in Greece. In some of the mountainous regions, especially in the Morea, are extensive table-lands. The plain of Mantinea is 2000 ft. high, and the upland district of Sciritis, between Sparta and Tegea, is in some parts 3000 ft.

Strabo said that the guiding thing in the geography of Greece was the sea, which presses in upon it at all parts with a thousand arms. From the Gulf of Arta on the one side to the Gulf CoasU of Volo on the other the coast is indented with a succession

of natural bays and gulfs. The most important are the Gulfs of Aegina {Saronicus) and Lepanto (Corinthiacus) , which separate the Morea from the northern mainland of Greece, — the first an inlet of the Aegean, the second of the Ionian Sea, — and are now connected by a canal cut through the high land of the narrow Isthmus of Corinth (3 J m. wide). The outer portion of the Gulf of Lepanto is called the Gulf of Patras, and the inner part the Bay of Corinth ; a narrow inlet on the north side of the same gulf, called the Bay of Salona or Itea, penetrates northwards into Phocis so far that it is within 24 geographical miles of the Gulf of Zeitun on the north-east coast. The width of the entrance to the gulf of Lepanto is subject to singular changes, which are ascribed to the formation of alluvial deposits by certain marine currents, and their removal again by others. At the time of the Peloponnesian war this channel was 1200 yds. broad ; in the time of Strabo it was only 850; and in our own day it has again increased to 2200. On the coast of the Morea there are several large gulfs, that of Arcadia (Cyparissius) on the west, Kalamata {Messeniacus) and Kolokythia (Laconicus) on the south and Nauplia (Argolicus) on the east. Between Euboea and the mainland lie the channels of Trikeri, Talanti (Euboicum Mare) and Egripo ; the latter two are connected by the strait of Egripo (Euripus). This strait, which is spanned by a swing-bridge, is about 1 80 ft. wideband is remarkable for the unexplained eccentricity of its tide, which has puzzled ancients and moderns alike. The current runs at the average speed of 5 m. an hour, but continues only for a short time in one direction, changing its course, it is said, ten or twelve times in a day ; it is sometimes very violent.

There are no volcanoes on the mainland of Greece, but every- where traces of volcanic action and frequently visitations of earth- quakes, for it lies near a centre of volcanic: agency, the Volcanic island of Santorin, which has been within recent years in action. a s j. ate f eruption. There is an extinct crater at Mount Laphystium (Granitsa) in Boeotia. The mountain of Methane, on the coast of Argolis, was produced by a volcanic eruption in 282 B.C. Earthquakes laid Thebes in ruins in 1853, destroyed every house in Corinth in 1858, filled up the Castalian spring in 1870, devastated Zante in 1893 and the district of Atalanta in 1894. There are hot springs at Thermopylae and other places, which are used for sanitary purposes. Various parts of the coast exhibit indications of up- heaval within historical times. On the coast of Elis four rocky islets are now joined to the land, which were separate from it in the days of ancient Greece. There are traces of earlier sea-beaches at Corinth, and on the coast of the Morea, and at the mouth of the Hellada. The land has gained so much that the pass of Ther- mopylae which was extremely narrow in the time of Leonidas and his three hundred, is now wide enough for the motions of a whole army. _ (J. D. B.)

Structurally, Greece may be divided into two regions, an eastern and a western. The former includes Thessaly, Boeotia, the island of Euboea, the isthmus of Corinth, and the peninsula of Geology. Argolis, and, throughout, the strike of the beds is nearly from west to east. The western region includes the Pindus and all the parallel ranges, and the whole of the Peloponnesus excepting Argolis. Here the folds which affect the Mesozoic and early Tertiary strata run approximately from N.N.W. to S.S.E.

Up to the close of the 19th century the greater part of Greece was believed to be formed of Cretaceous rocks, but later researches have shown that the supposed Cretaceous beds include a variety of geo- logical horizons. The geological sequence begins with crystalline

schists and limestones, followed by Palaeozoic, Triassic and Liassic rocks. The oldest beds which hitherto have yielded fossils belong to the Carboniferous System (Fusulina limestone of Euboea). Following upon these older beds are the great limestone masses which cover most of the eastern region, and which are now known to include Jurassic, Tithonian, Lower and Upper Cretaceous and Eocene beds. In the Pindus and the Peloponnesus these beds are overlaid by a series of shales and platy limestones (Olonos Limestone of the Peloponnesus), which were formerly supposed to be of Tertiary age. It has now been shown, however, that the upper series of limestones has been brought upon the top of the lower by a great overthrust. Triassic fossils have

been found in the Olonos Lime- stone and it is almost certain that other Mesozoic horizons are represented.

The earth movements which produced the mountain Chains of western Greece have folded the Eocene beds and must therefore be of post-Eocene date. The Neogene beds, on the other hand, are not affected by the folds, although by faulting without folding they have in some places been raised to a height of nearly 6000 ft. They lie, however, chiefly along the coast and in the valleys, and consist of marls, conglomerates and sands, sometimes with seams of lignite. The Pikermi deposits, of late Miocene age, are famous for their rich mammalian fauna.

Although the folding which formed the mountain chains appears to have ceased, Greece is still continually shaken by earthquakes, and these earthquakes are closely connected with the great lines of fracture to which the country owes its outline. Around the narrow gulf which separates the Peloponnesus from the mainland, earthquakes are particularly frequent, and another region which is often shaken is the south-western corner of Greece, the peninsula of Messene. 1 _ (P. La.)

The vegetation of Greece in general resembles that of southern Italy while presenting many types common to that of Asia Minor. Owing to the geographical configuration of the peninsula and its mountainous surface the characteristic flora of the Mediterranean regions is often found in juxtaposition with Flora.

that of central Europe. In respect to its vegetation the country may be regarded as divided into four zones. In the first, extending from the sea-level to the height of 1500 ft., oranges, olives, dates, almonds, pomegranates, figs and vines flourish, and cotton and tobacco are grown. In the neighbourhood of streams are found the laurel, myrtle, oleander and lentisk, together with the plane and white poplar; the cypress is often a picturesque feature in the landscape, and there is a variety of aromatic plants. The second zone, from 1500 to 3500 ft., is the region of the oak, chestnut and other British trees. In the third, from 3500 to 5500 ft., the beech is the characteristic forest tree; the Abies cephalonica and Pinus pinea now take the place of the Pinus halepensis, which grows everywhere in the lower regions. Above 5500 ft. is the Alpine region, marked by small plants, lichens and mosses. During the short period of spring anemones and other wild flowers enrich the hillsides with magnificent colouring; in June all verdure dis- appears except in the watered districts and elevated plateaus. The asphodel grows abundantly in the dry rocky soil ; aloes, planted in rows, form impenetrable hedges. Medicinal plants are numerous, such

as the Inula Helenium, the Mandragora Officinarum, the Colchicum napolitanum and the Helleborus orientalis, which still grows abundantly near Aspraspitia, the ancient Anticyra, at the foot of Parnassus.

The fauna is similar to that of the other Mediterranean peninsulas, and includes some species found in Asia Minor but not elsewhere in Europe. The lion existed in northern Greece in the time of Aristotle and at an earlier period in the Morea. The bear Fauna. is still found in the Pindus range. Wolves are common in all the mountainous regions and jackals are numerous in the Morea. Foxes are abundant in all parts of the country ; the polecat is found in the woods of Attica and the Morea; the lynx is now rare. The wild boar is common in the mountains of northern Greece, but is almost extinct in the Peloponnesus. The badger, the marten and the weasel are found on the mainland and in the islands. The red deer, the fallow deer and the roe exist in northern Greece, but are becoming scarce. The otter is rare. Hares and rabbits are abund- ant in many parts of the country, especially in the Cyclades ; the two species never occupy the same district, and in the Cyclades some islands (Naxos, Melos, Tenos, &c.) form the exclusive domain of the hares, others (Seriphos, Kimolos, Mykonos, &c.) of the rabbits. In Andros alone a demarcation has been arrived at, the hares retain- ing the northern and the rabbits the southern portion of the island.

•For the Geology of Greece see: M. Neumayr, &c, Denks. k. Akad.Wiss. Wien, math.-nat. CI. vol. xl. (1880); A. Philippson, Der Peloponnes (Berlin, 1892) and" Beitragezur Kenntnisdergriechischen Inselwelt," Peterm. Mitt., Erganz.-heft No. 134 (1901); R. Lepsius, Geologie von Attika (Berlin, 1893); L. Cayeux, " Ph6nom6nes de charriage dans la M6diterranee orientale," C. R. Acad. Sci. Paris, vol. cxxxvi. (1903) pp. 474-476; J. Deprat, " Note preliminaire surla geologie de l'ile d'Eubee," Bull. Soc. Geol. France, ser. 4, vol. iii. (1903) pp. 229-243, p. vii. and " Note sur la geologie du massif du Peiion et sur rinfluence exercee par les massifs arche«ns sur la tectonique de l'Egeuie," ib. vol. iv. (1904), pp. 299-338.

{POPULATION

The chamois is found in the higher mountains, such as Pindus, Parnassus and Tymphrestus. The Cretan agrimi, or wild goat (Capra

nubiana, C. aegagrus), found in Antimelos and said to exist in Taygetus, the jackal, the stellion, and the chameleon are among the Asiatic species not found westward of Greece. There is a great variety of birds; of 358 species catalogued two-thirds are migratory. Among the birds of prey, which are very numerous, are the golden and imperial eagle, the yellow vulture, the Gypaetus barbatus, and several species of falcons. The celebrated owl of Athena (Athene noctua) is becoming rare at Athens, but still haunts the Acropolis and the royal garden; itisa small species, found everywhere in Greece. The wild goose and duck, the bustard, partridge, woodcock, snipe, wood-pigeon and turtle-dove are numerous. Immense flocks of quails visit the southern coast of the Morea, where they are cap- tured in great numbers and exported alive. The stork, which was common in the Turkish epoch, has now become scarce. There is a great variety of reptiles, of which sixty-one species have been catalogued. The saurians are all harmless; among them the stellion (Stellio vulgaris), commonly called kpokSSuXos in Mykonos and Crete, is believed by Heldreich to have furnished a name to the crocodile of the Nile (Herod, ii. 69). There are five species of tortoise and nine of Amphibia. Of the serpents, which are numerous, there are only two dangerous species, the Vipera ammodytes and the Vipera aspis; the first-named is common. Among the marine fauna are the dolphins, familiar in the legends and sculpture of antiquity; in the clear water of the Aegean they often afford a beautiful spectacle as they play round ships ; porpoises and whales are sometimes seen. Sea-fish, of which 246 species have been ascertained, are very abundant.

The climate of Greece, like that of the other countries of the Balkan

peninsula, is liable to greater extremes of heat and cold than prevail

in Spain and Italy ; the difference is due to the general

ma ‘ contour of the peninsula, which assimilates its climatic conditions to those of the European mainland. Another distinctive feature is the great variety of local contrasts; the rapid transitions are the natural effect of diversity in the geographical configuration of the country. Within a few hours it is possible to pass from winter to spring and from spring to summer. The spring is short; the sun is already powerful in March, but the increasing warmth is often checked by cold northerly winds; in many places the corn harvest is cut in May, when southerly winds prevail and the temperature rises rapidly. The great heat of summer is tempered throughout the whole region of the-archipelago by the Etesian winds, which blow regularly from the N.E. for forty to fifty days in July and August. This current of cool dry air

from the north is due to the vacuum resulting from intense heat in the region of the Sahara. The healthy Etesian winds are generally replaced towards the end of summer by the southerly Libas or sirocco, which, when blowing strongly, resembles the blast from a furnace and is most injurious to health. The sirocco affects, though in a less degree, the other countries of the Balkan peninsula and even Rumania. The mean summer temperature is about 79° Fahr. The autumn is the least healthy season of the year owing to the great increase of humidity, especially in October and November. At the end of October snow reappears on the higher mountains, remaining on the summits till June. The winter is mild, and even in January there are, as a rule, many warm clear days; but the recurrence of biting northerly winds and cold blasts from the mountains, as well as the rapid transitions from heat to cold and the difference in the temperature of sunshine and shade, render the climate somewhat treacherous and unsuitable for invalids. Snow seldom falls in the maritime and lowland districts and frost is rare. The mean winter temperature is from 48° to 55° Fahr. The rain- fall varies greatly according to localities; it is greatest in the Ionian Islands (53-34 ins. at Corfu), in Arcadia and in the other mountainous districts, and least on the Aegean littoral and in the Cyclades; in Attica, the driest region in Greece, it is 16-1 ins. The wettest months are November, December and January; the driest July and August, when, except for a few thunder-storms, there is practi- cally no rainfall. The rain generally accompanies southerly or south- westerly winds. In all the maritime districts the sea breeze greatly modifies the temperature; it beginsabout9 a.m., attains its maximum force soon after noon, and ceases about an hour after sunset. Greece is renowned for the clearness of its climate; fogs and mists are almost unknown. In most years, however, only four or five days are recorded in which the sky is perfectly cloudless. The natural healthiness of the climate is counteracted in the towns, especially in Athens, by deficient sanitation and by stifling clouds of dust, which propagate infection and are peculiarly hurtful in cases of ophthalmia and pulmonary disease. Malarial fever is endemic in the marshy districts, especially in the autumn. .,

The area of the country was 1 8,34 1 sq. m. before the acquisition of the Ionian Islands in 1864, 19,381 sq. m. prior to the annexa- tion of Thessaly and part of Epirus in 1881, and Area and 24,352 sq. m. at the census in 1896. If we deduct 152 Won” * s fl- m -> th e exten t of territory ceded to Turkey after the war of 1897, the area of Greece in 1908 would be 24,400 sq. m. Other authorities give 25,164 and 25,136 sq. m.

as the area prior to the rectification of the frontier in 1898. 1 The

population in 1896 was 2,433,806, or 99-1 to the sq. m., the population of the territories annexed in 1881 being approxi- mately 350,000; and 2,631,952 in 1907, or 107-8 to the sq. m. (according to the official estimate of the area), showing an increase of 198,146 or o-8i% per annum, as compared with 1 -6i % during the period between 1896 and 1889; the diminished increase is mainly due to emigration. The population by sex in 1907 is given as 1,324,942 males and 1,307,010 females (or 50-3% males to 49-6 females). The preponderance of males, which was 52% to 48% females in 1896, has also been reduced by emigration; it is most marked in the northern departments, especially in Larissa. Only in the departments of Arcadia, Eurytania, Corinth, Cephalonia, Lacedaemon, Laconia, Phocis, Argolis and in the Cyclades, is the female population in excess of the male.

Neither the census of 1896 nor that of 1889 gave any classification by professions, religion or language. The following figures, which are only approximate, were derived from unofficial sources in 1901 : — agricultural and pastoral employments 444,000 ; industries 64,200; traders and their employes 118,000; labourers and servants 31,300; various professions 15,700; officials 12,000; clergy about 6000; lawyers 4000; physicians 2500. In 1879, 1,635,698 of the popula- tion were returned as Orthodox Christians, 14,677 as Catholics and Protestants, 2652 as Jews, and 740 as of other religions. The annexation of Thessaly and part of Epirus is stated to have added 24, 165 Mahommedan subjects to the Hellenic kingdom. A consider- able portion of these, however, emigrated immediately after the annexation, and, although a certain number subsequently returned, the total Mahommedan population in Greece was estimated to be under 5000 in 1908. A number of the Christian inhabitants of these regions, estimated at about 50,000, retained Turkish nationality with the object of escaping military service. The Albanian population, estimated at 200,000 by Finlay in 1851, still probably exceeds 120,000. It is gradually being absorbed in the Hellenic population. In 1870, 37,598 .persons (an obviously untrustworthy figure) were returned as speaking AlbaniaiTonly. In 1879 the number is given as 58,858. The Vlach population, which has been increased by the annexation of Thessaly, numbers about 6o,ooo. The number of foreign residents is unknown. The Italians are the most numerous, numbering about 11,000. Some 1500 persons, mostly Maltese, possess British nationality.

By a law of 27 November 1899, Greece, which had hitherto been divided into sixteen departments (vofwi) was redivided into twenty-six departments, as follows: —

Departments. Pop. Departments. Pop.

1 Attica 341,247 14 Corinth …. 71,229

2 Boeotia . . . 65,816 15 Arcadia …. 162,324 ‘3 Phthiotis. . . 112,328 16 Achaea …. 150,918

4 Phocis . . 62,246 17 Elis 103,810

5 Aetolia and Acar- 18 Triphylia . . . 90,523

nania . . . 141,405 19 Messenia …. 127,991

6 Eurytania . . 47,192 20 Laconia …. 61,522

7 Arta …. 41,280 21 Lacedaemon . . 87,106

8 Trikkala . . . 90,548 22 Corfu 99,571

9 Karditsa . . . 92,941 23 Cephalonia . . . 71,235

10 Larissa … 95,066 24 Leucas (with Ithaca) 41,186

11 Magnesia. . . 102,742 25 Zante 42,502

12 Euboea . . . 116,903 26 Cyclades …. 130,378

13 Argolis . . . 81,943

The population is densest in the Ionian Islands, exceeding 307 per sq. m. The departments of Acarnania, Phocis and Euboea are the most thinly inhabited (about 58, 61 and 66 per sq. m. respectively).

Very little information is obtainable with regard to the movement of the population ; no register of births, deaths and marriages is kept in Greece. The only official statistics are found in the periodical returns of the mortality in the twelve principal towns, according to which the yearly average of deaths in these towns for the five years 1903-1907 was approximately 10,253, or 2 3‘8 per 1000; of these more than a quarter are ascribed to pulmonary consumption, due in the main to defective sanitation. Both the birth-rate and death-rate are low, being 27-6 and 20-7 per 1000 respectively. Infant mortality is slight, and in point of longevity Greece compares favourably with most other European countries. The number of illegitimate births is 12-25 per 1000; these are almost exclusively in the towns.

Of the total population 28-5% are stated to live in towns. The

population of the principal towns is: —

1896. 1907.

Athens 111,486 167,479

Peiraeus 43,848 73.579

Patras 37,985 37.724

1 No state survey of Greece was available in 1908, though a survey had been undertaken by the ministry of war.

1896. 1907.

Trikkala 21,149 17.809

Hermopolis (Syra) . . 18,760 18,132

Corfu 18,581 -28,254!

Volo 16,788 23,563

Larissa 15,373 18,001

Zante 14,906 13,580

Kalamata 14,298 15,397

Pyrgos 12,708 13,690

Tripolis 10,465 10,789

Chalcis 8,661 10,958

Laurium 7,926 10,007

No trustworthy information is obtainable with regard to immigra- tion and emigration, of which no statistics have ever been kept. Emigration, which was formerly in the main to Egypt and Rumania, is now almost exclusively to the United States of America. The principal exodus is from Arcadia, Laconia and Maina; the emigrants from these

districts, estimated at about 14,000 annually, are for the most part young men approaching the age of military service. Accord- ing to American statistics 12,431 Greeks arrived in the United States from Greece during the period 1869-1898 and 130,154 in 1899-1907; a considerable number, however, have returned to Greece, and those remaining in the United States at the end of 1907 were estimated at between 136,000 and 138,000; this number was considerably reduced in 1908 by remigration. Since 1896 the tendency to emigration has received a notable and somewhat alarming impulse. There is an increasing immigration into the towns from the rural districts, which are gradually becoming depopu- lated. Both movements are due in part to the preference of the Greeks for a town life and in part to distaste for military service, but in the main to the poverty of the peasant population, whose condition and interests have been neglected by the government.

Greece is inhabited by three races — the Greeks, the Albanians and the Vlachs. The Greeks who are by far the most numerous, have to a large extent absorbed the other races; the lory ” process of assimilation has been especially rapid since the foundation of the Greek kingdom. Like most European nations, the modern Greeks are a mixed race. The question of their origin has been the subject of much learned controversy; their presumed descent from the Greeks of the classical epoch has proved a national asset of great value; during the period of their struggle for independence it won them the devoted zeal of the Philhellenes, it inspired the enthusiasm of Byron, Victor Hugo, and a host of minor poets, and it has furnished a pleasing illusion to generations of scholarly tourists who delight to discover in the present inhabitants of the country the mental and physical characteristics with which they have been familiarized by the literature and art of antiquity. This amiable tendency is encouraged by the modern Greeks, who possess an implicit faith in their illustrious ancestry. The discussion of the question entered a very acrimonious stage with the appearance in 1830 of Fallmerayer’s History of the Morea during the Middle Ages. Fallmerayer maintained that after the great Slavonic immigration at the close of the 8th century the original population of northern Greece and the Morea, which had already been much reduced during the Roman period, was practically supplanted by the Slavonic element and that the Greeks of modern times are in fact Byzantinized Slavs. This theory was subjected to exhaustive criticism by Ross, Hopf, Finlay and other scholars, and although many of Fallmerayer’s conclusions remain unshaken, the view is now generally held that the base of the population both in the mainland and the Morea is Hellenic, not Slavonic. During the 5th and 6th centuries

Greece had been subjected to Slavonic incursions which resulted in no permanent settlements. After the great plague of 746-747, however, large tracts of depopulated country were colonized by Slavonic immigrants; the towns remained in the hands of the Greeks, many of whom emigrated to Constantinople. In the Morea the Slavs established themselves principally in Arcadia and the region of Taygetus, extending their settlements into Achaia, Elis, Laconia and the promontory of Taenaron; on the mainland they occupied portions of Acarnania, Aetolia, Doris and Phocis. Slavonic place-names occurring in all these districts confirm the evidence of history with regard to this immigration. The Slavs, who were not a maritime race, did not colonize the Aegean Islands, but a few Slavonic place-names 1 Including suburbs.

in Crete seem to indicate that some of the invaders reached that island. The Slavonic settlements in the Morea proved more permanent than those in northern Greece, which were attacked by the armies of the Byzantine emperors. But even in the Morea the Greeks, or " Romans " as they called themselves (Tcoˆtuoi), who had been left undisturbed on the eastern side of the peninsula, eventually absorbed the alien element, which disappeared after the 15th century. In addition to the place- names the only remaining traces of the Slav immigration are the Slavonic type of features, which occasionally recurs, especially among the Arcadian peasants, and a few customs and traditions. Even when allowance is made for the remarkable power of assimilation which the Greeks possessed in virtue of their superior civilization, it is difficult to resist the conclusion that the Hellenic element must always have been the most numerous in order to effect so complete an absorption. This element ■• has apparently undergone no essential change since the epoch of Roman domination. The destructive invasions of the Goths in a.d. 267 and 395 introduced no new ethnic feature; the various races which during the middle ages obtained partial or complete mastery in Greece — the Franks, the Venetians, the Turks — contributed no appreciable ingredient to the mass of the popula- tion. The modern Greeks may therefore be regarded as in the main the descendants of the population which inhabited Greece in the earlier centuries of Byzantine rule. Owing to the opera- tion of various causes, historical, social and economic, that population was composed of many heterogeneous elements and represented in a very limited degree the race which repulsed the Persians and built the Parthenon. The internecine conflicts of the Greek communities, wars with foreign powers and the deadly struggles of factions in the various cities, had to a large extent obliterated the old race of free citizens by the beginning of the Roman

period. The extermination of the Plataeans by the Spartans and of the Melians by the Athenians during the Peloponnesian war, the proscription of Athenian citizens after the war, the massacre of the Corcyraean oligarchs by the democratic party, the slaughter of the Thebans by Alexander and of the Corinthians by Mummius, are among the more familiar instances of the catastrophes which overtook the civic element in the Greek cities; the void can only have been filled from the ranks of the metics or resident aliens and of the descendants of the far more numerous slave population. Of the latter a portion was of Hellenic origin; when a city was taken the males of military age were frequently put to the sword, but the women and children were sold as slaves; in Laconia and Thessaly there was a serf population of indigenous descent. In the classical period four-fifths of the population of Attica were slaves and of the remainder half were metics. In the Roman period the number of slaves enormously increased, the supply being maintained from the regions on the borders of the empire; the same influences which in Italy extinguished the small landed proprietors and created the latifundia prevailed also in Greece. The purely Hellenic population, now greatly diminished, congregated in the towns; the large estates which replaced the small freeholds were cultivated by slaves and managed or farmed by slaves or freedmen, and wide tracts of country were wholly depopulated. How greatly the free citizen element had diminished by the close of the 1st century a.d. may be judged from the estimate of Plutarch that all Greece could not furnish more than 3000 hoplites. The composite population which replaced the ancient Hellenic stock became completely Hellenized. According to eraniologists the modern Greeks are brachycephalous while the ancient race is stated to have been dolichocephalous, but it seems doubtful whether any such generalization with regard to “the ancients can be conclusively established. The Aegean islanders are more brachycephalous than the inhabitants of the mainland, though apparently of purer Greek descent. No general conception of the facial type of the ancient race can be derived from the highly-idealized statues of deities, heroes and athletes; so far as can be judged from portrait statues it was very varied. Among the modern Greeks the same variety of features prevails; the face is usually oval, the nose generally

long and somewhat aquiline, the teeth regular, and the eyes

remarkably bright and full of animation. The country-folk are, as a rule, tall and well-made, though slightly built and rather meagre; their form is graceful and supple in movement. The urban population, as elsewhere, is physically very inferior. The women often display a refined and delicate beauty which disappears at an early age. The best physical types of the race are found in Arcadia, in the Aegean Islands and in Crete.

The Albanian population extends over all Attica and Megaris (except the towns of Athens, Peiraeus and Megara), the greater part of Boeotia, the eastern districts of Locris, the southern half of Euboea and the northern side of Andros, the whole of the islands of Salamis, Hydra, Spetsae and Poros, and part of Aegina, the whole of Corinthia and Argolis, the northern districts of Arcadia and the eastern portion of Achaea. There are also small Albanian groups in Laconia and Messenia (see Albania). The Albanians, who call themselves Shkyipetar, and are called by the Greeks Arvanilae (‘ApfiaviTcu), belong to the Tosk or southern branch of the race; their immigration took place in the latter half of the 14th century. Their first settlements in the Morea were made in 1347-1355. The Albanian colonization was first checked by the Turks; in 1454 an Albanian insurrection in the Morea against Byzantine rule was crushed by the Turkish general Tura Khan, whose aid had been invoked by the Palaeo- logi. With a few exceptions, the Albanians in Greece retained their Christian faith after the Turkish conquest. The failure of the insurrection of 1770 was followed by a settlement of Moslem Albanians, who had been employed by the Turks to suppress the revolt. The Christian Albanians have long lived on good terms with the Greeks while retaining their own customs and language and rarely intermarrying with their neighbours. They played a brilliant part during the War of Independence, and furnished the Greeks with many of their most distinguished leaders. The process of their Hellenization, which scarcely began till after the establishment of the kingdom, has been somewhat slow; most of the men can now speak Greek, but Albanian is still the language of the household. The Albanians, who are mainly occupied with agriculture, are less quick-witted, less versatile, and less addicted to politics than the Greeks, who regard them as intellectually their inferiors. A vigorous and manly race, they furnish the best soldiers in the Greek army, and also make excellent sailors.

The Vlachs, who call themselves Aromdni, i. e. Romans, form another important foreign element in the population of Greece. They are found principally in Pindus (the Agrapha district), the mountainous parts of Thessaly, Othrys, Oeta, the mountains of Boeotia, Aetolia and Acarnania ; they have a few settlements in Euboea. They are for the

most part either nomad shepherds and herdsmen or carriers (kiradjis). They apparently descend from the Latinized provincials of the Roman epoch who took refuge in the higher mountains from the incursions of the bar- barians and Slavs (see Vlachs and Macedonia). In the 13th century the Vlach principality of ” Great Walachia ” (Me7aX7j BXaxia) included Thessaly and southern Macedonia as far as Castoria; its capital was at Hypati near Lamia. Acarnania and Aetolia were known as ” Lesser Walachia.” The urban element among the Vlachs has been almost completely Hellenized; it has always displayed great aptitude for commerce, and Athens owes many of its handsomest buildings to the benefactions of wealthy Vlach merchants. The nomad population in the mountains has retained its distinctive nationality and customs together with its Latin language, though most of the men can speak Greek. Like the Albanians, the pastoral Vlachs seldom intermarry with the Greeks; they occasionally take Greek wives, but never give their daughters to Greeks; many of them ate illiterate, and their children rarely attend the schools. Owing to their deficient intellectual culture they are regarded with disdain by the Greeks, who employ the term /3X&xos to denote not only a shepherd but an ignorant rustic.

A considerable Italian element was introduced into the Ionian Islands during the middle ages owing to their prolonged sub- jection to Latin princes and subsequently (till 1797) to the

Venetian republic. The Italians intermarried with the Greeks; Italian became the language of the upper classes, and Roman Catholicism was declared the state religion. The peasantry, however, retained the Greek language and remained faithful to the Eastern Church; during the past century the Italian element was completely absorbed by the Greek population.

The Turkish population in Greece, which numbered about 70,000 before the war of liberation, disappeared in the course of the struggle or emigrated at its conclusion. The Turks in Thessaly are mainly descended either from colonists established in the country by the Byzantine emperors or from immigrants from Asia Minor, who arrived at the end of the 14th century; they derive their name Konariots from Iconium (Konia) . Many of the beys or land-owning class are the lineal representatives of the Seljuk nobles who obtained fiefs under the feudal system introduced here and in Macedonia by the Sultan Bayezid I.

Notwithstanding their composite origin, their wide geo- graphical distribution and their cosmopolitan instincts, the modern Greeks are a remarkably homogeneous people, „ differing markedly in character

from neighbouring character. races, united by a common enthusiasm in the pursuit of their national aims, and profoundly convinced of their superiority to other nations. Their distinctive character, combined with their traditional tendency to regard non-Hellenic peoples as barbarous, has, indeed, to some extent counteracted the results of their great energy and zeal in the assimilation of other races; the advantageous position which they attained at an early period under Turkish rule owing to their superior civilization, their versatility, their wealth, and their monopoly of the ecclesiastical power would probably have enabled them to Hellenize permanently the greater part of the Balkan peninsula had their attitude towards other Christian races been more sympathetic. Always the most civilized race in the East, they have successively influenced their Macedonian, Roman and Turkish conquerors, and their remarkable intellectual endow- ments bid fair to secure them a brilliant position in the future. The intense patriotic zeal of the Greeks may be compared with that of the Hungarians; it is liable to degenerate into arrogance and intolerance; it sometimes blinds their judgment and involves them in ill-considered enterprises, but it nevertheless offers the best guarantee for the ultimate attainment of their national aims. All Greeks, in whatever country they may reside, work together for the realization of the Great Idea (17 Meyakri 'Idea) — the supremacy of Hellenism in the East — and to this object they freely devote their time, their wealth and their talents; the large fortunes which they amass abroad are often bequeathed for the foundation of various institutions in Greece or Turkey, for the increase of the national fleet and army, or for the spread of Hellenic influence in the Levant. This patriotic sentiment is unfortunately much exploited by self-seeking demagogues and publicists, who rival each other in exaggerating the national pretensions and in pandering to the national vanity. In no other country is the passion for politics so intense; " keen political discussions are constantly going on at the cafes; the newspapers, which are extraordinarily numerous and generally of little value, are literally devoured, and every measure of the government is violently criticized and ascribed to interested motives." The influence of the journals is enormous; even the waiters in the cafes and domestic servants have their favourite newspaper, and discourse fluently on the political problems of the day. Much of the national energy is wasted by this continued political fever; it is diverted from practical aims, and may be said to evaporate in words. The practice of independent criticism tends to indiscipline in the organized public services; it has been remarked that every Greek soldier is a general and every sailor an admiral. During the war of 1897 a young naval lieutenant telegraphed to the minister of war condemning the measures taken by

his admiral, and his action was applauded by several journals. There is also little discipline in the ranks of political parties, which are held together, not by any definite principle, but by the personal influence of the leaders; defections are frequent, and as a rule each deputy in the Chamber makes

his terms with his chief. On the other hand, the independent character of the Greeks is favourably illustrated by the circum- stance that Greece is the only country in the Balkan peninsula in which the government cannot count on securing a majority by official pressure at the elections. Few scruples are observed in political warfare, but attacks on private life are rare. The love of free discussion is inherent in the strongly-rooted demo- cratic instinct of the Greeks. They are in spirit the most demo- cratic of European peoples; no trace of Latin feudalism survives, and aristocratic pretensions are ridiculed. In social life there is no artificial distinction of classes; all titles of nobility are forbidden; a few families descended from the chiefs in the War of Independence enjoy a certain pre-eminence, but wealth and, still more, political or literary notoriety constitute the principal claim to social consideration. The Greeks display great intellectual vivacity; they are clever, inquisitive, quick-witted and ingenious, but not profound; sustained mental industry and careful accuracy are distasteful to them, and their aversion to manual labour is still more marked. Even the agricultural class is but moderately industrious; abundant opportunities for relaxation are provided by the numerous church festivals. The desire for instruction is intense even in the lowest ranks of the community; rhetorical and literary accomplishments possess a greater attraction for the majority than the fields of modern science. The number of persons who seek to qualify for the learned professions is excessive; they form a superfluous element in the community, an educated proletariat, attaching themselves to the various political parties in the hope of obtaining state employment and spending an idle existence in the cafes and the streets when their party is out of power. In disposition the Greeks are lively, cheerful, plausible, tactful, sympathetic; very affable with strangers, hospitable, kind to their servants and dependants, remarkably temperate and frugal in their habits, amiable and united in family life. Drunkenness is almost unknown, thrift is universally practised; the standard of sexual morality is high, especially in the

rural districts, where illegitimacy is extremely rare. The faults of the Greeks must in a large degree be attributed to their prolonged subjection to alien races; their cleverness often degenerates into cunning, their ready invention into mendacity, their thrift into avarice, their fertility of resource into trickery and fraud. Dishonesty is not a national vice, but many who would scorn to steal will not hesitate to compass illicit gains by duplicity and misrepre- sentation; deceit, indeed, is often practised gratuitously for the mere intellectual satisfaction which it affords. In the astuteness of their monetary dealings the Greeks proverbially surpass the Jews, but fall short of the Armenians; their remark- able aptitude for business is sometimes marred by a certain short-sightedness which pursues immediate profits at the cost of ulterior advantages. Their vanity and egoism, which are admitted by even the most favourable observers, render them jealous, exacting, and peculiarly susceptible to flattery. In common with other southern European peoples the Greeks are extremely excitable; their passionate disposition is prone to take offence at slight provocation, and trivial quarrels not infre- quently result in homicide. They are religious, but by no means fanatical, except in regard to politico-religious questions affecting their national aims. In general the Greeks may be described as a clever, ambitious and versatile people, capable of great effort and sacrifice, but deficient- in some of the more solid qualities which make for national greatness.

The customs and habits of the Greek peasantry, in which the observances of the classical age may often be traced, together Customs. w ‘ tn tri eir legends and traditions, have furnished an interesting subject of investigation to many writers (see Bibliography below). In the towns the more cosmopolitan population has largely adopted the ” European ” mode of life, and the upper classes show a marked preference for French manners and usages. In both town and country, however, the influence of oriental ideas is still apparent, due in part to the long period of Turkish domination, in part to the contact of the Greeks with Asiatic races at all epochs of their history. In

the rural districts, especially, the women lead a somewhat secluded life and occupy a subject position; they wait at table, and only partake of the meal when the men of the family have been served. In most parts of continental Greece the women work in the fields, but in the Aegean Islands and Crete they rarely leave the house. Like the Turks, the Greeks have a great partiality for coffee, which can always be procured even in the remotest hamlets; the Turkish practice of carrying a string of beads or rosary (comboloio) , which provides an occupation for the hands, is very common. Many of the observances in con- nexion with births, christenings, weddings and funerals are very

interesting and in some cases are evidently derived from remote antiquity. Nuptial ceremonies are elaborate and protracted; in some of the islands of the archipelago they continue for three weeks. In the preliminary negotiations for a marriage the question of the bride's dowry plays a very important part; a girl without a dowry often remains unmarried, notwithstanding the considerable excess of the male over the female population. I mmediat ely after the christening of a female child her parent s begin to lay up her portion, and young men often refrain from marrying until their sisters have been settled in life. The dead are carried to the tomb in .an open coffin; in the country districts profes- sional mourners are engaged to chant dirges; the body is washed with wine and crowned with a wreath of flowers. A valedictory oration is pronounced at the grave. Many superstitions still prevail among the peasantry; the belief in the vampire and the evil eye is almost universal. At Athens and in the larger towns many handsome dwelling-houses may be seen, but the upper classes have no predilection far rural life, and their country houses are usually mere farmsteads, which they rarely visit. In the more fertile districts two-storeyed houses of the modern type are common, but in the mountainous regions the habita- tions of the country-folk are extremely primitive; the small stone-built hut, almost destitute of furniture, shelters not only the family but its cattle and domestic animals. In Attica the peasants' houses are usually built of cob. In Maina the villagers live in fortified towers of three or more storeys; the animals occupy the ground floor, the family the topmost storey; the intermediate space serves as a granary or hay-loft. The walls are loop-holed for purposes of defence in view of the traditional vendetta and feuds, which in some instances have been handed down from remote generations and are maintained by occasional sharp-shooting from these primitive fortresses. In general cleanliness and sanitation are much neglected; the traveller in the country districts is doomed to sleepless nights unless he has provided himself with bedding and a hammock. Even Athens, though enriched by many munificent benefactions, is still without a drainage system or an adequate water supply; the sewers of many houses open into, the streets, in which rubbish is allowed to accumulate. The effects of insanitary conditions are, how- ever, counteracted in some degree by the excellent climate. The Aegean islanders contrast favourably with the continentals in point of personal cleanliness and the neatness of their dwellings; their houses are generally covered with the flat roof, familiar in Asia, on which the family sleep in summer. The habits and customs of the islanders afford an interesting study. Propitiatory rites are still practised by the mariners and fishermen, and thank- offerings for preservation at sea are hung up in the churches. Among the popular

amusements of the Greeks dancing holds a prominent place; the dance is of various kinds; the most usual is the somewhat inanimate round dance (avpro or rpara), in which a number of persons, usually of the same sex, take part holding hands; it seems indentical with the Slavonic kolo (" circle "). The more lively Albanian fling is generally danced by three or four persons, one of whom executes a series of leaps and pirouettes. The national music is primitive and monotonous. All classes are passionately addicted to card-playing, which is forbidden by law in places of public resort. The picturesque national costume, which is derived from the Albanian Tosks, has unfortunately been abandoned by the upper classes and the urban population since the abdication of King Otho, who always wore it; it is maintained as the uniform of the evzones (highland

Govern meat.

regiments). It consists of a red cap with dark blue tassel, a white shirt with wide sleeves, a vest and jacket, sometimes of velvet, handsomely adorned with gold or black braid, a belt in which various weapons are carried, a white kilt or fustanella of many folds, white hose tied with garters, and red leather shoes with pointed ends, from which a tassel depends. Over all is worn the shaggy white capote. The islanders wear a dark blue costume with a crimson waistband, loose trousers descending to the knee, stockings and pumps or long boots. The women's costume is very varied; the loose red fez is sometimes worn and a short velvet jacket with rich gold embroidery. The more elderly women are generally attired in black. In the Megara district and elsewhere peasant girls wear on festive occasions a head- dress composed of strings of. coins which formerly represented the dowry.

Greece is a constitutional monarchy; hereditary in the male line, or, in case of its extinction, in the female. The sovereign, by decision of the conference of London (August 1863), is styled "king of the Hellenes"; the title "king of Greece " was borne by King Otho. The heir apparent is styled & Siadoxos, "the successor"; the title " duke of Sparta," which has been accorded to the crown prince, is not generally employed in Greece. The king and the heir apparent must belong to the Orthodox Greek Church; a special exception has been made for King George, who is a Lutheran. The king attains his majority on completing his

eighteenth year; before ascending the throne he must take the oath to the con- stitution in presence of the principal ecclesiastical and lay dignitaries of the kingdom, and must convoke the Chamber within two months after his accession. The civil list amounts to 1,125,000 dr., in addition to which it was provided that King George should receive £4000 annually as a personal allowance from each of the three protecting powers, Great Britain, France and Russia. The heir apparent receives from the state an annuity of 200,000 dr. The king has a palace at Athens and other residences at Corfu, Tatoi (on the slopes of Mt Parnes) and Larissa. The present constitution dates from the 29th of October 1864. The legislative power is shared by the king with a single chamber (fiovKrj) elected by manhood suffrage for a period of four years. The election is by ballot; candidates must have completed their thirtieth year and electors their twenty-first. The deputies (PovXevrai), according to the constitution, receive only their travelling expenses, but they vote themselves a payment of 1800 dr. each for the session and a further allowance in case of an extraordinary session. The Chamber sits for a term of not less than three or more than six months. No law can be passed except by an absolute majority of the house, and one-half of the members must be present to form a quorum; these arrangements have greatly facilitated the practice of obstruction, and often enable individual deputies to impose terms on the government for their attendance. In 1898 the number of deputies was 234. Some years previously a law diminishing the national representation and enlarging the constituencies was passed by Trikoupis with the object of checking the local influence of electors upon deputies, but the measure was subsequently repealed. The number of deputies, however, who had hitherto been elected in the proportion of one to twelve thousand of the population, was reduced in 1905, when the proportion of one to sixteen thousand was substituted; the Chamber of 1906, elected under the new system, consisted of 177 deputies. In 1906 the electoral districts were diminished in number and enlarged so as to coincide with the twenty-six administrative departments (eo/ioi); the reduction of .these departments to their former number of sixteen, which is in contemplation, will bring about some further diminution in parliamentary representation. It is hoped that recent legislation will tend to check the pernicious practice of bartering personal favours, known as crvvaXXayr], which still prevails to the great detriment of public morality, paralysing all branches of the administration and wasting the resources of the state. Political parties are formed not for the furtherance of any principle or cause, but with the object of obtaining the spoils of office, and

the various groups, possessing no party watchword or programme, frankly designate themselves by the names of their leaders. Even the strongest government is compelled to bargain with its supporters in regard to the distribution of patronage and other favours. The consequent instability of successive ministries has retarded useful legislation and seriously checked the national progress. In 1906 a law was passed disqualifying junior officers of the army and navy for membership of the Chamber; great numbers of these had hitherto been candidates at every election. This much-needed measure had previously been passed by Trikoupis, but had been repealed by his rival Delyannes. The executive is vested in the king, who is personally irresponsible, and governs through ministers chosen by himself and responsible to the Chamber, of which they are ex-qfficio members. He appoints all public officials, sanctions and proclaims laws, convokes, prorogues and dissolves the Chamber, grants pardon or amnesty, coins money and confers decorations. There are seven ministries which respectively control the departments of foreign affairs, the interior, justice, finance, education and worship, the army and the navy.

The 26 departments or voˆiai, into which the country is divided for administrative purposes, are each under a prefect or nomarch (vonapxos); they are subdivided into 69 districts or eparchies, and into 445 communes or demes {drjixoi) £ ? ca / under mayors or demarchs (driixapxot) . The prefects tration. and sub-prefects are nominated by the government; the mayors are elected by the communes for a period of four years. The prefects are assisted by a departmental council, elected by the population, which manages local business and assesses rates; there are also communal councils under the presidency of the mayors. There are altogether some 12,000 state-paid officials in the country, most of them inadequately remunerated and liable to removal or transferral upon a change of government. A host of office-seekers has thus been created, and large numbers of educated persons spend many years in idleness or in political agitation. A law passed in 1905 secures tenure of office to civil servants of fifteen years' standing, and some restrictions have been placed on the dismissal and trans- ferral of schoolmasters.

Under the Turks the Greeks retained, together with their ecclesiastical institutions, a certain measure of local self-govern- ment and judicial independence. The Byzantine code, based on the Roman, as embodied in the 'E£d(3i/3Xos of Armenopoulos (1345), was sanctioned by royal decree ini83S with some modifications as the civil law of Greece. Further modifications and new enactments were subsequently introduced, derived from the old French and Bavarian systems. The penal code is Bavarian, the commercial French. Liberty of person and

domicile is inviolate; no arrest can be made, no house entered, and no letter opened without a judicial warrant. Trial by jury is established for criminal, political and press offences. A new civil code, based on Saxon and Italian law, has been drawn up by a commission of jurists, but it has not yet been considered by the Chamber. A separate civil code, partly French, partly Italian, is in force in the Ionian Islands. The law is administered by 1 court of cassation (styled the ” Areopagus “), 5 courts of appeal, 26 courts of first instance, 233 justices of the peace and 19 correctional tribunals.

The judges, who are appointed by the Crown, are liable to removal by the minister of justice, whose exercise of this right is often invoked by political partisans. The administration of justice suffers in consequence, more especially in the country districts, where the judges must reckon with the influential politicians and their adherents. The pardon or release of a convicted criminal is not infrequently due to pressure on the part of some powerful patron. The lamentable effects of this system have long been recognized, and in 1906 a law was introduced securing tenure of office for two or four years to judges of the courts of first instance and of the inferior tribunals. In the circumstances crime is less rife than might be expected; the temperate habits of the Greeks have conduced to this result. A serious feature is the great prevalence of homicide, due in

part to the passionate character of the people, but still more to the almost universal practice of carrying weapons. The tradi- tions of the vendetta are almost extinct in the Ionian Islands, but still linger in Maina, where family feuds are transmitted from generation to generation. The brigand of the old-fashioned type (Xjjffrijs, tiktcpTris) has almost disappeared, except in the remoter’ country districts, and piracy, once so prevalent in the Aegean, has been practically suppressed, but numbers of outlaws or absconding criminals (4 > vybdLKot) still haunt the mountains, and the efforts of the police to bring them to justice are far from successful. Their ranks were considerably increased after the warof 1897, when many deserters from the army and adventurers who came to Greece as volunteers betook themselves to a pre- datory life. On the other hand, there is no

habitually criminal class in Greece, such as exists in'the large centres of civilization, and professional mendicancy is still rare.

Police duties, for which officers and, in some cases, soldiers of the regular army were formerly employed, are since 1906 carried out by a reorganized gendarmerie force of 194 officers and 6344 non-commissioned officers and men, distributed in the twenty-six departments and commanded by an inspector- general resident at Athens, who is aided by a consultative com- mission. There are male and female prisons at all the depart- mental centres; the number of prisoners in 1906 was 5705. Except in the Ionian Islands, the general condition of the prisons is deplorable; discipline and sanitation are very deficient, and conflicts among the prisoners are sometimes reported in which knives and even revolvers are employed. A good prison has been built near Athens by Andreas Syngros, and a reformatory for juvenile offenders (kjyqfitiov) has been founded by George Averoff, another national benefactor. Capital sentences are usually commuted to penal servitude for life; executions, for which the guillotine is employed, are for the most part carried out on the island of Bourzi near Nauplia; they are often post- poned for months or even for years. There is no enactment resembling the Habeas Corpus Act, and accused persons may be detained indefinitely before trial. The Greeks, like the other nations liberated from Turkish rule, are somewhat litigious, and numbers of lawyers find occupation even in the smaller country towns.

The Greeks, an intelligent people, have always shown a remark- able zeal for learning, and popular education has made great strides. So eager is the desire for instruction that schools are often founded in the rural districts on the initiative of the villagers, and the sons of peasants, artisans and small shopkeepers come in numbers to Athens, where they support themselves by domestic service or other humble occupations in order to study at the university during their spare hours. Almost immediately after the accession of King Otho steps were taken to establish elementary schools in all the communes, and education was made obligatory. The law is not very rigorously applied in the remoter districts, but its enforcement is scarcely necessary. In 1898 there were 2914 " demotic " or primary schools, with 3465 teachers, attended by 129.210 boys (5-38% of the population) and 29,119 girls (1-19 % of the population). By a law passed in 1905 the primary schools, which had reached the number of 3359 in that year, were reduced to 2604. The expenditure on primary schools is nominally sustained by the communes, but in reality by the government in the form of advances to the communes, which are not repaid; it was reduced in 1905 from upwards of 7,000,000 dr. to

under 6,000,000 dr. In 1905 there were 306 ” Hellenic ” or secondary schools, with 819 teachers and 21,575 pupils (boys only) main- tained by the state at a cost of 1,720,096 dr.; and 39 higher schools, or gymnasia, with 261 masters and 6485 pupils, partly maintained by the state (expenditure 615,600 dr.) and partly by benefactions and other means. Besides these public schools there are several private educational institutions, of which there are eight at Athens with 650 pupils. The Polytechnic Institute of Athens affords technical instruction in the departments of art and science to 221 students. Scientific agricultural instruction has been much neglected; there is an agricultural school at

Educa- tion.

Religion

A’idinion in Thessaly with 40 pupils; there are eight agricultural stations (oraffyioi) in various parts of the country. There are two theological seminaries — the Rizari School at Athens (120 pupils) and a preparatory school at Arta; three other seminaries have been suppressed. The Commercial and Industrial Academy at Athens (about 225 pupils), a private institution, has proved highly useful to the country; there are four commercial schools, each in one of the country towns. A large school for females at Athens, the Arsakion, is attended by 1500 girls. There are several military and naval schools, including the military college of the Euelpides at Athens and the school of naval cadets (r&v dodficcv). The university of Athens in 1905 numbered 57 professors and 2598 students, of whom 557 were from abroad. Of the six faculties, theology numbered 79 students, law 1467, medicine 567, arts 206, physics and mathematics 192, and pharmacy 87. Ths university receives a subvention from the state, which in 1905 amounted to 563,960 dr.; it possesses a library of over 150,000 volumes and geological, zoological and botanical museums. A small tax on university education was imposed in 1903; the total cost to the student for the four years’ course at the university is about £25. Higher education is practically gratuitous in Greece, and there is a somewhat ominous increase in the number of educated persons who disdain agri- cultural pursuits and manual labour. The intellectual culture acquired is too often of a superficial character owing to the tendency to sacrifice scientific thoroughness and accuracy, to neglect the more useful branches of knowledge, and to aim at a showy dialectic and literary proficiency. (For the native and foreign archaeological institutions see Athens.)

The Greek branch of the Orthodox Eastern Church is practi- cally

independent, like those of Servia, Montenegro and Rumania, though nominally subject to the patriarchate of Constantinople. The jurisdiction of the patriarch was in fact repudiated in 1833, when the king was declared the supreme head of the church, and the severance was completed in 1850. Ecclesiastical affairs are under the control of the Ministry of Education. Church government is vested in the Holy Synod, a council of five ecclesiastics under the presidency of the metropolitan of Athens; its sittings are attended by a royal commissioner. The church can invoke the aid of the civil authorities for the punishment of heresy and the suppression of unorthodox literature, pictures, &c. There were formerly 21 archbishoprics and 29 bishoprics in Greece, but a law passed in 1899 suppressed the archbishoprics (except the metropolitan see of Athens) on the death of the existing prelates, and fixed the total number of sees at 3 2. The prelates derive their incomes partly from the state and partly from the church lands. There are about 5500 priests, who belong for the most part to the poorest classes. The parochial clergy have no fixed stipends, and often resort to agriculture or small trading in order to supplement the scanty fees earned by their ministrations. Owing to their lack of education their personal influence over their parishioners is seldom considerable. In addition to the parochial clergy there are 19 preachers (iepoKTjpvKis) salaried by the state. There are 1 70 monasteries and 4 nunneries in Greece, with about 1600 monks and 250 nuns. In regard to their constitution the monasteries are either " idiorrhythmic " or " coenobian " (see Athos) ; the monks (KaKoyepoi.) are in some cases assisted by lay brothers (KoofjuKoL) . More than 300 of the smaller monasteries were suppressed in 1829 and their revenues secular- ized. Among the more important and interesting monasteries are those of Megaspelaeon and Lavra (where the standard of insurrection, unfurled in 1821, is preserved) near Kalavryta, St Luke of Stiris near Arachova, Daphne and Penteli near Athens, and the Meteora group in northern Thessaly. The bishops, who must be unmarried, are as a rule selected from the monastic order and are nominated by the king; the parish priests are allowed to marry, but the remarriage of widowers is forbidden. The bulk of the population, about 2,000,000, belongs to the Orthodox Church; other Christian confessions number about 1 5,000, the great majority being Roman Catholics. The Roman Catholics (principally in Naxos and the Cyclades) have three

archbishoprics(Athens,Naxos andCorf u) ,five bishoprics and about 60 churches. The Jews, who are regarded with much hostility, have almost disappeared from the Greek mainland; they now number about 5000, and are found principally at Corfu. The Mahommedans are confined to Thessaly except a few at Chalcis. National sentiment is a more powerful factor than personal religious conviction in the attachment of the Greeks to the Orthodox Church; a Greek without the pale of the church is more or less an alien. The Catholic Greeks of Syros sided with the Turks at the time of the revolution; the Mahommedans of Crete, though of pure Greek descent, have always been hostile to their Christian fellow-countrymen and are commonly called Turks. On the other hand, that portion of the Macedonian population which acknowledges the patriarch of Constantinople is regarded as Greek, while that which adheres to the Bulgarian exarchate, though differing in no point of doctrine, has been declared schismatic. The constitution of 1864 guarantees toleration to all creeds in Greece and imposes no civil disabilities on account of religion.

Greece is essentially an agricultural country; its prosperity depends on its agricultural products, and more than half the population is occupied in the cultivation of the soil culture. an d kindred pursuits. The land in the plains and valleys is exceedingly rich, and, wherever there is a sufficiency of water, produces magnificent crops. Cereals nevertheless furnish the principal figure in the list of imports, the annual value being about 30,000,000 fr. The country, especially since the acquisition of the fertile province of Thessaly, might under a well-developed agricultural system provide a food-supply for all its inhabitants and an abundant surplus for exportation. Thessaly alone, indeed, could furnish cereals for the whole of Greece. Unfortunately, however, agriculture is still in a primitive state, and the condition of the rural popula- tion has received very inadequate attention from successive governments. The wooden plough of the Hesiodic type is still in use, especially in Thessaly; modern implements, however, are being gradually introduced. The employment of manure and the rotation of crops are almost unknown; the fields are generally allowed to lie fallow in alternate years. As a rule, countries dependent on agriculture are liable to sudden fluctua- tions in prosperity, but in Greece the diversity of products is so great that a failure in one class of crops is usually compensated by exceptional abundance in another. Among the causes which have hitherto retarded agricultural progress are the ignorance and conservatism of the peasantry, antiquated methods of cultivation, want of capital, absentee proprietorship, sparsity of population, bad roads, the prevalence of usury, the

uncertainty of boundaries and the land tax, which, in the absence of a survey, is levied on ploughing oxen; to these may be added the in- security hitherto prevailing in many of the country districts and the growing distaste for rural life which has accompanied the spread of education. Large estates are managed under the metayer system; the cultivator paying the proprietor from one-third to half of the gross produce; the landlords, who prefer to live in the larger towns, see little of their tenants, and rarely interest themselves in their welfare. A great proportion of the best arable land in Thessaly is owned by persons who reside permanently out of the country. The great estates in this province extend over some 1,500,000 acres, of which about 500,000 are cultivated. In the Peloponnesus peasant proprietor- ship is almost universal; elsewhere it is gradually supplanting the metayer system ; the small properties vary from 2 or 3 to 50 acres. The extensive state lands, about one-third of the area of Greece, were formerly the property of Mahommedan religious communities (vakoufs); they are for the most part farmed out annually by auction. They have been much en- croached upon by neighbouring owners; a considerable portion has also been sold to the peasants. The rich plain of Thessaly suffers from alternate droughts and inundations, and from the ravages of field mice; with improved cultivation, drainage and irrigation it might be rendered enormously productive. A commission has been occupied for some years in preparing

a scheme of hydraulic works. Usury is, perhaps, a greater scourge to the rural population than any visitation of nature; the institution of agricultural banks, lending money at a fair rate of interest on the security of their land, would do much to rescue the peasants from the clutches of local Shylocks. There is a difficulty, however, in establishing any system of land credit owing to the lack of a survey. Since 1897 a law passed in 1882 limiting the rate of interest to 8% (to 9 % in the case of commercial debts) has to some extent been enforced by the tribunals. In the Ionian Islands the rate of 10 % still prevails.

The following figures give approximately the acreage in 1906 and the average annual yield of agricultural produce, no official statistics being available : —

Acres.

Fields sown or lying fallow 3,000,000

Vineyards 337, 500

Currant plantations 175,000

Olives (10,000,000 trees) 250,000

Fruit trees (fig, mulberry, &c.) 125,000

Meadows and pastures 7,500,000

Forests 2,000,000

Waste lands 2,875,000

16,262,500

The average annual yield is as follows :—

Wheat 350,000,000 kilograms

Maize 100,000,000 ,,

Rye 20,000,000 „

Barley 70,000,000 ,,

Oats 75,000,000 „

Beans, lentils, &c 25,000,000 ,,

Currants 350,000,000 Venetian lb

Sultanina 4,000,000 ,,

Wine 3,000,000 hectolitres

Olive oil 300,000

Olives (preserved) .... 100,000,000 kilograms Figs (exported only) .... 12,000,000 ,,

Seed cotton 6,500,000 „

Tobacco 8,000,000 „

Vegetables and fresh fruits . . 20,000,000 „

Cocoons 1,000,000 „

Hesperidiums (exported only) . 4,000,000 „

Carobs (exported only) . . . 10,000,000 „

Resin 5,000,000

Beet . • 12,000,000

Rice is grown in the marshy plains of Elis, Boeotia, Marathon and Missolonghi; beet in Thessaly. The cultivation of vegetables is increasing ; beans, peas and lentils are the most common. Potatoes are grown in the upland districts, but are not a general article of diet. Of late years market-gardening has been taken up as a new industry in the neighbourhood of Athens. There is a great variety of fruits. Olive plantations are found everywhere; in i860 they occupied about 90,000 acres; in 1887, 433,701 acres. The trees are sometimes of immense age and form a picturesque feature in the landscape. In latter years the groves in many parts of the western Morea and Zante have been cut down to make room for currant plantations; the destruction has been deplorable ,in its consequences, for, as the tree requires twenty years to come into full bearing, replanting is seldom resorted to. Preserved olives, eaten with bread, are a common article of food. Excellent olive oil is produced in Attica and elsewhere. The value of the oil and fruit exported varies from five to ten million francs. Figs are also abundant, especially in Messenia and in the Cyclades. Mulberry trees are planted for the purposes of sericulture ; they have been cut down in great numbers in the currant-growing districts. Other fruit trees are the orange, citron, lemon, pomegranate and almond. Peaches, apricots, pears, cherries, &c, abound, but are seldom scientifically cultivated; the fruit is generally gathered while unripe. Cotton in 1906 occupied about 1 2 ,500 acres, chiefly in the neighbourhood of Livadia. Tobacco plantations in 1893 covered 16,320 acres, yielding about 3,500,000 kilograms; the yield in 1906 was 9,000,000 kilograms. About 40% of the produce is exported, principally to Egypt and Turkey. More important are the vineyards, which occupied in 1 887 an area of 306,42 1 acres. The best wine is made at Patras, on the royal estate at Decelea, and on other estates in Attica ; a peculiar flavour is imparted to the wine of the country by the addition of resin. The wine of Santorin, the modern representative of the famous ” malm- sey,” is mainly exported to Russia. The foreign demand for Greek wines is rapidly increasing; 3,77°> 2 57 gallons were exported in 1890, 4,974,196 gallons in 1894. There is also a growing demand for Greek cognac. The export of wine in 1905 was 20,850,941 okes, value 5,848,544 fr.; of cognac, 363,720 okes, value 1,091,160 fr.

The currant, by far the most important of Greek exports, is culti- vated in a limited area extending along the southern shore of the Gulf of Corinth and the seaboard of the Western Peloponnesus,

in Zante, Cephalonia and Leucas, and in certain districts of Acarnania and Aetolia; attempts to cultivate it elsewhere have c , generally proved unsuccessful. The history of the currant arraa s. in dustry nas been a record of extraordinary vicissitudes. Previously to 1 877 the currant was exported solely for eating purposes, the amounts for the years 1872 to 1877 being 70,766 tons, 71,222 tons, 76,210 tons, 72,916 tons, 86,947 tons, and 82,181 tons respect- ively. In 1877, however, the French vineyards began to suffer seriously from the phylloxera, and French wine producers were obliged to have recourse to dried currants, which make an excellent wine for blending purposes. The importation of currants into France at once rose from 881 tons in 1877 to 20,999 tons in 1880, and to 70,401 tons in 1889, or about 20,000 tons more than were imported into England in that year. Meanwhile the total amount of currants produced in Greece had nearly doubled in these thirteen years. The country was seized with a mania for currant planting; every other industry was neglected, and olive, orange and lemon groves were cut down to make room for the more lucrative growth. The currant growers, in order to increase their production as rapidly as possible, had recourse to loans at a high rate of interest, and the great profits which they made were devoted to further planting, while the loans remained unpaid. A crisis followed rapidly. By 1 89 1 the French vineyards had to a great extent recovered from the disease, and wine producers in France began to clamour against the competitionof foreign wines and wine-producingraisinsand currants. The import duty on these was thereupon raised from 6 francs to 15 francs per 100 kilos, and was further increased in 1894 to 25 francs. The currant trade with France was thus extinguished ; of a crop averaging 160,000 tons, only some 110,000 now found a market. Although a fresh opening for exportation was found in Russia, the value of the fruit dropped from £15 to £5 per ton, a price scarcely covering the cost of cultivation. In July 1895 the government introduced a measure, since known as the Retention (irapanpaTriais) Law, by which it was enacted that every shipper should deliver into depots provided by the government a weight of currants equiva- lent to 15 % of the amount which he intended to export. A later law fixed the quantity to be retained by the state at 10%, which might be increased to 20 %, should a representative committee, meeting every summer at Athens, so advise the government. The currants thus taken over by the government

cannot be exported unless they are reduced to pulp, syrup or otherwise rendered unsuitable for eating purposes; they may be sold locally for wine-making or distil- ling, due precautions being taken that they are not used in any other way. The price of exported currants is thus maintained at an artificial figure. The Retention Law, which after 1895 was voted annually, was passed for a period of ten years in 1899. This pernicious measure, which is in defiance of all economic laws, perpetuates a superfluous production, retards the development of other branches of agriculture and burdens the government with vast accumulations of an unmarketable commodity. It might excusably be adopted as a temporary expedient to meet a pressing crisis, but as a permanent system it can only prove detrimental to the country and the currant growers themselves.

In 1899 a ” Bank of Viticulture ” was established at Patras forthe purpose of assisting the growers, to whom it was bound to make advances at a low rate of interest ; it undertook the storage and the sale of the retained fruit, from which its capital was derived. The bank soon found itself burdened with an enormous unsaleable stock, while its loans for the most part remained unpaid; meantime over-production, the cause of the trouble, continued to increase, and prices further diminished. In 1903 a syndicate of English and other foreign capitalists made proposals for a monopoly of the export, guaranteeing fixed prices to the growers. The scheme, which con- flicted with Anglo-Greek commercial conventions, was rejected by the Theotokis ministry; serious disturbances followed in the currant- growing districts, and M. Theotokis resigned. His successor, M. Rallis, in order to appease the cultivators, arranged that the Currant Bank should offer them fixed minimum prices for the various growths, and guaranteed it a loan of 6,000,000 dr. The resources of the bank, however, gave out before the end of the season, and prices pursued their downward course. Another experiment was then tried; the export duty (15%) was made payable in kind, the retention quota being thus practically raised from 20 to 35 %. The only result of this measure was a diminution of the export ; in the spring of 1905 prices fell very low and the growers began to despair. A syndicate of banks and capitalists then came forward, which introduced the system now in operation. A privileged company was formed which obtained a charter from the government for twenty years, during which period the retention and export duties are maintained at the fixed rates of 20 and 15 % respectively. The company aims at keeping up the prices of the marketable qualities by employing profitably for industrial purposes the unexported surplus and retained inferior qualities; it pays to the state 4,000,000 dr. annually under the head of export duty; offers all

growers at the beginning of each agri- cultural year a fixed price of 1 15 dr. per 1000 Venetian lb irrespective of quality, and pays a price varying from 1 15 dr. to 145 dr. according to quality at the end of the year for the unexported surplus. In return for these advantages to the growers the company is entitled to receive 7 dr'. on every 1000 lb of currants produced and to dispose of the whole retained amount. A special company has been formed

for the conversion of the superfluous product into spirit, wine, &c. The system may perhaps prove commercially remunerative, but it penalizes the producers of the better growths in order to provide a livelihood for the growers of inferior and unmarketable kinds and protracts an abnormal situation. The following table gives the annual currant crop from 1877 to 1905 : —

Year.

Total crop

Exported to

Exported to

(tons).

Gt. Britain.

France.

1877

82,181

1 4

881

1878

100,004

9,086

1879

92,3U

19,087

1880

92,337

20,999

1881

121,994

30,315

1882

109,403

51,933

26,282

1883

114,980

52,099

24,815

1884

129,268

59,629

39,198

1885

113,287

55,765

37,730

1886

127,570

48,892

45,000

1887

127,160

55,549

37,438

1888

158,728

63,7H

40,735

1889

142,308

52,251

69,555

1890

146,749

67,502

37,8i6

1891

l6i,545

70,762

39,712

1892

116,944

60,418

21,721

1893

119,886

73,000

6,800

1894

135,500

64,500

15,000

1895

167,695

60,500

26,500

1896

I53,5H

65,000

6,500

1897

U5,730

63,000

2,000.

1898

I53,5H

69,500

6,000

1899

144,071

65,600

3,800

1900

47,236

36,000

300

1901

139,820

58,000

1,216

1902

152,580

58,400

4,782

1903

179,499

54,800

4,470

1904

146,500

58,850

820

1905

162,957

61,700

1,042

The ” peronospora,” a species of white blight, first caused considerable damage in the Greek vineyards in 1892, recurring in 1897 and 1900.

More than half the cultivable area of Greece is devoted to pastur- age. Cattle-rearing, as a rule, is a distinct occupation from agri- cultural farming; the herds are sent to pasture on the stock- mountains in the summer, and return to the plains at the tarmlnir beginning of winter. The larger cattle are comparatively *”

rare, being kept almost exclusively for agricultural labour; the smaller are very abundant. Beef is scarcely eaten in Greece, the milk of cows is rarely drunk and butter is almost unknown. Cheese, a staple article of diet, is made from the milk of sheep and goats. The number of larger cattle has declined in recent years; that of the smaller has increased. The native breed of oxen is small; buffaloes are seldom seen except in north-western Thessaly ; a few camels are used in the neighbourhood of Parnassus. The Thessalian breed of horses, small but sturdy and enduring, can hardly be taken to represent the celebrated chargers of antiquity. Mules are much employed in the mountainous districts; the best type of these animals is found in the islands. The flocks of long-horned sheep and goats add a picturesque feature to Greek rural scenery. The goats are more numerous in proportion to the population than in any other European country (137 per 100 inhabitants). The shepherds’ dogs rival those of Bulgaria in ferocity. According to an unofficial estimate published in 1905 the numbers of the various domestic animals in 1899 were as follows: Oxen and buffaloes, 408,744; horses, 157,068; mules, 88,869; donkeys, 141,174; camels, 51; sheep, 4,568,151; goats, 3,339,439; pigs, 79,716. During the four years 1899-1902 the annual average value of imported cattle was 4,218,015 dr., of exported cattle 209,32 1 dr.

The forest area (about 2,500,000 acres or one-fifth of the surface of the mainland) is for the most part state property. The value of the forests has been estimated at 200,000,000 fr. ; the most productive are in the district extending from the Pindus range to the Gulf of Corinth. The principal trees are the oak (about 30 varieties), the various coniferae, the chestnut, maple, elm, beech, alder, cornel and arbutus. In Greece, as in other lands formerly subject to Turkish rule, the forests are not only neglected, but often deliberately destroyed ; this great source of national wealth is thus continually diminishing. Every year immense forest ‘fires may be seen raging in the mountains, and many of the most picturesque districts in the country are converted into desolate wildernesses. These conflagrations are mainly the work of shep- herds eager to provide increased pasturage for their flocks ; they are sometimes, however, due to the carelessness of smokers, and occa- sionally, it is said, to spontaneous ignition in hot weather. Great damage is also done by the goats, which browse on theyoung saplings ; the pine trees are much injured by the practice of scoring their bark for resin. With the disappearance of the trees the soil of the moun- tain slopes, deprived of its natural protection, is soon washed away

Forests.

by the rain; the rapid descent of the water causes inundations in the plains, while the uplands become sterile and lose their vegetation. The climate has been affected by the change; rain falls less fre- quently but with greater violence, and the process of denudation is accelerated. The government has from time to time made efforts for the protection of the forests, but with little success till recently. A staff of inspectors and forest guards was first organized in 1877. The administration of the forests has since 1893 been entrusted to a department of the Ministry of Finance, which controls a staff of 4 inspectors (e7ri0«opi)rai), 31 superintendents (dWapxoi), 52 head foresters (dpx’^i’XiKes) and 298 foresters (5a

The chief minerals are silver, lead, zinc, copper manganese, magnesia, iron, sulphur and coal. Emery, salt, millstone and Mines gyP sum > which are found in considerable quantities,

are worked by the government. The important mines at Laurium, a

source of great wealth to ancient Athens, were reopened in 1864 by a Franco-Italian company, but were declared to be state property in 1871 ; they are now worked by a Greek and a French company. The output of marketable ore in 1899 amounted to 486,760 tons, besides 289,292 tons of dressed lead ore. In 1905 the output was as follows: Raw and roasted manganese iron ore, 113,636 tons; hematite iron ore, 94,734 tons; calamine or zinc ore, 22,612 tons; arsenic and argentiferous lead, 1875 tons; zinc blende and galena, 443 tons; total, 233,300 tons, together with 164,857 tons of dressed lead, producing 13,822 tons of silver pig lead containing 1657 to 1910 grams of silver per ton. It has been found profitable to resmelt the scoriae of the ancient workings. The total value of the exports from the Laurium mines.whichin 1875 amounted to only £150,513, had in 1899 increased to £827,209, but fell in 1905 to £499,882. The revenue accruing to the government from all mines

Tons.

Francs.

Chrome

Gypsum

Ferromanganese …. Lead (argentiferous pig) ore

Magnesite

Manganese ore ….

Millstones

Salt

Sulphur

Zinc ore

8,900

6,972 185 465,622 89,687 13,729 “,757 43,498

8,171 12,628 25,201

1,126 22,562

337,952 742,486

7,995 3,387,467 1,182,652 6,811,792

I43,8i4

864,982

122,565

34,660

1,638,065 121,000

2,852,355

green on Taygetus and in Thessaly; black at Tenos; and red (porphyry) in Maina.

The official statistics of the output and value of minerals produced in 1905 were as in the preceding table.

The number of persons employed in mining operations in 1905 was 9934.

Owing to the natural aptitude of the Greeks for commerce and their predilection for a seafaring life a great portion of the trade of the Levant has fallen into their hands. Im- portant Greek mercantile colonies exist in all the Commerce larger ports of the Mediterranean and the Black Sea, industry. and many of them possess great wealth. In some of the islands of the archipelago almost every householder is the owner or joint owner of a ship. The Greek mercantile marine, which in 1888 consisted of 1352 vessels (70 steamers) with a total tonnage of 219,415 tons, numbered in 1906, according to official returns, 1364 vessels (275 steamers) with a total tonnage of 427,291 tons. This figure is apparently too low, as the ship- owners are prone to understate the tonnage in order to diminish the payment of dues. Almost the whole corn trade of Turkey is in Greek hands. A large number of the sailing ships, especially the smaller vessels engaged in the coasting trade, belong to the islanders. A considerable portion of the shipping on the Danube and Pruth is owned by the inhabitants of Ithaca and Cephalonia; a certain number of their sleps (crXema) have latterly been acquired by Rumanian Jews, but the Greek flag is still pre- dominant. There are seven principal Greek steamship companies owning 40 liners with a total tonnage of 21,972 tons. In 1847 there was but one lighthouse in Greek waters; in 1906 there were 70 lighthouses and 68 port lanterns. Hermoupolis (Syra) is the chief seat of the carrying trade, but as a commercial port it yields to Peiraeus,

which is the principal centre of distribution for imports. Other important ports are Patras, Volo, Corfu, Kalamata and Laurium.

The following table gives the total value (in francs) of special Greek commerce for the given years : —

and quarries, including those worked by the state, was estimated in the budget for 1906 at 1,332,000 dr. The emery of Naxos, which is a state monopoly, is excellent in quality and very abundant. Mines of iron ore have latterly' been opened at Larimna in Locris. Magnesite mines are worked by an Anglo-Greek company in Euboea. There are sulphur and manganese mines in the island of Melos, and the volcanic island of Santorin produces pozzolana, a kind of cement, which is exported in considerable quantities. The great abundance of marble in Greece has latterly attracted the attention of foreign capitalists. New quarries have been opened since 1897 by an English company on the north slope of Mount Pentelicus, anil are now connected by rail with Athens and the Peiraeus. The marble on this side of the mountain is harder than that on the south, which alone was worked by the ancients. The output in 1905 was 1573 tons. Mount Pentelicus furnished material for most of the celebrated buildings of ancient Athens; the marble, which is white, blue- veined, and somewhat transparent, assumes a rich yellow hue after long exposure to the air. The famous Parian quarries are still worked; white marble is also found at Scyros, Tenos and Naxos; grey at Stoura and Karystos; variegated at Valaxa and Karystos;

1887.

1892.

1897.

1902.

Imports Exports

131,849,325 102,652,487

119,306,007 82,261,464

116,363,348 81,708,626

137,229,364 79,663,473

The marked fluctuations in the returns are mainly attributable to

variations in the price and quantity of imported cereals and in the sale of currants. The great excess of imports, caused by the large importation of food-stuffs and manufactured articles, is due to the neglect of agriculture and the undeveloped condition of local industries. : The imports and exports for 1905 were distributed as follows: —

Imports from.

Exports to.

Frs.

Frs.

Russia ….

27,725,218

810,925

Great Britain

27,516,928

24,436,707

Au st ria- H u ngary

19,444,415

7,876,806

Turkey ….

15,538,370

4,516,403

Germany

13,896,687

7,5H,474

France ….

10,101,070

7,078,321

Italy

6,190,253

4,266,210

Bulgaria ….

5,135,718

133,106

Rumania

3,814,641

1,152,207

America ….

2,656,501

6,440,648

Belgium ….

2,276,393

2,068,138

Netherlands .

1,921,762

7,180,301

Egypt ….

634,035

5,928,555

Switzerland .

348,281

Other countries

4,555,781

4,288,365

Total . . .

141,756,053 ,

83,691,166

An enumeration of the chief articles of importation and exporta- tion, together with their value, will be found in tabular form overleaf.

Greece does not possess any manufacturing industries on a large scale; the absence of a native coal supply is an obstacle to their development. In 1889 there were 145 establishments employing steam of 5568 indicated horse-power; in 1892 the total horse-power employed was estimated at 10,000. In addition to the smelting-works at Laurium, at which some 5000 hands are employed by Greek and French companies and local proprietors, there are flour mills, cloth, cotton and. silk spinning mills, ship-building and engineering works oil-presses, tanneries, powder and dynamite mills, soap mills (abou-

ARMY]

GREECE

437

Principal Articles of Importation.

Articles.

1904.

1905.

Total value in francs.

Imported from the United Kingdom.

Total value in francs.

Imported from the United Kingdom.

Textiles

Forest products …. Wrought metals …. Coals and pit-coal Yarn and tissues ….

Fish

Raw hides

Various animals ….

Rice

27.735.8o8

17.999.344 13,341,191 10,146,500

7.757-444 . 6,522,086

4-739-819 4,992,615

4.558,ioi

4.271. 151

3.on,450

3.327.144 2,957,601 2,606,696 1,977,894 1,750,858

none

10,762,464

7,630,633

9.769 2,162,250 6,087,068 2,504,667 2,394,224

478,965

none

none

157,017 293,610

none

63,882 341-839

32,511,784 13,460,620

12,254,190

5,073,841 8,021,523 1,014,164 3,909,657

3.373,523 2,070,250 3,319,700 3,060,904 2,887,854 1,901,486 2,146,509

none

5,497,172

61,309

4,308,357

6,838,079

186,072

215,745 1,268

none

76,454 107,296

70 236,027 281,433

Chief Articles of Exportation.

Articles.

1904.

1905.

Total value in francs.

Exported to the United Kingdom.

Total value in francs.

Exported to

the United

Kingdom.

Currants

Minerals and raw metals Wines

Figs

Minerals and metals (worked)

Olives

Valonea

Cognac. . . . ‘.

28,841,678

19,134,185

10,084,960

7,285,385

4,163,262

3,583,428

2,754-245 1,793,362 1,558,678 1,027,224

14.569,137 5,161,898

429,H3

39,512

212,081

62,304

7,750

9,833

200,849

12,099

34,299,78o

15,125,072

5,832,139 6,157,092 2,150,285 3,309,432 2,607,580 1,138,116 1,917,014 1,091,160

17,008,929

5.438,698

881,696

147,565

64,310

338,196

900

18,800

146,927

2,283

Posts and tele-

40), and some manufactures of paper, glass, matches.turpentine, white lead, hats, gloves, candles, &c. About 100 factories are established in the neighbourhood of Athens and Peiraeus. The wine industry (10 factories) is of considerable importance, and the manufacture of cognac has latterly made great progress; there are 10 large and numerous small cognac distilleries. Ship-building is carried on actively at all the ports on the mainland and islands; about 200 ships, mostly of low tonnage, are launched annually.

Public Works. — The important drainage-works at Lake Copais were taken over by an English company in 1890. The lake covered an area of 58,080 acres, the greater part of which is now rendered, fit for cultivation. The drainage works consist of a canal, 28 kilo- metres in length, and a tunnel of 600 metres descending through the mountain to a lower lake, which is connected by a second tunnel with the sea. The reclaimed land is highly fertile. The area under crops amounted in 1906 to 27,414 acres, of which 20,744 were let to tenants and the remainder farmed by the company. The un- cultivated portion' affords excellent grazing. The canal through the Isthmus of Corinth was opened to navigation in November 1893. The total cost of the works,

which were begun by a company in 1882, was 70,000,000 francs. The narrowness of the canal, which is only 24-60 metres broad at the surface, and the strength of the current which passes through it, seriously detract from its utility. The high charges imposed on foreign vessels have proved almost prohibitive. There are reduced rates for ships sailing in Greek waters. Up to the 31st of July 1906, 37,214 vessels, with a tonnage of 4,971,922, had passed through the canal. The receipts up to that date were3,207, 835 drachmae (mainly from Greek ships) and 415,976 francs (mainly from foreign ships). In 1905, 2930 vessels (2735 Greek) passed through, the receipts being 281,935 drachmae and 34,142 francs. The total liabilities of the company in 1906 were about 40,000,000 fr. The canal would be more frequented by foreign shipping if the harbours at its entrances were improved, and its sides, which are of masonry, lined with beams ; efforts are being made to raise funds for these purposes. The widening of the Eunpus Channel at Chalcis to the extent of 21-56 metres was accomplished in 1894. The opera- tions involved the destruction of the picturesque Venetian tower whifch guarded the strait. A canal was completed in 1903 rendering navigable the shallow channel between Leucas (Santa Maura) and the mainland (breadth 15 metres, depth 5 metres). Large careening docks were undertaken in 1909 at Peiraeus at an estimated cost of 4,750,000 drachmae.

Communications.— Internal communication by roads is improving, though much remains to be done, especially as regards the quality of the roads. A considerable impetus was given to road-making

under the Trikoupis administration. In 1878 there were onfy 555 m. of roads; in 1898 there were 2398 m. ; in 1906, 3275 m. Electric trams have been introduced at Patras. Railways were open to traffic in 1900 for a length of 598 m. ; in 1906 for a length of 867 m. The circuit of the Morea rail- ways (462 m.) was completed in 1902 ; from Diakophto, on the north coast, a cogwheel railway, finished in 1894, ascends to Kalavryta. A very im- portant undertaking is the completion of a line from Peiraeus to the frontier, the contract for which was signed in 1900 between the Greek government and the Eastern Railway Extension Syndicate (subsequently converted into the Society des Chemins de Fer helle- nigues). A line connecting Peiraeus with Larissa was begun in 1890, but in 1894 the English company which had undertaken the contract went into liquidation. Under the contract of 1900 the line was drawn through Demerli, in the south of Thessaly, to Larissa, a distance of 217 m., and con- tinued through the vale of Tempe to the Turkish frontier (about 246 m. in all). Branch lines have been con- structed to Lamia and Chalcis. The establishment of a connexion with the continental railway system, by a junction with

the line from Belgrade to Salonica, would be of immense ad- vantage to Greece, and the Peiraeus would become an important place of embarkation for Egypt, India and the Far East.

In 1905 the number of post offices was 640. Of these 320 were also tele- graph and 89 telephone stations, with 664 clerks; the remaining post offices possess no special staff, but Sˆpas. are served by persons who also pursue other occupations. The number of postmen and other employees was 889. During the year there passed through the post 6,897,899 ordinary letters for the interior, 2,980,958 for foreign destinations, 2,788,477 from abroad; 540,411 registered letters or parcels for the interior, 309,907 for. foreign countries, and 300,150 from abroad; 880,673 post-cards for the interior, 504,785 from abroad, and 187,975 sent abroad; 100,680 samples; 7,068,125 printed papers for the interior, 5,278,405 to or from foreign countries. Telegraph lines in 1905 extended over 4222 m. with 6836 m. of wires; 841,913 inland telegrams, 221,188 service telegrams and 129,036 telegrams to foreign destina- tions were despatched, and 169,519 received from abroad. Receipts amounted to 4,589,601 drachmae (postal service 2,744,212, telegraph and telephone services 1,845,389 drachmae) and expenditure to 3.954.742 drachmae.

The Greek army has recently been in a state of transition. Its condition has never been satisfactory, partly owing to the absence of systematic effort in the work of organization, partly owing to the pernicious influence of political rmy ‘

parties, and in times of national emergency it has never been in a condition of readiness. The experience of the war of 1897 proved the need of far-reaching administrative changes and disciplinary reforms. A scheme of complete reorganization was subsequently elaborated under the auspices of the crown prince Constantine, the commander-in-chief, and received the assent of the Chamber in June 1904. During the war of 1897 about 65,000 infantry, 1000 cavalry, and 24 batteries were put into the field, and after great efforts another 15,000 men were mobilized. Under the new scheme it is proposed to maintain on a peace footing 1887 officers, 25,140 non-commissioned officers and men, and 4059 horses and mules; in time of war the active army will consist of at least 120,000 men and the territorial army of at least 60,000 men. The heavy expenditure entailed by the project has been an obstacle to its immediate realization. In order to meet this expenditure a special fund has been instituted in addition to the ordinary military budget, and certain revenues have been assigned to it amounting to about 5,500,000 drachmae annually. In 1906, however, it was decided to suspend partially for five years the

operation of the law of 1904 and to devote

the resources thus economized together with other funds to the immediate purchase of new armaments and equipment. Under this temporary arrangement the peace strength of the army in 1908 consisted of 1939 officers and civilians, 19,416 non-commissioned officers and men and 2661 horses and mules; it is calculated that the reserves will furnish about 77,000 men and the territorial army about 37,000 men in time of war.

Military service is obligatory, and liability to serve begins from the twenty-first year. The term of service comprises two years in the active army, ten years in the active army reserve (for cavalry eight years), eight years in the territorial army (for cavalry ten years) and ten years for all branches in the territorial army reserve. As a rule, however, the period of service in the active army has hitherto been considerably shortened; with a view to economy, the men, under the law of 1904, receive furlough after eighteen months with the colours. Exemptions from military service, which were previously very numerous, are also restricted considerably by the law of 1904, which will secure a yearly contingent of about 13,000 men in time of peace. The conscripts in excess of the yearly contingent are withdrawn by lot; they are required to receive six months' training in the ranks as supernumeraries before passing into the reserve, in which they form a special category of " liability " men. Under the temporary system of 1906 the contingent is reduced to about 10,000 men by postponing the abrogation of several exemptions, and the period of service is fixed at fourteen months for all the conscripts alike. The field army as constituted by the law of 1904 consists of 3 divisions, each division comprising 2 brigades of infantry, each of 2 regiments of 3 battalions and other units. There are thus 36 battalions of infantry (of which 12 are cadres); also 6 battalions of evzones (highlanders) , 18 squadrons of cavalry (6 cadres), $ˆ batteries of artillery (6 cadres) , 3 battalions of engineers and telegraphists, 3 companies of ambulance, 3 of train, &c. The artillery is composed of 24 field batteries, 3 heavy and 6 mountain batteries; it is mainly provided with Krupp 7-5 cm. guns dating from 1870 or earlier. After a series of trials in 1907 it was decided to order 36 field batteries of 7-5 cm. quick-firing guns and 6 mountain batteries, in all 168 guns, with 1500 projectiles for each

battery from the Creuzot factory. The infantry, which was hitherto armed with the obsolete Gras rifle (-433 in.), was furnished in 1907 with the Mannlicher-Schonauer (model 1903) of which 100,000 had been delivered in May 1908. Hitherto the gendarmerie, which replaced the police, have formed a corps drawn from the army, which in 1908 consisted of 194 officers and 6344 non-commissioned officers and men, but a law passed in 1907 provided for these forces being thenceforth recruited separately by voluntary enlistment in annual contingents of 700 men. The participation of the officers in politics, which has proved very injurious to discipline, has been checked by a law forbidding officers below the rank of colonel to stand for the Chamber. In the elections of 1905 115 officers were candidates. The three divisional headquarters are at Larissa, Athens and Missolonghi; the six headquarters of brigades are at Trikkala, Larissa, Athens, Chalcis, Missolonghi and Nauplia. In 1907 annual manceuvres were instituted.

The Greek fleet consisted in 1907 of 3 armoured barbette ships of 4885 tons (built in France in 1890, reconstructed 1899), carrying each three io-8-in. guns, five 6-in., thirteen quick-firing and smaller guns, and three torpedo tubes; 1 cruiser of 1770 tons (built in 1879), w ‘th two 6-7-in. and six light quick-firing guns; 1 armoured central battery ship of 1774 tons (built 1867, reconstructed 1897) with two §-4 in. and nine small quick-firing guns; 2 coast-defence gunboats with one io-6-in. gun each; 4 corvettes; 1 torpedo depot ship; 8 destroyers, each with six guns (ordered in 1905); 3 transport steamers; 7 small gunboats; 3 mining boats; 5 torpedo boats; r royal yacht ; ,2 school ships and various minor vessels. The personnel of the navy was composed in 1907 of 437 officers, 26 cadets, 11 18 petty officers, 2372 seamen and stokers, 60 boys and 99 civilians, together with 386 artisans employed at the

Navy.

arsenal. The navy is manned chiefly by conscription ; the period of service is two years, with four years in the reserve. The headquarters of the fleet and arsenal are in the island of Salamis, where there is a dockyard with naval stores, a floating dock and a torpedo school. Most of the vessels of the Greek fleet were in 1907 obsolete; in 1004 a commission under the presidency of Prince George proposed the rearmament of the existing iron- clads and the purchase of three new ironclads and other vessels. A different scheme of reorganization, providing almost exclusively for submarines and scout vessels, was suggested to the government by the French admiral Fournier in 1908, but was opposed by the Greek naval officers. With a view to the

augmentation and better equipment of the fleet a special fund was instituted in 1900 to which certain revenues have been assigned; it has been increased by various donations and bequests and by the proceeds of a state lottery. The fleet is not exercised methodically either in navigation or gunnery practice ; a long voyage, however, was undertaken by the ironclad vessels in 1904. The Greeks, especially the islanders of the Aegean, make better sailors than soldiers; the personnel of the navy, if trained by foreign officers, might be brought to a high state of efficiency.

The financial history of Greece has been unsatisfactory from the outset. Excessive military and naval expenditure (mainly due to repeated and hasty mobilizations) , a lax and improvident system of administration, the corruption of political parties Finance. and the instability of the government, which has rendered impossible the continuous application of any scheme of fiscal reform — all alike have contributed to the economic ruin of the country. For a long series of years preceding the declaration of national insolvency in 1893 successive budgets presented a deficit, which in years of political excitement and military activity assumed enormous proportions: the shortcomings of the budget were supplied by the proceeds of foreign loans, or by means of advances obtained in the country at a high rate of interest. The two loans which had been contracted during the war of independence were extinguished by means of a conversion in 1889. Of the existing foreign loans the earliest is that of 60,000,000 frs., guaranteed by the three protecting powers in 1832; owing to the payment of interest and amortization by the powers, the capital amounted in 1871 to 100,392,833 f r. ; on this Greece pays an annual sum of 900,000 fr., of which 300,000 have been granted by the powers as a yearly subvention to King George. The only other existing foreign obligation of early date is the debt to the heirs of King Otho (4,500,000 dr.) contracted in 1868. A large amount of internal debt was incurred between 1848 and 1880, but a considerable proportion of this was redeemed with the proceeds of the foreign loans negotiated after this period. At the end of 1880 the entire national debt, external and internal, stood at 252,652,481 dr. In 1881 the era of great foreign loans began. In that year a 5 % loan of 120,000,000 fr. was raised to defray the expenses of the mobilization of 1880. This was followed in 1884 by a 5% loan of 170,000,000 fr., of which 100,000,000 was actually issued. The service of these loans was guaranteed by various State revenues. A ” patriotic loan ” of 30,000,000 dr. without interest, issued during the war excitement of 1885, proved a failure, only 2,723,860 dr. being subscribed. In 1888 a 4% loan of 135,000,000 fr. was contracted, secured on the receipts of the five State monopolies,

the management of which was entrusted to a privileged company. In the following year (1889) two 4% loans of 30,000,000 fr. and 125,000,000 fr. respectively were issued without guarantee or sinking fund ; Greek credit had now apparently attained an established position in the foreign money market, but a decline of public confidence soon became evident. In 1890, of a 5% loan of 80,000,000 fr. effective, authorized for the construction of the Peiraeus-Larissa railway, only 40,050,000 fr. was taken up abroad and 12,900,000 fr. at home; large portions of the proceeds were devoted to other purposes. In 1892 the government was compelled to make large additions to the internal floating debt, and to borrow 16,500,000 fr. from the National Bank on onerous terms. In 1893 an effort to obtain a foreign loan for the reduction, of the forced currency proved unsuccess- ful. (For the events leading up to the declaration of national bankruptcy in that year see under Recent History.) A funding convention was concluded in the summer, under which the creditors accepted scrip instead of cash payments of interest. A few months later this arrangement was reversed by the Chamber, and on the 13th December a law was passed assigning provisionally to all the foreign loans alike 30% of the stipulated interest; the reduced coupons were made payable in paper instead of gold, the sinking funds were suspended, and the sums encashed by the monopoly company were confiscated. The causes of the financial catastrophe may be briefly summarized as follows: (1) The military prepara- tions of 1885-1886, with the attendant disorganization of the country ; the extraordinary expenditure of these years amounted to 130,987,772 dr. (2) Excessive borrowing abroad, involving a charge

for the service of foreign loans altogether disproportionate to the revenue. (3) Remissness in the collection of taxation : the total loss through arrears in a period of ten years (1882-1891) was 36.549,202 dr., being in the main attributable to non-payment of direct taxes. (4) The adverse balance of trade, largely due to the neglected condition of agriculture ; in the five years preceding the crisis (1888-1892) the exports were stated to amount to £19,578,973, while the imports reached £24,890,146; foreign live stock and cereals being imported to the amount of £6,193,579. The proximate cause of the crisis was the rise in the exchange owing to the excessive amount of paper money in circulation. Forced currency was first introduced in 1868, when

15,000,000 dr. in paper money was issued; it was abolished in the following year, but reintroduced in 1877 with a paper issue of 44,000,000 dr. It was abolished a second time in 1884, but again put into circulation in 1885, when paper loans to the amount of 45,000,000 dr. were authorized. In 1893 the total authorized forced currency was 146,000,000 dr., of which 88,000,000 (including 14,000,000 dr. in small notes)was on account of the govern- ment. The gold and silver coinage had practically disappeared from circulation. The rate of exchange, as a rule, varies directly with the amount of paper money in circulation, but, owing to speculation, it is liable to violent fluctuations whenever there is an exceptional demand for gold in the market. In 1893 the gold franc stoodat the ratio of i-6o to the paper drachma; the service of the foreign loans required upwards of 31,000,000 dr. in gold, and any attempt to realize this sum in the market would have involved an outlay equivalent to at least half the budget. With the failure of the projected loan for the withdrawal of the forced currency repudiation became inevitable. The law of the 13th of December was not recog- nized by the national creditors: prolonged negotiations followed, but no arrangement was arrived at till 1897, when the intervention of the powers after the war with Turkey furnished the opportunity for a definite settlement. It was stipulated that Turkey should receive an indemnity of £T4,ooo,ooo contingent on the evacuation of Thessaly ; in order to secure the payment of this sum by Greece without prejudice to the interests of her creditors, and to enable the country to recover from the economic consequences of the war, Great Britain, France and Russia undertook to guarantee a 2 j % loan of 170,000,000 fr., of which 150,000,000 fr. has been issued. By the preliminary treaty of peace (18th of September 1897) an International Financial Commission, composed of six representatives of the powers, was charged with the payment of the indemnity to Turkey, and with ” absolute control ” over the collection and employment of revenues sufficient for the service of the foreign debt. A law defining the powers of the Commission was passed by the Chamber, 26th of February 1898 (o.s.). The revenues assigned to its supervision were the five government monopolies, the tobacco and stamp duties, and the import duties of Peiraeus (total annual value estimated at 39,600,000 dr.) : the collection was entrusted to a Greek society, which is under the absolute control of the Commission. The returns of Peiraeus customs (estimated at 10,700,000 dr.) are regarded as an extra guarantee, and are handed over to the Greek government; when the produce of the other revenues exceeds 28,900,000 dr. the ” plus value ” or surplus is divided in the propor- tion of 50-8 % to the Greek government and 49-2 % to the creditors. The plus values amounted to 3,301,481 dr. in 1898, 3,533,755 dr. in

1899. and 3,442.713 dr. in 1900. Simultaneously with the estab- lishment of the control the interest for the Monopoly Loan was fixed at 43%, for the Funding Loan at 40%, and for the other loans at 32 % of the original interest. With the revenues at its disposal the International Commission has already been enabled to make certain augmentations in the service of the foreign debt; since 1900 it has begun to take measures for the reduction of the forced currency, of which 2,000,000 dr. will be annually bought up and destroyed till the amount in circulation is reduced to 40,000,000 dr. On the 1st of January 1901 the authorized paper issue was 164,000,000 dr., of which 92,000,000 (including 18,000,000 in fractional currency) was on account of the government; the amount in actual circulation was 148,619,618 dr. On the 31st of July 1906 the paper issue had been reduced to 152,775,975 dr., and the amount in circulation was 124,668,057 dr. The financial commission retains its powers until the extinction of all the foreign loans contracted since 188 1. Though its activity is mainly limited to the administra- tion of the assigned revenues, it has exercised a beneficial influence over the whole domain of Greek finance ; the effect may be observed in the greatly enhanced value of Greek securities since its institution, averaging 25-76% in 1906. No change can be made in its composi- tion or working without the consent of the six powers, and none of the officials employed in the collection of the revenues subject to its control can be dismissed or transferred without its consent. It thus constitutes an element of stability and order which cannot fail to react on the general administration. It is unable, however, to .control the expenditure or to assert any direct influence over the government, with which the responsibility still rests for an im- proved system of collection, a more efficient staff of functionaries and the repression of smuggling. The country has shown a re- markable vitality in recovering from the disasters of 1897, an ˆ should it in future obtain a respite from paroxysms of mili- tary and political excitement, .its financial regeneration will be assured.

The following table gives the actual expenditure and receipts for the period 1 889-1906 inclusive:

Year.

Actual

Actual

Surplus or

Receipts.

Expenditure.

Deficit.

Drachmae.

Drachmae.

Drachmae.

1889

83,73i.59i

110,772,327

-27,040,736

1890

79,93 1 .795

125,932,579

—46,000,784

1891

90,321,872

122,836,385

-32,514,513

1892

95,465,569

107,283,498

— 11,817,929

I893 1

96,723,418

92,133,565

+ 4-589,853

1894

102,885,643

85,135,752

+ 17,749,891

1895

94,657,065

91,641,967

+ 3,015,098

1896

96,931,726

90,890,607

+ 6,041,119

18972

92,485,825

137,043,929

-44,558,104

1898 8

104,949,718

110,341,431

- 5,391,713

1899

111,318,273

104,586,504

+ 6,731,769

1900

112,206,849

112,049,279

+ 157,570

1901

“5,734,159

113,646,301

+ 2,087,858

1902

123,949,931

121,885,707

+ 2,064,224

1903

120,194,362

117,436,549

+ 2,757,813

1904

121,186,246

120,200,247

+ 985,999

1905

126,472,580

118,699,761

+ 7,772,819

1906

125,753,358

124,461,577

+ 1,291,781

The steady increase of receipts since 1898 attests the growing prosperity of the country, but expenditure has been allowed to out-strip revenue, and, notwithstanding the official figures which represent a series of surpluses, the accumulated deficit in 1905 amounted to about 14,000,000 dr. in addition to treasury bonds for 8,000,000 dr. A remarkable feature has been the rapid fall in the exchange since 1903 ; the gold franc, which stood at 1-63 dr. in 1902, had fallen to 1-08 in October 1906. The decline, a favourable symptom if resulting from normal economic factors, is apparently due to a combination of exceptional circumstances, and consequently may not be maintained ; it has imposed a considerable strain on the financial and commercial situation. The purchasing power of the drachma remains almost stationary and the price of imported commodities continues high; import dues, which since 1904 are payable in drachmae at the fixed rate of 1-45 to the franc, have been practically increased by more than 30%. In April 1900 a 4% loan of 43,750,000 francs for the completion of the railway from Peiraeus to the Turkish frontier, and another loan of 11,750,000 drachmae for the construction of a line from Pyrgos to Meligala, linking up the Morea railway system, were sanctioned by the Chamber; the first-named, the ” Greek Railways Loan,” was taken up at 80 by the syndicate contracting for the works and was placed on the market in 1902. The service of both loans is provided by the International Commission from the surplus funds of the assigned revenues. On the 1st of January 1906 the external debt amounted to 725,939,500 francs and the internal (including the paper circulation) to 1 7 1 ,629,436 drachmae.

The budget estimates for 1906 were as follows: Civil list, 1,325,000 dr.; pensions, payment of deputies, &c 7,706,676 dr. ; public debt, 34,253,471 dr.; foreign affairs, 3,563,994 dr.; justice, 6,240,271 dr.; interior, 13,890,927 dr. ; religion and education, 7,143,924 dr. ; army, 20,618,563 dr.; navy, 7,583,369 dr.; finance, 2,362,143 dr.; collection of revenue, 10,650,487 dr.; various expenditure, 9,122,752 dr.; total,

124,461,577 dr.

The two privileged banks in Greece are the National Bank, founded in 1841; capital 20,000,000 drachmae in 20,000 shares of 1000 dr. each, fully paid up; reserve fund 13,500,000 dr.; notes in circulation (September 1906) 126,721,887 dr., of which 76,360,905 dr. on account of the government ; and the Ionian Bank, incorporated in 1839; capital paid up £315,500 in 63,102 shares of £5 each; notes in circulation, 10,200,000 drachmae, of which 3,500,000 (in fractional notes of I and 2 dr.) on account of the government. The notes issued by these two banks constitute the forced paper currency circulating throughout the kingdom. In the case of the Ionian Bank the privilege of issuing notes, originally limited to the Ionian Islands, will expire in 1920. The National Bank is a private institution under supervision of the government, which is represented by a royal commissioner on the board of administration ; the central establish- ment is at Athens with forty-two branches throughout the country. The headquarters of the Ionian Bank, which is a British institution, are in London; the bank has a central office at Athens and five branches in Greece. The privileged Epiro-Thessalian Bank ceased to exist from the 4th of January 1900, when it was amalgamated with the National Bank. There are several other banking companies, as well as private banks, at Athens. The most important is the Bank of Athens (capital 40,000,000 dr.), founded in 1893; it possesses five branches in Greece and six abroad.

Greece entered the Latin Monetary Union in 1868. The monetary unit is the new drachma, equivalent to the franc, and divided into

1 Reduction of interest on foreign debt by 70 %.

2 War with Turkey.

3 International Financial Commission instituted.

and measures,

100 lepta or centimes. There are nickel coins of 20, 10 and 5 lepta, copper coins of 10 and 5 lepta. Gold and silver coins were minted in Paris between 1868 and 1884, but have since practic- Curreacy, a n v disappeared from the country. The paper currency weights cons i s t s

of notes for iooo dr., 500 dr., ioo dr., 25 dr., 10 dr. and 5 dr., and of fractional notes for 2 dr. and 1 dr. The decimal system of weights and measures was adopted in 1876, but some of the old Turkish standards are still in general use. The dram =ˆj oz. avoirdupois approximately; the oke =400 drams or 2-8 lb; the kilo =22 okes or 0-114 of an imperial quarter; the cantar or quintal =44 okes or 123-2 lb. Liquids are measured by weight. The punta = if in. ; the ruppa, 3ˆ in. ; the pik, 26 in. ; the stadion = 1 kilometre or 1093J yds. The stremma (square measure) is nearly one-third of an acre.

Authorities. — W. Leake, Researches in Greece (1814), Travels in the Morea (3 vols., 1830), Travels in Northern Greece (4 vols., 1834), Peloponnesiaca (1846) ; Bursian, Geographie von Griechenland (2 vols., Leipzig, 1862-1873); Lolling, ” Hellenische Landeskunde und Topographie ” in Ivan Milller's Handbuch der klassischen Altertums-wissenschaft; C. Wordsworth, Greece; Pictorial, Descriptive and Historical (new ed., revised by H. F. Tozer, London, 1882); K. Stephanos, ia Gr'ece (Paris, 1884); C. Neumann and J. Partsch, Physikalische Geographie von Griechenland (Breslau, 1885) ; K. Krumbacher, Griechische Reise (Berlin, 1886); J. P. Mahaffy, Rambles and Studies in Greece (London, 1887); R. A. H. Bickford- Smirh, Greece under King George (London, 1893); Ch. Diehl, Ex- cursions archeologiques en Gr'ece (Paris, 1893); Perrot and Chipiez, Histoire de I'art, tome vi., “La Grece primitive” (Paris, 1894); tome vii., “La Grece archa'ique ” (Paris, 1898); A. Philippson, Griechenland und seine Stellung im Orient (Leipzig, 1897); L. Sergeant, Greece in the Nineteenth Century (London, 1897); J. G. Frazer, Pausanias's Description of Greece (6 vols., London, 1898); Pausanias and other Greek Sketches (London, 1900) ; Greco-Turkish War of 1897, from official sources, by a German staff officer (Eng. trans., London, 1898); J. A. Symonds, Studies, and Sketches in Italy and Greece (3 vols., 2nd ed., London, 1898); V. Berard, La Turquie et Vhellenisme contemporaine (Paris, 1900).

For the climate: D. Aeginetes, To KXl/xa ttjs ‘EXXaSos (Athens,

1908).

For the fauna: Th. de Heldreich, La Fauna de la Grece (Athens,

1878).

For special topography : A. Meliarakes, KukAoSikci vvi]awv{;At\ieris, 1874) ;‘Tironi>T)na.Ta. wep<.ypat.Ka tS>v KuKXaSwe vqauiv “AvSpov xal K«o (Athens, 188O); Tewypatfria 71-0X1×1*17 vka koX

apxaia rod vopou ‘Ap7oX£5os Kal KopivQias (Athens, 1886); Teuypatfria ttoXituˆ via Kai Apx<"a tov voixov KecftaWˆvias. (Athens, 1890); Th. Bent, The Cyclades (London, 1885); A. Botticher, Olympia (2nd ed., Berlin, 1886); J. Partsch, Die Insel Corfu: eine geographiscke Monographic (Gotha, 1887); Die Insel Leukas (Gotha, 1889); Kephallenia und Ithaka (Gotha, 1890); Die Insel Zante (Gotha, l89i);A. Philippson, Der Peloponnes. (Versuch einer Landeskunde auf geologischer Grundlage.) (Berlin, 1892); " Thessalien und Epirus " (Reisen und Forschungen im nbrdlichen Griechenland) (Berlin, 1897); Die griechischen Inseln des dgdischen Meeres (Berlin, 1897); W. J. Woodhouse, Aetolia (Oxford, 1897) ; Schultz and Barnsley, The Monastery of St Luke of Stiris (London, 1901); M. Lamprinides, 'H NaraXia (Athens, 1898); Monuments de I'art byzantin, publi6s par le Ministere de l'lnstruction, tome i.; G. Millet, " Le Monastere de Daphni " (Paris, 1900). For the life, customs and habits of the modern Greeks: C. Wachsmuth, Das alle Griechenland im neuen (Bonn, 1864); C. K. Tuckerman, The Greeks of to-day (London, 1873); B. Schmidt, Volksleben der Neugriecheii und das hellenische Altertum (Leipzig, 1871); Estour- nelle de Constant, La Vie de province en Gr'ece (Paris, 1878); E. About, La Gr'ece contemporaine (Paris, 1855; 8th ed., 1883); J. T. Bent, Modern Life and Thought among the Greeks (London, 1891); J. Rennell Rodd, The Customs and Lore of Modern Greece (London, 1892). Guide-books, Baedeker's Greece (3rd ed., Leipzig, 1905); Murray's Handbook for Greece (7th ed., London, 1905) ; Macmillan's Guide to the Eastern Mediterranean (London, 1901). (J. D. B.)

2. History

a. Ancient; to 146 B.C.

1. Introductory. — It is necessary to indicate at the outset the scope and object of the present article. The reader must not expect to find in it a compendious summary of the chief events in the history of ancient Greece. It is not intended to supply an ” Outlines of Greek History.” It may be questioned whether such a sketch of the history, within the limits of space which are necessarily imposed in a work of reference, would be of utility to any class of readers. At any rate, the plan of the present work, in which the subject of Greek history is treated of in a large number of separate articles, allows of the narrative of events being given in a more satisfactory form under the more general of the headings {e.g. Athens, Sparta, Peloponnesian

War). The character of the history itself suggests a further reason why a general article upon Greek history should not be confined to, or even

attempt, a narrative of events. A sketch of Greek history is not possible in the sense in which a sketch of Roman history, or even of English history, is possible. Greek history is not the history of a single state. When Aristotle composed his work upon the constitutions of the Greek states, he found it necessary to extend his survey to no less that 158 states. Greek history is thus concerned with more than 1 50 separate and independent political communities. Nor is it even the history of a single country. The area occupied by the Greek race extended from the Pyrenees to the Caucasus, and from southern Russia to northern Africa. It is inevitable, therefore, that the impression conveyed by a sketch of Greek history should be a misleading one. A mere narrative can hardly fail to give a false perspective. Experience shows that such a sketch is apt to resolve itself into the history of a few great movements and of a few leading states. What is still worse, it is apt to confine itself, at any rate for the greater part of the period dealt with, to the history of Greece in the narrower sense, i.e. of the Greek peninsula. For the identification of Greece with Greece proper there may be some degree of excuse when we come to the 5th and 4th centuries. In the period that lies behind the year 500 B.C. Greece proper forms but a small part of the Greek world. In the 7th and 6th centuries it is outside Greece itself that we must look for the most active life of the Greek people and the most brilliant manifestations of the Greek spirit. The present article, therefore, will be concerned with the causes and conditions of events, rather than with the events themselves; it will attempt analysis rather than narrative. Its object will be to indicate problems and to criticize views; to suggest lessons and parallels, and to estimate the importance of the Hellenic factor in the development of civilization.

2. The Minoan and Mycenaean Ages. — When does Greek history begin? Whatever may be the answer that is given to this question, it will be widely different from any that could have been proposed a generation ago. Then the question was, How late does Greek history begin? To-day the question is, How early does it begin? The suggestion made by Grote that the first Olympiad (776 B.C.) should be taken as the starting- point of the history of Greece, in the proper sense of the term ” history,” seemed likely, not so many years ago, to win general acceptance. At the present moment the tendency would seem to be to go back as far as the 3rd or 4th millennium B.C. in order to reach a starting-point. It is to the results of archaeological research during the last thirty years that we must attribute so startling a change in the attitude of historical science towards this problem. In the days when Grote published the first volumes of his History of Greece archaeology was in its infancy. Its results, so far as they

affected the earlier periods of Greek history, were scanty; its methods were unscientific. The methods have been gradually perfected by numerous workers in the field; but the results, which have so profoundly modified our conceptions of the early history of the Aegean area, are principally due to the discoveries of two men, Heinrich Schliemann and A. J. Evans. A full account of these discoveries will be found elsewhere (see Aegean Civilization and Crete). It will be sufficient to mention here that Schliemann's labours began with the excava- tions on the site of Troy in the years 1870-1873; that he passed on to the excavations at Mycenae in 1876 and to those at Tiryns in 1884. It was the discoveries of these years that revealed

to us the Mycenaean age, and carried back the history to the middle of the 2nd millennium. The discoveries of Dr A. J. Evans in the island of Crete belong to a later period. The work of excavation was begun in 1900, and was carried on in subsequent years. It has revealed to us the Minoan age, and enabled us to trace back the development and origins of the civilization for a further period of 1000 or 1500 years. The dates assigned by archaeologists to the different periods of Mycenaean and Minoan art must be regarded as merely approximate. Even the relation of the two civilizations is still, to some extent, a matter of conjecture. The g'eneral chronological scheme.

however, in the sense of the relative order of the various periods and the approximate intervals between them, is too firmly established, both by internal evidence, such as the development of the styles of pottery, and of the art in general, and by external evidence, such as the points of contact with Egyptian art and history, to admit of its being any longer seriously called in question.

If, then, by " Greek history " is to be understood the history of the lands occupied in later times by the Greek race (i.e. the Greek peninsula and the Aegean basin), the beginnings of the history must be carried back some 2000 years before Grote's proposed starting-point. If, however, " Greek history " is taken to mean the history of the Greek people, the determination of the starting-point is far from easy. For the question to which archaeology does not as yet supply any certain answer is the question of race. Were the creators of the

Minoan and Mycenaean civilization Greeks or were they not ? In some degree the Minoan evidence has modified the answer suggested by the Mycenaean. Although wide differences of opinion as to the origin of the Mycenaean civilization existed among scholars when the results of Schliemann's labours were first given to the world, a general agreement had gradually been arrived at in favour of the view which would identify Mycenaean with Achaean or Homeric. In presence of the Cretan evidence it is no longer possible to maintain this view with the same confidence. The two chief difficulties in the way of attributing either the Minoan or the Mycenaean civilization to an Hellenic people are connected respectively with the script and the religion. The excavations at Cnossus have yielded thousands of tablets written in the linear script. There is evidence that this script was in use among the Mycenaeans as well.. If Greek was the language spoken at Cnossus and Mycenae, how is it that all attempts to decipher the script have hitherto failed ? The Cretan excavations, again, have taught us a great deal as to the religion of the Minoan age; they have, at the same time, thrown a new light upon the evidence supplied by Mycenaean sites. It is no longer possible to ignore the contrast between the cults of the Minoan and Mycenaean ages, and the religious conceptions which they imply, and the cults and religious conceptions prevalent in the historical period. On the other hand, it may safely be asserted that the argument derived from the Mycenaean art, in which we seem to trace a freedom of treatment which is akin to the spirit of the later Greek art, and is in complete contrast to the spirit of Oriental art, has received striking confirmation from the remains of Minoan art. The decipherment of the script would at once solve the problem. We should at least know whether the dominant race in Crete in the Minoan age spoke an Hellenic or a non-Hellenic dialect. And what could be inferred with regard to Crete in the Minoan age could almost certainly be inferred with regard to the mainland in the Mycenaean age. In the meanwhile, possibly until the tablets are read, at any rate until further evidence is forthcoming, any answer that can be given to the question must necessarily be tentative and provisional. (See Aegean Civilization.)

It has already been implied that this period of the history of Greece may be subdivided into a Minoan and a Mycenaean age. Whether these terms are appropriate is a question of comparatively little importance. They at least serve to remind us of the part played by the discoveries at Mycenae and Cnossus in the reconstruction of the history. The term " Mycenaean," it is true, has other associations than those of locality. It may seem to imply that the civilization disclosed in the excavations at Mycenae is Achaean in character, and that it is to

be connected with the Pelopid dynasty to which Agamemnon belonged. In its scientific use, the term must be cleared of all such associations. Further, as opposed to ” Minoan ” it must be understood in a’ more definite sense than that in which it has often been employed. It has come to be generally recognized that two different periods are to be distinguished in Schliemann’s discoveries at Mycenae itself. There is an earlier period, to which belong the objects found in the shaft-graves, and there is a later period, to which belong the beehive tombs and the remains of the palaces. It

is the latter period which is ” Mycenaean ” in the strict sense; i.e. it is ” Mycenaean ” as opposed to ” Minoan.” To this period belong also the palace at Tiryns, the beehive-tombs discovered elsewhere on the mainland of Greece and one of the cities on the site of Troy (Schliemann’s sixth). The pottery of this period is as characteristic of it, both in its forms (e.g. the ” stirrup ” or ” false-necked ” form of vase) and in its peculiar glaze, as is the architecture of the palaces and the beehive-tombs. Although the chief remains have been found on the mainland of Greece itself, the art of this period is found to have extended as far north as Troy and as far east as Cyprus. On the other hand, hardly any traces of it have been discovered on the west coast of Asia Minor, south of the Troad. The Mycenaean age, in this sense, may be regarded as extending from 1600 to 1200 B.C. The Minoan age is of far wider extent. Its latest period includes both the earlier and the later periods of the remains found at Mycenae. This is the period called by Dr Evans ” Late Minoan.” To this period belong the Great Palace at Cnossus and the linear system of writing. The ” Middle Minoan ” period, to which the earlier palace belongs, is characterized by the picto- graphic system of writing and by polychrome pottery of a peculiarly beautiful kind. Dr Evans proposes to carry back this period as far as 2500 B.C. Even behind it there are traces of a still earlier civilization. Thus the Minoan age, even if limited to the middle and later periods, will cover at least a thousand years. Perhaps the most surprising result of the excavations in Crete is the discovery that Minoan art is on a higher level than Mycenaean art. To the scholars of a generation ago it seemed a thing incredible that the art of the shaft-graves, and the architecture of the beehive-tombs and the palaces, could belong to the age before the Dorian invasion. The most recent discoveries seem to indicate that the art of Mycenae is a decadent art; they certainly prove that an art, hardly inferior in its way to the art of the classical period, and a civilization which implies the command of great material resources, were flourishing in the Aegean perhaps a thousand years before the siege of Troy.

To the question, ” What is the origin of this civilization? Is it of

foreign derivation or of native growth ? ” it is not possible to give a direct answer. It is clear, on the one hand that it was developed, by a gradual process of OHeotal differentiation, from a culture which was common to ence.” the whole Aegean basin and extended as far to the west as Sicily. It is equally clear, on the other hand, that foreign influences contributed largely to the process of develop- ment. Egyptian influences, in particular, can be traced through- out the ” Minoan ” and ” Mycenaean ” periods. The developed art, however, both in Crete and on the mainland, displays characteristics which are the very opposite of those which are commonly associated with the term ” oriental.” Egyptian work, even of the best period, is stiff and conventional; in the best Cretan work, and, in a less degree, in Mycenaean work, we find an originality and a freedom of treatment which remind one of the spirit of the Greek artists. The civilization is, in many respects, of an advanced type. The Cretan architects could design on a grand scale, and could carry out their designs with no small degree of mechanical skill. At Cnossus we find a system of drainage in use, which is far in advance of anything known in the modern world before the 19th century. If the art of the Minoan age falls short of the art of the Periclean age, it is hardly inferior to that of the age of Peisistratus. It is a civiliza- tion, too, which has long been familiar with the art of writing. But it is one that belongs entirely to the Bronze Age. Iron is not found until the very end of the Mycenaean period, and then only in small quantities. Nor is this the only point of contrast between the culture of the. earliest age and that of the historical period in Greece. The chief seats of the early culture are to be found either in the island of Crete, or, on the mainland, at Tiryns and Mycenae. In the later history Crete plays no part, and Tiryns and Mycenae are obscure. With the great names of a later age, Argos, Sparta and Athens, no great discoveries are connected. In northern Greece, Orchomenos rather than Thebes is the centre of influence. Further points of contrast readily

suggest themselves. The so-called Phoenician alphabet, in use amongst the later Greeks, is unknown in the earliest age. Its systems of writing, both the earlier and the later one, are syllabic in character, and analogous to those in vogue in Asia Minor and Cyprus. In the art of war, the chariot is of more importance than the foot-soldier, and the latter, unlike the Greek hoplite, is lightly clad, and trusts to a shield

large enough to cover the whole body, rather than to the metal helmet, breast- plate and greaves of later times (see Arms and Armour: Greek). The political system appears to have been a despotic monarchy, and the realm of the monarch to have extended to far wider limits than those of the ” city-states ” of historical Greece. It is, perhaps, in the religious practices of the age, and in the ideas implied in them, that the contrast is most apparent. Neither in Crete nor on the mainland is there any trace of the worship of the ” Olympian ” deities. The cults in vogue remind us rather of Asia than of Greece. The worship of pillars and of trees carries us back to Canaan, while the double-headed axe, so prominent in the ritual of Cnossus, survives in later times as the symbol of the national deity of the Carians. The beehive- tombs, found on many sites on the mainland besides Mycenae, are evidence both of a method of sepulture and of ideas of the future state, which are alien to the practice and the thought of the Greeks of history. It is only in one region — in the island of Cyprus — that the culture of the Mycenaean age is found surviving into the historical period. As late as the beginning of the 5th century B.C. Cyprus is still ruled by kings, the alphabet has not yet displaced a syllabary, the characteristic forms of Mycenaean vases still linger on, and the chief deity of the island is the goddess with attendant doves whose images are among the common objects of Mycenaean finds.

3. The Homeric Age. — Alike in Crete and on the mainland the civilization disclosed by excavation comes abruptly to an end. In Crete we can trace it back from c. 1200 B.C. to the Neolithic period. From trie Stone Age to the end of the Minoan Age the development is continuous and uninterrupted. 1 But between the culture of the Early Age and the culture of the Dorians, who occupied the island in historical times, no connexion whatever can be established. Between the two there is a great gulf fixed. It would be difficult to imagine a greater contrast than that presented by the rude life of the Dorian communities in Crete when it is compared with the political power, the material resources and the extensive commerce of the earlier period. The same gap between the archaeological age and the historical exists on the mainland also. It is true that the solution of continuity is here less complete. Mycenaean art continues, here and there, in a debased form down to the 9th century, a date to which we can trace back the beginnings of the later Greek art. On one or two lines (e.g. architecture) it is even possible to establish some sort of connexion between them. But Greek art as a whole cannot be evolved from Mycenaean art. We cannot bridge over the interval that separates the latter art, even in its decline, from the former. It is sufficient to compare the ” dipylon ” ware (with which the process of development

begins, which culminates in the pottery of the Great Age) with the Mycenaean vases, to satisfy oneself that the gulf exists. What then is the relation of the Heroic or Homeric Age (i.e. the age whose life is portrayed for us in the poems of Homer) to the Earliest Age ? It too presents many contrasts to the later periods. On the other hand, it presents contrasts to the Minoan Age, which, in their way, are not less striking. Is it then to be identified with the Mycenaean Age ? Schliemann, the dis- coverer of the Mycenaean culture, unhesitatingly identified Mycenaean with Homeric. He even identified the shaft-graves of Mycenae with the tombs of Agamemnon and Clytemnestra. Later inquirers, while refusing to discover so literal a corre- spondence between things Homeric and things Mycenaean, have not hesitated to accept a general correspondence between the Homeric Age and the Mycenaean. Where it is a case of

1 It would be more accurate to say to the year 1500 B.C. At Cnossus the palace is sacked soon after this date, and the art, both in Crete and in the whole Aegean area, becomes lifeless and decadent.

comparing literary evidence with archaeological, an exact coincidence is not of course to be demanded. The most that can be asked is that a general correspondence should be estab- lished. It may be conceded that the case for such a correspond- ence appears prima facie a strong one. There is much in Homer that seems to find confirmation or explanation in Schliemann's finds. Mycenae is Agamemnon's city; the plan of the Homeric house agrees fairly well with the palaces at Tiryns and Mycenae ; the forms and the technique of Mycenaean art serve to illustrate passages in the poems; such are only a few of the arguments that have been urged. It is the great merit of Professor Ridge- way's work (The Early Age of Greece) that it has demonstrated, once and for all, that Mycenaean is not Homeric pure and simple. He insists upon differences as great as the resemblances. Iron is in common use in Homer; it is practically unknown to the Mycenaeans. In place of the round shield and the metal armour of the Homeric soldier, we find at Mycenae that the warrior is lightly clad in linen, and that he fights behind an oblong shield, which covers the whole body; nor are the chariots the same in form. The Homeric dead are cremated; the Mycenaean are buried. The gods of Homer are the deities of Olympus, of whose cult no traces are to be found in the Mycenaean Age. The novelty of Professor Ridgeway's theory is that for the accepted equation, Homeric = Achaean = Mycenaean, he proposes to substitute the equations, Homeric = Achaean = post-Mycenaean, and Mycenaean = pre – Achaean = Pelasgian. The Mycenaean civilization he attributes to the Pelasgians, whom he regards as the indigenous population of Greece, the ancestors of the later Greeks, and

themselves Greek both in speech and blood. The Homeric heroes are Achaeans, a fair-haired Celtic race, whose home was in the Danube valley, where they had learned the use of iron. In Greece they are newcomers, a conquering class comparable to the Norman invaders of England or Ireland, and like them they have acquired the language of their subjects in the course of a few generations. The Homeric civilization is thus Achaean, i.e. it is Pelasgian (Mycenaean) civilization, appropriated by a ruder race; but the Homeric culture is far inferior to the Mycenaean. Here, at any rate, the Norman analogy breaks down. Norman art in England is far in advance of Saxon. Even in Normandy (as in Sicily), where the Norman appropriated rather than introduced, he not only assimilated but developed. In Greece the process must have been reversed.

The theory thus outlined is probably stronger on its destructive side than on its constructive. To treat the Achaeans as an immigrant race is to run counter to the tradition of the Greeks themselves, by whom the Achaeans were regarded as indigenous (cf. Herod, viii. 73). Nor is the Pelasgian part of the theory easy to reconcile with the Homeric evidence. If the Achaeans were a conquering class ruling over a Pelasgian population, we should expect to find this difference of race a prominent feature in Homeric society. We should, at least, expect to find a Pelasgian background to the Homeric picture. As a matter of fact, we find nothing of the sort. There is no consciousness in the Homeric poems of a distinction of race between the governing and the subject classes. There are, indeed, Pelasgians in Homer, but the references either to the people or the name are extraordinarily few. They appear as a people, presumably in Asia Minor, in alliance with the Trojans; they appear also, in a single passage, as one of the tribes inhabiting Crete. The name survives in ” Pelasgicon Argos,” which is probably to be identified with the valley of the Spercheius, 2 and as an epithet of Zeus of Dodona. The population, however, of Pelasgicon Argos and of Dodona is no longer Pelasgian. Thus, in the age of Homer, the Pelasgians belong, so far as Greece proper is concerned, to a past that is already remote. It is inadmissible to appeal to Herodotus against Homer. For the conditions of the Homeric age Homer is the sole authoritative witness. If, however, Professor Ridgeway has failed to prove that ” Mycenaean ” equals ” Pelasgian,” he has certainly proved that much that is Homeric is post-Mycenaean. It is possible

2 See T. W. Allen in the Classical Review, vol. xx. (1906), No. 4 I (May).

The

Homeric

state-

that different strata are to be distinguished in the Homeric poems. There are passages which seem to assume the conditions of the Mycenaean age; there are others which presuppose the conditions of a later age. It may be that the latter passages reflect the circumstances of the poet's own times, while the former ones reproduce those of an earlier period. If so, the substitution of iron for bronze must have been effected in the interval between the earlier and the later periods.

It has already been pointed out that the question whether the makers of the Minoan and Mycenaean civilizations were Greeks must still be regarded as an open one. No such question can be raised as to the Homeric Age. The Achaeans may or may not have been Greek in blood. What is certain is that '.lie Achaean Age forms an integral part of Greek history. Alike on the linguistic, the religious and the political sides, Homer is the starting-point of subsequent developments. In the Greek dialects the great distinction is that between the Doric and the rest. Of the non- Doric dialects the two main groups are the Aeolic and Ionic, both of which have been developed, by a gradual process of differentiation, from the language of the Homeric poems. With regard to religion it is sufficient to refer to the judgment of Herodotus, that it was Homer and Hesiod who were the authors of the Greek theogony (ii. 53 ovto'l eiai ol iroLrjeavres deoyov'vqv "EXXtjcti). It is a commonplace that Homer was the Bible of the Greeks. On the political side, Greek constitutional development would be unintelligible without Homer. When Greek history, in the proper sense, begins, oligarchy is almost universal. Every- where, however, an antecedent stage of monarchy has to be presupposed. In the Homeric system monarchy is the sole form of government; but it is monarchy already well on the way to being transformed into oligarchy. In the person of the king are united the functions of priest, of judge and of leader in war. He belongs to a family which claims divine descent and his office is hereditary. He is, however, no despotic monarch. He is compelled by custom to consult the council (boule) of the elders, or chiefs. He must ask their opinion, and, if he fails to obtain their consent, he has no power to enforce his will. Even when he has obtained the consent

of the council, the proposal still awaits the approval of the assembly (agora) , of the people.

Thus in the Homeric state we find the germs not only of the oligarchy and democracy of later Greece, but also of all the various forms of constitution known to the Western society. world. And a monarchy such as is depicted in the Homeric poems is clearly ripe for transmutation into oligarchy. The chiefs are addressed as kings (jSaciXˆes), and claim, equally with the monarch, descent from the gods. In Homer, again, we can trace the later organization into tribe (4>v\ri), clan (yivos), and phratry, which is characteristic of Greek society in the historical period, and meets us in analogous forms in other Aryan societies. The yivos corresponds to the Roman gens, the v \ii to the Roman tribe, and the phratry to the curia. The importance of the phratry in Homeric society is illustrated by the well-known passage (Iliad ix. 63) in which the outcast is described as ” one who belongs to no phratry ” (a.4>pffriiip). It is a society that is, of course, based upon slavery, but it is slavery in its least repulsive aspect. The treatment which Eumaeus and Eurycleia receive at the hands of the poet of the Odyssey is highly creditable to the humanity of the age. A society which regarded the slave as a mere chattel would have been impatient of the interest shown in a swineherd and a nurse. It is a society, too, that exhibits many of the distinguishing traits of later Greek life. Feasting and quarrels, it is true, are of more moment to the heroes than to the contemporaries of Pericles or Plato; but “music” and “gymnastic” (though the terms must be understood in a more restricted sense) are as distinctive of the age of Homer as of that of Pindar. In one respect there is retrogression in the historical period. Woman in Homeric society enjoys a greater freedom, and receives greater respect, than in the Athens of Sophocles and Pericles.

4. The Growth of the Creek States. — The Greek world at the

beginning of the 6th century B.C. presents a picture in many respects different from that of the Homeric Age. The Greek race is no longer confined to the Greek peninsula. It occupies the islands of the Aegean, the western seaboard of Asia Minor, the coasts of Macedonia and Thrace, of southern Italy and Sicily. Scattered settlements are found as far apart as the mouth of the Rhone, the north of Africa, the Crimea and the eastern end of the Black Sea. The Greeks are called by a national name, Hellenes, the symbol of a fully-developed national self-conscious- ness. They are divided into three great branches, the Dorian, the Ionian and the Aeolian, names almost, or entirely, unknown to Homer. The heroic monarchy has nearly everywhere dis-appeared. In Greece proper, south of Thermopylae, it survives, but in

a peculiar form, in the Spartan state alone. What is the significance and the explanation of contrasts so profound?

It is probable that the explanation is to be found, directly or indirectly, in a single cause, the Dorian invasion. In Homer the Dorians are mentioned in one passage only (Odyssey xix. 177). They there appear as one of the races which tavasLa. inhabit Crete. In the historical period the whole Peloponnese, with the exception of Arcadia, Elis and Achaea, is Dorian. In northern Greece the Dorians occupy the little state of Doris, and in the Aegean they form the population of Crete, Rhodes and some smaller islands. Thus the chief centres of Minoan and Mycenaean culture have passed into Dorian hands, and the chief seats of Achaean power are included in Dorian states. Greek tradition explained the overthrow of the Achaean system by an invasion of the Peloponnese by the Dorians, a northern tribe, which had found a temporary home in Doris. The story ran that, after an unsuccessful attempt to force an entrance by the Isthmus of Corinth, they had crossed from Naupactus, at the mouth of the Corinthian Gulf, landed on the opposite shore, and made their way into the heart of the Peloponnese, where a single victory gave them possession of the Achaean states. Their conquests were divided among the invaders into three shares, for which lots were cast, and thus the three states of Argos, Sparta and Messenia were created. There is much in this tradition that is impossible or improbable. It is impossible, e.g. for the tiny state of Doris, with its three or four ” small, sad villages ” (iroKas /Aiicpal Kal Atwp6x«poi, Strabo, p. 427), to have furnished a force of invaders sufficient to conquer and re-people the greater part of the Peloponnese. It is improbable that the conquest should have been either as sudden, or as complete, as the legend represents. On the contrary, there are indications that the conquest was gradual, and that the displacement of the older population was incomplete. The improbability of the details affords, however, no ground for questioning the reality of the invasion. 1 The tradition can be traced back at Sparta to the 7th century B.C. (Tyrtaeus, quoted by Strabo, p. 362), and there is abundant evidence, other than that of legend, to corroborate it. There is the Dorian name, to begin with. If, as Beloch supposes, it originated on the coast of Asia Minor, where it served to distinguish the settlers in Rhodes and the neighbouring islands from the Ionians and Aeolians to the north of them, how came the great and famous states of the Peloponnese to adopt a name in use among the petty colonies planted by their kinsmen across the sea? Or, if Dorian is simply Old Peloponnesian, how are we to account for the Doric dialect or the Dorian pride of race?

It is true that there are great differences between the literary Doric, the dialect of Corinth and Argos, and the dialects of Laconia and Crete, and that there are affinities between the dialect of Laconia and the non-Dorian dialects of Arcadia and Elis. It is equally true, however, and of far more consequence, that all the Doric dialects are distinguished from all other Greek dialects by certain common characteristics. Perhaps the strongest sentiment in the Dorian nature is the pride of race. Indeed, it looks as if the Dorians claimed to be the sole genuine Hellenes. How can we account for an indigenous population, first imagining itself to be immigrant, and then developing a

1 It has been impugned by J. Beloch, Griechische Geschichte, i. 149 ff.

contempt for the rest of the race, equally indigenous with itself, on account of a fictitious difference in origin? Finally, there is the archaeological evidence. The older civilization comes to an abrupt end, and it does so, on the mainland at least, at the very period to which tradition assigns the Dorian migration. Its development is greatest, and its overthrow most complete, precisely in the regions occupied by the Dorians and the other tribes, whose migrations were traditionally connected with theirs. It is hardly too much to say that the archaeologist would have been compelled to postulate an inroad into central and southern Greece of tribes from the north, at a lower level of culture, in the course of the 12th and nth centuries B.C., if the historian had not been able to direct him to the traditions of the great migrations (fieTavaaTacreis) , of which the Dorian invasion was the chief. With the Dorian migration Greek tradition connected the expansion of the Greek race eastwards across the Aegean. In the historical period the Greek settlements on the western coast of Asia Minor fall into three clearly denned groups. To the north is the Aeolic group, consisting of the island of Lesbos and twelve towns, mostly insignificant, on the opposite mainland. To the south is the Dorian hexapolis, consisting of Cnidus and Halicarnassus on the mainland, and the islands of Rhodes and Cos. In the centre comes the Ionian dodecapolis, a group consisting of ten towns on the mainland,, together with the islands of Samos and Chios. Of these three groups, the Ionian is incomparably the most important. The Ionians also occupy Euboea and the Cyclades. Although it would appear that

Cyprus (and possibly Pamphylia) had been occupied by settlers from Greece in the Mycenaean age, Greek tradition is probably correct in putting the colonization of Asia Minor and the islands of the Aegean after the Dorian migration. Both the Homeric and the archaeological evidence seem to point to the same conclusion. Between Rhodes on the south and the Troad on the north scarcely any Mycenaean remains have been found. Homer is ignorant of any Greeks east of Euboea. If the poems are earlier than the Dorian Invasion, his silence is conclusive. If the poems are some centuries later than the Invasion, they at least prove that, within a few generations of that event, it was the belief of the Greeks of Asia Minor that their ancestors had crossed the seas after the close of the Heroic Age. It is probable, too, that the names Ionian and Aeolian, the former of which is found once in Homer, and the latter not at all, originated among the colonists in Asia Minor, and served to designate, in the first instance, the members of the Ionic and Aeolic dodecapoleis. As Curtius 1 pointed out, the only Ionia known to history is in Asia Minor. It does not follow that Ionia is the original home of the Ionian race, as Curtius argued. It almost certainly follows, however, that it is the original home of the Ionian name.

It is less easy to account for the name Hellenes. The Greeks were profoundly conscious of their common nationality* and of the gulf that separated them from the rest of mankind. They themselves recognized a common race and language, and a common type of religion and culture, as the chief factors in this sentiment of nationality (see Herod, viii. 144 t6 ‘TSWrjviKdv eov ona.ii*bv t* Ka ‘ L byAylwooov Kai Oewv ISpvpaTa re noiva Kal OvorLai fidta re ofurrpcnra). “Hellenes” was the name of their common race, and ” Hellas ” of their common country. In Homer there is no distinct consciousness of a common nation- ality, and consequently no antithesis of Greek and Barbarian (see Thuc. i. 3) . Nor is there a true collective name. There are indeed Hellenes (though the name occurs in one passage only, Iliad ii. 684), and there is a Hellas; but his Hellas, whatever its precise signification may be, is, at any rate, not equivalent either to Greece proper or to the land of the Greeks, and his Hellenes are the inhabitants of a small district to the south of Thessaly. It is possible that the diffusion of the Hellenic name was due to the Dorian invaders. Its use can be traced back to the first half of the 7th century. Not less obscure are the causes of the fall of monarchy. It cannot have been the immediate effect of the

1 History of Greece (Eng. trans., i. 32 ff.); cf. the same writer’s loner vor der ionischen Wanderung.

Oovern- meat.

Dorian conquest, for the states founded by the Dorians were at first monarchically governed. It may, however, have been an in- direct effect of it. We have already seen that the power of the Homeric king is more limited than that of the rulers of Cnossus, Tiryns or Mycenae. In other words, monarchy is already in decay at the epoch of the Invasion. The Invasion, in its effects on wealth, commerce and civilization, is almost comparable to the irruption of the barbarians into the Roman empire. The monarch of the Minoan and Mycenaean age has extensive revenues at his command; the monarch of the early Dorian states is little better than a petty chief. Thus the interval, once a wide one, that separates him from the nobles tends to dis- appear. The decay of monarchy was gradual ; much more gradual than is generally recognized. There were parts of the Greek world in which it still survived in the 6th century, e.g. Sparta, Cyrene, Cyprus, and possibly Argos and Tarentum. Both Herodotus and Thucydides apply the title “king” (fiao-ikevs) to the rulers of Thessaly in the 5th century. The date at which monarchy gave place to a republican form of government must have differed, and differed widely, in different cases. The traditions relating to the foundation of Cyrene assume the existence of monarchy in Thera and in Crete in the middle of the 7th century (Herodotus iv. 150 and 154), and the reign of Amphicrates at Samos (Herod, iii. 59) can hardly be placed more than a generation earlier. In view of our general ignorance of the history of the 7th and 8th centuries, it is hazardous to pronounce these instances exceptional. On the other hand, the change from monarchy to oligarchy was completed at Athens before the end of the 8th century, and at a still earlier date in some of the other states. The process, again, by which the change was effected was, in all probability, less uniform than is generally assumed. There are extremely few cases in which we have any trustworthy evidence, and the instances about which we are informed refuse to be reduced to any common type. In Greece proper our information is fullest in the case of Athens and Argos. In the former case, the king is gradually stripped of his powers by a process of devolution. An hereditary king, ruling for life, is replaced by three annual and elective magistrates, between whom are divided the executive, military and religious functions of the monarch (see Archon). At Argos the fall of the monarchy is preceded by an aggrandisement of the royal prerogatives. There is nothing in common between these two cases, and there is no reason to suppose that the process elsewhere was analogous to that at Athens. Everywhere, however, oligarchy is the form of government which succeeds to monarchy. Political power is monopolized by a class of nobles, whose

claim to govern is based upon birth and the possession of land, the most valuable form of property in an early society. Sometimes power is confined to a single clan (e.g. the Bacchiadae at Corinth) ; more commonly, as at Athens, all houses that are noble are equally privileged. In every case there is found, as the adviser of the executive, a Boule, or council, representative of the privileged class. Without such a council a Greek oligarchy is inconceivable. The relations of the executive to the council doubtless varied. At Athens it is clear that the real authority was exercised by the archons; 2 in many states the magistrates were probably sub- ordinate to the council (cf . the relation of the consuls to the senate at Rome). And it is clear that the way in which the oligarchies . used their power varied also. The cases in which the power was abused are naturally the ones of which we hear; for an abuse of power gave rise to discontent and was the ultimate cause of revolution. We hear little or nothing of the cases in which power was exercised wisely. Happy is the constitution which has no annals! We know, however, that oligarchy held its ground for generations, or even for centuries, in a large propor- tion of the Greek states; and a government which, like the oligarchies of Elis, Thebes or Aegina, could maintain itself for three or four centuries cannot have been merely oppressive.

2 If the account of early Athenian constitutional history given in the Athenaion Politeia were accepted, it would follow that the archons were inferior in authority to the Eupatrid Boule, the Areopagus.

The period of the transition from monarchy to oligarchy is the period in which commerce begins to develop, and trade- routes to be organized. Greece had been the centre of Trade

an active trade in the Minoan and Mycenaean epochs.

The products of Crete and of the Peloponnese had found their way to Egypt and Asia Minor. The overthrow of the older civilization put an end to commerce. The seas became insecure and intercourse with the East was interrupted. Our earliest glimpses of the Aegean after the period of the migrations disclose the raids of the pirate and the activity of the Phoenician trader. It is not till the 8th century has dawned that trade begins to revive, and the Phoenician has to retire

before his Greek com- petitor. For some time to come, however, no clear distinction is drawn between the trader and the pirate. The pioneers of Greek trade in the West are the pirates of Cumae (Thucyd. vi. 4). The expansion of Greek commerce, unlike that of the commerce of the modern world, was not connected with any great scientific discoveries. There is nothing in the history of ancient navigation that is analogous to the invention of the mariner's compass or of the steam-engine. In spite of this, the development of Greek commerce in the 7th and 6th centuries was rapid. It must have been assisted by the great discovery of the early part of the former century, the invention of coined money. To the Lydians, rather than the Greeks, belongs the credit of the discovery; but it was the genius of the latter race that divined the import- ance of the invention and spread its use. The coinage of the Ionian towns goes back to the reign of Gyges (c. 675 B.C.). And it is in Ionia that commercial development is earliest and greatest. In the most distant regions the Ionian is first in the field. Egypt and the Black Sea are both opened up to Greek trade by Miletus, the Adriatic and the Western Mediterranean by Phocaea and Samos. It is significant that of the twelve states engaged in the Egyptian trade in the 6th century all, with the exception of Aegina, are from the eastern side of the Aegean (Herod, ii. 178). On the western side the chief- centres of trade during these centuries were the islands of Euboea and Aegina and the town of Corinth. The Aeginetan are the earliest coins of Greece proper (c. 650 B.C.); and the two rival scales of weights and measures, in use amongst the Greeks of every age, are the Aeginetan and the Euboic. Commerce naturally gave rise to commercial leagues, and commercial relations tended to bring about political alliances. Foreign policy even at this early epoch seems to have been largely determined by considerations of commerce. Two leagues, the members of which were connected by political as well as commercial ties, can be recognized. At the head of each stood one of the two rival powers in the island of Euboea, Chalcis and Eretria. Their primary object was doubtless protection from the pirate and the foreigner. Compet- ing routes were organized at an early date under their influence, and their trading connexions can be traced from the heart of Asia Minor to the north of Italy. Miletus, Sybaris and Etruria were members of the Eretrian league; Samos, Corinth, Rhegium and Zancle (commanding the Straits of Messina), and Cumae, on the Bay of Naples, of the Chalcidian. The wool of the Phrygian uplands, woven in the looms of Miletus, reached the Etruscan markets by way of Sybaris; through Cumae, Rome and the rest of Latium obtained the elements of Greek culture. Greek trade, however, was confined to the Mediterranean area. The Phoenician and the Carthaginian navigators penetrated to Britain; they discovered the passage round the Cape two

thousand years before Vasco da Gama's time. The Greek sailor dared not adventure himself outside the Black Sea, the Adriatic and the Mediterranean. Greek trade, too, was essentially mari- time. Ports visited by Greek vessels were often the starting points of trade-routes into the interior; the traffic along those routes was left in the hands of the natives (see e.g. Herod, iv. 24). One service, the importance of which can hardly be overestimated, was rendered to civilization by the Greek traders — the invention of geography. The science of geography is the invention of the Greeks. The first maps were made by them (in the 6th century) ; and it was the discoveries a.nd surveys of their sailors that made map-making possible.

Closely connected with the history of Greek trade is the history of Greek colonization. The period of colonization, in its narrower sense, extends from the middle of the 8th to the middle of the 6th century. Greek coloniza-

1 The dates before the middle of the 7th century are in most cases artificial, e.g. those given by Thucydides (book vi.) for the earlier Sicilian settlements. See J. P. Mahaffy, Journal of Hellenic Studies, ii. 164 ff.

themselves were in some cases on a similar level of culture. Where the natives were still backward or barbarous, they came of a stock either closely related to the Greek, or at least separated from it by no great physical differences. We need only contrast the Carian, the Sicel, the Thracian or even the Scythian, with the native Australian, the Hottentot, the Red Indian or the Maori, to apprehend the advantage of the Greek, Amalgama- tion with the native races was easy, and it involved neither physical nor intellectual degeneracy as its consequence. Of the races with which the Greeks came in contact the Thracian was far from the highest in the scale of culture; yet three of the greatest names in the Great Age of Athens are those of men who had Thracian blood in their veins, viz. Themistocles, Cimon and the historian Thucydides. In the absence of any distinction of colour, no insuperable barrier existed between the Greek and the hellenized native. The demos of the colonial cities was largely recruited from the native population, 1 nor was there anything in the Greek world analogous to the " mean whites " or the " black belt." Of hardly less

importance were the climatic conditions. In this respect the Mediterranean area is unique. There is no other region of the world of equal extent in which these conditions are at once so uniform and so favourable. Nowhere had the Greek settler to encounter a climate which was either unsuited to his labour or subversive . of his vigour. That in spite of these advantages so little, comparatively speaking, was effected in the work of Hellenization before the epoch of Alexander and the Diadochi, was the effect of a single counteracting cause. The Greek colonist, like the Greek trader, clung to the shore. He penetrated no farther inland than the sea-breeze. Hence it was only in islands, such as Sicily or Cyprus, that the process of Hellenization was complete. Elsewhere the Greek settlements formed a mere fringe along the coast.

To the 7th century there belongs another movement of high importance in its bearing upon the economic, religious and literary development of Greece, as well as upon its constitutional history. This movement is the rise of the tyrannis. In the political writers of a later age the word possesses a clear-cut connotation. From other forms of monarchy it is distinguished by a twofold differentiation. The tyrannus is an unconstitutional ruler, and his authority is exercised over unwilling subjects. In the 7th and 6th centuries the line was not drawn so distinctly between the tyrant and the legitimate monarch. Even Herodotus uses the words ” tyrant ” and ” king ” interchangeably (e.g. the princes of Cyprus are called ” kings ” in v. no and ” tyrants ” in v. 109), so that it is sometimes difficult to decide whether a legitimate monarch or a tyrant is meant (e.g. Aristophilides of Tarentum, iii. 136, or Telys of Sybaris, v. 44). But the distinction between the tyrant and the king of the Heroic Age is a valid one. It is not true that his rule was always exercised over unwilling subjects; it is true that his position was always unconstitutional. The Homeric king is a legitimate monarch; his authority is invested with the sanctions of religion and immemorial custom. The tyrant is an illegitimate ruler; his authority is not recognized, either by customary usage or by express enactment. But the word ” tyrant ” was originally a neutral team; it did not necessarily imply a misuse of power. The origin of the tyrannis is obscure. The word tyrannus has been thought, with some reason, to be a Lydian one. Probably both the name and the thing originated in the Greek colonies of Asia Minor, though the earliest tyrants of whom we hear in Asia Minor (at Ephesus and Miletus) are a generation later than the earliest in Greece itself, where, both at Sicyon and at Corinth, tyranny appears to date back to the second quarter of the 7th century. It is not unusual” to regard tyranny as a universal stage in the constitutional development of the

Greek states, and as a stage that occurs everywhere at one and the same period. In reality, tyranny is confined to certain regions, and it is a phenomenon that is peculiar to no one age or century. In Greece proper, before the

1 At Syracuse the demos makes common cause with the Sicel serf-population against the nobles (Herod, vii. 155).

4th century B.C., it is confined to a small group of states round the Corinthian and Saronic Gulfs. The greater part of the Pelo- ponnese was exempt from it, and there is no good evidence for its existence north of the Isthmus, except at Megara and Athens. It plays no part in the history of the Greek cities in Chalcidice and Thrace. It appears to have been rare in the Cyclades. The regions in which it finds a congenial soil are two, Asia Minor and Sicily. Thus it is incorrect to say that most Greek states passed through this stage. It is still wider of the mark to assume that they passed through it at the same time. There is no ” Age of the Tyrants.” Tyranny began in the Peloponnese a hundred years before it appears in Sicily, and it has disappeared in the Peloponnese almost before it begins in Sicily. In the latter the great age of tyranny comes at the beginning of the 5th century; in the former it is at the end of the 7th and the beginning of the 6th. At Athens the history of tyranny begins after it has ended both at Sicyon and Corinth. There is, indeed, a period in which tyranny is non-existent in the Greek states; roughly speaking, the last sixty years of the 5th century. But with this exception, there is no period in which the tyrant is not to be found. The greatest of all the tyrannies, that of Dionysius at Syracuse, belongs to the 4th century. Nor must it be assumed that tyranny always comes at the same stage in the history of a constitution; that it is always a stage between oligarchy and democracy. At Corinth it is followed, not by democracy but by oligarchy, and it is an oligarchy that lasts, with a brief interruption, for two hundred and fifty years. At Athens it is not immediately preceded by oligarchy. Between the Eupatrid oligarchy and the rule of Peisistratus there comes the timocracy of Solon. These exceptions do not stand alone. The cause of tyranny is, in one sense, uniform. In the earlier centuries, at any rate, tyranny is always the expression of discontent; the tyrant is always the champion of a cause. But it would be a mistake to suppose that the discontent is necessarily political, or that the cause which he champions is always a constitutional one. At Sicyon it is a racial one; Cleisthenes is the champion of the older population against their Dorian oppressors (see Herod, v. 67, 68). At Athens the discontent is economic rather than political; Peisistratus is

the champion of the Diacrii, the inhabitants of the poorest region of Attica. The party-strifes of which we hear in the early history of Miletus, which doubtless gave the tyrant his opportunity, are concerned with the claims of rival industrial classes. In Sicily the tyrant is the ally of the rich and the foe of the demos, and the cause which he champions, both in the 5th century and the 4th, is a national one, that of the Greek against the Cartha- ginian. We may suspect that in Greece itself the tyrannies of the 7th century are the expression of an anti-Dorian reaction. It can hardly be an accident that the states in which the tyrannis is found at this epoch, Corinth, Megara, Sicyon, Epidaurus, are all of them states in which a Dorian upper class ruled over a subject population. In Asia Minor the tyrannis assumes a peculiar character after the Persian conquest. The tyrant rules as the deputy of the Persian satrap. Thus in the East the tyrant is the enemy of the national cause; in the West, in Sicily, he is its champion.

Tyranny is not a phenomenon peculiar to Greek history. It is possible to find analogies to it in Roman history, in the power of Caesar, or of the Caesars; in the despotisms of medieval Italy; or even in the Napoleonic empire. Between the tyrant and the Italian despot there is indeed a real analogy; but between the Roman principate and the Greek tyrannis there are two essential differences. In the first place, the principate was expressed in constitutional forms, or veiled uiyler constitutional fictions; the tyrant stood altogether outside the constitution. And, secondly, at Rome both Julius and Augustus owed their position to the power of the sword. The power of the sword, it is true, plays a large part in the history of the later tyrants (e.g. Dionysius of Syracuse) ; the earlier ones, however, had no mercenary armies at their command. We can hardly compare the bodyguard of Peisistratus to the legions of the first or the second Caesar.

The view taken of the tyrannis in Greek literature is almost uniformly unfavourable. In this respect there is no difference between Plato and Aristotle, or between Herodotus and the later historians. 1 His policy is represented as purely selfish, and his rule as oppressive. Herodotus is influenced partly by the traditions current among the oligarchs, who had been the chief sufferers, and partly by the odious associations which had gathered round tyranny in Asia Minor. The philosophers write under their impressions of the later tyrannis, and their account

is largely an a priori one. It is seldom that we find any attempt, either in the philosophers or the historians, to do justice to the real services rendered by the tyrants. 2 Their first service was a constitutional one. They helped to break down the power of the old aristocratic houses, and thus to create the social and political conditions indispensable to democracy. The tyrannis involved the sacrifice of liberty in the cause of equality. When tyranny falls, it is never succeeded by the aristocracies which it had overthrown. It is frequently succeeded by an oligarchy, but it is an oligarchy in which the claim to exclusive power is based, not upon mere birth, but upon wealth, or the possession of land. It would be unfair to treat this service as one that was rendered unconsciously and unwillingly. Where the tyrant asserted the claims of an oppressed class, he consciously aimed at the destruction of privilege and the effacement of class distinc- tions. Hence it is unjust to treat his power as resting upon mere force. A government which can last eighty or a hundred years, as was the case with the tyrannies at Corinth and Sicyon, must have a moral force behind it. It must rest upon the consent of its subjects. The second service which the tyrants rendered to Greece was a political one. Their policy tended to break down the barriers which isolated each petty state from its neighbours. In their history we can trace a system of wide- spread alliances, which are often cemented by matrimonial connexions. The Cypselid tyrantsof Corinth appear to have been allied with the royal families of Egypt, Lydia and Phrygia, as well as with the tyrants of Miletus and Epidaurus, and with some of the great Athenian families. In Sicily we find a league of the northern tyrants opposed to a league of the southern; and in each case there is a corresponding matrimonial alliance. Anaxilaus of Rhegium is the son-in-law and ally of Terillus of Himera; Gelo of Syracuse stands in the same relation to Theron of Agrigentum. Royal marriages have played a great part in the politics of Europe. In the comparison of Greek and modern history it has been too often forgotten how great a difference it makes, and how great a disadvantage it involves, to a republic that it has neither sons nor daughters to. give in marriage. In commerce and colonization the tyrants were only continuing the work of the oligarchies to which they succeeded. Greek trade owed its expansion to the intelligent efforts of the oligarchs who ruled at Miletus and Corinth, in Samos, Aegina and Euboea; but in particular cases, such as Miletus, Corinth, Sicyon and Athens, there was a further development, and a still more rapid growth, under the tyrants. In the same way, the foundation •of the colonies was in most cases due to the policy of the oli- garchical governments. They can claim credit for the colonies of Chalcis and Eretria, of Megara, Phocaea and Samos, as well as for the great Achaean settlements in southern Italy. The Cypselids at Corinth, and

Thrasybulus at Miletus, are instances of tyrants who colonized on a great scale.

In their religious policy the tyrants went far to democratize Greek religion. The functions of monarchy had been largely religious; but, while the king was necessarily a lfe, ‘ gloa . priest, he was not the only priest in the community. “tyrants.” There were special priesthoods, hereditary in par- ticular families, even in the monarchical period; and upon the fall of the monarchy, while the priestly functions of the kings passed to republican magistrates, the priesthoods which were in the exclusive possession of the great families tended to become the important ones. Thus, before the rise of tyranny, Greek religion is aristocratic. The cults recognized

1 An exception should perhaps be made in the case of Thucydides.

2 The Peisistratidae come off better, however.

by the state are the sacra of noble clans. The religious pre- rogatives of the nobles helped to confirm their political ones, and, as long as religion retained its aristocratic character, it was impossible for democracy to take root. The policy of the tyrants aimed at fostering popular cults which had no associations with the old families, and at establishing new festivals. The cult of the wine-god, Dionysus, was thus fostered at Sicyon by Cleisthenes, and at Corinth by the Cypselids; while at Athens a new festival of this deity, which so completely overshadowed the older festival that it became known as the Great Dionysia, probably owed its institution to Peisistratus. Another festival, the Panathenaea, which had been instituted only a few years before his rise to power, became under his rule, and thanks to his policy, the chief national festival of the Athenian state. Every- where, again, we find the tyrants the patrons of literature. Pindar and Bacchylides, Aeschylus and Simonides found a welcome at the court of Hiero. Polycrates was the patron of Anacreon, Periander of Arion. To Peisistratus has been attri- buted, possibly not without reason, the first critical edition of the text of Homer, a work as important in the literary history of Greece as was the issue of the Authorized Version of the Bible in English history. It we would judge fairly of tyranny, and of what it contributed to the development of Greece, we must remember how many states there were in whose history the period of greatest power coincides with the rule of a tyrant. This is unquestionably true of Corinth and Sicyon, as well as of Syracuse in the 5th, and again in the 4th century; it is probably true of Samos and Miletus. In the case of Athens it is only the splendour of the Great Age that blinds us to the greatness of the results achieved by the policy of

the Peisistratids.

With the overthrow of this dynasty tyranny disappears from Greece proper for more than a century. During the century and a half which had elapsed since its first appearance the whole aspect of Greek life, and of the Greek world, had changed. The development was as yet incomplete, but the lines on which it was to proceed had been clearly marked out. Political power was no longer the monopoly of a class. The struggle between the ” few ” and the ” many ” had begun; in one state at least (Athens) the victory of the “many” was assured. The first chapter in the history of democracy was already written. In the art of war the two innovations which were ultimately to establish the military supremacy of Greece, hoplite tactics and the trireme, had already been introduced. Greek literature was no longer synonymous with epic poetry. Some of its most distinctive forms had not yet been evolved; indeed, it is only quite at the end of the period that prose-writing begins; but both lyric and elegiac poetry had been brought to perfection. In art, statuary was still compaiatively stiff and crude; but in other branches, in architecture, in vase- painting and in coin-types, the aesthetic genius of the race had asserted its pre-eminence. Philosophy, the supreme gift of Greece to the modern world, had become a living power. Some of her most original thinkers belong to the 6th century. Criticism had been applied to everything in turn: to the gods, to conduct, and to the conception of the universe. Before the Great Age begins, the claims of intellectual as well as of political freedom had been vindicated. It was not, however, in Greece proper that progress had been greatest. In the next century the centre of gravity of Greek civilization shifts to the western side of the Aegean; in the 6th century it must be looked for at Miletus, rather than at Athens. In order to estimate how far the develop- ment of Greece had advanced, or to appreciate the distinctive features of Greek life at this period, we must study Ionia, rather than Attica or the Peloponnese. Almost all that is greatest and most characteristic is to be found on the eastern side of the Aegean. The great names in the history of science and philosophy before the beginning of the 5th century — Thales, Pythagoras, Xenophanes, Heraclitus, Parmenides, Anaximander, Hecataeus; names which are representative of mathematics, astronomy, geography and metaphysics, are all, without exception, Ionian. In poetry, too, the most famous names, if not so exclusively Ionian, are connected either with the Asiatic coast or with

The arts.

the Cyclades. Against Archilochus and Anacreon, Sappho and Alcaeus, Greece has nothing better to set, after the age of Hesiod, than Tyrtaeus and Theognis. Reference has already been made to the greatness of the Ionians as navigators, as colonizers and as traders. In wealth and in population, Miletus, at the epoch of the Persian conquest, must have been far ahead of any city of European Greece. Sybaris, in Magna Graecia, can have been its only rival outside Ionia. There were two respects, however, in which the comparison was in favour of the mother-country. In warfare, the superiority of the Spartan infantry was un- questioned; in politics, the Greek states showed a greater power of combination than the Ionian.

Finally, Ionia was the scene of the first conflicts with the Persian. Here were decided the first stages of a struggle which was to determine the place of Greece in the history relations. °* t ‘ le wor ld. The rise of Persia under Cyrus was, as Herodotus saw, the turning-point of Greek history. Hitherto the Greek had proved himself indispensable to the oriental monarchies with which he had been brought into contact. In Egypt the power of the Saite kings rested upon the support of their Greek mercenaries. Amasis (569-525 B.C.), who is raised to the throne as the leader of a reaction against the influence of the foreign garrison, ends by showing greater favour to the Greek soldiery and the Greek traders than all that were before him. With Lydia the relations were originally hostile; the conquest of the Greek fringe is the constant aim of Lydian policy. Greek influences, however, seem to have quickly per- meated Lydia, and to have penetrated to the court. Alyattes (610-560 B.C.) marries an Ionian wife, and the succession is disputed between the son of this matriage and Croesus, whose mother was a Carian. Croesus (560-546 B.C.) secures the throne, only to become the lavish patron of Greek sanctuaries and the ally of a Greek state. The history of Hellenism had begun. It was the rise’ of Cyrus that closed the East to Greek enterprise and Greek influences. In Persia we find the antithesis of all that is characteristic of Greece — autocracy as opposed to liberty; a military society organized on an aristocratic basis, to an industrial society, animated by a democratic spirit; an army, whose strength lay in its cavalry, to an army, in which the foot- soldier alone counted; a morality, which assigned the chief place to veracity, to a morality which subordinated it to other virtues; a religion, which ranks among the great religions of the world, to a religion, which appeared to the most spiritual minds among the Greeks themselves both immoral and absurd. Between two such races

there could be neither sympathy nor mutual understanding. In the Great Age the Greek had learned to despise the Persian, and the Persian to fear the Greek. In the 6th century it was the Persian who despised, and the Greek who feared. Thehistory of the conflicts between the Ionian Greeks and the Persian empire affords a striking example of the combination of intellectual strength and political weakness in the character of a people. The causes of the failure of the Ionians to offer a successful resistance to Persia, both at the time of the conquest by Harpagus (546-545 B.C.) and in the Ionic revolt (490-494 B.C.), are not far to seek. The centrifugal forces always tended to prove the stronger in the Greek system, and nowhere were they stronger than in Ionia. The tie of their tribal union proved weaker, every time it was put to the test, than the political and commercial interests of the individual states. A league of jealous commercial rivals is certain not to stand the strain of a protracted struggle against great odds. Against the advancing power of Lydia a common resistance had not so much as been attempted. Miletus, the greatest of the Ionian towns, had received aid from Chios alone. Against Persia a common resistance was attempted. The Pani- onium, the centre of a religious amphictyony, became for the moment the centre of a political league. At the time of the Persian conquest Miletus held aloof. She secured favourable terms for herself, and left the rest of Ionia to its fate. In the later conflict, on the contrary, Miletus is the leader in the revolt. The issue was determined, not as Herodotus represents it, by the inherent indolence of the Ionian nature* but by the selfish

Persian wars.

policy of the leading states. In the sea-fight at Lade (494 B.C.) the decisive battle of the war, the Milesians and Chians fought with desperate courage. The day was lost thanks to the treachery of the Samian and Lesbian contingents.

The causes of the successful resistance of the Greeks to the invasions of their country, first by Datis and Artaphernes (490 B.C.), in the reign of Darius, and then by Xerxes in person (480-479 B.C.), are more complex. Their success was partly due to a moral cause. And this was realized by the Greeks themselves. They felt (see Herod, vii. 104) that the subjects of a despot are no match for the citizens of a free state, who yield obedience to a law which is self-imposed. But the cause was not solely a moral one. Nor was the result due to the numbers and efficiency of the Athenian fleet, in the degree that the Athenians claimed (see Herod, vii. 139). The truth is that the conditions, both political and military, were far more favour- able to the Greek defence

in Europe than they had been in Asia. At this crisis the centripetal forces proved stronger than the centrifugal. The moral ascendancy of Sparta was the deter- mining factor. In Sparta the Greeks had a leader whom all were ready to obey (Herod, viii. 2). But for her influence the forces of disintegration would have made themselves felt as quickly as in Ionia. Sparta was confronted with immense difficulties in conducting the defence against Xerxes. The two chief naval powers, Athens and Aegina, had to be reconciled after a long and exasperating warfare (see Aegina). After Thermopylae, the whole of northern Greece, with the exception of Athens and a few minor states, was lost to the Greek cause. The supposed interests of the Peloponnesians, who formed the greater part of the national forces, conflicted with the supposed interests of the Athenians. A more impartial view than was possible to the generation for which Herodotus wrote suggests that Sparta performed her task with intelligence and patriotism. The claims of Athens and Sparta were about equally balanced. And in spite of her great superiority in numbers, 1 the military conditions were far from favourable to Persia. A land so moun- tainous as Greece is was unsuited to the operations of cavalry, the most efficient arm of the service in the Persian Army, as in most oriental ones. Ignorance of local conditions, combined with the dangerous nature of the Greek coast, exposed their ships to the risk of destruction; while the composite character of the fleet, and the jealousies of its various contingents, tended to neutralize the advantage of numbers. In courage and discipline, the flower of the Persian infantry was probably little inferior to the Greek; in equipment, they were no match for the Greek panoply. Lastly, Xerxes laboured under a disadvantage, which may be illustrated by the experience of the British army in the South African War — distance from his base.

5. The Great Age {480-338 B.C.). — The effects of the repulse of Persia were momentous in their influence upon Greece. The effects upon Elizabethan England of the defeat of the Spanish armada would afford quite an inadequate parallel. It gave the Greeks a heightened sense, both of their own national unity and of their superiority to the barbarian, while at the same time' it helped to create the material conditions requisite alike for the artistic and political development of the 5th century. Other cities besides Athens were adorned with the proceeds of the spoils won from Persia, and Greek trade benefited both from the reunion of Ionia with Greece, and from the suppression of piracy in the Aegean and the Hellespont. Do these developments justify us in giving to the period, which begins with the repulse of Xerxes, and ends with the victory of Philip, the title of ” the Great Age “? If the title is justified in the case of the 5th , century, should the 4th

century be excluded from the period? At first sight, the difference between the 4th century and the 5th may seem greater than that which exists between the 5th and the 6th. On the political side, the 5th century is an age of growth, the 4th an age of decay; on the literary side, the

1 The numbers given by Herodotus (upwards of 5,000,000) are enormously exaggerated. We must divide by ten or fifteen to arrive at a probable estimate of the forces that actually crossed the Hellespont.

former is an age of poetry, the latter an age of prose. In spite of these contrasts, there is a real unity in the period which begins with the repulse of Xerxes and ends with the death of Alexander, as compared with any preceding one. It is an age of maturity in politics, in literature, and in art; and this is true of no earlier age. Nor can we say that the 5th century is, in all these aspects of Greek life, immature as compared with the 4th, or, on the other hand, that the 4th is decadent as compared with the 5th. On the political side, maturity is, in one sense, reached in the earlier century. There is nothing in the later century so great as the Athenian empire. In another sense, maturity is not reached till the 4th century. It is only in the later century that the tendency of the Greek constitutions to conform to a common type, democracy, is (at least approximately) realized, and it is only in this century that the principles upon which democracy is based are carried to their logical conclusion. In iiterature, if we confine our attention to poetry, we must pro- nounce the 5th century the age of completed development; but in prose the case is different. The style even of Thucydides is immature, as compared with that of Isocrates and Plato. In philosophy, however high may be the estimate that is formed of the genius of the earlier thinkers, it cannot be disputed that in Plato and Aristotle we find a more mature stage of thought. In art, architecture may perhaps be said to reach- its zenith in the 5th, sculpture in the 4th century. In its political aspect, the history of the Great Age resolves itself into the history of two movements, the imperial and the democratic. Hitherto Greece had meant, politically, an aggregate of independent states, very numerous, and, as a rule, very small. The principle of autonomy was to the Greek the most sacred of all govern?” political principles; the passion for autonomy the went, most potent of political factors. In the latter half of

the 6th century Sparta had succeeded in combining the majority of the Peloponnesian states into a loose federal union; so loose, however, that it appears to have been dormant in the intervals of peace. In the crisis of the Persian invasion the Peloponnesian League was extended so as to include all the states which had espoused the national cause. It looked on the morrow of Plataea and Mycale (the two victories, won simul- taneously, in 479 B.C., by Spartan commanders, by which the danger from Persia was finally averted) as if a permanent basis for union might be found in the hegemony of Sparta. The sense of a common peril and a common triumph brought with it the need of a common union; it was Athens, however, instead of Sparta, by whom the first conscious effort was made to transcend the isolation of the Greek political system and to bring the units into combination. The league thus founded (the Delian League, established in 477 B.C.) was under the presidency of Athens, but it included hardly any other state besides those that had conducted the defence of Greece. It was formed, almost entirely, of the states which had been liberated from Persian rule by the great victories of the war. The Delian League, even in the form in which it was first established, as a confederation of autonomous allies, marks an advance in political conceptions upon the Peloponnesian League. Provision is made for an annual revenue, for periodical meetings of the council, and for a permanent executive. It is a real federation, though an imperfect one. There were defects in its constitution which rendered it inevitable that it should be transformed into an empire. Athens was from the first ” the predominant partner.” The fleet was mainly Athenian, the commanders entirely so; the assessment of the tribute was in Athenian hands; there was no federal court appointed to determine questions at issue between Athens and the other members; and, worst omission of all, the right of secession was left undecided. By the middle of, the century the Delian League has become the Athenian empire. Henceforward the imperial idea, in one form or another, dominates Greek politics. Athens failed to extend her authority over the whole of Greece. Her empire was overthrown; but the triumph of autonomy proved the triumph of imperialism. The Spartan empire succeeds to the Athenian, and, when it is finally shattered at Leuctra (371 B.C.), the hegemony of Thebes,

XII. is

which is established on its ruins, is an empire in all but name. The decay of Theban power paves the way for the rise of Macedon. Thus throughout this period we can trace two forces contending for mastery in the Greek political system. Two causes divide the allegiance of the Greek world, the cause of empire and the cause of autonomy. The formation of the confederacy of Delos did not involve the dissolution

of the alliance between Athens and Sparta. For seventeen years more Athens retained her place in the league, ” which had been established against the Mede” under the presidency of Sparta in 480 B.C. (Thuc. i. 102). The ascendancy of Cimon and the Philolaconian party at Athens was favourable to a good understanding between the two states, and at Sparta in normal times the balance inclined in favour of the party whose policy is best described by the motto ” quieta non movere.”

In the end, however, the opposition of the two contending forces proved too strong for Spartan neutrality 1 . The fall of Cimon (461 B.C.) was followed by the so-called ” First Peloponnesian War,” a conflict between Athens and p0 nnes°an her maritime rivals, Corinth and Aegina, into which Wars. Sparta was ultimately drawn. Thucydides regards the hostilities of these years (460-454 B.C.), which were resumed for a few months in 446 B.C., on the expiration of the Five Years’ Truce, as preliminary to those of the great Peloponnesian War (431-404 B.C.). The real question at issue was in both cases the same. The tie that united the opponents of Athens was found in a common hostility to the imperial idea. It is a complete misapprehension to regard the Peloponnesian War as a mere duel between two rival claimants for empire. The ultimatum presented by Sparta on the eve of the war demanded the restora- tion of autonomy to the subjects of Athens. There is no reason for doubting her sincerity in presenting it in this form. It would, however, be an equal misapprehension to regard the war as merely a struggle between the cause of empire and the cause of autonomy. Corresponding to this fundamental contrast there are other contrasts, constitutional, racial and military. The military interest of the war is largely due to the fact that Athens was a sea power and Sparta a land one. As the war went on, the constitutional aspect tended to become more marked. At first there were democracies on the side of Sparta, and oligarchies on the side of Athens. In the last stage of the war, when Lysander’s influence was supreme, we see the forces of oligarchy everywhere united and organized for the destruction of demo- cracy. In its origin the war was certainly not due to the rivalry of Dorian and Ionian. This racial, or tribal, contrast counted for more in the politics of Sicily than of Greece; and, though the two great branches of the Greek race were represented respectively by the leaders of the two sides, the allies on neither side belonged exclusively to the one branch or the other. Still, it remains true that the Dorian states were, as a rule, on the Spartan side, and the Ionian states, as a rule, on the Athenian — a division of sentiment which must have helped to widen the breach, and to intensify the animosities.

As a political experiment the Athenian, empire possesses a unique

interest. It represents the first attempt to fuse the principles of imperialism and democracy. It is at once the first empire in history possessed and admini- T** stered by a sovereign people, and the first which empire. sought to establish a common system of democratic institutions amongst its subjects. 1 It was an experiment that failed, partly owing to the inherent strength of the oligarchic cause, partly owing to the exclusive character of ancient citizen- ship. The Athenians themselves recognized that their empire depended for its existence upon the solidarity of democratic interests (see Thuc. iii. 47; Pseudo-Xenophon, de Rep. Ath. i. 14, iii. 10). An understanding existed between the democratic leaders in the subject-states and the democratic party at Athens. 1 It has been denied by some writers (e.

Charges were easily trumped up against obnoxious oligarchs, and conviction as easily obtained in the Athenian courts of law. Such a system forced the oligarchs into an attitude of opposition. How much this opposition counted for was realized when the Sicilian disaster (413 B.C.) gave the subjects their chance to revolt. The organization of the oligarchical party throughout the empire, which was effected by Lysander in the last stage of the war, contributed to the overthrow of Athenian ascendancy hardly less than the subsidies of Persia. Had Athens aimed at establishing a community of interest between herself and her subjects, based upon a common citizenship, her empire might have endured. It would have been a policy akin to that which secured the permanence of the Roman empire. And it was a policy which found advocates when the day for it was past (see Aristophanes, Lysislrata, 574 ff.; cf. the grant of citizenship to the Samians after Aegospotami, C.I. A. iv. 2, ib). But the policy pursued by Athens in the plenitude of her power was the reverse of the policy pursued by Rome in her treatment of the franchise. It is hardly an exaggeration to say that the fate of the empire was sealed by the law of Pericles (451 B.C.), by which the franchise was restricted to those who could establish Athenian descent on both sides. It was not merely that the process of amalgamation through intermarriage was abruptly checked; what was more serious was that a hard and fast line was drawn, once and for all, between the small body of privileged rulers and the great mass of unprivileged subjects. Maine {Early Institu- tions, lecture 13) has classed the Athenian empire with those of the familiar Oriental type, which attempt nothing beyond the raising of taxes and the

levying of troops. The Athenian empire cannot, indeed, be classed with the Roman, or with the British rule in India; it does not, therefore, deserve to be classed with the empires of Cyrus or of Jenghiz Khan. Though the basis of its organization, like that of the Persian empire under Darius, was financial, it attempted, and secured, objects beyond the mere payment of tribute and the supply of ships. If Athens did not introduce a common religion, or a common system of educa- tion, or a common citizenship, she did introduce a common type of political institutions, and a common jurisdiction. 1 She went some way, too, in the direction of establishing a common system of coins, and of weights and measures. A common language was there already. In a word, the Athenian empire marks a definite stage of political evolution.

The other great political movement of the age was the progress of democracy. Before the Persian invasion democracy was a _. rare phenomenon in Greek politics. Where it was

mature found it existed in an undeveloped form, and its tenure demo- of power was precarious. By the beginning of the cracy. Peloponnesian War it had become the prevalent form of government. The great majority of Greek states had adopted democratic constitutions. Both in the Athenian sphere of influence and in the colonial world outside that sphere, demo- cracy was all but the only form of constitution known. It was only in Greece proper that oligarchy held its own. In the Peloponnese it could count a majority of the states; in northern Greece at least a half of them. The spread of democratic insti- tutions was arrested by the victory of Sparta in the East, and the rise of Dionysius in the West. There was a moment at the end of the 5th century when it looked as if democracy was a lost cause. Even Athens was for a brief period under the rule of the Thirty (404-403 B.C.). In the regions which had formed the empire of Athens the decarchies set up by Lysander were soon overthrown, and democracies restored in most cases, but oligarchy continued to be the prevalent form in Greece proper until Leuctra (371 B.C.), and in Sicily tyranny had a still longer tenure of power. By the end of the Great Age oligarchy has almost disappeared from the Greek world, except in the sphere of Persian influence. The Spartan monarchy still survives; a few Peloponnesian states still maintain the rule of the few; here 1 The evidence seems to indicate that all the more important criminal cases throughout the empire were tried in the Athenian courts. In civil cases Athens secured to the citizens of the subject- states the right of suing Athenian citizens, as well as citizens of other subject-states.

and there in Greece itself we meet with a revival of the tyrannis; but,

with these exceptions, democracy is everywhere the only type of constitution. And democracy has developed as well as spread. At the end of the 5th century the constitution of Cleisthenes, which was a democracy in the view of his contem- poraries, had come to be regarded as an aristocracy (Aristot. Ath. Pol. 29. 3). We can trace a similar change of sentiment in Sicily. As compared with the extreme form of constitution adopted at Syracuse after the defeat of the Athenian expedition, the democracies established two generations earlier, on the fall of the tyrannis, appeared oligarchical. The changes by which the character of the Greek democracies was revolutionized were four in number: the substitution of sortition for election, the abolition of a property qualification, the payment of officials and the rise of a class of professional politicians. In the demo cracy of Cleisthenes no payment was given for service, whether as a magistrate, a juror or a member of the Boule. The higher magistracies were filled by election, and they were held almost exclusively by the members of the great Athenian families. For the highest office of all, the archonship, none but Penta- cosiomedimni (the first of the four Solonian classes) were eligible. The introduction of pay and the removal of the property quali- fication formed part of the reforms of Pericles. Sortition had been instituted for election a generation earlier (487 B.C.). 2 What is perhaps the most important of all these changes, the rise of the demagogues, belongs to the era of the Peloponnesian War. From the time of Cleisthenes to the outbreak of the war every statesman of note at Athens, with the exception of Themistocles (and, perhaps, of Ephialtes), is of aristocratic birth. Down to the fall of Cimon the course of Athenian politics is to a great extent determined by the alliances and antipathies of the great clans. With the Peloponnesian War a new epoch begins. The chief office, the strategia, is still, as a rule, held by men of rank. But leadership in the Ecclesia has passed to men of a. different class. The demagogues were not necessarily poor men. Cleon was a wealthy man; Eucrates, Lysicles and Hyperbolus were, at any rate, tradesmen rather than artisans. The first ” labour member” proper is Cleophon (411-404 B.C.), a lyre-maker* They belonged, however, not to the land-owning, but to the in- dustrial classes; they were distinguished from the older race of party-leaders by a vulgar accent, and by a violence of gesture in public speaking, and they found their supporters among the population of the city and its port, the Peiraeus, rather than among the farmers of the country districts. In the 4th century the demagogues, though under another name, that of orators, have acquired entire control of the Ecclesia. It is an age of professionalism, and the professional soldier has his counterpart in the professional politician. Down to the death of Pericles the party-leader had always held office as Strategus. His rival,

Thucydides, son of Melesias, forms a solitary exception to this statement. In the 4th century the divorce between the general and the statesman is complete. The generals are professional soldiers, who aspire to no political influence in the state, and the statesmen devote themselves exclusively to politics, a career for which they have prepared themselves by a professional training in oratory or administrative work. The ruin of agri- culture during the war had reduced the old families to insigni- ficance. Birth counts for less than nothing as a political asset in the age of Demosthenes.

But great as are the contrasts which have been pointed out between the earlier and the later democracy, those that distinguish the ancient conception of democracy from the modern are of a still more essential nature. The differences that distinguish the democracies of ancient Greece from those of the modern world have their origin, to a great extent, in the difference between a city-state and a nation-state. Many of the most famous Greek states

2 After this date, and partly in consequence of the change, the archonship, to which sortition was applied, loses its importance. The strategi (generals) become the chief executive officials. As elec- tion was never replaced by the lot in their case, the change had less practical meaning than might appear at first sight. (See Archon; Strategus.)

The cHy- state.

had an area of a few square miles; the largest of them was no larger than an English county. Political theory put the limit of the citizen-body at 10,000. Though this number was exceeded in a few cases, it is doubtful if any state, except Athens, ever counted more than 20,000 citizens. In the nation-states of modern times, democratic government is possible only under the form of a representative system; in the city-state representative government was unnecessary, and therefore unknown. In the ancient type of democracy a popular chamber has no existence. The Ecclesia is not a chamber in any sense of the term; it is an assembly of the whole people, which every citizen is entitled to attend, and in which every one is equally entitled to vote and speak. The question raised in modern political science, as to whether

sovereignty resides in the electors or their representatives, has thus neither place nor meaning in ancient theory. In the same way, one of the most familiar results of modern analysis, the distinction between the executive and the legislative, finds no recognition in the Greek writers. In a direct system of government there can be no executive in the proper sense. Executive functions are discharged by the ecclesia, to whose decision the details of administration may be referred. The position of the strategi, the chief officials in the Athenian democracy of the 5th century, was in no sense comparable to that of a modern cabinet. Hence the individual citizen in an ancient democracy was concerned in, and responsible for, the actual work of government to a degree that is inconceivable in a modern state. Thus participation in the administrative and judicial business of the state is made by Aristotle the differentia of the citizen (ito\Ittis kcrrlv 6 ˆerkxoiv Kpicecos Kal apxys, Aristot. Politics, p. 1 275 a 20). A large proportion of the citizens of Athens, in addition, to frequent service in the courts of law, must in the course of their lives have held a magistracy, great or small, or have acted for a year or two as members of the Boule. 1 It must be remembered that there was nothing corre- sponding to a permanent civil service in the ancient state. Much of the work of a government office would have been transacted by the Athenian Boule. It must be remembered, too, that political and administrative questions of great import- ance came before the popular courts of law. Hence it follows that the ordinary citizen of an ancient democracy, in the course of his service in the Boule or the law-courts, acquired an interest in political questions, and a grasp of administrative work, which none but a select few can hope to acquire under the conditions of the modern system. Where there existed neither a popular chamber nor a distinct executive, there was no opportunity for the growth of a party-system. There were, of course, political parties at Athens and elsewhere — oligarchs and democrats, conservatives and radicals, a peace-party and a war-party, according to the burning question of the day. There was, however, nothing equivalent to a general election, to a cabinet (or to that collective responsibility which is of the essence of a cabinet), or to the government and the opposition. Party organization, therefore, and a party system, in the proper sense, were never developed. Whatever may have been the evils incident to the ancient form of democracy, the ” boss,” the caucus and the spoils-system were not among them.

Besides these differences, which, directly or indirectly, result from the difference of scale, there are others, hardly less profound, which are not connected with the size of the city-state. Perhaps the most striking contrast between the democracies of ancient and of modern times is to

be found in their attitude towards privilege. Ancient democracy implies privilege; modern democracy implies its destruction. In the more fully developed democracies of the modern world (e.g. in the United States, or in Australia), the privilege of class is unknown; in some of them (e.g. New Zealand, Australia, Norway) even the privilege of sex has been abolished. Ancient democracy was bound up with privilege as much as oligarchy was. The transition from the latter to the former was effected by enlarging the area of privilege and by altering its basis. In an oligarchical state citizenship

1 For an estimate of the numbers annually engaged in the service of Athens, see Aristot. Alh. Pol. 24. 3.

might be confined to 10 % of the free population; under a democracy 50% might enjoy it. In the former case the qualifica- tion might be wealth or land; in the latter case it might be, as it was at Athens, birth, i.e. descent, on both sides, from a citizen family. But, in both cases alike, the distinction between a privileged and an unprivileged body of free-born residents is fundamental. To the unprivileged class belonged, not only foreigners temporarily resident (£kvoi,) and aliens permanently domiciled (jueroiKoi),but also those native-born inhabitants of the state who were of foreign extraction, on one side or the other. 2 The privileges attaching to citizenship included, in addition to eligibility for office and a vote in the assembly, such private rights as that of owning land or a house, or of contracting a marriage with one of citizen status. The citizen, too, was alone the recipient of all the various forms of pay (e.g. for attend- ance in the assembly, for service in the Boule or the law-courts, or for the celebration of the great festivals) which are so con- spicuous a feature in the developed democracy of the 4th century. The metoeci could not even plead in a court of law in person, but only through a patron (trpoor arris). It is intelligible that privileges so great should be jealously guarded. In the demo- cracies of the modern world naturalization is easy; in those of ancient Greece admission to the franchise was rarely accorded. In modern times, again, we are accustomed to connect democracy with the emancipation of women. It is true that only a few democratic constitutions grant them the suffrage; ot but though, as a rule, they are denied public rights, women. the growth of popular government has been almost everywhere accompanied by an extension of their private rights, and by the removal of the restrictions imposed by law, custom or public opinion upon their freedom of action. In ancient Greece the democracies were as illiberal in their policy as the oligarchies. Women of the respectable class were condemned to comparative seclusion. They enjoyed far less freedom in 4th-century Athens than in the

Homeric Age. It is not in any of the democracies, but in conservative Sparta, that they possess privilege and exercise influence.

The most fundamental of all the contrasts between democracy in its ancient and in its modern form remains to be stated. The ancient state was inseparable from slavery. In „. this respect there was no difference between democracy and the other forms of government. No inconsistency was felt, therefore, between this institution and the democratic principle. Modern political theory has been profoundly affected by the conception of the dignity of labour; ancient political theory tended to regard labour as a disqualification for the exercise of political rights. Where slavery exists, the taint of it will inevitably cling to all labour that can be performed by the slave. In ancient Athens (which may be taken as typical of the Greek democracies) unskilled labour was almost entirely slave-labour, and skilled labour was largely so. The arts and crafts were, to some extent, exercised by citizens, but to a less extent in the 4th than in the 6th century. They were, however, chiefly left to aliens or slaves. The citizen-body of Athens in the age of Demosthenes has been stigmatized as consisting in great measure of salaried paupers. There is, doubtless, an exaggeration in this. It is, however, true, both that the system of state-pay-went a long way towards supplying the simple wants of a southern population, and that a large proportion of the citizens had time to spare for the service of the state. Had the life of the lower class of citizens been absorbed in a round of mechanical labours, as fully as is the life of our industrial classes, the working of an ancient democracy would have been impossible. In justice to the ancient democracies it must be conceded that, while popular government carried with it neither the enfranchise- ment of the alien nor the emancipation of the slave, the rights secured to both classes were more considerable in the democratic states than elsewhere. The lot of the slave, as well as that of the alien, was a peculiarly favourable one at Athens. The pseudo- Xenophon in the 5th century (De rep. Alh. 1. 10-12) and Plato

2 Foreign is not used here as equivalent to non-Hellenic. It means ” belonging to another state, whether Greek or barbarian.”

in the 4th {Republic, p. 563 b), prove that the spirit of liberty, with

which Athenian life was permeated, was not without its influence upon the position of these classes. When we read that critics complained of the opulence of slaves, and of the liberties they took, and when we are told that the slave could not be distinguished from the poorer class of citizens either by his dress or his look, we begin to realize the difference between the slavery of ancient Athens and the system as it was worked on the Roman laiifundia or the plantations of the New World.

It had been anticipated that the fall of Athens would mean the triumph of the principle of autonomy. If Athens had surrendered within a year or so of the Sicilian catas- Z he rt trophe, this anticipation would probably have been

empire" fulfilled. It was the last phase of the struggle (412- 404 B.C.) that rendered a Spartan empire inevitable. The oligarchical governments established by Lysander recognized that their tenure of power was dependent upon Spartan support, while Lysander himself, to whose genius, as a political organizer not less than as a commander, the triumph of Sparta was due, was unwilling to see his work undone. The Athenian empire had never included the greater part of Greece proper; since the Thirty Years' Peace its possessions on the mainland, outside the boundaries of Attica, were limited to Naupactus and Plataea. Sparta, on the other hand, attempted the control of the entire Greek world east of the Adriatic. Athens had been compelled to acknowledge a dual system; Sparta sought to establish uniformity. The attempt failed from the first. Within a year of the surrender of Athens, Thebes and Corinth had drifted into an attitude of opposition, while Argos remained hostile. It was not long before the policy of Lysander succeeded in uniting against Sparta the very forces upon which she had relied when she entered on the Peloponnesian War. The Corinthian War (394-387 B.C.) was brought about by the alliance of all the second- class powers — Thebes, Athens, Corinth, Argos — against the one first-class power, Sparta. Though Sparta emerged successful from the war, it was with the loss of her maritime empire, and at the cost of recognizing the principle of autonomy as the basis of the Greek political system. It was already evident, thus early in the century, that the centrifugal forces were to prove stronger than the centripetal. Two further causes may be indicated which help to explain the failure of the Spartan empire. In the first place Spartan sea-power was an artificial creation. History seems to show that it is idle for a state to aspire to naval supremacy unless it possesses a great commercial marine. Athens had possessed such a marine; her naval supremacy was due not to the mere size of her fleet, but to the numbers and skill of her seafaring population. Sparta had no

commerce. She could build fleets more easily than she could man them. A single defeat (at Cnidus, 391 B.C.) sufficed for t he ruin of her sea-power. The second cause is to be found in the financial weakness of the Spartan state. The Spartan treasury had been temporarily enriched by the spoils of the Peloponnesian War, but neither during that war, nor afterwards, did Sparta succeed in developing any scientific financial system. Athens was the only state which either possessed a large annual revenue or accumulated a considerable reserve. Under the conditions of Greek warfare, fleets were more expensive than armies. Not only was money needed for the building and maintenance of the ships, but the sailor must be paid, while the soldier served for nothing. Hence the power with the longest purse could both build the largest fleet and attract the most skilful seamen.

The battle of Leuctra transferred the hegemony from Sparta

to Thebes, but the attempt to unite Greece under the leadership

of Thebes was from the first doomed to failure. The

Thebaa conditions were less favourable to Thebes than they.

had been to Athens or Sparta. Thebes was even more

exclusively a land-power than Sparta. She had no

revenue comparable to that of Athens in the preceding century.

Unlike Athens and Sparta, she had not the advantage of being

identified with a political cause. As the enemy of Athens in the

5th century, she was on the side of oligarchy; as the rival of

Sparta in the 4th, she was on the side of democracy; but in her

hege- mony.

bid for primacy she could not appeal, as Athens and Sparta could, to a great political tradition, nor had she behind her, as they had, the moral force of a great political principle. Ker position, too, in Boeotia itself was insecure. The rise of Athens was in great measure the result of the synoecism {ovvoinioiibs) of Attica. All inhabitants of Attica were Athenians. But ” Boeotian ” and ” Theban ” were not synonymous terms. The Boeotian league was an imperfect form of union, as compared with the Athenian state, and the claim of Thebes

to the presi- dency of the league was, at best, sullenly acquiesced in by the other towns. The destruction of some of the most famous of the Boeotian cities, however necessary it may have been in order to unite the country, was a measure which at once impaired the resources of Thebes and outraged Greek sentiment. It has been often held that the failure of Theban policy was due to the death of Epaminondas (at the battle of Mantinea, 362 b. a). For this view there is no justification. His policy had proved a failure before his death. Where it harmonized with the spirit of the age, the spirit of dissidence, it succeeded; where it attempted to run counter to it, it failed. It succeeded in destroying the supremacy of Sparta in the Peloponnese; it failed to unite the Peloponnese on a new basis. It failed still more signally to unite Greece north of the Isthmus. It left Greece weaker and more divided than it found it (see the concluding words of Xenophon's Hellenics). It would be difficult to overestimate the importance of his policy as a destructive force; as a constructive force it effected nothing. 1 The Peloponnesian system which Epami- nondas overthrew had lasted two hundred years. Under Spartan leadership the Peloponnese had enjoyed almost complete immunity from invasion and comparative immunity from stasis (faction). The claim that Isocrates makes for Sparta is probably well-founded (Archidamus, 64-69; during the period of Spartan ascendency the Peloponnesians were ev5a.inovkaTa.Toi rue 'EWrivuv). Peloponnesian sentiment had been one of the chief factors in Greek politics; to it, indeed, in no small degree was due the victory over Persia. The Theban victory at Leuctra destroyed the unity, and with it the peace and the prosperity, of the Peloponnese. It inaugurated a period of misery, the natural result of stasis and invasion, to which no parallel can be found in the earlier history (See Isocrates, Archidamus, 65, 66; the Peloponnesians were opah) . It destroyed, too, the Peloponnesian sentiment of hostility to the invader. The bulk of the army that defeated Mardonius at Plataea came from the Peloponnese; at Chaeronea no Pelopon- nesian state was represented.

The question remains, Why did the city-state fail to save Greece from conquest by Macedon? Was this result due to the inherent weakness either of the city-state itself, or of one particular form of it, democracy? It is clear, in The rlse any case, that the triumph of Macedon was the effect Macedoa. of causes which had long been at work. If neither Philip nor Alexander had appeared on the scene, Greece might have maintained her independence for another generation or two; but, when invasion came, it would have found her weaker and more distracted, and the conquerors might easily have been less imbued with the Greek spirit, and less sympathetic towards

Greek ideals, than the great Macedonian and his son. These causes are to be found in the tendencies of the age, political, economic and moral. Of the two movements which characterized the Great Age in its political aspect, the imperial and the democratic, the one failed and the other succeeded. The failure and the success were equally fatal to the chances of Greece in the conflict with Macedon. By the middle of the 4th century Greek politics had come to be dominated by the theory of the balance of power. This theory, enunciated in its coarsest form by Demosthenes {Pro Megalopolit. 4 avu&pet. t{j xoXei /ecu AaKtSaxfjoviovs aoDevtis uvai. Kal ©tj/Jcuow; cf. in Aristocrat. 102, 103), had shaped the foreign policy of Athens since the end of the Peloponnesian War. As long as Sparta was the stronger, Athens inclined to a Theban alliance; after Leuctra she tended in the direction of a Spartan one. At the epoch of Philip's. 1 l It failed even to create a united Arcadia or a strong Messenia.

accession the forces were everywhere nicely balanced. The Peloponnese was fairly equally divided between the Theban and the Spartan interests, and central Greece was similarly divided between the Theban and the Athenian. Farther north we get an Athenian party opposed to an Olynthian in Chalcidice, and a republican party, dependent upon the support of Thebes, opposed to that of the tyrants in Thessaly. It is easy to see that the political conditions of Greece, both in the north and in the south, invited interference from without. And the triumph of democracy in its extreme form was ruinous to the military efficiency of Greece. On the one side there was a monarchical state, in which all powers, civil as well as military, were concentrated in the hands of a single ruler; on the other, a constitutional system, in which a complete separation had been effected between the responsibility of the statesman and that of the commander. 1 It could not be doubtful with which side victory would rest. Meanwhile, the economic conditions were steadily growing worse. The cause which Aristotle assigns for the decay of the Spartan state — a declining population (see Politics, p. 1270 a &7rcijXeTo)j 7r6Xts tCiv AaKeSainoviuv Sia rrjv b\uy avd pumiav) — might be extended to the Greek world generally. The loss of population was partly the result of war and stasis — Isocrates speaks of the number of political exiles from the various states as enormous 2 — but it was also due to a declining birth-rate, and to the exposure of infants. Aristotle, while

condemning exposure, sanctions the procuring of abortion {Politics, 1335 b). It is probable that both ante-natal and post-natal infanticide were rife everywhere, except among the more backward communities. A people which has condemned itself to racial suicide can have little chance when pitted against a nation in which healthier instincts prevail. The materials for forming a trustworthy estimate of the population of Greece at any given epoch are not available; there is enough evidence, however, to prove that the military population of the leading Greek states at the era of the battle of Chaeronea (338 B.C.) fell far short of what it had been at the beginning of the Peloponnesian War. The decline in population had been accompanied by a decline in wealth, both public and private; and while revenues had shrunk, expenditure had grown. It was a century of warfare; and warfare had become enormously more expensive, partly through the increased em- ployment of mercenaries, partly through the enhanced cost of material. The power of the purse had made itself felt even in the 5th century; Persian gold had helped to decide the issue of the great war. In the politics of the 4th century the power of the purse becomes the determining factor. The public finance of the ancient world was singularly simple in character, and the expedients for raising a revenue were comparatively few. The distinction between direct and indirect taxation was recog- nized in practice, but states as a rule were reluctant to submit to the former system. The revenue of Athens in the 5th century was mainly derived from the tribute paid by her subjects; it was only in time of war that a direct tax was levied upon the citizen-body. 3 In the age of Demosthenes the revenue derived from the Athenian Confederacy was insignificant. The whole burden of the expenses of a war fell upon the 1200 richest citizens, who were subject to direct taxation in the dual form of the Trier archy and the Eisphora (property-tax). The revenue thus raised was wholly insufficient for an effort on a great scale; yet the revenues of Athens at this period must have exceeded those of any other state.

It is to moral causes, however, rather than to political or economic ones, that the failure of Greece in the conflict with Macedon is attributed by the most famous Greek statesmen of that age. Demosthenes is never weary of insisting upon the decay of patriotism among the citizens and upon the decay of probity among their leaders. Venality had always been the besetting sin of Greek statesmen. Pericles' boast as to his

1 See Demosthenes, On the Crown, 235. Philip was airroKp&rwp, OtcnrOTiyi, T]ytjj.

2 See Archidamus, 68; Philippus, 96, &ort p$ov (hat avarijaai tjT

paTotrtbov pelfov nai Kpttrrov tK rwv Tr\ava)p.hcx>v *} en rcov iroKtTevopikvwv.

3 The Liturgies (e.g. the trierarchy) had much the same effect as a direct tax levied upon the wealthiest citizens.

own incorruptibility (Thuc. ii. 60) is significant as to the reputa- tion of his contemporaries. In the age of Demosthenes the level of public life in this respect had sunk at least as low as that which prevails in many states of the modern world (see Demosth. On the Crown, 61 7rapA rots "EXXtjcw, 011 riaiv aXX' airacnv dfioiois opa ■Kpoboroiv koX dupoSdKoiv avvifhi; cf. §§ 295, 296). Corruption was certainly not confined to the Macedonian party. The best that can be said in defence of the patriots, as well as of their opponents, is that they honestly believed that the policy which they were bribed to advocate was the best for their country's interests. The evidence for the general decay of patriotism among the mass of the citizens is less conclusive. The battle of Megalopolis (331 B.C.), in which the Spartan soldiery " went down in a blaze of glory," proves that the spirit of the Lacedemonian state remained unchanged. But at Athens it seemed to contemporary observers— to Isocrates equally with Demosthenes — that the spirit of the great days was extinct (see Isocr. On the Peate, 47, 48). It cannot, of course, be denied that public opinion was obstinately opposed to the diversion of the Theoric Fund to the purposes of the war with Philip. It was not till the year before Chaeronea that Demosthenes succeeded in persuading the assembly to devote the entire surplus to the expenses of the war. 4 Nor can it be denied that mercenaries were far more largely employed in the 4th century than in the 5th. In justice, however, to the Athenians of the Demosthenic era, it should be remembered that the burden of direct taxation was rarely imposed, and was reluctantly endured, in the previous century. It must also be remembered that, even in the 4th century, the Athenian citizen was ready to take the field, provided that it was not a question of a distant expedition or of prolonged service. 5 For distant expeditions, or for prolonged service, a citizen-militia is unsuited. The substitution of a professional force for an unprofessional one is to be explained, partly by the change in the character of Greek warfare, and partly by the operation of the laws of supply and demand. There had been a time when warfare meant a brief campaign in the summer months against a neighbouring state. It had come to mean prolonged operations against a distant enemy. 6 Athens was at war, e.g. with Philip, for eleven years continuously (357-346 B.C.). If winter campaigns in Thrace were unpopular at this epoch, they had been hardly less unpopular in the epoch of the Peloponnesian War. In the days of her greatness, too, Athens had

freely employed mer- cenaries, but it was in the navy rather than the army. In the age of Pericles the supply of mercenary rowers was abundant, the supply of mercenary troops inconsiderable. In the age of Demosthenes incessant warfare and ceaseless revolution had filled Greece with crowds of homeless adventurers. The supply helped to create the demand. The mercenary was as cheap as the citizen-soldier, and much more effective. On the whole, then, it may be inferred that it is a mistake to regard the preval- ence of the mercenary system as the expression of a declining patriotism. It would be nearer the mark to treat the transition from the voluntary to the professional system as cause rather than effect: as one among the causes which contributed to the decay of public spirit in the Greek world.

6. From Alexander to the Roman Conquest (236-146 B.C.). — In the history of Greece proper during this period the interest is mainly constitutional. It may be called the age of

federation. Federation, indeed, was no novelty in federal

govern* Greece. Federal unions had existed in Thessaly, in meat.

Boeotia and elsewhere, and the Boeotian league can be traced back at least to the 6th century. Two newly-founded federations, the Chalcidian and the Arcadian, play no inconsider- able part in the politics of the 4th century. But it is not till the 3rd century that federation attains to its full development in Greece, and becomes the normal type of polity. The two great

- His extreme caution in approaching the question at an earlier date is to be noticed. See, e.g., Olynthiacs, i. 19, 20.

6 e.g. the two expeditions sent to Euboea, the cavalry force that took part in the battle of Mantinea, and the army that fought at Chaeronea. The troops in all these cases were citizens.

6 For the altered character of warfare see Demosthenes, Philippics, iii. 48, 49.

leagues of this period are the Aetolian and the Achaean. Both had existed in the 4th century, but the latter, which had been dissolved

shortly before the beginning of the 3rd century, becomes important only after its restoration in 280 B.C., about which date the former, too, first begins to attract notice. The interest of federalism lies in the fact that it marks an advance beyond the conception of the city-state. It is an attempt to solve the problem which the Athenian empire failed to solve, the reconciliation of the claims of local autonomy with those of national union. The federal leagues of the 3rd century possess a further interest for the modern world, in that there can be traced in their constitutions a nearer approach to a representative system than is found elsewhere in Greek experience. A genuine representative system, it is true, was never developed in any Greek polity. What we find in the leagues is a sort of compromise between the principle of a primary assembly and the principle 04 a representative chamber. In both leagues the nominal sovereign was a primary assembly, in which every individual citizen had the right to vote. In both of them, however, the real power lay with a council (@ov\ri) composed of members representative of each of the component states. 1

The real interest of this period, however, is to be looked for elsewhere than in Greece itself. Alexander's career is one of the turning-points in history. He is one of the few to A d r> whom it has been given to modify the whole future empire. °f tne human race. He originated two forces which have profoundly affected the development of civilization. He created Hellenism, and he created for the western world the monarchical ideal. Greece had produced personal rulers of ability, or even of genius; but to the greatest of these, to Peisistratus, to Dionysius, even to Jason of Pherae, there clung the fatal taint of illegitimacy. As yet no ruler had suc- ceeded in making the person of the monarch respectable. Alexander made it sacred. From him is derived, for the West, that "divinity that doth hedge a king." And in creating Hellenism he created, for the first time, a common type of civilization, with a common language, literature and art, as well as a common form of political organization. In Asia Minor he was content to reinforce the existing Hellenic elements (cf. the case of Side, Arrian, Anabasis, i. 26. 4). In the rest of the East his instrument of hellenization was the polis. He is said to have founded no less than seventy cities, destined to become centres of Greek influence; and the great majority of these were in lands in which city-life was almost unknown. In this respect his example was emulated by his successors. The eastern provinces were soon lost, though Greek influences lingered on even in Bactria and across the Indus. It was only the regions lying to the west of the Euphrates that were effectively hellenized, and the permanence of this result was largely due to the policy of Rome. But after all deductions have been made, the great

fact remains that for many centuries after Alexander's death Greek was the language of literature and religion, of commerce and of administration throughout the Nearer East. Alexander had created a universal empire as well as a universal culture. His empire perished at his death, but its central idea survived — that of the municipal freedom of the Greek polis within the framework of an imperial system. Hellen- istic civilization may appear degenerate when compared with Hellenic; when compared with the civilizations which it super- seded in non-Hellenic lands, it marks an unquestionable advance. (For the historyof Greek civilization in the East,seeHELLENiSM.) Greece left her mark upon the civilization of the West as well as upon that of the East, but the process by which her influence was diffused was essentially different. In the East Hellenism came in the train of the conqueror, and Rome was content to-' build upon the foundations laid by Alexander. In the West ' Greek influences were diffused by the Roman conquest of Greece. It was through the ascendancy which Greek literature, philosophy and art acquired over the Roman mind that Greek culture penetrated to the nations of western Europe. The civilization

1 It is known that the councillors were appointed by the states in the Aetolian league; it is only surmised in the case of the Achaean.

of the East remained Greek. The civilization of the West became and remained Latin, but it was a Latin civilization that was saturated with Greek influences. The ultimate division, both of the empire and the church, into two halves, finds its explanation in this original difference of culture.

Ancient Authorities. — (I.) For the earliest periods of Greek history, the so-called Minoan and Mycenaean, the evidence is purely archaeological. It is sufficient here to refer to the article Aegean Civilization. For the next period, the Heroic or Homeric Age, the evidence is derived from the poems of Homer. In any estimate of the value of these poems as historical evidence, much will depend upon the view taken of the authorship, age and unity of the poems. For a full discussion of these questions see Homer. It cannot be questioned that the poems are evidence for the existence of a period in the history of the Greek race, which differed from later periods in political and social, military and economic conditions. But here agreement ends. If, as is generally held by German critics, the poems are not earlier than the oth century, if they contain large interpolations of con- siderably later date and if they are Ionian in origin, the authority of the poems becomes comparatively slight. The existence of different strata in the poems will imply the existence of incon- sistencies and contradictions

in the evidence; nor will the evidence be that of a contemporary. It will also follow that the picture of the heroic age contained in the poems is an idealized one. The more extreme critics, e.g. Beloch, deny that the poems are evidence even for the existence of a pre-Dorian epoch. If, on the other hand, the poems are assigned to the nth or 12th century, to a Peloponnesian writer, and to a period anterior to the Dorian Invasion and the colonization of Asia Minor (this is the view of the late Dr D. B. Munro), the evidence becomes that of a contemporary, and the authority of the poems for the distribution of races and tribes in the Heroic Age, as well as for the social and political conditions of the poet's time, would be conclusive. Homer recognizes no Dorians in Greece, except in Crete (see Odyssey, xix. 177), and no Greek colonies in Asia Minor. Only two explanations are possible. Either there is deliberate archaism in the poems, or else they are earlier in date than the Dorian Invasion and the colonization of Asia Minor.

II. For the period that extends from the end of the Heroic Age to the end of the Peloponnesian War 2 the two principal

Herodotus.

authorities are Herodotus and Thucydides. Not only have the other historical works which treated of this period perished (those at least whose date is earlier than the Christian era), but their authority was secondary and their material chiefly derived from these two writers. In one respect then this period of Greek history stands alone. Indeed, it might be said, with hardly an exaggeration, that there is nothing like it elsewhere in history. Almost our sole authorities are two writers of unique genius, and they are writers whose works have come down to us intact. For the period which ends with the repulse of the Persian invasion our authority is Hero- dotus. For the period which extends from 478 to 411 we are dependent upon Thucydides', In each case, however, a distinc- tion must be drawn. The Persian Wars form the proper subject of Herodotus's work; the Peloponnesian War is the subject of Thucydides. The' interval between the two wars is merely sketched by Thucydides; while of the period anterior to the conflicts of the Greek with the Persian, Herodotus does not attempt either a complete or a continuous narrative. His references to it are episodical and accidental. Hence our know- ledge of the Persian Wars and of the Peloponnesian War is widely different in character from our knowledge of the rest of this period. In the history of these wars the lacunae are few; in the rest of the history they are alike frequent and serious. In the history, therefore, of the Persian and Peloponnesian Wars little is to be learnt from the secondary sources. Elsewhere,

especially in the interval between the two wars, they become relatively important.

In estimating the authority of Herodotus (q.v.) we must be

2 Strictly speaking, to 411 B.C. For the last seven years of the war our principal authority is Xenophon, Hellenica, i., ii.

careful to distinguish between the invasion of Xerxes and all that is earlier. Herodotus's work was published soon after 430 B.C., i.e. about half a century after the invasion. Much of his information was gathered in the course of the preceding twenty years. Although his evidence is not that of an eye-witness, he had had opportunities of meeting those who had themselves played a part in the war, on one side or the other {e.g. Thersander of Orchomenos, ix. 16). In any case, we are dealing with a tradition which is little more than a generation old, and the events to which the tradition relates, the incidents of the struggle against Xerxes, were of a nature to impress themselves indelibly upon the minds of contemporaries. Where, on the other hand, he is treating of the period anterior to the invasion of Xerxes, he is dependent upon a tradition which is never less than two generations old, and is sometimes centuries old. His informants were, at best, the sons or grandsons of the actors in the wars (e.g. Archias the Spartan, iii. 55). Moreover, the invasion of Xerxes, entailing, as it did, the destruction of cities and sanctu- aries, especially of Athens and its temples, marks a dividing line in Greek history. It was not merely that evidence perished and records were destroyed. What in reference to tradition is even more important, a new consciousness of power was awakened, new interests were aroused, and new questions and problems came to the front. The former things had passed away; all things were become new. A generation that is occupied with making history on a great scale is not likely to busy itself with the history of the past. Consequently, the earlier traditions became faint and obscured, and the history difficult to recon- struct. As we trace back the conflict between Greece and Persia to its beginnings and antecedents, we are conscious that the tradition becomes less trustworthy as we pass back from one stage to another. The tradition of the expedition of Datis and Artaphernes is less credible in its details than that of the expedition of Xerxes, but it is at once fuller and more

credible than the tradition of the Ionian revolt. When we get back to the Scythian expedition, we can discover but few grains of historical truth.

Much recent criticism of Herodotus has been directed against his veracity as a traveller. With this we are not here concerned. The criticism of him as an historian begins with Thucydides. Among the references of the latter writer to his predecessor are the following passages: i. 21; i. 22 ad fin.; i. 20 ad fin. (cf. Herod, ix. 53, and vi. 57 ad fin.); iii. 62 § 4 (cf. Herod, ix. 87); ii. 2 §§ 1 and 3 (cf. Herod, vii. 233); ii. 8 § 3 (cf. Herod, vi. 98). Perhaps the two clearest examples of this criticism are to be found in Thucydides' correction of Herodotus's account of the Cylonian conspiracy (Thuc. i. 126, cf. Herod, v. 71) and in his appreciation of the character of Themistocles — a veiled protest against the slanderous tales accepted by Herodotus (i. 138). In Plutarch's tract " On the Malignity of Herodotus " there is much that is suggestive, although his general standpoint, viz. that Herodotus was in duty bound to suppress all that was discreditable to the valour or patriotism of the Greeks, is not that of the modern critic. It must be conceded to Plutarch that he makes good his charge of bias in Herodotus's attitude towards certain of the Greek states. The question, however, may fairly be asked, how far this bias is personal to the author, or how far it is due to the character of the sources from which his information was derived. He cannot, indeed, altogether be acquitted of personal bias. His work is, to some extent, intended as an apologia for the Athenian empire. In answer to the charge that Athens was guilty of robbing other Greek states of their freedom, Herodotus seeks to show, firstly, that it was to Athens that the Greek world, as a whole, owed its freedom from Persia, and secondly, that the subjects of Athens, the Ionian Greeks, were unworthy to be free. This leads him to be unjust both to the services of Sparta and to the qualities of the Ionian race. For his estimate of the debt due to Athens see vii. 139. For bias against the Ionians see especially iv. 142 (cf. Thuc. vi. 77); cf. also i. 143 and 146, vi. 12-14 (Lade), vi. 112 ad fin. A striking example of his prejudice in favour of Athens is furnished by vi. 91. At a moment when Greece rang with the crime of

Athens in expelling the Aeginetans from their island, he ventures to trace in their expulsion the vengeance of heaven for an act of sacrilege nearly sixty years earlier (see Aegina). As a rule, however, the bias apparent in his narrative is due to the sources from which it is derived. Writing at Athens, in the first years of the Peloponnesian War, he can hardly help seeing the past through an Athenian medium. It was inevitable that much of what he heard should come to him from Athenian informants, and should be coloured by Athenian

prejudices. We may thus explain the leniency which he shows towards Argos and Thessaly, the old allies of Athens, in marked contrast to his treatment of Thebes, Corinth and Aegina, her deadliest foes. For Argos cf. vii. 152; Thessaly, vii. 172-174; Thebes, vii. 132, vii. 233, ix. 87; Corinth (especially the Corinthian general Adeimantus, whose son Aristeus was the most active enemy of Athens at the outbreak of the Peloponnesian War), vii. 5, vii. 21, viii. 29 and 61, vii. 94; Aegina, ix. 78-80 and 85. In his intimacy with members of the great Alcmaeonid house we probably have the explanation of his depreciation of the services of Themistocles, as well as of his defence of the family from the charges brought against it in connexion with Cylon and with the incident of the shield shown on Pentelicus at the time of Marathon (v. 71, vi. 1 21-124). His failure to do justice to the Cypselid tyrants of Corinth (v. 92), and to the Spartan king Cleomenes, is to be accounted for by the nature of his sources — in the former case, the tradition of the Corinthian oligarchy; in the latter, accounts, partly derived from the family of the exiled king Demaratus and partly representative of the view of the ephorate. Much of the earlier history is cast in a religious mould, e.g. the story of the Mermnad kings of Lydia in book i., or of the fortunes of the colony of Cyrene (iv. 145-167). In such cases we cannot fail to recognize the influence of the Delphic priesthood. Grote has pointed out that the moralizing tendency observable in Herodotus is partly to be explained by the fact that much of his information was gathered from priests and at temples, and that it was given in explanation of votive offerings, or of the fulfilment of oracles. Hence the determination of the sources of his narrative has become one of the principal tasks of Herodotean criticism. In addition to the current tradition of Athens, the family tradition of the Alcmaeonidae, and the stories to be heard at Delphi and other sanctuaries, there may be indicated the Spartan tradition, in the form in which it existed in the middle of the 5th century; that of his native Halicarnassus, to which is due the prominence of its queen Artemisia; the traditions of the Ionian cities, especially of Samos and Miletus (important both for the history of the Mermnadae and for the Ionian Revolt) ; and those current in Sicily and Magna Graecia, which were learned during his residence at Thurii (Sybaris and Croton, v. 44, 45; Syracuse and Gela, vii. 153-167). Among his more special sources we can point to the descendants of Demaratus, who still held, at the beginning of the 4th century, the piincipality in the Troad which had been granted to their ancestor by Darius (Xen. Hell. iii. 1. 6), and to the family of the Persian general Artabazus, in which the satrapy of Dascylium (Phrygia) was hereditary in the 5th century. 1 His use of written material is more difficult to determine. It is generally agreed that the list of Persian satrapies, with their respective assessments of

tribute (iii. 89-97), the description of the royal road from Sardis to Susa (v. 52-54), and of the march of Xerxes, together with the list of the con- tingents that took part in the expedition (vii. 26-131), are all derived from documentary and authoritative sources. From previous writers (e.g. Dionysius of Miletus, Hecataeus, Charon of Lampsacus and Xanthus the Lydian) it is probable that he has borrowed little, though the fragments are too scanty to permit of adequate comparison. His references to monuments, dedicatory offerings, inscriptions and oracles are frequent.

The chief defects of Herodotus are his failure too grasp the principles of historical criticism, to understand the nature of military operations, and to appreciate the importance of

1 Possibly some of his information about Persian affairs may have been derived, at first or second hand, from Zopyrus, son of Megabyzus, whose flight to Athens is mentioned in iii. 160.

chronology. In place of historical criticism we find a crude rationalism (e.g. ii. 45, vii. 129, viii. 8). Having no conception of the distinction between occasion and cause, he is content to find the explanation of great historical movements in trivial incidents or personal motives. An example of this is furnished by his account of the Ionian revolt, in which he fails to discover the real causes either of the movement or of its result. Indeed, it is clear that he regarded criticism as no part of his task as an historian. In vii. 152 he states the principles which have guided him — eyoi 81 6<£elXa> \kytiv to. \ty6ntva, irdB&xdaL ye nev ov Traurairacn 6€iXco, KaX iwi tovto t6 «7ros kxeroi is iravra \byov. In obedience to this principle he again and again gives two or more versions of a story. We are thus frequently enabled to arrive at the truth by a comparison of the discrepant traditions. It would have been fortunate if all ancient writers who lacked the critical genius of Thucydides had been content to adopt the practice of Herodotus. His accounts of battles are always unsatisfactory. The great battles, Marathon, Thermopylae, Salamis and Plataea, present a series of problems. This result is partly due to the character of the traditions which he follows — traditions which were to some extent inconsistent or contra- dictory, and were derived from different sources; it is, however, in great measure due to his inability to think out a

strategical combination or a tactical movement. It is not too much to say that the battle of Plataea, as described by Herodotus, is wholly unintelligible. Most serious of all his deficiencies is his careless chronology. Even in the case of the 5th century, the data which he affords are inadequate or ambiguous. The interval between the Scythian expedition and the Ionian revolt is described by so vague an expression as fj.era Si ov iroWbv xpovov ixveais KaKuiv fjv (v. 28). In the history of the revolt itself, though he gives us the interval between its outbreak and the fall of Miletus (< =kto; ere'i, vi. 18), he does not give us the interval between this and the battle of Lade, nor does he indicate with sufficient precision the years to which the successive phases of the movement belong. Throughout the work professed synchronisms too often prove to be mere literary devices for facilitat- ing a transition from one subject to another (cf. e.g. v. 81 with 89, 90; or vi. 51 with 87 and 94). In the 6th century, as Grote pointed out, a whole generation, or more, disappears in his historical perspective (cf. i. 30, vi. 125, v. 94, iii. 47, 48, v. 113 contrasted with v. 104 and iv. 162). The attempts to reconstruct the chronology of this century upon the basis of the data afforded by Herodotus (e.g. by Beloch, Rheinisches Museum, xlv., 1890, pp. 465-473) have completely failed.

In spite of all such defects Herodotus is an author, not only of unrivalled literary charm, but of the utmost value to the historian. If much remains uncertain or obscure, even in the history of the Persian Wars, it is chiefly to motives or policy, to topography or strategy, to dates or numbers, that ‘uncertainty attaches. It is to these that a sober criticism will confine itself.

Thucydides is at once the father of contemporary history and the father of historical criticism. From a comparison of i. 1, i. 22 and v. 26, we may gather both the principles to idesT ‘ which he adhered in the composition of his work and the conditions under which it was composed. It is seldom that the circumstances of an historical writer have been so favourable for the accomplishment of his task. Thucydides was a contemporary of the Twenty-Seven Years’ War in the fullest sense of the term. He had reached manhood at its outbreak, and he survived its close by at least half-a-dozen years. And he was more than a mere contemporary. As a man of high birth, a member of the Periclean circle, and the holder of the chief political office in the Athenian state, the strategia, he was not only familiar with the business of administration and the” . conduct of military operations, but he possessed in addition a personal knowledge of those who played the principal part in the political life of the age. His exile in the year 424 afforded him opportunities of visiting the scenes of distant operations {e.g. Sicily) and of coming in contact with the

actors on the other side. He himself tells us that he spared no pains to obtain the best information available in each case. He also tells us that

he began collecting materials for his work from the very beginning of the war. Indeed, it is probable that much of books i.-v. 24 was written soon after the Peace of Nicias (421), just as it is possible that the history of the Sicilian Expedition (books vi. and vii.) was originally intended to form a separate work. To the view, however, which has obtained wide support in recent years, that books i.-v. 22 and books vi. and vii. were separately published, the rest of book v. and book viii. being little more than a rough draught, composed after the author had adopted the theory of a single war of twenty-seven years' duration, of which the Sicilian Expedition and the operations of the years 431-421 formed integral parts, there seem to the present writer to be insuperable objections. The work, as a whole, appears to have been composed in the first years of the 4th century, after his return from exile in 404, when the material already in existence must have been revised and largely recast. There are exceed- ingly few passages, such as iv. 48. 5, which appear to have been overlooked in the process of revision. It can hardly be questioned that the impression left upon the reader's mind is that the point of view of the author, in all the books alike, is that of one writing after the fall of Athens.

The task of historical criticism in the case of the Peloponnesian War is widely different from its task in the case of the Persian Wars. It has to deal, not with facts as they appear in the traditions of an imaginative race, but with facts as they appeared to a scientific observer. Facts, indeed, are seldom in dispute. The question is rather whether facts of importance are omitted, whether the explanation of causes is correct, or whether the judgment of men and measures is just. Such inaccuracies as have been brought home to Thucydides on the strength, e.g. of epigraphic evidence, are, as a rule, trivial. His most serious errors relate to topographical details, in cases where he was dependent on the information of others. Sphacteria (see Pylos) (see G. B. Grundy, Journal of Hellenic Studies, xvi., 1896, p. 1) is a case in point. Nor have the difficulties connected with the siege of Plataea been cleared up either by Grundy or by others (see Grundy, Topography of the Battle of Plataea, &c, 1894). Where, on the contrary, he is writing at first hand his descrip- tions of sites are surprisingly correct. The most serious charge as yet brought against his authority as to matters of fact relates to his account of the Revolution of the Four Hundred, which appears, at first sight, to be inconsistent with the documentary evidence supplied by Aristotle's Constitution of Athens (q.v.). It may be questioned, however, whether the documents have been correctly interpreted by Aristotle. On the

whole, it is probable that the general course of events was such as Thucydides describes (see E. Meyer, Forschungen, ii. 406-436), though he failed to appreciate the position of Theramenes and the Moderate party, and was clearly misinformed on some important points of detail. With regard to the omission of facts, it is unquestionable that much is omitted that would not be omitted by a modern writer. Such omissions are generally due to the author's [con- ception of his task. Thus the internal history of Athens is passed over as forming no part of the history of the war. It is only where the course of the war is directly affected by the course of political events (e.g. by the Revolution of the Four Hundred) that the internal history is referred to. However much if may be regretted that the relations of political parties are not more fully described, especially in book v., it cannot be denied that from his standpoint there is logical justification even for the omission of the ostracism of Hyperbolus. There are omissions, however, which are not so easily explained. Perhaps the most notable instance is that of the raising of the tribute in 425 B.C. (see Delian League).

Nowhere is the contrast between the historical methods of Herodotus and Thucydides more apparent than in the treatment of the causes of events. The distinction between the occasion and the cause is constantly present to the mind of Thucydides, and it is his tendency to make too little rather than too much of the personal factor. Sometimes, however, it may be doubted whether his explanation of the causes of an event is adequate or correct. In tracing the causes of the Peloponnesian War itself,

modern writers are disposed to allow more weight to the com- mercial rivalry of Corinth; while in the case of the Sicilian expedition, they would actually reverse his judgment (ii. 65 6 es SiKeXiap 7rXo0s 6s oil tooovtov yviofi-qs aiiaprrjua r/v irpbs ovs eiryeaav). To us it seems that the very idea of the expedition implied a gigantic miscalculation of the resources of Athens and of the difficulty of the task. His judgments of men and of measures have been criticized by writers of different schools and from different points of view. Grote criticized his verdict upon Cleon, while he accepted his estimate of the policy of Pericles. More recent writers, on the other hand, have accepted his view of Cleon, while they have selected for attack his appreciation

alike of the policy and the strategy of Pericles. He has been charged, too, with failure to do justice to the statesmanship of Alcibiades. 1 There are cases, undoubtedly, in which the balance of recent opinion will be adverse to the view of Thucydides. There are many more in which the result of criticism has been to establish his view. That he should occasionally have been mistaken in his judgment and his views is certainly no detraction from his claim to greatness.

On the whole, it may be said that while the criticism of Herodotus, since Grote wrote, has tended seriously to modify our view of the Persian Wars, as well as of the earlier history, the criticism of Thucydides, in spite of its imposing bulk, has affected but slightly our view of the course of the Peloponnesian War. The labours of recent workers in this field have borne most fruit where they have been directed to subjects neglected by Thucydides, such as the history of political parties, or the organization of the empire (G. Gilbert's Innere Gesckichte Athens im Zeilalter des pel. Krieges is a good example of such work).

In regard to Thucydides' treatment of the period between the Persian and Peloponnesian Wars (the so-called Penlecontaeleris) it should be remembered that he does not profess to give, even in outline, the history of this period as. a whole. The period is regarded simply as a prelude to the Peloponnesian War. There is no attempt to sketch the history of the Greek world or of Greece proper during this period. There is, indeed, no attempt to give a complete sketch of Athenian history. His object is to trace the growth of the Athenian Empire, and the causes that made the war inevitable. Much is therefore omitted not only in the history of the other Greek states, especially the Peloponnesian, but even in the history of Athens. Nor does Thucyd- ides attempt an exact chronology. He gives us a few dates (e.g. surrender of Ithome, in the tenth year, i. 103; of Thasos, in the third year, i. 101; duration of the Egyptian expedition six years, i. no; interval between Tanagra and Oenophyta 61 days, i. 108; revolt of Samos, in the sixth year after the Thirty Years' Truce, i. 115), but from these data alone it would be impossible to reconstruct the chronology of the period. In spite of all that can be gleaned from our other authorities, our knowledge of this, the true period of Athenian greatness, must remain slight and imperfect as compared with our knowledge of the next thirty years.

Of the secondary authorities for this period the two principal ones are Diodorus (xi. 38 to xii. 37) and Plutarch. Diodorus is of value chiefly in relation to Sicilian affairs, to which he devotes about a third of this section of his work and for which he is almost our sole authority. His

source for Sicilian history is the Sicilian writer Timaeus (q.v.), an author of the 3rd century bˆc. For the history of Greece Proper during the Pentecontaetia Diodorus contributes comparatively little of importance. Isolated notices of particular events (e.g. the Synoecism of Elis, 471 B.C., or the foundation of Amphipolis, 437 B.C.), which appear to be derived from a chronological writer, may generally be trusted. The greater part of his narrative is, however, derived from Ephorus, who appears to have had before him little authentic information for this period of Greek history other than that afforded by Thucydides' work. Four of Plutatch's Lives are concerned with this period, viz. Themistocles, Aristides, Cimon and Pericles. From the Aristides little can

1 For a defence of Thucydides' judgment on all three statesmen, see E. Meyer, Forschungen, ii. 296-379.

be gained. Plutarch, in this biography, appears to be mainly dependent upon Idomeneus of Lampsacus, an excessively untrustworthy writer of the 3rd century B.C., who is probably to be credited with the invention of the oligarchical conspiracy at the time of the battle of Plataea (ch. 13), and of, the decree of Aristides, rendering all four classes of citizens eligible for the archonship (ch. 22). The Cimon, on the other hand, contains much that is valuable; such as, e.g. the account of the battle of the Eurymedon (chs. 1 2 and 13). To the Pericles we owe several quotations from the Old Comedy. Two other of the Lives, Lycurgus and Solon, are amongst our most important sources for the early history of Sparta and Athens respectively. Of the two (besides Pericles) which relate to the Peloponnesian War, Alcibiades adds little to what can be gained from Thucydides and Xenophon; the Nicias, on the other hand, supplements Thucydides' narrative of the Sicilian expedition with many valuable details, which, it may safely be assumed, are derived from the contemporary historian, Philistus of Syracuse. Amongst the most valuable material afforded by Plutarch are the quotations, which occur in almost all the Lives, from the collection of Athenian decrees (\pricj>iaixaTO)v avvayuyri) formed by the Macedonian writer Craterus, in the 3rd century b.c Two other works may be mentioned in connexion with the history of Athens. For the history of the Athenian Constitution down to the end of the 5th century B.C. Aristotle's Constitution of Athens (q.v.) is our chief authority. s tuMoas The other Constitution of A thens, erroneously attributed to Xenophon, a tract of singular interest both on literary and historical grounds, throws a good deal of light on the internal condition of Athens, and on the system of government,

both of the state and of the empire, in the age of the Peloponnesian War, during the earlier years of which it was composed.

To the literary sources for the history of Greece, especially of Athens, in the 5th century B.C. must be added the epigraphic. Few inscriptions have been discovered which date back beyond the Persian Wars. For the latter half “io^s^ of the 5th century they are both numerous and im- portant. Of especial value are the series of Quota-lists, from which can be calculated the amount of tribute paid by the subject-allies of Athens from the year 454 B.C. onwards. The great majority of the inscriptions of this period are of Athenian origin. Their value is enhanced by the fact that they relate, as a rule, to questions of organization, finance and administration, as to which little information is to be gained from the literary sources.

For the period between the Persian and Peloponnesian Wars Busolt, Griechische Geschichte, iii. 1, is indispensable. Hill’s Sources of Greek History, b.c. 478-431 (Oxford, 1897) is excellent. It gives the most important inscriptions in a convenient form.

III. The4thCentury to the Death of Alexander. — Of the historians who flourished in the 4th century the sole writer whose works have come down to us is Xenophon. It is a singular X enoohon accident of fortune that neither of the two authors, who at once were most representative of their age and did most to determine the views of Greek history current in subsequent generations, Ephorus (q.v.) and Theopompus (q.v.), should be extant. It was from them, rather than from Herodotus, Thucyd- ides of Xenophon that the Roman world obtained its knowledge of the history of Greece in the past, and its conception of its significance. Both were pupils of Isocrates, and both, therefore, bred up in an atmosphere of rhetoric. Hence their popularity and their influence. The scientific spirit of Thucydides was alien to the temper of the 4th century, and hardly more congenial to the age of Cicero or Tacitus. To the rhetorical spirit, which is common to both, each added defects peculiar to himself. Theo- pompus is a strong partisan, a sworn foe to Athens and to Democracy. Ephorus, though a military historian, is ignorant of the art of war. He is also incredibly careless and uncritical. It is enough to point to his description of the battle of the Eurymedon (Diodorus xi. 60-62), in which, misled by an epigram, which he supposed to relate to this engagement (it really refers to the Athenian victory off Salamis in Cyprus, 449 B.C.), he

makes the coast of Cyprus the scene of Cimon's naval victory, and finds no difficulty in putting it on the same day as the victory on shore on the banks of the Eurymedon, in Pamphylia. Only a few fragments remain of either writer, but Theopompus (g.v.) was largely used by Plutarch in several of the Lives, while Ephorus continues to be the main source of Diodorus' history, as far as the outbreak of the Sacred War (Fragments of Ephorus in M tiller's Fragmenta historicorum Graecorum, vol. i.; of Theopompus in Hellenica Oxyrhynchia, cum Theopompi et Cratippi frugmentis, ed. B. P. Grenfell and A. S. Hunt,

1909).

It may be at least claimed for Xenophon (q.v.) that he is free from all taint of the rhetorical spirit. It may also be claimed for him that, as a witness, he is both honest and well-informed. But, if there is no justification for the charge of deliberate falsification, it cannot be denied that he had strong political prejudices, and that his narrative has suffered from them. His historical writings are the Anabasis, an account of the expedition of the Ten Thousand, the Hellenica and the Agesilaus, a eulogy of the Spartan king. Of these the Hellenica is far the most important for the student of history. It consists of two distinct parts (though there is no ground for the theory that the two parts were separately written and published), books i. and ii., and books iii. to vii. The first two books are intended as a continuation of Thucydides' work. They begin, quite abruptly, in the middle of the Attic year 411/10, and they carry the history down to the fall of the Thirty, in 403. Books iii. to vii., the Hellenica proper, cover the period from 401 to 362, and give the histories of the Spartan and Theban hegemonies down to the death of Epaminondas. There is thus a gap of two years between the point at which the first part ends and that at which the second part begins. The two parts differ widely, both in their aim and in the arrangement of the material. In the first part Xenophon attempts, though not with complete success, to follow the chronological method of Thucydides, and to make each successive spring, when military and naval operations were resumed after the winter's interruption, the starting-point of a fresh section. The resemblance between the two writers ends, however, with the outward form of the narrative. All that is characteristic of Thucydides is absent in Xenophon. The latter writer shows neither skill in portraiture, nor insight into motives. He is deficient in the sense of proportion and of the distinction between occasion and cause. Perhaps his worst fault is a lack of imagination. To make a story intelligible it is necessary sometimes to put oneself in the reader's place, and to

appreciate his ignorance of circumstances and events which would be perfectly familiar to the actors in the scene or to contemporaries. It was not given to Xenophon, as it was to Thucydides, to discriminate between the circumstances that are essential and those that are not essential to the comprehen- sion of the story. In spite, therefore, of its wealth of detail, his narrative is frequently obscure. It is quite clear that in the trial of the generals, e.g., something is omitted. It may be supplied as Diodorus has supplied it (xiii. 101), or it may be supplied otherwise. It is probable that, when under cross- examination before the council, the generals, or some of them, disclosed the commission given to Theramenes and Thrasybulus. The important point is that Xenophon himself has omitted to supply it. As it stands his narrative is unintelligible. In the first two books, though there are omissions (e.g. the loss of Nisaea, 409 B.C.), they are not so serious as in the last five, nor is the bias so evident. It is true that if the account of the rule of the Thirty given in Aristotle's Constitution of Athens be accepted, Xenophon must have deliberately misrepresented the course of events to the prejudice of Theramenes. But it is at least doubtful whether Aristotle's version can be sustained against Xenophon's, though it may be admitted, not only that there are mistakes as to details in the latter writer's narrative, but that less than justice is done to the policy and motives of the " Buskin." The Hellenica was written, it should be remembered, at Corinth, after 362. More than forty years had thus elapsed since the events recorded in the first, two books,

and after so long an interval accuracy of detail, even where the detail is of importance, is not always to be expected. 1 In the second part the chronological method is abandoned. A subject once begun is followed out to its natural ending, so that sections of the narrative which are consecutive in order are frequently parallel in point of date. A good example of this will be found in book iv. In chapters 2 to 7 the history of the Corinthian war is carried down to the end of 390, so far as the operations on land are concerned, while chapter 8 contains an account of the naval operations from 394 to 388. In this second part of the Hellenica the author's disqualifications for his task are more apparent than in the first two books. The more he is acquitted of bias in his selection of events and in his omissions, the more clearly does he stand convicted of lacking all sense of the propor- tion of things. Down to Leuctra (371 B.C.) Sparta is the centre of interest, and it is of the Spartan state alone that a complete or continuous history is given. After Leuctra, if the point of view is no longer exclusively Spartan, the narrative of events is hardly less incomplete. Throughout the second part of the Hellenica omissions abound which it is difficult either to explain or justify. The formation of the Second Athenian Confederacy

of 377 B.C., the foundation of Megalopolis and the restoration of the Messenian state are all left unrecorded. Yet the writer who passes them over without mention thinks it worth while to devote more than one-sixth of an entire book to a chronicle of the unimportant feats of the citizens of the petty state of Phlius. Nor is any attempt made to appraise the policy of the great Theban leaders, Pelopidas and Epaminondas. The former, indeed, is mentioned only in a single passage,, relating to the embassy to Susa in 368; the latter does not appear on the scene till a year later, and receives mention but twice before the battle of Mantinea. An author who omits from his narrative some of the most important events of his period, and elaborates the portraiture of an Agesilaus while not attempting the bare outline of an Epaminondas, may be honest; he may even write without a consciousness of bias; he certainly cannot rank among the great writers of history. 2

For the history of the 4th century Diodorus assumes a higher degree of importance than belongs to him in the earlier periods. This is partly to be explained by the deficiencies of Xenophon's Hellenica, partly by the fact that for the interval between the death of Epaminondas and the accession of Alexander we have in Diodorus alone a continuous narrative of events. Books xiv. and xv. of his history include the period covered by the Hellenica. More than half of book xiv. is devoted to the history of Sicily and the reign of Dionysius, the tyrant of Syracuse. For this period of Sicilian history he is, practically, our sole authority. In the rest of the book, as well as in book xv., there is much of value, especially in the notices of Macedonian history. Thanks to Diodorus we are enabled to supply many of the omissions of the Hellenica. Diodorus is, e.g., our sole literary authority for the Athenian naval confederation of 377. Book xvi. must rank, with the Hellenica and Arrian's Anabasis, as one of the three principal authorities for this century, so far, at least, as works of an historical character are concerned. It is our authority for the Social and the Sacred Wars, as well as for the reign of Philip. It is a curious irony of fate that, for what is perhaps the most momentous epoch in the history of Greece, we should have to turn to a writer of such inferior capacity. For this period his material is better and his import- ance greater: his intelligence is as limited as ever. Who but Diodorus would be capable of narrating the siege and capture of Methone twice over, once under the year 354, and again under the year 352 (xvi. 31 and 34; cf. xii. 35 and 42; Archidamus (q.v.) dies in 434, commands Peloponnesian army in 431); or of giving three different numbers of years (eleven, ten and nine) in three different passages (chs. r4, 23 and 59) for the length of the

1 On the discrepancies between Xenophon's account of the Thirty, and Aristotle's, see G. Busolt, Hermes (1898), pp. 71-86.

2 The fragment of the New Historian (Oxyrhynchus Papyri, vol. v.) affords exceedingly important material for the criticism of Xenophon's narrative. (See Theopompus.)

Sacred War; or of asserting the conclusion of peace between Athens and Philip in 340, after the failure of his attack on Perinthus and Byzantium? Amongst the subjects which are omitted is the Peace of Philocrates. For the earlier chapters, which bring the narrative down to the outbreak of the Sacred War, Ephorus, as in the previous book, is Diodorus' main source. His source for the rest of the book, i.e. for the greater part of Philip's reign, cannot be determined. It is generally agreed that it is not the Philippica of Theopompus.

For the reign of Alexander our earliest extant authority is Diodorus, who belongs to the age of Augustus. Of the others, Historians Q-Curtius Rufus, who wrote in Latin, lived in the of Alex- reign of the emperor Claudius, Arrian and Plutarch tinder's j n (.jjg 2n(j cen (- ur y A D Yet Alexander's reign is

re one of the best known periods of ancient history.

The Peloponnesian War and the twenty years of Roman history which begin with 63 B.C. are the only two periods which we can be said to know more fully or for which we have more trustworthy evidence. For there is no period of ancient history which was recorded by a larger number of contemporary writers, or for which better or more abundant materials were available. Of the writers actually contemporary with Alexander there were five of importance — Ptolemy, Aristo- bulus, Callisthenes, Onesicritus and Nearchus; and all of them occupied positions which afforded exceptional opportunities of ascertaining the facts. Four of them were officers in Alexander's service. Ptolemy, the future king of Egypt, was one of the somatophylaces (we may, perhaps, regard them as corresponding to Napoleon's marshals); Aristobulus was also an officer of high rank (see Arrian, Anab. vi. 29. 10); Nearchus was admiral of the fleet which surveyed the Indus and the Persian Gulf, and Onesicritus was one of his subordinates. The fifth, Callisthenes, a pupil of Aristotle,

accompanied Alexander on his march down to .his death in 327 and was admitted to the circle of his intimate friends. A sixth historian, Cleitarchus, was possibly also a contemporary; at any rate he is not more than a generation later. These writers had at their command a mass of official documents, such as the fiaa'iXeioi k(f»mepiSes — the Gazette and Court Circular combined — edited and published after Alexander's death by his secretary, Eumenes of Cardia; the (TTod/ioi, or records of the marches of the armies, which were carefully measured at the time; and the official reports on the conquered provinces. That these documents were made use of by the historians is proved by the references to them which are to be found in Arrian, Plutarch and Strabo; e.g. Arrian, Anab. vii. 25 and 26, and Plutarch, Alexander 76 (quotation from the /3

comes Plutarch's Life of Alexander, the merits of which, however, are not to be gauged by the influence which it has exercised upon literature. The Life is a valuable supplement to the Anabasis, partly because Plutarch, as he is writing biography rather than history (for his conception of the difference between the two see the famous preface, Life of Alexander, ch. i.), is concerned to record all that will throw light upon Alexander's character (e.g. his epigrammatic sayings and quotations from his letters) ; partly because he tells us much about his early life, before he became king, while Arrian tells us nothing. It is unfortunate that Plutarch writes in an uncritical spirit; it is hardly less unfortunate that he should have formed no clear conception and drawn no consistent picture of Alexander's character. Book xvii. of Diodorus and the Historiae Alexandri of Curtius Rufus are thoroughly rhetorical in spirit. It is probable that in both cases the ultimate source is the work of Clitarchus.

It is towards the end of the 5th century that a fresh source of information becomes available in the speeches of the orators, the earliest of whom is Antiphon (d. 41 r B.C.). Lysias is of great importance for the history of the Thirty orators. (see the speeches against Eratosthenes and Agoratus), and a good deal may be gathered from Andocides with regard to the last years of the 5th and the opening years of the next century. At the other end of this period Lycurgus, Hyperides and Dinarchus throw light upon the time of Philip and Alexander. The three, however, who are of most importance to the historian are Isocrates, Aeschines and Demosthenes. Isocrates (q.v.), whose long life (436-338) more than spans the interval between the outbreak of the Peloponnesian War and i socra tg S the triumph of Macedon at Chaeronea, is one of the most characteristic figures in the Greek world of his day. To comprehend that world the study of Isocrates is indispensable; for in an age

dominated by rhetoric he is the prince of rhetoricians. It is difficult for a modern reader to do him justice, so alien is his spirit and the spirit of his age from ours. It must be allowed that he is frequently monotonous and prolix; at the same time it must not be forgotten that, as the most famous representative of rhetoric, he was read from one end of the Greek world to the other. He was the friend of Evagoras and Archidamus, of Dionysius and Philip; he was the master of Aeschines and Lycurgus amongst orators and of Ephorus and Theopompus amongst historians. No other contemporary writer has left so indelible a stamp upon the style and the sentiment of his generation. It is a commonplace that Isocrates is the apostle of Panhellenism. It is not so generally recognized that he is the prophet of Hellenism. A passage in the Panegyricus (§ 50 ihart rd rwv 'EKkqvoiv ovofia. nrjKen tov yivovs aWa rfjs Siavoias SoKtiv elvai Kal /xaXKov "EXXTji'as KaXuadca tow rfjs ircuSevceiuS rijs ilturipas fj row ttjs koivtjs $weatt fterixovTas) is the key to the history of the next three centuries. Doubtless he had no conception of the extent to which the East was to be hellenized. He was, however, the first to recognize that it would be hellenized by the diffusion of Greek culture rather than of Greek blood. His Panhellenism was the outcome of his recognition of the new forces and tendencies which were at work in the midst of a new generation. When Greek culture was becoming more and more international, the exaggeration of the principle of autonomy in the Greek political system was becoming more and more absurd. He had sufficient insight to be aware that the price paid for this autonomy was the domination of Persia; a domina- tion which meant the servitude of the Greek states across the Aegean and the demoralization of Greek political life at home. His Panhellenism led him to a more liberal view of the distinction between what was Greek and what was not than was possible to the intenser patriotism of a Demosthenes. In his later orations he has the courage not only to pronounce that the day of Athens as a first-rate power is past, but to see in Philip the needful leader in the crusade against Persia. The earliest and greatest of his political orations is the Panegyricus, published in 380 B.C., midway between the peace of Antalcidas and Leuctra. It is his apologia for Panhellenism. To the period of the Social War belong the De pact (355 B.C.) and the Areopagiticut (354 B.C.),

both of great value as evidence tor the internal conditions of Athens at the beginning of the struggle with Macedon.' The Plataicus (373 B.C.) and the Archidamus (366 B.C.) throw light upon the politics of Boeotia and the Peloponnese respectively. The Panathenaicus (339 B.C.), the child of his old age, contains little that may not be found in the earlier orations. The Philippus (346 B.C.) is of peculiar interest, as giving the views of the Macedonian party.

Not the least remarkable feature in recent historical criticism is the reaction against the view which was at one time almost universally accepted of the character, statesmanship and authority of the orator Demosthenes (q.v.). During the last quarter of a century his character and statesmanship have been attacked, and his authority impugned, by a series of writers of whom Holm and Beloch are the best known. With the estimate of his character and statesmanship we are not here concerned. With regard to his value as an authority for the history of the period, it is to his speeches, and to those of his contemporaries, Aeschines, Hypereides, Dinarchus and Lycurgus, that we owe our intimate knowledge, both of the working of the constitutional and legal systems, and of the life of the people, at this period of Athenian history. From this point of view his value can hardly be overestimated. As a witness, however, to matters of fact, his authority can no longer he rated as highly as it once was, e.g. by Schaefer and by Grote. The orator's attitude towards events, both in the past and in the present, is inevitably a different one from the historian's. The object of a Thucydides is to ascertain a fact, or to exhibit it in its true relations. The object of a Demosthenes is to make a point, or to win his case. In their dealings with the past the orators exhibit a levity which is almost inconceivable to a modern reader. Andocides, in a passage of his speech On the Mysteries (§ 107), speaks of Marathon as the crowning victory of Xerxes' campaign; in his speech On the Peace (§3) he confuses Miltiades with Cimon, and the Five Years' Peace with the Thirty Years' Truce. Though the latter passage is a mass of absurdities and confusions, it was so generally admired that it was incorporated by Aeschines in his speech Onthe Embassy (§§ 172-176). If such was their attitude towards the past ; if, in order to make a point, they do not hesitate to pervert history, is it likely that they would conform to a higher standard of veracity in their state- ments as to the present — as to their contemporaries, their rivals or their own actions ? When we compare different speeches of Demosthenes, separated by an interval of years, we cannot fail to observe a marked difference in his statements. The farther he is from the events, the bolder are his mis-statements. It is only necessary to compare the speech On the Crown with that On the Embassy, and this latter speech with the Philippics

and Olynthiacs, to find illustrations. It has come to be recognized that no statement as to a matter of fact is to be accepted, unless it receives independent corroboration, or unless it is admitted by both sides. The speeches of Demosthenes may be conveniently divided into four classes according to their dates. To the pre- Philippic period belong the speeches On the Symmories (354 b. a), On Megalopolis (352 B.C.), Against Aristocrates (35r B.C.), and, perhaps, the speech On Rhodes (? 3Si B.C.). These speeches betray no consciousness of the danger threatened by Philip's ambition. The policy recommended is one based upon the principle of the balance of power. To the succeeding period, which ends with the peace of Philocrates (346 B.C.), belong the First Philippic and the three Olynthiacs. To the period between the peace of Philocrates and Chaeronea belong the speech On the Peace (346 B.C.), the Second Philippic (344 B.C.), the speeches On the Embassy (344 B.C.)' and On the Chersonese (341 B.C.), and* the Third Philippic. The masterpiece of his genius, the speech On the Crown, was delivered in 330 B.C., in the reign of Alexander. Of the three extant speeches of Aeschines (q.v.) that On the Embassy is of great value, as enabling us to correct the mis- statements of Demosthenes. For the period from the death of Alexander to the fall of Corinth (323-146 B.C.) our literary authorities are singularly defective. For the Diadochi Diodorus (books xviii.-xx.) is our chief source. These books form the

most valuable part of Diodorus' work. They are mainly based upon the work of Hieronymus of Cardia, a writer who combined exceptional opportunities for ascertaining the truth (he was in the service first of Eumenes, and then of Antigonus) with an exceptional sense of its importance. Hieronymus ended his history at the death of Pyrrhus (272 B.C.), but, unfortunately, book xx. of Diodorus' work carries us no farther than 303 B.C., and of the later books we have but scanty fragments. The narrative of Diodorus may be supplemented by the fragments of Arrian's History of the events after Alexander's death (which reach, however, only to 321 B.C.), and by Plutarch's Lives of Eumenes and of Demetrius. For the rest of the 3rd century and the first half of the 2nd we have his Lives of Pyrrhus, of Aratus, of Philopoemen, and of Agis and Cleomenes. For the period from 220 B.C. onwards Polybius (q.v.) is our chief authority (see Rome: Ancient History, section " Authorities "). In. a period in which the literary sources are so scanty great weight attaches to the epigraphic and numismatic evidence.

Bibliography. — The literature which deals with the history of Greece, in its various periods, departments and aspects, is of so vast a bulk that all that can be attempted here is to indicate the most im- portant and most accessible works.

General Histories of Greece. — Down to the middle of the 19th century the only histories of Greece deserving of mention were the products of English scholarship. The two earliest of these were published about the same date, towards the end of the 18th century, nearly threeIII.) he expresses the view that ” the History of Greece exposes the dangerous turbu- lence of Democracy, and arraigns the despotism of Tyrants, while it evinces the inestimable benefits, resulting to Liberty itself, from the steady operation of well-regulated monarchy.” Mitford was a Tory, who thought to demonstrate the evils of democracy from the example of the Athenian state. His History, in spite of its bias, was a work of real value. More than fifty years elapsed between Mitford’s work and Thirlwall’s. Connop Thirlwall, fellow of Trinity College, Cambridge, afterwards bishop of St David’s, brought a sound judgment to the aid of ripe scholarship. His History of Greece, published in 1835-1838 (8 vols.), isentirely free from the controversial tone of Mitford’s volumes. Ten years later (1846) George Grote published the first volumes of his history, which was not completed (in 12 vols.) till 1856. Grote, like Mitford, was a politician — an ardent Radical, with republican sympathies. It was in order to refute the slanders of the Tory partisan that he was impelled to write a history of Greece, which should do justice to the greatest democracy of the ancient world, the Athenian state. Thus, in the case of three of these four writers, the interest in their subject was mainly political. Incomparably the greatest of these works is Grote’s. Grote had his faults and his limitations. His prejudices are strong, and his scholarship is weak; he had never visited Greece, and he knew little or nothing of Greek art ; and, at the time he wrote, the importance of coins and inscriptions was imperfectly appre- hended. In spite of every defect, however, his work is the greatest history of Greece that has yet been written. It is not too much to say that nobody knows Greek history till he has mastered Grote. No history of Greece has since appeared in England on a scale at all comparable to that of Grote’s work. The most important of the more recent ones is that by J. B. Bury (1 vol., 1900), formerly fellow of Trinity College, Dublin, afterwards Regius Professor of Modern History at Cambridge. Mitford and Bury end with the death of Alexander; Gillies and Grote carry on the narrative a generation farther; while Thirlwall’s work extends to the absorption of Greece in the Roman Empire (146 B.C.).

While in France the Histoire des Grecs (ending at 146 B.C.) of Victor Duruy (new edition, 2 vols., 1883), Minister of Public Instruc- tion under Napoleon III., is the only one that need be mentioned, in Germany there has been a succession of histories of Greece since the middle of the 19th century. Kortum’s Geschichte Griechenlands (3

vols., 1854), a work of little merit, was followed by Max Duncker's Geschichte der Griechen (vols. I and 2 published in 1856; vols. I and 2, Neue Folge, which bring the narrative down to the death of Pericles, in 1884; the two former volumes form vols. 5, 6 and 7 of his Geschichte des Altertums), and by the Griechische Geschichte of Ernst Curtius (3 vols., 1857-1867). An English translation of Duncker, by S. F. Alleyne, appeared in 1883 (2 vols., Bentley), and of Curtius, by A. W. Ward (5 vols., Bentley, 1 868-1873). Among more recent works may be mentioned the Griechische Geschichte of Adolf Holm (4 vols., Berlin, 1 886-1 894; English translation by F. Clarke; 4 vols., Macmillan, 1894-1898), and histories with the same title by Julius Beloch (3 vols., Strassburg, 1893-1904) and Georg Busolt (2nd ed., 3 vols., Gotha, 1893-1904). Holm carries on the narrative to 30 B.C., Beloch to 217 B.C., Busolt to Chaeronea

(338 B.C.). 1 Busolt's work is entirely different in character from any other history of Greece. The writer's object is to refer in the notes (which constitute five-sixths of the book) to the views of every writer in any language upon every controverted question. It is absolutely indispensable, as a work of reference, for any serious study of Greek history. The ablest work since Grote's is Eduard Meyer's Geschichte des Altertums, of which 5 vols. (Stuttgart and Berlin, 1884-1902) have appeared, carrying the narrative down to the death of Epami- nondas (362 B.C.). Vols. 2-5 are principally concerned with Greek history. It must be remembered that, partly owing to the literary finds and the archaeological discoveries of the last thirty years, and partly owing to the advance made in the study of epigraphy and numismatics, all the histories published before those of Busolt, Beloch, Meyer and Bury are out of date.

Works bearing on the History of Greece. — Earlier works and editions are omitted, except in the case of a work which has not been superseded.

Introductions.— C Wachsmuth, Einleitung in das Studium der alten Geschichte (1 vol., Leipzig, 1895); E. Meyer, Forschungen zur alten Geschichte (2 parts, Halle, 1892-1899; quite indispensable); J. B. Bury, The Ancient Greek Historians (London, 1909).

Constitutional History and Institutions. — G. F. Schomann, Griechische Altertumer (2 vols., Berlin, 1855-1859; vol. L, tr. by E. G. Hardy and J. S. Mann, Rivingtons, 1880); G. Gilbert, Griechische Staatsaltertiimer (2nd ed., 2 vols., Leipzig, 1893; vol. i. tr. by E. J. Brooks and T. Nicklin, Swan Sonnenschein, 1895); K. F. Hermann, Lehrbuch der griechischen Antiquitdten (6th ed., 4 vols., Freiburg, 1 882-1 895); I wan M tiller, Handbuch der klassischen Altertumswissenschaft (9 vols., Nordlingen, 1886, in progress; several of the volumes are concerned with Greek history) ; J. H. Lipsius, Das attische Recht und Rechtsverfahren (Leipzig, 1905, in progress) ; A. H. J. Greenidge, Handbook of Greek Constitutional History (1 vol., Macmillan, 1896); Pauly-Wissowa, Realencyklopddie der klassischen Altertumswissenschaft (Stuttgart, 1894 foil.).

Geography. — E. H. Bunbury, History of Ancient Geography amongst the Greeks and Romans (2nd ed., 2 vols., Murray, 1883), W. M. Leake, Travels in the Morea (3 vols., 1830), and Travels in Northern Greece (4 vols., 1834) ; H. F. Tozer, Lectures on the Geography of Greece (1 vol., Murray, 1873), and History of Ancient Geography (1 vol., Cambridge, 1897) ; J. P. Mahaffy, Rambles and Studies in Greece (3rd ed., 1 vol., Macmillan, 1887, an admirable book); C. Bursian, Geographie von Griechenland (2 vols., Leipzig, 1872); H. Berger, Geschichte der wissenschaftlichen Erdkunde der Griechen (4 parts, Leipzig, 1887-1893); Ernst Curtius, Peloponnesos (2 vols., Gotha, 1850-1851).

Epigraphy and Numismatics. — Corpus inscriptionum Allicarum (Berlin, 1875, in progress), Corpus inscriptionum Graecarum (Berlin, 1892, in progress). The following selections of Greek inscriptions may be mentioned : E. F. Hicks and G. F. Hill, Manual of Greek Historical Inscriptions (newed., 1 vol., Oxford, 1901): W. Dittenberger, Sylloge inscriptionum Graecarum (2nd ed., 2 vols., Berlin, 1898); C. Michel, Recueil d' inscriptions grecques (Paris, 1900). Among works on numismatics the English reader may refer to B. V. Head, Historia numorum (1 vol., Oxford, 1887); G. F. Hill, Handbook of Greek and Roman Coins (1 vol., Macmillan, 1899), as well as to the British Museum Catalogue of Greek Coins. In French the most important general work is the Monnaies grecques of F. Imhoof-Blumer (Paris,

1883).

Chronology, Trade, War, Social Life, &c. — H. F. Clinton, Fasti Hellenici (3rd ed., 3 vols., Oxford, 1841, a work of which English scholarship may well be proud ; it is still invaluable for the study of Greek chronology) ; B. Biichsenschiitz, Besitz und Erwerb im

griechischen Altertume (1 vol., Halle, 1869; this is still the best book on Greek commerce) ; J. Beloch, Die Bevolkerung der griechisch-romischen Welt (x vol., Leipzig, 1886); W. Rilstow and H. Kochly, Geschichte des griechischen Kriegswesens (1 vol., Aarau, 1852); J. P. Mahaffy, Social Life in Greece (2nd ed., I vol., 1875). (E. M. W.)

b. Post-Classical: 146 b.c.-a.d. 1800

I. The Period or Roman Rule. — (i.) Greece under the Republic (146-27 B.C.). After the collapse of the Achaean League (q.v.) the Senate appointed a commission to reorganize Greece as a Roman dependency. Corinth, the chief centre of resistance, was destroyed and its inhabitants sold into slavery. In addition to this act of exemplary punishment, which may perhaps have been inspired in part by the desire to crush a commercial competitor, steps were taken to obviate future insurrections. The national and cantonal federations were dissolved, commercial intercourse between cities was restricted, and the government transferred from the democracies to the propertied classes, whose interests were bound up with Roman supremacy. In other respects few changes were made in existing institutions. Some favoured states like Athens and Sparta retained their full sovereign rights as civilates liberae, the other 1 Vol. iii. goes down to the end of the Peloponnesian War.

cities continued to enjoy local self-government. The ownership of the land was not greatly disturbed by confiscations, and though a tribute upon it was levied, this impost may not have been universal. General powers of supervision were entrusted to the governor of Macedonia, who could reserve cases of high treason for his decision, and in case of need send troops into the country. But although Greece was in the provincia of the Macedonian proconsul, in the sense of belonging to his sphere of command, its status was in fact more favourable than that of other provincial dependencies.

This settlement was acquiesced in by the Greek people, who had come to realize the hopelessness of further resistance. The internal disorder which was arising from the numerous disputes about property rights consequent upon the political revolutions was checked by the good offices of the historian Polybius, whom the Senate deputed to mediate between the litigants. The pacification of the country eventually became so complete that the Romans withdrew the former restrictions upon intercourse and allowed some of the leagues to revive. But its quiet was seriously disturbed during the first Mithradatic War (88-84 B.C.), when numerous Greek states sided with Mithradates (q.v.). The success which the invader experienced in detaching the Greeks from

Rome is partly to be explained by the skilful way in which his agents incited the imperialistic ambitions of prominent cities like Athens, partly perhaps by his promises of support to the democratic parties. The result of the war was disastrous to Greece. Apart from the confiscations and exactions by which the Roman general L. Cornelius Sulla punished the disloyal communities, the extensive and protracted campaigns left Central Greece in a ruinous condition. During the last decades of the Roman republic European Greece was scarcely affected by contemporary wars nor yet exploited by Roman magistrates in the same systematic manner as most other provinces. Yet oppression by officials who traversed Greece from time to time and demanded lavish entertainments and presentations in the guise of viaticum or aurum coronarium was not unknown. Still greater was the suffering produced by the rapacity of Roman traders and capitalists: it is recorded that Sicyon was reduced to sell its most cherished art treasures in order to satisfy its creditors. A more indirect but none the less far-reaching drawback to Greek prosperity was the diversion of trade which followed upon the establishment of direct comˆ munication between Italy and the Levant. The most lucrative source of wealth which remained to the European Greeks was pasturage in large domains, an industry which almost exclusively profited the richer citizens and so tended to widen the breach between capitalists and the poorer classes, and still further to pauperize the latter. The coast districts and islands also suffered considerably from swarms of pirates who, in the absence of any strong fleet in Greek waters, were able to obtain a firm footing in Crete and freely plundered the chief trading places and sanctuaries; the most notable of such visitations was experienced in 69 B.C. by the island of Delos. This evil came to an end with the general suppression of piracy in the Mediter- ranean by Pompey (67 B.C.), but the depopulation which it had caused in some regions is attested by the fact that the victorious admiral settled some of his captives on the desolated coast strip of Achaea.

In the conflict between Julius Caesar and Pompey the Greeks provided the latter with a large part of his excellent fleet. In 48 B.C. the decisive campaign of the war was fought on Greek soil, and the resources of the land were severely taxed by the requisitions of both armies. As a result of Caesar's victory at Pharsalus, the whole country fell into his power; the treatment "which it received was on the whole lenient, though individual cities were punished severely. After the murder of Caesar the Greeks supported the cause of Brutus (42 B.C.), but were too weak to render any considerable service. In 39 B.C. the Pelo- ponnese for a short time was made over to Sextus Pompeius. During the subsequent period Greece remained in the hands of M.

Antonius (Mark Antony), who imposed further exactions in order to defray the cost of his wars. The extensive levies which

condi- tions.

he made in 31 B.C. for his campaign against Octavian, and the contributions which his gigantic army required, exhausted the country's resources so completely that a general famine was prevented only by Octavian's prompt action after the battle of Actium in distributing supplies of grain and evacuating the land with all haste. The depopulation which resulted from the civil wars was partly remedied by the settlement of Italian colonists at Corinth and Patrae by Julius Caesar and Octavian; on the other hand, the foundation of Nicopolis (g.v.) by the latter merely had the effect of transferring the people from the country to the city, (ii.) The Early Roman Empire (27 b.C-a.d. 323). — Under the emperor Augustus Thessaly was incorporated with Macedonia; the rest of Greece was converted into the province of Achaea, under the control of a senatorial proconsul resident at Corinth. Many states, including Athens and Sparta, retained their rights as free and nominally independent cities. The provincials were encouraged to send delegates to a communal synod (koivov twv 'AxolLw) which met at Argos to consider the general interests of the country and to uphold national Hellenic sentiment; the Delphic amphictyony was revived and extended so as to represent in a similar fashion northern and central Greece.

Economic conditions did not greatly improve under the empire. Although new industries sprang up to meet the needs of Roman luxury, and Greek marble, textiles and Social table delicacies were in great demand, the only cities which regained a really flourishing trade were the Italian communities of Corinth and Patrae. Commerce languished in general, and the soil was mainly abandoned to pasturage. Though certain districts retained a measure of prosperity, e.g. Thessaly, Phocis, Elis, Argos and Laconia, huge tracts stood depopulated and many notable cities had sunk into ruins; Aetolia, Acarnania and Epirus never recovered from the effects of former wars and from the withdrawal of their surviving inhabitants into Nicopolis. Such wealth as remained was amassed in the hands of a few great landowners and capitalists; the middle class continued to dwindle, and large numbers of the people were reduced to earning a precarious subsistence, supplemented by frequent doles and largesses.

The social aspect of Greek life henceforward becomes its most attractive feature. After a long period of storm and stress, the European Hellenes had relapsed into a quiet and resigned frame of mind which stands in sharp contrast on the one hand with the energy and ability, and on the other with the vulgar intriguing of their Asiatic kinsmen. Seeing no future before them, the inhabitants were content to dwell in contemplation amid the glories of the past. National pride

was fostered by the undisguised respect with which the leading Romans of the age treated Hellenic culture. And although this sentiment could degenerate into antiquarian pedantry and vanity, such as finds its climax in the diatribes of Apollonius of Tyana against the ” barbarians,” it prevented the nation from sinking into some of the worst vices of the age. A healthy social tone repressed extravagant luxury and the ostentatious display of wealth, and good taste long checked the spread of gladiatorial contests beyond the Italian community of Corinth. The most widespread abuse of that period, the adulation and adoration of emperors, was indeed introduced into European Greece and formed an essential feature of the proceedings at the Delphic amphictyony, but it never absorbed the energies of the people in the same way as it did in Asia. In order to perpetuate their old culture, the Greeks’ continued to set great store by classical education, and in Athens they possessed an academic centre which gradually became the chief university of the Roman empire. The highest representatives of this type of old-world refinement are to be found in Dio Chrysostom and especially in Plutarch of Chaeroneia

The relations between European . Greece and Rome were practically confined to the sphere of scholarship. The Hellenes had so far lost their warlike qualities that they supplied scarcely any recruits to the army. They retained too much local patriot- ism to crowd into the official careers of senators or imperial servants. Although in the 1st century a.d. the astute Greek

man of affairs and the Graeculus esuriens of Juvenal abounded in Rome, both these classes were mainly derived from the less pure-blooded population beyond the Aegean.

The influx of Greek rhetoricians and professors into Italy during the 2nd and 3rd centuries was balanced by the large number of travellers who came to Greece to frequent its sanatoria, and especially to admire its works of art; the abundance in which these latter were preserved is strikingly attested in the extant record of Pausanias (about a.d. 170).

The experience of the Greeks under their earliest governors seems to have been unfortunate, for in a.d. 15 they petitioned Tiberius to transfer the administration to an imperial legate. This new arrangement was sanctioned, but a amini • only lasted till a.d. 44, when Claudius restored the tratlon. province to the senate. The proconsuls of the later 1st and 2nd centuries were sometimes ill qualified for their posts, but cases of oppression are seldom recorded against them. The years 66 and 67 were marked by a visit of the emperor Nero, who made a prolonged tour through Greece in order to

display his artistic accomplishments at the various national festivals. In return for the flattering reception accorded to him he bestowed freedom and exemption from tribute upon the country. But this favour was almost neutralized by the wholesale depredations which he committed among the chief collections of art. A scheme for cutting through the Corinthian isthmus and so reviving the Greek carrying trade was inaugurated in his presence, but soon abandoned.

As Nero's grant of self-government brought about a recrudes- cence of misplaced ambition and party strife, Vespasian revoked the gift and turned Achaea again into a province, at the same time burdening it with increased taxes. In the 2nd century a succession of genuinely phil-Hellenic emperors made serious attempts to revive the nation's prosperity. Important material benefits were conferred by Hadrian, who made a lengthy visit to Greece. Besides erecting useful public works in many cities, he relieved Achaea of its arrears of tribute and exempted it from various imposts. In order to check extravagance on the part of the free cities, he greatly extended the practice of placing them under the supervision of imperial functionaries known as correclores. Hadrian fostered national sentiment by establishing a new pan-Hellenic congress at Athens, while he gave recognition to the increasing ascendancy of Hellenic culture at Rome by his institution of the Athenaeum.

In the 3rd century the only political event of importance was the edict of Caracalla which threw open the Roman- citizenship to large numbers of provincials. Its chief effect in Greece was to diminish the preponderance of the wealthy classes, who formerly had used their riches to purchase the franchise and so to secure exemption from taxation. The chief feature of this period is the renewal of the danger from foreign invasions. Already in 175 a tribe named Costoboci had penetrated into central Greece, but was there broken up by the local militia. In 253 a threatened attack was averted by the stubborn resistance of Thessalonica. In 267-268 the province was overrun by Gothic bands, which captured Athens and some other towns, but were finally repulsed by the Attic levies and exterminated with the help of a Roman fleet.

(iii.) The Late Roman Empire. — After the reorganization of the empire by Diocletian, Achaea occupied a prominent position in the " diocese " of Macedonia. Under Constantine I. it was included in the " prefecture " of Illyricum. It was subdivided into the " eparchies " of Hellas, Peloponnesus, Nicopolis and the islands, with headquarters at Thebes, Corinth, Nicopolis and Samos. Thessaly was incorporated with Macedonia. A •complex hierarchy of imperial officials was now

introduced and the system of taxation elaborated so as to yield a steady revenue to the central power. The levying of the land-tax was imposed upon the SeicaTpuTot, or ” ten leading men,” who, like the Latin decuriones, were entrusted henceforth with the administration in most cities. The tendency to reduce all constitutions to the Roman municipal pattern became prevalent under the rulers of this period, and the greater number of them was stereotyped

by the general regulations of the Codex Theodosianus (438). Although the elevation of Constantinople to the rank of capital was prejudicial to Greece, which felt the competition of the new centre of culture and learning and had to part with numerous works of art destined to embellish its privileged neighbour, the general level of prosperity in the 4th century was rising. Com- mercial stagnation was checked by a renewed expansion of trade consequent upon the diversion of the trade routes to the east from Egypt to the Euxine and Aegean Seas. Agri- culture remained in a depressed condition, and many small proprietors were reduced to serfdom; but the fiscal interests of the government called for the good treatment of this class, whose growth at the expense of the slaves was an important step in the gradual equalization of the entire population under the central despotism which restored solidarity to the Greek nation.

This prosperity received a sharp set-back by a series of un- usually severe earthquakes in 375 and by the irruption of a host of Visigoths under Alaric (395-396), whom the imperial officers allowed to overrun the whole land unmolested and the local levies were unable to check. • Though ultimately hunted down in Arcadia and induced to leave the province, Alaric had time to execute systematic devastations which crippled Greece for several decades. The arrears of taxation which accumulated in consequence were remitted by Theodosius II. in 428.

The emperors of the 4th century made several attempts to stamp out by edict the old pagan religion, which, with its accompaniment of festivals, oracles and mysteries, still main- tained an outward appearance of vigour, and, along with the philosophy in which the intellectual classes found comfort, retained the affection of the Greeks. Except for the decree of Theodosius I. by which the Olympian games

were interdicted (394), these measures had no great effect, and indeed were not rigorously enforced. Paganism survived in Greece till about 600, but the interchange of ideas and practices which the long-continued contact with Christianity had effected considerably modified its character. Hence the Christian religion, though slow in making its way, eventually gained a sure footing among a nation which accepted it spontaneously. The hold of the Church upon the Greeks was strengthened by the judicious manner in which the clergy, unsupported by official patronage and often out of sympathy with the Arian emperors, identified itself with the interests of the people. Though in the days when the orthodox Church found favour at court corruption spread among its higher branches, the clergy as a whole rendered conspicuous service in opposing the arbitrary interferences of the central government and in upholding the use of the Hellenic tongue, together with some rudiments of Hellenic culture.

The separation of the eastern and western provinces of the empire ultimately had an important effect in restoring the language and customs of Greece to their predominant position in the Levant. This result, however, was long retarded by the romanizing policy of Constantine and his successors. The emperors of the 5th and 6th centuries had no regard for Greek culture, and Justinian I. actively counteracted Hellenism by propagating Roman law in Greece, by impairing the powers of the self-governing cities, and by closing the philosophical schools at Athens (529). In course of time the inhabitants had so far forgotten their ancient culture that they abandoned the name of Hellenes for that of Romans (Rhomaioi). For a long time Greece continued to be an obscure and neglected province, with no interests beyond its church and its commercial operations, and its culture declined rapidly. Its history for some centuries dwindles into a record of barbarian invasions which, in addition to occasional plagues and earthquakes, seem to have been the only events found worthy of record by the contemporary ■chroniclers.

In the 5th century Greece was only subjected to brief raids by Vandal pirates (466-474) and Ostrogoths (482) . In Justinian's reign irruptions by Huns and Avars took place, but led to no far-reaching results. The emperor had endeavoured to strengthen the country's defences by repairing the fortifications of cities and frontier posts (530), but his policy of supplanting the local

guards by imperial troops and so rendering the natives incapable of self-defence was ill-advised; fortunately it was never carried out with energy, and so the Greek militias were occasionally able to render good service against invaders.

Towards the end of the century mention is made for the first time of an incursion by Slavonic tribes (581). These invaders are to be regarded as merely the forerunners of a steady movement of immigration by which a con- Slavonic siderable part of Greece passed for a time into foreign aˆf*” hands. It is doubtful how far the newcomers won their territory by force of arms; in view of the desolation of many rural tracts, which had long been in progress as a result of economic changes, it seems probable that numerous settlements were made on unoccupied land and did not challenge serious opposition. At any rate the effect upon the Greek popula- tion was merely to accelerate its emigration from the interior to the coastland and th

II. The Byzantine Period. — In the 7th century the Greek language made its way into the imperial army and civil service, but European Greece continued to have little voice in the administration. The land was divided into four ” themes ” under a yearly appointed civil and military governor. Imperial troops were stationed at the chief strategic points, while the natives contributed ships for naval defence. During the dispute about images the Greeks were the backbone of the image-worshipping party, and the iconoclastic edicts of Leo III. led to a revolt in 727 which, however, was easily crushed by the imperial fleet; a similar movement in 823, when the Greeks sent 350 ships to aid a pretender, met with the same fate. The firm government of the Isaurian dynasty seems to have benefited Greece, whose commerce and industry again became flourishing. In spite of occasional set-backs due to the depredations of pirates, notably the Arab corsairs who visited the Aegean from the 7th century onwards, the Greeks remained the chief carriers in the Levant until the rise of the Italian republics, supplying all Europe, with its silk fabrics.

In the 10th century Greece experienced a renewal of raids from the Balkan tribes. The Bulgarians made incursions after 929 and sometimes penetrated to the Isthmus; but they mostly failed to capture the cities, and in 995 their strength was broken by a crushing defeat on the Spercheius at the hands of the Byzantine army. Yet their devastations greatly thinned the population of northern Greece, and after 1084 Thessaly was occupied without resistance by nomad tribes of Vlachs. In 1084 also Greece was subjected to the first attack from the new nations of the west, when the Sicilian Normans gained a footing in the Ionian islands. The same people made a notable raid upon the seaboard of Greece in 1145-1146, and sacked the cities 0’, Thebes and Corinth. The Venetians also appear as rivals of

the Greeks, and after 1122 their encroachments in the Aegean Sea never ceased.

In spite of these attacks, the country on the whole maintained its prosperity. The travellers IdrisI of Palermo (1153) and Benjamin of Tudela (1161) testify to the briskness of commerce, which induced many foreign merchants to take up their residence in Greece. But this prosperity revived an aristocracy of wealth which used its riches and power for purely selfish ends, and under the increasing laxity of imperial control the archontes or municipal rulers often combined with the clergy in oppressing the poorer classes. Least of all were these nobles prepared to become the champions of Greece against foreign invaders at a time when they alone could have organized an effectual resistance.

III. The Latin Occupation and Turkish Conquest. — The capture of Constantinople and dissolution of the Byzantine empire by the Latins (1204) brought in its train an invasion of Greece by Frankish barons eager for new territory. The natives, who had long forgotten the use of arms and dreaded no worse oppression from their new masters, submitted almost without resistance, and only the N.W. corner of Greece, where Michael Angelus, a Byzantine prince, founded the “despotat” of Epirus, was saved from foreign occupation. The rest of the country was divided up between a number of Frankish barons, chief among whom were the dukes of Achaea (or Peloponnese) and ” grand signors ” of Thebes and Athens, the Venetians, who held naval stations at different points and the island of Crete, and various Italian adventurers who mainly settled in the Cyclades. The conquerors transplanted their own language, customs and religion to their new possessions, and endeavoured to institute the feudal system of land-tenure. Yet recognizing the superiority of Greek civil institutions they allowed the natives to retain their law and internal administration and con- firmed proprietors in possession of their land on payment of a rent; the Greek church was subordinated to the Roman arch- bishops, but upheld its former control over the people. The commerce and industry of the Greek cities was hardly affected by the change of government.

Greek history during the Latin occupation loses its unity and has to be followed in several threads. In the north the ” despots ” of Epirus extended their rule to Thessaly and Macedonia, but eventually were

repulsed by the Asiatic Greeks of Nicaea, and after a decisive defeat at Pelagonia (1259) reduced to a small dominion round Iannina. Thessaly continued to change masters rapidly. Till 1308 it was governed by a branch line of the Epirote dynasty. When this family died out it fell to the Grand Catalan Company; in 1350 it was conquered along with Epirus by Stephen Dushan, king of Servia. About 1397 it was annexed by the Ottoman Turks, who after 143 1 also gradually wrested Epirus from its latest possessors, the Beneventine family of Tocco (1390-1469).

The leading power in central Greece was the Burgundian house de la Roche, which established a mild and judicious govern- ment in Boeotia and Attica and in 1261 was raised to ducal rank by the French king Louis IX. A conflict with the Grand Catalan Company resulted in a disastrous defeat of the Franks on the Boeotian Cephissus (1311) and the occupation of central Greece by the Spanish mercenaries, who seized for themselves the barons' fiefs and installed princes from the Sicilian house of Aragon as " dukes of Athens and Neopatras " (Thessaly). After seventy- five years of oppressive rule and constant wars with their neighbours the Catalans were expelled by the Peloponnesian baron Nerio Acciaiuoli. The new dynasty, whose peaceful government revived its subjects' industry, became tributary to the Turks about 141 5, but was deposed by Sultan Mahommed II., who annexed central Greece in 1456.

. The conquest of the Peloponnese was effected by two French knights, William Champlitte and Geoffrey Villehardouin, the latter of whom founded a dynasty of " princes of all Achaea." The rulers of this line were men of ability, who controlled their barons and spiritual vassals with a firm hand and established good order throughout their province. The Franks of the Morea maintained as high a standard of culture as their com-

patriots at home, while the natives grew rich enough from their industry to pay considerable taxes without discontent. The climax of the Villehardouins' power was attained under Prince William, who subdued the last independent cities of the coast and the mountaineers of Maina(i 246-1 248). In 1259, however, the same ruler was involved in the war between the rulers of Epirus and Nicaea, and being captured at the battle of Pela- gonia, could only ransom himself by the cession of Laconia to the restored Byzantine empire. This new dependency after 1349 was treated with great care by the Byzantine monarchs, who sought to repress the violence of the local aristocracies by sending their kinsmen to govern under the title of " despots." On the other hand, with the extinction of the Villehardouin dynasty the

Frankish province fell more and more into anarchy; at the same time the numbers of the foreigners were constantly dwindling through war, and as they disdained to recruit them by intermarriage, the preponderance of the native element in the Morea eventually became complete. Thus by 1400 the Byzantines were enabled to recover control over almost the whole peninsula and apportion it among several ” despots.” But the mutual quarrels of these princes soon proved fatal to their rule. Already in the 14th century they had employed Albanians and the Turkish pirates who harried their coasts as auxiliaries in their wars. The Albanians largely remained as settlers, and the connexion with the Turks could no longer be shaken off. – In spite of attempts to fortify the Isth mus (1 4 1 5) an Ottoman army penetrated into Morea and deported many inhabitants in 1423. An invasion of central Greece by the despot Constantine was punished by renewed raids in 1446 and 1450. In 1457 the despot Thomas withheld the tribute which he had recently stipulated to pay, but was reduced to obedience by an expedition under Mahommed II. (1458). A renewed revolt in 1459 was punished by an invasion attended with executions and deportations on a large scale, and by the annexation of the Morea to Turkey (1460).

IV. The Turkish Dominion till 1800. — Under the Ottoman government Greece was split up into six sanjaks or military divisions: (1) Morea, (2) Epirus, (3) Thessaly, (4) Euboea, Boeotia and Attica, (5) Aetolia and Acarnania, (6) the rest of central Greece, with capitals at Nauplia, Jannina, Trikkala, Negropont (Chalkis), Karlili and Lepanto; further divisions were subsequently composed of Crete and the islands. In each sanjak a number of fiefs was apportioned to Turkish settlers, who were bound in return to furnish some mounted men for the sultan’s army, the total force thus held in readiness being over 7000. The local government was left in the hands of the archontes or primates in each community, who also undertook the farming of the taxes and the policing of their districts. Law was usually administered by the Greek clergy. The natives were not burdened with large imposts, but the levying of the land-tithes was effected in an inconvenient fashion, and the capitation-tax, to which all Christians were subjected was felt as a humiliation. A further grievance lay in the requisitions of forced labour which the pashas were entitled to call for; but the most galling exaction was the tribute of children for the recruiting of the Janissaries (g.v.), which was often levied with great ruthlessness. The habitual weakness of the central govern- ment also left the Greeks exposed to frequent oppression by the Turkish residents and by their own magistrates and clergy. But the new rulers met with singularly little opposition. The dangerous

elements of the population had been cleared away by Mahommed's executions; the rest were content to absorb their energies in agriculture and commerce, which in spite of , preferential duties and capitulations to foreign powers largely fell again into the hands of Greeks. Another important instru- ment by which the people were kept down was their own clergy, whom the Turkish rulers treated with marked favour and so induced to acquiesce in their dominion.

In the following centuries Greece was often the theatre of war in which the Greeks played but a passive part. Several' wars with Venice (1463-79, 1498-1504) put the Turks in posses- sion of the last Italian strongholds on the mainland. But the

issue was mainly fought out on sea; the conflicts which had never ceased in the Aegean since the coming of the Italians now grew fiercer than ever; Greek ships and sailors were frequently requisitioned for the Turkish fleets, and the damage done to the Greek seaboard by the belligerents and by fleets of adventurers and corsairs brought about the depopulation of many islands and coast-strips. The conquest of the Aegean by the Ottomans was completed by 1570; but Venice retained Crete till 1669 and never lost Corfu until its cession to France in 1797.

In 1684 the Venetians took advantage of the preoccupation of Turkey on the Danube to attack the Morea. A small mercenary army under Francesco Morosini captured the strong places with remarkable ease, and by 1687 had conquered almost the whole peninsula. In 1687 the invaders also captured Athens and Lepanto; but the former town had soon to be abandoned, and with their failure to capture Negropont (1688) the Venetians were brought to a standstill. By the peace of Karlowitz (1699) the Morea became a possession of Venice. The new rulers, in spite of the commercial restrictions which they imposed in favour of their own traders, checked the impoverishment and decrease of population (from 300,000 to 86,000) which the war had caused. By their attempts to cooperate with the native magis- trates and the mildness of their administration they improved the spirit of their subjects. But they failed to make their government popular, and when in 1715 the Ottomans with a large and well-disciplined army set themselves to recover the Morea, the Venetians were left without support from the Greeks. The peninsula was rapidly recaptured and by the peace of Passarowitz (17 18) again became a Turkish dependency. The gaps left about this time in the Greek population were largely

made up by an immigration from Albania.

The condition of the Greeks in the 18th century showed a great improvement which gave rise to yet greater hopes. Already in the 17th century the personal services of the subjects had been commuted into money contributions, and since 1676 the tribute of children fell into abeyance. The increasing use of Greek officials in the Turkish civil service, coupled with the privileges accorded to the Greek clergy throughout the Balkan countries, tended to recall the consciousness of former days of predominance in the Levant. Lastly, the education of the Greeks, which had always remained on a comparatively high level, was rapidly improved by the foundation of new schools and academies.

The long neglect which Greece had experienced at the hands of the European Powers was broken in 1764, when Russian agents appeared in the country with promises of a speedy deliverance from the Turks. A small expedition under Feodor and Alexis Orloff actually landed in the Morea in 1769, but failed to rouse national sentiment. Although the Russian fleet gained a notable victory off Chesme near Chios, a heavy defeat near Tripolitza ruined the prospects of the army. The Albanian troops in the Turkish army subsequently ravaged the country far and wide, until in 1779 they were exterminated by a force of Turkish regulars. In 1774 a concession, embodied in the treaty of Kuchuk Kainarji, by which Greek traders were allowed to sail under the protection of the Russian flag, marked an important step in the rehabilitation of the country as an inde- pendent power. Greek commerce henceforth spread swiftly over the Mediterranean, and increased intercourse developed a new sense of Hellenic unity. Among the pioneers who fostered this movement should be mentioned Constantine Rhigas, the ” modern Tyrtaeus,” and Adamantios Coraes (q.v.), the reformer of the Greek tongue. The revived memories of ancient Hellas and the impression created by the French revolution combined to give the final impulse which made the Greeks strike for freedom. By 1800 the population of Greece had increased to 1,000,000, and although 200,000 of these were Albanians, the common aversion to the Moslem united the two races. The military resources of the country alone remained deficient, for the armatoli or local militias, which had never been quite dis- banded since Byzantine times, were at last suppressed by Ali

Pasha of Iannina and found but a poor substitute in the klephts who henceforth spring into prominence. But at the first sign of weakness in

the Turkish dominion the Greek nation was ready to rise, and the actual outbreak of revolt had become merely a question of time.

Ovl U rH HO , R «, T , I f S -~ Ge “^ al: G ,’ F! – nIay ‘ Histor y °f Greece (ed. Tozer, Oxford, 1877) especially vo s. 1., iv., v.; K. Paparrhigopoulos, ifropia tou E\ r ucov Wvovs (4 th ed., Athens, 1903), vols, ii v ■ Histovre de la civilisation hellenique (Paris, 1878) R v Scala Das Gnechentum seit Alexander dem Grossen (Leipzig and Vienna’ 1904) ; and specially W. Miller, The Latins in the Levant (1908)

Special— (a) The Roman period: Strabo, bks. viii.x.; Pausanias Descriptio Graeciae G. F Hertzberg, Die Geschichte Griechenlands unter der Herrschaftder RSmer (Hafle, 1866-1875); Sp. Lampros, laropta r-qs EAXofos (Athens, 1888 sqq.), vol. iii.T A. Holm History of Greece (Eng. trans., London, 1894-1898), vol. iv chs f 9 ‘ 1*’ % Seq – ; T r h – Mommsen, The Provinces of the Roman Empire (Eng. trans., London, 1886, ch. 7); J. P. Mahaffy The S ™ i?% der ^^ Sway, from Polybius to Plutarch (London, 1890) W. Miller, The Romans in Greece ” (Westminster Review, Zf Tk I9 ° 3 ‘.. P P^ ^ 6 t I0 2 : h F rie dlander, ” Griechenland unter ?, e “™ em (Deutsche Rundschau, 1899, pp. 251-274, 402-430). (b) The Byzantine and Latin periods: G. F. Hertzberg, Geschichte Griechenlands seit dem Absterben des antiken Lebens (Gotha 1876- 18/9),. vols 1 11. ; C. Hopf, Geschichte Griechenlands im Mittelalter (.Leipzig, 1S68) ; J. A. Buchon, Histoire des conqu’etcs et de Vetablisse- ment des Franqais dans les Etats de I’ancienne Grece (Paris 1846) ■ If’.™ 1 .”’ The r Chronicle of Morea (London, 1904); W. Miller’ the frinces of the Peloponnese ” (Quarterly Review, July 190s’ pp 109-135) ; D Bikelas, Seven Essays on Christian Greece (Paisley and London 1890); La Grece byzantine et moderne (Paris 180*) p P V 193 , @ ?> e ,, Tl ^ rkish and Venetian periods: Hertzberg op. at., vol 111.; K.M. Bartholdy, Geschichte Griechenlands von der hroberung Konstantinopds (Leipzig, 1870), bks. i. and ii., pp. i-i« ■ K. JN. bathas ToupKOKparovtiivr) ‘EXXds (Athens, 1 869) ; W Miller’ Greece under the Turks” (Westminster Review, August and September 1904 pp. 195-210, 304-320; English Historical Review, 1904, PP- 646-668); L. Ranke, “Die Venetianer in Morea ‘ ! (Historisch-pohtische Zeitschrift, 11. 405-502). (d) Special subjects: Religion E Hatch The Influence of Greek Ideas and Usages upon the Christian Church (London, 1890). Ethnology. J. P. Fallmerayer Geschichte der Halbinsel Morea wdhrend des Mittelalter s (Stuttgart

(Athens, 1857); A. Phihppson ” Zur Ethnographie des Peloponnes ” Petermann s Mitteilungen 36 (1890), pp. 1-11, 33-41 1; A Vasiliev

Die Slaven in Griechenland ” [Vizantijsky Vremennik, St Petersburg! 5 (1898), pp. 404-438, 626-670]. s

See also Roman Empire, Later; Athens. (M. O. B. C.)

c. Modern History: 1800-IQ08. At the beginning of the 19th century Greece was still under Turkish domination, but the dawn of freedom was already breaking, and a variety of forces were at work which prepared the way for the acquisition of national ™ e *<»

[HISTORY

Of the series of insurrections which took place in the 19th century, the first in order of time was the Servian, which broke out in 1804; the second was the Greek, which began influence. m 182 1. In both these movements the influence of Russia played a considerable part. In the case of the Servians Russian aid was mainly diplomatic, in that of the Greeks it eventually took a more material form. Since the days of Peter the Great, the eyes of Russia had been fixed on Con- stantinople, the great metropolis of the Orthodox faith. The policy of inciting the Greek Christians to revolt against their oppressors, which was first adopted in the reign of the empress Anna, was put into practical operation by the empress Catharine II., whose favourite, Orlov, appeared in the Aegean with a fleet in 1769 and landed in the Morea, where he organized a revolt. The attempt proved a failure; Orlov re-embarked, leaving the Greeks at the mercy of the Turks, and terrible massacres took place at Tripolitza, Lemnos and elsewhere. By the treaty of Kutchuk-Kainarji (July 21, 1774) Russia obtained a vaguely-defined protectorate over the Orthodox Greek subjects of Turkey, and in 1781 she arrived at an arrangement with Austria, known as the ” Greek project,” for a partition of Turkish territory and the restoration of the Byzantine empire under Constantine, the son of Catharine II. The outbreak of the French Revolution distracted the attention of the two empires, but Russia never ceased to intrigue among the Christian subjects’ of Turkey. A revolt of the inhabitants of Suli in 1790 took place with her connivance, and in the two first decades of the 19th century her agents were active and ubiquitous

The influence of the French Revolution, which pervaded all Europe, extended to the shores of the Aegean. The Greeks, areek wn ° had hitherto been drawn together mainly by a revolu- common religion,

were now animated by the sentiment tionary f nationality and by an ardent desire for political freedom. The national awakening, as in the case of the other subject Christian nations, was preceded by a literary revival. Literary and patriotic societies, the Philhellenes, the Philomousi, came into existence; Greek schools were founded everywhere; the philological labours of Coraes, which created the modern written language, furnished the nation with a mode of literary expression; the songs of Rhigas of Velestino fired the enthusiasm of the people. In 181 5 was founded the cele- brated Philike Hetaerea, or friendly society, a revolutionary organization with centres at Moscow, Bucharest, Triest, and in all the cities of the Levant; it collected subscriptions, issued manifestos, distributed arms and made preparations for the coming insurrection. The revolt of Ali Pasha of Iannina against the authority of the sultan in 1820 formed the prelude to the Greek uprising; this despot, who had massacred the Greeks by hundreds, now declared himself their friend, and became a member of the Hetaerea. In March 1821 Alexander Ypsi- lanti, a former aide-de-camp of the tsar Alexander I., and president of the Hetaerea, entered Moldavia from Russian territory at the head of a small force; in the same month Archbishop Germanos of Patras unfurled the standard of revolt at Kalavryta in the Morea.

For the history of the prolonged struggle which followed see Greek War of Independence. The warfare was practically brought to a close by the annihilation of the Egyptian fleet at Navarino by the fleets of Great Britain, France and Russia on the 20th of October 1827. Nine months previously, Count John Capo dTstria (q.v.), formerly minister of foreign affairs of the tsar Alexander, had been elected president of the Greek republic for seven years beginning on January 18, 1828. By the protocol of London (March 22, 1829) the Greek mainland south of a line drawn from the Gulf of Arta to the Gulf of Volo, the Morea and the Cyclades were declared a principality tributary to the sultan under a Christian prince. The limits drawn by the protocol of London were confirmed by the treaty of Adrianople (September 14, 1829), by which Greece was constituted an independent monarchy. The governments of Russia, France and England were far irom sharing the enthusiasm which the gallant resistance of the

Indepen- dence ot Greece.

Greeks had excited among the peoples of Europe, and which inspired the devotion of Byron, Cochrane, Sir Richard Church, Fabvier and other distinguished Philhellenes; jealousies prevailed among the three protecting powers, and the newly- liberated nation was treated in a niggardly spirit; its narrow limits were reduced by a new protocol

(February 3, 1830), which drew the boundary line at the Aspropotamo, the Spercheios and the Gulf of Lamia. Capo dTstria, whose Russian proclivities and arbitrary government gave great offence to the Greeks, was assassinated by two members of the Mavromichalis family (October 9, 1831), and a state of anarchy followed. Before his death the throne of Greece had been offered to Prince Leopold of Saxe-Coburg-Gotha, afterwards king of the Belgians, who declined it, basing his refusal on the inadequacy of the limits assigned to the new kingdom and especially the exclusion of Crete.

By the convention of London (May 7, 1832) Greece was declared an independent kingdom under the protection of Great Britain, France and Russia with Prince Otto, Kl ottlk son of King Louis I. of Bavaria, as king. The frontier line, now traced from the Gulf of Arta to the Gulf of Lamia, was fixed by the arrangement of Constantinople (July 21, 1832). King Otto, who had been brought up in a despotic court, ruled absolutely for the first eleven years of his reign; he surrounded himself with Bavarian advisers and Bavarian troops, and his rule was never popular. The Greek chiefs and politicians, who found themselves excluded from all influence and advance- ment, were divided into three factions which attached themselves respectively to the three protecting powers. On the 15th of September 1843 a military revolt broke out which compelled the king to dismiss the Bavarians and to accept a constitution. A responsible ministry, a senate nominated by the king, and a chamber elected by universal suffrage were now instituted. Mavrocordatos, the leader of the English party, became the first prime minister, but his government was overthrown at the ensuing elections, and a coalition of the French and Russian parties under Kolettes and Metaxas succeeded to power. The warfare of factions was aggravated by the rivalry between the British and French ministers, Sir Edmond Lyons and M. Piscatory; King Otto supported the French party, and trouble arose with the British government, which in 1847 despatched warships to enforce the payment of interest on the loan con- tracted after the War of Independence. A British fleet subse- quently blockaded the Peiraeus in order to obtain satisfaction for the claims of Pacifico, a Portuguese Jew under British protection, whose house had been plundered during a riot. On the outbreak of hostilities between Russia and Turkey in 1853 the Greeks displayed sympathy with Russia; armed bands were sent into Thessaly, and an insurrection was fomented in Epirus in„the hope of securing an accession of territory. In order to prevent further hostile action on the part of Greece, British and French fleets made a demonstration against the Peiraeus, which was occupied by a French force during the Crimean War. The disappointment of the national hopes increased the

unpopularity of King Otto, who had never acquiesced in constitutional rule. In 1862 a military revolt broke out, and a national assembly pronounced his deposition. The vacant throne was offered by the assembly to Duke Nicholas of Leuchtenberg, a cousin of the tsar, but the mass of the people desired a constitutional monarchy of the British type; a plebiscite was taken, and Prince Alfred of England was elected by an almost unanimous vote. The three protecting powers, however, had bound themselves to the exclusion of any member of their ruling houses. In the following year Prince William George of Schleswig-Holstein-Sonderburg-Gliicksburg, whom the British government had designated as a suitable candidate, was elected by the National Assembly with the title ” George I., king of the Hellenes.” Under the treaty of London (July 13, 1863) the change of dynasty was sanctioned by the three protect- ing powers, Great Britain undertaking to cede to Greece the seven Ionian Islands, which since 181 5 had formed a common- wealth under British protection.

On the 29th of October 1863 the new sovereign arrived in Athens, and in the following June the British authorities handed

over the Ionian Islands to a Greek commissioner. *T“‘t ˆ n 6 George thus began his reign under the most George I. favourable auspices, the patriotic sentiments of the

Greeks beingflattered by the acquisition of new territory . He was, however, soon confronted with constitutional difficulties; party spirit ran riot at Athens, the ministries which he appointed proved short-lived, his counsellor, Count Sponneck, became the object of violent attacks, and at the end of 1864 he was compelled to accept an ultra-democratic constitution, drawn up by the National Assembly. This, the sixth constitution voted sinˆe the establishment of the kingdom, is that which is still in force. In the following year Count Sponneck left Greece, and the attention of the nation was concentrated on the affairs of Crete. The revolution which broke out in that island received moral and material support from the Greek government, with the tacit approval of Russia; military preparations were pressed forward at Athens, and cruisers were purchased, but the king, aware of the inability of Greece to attain her ends by warlike means, discouraged a provocative attitude towards Turkey, and eventually dismissed the

bellicose cabinet of Koumoundouros. The removal of a powerful minister command- ing a large parliamentary majority constituted an important precedent in the exercise of the royal prerogative; the king adopted a similar course with regard to Delyannes in 1892 and 1897. The relations with the porte, however, continued to grow worse, and Hobart Pasha, with a Turkish fleet, made a demonstra- tion off Syra. The Cretan insurrection was finally crushed in the spring of 1869, and a conference of the powers, which assembled that year at Paris, imposed a settlement of the Turkish dispute on Greece, but took no steps on behalf of the Cretans. In 1870 the murder of several Englishmen by brigands in the neighbourhood of Athens produced an unfavourable impression in Europe; in the following year the confiscation of the Laurion mines, which had been ceded to a Franco-Italian company, provoked energetic action on the part of France and Italy. In 1875, after an acute constitutional crisis, Charilaos Trikoupes, who but ten months previously had been imprisoned for denouncing the crown in a newspaper article, was summoned to form a cabinet. This remarkable man, the only great states- man whom modern Greece has produced, exercised an extra- ordinary influence over his countrymen for the next twenty years; had he been able to maintain himself uninterruptedly in power during that period, Greece might have escaped a long succession of misfortunes. His principal opponent, Theodore Delyannes, succeeded in rallying a strong body of adherents, and political parties, hitherto divided into numerous factions, centred around these two prominent figures.

In 1877 the outbreak of the Russo-Turkish War produced a fever of excitement in Greece; it was felt that the quarrels of the party leaders compromised the interests of the frontier country, and the populace of Athens insisted on the 1881. formation of a coalition cabinet. The ” great ” or

” oecumenical ” ministry, as it was called, now came into existence under the presidency of the veteran Kanares; in reality, however, it was controlled by Trikoupes, who, recognizing the unpreparedness of the country, resolved on a pacific policy. The capture of Plevna by the Russians brought about the fall of the ” oecumenical ” ministry, and Koumoundouros and Delyannes, who succeeded to power, ordered the invasion of Thessaly. Their warlike energies, however, were soon checked by the signing of the San Stefano Treaty, in which the claims of Greece to an extension of frontier were altogether ignored. At the Berlin congress two Greek delegates obtained a hearing on the proposal of Lord Salisbury. The congress decided that the rectification of the frontier should be left to Turkey and Greece, the mediation of the powers being proposed in case of non-agreement; it was suggested,

however, that the rectified frontier should extend from the valley of the Peneus on the east to the mouth of the Kalamas, opposite the southern extremity of Corfu, on the west. In 1879 a Greco-Turkish commission

for the delimitation met first at Prevesa, and subsequently at Constantinople, but its conferences were without result, the Turkish commissioners declining the boundary suggested at Berlin. Greece then invoked the arbitration of the powers, and the settlement of the question was undertaken by a confer- ence of ambassadors at Berlin (1880). The line approved by the conference was practically that suggested by the congress; Turkey, however, refused to accept it, and the Greek army was once more mobilized. In was evident, however, that nothing could be gained by an appeal to arms, the powers not being prepared to apply coercion to Turkey. By a convention signed at Constantinople in July 1881, the demarcation was entrusted to a commission representing the six powers and the two interested parties. The line drawn ran westwards from a point between the mouth of the Peneus and Platamona to the summits of Mounts Kritiri and Zygosˆ thence following the course of the river Arta to its mouth. An area of 13,395 square kilometres, with a population of 300,000 souls, was thus added to the kingdom, while Turkey was left in possession of Iannina, Metzovo and most of Epirus. The ceded territory was occupied by Greek troops before the close of the year.

In 1882 Trikoupes came into power at the head of a strong party, over which he exercised an influence and authority hitherto unknown in Greek political life. With the exception of three brief intervals (May 1885 to May ˆ* 00,,e * 1886, October 1890 to February 1892, and a few Qei yaaaes , months in 1893), he continued in office for the next twelve years. The reforms which he introduced during this period were generally of an unpopular character, and were loudly denounced by his democratic rivals; most of them were cancelled during the intervals when his opponent Delyannes occupied the premiership. The same want of continuity proved fatal to the somewhat ambitious financial programme which he now inaugur- ated. While pursuing a cautious foreign policy, and keeping in control the rash impetuosity of his fellow-countrymen, he shared to the full the national desire for expansion, but he looked to the development of the material resources of the country as a necessary preliminary to the realization of the dreams of Hellenism. With this view he endeavoured to attract foreign capital to the country, and the confidence which he inspired in financial circles abroad enabled him to contract a number of loans and to better the financial situation by a series of con- versions. Under a stable, wise, and economical administration this far-reaching

programme might perhaps have been carried out with success, but the vicissitudes of party politics and the periodical outbursts of national sentiment rendered its realization impossible. In April 1885 Trikoupes fell from power, and a few months later the indignation excited in Greece by the revolu- tion of Philippopolis placed Delyannes once more at the head of a warlike movement. The army and fleet were again mobilized with a view to exacting territorial compensation for the aggrandizement of Bulgaria, and several conflicts with the Turkish troops took place on the frontier. The powers, after repeatedly inviting the Delyannes cabinet to disarm, established a blockade of Peiraeus and other Greek ports (8th May 1886), France alone declining to co-operate in this measure. Delyannes resigned (nth May) and Trikoupes, who succeeded to power, -issued a decree of disarmament (25th May). Hostilities, however, continued on the frontier, and the blockade was not raised till 7 th June. Trikoupes had now to face the serious financial situation brought about by the military activity of his predecessor. He imposed heavy taxation, which the people, for the time at least, bore without murmuring, and he continued to inspire such confidence abroad that Greek securities maintained •their price in the foreign market. It was ominous, however, that a loan which he issued in 1890 was only partially covered. Meanwhile the Cretan difficulty had become once more a source of trouble to Greece. In 1889 Trikoupes was grossly deceived by the Turkish government, which, after inducing him to dissuade the Cretans from opposing the occupation of certain fortified posts, issued a firman annulling many important provisions in the constitution of the island. The indignation

in Greece was intense, and popular discontent was increased by the success of the Bulgarians in obtaining the exequatur of the sultan for a number of bishops in Macedonia. In the autumn of 1890 Trikoupes was beaten at the elections, and Delyannes, who had promised the people a radical reform of the taxation, succeeded to power. He proved unequal, however, to cope with the financial difficulty, which now became urgent; and the king, perceiving that a crisis was imminent, dismissed him and recalled Trikoupes. The hope of averting national bankruptcy depended on the possibility of raising a loan by which the rapid depreciation of the paper currency might be arrested, but foreign financiers demanded guarantees which seemed likely to prove hurtful to Greek susceptibilities; an agitation was raised at

Athens, and Trikoupes suddenly resigned (May 1893). His conduct at this juncture appears to have been due to some misunderstarldings which had arisen between him and the king. The Sotiropoulos-Rhalles ministry which followed effected a temporary settlement with the national creditors, but Trikoupes, returning to power in the autumn, at once annulled the arrangement. He now proceeded to a series of arbitrary measures which provoked the severest criticism throughout Europe and exposed Greece to the determined hostility of Germany. A law was hastily passed which deprived the creditors of 70% of their interest, and the proceeds of the revenues conceded to the monopoly bondholders were . seized (December 1893). Long negotiations followed, resulting in an arrangement which was subsequently reversed by the German bondholders. In January 1895 Trikoupes resigned office, in consequence of a disagreement with the crown .prince on a question of military discipline. His popularity had vanished, his health was shattered, and he determined to abandon his political career. His death at Cannes (nth April 1896), on the eve of a great national convulsion, deprived Greece of his masterly guidance and sober judgment at a critical moment in her history.

His funeral took place at Athens on 23rd April, while the city was still decorated with flags and garlands after the celebration Katioa- °f l ˆ e Olympic games. The revival of the ancient aiist festival, which drew together multitudes of Greeks

agitation, from abroad, led to a lively awakening of the national 18 sentiment, hitherto depressed by the economic mis-

fortunes of the kingdom, and a secret patriotic society, known as the Elknike Hetaerea, began to develop prodigious activity, enrolling members from every rank of life and establishing branches in all parts of the Hellenic world. The society had been founded in 1894, by a handful of young officers who con- sidered that the military organization of the country was neglected by the government; its principal aim was the pre- paration of an insurrectionary movement in Macedonia, which, owing to the activity of the Bulgarians and the reconciliation of Prince Ferdinand with Russia, seemed likely to be withdrawn for ever from the domain of Greek irredentism. The outbreak of another insurrection in Crete supplied the means of creating a diversion for Turkey while the movement in Macedonia was being matured; arms and volunteers were, shipped to the island, but the society was as yet unable to force the hand of the government, and Delyannes, who had succeeded Trikoupes in 1895, loyally aided the powers in the restoration of order by advising the Cretans to accept the constitution of 1896. The appearance of strong insurgent bands in

Macedonia in the summer of that year testified to the activity of the society and provoked the remonstrances of the powers, while the spread of its propaganda in the army led to the issue of a royal rescript announcing grand military manceuvres, the formation of a standing camp, and the rearmament of the troops with a new. weapon (6th December). The objects of the society were , effectually furthered by the evident determination of the porte to evade the application of the stipulated reforms in Crete; the Cretan Christians lost patience, and indignation was widespread in Greece. Emissaries of the society were despatched to the island, and affairs were brought to a climax by an outbreak at Canea on 4th February 1897. The Turkish troops fired on

the Christians, thousands of whom took refuge on the warships of the powers, and a portion of the town was consumed by fire. Delyannes now announced that the government had abandoned the policy of abstention. On the 6th two warships were despatched to Canea, and on the 10th a torpedo flotilla, commanded by Prince George, left Peiraeus C H t f amid tumultuous demonstrations. The ostensible object 1897.' of these measures was the protection of Greek subjects in Crete, and Delyannes was still anxious to avoid a definite rupture with Turkey, but the Ethnike Hetaerea had found means to influence several members of the ministry and to alarm the king. Prince George, who had received orders to prevent the landing of Turkish reinforcements on the island, soon with- drew from Cretan waters owing to the decisive attitude adopted by the commanders of the international squadron. A note was now addressed by the government to the powers, declaring that Greece could no longer remain a passive spectator of events in Crete, and on the 13th of February a force of 1500 men, under Colonel Vassos, embarked at Peiraeus. On the same day a Greek warship fired on a Turkish steam yacht which was convey- ing troops from Candia to Sitia. Landing near Canea on the night of the 14th, Colonel Vassos issued a proclamation announc- ing the occupation of Crete in the name of King George. He had received orders to expel the Turkish garrisons from the fortresses, but his advance on Canea was arrested by the inter- national occupation of that town, and after a few engagements with the Turkish troops and irregulars he withdrew into the interior of the island. Proposals for the coercion of Greece were now put forward by Germany, but Great Britain declined to take action until an understanding had been arrived at with regard to the future government of Crete. Eventually (2nd March) collective notes were addressed to the Greek and Turkish governments announcing the decision of the powers that (1) Crete could in no case in present circumstances be annexed to Greece; (2) in

view of the delays caused by Turkey in the appli- cation of the reforms, Crete should be endowed with an effective autonomous administration, calculated to ensure it a separate government, under the suzerainty of the sultan. Greece was at the same time summoned to remove its army and fleet within the space of six days, and Turkey was warned that its troops must for the present be concentrated in the fortified towns and ultimately withdrawn from the island. The action of the powers produced the utmost exasperation at Athens; the populace demanded war with Turkey and the annexation of Crete, and the government drew up a reply to the powers in which, while expressing the conviction that autonomy would prove a failure, it indicated its readiness to withdraw some of the ships, but declined to recall the army. A suggestion that the troops might receive a European mandate for the preservation of order in the island proved unacceptable to the powers, owing to the aggressive action of Colonel Vassos after his arrival. Meanwhile troops, volunteers and munitions of war were hurriedly despatched to the Turkish frontier in anticipation of an inter- national blockade of the Greek ports, but the powers contented themselves with a pacific blockade of Crete, and military pre- parations went on unimpeded.

While the powers dallied, the danger of war increased; on 29th March the crown prince assumed command of the Greek troops in Thessaly, and a few days later hostilities were precipitated by the irregular forces of the Ethnike Turkey Hetaerea, which attacked several Turkish outposts near Grevena. According to a report of its proceedings, subse- quently published by the society, this invasion received the previous sanction of the prime minister. On 1 7th April Turkey declared war. The disastrous campaign which followed was of short duration , and it was evident from the outset that the Greeks had greatly underrated the military strength of their opponents (see Greco-Turkish War). After the evacuation of Larissa on the 24th, great discontent prevailed at Athens; Delyannes was invited by the king to resign, but refusing to do so was dismissed (29th April). His successor, Rhalles, after recalling the army from Crete (9th May) invoked the mediation

of the powers, and an armistice was concluded on the 19th of that month. Thus ended an unfortunate enterprise, which was undertaken in the hope that discord among the powers would lead to a European

war and the dismemberment of Turkey. Greek interference in Crete had at least the result of compelling Europe to withdraw the island for ever from Turkish rule. The conditions of peace put forward by Turkey included a war indemnity of £10,000,000 and the retention of Thessaly; the latter demand, however, was resolutely opposed by Great Britain, and the indemnity was subsequently reduced to £4,000,000. The terms agreed to by the powers were rejected by Rhalles; the chamber, however, refused him a vote of confidence and King George summoned Zaimes to power (October 3). The definitive treaty of peace, which was signed at Constantinople on the 6th of December, contained a provision for a slight modification of the frontier, designed to afford Turkey certain strategical advantages; the delimitation was carried out by a commission composed of military delegates of the powers and representatives of the interested parties. The evacuation of Thessaly by the Turkish troops was completed in June 1898. An immediate result of the war was the institution of an international financial commission at Athens, charged with the control of certain revenues assigned to the service of the national debt. The state of the country after the conclusion of hostilities was deplorable; the towns of northern Greece and the islands were crowded with destitute refugees from Thessaly; violent recriminations prevailed at Athens, and the position of the dynasty seemed endangered. A reaction, however, set in, in consequence of an attempt to assassinate King George (28th February 1898), whose great services to the nation in obtaining favourable terms from the powers began to receive general recognition. In the following summer the king made a tour through the country, and was everywhere received with enthusiasm. In the autumn the powers, on the initiative of Russia, decided to entrust Prince George of Greece with the government of Crete; on 26th November an intimation that the prince had been appointed high commissioner in the island was formally conveyed to the court of Athens, and on 21st December he landed in Crete amid enthusiastic demonstrations (see Crete).

In April 1899 Zaimes gave way to Theotokes, the chief of the Trikoupist party, who introduced various improvements in the administration of justice and other reforms includ- Mace- j n g a measure transferring the administration of the army from the minister of war to the crown prince. In May 1901 a meeting took place at Abbazia, under the auspices of the Austro-Hungarian government, between King George and King Charles of Rumania with a view to the conclusion of a Graeco-Rumanian understanding directed against the growth of Slavonic, and especially Bulgarian, influence in Macedonia. The compact, however, was destined to be short-lived owing to the

prosecution of a Rumanian propaganda among the semi-Hellenized Vlachs of Macedonia. In November riots took place at Athens, the patriotic indignation of the university students and the populace being excited by the issue of a transla- tion of the Gospels into modern Greek at the suggestion of the queen. The publication was attributed to Panslavist intrigues against Greek supremacy over the Orthodox populations of the East, and the archbishop of Athens was compelled to resign. Theotokes, whose life was attempted, retired from power, and Zaimes formed a cabinet. In 1902 the progress of the Bulgarian movement in Macedonia once more caused great irritation in Greece. Zaimes, having been defeated at the elections in December, resigned, and was succeeded by Delyannes, whose popularity had not been permanently impaired by the misfortunes of the war. Delyannes now undertook to carry out extensive economic reforms, and introduced a measure restoring the control of the army to the ministry of war. He failed, however, to carry out his programme, and, being deserted by a section of his followers, resigned in June 1903, when Theotokes again became prime minister. The new cabinet resigned within a month owing to the outbreak of disturbances in the currant-

doalan troubles.

growing districts, and Rhalles took office for the second time (July 8). The Bulgarian insurrection in Macedonia during the autumn caused great excitement in Athens, and Rhalles adopted a policy of friendship with Turkey (see Macedonia). The co-operation of the Greek party in Macedonia with the Turkish authorities exposed it to the vengeance of the insurgents, and in the following year a number of Greek bands were sent into that country. The campaign of retaliation was continued in subsequent years.

In December Rhalles, who had lost the support of the Delyannist party, was replaced by Theotokes, who promulgated a scheme of army reorganization, introduced various economies and imposed fresh taxation. In December De/yˆnes. the government was defeated on a vote of confidence and Delyannes once more became, prime minister, obtaining a considerable majority in the elections which followed (March 1905), but on the 13th of June he was assassinated. He was succeeded by Rhalles, who effected a settlement of the currant question and cultivated friendly relations with Turkey in regard to Macedonia.

In the autumn an ti- Greek demonstrations in Rumania led to a rupture of relations with that country. In December the ministry resigned owing to an adverse vote of the chamber, and Theotokes

formed a cabinet. The new government, as a preliminary to military and naval reorganization, introduced a law directed against the candidature of military officers for parliament. Owing to obstruction practised by the military members of the chamber a dissolution took place, and at the subsequent elections (April 1906) Theotokes secured a large majority. In the autumn various excesses committed against the Greeks in Bulgaria in reprisal for the depredations of the Greek bands in Macedonia caused great indignation in Greece, but diplomatic relations between the two countries were not suspended. On the 26th of September Prince George, who had resigned the high commissionership of Crete, returned to Athens; the designation of his successors was accorded by the protecting powers to King George as a satisfaction to Greek national senti- ment (see Crete). The great increase in the activity of the Greek bands in Macedonia during the following spring and summer led to the delivery of a Turkish note at Athens (July 1907), which was supported by representations of the powers.

In October 1908 the proclamation by the Cretan assembly of union with Greece threatened fresh complications, the cautious attitude of the Greek government leading to an agitation in the army, which came to a head in 1909. On the 18th of July a popular demonstration against his Cretan policy led to the resignation of Theotokes, whose successor, Rhalles, announced a programme of military and economical reform. The army, however, took matters into its own hands, and on the 23rd of August Rhalles was replaced by Mavromichales, the nominee of the ” Military League.” For the next six months constitutional government was practically superseded by that of the League, and for a while the crown itself seemed to be in danger. The influence of the League, however, rapidly declined; army and navy quarrelled; and a fresh coup d’etat at the beginning of 1910 failed of its effect, owing to the firmness of the king. On the 7th of February Mavromichales resigned, and his successor, Dra- goumis, accepting the Cretan leader Venezelo’s suggestion of a national assembly, succeeded in persuading the League to dissolve (March 29) on receiving the king’s assurance that such an assembly would be convened. On the 31st, accordingly, King George formally proclaimed the convocation of a national assembly to deal with the questions at issue.

Authorities. — Finlay, History of Greece (Oxford, 1877); K. N. Sathas, Mco-aiaiciKi) 0i/3Xio0jJK7) (7 vols., Venice, 1 872-1 894); and. Mˆjueia ‘EMˆt/:?/? taroptas. Documents inidits relatifs hVhistoire du moyen Age (9 vols., Paris, 1 880-1 890); Sp. Trikoupes, ‘laropia. rijs ‘EXXˆucrjs iira.vaoTi.aeus (4 vols., 3rd ed., Athens, 1888) ; K.

Paparrhegopoulos, ‘Icrropia rod ‘EXXrpucoD Wvovs (5 vols., 4th ed., Athens, 1903) ; J. Philemon, Aonlpiov hrropixov -n-tpl ttjs ‘EXXip/tnj? iiravaaT atrews (Athens, 1859-1861) ; P. Kontoyannes, Oi “EXXtjcct Kari. top TtpSyrov hirl Ai/carepii’Tjs ‘PweriroroupKtKov fl-oXep-oJ” (Athens, 1903) ; D. G. Kampouroglos, ‘Ioropta ™ ‘kdr)va.ioiv, ToupKOKparta, 1458-1687 (2 vols., Athens, 1 889-1 890) ; and Mi^p-eia rijs Itrroplas ruv ‘ kSr\vai

(3 vols., Athens, 1889-1892) ; G.E.Mavrogiannes, ‘laropla rS>v ‘lovloiv vTjaoiv, 1797-1815 (2 vols., Athens, 1889); P. Karolides, ‘laropla rod igaluvos, 1814-1892 (Athens, 1891-1893); E. Kyriakides, ‘laropla rov avyxpopov ‘EK\rivi.ap,ov 1832-1892 (2 vols., Athens, 1892); G. Konstantinides, ‘laropla rSiv ‘Aorivuv and Xpiarov yewriaews m«XP’ t0 ” 1821 (2nd ed., Athens, 1894) ; D. Bikelas, La Grece byzantine et moderne (Paris, 1893). (J- D. B.)

GREEK ART. It is proposed in the present article to give a brief account of the history of Greek art and of the principles embodied in that history. In any broad view of history, the products of the various arts practised by a people constitute an objective and most important record of the spirit of that people. But all nations have not excelled in the same way: some have found their best expression in architecture, some in music, some in poetry. The Greeks most fully embodied their ideas in two ways, first in their splendid literature, both prose and verse, and secondly, in their plastic and pictorial art, in which matter they have remained to our days among the greatest instructors of mankind. The three arts of architecture, sculpture and painting were brought by them into a focus; and by their aid they pro- duced a visible splendour of public life such as has perhaps been nowhere else attained.

The volume of the remains of Greek civilization is so vast, and the learning with which these have been discussed is so ample, that it is hopeless to attempt to give in a work like the present any complete account of either. Rather we shall be frankly eclectic, choosing for consideration such results of Greek art as are most noteworthy and most characteristic. In some cases it will be possible to give a reference to a more detailed treat- ment of particular monuments in these volumes under the heading of the places to which they belong. Architectural detail is relegated to Architecture and allied architectural articles. Coins (see Numismatics) and gems (see Gems)

are treated apart, as are vases (Ceramics), and in the bibliography which closes this article an effort is made to direct those who wish for further information in any particular branch of our subject.

1. The Rediscovery of Greek Art. — The visible works of Greek architect, sculptor and painter, accumulated in the cities of Greece and Asia Minor until the Roman conquest. And in spite of the ravages of conquering Roman generals, and the more systematic despoilings of the emperors, we know that when Pausanias visited Greece, in the age of the Antonines, it was from coast to coast a museum of works of art of all ages. But the tide soon turned. Works of originality were no longer produced, and a succession of disasters gradually obliterated those of previous ages. In the course of the Teutonic and Slavonic invasions from the north, or in consequence of earthquakes, very frequent in Greece, the splendid cities and temples fell into ruins; and with the taking of Constantinople by the Franks in 1 204 the last great collection of works of Greek sculpture disappeared. But while paintings decayed, and works in metal were melted down, many marble buildings and statues survived, at least in a mutilated condition, while terra-cotta is almost proof against decay.

With the Renaissance attention was directed to the extant remains of Greek and Roman art; as early as the 15th century collections of ancient sculpture, coins and gems began to be formed in Italy; and in the 16th the enthusiasm spread to Germany and France. The earl of Arundel, in the reign of James I., was the first Englishman to collect antiques from Italy and Asia Minor: his marbles are now in the Ashmolean Museum at Oxford. Systematic travel in Greece for the discovery of buildings and works of art was begun by Spon and Wheler (1675-1676); and the discovery of Pompeii in 1748 opened a new chapter in the history of ancient art.

But though kings delighted to form galleries of ancient statues, ‘arid the great Italian artists of the Renaissance drew from them inspiration for their paintings and bronzes, the first really critical appreciation of Greek art belongs to Winckelmann (Geschichte der Kunst des Altertums, 1764). The monuments accessible to Winckelmann were but a very small proportion of those we now possess, and in fact mostly works of inferior merit :

but he was the first to introduce the historical method into the treatment of ancient art, and to show how it embodied the ideas of the great peoples of the ancient world. He was suc- ceeded by Lessing, and the waves of thought and feeling set in motion by these two affected the cultivated class in all nations, — they inspired in particular Goethe

in Germany and Lord Byron in England.

The second stage in the recovery of Greek art begins with the permission accorded by the Porte to Lord Elgin in 1800 to re- move to England the sculptural decoration of the Parthenon and other buildings of Athens. These splendid works, after various vicissitudes, became the property of the English nation, and are now the chief treasures of the British Museum. The sight of them was a revelation to critics and artists, accustomed only to the base copies which fill the Italian galleries, and a new epoch in the appreciation of Greek art began. English and German savants, among whom Cockerell and Stackelberg were conspicuous, recovered the glories of the temples of Aegina and Bassae. Leake and Ross, and later Curtius, journeyed through the length and breadth of Greece, identifying ancient sites and studying the monuments which were above ground. Ross re-constructed the temple of Athena Nike on the Acropolis of Athens from fragments rescued from a Turkish bastion.

Meantime more methodical exploration brought to light the remains of remarkable civilizations in Asia, not only in the valley of the Euphrates, but in Lycia, whence Sir Charles Fellows brought to London the remains of noteworthy tombs, among which the so-called Harpy Monument and Nereid Monument take the first place. Still more important were the accessions derived from the excavations of Sir Charles Newton, who in the years 1B5 2-1859 resided as consul in Asia Minor, and explored the sites of the mausoleum at Halicarnassus and the shrine of Demeter at Cnidus. Pullan at Priene, and Wood at Ephesus also made fruitful excavations.

The next landmark is set by the German excavations at 01ympia(i876 and foil.), which not only were conducted with a scientific completeness before unknown, and at great cost, but also established the principle that in future all the results of excavations in Greece must remain in the country, the right of first publication only remaining with the explorers. The dis- covery of the Hermes of Praxiteles, almost the only certain original of a great Greek sculptor which we possess, has fur- nished a new and invaluable fulcrum for the study of ancient art. In emulation of the achievements of the Germans at Olympia, the Greek archaeological society methodically excavated the Athenian acropolis, and were rewarded by finding numerous statues and fragments of pediments belonging to the age of Peisistratus, an age when the promise of art was in full bud. More recently French explorers have made a very thorough examination of the site of Delphi, and have succeeded in recover- ing almost complete two small treasuries, those of the people of Athens and of Cnidus or

Siphnos, the latter of 6th-century Ionian work, and adorned with extremely important sculpture.

No other site of the same importance as Athens, Olympia and Delphi remains for excavation in Greece proper. But in all parts of the country, at Tegea, Corinth, Sparta and on a number of other ancient sites, striking and important monuments have come to light. And at the same time monuments already known in Italy and Sicily, such as the temples of Paestum, Selinus and Agrigentum have been re-examined with fuller knowledge and better system. Only Asia Minor, under the influence of Turkish rule, has remained a country where systematic exploration is difficult. Something, however, has been accomplished atEphesus, Priene, Assos and Miletus, and great works of sculpture such as £he reliefs of the great altar at Pergamum, now at Berlin, and the splendid sarcophagi from Sidon, now at Constantinople, show what might be expected from methodic investigation of the wealthy Greek cities of Asia.

From further excavations at Herculaneum we may expect a rich harvest of works of art of the highest class, such as have already been found in the excavations on that site in the past; and the building operations at Rome are constantly bringing

to light fine statues brought from Greece in the time of the Empire, which are now placed in the collections of the Capitol and the Baths of Diocletian.

The work of explorers on Greek sites requires as its comple- ment and corrective much labour in the great museums of Europe. As museum work apart from exploration tends to dilettantism and pedantry, so exploration by itself does not produce reasoned knowledge. When a new building, a great original statue, a series of vases is discovered, these have to be fitted in to the existing frame of our knowledge; and it is by such fitting in that the edifice of knowledge is enlarged. In all the museums and universities of Europe the fresh examination of new monuments, the study of style and subject, and attempts to work out points in the history of ancient art, are incessantly going on. Such archaeological work is an important element in the gradual education of the world, and is fruitful, quite apart from the particular results

attained, because it encourages a method of thought. Archaeology, dealing with things which can be seen and handled, yet being a species of historic study, lies on the borderland between the province of natural science and that of historic science, and furnishes a bridge whereby the methods of investigation proper to physical and biological study may pass into the human field.

These investigations and studies are recorded, partly in books, but more particularly in papers in learned journals (see bibliography), such as the Mitteilungen of the German Institute, and the English Journal of Hellenic Studies.

An example or two may serve to give the reader a clearer notion of the recent progress in the knowledge of Greek art.

To begin with architecture. Each of the palmary sites of which we have spoken has rendered up examples of early Greek temples. At Olympia there is the Heraeum, earliest of known temples of Greece proper, which clearly shows the process whereby stone gradually superseded wood as a constructive material. At Delphi the explorers have been so fortunate as to be able to put together the treasuries of the Cnidians (or Siphnians) and of the Athenians. The former (see fig. 17) is a gem of early Ionic art, with two Caryatid figures in front in the place of columns, and adorned with the most delicate tracery and fine reliefs. On the Athenian acropolis very considerable remains have been found of temples which were destroyed by the Persians when they temporarily occupied the site in 480 B.C. And recently the ever-renewed study of the Erechtheum has resulted in a restoration of its original form more valuable and trustworthy than any previously made.

In the field of sculpture recent discoveries have been too many and too important to be mentioned at any length. One instance may serve to mark the rapidity of our advance. When the remains of the Mausoleum were brought to London from the excavations begun by Sir Charles Newton in 1856 we knew from Pliny that four great sculptors, Scopas, Bryaxis, Leochares and Timotheus, had worked on the sculpture; but we knew of these artists little more than the names. At present we possess many fragments of two pediments at Tegea executed under the direction of Scopas, we have a basis with reliefs signed by Bryaxis, we have identified a group in the Vatican museum as a cbpy of the Ganymede of Leochares, and we have pedimental remains from Epidaurus which we know from inscriptional evidence to be either the works of Timotheus or made from his models. Any one can judge how enormously our power of criticizing the Mausoleum

sculptures, and of comparing them with contemporary monu- ments, has increased.

In regard to ancient painting we can of course expect no such fresh illumination. Many important wall-paintings of the Roman age have been found at Rome and Pompeii: but we have no certain or even probable work of any great Greek painter. We have to content ourselves with studying the colouring of reliefs, such as those' of the sarcophagi at Constantinople, and the drawings on vases, in order to get some notion of the composition and drawing of painted scenes in the great age of Greece. As to the portraits of the Roman age painted on wood which have come in considerable quantities from Egypt, they stand at a far

lower level than even the paintings of Pompeii. The number of our vase-paintings, however, increases steadily, and whole classes, such as the early vases of Ionia, are being marked off from the crowd, and so becoming available for use in illustrating the history of Hellenic civilization.

The study of Greek art is thus one which is eminently pro- gressive. It has over the study of Greek literature the immense advantage that its materials increase far more rapidly. And it is becoming more and more evident that a sound and methodic study of Greek art is quite as indispensable as a foundation for an artistic and archaeological education as the study of Greek poets and orators is as a basis of literary education. The extreme simplicity and thorough rationality of Greek art make it an unrivalled field for the training and exercise of the faculties which go to the making of the art-critic and art historian.

2. The General Principles of Greek Art. — Before proceeding to sketch the history of the rise and decline of Greek art, it is desirable briefly to set forth the principles which underlie it (see also P. Gardner's Grammar of Greek Art).

As the literature of Greece is composed in a particular language, the grammar and the syntax of which have to be studied before the works in poetry and prose can be read, so Greek works of art are composed in what may be called an artistic language. To the accidence of a grammar may be compared the mere technique of sculpture and painting: to the syntax of a grammar corre- spond the principles of composition and grouping of individual figures into a relief or picture. By means of the rules of this grammar the Greek artist threw into form the ideas which belonged to him as a personal or a racial possession.

We may mention first some of the more external conditions of Greek art; next, some of those which the Greek spirit posited for itself.

No nation is in its works wholly free from the domination of climate and geographical position; least of all a people so keenly alive to the influence of the outer world as the Greeks. They lived in a land where the soil was dry and rocky, far less hospitable to vegetation than that of western Europe, while on all sides the horizon of the land was bounded by hard and jagged lines of mountain. The sky was extremely clear and bright, sunshine for a great part of the year almost perpetual, and storms, which are more than passing gales, rare. It was in accordance with these natural features that temples and other buildings should be simple in form and bounded by clear lines. Such forms as the cube, the oblong, the cylinder, the triangle, the pyramid abound in their constructions. Just as in Switzerland the gables of the chalets match the pine-clad slopes and lofty summits of the mountains, so in Greece, amid barer hills of less elevation, the Greek temple looks thoroughly in place. But its construction is related not only to the surface of the land, but also to the character of the race. M. Emile Boutmy, in his interesting Philosophic de V architecture en Grece, has shown how the temple is a triumph of the senses and the intellect, not primarily emotional, but showing in every part definite purpose and design. It also exhibits in a remarkable degree the love of balance, of symmetry, of a mathematical proportion of parts and correctness of curvature which belong to the Greek artist.

The purposes of a Greek temple may be readily judged from its plan. Primarily it was the abode of the deity, whose statue dwelt in it as men dwell in their own houses. Hence the cella or naos is the central feature of the building. Here was placed the image to which worship was brought, while the treasures belonging to the god were disposed partly in the cella itself, partly in a kind of treasury which often existed, as in the Parthenon, behind the cella. There was in large temples a porch of approach, the pronaos, and another behind, the opistho- domos. Temples were not meant for, nor accommodated to, regular services or a throng of worshippers. Processions and festivals took place in the open air, in the streets and fields, and men entered the abodes of the gods at most in groups and families, commonly alone. Thus when a place had been found for the statue, which stood for the presence of the god, for the small altar of incense, for the implements of cult and the gifts of

votaries, little space remained free, and great spaces or subsidiary chapels such as are usual in Christian cathedrals did not exist (see Temple).

Here our concern is not with the purposes or arrangements of a temple, but with its appearance and construction, regarded as a work of art, and as an embodiment of Greek ideas. A few simple and striking principles may be formulated, which are characteristic of all Greek buildings: —

(i.) Each member of the building has one function, and only one, and this function controls even the decoration of that member. The pillar of a temple is made to support the architrave and is for that purpose only. The flutings of the pillar, being perpendicular, emphasize this fact. The line of support which runs up through the pillar is continued in the triglyph, which also shows perpendicular grooves. On the other hand, the wall Of a temple is primarily meant to divide or space off; thus it may well at the top be decorated by a horizontal band of relief, which belongs to it as a border belongs to a curtain. The base of a column, if moulded, is moulded in such a way as to suggest support of a great weight; the capital of a column is so carved as to form a transition between the column and the cornice which it supports.

(ii.) Greek architects took the utmost pains with the propor- tions, the symmetry as they called it, of the parts of their buildings. This was a thing in which the keen and methodical eyes of the Greeks delighted, to a degree which a modern finds it hard to understand. Simple and natural relations, 1:2, 1:3, 2 13 and the like, prevailed between various members of a construction. All curves were planned with great care, to please the eye with their flow; and the alternations and corre- spondences of features is visible at a glance. For example, the temple must have two pediments and two porches, and on its sides and fronts triglyph and metope must alternate with unvarying regularity.

(iii.) Rigidity in the simple lines of a temple is avoided by the device that scarcely any outline is actually straight. All are carefully planned and adapted to the eye of the spectator. In the Parthenon the line of the floor is curved, the profiles of the columns are curved, the corner columns slope inward from their bases, the columns are not even equidistant. This elaborate adaptation, called entasis, was expounded by F. C. Penrose in his work on Athenian architecture, and has since been observed in several of the great temples of Greece.

(iv.) Elaborate decoration is reserved for those parts of the temple which have, or at least appear to have, no strain laid upon them. It is true that in the archaic age experiments were made in carving reliefs on the lower drums of columns (as at Ephesus) and on the line of the architrave (as at Assus). But such examples were not followed. Nearly always the spaces reserved for mythological reliefs or groups are the tops of walls, the spaces between the triglyphs, and particularly the pediments surmount- ing the two fronts, which might be Jeft hollow without danger to the stability of the edifice. Detached figures in the round are in fact found only in the pediments, or standing upon the tops of the pediments. And metopes are sculptured in higher relief than friezes.

" When we examine in detail even the simplest architectural decoration, we discover a combination of care, sense of proportion, and reason. The flutings of an Ionic column are not in section mere arcs of a circle, but made up of a combination of curves which produce a beautiful optical effect ; the lines of decoration, as may be best seen in the case of the Erechtheum, are cut with a marvellous delicacy. Instead of trying to invent . new schemes, the mason contents himself with improving the regular patterns until they approach perfection, and he takes everything into consideration. Mouldings on the outside of a temple, in the full light of the "sun, are differently planned from those in the diffused light of the interior. Mouldings executed in soft stone are less fine than those in marble. The mason thinks before he works, and while he works, and thinks in entire correspondence with his surroundings." 1

Greek architecture, however, is treated elsewhere (see Archi- tecture) ; we will therefore proceed to speak briefly of the principles exemplified in sculpture. Existing works of Greek 1 Grammar of Greek Art.

sculpture fall easily into two classes. The first class comprises what may be called works of substantive art, statues or groups made for their own sake and to be judged by themselves. Such are cult-statues of gods and goddesses from temple and shrine, honorary portraits of rulers or of athletes, dedicated groups and the like. The second class comprises decorative sculptures, such as were made, usually in relief, for the decoration of temples and tombs and other buildings, and were intended to be sub- ordinate to architectural effect.

Speaking broadly, it may be said that the works of substantive sculpture in our museums are in the great majority of cases copies of doubtful exactness and very various merit. The Hermes of Praxiteles is

almost the only marble statue which can be assigned positively to one of the great sculptors; we have to work back towards the productions of the peers of Praxiteles through works of poor execution, often so much restored in modern times as to be scarcely recognizable. Decorative works, on the other hand, are very commonly originals, and their date can often be accurately fixed, as they belong to known buildings. They are thus infinitely more trustworthy and more easy to deal with than the copies of statues of which the museums of Europe, and more especially those of Italy, are full. They are also more commonly unrestored. But yet there are certain disadvantages attaching to them. Decorative works, even when carried out under the supervision of a great sculptor, were but seldom executed by him. Usually they were the productions of his pupils or masons. Thus they are not on the same level of art as substantive sculpture. And they vary in merit to an extraordinary extent, according to the capacity of the man who happened to have them in hand, and who was probably but little. controlled. Every one knows how noble are the pedimental sculptures of the Parthenon. But we know no reason why they should be so vastly superior to the frieze from Phigalia; nor why the heads from the temple at Tegea should be so fine, while those from the contemporary temple at Epidaurus should be comparatively insignificant. From the records of payments made to the sculptors who worked on the Erechtheum at Athens it appears that they were«ordinary masons, some of them not even citizens, and paid at the rate of 60 drachms (about 60 francs) for each figure, whether of man or horse, which they produced. Such piece-work would not, in our days, produce a Very satisfactory result.

Works of substantive sculpture may be divided into two classes, the statues of human beings and those of the gods. The line between the two is not, however, very easy to draw, or very definite. For in representing men the Greek sculptor had an irresistible inclination to idealize, to represent what was generic and typical rather than what was individual, and the essential rather than the accidental. And in representing deities he so fully anthropomorphized them that they became men and women, only raised above the level of everyday life and endowed with a superhuman stateliness. Moreover, there was a class of heroes represented largely in art who covered the transition from men to gods. For example, if one regards Heracles as a deity and Achilles as a man of the heroic age and of heroic mould, the line between the two will be found to be very narrow.

• Nevertheless one may for convenience speak first of human and afterwards of divine figures. It was the custom from the 6th century onwards to honour those who had done any great achievement by

setting up their statues in conspicuous positions. One of the earliest examples is that of the tyrannicides, Harmodius and Aristogiton, a group, a copy of which has come down to us (Plate I. fig. 50 2). Again, people who had not won any distinc- tion were in the habit of dedicating to the deities portraits of themselves or of a priest or priestess, thus bringing themselves, as it were, constantly under the notice of a divine patron. The rows of statues before the temples at Miletus, Athens and

2 It may here be pointed out that it was found impossible, with any regard for the appearance of the pages, to arrange the Plates for this article so as to preserve a chronological order in the individual figures; they are not arranged consecutively as regards the history or the period, and are only grouped for convenience in paging. — Ed.

GREEK ART

Plate I.

Photo, Brngi

Fir,. 50.

FARNESE BULL. (Naples.)

-HARMODHS AND ARISTOGITON.

(Nat. Mus., Naples.)

Phots, Anderson.

Fig. 52.— LAOCOON GROUP. (Vatican.)

XII. 47».

Photo, Anderson,

Fig. 53.— GANYMEDE OF LEOCHARES.

(Vatican.)

Plate II.

GREEK ART

Photo, Anderson.

Fig. 54 .—FLAYING OF MARSYAS. (Villa Al- bani, Rome.)

Photo, Anderson.

Fig. 55.— APOLLO OF THE BELVIDERE. (Vatican.)

Fig. 56.— HEAD OF YOUNG ALEXANDER. (Brit. Mus.)

Pkolo, Seebah.

Fig. 57.— HERMES OF ALCA- MENES. (Constantinople.)

Fig. 58.— THESEUS AND AMAZON (ERETKIA).

Photo, Mansell,

Fig. 59— DRUM OF COLUMN FROM EPHESUS. (Brit. Mus.)

Photo, Baldwin Coolidge,

Fig. 60.— YOUNG HERMES. (Mus. of Fine Arts, Boston.)

elsewhere came thus into being. But from the point of view of art, by far the most important class of portraits consisted of athletes who had won victories at some of the great games of Greece, at Olympia, Delphi or elsewhere. Early in the 6th century the custom arose of setting up portraits of athletic victors in the great sacred places. We have records of number- less such statues executed by all the greatest sculptors. When Pausanias visited Greece he found them everywhere far too numerous for complete mention.

It is the custom of studying and copying the forms of the finest of the young athletes, combined with the Greek habit of complete nudity during the sports, which lies at the basis of Greek excellence in sculpture. Every sculptor had unlimited opportunities for observing young vigorous bodies in every pose and in every variety of strain. The natural sense of beauty which was an endowment of the Greek race impelled him to copy and preserve what was excellent, and to omit what was ungainly or poor. Thus there existed, and in fact there was constantly accumulating, a vast series of types of male beauty, and the public taste was cultivated to an extreme delicacy. And of

course this taste, though it took its start from athletic customs, and was mainly nurtured by them, spread to all branches of portraiture, so that elderly men, women, and at last even children, were represented in art with a mixture of ideality and fidelity to nature such as has not been reached by the sculpture of any other people.

The statues of the gods began either with stiff and ungainly figures roughly cut out of the trunk of a tree, or with the monstrous and symbolical representations of Oriental art. In the Greece of late times there were still standing rude pillars, with the tops sometimes cut into a rough likeness to the human form. And in early decoration of vases and vessels one may find Greek deities represented with wings, carrying in their hands lions or griffins, bearing on their heads lofty crowns. But as Greek art progressed it grew out of this crude symbolism. In the language of Brunn, the Greek artists borrowed from Oriental or Mycenaean sources the letters used in their works, but with these letters they spelled out the ideas of their own nation. What the artists of Babylon and Egypt express in the character of the gods by added attribute or symbol, swiftness by wings, control of storms by the thunderbolt, traits of character by animal heads, the artists of Greece work more and more fully into the sculptural type; modifying the human subject by the constant addition of something which is above the ordinary level of humanity, until we reach the Zeus of Pheidias or the Demeter of Cnidus. When the decay of the high ethical art of Greece sets in, the gods become more and more warped to the merely human level. They lose their dignity, but they never lose their charm.

The decoratiye sculpture of Greece consists not of single figures, but of groups; and in the arrangement of these groups the strict Greek laws of symmetry, of rhythm, and of balance, come in. We will take the three most usual forms, the pediment, the metope and the frieze, all of which belong properly to the temple, but are characteristic of all decoration, whether of tomb, trophy or other monument.

The form of the pediment is triangular; the height of the triangle in proportion to its length being about i : 8. The conditions of space are here strict and dominant; to comply with them requires some ingenuity. To a modern sculptor the problem thus presented is almost insoluble; but it was allowable in ancient art to represent figures in a single composition as of various sizes, in correspondence not to actual physical measurement but to importance. As the more important figures naturally occupy the midmost place in a pediment, their greater size comes in conveniently. And by placing some of the persons of the group in a standing, some in a seated, some in a

reclining position, it can be so contrived that their heads are equidistant from the upper line of the pediment.

The statues in a Greek pediment, which are after quite an early period usually executed in the round, fall into three, five or seven groups, according to the size of the whole. As examples

to illustrate this exposition we take the two pediments of the temple at Olympia, the most complete which have come down to us, which are represented in figs. 33 and 34. The east pediment represents the preparation for the chariot race between Pelops and Oenomaus. The central group consists of five figures, Zeus standing between the two pairs of competitors and their wives. In the corners recline the two river-gods Alpheus and Cladeus, who mark the locality; and the two sides are filled up with the closely corresponding groups of the chariots of Oenomaus and Pelops with their grooms and attendants. Every figure to the left of Zeus balances a corresponding figure on his right, and all the lines of the composition slope towards a point above the apex of the pediment.

In the opposite or western pediment is represented the battle between Lapiths and Centaurs which broke out at the marriage of Peirithous in Thessaly. Here we have no less than nine groups. In the midst is Apollo. On each side of him is a group of three, a centaur trying to carry off a woman and a Lapith striking at him. Beyond these on each side is a struggling pair, next once more a trio of two combatants and a woman, and finally in each corner two reclining female figures, the outermost apparently nymphs to mark locality. A careful examination of these compositions will show the reader more clearly than detailed description how clearly in this kind of group Greek artists adhered to the rules of rhythm and of balance.

The metopes were the long series of square spaces which ran along the outer walls of temples between the upright triglyphs and the cornice. Originally they may have been left open and served as windows; but the custom came in as early as the 7th century, first of filling them in with painted boards or slabs of stone, and next of adorning them with sculpture. The metopes of the Treasury of Sicyon at Delphi (Plate IV. fig. 66) are as early as the first half of the 6th century. This recurrence of a long series of square fields for occupation well suited the genius and the habits of the sculptor. As subjects he took the successive exploits of some hero such as Heracles or Theseus, or the contemporary groups of a battle. His number of figures was limited to two or three, and these figures had to be worked into a group or scheme, the main features of which were determined by artistic tradition, but

which could be varied in a hundred ways so as to produce a pleasing and in some degree novel result;

With metopes, as regards shape, we may compare the reliefs of Greek tombs, which also usually occupy a space roughly square, and which also comprise but a few figures arranged in a scheme generally traditional. A figure standing giving his hand to one seated, two men standing hand in hand, or a single figure' in some vigorous pose is sufficient to satisfy the simple but severe taste of the Greeks.

In regard to friezes, which are long reliefs containing figures ranged between parallel lines, there is more variety of custom. In temples the height of the relief from the background varies according to the light in which it was to stand, whether direct or diffused. Almost all Greek friezes, however, are of great simplicity in arrangement and perspective. Locality is at most hinted at by a few stones or trees, never actually portrayed. There is seldom more than one line of figures, in combat orpro- cession, their heads all equidistant from the top line of the frieze. They are often broken up into groups; and when this is the case, figure will often balance figure on either side of a central point almost as rigidly as in a pediment. An example of this will be found in the section of the Mausoleum frieze shown in fig. 70, Plate IV. Some of the friezes executed by Greek artists for semi-Greek peoples, such as those adorning the tomb at Trysa in Lycia, have two planes, the figures in the background being at a higher level.

The rules of balance and symmetry in composition which are followed in Greek decorative art are still more to be discerned in the paintings of vases, which must serve, in the absence of more dignified compositions, to enlighten us as to the methods of Greek painters. Great painters would not, of course, be bound by architectonic rule in the same degree as the mere workmen who painted vases. Nevertheless we must never forget that

[GENERAL PRINCIPLES

Greek painting of the earlier ages was of extreme simplicity. It did not represent localities, save by some slight hint; it had next to no perspective; the colours used were but very few even down to the days of Apelles. Most of the great pictures of which we hear consisted of but one or two figures; and when several figures were introduced they

were kept apart and separately treated, though, of course, not without relation to one another. Idealism and ethical purpose must have predominated in painting as in sculpture and in the drama and in the writing of history.

We will take from vases a few simple groups to illustrate the laws of Greek drawing; colouring we cannot illustrate.

The fields offered to the draughtsman on Greek vases naturally follow the form of the vase; but they may be set down as

approximately round, square or oblong. To each of these spaces the artist carefully adapts his designs. In fig. i we have a characteristic adaptation to circular form by the vase painter Epictetus.

In the early period of painting all the space not occupied by the figures is filled with patterns or accessories, or even animals which have no connexion with the sub- ject (fig. 9). In later and more developed art, as in this example, the outlines of the figures are so arranged as to fill the space.

When the space is square we have much the same problem as is presented by the metope spaces of a temple. In the case of both square and oblong fields the laws of balance are carefully observed. Thus if there is an even number of figures in the scheme, two of them will form a sort of centre-piece, those on either side balancing one another. If the number of figures is uneven, either there will be a group of three in the midst, or the midmost figure will be so contrived that he belongs wholly to neither side, but is the balance between them. These remarks will be made clear by figs. 2 and 3, which repeat the two sides

(Brit. Mus. Catalogue oj Vases, iii. PI. vi. 2).

Fig. i. — Kylix by Epictetus.

which represent the defeat of one of these by the other; the vanquished has commonly fallen on his knees, but still defends himself. There is a scheme for the leading away of a captive woman; the captor leads her by the hand looking back at her, while a friend walks behind to ward off pursuit. Such schemes are constantly varied in detail, and often very skilfully varied; but the Greek artist uses schemes as a sort of shorthand, to show as clearly as possible what he meant. They serve the same purpose as the mask in the acting of a play, the first glance at which will tell the spectators what they have to look for.

No doubt the great painters of Greece were not so much under the dominion of these schemes as the very inferior painters of vases. They used the schemes for their own purposes instead of being used by them. But as great poets do not revolt against the restrictions of the sonnet or of rhyme, so great artists in Greece probably found recognized conventions more helpful than hurtful.

Students of Greek sculpture and vases must be warned not to suppose that Greek reliefs and drawings can be taken as direct illustrations of Homer or the dramatists. Book illustra- tion in the modern sense did not exist in Greece. The poet and the painter pursued courses which were parallel, but never in actual contact. Each moved by the traditions of his own craft. The poet took the accepted tale and enshrined it in a setting of feeling. and imagination. The painter took the traditional schemes which were current, and altered or enlarged them, adding new figures and new motives, but not attempting to set aside the general scheme. But varieties suitable to poetry were not Jikely to be suitable in painting. Thus it is but seldom that a vase-painter seems to have had in his mind, as he drew, passages of the Homeric poems, though these might well be familiar to him. And almost never does a vase-painting of the 5th century show any sign of the influence of the dramatists, who were bringing before the Athenian public on the stage many of the tales and incidents popular with the vase-painter. Only on vases of lower Italy of the 4th century and later we can occasion- ally discern something of Aeschylean and Euripidean influence in the treatment of a myth; and even in a few cases we may discern that the vase-painter has taken suggestions direct from the actors in the theatre.

3. Historic Sketch.— We propose next to trace in brief outline the history of Greek art from its rise to its decay. We begin with the rise of a national art, after the destruction of the

From Wiener Vorlegeblatter, 1890, PI. viii., by permission of the Director of the K. K. Osterr. Archaol. InslUul.

Fig. 2. Vase' Drawings.

of an amphora, one of which bears a design of three figures, the other of four.

The Greek artist not only adhered to the architectonic laws of balance and symmetry, but he thought in schemes. Certain group arrangements had a recognized signification- There are schemes for warriors fighting on equal terms, and schemes

Fig. 3.

Minoan and Mycenaean civilizations of early Greece by the irruption of tribes from the north, that is to say, about 800 B.C., and we stop with the Roman age of Greece, after which Greek art works in the service of the conquerors (see Roman Art). The period 800-50 B.C. we divide into four sections: (1) the period down to the Persian Wars, 800-480 B.C.; (2) the period

800-480 B.C.!

of the early schools of art, 480-400 B.C.; (3) the period of the later great schools, 400-300 B.C.; (4) the period of Hellenistic art, 300-50 B.C. In dealing with these successive periods we confine our sketch to the three greater branches of representative art, architecture, sculpture and painting, which in Greece are closely connected. The lesser arts, of pottery, gem-engraving, coin-stamping and the like, are treated of under the heads of Ceramics, Gem, Numismatics, &c, while the more technical treatment of architectural construction are dealt with under Architecture and allied architectural articles. Further, for brief accounts of the chief artists the reader is referred to biographical articles, under such heads as Pheidias, Praxiteles, Apelles. We treat here only of the main course of art in its historic evolution.

Period I. 800-480 B.C. — The fact is now generally allowed that the Mycenaean, or as it is now termed Aegean, civilization was for the most part destroyed by an invasion from invasion. tne nor th. This invasion appears to have been gradual; its racial character is much in dispute. Archaeological evidence abundantly proves that it was the conquest of a more by a less rich and civilized race. In the graves of the period (900-600 B.C.) we find none of the wealthy spoil which has made celebrated the tombs of Mycenae andVaphiofa.tf.) . The character of the pottery and the bronze-work which is found in these later graves reminds us of the art of the necropolis of Hallstatt in Austria, and other sites belonging to what is called the bronze age of North Europe. Its predominant characteristic is the use of geometrical forms, the lozenge, the triangle, the maeander, the circle with tangents, in” place of the elaborate spirals and plant-forms which mark Mycenaean ware. For this reason the period from the 9th to the 7th century in Greece passes by the name of ” the Geometric Age.” It is commonly held that in the remains of the Geometric Age we may

trace the influence of the Dorians, who, coming in as a hardy but uncultivated race, probably of purer Aryan blood than the previous inhabitants of Greece, not only brought to an end the wealth and the luxury which marked the Mycenaean age, but also replaced an art which was in character essentially southern by one which belonged rather to the north and the west. The great difficulty inherent in this view, a difficulty which has yet to be met, lies in the fact that some of the most abundant and characteristic remains of the geometric age which we possess come, not from Peloponnesus, but from Athens and Boeotia, which were never conquered by the Dorians.

The geometric ware is for the most part adorned with painted patterns only. Fig. 4 is a characteristic example, a small two- handled vase from Rhodes in the Ashmolean Museum, the adornment of which consists in zigzags, circles with tangents, and lines of water birds, perhaps swans. Sometimes, however, especially in the case of large vases from the cemetery at Athens, which adjoins the Dipylon gate, scenes

Geometric ware.

Fig. 4. — Geometric Vase from Rhodes. (Ashmolean Museum.)

from Greek life are depicted, from daily life, not from legend or divine myth. Especially scenes from the lying-in-state and the burial of the dead are prevalent. An excerpt from a Dipylon vase (fig. 5) shows a dead man on his couch surrounded by mourners, male and female. Both sexes are apparently repre- sented naked, and are distinguished very simply; some of them hold branches to sprinkle the corpse or to keep away flies. It

will be seen how primitive and conventional is the drawing of this age, presenting a wonderful contrast to the free drawing and modelling of the Mycenaean age. In the same graves with the pottery are sometimes found plaques of gold or bronze, and towards the end of the geometric age these somtimes bear scenes from mythology, treated with the greatest simplicity.

Mon. d. lust. ix. 39.

Fig. 5. — Corpse with Mourners.

For example, in the museum of Berlin are the contents of a tomb found at Corinth, consisting mainly of gold work of geo- metric decoration. But in the same tomb were also found gold plates or plaques of repousse work bearing subjects from Greek

Fig. 6.— Gold Plaques: Corinth.

legend. Two of these are shown in fig. 6. On one Theseus is slaying the Minotaur, while Ariadne stands by and encourages the hero. The tale could not have been told in a simpler or more straightforward way. On the other we have an armed warrior with his charioteer in a chariot drawn by two horses. The treatment of the human body is here more advanced than on the vases of the Dipylon. On the site of Olympia, where Mycenaean remains are not found, but the earliest monuments show the geometric style, a quantity of dedications in bronze have been found, the decoration of which belongs to this style. Fig. 7 shows the handle of a tripod from Olympia, which is

adorned with geometric

patterns and surmounted

by the figure of a horse.

It was about the 6th century that the genius of the Greeks, almost suddenly, as it seems to us, emancipated itself from the thraldom of tradition, and passed beyond the limits with which the nations of the east and west had hitherto been content, in a free and bold effort towards the ideal. Thus the 6th century marks

Olympia iv. 33.

Fig. 7.-

-Handle of Tripod.

Ionian vases.

the stage in art in which it may be said to have become definitely Hellenic. The Greeks still borrowed many of their decorative forms, either from the prehistoric remains in their own country or, through Phoenician agency, from the old-world empires of Egypt and Babylon, but they used those forms freely to express their own meaning. And gradually, in the course of the century, we see both in the painting of vases and in sculpture a national spirit and a national style forming under the influence of Greek religion and mythology, Greek athletic training, Greek worship of beauty. We must here lay emphasis on the fact, which is sometimes overlooked in an age which is greatly given to the Darwinian search after origins, that it is one thing to trace back to its original sources the nascent art t of Greece, and quite another thing to follow and to- understand its gradual embodiment of Hellenic ideas and civilization. The immense success with which the veil has in late years been lifted from the prehistoric age of Greece, and the clearness with which we can discern the various strands woven into the web of Greek art, have tended to fix our attention rather on what Greece possessed in common with all other peoples at the same early stage of civilization than on what Greece added for herself to this common stock. In many respects the art of Greece is incomparable —

one of the great inspirations which have redeemed the world from mediocrity and vulgarity. And it is the . searching out and appreciation of this unique and ideal beauty in all its phases, in idea and composition and execution, which is the true task of Greek archaeological science.

In very recent years it has been possible, for the first time, to trace the influence of Ionian painting, as represented by vases, on the rise of art. The discoveries at Naucratis and Daphnae in Egypt, due to the keenness and pertinacity of W.M. Flinders Petrie, threw new light on this matter. It became evident that when those cities were first inhabited by Ionian Greeks, in the 7th century, they used pottery of

several distinct but allied styles, the most notable feature of which was the use of the lotus in decora- tion, the presence of con-‘ tinuous friezes of animals and of monsters, and the filling up of the back-ground with rosettes, lozenges and other forms. Fig. 8 shows a vase found in Rhodes which illus- trates this Ionian decora- tion. The sphinx, the deer and the swan are prominent on it, the last- named serving as a link between the ‘ geometric ware and the more brilliant and varied ware of the Ionian cities. The assignment of the many species of early Ionic ware to various Greek localities, Miletus, Samos, Phocaea and other cities, is a work of great difficulty, which now closely occupies the attention of archaeologists. For the results of their studies the reader is referred to two recent German works, Bohlau’s A us ionischen und ilalischen Nekropolen, and Endt’s Beitrdge zur ionischen Vasenmalerei. The feature which is most interesting in this pottery from our present point of view is the way in which representations of Greek myth and legend gradually make their way, and relegate the mere decoration of the vases to borders and neck. One of the earliest examples of representation of a really Greek subject is the contest of Menelaus and Euphorbus on a plate found in Rhodes. On the vases of Melos, of the 7th century, which are, however, not Ionian, but rather Dorian in character, we have a certain number -,f mythological scenes,

Mus. Napoleon, 57.

Fig. 8. — Jug from Rhodes.

battles of Homeric heroes and the like. One of these is shown in fig. 9. It represents Apollo in a chariot drawn by winged horses, playing on the lyre, and accompanied by a pair of Muses, meeting his sister Artemis. It is notable that Apollo is bearded, and that Artemis holds her stag by the horns, much in the manner of the deities on

Babylonian cylinders; in the other hand she carries an arrow; above is a line of water birds.

Some sites in Asia Minor and the islands adjoining, such cities as Samos, Camirus in Rhodes, and the Ionian colonies on the

Coaze, Mel. Tongefdsse, 4.

Fig. 9. — Vase Painting: Melos.

Black Sea, have furnished us with a mass of ware of the Ionian class, but it seldom bears interesting subjects; it is essentially decorative. For Ionian ware which has closer relation to Greek mythology and history we must turn elsewhere. The cemeteries of the great Etruscan cities, Caere in particular, have preserved for us a large number of vases, which are now generally recognized as Ionian in design and drawing, though they may in some cases be only Italian imitations of Ionian imported ware. Thus has been filled up what was a blank page in the history of early Greek art. The Ionian painting is unrestrained in character, characterized by a licence not foreign to the nature of the race, and wants the self-control and moderation which belong to Doric art, and to Attic art after the first.

Some of the most interesting examples of early Ionic painting are found on the sarcophagi of Clazomenae. In that city in archaic times an exceptional custom prevailed of burying the dead in great coffins of terra-cotta adorned with painted scenes from chariot-racing, war and the chase. The British Museum possesses some remarkable specimens, which are published in A. S. Murray's Terra-Cotta Sarcophagi of the British Museum. On one of them he sees depicted a battle between Cimmerian invaders and Greeks, the former accompanied to the field by their great war-dogs. In some of the representations of hunting on these sarcophagi the hunters ride in chariots, a way of hunting quite foreign to the Greeks, but familiar to us from Assyrian wall-sculptures. We know that the life of the Ionians before the Persian conquest was refined and not untinged with luxury, and they borrowed many of the stately ways of the satraps of the kings of Assyria and Persia.

Fig. ro shows a curious product of the Ionian workshops, a fish of solid gold, adorned with reliefs which represent a flying

Furtwangler, Goldjund v. Veltersjeldc.

Fig. 10.-

-Fish of Gold.

eagle, lions pulling down their prey, and a monstrous sea-god among his fishes. This relic is the more valuable on account of the spot where it was found — Vettersfelde in Brandenburg. It

Plate III.

Kig. 63— HEAD OF WARRIOR, RESTORED, FROM TEGEA.

Photo, Anderson,

Fig. 64.— MARSYAS OF MYRON.

(Lateran Mus.)

Phots, Mansett.

Fig. 65.— EAST PEDIMENT OF THE PARTHENON; LEFT AND RIGHT ENDS, (Brit. Mus.)

XIL 476.

Plate IV

Fig. 66.— METOPE OF THE TREASURY OF SICYON

AT DELPHI. (From Fouilles de Delphes, by permission of A. Fontemoing.)

Fig. 67.— GREEK PAINTING OF WOMAN'S HEAD. (From Camptes Rendits of Si. Petersburg, 1865. PI. I.)

Fhota, Mansell.

Fig. 70— PORTION OF FRIEZE OF MAUSOLEUM. (Brit. Mus.)

furnishes a proof that the influence and perhaps the commerce of the Greek colonies on the Black Sea spread far to the north through the countries of the Scythians and other barbarians. The fish dates from

the 6th century B.C.

We may compare some of the gold ornaments from Camirus in Rhodes, which show an Ionian tendency, perhaps combined with Phoenician elements. On one of them (fig. n) we see a centaur with human forelegs holding up a fawn, on the other

the oriental goddess whom the Greeks identi- fied with their Artemis, winged, and flanked by lions. This form was given to Artemis on the Corinthian chest of Cypselus, a work of art preserved at Olympia, and carefully described for us by Pausanias.

From Ionia the style of vase-painting which has been called by various names, but may best be ; termed the ” orientaliz- ing,” spread to Greece proper. Its main home here was in Corinth; and small Corinthian un- guent-vases bearing figures of swans, lions, monsters and human beings, the intervals between which are filled by rosettes, are found wherever Corinthian trade penetrated, notably in the cemeteries of Sicily. For the larger Corinthian vases, which bore more elaborate scenes from mythology, we must again turn to the graves of the cities of Etruria. Here, besides the Ionian ware, of which mention has already been made, we find pottery of three Greek cities clearly defined, that of Corinth, that of Chalcis in Euboea, and that of Athens. Corinthian and Chalcidian ware is most readily distinguished by means of the alphabets used in the inscriptions which have distinctive forms easily to be identified. Whether in the style of the paintings coming from the various cities any distinct differences may be traced is a far more difficult question, into which we cannot now enter. The subjects are mostly from heroic legend, and are treated with great simplicity and directness. There is a manly vigour about them which distinguishes them at a glance from the laxer works of Ionian style.’ Fig. 12 shows a group from a Chalcidian vase, which represents the conflict

Fig. 11. — Gold Ornaments from Camirus.

Mon. d. Inst. . 51.

Fig. 12.ˆ-Fight over the Body of Achilles, over the dead body of Achilles. The corpse of’ the hero lies in the midst, the arrow in his heel. The Trojan Glaucus tries to draw away the body by means of a rope tied round the ankle, but in doing so is transfixed by the spear of Ajax, who charges under the protection of the goddess Athena. Paris on the Trojan side shoots an arrow at Ajax.

In fig. 13, from a Corinthian vase, Ajax falls on his sword in the presence of his colleagues, Odysseus and Diomedes. The short stature of Odysseus is a well-known Homeric feature. These vases are black-figured; the heroes are painted in silhouette on

the red ground of the vases. Their names are appended in archaic Greek letters.

The early history of vase-painting at Athens is complicated. It was only by degrees that the geometric style gave way to, or developed into, what is known as the black-figured style. It would seem that until the age of Peisistratus ***”” > Athens was not notable in the world of art, and nothing could be ruder than some of the vases of Athens in the 7th century,

Mus. Napolton, 66.

Fig. 13. — Suicide of Ajax.

for example that here figured, on one side of which are represented the winged Harpies (fig. 14) and on the other Perseus accompanied by Athena flying from the pursuit of the Gorgons. This vase retains in its decoration some features of geometric style; but the lotus and rosette, the lion and sphinx which appear on it, belong to the wave of Ionian influence. Although it involves a departure from strict chronological order, it will be well here to follow the course of development in pottery at Athens until the end of bur period. Neighbouring cities, and especially Corinth, seem to have exercised a strong influence at Athens about the

Arch. Zeil. 1882, 9.

Fig. 14. — Harpies: Attic Vase.

7th century. We have even a class of vases called by archae ologists Corintho-Attic. But in the course of the 6th century there is formed at Athens a distinct and marked black-figured style. The most-remarkable example of this ware is the so-called Francois vase at Munich, by Clitias and Ergotimus, which contains, in most careful and precise rendering, a number of scenes from Greek myth. One of these vases is dated, since it bears the name and the figure of Callias in his chariot (Mon. ‘dell’ Inst. iii. 45), and this Callias won a victory at Olympia in 564 B.C. Fig. 15 shows the reverse of a somewhat later black- figured vase of the Panathenaic class, given at Athens as a prize to the winner of a foot-race at the Panathenaea, with the foot-race (stadian) represented on it. A large number of Athenian vases of the 6th century have reached us, which bear the signa- tures of the potters who made, or the artists who painted them: lists of these will be found in the useful work of Klein, Griechische Vasen mil Meistersignaturen. The recent excavations on the

Acropolis have proved the erroneousness of the view, strongly maintained by Brunn, that the mass of the black-figured vases were of a late and imitative fabric. We now know that, with a few exceptions, vases of this class are not later than the early part of the 5th century. The same excavations have also proved that red-figured vase-painting, that is, vase-painting in which the background was blocked out with black, and the figures left in the natural colour of the vase originated at Athens in the last quarter of the 6th century. We cannot here give a

4 /* £$

lion. i. liut. x. 48 m.

Fig. 15. — Foot-race : Panathenaic Vase.

detailed account of the beautiful series of Athenian vases of this fabric. Many of the finest of them are in the British Museum. As an example, fig. 16 presents a group by the painter Pamphaeus, representing Heracles wrestling with the river-monster Achelous, which belongs to the age of the Persian Wars. The clear precision of the figures, the vigour of the grouping, the correctness of the anatomy and the delicacy of the lines are all marks of distinction. The student of art will perhaps find the nearest parallel to these vase-pictures in

Japanese drawings. The Japanese artists are very inferior to the Greek in their love and understanding of the human body, but equal them in freshness and vigour of design. At the same time began the beautiful series of white

Witner Verlegeblasier, D. 6.

Fig. i6.-

-Heracles and Achelous.

vases made at Athens for the purpose of burial with the dead, and found in great quantities in the cemeteries of Athens, of Eretria, of Gela in Sicily, and of some other cities. They are well represented in the British Museum and that of Oxford.

We now return to the early years of the 6th century, and proceed to trace, by the aid of recent discoveries, the rise of architecture and sculpture. The Greek temple in its character and form gives the clue to the whole character of Greek art. It is the abode of the deity, who is represented by his sacred image; and the flat surfaces of the temple offer a great field to the sculptor for the depicting of sacred legend. The process of discovery has emphasized the line which divides Ionian from Dorian architecture and art. We will speak first of the temples

and the sculpture of Ionia. The Ionians were a people far more susceptible than were the Dorians to oriental influences. The dress, the art, the luxury of western Asia attracted them with irresistible force. We may suspect, as Brunn has suggested, that Ionian artists worked in the great Assyrian and Persian palaces, and that the reliefs which adorn the walls of those palaces were in part their handiwork. Some of the great temples of Ionia have been excavated in recent years, notably those of Apollo at Miletus, of Hera at Samos, and of Artemis at Ephesus. Very little, however, of the architecture of the 6th-century temples of those sites has been recovered. Quite recently, however, the French excavators at Delphi have successfully restored the treasury of the people of Cnidus, which is quite a gem of Ionic style, the entablature being supported in front e *

not by pillars but by two maidens or Corae, and a frieze running all round the building above. But though this building is of

Ionic type, it is scarcely in the technical sense of

Ionic style, since the columns have not Ionic

capitals, but are carved with curious reliefs. The

Ionic capital proper is developed in Asia by degrees (see

Architecture and Capital; also Perrot and Chipiez, Hist.

del' art, vii. ch. 4).

The Doric temple is not wholly of European origin. One of the earliest examples is the old temple of Assus in Troas. Yet it was developed mainly in Hellas and the west. The most ancient example is the Heraeum at Olympia, next to which come the fragmentary temples of Corinth and of Selinus in Sicily. With the early Doric temple we are familiar from examples which have survived in fair preservation to our own days at Agrigentum in Sicily, Paestum in Italy, and other sites.

Of the decorative sculpture which adorned these early temples we have more extensive remains than we have of actual con- struction. It will be best to speak of them under their districts. On the coast of Asia Minor, the most extensive series of archaic decorative sculptures which has come down to us is that which adorned the temple of Assus (fig. 18). These were placed in a unique position on the temple, a long frieze running along the entablature, with representations of wild animals, of centaurs, of Hercules seizing Achelous, and of men feasting, scene succeed- ing scene without much order or method. The only figures from Miletus which can be considered as belonging to the original temple destroyed by Darius, are the dedicated seated statues, some of which, brought away by Sir Charles Newton, are now preserved at the British Museum. At Ephesus Mr Wood has been more successful, and has recovered considerable fragments

of the temple of Artemis, to which, as Herodotus tells us, Croesus presented many columns. The lower part of one of these columns, bearing figures in relief of early Ionian style, has been put together at the British Museum; and remains of inscriptions recording the presentation by Croesus are still to be traced. Reliefs from a cornice of somewhat later date are also to be found at the British Museum. Among the Aegean islands,

From Perrot and Chipiez, vii. pi. 35, by permission “of Chapman and Hall, Ltd., and Hachette & Co.

Fig. 18. — Restoration of the Temple at Assus.

Delos has furnished us with the most important remains of early art. French excavators have there found a very early statue of a woman dedicated by one Nicandra to Artemis, a figure which may be instructively compared with another from Samus, dedicated to Hera by Cheramues. The Delian statue is in shape like a flat beam; the Samian, which is headless, is like a round tree. The arms of the Delian figure are rigid to the sides; the Samian lady has one arm clasped to her breast. A great im- provement on these helpless and inexpressive figures is marked by another figure found at Delos, and connected, though perhaps incorrectly, with a basis recording the execution of a statue by Archermus and Micciades, two sculptors who stood, in the middle of the 6th century, at the head of a sculptural school at Chios. The representation (fig. 19) is of a running or flying figure, having six wings, like the seraphim in the vision of

early sculpture of Athens, we find reason to think that the Chian school had great influence in that city in the days of Peisistratus. At Athens, in the age 650-480, we may trace two quite distinct periods of architecture and sculpture. In the earlier of the two periods, a rough limestone was used alike for the walls and the sculptural decoration of temples; in the sculpture. later period it was superseded by marble, whether native or imported. Every visitor to the museum of the Athenian acropolis stands astonished at the recently recovered groups which decorated the pediments of Athenian temple^

Fig. 19. — Nike of Delos, restored.

Isaiah, and clad in long drapery. It may be a statue of Nike or Victory, who is said to have been represented in winged form by Archermus. The figure, with its neatness and precision of work, its expressive face and strong outlines, certainly marks great progress in the art of sculpture. When we examine the

Alhen. Mitteil.x. 237.

Fig. 20. — Athenian Pediment : Heracles and Hydra.

before the age of Peisistratus — groups of large size, rudely cut in soft stone, of primitive workmanship, and painted with bright red, blue and green, in a fashion which makes no attempt to follow nature, but only to produce a vivid result. The two largest in scale of these groups

seem to have belonged to the pediments of the early 6th-century temple of Athena. On other smaller pediments, perhaps belonging to shrines of Heracles and Dionysus, we have conflicts of Heracles with Triton or with other monstrous foes. It is notable how fond the Athenian artists of this early time are of exaggerated muscles and of monstrous forms, which combine the limbs of men and of animals ; the measure and moderation which mark developed Greek art are as completely absent as are skill in execution or power of group- ing. Fig. 20 shows a small pediment in which appears in relief

Alhen. Mitteil. xxii. 3.

Fig. 21.'

-Pediment : Athena and Giant.

the slaying of the Lernaean hydra by Heracles. The hero strikes at the many-headed water-snake, somewhat inappropriately, with his club. Iolaus, his usual companion, holds the reins of the chariot which awaits Heracles after his victory. On the extreme left a huge crab comes to the aid of the hydra. ' There can be little doubt that Athens owed its great start in art to the influence of the court of Peisistratus, at which artists of all kinds were welcome. We can trace a gradual transforma- tion in sculpture, in which the influence of the Chian and other progressive schools of sculpture is visible, not only in the sub- stitution of island marble for native stone, but in increased grace and truth to nature, in the toning down of glaring colour, and the appearance of taste in composition. A transition

between the older and the newer is furnished by the well-known statue of the calf-bearer, an Athenian preparing to sacrifice a calf to the deities, which is made of marble of Hymettus, and in robust clumsiness of forms is not far removed from the lime- stone pediments. The sacrificer has been commonly spoken of as Hermes or Theseus, but he seems rather to be an ordinary human votary.

In the time of Peisistratus or his sons a peristyle of columns was added to the old temple of Athena; and this necessitated the preparation of fresh pediments. These were of marble. In one of them was re- presented the battle between gods and giants; ill the midst Athena

herself strik- ing at a prostrate foe (fig. 21). In, these figures no eye can fail to trace remarkable progress. On about the same level of art are the charming statues dedicated to Athena, which were set up in the latter half of the 6th century in the Acropolis, whose graceful though conventional forms and delicate colouring make them one of the great attractions of the Acropolis Museum. C ! . : ; ; , , . : . : “.’. t i i . ! i ; . i ‘. ! l’i We show a figure (fig, 22)’ which, if it be

■ ■”’-••y 1 rightly connected with the basis on which

it stands, is the work of the sculptor Fig. 22. — Figure by Antenor, who was also author of a celebrated Antenor, restored. group representing the tyranf-slayeis, Harmodius and Aristogiton. To the same age belong many other votive reliefs of the Acropolis, representing horsemen, scribes and other votaries of Athena.

From Athens we pass to the seats of Dorian art. And in doing so we find a complete change of character. In place of draped . goddesses and female figures, we find nude sculpture, male forms. In place of Ionian softness and elegance, we find hard, rigid outlines, strong muscular develop- ment, . a greater love of and faithfulness to the actual human form— -the influence of the palaestra rather than of the harem.

To the known series of archaic male figures, recent years have added many examples. We may especially mention a series, of -figures from the temple of Apollo Ptoo’s in Boeotia, probably – represent- ing the god himself. Still more note- worthy are two colossal nude figures of Apollp, remarkable both “for force and for rudeness, found at Delphi, the in- scriptions of which prove them to be the work of an Argive sculptor. (Plate V. fig. 76.)

_ „ ,_ , „ Frpm Crete we have

Fig. 23. — Bust from Crete. • . ;,

acquired the upper

part of a draped figure (fig. 23), whether male or female is not

certain, which should be an example of the early Daedalid

school, whence the art of Peloponnesus was derived; but we

can scarcely venture to treat it as a characteristic product of

that school; rather the likeness to the dedication of Nicandra is striking.

Another- remarkable piece of Athenian sculpture, of the time of the Persian Wars, is the group of the tyrannicides Harmodius

Olympla,

Sparta,

Selinus.

Notable

and Aristogiton, set up by the people of Athens, and made by the sculptors Critius and Nesiotes. These figures were hard and rigid in outline, but showing some progress in the treatment of the nude. Copies are preserved in the museum of Naples (Plate I. fig. 50). It should be observed that one of the heads does not belong.

Next in importance to Athens, as a find-spot for works of early Greek art, ranks Olympia. Olympia, however, did not suffer like Athens from sudden violence, and the explorations there have brought to light a continuous series of remains, beginning with the bronze tripods of the geometric age already mentioned and ending at the barbarian invasions of the 4th century a.d.

among the 6th-century stone-sculpture of Olympia are the pediment of the treasury of

the people of Megara, in

which is represented a battle of gods and giants, and a huge rude head of Hera (fig. 24), which seems to be part of the image worshipped in the Heraeum. Its flatness and want of style are noteworthy. Among the temples of Greece proper the Heraeum of Olympia stands almost alone for antiquity and interest, its chief rival, besides the temples of Athens, being the other temple of Hera at Argos. It appears to have been origin- ally constructed of wood, for which stone was by slow degrees, part by part, sub- stituted. In the time of Pausanias one of the pillars p IG . 24.— Head of Hera: Olympia. was still of oak, and at the present day the varying diameter of the columns and other structural irregularities bear witness to the process of constant renewal which must have taken place. The early small bronzes of Olympia form an important series, figures of deities standing or striding, warriors in their armour, athletes with exaggerated muscles, and women draped in the Ionian fashion, which., did not become unpopular in Greece until after the Persian Wars. Excava- tions at Sparta have re- vealed interesting monu- ments belonging to the worship of ancestors, which seems in the con- servative Dorian states of Greece to have been more

strongly developed than elsewhere. On some of these stones, which doubt- less belonged to the family cults of Sparta, we see the ancestor seated hold- ing a wine-cup, accom- panied by his faithful horse or dog; on some we see the ancestor and ancestress seated side by side (fig. 25), ready to receive the gifts of their descendants, who appear in the corner of the relief on a much smaller scale. The male figure holds a wine-cup, in allusion to the libations of wine made at the tomb. The female figure holds her veil and the pomegranate, the recognized food of the dead. A huge serpent stands erect behind the pair. The style of these sculptures is as striking as the subjects; we see lean, rigid

Fig. 25. — Spartan Tombstone : Berlin.

GREEK ART

Plate V.

Photo, A nderson.

Fig. 71.— APHRODITK OF CNIDUS. Fig. 72.— BRONZE BOXER OF TERME (Vatican.) (Rome.)

Fig. 73.— BRONZE OF CERIGOTTO. (Athens.) Found in the sea near Cythera.

1″ «#

Fig. 74— AGIAS AT DELPHI. (F>om FouUles de Delphes, by permission of A. Fontemoing.)

Fig. 75.— CORA (KORE) OF EKECHTHEUM. (Athens.)

Fig. 76. — APOLLO AT DELPHI. (From FouUles de Delphes, by permission of A. Fontemoing.)

Plate VI.

GREEK ART

Photo, Giraud&n.

Fig. 77.— APHRODITE OF MELOS. (Louvre.)

Fig. 78— NIOBE AND HER YOUNGEST DAUGHTER. (Florence.)

Photo, Anderson.

Fig. 79.— APOXYOMENUS. (Vatican.)

Phafa, Brt > gi.

Fig. 80— DORYPHORUS OF POLY- CLITUS. (Nat. Mus., Naples.)”

Photo, AUnari.

Fig. 81.— ANTIOCH SEATED ON A ROCK. (Vatican.)

Photo, English Photographic Co.

Fig. 82.— HERMES OF PRAXI- TELES. (Olympia.)

forms with severe outline carved in a very low relief, the surface of which is not rounded but flat. The name of Selinus in Sicily, an early Megarian colony, has long been associ- ated with some of the most curious of early sculptures, the metopes of ancient temples, representing the exploits of Heracles and of Perseus. Even more archaic metopes have in recent years been brought to light, one representing a seated sphinx, one the journey of Europa over the sea on the back of the amorous bull (fig. 26), a pair of dolphins swimming beside her. In simplicity and in rudeness of work these reliefs remind us of the limestone pediments of Athens (fig. 20), but yet they are of another and a severer style; the Ionian laxity is wanting.

The recent French excavations at Delphi add a new and important chapter to the history of 6th-century art. Of three Delphi. treasure-houses, those of Sicyon, Cnidus and Athens, the sculptural adornments have been in great part recovered. These sculptures form a series almost covering the century 570-470 B.C., and include representations of some myths

of which we have hither- to had no example. We may say here a few words as to the sculpture which has been dis- covered, leaving to the article Delphi an account of the topo- graphy and the buildings of the sacred site. Of the archaic temple of Apollo, built as Hero- dotus tells us by the Alcmaeonidae of Athens, the only sculptural re- mains which have come down to us are some fragments of the pedi- mental figures. Of the treasuries which con- tained the offerings of the pious at Delphi, the most archaic of which there are remains is that belonging to the people of Sicyon. To it appertain a set of exceedingly primitive

metopes. One represents Idas and Dioscuri driving off cattle (Plate IV. fig. 66); another, the ship Argo; another, Europa on the bull, others merely animals, a ram or a boar. The treasury of the people of Cnidus (or perhaps Siphnos) is in style some half a century later (see fig. 17). To it belongs a long frieze representing a variety of curious subjects: a battle, perhaps between Greeks

Fig. 26.

-Metope; Europa on Bull: Palermo.

Castor and Pollux; Aeolus holding the winds in sacks. The Treasury of the Athenians, erected at the time of the Persian Wars, was adorned with metopes of singularly clear-cut and beautiful style, but very fragmentary, representing the deeds of Heracles and Theseus.

We have yet to speak of the most interesting and important of all Greek archaic sculptures, the pediments of the temple at Aegina (q.v.). These groups of nude athletes fighting over the corpses of their comrades are preserved at Aes ‘ aa – Munich, and are familiar to artists and students. But the very fruitful excavations of Professor Furtwangler have put them in quite a new light. Furtwangler {Aegina: Heiligtum der Aphaia) has entirely rearranged these pediments, in a way which removes the extreme simplicity and rigour of the composition, and introduces far greater variety of attitudes and motive. We repeat here these new arrangements (figs. 27 and 28), the reasons for which must be sought in Furtwangler’s great publication. The individual figures are not much altered, as the restorations of Thorwaldsen, even when incorrect, have now a prescriptive right of which it is not easy to deprive them. Besides the pediments of Aegina must be set the remains of the pediments of the temple of Apollo at Eretria in Euboea, the chief group of which (Plate II. fig- 58), Theseus carrying off an Amazon, is one of the most finely executed works of early Greek art.

Period II. 480-400 B.C.— The most marveHous phenomenon in the whole history of art is the rapid progress made by Greece in painting and sculpture during the 5th century B.C. As in literature the 5th century takes us from the rude peasant plays of Thespis to the drama of Sophocles and Euripides; as in philosophy it takes us from Pythagoras to Socrates; so in sculpture it covers the space from the primitive works made for the Peisistratidae to some of the most perfect productions of the chisel.

In architecture the 5th century is ennobled by the Theseum the Parthenon and the Erechtheum, the temples of Zeus at Olympia, of Apollo at Phigalia, and many other central shrines, as well as by the Hall of the Mystae at Eleusis and the Propylaea of the Acropolis. Some of the most important of the Greek temples of Italy and Sicily, such as those of Segesta and Selinus, date from the same age. It is, however only of their sculptural decorations, carried out by the greatest masters in Greece, that we need here treat in any detail.

It is the rule in the history of art that innovations and technical progress are shown earlier in the case of painting than in that of sculpture, a fact easily explained by the greater ease and rapidity of the brush compared with the chisel. Pa ‘ at ‘ n *- That this was the order of development in Greek art cannot be doubted. But our means for judging of the painting of the 5th century are very slight. The noble paintings of such masters

Archi- tecture.

Fig. 27.— Restoration of West Pediment, Aegina.

and Trojans, with gods and goddesses looking on; a giganto- machy in which the figures of Poseidon, Athena, Hera, Apollo, Artemis and Cybele can be made out, with their opponents, who are armed like Greek hoplites; Athena and Heracles in a chariot; the carrying off of the daughters of Leucippus by xii. 16

Fig. 28. — Restoration of East Pediment, Aegina.

as Polygnotus, Micon and Panaenus, which once adorned the walls of the great porticoes of Athens and Delphi, have dis- appeared. There remain only the designs drawn rather than painted on the beautiful vases of the age, which in some degree help us to realize, not the colouring or the charm of contemporary

paintings, but the principle of their composition and the accuracy of their drawing.

Polygnotus of Thasos was regarded by his compatriots as a great ethical painter. His colouring and composition were alike very simple,

his figures quiet and statuesque, his drawing careful and precise. He won his fame largely by incorporating in his works the best current ideas as to mythology, religion and morals. In particular his painting of Hades with its rewards and punish-

From Monumenli dtlV Institute di Correspondenza archcologica, xi. 40.

Fig. 29. — Vase of Orvieto. (The Children of Niobe.)

ments, which was on the walls of the building of the people of Cnidus at Delphi, might be considered as a great religious work, parallel to the paintings of the Campo Santo at Pisa or to the painted windows of such churches as that at Fairford. But he also introduced improvements in perspective and greater freedom in grouping.

It is fortunate for us that the Greek traveller Pausanias has left us very careful and detailed descriptions of some of the most important of the frescoes of Polygnotus, notably of the Taking of Troy and the Visit to Hades, which were at Delphi. A com- parison of these descriptions with vase paintings of the middle of the 5th century has enabled us to discern with great pro- bability the principles of Polygnotan drawing and perspective. Professor Robert has even ventured to restore the paintings on the evidence of vases. We here represent one of the scenes depicted on a vase found at Orvieto (fig. 29), which is certainly Polygnotan in character. It represents the slaying of the

children of Niobe

Mm\ ■»! w WtJmgjSjjggB

by Apollo and Artemis. Here we may observe a remarkable per- spective. The different heights of the rocky back- ground are repre- sented by lines traversing the picture on which the figures stand; but the more distant figures are no smaller than the nearer. The forests of Mount Sipylus are repre- sented by a single conventional tree. The figures are beautifully drawn, and full of charm; but there is a want of energy in the action.

There can be little doubt that the school of Polygnotus exercised great influence on contemporary sculpture. Panaenus, brother of Pheidias, worked with Polygnotus, and many of the groupings found in the sculptures of the Parthenon remind us of those usual with the Thasian master. At this simple and early stage of art there was no essential difference between fresco-

Arck. Zeit. 1878, pi. 22.

Fig. 30. — Vase Drawing

painting and coloured relief, light and shade and aerial per- spective being unknown. We reproduce two vase-paintings, one (fig. 30) a group of man and horse which closely resembles figures in the Panathenaic frieze of the Parthenon (fig. 31); the other (fig. 32) representing Victory pouring water for a sacrificial ox to drink, which reminds us of the balustrade of the shrine of Wingless Victory at Athens.

Most writers on Greek painting have supposed that after the middle of the 5th century the technique of painting rapidly improved. This may well have been the case; but we have little means of testing the ques- tion. Such im- prove ments would soon raise such a barrier between fresco- painting and vase-painting, — which by its very nature must be simple and architect- onic, — that vases can no longer be used with confidence as evidence for contemporary painting. The stories told us by Pliny of the lives of Greek painters are mostly of a trivial and untrustworthy character. Some of them are mentioned in this Encyclopaedia under the names of individual artists. We can only discern a few general facts. Of Agatharchus of Athens we learn that he painted, under compulsion, the interior of the house of Alcibiades. And we are told that he painted a scene for the tragedies of Aeschylus or Sophocles. This has led some writers to suppose that he attempted illusive landscape; but this is contrary to the possibilities of the time; and it is fairly certain that what he really did was to paint the wooden front of the stage building in imitation of architecture; in fact he painted a permanent architectural background, and not one suited to any particular play. Of other painters who flourished at the end of the century, such as Zeuxis and Aristides, it will be best to speak under the next period.

It is now generally held, in consequence of evidence furnished by tombs, that the 5th century saw the end of the making of

Fig. 31. — Part of Frieze of the Parthenon.

From Gerhard's Auserlesene Vasenbilder, ii. pi.

Fig. 32. — Nike and Bull.

vases on a great scale at Athens for export to Italy and Sicily. And in fact few things in the history of art are more remarkable than the rapidity with which vase-painting at Athens reached its highest point

and passed it on the downward road. At the beginning of the century black-figured ware was scarcely out of fashion, and the masters of the severe red-figured style, Pamphaeus, Epictetus and their contemporaries, were in vogue.

The schools of Euphronius, Hiero and Duris belong to the age of the Persian wars. With the middle of the century the works of these makers are succeeded by unsigned vases of most beautiful design, some of them showing the influence of Polygnotus. In the later years of the century, when the empire of Athens was approaching its fall, drawing becomes laxer and more careless, and in the treatment of drapery we frequently note the over- elaboration of folds, the want of simplicity, which begin to mark contemporary sculpture. These changes of style can only be

stood Zeus the supreme arbiter. On one side of him stood Oenomaiis with his wife Sterope, on the other Pelops and Hippo- dameia, the daughter of Oenomaiis, whose position at once indicates that she is on the side of the newcomer, whatever her parents may feel. Next on either side are the four-horse chariots of the two competitors, that of Oenomaiis in the charge of his perfidious groom Myrtilus, who contrived that it should break down in the running, that of Pelops tended by his grooms. At either end, where the pediment narrows to a point, reclines a

Fig. 33. — East Pediment, Olympia. Two Restorations.

satisfactorily followed in the vase rooms of the British Museum, or other treasuries of Greek art (see also A. B. Walters, History of Ancient Pottery; and the article Ceramics).

Among the sculptural works of this period the first place may be given to the great temple of Zeus at Olympia. The statue by

Pheidias which once occupied the place of honour in Temple of t ˆ at temple, and was regarded as the noblest monu- Zeus. ment of Greek religion, has of course disappeared, nor

are we able with confidence to restore it. But the plan of the temple, its pavement, some of its architectural ornaments, remain. The

marbles which occupied the pediments and the metopes of the temple have been in large part recovered, having been probably thrown down by earthquakes and gradually buried in the alluvial sbil. The utmost ingenuity and science of the archaeologists of Germany have been employed in the recovery of the composition of these groups; and although doubt remains as to the places of some figures, and their precise attitudes, yet we may fairly say that we know more about the sculpture of

river god, at one end Alpheus, the chief stream of Olympia, at the other end his tributary Cladeus. Only one figure remains, not noticed in the careful description of Pausanias, the figure of a handmaid kneeling, perhaps one of the attendants of Sterope. Our engraving gives two conjectural restorations of the pediment, that of Treu and that of Kekule, which differ principally in the arrangement of the corners of the composition; the position of the central figures and of the chariots can scarcely be called in question. The moment chosen is one, not of action, but of expectancy, perhaps of preparation for sacrifice. The arrange- ment is undeniably stiff and formal, and in the figures we note none of the trained perfection of style which belongs to the sculptures of the Parthenon, an almost contemporary temple. Faults abound, alike in the rendering of drapery and in the representation of the human forms, and the sculptor has evidently trusted to the painter who was afterwards to colour his work, to remedy some of his clumsiness, or to make clear the ambiguous. Nevertheless there is in the whole a dignity, a

Fig. 34. — West Pediment, Olympia. Two Restorations.

the Olympian temple of Zeus than about the sculpture of any other great Greek temple. The exact date of these sculptures is not certain, but we may with some confidence give them to 470-460 B.C. (In speaking of them we shall mostly follow the* opinion of Dr Treu, whose masterly work in vol. iii. of the great German publication on Olympia is a model of patience and of science.) In the eastern pediment (fig. 33), as Pausanias tells us, were represented the preparations for the chariot-race between Oenomaiis and Pelops, the result of which was to determine whether Pelops should find death or a bride and a kingdom. In the midst, invisible to the contending heroes,

sobriety, and a simplicity, which reconcile us to the knowledge that this pediment was certainly regarded in antiquity as a noble work, fit to adorn even the palace of Zeus. In the other, the western pediment (fig. 34), the subject is the riot of the Centaurs when they attended the

wedding of Peirithous in Thessaly, and, attempting to carry off the bride and her comrades, were slain by Peirithous and Theseus. In the midst of the pediment, invisible like Zeus in the eastern pediment, stands Apollo, while on either side of him Theseus and Peirithous attack the Centaurs with weapons hastily snatched. Our illustration gives two possible arrangements. The monsters are in various attitudes

of attempted violence, of combat and defeat; with each grapples one of the Lapith heroes in the endeavour to rob them of their prey. In the corners of the pediment recline female figures, perhaps attendant slaves, though the farthest pair may best be identified as local Thessalian nymphs, looking on with the calmness of divine superiority, yet not wholly unconcerned in what is going forward. Though the composition of the two pediments differs notably, the one bearing the impress of a parade-like repose, the other of an overstrained activity, yet

Olympia, iii. 45.

Fig. 35. — Metope: Olympia; restored.

the style and execution are the same in both, and the short- comings must be attributed to the inferior skill of a local school of sculptors compared with those of Athens or of Aegina. It even appears likely that the designs also belong to a local school. Pausanias, it is true, tells us that the pediments were the work of Alcamenes, the pupil of Pheidias, and of Paeonius, a sculptor of Thrace, respectively; but it is almost certain that he was

misled by the local guides, who would naturally be anxious to connect the sculptures of their great temple with well – known names.

The metopes of the temple are in the same style of art as the pediments, but the defects of awkwardness and want of mastery are less conspicuous, because the narrow limits of the metope exclude any elabo- rate grouping. The sub- jects are provided- by the twelve labours of Heracles; the figures introduced in each metope are but two or at most three; and the action is simplified as much as possible. The example shown (fig. 35) represents Heracles- holding up the sky on a cushion, with the while Atlas, whom he has

and people of Naupactus from the spoils of their enemies, but the name of the enemy is not mentioned in the inscription. The statue of Paeonius, which comes floating down through the air with drapery borne- backward, is of a bold and innovating type, and we may trace its influence in many works of the next age. ‘

Among the discoveries at Delphi none is so striking and valuable to us as the life-size statue in bronze of a charioteer holding in his hand the reins. This is maintained Delphic by M. Homolle to be part of a chariot-group set up charioteer. by Polyzalus, brother of Gelo and Hiero of Syracuse, in honour of a victory won in the chariot-race at the Pythian games at Delphi (fig. 37). The charioteer is evidently a high-born youth, and is clad in the long chiton which was necessary to protect a driver of a chariot from the rush of air. The date would be about 480-470 B.C. Bronze groups representing victorious chariots with their drivers were among the noblest and most costly dedications of antiquity; the present figure is our only satisfactory representative of them. In style the figure is very notable, tall and slight beyond all contemporary examples. The contrast between the conventional decorousness of face and drapery and the lifelike accuracy of hands and

Olympia, iii. 48.

Fig. 36. — Nike of Paeonius; restored.

friendly aid of a Hesperid nymph relieved of his usual burden, approaches bringing the apples ‘ which it was the task of Heracles to procure.

Another of the fruits of the excavations of Olympia is the floating Victory by Paeonius, unfortunately faceless (fig. 36), which was set up in all probability in memory of the victory of the Athenians and their Messenian allies at Sphacteria in 425 B.C. The inscription states that it was dedicated by the Messenians

Memoires, Plot, 1897, 16.

Fig. 37. — Bronze Charioteer: Delphi.

feet is very striking, and indicates the clashing of various tendencies in art at the time when the great style was formed in Greece.

The three great masters of the 5th century, Myron, Pheidias and Polyclitus are all in some degree known to us from their works. Of Myron we have copies of two works, the Marsyas (Plate III. fig. 64)

and the Discobolus. The Marsyas (a copy in the Lateran Museum) represents the Satyr so named in the grasp of conflicting emotions, eager to pick up the flutes which Athena has thrown down, but at the same time dreading her displeasure if he does so. The Discobolus has usually been judged from the examples in the Vatican and the British Museum, in which the anatomy is modernized and the head wrongly put on. We have now photographs of the very superior replica in the Lancelotti gallery at Rome, the pose of which is much nearer to the original. Our illustration represents a restoration made at Munich, by combining the Lancelotti head with the Vatican body (Plate IV. fig. 68).

Of the works of Pheidias we have unfortunately no certain copy, if we except the small replicas at Athens of his Athena Parthenos. The larger of these (fig. 38) was found in 1880: it is very clumsy, and the wretched device by which a pillar is introduced to support the Victory in the hand of Athena can scarcely be supposed to have belonged to the great original. Tempting theories have been published by Furtwangler {Master- pieces of Greek Sculpture) and other archaeologists, which identify copies of the Athena Lemnia of Pheidias, his Pantarces,

his Aphrodite Urania and other statues; but doubt hangs over all these attributions.

A more pertinent and more promising question is, how far we may take the decorative sculpture of the Parthenon, since Lord Elgin's time the pride of the British Museum, as the actual work of Pheidias, or as done from his designs. Here again we have no conclusive evidence; but it appears from the testimony of inscriptions that the pediments at all events were not executed until after Pheidias's death.

Of course the pediments and frieze of the Parthenon (q.v), whose work soever they may be, stand at the head of all Greek

decorative sculpture. Whether we regard the grace of the composi- tion, the exquisite finish of the statues in the round, or the delightful atmosphere of poetry and religion which sur- rounds these sculptures, they rank among the masterpieces of the world. The Greeks esteemed them far below the statue which the temple was made to shelter; but

to us, who have lost the great figure in ivory and gold, the carvings of the casket which once contained it are a perpetual source of instruction and delight. The whole is repro- Fig. 38.— Statuette of Athena Parthenos. duced by photography in A. S. Murray's Sculptures of the Parthenon.

An abundant literature has sprung up in regard to these sculptures in recent years. It will suffice here to mention the discussions in Furtwangler's Masterpieces, and the very ingenious attempts of Sauer to determine by a careful examination of the bases and backgrounds of the pediments as they now stand how the figures must have been arranged in them. The two ends of the eastern pediment (Plate III. fig. 65) are the only fairly well-preserved part of the pediments.

Among the pupils of Pheidias who may naturally be supposed to have worked on the sculptures of the Parthenon, the most notable were Alcamenes and Agoracritus. Some fragments remain of the great statue of Nemesis at Rhamnus by Agoracritus. And an interesting light has been thrown on Alcamenes by the discovery at Pergamum of a professed copy of his Hermes set up at the entrance to the Acropolis at Athens (Plate II. fig. 57). The style of this work, however, is conventional and archaistic, and we can scarcely regard it as typical of the master.

Another noted contemporary who was celebrated mainly for his portraits was Cresilas, a Cretan. Several copies of his portrait of Pericles exist, and testify to the lofty and idealizing style of portraiture in this great age.

We possess also admirable sculpture belonging to the other important temples of the Acropolis, the Erechtheum and the temple of Nike. The temple of Nike is the earlier, being possibly a memorial of the Spartan defeat at Sphacteria. The Erech- theum belongs to the end of our period, and embodies the delicacy and finish of the conservative school of sculpture at Athens just as the Parthenon illustrates the ideas of the more progressive school. The reconstruction of the Erechtheum has been a task which has long occupied the attention of archaeo- logists (see the paper by Mr Stevens in the American Journal of Archaeology, 1906). Our illustration (Plate V. fig. 75) shows one of the Corae or maidens who support the entablature of the south porch of the Erechtheum in her proper setting. This

precedent (see fig. 17) and is not altogether happy; but the idea is carried out with remarkable skill, the perfect repose and solid strength of the maiden being emphasized.

Beside Pheidias of Athens must be placed the greatest of early Argive sculptors, Polyclitus. His two typical athletes, the Doryphorus or spear-bearer (Plate VI. fig. 80) and the Diadu- menus, have long been identified, and though the copies are not first-rate, they enable us to recover the principles of the master's art.

Among the bases discovered at Olympia, whence the statues had been removed, are three or four which bear the name of Polyclitus, and the definite evidence furnished by these bases as to the position of the feet of the Po ' ycmus – statues which they once bore has enabled archaeologists, especially Professor Furtwangler, to identify copies of those statues among known works. Also newly discovered copies of Polyclitan works have made their appearance. At Delos there has been found a copy of the Diadumenus, which is of much finer work than the statue in the British Museum from Vaison. The Museum of Fine Arts at Boston, U.S.A., has secured a very beautiful statue of a young Hermes, who but for the wings on the temples might pass as a boy athlete of Polyclitan style (Plate II. fig. 60). In fact, instead of relying as regards the manner of Polyclitus on Roman copies of the Doryphorus and Diadumenus, we have quite a gallery of athletes, boys and men. who all claim relationship, nearer or more remote, to the school of the great Argive master. It might have been hoped that the excavations, made under the leadership of Professor Waldstein at the Argive Heraeum, would have enlightened us as to the style of Polyclitus. Just as the sculptures of the Parthenon are the best monument of Pheidias, so it might seem likely that the sculptural decoration of the great temple which contained the Hera of Polyclitus would show us at large how his school worked in marble. Unfortunately the fragments of sculpture from the Heraeum are few The most remarkable is a female head, which may perhaps come from a pediment (fig. 39). But archaeologists are not in agreement whether it is in style Poly-

Fig. 39. — Female Head : Heraeum.

clitan or whether it rather resembles in style Attic works. Other heads and some highly-finished fragments of bodies come apparently from the metopes of the same temple. (See also a'rticle Argos.)

Another work of Polyclitus was his Amazon, made it is said in competition with his great contemporaries, Pheidias, Cresilas and Phradmon, all of whose Amazons were preserved in the great temple of Artemis at Ephesus. In our museums are many statues of Amazons representing 5th century originals. These have usually been largely restored, and it is no easy matter to

use of the female figure in place of a pillar is based on old Ionian I discover their original type. Professor Michaelis has recovered

successfully three types (fig. 40). The attribution of these is a matter of controversy. The first has been given to the chisel of Polyclitus; the second seems to represent the Wounded Amazon of Cresilas; the third has by some archaeologists been given to Pheidias. It does not represent a wounded amazon, but one alert, about to leap upon her horse with the help of a spear as a leaping pole.

We can devote little more than a passing mention to the sculpture of other temples and shrines of the later 5th century, , . which nevertheless deserve careful study. The frieze

from the temple of Apollo at Phigalia, representing Centaur and Amazon battles, is familiar to visitors of the British Museum, where, however, its proximity to the remains of the

Fig. 40. — Types of Amazons (Michaeiis.)

Parthenon lays stress upon the faults of grouping and execution which this frieze presents. It seems to have been executed by local Arcadian artists. More pleasing is the sculpture of the Ionic tomb called the Nereid monument, brought by Sir Charles Fellows from Lycia. Here we have not only a series of bands of relief which ran round the tomb, but also detached female figures, whence the name which it bears is derived. A recent view sees in these women with their fluttering drapery not nymphs of t,he sea, but personifications of sea-breezes.

The series of known Lycian tombs has been in recent years enriched through the acquisition by the museum of Vienna of the sculptured friezes which adorned a heroon near Geul Bashi. In the midst of the enclosure was a tomb, and the walls of the enclosure itself were adorned within and without with a great series of reliefs, mostly of mythologic purport. Many subjects which but rarely occur in early Greek art, the siege of Troy, the adventure of the Seven against Thebes, the carrying off of the daughters of Leucippus, Ulysses shooting down the Suitors, are here represented in detail. Professor Benndorf, who has pub- lished these sculptures in an admirable volume, is disposed to see in them the influence of the Thasian painter

Polygnotus. Any one can see their kinship to painting, and their subjects recur in some of the great frescoes painted by Polygnotus, Micon and others for the Athenians. Like other Lycian sculp- tures, they contain non-Hellenic elements; in fact Lycia forms a link of the chain which extends from the wall-paintings of Assyria to works like the columns of Trajan and of Antoninus, but is not embodied in the more purely idealistic works of the highest Greek art. The date of the Vienna' tomb is not much later than the middle of the 5th century. A small part of the frieze of this monument is shown in fig. 41. It will be seen that ■ in this fragment there are two scenes, one directly above the other. In the upper line Ulysses, accompanied by his son Telemachus, is in the act of shooting the suitors, who are reclining at table in the midst of a feast; a cup-bearer, possibly Melanthius, is escaping by a door behind Ulysses. In the lower line is the central group of a frieze which represents the hunting of the

Calydonian boar, which is represented, as is usual in the best time of Greek art, as an ordinary animal and no monster.

Archaeologists have recently begun to pay more attention to an interesting branch of Greek art which had until recently been neglected, that of sculptured portraits. The _ known portraits of the 5th century now include Pericles, Herodotus, Thucydides, Anacreon, Sophocles, Euripides, Socrates and others. As might be expected in a time when style in sculpture was so strongly pronounced, these portraits, when not later unfaithful copies, are notably ideal. They represent the great men whom they portray not in the spirit of realism. Details are neglected, expression is not elaborated; the sculptor tries to represent what is permanent in his subject rather than what is temporary. Hence these portraits do not seem to belong to a particular time of life; they only represent a man in the perfection of physical force and mental energy. And the race or type is clearly shown through individual traits. In some cases it is still disputed whether statues of this age represent deities or mortals, so notable are the repose and dignity which even human figures acquire under the hands of 5th-century masters. The Pericles after Cresilas in the British Museum, and the athlete-portraits of Polyclitus, are good examples.

Period III. 400-300 B.C. — The high ideal level attained by Greek art at the end of the 5th century is maintained in the 4th. There cannot be any question of decay in it save at Athens, where undoubtedly the loss of religion and the decrease of national prosperity acted prejudicially. But in Peloponnesus the time was one of expansion; several new and important cities, such as Messene, Megalopolis and Mantinea, arose under the protection of Epaminondas. And in Asia the Greek cities

were still prosperous and artistic, as were the cities of Italy and Sicily which kept their independence. On the whole we find during this age some diminution of the freshness and simplicity of art;

w > »«TM». : i5Kt,yˆa«ˆMSˆ

■J**.Ci

CT'-V/ˆ

-ˆ-»fllWW" :. Z-.4Z'

Heroon of Gyeul Bashi Trysa, PI. 7.

Fig. 41. — Odysseus and Suitors; Hunting of Boar.

it works less in the service of the gods and more in that of private patrons; it becomes less ethical and more sentimental and emotional. On the other hand, there can be no doubt that technique both in painting and sculpture advanced with rapid strides; artists had a greater mastery of their materials, and ventured on a wider range of subject.

In the 4th century no new temples of importance rose at Athens; the Acropolis had taken its final form; but at Messene, Tegea, Epidaurus and elsewhere, very admirable buildings arose. The remains of the temple at Tegea are of wonderful beauty and finish; as are those of the theatre and the so-called Tholus of Epidaurus. In Asia Minor vast temples of the Ionic order arose, especially at Miletus and Ephesus. The colossal pillars of Miletus astonish the visitors to the Louvre; while the sculptured columns of Ephesus in the British Museum (Plate II. fig. 59) show a high level of artistic skill. The Mausoleum erected about 350 B.C. at Halicarnassus in memory of Mausolus, I king of Caria, and adorned with sculpture by the most noted

artists of the day, was reckoned one of the wonders of the world. It has been in part restored in the British Museum. Mr Oldfield's conjectural restoration, published in Archaeologia for 1895, though it has many rivals, surpasses them all in the lightness of the effect, and in close correspondence to the description by Pliny. We show a small

part of the sculptural decoration, representing a battle between Greeks and Amazons (Plate IV. fig. 70), wherein the energy of the action and the careful balance of figure against figure are remarkable. We possess also the fine portraits of Mausolus himself and his wife Artemisia, which stood in or on the building, as well as part of a gigantic chariot with four horses which surmounted it.

Another architectural work of the 4th century, in its way a gem, is the structure set up at Athens by Lysicrates, in memory of a choragic victory. This still survives, though the reliefs with which it is adorned have suffered severely from the weather.

The 4th century is the brilliant period of ancient painting. It opens with the painters of the Asiatic School, Zeuxis and Par- rhasius and Protogenes, with their contemporaries Nicias and Apollodorus of Athens, Timanthes of Sicyon or Cythnus, and

AAEIANAPOZ AOHNAIOX

ErPAˆEN

WAAIH

AHTQ

MOBH

$OI8H

IAEAIPA

Praxi- teles.

Nat. Mus., Naples.

Fig. 42. — Greek Drawing of Women playing at Knucklebones.

Euphranor of Corinth. It witnesses the rise of a great school at Sicyon, under Eupompus and Pamphilus, which was noted for its scientific character and the fineness of its drawing, and which culminated in Apelles, the painter of Alexander the Great, and probably the greatest master of the art in antiquity. To each of these painters a separate article is given, fixing their place in the history of the art. Of their paintings unfortunately we can form but a very inadequate notion. Vase-paintings, which in the 5th century give us some notion at least of con- temporary drawing, are less careful in the 4th century. Now

and then we find on them figures admirably designed, or success- fully foreshortened; but these are rare occurrences. The art of the vase decorator has ceased to follow the methods and improvements of contemporary fresco painters, and is pursued' as a mere branch of commerce.

But very few actual paintings of the age survive, and even these fragmentary remains have with time lost the freshness of their colouring; nor are they in any case the work of a note- worthy hand. We reproduce two examples. The first is from a stone of the vault of a Crimean grave (Plate IV. fig. 67). The date of the grave is fixed to the 4th century by ornaments found in it, among which was a gold coin of Alexander the Great. The

representation is probably of Demeter or her priestess, her hair bound with poppies and other flowers. The original is of large size. The other illustration (fig. 42) represents the remains of a drawing on marble, representing a group of women playing knucklebones. It was found at Herculaneum. Though signed by one Alexander of Athens, who was probably a worker of the Roman age, Professor Robert is right in maintaining that Alexander only copied a design of the age of Zeuxis and Par- rhasius. In fact the drawing and grouping is so closely like that of reliefs of about 400 B.C. that the drawing is of great historic value, though there be no colouring. Several other drawings of the same class have been found at Herculaneum, and on the walls of the Transtiberine Villa at Rome (now in the Terme Museum).

Until about the year 1880, our knowledge of the great Greek sculptors of the 4th century was derived mostly from the statements of ancient writers and from Roman copies, or what were supposed to be copies, of their works. We are now in a far more satisfactory position. We now possess an original work of Praxiteles, and sculptures executed under the immediate direction of, if not from the hand of, other great sculptors of that age — Scopas, Timotheus and others. Among all the discoveries made at Olympia, none has become so familiar to the artistic world as that of the Hermes of Praxiteles. It is the first time that we have become possessed of a first-rate Greek original by one of the greatest of sculptors. Hitherto almost all the statues in our museums have been either late copies of Greek works of art, or else the mere decorative sculpture of temples and tombs, which was by the ancients themselves but little regarded. But we can venture without misgiving to submit the new Hermes to the strictest examination, sure that in every line and touch we have the work of a great artist. This is more than we can say of any of the literary remains of antiquity — poem, play or oration. Hermes is repre- sented by the sculptor (fig. 43

and Plate VI. fig. 82) in the act of carrying the young child Dionysus to the nymphs who were charged with his rearing. On the journey he pauses and amuses himself by holding out to the child-god a bunch of grapes, and watching his eagerness to grasp them. To the modern eye the child is not a success; only | the latest art of Greece is at home in dealing with children. But the Hermes, strong without excessive muscular development, and grace- ful without leanness, is a model of physical formation, and his face expresses the perfection of health, natural endowment and sweet nature. The statue can scarcely be called a work of religious art in the modern or Christian sense of the word 0lympia ˆ m 53- religious, but from the Greek FlG . 43 —Hermes of Praxiteles ; point of view it is religious, as restored,

embodying the result of the har- monious development of all human faculties and life in accord- ance with nature.

The Hermes not only adds to our knowledge of Praxiteles, but also confirms the received views in regard to him. Already many works in galleries of sculpture had been identified as copies of statues of his school. Noteworthy among these are, the group at Munich representing Peace nursing the infant Wealth, from an original by Cephisodotus, father of Praxiteles; copies of the Cnidian Aphrodite of Praxiteles, especially one in the Vatican which is here illustrated (Plate V. fig. 71); copies of the Apollo slaying a lizard (Sauroctonus), of a Satyr (in the Capitol Museum), and others. These works, which are noted

for their softness and charm, make us understand the saying of ancient critics that Praxiteles and Scopas were noted for the pathos of their works, as Pheidias and Polyclitus for the ethical quality of those they produced. But the pathos of Praxiteles is of a soft and dreamy character; there is no action, or next to none; and the emotions which he rouses are sentimental rather than passionate. Scopas, as we shall see, was of another mood. The discovery of the Hermes has naturally set archae- ologists searching in the museums of Europe for other works which may from their likeness to it in various respects be set down as Praxitelean in character. In the case of many of the great sculptors of Greece — Strongylion, Silanion, Calamis and others — it is of little use to search for copies of their works, since we have little

really trustworthy evidence on which to base our inquiries. But in the case of Praxiteles we really stand on a safe level. Naturally it is impossible in these pages to give any sketch of the results, some almost certain, some very doubtful, of the researches of archaeologists in quest of Praxitelean works. But we may mention a few works which have been claimed by good judges as coming from the master himself. Professor Brunn claimed as work of Praxiteles a torso of a satyr in the Louvre, in scheme identical with the well-known satyr of the Capitol. Professor Furtwangler puts in the same category a delicately beautiful head of Aphrodite at Petworth. And his translator, Mrs Strong, regards the Aberdeen head of a young man in the British Museum as the actual work of Praxiteles. Certainly this last head does not suffer when placed beside the Olympian head of Hermes. At Mantinea has been found a basis whereon stood a group of Latona and her two children, Apollo and Artemis, made by Praxiteles. This base bears reliefs representing the musical contest of Apollo and Marsyas, with the Muses as spectators, reliefs very pleasing in style, and quite in the manner of Attic artists of the 4th century. But of course we must not ascribe them to the hand of Praxiteles himself; great sculptors did not themselves execute the reliefs which adorned temples and other monuments, but reserved them for their pupils. Yet the graceful figures of the Muses of Mantinea suggest how much was due to Praxiteles in determining the tone and character of Athenian art in relief in the 4th century. Exactly the same style which marks them belongs also to a mass of sepulchral monuments at Athens, and such works as the Sidonian sarcophagus of the Mourning Women, to be presently mentioned.

Excavation on the site of the temple of Athena Alea at Tegea has resulted in the recovery of works of the school of Scopas. Pausanias tells us that Scopas was the architect of the temple, and so important in the case of a Greek temple is the sculptural decoration, that we can scarcely doubt that the sculpture also of the temple at Tegea was under the supervision of Scopas, especially as he was more noted as a sculptor than as an architect. In the pediments of the temple were represented two scenes from mythology, the hunting of the Calydonian boar and the combat between Achilles and Telephus. To one or other of these scenes belong several heads of local marble discovered on the spot, which are very striking from .their extraordinary life and animation. Unfortunately they are so much injured that they can scarcely be made intelligible except by the help of restoration; we therefore engrave one of them, the helmeted head, as restored by a German sculptor (Plate III. fig. 63). The strong bony frame of this head,, and its depth from front to back, are not less

noteworthy than the parted lips and deeply set and strongly shaded eye; the latter features impart to the head a vividness of expression such as we have found in no previous work of Greek art, but which sets the key to the developments of art which take place in the Hellenistic age. A draped torso of Atalanta from the same pediment has been fitted to one of these heads. Hitherto Scopas was known to us, setting aside literary records, only as one of the sculptors who had worked at the Mausoleum. Ancient critics and travellers, however, bear ample testimony to his fame, and the wide range of his activity, which extended to northern Greece, Peloponnese and Asia Minor. His Maenads

Scopas.

and his Tritons and other beings of the sea were much copied in antiquity. But perhaps he reached his highest level in statues such as that of Apollo as leader of the Muses, clad in long drapery.

The interesting precinct of Aesculapius at Epidaurus has furnished us with specimens of the style of an Athenian con- temporary of Scopas, who worked with him on the Mausoleum. An inscription which records the sums p™”’* 6 “*. spent on the temple of the Physician-god, informs us leochares. that the models for the sculptures of the pediments, and one set of acroteria or roof adornments, were the work of Timo- theus. Of the pedimental figures and the acroteria considerable fragments have been recovered, and we may with confidence assume that at all events the models for these were by Timotheus. It is’ strange that the unsatisfactory arrangement whereby a noted sculptor makes models and some local workman the figures enlarged from those models, should have been tolerated by so artistic a people as the Greeks. The subjects of the pedi- ments appear to have been the common ones of battles between Greek and Amazon and between Lapith and Centaur. We possess fragments of some of the Amazon figures, one of which, striking downwards at the enemy, is here shown (fig. 44). Their attitudes are vigorous and alert; but the work shows no delicacy of detail. Figures of – Nereids riding on horses, which were found on the same site, may very probably be roof ornaments (acro- teria) of the temple. We have also several figures of Victory, which probably were acroteria on some smaller temple, per- haps that of Artemis. A base found at Athens, sculptured with figures of horse- men in relief, bears the name of Bryaxis, and was probably made by a pupil of his. Prob- able conjecture assigns’ to Leochares the originals copied in the FlG – 44- — Amazon from Epidaurus. Ganymede of the Vatican, borne aloft by an eagle (Plate I. fig- 53) an(l the noble statue of Alexander the Great at Munich (see Leochares).

Thus we may fairly say that we are now acquainted with the work of all the great sculptors who worked on the Mausoleum — Scopas, Bryaxis, Leochares and Timotheus; and are in a far more advantageous position than were the archaeologists of 1880 for determining the artistic problems connected with that noblest of ancient tombs.

Contemporary with the Athenian school of Praxiteles and Scopas was the great school of Argos and Sicyon, of which Lysippus was the most distinguished member. Lysippus con- tinued the academic traditions of Polyclitus, but he was far bolder in his choice of subjects and more innovating in style. Gods, heroes and mortals alike found in him a sculptor who knew how to combine fine ideality with a vigorous actuality. He was at the height of his fame during Alexander's life, and the grandiose ambition of the great Macedonian found him ample employment, especially in the frequent representation of himself and his marshals.

We have none of the actual works of Lysippus; but our best evidence for his style will be found in the statue of Agias an athlete (Plate V. fig. 74) found at Delphi, and shown by an inscription to be a marble copy of a bronze original by Lysippus. The Apoxyomenus of the Vatican (man scraping himself with a strigil) (Plate VI. fig. 79) has hitherto been regarded as a copy from Lysippus; but of this there is no evidence, and the style of that statue belongs rather to the 3rd century than the 4th.

The Agias, on the other hand, is in style contemporary with the works of 4th-century sculptors.

Of the elaborate groups of combatants with which Lysippus enriched such centres as Olympia and Delphi, or of the huge bronze statues which he erected in temples and shrines, we can form no adequate notion. Perhaps among the extant heads of Alexander the one which is most likely to preserve the style of Lysippus is the head from Alexandria in the British Museum (Plate II. fig. 56), though this was executed at a later time.

Many noted extant statues may be attributed with probability to the latter part of the 4th or the earlier part of the 3rd century. We will mention a few only. The celebrated group at Florence representing

Niobe and her children falling before the arrows of Apollo and Artemis is certainly a work of the pathetic school, and may be by a pupil of Praxiteles. Niobe, in an agony of grief, which is in the marble tempered and idealized, tries to protect her youngest daughter from destruction (Plate VI. fig. 78). Whether the group can have originally been fitted into the gable of a temple is a matter of dispute.

Two great works preserved in the Louvre are so noted that it is but necessary to mention them, the Aphrodite of Melos (Plate VI. fig. 77), in which archaeologists are now disposed to see the influence of Scopas, and the Victory of Samothrace (Plate III. figs. 61 and 62), an original set up by Demetrius Po'liorcetes after a naval victory won at Salamis in Cyprus in 306 B.C. over the fleet of Ptolemy, king of Egypt.

Nor can we pass over without notice two works so celebrated as the Apollo of the Belvidere in the Vatican (Plate II. fig. 55), and the Artemis of Versailles. The Apollo is now by most archaeologists regarded as probably a copy of a work of Leochares, to whose Ganymede it bears a superficial resemblance. The Artemis is regarded as possibly due to some artist of the same age. But it is by no means clear that we have the right to remove either of these figures from among the statues of the Hellenistic age. The old theory of Preller,- which saw in them copies from a trophy set up to commemorate the repulse of the Gauls at Delphi in 278 B.C., has not lost its plausibility.

This may be the most appropriate place for mentioning the remarkable find made at Sidon in 1886 of a number of sarcophagi, which once doubtless contained the remains of kings of Sidon. They are now in the museum of Constanti- nople, and are admirably published by Hamdy Bey and T. Reinach (Une Necropole royale a Sidon, 1892- The sarcophagi in date cover a considerable period. The earlier are made on Egyptian models, the covers shaped roughly in the form of a human body or mummy. The later, however, are Greek in form, and are clearly the work of skilled

Greek sculptors, who seem to have been employed by the grandees of Phoenicia in the adornment of their last resting-places. Four of these sarcophagi in par- ticular claim attention, and in fact present us with examples of Greek art of the 5th and 4th centuries in several of its aspects. To the 5th century belong the tomb of the Satrap, the reliefs of which bring before us the activities and glories of some unknown king, and* the Lycian sarcophagus, so called from its form, which resembles that of tombs found in Lycia, and which is also adorned with reliefs which have reference to the past deeds of the hero buried in the tomb, though these deeds are represented, not in the Oriental

manner directly, but in the Greek manner, clad in mythological forms. To the 4th century belong two other sarcophagi. One

Sarco- phagi of Sidon.

1896).

Hamdy et Reinach, Necropole h Sidon, PL 7.

Fig. 45. — Tomb of Mourning Women: Sidon.

of these is called the Tomb of Mourning Women. On all sides of it alike are ranged a series of beautiful female figures, separated by Ionic pillars, each in a somewhat different attitude, though all attitudes denoting grief (fig. 45) . The pediments at the ends of the cover are also closely connected with the mourning for the loss of a friend and protector, which is the theme of the whole decoration of the sarcophagus. We see depicted in them the telling of the news of the death, with the results in the mournful attitude of the two seated figures. The mourning women must be taken, not as the representation of any persons in particular, but generally as the expression of the feeling of a city. Such figures are familiar to us in the art of the second Attic school; we could easily find parallels to the sarcophagus among the 4th-century sepulchral reliefs of Athens. We can scarcely be mistaken in attributing the workmanship of this beautiful sarcophagus to some sculptor trained in the school of Praxiteles. And it is a conjecture full of probability that it once contained the body of Strato, king of Sidon, who ruled about 380 B.C., and who was proxenos or public friend of the Athenians.

More celebrated is the astonishing tomb called that of Alexander, though there can be no doubt that, although it commemorates the victories and exploits of Alexander, it was made not to hold his remains, but those of some ruler of Sidon who was high in his favour. Among all the monuments of anti- quity which have come down to us, none is more admirable than this, and none more characteristic of the Greek genius. We give, , in two lines, the composition which adorned one of the sides of this sarcophagus. It represents a victory of Alexander, probably that of the Granicus (fig. 46). On the left we see the Macedonian king charging the Persian Korse, on the right his general Parmenio, and in the midst a younger officer, perhaps Cleitus. Mingled with the chiefs are foot-soldiers, Greek and Macedonian, with whom the Persians are mingled in unequal fray. What most strikes the modern eye is the remarkable freshness and force of the action and the attitudes. Those, however, who have seen the originals have been

specially impressed with the colouring, whereof, of course, our engraving gives no hint, but which is applied to the whole surface of the relief with equal skill and delicacy. There are other features in the relief on which a Greek eye would have dwelt with special pleasure — the exceedingly careful symmetry of the whole, the balancing of figure against figure, the skill with which the result of the battle is hinted rather than depicted. The composition is one in which the most careful planning and the most precise calculation are mingled with freedom of hand and expressiveness in detail. The faces in particular show more expression than would be tolerated in art of the previous century. We are unable as yet to assign an author or even a school to the sculptor of this sarcophagus; he comes to us as a new and striking phenomenon in the history of ancient art. The reliefs which adorn the other sides of the sarcophagus are almost equally interesting. On one side we see Alexander again, in the company of a Persian noble, hunting a lion. The short sides also show us scenes of fighting and hunting. In fact it can scarcely be doubted that if we had but a clue to the interpretation of the reliefs, they would be found to embody historic events of the end of the 4th century. There are but a few other works of art, such as the Bayeux tapestry and the Column of Trajan, which bring con- temporary history so vividly before our eyes. The battles with the Persians represented in some of the sculpture of the Parthenon and the temple of Nike at Athens are treated conventionally and with no attempt at realism; but here the ideal and the actual are blended into a work of consummate art, which is at the same time, to those who can read the language of Greek art, a historic record. The portraits of Alexander the Great which appear on this sarcophagus are almost contemporary, and the most authentic likenesses of him which we possess. The great Mace- donian exercised so strong an influence on contemporary art that a multitude of heads of the age, both of gods and men, and even the portraits of his successors, show traces of his type.

We have yet to mention what are among the most charming and the most characteristic products of the Greek chisel, the

beautiful tombs, adorned with seated or standing portraits or with reliefs, which were erected in great numbers on all the main roads of Greece. A great number of these from the Dipylon cemetery are

preserved in the Central Museum at Athens, and

Hamdy et Reinach.

Nicropole h Sidan, PI. 30.

Fig. 46. — Battle of The Granicus: Sarcophagus from Sidon.

impress all visitors by the gentle sentiment and the charm of grouping which they display (Gardner, Sculptured Tombs of Hellas) .

Period IV. 300-50 B.C. — There can be no question but that the period which followed the death of Alexander, commonly called the age of Hellenism, was one of great activity and expan- sion in architecture. The number of cities founded by himself and his immediate successors in Asia and Egypt was enormous. The remains of these cities have in a few cases (Ephesus, Pergamum, Assus, Priene, Alexandria) been partially excavated. But the adaptation of Greek architecture to the needs of the semi-Greek peoples included in the dominions of the kings of Egypt, Syria and Pergamum is too vast a subject for us to enter upon here (see Architecture).

Painting during this age ceased to be religious. It was no longer for temples and public stoae that artists worked, but for private persons; especially they made frescoes for the decoration of the walls of houses, and panel pictures for galleries set up by rich patrons. The names of very few painters of the Hellenistic age have come down to us. There can be no doubt that the character of the art declined, and there were no longer produced great works to be the pride of cities, or to form an embodiment for all future time of the qualities of a deity or the circumstances of scenes mythical or historic. But at the same time the mural paintings of Pompeii and other works of the Roman age, whieh are usually more or less nearly derived from Hellenistic models, prove that in technical matters painting continued to progress. Colouring became more varied, groups more elaborate, per- spective was worked out with greater accuracy, and imagination shook itself free from many of the conventions of early art. Pompeian painting, however, must be treated of under Roman, not under Greek art. We figure a single example, to show the elaboration of painting at Alexandria and elsewhere, the wonder-

ful Pompeian mosaic (fig. 47), which represents the victory of Alexander at Issus. This work being in stone has preserved its colouring; and it stands at a far higher level of art than ordinary Pompeian paintings, which are the work of mere house-decorators.

This on the contrary is certainly copied from the work of a great master. It is instructive to compare it with the sarcophagus illustrated inFig.46,whichitexcels in perspective and in the freedom of individual figures, though the compositionis much less careful and precise. Alexander charges from the left (his portrait being the least successful part of the picture), and bears downayoung Persian; Darius in his chariot flees towards the right ; in the foreground a young knight is trying to manage a restive horse. It will be ob- served how very simple is the indication of locality: a few stones and a broken tree stand for rocks and woods.

Among the original

sculptural creations of

the early Hellenistic

age, a prominent place

is claimed by the statue

of Fortune, typifying

the city of Antioch

(Plate VI. fig. 81), a work of Eutychides, a pupil of Lysippus. Of

this we possess a small copy, which is sufficient to show how

worthy of admiration was the original. We have a beautiful

embodiment of the personality of the city, seated on a rock,

holding ears of corn, while the river Orontes, embodied in a

young male figure, springs forth at her feet.

This is, so far as we know, almost the only work of the early part of the 3rd century which shows imagination. Sculptors often worked on a colossal scale, producing such monfters as the colossal Apollo at Rhodes, the work of Chares of Lindus, which was more than 100 ft. in height. But they did not show freshness or invention; and for the most part content themselves

From a photograph by G. Brogi.

Fig. 47. — Mosaic of the Battle of Issus (Naples).

with varying the types produced in the great schools of the 4th century. The wealthy kings of Syria, Egypt and Asia Minor formed art galleries, and were lavish in their payments; but it has often been proved in the history of art that originality cannot be produced by mere expenditure.

Fig. 48.-

A great artist, whose date has been disputed, but who is now assigned to the Hellenistic age, Damophon of Messene, is known to us from his actual works. He set up in the shrine of the Mistress (Despoena) at Lycosura in Arcadia a great group of figures consisting of Despoena, Demeter, Artemis and the Titan Anytus. Three colossal heads found on the spot probably belong to the three last-mentioned deities. We illustrate the head of Anytus, with wild disordered hair and turbulent expression (fig. 48). Dr Dorpfeld has argued, on

architectural grounds, that shrine and images alike must be given to a later time than the 4th century; and this judgment is now confirmed by inscriptional and other evidence.

In one important direc- tion sculpture certainly made progress. Hitherto Greek sculptors had con- tented themselves with studying the human body whether in rest or motion, from outside. The dissec- tion of the human body, with a consequent increase in knowledge of anatomy, became usual at Alexandria in the medical school which flourished under the Ptole- mies. This improved ana- tomical knowledge soon

„ , ,, . t _ reacted upon the art of

-Head of Anytus : Lycosura. . ˆ ˆ „. , ,

sculpture. Works such as

the Fighter of Agasias in the Louvre (Plate IV. fig. 69), and in a less degree the Apoxyomenus (Plate VI. fig. 70), display a remarkable internal knowledge of the human frame, such as could only come from the habit of dissection. Whether this was really productive of improvement in sculpture may be doubted. But it is impossible to

withhold one's admiration from works which show an astonishing knowledge of the body of man down to its bony framework, and a power and mastery of execution which have never since been surpassed.

With accuracy in the portrayal of men's bodies goes of necessity a more naturalistic tendency in portraiture. As we have seen, the art of portraiture was at a high ideal level in the Pheidian age; and even in the age of Alexander the Great, notable men were rendered rather according to the idea than the fact. To a base and mechanical naturalism Greek art never at any time descended. But from 300 B.C. onwards we have a marvellous series of portraits which may be termed rather characteristic than ideal, which are very minute in their execution, and delight in laying emphasis on the havoc wrought by time and life on the faces of noteworthy men. Such are the portraits of Demos- thenes, of Antisthenes, of Zeno and others, which exist in our galleries. And it was no long step from these actual portraits to the invention of characteristic types to represent the great men of a past generation, such as Homer and Lycurgus, or to form generic images to represent weatherbeaten fishermen or toothless old women.

Our knowledge of the art of the later Hellenistic age has received a great accession since 1875 through the systematic labours directed by the German Archaeological Insti- tute, which have resulted in recovering the remains of Pergamum, the fortress-city which was the capital of the dynasty of the Philetaeri. Among the ancient buildings of Pergamum none was more ambitious in scale and striking in execution than the great altar used for sacrifices to Zeus, a monument supposed to be referred to in the phrase of the Apocalypse " where Satan's throne is." This altar, like many great sacrificial altars of later Greece, was a vast erection to which one mounted by many steps, and its outside was adorned

Altar of Per- gamum.

with a frieze which represented on a gigantic scale, in the style of the 2nd century B.C., the battle between the gods and the giants. This enormous frieze (see Pergamum) is now one of the treasures of the Royal Museums of Berlin, and it cannot fail to impress visitors by the size of the figures, the energy of the action, and the strong vein of sentiment which pervades the whole, giving it a certain air of modernity, though the subject is strange to the Christian world. In early Greek art the giants where they oppose the gods are represented as men armed in full panoply, " in shining armour, holding long spears in their hands," to use the phrase in which Hesiod describes

them. But in the Pergamene frieze the giants are strange compounds, having the heads and bodies of wild and fierce barbarians, sometimes also human legs, but sometimes in the place of legs two long serpents, the heads of which take with the giants them- selves a share in the battle. Sometimes also they are winged. The gods appear in the forms which had been gradually made for them in the course of Greek history, but they are usually accompanied by the animals sacred to them in cultus, between which and the serpent-feet of the giants a weird combat goes on. We can conjecture the source whence the Pergamene artist derived the shaggy hair, the fierce expression, the huge muscles of his giants (fig. 49); probably these features came originally from the Galatians, who at the time had settled in Asia Minor, and were spreading the terror of their name and the report of their savage devastations through all Asia Minor. The victory over the giants clearly stands for the victory of Greek civilization over Gallic barbarism ; and this meaning is made more emphatic because the gods are obviously inferior in physical force to their opponents, indeed, a large proportion of the divine combatants are goddesses. Yet everywhere the giants are overthrown, writhing in pain on the ground, or transfixed by the weapons of their opponents; everywhere the gods are victorious, yet in the victory retain much of their divine calm. The piecing together of the frieze at Berlin has been a labour of many years; it is now complete, and there is a special museum devoted to it. Some of the groups have become familiar to students from photographs, especially the group which represents Zeus slaying his enemies with thunderbolts, and the group wherein Athena seizes by the hair an overthrown opponent, who is winged, while Victory runs to crown her, and be- neath is seen Gaia, the earth- goddess who is the mother of the giants, rising out of the ground, and mourning over ‘ her vanquished and tortured children. Another and smaller frieze which also decorated the altar-place gives us scenes from the history of Telephus, who opposed the landing of the army of Agamemnon in Asia Minor and was over- thrown by Achilles. This frieze, which is quite fragmentary, is put together by Dr Schneider in the Jahrbuch of the German Archaeological Institute for 1900. Since the Renaissance Rome has continually produced a crop of works of Greek art of all periods, partly originals brought from Greece by conquering generals, partly copies, such as the group at Rome formerly known as Paetus and Arria, and the overthrown giants and barbarians which came from the elaborate trophy set up by Attalus at Athens, of which copies exist in many museums. A noted work of kindred school is the group of Laocoon and his sons (Plate I. fig. 52), signed by Rhodian sculptors of the 1st century B.C., which has been perhaps more discussed than any work of the Greek chisel, and served

as a peg

Fig. 49. — Giant from Great Altar : Pergamum.

for the aesthetic theories of Lessing and Goethe. In our days the histrionic and strained character of the group is regarded as greatly diminishing its interest, in spite of the astounding skill and knowledge of the human body shown by the artists. To the same school belong the late representations of Marsyas being flayed by the victorious Apollo (Plate II. fig. 54), a some- what repulsive subject, chosen by the artists of this age as a means for displaying their accurate knowledge of anatomy.

On what a scale some of the artists of Asia Minor would work is shown us by the enormous group, by Apollonius and Tauriscus of Tralles, which is called the Farnese Bull (Plate I. fig. 51), and which represents how Dirce was tied to a wild bull by her step- sons Zethus and Amphion.

The extensive excavations and alterations which have taken place at Rome in recent years have been very fruitful; the results may be found partly in the palace of the Home. Conservatori on the Capitol, partly in the new museum of the Terme. Among recently found statues none excel in interest some bronzes of large size dating from the Hellenistic age. In the figure of a seated boxer (Plate V. fig. 72), in scale somewhat exceeding life, attitude and gesture are expressive. Evidently the boxer has fought already, and is awaiting a further conflict. His face is cut and swollen; on his hands are the terrible caestus, here made of leather, and not loaded with iron, like the caestus described by Virgil. The figure is of astounding force; but though the face is brutal and the expression savage, in the sweep of the limbs there is nobility, even ideal beauty. To the last the Greek artist could not set aside his admiration for physical perfection. Another bronze figure of more than life-size is that of a king of the Hellenistic age standing leaning on a spear. He is absolutely nude, like the athletes of Polyclitus. Another large bronze presents us with a Hellenistic type of Dionysus.

Besides the bronzes found in Rome we may set those recently found in the sea on the coast of Cythera, the contents of a ship sailing from Greec’e to Rome, and lost on the way. The date of these bronze statues

has been disputed. In any case, even if executed in the Roman age, they go back to originals of the 5th and 4th centuries. The most noteworthy among them is a beautiful athlete (Plate V. fig. 73) standing with hand upraised, which reflects the style of the Attic school of the 4th century.

After 146 B.C. when Corinth was destroyed and Greece became a Roman province, Greek art, though by no means extinct, worked mainly in the employ of the Roman conquerors (see Roman Art).

IV. Select Bibliography. 1 — I. General works on Greek Art. — The only recent general histories of Greek art are: H. Brunn, Griechische Kunstgeschichte, bks. i. and ii., dealing with archaic art; W. Klein, Geschichte der griechischen Kunst, no illustrations; Perrot et Chipiez, Histoire de I'art dans I antiquite, vols. vii. and viii. (archaic art only).

Introductory are: P. Gardner, Grammar of Greek Art; J. E. Harrison, Introductory Studies in Greek Art; H. B. Walters, Art of the Greeks.

Useful are also: H. Brunn, Geschichte der griechischen Kiinstler, (new edition, 1889); J. Overbeck, Die antiken Schriftquellen zur Geschichte der bildenden Kiinste bei den Griechen; untranslated passages in Latin and Greek; the Elder Pliny's Chapters on the History of Art, edited by K. Tex-Blake and E. Sellers; H. S. Jones, Ancient Writers on Greek Sculpture.

II. Periodicals dealing with Greek Archaeology. — England: Journal of Hellenic Studies; Annual of the British School at Athens; Classical Review. France : Revue archeologique ; Gazette arche- ologique; Bulletin de correspondence hellenique. Germany: Jahr- buch des K. deutschen arch. Instituts; Mitteilungen des arch. Inst., Athenische Abteilung, Romische Abteilung; Antike Denkmaler. Austria: Jahreshefte des K. Osterreich. arch. Instituts. Italy: Publications of the Accademia dei Lincei; Monumenti antichi; Not. dei scavi; Bulletino comunale di Roma. Greece: Ephemeris archaiologike; Deltion archaiologikon; Praktika of the Athenian Archaeological Society.

III. Greek Architecture. — General: Perrot et Chipiez, Histoire de ' I'art dans I 'antiquite, vol. vii. ; A. Choisy, Histoire de V architecture,

vol. i. ; Anderson and Spiers, Architecture of Greece and Rome; E. Boutmy, Philosopkie de I' architecture en Grece ; R. Sturgis, History of Architecture, vol. i.; A. Marquand, Greek Architecture.

IV. Greek Sculpture. — General: M. Collignon, Histoire de la sculpture grecque (2 vols.) ; E. A. Gardner, Handbook of Greek Sculp-

1 The date is given when the work cannot be considered new.

ture ; A. Furtwangler, Masterpieces of Greek Sculpture, translated and edited by E. Sellers; Friederichs and Wolters, Bausteine zur Geschichte der griechisch-romischen Plastih (1887) ; von Mach, Hand- book of Greek and Roman Sculpture, 500 plates ; H. Bulle, Der schbne Mensch in der Kunst: Altertum, 216 plates; S. Reinach, Repertoire de la statuaire grecque et romaine, 3 vols.

V. Greek Painting and Vases. — Woltmann and Woermann, History of Painting, vol. i., translated and edited by S. Cohan (1880); H. B. Walters, History of Ancient Pottery (2 vols.) ; Harrison and MacColl, Greek Vase-paintings (1894); O. Rayet et M. Collignon, Histoire de la ceramique grecque (1888); P. Girard, La Peinture antique . (1892) ; S. Reinach, Repertoire des vases peints grecs el etrusques (2 vols.) ; Furtwangler und Reichhold, “Griechische Vasenmalerei,” Wiener Vorlegeblatter filr archaologische tjbungen (1887-1890).

VI. Special Schools and Sites. — A. Joubin, La Sculpture grecque entre les guerres mediques et I’epoque de Piriclbs; C. Waldstein, Essays on the Art of Pheidias (1885); W. Klein, Praxiteles; G. Perrot, Praxitele; A. S. Murray, Sculptures of the Parthenon; W. Klein, Euphronios ; E. Pottier, Douris ; P. Gardner, Sculptured Tombs of Hellas; E. A. Gardner, Ancient Athens; A. Botticher, Olyrnpia; Bernoulli, Griechische Ikonographie ; P. Gardner, The Types of Greek Coins (1883); E. A. Gardner, Six Greek Sculptors.

VII. Books related to the subject. — J. G. Frazer, Pausanias’s Description of Greece (6 vols.) ; J. Lange, Darstellung des Menschen in der alteren griechischen Kunst; E. Brilcke, The Human Figure; its Beauties and Defects; A. Michaelis, Ancient Marbles in Great Britain (1882) ; Catalogue of Greek Sculpture in the British Museum (3 vols.) ; Catalogue of Greek Vases in the British Museum (4 vols.) ; J. B. Bury, History of Greece (illustrated edition) ; Baumeister, Denkmaler des klassischen Altertums (3 vols.), (P. G.)

GREEK FIRE, the name applied to inflammable and destructive compositions used in warfare during the middle ages and particularly by the Byzantine Greeks at the- sieges of Constantinople. The employment of liquid fire is represented on Assyrian bas-reliefs. At the siege of Plataea (429 B.C.) the Spartans attempted to burn the town by piling up against the walls wood saturated with pitch and sulphur and setting it on fire (Thuc. ii. 77), and at the siege of Delium (424 B.C.) a cauldron containing pitch, sulphur and burning charcoal, was placed against the walls and urged into flame by the aid of a bellows, the

blast from which was conveyed through a hollow tree-trunk (Thuc. iv. 100). Aeneas Tacticus in the following century mentions a mixture of sulphur, pitch, charcoal, incense and tow, which was packed in wooden vessels and thrown lighted upon the decks of the enemy's ships. Later, as in receipts given by Vegetius (c. a.d. 350), naphtha or petroleum is added, and some nine centuries afterwards the same substances are found forming part of mixtures described in the later receipts (which probably date from the beginning of the 13 th century) of the collection known as the Liber ignium of Marcus Graecus. In subsequent receipts saltpetre and turpentine make their appearance, and the modern " carcass composition," containing sulphur, tallow, rosin, turpentine, saltpetre and crude antimony, is a repre- sentative of the same class of mixtures, which became known to the Crusaders as Greek fire but were more usually called wildfire. Greek fire, properly so-called, was, however, of a some- what different character. It is said that in the reign of Con- stantine Pogonatus (648-685) an architect named Callinicus, who had fled from Heliopolis in Syria to Constantinople, prepared a wet fire which was thrown out from siphons (to Sia tSiv mˆxavuv eKfaponevov irvp vypov), and that by its aid the ships of the Saracens were set on fire at Cyzicus and their defeat assured. The art of compounding this mixture, which is also referred to as irvp daXao-dLov, or sea fire, was jealously guarded at Con- stantinople, and the possession of the secret on several occasions proved of great advantage to the city. The nature of the compound is somewhat obscure. It has been supposed that the novelty introduced by Callinicus was saltpetre, but this view involves the difficulty that that substance was apparently not known till the 13th century, even if it were capable of accounting for the properties attributed to the wet fire. Lieut.-Colonel H. W. L. Hime, after a close examination of the available evidence, concludes that what distinguished Greek fire from the other incendiaries of the period was the presence of quicklime, which was well known to give rise to a large development of heat when brought into contact with water. The mixture, then, was composed of such materials as sulphur and naphtha with

quicklime, and took fire spontaneously when wetted — whence the name of wet fire or sea fire; and portions of it were " pro- jected and at the same time ignited by applying the hose of a water engine to the breech " of the siphon, which was a wooden tube, cased with bronze.

See Lieut. -Col. H. VV. L. Hime, Gunpowder and Ammunition, their Origin and Progress (London, 1904).

GREEK INDEPENDENCE, WAR OF, the name given to the great rising of the Greek subjects of the suJtan against the Ottoman domination, which began in 182 1 and ended in 1833 with the establishment of the independent kingdom of Greece. The circumstances that led to the insurrection and the general diplomatic situation by which its fortunes were from time to time affected are described elsewhere (see Greece: History; Turkey: History). The present article is confined to a description of the general character and main events of the war itself. If we exclude the abortive invasion of the Danubian principalities by Prince Alexander Ypsilanti (March 182 1), which collapsed ignominiously as soon as it was disavowed by the tsar, the theatre of the war was confined to continental Greece, the Morea, and the adjacent narrow seas. Its history may, broadly speaking, be divided into three periods: the first (1821-1824), during which the Greeks, aided by numerous volunteers from Europe, were successfully pitted against the sultan's forces alone; the second, from 1824, when the disciplined troops of Mehemet Ali, pasha of Egypt, turned the tide against the insurgents; the third, from the intervention of the European powers in the autumn of 1827 to the end.

When, on the 2nd of April 1821, Archbishop Germanos, head of the Hetaeria in the Morea, raised the standard of the cross at Kalavryta as the signal for a general rising of the Christian population, the circumstances were highly favourable. In the Morea itself, in spite of plentiful warning, the Turks were wholly unprepared; while the bulk of the Ottoman army, under the seraskier Khurshid Pasha, was engaged in the long task of reducing the intrepid Ali, pasha of Iannina (see Ali, pasha of Iannina).

Another factor, and that the determining one, soon came to the aid of the Greeks. In warfare carried on in such a country as Greece, sea-girt and with a coast deeply indented, inland without roads and intersected with rugged mountains, victory — as Wellington was quick to observe — must rest with the side that has command of the sea. This was assured to the insurgents at the outset by the revolt of the maritime communities of the Greek archipelago. The Greeks of the islands had been accus- tomed from time immemorial to seafaring; their ships — some as large as frigates — were well armed, to guard against the Barbary pirates and rovers of their own kin; lastly, they had furnished the bulk of the sailors to the Ottoman navy which, now that this recruiting ground was closed, had to be manned hastily with impressed crews of dock-labourers and peasants, many of whom had

never seen the sea. The Turkish fleet, ” adrift in the Archipelago ” — as the British seamen put it — though greatly superior in tonnage and weight of metal, could never be a match for the Greek brigs, manned as these were by trained, if not disciplined, crews.

The war was begun by the Greeks without definite plan and without any generally recognized leadership. The force with Outbreak w ˆich Germanos marched from Kalavryta against of the Patras was composed of peasants armed with scythes, lasumc- clubs and slings, among whom the ” primates ” exer- Uoa ‘ cised a somewhat honorary authority. The town

itself was destroyed and those of its Mussulman inhabitants who could not escape into the citadel were massacred; but the citadel remained in the hands of the Turks till 1828. Mean- , while, in the south, leaders of another stamp had appeared: Petros, bey of the Maina (q.v.) chief of the Mavromichales, who at the head of his clan attacked Kalamata and put the Mussul- man inhabitants to the sword; and Kolokotrones, a notable brigand once in the service of the Ionian government, who — fortified by a vision of the Virgin — captured Karytaena and slaughtered its infidel population. Encouraged by these

successes the revolt spread rapidly; within three weeks there was not a Mussulman left in the open country, and the remnants of the once dominant class were closely besieged in the fortified towns by hosts of wild peasants and brigands. The flames ot revolt now spread across the Isthmus of Corinth : early in April the Christians of Dervenokhoria rose, and the whole of Boeotia and Attica quickly followed suit; at the beginning of May the Mussulman inhabitants of Athens were blockaded in .the Acro- polis. In the Morea, meanwhile, a few Mussulman fortresses still held out : Coron, Modon, Navarino, Patras, Nauplia, Monemvasia, Tripolitsa. One by one they fell, and everywhere were repeated the same scenes of butchery. The horrors culminated in the capture of Tripolitsa, the capital of the vilayet. In Sept- ember this was taken by storm; Kolokotrones rode in triumph to the citadel over streets carpeted with the dead; and the crowning triumph of the Cross was celebrated by a cold-blooded massacre of 2000 prisoners of all ages and both sexes. This completed the success of the insurrection in the Morea, where only Patras, Nauplia, and one or two lesser fortresses remained to the Turks.

Meanwhile, north of the Isthmus, the fortunes of war had been less one-sided. In the west Khurshid’s lieutenant, Omar Vrioni (a Mussulman Greek of the race of the Palaeologi), had inflicted a series of defeats on the insurgents, recaptured Levadia, and on the 30th of

June relieved the Acropolis; but the rout of the troops which Mahommed Pasha was bringing to his aid by the Greeks in the defile of Mount Oeta, and the news of the fall of Tripolitsa, forced him to retreat, and the campaign of 182 1 ended with the retirement of the Turks into Thessaly.

The month of April had witnessed the revolt of the principal Greek islands, Spetsae on the 7th, Psara on the 23rd, Hydra on the 28th and Samos on the 30th. Their fleets were divided into squadrons, of which one, under. Tombazes, was deputed to watch for the entrance of the Ottomans into the archipelago, while the other under Andreas Miaoulis (q.v.) sailed to blockade Patras and watch the coasts of Epirus. At sea, as on land, the Greeks opened the campaign with hideous atrocities, almost their first exploit being the capture of a vessel carrying to Mecca the sheik-ul-Islam and his family, whom they murdered with every aggravation of outrage.

These inauspicious beginnings, indeed, set the whole tone of the war, which was frankly one of mutual extermination. On both sides the combatants were barbarians, without discipline or competent organization. At sea the Z ner %! Greeks rapidly developed into mere pirates, and even / the war. Miaoulis, for all his high character and courage, was often unable to prevent his captains from sailing home at critical moments, when pay or booty failed. On land the presence of a few educated Phanariots, such as Demetrios Ypsilanti or Alexander Mavrocordato, was powerless to inspire the rude hordes with any sense of order or of humanity in warfare; while every lull in the fighting, due to a temporary check to the Turks, was the signal for internecine conflicts due to the rivalry of leaders who, with rare exceptions, thought more of their personal power and profit than of the cause of Greece.

This cause, indeed, was helped more by the impolitic re- prisals of the Turks than by the heroism of the insurgents. All . Europe stood aghast at the news of the execution of ,

the Patriarch Gregorios of Constantinople (April 22, reprisals. 182 1) and the wholesale massacres that followed, culminating as these did in the extermination of the prosperous community of Scio (Chios) in March 1822. The cause of Greece was now that of Christendom, of the Catholic and Protestant West, as of the Orthodox East. European Liberalism, too, gagged and fettered under Metternich's Europe " system," recognized in the Greeks the champions and the of its own cause; while even conservative states- rising men, schooled in the memories of ancient Hellas, i en i s „\~ saw in the struggle a fight of

civilization against barbarism. This latter belief, which was, moreover, flattering to their vanity, the Greek leaders were astute enough to foster; the propaganda of Adamantios Coraes (q.v.) had done its

work; and wily brigands, like Odysseus of Ithaka, assuming the style and trappings of antiquity, posed as the champions of classic culture against the barbarian. All Europe, then, hailed with joy the exploit of Constantine Kanaris, who on the night of June 18-19 succeeded in steering a fire-ship among the Turkish squadron off Scio, and burned the flag-ship of the capudan-pasha with 3000 souls on board.

Meanwhile Sultan Mahmud, now wide awake to the danger, had been preparing for a systematic effort to suppress the rising. The threatened breach with Russia had been avoided by Metternich's influence on the tsar Alexander; the death of Ali of lannina had set free the army of Khurshid Pasha, who now, as seraskier of Rumelia, was charged with the task of reducing the Morea. In the spring of 1822 two Turkish armies advanced southwards: one, under Omar Vrioni, along the coast of Western Hellas, the other, under Ali, pasha of Drama (Dramali), through Boeotia and Attica. Omar was held in check by the mud Expert- ramparts of Missolonghi; but Dramali, after exacting tioa of fearful vengeance for the massacre of the Turkish Dramali, garrison of the Acropolis at Athens, crossed the Isthmus and with the over-confidence of a conquering barbarian advanced to the relief of the hard-pressed garrison of Nauplia. He crossed the perilous defile of Dervenaki un- opposed; and at the news of his approach mostof the members of the Greek government assembled at Argos fled in panic terror. Demetrios Ypsilanti, however, with a few hundred men joined the Mainote Karayanni in the castle of Larissa, which crowns the acropolis of ancient Argos. This held Dramali in check, and gave Kolokotrones time to collect an army. The Turks, in the absence of the fleet which was to have brought them supplies, were forced to retreat (August 6) ; the Greeks, inspired with new courage, awaited them in the pass of Dervenaki, where the undisciplined Ottoman host, thrown into confusion by an avalanche of boulders hurled upon them, was annihilated. In Western Greece the campaign had an outcome scarcely less disastrous for the Turks. The death of Ali of lannina had been followed by the suppression of the insurgent Suliotes and the advance of Omar Vrioni southwards to Missolonghi; but the town held out gallantly, a Turkish surprise attack, on the 6th of January 1823, was beaten off, and Omar Vrioni had to abandon the siege and retire

northwards over the pass of Makrynoros.

The victorious outcome of the year's fighting had a disastrous effect upon the Greeks. Their victories had been due mainly to the guerilla tactics of the leaders of the type of mmonxihe Kolokotrones; Mavrocordato, whose character and Greeks. antecedents had marked him out as the natural head of the new Greek state, in spite of his successful defence of Missolonghi, had been discredited by failures else- where; and the Greeks thus learned to despise their civilized advisers and to underrate the importance of discipline. The temporary removal of the common peril, moreover, let loose all the sectional and personal jealousies, which even in face of the enemy had been with difficulty restrained, and the year 1823 witnessed the first civil war between the Greek parties. These internecine feuds might easily have proved fatal to the cause of Greece. In the Archipelago Hydriotes and Spetsiotes were at daggers drawn; the men of Psara were at open war with those of Samos; all semblance of discipline and cohesion had vanished from the Greek fleet. Had Khosrev, the new Ottoman admiral, been a man of enterprise, he might have regained the command of the sea and, with it, that of the whole situation. But the fate of his predecessor had filled him with a lively terror of Kanaris and his fire-ships; he contented himself with a cruise round the coasts of Greece, and was happy. otiSH*" t0 return t0 safety under the guns of the Dardanelles without having accomplished anything beyond throw- ing supplies and troops into Coron, Modon and Patras. On land, meanwhile, the events of the year before practically repeated themselves. In the west an army of Mussulman and Catholic Albanians, under Mustai Pasha, advanced southwards. On the night of the 21st of August occurred the celebrated exploit of Marko Botzaris and his Suliotes: a successful surprise

attack on the camp of the Ottoman vanguard, in which the Suliote leader fell. The jealousy of the Aetolian militia for the Suliotes, however, prevented the victory being decisive; and Mustai advanced to the siege of Anatoliko, a little town in the lagoons near Missolonghi. Here he was detained until, on the nth of December, he was forced to raise the siege and retire northwards. His colleague, Yussuf Pasha, in East Hellas fared no better; here, too, the Turks gained some initial successes, but in the end the harassing tactics of Kolokotrones and his guerilla bands forced them back into the plain of the Kephissos. At the end of the year the Greeks were once more free to renew their internecine feuds.

Just when these feuds were at their height, in the autumn of 1823, the most famous of the Philhellenes who sacrificed themselves for the

cause of Greece, Lord Byron, arrived in Greece.

The year 1824 was destined to be a fateful one for the Greek cause. The large loans raised in Europe, the first instalment of which Byron had himself brought over, while providing the Greeks with the sinews of war, provided s f c f.” them also with fresh material for strife. To the 1824. struggle for power was added a struggle for a share of this booty, and a second civil war broke out, Kolokotrones leading the attack on the forces of the government. Early in 1825 the government was victorious; Kolokotrones was in prison; and Odysseus, the hero of so many exploits and so many crimes, who had ended by turning traitor and selling his services to the Turks, had been captured, imprisoned in the Acropolis, and finally assassinated by his former lieutenant Gouras (July 16, 1824). But a new and more terrible danger now threatened Greece. Sultan Mahmud, despairing of sup- pressing the insurrection by his own power, had reluctantly summoned to his aid Mehemet Ali, pasha of Egypt, whose well-equipped fleet and disciplined army were now i n t errea . thrown into the scale against the Greeks. Already, Hon ot in June 1823, the pasha’s son-in-law Hussein Bey Mehemet had landed in Crete, and by April of the following year had reduced the insurgent islanders to submission. Crete now became the base of operations against the Greeks. On the 19th of June Hussein appeared before Kasos, a nest of pirates of evil reputation, which he captured and destroyed. The same day the Egyptian fleet, under Ibrahim Pasha, sailed from Alexandria. Khosrev, too, emboldened by this new sense of support, ventured to sea, surprised and destroyed Psara (July 2), and planned an attack on Samos, which was defeated by Miaoulis and his fire-ships (August 16, 17). On the 1st of September, however, Khosrev succeeded in effecting a junction with Ibrahim off Budrun, and two indecisive engagements followed with the united Greek fleet on the 5th and 10th. The object of Ibrahim was to reach Suda Bay with his transports, which the Greeks should at all costs have prevented. A first attempt was defeated by Miaoulis on the 16th of November, and Ibrahim was compelled to retire and anchor off Rhodes; but the Greek admiral was unable to keep his fleet together, the season was far advanced, his captains were clamouring for arrears of pay, and the Greek fleet sailed for Nauplia, leaving the sea unguarded. On the 5th of December Ibrahim again set sail, and reached Suda without striking a blow. Here he completed his preparations, and, on the 24th of February 1825, landed at Modon in the Morea with a force of 4000 regular infantry and 500 cavalry. The rest followed, without the Greeks making any effort to intercept them.

The conditions of the war were now completely changed. The Greeks, who had been squandering the money provided by the loans in every

sort of senseless extravagance, affected to despise the Egyptian invaders, but they L'JXe'" were soon undeceived. On the 21st of March Ibrahim Morea. had laid siege to Navarino, and after some delay a Greek force under Skourti, a Hydriote sea-captain, was sent to its relief. The Greeks had in all some 7000 men, Suliotes, Albanians, armatoli from Rumelia, and some irregular Bulgarian and Vlach cavalry. On the 19th of April they were met by

MIsso looghl.

Ibrahim at Krommydi with 2000 regular infantry, 400 cavalry and four guns. The Greek entrenchments were stormed at the point of the bayonet by Ibrahim's fellahin at the first onset; the defenders broke and fled, leaving 600 dead on the field. The news of this disaster, and of the fall of Pylos and Navarino that followed, struck terror into the Greek government; and in answer to popular clamour Kolokotrones was taken from prison and placed at the head of the army. But the guerilla tactics of the wily klepht were powerless against Ibrahim, who marched northward, and, avoiding Nauplia for the present, seized Tripolitsa, and made this the base from which his* columns marched to devastate the country far and wide.

Meanwhile from the north the Ottomans were making another supreme effort. The command of the army that was to operate Reshid ' n west Hellas had been given to Reshid " Kutahia," " Kutabia " pasha of Iannina, an able general and a man of deter- beshges mined character. On the 6th of April, after bribing the Albanian clansmen to neutrality, he passed the defile of Makrynoros, which the Greeks had left undefended, and on the 7th of May opened the second siege of Missolonghi. For twelve months the population held out, re- pulsing the attacks of the enemy, refusing every offer of honour- able capitulation. This resistance was rendered possible by the Greek command of the sea, Miaoulis from time to time entering the lagoons with supplies; it came to an end when this command was lost. In September 1825 Ibrahim, at the order of the sultan, had joined Reshid before the town; piecemeal the outlying forts and defences now fell, until the garrison, reduced by starvation and disease, determined to hazard all on a final sortie. This took place on the night of the 22nd of April 1826; but a mistaken order threw the ranks of the Greeks into disorder, and the Turks entered the town pell-mell with the retreating crowd. Only a remnant of the defenders succeeded in gaining the

forests of Mount Zygos, where most of them perished.

The fall of Missolonghi, followed as this was by the submission of many of the more notable chiefs, left Reshid free to turn his attention to East Hellas, where Gouras had been ruling iskakis. as a practically independent chief and in the spirit of a brigand. The peasants of the open country welcomed the Turks as deliverers, and Reshid's conciliatory policy facilitated his march to Athens, which fell at the first assault on the 25th of August, siege being at once laid to the Acropolis, where Gouras and his troops had taken refuge. Round this the war now centred; for all recognized that its fall would involve that of the cause of Greece. In these straits the Greek government entrusted the supreme command of the troops to Karaiskakis, an old retainer of Ali of Iannina, a master of the art of guerilla war, and, above all, a man of dauntless courage and devoted patriotism. A first attempt to relieve the Acropolis, with the assistance of some disciplined troops under the French Colonel Fabvier, was defeated at Chaidari by the Turks. The garrison of the Acropolis was hard pressed, and the death of Gouras (October 13th) would have ended all, had not his heroic wife taken over the command and inspired the defenders with new courage. For months the siege dragged on, while Karaiskakis fought with varying success in the mountains, a final victory at Distomo (February 1827) over Omar Vrioni securing the restoration to the Greek cause of all continental Greece, except the towns actually held by the Turks.

It was at this juncture that the Greek government, reinforced by a fresh loan from Europe, handed over the chief command at sea to Lord Cochrane (earl of Dundonald, q.v.), and Cochrane tna(. of the land forces to General (afterwards Sir Church. Richard) Church, both Miaoulis and Karaiskakis consenting without demur to serve under them. Cochrane and Church at once concentrated their energies on the task of relieving the Acropolis. Already, on the 5th of February, General Gordon had landed and entrenched himself on the hill of Munychia, near the ancient Piraeus, and the efforts of the Turks to dislodge him had failed, mainly owing to the fire of the steamer " Karteria " commanded by Captain Hastings. When Church and Cochrane arrived, a general assault on the

Ottoman camp was decided on. This was preceded, on the 25th of April, by an attack, headed by Cochrane, on the Turkish troops established near the monastery of St Spiridion, the result of which was to establish communications between the Greeks at Munychia and Phalerum and isolate*Reshid's vanguard on the promontory of the Piraeus. The monastery held out for two days longer, when the

Albanian garrison surrendered on terms, but were massacred by the Greeks as they were marching away under escort. For this miserable crime Church has, by some historians, been held responsible by default; it is clear, however, from his own account that no blame rests upon him (see his MS. Narrative, vol. i. chap. ii. p. 34). The assault on the Turkish main camp was fixed for the 6th of May; but, unfortunately, a chance skirmish brought on an engagement the day before, in the course of which Karaiskakis was killed, an irreparable loss in view of his prestige with the wild armatoli. The assault on the following day was a disastrous failure. The Greeks, advancing prematurely over broken ground and in no sort of order, were fallen upon in flank by defeat at Reshid's horsemen, and fled in panic terror. The Athens. English officers, who in vain tried to rally them, themselves only just escaped by scrambling into their boats and putting off to the war-vessels, whose guns checked the pursuit and enabled a remnant of the fugitives to escape. Church held Munychia till the 27th, when he sent instructions for the garrison of the Acropolis to surrender. On the 5th of June the remnant of the defenders marched out with the honours of war, and continental Greece was once more in the power of the Turks. Had Reshid at once advanced over the Isthmus, the Morea also must have been subdued; but he was jealous of Ibrahim, and preferred to return to Iannina to consolidate his conquests.

The fate of Greece was now in the hands of the Powers, who after years of diplomatic wrangling had at last realized that intervention was necessary if Greece was to be saved for European civilization. The worst enemy of the anarchy. Greeks was their own incurable spirit of faction; in the very crisis of their fate, during the siege of Missolonghi, rival presidents and rival assemblies struggled for supremacy, and a third civil war had only been prevented by the arrival of Cochrane and Church. Under their influence a new National Assembly met at Troezene in March 1827 and elected as president Count Capo d' Istria (

Authorities. — There is no trustworthy history of the war, based on all the material now available, and all the existing works must be read with caution, especially those by eye-witnesses, who were too often prejudiced or the dupes of the Greek factions. The best-known works are: G. Finlay, Hist, of the Greek Revolution (2 vols., London, ˆ1861); T. Gordon, Hist, of the Greek Revolution (London, 1833); C. W. P. Mendelssohn-Bartholdy, Geschichte Griechenlands, &fc. {Staatengeschichte der neuesten Zeit) (2 vols. , Leipzig, 1 870-1 874) ; F. C. H. L. Pouqueville, Histoire de la regeneration de la Greet, &c. (4 vols., Paris, 1824), — the author was French resident at the court of

Ali of Iannina and afterwards consul at Patras; Count A. Prokesch-Osten, Geschichte des Abfalls der Griechen vom tiirkischen Reich, &c. (6 vols., Vienna, 1867), the last four volumes consist- ing of pieces justificatives of much value. See also W. Alison Phillips, The War of Greek Independence (London and New York,

1897), a sketch compiled mainly from the above-mentioned works: p Spiridionos Tricoupi, 'laropla rijs 'EXAiji'urijs inavacrTi.mjs tiravaoTaaeus (Athens, 1859), in four parts: (1) History of the Hetaeria Philike, (2) The heralding of thenar and the rising under Ypsilanti,(3 and 4). The insurrection in Greece to 1822, with many documents. Of great value also are the 29 volumes of Correspondence and Papers of Sir Richard Church, now in the British Museum (Add MSS. 36,543- 36,571). Among these is a Narrative by Church of the war in Greece during his tenure of the command (vols, xxi.xxiii., Nos. 36,563 36,565), which contains the material for correcting many errors re- peated in most works on the war, notably the strictures of Finlay and others on Church's conduct before Athens. For further references see the bibliography appended to W. Alison Phillips's chapter on " Greece and the Balkan Peninsula " in the Cambridge Modern History, x. 803. (W. A. P.)

GREEK LANGUAGE. Greek is one of the eight main branches into which the Indo-European languages (q.v.) are divided. The area in which it is spoken has been curiously constant throughout its recorded history. These limits are, roughly speaking, the shores of the Aegean, on both the European and the Asiatic side, and the intermediate islands (one of the most archaic of Greek dialects being found on the eastern side in the island of Cyprus), and the Greek peninsula generally from its southern promontories as far as the mountains which shut in Thessaly on the north. Beyond Mt. Olympus and the Cambunian mountains lay Macedonia, in which a closely kindred dialect was spoken, so closely related, indeed, that O. Hoffmann has argued (Die Makedonen, Gottingen, 1906) that Macedonian is not only Greek, but a part of the great Aeolic dialect which included Thessalian to the south and Lesbian to the east. In the north-west, Greek included many rude dialects little known even to the ancient Greeks themselves, and it extended northwards beyond Aetolia. and Ambracia to southern Epirus and Thesprotia. In the Homeric age the great shrine of Pelasgian Zeus was at Dodona, but, by the time of Thucydides, Aetolia and all north of it had come to be looked upon as

the most backward of Greek lands, where men lived a savage life, speaking an almost unin- telligible language, and eating raw flesh (ayvdnxTbrarot. 5ˆ ytwccrav Kai wfjuHfrayoi, Thuc. iii. 94, of the Aetolian Eurytanes). The Greeks themselves had no memory of how they came to occupy this land. Their earliest legends connected the origin of their race with Thessaly and Mt. Pindus,but Athenians and Arcadians also boasted themselves of autochthonous race, inhabiting a country wherein no man had preceded their ancestors. The Greek language, at any rate as it has come down to us, is remarkably perfect, in vowel sounds being the most primitive of any of the Indo-European languages, while its verb system has no rival in completeness except in the earliest Sanskrit of the Vedic literature. Its noun system, on the other hand, is much less complete, its cases being more broken down than those of the Aryan, Armenian, Slavonic and Italic families.

The most remarkable characteristic of Greek is one conditioned by the geographical aspect of the land. Few countries are so broken up with mountains as Greece. Not only do mountain ranges as elsewhere on the European continent run east and west, but other ranges cross them from north to south, thus dividing the portions of Greece at some distance from the sea into hollows without outlet, every valley being separated for a considerable part of the year from contact with every other, and inter-communication at all seasons being rendered difficult. Thus till external coercion from Macedon came into play it was never possible to establish a great central government controlling the Greek mainland. The geo- graphical situation of the islands in the Aegean equally led to the isolation of one little territory from another. To these geographical considerations may be added the inveterate desire of the Greeks to make the 7r6Xu, the city state, everywhere and at all times an independent unit, a desire which, originating in the geographical conditions, even accentuated the isolating effect of the natural features of the country. Thus at one time in the little island of Amorgos there were no less than three separate and independent political units. The inevitable result of geographical and political division was the maintenance of a great number of local character- istics in language, differentiating in this respect also each political community from its nearest neighbours. It was only natural that the inhabitants of a country so little adapted to maintain a numerous population should have early sent off swarms to other lands. The earliest stage of colonization lies in the borderland between myth and history. The Greeks themselves knew that a population had preceded them in the islands of the Cyclades which they identified

with the Cariahs of Asia Minor (Herodotus i. 171; Thucydides i. 4. 8). The same population indeed appears to have preceded them on the

mainland of Greece, for there are similar place-names in Caria and in Greece which have no etymology in Greek. Thus the endings of words like Parnassus and Halicarnassus seem identical, and the common ending of place-names in -ivdos, KopivSos, npo/SdAwflos, &c, seems to be the same in origin with the common ending of Asiatic names in -nda, Alinda, Karyanda, &c. Probably the earliest portion of Asia Minor to be colonized by the Greeks was the north-west, to which came settlers from Thessaly, when the early inhabitants were driven out by the Thesprotians, who later controlled Thessaly. The name Aeolis, which after times gave to the N.W. of Asia Minor, was the old name for Thessaly (Hdt. vii. 176). These Thesprotians were of the same stock as the Dorians, to whose invasion of the Peloponnese the later migration, which carried the lonians to Asia and the Cypriot Greeks to Cyprus, in all probability was due. From the north Aegean probably the Dorians reached Crete, where alone their existence is recorded by Homer (Odyssey, xix. 175 ff.; Diodorus Siculus v. 80. 2) ; cp. Fick, Vorgriechische Ortsnamen (1906).

Among the Greeks of the pre-Dorian period Herodotus distin- guishes various stocks. Though the name is not Homeric, both Herodotus and Thucydides recognize an Aeolian stock which must have spread over Thessaly and far to the west till it was suppressed and absorbed by the Dorian stock which came in from the north- west. The name of Aeolis still attached in Thucydides' time to the western area of Calydon between the mountains and the N. side of the entrance to the Corinthian gulf (iii. 102). In Boeotia the same stock survived (Thuc. vii. 57. 5), overlaid by an influx of Dorians, and it came down to the isthmus; for the Corinthians, though speaking in historical times a Doric dialect, were originally Aeolians (Thuc. iv. 42). In the Peloponnese Herodotus recognizes (viii. 73) three original stocks, the Arcadians, the lonians of Cynuria. and the Achaeans. . In Arcadia there is little doubt that the pre-Dorian population maintained itself and its language, just as in the moun- tains of Wales, the Scottish Highlands and Connemara the Celtic language has maintained itself against the Saxon invaders. By Herodotus' time the Cynurians had been doricized, while the lonians, along the south side of the Corinthian gulf, were expelled by the Achaeans (vii. 94, viii. 73), apparently themselves driven from their own homes by the Dorian invasion (Strabo viii. p. 333 fin.). How- ever this may be, the Achaeans of historical times spoke a dialect akin to that of northern Elis and of the Greeks on the north side of the Corinthian gulf. How close the relation may have been between the language of the Achaeans of the Peloponnese in the Homeric age and their contemporaries in Thessaly we have no means of ascertain- ing

definitely, the documentary evidence for the history of the dialects being all very much later than Homeric times. Even in the Homeric catalogue Agamemnon has to lend the Arcadians ships to take them to Troy (Iliad, ii. 612). But a population speaking the same or a very similar dialect was probably seated on the eastern coast, and migrated at the beginning of the Doric invasion to Cyprus. As this population wrote not in the Greek alphabet but in a peculiar syllabary and held little communication with the rest of the Greek world, it succeeded in preserving in Cyprus a very archaic dialect very closely akin to that of Arcadia, and also containing a consider- able number of words found in the Homeric vocabulary but lost or modified in later Greek elsewhere.

On this historical foundation alone is it possible to understand clearly the relation of the dialects in historical times. The prehistoric movements of the Greek tribes can to some extent be realized in their dialects, as recorded in their inscriptions, though all existing inscriptions belong to a much later period. Thus from the ancient Aeolis of northern Greece sprang the historical dialects of Thessaly and Lesbos with the neighbouring coast of Asia Minor. At an early period the Dorians had invaded and to some extent affected the character of the southern Thessalian and to a much greater extent that of the Boeotian dialect. The dialects of Locris, Phocis and Aetolia were a somewhat uncouth and unliterary form of Doric. According to accepted tradition, Elis had been colonized by Oxylus the Aetolian, and the dialect of the more northerly part of Elis, as already pointed out, is, along with the Achaean of the south side of the Corinthian gulf, closely akin to those dialects north of the Isthmus. The most southerly part of Elis — Triphylia — has a dialect akin to Arcadian. Apart from Arcadian the other dialects of the Peloponnese in historical times are all Doric, though in small details they differ among themselves. Though we are unable to check the statements of the historians as to the area occupied by Ionic in prehistoric times, it is clear from the legends of the close connexion between Athens and Troezen that the same dialect, had been spoken on both sides of the Saronic gulf, and may well have extended, as Herodotus says, along the eastern coast of the Peloponnese andthe south side of the Corinthian gulf. According to legend, the lonians expelled from the Peloponnese collected at Athens before they started on their migrations to the coast of Asia Minor._ Be that as it may, legend and language alike connected the Athenians with the lonians, though by the 5th century B.C. the Athenians no longer cared to be known by the name (Hdt. i. 143). Lemnos, Imbros and Scyros, which had long belonged to Athens, were Athenian also in language. The great island

of Euboea and all the islands of the- central Aegean between Greece and Asia were Ionic. Chios, the most'

northerly Ionic island on the Asiatic coast, seems to have been originally Aeolic, and its Ionic retained some Aeolic characteristics. The most southerly of the mainland towns which were originally Aeolic was Smyrna, but this at an early date became Ionic (Hdt. i. 149). The last important Ionic town to the south was Miletus, but at an early period Ionic widened its area towards the south also and took in Halicarnassus from the Dorians. According to Herodotus, there were four kinds of Ionic (xapaKTijpes y\uxjo-t)s Ttootpts, i. 142). Herodotus tells us the areas in which these dialects were spoken, but nothing of the differences between them. They were (1) Samos, (2) Chios and Erythrae, (3) the towns in Lydia, (4) the towns in Caria. The language of the inscriptions unfortunately is a koixtj, a conven- tional literary language which reveals no differences cf importance. Only recently has the characteristic so well known in Herodotus of k appearing in certain words where other dialects have ir (onus for oitwj, kou for iroO, &c.) been found in any inscription. It is, however, clear that this was a popular characteristic not considered to be sufficiently dignified for official documents. We may conjecture that the native languages spoken on the Lydian and Carian coasts had affected the character of the language spoken by the Greek immigrants, more especially as the settlers from Athens married Carian women, while the settlers in the other towns were a mixture of Greek tribes, many of them not Ionic at all (Hdt. i. 146).

The more southerly islands of the Aegean and the most southerly peninsula of Asia Minor were Doric. In the Homeric age Dorians were only one of many peoples in Crete, but in historical times, though the dialects of the eastern and the western ends of the island differ from one another and from the middle whence our most valuable documents come, all are Doric. By Melos and Thera Dorians carried their language to Cos, Calymr.us, Cnidus and Rhodes.

These settlements, Aeolic, Ionic and Doric, grew and prospered, and like nourishing hives themselves sent out fresh swarms to other lands. Most prosperous and energetic of all was Miletus, which established its trading posts in the Black Sea to the north and in the delta of the Nile (Naucratis) to the south. The islands also sent off their colonies, carrying their dialects with them, Paros to Thasos, Euboea to the

peninsulas of Chalcidice; the Dorians of Megara guarded the entrance to the Black Sea at Chalcedon and Byzantium. While Achaean influence spread out to the more southerly Ionian islands, Corinth carried her dialect with her colonies to the coast of Acarnania, Leucas and Corcyra. But the greatest of all Corinthian colonies was much farther to the west — at Syracuse in Sicily. Un- fortunately the continuous occupation of the same or adjacent sites has led to the loss of almost all that is early from Corinth and from Syracuse. Corcyra has bequeathed to us some interesting grave inscriptions from the 6th century B.C. Southern Italy and Sicily were early colonized by Greeks. According to tradition Cumae was founded not long after the Trojan War; even if we bring the date nearer the founding of Syracuse in 735 B.C., we have apparently no record earlier than the first half of the 5th century B.C., though it is still the earliest of Chalcidian inscriptions. Tarentum was a Laconian foundation, but the longest and most important document from a Laconian colony in Italy comes from Heraclea about the end of the 4th century B.C. — the report of a commission upon and the lease of temple lands with description and conditions almost of modern precision. To Achaea belonged the south Italian towns of Croton, Metapontum and Sybaris. The ancestry of the Greek towns of Sicily has been explained by Thucydides (vi. 2-5). Selinus, a colony of Megara, bewrays its origin in its dialect. Gela and Agrigentum no less clearly show their descent from Rhodes. According to tradition the great city of Cyrene in Africa was founded from Thera, itself an offshoot from Sparta.

Chief Characteristics of the Greek Dialects

1 . A rcadian and Cyprian. — As Cyprian was written in a syllabary which could not represent a consonant by itself, did not distinguish between voiced, unvoiced and aspirated consonants, did not represent at all a nasal before another consonant, and did not distinguish between long and short vowels, the interpretation of the symbols is of the nature of a conundrum and the answer is not always certain. Thus the same combination of two symbols would have to stand for Tore, robe, dirt, ooBij, rovde, rS>bt, to, or). No inscription of more than a few words in length is found in either dialect earlier than the 5th century B.C. In both dialects the number of important in- scriptions is steadily increasing. Both dialects change final o to v, curb passing into diru. Arcadian changes the verb ending -at into -ot. Arcadian uses or f for an original gw-sound, which appears in Attic Greek as 0: feXXu, Attic 0dXX«, ” throw.” In inflexion both agree in changing -do of masculine -d stems into av (Arcadian -carries this form also into the feminine -d stems), and in using locatives in – are declined not as -01, but as -/n verbs. The final 1 of the ending of the 3rd plural present

changes the preceding t to a : (pipovai, cp. Laconian (Doric) ioovTt, Attic ˆepotwt, Lesbian *poicjt. Instead of the Attic tis, the interrogative pronoun appears as iris, the initial a in Arcadian being written with a special symbol *• . The pronunciation is not certain. The original sound was qw, as in Latin quis, whence Attic tU and Thessalian ds. In Arcadian tav the Aeolie particle Kt and the Ionic av seem to be combined.

2. Aeolic. — Though Boeotian is overlaid with a Doric element, it nevertheless agrees with Thesˆdian and Lesbian in some characteristics. Unlike Greek generally; they represent the original qw of the word for four by ir before e, where Attic and other dialects have t: Trerrapes, Attic Tirrapes. The corresponding voiced and aspirated sounds are similarly treated : BeXˆeuos the adjective in Thessalian to Ae\ol, and iip for 6ijp. They all tend to change to v : owua, “name”; ov for &) in Thessalian: “AttXow, ” Apollo “; and v in Boeotian for ot: FvkIo. (obcla), ” house.” They also make the dative plural of the third declension in -eo-o-t, and the perfect participle active is declined like a present participle in -av. Instead of the Athenian method of giving the father’s name in the genitive when a citizen is described, these dialects (especially Thessalian) tend to make an adjective: thus instead of the Attic Arnioo-Bevris Arnxoa6kvovs, Aeolic would rather have A. AijfiooShetos. Thessalian stands midway between Lesbian and Boeotian, agreeing with Lesbian in the use of double consonants, where Attic has a single consonant, with or without lengthening of the previous syllable: i/j.p.1, Attic dpi for an original *esmi; o-rdXXa, Attic 0-7-17X77; £ewos for an earlier £kvFos, Attic ijtvoz, Ionic |«vjs, Doric lijros. Where Attic has -as from an earlier -acs or -avrs, Lesbian has cus: rals &p%ais accusative in Lesbian for older ravs apx”“s. Lesbian has no oxyton words according to the grammarians, the accent being carried back to the penult or ante- penultimate syllable. It has also no ” rough breathing,” but this characteristic it shared with the Ionic of Asia Minor, and in the course of time with other dialects. The characteristic particle of the dialects is kc, which is used like the Doric i > xa = Ti > x’?i J ‘ chance “; the pronunciation, therefore, must have been like the English sound in news, tune. Boeotian developed earlier than other dialects the changes in the vowels which characterize modern Greek: ai became e, nal passing into kt\: compare vartlp and Fixla above: et became t in ixt, ” has.” Thessalian shows some examples of the Homeric genitive in 010: iroXejuoto, &c. ; its ordinary genitive of o stems is in -01.

There are some points of connexion between this group and Arcadian-Cyprian: in both Thessalian and Cyprian the character- istic 7tt6X«

(Attic, &c, t6\ls) and oavxva- for odˆci; are found, and both groups form the ” contracting verbs ” not in -u but in -/u. In the second group as in the first there is little that precedes the 5th century B.C. Future additions to our materials may be expected to lessen the gap between the two groups and Homer.

3. Ionic-Attic— One of the earliest of Greek inscriptions — of the 7th century, at least— is the Attic inscription written in two lines from right to left upon a wine goblet (oivox&y) given as a prize: hbs vvv opxecTOJ’ trawrov I draX6Tara Tratfet toto denav p.iv. The last words are uncertain. Till lately early inscriptions in Ionic were few, but recently an early inscription has been found at Ephesus and a later copy of a long early inscription at Miletus.

The most noticeable characteristic of Attic and Ionic is the change of d into 7) which is universal in Ionic but does not appear in Attic after another vowel or p. Thus both dialects used /J177-77P, rtnv from an earlier n&rqp, Tina, but Attic had aoˆia, irpay/ia. and %iipa, not aoa of the first aorist, and roiis, oUovs, ixovai representing an earlier tovs, oXkovs, Ixovti (3 pi. present) or *txovro-t (dative pi. of present participle). Both djalects also agreed in changing r before 1 into a (like Aeolic), as in ˆowi above, and in the 3rd person singular of -/a verbs, tWtioi, SISiMTi, &c, and in noun stems, as in boats for an earlier *bbrts. Neither dialect used the particle ice or na, but both have ftv instead. One of the effects of the change of a into n was that the combination do changed in both dialects to 170, which in all Attic records and in the later Ionic has become eu by a metathesis in the quantity of the vowels: vd6s, earlier vaF6s, “temple,” is in Homeric Greek yi>6s, in later Ionic and Attic veas. In the dative (locative) plural of the -d stems, Ionic has generally -171171 on the analogy of the singular; Attic had first the old locative form in -wi, -dot, which survived

in forms which became adverbs like ‘ASj/ctjot and SbpHuri; but after 420 B.C. these were replaced bw -ok, Bipais, &c. The Ionic of Asia Minor showed many changes earlier than that of the Cyclades and Euboea. It lost the aspirate very early: hence in the Ionic alphabet H is e, not h; it changed av and tv into ao and «>, and very early replaced to a large extent the -in. by the -u verbs. This confusion can be seen in progress in the Attic literature of the 5th and 4th centuries B.C., Sflxw/u gradually giving way to SaxvOw, while the literature

generally uses forms like &4 > ia for l < £»i) (impft.). In Attica also the aspiration which survived in the Ionic of Euboea and the Cyclades ceased by the end of the 5th century. The Ionic of Asia Minor has -ws as the genitive of t-stems; the other forms of Ionic have -i5os.

4. Doric. — As already mentioned, the dialects of the North- West differ in several respects from Doric elsewhere. As general characteristics of Doric may be noted the contractions of a + t into tj. and of 0 + 0 or w into d, while the results in Attic and Ionic of these contractions are d and w respectively: kvUi) from vuebxa, Attic ivUa; Tipa/iis 1 pi. pres. from tiii&jui, Attic riix&tuv; Ti.11.av gen. pi. of Tip.6 ” honour, Attic npiSsv, In inflection the most noticeable points are the pronominal adverbs in locative form : rourel, rijcet (this from a stem limited to a few Doric dialects and the Bucolic Poets), rtiSt, iirtt., &c. ; the nom. pi. of the article toI, rat, not ol, al, and so tovtoi in Selinus and Rhodes; the 1st pi. of the verb in -/its, not in -juff, cp. the Latin -mus; the aorist and future in £, where other dialects have a, or contraction from presents in-fw; Sucafoi, iiK&aa, Doric bmbˆta, &c. ; the future passive with active endings, iTntitkiflqofvvTt. (Rhodes), found as yet only in the Doric islands and in the Doric prose of Archimedes; the particles at ” if ” and *a with a similar value to the Aeolic at and the Attic-Ionic av. Doric had an accentuation system different both from Aeolic and from Ionic- Attic, but the details of the system are very imperfectly known.

In older works Doric is often divided into a dialectus severior and a dialectus mitts. But the difference is one of time rather than of place, the peculiarities of Doric being gradually softened down till it was ultimately merged in the lingua franca, the Koivii, which in time engulfed all the local dialects except the descendant of Spartan, Tzakonian. Here it is possible to mention its varieties only in the briefest form, (a) The southern dialects are well illustrated in the inscriptions of Laconia recently much increased in number by the excavations of the British School at Athens. Apart from some brief dedications, the earliest inscription of importance is the list of names placed on a bronze column sootl after 479 B.C. to commemorate the tribes which had repulsed the Persians. The column, originally at Delphi, is now at Constantinople. The most striking features of the dialect are the retention of F at the beginning of words, as in the dedication from the 6th century Fava£if3ios (Annual of British School, xiv. 144). The dialect changed a between vowels into h, ii&ha for n&cra ” muse.” Later it changed 6 into a sound like the English th, which was represented by infinitive = tlvai from *esmen; gen. sing, of o-stems in 01: 8tG >, ace. pi. in -wj: flews; dy was represented by 85, not f, as in Attic-Ionic; tibai&he = /iWhfe. The dialect has many

strange words, especially in connexion with the state education and organization of the boys and young men. The Heraclean tables from a Laconian colony in S. Italy have curious forms in -aaai for the dat. pi. of the participle Tcpaaabvraaai = Attic ■xpaTTowi. Of the dialect of Messenia we know little, the long inscription about mysteries from Andania being only about 100 B.C. From Argolis. there are a considerable number of early inscriptions, and in a later form of the dialect the cures recorded at the temple of Asklepios at Epidaurus present many points of interest. There is also an inscription of the 6th century B.C. from the temple of Aphaia in Aegina. F survives in the old inscriptions: FtFpeniva (= dpr)p.kva) ; cs , whether original or arising by sound change from nty, persists till the 2nd century B.C.: havriTVxbvaa. =)) avrirvxovoa, rivs vibnˆrois viovs. The dialect of the Inachus valley seems to resemble Laconian more closely than does that of the rest of the Argolic area. Corinth and her colonies in the earliest inscriptions pre serve F and P (= Latin Q) before o and v sounds, and write £ and \j/ by x' and o-, the symbols which are used also for this purpose in old Attic. In the Corcyrean and Sicilian forms of the dialect, X before a dental appears as v. Actios = $iXr£as ; and in Sicilian the perfect-active was treated as a present : htboUui for biSoina, &c. From Megara has come lately an obscure inscription from the beginning of the 5th century; its colony Selinus has inscriptions from the middle of the same century ; the inscriptions from Byzantium and its other Pontic colonies date only from Hellenistic times. In Crete, which shows a considerable variety of subdialects, the most important document is , the great inscription from Gortyn containing twelve tables of family law, which was discovered in 1884. The local alphabet has no separate symbols for x and , and these sounds are therefore written with k and jr. As in Argive the combination -cs was kept both medially and finally except before words beginning with a consonant ; ty was represented by f , later by tt, as in Thessalian and Boeotian : birth-rot, Attic ottoctoi ; and finally by 88 ; X combined with a pre- ceding vowel into an aw-diphthong : otea, Attic dX/tr), cp. the English

pronunciation of talk, &c. In Gortyn and some other towns -o-ff- was assimilated to 88, where 8 must have been a spirant like the English th in thin; f of Attic Greek is represented initially by b, medially by iS, but in some towns by t and tt: So6s(= fw6s), SiK&SSev (=*5iK&fHx). Final consonants are generally assimilated to the beginning of the next word. In inflection there are many local peculiarities. In Melos and Thera some very old inscriptions have been found written in an alphabet without symbols for , \, i/<, £, which are therefore written as irh, nh or P h, ra, k

(6) The dialects of N.W. Doric, Locrian, Phocian, Aetolian, with which go Elean and Achaean, present a more uncouth appearance than the other Doric dialects except perhaps Cretan. Only from Locris and Phocis come fairly old inscriptions; later a koivIi was developed, in which the documents of the Aetolian league are written, and of which the most distinctive mark is the dative plural of consonant stems in -01s: apxbvrois (= Attic apxovoC), aywvois (= Attic aySxrt.), &c. Phocian and the Locrian of Opus have also forms like Aeolic in -tertrt. In place of the dative in -«, locatives in -o 1 are used in Locrian and Phocian. Generally north of the Corinthian gulf the middle present participle from fw verbs ends in -ttfievos; similar forms are found also in Elean. Locrian changed e before p into o : irarapa for varkpa ; cf . English Kerr and Carr, sergeant and Sargeaunt.

The more important of the older materials for Achaean come from the Achaean colonies of S. Italy, and being scanty give us only an imperfect view of the dialect, but it is clearly in its main features Doric. Much more remarkable is the Elean dialect known chiefly from inscriptions found at Olympia, some of which are as early as the beginning of the 6th century. The native dialect was replaced first by a Doric and then by the Attic Koivq, but under the Caesars the archaic dialect was restored. Many of its characteristics it shares with the dialects north of the Corinthian gulf, but it changes original I to a : y.a =p.n, &c. ; S was apparently a spirant, as in modern Greek (= th in English the, thine) , and is represented by f in some of the earliest inscriptions. Final -s became -p; this is found also in Laconian; ty became aa, but was not simplified as in Attic to ff : 6ffaa ~ Attic Sera.

As we have seen, Ionians, Aetolians and Dorians tended to level local peculiarities and make a generally intelligible dialect in which treaties and other important records were framed. The language of literature' is always of necessity to some extent a K01X17: with some Greek writers the use of a Koiv-q- was. especially necessary. The local dialect of Boeotia was not easily intelligible in other districts, and a writer like Pindar, whose patrons were mostly not Boeotians, had perforce to write in a dialect that they could understand. Hence he writes in a conventional Doric with Aeolic elements, which forms a strong contrast to that of Corinna, who kept more or less closely to the Boeotian dialect. For different literary purposes Greek had different Koival. A poet who would write an epic must adopt a form of language modelled on that of Homer and Hesiod ; Alcaeus and Sappho were the models for the love lyric, which was therefore Aeolic; Stesichorus was the founder of the triumphal ode, which, as he was a Dorian of Sicily, must henceforth be in Doric, though Pindar was an Aeolian, and its other chief representatives, Simonides and

Bacchylides, were Ionians from Ceos. The choral ode of tragedy was always conventional Doric, and in the iambics also are Doric words like Spbw, Xdw, &c. Elegy and epigram were founded on epic; the satirical iambics of Hipponaxand his late disciple Herondas are Ionic. The first Greek prose was developed in Ionia, of which an excellent example has been preserved to us in Herodotus. Thucy- dides was not an Ionian, but he could not shake himself free of the tradition: he therefore writes vpatrcroi, raatrw, &c, with-era, but in the one speech actually intended for the law-courts tt). Similarly Hippocrates and his medical school in Cos wrote in Ionic, not, however, in the Ionic of Herodotus, but in a language more akin to the Ionic koivJi of the inscriptions; and this dialect continued to be used in medicine later, much as doctors now use Latin for their prescriptions. The first literary document written in Attic prose is the treatise on the Constitution of Athens, which is generally printed amongst the minor works of Xenophon, but really belongs to about 425 B.C. From the fragment of Aristophanes'

Banqueters and from the first speech of Lysias ' ' Against Theomnestos ' ' it is clear that the Attic dialect had changed rapidly in the 6th and 5th centuries B.C., and that much of the phraseology of Solon's laws was no longer intelligible by 400 B.C. Among the most difficult of the literary dialects to trace is the earliest — the Homeric dialect. The Homeric question cannot be discussed here, and on that question it may be said quot homines tot sententiae. To the present writer, however, it seems probable that the poems were composed in Chios as tradition asserted; the language contains many Aeolisms, and the heroes sung are, except for the Athenians (very briefly referred to), and possibly Telamonian Ajax, not of the Ionic stock. Chios was itself an Ionicized Aeolic colony (Diodorus v. 81. 7). The hypothesis of a great poet writing on the basis of earlier Aeolic lays (xXeo ivSpav) in Chios seems to explain the main peculiarities of the Homeric language, which, however, was modified to some extent in later times first under Ionic and afterwards under Athenian influence.

Of Dorian literature we know little. The works of Archimedes written in the Syracusan dialect were much altered in language by the late copyists. The most striking development of the late classical age in Doric lands is that of pastoral poetry, which, like Spenser, is " writ in no language," but, on a basis of Syracusan and possibly Coan Doric, has in its structure many elements borrowed from the Aeolic love lyric

and from epic.

From the latter part of the 5th century B.C. Athens became ever more important as a literary centre, and Attic prose became the model for the later mirf, which grew up as a consequence of the decay of the local dialects. For this decay there were several reasons. If the Athenian empire had survived the Peloponnesian War, Attic influence would no doubt soon have permeated the whole of that empire. This consummation was postponed. Attic became the court language of Macedon, and, when Alexander's conquests led to the foundation of great new towns, like Alexandria, filled with inhabitants from all parts of the Greek world, this dialect furnished a basis for common intercourse. Naturally the resultant dialect was not pure Attic. There were in it considerable traces of Ionic. In Attica itself the dialect was less uniform than elsewhere even in the 5th century B.C., because Athens was a centre of empire, litera- ture and commerce. Like every other language which is not under the dominion of the schoolmaster, it borrowed the names of foreign objects which it imported from foreign lands, not only from those of Greek-speaking peoples, but also from Egypt, Persia, Lydia, Phoe- nicia, Thrace and elsewhere. The Ionians were great seafarers, and from them Athens borrowed words for seacraft and even for the tides : 2/iruri; " ebb," paxio " high tide," an Ionic word p7/x«; spelt in Attic fashion. From the Dorians it borrowed words connected with war and sport : Xox < *y6s, nwaybs, &c. A soldier of fortune like Xenophon, who spent most of his life away from Athens, introduced not only strange words but strange grammatical constructions also into his literary compositions. With Aristotle, not a born Athenian but long resident in Athens, the koivv may be said to have begun. Some characteristics of Attic foreigners found it hard to acquire — its subtle use of particles and its accent. Hence in Hellenistic Greek particles are comparatively rare. According to Cicero, Theophrastus, who came from as near Attica as Eretna in Euboea, was easily detected by a market-woman as no Athenian after he had lived thirty years in Athens. Thoucritus, an Athenian, who was taken prisoner in the Peloponnesian War and lived for many years in Epirus as a slave, was unable to recover the Athenian accent on his return, and his family lay under the suspicion that they were an alien's children, as his son tells us in Demosthenes' speech " Against Eubulides." In the Koivy there were several divisions, though the line between them is faint and irregular. There was a aoivij of literary men like Polybius and of carefully prepared state documents, as at Magnesia or Pergamum; and a different koivti of the vulgar which is represented to us in its Egyptian form in the Pentateuch, in a later and at least partially Palestinian form in the Gospels. Still more corrupt is

the language which we find in the ill-written and ill-spelt private letters found amongst the Egyptian papyri. Not out of the old dialects but out of this koivtj arose modern Greek, with a variety of dialects no less bewildering than that of ancient Greek. In one place more rapidly, in another more slowly, the characteristics of modern Greek begin to appear. As we have seen, in Boeotia the vowels and diphthongs began to pass into the char- acteristic sounds of modern Greek four centuries before Christ. Dorian dialects illustrate early the passing of the old aspirate 0, the sound of which was like the final t in English bit, into a sound like the English th in thin, pith, which it still retains in modern Greek. The change of y between vowels into a y sound was charged by the comic poets against Hyperbolus the demagogue about 415 B.C. Only when the Attic sound changes stood isolated amongst the Greek dialects did they give way in the koivti to Ionic. Thus the forms with rcr instead of tt won the day, while modern Greek shows that sometimes the pp which Attic shared with some Doric dialects and Arcadian was retained, and that sometimes the Ionic pv, which was also Lesbian and partly Doric, took its place. In other cases, where Ionic and Attic did not agree, forms came in which were different from either: the genitives of masculine a stems were now formed as in Doric with o, but the analogy of the other cases may have been the effective force. The form rais ” temple,” instead of

Ionic vqbs, Attic vtm, can only be Doric. 1 In the first five centuries of the Christian era came in the modern Greek characteristics of Itacism and vowel contraction, of the pronunciation of /nr and vt as mb and nd and many other sound changes, the loss of the dative and the confusion of the 1st with the 3rd declension, the dropping of the -mi conjugation, the loss of the optative and the assimilation of the imperfect and second aorist endings to those of the first aorist. 2 There were meantime spasmodic attempts at the revival of the old language. Lucian wrote Attic dialogue with a facility almost equal to Plato; the old dialect was revived in the inscriptions of Sparta; Balbilla, a lady-in-waiting on Hadrian’s empress, wrote epigrams in Aeolic, and there were other attempts of the same kind. But they were only tours de force, /rijirot ‘ASiiviSos, whose flowers had no root in the spoken language and therefore could not survive. Even in the hands of a cultivated man like Plutarch the koivt\ of the 1st century a.d. looks entirely different from Attic Greek. Apart from non-Attic constructions, which are not very numerous, the difference consists largely in the new vocabulary of the philosophical schools since Aristotle, whose jargon had become part of the language of educated men in Plutarch’s time, and made a difference in the language not unlike that which has been brought about in English by the

development of the natural sciences. It is hardly necessary to say that these changes, whether of the koivt) or of modern Greek, did not of necessity impair the powers of the language as an organ of expression; if elaborate inflection were a necessity for the highest literary merit, then we must prefer Caxlmon to Milton and Cynewulf to Shakespeare.

The Chief Characteristics of Greek. As is obvious from the foregoing account, of the Greek dialects, it is not possible to speak of the early history of Greek as handed down to us as that of a single uniform tongue. From the earliest times it shows much variety of dialect accentuated by the geo- graphical characteristics of the country, but arising, at least in part, from the fact that the Greeks came into the country in separate waves divided from one another by centuries. For the history of the language it is necessary to take as a beginning the form of the Indo- European language from which Greek descended, so far as it can be reconstructed from a comparison of the individual I.E. languages (see Indo-European Languages). The sounds of this language, so far as at present ascertained, were the following: —

(a) 11 vowels: a, a, e, e, i, 1,0, 0, u, u, 9 (a short indistinct vowel).

(b) 14 diphthongs: at, au, ei, eu, oi, ou, ai, au, ei, eu, 6i, 6u, vi, 3U.

(c) 20 stop consonants.

Labials: p, b, ph, bh (ph and bh being p and b followed by an audible breath, not / and v).

Dentals: t, d, th, dh {th and dh not spirants like the two English sounds in thin and then, but aspirated / and d).

Palatals: ft, g, kh, git (kh and gh aspirates as explained above).

Velars: q, g, qh, gh (velars differ from palatals by being produced against the soft palate instead of the roof of the mouth).

Labio- velars: q>l, gt, qXh, g*h{these differ from the velars by being combined with a slight labial w-sound).

(d) Spirants —

Labial: w.

Dental: s, z, post-dental s, z, interdental possibly |, S. Palatal: x (Scotch th), y.

Velar: x (a deeply guttural x, heard now in Swiss dialects), 3. Closely akin to iv and y and often confused with them were the semi-vowels 11 and i.

(e) Liquids: l*r.

(Y) Nasals : m (labial), n (dental), n (palatal), n (velar), the last three in combination with similar consonants.

(a) As far as the vowels are concerned, Greek retains the original state of things more accurately than any other language. The sounds of short e and short in Attic and Ionic were close, so that e + e contracted to a long close e represented by ti, 0 + 0 to a long close represented by ov. In these dialects u, both long and short, was modified to u, and they changed the long a to e, though Attic has after c, 1 and p. In Greek a appeared regularly as a, but under the influence of analogy often as e and o.

{b) The short diphthongs as a whole remained unchanged before a following consonant. Before a following vowel the diphthong was divided between the two syllables, the 1 or v forming a consonant at the beginning of the second syllable, which ultimately disappeared. Thus from a root dheu- ” run ” comes a verb etu for 6e-Fu, from an earlier *8ev-w. The corresponding adjective is 0o6s “swift,” for 00-Fo-t, from an earlier *0cv-o-s. The only dialect which kept the whole diphthong in one syllable was Aeolic. The long diph- thongs, except at the ends of words, were shortened in Attic. Some ‘of these appear merely as long vowels, having lost their second element in the proethnic period. Apparent long diphthongs like those in \yTovpyla, crqjfw arise by contraction of two syllables.

(e) The consonants suffered more extensive change. The voiced aspirates became unvoiced, so that bh, dh, gh, gh, gnh are confused with original ph, th, kh, qh, qKh: I.E. *bher5 (Skt. bharami) is Gr. *kpo>; I.E. *dhumos (Skt. dhumas), Gr. Bv/ios; I.E. *gliimo- (Skt.*

1 Thumb, Die griechische Sprache im Zeitalter des Hellenismus (1901), pp. 242-243.

2 Thumb, op. cit. p. 249.

hima-), Gr. (5u

vowels, nasals and liquids, the series appears as ir, f), ; before e and i vowels as t, /9(5), 0; in combination with u, which led to loss of the !f by dissimilation,

*A great variety of changes in the stopped consonants arose in combination with other sounds, especially i (a semivowel of the nature of English y), u (w) and s; ti, 0i became first 00 and later a in Attic Greek, it in Boeotian (the precise pronunciation of a and TT is uncertain) : Attic 6-iroam, earlier o-xoao-os, Boeotian 6-ttottos, from the same stem as the Latin quot, quotiens; Homeric Aieo-s, Latin medius; «$, xi became aa, Attic TT: iria-aa "pitch," Attic vLtto. from *jrko, cp. Latin pix, picis, thhaauiv, Attic iXarroiv comparative to eXaxus. Si and yi becameˆ f : Zeds (Skt. Dyaus) iMfa from iXvis, stem eX-TriS- " hope," Aiaorifw from p.a.aTi.%, stem nao-rly- " lash."*

(d) The sound u was represented in the Greek alphabet by F, the " digamma," but. in Attic and Ionic the sound was lost very early. In Aeolic, particularly Boeotian and Lesbian, it was persistent, and so also in many Doric dialects, especially at the beginning of words. When the Ionic alphabet was adopted by districts which had retained F, it was represented by /3: pp65ov Aeolic for pbSov, i.e. FpdSov. In Attic it disappeared, leaving no trace; in Ionic it lengthened the

*Preceding syllable ; thus in Homer iiroSdcras is scanned with o long ecause the root of the verb contained F: 8F«-. Attic has £tw>s, but Ionic £eiros for £ecfbs. Its combination with t became aa, Attic and Boeotian tt, in T«rs, Doric fiMs, Latin sua(d)vis, English sweet; cp. oticoio for *Foi.KoaLp, vt)6s, Lesbian vavos " temple," through vaFds from *vaaFo-s connected with vaiw " dwell." Before nasals and liquids s was assimilated: nei-Sau, Latin mi-ru-s, English smile; vi4>a, Latin nivem, English snow; Xˆyu, Latin laxus, English slack; pew from *sreu-o of the same origin as English stream (where t is a later insertion), imperfect ipptov for *esreuom; cp. also c £tXop;p;e£57;s, ayawitpos, HWtiktos.*

*After nasals s is assimilated except finally ; when assimilated, in all dialects except Aeolic the previous syllable is lengthened if not already long: Attic iveipia, ipava for the first aorist *enemsa, *emensa; but tots, ravs, &c, of the accusative pi. either remained or became in Aeolic to/s, to£s, in Ionic land Attic tous, tcis, in Doric tus, Tis; cp. riSdi for *ti0cjts, /3ds for *f} avTs, th "one" for *sem-s, then by analogy of the neuter *sens. Assimilation of a to preceding p and X is a matter of dialect : Ionic flapcreco, but Attic Bappd, and so also the Doric of Thera: exeXo-a, but eoreiXa for "irrtXaa. With nasals t affected the previous syllable: Tturalva (VtKTtfjtu), where 5 is the nasal of the stem' tcktuv, itself forming a syllable (see the article N for these so-called sonant nasals). Before*

1 original m becomes n ; hence fJaivu with w, though from the same root as English come. Original 1 does not survive in Greek, but'is represented by the aspirate at the beginning of' words, d7>< 6s = Skt. yajnas; medially after consonants it disappears, affecting the preceding consonant or syllable where a consonant precedes; between vowels it disappears. A sound of the same kind is indicated in Cyprian and some other dialects as a glide or transition sound between two vowels.

(e) The most remarkable feature in the treatment of the nasals is that when n or m forms a syllable by itself its consonant character disappears altogether and it is represented by the vowel o only:

t, 7ri-7roXTai; ibpaKov, dpacrvs, Sapaos.

The ends of words were modified in appearance by the loss of all stop-consonants and the change of final m to n, i8ti£t, Latin dixit ; Zvybv, Latin iugum.

Accent.— The vowel system of Greek has been so well preserved because it shows till late times very little in the way of stress accent. As in early Sanskrit the accent was predominantly a pitch accent (see Accent).

Noun System.— The I.E. noun had three numbers, but the dual was limited to pairs, the two hands, the two horses in the chariot, and was so little in use that the original form of the oblique cases cannot be restored with certainty. Ionic has no dual. The I.E. noun had the following cases: Nominative, Accusative, Genitive, Ablative, Instrumental, Locative and Dative. The vocative was not properly a case, because it usually stands outside the syntactical construction of the sentence; when a distinctive form appears, it is the bare stem, and there is no form (separate from the nominative) for the plural. Greek has confused genitive and ablative (the dis- tinction between them seems to have been derived from the pro-nouns), except for the solitary F0U01 = oUodtv in an inscription of Delphi. The instrumental, locative and dative are mixed in one case, partly for phonetic, partly for syntactical reasons. In Arcadian, Elean, Boeotian, and later widely in N. Greece, the locative -01 is used for the dative. The masculine

-ats, -ots.

The Verb System. — The verb system of Greek is more complete than that of any of the other I.E. languages. Its only rival, the early Vedic verb system, is already in decay when history begins, and when the classical period of Sanskrit arrives the moods have broken down, and the aorist, perfect, and imperfect tenses are syntactically confused. Throughout the

Greek classical period the moods are maintained, but in the period of the koivo the optative occurs less and less and finally disappears. The original I.E. had two voices, an active and a middle, and to these Greek has added a third, the passive, distinguished from the middle in many verbs by separate forms for the future and aorist, made with a syllable 0ij, TtpTjevcropai, iriiiifiTiv, though in this instance, Tip.i?iropat, the future middle, is often used with a passive sense. Other forms which Greek has added to the original system are the pluperfect — in form a past of the perfect stem with aorist endings. It merely expressed the perfect action in past time, and, except as derived from the context, did not possess the notion of relative time (past at a time already past), which attaches to the Latin forms with the same name. The future optativewas also a new formation, betraying its origin in the fact that it is almost entirely limited to Oratio Obliqua. The aorist imperatives were also new ; the history of some of them, as the second sing. act. iravaoy, is not very clear. The whole verb system is affected by the distinction between -0 and -mi verbs ; the former or thematic verbs have a so-called " thematic vowel " between the root and the personal suffix, while the -mi verbs attach the suffixes directly to the root. The distinction is really one between monosyllabic and disyllabic roots. The history of the personal endings is not altogether clear; the -0 verbs have in the present forms for the 2nd and 3rd person in -eis and -et, which are not yet elucidated. In the middle, Greek does not entirely agree with Sanskrit in its personal endings, and the original forms cannot all be restored with certainty. The endings of the primary tenses differed from those of the secondary, but there has been a certain amount of confusion between them.

The syntax of the verb is founded on the original I.E. distinction of the verb forms, not by time (tense), but by forms of action, pro- gressive action (presentand imperfect), consummated action (aorist), state arising from action, emphatic or repeated action (perfect). For the details of this see Indo-European Languages.

Bibliography. — (i.) A grammar of Greek, which will deal fully withthe whole material of the language, is at present a desideratum, and is hardly possible so long as new dialect material is being con- stantly added and while comparatively so little has been done on the syntax of the dialects. The greatest collection of material is to be found in the new edition of Kiihner's Griechische Grammatik, Laut- und Formenlehre, by Blass (2 vols., 1890-1892); Syntax, by Gerth (2 vols., 1896, 1900). Blass's part is useful only for material, the explanations being entirely antiquated. The only full historical account of the language (sounds, forms and syntax) at present in existence is K. Brugmann's Griechische Grammatik (3rd ed., 1900).

Gustav Meyer's Griechische Grammatik (nothing on accent or syntax) , which did excellent pioneer work when it first appeared in 1880, was hardly brought up to date in its 3rd edition (1896), but is still useful for the dialect and bibliographical material collected. See also H. Hirt, Handbuch der griech. Laut- und Formenlehre (1902). Of smaller grammars in English perhaps the most complete is that of J. Thompson (London, 1902). The grammar of Homer was handled by D. B. Monro (2nd ed., Oxford, 1891). The syntax has been treated in many special works, amongst which may be mentioned W. W. Goodwin, Syntax of the Greek Moods and Tenses (new ed., 1889) ; B. L. Gildersleeve and C. W. E. Miller, Syntax of Classical Greek from Homer to Demosthenes, pt. i. (New York, 1901 — and following) ; J. M. Stahl, Kritisch-historische Syntax des griechischen Verbums (1907); F. E. Thompson, Attic Greek Syntax (1907). (ii.) The relations between Greek and the other I.E. languages are very well brought out in P. Kretschmer's Einleitung in die Geschichte der griechischen Sprache (Gottingen, 1896). For comparative grammar see K. Brugmann and B. Delbruck, Grundriss der vergleichenden Grammatik der indogermanischen Sprachen (the 2nd ed., begun 1897, is still incomplete) and Brugmann's Kurze vergleichende Grammatik (1902-1903) ; A. Meillet, Introduction a I 'etude comparative des langues indo-europeennes (2nd ed., 1908). Greek compared with Latin and English : P.uiles, A Short Manual of Comparative Philology for Classical Students (2nd ed., 1901, with an appendix containing a brief account and specimens of the dialects); Riemann and Goelzer, Grammaire comparative du Grec et du Latin (1901), a parallel grammar in 2 vols., specially valuable for syntax, (iii.) For the dialects two works have recently appeared, both covering in brief space the whole field: A. Thumb, Handbuch der griechischen Dialekte (with bibliographies for each dialect, 1909); C. D. Buck, Introduction to the Study of the Greek Dialects, Grammar, Selected Inscriptions, Glossary (Boston, 1910). Works on a larger scale have been undertaken by R. Meister, by 0. Hoffmann and by H. W. Smyth. For the koivt) may be specially mentioned A. Thumb, Die griech. Sprache in Zeitalter des Hellenismus (1901); E. Mayser, Grammatik der griechischen Papyri aus der Ptolemderzeit: Laut- und Wortlehre (1906) ; H. St J. Thackeray, A Grammar of the Old Testament in Greek, vol. i. (1909); Blass, Grammar of New Testament Greek, trans, by Thackeray (1898); J. H. Moulton, A Grammar of New Testament Greek. I. Prolegomena (3rd ed., 1906). (iv.) For the development from the koivt] to modern Greek: A. N. Jannaris, An Historical Greek Grammar, chiefly of the Attic Dialect, as written and spoken from Classical Antiquity down to the Present Time (1901); G. N. Hatzidakis, Einleitung in die neugriechische Grammatik (1892); A. Thumb,

Handbuch der neu- griechischen Volkssprache (2nd ed. 1910). (v.) The inscriptions are collected in Inscriptiones Graecae in the course of publication by the Berlin Academy, those important for dialect in the Sammlung ier griech. Dialektinschriften, edited by Collitz and Bechtel. The earlier parts of this collection are to some extent superseded by later volumes of the Inscr. Graecae, containing better readings and new inscriptions. A good selection (too brief) is Solmsen's Inscrip- tiones Graecae ad inlustrandas dialectos selectae (3rd ed., 1910). A serviceable lexicon for dialect words is van Herwerden's Lexicon Graecum suppletorium et dialecticum (2nd ed., much enlarged, 2 vols. 1910). (vi.) The historical basis for the distribution of the Greek dialects is discussed at length in the histories of E. Meyer (Geschichte des Alterlums, ii.) and G. Busolt (Griechische Geschichte, i.); by Pro- fessor Ridgeway, Early Age of Greece, i. (1901), and P. Kretschmer in Glotta, 1. 9 ft. See also A. Fick, Die vor griechischen Ortsnamen (i9°5)- (vii.) Bibliographies containing the new publications on Greek, with some account of their contents, appear from time to time in Indogermanische Forschungen: Anzeiger (Strassburg, Triibner), annually in Glotta (Gottingen, Vandenhoeck und Ruprecht), and The Year's Work in Classical Studies (London, Murray). (P. Gi.)

GREEK LAW. Ancient Greek law is a branch of comparative jurisprudence the importance of which has been long ignored. Greek law J ur i sts have commonly left its study to scholars, who and com- have generally refrained from comparing the institu- parative tions of the Greeks with those of other nations. Greek l uris ' law has, however, been partially compared with

Roman law, and has been incidentally illustrated with the aid of the primitive institutions of the Germanic nations. It may now be studied in its earlier stages in the laws of Gortyn; its influence may be traced in legal docu- ments preserved in Egyptian papyri; and it may be recognized as a consistent whole in its ultimate relations to Roman law in the eastern provinces of the Roman empire.

The existence of certain panhellenic principles of law is implied by the custom of settling a difference between two Greek states, or between members of a single state, by resorting to external arbitration. The general unity of Greek law is mainly to be seen in the laws of inheritance and adoption, in laws of commerce and contract, and in the publicity uniformly given to legal agreements.

No systematic collection of Greek laws has come down to us. Our knowledge of some of the earliest notions of the subject is derived from the Homeric poems. For the details of Attic law we have to depend on ex parte statements Offefaai in the speeches of the Attic orators, and we are some- r ft/es. times enabled to check those statements by the trustworthy, but often

imperfect, aid of inscriptions. Incidental illustrations of the laws of Athens may be found in the Laws of Plato, who deals with the theory of the subject without exercising any influence on actual practice. The Laws of Plato are criticized in the Politics of Aristotle, who, besides discussing laws in their relation to constitutions, reviews the work of certain early Greek lawgivers. The treatise on the Constitution of Athens includes an account of the jurisdiction of the various public officials and of the machinery of the law courts, and thus enables us to dispense with the second-hand testimony of grammarians and scholiasts who derived their information from that treatise (see Constitution or Athens). The works of Theophrastus On the Laws, which included a recapitulation of the laws of various barbaric as well as Grecian states, are now represented by only a few fragments (Nos. 97-106, ed. Wimmer).

Our earliest evidence is to be sought in the Homeric poems. In the primitive society of the heroic age (as noticed by Plato) written laws were necessarily unknown; for, "in that early period, they had no letters; they lived Homer. by habit and by the customs of their ancestors " (Laws, 680 a). We find a survival from a still more primitive time in the savage Cyclops, who is " unfamiliar with dooms of law, or rules of right" (owe Siicas ev eibbra ovre dhtucrras, Od. ix. 215 and 112 f.).

Dike (SUrf), assigned by Curtius (Etym. 134) to the same root as bdavviu, primarily means a " way pointed out," a " course pre- scribed by usage," hence " way " or "fashion," " manner" D; . g or " precedent." In the Homeric poems it sometimes signifies a " doom " of law, a legal " right," a " lawsuit "; while it is rarely synonymous with " justice," as in Od. xiv. 84, where " the gods honour justice," Hova 1 iU-qv.

Various senses of " right " are expressed in the same poems by themis (9ly.Lt), a term assigned (ib. 254) to the same root as t10t](ii. In its primary sense themis is that which " has been laid _. . down"; hence a particular decision or "doom." The eDS '

plural themistes implies a body of such precedents, " rules of right," which the king receives from Zeus with his sceptre (II. ix. 99). Themis and dike have sometimes been compared with the Roman fas and jus respectively, the former being regarded as of divine, the latter of human origin; and this is more satisfactory than the latest view (that of Hirzel), which makes " counsel " the primary meaning of themis.

Thesmos _(0e

A trial for homicide is one of the scenes represented on the shield of Achilles (II. xviii. 497-508). The folk are here to be seen thronging the

market-place, where a strife has arisen between two men as to the price of a man that has been slain. The slayer vows that he has paid all (e&xero iravr' awoSovvai.) , the kinsman of the slain protests that he has received nothing (avaivero (lyjSev eXkodat.); both are eager to join issue before an umpire, and both are favoured by their friends among the folk, who are kept back by the heralds. The cause is tried by the elders, who are seated on polished stones in a sacred circle, and in the midst there lie two talents of gold, " to give to him who, among them all, sets forth the cause most rightly " (rcj? do/jtev 6s fiera TOiai 5Utjv WuvTara ehroi).

The discussions of the above passage have chiefly turned on two points: (1) the legal questions at issue; and (2) the destination of the" two talents." (1) In the ordinary view (a), it is solely a question whether the fine or blood-money, corresponding to the Wergeld (see Wergeld, Teutonic Peoples, Britain: Anglo-Saxon) of the old Germanic law (Grimm, Rechtsalterthiimer, 661 f.), has been paid or not. (This is accepted by Thonissen, Lipsius, Sidgwick and Ridge- way.) In the other view (b), it is held that the slayer " claimed to pay " the fine, and the kinsman of the slain " refused to accept any compensation " (so Passow and Leaf, approved by Pollock). (2) The " two talents " (shown by Ridgeway to be a small sum, equal in

The trial

scene.

value to two oxen) are awarded either (a) to the litigant who " pleads his cause most justly before them " (so Thonissen, Shilleto and Lipsius, in accordance with the Attic use of phrases like bUi\v dirtiv), or (b) to the judge " who, among all the elders, gives the most righteous judgment " (so Maine, approved by Sidgwick, Pollock, Leaf and Ridgeway).

On this controversy, cf. Maine's Ancient Law, chap. x. pp. 385 f., 405 f., ed. Pollock; Thonissen, Droit penal (1875), 27; P. M. Laurence (on Shilleto's view) in Journal of Philology, viii. (1879), 125 f. ; Ridgeway, ib. x. (1882), 30 f., and Journal of Hellenic Studies, viii. (1887), 133 f. ; and Leaf, ib. viii. 122 f., and in his Commentary on Iliad, ii. (1902), 610-614; also J. H. Lipsius in Leipziger Studien, xii. (1890), 225-231, criticized by H. Sidgwick in Classical Review, viii. (1894), 1-4.

We are told elsewhere in Homer that sometimes a man accepted blood-money from the slayer of his brother or his son, and that the slayer

remained in the land after paying this penalty (77. ix. 633). As a rule the slayer found it safest to flee (Od. xxiii. 118 f), but even so, he might be pursued by the friends of the slain (Od. xv. 272-278). If he remained, the land was not (as in later ages) deemed to be polluted by his presence. In Homer, Orestes does not slay Clytaemestra, and he needs no " purification " for slaying Aegisthus.

The laws of Sparta are ascribed to the legislation of Lycurgus, whose traditional date is 884 B.C. Written laws are said to have Greek law been expressly forbidden by Lycurgus (Plutarch, givers: Lycurgus, 13) ; hence the " laws of Sparta " are simply Lycurgus a body of traditional observances. We learn that all at Sparta. tr j a j s f or homicide came before the Council of Elders and lasted for several days, and that all civil causes were tried by the ephors (q.v.): We are also told that originally the land was equally divided among the citizens of Sparta, and that this equality was enforced by law (Polybius vi. 45-46). Early in the 4th century the ephor Epitadeus, owing to a disagreement with his son, enacted that every Spartan should be allowed to transfer his estate and his allotment to any other person (Plutarch, Agis, 5), while Aristotle, in a much-debated passage of the Politics (iL 9. 14-15), criticizes the Spartan constitution for allowing the accumulation of property in a few hands, an evil aggravated by the large number of " heiresses"; " a man (he adds) may bestow his heiress on any one he pleases; and, if he dies intestate, this privilege descends to his heir."

Law was first reduced to writing in the 7th century B.C. A written code is a necessary condition of just judgment, and such a code was the first concession which the people in the Greek cities extorted from the ruling aristocracies. The change was generally effected with the aid of a single legislator entrusted with complete authority to draw up a code.

The first communities to reach this stage of progress were the Greek colonies in the West. The Epizephyrian Locrians, Zaieucus near the extreme south of Italy, received the earliest atLocrt written code from Zaieucus (663 B.C.), whose strict Epize-. anc i severe legislation put an end to a period of strife p y ' and confusion, though we know little of his laws, except that they attached definite penalties to each offence, and that they strictly protected the rights of property. Two centuries later, his code was adopted even by the Mc7unT Athenian colony of Thurii in south Italy (443 B.C.). etCm ' Charondas, the " disciple " of Zaieucus, became the lawgiver, not only of his native town of Catana on the east coast of Sicily, but also of other Chakidian colonies in Sicily and Italy. The laws cf Charondas were marked by a singular precision, but there was nothing (says Aristotle) Aodro- t }j at jj e cou i(j c j a ; m as his own except the special damasof . , „,.... x

Rhegium. procedure against false witnesses (Politics, n. 12. 11).

In the case of judges who neglected to serve in' the law courts, he inflicted a large fine on the rich and a small fine on the poor (ib. vi. (iv.) 13. 2). Androdamas of Rhegium gave laws on homicide and on heiresses to the Chalcidians of Thrace, while Philolaus cf Corinth provided the Thebans with " laws of adoption " with a view to preventing any change in the number of the allotments of land (ib. ii. 12. 8-14).

Era of

written

laws.

Philolaus of Corinth.

Local legislation in Crete is represented by the laws of the important city of Gortyn, which lies to the south of Ida in a plain watered by the Lethaeus. Part of that stream forms a sluice for a water-mill, and at or neat this mill ot Q ttrtya , some fragmentary inscriptions were found by French archaeologists in 1857 and 1879. The great inscription, to which most of our knowledge of the laws is due, was not dis- covered until 1884. It had been preserved on a wall 27 ft. long and 5 ft. high, the larger part of which was buried in the ground, while its farthest extremity passed obliquely athwart the bed of the mill-stream. It was necessary to divert the water before the last four columns could be transcribed by the Italian scholar, Federico Halbherr, whose work was completed in the same year by the excavation and transcription of the first eight columns by the German scholar, E. Fabricius. In the following year Halbherr discovered more than eighty small fragments on the neighbouring site of a former temple of the Pythian Apollo.

These fragments, which are far earlier than the great inscription above-mentioned, have been assigned to about 650 B.C. They precede the introduction of coined money into Crete, the penalties being reckoned, not in coins, but in caldrons.. They deal with the powers of the magistrates and the observances of religion, but are mainly concerned with private matters of barter and sale, dowry and adoption, inheritance and succession, fines for trespass and questions of blood- money. As in the code of Zaieucus, we have a fixed scale of penalties, including the fine of a single tripod, and rang- ing from one to a hundred caldrons.

The great inscription is perhaps two centuries later (c. 450 B.C.). It consists of a number of amendments or additions to an earlier code, and it deals exclusively with private law, in which the family and family property

occupy the largest part. The procedure is entirely oral; oaths and other oral testimony are alone admitted; there are no documentary proofs, and no record of the verdict except in the memory of the judge or of his " remembrancer." All the causes are tried before a single judge, who varies according to the nature of the suit. Where the law specially enjoins it, he is bound to give judg- ment (huiaSbtv) in accordance with the law and the " witnesses or oaths," but, in other cases, he is permitted to take oath and decide (Kplvtiv) in view of " the contentions of the parties," as distinguished from " the declarations of the witnesses." Offences against the person are treated as matters of private compensation according to a carefully graduated tariff. In certain cases the defendant may clear himself by an " oath of purgation " with the support of " co- jurors " (bitupArat), the Eideshelfer of old Germanic law (Grimm 859 f-), who have no necessary knowledge of the facts. There is no interference with the exposure of infants, except in the interest of the father (if the child is free-born) or of the lord (in the case of serfs). The law of debt is primitive, though less severe than that of the early Romans. In contrast with these primitive elements we have others which are distinctly progressive. The estates of husband, wife and sons are regarded as absolutely distinct. Wills are unknown, even in their most restricted form. Elaborate provisions are made to secure with all speed the marriage of an " heiress "; she is bound to marry the eldest of her paternal uncles or to surrender part of her estate, and it is only if there are no paternal uncles that she is permitted to marry one (and that the eldest) of their sons. Adoption is made by the simple procedure of mounting a block of stone in the market-place and making a public announcement at a time when the citizens are assembled. The adopted son does not inherit any larger share than that of a daughter. Any one who desires to repudiate his adopted son makes a public announcement as before, and theperson repudiated receives, by way of nominal compensation, the gift of a small number of staters. In these later " laws of Gortyn " we have reached the time when payments are made, not in " caldrons," but in coins. In the inscription itself the laws are simply described as " these writings."

The text of the great inscription was first published by E. Fabricius in Atk. Mitth. ix. (1885), 362-384; there is a cast of the whole in the Cambridge Museum of Classical Archaeology. Cf. Comparetti's Leggi di Gortyna (1893); Biicheler and Zittelmann in Rhein. Mus. xl. (1885); Dareste, Haussoullier and Th. Reinach, Inscr. juridiques grecques, iii. (1894), 352-493 (with the literature there quoted). Eng. trans, by Roby in Law Quarterly Review (1886), 135-152; see also E. S. Roberts, Gh Epigraphy, i. 39 f-, 52 f-, 325-332; J- W. Headlam in Journal of Hellenic Studies, xiii. (1892-1893), 48-69; P. Gardner and F. B. Jevons, Greek Antiquities (1895), 560-574; W. Wyse in Whibley's Companion to Greek Studies

(1905), 378-383; and Hermann Lipsius, Zum Recht von Gortyns (Leipzig, 1909).

A Roman writer ascribes to the Athenians the very invention of lawsuits (Aelian, Var. Hist. iii. 38) , and the Athenians themselves regarded their tribunals of homicide as I institutions of immemorial antiquity (Isocr. Paneg. 40),

Athens.

Draco.

On the abolition of the single decennial archon l in 683 B.C., his duties were distributed over several officials holding office for one year only. The judicial duties thenceforth discharged by

the chief archon {the archon), in the case of citizens, senior were discharged by the polemarch in the case of foreign archoas. settlers or metics ((i&toikoi.) ; while the king-archon,

who succeeded to the religious functions of the ancient kings, decided cases connected with religious observances (see Archon). He also presided over the primitive council of the state, which was identical with the council of the Areopagus. It was possibly with a view to the recognition of the rights of the lower classes that, about the middle of the 7th century B.C., the three archons were raised to the number of nine by the institution

of the joint board of the six thesmothetae, who super- T J' e intended the judicial system in general, kept a record

thetae. ' °^ a ^ l e 8 a l decisions, and drew attention to any defects

in the laws. It is probable that in their title we have the earliest example in Attic Greek of the use of thesmos in the sense of "4aw. "

The constitution was at this time thoroughly oligarchical. With a view, however, to providing a remedy for the conflict

between the several orders of the state, the first code

of Athenian law was drawn up and published by Draco (strictly Dracon), who is definitely described as. a thesmothetes (621). His laws were known as thesmoi. The distinctive part of his legislation was the law of homicide,

which was held in such high esteem that it was left unaltered in the legislation of Solon and in the democratic restoration of 411 B.C. It is partly preserved in an inscription of 409, which has been restored with the aid of quotations from the orators {C.I. A. i. 61; Inscr. jurid. grecques, ii. 1. 1-24; and Hicks, Gk. Hist. Inscr. No. 59). It drew a careful distinction between different kinds of homicide. Of the rest of Draco's legislation we only know that Aristotle {Politics, ii. 12, 13) was struck by the severity of the penalties, and that the creditor was permitted to seize the person of the debtor as security for his debt.

The conflict of the orders was not allayed until both parties agreed in choosing Solon as mediator and as archon (594 B.C.).

Solon cancelled all mortgages and debts secured on

the person of the debtor, set free all who had become slaves for debt, and forbade such slavery for the future (see Solon). Thenceforth every citizen had also " the right of appeal to the law-courts," and the privilege of claiming legal satisfaction on behalf of any one who was wronged. Cases of constitutional law {inter alia) came before large law-courts numbering hundreds of jurors, and the power of voting in these law-courts made the people masters of the constitution (Aristotle's Constitution of Athens, c. 9). Solon's legislation also had an important effect on the law of property. In primitive times, on a man's death, his money or lands remained in the family, and, even in the absence of direct descendants, the owner could not dispose of his property by will. Permission to execute a will was first given to Athenian citizens by the laws of Solon. But " the Athenian Will was only an inchoate Testament " (Maine's Ancient Law, c. vi.); for this permission was expressly limited to those citizens who had no direct male descendants (Dem. Lept. 102; Plutarch, Solon, 21; cf. Wyse on Isaeus, p. 325).

The law of intestate succession is imperfectly preserved in [Dem.] 43, § 51 (cf. Wyse, ib. p. 562 f.). In the absence of direct male descendants, a daughter who survived her father was known as an ct-ikXtjpos, not an " heiress," but a " person who went with the estate "; and, in the absence of a will, the right or duty of marrying the daughter followed (with. certain obvious exceptions) the same rules as the right of succession to the estate (cf. Wyse, ib. p. 348 f.).

Among the reforms of Cleisthenes (508) was the law of

c '^" ostracism {q.v.). The privileges of the Areopagus were

Ephlaltes. curtailed (while its right to try certain cases of homicide

was left untouched) by the reforms of Ephialtes (462),

1 For further information as to the evolution of the Athenian constitutionseeARCHON, Areopagus, Boule, Ecclesia, Strategus, and articles on all the chief legislators.

Solon.

and of Pericles, who also restored the thirty " local justices "

(453), limited the franchise to those of citizen-blood

by both parents (451), and was the first to assign to cieon. '

jurors a fee for their services in the law-courts, which

was raised to three obols by Cleon (425).

In contrast to legislative reforms brought about by lawgivers entrusted with special authority, such as Draco, Solon and Cleisthenes, there was the regular and normal course ordinary of public legislation. The legislative power was not course of exercised directly by the popular assembly (see legisia- Ecclesia), but the preliminary consent of that body "" was necessary for the appointment of a legislative commission.

In the 5th century {e.g. in 450 and 446 B.C.) certain com- missioners called avyYpaeis were appointed to draw up laws which, after approval by the council, were submitted s to the assembly. The same term was still in use grapnels. in March 411 (Thuc. viii. 61). But in October, on Nomo- the overthrow of the Four Hundred, the commissioners taetae – are for the first time called nomothetae {ib. 97).

The procedure in ordinary legislation was as follows. At the first meeting of the assembly in the year, the people was asked whether it would permit motions to be made for altering or supplementing the existing laws. A debate ensued, and, if such permission were granted, any citizen who wished to make a motion to the above effect was required to publish his proposals in the market-place, and to hand them to the secretary of the council (Boule) to be read aloud at more than one meeting of the assembly. At the third regular meeting the people appointed the legislative commissioners, who were drawn by lot from the whole number of those then qualified to act as jurors. The number, and the duration of the commission, were determined in each case by the people. The proceedings before the commission were conducted exactly in the manner of a lawsuit. Those who desired to see old laws repealed, altered or replaced by new laws came forward as accusers of those laws ; those of the contrary opinion, as defenders; and the defence was formally entrusted to public advocates specially appointed for the purpose (avviffopoi) . The number of

the commissioners varied with the number or importance of the laws in question; there is evidence for the number 1001 (Dem. xxiv. 27). If a law approved by the commission was deemed to be unconstitutional, the proposer was liable to be prosecuted (by a •ypoˆi) irapavotiuv) , just as in the case of the proposer of an unconstitu- tional decree in the public assembly. Formal proceedings might also be instituted against laws on the sole ground of their inexpedi- ency (see note on Aristotle's Constitution of Athens, p. 219, ed. Sandys). A prosecutor who (like Aeschines in his indictment of Ctesiphon) failed to obtain one-fifth of the votes was fined 1000 drachmae (£40), and lost the right to adopt this procedure in future. When a year had elapsed, the proposer of a law or a decree was free from personal responsibility. This was the case with Leptines, but the law itself could still be attacked, and, in this event, five advocates were appointed to defend it {aiviiKoi), cf. Dem. Lept. 144, 146.

Limits of space make it impossible to include in the present article any survey of the purport of the extant remains of the laws of Athens. Such a survey would begin with the laws of the family, including laws of marriage, adoption f Athens. and inheritance, followed by the law of property and contracts, and the laws for the protection of life, the protection of the person, and the protection of the constitution. The texts have been collected and classified in Telfy's Corpus juris Attici (1867), a work which can be supplemented or corrected with the aid of Aristotle's Constitution of Athens; while some of the recent expositions of the subject are mentioned in the bibliography at the end of this article. We now proceed to notice the law of homicide, but solely in connexion with jurisdiction.

The general term for a tribunal is SiKaarripiov (from 5t/cdfco), Anglicized " dicastery." Of all the tribunals of Athens those for the trial of homicide were at once the most primitive I and the least liable to suffer change through lapse tioa . tn ' e I of time. In the old Germanic law all trials whatsoever tive'priml- were held in the open air (Grimm 793 f.). At Athens tlvetri- this custom was characteristic of all the five primitive b " aalstor courts of homicide, the object being to prevent the homicide. prosecutor and the judges from coming under the same roof as one who was charged with the shedding of blood (Antiphon, De caede Herodis, n). The place where the trial was held depended on the nature of the charge.

At the Del- phinloa.

1. The rock of the Acropolis, outside the earliest of the city-walls, was the

proper place for the. trial of persons charged with pre- On the meditated homicide, or with wounding with intent to kill. Areooanus ˆ ne P ena l t y f° r tne former crime was death ; for the latter

‘ exile; and, in either case, the property was confiscated. If the votes were equal, the person accused was acquitted. The proceedings lasted for three days, and each side might make two speeches. After the first speech the person accused of premeditated homicide was mercifully permitted to go into exile, in which case his property was confiscated, and in the ordinary course he remained in exile for the rest of his life.

2. Charges of unpremeditated homicide, or of instigating another to inflict bodily harm on a third person, or of killing a slave or a At the resident alien or a foreigner, were tried at the Palladion, Pall dl n tne anc ‘ en t shrine of Pallas, east of the city-walls. The

a ° ‘ punishment for unpremeditated homicide was exile (without confiscation) until such time as the criminal had propiti- ated the relatives of the person slain ; or (failing that) for some definite time. The punishment for instigating a crime was the same as for actually committing it.

3. .Trials at the Delphinion, the shrine of Apollo Delphinios, in the same quarter, were reserved for special cases of either accidental or justifiable homicide.

4. If a man already in exile for unpremeditated homicide were accused of premeditated homicide, or of wounding with intent to At kill, provision was made for this rare contingency by per- Phreatto mitting him to approach the shore of Attica and conduct

his defence on board a boat, while his judges heard the cause on shore, at a ” place of pits ” called Phreatto, near the harbour of Zea. If the accused were found guilty, he incurred the proper penalty ; if acquitted, he remained in exile.

5. The court in the precincts of the Prytaneum, to the north of the Acropolis, was only of ceremonial importance. It ” solemnly heard At the Pry aru ˆ condemned undiscovered murderers, and animals or taneum inanimate objects that had caused the loss of life.” 1

The writ ran ” against the doer of the deed,” and any instrument of death that was found guilty was thrown across the frontier. The trial was held by the four ” tribe-kings” (4 > uXo/3a

In all the courts of homicide the president was the archon-basi- leus, or

king-archon, who on these occasions laid aside his crown. Bohetae Originally all these courts were under the jurisdiction of " an ancient body of judges called the ephetae (iQircu), whose institution was ascribed to Draco. The transfer of the first of the above courts to the council of the Areopagus is attributed to Solon. In practice the jurisdiction of the ephetae (see also Areopagus) was probably confined to the courts at the Palladion and Delphinion; but even there the rights of this primitive body became obsolete, for trials " at the Palladion " sometimes came before an ordinary tribunal of 500 or 700 jurors (Isocr. c. Callim. 52, 54; [Dem.] c. Neaeram, 10).

Except in the case of the primitive courts of homicide, the right of jurisdiction was entrusted to the several archons until The l ˆ e d ate °f Solon (594). When the direct jurisdiction

presidents of the archons was impaired by Solon's institution otthe f the " right of appeal to the law-courts," the tribunals, dignity f those officials was recognized by their having the privilege of presiding over the new tribunals (riyenovia diKaarripLov). A similar position was assigned to the other executive officers, such as the strategi (generals), the board of police called the " Eleven," and the financial officers, all of whom presided over cases connected with their respective departments. In their new position as presidents of the several courts, the archons received plaints, obtained from both parties the evidence which e . ag " they proposed to present, formally presided at the trial, and gave instructions for the execution of the sentence. The choice of the presiding magistrate in each case was determined by the normal duties of his office. Thus the chief archon, the official guardian of orphans and The po e- w jd 0WSj presided in all cases, public or private, con- nected with the family property of citizens (Aristotle, u.s. c. 56). The king-archon had charge of all offences against religion, e.g. indictments for impiety, disputes within the family as to the right to hold a particular priest- hood, and all actions for homicide (c. 57). The third

1 In the case of " animals," we may compare the Mosaic law of Exod. xxxi. 28 and the old Germanic law (Grimm 664) ; and in that of " inanimate objects," the English law of deodands (Blackstone i. 300), repealed in 1846. See also Frazer on Pausanias, i. 28. 10.

The chief archon.

The strategi.

archon, the polemarch, discharged in relation to resident aliens all such legal duties as were discharged by the chief archon in relation to citizens (c. 58). The trial of military off ences _ was under the presidency of the

strategi, who were mo thetae. assisted by the other military officers in preparing the case for the court. The six junior archons, the thesmothetae, acted as a board which was responsible for all cases not specially assigned to any other officials (details in c. 59).

The Forty, who were appointed by lot, four for each of the ten tribes, acted as sole judges in petty cases where the damages claimed did not exceed ten drachmae. Claims beyond that amount they handed over to the arbitrators. Forty The four representatives of any given tribe received notice of such claims brought against members of that tribe. It seems probable that they dealt with all private suits not other- wise assigned, but, unlike the archons, they did not prepare any case for the court but referred it, in the first instance, to a public arbitrator appointed by lot (c. 53). 2

The public arbitrators (SiamjraO were a body including all Athenian citizens in the sixtieth year of their age. The arbitrator, on receiving the case from the four representatives of the Forty, first endeavoured to bring the parties ar ///"' to an agreement. If this failed, he heard the evidence trators. and gave a decision. If the decision were accepted, the case was at an end, but, if either of the two parties insisted on appealing to a law-court, the arbitrator placed in two caskets (one for each party) copies of all the depositions, oaths and challenges, and of all the laws quoted in the case, sealed them up, and, after attaching a copy of his own decision, handed them over to the four representatives of the Forty, who brought the case into court and presided over the trial. Documents which had not been brought before the arbitrator could not be produced in court. The court consisted of 201 jurors where the sum in question was not more than 1000 drachmae (£40); in other cases the number of jurors was 401 (c. 53).

A small board of five appointed by lot, one for each pair of tribes, and known as the " introducers " (eicra7co7«Ts) , brought up certain of the cases that had to be decided within a month (enixrˆvoL Sinai) , such as actions for restitution »™w of dowry, repayment of capital for setting up a business, and cases connected with banking.

The largest and most important of the legal tribunals, the " dicastery " (par excellence), was known as the heliaea. The name, which is of uncertain origin, 3 denotes not only Heliaea. the place where the court was held but also the members of the court, — the heliastae of Aristophanes, the dicastae, 01 av5pts diKacral, of the Attic orators. During the palmy days of the Athenian democracy, in the interval between the Persian and the Peloponnesian wars, the total number liable to serve as jurors is said to have been 6000 (Aristotle, u.s. c. 24. 3), and this number was never exceeded (Aristoph. Vesp. 661 f.). Any Athenian citizen in full possession of his rights, and over thirty years of age, was entitled to be placed on the

list (Aristotle, u.s. c. 63. 3). At the beginning of the year the whole body of jurors assembled on the hill of Ardettos looking down on the Panathenaic Stadium, and there took a solemn oath to the effect that they would judge according to the laws and decrees of the Athenian people and of the council of the Five Hundred (Boule), and that, in cases where there were no laws, they would decide to the best of their judgment; that they would hear both sides impartially, and vote on the case actually before the court.

It has been suggested that, as the normal number of a court was 500, the maximum number of 6000 jurors was probably divided into ten sections of 500 each, with 1000 reserves. There is evidence in the 4th century for courts of 200, 400, 500, 700 and

2 Cf. R. J. Bonner, in Classical Philology (Chicago, 1907), 407-418, who urges that only cases belonging to the Forty were subject to public arbitration.

3 Connected either with dXifecrOai., " to assemble," or jjXios, or "HXis (cf. Curt Wachsmuth, Stadt Athen, ii. (1) 359-364). The first is possibly right (cf. Rogers on Aristoph. V/asps, xvii. f.); the second implies that this large court was held in the open air (Lipsius, Att. Recht, 172).

(in important political trials) various multiples of 500, namely, 1000, 1500, 2000 or 2500. To some of these numbers one juror is added; it was probably added to all, to obviate the risk of the votes being exactly equal.

The evidence as to the organization of the jurors in the early part of the 4th century is imperfect. Passages in Aristophanes (Ecclesiazusae, 682-688; Plutus, 1166 f.) imply that in 392-388 B.C. the total number was divided into ten sections distinguished by the first ten letters of the Greek alphabet, A to K. Every juror, on his first appointment, received a ticket of boxwood (or of bionze) bearing his name with that of his father and his deme, and with one of the above letters in the upper left-hand corner. Of the bronze tickets many have been found (see notes on Aristotle's Constitution of Athens, c. 63, and fig. 1 in frontispiece, ed. Sandys). These tickets formed part of the machinery for allotting the jurors to the several courts. To guard against the possibility of bribery or other undue influence, the allotment did not take place until immediately before the hearing of the case. Each court contained an equal number of jurors from each of the ten tribes, and thus represented the whole body of the state. The juror, on entering the court assigned him, received a counter (see fig. 3 in frontispiece, u.s.), on

presenting which at the end of the day he received his fee. The machinery for carrying out the above arrangements is minutely described at the end of Aristotle's Constitution of Athens (for details, cf. Gilbert, 397-399, Eng. trans., or Wyse in Whibley's Companion to Greek Studies, 387 f.).

The law-courts gradually superseded most of the ancient judicial functions of the council and the assembly, but the council continued to hold a strict scrutiny (Sow/mcia) "diction °i candidates for office or for other privileges, while of the the council itself, as well as all other officials, had to council give account (eWvva) on ceasing to hold office.' The council also retained the right to deal with extra- ordinary crimes against the state. It was open to any citizen to bring such crimes to the knowledge of the council in writing. The technical term for this information, denunciation or impeachment was eisangelia (tier ay yekia). The Bella.' council could inflict a fine of 500 drachmae (£20), or, in important cases, refer the matter either to a law- court, as in the trial of Antiphon (Thuc. viii. 68), or to the ecclesia, as in that of Alcibiades (415 B.C.), and the strategi in command at Arginusae (406; Xen. Hell. i. 7. 19). The term tioayyeKla was also applied to denunciations brought against persons who wronged the orphan or the widow, or against a public arbitrator who had neglected his duty (Dem. Meidias, 86 f.).

A " presentation " of criminal information (irpo/3o\i7) might be laid before the assembly with a view to obtaining its pre- _. .- liminary sanction for bringing the case before a judicial tribunal. Such was the mode of procedure adopted against persons who had brought malicious, groundless or vexatious accusations, or who had violated the sanctity of certain public festivals. The leading example of the former is the trial of the accusers who prompted the people to put to death the generals who had won the Battle of Arginusae (Xen. Hell. i. 7. 34) ; and, of the latter, the proceedings of Demosthenes against Meidias.

Legal actions (Slkcu) were classified as private (Ktcu) or public (5rnibai or "prosecutions," but soraeypaˆai were called "private," Classes wnen the state was regarded as only indirectly injured actions. by a wrong done to an individual citizen (Dem. xxi. 47). A private suit could only be brought by the man directly interested, or, in the case of a slave, a ward or an alien, by the master, guardian or patron respectively; and, if the suit were successful, the sum claimed generally went to the plaintiff. Public actions may be divided into ordinary criminal cases, and offences against the state. As a rule they could be instituted by any person who possessed the franchise, and the penalty was paid to the state. If the prosecutor failed to obtain one-fifth of the votes, he had to pay a fine of 1000 drachmae (£40), and lost the right of ever bringing a similar action.

and assembly.

Lawsuits, whether public or private, were also distinguished as Sinai Kara twos or irpos riva, according as the defeated party could or could not be personally punished. Actions (ayooves) were also distinguished as ayuves rifirjTol (" to be assessed "), in which the amount of damages had to be deter- mined by the court, because it had not been fixed by law, and dri/i? jroi (" not to be assessed "), in which the damages had not to be determined by the court, because they had already been fixed by law or by special agreement.

Among special kinds of action were aTayaiyr}, eriyrjais and ev&iijts. These could only be employed when the offence was patent and could not be denied. In the first, the person accused was summarily arrested by the prosecutor and haled into the presence of the proper official. In the second, the accuser took the officer with him to arrest the culprit (Dem. xxii. 26). In the third, he lodged an information with the official, and left the latter to effect the capture. Qaois, a general term for many kinds of legal " information," was a form of procedure specially directed against those who injured the fiscal interests of the state, and against guardians who neglected the pecuniary interests of their wards. 'Airoypari was an action for confiscating property in private hands, which was claimed as belonging to the state, the term being derived from the claimants' written inventory of the property in question.

The ordinary procedure in all lawsuits, public or private, began with a personal summons {vpbaK\ri

The action was begun by presenting a written statement oi the case to the magistrate who presided over trials of the class in question. If the statement were accepted, court-fees were paid by both parties in a private action, and by the prosecutor alone in a public action. The magistrate fixed a day for the preliminary investigation (avaKpio-is) , and, whenever several causes were instituted at the same time, he drew lots to determine the order in which they should be taken. Hence the plaintiff was said " to have a suit assigned him by lot " (Xayxavew SIk-qv), a phrase practically equivalent to " obtaining leave to bring an action." At the avatcpicns the plaintiff and defendant both swore to the truth of their statements. If the defendant raised no formal protest, the trial proceeded in regular course (evdvducla), but he might contend that the suit was inadmissible, and, to prove his point, might bring witnesses to confront those on the side of the plaintiff (diapapTvpia) , or he might rely on argument without witnesses by means of a written statement traversing that of the plaintiff (irapaypa4>ri). The person who submitted the special plea in bar of action naturally spoke first, and, if he gained the verdict, the main suit could not come on, or, at any rate, not in the way proposed or before the same court. A cross-action (avnypacpTi) might be brought by the defendant, but the verdict did not necessarily affect that of the original suit.

In the preliminary examination copies of the laws or other documents bearing on the case were produced. If any such document were in the hands of a third person, he could be compelled to produce it by an action for that me nts. purpose (ek ifJ.

Mercantile cases had to be decided within the interval of a month; others might be postponed for due cause. If, on the

Th Mai ^^ °^ iTla ^' one °f tne P art i es was absent, his representative had to show cause under oath (wr- oiimcLo); if the other party objected, he did so under oath (avdwrwiMXTia). If the plea for delay were refused by the court, and it were the defendant who failed to appear, judgment went by default; in the absence of the plaintiff, the case was given in favour of the defendant.

The official who had conducted the preliminary inquiry also presided at the trial. The proceedings began with a solemn sacrifice. The plea of the plaintiff and the formal reply of the defendant were then read by the clerk. The court was next addressed first by the plaintiff, next by the defendant;

in some cases there were two speeches on each side. Every litigant was legally required to conduct his own case. The speeches were often composed by professional experts for delivery by the parties to the suit, who were required to speak in person, though one or more unprofessional supporters (owiptopoi) might subse- quently speak in support of the case. The length of the speeches was in many cases limited by law to a fixed time recorded by means of a water-clock (clepsydra). Documents were not regarded as part of the speech, and, while these were being read, the clock was stopped (Goethe found a similar custom in force in Venice in October 1786). The witnesses were never cross- examined, but one of the litigants might formally interrogate the other. The case for the defence was sometimes finally supported by pathetic appeals on the part of relatives and friends.

When the speeches were over, the votes were taken. In the 5th century mussel-shells (xoiplvat,) were used for the purpose. Each of the jurors received a shell, which he placed in one of the two urns, in that to the front if he voted for acquittal; in that to the back if he voted for condemnation. If a second vote had to be taken to determine the amount of the penalty, wax tablets were used, on which the juror drew a long line, if he gave the heavy penalty demanded by the plaintiff; a short one, if he de- cided in favour of the lighter penalty proposed by the defendant. In the 4th century the mussel-shells were replaced by disks of bronze. Each disk (inscribed with the words ˆH$OS AHMOSIA) was about 1 in. in diameter, with a short tube running through the centre. This tube was either perforated or closed (see figs. 6 and 7 in frontispiece to Aristotle's Constitution of Athens, ed. Sandys). One of each kind was given to every juror, who was required to use the perforated or the closed disk, according as he voted for the plaintiff or for the defendant. On the platform there were two urns, one of bronze and one of wood. The juror placed in the hollow of his hand the disk that he proposed to use, and closed his fingers on the extremity of the tube, so that no one could see whether it were a perforated disk or not, and then deposited it in the bronze urn, and (with the same precaution to ensure secrecy) dropped the unused disk into the wooden urn. The votes were sorted by persons appointed by lot, and counted by the president of the court, and the result announced by the herald. For any second vote the same procedure was adopted (Aristotle, u.s., c. 68 of Kenyon's Berlin text).

Pecuniary penalties were inflicted both in public and in private suits; personal penalties, in public suits only. Personal „ ... penalties included sentences of death or exile, or different degrees of disfranchisement (art- iila) with or without confiscation. Imprisonment before trial was common, and persons mulcted in penalties might be imprisoned until the penalties were paid, but imprisonment was never inflicted as the sole penalty after conviction. Foreigners alone could be sold into slavery. Sentences of death

were carried out under the supervision of the board of police called the " Eleven." In ancient times a person condemned was hurled into a deep pit (the barathrum) in a north-western suburb of Athens. In later times he was compelled to drink the fatal draught of hemlock. Common malefactors were beaten to death with clubs. Fines were collected and confiscated property

sold by special officials, called irpaKropts and TUiXryrai respec- tively. In private suits the sentence was executed by the state if the latter had a share in any fine imposed, or if imprison- ment were part of the penalty. Otherwise, the execution of the sentence was left to the plaintiff, who had the right of distraint, or, if this failed, could bring an action of ejectment (St/a; eˆoiryris).

From the verdict of the heliaea there was no appeal. But, if judgment had been given by default, the person condemned might bring an action to prove that he was not responsible for such default, t1)v eprnwv (sc. 8'iktiv) avriXayxa-vtiv. The corre- sponding term for challenging the award of an arbitrator was njv fifj ovaav avrCKa-yxˆ-vˆv- He might also bring an action for false evidence (81ktj xpivhoixaprvpuZiv) against his opponent's witnesses, and, on their conviction, have the sentence annulled. This " denunciation " of false evidence was technically called kiricKriipLS and 'eKLCKr\TTTecrd(U.

The large number of the jurors made bribery difficult, but, as was first proved by Anytus (in 409), not impossible. It also diminished the feeling of personal responsibility, while character it increased the influence of political motives. In of the addressing such a court, the litigants were not above Athenian appealing to the personal interests of the general r un " ' public. We have a striking example of this in the terms in which Lysias makes one of his clients close a speech in prosecution of certain retail corn-dealers who have incurred the penalty of death by buying more than 75 bushels of wheat at one time: " If you condemn these persons, you will be doing what is right, and will pay less for the purchase of your corn; if you acquit them, you will pay more " (xxii. § 22).

Speakers were also tempted to take advantage of the popular ignorance by misinterpreting the enactments of the law, and the jurors could look for no aid from the officials who formally presided over the courts. The latter were not necessarily experts, for they owed their own original appointment to the caprice of the lot. Almost the only officials specially elected as experts were the strategi, and these presided only in their own courts. Again, there was every temptation for the informer to propose the confiscation of the property of a wealthy citizen, who would naturally prefer paying blackmail to running the risk of having his case tried before a

large tribunal which was under every temptation to decide in the interests of the treasury. In con- clusion we may quote the opinions on the judicial system of Athens which have been expressed by two eminent classical scholars and English lawyers.

A translator of Aristophanes, Mr B. B. Rogers, records his opinion " that it would be ; difficult to devise a judicial system less adapted for the due administration of justice " (Preface to Wasps, xxxv. f.), while a translator of Demosthenes, Mr C. R. Kennedy, observes that the Athenian jurors " were persons of no legal education or learning; taken at haphazard from the whole body of citizens, and mostly belonging to the lowest and poorest class. On the other hand, the Athenians were naturally the quickest and cleverest people in the world. Their wits were sharpened by the habit … of taking an active part in important debates, and hearing the most splendid orators. There was so much litigation at Athens that they were constantly either engaged as jurors, or present as spectators in courts of law" (Private Orations, p. 361).

Authorities. — 1. Greek Law. B. W. Leist, Graco-italische Rechtsgeschichte (Jena, 1884); L. Mitteis, Reichsrecht und Volksrecht in den ostlichen Provinzen des romischen Kaiserreichs, mil Beitrdgen zur Kenntnis des griechischen Rechts (Leipzig, 1891); J. H. Lipsius, Von der Bedeutung des griechischen Rechts (Leipzig, 1893) ; G. Gilbert, " Zur Entwickelungsgeschichte des . . . griechischen Rechtes " in Jahrb. fur kl. Philologie (Leipzig, 1896); H. J. Hitzig, Die Bedeutung des allgriechischen Rechtes fur die vergleichende Rechtswissenschaft (Stutt- gart, 1906) ; R. Hirzel, Themis, Dike und Verwandtes (Leipzig, 1907) ; J. J. Thonissen, Le Droit criminel de la Gr'ece legendaire, followed by Le Droit penal de la republique athenienne (Brussels, 1875).

2. Attic Law. (a) Editions of Greek texts: I. B. T61fy, Corpus juris Attici (Pest and Leipzig, 1868) ; Aristotle's Constitution of Athens, ed. Kenyon (London, 1891, &c, and esp. ed. 4, Berlin, 1903); ed. 4, Blass (Leipzig, 1903) ; text with critical and explanatory notes, ed. Sandys (London, 1893); Lysias, ed. Frohberger (Leipzig, 1866- 1871); Isaeus, ed. Wyse (Cambridge, 1904); Demosthenes, Private Orations, ed. Paley and Sandys, ed. 3 (Cambridge, 1896-1898); Against Midias, ed. Goodwin (Cambridge, 1906); Dareste, Haus- soullier, Th. Reinach, Inscr. juridiques grecques (Paris, 1891-1904). (b) Modern treatises: K. F. Hermann, De vestigiis institutorum

. . . Atticorum per Platonis de legibus libros indagandis (Marburg, 1836); Staatsaltertumer , ed. 6, Thumser (Freiburg, 1892); Rechts- altertiimer, ed. 3, Thalheim (Freiburg, 1884); G. Busolt, Staats- und Rechtsallerliimer , ed. 2 (Munich, 1892) ; U. von Wilamowitz- Mollendorff, Aristoteles und Alhen (Berlin, 1893); G. Gilbert, Gk. Constitutional Antiquities (vol. i., Eng. trans., pp. 376-416, London, '895); J. H. Lipsius, (1) new ed. of Meier and Schomann, Der attische Process (Berlin, 1883-1887); (2) ed. 4 of Schomann, Gr. Altertumer (Berlin, 1897-1902); (3) Das attische Recht und Rechts- verfahren (Leipzig, 1905) ; Daremberg and Saglio, Dictionnaire des antiquites (Paris, 1877) ; G. Glotz, La Solidarity de la famille dans le droit criminel en Grece (Paris, 1904) ; L. Beauchet, Droit prive de la rep. athen. (4 vols., Paris, 1897); C. R. Kennedy, Appendices to transl. of Dem. vols. iii. and iv. (1856-1861); Smith's Dictionary of . . . Antiquities, ed. 3 (1891); F. B. Jevons, in Gardner and Jevons, Greek Antiquities (1895, pp. 526-597); W. Wyse, in Whibley's Companion to Greek Studies (Cambridge, 1905), pp. 377-402.

(J. E. S.) GREEK LITERATURE.— The literature of the Greek language is broadly divisible into three main sections: (1) Ancient, (2) Byzantine, (3) Modern. These are dealt with below in that order.*

I. The Ancient Greek Literature

The ancient literature falls into three periods: (A) The Early Literature, to about 475 B.C.; epic, elegiac, iambic and lyric poetry; the beginnings of literary prose. (B) The Attic Literature 475-300 B.C.; tragic and comic drama; historical, oratorical and philosophical prose. (C) The Literature of the Decadence, 300 B.C. to a.d. 529; which may again be divided into the Alexandrian period, 300-146 B.C., and the Graeco- Roman period, 146 B.C. to a.d. 529.

For details regarding particular works or the lives of their authors reference should be made to the separate articles devoted to the principal Greek writers. The object of the following pages is to sketch the literary development as a whole, to show how its successive periods were related to each other, and to mark the dominant characteristics of each.

(A) The Early Literature. — A process of natural growth may be traced through all the best work of the Greek genius. The Greeks were not literary imitators of foreign models; the forms of poetry and prose in which they attained to such unequalled excellence were first developed by themselves. Their literature had its roots in their political and social life; it is the spontaneous expression of that life in youth, maturity and decay; and the

order in which its several fruits are produced is not the result of accident or caprice. Further, the old Greek literature has a striking completeness, due to the fact that each great branch of the Hellenic race bore a characteristic part in its development. Ionians, Aeolians, Dorians, in turn contributed their share. Each dialect corresponded to a certain aspect of Hellenic life and character. Each found its appropriate work.

The Ionians on the coast of Asia Minor — a lively and genial people, delighting in adventure, and keenly sensitive to every- thing bright and joyous — created artistic epic poetry out of the lays in which Aeolic minstrels sang of the old Achaean wars. And among the Ionians arose elegiac poetry, the first variation on the epic type. These found a fitting instrument in the harmonious Ionic dialect, the flexible utterance of a quick and versatile intelligence. The Aeolians of Lesbos next created the lyric of personal passion, in which the traits of their race — its chivalrous pride, its bold but sensuous fancy — found a fitting voice in the fiery strength and tenderness of Aeolic speech. The Dorians of the Peloponnesus, Sicily and Magna Graecia then perfected the choral lyric for festivals and religious worship; and here again an earnest faith, a strong pride in Dorian usage and renown had an apt – interpreter in the massive and sonorous Doric. Finally, the Attic branch of the Ionian stock produced the drama, blending elements of all the other kinds, and developed an artistic literary prose in history, oratory and philosophy. It is in the Attic literature that the Greek mind receives its most complete interpretation.

A natural affinity was felt to exist between each dialect and that species of composition for which it had been specially used. Hence the dialect of the Ionian epic poets would be adopted with more or less thoroughness even by epic or elegiac poets who

Hymns,

The dialects.

were not Ionians. Thus the Aeolian Hesiod uses it in epos, the Dorian Theognis in elegy, though not without alloy. Similarly, the Dorian Theocritus wrote love-songs in Aeolic. All the faculties and tones of the language were thus gradually brought out by the co-operation of the dialects. Old Greek literature has an essential unity — the unity of a living organism; and this unity comprehends a number of distinct types, each of which is complete in its own kind.

Extant Greek literature begins with the Homeric poems. These are works of art which imply a long period of antecedent poetical cultivation. Of the pre-Homeric poetry we have no remains, and very little knowledge. Such ˆ e ‘

glimpses as we get of it connect it with two different poetry. stages in the religion of the prehistoric Hellenes. The first of these stages is that in which the agencies or forms of external nature were personified indeed, yet with the conscious- ness that the personal names were only symbols. Some very ancient Greek songs of which mention is made may have belonged to this stage — as the songs of Linus, ˆff 8 Ialemus and Hylas. Linus, the fair youth killed by seasons. dogs, seems to be the spring passing away before Sirius. Such songs have been aptly called " songs of the seasons." The second stage is that in which the Hellenes have now defini- tively personified the powers which they worship. Apollo, Demeter, Dionysus, Cybele, have now become to them beings with clearly conceived attributes. To this second stage belong the hymns connected with the names of the legendary bards, such as Orpheus, Musaeus, Eumolpus, who are themselves associated with the worship of the Pierian Muses and the Attic ritual of Demeter. The seats of this early sacred poetry are not only "Thracian" — i.e. on the borders of northern Greece — but also " Phrygian " and " Cretan." It belongs, that is, presumably to an age when the ancestors of the Hellenes had left the Indo-European home in central Asia, but had not yet taken full possession of the lands which were afterwards Hellenic. Some of their tribes were still in Asia; others were settling in the islands of the Aegean; others were passing through the lands on its northern seaboard. If there was a period when the Greeks possessed no poetry but hymns forming part of a religious ritual, it may be conjectured that it was not of long duration. Already in the Iliad a secular character belongs to the marriage hymn and to the dirge for the dead, which in ancient India were chanted by the priest. The bent of the Greeks was to claim poetry and music as public joys; they would not long have suffered them to remain sacerdotal mysteries. And among the earliest themes on which the lay artist in poetry was employed were probably war-ballads, sung by minstrels in the houses of the chiefs whose ancestors they celebrated.

Such war-ballads were the materials from which the earliest epic poetry of Greece was constructed. By an " epic " poem the Greeks meant a narrative of heroic action in „

hexameter verse. The term hn) meant at first simply "verses"; it acquired its special meaning only when ixeKi}, lyric songs set to music, came to be distinguished from hrrj, verses not set to music, but merely recited. Epic poetry is the only kind of extant Greek poetry which is older than about 700 B.C. The early epos of Greece is represented by the Iliad and the Odyssey, Hesiod and the Homeric hymns; also by some fragments of the " Cyclic " poets.

After the Dorian conquest of the Peloponnesus, the Aeolian emigrants who settled in the north-west of Asia Minor brought with them the warlike

legends of their chiefs, the Achaean princes of old. These legends lived in the T^t' t '^ [ballads of the Aeolic minstrels, and from them passed "odysney. " southward into Ionia, where the Ionian poets gradually shaped them into higher artistic forms. Among the seven places which claimed to be the birthplace of Homer, that which has the best title is Smyrna. Homer himself is called " son of Meles " — the stream which flowed through old Smyrna, on the border between Aeolia and Ionia. The tradition is significant in regard to the origin and character of the Iliad, for in the Iliad we have Achaean ballads worked up by Ionian art. A preponderance

of evidence is in favour of the view that the Odyssey also, at least in its earliest form, was composed on the Ionian coast of Asia Minor. According to the Spartan account, Lycurgus was the first to bring to Greece a complete copy of the Homeric poems, which he had obtained from the Creophylidae, a clan or gild of poets in Samos. A better authenticated tradition connects Athens with early attempts to preserve the chief poetical treasure of the nation. Peisistratus is said to have charged some learned men with the task of collecting all " the poems of Homer "; but it is difficult to decide how much was comprehended under this last phrase, or whether the province of the commission went beyond the mere task of collecting. Nor can it be deter- mined what exactly it was that Solon and Hipparchus respec- tively did for the Homeric poems. Solon, it has been thought, enacted that the poems should be recited from an authorized text (e£ wro/3oX?)s); Hipparchus, that they should be recited in a regular order (e £ wroXTj^ecos) . At any rate, we know that in the 6th century B.C. a recitation of the poems of Homer was one of the established competitions at the Panathenaea, held once in four years. The reciter was called a rhapsodisl — properly one who weaves a long, smoothly-flowing chant, then an epic poet who chants his own or another's poem. The rhapsodist did not, like the early minstrel, use the accompaniment of the harp; he gave the verses in a flowing recitative, bearing in his hand a branch of laurel, the symbol of Apollo's inspiration. In the 5th century B.C. we find that various Greek cities had their own editions (al iroXiTi/cai, Kara iroXeis or e/c ToKeoiv indocreis) of the poems, for recitation at their festivals. Among these were the editions of Massilia, of Chios and of Argolis. There were also editions bearing the name of the individual editor (al kot' &v8pa) — the best known being that which Aristotle prepared for Alexander. The recension of the poems by Aristarchus (156 B.C.) became the standard one, and is probably that on which the existing text is based. The oldest

Homeric MS. extant, Venetus A of the Iliad, is of the 10th century; the first printed edition of Homer was that edited by the Byzantine Demetrius Chalcondyles (Florence, 1488).

The ancient Greeks were almost unanimous in believing the Iliad and the Odyssey to be the work of one man, Homer, to whom they also ascribed some extant hymns, and probably much more besides. Aristotle and Aristarchus seem to have put Homer's date about 1044 B.C., Herodotus about 850 B.C. It is not till about 170 B.C. that the grammarians Hellanicus and Xenon put forward the view that Homer was the author of the Iliad, but not of the Odyssey. Those who followed them in assigning different authors to the two poems were called the Separators (Chorizontes). Aristarchus combated " the paradox of Xenon," and it does not seem to have had much acceptance in antiquity. Giovanni Battista Vico, a Neapolitan (1668-1744), seems to have been the first modern to suggest the composite authorship and oral tradition of the Homeric poems; but this was a pure conjecture in support of his theory that the names of ancient lawgivers and poets are often mere symbols. F. A. Wolf, in the Prolegomena to his edition (1795), was the founder of a scientific scepticism. The Iliad, he said (for he recognized the comparative unity and consistency of the Odyssey), was pieced together from many small unwritten poems by various hands, and was first committed to writing in the time of Peisistratus. This view was in harmony with the tone of German criticism at the time; it was welcomed as a new testimony to the superiority of popular poetry, springing from fresh natural sources, to elaborate works of art; and it at once found enthusiastic adherents. For the course of Homeric controversy since Wolf the reader is referred to the article Homer.

The Ionian school of epos produced a number of poems founded on the legends of the Trojan war, and intended as introductions or continuations to the Iliad and the poems. Odyssey. The grammarian Proclus (a.d. 140) has preserved the names and subjects of some of these; but the fragments are very scanty. The Nostoi or Homeward Voyages, by Agias (or Hagias) of Troezen, filled up the gap of

The

Homeric

question.

Heslodlc epos.

ten years between the Iliad and the Odyssey; the Lay of Telegonus, by Eugammon of Cyrene, continued the story of the Odyssey to the death of

Odysseus by the hand of Telegonus, the son whom Circe bore to him. Similarly the Cyprian Lays by Stasinus of Cyprus, ascribed by others to Hegesias (or Hegesinus) of Salamis or Halicarnassus, was introductory to the Iliad; the Aethiopis and the Sack of Troy, by Arctinus of Miletus, and the Little Iliad, by Lesches of Mytilene, were supplementary to it. These and many other names of lost epics — some taken also from the Theban myths (Thebais, Epigoni, Oedipodea) — serve to show how prolific was that epic school of which only two great examples remain. The name of epic cycle was properly applied to a prose compilation of abstracts from these epics, pieced together in the order of the events. The compilers were called ." cyclic " writers; and the term has now been transferred to the epic poets whom they used. 1

The epic poetry of Ionia celebrated the great deeds of heroes in the old wars. But in Greece proper there arose another school of epos, which busied itself with religious lore and ethical precepts, especially in relation to the rural life of Boeotia. This school is represented by the name of Hesiod. The legend spoke of him as vanquishing Homer in a poetical contest of Chalcis in Euboea; and it expresses the fact that, to the old Greek mind, these two names stood for two contrasted epic types. Nothing is certainly known of his date, except that it must have been subsequent to the maturity of Ionian epos. He is conjecturally placed about 850-800 B.C.; but some would refer him to the early part of the 7th century B.C. His home was at Ascra, a village in a valley under Helicon, whither his father had migrated from Cyme in Aeolis on the coast of Asia Minor. In Hesiod's Works and Days we have the earliest example of a didactic poem. The seasons and the labours of the Boeotian farmer's year are followed by a list of the days which are lucky or unlucky for work. The Theogony, or " Origin of the Gods," describes first how the visible order of nature arose out of chaos; next, how the gods were born. Though it never possessed the character of a sacred book, it remained a standard authority on the genealogies of the gods. So far as a corrupt and confused text warrants a judgment, the poet was piecing together — not always intelligently — the fragments of a very old cosmogonic system, using for this purpose both the hymns preserved in the temples and the myths which lived in folklore. The epic lay in 480 lines called the Shield of Heracles — partly imitated from the 18th book of the Iliad — is the work of an author or authors later than Hesiod. In the Hesiodic poetry, as represented by the Works and Days and the Theogony, we see the influence of the temple at Delphi. Hesiod recognizes the existence of Sal/Mves — spirits of the departed who haunt the earth as the invisible guardians of justice; and he connects the office of the poet with that of the prophet. The poet is one whom the gods have authorized to impress doctrine and practical duties on men. A religious purpose was essentially characteristic of the Hesiodic school. Its poets treated the old

legends as relics of a sacred history, and not merely, in the Ionian manner, as subjects of idealizing art. Such titles as the Maxims of Cheiron and the Lay of Melampus, the seer — lost poems of the Hesiodic school — illustrate its ethical and its mystic tendencies. The Homeric Hymns are a collection of pieces, some of them very short, in hexameter verse. Their traditional title is — Hymns or Preludes of Homer and the Homeridae. The second of the alternative designations is the true one. 11 . The pieces are not " hymns " used in formal worship, hymns. but " preludes " or prefatory addresses (irpooifiia) with which the rhapsodists ushered in their recitations of epic poetry. The " prelude " might be addressed to the presiding god of the festival, or to any local deity whom the reciter wished to honour. The pieces (of which there are 3s) range in date perhaps from 750 to 500 B.C. (though some authorities assign dates as late as the 3rd and 4th centuries a.d.; see ed. by Sikes and Allen, e.g. p. 228), and it is probable that the collection was

1 For authorities and criticisms see T. W. Allen in Classical Quarterly (Jan. and April 1908),

formed in Attica, for the use of rhapsodists. The style is that of the Ionian or Homeric epos; but there are also several traces of the Hesiodic or Boeotian school. The principal " hymns " are (1) to Apollo (generally treated as two or more hymns combined in one); (2) to Hermes; (3) to Aphrodite; and (4) to Demeter. The hymn to Apollo, quoted by Thucydides (iii. 104) as Homer's, is of peculiar interest on account of the lines describing the Ionian festival at Delos. Two celebrated pieces of a sportive kind passed under Homer's name. The Margites — a comic poem on one " who knew many things but knew them all badly " — is regarded by Aristotle as the earliest germ of comedy, and was possibly as old as 700 B.C. Only a few lines remain. The Batracho(myo)machia, or Battle of the Frogs and Mice probably belongs to the decline of Greek literature, perhaps to the 2nd century B.C. 1 About 300 verses of it are extant.

In the Iliad and the Odyssey the personal opinions or sym- pathies of the poet may sometimes be conjectured, but they are _ , not declared or even hinted. Hesiod, indeed, some- tioa from times gives us a glimpse of his own troubles or views. epos to Yet Hesiod is, on the whole, essentially a prophet. elegy.

the truths which he imparts have not been discovered by his own search. He is the mouthpiece of the Delphian Apollo. Personal opinion and feeling may tinge his utterance, but they do not determine its general complexion. The egotism is a single thread; it is not the basis of the texture. Epic poetry was in Greece the foundation of all other poetry; for many centuries no other kind was generally cultivated, no other could speak to the whole people. Politically, the age was monarchical or aristocratic; intellectually, it was too simple for the analysis of thought or emotion. Kings and princes loved to hear of the great deeds of their ancestors; common men loved to hear of them too, for they had no other interest. The mind of Greece found no subject of contemplation so attractive as the warlike past of the race, or so useful as that lore which experience and tradition had bequeathed. But in the course of the 8th century B.C. the rule of hereditary princes began to disappear. Monarchy gave place to oligarchy, and this — often after the intermediate phase of a tyrannis — to democracy. Such a change was neces- sarily favourable to the growth of reflection. The private citizen is no longer a mere cipher, the Homeric r«, a unit in the dim multitude of the king-ruled folk; he gains more power of independent action, his mental horizon is widened, his life becomes fuller and more interesting. He begins to feel the need of expressing the thoughts and feelings that are stirred in him. But as yet a prose literature does not exist; the new thoughts, like the old heroic stories, must still be told in verse. The forms of verse created by this need were the Elegiac and the Iambic.

The elegiac metre is, in form, a simple variation on the epic metre, obtained by docking the second of two hexameters so as El to make it a verse of five feet or measures. But the

poetical capabilities of the elegiac couplet are of a wholly different kind from those of heroic verse. iXeyos seems to be the Greek form of a name given by the Carians and Lydians to a lament for the dead. This was accompanied by the soft music of the Lydian flute, which continued to be associated with Greek elegy. The non-Hellenic origin of elegy is indicated by this very fact. The flute was to the Greeks an Asiatic instru- ment — string instruments were those which they made their own — and it would hardly have been wedded by them to a species of poetry which had arisen among themselves. The early elegiac poetry of Greece was by no means confined to mourning for the dead. War, love, politics, proverbial philosophy, were in turn its themes; it dealt, in fact, with the chief interest of the poet and his friends, whatever that might be at the time. It is the direct expression of the poet's own thoughts, addressed to a sympathizing society. This is its first characteristic. The second is that, even when most pathetic or most spirited, it still preserves, on the whole, the tone of conversation or of

1 Others attribute it, as well as the Margites, to Pigres of Hali- carnassus, the supposed brother of the Carian queen Artemisia, who fought on the side of Xerxes at the battle of Salamis.

Iambic verse.

narrative. Greek elegy stops short of lyric passion. English elegy, whether funereal as in Dryden and Pope, or reflective as in Gray, is usually true to the same normal type. Roman elegy is not equally true to it, but sometimes tends to trench on the lyric province. For Roman elegy is mainly amatory or sentimental; and its masters imitated, as a rule, not the early Greek elegists, not Tyrtaeus or Theognis, but the later Alexandrian elegists, such as Callimachus or Philetas. Catullus introduced the metre to Latin literature, and used it with more fidelity than his followers to its genuine Greek inspiration.

Elegy, as we have seen, was the first slight deviation from epos. But almost at the same time another species arose which had nothing in common with epos, either in form or in spirit. This was the iambic. The word lajifios, iambus {iaTrruv, to dart or shoot) was used in reference to the licensed raillery at the festivals of Demeter; it was the maiden Iambe, the myth said, who drew the first smile from the mourning goddess. The iambic metre was at first used for satire; and it was in this strain that it was chiefly employed by its earliest master of note, Archilochus of Paros (670 B.C.). But it was adapted to the expression generally of any pointed thought. Thus it was suitable to fables. Elegiac and iambic poetry both belong to the borderland between epic and lyric. While, however, elegy stands nearer to epos, iambic stands nearer to the lyric. Iambic poetry can express the personal feeling of the poet with greater intensity than elegy does; on the other hand, it has not the lyric flexibility, self-abandonment or glow. As we see in the case of Solon, iambic verse could serve for the expression of that deeper thought, that more inward self-communing, for which the elegiac form would have been inappropriate.

But these two forms of poetry, both Ionian, the elegiac and the iambic, belong essentially to the same stage of the literature. They stand between the Ionian epos and the lyric poetry of the Aeolians and Dorians. The earliest of the Greek elegists, Callinus and Tyrtaeus, use elegy to rouse a warlike spirit in sinking hearts. Archilochus too wrote warlike elegy, but used it also in other strains, as in lament for the dead. The elegy of Mimner- mus of Smyrna or Colophon is the plaintive farewell of an ease-loving Ionian to the days of Ionian freedom. In Solon elegy takes a higher range; it becomes political and ethical. 2 Theognis represents the maturer union of politics with a proverbial philosophy. Another gnomic poet was Phocylides of Miletus; an admonitory poem extant under his name is

probably the work of an Alexandrine Jewish Christian. Xenophanes gives a philosophic strain to elegy. With Simonides of Ceos it reverts, in an exquisite form, to its earliest destination, and becomes the vehicle of epitaph on those who fell in the Persian Wars. Iambic verse was used by Simonides (or Semonides) of Amorgus, as by Archilochus, for satire — but satire directed against classes rather than persons. Solon's iambics so far preserve the old associations of the metre that they represent the polemical or controversial side of his political poetry. Hipponax of Ephesus was another iambic satirist — using the o-Kafav (" limping ") or choliambic verse, produced by substituting a spondee for an iambus in the last place. But it was not until the rise of the Attic drama that the full capabilities of iambic verse were seen. The lyric poetry of early Greece may be regarded as the final form of that effort at self-expression which in the elegiac and iambic is still incomplete. The lyric expression is deeper and more impassioned. Its intimate union poetrv. with music and with the rhythmical movement of the dance gives to it more of an ideal character. At the same time the, continuity of the music permits pauses to the voice — pauses necessary as reliefs after a climax. Before lyric poetry could be effective, it was necessary that some progress should have been made in the art of music. The instrument used by the Greeks to accompany the voice was the four-stringed lyre, and the first great epoch in Greek music was when Terpander of Lesbos (660 B.C.), by adding three strings, gave the lyre the

2 The extant fragments of Solon have been augmented by- lengthy quotations in the Constitution of A tkens.

compass of the octave. Further improvements are ascribed to Olympus and Thaletas. By 500 B.C. Greek music had probably acquired all the powers of expression which the lyric poet could demand. The period of Greek lyric poetry may be roughly defined as from 670 to 440 B.C. Two different parts in its development were taken by the Aeolians and the Dorians.

The lyric poetry of the Aeolians — especially of Lesbos — was essentially the utterance of personal feeling, and was usually intended for a single voice, not for a chorus. Lesbos, in the 7th century B.C., had attained some naval and commercial importance. But the strife of oligarchy and democracy was active; the Lesbian nobles were often driven by revolution

to exchange their luxurious home-life for the hardships of exile. It is such a life of contrasts and excitements, working on a sensuous and fiery temperament, that is reflected in the fragments of Alcaeus. In these glimpses of war and love, of anxiety for the storm-tossed state and of careless festivity, there is much of the cavalier spirit; if Archi- lochus is in certain aspects a Greek Byron, Alcaeus might be compared to Lovelace. The other great representative of the Aeolian lyric is Sappho, the only woman of Greek race who is known to have possessed poetical genius of the first order. Intensity and melody are the characteristics of the fragments that remain to us. 1 Probably no poet ever surpassed Sappho as an interpreter of passion in exquisitely subtle harmonies of form and sound. Anacreon of Teos, in Ionia, may be classed with the Aeolian lyrists in so far as the matter and form of his work resembled theirs, though the dialect in which he wrote was mainly the Ionian. A few fragments remain from his hymns to the gods, from love-poems and festive songs. The collection of sixty short pieces which passes current under his name date only from the 10th century. The short poems which it comprises are of various age and authorship, probably ranging inˆ date from c. 200 B.C. to a.d. 400 or 500. They have not the pure style, the flexible grace, or the sweetness of the classical fragments; but the verses, though somewhat mechanical, are often pretty. The Dorian lyric poetry, in contrast with the Aeolian, had more of a public than of a personal character, and was for the most part choral. Hymns or choruses for the public school. worship of the gods, and odes to be sung at festivals on occasions of public interest, were its characteristic forms. Its central inspiration was the pride of the Dorians in the Dorian past, in their traditions of worship, government and social usage. The history of the Dorian lyric poetry does not present us with vivid expressions of personal character, like those of Alcaeus and Sappho, but rather with a series of artists whose names are associated with improvements of form. Thus Alcman (the Doric form of Alcmaeon; 660 B.C.) is said to have introduced the balanced movement of strophe and antistrophe. Stesichorus, of Himera in Sicily, added the epode, sung by the chorus while stationary after these movements; Arion of Methymna in Lesbos gave a finished form to the choral hymn (" dithyramb ") in honour of Dionysus, and organized the " cyclic " or circular chorus which sang it at the altar. Ibycus of Rhegium (c. 540) wrote choral lyrics after Stesichorus and glowing love-songs in the Aeolic style.

The culmination of the lyric poetry is marked by two great names, Simonides and Pindar. Simonides (556-468) was an Ionian of the island of Ceos, but his lyrics belonged by a'rˆ"" UeS ˆ 0rm t0 l ˆ e cnora l D°ri an school. Many of his subjects Pindar. were taken from the events of the Persian wars: his epitaphs on those who fell at Thermopylae and Salamis were celebrated. In him the lyric art of the Dorians is interpreted by Ionian

genius, and Athens — where part of his life was passed — is the point at which they meet. Simonides is the first Greek'

1 Since the above was written, four considerable fragments generally assigned to Sappho have been discovered: a prayer to the Nereids for the safe return of her brother Charaxus; the leave- taking of a favourite pupil ; a greeting to Atthis, one of her friends, in Lydia; the fourth, much mutilated, addressed to another pupil, Gongyla. They are of great beauty and throw considerable light on the personality of Sappho and the language and metre of her poems.

lyrist whose significance is not merely Aeolian or Dorian but Panhellenic. The same character belongs even more completely to his younger contemporary. Pindar (518-c. 443) was born in Boeotia of a Dorian stock; thus, as Ionian and Dorian elements meet in Simonides, so Dorian and Aeolian elements meet in Pindar. Simonides was perhaps the most tender and most exquisite of the lyric poets. Pindar was the boldest, the most fervid and the most sublime. His extant fragments 2 represent almost every branch of the lyric art. But he is known to us mainly by forty-four Epinicia, or odes of victory, for the Olympian, Pythian, Nemean and Isthmian festivals. The general characteristic of the treatment is that the particular victory is made the occasion of introducing heroic legends connected with the family or city of the victor, and of inculcating the moral lessons which they teach. No Greek lyric poetry can be completely appreciated apart from the music, now lost, to which it was set. Pindar's odes were, further, essentially occasional poems; they abound in allusions of which the effect is partly or wholly lost on us; and the glories which they cele- brate belong to a life which we can but imperfectly realize. Of all the great Greek poets, Pindar is perhaps the one to whom it is hardest for us to do justice; yet we can at least recognize his splendour of imagination, his strong rapidity and his soaring flight.

Bacchylides of Ceos (c. 504-430), the youngest of the three great lyric poets and nephew of Simonides, was known only by scanty fragments until the discovery of nineteen poems on an Egyptian papyrus in 1896. They consist of thirteen (or fourteen) epinicia, two of which celebrate the same victories as two odes of Pindar. The papyrus also contains six odes for the festivals of gods or heroes. The poems contain valuable information on the court life of the time and legendary history. Bacchylides, the little " Cean nightingale," is inferior to his great rival Pindar, " the Swan of Dirce," in originality and splendour of language, but he writes simply and elegantly, while his excellent yvSiixai attracted readers of a philosophical turn of mind, amongst them the emperor Julian.

Similarly, the scanty fragments of Timotheus of Miletus (d. 357), musical

composer and poet, and inventor of the eleven- stringed lyre, were increased by the discovery in 1902 of some 250 lines of his " nome " the Persae, written after the manner of Terpander. The beginning is lost; the middle describes the battle of Salamis; the end is of a personal nature. The papyrus is the oldest Greek MS. and belongs to the age of Alexander the Great. The language is frequently very obscure, and the whole is a specimen of lyric poetry in its decline.

(B) The Attic Literature. — The Ionians of Asia Minor, the Aeolians and the Dorians had now performed their special parts in the development of Greek literature. Epic poetry had inter- preted the heroic legends of warlike deeds done by Zeus-nourished kings and chiefs. Then, as the individual life became more and more elegiac and iambic poetry had become the social expression of that life in all its varied interests and feelings. Lastly, lyric poetry had arisen to satisfy a twofold need — to be the more intense utterance of personal emotion, or to give choral voice, at stirring moments, to the faith or fame, the triumph or the sorrow, of a city or a race. A new form of poetry was now to be created, with elements borrowed from all the rest. And this was to be achieved by the people of Attica, in whose character and language the distinctive traits of an Ionian descent were tempered with some of the best qualities of the Dorian stock.

The drama (q.v.) arose from the festivals of Dionysus, the god of wine, which were held at intervals from the beginning of winter to the beginning of spring. A troop of rustic ■worshippers would gather around the altar of the god, arama? and sing a hymn in his honour, telling of his victories or sufferings in his progress over the earth. " Tragedy " meant " the goat-song," a goat (rpayos) being sacrificed to Dionysus before the hymn was sung. " Comedy," " the village- song," is the same hymn regarded as an occasion for

2 Recently increased by specimens of the Partheneia (choral songs for maidens) and paeans.

rustic jest. Then the leader of the chorus would assume the part of a messenger from Dionysus, or even that of the god himself, and recite an adventure to the worshippers, who made choral response. The next step was to arrange a dialogue between the leader(/copu<£cuos, coryphaeus)

and one chosen member of the chorus, hence called " the answerer " (iiroKpiTr]S, hypocrites, afterwards the ordinary word for " actor "). This last improve- ment is ascribed to the Attic Thespis (about 536 B.C.). The elements of drama were now ready. The choral hymn to Dionysus (the " dithyramb ") had received an artistic form from the Dorians; dialogue, though only between the leader of the chorus and a single actor, had been introduced in Attica. Phrynichus, an Athenian, celebrated in this manner some events of the Persian Wars; but in his " drama " there was still only one actor. Choerilus of Athens and Pratinas of Phlius, who belonged to the same period, developed the satyric drama; Pratinas also wrote tragedies, dithyrambs, and hyporchemata (lively choral odes chiefly in honour of Apollo).

Aeschylus (born 525 B.C.) became the real founder of tragedy by introducing a second actor, and thus rendering the dialogue Aeschylus, independent of the chorus. At the same time the

choral song — hitherto the principal part of the per- formance — became subordinate to the dialogue; and drama was mature. Aeschylus is also said to have made various improvements of detail in costume and the like; and it was early in his career that the theatre of Dionysus under the acropolis was commenced — the first permanent home of Greek drama, in place of the temporary wooden platforms which had hitherto been used. The system of the ” trilogy ” and the ” tetralogy ” is further ascribed to Aeschylus, — the ” trilogy ” being properly a series of three tragedies connected in subject, such as the Agamemnon, Ckoephori, Eumenides, which together form the Oresteia, or Story of Orestes. The ” tetralogy ” is such a triad with a ” satyric drama ” added — that is, a drama in which ” satyrs,” the grotesque woodland beings who attended on Dionysus, formed the chorus, as in the earlier dithyramb from which drama sprang. The Cyclops of Euripides is the only extant specimen of a satyric drama. In the seven tragedies which alone remain of the seventy which Aeschylus is said to have composed, the forms of kings and heroes have a grandeur which is truly Homeric; there is a spirit of Panhellenic patriot- ism such as the Persian Wars in which he fought might well quicken in a soldier-poet ; and, pervading all, there is a strain of speculative thought which seeks to reconcile the apparent conflicts between the gods of heaven and of the underworld by the doctrine that both alike, constrained by necessity, are work- Sophocles. ‘ n 8 out tne ˆ aw ˚f righteousness. Sophocles, who was

born thirty years after Aeschylus (495 B.C.), is the most perfect artist of the ancient drama. No one before or after him gave to Greek tragedy so high a degree of ideal beauty, or appreciated so finely the possibilities and the limitations of its sphere. He excels especially in drawing character; his Antigone, his Ajax, his Oedipus — indeed, all the chief persons of his

dramas — are typical studies in the great primary emotions of human nature. He gave a freer scope to tragic dialogue by adding a third actor; and in one of his later plays, the Oedipus at Colonus, a fourth actor is required. From the time when he won the tragic prize against Aeschylus in 468 to his death in 405 B.C. he was the favourite dramatist of Athens; and for us he is not only a great dramatist, but also the most spiritual representative of the age of Pericles. The distinctive interest of Euripides is of Euripides. anotn er kind. He was only fifteen years younger than

Sophocles; but when he entered on his poetical career, the old inspirations of tragedy were already failing. Euripides marks a period of transition in the tragic art, and is, in fact, the mediator between the classical and the romantic drama. The myths and traditions with which the elder dramatists had dealt no longer commanded an unquestioning faith. Euripides himself was imbued with the new intellectual scepticism of the day; and the speculative views which were conflicting in his own mind are reflected in his plays. He had much picturesque and pathetic power; he was a master of expression; and he shows ingenuity

in devising fresh resources for tragedy — especially in his manage- ment of the choral songs. Aeschylus is Panhellenic, Sophocles is Athenian, Euripides is cosmopolitan. He stands nearer to the modern world than either of his predecessors; and though with him Attic tragedy loses its highest beauty, it acquires new elements of familiar human interest.

In Attica, as in England, a period of rather less than fifty years sufficed for the complete development of the tragic art. The two distinctive characteristics of Athenian drama are its origin- ality and its abundance. The Greeks of Attica were not the only inventors of drama, but they were the first people who made drama a complete work of art. And the great tragic poets of Attica were remarkably prolific. Aeschylus was the reputed author of 70 tragedies, Sophocles of 113, Euripides of 92; and there were others whose productiveness was equally great.

Comedy represented the lighter side, as tragedy the graver side, of the Dionysiac worship; it was the joy of spring following the gloom of winter. The process of growth was comedy. nearly the same as in tragedy; but the Dorians, not the Ionians of Attica, were the first who added dialogue to the comic chorus. Susarion, a Dorian of Megara, exhibited, about 580 B.C., pieces of the kind known as " Megarian farces." Epicharmus of Cos (who settled at Syracuse) gave literary form to the Doric farce, and treated in burlesque style the stories of gods and heroes, and subjects taken from everyday life. His Syracusan contemporary Sophron (c. 450) was a famous writer of mimes, chiefly scenes from low-class life. The most artistic form of comedy seems, however, to have been developed in Attica. The

greatest names before Aristophanes are those of Cratinus and Eupolis; but from about 470 B.C. there seems to have been a continuous succession of comic dramatists, amongst them Plato Comicus, the author of 28 comedies, political satires and parodies after the style of the Middle Comedy. Aristophanes came forward as a comic poet in 42 7 B.C. , phanes. and retained his popularity for about forty years. He presents a perhaps unique union of bold fancy, exquisite humour, critical acumen and lyrical power. His eleven extant comedies may be divided into three groups, according as the licence of political satire becomes more and more restricted. In the Acharnians, Knights, Clouds, Wasps and Peace (425-421) the poet uses unrestrained freedom. In the Birds, Lysistrata, Thesmophori- azusae and Frogs (414-405) a greater reserve may be perceived. Lastly, in the Ecclesiazusae and the Plutus (392-388) personal satire is almost wholly avoided. The same general tendency continued. The so-called " Middle Comedy " (390-320) repre- sents the transition from the Old Comedy, or political satire, to satire of a literary or social nature; its chief writers were Anti- phanes of Athens and Alexis of Thurii. The " New Comedy " (320-250) resembled the modern " comedy of manners."

Its chief representative was Menander (342-291), the author of 105 comedies. Fragments have been discovered of seven of these, of sufficient length to give an idea of their dramatic action. His plays were produced on the stage as late as the time of Plutarch, and his yv&ncu, distinguished by worldly wisdom, were issued in the form of anthologies, which enjoyed great popularity. Other prominent writers of this class were Diphilus, Philemon, Posidippus and Apollodorus of Carystus. About 330 B.C. Rhinthon of Tarentum revived the old Doric farce in his Hilar otragoediae or travesties of tragic stories. These successive periods cannot be sharply or precisely marked off. The change which gradually passed over the comic drama was simply the reflection of the change which passed over the political and social life of Athens. The Old Comedy, as we see it in the earlier plays of Aristophanes, was probably the most powerful engine of public criticism that has ever existed in any community. Unsparing personality was its essence. The comic poet used this recognized right on an occasion at once festive and sacred, in a society where every man of any note was known by name and sight to the rest. The same thousands who heard a policy or a character denounced or lauded in the theatre might be required to pass sentence on it in the popular assembly or in the courts of law.

*The development of Greek poetry had been completed before a prose literature had begun to exist. The earliest name in extant Greek prose literature is that of Herodotus; prose! 7 anc *> when he wrote, the Attic drama had already passed its prime. There had been, indeed, writers of prose before Herodotus; but there had not been, in the proper sense of the term, a prose literature. The causes of this compara- tively late origin of Greek literary prose are independent of the question as to the time at which the art of writing began to be generally used for literary purposes. Epic poetry exercised for a very long period a sovereign spell over the Greek mind. In it was deposited all that the race possessed of history, theology, philosophy, oratory. Even after an age of reflection had begun, elegiac poetry, the first offshoot of epic, was, with iambic verse, the vehicle of much which among other races would have been committed to prose. The basis of Greek culture was essentially poetical. A political cause worked in the same direction. In the Eastern monarchies the king was the centre of all, and the royal records afforded the elements of history from a remote date. The Greek nation was broken up into small states, each busied with its own affairs and its own men. It was the collision between the Greek and the barbarian world which first provided a national subject for a Greek historian. The work of Herodotus, in its relation to Greek prose, is so far analogous to the Iliad in its relation to Greek poetry, that it is the earliest work of art, and that it bears a Panhellenic stamp.*

The sense and the degree in which Herodotus was original may be inferred from what is known of earlier prose-writers. For about a century before Herodotus there had been ■ˆ a series of writers in philosophy, mythology, geography

writers. and history. The earliest, or among the earliest, of the philosophical writers were Pherecydes of Syros (550 B.C.) and the Ionian Anaximenes and Anaximander. It is doubtful whether Cadmus of Miletus, supposed to have been the first prose writer, was an historical personage. The Ionian writers, especially called \oyoypat., " narrators in prose " (as distinguished from «roiroioi, makers of verse), were those who compiled the myths, especially in genealogies, or who described foreign countries, their physical features, usages and traditions. Hecataeus of Miletus (500 B.C.) is the best- known representative of the logographi in both these branches. Hellanicus of Mytilene (450 B.C.), among whose works was a history of Attica, appears to have made a nearer approach to the character of a systematic historian. Other logographi were Charon of Lampsacus; Pherecydes of Leros, who wrote on the myths of early Attica; Hippys of Rhegium, the oldest writer on Italy and Sicily; and Acusilaus of Argos in Boeotia, author of genealogies (see Logographi, and Greece: Ancient History, " Authorities ").

Herodotus was born in 484 B.C.; and his history was probably not completed before the beginning of the Peloponnesian War (431 B.C.). His subject is the struggle between Greece and Asia, which he deduces from the legendary rape of the Argive Io by Phoenicians, and traces down to the final victory of the Greeks over the invading host of Xerxes. His literary kinship with the historical or geographical writers who had preceded him is seen mainly in two things. First, though he draws a line between the mythological and the historical age, he still holds that myths, as such, are worthy to be reported, and that in certain cases it is part of his duty to report them. Secondly, he follows the example of such writers as Hecataeus in describing the natural and social features of countries. He seeks to combine the part of the geographer or intelligent traveller with his proper part as historian. But when we turn from these minor traits to the larger aspects of his wort, Herodotus stands forth as an artist whose conception and whose method were his own. His history has an epic unity. Various as are the subordinate parts, the action narrated is one, great and complete; and the unity is due to this, that Herodotus refers all events of human history to the principle of divine Nemesis. If Sophocles had told the story of Oedipus in the Oedipus Tyrannus alone, and had not added to it the Oedipus at Colonus,

Hero- dotus.

it would have been comparable to the story of Xerxes as told by Herodotus. Great as an artist, great too in the largeness of his historical conception, Herodotus fails chiefly by lack of insight into political cause and effect, and by a general silence in regard to the history of political institutions. Both his strength and his weakness are seen most clearly when he is contrasted with that other historian who was strictly his contemporary and who yet seems divided from him by centuries.

Thucydides was only thirteen years younger than Herodotus; but the intellectual space between the men is so great that they seem to belong to different ages. Herodotus is the first artist in historical writing; Thucydides is the aides.' first thinker. Herodotus interweaves two threads of causation — human agency, represented by the good or bad qualities of men, and divine agency, represented by the vigilance of the gods on behalf of justice. Thucydides concentrates his attention on the human agency (without, however, denying the other), and strives to trace its exact course. The subject of Thucydides is the Peloponnesian War. In resolving to write its history, he was moved, he says, by these considerations. It was probably the greatest movement which had ever affected Hellas collectively. It was possible for him as a contemporary to record it with approximate accuracy. And this record was likely to have a general value, over and above its particular interest as a record, seeing that the political future was likely to

resemble the political past. This is what Thucydides means when he calls his work " a possession for ever." The speeches which he ascribes to the persons of the history are, as regards form, his own essays in rhetoric of the school to which Antiphon belongs. As regards matter, they are always so far dramatic that the thoughts and sentiments are such as he conceived possible for the supposed speaker. Thucydides abstains, as a rule, from moral comment; but he tells his story as no one could have told it who did not profoundly feel its tragic force; and his general claim to the merit of impartiality is not invali- dated by the possible exceptions — difficult to estimate — in the cases of Cleon and Hyperbolus.

Strong as is the contrast between Herodotus and Thucydides, their works have yet a character which distinguish both alike from the historical work of Xenophon in the Anabasis and the Hellenica. Herodotus gives us a vivid drama phoa. with the unity of an epic. Thucydides takes a great chapter of contemporary history and traces the causes which are at work throughout it, so as to give the whole a scientific unity. Xenophon has not the grasp either of the dramatist or of the philosopher. His work does not possess the higher unity either of art or of science. The true distinction of Xeno- phon consists in his thorough combination of the practical with the literary character. He was an accomplished soldier, who had done and seen much. He was also a good writer, who could make a story both clear and lively. But the several parts of the story are not grouped around any central idea, such as a divine Nemesis is for Herodotus, or such as Thucydides finds in the nature of political man. The seven books of the Hellenica form a supplement to the history of Thucydides, beginning in 411 and going down to 362 B.C. The chief blot on the Hellenica is the author's partiality to Sparta, and in particular to Agesilaus. Some of the greatest achievements of Epaminondas and Pelopidas are passed over in silence. On the whole, Xenophon is perhaps seen at his best in his narrative of the Retreat of the Ten Thousand — a subject which exactly suits him. The Cyropaedeia is a romance of little historical worth, but with many good passages. The Recollections of Socrates, on the other hand, derive their principal value from being uniformly matter-of-fact. In his minor pieces on various subjects Xenophon appears as the earliest essayist. It may be noted that one of the essays errone- ously ascribed to him — that On the Athenian Polity — is probably the oldest specimen in existence of literary Attic prose.

His contemporaries Ctesias of Cnidus and Philistus of Syracuse wrote histories of Persia and Sicily. In the second half of the 4th century a number of histories were compiled by literary men of little practical knowledge, who had been trained in the

rhetorical schools. Such were Ephorus of Cyme and Theopompus of Chios, both pupils of Isocrates; and the writers of AUhides (chronicles of Attic history), the chief of whom were Androtion and Philochorus. Timaeus of Tauromenium was the author of a great work on Sicily, and introduced the system of reckoning by Olympiads.

The steps by which an Attic prose style was developed, and the principal forms which it assumed, can be traced most clearly in the Attic orators. Every Athenian citizen who aspired to take part in' the affairs of the city, or even to be qualified for self-defence before a law-court, required to have some degree of skill in public speaking; and an Athenian audience looked upon public debate, whether political or forensic, as a competitive trial of proficiency in a fine art. Hence the speaker, no less than the writer, was necessarily a student of finished expression; and oratory had a more direct influence on the general structure of literary prose than has ever perhaps been the case elsewhere. A systematic rhetoric took its rise in Sicily, where Corax of Syracuse (466 B.C.) devised his Art of Words to assist those who were pleading before the law- courts; and it was brought to Athens by his disciple Tisias. The teaching of the Sophists, again, directed attention, though in a superficial and imperfect way, to the elements of grammar and logic; and Gorgias of Leontini — whose declamation, however turgid, must have been striking — gave an impulse at Athens to the taste for elaborate rhetorical brilliancy.

Antiphon represents the earliest, and what has been called the grand, style of Attic prose; its chief characteristics are a grave, dignified movement, a frequent emphasis orators. on ver b a l contrasts, and a certain austere elevation. The interest of Andocides is mainly historical; but he has graphic power. Lysias, the representative of the " plain style," breaks through the rigid mannerism of the elder school, and uses the language of daily life with an ease and grace which, though the result of study, do not betray their art. He is, in his own way, the canon of an Attic style; and his speeches, written for others, exhibit also a high degree of dramatic skill. Isocrates, whose manner may be regarded as intermediate between that of Antiphon and that of Lysias, wrote for readers rather than for hearers. The type of literary prose which he founded is distinguished by ample periods, by studied smoothness and by the temperate use of rhetorical ornament. From the middle of the 4th century B.C. the Isocratic style of prose became general in Greek literature. From the school of Rhodes, in which it became

more florid, it passed to Cicero, and through him it has helped to shape the literary prose of the modern world. The speeches of Isaeus in will-cases are interesting, — apart from their bearing on Attic life, — because in them we see, as Dionysius says, " the seeds and the beginnings " of that technical mastery in rhetorical argument which Demosthenes carries to perfection. Isaeus has also, in a degree, some of the qualities of Lysias. Demosthenes excels all other masters of Greek prose not only in power but in variety; his political speeches, his orations in public or private causes, show his consummate and versatile command over all the resources of the language. In him the development of Attic prose is completed, and the best elements in each of its earlier phases are united. The modern world can more easily appreciate Demos- thenes as a great natural orator than as an elaborate artist. But, in order to apprehend his place in the history of Attic prose, we must remember that the ancients felt him to be both; and that he was even reproached by detractors with excessive study of effect. Aeschines is the most theatrical of the Greek orators; he is vehement, and often brilliant, but seldom persuasive. Hypereides was, after Demosthenes, probably the most effective; he had much of the grace of Lysias, but also a wit, a fire and a pathos which were his own. Portions of six of his speeches, found in Egypt between 1847 and 1890, are extant. The one oration of Lycurgus which remains to us is earnest and stately, reminding us both of Antiphon and of Isocrates. Dinarchus was merely a bad imitator of Demosthenes. There seems more reason to rperet that Demades is not represented by larger

fragments. The decline of Attic oratory may be dated from Demetrius of Phalerum (318 B.C.), the pupil of Aristotle, and the first to introduce the custom of making speeches on imaginary subjects as practised in the rhetorical schools. Cicero names him as the first who impaired the vigour of the earlier eloquence, " preferring his own sweetness to the weight and dignity of his predecessors." He forms a connecting link between Athens and Alexandria, where he found refuge after his downfall and pro- moted the foundation of the famous library.

In later times oratory chiefly flourished in the coast and island settlements of Asia Minor, especially Rhodes. Here a new, florid style of oration arose, called the " Asiatic," which owed its origin to Hegesias of Magnesia (c. 250 B.C.).

The place of Plato in the history of Greek literature is as unique as his place in the history of Greek thought. The literary genius shown in the

dialogues is many-sided: it pt,u oso . includes dramatic power, remarkable skill in parody, phical a subtle faculty of satire, and, generally, a command prose- over the finer tones of language. In passages of ˆl'?f/"' continuous exposition, where the argument rises into the higher regions of discussion, Plato's prose takes a more decidedly poetical colouring — never florid or sentimental, however, but lofty and austere. In Plato's later works — such, for instance, as the Laws, Timaeus, Critics — we can perceive that his style did not remain unaffected by the smooth literary prose which contemporary writers had developed. Aristotle's influence on the form of Attic prose literature would probably have been considerable if his Rhetoric had been published while Attic oratory had still a vigorous life before it. But in this, as in other departments of mental effort, it was Aristotle's lot to set in order what the Greek intellect had done in that creative period which had now come to an end. His own chief contribution to the original achievements of the race was the most fitting one that could have been made by him in whose lifetime they were closed. He bequeathed an instrument by which analysis could be carried further, he founded a science of reasoning, and left those who followed him to apply it in all those provinces of knowledge which he had mapped out. 1 Theophrastus, his pupil and his successor in the Lyceum, opens the new age of research and scientific classification with his extant works on botany, but is better known to modern readers by his lively Characters, the prototypes of such sketches in English literature as those of Hall, Overbury and Earle.

(C) The Literature of the Decadence. — The period of decadence in Greek literature begins with the extinction of free political life in the Greek cities. So long as the Greek common- character wealths were independent and vigorous, Greek life of the rested on the identity of the man with the citizen.

1 His Constitution of Athens (q.v.), of which a papyrus MS. was found in Egypt and published in 1891, forms part of a larger work on the constitution of 158 Greek and foreign cities.

real and vivid, perceptions which had been quickened in them by a living communion with the Athenian spirit, by a daily contemplation of Athenian greatness, in the theatre where tragic poets idealized the legends of the past, in the ecclesia where every citizen had his vote on the policy of the state, or in that free and gracious society, full of beauty, yet exempt from vexatious constraint, which belonged to the age of Pericles. The tribunal which judged

these works of literature or art was such as was best fitted to preserve the favourable conditions under which they arose. Criticism was not in the hands of a literary clique or of a social caste. The influence of jealousy or malevolence, and the more fatal influence of affectation, had little power to affect the verdict. The verdict was pronounced by the whole body of the citizens. The success or failure of a tragedy was decided, not by the minor circumstance that it gained the first or second prize, but by the collective opinion of the citizens assembled in the theatre of Dionysus. A work of architecture or sculpture was approved or condemned, not by the sentence of a few whom the multitude blindly followed, but by the general judgment of some twenty thousand persons, each of whom was in some degree qualified by education and by habit to form an independent estimate. The artist worked for all his fellow-citizens, and knew that he would be judged by all. The soul of his work was the fresh and living inspiration of nature; it was the ennobled expression of his own life; and the public opinion before which it came was free, intelligent and sincere.

Philip of Macedon did not take away the municipal inde- pendence of the Greek cities, but he dealt a death-blow to the old political life. The Athenian poet, historian, artist

The tran- m ;g}jt s till do good work, but he could never again have sltlon to , i . i , , , ■ • c ii i

Hefleaism. that which used to be the very mainspring ot all such

activity — the daily experience and consciousness of participation in the affairs of an independent state. He could no longer breathe the invigorating air of constitutional freedom, or of the social intercourse to which that freedom lent dignity as well as grace. Then came Alexander's conquests; Greek civiliza- tion was diffused over Asia and the East by means of Greek colonies in which Asiatic and Greek elements were mingled. The life of such settlements, under the monarchies into which Alexander's empire broke up, could not be animated by the spirit of the Greek commonwealths in the old days of political freedom. But the externals of Greek life were there — the temples, the statues, the theatres, the porticos. Ceremonies and festivals were conducted in the Greek manner. In private life Greek usages prevailed. Greek was the language most used; Greek books were in demand. The mixture of races would always in some measure distinguish even the outward life of such a com- munity from that of a pure Greek state; and the facility with which Greek civilization was adopted would vary in different places. Syria, for example, was rapidly and completely Hellen- ized. Judaea resisted the process to the last. In Egypt a Greek aristocracy of office, birth and intellect existed side by side with a distinct native life. But, viewed in its broadest aspect, this new civilization may be

called Hellenism. Hellenism (q.v.) means the adoption of Hellenic ways; and it is properly applied to a civilization, generally Hellenic in external things, pervading people not necessarily or exclusively Hellenic by race. What the Hellenic literature was to Hellas, that the Hellenistic literature was to Hellenism. The literature of Hellenism has the Hellenic form without the Hellenic soul. The literature of Hellas was creative; the literature of Hellenism is derivative.

Alexandria was the centre of Greek intellectual activity from Alexander to Augustus. Its " Museum,"- or college, and its library, both founded by the first Ptolemy (Soter), T/ rfw' eX " 8 ave ' l sucn attractions for learned men as no other period. city could rival. The labours of research or arrange- ment are those which characterize the Alexandrian period. Even in its poetry spontaneous motive was replaced by erudite skill, as in the hymns, epigrams and elegies of Calli- Poetry machus, in the enigmatic verses of Lycophron, in the highly finished epic of Apollonius Rhodius, and in the versified lore, astronomical or medical, of Aratus and

Nicander. The mimes of Herodas (or Herondas) of Cos (c. 200 B.C.), written in the Ionic dialect and choliambic verse, represent scenes from everyday life. The papyrus (published in 1801) contains seven complete poems and fragments of an eighth. They are remarkably witty and full of shrewd observations, but at times coarse. The pastoral poetry of the age — Dorian by origin — was the most pleasing; for this, if it is to please at all, must have its spring in the contemplation of nature. Theocritus is not exempt from the artificialism of the Hellenizing literature; but his true sense of natural beauty entitles him to a place in the first rank of pastoral poets. Bion of Ionia and Moschus of Syracuse also charm by the music and often by the pathos of their bucolic verse. Excavations on the site of the temple of Asclepius at Epidaurus have brought to light two hexameter poems and a paean (in Ionic metre) on Apollo and Asclepius by a local poet named Isyllus, who flourished about 280. Tragedy was represented by the poets known as the Alexandrian Pleiad. But it is not for its poetry of any kind that this period of Greek literature is memorable. Its true work was in erudition and science. Aristarchus (156 B.C.), the greatest in a Bniditloa long line of Alexandrian critics, set the example of a science. more thorough method in revising and interpreting the ancient texts, and may in this sense be said to have become the founder of scientific scholarship. The critical studies of Alexandria, carried on by the followers of Aristarchus, gradually formed the basis for a science of grammar. The earliest Greek grammar is that of Dionysius Thrax (born c. 166), a pupil of Aristarchus. Translation was another province of work which employed the learned of Alexandria— where the Septuagint version of the Old Testament was begun, probably about 300- 250 B.C. Chronology was treated scientifically by Eratosthenes, and was combined with history by Manetho in his

chronicles of Egypt, and by Berossus in his chronicles of Chaldaea. Euclid was at Alexandria in the reign of Ptolemy Soter. Herophilus and Erasistratus were distinguished physicians and anatomists, and the authors of several medical works. The general results

Summary.

of the Alexandrian period might perhaps be stated thus. Alexandria produced a few eminent men of science, some learned poets (in a few cases, of great literary merit) and many able scholars. The preservation of the best Greek literature was due chiefly to the unremitting care of the Alexandrian critics, whose appreciation of it partly compensated for the decay of the old Greek perceptions in literature and art, and who did their utmost to hand it down in a form as free as possible from the errors of copyists. On the whole, the patronage of letters by the Ptolemies had probably as large a measure of success as was possible under the existing conditions; and it was afforded at a time when there was special danger that a true literary tradition might die out of the world.

The Graeco-Roman period in the literature of Hellenism may be dated from the Roman subjugation of Greece. " Greece made a captive of the rough conqueror," but it did The not follow from this intellectual conquest that Athens Qraeco- became once more the intellectual centre of the world. Roman Under the empire, indeed, the university of Athens per long enjoyed a pre-eminent reputation. But Rome gradually became the point to which the greatest workers in every kind were drawn. Greek literature had already made a home there before the close of the 2nd century B.C. Sulla brought a Greek library from Athens to Rome. Such men as Cicero and Atticus were indefatigable collectors and readers of Greek books. The power of speaking and writing the Greek language became an indispensable accomplishment for highly educated Romans. The library planned by Julius Caesar and founded by Augustus had two principal departments, one for Latin, the other for Greek works. Tiberius, Vespasian, Domitian and Trajan contributed to enlarge the collection. Rome became more and more the rival of Alexandria, not only as possessing great libraries, but also as a seat of learning at which Greek men of letters found appreciation and encouragement. Greek poetry, especially in its higher forms, rhetoric and literary criticism, history and philosophy, were all cultivated by Greek writers at Rome.

ANCIENT]

GREEK LITERATURE

The first part of the Graeco-Roman period may be defined as extending from 146 B.C. to the close of the Roman republic. At its commencement stands the name of one who i¥6-?o" ' had more rea ' affinity than any of his contemporaries B.C. w ith tn e great writers of old Athens, and who, at the

same time, saw most clearly how the empire of the world was passing to Rome. The subject of Polybius (c. 205-1 20) was the history of Roman conquest from 264 to 146 B.C. His style, plain and straightforward, is free from the florid rhetoric of the time. But the distinction of Polybius is that he is the last Greek writer who in some measure retains the spirit of the old citizen-life. He chose his subject, not because it gave scope to learning or literary skill, but with a motive akin to that which prompted the history of Thucydides — namely, because, as a Greek citizen, he felt intensely the political importance of those wars which had given Rome the mastery of the world. The chief historical work which the following century produced — the Universal History of Diodorus Siculus (fl. c. 50 b.c.) — resembled that of Polybius in recognizing Rome as the political centre of the earth, as the point on which all earlier series of events converged. In all else Diodorus represents the new age in which the Greek historian had no longer the practical knowledge and insight of a traveller, a soldier or a statesman, but only the diligence, and usually the dulness, of a laborious compiler.

The Greek literature of the Roman empire, from Augustus to Justinian, was enormously prolific. The area over which Second the Greek language was diffused — either as a medium part: of intercourse or as an established branch of the higher

30 B.C.' education — was co-extensive with the empire itself. a.d. 529. ˆ n i mmense store of materials had now been accumulated, on which critics, commentators, compilers, imitators, were employed with incessant industry. In very many of its forms, the work of composition or adaptation had been reduced to a mechanical knack. If there is any one charac- teristic which broadly distinguishes the Greek literature of these five centuries, it is the absence of originality either in form or in matter. Lucian is, in his way, a rare exception; and his great popularity — he is the only Greek writer of this period, except Plutarch, who has been widely popular — illustrates the flatness of the arid level above which he stands out. The sustained abundance of literary production under the empire was partly due to the fact that there was no open political career. Never, probably, was literature so important as a resource for educated men; and the habit of reciting before friendly or obsequious audiences swelled the number of writers whose taste had been cultivated to a point just short of perceiving that they ought not to write.

In the manifold prose work of this period, four principal departments may be distinguished. (1) History, with Biography, Depart- ar, d Geography. History is represented by Dionysius meats of of Halicarnassus — also memorable for his criticisms on prose the orators and his effort to revive a true standard

terature. Q j ˆ tt j c p rose — by Cassius Dio, Josephus, Arrian, Appian, Herodian, Eusebius and Zosimus. In biography, the foremost names are Plutarch, Diogenes Laertius and Philo- stratus; in geography, Hipparchus of Nicaea, Strabo, Ptolemy and Pausanias. (2) Erudition and Science. The learned labours of the Alexandrian schools were continued in all their various fields. Under this head may be mentioned such works as the lexicons of Julius Pollux, Harpocration and Hesychius, Hephaestion's treatise on metre, and Herodian's system of accentuation; the commentaries of Galen on Plato and on Hippocrates; the learned miscellanies of Athenaeus, Aelian and Stobaeus; and the Stratagems of Polyaenus. (3) Rhetoric and Bclles-Leltres. The most popular writers on the theory of rhetoric were Hermagoras, Hermogenes, Aphthonius and Cassius Longinus — the last the reputed author of the essay On Sublimity. Among the most renowned teachers of rhetoric — now distinctively, called " Sophists," or rhetoricians — were Dio Chrysostom, AeliusAristides, Themistius, Himerius, Libanius and Herodes Atticus. Akin to the rhetorical exercises were

various forms of ornamental or imaginative prose — dialogues, letters, essays or novels. Lucian, in his dialogues, exhibits more of the classical style and of the classical spirit than any writer of the later age; he has also a remarkable affinity with the tone of modern satire, as in Swift or Voltaire. His Attic prose, though necessarily artificial, was at least the best that had been written for four centuries. The emperor Julian was the author both of orations and of satirical pieces. The chief of the Greek novelists (the forerunner of whom was Aristides of Miletus, c. 100 B.C., in his Milesian Tales) are Xenophon of Ephesus and Longus, representing a purely Greek type of romance, and Heliodorus — with his imitators Achilles Tatius and Chariton — representing a school influenced by Oriental fiction. There were also many Christian romances in Greek, usually of a religious tendency. Alciphron's fictitious Letters — founded largely on the New Comedy of Athens — represent the same kind of industry which produced the letters of Phalaris, Aristaenetus and similar collections. (4) Philosophy is repre- sented chiefly by Epictetus and Marcus Aurelius, in both of whom the Stoic element is the prevailing one; by the Neo- platonists, such as Plotinus, Porphyry, Iamblichu-s; and by Proclus, of that eclectic school which arose at Athens in the 5th century a.d.

The Greek poetry of this period presents no work of high merit. Babrius

versified the Aesopic Fables; Oppian (or two poets of this name) wrote didactic poems on fishing verse. and hunting; Nonnus and Quintus Smyrnaeus made elaborate essays in epic verse; and the Orphic lore inspired some poems and hymns of a mystic character. The so-called Sibylline Oracles, in hexameter verse, range in date from about 170 B.C. to a.d. 700, and are partly the expression of the Jewish longings for the restoration of Israel, partly predictions of the triumph of Christianity. By far the most pleasing com- positions in verse which have come to us from this age thotogy. are some of the short poems in the Greek Anthology, which includes some pieces as early as the beginning of the 5th century B.C. and some as late as the 6th century of the Christian era.

The 4th century may be said to mark the beginning of the last stage in the decay of literary Hellenism. From that point the decline was rapid and nearly continuous. The attitude of the church towards it was no longer that which had been held by Clement of Alexandria, by Justin Martyr or by Origen. There was now a Christian Greek literature, and a Christian Greek eloquence of extraordinary power. The laity became more and more estranged from the Greek literature — however intrinsically pure and noble — of the pagan past. At the same time the Greek language — which had maintained its purity in Italian seats — was becoming corrupted in the new Greek Rome of the East. In a.d. 529 Justinian put forth an edict by which the schools of heathen philosophy were formally closed. The act had at least a symbolical meaning. It is necessary to guard against the supposition that such assumed landmarks in political or literary history always mark a definite transition from one order of things to another. But it is practically convenient, or necessary, to use such landmarks.

Bibliography. — The first attempt at a connected history of Greek literature was the monumental and still indispensable work of J. A. Fabricius (14 vols., 1705-1728; new ed. in 12 vols, by G. C. Harless, 1790-1809); this was followed by F. Scholl's Hist, de la lilterature grecque (1813). Both these works begin with the earliest times and go down to the latest period of the Byzantine empire. Of more modern and recent works the following may be mentioned: G. Bernhardy, Grundriss der griechischen Literatur (1836-1845; 4th ed., 1876-1880; 5th ed. of vol. i., by R. Volkmann, 1892), chiefly confined to the poets; C. O. Mtiller, History of Greek Literature (unfinished), written for the London Society for the Diffusion of Useful Knowledge, and published in English in 1840, the translation being by G. Cornewall Lewis and J. W. Donaldson (the latter completed the work to the end of the Byzantine period for the edition of 1858; the German text was published by E. Mtiller in 1841 ; 4th ed. by E. Heitz, 1882-1884) ; W. Mure, Critical History of the Language and Literature of Ancient Greece (1850- 1857); T. Bergk, Griechische Literatur gesckichte (1872-1894, vols. 2, 3, ed. G. Hinrichs, vol. 4 by R. Peppmuller) containing epos,

lyric, drama down to Euripides, and the beginnings of prose; R. Nicolai, Griechische Liieraturgeschichte (2nd ed., 1873-1878), useful for bibliography, but in other respects unsatisfactory; J. P. Mahaffy, Hist, of Classical Greek Literature (4th ed., 1903) ; A. and M. Croiset, Hist, de la litterature grecaue (1887-1899, 2nd ed. 1896); w! Christ, Geschichte der griechischen Literatur bis auf die Zeit Justinians (4th ed 1905; 5th ed., pt. i., by O. Stahlin and W. Schmid, 1908), by far the most serviceable handbook for the student. F. Susemihl's Geschichte der griechischen Literatur in der Alexandrinerzeit (1891- 1892) is especially valuable for its notes. Of smaller manuals the following will be found most useful: G. G. Murray, History of Ancient Greek Literature (1897); F. B. Jevons, History of Greek Literature (3rd ed., 1900) down to the time of Demosthenes; A. and M. Croiset, Manuel d'hist. de la litterature grecque (1900; Eng. trans ,Y G ' F – Heffelbower, N.Y., 1904); also the general sketches by U. von Wilamowitz-Mollendorff in Die Kultur der Gegenwart, i. 8 (!905). by A. Gercke in the Sammlung Goschen (Leipzig, 2nd ed., 1905), and by R. C. Jebb in Companion to Greek Studies (Cambridge, c- 9 ° u-u wor . k s generally connected with the subject are:

E. Hiibner, Bibliographic der klassischen Altertumswissenschaft (2nd ed., 1889), pp. 161-171; W. Engelmann, Bibliotheca scriUorum classicorum (8th ed., by E. Preuss, 1880); J. B. Mayor, Guide to the Choice of Classical Books (1896), p. 86; W. Kroll, Die Alter- tumswissenschaft im letzten Vierteljahrhundert 1875-1000 (1905) P ' 4 oˆ 5 /.°il-l,J- E ' Sand y s > History of Classical Scholarship (1906- 1908); Bibliotheca philologica classica," in C. Bursian's Jahres- bericht uber die Fortschntte der klassischen Altertumswissenschaft- articles in Pauly-Wissowa's Realencyclopadie der klassischen Alter- tumswissenschaft (1894 —)• (R. C I • X)

II. Byzantine Literature

By "Byzantine literature" is generally meant the literature, written in Greek, of the so-called Byzantine period. There is no Defiai- Justification whatever for the inclusion of Latin works tioa. ' of the time of the East Roman empire. The close of the Byzantine period is clearly marked by the year 1453, at which date, with the fall of the Eastern empire, the peculiar culture and literary life of the Byzantines came to an end. It is only as regards the beginning of the Byzantine period that any doubts exist. There are no sufficient grounds for dating it from Justinian,' as was formerly often done. In surveying the whole development of the political,

ecclesiastical and literary life and of the general culture of the Roman empire, and particu- larly of its eastern portion, we arrive, on the contrary, at the conclusion that the actual date of the beginning of this new era— i.e. the Christian-Byzantine, in contradistinction to the Pagan- Greek and Pagan-Roman— falls within the reign of Constantine the Great. By the foundation of the new capital city of Con- stantinople (which lay amid Greek surroundings) and by the establishment of the Christian faith as the state religion, Con- stantine finally broke with the Roman-Pagan tradition, and laid the foundation of the Christian-Byzantine period of develop- ment. Moreover, in the department of language, so closely allied with that of literature, the 4th century marks a new epoch. About this time occurred the final disappearance of a character- istic of the ancient Greek language, important alike in poetry and in rhythmic prose, the difference of " quantity." Its place was henceforth taken by the accent, which became a determining principle in poetry, as well as for the rhythmic conclusion of the prose sentence. Thus the transition from the old musical language to a modern conversational idiom was complete.

*The reign of Constantine the Great undoubtedly marks the beginning of a. new period in the most important spheres of Trans/- national \ ife > but it is equally certain that in most of tionai ' * nem ancien t tradition long continued to exercise an period. influence. Sudden breaches of continuity are less common in the general culture and literary life of the world than in its political or ecclesiastical development. This is true of the transition from pagan antiquity to the Christian middle ages. Many centuries passed before the final victory of the new religious ideas and the new spirit in public and private intellectual and moral life. The last noteworthy remnants of paganism disappeared as late as the 6th and 7th centuries. The last great educational establishment which rested upon pagan foundations— the university of Athens— was not abolished till a.d. 529. The Hellenizing of the seat of empire and of the state, which was essential to the independent development of Byzantine*

[BYZANTINE

literature, proceeds yet more slowly. The first purely Greek emperor was Tiberius II. (578-582); but the complete Hellen- izing of the character of the state had not been accomplished until the 7th century. We shall, therefore, regard the period from the 4th to the 7th century as that of the transition between ancient times and the middle ages. This period coincides with the rise of a new power in the world's history— Islam. But though, in this transitional period, the old and the new elements are both to a large extent present and are often inextricably interwoven, yet it is certain that the new elements are, both as regards their essential force and their influence upon the succeed- ing period, of infinitely greater moment than

the decrepit and mostly artificial survivals of the antique.

*In order to estimate rightly the character of Byzantine literature and its distinctive peculiarities, in contradistinction to ancient Greek, it is imperative to examine the great „. difference between the civilizations that produced character them. The Byzantine did not possess the homo- of By geneous, organically constructed system of the ancient * aatlae civilization, but was the outcome of an amalgamation culture – of which Hellenism formed the basis. For, although the Latin character of the empire was at first completely retained, even after its final division in 395, yet the dominant position of Greek in the Eastern empire gradually led to the Hellenizing of the state. _ The last great act of the Latin tradition was the codifica- tion,ˆ the Latin language, of the law by Justinian (527-565). But it is significant that the Novels of Justinian were composed partly in Greek, as were all the laws of the succeeding period. Of the emperors in the centuries following Justinian, many of course were foreigners, Isaurians, Armenians and others; but in language and education they were all Greeks. In the last five centuries of the empire, under the Comneni and the Palaeologi, court and state are purely Greek.*

In spite of the dominant position of Greek in the Eastern empire, a linguistic and national uniformity such as formed the foundation of the old Latin Imperium Romanum never existed there. In the West, with the expansion of Rome's political supremacy, the Latin language and Latin culture were every- where introduced— first into the non-Latin provinces of Italy, later into Spain, Gaul and North Africa, and at last even into certain parts of the Eastern empire. This Latinizing was so thorough that it weathered all storms, and, in the countries affected by it, was the parent of new and vigorous nationalities, the French, the Spaniards, the Portuguese and the Rumanians. Only m Africa did " Latinism " fail to take root permanently. From the 6th century that province relapsed into the hands of the native barbarians and of the immigrant Arabs, and both the Latm and the Greek influences (which had grown in strength during the period of the Eastern empire) were, together with Christianity, swept away without leaving a trace behind. It might have been expected that the Hellenizing of the political system of the Eastern empire would have likewise entailed the Hellenizing of the non-Greek portions of the empire. Such however, was not the case; for all the conditions precedent to such a development were wanting. The non-Greek portions of the Eastern empire were not, from the outset, gradually incorporated into the state from a Greek centre, as were the provinces in the West from a Latin centre. They had been acquired in the old period of the homogeneous Latin Imperium. In the centuries immediately following the division of the empire, the idea of Hellenizing the Eastern provinces could not take root, owing to the fact that Latin was retained, at least in principle, as the state language. During the later

centuries, in the non-Greek parts, centrifugal tendencies and the destructive inroads of barbarians began on all sides; and the government was too much occupied with the all but impossible task of preserving the political unity of the empire to entertain seriously the wider aim of an assimilation of language and culture. More- over, the Greeks did not possess that enormous political energy and force which enabled the Romans to assimilate foreign races; and, finally, they were confronted by sturdy Oriental, mostly Semitic, peoples, who were by no means so easy to subjugate as

were the racially related inhabitants of Gaul and Spain. Their impotence against the peoples of the East will be still less hardly judged if we remember the fact already mentioned, that even the Romans were within a short period driven back and over- whelmed by the North African Semites who for centuries had been subjected to an apparently thorough process of Latin- ization.

The influence of Greek culture then, was very slight; how little indeed it penetrated into the oriental mind is shown by the fact that, after the violent Arab invasion in the south-east corner of the Mediterranean, the Copts and Syrians were able to retain their language and their national characteristics, while Greek culture almost completely disappeared. The one great instance of assimilation of foreign nationalities by the Greeks is the Hellenizing of the Slavs, who from the 6th century had migrated into central Greece and the Peloponnese. All other non-Greek tribes of any importance which came, whether for longer or for shorter periods, within the sphere of the Eastern empire and its civilization — such as the Copts, Syrians, Armenians, Georgians, Rumanians, Serbs, Bulgarians, Albanians —one and all retained their nationality and language. The complete Latinizing of the West has, accordingly, no counterpart in a similar Hellenizing of the East. This is clearly shown during the Byzantine period in the progress of Christianity. Every- where in the West, even among the non-Romanized Anglo- Saxons, Irish and Germans, Latin maintained its position in the church services and in the other branches of the ecclesiastical system; down to the Reformation the church remained a complete organic unity. In the East, at the earliest period of its conversion to Christianity, several foreign tongues competed with Greek, i.e. Syrian, Coptic, Armenian, Georgian, Gothic, Old-Bulgarian and others. The sacred books were translated into these languages and the church services were

held in them and not in Greek. One noticeable effect of this linguistic division in the church was the formation of various sects and national churches (cf. the Coptic Nestorians, the Syrian Monophysites, the Armenian and, in more recent times, the Slavonic national churches). The Church of the West was characterized by uniformity in language and in constitution. In the Eastern Church parallel to the multiplicity of languages developed also a corresponding variety of doctrine and constitution.

Though the character of Byzantine culture is mainly Greek, and Byzantine literature is attached by countless threads to ancient Greek literature, yet the Roman element influence, torras, a very essential part of it. The whole political character of the Byzantine empire is, despite its Greek form and colouring, genuinely Roman. Legislation and administration, the military and naval traditions, are old Roman work, and as such, apart from immaterial alterations, they continued to exist and operate, even when the state in head and limbs had become Greek. It is strange, indeed, how strong was the political conception of the Roman state (Staatsgedanke), and with what tenacity it held its own, even under the most adverse conditions, down to the latter days of the empire. The Greeks even adopted the name " Romans," which gradually became so closely identified with them as to supersede the name " Hellenes "; and thus a political was gradually converted into an ethnographical and linguistic designation. Rhomaioi was the most common popular term for Greeks during the Turkish period, and remains so still. The old glorious name " Hellene " was used under the empire and even during the middle ages in a contemptuous sense — " Heathen " — and has only in quite modern times, on the formation of the kingdom of " Hellas," been artificially revived. The vast organization of the Roman political system could not but exercise in various ways a profound influence upon Byzantine civilization; and it often seemed as if Roman political principles had, educated and nerved the unpolitical Greek people to great political enterprise. The Roman influence has left distinct traces in the Greek language, Greek of the Byzantine and modern period is rich in Latin terms for conceptions connected with the departments of justice, administration and the imperial court. In literature such

" barbarisms " were avoided as far as possible, and were replaced by Greek periphrases.

But by far the most momentous and radical change wrought on the old Hellenism was effected by Christianity; and yet the transition was, in fact, by no means so abrupt as one might be led to believe by comparing the Pagan- a „ity. ' Hellenic culture of Plato's day with the Christian-Byzantine of the time of Justinian. For the path had been most effectually prepared for the new religion by the crumbling away of the ancient belief in the gods, by the humane doctrine of the Stoics, and, finally, by the mystic

intellectual tendencies of Neoplatonism. Moreover, in many respects Christianity met paganism halfway by adapting itself to popular usages and ideas and by adopting important parts of the pagan literature. The whole educational system especially, even in Christian times, was in a very remarkable manner based almost entirely on the methods and material inherited from paganism. Next to the influences of Rome and of Christianity, that of the East was of importance in developing the Byzantine civilization, and in lending Byzantine literature its distinctive character. Much that was oriental in the Eastern empire dates orient back to ancient times, notably to the period of Alex- ander the Great and his successors. Since the Greeks had .at that period Hellenized the East to the widest extent, and had already founded everywhere flourishing cities, they them- selves fell under the manifold influences of the soil they occupied. In Egypt, Palestine and Syria, in Asia Minor as far inland as Mesopotamia, Greek and oriental characteristics were often blended. In respect of the wealth and the long duration of its Greek intellectual life, Egypt stands supreme. It covers a period of nearly a thousand years from the foundation of Alexandria down to the conquest of Egypt by the Arabs (a.d. 643). The real significance of Egyptian Hellenism during this long period can be properly estimated only if a practical attempt be made to eliminate from the history of Greek literature and science in pagan and in Christian times all that owed its origin to the land of the Nile. The soil of Egypt proved itself especially productive of Greek literature under the Cross (Origen, Athanasius, Arius, Synesius), in the same way as the soil of North Africa was productive of Latin literature (Tertullian, Cyprian, Lactantius, Augustine). Monastic life, which is one of the chief characteristic elements of Christian-Byzantine civilization, had its birth in Egypt. .

Syria and Palestine came under the influence of Greek civiliza- tion at a later date than Egypt. In these, Greek literature and culture attained their highest development between the 3rd and the 8th centuries of the Christian era. Antioch rose to great influence, owing at first to its pagan school of rhetoric and later to its Christian school of exegesis. Gaza was renowned for its school of rhetoric; Berytus for its academy of law. It is no mere accident that sacred poetry, aesthetically the most valuable class of Byzantine literature, was born in Syria and Palestine.

In Asia Minor, the cities of Tarsus, Caesarea, Nicaea, Smyrna, Ephesus, Nicopolis, &c, were all influential centres of Greek culture and literature. For instance, the three great fathers of Cappadocia, Basil, Gregory of Nyssa, and Gregory of Nazianzus all belonged to Asia Minor.

If all the greater Greek authors of the first eight centuries of the Christian era, i.e. the period of the complete development of Byzantine culture, be classified according to the countries of their birth, the significant fact

becomes evident that nine- tenths come from the African and Asiatic districts, which were for the most part opened up only after Alexander the Great, •and only one-tenth from European Greece. In other words, the old original European Greece was, under the emperors, completely outstripped in intellectual productive force by the newly founded African and Asiatic Greece. This huge tide of conquest which surged from Greece over African and Syrian territories occupied largely by foreign races and ancient civilizations, could not fail to be fraught with serious con- sequences for the Greeks themselves. The experience of the

Romans in their conquest of Greece (Graecia capta ferum victorem cepit) repeated itself in the conquest of the East by Greece, though to a minor extent and in a different way. The whole literature of Egypt, Syria and Asia Minor cannot, despite its international and cosmopolitan character, disavow the influence of the Oriental soil on which it was nourished. Yet the growth of too strong a local colouring in its literature was repressed, partly by the checks imposed by ancient Greek tradition, partly by the spirit of Christianity which reconciled all national distinctions. Even more clearly and unmistakably is Oriental influence shown in the province of Byzantine art, as Joseph Strzygowski has conclusively proved.

The greater portion of Greek literature from the close of ancient times down to the threshold of modern history was Lanruaxe wr i'ten in a language identical in its principal features with the common literary language, the so-called Koine, which had its origin in the Alexandrian age. This is the Jiterary form of Greek as a universal language, though a form that scintillates with many facets, from an almost Attic diction down to one that approaches the language of everyday life such as we have, for instance, in the New Testament. From what has been already said, it follows that this stable literary language cannot always have remained a language of ordinary life. For, like every living tongue, the vernacular Greek continu-, ally changed in pronunciation and form, as wellas in vocabulary and grammar, and thus the living language surely and gradually separated itself from the rigid written language. This gulf was, moreover, considerably widened owing to the fact that there took place in the written language a retrograde movement, the so-called " Atticism." Introduced by Dionysius of Hali- carnassus in the. ist century before Christ, this linguistic- literary fashion attained its greatest height in the 2nd century a.d., but still continued to flourish in succeeding centuries, and,

indirectly, throughout the whole Byzantine period. It is true that it often seemed as though the living language would be gradually introduced into literature; for several writers, such as the chronicler Malalas in the 6th century, Leontius of Neapolis (the author of Lives of Saints) in the 7th century, the chronicler Theophanes at the beginning of the 9th century, and the emperor Constantine Porphyrogenitus in the 10th century, made in their writings numerous concessions to the living language. This progressive tendency might well have led, in the nth and 1 2th centuries, to the founding in the Greek vernacular of a new literary language similar to the promising national languages and literature which, at that period, in the Romance countries, developed out of the despised popular idiom. In the case of the Byzantines, unfortunately, such a radical change never took place. All attempts in the direction of a popular reform of the literary language, which were occasionally made in the period from the 6th to the 10th centuries, were in turn extinguished by the resuscitation of classical studies, a movement which, begun in the oth century by Photius and continued in the nth by Psellus, attained its full development under the Comneni and the Palaeologi. This classical renaissance turned back the literary language into the old ossified forms, as had previously happened in the case of the Atticism of the early centuries of the empire. In the West, humanism (so closely connected with the Byzantine renaissance under the Comneni and the Palaeologi) also artificially reintroduced the " Ciceronian " Latin, but was unable seriously to endanger the development of the national languages, which had already attained to full vitality. In Byzantium, the humanistic movement came prematurely, and crushed the new language before it had fairly established itself. Thus the language of the Byzantine writers of the nth-i5th centuries is almost Old Greek in colour; artifiei- ally learnt by grammar, lexicon and assiduous reading, it ' followed Attic models more and more slavishly; to such an extent that, in determining the date of works, the paradoxical principle holds good that the more ancient the language, the more recent the author.

Owing to this artificial return to ancient Greek, the contrast lhat had long existed with the vernacular was now for the first

time fully revealed. The gulf between the two forms of language could no longer be bridged; and this fact found its expression in literature also. While the vulgarizing authors of the 6th-ioth centuries, like the Latin-writing Franks (such as Gregory of Tours), still attempted a compromise between the language of the schools and that of conversation, we meet after the 12th century with authors who freely and naturally employed the vernacular in their literary works. They accordingly form the Greek counterpart of the oldest writers in Italian, French and other Romance languages. That they could not succeed like their Roman colleagues, and always remained the pariahs of Greek literature, is due to the all-powerful

philological-anti- quarian tendency which existed under the Comneni and l he Palaeologi. Yet once more did the vernacular attempt to assert its literary rights, i.e. in Crete and some other islands in the 16th and 17th centuries. But this attempt also was foiled by the classical reaction of the 19th century. Hence it comes about that Greek literature even in the 20th century employs gram- matical forms which were obsolete long before the 10th century. Thus the Greeks, as regards their literary language, came into a cul de sac similar to that in which certain rigidly conservative Oriental nations find themselves, e.g. the Arabs and Chinese, who, not possessing a literary language suited to modern requirements, have to content themselves with the dead Old-Arabic or the ossified Mandarin language. The divorce of the written and spoken languages is the most prominent and also the most fatal heritage that the modern Greeks have received from their Byzantine forefathers.

The whole Byzantine intellectual life, like that of the Western medieval period, is dominated by theological interests. Theology

accordingly, in literature too, occupies the chief place, „ , 111 • it tˆt . General

in regard to both quantity and quality. Next to it character

*comes the writing of history, which the Byzantines of By cultivated with great conscientiousness until after * l f t ni,B t e the fall of the empire. All other kinds of prose writing, e.g. in geography, philosophy, rhetoric and the technical sciences, were comparatively neglected, and such works are of value for the most part only in so far as they preserve and interpret old material. In poetry, again, theology takes the lead. The poetry of the Church produced works of high aesthetic merit and endur- ing value. In secular poetry, the writing of epigrams especially was cultivated with assiduity and often with ability. In popular literature poetry predominates, and many productions worthy of notice, new both in matter and in form, are here met with.*

The great classical period of Greek theological literature is that of the 4th century. Various factors contributed to this result — some of them positive, particularly the xteolozy establishment of Christianity as the official religion and the protection accorded to it by the state, others negative, i.e. the heretical movements, especially Arianism, which at this period arose in the east of the empire and threatened the unity of the doctrine and organization of the church. It was chiefly against these that the subtle Athanasius of Alexandria directed his attacks. The learned Eusebius founded a new department of literature, church history. In Egypt, Antonius (St Anthony) founded the Greek monastic system; Synesius of Cyrene, like

his greater contemporary Augustine in the West, represents both in his life and in his writings the difficult transition from Plato to Christ. At the centre, in the forefront of the great intellectual movement of this century, stand the three great Cappadocians, Basil the Great, the subtle dogmatist, his brother Gregory of Nyssa, the philosophically trained defender of the Christian faith, and Gregory of Nazianzus, the distinguished orator and poet. Closely allied to them was St Chrysostom, the courageous champion of ecclesiastical liberty and of moral purity. To modern readers the greater part of this literature appears strange and foreign; but, in order to be appreciated rightly, it must be regarded as the outcome of the period in which it was produced, a period stirred to its depths by religious emotions. For the times in which they lived and for their readers, the Greek fathers reached the highest attainable; though, of course, they produced nothing of such general human

interest, nothing so deep and true, as the Confessions of St Augustine, with which the poetical autobiography of Gregory of Nazianzus cannot for a moment be compared.

The glorious bloom of the 4th century was followed by a perceptible decay in theological intellectual activity. Inde- pendent production was in succeeding centuries almost solely prompted by divergent dogmatical views and heresies, for the refutation of which orthodox authors were impelled to take up the pen. In the 5th and 6th centuries a more copious literature was called into existence by the Monophysites, who maintained that there was but one nature in Christ ; in the 7th century by the Monothelites, who acknowledged but one will in Christ; in the 8th century by the Iconoclasts and by the new teaching of Mahomet. One very eminent theologian, whose importance it has been reserved for modern times to estimate aright — Leontius of Byzantium (6th century) — was the first to introduce Aristotelian definitions into theology, and may thus be called the first scholastic. In his works he attacked the heretics of his age, particularly the Monophysites, who were also assailed by his contemporary Anastasius of Antioch. The chief adver- saries of the Monothelites were Sophronius, patriarch of Jerusalem (whose main importance, however, is due to his work in other fields, in hagiography and homiletics), Maximus the Confessor, and Anastasius Sinai'tes, who also composed an .interpretation of the Hexaemeron in twelve books. Among writers in the departments of critical interpretation and asceticism in this period must be enumerated

Procopius of Gaza, who devoted himself principally to the exegesis of the Old Testament; Johannes Climax (6th century), named after his much-read ascetic work Klimax (Jacob's ladder); and Johannes Moschus (d. 619), whose chief work Leimon (" spiritual pasture ") describes monastic life in the form of statements and narratives of their experiences by monks themselves. The last great heresy, which shook the Greek Church to its very foundations, the Iconoclast movement, summoned to the fray the last great Greek theologian, John of Damascus (Johannes Damascenus). Yet his chief merit lies not so much in his polemical speeches against the Iconoclasts, and in his much admired but over-refined poetry, as in his great dogmatic work, The Fountain of Knowledge, which contains the first comprehensive exposition of Christian dogma. It has remained the standard work on Greek theology down to the present day. Just as the internal development of the Greek Church in all essentials reached its limit with the Iconoclasts, so also its productive intellectual activity ceased with John of Damascus. Such theological works as were subsequently produced, consisted mostly in the interpretation and revision of old materials. An extremely copious, but unfruitful, literature was produced by the disputes about the reunion of the Greek and Roman Churches. Of a more independent character is the literature which in the 14th century centred round the dissensions of the Hesychasts.

Among theologians after John of Damascus must be mentioned : the emperor Leo VI., the Wise (886-911), who wrote numerous homilies and church hymns, and Theodorus of Studium (759- 826), who in his numerous writings affords us instructive glimpses of monastic life. Pre-eminent stands the figure of the patriarch Photius. Yet his importance consists less in his writings, which often, to a remarkable extent, lack independence of thought and judgment, than in his activity as a prince of the church. For he it was who carried the differences which had already repeatedly arisen between Rome and Constantinople to a point at which reconciliation was impossible, and was mainly instru- mental in preparing the way for the separation of. the Greek and Latin Churches accomplished in 1054 under the patriarch Michael Cemlarius. In the 1 ith century the polyhistor Michael Psellus also wrote polemics against the Euchites, among whom the Syrian Gnosis was reviving. All literature, including theology, experienced a considerable revival under the Comneni. In the reign of Alexius I. Comnenus (1081-1118), Euthymius Zigabenus wrote his great dogmatic work, the Dogmatic Panoply, which, like The Fountain of Knowledge of John of Damascus in earlier times, was partly positive, furnishing an armoury of

theology, partly negative and directed against the sects. In addition to attacking the dead and buried doctrines of the Monothelites, Iconoclasts, &c, to fight which was at this time a mere tilting at windmills, Zigabenus

also carried on a polemic against the heretics of his own day, the Armenians, Bogomils and Saracens. Zigabenus's Panoply was continued and enlarged a century later by the historian Nicetas Acominatus, who published it under the title Treasure of Orthodoxy. To the writings against ancient heresies were next added a flood of tracts, of all shapes and sizes, " against the Latins," i.e. against the Roman Church, and among their authors must also be enumerated an emperor, the gifted Theodore II. Lascaris (1254- 1258). The chief champion of the union with the Roman Church was the learned Johannes Beccus (patriarch of Constantinople 1275-1282). Of his opponents by far the most eminent was Gregory of Cyprus, who succeeded him on the patriarchal throne. The fluctuations in the fortunes of the two ecclesiastical parties are reflected in the occupation of the patriarchal throne. The battles round the question of the union, which were waged with southern passion, were for a while checked by the dissensions aroused by the mystic tendency of the Hesychasts. The impetus to this great literary movement was given by the monk Barlaam, a native of Calabria, who came forward in Constantinople as an opponent of the Latins and was in 1339 entrusted by Andronicus III, with a mission to Pope Benedict XII. at Avignon. He condemned the doctrine of the Hesychasts, and attacked them both orally and in writing. Among those who shared his views are conspicuous the historian Nicephorus Gregoras and Gregorius Acindynus, the latter of whom closely followed Thomas Aquinas in his writings. In fact the struggle against the Hesychasts was essentially a struggle between sober western scholasticism and dreamy Graeco-Oriental mysticism. On the side of the Hesychasts fought Gregorius Palamas, who tried to give a dogmatic founda- tion to the mysticism of the Hesychasts, Cabasilas, and the emperor John VI. Cantacuzenus who, after his deposition, sought, in the peaceful retreat of a monastery, consolation in theological studies, and in his literary works refuted the Jews and the Mahommedans. For the greatest Byzantine " apologia " against Islamism we are indebted to an emperor, Manuel II. Palaeologus (1391-1425), who by learned discussions tried to make up for the deficiency in martial prowess shown by the Byzantines in their struggle with the Turks. On the whole, theological literature was in the last century of the empire almost completely occupied with the struggles for and against the union with Rome. The reason lay in the political conditions. The emperors saw more and more clearly that without the aid of the West they would no longer be able to stand their ground against the Turks, the vanguard of the armies of the Crescent; while the majority of Byzantine theologians feared that the assistance of the West would force the Greeks to unite with Rome, and thereby to forfeit their ecclesiastical independence. Considering the supremacy of the theological party in Byzantium, it was but natural that religious considerations should gain the day over political; and this was the view almost universally held by the Byzantines in the later centuries of the

*empire; in the words of the chronicler Ducas: "it is better to fall into the hands of the Turks than into those of the Franks." The chief opponent of the union was Marcus Eugenicus, metropolitan of Ephesus, who, at the Council of Florence in 1439, denounced the union with Rome accomplished by John VIII. Palaeologus. Conspicuous there among the partisans of the union, by reason of his erudition and general literary merit, was Bessarion, after- wards cardinal, whose chief activity already falls under the head of Graeco-Italian humanism. * Hagiography, i.e. the literature of the acts of the martyrs and the lives of the saints, forms an independent group and one comparatively unaffected by dogmatic struggles. The main interest centres here round the objects graphy. described, the personalities of the martyrs and saints themselves. The authors, on the other hand — the Acts of the Martyrs are mostly anonymous — keep more in the background than in other branches of literature. The man whose name is*

mainly identified with Greek hagiography, Symeon Metaphrastes, is important not as an original author, but only as an editor. Symeon revised in the ioth century, according to the rhetorical and linguistic principles of his day, numerous old Acts of the Martyrs, and incorporated them in a collection consisting of several volumes, which was circulated in innumerable copies, and thus to a great extent superseded the older original texts. These Acts of the Martyrs, in point of time, are anterior to our period; but of the Lives of Saints the greater portion belong to Byzantine literature. They began with biographies of monks distinguished for their saintly living, such as were used by Palladius about 420 in his Historia Lausiaca. The most famous work of this description is that by Athanasius of Alexandria, viz. the biography of St Anthony, the founder of monachism. In the 6th century Cyril of Scythopolis wrote several lives of saints, distinguished by a simple and straightforward style. More expert than any one else in reproducing the naive popular style was Leontius of Neapolis in Cyprus who, in the 7th century, wrote, among other works, a life of St John the Merciful, arch- bishop of Alexandria, which is very remarkable as illustrating the social and intellectual conditions of the time. From the popular Lives of Saints, which for the reading public of the middle ages formed the chief substitute for modern " belles lettres," it is easy to trace the transition to the religious novel. The most famous work of this class is the history of Barlaam and Josaphat (q.v.).

The religious poetry of the Greeks primarily suffered from the influence of the ancient Greek form, which was fatal to

original development. The oldest work of this class is poefry" 8 the hymn, composed in anapaestic monometers and

dimeters, which was handed down in the manuscripts with the Paedagogus of Clement of Alexandria (d. about 215), but was probably not his work. The next piece of this class is the famous " Maidens' Song " in the Banquet of St Methodius (d. about 311), in which many striking violations of the old rules of quantity are already apparent. More faithful to the tradition of the schools was Gregory of Nazianzus. But, owing to the fact that he generally employed antiquated versification and very erudite language, his poems failed to reach the people or to find a place in the services of the church. Just as little could the artificial paraphrase of the Psalms composed by the younger Apollinaris, or the subtle poems of Synesius, become popular. It became more and more patent that, with the archaic metre which was out of keeping with the character of the living language, no genuine poetry suited to the age could possibly be produced. Fortunately, an entirely new form of poetical art was discovered, which conferred upon the Greek people the blessings of an intelligible religious poetry — the rhythmic poem. This no longer depended on difference of quantity in the syllables, which had disappeared from the living language, but on the accent. Yet the transition was not effected by the substitution of accent for the old long syllables; the ancient verse form was entirely abandoned, and in its stead new and variously con- structed lines and strophes were formed. In the history of the rhythmic sacred poetry three periods are clearly marked — the preparatory period; that of the hymns; and that of the Canones. About the first period we know, unfortunately, comparatively little. It appears that in it church music was in the main confined to the insertion of short songs between the Psalms or other portions of Holy Writ and the acclamations of the congregation. The oldest rhythmic songs date from Gregory of Nazianzus — his " Maidens' Song " and his " Evening Hymn." Church poetry reached its highest expression in the second period, in the grand development of the hymns, i.e. lengthy songs compris- ing from twenty to thirty similarly constructed strophes, eaeh connected with the next in acrostic fashion. Hymnology, again, attained its highest perfection in the first half of the 6th century with Romanos, who in the great number and excellence of his hymns dominated this species of poetry, as Homer did the Greek epic. From this period dates, moreover, the most famous song of the Greek Church, the so-called Acathistus, an anonymous hymn of praise to the Virgin Mary, which has

sometimes, but erroneously, been attributed to the patriarch Sergius.

Church poetry entered upon a new stage, characterized by an increase in artistic finish and a falling off in poetical vigour, with the composition of the Canones, songs artfully caaoaes. built up out of eight or nine lyrics, all differently constructed. Andreas, archbishop of Crete (c. 650-720), is regarded as the inventor of this new class of song. His chief work, " the great Canon," comprises no less than 250 strophes. The most celebrated writers of Canones are John of Damascus and Cosmas of Jerusalem, both of whom flourished in the first half of the 8th century. The " vulgar " simplicity of Romanos was regarded by them as an obsolete method; they again resorted to the classical style of Gregory of Nazianzus, and John of Damascus even took a special delight in the most elaborate tricks of expression. In spite of this, or perhaps on that very account, both he and Cosmas were much admired in later times, were much read, and — as was very necessary — much commen- tated. Later, sacred poetry was more particularly cultivated in the monastery of the Studium at Constantinople by the abbot Theodorus and others. Again, in the 9th century, Joseph, " the hymn-writer," excelled as a writer of songs, and, finally, John Mauropus (nth century), bishop of Euchaita, John Zonaras (12th century), and Nicephorus Blemmydes (13th century), were also distinguished as authors of sacred poems, i.e. Canones. The Basilian Abbey of Grotta Ferrata near Rome, founded in 1004, and still existing, was also a nursery of religious poetry. As regards the rhythmic church poetry, it may now be regarded as certain that its origin was in the East. Old Hebrew and Syrian models mainly stimulated it, and Romanos (q.v.) was especially influenced by the metrical homilies of the great Syrian father Ephraem (d. about 373).

In profane literature the writing of history takes the first place, as regards both form and substance. The Greeks have always been deeply interested in history, and they have profane never omitted, amid all the vicissitudes of their literature; existence, to hand down a record to posterity. Thus, historical they have produced a literature extending from the Ionian logographers and Herodotus down to the times of Sultan Mahommed II. In the Byzantine period all historical accounts fall under one of two groups, entirely different, both in form and in matter, (1) historical works, the authors of which described, as did most historians of ancient times, a period of history in which they themselves had lived and moved, or one which only immediately preceded their own times; and (2) chronicles, shortly recapitulating the history of the world. This latter class has no exact counterpart in ancient literature. The most clearly marked stage in the development of a Christian- Byzantine universal history was the chronicle (unfortunately lost) written by the Hellenized Jew, Justus of Tiberias, at the beginning of the 2nd century of the Christian era; this work began with the story of Moses.

Byzantine histories of contemporary events do not differ substantially from

ancient historical works, except in their Christian colouring. Yet even this is often very faint and blurred owing to close adherence to ancient methods. Apart from this, neither a new style nor a new critical method nor any radically new views appreciably altered the main character of Byzantine historiography. In their style most Byzantine compilers of contemporary history followed the beaten track of older his- torians, e.g. Herodotus, Thucydides, and, in some details, also Polybius. But, in spite of their often excessive tendency to imitation, they displayed considerable power in the delineation of character and were not wanting in independent judgment. As regards the selection of their matter, they adhered to the old custom of beginning their narrative where their predecessors left off.

The outstripping of the Latin West by the Greek East, which after the close of the 4th century was a self-evident fact, is reflected in historiography also. After Constantine the Great, the history of the empire, although its Latin character was maintained until the 6th century, was mostly written by Greeks;

e.g. Eunapius (c. 400), Olympiodorus (c. 450), Priscus (c. 45°), Malchus (c. 490), and Zosimus, the last pagan historian (c. 500), all of whom, with the exception of Zosimus, are unfortunately preserved to us only in fragments. Historiography received a great impulse in the 6th century. The powerful Procopius and Agathias (q.v.), tinged with poetical rhetoric, described the stirring and eventful times of Justinian, while Theophanes of Byzantium, Menander Protector, Johannes of Epiphaneia and Theophylactus of Simocatta described the second half of the 6th century. Towards the close of the 6th century also flourished the last independent ecclesiastical historian, Evagrius, who wrote the history of the church from 431 to 593. There now followed, however, a lamentable falling off in production. From the 7 th to the 10th century the historical side is represented by a few chronicles, and it was not until the 10th century that, owing to the revival of ancient classical studies, the art of writing history showed some signs of life. Several historical works are associated with the name of the emperor Constantine VII. Porphyrogenitus. To his learned circle be- longed also Joseph Genesius, who at the emperor's instance compiled the history of the period from 813 to 886. A little work, interesting from the point of view of historical and ethnographical science, is the account of the taking of Thessalonica by the Cretan Corsairs (a.d. 904), which a priest, Johannes Cameniata, an eyewitness of the event, has

bequeathed to posterity. There is also contained in the excellent work of Leo Diaconus (on the period from 959 to 975) a graphic account of the bloody wars of the Byzantines with the Arabs in Crete and with the Bulgarians. A continuation was undertaken by the philosopher Michael Psellus in a work covering the period from 976 to 1077. A valuable supplement to the latter (describing the period from 1034 to 1079) was supplied by the jurist Michael Attaliata. The history of the Eastern empire during the Crusades was written in four considerable works, by Nicephorus Bryennius, his learned consort Anna Comnena, the " honest Aetolian," Johannes Cinnamus, and finally by Nicetas Acominatus in an exhaustive work which is authoritative for the history of the 4th Crusade. The melancholy conditions and the ever increasing decay of the empire under the Palaeologi (i3th-i5th centuries) are described in the same lofty style, though with a still closer following of classical models. The events which took place between the taking of Constantinople by the Latins and the restoration of Byzantine rule (1 203-1 261) are recounted by Georgius Acropolita, who emphasizes his own share in them. The succeeding period was written by the versatile Georgius Pachymeres, the erudite and high-principled Nicephorus Gregoras, and the emperor John VI. Cantacuzenus. Lastly, the death-struggle between the East Roman empire and the mighty rising power of the Ottomans was narrated by three historians, all differing in culture and in style, Laonicus Chalco- condyles, Ducas and Georgius Phrantzes. With them may be classed a fourth (though he lived outside the Byzantine period), Critobulus, a high-born Greek of Imbros, who wrote, in the style of the age of Pericles, the history of the times of the sultan Mahommed II. (down to 1467).

The essential importance of the Byzantine chronicles (mostly chronicles of the history of the world from the Creation) consists in the fact that they in part replace older lost works, jyˆ s- " and thus fill up many gaps in our historical survey (e.g. for the period from about 600 to 800 of which very few records remain). They lay no claim to literary merit, but are often serviceable for the history of language. Many such chronicles were furnished with illustrations. The remains of one such illustrated chronicle on papyrus, dating from the beginning of the 5th century, has been preserved for us by the soil of Egypt. 1 The authors of the chronicles were mostly monks, who wished to compile handbooks of universal history for their brethren and for pious laymen; and this explains the strong clerical and popular tendency of these works. And it is due to

1 See Ad. Bauer and J. Strzygowski, " Eine alexandrinische Weltchronik" (1905) {Denkschrift der kaiserlich. Akademie der Wissenschqften, li.).

these two qualities that the chronicles obtained a circulation abroad, both in the West and also among the peoples Christian- ized from Byzantium,

e.g. the Slavs, and in all of them sowed the seeds of an indigenous historical literature. Thus the chronicles, despite the jejuneness of their style and their uncritical treatment of material were for the general culture of the middle ages of far greater importance than the erudite contemporary histories designed only for the highly educated circles in Byzantium. The oldest Byzantine chronicle of universal history preserved to us is that of Malalas (6th century), which is also the purest type of this class of literature. In the 7th century was completed the famous Easter or Paschal Chronicle (Chronicon Paschale). About the end of the 8th or the beginning of the 9th century Georgius Syncellus compiled a concise chronicle, which began with the Creation and was continued down to the year 284. At the request of the author, when on his death-bed, the con- tinuation of this work was undertaken by Theophanes Confessor, who brought down the account from a.d. 284 to his own times (a.d. 813). This exceedingly valuable work of Theophanes was again continued (from 813-961) by several anonymous chroniclers. A contemporary of Theophanes, the patriarch Nicephorus, wrote, in addition to a Short History of the period from 602 to 769, a chronological sketch from Adam down to the year of his own death in 829. Of great influence on the age that followed was Georgius Monachus, only second in importance as chronicler of the early Byzantine period, who compiled a chronicle of the world's history (from Adam until the year 843, the end of the Iconoclast movement), far more theological and monkish in character than the work of Theophanes. Among later chroniclers Johannes Scylitza stands put conspicuously. His work (covering the period from 811 to 1057), as regards the range of its subject-matter, is something between a universal and a contemporary history. Georgius Cedrenus (c. 1100) embodied the whole of Scylitza's work, almost unaltered, in his Universal Chronicle. In the 12th century the general increase in literary production was evident also in the department of chronicles of the world. From this period dates, for instance, the most distinguished and learned work of this class, the great universal chronicle of John Zonaras. In the same century Michael Glycas compiled his chronicle of the world's history, a work written in the old popular style and designed for the widest circles of readers. Lastly, in the 12th century, Con- stantine Manasses wrote a universal chronicle in the so-called " political " verse. With this verse-chronicle must be classed the imperial chronicle of Ephraem, written in Byzantine trimeters at the beginning of the 14th century.

Geography and topography, subjects so closely connected with history, were as much neglected by the Byzantines as by their political forerunners, the Romans. Of purely practical importance are a few handbooks of navigation, gra'phy. itineraries, guides for pilgrims, and catalogues of provinces and cities, metropolitan sees and bishoprics. The geographical

work of Stephanus of Byzantium, which dates from Justinian's time, has been lost. To the same period belongs the only large geographical work which has been preserved to us, the Christian Topography of Cosmas Indicopleustes. For the topography of Constantinople a work entitled Ancient History (Patria)- of Constantinople, which may be compared to the medieval Mirabilia urbis Romae, and in late manuscripts has been wrongly attributed to a certain Codinus, is of great import- ance.

Ancient Greek philosophy under the empire sent forth two new shoots — Neopythagoreanism and Neoplatonism. It was the latter with which moribund paganism essayed to stem the advancing tide of Christianity. The last great sooh'y. exponent of this philosophy was Proclus in Athens (d. 485). The dissolution, by order of Justinian, of the school of philosophy at Athens in 529 was a fatal blow to this nebulous system, which had long since outlived the conditions that made it a living force. In the succeeding period philosophical activity was of two main kinds; on the one hand, the old philosophy, e.g. that of Aristotle, was employed to systematize Christian

doctrine, while, on the other, the old works were furnished with copious commentaries and paraphrases. Leontius of Byzantium had already introduced Aristotelian definitions into Christology; but the real founder of medieval ecclesiastical philosophy was John of Damascus. Owing, however, to his having early attained to canonical authority, the independent progress of ecclesiastical philosophy was arrested; and to this it is due that in this respect the later Byzantine period is far poorer than is the West. Byzantium cannot boast a scholastic like Thomas Aquinas. In the nth century philosophical studies experienced a satis- factory revival, mainly owing to Michael Psellus, who brought Plato as well as Aristotle again into fashion.

Ancient rhetoric was cultivated in the Byzantine period with greater ardour than scientific philosophy, being regarded as an

indispensable aid to instruction. It would be difficult

to imagine anything more tedious than the numerous theoretical writings on the subject and the examples of their practical application: mechanical school essays, which here count as " literature," and innumerable letters,

the contents of which are wholly insignificant. The evil effects of this were felt beyond the proper sphere of rhetoric. The anxious attention paid to the laws of rhetoric and the unrestricted use of its withered flowers were detrimental to a great part of the rest of Byzantine literature, and greatly hampered the development of any individuality and simplicity of style. None the less, among the rhetorical productions of the time are to be found a few interesting pieces, such as the Philopatris, in the style of Lucian, which gives us a remarkable picture of the times of Nicephorus Phocas (10th century). In two other smaller works a journey to the dwellings of the dead is described, after the pattern of Lucian's Nekyomanteia, viz. in Timarion (i 2th century) and in Mazaris' Journey to the Underworld (c. 1414). A very charming representative of Byzantine rhetoric is Michael Acominatus, who, in addition to theological works, wrote numerous occasional speeches, letters and poems.

In the field of scientific production, which can be accounted literature in the modern acceptation of the term only in a limited

*sense, Byzantium was dominated to an extravagant sciences. anc * even grotesque extent by the rules of what in*

modern times is termed " classical scholarship." The numerous works which belong to this category, such as grammars, dictionaries, commentaries on ancient authors, extracts from ancient literature, and metrical and musical treatises, are of little general interest, although of great value for special branches of philological study, e.g. for tracing the influences through which the ancient works handed down to us have passed, as well as for their interpretation and emenda- tion; for information about ancient authors now lost; for the history of education; and for the underlying principles of in- tellectual life in Byzantium. The most important monument of Byzantine philology is, perhaps, the Library of the patriarch Photius. The period from about 650 to 850 is marked by a general decay of culture. Photius, who in the year 850 was about thirty years of age, now set himself with admirable energy to the task of making ancient literature, now for the most part dead and forgotten, known once more to his contemporaries, thus contributing to its preservation. He gave an account of all that he read, and in this way composed 280 essays, which were collected in what is commonly known as the Library or Myriobiblon. The character of the individual sketches is somewhat mechanical and formal; a more or less complete account of the contents is followed by critical discussion, which is nearly always confined to the linguistic form. With this work may be compared in importance the great Lexikon of Suidas, which appeared about a century later, a sort of encyclo- paedia, of which the main feature was its articles on the history of literature. A truly sympathetic figure is Eustathius, the famous archbishop

of Thessalonica (12th century). His volumin- ous commentaries on Homer, however, rivet the attention less than his enthusiastic devotion to science, his energetic action on behalf of the preservation of the literary works of antiquity, and last, not least, his frank and heroic character, which had

nothing in it of the Byzantine. If, on the other hand, acquaint- ance with a caricature of Byzantine philology be desired, it is afforded by Johannes Tzetzes, a contemporary of Eustathius, a Greek in neither name nor spirit, narrow-minded, angular, superficial, and withal immeasurably conceited and ridiculously coarse in his polemics. The transition to Western humanism was effected by the philologists of the period of the Palaeologi, such as Maximus Planudes, whose translations of numerous works renewed the long-broken ties between Byzantium and the West; Manuel Moschopulus, whose grammatical works and commentaries were, down to the 16th century, used as school text-books; Demetrius Triclinius, distinguished as a textual critic; the versatile Theodorus Metochites, and others.

Originally, as is well known, Latin was the exclusive language of Roman law. But with Justinian, who codified the laws in his Corpus juris, the Hellenizing of the legal language also began. The Institutes and the Digest were trans- prudence. lated into Greek, and the Novels also were issued in a Greek form. Under the Macedonian dynasty there began, after a long stagnation, the resuscitation of the code of Justinian. The emperor Basilius I. (867-886) had extracts made from the existing law, and made preparations for the codifying of all laws. But the whole work was not completed till the time of Leo VI. the Wise (886-912), and Constantine VII. Porphyrogenitus (912-959), when it took the form of a grand compilation from the Digests, the Codex, and the Novels, and is commonly known as the Basilica (Ta /3cunXiKa). In the East it completely super- seded the old Latin Corpus juris of Justinian. More that was new was produced, during the Byzantine period, in canon law than in secular legislation. The purely ecclesiastical rules of law, the Canones, were blended with those of civil law, and thus arose the so-called Nomocanon, the most important edition of which is that of Theodorus Bestes in 1090. The alphabetical handbook of canon law written by Matthaeus Blastares about the year 1335 also exercised a great influence.

In the province of mathematics and astronomy the remarkable fact must be recorded that the revival among the Greeks of these long-forgotten studies was primarily due to Mathe- Perso-Arabian influence. The Great Synlaxis of maths Ptolemy operated in the oriental guise of the Almagest. <">das- The most important direct source of this intellectual "omy. loan was not Arabia, however, but Persia. Towards the close of the 13th century the Greeks became acquainted with Persian astronomy. At the beginning of the

14th century Georgius Chrysococca and Isaac Argyrus wrote astronomical treatises based on Persian works. Then the Byzantines themselves, notably Theodorus Metochites and Nicephorus Gregoras, at last had recourse to the original Greek sources.

The Byzantines did much independent work in the field of military science. The most valuable work of the period on this subject is one on tactics, which has science. come down to posterity associated with the name of Leo VI., the Wise.

Of profane poetry — in complete contrast to sacred poetry — the general characteristic was its close imitation of the antique in point of form. All works belonging to this category reproduce the ancient style and are framed after poetry. ancient models. The metre is, for the most part, either the Byzantine regular twelve-syllable trimeter, or the " political " verse; more rarely the heroic and Anacreontic measures.

Epic popular poetry, in the ancient sense, begins only with the vernacular Greek literature (see below); but among the literary works of the period there are several which can be compared with the epics of the Alexandrine age. Nonnus (c. 400) wrote, while yet a pagan, a fantastic epic on the triumphal progress of the god Dionysus to India, and, as a Christian, a voluminous commentary on the gospel of St John. In the 7th century, Georgius Pisides sang in several lengthy iambic poems the martial deeds of the emperor Heraclius, while the deacon Theodosius (10th century) immortalized in extrava- gant language the victories of the brave Nicephorus Phocas.

epic

BYZANTINE]

GREEK LITERATURE

523

Romances.

Lyrics.

The epigram.

From the nth century onwards, religious, grammatical, astrological, medical, historical and allegorical poems, framed partly in duodecasyllables and partly in " political " poems. verse, made their appearance in large quantities. Didactic religious poems were composed,

for example, by Philippus (6 Movorpcnros, Solitarius, c. 1100), grammatico- philological poems by Johannes Tzetzes, astrological by Johannes Camaterus (12th century), others on natural science by Manuel Philes (14th century) and a great moral, allegorical, didactic epic by Georgius Lapithes (14th century).

To these may be added some voluminous poems, which in style and matter must be regarded as imitations of the ancient Greek romances. They all date from the 1 2th century, a fact evidently connected with the general revival of culture which characterizes the period of the Comneni. Two of these romances are written in the duodecasyllable metre, viz. the story of Rodanthe and Dosicles by Theodorus Prodromus, and an imitation of this work, the story of Drusilla and Charicles by Nicetas Eugenianus; one in " political " verse, the love story of Aristander and Callithea by Constantine Manasses, which has only been preserved in fragments, and lastly one in prose, the story of Hysmine and Hysminias, by Eustathius (or Eumathius) Macrembolita, which is the most insipid of all.

The objective point of view which dominated the whole Byzantine period was fatal to the development of a profane lyrical poetry. At most a few poems by Johannes Geometres and Christophorus of Mytilene and others, in which personal experiences are recorded with some show of taste, may be placed in this category. The dominant form for all subjective poetry was the epigram, which was employed in all its variations from playful trifles to long elegiac and narrative poems. Georgius Pisides (7th century) treated the most diverse themes. In the 9th century Theodorus of Studium had lighted upon the happy idea of immortalizing monastic life in a series of epigrams. The same century produced the only poetess of the Byzantine period, Casia, from whom we have several epigrammatic pro- ductions and church hymns, all characterized by originality. Epigrammatic poetry reached its highest development in the 10th and nth centuries, in the productions of Johannes Geo- metres, Christophorus of Mytilene and John Mauropus. Less happy are Theodorus Prodromus (12th century) and Manuel Philes (14th century). From the beginning of the 10th century also dates the most valuable collection of ancient and of Byzantine epigrammatic poems, the Anthologia Palatina (see Anthology). Dramatic poetry, in the strict sense of the term, was as completely lacking among the Byzantine Greeks as was the condition precedent to its existence, namely, public performance. Apart from some moralizing allegorical dialogues (by Theodorus Prodromus, Manuel Philes and others), we possess only a single work of the Byzantine period that, at least in external form, resembles a drama: the Sufferings of Christ (Xputtos Hacrxuv). This work, written probably in the 1 2th century, or at all events not earlier, is a cento, i.e. is in great measure composed of verses culled from ancient writers, e.g. Aeschylus, Euripides and Lycophron; but it was certainly not written with a

view to the dramatic production.

The vernacular literature stands alone, both in form and in

contents. We have here remarkable originality of conception

and probably also entirely new and genuinely medieval

Veraacu- ma tter. While in the artificial literature prose is lar Greek . . , . ,. r

literature, pre-eminent, in the vernacular literature, poetry,

both in quantity and quality, takes the first place, as

was also the case among the Latin nations, where the vulgar

tongue first invaded the field of poetry and only later that of

prose. Though a few preliminary attempts were made (proverbs,

acclamations addressed by the people to the emperor, &c), the

Greek vernacular was employed for larger works only from the

12th century onwards; at first in poems, of which the major

portion were cast in " political " verse, but some in the trochaic

eight-syllabled line. Towards the close of the 15th century

rhyme came into use. The subjects treated in this vernacular

Drama.

poetry are exceedingly diverse. In the capital city a mixture of the learned and the popular language was first used in poems of admonition, praise and supplication. In this oldest class of " vulgar " works must be reckoned the Spaneas, an admoni- tory poem in imitation of the letter of Pseudo-Isocrates addressed to Demonicus; a supplicatory poem composed in prison by the chronicler Michael Glycas, and several begging poems of Theo-dorus Prodromus (Ptochoprodromos). In the succeeding period erotic poems are met with, such as the Rhodian love songs preserved in a MS. in the British Museum (ed. W. Wagner, Leipzig, 1879), fairy-tale like romances such as the Story of Ptocholeon, oracles, prayers, extracts from Holy Writ, lives of saints, &c. Great epic poems, in which antique subjects are treated, such as the legends of Troy and of Alexander, form a separate

group. To these may be added romances in verse after the manner of the works written in the artificial classical language, e.g. Callimachus and Chrysorrhoe, Belthandrus and Chrysantza, Lybistrus and Rhodamne, also romances in verse after the Western pattern, such as Phlorius and Platziaphlora (the old French story of Flore et Blanchefleur) . Curious are also sundry legends connected with animals and plants, such as an adaptation of the famous medieval animal fables of the Physiologus, a history of quadrupeds, and a book of birds, both written with a satirical intention, and, lastly, a rendering of the story of Reynard the Fox. Of quite peculiar originality also are several legendary and historical poems, in which famous heroes and historical events are celebrated. There are, for instance, poems on the fall of Constantinople, the taking of Athens and Trebizond, the devastating campaign of Timur, the plague in Rhodes in 1498, &c. In respect of import- ance and antiquity the great heroic epic of Digenis Akritas stands pre-eminent.

*Among prose works written in the vulgar tongue, or at least in a compromise with it, may be mentioned the Greek rendering of two works from an Indian source, the Book of the Seven Wise Masters (as Syntipas the Philosopher by " Val g*r" Michael Andreopulus) , and the Hitopadera or Mirror £. or A S< of Princes (through the Arabic Kalilah and Dimnah by Simeon Sethus as ST€<ˆowrr)S Kal 'lnvrfKiiTris), a fish book, a fruit book (both skits on the Byzantine court and official circles) . To these must be added the Greek laws of Jerusalem and of Cyprus of the 12th and 13th centuries, chronicles, &c. In spite of many individual successes, the literature written in the vulgar tongue succumbed, in the race for existence, to its elder sister, the literature written in classical and polished Greek. This was mainly due to the continuous employment of the ancient language in the state, the schools and the church.*

The importance of Byzantine culture and literature in the history of the world is beyond dispute. The Christians of the East Roman empire guarded for more than a thousand Genera/ years the intellectual heritage of antiquity against the sigain- violent onslaught of the barbarians. They also called cance of into life a peculiar medieval culture and literature, / fterafaref They communicated the treasures of the old pagan as well as of their own Christian literature to neighbouring nations; first to the Syrians, then to the Copts, the Armenians, the Georgians; later, to the Arabians, the Bulgarians, the Serbs and the Russians. Through their teaching they created a new East European culture, embodied above all in the Russian empire, which, on its religious side, is included in the Orthodox Eastern Church, and from the point of view of nationality touches the two extremes of Greek and Slav. Finally the learned men of the dying Byzantine empire, fleeing from the barbarism of the Turks, transplanted the treasures of old Hellenic wisdom to the West, and thereby fertilized the Western peoples

with rich germs of culture.

Bibliography. — 1. General sources: K. Krumbacher, Geschichte der byzantinischen Literatur (2nd ed., 1897), supplemented in Die byzantinische Zeitschrift (1892 seq.), and the Byzanlinisch.es Archiv (1898 seq.), which is intended for the publication of more exhaustiye matter. The Russian works in this department are comprised in the Vizantiisky Vremennik (1894 seq.).

2. Language: Grammar: A. N. Jannaris (Giannaris), An

Historical Greek Grammar (1897); A. Dieterich, " Untersuchungen zur Geschichte der griechischen Sprache von der hellenlstischen Zeit bis zum ioten Jahrhundert," in Byzant. Archiv, i. (1898). Glossary: Ducange, Glossarium ad scriptores mediae et infimae Graecitatis (1688), in which particular attention is paid to the " vulgar " language; E. A. Sophocles, Greek Lexicon of the Roman and Byzantine Periods (3rd ed., 1888).

3. Theology : Chief work, A. Ehrhard in Krumbacher's Geschichte der byz. Lit. pp. 1-2 18. For the ancient period, cf. the works on Greek patrology (underarticleFATHERSOFTHECHURCH). Collective edition of the Fathers (down to the 15th century); Patrologia, series Graeca (ed. by Migne, 161 vols., 1857-1866). Church poetry: A collection of Greek Church hymns was published by W. Christ and M. Paranikas, entitled Anthologia Graeca carminum Chris tia- norum (1871). Many unedited texts, particularly the songs of Romanos, were published by Cardinal J. B. Pitra, under the title Analecta sacra spicilegio Solesmensi parata (1876). A complete edition of the hymns is edited by K. Krumbacher.

4. Historical literature: A collective edition of the Byzantine historians and chroniclers was begun under Louis XIV., and con- tinued later (1648-1819), called the Paris Corpus. This whole collection was on B. G. Niebuhr's advice republished with some additions (Bonn, 1828-1878), under the title Corpus scriptorum historiae Byzantinae. The most important authors have also appeared in the Bibliotheca Teubneriana. A few Byzantine and oriental historical works are also contained in the collection edited by J. B. Bury (1898 seq.).

5. Vernacular Greek literature: The most important collective editions are: W. Wagner, Medieval Greek Texts (1870), Carmina Graeca Medii Aevi

(1874), Trois Poemes grecs du moyen dge (1881); E. Legrand, Collection de monuments pour servir d, V elude de la langue neo-hellenique (in 26 parts, 1869-1875), Bibliotheque grecque vulgaire (in 8 vols., 1880-1896). (K. Kr.)

III. Modern Greek Literature (1453-1908)

After the capture of Constantinople, the destruction of Greek national life and the almost total effacement of Greek civilization naturally involved a more or less complete cessation of Greek literary production in the regions subjected to the rule of a barbarous conqueror. Learned Greeks found a refuge away from their native land; they spoke the languages of foreign people, and when they wrote books they often used those languages, but in most cases they also wrote in Greek. The fall of Constantinople must not therefore be taken as indicating a break in the continuity of Greek literary history. Nor had that event so decisive an influence as has been supposed on the revival of learning in western Europe. The crusades had already brought the Greeks and Westerns together, and the rule of the Franks at Constantinople and in the Levant had rendered the contact closer. Greeks and Latins had keenly discussed the dogmas which divided the Eastern and Western Churches; some Greeks had adopted the Latin faith or had endeavoured to reconcile the two communions, some had attained preferment in the Roman Church. Many had become connected by marriage or other ties with the Italian nobles who ruled in the Aegean or the Heptanesos, and circumstances led them to settle in Italy. Of the writers who thus found their way to the West before the taking of Constantinople the most prominent were Leon or Leontios Pilatos, Georgius Gemistus, or Pletho, Manuel and John Chrysoloras, Theodore Gazes, George of Trebizond and Cardinal Bessarion.

The Ottoman conquest had reduced the Christian races in the plains to a condition of serfdom, but the spirit of liberty continued to breathe in the mountains, where groups Kkphtk ° f . des P erate men > the Klephts and the Haiduks, poetry. maintained the struggle against alien tyranny. The adventurous and romantic life of these champions of freedom, spent amid the noblest solitudes of nature and often tinged with the deepest tragedy, naturally produced a poetry of its own, fresh, spontaneous and entirely indigenous. The Klephtic ballads, all anonymous and composed in the languag6 of the people, are unquestionably the best and most genuine Greek poetry of this epoch. They breathe the aroma of the forests and mountains; like the early rhapsodies of antiquity, which peopled nature with a thousand forms, they lend a voice to the trees, the rocks, the rivers and to the mountains themselves, which sing the prowess of the Klepht, bewail his death and comfort his disconsolate wife or mother. Olympia boasts to

Ossa that the footstep of the Turk has never desecrated its valleys; the standard of freedom floats over its springs; there is a Klepht beneath every tree of its forests; an eagle sits on its summit with the head of a warrior in its talons. The dying Klepht bids his companions make him a large and lofty tomb that he may stand therein and load his musket: " Make a window in the side that the swallows may tell me that spring has come, that the nightingales may sing me the approach of flowery May." The wounded Vervos is addressed by his horse: " Rise, my master, let us go and find our comrades." " My bay horse, I cannot rise; I am dying: dig me a tomb with thy silver-shod hoof; take me in thy teeth and lay me therein. Bear my arms to my companions and this handkerchief to my beloved, that she may see it and lament me." Another type of the popular poetry is presented by the folk-songs of the Aegean islanders and the maritime population of the Asiatic coast. In many of the former the influence of the Frankish conquest is apparent. Traces of the ancient mythology are often to be found in the popular songs. Death is commonly personified by Charon, who struggles with his victim; Charon is sometimes worsted, but as a rule he triumphs in the conflict.

In Crete, which for nearly two centuries after the fall of Constantinople remained under Venetian rule, a school of Greek poetry arose strongly impressed with Italian influences. The language employed is the dialect of the Candiotes, pZfs? with its large admixture of Venetian words. The first product of this somewhat hybrid literature was Erotocritos, an epic poem in five cantos, which relates the love story of Arete, daughter of Hercules, king of Athens, and Erotocritos, the son of his minister. The poem presents an interesting picture of Greece under the feudal Frankish princes, though professing to describe an episode of the classical epoch; notwithstanding some tedious passages, it possesses considerable merit and contains some charming scenes. The metre is the rhymed alexandrine. Of the author, Vicence Cornaro, who lived in the middle or end of the 16th century, little is known; he probably belonged to the ducal family of that name, from which Tasso was descended. The second poem is the Erophile of George Chortakis, a Cretan, also written in the Candiote dialect. It is a tragic drama, the scene of which is laid in Egypt. The dialogue is poor, but there are some fine choral interludes, which perhaps are by a different hand. Chortakis, who was brought up at Retimo, lived at the end of the 16th and beginning of the 17th centuries. The third Cretan poem worthy of notice is the Shepherdess, a charming and graceful idyll written by Nicolas Drimyticos, a native of Apokorona, early in the 17th century. Other Cretan poets were J. Gregoropoulos and G. Melissinos (1500), who wrote epigrams, and Maroulos (1493), who endeavoured to write Pindaric odes.

Among the Greeks who were prominent in spreading a know- ledge of Greek in Europe after the fall of Constantinople were John Argyropulos,

Demetrius Chalcondyles, Con- stantine and John Lascaris and Marcus Musurus, a tM Cretan. These men wrote in the accepted literary after the language; in general, however, they were rather taitot employed about literature than engaged in producing c° astaa – it. They taught Greek; several of them wrote Greek °° P ”’ grammars; they transcribed and edited Greek classical writers, and they collected manuscripts. Their stores enriched the newly founded libraries of St Mark at Venice, of the Escorial, of the Vatican and of the National Library in Paris. But none of them accomplished much in literature strictly so called. The question which most deeply interested them was that of the rival merits of the Platonic and Aristotelian philosophies, over which a controversy of extraordinary bitterness broke out towards the close of the 1 5th century. The dispute was in reality theological rather than philosophical; the cause of Plato was championed by the advocates of a union between the Eastern and Western Churches, that of Aristotle was upheld by the opposing party, and all the fury of the old Byzantine dogmatic controversies was revived. The patriarch, George Kurtesios or Gennadius, whom Mahommed II. had appointed after the capture of

Constantinople, wrote a treatise in favour of Aristotle and ex-communicated Gemistus Pletho, the principal writer among the Platonists. On the other hand, George of Trebizond, who attacked Pletho with unmeasured virulence, was compelled to resign his post of secretary to Pope Nicholas V. and was imprisoned by Pope Paul I. Scholarship was not wholly extinct in Greece or among the Greeks for a considerable time after the Turkish conquest. Arsenius, who succeeded Musurus as bishop of Monemvasia (15 10), wrote commentaries on Aristophanes and Euripides; his father, Apostoles, made a collection of Greek proverbs. Aemilius Portos, a Cretan, and Leo Allatios (1600- 1650) of Chios edited a number of works of the classical and later periods with commentaries and translations; Allatios also wrote Greek verses showing skill and cleverness. Constan- tine Rhodokanakes, physician to Charles II. of England, wrote verses on the return of that monarch to England. About the time of the fall of Constantinople we meet with some versifiers who wrote poems in the spoken dialect on historical subjects; among these were Papaspondylos Zotikos (1444), Georgilas Limenitis (1450-1500) and Jacobos Trivoles (beginning of the 16th century); their poems have little merit, but are interesting as specimens of the popular language of the day and as illustrating the manners and ideas of contemporary Greeks.

Among the prose writers of the 16th century were a number of chroniclers. At the end of the 15th, Kritobulos of Imbros, who had been private secretary of Mahommed II., works." wrote the history of his master, Emmanuel Melaxos a history of the patriarchate, and Phranzes a history of the Palaeologi. Theodosius Zygomalas (1580) wrote a history of Constantinople from 1391 to 1578. In the 17th century Demetrius Cantemir, a Moldavian by birth, wrote a history of the Ottoman empire, and G. Kontares tales of ancient Athens. Others composed chronicles of Cyprus and Crete, narratives of travels and biographies of saints. Most of these works are written in the literary language, the study of which was kept alive by the patriarchate and the schools which it maintained at Constantinople and elsewhere. Various theo- logical and philosophical works, grammars and dictionaries were written during this period, but elegant literature practically disappears. 1

A literary revival followed in the 18th century, the precursor of the national uprising which resulted in the independence of Greece. The efforts of the great Phanariote families J 6 at Constantinople, the educational zeal of the higher*

revival. Greek clergy and the munificence of wealthy Greeks in the provinces, chiefly merchants who had acquired fortunes by commerce, combined to promote the spread of education among a people always eager for instruction. The Turks, indifferent to educational matters, failed to discern the significance of the movement. Schools were established in every important Greek town, and school-books and translations from Western languages issued from the presses of Venice, Triest, Vienna and other cities where the Greeks possessed colonies. Young men completed their studies in the Western universities and returned to the East as the missionaries of modern civiliza- tion. For the greater part of the 18th century the literature was mainly theological. Notable theological writers of this epoch were Elias Miniates, an elegant preacher, whose sermons are written in the popular language, and Meletios of Iannina, metropolitan of Athens, whose principal works were an ecclesi- astical history, written in ancient Greek, and a descriptive geography of Greece in the modern language, composed, like the work of Pausanias, after a series of tours.- The works of two distinguished prelates, both natives of Corfu and both ardent partisans of Russia, Nikephoros Theotokes (1731 ?-i8oo) and Eugenios Bulgares (1715-1806), mark the beginning of the national and literary renaissance. ' They wrote much in defence 1 The patriarch Cyrillos Lucares (1572-1638), who had studied for a time in England and whose sympathies with Protestantism made him many enemies, established a Greek printing-press at Constanti- nople, from which he had the temerity to issue a work condemning the faith of Mahomet; he was denounced to the Turks by the Jesuits, and his printing-press was suppressed.

of Greek orthodoxy against Latin heresy. Theotokes, famous as a preacher, wrote, besides theological and controversial works, treatises on mathematics, geography and physics. Bulgares was a most prolific author; he wrote numerous translations and works on theology, archaeology, philosophy, mathematics, physics and astronomy; he translated the Aeneid and Georgics of Virgil into Homeric verse at the request of Catherine II. His writings exercised a considerable influence over his contem- poraries.

The poets of the earlier period of the Greek revival were Constantinos Rhigas (q.v.), the Alcman of the revolutionary movement, whose songs fired the spirit of his fellow- countrymen; Christopoulos (1772-1847), a Phanariote, Jl oe ˆ of k who wrote some charming Anacreontics, and Jacobos revival. Rizos Neroulos (1778-1850), also a Phanariote, author of tragedies, comedies and lyrics, and of a work in French on modern Greek literature. They are followed in the epoch of Greek independence by the brothers Panagiotes and Alexander Soutzos (1800-1868 and 1803-1863) and Alexander Rhizos Rhangabes (Rhankaves, 1810-1892), all three Phanariotes. Both Soutzos had a rich command of musical language, were highly ideal in their conceptions, strongly patriotic and possessed an ardent love of liberty. Both imitated to some extent Byron, Lamartine and Beranger; they tried various forms of poetry, but the genius of Panagiotes was essentially lyrical, that of Alexander satirical. The other great poet of the Greek revival, Alexander Rizos Rhangabe, was a writer with a fine poetic feeling, exquisite diction and singular beauty and purity of thought and sentiment. Besides numerous odes, hymns, ballads, narrative poems, tragedies and comedies, he wrote several prose works, including a history of ancient Greece, a history of modern Greek literature, several novels and works on ancient art and archaeology. Among the numerous dramatic works of this time may be mentioned the Mapta Aoˆnrarpfj of Demetrios Bernardakes, a Cretan, the scene of which is laid in the Morea at the time of the crusades.

In prose composition, as in poetry, the national revival was marked by an abundant output. Among the historians the greatest is Spiridon Trikoupis, whose History of the Prose Revolution is a monumental work. It is distinguished writers by beauty of style, clearness of exposition and an of the impartiality which is all the more remarkable as the revva – author played a leading part in the events which he narrates. Almost all the chiefs of the revolutionary movement left their memoirs; even Kolokotrones, who was illiterate, dictated his recollections. John Philemon, of Constantinople, wrote a history of the revolution in six volumes. He was an ardent partisan of Russia, and as such was opposed to Trikoupis, who was attached to the English party. K. Paparrhegopoulos's History of the Greek Nation is especially valuable in regard to the later periods; in regard to the earlier he largely follows Gibbon and Grote. With him may be mentioned

Moustoxides of Corfu, who wrote on Greek history and literature; Sakellarios, who dealt with the topography and history of Cyprus; N. Dragoumes, whose historical memoirs treat of the period which followed the revolution; K. Assopios, who wrote on Greek literature and history. In theology Oeconomos fills the place occupied by Miniates in the 1 7 th century as a great preacher. Kontogones is well known by his History of Patristic Literature of the First Three Centuries and his Ecclesiastical History, and Philotheos Bryennios, bishop of Serres, by his elaborate edition of Clemens Romanus. Kastorches wrote well on Latin literature. Great literary activity in the domains of law, political economy, mathematics, the physical sciences and archaeology displayed itself in the generation after the establishment of the Greek kingdom. But the writer who at the time of the national revival not only exercised the greatest influence over his contemporaries but even to a large extent shaped the future course caraSs of Greek literature was Adamantios Coraes (Korais) of Chios. This remarkable man, who devoted his life to philological studies, was at the same time an ardent patriot, and in the prolegomena to his numerous editions of the classical

writers, written in Greek or French, he strove to awake the interest of his countrymen in the past glories of their race or administered to them sage counsels, at the same time addressing ardent appeals to civilized Europe on their behalf. The great importance of Coraes, however, lies in the fact that he was practically the founder of the modern literary language.

In contemporary Greek literature two distinct forms of the modern language present themselves — the vernacular (ˆ The KaJBonCKovfikvri) and the purified (17 KaBapevovaa).

modem The former is the oral language, spoken by the whole literary Greek world, with local dialectic variations; the language. i atter jg based on the Greek of the Hellenistic writers, modified, but not essentially altered, in successive ages by the popular speech. At the time of the War of Independence the enthusiasm of the Greeks and the Philhellenes was fired by the memory of an illustrious past, and at its close a classical reaction followed: the ancient nomenclature was introduced in every department of the new state, towns and districts received their former names, and children were christened after Greek heroes and philosophers instead of the Christian saints. In the literary revival which attended the national

movement, two schools of writers made their appearance — the purists, who, rejecting the spoken idiom as degenerate and corrupt, aimed at the restoration of the classical language, and the vulgarists, who regarded the vernacular or " Romaic " as the' genuine and legitimate representative of the ancient tongue. A controversy which had existed in former times was thus revived, with the result that a state of confusion still prevails in the national literature. The classical scholar who is as yet unacquainted with modern Greek will find, in the pages of an ordinary periodical or newspaper, specimens of the conventional literary language, which he can read with ease side by side with poems or even prose in the vernacular which he will be altogether unable to interpret.

The vernacular ororal language is never taught, but is univers- ally spoken. It has been evolved from the ancient language by a natural and regular process, similar to that which Reforms nas produced the Romance languages from the Latin, Corses or tne R uss i an > Bulgarian and Servian from the old Slavonic. It has developed on parallel lines with the modern European languages, and in obedience to the same laws; like them, it might have grown into a literary language had any great writers arisen in the middle ages to do for it what Dante and his successors of the trecento did for Italian. But the effort to adapt it to the requirements of modern literature could hardly prove successful. In the first place, the national sentiment of the Greeks prompts them to imitate the classical writers, and so far as possible to appropriate their diction. The beauty and dignity of the ancient tongue possesses such an attraction for cultivated writers that they are led insensibly to adopt its forms and borrow from its wealth of phrase and idiom. In the next place, a certain literary tradition and usage has already been formed which cannot easily be broken down. For more than half a century the generally accepted written language, half modern half ancient, has been in use in the schools, the university, the parliament, the state departments and the pulpit, and its influence upon the speech of the more educated classes is already noticeable. It largely owes its present form- though a fixed standard is still lacking— to the influence and teaching of Coraes. As in the time of the decadence a koipi) Sii.\eKT0S stood midway between the classical language and the popular speech, so at the beginning of the 19th century there existed a common literary dialect, largely influenced by the vernacular, but retaining the characteristics of the old Hellenistic, from which it was derived by an unbroken literary tradition. This written language Coraes took as the basis of his reforms, purging it of foreign elements, preserving its classical remnants and enlarging its vocabulary with words borrowed from the ancient lexicon or, in case of need, invented in accordance with a fixed principle. He thus adopted a middle course, discounten- ancing alike the pedantry of the purists and the over-confident optimism of the vulgarists, who found in the

uncouth popular

speech all the material for a langue savante. The language which he thus endeavoured to shape and reconstruct is, of course, conventional and artificial. In course of time it will probably tend to approach the vernacular, while the latter will gradually be modified by the spread of education. The spoken and written languages, however, will always be separated by a wide interval.

Many of the best poets of modern Greece have written in the vernacular, which is best adapted for the natural and spontaneous expression of the feelings. Dionysios Solomos (1798- 1857), the greatest of them all, employed the dialect wr u ers of the Ionian Islands. Of his lyrics, which are full of in the poetic fire and inspiration, the most celebrated is his veraa – " Ode to Liberty." Other poets, of what may be cu,ar- described as the Ionic school, such as Andreas Kalvos (1796- 1869), Julius Typaldos (1814-1883), John Zampelios (1787-1856), and Gerasimos Markoras (b. 1826), followed his example in using the Heptanesian dialect. On the other hand, Georgios Terzetes (1806-1874), Aristotle Valaorites (1824-1879) and Gerasimos Mavrogiannes, though natives of the Ionian Islands, adopted in their lyrics the language of the Klephtic ballads — in other words, the vernacular of the Pindus range and the mountainous district of Epirus. This dialect had at least the advantage of being generally current throughout the mainland, while it derived distinction from the heroic exploits of the champions of Greek liberty. The poems of Valaorites, which are characterized by vivid imagination and grace of style, have made a deep impression on the nation. Other poets who largely employed the Epirotic dialect and drew their inspiration from the Klephtic songs were John Vilaras (1771-1823), George Zalokostas (1805-1857) in his lyric pieces, and Theodore Aphen- toules, a Cretan (d. 1893). With the poems of this group may be classed those of Demetrius Bikelas (b. 1835). The popular language has been generally adopted by the younger generation of poets, among whom may be mentioned Aristomenes Probelegios (b. 1850), George Bizyenos (1853-1896), George Drosines, Kostes Palamas (b. 1859), John Polemes, Argyres Ephthaliotes, and Jacob Polylas (d. 1896).

*Contemporary with the first-mentioned or Ionic group, there existed at Constantinople a school of poets who wrote in the accepted literary language, and whose writings serve as models for the later group which gathered at Athens Poe * ,a " after the emancipation of Greece. The literary i a f Be traditions founded by Alexander Rizos Rhangabes convew . (1810-1892) and the brothers Alexander and Panagiotis ˆ oaal Soutzos (1803-1863 and 1800-1868), who belonged aaguage ‘ to Phanariot families, were maintained in Athens by Spiridion Basiliades (1843-1874) Angelos Vlachos (b. 1838), John Kara- soutzas (1824-1873), Demetrios*

*Paparrhegopoulos (1843-1873), and Achilles Paraschos (b. 1838). The last, a poet of fine feeling, has also employed the popular language. In general the practice of versification in the conventional literary language has declined, though sedulously encouraged by the university of Athens, and fostered by annual poetic competitions with prizes provided by patriotic citizens. Greek lyric poetry during the first half of the century was mainly inspired by the patriotic sentiment aroused by the struggle for independence, but in the present generation it often shows a tendency towards the philosophic and contemplative mood under the influence of Western models. There has been an abundant production of dramatic literature in recent years. In succession to Alexander Rhangabes, John Zampelios and the two Soutzos, who belong to the past generation, Kleon Rhangabes, Angelos Vlachos, f, r f s ma " Demetrios Koromelas, Basiliades and Bernadakes trans- are the most prominent among modern dramatic lators and writers. Numerous translations of foreign master- &**• pieces have appeared, among which the metrical versions of Romeo and Juliet, Othello, King Lear, Hamlet, Macbeth and The Merchant of Venice, by Demetrios Bikelas, deserve mention as examples of artistic excellence. Goethe's Faust has been rendered into verse by Probelegios, and Hamlet, Antony and Cleopatra, Coriolanus and Julius Caesar, into prose by Damiroles.*

Fiction.

Among recent satirists, George Soures (b. 1853) occupies a unique position. He reviews social and political events in the 'Pcopfjos, a witty little newspaper written entirely in verse, which is read with delight by all classes of the population.

Almost' all the prose writers have employed the literary language. In historical research the Greeks continue to display much activity and erudition, but no great work Recent comparable to Spiridion Trikoupis's History of the writers. Revolution has appeared in the present generation. A history of the Greek nation from the earliest times to the present day, by Spiridion Lampros, and a general history of the 19th century by Karolides, have recently been published. The valuable MeTjjueia of Sathas, the / ieXtrtu Buf avrivijs laroplas of Spiridion Zampelios and Mavrogiannes's History of the Ionian Islands deserve special mention, as well as the essays of Bikelas, which treat of the Byzantine and modern epochs of Greek history. Some of the last-named were translated into English by the late marquis of Bute. Among the writers on jurisprudence are Peter Paparrhegopoulos, Kalligas, Basileios Oekonomedes and Nikolaos Saripolos. Brailas-Armenes and John Skaltzounes, the latter an opponent of Darwin, have written philosophical works. The Ecclesiastical History of Diomedes Kyriakos and the Theological Treatises of Archbishop Latas should be noted. The best-known writers of philological works are Constantine Kontos, a strong advocate of literary purism, George Hatzidakes, Theodore Papademetrakopoulos and John Psichari; in archaeology, Stephen Koumanoudes, Panagiotes Kawadias and Christos Tsountas have won a recognized position among scholars. John Svoronos is a high authority on numismatics. The works of John Hatzidakes on mathematics, Anast. Christomanos on chemistry, and Demetrios Aeginetes on astronomy are well known.

The earlier works of fiction, written in the period succeeding the emancipation of Greece, were much affected by foreign influence. Modern Greece has not produced any great novelist. The Kpˆ riKoi ya/ML of Spiridion Zampelios, the scene of which is laid in Crete, and the Thanos Blechas of Kalligas are interesting, the former for accuracy of historical detail, the latter as a picture of peasant life in the mountains of Greece. Original novel writing has not been much cultivated, but translations of foreign romances abound. In later times the short story has come into vogue through the example of D. Bikelas, whose tales have acquired great popu- larity; one of them, Loukis Laras, has been translated into many languages. The example of Bikelas has been followed by Drosines Karkavitzas, Ephthaliotis, Xenopoulos and many others.

The most distinguished of the writers who adhere to the vernacular in prose

is John Psichari, professor of the Ecole des Prose Hautes Etudes in Paris. He is the recognized leader of

writers the vulgarists. Among the best known of his works in the ar e To raˆeldl nou, a narrative of a journey in Greek lands, Tovetpo rod Yi.avvipq, 'H ZovXta, and 6 Mayos. The tales of Karkavitzas and Ephthaliotis are also in the vernacular. Among the younger of M. Psichari's followers is M. Palli, who has recently published a translation of the Iliad. Owing to the limited resources of the popular language, the writers of this school are sometimes compelled to employ strange and little-known words borrowed from the various dialects. The vernacular has never been adopted by writers on scientific subjects, owing to its inherent unsuitability and the incongruity arising from the introduction of technical terms derived from the ancient language. Notwithstanding the zeal of its adherents, it seems unlikely to maintain its place in literature outside the domain of poetry; nor can any other result be expected, unless its advocates succeed 'u reforming the system of public instruc- tion in Greece.

Many periodicals are published at Athens, among which may be mentioned the Athena, edited by Constantine Kontos, the Ethnike Agoge, a continuation of the old Heslia, the Harmonia and the Ai&irXcuris twv valowv, an educational review. The Parnassos, the Archaeological Society and other

verna- cular.

*learned bodies issue annual or quarterly reports. The Greek journals are both numerous and widely read. They contain much clever writing, which is often marred by inac- curacy and a deficient sense of responsibility. Their **"*"" tendency to exaggerated patriotic sentiment sometimes journals. borders on the ludicrous. For many years the Nea Hemira of Trieste exerted a considerable influence over the Greek world, owing to the able political reviews of its editor, Anastasios Byzantios (d. 1898), a publicist of remarkable insight and*

judgment.

Authorities. — Constantine SathaSjNeoeXXTjvuc!) 01X0X07(0 (Athens, 1868); D. Bikelas, Ilepi veoeXXrjfucˆs ˆtXoXo-yias donifuov (London, 1871), reprinted in AmXe£«$ Kal diopSs (Athens. 1889) ; M. Konstantinides, Neo-hellenica (Dialogues in Modem Greek, with Appendix on the Cypriot Dialect) (London, 1892); Rhoi'des, To EW

For the Klephtic ballads and folk-songs: C. Fauriel, Chants populaires de la Grece moderne (Paris, 1824, 1826); Passow, Popu- laria carmina

Graeciae recentioris (Leipzig, i860) ; von Hahn, Griechische und albanesische Marchen (Leipzig, 1 864) ; TeapUris, AtavorpayovSa. (2nd ed., Athens, 1868); E. Legrand, Recueil de chansons populaires grecques (Paris, 1874) ; Recueil de contes populaires grecs (Paris, 1881); Paul de Lagarde, Neugriechisches aus Kleinasien (Gottingen, 1886); A. Jannaris, "Aap-ara Kpij-rucd (Kreta's Volks- lieder) (Leipzig, 1876); A. Sakellariou, Td Kra-piaxa (Athens, 1891); Za-Ypaeios 'Ay 6>p, published by the 'EXXˆikos tfˆoˆoj" 1 ˆ o-uXXo-yoj (Constantinople, 1891). Translations: L. Garnett, Greek Folksongs from the Turkish Provinces of Greece (London, 1885); E. M. Geldart, Folklore of Modern Greece (London, 1884). Lexicons: A. N. Jannaris, A Concise Dictionary of the English and Modern Greek Languages (English-Greek) (London, 1895); Byzantios (Skarlatos D.), Aelocoi/ rrjs 'EXXijcikˆs yXiioaris (Athens, 1895); A. Sakellario, Ae|«oc rijs "EXXˆi/cijs y\6iaai)s (5th ed., Athens, 1898); S. Koumanoudes, twayoiyi) vkiav Xlijeow (Athens, 1900). Grammars: Mitsotakes, Praktische Grammatik der neugriechischen Schrift- und Umgangssprache (Stuttgart, 1891); M. Gardner, A Practical Modern Greek Grammar (London, 1892) ; G. N. Hatzidakes, Einleitung in die neugriechische Grammatik (Leipzig, 1892); E. Vincent and T. G. Dickson, Handbook to Modern Greek (London, 1893); A. Thumb, Handbuch der neugriechischen Volkssprache (Strassburg, 1895); C. Wied, Die Kunst der neugriechischen Volkssprache durch Selbstunterricht schnell und leicht zu lernen (2nd ed., undated, Vienna) : A. N. Jannaris, Historical Greek Grammar (London, 1897). (J.D.B.)

GREEK RELIGION. The recent development of anthropo- logical science and of the comparative study of religions has enabled us at last to assign to ancient Greek religion its proper place in the classification of creeds and to appreciate its import- ance for the history of civilization. In spite of all the diversities of local cults we may find a general definition of the theological system of the Hellenic communities, and with sufficient accuracy may describe it as an anthropomorphic polytheism, preserving many traces of a pre-anthropomorphic period, unchecked by any exacting dogma or tradition of revelation, and therefore pliantly adapting itself to all the changing circumstance of the social and political history of the race, and easily able to assimilate alien ideas and forms. Such a religion, continuing in whole or in part throughout a period of at least 2000 years, was more capable of progress than others, possibly higher, that have crystallized at an early period into a fixed dogmatic type; and as, owing to its essential character, it could not be convulsed by any inner revolution that might obliterate the deposits of its earlier life, it was likely to preserve the imprints of the succes- sive ages of culture, and to reveal more clearly than any other testimony the evolution of the race from savagery to civilization. Hence it is that Greek religion appears to teem with incongruities, the

highest forms of religious life being often confronted with the most primitive. And for this reason the student of savage

anthropology and the student of the higher religions of the world are equally rewarded by its study.

Modern ethnology has arrived at the conviction that the Hellenic nation, like others that have played great parts in history, was the product of a blend of populations, the conquering tribes of Aryan descent coming from the north and settling among and upon certain pre-Hellenic Mediterranean stocks. The conclu- sion that is naturally drawn from this is that Hellenic religion is also the product of a blend of early Aryan or Indo-Germanic beliefs with the cult-ideas and practices of the Mediterranean area that were from of old indigenous in the lands which the later invaders conquered. But to disentangle these two com- ponent parts of the whole, which might seem to be the first problem for the history of the development of this religion, is by no means an easy task; we may advance further towards its solution, when the mysterious pre-Hellenic Mediterranean language or group of languages, of which traces remain in Hellenic place-names, and which may be lying uninterpreted on the brick-tablets of the palace of Cnossus, has found its interpreter. For the first question is naturally one of language. But the comparative study of the Indo-European speech-group, great as its philological triumphs have been, has been meagre in its contributions to our positive knowledge of the original belief of the primitive stock. It is not possible .to reconstruct a common Indo-European religion. The greater part of the separate Aryan cult-systems may have developed after the diffusion and may have been the result of contact in prehistoric days with non-Aryan peoples. And many old religious etymo-logical equations, such as Ovpavos = Sanskrit Varuna, 'Ep/nijs = Sarameyas, Athena = Ahana, were uncritically made and have been abandoned. The chief fact that philology has revealed concerning the religious vocabulary of the Aryan peoples is that many of them are found to have designated a high god by a word derived from a root meaning " bright," and which appears in Zeus, Jupiter, Sanskrit Dyaus. This is important enough, but we should not exaggerate its importance, nor draw the unwarranted inference that therefore the primitive Indo- Europeans worshipped one supreme God, the Sky-Father. Besides the word " Zeus," the only other names of the Hellenic pantheon that can be explained wholly or partly as words of Aryan formation are Poseidon, Demeter, Hestia, Dionysus (whose name and cult were derived from the Aryan stock of the Thraco-Phrygians) and probably Pan. But other names, such as Athena,

Ares, Apollo, Artemis, Hera, Hermes, have no discovered affinities with other Aryan speech-groups; and yet there is nothing suspiciously non-Aryan inthe formation of these words, and they may all have belonged to the earliest Hellenic- Aryan vocabulary. In regard to others, such as Rhea, Hephaestus and Aphrodite, it is somewhat more probable that they belonged to an older pre-Hellenic stock that survived in Crete and other islands, and here and there on the mainland; while we know that Zeus derived certain unintelligible titles in Cretan cult from the indigenous Eteo-cretan speech.

A minute consideration of a large mass of evidence justifies the conclusion that the main tribes of the Aryan Hellenes, pushing down from the north, already possessed certain deities in common such as Zeus, Poseidon and Apollo with whom they associated certain goddesses, and that they maintained the cult of Hestia or " Holy Hearth." Further, a comparison of the developed religions of the respective Aryan peoples suggests that they tended to give predominance to the male divinity, although we have equally good reason to assert that the cult of goddesses, and especially of the earth-goddess, is a genuinely " Aryan " product. But ˆwhen the tribes of this family poured into the Greek peninsula, it is probable that they would find in certain centres of a very ancient civilization, such as Argolis and Crete, the dominant cult of a female divinity. 1 The recent

1 This has often been explained as a result of Mutterrecht, or reckoning descent through the female : for reasons against this hypothesis see L. R. Farnell in Archiv fur vergleichende Religions- wissenschaft (1904); cf. A. J. Evans, " Mycenaean Tree and Pillar Cult," in Journ. of Hellenic Studies (1901).

excavations on the site of the Hera temple at Argos prove that a powerful goddess was worshipped here many centuries before it is probable that the Hellenic invader appeared. He may have even found the name Hera there, or may have brought it with him and applied it to the indigenous divinity. Again, we are certain that the great mother-goddess of Crete, discovered by Dr Arthur Evans, is the ancestress of Rhea and of the Greek " Mother of the gods ": and it is a reasonable conjecture that she accounts for many of the forms of Artemis and perhaps for Athena. But the evidence by no means warrants us in assuming as an axiom that wherever we find a dominant goddess-cult, as that of Demeter at Eleusis, we are confronted with a non- Hellenic religious phenomenon. The very name " Demeter " and the study of other Aryan religions prove the prominence of the worship of the earth-goddess in our own family of the nations. Finally, we must reckon with the possibility that the other great nations which fringed the Mediterranean, Hittite, Semitic and Egyptian peoples, left their impress on early Greek religion, although former scholars may have made rash use of

this hypothesis. 2

Recognizing then the great perplexity of these problems concerning the ethnic origins of Hellenic religion, we may at least reduce the tangle of facts to some order by . . . distinguishing its lower from its higher forms, and thus provide the material for some theory of evolution. We may collect, and sift the phenomena that remain over from a pre-anthropomorphic period, the imprints of a savage past, the beliefs and practices that belong to the animistic or even the pre-animistic period, fetishism, the worship of animals, human sacrifice. We shall at once be struck with the contrast between such civilized cults as those of Zeus, Athena, Apollo, high personal divinities to whom the attributes of a progressive morality could be attached, and practices that long survived in backward communities, such as the Arcadian worship of the thunder and the winds, the cult of Zeus KepavvSs " the thunder " at Mantinea and Zeus KainrcoTas in Laconia, who is none other than the mysterious meteoric stone that falls from heaven. These are examples of a religious view in which certain natural pheno- mena or objects are regarded as mysteriously divine or sacred in their own right and a personal divinity has not yet emerged or been separated from them. A noteworthy product of primitive animistic feeling is the universally prevalent cult of Hestia, who is originally " Holy Hearth " pure and simple, and who even under the developed polytheism, in which she played no small part, was never established as a separate anthropomorphic personage.

The animistic belief that certain material objects can be charged with a divine potency or spirit gives rise to fetishism, a term which properly denotes the worshipful or superstitious use of objects made by art and invested & ˆ with mysterious power, so as to be used like amulets for the purposes of protective magic or for higher purposes of communion with the divinity. From the earliest discoverable period down to the present day fetishism has been a powerful factor in the religion of the Graeco-Roman world. The import- ance of the sacred stone and pillar in the " Mycenaean " or " Minoan " period which preceded Homer has been impressively shown by Dr Arthur Evans, and the same fetishistic worship continued throughout the historic ages of classic paganism, the rude aniconic emblem of pillar or tree-trunk surviving often by the side of the iconic masterpiece. It is a reasonable con- jecture that the earliest anthropomorphic images of divinities, which were beginning to make their appearance by the time of Homer, were themselves evolved by slow transformation from the upright sacred column. And the altar itself may have arisen as another form of this; the simple heap of stones, such

2 V. BeYard has recently revived the discredited theory of a prevalent Phoenician influence in his ingenious but uncritical work, L'Origine des

cultes arcadiens. M. P. Foucart believes in very early borrowing from Egypt, as explaining much in the religion of Demeter and Dionysus; see Les Grands Mysteres d'ltleusis and Le Culte de Dionysos en Attiqtie.

as those erected to Hermes by the way-side and called 'Ep/jcuoi X60oi, may have served both as a place of worship and as an agalrfia that could attract and absorb a divine potency into itself. Hence the fetishistic power of the altar was fully recognized in Greek ritual, and hence also in the cult of Apollo Agyieus the god and the altar are called by the same name.

It has been supposed that the ancestors of the historic Greeks, before they were habituated to conceive of their divinities as in human form, may have been accustomed to invest them with animal attributes and traits. We must not indeed suppose it to be a general law of religious evolution that " theriomorphism " must always precede anthropomorphism and that the latter transcends and obliterates the former. The two systems can exist side by side, and savages of low religious development can conceive of their deities as assuming at one time human, at another bestial, shape. Now the developed Greek religion was devotedly anthropomorphic, and herein lay its strength and its weakness; nevertheless, the advanced Hellene could imagine his Dionysus entering temporarily into the body of the sacrificial bull or goat, and the men of Phigalia in Arcadia were attached to their horse-headed Demeter, and the primitive Laconians possibly to a ram-headed Apollo. Theriolatry in itself, i.e. the worship of certain animals as of divine power in their own right, apart from any association with higher divinities, can scarcely be traced among the Greek communities at any period. They are not found to have paid reverence to any species, though individual animals could acquire temporarily a divine character through communion with the altar or with the god. The wolf might at one time have been regarded as the incarnation of Apollo, the wolf-god, and here and there we find faint traces of a wolf-sacrifice and of offerings laid out for wolves. But the occasional propitiation of wild beasts may fall short of actual worship. The Athenian who slew a wolf might give it a sumptu- ous funeral, probably to avoid a blood-feud with the wolf's relatives, yet the Athenian state offered rewards for a wolf's head. Nor did any Greek individual or state worship flies as a class, although a small oblation might be thrown to the flies before the great sacrifice to Apollo on the Leucadian rock, to please them and to persuade them not to worry the worshippers at the great solemnity, where the reek of roast flesh would be likely to attract them.

Theriolatry suggests totemism; and though we now know that the former can arise and exist quite independently of the latter, recent anthropologists have interpreted the apparent sanctity or prestige of certain animals in parts of Greek mythology and religion as the deposit of an earlier totemistic system. But this interpretation, originated and maintained with great acumen by Andrew Lang and W. Robertson Smith, appears now somewhat hazardous; and as a scientific hypothesis there are many flaws in it. The more observant study of existing totem-tribes has weakened our impression of the importance of totemism as a primitive religious phenomenon. It is in reality more important as a social than as a religious factor. If indeed we choose to regard totemism as a mere system of nomenclature, by which a tribe names, itself after some animal or plant, then we might quote a few examples of Hellenic tribes totemistic in this sense. But totemism is a fact of importance only when it affects the tribal marriage laws or the tribal religion. And the tribal marriage laws of ancient Greece, so far as they are known, betray no clear mark of totemistic arrangements; nor does the totemism of contemporary savages appear to affect their, religion in any such way as to suggest a natural explanation for any of the peculiar phenomena of early Hellenic polytheism. Here and there we have traces of a snake-tribe in Greece, the 'Octets in Aetolia, the '04 > ioyeveis in Cyprus and Parium, but we are not told that these worshipped the snake, though the latter clan were on terms of intimacy with it. Where the snake was actually worshipped in Hellenic cult — the cases are few and doubtful — it may have been regarded as the incarnation of the ancestor or as the avatar of the under-world divinity.

Totem- ism.

Finally, among the primitive or savage phenomena the practice of human sacrifice looms large. Encouraged at one time by the Delphic oracle, it was becoming rare and repellent to the conscience by the 6th century B.C.; Human but it was not wholly extinct in the Greek world even tice- by the time of Porphyry. The facts are very complex and need critical handling, and a satisfying scientific explanation of them all is still to be sought.

We can now observe the higher aspects of the advanced polytheism. And at the outset we must distinguish between mythology and religion strictly understood, between the stories about the divinities and the private or public religious service. No doubt the former are often a reflection of the latter, in many cases being suggested by the ritual which they may have been invented to interpret, and often envisaging important cult-ideas. Such for example are the myths about the purification and trial of Orestes, Theseus, Ixion, the story of Demeter's sorrow, of the sufferings and triumph of Dionysus, and those about the abolition of human sacrifice. Yet Greek mythology as a whole was irre- sponsible, without reserve, and unchecked

by dogma or sacerdotal prohibition; and frequently it sank below the level of the current religion, which was almost free from the " impurities which shock the modern reader of Hellenic myths. Nor again did any one feel himself called upon to believe any particular myth; in fact, faith, understood in the sense in which the term is used in Christian theology, as the will to believe certain dogmatic statements about the nature and action of divinity, is a concept which was neither named nor recognized in Hellenic ethics or religious doctrine; only, if a man proclaimed his disbelief in the existence of the gods and refused to join in the ritual of the community, he would become " suspect," and might at times be persecuted by his fellows. Greek religion was not so much an affair of doctrine as of ritual, religious formulae of which the cult-titles of the divinities were an im- portant component, and prayer; and the most illuminative sources of our knowledge of it are the ritual-inscriptions and other state-documents, the private dedications, the monuments of religious art and certain passages in the literature, philology and archaeology being equally necessary to the equipment of the student.

*We are tempted to turn to Homer as the earliest authority. And though Homer is not primitive and does not present even an approximately complete account of Greek religion, we can gather from his poems a picture of an advanced JM«*m» polytheism which in form and structure at least is Homer. that which was presented to the world of Aeschylus. We discern a pantheon already to some extent systematized, a certain hierarchy and family of divinities in which the supremacy of Zeus is established as incontestable. And the anthropomorphic impulse, the strongest trend in the Greek religious imagination, which filled the later world with fictitious personages, generating transparent shams such as an Ampi- dromus for the ritual of the Ampidromia, Amphiction for the Amphictiones, a hero Kepafxos for the gild of potters, is already at its height in the Homeric poems. The deities are already > clear-cut, individual personalities of distinct ethos, plastically shaped figures such as the later sculpture and painting could work upon, not vaguely conceived numina like the forms of the old Roman religion. Nor can we call them for the most part nature-deities like the personages of the Vedic system, thinly disguised " personifications " of natural phenomena. Athena is not the blue sky nor Apollo the sun; they are simply Athena and Apollo, divine personages with certain powers and character, as real for their people as Christ and the Virgin for Christendom. By the side of these, though generally in a subordinate position, we find that Homer recognized certain divinities that we may properly call nature-powers, such as Helios, Gaia and the river-deities, forms descending probably from a remote animistic period, but maintaining themselves within the popular religion till the end of Paganism. Again, though Homer may talk and think at times with levity and banalite*

about his deities, his deeper utterances impute an advanced morality to the supreme

God. His Zeus is on the whole a power of righteousness, dealing with men by a righteous law of nemesis, never being himself the author of evil — an idea revealed in the opening passage of the Odyssey — but protecting the good and punishing the wicked. Vengeance, indeed, was one of the attributes of divinity both for Homer and the average Greek of the later period, as it is in Judaic and Christian theology, though Plato and Euripides protested strongly against such a view. But the Homeric Zeus is equally a god of pity and mercy, and the man who neglects the prayers of the sorrowful and afflicted, who violates the sanctity of the suppliant and guest, or oppresses the poor or the wanderer, may look for divine punishment. Though not regarded as the physical author of the universe or the Creator, he is in a moral sense the father of gods and men. And though the sense of sin and the need of piacular sacrifice are expressed in the Homeric poems, the relations between gods and men that they reveal are on the whole genial and social; the deity sits unseen at the good man's festal sacrifice, and there is a simple apprehension of the idea of divine communion. There is also indeed a glimmering of the dark background of the nether world, and the chthonian powers that might send up the Erinys to fulfil the curse of the wronged. Yet on the whole the religious atmosphere is generally cheerful and bright; freer than that of the later ages from the taint of magic and superstition; nor is Homer troubled much about the life after death; he scarcely recognizes the cult of the dead, 1 and is not oppressed by fear of the ghost-world.

If we look now broadly over the salient facts of the Greek

public and private worship of the historic period we find much

in it that agrees with Homeric theology. His

The post- „ Olympian " system retains a certain life almost to

Homeric ,,,•»,. i • • • • ,

period. the end of Paganism, and it is a serious mistake to suppose that it had lost its hold upon the people of the 5th and 4th century B.C. We find it, indeed, enriched in the post- Homeric period with new figures of prestige and power ; Dionysus, of whom Homer had only faintly heard, becomes a high god with a worship full of promise for the future. Demeter and Kore,

the mother and the girl, whom Homer knew well enough but could not use for his epic purposes, attract the ardent affections and hopes of the people; and Asclepius, whom the old poet did not recognize as a god, wins a conspicuous place in the later shrines. But much that has been said of the Homeric may be said of the later classical theology. The deities remain anthropomorphic, and appear as clearly defined individuals. A certain hierarchy is recognized; Zeus is supreme, even in the city of Athena, but each of the higher divinities played many parts, and local enthusiasm could frustrate the depart- mental system of divine functions; certain members of the pantheon had a preference for the life of the fields, but as the polis emerged from the village communities, Demeter, Hermes, Artemis and others, the gods and goddesses of the husbandmen and shepherds, become powers of the council-chamber and the market-place. The moral ideas that we find in the Homeric religion are amply attested by cult-records of the later period. The deities are regarded on the whole as beneficent, though revengeful if wronged or neglected; the cult-titles used in prayer, which more than any other witnesses reveal the thought and wish of the worshipper, are nearly always euphemistic, the doubtful title of Demeter Erinys being possibly an exception. The important cults of Zeus 'iKetrws and n poarpoircuos, the suppliant's protecting deity, embody the ideas of pity and mercy that mark advanced religion; and many momentous steps in the development of morality and law were either suggested or assisted by the state-religion. For example,' the sanctity of the oath, the main source of the secular virtue of truthfulness, was originally a religious sanction, and though the Greek may have been prone to perjury, yet the Hellenic like the Hebraic religious ethics regarded it as a heinous sin. The sanctity of

1 This became very powerful from the 7th century onward, and there are reasons for supposing that it existed in the pre-Homeric, or Mycenaean, period; vide Rohde's Psyche (new edition), Tsountas and Manatt, The Mycenaean Age.

family duties, the sacredness of the life of the kinsman, were ideas fostered by early Hellenic religion before they generated principles of secular ethics. In the post-Homeric period, the development of the doctrine of purity, which was associated with the Apolline religion, combining with a growing dread of the ghost-world, stimulated and influenced in many important ways the evolution of the Greek law concerning homicide. 2 And the beginnings of international law and morality were rooted in religious sanctions and taboo. In fact, Greek state- life was indebted in manifold ways to Greek religion, and the study of the Greek oracles would alone supply sufficient testimony of this. In many cases the very origin of the state was religious, the earliest polis sometimes having arisen under the shadow of the temple.

Yet as Greek religion was always in the service of the state, and the priest a state-official, society was the reverse of theocratic. Secular advance, moral progress and the march of science, could never long be thwarted by religious tradition; on the contrary, speculative thought and artistic creation were con- sidered as attributes of divinity. We may say that the religion of Hellas penetrated the whole life of the people, but rather as a servant than as a master.

Distinct and apart from these public worships and those of the clan and family were the mystic cults of Eleusis, Andania and Samothrace, and the private services of the mystic brother- hoods. The latter were scattered broadcast over Hellas, and the influence of the former was strengthened and their significance intensified by the wave of mysticism that spread at first from the north from the beginning of the 7th century onwards, and derived its strength from the power of Dionysus and the Orphic brotherhoods. New ideals and hopes began to stir in the religious consciousness, and we find a strong Salvationist tendency, the promise of salvation relying on mystic communion with the deity. Also a new and vital principle is at work; Orphism is the only force in Greek religion of a clear apostolic purpose, for it broke the barriers of the old tribal and civic cults, and preached its message to bond and free, Hellene and barbarian.

•The later history of Greek paganism is mainly concerned with its gradual penetration by Oriental ideas and worships, and the results of this OeoKpaala are discerned in an ever increas- ing mysticism and a tendency towards monotheism. Obliterated as the old Hellenic religion appeared to be by Christianity, it nevertheless retained a certain life, though transformed, under the new creed to which it lent much of its hieratic organization and religious terminology. The indebtedness of Christianity to Hellenism is one of the most interesting problems of com- parative religion; and for an adequate estimate a minute knowledge of the ritual and the mystic cults of Hellas is one of the essential conditions.

Bibliography. — Older Authorities: A. Maury, Histoire des religions de la Grece antique (3 vols., 1 857-1 859) ; Welcker, Griechische Gotterlehre (3 vols., 1857-1863); Preller, Griechische Mythologie, 2 vols. (4th edition by C. Robert, 1887), all antiquated in regard to theory, but still of some value for collection of materials. Recent Literature — [a) General Treatises: O. Gruppe, " Griechische Mythologie und Religionsgeschichte " in I wan von M tiller's .ff andbuch der klassischen Altertumswissenschaft, v. 2. 2 (1902-1906); L. R. Farnell's Cults of the Greek States, 4 vols. (1896-1906, vol. 5, 1908) ; Miss Jane Harrison's Prolegomena to the Study of Greek Religion (ed. 1908) ; Chantepie de laSaussaye's Lehrbuch der Religions- geschichte (Greek section, 1904); {b) Special Works or Dissertations: articles in Roscher's Ausfiihrliches Lexikon der griechischen

und romischen Mythologie, and Pauly-Wissowa Encyklopadie (1894-) ; Immerwahr, Kulte und Mythen Arkadiens (1891); Wide, Lakonische Kulte (1893); de Visser, De Graetorum diis non referentibus speciem humanam (Leiden, 1900). Greek Ritual and Festivals— A. Mommsen, Feste der Stadt Athen (1898); P. Stengel, " Die griechischen Sacral- altertilmer " in Iwan von Mtiller's Handbuch, v. 3 (1898); W. H. D. Rouse, Greek Votive Offerings (1902). Greek Religious Thought and Speculation — L. Campbell's Religion in Greek Literature (1898); Ducharme, La Critique des traditions religieuses chez les Grecs des origines au temps de Plutarque (Paris, 1904). See also articles on individual deities, and cf. Roman Religion; Mysteries; Mithras. (L. R. F.)

2 See L. R. Farnell, Evolution of Religion (Hibbert Lectures, 1905). PP- I39-I52-

GREELEY, HORACE (1811-1872), American statesman and man of letters, was born at Amherst, New Hampshire, on the 3rd of February 181 1 . His parents were of Scottish-Irish descent, but the ancestors of both had been in New England for several generations. He was the third of seven children. His father, Zaccheus Greeley, owned a farm of 50 acres of stony, sterile land, from which a bare support was wrung. Horace was a feeble and precocious lad, taking little interest in the ordinary sports of childhood, learning to read before he was able to talk plainly, and the prodigy of the neighbourhood for accurate spelling. Before Horace was ten years old (1820), his father became bankrupt, his home was sold by the sheriff, and Zaccheus Greeley himself fled the state to escape arrest for debt. The family soon removed to West Haven, Vermont, where, all working together, they made a scanty living as day labourers. Horace from childhood desired to be a printer, and, when barely eleven years old, tried to be taken as an apprentice in an office at Whitehall, New York, but was rejected on account of his youth. After three years more with the family as a day labourer at West Haven, he succeeded, with his father's consent, in being apprenticed in the office of The Northern Spectator, at East Poultney, Vermont. Here he soon became a good workman, developed a passion for politics and especially for political statistics, came to be depended upon for more or less of the editing of the paper, and was a figure in the village debating society. He received only $40 a year, but he sent most of his money to his father. In June 1830 The Northern Spectator was suspended. Meantime his father had removed to a small tract of wild land in the dense forests of Western Pennsylvania, 30 m. from Erie. The released apprentice now visited his parents, and worked for a little time with them on the farm,

meanwhile seeking employment in various printing offices, and, when he got it, giving nearly all his earnings to his father. At last, with no further prospect of work nearer Lome, he started for New York. He travelled on foot and by canal-boat, entering New York in August 1831, with all his clothes in a bundle carried over his back with a stick, and with but $10 in his pocket. More than half of this sum was exhausted while he made vain efforts to find employment. Many refused to employ him, in the belief that he was a runaway apprentice, and his poor, ill-fitting apparel and rustic look were everywhere greatly against him. At last he found work on a 32mo New Testament, set in agate, double columns, with a middle column of notes in pearl. It was so difficult and so poorly paid that other printers had all abandoned it. He barely succeeded in making enough to pay his board bill, but he finished the task, and thus found subsequent employment easier to get.

In January 1833 Greeley formed a partnership with Francis V. Story, a fellow-workman. Their combined capital amounted to about $150. Procuring their type on credit, they opened a small office, and undertook the printing of the Morning Post, the first cheap paper published in New York. Its projector, Dr Horatio D. Shepard, meant to sell it for one cent, but under the arguments of Greeley he was persuaded to fix the price at two cents. The paper failed in less than three weeks, the printers losing only $50 or $60 by the experiment. They still had a Bank Note Reporter to print, and soon got the printing of a tri-weekly paper, the Constitutionalist, the organ of some lottery dealers. Within six months Story was drowned, but his brother-in-law, Jonas Winchester, took his place in the firm. Greeley was now asked by James Gordon Bennett to go into partnership with him in starting The Herald. He declined the venture, but recommended the partner whom Bennett subsequently took. On the 2nd of March 1834, Greeley and Winchester issued the first number of The New Yorker, a weekly literary and news paper, the firm then supposing itself to be worth about $3000. Of the first number they sold about 100 copies; of the second, nearly 200. There was an average increase for the next month of about 100 copies per week. The second volume began with a circulation of about 4550 copies, and with a loss on the first year's publication of $3000. The second year ended with 7000 subscribers and a further loss of $2000. By the end of the third year The New

Yorker had reached a circulation of 9500 copies, and had sustained a total loss of $7000. It was published seven years (until the 20th of September 1841), and was never profitable, but it was widely popular, and it gave Greeley, who was its sole editor, much prominence. On the 5th of July 1836 Greeley married Miss Mary Y. Cheney, a Connecticut school teacher, whom he had met in a Grahamite (vegetarian) boarding-house in New York.

During the publication of The New Yorker he added to the scanty income which the job printing brought him by supplying editorials to the short-lived Daily Whig and various other publica- tions. In 1838 he had gained such standing as a writer that he was selected by Thurlow Weed, William H. Seward, and other leaders of the Whig Party, for the editorship of a campaign paper entitled The Jeffersonian, published at Albany. He continued The New Yorker, and travelled between Albany and New York each week to edit the two papers. The Jeffersonian was a quiet and instructive rather than a vehement campaign sheet, and the Whigs believed that it had a great effect upon the elections of the next year. When, on the 2nd of May 1840, some time after the nomination by the Whig party of William Henry Harrison for the Presidency, Greeley began the publication of a new weekly campaign paper, The Log Cabin, it sprang at once into a great circulation; 40,000 copies of the first number were sold, and it finally rose to 80,000. It was considered a brilliant political success, but it was not profitable, and in September 1841 was merged in the Weekly Tribune. On the 3rd of April 1841, Greeley announced that on the following Saturday (April 10th) he would begin the publication of a daily newspaper of the same general principles, to be called The Tribune. He was now entirely without money. From a personal friend, James Cogges- hall, he borrowed $1000, on which capital and the editor's reputa- tion The Tribune was founded. It began with 500 subscribers. The first week's expenses were $525 and the receipts $92. By the end of the fourth week it had run up a circulation of 6000, and by the seventh reached 11,000, which was then the full capacity of its press. It was alert, cheerful and aggressive, was greatly helped by the attacks of rival papers, and promised success almost from the start.

From this time Greeley was popularly identified with The Tribune, and its share in the public discussion of the time is his history. It soon became moderately prosperous, and his assured income should have placed him beyond pecuniary worry. His income was long above $15,000 per year, frequently as much as $35,000 or more. But he lacked business thrift, inherited a disposition to endorse for his friends, and was often unable to distinguish between deserving applicants for aid and adventurers. He was thus frequently straitened, and, as his necessities pressed, he sold successive interests in his newspaper. At the outset he owned the whole of it. When it was already firmly established (in July 1841), he took in Thomas McElrath as an equal partner, upon the contribution of $2000 to the common fund. By the 1 st of January 1849 he had reduced his interest to 315 shares out of 100; by July 2nd, i860, to 15 shares; in 1868 he owned only 9; and in 1872, only 6. In 1867 the stock sold for $6500 per share, and his last sale was for $9600. He bought Wild lands, took stock in mining companies, desiccated egg companies, patent looms, photo-

lithographic companies, gave away pro- fusely/lent to plausible rascals, and was the ready prey of every new inventor who chanced to find him with money or with property that he could readily convert into money.

In September 1841 Greeley merged his weekly papers, The Log Cabin and The New Yorker, into The Weekly Tribune, which soon attained as wide circulation as its predecessors, and was much more profitable. It rose in a time of great political excite- ment to a total circulation of a quarter of a million, and it some- times had for successive years 140,000 to 150,000. For several years it was rarely much below 100,000. Its subscribers were found throughout all quarters of the northern half of the Union from Maine to Oregon, large packages going to remote districts beyond the Mississippi or Missouri, whose only connexion with the outside world was through a weekly or semi-weekly mail. The readers of this weekly paper acquired a personal affection foi

its editor, and he was thus for many years the American writer most widely known and most popular among the rural classes. The circulation of The Daily Tribune was never proportionately great — its advocacy of a protective tariff, prohibitory liquor legislation and other peculiarities, repelling a large support which it might otherwise have commanded in New York. It rose within a short time after its establishment to a circulation of 20,000, reached 50,000 and 60,000 during the Civil War, and thereafter ranged at from 30,000 to 45,000. After May 1845 a semi-weekly edition was also printed, which ultimately reached a steady circulation of from 15,000 to 25,000.

From the outset it was a cardinal principle with Greeley to hear all sides, and to extend a special hospitality to new ideas. In March 1842 The Tribune began to give one column daily to a discussion of the doctrines of Charles Fourier, contributed by Albert Brisbane. Gradually Greeley came to advocate some of these doctrines editorially. In 1846 he had a sharp discussion upon them with a former subordinate, Henry J. Raymond, then employed upon a rival journal. It continued through twelve articles on each side, and was subsequently published in book form. Greeley became personally interested in one of the Fourierite associations, the North American Phalanx, at Red Bank, N. J. (1843-1855), while the influence of his discussions doubtless led to or gave encouragement to other socialistic experiments, such as that at Brook Farm. When this was abandoned, its leader George Ripley, with one or two other members, sought employment from Greeley upon The Tribune. Greeley dissented from

many of Fourier's propositions, and in later years was careful to explain that the principle of association for the common good of working men and the elevation of labour was the chief feature which attracted him. Co-operation among working men he continued to urge throughout his life. In 1850 the Fox Sisters, on his wife's invitation, spent several weeks in his house. His attitude towards their "rappings" and "spiritual manifestations" was one of observation and inquiry; and in his Recollections he wrote concerning these manifestations: " That some of them are the result of juggle, collusion or trick I am confident; that others are not, I decidedly believe."

From boyhood he had believed in a protective tariff, and throughout his active life he was its most trenchant advocate and propagandist. Besides constantly urging it in the columns of The Tribune, he appeared as early as 1843 in a public debate on " The Grounds of Protection," with Samuel J. Tilden and Parke Godwin as his opponents. A series of popular essays on the subject were published over his own signature in The Tribune in 1869, and subsequently republished in book form, with a title-page describing protection to home industry as a system of national co-operation for the elevation of labour. He opposed woman suffrage on the ground that the majority of women did not want it and never would, and decfared that until woman' should " emancipate herself from the thraldom to etiquette," he " could not see how the ' woman's rights theory ' is ever to be anything more than a logically defensible abstraction." He aided practical efforts, however, for extend- ing the sphere of woman's employments. He opposed the theatres, and for a time refused to publish their advertisements. He held the most rigid views on the sanctity of marriage and against easy divorce, and vehemently defended them in con- troversies with Robert Dale Owen and others. He practised and pertinaciously advocated total abstinence from spirituous liquors, but did not regard prohibitory laws as always wise. He denounced the repudiation of state debts or the failure to pay interest on them. He was zealous for .Irish repeal, once held a place in the " Directory of the Friends of Ireland," and contributed liberally to its support. He used the occasion of Charles Dickens's first visit to America to urge international ' copyright, and was one of the few editors to avoid alike the flunkeyism with which Dickens was first received, and the ferocity with which he was assailed after the publication of his American Notes. On the occasion of Dickens's second visit to America, Greeley presided at the great banquet given him by the press of the country. He made the first elaborate reports

of popular scientific lectures by Louis Agassiz and other authori- ties. He gave ample hearing to the advocates of phonography and of phonographic spelling. He was one of the most conspicu- ous advocates of the Pacific railroads, and of many other internal improvements.

But it is as an anti-slavery leader, and as perhaps the chief agency in educating the mass of the Northern people to that opposition through legal forms to the extension of slavery which culminated in the election of Abraham Lincoln and the Civil War, that Greeley's main work was done. Incidents in it were his vehement opposition to the Mexican War as a scheme for more slavery territory, the assault made upon him in Washington by Congressman Albert Rust of Arkansas in 1856, an indict- ment in Virginia in the same year for circulating incendiary documents, perpetual denunciation of him in Southern news- papers and speeches, and the hostility of the Abolitionists, who regarded his course as too conservative. His anti-slavery work culminated in his appeal to President Lincoln, entitled " The Prayer of Twenty Millions," in which he urged " that all attempts to put down the rebellion and at the same time uphold its inciting cause " were preposterous and futile, and that " every hour of deference to slavery " was " an hour of added and deepened peril to the Union." President Lincoln in his reply said: " My paramount object is to save the Union, and not either to save or destroy slavery. . . . What I do about slavery and the coloured race, I do because I believe it helps to save this Union; and what I forbear, I forbear because I do not believe it would help to save the Union … I have here stated my purpose according to my views of official duty; and I intend no modification of my oft-expressed personal wish that all men everywhere could be free." Precisely one month after the date of this reply the Emancipation Proclamation was issued.

Greeley's political activity, first as a Whig, and then as one of the founders of the Republican party, was incessant; but he held few offices. In 1848-1849 he served a three months' term in Congress, filling a vacancy. He introduced the first bill for giving small tracts of government land free to actual settlers, and published an exposure of abuses in the allowance of mileage to members, which corrected the evil, but brought him much personal obloquy. In the National Republican Convention in i860, not being sent by the Republicans of his own state on account of his opposition to William Seward as a candidate, he was made a delegate for Oregon. His active hostility to Seward did much to prevent the success of that statesman, and to bring about instead the nomination of Abraham Lincoln. This was attributed by his opponents to personal motives, and a letter from Greeley to Seward, the publication of which he challenged, was produced, to show that in his struggling days he had been wounded at Seward's failure to offer him office. In 1861 he was a candidate for United States senator, his principal opponent being William M. Evarts. When it was clear that Evarts could not be elected, his supporters threw their votes for a third candidate, Ira Harris, who was thus chosen over Greeley by a small majority. At the o.utbreak of the war he favoured allowing the Southern states to secede, provided a majority of their people at a fair election

should so decide, declaring " that he hoped never to live in a Republic whereof one section was pinned to the other by bayonets." When the war began he urged the most vigorous prosecution of it. The " On to Richmond " appeal, which appeared day after day in The Tribune, was incorrectly attributed to him, and it did not wholly meet his approval; but after the defeat in the first battle of Bull Run he was widely blamed for it. In 1864 he urged negotiations for peace with representatives of the Southern Confederacy in Canada, and was sent by President Lincoln to confer with them. They were found to have no sufficient authority. In 1864 he was one of the Lincoln Presidential electors for New York. At the close of the war, contrary to the general feeling of his party, he Urged universal amnesty and impartial suffrage as the basis of reconstruction. In 1867 his friends again wished to elect him to the Senate of the United

States, and the indications were all in his favour. But he refused to be elected under any misapprehension of his attitude, and with what his friends thought unnecessary candour re-stated his obnoxious views on universal amnesty at length, just before the time for the election, with the certainty that this would pre- vent his success. Some months later he signed the bail bond of Jefferson Davis, and this provoked a torrent of public indigna- tion. He had written a popular history of the late war, the first volume having an immense sale and bringing him unusually large profits. The second was just issued, and the subscribers, in their anger, refused by thousands to receive it. An un- successful attempt was also made to expel him from the Union League Club of New York.

In 1867 he was a delegate-at -large to the convention for the revision of the state constitution, and in 1869 and 1870 he was the Republican candidate for controller of the state and member of Congress respectively, but in each case was defeated.

He was dissatisfied with General Grant's administration, and became its sharp critic. The discontent which he did much to develop ended in the organization of the Liberal Republican party, which held its National Convention at Cincinnati in 1872, and nominated Greeley for the presidency. For a time the tide of feeling ran strongly in his favour. It was first checked by the action of his life-long opponents, the Democrats, who also nominated him at their National Convention. He expected their support, on account of his attitude toward the South and hostility to Grant, but he thought it a mistake to give him their formal nomination. The event proved his wisdom. Many Republicans who had sympathized with his

criticisms of the administration, and with the declaration of principles adopted at the first convention, were repelled by the coalition. This feeling grew stronger until the election. His old party associates regarded him as a renegade, the Democrats gave him a half- hearted support. The tone of the canvass was one of unusual bitterness, amounting sometimes to actual ferocity. In August, on representations of the alarming state of the contest, he took the field in person, and made a series of campaign speeches, beginning in New England and extending throughout Pennsyl- vania, Ohio and Indiana, which aroused great enthusiasm, and were regarded at the time by both friends and opponents as the most brilliant continuous exhibition of varied intellectual power ever made by a candidate in a presidential canvass. General Grant received in the election 3,597,˚7˚ votes, Greeley 2,834,079. The only states Greeley carried were Georgia, Kentucky, Maryland, Missouri, Tennessee and Texas.

He had resigned his editorship of The Tribune immediately after the nomination; he now resumed it cheerfully; but it was soon apparent that his powers had been overstrained. For years he had suffered greatly from sleeplessness. During the intense excitement of the campaign the difficulty was increased. Returning from his campaign tour, he went immedi- ately to the bedside of his dying wife, and for some weeks had practically no sleep at all. This resulted in an inflammation of the upper membrane of the brain, delirium and death. He expired on the 29th of November 1872. His funeral was a simple but impressive public pageant. The body lay in state in the City Hall, where it was surrounded by crowds of many thousands. The ceremonies were attended by the President and Vice-President of the United States, the Chief-Justice of the Supreme Court, and a large number of eminent public men of both parties, who followed the hearse in a solemn procession, preceded by the mayor and other civic authorities, down Broadway. He had been the target of constant attack during his life, and his personal foibles, careless dress and mental eccentricities were the theme of endless ridicule. But his death revealed the high regard in which he was generally held as a leader of opinion and faithful public servant. " Our later Franklin " Whittier called him, and it is in some such light his countrymen remember him.

In 1851 Greeley visited Europe for the first time, serving as a juryman at the Crystal Palace Exhibition, appearing before a committee of the House of Commons on newspaper taxes,

and urging the repeal of the stamp duty on advertisements. In 1855 he made a second trip to Europe. In Paris he was arrested on the suit of a sculptor, whose statue had been injured in the New York World's Fair (of which he had been a director), and spent two days in Clichy, of which he gave an amusing account. In 1859 he visited California by the overland

route, and had numerous public receptions. In 1871 he visited Texas, and his trip through the southern country, where he had once been so hated, was an ovation. About 1852 he purchased a farm at Chappaqua, New York, where he afterwards habitually spent his Saturdays, and experimented in agriculture. He was in constant demand as a lecturer from 1843, when he made his first appearance on the platform, always drew large audiences, and, in spite of his bad management in money matters, received considerable sums, sometimes $6000 or $7000 for a single winter's lecturing. He was also much sought for as a con- tributor, over his own signature, to the weekly newspapers, and was sometimes largely paid for these articles. In religious faith he was from boyhood a Universalist, and for many years was a conspicuous member of the leading Universalist church in New York.

His published works are: Hints Toward Reforms (1850); Glances at Europe (1851); History of the Struggle for Slavery Extension (1856); Overland Journey to San Francisco (i860); The American Conflict (2 vols., 1864-1866); Recollections of a Busy Life (1868; new edition, with appendix containing an account of his later years, his argument with Robert Dale Owen on Marriage and Divorce, and Miscellanies, 1873); Essays on Political Economy (1870); and What. I know of Farming (1871). He also assisted his brother-in-law, John F. Cleveland, in editing A Political Text-book (i860), and supervised for many years the annual issues of The Whig Almanac and The Tribune Almanac, comprising extensive political statistics.

The best Lives of Greeley are those by James Parton (New York, 1855; new ed., Boston, 1872) and W. A. Linn (N.Y. 1903). Lives have also been written by L. U. Reavis (New York, 1872), and L. D. Ingersoll (Chicago, 1873); and there is a Memorial of Horace Greeley (New York, 1873). (W. R.)

GREELEY, a city and the county-seat of Weld county, Colorado, U.S.A., about 50 m. N. by E. of Denver. Pop. (1890) 2 39S; (JQO) 3° 2 3 (286 foreign-born); (1910) 8179. It is served by the Union Pacific and the Colorado & Southern railways. In 1908 a franchise was granted to the Denver & Greeley Electric railway. The city is the seat of the State Normal School of Colorado (1889). There are rich coal-fields near the city. The county is naturally arid and unproductive, and its agricultural importance is due to an elaborate system of irrigation. In Weld county had under irrigation 226,613 acres, repre-

senting an increase of 102-2% since 1889, and a much larger irrigated area than in any other county of the state. Irrigation ditches are supplied with water chiefly from the Cache la Poudre, Big Thompson and South

Platte rivers, near the foothills. The principal crops are potatoes, sugar beets, onions, cabbages and peas; in 1899 Weld county raised 2,821,285 bushels of potatoes on 23,195 acres (53% of the potato acreage for the entire state). The manufacture of beet sugar is a growing industry, a large factory having been established at Greeley in 1902. Beets are also grown as food for live stock, especially sheep. Peas, tomatoes, cabbages and onions are canned here. Greeley was founded in 1870 by Nathan Cook Meeker (1817- 1879), agricultural editor of the New York Tribune. With the support of Horace Greeley (in whose honour the town was named), he began in 1869 to advocate in The Tribune the founding of an agricultural colony in Colorado. Subsequently President Hayes appointed him Indian agent at White River, Colorado, and he was killed at what is now Meeker, Colorado, in an uprising of the Ute Indians. Under Meeker's scheme, which attracted mainly people from New England and New York state, most of whom were able to contribute at least a little capital, the Union Colony of Colorado was organized and chartered, and bought originally 11,000 acres of land, each member being entitled to buy from it one residence lot, one business lot, and a tract of farm land.

The funds thus acquired were, to a large extent, expended in making public improvements. A clause inserted in all deeds forbade the sale of intoxicating liquors on the land concerned, under pain of the reversion of such property to the colony. The initiation fees ($5) were used for the expenses of locating the colony, and the membership certificate fees ($150) were ex- pended in the construction of irrigating ditches, as was the money received from the sale of town lots, except about $13,000 invested in a school building (now the Meeker Building). Greeley was organized as a town in 187 1, and was chartered as a city of the second class in 1886. The "Union Colony of Colorado" still exists as an incorporated body and holds reversionary rights in streets, alleys and public grounds, and in all places " where intoxicating liquors are manufactured, sold or given away, as a beverage."

See Richard T. Ely, " A Study of a ' Decreed ' Town," Harper's Magazine-, vol. 106 (1902-1903), p. 390 sqq.

GREEN, ALEXANDER HENRY (1832-1896), English geolo- gist, son of the Rev. Thomas Sheldon Green, master of the Ashby Grammar School, was born at Maidstone on the 10th of October 1832. He was educated partly at his father's school, Ashby-de-la-Zouch, and afterwards at Gonville and Caius College, Cambridge, where he graduated as sixth wrangler in 1855

and was elected a fellow of his college. In 1861 he joined the Geological Survey of Great Britain,- and surveyed large areas of the midland counties, Derbyshire and Yorkshire. He wrote (wholly or in part) memoirs on the Geology of Banbury (1864), of Stockport (1866), of North Derbyshire (1869, 2nd ed. 1887), and of the Yorkshire Coal-field (1878). In 1874 he retired from the Geological Survey, having been appointed professor of geology in the Yorkshire College at Leeds; in 1885 he became also professor of mathematics, while for many years he held the lectureship on geology at the school of military engineering at Chatham. He was elected F.R.S. in 1886, and two years later was chosen professor of geology in the university of Oxford. His manual of Physical Geology (1876, 3rd ed. 1882) is an excellent book. He died at Boar's Hill, Oxford, on the 19th of August 1896.

A portrait of him, with brief memoir, was published in Proc. Yorksh. Geol. and Polytechnic Soc. xiii. 232.

GREEN, DUFF (1 791-1875), American politician and journalist, was born in Woodford county, Kentucky, on the 15th of August 1791. He was a school teacher in his native state, served during the War of 181 2 in the Kentucky militia, and then settled in Missouri, where he worked as a schoolmaster and practised law. He was a member of the Missouri Constitutional Convention of 1820, and was elected to the state House of Representatives in 1820 and to the state Senate in 1822, serving one term in each house. Becoming interested in journalism, he purchased and for two years edited the St Louis Enquirer. In 1825 he bought and afterwards edited in Washington, D.C., The United States Telegraph, which soon became the principal organ of the Jackson men in opposition to the Adams administration. Upon Andrew Jackson's election to the presidency, the Telegraph became the principal mouthpiece of the administration, and received printing patronage estimated in value at $50,000 a year, while Green became one of the coterie of unofficial advisers of Jackson known as the " Kitchen Cabinet." In the quarrel between Jackson and John C. Calhoun, Green supported the latter, and through the columns of the Telegraph violently attacked the administration. In consequence, his paper was deprived of the government printing in the spring of 1831. Green, however, continued to edit it in the Calhoun interest until 1835, and gave vigorous support to that leader's nullification views. From 1835 to 1838 he edited The Reformation, a radically partisan publica- tion, devoted to free trade and the extreme states' rights theory.. In 1841-1843 he was in Europe on behalf of the Tyler administra- . tion, and he is said to have been instrumental in causing the appointment of Lord Ashburton to negotiate in Washington concerning the boundary dispute between Maine and Canada. In January 1843 Green established in New York City a short-lived journal, The Republic, to combat the spoils system and to advocate

free trade. In September 1844 Calhoun, then secretary of state, sent Green to Texas ostensibly as consul at Galveston,

but actually, it appears, to report to the administration, then considering the question of the annexation of Texas, concerning the political situation in Texas and Mexico. After the close of the war with Mexico Green was sent to that country in 1849 by President Taylor to negotiate concerning the moneys which, by the treaty of Guadalupe Hidalgo, the United States had agreed to pay; and he saved his country a considerable sum by arranging for payment in exchange instead of in specie. Subse- quently Green was engaged in railway building in Georgia and Alabama. On the 10th of June 1875 he died in Dalton, Georgia, a city which in 1848 he had helped to found.

GREEN, JOHN RICHARD (1837-1883), English historian, was born at Oxford on 12th December 1837, and educated at Magdalen College School and at Jesus College, where he obtained an open scholarship. On leaving Oxford he took orders and became the incumbent of St Philip's, Stepney. His preaching was eloquent and able; he worked diligently among his poor parishioners and won their affection by his ready sympathy. Meanwhile he studied history in a scholarly fashion, and wrote much for the Saturday Review. Partly because his health was weak and partly because he ceased to agree with the teaching of the Church of England, he abandoned clerical life and devoted himself to history; in 1868 he took the post of librarian at Lambeth, but his health was already breaking down and he was attacked by consumption. His Short History of the English People (1874) at once attained extraordinary popularity, and was afterwards expanded in a work of four volumes (1877-1880). Green is pre-eminently a picturesque historian; he had a vivid imagination and a keen eye for colour. His chief aim was to depict the progressive life of the English people rather than to write a political history of the English state. In accomplishing this aim he worked up the results of wide reading into a series of brilliant pictures. While generally accurate in his statement of facts, and showing a firm grasp of the main tendency of a period, he often builds more on his authorities than is warranted by their words, and is apt to overlook points which would have forced him to modify his representations and lower the tone of his colours. From his animated pages thousands have learned to take pleasure in the history of their own people, but could scarcely learn to appreciate the complexity inherent in all historical movement. His style is extremely bright, but it lacks sobriety and presents some affectations. His later histories, The Making of England (1882) and The Conquest of England (1883), are more soberly written than his earlier books, and are valuable contributions to historical knowledge. Green died at Mentone on the 7th of March 1883. He was a singularly attrac- tive man, of wide intellectual sympathies and an enthusiastic temperament ; his good-humour

was unfailing and he was a brilliant talker; and his work was done with admirable courage in spite of ill-health. It is said that Mrs Humphry Ward's Robert Elsmere is largely a portrait of him. In 1877 Green married Miss Alice Stopford; and Mrs Green, besides writing a memoir of her husband, prefixed to the 1888 edition of his Short History, has herself done valuable work as an historian, particularly in her Henry II. in the " English Statesmen " series (1888), her Town Life in the 15th Century (1894), and The Making, of Ireland and Us Undoing (1908).

See the Letters of J. R. Green (1901), edited by Leslie Stephen.

(W. Hu.)

GREEN, MATTHEW (1696-1737), English poet, was born of Nonconformist parents. He had a post in the custom house, and the few anecdotes that have been preserved of him show him to have been as witty as his poems would lead one to expect. He died unmarried at his lodging in Nag's Head Court, Grace- church Street, in 1737. His Grotto, a poem on Queen Caroline's grotto at Richmond, was printed in 1732; and his chief poem, The Spleen, in 1737 with a preface by his friend Richard Glover. These and some other short poems were printed in Dodsley's collection (1748), and subsequently in various editions of the British poets. They were edited in 1796 with a preface by Dr Aikin and in 1883 by R. E. A. Willmott with the poems of Gray I and others. The Spleen is an epistle to Mr Cuthbert Jackson,

advocating cheerfulness, exercise and a quiet content as remedies. It is full of witty sayings. Thomas Gray said of it : "There is a profusion of wit everywhere; reading would have formed his judgment, and harmonized his verse, for even his wood-notes often break out into strains of real poetry and music."

GREEN, THOMAS HILL (1836-1882), English philosopher, the most typical English representative of the school of thought called Neo- Kantian, or Neo-Hegelian, was born on the 7th of April 1836 at Birkin, a village in the West Riding of Yorkshire, of which his father was rector. On the paternal side he was de- scended from Oliver Cromwell, whose honest, sturdy independence of character he seemed to have inherited. His education was conducted entirely at home until, at the age of fourteen, he entered Rugby, where he remained five years. In 1855 he became an undergraduate member of Balliol College, Oxford, of which society he was,

in i860, elected fellow. His life, hence- forth, was devoted to teaching (mainly philosophical) in the university — first as college tutor, afterwards, from 1878 until his death (at Oxford on the 26th of March 1882) as Whyte's Professor of Moral Philosophy. The lectures he delivered as professor form the substance of his two most important works, viz. the Pro- legomena to Ethics and the Lectures on the Principles of Political Obligation, which contain the whole of his positive constructive teaching. These works were not published until after his death, but Green's views were previously known indirectly through the Introduction to the standard edition of Hume's works by Green and T. H. Grose (d. 1906), fellow of Queen's College, in which the doctrine of the " English " or " empirical " philosophy was exhaustively examined.

Hume's empiricism, combined with a belief in biological evolution (derived from Herbert Spencer), was the chief feature in English thought during the third quarter of the 19th century. Green represents primarily the reaction against doctrines which, when carried out to their logical conclusion, not only " rendered all philosophy futile," but were fatal to practical life. By reducing the human mind to a series of unrelated atomic sensa- tions, this teaching destroyed the possibility of knowledge, and further, by representing man as a " being who is simply the result of natural forces," it made conduct, or any theory of conduct, unmeaning; for life in any human, intelligible sense implies a personal self which (1) knows what to do, (2) has power to do it. Green was thus driven, not theoretically, but as a practical necessity, to raise again the whole question of man in relation to nature. When (he held) we have discovered what man in him- self is, and what his relation to his environment, we shall then know his function — what he is fitted to do. In the light of this knowledge we shall be able to formulate the moral code, which, in turn, will serve as a criterion of actual civic and social institu- tions. These form, naturally and necessarily, the objective expression of moral ideas, and it is in some civic or social whole that the moral ideal must finally take concrete shape.

To ask "What is man?" is to ask "What is experience?" for experience means that of which I am conscious. The facts of consciousness are the only facts which, to begin with, we are justified in asserting to exist. On the other hand, they are valid evidence for whatever is necessary to their own explanation, i.e. for whatever is logically involved in them. Now the most striking characteristic of man, that in fact which marks him specially, as contrasted with other animals, is ˆ//-consciousness. The simplest mental act into which we can analyse the operations of the human mind — the act of sense-perception — is never merely a change, physical or psychical, but is the consciousness of a change. Human experience consists, not of processes in an animal organism, but of these processes recognized as such. That which we perceive is from the outset an apprehended fact— that is to

say, it cannot be analysed into isolated elements (so- called sensations) which, as such, are not constituents of con- sciousness at all, but exists from the first as a synthesis of relations in a consciousness which keeps distinct the " self " and the various elements of the " object," though holding all together in the unity of the act of perception. In other words, the whole mental structure we call knowledge consists, in its simplest equally with

its most complex constituents, of the " work of the mind." Locke and Hume held that the work of the mind was eo ipso unreal because it was " made by " man and not " given to " man. It thus represented a subjective creation, not an objective fact. But this consequence follows only upon the assumption that the work of the mind is arbitrary, an assumption shown to be un- justified by the results of exact science, with the distinction, universally recognized, which such science draws between truth and falsehood, between the real and " mere ideas." This (obviously valid) distinction logically involves the consequence that the object, or content, of knowledge, viz. reality, is an intelligible ideal reality, a system of thought relations, a spiritual cosmos. How is the existence of this ideal whole to be accounted for? Only by the existence of some " principle which renders all relations possible and is itself determined by none of them "; an eternal self-consciousness which knows in whole what we know in part. To God the world is, to man the world becomes. Human experience is God gradually made manifest. .

Carrying on the same analytical method into the special department of moral philosophy, Green held that ethics applies to the peculiar conditions of social life that investigation into man's nature which metaphysics began. The faculty employed in this further investigation is no " separate moral faculty," but that same reason which is the source of all our knowledge — ethical and other. Self-reflection gradually reveals to us human capacity, human function, with, consequently, human responsi- bility. It brings out into clear consciousness certain potentialities in the realization of which man's true good must consist. As the result of this analysis, combined with an investigation into the surroundings man lives in, a " content " — a moral code — becomes gradually evolved. Personal good is perceived to be realizable only by making actual the conceptions thus arrived at. So long as these remain potential or ideal, they form the motive of action; motive consisting always in the idea of some " end " or " good " which man presents to himself as an end in the attain- ment of which he would be satisfied, that is, in the realization of which he would find his true self. The determination to realize the self in some definite way constitutes an "act of will," which, as thus constituted, is neither arbitrary nor externally determined. For the motive which may be said to be its cause lies in the man himself, and the identification of the self with such a motive is a 5e//-

determination, which is at once both rational and free. The " freedom of man " is constituted, not by a supposed ability to do anything he may choose, but in the power to identify him- self with that true good which reason reveals to him as his true good. This good consists in the realization of personal character; hence the final good, i.e. the moral ideal, as a whole, can be realized only in some society of persons who, while remaining ends to themselves in the sense that their individuality is not lost but rendered more perfect, find this prefection attainable only when the separate individualities are integrated as part of a social whole. Society is as necessary to form persons as persons are to constitute society. Social union is the indispensable condition of the development of the special capacities of the individual members. Human self-perfection cannot be gained in isola- tion; it is attainable only in inter-relation with fellow-citizens in the social community.

The law of our being, so revealed, involves in its turn civic or political duties. Moral goodness cannot be limited to, still less constituted by, the cultivation of self-regarding virtues, but con- sists in the attempt to realize in practice that moral ideal which self-analysis has revealed to us as our ideal. From this fact arises the ground of political obligation, for the institutions of political or civic life are the concrete embodiment of moral ideas in terms of our day and generation. But, as society exists only for the proper development of persons, we have a criterion by which to test these institutions, viz. do they, or do they not, contribute to the development of moral character in the individual citizens ? It is obvious that the final moral ideal is not realized in any body of civic institutions actually existing, but the same analysis which demonstrates this deficiency points out the I direction which a true development will take. Hence arises the

conception of rights and duties which should be maintained by law, as opposed to those actually maintained; with the further consequence that it may become occasionally a moral duty to rebel against the state in the interest of the state itself, that is, in order better to subserve that end or function which constitutes the raison d'etre of the state. The state does not consist in any definite concrete organization formed once for all. It represents a " general will " which is a desire for a common good. Its basis is not a coercive authority imposed upon the citizens from without, but consists in the spiritual recognition, on the part of the citizens, of that which constitutes their true nature. " Will, not force, is the basis of the state."

Green's teaching was, directly and indirectly, the most potent philosophical influence in England during the last quarterof the 19th century, while his enthusiasm for a common citizenship, and his personal example in practical municipal life, inspired much of the effort made, in the years succeeding his death, to bring, the universities more into touch with the people, and to break down the rigour of class distinctions.

Of his philosophical doctrine proper, the most striking char- acteristic is Integration, as opposed to Disintegration, both in thought and in reality. " That which is " is a whole, not an aggregate ; an organic complex of parts, not a mechanical mass; a " whole " too not material but spiritual, a " world of thought-relations." On the critical side this teaching is now admittedly valid against the older empiricism, and the cogency of the reasoning by which his constructive theory is supported is generally recognized. Never- theless, Green's statement of his conclusions presents important difficulties. Even apart from the impossibility of conceiving a whole of relations which are relations and nothing else (this ob- jection is perhaps largely verbal), no explanation is given of the fact (obvious in experience) that the spiritual entities of which the Universe is composed appear material. Certain elements present themselves in feeling which seem stubbornly to resist any attempt to exolain them in. terms of thought. While, again, legitimately insisting upon personality as a fundamental constituent in any true theory of reality, the relation between human individualities and the divine Person is left vague and obscure; nor is it easy to see how the existence of several individualities — human or divine — ■ in one cosmos is theoretically possible. It is at the solution of these two questions that philosophy in the immediate future may be expected to work.

Green's most important treatise — the Prolegomena to Ethics— practically complete in manuscript at his death — was published in the year following, under the editorship of A. C. Bradley (4th ed., 1899). Shortly afterwards R. L. Nettleship's standard edition of his Works (exclusive of the Prolegomena) appeared in three volumes: vol. i. containing reprints of Green's criticism of Hume, Spencer, Lewes; vol. ii. Lectures on Kant, on Logic, on the Principles of Political Obligation; vol. iii. Miscellanies, preceded by a full Memoir by the Editor. The Principles of Political Obligation was afterwards published in separate form. A criticism of Neo-Hegelianism will be found in Andrew Seth (Pringle Pattison), Hegelianism and Person- ality. See also articles in Mind (January and April 1884) by A. J. Balfour and Henry Sidgwick, in the Academy (xxviii. 242 and xxv. 297) by S. Alexander, and in the Philosophical Review (vi., 1897) by S. S. Laurie; W. H. Fairbrother, Philosophy of T. H. Green (London and New York, 1896); D. G. Ritchie, The Principles of Stale Interference (London, 1891); H. Sidgwick, Lectures on the Philosophy of Kant (London, 1905) ;

J. H. Muirhead, The Service of the State: Four Lectures on the Political Teaching of T. H. Green (1908); A. W. Benn, English Rationalism in the XlXth Century (1906), vol. ii., pp. 401 foil. (W. H. F., X.)*

GREEN, VALENTINE (1739-1813), British engraver, was born at Halesowen. He was placed by his father in a solicitor's office at Evesham, where he remained for two years; but ulti- mately he decided, on his own responsibility, to abandon the legal profession and became a pupil of a line engraver at Worcester. In 1765 he migrated to London and began work as a mezzotint engraver, having taught himself the technicalities of this art, and quickly rose to a position in absolutely the front rank of British engravers. He became a member of the Incorporated Society of Artists in 1767, an associate-engraver of the Royal Academy in 1775, and for some forty years he followed his profession with the greatest success. The exclusive right of engraving and publishing plates from the pictures in the Diisseldorf gallery was ' granted him by the duke of Bavaria in 1789, but, after he had issued more than twenty of these plates, the siege of that city by the French put an end to this undertaking and caused him serious financial loss. From this cause, and through the failure of certain other speculations, he was reduced to poverty; and in consequence he took the post of keeper of the British Institution

in 1805, and continued in this office for the remainder of his life. During his career as an engraver he produced some four hundred plates after portraits by Reynolds, Romney, and other British artists, after the compositions of Benjamin West, and after pictures by Van Dyck, Rubens, Murillo, and other old masters. It is claimed for him that he was one of the first engravers to show how admirably mezzotint could be applied to the translation of pictorial compositions as well as portraits, but at the present time it is to his portraits that most attention is given by collectors. His engravings are distinguished by exceptional richness and subtlety of tone, and by very judicious management of relations of light and shade; and they have, almost without exception, notable freshness and grace of handling. See Valentine Green, by Alfred Whitman (London, 1902). GREEN, WILLIAM HENRY (1825-1900), American Hebrew scholar, was born in Groveville, near Bordentown, New Jersey, on the 27 th of January 1825. He was descended in the sixth generation from Jonathan Dickinson, first president of the College of New Jersey (now Princeton University), and his ancestors had been closely connected with the Presbyterian church. He graduated in 1840 from Lafayette College, where he was tutor in mathematics (1840-1842) and .adjunct professor (1843-1844). In 1846 he graduated from Princeton Theological Seminary, and was instructor in Hebrew there in 1 846-1 849. He was ordained in 1848 and was pastor of the Central Presbyterian church of Philadelphia in 1849-1851. From August 1851 until his death, in Princeton, New Jersey, on the 10th of

February 1900, he was professor of Biblical and Oriental Literature in Princeton Theological Seminary. From 1859 the title of his chair was Oriental and Old Testament Literature. In 1868 he refused the presidency of Princeton College; as senior professor he was long acting head of the Theological Seminary. He was a great Hebrew teacher: his Grammar of the Hebrew Language (1861, revised 1888) was a distinct improvement in method on Gesenius, Roediger, Ewald and Nordheimer. All his knowledge of Semitic languages he used in a " conservative Higher Criticism," which is maintained in the following works: The Pentateuch Vindicated from the Aspersions of Bishop Colenso (1863), Moses and the Prophets (1883), The Hebrew Feasts in their Relation to Recent Critical Hypotheses Concerning the Pentateuch (1885), The Unity of the Book of Genesis (1895), The Higher Criticism of the Pentateuch (1895), and A General Introduction to the Old Testament, vol.i. Canon (1898), vol. ii. Text (1899). He was the scholarly leader of the orthodox wing of the Presbyterian church in America, and was moderator of the General Assembly of 1891. Green was chair- man of the Old Testament committee of the Anglo-American Bible revision committee.

See the articles by John D. Davis in The Biblical World, new series, vol. xv., pp. 406-413 (Chicago, 1900), and The Presbyterian and Reformed Review, vol. xi. pp. 377-396 (Philadelphia, 1900).

GREENAWAY, KATE (1846-1901), English artist and book illustrator, was the daughter of John Greenaway, a well-known draughtsman and engraver on wood, and was born in London on the 17 th of March 1846. After a course of study at South Kensington, at " Heatherley's " life classes, and at the Slade School, Kate Greenaway began, in 1868, to exhibit water-colour drawings at the Dudley Gallery, London. Her more remarkable early work, however, consisted of Christmas cards, which, by reason of their quaint beauty of design and charm of draughts- manship, enjoyed an extraordinary vogue. Her subjects were, in the main, young girls, children, flowers, and landscape; and the air of artless simplicity, freshness, humour, and purity of these little works so appealed to public and artists alike that the enthusiastic welcome habitually accorded to them is to be attri- buted to something more than love of novelty. In the line she had struck out Kate Greenaway was encouraged by H. Stacy Marks, R.A., and she refused to listen to those friends who urged her to return to a more conventional manner. Thenceforward her illustrations for children (such as for Little Folks, 1873, et seq.) attracted much attention. In 1877 her drawings at the Dudley Gallery were sold for £54, and her Royal Academy picture for eighteen guineas; and in the same year she began to draw for the

Illustrated London News. In the year 1879 she produced Under the Window, of which 150,000 copies are said to have been sold, and of which French and German editions were also issued. Then followed The Birthday Book, Mother Goose, Little Ann, and other books for children which were appreciated not less by adults, and were to be found on sale in the bookshops of every capital in Europe and in the cities of America. The extraordinary success achieved by the young girl may be estimated by the amounts paid to her as her share of the profits: for Under the Window she received £1130; for The Birthday Book, £1250; for Mother Goose, £905; and for Little Ann, £567. These four books alone produced a clear return of £8000. " Toy-books " though they were, these little works created a revolution in illustration, and so were of real importance; they were loudly applauded by John Ruskin {Art of England and Fors Clavigera), by Ernest Chesneau and Arsene Alexandre in France, by Dr Muther in Germany, and by leading art-critics throughout the world. In 1890 Kate Greenaway was elected a member of the Royal Institute of Painters in Water Colours , and in 1 89 1 , 1 894 and 1898 she exhibited water-colour drawings, including illustrations for her books, at the gallery of the Fine Art Society (by which a re- presentative selection was exhibited in i902),wheretheysurprised the world by the infinite delicacy.tenderness, and grace which they displayed. A leading feature in Miss Greenaway's work was her revival of the delightfully quaint costume of the beginning of the 19th century; this lent humour to her fancy, and so captivated the public taste that it has been said, with poetic exaggeration, that " Kate Greenaway dressed the children of two continents."' Her drawings of children have been compared with Stothard's for g-ace and with Reynolds's for naturalness, and those of flowers with the work of van Huysum and Botticelli. From 1883 to 1897, with a break only in 1896, she issued a series of Kate Greenaway's Almanacs. Although she illustrated The Pied Piper of Hamelin and other works, the artist preferred to pro- vide her own text; the numerous verses which were found among her papers after her death prove that she might have added to her reputation with her pen. She had great charm of character, but was extremely shy of public notice, and not less modest in private life. She died at Hampstead on the 6th of November 1901. See the Life, by M. H. Spielmann and G. S. Layard (1905).

*/TIT TJ C *

GREENBACKS, a form of paper currency in the United States, so named from the green colour used on the backs of the notes. They are treasury notes, and were first issued by the government in 1862, " as a question of hard necessity " to provide for the expenses of the Civil War. The government, following the example of the banks, had suspended specie pay- ment. The new notes were therefore for the time being an inconvertible paper currency, and, since they were made legal tender, were really a form

of fiat money. The first act, providing for the issue of notes to the amount of $150,000,000, was that of the 25th February 1862; the acts of nth July 1862 and 3rd March 1863 each authorized further issues of $1 50,000,000. The notes soon depreciated in value, and at the lowest were worth only 35 cents on the dollar. The act of 12th April 1866 authorized the retirement of $10,000,000 of notes within six months and of $4,000,000 per month thereafter; this was dis- continued by act of 4 th February 1868. On 1st January 1879 specie payment was resumed, and the nominal amount of notes then stood at $346,681,000, which is still outstanding.

*The so-called Greenback party (also called the Independent, and the national party) first appeared in a presidential campaign in 1876 when its candidate, Peter Cooper, received 81,740 votes It advo- cated increasing the volume of greenbacks, forbidding bank issues and the paying in greenbacks of the principal of all government bonds not expressly payable in coin. In 1878 the party, by various ,-n S TR^\ < lf St ° Ver /.0«>.«»\vote8 and elected 14 Congressmen; and in 18S0 there was fusion with labour reformers and it cast 308 S78 C°™Ll OT ltS P r f lde o ntial candidate, Ji B. Weaver, and elected 8 r a nH g iH a ff en f – ♦ J" ^ **™ r candidate Benjamin F. Butler (also the candidate of the Anti-Monopoly party) received 175,370 votes. Subsequently the party went out of existence.*

GREEN BAY, a city and the county-seat of Brown county, Wisconsin, U.S.A., at the S. extremity of Green Bay, at the

537

mouth of the Fox river, 114 m. N. of Milwaukee. Pop. (1890) 9069; (1900) 18,684, of whom 4022 were foreign-born and 33 were negroes; (i 9IO census) 25,236. The city is served

by the Chicago & North- Western, the Chicago, Milwaukee & St Paul, the Kewaunee, Green Bay & Western, and the Green Bay & Western railways, by an inter-urban electric railway connecting with other Fox River Valley cities, and by lake and river steamboat lines. Green Bay lies on' high level ground on both sides of the river, which is here crossed by several bridges. The city has the Kellogg Public Library, the Brown County Court House, two high schools, a business college, several academies, two hospitals, an orphan asylum and the State Odd Fellows' Home. It is the seat of a Roman Catholic cathedral, the bishopric being the earliest established in the North-west. The so-called " Tank Cottage," now in Washington Park, is said to be the oldest house in Wisconsin- it was built on the W. bank of the river near its mouth by Joseph Roy, a French-Canadian voyageur, in 1766, was

subsequently somewhat modified, and in 1908 was bought and removed to its present site by the Green Bay Historical Society. Midway between Green Bay and De Pere (5 m. S.W. of Green Bay) is the state reformatory, opened in 1899-1901. Green Bay's fine harbour accommodates a considerable lake commerce, and the city is the most important railway and wholesale distributing centre in N.E. Wisconsin. Its manufactures include lumber and lumber products, furniture, wagons, woodenware, farm implements and machinery, flour, beer, canned goods, brick and tile and dairy products; and it has lumber yards, grain elevators, fish warehouses and railway repair shops. The total value of the factory product in 1905 was $4,873,027 an increase of 79-9% since 1900. The first recorded visit of a European to the vicinity of what is now Green Bay is that of Jean Nicolet, who was sent west by Champlain in 1634, and found, probably at the Red Banks, some 10 m. below the present city, a village of Winnebago Indians, who he thought at first were Chinese. Between 1654 and 1658 Radisson and Groseilliers and other coureurs des bois were at Green Bay. Claude Jean Allouez, the Jesuit missionary, established a mission on the W shore of the bay, about 20 m. from the present city Later he removed his mission to the Red Banks, and in the winter of 1671-1672 established it permanently 5 m. above the present city, at Rapides des Peres, on the E. shore of the Fox river In 1673 Joliet and Marquette visited the spot. In 1683-1685 Le Sueur and Nicholas Perrot traded with the Indians here. In 1718-1720 Fort St Francis was erected at the mouth of the river on the W. bank, and after being several times deserted was permanently re-established in 1732. About 1745 Augustin de Langlade established a trading post at La Baye and later brought his family there from Mackinac. This was the first permanent settlement at Green Bay and in Wisconsin. The British garrison which occupied the fort from 1761 to 1763 during which time the fort received the name of Fort Edward Augustus, was removed at the time of Pontiac's rising and the fort was never re-garrisoned by the English, except for a short time during the War of 181 2. The inhabitants of La Baye were, however, acknowledged subjects of Great Britain the jurisdiction of the United States being practically a dead letter until the American fort (Fort Howard) was garrisoned in 1816 As early as i8 IO fur traders, employed by John Jacob Astor were stationed here; about 1820 Astor erected a warehouse and other buildings; and for many years Green Bay consisted of two distinct settlements, Astor and Navarino, which were finally united in 1839 as Green Bay. The city was chartered in 1854. In 1893 Fort Howard was consolidated with it. The Green Bay Intelligencer, the first newspaper in Wisconsin began publication here in 1833. '

See Neville and Martin, Historic Green Bay (Green Bav i8cnV and Martin and Beaumont, Old Green Bay (Green Bay? i 9 Z). 93 ' ' GREENCASTLE, a city and the county-seat of Putnam county, Indiana, U.S.A., about 38 m.

W. by S. of Indianapolis and on the Big Walnut river. Pop. (1000) 3661; (i 9IO) 3790. It is served by the Cleveland, Cincinnati, Chicago & St. Louis,

the Chicago, Indianapolis & Louisville, the Vandalia, and the Terre Haute, Indianapolis & Eastern (electric) railways. It has manufactures of some importance, including lumber, pumps, kitchen-cabinets, drag-saws, lightning-rods and tin-plate, is in the midst of a blue grass region, and is a shipping point for beef cattle. The city has a Carnegie library and is the seat of the de Pauw University (co-educational), a Methodist Episcopal institution, founded as Indiana Asbury University in 1837, and renamed in 1884 in honour of Washington Charles de Pauw (1822-1887), a successful capitalist, banker and glass manu- facturer. The total gifts of Mr de Pauw and his family to the institution amount to about $600,000. Among the presidents of the university have been Bishop Matthew Simpson, Bishop Thomas Bowman (b. 181 7), and Bishop Edwin Holt Hughes (b. 1866), all of the Methodist Episcopal church. The university comprises the Asbury College of Liberal Arts, a School of Music, a School of Art and an Academy, and had in 1900-1010 43 instructors, a library of 37,000 volumes, and 1017 students. Greencastle was first settled about 1820, and was chartered as a city in 1861.

GREENE, GEORGE WASHINGTON (1811-1883), American historian, was born at East Greenwich, Rhode Island, on the 8th of April 181 1, the grandson of Major-General Nathanael Greene. He entered Brown University in 1824, left in his junior year on account of ill-health, was in Europe during the next twenty years, except in 1833-1834, when he was principal of Kent Academy at East Greenwich, and was the United States consul at Rome from 1837 to 1845. He was instructor in modern languages in Brown University from 1848 to 1852; and in 1871-1875 was non-resident lecturer in American history in Cornell University. He died at East Greenwich, Rhode Island, on the 2nd of February 1883. His published works include French and Italian text-books; Historical Studies (1850); Biographical Studies (i860); Historical View of the American Revolution (i&6$); Life of Nathanael Greene (3 vols., 1867-187 1); The German Element in the War of American Independence (1876) ; and a Short History of Rhode Island (1877).

GREENE, MAURICE (1695-1755) English musical composer, was born in London. He was the son of a clergyman in the city, and soon became a chorister of St Paul's cathedral, where he studied under Charles King, and

subsequently under Richard Brind, organist of the cathedral from 1707 to 1718, whom, on his death in the last-named year, he succeeded. Nine years later he became organist and composer to the chapel royal, on the death of Dr Croft. In 1730 he was elected to the chair of music in the university of Cambridge, and had the degree of doctor of music conferred on him. Dr Greene was a voluminous composer of church music, and his collection of Forty Select Anthems became a standard work of its kind. He wrote a " Te Deum," several oratorios, a masque, The Judgment of Hercules, and a pastoral opera, Phoebe (1748); also glees and catches: and a collection of Catches and Canons for Three and Four Voices is amongst his compositions. In addition he com- posed many occasional pieces for the king's birthday, having been appointed master of the king's band in 1735. But it is as a composer of church music that Greene is chiefly remembered. It is here that his contrapuntal skill and his sound musical scholarship are chiefly shown. With Handel, Greene was originally on intimate terms, but his equal friendship for Buononcini, Handel's rival, estranged the German master's feelings from him, and all personal intercourse between them ceased. Greene, in conjunction with the violinist Michael Christian Festing (1727-1752) and others, originated the Society of Musicians, for the support of poor artists and their families. He died on the 1st of December 1755. J

GREENE, NATHANAEL (1 742-1 786), American general, son ' of a Quaker farmer and smith, was born at Potowomut, in the township of Warwick, Rhode Island, on the 7th of August (not, as has been stated, 6th of June) 1742. Though his father's sect discouraged " literary accomplishments," he acquired a large amount of general information, and made a special study of mathematics, history and law. At Coventry, R. I., whither

he removed in 1770 to take charge of a forge built by his father and his uncles, he was the first to urge the establishment of a public school; and in the same year he was chosen a member of the legislature of Rhode Island, to which he was re-elected in 1 771, 1772 arid 1775. He sympathized strongly with the Whig, or Patriot, element among the colonists, and in 1774 joined the local militia. At this time he began to study the art of war. In December 1774 he was on a committee appointed by the assembly to revise the militia laws. His zeal in attending to military duty led to his expulsion from the Society of Friends. In 1775, in command of the contingent raised by Rhode Island, he joined the American forces at Cambridge, and on the 22nd of June was appointed a brigadier by Congress. To him Washington assigned the command of the city of Boston after it was evacuated by Howe in March 1776. Greene's letters of October 1775 an d January 1776 to Samuel Ward, then a delegate from Rhode Island to the Continental Congress, favoured a declaration of

independence. On the 9th of August 1776 he was promoted to be one of the four new major-generals and was put in command of the Continental troops on Long Island; he chose the place for fortifications (practically the same as that picked by General Charles Lee) and built the redoubts and entrenchments of Fort Greene on Brooklyn Heights. Severe illness prevented his taking part in the battle of Long Island. He was prominent among those who advised a retreat from New York and the burning of the city, so that the British might not use it. Greene was placed in command of Fort Lee, and on the 25th of October succeeded General Israel Putnam in command of Fort Washington. He received orders from Washington to defend Fort Washington to the last extremity, and on the nth of October Congress had passed a resolution to the same effect ; but later Washington wrote to him to use his own discretion. Greene ordered Colonel Magaw, whowas in immediate command,to defend the place until he should hear from him again, and reinforced it to meet General Howe's attack. Nevertheless, the blame for the losses of Forts Washington and Lee was put upon Greene, but apparently without his losing the confidence of Washington, who indeed himself assumed the responsibility. At Trenton Greene commanded one of the two American columns, his own, accompanied by Washington, arriving first; and after the victory here he urged Washington to push on immediately to Princeton, but was over-ruled by a council of war. At the Brandy wine Greene commanded the reserve. At Germantown Greene's command, having a greater distance to march than the right wing under Sullivan, failed to arrive in good time — a failure which Greene himself thought (without cause) would cost him Washington's regard; on this, with the affair of Fort Washington, Bancroft based his unfavourable estimate of Greene's ability. But on their arrival, Greene and his troops distinguished them- selves greatly.

At the urgent request of Washington, on the 2nd of March 1778, at Valley Forge, he accepted the office of quartermaster- general (succeeding Thomas Mifflin), and of his conduct in this difficult work, which Washington heartily approved, a modern critic, Colonel H. B. Carrington, has said that it was " as good as was possible under the circumstances of that fluctuating uncertain force." He had become quartermaster-general on the understanding, however, that he should retain the right to command troops in the field; thus we find him at the head of the right wing at Monmouth on the 28th of June. In August Greene and Lafayette commanded the land forces sent to Rhode Island to co-operate with the French admiral d'Estaing, in an expedition which proved abortive. In June 1780 Greene com- manded in a skirmish at Springfield, New Jersey. In August he resigned the office of quartermastef-general, after a long and bitter struggle with Congress over the interference in army administration by the Treasury Board and by commissions appointed by Congress. Before his resignation

became effective it fell to his lot to preside over the court which, on the 29th of September, condemned Major John Andre to death.

On the 14th of October he succeeded Gates as commander-in- ‘, chief of the Southern army, and took command at Charlotte, N.C.,

on the 2nd of December. The army was weak and badly equipped and was opposed by a superior force under Cornwallis. Greene decided to divide his own troops, thus forcing the division of the British as well, and creating the possibility of a strategic interplay of forces. This strategy led to General Daniel Morgan’s victory of Cowpens (just over the South Carolina line) on the 17th of January 1781, and to the battle at Guilford Court House, N.C. (March 15), in which after having weakened the British troops by continual movements, and drawn in reinforce- ments for his own army, Greene was defeated indeed, but only at such cost to the victor that Tarleton called it ” the pledge of ultimate defeat.” Three days after this battle Cornwallis withdrew toward Wilmington. Greene’s generalship and judg- ment were again conspicuously illustrated in the next few weeks, in which he allowed Cornwallis to march north to Virginia and himself turned swiftly to the reconquest of the inner country of South Carolina. This, in spite of a reverse sustained at Lord Rawdon’s hands at Hobkirk’s Hill (2 m. N. of Camden) on the 25th of April, he achieved by the end of June, the British retiring to the coast. Greene then gave his forces a six weeks’ rest on the High Hills of the Santee, and on the 8th of September, with 2600 men, engaged the British under Lieut.-Colonel James Stuart (who had succeeded Lord Rawdon) at Eutaw Springs; the battle, although tactically drawn, so weakened the British that they withdrew to Charleston, where. Greene penned them during the remaining months of the war. Greene’s Southern campaign showed remarkable strategic features that remind one of those of Turenne, the commander whom he had taken as his model in his studies before the war. He excelled in dividing, eluding and tiring his opponent by long marches, and in actual conflict forcing him to pay for a temporary advantage a price that he could not afford. He was greatly assisted by able subordinates, including the Polish engineer, Tadeusz Kosciusko, the brilliant cavalry captains, Henry (” Light-Horse Harry “) Lee and William Washington, and the partisan leaders, Thomas Sumter and Francis Marion.

South Carolina and Georgia voted Greene liberal grants of lands and money. The South Carolina estate, Boone’s Barony, S. of Edisto in Bamberg County, he sold to meet bills for the rations of his Southern army. On the Georgia estate, Mulberry Grove, 14 m. above Savannah, on the

river, he settled in 1785, after twice refusing (1781 and 1784) the post of secretary of war, and there he died of sunstroke on the 19th of June 1786. Greene was a singularly able, and — like other prominent generals on the American side — a self-trained soldier, and was second only to Washington among the officers of the American army in military ability. Like Washington he had the great gift of using small means to the utmost advantage. His attitude towards the Tories was humane and even kindly, and he generously defended Gates, who had repeatedly intrigued against him, when Gates's conduct of the campaign in the South was criticized. There is a monument to Greene in Savannah (1829). His statue, with that of Roger Williams, represents the state of Rhode Island in the National Hall of Statuary in the Capitol at Washington; in the same city there is a bronze equestrian statue of him by H. K. Brown.

See the Life of Nathanael Greene (3 vols., 1867-1871), by his grand- son, George W. Greene, and the biography (New York, 1893), by Brig.-Gen. F. V. Greene, in the " Great Commanders Series."

GREENE, ROBERT (e. 1360-1592), English dramatist and miscellaneous writer, was born at Norwich about 1560. The identity of his father has been disputed, but there is every reason to believe that he belonged to the tradesmen's class and had small means. It is doubtful whether Robert Greene attended Norwich grammar school; but, as an eastern counties man (to one of whose plays, Friar Bacon, the Norfolk and Suffolk borderland owes a lasting poetic commemoration) he naturally found his way to Cambridge, where he entered St John's College as a sizar in 1575 and took his B.A. thence in 1579, proceeding M.A. in 1583 from Clare Hall. His life at the university was, according to his own account, spent " among wags as lewd as himself, with whom he consumed the flower of his youth." In

1588 he was incorporated at Oxford, so that on some of his title- pages he styles himself " utriusque Academiae in Artibus Magister "; and Nashe humorously refers to him as " utriusque Academiae Robertus Greene." Between the years 1578 and 1583 he had travelled abroad, according to his own account very extensively, visiting France, Germany, Poland and Denmark, besides learning at first-hand to " hate the pride of Italie " and to know the taste of that poet's fruit, " Spanish mirabolones." The grounds upon which it has been suggested that he took holy orders are quite insufficient; according to the title-page of a pamphlet published by him in 1585 he was then a " student in phisicke." Already, however, after taking his M.A. degree, he had according to his own account begun his London life, and his earliest extant literary production wste in hand as early as 1580. He now became " an author of playes and a penner of love-pamphlets, so that I soone grew famous in that qualitie, that who for that trade growne so ordinary about London as Robin Greene?" " Glad was that

printer," says Nashe, " that might bee so blest to pay him deare for the very dregs of his wit." By his own account he rapidly sank into the worst debaucheries of the town, though Nashe declares that he never knew him guilty of notorious crime. He was not without passing impulses towards a more righteous and sober life, and was derided in consequence by his associates as a " Puritane and Presizian." It is possible that he, as well as his bitter enemy, Gabriel Harvey, exaggerated, the looseness of his conduct. His marriage, which took place in 1585 or 1586, failed to steady him; if Francesco, in Greene's pamphlet Never too late to -mend (1590), is intended for the author himself, it had been a runaway match; but the fiction and the autobiographical sketch in the Repentance agree in their account of the unfaithfulness which followed on the part of the husband. He lived with his wife, whose name seems to have been Dorothy (" Doll "; and cf. Dorothea in James IV.), for a while; " but forasmuch as she would perswade me from my wilful wickednes, after I had a child by her, I cast her off, having spent up the marriage-money which I obtained by her. Then left I her at six or seven, who went into Lincolnshire, and I to London," where his reputation as a playwright and writer of pamphlets of " love and vaine fantasyes " continued to increase, and where his life was a feverish alternation of labour and debauchery. In his last years he took it upon himself to make war on the cutpurses and " conny-catchers " with whom he came into contact in the slums, and whose doings he fearlessly exposed in his writings. He tells us how at last he was friendless " except it were in a fewe alehouses," where he was respected on account of the score he had run up. When the end came he was a dependant on the charity of the poor and the pitying love of the unfortunate. Henri Murger has drawn no picture more sickening and more pitiful than the story of Greene's death, as told by his Puritan adversary, Gabriel Harvey — a veracious though a far from unprejudiced narrator. Greene had taken up the cudgels provided by the Harvey brothers on their intervention in the Marprelate controversy, and made an attack (immediately suppressed) upon Gabriel's father and family in the prose-tract A Quip for an Upstart Courtier, or a Quaint Dispute between Velvet Breeches and Cloth Breeches (1592). After a banquet where the chief guest had been Thomas Nashe — an old associate and perhaps a college friend of Greene's, any great intimacy with whom, however, he seems to have been anxious to disclaim — Greene had fallen sick " of a surfeit of pickle herringe and Rennish wine. " At the house of a poor shoemaker near Dowgate, deserted by all except his compassionate hostess (Mrs Isam) and two women — one of them the sister of a notorious thief named " Cutting Ball," and the mother of his illegitimate son, Fortunatus Greene — he died on the 3rd of September 1592. Shortly before his death he wrote under a bond for £10 which he had given to the good shoemaker, the following words addressed to his long- forsaken wife: " Doll, I charge thee, by the loue of our youth and by my soules rest, that

thou wilte see this man paide; for if hee and his wife had not succoured me, I had died in the streetes. — Robert Greene."

Four Letters and Certain Sonnets, Harvey's attack on Greene.

14°

GREENE, ROBERT

appeared almost immediately after his death, as to the circum- stances of which his relentless adversary had taken care to inform himself personally. Nashe took up-the defence of his dead friend and ridiculed Harvey in Strange News (1593); and the dispute continued for some years. But, before this, the dramatist Henry Chettle published a pamphlet from the hand of the unhappy man, entitled Greene's Groat' s-worth of Wit bought with a Million of Repentance (1592), containing the story of Roberto, who may be regarded, for practical purposes, as representing Greene himself. This ill-starred production may almost be said to have done more to excite the resentment of posterity against Greene's name than all the errors for which he professed his repentance. For in it he exhorted to repentance three of his quondam acquaint- ance. Of these three Martowe was one — to whom and to whose creation of "that Atheist Tamberlaine " he had repeatedly alluded. The second was Peele, the third probably Nashe. But the passage addressed to Peele contained a transparent allusion to a fourth dramatist, who was an actor likewise, as " an vpstart crow beautified with our feathers, that with his Tygres heart wrapt in a player's hyde supposes hee is as well able to bombast out a blanke- verse as the best of you; and being an absolute Iohannes-fac-totum, is in his owne conceyt the onely shake-scene in a countrey." The phrase italicized parodies a passage occurring in The True Tragedie of Richard, Duke of York, &c, and retained in Part III. of Henry VI. If Greene (as many eminent critics have thought) had a hand in The True Tragedie, he must here have intended a charge of plagiarism against Shakespeare. But while it seems more probable that (as the late R. Simpson suggested) the upstart crow beautified with the feathers of the three dramatists is a sneering description of the actor who declaimed their verse, the animus of the whole attack (as explained by Dr Ingleby) is revealed in its concluding phrases. This " shake-scene," i.e. this actor had ventured to intrude upon the domain of the regular staff of playwrights — their monopoly was in danger!

Two other prose pamphlets of an autobiographical nature were issued posthumously. Of these, The Repentance of Robert Greene, Master of Arts (1592), must originally have been written by him on his death-bed, under the influence, as he says, of Father Parsons's Booke of Resolution (The Christian Directorie, appertayning to Resolution, 1582, republished in an

enlarged form, which became very popular, in 1585); but it bears traces of having been improved from the original; while Greene's Vision was certainly not, as the title-page avers, written during his last illness.

Altogether not less than thirty-five prose-tracts are ascribed to Greene's prolific pen. Nearly all of them are interspersed with verses; in their themes they range from the " misticall " wonders of the heavens to the familiar but " pernitious sleights " of the sharpers of London. But the most widely attractive of his prose publications were his " love-pamphlets," which brought upon him the outcry of Puritan censors. The earliest of his novels, as they may be called, Mamillia, was licensed in 1583. This interesting story may be said to have accompanied Greene through life; for even part ii., of which, though probably com- pleted several years earlier, the earliest extant edition bears the date 1593, had a sequel, The Analomie of Love's Flatteries, which contains a review of suitors recalling Portia's in The Merchant of Venice. The Myrrour of Modestie (the story of Susanna) (1584); The Historie of Arhasto, King of Denmarke (1584); Morando, the Tritameron of Love (a rather tedious imitation of the Decameron (1584); Planetomachia (1 585) (a contention in story- telling between Venus and Saturn); Penelope's Web (1587) (another string of stories); Alcida, Greene's Metamorphosis (1588), and others, followed. In these popular productions he appears very distinctly as a follower of John Lyly; indeed, the first part of Mamillia was entered in the Stationers' Registers in the year of the appearance of Euphues, and two of Greene's novels are by their titles announced as a kind of sequel to the parent romance: Euphues his Censure to Philautus (1587), Menaphon. Camilla's Alarum to Slumbering Euphues (1589), named in some later editions Greene's Arcadia. This pastoral

romance, written in direct emulation of Sidney's, with a heroine called Samila, contains St Sephestia's charming lullaby, with its refrain " Father's sorowe, father's joy." But, though Greene's style copies the balanced oscillation, and his diction the ornate- ness (including the proverbial philosophy) of Lyly, he contrives to interest by the matter as well as to attract attention by the manner of his narratives. Of his highly moral intentions he leaves the reader in no doubt, since they are exposed on the title-pages. The full title of the Myrrour of Modestie for instance continues: " wherein appeareth as in a perfect glasse how the Lord delivereth the innocent from all imminent perils, and plagueth the blood-thirsty hypocrites with deserved punish- ments," &c. On his Pandosto, The Triumph of Time (1588) Shakespeare founded A Winter's Tale; in fact, the novel contains the entire plot of the comedy, except the device of the living statue; though some of the subordinate characters in the play, including Autolycus, were added by Shakespeare, together with the pastoral fragrance of one of its episodes.

In Greene's Never too Late (1590), announced as a " Powder of Experience: sent to all youthfull gentlemen " for their benefit, the hero, Francesco, is in all probability intended for Greene himself, the sequel or second part is, however, pure fiction. This episodical narrative has a vivacity and truthfulness of manner which savour of an 18th century novel rather than of an Elizabethan tale concerning the days of " Palmerin, King of Great Britain." Philador, the prodigal of The Mourning Garment (1590), is obviously also in some respects a portrait of the writer. The experiences of the Roberto of Greene's Groat' s- worth of Wit (1592) are even more palpably the experiences of the author himself, though they are possibly overdrawn — for a born rhetorician exaggerates everything, even his own sins. Besides these and the posthumous pamphlets on his repentance, Greene left realistic pictures of the very disreputable society to which he finally descended, in his pamphlets on " conny- catching ": A Notable Discovery of Coosnage (1591), The Blacke Bookes Messenger. Laying open the Life and Death of Ned Browne, one of the most Notable Cutpurses, Crossbiters, and Conny-catchers that ever lived in England (1592). Much in Greene's manner, both in his romances and in his pictures of low life, anticipated what proved the slow course of the actual development of the English novel ; and it is probable that his true metier, and that which best suited the bright fancy, ingenuity and wit of which his genius was compounded, was pamphlet- spinning and story-telling rather than dramatic composition. It should be added that, euphuist as Greene was, few of his contemporaries in their lyrics warbled wood-notes which like his resemble Shakespeare's in their native freshness.

Curiously enough, as Mr Churton Collins has pointed out, Greene, except in the two pamphlets written just before his death, never refers to his having written plays; and before 1592 his contemporaries are equally silent as to his labours as a playwright. Only four plays remain to us of which he was indisputably the sole author. The earliest of these seems to have been the Comicall History of Alphonsus, King of Arragon, of which Henslowe's Diary contains no trace. But it can hardly have been first acted long after the production of Marlowe's Tamburlaine, which had, in all probability, been brought on the stage in 1587. For this play, " comical " only in the negative sense of having a happy ending, was manifestly written in emulation as well as in direct imitation of Marlowe's tragedy. While Greene cannot have thought himself capable of surpassing Marlowe as a tragic poet, he very probably wished to outdo him in " business, " and to equal him in the rant which was sure to bring down at least part of the house. Alphonsus is a history proper — a dramatized chronicle or narrative of warlike events. Its fame could never equal that of Marlowe's tragedy; but its composition showed that Greene could seek to rival the most popular drama of the day, without falling very far short of his model.

In the Honourable History of Friar Bacon and Friar Bungay (not known to have been acted before February, 1592, but probably written in 1 589) Greene once more attempted to emulate

Marlowe; and he succeeded in producing a masterpiece of his own. Marlowe's Doctor Faustus, which doubtless suggested the composition of Greene's comedy, reveals the mighty tragic genius of its author; but Greene resolved on an altogether distinct treatment of a cognate theme. Interweaving with the popular tale of Friar Bacon and his wondrous doings a charming idyl (so far as we know, of his own invention), the story of Prince Edward's love for the Fair Maid of Fressingfield, he produced a comedy brimful of amusing action and genial fun. Friar Bacon remains a dramatic picture of English Elizabethan life with which The Merry Wives alone can vie; and not even the ultra- classicism in the similes of its diction can destroy the naturalness which constitutes its perennial charm. The History of Orlando Furioso, one of the Twelve Peeres of France has on unsatisfactory evidence been dated as before 1586, and is known to have been acted on the 21st of February 1592. It is a free dramatic adaptation of Ariosto, Harington's translation of whom appeared in 1 59 1, and who in one passage is textually quoted; and it contains a large variety of characters and a superabundance of action. Fairly lucid in arrangement and fluent in style, the treatment of the madness of Orlando lacks tragic power. Very few dramatists from Sophocles to Shakespeare have succeeded in subordinating the grotesque effect of madness to the tragic; and Greene is not to be included in the list.

In The Scottish Hislorie of James IV. (acted 1592, licensed for publication 1594) Greene seems to have reached the climax of his dramatic powers. The " historical " character of this play is pure pretence. The story is taken from one of Giraldi Cinthio's tales. Its theme is the illicit passion of King James for the chaste lady Ida, to obtain whose hand he endeavours, at the suggestion of a villain called Ateukin, to make away with his own wife. She escapes in doublet and hose, attended by her faithful dwarf; but, on her father's making war upon her husband to avenge her wrongs, she brings about a reconciliation between them. Not only is this well-constructed story effectively worked out, but the characters are vigorously drawn, and in Ateukin there is a touch of Iago. The fooling by Slipper, the clown of the piece, is unexceptionable; and, lest even so the play should hang heavy on the audience, its action is carried off by a " pleasant comedie " — i.e. a prelude and some dances between the acts — " presented by Oboram, King of Fayeries," who is, however, a very different person from the Oberon of,

A Midsummer Night's Dream.

George-a-Greene the Pinner of Wakefield (acted 1593, printed 1599), a delightful picture of English life fully worthy of the author of Friar Bungay, has been attributed to him; but the external evidence is very slight, and the internal unconvincing. Of the comedy of Fair Em, which resembles Friar Bacon in more than one point, Greene cannot have been the author; the question as to the priority between the two plays is not so easily solved. The conjecture as to his supposed share in the plays on which the second and third parts of Henry VI. are founded has been already referred to. He was certainly joint author with Thomas Lodge of the curious drama called A Looking Glasse for London and England (acted in 1592 and printed in 1594) — a dramatic apologue conveying to the living generation of English- men the warning of Nineveh's corruption and prophesied doom. The lesson was frequently repeated in the streets of London by the " Ninevitical motions " of the puppets; but there are both fire and wealth of language in Greene and Lodge's oratory. The comic element is not absent, being supplied in abundance by Adam, the clown of the piece, who belongs to the family of Slipper, and of Friar Bacon's servant, Miles. .

Greene's dramatic genius has nothing in it of the intensity of Marlowe's tragic muse; nor perhaps does he ever equal Peele at his best. On the other hand, his dramatic poetry is occasionally ' animated with the breezy freshness which no artifice can simulate. He had considerable constructive skill, but he has created no character of commanding power — unless Ateukin be excepted; but his personages are living men and women, and marked out from one another with a vigorous but far from rude hand. His comic humour is undeniable, and he had the gift of light and

graceful dialogue. His diction is overloaded with classical ornament, but his versification is easy and fluent, and its cadence is at times singularly sweet. He creates his best effects by the simplest means; and he is indisputably one of the most attractive of early English dramatic authors.

Greene's dramatic works and poems were edited by Alexander Dyce in 1831 with a life of the author. This edition was reissued in one volume in 1858. His complete works were edited for the Huth Library by A. B. Grosart. This issue (1881-1886) contains a translation of Nicholas Storojhenko's monograph on Greene (Moscow, 1878). Greene's plays and poems were edited with introductions and notes by J. Churton Collins in 2 vols. (Oxford, 1905) ; the general introduction to this edition has superseded previous accounts of Greene and his dramatic and lyrical writings. An account of his pamphlets is to be found in J. J. Jusserand's English Novel in the Time of Shakespeare (Eng. trans., 1890). See also W. Bernhardi, Robert Greenes Leben und Schriften (1874); F. M. Bodenstedt,

in •Shakespeare's Zeitgenossen und ihre Werke (1858); and an introduction by A. W. Ward to Friar Bacon and Friar Bungay (Oxford, 1886, 4th ed,, 1901). (A. W. W.)

GREENFIELD, a township and the county-seat of Franklin county, in N.E. Massachusetts, U.S.A., including an area of 20 sq. m. of meadow and hill country, watered by the Green and Deerfield rivers and various small tributaries. Pop. (1890) 5252, (1900) 7927, of whom 1431 were foreign-born; (1910 census) 10,427. The principal village, of the same name as

the township, is situated on the N. bank of the Deerfield river, and on the Boston & Maine railway and the Connecticut Valley street railway (electric). Among Greenfield's manufactures are cutlery, machinery, and taps and dies. Greenfield, originally part of Deerfield, was settled about 1682, was established as a " district " in 1753, and on the 23rd of August 1775 was, by a general Act, separated from Deerfield and incorporated as a separate township, although it had assumed full township rights in 1774 by sending delegates to the Provincial Congress. In 1793 part of it was taken to form the township of Gill; in 1838 part of it was annexed to Bernardston; and in 1896 it annexed a part of Deerfield. It was much disaffected at the time of Shays's Rebellion.

See F. M. Thompson, History of Greenfield (2 vols., Greenfield,

1904).

GREENFINCH (Ger. Grunfink), or Green Linnet, as it is very often called, a common European bird, the Fringilla chloris of Linnaeus, ranked by many systematists with one section of haw- finches, Coccothraustes, but apparently more nearly allied to the other section Hesperiphona, and perhaps justifiably deemed the type of a distinct genus, to which the name Chloris or Ligurinus has been applied. The cock, in his plumage of yellowish-green and yellow is one of the most finely coloured of common English birds, but he is rather heavily built, and his song is hardly commended. The hen is much less brightly tinted.- Throughout Britain, as a rule, this species is one of the most plentiful birds, and is found at all seasons of the year. It pervades almost the whole of Europe, and in Asia reaches the river Ob. It visits Palestine, but is unknown in Egypt. It is, however, abundant in Mauritania, whence specimens are so brightly coloured that they have been deemed to form a distinct species, the Ligurinus aurantiiventris of Dr Cabanis, but that view is now generally abandoned. In the north-east of Asia and its adjacent islands occur two allied species — the Fringilla sinica of Linnaeus and the F. kawarahiba of Temminck. (A. N.)

GREENHEART, one of the most valuable of timbers, the produce of Nectandra Rodiaei, natural order Lauraceae, a large tree, native of tropical South America and the West Indies. The Indian name of the tree is sipiri or bibiru, and from its bark and fruits is obtained the febrifuge principle bibirine. Greenheart wood is of a dark-green colour, sap wood and heart wood being so much alike that they can with difficulty be distinguished from each other. The heart wood is one of the most durable of all timbers, and its value is greatly enhanced by the fact that it is proof against the ravages of many marine borers which rapidly destroy piles and other submarine structures of most other kinds of wood available for such purposes. In the Kelvingrove Museum, Glasgow, there are two pieces of planking from a wreck submerged during eighteen years on the west coast of Scotland.

The one specimen — greenheart — is merely slightly pitted on the surface ,thebodyofthe wood being perfectly sound and untouched, while the other — teak — is almost entirely eaten away. Green- heart, tested either by transverse or by tensile strain, is one of the strongest of all woods, and it is also exceedingly dense, its specific gravity being about 1150. It is included in the second line of Lloyd's Register for shipbuilding purposes, and it is exten- sively used for keelsons, beams, engine-bearers and planking, &c, as well as in the general engineering arts, but its excessive weight unfits it for many purposes for which its other properties would render it eminently suitable.

GREENLAND (Danish, &c, Gronland), a large continental island, the greater portion of which lies within the Arctic Circle, while the whole is arctic in character. It is not connected with any portion of Europe or America except by suboceanic ridges; but in the extreme north it is separated only by a narrow strait; from Ellesmere Land in the archipelago of the American continent. It is bounded on the east by the North Atlantic, the Norwegian and Greenland Seas — Jan Mayen, Iceland, the Faeroe Islands and the Shetlands being the only lands between it and Norway. Denmark Strait is the sea between it and Iceland, and the northern Norwegian Sea or Greenland Sea separates it from Spitsbergen. On the west Davis Strait and Baffin Bay separate it from Baffin Land. The so-called bay narrows northward into the strait successively known as Smith Sound, Kane Basin, Kennedy Channel and Robeson Channel. A submarine ridge, about 300 fathoms deep at its deepest, unites Greenland with Iceland (across Denmark Strait), the Faeroes and Scotland. A similar submarine ridge unites it with the Cumberland Peninsula of Baffin Land, across Davis

Strait. Two large islands (with others smaller) lie probably off the north coast, being apparently divided from it by very narrow channels which are not yet ex- plored. If they be reckoned as integral parts of Greenland, then the north coast, fronting the polar sea, culminates about 83°4o' N. Cape Farewell, the most southerly point (also on a small island), is in 59° 45′ N. The extreme length of Greenland may therefore be set down at about 1650 m., while its extreme breadth, which occurs about 77° 30′ N., is approximately 800 m. The area is estimated at 827,275 sq. m. Greenland is a Danish colony, inasmuch as the west coast and also the southern east coast belong to the Danish crown. The scattered settlements of Europeans on the southern parts of the coasts are Danish, and the trade is a monopoly of the Danish government.

The southern and south-western coasts have been known, as will be mentioned later, since the 10th century, when Norse settlers appeared there, and the names of many famous arctic explorers have been associated with the exploration of Greenland. The communication between the Norse settlements in Greenland and the motherland Norway was broken off at the end of the 14th and the beginning of the 15th century, and the Norsemen's knowledge about their distant colony was gradually more or less forgotten. The south and west coast of Greenland was then re-discovered by John Davis in July 1585, though previous ex- plorers, as Cortereal, Frobisher and others, had seen it, and at the end of the 16th and the beginning of the 17th century the work of Davis (1586-1588), Hudson (1610) and Baffin (1616) in the western seas afforded some knowledge of the west coast. This was added to by later explorers and by whalers and sealers. Among explorers who in the 19th century were specially con- nected with the north-west coast may be mentioned E. A. Inglefield (1852) who sailed into Smith's Sound, 1 Elisha KentKane (1853-1855) 2 who worked northward through Smith Sound into Kane Basin, and Charles Francis Hall (1871) who explored the strait (Kennedy Channel and Robeson Channel) to the north of this. 3

The northern east coast was sighted by Hudson (1607) in about . 73 30′ N. (C. Hold with Hope), and during the 17th century and

1 Inglefield, Summer Search for Franklin (London, 1853).

2 Second Crinnell Expedition (2 vols., Philadelphia, 1856).

3 Davis, Polaris {Hall's) North Polar Expedition (Washington, 1876). See also Bessels, Die amerikanische Nordpcl- Expedition (Leipzig, 1879).

later this northern coast was probably visited by many Dutch whalers. The first who gave more accurate information was the Scottish whaler, Captain

William Scoresby, jun. (1822), who, with his father, explored the coast between 69° and 75 N., and gave the first fairly trustworthy map of it. 4 Captains Edward Sabine and Clavering (1823) visited the coast between 72° 5′ and 75° 12′ N. and met the only Eskimo ever seen in this part of Greenland. The second German polar expedition in 1870, under Carl Christian Koldewey 6 (1837-1908), reached 77° N. (Cape Bismarck); and the duke of Orleans, in 1905, ascertained that this point was on an island (the Dove Bay of the German expedition being in reality a strait) and penetrated farther north, to about 7 8° 16'. From this point the north-east coast remained unexplored, though a sight was reported in 1670 by a whaler named Lambert, and again in 1775 as far north as 79° by Daines Barrington, until a Danish expedition under Mylius Erichsen in 1906-1908 explored it, discovering North-East Foreland, the easternmost point (see Polar Regions and map). The southern part of the east coast was first explored by the Dane Wilhelm August Graah (1829-1830) between Cape Farewell and 65 16′ N. 6 In 1883-1885 the Danes G. Holm and T. V. Garde carefully explored and mapped the coast from Cape Farewell to Angmagssalik, in 66° N. 7 F. Nansen and his companions also travelled along a part of this coast in i888. s A. E. Nordens- kiold, in the " Sophia," landed near Angmagssalik, in 65° 36′ N., in 1883. 9 Captain C. Ryder, in 1891-1892, explored and mapped the large Scoresby Sound, or, more correctly, Scoresby Fjord. 10 Lieutenant G. Amdrup, in 1899, explored the coast from Ang- magssalik north to 67° 22′ N. 11 A part of this coast, about 67° N., had also been seen by Nansen in 1882. 12 In 1899 Professor A.' G. Nathorst explored the land between Franz Josef Fjord and Scoresby Fjord, where the large King Oscar Fjord, connecting Davy's Sound with Franz Joseph Fjord, was discovered. 13 In 1900 Lieutenant Amdrup explored the still unknown east coast from 69° 10′ N. south to 67° N. 14

From the work of explorers in the north-west it had been possible to infer the approximate latitude of the northward termination of Greenland long before it was definitely known. Towards the close of the 19th century several explorers gave attention to this question. Lieutenant (afterwards Admiral) L. A. Beaumont (1876), of the Nares Expedition, explored the coast north-east of Robeson Channel to 82 20′ N. 15 In 1882 Lieut. J. B. Lockwood and Sergeant (afterwards Captain) D. L. Brainard, of the U.S. expedition to Lady Franklin Bay, 16 explored the north-west coast beyond Beaumont's farthest to a promontory in 83° 24′ N. and 40° 46′ E. and they saw to the north-east Cape Washington, in about 83° 38′ N. and 39° 30′ E., the most northerly point of land till then observed. In July 1892 R. E. Peary and E. Astrup, crossing by land from Inglefield Gulf, Smith Sound, discovered Independence Bay on the north-east coast in 81° 37′ N. and 34 5′ W. 17 In May 1895 it

4 Journal of a Voyage to the Northern Whale Fishery (1823).

6 Die zweite deutsche Nordpolarfahrt (1873-1875).

6 Reise til Ostkysten af Gronland (1832; trans, by G. Gordon Macdougall, 1837).

7 Meddelelser om Gronland, parts ix. and x. (Copenhagen, 1888).

8 The First Crossing of Greenland, vol. i. (London, 1890), H. Mohn and F. Nansen; " Wissenschaftliche Ergebnisse von Dr F. Nansen Durchquerung von Gronland " (1888), Erganzungsheft No. 105 zu Petermanns Mitteilungen (Gotha, 1892).

9 A. F. Nordenskiold, Den andra Dicksonska Expeditionen til Gronland (Stockholm, 1885).

10 Meddelelser om Gronland, pts.xvii.-xix. (Copenhagen, 1895-1896).

11 Geografish Tidskrift, xv. 53-71 (Copenhagen, 1899). 18 Ibid. vii. 76-79 (Copenhagen, 1884).

13 The Geographical Journal, xiv. 534 (1899); xvii. 48 (1901),; Tvd Somrar i Nona Ishafvet (Stockholm, 1901).

14 Meddelelser om Gronland, parts xxvi.-xxvii.

15 Nares, Voyage to the Polar Sea (2 vols. London, 1877). See also Blue Book, journals, &c, (Nares) Expedition, 1875-1 876 (London,

1877)-

16 A. W. Greely, Report on the Proceedings of the United States Expedition to Lady Franklin Bay, Grinnell Land, vols. i. and ii. (Washington, 1885); Three Years of Arctic Service (2 vols. London,

1886).

V R. E. Peary, Northward over the " Great Ice " (2 vols. New York, 1898) ; E. Astrup, Blandt Nordpolen's Naboer (Christiania, 1895).

GREENLAND

was revisited by Peary, who supposed this bay to be a sound communicating with Victoria Inlet on the north-west coast. To the north Heilprin Land and Melville Land were seen stretching northwards, but the probability seemed to be that the coast soon trended north-west. In 1901 Peary rounded the north point and penetrated as far north as 83 50′ N. .The scanty exploration of

the great ice-cap, or inland ice, which may be asserted to cover the whole of the interior of Greenland, has been prosecuted chiefly from the west coast. In 1751 Lars Dalager, a Danish trader, took some steps in this direction from Frederikshaab. In 1870 Nordenskiold and Berggren walked 35 m. inland from the head of Aulatsivik Fjord (near Disco Bay) to an elevation of 2200 ft. The Danish captain Jens Arnold Dietrich Tensen reached, in 1878, the Jensen Nunataks (5400 ft. above the sea), about 45 m.

fromthe western margin, in 62°so'N. 1 Nordenskiold penetrated in 1883 about 70 m. inland in 68° 20′ N., and two Lapps of his expedition went still farther on skis, to a point nearly under 4S ° W. at an elevation of 6600 ft. Peary and Maigaard reached in 1886 about 100 m. inland, a height of 7500 ft. in 6o° 30′ N Nansen with five companions in 1888 made the first complete crossing of the inland ice, working from the east coast to the west, about 64° 25′ N., and reached a height of 8922 ft. Peary and Astrup, as already indicated, crossed in 1892 the northern part of the inland ice between 78 and 82 N., reaching a height of about 8000 ft., and deter- mined the northern termination of the ice- covering. Peary made very nearly the same journey again in 1895. Captain T. V. Garde explored in 1893 the interior of the inland ice between 61° and 62° N. near its southern termination, and he reached a height of 7080 ft. about 60 m. from the margin. 2

Coasts.— The coasts of Greenland are for the most part deeply indented with fjords, being in- tensely glaciated. The coast-line of Melville Bay (the northern part of the west coast) is to some degree an exception, though the fjords may here be somewhat filled with glaciers, and, for another example, it may be noted that Peary observed a marked contrast on the north coast. Eastward as far as Cape Morris Jesup there are precipitous headlands and islands, as elsewhere, with deep water close inshore. East of the same cape there is an abrupt change; the coast is unbroken, the mountains recede inland, and there is shoal-water for a considerable distance from the coast. Numerous islands lie off the coasts v/here they are indented; but these are in no case large excepting those off the north coast, and that of Disco off the west, which is crossed by the parallel of 70 N. This island, which is separated by VVaigat Strait from the Nugsuak peninsula, is lofty, and has an area of 3005 sq. m. Steenstrup in 1898 discovered in it the warmest spring known in Greenland, having a temperature of 66° F.

The unusual glaciation of the east coast is evidently owing to the north polar current carry- ing the ice masses from the north polar basin south-westward along the land, and giving it an entirely arctic climate down to Cape Farewell. In some parts the interior ice-covering extends down to the outer coast, while in other parts its margin is situated more inland, and the ice-bare coast-land is deeply intersected by fjords extend- ing far into the interior, where they are blocked by enormous glaciers or " ice-currents " from the interior ice-covering which discharge masses of icebergs into them. The east coast of Greenland \ is in this respect highly interesting. All coasts in the world which are much intersected by deep fjords have, with very few exceptions, a western exposure, e.g. Norway, Scotland, British Columbia and Alaska, Patagonia and Chile, and even Spitsbergen and Novaya Zemlya, whose west coasts are far more indented than their east ones. Greenland forms the most prominent exception, its eastern coast being quite as much indented as its western. The reason is to be found in its geo-graphical position, a cold ice-covered polar current running south along the land, while not far out- side there is an open warmer sea, a circumstance which, while producing a cold climate, must also give rise to much precipitation, the land being thus exposed to the alternate erosion of a rough atmosphere and large glaciers. On the east coast of Baffin Land and Labrador there are similar conditions. The result is that the east ..coast of Greenland has the largest system of typical fjords known on the earth's surface. Scoresby Fjord has a length of about 180 m. from the outer coast to the point where it is blocked by the glaciers, and with its numerous branches covers an enormous area. Franz Josef Fjord, with its branch King Oscar Fjord, com- municating with Davy's Sound, forms a system of fjords on a similar scale. These fjords are very deep; the greatest depth

1 Meddelelser om Gronland, part i. (Copenhagen, 1879). 2 Ibid, part xvi. (Copenhagen, 1896).

found by Ryder in Scoresby Sound was 300 fathoms, but there are certainly still greater depths; like the Norwegian fjords they have, however, probably all of them, a threshold or sill, with shallow water, near their mouths. A few soundings made outside this coast seem to indicate that the fjords continue as deep submarine valleys far out into the sea. On the west coast there are also many great fjords. One of the best known from earlier days is the great Godthaab Fjord (or Baals Revier) north of 64° N. Along the east coast there are many high mountains, exceeding 6000 and 7000 ft. in height. One of the highest peaks hitherto measured is at Tiningnertok, on the Lindenov Fjord, in 6o° 35′ N., which is 7340 ft. high. At the bottom

of Mogens Heinesen Fjord, 62° 30′ N., the peaks are 6300 ft., and in the region of Umanak, 63 N., they even exceed 6600 ft. At Umivik, where Nansen began his journey across the inland ice, the highest peak projecting through the ice- covering was Gamel's Nunatak, 6440 ft., in 64 34′ N. In the region of Angmagssalik, which is very mountainous, the mountains rise to 6500 ft., the most prominent peak being Ingolf's Fjeld, in 66° 20′ N., about 6000 ft., which is seen from far out at sea, and forms an excellent landmark. This is probably the Blaaserk (i.e. Blue Sark or blue shirt) of the old, .Norsemen, their first landmark on their way from Iceland to the Oster Bygd, the present Julianehaab district, on the south-west coast of Greenland. A little farther north the coast is much lower, rising only to heights of 2000 ft., and just north of 67 ° 10′ N. only to 500 ft. or less. 1 The highest mountains near the inner branches of Scoresby Fjord are about 7000 ft. The Peterrnann Spitze, near the shore of Franz Josef Fjord, measured by Payer and found to be 11,000 ft., has hitherto been considered to be the highest mountain in Greenland, but according to Nathorst it " is probably only two-thirds as high as Payer supposed," perhaps between 8000 and 9000. ft.

Along the west coast of Greenland the mountains are generally not quite so high, but even here peaks of 5000 and 6000 ft. are not uncommon. As a whole the coasts are unusually mountainous, and Greenland forms in this respect an interesting exception, as there is no other known land of such a size so filled along its coasts on all sides with high mountains and deep fjords and valleys.

Tlte Inland Ice. — The whole interior of Greenland is completely covered by the so-called inland ice, an enormous glacier forming a regular shield-shaped expanse of snow and glacier ice, and burying all valleys and mountains far below its surface. Its area is about 715,400 sq. m., and it is by far the greatest glacier of the northern hemisphere. Only occasionally there emerge lofty rocks, isolated but not completely covered by the ice-cap ; such rocks are known as nunataks (an Eskimo word). The inland ice rises in the interior to a level of 9000, and in places perhaps 10,000 ft. or more, and descends gradually by extremely gentle slopes towards the coasts or the bottom of the fjords on all sides, discharging a great part of its yearly drainage or surplus of precipitation in the form of icebergs in the fjords, the so-called ice-fjords, which are numerous both on the west and on the east coast. These icebergs float away, and are gradually melted in the sea, the temperature of which is thus lowered by cold stored up in the interior of Greenland. The last remains of these icebergs are met with in the Atlantic south of Newfoundland. The surface of the inland ice forms in a transverse section from the west to the east coast an extremely regular curve, almost approach- ing an arc of a wide circle, which along Nansen's route has its highest ridge somewhat nearer the east than the west coast. The same also

seems to be the case farther south. The curve shows, however, slight irregularities in the shape of undulations. The angle of the slope decreases gradually from the margin of the inland ice, where it may be 1° or more, towards the interior, where it is 0°. In the interior the surface of the inland ice is composed of dry snow which never melts, and is constantly packed and worked smooth by the winds. It extends as a completely even plain of snow, with long, almost imperceptible, undulations or waves, at a height of 7000 to 10,000 ft., obliterating the features of the underlying land, the mountains and valleys of which are completely interred. Over the deepest valleys of the land in the interior this ice-cap must be at least 6000 or 7000 ft. thick or more. Approaching the coasts from the interior, the snow of the surface gradually changes its structure. At first it becomes more coarse-grained, like the Firn Schnee of the Alps, and is moist by melting during the summer. Nearer the coast, where the melting on the surface is more considerable, the wet snow freezes hard during the winter and is more or less transformed into ice, on the surface of which rivers and lakes are formed, the water of which, however, soon finds its way through crevasses and holes in the ice down to its under surface, and reaches the sea as a sub-glacial river. Near its margin the surface of the inland ice is broken up by numerous large crevasses, formed by the outward motion of the glacier covering the underlying land. The steep ice- walls at the margin of the inland ice show, especially where the' motion of the ice is slow, a distinct striation, which indicates the ■ strata of annual precipitation with the intervening thin seams of dust (Nordenskiold's kryokonite). This is partly dust blown on

1 See C. Kruuse in Geografi.sk Tidskrift, xv. 64 (Copenhagen, 1899). See also F. Nansen, " Die Ostkiiste Gronlands," Erganzungs- heft No. 105 zu Petermanns Milteilunien (Gotha, 1892), p. 55 and pi. iv., sketch No. 11.

to the surface of the ice from the ice-bare coast-land and partly the dust of the atmosphere brought down by the falling snow and accumulated on the surface of the glacier's covering by the melting during the summer. In the rapidly moving glaciers of the ice- fjords this striation is not distinctly visible, being evidently obliterated by the strong motion of the ice masses.

The ice-cap of Greenland must to some extent be considered as a viscous mass, which, by the vertical pressure in its interior, is pressed outwards and slowly Aqws towards the coasts, just as a mass of pitch placed on a table and left to itself will in the course of time flow outwards towards all sides. The motion of the outwards- creeping inland ice will naturally be more independent of the con- figurations of the underlying land in the interior, where its thickness is so enormous, than near the margin where it is thinner. Here the ice converges into the valleys and moves with increasing velocity in the form of glaciers into the fjords, where they break off as ice-

bergs. The drainage of the interior of Greenland is thus partly given off in the solid form of icebergs, partly by the melting of the snow and ice on the surface of the ice-cap, especially near its western margin, and to some slight extent also by the melting produced on its under side by the interior heat of the earth. After Professor Amund Helland had, in July 1875, discovered the amazingly great velocity, up to 64! ft. in twenty-four hours, with which the glaciers of Greenland move into the sea, the margin of the inland ice and its glaciers was studied by several expeditions. K. J. V. Steenstrup during several years, Captain Hammer in 1879-1880, Captain Ryder in 1886-1887, Dr Drygalski in 1891-1893, 2 and several American expeditions in later years, all examined the question closely. The highest known velocities of glaciers were measured by Ryder in the Upernivik glacier (in 73 N.), where, between the 13th and 14th of August of 1886, he found a velocity of 125 ft. in twenty-four hours, and an average velocity during several days of 101 ft. (Danish). 3 It was, however, ascertained that there is a great difference between the velocities of the glaciers in winter and in summer. For instance, Ryder found that the Upernivik glacier had an average velocity of only 33 ft. in April 1887. There seem to be periodical oscillations in the extension of the glaciers and the inland ice similar to those that have been observed on the glaciers of the Alps and elsewhere. But these interesting phenomena have not hitherto been subject to systematic observation, and our knowledge of them is therefore uncertain. Numerous glacial marks, however, such as polished striated rocks, moraines, erratic blocks, &c, prove that the whole of Greenland, even the small islands and skerries outside the coast, has once been covered by the inland ice.

Numerous raised beaches and terraces, containing shells of marine mollusca, &c, occur along the whole coast of Greenland, and indicate that the whole of this large island has been raised, or the sea has sunk, in post-glacial times, after the inland ice covered its now ice- bare outskirts. In the north along the shores of Smith Sound these traces of the gradual upheaval of the land, or sinking of the sea, are very marked ; but they are also very distinct in the south, although not found so high above sea-level, which seems to show that the upheaval has been greater in the north. In Uvkusigsat Fjord (72 ° 20′ N.) the highest terrace is 480 ft. above the sea. 4 On Manitsok (65 ° 30′ N.) the highest raised beach was 360 ft. above the sea. 6 In the Isortok Fjord (67 11′ N.) the highest raised beach is 380 ft. above sea-level. 6 In the Ameralik Fjord (64° 14′ N.) the highest marine terrace is about 340 ft. above sea-level, and at Ilivertalik (63 14′ N.), north of Fiskernaes, the highest terrace is about 325 ft. above the sea. At Kakarsuak, near the Bjornesund (62° 50′ N.), a terrace is found at 615 ft. above the sea, but it is doubtful whether this is of marine origin. 7 In the Julianehaab district, between 60° and 61 ° N., the highest marine terraces

are found at about 160 ft. above the sea. 8 The highest marine terrace observed in Scoresby Fjord, on the east coast, was 240 ft. above sea- level. 9 There is a common belief that during quite recent times the west and south- west coast, within the Danish possessions, has been sinking. Al- though there are many indications which may make this probable, none of them can be said to be quite decisive. 10

[Geology. — So far as made out, the structure of explored Greenland is as follows:

1. Laurentian gneiss forms the greatest mass of the exposed rocks of the country bare of ice. They are found on both sides of Smith Sound, rising to heights of 2000 ft., and underlie the Miocene and Cretaceous rocks of Disco Island, Noursoak Peninsula and the

2 E. v. Drygalski, Gronland-Expedition der Gesellschaft fur Erd- kunde zu Berlin, 1891-1893 (2 vols., Berlin, 1897).

3 Meddelelser om Gronland, part viii. pp. 203-270 (Copenhagen,

1889).

4 Ibid., part iv. p. 230 (Copenhagen, 1883) ; see also part xiv. pp. 317 et seq., 323,

6 Ibid, part xiv. p. 323 (Copenhagen, 1898).

6 Ibid, part ii. pp. 181-188 (Copenhagen, 1881).

7 Ibid, part i. pp. 99-101 (Copenhagen, 1879).

8 Ibid, part ii. p. 39 (Copenhagen, 1881); part xvi. pp. ISO-I54 (1896).

9 Ibid., part xix. p. 175 (1896).

10 Ibid, part i. p. 34; part ii. p. 40; part xiv. pp. 343-347; part iv. p. 237 ; part viii. p. 26.

Oolites of Pendulum Island in East Greenland. Ancient schists occur on the east coast south of Angmagssalik, and basalts and schists are found in Scoresby Fjord. It is possible that some of these rocks are also of Huronian age, but it is doubtful whether the rocks so designated by the geologists of the " Alert " and " Dis- covery " expedition are really the rocks so known

in Canada, or are a continuous portion of the fundamental or oldest gneiss of the north-west of Scotland and the western isles.

2. Silurian. — Upper Silurian, having a strong relation to the Wenlock group of Britain, but with an American facies, and Lower Silurian, with a succession much the same as in British North America, are found on the shores of Smith Sound, and Nathorst has discovered them in King Oscar Fjord, but not as yet so far south as the Danish possessions.

3. Devonian rocks are believed to occur in«Igaliko and Tunnu- diorbik Fjords, in S.W. Greenland, but as they are unfossiliferous sandstone, rapidly disintegrating, this cannot be known. It is, however, likely that this formation occurs in Greenland, for in Dana Bay, Captain Feilden found a species of Spirifera and Pro- ductus mesolobus or costatus, though it is possible that these fossils represent the " Ursa stage " (Heer) of the Lower Carboniferous. A few Devonian forms have also been recorded from the Parry Archipelago, and Nathorst has shown the existence of Old Red Sandstone facies of Devonian in Traill Island, Geographical Society Island, Ymer Island and Gauss Peninsula.

4. Carboniferous. — In erratic blocks of sandstone, found on the Disco shore of the Waigat have been detected a Sigillaria and a species of either Pecopteris 'or Gleichenia, perhaps of this age ; and probably much of the extreme northern coast of Ellesmere Land, and therefore, in all likelihood, the opposite Greenland shore, contains a clearly developed Carboniferous Limestone fauna, identical with that so widely distributed over the North American continent, and referable also to British and Spitsbergen species. Of the Coal Measures above these, if they occur, we know nothing at present. Capt. Feilden notes as suggestive that, though the explorers have not met with this formation on the northern shores of Greenland, yet it was observed that a continuation of the direction of the known strike of the limestones of Feilden peninsula, carried over the polar area, passes through the neighbourhood of Spitsbergen, where the formation occurs, and contains certain species identical with those of the Grinnell Land rocks of this horizon. The facies of the fossils is, according to Mr Etheridge, North American and Canadian, though many of the species are British. The corals are few in number, but' the Molluscoida (Polyzoa) are more numerous in species and individuals. No Secondary rocks have been dis- covered in the extreme northern parts of West Greenland, but they are present on the east and west coasts in more southerly latitudes than Smith Sound.

5. Jurassic. — These do not occur on the west coast, but on the east coast the German expedition discovered marls and sandstones on Kuhn Island, resembling those of the Russian Jurassic, charac- terized by the presence of

the genus Aucella, Olcostephanus Payeri, 0. striolaris, Belemnites Panderianus, B. volgensis, B. absolutus, and a Cyprina near to C. syssolae. On the south coast of the same island are coarse-grained, brownish micaceous and light-coloured calcareous sandstone and marls, containing fossils, which render it probable that they are of the same age as the coal-bearing Jurassic rocks of Brora (Scotland) and the Middle Dogger of Yorkshire. There is also coal on Kuhn Island.

The Danish expeditions of 1899-1900 have added considerably to our knowledge of the Jurassic rocks of East Greenland. Rhaetic- Lias plants have been described by Dr Hartz from Cape Stewart and Vardekloft. Dr Madsen has recognized fossils that correspond with those from the Inferior oolite, Cornbrash and Callovian of England. Upper Kimmeridge and Portlandian beds also occur.

6. Cretaceous.— Beds of this age, consisting of sandstones and coal, are found on the northern coast of Disco Island and the southern side of the Noursoak Peninsula, the beds in the former locality, " the Kome strata " of Nordenskiold, being the oldest. They reach 1000 ft. in thickness, occupying undulating hollows in the underlying gneiss, and dip towards the Noursoak Peninsula at 20°, when the overlying Atanakerdluk strata come in. Both these series contain numerous plant remains, evergreen oaks, magnolias, aralias, &c, and seams of lignite (coal), which is burnt; but in neither occur the marine beds of the United States. Still, the presence of dicotyledonous leaves, such as Magnolia alternans, in the Atanakerdluk strata, proves their close alliance with the Dakota series of the United States. The underlying Kome beds are not present in the American series. They are characterized by fine cycads {Zamites arcticus and Glossozamites Hoheneggeri) , which also occur in the Urgonian strata of WernsdorfF.

7. Miocene. — This formation, one of the most widely spread in .polar lands, though the most iocal in Greenland, is also the best

known feature in its geology. It is limited to Disco Island, and perhaps to a small part of the Noursoak Peninsula, and the neigh- bouring country, and consists of numerous thin beds of sandstone, shale and coal — the sideritic shale containing immense quantities of leaves, stems, fruit, &c, as well as some insects, and the coal pieces of retinite. The study of these plant and insect remains shows that forests containing a vegetation very similar to that of

California and the southern United States, in some instances even the species of trees being all but identical, flourished in 70° N. during

geological periods comparatively recent. These beds, as well as the Cretaceous series, from which they are as yet only im- perfectly distinguished, are associated with sheets of basalt, which penetrate them in great dikes, and in some places, owing to the wearing away of the softer sedimentary rocks, stand out in long walls running across the beds. These Miocene strata have not been found farther north on the Greenland shore than the region mentioned; but in Lady Franklin Bay, on the Grinnell Land side of Smith Sound, they again appear, so that the chances are they will be found on the opposite coast, though doubtless the great disintegration Greenland has undergone and is undergoing has destroyed many of the softer beds of fossiliferous rocks. On the east coast, more particularly in Hochstetter Foreland, the Miocene beds again appear, and we may add that there are traces of them even on the west coast, between Sonntag Bay and Foulke Fjord, at the entrance to Smith Sound. It thus appears that since early Tertiary times there has been a great change in the climate of Greenland.

Nathorst has suggested that the wholeof Greenland is a "horst," in the subordinate folds of which, as well as in the deeper " graben," the younger rocks are preserved, often with a covering of Tertiary or later lava flows. 1 — J. A. H.]

Minerals.— Native iron was found by Nordenskiold at Ovifak, on Disco Island, in 1870, and brought to Sweden(i87i)as meteorites. The heaviest nodule weighed over 20 tons. Similar native iron has later been found by K. J. V. Steenstrup in several places on the west coast enclosed as smaller or larger nodules in the basalt. This iron has very often beautiful Widmannstatten figures like those of iron meteorites, but it is obviously of telluric origin. 2 In 1895 Peary found native iron at Cape York; since John Ross's voyage in 1818 it has been known to exist there, and from it the Eskimo got iron for their weapons. In 1897 Peary brought the largest nodule to New York; it was estimated to weigh nearly 100 tons. This iron is considered by several of the first authorities on the subject to be of meteoric origin, 3 but no evidence hitherto given seems to prove decisively that it cannot be telluric. That the nodules found were lying on gneissic rock, with no basaltic rocks in the neighbour- hood, does not prove that the iron may not originate from basalt, for the nodules may have been transported by the glaciers, like other erratic blocks, and will stand erosion much longer than the basalt, which may long ago have disappeared. This iron seems, however, in several respects to be unlike the celebrated large nodules of iron found by Nordenskiold at Ovifak, but appears to resemble much more closely the softer kind of iron nodules found by Steenstrup in the basalt ; i it stands exposure to the air equally well, and has similar Widmannstatten figures very sharp, as is to be expected in such a large mass. It contains, however, more nickel and also phosphorus. A few other minerals may be

noticed, and some have been worked to a small extent — graphite is abundant, particularly near Upernivik; cryolite is found almost exclusively at Ivigtut; copper has been observed at several places, but only in nodules and laminae of limited extent ; and coal of poor quality is found in the districts about Disco Bay and Umanak Fjord. Steatite or soapstone has long been used by the natives for the manufacture of lamps and vessels.

Climate. — The climate is very uncertain, the weather changing suddenly from bright sunshine (when mosquitos often swarm) to dense fog or heavy falls of snow and icy winds. At Julianehaab in the extreme south-west the winter is not much colder than that of Norway and Sweden in the same locality; but its mean tempera- ture for the whole year probably approximates to that on the Norwegian coast 600 m. farther north. The climate of the interior has been found to be of a continental character, with large ranges of temperature, and with an almost permanent anti-cyclonic region over the interior of the inland ice, from which the prevailing winds radiate towards the coasts. On the 64th parallel the mean annual temperature at an elevation of 6560 ft. is supposed to be -13° F., or reduced to sea-level 5° F. The mean annual temperature in the interior farther north is supposed to be -10° F. reduced to sea-level. The mean temperature of the warmest month, July, in the interior should be, reduced to sea-level, on the 64th parallel 32 F., and that of the coldest month, January, about -22° F., while in North Greenland it is probably -40° reduced to sea-level. Here we may probably find the lowest temperatures of the northern hemisphere. The interior of Greenland contains both summer and winter a pole of cold, situated in the opposite longitude to that of Siberia, with which it is well able to compete in extreme severity. On Nansen's expedition temperatures of about -49 ° F. were experienced during

1 See A. G. Nathorst, " Bidrag till nordostra Gronlands geologi," with map Geologiska Foreningens i Stockholm Forhandlingar , No. 257, Bd. 23, Heft 4, 1901 ; O. Heer, Flora fossilis Arctica (7 vols., 1868-1883), and especially Meddeleher om Gronland for numerous papers on the geology and palaeontology.

2 Medd. om Grbnl., part iv. pp. 115-131 (Copenhagen, 1883).

3 See Peary, Northward over the " Great Ice," ii. 604 et seq. (New York, 1898).

4 See he. cit. pp. 127-128.

the nights in the beginning of September, and the minimum during the winter may probably sink to — 90 ° F. in the interior of the inland ice. These low temperatures are evidently caused by the radiation of heat from the snow-surface in the rarefied air in the interior. The daily range of temperature is therefore very considerable, sometimes amounting to 40°. Such a range is elsewhere found only in deserts, but the surface of the inland ice may be considered to be an elevated desert of snow. 1 The climate of the east coast is on the whole considerably more arctic than that of the west coast on corresponding latitudes; the land is much more completely snow- covered, and the snow-line goes considerably lower. The probability also is that there is more precipitation, and that the mean tempera- tures are lower. 2 The well-known strangely warm and dry fbhn-winds of Greenland occur both on the west and the east coast; they are more local than was formerly believed, and are formed by cyclonic winds passing either over mountains or down the outer slope of the inland ice. 3 Mirage and similar phenomena and the aurora are common.

Fauna and Flora. — It was long a common belief that the fauna and flora of Greenland were essentially European, a circumstance which would make it probable that Greenland has been separated by sea from America during a longer period of time than from Europe. The correctness of this hypothesis may, however, be doubted. The land mammals of Greenland are decidedly more American than European; the musk-ox, the banded lemming (Cuniculus torquatus), the white polar wolf, of which there seems to have been a new invasion recently round the northern part of the country to the east coast, the Eskimo and the dog — probably also the reindeer — have all come from America, while the other land mammals, the polar bear, the polar fox, the Arctic hare, the stoat (Mustela erminea), are perfectly circumpolar forms. The species of seals and whales are, if anything, more American than European, and so to some extent are the fishes. The bladder-nose seal (Cystophora cristata), for instance, may be said to be a Greenland- American species, while a Scandinavian species, such as the grey seal (Halichoerus grypus), appears to be very rare both in Greenland and America. Of the sixty-one species of birds breeding in Green- land, eight are European-Asiatic, four are American, and the rest circumpolar or North Atlantic and North Pacific in their distribu- tion. 4 About 310 species of vascular plants are found, of which about forty species are American, forty-four European-Asiatic, fifteen endemic, and the rest common both to America and Europe or Asia. We thus see that the American and the European-Asiatic elements of the flora are nearly equivalent ; and if the flora of Arctic North America were better known, the number of plants common to America might be still more enlarged. 6

In the south, a few goats, sheep, oxen and pigs have been intro- duced. The whaling industry was formerly prolific off the west coast but decayed when the right whale nearly disappeared. The white whale fishery of the Eskimo, however, continued, and sealing is important; walruses are also caught and sometimes narwhal. There are also important fisheries for cod, caplin, halibut, red fish (Sebastes) and nepisak (Cyclopterus lumpus) ; a shark (Somniosus microcephalus) is taken for the oil from its liver; and sea-trout are found in the streams and small lakes of the south. On land reindeer were formerly hunted, to their practical extinction in the south, but in the districts of Godthaab, Sukkertoppen and Holstensborg there are still many reindeer. The eider-duck, guillemot and other sea-birds are in some parts valuable for food in winter, and so is the ptarmigan. Eggs of sea-birds are collected and eider-down. Valuable fur is obtained from the white and blue fox, the skin of the eider-duck and the polar bear.

At Tasiusak (73 22′ N.), the most northern civilized settlement in the world, gardening has been attempted without success, but several plants do well in forcing frames. At Umanak (70 40′ N.) is the most northern garden in the world. Broccoli and radishes grow well, turnips (but not every year), lettuce and chervil suc- ceed sometimes, but parsley cannot be reared. At Jacobshavn

1 H. Mohn, ” The Climate of the Interior of Greenland,” The Scott. Geogr. Magazine, vol. ix. (Edinburgh, 1893), pp. 142-145, 199; H. Mohn and F. Nansen, ” Wissenschaftliche Ergebnisse,” &c. Erganzungsheft No. 105 zu Petermanns Mitteilungen (1892), p. 51.

2 On the climate of the east coast of Greenland see V. Willaume- Jantzen, Meddelelser om Grbnland, part ix. (1889), pp. 285-310, part xvii. (1895), pp. 171-180.

3 See A. Paulsen, Meteorolog. Zeitschrift (1889), p. 241 ; F. Nansen, The First Crossing of Greenland (London, 1890), vol. ii. pp. 496-497; H. Mohn and F. Nansen, ” Wissenschaftliche Ergebnisse,” &c. Erganzungsheft No. 105 zu Petermanns Mitteihingen (1892), p. 51.

4 H. Winge, ” Gronlands Fugle,” Meddelelser om Grbnlafld, part xxi. pp. 62-63 (Copenhagen, 1899).

s See J. Lange, ” Conspectus florae Groenlandicae,” Meddelelser om Grbnland, part iii. (Copenhagen, 1880 and 1887); E. Warming, ” Om Gronlands Vegetation,” Meddelelser om Grbnland, part xii. (Copenhagen, 1888); and in Botanische Jahrbiicher, vol. x. (1888- 1889). See also A. Blytt, Englers Jahrbiicher, ii. (1882), pp. 1-50; A. G. Nathorst, Otversigt af K. Vetenskap. Akad. Forhandl. (Stock- holm, 1884) ; ” Kritische

Bemerkungen uber die Geschichte der Vegetation Gronlands," Botanische Jahrbiicher, vol. xiv. (1891).

(69° 12′ N.), only some 15 m. from the inland ice, gardening succeeds very well; broccoli and lettuce grow willingly; the spinach pro- duces large leaves; chervil, pepper-grass, leeks, parsley and turnips grow very well ; the radishes are sown and gathered twice during the summer (June to August). In the south, in the Julianehaab district, even flowering plants, such as aster, nemophilia and mignonette, are cultivated, and broccoli, spinach, sorrel, chervil, parsley, rhubarb, turnips, lettuce, radishes grow .well. Potatoes give fair results when they are taken good care of, carrots grow to a thickness of l| in., while cabbage does poorly. Strawberries and cucumbers have been ripened in a forcing frame. In the " Kongespeil " (King's mirror) of the 13th century it is stated that the old Norsemen tried in vain to raise barley.

The wild vegetation in the height of summer is, in favourable situations, profuse in individual plants, though scanty in species. The plants are of the usual arctic type, and identical with or allied to those found in Lapland or on the summits of the highest British hills. Forest there is none in all the country. In the north, where the lichen-covered or ice-shaven rocks do not protrude, the ground is covered with a carpet of mosses, creeping dwarf willows, crow- berries and similar plants, while the flowers most common are the andromeda, the yellow poppy, pedicularis, pyrola, &c. besides the flowering mosses; but in South Greenland there is something in the shape of bush, the dwarf birches even rising a few feet in very sheltered places, the willows may grow higher tha'n a man, and the vegetation is less arctic and more abundant.

Government and Trade. — The trade of Greenland is a monopoly of the Danish crown, dating from 1774, and is administered in Copenhagen by a government board (Kongelige Grbnlandske Handel) and in the country by various government officials In order to meet the double purposes of government and trade the west coast, up to nearly 74° N., is divided into two inspec- torates, the southern extending to 67 40′ N., the northern com- prising the rest of the country; the respective seats of govern- ment being at Godthaab and Godhavn. These inspectorates are ruled by two superior officials or governors responsible to the director of the board in Copenhagen. Each of the inspec- torates is divided into districts, each district having, in addition to the chief settlement or coloni, several outlying posts and Eskimo hunting stations, each presided over by an udligger, who is responsible to the colonibestyrer, or superintendent of the district. These trading settlements, which dot the coast for a distance of 1000 m., are about sixty in number. From the Eskimo hunting and fishing stations blubber is the chief article received, and is forwarded in casks to the coloni,

where it is boiled into oil, and prepared for being despatched to Copenhagen by means of the government ships which arrive and leave between May and November. For the rest of the year navigation is stopped, though the winter months form the busy seal-killing season. The principle upon which the government acts is to give the natives low prices for their produce, but to sell them European articles of necessity at prime cost, and other stores, such as bread, at prices which will scarcely pay for the purchase and freight, while no merchandise is charged, on an average, more than 20% over the cost price in Denmark. In addition the Greenlanders are allowed to order goods from private dealers on paying freight for them at the rate of 23d. per 10 lb. or is. 6d. per cub. ft. The prices to be paid for European and native articles are fixed every year, the prices current in Danish and Eskimo being printed and distributed by the government. Out of the payment five-sixths are given to the sellers, and one- sixth devoted to the Greenlanders' public fund, spent in " public works," in charity, and on other unforeseen contingencies. The object of the monopoly is solely for the good of the Green- landers — to prevent spirits being sold to them, and the vice, disease and misery which usually attend the collision between natives and civilization of the trader's type being introduced into the primitive arctic community. The inspectors, in addition to being trade superintendents, are magistrates, but serious crime is very rare. Though the officials are all-powerful, local councils or parsissaet were organized in 1857 in every district. To these parish parliaments delegates are sent from every station. These parsissoks, elected at the rate of about one representative to 120 voters, wear a cap with a badge (a bear rampant), and aid the European members of the council in distributing the surplus profit apportioned to each district, and generally in advising oS to the welfare of that part of Greenland under their partial

control. The municipal council has the disposal of 20% of the annual profits made on produce purchased within the confines of each district. It holds two sessions every year, and the discussions are entirely in the Eskimo language. In addition to their functions as guardians of the poor, the parish members have to investigate crimes and punish misdemeanours, settle litigations and divide inheritances. They can impose fines for small offences not worth sending before the inspector, and, in cases of high misdemeanour, have the power of inflicting corporal punishment.

A Danish coloni in Greenland might seem to many not to be a cheerful place at best; though in the long summer days they would certainly find some of those on the southern fjords com- paratively pleasant. The fact is,

however, that most people who ever lived some time in Greenland always long to go back. There are generally in a coloni three or four Danish houses, built of wood and pitched over, in addition to storehouses and a blubber-boiling establishment. The Danish residents may include, besides a coloni-bestyrer and his assistant, a missionair or clergyman, at a few places also a doctor, and perhaps a carpenter and a schoolmaster. In addition there are generally from twenty to several hundred Eskimo, who live in huts built of stone and turf, each entered by a short tunnel. Lately their houses in the colonis have also to some extent been built of imported wood. Following the west coast northward, the trading centres are these: in the south inspectorate, Juliane- haab, near which are remains of the early Norse settlements of Eric the Red and his companions (the Oster-Bygd) ; Frederiks- haab, in which district are the cryolite mines of Ivigtut; Godt-haab, the principal settlement of all, in the neighbourhood of which are also early Norse remains (the V ester- By gd); Sukker- toppen, a most picturesque locality; and Holstenborg. In the north inspectorate the centres are: Egedesminde, on an islet at the mouth of Disco Bay; Christianshaab, one of the pleasantest settlements in the north, and Jacobshavn, on the inner shores of the same bay; Godhavn (or Lievely) on the south coast of Disco Island, formerly an important seat of the whaling industry; Ritenbenk, Umanak, and, most northerly of all, Upernivik. On the east coast there is but one coloni, Angmagssalik, in 65 30′ N., only established in 1894. For ecclesiastical purposes Danish Greenland is reckoned in the province of the bishop of Zeeland. The Danish mission in Greenland has a yearly grant of £2000 from the trading revenue of the colony, besides a contribution of £880 from the state. The Moravian mission, which had worked in Greenland for a century and a half, retired from the country in 1900. The trade of Greenland has on the whole much decreased in modern times, and trading and missions cost the Danish state a com- paratively large sum (about £11,000 every year), although this is partly covered by the income from the royalty of the cryolite mines at Ivigtut. There is, however, a yearly deficiency of more than £6000. The decline in the value of the trade, which was formerly very profitable, has to a great extent been brought about by the fall in the price of seal-oil. It might be expected that there should be a decrease in the Greenland seal fisheries, caused by the European and American sealers catching larger quantities every year, especially along the coasts of Newfoundland and Labrador, and so actually diminishing the number of the animals in the Greenland seas. The statistics of South Greenland, however, do not seem to demonstrate any such decrease. The average number of seals killed annually is about 33,00c 1 The

1 Owing to representations of the Swedish government in 1874 as to the killing of seals at breeding time on the east coast of Green- land, and the

consequent loss of young seals left to die of starvation, the Seal Fisheries Act 1875 was passed in England to provide tor the establishment of a close time for seal fishery in the seas in question. This act empowered the crown, by order in council, to put its provisions in force, when any foreign state, whose ships or subjects were engaged in the seal fishery in the area mentioned in the schedule thereto, had made, or was about to make, similar pro- visions with respect to its ships and subjects. An order in council under the act, declaring the season to begin on the 3rd of April in each year, was issued February 8, 1876. Rescinded February 15, 1876, it was re-enacted on November 28, 1876, and is still operative.

annual value of imports, consisting of manufactured goods, foodstuffs, &c, may be taken somewhat to exceed £40,000. The chief articles of export (together with those that have lapsed) have been already indicated; but they may be sum- marized as including seal-oil, seal, fox, bird and bear skins, fish products and eiderdown, with some quantity of worked skins. Walrus tusks and walrus hides, which in the days of the old Norse settlements were the chief articles of export, are now of little importance.

Population. — The area of the entire Danish colony is estimated at 45,000 sq. m., and its population in 1901 was 11,893. The Europeans number about 300. The Eskimo population of Danish Greenland (west coast) seems to have decreased since the middle of the 18th century. Hans Egede estimated the population then at 30,000, but this is probably a large over-estimate. The decrease may chiefly have been due to infectious diseases, especially a very severe epidemic of smallpox. During the last half of the 19th century there was on the whole a slight increase of the native population. The population fluctuates a good deal, owing, to some extent, to an immigration of natives from the east to the west coast. The population of the east coast seems on the whole to be decreasing in number, several hundreds chiefly living at Angmagssalik. In the north part of the east coast, in the region of Scoresby Fjord and Franz Josef Fjord, numerous ruins of Eskimo settlements are found, and in 1823 Clavering met Eskimo there, but now they have either completely died out or have wandered south. A little tribe of Eskimo living in the region of Cape York near Smith Sound — the so-called " Arctic Highlanders " or Smith Sound Eskimo — number about 240.

History. — In the beginning of the 10th century the Norwegian Gunnbjorn, son of Ulf Kraka, is reported to have found some islands to the west of Iceland, and he may have seen, without landing upon it, the southern part of the east coast of Greenland. In 982 the Norwegian Eric the Red sailed from Iceland to find the land which Gunnbjorn had seen, and he spent three years on its south-western coasts exploring the country. On his return to Iceland in 985 he called the land Greenland in order to make people

more willing to go there, and reported so favourably on its possibilities that he had no difficulty in obtaining followers. In 986 he started again from Iceland with 25 ships, but only 14 of them reached Greenland, where a colony was founded on the south-west coast, in the present Julianehaab district. Eric built his house at Brattalid, near the inner end of the fjord Tunugdliarfik, just north of the present Julianehaab. Other settlers followed and in a few years two colonies had been formed, one called Osterbygd in the present district of Julianehaab comprising later about 190 farms, and another called Vester- bygd farther north on the west coast in the present district of Godthaab, comprising later about 90 farms. Numerous ruins in the various fjords of these two districts indicate now where these colonies were. Wooden coffins, with skeletons wrapped in coarse hairy cloth, and both pagan and Christian tombstones with runic inscriptions have been found. On a voyage from Norway to Greenland Leif Ericsson (son of Eric the Red) dis- covered America in the year 1000, and a few years later Torfinn Karlsefne sailed with three ships and about 150 men, from Green- land to Nova Scotia to form a colony, but returned three years later (see Vinland).

When the Norsemen came to Greenland they found various remains indicating, as the old sagas say, that there had been people of a similar kind as those they met with in Vinland, in America, whom they called Skraeling (the meaning of the word is uncertain, it means possibly weak people); but the sagas do not report that they actually met the natives then. But somewhat later they have probably met with the Eskimo farther north on the west coast in the neighbourhood of Disco Bay, where the Norsemen went to catch seals, walrus, &c. The Norse colonists penetrated on these fishing expeditions at least to 73 N., where a small runic stone from the 14th century has been found. On a voyage in 1267 they penetrated even still farther north into the Melville Bay.

Christianity was introduced by Leif Ericsson at the instance of Olaf Trygvasson, king of Norway, in iooo and following years. In the beginning of the 12th century Greenland got its own bishop, who resided at Garolar, near the present Eskimo station Igoliko, on an isthmus between two fjords, Igaliksfjord (the old Einarsfjord) and Tunugdliarfik (the old Eriksfjord), inside the present colony Julianehaab. The Norse colonies had twelve churches, one monastery and one nunnery in the Osterbygd, and four churches in the Vesterbygd. Greenland, like Iceland, had a republican organization up to the years 1247 to 1261, when the Greenlanders were induced to swear allegiance to the king of Norway. Greenland belonged to

the Norwegian crown till 1814, when, at the dissolution of the union between Denmark and Norway, neither it nor Iceland and the Faeroes were men- tioned, and they, therefore, were kept by the Danish king and thus came to Denmark. The settlements were called respectively Oster Bygd (or eastern settlement) and V ester (western) Bygd, both being now known to be on the south and west coast (in the districts of Julianehaab and Godthaab respectively), though for long the view was persistently held that the first was on the east coast, and numerous expeditions have been sent in search of these " lost colonies " and their imaginary survivors. These settlements at the height of their prosperity are estimated to have had 10,000 inhabitants, which, however, is an over-estimate, the number having probably been nearer one-half or one-third of that number. The last bishop appointed to Greenland died in 1540, but long before that date those appointed had never reached their sees; the last bishop who resided in Greenland died there in 1377. After the middle of the 14th century very little is heard of the settlements, and their communication with the motherland, Norway, evidently gradually ceased. This may have been due in great part to the fact that the shipping and trade of Greenland became a monopoly of the king of Norway, who kept only one ship sailing at long intervals (of years) to Greenland; at the same time the shipping and trade of Norway came more and more in the hands of the Hanseatic League, which took no interest in Greenland. The last ship that is known to have visited the Norse colony in Greenland returned to Norway in 14 10. With no support from home the settlements seem to have decayed rapidly. It has been supposed that they were destroyed by attacks of the Eskimo, who about this period seem to have become more numerous and to have extended southwards along the coast from the north. This seems a less feasible explanation; it is more probable that the Norse settlers intermarried with the Eskimo and were gradually absorbed. About the end of the 15th or the beginning of the 16th century it would appear that all Norse colonization had practically disappeared. When in 1 585 John Davis visited it there was no sign of any people save the Eskimo, among whose traditions are a few directly relating to the old Norsemen, and several traces of Norse influence. 1 For more than two hundred years Greenland seems to have been neglected, almost forgotten. It was visited by whalers, chiefly Dutch, but nothing in the form of permanent European settlements was established until the year 1721, when the first missionary, the Norwegian clergyman Hans Egede, landed, and established a settlement near Godthaab. Amid many hardships and discouragements he persevered; and at the present day the native race is civilized and Christianized. Many of the colonists of the 18th century were convicts and other offenders; and in 1750 the trade became a monopoly in the hands of a private company. In 1 733-1 734 there was a dreadful epidemic of smallpox, which destroyed a great number of the people. In 1774 the trade ceased to be

profitable as a private monopoly, and to prevent it being abandoned the government took it over. Julianehaab was founded in the. following year. In 1807-1814, owing to the war, communication was cut off with Norway and Denmark; but subsequently the colony prospered in a languid fashion

Authorities. — As to the discovery of Greenland by the Norsemen and its early history see Konrad Maurer's excellent paper, " Ge- schichte der. Entdeckung Ostgronlands " in the report of Die zweite

1 Cf. F. Nansen, Eskimo Life (London, 1893).

deutsche Nordpolarfahrt 1869-1870 (Leipzig, 1874), vol. i. ; G. Storm, Studies on the " Vineland " Voyages (Copenhagen, 1 889); Extrails des Memoires de la Societe Royale des Antiquaires du Nord (1888); K. J. V. Steenstrup, " Om Osterbygden," Meddelelser . om Gronland, part ix. (1882), pp. 1-51; Finnur J6nsson, "Gronlands gamle Topografi efter Kilderne " in Meddelelser om Gronland, part xx. (1899), pp. 265-329; Joseph Fischer, The Discoveries of the Norsemen in America, translated from German by B. H. Soulsby (London, l 9°3)-_ As to the general literature on Greenland, a number of the more important modern works have been noticed in footnotes. The often-quoted Meddelelser om Gronland is of especial value; it is published in parts (Copenhagen) since 1879, and is chiefly written in Danish, but each part has a summary in French. In part xiii. there is a most valuable list of literature about Greenland up to 1880. See also Geographical Journal, passim.

Amongst other important books on Greenland may be mentioned : Hans Egede, Description of Greenland (London, 1745); Crantz, History of Greenland (2 vols., London, 1820); Gronlands historiske Mindesmerker (3 vols., Copenhagen, 1838-1845); H. Rink, Danish Greenland (London, 1877); H. Rink, Tales of the Eskimo (London, !875); (see also same, " Eskimo Tribes" in Meddelelser om Gron- land, part xi.); Johnstrup, Giesecke's Mineralogiske Reise i Gronland (Copenhagen, 1878). (F. N.)

GREENLAW (a " grassy hill "), a town of Berwickshire, Scot- land. Pop. (1901) 611. It is situated on the Blackadder, 625 m. S.E.of Edinburghby the North British railway company's branch line from Reston Junction to St Boswells. The town was built towards the end of the 17th century, to take the place of an older one, which stood about a mile to the S.E. It was the county town from 1696 to 1853, when for several years it shared this dignity with Duns, which, however, is now the sole capital. The chief manufactures are woollens and agricultural implements. About 3 m, to the S. the ruin of Hume Castle, founded in the 13th century, occupies a commanding site. Captured by the English in 154.7, in spite of Lady Home's gallant defence, it was retaken two years afterwards, only to fall

again in 1569. After its surrender to Cromwell in 1650 it gradually decayed. Towards the close of the 18th century the 3rd earl of Marchmont had the walls rebuilt out of the old stones, and the castle, though a mere shell of the original structure, is now a picturesque ruin.

GREENLEAF, SIMON (1783-1853), American jurist, was born at Newburyport, Massachusetts, on the 5th of December 1783. When a child he was taken by his father to Maine, where he studied law, and in 1806 began to practise at Standish. He soon removed to Gray, where he practised for twelve years, and in 1818 removed to Portland. He was reporter of the supreme court of Maine from 1820 to 1832, and published nine volumes of Reports of Cases in the Supreme Court of Maine (1822-1835). In 1833 he became Royall professor, and in 1846 succeeded Judge Joseph Story as Dane professor of law in Harvard Univer- sity; in 1848 he retired from his active duties, and became professor emeritus. After being for many years president of the Massachusetts Bible Society, he died at Cambridge, Mass , on the 6th of October 1853. Greenleaf's principal work is a Treatise on the Law of Evidence (3 vols., 1842-1853). He also published A Full Collection of Cases Overruled, Denied, Doubted, or Limited in their Application, taken from American and English Reports (18 21), and Examination of the Testimony of the Four Evangelists by the Rules of Evidence administered in the Courts of Justice, with an account of the Trial of Jesus (1846; London, 1847). He revised for the American courts William Cruise's Digest of Laws respecting Real Property (3 vols., 1849-1850).

GREEN MONKEY, a west African representative of the typical group of the guenon monkeys technically known as Cercopithecus callilrichus, taking its name from the olive-greenish hue of the fur of the back, which forms a marked contrast to the white whiskers and belly.

GREENOCK, a municipal and police burgh and seaport of Renfrewshire, Scotland, on the southern shore of the Firth of Clyde, 23 m. W. by N. of Glasgow by the Caledonian and the Glasgow & South- Western railways, 21 m. by the river and firth. Pop. (1901) 68,142. The town has a water frontage of nearly 4 m. and rises gradually to the hills behind the town in which are situated, about 3 m. distant, Loch, Thorn and Loch Gryf e, from both of which is derived the water supply for domestic use, and for driving several mills and factories. The streets are

laid out on the comparatively level tract behind the firth, the older

thoroughfares and buildings lying in the centre. The west end contains numerous handsome villas and a fine esplanade, ifm. long, running from Prince's Pier to Fort Matilda, which is supplied with submarine mines for the defence of the river. The capacious bay, formerly known as the Bay of St Lawrence from a religious house long.since demolished, is protected by a sandbank that ends here, and is hence known as the Tail of the Bank. The fairway between this bank, which begins to the west of Dumbarton, and the southern shore constitutes the safest anchorage in the upper firth. There is a continuous line of electric tramways, connecting with Port Glasgow on the east and Gourock on the west, a total distance of 7! m. The annual rainfall amounts to 64 in. and Greenock thus has the reputation "of being the wettest town in Scotland.

Many of the public buildings are fine structures. The muni- cipal buildings, an ornate example of Italian Renaissance, with a tower 244 ft. high, were opened in 1887. The custom house on the old steamboat quay, in classic style with a Doric portico, dates from 1818. The county buildings (1867) have a tower and spire 112 ft. high. The Watt Institution, founded in 1837 by a son of the famous engineer, James Watt, contains the public library (established in 1783), the Watt scientific library (pre- sented in 1816 by Watt himself), and the marble statue of James Watt by Sir Francis Chantrey. Adjoining it are the museum and lecture hall, the gift of James McLean, opened in 1876. Other buildings are the sheriff court house, and the Spence Library, founded by the widow of William Spence the mathematician. In addition tot lumerous board schools there are the Greenock academy for secondary education, the technical college (1900), the school of art, and a school of navigation and engineering. The charitable institutions include the infirmary; the cholera hospital; the eye infirmary; the fever reception house; Sir Gabriel Wood's mariners' asylum, an Elizabethan building erected in 1851 for the accommodation of aged merchant sea- men; and the Smithson poorhouse and lunatic asylum, built beyond the southern boundary in 1870. Near Albert Harbour stands the old west now the north parish church (a Gothic edifice dating from 1591) containing some stained-glass windows by William Morris; in its kirkyard Burns's " Highland Mary " was buried (1786). The west parish church in Nicholson Street (1839) is in the Italian Renaissance style and has a campanile. The middle parish church (1759) in Cathcart Square is in the Classic style with a fine spire. Besides burial grounds near the infirmary and attached to a few of the older churches, a beauti- ful cemetery, 90 acres in extent, has been laid out in the south- western district. The parks and open spaces include Wellington Park, Well Park in the heart of the town (these were the gift of Sir Michael Shaw-Stewart), Whin Hill, Lyle Road — a broad drive winding over the heights towards Gourock, constructed as a " relief work' " in the severe winter of 1879-1880.

Greenock is under the jurisdiction of a town council with provost and bailies. It is a parliamentary burgh, represented by one member. The corporation owns the supplies of water (the equipment of works and reservoirs is remarkably complete), gas, electric light and power, and the tramways (leased to a company). The staple industries are shipbuilding (established in 1760) and sugar refining (1765). Greenock-built vessels have always been esteemed, and many Cunard, P. & O. and Allan liners have been constructed in the yards. The town has been one of the chief centres of the sugar industry. Other important industries include the making of boilers, steam-engines, locomotives, anchors, chain-cables, sailcloth, ropes, paper, woollen and worsted goods, besides general engineering, an aluminium factory, a flax-spinning mill, distilleries and an oil-refinery. The ‘ seal and whale fisheries, once vigorously prosecuted, are extinct, ‘ but the fishing-fleets for the home waters and the Newfoundland grounds are considerable. Till 1772 the town leased the first harbour (finished in 17 10) from Sir John Shaw, the superior, but acquired it in that and the following year, and a graving dock was opened in 1786. Since then additions and improvements have been periodically in progress, and there are now several*

tidal harbours — among them Victoria harbour, Albert harbour, the west harbour, the east harbour, the northern tidal harbour, the western tidal harbour, the great harbour and James Watt dock (completed in 1886 at a cost of £650,000 with an area of 2000 ft. by 400 ft. with a depth at low water of 32 ft.), Garvei graving dock and other dry docks. The quayage exceeds 100 acres in area and the quay walls are over 3 m. in length. Both the Caledonian and the Glasgow & South-Western railways (in Prince’s Pier the latter company possesses a landing-stage nearly 1400 ft. long) have access to the quays. From first to last the outlay on the harbour has exceeded £1,500,000.

In the earlier part of the 17th century Greenock was a fishing village, consisting of one row of thatched cottages. A century later there were only six slated houses in the place. In 1635 it was erected by Charles I. into a burgh of barony under a charter granted to John Shaw, the government being administered by a baron-bailie, or magistrate, appointed by the superior. Its commercial prosperity received an enormous impetus from the Treaty of Union (1707), under which trade with America and the West Indies rapidly developed. The American War of Independ- ence suspended progress for a brief interval, but revival set in in 1783, and within the following seven years shipping trebled in amount. Meanwhile Sir John Shaw — to whom and to whose descendants, the Shaw-Stewarts, the town has always been indebted — by charter (dated 1741 and 1751) had empowered the householders to elect a council of nine members, which proved to be the most liberal constitution of any Scots burgh prior to the

Reform Act of 1832, when Greenock was raised to the status of a parliamentary burgh with the right to return one member to parliament. Greenock was the birthplace of James Watt, William Spence (1777-1815) and Dr John Caird (1820-1898), principal of Glasgow University, who died in the town and was buried in Greenock cemetery. John Gait, the novelist, was educated in Greenock, where he also served some time in the custom house as a clerk. Rob Roy is said to have raided the town in 171 5.

GREENOCKITE, a rare mineral composed of cadmium sulphide, CdS, occurring as small, brilliant, honey-yellow crystals or as a canary-yellow powder. Crystals are hexagonal with hemimorphic development, being differently terminated at the two ends. The faces of the hexagonal prism and of the numerous hexagonal pyramids are deeply striated horizontally. The crys- tals are translucent to transparent, and have an adamantine to resinous lustre; hardness 3-3I; specific gravity 4-9. Crystals have been found only in Scotland, at one or two places in the neighbourhood of Glasgow, where they occur singly on prehnite in the amygdaloidal cavities of basaltic igneous rocks — a rather unusual mode of occurrence for a metallic sulphide. The first, and largest crystal (about 3 in. across) was found, about the year 1810, in the dolerite quarry at Bowling in Dumbartonshire, but this was thought to be blende. A larger number of crystals, but of smaller size, were found in 1840 during the cutting of the Bishopton tunnel on the Glasgow & Greenock railway; they were detected by Lord Greenock, afterwards the 2nd earl of Cathcart, after whom the mineral was named. A third locality is the Boyleston quarry near Barrhead. At all other localities — Przibram in Bohemia, Laurion in Greece, Joplin in Missouri, &c. — the mineral is represented only as a powder dusted over the surface of zinc minerals, especially blende and calamine, which contain a small amount of cadmium replacing zinc.

Isomorphous with greenockite is the hexagonal zinc sulphide (ZnS) known as wurtzite. Both minerals have been prepared artificially, and are not uncommon as furnace products. Previous to the recent discovery in Sardinia of cadmium oxide as small octahedral crystals, greenockite was the only known mineral containing cadmium as an essential constituent. (L. J. S.).

GREENORE, a seaport and watering-place of county Louth, Ireland, beautifully situated at the north of Carlingford Lough on its western shore. It was brought to importance by the action of the London & North-Western railway company of England, which owns the pier and railways joining the Great Northern system at Dundalk (125 m.) and Newry (14 m.). A regular

service of passenger steamers controlled by the company runs to Holyhead, Wales, 80 m. S.E. A steam ferry crosses the Lough to Greencastle, for Kilkeel, and the southern watering-places of county Down. The company also owns the hotel, and laid out the golf links. In the vicinity a good example of raised beach, some 10 ft. above present sea-level, is to be seen.

GREENOUGH, GEORGE BELLAS (1778-1855), English geo- logist, was born in London on the 18th of January 1778. He was educated at Eton, and afterwards (1795) entered Pem- broke College, Oxford, but never graduated. In 1798 he pro- ceeded to Gottingen to prosecute legal studies, but having attended the lectures of Blumenbach he was attracted to the study of natural history, and, coming into the possession of a fortune, he abandoned law and devoted his attention to science. He studied mineralogy at Freiburg under Werner, travelled in various parts of Europe and the British Isles, and worked at chemistry at the Royal Institution. A visit to Ireland aroused deep interest in political questions, and he was in 1807 elected member of parliament for the borough of Gatton, continuing to hold his seat until 181 2. Meanwhile his interest in geology increased, he was elected F.R.S. in 1807, and he was the chief founder with others of the Geological Society of London in 1807. He was the first chairman of that Society, and in 181 1, when it was more regularly constituted, he was the first president: and in this capacity he served on two subsequent' occasions, and did much to promote the advancement of geology. In 18 19 he published A Critical Examination of the First Principles of Geology, a work which was useful mainly in refuting erroneous theories. In the same year was published his famous Geological Map of England and Wales, in six sheets; of which a second edition was issued in 1839. This map was to a large extent based on the original map of William Smith; but much new informa- tion was embodied. In 1843 he commenced to prepare a geo- logical map of India, which was published in 1854. He died at Naples on the 2nd of April 1855.

GREENOUGH, HORATIO (1805-1852), American sculptor, son of a merchant, was born at Boston, on the 6th of September 1805. At the age of sixteen he entered Harvard, but he devoted his principal attention to art, and in the autumn of 1825 he went to Rome, where he studied under Thorwaldsen. After a short visit in 1826 to Boston, where he executed busts of John Quincy Adams and other people of distinction, he returned to Italy and took up his residence at Florence. Here one of his first com- missions was from James Fenimore Cooper for a group of Chant- ing Cherubs; and he was chosen by the American government to execute the colossal statue of Washington for the national capital. It was unveiled in 1843, and was really a fine piece of work for its day; but in modern times

it has been sharply criticized as unworthy and incongruous. Shortly afterwards he received a second government commission for a colossal group, the "Rescue," intended to represent the conflict between the Anglo-Saxon and Indian races. In 1851 he returned to Washington to superintend its erection, and in the autumn of 1852 he was attacked by brain fever, of which he died in Somer- ville near Boston on the 18th of December. Among other works of Greenough may be mentioned a bust of Lafayette, the Medora and the Venus Victrix in the gallery of the Boston Athenaeum. Greenough was a man of wide culture, and wrote well both in prose and verse.

See H. T. Tuckerman, Memoir of Horatio Greenough (New York,

1853)-

GREENOUGH, JAMES BRADSTREET (1833-1901), American classical scholar, was born in Portland, Maine, on the 4th of May 1833. He graduated at Harvard in 1856, studied one year at the Harvard Law School, was admitted to the Michigan bat, and practised in Marshall, Michigan, until 1865, when he was ■ appointed tutor in Latin at Harvard. In 1873 he became assistant professor, and in 1883 professor of Latin, a post which he resigned hardly six weeks before his death at Cambridge, Massachusetts, on the nth of October 1901. Following the lead of Goodwin's Moods and Tenses (i860), he set himself to study Latin historical syntax, and in 1870 published Analysis

of the Latin Subjunctive, a brief treatise, privately printed, of much originality and value, and in many ways coinciding with Berthold Delbriick's Gebrauch des Conjunctivs und Optalivs in Sanskrit und Griechischen (1871), which, however, quite over- shadowed the Analysis. In 1872 appeared A Latin Grammar for Schools and Colleges, founded on Comparative Grammar, by Joseph A. Allen and James B. Greenough, a work of great critical carefulness. His theory of «»»-constructions is that adopted and developed by William Gardner Hale. In 1872-1880 Greenough offered the first courses in Sanskrit and comparative philology given at Harvard. His fine abilities for advanced scholarship were used outside the classroom in editing the Allen and Greenough Latin Series of text-books, although he occa- sionally contributed to Harvard Studies in Classical Philology (founded in 1889 and endowed at his instance by his own class) papers on Latin syntax, prosody and etymology — a subject on which he planned a long work — on Roman archaeology and on Greek religion at the time of the New Comedy. He assisted largely in the founding of Radcliffe College. An able English scholar and an excellent etymologist, he collaborated with Professor George L. Kittredge on Words and their Ways in English Speech (1901), one o,f the best books on the subject in the

language. He wrote clever light verse, including The Black- birds, a comedietta, first published in The Atlantic Monthly (vol. xxxix. 1877); The Rose and the Ring (1880), a pantomime adapted from Thackeray; TheQueen of Hearts (1885), a dramatic fantasia; and Old King Cole (1889), an operetta.

See the sketch by George L. Kittredge in Harvard Studies in Classical Philology, vol. xiv. (1903), pp. 1-17 (also printed in Harvard Graduates' Magazine, vol. x., Dec. 1901, pp. 196-201).

GREEN RIBBON CLUB, one of the earliest of the loosely combined associations which met from time to time in London taverns or coffee-houses for political purposes in the 17th century. It had its meeting-place at the King's Head tavern at Chancery Lane End, and was therefore known as the " King's Head Club." It seems to have been founded about the year 1675 as a resort for members of the political party hostile to the court, and as these associates were in the habit of wearing in their hats a bow, or " bob," of green ribbon, as a distinguishing badge useful for the purpose of mutual recognition in street brawls, the name of the club became changed, about 1679, to the Green Ribbon Club. The frequenters of the club were the extreme faction of the country party, the men who supported Titus Oates, and who were concerned in the Rye House Plot and Monmouth's rebellion. Roger North tells us that " they admitted all strangers that were confidingly introduced, for it was a main end of their institutions to make proselytes, especially of the raw estated youth newly come to town." According to Dryden {Absalom and Achitophel) drinking was the chief attraction, and the members talked and organized sedition over their cups. Thomas Dangerfield supplied the court with a list of forty-eight members of the Green Ribbon Club in 1679; and although Dangerfield's numerous perjuries make his unsupported evidence worthless, it receives confirmation as regards several names from a list given to James II. by Nathan Wade in 1885 (Harleian MSS. 6845), while a number of more eminent personages are mentioned in The Cabal, a satire published in 1680, as also frequenting the club. From these sources it would appear that the duke of Monmouth himself, and statesmen like Halifax, Shaftesbury, Buckingham, Maccles- field, Cavendish, Bedford, Grey of Warke, Herbert of Cherbury, were among those who fraternized at the King's Head Tavern with third-rate writers such as Scroop, Mulgrave and Shadwell, with remnants of the Cromwellian regime like Falconbridge, Henry Ireton and Claypole, with such profligates as Lord Howard of Escrik and Sir Henry Blount, and with scoundrels of the type of Dangerfield and Oates. An allusion to Dangerfield. notorious among his other crimes and treacheries for a seditious paper found in a meal-tub, is found in connexion with the club in The Loyal Subjects' Litany, one of the innumerable satires of the period, in which occur the lines:

" From the dark-lanthorn Plot, and the Green Ribbon Club From brewing sedition in a sanctified Tub, Libera nos, Domine."

GREENSAND

The club was the headquarters of the Whig opposition to the court, and its members were active promoters of conspiracy and sedition. The president was either Lord Shaftesbury or Sir Robert Peyton, M.P. for Middlesex, who afterwards turned informer. The Green Ribbon Club served both as a debating society and an intelligence department for the Whig faction. Questions under discussion in parliament were here threshed out by the members over their tobacco and ale; the latest news from Westminster or the city was retailed in the tavern, " for some or others were continually coming and going," says Roger North, " to import or export news and stories." Slander of the court or the Tories was invented in the club and sedulously spread over the town, and measures were there concerted for pushing on the Exclusion Bill, or for promoting the pretensions of the duke of Monmouth. The popular credulity as to Catholic outrages in the days of the Popish Plot was stimulated by the scandalmongers of the club, whose members went about in silk armour, supposed to be bullet proof, " in which any man dressed up was as safe as a house," says North, " for it was impossible to strike him for laughing "; while in their pockets, " for street and crowd-work," they carried the weapon of offence invented by Stephen College and known as the " Protestant Flail."

The genius of Shaftesbury found in the Green Ribbon Club the means of constructing the first systematized political organiza- tion in England. North relates that " every post conveyed the news and tales legitimated there, as also the malign construc- tions of all the good actions of the government, especially to places where elections were depending, to shape men's characters into fit qualifications to be chosen or rejected." In the general election of January and February 1679 the Whig interest throughout the country was managed and controlled by a committee sitting at the club in Chancery Lane. The club's organizing activity was also notably effective in the agitation of the Petitioners in 1679. This celebrated movement was engineered from the Green Ribbon Club with all the skill and energy of a modern caucus. The petitions were prepared in London and sent down to every part of the country, where paid canvassers took them from house to house collecting signatures with an air of authority that made refusal difficult. The great " pope-burning " processions in 1680 and 1681, on the anniversary of Queen Elizabeth's accession, were also organized by the club. They ended by the fighting of a huge bon-fire in front of the club windows; and as they proved an effective means of inflaming the religious passions of the populace, it was at the Green Ribbon Club that the mobile vulgus first received the nickname of " the mob." The activity of the club was, however, short-lived. The failure to carry the Exclusion Bill, one of the favourite projects of the faction, was a blow to its influence, which declined rapidly after the flight of Shaftesbury, the

confiscation of the city of London's charter, and the discovery of the Rye House Plot, in which many of its members were implicated. In 1685 John Ayloffe, who was found to have been " a clubber at the King's Head Tavern and a green-ribon man," was executed in front of the premises on the spot where the " pope-burning " bon-fires had been kindled; and although the tavern was still in existence in the time of Queen Anne, the Green Ribbon Club which made it famous did not survive the accession of James II. The precise situation of the King's Head Tavern, described by North as " over against the Inner Temple Gate," was at the corner of Fleet Street and Chancery Lane, on the east side of the latter thoroughfare.

See Sir George SitwelL The First Whig (Scarborough, 1894), containing an illustration of the Green Ribbon Club and a pope- burning procession; Roger North, Examen (London, 1740); Anchitell Grey, Debates of the House of Commons, 1667-1684, vol. viii. (10 vols., London, 1769); Sir John Bramston, Autobiography (Camden Soc, London, 1845). (R. J. M.)

GREENSAND, in geology, the name that has been applied to no fewer than three distinct members of the Cretaceous System, viz. the Upper Greensand (see Gault), the Lower Greensand and the so-called Cambridge Greensand, a local phase of the base of the Chalk (q.v.). The term was introduced by the early English geologists for certain sandy rocks which frequently

exhibited a greenish colour on account of the presence of minute grains of the green mineral glauconite. Until the fossils of these rocks came to be carefully studied there was much confusion between what is now known as the Upper Greensand (Selbornian) and the Lower Greensand. Here we shall confine our attention to the latter.

The Lower Greensand was first examined in detail by W. H. Fitton (Q.J.G.S. iii., 1847), who, in 1845, had proposed the name " Vectine " for the formation. The name was revived under the form " Vectian " in 1885 by A. J. Jukes-Browne, because, although sands and sandstones prevail, the green colour has often changed by oxidation of the iron to various shades of red and brown, and other lithological types, clays and limestones represent this horizon in certain areas. The Lower Greensand is typically developed in the Wealden district, in the Isle of Wight, in Dorsetshire about Swanage, and it appears again beneath the northern outcrop of the Chalk in Berkshire, Oxford- shire and Bedfordshire, and thence it is traceable through Norfolk and Lincolnshire into east Yorkshire. It rests conform- ably upon the Wealden formation in the south of England, but it is clearly separable from the beds beneath by the occurrence of marine fossils, and by the fact that there is a marked overlap of the Lower Greensand on the Weald in Wiltshire, and derived pebbles are found in the basal beds. The whole series is 800 ft. thick at Atherfield in the Isle of Wight, but it thins

rapidly westward. It is usually clearly marked off from the overlying Gault.

In the Wealden area the Lower Greensand has been sub- divided as follows, although the several members are not every- where recognizable: —

Isle of Wight. Folkestone Beds (70-100 ft.) . Carstone and Sand rock series. Sandgate Beds (75-ioc ft.) . Ferruginous Sands (Shanklin sands). Hythe Beds (80-300 ft.) . . Ferruginous Sands (Walpen sands). Atherfield Clay (20-90 ft.). . Atherfield Clay.

The Atherfield Clay is usually a sandy clay, fossiliferous. The basal portion, 5-6 ft., is known as the " Perna bed " from the abundance of Perna Mulleti; other fossils are Hoplites Deshayesii, Exogyra sinuata, Ancyloceras Mathesonianum. The Hythe beds are interstratified thin limestones and sandstones; the former are bluish-grey in colour, compact and hard, with a certain amount of quartz and glauconite. The limestone is known locally as " rag " ; the Kentish Rag has been largely employed as a building stone and roadstone; it frequently contains layers of chert (known as Sevenoaks stone near that town). The sandy portions are very variable; the stone is often clayey and calcare- ous and rarely hard enough to make a good building stone; locally it is called "hassock " (or Calkstone). The two stones are well exposed in the Iguanodon Quarry near Maidstone (so called from the discovery of the bones of that reptile). South- west of Dorking sandstone and grit become more prevalent, and it is known there as " Bargate stone," much used around Godal- ming. Pulborough stone is another local sandstone of the Hythe beds. Fuller's earth occurs in parts of this formation in Surrey. The Sandgate beds, mainly dark, argillaceous sand and clay, are well developed in east Kent, and about Midhurst, Pulborough and Petworth. At Nutfield the celebrated fuller's earth deposits occur on this horizon; it is also found near Maidstone, at Bletchingley and Red Hill. The Folkestone beds are light-coloured, rather coarse sands, enclosing layers of siliceous limestone (Folkestone stone) and cher.t; a phosphatic bed is found near the top. These beds are well seen in the cliffs at Folkestone and near Reigate. At Ightham there is a fine, hard, white sand- stone along with a green, quartzitic variety (Ightham stone). In Sussex the limestone and chert are usually lacking, but a fer- ruginous grit, " carstone," occurs in lenticular masses and layers, which is used for ••oad metal at Pulborough, Fittleworth, &c.

The Lower Greensand usually forms picturesque, healthy country, as about Leith Hill, Hindhead, Midhurst, Petworth, at Woburn, or at Shanklin and Sandown in the Isle of Wight. Outside the southern area the Lower Greensand is represented by the Faringdon sponge-bearing beds in Berkshire, the Sandy and

Potton beds in Bedfordshire, the Shotover iron sands of Oxford- shire, the sands and fuller's earth of Woburn, the Leighton Buzzard sands, the brick clays of Snettisham, and perhaps the Sandringham sands of Norfolk, and the carstone of that county and Lincolnshire. The upper ironstone, limestone and clay of the Lincolnshire Tealby beds appear to belong to this horizon along with the upper part of the Speeton beds of Yorkshire. The sands of the Lower Greensand are largely employed for the manufacture of glass, for which purpose they are dug at Aylesford, Godstone, near Reigate, Hartshill, near Aylesbury and other places; the ferruginous sand is worked as an iron ore at Seend.

Thi? formation is continuous across the channel into France, where it is well developed in Boulonnais. According to the continental classification the Atherfield Clay is equivalent to the Urgonian or Barremian; the Sandgate and Hythe beds belong to the Aptian (?.».); while the upper part of the Folkestone beds would fall within the lower Albian (q.v.).

See the Memoirs of the Geological Survey, " Geology of the Weald " (1875), " Geology of the Isle of Wight " (2nd ed., 1889), " Geology of the Isle of Purbeck " (1898); and the Record of Excursions, Geologists' Association (London, 1891). (J. A. H.)

GREENSBORO, a city and the county-seat of Guilford county, North Carolina, U.S.A., about 80 m. N.W. of Raleigh. Pop. (1890) 3317, (1900) 10,035, of whom 4086 were negroes; (1910 census), 15,895. Greensboro is. served by several lines of the Southern railway. It is situated in the Piedmont region of the state and has an excellent climate. The city is the seat of the State Normal and Industrial College (1892) for girls; of the Greensboro Female College (Methodist Episcopal, South; chartered in 1838 and opened in 1846), of which the Rev. Charles F. Deems was president in 1850-1854, and which, owing to the burning of its buildings, was suspended from 1863 to 1874; and of two institutions for negroes— a State Agricultural and Mechanical College, andBennettCollege(MethodistEpiscopal, co-educational, 1873). Another school for negroes, Immanuel Lutheran College (Evangelical Lutheran, co-educational), was opened at Concord, N.C., in 1903, was removed to Greensboro in 1905, and in 1907 was established at Lutherville, E. of Greensboro. About 6 m. W. of Greensboro is Guilford College (co-educational; Friends), founded as " New Garden Boarding School " in 1837 and re- chartered under its present name in 1888. Greensboro has a Carnegie library, St Leo hospital and a large auditorium. It is the shipping-

point for an agricultural, lumbering and trucking region, among whose products Indian corn, tobacco and cotton are especially important; is an important insurance centre; has a large wholesale trade; and has various manufactures, including cotton goods 1 (especially blue denim), tobacco and cigars, lumber, furniture, sash, doors and blinds, machinery, foundry products and terra-cotta. The value of the factory products increased from $925,411 in 1900 to $1,828,837 in 1905, or 97-6%. The municipality owns and operates the water- works. Greensboro was named in honour of General Nathanael Greene, who on the 15th of March 1781 fought with Cornwallis the battle of Guilford Court House, about 6 m. N.W. of the city, where there is now a Battle-Ground Park of 100 acres (including Lake Wilfong) ; this park contains a Revolutionary museum, and twenty-nine monu- ments, including a Colonial Column, an arch (1906) in memory of Brig. -General Francis Nash (1720-1777), of North Carolina, who died in October 1 7 7 7 of wounds received at Germantown, and Davidson Arch (1905), in honour of William Lee Davidson (1746- 1 78 1) , a brigadier-general of North Carolina troops, who was killed at Catawba and in whose honour Davidson College, at Davidson, N.C., was named. Greensboro was founded and became the county-seat in 1808, was organized as a town in 1829, and was first chartered as a city in 1870.

1 One of the first cotton mills in the South and probably the , first in this state was established at Greensboro in 1832. It closed about 20 years afterwards, and in 1889 new mills were built. Three very large mills were built in the decade after 1 895, and three mill villages, Proximity, Revolution and White Oak, named from these three mills, lie immediately N. of the city; in 1908 their population was estimated at 8000. The owners of these mills maintain schools for the children of operatives and carry on " welfare work " in these villages.

GREENSBUR6, a borough and the county-seat of Westmore- land county, Pennsylvania, U.S.A., 31 m. E.S.E. of Pittsburg. Pop. (1890) 4202; (1900) 6508 (484 foreign-born); (1910) 5420. It is served by two lines of the Pennsylvania railway. It is an important coal centre, and manufactures engines, iron and brass goods, flour, lumber and bricks. In addition to its public school system, it has several private schools, including St Mary's Academy and St Joseph's Academy, both Roman Catholic. About 3 m. N.E. of what is now Greensburg stood the village of Hanna's Town, settled about 1770 and almost completely destroyed by the Indians on the 13th of July 1782; here what is said to have been the first court held west of the Alleghanies opened on the 6th of April 1773, and the county courts continued to be held here until 1787. Greensburg was settled in 1 784-1 785, imme- diately after the opening of the state road, not far from the trail followed by General John Forbes on his march to Fort Duquesne in 1758; it was made the county-seat in 1787, and was incor- porated in

1799. In 1905 the boroughs of Ludwick (pop. in 1900, 901), East Greensburg (1050), and South-east Greensburg (620) were merged with Greensburg.

See John N. Boucher's History of Westmoreland County, Pa. (3 vols., New York, 1906).

GREENSHANK, one of the largest of the birds commonly known as sandpipers, the Totanus glottis of most ornithological writers. Some exercise of the imagination is however needed to see in the dingy olive-coloured legs of this species a justification of the English name by which it goes, and the application of that name, which seems to be due to Pennant, was probably by way of distinguishing it from two allied but perfectly distinct species of Totanus (T. calidris and T. fuscus) having red legs and usually called redshanks. The greenshank is a native of the northern parts of the Old World, but in winter it wanders far to the south, and occurs regularly at the Cape of Good Hope, in India and thence throughout the Indo-Malay Archipelago to Australia. It has also been recorded from North America, but its appearance there must be considered accidental. Almost as bulky as a woodcock, it is of a much more slender build, and its long legs and neck give it a graceful appearance, which is enhanced by the activity of its actions. Disturbed from the moor or marsh, where it has its nest, it rises swiftly into the air, conspicuous by its white back and rump, and uttering shrill cries flies round the intruder. It will perch on the topmost bough of a tree, if a tree be near, to watch his proceedings, and the cock exhibits all the astounding gesticulations in which the males of so many other Limicolae indulge during the breeding-season — with certain variations, however, that are peculiarly its own. It breeds in no small numbers in the Hebrides, and parts of the Scottish Highlands from Argyllshire to Sutherland, as well as in the more elevated or more northern districts of Norway, Sweden and Finland, and probably also thence to Kam- chatka. In North America it is represented by two species, Totanus semipalmatus and T. melanoleucus , there called willets, telltales or tattlers, which in general habits resemble the green- shank of the Old World. (A. N.)

GREENVILLE, a city and the county-seat of Washington county, Mississippi, U.S.A., on the E. bank of the Mississippi river, about 75 m. N. of Vicksburg. Pop. (1890) 6658; (1900) 7642 (4987 negroes); (1910) 9610. Greenville is served by the Southern and the Yazoo & Mississippi Valley railways, and by various passenger and freight steamboat lines on the Mississippi river. It is situated in the centre of the Yazoo Delta, a rich cotton-producing region, and its industries are almost exclusively connected with that staple. There are large warehouses, com- presses and gins, extensive cotton-seed oil works and sawmills. Old Greenville, about 1 m. S. of the present site, was the county seat of Jefferson county until 1825

(when Fayette succeeded it), and later became the county-seat of Washington county. Much of the old town caved into the river, and during the Civil War it was burned by the Federal forces soon after the capture of Memphis. The present site was then adopted. The town of Greenville was incorporated in 1870; in 1886 it was chartered as a city.

GREENVILLE, a city and the county-seat of Darke county, Ohio, U.S.A., on Greenville Creek, 36 m. N.W. of Dayton. Pop. (1900) 5501; (1910) 6237. It is served by the Pittsburg, Cincinnati, Chicago & St Louis and the Cincinnati Northern railways, and by interurban electric railways. It is situated about 1050 ft. above sea-level and is the trade centre of a large and fertile agricultural district, producing cereals and tobacco. It manufactures lumber, foundry products, canned goods and creamery products and has grain elevators and tobacco ware- houses. In the city is a Carnegie library, and 3 m. distant there is a county Children's Home and Infirmary. The municipality owns and operates its water-works. Greenville occupies the site of an Indian village and of Fort Greenville (built by General Anthony Wayne in 1793 and burned in 1796). Here, on the 3rd of August 1795, General Wayne, the year after his victory over the Indians at Fallen Timbers, concluded with them the treaty of Greenville, the Indians agreeing to a cessation of hostilities and ceding to the United States a considerable portion of Ohio and a number of small tracts in Indiana, Illinois and Michigan (including the sites of Sandusky, Toledo, Defiance, Fort Wayne, Detroit, Mackinac, Peoria and Chicago), and the United States agreeing to pay to the Indians $20,000 worth of goods immediately and an annuity of goods, valued at $9500, for ever. The tribes concerned were the Wyandots, the Dela- wares, the Shawnees, the Ottawas, the Chippewas, the Pottawa- tomies, the Miamis, the Weeas, the Kickapoos, the Piankashas, the Kaskaskias and the Eel-river tribe. Tecumseh lived at Greenville from 1805 to 1809, and a second Indian treaty was negotiated there in July 1814 by General W. H. Harrison and Lewis Cass, by which the Wyandots, the Delawares, the Shawnees, the (Ohio) Senecas and the Miamis agreed to aid the United States in the war with Great Britain. The first permanent white settlement of Greenville was established in 1808 and the town was laid out in the same year. It was made the county-seat of the newly erected- county in 1809, was incorporated as a town in 1838 and chartered as a city in 1887.

GREENVILLE, a city and the county-seat of Greenville county, South Carolina, U.S.A., on the Reedy river, about 140 m. N.W. of Columbia, in the N.W. part of the state. Pop. (1890) 8607; (1900) 11,860, of whom

5414 were negroes; (1910, cen- sus) 15,741. It is served by the Southern, the Greenville & Knoxville and the Charleston & Western Carolina railways. It lies 976 ft. above sea-level, near the foot of the Blue Ridge Mountains, its climate and scenery attracting summer visitors. It is in an extensive cotton-growing and cotton-manufacturing district. Greenville's chief interest is in cotton, but it has various other manufactures, including carriages, wagons, iron and fertilizers. The total value of the factory products of the city in 1905 was $1,676,774, an increase of 73-5% since 1900. The city is the seat of Furman University, Chicora College for girls (1893; Presbyterian), and Greenville Female College (1854; Baptist), which in 1907-1908 had 379 students, and which, besides the usual departments, has a conservatory of music, a school of art, a school of expression and physical culture and a kindergarten normal training school. Furman University (Baptist; opened in 1852) grew out of the " Furman Academy and Theological Institution," opened at Edgefield, S.C., in 1827, and named in honour of Richard Furman (1755-1825), a well- known Baptist clergyman of South Carolina, whose son, James C. Furman (1800-1891), was long president of the University. In 1907-1908 the university had a faculty of 15 and 250 students, of whom 101 were in the Furman Fitting School. Greenville was laid out in 1797, was originally known as Pleasantburg and was first chartered as a city in 1868.

GREENVILLE, a city and the county-seat of Hunt county? Texas, U.S.A., near the headwaters of the Sabine river, 48 m. N.E. of Dallas. Pop. (190c) 686o, of whom 114 were foreign- born and 1751 were negroes; (1910) 8850. It is served by the Missouri, Kansas & Texas, the St Louis South-Western and the Texas Midland railways. It is an important cotton market, has gins and compresses, a large cotton seed oil refinery, and other manufactories, and is a trade centre for a rich agri-

cultural district. The city owns and operates its electric-lighting plant. It is the seat of Burleson College (Baptist), founded in 1893, and 1 m. from the city limits, in the village of Peniel (pop. 1908, about 500), a community of " Holiness " people, are the Texas Holiness University (1898), a Holiness orphan asylum and a Holiness press. Greenville was settled in 1844, and was chartered as a city in 1875. In 1907 the Texas legislature granted to the city a new charter establishing a commission government similar to that of Galveston.

GREENWICH, a township of Fairfield county, Connecticut, U.S.A., on Long Island Sound, in the extreme S.W. part of the state, about 28 m. N.E. of New York City. It contains a borough of the same name and the villages of Cos Cob, Riverside and Sound Beach, all served by the New York, New Haven & Hart- ford Railway; the township has steamboat and electric railway connexions with New York City. Pop. of the township (1900)

12,172, of whom 3271 were foreign-born; (1910) 16,463; of the borough (1910) 3886. Greenwich is a summer resort, principally for New Yorkers. Among the residents have been' Edwin Thomas Booth, John Henry Twachtman, the landscape painter, and Henry Osborne Havemeyer (1847-1907), founder of the American Sugar Company. There are several fine churches in the township; of one in Sound Beach the Rev. William H. H. Murray (1840-1904), called " Adirondack Murray," from his Camp Life in the Adirondack Mountains (1868), was once pastor. In the borough are a public library, Greenwich Academy (1827; co-educational), the Brunswick School for boys (1901), with which Betts Academy of Stamford was united in 1908, and a hospital. The principal manufactures are belting, woollens, tinners' hardware, iron and gasolene motors. Oysters are shipped from Greenwich. The first settlers came from the New Haven Colony in 1640; but the Dutch, on account of the explora- tion of Long Island Sound by Adrian Blok in 1614, laid claim to Greenwich, and as New Haven did nothing to assist the settlers, they consented to union with New Netherland in 1642. Greenwich then became a Dutch manor. By a treaty of 1650, which fixed the boundary between New Netherland and the New Haven Colony, the Dutch relinquished their claim to Greenwich, but the inhabitants of the town refused to submit to the New Haven Colony until October 1656. Six years later Greenwich was one of the first towns of the New Haven Colony to submit to Connecticut. The township suffered severely during the War of Independence on account of the frequent quartering of American troops within its borders, the depreda- tions of bands of lawless men after the occupation of New York by the British in 1778 and its invasion by the British in 1779 (February 25) and 1781 (December 5). There was also a strong loyalist sentiment. On the old post-road in Greenwich is the inn, built about 1729, at which Israel Putnam was surprised in February 1779 by a force under General Tryon; according to tradition he escaped by riding down a flight of steep stone steps. The inn was purchased in 1901 by the Daughters of the American Revolution, who restored it and made it a Putnam Memorial. The township government of Greenwich was instituted in the colonial period. The borough of Greenwich was incorporated in

1858.

See D.M. Mead, History of the Town of Greenwich(Ne\v York, 1857).

GREENWICH, a south-eastern metropolitan borough of London, England, bounded N. by the river Thames, E. by Woolwich, S. by Lewisham and W. by Deptford. Pop. (1901) 95,770. Area, 3851-7 acres. It has a river-frontage of i,\ m., the Thames making two deep bends, enclosing the Isle of Dogs on the north and a similar peninsula on the Greenwich side. Greenwich is connected with Poplar on the north shore by the Greenwich

tunnel (1902), for foot-passengers, to the Isle of Dogs (Cubitt Town), and by the Blackwall Tunnel (1897) for street traffic, crossing to a point between the East and West India Docks (see Poplar). The main thoroughfares from W. to E. are Woolwich and Shooter's Hill Roads, the second representing the old high road through Kent, the Roman Watling Street. Greenwich is first noticed in the reign of Ethelred, when it was a station of the Danish fleet (1011-1014).

The most noteworthy buildings are the hospital and the observatory. Greenwich Hospital, as it is still called, became in 1873 a Royal Naval College. Upon it or its site centre nearly all the historical associations of the place. The noble buildings, contrasting strangely with the wharves adjacent and opposite to it, make a striking picture, standing on the low river-bank with a background formed by the wooded elevation of Greenwich Park. They occupy the site of an ancient royal palace called Greenwich House, which was a favourite royal residence as early as 1300, but was granted by Henry V. to Thomas Beaufort, duke of Exeter, from whom it passed to Humphrey, duke of Gloucester, who largely improved the property and named it Placentia. It did not revert to the crown till his death in 1447. It was the birthplace of Henry VIII., Queen Mary and Queen Elizabeth, and here Edward VI. died. The building was enlarged by Edward IV., by Henry VIII., who made it one of his chief residences, by James I. and by Charles I., who erected the " Queen's House " for Henrietta Maria. The tenure of land from the crown " as of the manor of East Greenwich " became at this time a recognized formula, and occurs in a succession of American colonial charters from those of Virginia in 1606, 1609 and 161 2 to that of New Jersey in 1674. Along with other royal palaces Greenwich was at the Revolution appropriated by the Protector, but it reverted to the crown on the restoration of Charles II., by whom it was pulled down, and the west wing of the present hospital was erected as part of an extensive design which was not further carried out. In its unfinished state it was assigned by the patent of William and Mary to certain of the great officers of state, as commissioners for its conversion into a hospital for seamen; and it was opened as such in 1705. The building consists of four blocks. Behind a terrace 860 ft. in length, stretching along the river side, are the buildings erected in the time of Charles II. from Inigo Jones's designs, and in that of Queen Anne from designs by Sir Christopher Wren; and behind these buildings are on the west those of King William and on the east those of Queen Mary, both from Wren's designs. In the King William range is the painted hall. Here in 1806 the remains of Nelson lay in state before their burial in St Paul's Cathedral. Its walls and ceiling were painted by Sir

James Thornhill with various emblematic devices, and it is hung with portraits of the most distinguished admirals and paintings of the chief naval battles of England. In the Queen Anne range is the Royal Naval Museum, containing models, relics of Nelson and of Franklin, and other objects. In the centre of the principal quadrangle of the hospital there is a statue of George II. by Rysbrack, sculptured out of a single block of marble taken from the French by Admiral Sir George Rooke. In the upper quad- rangle is a bust of Nelson by Chantrey, and there are various other memorials and relics. The oldest part of the building was in some measure rebuilt in 18 n, and the present chapel was erected to replace one destroyed by fire in 1779. The endow- ments of the hospital were increased at various periods from bequests and forfeited estates. Formerly 2700 retired seamen were boarded within it, and 5000 or 6000 others, called out- pensioners, received stipends at various rates out of its funds; but in 1865 an act was passed empowering the Admiralty to grant liberal pensions in lieu of food and lodging to such of the inmates as were willing to quit the hospital, and in 1869 another act was passed making their leaving on these conditions com- pulsory. It was then devoted to the accommodation of the students of the Royal Naval College, the Infirmary being granted to the Seamen's Hospital Society. Behind the College is the Royal Hospital School, where 1000 boys, sons of petty officers and seamen, are boarded.

To the south of the hospital is Greenwich Park (185 acres), lying high, and commanding extensive views over London, the ■ Thames and the plain of Essex. It was enclosed by Humphrey, duke of Gloucester, and laid out by Charles II., and contains a fine avenue of Spanish chestnuts planted in his time. In it is situated the Royal Observatory, built in 1675 for the advance- ment of navigation and nautical astronomy. From it the exact time is conveyed each day at one o'clock by electric signal to*

the chief towns throughout the country; British and the majority of foreign geographers reckon longitude from its meridian. A standard clock and measures are seen at the entrance. A new building was completed in 1899, the magnetic pavilion lying some 400 yds. to the east, so placed to avoid the disturbance of instruments which would be occasioned by the iron used in the principal building. South of the park lies the open common of Blackheath, mainly within the borough of Lewisham, and in the east the borough includes the greater part of Woolwich Common.

At Greenwich an annual banquet of cabinet ministers, known as the whitebait dinner, formerly took place. This ceremony arose out of a dinner held annually at Dagenham, on the Essex shore of the Thames, by the commissioners for engineering works carried out therein 1 70.5-1 7 20 — a remarkable achievement for this period — to save the lowlands from flooding. To one of these dinners Pitt was invited, and was subsequently

accom- panied by some of his colleagues. Early in the 19th century the venue of the dinner, which had now become a ministerial function, was transferred to Greenwich, and though at first not always held here, was later celebrated regularly at the " Ship," an hotel of ancient foundation, closed in 1908. The banquet continued till 1868, was revived in 1874-1880, and was held for the last time in 1894.

The parish church of Greenwich, in Church Street, is dedicated to St Alphege, archbishop, who was martyred here by the Danes in 1012. In the church Wolfe, who died at Quebec (1759), and Tallis, the musician, are buried. A modern stained- glass window commemorates Wolfe.

The parliamentary borough of Greenwich returns one member. Two burgesses were returned in 1577, but it was not again repre- sented till the same privilege was conferred on it in 1832. The borough council consists of a mayor, five aldermen and thirty councillors.

GREENWOOD, FREDERICK (1830-1909), English journalist and man of letters, was born in April 1830. He was one of three brothers — the others being James and Charles — who all gained reputation as journalists. Frederick started life in a printing house, but at an early age began to write in periodicals. In 1853 he contributed a sketch of Napoleon III. to a volume called The Napoleon Dynasty (2nd ed., 1855). He also wrote several novels: The Loves of an Apothecary (1854), The Path of Roses (1859) and (with his brother James) Under a Cloud (i860). To the second number of the Cornhill Magazine he contributed " An Essay without End," and this led to an intro- duction to Thackeray. In 1862, when Thackeray resigned the editorship of the Cornhill, Greenwood became joint editor with G. H. Lewes. In 1864 he was appointed sole editor, a post which he held until 1868. While at the Cornhill he wrote an article in which he suggested, to some extent, how Thackeray might have intended to conclude his unfinished work Denis Duval, and in its pages appeared Margaret Denzil's History, Greenwood's most ambitious work of fiction, published in volume form in 1864. At that time Greenwood had conceived the idea of an evening newspaper, which, while containing " all the news proper to an evening journal," should, for the most part, be made up " of original articles upon the many things which engage the thoughts, or employ the energies, or amuse the leisure of mankind." Public affairs, literature and art, " and all the influences which strengthen or dissipate society " were to be discussed by men whose independence and authority were equally unquestionable. Canning's Anti-Jacobin and the Saturday Review of 1864 were the joint models Greenwood had before him. The idea was taken up by Mr George Smith, and the Pall Mall Gazette (so named after Thackeray's imaginary paper in Pendennis) was launched in February 1865, with Greenwood as editor. Within a few years he had come to

exercise a great influence on public affairs. His views somewhat rapidly ripened from what was described as philosophic Liberal- ism into Conservatism. No minister in Great Britain, Mr Gladstone declared, ever had a more able, a more zealous, a more effective supporter for his policy than Lord Beaconsfield

had in Greenwood. It was on the suggestion of Greenwood that Beaconsfield purchased in 1875 the Suez Canal shares of the Khedive Ismail; the British government being ignorant, until informed by Greenwood, that the shares were for sale and likely to be bought by France. It was characteristic of Greenwood that be declined to publish the news of the purchase of the shares in the Pall Mall before the official announcement was made.

Early in 1880 the Pall Mall changed owners, and the new proprietor required it to support Liberal policy. Greenwood at once resigned his editorship, but in May a new paper, the St James's Gazette, was started for him by Mr Henry Hucks Gibbs (afterwards Lord Aldenham), and Greenwood proceeded to carry on in it the tradition which he had established in the Pall Mall. At the St James's Greenwood remained for over eight years, continuing to exercise a marked influence upon political affairs, notably as a pungent critic of the Gladstone administration (1880-1885) and an independent supporter of Lord Salisbury. His connexion with the paper ceased in August 1888, owing to disagreements with the new proprietor, Mr E. Steinkopff, who had bought the St James's at Greenwood's own suggestion. In January 1891 Greenwood brought out a weekly review which he named the Anti-Jacobin. It failed, however, to gain public support, the last number appearing in January 1892. In 1893 he published The Lover',s Lexicon and in 1894 Imagination in Dreams. He continued to express his views on political and social questions in contributions to newspapers and magazines, writing frequently in the Westminster Gazette, the Pall Mall, Blackwood, the Cornhill, &c. Towards the end of his life his political views reverted in some respects to the Liberalism of his early days.

In the words of George Meredith " Greenwood was not only a great journalist, he had a statesman's head. The national interests were always urgent at his heart." He was remarkable for securing for his papers the services of the ablest writers of the day, and for the gift of recognizing merit in new writers, such, for instance, as Richard Jeffries and J. M. Barrie. His instinct for capacity in others was as sure as was his journalistic judgment.

In 1905, on the occasion of his 75th birthday, a dinner was given in his honour by leading statesmen, journalists, and men of letters (with John Morley — who had succeeded him as editor of the Pall Mall — in the chair). In May 1907 he contributed to Blackwood an article on " The New Journalism," in which he drew a sharp contrast between the old and the new conditions under w-hich the work of a newspaper writer is conducted. He died at Sydenham on the 14th of December 1909.

See Honouring Frederick Greenwood, being a report of the speeches at the dinner on the 8th of April 1905 (London, privately printed, I 9°5)'. " Birth and Infancy of the Pall Mall Gazette," an article contributed by Greenwood to the Pall Mall of the 14th of April V897; " The Blowing of the Trumpet " in the introduction to the St James's (May 31, 1880); obituary notices in the Athenaeum (Dec. 25, 1909) and The Times (Dec. 17, 1909).

GREENWOOD, JOHN (d. 1593), English Puritan and Separatist (the date and place of his birth are unknown) , entered as a sizar at Corpus Christi College, Cambridge, on the 18th of March 1577-1578, and commenced B. A. 1581. Whether he was directly influenced by the teaching of Robert Browne (q.v.), a graduate of the same college, is uncertain; in any case he held strong Puritan opinions, which ultimately led him to Separatism of the most rigid type. In 1581 he was chaplain to Lord Rich, at Rochford, Essex. At some unspecified time he had been made deacon by John Aylmer, bishop of London, and priest by Thomas Cooper, bishop of Lincoln; but ere long he re- nounced this ordination as " wholly unlawful.". Details of the next few years are lacking; but by 1586 he was the recognized leader of the London Separatists, of whom a considerable number had been imprisoned at various times since 1567. Greenwood Was arrested early in October 1586, and the following May was committed to the Fleet prison for an indefinite time, in default of baM for conformity. During his imprisonment he wrote some controversial tracts in conjunction with his fellow-prisoner Henry Barrowe (q.v.). He is understood to have been at liberty in the autumn of 1588; but this may have been merely " the

liberty of the prison." However, he was certainly at large in September 1592, when he was elected "teacher" of the Separatist church. Meanwhile he had written (1590) " An Answer to George Gifford's pretended Defence of Read Prayers." On the 5th of December he was again arrested; and the following March was tried, together with Barrowe, and condemned to death on a charge of " devising and circulating seditious books." After two respites, one at the foot of the gallows, he was hanged on the 6th of April 1593.

Authorities. — H. M. Dexter, Congregationalism during the last three hundred years; The England and Holland of the Pilgrims; F. J. Powicke,

Henry Barrowe and the Exiled Church of Amsterdam; B. Brook, Lives of the Puritans; C. H. Cooper, Athevae Canta- brigienses, vol. ii.

GREG, WILLIAM RATHBONE (1809-1881), English essayist, the son of a merchant, was born at Manchester in 1809. He was educated at the university of Edinburgh and for a time managed a mill of his father's at Bury, and in 1832 began business on his own account. He entered with ardour into the struggle for free trade, and obtained in 1842 the prize offered by the Anti- Corn Law League for the best essay on " Agriculture and the Corn Laws. " He was too much occupied with political, economi- cal and theological speculations to give undivided attention to his business, which he gave up in 1850 to devotehimself to writing. His Creed of Christendom was published in 185 1, and in 1852 he contributed no less than twelve articles to four leading quarterlies. Disraeli prajsed him; Sir George Cornewall Lewis bestowed a Commissionership of Customs upon him in 1856; and in 1864 he was made Comptroller of the Stationery Office. Besides contributions to periodicals he produced several volumes of essays on political and social philosophy. The general spirit of these is indicated by the titles of two of the best known, The Enigmas of Life (1872) and Rocks Ahead (1874). They represent a reaction from the high hopes of the author's youth, when wise legislation was assumed to be a remedy for every public ill. Greg was a man of deep moral earnestness of character and was interested in many philanthropic works. He died at Wimbledon on the 151I1 of November 1881. His brother, Robert Hyde Greg (1795-1875), was an economist and antiquary of some distinction. Another brother, Samuel Greg (1804-1876), became well known in Lancashire by his philan- thropic efforts on behalf of the working-people. Percy Greg (1836-1889), son of William Rathbone Greg, also wrote, like his father, on politics, but his views were violently reactionary. His History of the United States to the Reconstruction of the Union (1887) is a polemic rather than a history.

GREGARINES (mod. Lat. Gregarina, from gregarius, collecting in a flock or herd, grex) a large and abundant order of Sporozoa Ectospora, in which a very high degree of morphological special- ization and cy tological differentiation of the cell-body is frequently found. On the other hand, the life-cycle is, in general, fairly simple. Other principal characters which distinguish Gregarines from allied Sporozoan parasites are as follows: — The fully- grown adult (trophozoite) is always " free " in some internal cavity, i.e. it is extracellular; in nearly all cases prior to sporula- tion two Gregarines (associates) become attached to one another, forming a couple (syzygy), and are surrounded by a common cyst; inside the cyst the body of each associate becomes segmented up into a number of sexual elements (gametes, primary sporo blasts), which then conjugate in pairs; the resulting copula (zygote, definitive sporoblast) becomes usually a spore by

the secretion of spore-membranes (sporocyst), its protoplasm (sporoplasm) dividing up to form the germs (sporo- zoites).

F. Redi (1684) is said to have been the first to observe a Gregarine parasite, but his claim to this honour is by no means certain. Much later (1787) Cavolini described /fj storlca i and figured an indubitable Gregarine (probably the form now known as Aggregata conformis) from a Crustacean (Pachygrapsus) , which, however, he regarded as a tapeworm. Leon Dufour, who in his researches on insect anatomy came across several species of these parasites, also considered them as allied to the worms and proposed the generic name of Gregarine.

The unicellular nature of Gregarines was first realized by A. von Kolliker, who from 1845-1848 added considerably to our know- ledge of the frequent occurrence and wide distribution of these organisms. Further progress was due to F. Stein who demon- strated about this time the relation of the "pseudo- navicellae" (spores) to the re- production of the parasites.

Apart from the continually in- creasing number of known species, matters remained at ab out this stage for many years. It is, in fact, only since the closing years of the 19th century that the complete life- history has been fully worked out; this has now been done in many cases, thanks to the researches of M. Siedlecki, L. Cuenot, L. Leger, O. Duboscq, A. iv ■ i„ I- c. 1 j ■ -r. r ■ Laveran, M.*

From W asielewski s Sporozcenhunde, alter Pteiffer. _ ' „

*Fig. I.— a, Transverse Section of Intestine of ~ A u l . r y ' * ' Mealworm, infected with Gregarina (ClepsydHna) Mesnil and polymorpha ; 1 b, Part of a highly magnified. others, to whom j*

also we owe most of our knowledge regarding the relations of the parasites to the cells of their host during their early development.

*Gregarines are essentially parasites of Invertebrates; they are not known to occur in any true Vertebrate although met with in Occur- Ascidians. By far the greatest number of hosts is reace; furnished by the Arthropods. Many members of the J"°!*f ."' various groups of worms (especially the Annelids) also harbour the parasites, and certain very interesting forms are found in Echinoderms; in the other classes, they either occur only sporadically or else are absent. Infection is invariably of the accidental (casual) type, by*

way of the ali- mentary canal, the spores being usually swallowed by the host when feeding; a novel variation of this method has been described by Woodcock (31) in the case of a Gregarine parasitic in Cucumaria, where the spores are sucked up through the cloaca into the respiratory trees, by the inhalant current.

The favourite habitat is either the intestine (fig. 1) or its diverticula (e.g. the Malpighian tubules), or the body-cavity.

ing, however, extracellular), grow considerably in that situation, and ultimately fall into the body-cavity (e.g. Diplocystis); or they may pass straightway into the body-cavity and there come into relation with some organ or tissue (e.g. and ettectf Monocystis of the earthworm, which is for a time intra- on host cellular in the spermatoblasts (fig. 4, c). In the case of intestinal Gregarines, the behaviour of the young trophozoite with respect to the epithelial cells of its host varies greatly. The parasite may remain only attached to the host-cell, never becoming actually intracellular (e.g. Pterocephalus); more usually it penetrates partially into it, the extracellular portion of the Gregarine, however, giving rise subsequently to most of the adult (e.g. Gregarina) ; or lastly, in a few forms, the early development is entirely intracellular (e.g. Lankesteria, Stenophora). The effects on the host are confined to the parasitized cells. These generally undergo at first marked hypertrophy and altera- tion in character; this condition is succeeded by one of atrophy, when the substance of the cell becomes in one way or another practically absorbed by the growing parasite (cf. also Coccidia). Since, however, the Gregarines never over- run their hosts in the way that many other Sporozoa do (because of their lack, in general, of the power of endo- genous multiplication) , the number of cells of any tissue attacked, even in the case of a strong infection, is only a

From Wasielewski, after Leger.

Fig. 2. — Cysts of a Coelomic Gregarine, in the body-cavity of 2u larva of Tipula.

In the latter case, after infection has occurred, the liberated germs at once traverse the intestinal epithelium. They may come to rest in the connective tissue of the sub-mucosa (remain-

1 Figures I, 2, 6, 7, 10, n, 12 and 16 are redrawn from Wasielewski's Sporozoenkunde, by permission of the author and of the publisher, Gustav Fischer, Jena.

From Lankester.

Fig. 3. — Porospora gigantea f, (E. van Ben.), from the intes- tine of the

lobster, a, Nucleus.

C.

From Lankester, after various authors. Fig. 4. a-c,Trophozoites of Monocystis agilis. a and b, Young individuals showing changes of body-form.

c, Older individual, still enveloped

in a coat of spermatozoa.

d, e, Trophozoites of M. magna at-

tached to seminal funnel of Lumbricus. Goblet-shaped epithelial cells, in which the extremity of the parasite is inserted.

very small percentage of the whole. In short the hosts d noi,, as a rule, suffer any appreciable inconvenience from the presence of the parasites. The body of a Gregarine is always of a definite shape, usually ovaJ*

or elongated; in one or two instances (e.g. Diplodina) it is spherical,

and, on the other hand, in Porospora (fig. 3) it is greatly

. orp °" drawn out and vermiform. In many adult Gregarines,

xy ' the body is divided into two distinct but unequal regions

or halves, the anterior part being known as the protomerite, the

hinder, generally the larger, as the deutomerite. This feature is

closely associated with another important morphological character,

one which is observable, however, only during the earlier stages of

,,&>. growth and development,

Jlpjjt, namely, the presence of

iflllfilsk. f a definite organ, the epi-

S=,SK«s^. merite, which serves for

the attachment of the parasite to the host-cell (fig. 6).

In those Gregarines (most intestinal forms) which become attached to an epithelial cell, the attachment occurs by means of a minute pro- jection or beak (rostrum) at the anterior end of the sporozoite, which pushes its way into the cell, followed by the first part of the growing germ. This After Siedlecki, from Lankester's Treatise on Zoology, portion of the body in- Fig. 5.— Part of a section through the creases in size much apparatus of fixation of a Pyocephalus, quicker at first than the snowing root-like processes extending from the Gregarine between the epithelial

&t

rest (the extracellular

„-„„.„ „„ „ , part), more or less fills up

ceils". ~^ Hearf of Gregarine; ^Root-Tike the host-cell, and forms processes; ep, Epithelial cells. the well-developed epi-

merite or secondary attaching organella. The extracellular part of the Gregarine next grows rapidly, and a transverse septum is formed at a short distance away from- (outside) the point where the body pene- trates into the cell (fig. 6) ; this marks off the large deutomerite posteriorly (distally). Leger thinks that this partition most likely owes its origin to trophic considerations, i.e. to the slightly different manner in which the two halves of the young parasite (the proximal, largely intracellular part, and the distal, extracellular one) may be supposed to obtain their nutriment. In the case of the one half, the host -cell supplies the nutriment, in that of the other, the intestinal liquid ; and the septum is, as it were, the expression of the conflicting limit between these two methods. Nevertheless, the present writer does not think that mechanical considerations should be altogether left out of account. The septum may also be, to some extent, an adaption for strengthening the body of the fixed parasite against

lateral thrusts or strains, due to the impact of foreign bodies (food, &c.) in the intestine.

At the point where the body becomes actually intracellular, it is constricted, and this constriction marks off the epimerite (internally) from the middle portion (between this point and the septum), which is the protomerite. Further growth is restricted, practically, to the extracellular regions, and the epimerite often comes to appear ultimately as a small appendage at the anterior end of the proto- merite. A Gregarine at this stage is known as a cephalont. Later on, the parasite breaks loose from the host-cell and becomes free in the lumen, the separation taking place at the constriction

between the protomerite and the epimerite ; the latter is left behind in the remains of the host-cell, the former becomes the anterior part of the free trophozoite.

In other Gregarines, however, those, namely, which pass inwards, ultimately becoming " coelomic," as well as those which become entirely intracellular, no epimerite is ever developed, and, further, the body remains single or unseptate. These forms, which include, for instance, Monocystis (fig. 4), Lankesteria, Diplocystis, are dis- tinguished, as Acephalina or Aseptata (Haplocyta, Monocystida), ac- cording to which character is referred to, from the others, termed Cephalina or Septata (Polycystida).

The two sets of terms are not, however, completely identical or interchangeable, for there are a few forms which possess an epimerite, but which lack the division into protomerite and deutomerite, and are hence known as Pseudomonocystida; this condition may be primitive (Doliocystis) or (possibly) secondary, the partition having in course of time disappeared. Again, Stenophora is a septate form

From Wasielewski, after Leger.

Fig. 6. — Corycella armata, Leger. a, Cephalont; b, Epi- merite in host-cell; c, Sporont.

which has become, secondarily, completely intracellular during the young stages, and, doubtless correlated with this, shows no sign of an epimerite.

With regard to the epimerites themselves, they are of all variety of form and shape and need not be described in detail (fig. 7). In one or two cases, however, another variety of attaching organella is met with. Thus in Pterocephalus, only the rostrum of the sporozoite

Z & 4-

From Wasielewski, after Leger.

Fig. 7. — Forms of Epimerites.

1, Gregarina longa. 6, Cometoides crinitus.

2, Syria inopinala. 7, Geneiorhynchus monnieri.

3, Pileocephalus heerii. 8, Echinomera hispida.

4, Stylorhynchus longicollis. Q, Pterocephalus nobilis.

5, Beloides firmus.

penetrates into the host-cell, and no epimerite is formed. Instead, a number of fine root-like processes are developed from near the anterior end, which pass in between the host-cells (fig. 5) and thus anchor the parasite firmly. Similarly, in the curious Schizogregarinae, the anterior end of the (unseptate) body forms a number of stiff, irregular processes, which perform the same function (fig. 8). It is to be noted that these processes are non-motile, and not in any way comparable to pseudopodia, to which they were formerly likened.

A very interesting and remarkable morphological peculiarity has been recently described by Leger (18) in the case of a new Gregarine, Taeniocystis. In this form the body is elongated and metamerically segmented, recalling that of a segmented worm, the adult trophozo- ites possessing numerous partitions or segments (each corresponding to the septum between the proto- and deuto-merite in an ordinary Polycystid), which divide up the cytoplasm into roughly equal compartments. Leger thinks only the deutomerite becomes thus segmented, the protomerite remaining small and undivided. The nucleus remains single, so that there is no question as to the uni- cellular or individual nature of the entire animal.

The general cytoplasm usually consists of distinct ectoplasm and endoplasm, and is limited by a membrane or cuticle (epicyte), secreted by the former. The cuticle varies considerably in thickness, being well developed in active, intestinal forms, but very thin and delicate in non-motile coelomic forms (e.g. Diplodina). In the former case it may show longi- tudinal striations. The cuticle also forms the hooks or spines of many epimerites. The ectoplasm usually shows (fig. 9A) a differ- entiation into two layers, an outer, firmer layer, clear and hyaline, the sarcocyte, and an inner layer, the myocyte, which is formed of a network of muscle- fibrillae (mainly longitu- dinal and transverse, fig. 9B). The sarcocyte alone constitutes the septum, traversing the endoplasm, in septate Gregarine myonemes are the agents r< the active " gregarinoid movements (of flexion and contraction) to be observed in many forms. The peculiar gliding movements

Minute structure.

•egannes. The ffiˆPˆfˆHffliPffl® ! 7ˆ|aV.u'i -e undoubtedly ;%? ˆˆj;aˆˆ> ˆˆSˆpˆ

fof flexion and ‘ ”

After Leger and Hagenmiiller : from Lankester's Treatise on Zoology.

, ~ , ~ Fig. 8.— Three Individuals (G) of

were formerly thought to Ophryocystis schneideri, attached to be produced by the extru- wa ll of Malpighian tubule of Blaps sp. sion of a gelatinous thread p t Syncytial protoplasm of the tubule; posteriorly, but Crawley (8) c> cilia lining the lumen, has recently ascribed them

to a complicated succession of wave-like contractions of the myocyte layer. This view is supported by the fact that certain coelomic forms, like Diplodina and others, which either lack muscle-fibrils or else show no ectoplasmic differentiation at all, are non-motile. The endoplasm, or nutritive plasm, consists of a semi-fluid matrix in which are embedded vast numbers of grains and spherules of various kinds and of all sizes, representing an accumulation of food-material which is being stored up prior to reproduction. The largest and most abundant grains are of a sub-stance termed para-glycogen, a carbohydrate; in addition, flattened

lenticular platelets, of an albuminoid character, and highly-refringent

granules often occur.

The nucleus is always lodged in the endoplasm, and, in the septate

forms, in the deutomeritic half of the body. It is normally spherical

and always limited by a distinct nuclear membrane, which itself often

*contains chromatin. The most char- acteristic feature of the nucleus is the deeply-staining, more or less vacuolated spherical karyosome (consisting of chromatin intimately *-mf bound up with a plastinoid basis) which is invariably present. In one ■$■ or two instances (e.g. Diplocystis*

schneideri) the nucleus has more than one karyosome. All the chro- matin of the nucleus is not, how- ever, confined to the karyosome, some being in the form of grains in the nuclear sap; and in some cases at any rate (e.g. Diplodina, Lankesteria) there is a well-marked

After Schewiakoff, from Lankester's Treatise on Zoology.

Fig. 9A. — Longitudinal section of a Gregarine in the region of the septum between protomerite and deutomerite. Pr, Protomerite. De, Deutomerite. s, Septum. en, Endoplasm. sc, Sarcocyte. c, Cuticle. m, /.Myocyte fibrils (cut

across). g, Gelatinous layer.

Fig. O.B. — Gregarina munieri, show- ing the network of myocyte fibrillae.

nuclear reticulum which is impregnated with granules and dots of chromatin.

A sexual multiplication (schizogony) is only known certainly to occur in a few cases, one being in a Monocystid form, a species of Lite- Gonospora, which is for a long time intracellular (Caullery

history. and Mesnil [*]). the rest among the Schizogregarinae, so named for this reason, in which schizogonous fission takes place regularly during the free, trophic condition. Usually, the body divides up, by a process of multiple fission (fig. 10), into a few (up to

eight) daughter – indi- viduals; but in a new ge n u s (Eleuthero- schizon), Brasil (3) finds that a great number of little merozoites are formed, and a large amount of vacuolated cytoplasm is left over unused.

In the vast majority of Gregarines, however, the life-cycle is limited to gametogony and sporogony. Avery general, if not indeed universal, prelude to gametogony is the characteristic and im- portant feature of the order, known as associa- tion, the biological sig- nificance of which has only lately been fully brought out (see H. M. Woodcock [31]). In normal association, two individuals which are to be regarded as of opposite sex, come into close contact with eacfy other and remain thus attached. The manner in which the parasites , , . . join varies in different

terms; the association may be end-to-end (terminal), either by like or by unlike poles, or it may be side-to-side (lateral) (ng. 12). The couple (syzygy) thus formed may proceed forthwith to encystment and sporoblast-formation {Lankesteria, Monocystis) or may continue in the trophic phase for some time longer {Gregarina.)'. In one or two instances {Zygocystis), association occurs as soon as the

From Wasielewski, after A. Schneider.

Fig. io. — Schizogony in Ophryocystis Jrancisci. a, Rosette of small individuals, produced from a schizont which has just divided; b, A later stage, the daughter- individuals about to separate and assuming the characters of the adult.

trophozoites become adult. This leads on to the interesting pheno- menon of precocious association (neogamy), found in non-motile, coelomic Gregarines (e.g. Cystobia, Diplodina and Diplocystis), in which the parasitism is most advanced. Woodcock {loc. cit.) has de- scribed and compared the different methods adopted to ensure a permanent union, and

the degree of neogamy attained, in these forms. Here it must suffice to say that, in the extreme condition (seen, for instance, in Diplodina minchinii) the union takes place very early in the life-history, between individuals which are little more than sporozoites, and is of a most intimate character, the actual cytoplasm of the two associates join- ing. In such cases, there is absolutely nothing to indicate the " double " nature of the growing tro- phozoite, but the presence of the two nuclei which remain quite distinct.

*There can be little doubt that, in the great majority, if not in all Gregarines, association is necessary for subsequent spolia- tion to take place; i.e. that the cytotactic attrac- tion imparts a develop- mental stimulus to both partners, which is requisite for the formation of prim- ary sporoblasts (gametes). This association is usually permanent; but in one or two cases (perhaps Gono- spora sp.) temporary as- sociation may suffice. While association has fundamentally a repro- From Wasielewski, after Leger. ductive (sexual) signifi- Fig. ii— Eirmocystis spp.a,b, Associa,- cance, in some cases, this tions of two and three Gregarines- c function may be delayed Chain of five parasites; *, Primite- s. or, as it were, temporarily Satellites, suspended, the cytotactic*

attraction serving meanwhile a subsidiary purpose in trophic life. Thus, probably, are to be explained the curious multiple associations and long chains of Gregarines (fig. n) sometimes met with (eg Eirmocystis, Clepsydrina) .

Encystment is nearly always double, i.e. of an associated couple. Solitary encystment has been described, but whether successful independent sporulation results, is uncertain; if it does, the encyst- ment in such cases is, in all probability, only after prior (temporary) association. In the case of free parasites, a well-developed cyst is secreted by the syzygy, which rotates and gradually becomes spherical. _ A thick, at first gelatinous, outer cyst- membrane (ectocyst) is laid down, and then a thin, but firm internal one (endo- cyst). The cyst once formed, further development is quite inde- pendent of the host, and, in fact, often proceeds outside it. In certain coelomic Gregarines, on the other hand, which remain in very close relation with the host's tissues, little or nothing of an encystment-process on the part of the parasites is recognizable, the cyst-wall being formed by an enclosing layer of the host (Diplodina).

The nuclear changes and multiplication which precede sporoblast-formation vary greatly in different Gregarines and can only be outlined here. In the formation of both sets of sexual elements (gametes) there is always a comprehensive nuclear purifica- tion or maturation. This elimination of a part of the nuclear material (to be distin- guished as trophic or somatic, from the functional or germinal portion, which forms the sexual nuclei)

may occur at widely- different periods. In some cases (Lankes- teria, Monocystis), a large part of the original (sporont-) nucleus of each associate is at once got rid of, and the resulting (segmentation-) nucleus, which is highly-specialized, represents the sexual part. In other c jses, again, the entire sporont-nucleus proceeds to division, and the distinction between somatic and germinal portions does not become manifest until after nuclear multiplication has continued for some little time, when certain of the daughter-nuclei become altered in character, and ultimately degenerate, the remainder giving rise to the sporoblast-nuclei (Diplodina, Stylorhynchus). Even after the actual sporoblasts (sex-cells) themselves are con- stituted, their nuclei may yet undergo a final maturation (e.g. Uepsydrtnaˆ ovata); and in Monocystis, indeed, Brasil (2) finds that what is apparently a similar process is delayed until after conjugation and formation of the zygote (definitive sporoblast).

Nuclear multiplication is usually indirect, the mitosis being, as a

From Wasielewski, after Leger.

Fig. 12. — Associations of Gonospora sparsa.

rule, more elaborate in the earlier than in the later divisions. The attraction-spheres are generally large and conspicuous, sometimes consisting of a well-developed centrosphere, with or without centro- somic granules, at other times of very large centrosomes with a few astral rays. In those cases where the karyosome is retained, and the sporont-nucleus divides up as a whole, however, the earliest nuclear divisions are direct ; the daughter-nuclei being formed either by a process of simple constriction (e.g. Diplodina), or by a kind of multiple fission or fragmentation {Gregarina and Selenidium spp.). Nevertheless, the later divisions, at any rate in Diplodina, are in- direct.

By the time nuclear multiplication is well »lvanced or completed, the bodies of the two parent-Gregarines (associates) have usually become very irregular in shape, and produced into numerous lobes and processes. While in some forms {e.g. Monocystis, Urospora, Stylorhynchus) the two individuals remain fairly separate and inde- pendent of each other, in others (Lankesteria) they become inter- twined and interlocked, often to a remarkable extent {Diplodina). The sexual nuclei next pass to the surface of the processes and segments, where they take up a position of uniform distribution. Around each, a small area of cytoplasm becomes segregated,

the whole often projecting as a little bud or hillock from the general surface. These uninuclear protuberances are at length cut off as the sporoblasts or gametes. Frequently a large amount of the general protoplasm of each parent-individual is left over unused, constituting two cystal residua, which may subsequently fuse; in Diplodina, however, practically the whole cytoplasm is used up in the formation of the gametes.

The sporoblasts themselves show all gradations from a condition of marked differentiation into male and female (anisogamy), to one of complete equality (isogamy). Anisogamy is most highly developed in Pterocephalus. Here, the male elements (microgametes) are minute, elongated and spindle-like in shape, with a minute rostrum anteriorly and a long flagellum posteriorly, and very active; the female elements (megagametes) are much iarger, oblong to ovoid, and quite passive. In Stylorhynchus the difference between the conjugating gametes is not quite so pronounced (fig. 13), the male elements being of about the same bulk as the females, but pyriform

difference whatever between the conjugating elements. Neverthe- less, these forms are also to be regarded as instances of binary sexuality and not merely of exogamy; for it is practically certain that this condition of isogamy is derived from one of typical aniso- gamy, through a stage such as is seen in Gonospora, &c. And, similarly, just as in all instances where the formation of differentiated gametes has been observed, the origin of the two conjugates is from different associates (parent-sporonts), and all the elements arising from the same parent are of the same sex, so it is doubtless the case here.

The actual union is brought about or facilitated by the well-known phenomenon termed the danse des sporoblastes, which is due to various

After L£ger, from Lankester's Treatise on Zoology.

Fig. 13. — Development of the Gametes and Conjugation in Stylorhynchus longicollis. Undifferentiated gamete, /, g, Stages in conjugation and

attached to body of parent- individual.

b-d, Stages in development of motile male gamete.

e, Mature female gamete.

nuclear union of the two

elements. h, Zygote (copula). i, Spore, still with single

nucleus and undivided

sporoplasm.

instead of round, and possessing a distinct flagellum; a most inter- esting point about this parasite is that certain highly motile and spermatozoon-like male gametes are formed (fig. 13), which are, however, quite sterile and have acquired a subsidiary function. In other cases, again, the two kinds of element exhibit either very slight differences {Monocystis) or none {Urospora, Gonospora), in size and appearance, the chief distinction being in the nuclei, those of the male elements being smaller and chromatically denser than those of the females.

Lastly, in Lankesteria, Gregarina, Clepsydrina, Diplocystis and "Diplodina complete isogamy is found, there being no apparent

Fig. 14. — Cyst of Monocystis agilis, the common Gregarine of the Earthworm, showing ripe spores and absence of any residual proto- plasm in the cyst. (From Lankester.)

causes. In the case of highly-differentiated gametes {Pterocephalus), the actively motile microgametes rush about here and there, and seek out the female elements. In Stylorhynchus, Leger has shown that the function of the sterile male gametes is to bring about, by their vigorous movements, the melee sexuelle. In the forms where the gametes are isogamous or only slightly differentiated and (probably) not of themselves motile, other factors aid in producing the necessary commingling. Thus in Gregarina sp. from the mealworm, the unused somata or cystal residua become amoeboid and send put processes which drive the peripherally-situated gametes round in the cyst; in some cases where the residual soma becomes liquefied (Urospora) the movements of the host are considered to be sufficient ; and lastly, in Diplodina, owing to the extent to which the inter- twining process is carried, if each gamete is not actually contiguous to a suitable fellow-conjugant, a very slight movement or mutual attraction will bring two such, when liberated, into contact.

An unusual modification of the process of sporoblast-formation and conjugation, which occurs in Ophryocystis, must be mentioned. Here encystment of two associates takes place as usual ; the sporont- nucleus of each, however, only divides twice, and one of the daughter- nuclei resulting from each division degenerates. Hence only one sporoblast-nucleus, representing a quarter of the original nuclear- material, persists in each half. Around this some of the cytoplasm condenses, the rest forming a residuum. The sporoblast or gamete thus formed is completely isogamous and normally conjugates with the like one from the other associate, when a single zygote results which becomes a spore containing eight sporozoites, in the ordinary manner. Sometimes, however, the septum between the two

halves of the cyst does not break down, in which case parthenogenesis occurs, each sporoblast developing by itself into a small spore.

The two conjugating elements unite completely, cytoplasm with cytoplasm and nucleus with nucleus, to form the definitive sporoblast or zygote. The protoplasm assumes a definite outline, generally that of an ovoid or barrel, and secretes a delicate membrane, the ectospore. This subsequently becomes thickened, and often produced into rims, spines or processes, giving rise to the characteristic appearance of the Gregarine spore. Internal to the ectocyst, another, thinner mem- brane, the endocyst, is also laid down. These two membranes form the spore- wall (sporocyst). Meanwhile the contents of the spore have been undergoing division. By successive divisions, usually mitotic, the zygote-nucleus gives rise to eight daughter-nuclei, each of which becomes the nucleus of a sporozoite. Next, the sporoplasm becomes split longitudinally, around each nucleus, and thus eight sickle- shaped (falciform) sporozoites are formed. There is usually a

certain amount of unused sporoplasm left over in the centre of the spore, constituting the sporal residuum. It is important to note that in all known Gregarines, with one exception, the number of sporo- zoites in the spore is eight ; the exception is Selenidium, in many ways far from typical, where the number is half, viz. four.

Hitherto a variation from the general mode of spore-formation has been considered to occur in certain Crustacean Gregarines, the

Aggregatidae and the Poro- sporidae. The spores of these forms have been regarded as gymnospores (naked), lacking the en- veloping membranes (sporocyst) of the ordinary spores, and the sporo- zoites, consequently, as developed freely in the cyst. In the case of the first-named parasites, however, what was taken for sporogony has been proved to be really schizo- gony, and on other grounds these forms are, in the present writer's opinion, preferably asso- ciated with the Coccidia {q.v.). With regard to the Porosporidae, also, it is quite likely that the gymnospbrous cysts con- sidered to belong to the Gregarine Porospora (as known in the trophic condition) have really no connexion with it, but represent the schizogonous generation of some other form, similar to Aggregata; in which case the true spores of Porospora have yet to be identified.

In the intestine of a fresh host the cysts rupture and the spores are

liberated. This is usually largely brought about by the swelling of

the residual protoplasm. Sometimes (e.g. Gregarina) long tubular outgrowths, known as sporoducts (fig. 15), are developed from the residual protoplasm, for the passage of the spores to the exterior.

The Gregarines are extremely numerous, and include several families, characterized, for the most part, by the form Classifies- f the spores (fig. 16). The specialized Sch.izogregarinaea.re tion. usually separated off from the rest as a distinct sub-order.

Sub-order I. — Schizogregarinae.

Forms in which schizogonic reproduction is of general occurrence during the extra-cellular, trophic phase. Three genera, Ophryo- cystis, Schizocystis and Eleutheroschizon, different peculiarities of which have been referred to above. Mostly parasitic in the intestine

Fig. 15. — Ripe Cyst of Gregarina blat- tarum, partially emptied. (From Lan- kester.) a, Channels leading to the sporoducts; b, Mass of spores still left in the cyst ; c, Endocyst ; d, The everted sporoducts ; e, Gelatinous ectocyst.

From Wasielewski, after Leger.

Fig. 16. — Spores of various Gregarines. a, Eirmocystis, Sphaerocystis, &c. f, Stylorhynchidae (type of).

b, Echinomera, Pterocephalus, &c.

c, Gregarina, &c.

d, Beloides.

e, Ancyrophora. or Malpighian tubules of insects

g, Menosporidae. h, Gonospora terebellae. i, Ceratospora. k, Urospora synaptae. (In this type of parasite, as ex-

emplified by Ophryocystis, the body was formerly wrongly considered as amoeboid, and hence this genus was placed in a special order, the Amoebosporidia.)

Sub-order II. — Eugregarinae.

Schizogony very exceptional, only occurring during the intracellular phase, if at all. Gregarines fall naturally into two tribes, described is cephalont and septate, or as acephalont and aseptate (haplocytic), respectively. In strictness, however, as already mentioned, these two sets of terms do not agree absolutely, and whichever set is adopted, the other must be taken into account in estimating the proper position of certain parasites. Here the cephalont or acephal- ont condition is regarded as the more primary and fundamental. Tribe A. — Cephalina (practically equivalent to Septata).*

Save exceptionally, the body possesses an epimerite, at any rate during the early stages of growth, and is typically septate. Mostly intestinal parasites of Arthropods.

The chief families, with representative genera, are as follows: Porosporidae, with Porospora gigantea, at present thought to be gymnosporous ; Gregarinidae (Ciepsydrinidae), with Gregarina, Clepsydrina, Eirmocystis, Hyalospora, Cmenidospora, Stenophora; Didymophyidae, with Didymophyes ; Dactylophoridac, with Dactylo- phorus, Pterocephalus, Echinomera, Rhopalonia; Acttnocephalidae with Actinocephalus, Pyxinia, Coleorhynchus, Stephanophora, Legeria, Stictospora, Pileocephalus, Sciadophora ; Acanthosporidae with Acan- thospora, Corycella, Cometoides; Menosporidae with Menospora, Hoplorhynchus ; Stylorhynchidae, with Stylorhynchus, Lophocephalus ; Doliocystidae with Dohocystis; and Taeniocystidae, with Taenio- cystis. The curious gdHus Selenidium is somewhat apart. Tribe B. — Acephalina (practically equivalent to Aseptata, Haplocyta). The body never possesses an epimerite and is non-septate. Chiefly coelomic parasites of " worms," Holothurians and insects.

The Aseptata have not been so completely arranged in families as the Septata. Leger has distinguished two well-marked ones, but the remaining genera still want classifying more in detail. Fam. Gonosporidae, with Gonospora, Diplodina; and Urosporidae, with Urosopora, Cystobia, Lithocystis, Ceratospora ; the genera Monocystis, Diplocystis Lankesteria and Zygocyslis probably constitute another; Pterospora and, again, Syncystis are distinct; lastly, certain forms, e.g. Zygosoma, Anckora (Anchorina) , are incompletely known.

There remains for mention the remarkable parasite, recently described by J. Nusbaum (24) under the appropriate name of Schaudinnella henleae, which inhabits the intestine of Henlea leptodera. Briefly enumerated, the principal features in the life-cycle are as follows. The young trophozoites (aseptate) are attached to the in- testinal cells, but practically entirely

extracellular. Association is very primitive in character and indiscriminate; it takes place indifferently between individuals which will give rise to gametes of the same or opposite sex. Often it is only temporary ; at other times it is multiple, several adults becoming more or less enclosed in a gelatinous investment. Nevertheless, in no case does true encyst- ment occur, the sex-cells being developed practically free. The female gametes are large and egg-like; the males, minute and sickle-like, but with no flagellum and apparently non-motile. While many of the zygotes (" amphionts ") resulting from copulation pass; out to the exterior, to infect a new host, others, possessing a more delicate investing-membrane, penetrate in between the intestinal cells, producing a further infection (auto-infection). Numerous sporozoites are formed in each zygote. It will be seen that Schau- dinnella is a practically unique form. While, on the one hand, it recalls the Gregarines in many ways, on the other hand it differs widely from them in several characteristic features, being primitive in some respects, but highly specialized in others, so that it cannot be properly included in the order. Schaudinnella rather represents a primitive EctosDoran parasite, which has proceeded upon a line of its own, intermediate between the Gregarines and Coccidia.

Bibliography. — Among the important papers relating to Grega- rines are the following: 1. A. Berndt, " Beitrag zur Kenntnis der . . . Gregarinen," Arch. Protistenk. I, p. 375, 3 pis. (1902); 2. L. Brasil, " Recherches sur la reproduction des Gregarines monocystidees," Arch. zool. exp. (4) 3, p. 17, pi. 2 (1905), and op. cit. 4, p. 69, 2 pis. (1905) ; 3. L. Brazil, " Eleutheroschizon duboscqi, parasite nouveau, &c," op. cit. (N. et R.) (4), p. xvii., 5 figs. (1906); 4. M. Caullery and F. Mesnil, " Sur une Gregarine . . . prtisentant . . . une phase de multiplication asporulee," C.R. Ac. Sci. 126, p. 262 (1898) ; 5. M. Caullery and F. Mesnil, " Le Parasitisme intra-cellulaire des Gregarines," op. cit. 132, p. 220 (1901) ; 6. M. Caullery and F. Mesnil, " Sur une mode particuliere de division nucleaire chez les Gregarines," Arch. anat. microsc. 3, p. 146, 1 pi. (1900) ; 7. M. Caullery and F. Mesnil, " Sur quelques parasites internes des Ann&ides," Misc. biol. (Trav. Stat. Wimereux), 9, p. 80, I pi. (1899); 7a. J. Cecconi, " Sur V Anchorina sagittata, &c," Arch. Protistenk. 6, p. 230, 2 pis. (1905) ; 8. H. Crawley, " Progressive Movement of Gregarines," P. Ac. Philad. 54, p. 4, 2 pis. (1902), also op. cit. 57, p. 89 (1905) ; 9. H. Crawley, " List of the Polycystid Gregarines of the U.S.," op. cit. 55, pp. 41, 632, 4 pis. (1903); 10. L. Cuenot, " Recherches sur revolution et la conjugaison des Gregarines," Arch, biol. 17, .p. 581, 4 pis. (1901); 11. A. Laveran and F. Mesnil, " Sur quelques particularity de Involution d'une Gregarine et la reaction de la cellule-h6te," C.R. Soc. Biol. 52, p. 554, 9 figs. (1900); 12. L. Leger, " Recherches sur les Gregarines," Tabl. zool. 3, p. i., 22 pis. (1892); 13. L. L6ger, " Contribution a la connaissance des Sporo- zoaires,

&c," Bull. Sci. France, 30, p. 240, 3 pis. (1897) ; 14. L. Leger, " Sur un nouveau Sporozoaire (Schizocystis), &c," C.R. Ac. Sci. 131, p. 722 (1900); IS. L. Leger, "La Reproduction sexuee chez les Ophryocystis," t. c. p. 761 (1900) ; 16. L. Leger, " Sur une nouvelle Gregarine (Aggregata coelomica,), &c," op. cit. 132, p. 1343 (1901); 17. L. Leger, " La Reproduction sexuee chez les Stylorhynchus," Arch. Protistenk. 3, p. 304, 2 pis. (1904) ; 18. L. Leger, " Etude sur Taeniocystis mira (L6ger), &c," op. cit. 7, p. 307, 2 pis. (1906) ; 19. L. Leger and O. Duboscq, " La Reproduction sexuee chez Ptero- cephalus," Arch. zool. exp. (N. et R.) (4) 1, p. 141, 11 figs. (1903); 20. L. Leger and O. Duboscq, " Aggregata vagans, n. sp., &c," t. c. p. 147, 6 figs. (1903) ; 21. L. Leger and O. Duboscq, " Les Gregarines et l'epithelium intestinal, &c. Arch, parasitol. 6, p. 377, 4 pis. (1902); 22. L. Leger and O. Duboscq, " Nouvelles Recherches sur

lei: Gregarines, &c," Arch. Protistenk. 4, p. 335, 2 pis. (1904); 23. M. Liihe, " Bau und Entwickelung der Gregarinen," /. c. p. 88, several figs. (1904); 24. J. Nusbaum, " tJber die . . . Fortpflanzung einer . . . Gregarine, Schaudinnella henleae," Zeit. wiss. Zool. 75, p. 281, pi. 22 (1903); 25. F. Paehler, " tJber die Morphologie, Fortpflanzung . . . von Gregarina ovata," Arch. Protistenk. 4, p. 64, 2 pis. (1904) ; 26. S. Prowazek, " Zur Entwickelung der Grega- rinen," op. cit., 1, p. 297, pi. 9 (1902); 27. A. Schneider (Various memoirs on Gregarines), Tool. zool. I and 2 (1886-1892); 28. H. Schnitzler, " fiber die Fortpflanzung von Clepsydrina ovata" Arch. Protistenk. 6, p. 309, 2 pis. (1905); 29. M. Siedlecki, " tJber die geschlechtliche Vermehrung der Monocyslis ascidiae," Bull. Ac. Cracovie, p. 515, 2 pis. (1900); 30. M. Siedlecki, "Contribution a l'6tude des changements cellulaires provoquees par les Gregarines," Arch. anat. microsc. 4, p. 87, 9 figs. (1901); 31. H. M. Woodcock, " The Life-Cycle of Cystobia irregularis, &c," Q.J.M. Set. 50, p. 1. 6 pis. (1906). (H. M. Wo.)

GREGOIRE, HENRI (1750-1831), French revolutionist and constitutional bishop of Blois, was born at Veho near Luneville, on the 4th of December 1750, the son of a peasant. Educated at the Jesuit college at Nancy, he became cure of Embermenil and a teacher at the Jesuit school at Pont-a-Mousson. In 1783 he was crowned by the academy of Nancy for his JEloge de la poesic, and in 1 788 by that of Metz for an Essai sur la Hgeniration physique el morale des Juifs. He was elected in 1789 by the clergy of the bailliage of Nancy to the states-general, where he soon became conspicuous in the group of clerical and lay deputies of Jansenist or Gallican

sympathies who supported the Revolu- tion. He was among the first of the clergy to join the third estate, and contributed largely to the union of the three orders; he presided at the permanent sitting of sixty-two hours while the Bastille was being attacked by the people, and made a vehement speech against the enemies of the nation. He sub- sequently took a leading share in the abolition of the privileges of the nobles and the Church. Under the new civil constitution of the clergy, to which he was the first priest to take the oath (December 27, 1790), he was elected bishop by two departments. He selected that of Loire-et-Cher, taking the old title of bishop of Blois, and for ten years (1791-1801) ruled his diocese with exemplary zeal. An ardent republican, it was he who in the first session of the National Convention (September 21, 1792) proposed the motion for the abolition of the kingship, in a speech in which occurred the memorable phrase that " kings are in the moral order what monsters are in the natural." On the 15th of November he delivered a speech in which he demanded that the king should be brought to trial, and immediately afterwards was elected president of the Convention, over which he presided in his episcopal dress. During the trial of Louis XVI., being absent with other three colleagues on a mission for the union of Savoy to France, he along with them wrote a letter urging the condemnation of the king, but omitting the words & mort; and he endeavoured to save the life of the king by proposing in the Convention that the penalty of death should be suspended.

When on the 7th of November 1793 Gobel, bishop of Paris, was intimidated into resigning his episcopal office at the bar of the Convention, Gregoire, who was temporarily absent from the sitting, hearing what had happened, hurried to the hall, and in the face of a howling mob of deputies refused to abjure either his religion or his office. He was prepared to face the death which he expected; but his courage, a rare quality at that time, won the day, and the hubbub subsided in cries of " Let Gregoire have his way! " Throughout the Terror, in spite of attacks in the Convention, in the press, and on placards posted at the street corners, he appeared in the streets in his episcopal dress and daily read mass in his house. After Robespierre's fall he was the first to advocate the reopening of the churches (speech of December 21,1794). He also exerted himself to get measures put in execution for restraining the vandalistic fury against the monuments of art, extended his protection to artists and men of letters, and devoted much of his attention to the reorganiza- tion of the public libraries, the establishment of botanic gardens, and the improvement of technical education. He had taken during the Constituent Assembly a great interest in Negro emancipation,- and it was on his motion that men of colour in the French colonies were admitted to the same rights as whites.

On the establishment of the new constitution, Gregoire was elected to the Council of 500, and after the 18th Brumaire he became a member of the

Corps Legislatif, then of the Senate (1801). He took the lead in the national church councils of 1797 and 1801; but he was strenuously opposed to Napoleon's policy of reconciliation with the Holy See, and after the signature of the concordat he resigned his bishopric (October 8, 1801). He was one of the minority of five in the Senate who voted against the proclamation of the empire, and he opposed the creation of the new nobility and the divorce of Napoleon from Josephine; but notwithstanding this he was subsequently created a count of the empire and officer of the Legion of Honour. During the later years of Napoleon's reign he travelled in England and Germany, but in 1814 he had returned to France and was one of the chief instigators of the action that was taken against the empire.

To the clerical and ultra-royalist faction which was supreme in the Lower Chamber and in the circles of the court after the second Restoration, Gregoire, as a revolutionist and a schismatic bishop, was an object of double loathing. He was expelled from the Institute and forced into retirement. But even in this period of headlong reaction his influence was felt and feared. In 1814 he had published a work, De la constitution francaise de Van 18 14, in which he commented on the Charter from a Liberal point of view, and this reached its fourth edition in 18 19. In this latter year he was elected to the Lower Chamber by the department of Isere. By the powers of the Quadruple Alliance this event was regarded as of the most sinister omen, and the question was even raised of a fresh armed intervention in France under the terms of the secret treaty of Aix-la-Chapelle. To prevent such a catastrophe Louis XVIII. decided on a modification of the franchise; the Dessolle ministry resigned; and the first act of Decazes, the new premier, was to carry a vote in the chamber annulling the election of Gregoire. From this time onward the ex-bishop lived in retirement, occupying himself in literary pur- suits and in correspondence with most of the eminent savants of Europe; but as he had been deprived of his pension as a senator he was compelled to sell his library to obtain means of support. He died on the 20th of May 1831.

To the last Gregoire remained a devout Catholic, exactly fulfilling all his obligations as a Christian and a priest; but he refused to budge an inch from his revolutionary principles. During his last illness he confessed to his parish cure, a priest of Jansenist sympathies, and expressed his desire for the last sacraments of the Church. These the archbishop of Paris would only concede on condition that he would retract his oath to the civil constitution of the clergy, which he peremptorily refused to do. Thereupon, in defiance of the archbishop, the abbe Baradere gave him the viaticum, while the rite of extreme unction was administered by the abbe Guillon, an opponent of the civil constitution, without consulting the archbishop or the parish cure. The attitude of the archbishop roused great excitement in Paris, and the government had to take precautions to avoid a repetition of

the riots which in the preceding February had led to the sacking of the church of St Germain l'Auxerrois and the archiepiscopal palace. On the day after his death Gregoire's funeral was celebrated at the church of the Abbaye-aux-Bois; the clergy of the church had absented themselves in obedience to the archbishop's orders, but mass was sung by the abbe Grieu assisted by two clergy, the catafalque being decorated with the episcopal insignia. After the hearse set out from the church the horses were unyoked, and it was dragged by students to the cemetery of Montparnasse, the cortege being followed by a sympathetic crowd of some 20,000 people.

Whatever his merits as a writer or as a philanthropist, Gregoire's name lives in history mainly by reason of his whole- hearted effort to prove that Catholic Christianity is not irre- concilable with modern conceptions of political liberty. In this effort he was defeated, mainly because the Revolution, for lack of experience in the right use of liberty, changed into a military despotism which allied itself with the spiritual despotism of Rome; partly because, when the Revolution was overthrown.

the parties of reaction sought salvation in the " union of altar and throne." Possibly Gregoire's Gallicanism was fundamentally irreconcilable with the Catholic idea of authority. At least it made their traditional religion possible for those many French Catholics who clung passionately to the benefits the Revolution had brought them; and had it prevailed, it might have spared France and the world that fatal gulf between Liberalism and Catholicism which Pius IX. 's Syllabus of 1864 sought to make impassable.

Besides several political pamphlets, Gregoire was the author of Histoire des sectes religieuses, depuis le commencement du Steele dernier jusqu'a I'epoque acluette (2 vols., 1810); Essai historique sur les liberies de Veglise gallicane (1818) ; De Vinfluence du Christianisme sur la condition desfemmes (1821) ; Histoire des confesseurs des empereurs, des rots, et d'autres princes (1824) ; Histoire du mariage des pritres en France (1826). Gregoireana, ott resume general de la conduite, des actions, et des ecrits de M. le comte Henri Gregoire, preceded by a biographical notice by Cousin d'Avalon, was published in 1821 ; and the Memoires . . . de Gregoire, with a biographical notice by H. Carnot, appeared in 1837 (2 vols.). See also A. Debidour, L' Abbe Gregoire (1881); A. Gazier, Etudes sur I'histoire religieuse de la Revolution Francaise (1883); L. Maggiolo, La Vie et les ceuvres de I' abbe Gregoire (Nancy, 1884), and numerous articles in La Revolution Francaise ; E. Meaume, Etude hist, et biog. sur les Lorrains rivolution- naires (Nancy, 1882); and A. Gazier, Etudes sur

I'histoire religieuse de la Revolution Francaise (1887).

GREGORAS, NICEPHORUS (c. 1205-1360), Byzantine historian, man of learning and religious controversialist, was born at Heraclea in Pontus. At an early age he settled at Constantinople, where his reputation for learning brought him under the notice of Andronicus II., by whom he was appointed Chartophylax (keeper of the archives). In 1326 Gregoras pro- posed (in a still extant treatise) certain reforms in the calendar, which the emperor refused to carry out for fear of disturbances; nearly two hundred years later they were introduced by Gregory XIII. on almost the same lines. When Andronicus was de- throned (1328) by his grandson Andronicus III., Gregoras shared his downfall and retired into private life. Attacked by Barlaam, the famous monk of Calabria, he was with difficulty persuaded to come forward and meet him in a war of words, in which Barlaam was worsted. This greatly enhanced his reputa- tion and brought him a large number of pupils. Gregoras remained loyal to the elder Andronicus to the last, but after his death he succeeded in gaining the favour of his grandson, by whom he was appointed to conduct the unsuccessful negotiations (for a union of the Greek and Latin churches) with the ambas- sadors of Pope John XXII. (1333). Gregoras subsequently took an important part in the Hesychast controversy, in which he violently opposed Gregorius Palamas, the chief supporter of the sect. After the doctrines of Palamas had been recognized at the synod of 13 51, Gregoras, who refused to acquiesce, was practically imprisoned in a monastery for two years. Nothing is known of the end of his life. His chief work is his Roman History, in 37 books, of the years 1204 to 1350. It thus partly supplements and partly continues the work of George Pachy- meres. Gregoras shows considerable industry, but his style is pompous and affected. Far too much space is devoted to religious matters and dogmatic quarrels. This work and that of John Cantacuzene supplement and correct each other, and should be read together. The other writings of Gregoras, which (with a few exceptions) still remain unpublished, attest his great versatility. Amongst them may be mentioned a history of the dispute with Palamas; biographies of his uncle and early instructor John, metropolitan of Heraclea, and of the martyr Codratus of Antioch; funeral orations for Theodore Metochita, and the two emperors Andronicus; commentaries on the wan- derings of Odysseus and on Synesius's treatise on dreams; tracts on orthography and on words of doubtful meaning; a philosophical dialogue called Florentius or Concerning Wisdom; astronomical treatises on the date of Easter and the preparation of the astrolabe; and an extensive correspondence.

Editions: in Bonn Corpus scriptorum hist. Byz., by L. Schopen and I. Bekker, with life and list of works by J. Boivin (1829-1855); J. P. Migne, Patrologia graeca, cxlviii., cxlix. ; seealsoC. Krumbacher, Geschichte der bymntinischen Litteratur (1897).

GREGOROVIUS, FERDINAND (1821-1891), German historian, was born at Neidenburg on the 19th of January 1821, and studied at the university of Konigsberg. After spending some years in teaching he took up his residence in Italy in 1852, remaining in that country for over twenty years. He was made a citizen of Rome, and he died at Munich on the 1st of May 1891. Gregorovius's interest in and acquaintance with Italy and Italian history is mainly responsible for his great book, Geschichte der Stadt Rom im Mittelalter (Stuttgart, 1859-1872, and other editions), a work of much erudition and interest, which has been translated into English by A. Hamilton (13 vols., 1894- 1900), and also into Italian at the expense of the Romans (Venice, 1874-1876). It deals with the history of Rome from about a.d. 400 to the death of Pope Clement VII. in 1534, and in the words of its author it describes " how, from the time of Charles the Great to that of Charles V., the historic system of the papacy remained inseparable from that of the Empire." The other works of Gregorovius include: Geschichte des Kaisers Hadrian und seiner Zeit (Konigsberg, 1851), English translation by M. E. Robinson (1898); Corsica (Stuttgart, 1854), English translation by R. Martineau (1855); Lucrezia Borgia (Stuttgart, 1874), English translation by J. L. Garner (1904) ; Die Grabdenkmdler der Papste (Leipzig, 1881), English translation by R. W. Seton- Watson (1903); Wanderjahre in Italien (5 vols., Leipzig, 1888-1892); Geschichte der Stadt Athen im Mittelalter (1889); Kleine Schriften zur Geschichte der Kultur (Leipzig, 1887-1892); and Urban VIII. im Widerspruch zu Spanien und dem Kaiser (Stuttgart, 1879). This last work was translated into Italian by the author himself (Rome, 1879). Gregorovius was also something of a poet; he wrote a drama, Der Tod des Tiberius (1851), and some Gedichte (Leipzig, 1891).

His Romische Tagebiicher were edited by F. Althaus (Stuttgart, 1892), and were translated into English as the Roman Journals of F. Gregorovius, by A. Hamilton (1907).

GREGORY, ST (c. 213-c. 270), surnamed in later ecclesiastical tradition Thaumaturgus (the miracle worker), was born ol noble and wealthy pagan parents at Neocaesarea in Pontus, about a.d. 213. His original name was Theodorus. He took up the study of civil law, and, with his brother Athenodorus, was on his way to Berytus to complete his training when at Caesarea he met Origen, and became, his pupil and then his convert (a.d. 233). In returning to Cappadocia some five years after his conversion, it had been his original intention to live a retired ascetic life (Eus. H.E. vi. 30), but, urged by Origen, and at last almost compelled by Phaedimus of Amasia, his metropolitan, neither of whom was willing to see so much learning, piety and masculine energy practically lost to the church, he, after many attempts to evade the dignity, was consecrated bishop of his native town (about 240). His episcopate, which lasted some thirty years, was

characterized by great missionary zeal, and by so much success that, according to the (doubtless somewhat rhetorical) statement of Gregory of Nyssa, whereas at the outset of his labours there were only seventeen Christians in the city, there were at his death only seventeen persons in all who had not embraced Christianity. This result he achieved in spite of the Decian persecution (250 251), during which he had felt it to be his duty to absent himself from his diocese, and notwithstanding the demoralizing effects of an irruption of barbarians (Goths and Boranians) who laid waste the diocese in a.d. 253-254- Gregory, although he has not always escaped the charge of Sabellianism, now holds an undisputed place among the fathers of the church; and although the turn of his mind was practical rather than speculative, he is known to have taken an energetic part in most of the doctrinal controversies of his time. He was active at the first synod of Antioch (a.d. 264-265), which investigated and condemned the heresies of Paul of Samosata; and the rapid spread in Pontus of a Trinitarianism approaching the Nicene type is attributed in large measure to the weight of his influence. Gregory is believed to have died in the reign of Aurelian, about the year 270, though perhaps an earlier date is more probable. His festival (semiduplex) is ob- served by the Roman Catholic Church on the 17 th of November.

GREGORY OF NAZIANZUS

563

For the facts of his biography we have an outline of his early years in his eulogy on Origen, and incidental notices in the writings of Eusebius, of Basil of Caesarea and Jerome. Gregory of Nyssa's untrustworthy panegyric represents him as having wrought miracles of a very startling description; but nothing related by him comes near the astounding narratives given in the Martyrologies, or even in the Breviarium Romanum, in connexion with his name.

The principal works of Gregory Thaumaturgus are the Panegyricus in Origenem (E;s 'Qpiykvrjv iravriyvpuim \670s), which he wrote when on the point of leaving the school of that great master (it contains a valuable minute description of Origen's mode of instruction), a Mctaphrasis in Ecclesiasten , characterized by Jerome as " short but useful "; and an Epistola canonica, which treats of the discipline to be undergone by those Christians who under pressure of persecu- tion had relapsed into paganism, but desired to be restored to the privileges of the Church. It gives a good picture of the conditions of the time, and shows Gregory to be a true shepherd (cf. art Penance). The "Ek0c

Editions: Gerhard Voss (Mainz, 1604), Fronto Ducaus (Paris, 1622),

Migne, Patr. Graec. x. 963.

Translations: S. D. F. Salmond in Ante-Nicene Fathers, vi.; Lives, by Pallavicini (Rome, 1644); J. L. Boye (Jena, 1709); H. R. Reynolds {Diet. Chr. Biog. ii.) ; G. Kriiger, Early Chr. Lit. 226; Herzog-Hauck, Realencyk. vii. (where full bibliographies are given).

GREGORY, ST, OF NAZIANZUS (320-389), surnamed Theologus, one of the four great fathers of the Eastern Church, was born Hlrbout the year a.d. 329, at or near Nazianzus, Cappadocia. His father, also named Gregory, had lately be- come bishop of the diocese; his mother, Nonna, exercised a powerful influence over the religious convictions of both father and son. Gregory visited successively the two Caesareas, Alexandria and Athens, as a student of grammar, mathematics, rhetoric and philosophy; at Athens he had for fellow-students Basil {q.v.), who afterwards became bishop of Caesarea, and Julian, afterwards emperor. Shortly after his return to his father's house at Nazianzus (about the year 360) Gregory received baptism. He resolved to give himself to the service of religion; but for some time, and indeed more or less throughout his whole life, was in a state of hesitation as to the form which that service ought to take. Strongly inclined by nature and education to a contemplative life spent among books and in the society of congenial friends, he was continually urged by outward circumstances, as well as by an inward call, to active pastoral labour. The spirit of refined intellectual monasticism, which clung to him through life and never ceased to struggle for the ascendancy, was about this time strongly encouraged by his intercourse with Basil, who induced him to share the exalted pleasures of his retirement in Pontus. To this period belongs the preparation of the $tXo/caXla, a sort of chrestomathy compiled by the two friends from the writings of Origen. But the events which were stirring the political and ecclesiastical life of Cappadocia, and indeed of the whole Roman world, made a career of learned leisure difficult if not impossible to a man of Gregory's position and temperament. The emperor Constantius, having by intrigue and intimidation succeeded in thrusting a semi- Arian formula upon the Western bishops assembled at Ariminum in Italy, had next attempted to follow the same course with the Eastern episcopate. The aged bishop of Nazianzus having yielded to the imperial threats, a great storm arose among the monks of the diocese, which was only quelled by the influence of the younger Gregory, who shortly afterwards (about 361) was ordained to the priesthood. After a vain attempt to evade his new duties and responsibilities by flight, he appears to have continued to act as a presbyter in his father's diocese without interruption for some considerable time; and it is probable that his two Invectives against Julian are to be assigned to this period. Subsequently (about 372), under a pressure which he somewhat resented, he allowed himself to be nominated by Basil as bishop of Sasima, a miserable little

village some 32 m. from Tyana; but he seems' hardly, if at all, to have assumed the duties of this diocese, for after another interval of " flight " we find him once

more (about 372-373) at Nazianzus, assisting his aged father, on whose death (374) he retired to Seleucia in Isauria for a period of some years. Meanwhile a more important field for his activities was opening up. Towards 378-379 the small and depressed remnant of the orthodox party in Constantinople sent him an urgent summons to undertake the task of resuscitating their cause, so long persecuted and borne down by the Arians of the capital. With the accession of Theodosius to the imperial throne, the prospect of success to the Nicene doctrine had dawned, if only it could find some courageous and devoted champion. The fame of Gregory as a learned and eloquent disciple of Origen, and still more of Athanasius, pointed him out as such a defender; nor could he resist the appeal made to him, although he took the step reluctantly. Once arrived in Constantinople, he laboured so zealously and well that the orthodox party speedily gathered strength; and the small apartment in which they had been accustomed to meet was soon exchanged for a vast and celebrated church which received the significant name of Anastasia, the Church of the Resurrection. Among the hearers of Gregory were to be found, not only churchmen like Jerome and Evagrius, but also heretics and pagans; and it says much for the sound wisdom and practical tact of the preacher that he set himself less to build up and defend a doctrinal position than to urge his flock to the cultivation of the loving Christian spirit which cherishes higher aims than mere heresy hunting or endless dis- putation. Doctrinal, nevertheless, he was, as is abundantly shown by the famous five discourses on the Trinity, which earned for him the distinctive appellation of dwkoyos. These orations are the finest exposition of the Catholic doctrine of the Trinity as conceived by the orthodox teachers of the East, and they were directed especially against the Eunomians and Macedonians. "There is perhaps no single book in Greek patristic literature to which the student who desires to gain an exact and com- prehensive view of Greek theology can be more confidently referred." With the arrival of Theodosius in 380 came the visible triumph of the orthodox cause; the metropolitan see was then conferred upon Gregory, and after the assembling of the second ecumenical council in 381 he received consecration from Meletius. In consequence, however, of a spirit of discord and envy which had manifested itself in connexion with this promotion, he soon afterwards resigned his dignity and withdrew into comparative retirement. The rest of his days were spent partly at Nazianzus in ecclesiastical affairs, and partly on his neighbouring patrimonial estate at Arianzus, where he followed his favourite literary pursuits, especially poetical composition, until his death, which occurred in 389 or 390. His festival is celebrated in the Eastern Church on the 25th and30th of

January, in the Western on the 9th of May (duplex).

His extant works consist of poems, epistles and orations. The poems, which include epigrams, elegies and an autobiographical sketch, have been frequently printed, the editio princeps being the Aldine (1504). Other editions are those of Tollius (1696) and Muratori (1709); a volume of Carmina selecta also has been edited by Dronke (1840). The tragedy entitled Xpio-rds iraoxuv usually included is certainly not genuine. Gregory's poetry did not absorb his best energies; it was adopted in his later years as a recreation rather than as a serious pursuit; thus it is occasionally delicate, graphic, beautiful, but it is not sustained. Of the hymns none have passed into ecclesiastical use. The letters are entitled to a higher place in literature. They are always easy and natural ; and there is nothing forced in the manner in which their acute, witty and profound sayings are introduced. Those to Basil introduce us to the story of a most romantic friendship, those to Cledonius have theological value for their bearing on the Apollinarian controversy. As an orator he was so facile, vigorous and persuasive, that men forgot his small stature and emaciated countenance. Forty-five orations are extant. Gregory was less an independent theologian 'than an interpreter. He was influenced by Athanasius in his Christ – ology, by Origen in his anthropology, for, though teaching original sin and deriving human mortality from the Fall, he insists on the ability of the human will to choose the good and to co-operate in the work of salvation with the will of God. Though possessed neither of Basil's gift of government nor of Gregory of Nyssa's power of specu- lative thought, he worthily takes a place in that triumvirate of Cappadocians whom the Catholic Church gratefully recognizes as having been, during the critical struggles in the latter half of the 4th century, the best defenders of its faith. The Opera omnia were

first published by Hervagius (Basel, 1550); the subsequent editions have been those of Billius (Paris, 1609, 161 1 ; aucta ex interpreta- tione Morelli, 1630), of the Benedictines (begun in 1778, but interrupted by the French Revolution and not completed until 1840, Caillau being the final editor) and of Migne. The Theological Orations (edited by A. J. Mason) were published separately at Cambridge in 1899. •

Scattered notices of the life of Gregory Nazianzen are to be found in the writings of Socrates, Sozomen, Theodoret and Rufinus, as well as in his own letters and poems. The data derived from these sources do not always harmonize with the account of Suidas. The earlier modern authorities, such

as Tillemont (Mem. Keel. t. ix.) and Leclerc {Bib. Univ. t. xviii,), were used by Gibbon. See also C. Ullmann, Gregorius von Nazianz, der Theologe (1825; Eng. trans, by G. F. Coxe, M.A., 1857); A. B6noit, St Gregoire de Nazianze; sa vie, ses ceuvres, el son epoque (1877) ; M ontaut, Revue critique de quelques questions historiques se rapportant b\ St Gregoire de Nazianze (1879); F. W. Farrar, Lives of the Fathers, i. 491-582, and F. Loofs in Hauck-Herzog's Realencyk. fur prot. Theologie, vii. 138.

GREGORY, ST, OF NYSSA (c. 331-c. 396), one of the four great fathers of the Eastern Church, designated by one of the later ecumenical councils as " a father of fathers," was a younger brother of Basil (the Great), bishop of Caesarea, and was born (probably) at Neocaesarea about a.d. 331. For his education he was chiefly indebted to his elder brother. At a comparatively early age he entered the church, and held for some time the office of anagnost or reader; subsequently he manifested a desire to devote himself to the secular life as a rhetorician, an impulse which was checked by the earnest remonstrances of Gregory of Nazianzus. Finally, in 371 or 372 he was ordained by his brother Basil to the bishopric of Nyssa, a small town in Cappadocia. Here he is usually said (but on inadequate data) to have adopted the opinion then gaining ground in favour of the celibacy of the clergy, and to have separated from his wife Theosebia, who became a deaconess in the church. His strict orthodoxy on the subject of the Trinity and the Incarnation, together with his vigorous eloquence, combined to make him peculiarly obnoxious to the Arian faction, which was at that time in the ascendant through the protection of the emperor Valens; and in 375, the synod of Ancyra, convened by Demetrius the Arian governor of Pontus, condemned him for alleged irregularities in his election and in the administration of the finances of his diocese. In 376 he was deprived of his see, and Valens sent him into exile, whence he did not return till the publication of the edict of Gratian in 3 78. Shortly afterwards he took part in the proceedings of the synod which met at Antioch in Caria, principally in connexion with the Meletian schism. At the great ecumenical council held at Constantinople in 381, he was a conspicuous champion of the orthodox faith; according to Nicephorus, indeed, the additions made to the Nicene creed were entirely due to his suggestion, but this statement is of doubtful authority. That his eloquence was highly appreciated is shown by the facts that he pronounced the discourse at the consecration of Gregory of Nazianzus, and that he was chosen to deliver the funeral oration on the death of Meletius the first president of the council. In the following year, moreover (382), he was commissioned by the council to inspect and set in order the churches of Arabia, in connexion with which mission he also visited Jerusalem. The impressions he gathered from this journey may, in part at least, be gathered from his famous letter De euntibus Hiero- solyma, in which an opinion strongly unfavourable to pilgrimages is expressed. In

383 he was probably again in Constantinople; where in 385 he pronounced the funeral orations of the princess Pulcheria and afterwards of the empress Placilla. Once more we read of him in 394 as having been present in that metropolis at the synod held under the presidency of Nectarius to settle a controversy which had arisen among the bishops of Arabia; in the same year he assisted at the consecration of the new church of the apostles at Chalcedon, on which occasion there is reason to believe that his discourse commonly but wrongly known as that Eis Tr/v eavrov xeipoTOi'tae was delivered. The exact date of his death is unknown; some authorities refer it to 376, others to 400; His festival is observed by the Greek Church on the 10th of January; in the Western martyrologies he is commemorated on the 9th of March.

Gregory of Nyssa was not so firm and able an administrator as his brother Basil, nor so magnificent an orator as Gregory of Nazianzus, but he excelled them both, alike as a speculative and constructive theologian, and in the wide extent of his acquirements. His teaching, though strictly trinitarian, shows considerable freedom and originality of thought; in many points his mental and spiritual affinities with Origen show themselves with advantage, as in his doctrine of airoKaracrTacns or final restoration. There are marked pantheistic tendencies, e.g. the inclusion of sin as a necessary part of the cosmical process, which make him akin to the pantheistic monophysites and to some modern thinkers.

His style has been frequently praised by competent authorities for sweetness, richness and elegance. His numerous works may be classified under five heads: (1) Treatises in doctrinal and polemical theology. Of these the most important is that Against Eunomius in twelve books. Its doctrinal thesis (which is supported with great philosophic acumen and rhetorical power) is the divinity and consubstantiality of the Word; incidentally the character of Basil, which Eunomius had aspersed, is vindicated, and the heretic himself is held up to scorn and contempt. This is the work which, most probably in a shorter draft, was read by its author when at Constantinople before Gregory Nazianzen and Jerome in 381 (Jerome, De vir. ill. 128). To the same class belong the treatise To Ablavius, against the tritheists; On Faith, against the Arians; On Common Notions, in explanation of the terms in current employ- ment with regard to the Trinity; Ten Syllogisms, against the Manichaeans; To Theophilus, against the Apollinarians ; an Antir- rhetic against the same; Against Fate, a disputation with a heathen philosopher; De anima el resurrectione, a dialogue with his dying sister Macrina; and the Oratio catechetica magna, an ardttient for the incarnation as the best possible form of redemption, intended to convince educated pagans and Jews. (2) Practical treatises. To this category belong the tracts On Virginity and On Pilgrimages; as also the Canonical Epistle upon the rules of penance. (3) Expository and

homiletical works, including the Hexaemeron, and several series of discourses On the Workmanship of Man, On the Inscriptions of the Psalms, On the Sixth Psalm, On the first three Chapters of Ecclesiastes, On Canticles, On the Lord's Prayer and On the Eight Beatitudes. (4) Biographical, consisting chiefly of funeral orations. (5) Letters.

The only complete editions of the whole works are those by Fronton le Due (Fronto Ducaus, Paris, 1615; with additions, 1618 and 1638) and by Migne. G. H. Forbes began an excellent critical edition, but only two parts of the first volume appeared (Burntisland, 1855 and 1861) containing the Explicatio apologelica in hexaemeron and the De opificio hominis. Of the new edition projected by F. Oehler only the first volume, containing the Opera dogmatica, has appeared (1865). There have been numerous editions of several single treatises, as for example of the Oratio catechetica (J. G. Krabinger, Munich, 1838; J. H. Crawley, Cambridge, 1903), De precatione and De anima et resurrectione.

See F. W. Farrar, Lives of the Fathers, ii. 56-83, the monograph by J. Rupp (Gregors, des Bischofs von Nyssa, Leben und Meinungen, Leipzig, 1834), and compare P. Heyns (Disputatio historico-theologica de Greg. Nyss., 1835), C. W. Moller (Gregorii Nyss. doctrinam de hominis natura et illustravit et cum Origeniana comparavit, 1854) and J. N. Stigler, Die Psychologie des h. Gregors von Nyssa (Regensburg, 1857), and many smaller monographs cited in Hauck-Herzog's Realencyk. fur prot. Theol. vii. 149.

GREGORY, ST, OF TOURS (538-594), historian of the Franks, was born in the chief city of the Arverni (the modern Clermont- Ferrand) on the 30th of November 538. His real name was Georgius Florentius, Georgius being his grandfather's name and Florentius his father's. He was called Gregory after his maternal great-grandfather, the bishop of Langres. Gregory belonged to an illustrious senatorial family, many of whose members held high office in the church and bear honoured names in the history of Christianity. He was descended, it is said, from Vettius Epagathus, who was martyred at Lyons in 177 with St Pothinus; his paternal uncle, Gallus, was bishop of Clermont; his maternal grand-uncle, Nicetius (St Nizier), occupied the see of Lyons; and he was a kinsman of Euphronius, bishop of Tours.

Gregory lost his father early, and his mother Armentaria settled in the kingdom of Burgundy on an estate belonging to her near Cavaillon, where her son often visited her. Gregory was brought up at Clermont-Ferrand by his uncle Gallus and by his successor, Avitus, and there he received his education. Among profane authors he read the first six books of the Aeneid and Sallust's history of the Catiline conspiracy, but his education was

mainly religious. The principles of religion he learnt from

the Bible, Sulpicius Severus and some lives of saints, but to patristic literature and the subtleties of theology he remained a stranger. In 563, at the age of twenty-five, he was ordained deacon. Falling seriously ill, he went to Tours to seek a cure at the tomb of St Martin. At Tours he lived with Euphronius, and so great was the young man's popularity that, on the death of Euphronius in 573, the people unanimously designated him bishop.

At that time Tours belonged to Austrasia, and King Sigebert hastened to confirm Gregory's election. After the assassination of Sigebert (575), the province was ruled by Chilperic for nine years, during which period Gregory displayed the greatest energy in protecting his town and church from the Frankish king. He had to contend with Count Leudast, the governor of Tours; despite all the king's threats, he refused to give up Chilperic's son Meroving, who had sought refuge from his father's wrath at the sanctuary of St Martin; and he defended Bishop Pre- textatus against Chilperic, by whom he had been condemned for celebrating the marriage of Merovech and Queen Brunhilda. In 580 Gregory was himself accused before a council at Berny of using abusive language against Queen Fredegond, but he cleared himself of the charge by an oath and was acquitted. On the death of Chilperic, Tours remained for two years (584-585) in the hands of Guntram, but when Guntram adopted his nephew Childebert, Sigebert's son, it again became Austrasian. This change was welcome to Gregory, who often visited the court. In 586 he was at Coblenz, and on his return to Yvois (the modern Carignan) visited the stylite Wulfilaic; in 588 we hear of him at Metz and also at Chalon-sur-Saone, whither he was sent to obtain from King Guntram the ratification of the pact of Andelot ; in 593 he was at Orleans, where Childebert had just succeeded his uncle Guntram. In the intervals of these journeys he governed Tours with great firmness, repressing disorders and reducing the monks and nuns to obedience. He died on the 17th of November 594.

Gregory left many writings, of which he himself gives an enumeration at the end of his Historia Francorum: " Decern libros Historiarum, septem Miraculorum, unum de Vita Patrum scripsi; in Psalterii tractatu librum unum commentatus sum; de Cursibus etiam ecclesiasticis unum librum condidi." The ten books of history are discussed below. The seven books of miracles are divided into the De gloria martyrum, the De virtutibus sancti Juliani, four books of Miranda sancti Martini, and the De gloria

confessorum, the last dealing mainly with confessors who had dwelt in the cities of Tours and Clermont. The Vitae patrum consists of twenty biographies of bishops, abbots and hermits belonging to Gaul. The commentary on the Psalms is lost, the preface and the titles of the chapters alone being extant. The treatise De cursibus ecclesiasticis, discovered in 1853, is a liturgical manual for determining the hour of divers nocturnal offices by the position of the stars. Gregory also left a life of St Andrew, translated from the Greek, and a history of the Seven Sleepers of Ephesus, translated from Syriac.

His most important work, however, is the Historia Francorum, which is divided into three parts. The .first four books, which were composed at one time, cover the period from the creation of the world to the death of Sigebert in 575. The first book, which is a mere compilation from the chronicles of St Jerome and Orosius, is of no value. The second book, from 397 to 511, deals with the invasions of the Franks, and is based on the histories of Sulpicius Alexander and Renatus Profuturus Frigeridus, now lost; on the catalogues of the bishops of Cler- mont and Tours; on some lives of saints, e.g. Remigius and Maxentius, now lost; on the annals of Aries and Angers, now lost; and on legends, either collected by Gregory himself from oral tradition, or cantilenes or epics written in the Latin and Germanic languages. In the third and fourth books the earlier part is based on materials collected from men older than himself; of the later events he was himself an eye-witness. The fifth and sixth books, up to the death of Chilperic (584), deal with matters within his own experience. The first six books are often separate : n the MSS., and it was these alone that were used by the

chronicler Fredegarius in his abridgment of Gregory's history. To the first six books Gregory subsequently added chapters on the bishops Salonius and Sagittarius, and on his quarrels with Felix of Nantes. The authenticity of these chapters has been undeservedly attacked by Catholic writers. Books vii. to x., from 584 to 591, were written in the form of a diary; of each important event, as it occurred, he inserted an account in his book. The last six books are of great historical value.

Gregory had an intimate knowledge of contemporary events. He was frequently at court, and he found Tours an excellent place for collecting information. The shrine of St Martin attracted the sick from all quarters, and the basilica of the saint was a favourite sanctuary for political refugees. Moreover, Tours was on the high road between the north and south of France, and was a convenient stage for travellers, the am- bassadors going to and from Spain frequently halting there. Gregory plied every one with questions, and in this way gathered a great mass of detailed information. He was, besides, at great pains to be an impartial writer, but

was not always successful. His devotion to Austrasia made him very bitter against, and perhaps unjust to, the sovereigns of Neustria, Chilperic and Fredegond. As an orthodox Christian, he had no good word for the Arians. He excuses the crimes of kings who protected the church, such as Clovis, Clotaire I. and Guntram, but had no mercy for those who violated ecclesiastical privileges. This attitude, no doubt, explains his hatred for Chilperic. But if Gregory's historical judgments are suspect, he at least concealed nothing and invented nothing; and we can correct his judgments by his own narrative. His history is a curious compound of artlessness and shrewdness. He was ignorant of the rules of grammar, confused genders and cases, and wrote in the vernacular Latin of his time, apart from certain passages which are especi- ally elaborated and filled with poetical and elegant expressions. But in spite of his shortcomings he is an exceedingly attractive writer, and his mastery of the art of narrative has earned for him the name of the Herodotus of the barbarians.

T. Ruinart brought out a complete edition of Gregory's works at Paris in 1699. The best modern complete edition is that of W. Arndt and B. Krusch in Mori. Germ. hist, script, rer. Merov. (vol. i., 1885). Of the many editions of the Historia Francorum may be mentioned those of Guadet and Taranne in the Soc. de I'hist. de France (4 vols., with French translation, 1836-1838), of Omont (the first six books; a reproduction of the Corvey MS.) and of G. Collon (the last four books; a reproduction of the Brussels MS. No. 9, 403). Gregory's hagiographic works were published by H. Bordier in the Soc. de I'hist. de France (4 vols., with French translation, 1857-1864). Cf. J. W. Lobell, Gregor von Tours und seine Zeit (2nd ed., Leipzig, 1868); G. Monod, "Etudes critiques sur les sources de l'histoire m6rovingienne " in the Bibl. de I'Acole des Hautes Etudes (1872); G. Kurth, " Gregoire de Tours et les etudes classiques au VI e siecle " in the Revue des questions historiques (xxiv. 586 seq., 1878); Max Bonnet, Le Latin de Gregoire de Tours (Paris, 1890). For details, see Ulysse Chevalier, Biobibliographie (2nd ed.). (C. Pf.)

GREGORY THE ILLUMINATOR, the reputed founder of the Armenian Church. His legend is briefly as follows. His father Anak, head of the Parthian clan of Suren, was bribed about the time of his birth (c. 257) by the Sassanid king of Persia to assassinate the Armenian king, Chosroes, who was of the old Arsacid dynasty, and father of Tiridates or Trdat, first Christian king of Armenia. Anak was slain by his victim's soldiers; Gregory'was rescued by his Christian nurse, carried to Caesarea in Cappadocia, and brought up a Christian. Grown to manhood he took service under Tiridates, now king of Armenia, in order by his own fidelity to atone for his father's treachery. Presently at a feast of Anahite Gregory refused to assist his sovereign in offering pagan sacrifice, and his parentage being now revealed, was thrown into a deep pit at Artashat, where he

languished for fourteen years, during which persecution raged in Armenia.

The scene of the legend now shifts to Rome, where Diocletian falls in love with a lovely nun named Ripsime; she, rather than gratify his passion, flees with her abbess Gaiana and several priests to Armenia. Diocletian asks her back of Tiridates, who meanwhile has fallen in love with her himself. He too is flouted, and in his rage tortures and slays her and her companions. The traditional date of this massacre is the 5th of October,

a.d. 301. Providence, incensed at such cruelty, turns Tiridates into a wild boar, and afflicts his subjects with madness; but his sister, Chosrowidukht, has a revelation to bring Gregory back out of his pit. The king consents, the saint is acclaimed, the bodies of the thirty-seven martyrs solemnly interred, and the king, after, fasting five, and listening to Gregory's homilies for sixty days, is healed. This all took place at Valarshapat, where Gregory, anxious to fix a site on which to build shrines for the relics of Ripsime and Gaiana, saw the Son of God come down in a sheen of light, the stars of heaven attending, and smite the earth with a golden hammer till the nether world resounded to his blows. Three chapels were built on the spot, and Gregory raised his cross there and elsewhere for the people to worship, just as St Nino was doing about the same time in Georgia. There followed a campaign against the idols whose temples and books were destroyed. The time had now come for Gregory, who was still a layman and father of two sons, to receive ordination; so he went to Caesarea, where Leontius ordained and consecrated him catholicos or vicar-general of Armenia. This was sometime about 290, when Leontius may have acceded, though we first hear of him as bishop in 314.

Gregory's ordination at Caesarea is historical. The vision at Valarshapat was invented later by the Armenians when they broke with the Greeks, in order to give to their church the semblance, if not of apostolic, at least of divine origin.

According to Agathangelus, Tiridates went to Rome with Gregory, Aristaces, son of Gregory, and Albianos, head of the other priestly family, to make a pact with Constantine, newly converted to the faith, and receive a pallium from Silvester. The better sources make Sardica the scene of meeting and name Eusebius (of Nicomedia) as the prelate who attended Constantine. There is no reason to doubt that some such visit was made about the year 315, when the death of Maximin Daza left Constantine supreme. Eusebius testifies (H.E. ix. 8) that the Armenians were ardent

Christians, and ancient friends and allies of the Roman empire when Maximin attacked them about the year 308. The conversion of Tiridates was probably a matter of policy. His kingdom was honeycombed with Christianity, and he wished to draw closer to the West, where he foresaw the victory of the new faith, in order to fortify his realm against the Sassanids of Persia. Following the same policy he sent Aristaces in 325 to the council of Nice. Gregory is related to have added a clause to the creed which Aristaces brought back ; he became a hermit on Mount Sebuh about the year 332, and died there.

Is the Ripsime episode mere legend ? The story of the conversion of Georgia by St Nino in the same age is so full of local colour, and coheres so closely with the story of Ripsime and Gaiana, that it seems over-sceptical to explain the latter away as a mere doublet of the legend of Prisca and Valeria. The historians Faustus of Byzant and Lazar of Pharp in the 5th century already attest the reverence with which their memory was invested. We know from many sources the prominence assigned to women prophets in the Phrygian church. Nino's story reads like that of such a female missionary, and something similar must underlie the story of her Armenian companions.

The history of Gregory by Agathangelus is a compilation of about 450, which was rendered into Greek 550. Professor Marr has lately published an Arabic text from a MS. in Sinai which seems to contain an older tradition. A letter of Bishop George of Arabia to Jeshu, a priest of the town Anab, dated 714 (edited by Dashian, Vienna, 1801), contains an independent tradition of Gregory, and styles him a Roman by birth.

In spite of legendary accretions we can still discern the true outlines and significance of his life. He did not really illumine or convert great Armenia, for the people were in the main already converted by Syrian missionaries to the Adoptionist or Ebionite type of faith which was dominant in the far East, and was afterwards known as Nestorianism. Marcionites and Montanists had also worked in the field. Gregory persuaded Tiridates to destroy the last relics of the old paganism, and carried out in the religious sphere his sovereign's policy of detaching Great

Armenia from the Sassanid realm and allying it with the Graeco- Roman empire and civilization. He set himself to Hellenize or Catholicize Armenian Christianity, and in furtherance of this aim set up a hierarchy officially dependent on the Cappadocian. He in effect turned his country into a province of the Greek see of Cappadocia. This hierarchical tie was soon snapped, but the Hellenizing influence continued to work, and bore its most abundant fruit in the 5th century. His career was thus analogous to that of St Patrick in Ireland.

Authorities. — S. Weber, Die Catholische Kirche in Armenien (Freiburg, 1903, with bibliography) ; Bollandii, Acta sanctorum sept. torn. 8; A. Carriere, Les Huit Sanctuaires de I'Armenie (Paris, 1899) ; " Chrysostom " in Migne, P. Gr. torn. 63, col. 943 foil. ; C. Fortescue, The Armenian Church (London, 1872); H. Gelzer, Die Anfdnge der armenischen Kirche (Leipzig, 1895) (Sachs. Gesells. der Wissensch.) ; and s.v. "Armenien" in Herzog-Hauck (Leipzig, 1897); v. Gut- schmid, Kleine Schriften (Leipzig, 1892); Himpel, Gregor der Erleuchter, Kl. v. ; Issaverdenz, Hist, of Arm. Church (Venice, 1875); de Lagarde, Agathangelos (Gottingen, 1888); Arshak Ter Mikelian, Die arm. Kirche (Leipzig, 1892); Palmieri, " La Conver- sione ufficiale degli Iberi," Oriens Christ. (Rome, 1902) ; Ryssel, Ein Brief Gregors, ubersetzt, Studien und Kritiken, 56, Bd. (1883); Samuelian, Bekehrung Armeniens (Vienna, 1844) ; Vetter, " Die arm. Vater," in Nischl's Lehrbuch der Patrol, iii. 215-262, (Mainz, 1881-1885); Malan, 5. Gregory the Illuminator (Rivingtons, 1868).

(F. C. C.)

GREGORY (Gregorius), the name of sixteen popes and one anti-pope.

Saint Gregory, surnamed the Great (c. 540-604), the first pope of that name, and the last of the four doctors of the Latin Church, was born in Rome about the year 540. His father was Gordianus " the regionary," a wealthy man of senatorial rank, owner of large estates in Sicily and of a palace on the Caelian Hill in Rome; his mother was Silvia, who is commemorated as a saint on the 3rd of November. Of Gregory's early period we know few details, and almost all the dates are conjectural. He received the best education to be had at the time, and was noted for his proficiency in the arts of grammar, rhetoric and dialectic. Entering on a public career he held, about 573, the high office of prefect of the city of Rome; but about 574, feeling irresistibly attracted to the " religious " life, he resigned his post, founded six monasteries in Sicily and one in Rome, and in the last — the famous monastery of St Andrew — became himself a monk. This grateful seclusion, however, he was not permitted long to enjoy. About 578 he was ordained " seventh deacon " (or possibly archdeacon) of the Roman Church, and in the following spring Pope Pelagius II. appointed him " apocrisiarius," or resident ambassador, at the imperial court in Constantinople. Here he represented the interests of his church till about 586, when he returned to Rome and was made abbot of St Andrew's monastery. His rule, though popular, was characterized by great severity, as may be inferred from the story of the monk Justus, who was denied Christian burial because he had secreted a small sum of money. About this time Gregory completed and published his well-known exposition of the book of Job, com- menced in Constantinople he also delivered lectures on the Heptateuch, the- books of Kings, the Prophets, the book of Proverbs and*

the Song of Songs. To this period, moreover, Bede's incident of the English slave-boys (if indeed it be accepted as historical) ought to be assigned. Passing one day through the Forum, Gregory saw some handsome slaves offered for sale, and inquired their nation. " Angles," was the reply. " Good," said the abbot, " they have the faces of angels, and should be coheirs with the angels in heaven. From what province do they come ?" " From Deira." " Deira. Yea, verily, they shall be saved from God's ire {de ira) and called to the mercy of Christ. How is the king of that country named ?" " jElla." " Then must Allelulia be sung in yElla's land." Gregory determined personally to undertake the conversion of Britain, and with the pope's consent actually set out upon the mission, but on the third day of his journey he was overtaken by messengers recalling him to Rome. In the year 590 Pelagius II. died of the plague that was raging in the city; whereupon the clergy and people unanimously chose Gregory as his successor. The abbot did his best to avoid the dignity, petitioned the emperor Maurice not

to ratify his election, and even meditated going into hiding; but, " while he was preparing for flight and concealment, he was seized and carried off and dragged to the basilica of St Peter," and there consecrated bishop, on the 3rd of September 590.

The fourteen years of Gregory's pontificate were marked by extraordinary vigour and activity. " He never rested," writes a biographer, "he was always engaged in providing for the interests of his people, or in writing some composition worthy of the church, or in searching out the secrets of heaven by the grace of contemplation." His mode of life was simple and ascetic in the extreme. Having banished all lay attendants from his palace, he surrounded himself with clerics and monks, with whom he lived as though he were still in a monastery. To the spiritual needs of his people he ministered with pastoral zeal, frequently appointing "stations" and delivering sermons; nor was he less solicitous in providing for their physical neces- sities. Deaconries (offices of alms) and guest-houses were liberally endowed, and free distributions of food were made to the poor in the convents and basilicas. The funds for these and similar purposes were supplied from the Patrimony of St Peter — the papal estates in Italy, the adjacent islands, Gaul, Dalmatia and Africa. These extensive domains were usually administered by specially appointed agents,' — rectors and defensors, — who resided on the spot ; but the general superin- tendence devolved upon the pope. In this sphere Gregory manifested rare capacity. He was one of the best of the papal landlords. During his pontificate the estates increased in value, while at the same time the real grievances of the

tenants were redressed and their general position was materially improved. Gregory's principal fault as a man of business was that he was inclined to be too lavish of his revenues. It is said that he even impoverished the treasury of the Roman Church by his unlimited charities.

Within the strict bounds of his patriarchate, i.e. the churches of the suburbicarian provinces and the islands, it was Gregory's policy to watch with particular care ever the election and discipline of the bishops. With wise toleration he was willing to recognize local deviations from Roman usage (e.g. in the ritual of baptism and confirmation), yet he was resolute to withstand any unauthorized usurpation of rights and privileges. The following rules he took pains to enforce: that clerics in holy orders should not cohabit with their wives or permit any women, except those allowed by the canons, to live in their houses; that clerics accused on ecclesiastical or lesser criminal charges should be tried only in the ecclesiastical courts; that clerics in holy orders who had lapsed should " utterly forfeit their orders and never again approach the ministry of the altar "; that the revenues of each church should be divided by its bishop into four equal parts, to be assigned to the bishop, the clergy, the poor and the repair of the fabric of the church.

In his relations with the churches which lay outside the strict limits of his patriarchate, in northern Italy, Spain, Gaul, Africa and Illyricum and also in the East, Gregory consistently used his influence to increase the prestige and authority of the Roman See. In his view Rome, as the see of the Prince of the Apostles, was by divine right " the head of all the churches." The decrees of councils would have no binding force " without the authority and consent of the apostolic see ": appeals might be made to Rome against the decisions even of the patriarch of Constanti- nople: all bishops, including the patriarchs, if guilty of heresy or uncanonical proceedings, were subject to correction by the pope. " If any fault is discovered in a bishop," Gregory wrote, " I know of no one who is not subject to the apostolic see." It is true that Gregory respected the rights of metropolitans and disapproved of unnecessary interference within the sphere of their jurisdiction canonically exercised; also that in his relations with certain churches {e.g. those in Africa) he found it expedient to abstain from any obtrusive assertion of Roman claims. But of his general principle there can be no doubt. His sincere belief in the apostolic authority of the see of St Peter, his outspoken assertion of it, the consistency and firmness with which in practice he maintained it (e.g. in his controversies with the

bishops of Ravenna concerning the use of the pallium, witr Maximus the " usurping " bishop of Salona, and with thf patriarchs of Constantinople in respect of the title " ecumenical bishops "), contributed greatly to build up the system of papal absolutism. Moreover this consolidation of spiritual

authority coincided with a remarkable development of the temporal power of the papacy. In Italy Gregory occupied an almost regal position. Taking advantage cf the opportunity which circumstances offered, he boldly stepped into the place which the emperors had left vacant and the Lombard kings had not the strength to seize. For the first time in history the pope appeared as a political power, a temporal prince. He appointed governors to cities, issued orders to generals, provided munitions of war, sent his ambassadors to negotiate with the Lombard king and actually dared to conclude a private peace. In this direction Gregory went farther than any of his predecessors: he laid the foundation of a political influence which endured for centuries. "Of the medieval papacy," says Milman, "the real father is Gregory the Great."

The first monk to become pope, Gregory was naturally a strong supporter of monasticism. He laid himself out to diffuse the system, and also to carry out a reform of its abuses by en- forcing a strict observance of the Rule of St Benedict (of whom, it may be noted, he was the earliest biographer). Two slight innovations were introduced: the minimum age of an abbess was fixed at sixty, and the period of novitiate was prolonged from one year to two. Gregory sought to protect the monks from episcopal oppression by issuing privilegia, or charters in restraint of abuses, in accordance with which the jurisdiction of the bishops over the monasteries was confined to spiritual matters, all illegal aggressions being strictly prohibited. The documents are interesting as marking the beginning of a revolu- tion which eventually emancipated the monks altogether from the control of their diocesans and brought them under the direct authority of the Holy See. Moreover Gregory strictly forbade monks to minister in parish churches, ordaining that any monk who was promoted to such ecclesiastical cure should lose all rights in his monastery and should no longer reside there. " The duties of each office separately are so weighty that no one can rightly discharge them. It is therefore very improper that one man should be considered fit to discharge the duties of both, and that by this means the ecclesiastical order should interfere with the monastic life, and the rule of the monastic life in turn interfere with the interests of the churches."

Once more, Gregory is remembered as a great organizer of missionary enterprise for the conversion of heathens and heretics. Mose important was the two-fold mission to Britain — of St Augustine in 596, of Mellitus, Paulinus and others in 601; but Gregory also made strenuous efforts to uproot paganism in Gaul, Italy, Sicily, Sardinia and Corsica, Arianism in Spain, Donatism in Africa, Manichaeism in Sicily, the heresy of the Three Chapters in Istria and northern Italy. In respect of the methods of conversion which he advocated he was not less intolerant than his contemporaries. Towards the Jews, however, he acted with exceptional lenity, protecting them from persecution and securing them the enjoyment

of their legal privileges. The so-called " simoniacal heresy," particularly prevalent in Gaul, Illyricum and the East, he repeatedly attacked; and against the Gallican abuse of promoting laymen to bishoprics he protested with vigour.

The extent and character of Gregory's works in connexion with the liturgy and the music of the church is a subject of dispute. If we are to credit a 9th century biographer, Gregory abbreviated and otherwise simplified the Sacramentary of Gelasius, producing a revised edition with which his own name" has become associated, and which represents the groundwork of the modern Roman Missal. But though it is certain that he introduced three changes in the liturgy itself (viz. the addition of some words in the prayer Hanc igitur, the recitation of the Pater Noster at the end of the Canon immediately before the fraction of the bread, and the chanting of the Allelulia after the Gradual at other times besides the season of Easter) and two

others in the ceremonial connected therewith (forbidding deacons to perform any musical portion of the service except the chanting of the gospel, and subdeacons to wear chasubles), neither the external nor the internal evidence appears to warrant belief that the Gregorian Sacramentary is his work. Ecclesias- tical tradition further ascribes to Gregory the compilation of an Antiphonary, the revision and rearrangement of the system of church music, and the foundation of the Roman schola cantorum. It is highly doubtful, however, whether he had anything to do either with the Antiphonary or with the invention or revival of the cantus planus; it is certain that he was not the founder of the Roman singing-school, though he may have interested himself in its endowment and extension.

Finally, as Fourth Doctor of the Latin Church, Gregory claims the attention of theologians. He is the link between two epochs. The last of the great Latin Fathers and the first representative of medieval Catholicism he brings the dogmatic theology of Tertullian, Ambrose and Augustine into relation with the Scholastic speculation of later ages. " He connects the Graeco-Roman with the Romano-Germanic type of Christianity." His teaching, indeed, is neither philosophical, systematic nor truly original. Its importance lies mainly in its simple, popular summarization of the doctrine of Augustine (whose works Gregory had studied with infinite care, but not always with insight), and in its detailed exposition of various religious conceptions which were current in the Western Church, but had not hitherto been defined with precision (e.g. the views on angelology and demonology, on purgatory, the Eucharistic Sacrifice, and the efficacy of relics). In his exposition of such ideas Gregory made a distinct advance upon the older theology and influenced profoundly the dogmatic development of the future. He im- parted a life and impulse to prevailing tendencies, helping on the construction of the system hereafter to be completed in Scholastic- ism. He gave to theology a tone and emphasis which could not be disregarded. From his time to that of Anselm no teacher of equal eminence arose in the Church.

Gregory died on the 12th of March 604, and was buried the

same day in the portico of the basilica of St Peter, in front of

the sacristy. Translations took place in the oth, 15th and 17th

centuries, and the remains now rest beneath the altar in the

chapel of Clement VIII. In respect of his character, while most

historians agree that he was a really great man, some deny that he was also a great saint. The worst blot on his fair fame is his adulatory congratulation of the murderous usurper Phocas; though his correspondence with the Frankish queen Brunhilda, and the series of letters to and concerning the renegade monk Venantius also present problems which his admirers find difficult of solution. But while it may be admitted that Gregory was inclined to be unduly subservient to the great, so that at times he was willing to shut his eyes to the vices and even the crimes of persons of rank; yet it cannot fairly be denied that his character as a whole was singularly noble and unselfish. His life was entirely dominated by the religious motive. His sole desire was to promote the glory of God and of his church. At all times he strove honestly to live up to the light that was in him. " His goal," says Lau, " was always that which he acknowledged as the best." Physically, Gregory was of medium height and good figure. His head was large and bald, surrounded with a fringe of dark hair. His face was well-proportioned, with brown eyes, aquiline nose, thick and red lips, high-coloured cheeks, and prominent chin sparsely covered with a tawny beard. His hands, with tapering fingers, were remarkable for their beauty.

Gregory's Works. — The following are now universally admitted to be genuine: — Epistolarum libri xiv., Moralium libri xxxy., ■ Regulae pastor alls liber, Dialogorum libri iv., Homiliarum in Ezechielem prophetam libri ii., Homiliarum in Evangelia libri ii. These are all printed in Migne's Patrologia Latina. The Epistolae, however, have been published separately by P. Ewald and L. M. Hartmann in the Monumenta Germaniae historica

(Berlin, 1887- 1899), and this splendid edition has superseded all others. The question of the chronological reconstruction of the Register is dealt with by Ewald in his celebrated article in the Nines Archiv der Gesellschaft fur dltere deutsche Geschichtskunde, iii. pp. 433-625; and briefly by T. Hodgkin, Italy and her Invaders, v. 333-343- F° r

information about these writings of Gregory, consult especially G. J. T. Lau, Gregor I. der Grosse, pt. ii. chap. i. Die Schriften Gregors and F. Homes Dudden, Gregory the Great (see Index II. B.). In addition to the above-mentioned works there are printed under Gregory's name in Migne's Patrologia Latina, vol. lxxix., the follow- ing : — Super Cantico Canticorum expositio, In librum primum Regum variarum expositionum libri vi., In septem psalmos poenitentiales expositio and Concordia quorundam testimoniorum s. scripturae. But (with the possible exception of the first) none of these treatises are of Gregorian authorship. See the discussions in Migne, Lau and Dudden.

Authorities. — (a) The principal ancient authorities for the life and works of Gregory are given in their chronological order. They are : Gregory of Tours, Historia Francorum, x. 1 ; Liber pontificalis, " Vita Gregorii Magni "; Isidore of Seville, De vir. illustr. 40, and Ildefonsus of Toledo, De vir. illustr. i. ; an anonymous Vita Gregorii (of English authorship) belonging to the monastery of St Gall, discovered by Ewald and published by F. A. Gasquet, A Life of Pope St Gregory the Great (1904) ; Bede, Historia ecclesiastica, ii. c. I ; Paul the Deacon, Vita Gregorii Magni (770-780) ; John the Deacon, Vita Gregorii (872-882). (b) Recent Literature: J. Barmby, Gregory the Great (1892); T. Bonsmann, Gregor I. der Grosse, ein Lebensbild (1890); F. Homes Dudden, Gregory the Great: his place in History and Thought (2 vols., 1905) ; G. J. T. Lau, Gregor I. der Grosse nach seinem Leben und seiner Lehre geschildert (1845); C. Wolfsgruber, Gregor der Grosse (1897). See also F. Gregorovius, Rome in the Middle Ages (Eng. trans.) u. 16-103; T. Hodgkin, Italy and her Invaders, v. cc. 7-10; H. K. Mann, The Lives of the Popes, i. 1-250; F. W. Kellett, Pope Gregory the Great and his Re- lations with Gaul; L. Pingaud, La Politique de Saint Gregoire le Grand; W. Wisbaum, Die wichtigsten Richtungen und Ziele der Tdtigkeit des Papstes Gregors des Grossen; W. Hohaus, Die Bedeu- tung Gregors des Grossen als liturgischer Schriftsteller ; E. G. P. Wyatt, St Gregory and the Gregorian Music ; and the bibliographies of Gregory in Chevalier, Repertoire des sources historiques du moyen Age, and A. Potthast, Bibliotheca historica medii aevi. (F. H. D.)

Gregory II., pope from 715 to 731, succeeded Constantine I., whom he accompanied from Constantinople in 710. Gregory did all in his power to promote the spread of Christianity in Germany, and gave special encouragement to the mission of St Boniface, whom he consecrated bishop

in 722. He was a staunch adherent of the East Roman empire, which still exercised sovereignty over Rome, Ravenna and some other parts of Italy, and he impeded as far as possible the progress of the Lombards. About 726, however, he became involved in a conflict with the emperor Leo the Isaurian on account of the excessive taxation of the Italians, and, later, on the question of image worship, which had been proscribed by the government of Constantinople. Leo endeavoured to rid himself of the pope by violence, but Gregory, supported by the people of Rome and also by the Lombards, succeeded in eluding the emperor's attacks, and died peacefully on the nth of February 731.

Gregory III., pope from 731 to 741. He condemned the iconoclasts at a council convened at Rome in November 731, and, like his predecessor Gregory II., stimulated the missionary labours of St Boniface, on whom he conferred the pallium. Towards the Lombards he took up an imprudent attitude, in support of which he in vain invoked the aid of the Frankish prince Charles Martel.

Gregory IV., pope from 827 to 844, was chosen to succeed Valentinus in December 827, on which occasion he recognized the supremacy of the Frankish emperor in the most unequivocal manner. His name is chiefly associated with the quarrels between Lothair and Louis the Pious, in which he espoused the cause of the former, for whom, in the Campus Mendacii (Lugenfeld, field of lies), as it is usually called (833), he secured by his treachery a temporary advantage. The institution of the feast of All Saints is usually attributed to this pope. He died on the 25th of January 844, and was succeeded by Sergius II. Gregory V. (Bruno), pope from 996 to 999, a great-grandson of the emperor Otto the Great, succeeded John XV. when only twenty-four years of age, and until the council of Pavia (997) had a rival in the person of the anti-pope John XVI., whom the people of Rome, in revolt against the will of the youthful emperor Otto III., had chosen after having expelled Gregory. The most memorable acts of his pontificate were those arising out of the contumacy of the French king, Robert, who was ultimately brought to submission by the rigorous infliction of a sentencfc

of excommunication. Gregory died suddenly, and not without suspicion of foul play, on the 1 8th of February 999. His successor was Silvester II.

Gregory VI., pope from 1045 to 1046. As Johannes Gratianus he had earned a high reputation for learning and probity, and in 1045 he bought the Roman pontificate from his godson Benedict IX. At a council held by

the emperor Henry III. at Sutri in 1046, he was accused of simony and deposed. He was banished into Germany, where he died in 1047. He was accompanied into exile by his young protege Hildebrand (afterwards pope as Gregory VII.), and was succeeded by Clement II. (L. D.)*

Gregory VII., pope from 1073 to 1085. Hildebrand (the future pope) would seem to have been born in Tuscany — perhaps Raovacum — early in the third decade of the nth century. The son of a plain citizen, Bunicus or Bonizo, he came to Rome at an early age for his education; an uncle of his being abbot of the convent of St Mary on the Aventine. His instructors appear to have included the archpriest Johannes Gratianus, who, by disbursing a considerable sum to Benedict IX., smoothed his way to the papal throne and actually ascended it as Gregory VI. But when the emperor Henry III., on his expedition to Rome (1046), terminated the scandalous impasse in which three popes laid claim to the chair of Peter by deposing all three, Gregory VI. was banished to Germany, and Hildebrand .found himself obliged to accompany him. As he himself afterwards admitted, it was with extreme reluctance that he crossed the Alps. But his residence in Germany was of great educative value, and full of significance for his later official activity. In Cologne he was enabled to pursue his studies; he came into touch with the circles of Lorraine where interest in the elevation of the Church and her life was highest, and gained acquaintance with the political and ecclesiastical circumstances of that country which was destined to figure so largely in his career. Whether, on the death of Gregory VI. in the beginning of 1048, Hildebrand proceeded to Cluny is doubtful. His brief residence there, if it actually occurred, is to be regarded as no more than a visit; for he was never a monk of Cluny. His contemporaries indeed describe him as a monk; but his entry into the convent must be assigned to the period preceding or following his German travels and presumably took place in Rome. He returned to that city with Bishop Bruno of Toul, who was nominated pope under the title of Leo IX. (1048-1054). Under him Hildebrand found his first employment in the ecclesiastical service, becoming a sub- deacon and steward in the Roman Church. He acted, moreover, as a legate in France, where he was occupied inter alia with the question of Berengarius of Tours, whose views on the Lord's Supper had excited opposition. On the death of Leo IX. he was commissioned by the Romans as their envoy to the German court, to conduct the negotiations with regard to his successor. The emperor pronounced in favour of Bishop Gebhard of Eich- stadt, who, in the course of his short reign as Victor II. (1055- 1057), again employed Hildebrand as his legate to France. When Stephen IX. (Frederick of Lorraine) was raised to the papacy, without previous consultation with the German court, Hildebrand and Bishop Anselm of Lucca were despatched to Germany to secure a belated recognition, and he succeeded in gaining the consent of the empress Agnes.

Stephen, however, died before his return, and, by the hasty elevation of Bishop Johannes of Velletri, the Roman aristocracy made a last attempt to recover their lost influence on the appointment to the papal th rone — a proceeding which was charged with peril to the Church as it implied a renewal of the disastrous patrician regime. That the crisis was surmounted was essentially the work of Hildebrand. To Benedict X., the aristocratic nominee, he opposed a rival pope in the person of Bishop Gerhard of Florence, with whom the victory rested. The reign of Nicholas II. (1059-1061) was distinguished by events which exercised a potent influence on the policy of the Curia during the next two decades — 'the rapprochement with the Normans in the south of Italy, and the alliance with the democratic and, subsequently, anti-German movement of the Patarenes in the north. It was also under his pontificate(i059) that the law was enacted which transferred the

papal election to the College of Cardinals, thus withdrawing it from the nobility and populace of Rome and thrusting the German influence on one side. It would be too much to maintain that these measures were due to Hildebrand alone, but it is obvious that he was already a dominant personality on the Curia, through he still held no more exalted office than that of arch- deacon, which was indeed only conferred on him in 1059. Again, when Nicholas II. died and a new schism broke out, the dis-comfiture of Honorius II. (Bishop Cadalus of Parma) and the success of his rival (Anselm of Lucca) must be ascribed princi- pally, if not entirely, to Hildebrand's opposition to the former. Under the sway of Alexander II. (1061-1073) this man loomed larger and larger in the eye of his contemporaries as the soul of the Curial policy. It must be confessed the general political conditions, especially in Germany, were at that periqd exception- ally favourable to the Curia, but to utilize them with the sagacity actually shown was nevertheless no slight achievement, and the position of Alexander at the end of his pontificate was a brilliant justification of the Hildebrandine statecraft.

On the death of Alexander II. (April 21, 1073), Hildebrand became pope and took the style of Gregory VII. The mode of his election was bitterly assailed by his opponents. True, many of the charges preferred are obviously the emanations of scandal and personal dislike, liable to suspicion from the very fact that they were not raised to impugn his promotion till several years had elapsed (c. 1076); still it is plain from his own account of the circumstances of his elevation that it was conducted in extremely irregular fashion, and that the forms prescribed by the law of 1059 were not observed. But the sequel justified his election — of which the worst that can be said is that there was no general suffrage. And this sequel again owed none of its success to chance, but was the fruit of his own exertions. In his character were united wide experience and great

energy tested in difficult situations. It is proof of the popular faith in his qualifications that, although the circumstances of his election invited assault in 1073, no sort of attempt was then made to set up a rival pontiff. When, however, the opposition which took head against him had gone so far as to produce a pretender to the chair, his long and undisputed possession tended to prove the original legality of his papacy; and the appeal to irregularities at its beginning not only lost all cogency but assumed the appearance of a mere biased attack. On the 22nd of May he received sacerdotal ordination, and on the 30th of June episcopal consecration; the empress Agnes and the duchess Beatrice of Tuscany being present at the ceremony, in addition to Bishop Gregory of Vercelli, the chancellor of the German king, to whom Gregory would thus seem to have communicated the result of the election.

The focus of the ecclesiastico-political projects of Gregory VII. is to be found in his relationship with Germany. Since the death of Henry III. the strength of the monarchy in that country had been seriously impaired, and his son Henry IV. had to contend with great internal difficulties. This state of affairs was of material assistance to the pope. His advantage was still further accentuated by the fact that in 1073 Henry was but twenty-three years of age and by temperament inclined to precipitate action. Many sharp lessons were needful before he learned to bridle his impetuosity, and he lacked the support and advice of a dis- interested and experienced statesman. Such being the conditions, a conflict between Gregory VII. and Henry IV. could have only one issue — the victory of the former.

In the two following years Henry was compelled by the Saxon rebellion to come to amicable terms with the pope at any cost. Consequently in May 1074 he did penance at Nuremberg in presence of the legates to expiate his continued intimacy with the members of his council banned by Gregory, took an oath of obedience, and promised his support in the work of reforming the Church. This attitude, however, which at first won him the confidence of the pope, he abandoned so soon as he gained the upper hand of the Saxons: this he achieved by his victory at Hohenburg on the Unstrut (June 9, 1075). He now attempted to reassert his rights of suzerain in upper Italy without delay.

He sent Count Eberhard to Lombardy to combat the Patarenes; nominated the cleric Tedaldo to the archbishopric of Milan, thus settling a prolonged and contentious question; and finally endeavoured to establish relations with the Norman duke, Robert Guiscard. Gregory VII. answered with a

rough letter, dated December 8, in which — among other charges — he reproached the German king with breach of his word and with his further countenance of the excommunicated councillors; while at the same time he sent by word of mouth a brusque message intimating that the enormous crimes which would be laid to his account rendered him liable, not only to the ban of the church, but to the deprivation of his crown. Gregory ventured on these audacious measures at a time when he himself was confronted by a reckless opponent in the person of Cencius, who on Christmas-night did not scruple to surprise him in church and carry him off as a prisoner, though on the following day he was obliged to surrender his captive. The reprimands of the pope, couched as they were in such an unprecedented form, infuriated Henry and his court, and their answer was the hastily convened national council in Worms, which met on the 24th of January 1076. In the higher ranks of the German clergy Gregory had many enemies, and a Roman cardinal, Hugo Candidus, once on intimate terms with him but now at variance, had made a hurried expedition to Germany for the occasion and appeared at Worms with the rest. All the gross scandals with regard to the pontiff that this prelate could utter were greedily received by the assembly, which committed itself to the ill-considered and disastrous resolution that Gregory had forfeited his papal dignity. In a document full of accusations the bishops renounced their allegiance. In another King Henry pronounced him deposed, and the Romans were required to choose a new occupant for the vacant chair of St Peter. With the utmost haste two bishops were despatched to Italy in company with Count Eberhard under commission of the council, and they suc- ceeded in procuring a similar act of deposition from the Lombard bishops in the synod of Piacenza. The communication of these decisions to the pope was undertaken by the priest Roland of Parma, and he was fortunate enough to gain an opportunity for speech in the synod, which had barely assembled in the Lateran church, and there to deliver his message announcing the dethronement of the pontiff. For the moment the members were petrified with horror, but soon such a storm of indignation was aroused that it was only due to the moderation of Gregory himself that the envoy was not cut down on the spot. On the following day the pope pronounced the sentence of excommunica- tion against the German king with all formal solemnity, divested him of his royal dignity and absolved his subjects from the oaths they had sworn to him. This sentence purported to eject the king from the church and to strip him of his crown. Whether it would produce this effect, or whether it would remain an idle threat, depended not on the author of the verdict, but on the subjects of Henry — before all, on the German princes. We know from contemporary evidence that the excommunication of the king made a profound impression both in Germany and Italy. Thirty years before, Henry III. had deposed three popes, and thereby rendered a great and acknowledged service to the

church. When Henry IV. attempted to copy this summary procedure he came to grief, for he lacked the support of the people. In Germany there was a speedy and general revulsion of sentiment in favour of Gregory, and the particularism of the princes utilized the auspicious moment for prosecuting their anti-regal policy under the cloak of respect for the papal decision. When at Whitsuntide the king proposed to. discuss the measures to be taken against Gregory in a council of his nobles at Mainz, only a few made their appearance; the Saxons snatched at the golden opportunity for renewing their insurrection and the anti-royalist party grew in strength from month to month. The situation now became extremely critical for Henry. As a result of the agitation, which was zealously fostered by the papal legate Bishop Altmann of Passau, the princes met in October at Tribur to elect a new German king, and Henry, who was stationed at Oppenheim on the left bank of the Rhine, was only saved from

the loss of his sceptre by the failure of the assembled princes to agree on the question of his successor. Their dissension, however, merely induced them to postpone the verdict. Henry, they declared, must make reparation to the pope and pledge himself to obedience; and they settled that, if, on the anniversary of his excommunication, he still lay under the ban, the throne should be considered vacant. At the same time they determined to invite Gregory to Augsburg, there to decide the conflict. These arrangements showed Henry the course to be pursued. It was imperative, under any circumstances and at any price, to secure his absolution from Gregory before the period named, otherwise he could scarcely foil his opponents in their intention to pursue their attack against himself and justify their measures by an appeal to his excommunication. At first he attempted to attain his ends by an embassy, but when Gregory rejected his overtures he took the celebrated step of going to Italy in person. The pope had already left Rome, and had intimated to the German princes that he would expect their escort for his journey on January 8 in Mantua. But this escort had not appeared when he received the news of the king's arrival. Henry, who travelled through Burgundy, had been greeted with wild enthusiasm by the Lombards, but resisted the temptation to employ force against Gregory. He chose instead the unexpected and unusual, but, as events proved, the safest course, and determined to compel the pope to grant him absolu- tion by doing penance before him at Canossa, where he had taken refuge. This occurrence was quickly embellished and inwoven by legend, and great uncertainty still prevails with regard to several important points. The reconciliation was only effected after prolonged negotiations and definite pledges on the part of the king, and it was with reluctance that Gregory at length gave way, for, if he conferred his absolution, the diet of princes in Augsburg, in which he might reasonably hope to act as arbitrator, would either be rendered purposeless, or, if it met at all, would wear an entirely

different character. It was impossible, however, to deny the penitent re-entrance into the church, and the politician had in this case to be subordinated to the priest. Still the removal of the ban did not imply a genuine reconciliation, and no basis was gained for a settlement of the great questions at issue — notably that of investiture. A new conflict was indeed inevitable from the very fact that Henry IV. naturally considered the sentence of deposition repealed with that of excommunication; while Gregory on the other hand, intent on reserving his freedom of action, gave no hint on the subject at Canossa.

That the excommunication of Henry IV. was simply a pretext — not a motive — for the opposition of the rebellious German nobles is manifest. For not only did they persist in their policy after his absolution, but they took the more decided step of setting up a rival king in the person of Duke Rudolph of Swabia (Forchheim, March 1077). At the election the papal legates present observed the appearance of neutrality, and Gregory himself sought to maintain this attitude during the following years. His task was the easier in that the two parties were of fairly equal strength, each endeavouring to gain the upper hand by the accession of the pope to their side. But his hopes and labours, with the object of receiving an appeal to act as arbitrator in the dynastic strife, were fruitless, and the result of his non- committal policy was that he forfeited in large measure the confidence of both parties. Finally he decided for Rudolph of Swabia in consequence of his victory at Flarchheim (January 27, 1080). Under pressure from the Saxons, and misinformed as to the significance of this battle, Gregory abandoned his waiting policy and again pronounced the excommunication and deposi- tion of King Henry (March 7, 1080), unloosing at the same time all oaths sworn to him in the past or the future. But the papal censure now proved a very different thing from the papal censure four years previously. In wide circles it was felt to be an in- justice, and men began to put the question — so dangerous to the prestige of the pope — whether an excommunication pronounced on frivolous grounds was entitled to respect. To make matters I worse, Rudolph of Swabia died on the 16th of October of the

same year. True, a new claimant — Hermann of Luxemburg — was put forward in August 1081, but his personality was ill adapted for a leader of the Gregorian party in Germany, and the power of Henry IV. was in the ascendant. The king, who had now been schooled by experience, took up the struggle thus forced upon him with great vigour. He refused to acknowledge the ban on the ground of illegality. A council had been sum- moned at Brixen, and on the 25th of June 1080 it pronounced Gregory deposed and nominated the archbishop Guibert of Ravenna as his successor

— a policy of anti-king, anti-pope. In 1081 Henry opened the conflict against Gregory in Italy. The latter had now fallen on evil days, and he lived to see thirteen cardinals desert him, Rome surrendered by the Romans to the German king, Guibert of Ravenna enthroned as Clement III. (March 24, 1084), and Henry crowned emperor by his rival, while he himself was constrained to flee from Rome.

The relations of Gregory to the remaining European states were powerfully influenced by his German policy; for Germany, by engrossing the bulk of his powers, not infrequently compelled him to show to other rulers that moderation and forbearance which he withheld from the German king. The attitude of the Normans brought him a rude awakening. The great concessions made to them under Nicholas II. were not only powerless to stem their advance into central Italy but failed to secure even the expected protection for the papacy. When Gregory was hard pressed by Henry IV., Robert Guiscard left him to his fate, and only interfered when he himself was menaced with the German arms. Then, on the capture of Rome, he abandoned the city to the tender mercies of his warriors, and by the popular indignation evoked by his act brought about the banishment of Gregory.

In the case of several countries, Gregory attempted to establish a claim of suzerainty on the part of the see of St Peter, and to secure the recognition of its self-asserted rights of possession. On the ground of "immemorial usage" Corsica and Sardinia were assumed to belong to the Roman Church. Spain and Hungary were also claimed as her property, and an attempt was made to induce the king of Denmark to hold his realm as a fief from the pope. Philip I. of France, by his simony and the violence of his proceedings against the church, provoked a threat of summary measures; and excommunication, deposition and the interdict, appeared to be imminent in 1074. Gregory, however, refrained from translating his menaces into actions, although the attitude of the king showed no change, for he wished to avoid a dispersion of his strength in the conflict soon to break out in Germany. In England, again, William the Conqueror derived no less benefit from this state of affairs. He felt himself &o safe that he interfered autocratically with the management of the church, forbade the bishops to visit Rome, filled bishoprics and abbeys, and evinced little anxiety when the pope expatiated' to him on the different principles which he entertained as to the relationship of church and state, or when he prohibited him from commerce or commanded him to acknowledge himself a vassal of the apostolic chair. Gregory had no power to compel the English king to an alteration in his ecclesiastical policy, so chose to ignore what he could not approve, and even considered it advisable to assure him of his particular affection.

Gregory, in fact, established relations — if no more — with every land in Christendom; though these relations did not invariably realize the ecclesiastico-political hopes connected with them. His correspondence extended to Poland, Russia and Bohemia. He wrote in friendly terms to the Saracen king of Mauretania in north Africa, and attempted, though without success, to bring the Armenians into closer contact with Rome. The East, especially, claimed his interest. The ecclesiastical rupture between the bishops of Rome and Byzantium was a severe blow to him, and he laboured hard to restore the former amicable relationship. At that period it was impossible to suspect that the schism implied a definite separation, for pro- longed schisms had existed in past centuries, but had always been surmounted in the end. Both sides, moreover, had an

interest in repairing the breach between the churches. Thus, immediately on his accession to the pontificate, Gregory sought to come into touch with the emperor Michael VII. and succeeded. When the news of the Saracenic outrages on the Christians in the East filtered to Rome, and the political embarrassments of the Byzantine emperor increased, he conceived the project of a great military expedition and exhorted the faithful to participa- tion in the task of recovering the sepulchre of the Lord (1074). Thus the idea of a crusade to the Holy Land already floated before Gregory's vision, and his intention was to place himself at the head. But the hour for such a gigantic enterprise was not yet come, and the impending struggle with Henry IV. turned his energies into another channel.

In his treatment of ecclesiastical policy and ecclesiastical reform, Gregory did not stand alone, but on the contrary found powerful support. Since the middle of the nth century the tendency — mainly represented by Cluny — towards a stricter morality and a more earnest attitude to life, especially on the part of the clergy, had converted the papacy; and, from Leo IX. onward, the popes had taken the lead in the movement. Even before his election, Gregory had gained the confidence of these circles, and, when he assumed the guidance of the church, they laboured for him with extreme devotion. From his letters we see how he fostered his connexion with them and stimulated their zeal, how he strove to awake the consciousness that his cause was the cause of God and that to further it was to render service to God. By this means he created a personal party, uncon- ditionally attached to himself, and he had his confidants in every country. In Italy Bishop Anselm of Lucca, to take an example, belonged to their number. Again, the duchess Beatrice of Tuscany and her daughter the Margravine Matilda, who put her great wealth at his disposal, were of inestimable service. The empress Agnes also adhered to his cause. In upper Italy the Patarenes had worked for him in many ways, and all who stood for their

objects stood for the pope. In Germany at the begin- ning of his reign the higher ranks of the clergy stood aloof from him and were confirmed in their attitude by some of his regula- tions. But Bishop Altmann of Passau, who has already been mentioned, and Archbishop Gebhard of Salzburg, were among his most zealous followers. That the convent of Hirschau in Swabia was held by Gregory was a fact of much significance, for its monks spread over the land as itinerant agitators and accomplished much for him in southern Germany. In England Archbishop Lanfranc of Canterbury probably stood closest to him; in France his champion was Bishop Hugo of Die, who afterwards ascended the archiepiscopal chair of Lyons.

The whole life-work of Gregory VII. was based on his convic- tion that the church has been founded by God and entrusted with the task of embracing all mankind in a single society in which His will is the only law; that, in her capacity as a divine institution, she outtops all human structures; and that the pope, qua head of the church, is the vice-regent of God on earth, so that disobedience to him implies disobedience to God — or, in other words, a defection from Christianity. Elaborating an idea discoverable in St Augustine, he looked on the worldly state — a purely human creation — as an unhallowed edifice whose character is sufficiently manifest from the fact that it abolishes the equality of man, and that it is built up by violence and injustice. He developed these views in a famous series of letters to Bishop Hermann of Metz. But it is clear from the outset that we are only dealing with reflections of strictly theoretical importance; for any attempt to interpret them in terms of action would have bound the church to annihilate not merely a single definite state, but all states. Thus Gregory, as a politician desirous of achieving some result, was driven in practice to adopt a different standpoint. He acknowledged the existence of the state as a dispensation of Providence, described the coexistence of church and state as a divine ordin- ance, and emphasized the necessity of union between the sacer- dotium and the imperium. But at no period would he have dreamed of putting the two powers on an equality; the superiority of church to state was to him a fact which admitted

of no discussion and which he had never doubted. Again, this very superiority of the church implied in his eyes a superiority of the papacy, and he did not shrink from drawing the extreme conclusions from these premises. In other words, he claimed the right of excommunicating and deposing incapable monarchs, and of confirming the choice of their successors. This habit of thought needs to be appreciated in order to understand his efforts to bring individual states into feudal subjection to the

chair of St Peter. It was no mere question of formality, but the first step to the realization of his ideal theocracy comprising each and every state.

Since this papal conception of the state involved the exclusion of independence and autonomy, the history of the relationship between church and state is the history of one continued struggle. In the time of Gregory it was the question of appointment to spiritual offices — the so-called investiture— which brought the theoretical controversy to a head. The preparatory steps had already been taken by Leo IX., and the subsequent popes had advanced still further on the path he indicated; but it was reserved for Gregory and his enactments to provoke the outbreak of the great conflict which dominated the following decades. By the first law (1075) the right of investiture for churches was in general terms denied to the laity. In 1078 neglect of this prohibition was made punishable by excommunication, and, by a further decree of the same year, every investiture conferred by a layman was declared invalid and its acceptance pronounced liable to penalty. It was, moreover, enacted that every layman should restore, under pain of excommunication, all lands of the church, held by him as fiefs from princes or clerics; and that, henceforward, the assent of the pope, the archbishop, &c, was requisite for any investiture of ecclesiastical property. Finally in 1080 the forms regulating the canonical appointment to a bishopric were promulgated. In case of a vacancy the election was to be conducted by the people and clergy under the auspices of a bishop nominated by the pope or metropolitan; after which the consent of the pope or archbishop was to be procured; if any violation of these injunctions occurred, the election should be null and void and the right of choice pass to the pope or metropolitan. In so legislating, Gregory had two objects: in the first place, to withdraw the appointment to episcopal offices from the influence of the king; in the second, to replace that influence by his own. The intention was not to increase the power of the metropolitan: he simply desired that the nomination of bishops by the pope should be substituted for the prevalent nomination of bishops by the king. But in this course of action Gregory had a still more ambitious goal before his eyes. If he could once succeed in abolishing the lay investiture the king would, ipso facto, be deprived of his control over the great possessions assigned to the church by himself and his predecessors, and he could have no security that the duties and services attached to those possessions would continue to be discharged for the benefit of the Empire. The bishops in fact were to retain their position as princes of the Empire, with all the lands and rights of supremacy pertaining to them in that capacity, but the bond between them and the Empire was to be dissolved: they were to owe allegiance not to the king, but to the pope — a non-German sovereign who, in consequence of the Italian policy of the German monarchy, found himself in perpetual opposition to Germany. Thus, by his ecclesiastical legislation, Gregory

attempted to shake the very foundations on which the constitution of the German empire rested, while completely ignoring the historical development of that constitution (see Investiture).

That energy which Gregory threw into the expansion of the papal authority, and which brought him into collision with thfe secular powers, was manifested no less in the internal government of the church. He wished to see all important matters of dispute referred to Rome ; appeals were to be addressed to himself, and he arrogated the right of legislation. The fact that his laws were usually promulgated by Roman synods which he convened during Lent does not imply that these possessed an independent position; on the contrary, they were entirely dominated by his influence,

and were no more than the instruments of his will. The central- ization of ecclesiastical government in Rome naturally involved a curtailment of the powers of the bishops and metropolitans. Since these in part refused to submit voluntarily and attempted to assert their traditional independence, the pontificate of Gregory is crowded with struggles against the higher ranks of the prelacy. Among the methods he employed to break their power of resistance, the despatch of legates proved peculiarly effective. The regulation, again, that the metropolitans should apply at Rome in person for the pallium — pronounced essential to their qualifications for office — served to school them in humility.

This battle for the foundation of papal omnipotence within the church is connected with his championship of compulsory celibacy among the clergy and his attack on simony. Gregory VII. did not introduce the celibacy of the priesthood into the church, for even in antiquity it was enjoined by numerous laws. He was not even the first pope to renew the injunction in the nth century, for legislation on the question begins as early as in the reign of Leo IX. But he took up the struggle with greater energy and persistence than his predecessors. In 1074 he published an encyclical, requiring all to renounce their obedience to those bishops who showed indulgence to their clergy in the matter of celibacy. In the following year he commanded the laity to accept no official ministrations from married priests and to rise against all such. He further deprived these clerics of their revenues. Wherever these enactments were proclaimed they encountered tenacious opposition, and violent scenes were not infrequent, as the custom of marriage was widely diffused throughout the contemporary priesthood. Other decrees were issued by Gregory in subsequent years, but were now couched in milder terms, since it was no part of his interest to increase the numbers of the German faction. As to the objectionable nature of simony— the transference or acquisition of a spiritual office for monetary considerations — no doubt could exist in the mind of an earnest Christian, and no theoretical justification was ever attempted. The practice, however,

had attained great dimensions both among the clergy and the laity, and the sharp campaign, which had been waged since the days of Leo IX., had done little to limit its scope. The reason was that in many cases it had assumed an extremely subtle form, and detection was difficult when the simony took the character of a tax or an honorarium. The fact, again, that lay investiture was described as simony, inevitably brought with it an element of confusion, and, in the case of a charge of simoniacal practices, enormously accentuates the difficulty of determining the actual state of affairs. The war against simony in its original form was un- doubtedly necessary, but it led to highly complicated and pro- blematic issues. Was the priest or bishop, whose ordination was due to simony, actually in the possession of the sacerdotal or episcopal power or not? If the answer was in the affirmative, it would seem possible to buy the Holy Ghost; if in the negative, then obviously all the official acts of the respective priest or bishop — which, according to the doctrine of the church, pre- supposed the possession of a spiritual quality — were invalid. And, since the number of simoniacal bishops was at that period extremely large, incalculable consequences resulted. The diffi- culty of the problem accounts for the diversity of solutions propounded. The perplexity of the situation was aggravated by the fact that, if the stricter view was adopted, it followed that the sacrament of ordination must be pronounced invalid, even in the cases where it had been unconsciously sought at the hands of a simoniac, for the dispenser was in point of fact no bishop, although he exercised the episcopal functions and his trans- gressions were unknown, and consequently it was impossible for him to ordain others. In the time of Gregory the conflict was still swaying to and fro, and he himself in 1078 declared consecra- tion by a simoniac null and void.

The pontificate of Gregory VII. came to a melancholy close,

for he died an exile in Salerno; the Romans and a number of his

most trusted coadjutors had renounced him, and the faithful

I band in Germany had shrunk to scant proportions. Too much

GREGORY (POPES)

the politician, too rough in his methods, too exclusively the representative of the Roman see and its interests, he had gained more enemies than friends. He was of course a master of state- craft; he had pursued political ends with consummate skill, causing them to masquerade as requirements of religion; but he forgot that incitement to civil war, the preaching of rebellion, and the release of subjects from their oaths, were methods which must infallibly lead to moral anarchy, and tend, with justice, to Stifle the

confidence once felt in him. The more he accustomed his contemporaries to the belief that any and every measure- so long as it opened up some prospect of success — was good in his sight, no matter how dangerous the fruits it might mature, the fainter grew their perception of the fact that he was not only a statesman but primarily the head of the Christian Church. That the frail bonds of piety and religious veneration for the chair of St Peter had given way in the struggle for power was obvious to all, when he himself lost that power and the star of his opponent was in the ascendant. He had given the rein to his splendid gifts as a ruler, and in his capacity of pope he omitted to provide an equivalent counterpoise. We are told that he was once an impressive preacher, and he could write to his faithful countesses in terms which prove that he was not wanting in religious feeling; but in the whirlpool of secular politics this phase of his character was never sufficiently developed to allow the vice-gerent of Christ to be heard instead of the hierarch in his official acts.

But to estimate the pontificate of Gregory by the disasters of its closing years would be to misconceive its significance for the history of the papacy entirely. On the contrary, his reign forms an important chapter in the history of the popedom as an institution; it contains the germs of far-reaching modifications of the church, and it gave new impulses to both theory and practice, the value of which may indeed be differently estimated, but of which the effects are indubitable. It was he who conceived and formulated the ideal of the papacy as a structure embracing all peoples and lands. He took the first step towards the codifica- tion of ecclesiastical law and the definite ratification of the claims of the apostolic chair as corner-stones in the church's foundation. He educated the clergy and the lay world in obedience to Rome; and, finally, it was due to his efforts that the duty of the priest with regard to sexual abstinence was never afterwards a matter of doubt in the Catholic Christianity of the West.

On the 25th of May 1085 he died, unbroken by the misfortunes of his last years, and unshaken in his self-certainty. Dilexi jusiiliam et odivi iniquitatem: propterea morior in exilio — are said to have been his last words. In 1584 Gregory XIII. received him into the Martyrologium Romanum; in 1606 he was canonized by Paul V. The words dedicated to him in the Breviarium Romanum, for May 25, contain such an apotheosis of his ponti- ficate that in the 18th and 19th centuries they were prohibited by the governments of several countries with Roman Catholic populations.

Bibliography. — A comprehensive survey of the sources and literature for the history of Gregory VII. is given by C. Mirbt, s.v. " Gregor VII." in Herzog-Hauck, Realencyklopddie, 3rd ed. vol. vii. pp. 96 sqq. The main source for the reign of Gregory consists of his letters and decrees, the greater part of which are collected in the Registrum (ed. P. Jaffe,

Bibliotkeca rerum Germanicarum, ii., Berlin, 1865). The letters preserved in addition to this official collection are also reprinted by Jaffe under the title of Epistolae collectae. The Dictatus Papas — a list of twenty-seven short sentences on the rights of the pope, — which is given in the Registrum, is not the work of Gregory VII., but should probably be ascribed to Cardinal Deus- dedit. Further: A. Potthast, Bibliotheca historica medii aevi, i. (2nd ed., Berlin, 1896), pp. 541 sq., ii. 1351; P. Jaffe\ Regesta ponti- ficum (2nd ed., 1865), tome i. pp. 594-649, Nr. 4771-5313, tome ii. p. 751. The most important letters and decrees of Gregory VII. are reprinted by C. Mirbt, Quellen zur Geschichte des Papsttums (2nd ed., Tubingen, 1901), Nr. 183 sqq., pp. 100 sqq. The oldest life of Gregory is that by Paul von Bermried, reprinted, e.g. by Watterich, Vitae pontificum, i. 474-546. Among the historians the following are of especial importance: Berthold, Bernold, Lambert von Hersfeld, Bruno, Marianus Scotus, Leo of Ostia, Peter of Marte Cassino, Sigebert of Gembloux, Hugo of Flavigny, Arnulph and Landulf of Milan, Donizo — their works being reprinted in the section " Scriptores " in the Monumenta Cermaniae historica, vols, v., vi., vii., viii., xii. The struggles which broke out under Gregory VII-

and were partially continued in the subsequent decades gave rise to a pamphlet literature which is of extreme importance for their internal history. The extant materials vary greatly in extent, and display much diversity from the literary-historical point of view. Most of them are printed in the Monumenta Cermaniae, under the title, Libelli de lite imperatomm et pontificum saeculis XI. et XII. conscripti, tome i. (Hanover, 1891), tome ii. (1892), tome iii. (1897). The scientific investigation of the Gregorian age has received enor- mous benefit from the critical editions of the sources in the Monu- menta Germaniae, so that the old literature is for the most part antiquated. This is true even of the great monograph on this pope — A. F. Gfrorer, Papst Gregorius VII. und sein Zeitalter (7 vols., Schaffhausen, 1859-1861), which must be used with extreme caution. The present state of criticism is represented by the following works: G. Meyer von Knonau, Jahrbiicher des deutschen Reichs unter Heinrich IV. und Heinrich V., vol. i. (Leipzig, 1 890), ii. (1894), m – (1900), iv. (1903); W. Martens, Gregor VII., sein Leben und Werken (2 vols., Leipzig, 1904) ; C. Mirbt, Die Publizistik im Zeitalter Gregors VII. (Leipzig, 1894); A. Hauck, Kirchengeschichte Deutschlands (3 vols., Leipzig, 1894). The special literature on individual events during the Gregorian pontificate is so extensive that no list can be given here. On Gregory's elevation to the chair, cf. C. Mirbt, Die Wahl Gregors VII. (Marburg, 1892). See also A. H. Mathew, D.D., Life and Times of Hildebrand, Pope Gregory VII. (1910). (C. M.)

Gregory VIII. {Mauritius Burdinus), antipope from 'n 18 to 1 121, was a native of southern France, who had crossed the Pyrenees while young and had later been made archbishop of Braga. Suspended by Paschal II. in 1 1 14 on account of a dispute with the Spanish primate and papal legate, the archbishop of Toledo, he went to Rome and regained favour to such an extent that he was employed by the pope on important legations. He opposed the extreme Hildebrandine policy, and, on the refusal of Gelasius II. to concede the emperor's claim to investiture, he was proclaimed pope at Rome by Henry V. on the 8th of March n 18. He was not universally recognized, however, and never fully enjoyed the papal office. He was excommunicated by Gelasius II. in April n 18, and by Calixtus II. at the synod of Reims (October n 19). He was driven from Rome by the latter in June 11 21, and, having been surrendered by the citizens of Sutri, he was forced to accompany in ridiculous guise the triumphal procession of Calixtus through Rome. He was exiled to the convent of La Cava, where he died.

The life of Gregory VIII. by Baluzius in Baluzii miscellanea, vol. I, ed. by J. D. Mansi (Lucca, 1761), is an excellent vindication of an antipope. The chief sources are in Monumenta Germaniae historica, Scriptores, vols. 5 and 20, and in J. M. Watterich, Pontif. Roman, vitae, vol. 2. See C. Mirbt, Die Publizistik im Zeitalter Gregors VII. (Leipzig, 1894) ; J. Langen, Geschichte der romischen Kirche von Gregor VII. bis Innocenz III. (Bonn, 1893) ; Jaff6, Regesta pontif. Roman., 2nd ed., (1885-1888); K. J. von Hefele, Conciliengeschichle, Bd. 5, 2nd ed. ; F. Gregorovius, Rome in the Middle Ages, vol. 4, trans, by Mrs G. W. Hamilton (London, 1900-1902) ; P. B. Gams, Kirchengeschichte von Spanien, vol. 3 (Regensburg, 1876).

Gregory VIII. {Alberto de Mora), pope from the 21st of October to the 17th of December 1187, a native of Benevento and Praemonstratensian monk, successively abbot of St Martin at Laon, cardinal-deacon of San' Adriano al foro, cardinal-priest of San Lorenzo in Lucina, and chancellor of the Roman Church, was elected to succeed Urban III. Of amiable disposition, he hastened to make peace with Henry VI. and promised not to oppose the latter's claim to Sicily. He addressed general letters both to the bishops, reminding them of their duties to the Roman Church, especially of their required visits ad limina, and to the whole Christian people, urging a new crusade to recover Jerusalem. He died at Pisa while engaged in making peace between the Pisans and Genoese in order to secure the help of both cities in the crusade. His successor was Clement III.

His letters are in J. P. Migne, Patrol. Lat. vol. 202. Consult also J. M. Watterich, Pontif. Roman, vitae, vol. 2 (Leipzig, 1862), and ˆaffe-Wattenbach, Regesta pontif. Roman. (1 885-1888). See J. Langen, Geschichte der romischen Kirche von Gregor VII. bis Innocenz III. (Bonn,

1893); P. Nadig, Gregors VIII. sftagiges Pontifikat (Basel, 1890); P. Scheffer-Boichorst, Friedrichs I. letzter Streit mil der Kurie (Berlin, 1866) ; F. Gregorovius, Rome in the Middle Ages, vol. 4, trans, by Mrs G. W. Hamilton (London, 1896).

Gregory IX. (Ugolino Conti de Segni), pope from the 19th of March 1227, to the 22nd of August 1241, was a nobleman of Anagni and probably a nephew of Innocent III. He studied

at Paris and Bologna, and, having been successively archpriest of St Peter's, papal chaplain, cardinal-deacon of Sant' Eustachio, cardinal-bishop of Ostia, the first protector of the Franciscan order, and papal legate in Germany under Innocent III., and Honorius III., he succeeded the latter in the papacy. He had long been on friendly terms with the emperor Frederick II., but now excommunicated him (29th of September 1227) for continued neglect of his vows and refusal to undertake the crusade. When Frederick finally set out the following June without making submission to the pope, Gregory raised an insurrection against him in Germany, and forced him in 1230 to beg for absolution. The Romans, however, soon began a very bitter war against the temporal power and exiled the pope (1st of June 1231). Hardly had this contest been brought to an end favourable to the papacy (May 1235) when Gregory came into fresh conflict with Frederick II. He again excommunicated the emperor and released his subjects from their allegiance (24th of March 1239). Frederick, on his side, invaded the Papal States and prevented the assembling of a general council convoked for Easter 1241. The work of Gregory, however, was by no means limited to his relations with emperor and Romans. He systematized the Inquisition and entrusted it to the Dominicans; his rules against heretics remained in force until the time of Sixtus V. He supported Henry III. against the English barons, and protested against the Pragmatic Sanction of Louis IX. of France. He sent monks to Constantinople to negotiate with the Greeks for church unity, but without result. He canonized Saints Elizabeth of Thuringia, Dominic, Anthony of Padua and Francis of Assisi. He permitted free study of the Aristotelian writings, and issued (1234), through his chaplain, Raymond of Pennaforte, an important new compilation of decretals which he prescribed in the bull Rex pacificus should be the standard text-book in canon law at the universities of Bologna and Paris. Gregory was famed for his learning and eloquence, his blameless life, and his great strength of character. He died on the 22nd of August 1241, while Frederick II. was advancing against him, and was succeeded by Celestine IV.

For the life of Gregory IX., consult his Letters in Monumenta Germaniae historica, Epistolae saeculi XIII. e regestis pontif. Roman. selectae (Berlin, 1883); " Les Registres de Gregoire IX," ed. L. Auvray in Bibliotheque des ecoles francaises d'Athenes et de Rome (Paris, 1890-1905); A. Potthast, Regesta pontif. Roman. (Berlin, 1875) and " Registri dei Cardinali Ugolino d' Ostia et Ottaviano degli Ubaldini," ed. G. Levi in Fonti per la storia d' Italia (1890). See J. Felten, Papst Gregor IX. (Freiburg i. B., 1886); J. Marx, Die Vita Gregorii IX. quellenkritisch untersucht (1889); P. Balan, Storia di Gregorio IX e dei suoi tempi (3 vols.,"Modena, 1872-1873) ; F. Gregorovius, Rome in the Middle Ages, vol. 5, trans, by Mrs G. W. Hamilton (London, 1900-1902) ; H. H. Milman, Latin Christianity, vol. 5 (London, 1899); R. Honig, Rapporti tra Federico II e Gregorio IX rispetto alia spedizione in Palestina (1896); P. T. Masetti, / Pontefici Onorio III, Gregorio IX ed Innocenzo IV a Jronte dell' Imperatore Federico II nel secolo XIII (1884); T. Frantz, Der grosse Kampf zwischen Kaisertum u. Papsttum zur Zeit des Hohenstaufen Friedrich II. (Berlin, 1903) ; W. JMorden, Das Papsttum u. Byzanz (Berlin, 1903). An exhaustive bibliography and an excellent article on Gregory by Carl Mirbt are to be found in Hauck's Realencyklopadie, 3rd edition.

. Gregory X. (Tebaldo Visconti), pope from the istof September 1271, to the 10th of January 1276, was born at Piacenza in 1208, studied for the church, and became archdeacon of Liege. The eighteen cardinals who met to elect a successor to Clement IV. were divided into French and Italian factions, which wrangled over the election for nearly three years in the midst of great popular excitement, until finally, stirred by the eloquence of St Bonaventura, the Franciscan monk, they entrusted the choice to six electors, who hit on Visconti, at that time accompanying Edward of England on the crusade. He returned to Rome aiyd was ordained priest on the 19th of March 1272, and consecrated on the 27th. He at once summoned the fourteenth general council of the Catholic Church, which met at Lyons in 1274, with an attendance of some 1600 prelates, for the purpose of considering the eastern schism, the condition of the Holy Land, and the abuses in the church. The Greeks were persuaded, thanks to St Bonaventura, to consent to a union with Rome for the time being, and Rudolph of Habsburg renounced at the

council all imperial rights in the States of the Church. The most celebrated among the many reform decrees issued by Gregory was the constitution determining for the first time the form of conclave at papal elections, which in large measure has remained ever since the law of the church. Gregory was on his way to Rome to crown Rudolph and send him out on a great crusade in company with the kings of England, France, Aragon and Sicily, when he died at Arezzo on the 10th of January 1276. He was a nobleman, fond of peace and actuated by the conscious- ness of a great mission. He

has been honoured as a saint by the inhabitants of Arezzo and Piacenza. His successor in the papacy was Innocent V.

The registers of Gregory X. have been published by J. Guiraud in the Bibliotheque des ecoles franqaises d'Athenes et de Rome (Paris, 1892-1898). See K. J. von Hefele, Conciliengeschichte, vol. 5, 2nd edition (1873-1890); H. Finke, Konzilienstudien z. Gesch. des 13 ten Jahrhunderts (Miinster, 1891); P. Piacenza, Compendio delta storia del b. Gregorio X, papa (Piacenza, 1876) ; F. Gregorovius, Rome in the Middle Ages, vol. 5, trans, by Mrs G. W. Hamilton (London, 1900-1902) ; H. Otto, Die Beziehungen Rudolfs von Habsburgs zu Papst Gregor X. (Innsbruck, 1895); A Zisterer, Gregor X. u. Rudolf von Habsburg in ihren gegenseitigen Beziehungen (Freiburg i. B., 1891) ; F. Walter, Die Politik der Kurie unter Gregor X. (Berlin, 1894); A. Potthast, Regesta pontif. Roman, vol. 2 (Berlin, 1875) ; W. Norden, Das Papsttum und Byzanz (Berlin, 1903) ; J. Loserth, " Akten tibcr die Ward Gregors X." in Neues Archiv, xxi. (1895); A. von Hirsch-Gereuth, "Die Kreuzzugspolitik Gregors X." in Studien z. Gesch. d. Kreuzzugsidee nach den Kreuzziigen (Munich, 1896). There is an excellent article by Carl Mirbt in Hauck's Realencyklopadie, 3rd edition.

Gregory XL {Pierre Roger de Beaufort), pope from the 30th of December 1370 to the 27th of March 1378, born in Limousin in 1330. created cardinal-deacon of Sta Maria Nuova by his uncle, Clement VI., was the successor of Urban V. His efforts to establish peace between France and England and to aid the Eastern Christians against the Turks were fruitless, but he prevented the Visconti of Milan from making further encroach-ments on the States of the Church. He introduced many reforms in the various monastic orders and took vigorous measures against the heresies of the time. His energy was stimulated by the stirring words of Catherine of Siena, to whom in particular the transference of the papal see back to Italy (17th of January 1377) was almost entirely due. Whilst at Rome he issued several bulls to the archbishop of Canterbury, the king of England, and the university of Oxford, commanding an investigation of Wycliffe's doctrines. Gregory was meditating a return to Avignon when he died. He was the last of the French popes who for some seventy years had made Avignon their see, a man learned and full of zeal for the church, but irresolute and guilty of nepotism. The great schism, which was to endure fifty years, broke out soon after the election of his successor, Urban VI.

See H. J. Tomaseth, " Die Register u. Secretaire Urbans V. u. Gregors XL" in Mitieilungen des Instiluts fiir osterreichische Ge- schichtsforschung (1898); Baluzius, Vitae pap. Avenion. vol. 1 (Paris, 1693) ; L. Pastor, History of the Popes, vol. 1, trans, by F. I. Antrobus (London, 1899) ; F. Gregorovius, Rome in the Middle Ages, vol. 6, trans, by Mrs G. W.

Hamilton (London, 1900-1902) ; J. P. Kirsch, Die Rückkehr der Pdpste Urban V. u. Gregor XI. con Avignon nach Rom (Paderborn, 1898); J. B. Christophe, Histoire de la papaute pendant le XIV' siecle, vol. 2 (Paris, 1853). There is a good article by J. N. Brischar in the Kirchenlexikon, 2nd edition.

Gregory XII. (Angelo Coriaro, or Correr), pope from the 30th of November 1406, to the 4th of July 1415, was born of a noble family at Venice about 1326. Successively bishop of Castello, Latin patriarch of Constantinople, cardinal-priest of San Marco, and papal secretary, he was elected to succeed Innocent VII., after an interregnum of twenty-four days, under the express condition that, should the antipope Benedict XIII. at Avignon renounce all claim to the papacy, he also would renounce his, so that the long schism might be terminated. As pope, he concluded a treaty with his rival at Marseilles, by which a general council was to be held at Savona in September, 1408, but King Ladislaus of Naples, who opposed the plan from policy, seized Rome and brought the negotiations to nought. Gregory had promised not to create any more cardinals, and when he did so, in 1408, his former cardinals deserted him and, together with the Avignon cardinals, convoked the council of

Pisa, which, despite its irregularity, proclaimed in June 1409 the deposition of both popes and the election of Alexander V. Gregory, still supported by Naples, Hungary, Bavaria, and by Rupert, king of the Romans, found protection with Ladislaus, and in a synod at Cividale del Friuli banned Benedict and Alexander as schismatical, perjured and scandalous. John XXIII., having succeeded to the claims of Alexander in 1410, concluded a treaty with Ladislaus, by which Gregory was banished from Naples on the 31st of October 141 1. The pope then took refuge with Carlo Malatesta, lord of Rimini, through whom he presented his resignation to the council of Constance on the 4th of July 1415. A weak and easily-influenced old man, his resignation was the noblest act of his pontificate. The rest of his life was spent in peaceful obscurity as cardinal-bishop of Porto and legate of the mark of Ancona. He died at Recanati on the 18th of October 1417. Some writers reckon Alexander V. and John XXIII. as popes rather than as antipopes, and accord- ingly count Gregory's pontificate from 1406 to 1409. Roman Catholic authorities, however, incline to the other reckoning.

See L. Pastor, History of the Popes, vol. i., trans, by F. I. Antrobus (London, 1899); M. Creighton, History of the Papacy, vol. I (London, 1899); N. Valois, La France et le grand schisme d'occident (Paris,

1896-1902); Louis Gayet, Le Grand Schisme d'occident (Paris, 1898); J. von Haller, Papsttum u. Kirchenreform (Berlin, I9°3); J- Loserth, Geschichte des spateren Mittclalters (1903); Theoderici de Nyem de schismate libri tres, ed. by G.' Erler (Leipzig, 1890). There is an excellent article by J. N. Brischar in the.Kirchen- lexikon 2nd ed., vol. 5. (C. H. Ha.)

Gregory XIII. (Ugo Buoncompagno), pope from 1572 to 1585, was born on the 7th of January 1502, in Bologna, where he received his education, and subsequently taught, until called to Rome (1539) by Paul III., who employed him in various offices. He bore a prominent part in the council of Trent, 1562- 1563. In 1564 he was made cardinal by Pius IV., and, in the following year, sent to Spain as legate. On the 13th of May 1572 he was chosen pope to succeed Pius V. His previous life had been rather worldly, and not wholly free from spot; but as pope he gave no occasion of offence. He submitted to the influence of the rigorists, and carried forward the war upon heresy, though not with the savage vehemence of his predecessor. However, he received the news of the massacre of St Bartholomew (23rd of August 1572) with joy, and publicly celebrated the event, having been led to believe, according to his apologists, that France had been miraculously delivered, and that the Huguenots had suffered justly as traitors. Having failed to rouse Spain and Venice against the Turks, Gregory attempted to form a general coalition against the Protestants. He subsidized Philip II. in his wars in the Netherlands; aided the Catholic League in France; incited attacks upon Elizabeth by way of Ireland. With the aid of the Jesuits, whose privileges he multi- plied, he conducted a vigorous propaganda. He established or endowed above a score of colleges, among them the Collegium Romanum (founded by Ignatius Loyola in 1550), and the Collegium Germanicum, in Rome. Among his noteworthy achievements are the reform of the calendar on the 24th of February 1582 (see Calendar); the improved edition of the Corpus juris canonici, 1582; the splendid Gregorian Chapel in St Peter's; the fountains of the Piazza Navona; the Quirinal Palace; and many other public works. To meet the expenses entailed by his liberality and extravagance, Gregory resorted to confiscation, on the pretext of defective titles or long-standing arrearages. The result was disastrous to the pub.lic peace: nobles armed in their defence;' old feuds revived; the country became infested with bandits; not even in Rome could order be maintained. Amid these disturbances Gregory died, on the 10th of April 1585, leaving to his successor, Sixtus V., the task of pacifying the state.

See the contemporary lives by Cicarella, continuator of Platina, De vitis pontiff. Rom. ; Ciaconius, Vitae et res gestae summorum pontiff. Rom. (Rome, 1601-1602); and Ciappi, Comp. dell' attioni e santa vita di Gregorio XIII (Rome, 1591). See also Bompiano, Hist, pontificatus Gregorii

XIII. (Rome, 1655); Ranke, Popes (Eng. trans., Austin), i. 428 seq. ; v. Reumont, Gesch. der Stadt Rom, iii. 2,' 566 seq.; and for numerous references upon Gregory's relation to the massacre of St Bartholomew, Cambridge Mo'd. Hist. iii. 771 seq.

Gregory XIV. (Nicolo Sfondrato), pope 1590-1591, was born in Cremona, on the nth of February 1535, studied in Perugia, and Padua, became bishop of his native place in 1560, and took part in the council of Trent, 1562-1563. Gregory XIII. made him a cardinal, 1583, but ill-health forbade his active participa- tion in affairs. His election to the papacy, to succeed Urban VII. , on the 5th of December 1590, was due to Spanish influence Gregory was upright and devout, but utterly ignorant of politics. During his short pontificate the States of the Church suffered dire calamities, famine, epidemic and a fresh outbreak of brigand' age. Gregory was completely subservient to Philip II.; he aided the league, excommunicated Henry of Navarre, and threatened his adherents with the ban; but the effect of hi» intervention was only to rally the moderate Catholics to the support of Henry, and to hasten his conversion. Gregory died on the 15th of October 1591, and was succeeded by Innocent IX

See Ciaconius, Vitae et res gestae summorum pontiff. Rom. (Rome, 1601-1602) ; Cicarella, continuator of Platina, De vitis pontiff. Rom (both contemporary) ; Brosch, Gesch. des Kirchenstaates (1880), i. 300. Ranke, Popes (Eng. trans., Austin), ii. 228 seq.

Gregory XV. (Alessandro Ludovisi) was born on the 9th cJ January 1554, in Bologna, where he also studied and taught. He was made archbishop of his native place and cardinal by Paul V., whom he succeeded as pope on the 9th of February 1621. Despite his age and feebleness, Gregory displayed remarkable energy. He aided the emperor in the Thirty Years' War, and the king of Poland against the Turks. He endorsed the claims of Maximilian of Bavaria to the electoral dignity, and was rewarded with the gift of the Heidelberg library, which was carried off to Rome. Gregory founded the Congregation of the Propaganda, encouraged missions, fixed the order to be observed in conclaves, and canonized Ignatius Loyola, Francis Xavier, Philip Neri and Theresa de Jesus. He died on the 8th of July 1623, and was succeeded by Urban VIII.

See the contemporary life by Vitorelli, continuator of Ciaconius, Vitae et res gestae summorum pontiff. Rom. ; Ranke's excellent account, Popes (Eng. trans., Austin), ii. 468 seq. ; v. Reumont, Gesch. der Stadt Rom, iii. 2, 609 seq. ; Brosch, Gesch. des Kirchenstaates (1880), i. 370 seq.; and the extended bibliography in Herzog-Hauck, Realencyklopadie, s.v. " Gregor XV." (T. F. C.)

Gregory XVI. {Bartolommeo Alberto Cappettari) , pope from i83r to 1846, was born at Belluno on the 18th of September 1765, and at an early age entered the order of the Camaldoli, among whom he rapidly gained distinction for his theological and linguistic acquirements. His first appearance before a wider public was in 1799, when he published against the Italian Jansenists a controversial work entitled II Trionfo delta Santa Sede, which, besides passing through several editions in Italy, has been translated into several European languages. In 1800 he became a member of the Academy of the Catholic Religion, founded by Pius VII., to which he contributed a number of memoirs on theological and philosophical questions and in 1805 was made abbot of San Gregorio on the Caelian Hill. When Pius VII. was carried off from Rome in 1809, Cappellaii withdrew to Murano, near Venice, and in 1814, with some other members of his order, he removed to Padua; but soon after the restoration of the pope he was recalled to Rome, where he received successive appointments as vicar-general of the Camaldoli, councillor of the Inquisition, prefect of the Propaganda, and examiner of bishops. In March 1825 he was created cardinal by Leo XII., and shortly afterwards was entrusted with an important mission to adjust a concordat regarding the interests of the Catholics of Belgium and the Protestants of Holland. On the 2nd of February 1831 he was, after sixty-four days' conclave, unexpectedly chosen to

succeed Pius VIII. in the papal chair. The revolution of 1830 •had just inflicted a severe blow on the ecclesiastical party in France, and almost the first act of the new government there was to seize Ancona, thus throwing all Italy, and particularly the Papal States, into an excited condition which seemed to demand strongly repressive measures. In the course of the struggle which ensued it was more than once necessary to call in the Austrian bayonets. The reactionaries in power put off their promised reforms so persistently as to anger even

Metternich; nor did the replacement of Bernetti by Lambruschini in 1836 mend matters; for the new cardinal secretary of state objected even to railways and illuminating gas, and was liberal chiefly in his employment of spies and of prisons. The embar- rassed financial condition in which Gregory left the States of the Church makes it doubtful how far his lavish expenditure in architectural and engineering works, and his magnificent patron- age of learning in the hands of Mai, Mezzofanti,Gaetano, Moroni and others, were for the real benefit of his subjects. The years of his pontificate were marked by the steady development and diffusion of those ultramontane ideas which were ultimately formulated, under the presidency of his successor Pius IX., by the council of the Vatican. He died on the 1st of June 1846.

See A. M. Bernasconi, Acta Gregorii Papae XVI. scilicet constitu- tiones, bullae, litterae apostolicae, epistolae, vols, i-4 (Rome, 1901 ff.) ; Cardinal Wiseman, Recollections of the Last Four Popes (London, 1858); Herzog-Hauck, Realencyklopddie, vol. vii. (Leipzig, 1899), 127 ff. (gives literature) ; Frederik Nielsen, History of the Papacy in the igth Century, ii. (London, 1906). (W. W. R.)*

GREGORY, 1 the name of a Scottish family, many members of which attained high eminence in various departments of science, fourteen having held professorships in mathematics or medicine. Of the most distinguished of their number a notice is given below.

I. David Gregory (1627-1720), eldest son of the Rev. John Gregory of Drumoak, Aberdeenshire, who married Janet Anderson in 1621. He was for some time connected with a mercantile house in Holland, but on succeeding to the family estate of Kinardie returned to Scotland, and occupied most of his time in scientific pursuits, freely giving his poorer neighbours the benefit of his medical skill. He is said to have been the first possessor of a barometer in the north of Scotland; and on account of his success by means of it in predicting changes in the weather, he was accused of witchcraft before the presbytery of Aberdeen, but he succeeded in convincing that body of his innocence.

II. James Gregory (1638-1675), Scottish mathematician, younger brother of the preceding, was educated at the grammar school of Aberdeen and at Marischal College of that city. At an early period he manifested a strong inclination and capacity for mathematics and kindred sciences; and in 1663 he published his famous treatise Optica promota, in which he made known his great invention, the Gregorian reflecting telescope. About 1665

• he went to the university of Padua, where he studied for some years, and in 1667 published Vera circuli et hyperbolae quadra- tura, in which he discussed infinite convergent series for the areas of the circle and hyperbola. In the following year he published also at Padua Geometriae pars universalis, in which he gave a series of rules for the rectification of curves and the mensuration of their solids of revolution. On his return to England in this year he was elected a fellow of the Royal Society; in 1669 he became professor of mathematics in the university of St Andrews; and in 1674 he was transferred to the chair of mathematics in Edinburgh. In October 1675, while showing the satellites of the planet Jupiter to some of his students through one of his telescopes, he was suddenly struck with blindness, and he died a few days afterwards.

He was also the author of Exercitationes geometricae (1668), and, it is alleged, of a satirical tract entitled The Great and New Art of Weighing Vanity, intended to ridicule certain fallacies of a con- temporary writer on hydraulics, and published at Glasgow in 1672, professedly by " Patrick Mathers, archbeadle of the university of St Andrews."

III. David Gregory (1661-1708), son of David Gregory (1627-1720), was born in Aberdeen and educated partly in his native city and partly in Edinburgh, where he became professor of mathematics in 1683. From 1691 till his death he was Savilian professor of astronomy at Oxford. His principal works are Exercitatio geometrica de dimensione figurarum (1684), Catoptricae et dioptricae sphaericae elementa (1695), and Astronomiae physicae et geometricae elementa (1702) — the last a work highly esteemed by Sir Isaac Newton, of whose system it is an illustration

and a defence. A Treatise on Practical Geometry

1 See A. G. Stewart, The Academic Gregories.

which he left in manuscript was translated from the Latin and published in 1745. He was succeeded in the chair of mathe- matics in Edinburgh by his brother James; another brother, Charles, was in 1707 appointed professor of mathematics in the university of St Andrews; and his eldest son, David (1696- 1767), became professor of modern history at Oxford, and canon and subsequently dean of Christ Church.

IV. John Gregory (1724-1773), Scottish physician, grandson of James Gregory (1638-1675) and youngest son of Dr James Gregory (d. 1731), professor of medicine in King's College, Aberdeen, was born at Aberdeen on the 3rd of June 1724. He received his early education at the grammar school of Aberdeen and at King's College in that city, and in 1741 he attended the medical classes at Edinburgh university. In 1745 he went to Leiden to complete his medical studies, and during his stay there he received without solicitation the degree of doctor of medicine from King's College, Aberdeen. On his return from Holland he was elected professor of philosophy at King's College, but in 1 749 he resigned his professorship on account of its duties interfering too much with his private practice. In 1754 he pro- ceeded to London, where he made the acquaintance of many persons of distinction, and the same year was chosen fellow of the Royal Society. On the death in November 1755 of his brother Dr James Gregory, who had succeeded his father as professor of medicine in King's College, Aberdeen, he was appointed to that office. In 1764 he removed to Edinburgh in the hope of obtaining a more extended field of practice as a physician, and in 1766 he was appointed professor of the practice of medicine in the university of Edinburgh, to whose eminence as a medical school he largely contributed. He died of gout on the 10th of February 1773.

He is the author of A Comparative View of the State and Faculties of Man with those of the Animal World (1765); Observations on the Duties, Offices and Qualifications of a Physician (1772); Elements of the Practice of Physic (1772); and A Father's Legacy to his Daughters (1774). His Whole Works, with a life by Mr Tytler (after- wards Lord Woodhouselee), were published at Edinburgh in 1788.

V. James Gregory (1753-1821), Scottish physician, eldest son of the preceding, was born at Aberdeen in January 1753. He accompanied his father to Edinburgh in 1764, and aftei going through the usual course of literary studies at that uni- versity, he was for a short time a student at Christchurch, Oxford. It was there probably that he acquired that taste for

classical learning which afterwards distinguished him. He studied medicine at Edinburgh, and, after graduating doctor of medicine in 1774, spent the greater part of the next two years in Holland, France and Italy. Shortly after his return to Scotland he was appointed in 1776 to the chair his father had formerly held, and in the following year he also entered on the duties of teacher of clinical medicine in the Royal Infirmary. On the illness of Dr William Cullen in 1700 he was appointed joint-professor of the practice of medicine, and he became the head of the Edinburgh Medical School on the death of Dr Cullen in the same year. He died on the 2nd of April 1821. As a medical practitioner Gregory was for the last ten years of his life at the head of the profession in Scotland. He was at one time president of the Edinburgh College of Physicians, but his indiscretion in publishing certain private proceedings of the college led to his suspension on the 13th of May 1809 from all rights and privileges which pertained to the fellowship.

Besides his Conspectus medicinae theoreticae, published in 1788 as a text-book for his lectures on the institutes, Dr Gregory was the author of " A Theory of the Moods of Verbs," published in the Edin. Phil. Trans. (1787), and of Literary and Philosophical Essays, published in two volumes in 1 792.

VI. William Gregory (1803-1858), son of James Gregory (1753-1821), was born on the 25th of December 1803. In 1837 he became professor of chemistry at the Andersonian Institution, Glasgow, in 1839 at King's College, Aberdeen, and in 1844 at Edinburgh University. He died on the 24th of April 1858. Gregory was one of the first in England to advocate the theories of Justus von Liebig, and translated several of his works. He is also the author of Outlines of Chemistry (1845), an d an Ele- mentary Treatise on Chemistry (1853).

VII. Duncan Farquharson Gregory (1813-1844), brother of the preceding, was born on the 13th of April 1813. After studying at the university of Edinburgh he in 1833 entered Trinity College, Cambridge, where he was for a time assistant professor of chemistry, but he devoted his attention chiefly to mathematics. He died on the 23rd of February 1844.

The Cambridge Mathematical Journal was originated, and for some time edited, by him ; and he also published a Collection of Examples of Processes in the Differential and Integral Calculus (1841). A Treatise on the Application of Analysis to Solid Geometry, which he left unfinished,

was completed by W. Walton, and published posthum- ously in 1846. His Mathematical Writings, edited by W. Walton, with a biographical memoir by Robert Leslie Ellis, appeared in 1865.

GREGORY, EDWARD JOHN (1850-1909), British painter, born at Southampton, began work at the age of fifteen in the engineer's drawing office of the Peninsular and Oriental Company. Afterwards he studied at South Kensington, and about 1871 entered on a successful career as an illustrator and as an admir- able painter in oil and water colour. He was elected associate of the Royal Academy in 1883, academician in 1898, and president of the Royal Institute of Painters in Water Colours in 1898. His work is distinguished by remarkable technical qualities, by exceptional firmness and decision of draughtsmanship and by unusual certainty of handling. His " Marooned," a water colour, is in the National Gallery of British Art. Many of his pictures were shown at Burlington House at the winter exhibi- tion of 1 909-1910 after his death in June 1909.

GREGORY, OLINTHUS GILBERT (1774-1841), English mathematician, was born on the 29th of January 1774 at Yaxley in Huntingdonshire. Having been educated by Richard Weston, a Leicester botanist, he published in 1793 a treatise, Lessons Astronomical and Philosophical. Having settled at Cambridge in 1796, Gregory first acted as sub-editor on the Cambridge Intelligencer, and then opened a bookseller's shop. In 1802 he obtained an appointment as mathematical master at Woolwich through the influence of Charles Hutton, to whose notice he had been brought by a manuscript on the " Use of the Sliding Rule "; and when Hutton resigned in 1807 Gregory succeeded him in the professorship. Failing health obliged him to retire in 1838, and he died at Woolwich on the 2nd of February 1841.

Gregory wrote Hints for the Use of Teachers of Elementary Mathe- matics (1840, new edition 1853), and Mathematics for Practical Men (1825), which was revised and enlarged by Henry Law in 1848, and again by J. R. Young in 1862. His Letters on the Evidences of Christianity (1815) have been several times reprinted, and an abridg- ment was published by the Religious Tract Society in 1853. He will probably be longest remembered for his Biography of Robert Hall, which first appeared in the collected edition of Hall's works, was published separately in 1833, and has since passed through several editions. The minor importance of his Memoir of John Mason Good (1828) is due to the narrower fame of the subject. Gregory was one of the founders of the Royal Astronomical Society. In 1802 he was appointed editor of the Gentlemen's Diary, and in 1818 editor of the Ladies' Diary and superintendent of the almanacs of the Stationers' Company.

GREIFENBERG, a town of Germany, in the Prussian province of Pomerania, on the Rega, 45 m. N.E. of Stettin on the railway to Kolberg. Pop. (1905) 7208. It has two Evangelical churches (among them that of St Mary, dating from 13th century), two ancient gateways, a powder tower and a gymnasium. The manufacture of machines, stoves and bricks are the principal industries. Greifenberg possessed municipal rights as early as 1262, and in the 14th and 15th centuries had a considerable shipping trade, but it lost much of its prosperity during the Thirty Years' War.

See Riemann, Geschichte der Stadt Greifenberg (1862).

GREIFENHAGEN, a town of Germany,- in the Prussian province of Pomerania, on the Reglitz, 12 m. S.S.W. of Stettin by rail. Pop. (1905) 6473. Its prosperity depends chiefly oh agriculture and it has a considerable trade in cattle. There are also felt manufactures and saw mills. Greifenhagen was built in 1 230, and was raised to the rank of a town and fortified about 1250. In the Thirty Years' War it was taken both by the imperialists and the Swedes, and in 1675 it was captured by the Brandenburgers, into whose possession it came finally in 1679.

XII. 19

GREIFSWALD, a town of Germany, in the Prussian province of Pomerania, on the navigable Ryk, 3 m. from its mouth on the Baltic at the little port of Wyk, and 20 m. S.E. from Stralsund by rail. Pop. (1875) 18,022, (1905) 23,750. It has wide and regular streets, flanked by numerous gabled houses, and is surrounded by pleasant promenades on the site of its old ram- parts. The three Gothic Protestant churches, the Marienkirche, the Nikolaikirche and the Jakobikirche, and the town-hall (Rathaus) are the principal edifices, and these with their lofty spires are very picturesque. There is a statue of the emperor Frederick III. and a war memorial in the town. The industries mainly consist in shipbuilding, fish-curing, and the manufacture of machinery (particularly for agriculture), and the commerce in the export of corn, wood and fish. There is a theatre, an orphanage and a municipal library. Greifswald is, however, best known to fame by reason of its university. This, founded in 1456, is well endowed and is largely frequented by students of medicine. Connected with it are a library of 150,000 volumes and 800 MSS., a chemical laboratory, a zoological museum, a gynaecological institute, an ophthalmological school, a botanical garden and at Eldena (a seaside resort on the Baltic) an agri- cultural school. In front of the university, which had 775 students and about 100 teachers in 1904, stands a monument commemorating its four hundredth anniversary.

Greifswald was founded about 1240 by traders from the Netherlands. In

1250 it received a town constitution and Liibeck rights from Duke Wratislaw of Pomerania. In 1270 it joined the Hanse towns, Stralsund, Rostock, Wismar and Liibeck, and took part in the wars which they carried on against the kings of Denmark and Norway. During the Thirty Years' War it was formed into a fortress by the imperialists, but they vacated it in 163 1 to the Swedes, in whose possession it remained after the peace of Westphalia. In 1678 it was captured by the elector of Brandenburg, but was restored to the Swedes in the following year; in 1713 it was desolated by the Russians; in 1715 it came into the possession of Denmark; and in 1721 it was again restored to Sweden, under whose protection it remained till 181 5, when, along with the whole of Swedish Pomerania, it came into the possession of Prussia.

See J. G. L. Kosegarten, Geschichte der Universitat Greifswald (1856); C. Gesterding, Beitrag zur Geschichte der Stadt Greifswald (3 vols., 1827-1829); and I. Ziegler, Geschichte der Stadt Greifswald (Greifswald, 1897).

GREISEN (in French, hyalomicte), a modification of granite, consisting essentially of quartz and white mica, and distinguished from granite by the absence of felspar and biotite. In the hand specimen the rock has a silvery glittering appearance from the abundance of lamellar crystals of muscovite, but many greisens have much of the appearance of granite, except that they are paler in colour. The commonest accessory minerals are tourma- line, topaz, apatite, fluorspar and iron oxides; a little felspar more or less altered may also be present and a brown mica which is biotite or lithionite. The tourmaline in section is brown, green, blue- or colourless, and often the same crystal shows many different tints. The white mica forms mostly large plates with imperfect crystalline outlines. The quartz is rich in fluid enclosures. Apatite and topaz are both colourless and of irregular form. Felspar if present may be orthoclase and oligoclase.

Greisen occurs typically in belts or veins intersecting granite. At the centre of each vein there is usually a fissure which may be open or filled with quartz. The greisen bands are from 1 in. up to 2 ft. or more in thickness. At their outer edges they pafs gradually into the granite, for they contain felspar crystals more or less completely altered into aggregates of white mica and quartz. The transition between the two rocks is perfectly gradual, a fact which shows that the greisen has been produced by alteration of the granite. Vapours or fluids rising through the fissure have been the agents which effected the transmutation. They must have contained fluorine, boron and probably also lithium, for topaz, mica and tourmaline, the new minerals of the granite, contain these elements. The change is a post-volcanic

or pneumatolytic one induced by the vapours set free by the granite magma when it cools. Probably the rock was at a relatively high temperature at the time. A similar type of alteration, the development of white mica, quartz and tourmaline, is found sometimes in sedimentary rocks around granite masses. Greisen is closely connected with schorl rock both in its mineralogical composition and in its mode of origin. The latter is a pneumatolytic product consisting of quartz and tourmaline; it often contains white mica and thus passes by all stages into greisen. Both of these rocks carry frequently small percentages of tin oxide (cassiterite) and may be worked as ores of tin. They are common in Cornwall, Saxony, Tasmania and other districts which are centres of tin-mining. Many other greisens occur in which no tin is found. The analyses show the composition

Si0 2 .

AI2O3.

Fe 2 3 .

FeO.

CaO.

MgO.

K 2 0.

Na 2 0.

Fl.

B 2 3 .

Granite Greisen

70-17 69-42

15-07 15-65

•88

1-25

1-79 3-30

I-I3 •63

i-ii

1-02

5-73 4-06

2-69

•27

•15

3-36

tr. •59

of Cornish granite and greisen. They make it clear that there has been an introduction of fluorine and boron and a diminution in the alkalies during the transformation of the granitic rock into the greisen. (J. S. F.)

GREIZ, a town of Germany, capital of the -principality of Reuss-Greiz (Reuss the Elder), in a pleasant valley on the right bank of the White Elster, near the borders of Saxony, and 66 m. by rail S. from Leipzig. Pop. (1875) 12,657; (1905) 23,114. It consists of two parts, the old town on the right bank and the new town on the left bank of the river; it is rapidly growing and is regularly laid out. The principal buildings are the palace of the prince of Reuss-Greiz, surrounded by a fine park, the old chateau on a rocky hill overlooking the town, the summer palace with a fine garden, the old town church dating from 1225 and possessing a beautiful tower, the town hall, the govern- mental buildings and statues of the emperor William I. and of Bismarck. There are classical and modern schools and a school of textile industry. The industries are considerable, and include dyeing, tanning and the manufacture of woollen, cotton, shawls, coverlets and paper. Greiz (formerly Grewcz) is apparently a town of Slav origin. From the 1 2th century it was governed by advocati (Vogte), but in 1236 it came into the possession of Gera, and in 1550 of the younger line of the house of Plauen. It was wholly destroyed by fire in 1494, and almost totally in 1802.

See Wilke, Greiz und seine Vtngebung (1875), and Jahresberichte des Vereins filr Greizer Geschichte (1894, seq-)

GRENADA, the southernmost of the Windward Islands, British West Indies. It lies between n° 58′ and 12 15′ N. and between 61° 35′ and 61° 50′ W., being 140 m. S.W. of Barbados and 85 m. N. by W. of Trinidad. In shape oval, it is 21 m. long, 12 m. broad at its maximum and has an area of 133 sq. m. It owes much of its beauty to a well-wooded range of mountains traversing the island from N. to S. and throwing off from the centre spurs which form picturesque and fertile valleys. These mountains attain their highest elevation in MountCatharine (2750 ft.). In the S.E. and N.W. there are stretches of low or undulating ground, devoted to fruit growing and cattle raising. The island is of volcanic origin; the only signs of upheaval are raised limestone beaches in the extreme N. Red and grey sandstones, hornblende and argillaceous schist are found in the mountains, porphyry and basaltic rocks also occur; sulphur and fuller's earth are worked. In the centre, at the height of 1740 ft. above the sea, is the chief natural curiosity of Grenada, the Grand Etang, a circular lake, 13 acres in extent, occupying the site of an ancient crater. Near it is a large sanatorium, ■ much frequented as a health resort. In the north-east is a larger lake, Lake Antoine, also occupying a crater, but it lies almost at the sea level. The island is watered by several short rivers, mainly on the east and south; there are numerous fresh water springs, as well as hot chalybeate and sulphurous springs. The south- eastern coast is much indented with bays. The climate is goddi

the temperature equable and epidemic diseases are rare. In the low country the average yearly temperature is 82° F., but it is cooler in the heights. The rainfall is very heavy, amounting in some parts to as much as 200 in., a year. The rainy season lasts from May to December, but refreshing showers frequently occur during other parts of the year. The average annual rainfall at St Georges is 79-07 in., and at Grand Etang 164 in. The excellent climate and good sea-bathing have made Grenada the health resort of the neighbouring islands, especially of Trinidad. Good roads and byeways intersect it in every direction. The soil is extraordinarily fertile, the chief products being cocoa and spices, especially nutmegs. The exports, sent chiefly to Great Britain, are cocoa, spices, wool, cotton, coffee, live stock, hides, turtles, turtle shell, kola nuts, vanilla and timber. Barbados is dependent on Grenada for the majority of its firewood. Sugar is still grown, and rum and molasses are made, but the consump- tion of these is confined to the island.

Elementary education is chiefly in the hands of the various denominations, whose schools are assisted by government grants-in-aid. There are, however, a few secular schools conducted by the government, and government-aided secondary schools for girls and a grammar school for boys. The schools are controlled by a board of education, the members of which are nominated by the government, and small fees are charged in all

schools. The governor of the Windward Islands resides in Grenada and is administrator of it. The Legislative Council consists of 14 members; 7 including the governor are ex-qfficio members and the rest are nominated by the Crown. English is universally spoken, but the negroes use a French patois, which, however, is gradually dying out. Only 2 % of the inhabitants are white, the rest being negroes and mulattoes with a few East Indians. The capital, St George, in the south-west, is built upon a lava peninsula jutting into the sea and forming one side of its land- locked harbour. It is surrounded by an amphitheatre of hills, up the sides of which climb the red-brick houses of the town. At the extremity of the peninsula is Fort St George, with a saluting battery. The ridge connecting Fort St George with Hospital Hill is tunnelled to give access to the two parts of the town lying on either side. The population in 1901 was 5198. There are four other towns — on the west coast Gouyave, or Charlotte Town, and 4 m. N. of it Victoria; on the north coast Sauteurs; and Grenville at the head of a wide bay on the east. They are all in frequent communication with the capital by steamer. The population of the entire colony in 1901 was 63,438. History. — Grenada was discovered in 1498 by Columbus, who named it Conception. Neither the Spanish nor the British, to whom it was granted in 1627, settled on the island. The governor of Martinique, du Parquet, purchased it in 1650, and the French were well received by the Caribs, whom they afterwards extirpated with the greatest cruelty. In 1665 Grenada passed into the hands of the French West India Com- pany, and was administered by it until its dissolution in 1674, when the island passed to the French Crown. Cocoa, coffee and cotton were introduced in 1714. During the wars between Great Britain and France, Grenada capitulated to the British forces in 1762, and was formally ceded next year by the Treaty of Paris. The French, under Count d'Estaing, re-captured the island in 1779, but it was restored to Great Britain by the Treaty of Versailles in 1783. A rebellion against the British rule, instigated and assisted by the French, occurred in 1795, but was quelled by Sir Ralph Abercromby in the following year. The emancipation of the slaves took place in 1837, and by i877itwasfoundnecessary to introduce East Indian labour. Grenada, with cocoa as its staple, has not experienced similar depression to that which overtook the sugar-growing islands of the West Indies. See Grenada Handbook (London, 1905).

GRENADE (from the French word for a pomegranate, from a resemblance in shape to that fruit), a small spherical explosive vessel thrown by hand. Hand-grenades were used in war in the 16th century, but the word " grenade " was also from the

first used to imply an explosive shell fired from a gun; this survives to the present day in the German Granate. These weapons were employed after about 1660, by special troops called " grenadiers " (q.v.), and in the wars of the 17th and 18th centuries they are continually met with. They became obsolete i:i the 19th century, but were given a new lease of life in the 20th, owing to their employment in the siege of Port Arthur in 1904, where hand-grenades of a modern type, and containing powerful modern explosives, proved very effective (see Ammunition, Shell). Hand-grenades filled with chemicals and made of glass are used as a method of fire-extinction, and similar vessels containing a liquid with a very strong smell are used to discover defects in a drain or sewer.

GRENADIER, originally a soldier whose special duty it was to throw hand-grenades. The latterwerein use fora considerable time before any special organization was given to the troops who were to use them. In 1667 four men per company in the French Regiment du Roi were trained with grenades (siege of Lille), and in 1668-1670 grenadier companies were formed in this regiment and in about thirty others of the French line. Evelyn, in his Diary, tells us that on the 29th of June 1678 he saw at Hounslow " a new sort of soldiers called granadiers, who were dexterous in flinging hand-granades." As in the case of the fusiliers, the French practice was therefore quickly copied in England. Eventually each English battalion had a grenadier company (see for illustrations Archaeological Journal, xxiii. 222, and xlvii. 321-324). Besides their grenades and the firelock, grenadiers carried axes which, with the grenades, were employed in the assault of fortresses, as we are told in the celebrated song, " The British Grenadiers."

The grenadier companies were formed always of the most powerful men in the regiment and, when the grenade ceased to be used, they maintained their existence as the " crack " companies of their battalions, taking the right of the line on parade and wearing the distinctive grenadier headdress. This system was almost universal, and the typical infantry regiment of the 1 8th and early 19th century had a grenadier and a light company besides its " line " companies. In the British and other armies these elite companies were frequently taken from their regiments and combined in grenadier and light infantry battalions for special service, and Napoleon carried this practice still further in the French army by organizing brigades and divisions of grenadiers (and correspondingly of voltigeurs). Indeed the companies thus detached from the line practically never returned to it, and this was attended with serious evils, for the battalion at the outbreak of war lost perhaps a quarter of its best men, the average men onlyremainingwiththeline. This specialorgan ization of grenadiers and light companies lasted in the British army until about 1858. In the Prussian service the grenadiers became permanent and independent battalions about

1740, and the gradual adoption of the four-company battalion by Prussia and other nations tended still further to place the grenadiers by themselves and apart from the line. Thus at the present day in Germany, Russia and other countries, the title of "grenadiers" is borne by line regiments, indistinguishable, except for details of uniform and often the esprit de corps inherited from the old elite companies, from the rest. In the British service the only grenadiers remaining are the Grenadier Guards, originally the 1 st regiment of Foot Guards, which was formed in 1660 on the nucleus of a regiment of English royalists which followed the fortunes of Charles II. in exile. In Russia a whole army corps (headquarters Moscow), inclusive of its artillery units, bears the title.

The special headdress of the grenadier was a pointed cap, with peak and flaps, of embroidered cloth, or a loose fur cap of similar shape; both these were light field service caps. The fur cap has in the course of time developed into the tall " bearskin " worn by British guards and various corps of other armies; the embroidered field cap survives, transformed, however, into a heavy brass headdress, in the uniform of the 1st Prussian Foot Guards, the 1st Prussian Guard Grenadiers and the Russian Paul (Pavlovsky) Grenadier Guards.

GRENADINES, a chain of islets in the Windward Islands, West Indies. They stretch for 60 m. between St Vincent and Grenada, following a N.E. to S.W. direction, and consist of some 600 islets and rocks. Some are a few square miles in extent, others are merely rocky cones projecting from the deep. For purposes of administration they are divided between St Vincent and Grenada. Bequia, the chief island in the St Vincent group, is long and narrow, with an area 6 sq. m. Owing to a lack of water it is only slightly cultivated, but game is plentiful. Admiralty Bay, on the W. side, is a safe and commodious harbour. Carriacou, belonging to Grenada, is the largest of the group, being 7 m. long, 2 m. wide and 13 sq. m. in extent. A ridge of hills, rising to an altitude of 700 ft., traverses the centre from N.E. to S.W.; here admirable building stone is found. There are two good harbours on the west coast, Hillsborough Bay on which stands Hillsborough, the chief town, and Tyrell Bay, farther south. The island is thickly populated, the negro peasantry occupying small lots and working on the metayer system. Excellent oysters are found along the coast, and cotton and cattle are the chief exports. Pop. of the 4 group, mostly on Carriacou (1901) 6497.

GRENOBLE, the ancient capital of the Dauphine in S.E. France, and now the chief town of the Isere department, 75 m. by rail from Lyons, 38J m. from Chambery and 85! m. from Gap. Pop. (1906), town, 58,641; commune, 73,022. It is one of the most beautifully situated, and also one of the most strongly fortified, cities in Europe. Built at a height of 702 ft. on both banks of the river Isere just above its junction with the Drac, the

town occupies a considerable plain at the south-western end of the fertile Graisivaudan valley. To the north rise the moun- tains of the Grande Chartreuse, to the east the range of Belle- donne, and to the south those of Taillefer and the Moucherotte, the higher summits of these ranges being partly covered with snow. From the Jardin de Ville and the quays of the banks of the Isere the summit of Mont Blanc itself is visible. The greater part of the town rises on the left bank of the Isere, which is bordered by broad quays. The older portion has the tortuous and narrow streets usual in towns that have been confined within fortifications, but in modern times these hindrances have been demolished. The newer portion of the town has wide thorough- fares and buildings of the modern French type, solid but not picturesque. The original town (of but small extent) was built on the right bank of the Isere at the southern foot of the Mont Rachais, now covered by a succession of fortresses that rise picturesquely on the slope of that hill to a very considerable height (885 ft. above the town).

Grenoble is the seat of a bishopric which was founded in the 4th century, and now comprises the department of the Isere — formerly a suffragan of Vienne it now forms part of the ecclesi- astical province of Lyons. The most remarkable building in the town is the Palais de Justice, erected (late 15th century to 16th century) on the site of the old palace of the Parlement of the Dauphine. Opposite is the most noteworthy church of the city, that of St Andre (13th century), formerly the chapel of the dauphins of the Viennois: in it is the 17 th century monument of Bayard (1476-1524), the chevalier sans peur et sans reproche, which was removed hither in 1822; but it is uncertain whose bones are therein. The cathedral church of Notre Dame is a heavy building, dating in part from the nth century. The church of St Laurent, on the right bank of the Isere, is the oldest in the city (nth century) and has a remarkable crypt, dating from Merovingian times. The town, hall is a mainly modern building, constructed on the site of the palace of the dauphins, while the prefecture is entirely modern. The town library contains a considerable collection of paintings, mainly of the modern French school, but is more remarkable for its very rich collection of MSS. (7000) and printed books (250,000 vols.) which in great part belonged till 1793 to the monastery of the Grande Chartreuse. The natural history museum houses rich collections of various kinds, which contain {inter alia) numerous geological specimens from the neighbouring districts of the Dauphine and Savoy. The university, revived in modern times

after a long abeyance, occupies a modern building, as does also the hospital, though founded as far back as the 15th century. There are

numerous societies in the town, including the Academie Delphinale (founded in 1772), and many charitable institutions.

The staple industry of Grenoble is the manufacture of kid gloves, most of the so-called gants Jouvin being made here — they are named after the reviver of the art, X. Jouvin (1800-1844). There are about 80 glove factories, which employ 18,500 persons (of whom 15,000 are women), the annual output being about 800,000 dozen pairs of gloves. Among other articles produced at Grenoble are artificial cements, liqueurs, straw hats and carved furniture.

Grenoble occupies the site of Cularo, a village of the Allobroges, which only became of importance when fortified by Diocletian and Maximian at the end of the 3rd century. Its present name is a corruption of Gratianopolis, a title assumed probably in honour of Gratian (4th century), who raised it to the rank of a civitas. After passing under the power of the Burgundians (c. 440) and the Franks (532) it became part of the kingdom of Provence (870-1032). On the break-up of that kingdom a long struggle for supremacy ensued between the bishops of the city and the counts of Albon, the latter finally winning the day in the 12th century, and taking the title of Dauphins of the Viennois in the 13th century. In 1349 Grenoble was ceded with the rest of the Dauphine to France, but retained various municipal privileges which had been granted by the dauphins to the town, originally by a charter of 1242. In 1562 it was sacked by the Protestants under the baron des Adrets, but in 1572 the firmness of its governor, Bertrand de Gordes, saved it from a repetition of the Massacre of St Bartholomew. In 1590 Lesdiguieres (1 543-1626) took the town in the name of Henry IV., then still a Protestant, and during his long governorship (which lasted to his death) did much for it by the construction of fortifications, quays, &c. In 1788 the attempt of the king to weaken the power of the parlement of Grenoble (which, though strictly a judicial authority, had preserved traditions of independence, since the suspension of the states-general of the Dauphine in 1628) roused the people to arms, and the " day of the tiies " (7th of June 1788) is memorable for the defeat of the royal forces. In 1790, on the formation of the department of the Isere, Grenoble became its capital. Grenoble was the. first important town to open its gates to Napoleon on his return from Elba (7th of March 181 5), but a few months later (July) it was obliged to surrender to the Austrian army. Owing to its situation Grenoble was formerly much subject to floods, particularly in the case of the wild Drac. One of the worst took place in 12 19, while that of 1778 was known as the deluge de la Saint Crepiti. Among the celebrities who have been born at Grenoble are Vaucanson (1709-1782), Mably (1700-1785), Condillac (1715-1780), Beyle, best known as Stendhal, his nom de guerre (1783-1842), Barnave (1761-1793) and Casimir'Perier (1777-1832).

See A. Prudhomme, Histoire de Grenoble (1888); X. Roux, La Corporation des gantiers de Grenoble (1887); H. Duhamel, Grenoble considere comme centre d'excursions (1902); J. Marion, Cartulaires de I iglise cathidrale de Grenoble (Paris, 1869). (W. A. B. C.)

GRENVILLE, SIR BEVIL (1596-1643), Royalist soldier in the English Civil War (see Great Rebellion), was educated at Exeter College, Oxford. As member of Parliament, first for Cornwall, then for Launceston, Grenville supported Sir John Eliot and the opposition, and his intimacy with Eliot was lifelong. In 1639, however, he appears as a royalist going to the Scottish War in the train of Charles I. The reasons of this change of front are unknown, but Grenville's honour was above suspicion, and he must have entirely convinced himself that he was doing right. At any rate he was a very valuable recruit to the royalist cause, being " the most generally loved man in Cornwall." At the outbreak of the Civil War he and others of the gentry not only proclaimed the king's Commission of Array at Launceston assizes, but also persuaded the grand jury of the county to declare their opponents guilty of riot and unlawful assembly, whereupon the Posse comitatus was called out to expel them. Under the command of Sir Ralph Hopton, Sir Bevil took a

distinguished part in the action of Bradock Down, and at Stratton (16 May 1643), where the parliamentary earl of Stamford was completely routed by the Cornishmen, led one of the storming parties which captured Chudleigh's lines (Clarendon, vii. 89). A month later, the endeavour of Hopton to unite with Maurice and Hertford from Oxford brought on the battle of Lansdown, near Bath. Here Grenville was killed at the head of the Cornish infantry as it reached the top of the hill. His death was a blow from which the king's cause in the West never recovered, for he alone knew how to handle the Cornishmen. Hopton they revered and respected, but Grenville they loved as peculiarly their own commander, and after his death there is little more heard of the reckless valour which had won Stratton and Lansdown. Grenville is the type of all that was best in English royalism. He was neither rapacious, drunken nor dissolute, but his loyalty was unselfish, his life pure and his skill no less than his bravery unquestionable. A monument to him has been erected on the field of Lansdown.

See Lloyd, Memoirs of Excellent Personages (1668) ; S. R. Gardiner, History of the English Civil War (vol. i. passim).

GRENVILLE, GEORGE (1712-1770), English statesman, second son of Richard Grenville and Hester Temple, afterwards Countess Temple, was born on the 14th of October 1712. He was educated at Eton and at Christ Church, Oxford, and was called to the bar in 1735. He entered parliament in 1741 as member for Buckingham, and continued to represent that

borough till his death. In parliament he was a member of the " Boy Patriot " party which opposed Sir Robert Walpole. In December 1744 he became a lord of the admiralty in the Pelham administration. He allied himself with his brother Richard and with William Pitt in forcing their feeble chief to give them promotion by rebelling against his authority and obstructing business. In June 1747 he became a lord of the treasury, and in 1754 treasurer of the navy and privy councillor. As treasurer of the navy in 1758 he introduced and carried a bill which established a less unfair system of paying the wages of the seamen than had existed before. He remained in office in 1761, when his brother Lord Temple and his brother-in-law Pitt resigned upon the question of the war with Spain, and in the administration of Lord Bute he was entrusted with the leadership of the House of Commons. In May 1762 he was appointed secretary of state, and in October first lord of the admiralty; and in April 1763 he became first lord of the treasury and chancellor of the exchequer. The most prominent measures of his administration were the prosecution of Wilkes and the passing of the American Stamp Act, which led to the first symptoms of alienation between America and the mother country. During the latter period of his term of office he was on a very unsatisfactory footing with the young king George III., who gradually came to feel a kind of horror of the interminable persistency of his conversation, and whom he endeavoured to make use of as the mere puppet of the ministry. The king made various attempts to induce Pitt to come to his rescue by forming a ministry, but without success, and at last had recourse to the marquis of Rockingham, on whose agreeing to accept office Grenville was dismissed July 1765. He never again held office, and died on the 13th of November 1770.

The nickname of " gentle shepherd " was given him because he bored the House by asking over and over again, during the debate on the Cider Bill of 1763, that somebody should tell him " where " to lay the new tax if it was not to be put on cider. Pitt whistled the air of the popular tune " Gentle Shepherd, tell me where," and the House laughed. Though few excelled him in a knowledge of the forms of the House or in mastery of administrative details, his tact in dealing with men and with affairs was so defective that there is perhaps no one who has been at the head of an English administration to whom a lower place can be assigned as a statesman.

In 1749 he married Elizabeth, daughter of Sir William Wynd- ham, by whom he had a large family. His son, the second Earl Temple, was created marquess, and his grandson duke, of Buckingham. Another son was William, afterwards Lord

Grenville. Another, Thomas Grenville (1755-1846), who was, with one interval, a member of parliament from 1780 to 1818, and for a few months during 1806 and 1807 president of the board of control and first lord of the admiralty, is perhaps more famous as a book-collector than as a statesman; he bequeathed his large and valuable library to the British Museum.

The Grenville Papers, being the Correspondence of Richard Grenville, Earl Temple, K.G., and the Right Hon. George Grenville, their Friends and Contemporaries, were published at London in 1852, and afford the chief authority for his life. But see also H. Walpole's Memoirs of the Reign of George II. (London, 1845); Lord Stanhope's History of England (London, 1858) ; Lecky's History of England (1885) ; and E. D. Adams, The Influence of Grenville on Pitt's Foreign Policy (Washington, 1904).

GRENVILLE (or Greynvile), SIR RICHARD (c. 1541-1591), British naval commander, was born of an old Cornish family about 1 541. His grandfather, Sir Richard, had been marshal of Calais in the time of Henry VIII., and his father commanded and was lost in the " Mary Rose " in 1545. At an early age Grenville is supposed to have served in Hungary under the emperor Maximilian against the Turks. In the years 1571 and 1584 he sat in parliament for Cornwall, and in 1583 and 1584 he was commissioner for the works at Dover harbour. He appears to have been a man of much pride and ambition. Of his bravery there can be no doubt. In 1585 he commanded the fleet of seven vessels by which the colonists sent out by his cousin, Sir Walter Raleigh, were carried to Roanoke Island in the present North Carolina. Grenville himself soon returned with the fleet to England, capturing a Spanish vessel on his way, but in 1586 he carried provisions to Roanoke, and finding the colony deserted, left a few men to maintain possession. He then held an im- portant post in charge of the defences of the western counties of England. When a squadron was despatched in 1591, under Lord Thomas Howard, to intercept the homeward-bound treasure-fleet of Spain, Grenville was appointed as second in command on board the " Revenge," a ship of 500. tons which had been commanded by Drake against the Armada in 1588. At the end of August Howard with 16 ships lay at anchor to the north of Flores in the Azores. On the last day of the month he received Aws from a pinnace, sent by the earl of Cumberland, who was then off the Portugal coast, that a Spanish fleet of 53 vessels was then bearing up to the Azores to meet the treasure-ships. Not being in a position to fight a fleet more than three times the size of his own, Howard gave orders to weigh anchor and stand out to sea. But, either from some misunderstanding of the order, or from some idea of Grenville's that the Spanish vessels rapidly approaching were the ships for which they had been waiting, the " Revenge " was delayed and cut off from her consorts by the Spaniards. Grenville resolved to try to

break through the middle of the Spanish line. His ship was becalmed under the lee of a huge galleon, and after a hand-to-hand fight lasting through fifteen hours • against fifteen Spanish ships and a force of five thousand men, the " Revenge " with her hundred and fifty men was captured. Grenville himself was carried on board the Spanish flag-ship " San Pablo," and died a few days later. The incident is commemorated in Tennyson's ballad of " The Revenge."

The spelling of Sir Richard's name has led to much controversy. Four different families, each of which claim to be descended from him, spell it Granville, Grenville, Grenfell and Greenfield. The spelling usually accepted is Grenville, but his own signature, in a bold clear handwriting, among the Tanner MSS. in the Bodleian library at Oxford, is Greynvile.

GRENVILLE (or Granville), SIR RICHARD (1600-1658), English royalist, was the third son of Sir Bernard Grenville (1559-1636), and a grandson of the famous seaman, Sir Richard Grenville. Having served in France, Germany and the Nether- lands, Grenville gained the favour of the duke of Buckingham, took part in the expeditions to Cadiz, to the island of Rhe and to La Rochelle, was knighted, and in 1628 was chosen member of parliament for Fowey. Having married Mary Fitz (1596- 167 1), widow of Sir Charles Howard (d. 162 2) and a lady of fortune, Grenville was made a baronet in 1630; his violent temper, however, made the marriage an unhappy one, and he was ruined

and imprisoned as the result of two lawsuits, one with his wife, and the other with her kinsman, the earl of Suffolk. In 1633 he escaped from prison and went to Germany, returning to England six years later to join the army which Charles I. was collecting to march against the Scots. Early in 1641, just after the out- break of the Irish rebellion, Sir Richard led some troops to Ireland, where he won some fame and became governor of Trim; then returning to England in 1643 h e was arrested at Liverpool by an officer of the parliament, but was soon released and sent to join the parliamentary army. Having, however, secured men and money, he hurried to Charles I. at Oxford and was despatched to take part in the siege of Plymouth, quickly becoming the leader of the forces engaged in this enterprise. Compelled to raise the siege he retired into Cornwall, where he helped to resist the advancing Parliamentarians; but he quickly showed signs of insubordination, and, whilst sharing in the siege of Taunton, he was wounded and obliged to resign his command. About this time loud complaints were brought against Grenville. He had behaved, it was said, in a very arbitrary fashion; he had hanged some men and imprisoned others; he had extorted money and had used the contributions towards the cost of the war for his own ends. Many of these charges were undoubtedly true, but upon his recovery the councillors of the prince of Wales gave him a

position under Lord Goring, whom, however, he refused to obey. Equally recalcitrant was his attitude towards Goring's successor, Sir Ralph Hopton, and in January 1646 he was arrested. But he was soon released; he went to France and Italy, and after visiting England in disguise passed some time in Holland. He was excepted by parliament from pardon in 1648, and after the king's execution he was with Charles II. in France and elsewhere until some unfounded accusation which he brought against Edward Hyde, afterwards earl of Clarendon, led to his removal from court. He died in 1658, and was buried at Ghent. In 1644, when Grenville deserted the parliamentary party, a proclamation was put out against him; in this there were at- tached to his name several offensive epithets, among them being skellum, a word probably derived from the German Schelm, a scoundrel. Hence he is often called " skellum Grenville."

Grenville wrote an account of affairs in the west of England, which was printed in T. Carte's Original Letters (1739). To this partisan account Clarendon drew up an answer, the bulk of which he after- wards incorporated in his History. In 1654 Grenville wrote his Single defence against all aspersions of all malignant persons. This is printed in the Works of George Granville, Lord Lansdowne (London, 1736), where Lansdowne's Vindication of his kinsman, Sir Richard, against Clarendon's charges is also found. See also Clarendon, History of the Rebellion, edited by W. D. Macray (Oxford, 1888); and R. Granville, The King's General in the West (1908).

GRENVILLE, WILLIAM WYNDHAM GRENVILLE, Baron

(1759-1834), English statesman, youngest son of George Gren- ville, was born on the 25th of October 1759. He was educated, at Eton and Christ Church, Oxford, gaining the chancellor's prize for Latin verse in 1779. In February 1782 Grenville was returned to parliament as member for the borough of Bucking- ham, and in the following September he became secretary to the lord lieutenant of Ireland, who at this time was his brother, Earl Temple, afterwards marquess of Buckingham. He left office in June 1783, but in the following December he became paymaster-general of the forces under his cousin, William Pitt, and in 1786 vice-president of the committee of trade. In 1787 he was sent on an important mission to the Hague and Versailles with reference to the affairs of Holland. In January 1789 he was chosen speaker of the House of Commons, but he vacated the chair in the same year on being appointed secretary of state for the home department; about the same time he resigned his other offices, but he became president of the board of control, and in November 1790 was created a peer as Baron Grenville. In the House of Lords he was very active in directing the business of the government, and in 1791 he was transferred to the foreign office, retaining his post at the board of control until 1793.

He was doubtless regarded by Pitt as the man best fitted to carry out his policy with reference to France, but in the succeeding years he and his chief were frequently at variance on important

questions of foreign policy. In spite of his multifarious duties at the foreign office Gr'enville continued to take a lively interest in domestic matters, which he showed by introducing various bills into the House of Lords. In February 1801 he resigned office with Pitt because George III. would not consent to the introduction of any measure of Roman Catholic relief, and in opposition he gradually separated himself from his former leader. When Pitt returned to power in 1804 Grenville refused to join the ministry unless his political ally, Fox, was also admitted thereto; this was impossible and he remained out of office until February 1806, when just after Pitt's death he became the nominal head of a coalition government. This ministry was very unfortunate in its conduct of foreign affairs, but it deserves to be remembered with honour on account of the act passed in 1807 for the abolition of the slave trade. Its influence, however, was weakened by the death of Fox, and in consequence of a minute drawn up by Grenville and some of his colleagues the king demanded from his ministers an assurance that in future they would not urge upon him any measures for the relief of Roman Catholics. They refused to give this assurance and in March 1807 they resigned. Grenville's attitude in this matter was somewhat aggressive; his colleagues were not unanimous in supporting him, and Sheridan, one of them, said " he had known many men knock their heads against a wall, but he had never before heard of any man who collected the bricks and built the very wall with an intention to knock out his own brains against it."

Lord Grenville never held office again, although he was requested to do so on several occasions. He continued, however, to take part in public life, being one of the chief supporters of Roman Catholic emancipation, and during the remaining years of his active political career, which ended in 1823, he generally voted with the Whigs, although in 181 5 he separated himself from his colleague, Charles Grey, and supported the warlike policy of Lord Liverpool. In 1819, when the marquess of Lansdowne brought forward his motion for an inquiry into the causes of the distress and discontent in the manufacturing districts, Grenville delivered an alarmist speech advocating repressive measures. His concluding years were spent at Dropmore, Buckinghamshire, where he died on the 12th of January 1834. His wife, whom he marriedini792, was Anne(i772-i 864) , daughter of Thomas Pitt, 1 st Baron Camelford, but he had no issue and his title

became extinct. In 1809 he was elected chancellor of Oxford university.

Though Grenville's talents were not of the highest order his straightforwardness and industry, together with his knowledge of politics and the moderation of his opinions, secured for him considerable political influence. He may be enrolled among the band of English statesmen who have distinguished themselves in literature. He edited Lord Chatham's letters to his nephew, Thomas Pitt, afterwards Lord Camelford (London, 1804, and other editions); he wrote a small volume, NugaeMetricae (1824), being translations into Latin from English, Greek and Italian, and an Essay on the Supposed Advantages of a Sinking Fund (1828).

The Dropmore MSS. contain much of Grenville's correspondence, and on this the Historical Manuscripts Commission has published a report.

GRESHAM, SIR THOMAS (1510-1579), London merchant, the founder of the Royal Exchange and of Gresham College, London, was descended from an old Norfolk family; he was the only son of Sir Richard Gresham, a leading London merchant, who for some time held the office of lord mayor, and for his services as agent of Henry VIII. in negotiating loans with foreign merchants received the honour of knighthood . Though his father intended him to follow his own profession, he nevertheless sent him for some time to Caius College, Cambridge, but there is no information as to the duration of his residence. It is uncertain also whether it was before or after this that he was apprenticed to his uncle Sir John Gresham, who was also a merchant, but we have his own testimony that he served an apprenticeship of eight years. In 1543, at the age of twenty-four, he was admitted a member of the Mercers' Company, and in the same year he went to the Low Countries, where, either on his own account or

on that of his father or uncle, he both carried on business as a merchant and acted in various matters as an agent for Henry VIII. In 1 544 he married the widow of William Read, a London merchant , but he still continued to reside principally in the Low Countries, having his headquarters at Antwerp. When in 1551 the mismanagement of Sir William Dansell, " king's merchant " in the Low Countries, had brought the English government into great financial embarrassment, Gresham was called in to give his advice, and chosen to carry out his own proposals. Their leading feature was the adoption of various methods — highly ingenious, but quite arbitrary and unfair — for raising the value of the pound sterling on the " bourse " of Antwerp, and it was so successful that in a few years nearly all King Edward's debts were discharged. The advice of Gresham was likewise sought by the government in all their money difficulties, and he was also frequently employed in various diplomatic missions. He had no stated salary, but in reward of his services received

from Edward various grants of lands, the annual value of which at that time was ultimately about £400 a year. On the accession of Mary he was for a short time in disfavour, and was displaced in his post by Alderman William Dauntsey. But Dauntsey's financial operations were not very successful and Gresham was soon reinstated; and as he professed his zealous desire to serve the queen, and manifested great adroitness both in negotiating loans and in smuggling money, arms and foreign goods, not only were his services retained throughout her reign, but besides his salary of twenty shillings per diem he received grants of church lands to the yearly value of £200. Under Queen Elizabeth, besides continuing in his post as financial agent of the crown, he acted temporarily as ambassador at the court of the duchess of Parma, being knighted in 1559 previous to his departure. By the outbreak of the war in the Low Countries he was compelled to leave Antwerp on the 19th of March 1567; but, though he spent the remainder of his life in London, he continued his business as merchant and financial agent of the government in much the same way as formerly. Elizabeth also found him useful in a great variety of other ways, among which was that of acting as jailer, to Lady Mary Grey, who, as a punishment for marrying Thomas Keys the sergeant porter, remained a prisoner in his house from June 1569 to the end of 1572. In 1565 Gresham made a proposal to the court of aldermen of London to build at his own expense a bourse or exchange, on condition that they purchased for this purpose a piece of suitable ground. In this proposal he seems to have had an eye to his own interest as well as to the general good of the merchants, for by a yearly rental of £700 obtained for the shops in the upper part of the building he received a sufficient return for his trouble and expense. Gresham died suddenly, apparently of apoplexy, on the 21st of November 1579. His only son predeceased him, and his illegitimate daughter Anne he married to Sir Nathaniel Bacon, brother of the great Lord Bacon. With the exception of a number of small sums bequeathed to the support of various charities, the bulk of his property, consisting of estates in various parts of England of the annual value of more than £2300, was bequeathed to his widow and her heirs with the stipulation that after her decease his residence in Bishopsgate Street, as well as the rents arising from the Royal Exchange, should be vested in the hands of the corporation of London and the Mercers' Company, for the purpose of instituting a college in which seven professors should read lectures — one each day of the week — on astronomy, geometry, physic, law, divinity, rhetoric and music. The lectures were begun in 1597, and were delivered in the original building until 1768, when, on the ground that the trustees were losers by the gift, it was made over to the crown for a yearly rent of £500, and converted into an excise office. From that time a room in the Royal Exchange was used for the lectures until in 1843 the present building was erected at a cost of £7000.

A notice of Gresham is contained in Fuller's Worthies and Ward's Gresham Professors; but the fullest account of him, as well as of the history of the Exchange and Gresham College is that by J. M. Burgon in his Life and Times of Sir Thomas Gresham (2 vols., 1839). See also a Brief Memoir of Sir Thomas Gresham (1833) ; and The Life of Sir Thomas Gresham, Founder of the Royal Exchange (1845).

GRESHAM, WALTER QU1NT0N (1832-1895), American statesman and jurist, was born near Lanesville, Harrison county, Indiana, on the 17th of March 1832. He spent two years in an academy at Corydon, Indiana, and one year at the Indiana State University at Bloomington, then studied law, and in 1854 was admitted to the bar. He was active as a campaign speaker for the Republican ticket in 1856, and in i860 was elected to the State House of Representatives as a Republican in a strong Democratic district. In the House, as chairman of the committee on military affairs, he did much to prepare the Indiana troops for service in the Federal army; in 1861 he became colonel of the 53rd Indiana Volunteer Infantry, and subsequently took part in Grant's Tennessee campaign of 1862, and in the operations against Corinth and Vicksburg, where he commanded a brigade. In August 1863 he was appointed brigadier-general of volunteers, and was placed in command of the Federal forces at Natchez. In 1864 he commanded a division of the 17th Army Corps in Sherman's Atlanta campaign, and before Atlanta, on the 20th of July, he received a wound which forced him to retire from active service, and left him lame for life. In 1865 he was brevetted major-general of volunteers. After the war he practised law at New Albany, Indiana, and in 1869 was appointed by President Grant United States District Judge for Indiana. In April 1883 he succeeded Timothy O. Howe. (1816-1883) as postmaster-general in President Arthur's cabinet, taking an active part in the suppression of the Louisiana Lottery, and in September 1884 succeeded Charles J. Folger as secretary of the treasury. In the following month he resigned to accept an appointment as United States Judge for the Seventh Judicial Circuit.. Gresham was a candidate for the Republican presi- dential nomination in 1884 and 1888, in the latter year leading for some time in the balloting. Gradually, however, he grew out of sympathy with the Republican leaders and policy, and in 1892 advocated the election of the Democratic candidate, Grover Cleveland, for the presidency. From the 7th of March 1893 until his death at Washington on the 28th of May 1895, he was secretary of state in President Cleveland's cabinet.

GRESHAM'S LAW, in economics, the name suggested in 1857 by H. D.

Macleod for the principle of currency which may be briefly summarized — " bad money drives out good." Macleod gave it this name, which has been universally adopted, under the impression that the principle was first explained by Sir Thomas Gresham in 1558. In reality it had been well set forth by earlier economic writers, notably Oresme and Copernicus. Macleod states the law in these terms: the worst form of currency in circulation regulates the value of the whole currency and drives all other forms of currency out of circulation. Gresham's law applies where there is under-weight or debased coin in circulation with full- weight coin of the same metal; where there are two metals in circulation, and one is undervalued as compared with the other, and where inconvertible paper money is put into circulation side by side with a metallic currency. See further Bimetallism; Money.

GRESSET, JEAN BAPTISTE LOUIS (1709-17 7 7), French poet and dramatist, was born at Amiens on the 29th of August 1709. His poem Vert Vert is his main title to fame. He spent, however, the last twenty-five years of his life in regretting the frivolity which enabled him to produce this most charming of poems. He was brought up by the Jesuits of Amiens. He was accepted as a novice at the age of sixteen, and sent to pursue his studies at the College Louis le Grand in Paris. After completing his course he was appointed, being then under twenty years of age, to a post as assistant master in a college at Rouen. He pub- lished Vert Vert at Rouen in 1 734. It is a story, in itself exceed- ingly humorous, showing how a parrot, the delight of a convent, whose talk was all of prayers and pious ejaculations, was conveyed to another convent as a visitor to please the nuns. On the way he falls among bad companions, forgets his convent language, and shocks the sisters on arrival by profane swearing. He is sent back in disgrace, punished by solitude and plain bread, presently repents, reforms and is killed by kindness. The story, however, is nothing. The treatment of the subject, the

atmosphere which surrounds it, the delicacy in which the little prattling ways of the nuns, their jealousies, their tiny trifles, are presented, takes the reader entirely by surprise. The poem stands absolutely unrivalled, even among French contes en vers.

Cresset found himself famous. He left Rouen, went up to Paris, where he found refuge in the same garret which had sheltered him when a boy at the College Louis le Grand, and there wrote his second poem, La Chartreuse. It was followed by the Carente impromptu, the Lulrin vivani and Les Ombres. Then trouble came upon him; complaints were made to the fathers of the alleged licentiousness of his verses, the real cause of complaint being the ridicule which Vert Vert seemed to throw upon the whole race of nuns and the anti-clerical tendency of the other poems. An example, it was urged,

must be made; Gresset was expelled the order. Men of robust mind would have been glad to get rid of such a yoke. Gresset, who had never been taught to stand alone, went forth weeping. He went to Paris in 1740 and there produced £douard III, a tragedy (1740) and Sidnei (1 745) , a comedy. These were followed by Le Mechant which still keeps the stage, and is qualified by Brunetiere as the best verse comedy 9f the French 18th century theatre, not excepting even the Me'tromanie of Alexis Piron. Gresset was admitted to the Academy in 1748. And then, still young, he retired to Amiens, where his relapse from the discipline of the church became the subject of the deepest remorse. He died at Amiens on the i6tjj of June 1777.

The best edition of his poems is A. A. Rˆnouard's (181 1). See Jules Wogue, J. B. L. Cresset (1894).

GRETNA GREEN, or Graitney Green, a village in the south- east of Dumfriesshire, Scotland, about 8 m. E. of Annan, 9 m. N.N.W. of Carlisle, and £ m. from the river Sark, here the dividing-line between England and Scotland, with a station on the Glasgow & South- Western railway. The Caledonian and North British railways have a station at Gretna on the English side of the Border. As the nearest village on the Scottish side, Gretna Green was notorious as the resort of eloping couples, who had failed to obtain the consent of parents or guardians to their union. Up till 1754, when LordHardwicke's act abolishing clandestine marriages came into force, the ceremony had com- monly been performed in the Fleet prison in London. After that date runaway couples were compelled to seek the hospitality of a country where it sufficed for them to declare their wish to marry in the presence of witnesses. At Gretna Green the ceremony was usually performed by the blacksmith, but the toll- keeper, ferryman or in fact any person might officiate, and the toll-house, the inn, or, after 1826, Gretna Hall was the scene of many such weddings, the fees varying from half a guinea to a sum as large as impudence could extort or extravagance bestow. As many as two hundred couples were married at the toll-house in a year. The romantic traffic was practically, though not necessarily, put an end to in 1856, when the law required one of the contracting parties to reside in Scotland three weeks previous to the event.

GRETRY, ANDRE ERNEST MODESTE (1741-1813), French composer, was born at Liege on the 8th of February 1741, his father being a poor musician. He was a choir boy at the church of St Denis. In 1753 he became a pupil of Leclerc and later of Renekin and Moreau. But of greater importance was the practical tuition he received by attending the performance of an Italian opera company. Here he heard the operas of Galuppi, Pergolesi and other masters; and the desire of completing his own studies in Italy was the immediate result. To find the necessary means he

composed in 1759 a mass which he dedicated to the canons of the Li6ge cathedral, and it was at the cost of Canon Hurley that he went to Italy in the March of 1759. In Rome he went to the College de Liege. Here Gretry resided for five years, studiously employed in completing his musical education under Casali. His proficiency in harmony and counter- point was, however, according to his own confession, at all times very moderate. His first great success was achieved by La Vendemmiatrice, an Italian intermezzo or operetta, composed for the Aliberti theatre in Rome and received with universal

applause. It is said that the study of the score of one of Mon- signy's operas, lent to him by a secretary of the French embassy in Rome, decided Gretry to devote himself to French comic opera. On New Year's day 1767 he accordingly left Rome, and after a short stay at Geneva (where he made the acquaintance of Voltaire, and produced another operetta) went to Paris. There for two years he had to contend with the difficulties incident to poverty and obscurity. He was, however, not without friends, and by the intercession of Count Creutz, the Swedish ambassador, Gretry obtained a libretto from Marmontel, which he set to music in less than six weeks, and which, on its perform- ance in August 1768, met with unparalleled success. The name of the opera was Le Huron. Two others, Lucile and Le Tableau parlant, soon followed, and thenceforth Gretry's position as the leading composer of comic opera was safely established. Alto- gether he composed some fifty operas. His masterpieces are Zemire et Azor and Richard Cosur de Lion, — the first produced in 1771, the second in 1784. The latter in an indirect way became connected with a great historic event. In it occurs the celebrated romance, O Richard, 6 mon roi, I'univers t'abandonne, which was sung at the banquet — " fatal as that of Thyestes," remarks Carlyle — given by the bodyguard to the officers of the Versailles garrison on October 3, 1789. The Marseillaise not long after- wards became the reply of the people to the expression of loyalty borrowed from Gretry's opera. The composer himself was not uninfluenced by the great events he witnqpsed, and the titles of some of his operas, such as La Rosiere republicaine and La Fete dc la raison, sufficiently indicate the epoch to which they belong; but they are mere pieces de circonstance, and the republican enthusiasm displayed is not genuine. Little more successful was Gretry in his dealings with classical subjects. His genuine power lay in the delineation of character and in the expression of tender and typically French sentiment. The structure of his concerted pieces on the other hand is frequently flimsy, and his instrumentation so feeble that the orchestral parts of some of his works had to be rewritten by other composers, in order to make them

acceptable to modern audiences. During the revolution Gretry lost much of his property, but the successive governments of France vied in favouring the composer, regardless of political differences. From the old court he received distinctions and rewards of all kinds; the republic made him an inspector of the conservatoire; Napoleon granted him the cross of the legion of honour and a pension. Gretry died on the 24th of September 1 813, at the Hermitage in Montmorency, formerly the house of Rousseau. Fifteen years after his death Gretry's heart was transferred to his birthplace, permission having been obtained after a tedious lawsuit. In 1842 a colossal bronze statue of the composer was set up at Liege.

See Michael Brenet, Vie de Gretry (Paris, 1884); Joach. le Breton, Notice historique sur la vie et les ouvrages de Gretry (Paris, 1814); A. Gretry (his nephew), Gretry en famille (Paris, 1814); Felix van Hulst, Gretry (Liege, 1842); L. D. S. Notice biographique sur Gretry (Bruxelles, 1859).

GREUZE, JEAN BAPTISTE (1725-1805), French painter, was born at Tournus, in Burgundy, on the 21st of August 1725, and is generally said to have formed his own talent; this is, however, true only in the most limited sense, for at an early age his in- clinations, though thwarted by his father, were encouraged by a Lyonnese artist named Grandon, or Grondom, who enjoyed during his lifetime considerable reputation as a portrait-painter. Grandon not only persuaded the father of Greuze to give way to his son's wishes, and permit the lad to accompany him as his pupil to Lyons, but, when at a later date he 'himself left Lyons for Paris — where his son-in-law Gretry the celebrated composer enjoyed the height of favour — Grandon carried young Greuze with • him. Settled in Paris, Greuze worked from the living model in the school of the Royal Academy, but did not attract the attention of his teachers; and when he produced his first picture, " Le Pere de famille expliquant la Bible a ses enfants," considerable doubt was felt and shown as to his share in its production. By other and more remarkable works of the same class Greuze soon established his claims beyond contest, and won for himself the

notice and support of the well-known connoisseur La Live de Jully, the brother-in-law of Madame d'fipinay. In 1755 Greuze exhibited his " Aveugle trompe," upon which, presented by Pigalle the sculptor, he was immediately agrei by the Academy. Towards the close of the same year he left France for Italy, in company with the Abbe Louis Gougenot, who had deserted from the magistrature — although he had obtained the post of " con- seillier au Chatelet " — in order to take the " petit collet." Gougenot had some acquaintance with the arts, and was highly valued by the Academicians, who, during his journey with Greuze, elected him an honorary member of their body on account of his studies in mythology and allegory; his acquire- ments in these respects are said to have been largely

utilized by them, but to Greuze they were of doubtful advantage, and he lost rather than gained by this visit to Italy in Gougenot's company. He had undertaken it probably in order to silence those who taxed him with ignorance of " great models of style," but the Italian subjects which formed the entirety of his contri- butions to the Salon of 1757 showed that he had been put on a false track, and he speedily returned to the source of his first inspiration. In 1759, 1761 (" L'Accordee de village " — Louvre), and 1763 Greuze exhibited with ever-increasing success; in 1765 he reached the zenith -of his powers and reputation. In that year he was represented with no less than thirteen works, amongst which may be cited " La Jeune Fille qui pleure son oiseau mort," " La Bonne Mere," " Le Mauvais fils puni " (Louvre) and " La Malediction paternelle " (Louvre) . The Academy took occasion to press Greuze for his diploma picture, the execution of which had been long delayed, and forbade him to exhibit on their walls until he had complied with their regulations. " J'ai vu la lettre," says Diderot, " qui est un modele d'honnetete et d'estime; j'ai vu la reponse de Greuze, qui est un modele de vanite et d'impertinence: il fallait appuyer cela d'un chef-d'eeuvre, et e'est ce que Greuze n'a pas fait." Greuze wished to be received as a historical painter, and produced a work which he intended to vindicate his right to despise his qualifications as a peintrede genre. This unfortunate canvas — " Severeet Caracalla" (Louvre) — was exhibited in 1769 side by side with Greuze's portrait of Jeaurat (Louvre) and his admirable " Petite Fille au chien noir." The Academicians received their new member with all due honours, but at the close of the ceremonies the Director addressed Greuze in these words — " Monsieur, l'Academie vous a recu, mais e'est comme peintre de genre; elle a eu egard a vos anciennes productions, qui sont excellentes, et elle a ferme les yeux sur celle-ci, qui n'est digne ni d'elle ni de vous." Greuze, greatly incensed, quarrelled with his confreres, and ceased to exhibit until, in 1804, the Revolution had thrown open the doors of the Academy to all the world. In the following year, on the 4th of March 1805, he died in the Louvre in great poverty. He had been in receipt of considerable wealth, which he had dissi- pated by extravagance and bad management, so that during his closing years he was forced even to solicit commissions which his enfeebled powers no longer enabled him to carry out with success. The brilliant reputation which Greuze acquired seems to have been due, not to his acquirements as a painter — for his practice is evidently that current in his own day — but to the character of the subjects which he treated. That return to nature which inspired Rousseau's attacks upon an artificial civilization demanded expression in art. Diderot, in Le Fils naturel et le pere de famille, tried to turn the vein of domestic drama to account on the stage; that which he tried and failed to do Greuze, in painting, achieved with extraordinary success, although his works, like the plays of Diderot, were affected by that very artificiality against which they protested. The touch of melodramatic

exaggeration, however, which runs through them finds an apology in the firm and brilliant play of line, in the freshness and vigour of the flesh tints, in the enticing softness of expression (often obtained by almost an abuse of meplats), by the alluring air of health and youth, by the sensuous attractions, in short, with which Greuze invests his lessons of bourgeois morality. As Diderot said of " La Bonne Mere," " ca preche la population;" and a certain piquancy of contrast is the result which never

fails to obtain admirers. " La Jeune Fille a l'agneau " fetched, indeed, at the Pourtales sale in 1865, no less than 1,000,200 francs. One of Greuze's pupils, Madame Le Doux, imitated with success the manner of her master; his daughter and granddaughter, Madame de Valory, also inherited some traditions of his talent. Madame de Valory published in 1813 a comedie-vaudeville, Greuze, ou I'accordee de village, to which she prefixed a notice of her grandfather's life and works, and the Salons of Diderot also contain, besides many other particulars, the story at full length of Greuze's quarrel with the Academy. Four of the most distinguished engravers of that date, Massard pere, Flipart, Gaillard and Levasseur, were specially entrusted by Greuze with the reproduction of his subjects, but there are also excellent prints by other engravers, notably by Cars and Le Bas.

See also Normand, J. B. Greuze (1892). (E. F. S. D.)

GREVILLE, CHARLES CAVENDISH FULKE (1794-1865), English diarist, a great-grandson by his father of the 5th earl of Warwick, and son of Lady Charlotte Bentinck, daughter of the duke of Portland, formerly a leader of the Whig party, and first minister of the crown, was born on the 2nd of April 1794. Much of his childhood was spent at his grandfather's house at Bulstrode. He was one of the pages of George III., and was educated at Eton and Christ Church, Oxford; but he left the university early, having been appointed private secretary to Earl Bathurst before he was twenty. The interest of the duke of Portland had secured for him the secretaryship of the island of Jamaica, which was a sinecure office, the duties being performed by a deputy, and the reversion of the clerkship of the council. Greville entered upon the discharge of the duties of clerk of the council in ordinary in 1821, and continued to perform them for nearly forty years. He therefore served under three successive sovereigns, — George IV., William IV. and Victoria, — and although no political or confidential functions are attached to that office, it is one which brings a man into habitual inter- course with the chiefs of all the parties in the state. Well-born, well-bred, handsome and accomplished, Greville led the easy life of a

man of fashion, taking an occasional part in the transac- tions of his day and much consulted in the affairs of private life. Until 1855 when he sold his stud he was an active member of the turf, and he trained successively with Lord George Bentinck, and with the duke of Portland. But the celebrity which now attaches to his name is entirely due to the posthumous publication of a portion of a Journal or Diary which it was his practice to keep during the greater part of his life. These papers were given by him to his friend Mr Henry Reeve a short time before his death (which took place on the 18th of January 1865), with an injunction that they should be published, as far as was feasible, at not too remote a period after the writer's death. The journals of the reigns of George IV. and William IV. (extending from 1820 to 1837) were accordingly so published in obedience to his directions about ten years after that event. Few publica- tions have been received with greater interest by the public; five large editions were sold in little more than a year, and the demand in America was as great as in England. These journals were regarded as a faithful record of the impressions made on the mind of a competent observer, at the time, by the events he witnessed and the persons with whom he associated. Greville did not stoop to collect or record private scandal. His object appears to have been to leave behind him some of the materials of history, by which the men and actions of his own time would be judged. He records not so much public events as the private causes which led to them; and perhaps no English memoir- writer has left behind him a more valuable contribution to the history of the 19th century. Greville published anonymously, in 1845, a volume on the Past and Present Policy of England to Ireland, in which he advocated the payment of the Roman Catholic clergy; and he was also the author of several pamphlets on the events of his day.

His brother, Henry Greville (1801-1872), attache to the British embassy in Paris from 1834 to 1844, also kept a diary, of which part was published by Viscountess Enfield, Leaves from the Diary of Henry Greville (London, 1883-1884).

See the preface and notes to the Greville Memoirs by Henry Reeve. The memoirs appeared in three sets — one from 1817 to 1837 (London, 1875, 3 vols.), and two for the period from 1837 to i860, three volumes in 1885 and two in 1887. When the first series appeared in 1875 some passages caused extreme offence. The copies issued were as far as possible recalled and passages suppressed.

GREVIN, JACQUES (c. 1539-1570), French dramatist, was born at Clermont about 1539. He studied medicine at the university of Paris. He became a disciple of Ronsard, and was one of the band of dramatists who sought to introduce the classical drama in France. As Sainte-Beuve points out, the comedies of Grevin show considerable affinity with the farces and

soties that preceded them. His first play, La Maubertine, was lost, and formed the basis of a new comedy, La Tresoriere, first performed at the college of Beauvais in 1558, though it had been originally com- posed at the desire of Henry II. to celebrate the marriage of Claude, duchess of Lorraine. In 1560 followed the tragedy of Jules Cesar, imitated from the Latin of Muret, and a comedy, Les Ebahis, the most important but also the most indecent of his works. Grevin was also the author of some medical works and of miscellaneous poems, which were praised by Ronsard until the friend's were separated by religious differences. Grevin became in 1561 physician and counsellor to Margaret of Savoy, and died at her court in Turin in 1570.

The ThSAlre of Jacques GreVin was printed in 1562, and in the Ancien Thedtre francais, vol. iv. (1855-1856). See L. Pinvert, Jacques Grevin (1899).

GREVY, FRANCOIS PAUL JULES (1813-1891), President of the French Republic, was born at Mont-sous- Vaudrey in the Jura, on the 15th of August 1813. He became an advocate in 1837, and, having steadily maintained republican principles under the Orleans monarchy, was elected by his native depart- ment to the Constituent Assembly of 1848. Foreseeing that Louis Bonaparte would be elected president by the people, he proposed to vest the chief authority in a president of the Council elected and removable by the Assembly, or in other words, to suppress the Presidency of the Republic. After the coup d'etat this proposition gained Grevy a reputation for sagacity, and upon his return to public life in 1868 he took a prominent place in the republican party. After the fall of the Empire he was chosen president of the Assembly on the 16th of February 1871, and occupied this position till the 2nd of April 1876, when he resigned on account of the opposition of the Right, which blamed him for having called one of its members to order in the session of the previous day. On the 8th of March 1876 he was elected president of the Chamber of Deputies, a post which he filled with such efficiency that upon the resignation of Marshal MacMahon he seemed to step naturally into the Presidency of the Republic (30th January 1879), and was elected without opposition by the republican parties (see France: History). Quiet, shrewd, attentive to the public interest and his own, but without any particular distinction, he would have left an unblemished reputation if he had not unfortunately accepted a second term (18th December 1885). Shortly afterwards the traffic of his son-in-law (Daniel Wilson) in the decorations of the Legion of Honour came to light. Grevy was not accused of personal participation in these scandals, but he was somewhat obstinate in refusing to realize that he was responsible indirectly for the use which his relative had made of the Elysee, and it had to be unpleasantly impressed upon him that his resignation was inevitable (2nd December 1887). He died at Mont-sous-

Vaudrey on the 9th of September 1891. He owed both his success and his failure to the completeness with which he represented the particular type of the thrifty, generally sensible and patriotic, , but narrow-minded and frequently egoistic bourgeois.

See his Discours politiques et judiciaires, rapports et messages . . . accompagnes de notices historiques et precedes d'une introduction par L. Delabrousse (2 vols., ifi " "'

GREW, NEHEMIAH (1641-1712), English vegetable anatomist and physiologist, was the only son of Obadiah Grew (1607-1688), Nonconformist divine and vicar of St Michael's, Coventry, and was born in Warwickshire in 164 1. He graduated at Cambridge in 1661, and ten years later took the degree of M.D. at Leiden,

his thesis being Disputatio medico-physica . . . de liquore nervosa. He began observations on the anatomy of plants in 1664, and in 1670 his essay, The Anatomy of Vegetables begun, was communi- cated to the Royal Society by Bishop Wilkins, on whose recom- mendation he was in the following year elected a fellow. In 1672, when the essay was published, he settled in London, and soon acquired an extensive practice as a physician. In 1673 he published his Idea of a Phytological History, which consisted of papers he had communicated to the Royal Society in the preceding year, and in 1677 he succeeded Henry Oldenburg as secretary of the society. He edited the Philosophical Transac- tions in 1678-1679, and in 1681 he published " by request " a descriptive catalogue of the rarities preserved at Gresham College, with which were printed some papers he had read to the Royal Society on the Comparative Anatomy of Stomachs and Guts. In 1682 appeared his great work on the Anatomy of Plants, which also was largely a collection of previous publications. It was divided into four books, Anatomy of Vegetables' begun, Anatomy of Roots, Anatomy of Trunks and Anatomy of Leaves, Flowers, Fruits and Seeds, and was illustrated with eighty-two plates, while appended to it were seven papers mostly of a chemical character. Among his other publications were Sea- water made Fresh (1684), the Nature and Use of the Salt contained in Epsom and such other Waters (1697), which was a rendering of his Tractalus de salis . . . usu (1693), and Cosmologia sacra (1701). He died suddenly on the 25th of March 1712. Linnaeus named a genus of trees Grewia (nat. ord. Tiliaceae) in his honour.

GREY, CHARLES GREY, 2ND Earl (1764-1845), English statesman, was

the eldest surviving son of General Sir Charles Grey, afterwards 1st Earl Grey. He was born at his father's residence, Fallodon, near Alnwick, on the 13th of March 1764. General Grey (1 729-1807), who was a younger son of the house of Grey of Howick, one of the most considerable territorial families in Northumberland, had already begun a career of active service which, like the political career of his son, covered nearly half a century. Before the latter was born, General Grey had served on the staff of Prince Ferdinand of Brunswick in the Seven Years' War and had been wounded at Minden. While the son was making verses at Eton, the father was serving against the revolted colonists in Pennsylvania and New Jersey, and while the young member for Northumberland was denouncing Pitt's war against the Convention, the veteran soldier was destroying the remnant of the French colonial empire by the capture of Martinique and Guadeloupe. When Napoleon threatened an invasion, General Grey took the command of the southern dis- trict, and at the peace of Amiens he was rewarded with a peerage, as Baron Grey of Alnwick, being created in 1806 Earl Grey and Viscount Howick. His elder brother, Sir Henry Grey of Howick, the head of the family, had supported the government in parlia- ment. But the political career of young Grey, who was heir- presumptive to the family estates, took a different complexion.

Young Grey expected to reoccupy the seat which had been his uncle's; and his early years were spent in preparation for a parliamentary career. He was sent to Eton, and proceeded thence to Cambridge. William Pitt, a youth five years older, was then in residence as a master of arts, studiously paying court to the Whigs of the university; and at the general election of 1780 he came forward as a candidate for the academical seat. His name stood last on the poll, but he was brought in elsewhere, and his first speech proved him a man of the first mark. The unparalleled successes which followed portended grave changes. Pitt's elevation to the premiership, his brilliant and hard-fought battle in the house, and his complete rout of the Whig party at the general election of 1784, when he came in for Cambridge at the head of the poll, threatened the great territorial interest with nothing less than extinction. It was to this interest that Grey belonged; and hence, when at length returned for North- umberland in 1 786, he at once came forward as a vigorous assailant of the government of Pitt. He was hailed by the opposition, and associated with Fox, Burke and Sheridan as a manager in the Hastings impeachment. During the nineteen years which

remained of the career of Fox, he followed the great Whig statesman with absolute fidelity, and succeeded him as leader of the party. The shortcomings of Fox's statesmanship were inherited by Grey. Both were equally devoid of political originality, shunned the severer labours of the politician, and instinctively feared any deviation from the traditions of their

party. Such men cannot save a party in its decadence, and the history of Fox and Grey has been aptly termed the history of the decline and fall of Whiggism.

The stunning blow of 1784 was the first incident in this history. Its full significance was not at once perceived. An opposition, however weak in the beginning, generally has a tendency to revive, and Grey's early successes in the house helped to revive the Foxites. The European situation became favourable to this revival. The struggle in France for popular rights, culminating in the great Revolution, was watched by Fox with interested sympathy. He affected to regard the domination of Pitt as the domination of the crown, and as leading logically to absolutism, and saw in that popular sympathy for the French Revolution which naturally arose in England an instrument which might be employed to overthrow this domination.

But Pitt gathered the fruits of the windfall. The spread of " Jacobinism," or " French principles," became the pretext on which the stronger half of the opposition went over to the government. Burke led the movement in the Commons, the duke of Portland and Lord Fitzwilliam in the Lords, and with this second incident in the Whig decline began the difficulties of Grey's career. The domination of the premier had already stirred the keenest resentment in the younger and more ambitious members of the Whig party. Freed from the restraint of the steadier politicians under Burke and Portland, the residuum under Fox fell into a series of grave mistakes. Of this residuum Grey became the moving spirit, for though Fox did not check their activity, he disclaimed the responsibility of their policy. Fox had refused to condemn " French principles," and denounced the war with France; but he would take no part in exciting agitation in England. It was otherwise with the restless spirits among whom Grey was found. Enraged by the attitude of Pitt, which was grounded on the support of the constituencies as they then stood, the residuum plotted an ill-timed agitation for parliamentary reform.

The demand for parliamentary reform was as yet in a rudi- mentary stage. Forty years later it had become the demand of an unenfranchised nation, disabused by a sudden spread of political and economical knowledge. It was as yet but the occasional instrument of the scheming politician. Chatham had employed the cry in this sense. The Middlesex agitators had done the same; even the premier of the time, after his accession to power, had sought to strengthen his hands in the same way. But Pitt's hands were now strengthened abundantly; whereas the opposition had nothing to lose and much to gain by such a measure. The cry for reform thus became their natural expedient. Powerless to carry reform in the House, they sought to overawe parliament by external agitation, and formed the Society of the

Friends of the People, destined to unite the forces of all the " patriotic " societies which already existed in the country, and to pour their violence irresistibly on a terrified parliament. Grey and his friends were enrolled in this portentous association, and presented in parliament its menacing petitions. Such petitions, which were in fact violent impeachments of parliament itself, proceeding from voluntary associations having no corporate existence, had been hitherto unknown in the English parliament. They had been well known in the French assembly. They had heralded and furthered the victory of the Jacobins, the dissolution of the constitution, the calling of the Convention and the fall of the monarchy.

The Society of the Friends of the People was originally an after-dinner folly, extemporized at the house of a man who after- wards gained an earldom by denouncing it as seditious. Fox discountenanced it, though he did not directly condemn it; but Grey was overborne by the fierce Jacobinism of Lauderdale, and avowed himself the parliamentary mouthpiece of this dangerous

agitation. But Pitt, strong in his position, cut the ground from under Grey's feet by suppressing the agitation with a strong hand. The suspension of the Habeas Corpus Act, the Gagging Acts and the state prosecutions form a painful historical episode. But the discredit belongs as much to Grey and Lauderdale as to Pitt. Grey always spoke regretfully of his share in the movement. " One word from Fox, " he said, " would have kept me out of all the mess of the Friends of the People. But he never spoke it." It was Grey who moved the impeachment of Pitt, and he next promoted the equally foolish " Secession." Since the parliament did not properly represent the nation, and refused to reform itself or to impeach the minister, nothing remained but to disown it; and the opposition announced their intention of " seceding," or systematically absenting themselves from their places in parliament. This futile movement was originated by Grey, Lauderdale and the duke of Bedford. It obtained a somewhat wider support. It suited the languor of some dispirited politicians like Fox, and the avarice of some lawyers in large practice like Erskine; but sensible politicians at once condemned it. It directly ignored parliamentary government, and amounted to nothing but a pettish threat of revolution.. " Secession," said Lord Lansdowne, with characteristic shrewdness, " either means rebellion, or it is nonsense." Pitt easily dashed this feeble weapon from the hands of his opponents. He roused jealousy in the absent by praising the parts and the patriotism of the rest, and thus gradually brought them back. Grey himself reappeared to protest against the union with

Ireland.

When Pitt died in 1806 nothing could prevent the reunited opposition from coming into power, and thus the Broad-bottom ministry was formed under Fox. On his death Grenville became premier, and Grey, now Lord Howick, foreign secretary, and leader of the House of Commons. Disunion, always the bane of English Liberalism, lurked in the coalition, and the Foxites and Grenvillites were only ostensibly at one. Grey opposed the war policy of Grenville; and this policy was not more successful than it had been in the hands of Pitt. And the change from the leadership of Fox to that of Grenville was only too perceptible. Both in court and country Grenville affected the role of Pitt, and assumed a stiff and peremptory attitude which ill became him. An ill-advised dissolution weakened their majority; they lost ground by the " delicate investigation " into the conduct of the princess of Wales; Lord Henry Petty's budget was too specious to. command confidence; and the king, fully aware of their weak situation, resolved to get rid of them. When they proposed to concede a portion of the Catholic claims, George refused and demanded of them an undertaking never to propose such a measure again. This was refused, and the Grenville- Grey cabinet retired in March 1807. In the same year Grey's father died, and Grey went to the Upper House. Opposition united Grey and Grenville for a time, but the parties finally split on the old war question. When Napoleon returned from Elba in 181 5, and once more seized the government of France, the same question arose which had arisen in 1702, Was England to go to war for the restoration of the Bourbons? Grenville followed the traditions of Pitt, and supported the ministry in at once renewing hostilities. Grey followed those of Fox, and maintained the right of France to choose her own governors, and the im- possibility of checking the reaction in the emperor's favour. The victory of Waterloo put an end to the dispute, but the disruption became permanent. The termination of the war, and the cessation of all action in common, reduced the power of the opposition to nothing. Grenville retired from public life, and his adherents reinforced the ministry. Little remained for the Whigs to do. But the persecution of the queen afforded an opportunity of showing that the ministry were not omnipotent; and the part taken on that occasion by Grey won him at once the increased respect of the nation and the undying aversion of George IV. It sealed the exclusion of himself and his few friends from office during the king's life; and when in 1827 Grey came forth to denounce the ministry orf Canning, he declared that he stood alone in the political world. His words were soon justified, for when Lord Goderich resigned, the remnant which had hitherto

supported Grey, hastened to support the ministry of the duke of Wellington.

We now reach the principal episode in Grey's career. In 1827 he seemed to stand forth the solitary and powerless relic of an extinct party. In 1832 we find that party restored to its old numbers and activity, supreme in parliament, popular in the nation, and Lord Grey at its head. The duke of Wellington's foolish declaration against parliamentary reform, made in a season of great popular excitement, suddenly deprived him of the confidence of the country, and a coalition of the Whigs and Canningites became inevitable. The Whigs had in 1827 sup- ported the Canningites; the latter now supported the Whigs, of whom Grey remained the traditional head. George IV. was dead, and no obstacle existed to Grey's elevation. Grey was sent for by William IV. in November 1830, and formed a coalition cabinet, pledged to carry on the work in which the duke of Wellington had faltered. But Grey himself was the mere instru- ment of the times. An old-fashioned Whig, he had little personal sympathy with the popular cause, though he had sometimes indicated a certain measure of reform as necessary. When he took office, he guessed neither the extent to which the Reform Act would go, nor the means by which it would be carried. That he procured for the country a measure of constitutional reform for which he had agitated in his youth was little more than a coincidence. In his youth he had put himself at the head of a frantic agitation against parliament, because he there found himself powerless. In his old age the case was reversed. Suddenly raised to a position of authority in the country, he boldly stood between parliament, as then constituted, and the formidable agitation which now threatened it and by a forced reform saved it from revolution. In his youth he had assailed Pitt's administration because Pitt's administration threatened with extinction the political monopoly of that landed interest to which he belonged. In his old age, on the contrary, unable to check the progress of the wave, he swam with it, and headed the movement which compelled that landed interest to surrender its monopoly.

The second reading of the first Reform Bill was carried in the Commons by a majority of one. This was equivalent to a defeat, and further failures precipitated a dissolution. The confidence which the bold action of the ministry had won was soon plainly proved, for the second reading was carried in the new parliament by a majority of 136. When the bill had at length passed the Commons after months of debate, it was Grey's task to introduce it to the Lords. It was rejected by a majority of 41. The safety of the country now depended on the prudence and courage of the ministry. The resignation of Grey and his colleagues was dreaded even by the opposition, and they remained in office with the intention of introducing a third Reform Bill in the next session. The last months of 1 83 1 were the beginning of a political crisis such as England had not seen since 1688. The two extreme parties, the Ultra-Radicals and the Ultra-Tories, were ready

for civil war. Between them stood the ministry and the majority of intelligent peace-loving Englishmen; and their course of action was soon decided. The bill must be passed, and there were but two ways of passing it. One was to declare the consent of the House of Lords unnecessary to the measure, the other to create, if necessary, new peers in sufficient number to outvote the opposition. These two expedients did not in reality differ. To swamp the house in the way proposed would have been to destroy it. The question whether the ministry should demand the king's consent to such a creation, if necessary, was debated in the cabinet in September. Brougham proposed it, and gradually a ■majority of the cabinet were won over. Grey had at first refused to employ even the threat of so unconstitutional a device as a means to the proposed end. But his continued refusal would have broken up the ministry, and the breaking up of the ministry must now have been the signal for revolution. The second reading in the Commons was passed in December by a majority of 162, and on New-Year's day 1832 the majority of the cabinet resolved on demanding power to carry it in the Lords by a creation of peers. Grey carried the resolution to the king.

Some time still remained before the bill could be committed and read a third time. It was not until the 9th of April that Grey- moved the second reading in the Lords. A sufficient number of the opposition temporized; and the second reading was allowed to pass by a majority of nine. Their intention was to mutilate the bill in committee. The Ultra-Tories, headed by the duke of Wellington, had entered a protest against the second reading, but they were now politically powerless. The struggle had become a struggle on the one hand for the whole bill, to be carried by a creation of peers, and on the other for some mutilated measure. Grey's instinct divined that the crisis was approaching. Either the king must consent to swamp the House, or the ministry must cease to stand in the breach between the peers and the country. The king, a weak and inexperienced politician, had in the meantime been wrought upon by the temporizing leaders in the Lords. He was induced to believe that if the Commons should reject the mutilated bill when it was returned to them, and the ministry should consequently retire, the mutilated bill might be reintroduced and passed by a Tory ministry. He was deaf to all representations of the state of public opinion; and to the surprise of the ministry, and the terror and indignation of every man of sense in the country, he rejected their proposal and accepted their resignation, May 9, 1832. The duke of Wellington undertook the hopeless task of constructing a ministry which should pass a restricted or sham Reform Bill. The only man who could have made the success of such a ministry even probable was Peel, and Peel's conscience and good sense

forbade the attempt. He refused, and after a week of the pro- foundest agitation throughout the country, the king, beaten and mortified, was forced to send for Grey and Brougham. On being told that his consent to the creation of peers was the only condition on which they could undertake the government, he angrily and reluctantly yielded. The chancellor, with cool forethought, demanded this consent in writing. Grey thought such a demand harsh and unnecessary. " I wonder," he said to Brougham, when the interview was over, " you could have had the heart to press it." But Brougham was inexorable, and the king signed the following paper: " The king grants permission to Earl Grey, and to his chancellor, Lord Brougham, to create such a number of peers as will be sufficient to ensure the passing of the Reform Bill, first calling up peers' eldest sons. — William R., Windsor, May 17, 1832."

Grey had now won the game. There was no danger that he would have to resort to the expedient which he was authorized to employ. The introduction of sixty new peers would have destroyed the opposition, but it would have been equivalent to the abolition of the House. The king's consent made known, a sufficient number of peers were sure to withdraw to enable the bill to pass, and thus the dignity of both king and peerage would be saved. The duke of Wellington headed this movement on the part of the opposition; and the third reading of the bill was carried in the Lords by a majority of 84.

It is well known that in after years both Grey and Brougham disclaimed any intention of executing their threat. If this were so, they must have merely pretended to brave a danger which they secretly feared to face, and intended to avoid; and the credit of rescuing the country would belong to the duke of Wellington and the peers who seceded with him. To argue such cowardice in them from statements made when the crisis was long past, and when they were naturally willing to palliate the rough policy which they were forced to adopt, would be to set up a needless and unjustifiable paradox. Nothing else in the career of either Grey or Brougham leads us to suppose them capable of the moral baseness of yielding up the helm of state, in an hour of darkness and peril, to reckless and unskilled hands. Such , would have been the result if they had lacked the determination to carry out their programme to the end. The influence of every statesman in the country would then have been extinguished, and the United Kingdom would have been absolutely in the hands of O'Connell and Orator Hunt.

Grey took but little part in directing the legislation of the reformed parliament. Never anxious for power, he had executed

the arduous task of 1831-1832 rather as a matter of duty than of inclination, and wished for an opportunity of retiring. Such an opportunity

very shortly presented itself. The Irish policy of the ministry had not conciliated the Irish people, and O'Connell denounced them with the greatest bitterness. On the renewal of the customary Coercion Bill, the ministry was divided on the question whether to continue to the lord-lieutenant the power of suppressing public meetings. Littleton, the Irish secretary, was for abolishing it; and with the view of conciliating O'Connell, he informed him that the ministry intended to abandon it. But the result proved him to have been mistaken, and O'Connell, with some reason supposing himself to have been duped, called on Littleton to resign his secretaryship. It had also transpired in the discussion that Lord Althorp, the leader of the House of Commons, was privately opposed to retaining those clauses which it was his duty to push through the house. Lord Althorp therefore resigned, and Grey, who had lately passed his seventieth year, took the opportunity of resigning also. It was his opinion, it appeared, which had overborne the cabinet in favour of the public meeting clauses; and his voluntary withdrawal enabled Lord Althorp to return to his post and to proceed with the bill in its milder form. Grey was succeeded by Lord Melbourne; but no other change was made in the cabinet. Grey took no further part in politics. During most of his remaining years he continued to live in retirement at Howick, where he died on the 17th of July 1845, in his eighty-second year. By his wife Mary Elizabeth, only daughter of the first Lord Ponsonby, whom he married on the 18th of November 1794, he became the father of ten sons and five daughters. Grey's eldest son Henry (q.v.) be- came the 3rd earl, and among his other sons were General Charles Grey (1804-1870) and Admiral Frederick Grey (1805-1878).

In public life, Grey could always be upon occasion bold, strenuous and self-sacrificing; but he was little disposed for the active work of the politician. He was not one of those who took the statesman's duty " as a pleasure he was to enjoy." A certain stiffness and reserve ever seemed in the popular eye to hedge him in; nor was his oratory of the kind which stirs enthusiasm and delight. A tall, stately figure, fine voice and calm aristocratic bearing reminded the listener of Pitt rather than of Fox, and his speeches were constructed on the Attic rather than the Asiatic model. Though simple and straightforward, they never lacked either point or dignity; and they were admirably adapted to the audience to which they were addressed. The scrupulous up- rightness of Grey's political and private character completed the ascendancy which he gained; and no politician could be named who, without being a statesman of the highest class, has left a name more enviably placed in English history. (E. J. P.)

GREY, SIR EDWARD, 3rd Bart. (1862-), English statesman, was educated at Winchester and at Balliol College, Oxford, and succeeded his grandfather, the 2nd baronet, at the age of twenty. He entered the House of Commons as Liberal member for Berwick-on-Tweed in 1885, but he was

best known as a country gentleman with a taste for sport, and as amateur champion tennis-player. His interest in politics was rather languid, but he was a disciple of Lord Rosebery, and in the 1892-1895 Liberal ministry he was under-secretary for foreign affairs. In this position he earned a reputation as a politician of thorough straightforwardness and grit, and as one who would maintain British interests independently of party; and he shared with Mr Asquith the reputation of being the ablest of the Imperialists who followed Lord Rosebery. Though outside foreign affairs he played but a small part in the period of Liberal opposition between 1895 and 1905, he retained public confidence as one who was indispensable to a Liberal administration. ' When Sir Henry Campbell-Bannerman's cabinet was formed in December 1905 he became foreign minister, and he retained this office when in April 1908 Mr Asquith became prime minister.

GREY, SIR GEORGE (1812-1898), British colonial governor and statesman, only son of Lieutenant-Colonel Grey of the 30th Foot, was born in Lisbon on the 14th of April 181 2, eight days after the death of his father at the storming of Badajoz.

He passed through Sandhurst with credit, and received his com- mission in 1829. His lieutenancy was dated 1833, and his captaincy 1839, in which year he sold out and left the army. In the early 'thirties he was quartered in Ireland, where the wretchedness of the poorer classes left a deep impression on his mind. In 1836 the Royal Geographical Society accepted his offer to explore the north-west region of West Australia, and accordingly he landed at Hanover Bay at the end of 1837. The surrounding country he found broken and difficult, and his hardships were aggravated by the tropical heat and his ignorance of the continent. In a skirmish with the natives, in which he was speared near the hip, he showed great courage, and put the assailants to flight, shooting the chief, who had wounded him. After a brave endeavour to continue his journey his wound forced him to retreat to the coast, whence he sailed to Mauritius to recruit. Next year he again essayed exploration, this time on the coast to the north and south of Shark's Bay. He had three whale-boats and an ample supply of provisions, but by a series of disasters his stores were spoilt by storms, his boats wrecked in the surf, and the party had to tramp on foot from Gantheaume Bay to Perth, where Grey, in the end, walked in alone, so changed by suffering that friends did not know him. In 1839 he was appointed governor-resident at Albany, and during his stay there married Harriett, daughter of Admiral Spencer, and also prepared for publication an account, in two volumes, of his expeditions. In 1840 he returned to

England, to be immediately appointed by Lord John Russell to succeed Colonel Gawler as governor of South Australia. Reaching the colony in May 1841, he found it in the depths of a depression caused by mismanagement and insane land speculation. By rigorously reducing public expenditure, and forcing the settlers to quit the town and betake themselves to tilling their lands, and with the opportune help of valuable copper discoveries, Grey was able to aid the infant colony to emerge from the slough. So striking were his energy and determination that when, in 1845, the little settlements in New Zealand were found to be involved in a native war, and on the verge of ruin, he was sent to save them. The Maori chiefs in open rebellion were defeated, and made their submission. Another powerful leader suspected of fomenting discontent was arrested, and friendly chieftains were subsidized and honoured. Bands of the natives were employed in making government roads, and were paid good wages. The governor gained the veneration of the Maori tribes, in whose welfare he took a close personal interest, and of whose legends and myths he made a valuable and scholarly collection, published in New Zealand in 1855 and reprinted thirty years afterwards. With peace prosperity came to New Zealand, and the colonial office desired to give the growing settlements full self-government. Grey, arguing that this would renew war with the Maori, returned the constitution to Downing Street. But though the colonial office sustained him, he became involved in harassing disputes with the colonists, who organized an active agitation for autonomy. In the end a second constitution, partly framed by Grey himself, was granted them, and Grey, after eight years of despotic but successful rule, was transferred to Cape Colony. He had been knighted for his services, and had undoubtedly shown strength, dexterity and humanity in dealing with the whites and natives. In South Africa his success con- tinued. He thwarted a formidable Kaffir rebellion in the Eastern Provinces, and pushed on the work of settlement by bringing out men from the German Legion and providing them with homes. He gained the respect of the British, the confidence of the Boers, the admiration and the trust of the natives. The Dutch of the Free State and the Basuto chose him as arbitrator of their quarrels. When the news of the Indian Mutiny reached Cape Town he strained every nerve to help Lord Canning, despatching men, horses, stores and £60,000 in specie to Bombay. He per- suaded a detachment, then on its way round the Cape as a rein- forcement for Lord Elgin in China, to divert its voyage to Calcutta. Finally, in 1859, Grey almost reached what would have been the culminating point of his career by federating South Africa. Persuaded by him, the Orange Free State passed resolutions in

favour of this great step, and their action was welcomed by Cape Town. But the colonial office disapproved of the change, and when Grey attempted to persevere with it Sir Edward Bulwer Lytton recalled him. A

change of ministry during his voyage to England displaced Sir Edward Bulwer Lytton. But though the duke of Newcastle reinstated Grey, it was with instructions to let federation drop. In 1861 the colonial office sent him, for the fourth time in succession, to take up a post of exceptional difficulty by again entrusting him with the governorship of New Zealand, where an inglorious native war in Taranaki had just been succeeded by an armed truce. Grey did his best to make terms with the rebels and to re-establish friendship with the Maori king and the land league of tribes formed to stop further sales of land to the whites. But the Maori had got guns and powder, and were suspicious and truculent. In vain Grey, supported by Bishop Selwyn and by Fox and the peace party among the settlers, strove to avert war. It came in 1863, and spread from province to province. Ten thousand regulars and as many colonial riflemen were employed to put it down. The imperial troops were badly handled, and Grey, losing patience, became involved in bitter disputes with their commanders. As an example to the former he himself attacked and captured Weraroa, the strongest of the Maori stockades, with a handful of militia, a feat which delighted the colonists, but made him as much disliked at the war office as he now was at Downing Street. Moreover, Grey had no longer real control over the islands. New Zealand had become a self-governing colony, and though he vindicated the colonists generally when libellous imputations of cruelty and land-grabbing were freely made against them in London, he crossed swords with his ministers when the latter confiscated three million acres of tribal land belonging to the insurgent Maori. Yet through all these troubles progress was made; many successes were gained in 1866, chiefly by the colonial militia, and a condition of something like tranquillity had been reached in 1867, when he received a curt intimation from the duke of Buckingham that he was about to be superseded. The colonists, who believed he was sacrificed for upholding their interests and good name, bade farewell to him in 1868 in an out- burst of gratitude and sympathy; but his career as a colonial governor was at an end. Returning to England, he tried to enter public life, delivered many able speeches advocating what later came to be termed Imperialism, and stood for Newark. Dis- couraged, however, by the official Liberals, he withdrew and turned again to New Zealand. In 1872 he was given a pension of £1000 a year, and settled down on the island of Kawau, not far from Auckland, which he bought, and where he passed his leisure in planting, gardening and collecting books. In 1875, on the invitation of the Auckland settlers, he became superintendent of their province, and entered the New Zealand House of Representatives to resist the abolition of the provincial councils of the colony, a change then being urged on by Sir Julius Vogel in alliance with the Centralist Party. In this he failed, but his eloquence and courage drew round him a strong Radical following, and gave him the premiership in 1877. Manhood suffrage, triennial parliaments, a land-tax, the purchase of

large estates and the popular election of the governor, were leading points of his policy. All these reforms, except the last, he lived to see carried; none of them were passed by him. A commercial depression in 1879 shook his popularity, and on the fall of his ministry in 1879 he was deposed, and for the next fifteen years remained a solitary and pathetic figure in the New Zealand parliament, respectfully treated, courteously listened to, but never again invited to lead. In 189 1 he came before Australia as one of the New Zealand delegates to the federal convention at Sydney, and characteristically made his mark by standing out almost alone for " one man one vote " as the federal franchise. This point he carried, and the Australians thronged to hear him, so that his visits to Victoria and South Australia were personal triumphs. When, too, in 1894, he quitted New Zealand for London, some reparation was at last made him by the imperial government; he was called to the privy council, and graciously received by Queen Victoria on his visit to Windsor. Thereafter

he lived in London, and died on the 20th of September 1898. He was given a public funeral at St Paul's. Grey was all his life a collector of books and manuscripts. After leaving Cape Colony, he gave his library to Cape Town in 1862; his subsequent collection, which numbered 12,000 volumes, he presented to the citizens of Auckland in 1887. In gratitude the people of Cape Town erected a statue of him opposite their library building.

Lives of Sir George Grey have been written by W. L. and L. Rees (1892), Professor G. C. Henderson (1907) and J. Collier (1909).

(W. P. R.)

GREY, HENRY GREY, 3 rd Earl (1802-1894), English statesman, was born on the 28th of December 1802, the son of the 2nd Earl Grey, prime minister at the time of the Reform Bill of 1832. He entered parliament in 1826, under the title of Viscount Howick, as member for Winchilsea, which constituency he left in 1831 for Northumberland. On the accession of the Whigs to power in 1830 he was made under-secretary for the colonies, and laid the foundation of his intimate acquaintance with colonial questions. He belonged at the time to the more advanced party of colonial reformers, sharing the views of Edward Gibbon Wakefield on questions of land and emigration, and resigned in 1834 from dissatisfaction that slave emancipation was made gradual instead of immediate. In 1835 he entered Lord Melbourne's cabinet as secretary at war, and effected some valuable administrative reforms, especially by suppressing malpractices detrimental

to the troops in India. After the partial reconstruction of the ministry in 1839 he again resigned, dis- approving of the more advanced views of some of his colleagues. These repeated resignations gave him a reputation for crotcheti- ness, which he did not decrease by his disposition to embarrass his old colleagues by his action on free trade questions in the session of 1841. During the exile of the Liberals from power he went still farther on the path of free trade, and anticipated Lord John Russell's declaration against the corn laws. When, on Sir Robert Peel's resignation in December 1845, Lord John Russell was called upon to form a ministry, Howick, who had become Earl Grey by the death of his father in the preceding July, refused to enter the new cabinet if Lord Palmerston were foreign secretary (see J. R. Thursfield in vol. i. and Hon. F. H. Baring in vol. xxiii. of the English Historical Review). He was greatly censured for perverseness, and particularly when in the following July he accepted Lord Palmerston as a colleague without remonstrance. His conduct, nevertheless, afforded Lord John Russell an escape from an embarrassing situation. Be- coming colonial secretary in 1846, he found himself everywhere confronted with arduous problems, which in the main he en- countered with success. His administration formed an epoch. He was the first minister to proclaim that the colonies were to be governed for their own benefit and not for the mother- country's; the first systematically to accord them self-govern- ment so far as then seemed possible; the first to introduce free trade into their relations with Great Britain and Ireland. The concession by which colonies were allowed to tax imports from the mother-country ad libitum was not his; he protested against it, but was overruled. In the West Indies he suppressed, if he could not overcome, discontent ; in Ceylon he put down rebellion; in New Zealand he suspended the constitution he had himself accorded, and yielded everything into the masterful hands of Sir George .Grey. The least successful part of his administration was his treatment of the convict question at the Cape of Good Hope, which seemed an exception to his rule that the colonies were to be governed for their own benefit and in accordance with their own wishes, and subjected him to a' humiliating defeat. After his retirement he wrote a history and defence of his colonial policy in the form of letters to Lord John Russell, a dry but instructive book (Colonial Policy of Lord John Russell's Admini- stration, 1853). He resigned with his colleagues in 1852. No room was found for him in the Coalition Cabinet of 1853, and although during the Crimean struggle public opinion pointed to him as the fittest man as minister for war, he never again held office. During the remainder of his long life he exercised a vigilant criticism on public affairs. In 1858 he wrote a work

(republished in 1864) on parliamentary reform; in 1888 he wrote another on the state of Ireland; and in 1892 one on the United States tariff. In his latter years he was a frequent contributor of weighty letters to The Times

on land, tithes, currency and other public questions. His principal parliamentary appearances were when he moved for a committee on Irish affairs in 1866, and when in 1878 he passionately opposed the policy of the Beaconsfield cabinet in India. He nevertheless supported Lord Beaconsfield at the dissolution, regarding Mr Gladstone's acces- sion to power with much greater alarm. He was a determined opponent of Mr Gladstone's Home Rule policy. He died on the 9th of October 1894. None ever doubted his capacity or his conscientiousness, but he was generally deemed impracticable and disagreeable. Prince Albert, however, who expressed himself as ready to subscribe to all Grey's principles, and applauded him for having principles, told Stockmar that, although dogmatic, he was amenable to argument; and Sir Henry Taylor credits him with " more freedom from littlenesses of feeling than I have met before in any public man." His chief defect was perceived and expressed by his original tutor and subsequent adversary in colonial affairs, Edward Gibbon Wake- field, who wrote, " With more than a common talent for under- standing principles, he has no originality of thought, which compels him to take all his ideas from somebody; and no power of working out theory in practice, which compels him to be always in somebody's hands as respects decision and action."

The earl had no sons, and he was followed as -4th earl by his nephew Albert Henry George (b. 185 1), who in 1904 became governor-general of Canada.

GREY, LADY JANE (1537-1554), a lady remarkable no less for her accomplishments than for her misfortunes, was the great-granddaughter of Henry VII. of England. Her descent from that king was traced through a line of females. His second daughter Mary, after being left a widow by Louis XII. of France, married Charles Brandon, duke of Suffolk, who was a favourite with her brother King Henry VIII. Of this marriage came two daughters, the elder of whom, Lady Frances Brandon, was married to Henry Grey, marquess of Dorset; and their issue, again, consisted of daughters only. Lady Jane, the subject of this article, was the eldest of three whom the marquess had by Lady Frances. Thus it will appear that even if the crown of England had ever fallen into the female line of descent from Henry VII., she could not have put in a rightful claim unless the issue of his elder daughter, Margaret, had become extinct. But Margaret had married James IV. of Scotland; and, though her descendant, James VI., was ultimately called to the English throne, Henry VIII. had placed her family after that of his second sister in the succession; so that, failing the lawful issue of Henry himself, Lady Jane would, according to this arrangement, have succeeded. It was to these circumstances that she owed her exceptional position in history, and became the victim of an ambition which was not her own.

She was born at her father's seat named Bradgate in Leicester- shire about the year 1537. Her parents, though severe disciplin- arians, bestowed more than ordinary care upon her education, and she herself was so teachable and delighted so much in study that she became the marvel of the age for her acquirements. She not only excelled in needlework and in music, both vocal and instrumental, but while still very young she had thoroughly mastered Latin, Greek, French and Italian. She was able to speak and write both Greek and Latin with an accuracy that satisfied even such critics as Ascham and her tutor Dr Aylmer, afterwards bishop of London. She also acquired some knowledge of at least three Oriental tongues, Hebrew, Chaldee and Arabic. In Ascham's Schoolmaster is given a touching account of the devotion with which she pursued her studies and the harshness she experienced from her parents. The love of learning was her solace; in reading Demosthenes and Plato she found a refuge from domestic unhappiness. When about ten years old she was placed for a time in the household of Thomas, Lord Seymour, who, having obtained her wardship, induced her parents to let her stay with him, even after the death of his wife, Queen

Catherine Parr, by promising to marry her to his nephew, King Edward VI. Lord Seymour, however, was attainted of high treason and beheaded in 1549, and his brother, the duke of Somerset, made some overtures to the marquess of Dorset to marry her to his son the earl of Hertford. These projects, however, came to nothing. The duke of Somerset in his turn fell a victim to the ambition of Dudley, duke of Northumberland, and was beheaded three years after his brother. Meanwhile, the dukedom of Suffolk having become extinct by the deaths of Charles Brandon and his two sons, the title was conferred upon the marquess of Dorset, Lady Jane's father. Northumber- land, who was now all-powerful, fearing a great reverse of fortune in case of the king's death, as his health began visibly to decline, endeavoured to strengthen himself by marriages between his family and those of other pbwerful noblemen, especially of the new-made duke of Suffolk. His three eldest sons being already married, the fourth, who was named Lord Guilford Dudley, was accordingly wedded to Lady Jane Grey about the end of May 1553. The match received the full approval of the king, who furnished the wedding apparel of the parties by royal warrant. But Edward's state of health warned Northumberland that he must lose no time in putting the rest of his project into execution. He persuaded the king that if the crown should descend to his sister Mary the work of the Reformation would be undone and the liberties of the kingdom would be in danger. Besides, both Mary and her sister Elizabeth had been declared

illegitimate by separate acts of parliament, and the objections to Mary queen of Scots did not require to be pointed out. Edward was easily persuaded to break through his father's will and make a new settlement of the crown by deed. The document was witnessed by the signatures of all the council and of all but one of the judges; but those of the latter body were obtained only with difficulty by threats and intimidation.

Edward VI. died on the 6th July 1553, and it was announced to Lady Jane that she was queen. She was then but sixteen years of age. The news came upon her as a most unwelcome surprise, and for some time she resisted all persuasions to accept the fatal dignity; but at length she yielded to the entreaties of her father, her father-in-law and her husband. The better to mature their plans the cabal had kept the king's death secret for some days, but they proclaimed Queen Jane in the city on the 10th. The people received the announcement with manifest coldness, and a vintner's boy was even so bold as to raise a cry for Queen Mary, for which he next day had his ears nailed to the pillory and afterwards cut off. Mary, however, had received early intimation of her brother's death, and, retiring from Hunsdon into Norfolk, gathered round her the nobility and commons of those parts. Northumberland was despatched thither with an army to oppose her; but after reaching New- market he complained that the council had not sent him forces in sufficient numbers and his followers began to desert. News also came that the earl of Oxford had declared for Queen Mary; and as most of the council themselves were only seeking an opportunity to wash their hands of rebellion, they procured a meeting at Baynard's Castle, revoked their former acts as done under coercion, and caused the lord mayor to proclaim Queen Mary, which he did amid the shouts of the citizens. The duke of Suffolk was obliged to tell his daughter that she must lay aside her royal dignity and become a private person once more. She replied that she relinquished most willingly a crown that she had only accepted out of obedience to him and her mother, and her nine days' reign was over.

The leading actors in the conspiracy were now called to answer for their deeds. Northumberland was brought up to London a prisoner, tried and sent to the block, along with' some of his partisans. The duke of Suffolk and Lady Jane were also committed to the Tower; but the former, by the influence of his duchess, procured a pardon. Lady Jane and her husband Lord Guilford Dudley were also tried, and received sentence of death for treason. This, however, was not immediately carried out; on the contrary, the queen seems to have wished to spare their lives and mitigated the rigour of their confinement.

Unfortunately, owing to the general dislike, of the queen's marriage with Philip of Spain, Sir Thomas Wyat soon after raised a rebellion in which the

duke of Suffolk and his brothers took part, and on its suppression the queen was persuaded that it was unsafe to spare the lives of Lady Jane and her husband any longer. On hearing that they were to die, Lady Jane declined a parting interview with her husband lest it should increase their pain, and prepared to meet her fate with Christian fortitude. She and her husband were executed on the same day, on the 1 2th of February 1554, her husband on Tower Hill, and herself within the Tower an hour afterwards, amidst universal sympathy and compassion.

See Ascham's Schoolmaster; Burnet's History of the Reformation; Howard's Lady Jane Grey; Nicolas's Literary Remains of Lady Jane Grey; Tytler's England under Edward VI. and Mary; The Chronicles

of Queen Jane, ed. J. G. Nichols; The Accession of Queen Mary (Guaras's narrative), ed. R. Garnett (1892); Foxe's Acts and Monuments.

GREY DE WILTON and Grey de Ruthyn. The first Baron Grey de Wilton was Reginald de Grey, who was summoned to parliament as a baron in 1295 and who died in 1308. Reginald's son John, the 2nd baron (1268-1323), was one of the lords ordainers in 13 10 and was a prominent figure in English politics during the reign of Edward II. The later barons Grey de Wilton were descended from John's eldest son Henry (d. 1342), while a younger son Roger (d. 1353) was the ancestor of the barons Grey de Ruthyn.

William, 13TH Lord Grey de Wilton (d. 1562), who suc- ceeded to the title on the death of his brother Richard, about 1520, won great fame as a soldier by his conduct in France during the concluding years of Henry VIII. 's reign, and was one of the leaders of the victorious English army at the battle of Pinkie in 1547. He was then employed on the Scottish marches and in Scotland, and in 1549 he rendered good service in sup- pressing the rebellion in Oxfordshire and in the west of England; in 1 551 he was imprisoned as a friend of the fallen protector, the duke of Somerset, and he was concerned in the attempt made by John Dudley, duke of Northumberland, to place Lady Jane Grey on the English throne in 1553. However, he was pardoned by Queen Mary and was entrusted with the defence of Guines. Although indifferently supported he defended the town with great gallantry, but in January 1558 he was forced to surrender and for some time he remained a prisoner in France. Under Elizabeth, Grey was again employed on the Scottish border, and he was responsible for the pertinacious but unavailing attempt to capture Leith in May 1560. He died at Cheshunt in Hertfordshire on the i4th/25th of December 1562.

He was described by William Cecil as " a noble, valiant, painful and careful gentleman," and his son and successor, Arthur, wrote A

Commentary of the Services and Charges of William, Lord Grey of Wilton, K.G. This has been edited by Sir P. de M. Grey Egerton for the Camden Society (1847).

Grey's elder son Arthur, 14TH Lord Grey de Wilton (1536- 1593), was during early life with his father in France and in Scotland; he fought at the battle of St Quentin and helped to defend Guines and to assault Leith. In July 1580 he was appointed lord deputy of Ireland, and after an initial defeat in Wicklow was successful in reducing many of the rebels to a temporary submission. Perhaps the most noteworthy event during his tenure of this office was the massacre of 600 Italians and Spaniards at Smerwick in November 1580, an action for which he was responsible. Having incurred a heavy burden of debt Grey frequently implored'the queen to recall him, and in August 1582 he was allowed to return to England (see E. Spenser, View of the State of Ireland, edited by H. Morley, 1890, and R. Bagwell, Ireland under the Tudor s, vol. iii., 1890). While in Ireland Grey was served as secretary by Edmund Spenser, and in book v. of the Faerie Queene the poet represents his patron as a knight of very noble qualities named Artegall. As one of the commissioners who tried Mary queen of Scots, Grey defended the action of Elizabeth's secretary, William Davison, with regard to this matter, and he took part in the preparations for the defence of England against the Spaniards in 1588. His

account of the defence of Guines was used by Holinshed in his Chronicles.

When he died on the 14th of October 1393 he was succeeded as 15th baron by his son Thomas (d. 1614), who while serving in Ireland incurred the enmity of Robert Devereux, earl of Essex, and of Henry Wriothesley, earl of Southampton; and after fighting against Spain in the Netherlands he was a member of the court which sentenced these two noblemen to death in 1601. On the accession of James I. he was arrested for his share in the " Bye " plot, an attempt made by William Watson and others to seize the king. He was tried and sentenced to death, but the sentence was not carried out and he remained in prison until his death on the 9th of July 1614. He displayed both ability and courage at his trial, remarking after sentence had been passed, " the house of Wilton hath spent many lives in their prince's service and Grey cannot beg his." Like his father Grey was a strong Puritan. He left no children and his barony became

extinct.

In 1784 Sir Thomas Egerton, Bart., a descendant in the female line of the 14th baron, was created Baron Grey de Wilton. He died without sons in September 1814, when his barony became extinct; but the titles of Viscount Grey de Wilton and earl of Wilton, which had been conferred upon him in 1801, passed to Thomas Grosvenor (1799-1882), the second son of his daughter Eleanor (d. 1846); and her husband Robert Grosvenor, 1st marquess of Westminster. Thomas took the name of Egerton and his descendants still hold the titles.

Roger Grey, ist Baron Grey de Ruthyn, who was sum- moned to parliament as a baron in 1324, saw much service as a soldier before his death on the 6th of March 1353. The second baron was his son Reginald, whose son Reginald (c. 1362-1440) succeeded to the title on his father's death in July 1388. In 1410 after a long dispute the younger Reginald won the right to bear the arms of the Hastings family. He enjoyed the favour both of Richard II. and Henry IV., and his chief military exploits were against the Welsh, who took him prisoner in 1402 and only released him upon' payment of a heavy ransom. Grey was a member of the council which governed England during the absence of Henry V. in France in 1415; he fought in the French wars in 1420 and 1421 and died on the 30th of September 1440. His eldest son, Sir John Grey, K.G. (d. 1439), who predeceased his father, fought at Agincourt and was deputy of Ireland in 1427. He was the father of Edmund Grey (d. 1489), who succeeded his grandfather as Lord Greyde Ruthyn in 1440 and was created earl of Kent in 1465.

One of Reginald Grey's younger sons, Edward (1415-1457), succeeded his maternal grandfather as Baron Ferrers of Groby in 1445. He was the ancestor of the earls of Stamford aiW also of the Greys, marquesses of Dorset and dukes of Suffolk.

The barony of Grey de Ruthyn was merged in the earldom of Kent until the death of Henry, the 8th carl, in November 1639. It then devolved upon Kent's nephew Charles Longueville (1612- 1643), through whose daughter Susan (d. 1676) it came to the family of Yelverton, who were earls of Sussex from i7i7to I799. The next holder was Henry Edward Gould (1780-1810), a grandson of Henry Yelverton, earl of Sussex; and through Gould's daughter Barbara, • marchioness of Hastings (d. 1858), it passed to the last marquess of Hastings,jon whose death in 1868 the barony fell into abeyance, this being terminated in 1885 in favour of Hastings's sister Bertha (d. 1887), the wife of Augustus Wykeham Clifton. Their son, Rawdon George Grey Clifton (b. 1858), succeeded his mother as 24th holder of the barony.

GREYMOUTH, a seaport of New Zealand, the principal port on the west

coast of South Island, in Grey county. Pop. (1906) 4569. It stands on the small estuary of the Grey or Mawhera river, has a good harbour, and railway communication with Hokitika, Reefton, &c, while the construction of a line to connect with Christchurch and Nelson was begun in 1.887. The district is both auriferous and coal-bearing. Gold-dredging is a rich industry, and the coal-mines have attendant industries in coke,' bricks and fire-clay. The timber trade is also well developed. ' The neighbouring scenery is picturesque, especially among the hills surrounding Lake Brunner (15 m. S.E.).

GREYTOWN (San Juan del Norte), the principal seaport on the Caribbean coast of Nicaragua, in the extreme south-eastern corner of the republic, and at the mouth of the northern channel of the San Juan river delta. Pop. (1905) about 2500. The town

occupies the seaward side of a narrow peninsula, formed by the windings of the river. Most of its houses are raised on piles 2 or 3 ft. above the ground. The neighbourhood is unhealthy and unsuited for agriculture, so that almost all food-stuffs must be imported, and the cost of living is high. Greytown has suffered severely from the accumulation of sand in its once fine harbour. Between 1832 and 1848 Point Arenas, the seaward end of the peninsula, was enlarged by a sandbank more than 1 m. long; between 1850 and 1875 the depth of water over the bar decreased from about 25 ft. to 5 ft., and the entrance channel, which had been nearly Jm. wide, was almost closed. Subsequent attempts to improve the harbour by dredging and building jetties have only had partial success; but Greytown remains the headquarters of Nicaraguan commerce with Europe and eastern America. The village called America, 1 m. N., was built as the eastern terminus of a proposed interoceanic canal. The harbour of San Juan, discovered by Columbus, was brought into further notice by Captain Diego Machuca, who in 1529 sailed down the river from Lake Nicaragua. The date of the first Spanish settlement on the spot is not known, but in the 17th century there were fortifications at the mouth of the river. In 1796 San Juan was made a port of entry by royal charter, and new defences were erected in 182 1. In virtue of the pro- tectorate claimed by Great Britain over the Mosquito Coast (q.v.), the Mosquito Indians, aided by a British force, seized the town in 1848 and occupied it until i860, when Great Britain ceded its protectorate to Nicaragua by the treaty of Managua. This treaty secured religious liberty and trial by jury for all civil and criminal charges in Greytown; its seventh article declared the port free, but was never enforced.

GREYWACKE, or Grauwacke (a German word signifying a grey earthy rock), the designation, formerly more generally used by English geologists than at the present day, for impure, highly composite, gritty rocks belonging to the Palaeozoic systems. They correspond to the sandstones, grits and fine

conglomerates of the later periods. Greywackes are mostly grey, brown, yellow or black, dull-coloured, sandy rocks which may occur in thick or thin beds along with slates, limestones, &c, and are abundant in Wales, the south of Scotland and the Lake district of England. They contain a very great variety of minerals, of which the principal are quartz, orthoclase and plagioclase, calcite, iron oxides and graphitic carbonaceous matters, together with (in the coarser kinds) fragments of such rocks as felsite, chert, slate, gneiss, various schists, quartzite. Among other minerals found in them are biotite and chlorite, tourmaline, epidote, apatite, garnet, hornblende and augite, sphene, pyrites. The cementing material may be siliceous or argillaceous, and is sometimes calcareous. As a rule greywackes are not fossiliferous, but organic remains may be common in the finer beds associated with them. Their component particles are usually not much rounded by attrition, and the rocks have often been considerably indurated by pressure and mineral changes, such as the introduction of interstitial silica. In some districts the greywackes are cleaved, but they show phenomena of this kind much less perfectly than the slates. Although the group is so diverse that it is difficult to characterize minera- logically, it has a well-established place in petrographical classifications, because these peculiar composite arenaceous deposits are very frequent among Silurian and Cambrian rocks, and rarely occur in Secondary or Tertiary systems. Their essential features are their gritty character and their complex composition. By increasing metamorphism greywackes fre- quently pass into mica-schists, chloritic schists and sedimentary gneisses. (J. S. F.)

GRIBEAUVAL, JEAN BAPTISTE DE (1715-1789), French artillery general, was the son of a magistrate of Amiens and was born there on the 15th of September 1715- He entered the French royal artillery in 1732 as a volunteer, and became an officer in 1735. For nearly twenty years regimental duty and scientific work occupied him, and in 1752 he became captain of a company of miners. A few years later he was employed in a military mission in Prussia. In 1757, being then a lieutenant'

colonel, he was lent to the Austrian army on the outbreak of the Seven Years' War, and served as a general officer of artillery. The siege of Glatz and the defence of Schweidnitz were his principal exploits. The empress Maria Theresa rewarded him for his work with the rank of lieutenant field-marshal and the cross of the Maria Theresa order. On his return to France he was made marechal de camp, in 1764 inspector of artillery, and in 1765 lieutenant-general and commander of the order of St Louis. For some years after this he was in disfavour at court, and he became first inspector

of artillery only in 1776, in which year also he received the grand cross of the St Louis order. He was now able to carry out the reforms in the artillery arm which are his chief title to fame. See Artillery; and for full details Gribeauval's own Table des constructions des principaux attiratts de V artillerie . . .deM.de Gribeauval, and the reglement for the French artillery issued in 1776. He died in 1789.

See Puysegur in Journal de Paris, supplement of the 8th of July 1789 ; Chevalier de Passac, Precis sur M. de Gribeauval (Paris, 1816) ; Veyrines, Gribeauval (Paris, 1889), and Henn6bert, Gribeauval, lieutenant-general des armies du roy (Paris, 1896).

GRIBOYEDOV, ALEXANDER SERGUEEVICH (1 795-1829), Russian dramatic author, was born in 1795 at Moscow, where he studied at the university from i8ioto 1812. He then obtained a commission in a hussar regiment, but resigned it in 1816. Next year he entered the civil service, and in 1818 was appointed secretary of the Russian legation in Persia, whence he was transferred to Georgia. He had commenced writing early, and had produced on the stage at St Petersburg in 18 16 a comedy in verse, translated from the French, called The Young Spouses, which was followed by other pieces of the same kind. But neither these nor the essays and verses which he wrote would have been long remembered but for the immense success gained by his comedy in verse, Gore ot uma, or " Misfortune from Intelligence " (Eng. trans, by N. Benardaky, 1857). A satire upon Russian society, or, as a high official styled it, "A pasquin- ade on Moscow," its plot is slight, its merits consisting in its accurate representation of certain social and official types — ■ such as Famousoff, the lover of old abuses, the hater of reforms; his secretary, Molchanin, servile fawner upon all in office; the aristocratic young liberal and Anglomaniac, Repetiloff; con- trasted with whom is the hero of the piece, Tchatsky, the ironical satirist, just returned from the west of Europe, who exposes and ridicules the weaknesses of the rest, his words echoing that outcry of the young generation of 1820 which reached its climax in the military insurrection of 1825, and was then sternly silenced by Nicholas. Griboyedov spent the summer of 1823 in Russia, completed his play and took it to St Petersburg. There it was rejected by the censorship. Many copies were made and privately circulated, but Griboyedov never saw it published. The first edition was printed in 1833, four years after his death. Only once did he see it on the stage, when it was acted by the officers of t he garrison at Erivan. Soured by disappointment he returned to Georgia, made himself useful by his linguistic knowledge to his relative Count Paskievitch-Erivansky during a campaign against Persia, and was sent to St Petersburg with the treaty of 1828. Brilliantly received there, he thought of devoting himself to literature, and commenced a romantic drama, A Georgian Night. But he was suddenly sent to Persia as minister-

plenipotentiary. Soon after his arrival at Teheran a tumult arose, caused by the anger of the populace against some Georgian and Armenian captives — Russian subjects — who had taken refuge in the Russian embassy. It was stormed, Griboyedov was killed (February n, 1829), and his body was for three days so ill-treated by the mob that it was at last recognized only by an old scar on the hand, due to a wound received in a duel. It was taken to Tiflis, and buried in the monastery of St David. There . a momument was erected to his memory by his widow, to whom he had been but a few months married.

GRIEG, EDVARD HAGERUP (1843-19.07), Norwegian musical composer, was born on the 15th of June 1843 in Bergen, where his father, Alexander Grieg (sic), was English consul. The Grieg family were of Scottish origin, but the composer's grandfather,

a supporter of the Pretender, left his home at Aberdeen after Charles Edward's defeat at Culloden, and went to Bergen, where he carried on business. The composer's mother, Gesine Hagerup, belonged to a pure Norwegian peasant family; and it is from the mother rather than from the father that Edvard Grieg derived his musical talent. She had been educated as a pianist and began to give her son lessons on the pianoforte when he was six years of age. His first composition, " Variations on a German melody," was written at the age of nine. A summer holiday in Norway with his father in 1858 seems to have exercised a powerful influence on the child's musical imagination, which was easily kindled at the sight of mountain and fjord. In the autumn of the same year, at the recommendation of Ole Bull, young Grieg entered the Leipzig Conservatorium, where he passed, like all his contemporaries, under the influence of the Mendelssohn and Schumann school of romantics. But the curriculum of academic study was too narrow for him. He dreamed half his time away and overworked during the other half. In 1862 he completed his Leipzig studies, and appeared as pianist and composer before his fellow-citizens of Bergen. In 1863 he studied in Copenhagen for a short time with Gade and Emil Hartmann, both composers representing a sentimental strain of Scandinavian temperament, from which Grieg emancipated himself in favour of the harder inspiration of Richard Nordraak. " The scales fell from my eyes," says Grieg of his acquaintance with Nordraak. " For the first time I learned through him to know the northern folk tunes' and my own nature. We made a pact to combat the effeminate Gade-Mendelssohn mixture of Scandinavism, and boldly entered upon the new path along which the northern school at present pursues its course." Grieg now made a kind of crusade in favour of national music. In the winter of 1864- 1865 he founded the Copenhagen concert-society Euterpe, which was intended to produce the works of young Norwegian composers. During the winters of 1865-1866 and 1869-1870 Grieg was in Rome. In the

autumn of 1866 he settled in Christiania, where from 1867 till 1880 he conducted a musical union. From 1880 to 1882 he directed the concerts of the Harmonic Society in Bergen. In 1872 the Royal Musical Academy of Sweden made Grieg a member; in 1874 the Norwegian Storthing granted him an annual stipend of 1600 kronen. He had already been decorated with the Olaf order in 1873. In 1888 he played his pianoforte concerto and conducted his " two melodies for strings " at a Philharmonic concert in London, and visited England again in 1891, 1894 and 1896, receiving the degree of Mus.D. from the university of Cambridge in 1894. He died at Bergen on the 4th of September 1907.

As a composer Grieg's distinguishing quality is lyrical. Whether his orchestral works or his songs or his best pianoforte works are submitted to examination, it is almost always the note of song that tells. Sometimes, as in the music to Ibsen's Peer Gynt, or in the suite for stringed orchestra, Aus Holbergs Zeit, this characteristic is combined with a strong power for raising pictures in the listener's mind, and the romantic " programme " tendency in Grieg's music becomes clearer the farther writers like Richard Strauss carry this movement. Grieg's songs may be said to be generally the more spontaneous the more closely they conform to the simple model of the Volkslied; yet the much sung " Ich Hebe dich " is a song of a different kind, which has hardly ever been surpassed for the perfection with which it depicts a strong momentary emotion, and it is difficult to ascribe greater merits to songs of Grieg even so characteristic as " Sol- vejg's Lied " and " Ein Schwan." The pianoforte concerto is brilliant and spontaneous; it has been performed by most pianists of the first rank, but its essential qualities and the pure nationality of its themes have been brought out to their perfec- tion by one player only — the Norwegian pianist Knudsen. The first and second of Grieg's violin sonatas are agreeable, so free and artless is the flow of their melody. In his numerous piano pieces and in those of his songs which are devoid of a definitely national inspiration the impression made is less permanent. Bülow called Grieg the " Chopin of the North." The phrase is an exaggeration rather than an expression of the truth, for

the range of the appeal in Chopin is far wider, nor has the national movement inaugurated by Grieg shown promise of great develop- ment. He is rather to be regarded as the pioneer of a musical mission which has been perfectly carried out by himself alone. See La Mara, Edvard Grieg (Leipzig, 1898). GRIESBACH, JOHANN JAKOB (1745-1812), German biblical critic, was born at Butzbach, a small town of Hesse-Darmstadt, where his father, Konrad Kaspar (1705-1777), was pastor, on the 4th of January

1745. He was educated at Frankfort-on-the- Main, and at the universities of Tubingen, Leipzig and Halle, where he became one of J. S. Semler's most ardent disciples. It was Semler who induced him to turn his attention to the textual criticism of the New Testament. At the close of his undergraduate career he undertook a literary tour through Germany, Holland, France and England. On his return to Halle, he acted for some time as Privatdozent, but in 1773 was appointed to a professorial chair; in 1775 he was translated to Jena, where the rest of his life was spent (though he received calls to other universities). He died on the 24th of March 1812. Griesbach's fame rests upon his work in New Testament criticism, in which he inaugurated a new epoch.

His critical edition of the New Testament first appeared at Halle, in three volumes, in 1 774-1 775. The first volume contained the first three Gospels, synoptically arranged; the second, the Epistles and the book of Revelation. All the historical books were reprinted in one volume in 1777, the synoptical arrangement of the Gospels having been abandoned as inconvenient. Of the second edition, considerably enlarged and improved, the first volume appeared in 1796 and the second in 1806 (Halle and London). Of a third edition, edited by David Schulz, only the first volume, containing the four Gospels, appeared (1827).

For the construction of his critical text Griesbach took as his basis the Elzevir edition. Where he differed from it he placed the Elzevir reading on the inner margin along with other readings he thought worthy of special consideration (these last, however, being printed in smaller type). To all the readings on this margin he attached special marks indicating the precise degree of probability in his opinion attaching to each. In weighing these probabilities he pro- ceeded upon a particular theory which in its leading features he had derived from J. A. Bengel and J. S. Semler, dividing all the MSS. into three main groups — the Alexandrian, the Western and the Byzantine (see Bible: New Testament, " Textual Criticism "). A reading supported by only one recension he considered as having only one witness in its favour; those readings which were supported by all the three recensions, or even by two of them, especially if these two were the Alexandrian and the Western, he unhesitatingly accepted as genuine. Only when each of the three recensions gives a different reading does he proceed to discuss the question on other grounds. See his Symbolae criticae ad supplendas et corrigendas variarum N.T. lectionum collectiones (Halle, 1785, 1793), and his Commentarius criticus in textum Graecum N.T., which extends to the end of Mark, and discusses the more important various readings with great care and thoroughness (Jena, 1794 ff.). Among the other works of Griesbach (which are comparatively unimportant) may be mentioned his university thesis De codicibus quatuor evangelistarum Origenianis (Halle, 1 771) and a work upon systematic theology

(Anleitung zur Kenntniss der popularen Dogmalik, Jena, 1779). His Opuscula, consisting chiefly of university "Programs" and addresses, were edited by Gabler (2 vols., Jena, 1824).

See the article in flerzog-Hauck, Realencyklopddie, and the Allgemeine deutsche Biographie.

GRIESBACH, a watering-place in the grand duchy of Baden, in the valley of the Rench, 1550 ft. above the sea, 6 m. W. from Freudenstadt in Wurttemberg. It is celebrated for its saline chalybeate waters (twelve springs), which are specific in cases of anaemia, feminine disorders and diseases of the nervous system, and were used in the 16th century. The annual number of visitors is nearly 2000. Pop. (1900) 800. From 1665 to 1805 Griesbach was part of the bishopric of Strassburg.

See Haberer, Die Renchbdder Petersthal und Griesbach (Wurzburgr,

1866). '

GRIFFE (French for "claw"), an architectural term for the spur, an ornament carved at the angle of the square base of columns.

, GRIFFENFELDT, PEDER, Count (Peder Schumacher) (1635- 1699), Danish statesman, was born at Copenhagen on the 24th of August 1635, of a wealthy trading family connected with the leading civic, clerical and learned circles in the Danish capital. His tutor, Jens Vorde, who prepared him in his eleventh year for the university, praises his extraordinary gifts, his mastery

of the classical languages and his almost disquieting diligence. The brilliant way in which he sustained his preliminary examina- tion won him the friendship of the examiner, Bishop Jasper Brokman, at whose palace he first met Frederick III. The king was struck with the lad's bright grey eyes and pleasant humorous face; and Brokman, proud of his pupil, made him translate a chapter from a Hebrew Bible first into Latin and then into Danish, for the entertainment of the scholarly monarch. In 1654 young Schumacher went abroad for eight years, to complete his education. From Germany he proceeded to the Netherlands, staying at Leiden, Utrecht and Amsterdam, and passing in 1657 to Queen's College, Oxford, where he lived three years. The epoch-making events which occurred in England, while he was at Oxford profoundly interested him, and coinciding with the Revolution in Denmark, which threw open a career to the middle classes, convinced him that his proper sphere was politics. In the autumn of 1660 Schumacher visited Paris, shortly after Mazarin's death, when the young Louis XIV. first seized the reins of power. Schumacher seems to have been

profoundly impressed by the administrative superiority of a strong centralised monarchy in the hands of an energetic monarch who knew his own mind; and, in politics, as in manners, France ever afterwards was his model. The last year of his travels was spent in Spain, where he obtained a thorough knowledge of the Castilian language and literature. His travels, however, if they enriched his mind, relaxed his character, and he brought home easy morals as well as exquisite manners.

On his return to Copenhagen, in 1662, Schumacher found the monarchy established on the ruins of the aristocracy, and eager to buy the services of every man of the middle classes who had superior talents to offer. Determined to make his way in this " new Promised Land," the young adventurer contrived to secure the protection of Kristoffer Gabel, the king's confidant, and in 1663 was appointed the royal librarian. A romantic friendship with the king's bastard, Count Ulric Frederick Gyldenlove, consolidated his position. In 1665 Schumacher obtained his first political post as the king's secretary, and the same year composed the memorable Kongelov (see Denmark, History). He was now a personage at court, where he won all hearts by his amiability and gaiety; and in political matters also his influence was beginning to be felt.

On the death of Frederick III. (February 9th, 1670) Schumacher was the most trusted of all the royal counsellors. He alone was aware of the existence of the new throne of walrus ivory embellished with three silver life-sizelions, and of the new regalia, both of which treasures he had, by the king's command, concealed in a vault beneath the royal castle. Frederick III. had also confided to him a sealed packet containing the Kongelov, which was to be delivered to his successor alone. Schumacher had been recommended to his son by Frederick III. on his death- bed. " Make him a great man, but do it slowly !" said Frederick, who thoroughly understood the characters of his son and of his minister. Christian V. was, moreover, deeply impressed by the confidence which his father had ever shown to Schumacher. When, on the 9th of February 1670, Schumacher delivered the Kongelov to Christian V., the king bade all those about him withdraw, and after being closeted a good hour with Schumacher, appointed him his " Obergeheimesekreter." His promotion was now almost disquietingly rapid. In May 1670 he received the titles of excellency and privy councillor; in July of the same year he was ennobled under the name of Griffenfeldt, deriving his title from the gold griffin with outspread wings which surmounted his escutcheon; in November 1673 he was created a count, a knight of the Elephant and, finally, imperial chancellor. . In the course of the next few months he gathered into his hands every branch of the government: he had reached the apogee of his short-lived greatness.

But if his offices were manifold, so also were his talents. Seldom has any

man united so many and such various gifts in his own person and carried them so easily — a playful wit, a vivid imagination, oratorical and literary eloquence and, above all, a profound knowledge of human nature both male and female,

of every class and rank, from the king to the meanest citizen. He had captivated the accomplished Frederick III. by his literary graces and ingenious speculations; he won the obtuse and ignorant Christian V. by saving him trouble, by acting and thinking for him, and at the same time making him believe that he was thinking and acting for himself. Moreover, his commanding qualities were coupled with an organizing talent which made itself felt in every department of the state, and with a marvellous adaptability which made him an ideal diplomatist.

On the 25th of May 167 1 the dignities of count and baron were introduced into Denmark " to give lustre to the court "; a few months later the order of the Danebrog was instituted as a fresh means of winning adherents by marks of favour. Griffen- feldt was the originator of these new institutions. To him monarchy was the ideal form of government. But he had also a political object. The aristocracy of birth, despite its reverses, still remained the elite of society, and GriSenfeldt, the son of a burgess as well as the protagonist of monarchy, was its most determined enemy. The new baronies and countships, owing their existence entirely to the crown, introduced a strong solvent into aristocratic circles. Griffenfeldt saw that, in future, the first at court would be the first everywhere. Much was also done to promote trade and industry, notably by the revival of the Kammer Kollegium, or board of trade, and the abolition of some of the most harmful monopolies. Both the higher and the provincial administrations were thoroughly reformed with the view of making them more centralized and efficient; and the positions and duties of the various magistrates, who now also received fixed salaries, were for the first time exactly defined. But what Griffenfeldt could create, Griffenfeldt could dispense with, and it was not long before he began to encroach upon the jurisdiction of the new departments of state by private con- ferences with their chiefs. Nevertheless it is indisputable that, under the single direction of this master-mind, the Danish state was now able, for a time, to utilize all its resources as it had never done before.

In the last three years of his administration, Griffenfeldt gave himself entirely to the conduct of the foreign policy of Denmark. It is difficult to form a clear idea of this, first, because his influence was perpetually

traversed by opposite tendencies; in the second place, because the force of circumstances compelled him, again and again, to shift his standpoint; and finally because personal considerations largely intermingled with his foreign policy, and made it more elusive and ambiguous than it need have been. Briefly, Griffenfeldt aimed at restoring Denmark to the rank of a great power. He proposed to accomplish this by carefully nursing her resources, and in the meantime securing and enriching her by alliances, which would bring in large sub- sidies while imposing a minimum of obligations. Such a con- ditional and tentative policy, on the part of a second-rate power, in a period of universal tension and turmoil, was most difficult; but Griffenfeldt did not regard it as impossible. The first postulate of such a policy was peace, especially peace with Denmark's most dangerous neighbour, Sweden. The second postulate was a sound financial basis, which he expected the wealth of France to supply in the shape of subsidies to be spent on armaments. Above all things Denmark was to beware of making enemies of France and Sweden at the same time. An alliance, on fairly equal terms, between the three powers, would, in these circumstances, be the consummation of Griffenfeldt's " system "; an alliance with France to the exclusion of Sweden would be the next best policy; but an alliance between France and Sweden, without the admission of Denmark, was to be, avoided at all hazards. Had Griffenfeldt's policy succeeded, Denmark might have recovered her ancient possessions to the south and east comparatively cheaply. But again and again he was overruled. Despite his open protests and subterraneous counter-mining, war was actually declared against Sweden in 167 s, and his subsequent policy seemed so obscure and hazardous to those who did not possess the clue to the perhaps purposely tangled skein, that the numerous enemies whom his arrogance

and superciliousness had raised up against him, resolved to destroy him.

On the nth of March 1676, while on his way to the royal apartments, Griffenfeldt was arrested in the king's name and conducted to the citadel, a prisoner of state. A minute scrutiny of his papers, lasting nearly six weeks, revealed nothing treason- able; but it provided the enemies of the fallen statesman with a deadly weapon against him in the shape of an entry in his private diary, in which he had imprudently noted that on one occasion Christian V. in a conversation with a foreign ambassador had " spoken like a child." On the 3rd of May Griffenfeldt was tried not by the usual tribunal, in such cases the Hdjesteret, or supreme court, but by an extraordinary tribunal of 10 dignitaries, none of whom was particularly well disposed towards the accused. Griffenfeldt, who was charged with simony, bribery, oath-breaking, malversation and lese-majeste, conducted his own defence under every imaginable difficulty. For forty-six days before his trial he had been closely confined in a dungeon without lights, books or writing materials. Every legal assistance was illegally denied him.

Nevertheless he proved more than a match for the forensic ability arrayed against him, and his first plea in defence is in a high degree dignified and manly. Finally, he was con- demned to degradation and decapitation; though one of the ten judges not only refused to sign the sentence, but remonstrated in private with the king against its injustice. And indeed its injustice was flagrant. The primary offence of the ex-chancellor was the taking of bribes, which no twisting of the law could convert into a capital offence, while the charge of treason had not been substantiated. Griffenfeldt was pardoned on the scaffold, at the very moment when the axe was about to descend. On hearing that the sentence was commuted to life-long imprison- ment, he declared that the pardon was harder than the punish- ment, and vainly petitioned for leave to serve his king for the rest of his life as a common soldier. For the next two and twenty years Denmark's greatest statesman lingered out his life in a lonely state-prison, first in the fortress of Copenhagen, and finally at Munkholm on Trondhjem fiord. He died at Trondhjem on the 12th of March 1699. Griffenfeldt married Kitty Nansen, the granddaughter of the great Burgomaster Hans Nansen, who brought him half a million rix-dollars. She died in 1672, after bearing him a daughter.

See Danmark's Riges Histoire, vol. v. (Copenhagen, 1897-1905); Jorgenson, Peter Schumacher-Griff enfeldt (Copenhagen, 1893-1894); O. Vaupell, Rigskansler Grev Griffenfeldt (Copenhagen, 1880-1882); Bain, Scandinavia, cap. x. (Cambridge, 1905). (R. N. B.)

GRIFFIN [O'Griobta, O'Greeva], GERALD (1803-1840), Irish novelist and dramatic writer, was born at Limerick of good family, on the 1 2 th of December 1803. His parents emigrated in 1820 to America, but he was left with an elder brother, who was a medical practitioner at Adare. As early as his eighteenth year he undertook for a short time the editorship of a newspaper in Limerick. Having written a tragedy, A guire, which was highly praised by his friends, he set out in 1823 for London with the purpose of " revolutionizing the dramatic taste of the time by writing for the stage." In spite of the recommendations of John Banim, he had a hard struggle with poverty. It was only by degrees that his literary work obtained any favour. The Noyades, an opera entirely in recitative, was produced at the English Opera House in 1826; and the success of Holland Tide Tales (1827) led to Tales of the Munster Festivals (3 vols., 1827), which were still more popular. In 1829 appeared his fine novel, The Collegians, afterwards successfully adapted for the stage by Dion Boucicault under the title of The Colleen Bawn. He followed up this success with The Invasion (1832), Tales of my Neighbourhood (1835), The Duke of Monmouth (1836), and Talis Qualis, or Tales of the Jury-room (1842). He also wrote a number of lyrics touched with his native melancholy. But he became doubtful as to the moral influence of his writings, and ultimately he came

to the conclusion that his true sphere of duty was to be found within the Church. He was admitted into a society of the Christian Brothers at Dublin, in September 1838, under the name of Brother Joseph, and in the following summer

he removed to Cork, where he died of typhus fever on the 12th of June 1840. Before adopting the monastic habit he burned all his manuscripts; but Gisippus, a tragedy which he had composed before he was twenty, accidentally escaped destruction, and in 1842 was put on the Drury Lane stage by Macready with great success.

The collected works of Gerald Griffin were published in 1842- 1843 in eight volumes, with a Life by his brother William Griffin, M.D.; an edition of his Poetical and Dramatic Works (Dublin, 1895) by C. G. Duffy ; and a selection of his lyrics, with a notice by George Sigerson, is included in the Treasury of Irish Poetry, edited by Stopford A. Brooke and T. W. Rolleston (London, 1900).

GRIFFIN, a city and the county-seat of Spalding county, Georgia, U.S.A., 43 m. S. of Atlanta, and about g7o ft. above the sea. Pop. (1890) 4503; (1900) 6857 (3258 negroes); (1910) 7478. It is served by the Southern and the Central of Georgia railways, and is the southern terminus of the Griffin & Chat- tanooga Division of the latter. The city is situated in a rich agricultural region, and just outside the corporate limits is an agricultural experiment station, established by the state but maintained by the Federal government. Griffin has a large trade in cotton and fruit. The principal industry is the manu- facture of cotton and cotton-seed oil. Buggies, wagons, chairs and harness are among the other manufactures. The munici- pality owns and operates the water and electric-lighting systems. Griffin was founded in 1840 and was chartered as a city in 1846.
GRIFFIN, Griffon or Gryphon (from Fr. griffon, Lat. gryphus, Gr. ypv\p), in the natural history of the ancients, the name of an imaginary rapacious creature of the eagle species, represented with four legs, wings and a beak, — the fore part resembling an eagle and the hinder a lion. In addition, some writers describe the tail as a serpent. This animal, which was supposed to watch over gold mines and hidden treasures, and to be the enemy of the horse, was consecrated to the Sun; and the ancient painters represented the chariot of the Sun as drawn by griffins. According to Spanheim, those of Jupiter and Nemesis were similarly provided. The griffin of Scripture is probably the osprey, and the name is now given to a species of vulture. The griffin was said to inhabit Asiatic Scythia, where

gold and precious stones were abundant; and when strangers approached to gather these the creatures leapt upon them and tore them in pieces, thus chastising human avarice and greed. The one-eyed Arimaspi waged constant war with them, according to Herodotus (iii. 16). Sir John de Mandeville, in his Travels, described a griffin as eight times larger than a lion.

The griffin is frequently seen as a charge in heraldry (see Heraldry, fig. 163); and in architectural decoration is usually represented as a four-footed beast with wings and the head of a leopard or tiger with horns, or with the head and beak of an eagle; in the latter case, but very rarely, with two legs. To what extent it owes its origin to Persian sculpture is not known, the capitals at Persepolis have sometimes leopard or lion heads with horns, and four-footed beasts with the beaks of eagles are represented in bas-reliefs. In the temple of Apollo Branchidae near Miletus in Asia Minor, the winged griffin of the capitals has leopards' heads with horns. In the capitals of the so-called lesser propylaea at Eleusis conventional eagles with two feet support trie angles of the abacus. The greater number of those in Rome have eagles' beaks, as in the frieze of the temple of Antoninus and Faustina, and their tails develop into conventional foliage. A similar device was found in the Forum of Trajan. The best decorative employment of the griffin is found in the vertical supports of tables, of which there are two or three examples in Pompeii and others in the Vatican and the museums in Rome. In some of these cases the head is that of a lion at one end of the support and an eagle at the" .other end, and there is only one strongly developed paw; the wings circling round at the top form conspicuous features on the sides of these supports, the surfaces below being filled with conventional Greek foliage.

GRIFFITH, SIR RICHARD JOHN (1784-1878), Irish geologist, was born in Dublin on the 20th of September 1 784. He obtained in 1799 a commission in the Royal Irish Artillery, but a year

later, when the corps was incorporated with that of England, he retired, and devoted his attention to civil engineering and mining. He studied chemistry, mineralogy and mining for two years in London under William Nicholson (editor of the Journal of Nat. Phil.), and afterwards examined the mining districts in various parts of England, Wales and Scotland. While in Cornwall he discovered ores of nickel and cobalt in material that had been rejected as worthless. He completed his studies under Robert Jameson and others at Edinburgh, was elected a Fellow of the Royal Society of Edinburgh in 1807, a member of the newly established Geological Society of London in 1808, and in the same year he returned to Ireland. In 1809 he was appointed by the commissioners to inquire into the nature and extent of the bogs in Ireland, and the means of improving them. In 1812 he

was elected professor of geology and mining engineer to the Royal Dublin Society. During subsequent years he made many surveys and issued many reports on mineral districts in Ireland, and these formed the foundation of his first geological map of the country (1815). In 1822 Griffith became engineer of public works in Cork, Kerry and Limerick, and was occupied until 1830 in repairing old roads and in laying out many miles of new roads. Meanwhile in 1825 he was appointed to carry out the perambulation or boundary survey of Ireland, the object of which was to ascertain and mark the boundaries of every county, barony, parish and townland in preparation for the ordnance survey. This work was finished in 1844, He was also called upon to assist in preparing a bill for the general valuation of Ireland; the act was passed in 1826, and he was appointed commissioner of valuation, in which capacity he continued to act until 1868. On " Griffith's valuation " the various local and public assess- ments were made. His extensive investigations furnished him with ample material for improving his geological map, and the second edition was published in 1835. A third edition on a larger scale (1 in. to 4 m.) was issued under the Board of Ordnance in 1839, and it was further revised in 1855. For this great work and his other services to science he was awarded the Wollaston medal by the Geological Society in 1854. In 1850 he was made chairman of the Irish Board of Works, and in 1858 he was created a baronet. He died in Dublin on the 22nd of September 1878.

Among his many geological works the following may be mentioned : Outline of the Geology of Ireland (1838) ; Notice respecting the Fossils of the Mountain Limestone of Ireland, as compared with those of Great Britain, and also with the Devonian System (1842) ; A Synopsis of the Characters of the Carboniferous Limestone Fossils of Ireland (1844) (with F. McCoy) ; A Synopsis of the Silurian Fossils of Ireland (1846) (with F. McCoy). See memoirs in Quart. Journ. Geol. Soc. xxxv. 39; and Geol. Mag., 1878, p. 524, with bibliography.

GRILLE, a French term for an enclosure in either iron or bronze; there is no equivalent in English, " grating " applying more to a horizontal frame of bars over a sunk area, and " grate " to the iron bars of an open fireplace. The finest examples of the grille are those known as the rejas, which in Spanish churches form the enclosures of the chapels, such as the reja in the Capilla Real at Granada in wrought iron partly gilt (1522). Similar grilles are employed to protect the ground-floor windows of mansions not only in Spain but in Italy and Germany. In England the most beautiful example is that in front of Queen Eleanor's tomb in Westminster Abbey, in wrought iron. The finest grilles in Italy are the enclosures of the tombs of the Delia Scalas at Verona (end of 13th century), in Germany the grille of the cenotaph of Maximilian at Innsbruck (early 16th century) and in France those which enclose the Place Stanislaus, the Place de la Carriere and the

churches of Nancy, which were wrought by Jean Lamour in the middle of the 18th century. Generally, however, throughout Germany the wrought iron grilles are fine examples of forging, and they are employed for the enclosures of the numerous fountains, in the tympana of gateways, and for the protection of windows. At Danzig in the Marienkirche are some fine examples in brass.

GRILLPARZER, FRANZ (1791-1872), the greatest dramatic poet of Austria, was born in Vienna, on the 15th of January 1 79 1. His father, severe, pedantic, a staunch upholder of the liberal traditions of the reign of Joseph II., was an advocate

of some standing; his mother, a nervous, finely-strung woman, belonged to the well-known musical family of Sonnleithner. After a desultory education, Grillparzer entered in 1807 the university of Vienna as a student of jurisprudence; but two years later his father died, leaving the family in straitened circumstances, and Franz, the eldest son, was obliged to turn to private tutoring. In 1813 he received an appointment in the court library, but as this was unpaid, he accepted after some months a clerkship that offered more solid prospects, in the Lower Austrian revenue administration. Through the influence of Graf Stadion, the minister of finance, he was in 1818 appointed poet to the Hofburgtheater, and promoted to the Hofkammer (exchequer); in 1832 he became director of the archives of that department, and in 1856 retired from the civil service with the title of Hofrat. Grillparzer had little capacity for an official career and regarded his office merely as a means of independence. In 1817 the first representation of his tragedy Die Ahnfrau made him famous, but before this he had written a long tragedy in iambics, Blanca von Cashlien (1807-1809), which was obviously modelled on Schiller's Don Carlos; and even more promising were the dramatic fragments Spartacus and Alfred der Grosse (1809). Die Ahnfrau is a gruesome " fate-tragedy " in the trochaic measure of the Spanish drama, already made popular by Adolf Mullner in his Schuld; but Grillparzer's work is a play of real poetic beauties, and reveals an instinct for dramatic as opposed to merely theatrical effect, which distinguishes it from other " fate-dramas " of the day. Unfortunately its success led to the poet's being classed for the best part of his life with playwrights like Milliner and Houwald. Die Ahnfrau was followed by Sappho (1818), a drama of a very different type; in the classic spirit of Goethe's Tasso, Grillparzer unrolled the tragedy of poetic genius, the renunciation of earthly happiness imposed upon the poet by his higher mission. In 1821 appeared Das goldene Vliess, a trilogy which had

been interrupted in 181 9 by the death of the poet's mother — in a fit of depression she had taken her own life — and a subsequent visit to Italy. Opening with a powerful dramatic prelude in one act, Der Gaslfreund, Grillparzer depicts in Die Argonauten Jason's adventures in his quest for the Fleece; while Medea, a tragedy of noble classic proportions, contains the culminating events of the story which had been so often dramatized before. The theme is similar to that of Sappho, but the scale on which it is represented is larger; it is again the tragedy of the heart's desire, the conflict of the simple happy life with that sinister power — be it genius, or ambition — which upsets the equilibrium of life. The end is bitter disillusionment, the only consolation renunciation. Medea, her revenge stilled, her children dead, bears the fatal Fleece back to Delphi, while Jason is left to realize the nothing- ness of human striving and earthly happiness.

For his historical tragedy Konig Ottokars Gliick und Ende (1823, but owing to difficulties with the censor, not performed until 1825), Grillparzer chose one of the most picturesque events in Austrian domestic history, the conflict of Ottokar of Bohemia with Rudolph von Habsburg. With an almost modern realism he reproduced the motley world of the old chronicler, at the same time not losing sight of the needs of the theatre; the fall of Ottokar is but another text from which the poet preached the futility of endeavour and the vanity of worldly greatness. A second historical tragedy, Ein treuer Diener seines Herrn (1826, performed 1828), attempts to embody a more heroic gospel; but the subject — the superhuman self- effacement of Bankbanus before Duke Otto of Meran — proved too uncompromising an illustration of Kant's categorical impera- tive of duty to be palatable in the theatre. With these historical tragedies began the darkest ten years in the poet's life. They brought him into conflict with the Austrian censor — a conflict which grated on Grillparzer's sensitive soul, and was aggravated by his own position as a servant of the state; in 1826 he paid a visit to Goethe in Weimar, and was able to compare the en- lightened conditions which prevailed in the little Saxon duchy with the intellectual thraldom of Vienna. To these troubles were added more serious personal worries. In the winter of

1820-1821 he had met for the first time Katharina Frohlich (1801-1879), and the acquaintance rapidly ripened into love on both sides; but whether owing to a presentiment of mutual incompatibility, or merely owing to Grillparzer's conviction that life had no happiness in store for him, he shrank from marriage. Whatever the cause may have been, the poet was plunged into an abyss of misery and despair to which his diary bears heart-rending witness; his sufferings found poetic expression in the fine cycle of poems bearing the significant title Tristia ex Ponto

(183s).

Yet to these years we owe the completion of two of Grillparzer's greatest dramas, Des Meeres und der Liebe Wellen (1831) and Der Traum, ein Leben (1834). In the former tragedy, a dramatization of the story of Hero and Leander, he returned to the Hellenic world of Sappho, and produced what is perhaps the finest of all German love-tragedies. His mastery of dramatic technique is here combined with a ripeness of poetic expression and with an insight into motive which suggests the modern psychological drama of Hebbel and Ibsen; the old Greek love-story of Musaeus is, moreover, endowed with something of that ineffable poetic grace which the poet had borrowed from the great Spanish poets, Lope de Vega and Calderon. Der Traum, ein Leben, Grillparzer's technical masterpiece, is in form perhaps even more Spanish; it is also more of what Goethe called a " confession." The aspirations of Rustan, an ambitious young peasant, are shadowed forth in the hero's dream, which takes up nearly three acts of the play; ultimately Rustan awakens from his nightmare to realize the truth of Grillparzer's own pessimistic doctrine that all earthly ambitions and aspirations are vanity; the only true happiness is contentment with one's lot, " des Innern stiller Frieden und die schuldbefreite Brust." Der Traum, ein Leben was the first of Grillparzer's dramas which did not end tragically, and in 1838 he produced his only comedy, Weh' dem, der lilgt. But Weh' dem, der lilgt, in spite of its humour of situation, its sparkling dialogue and the originality of its idea — namely, that the hero gains his end by invariably telling the truth, where his enemies as invariably expect him to be lying — was too strange to meet with approval in its day. Its failure was a blow to the poet, who turned his back for ever on the German theatre. In 1S36 Grillparzer paid a visit to Paris and London, in 1843 to Athens and Constantinople. Then came the Revolution which struck off the intellectual fetters under which Grillparzer and his contemporaries had groaned in Austria, but the liberation came too late for him. Honours were heaped upon him; he was made a member of the Academy of Sciences; Heinrich Laube, as director of the Burgtheater, reinstated his plays on the repertory; he was in 1861 elected to the Austrian Herrenhaus; his eightieth birthday was a national festival, and when he died in Vienna, on the 21st of January 1872, the mourning of the Austrian people was universal. With the exception of a beautiful fragment, Esther (1861), Grillparzer published no more dramatic poetry after the fiasco of Weh' dem, der lilgt, but at his death three completed tragedies were found among his papers. Of these, Die Jtidin von Toledo, an admirable adaptation from the Spanish, has won a permanent place in the German classical repertory; Ein Brnderzwist im Hause Habsburg is a powerful historical tragedy and Libussa is perhaps the ripest, as it is certainly the deepest, of all Grillparzer's dramas; the latter two plays prove how much was lost by the poet's divorce from the theatre.

Although Grillparzer was essentially a dramatist, his lyric poetry is in the

intensity of its personal note hardly inferior to Lenau's; and the bitterness of his later years found vent in biting and stinging epigrams that spared few of his greater con- temporaries. As a prose writer, he has left one powerful short story, Der arme Spielmann (1848), and a volume of critical studies on the Spanish drama, which shows how completely he had succeeded in identifying himself with the Spanish point of view.

Grillparzer's brooding, unbalanced temperament, his lack of will-power, his pessimistic renunciation and the bitterness which his self-imposed martyrdom produced in him, made him peculiarly adapted to express the mood of Austria in the epoch of intellectual

thraldom that lay between the Napoleonic wars and the Revolu- tion of 1848; his poetry reflects exactly the spirit of his people under the Metternich regime, and there is a deep truth behind the description of Der Traum, ein Leben as the Austrian Faust. His fame was in accordance with the general tenor of his life; even in Austria a true understanding for his genius was late in coming, and not until the centenary of 1891 did the German- speaking world realize that it possessed in him a dramatic poet of the first rank; in other words, that Grillparzer was no mere " Epigone " of the classic period, but a poet who, by a rare assimilation of the strength of the Greeks, the imaginative depth of German classicism and the delicacy and grace of the Spaniards, had opened up new paths for the higher dramatic poetry of Europe.

Grillparzer's Sdmtliche Werke are edited by A. Sauer, in 20 vols., 5th edition (Stuttgart, 1892-1894); also, since the expiry of the copyright in 1901, innumerable cheap reprints. Briefe und Tage- biicher, edited by C. Glossy and A. Sauer (2 vols., Stuttgart, 1903). Jahrbuch der Grillparzer-Gesellschaft, edited by K. Glossy (the publica- tion of the Grillparzer Society) (Vienna, 1891 ff.). See also H. Laube, Franz Grillparzers Lebensgeschichte (Stuttgart, 1884); J. Volkelt, Franz Grillparzer als Dichter des Tragischen (Nordlingen, 1888); E. Reich, Franz Grillparzers Dramen (Dresden, 1894); A. Ehrhard, Franz Grillparzer (Paris, 1900) (German translation by M. Necker, Munich, 1902); H. Sittenberger, Grillparzer, sein Leben und Wirken (Berlin, 1904); Gustav Pollak, F. Grillparzer and the Austrian Drama (New York, 1907). Of Grillparzer's works, transla- tions have appeared in English of Sappho (1820, by J. Bramsen; 1846, by E. B. Lee; 1855, by L. C. Cumming; 1876, by E. Froth- ingham); and of Medea (1879, by F. W. Thurstan and J. A. Witt- mann). Byron's warm admiration of Sappho {Letters and Journals, v. 171) is well

known, while Carlyle's criticism, in his essay on German Playwrights (1829), is interesting as expressing the generally accepted estimate of Grillparzer in the first half of the 19th century. See the bibliography in K. Goedeke's Grundriss zur Geschichte der deutschen Dichtung, 2nd ed., vol. viii. (1905). (J. G. R.)

GRIMALD (or Grimoald), NICHOLAS (1519-1562), English poet, was born in Huntingdonshire, the son probably of Giovanni Baptista Grimaldi, who had been a clerk in the service of Empson and Dudley in the reign of Henry VII. He was educated at Christ's College, Cambridge, where he took his B.A. degree in 1540. He then removed to Oxford, becoming a probationer- fellow of Merton College in 1541. In 1547 he was lecturing on rhetoric at Christ Church, and shortly afterwards became chaplain to Bishop Ridley, who, when he was in prison, desired Grimald to translate Laurentius Valla's book against the alleged Donation of Constanline, and the De gestis Basiliensis Concilii of Aeneas Sylvius (Pius II.). His connexion with Ridley brought him under suspicion, and he was imprisoned in the Marshalsea. It is said that he escaped the penalties of heresy by recanting his errors, and was despised accordingly by his Protestant con- temporaries. Grimald contributed to the original edition (June 1557) of Songes and Sonettes (commonly known as Tottel's Miscellany), forty poems, only ten of which are retained in the second edition published in the next month. He translated (1553) Cicero's De officiis as Marcus Tullius Ciceroes thre bokes of duties (2nd ed., 1556); a Latin paraphrase of Virgil's Ceorgics (printed 1591) is attributed to him, but most of the works assigned to him by Bale are lost. Two Latin tragedies are extant; Archiprophela sive Johannes Baptista, printed at Cologne in 1548, probably performed at Oxford the year before, and Christus re- divivus (Cologne, 1 543) , edited by Prof. J. M. Hart (for the Modern Language Association of America, 1886, separately issued 1899). It cannot be determined whether Grimald was familiar with Buchanan's Baptistes (1543), or with J. Schoeppe's Johannes decollatus vel Ectrachelistes (1546). Grimald provides a purely romantic motive for the catastrophe in the .passionate attach- ment of Herodias to Herod, and constantly resorts to lyrical methods. As a poet Grimald is memorable as the earliest follower of Surrey in the production of blank verse. He writes ■ sometimes simply enough, as in the lines on his own childhood addressed to his mother, but in general his style is more artificial, and his metaphors more studied than is the case with the other contributors to the Miscellany. His classical reading shows itself in the comparative terseness and smartness of his verses. His epitaph was written by Barnabe Googe in May 1562.

See C. H. Herford, Studies in the Literary Relations of England and Germany (pp. 113-119, 1886). A Catalogue of printed books . . . by writers bearing the name of Grimaldi (ed. A. B. Grimaldi), printed 1883;

and Arber's reprint of Tottel's Miscellany.

GRIMALDI, GIOVANNI FRANCESCO (1606-1680), Italian architect and painter, named II Bolognese from the place of his birth, was a relative of the Caracci family, under whom it is presumed he studied first. He was afterwards a pupil of Albani. He went to Rome, and was appointed architect to Pope Paul V., and was also patronized by succeeding popes. Towards 1648 he was invited to France by Cardinal Mazarin, and for about two years was employed in buildings for that minister and for Louis XIV., and in fresco-painting in the Louvre. His colour was strong, somewhat excessive in the use of green; his touch light. He painted history, portraits and landscapes — the last with predilection, especially in his advanced years — and executed engravings and etchings from his own landscapes and from those of Titian and the Caracci. Returning to Rome, he was made president of the Academy of St Luke ; and in that city he died on the 28th of November 1680, in high repute not only for his artistic skill but for his upright and charitable deeds. His son Alessandro assisted him both in painting and in engraving. Paintings by Grimaldi are preserved in the Quirinal and Vatican palaces, and in the church of S. Martino a'Monti; there is also a series of his landscapes in the Colonna Gallery.

GRIMALDI, JOSEPH (1779-1837), the most celebrated of English clowns, was born in London on the 18th of December 1779, the son of an Italian actor. When less than two years old he was brought upon the stage at Drury Lane; at the age of three he began to appear at Sadler's Wells; and he did not finally retire until 1828. As the clown of pantomime he was considered without an equal, his greatest success being in Mother Goose, at Covent Garden (1806 and often revived). Grimaldi died on the 31st of May 1837.

His Memoirs in two volumes (1838) were edited by Charles Dickens.

GRIMKfi, SARAH MOORE (1792-1873) and ANGELINA EMILY (1805-1879), American reformers, born in Charleston, South Carolina — Sarah on the 6th of November 1792, and Angelina on the 20th of February 1805 — were daughters of John Fachereau Grimke (1752-1819), an artillery officer in the Continental army, a jurist of some distinction, a man of wealth and culture and a slave-holder.

Their older brother, Thomas Smith Grimke (1 786-1834), was born in Charleston; graduated at Yale in 1807; was a successful lawyer, and in 1826-1830 was a member of the state Senate, in which he, almost alone of the prominent lawyers of the state, opposed nullification; he strongly advocated spelling- reform, temperance and absolute non-resistance, and published Addresses on Science, Education and Literature (1831). His

early intellectual influence on Sarah was strong.

In her thirteenth year Sarah was godmother to her sister Angelina. Sarah in 182 1 revisited Philadelphia, whither she had accompanied her father on his last illness, and there, having been already dissatisfied with the Episcopal Church and with the Presbyterian, she became a Quaker; so, too, did Angelina, who joined her in 1829. Both sisters (Angelina first) soon grew into a belief in immediate abolition, strongly censured by many Quakers, who were even more shocked by a sympathetic letter dated " 8th Month, 30th, 1835 " written by Angelina to W. L. Garrison, followed in 1836 by her Appeal to the Christian Women of the South, and at the end of that year, by an Epistle to the Clergy of the Southern Stales, written by Sarah, who now thoroughly agreed with her younger sister. In the same year, at the invitation of Elizur Wright (1804-1885), corresponding secretary of the American Anti-Slavery Society, Angelina, accompanied by Sarah, began giving talks on slavery, first in private and then in public, so that in 1837, when they set to work in Massachusetts, they had to secure the use of large halls. Their speaking from public platforms resulted in a letter issued by some members of the General Association of Congregational Ministers of Massachusetts, calling on the clergy to close their

churches to women exhorters; Garrison denounced the attack °^u T ? nmk6 sisters an d Whittier ridiculed it in his poem The Pastoral Letter." Angelina pointedly answered Miss Beecher on the Slave Question (1837) in letters in the Liberator barah who had never forgotten that her studies had been curtailed because she was a girl, contributed to the Boston Spectator papers on " The Province of Woman " and published Letters on the Condition of Women and the Equality of the Sexes (1838)— the real begmning of the " woman's rights " movement in America, and at the time a cause of anxiety to Whittier and others, who urged upon the sisters the prior importance of the anti-slavery cause. In r8 3 8 Angelina married Theodore Dwight Weld (1803-1895), a reformer and abolition orator and pam- phleteer, who had taken part in the famous Lane Seminary debates in 1834, had left the Seminary for the lecture platform when the anti-slavery society was broken up by the Lane trustees but had lost his voice in 1836 and had become editor of the publications of the American Anti-Slavery Society 1 Thev lived with Sarah, at Fort Lee, New Jersey, in 1838-1840, then on a farm at Belleville, New Jersey, and then conducted a school for black and white alike at Eagleswood, near Perth Ambov New Jersey, from 1854 to 1864. Removing to Hyde Park! Massachusetts, the three were employed in Dr Lewis's school! There Sarah died on the 23rd of December 1873, and Angelina on .the 26th of October 1879. Both sisters indulged in various lads —Graham s diet, bloomer-wearing, absolute non-resist- ance. Angelina

did no public speaking after her marriage, save at Pennsylvania Hall (Philadelphia), destroyed by a mob immediately after her address there; but besides her domestic and school duties she was full of tender charity. Sarah at the age of 62 was still eager to study law or medicine, or to do some- thing to aid her sex; at 75 she translated and abridged Lamar- tine s life of Joan of Arc.

See Catherine H. Birney, The Grimke Sisters (Boston, 1885) GRIMM, FRIEDRICH MELCHIOR, Laron von (1723-1807) French author the son of a German pastor, was born at Ratisbon on the 26th of December 1723. He studied at the University of Leipzig, where he came under the influence of Gottsched and ot J. A. Lrnesti, to whom he was largely indebted for his critical appreciation of classical literature. When nineteen he produced a tragedy, Bamsc, which met with some success. After two years of study he returned to Ratisbon, where he was attached to the household of Count Schonberg. In 1 74 8 he accompanied August Heinnch, Count Friesen, to Paris as secretary, and he is said by Rousseau to have acted for some time as reader to Frederick the young hereditary prince of Saxe-Gotha. His acquaintance with Rousseau, through a mutual sympathy in regard to musical matters, soon ripened into intimate friendship, and led to a close assoc.at.on with the encyclopaedists. He rapidly obtained a thorough knowledge of the French language, and acquired so perfectly the tone and sentiments of the society in which he moved that all marks of his foreign origin and training seemed enaced. A witty pamphlet entitled Le Petit Prophete de Boeh- mischbroda (1753), written by him in defence of Italian as against French opera, established his literary reputation. It is possible that the origin of the pamphlet is partly to be accounted for by his vehement passion for Mile Fel, the prima donna of the Italian company. In 1 753 Grimm, following the example of the abbe Kaynal, began a literary correspondence with various German sovereigns. Raynal's letters, Nouvelles HttSraires, ceased*

Al U I7 JZ Wkh the aid of friends > especially of Diderot and Mined Epmay, during his temporary absences from France Grimm himself carried on the correspondence, which consisted of two letters a month, until 1773, and eventually counted among his subscribers Catherine II. of Russia, Stanislas Poniatowsk king ot Poland, and many princes of the smaller German States. " V >' e, d was the author of several anti-slavery books which hid considerable influence at the time. Among them are The Bible ajatnst Slavery (,837) American Slavery as It Is (1839) a collect on*

fenJTsˆSST papers – and Slaveryand ˆˆ"iZ

ust £ˆˆL£? {C ° nf —' 2nd Part ' 8th

It was probably m 1754 that Grimm was introduced by Rousseau to Madame d Epmay, with whom he soon formed a liaison which led to an irreconcilable rupture between him and Rousseau Rousseau was induced by his resentment to give in his Confessions a wholly mendacious portrait of Grimm's character, hm? after the death of Count Friesen, who was a nephew of Marshal Saxe and an officer m the French army, Grimm became secretaire des commandemenis to the duke of Orleans, and in this capacity he accompanied Marshal d'Estrees on the campaign of Westphalia m 1756-57. He was named envoy of the town of Frankfort at the court of France in 1759, but was deprived of his office for criticizing the comte de Broglie in a despatch intercepted by Louis XV He was made a baron of the Holy Roman Empire 2I ! ll 7 4\ i S mt ™ duction to Catherine II. of Russia took place at St Petersburg m 1773, when he was in the suite of Wilhelmine of Hesse-Darmstadt on the occasion of her marriage to the czarevitch Paul. He became minister of Saxe-Gotha at the court of France in 1776, but in 1777 he again left Paris on a visit to St Petersburg, where he remained for nearly a year in daily intercourse with Catherine. He acted as Paris agent for the empress m the purchase of works of art, and executed many confidential commissions for her. In 1783 and the following years he lost his two most intimate friends, Mme d'fipinay and D.derot. In I79 2 he emigrated, and in the next year settled in Gotha, where his poverty was relieved by Catherine, who in 1796 appointed him minister of Russia at Hamburg. On the death of the empress Catherine he took refuge with Mme dEpinays_ granddaughter, Emilie de Belsunce, comtesse de tfueil. Grimm had always interested himself in her, and had procured her dowry from the empress Catherine. She now received him with the utmost kindness. He died at Gotha on the 19th of December 1807.

The correspondence of Grimm was strictly confidential, and was not d.vulged during his lifetime. It embraces nearly the whole period from 1750 to 1790, but the later volumes, i 77 , to 1790, were chiefly the work of his secretary, Jakob Heinrich Master. At first he contented himself with enumerating the chief current views in literature and art and indicating very slightly the contents of the principal new books, but gradually his criticisms became more extended and trenchant, and he touched on nearly every subject-political, literary, artistic social and rehg.ous-which interested the Parisian society of

a u me -ˆ 1S D ,° tlCeS of cont emporaries are somewhat severe and he exh.bits the foibles and selfishness of the society in which he moved; but he was unbiassed in his literary judgments, and time has only served to confirm his criticisms. In style and manner of expression he is thoroughly French. He is generally somewhat cold in his appreciation, but his literary

taste is delicate and subtle; and it was the opinion of Sainte-Beuve that the quality of his thought in his best moments will compare not unfavourably even with that of Voltaire. His religious and philosophical opinions were entirely negative.

*Grimm' s'Correspondance litteraire, philosophique et critique *°P»" ˆSJjfWf'en 1760, was edited, with many excLfons, by J. a. A. buard and published at Paris in 1812, in 6 vols 8vo- deuxteme parhe, de 1771 A I? 8 2 , in 1812 in 5 vols. 8vo LdtroisiZe*

ˆil\ P tT Hied f S – an f™i775 eti776, et pendant lesannZt 1782 d 1790 tnclustvement, in 1813 in 5 vols. 8vo. A supplemental volume appeared in 1814; the whole correspondence was c™ teed and published by M Jules Taschereau, with the assistance of A Cha ude, in a Nouvelk Edition, revue et mise dans un meilleurordre ave'c des notes et des ecairctssements, et oil se trouvent retabliesPourla Preˆerefojs les phrases supprimees P ar la censure imp7rMe P °pLs, 1829, 15 yols. 8vo); and the Correspondance inedite, et recueil de

*ZZiateTˆTTrTri * W J*™ ** Pˆsute •Son is th//n1 M t 3 TOS Pˆˆed ln l82 9- The standard emtion is that of M. Tourneux (16 vols., 1877-1882). Grimm's Memoue historiqtie sur Vorigine et les suites de mon attJhementpZl*

lZ P S?tZl C ° thenne H J USqU ' ?l d6chs de sa ˆjestTTnTperfate, and Catherine s correspondence with Grimm (1774—1706) were pub- lished by J Grot m 1880, in the Collection of the Russian Imperial Historical Society. She treats him very familiarly, and caHs h im Herachte, Georges Dandin, &c. At the time of the Revolurion she" begged him to destroy her letters, but he refused, and after his death they were returned to St Petersburg. Grimm's side of the corre- spondence, however, ,s bnly partially preserved. He signs hiWlf

" Pleureur." Some of Grimm's letters, besides the official corre- spondence, are included in the edition of M. Tourneux; others are contained in the Erinnerungen einer Urgrossmutler of K. von Bechtols- heim, edited (Berlin, 1902) by Count C. Oberndorff. See also Mme d'Epinay's Memoires; Rousseau's Confessions; the notices con- tained in the editions quoted; E. Scherer, Melchior Grimm (1887); Sainte-Beuve, Causeries du lundi, vol. vii. For further works bearing on the subject, see K, A. Georges, Friedrich Melchior Grimm (Hanover and Leipzig, 1904).

GRIMM, JACOB LUDWIG CARL (1785-1863), German philologist and mythologist, was born on the 4th of January 1785 at Hanau, in Hesse-Cassel. His father, who was a lawyer, died while he was a child, and the mother was left with very small means; but her sister, who was lady of the chamber to the landgravine of Hesse, helped to support and educate her numerous family. Jacob, with his younger brother Wilhelm (born on the 24th of February 1786), was sent in 1798 to the public school at Cassel. In 1802 he proceeded to the university of Marburg, where he studied law, a profession for which he had been destined by his father. His brother joined him at Marburg a year later, having just recovered from a long and severe illness, and likewise began the study of law. Up to this time Jacob Grimm had been actuated only by a general thirst for knowledge and his energies had not found any aim beyond the practical one of making himself a position in life. The first definite impulse came from the lectures of Savigny, the celebrated investigator of Roman law, who, as Grimm himself says (in the preface to the Deutsche Gramma/ik), first taught him to realize what it meant to study any science. Savigny's lectures also awakened in him that love for historical and antiquarian investigation which forms the basis of all his work. Then followed personal acquaintance, and it was in Savigny's well-provided library that Grimm first turned over the leaves of Bodmer's edition of the Old German minnesingers and other early texts, and felt an eager desire to penetrate further into the obscurities and half-revealed mysteries of their language. In the beginning of 1805 he re- ceived an invitation from Savigny, who had removed to Paris, to help him in his literary work. Grimm passed a very happy time in Paris, strengthening his taste for the literatures of the middle ages by his studies in the Paris libraries. Towards the close of the year he returned to Cassel, where his mother and Wilhelm had settled, the latter having finished his studies. The next year he obtained a situation in the war office with the very small salary of 100 thalers. One of his grievances was that he had to exchange his stylish Paris suit for a stiff uniform and pigtail. But he had full leisure for the prosecution of his studies. In 1808, soon after the death of his mother, he was appointed superintendent of the private library of Jerome Buonaparte, king of Westphalia, into which Hesse-Cassel had been incorporated by Napoleon. Jerome appointed him an auditor to the state council, while he retained his other post. His salary was increased in a short interval from 2000 to 4000 francs, and his official duties were hardly more than nominal. After the expulsion of Jerome and the reinstalment of an elector, Grimm was appointed in 1813 secretary of legation, to accompany the Hessian minister to the headquarters of the allied army. In 1814 he was sent to Paris to demand restitution of the books carried off by the French, and in 1814-1815 he attended the congress of Vienna as secretary of legation. On his return he was again sent to Paris on the same errand as before. Meanwhile Wilhelm had received an

appointment in the Cassel library, and in 1 816 Jacob was made second librarian under Volkel. On the death of Volkel in 1828 the brothers expected to be advanced to the first and second librarianships respectively, and were much dissatisfied when the first place was given to Rommel, keeper of the archives. So they removed next year to Gottingen, where Jacob received the appointment of professor and librarian, Wilhelm that of under-librarian. Jacob Grimm lectured on legal antiquities, historical grammar, literary history, and diplomatics, explained Old German poems, and commented on the Germania of Tacitus. At this period he is described as small and lively in figure, with a harsh voice, speaking a broad Hessian dialect. His powerful memory enabled him to dispense with the

manuscript which most German professors rely on, and he spoke extempore, referring only occasionally to a few names and dates written on a slip of paper. He himself regretted that he had begun the work of teaching so late in life; and as a lecturer he was not successful: he had no idea of digesting his facts and suiting them to the comprehension of his hearers; and even the brilliant, terse and eloquent passages which abound in his writings lost much of their effect when jerked out in the midst of a long array of dry facts. In 1837, being one of the seven professors who signed a protest against the king of Hanover's abrogation of the con- stitution established some years before, he was dismissed from his professorship, and banished from the kingdom of Hanover. He returned to Cassel together with his brother, who had also signed the protest, and remained there till, in 1840, they accepted an invitation from the king of Prussia to remove to Berlin, where they both received professorships, and were elected members of the Academy of Sciences. Not being under any obligation to lecture, Jacob seldom did so, but together with his brother worked at the great dictionary. During their stay at Cassel Jacob regularly attended the meetings of the academy, where he read papers on the most varied subjects. The best known of these are those on Lachmann, Schiller, and his brother Wilhelm (who died in 1859), on old age, and on the origin of language. He also described his impressions of Italian and Scandinavian travel, interspersing his more general observations with linguistic details, as is the case in all his works.

Grimm died in 1863, working up to the last. He was never ill, and worked on all day, without haste and without pause. He was not at all impatient of interruption, but seemed rather to be refreshed by it, returning to his work without effort. He wrote for the press with great rapidity, and hardly ever made correc- tions. He never revised what he had written, remarking with a certain wonder of his brother, " Wilhelm reads his manuscripts over again before sending them to press ! " His temperament was uniformly cheerful, and he was easily amused. Outside his own special work he had a marked taste for botany. The spirit which animated his work is best

described by himself at the end of his autobiography. " Nearly all my labours have been devoted, either directly or indirectly, to the investigation of our earlier language, poetry and laws. These studies may have appeared to many, and may still appear, useless; to me they have always seemed a noble and earnest task, definitely and inseparably connected with our common fatherland, and cal- culated to foster the love of it. My principle has always been in these investigations to under- value nothing, but to utilize the small for the illustration of the great, the popular tradition for the elucidation of the written monuments."

The purely scientific side of Grimm's character developed slowly. He seems to have felt the want of definite principles of etymology without being able to discover them, and indeed even in the first edition of his grammar (1819) he seems to be often groping in the dark. As early as 181 5 we find A. W. Schlegel reviewing the Altdeutsche W alder (a periodical published by the two brothers) very severely, condemning the lawless etymological combinations it contained, and insisting on the necessity of strict philological method and a fundamental investigation of the laws of language, especially in the correspondence of sounds. This criticism is said to have had a considerable influence on the direc- tion of Grimm's studies.

The first work he published, Uber den altdeutschen Meisler- gcsang (181 1), was of a purely literary character. Yet even in this essay Grimm showed that Minnesang and Meistersang were really one form of poetry, of which they merely represented different stages of development, and also announced his important discovery of the invariable division of the Lied into three strophic parts.

His text-editions were mostly prepared in common with his brother. In 181 2 they published the two ancient fragments of the Hildebrandslied and the Weissenbrunner Gebet, Jacob having discovered what till then had never been suspected — the alliteration in these poems. However, Jacob had little taste for text-editing, and, as he himself confessed, the evolving of a

critical text gave him little pleasure. He therefore left this department to others, especially Lachmann, who soon turned his brilliant critical genius, trained in the severe school of classical philology, to Old and Middle High German poetry and metre. Both brothers were attracted from the beginning by all national poetry, whether in the form of epics, ballads or popular tales. They published in 1816-1818 an analysis and critical sifting of the oldest epic traditions of the Germanic races under the title of Deutsche

Sagen. At the same time they collected all the popular tales they could find, partly from the mouths of the people, partly from manuscripts and books, and published in 1812-1815 the first edition of those Kinder-und Hausmdrchen which have carried the name of the brothers Grimm into every household of the civilized world, and founded the science of folk-lore. The closely allied subject of the satirical beast epic of the middle ages also had a great charm for Jacob Grimm, and he published an edition of the Reinhart Fuchs in 1834. His first contribution to mythology was the first volume of an edition of the Eddaic songs, undertaken conjointly with his brother, published in 1815, which, however, was not followed by any more. The first edition of his Deutsche Mylhologie appeared in 1833. This great work covers the whole range of the subject, tracing the mythology and superstitions of the old Teutons back to the very dawn of direct evidence, and following their decay and loss down to the popular traditions, tales and expressions in which they still linger.

Although by the introduction of the Code Napoleon into Westphalia Grimm's legal studies were made practically barren, he never lost his interest in the scientific study of law and national institutions, as the truest exponents of the life and character of a people. By the publication (in 1828) of his Rechtsalterthiimer he laid the foundations of that historical study of the old Teutonic laws and constitutions which was continued with brilliant success by Georg L. Maurer and others. In this work Grimm showed the importance of a linguistic study of the old laws, and the light that can be thrown on many a dark passage in them by a comparison of the corresponding words and expressions in the other old cognate dialects. He also knew how — and this is perhaps the most original and valuable part of his work — to trace the spirit of the laws in countless allusions and sayings which occur in the old poems and sagas, or even survive in modern colloquialisms.

Of all his more general works the boldest and most far-reaching is his Geschichte der deutschen Sprache, where at the same time the linguistic element is most distinctly brought forward. The subject of the work is, indeed, nothing less than the history which lies hidden in the words of the German language — the oldest national history of the Teutonic tribes determined by means of language. For this purpose he laboriously collects the scattered words and allusions to be found in classical writers, and endeavours to determine the relations in which the German language stood to those of the Getae, Thracians, Scythians, and many other nations whose languages are known only by doubtfully identified, often extremely corrupted remains preserved by Greek and Latin authors. Grimm's results have been greatly modified by the wider range of comparison and improved methods of investigation which now characterize linguistic science, and many of the questions raised by him will probably for ever remain obscure;

but his book will always be one of the most fruitful and suggestive that have ever been written.

Grimm's famous Deutsche Grammatik was the outcome of his purely philological work. The labours of past generations — ■ from the humanists onwards — had collected an enormous mass of materials in the shape of text-editions, dictionaries and grammars, although most of it was uncritical and often untrustworthy. Something had even been done in the way of comparison and the determination of general laws, and the conception of a comparative Teutonic grammar had been clearly grasped by the illustrious Englishman George Hickes, at the beginning of the 18th century, and partly carried out by him in his Thesaurus. Ten Kate in Holland had afterwards made valuable contributions to the history and comparison of the Teutonic languages. Even Grimm himself did not at first intend

to include all the languages in his grammar; but he soon found that Old High German postulated Gothic, that the later stages of German could not be understood without the help of the Low German dialects, including English, and that the rich literature of Scandinavia could as little be ignored. The first edition of the first part of the Grammar, which appeared in 1810, and is now extremely rare, treated of the inflections of all these languages, together with a general introduction, in which he vindicated the importance of an historical study of the German language against the a priori, quasi-philosophical methods then in vogue.

In 1822 this volume appeared in a second edition — really a new work, for, as Grimm himself says in the preface, it cost him little reflection to mow down the first crop to the ground. The wide distance between the two stages of Grimm's development in these two editions is significantly shown by the fact that while the first edition gives only the inflections, in the second volume phonology takes up no fewer than 600 pages, more than half of the whole volume. Grimm had, at last, awakened to the full conviction that all sound philology must be based on rigorous adhesion to the laws of sound-change, and he never afterwards swerved from this principle, which gave to all his investigations, even in their boldest flights, that iron-bound consistency, and that force of conviction which distinguish science from dilettante- ism; up to Grimm's time philology was nothing but a more or less laborious and conscientious dilettanteism, with occasional flashes of scientific inspiration; he made it into a science. His advance must be attributed mainly to the influence of his contemporary R. Rask. Rask was born two years later than Grimm, but his remarkable precocity gave him somewhat the start. Even in Grimm's first editions his Icelandic paradigms are based entirely on Rask's grammar, and in his second edition he relied almost entirely on Rask for Old English. His debt to Rask can only be estimated at its true value by comparing his treatment of Old English in

the two editions; the difference is very great. Thus in the first edition he declines dceg, dceges, plural dagas, not having observed the law of vowel-change pointed out by Rask. There can be little doubt that the appear- ance of Rask's Old English grammar was a main inducement for him to recast his work from the beginning. To Rask also belongs the merit of having first distinctly formulated the Jaws of sound-correspondence in the different languages, especially in the vowels, those more fleeting elements of speech which had hitherto been ignored by etymologists.

This leads to a question which has been the subject of much controversy, — Who discovered what is known as Grimm's law? This law of the correspondence of consonants in the older Indo- germanic, Low and High German languages respectively was first fully stated by Grimm in the second edition of the first part of his grammar. The correspondence of single consonants had been more or less clearly recognized by several of his pre- decessors; but the one who came nearest to the discovery of the complete law was the Swede J. Ihre, who established a consider- able number of " literarum permutationes," such as b for /, with the examples bara = ferre, bejwer = fiber . Rask, in his essay on the origin of the Icelandic language, gives the same com- parisons, with a few additions and corrections, and even the very same examples in most cases. As Grimm in the preface to his first edition expressly mentions this essay of Rask, there is every probability that it gave the first impulse to his own investigations. But there is a wide difference between the isolated permutations of his predecessors and the comprehensive generalizations under which he himself ranged them. The extension of the law to High German is also entirely his own. The only fact that can be adduced in support of the assertion that Grimm wished to deprive Rask of his claims to priority is that he does not expressly mention Rask's results in his second edition. But this is part of the plan of his work, viz. to refrain from all controversy or reference to the works of others. In his first edition he expressly calls attention to Rask's essay, and praises it most ungrudgingly. Rask himself refers as little to Ihre, merely alluding in a general way to Ihre's permutations, although his own debt to Ihre is infinitely greater than that of Grimm to

Rask or any one else. It is true that a certain bitterness of feeling afterwards sprang up between Grimm and Rask, but this was the fault of the latter, who, impatient of contradiction and irritable in controversy, refused to acknowledge the value of Grimm's views when they involved

modification of his own. The importance of Grimm's generalization in the history of philology cannot be overestimated, and even the mystic completeness and symmetry of its formulation, although it has proved a hindrance to the correct explanation of the causes of the changes, was well calculated to strike the popular mind, and give it a vivid idea of the paramount importance of law, and the necessity of disregarding mere superficial resemblance. The most lawless etymologist bows down to the authority of Grimm's law, even if he honours it almost as much in the breach as in the observance.

The grammar was continued in three volumes, treating principally of derivation, composition and syntax, which last was left unfinished. Grimm then began a third edition, of which only one part, comprising the vowels, appeared in 1840, his time being afterwards taken up mainly by the dictionary. The grammar stands alone in the annals of science for comprehensive- ness, method and fullness of detail. Every law, every letter, every syllable of inflection in the different languages is illustrated by an almost exhaustive mass of material. It has served as a model for all succeeding investigators. Diez's grammar of the Romance languages is founded entirely on its methods, which have also exerted a profound influence on the wider study of the Indo-Germanic languages in general.

In the great German dictionary Grimm undertook a task for which he was hardly suited. His exclusively historical tendencies made it impossible for him to do justice to the individuality of a living language; and the disconnected statement of the facts of language in an ordinary alphabetical dictionary fatally mars its scientific character. It was also undertaken on so large a scale as to make it impossible for him and his brother to com- plete it themselves. The dictionary, as far as it was worked out by Grimm himself, may be described as a collection of discon- nected antiquarian essays of high value.

Grimm's scientific character is notable for its combination of breadth and unity. He was as far removed from the narrow- ness of the specialist who has no ideas, no sympathies beyond some one author, period or corner of science, as from the shallow dabbler who feverishly attempts to master the details of half-a- dozen discordant pursuits. Even within his own special studies there is the same wise concentration; no Mezzofanti-like parrot display of useless polyglottism. The very foundations of his nature were harmonious; his patriotism and love of historical investigation received their fullest satisfaction in the study of the language, traditions, mythology, laws and literature of his own countrymen and their nearest kindred. But from this centre his investigations were pursued in every direction as far as his unerring instinct of healthy limitation would allow. He was equally fortunate in the harmony that subsisted between his intellectual and moral

nature. He made cheerfully the heavy sacrifices that science demands from its disciples, without feeling any of that envy and bitterness which, often torment weaker natures; and although he lived apart from his fellow men, he was full of human sympathies, and no man has ever exercised a profounder influence on the destinies of mankind. His was the very ideal of the noblest type of German character.

*The following is a complete list of his separately published works, those which he published in common with his brother being 'marked with a star. For a list of his essays in periodicals, &c., see vol. v. of his Kleinere Schriften, from which the present list is taken. His life is best studied in his own " Selbstbiographie," in vol. i. of the Kleinerˆ Schriften. There is also a brief memoir by K. Godeke in Gottinger Professoren (Gotha (Perthes), 1872): Uber den altdeutschen Meister- ' gesang (Gottingen, 181 1); *Kinder- und Hausmdrchen (Berlin, 1812—1815) (many editions); *Das Lied von Hildebrand und das Weissenbrunner Gebel (Cassel, 1812); Altdeutsche Wdlder (Cassel, Frankfort, 1813-1816, 3 vols.); *Der arme Heinrich von Hartmann von der Arte (Berlin, 1815) ;' Irmenstrasse und Irmensdule (Vienna, 1815); *Die Lieder der alien Edda (Berlin, 1815), Siiva de romances viejos (Vienna, 1815); * Deutsche Sagen (Berlin, 1816-1818, 2nd ed.,*

*Berlin, 1865-1866); Deutsche Grammatik (Gottingen, 1819, 2nd ed., Gottingen, 1 822-1840) (reprinted 1870 by W. Scherer, Berlin); Wuk Stephanovitsch' s kleine serbische Grammatik, verdeutscht mit einer Vorrede (Leipzig and Berlin, 1824); Zur Recension der deutschen Grammatik (Cassel, 1826); *Irische Elfenmdrchen, aus dem Englischen (Leipzig, 1826); Deutsche Rechtsaltertiimer (Gottingen, 1828, 2nd ed., 1854); Hymnorum veteris ecclesiae XXVI. inter pretatio theodisca (Gottingen, 1830); Reinhart Fuchs (Berlin, 1834); Deutsche Mythologie (Gottingen, 1835, 3rd ed., 1854, 2 vols.) ; Taciti Germania edidit (Gottingen, 1835); Uber meine Entlassung (Basel, 1838); (together with Schmeller) Lateinische Gedichte des X. und XI. Jahrhunderts (Gottingen, 1838); Sendschreiben an Karl Lachmann uber Reinhart Fuchs (Berlin, 1840); Weistiimer, Th. i. (Gottingen, 1840) (continued, partly by others, in 5 parts, 1840-1869); Andreas und Elene (Cassel, 1840); Frau Aventure (Berlin, 1842); Geschichte der deutschen Sprache (Leipzig, 1848, 3rd ed., 1868, 2 vols.); Das Wort des Besitzes (Berlin, 1850); *Deutsches Wbrterbuch, Bd. i. (Leipzig, 1854); Rede auf Wilhelm Grimm und Rede uber das Alter (Berlin, 1868, 3rd ed., 1865); Kleinere Schriften (Berlin, 1864-1870, 5 vols.). (H. Sw.)*

GRIMM, WILHELM CARL (1786-1859). For the chief events in the life of Wilhelm Grimm see article on Jacob Grimm above. As Jacob himself said in his celebrated address to the Berlin Academy on the death of his brother,

the whole of their lives were passed together. In their schooldays they had one bed and one table in common, as students they had two beds and two tables in the same room, and they always lived under one roof, and had their books and property in common. Nor did Wilhelm's marriage in any way disturb their harmony. As Cleasby said (" Life of Cleasby," prefixed to his Icelandic Dictionary, p. lxix.), " they both live in the same house, and in such harmony and community that one might almost imagine the children were common property." Wilhelm's character was a complete contrast to that of his brother. As a boy he was strong and healthy, but as he grew up he was attacked by a long and severe illness, which left him weak all his life. His was a less comprehensive and energetic mind than that of his brother, and he had less of the spirit of investigation, preferring to confine himself to some limited and definitely bounded field of work; he utilized everything that bore directly on his own studies, and ignored the rest. These studies were almost always of a literary nature. It is characteristic of his more aesthetic nature that he took great delight in music, for which his brother had but a moderate liking, and had a remarkable gift of story-telling. Cleasby, in the account of his visit to the brothers, quoted above, tells that " Wilhelm read a sort of farce written in the Frankfort dialect, depicting the ' malheurs ' of a rich Frankfort tradesman on a holiday jaunt on Sunday. It was very droll, and he read it admirably." Cleasby describes him as " an uncommonly animated, jovial fellow." He was, accordingly, much sought in society, which he frequented much more than his brother.

His first work was a spirited translation of the Danish Ktzmpeviser, Altddnische Heldenlieder, published in 1811-1813, which made his name at first more widely known than that of his brother. The most important of his text editions are — Ruolandslied (Gottingen, 1838); Konrad von Wiirzburg's Goldene Schmiede (Berlin, 1840); Grave Ruodolf (Gottingen, 1844, 2nd ed.); Athis und Prophilias (Berlin, 1846); Altdeutsche Gesprdche (Berlin, 1851); Freidank (Gottingen, i860, 2nd ed.). Of his other works the most important is Deutsche Heldensage (Berlin, 1868, 2nd ed.). His Deutsche Runen (Gottingen, 1821) has now only an historical interest. (H. Sw.)

GRIMMA, a town in the kingdom of Saxony, on the left bank of the-Mulde, 19 m. S.E. of Leipzig on the railway Dobeln- Dresden. Pop. (1905) 11,182. It has a Roman Catholic and three Evangelical churches, and among other principal buildings are the Schloss built in the 12th century, and long a residence of the margraves of Meissen and the electors of Saxony; the town- hall, dating from 1442, and the famous school Fiirstenschule (Illustre Moldanum) , erected by the elector Maurice on the site of the former Augustinian monastery in 1550, having provision for 104 free scholars and a library numbering 10,000 volumes. There are also a

modern school, a teachers' seminary, a com- mercial school and a school of brewing. Among the industries of the town are ironfounding, machine building and dyeworks, while paper and gloves are manufactured there. Gardening and agriculture generally are also important branches of industry. In the immediate neighbourhood are the ruins of the Cistercian

nunnery from which Catherine von Bora fled in 1523, and the village of Doben, with an old castle. Grimma is of Sorbian origin, and is first mentioned in 1203. It passed then into possession of Saxony and has remained since part of that country.

See Lorenz, Die Stadt Grimma, historisch beschrieben (Leipzig, 1871) ; Rossler, Geschickte der koniglich sdchsischen Fürsten- und Landes- schule Grimma (Leipzig, 1891); L. Schmidt, Urkundenbuch der Stadt Grimma (Leipzig, 1895); and Fraustadt, Grimmenser Stamm- buch (Grimma, 1900).

GRIMMELSHAUSEN, HANS JAKOB CHRISTOFFEL VON

(c. 1625-1676), German author, was born at Gelnhausen in or about 1625. At the age of ten he was kidnapped by Hessian soldiery, and in their midst tasted the adventures of military life in the Thirty Years' War. . At its close, Grimmelshausen entered the service of Franz Egon von Furstenberg, bishop of Strassburg and in 1665 was made Sckullheiss (magistrate) at Renchen in Baden. On obtaining this appointment, he devoted himself to literary pursuits, and in 1669 published Der abenteuerliche Simplicissimus, Teutsch, d.h. die Beschreibung des Lebens eines seltsamen Vaganten, genannt Melchior Stemfels von Fuchsheitn, the greatest German novel of the 17th century. For this work he took as his model the picaresque romances of Spain, already to some extent known in Germany. Simplicissi- mus is in great measure its author's autobiography; he begins with the childhood of his hero, and describes the latter's adven- tures amid the stirring scenes of the Thirty Years' War. The realistic detail with which these pictures are presented makes the book one of the most valuable documents of its time. In the later parts Grimmelshausen, however, over- indulges in allegory, and finally loses himself in a Robinson Crusoe story. Among his other works the most important are the so-called Simplicia- nische Schriften: Die Erzbctrtigerin und Landslortzerin Courasche (c. 1669); Der selfsame Springinsfeld (1670) and Das wunderbar- liche Vogelncst (1672). His satires, such as Der teutsche Michel (1670), and "gallant" novels, like Dietwald und Amelinde (1670) are of inferior interest. He died at Renchen on the 17th of August 1676, where a monument was erected to him in

1879. _

Editions of Simplicissimus and the Simplicianische Schriften have been published by A. von Keller (1854), H. Kurz (1863-1864), J. Tittmann (1877) and F. Bobertag (1882). A reprint of the first edition of the novel was edited by R. Kogel for the series of Neudrucke des 16. und 17. Jahrhunderh (1880). See the introductions to these editions; also F. Antoine, Etude sur le Simplicissimus de Grimmels- hausen (1882) and E. Schmidt in his Charakieristiken, vol. i. (1886).

GRIMOARD, PHILIPPE HENRI, Comte de (1753-1813), French soldier and military writer, entered the royal army at the age of sixteen, and in 1775 published his Essai thtorique et Practique sur les batailles. Shortly afterwards Louis XVI. placed him in his own military cabinet and employed him especially in connexion with schemes of army reform. By the year of the Revolution he had become one of Louis's most valued counsellors, in political as well as military matters, and was marked out, though only a colonel, as the next Minister of War. In 1791 Grimoard was entrusted with the preparation of the scheme of defence for France, which proved two years later of great assistance to the Committee of Public Safety. The events of 1792 put an end to his military career, and the remainder of his life was spent in writing military books.

The following works by him, besides his first essay, have retained some importance: Histoire des dernieres campagnes de Turenne (Pans, 1780), Lettres et memoires de. Turenne (Paris, 1780), Troupes legeres et leur emploi (Paris, 1782), Conquetes de Gustave-Adolphe (Stockholm and Xeufchatel, 1782-1791) ; Memoires de Gustave Adolphe (Paris, 1790), Correspondence of Marshal Ri'chelieu (Paris, 1789), St Germain (1789), and Bernis (1790), Vie et regne de Frederic le Grand (London, 1788), Lettres et memoires du marechal de Saxe (Pans, 1794), L' Expedition de Minorque en 1756 (Paris, 1798), Recherches sur la force de I'armee francaise depuis Henri IV jusgu'en 1S05 (Pans, 1806), Memoires du marechal de Tesse (Paris 1806) Lettres de Bohngbroke (Paris, 1808), Traite sur le service d'etat-major (Pari.-, 1809), and (with Servan) Tableau historique de la guerre de la Revolution 1792-1794 (Paris, 1808).

GRIMSBY, or Great Grimsby, a municipal, county and parliamentary borough of Lincolnshire, England; an important

seaport near the mouth of the Humber on the south shore. Pop. (1901) 63,138. It is 155 m. N. by E. from London by the Great Northern railway, and is also served by the Great Central railway. The church of St James,

situated in the older part of the town, is a cruciform Early English building, retaining, in spite of injudicious restoration, many beautiful details. The chief buildings are that containing the town hall and the grammar school (a foundation of 1547), the exchange, a theatre, and the customs house and dock offices. A sailors' and fishermen's Harbour of Refuge, free library, constitutional club and technical school are maintained. The duke of York public gardens were opened in 1894. Adjacent to Grimsby on the east is the coastal watering-place of Cleethorpes.

The dock railway station lies a mile from the town station. In 1849 the Great Central (then the Manchester, Sheffield and Lincolnshire) railway initiated a scheme of reclamation and dock-construction. This was completed in 1854, and sub- sequent extensions were made. There are two large fish-docks, and, for general traffic, the Royal dock, communicating with the Humber through a tidal basin, the small Union dock, and the extensive Alexandra dock, together with graving docks, timber yards, a patent slip, &c. These docks have an area of about 104 acres, but were found insufficient for the growing traffic of the port, and in 1906 the construction of a large new dock, of about 40 acres' area and 30 to 35 ft. depth, was undertaken by the Great Central Company at Immingbam, 5 m. above Grimsby on the Humber. The principal imports are butter, woollens, timber, cereals, eggs, glass, cottons, preserved meat, wool, sugar and bacon. The exports consist chiefly of woollen yarn, woollens, cotton goods, cotton yarn, machinery, &c. and coal. It is as a fishing port, however, that Grimsby is chiefly famous. Two of the docks are for the accommodation of the fishing fleet, which, consisting principally of steam trawlers, numbers up- wards of 500 vessels. Regular passenger steamers run from Grimsby to Dutch and south Swedish ports, and to Esbjerg (Denmark), chiefly those of the Wilson line and the Great Central railway. The chief industries of Grimsby are shipbuilding, brewing, tanning, manufactures of ship tackle, ropes, ice for preserving fish, turnery, flour, linseed cake, artificial manure; and there are saw mills, bone and corn mills, and creosote works. The municipal borough is under a mayor, 12 aldermen and 36 councillors. Area, 2852 acres.

Grimsby (Grimesbi) is supposed to have been the landing-place of the Danes on their first invasion of Britain towards the close of the 8th century. It was a borough by prescription as early as 1 20 1, in which year King John granted the burgesses a charter of liberties according to the custom of the burgesses of North- ampton. Henry III. in 1227 granted to " the mayor and good men " of Grimsby, that they should hold the town for a yearly rent of £111, and confirmed the same in 1271. These charters were confirmed by later sovereigns. A governing charter, under the title of mayor and burgesses, was given by James II. in 1688, and under this the appointment of officers and other of the corporation, arrangements are to a

great extent regulated. In 1 201 King John granted the burgesses an annual fair for fifteen days, beginning on the 25th of May. Two annual fairs are now held, namely on the first Monday in April and the second Monday in October. No early grant of a market can be found, but in 1792 the market-day was Wednesday. In 1888 it had ceased to exist. Grimsby returned two members to the parlia- ment of 1298,. but in 1833 the number was reduced to one.

In the time of Edward III. Grimsby was an important seaport, but the haven became obstructed by sand and mud deposited by. the Humber, and so the access of large vessels was prevented. At the beginning of the 19th century a subscription was raised by the proprietors of land in the neighbourhood for improving the harbour, and an act was obtained by which they were incorporated under the title " The Grimsby Haven Co." The fishing trade had become so important by 1800 that it was necessary to construct a new dock.

GRIMSTON, SIR HARBOTTLE (1603- 168 5), English politician, second son of Sir Harbottle Grimston, Bart. (d. 1648), was born

at Bradfield Hall, near Manningtree, on the 27th of January 1603. Educated at Emmanuel College, Cambridge, he became a barrister of Lincoln's Inn, then recorder of Harwich and recorder of Colchester. As member for Colchester, Grimston sat in the Short Parliament of 1640, and he represented the same borough during the Long Parliament, speedily becoming a leading member of the popular party. He attacked Archbishop Laud with great vigour; was a member of the important committees of the parliament, including the one appointed in consequence of the attempted seizure of the five members; and became deputy-lieutenant of Essex after the passing of the militia ordinance in January 1642. He disliked taking up arms against the king, but remained nominally an adherent of the parliamentary party during the Civil War. In the words of Clarendon, he " continued rather than concurred with them." Grimston does not appear to have taken the Solemn League and Covenant, but after the conclusion of the first period of the war he again became more active. He was president of the committee which investigated the escape of the king from Hampton Court in 1647, and was one of those who negotiated with Charles at Newport in 1648, when, according to Burnet, he fell upon his knees and urged the king to come to terms. From this time Grimston's sympathies appear to have been with the Royalists. Turned out of the House of Commons when the assembly was " purged " by colonel Pride, he was

imprisoned; but was released after promising to do nothing detrimental to the parliament or the army, and spent the next few years in retirement. Before this time, his elder brother having already died, he had succeeded his father as 2nd baronet. In 1656 Sir Harbottle was returned to Cromwell's second parliament as member for Essex; but he was not allowed to take his seat; and with 97 others who were similarly treated he issued a remonstrance to the public. He was among the secluded members who re-entered the Lcng Parliament in February 1660, was then a member of the council of state, and was chosen Speaker of the House of Commons in the Convention Parliament of 1660. As Speaker he visited Charles II. at Breda, and addressed him in very flattering terms on his return to London; but he refused to accede to the king's demand that he should dismiss Burnet from his position as chaplain to the Master of the Rolls, and in parliament he strongly denounced any relaxation of the laws against papists. Grimston did not retain the office of Speaker after the dissolution of the Convention Parliament, but he was a member of the commission which tried the regicides, and in November 1660 he was appointed Master of the Rolls. Report says he paid Clarendon £8000 for the office, while Burnet declares he obtained it " without any application of his own." He died on the 2nd of January 1685. His friend and chaplain, Burnet, speaks very highly of his piety and impartiality, while not omitting the undoubted fact that he was " much sharpened against popery." He translated the law reports of his father-in- law, the judge, Sir George Croke {1560-1642), which were written in Norman-French, and five editions of this work have appeared. Seven of his parliamentary speeches were published, and he also wrote Strena Christiana (London, 1644, and other editions). Grimston's first wife, Croke's daughter Mary, bore him six sons and two daughters; and by his second wife, Anne, daughter and heiress of Sir Nathaniel Bacon, K.B., a grandson of Sir Nicholas Bacon, he had one daughter.

Of his sons one only, Samuel (1643-1700), survived his father, and when he died in October 1700 the baronetcy became extinct. Sir Harbottle's eldest daughter, Mary, married Sir Capel Luckyn, Bart., and their grandson, William Luckyn, succeeded to the estates of his great-uncle, Sir Samuel Grimston, and took the name of Grimston in 1700. This William Luckyn Grimsto"h (1683-1756) was created Baron Dunboyne and Viscount Grimston in the peerage of Ireland in 1719. He was succeeded as 2nd viscount by his son Jamˆs (1 7 1 1-1 773) , whose son James Bucknall (1747-1808) was made an English peer as baron Verulam of Gorhambury in 1790. Then in 1815 his son James Walter (1775- 1845), 2nd baron Verulam, was created earl of Verulam, and the present peer is his direct descendant. Sir Harbottle Grimston

bought Sir Nicholas Bacon's estate at Gorhambury, which is still the residence of his descendants.

See G. Burnet, History of My Own Time, edited by O. Airy (Oxford, 1900).

GRIMTHORPE, EDMUND BECKETT, ist Baron (1816-1905), son of Sir Edmund Beckett Denison, was born on the 12th of May 1816. He was educated at Doncaster and Eton, whence he proceeded to Trinity College, Cambridge, and graduated thirtieth wrangler in 1838. He was called to the bar at Lincoln's Inn in 1 84 1. Upon succeeding to the baronetcy in 1874 he dropped the name of Denison, which his father had assumed in 1816. From 1877 to 1900 he was chancellor and vicar-general of York, and he was raised to the peerage in 1886. He was made a Q.C. in 1854, and was for many years a leader of the Parliamentary Bar. He devoted himself to the study of astronomy, horology and architecture, more especially Gothic ecclesiastical architec- ture. As early as 1850 he had become a recognized authority on clocks, watches and bells, and in particular on the construction of turret clocks, for he had designed Dent's Great Exhibition clock, and his Rudimentary Treatise had gone through many editions. In 185 1 he was called upon, in conjunction with the astronomer royal (Mr, afterwards Sir, G. B. Airy) and Mr Dent, to design a suitable clock for the new Houses of Parliament. The present tower clock, popularly known as " Big Ben," was constructed after Lord Grimthorpe's designs. In a number of burning questions during his time Lord Grimthorpe took a prominent part. It is, however, in connexion with the restora- tion of St Albans Abbey that he is most widely known. The St Albans Abbey Reparation Committee, which had been in existence since 187 1, and for which Sir Gilbert Scott had carried out some admirable repairs, obtained a faculty from the Diocesan Court in 1877 to repair and restore the church and fit it for cathedral and parochial services. Very soon, however, the committee found itself unable to raise the necessary funds, and it was at this juncture that a new faculty was granted to Lord Grimthorpe (then Sir Edmund Beckett) to " restore, repair and refit " the abbey at his own expense. Lord Grimthorpe made it an express stipulation that the work should be done according to his own designs and under his own supervision. His public spirit in undertaking the task was undeniable, but his treatment of the roof, the new west front, and the windows inserted in the terminations of the transepts, excited a storm of adverse criticism, and was the subject of vigorous protests from the professional world of architecture. He died on the 29th of April 1905, being succeeded as 2nd baron by his nephew, E. W. Beckett (b. 1856), who had sat in parliament as conserva- tive member for the Whitby division of Yorkshire from 1885.

GRINDAL, EDMUND (c. 1519-1583), successively bishop of London, archbishop of York and archbishop of Canterbury, born about 1 5 19, was son of William Grindal, a farmer of Hensing- ham, in the parish of St Bees,

Cumberland. He was educated at Magdalene and Christ's Colleges and then at Pembroke Hall, Cambridge, where he graduated B.A. and was elected fellow in 1538. He proceeded M.A. in 1541, was ordained deacon in 1544 and was proctor and Lady Margaret preacher in 1 548-1 549. Probably through the influence of Ridley, who had been master of Pembroke Hall, Grindal was selected as one of the Protestant disputants during the visitation of 1 549. He had a considerable talent for this work and was often employed on similar occasions. When Ridley became bishop of London, he made Grindal one of his chaplains and gave him the precentorship of St Paul's. He was soon promoted to be one of Edward VI. 's chaplains and prebendary of Westminster, and in October 1552 was one of the sis divines to whom the Forty-two articles were submitted for examination before being sanctioned by the Privy Council. According to Knox, Grindal distinguished himself from most of the court preachers in 1553 by denouncing the worldliness of

the courtiers and foretelling the evils to follow on the king's

death.

That event frustrated Grindal's proposed elevation to the

episcopal bench and he did not consider himself bound to await

the evils which he had foretold. He abandoned his preferments

on Mary's accession and made his way to Strassburg. Thence, like so many of the Marian exiles, he proceeded to Frankfurt, where he endeavoured to compose the disputes between the " Coxians " (see Cox, Richard), who regarded the 1552 Prayer Book as the perfection of reform, and the Knoxians, who wanted further simplification. He returned to England in January 1559, was appointed one of the committee to revise the liturgy, and one of the Protestant representatives at the Westminster con- ference. In July he was also elected Master of Pembroke Hall in succession to the recusant Dr Thomas Young (1514-1580) and Bishop of London in succession to Bonner.

Grindal himself was, however, inclined to be recalcitrant from different motives. He had qualms about vestments and other traces of " popery " as well as about the Erastianism of Eliza- beth's ecclesiastical government. His Protestantism was robust enough; he did not mind recommending that a priest " might be put to some torment " {Hatfield MSS. i. 269) ; and in

October 1562 he wrote to Cecil begging to know " if that second Julian, the king of Navarre, is killed; as he intended to preach at St Paul's Cross, and might take occasion to mention God's judge- ments on him " (Domestic Cal., 1 547-1 580, p. 209). But he was loth to execute judgments upon English Puritans, and modern high churchmen complain of his infirmity of purpose, his oppor- tunism and his failure to give Parker adequate, assistance in rebuilding the shattered fabric of the English Church. Grindal lacked that firm faith in the supreme importance of uniformity and autocracy which enabled Whitgift to persecute with a clear conscience nonconformists whose theology was indistinguishable from his own. Perhaps he was as wise as his critics; at any rate the rigour which he repudiated hardly brought peace or strength to the Church when practised by his successors, and London, which was always a difficult see, involved Bishop Sandys in similar tronbles when Grindal had gone to York. As it was, although Parker said that Grindal " was not resolute and severe enough for the government of London," his attempts to enforce the use of the surplice evoked angry protests, especially in 1565, when considerable numbers of the nonconformists were sus- pended; and Grindal of his own motion denounced Cartwright to the Council in 1570. Other anxieties were brought upon him by the burning of his cathedral in 1561, for although Grindal himself is said to have contributed £1200 towards its rebuilding, the laity of his diocese were niggardly with their subscriptions and even his clergy were not liberal.

In 1570 Grindal was translated to the archbishopric of York, where Puritans were few and coercion would be required mainly for Roman Catholics. His first letter from Cawood to Cecil told that he had not been well received, that the gentry were not " well-affected to godly religion and among the common people many superstitious practices remained." It is admitted by his Anglican critics that he did the work of enforcing uniformity against the Roman Catholics with good-will and considerable tact. He must have given general satisfaction, for even before Parker's death two persons so different as Burghley and Dean Nowell independently recommended Grindal's appointment as his successor, and Spenser speaks warmly of him in the Shepherd's Calendar as the " gentle shepherd Algrind." Burghley wished to conciliate the moderate Puritans and advised Grindal to mitigate the severity which had characterized Parker's treatment of the nonconformists. Grindal indeed attempted a reform of the ecclesiastical courts, but his metropolitical activity was cut short by a conflict with the arbitrary temper of the queen. Elizabeth required Grindal to suppress the " prophesyings " or meetings for discussion which had come into vogue among the Puritan clergy, and she even wanted him to discourage preaching ; she would have no doctrine that was not inspired by her authority. Grindal remonstrated, claiming some voice for the Church,

and in June 1577 was suspended from his jurisdictional, though not his spiritual, functions for disobedience. He stood firm, and in January 1578 Secretary Wilson informed Burghley that the queen wished to have the archbishop deprived. She was dis- suaded from this extreme course, but Grindal's sequestration was continued in spite of a petition from Convocation in 1581

for his reinstatement. Elizabeth then suggested that he should resign; this he declined to do, and after making an apology to the queen he was reinstated towards the end of 1582. But his infirmities were increasing, and while making preparations for his resignation, he died on the 6th of July 1 583 and was buried in Croydon parish church. He left considerable benefactions to Pembroke Hall, Cambridge, Queen's College, Oxford, and Christ's College, Cambridge; he also endowed a free school at St Bees, and left money for the poor of St Bees, Canterbury, Lambeth and Croydon.

Strype's Life of Grindal is the principal authority ; see also Diet. Nat. Biogr. and, besides the authorities there cited, Gough's General Index to Parker Soc. Publ. ; Acts of the Privy Council; Cal. of Hatfield MSS.; Dixon's Hist, of the Church of England; Frere's volume in Stephens' and Hunt's series; Cambridge Mod. Hist. vol. iii.; Gee's Elizabethan Clergy; Birt's Elizabethan Religious Settlement; and Pierce's Introduction to the Marprelale Tracts (1909).

(A. F. P.)

GRINDELWALD, a valley in the Bernese Oberland, and one of the chief resorts of tourists in Switzerland. It is shut in on the south by the precipices of the Wetterhorn, Mettenberg and Eiger, between which two famous glaciers flow down. On the north it is sheltered by the Faulhorn range, while on the east the Great Scheidegg Pass leads over to Meiringen; and on the south-west the Little Scheidegg or Wengern Alp (railway iijm. across) divides it from Lauterbrunnen. The main village is connected with Interlaken by a rack railway (13 m.). The valley is very green, and possesses excellent pastures, as well as fruit trees, though little corn is grown. It is watered by the Black Lutschine, a tributary of the Aar. The height of the parish church above the sea-level is 3468 ft. The population in 1900 was 3346,practically all Protestant and German-speaking, and living in 558 houses. The glacier guides are among the best in the Alps. The valley was originally inhabited by the serfs of various great lords in summer for the sake of pasturage. A chapel in a cave was superseded about 1 146 by a wooden church, replaced about 1180 by a stone church, which was pulled down in 1793 to erect the present building. Gradually the Austin canons of Interlaken bought out all the other owners in the valley, but when that house was suppressed in 1528 by the town of Berfl the

inhabitants gained their freedom. The houses near the hotel Adler bear the name of Gydisdorf, but there is no village of Grindelwald properly speaking, though that name is usually given to the assemblage of hotels and shops between Gydisdorf and the railway station. Grindelwald is now very much frequented by visitors in winter.

See W. A. B. Coolidge, Walks and Excursions in the Valley of Grindelwald (also in French and German) (Grindelwald, 1900) ; Emmanuel Friedli, Barndiitsch als Spiegel bernischen Volkslums, vol. ii. (Grindelwald, Bern, 1908) ; E. F. von Millinen, Beitrage zur Heimatkunde des Kantons Bern, deutschen Teils, vol. i. (Bern, 1S79), pp. 24-26; G. Strasser, Der Gletschermann (Grindelwald, 1 888-1890). Scattered notices may be found in the edition (London, 1899) of the " General Introduction " (entitled " Hints and Notes for Travellers in the Alps ") to John Ball's Alpine Guide. (W. A. B. C.)

GRINGOIRE (or Gringore), PIERRE (c. 1480-1 539), French poet and dramatist, was born about the year 1480, probably at Caen. In his first work, Le Chasteau de labour (1499), a didactic poem in praise of diligence, he narrates the troubles following on marriage. A young couple are visited by Care, Need, Dis- comfort, &c; and other personages common to medieval alle- gories take part in the action. In November 1501 Gringoire was in Paris directing the production of a mystery play in honour of the archduke Philip of Austria, and in subsequent years he received many similar commissions. The fraternity of the Enfans sans Souci advanced him to the dignity of Mere Sotte and afterwards to the highest honour of the gild, that of Prince des Sols. For twenty years Gringoire seems to have been at the head of this illustrious confrerie. As Prince des Sots he exercised an extraordinary influence. At no time was the stage, rude and coarse as it was, more popular as a true exponent of the popular mind. Gringoire's success lay in the fact that he followed, but did not attempt to lead; on his stage the people saw exhibited their passions, their judgments of the moment, their jealousies, their hatreds and their ambitions. Brotherhoods

of the kind existed all over France. In Paris there were the Enfans sans Souci, the Basochiens, the Confrerie de la Passion and the Souverain Empire de Galilee; at Dijon there were the Mere Folle and her family; in Flanders the Societe des Arbaletriers played comedies; at Rouen the Cornards or Conards yielded to none in vigour and fearlessness of satire. On Shrove Tuesday 1512 Gringoire, who was the accredited defender of

the policy of Louis XII., and had already written many political poems, represented the Jeu du Prince des Sots et Mere Sotte. It was at the moment when the French dispute with Julius II. was at its height. Mere Sotte was disguised as the Church, and disputed the question of the temporal power with the prince. The political meaning was even more thinly veiled in the second part of the entertainment, a morality named L' Homme obstine, the principal personage representing the pope. The performance concluded with a farce. Gringoire adopted for his device on the frontis- piece of this trilogy, Tout par Raison, Raison par Tout, Par lout Raison. He has been called the Aristophane des Holies. In one respect at least he resembles Aristophanes. He is serious in his merriment; there is purpose behind his extravagances. The Church was further attacked in a poem printed about 1510, La Chasse dv, cerf des cerfs (serf des serfs, i.e. serous servorum), under which title that of the pope is thinly veiled. About 1514 he wrote his mystery of the Vie de Monseigneur Saint-Louis par personnages in nine books for the confrerie of the masons and carpenters. He became in 1518 herald at the court of Lorraine, with the title of Vaudemont, and married Catherine Roger, a lady of gentle birth. During the last twenty years of a long life he became orthodox, and dedicated a Blason des heretiques to the duke of Lorraine. There is no record of the payment of his salary as a herald after Christmas 1538, so that he died probably in 1 539.

His works were edited by C. d'Hfiricault and A. de Montaiglon for the Bibliotheque elzevirienne in 1858. This edition was incom- plete, and was supplemented by a second volume in 1877 by Mon- taiglon and M. James de Rothschild. These volumes include the works already mentioned, except Le Chasteau de labour, and in addition, Les Folles Entreprises (1505), a collection of didactic and satirical poems, chiefly ballades and rondeaux, one section of which is devoted to the exposition of the tyranny of the nobles, and another to the vices of the clergy; VEntreprise de Venise (c. 1509), poem in seven-lined stanzas, giving a list of the Venetian fortresses which belonged, according to Gringoire, to other powers; L'Espoir de paix (1st ed. not dated; another, 1510), a verse treatise on the deeds of " certain popes of Rome," dedicated to Louis XII.; and La Coque- luche (1510), a verse description of an epidemic, apparently influenza. For details of his other satires, Les Abus du monde (1509), Complainte de trap tard marie, Les Fantasies du monde qui regne; of his religious verse, Chants royaux (on the Passion, 1527), Heures de Notre Dame (1525); and a collection of tales in prose and verse, taken from the Gesta Romanorum, entitled Les Fantasies de Mere Sotte (1516), seeG. Brunet, Manuel dulibr aire (s.v. Gringore). Most of Gringoire's works conclude with an acrostic giving the name of the author. The Chasteau de labour was translated into English by Alexander Barclay and. printed by Wynkyn de Worde in 1506. Barclay's translation was edited (1905) with his original for the Roxburghe*

Clubby Mr A. W. Pollard.whoprovided an account of Gringoire, and a bibliography of the book. See also, for the Jeu du Prince des Sots, Petit de Julleville, La Comedie et les mceurs en France au moyen dge, pp. 151-168 (Paris, 1886); for Saint Louis, the same author's Les Myst'eres, i. 331 et seq., ii. 583-597 (1880), with further biblio- graphical references; and E. Picot, Gringore et les comidiens italiens (1877). The real Gringoire cannot be said to have ma.ny points of resemblance with the poet described in Victor Hugo's Notre-Dame de Paris, nor is there more foundation in fact for the one- act prose comedy of Theodore de Banville.

GRINNELL, a city in Poweshiek county, Iowa, U.S.A., 55 m. E. by N. of Des Moines. Pop. (1900) 3860, of whom 274 were foreign-born; (1905) 4634; (1910) 5036. Grinnell is served by the Chicago, Rock Island & Pacific, and the Iowa Central rail- ways. It is the seat of Iowa College (co-educational), founded in 1847 by the Iowa Band (Congregationalists and graduates – of New England colleges and Andover Theological Seminary, who had devoted themselves to home missionary educational work in Iowa, and who came to Iowa in 1843), and by a few earlier pioneers from New England. The college opened in 1848 at Davenport, and in 1859 removed to Grinnell, where there was a school called Grinnell University, which it absorbed. Closely

affiliated with the college are the Grinnell Academy and the Grinnell School of Music. In 1907-1908 the College had 463 students, the Academy had 129 students, and the School of Music had 141 students. Among the manufactures are carriages and gloves. The city was named in honour of one of its founders, Josiah Bushnell Grinnell (1821-1891), a Congregational clergy- man, friend of and sympathizer with John Brown, and from 1863 to 1867 a member of the National House of Representatives. Grinnell was settled in 1854, was incorporated as a town in 1865, and in 1882 was chartered as a city of the second class. In 1882 it suffered severely from a cyclone.

GRIQUALAND EAST and GRIQUALAND WEST, territorial divisions of the Cape Province of the Union of South Africa. Griqualand East, which lies south of Basutoland and west of Natal, is so named from the settlement there in 1862 of Griquas under Adam Kok. It forms part of the Transkeian Territories of the Cape, and is described under Kaffraria. Griqualand West, formerly Griqualand simply, also named after its Griqua inhabitants, is part of the great tableland of South Africa. It is bounded S. by the Orange river, W. and N. by Bechuanaland, E. by the Transvaal and Orange Free State Province, and has an area of 15,197 sq. m. It has a general elevation of 3000 to 4000 ft. above the sea, low ranges of rocky hills, the Kaap, Asbestos, Vansittart and Langeberg mountains, traversing its western portion in a general N.E.S.W. direction. The only perennial rivers are in the

eastern district, through which the Vaal flows from a point a little above Fourteen Streams to its junction with the Orange (160 m.). In this part of its course the Vaal receives the Harts river from the north and the Riet from the east. The Riet, 4 m. within the Griqualand frontier, is joined by the Modder. The banks of the rivers are shaded by willows; elsewhere the only tree is the mimosa. The greater part of the country is barren, merging N.W. into absolute desert. The soil is, however, wherever irrigated, extremely fertile. The day climate is hot and dry, but the nights are fre quently cold. Rain rarely falls, though thunderstorms of great severity occasionally sweep over the land, and sandstorms are prevalent in the, summer. A portion of the country is adapted for sheep-farming and the growing of crops, horse-breeding is carried on at Kimberley, and asbestos is worked in the south- western districts, but the wealth of Griqualand West lies in its diamonds, which are found along the banks of the Vaal and in the district between that river and the Riet. From the first dis- covery of diamonds in 1867 up to the end of 1905 the total yield of diamonds was estimated at 13! tons, worth £95,000,000. The chief town is Kimberley (q.v.), the centre of the diamond mining industry. It is situated on the railway from Cape Town to the Zambezi, which crosses the country near its eastern border. Three miles south of Kimberley is Beaconsfield (q.v.). On the banks of the Vaal are Barkly West (q.v.), Windsorton (pop. 800) and Warrenton (pop. 1500); at all these places are river diggings, diamonds being found along the river from Fourteen Streams to the Harts confluence. Warrenton is 44 m. N. by rail from Kimberley. Douglas (pop. 300), on the south bank of the Vaal, 12 m. above its confluence with the Orange, is the centre of an agricultural district, a canal 95 m. long serving to irrigate a considerable area. Thirty five miles N.W. of Douglas is Griquatown (pop. 401), the headquarters of the first Griqua settlers. Campbell (pop. 250) is 30 m. E. of Griqua town, and Postmasburg 42 m. N. by W. A census taken in 1877 showed the population of Griqualand West to be 45,277, of whom 12,347 were whites. At the census of 1891 the population was 83,215, of whom 29,602 were whites, and in 1904 the population was 108,498, of whom 32,570 were whites.

History. — Before the settlement in it of Griqua clans the district was thinly inhabited by Bushmen and Hottentots. At the end of the 18th century a horde known as Bastaards, descendants of Dutch farmers and Hottentot women, led a nomadic life on the plains south of the Orange river. In 1803 a missionary named Anderson induced a number of the Bastaards with their chief Barend Barends to settle north of the river, and a mission station was formed at a place where there was a strong

flowing fountain, which has now disappeared, which gave the name of Klaarwater to what is now known as Griquatown or Griquastad. Klaarwater became a retreat for other Bastaards, Hottentot refugees, Kaffirs and Bechuanas. From Little Namaqualand came a few half-breeds and others under the leadership of Adam Kok, son of Cornelius Kok and grandson of Adam Kok (c. 1 710-1795), a man of mixed white and Hottentot blood who is regarded as the founder of the modern Griquas. The settlement prospered, and in 1813, at the instance of the Rev. Tciin Campbell, who had been sent by the London Mission- ary Society to inspect the country, the tribesmen abandoned the name of Bastaards in favour of that of Griquas, 1 some of them professing descent from a Hottentot tribe, originally settled near Saldanha Bay, called by the early Dutch settlers at the Cape Chariguriqua or Grigriqua. Under the guidance of missionaries the Griquas made some progress in civilization, and many professed Christianity. Adam Kok and Barends having moved eastward in 1820, those who remained behind elected as their head man a teacher in the mission school named Andries Waterboer, who successfully administered the settle- ment, and by defeating the Makololo raiders greatly increased the prestige of the tribe. Meanwhile Adam Kok and his com- panions had occupied part of the country between the Modder and Orange rivers. In 1825 Kok settled at the. mission station of Philippolis (founded two years previously), and in a short time had exterminated the Bushmen inhabiting that region. He died about 1835, and after a period of civil strife was succeeded by his younger son, Adam Kok III. This chief in November 1843 signed a treaty placing himself under British protection. Many Dutch farmers were settled on the land he claimed. In 1845 he received British military aid in a contest with the white settlers, and in 1848 helped the British under Sir Harry Smith against the Boers (see Orange Free State: History). Eventu- ally finding himself straitened by the Boers of the newly estab- lished Orange Free State, he removed in 1861-1863 with his people, some 3000 in number, to the region (then depopulated by Kaffir wars) now known as Griqualand East. His sovereign rights to all territory no:.th of the Orange he sold to the Free State for £4000. He founded Kokstad (q. v.) and died in 1876. Waterboer, the principal Griqua chief, had entered into treaty relations with the British government as early as 1834, and he received a subsidy of £150 a year. He proved a stanch ally of the British, and kept the peace on the Cape frontier to the day of his death in 1852. He was succeeded by his son Nicholas Waterboer, under whom the condition of the Griquas declined — a decline induced by the indolence of the people and intensified by the drying up of the water supplies, cattle plague and brandy drinking. During this period white settlers acquired farms in the country, and the loss of their independence by the Griquas became inevitable. The discovery of diamonds along the banks of the Vaal in 1867 entirely altered the fortunes of the country, and by the end of 1869 the

rush to the alluvial diggings had begun. At the diggers' camps the Griquas exercised no authority, but over part of the district the South African Republic and the Orange Free State claimed sovereignty. At Klip Drift (now Barkly West) the diggers formed a regular government and elected Theodore Parker as their president. Most of the diggers being British subjects, the high commissioner of South Africa interfered, and a Cape official was appointed magistrate at Klip Drift, President Parker resigning office in February 1871. At this time the " dry diggings," of which Kimberley is the centre, had been discovered, 2 and over the miners there the Orange Free State asserted jurisdiction. The land was, however, claimed by Nicholas Waterboer, who, on the advice of his agent, David Arnot, petitioned the British to take over his country.' This Great Britain consented to do, and on the 27th of October 1871 proclamations were issued by the high commissioner

1 The Griquas, as a distinct tribe, numbered at the Cape census of 1904 but 6289. They have largely intermarried with Kaffir and Bechuana tribes.

2 The order of discovery of the chief mines was : — Dutoitspan, Sept. 1870; Bultfontein, Nov. 1870; De Beers, May 1871; Coles- berg Kop (Kimberley), July 1871.

receiving Waterboer and his Griquas as British subjects and defining the limits of his territory. In addition to the Kimberley district this territory included that part of the diamondiferous area which had been claimed by the Transvaal, but which had been declared, as the result of the arbitration of R. W. Keate, lieutenant-governor of Natal, part of Waterboer's land. On the 4th of November a small party of Cape Mounted Police took possession of the dry diggings and hoisted the British flag. Shortly afterwards the representative of the Orange Free State withdrew. The Free State was greatly incensed by the action of the British government, but the dispute as to the sovereignty was settled in 1876 by the payment of £90,000 by the British to the Free State as compensation for any injury inflicted on the state.

The diggers, who under the nominal rule of the Transvaal and Free State had enjoyed practical independence, found the new government did little for their benefit, and a period of dis- order ensued, which was not put an end to by the appointment in January 1873 of Mr (afterwards Sir) Richard Southey 3 as sole administrator, in place of the three commissioners who had previously exercised authority. In the July following the territory was made a crown colony and Southey's title changed to that of lieutenant-governor. The government remained unpopular, the diggers complaining of its unrepresentative character, the heavy taxation exacted, and the inadequate protection of property. They

formed a society for mutual protection, and the discontent was so great that an armed force was sent (early in 1875) from the Cape to overawe the agitators. At the same time measures were taken to render the government more popular. The settlement of the dispute with the Free State paved the way for the annexation of Griqualand to the Cape Colony on the 15th of October 1880.

See Kimberley, Cape Colony, Transvaal and Orange Free State. For the early history of the country and an account of life at the diggings, 1871-1875, consult G. M'Call Theal's Compendium of the History and Geography of South Africa (London, 1 878) , chapters xl. and xli. ; Gardner F. Williams, The Diamond Mines of South Africa (New York and London, 1902) ; and the works bearing on the subject quoted in that book. See also Theal's History of South Africa . . . 1834.-1854 (London, 1893); J. Campbell, Travels in South Africa (London, 1815), Travels . . . A Second Journey . . . (2 vols., London, 1822) ; the Blue Books C. 459 of 1871 and C. 508 of 1872 (the last-named containing the Keate award, &c.) ; the Griqua- land West report in Papers relating to Her Majesty's Colonial Possessions, part ii. (1875), and the Life of Sir Richard Southey, K.C.M.G., by A. Wilmot (London, 1904). For the Griqua people consult G. W. Stow, The Native Races of South Africa, chapters xvii.- xx. (London, 1905).

GRISAILLE, a French term, derived from gris, grey, for painting in monochrome in various shades of grey, particularly used in decoration to represent objects in relief. The frescoes of the roof of the Sistine chapel have portions of the design in grisaille. At Hampton Court the lower part of the decoration of the great staircase by Verrio is in grisaille. The term is also applied to monochrome painting in enamels, and also to stained glass; a fine example of grisaille glass is" in the window known as the Five Sisters, at the end of the north transept in York cathedral.

GRISELDA, a heroine of romance. She is said to have been the wife of Walter, marquis of Saluces or Saluzzo, in the nth century, and her misfortunes were considered to belong to history when they were handled by Boccaccio and Petrarch, although the probability is that Boccaccio borrowed his narrative from a Provencal fabliau. He included it in the recitations of the tenth day (Decamerone), and must have written it about 1350. Petrarch related it in a Latin letter in 1373, and his translation formed the basis of much of the later literature. The letter was printed by Ulrich Zel about 1470, and often subsequently. It was translated into French as La Patience de

3 Sir Richard Southey (1809-1901) was the son of one of the emigrants from the west of England to Cape Colony (1820). He organized and

commanded a corps of Guides in the Kaffir war of 1834-35, an d was with Sir Harry Smithat Boomplaats (1848). From 1864 to 1872 he was colonial secretary at the Cape. He gave up his appointment in Griqualand West in 1875, and lived thereafter in retirement. In 1891 he was created a K.C.M.G.

Griselidis and printed at Brehan-Loudeac in 1484, and its popularity is shown by the number of early editions quoted by Brunet {Manuel du libraire, s.v. Petrarca). The story was dramatized in 139s, and a Mystere de Griselidis, marquise de Saluses par personnaiges was printed by Jehan Bonfons (no date) . Chaucer followed Petrarch's version in the Canterbury Tales. Ralph Radcliffe, who flourished under Henry VIII., is said to have written a play on the subject, and the story was dramatized by Thomas Dekker, Henry Chettle and W. Haughton in 1603.

An example of the many ballads of Griselda is given in T. Deloney's Garland of Good Will (1685), and the 17th-century chap-book, The History of Patient Grisel (1619), was edited by H. B. Wheatley (1885) for the Villon Society with a bibliographical and literary introduction.

GRISI, GIULIA (1811-1869), Italian opera-singer, daughter of one of Napoleon's Italian officers, was born in Milan. She came of a family of musical gifts, her maternal aunt Josephina Grassini (1773-1850) being a favourite opera-singer both on the continent and in London; her mother had also been a singer, and her elder sister Giudetta and her cousin Carlotta were both exceedingly talented. Giulia was trained to a musical career, and made her stage debut in 1828. Rossini and Bellini both took an interest in her, and at Milan she was the first Adalgisa in Bellini's Norma, in which Pasta took the title-part. Grisi appeared in Paris in 1832, as Semiramide in. Rossini's opera, and had a great success; and in 1834 she appeared in London. Her voice was a brilliant dramatic soprano, and her established position as a prima donna continued for thirty years. She was a particularly fine actress, and in London opera her associa- tion with such singers as Lablache, Rubini, Tamburini and Mario was long remembered as the palmy days of Italian opera. In 1854 she toured with Mario in America. She had married Count de Melcy in 1836, but this ended in a divorce; and in 1856 she married Mario (q.v.). She died in Berlin on the 29th of November

1869.

GRISON (Galiclis vitlata); a carnivorous mammal, of the family Mustelidae, common in Central and South America and Mexico. It is about the size of a marten, and has the upper surface of a bluish-grey tint, and the under surface is dark brown. The grison lives on small mammals and birds, and in settled districts is destructive to poultry. Allamand's grison (G. allamandi) , with the same range, is somewhat larger. Another member of the genus is the tayra or taira (G. barbara), about as large as an otter, with a range from Mexico to Argentina. This species hunts in companies (see Carnivora).

GRISONS (Ger. Graubiinden) , the most easterly of the Swiss cantons and also the largest in extent, though relatively the most sparsely populated. Its total area is 2753-2 sq. m., of which 1634-4 sq. m. are classed as " productive " (forests covering 503-1 sq. m. and vineyards 1-3 sq. m.), but it has also 138-6 sq. m. of glaciers, ranking in this respect next after the Valais and before Bern. The whole canton is mountainous, the principal glacier groups being those of the Todi, N. (11,887 ft.), of Medels, S.W. (Piz Medel, 10,509 ft.), of the Rheinwald or the Adula Alps, S.W. (Rheinwaldhorn, 11,149 ft.), with the chief source of the Rhine, of the Bernina, S.E. (Piz Bernina, 13,304 ft.), the most extensive, of the Albula, E. (Piz Kesch, 11,228 ft.), and of the Silvretta, N.E. (PizLinard, 11,201 ft.). The principal valleys are those of the upper Rhine and of the upper Inn (or Engadine, q.v.). The three main sources of the Rhine are in the canton. The valley of the Vorder Rhine is called the Biindner Oberland, that of the Mittel Rhine the Val Medels, and that of the Hinter Rhine (the principal), in different parts of its course, the Rheinwald, the Schams valley and the-Domlesehg valley, while the upper valley of the Julia is named the Oberhalbstein. The chief affluents of the Rhine in the canton are the Glenner (flowing through the Lugnetz valley), the Avers Rhine, the Albula (swollen by the Julia and the Landwasser), the Plessur (Schanfigg valley) and the Landquart (coming from the Prat- tigau). The Rhine and the Inn flow respectively into the North and the Black Seas. Of other streams that of Val Mesocco joins the Ticino and so the Po, while the Maira or Mera (Val Bregaglia) and the Poschiavino join the Adda, and the Rambach (Minister

valley) the Adige, all four thus ultimately reaching the Adriatic Sea. The inner valleys are the highest in Central Europe, and among the loftiest villages are Juf, 6998 ft. (the highest per- manently inhabited village in the Alps), at the head of the Avers glen, and St Moritz, 6037 ft., in the Upper Engadine. The lower courses of the various streams are rent by remarkable gorges, such as the Via Mala, the Rofna, the Schyn, and those in the Avers, Medels and Lugnetz glens, as well as that of the Ziige in the Landwasser glen. Below Coire, near Malans, good wine is produced, while in the Val Mesocco, &c, maize and chest- nuts flourish. But the forests and the

mountain pasturages are the chief source of wealth. The lower pastures maintain a fine breed of cows, while the upper are let out in summer to Berga- masque shepherds. There are many mineral springs, such as those of St Moritz, Schuls, Alvaneu, Fideris, Le Prese and San Bernardino. The climate and vegetation, save on the southern slope of the Alps, are alpine and severe. But yearly vastnumbers of stranger% visit different spots in the canton, especially Davos (q.v.), Arosa and the Engadine. As yet there are comparatively few railways. There is one from Maienfeld (continued north to Constance and north-west to Zurich) to Coire (11 m.), which sends off a branch line from Landquart, E., past Klosters to Davos (31 m.). From Coire the line bears west to Reichenau (6 m.), whence one branch runs S.S.E. beneath the Albula Pass to St Moritz (50 m.), and another S.W. up the Hinter Rhine valley to Ilanz (205 m.). There are, however, a number of fine carriage roads across the passes leading to or towards Italy. Besides those leading to the Engadine may be noted the roads from Ilanz past Disentis over the Oberalp Pass (6719 ft.) to Andermatt, from Disentis over the Lukmanier Pass (6289 ft.) to Biasca, on the St Gotthard railway, from Reichenau past Thusis and Spliigen over the San Bernardino Pass (6769 ft.) to Bellinzona on the same railway line, and from Spliigen over the Spliigen Pass(6946 ft.)to Chiavenna. The Septimer Pass(7582 ft.) from the Julier route to the Maloja route has now only a mule path, but was probably known in Roman times (as was possibly the Spliigen), and was much frequented in the middle ages.

The population of the canton in 1900 was 104,520. Of this number 55,155 (mainly near Coire and Davos, in the Prattigau and in the Schanfigg valley) were Protestants, while 49,142 (mainly in the Biindner Oberland, the Vail Mesocco and the Oberhalbstein) were Romanists, while there were also 114 Jews (81 of whom lived in Davos). In point of language 48,762 (mainly near Coire and Davos, in the Prattigau and in the Schanfigg valley) were German-speaking, while 17,539 (mostly in the Val Mesocco, the Val Bregaglia and the valley of Poschiavo, but including a number of Italian labourers engaged on the construction of the Albula railway) were Italian-speaking. But the characteristic tongue of the Grisons is a survival of an ancient Romance language (the lingua rustica of the Roman Empire), which has lagged behind its sisters. It has a scanty printed literature, but is still widely spoken, so that, of the 38,651 persons in the Swiss Confederation who speak it, no fewer than 36,472 are in the Grisons. It is distinguished into two dialects: the Romonsch (sometimes wrongly called Romansch), which prevails in the Biindner Oberland and in the Hinter Rhine valley (Schams and Domleschg), and the Ladin (closely related to the tongue spoken in parts of the South Tyrol), that survives in the Engadine and in the neighbouring valleys of Bergiin, Oberhalbstein and Miinster. (See F. Rausch's Geschichte der Literatur des rhaelo-romanischen

Volkes, Frankfort, 1870, and Mr Coolidge's bibliography of this language, given on pp. 22-23 of Lorria and Martel's Le Massif de la Bernina, Zurich, 1894.) Yet in the midst of this Romance-speaking population are islets (mostly, if not entirely, due to immigration in the 13th century from the German-speaking Upper Valais) of German-speaking inhabitants, so in the Vals and Safien glens, and at Obersaxen (all in the Biindner Oberland), in the Rhein- wald (the highest part of the Hinter Rhine valley), and in the Avers glen (middle reach of the Hinter Rhine valley), as well as in and around Davos itself.

There is not much industrial activity in the Grisons. A

considerable portion of the population is engaged in attending to the wants of the foreign visitors, but there is a considerable trade with Italy, particularly in the wines of the Valtellina, while many young men seek their fortunes abroad (returning home after having accumulated a small stock of money) as confectioners, pastry-cooks and coffee-house keepers. A certain number of lead and silver mines were formerly worked, but are now abandoned. The capital of the canton is Coire (q.v.).

*The canton is divided into 14 administrative districts, and includes 224 communes. It sends 2 members (elected by a popular vote) to the Federal Stdnderath, and 5 members (also elected by a popular vote) to the Federal Nationalrath. The existing cantonal constitution was accepted by the people in 1892, and came into force on 1st January 1894. The legislature (Grossrath — no numbers fixed by the constitution) is elected for 2 years by a popular vote, as are the 5 members of the executive (Kleinrath) for 3 years. The " obligatory referendum " obtains in the case of all laws and important matters of expendi- **ire, while 3000 citizens can demand (" facultative referendum") a popular vote as to resolutions and ordinances made by the legislature. Three thousand citizens also have the right of " initiative " as to legislative projects, but 5°°° signatures are required for a proposed revision of the cantonal constitution. In the revenue and expenditure of the canton the taxes are never counted. This causes an apparent deficit which is carried to the capital account, and is met by the land tax (art. 19 of the constitution), so that there is never a real deficit, as the amount of the land tax varies annually according to the amount that must be provided. In the pre-1799 constitution of the three Raetian Leagues the system of the " referendum " was in working as early as the 16th century, not merely as between the three Leagues themselves, but as between the bailiwicks (H ' ochgerichte) , the sovereign units within each*

League, and sometimes (as in the Upper Engadine) between the villages composing each bailiwick.

The greater part (excluding the three valleys where the inhabitants speak Italian) of the modern canton of the Grisons formed the southern part of the province of Raetia (probably the aboriginal inhabitants, the Raeti, were Celts rather than, as was formerly believed, Etruscans), set up by the Romans after their conquest of the region in 15 B.C. The Romanized inhabi- tants were to a certain extent (The Romonsch or Ladin tongue is a survival of the Roman dominion) Teutonized under the Ostrogoths (a.d. 493-537) and under the Franks (from 537 onwards). Governors called Praesides are mentioned in the 7th and 8th centuries, while members of the same family occupied the episcopal see of Coire (founded 4th-5th centuries). About 806 Charles the Great made this region into a county, but in 831 the bishop procured for his dominions exemption ("im- munity ") from the jurisdiction of the counts, while before 847 his see was transferred from the Italian province of Milan to the German province of Mainz (Mayence) and was thus cut off from Italy to be joined to Germany. In 916 the region was united with the duchy of Alamannia, but the bishop still retained practical independence, and his wide-spread dominions placed him even above the abbots of Disentis and Pfafers, who likewise enjoyed " immunity." In the 10th century the bishop obtained fresh privileges from the emperors (besides the Val Bregaglia in 960), and so became the chief of the many feudal nobles who struggled for power in the region. He became a prince of the empire in n 70 and later allied himself with the rising power (in the region) of the Habsburgers. This led in 1367 to the foundation of the League of God's House or the! Golteshausbund (composed of the city and chapter of Coire, and of the bishop's subjects, especially in the Engadine, Val Bregaglia, Domleschg and Oberhalbstein) in order to stem his rising power, the bishop entering it in 1392. In 1395 the abbot of Disentis, the men of the Lugnetz valley, and the great feudal lords of Razuns and Sax (in 1399 the counts of Werdenberg came in) formed another League, called the Ober Bund (as comprising the highlands in the Vorder Rhine valley) and also wrongly the " Grey League " (as the word interpreted " grey " is simply a misreading of

graven or counts, though the false view has given rise to the name of Grisons or Graubunden for the whole canton), their alliance being strengthened in 1424 when, too, the free men of the Rheinwald and Schams came in, and in 1480 the Val Mesocco also. Finally, in 1436, the third Raetian League was founded, that of the Zehngerichtenbund or League of the Ten Jurisdictions, by the former subjects of the count of Toggenburg, whose dynasty then became extinct; they include the

inhabitants of the Prattigau, Davos, Maienfeld, the Schanfigg valley, Churwalden, and the lordship of Belfort {i.e. the region round Alvaneu) , and formed ten bailiwicks, whence the name of the League. In 1450 the Zehngerichtenbund concluded an alliance with the Golteshausbund and in 14 71 with the Ober Bund; but of the so-called perpetual alliance at Vazerol, near Tiefenkastels, there exists no authentic evidence in the oldest chronicles, though diets were held there. By a succession of purchases (1477-1496) nearly all the possessions of the extinct dynasty of the counts of Toggenburg in the Prattigau had come to the junior or Tyrolese line of the Habsburgers. On its extinction (1496) in turn they passed to the elder line, the head of which, Maximilian, was already emperor-elect and desired to maintain the rights of his family there and in the Lower Engadine. Hence in 1497 the Ober Bund and in 1498 the Golteshausbund became allies of the Swiss Confederation. War broke out in 1499, but was ended by the great Swiss victory (22nd May 1499) at the battle of the Calven gorge (above Mais) which, added to another Swiss victory at Dornach (near Basel), compelled the emperor to recognize the practical independence of the Swiss and their allies of the Empire. The religious Reformation brought disunion into the three Leagues, as the Ober Bund clung in the main to the old faith, and for this reason their connexion with the Swiss Confederation was much weakened. In 1526, by the Articles of Ilanz, the last remaining traces of the temporal jurisdiction of the bishop of Coire was abolished. In i486 Poschiavo had at last been secured from Milan, and Maienfeld with Malans was bought in 1509, while in 1549 the Val Mesocco (included in the Ober Bund since 1480) purchased its freedom of its lords, the Trivulzio family of Milan. In 1 5 1 2 the three Leagues conquered from Milan the rich and fertile Valtellina, with Bormioand Chiavenna, and held these districts as subject lands till in 1797 they were annexed to the Cisalpine Republic. The struggle for lucrative offices in these lands further sharpened the long rivalry between the families of Planta (Engadine) and Salis (Val Bregaglia), while in the 17th century this rivalry was complicated by political enmities, as the Plantas favoured the Spanish side and the Salis that of France during the long struggle (1620-1639) for the Valtellina (see Jenatsch and Valtellina). Troubles arose (1622) also in the Prattigau through the attempts of the Habsburgers to force the inhabitants to give up Pro- testantism. Finally, after the emperor had formally recognized, by the treaty of Westphalia (1648), the independence of the Swiss Confederation, the rights of the Habsburgers in the Prattigau and the Lower Engadine were bought up (1649 and 1652). But the Austrian enclaves of Tarasp (Lower Engadine) and of Razuns (near Reichenau) were only annexed to the Grisons in 1809 and 18 15 respectively, in each case France holding the lordship for a short time after its cession by Austria. In 1748 (finally in 1762) the three Leagues secured the upper portion of the valley of Munster. In 1799 the French invaded the

canton, which became the scene of a fierce conflict (1799-1800) between them and the united Russian and Austrian army, in the course of which the French, burnt (May 1799) the ancient convent of Disentis with all its literary treasures. In April 1799 the provisional government agreed to the incorporation of the three Leagues in the Helvetic Republic, though it was not till June 1801 that the canton of Raetia became formally part of the Helvetic Republic. In 1803, by Napoleon's Act of Mediation, it entered, under the name of Canton of the Grisons or Grau- bunden, the reconstituted Swiss Confederation, of which it then first became a full member.

Authorities. — A. Andrea, Das Bergell (Frauenfeld, 1901); Bundnergeschichte in 11 Vortrdgen, by various writers (Coire, I 902);

Codex diplomaticus Raetiae (5 vols., Coire, 1848-1886); W. Coxe, Travels in Switzerland, vol. ii. of the 1789 London edition ; E. Dunant, La Reunion des Grisons a la Suisse {1798-1799) (Basel, 1899); G. Fient, Das Prdttigau (2nd ed., Davos, 1897); P. Foffa, Das biindnerische Munsterthal (Coire, 1864); F. Fossati, Codice diplo- matico delta Rezia (originally published in the Periodico of the Societa storica a Comense at Como; separate reprint, Como, 1901); R. A. Ganzoni, Beitrdge zur Kenntnis d. bundnerischen Referendums (Zurich, 1890); Mrs Henry Freshfield, A Summer Tour in the Grisons (London, 1862); C. and F. Jecklin, Der Anteil Graubundens am Sch-oabenkrieg (1499) (Davos, 1899); C. von Moor, Geschichte von Curraetien (2 vols., Coire, 1870-1874), and Wegweiser (Coire, 1873); E. Lechner, Das Thai Bergell (2nd ed., Leipzig, 1874); G. Leonhardi, Das Poschiavinothal (Leipzig, 1859); A. Lorria and E. A. Martel, Le Massif de la Bernina (Upper Engadine and Val Bregaglia) (Zurich, 1894) < P- C. von Planta, Das alte Raetien (Berlin, 1872); Die curraetischen Herrschaften in d. Feudalzeit (Bern, 1881); Geschichte von Graubiinden (Bern, 1892) ; and Chronik d. Familie von Planta (Zurich, 1892); W. Plattner, Die, Entstehung d. Freistaates der J Biinde (Davos, 1895), R. von Reding-Biberegg, Der Zug Suworoffs durch die Schweiz in 1799 (Stans, 1895); N. Salis-Soglio, Die Familie von Salis (Lindau, 1891); G. Theobald, Das Biindner Oberland (Coire, 1861), and Naturbilder aus den rhdtischen Alpen (3rd ed., Coire, 1893); N. Valaer, Johannes von Planta (d. 1572) (Ziirich, 1888) ; R. Wagner and L. R. von Salis, Rechtsquellen d. Cant. Graubiinden (Basel, 1877-1892); F. Jecklin, Materialen zur Standes- und Landes geschichte Gem. iii. Biinde (Graubiinden), 1464.-1803 (pt. i., Regesten, was published at Basel in 1907). See also Coire, Engadine, Jenatsch and Valtellina. (W. A. B. C.)

GRISWOLD, RUFUS WILMOT (181,5-1857),' American editor and compiler, was born in Benson, Vermont, on the 15th of February 1815. He travelled extensively, worked in newspaper offices, was a Baptist clergyman for a time, and finally became a journalist in New York City, where he was successively a member of the staffs of The Brother Jonathan, The New World (1830-1840) and The New Yorker (1840). From 1841 to 1843 he edited Graham's Magazine (Philadelphia), and added to its list of contributors many leading American writers. From 1850 to 1852 he edited the International Magazine (New York), which in 1852 was merged into Harper's Magazine. He died in New York City on the 27th of August 1857. He is best known as the compiler and editor of various anthologies (with brief biographies and critiques), such as Poets and Poetry of America (1842), his most popular and valuable book; Prose Writers of America (1846); Female Poets of America (1848); and Sacred Poets of England and America (1849). Of his own writings his RepublicanCourt: or American Society in the Days of Washington (1854) is the only one of permanent value. He edited the first American edition of Milton's prose works (1845), and, as literary executor, edited, with James R. Lowell and N. P. Willis, the works (1 8 50) of Edgar Allan Poe. Gris wold 's great contemporary reputation as a critic has not stood the test of time; but he rendered a valuable service in making Americans better ac- quainted with the poetry and prose of their own countrymen.

See Passages from the Correspondence and Other Papers of Rufus W. Griswold (Cambridge, Mass., 1898), edited by his son William McCrillis Griswold (1853-1899).

GRIVET, a monkey, Cercopilhecus sabaeus, of the guenon group, nearly allied to the green monkey. It is common through- out equatorial Africa. The chin, whiskers and a broad band across the forehead, as well as the under-parts, are white, and the head and back olive-green. These monkeys are very commonly seen in menageries.

GROAT (adapted from the Dutch groot, great, thick; cf. Ger. Groschen; the Med. Lat. grossus gives Ital. grosso, Fr. gros, as names for the coin), a name applied as early as the 13th century on the continent of Europe to any large or thick coin. The groat was almost universally a silver coin, but its value varied considerably, as well at different times as in different countries. The English groat was first coined in 1351, of a value somewhat higher than a penny. The continuous debasement of both the penny and the groat left the latter finally worth four pennies. The issue of the groat was discontinued after 1662, but a coin worth fourpence was again struck in 1836. Although frequently referred to as a groat, it had no other official designa- tion than a " fourpenny piece." Its issue was again discontinued

in 1856. The groat was imitated in Scotland by a coin struck

by David II. in 1358. In Ireland it was first struck by Edward IV. in 1460.

GROCER, literally one who sells by the gross, a wholesale dealer; the word is derived through the 0. Fr. form, grossia, from the Med. Lat. grossarius, defined by du Cange, Glossarium, s.v. Grossares, as solidae mercis propola. The name, as a general one for dealers by wholesale, " engrossers " as opposed to " regrators," the retail dealers, is found with the commodity attached; thus in the Munimenta Gildhallae (" Rolls " series) ii. 1.304 (quoted in the New English Dictionary) is found an allusion to grossours de vin, cf. groser of fysshe, Surtees Misc. (1888) 63, for the customs of Malton (quoted ib.). The specific application of the word to one who deals either by wholesale or retail in tea, coffee, cocoa, dried fruits, spices, sugar and all kinds of articles of use or consumption in a household is connected with the history of the Grocers' Company of London, one of the twelve " great " livery companies. In 1345 the pepperers and the spicers amalgamated and were known as the Fraternity of St Anthony. The name " grocers " first appears in 1373 in the records of the company. In 1386 the association was granted a right of search over all " spicers " in London, and in 1394 they obtained the right to inspect or " garble " spices and other " subtil wares." Their first charter was obtained in 1428; letters patent in 1447 granted an extension of the right of search over the whole county, but removed the " liberties " of the city of London. They sold all kinds of drugs, medicines, oint- ments, plasters, and medicated and other waters. For the separation of the apothecaries from the grocers in 1617 see Apothecary. (See further Livery Companies.)

See The Grocery Trade, by J. Aubrey Rees (1910).

GROCYN, WILLIAM (i446?isio), English scholar, was born at Colerne, Wiltshire, about 1446. Intended by his parents for the church, he was sent to Winchester College, and in 1465 was elected to a scholarship at New College, Oxford. In 1467 he became a fellow, and had among his pupils William Warham, afterwards archbishop of Canterbury. In 1479 h"e accepted the rectory of Newton Longville, in Buckinghamshire, but continued to reside at Oxford. As reader in divinity in Magdalen College in 1481, he held a disputation with John Taylor, professor of divinity, in presence of King Richard III., and the king acknow ledged his skill as a debater by the present of a buck and five marks. In 1485 he became prebendary of Lincoln cathedral. About 1488 Grocyn left England for Italy, and before his return in 1491 he had visited Florence, Rome and Padua, and studied Greek and Latin under Demetrius Chalchondyles and Politian. As lecturer in Exeter College he found an opportunity of in- doctrinating his countrymen in the new Greek learning.

Erasmus says in one of his letters that Grocyn taught Greek at Oxford before his visit to Italy. The Warden of New College, Thomas Chaundler, invited Cornelius Vitelli, then on a visit to Oxford, to act as praelector. This was about 1475, and as Vitelli was certainly familiar with Greek literature, Grocyn may have learnt Greek from him. He seems to have lived in Oxford until 1499, but when his friend Colet became dean of St Paul's in 1504 he was settled in London. He was chosen by his friend to deliver lectures in St Paul's; and in this connexion he gave a singular proof of his honesty. He had at first denounced all who impugned the authenticity of the Hierarchia ecclesiastica ascribed to Dionysius the Areopagite, but, being led to modify his views by further investigation, he openly declared that he had been completely mistaken. He also counted Linacre, William Lily, William Latimer and More among his friends, and Erasmus writing in 1514 says that he was supported by Grocyn in London, and calls him " the friend and preceptor of us all." He held several preferments, but his generosity to his friends involved him in continual difficulties, and though in 1506 he was appointed on Archbishop Warham's recommenda- tion master or warden of All Hallows College at Maidstone in Kent, he was still obliged to borrow from his friends, and even to pledge his plate as a security. He died in 1519, and was buried in the collegiate church at Maidstone. Linacre acted as his executor, and expended the money he received in gifts

to the poor and the purchase of books for poor scholars. With the exception of a few lines of Latin verse on a lady who snow- balled him, and a letter to Aldus Manutius at the head of Linacre's translation of Proclus's Sphaera (Venice, 1499), Grocyn has left no literary proof of his scholarship or abilities. His proposal to execute a translation of Aristotle in company with Linacre and Latimer was never carried out. Wood assigns some Latin works to Grocyn, but on insufficient authority. By Erasmus he has been described as " vir severissimae castissimae vitae, ecclesiasticarum constitutionum observantissimus pene usque ad superstitionem, scholasticae theologiae ad unguem doctus ac natura etiam acerrimi judicii, demum in omni disciplinarum genere exacte versatus " (Declarationes ad censuras facultatis

theo

giae Parisianae, 1522).

An account of Grocyn by Professor Burrows appeared in the Oxford Historical Society's Collectanea (1890).

GRODNO, one of the Lithuanian governments of western Russia, lying between 51 40′ and 52 N. and between 22 12′ and 26° E., and bounded N. by the government of Vilna, E. by Minsk, S. by Volhynia, and W. by the Polish governments of Lomza and Siedlce. Area, 14,926 sq. m. Except for some hills (not exceeding 925 ft.) in the N., it is a uniform plain, and is drained chiefly by the Bug, Niemen, Narev and Bobr, all navigable. There are also several canals, the most important being the Augustowo and Oginsky. Granites and gneisses crop out along the Bug, Cretaceous, and especially Tertiary, deposits elsewhere. The soil is mostly sandy, and in the district of Grodno and along the rivers is often drift-sand. Forests, principally of Coniferae, cover more than one-fourth of the area. Amongst them are some of vast extent, e.g. those of Grodno (410 sq. m.) and Byelovitsa (Bialowice) (376 sq. rrr.), embracing wide areas of marshy ground. In the last mentioned forest the wild ox survives, having been jealously preserved since 1803. Peat bogs, sometimes as much as 4 to 7 ft. thick, cover extensive districts. Theclimateiswetand cold; the annual mean temperature being 44-5° F., the January mean 22-5° and the July mean 64-5°. The rainfall amounts to 215 in.; hail is frequent. Agriculture is the predominant industry. The peasants own 42! % of the iand, that is, about 4,000,000 acres, and of these over 2j million acres are arable. The crops principally grown are potatoes, rye, oats, wheat, flax, hemp and some tobacco. Horses, cattle and sheep are bred in fairly large numbers. There is, however, a certain amount of manufacturing industry, especially in woollens, distilling and tobacco. In woollens this government ranks second (after Moscow) in the empire, the centre of the industry being Byelostok. Other factories produce silk, shoddy and leather. The govern- ment is crossed by the main lines of railway from Warsaw to St Petersburg and from Warsaw to Moscow. The population numbered 1,008,521 in 1870 and 1,616,630 in 1897; of these last 789,801 were women and 255,946 were urban. In 1906 it was estimated at 1,826,600. White Russians predominate (54 °o), then follow Jews (17-4 %), Poles (10 %), Lithuanians and Germans. The government is divided into nine districts, the chief towns, with their populations in 1897, being Grodno (q.v.), Brest-Litovsk (pop. 42,812 in 1901), Byelsk (7461), Byelostok or Bialystok (65,781 in 1901), Kobrin (10,365), Pruzhany (7634), Slonim (15,893), Sokolsk (7595) and Volkovysk (10,584). In 1795 Grodno, which had been Polish for ages, was annexed by Russia.

GRODNO, a town of Russia, capital of the government of the same name in 53 40′ N. and 23° 50′ E., on the right bank of the Niemen, 160 m. by rail N.E. of Warsaw and 98 m. S.W. of Vilna on the main line to St Petersburg. Pop. (1901.) 41,736, nearly two- thirds Jews. It is an episcopal see of the Orthodox Greek church and the headquarters of the II. Army Corps. It has two old castles, now converted to other uses, and two

churches (16th and 17th centuries). Tobacco factories and distilleries are important; machinery, soap, candles, vehicles and firearms are also made. Built in the 12th century, Grodno was almost entirely destroyed by the Mongols (1241) and Teutonic knights (1284 and 1391). Stephen Bathory, king of Poland, made it his capital, and died there in 1586. The Polish Estates frequently

met at Grodno after 1673, and there in 1793 they signed the second partition of Poland. It was at Grodno that Stanislaus Poniatowski resigned the Polish crown in 1795.

GROEN VAN PRINSTERER, GUILLAUME (1801-1876), Dutch politician and historian, was born at Voorburg, near the Hague, on the 21st of August 1801. He studied at Leiden university, and graduated in 1823 both as doctor of literature and LL.D. From 1829 to 1833 he acted as secretary to King William I. of Holland, afterwards took a prominent part in Dutch home politics, and gradually became the leader of the so-called anti-revolutionary party, both in the Second Chamber, of which he was for many years a member, and outside. In Groen the doctrines of Guizot and Stahl found an eloquent exponent. They permeate his controversial and political writings and historical studies, of which his Handbook of Dutch History (in Dutch) and Maurice et Barnevelt (in French, 1875, a criticism of Motley's Life of Van Olden-Barnevelt) are the principal. Groen was violently opposed to Thorbecke, whose principles he denounced as ungodly and revolutionary. Although he lived to see these principles triumph, he never ceased to oppose them until his death, which occurred at the Hague on the 19th of May 1876. He is best known as the editor of the Archives et corre- spondance de la maison d'Orange (12 vols., 1835-1845), a great work of patient erudition, which procured for him the title of the " Dutch Gachard." J. L. Motley acknowledges his indebted- ness to Groen 's Archives in the preface to his Rise of the Dutch Republic, at a time when the American historian had not yet made the acquaintance of King William's archivist, and also bore emphatic testimony to Groen's worth as a writer of history in the correspondence published after his death. At the first reception, in 1858, of Motley at the royal palace at the Hague, the king presented him with a copy of Groen's Archives as a token of appreciation and admiration of the work done by the " worthy vindicator of William I., prince of Orange." This copy, bearing the king's autograph inscription, afterwards came into the posses- sion of Sir William Vernon Harcourt, Motley's son-in-law.

GROIN. (1) An obsolete word for the grunting of swine, from Lat. grunnire, and so applied to the snout of a pig; it is probably the origin of the word, more commonly spelled " groyne," for a small timber framework or wall of masonry used on sea coasts as a breakwater to prevent the

encroachment of sand and shingle. (2) (Of uncertain origin; from an older form grynde or grinde; the derivation from " grain," an obsolete word meaning " fork, "cannot, accordingto the New English Dictionary, be accepted), in anatomy the folds or grooves formed between the lower part of the abdomen and the thighs, covering the inguinal glands, and so applied in architecture to the angle or " arris " formed by the intersection of two vaults crossing one another, occasionally called by workmen " groin point." If the vaults are both of the same radius and height, their intersections lie in a vertical plane, in other cases they form winding curves for which it is difficult to provide centering. In early medieval vaulting this was sometimes arranged by a slight alteration in the geometrical curve of the vault, but the problem was not satis- factorily solved until the introduction of the rib which hence- forth ruled the vaulting surface of the web or cell (see Vault). The name " Welsh groin " gr " underpitch " is generally given to the vaulting surface or web where the main longitudinal vault is higher than the cross or transverse vaults; as the trans- verse rib (of much greater radius than that of the wall rib), projected diagonally in front of the latter, the filling-in or web has to be carried back from the transverse to the wall rib. The term " groin centering " is used where, in groining without ribs, the whole surface is supported by centering during the erec- tion of the vaulting. In ribbed work the stone ribs only are supported by timber ribs during the progress of the work, any light stuff being used while filling in the spandrils. (See Vault.) GROLMANN, KARL WILHELM GEORG VON (1777-1843), Prussian soldier, was born in Berlin on the 30th of July 1777. He entered an infantry regiment when scarcely thirteen, became an ensign in 1795, second lieutenant 1797, first lieutenant 1804 and staff-captain in 1805. As a subaltern he had become one of

Scharnhorst's intimates, and he was distinguished for his energetic and fearless character before the war of 1806, in which he served throughout, from Jena to the peace of Tilsit, as a staff officer, and won the rank of major for distinguished service in action. After the peace, and the downfall of Prussia, he was one of the most active of Scharnhorst's assistants in the work of reorganization (1809), joined the Tugendbund and endeavoured to take part in Schill's abortive expedition, after which he entered the Austrian service as a major on the general staff. Thereafter he journeyed to Cadiz to assist the Spaniards against Napoleon, and he led a corps of volunteers in the defence of that port against Marshal Victor in 1810. He was present at the battle of Albuera, at Saguntum, and at Valencia, becoming a prisoner of war at the surrender of the last-named place. Soon, however, he escaped to Switzerland, whence early in 1813 he returned to

Prussia as a major on the general staff. He served suc- cessively under Colonel von Dolffs and General von Kleist, and as commissioner at the headquarters of the Russian general Barclay de Tolly. He took part with Kleist in the victory of Kulm, and recovered from a severe wound received at that action in time to be present at the battle of Leipzig. He played a conspicuous part in the campaign of 1814 in France, after which he was made a major-general. In this rank he was appointed quartermaster-general to Field Marshal Prince Bliicher, and, after his chief and Gneisenau, Grolmann had the greatest share in directing the Prussian operations of 181 5. In the decision, on the 18th of June 1 81 5, to press forward to Wellington's assistance (see Waterloo Campaign), Grolmann actively concurred, and as the troops approached the battle-field, he is said to have over- come the momentary hesitation of the commander-in-chief and the chief of staff by himself giving the order to advance. After the peace of 181 5, Grolmann occupied important positions in the ministry of war and the general staff. His last public services were rendered in Poland as commander-in-chief, and practically as civil administrator of the province of Posen. He was promoted general of infantry in 1837 and died on the 1st of June 1843, at Posen. His two sons became generals in the Prussian army. The Prussian 18th infantry regiment bears his name.

General von Grolmann supervised and provided much of the material for von Damitz's Gesch. des Feldzugs 1815 (Berlin, 1837-1838), and Gesch. des Feldzugs 1814 in Frankreich (Berlin,

1842-1843).

See v. Conrady, Leben und Wirken des Generals Karl von Grolmann (Berlin, 1894-1896).

GROMATICI (from groma or gruma, a surveyor's pole), or Agrimensores, the name for land-surveyors amongst the Romans. The art of surveying was probably at first in the hands of the augurs, by whom it was exercised in all cases where the demarca- tion of a templum (any consecrated space) was necessary. Thus, the boundaries of Rome itself, of colonies and camps, were all marked out in accordance with the rules of augural procedure. The first professional surveyor mentioned is L. Decidius Saxa, who was employed by Antony in the measurement of camps (Cicero, Philippics, xi. 12, xiv. 10). During the empire their number and reputation increased. The distribution of land amongst the veterans, the increase, in the number of military colonies, the settlement of Italian peasants in the provinces, the general survey of the empire under Augustus, the separation of private and state domains, led to the establishment of a recognized professional corporation of surveyors. During later times they were in receipt of large salaries, and in some cases were even honoured with the title clarissimus.

Their duties were not merely geometrical or mathematical, but required legal knowledge for consultations or the settlement of disputes. This led to the institution of special schools for the training of sur- ■ veyors and a special literature, which lasted from the 1st to the 6th century a.d. The earliest of the gromatic writers was Frontinus (q.v.), whose De agrorum qualitate, dealing with the kgal aspect of the art, was the subject of a commentary by Aggenus Urbicus, a Christian schoolmaster. Under Trajan a certain Balbus, who had accompanied the emperor on his

Dacian campaign, wrote a still extant manual of geometry for land surveyors (Expositio et ratio omnium formarum or men- surarum, probably after a Greek original by Hero), dedicated to a certain Celsus who had invented an improvement in a gromatic instrument (perhaps the dioptra, resembling the modern theodolite) ; for the treatises of Hyginus see that name. Somewhat later than Trajan was Siculus Flaccus {De con- dicionibus agrorum, extant), while the most curious treatise on the subject, written in barbarous Latin and entitled Casae litterarum (long a school textbook) is the work of a certain Innocentius (4th-5th century). It is doubtful whether Boetius is the author of the treatises attributed to him. The Gromatici veteres also contains extracts from official registers (probably belonging to the 5th century) of colonial and other land surveys, lists and descriptions of boundary stones, and extracts from the Theodosian Codex. According to Mommsen, the collection had its origin during the 5th century in the office of a vicarius (dio- cesan governor) of Rome, who had a number of surveyors under him. The surveyors were known by various names: decem- pedator (with reference to the instrument used) ; finitor, metator or mensor castrorum in republican times; togati Augustorum as imperial civil officials; professor, auctor as professional instructors.

The best edition of the Gromatici is by C. Lachmann and others (1848) with supplementary volume, Die Schriften der romischen Feldmesser (1852); see also B. G. Niebuhr, Roman History, ii., appendix (Eng. trans.), who first revived interest in the subject; M. Cantor, Die romischen Agrimensoren (Leipzig, 1875) ; P. de Tissot, La Condition des Agrimensores dans I'ancienne Rome (1879); G. Rossi, Groma e squadro (Turin, 1877); articles by F. Hultsch in Ersch and Gruber's Allgem. Encyklopddie, and by G. Humbert in Daremberg and Saglio's Dictionnaire des antiquites ; Teuff el-Schwabe, Hist, of Roman Literature, 58.

GRONINGEN, the most northerly province of Holland, bounded S. by Drente, W. by Friesland and the Lauwers Zee, N. and N.E. by the North Sea and the mouth of the Ems with the Dollart, and on the S.E. by the Prussian province of Hanover. It includes the islands of Boschplaat and Rottumeroog, belonging to the group of Frisian islands (q.v.). Area, 887 sq. m.; pop. (1900) 299,602. Groningen is connected with the Drente plateau

by the sandy tongue of the Hondsrug which extends almost up to the capital. West, north and north-east of this the province is flat and consists of sea-clay or sand and clay mixed, except where patches of low and high fen occur on the Frisian borders. Low fen predominates to the east of the capital, between the Zuidlardermeer and the Schildmeer or lakes. The south-eastern portion of the province consists of high fen resting on diluvial sand. A large part of this has been reclaimed and the sandy soil laid bare, but on the Drente and Prussian borders areas of fen still remain. The so-called Boertanger Morass on the Piussian border was long considered as the natural protection of the eastern frontier, and with the view of preserving its impassable condition neither agriculture nor cattle-rearing might be practised here until 1824, and it was only in 1868 that the building of houses was sanctioned and the work of reclamation begun. The gradual extension of the seaward boundaries of the province owing to the process of littoral deposits may be easily traced, a triple line of sea-dikes in places marking the successive stages in this- advance. The rivers of Groningen descending from the Drente plateau meet at the capital, whence they are continued by the Reitdiep to the Lauwers Zee (being discharged through a lock), and by the Ems canal (1876) to Delfzyl. The south-eastern corner of the province is traversed by the Westerwolde Aa, which discharges into the Dollart. The railway system belongs to the northern section of the State railways, and affords communication with Germany via Winschoten. Steam-tram- ways also serve many parts of the province. Agriculture is the main industry. The proportion of landowners is a very large one, and the prosperous condition of the Groningen farmer is attested by the style of his home, his dress and his gig. As a result, however, partly of the usual want of work on the grass- lands in certain seasons, there has been a considerable emigration to America. The ancient custom called the beklem-recht, or

lease-right, doubtless accounts for the extended ownership of the land. By this law a tenant-farmer is able to bequeath his farm, that is to say, he holds his lease in perpetuity.

The chief agricultural products are barley, oats, wheat, and in the north-east flax is also grown, and exported to South Holland and Belgium. On the higher clay grounds cattle-rearing and horse-breeding are also practised, together with butter and cheese making. The cultivation of potatoes on the sandgrounds in the south and the fen colonies along the Stads-Canal invite general comparison with the industries of Drente (q.v.). Hooge- zand and Sappemeer, Veendam and Wildervank, New and Old

Pekela, New and Old Stads-Canal are instances of villages which have extended until they overlap one another and are similar in this respect to the industrial villages of the Zaan Streek in North Holland. The coast fisheries are considerable. Groningen (q.v.) is the chief and only large town of the province. Delfzyl, which was formerly an important fortress for the protection of the ancient sluices on the little river Delf (hence its name), has greatly benefited by the construction of the Ems (Eems) ship- canal connecting it with Groningen, and has a good harbour with a considerable import trade in wood. Appingedam and Winschoten are very old towns, having important cattle and horse markets. The pretty wood at Winschoten was laid out by the Society for Public Welfare (Tot Nut van het Algemeen) in 1826.

GRONINGEN, a town of Holland, capital of the province of the same name, at the confluence of the two canalized rivers the Drentsche Aa and the Hunse (which are continued to the Lauwers Zee as the Reit Diep), 16 m. N. of Assen and 33 m. E. of Leeuwarden by rail. Pop. (1900) 67,563. Groningen is the centre from which several important canals radiate. Besides the Reit Diep, there are the Ems Canal and the Damster Diep, connecting it with Delfzyl and the Dollart, the Kolonel's Diep with Leeuwarden, the Nord Willem's Canal with Assen and the south and the Stads-Canal south-east with the Ems. Hence steamers ply in all directions, and there is a regular service to Emden and the island of Borkum via Delfzyl, and via the Lauwers Zee to the island of Schiermonnikoog. Groningen is the most important town in the north of Holland, with its fine shops and houses and wide clean streets, while brick houses of the 16th and 17th centuries help it to retain a certain old-world air. The ancient part of the town is still surrounded by the former moat, and in the centre lies a group of open places, of which the Groote Markt is one of the largest market-squares in Holland. Pleasant gardens and promenades extend on the north side of the town, together with a botanical garden. The chief church is the Martini-kerk, with a high tower (432 ft.) dating from 1477, and an organ constructed by the famous scholar and musician Rudolph Agricolo, who was born near Groningen in 1443. The Aa church dates from 1465, but was founded in 1253. The Roman Catholic Broederkerk (rebuilt at the end of the 19th century) contains some remarkable pictures of the Passion by L. Hendricx (1865). There is also a Jewish synagogue. The large town hall (in classical style), one of the finest public buildings, was built at the beginning of the 19th century and"enlarged in 1873. The provincial government offices also occupy a fine building which received a splendid front in 1871. Other noteworthy buildings are the provincial museum of antiquities, containing interesting Germanic anti- quities, as well as medieval and modern collections of porcelain, pictures, &c; the courts of justice (transformed in the middle of the 1 8th century); the old

Ommelanderhuis, formerly devoted to the administration of the surrounding district, built in 1509 and restored in 1899; the weigh-house (1874); the civil and military prison; the arsenal; the military hospital; and the concert hall.

The university of Groningen, founded in 1614, received its present fine buildings in classical style in 1850. Among its auxiliary establishments are a good natural history museum, an observatory, a laboratory, and a library which contains a copy of Erasmus' New Testament with marginal annotations by Luther. Other educational institutions are the deaf and

dumb institution founded by Henri Daniel Guyot (d. 1828) in 1790, a gymnasium, and schools of navigation, art and music. There are learned societies for the study of law (1761) and natural science (1830); an academy of fine arts (1830); an archaeological society; and a central bureau for collecting information concerning the province.

As capital of the province, and' on account of the advan- tages of its natural position, Groningen maintains a very con- siderable trade, chiefly in oil-seed, grain, wood, turf and cattle, with Great Britain, Germany, Scandinavia and Russia. The chief industries are flax-spinning, rope-making, sugar refining, book printing, wool combing and dyeing, and it also manufactures beer, tobacco and cigars, cotton and woollen stuffs, furniture, organs and pianos; besides which there are saw, oil and grain mills, machine works, and numerous goldsmiths and silversmiths. History. — The town of Groningen belonged originally to the pagus, or gouw, of Triantha (Drente), the countship of which was bestowed by the emperor Henry II. on the bishop and chapter of Utrecht in 1024. In 1040 Henry III. gave the church of Utrecht the royal domain of Groningen, and in the deed of gift the " villa Cruoninga " is mentioned. Upon this charter the bishops of Utrecht based their claim to the overlordship of the town, a claim which the citizens hotly disputed. At the time of the donation, indeed, the town can hardly be said to have existed, but the royal " villa " rapidly developed into a community which strove to assert the rights of a free imperial city. At first the bishops were too strong for the townsmen; the defences built in n 10 were pulled down by the bishop's order two years later; and during the 12th and 13th centuries the see of Utrecht, in spite of frequent revolts, succeeded in maintaining its authority. Down to the 1 5th century an episcopal prefect, or burgrave, had his seat in the city, his authority extending over the neighbouring districts known as the Gorecht. In 1 143 Heribert of Bierum, bishop of Utrecht, converted the office into an hereditary fief in favour of his brother Liffert, on the extinction of whose male line it was partitioned between the families of Koevorden (or Coevorden) and van den Hove. Gradually, however, the burghers, aided by the neighbouring Frisians, succeeded in freeing themselves from the

episcopal yoke. The city was again walled in 1255; before 1284 it had become a member of the Hanseatic league; and by the end of the 14th century it was practically a powerful independent republic, which exercised an effective control over the Frisian Ommelande between the Ems and the Lauwers Zee. At the close of the 14th century the heirs of the Koevorden and van den Hove families sold their rights, first to the town, and then to the bishop. A struggle followed, in which the city was temporarily worsted; but in 1440 Bishop Dirk II. finally sold to the city the rights of the see of Utrecht over the Gorecht.

The medieval constitution of Groningen, unlike that of Utrecht, was aristocratic. Merchant gild there was none; and the craft gilds were without direct influence on the city government, which held them in subjection. Membership of the governing council, which selected from its own body the four rationales or burgomasters, was confined to men of approved " wisdom," and wisdom was measured in terms of money. This Raad of wealthy burghers gradually monopolized all power. The bishop's bailiff (schout), with his nominated assessors (scabini), continued to exercise jurisdiction, but members of the Raad sat on the bench with him, and an appeal lay from his court to the Raad itself. The council was, in fact, supreme in the city, and not in the city only. In 1439 it decreed that no one might trade in all the district between the Ems and the Lauwers Zee except burghers, and those who had purchased the fiurwal (right of residence in the city) and the freedom of the gilds. Maximilian I. assigned Groningen to Albert of Saxony, hereditary podestat of Friesland, but the citizens preferred to accept the protection of the bishop of Utrecht; and when Albert's son George attempted in 1505 to seize the town, they recognized the lordship of Edzart of East Frisia. On George's renewal of hostilities they transferred their allegiance to Duke Charles of Gelderland, in 1515. In 1536 the city passed into the

hands of Charles V., and in the great wars of the 16th century suffered all the miseries of siege and military occupation. From 1 581 onwards, Groningen still held by the Spaniards, was con- stantly at war with the " Ommelanden " which had declared against the king of Spain. This feud continued, in spite of the capture of the city in 1594 by Maurice of Nassau, and of a decree of the States in 1597 which was intended to set them at rest. In 1672 the town was besieged by the bishop of Miinster, but it was successfully defended, and in 1698 its fortifications were improved under Coehoorn's direction. The French Republicans planted their tree of liberty in the Great Market on the 14th of February 1795, and they continued in

authority till the 16th of November 1814. The fortifications of the city were doomed to destruction by the law of the 18th of April 1874.

See C. Hegel, Stadie und Gilden (Leipzig, 1891); Stokvis, Manuel d'histoire, iii. 496 (Leiden, 1890-1893); also s.v. in Chevalier, Repertoire des sources hist, du moyen dge (Topo-bibliographie).

GRONLUND, LAURENCE (1846-1899), American socialist, was born in Copenhagen, Denmark, on the 13th of July 1846. He graduated from the university of Copenhagen in 1865, began the study of law, removed to the United States in 1867, taught German in Milwaukee, was admitted to the bar in 1869, and practised in Chicago. He became a writer and lecturer on socialism and was closely connected with the work of the Socialist Labor party from 1874 to 1884, then devoted himself almost ex- clusively to lecturing until his appointment to a post in the bureau of labour statistics. He again returned to the lecture field, and was an editorial writer for the New York and Chicago American from 1898 until his death in New York City on the 15th of October 1899. His principal works are: The Coming Revolution (1880) ; The Co-operative Commonwealth in its Outlines, An Exposition of Modern Socialism (1884); Qa Ira, or Danton in the French Revolution (1888), a rehabilitation of Danton; Our Destiny, The Influence of Socialism on Morals and Religion (1890); and The 'New Economy (1898).

GRONOVIUS (the latinized form of Gronov), JOHANN FRIEDRICH (1611-1671), German classical scholar and critic, was born at Hamburg on the 8ˆh of September 161 1. Having studied at several universities, he travelled in England, France and Italy. In 1643 he was appointed professor of rhetoric and history at Deventer, and in 1658 to the Greek chair at Leiden, where he died on the 28th of December 1671. (See also Fabretti, Raphael.) Besides editing, with notes, Statius, Plautus, Livy, Tacitus, Aulus Gellius and Seneca's tragedies, Gronovius was the author, amongst numerous other works, of Commentarius de scstertiis (1643) and of an edition of Hugo Grotius' De jure belli et pads (1660). His Observationes contain a number of brilliant emendations. His son, Jakob Gronovius (1645-1716), is chiefly known as the editor of the Thesaurus antiquitatum Graecarum (1697-1702, in 13 volumes)...

See J. E. Sandys, Hist, of Class. Schol. ii. (1908) ; F. A. Eckstein in Ersch and Gruber's Allgemeine Encyklopddie.

GROOM, in modern usage a male servant attached to the stables, whose duties are to attend to the cleaning, feeding, currying and care generally of horses. The earliest meaning of the word appears to be that of a boy, and in 16th and 17th century literature it frequently occurs, in pastorals, for a shepherd lover. Later it is used for any male attendant, and thus survives in the name for several officials in the royal household, such as the grooms-in-waiting, and the grooms of the great chamber. The groom-porter, whose office was abolished by George III., saw to the preparation of the sovereign's apartment, and, during the 16th and 17th centuries, provided cards and dice for playing, and was the authority to whom were submitted

all questions of gaming within the court. The origin of the word is obscure. The O. Fr. gromet, shop boy, is taken by French etymologists to be derived from the English. From the application of this word to a wine-taster in a wine merchant's shop, is derived gourmet, an epicure. According to the New English Dictionary, though there are no instances of groom in other Teutonic languages, the word may be ultimately connected with the root of " to grow." In " bridegroom," a newly married man,

" grom " in the 16th century took the place of an older gome, a common old Teutonic word meaning " man," and connected with the Latin homo. The Old English word was brydguma, later bridegome. The word survives in the German Brdutigam. GROOT, GERHARD (1340-1384), otherwise Gerrit or Geert Groet, in Latin Gerardus Magnus, a preacher and founder of the society of Brothers of Common Life (q.v.), was born in 1340 at Deventer in the diocese of Utrecht, where his father held a good civic position. He went to the university of Paris when only fifteen. Here he studied scholastic philosophy and theology under a pupil of Occam's, from whom he imbibed the nominalist conception of philosophy; in addition he studied canon law, medicine, astronomy and even magic, and apparently some Hebrew. After a brilliant course he graduated in 1358, and possibly became master in 1363. He pursued his studies still further in Cologne, and perhaps in Prague. In 1366 he visited the papal court at Avignon. About this time he was appointed to a canonry in Utrecht and to another in Aix-la-Chapelle, and the life of the brilliant young scholar was rapidly becoming luxurious, secular and selfish, when a great spiritual change passed over him which resulted in a final renunciation of every worldly enjoyment. This conversion, which took place in 1374, appears to have been due partly to the effects of a dangerous illness and partly to the influence of Henry de Calcar, the learned and pious prior of the Carthusian monastery at Munnikhuizen near Arnhem, who had remonstrated with him on the vanity of his life. About 1376 Gerhard retired to this monastery and there spent three years in meditation, prayer and study, without, however, becoming a Carthusian. In 1379, having received ordination as a deacon, he became missionary preacher through- out the diocese of Utrecht. The success which followed his labours not only in the town of Utrecht, but also in Zwolle, Deventer, Kampen, Amsterdam, Haarlem, Gouda, Leiden, Delft, Ziitphen and elsewhere, was immense; according to Thomas a. Kempis the people left their business and their meals to hear his sermons, so that the churches could not hold the crowds that flocked together wherever he came. The bishop of Utrecht supported him warmly, and got him to preach against concubinage in the presence of the clergy assembled in synod. The impartiality of his censures, which he directed not only against the prevailing sins of the – laity, but also against heresy, simony, avarice, and impurity among the secular and regular clergy, provoked the hostility of the

clergy, and accusations of heterodoxy were brought against him. It was in vain that Groot emitted a Publica Protestatio, in which he declared that Jesus Christ was the great subject of his discourses, that in all of them he believed himself to be in harmony with Catholic doctrine, and that he willingly subjected them to the candid judgment of the Roman Church. The bishop was induced to issue an edict which prohibited from preaching all who were not in priest's orders, and an appeal to Urban VI. was without effect. There is a difficulty as to the date of this prohibition; either it was only a few months before Groot's death, or else it must have been removed by the bishop, for Groot seems to have preached in public in the last year of his life. At some period (perhaps 138 1, perhaps earlier) he paid a visit of some days' duration to the famous mystic Johann Ruysbroeck, prior of the Augustinian canons at Groenendael near Brussels; at this visit was formed Groot's attraction for the rule and life of the August- inian canons which was destined to bear such notable fruit. At the close of his life he was asked by some of the clerics who attached themselves to him to form them into a religious order, and Groot resolved that they should be canons regular of St Augustine. No time was lost in the effort to carry out the project, but Groot died before a foundation could be made. In 1387, however, a site was secured at Windesheim, some 20 m. north of Deventer, and here was established the monastery that became the cradle of the Windesheim congregation of canons regular, embracing in course of time nearly one hundred houses, and leading the way in the series of reforms undertaken during the 15th century by all the religious orders in Germany. The initiation of this movement was the great achievement of Groot's

life; he lived to preside over the birth and first days of his other creation, the society of Brothers of Common Life. He died of the plague at Deventer in 1384, at the age of 44.

The chief authority for Groot's life is Thomas a Kempis, Vita Gerardi Magni (translated into English by J. P. Arthur, The Founders of the New Devotion, 1905) ; also the Chronicon Windeshemense of Johann Busch (ed. K. Grube, 1886). An account, based on these sources, will be found in S. Kettlewell, Thomas a Kempis and the Brothers of Common Life (1882), i. c. 5; and a shorter account in F. R. Cruise, Thomas a Kempis, 1887, pt. ii. An excellent sketch, with an account of Groot's writings, is given by L. Schulze in Herzog- Hauck, Realencyklopadie (ed. 3) ; he insists on the fact that Groot's theological and ecclesiastical ideas were those commonly current in his day, and that the attempts to make him " a reformer before the Reformation " are unhistorical. (E. C. B.)

GROOVE-TOOTHED SQUIRREL, a large and brilliantly coloured Bornean squirrel, Rhithrosciurus macrotis, representing a genus by itself distinguished from all other members of the family Sciuridae by having numerous longitudinal grooves on the front surface of the incisor teeth; the molars being of a simpler type than in other members of the family. The tail is large and fox-like, and the ears are tufted and the flanks marked by black and white bands.

GROS, ANTOINE JEAN, Baron (1771-1835), French painter, was born at Paris in 1771. His father, who was a miniature painter, began to teach him to draw at the age of six, and showed himself from the first an exacting master. Towards the close of 1785 Gros, by his own choice, entered the studio of David, which he frequented assiduously, continuing at the same time to follow the classes of the College Mazarin. The death of his father, whose circumstances had been embarrassed by the Revolu- tion, threw Gros, in 1791, upon his own resources. He now devoted himself wholly to his profession, and competed in 1792 for the grand prix, but unsuccessfully. About this time, how- ever, on the recommendation of the Ecole des Beaux Arts, he was employed on the execution of portraits of the members of the Convention, and when — disturbed by the development of the Revolution — Gros in 1703 left France for Italy, he supported himself at Genoa by the same means, producing a great quantity of miniatures and fixes. He visited Florence, but returning to Genoa made the acquaintance of Josephine, and followed her to Milan, where he was well received by her husband. On November 15, 1796, Gros was present with the army near Areola when Bonaparte planted the tricolor on the bridge. Gros seized on t his incident, and showed by his treatment of it that he had found his vocation. Bonaparte at once gave him the post of " in- specteur aux revues," which enabled him to follow the army, and in 1797 nominated him on the commission charged to select the spoils which should enrich the Louvre. In 1799, having escaped from the besieged city of Genoa, Gros made his way to Paris, and in the beginning of 1801 took up his quarters in the Capucins. His " esquisse " (Musee de Nantes) of the " Battle of Nazareth " gained the prize offered in 1802 by the consuls, but was not carried out, owing it is said to the jealousy of Junot felt by Napoleon; but he indemnified Gros by commissioning him to paint his own visit to the pest-house of Jaffa. " Les Pestiferes de Jaffa " (Louvre) was followed by the " Battle of Aboukir " 1806 (Versailles), and the " Battle of Eylau," 1808 (Louvre). These three subjects — the popular leader facing the pestilence unmoved, challenging the splendid instant of victory, heart-sick with the bitter cost of a hard-won field — gave to Gros his chief title to fame. As long as the military element remained bound up with French national life, Gros received from it a fresh and energetic inspiration which carried him to the very heart of the events which he depicted; but as the

army and its general separated from the people, Gros, called on to illustrate episodes representative only of the fulfilment of personal ambition, ceased to find the nourishment necessary to his genius, and the defect of his artistic position became evident. Trained in the sect of the Classicists, he was shackled by their rules, even when — by his naturalistic treatment of types, and appeal to picturesque effect in colour and tone — he seemed to run counter to them. In 1810 his " Madrid ." and " Napoleon at the Pyramids "(Versailles) show that his star had deserted him. His " Francis I." and " Charles

V.," 181 2 (Louvre), had considerable success; but the decoration of the dome of St Genevieve (begun in 181 1 and completed in 1824) is the only work of Gros's later years which shows his early force and vigour, as well as his skill. The " Departure of Louis XVIII." (Versailles), the " Embarkation of Madame d'Angouleme " (Bordeaux), the plafond of the Egyptian room in the Louvre, and finally his " Hercules and Diomedes," exhibited in 1835, testify only that Gros's efforts — in accordance with the frequent counsels of his old master David — to stem the rising tide of Romanticism, served but to damage his once brilliant reputa- tion. Exasperated by criticism and the consciousness of failure, Gros sought refuge in the grosser pleasures of life. On the 25th of June 1835 he was found drowned on the shores of the Seine near Sevres. From a paper which he had placed in his hat it became known that " las de la vie, et trahi par les dernieres facultes qui la lui rendaient supportable, il avait resolu de s'en deiaire." The number of Gros's pupils was very great, and was considerably augmented when, in 1815, David quitted Paris and made over his own classes to him. Gros was decorated and named baron of the empire by Napoleon, after the Salon of 1808, at which he had exhibited the " Battle of Eylau." Under the Restora- tion he became a member of the Institute, professor at the Ecole des Beaux Arts, and was named chevalier of the order of St Michel.

M. Delecluze gives a brief notice of his life in Louis David et son temps, and Julius Meyer's Geschichte der modernen franzosischen Malerei contains an excellent criticism on his works.

GROSART, ALEXANDER BALLOCH (1827-1899), Scottish divine and literary editor, the son of a building contractor, was born at Stirling on the 18th of June 1827. He was educated at Edinburgh University, and in 1856 became a Presbyterian minister at Kinross. In 1865 he went to Liverpool, and three years later to Blackburn. He resigned from the ministry in 1892, and died at Dublin on the 16th of March 1899. Dr Grosart is chiefly remembered for his exertions in reprinting much rare Elizabethan literature, a work which he undertook in the first instance from his strong interest in Puritan theology. Among the first writers whose works he edited

were the Puritan divines, Richard Sibbes, Thomas Brooks and Herbert Palmer. Editions of Michael Bruce's Poems (1865) and Richard Gilpin's Demono- logia sacra (1867) followed. In 1868 he brought out a bibliography of the writings of Richard Baxter, and from that year until 1876 he was occupied in reproducing for private subscribers the " Fuller Worthies Library," a series of thirty-nine volumes which included the works of Thomas Fuller, Sir John Davies, Fulke Greville, Henry Vaughan, Andrew Marvell, George Herbert, Richard Crashaw, John Donne and Sir Philip Sidney. The last four volumes of the series were devoted to the works of many little known and otherwise inaccessible authors. His Occasional Issues of Unique and Very Rare Books (1875-1881) is of the utmost interest to the book-lover. It included among other things the Annalia Dubrensia of Robert Dover. In 1876 still another series, known as the " Chertsey Worthies Library," was begun. It included editions of the works of Nicholas Breton, Francis Quarles, Dr Joseph Beaumont, Abraham Cowley, Henry More and John Davies of Hereford. Grosart was untiring in his enthusiasm and energy for this kind of work. The two last-named series were being produced simultaneously until 1881, and no sooner had they been completed than Grosart began the " Huth Library," so called from the bibliophile Henry Huth, who possessed the originals of many of the reprints. It included the works of Robert Greene, Thomas Nash, Gabriel Harvey, and the prose tracts of Thomas Dekker. He also edited the complete works of Edmund Spenser and Samuel Daniel. From 'the Townley Hall collection he reprinted several MSS. and edited Sir John Eliot's works, Sir Richard Boyle's Lismore Papers, and various publications for the Chetham Society, the Camden Society and the Roxburghe Club. Dr Grosart's faults of style and occasional inaccuracy do not seriously detract from the immense value of his work. He was unwearied in searching for rare books, and he brought to light much interesting literature, formerly almost inaccessible.

GROSBEAK (Fr. Grosbec), a name very indefinitely applied to many birds belonging to the families Fringillidae and Ploceidae of modern ornithologists, and perhaps to some members of the Emberizidae and Tanagridae, but always to birds distinguished by the great size of their bill. Taken alone it is commonly a synonym of hawfinch (q.v.), but a prefix is usually added to indicate the species, as pine-grosbeak, cardinal-grosbeak and the like. By early writers the word was generally given as an equivalent of the Linnaean Loxia, but that genus has been found to include many forms not now placed in the same family. The Pine-grosbeak (Pinicola enucleator) inhabits the conifer- zone of both the Old and the

New Worlds, seeking, in Europe and probably elsewhere, a lower latitude as winter approaches — often journeying in large flocks; stragglers have occasionally reached the British Islands (Yarrell, Br. Birds, ed. 4, ii. 177-179). In structure and some of its habits much resembling a bullfinch, but much exceeding that bird in size, it has the plumage of a crossbill and appears to undergo the same changes as do the members of the restricted genus Loxia — the young being of a dull greenish-grey streaked with brownish-black, the adult hens tinged with golden-green, and the cocks glowing with crimson-red on nearly all the body-feathers, this last colour being replaced after moulting in confinement by bright yellow. Nests of this species were found in 182 1 by Johana Wilhelm Zetterstedt near Juckasjarwi in Swedish Lapland, but little was known concerning its nidification until 1855, when John Wolley, after two years' ineffectual search, succeeded in obtaining near the Finnish village Muonioniska, on the Swedish frontier, well-authenticated specimens with the eggs, both of which are like exaggerated bullfinches'. The food of this species seems to consist of the seeds and buds of many sorts of trees, though the staple may very possibly be those of some kind of pine.

Allied to the pine-grosbeak are a number of species of smaller size, but its equals in beauty of plumage. 1 They have been referred to several genera, such as Carpodacus, Propasser, Bycaneles, Uragus and others; but possibly Carpodacus is sufficient to contain all. Most of them are natives of the Old World, and chiefly of its eastern division, but several inhabit the western portion of North America, and one, C. gilhagineus (of which there seem to be at least two local races) , is an especial native of the deserts, or their borders, of Arabia and North Africa, extending even to some of the Canary Islands — a singular modification in the habitat of a form which one would be apt to associate exclusively with forest trees, and especially conifers.

The cardinal grosbeak, or Virginian nightingale, Cardinalis virginianus, claims notice here, though doubts may be entertained as to the family to which it really belongs. It is no less remarkable for its bright carmine attire, and an elongated crest of the same colour, than for its fine song. Its ready adaptation to confine- ment has made it a popular cage-bird on both sides of the Atlantic. The hen is not so good a songster as the cock bird. Her plumage, with exception of the wings and tail, which are of a dull red, is light-olive above and brownish-yellow beneath. This species inhabits the eastern parts of the United States southward of 40 N. lat., and also occurs in the Bermudas. It is represented in the south-west of North America by other forms that by some writers are deemed species, and in the northern parts of South America by the C. phoeniceus, which would really seem entitled to distinction. Another kindred bird placed from its short and broad bill in a different genus, and known as Pyrrhuloxia sinuata or the

Texan cardinal, is found on the southern borders of the United States and in Mexico; while among North American " grosbeaks " must' also be named the birds belonging to the genera Guiraca and Hedymeles — the former especially exemplified by the beautiful blue G. caerulea, ■ and the latter by the brilliant rose-breasted H. ludovicianus, which last extends its range into Canada.

1 Many of them are described and illustrated in the Monographic des loxiens of Prince C. L. Bonaparte and Professor Schlegel (1850), though it excludes many birds which an English writer would call " grosbeaks."

The species of the Old World which, though commonly called " grosbeaks," certainly belong to the family Ploceidae, are treated under Weaver-bird. (A. N.)

GROSE, FRANCIS (c. 1730-1791), English antiquary, was born at Greenford in Middlesex, about the year 1730. His father was a wealthy Swiss jeweller, settled at Richmond, Surrey. Grose early showed an interest in heraldry and antiquities, and his father procured him a position in the Heralds' College. In 1763, being then Richmond Herald, he sold his tabard, and shortly afterwards became adjutant and paymaster of the Hampshire militia, where, as he himself humorously observed, the only account-books he kept were his right and left pockets, into the one of which he received, and from the other of which he paid. This carelessness exposed him to serious financial difficulties; and after a vain attempt to repair them by 1 accepting a captaincy in the Surrey militia, the fortune left him by his father being squandered, he began to turn to account his excellent education and his powers as a draughtsman. In 1757 he had been elected fellow of the Society of Antiquaries. In 1773 he began to publish his Antiquities of England and Wales, a work which brought him money as well as fame. This, with its supplementary parts relating to the Channel Islands, was not completed till 1787. In 1789 he set out on an antiquarian tour through Scotland, and in the course of this journey met Burns, who composed in his honour the famous song beginning " Ken ye aught o' Captain Grose," and in that other poem, still more famous, "Hear, land o' cakes, and brither Scots," warned all Scotsmen of this " chield amang them taking notes." In 1790 he began to publish the results of what Burns called " his peregrinations through Scotland;" but he had not finished the work when he bethought himself of going over to Ireland and doing for that country what he had already done for Great Britain. About a month after his arrival, while in Dublin, he died in an apoplectic fit at the dinner-table of a friend, on the 12th of June 1791.

Grose was a sort of antiquarian Falstaff — at least he possessed in a striking degree the knight's physical peculiarities; but he was a man of true

honour and charity, a valuable friend, " overlooking little faults and seeking out greater virtues," and an inimitable boon companion. His humour, his varied knowledge and his good nature were all eminently calculated to make him a favourite in society. As Burns says of him —

" But wad ye see him in his glee, For meikle glee and fun has he, Then set him down, and twa or three

Gude fellows wi' him ; And port, O port! shine thou a wee,

And then ye'll see him! "

Grose's works include The Antiquities of England and Wales (6 vols., 1773-1787) ; Advice to the Officers of the British Army (1782), a satire in the manner of Swift's Directions to Servants; A Guide to Health, Beauty, Riches arid Honour (1783), a collection of advertise- ments of the period, with characteristic satiric preface;;! Classical Dictionary of the Vulgar Tongue (1785); A Treatise on Ancient Armour and Weapons (1785-1789) ; Darrell's History of Dover (1786) ; Military Antiquities (2 vols., 1786-1788); A Provincial Glossary (1787); Rules for Drawing Caricatures (1788); The Antiquities of Scotland (2 vols., 1789-1791) ; Antiquities of Ireland (2 vols., 1791), edited and partly written by Ledwich. The Grumbler, sixteen humerous essays, appeared in 1791 after his death; and in 1793 The Olio, a collection of essays, jests and small pieces of poetry, highly characteristic of Grose, though certainly not all by him, was put together from his papers by his publisher, who was also his executor.

A capital full-length portrait of Grose by N. Dance is in the first volume of the Antiquities of England and Wales, and another is among Kay's Portraits. A versified sketch of him appeared in the Gentleman's Magazine, lxi. 660. See Gentleman's Magazine, lxi. 498, 582 ; Noble's Hist, of the College of Arms, p. 434; Notes and Queries, 1st ser., ix. 350; 3rd ser., i. 64, x. 280-281; 5th ser., xii. 148; 6th ser., ii. 47, 2 57> 2 9 l ! Hone, Every-day Book, i. 655.

GROSS, properly thick, bulky, the meaning of the Late Lat.

grossus. The Latin word has usually been taken as cognate

with crassus, thick, but this is now doubted. It also appears

not to be connected with the Ger. gross, a Teutonic word repre-

I sented in English by " great." Apart from its direct meaning,.

and such figurative senses as coarse, vulgar or flagrant, the chief uses are whole, entire, without deduction, as opposed to " net," or as applied to that which is sold in bulk as opposed to " retail " (cf. " grocer " and " engrossing "). As a unit of tale, "gross" equals 12 dozen, 144, sometimes known as " small gross," in contrast with "great gross," i.e. 12 gross, 144 dozen. As a technical expression in English common law, " in gross " is applied to an incorporeal hereditament attached to the person of an owner, in contradistinction to one which is appendant or appurtenant, that is, attached to the ownership of land (see Commons).

GROSSE, JULIUS WALDEMAR (1828-1002), German poet, the son of a military chaplain, was born at Erfurt on the 25th of April 1828. He received his early education at the gymnasium in Magdeburg, and on leaving school and showing disinclination for the ministry, entered an architect's office. But his mind was bent upon literature, and in 1849 he entered the university of Halle, where, although inscribed as a student of law, he devoted himself almost exclusively to letters. His first poetical essay was with the tragedy Cola di Ricnzi (1851), followed in the same year by a comedy, Eine Nachtparlie Shakespeares, which was at once produced on the stage. The success of these first two pieces encouraged him to follow literature as a profession, and proceeding in 1852 to Munich, he joined the circle of young poets of whom Paul Heyse (q.v.) and Hermann Lingg (1820- 1905) were the chief. For six years (1855-1861) he was dramatic critic of the Neue Milnchener Zeitung, and was then for a while on the staff of the Leipziger Illustrierle Zeihmg, but in 1862 he returned to Munich as editor of the Bayrische Zeitung, a post he retained until the paper ceased to exist in 1867. In 1869 Grosse was appointed secretary of the Schiller-Stiftung, and lived for the next few years alternately in Weimar, Dresden and Munich, until, in 1890, he took up his permanent residence in Weimar. He was made grand-ducal Hofrat and had the title of " professor." He died at Torbole on the Lago di Garda on the 9th of May 1902.

Grosse was a most prolific writer of novels, dramas and poems. As a lyric poet, especially in Gedichte (1857) and Aus bewegten Tagen, a volume of poems (1869), he showed himself more to advantage than in his novels, of which latter, however, Untreu aus Mitleid (2 vols., 1868); Vox populi, vox dei (1869); Maria Mancini (1871); Neue Erzdhlungen (1875); Sophie Monnier (1876), and Ein Frauenlos (1888) are remarkable for a certain elegance of style. His tragedies, Die Ynglinger (1858); Tiberius (1876); Johann von Schwaben; and the comedy Die steinerne Braid, had considerable success on the stage.

Grosse's Gesammclte dramatische Werke appeared in 7 vols, in Leipzig (1870), while his Erzdhlende Dichlungen were published at Berlin (6 vols., 1871-1873). An edition of his selected works by A. Bartels is in preparation. See also his autobiography, Literarische Ursachen und Wirkungen (1896); R. Prutz, Die Literatur der Gegenwart (1859); J- Ethe, J. Crosse als epischer Dichler (1872).

GROSSENHAIN, a town in the kingdom of Saxony, 20 m. N. from Dresden, on the main line of railway (via Elsterwerda) to Berlin and at the junction of lines to Priestewitz and Frankfort- on-Oder. Pop. (1905) 12,015. If has an Evangelical church, a modern and a commercial school, a library and an extensive public park. The industries are very important, and embrace manufactures of woollen and cotton stuffs, buckskin, leather, glass and machinery. Grossenhain was originally a Sorb settle- ment. It was for a time occupied by the Bohemians, by whom • it was strongly fortified. It afterwards came into the possession of the margraves of Meissen, from whom it was taken in 131 2 by the margraves of Brandenburg. It suffered considerably in all the great German wars, and in 1744 was nearly destroyed by fire. On the 16th of May 1813, a battle took place here between the French and the Russians.

See G. W. Schuberth, Chronik der Stadt Grossenhain (Grossenhain, ■ 1887-1892).

GROSSETESTE, ROBERT (c. 1175-1253), English statesman, theologian and bishop of Lincoln, was born of humble parents at Stradbrook in Suffolk. He received his education at Oxford where he became proficient in law, medicine and the natural sciences. Giraldus Cambrensis, whose acquaintance he had

made, introduced him, before n 99, to William de Vere, bishop of Hereford. Grosseteste aspired to a post in the bishop's house- hold, but being deprived by death of this patron betook himself to the study of theology. It is possible that he visited Paris for this purpose, but he finally settled in Oxford as a teacher. His first preferment of importance was the chancellorship of the university. He gained considerable distinction as a lecturer, and was the first rector of the school which the Franciscans established in Oxford about 1224. Grosseteste's learning is highly praised by Roger Bacon, who was a severe critic. Accord- ing to Bacon, Grosseteste knew little Greek or Hebrew and paid slight attention to the works of Aristotle, but was pre-eminent among his contemporaries for his knowledge of the natural sciences. Between 12 14 and 1231 Grosseteste held in succession the archdeaconries of Chester, Northampton and Leicester. In 1232, after a severe illness, he resigned all his benefices and preferments except one prebend which he held at Lincoln. His intention was to spend

the rest of his life in contemplative piety. But he retained the office of chancellor, and in 1235 accepted the bishopric of Lincoln. He undertook without delay the reformation of morals and clerical discipline throughout his vast diocese. This scheme brought him into conflict with more than one privileged corporation, but in particular with his own chapter, who vigorously disputed his claim to exercise the right of visitation over their community. The dispute raged hotly from 1239 to 1245. It was conducted on both sides with unseemly violence, and those who most approved of Grosseteste's main purpose thought it needful to warn him against the mistake of over-zeal. But in 1245, by a personal visit to the papal court at Lyons, he secured a favourable verdict. In ecclesiastical politics the bishop belonged to the school of Becket. His zeal for reform led him to advance, on behalf of the courts-Christian, pretensions which it was impossible that the secular power should admit. He twice incurred a well-merited rebuke from Henry ill. upon this subject; although it was left for Edward I. to settle the question of principle in favour of the state. The devotion of Grosseteste to the hierarchical theories of his age is attested by his correspondence with his chapter and the king. Against the former he upheld the prerogative of the bishops; against the latter he asserted that it was impossible for a bishop to disregard the commands of the Holy See. Where the liberties of the national church came into conflict with the pretensions of Rome he stood by his own countrymen. Thus in 1238 he demanded that the king should release certain Oxford scholars who had assaulted the legate Otho; But at least up to the year 1247 he submitted patiently to papal encroachments, contenting himself with the protection (by a special papal privilege) of his own diocese from alien clerks. Of royal exactions he was more impatient; and after the retirement of Archbishop Saint Edmund (q.v.) constituted himself the spokesman of the clerical estate in the Great Council. In 1244 he sat on a committee which was empanelled to consider a demand for a subsidy. The committee rejected the demand, and Grosseteste foiled an attempt on the king's part to separate the clergy from the baronage. " It is written," the bishop said, " that united we stand and divided we fall."

It was, however, soon made clear that the king and pope were in alliance to crush the independence of the English clergy; and from 1250 onwards Grosseteste openly criticized the new financial expedients to which Innocent IV. had been driven by his desperate conflict with the Empire. In the course of a visit which he made to Innocent in this year, the bishop laid before the pope and cardinals a written memorial in which he ascribed all the evils of the Church to the malignant influence of the Curia. It produced no effect, although the cardinals felt that Grosseteste was too influential to be punished for his audacity. Much discouraged by his failure the bishop thought of resigning. In the end, however, he decided to continue the

unequal struggle. In 1 2 51 he protested against a papal mandate enjoining the English clergy to pay Henry III. one-tenth of their revenues for a crusade; and called attention to the fact that, under the sysfepi of provisions ; a sum of 70,000 marks was annually drawn

from England by the alien nominees of Rome. In 1253, upon being commanded to provide in his own diocese for a papal nephew, he wrote a letter of expostulation and refusal, not to the pope himself but to the commissioner, Master Innocent, through whom he received the mandate. The text of the remonstrance, as given in the Burton Annals and in Matthew Paris, has possibly been altered by a forger who had less respect than Grosseteste for the papacy. The language is more violent than that which the bishop elsewhere employs. But the general argument, that the papacy may command obedience only so far as its commands are consonant with the teaching of Christ and the apostles, is only what should be expected from an ecclesi- astical reformer of Grosseteste's time. There is much more reason for suspecting the letter addressed " to the nobles of England, the citizens of London, and the community of the whole realm," in which Grosseteste is represented as denouncing in unmeasured terms papal finance in all its branches. But even in this case allowance must be made for the difference between modern and medieval standards of decorum.

Grosseteste numbered among his most intimate friends the Franciscan teacher, Adam Marsh (g.v.). Through Adam he came into close relations with Simon de Montfort. From the Franciscan's letters it appears that the earl had studied a political tract by Grosseteste on the difference between a monarchy and a tyranny; and that he embraced with enthusiasm the bishop's projects of ecclesiastical reform. Their alliance began as early as 1239, when Grosseteste exerted himself to bring about a reconciliation between the king and the earl. But there is no reason to suppose that the political ideas of Montfort had matured before the death of Grosseteste; nor did Grosseteste busy him- self overmuch with secular politics, except in so far as they touched the interest of the Church. Grosseteste realized that the misrule of Henry III. and his unprincipled compact with the papacy largely accounted for the degeneracy of the English hierarchy and the laxity of ecclesiastical discipline. But he can hardly be termed a constitutionalist.

Grosseteste died on the 9th of October 1253. He must then have been between seventy and eighty years of age. He was already an elderly man, with a firmly established reputation, when he became a bishop. As an

ecclesiastical statesman he showed the same fiery zeal and versatility of which he had given proof in his academical career; but the general tendency of modern writers has been to exaggerate his political and ecclesiastical services, and to neglect his performances as a scientist and scholar. The opinion of his own age, as expressed by Matthew Paris and Roger Bacon, was very different. His contemporaries, while admitting the excellence of his intentions as a statesman, lay stress upon his defects of temper and discretion. But they see in him the pioneer of a literary and scientific movement; not merely a great ecclesiastic who patronized learning in his leisure hours, but the first mathematician and physicist of his age. It is certainly true that he anticipated, in these fields of thought, some of the most striking ideas to which Roger Bacon subsequently gave a wider currency.

See the Epistolae Roberti Grosseteste (Rolls Series, 1861) edited with a valuable introduction by H. R. Luard. Grosseteste's famous memorial to the pope is printed in the appendix to E. Brown's Fasciculus rerum expetendarum et fugiendarum (1690). A tract De phisicis, lineis, angulis et figuris was printed at Nuremberg in 1503. A French poem, Le Chastel d'amour, sometimes attributed to him, has been printed by the Caxton Society. Two curious tracts, the " De moribus pueri ad mensam " (printed by Wynkyn de Worde) and the " Statuta familiae Roberti Grosseteste " (printed by J. S. Brewer in Monumenta Franciscana, i. 582), may be from his pen; but the editor of the latter work ascribes it to. Adam de Marsh. There is less doubt respecting the Reules Seynt Robert, a tract giving advice for the management of the household of the countess of Lincoln. For Grosseteste's life and work see Roger Bacon's Opus majus (ed. J. H. Bridges, 1897, 2 vols.) and Opera quaedam inedita (ed. J. S. Brewer, Rolls Series, 1859); M. Paris's Chronica majora fed. H. R. Luard, Rolls Series, 1872-1883, 5 vols.); and the Lives by S. Pegge (1793) and F. S. Stevenson (1899). (H. W. C. D.)

GROSSETO, a town and episcopal see of Tuscany, capital of the province of Grosseto, 90 m. S.S.E. of Pisa by rail. Pop. (1901) 5856 (town), 8843 (commune). It is 38 ft. aUove s"ea4e"veL

and is almost circular in shape ; it is surrounded by fortifications, constructed by Francis I. (1574-1587) and Ferdinand I. (1587- 1609), which form a hexagonal enceinte with projecting bastions, with two gates only. The small cathedral, begun in 1294, is built of red and white marble alternating, in the Italian Gothic style; it was restored in 1855, The citadel was built in 1311 by the Sienese. Grosseto is on the main line from Pisa to Rome, and is also the starting-point (Montepescali, 8 m. to the N., is the exact point of divergence) of a branch line to Asciano and Siena.

The town dates from the middle ages. In 1138 the episcopal see was transferred thither from Rusellae. In 1230 it, with the rest of the Maremma, of which it is the capital, came under the dominion of Siena. By the peace of 1559, however, it passed to Cosimo I. of Tuscany. In 1745 the malaria had grown to such an extent, owing to the neglect of the drainage works, that Grosseto had only 648 inhabitants, though in 1224 it had 3000 men who bore arms. Leopold I. renewed drainage operations, and by 1836 the population had risen to 2392. The malaria is not yet entirely conquered, however, and the official headquarters of the province are in summer transferred to Scansano (1837 ft.), 20 m. to the S.E. by road.

GROSSI, GIOVANNI FRANCESCO (?-i69o), one of the greatest Italian singers of the age of bel canto, better known as Siface, was born at Pescia in Tuscany about the middle of the 17th century. He entered the papal chapel in 1675, and later sang at Venice. He derived his nickname of Siface from his impersonation of that character in an opera of Cavalli. It has generally been said that he appeared as Siface in Alessandro Scarlatti's Mitridate, but the confusion is due to his having sung the part of Mitridate in Scarlatti's Pompeo at Naples in 1683. In 1687 he was sent to London by the duke of Modena, to become a member of the chapel of James II. He probably did much for the introduction of Italian music into England, but soon left the country on account of the climate. Among Purcell's harpsichord music is an air entitled " Sefauchi's Farewell." He was murdered in 1699 on the road between Bologna and Ferrara, probably by the agents of a nobleman with whose wife he had a liaison.

See Corrado Ricci's Vita Barocca (Milan, 1904).

GROSSI, TOMMASO (1791-1853), Lombard poet and novelist, was born at Bellano,on the Lake of Como,on the 20th of January 1 79 1. He took his degree in law at Pavia in 18 10, and proceeded thence to Milan to exercise his profession; but the Austrian government, suspecting his loyalty, interfered with his prospects, and in consequence Grossi was a simple notary all his life. That the suspicion was well grounded he soon showed by writing in the Milanese dialect the battle poem La Prineide, in which he described with vivid colours the tragical death of Prina, chief treasurer during the empire, whom the people of Milan, instigated by Austrian agitators, had torn to pieces and dragged through the streets of the town (1814). The poem, being anonymous, was first attributed to the celebrated Porta, but Grossi of his own accord acknowledged himself the author. In 1816 he published other two poems, written likewise in Milanese — The Golden Rain (La Pioggia d' oro) and The Fugitive (La Fuggitiva). These compositions secured him the friendship of Porta and Manzoni, and the three poets came to form a sort of romantic literary triumvirate. Grossi took advantage of the popularity of his Milanese poems to try Italian verse,

into which he sought to introduce the moving realism which had given such satisfaction in his earliest compositions; and in this he was entirely successful with his poem Ildegonda (1814). He next wrote an epic poem, entitled The Lombards in the First Crusade, a work of which Manzoni makes honourable mention in I Promessi Sposi. This composition, which was published by subscription (1826), at- tained a success unequalled by that of any other Italian poem within the century. The example of Manzoni induced Grossi to write an historical novel entitled Marco Visconti (1834) — a work which contains passages of fiae description and deep pathos. A little later Grossi published a tale in verse, Ulrico and Lid-a, But with this publication his poetical activity ceased.

After his marriage in 1838 he continued to employ himself as a notary in Milan till his death on the 10th of December 1853. His Life by Cantu appeared at Milan in 1854,

GROSSMITH, GEORGE (1847-), English comedian, was born on the 9th of December 1847, the son of a law reporter and entertainer of the same name. After some years of journalistic work he started about 1870 as a public entertainer, with songs and recitations; but in 1877 he began a long connexion with the Gilbert and Sullivan operas at the Savoy Theatre, London, in The Sorcerer. For twelve years he had the leading part, his capacity for " patter-songs," and his humorous acting, dancing and singing marking his creations of the chief characters in the Gilbert and Sullivan operas as the expression of a highly original individuality. In 1889 he left the Savoy, and again set up as an entertainer, visiting all the cities of Great Britain and the United States, but retiring in 1901. Among other books he wrote The Reminiscences of a Society Clown (1888); and, with his brother Weedon, The Diary of a Nobody (1894). His humorous songs and sketches numbered over six hundred. His younger brother, Weedon Grossmith, who was educated as a painter and exhibited at the Academy, also took to the stage, his first notable success being in the Pantomime Rehearsal; in 1894 he went into manage- ment on his own account, and had much success as a comedian. George Grossmith 's two sons, Laurence Grossmith and George Grossmith, jun., were both actors, the latter becoming a well- known figure in the musical comedies at the Gaiety Theatre, London.

GROS VENTRES (Fr. for " Great Bellies "), or Atsina, a tribe of North American Indians of Algonquian stock. The name is said to have reference to the greediness of the people, but more probably originated from their prominent tattooing. They are settled at Fort Belknap agency, Montana.

The name has also been given to other tribes, e.g. the Hidatsa or Minitari, now at Fort Berthold, North Dakota.

GROTE, GEORGE (1794-1871), English historian of Greece, was born on the 17th of November 1794, at Clay Hill near Beckenham in Kent. His grandfather, Andreas, originally a Bremen merchant, was one of the founders (1st of January 1766) of the banking-house of Grote, Prescott & Company in Thread- needle Street, London (the name of Grote did not disappear I from the firm till 1879). His father, also George, married (1793) Selina, daughter of Henry Peckwell (1747-1787), minister of the countess of Huntingdon's chapel in Westminster (descended from a Huguenot family, the de Blossets, who had left Touraine on the revocation of the Edict of Nantes), and had one daughter and ten sons, of whom the historian was the eldest. Educated at first by his mother, George Grote was sent to the Sevenoaks grammar school (1 800-1 804) and afterwards to Charterhouse (1804-1810), where he studied under Dr Raine in company with Connop Thirlwall, George and Horace Waddington and Henry Havelock. In spite of Grote's school successes, his father refused to send him to the university and put him in the bank in 1810. He spent all his spare time in the study of classics, history, metaphysics and political economy, and in learning German, French and Italian. Driven by his mother's Puritanism and his father's contempt for academic learning to outside society, he became intimate with Charles Hay Cameron, who strengthened him in his love of philosophy, and George W. Norman, through whom he met his wife, Miss Harriet Lewin (see below). After various difficulties the marriage took place on the 5th of March 1820, and was in all respects a happy union. In the meanwhile Grote had finally decided his philosophic and political attitude. In 181 7 he came under the influence of David Ricardo, and through him of James Mill and Jeremy. Bentham. He settled in 1820 in a house attached to the bank , in Threadneedle Street, where his only child died a week after its birth. During Mrs Grote's slow convalescence at Hampstead, he wrote his first published work, the Statement of the Question of Parliamentary Reform (182 1), in reply to Sir James Mackintosh's article in the Edinburgh Review, advocating popular representation, vote by ballot and short parliaments. In 1822 he published in the Morning Chronicle (April) a letter

against Canning's attack on Lord John Russell, and edited, or rather re-wrote, some discursive papers of Bentham, which he published under the title Analysis of the Influence of Natural Religion on the Temporal Happiness of Mankind by Philip Beauchamp (1822). The book was published in the name of Richard Carlile, then in gaol at Dorchester. Though not a member of J. S. Mill's Utilitarian Society (1822-1823), he took a great interest in a society for reading and discussion, which met (from 1823) in a room at the bank before business hours twice a week.

From the Posthumous Papers (pp. 22, 24) it is clear that Mrs Grote was wrong in asserting that she first in 1823 (autumn) suggested the History of Greece; the book was already in preparation in 1822, though what was then written was subsequently reconstructed. In 1826 Grote published in the Westminster Review (April) a criticism of Mitford's History of Greece, which shows that his ideas were already in order. From 1826 to 1830 he was hard at work with J. S. Mill and Henry Brougham in the organization of the new " university " in Gower Street. He was a member of the council which organ- ized the faculties and the curriculum; but in 1830, owing to a difference with Mill as to an appointment to one of the philo- sophical chairs, he resigned his position.

In 1830 he went abroad, and, attracted by the political crisis, spent some months in Paris in the society of the Liberal leaders. Recalled by his father's death (6th of July), he not only became manager of the bank, but took a leading position among the city Radicals. In 1831 he published his important Essentials of Parliamentary Reform (an elaboration of his previous Statement), and, after refusing to stand as parliamentary candidate for the city in 1831, changed his mind and was elected head of the poll, with three other Liberals, in December 1832. After serving in three parliaments, he resigned in 1841, by which time his party (" the philosophic Radicals ") had dwindled away. During these years of active public life, his interest in Greek history and philosophy had increased, and after a trip to Italy in 1842, he severed his connexion with the bank and devoted himself to literature. In 1846 the first two volumes of the History appeared, and the remaining ten between 1847 and the spring of 1856. In 1845 with Molesworth and Raikes Currie he gave monetary assistance to Auguste Comte (q.v.), then in financial difficulties. The formation of the Sonderbund (20th of July 1847) led him to visit Switzerland and study for himself a condition of things in some sense analogous to that of the ancient Greek states. This visit resulted in the publication in the Spectator of seven weekly letters, collected in book form at the end of 1847 (see a letter to de Tocqueville in Mrs Grote's reprint of the Seven Letters, 1876).

In 1856 Grote began to prepare his works on Plato and Aristotle. Plato and the Other Companions of Sokrates (3 vols.) appeared in 1865, but the work on Aristotle he was not destined to complete. He had finished the Organon and was about to deal with the metaphysical and physical treatises when he died on the 18th of June 1871, and was buried in Westminster Abbey. He was a man of strong character and self-control, unfailing courtesy and unswerving devotion to what he considered the best interests of the nation. To colleagues and subordinates alike, he was considerate and tolerant; he was unassuming, trustworthy in the smallest detail, accurate and comprehensive in thought, energetic and conscientious in action. Yet, hidden under his calm exterior there was a burning

enthusiasm and a depth of passion of which only his intimate friends were aware. His work may best be considered under the following heads: 1. Grote's Services to Education. — He took, as already stated, an important part in the foundation and organization of the original university of London, which began its public work in Gower Street on the 28th of October 1828, and in 1836, on the incorporation of the university of London proper, became known as University College. In 1849 he was re-elected to the council, in i860 he became treasurer, and on the death of Brougham (1868) president. He took a keen interest in all the work of the college, presented to it the Marmor Homericum, and finally bequeathed the reversion of £6000 for the endowment of a chair

of philosophy of mind and logic. The emoluments of this sum I were, however, to be held over and added to the principal if at any time the holder of the chair should be " a minister of the Church of England or of any other religious persuasion." In 1850 the senate of the university was reconstituted, and Grote was one of seven eminent men who were added to it. Eventually he became the strongest advocate for open examinations, for the claims not only of philosophy and classics but also of natural science, and, as vice-chancellor in 1862, for the admission of women to examinations. This latter reform was carried in 1868. He succeeded his friend Henry Hallam as a trustee of the British Museum in 1859, and took part in the reorganization of the departments of antiquities and natural science.

The honours which he received in recognition of these services were as follows: D.C.L. of Oxford (1853); LL.D. Cambridge (1861); F.R.S. (1857); honorary professor of ancient history in the Royal Academy (1859). By the French Academy of Moral and Political Sciences he was made correspondent (1857) and foreign associate (the first Englishman since Macaulay) (1864). In 1869 he refused Gladstone's offer of a peerage.

2. Political Career. — In politics Grote belonged to the " philo- sophic Radicals " of the school of J. S. Mill and Bentham, whose chief principles were representative government, vote by ballot, the abolition of a state church, frequent elections. He adhered to these principles throughout, and refused to countenance any reforms which were incompatible with them. By this uncom- promising attitude, he gradually lost all his supporters save a few men of like rigidity. As a speaker, he was clear, logical and impressive, and on select committees his common sense was most valuable.

For his speeches see A. Bain in the Minor Works; see also Ballot.

3. The History of Greece. — It is on this work that Grote's reputation mainly rests. Though half a century has passed since its production, it is still in some sense the text-book. It consists of two parts, the " Legendary " and the " Historical " Greece. The former, owing to the development of comparative mythology, is now of little authority, and portions of part ii. are obsolete owing partly to the immense accumulations of epi- graphic and archaeological research, partly to the subsequent discovery of the Aristotelian Constitution of Athens, and partly also to the more careful weighing of evidence which Grote himself misinterpreted. The interest of the work is twofold. In the first place it contains a wonderful mass of information carefully collected from all sources, arranged on a simple plan, and ex- pressed in direct forcible language. It is in this respect one of the few great comprehensive histories in our possession, great in scope, conception and accomplishment. But more than this it is interesting as among the first works in which Greek history became a separate study, based on real evidence and governed by the criteria of modern historical science. Further Grote, a practical man, a rationalist and an enthusiast for democracy, was the first to consider Greek political development with a sympathetic interest (see Greece: History, Ancient, section " Authorities "), in opposition to the Tory attitude of John Gillies and Mitford, who had written under the influence of horror at the French Revolution. On the whole his work was done with impartiality, and more recent study has only confirmed his general conclusions. Much has been made of his defective accounts of the tyrants and the Macedonian empire, and his opinion that Greek history ceased to be interesting or instructive after Chaeronea. It is true that he confined his interest to the fortunes of the city state and neglected the wider diffusion of the Greek culture, but this is after all merely a criticism of the title of the book. The value of the History consists to-day primarily in its examination of the Athenian democracy, its growth and decline, an examination which is still the most inspiring, and in general the most instructive, in any language. In the descrip- tion of battles and military operations generally Grote was handi- capped by the lack of personal knowledge of the country. In this respect he is inferior to men like Ernst Curtius and G. B. Grundy.

4, In Philosophy Grote was a follower of the Mills and Bentham. J. S. Mill paid a tribute to him in the preface to the

third edition of his Examination of Sir Wm. Hamilton's Philosophy, and there is no doubt that the empirical school owed a great deal to his sound, accurate thinking, untrammelled by any reverence for authority, technique and convention. In dealing with Plato he was handicapped by this very common sense, which prevented him from appreciating the theory of ideas

in its widest relations. His Plato is important in that it emphasizes the generally neglected passages of Plato in which he seems to indulge in mere Socratic dialectic rather than to seek knowledge; it is, therefore, to be read as a corrective to the ordinary criticism of Plato. The more congenial study of Aristotle, though incomplete, is more valuable in the positive sense, and has not received the attention it deserves. Perhaps Grote's most distinctive contribu- tion to the study of Greek philosophy is his chapter in the History of Greece on the Sophists, of whom he took a view some- what more favourable than has been accepted before or since.

His wife, Harriet Lewin (1792-1878), was the daughter of Thomas Lewin, a retired Indian civilian, settled in Southampton. After her marriage with Grote in 1820 she devoted herself to the subjects in which he was interested and was a prominent figure in the literary, political and philosophical circle in which he lived. She carefully read the proofs of his work and relieved him of anxiety in connexion with his property. Among her writings are: Memoir of Ary Schejfer (i860); Collected Papers (1862); and her biography of her husband (1873). Another publication, The Philosophical Radicals of 1832 (privately circulated in 1866), is interesting for the light it throws on the Reform movement of 1832 to 1842, especially on Molesworth.

Bibliog RA PHY. — The History of Greece passed through five editions the fifth (10 vols., 1888) being final. An edition covering the period from Solon to 403, with new notes and excursuses, was published by J. M. Mitchell and M. O. B. Caspari in 1907. The Plato was finally edited by Alexander Bain in 4 vols. See Mrs Grote's Personal Life of George Grote, and article in Diet. Nat. Biog. by G. Croom Robertson. (J. M. M.)

GROTEFEND, GEORG FRIEDRICH (1775-1853), German

epigraphist, was born at Miinden in Hanover on the 9th of June

1775. He was educated partly in his native town, partly at

Ilfeld, where he remained till 1795, when he entered the university

of Gottingen, and there became the friend of Heyne, Tychsen

and Heeren. Heyne's recommendation procured for him an

assistant mastership in the Gottingen gymnasium in 1797.

While there he published his work De pasigraphia sive scriptura

universali (1799), which led to his appointment in 1803 as

prorector of the gymnasium of Frankfort-on-Main, and shortly afterwards as conrector. Grotefend was best known during his lifetime as a Latin and Italian philologist, though the attention he paid to his own language is shown by his Anfangsgrunde der deutschen Poesie, published in 1815, and his foundation of a society for investigating the German tongue in 181 7. Ini82i he became director of the gymnasium at Hanover, a post which he retained till his retirement in 1849. I n 1823-1824 appeared his revised edition of Wenck's Latin grammar, in two volumes, followed by a smaller grammar for the use of schools in 1826; in 183 5-1838 a systematic attempt to explain the fragmentary remains of the Umbrian dialect, entitled Rudimenta linguae Umbricae ex inscriptionibus antiquis enodata (in eight parts) ; and in 1839 a work of similar character upon Oscan {Rudimenta linguae Oscae). In the same year he published an important memoir on the coins of Bactria, under the name of Die Miinzen der griechischen, parthischen, und indoskythischen Konige von Bactrien und den Ldndern am Indus. He soon, however, returned to his favourite subject, and brought out a work in five parts, Zur Geographie und Geschichte vonAltitalien (1840-1842). Previously, in 1836, he had written a preface to Wagenf eld's translation of the spurious Sanchoniathon of Philo Byblius, which was alleged to have been discovered in the preceding year in the Portuguese convent of Santa Maria de Merinhao. But it was in the East

rather than in the West that Grotefend did his greatest work.

The cuneiform inscriptions of Persia had for some time been

attracting attention in Europe; exact copies of them had been

published by the elder Niebuhr, who lost his eyesight over the

work; and Grotef end's friend, Tychsen of Rostock, believed

that he had ascertained the characters in the column, now known to be Persian, to be alphabetic. At this point Grotefend took the matter up. His first discovery was communicated to the Royal Society of Gottingen in 1800, and reviewed by Tychsen two years afterwards. In 1815 he gave an account of it in Heeren's great work on ancient history, and in 1837 published his Neue Beitriige zur Erlauterung der persepolitanischen Keil-schrift. Three years later appeared his Neue Beitrdge zur Erlauterung der babylonischen Keilschrijt. His discovery may be summed up as follows: (1) that the Persian inscriptions contain three different forms of cuneiform writing, so that the decipherment of the one would give the key to the decipherment of the others; (2) that the characters of the Persian column are alphabetic and not syllabic; (3) that they must be read from left to right; (4) that the alphabet consists of forty letters, including signs for long and short vowels; and (5) that the Persepolitan inscriptions are written in Zend (which, however, is not the case), and must be ascribed to the age of the Achae- menian princes. The process whereby Grotefend arrived at these conclusions is a prominent illustration of persevering genius (see Cuneiform). A solid basis had thus been laid for the interpretation of the Persian inscriptions, and all that remained was to work out the results of Grotefend's brilliant discovery, a task ably performed by Burnouf, Lassen and Rawlinson. Grotefend died on the 15th of December 1853.

GROTESQUE, strictly a form of decorative art, in painting or sculpture, consisting of fantastic shapes of human beings, animals and the like, joined together by wreaths of flowers, garlands or arabesques. The word is also applied to any whim- sical design or decorative style, if characterized by unnatural distortion, and, generally, to anything ludicrous or extravagantly fanciful. " Grotesque " comes through the French from the Ital. groltesco, an adjective formed from grotta, which has been corrupted in English to " grotto." The commonly accepted explanation of the special use of the term " grotesque " is that this particular form of decorative art was most frequently found in the excavated ancient Roman and Greek dwellings

found in Italy, to which was applied the name grotte. The derivation of grotta is through popular Lat. crupta or grupta (cf. " crypt "), from Gr. Kpinrr-r), a vault, Kpinrrtiv, to hide. Such a term would be applicable both to the buried dwellings of ancient Italy, and to a cavern, artificial or natural, the ordinary sense of the word. An interesting parallel with this origin of the word is found in that of " antic," now meaning a freak, a jest, absurd fancy, &c. This word is the same as " antique," and was, like " grotesque," first applied to the fanciful decorations of ancient art.

GROTH, KLAUS (1819-1899), Low German poet, was born at Heide in Schleswig-Holstein, on the 24th of April 1819. After studying at the seminary in Tondern (1838-1841), he became a teacher at the girls' school in his native village, but in 1847 went to Kiel to qualify for a higher educational post. Ill-health interrupted his studies and it was not until 1853 that he was able to resume them at Kiel. In 1856 he took the degree of doctor of philosophy at Bonn, and in 1858 settled as privatdocenl in German literature and languages at Kiel, where, in 1866, he was made professor, and where he lived until his death on the 1st of June 1899. In his Low German (Plattdeutsch) lyric and epic poems, which reflect the influence of Johann Peter Hebel (

Groth's Gesammelte Werke appeared in 4 vols. (1893). His Lebens-erinnerungen were edited by E. Wolff in 1891; see also K. Eggers, K. Groth urid die plattdeutsche Dichtung (1885); and biographies by A. Bartels (1899) and H. Siercks (1899)

GROTH, PAUL HEINRICH VON (1843-), German mineralogist, was born at Magdeburg on the 23rd of June 1843. He was educated at Freiberg, Dresden and Berlin, and took the degree of Ph.D. in 1868. After holding from 1872 the chair of mineralogy at Strasburg, he was in 1883 appointed professor of mineralogy and curator of minerals in the state museum at Munich. He carried on extensive researches on crystals and minerals, and also on rocks; and published Tabellarische Ubersichl der einfachen Mineralien (1874-1898), and Physi- kalische Kry stall ographie (1876-1895, ed. 4, 1905). He edited for some years the Zeilschrifl fur Kryslallographie und Mineralogie.

GROTIUS, HUGO (1583-1645), in his native country Huig van Groot, but known to the rest of Europe by the latinized form of the name, Dutch publicist and statesman, was born at Delft on Easter day, the 10th of April 1583. The Groots were a branch of a family of distinction, which had been noble in France, but had removed to the Low Countries more than a century before. Their French name was de Comets, and this cadet branch had taken the name of Groot on the marriage of Hugo's great-grand- father with a Dutch heiress. The father of Hugo was a lawyer in considerable

practice, who had four times served the office of burgomaster of Leiden, and was one of the three curators of the university of that place.

In the annals of precocious genius there is no greater prodigy on record than Hugo Grotius, who was able to make good Latin verses at nine, was ripe for the university at twelve, and at fifteen edited the encyclopaedic work of Martianus Capella. At Leiden he was much noticed by J. J. Scaliger, whose habit it was to engage his young friends in the editing of some classical text. At fifteen Grotius accompanied Count Justin of Nassau, and the grand pensionary J. van Olden Barneveldt on their special embassy to the court of France. After a year spent in acquiring the language and making acquaintance with the leading men of France, Grotius returned home. He took the degree of doctor of law at Leiden, and entered on practice as an advocate.

Notwithstanding his successes in his profession, his inclination was to literature. In 1600 he edited the remains of Aratus, with the versions of Cicero, Germanicus and Avienus. Of the Germanicus Scaliger says — " A better text than that which Grotius has given, it is impossible to give "; but it is probable that Scaliger had himself been the reviser. Grotius vied with the Latinists of his day in the composition of Latin verses. Some lines on the siege of Ostend spread his fame beyond the circle of the learned. He wrote three dramas in Latin: — Christus patiens; Sophomphaneas, on the story of Joseph and his brethren; and Adamus exul, a production still remembered as having given hints to Milton. The Sophomphaneas was translated into Dutch by Vondel, and into English by Francis Goldsmith (1652); the Christus patiens into English by George Sandys (1640).

In 1603 the United Provinces, desiring to transmit to posterity some account of their struggle with Spain, determined to appoint a historiographer. The choice of the states fell upon Grotius, though he was but twenty years of age, and had not offered himself for the post.' There was some talk at this time in Paris of calling Grotius to be librarian of the royal library. But it was a ruse of the Jesuit party, who wished to persuade the public that the opposition to the appointment of Isaac Casaubon did not proceed from theological motives, since they were ready to appoint a Protestant in the person of Grotius.

His next preferment was that of advocate-general of the fisc for the provinces of Holland and Zeeland. This was followed by his marriage, in 1608, to Marie Reigersberg, a lady of family in Zeeland, a woman of great capacity and noble disposition.

Grotius had already passed from occupation with the classics to studies more immediately connected with his profession. In the winter of 1604 he

composed (but did not publish) a treatise entitled De jure praedae. The MS. remained unknown till 1868, when it was brought to light, and printed at the Hague under the auspices of Professor Fruin. It shows that the principles and the plan of the celebrated De jure belli, which was not composed

till 1 62 5, more than twenty years after,had already been conceived by a youth of twenty-one. It has always been a question what it was that determined Grotius, when an exile in Paris in 1625, to that particular subject, and various explanations have been offered; among others a casual suggestion of Peiresc in a letter of early date. The discovery of the MS. of the De jure praedae discloses the whole history of Grotius's ideas, and shows that from youth upwards he had steadily read and meditated in one direction, that, namely, of which the famous De jure belli was the mature product. In the Dejure praedae of 1604 there is much more than the germ of the later treatise De jure belli. Its main principles, and the whole system of thought implied in the later, are anticipated in the earlier work. The arrangement even is the same. The chief difference between the two treatises is one which twenty years' experience in affairs could not but bring — the substitution of more cautious and guarded language, less dogmatic affirmation, more allowance for exceptions and deviations. The Jus pacts was an addition introduced first in the later work, an insertion which is the cause of not a little of the confused arrangement which has been found fault with in the De jure belli.

The De jure praedae further demonstrates that Grotius was originally determined to this subject, not by any speculative intellectual interest, but by a special occasion presented by his professional engagements. He was retained by the Dutch East India Company as their advocate. One of their captains, Heemskirk, had captured a rich Portuguese galleon in the Straits of Malacca. The right of a private company to make prizes was hotly contested in Holland, and denied by the stricter religionists, especially the Mennonites, who considered all war unlawful. Grotius undertook to prove that Heemskirk's prize had been lawfully captured. In doing this he was led to in- vestigate the grounds of the lawfulness of war in general. Such was the casual origin of a book which long enjoyed such celebrity that it used to be' said, with some exaggeration indeed, that it had founded a new science.

A short treatise which was printed in 1609, Grotius says without his permission, under the title of Mare liberum, is nothing more than a chapter — the 12th — of the Dejure praedae. It was necessary to Grotius's defence

of Heemskirk that he should show that the Portuguese pretence that Eastern waters were their private property was untenable. Grotius maintains that the ocean is free to all nations. The occasional character of this piece explains the fact that at the time of its appearance it made no sensation. It was not till many years afterwards that the jealousies between England and Holland gave import- ance to the novel doctrine broached in the tract by Grotius, a doctrine which Selden set himself to refute in his Mare clausum

(1632).

Equally due to the circumstances of the time was his small contribution " to constitutional history entitled De antiquitate reipublicae Batavae (1610). In this he vindicates, on grounds of right, prescriptive and natural, the revolt of the United Provinces against the sovereignty of Spain.

Grotius, when he was only thirty, was made pensionary of the city of Rotterdam. In 1613 he formed one of a deputation to England, in an attempt to adjust those differences which gave rise afterwards to a naval struggle disastrous to Holland. He was received by James with every mark of distinction. He also cultivated the acquaintance of the Anglican ecclesiastics John Overall and L. Andrewes, and was much in the society of the celebrated scholar Isaac Casaubon, with whom he had been in correspondence by letter for many years. Though the mediating views in the great religious conflict between Catholic and Protestant, by which Grotius was afterwards known, had been arrived at by him by independent reflection, yet it could not but be that he would be confirmed in them by finding in England a developed school of thought of the same character already in existence. How highly Casaubon esteemed Grotius appears from a letter of his to Daniel Heinsius, dated London, 13th of April 1613. " I cannot say how happy I esteem myself in having seen so much of one so truly great as Grotius. A

wonderful man! This I knew him to be before I had seen him; but the rare excellence of that divine genius no one can sufficiently feel who does not see his face, and hear him speak. Probity is stamped on his features; his conversation savours of true piety and profound learning. It is not only upon me that he has made this impression; all the pious and learned to whom he has been here introduced have felt the same towards him; the king especially so!"

After Grotius's return from England the exasperation of theological parties in Holland rose to such a pitch that it became clear that an appeal to force would be made. Grotius sought to find some mean term in which the two hostile parties of Remonstrants and Anti-remonstrants, or as they were subse- quently called Arminians and Gomarists (see Remonstrants), might

agree. A form of edict drawn by Grotius was published by the states, recommending mutual toleration, and forbidding ministers in the pulpit from handling the disputed dogmas. To the orthodox Calvinists the word toleration was insupportable. They had the populace on their side. This fact determined the stadtholder, Maurice of Nassau, to support the orthodox party — a party to which he inclined the more readily that Olden Barneveldt, the grand pensionary, the man whose uprightness and abilities he most dreaded, sided with the Remonstrants.

In 1618 Prince Maurice set out on a sort of pacific campaign, disbanding the civic guards in the various cities of Guelders, Holland and Zeeland, and occupying the places with troops on whom he could rely. The states of Holland sent a commission, of which Grotius was chairman, to Utrecht, with the view of strengthening the hands of their friends, the Remonstrant party, in that city. Feeble plans were formed, but not carried into effect, for shutting the gates upon the stadtholder, who entered the city with troops on the night of the 26th of July 1 61 8. There were conferences in which Grotius met Prince Maurice, and taught him that Olden Barneveldt was not the only man of capacity in the ranks of the Remonstrants whom he had to fear. On the early morning of the 31st of July the prince's coup d'etat against the liberties of Utrecht and of Holland was carried out; the civic guard was disarmed — Grotius and his colleagues saving themselves by a precipitate flight. But it was only a reprieve. The grand pensionary, Olden Barneveldt, the leader of the Remonstrant party, Grotius and Hoogerbeets were arrested, brought to trial, and condemned — Olden Barneveldt to death, and Grotius to imprisonment for life and confiscation of his property. In June 161 9 rje was immured in the fortress of Louvestein near Gorcum. His confinement was rigorous, but after a time his wife obtained permission to share his captivity, on the condition that if she came out, she should not be suffered to return.

Grotius had now before him, at thirty-six, no prospect but that of a lifelong captivity. He did not abandon himself to despair, but sought refuge in returning to the classical pursuits of his youth. Several of his translations (into Latin) from the Greek tragedians and other writers, made at this time, have been printed. " The Muses," he writes to Voss, " were now his consolation, and appeared more amiable than ever."

The ingenuity of Madame Grotius at length devised a mode of escape. It had grown into a custom to send the books which he had done with in a chest along with his linen to be washed at Gorcum. After a time the warders began to let the chest pass without opening it. Madame Grotius, perceiving this, prevailed on her husband to allow himself to be shut up in it at the usual time. The two soldiers who carried the chest out complained that it was so heavy " there must be an Arminian in it." " There are

indeed," said Madame Grotius, " Arminian books in it." The chest was carried to the house of a friend, where Grotius was released. He was then dressed like a mason with hod and trowel, and so conveyed over the frontier. His first place of refuge was Antwerp, from which he proceeded to Paris, where he arrived in April 1621. In October he was joined by his wife. There he was presented to the king, Louis XIII., and a pension of 3000 livres conferred upon him. French pensions were easiry granted, all the more so as they were never paid. Grotius was now

reduced to great straits. He looked about for any opening through which he might earn a living. There was talk of some- thing in Denmark; or he would settle in Spires, and practise in the court there. Some little relief he got through the interven- tion of Etienne d'Aligre, the chancellor, who procured a royal mandate which enabled Grotius to draw, not all, but a large part of his pension. In 1623 the president Henri de Meme lent him his chateau of Balagni near Senlis (dep. Oise), and there Grotius passed the spring and summer of that year. De Thou gave him facilities to borrow books from the superb library formed by his father.

In these circumstances the Dejure belli et pads was composed. That a work of such immense reading, consisting in great part of quotation, should have been written in little more than a year was a source of astonishment to his biographers. The achieve- ment would have been impossible, but for the fact that Grotius had with him the first draft of the work made in 1604. He had also got his brother William, when reading his classics, to mark down all the passages which touched upon law, public or private. In March 1625 the printing of the De jure belli, which had taken four months, was completed, and the edition despatched to the fair at Frankfort. His own honorarium as author consisted of 200 copies, of which, however, he had to give away many to friends, to the king, the principal courtiers, the papal nuncio, &c. What remained he sold for his own profit at the price of a crown each, but the sale did not recoup him his outlay. But though his book brought him no profit it brought him reputation, so widely spread, and of such long endurance, as no other legal treatise has ever enjoyed.

Grotius hoped that his fame would soften the hostility of his foes, and that his country would recall him to her service. Theo- logical rancour, however, prevailed over all other sentiments, and, after fruitless attempts to re-establish himself in Holland, Grotius accepted service under Sweden, in the capacity of ambassador to France. He was not very successful in negotiating the treaty on behalf of the Protestant interest in Germany,

Richelieu having a special dislike to him. He never enjoyed the confidence of the court to which he was accredited, and frittered away his influence in disputes about precedence. In 1645 he demanded and obtained his recall. He was honourably received at Stockholm, but neither the climate nor the tone of the court suited him, and he asked permission to leave. He was driven by a storm on the coast near Dantzig. He got as far as Rostock, where he found himself very ill. Stockman, a Scottish physician who was sent for, thought it was only weakness, and that rest would restore the patient. But Grotius sank rapidly, and died on the 29th of August 1645.

Grotius combined a wide circle of general knowledge with a profound study of one branch of law. History, theology, jurisprudence, politics, classics, poetry, — all these fields he cultivated. His commentaries on the Scriptures were the first application on an extensive scale of the principle affirmed by Scaliger, that, namely, of interpretation by the rules of grammar without dogmatic assumptions. Grotius's philological skill, however, was not sufficient to enable him to work up to this ideal. As in many other points Grotius inevitably recalls Erasmus, so he does in his attitude towards the great schism. Grotius was, however, animated by an ardent desire for peace and con- cord. He thought that a basis for reconciliation of Protestant and Catholic might be found in a common piety, combined with reticence upon discrepancies of doctrinal statement. His De veritate religionis Chrislianae (1627), a presentment of the evidences, is so written as to form a code of common Christianity, irrespective of sect. The little treatise became widely popular, gaining rather than losing popularity in the 18th century. It became the classical manual of apologetics in Protestant colleges, and was translated for missionary purposes into Arabic (by Pococke, 1660), Persian, Chinese, &c. His Via et volum ad pacem ecclcsiasticam (1642) was a detailed proposal of a scheme of accommodation. Like all men of moderate and mediating views, he was charged by both sides with vacillation. An Amsterdam minister, James Laurent, published his Grotius

papizans (1642), and it was continually being announced from Paris that Grotius had " gone over." Hallam, who has collected all the passages from Grotius's letters in which the prejudices and narrow tenets of the Reformed clergy are condemned, thought he had a " bias towards popery " (Lit. of Europe, ii. 312). The true interpretation of Grotius's mind appears to be an indifference to dogmatic propositions, produced by a profound sentiment of piety. He approached parties as a statesman approaches them, as facts which have to be dealt with, and governed, not sup- pressed in the interests of some one of their number.

His editions and translations of the classics were either juvenile exercises prescribed by Scaliger, or " lusus poetici," the amuse- ment of vacant

hours. Grotius read the classics as a humanist, for the sake of their contents, not as a professional scholar.

His Annals of the Low Countries was begun as an official duty while he held the appointment of historiographer, and was being continued and retouched by him to the last. It was not published till 1657, by his sons Peter and Cornelius.

Grotius was a great jurist, and his Dejure belli et pacts (Paris, 1625), though not the first attempt in modern times to ascertain the principles of jurisprudence, went far more fundamentally into the discussion than any one had done before him. The title of the work was so far misleading that the jus belli was a very small part of his comprehensive scheme. In his treatment of this narrower question he had the works of Alberico Gentili and Ayala before him, and has acknowledged his obligations to them. But it is in the larger questions to which he opened the way that the merit of Grotius consists. His was the first attempt to obtain a principle of right, and a basis for society and govern- ment, outside the church or the Bible. The distinction between religion on the one hand and law and morality on the other is not indeed clearly conceived by Grotius, but he wrestles with it in such a way as to make it easy for those who followed him to seize it. The law of nature is unalterable; God Himself cannot alter it any more than He can alter a mathematical axiom. This law has its source in the nature of man as a social being; it would be valid even were there no God, or if God did not interfere in the government of the world. These positions, though Grotius's religious temper did not allow him to rely unreservedly upon them, yet, even in the partial application they find in his book, entitle him to the honour of being held the founder of the modern science of the law of nature and nations. The De jure exerted little influence on the practice of belligerents, yet its publication was an epoch in the science. De Quincey has said that the book is equally divided between " empty truisms and time-serving Dutch falsehoods." For a saner judgment and a brief abstract of the contents of the Dejure, consult J. K. Bluntschli, Geschichte des allgemeinen Staatsrechts (Munich, 1864). A fuller analysis, and some notice of the predecessors of Grotius, will be found in Hely, Etude sur le droit de la guerre de Grotius (Paris, 1875). The writer, however, had never heard of the De jure praedae, published in 1868. Hallam, Lit. of Europe, ii. p. 543, has an abstract done with his usual conscientious pains. Dugald Stewart (Collected Works, i. 370) has dwelt upon the confusion and defects of Grotius's theory. Sir James Mackintosh (Miscell. Works, p. 166) has defended Grotius, affirming that his work " is perhaps the most complete that the world has yet owed, at so early a stage in the progress of any science, to the genius and learning of one man."

The chief writings of Grotius have been named. For a complete bibliography

of his works, see Lehmann, Hugonis Grotii manes vindicati (Delft, 1727), which also contains a full biography. Of this Latin life De Burigny published a rechauffee in French (2 vols., 8vo, Paris, 1752). Other lives are: Van Brandt, Historie van het Leven II. de Groot (2 vols., 8vo, Dordrecht, 1727); Von Luden, Hugo Grotius nach seinen Schicksalen und Schriften dargestellt (8vo, Berlin, 1806); Life of Hugo Grotius, by Charles Butler of Lincoln's Inn (8vo, London, 1826). The work of the Abbe Hely contains a life of Grotius. See also Hugo Grotius, by L. Neumann (Berlin, 1884) ; Opinions of Grotius x by D. P. de Bruyn (London, 1894).

Grotius's theological works were collected in 3 vols. fol. at Amster- dam (1644-1646; reprinted London, 1660; Amsterdam, 1679; and again Amsterdam, 1698). His letters were printed first in a selection, Epistolae ad Gallos (l2mo, Leiden, 1648), abounding, though an Elzevir, in errors of the press. They were collected in H.

%

Grotii epistolae quotquot reperiri poluerunt (fol., Amsterdam, 1687). A few may be found scattered in other collections of Epistolae. Supplements to the large collection of 1687 were published at Haarlem, 1806; Leiden, 1809; and Haarlem, 1829. The De jure belli was translated into English by Whewell (3 vols., 8vo, Cambridge, 1853); into French by Barbeyrac (2 vols. 4to, Amsterdam, 1724); into German in Kirchmann' s Philosophische Bibliothek (3 vols. i2mo, Leipzig, 1879). (M. P.)

GROTTAFERRATA, a village of Italy, in the province of Rome, from which it is 13 m. S.E. by electric tramway, and 25m. S. of Frascati, 1080 ft. above sea-level, in the Alban Hills. Pop. (1001) 2645. It is noticeable for the Greek monastery of Basilians founded by S. Nilus in 1002 under the Emperor Otho III., and which occupies the site of a large Roman villa, possibly that of Cicero. It was fortified at the end of the 15th century by Cardinal Giuliano della Rovere (afterwards Pope Julius II.), whose arms may be seen about it. The massive towers added by him give it a picturesque appearance. The church belongs to the 12th century, and the original portal, with a mosaic over it, is still preserved; the interior was restored in 1574 and in 1754, but there are some remains of frescoes of the 13th century. The chapel of S. Nilus contains frescoes by Domenico Zampieri (Domenichino) of 1610, illustrating the life of the saint, which are among his most important works. The abbot's palace has a fine Renaissance portico, and contains an interesting museum of local

antiquities. The library contains valuable MSS., among them one from the hand of S. Nilus (965); and a palaeographical school, for the copying of MSS. in the ancient style, is maintained. An omophorion of the nth or 12th century, with scenes from the Gospel in needlework, and a chalice of the 15th century with enamels, given by Cardinal Bessarion, the predecessor of Giuliano della Rovere as commendatory of the abbey, are among its treasures. An important exhibition of Italo-Byzantine art was held here in 1905-1906.

See A. Rocchi, La Badia di Grottaferrata (Rome, 1884) ; A. Mufioz, V Art byzantin a V exposition de Grottaferrata (Rome, 1905); T. Ashby in Papers of the British School at Rome, iv. (1907). (T. As.)

GROUCHY, EMMANUEL, Marquis de (1766-1847), marshal of France, was born in Paris on the 23rd of October 1766. He entered the French artillery in 1779, transferred to the cavalry in 1782, and to the Gardes du corps in 1786. In spite of his aristocratic birth and his connexions with the court, he was a convinced supporter of the principles of the Revolution, and had in consequence to leave the Guards. About the time of the outbreak of war in 1792 he became colonel of a cavalry regiment, and soon afterwards, as a marechal de camp, he was sent to serve on the south-eastern frontier. In 1793 he distinguished himself in La Vendee, and was promoted general of division. Grouchy was shortly afterwards deprived of his rank as being of noble birth, but in 1795 he was again placed on the active list. He served on the staff of the Army of Ireland (1796-1797), and took a conspicuous part in the Irish expedition. In 1798 he administered the civil and military government of Piedmont at the time of the abdication of the king of Sardinia, and in 1799 he distinguished himself greatly as a divisional commander in the campaign against the Austrians and Russians. In covering the retreat of the French after the defeat of Novi, Grouchy received fourteen wounds and was taken prisoner. On his release he returned to France. In spite of his having protested against the coup d'etat of the 18th of Brumaire he was at once re-employed by the First Consul, and distinguished himself again at Hohenlinden. It was not long before he accepted the new regime in France, and from 1801 onwards he was employed by Napoleon in military and political positions of importance. He served in Austria in 1805, in Prussia in 1806, Poland in 1807, Spain in 1808, and com- manded the cavalry of the Army of Italy in 1809 in the Viceroy Eugene's advance to Vienna. In 181 2 he was made commander ' of one of the four cavalry corps of the Grand Army, and during the retreat from Moscow Napoleon appointed him to command the escort squadron, which was composed entirely of picked officers. His almost continuous service with the cavalry led Napoleon to decline in 1813 to place Grouchy at the head of an army corps, and Grouchy thereupon retired to France. In

1814, however, he hastened to take part in the defensive campaign in France, and he was severely wounded at Craonne. At the Restoration he was deprived of the post of colonel-general of chasseurs & cheval and retired. He joined Napoleon on his return from Elba, and was made marshal and peer of France. In the campaign of Waterloo he commanded the reserve cavalry of the army, and after Ligny he was appointed to command the right wing to pursue the Prussians. The march on Wavre, its influence on the result of the campaign, and the controversy to which Grouchy's conduct on the day of Waterloo has given rise, are dealt with briefly in the article Waterloo Campaign, and at length in nearly every work on the campaign of 181 5. Here it is only necessary to say that on the 17th Grouchy was unable to close with the Prussians, and on the 18th, though urged to march towards the sound of the guns of Waterloo, he permitted himself, from whatever cause, to be held up by a Prussian rearguard while the Prussians and English united to crush Napoleon. On the 19th Grouchy won a smart victory over the Prussians at Wavre, but it was then too late. So far as resistance was possible after the great disaster, Grouchy made it. He gathered up the wrecks of Napoleon's army, and retired, swiftly and unbroken, to Paris, where, after interposing his reorganized forces between the enemy and the capital, he resigned his command into the hands of Marshal Davout. The rest of his life was spent in defending himself. An attempt to have him condemned to death by a court-martial failed, but he was exiled and lived in America till amnestied in 1821. On his return to France he was reinstated as general, but not as marshal nor as peer of France. For many years thereafter he was equally an object of aversion to the court party, as a member of their own caste who had followed the Revolution and Napoleon, and to his comrades of the Grand Army as the supposed betrayer of Napoleon. In 1830 Louis Philippe gave him back the marshal's baton and restored him to the Chamber of Peers. He died at St-Etienne on the 29th of May 1847.

See Marquis de Grouchy, Memoires du marechal Marquis de Grouchy (Paris, 1873-1874); General Marquis de Grouchy, Le General Grouchy en Irlande (Paris, 1866), and Le Marechal Grouchy du 16 au 18 juin, 18 15 (Paris, 1864) ; Appel d, I'histoire sur les faites de I'aile droite de I'armee francaise (Paris, n.d.) ; Severe Justice sur les fails . . . du 28 juin au 3 juillet, 18 15 (Paris, 1866); and the literature of the Waterloo campaign. Marshal Grouchy himself wrote the following: Observations sur la relation de la campagne de 181 5 par le general de Gourgaud (Philadelphia and Paris, 1818); Refutation de quelques articles des memoires de M. le Due de Rovigo (Paris, 1829); Fragments historiques relatifs d, la campagne et a" la bataille de Waterloo (Paris, 1829-1830, in reply to Barthelemy and Mery, and to Marshal Gerard) ; Reclamation du marechal de Grouchy (Paris, 1834) ; Plainte contre le general Baron Berthezene (Berthezene,

.formerly a divisional commander under Gerard, stated in reply to this defence that he had no intention of accusing Grouchy of ill faith).

GROUND-ICE, 1 ice formed at the bottom of streams while the temperature of the water is above freezing-point. Every- thing points to radiation as the prime cause of the formation of ground-ice. It is formed only under a clear sky, never in cloudy weather; it is most readily formed on dark rocks, and never under any covering such as a bridge, and rarely under surface- ice. Professor Howard T. Barnes of McGill University concludes that the radiation from a river bed in cold and clear nights goes through the water in long rays that penetrate much more easily from below upwards than the sun's heat rays from above down- wards, which are mostly absorbed by the first few feet of water. On a cold clear night, therefore, the radiation from the bottom is excessive, and loosely-grown spongy masses of anchor-ice form on the bottom, which on the following bright sunny day receive just sufficient heat from the sun to detach the mass of

1 The O. Eng. word grund, ground, is common to Teutonic languages, cf. Du. grond, Ger. Grund, but has no cognates outside Teutonic. The suggestion that the origin is to be found in " grind," to crush small, reduce to powder, is plausible, but the primary meaning seems to be the lowest part or bottom of anything rather than grit, sand or gravel. The main branches in sense appear to be, first, bottom, as of the sea or a river, cf. the use, in the plural, for dregs; second, base or foundation, actual, as of the first or main surface of a painting, fabric, &c, or figurative, as of a principle or reason; third, the surface of the earth, or a particular part of that surface.

ice, which rises to the surface with considerable force. It is prob- able that owing to surface tension a thin film of stationary water rests upon the boulders and sand over which a stream flows, and that this, becoming frozen owing to radiation, forms the foundation for the anchor-ice and produces a surface upon which the descending frazil-ice (see below) can lodge. The theory of radiation from the boulders is supported by the fact that as the ice is formed upon them in response to a sudden fall in the air temperature, it is only released under the influence of a strong rise of temperature during the morning. It may not rise for several days, but the advent of bright sunlight is followed by the appearance on the surface of masses of ground-ice. This ice has a spongy texture and frequently carries gravel with it when it rises. It is said that the bottom of Lake Erie is strewn with gravel that has been floated down in this way. This " anchor-ice," as

it was called by Canadian trappers, frequently forms dams across narrow portions of the river where the floating masses are caught. Dr H. Landor pointed out that the Mackenzie and Mississippi rivers, which rise in the same region and flow in opposite directions, carry ground-ice from their head-waters for a considerable distance down stream, and suggested that here and in Siberia many forms of vegetable and animal life may be distributed from a centre by this agency, since the material carried by the floating ice would contain the seeds and eggs or larvae of many forms.

Besides ground-ice and anchor-ice this formation is called also bottom-ice, ground-gru and lappered ice, the two last names being Scottish. In France it is called glace du fond, in Germany Grundeis, and in French Canada moutonne from the appearance of sheep at rest, since the ice formed at the bottom grows in woolly, spongy masses upon boulders or other projections.

" Frazil-ice " is a Canadian term from the French for " forge- cinders." It is surface ice formed in spicules and carried down- wards in water agitated by winds or rapids. The frazil-ice may render swiftly moving water turbid with ice crystals, it may be swirled downwards and accumulated upon the ground ice, or it may be swept under the sheet of surface-ice, coating the under surface of the sheet to a thickness as great as 80 ft. of loose spicular ice.

See W. G. Thompson, in Nature, i. 555 (1870); H. Landor, in Geological Magazine, decade II., vol. iii., p. 459 (1876); H. T. Barnes, Ice Formation with special Reference to Anchor-ice and Frazil

(1906).

GROUND NUT (Earth Nut, Pistache de Terre, Monkey Nut, Pea Nut, Manilla Nut), in botany, the fruit or pod of Arachis hypogaea (nat. ord. Leguminosae). The plant is an annual of diffuse habit, with hairy stem, and two-paired, abruptly pinnate leaflets. The pods or legumes are stalked, oblong, cylindrical, about 1 in. in length, the thin reticulated shell containing one or two irregularly ovoid seeds. After the flower withers, the stalk of the ovary has the peculiarity of elongating and bending down, forcing the young pod underground, and thus the seeds become matured at some distance below the surface. Hence the specific and vernacular names of the plant. Originally a native of South America, it is extensively cultivated in all tropical and subtropical countries. The plant affects a light sandy soil, and is very prolific, yielding in some instances 30 to 38 bushels of nuts per acre. The pods when ripe are dug up and dried. The seeds when fresh are largely eaten in tropical countries, and in taste are almost equal to almonds; when roasted they are used as a substitute for chocolate. In America they are consumed in large quantities as the "pea-nut"; but are

not much appreciated in England except by the poorer children, who know them as " monkey-nuts." By expression the seeds yield a large quantity of oil, which is used by natives for lamps, as a fish or curry oil and for medicinal purposes. The leaves form an excellent food for cattle, being very like clover.

Large quantities of seeds are imported to Europe, chiefly to Marseilles, London and Hamburg, for the sake of their contained oil. The seeds yield from 42 to 50% of oil by cold expression, but a larger quantity is obtained by heat, although of an inferior quality. The seeds being soft facilitate mechanical expression,

and where bisulphide of carbon or other solvent is used, a very pure oil is obtained.

The expressed oil is limpid, of a light yellowish or straw colour, having a faint smell and bland taste; it forms an excellent substitute for olive oil, although in a slight degree more prone to rancidity than the latter. Its specific gravity is 0-916 to 0-918; it becomes turbid at 3 C, concretes at +3 to – 4° C, and hardens at +7 C. It is a non-drying oil. Ground nut oil consists of (1) oleic acid (Ci8H 34 2); (2) hypogaeic acid (C16H30O2), by some supposed to be identical with a fatty acid found in whale oil; (3) palmitic acid (C16H32O2); and (4) arachic acid (C20H40O2), The oil is used in the adulteration of gingelly oil.

GROUND-PEARL, the glassy secretion forming the pupacase of coccid insects of the genus Margarodes, belonging to the homopterous division of the Hemiptera.

GROUND RENT. In Roman law, ground rent {solarium) was an annual rent payable by the lessee of a superficies or perpetual lease of building land. In English law, it appears that the term was at one time popularly used for the houses and lands out of which ground rents issue as well as for the rents themselves (cf. Maundy v. Maundy, 2 Strange, 1020); and Lord Eldon observed in 181 5 that the context in which the term occurred may materially vary its meaning {Stewart v. Alliston, 1 Mer. 26). But at the present time the accepted meaning of ground rent is the rent at which land is let for the purpose of improvement by building, i.e. a rent charged in respect of the land only and not in respect of the buildings to be placed thereon. It thus conveys the idea of something lower than a rack rent (see Rent); and accordingly if a vendor described property as property for which he paid a " ground rent," without any further explanation of the term, a purchaser would not be obliged to accept the property if it turned out to be held at a rack rent. But while a rack rent is generally higher in amount than a ground rent, the latter is usually better secured, as it carries

with it the reversionary interest in buildings and improvements put on the ground after the date at which the ground rent was fixed, and accordingly ground rents have been regarded as a good investment. Trustees empowered to invest money on the security of freehold or copyhold hereditaments, may invest upon freehold ground rents reserved out of house property. In estimating the amount that may be so invested, account may be taken of the value of the houses, as, if the ground rents are not paid, the landlord can re-enter. Again, where a settlement authorizes trustees to purchase lands or hereditaments in fee-simple or possession, a purchase of freehold ground rents has been held to be proper. A devise of " ground rent " carries not only the rent but the reversion. Where a tenant is compelled, in order to protect himself in the enjoyment of the land in respect of which his rent is payable, to pay ground rent to a superior landlord (who is of course in a position to distrain on him for it), he is considered as having been authorized by his immediate landlord to apply his rent,- due or accruing due, in this manner, and the payment of the ground rent will be held to be payment of the rent itself or part of it. A lodger, should make any payment of this char- acter under the Law of Distress Amendment Act 1908 (s. 3; and see Rent). Ground rents are apportionable (see Appor- tionment).

In Scots law, the term " ground rent " is not employed, but its place is taken, for practical purposes, by the " ground-annual, " which bears a double meaning, (i.) At the time of the Reformation in Scotland, the lands of the Church were parcelled out by the crown into various lordships — the grantees being called Lords of Erection. In the 17th century these Lords of Erection resigned their'superiorities ..to the crown, with the exception of the feu-duties, which were to be retained till a price agreed upon for their redemption had been paid. This reserved power of redemption was, however, resigned by the crown on the eve of the Union and the feu-duties became payable in perpetuity to the Lords of Erection as a " ground-annual." (ii.) Speculators in building ground usually grant sub-feus to builders at a high feu-duty. But where sub-feus are prohibited — as they might be, prior to the Conveyancing (Scotland) Act 1874 — and there is much demand for building ground, the feuars frequently stipulate for an annual rent from the builders rather than for a price payable at once. This annual rent is called a " ground-annual.' Interest is not

due on arrears of ground-annuals. Like other real burdens, ground-annuals may now be freely assigned and conveyed (Conveyancing (Scotland) Act 1874, s. 30).-

The term " ground rent " in the English sense does not seem to be generally used in the United States, but is applied in Pennsylvania to a kind of tenure, created by a grant in fee simple, the grantor reserving to himself and his heirs a certain rent, which is the interest of the money value of the land. These " ground rents " are real estate, and, in cases of intestacy, go to the heir. They are rent services and not rent charges — the statute Quia Emptores never having been in force in Pennsylvania, and are subject to all the incidents of such rents (see Rent). The grantee of such a " ground rent " may mortgage, sell, or otherwise dispose of the grant as he pleases; and while the rent is paid the land cannot be sold or the value of the improvements lost.

A ground rent being a freehold estate, created by deed and perpetual in duration, no presumption could, at common law, arise from lapse of time, that it had been released. But now, by statute (Act of 27th of April 1855, s. 7), a presumption of release or extinguishment is created where no payment, claim or demand has been made for the rent, nor any declaration or acknowledgment of its existence made or given by the owner of the premises subject to it, for the period of 21 years. Ground rents were formerly irredeemable after a certain time. But the creation of irredeemable ground rents is now forbidden (Pennsyl- vania Act 7 Assembly, 22nd of April 1850).

For English Law see Foa, Landlord and Tenant (3rd ed., London, 1901); Scots Law, Bell's Principles (10th ed., Edinburgh, 1899); American Law, Bouvier, Law Diet. (Boston and London, 1897).

(A. W. R.)

GROUNDSEL (Ger. Kreuzkraut; Fr. senecon), Senecio vul- garis, an annual, glabrous, or more or less woolly plant of the natural order Compositae, having a branched succulent stem 6 to 15 in. in height, pinnatifid irregularly and coarsely-toothed leaves, and small cylindrical heads of yellow tubular florets enveloped in an involucre of numerous narrow bracts; the ribbed fruit bears a soft, feathery, hoary tuft of hairs {pappus). The plant is indigenous to Europe, whence it has been introduced into all temperate climates. It is a troublesome weed, flowering throughout the year, and propagating itself rapidly by means of its light feathery fruits; it has its use, however, as a food for cage-birds. Senecio Jacobaea, ragwort, is a showy plant with heads of bright yellow flowers, common in pastures and by roadsides. The genus Senecio is a very large one, widely distri- buted in temperate and cold climates. The British species are all herbs, but the genus also includes shrubs and even arborescent forms, which are characteristic features of the vegetation of the higher levels on the mountains of tropical Africa. Many species of the genus are handsome

florists' plants. The groundsel tree, Baccharis halimifolia, a native of the North American sea-coast from Massachusetts southward, is a Composite shrub, attaining 6 to 12 ft. in height, and having angular branches, obovate or oblong-cuneate, somewhat scurfy leaves, and flowers larger than but similar to those of common groundsel. The long white pappus of the female plant renders it a conspicuous object in autumn. The groundsel tree has been cultivated in British gardens since 1683.

The Old English word, represented by " groundsel," appears in two forms, grundeswylige and gundceswelgicB ; of the first form the accepted derivation is from grund, ground, and swelgau, to swallow; a weed of such rapid growth would not inaptly be styled a " ground- swallower." If the form without the r be genuine, the word might mean " pus-absorber " (O.E. gund, filth, matter), with reference to its use in poultices for abscesses and the like.

GROUND-SQUIRREL, one of the names for a group of (chiefly) North American striped terrestrial squirrel-like rodents, m6re generally known as chipmunks. They are closely allied to squirrels, from which they are distinguished by the possession of cheek-pouches for the storage of food. The sides, or the sides and back, are marked with light stripes bordered by dark bands; the ears are small, and without tufts; and the tail is relatively short. With the exception of one Siberian species {Tamias asialicus), ground-squirrels are confined to North America,

where they are represented by a large number of species and races, all referable to the genus Tamias. In North America ground-squirrels are migratory, and may be abundant in a district one year, and absent the next. They feed on nuts, beechmast, corn and roots, and also on grubs. With the assist- ance of their cheek-pouches they accumulate large supplies of food for the winter, during which season they lie dormant in holes. Although generally keeping to the ground, when hunted they take to trees, which they climb in search of food. One of the longest known American species is T. striatus.

GROUPS, 1 THEORY OF. The conception of an operation to be carried out on some object or set of objects underlies all mathematical science. Thus in elementary arithmetic there are the fundamental operations of the addition and the multiplication of integers; in algebra a linear transformation is an operation which may be carried out on any set of variables; while in geometry a translation, a rotation, or a projective transformation are operations which may be carried out on any figure.

In speaking of an operation, an object or a set of objects to which it may be applied is postulated; and the operation may, and generally will, have no

*meaning except in regard to such a set of objects. If two operations, which can be performed on the same set of objects, are such that, when carried out in succession on any possible object, the result, whichever operation is performed first, is to produce no change in the object, then each of the operations is spoken of as a definite operation, and each of them is called the inverse of the other. Thus the opera- tions which consist in replacing * by nx and by x/n respectively, in any rational function of x, are definite inverse operations, if n is any assigned number except zero. On the contrary, the operation of replacing x by an assigned number in any rational function of x is not, in the present sense, although it leads to a unique result, a definite operation; there is in fact no unique inverse operation corresponding to it. It is to be noticed that the question whether an operation is a definite operation or no may depend on the range of the objects on which it operates. For example, the operations of squaring and extracting the square root are definite inverse operations if the objects are restricted to be real positive numbers, but not otherwise.*

If O, O', O", ... is the totality of the objects on which a definite operation S and its inverse S' may be carried out, and if the result of carrying out S on O is represented by O.S, then O.S.S', O.S'.S., and O are the same object whatever object of the set O may be. This will be represented by the equations SS' = S'S = I. Now O.S.S' has a meaning only if O.S is an object on which S' may be performed. Hence whatever object of the set O may be, both O.S and O.S' belong to the set. Similarly O.S.S, O.S.S.S, . . .are objects of the set. These will be represented by O.S 2 , O.S 3 , . . . Suppose now that T is another definite operation with the same set of objects as S, and that T' is its inverse operation. Then O.S.T is a definite operation of the set, and therefore the result of carrying out S and then T on the set of objects is some operation U with a unique result. Represent by U' the result of carrying out T' and then S'. Then O. UU' = O.S.T.T'.S' = O.SS' = O, and O. U'U = O.T'.S'.S.T = O.T'T = 0, whatever object O may be. Hence UU' = U'U = i; and U, U' are definite inverse operations.

If S, U, V are definite operations, and if S' is the inverse of S, then

SU = SV implies S'SU = S'SV,

or U = V.

Similarly US = VS

implies U = V.

Let S, T, U, . . .be a set of definite operations, capable of being carried out on a common object or set of objects, and let n e fi D ui OB the set contain

— ot a emtio

*(i.) the operation ST, S and T being any two operations * of the set ;*

(ii.) the inverse operation of S, S being any operation of the set; the set of operations is then called a group.

The number of operations in a group may be either finite or in- finite. When it is finite, the number is called the order of the group,

1 The word ” group,” which appears first in English in the sense of an assemblage of figures in an artistic design, picture, &c, is adapted from the Fr. groupe, which is to be referred to the Teutonic word meaning ” knot,” ” mass,” ” bunch,” represented in English by ” crop ” (q.v.). The technical mathematical sense is not older than 1870.

and the group is spoken of as a group of finite order. If the number of operations is infinite, there are three possible cases. When the group is represented by a set of geometrical operations, for the speci- fication of an individual operation a number of measurements will be necessary. In more analytical language, each operation will be specified by the values of a set of parameters. If no one of these parameters is capable of continuous variation, the group is called a discontinuous group. If all the parameters are capable of continuous variation, the group is called a continuous group. If some of the parameters are capable of continuous variation and some are not, the group is called a mixed group.

If S’ is the inverse operation of S, a group which contains S must contain SS’, which produces no change on any possible object. This is called the identical operation, and will always be represented by 1. Since S ,, S’ I = S , ‘ +9 when p and a are positive integers, and S ! ‘S’ = S p_1 while no meaning at present has been attached to S 5 when a is negative, S’ may be consistently represented by S -1 . The set of operations . . ., S -2 , S~\ 1, S, S 2 , . . . obviously constitute a group. Such a group is called a cyclical group.

It will be convenient, before giving some illustrations of the general group idea, to add a number of further definitions and ex- – planations which apply to all groups alike. If from among

u groups t j ig get o j p erat [ons S, T, U, . . . which constitute a group o°o rations • a sma ” er set S’, T’, U’, . . . can be chosen which them- isomorph-

se l ves constitute a group H, the group H is called a sub- Ism &c group of G. Thus, in particular, if S is an operation of G, the cyclical group constituted by . . . , S -2 , S -1 , 1, S, S 2 , . . . is a subgroup of G, except in the special case when it coincides with G itself.

If S and T are any two operations of G, the two operations S and T~'ST are called conjugate operations, andT _1 ST is spoken of as the result of transforming S by T. It is to be noted that since ST = T _1 . TS. T, ST and TS are always conjugate operations in any group containing both S and T. If T transforms S into itself, that is, if S = T~'ST or TS = ST, S and T are called permutable operations. A group whose operations are all permutable with each other is called an Abelian group. If S is transformed into itself by every operation of G, or, in other words, if it is permutable with every operation of G, it is called a self-conjugate operation of G.

The conception of operations being conjugate to each other is extended to subgroups. If S', T', U', . . . are the operations of a subgroup H, and if R is any operation of G, then the operations R-'S'R, R-'T'R, R-'U'R, . . . belong to G, and constitute a sub- group of G. For if S'T' = U', then R- 1 S'R.R- 1 T'R = R- I S'T'R = Rr'U'R. This subgroup may be identical with H. In particular, it is necessarily the same as H if R belongs to H. If it is not identical with H, it is said to be conjugate to H ; and it is in any case represented by the symbol R"'HR. If H = R~'HR, the operation R is said to be permutable with the subgroup H. (It is to be noticed that this does not imply that R is permutable with each operation of H.) If H =R"'HR, when for R is taken in turn each of the operations of G, then H is called a self-conjugate subgroup of G.

A group is spoken of as simple when it has no self-conjugate subgroup other than that constituted by the identical operation alone. A group which has a self-conjugate subgroup is called composite.

Let G be a group constituted of the operations S, T, U, . . ., and g a second group constituted of s, t, u, . . ., and suppose that to each operation of G there corresponds a single operation of g in such a way that if ST = U, then st = u, where s, t, u are the operations corresponding to S, T, U respectively. The groups are then said to be isomorphic, and the correspondence between their operations is spoken of as an isomorphism between the groups. It is clear that there may be two distinct cases of such isomorphism. To a single operation of g there may correspond either a single operation of G or more than one. In the first case the isomorphism is spoken of as simple, in the second as multiple.

Two simply isomorphic groups considered abstractly — that is to say, in regard ordy to the way in which their operations combine among

themselves, and apart from any concrete representation of the operations — are clearly indistinguishable.

If G is multiply isomorphic with g, let A, B, C, . . . be the opera- tions of G which correspond to the identical operation of g. Then to the operations A 1 and AB of G there corresponds the identical operation of g; so that A, B, C, . . constitute a subgroup H of G. Moreover, if R is any operation of G, the identical operation of g corresponds to every operation of R~'HR, and therefore H is a self conjugate subgroup of G. Since S corresponds to s, and every opera^ tion of H to the identical operation of g, therefore every operation of the set SA, SB, SC, . . ., which is represented by SH, corresponds to s. Also these are the only operations that correspond to s. The opera- tions of G may therefore be divided into sets, no two of which contain a, common operation, such that the correspondence between the operations of G and g connects each of the sets H, SH, TH, UH, . . . with the single operations 1, s, t, u, . . written below them. The sets into which the operations of G are thus divided combine among themselves by exactly the same laws as the operations of g. For if st = u, then SH.TH = UH, in the sense that any operation of the set SH followed by any operation of the set TH gives an operation of the set UH.

The group g, abstractly considered, is therefore completely defined by the division of the operations of G into sets in respect of the self- conjugate subgroup H. From this point of view it is spoken of as the factor-group of G in respect of H, and is represented by the symbol G/H. Any composite group in a similar way defines abstractly a factor-group in respect of each of its self-conjugate subgroups.

It follows from the definition of a group that it must always be possible to choose from its operations a set such that every operation of the group can be obtained by combining the operations of the set and their inverses. If the set is such that no one of the operations belonging to it can be represented in terms of the others, it is called a set of independent generating operations. Such a set of generating operations may be either finite or infinite in number. If A, B, . . ., E are the generating operations of a group, the group generated by

them is represented by the symbol {A, B Ej. An obvious

extension of this symbol is used such that (A, Hj represents the group generated by combining an operation A with every operation of a group H ; {Hi, H 2 j represents the group obtained by combining in all possible ways the operations of the groups Hi and H 2 ; and so on. The independent generating operations of a group may be subject to certain relations connecting them, but these must be such that it is impossible by combining

them to obtain a relation expressing one operation in terms of the others. For instance, AB = B A is a relation conditioning the group {A, Bj ; it does not, however, enable A to be expressed in terms of B, so that A and B are independent generating operations.

Let O, O', O", ... be a set of objects which are interchanged among themselves by the operations of a group G, so that if S is any opera- tion of the group, and O any one of the objects, then O. S _, is an object occurring in the set. If it is possible to find an A r f, " . operation S of the group such that O. S is any assigned one r j y . an of the set of objects, the group is called transitive in respect £T j? ' of this set of objects. When this is not possible the group y '

is called intransitive in respect of the set. If it is possible to find S so that any arbitrarily chosen n objects of the set, Oi, O2, . . ., O n are

changed by S into O'i, 0\ 0′ n respectively, the latter being also

arbitrarily chosen, the group is said to be ra-ply transitive.

If O, 0', O", ... is a set of objects in respect of which a group G is transitive, it may be possible to divide the set into a number of subsets, no two of which contain a common object, such that every operation of the group either interchanges the objects of a subset among themselves, or changes them all into the objects of some other subset. When this is the case the group is called imprimitive in respect of the set ; otherwise the group is called primitive. A group which is doubly-transitive, in respect of a set of objects, obviously cannot be imprimitive.

The foregoing general definitions and explanations will now be

illustrated by a consideration of certain particular groups. To begin

with, as the operations involved are of the most familiar …

nature, thegroupof rational arithmetic maybe considered. t , us ra ! tu~ c.. nr t~~. — , + ~i _~4-:„.. „r „i- — <- „„:4-u.«„ <-:~ nous or

The fundamental operations of elementary arithmetic

the group

consist in the addition and subtraction of integers, and Mea multiplication and division by integers, division by zero alone omitted. Multiplication by zero is not a definite operation, and it must therefore be omitted in dealing with those operations of elementary arithmetic which form a group. The

operation that results from carrying out additions, subtractions, multiplications and divisions, of and by integers a finite number of times, is represented bythe relation x'=ax+b, where a and b are rational numbers of which a is not zero, x is the object of the operation, and x' is the result. The totality of operations of this form obviously constitutes a group.

If S and T represent respectively the operations x' = ax--b and x' = cx +d, then T~'ST represents x' ' =ax--d-ad--bc. When a and b are given rational numbers, c and d may be chosen in an infinite number of ways as rational numbers, so that dˆad+bc shall be any assigned rational number. Hence the operations given by x' = ax+b, where a is an assigned rational number and b is any rational number, are all conjugate; and no two such operations for which the a's are different can be conjugate. If a is unity and b zero, S is the identical operation which is necessarily self-conjugate. If a is unity and b different from zero, the operation x' = x+b is an addition. The totality of additions forms, therefore, a single conjugate set of operations. Moreover, the totality of additions with the identical opera- tion, i.e. the totality of operations of the form x' = x--b, where b may be any rational number or zero, obviously constitutes a group. The operations of this group are interchanged among themselves when transformed by any operation of the original group. It is therefore a self-conjugate subgroup of the original group.

The totality of multiplications, with the identical operation, i.e. all operations of the form x' = ax, where a is any rational number other than zero, again obviously constitutes a group. This, however, is not a self-conjugate subgroup of the original group. In fact, if the operations x' — ax are all transformed by x' — cx+d, they give rise to the set x' =ax+d(i-a). When d is a given rational number, the set constitutes a subgroup which is conjugate to the group of multi- plications. It is to be noticed that the operations of this latter sub- group may be written in the form x'-d = a(x-d).

The totality of rational numbers, including zero, forms a set of objects which are interchanged among themselves by all operations of the group.

If Xi and Xi are any pair of distinct rational numbers, and yi and yt any other pair, there is just one operation of the group which changes Xi and x° into y\ and y% respectively. For the equations yi = axi+b, yi=axi+b determine a and b uniquely. The group is therefore doubly transitive in respect of the set of rational numbers. If H is the subgroup that leaves

unchanged a given rational number Xi, and S an operation changing x t into Xi, then every operation of S _, HS leaves x 2 unchanged. The subgroups, each of which leaves a single rational number unchanged, therefore form a single conjugate set. The group of multiplications leaves zero unchanged; and, as has been seen, this is conjugate with the subgroup formed of all operations x'-d = a(x-d), where d is a given rational number. This subgroup leaves d unchanged.

The group of multiplications is clearly generated by the operations x' =px, where for p negative unity and each prime is taken in turn. Every addition is obtained on transforming x' = x+l by the different operations of the group of multiplications. Hence x' =x--l, and x' = px, (p = -I, 3, 5, 7, . . .), form a set of independent generating operations of the group. It is a discontinuous group.

As a second example the group of motions in three-dimensional space will be considered. The totality of motions, i.e. of space displacements which leave the distance of every pair of points unaltered, obviously constitutes a set of operations which satis- fies the group definition. From the elements of . kinematics it is known that every motion is either (i.) a translation which leaves no point unaltered, but changes each of a set of parallel lines into itself ; or (ii.) a rotation which leaves every point of one line unaltered and changes every other point and line; or (iii.) a twist which leaves no point and only one line (its axis) unaltered, and may be regarded as a translation along, combined with a rotation round, the axis. Let S be any motion consisting of a translation / along and a rotation a round a line AB, and let T be any other motion. There is some line CD into which T changes AB; and therefore T _I ST leaves CD un- changed. Moreover, T 1 ST clearly effects the same translation along and rotation round CD that S effects for AB. Two motions, there fore, are conjugate if and only if the amplitudes of their translation and rotation components are respectively equal. In particular, all translations of equal amplitude are conjugate, as also are all rotations of equal amplitude. Any two translations are permutable with each other, and give when combined another translation. The totality of translations constitutes, therefore, a subgroup of the general group of motions; and this subgroup is a self-conjugate subgroup, since a translation is always conjugate to a translation.

All the points of space constitute a set of objects which are inter- changed among themselves by all operations of the group of motions. So also do all the lines of space and all the planes. In respect of each of these sets the group is simply transitive. In fact, there is an infinite number of motions which change a point A to A', but no motion can change A and B to A' and B' respectively unless the distance AB is equal to the distance A'B'.

The totality of motions which leave a point A unchanged forms a subgroup. It is clearly constituted of all possible rotations about all possible axes through A, and is known as the group of rotations about a point. Every motion can be represented as a rotation about some axis through A followed by a translation. Hence if G is the group of motions and H the group of translations, G/H is simply isomorphic with the group of rotations about a point.

The totality of the motions which bring a given solid to congruence with itself again constitutes a subgroup of the group of motions. This will in general be the trivial subgroup formed of the identical operation above, but may in the case of a symmetrical body be more extensive. For a sphere or a right circular cylinder the subgroups are those that leave the centre and the axis respectively unaltered. For a solid bounded by plane faces the subgroup is clearly one of finite order. In particular, to each of the regular solids there corresponds such a group. That for the tetrahedron has 12 for its order, for the cube (or octahedron) 24, and for the icosahedron (or dodecahedron) 60.

The determination of a particular operation of the group of motions involves six distinct measurements; namely, four to give the axis of the twist, one for the magnitude of the translation along the axis, and one for the magnitude of the rotation about it. Each of the six quantities involved may have any value whatever, and the group of motions is therefore a continuous group. On the other hand, a sub- group of the group of motions which leaves a line or a plane unaltered is a mixed group.

We shall now discuss (i.) continuous groups, (ii.) discontinuous groups whose order is not finite, and (iii.) groups of finite order. For proofs of the statements, and the general theorems, the reader is referred to the bibliography.

Continuous Groups.

The determination of a particular operation of a given con- tinuous group depends on assigning special values to each one of a set of parameters which are capable of continuous variation. The first distinction regards the number of these parameters,,

If this number is finite, the group is called a finite continuous group; if infinite, it is called an infinite continuous group. In the latter case arbitrary functions must appear in the equations defining the operations of the group when these are reduced to an analytical form. The theory of infinite continuous groups is not yet so completely developed as that of finite continuous groups. The latter theory will mainly occupy us here.

Sophus Lie, to whom the foundation and a great part of the development of the theory of continuous groups are due, un doubtedly approached the subject from a geometrical standpoint. His conception of an operation is to regard it as a geometrical transformation, by means of which each point of («-dimensional) space is changed into some other definite point.

The representation of such a transformation in analytical form involves a system of equations,

x'a=fs{Xl, X 2 X„), (S = I, 2, . . ., n),

expressing x'i, x'i, . . ., x'„, the co-ordinates of the transformed point in terms of Xi, x 2 , . . ., x„, the co-ordinates of the original point. In these equations the functions /, are analytical functions of their arguments. Within a properly limited region they must be one- valued, and the equations must admit a unique solution with respect to Xi, x 2 , . . ., x n , since the operation would not otherwise be a definite one.

From this point of view the operations of a continuous group, which depends on a set of r parameters, will be defined analytically by a system of equations of the form

x', =f,{x u x 2 , . . ., x„; Oi, o 2 , . . ., Or), = 1, 2, . . ., n), (i.)

where d, a 2 a, represent the parameters. If this operation be

represented by A, and that in which 61, 6 2 , . . ., 6 r are the parameters by B, then the operation AB is represented by the elimination

(assumed to be possible) of x'i, x\ x' n between the equations(i.)

and the equations

x". =/.('i, x\ x' n ; 61, 6 2 , . . ., b r), = 1, 2 n).*

Since AB belongs to the group, the result of the elimination must be x", =f, {x it xi, . . ., x n ; ci, c 2 , . . ., c r),

where c i} e 2 c, represent another definite set of values of the

parameters. Moreover, since A -1 belongs to the group, the result of solving equations (i.) with respect to x lt x lt . . ., # n must be

X, =fi{x\, x'i, . . ., X'n) d u i 2 , . . ., dr), 0=1,2,.. ., »).

Conversely, if equations (i.) are such that these two conditions are satisfied, they do in fact define a finite continuous group.

It will be assumed that the r parameters which enter in equations (i.) are independent, i.e. that it is impossible to choose r' (

In regard to equations (i.), which define the general operation of the group, it is to be noticed that, since the group contains the identical operation, these equations must for some definite set of values of the parameters reduce to x\ = Xi, x\=xz, . . ., x' n = x n . This set of values may, without loss of generality, be assumed to be simultaneous zero values. For if i\, i 2 , . . ., i, be the values of the parameters which give the identical operation, and if we write

a, = i,+a, = 1,2, . . .,r), then zero values of the new parameters

To infinitesimal values of the parameters, thus chosen, will corre- spond operations which cause an infinitesimal change in each of the variables. These are called infinitesimal operations. The most general infinitesimal operation of the group is that given by the system

ˆ.-.fa.|£to+ S £aa,+ . . . +gˆ«r- = 1, 2. .... n),*

where, in df,/ddi, zero values of the parameters are to be taken. Since a\, ch, . . . , a., are independent, the ratios of ta,\, ba 2 , . . . , Sa T are arbitrary. Hence the most general infinitesimal operation of the group may be written in the form

*where ei, e-i, . . . , e r are arbitrary constants, and U is an infinitesimal. If F(*i, X2, ■ ■ ■ , Xn) is any function of the variables, and if an infinitesimal operation of the group be carried Out on the variables in F, the resulting increment of F will be*

3F.„ , 3F„ , , 8F.

If the differential operator

*cSoi 5*1 <5i dx 2 ' ' ' ' ""Boi Sx n*

be represented by Xj, (»' = i, 2, . . . ,r), then the increment of F is I given by

(e 1 X 1 e 2 X, ... +e r X r)Fit.

When the equations (i.) defining the general operation of the group are given, the coefficients dfjdai which enter in these differential operators are

functions of the variables which can be directly calcu- lated.

The differential operator e 1 Xi+e 2 X 2 + . . . +e r X r may then be regarded as defining the most general infinitesimal operation of the group. In fact, if it be for a moment represented by X, then (1 +«X)F is the result of carrying out the infinitesimal operation on F ; and by putting Xi, xi, . . . , x„ in turn for F, the actual infinitesimal operation is reproduced. By a very convenient, though perhaps hardly justifiable, phraseology this differential operator is itself spoken of as the general infinitesimal operation of the group. The sense in which this phraseology is to be understood will be made clear by the foregoing explanations.

We suppose now that the constants e it e 2 e r have assigned

values. Then the result of repeating the particular infinitesimal operation eiXi+e 2 X 2 + . . . +e,X r or X an infinite number of times is some finite operation of the group. The effect of this finite opera- tion on F may be directly calculated. In fact, if U is the infinitesimal already introduced, then

Hence

“3T = XF ‘ -3J = X – X – F .--- = F+(X.F+ˆX.X.F +

dP +

It must, of course, be understood that in this analytical representa- tion of the effect of the finite operation on F it is implied that / is taken sufficiently small to ensure the convergence of the (in general) infinite series.

When Xi, x 2 , . . . are written in turn for F, the system of equations

x’. = (i+tX+ˆ3X.X+...

)X„ (s = I,2,

,n) ,(ii.)

represent the finite operation completely. If / is here regarded as a parameter, this set of operations must in themselves constitute a group, since they arise by the repetition of a single infinitesimal operation. That this is really the case results immediately from noticing that the result of eliminating F' between

and

F' = F-HX.F+y^X.X.F+ • • • F" = F'4-/'x.F'^X.X.F' . . .

F" = F + (/+OX.F+^ip" x – x – F + • • ■

must satisfy in order that they may, in fact, be the independent infinitesimal operations of such a group.

If X, Y are two linear differential operators, XY – YX is also a linear differential operator. It is called the " combinant " of X and Y (Lie uses the expression Klammerausdruck) and is denoted by (XY). If X, Y, Z are any three linear differential operators the identity (known as Jacobi's)

(X(YZ)) + (Y(ZX)) + (Z(XY))-o holds between them. Now it may be shown that any continuous group of which X, Y are infinitesimal operations contains also (XY) among its infinitesimal operations. Hence if r linearly independent operations Xi, X 2 , . . . , X r give rise to a finite continuous group of order r, the combinant of each pair must be expressible linearly in terms of the r operations themselves : that is, there must be a system of relations

(X{X,-) = / CijkXi,,

where the c's are constants. Moreover, from Jacobi's identity and the identity (X Y) + (YX) = o it follows that the c's are subject to the relations

CiH+Cj>,=0,]

and 2(cjktCi.t+Cki^ui+cnM,t) =0 y (111.)

The group thus generated by the repetition of an infinitesimal operation is called a cyclical group; so that a continuous group contains a cyclical subgroup corresponding to each of its infinitesimal operations.

The system of equations (ii.) represents an operation of the group

whatever the constants e u e 2 e r may be. Hence if erf, e4, . . . , e r t

be replaced by 01, a 2 , . . . , Or the equations (ii.) represent a set of operations, depending on r parameters and belonging to the group. They must therefore be a form of the general equations for any operation of the group, and are equivalent to the equations (i.). The determination of the finite equations of a cyclical group, when the infinitesimal operation which generates it is given, will always depend on the integration of a set of simultaneous ordinary differential equations. As a very simple example we may consider the case in which the infinitesimal ooeration is given by X = x 2 3/dx, so that there is only a single variable. The relation between %' and t is given by dx'ldl=x' 2 , with the condition that x' = x when t = o. This gives at once x' =x/(i-lx), which might also be obtained by the direct use of (ii.).

When the finite equations (i.) of a continuous group of order r are known, it has now been seen that the differential operator which defines the most general infinitesimal operation of the Relations group can be directly constructed, and that it contains r between arbitrary constants. This is equivalent to saying that „.!"'. the group contains r linearly independent infinitesimal Hnlteslmal p erat ; ons . anc j that the most general infinitesimal opera oas p erat j on j s obtained by combining these linearly with ota finite cons t a nt coefficients. Moreover, when any r independent continuous ; n fi n itesimal operations of the group are known, it has K™" – been seen how the general finite operation of the group*

may be calculated. This obviously suggests that it must be possible to define the group by means of its infinitesimal operations alone; and it is clear that such a definition would lend itself more readily to some applications (for instance, to the theory of differential equations) than the definition by means of the finite equations.

On the other hand, r arbitrarily given linear differential operators will not, in general, give rise to a finite continuous group of order r; and the question arises as to what conditions such a set of ODerators

for all values of i, j, k and t.

*The fundamental theorem of the theory of finite continuous groups is now that these conditions, which are necessary in order that Xi, X 2 , . . . , X r may generate, as infinitesimal ;, "/< **" operations, a continuous group of order r, are also H?, _? **sufficient. . f st** "" f*

For the proof of this fundamental theorem see Lie's ^^tinuoua works (cf. Lie-Engel, i. chap. 9; iii. chap. 25). groups of

If two continuous groups of order r are such that, for axj y en each, a set

of linearly independent infinitesimal operations on / en

Xi, X 2 , . . . , X r and Yi, Y 2 Y r can be chosen, so

that in the relations

(XiX/) =2c;,- s Xs, (YiYj) =2at, s Y s , the constants c,-, s and dˆ, are the same for all values of i,j and J, the two groups are simply isomorphic, X„ and Y„ being corresponding infinitesimal operations.

Two continuous groups of order r, whose infinitesimal operations obey the same system of equations (iii.), may be of very different form; for instance, the number of variables for the one may be different from that for the other. They are, however, said to be of the same type, in the sense that the laws according to which their operations combine are the same for both.

The problem-of determining all distinct types of groups of order r is then contained in the purely algebraical problem of finding all the systems of r 3 quantities dj, which satisfy the relations

Cijt+Ciji=0,

'^'(CijsCskf'CjksCnt J rCkisCsjt) =0, s

for all values of i,j, k and /. To two distinct solutions of the alge- braical problem, however, two distinct types of group will not necessarily correspond. In fact, Xi, X 2 , . . , X r may be replaced by any r independent linear functions of themselves, and the c's will then be transformed by a linear substitution containing r 2 inde- pendent parameters. This, however, does not alter the type of group considered.

For a single parameter there is, of course, only one type of group, which has been called cyclical.

For a group of order two there is a single relation (X 1 X 2)=aX 1 + /3X 2 .

If o and /? are not both zero, let a be finite. The relation may then be written (aXi+/3X 2 , a-'Xs) = oX, /3X,. Hence if oXi/3X,=X'i, and a _1 X 2 = X' 2 , then (X'iX' 2) =X'i. There are, therefore, just two types of group of order two, the one given by the relation last written, and the other by (XiX 2) =0.

Lie has determined all distinct types of continuous groups of orders three or four; and all types of non-integrable groups (a term which will be explained immediately) of orders five and six (cf . Lie- Engel, iii. 713-744).

*A problem of fundamental importance in connexion with any given continuous group is the determination of the self-conjugate subgroups which it contains. If X is an infinitesimal Se//-eoii- operation of a group, and Y any other, the general form ’”*f te of the infinitesimal operations which are conjugate to X is V’t^”??’*

*X + *(XY) + ^((XY)Y) + ... groups –*

Any subgroup which contains all the operations conjugate to X must therefore contain all infinitesimal operations (XY), ((XY)Y) , . . ., where for Y each infinitesimal operation of the group is taken in turn. Hence if X’l X’ 2 , . . . , X’„ are 5 linearly independent operations of the group which generate a self-conjugate subgroup of order s, then for every infinitesimal operation Y of the group relations of the form

(X’iY) = 2o j .X’. 1 (= l,2,*

**)*

must be satisfied. Conversely, if such a set of relations is satisfied, X’i, X’ 2 > . . . , X’„ generate a subgroup of order s, which contains every operation conjugate to each of the infinitesimal generating operations, and is therefore a self-conjugate subgroup.

A specially important self-conjugate subgroup is that generated by the combinants of the r infinitesimal generating operations. That these generate a self-conjugate subgroup follows from the relations (iii.). In fact,

((X i X,)X l) = 2t, i .(X,X it).

Of the §r(r-i) combinants not more than r can be linearly inde- pendent. When exactly r of them are linearly independent, the self- conjugate group generated by them coincides with the original group. If the number that are linearly independent is less than r, the self- conjugate subgroup generated by them is actually a subgroup; i.e. its order is less than that of the original group. This subgroup is known as the derived group, and Lie has called a group perfect when it coincides with its derived group. A simple group, since it contains no self-conjugate subgroup distinct from itself, is necessarily a per- fect group.

If G is a given continuous group, Gi the derived group of G, G 2 that of Gi, and so on, the series of groups G, Gi, G 2 , . . will terminate either with the

identical operation or with a perfect group ; for the order of G„ + i is less than that of G s unless G, is a perfect group. When the series terminates with the identical operation, G is said to be an integrable group ; in the contrary case G is called non- integrable.

If G is an integrable group of order r, the infinitesimal opera- tions Xi, X2, ... X r which generate the group may be chosen so

that Xi, X 2 Xn, (ri

Xi, X 2 , . . ., X r2 , (r s

In particular the generating operations may be chosen so that Ci,-, vanishes unless s is equal to or less than the smaller of the two numbers i, j; and conversely, if the c's satisfy these relations, the group is integrable.

A simple group, as already defined, is one which has no self- conjugate subgroup. It is a remarkable fact that the determination of all distinct types of simple continuous groups has been ~ mpie made, for in the case of discontinuous groups and groups groups. Q f g n ; te orc i er this is far from being the case. Lie has demonstrated the existence of four great classes of simple groups:—

(i.) The groups simply isomorphic with the general projective group in space of n dimensions. Such a group is defined analytically as the totality of the transformations of the form

**. =*

q„ 1X1 + O,, 2X2 + ■ ■ • + Os, nXn + O

ˆ, (5 = 1, 2,..., »),

*On + l, l*i + O n + i, 2X2 + . . . a n i, nX„-f-*

where the o's are parameters. The order of this group is clearly n(n + 2).

(ii.) The groups simply isomorphic with the totality of the pro- jective transformations which transform a non-special linear complex in space of 2«-i dimensions with itself. The order of this group is «(2n + i).

(iii.) and (iv.) The groups simply isomorphic with the totality of the projective transformations which change a quadric of non- vanishing discriminant into itself. These fall into two distinct classes of types according as n is even or odd. In either case the order is \n(n--i). The case « = 3 forms an exception in which the corresponding group is not simple.

It is also to be noticed that a cyclical group is a simple group, since it has no continuous self- conjugate subgroup distinct from itself.

W. K. J. Killing and E. J. Cartan have separately proved that outside these four great classes there exist only five distinct types of simple groups, whose orders are 14, 52, 78, 133 and 248; thus completing the enumeration of all possible types.

To prevent any misapprehension as to the bearing of these very general results, it is well to point out explicitly that there are no limitations on the parameters of a continuous group as it has been defined above. They are to be regarded as taking in general complex values. If in the finite equations of a continuous group the imaginary symbol does not explicitly occur, the finite equations will usually define a group (in the general sense of the original definition) when both parameters and variables are limited to real values. Such a group is, in a certain sense, a continuous group; and such groups have been considered shortly by Lie (cf. Lie-Engel, iii. 360-392), who calls them real continuous groups. To these real continuous groups the above statement as to the totality of simple groups does not apply; and indeed, in all probability, the number of types of real simple continuous groups admits of no such complete enumera- – tion. The effect of limitation to real transformations may be illus- trated by considering the groups of' projective transformations which change

$$x^2 + y^2 + z^2 - i = 0 \text{ and } x^2 - f - j > 2 - z^2 - i = 0$$

respectively into themselves. Since one of these quadrics is changed into the other by the imaginary transformation

$$x' = x,\ y' = y,\ z' = zV(-i),$$

the general continuous groups which transform the two quadrics respectively into themselves are simply isomorphic. This is not, however, the case for the real continuous groups. In fact, the second quadric has two real sets of generators ; and therefore the real group which transforms it into itself has two self-conj ugate subgroups, either of which leaves unchanged each of one set of generators. The first quadric having imaginary generators, no such self-conjugate subgroups can exist for the real group which transforms it into itself ; and this real group is in fact simple.

Among the groups isomorphic with a given continuous group there is one of special importance which is known as the adjunct group. This is a homogeneous linear group in a number of The variables equal to the order of the group.whose infinitesimal adjunct operations are defined by the

relations group.

X, = 2ci]S x,— , (.7 = 1,2,

t,s

dx,

r),

where c iis are the often-used constants, which give the combinants of the infinitesimal operations in terms of the infinitesimal operations themselves.

That the r infinitesimal operations thus defined actually generate a group isomorphic with the given group is verified bv forming their combinants. It is thus found that (X„X a) = 2e M ˆX,. The X's,

however, are not necessarily linearly independent. In fact, the sufficient condition that 2a,X, should be identically zero is that

j 2a,Ci, s should vanish for all values of i and s. Hence if the equations i

*2a,c»;, = o for all values of * and j, have r' linearly independent j*

solutions, only r—r' of the X's are linearly independent, and the isomorphism of the two groups is multiple. If Yi, Y 2 , . . ., Y r are the infinitesimal operations of the given group, the equations 2a,c», s = o, (s, i = l, 2,. . ., r) i express the condition that the operations of the cyclical group generated by 2

i the group; in other words, that they should be self-conjugate operations. In the case supposed, therefore, the given group contains a subgroup of order r' each of whose operations is self- conjugate. The adjunct group of a given group will therefore be simply isomorphic with the group, unless the latter contains self- conjugate operations; and when this is the case the order of the adjunct will be less than that of the given group by the order of the subgroup formed of the self-conjugate operations.

We have been thus far mainly concerned with the abstract theory of continuous groups, in which no distinction is made be- tween two simply isomorphic groups. We proceed to Coat!au ° as discuss the classification and theory of groups when groups of the their form is regarded as essential; and this is a return Uaeotthe to a more geometrical point of view. f"h' "

It is natural to begin with the projective groups, ° d! ' " e ; " a , which are the simplest in form and at the same time are "pace of supreme importance

in geometry. The general pro- jective group of the straight line is the group of order three given by

, ax+b ~ cx+d' where the parameters are the ratios of a, b, c, d. Since

X's— X\ x'—x\ X3—X2 X—Xi

-x 1 x

X3 — X1 X—Xi

is an operation of the above form, the group is triply transitive. Every subgroup of order two leaves one point unchanged, and all such subgroups are conjugate. A cyclical subgroup leaves either two distinct points or two coincident points unchanged. A subgroup which either leaves two points unchanged or interchanges them is an example of a " mixed " group.

The analysis of the general projective group must obviously increase very rapidly in complexity, as the dimensions of the space to which it applies increase. This analysis has been completely carried out for the projective group of the plane, with the result of showing that there are thirty distinct types of subgroup. Excluding the general group itself, every one of these leaves either a point, a line, or a conic section unaltered. For space of three dimensions Lie has also carried out a similar investigation, but the results are ex- tremely complicated. One general result of great importance at which Lie arrives in this connexion is that every projective group in space of three dimensions, other than the general group, leaves either a point, a curve, a surface or a linear complex unaltered.

Returning now to the case of a single variable, it can be shown that any finite continuous group in one variable is either cyclical or of order two or three, and that by a suitable transformation any such group may be changed into a projective group.

The genesis of an infinite as distinguished from a finite continuous group may be well illustrated by considering it in the case of a single variable. The infinitesimal operations of the projective group in

one variable are -jz, x-r-., x 2 r. If these combined with x 3 j be

*transfer**

mations.

taken as infinitesimal operations from which to generate a continuous group among the infinitesimal operations of the group, there must

occur the combinant of x—j- and x 3 y-. This is xS~- The combinant

of this and x 2 r is 2x'r and so on. Hence f-r, where r is any

positive integer, is an infinitesimal operation of the group. The

general infinitesimal operation of the group is therefore f{x)~jZ> where

fix) is an arbitrary integral function of x.

In the classification of the groups, projective or non-projective of two or more variables, the distinction between primitive and imprimitive groups immediately presents itself. For groups of the plane the following question arises. Is there or is there not a singly- infinite family of curves f(x, y) = C, where C is an arbitrary constant such that every operation of the group interchanges the curves of the family among themselves? In accordance with the previously given definition of imprimitivity, the group is called imprimitive or primitive according as such a set exists or not. In space of three dimensions there are two possibilities; namely, there may either be a singly infinite system of surfaces P (x, y, 2) =C, which are inter- changed among themselves by the operations of the group; or there may be a doubly-infinite system of curves G{x, y, z)=a, H(x, y, z) =£>, which are so interchanged.

In regard to primitive groups Lie has shown that any primitive group of the plane can, by a suitably chosen transformation, be transformed into one of three definite types of projective groups; and that any primitive group of space of three dimensions can be transformed into one of eight definite types, which, however, cannot all be represented as projective groups in three dimensions.

The results which have been arrived at for imprimitive groups in two and three variables do not admit of any such simple statement. We shall now explain the conception of contact-transformations and groups of contact-transformations. This concep- tion, like that of continuous groups, owes its origin to Lie.

From a purely analytical point of view a contact- transformation may be defined as a point-transformation in 2W + 1 variables, z, x\, x, . . ., x n*

, pi, p$, . . ., p n which leaves unaltered the equation dz—p^dxi—p^dxi — . . . —p„dx n = o. Such a definition as this, however, gives no direct clue to the geometrical properties of the transformation, nor does it explain the name given.

In dealing with contact-transformations we shall restrict ourselves to space of two or of three dimensions; and it will be necessary to begin with some purely geometrical considerations. An infinitesimal surface-element in space of three dimensions is completely specified, apart from its size, by its position and orientation. If x, y, z are the co-ordinates of some one point of the element, and if p, q, -I give the ratios of the direction-cosines of its normal, x, y, z, p, q are five quantities which completely specify the element. There are, therefore, 00 5 surface elements in three-dimensional space. The surface-elements of a surface form a system of 00 2 elements, for there are x 2 points on the surface, and at each a definite surface-element. The surface-elements of a curve form, again, a system of 00 2 elements, for there are 00 l points on the curve, and at each 00 1 surface-elements containing the tangent to the curve at the point. Similarly the surface-elements which contain a given point clearly form a system of » 2 elements. Now each of these systems of 00 2 surface-elements has the property that if (x, y, z, p, q) and (x + dx, y + dy, z + dz, p + dp, q + dq) are consecutive elements from any one of them, then ciz — pdx—qdy = o. In fact, for a system of the first kind dx, dy, dz are proportional to the direction-cosines of a tangent line at a point of the surface, and p, q, — 1 are proportional to the direction-cosines of the normal. For a system of the second kind dx, dy, dz are pro- portional to the direction-cosines of a tangent to the curve, and p, q, -1 give the direction-cosines of the normal to a plane touching the curve; and for a system of the third kind dx, dy, dz are zero. Now the most general way in which a system of co 2 surface-elements can be given is by three independent equations between x, y, z, p and q. If these equations do not contain p, q, they determine one or more (a finite number in any case) points in space, and the system of surface-elements consists of the elements containing these points; i.e. it consists of one or more systems of the third kind.

If the equations are such that two distinct equations independent of p and q can be derived from them, the points of the system of surface-elements lie on a curve. For such a system the equation dz-pdx-qdy = o will hold for each two consecutive elements only when the plane of each element touches the curve at its own point. If the equations are such that only one equation independent of p and q can be derived from them, the points of the system of surface- elements lie on a surface. Again, for such a system the equation dz-pdx-qdy = o will hold for each two consecutive elements only when each element touches the surface at its own point. Hence, when all possible systems of » 2 surface-elements in space are considered, the equation dz-

pdx-qdy = o is characteristic of the three special types in which the elements belong, in the sense ex- plained above, to a point or a curve or a surface.

Let us consider now the geometrical bearing of any transformation x' =fi(x, y, z, p, q), . . ., q' =ft(x, y, z, p, 2), of the five variables. It

will interchange the surface-elements of space among themselves, and will change any system of co 2 elements into another system of 00 2 elements. A special system, i.e. a system which belongs to a point, curve or surface, will not, however, in general be changed into another special system. The necessary and sufficient condition that a special system should always be changed into a special system is that the equation dz'-p'dx'-q'dy' —o should be a consequence of the equation dz-pdx-qdy = o ; or, in other words, that this latter equation should be invariant for the transformation.

When this condition is satisfied the transformation is such as to change the surface-elements of a surface in general into surface- elements of a surface, though in particular cases they may become the surface-elements of a curve or point ; and similar statements may be made with respect to a curve or point. The transformation is therefore a veritable geometrical transformation in space of three dimensions. Moreover, two special systems of surface-elements which have an element in common are transformed into two new special systems with an element in common. Hence two curves or surfaces which touch each other are transformed into two new curves or surfaces which touch each other. It is this property which leads to the transformations in question being called contact-transforma- tions. It will be noticed that an ordinary point-transformation is always a contact-transformation, but that a contact-transformation (in space of n dimensions) is not in general a point-transformation (in space of n dimensions), though it may always be regarded as a point-transformation in space of 2ra + 1 dimensions. In the analogous theory for space of two dimensions a line-element, defined by (x, y, p) , where 1 : p gives the direction-cosines of the line, takes the place of the surface-element ; and a transformation of x, y and p which leaves the equation dy-pdx = o unchanged transforms the °o l line-elements, which belong to a curve, into 00 1 line-elements which again belong to a curve ; while two curves which touch are transformed into two other curves which touch.

One of the simplest instances of a contact-transformation that can be given is the transformation by reciprocal polars. By this trans- formation a point P and a plane p passing through it are changed into a plane p' and a point P' upon it ; i.e. the surface-element defined by P, p is changed into a definite surface-element defined by P', p'. The totality of surface-elements which belong to a (non-developable) surface is known from geometrical

considerations to be changed into the totality which belongs to another (non-developable) surface. On the other hand, the totality of the surface-elements which belong to a curve is changed into another set which belong to a developable. The analytical formulae for this transformation, when the reciproca- tion is effected with respect to the paraboloid x 2 + y 2 -2z = o, are x'=p, y' =q, z' =px+qy — z, p'—x, q' =y. That this is, in fact, a contact-transformation is verified directly by noticing that dz' —p'dx'— q'dy' = — d(z —px—qy) —xdp —ydq = — {dz —pdx —qdy). A second simple example is that in which every surface-element is displaced, without change of orientation, normal to itself through a constant distance t. The analytical equations in this case are easily found in the form

- & – , It , t

- *= *+.; f j.rfj.^. y =y+ –*

Vi+£ 2 +2 2 '

Vi+^+2 2 '

Vi+^+2 2 '

£' = _2'=2- That this is a contact-transformation is seen geometrically by noticing that it changes a surface into a parallel surface. Every point is changed by it into a sphere of radius t, and when t is regarded as a parameter the equations define a cyclical group of contact-trans- formations.

The formal theory of continuous groupsof contact-transformations, is, of course, in no way distinct from the formal theory of continuous groups in general. On what may be called the geometrical side, the theory of groups of contact-transformations has been developed with very considerable detail in the second volume of Lie-Engel.

To the manifold applications of the theory of continuous groups in various branches of pure and applied mathematics it is impossible here to refer in any detail. It must suffice to indicate a few of them very briefly. In some of the older theories a new point of view is obtained which presents the results in a fresh light, and suggests the natural generalization. As an example, the theory of the invariants of a binary form may be considered.

If in the form / '= a x n +na,ix n ~ 1 y -f . . . --a„y n , the variables be subjected to a homogeneous substitution

x' = ax + 0y, y' = yx+Sy, (i.)

and if the coefficients in the new form be represented by accenting the old coefficients, then

a' = aoa n +aina n ~ 1 y-- . . . --a n y n ,

Applica- tions of the theory of con- tinuous groups.

a' 1 =Ooa"- 1 /3+o 1 |(«-l)a n – 2 J 87+a"- 1 5}-f. . . +a n y n ~ 1 S,

(ii.)

a' n = cuS n --ain^- l &+ . . . +a„,5"; j

and this is a homogeneous linear substitution performed on the coefficients. The totality of the substitutions, (i.), for which aS — 07 = I, constitutes a continuous group of order 3, which is generated

by the two infinitesimal transformations y-Kz. and 357,. Hence with

'dx'

"dy-

the same limitations on a, 0, y, S the totality of the substitutions (ii.) forms a simply isomorphic continuous group of order 3, which is generated by the two infinitesimal transformations

8.' , 3 , 3 . , 3

and

*na t * — -{n — i)a r — + (n — 2)a r —-. . . +a**-, — • cat co>\ °°2 0Ou_i*

The invariants of the binary form, i.e. those functions of the co- efficients which are unaltered by all homogeneous substitutions on x, y of determinant unity, are therefore identical with the functions of the coefficients which are invariant for the continuous group generated by the two infinitesimal operations last written. In other words, they are given by the common solutions of the differential equations

^+ 2a >li+3 a °l;+---= > no 'S +(n_l)a2 ^ +(n ~ 2)03 £ + –• • =o –

Both this result and the method by which it is arrived at are well known, but the point of view by which we pass from the transforma- tion group of the variables to the isomorphic transformation group of the coefficients, and regard the invariants as invariants rather of the group than of the forms, is a new and a fruitful one.

The general theory of curvature of curves and surfaces may in a similar way be regarded as a theory of their invariants for the group of motions. That something more than a mere change of phraseology is here implied will be evident in dealing with minimum curves, i.e. with curves such that at every point of them dx 2 + dy 2 + dz 2 = o. For such curves the ordinary theoryof curvature has no meaning, but they nevertheless have invariant properties in regard to the group of motions.

The curvature and torsion of a curve, which are invariant for all transformations by the group of motions, are special instances of

what are known as differential invariants. If fc + Tsr; is the

general infinitesimal transformation of a group of point-transforma- tions in the plane, and if y\, yi, . ■ ■ represent the successive differential coefficients of y, the infinitesimal transformation may be written in the extended form

-+..

,3,3, 3 , 3

where i^ii, i/tSt, . . . are the increments of yi, y t , . . . By including a sufficient number of these variables the group must be intransitive in them, and must therefore have one or more invariants. Such invariants are known as differential invariants of the original group, being necessarily functions of the differential coefficients of the original variables. For groups of the plane it may be shown that not more than two of these differential invariants are independent, all others being formed from these by algebraical processes and differ- entiation. For groups of point-transformations in more than two variables there will be more than one set of differential invariants. For instance, with three variables, one may be regarded as inde- pendent and the other two as functions of it, or two as inde- pendent and the remaining one as a function. Corresponding to these two points of view, the differential invariants for a curve or for a surface will arise.

If a differential invariant of a continuous group of the plane be equated to zero, the resultingMifferential equation remains unaltered when the variables undergo any transformation of the group. Con- versely, if an

ordinary, differential equation f(x, y, y it y 2 , . . .)—o admits the transformations of a continuous group, i.e. if the equation is unaltered when x and y undergo any transformation of the group, then/(x, y, yi, y 2 , . 1 .) or some multiple of it must be a differential invariant of the group. Hence it must be possible to find two inde- pendent differential invariants a, of the group, such that when these are taken as variables the differential equation takes the form

F(o, j3,r- -r-j, . . .) =0. This equation in o, j9 will be of lower order

than the original equation, and in general simpler to deal with. Supposing it solved in the form — {a), where for a, /3 their values in terms of x, y, y lt y it . . . are written, this new equation, containing arbitrary constants, is necessarily again of lower order than the original equation. The integration of the original equation is thus divided into two steps. This will show how, in the case of an ordinary differential equation, the fact that the equation admits a continuous group of transformations maybe taken advantage of for its integra- tion.

The most important of the applications of continuous groups are to the theory of systems of differential equations, both ordinary and partial ; in fact, Lie states that it was with a view to systematizing and advancing the general theory of differential equations that he was led to the development of the theory of continuous groups. It is quite impossible here to give any account of all that Lie and his followers have done in this direction. An. entirely new mode of regarding the problem of the integration of a differential equation

has been opened up, and in the classification that arises from it all those apparently isolated types of equations which in the older sense are said to be integrable take their proper place. It may, for instance, be mentioned that the question as to whether Monge's method will apply to the integration of a partial differential equation of the second order is shown to depend on whether or not a contact-trans- formation can be found which will reduce the equation to either

4 = o or >r- =0. It is in this direction that further advance in the

ox 2 dxOy

theory of partial differential equations must be looked for. Lastly, it may be remarked that one of the most thorough discussions of the axioms of geometry hitherto undertaken is founded entirely upon the theory of continuous groups.

Discontinuous Groups.

We go on now to the consideration of discontinuous groups. Although groups of finite order are necessarily contained under this general head, it is convenient for many reasons to deal with them separately, and it will therefore be assumed in the present section that the number of operations in the group is not finite. Many large classes of discontinuous groups have formed the subject of detailed investigation, but a general formal theory of discontinuous groups can hardly be said to exist as yet. It will thus be obvious that in considering discontinuous groups it is necessary to proceed on different lines from those followed with continuous groups, and in fact to deal with the subject almost entirely by way of example.

The consideration of a discontinuous group as arising from a set of independent generating operations suggests a purely abstract point of view in which any two simply isomorphic groups are g ea erat- indistinguishable. The number of generating operations /„„ ODer a- may be either finite or infinite, but the former case alone y^, s will be here considered. Suppose then that Si, S 2 , . . ., S n is a set of independent operations from which a group G is generated. The general operation of the group will be represented by the symbol S£S| . . . SJ, or 2, where a, b, . . ., d are chosen from 1,2,.. ., », and a, jS, . . ., & are any positive or negative integers. It may be assumed that no two successive suffixes in 2 are the same, for if b =a, then S°Sj may be replaced by S£ ^. If there are no relations connecting the generating operations and the identical operation, every distinct symbol 2 represents a distinct operation of the group. For if

2 = 2 1 ,orS:s£...S! = S2S£. . . S £, then S^. . .S^S^S. . . S»*

= 1 ; and unless a = 01, 6 = 61, ..., a=ai, /S = ft, ... , this is a relation connecting the generating operations.

Suppose now that Ti, T 2 , . . . are operations of G, and that H is that self - conjugate subgroup of G which is generated by Ti, T 2 , . . . and the operations conjugate to them. Then, of the operations that can be formed from Si, Si, . . ., S n , the set 2H, and no others, reduce to the same operation 2 when the conditions Ti = 1, Tj = I, . . . are satisfied by the generating operations. Hence the group which is generated by the given operations, when subjected to the conditions just written, is simply isomorphic with the factor-group G/H. Moreover, this is obviously true even when the conditions are such that the generating operations are no longer independent. Hence any discontinuous group may be defined abstractly, that is, in regard to the laws of combination of its operations apart from their actual form, by a set of generating operations and a system of relations connecting them. Conversely, when such a set of operations and system of relations are given arbitrarily they define in abstract form a single discontinuous group. It may, of course, happen that

the group so defined is a group of finite order, or that it reduces to the identical operation only; but in regard to the general statement these will be particular and exceptional cases.

An operation of a discontinuous group must necessarily be specified analytically by a system of equations of the form

‘ x’, =f,{x u xi x H ;ai, a%, . . .,a r), (s = i,2 »),

and the different operations of the group will be given by

different sets of values of the parameters ai, Oi a r . Properly

No one of these parameters is susceptible of continuous andlm- variations, but at least one must be capable of taking a properly number of values which is not finite, if the group is not one ?. scoa ” of finite order. Among the sets of values of the parameters m”m there must be one which gives the identical transformation. ‘

No other transformation makes each of the differences x-xu x’i-Xt, . . ., x-x n vanish. Let d be an arbitrary assigned positive quantity. Then if a transformation of the group can be found such that the modulus of each of these differences is less than d when the variables have arbitrary values within an assigned range of variation, however small d may be chosen, the group is said to be improperly discontinuous. In the contrary case the group is called properly discontinuous. The range within which the variables are allowed to vary may clearly affect the question whether a given group is I properly or improperly discontinuous. For instance, the group

defined by the equation x’ = ax+b, where o and b are any rational numbers, is improperly discontinuous; and the group defined by x’ = x+a, where a is an integer, is properly discontinuous, whatever the range of the variable. On the other hand, the group, to be later

considered, defined by the equation x’ = ,. , where a, 6, c, d are

*integers satisfying the relation ad-bc = l, is properly discontinuous when x may take any complex value, and improperly discontinuous when the range of * is limited to real values.*

Among the discontinuous groups that occur in analysis, a large number may be regarded as arising by imposing limitations on the range of

variation of the parameters of continuous groups. If x', =fi(xi, x

A and B with corresponding parameters in succession, then the c's are determined uniquely by the a's and the b's. If the c's are rational functions of the a's and b's, and if the a's and b's are arbitrary rational numbers of a given corpus (see Number), the c's will be rational numbers of the same corpus. If the c's are rational integral functions of the a's and b's, and the latter are arbitrarily chosen integers of a corpus, then the c's are integers of the same corpus. Hence in the first case the above equations, when the a's are limited to be rational numbers of a given corpus, will define a discontinuous group ; and in the second case they will define such a group when

the a's are further limited to be integers of the corpus. Linear A most important class of discontinuous groups are those dlscoa- that arise in this way from the general linear continuous tlauous group in a given set of variables. For n variables the groups. finite equations of this continuous group are

x'. = a n Xi+a a X2+ . . . +a, H Xn, {s = l, 2 n),

where the determinant of the a's must not be zero. In this case the c's are clearly integral lineo-linear functions of the a's and b's. Moreover, the determinant of the c's is the product of the determinant of the a's and the determinant of the 6's. Hence equations (ii.), where the parameters are restricted to be integers of a given corpus, define a discontinuous group; and if the determinant of the co- efficients is limited to the value unity, they define a discontinuous group which is a (self-conjugate) subgroup of the previous one.

The simplest case which thus presents itself is that in which there are two variables while the coefficients are rational integers. This is the group defined by the equations

x' = ax+by, y' = cx+dy,

where a,b, c, d are integers such that ad-bc = 1 . To every operation of this group there corresponds an operation of the set defined by

,_az + b z ~cz+d' in such a way that to the product of two operations of the group there corresponds the product of the two analogous operations of the set. The operations of the set (iv.), where ad-bc = l, therefore constitute a group which is isomorphic with the previous group. The isomorphism is multiple, since to a single operation of the second set there correspond the two operations of the first for which a, b, c, d and -a, -b, -c, -d are parameters. These two groups, which are of fundamental importance

in the theory of quadratic forms and in the theory of modular functions, have been the object of very many investigations.

Another large class of discontinuous groups, which have far- reaching applications in analysis, are those which arise in the first

*instance from purely geometrical considerations. By the Dlscoa- combination and repetition of a finite number of geo- tlauous metrical operations such as displacements, projective **?"""* transformations, inversions, &c, a discontinuous group of "ro'mxeo- sucn °P erat i° ns will arise. Such a group, as regards the metrical P°' n ts of the plane (or of space), will in general be im- opera- properly discontinuous; but when the generating opera – r/ons. tions are suitably chosen, the group may be properly*

discontinuous. In the latter case the group may be represented in a graphical form by the division of the plane (or space) into regions such that no point of one region can be transformed into another point of the same region by any operation of the group, while any given region can be transformed into any other by a suitable transformation. Thus, let ABC be a triangle bounded by three circular arcs BC, CA, AB; and consider the figure produced from ABC by inversions in the three circles of which BC, CA, AB are part. By inversion at BC, ABC becomes an equiangular triangle A'BC. Ah inversion in AB changes ABC and A'BC into equiangular triangles ABC and A"BC. Successive inversions at AB and BC then will change ABC into a series of equiangular triangles with B for a common vertex. These will not overlap and will just fill in the space round B if the angle ABC is a submultiple of two right angles. If then the angles of ABC are submultiples of two right angles (or zero), the triangles formed by any number of inversions will never overlap, and to each operation consisting of a definite series of inversions at BC, CA and AB will correspond a distinct triangle into which ABC is changed by the operation. The network of triangles so

formed gives a graphical representation of the group that arises from the three inversions in BC, CA, AB. The triangles may be divided into two sets, those, namely, like A'BC, which are derived from ABC by an even number of inversions, and those like A'BC or ABC' pro- duced by an odd number. Each set are interchanged among them- selves by any even number of inversions. Hence the operations consisting of an even number of inversions form a group by them- selves. For this group the quadrilateral formed by ABC andA'BC con- stitutes a region, which is changed by every operation of the group into a distinct region (formed of two adjacent triangles), and these regions clearly do not overlap. Their distribution presents in a graphical form the group that arises by pairs of inversions at BC, CA, AB ;

and this group is generated by the operation which consists of successive inversions at AB, BC and that which consists of successive inversions at BC, CA. The group defined thus geometrically may be presented in many analytical forms. If x, y and x', y' are the rectangular co- ordinates of two points which are inverse to each other with respect to a given circle, x' and y' are rational functions of x and y, and con- versely. Thus the group may be presented in a form in which each operation gives a birational transformation of two variables. If x+iy = z, x'+iy' = z', and if x', y' is the point to which x, y is trans- formed by any even number of inversions, then z' and z are connected

by a linear relation z' = tt g , t t , where o, £, 7, S are constants (in

general complex) depending on the circles at which the inversions are taken. Hence the group may be presented in the form of a group of linear transformations of a single variable generated by the two

linear transformations z'~— — r^r> z' = a2 Tv . which correspond 71Z + 01 72Z + «a

to pairs of inversions at AB, BC and BC, CA respectively. In particular, if the sides of the triangle are taken to be x = o, x 2 --y 2 – 1=0, x i --y i: -2X = o, the generating operations are found to be 2' =a + i, z'= -z 1 ; and the group is that consisting of all trans formations of the form z ' = 7rrri< where ad-bc = i, a, b, c, d being

integers. This is the group already mentioned which underlies the theory of the elliptic modular functions; a modular function being a function of z which is invariant for some subgroup of finite index of the group in question.

The triangle ABC from which the above geometrical construction started may be replaced by a polygon whose sides are circles. If each angle is a submultiple of two right angles or zero, the construc- tion is still effective to give a set of non-overlapping regions, which represent graphically the group which arises from pairs of inversions in the sides of the polygon. In their analytical form, as groups of linear transformations of a single variable, the groups are those on which the theory of automorphic functions depends. A similar construction in space, the polygons bounded by circular arcs being replaced by polyhedra bounded by spherical faces, has been used by F. Klein and Fricke to give a geometrical representation for groups which are improperly discontinuous when represented as groups of the plane.

The special classes of discontinuous groups that have been dealt with in the

previous paragraphs arise directly from geometrical considerations. As a final example we shall refer briefly Group ol to a class of groups whose origin is essentially analytical. a linear Let dltterea-

.fn-v Jn-l v „■-, . tlalequa-

be a linear differential equation, the coefficients in which are rational functions of x, and let yi, y 2 , . . ., y„ be a linearly inde- pendent set of integrals of the equation. In the neighbourhood of a finite value Xo of x, which is not a singularity of any of the coefficients in the equation, these integrals are ordinary power-series in x-Xs,. If the analytical continuations of y lt y 2 , . , ., y n be formed for any closed path starting from and returning to Xo, the final values arrived at when x is again reached will be another set of linearly independent integrals. When the closed path contains no singular point of the coefficients of the differential equation, the new set of integrals is identical with the original set. If, however, the closed path encloses one or more singular points, this will not in general be the case.

Let y'i, y\ y'„ be the new integrals arrived at. Since in the

neighbourhood of x 9 every integral can be represented linearly in terms of yi, ji,,,. j,, there must be a system of equations

y'i = a n yi +a 12 y 2 + . . . +a in y n ,

y' 2 = a 2 iyi 022^2 . . . +a 2n y n ,

y'n = a nl yi+a ni y 2 + . . . +a nn y n , where the a's are constants, expressing the new integrals in terms of the original ones. To each closed path described by Xt, there therefore corresponds a definite linear substitution performed on the y's. Further, if Si and S2 are the substitutions that correspond to two closed paths Li and L2, then to any closed path which can be con- tinuously deformed, without crossing a singular point, into Li followed by L 2 , there corresponds the substitution SiS 2 . Let Li, L 2 , . . ., L r be arbitrarily chosen closed paths starting from and return- ing to the same point, and each of them enclosing a single one ofthe

vr) finite singular points of the equation. Every closed path in the plane can be formed by combinations of these r paths taken either in the positive or in the negative direction. Also a closed path which does not cut itself, and encloses all the r singular points within it, is equivalent to a path enclosing

the point at infinity and no finite singular point. If Si, Sj, S3, . . . , S r are the linear substitutions that correspond to these r paths, then the substitution corresponding to every possible path can be obtained by combination and repetition of these r substitutions, and they therefore generate a discontinuous group each of whose operations corresponds to a definite closed path. The group thus arrived at is called the group of the equation. For a given equation it is unique in type. In fact, the only effect of starting from another set of independent integrals is to transform every operation of the group by an arbitrary substitution, while choosing a different set of paths is equivalent to taking a new set of generating operations. The great importance of the group of the equation in connexion with the nature of its integrals cannot here be dealt with, but it may be pointed out that if all the integrals of the equation are algebraic functions, the group must be a group of finite order, since the set of quantities y it yi, . . ., y n can then only take a finite number of distinct values.

Groups of Finite Order.

We shall now pass on to groups of finite order. It is clear that here we must have to do with many properties which have no direct analogues in the theory of continuous groups or in that of discontinuous groups in general; those properties, namely, which depend on the fact that the number of distinct operations in the group is finite.

Let Si, S3, S3, ... , S N denote the operations of a group Gof finite order N, Si being the identical operation. The tableau

Si, S2, S3, . . . , S N ,

5152, S2S2, S3S3, . . . , S N S2,

5153, S2S3, S3S3, . . . , S N S3,

SiS N , S2S N , S3SN,

S n Sn,

when in it each compound symbol S P S, is replaced by the single symbol S r that is equivalent to it, is called the multiplication table of the group. It- indicates directly the result of multiplying together in an assigned sequence any number of operations of the group. In each line (and in each column) of the tableau every operation of the group occurs just once. If the letters in the tableau are regarded as mere symbols, the operation of replacing each symbol in the first line by the symbol which stands under it in the pth line is a permuta- tion performed on the set of N symbols. Thus to the N lines of the tableau there corresponds a set of N permutations performed on the N

symbols, which includes the identical permutation that leaves each unchanged. Moreover, if S p S 9 = S r , then the result of carrying out in succession the permutations which correspond to the pth and gth lines gives the permutation which corresponds to the rth line. Hence the set of permutations constitutes a group which is simply isomorphic with the given group.

Every group of finite order N can therefore be represented in concrete form as a transitive group of permutations on N symbols.

The order of any subgroup or operation of G is necessarily finite. If Ti(= Si), T2, . . ., T„ are the operations of a subgroup H of G, and if 2 is any operation of G which is not contained in H, Properties the xt of operat ions ZT,, ZT 2 , . . . , 2T„, or 2H, are all of a group jjj s t:inct from each other and from the operations of H. which jf t), e ggjg jj ant j 2 pj Jq not exhaust the operations of G,

°f pe "^ on and if 2′ is an operation not belonging to them, then the the oner. p era tions of the set 2'H are distinct from each other and from those of H and ZH. This process may be continued till the operations of G are exhausted. The order ft of H must therefore be a factor of the order N of G. The ratio N/» is called the index of the subgroup H. By taking for H the cyclical subgroup generated by any operation S of G, it follows that the order of S must be a factor of the order of G.

Every operation S is permutable with its own powers. Hence there must be some subgroup H of G of greatest possible order, such that every operation of H is permutable with S. Every operation of H transforms S into itself, and every operation of the set H2 trans- forms S into the same operation. Hence, when S is transformed by every operation of G, just N/» distinct operations arise if n is the order of H. These operations, and no others, are conjugate to S within G; they are said to form a set of conjugate operations. The number of operations in every conjugate set is therefore a factor of the order of G. In the same way it may be shown that the number of subgroups which are conjugate^ to a given subgroup is a factor of the order of G. An operation which is permutable with every opera- tion of the group is called a self-conjugate operation. The totality of the self-conjugate operations of a §roup forms a self-conjugate Abelian subgroup, each of whose operations is permutable with every operation of the group.

An Abelian group contains subgroups whose orders are any given factors of the order of the group. In fact, since every subgroup H

of an Abelian group G and the corresponding factor groups G/H are Abelian, this result follows immediately by an induction from the case in

which the order contains n prime factors to that in which it contains n + 1. For a group which is not Abelian no general f

law can be stated as to the existence or non-existence of a fu w S subgroup whose order is an arbitrarily assigned factor theorem. of the order of the group. In this connexion the most important general result, which is independent of any supposition as to the order of the group, is known as Sylow's theorem, which states that if p a is the highest power of a prime p which divides the order of a group G, then G contains a single conjugate set of subgroups of order p, the number in the set being of the form I f kp. Sylow's theorem may be extended to show that if p°' is a factor of the order of a group, the number of subgroups of order p«-' is of the form I --kp. If, however, p"-' is not the highest power of p which divides the order, these groups do not in general form a single conjugate set.*

The importance of Sylow's theorem in discussing the structure of a group of given order need hardly be insisted on. Thus, as a very simple instance, a group whose order is the product pipi of two primes {pi

There is one other numerical property of a group connected with its order which is quite general. If N is the order of G, and n a factor of N, the number of operations of G, whose orders are equal to or are factors of n, is a multiple of n.

As already defined, a composite group is a group which contains one or more self-conjugate subgroups, whose orders are greater than unity. If H is a self-conjugate subgroup of G, the factor- group G/H may be either simple or composite. In the C° m P osl ' former case G can contain no self-conjugate subgroup K, "° nmSer ' es which itself contains H ; for if it did K/H would be a self- ot a group. conjugate subgroup of G/H. When G/H is simple, H is said to be a maximum self-conjugate subgroup of G. Suppose now that G being a given composite group, G, Gi, G2, . . ., Gre, 1 is a series of subgroups of G, such that each is a maximum self-conjugate sub- group of the preceding ; the last term of the series consisting of the identical operation only. Such a series is called a composition-series of G. In general it is not unique, since a group may have two or more maximum self-conjugate subgroups. A composition-series of a group, however it may be chosen, has the property that the number of terms of which it consists is alwavs the same, while the factor r groups G/Gi, G1/G2, . . . , Gn differ only in the sequence in which they occur. It should be noticed that though a group defines uniquely the set of factor-groups that occur in its composition-series, the set of factor-groups do not conversely in general define a single type of group. When the orders of all the factor-groups are primes the group is said to be soluble.

If the series of subgroups G, H, K, . . ., L, 1 is chosen so that each is the greatest self-conjugate subgroup of G contained in the previous one, the series is called a chief composition-series of G. All such series derived from a given group may be shown to consist of the same number of terms, and to give rise to the same set of factor-groups, except as regards sequence. The factor-groups of such a series will not, however, necessarily be simple groups. From any chief com- position-series a composition-series may be formed by interpolating between any two terms H and K of the series for which H/K is not

a simple group, a number of terms hi, fe h r ; and it may be

shown that the factor-groups H/hi, /zi/fe, . . ., h,/K are all simply isomorphic with each other.

*A group may be represented as isomorphic with itself by trans- forming all its operations by any one of them. In fact, if 5,55=5,, then S _1 SpS . S _1 S g S = S _1 S r S. An isomorphism of the group with itself, established in this way, is called an / * omo,w inner isomorphism. It may be regarded as an operation p ‘ sm ° * carried out on the symbols of the operations, being indeed fT° j? w a permutation performed on these symbols. The totality of these operations clearly constitutes a group isomorphic with the given group, and this group is called the group of inner isomorphisms. A group is simply or multiply isomorphic with its group of inner isomorphisms according as it does not or does contain self-conjugate operations other than identity. It may be possible to establish a correspondence between the operations of a group other than those given by the inner isomorphisms, such that if S’ is the operation corresponding to S, then S’ p S’ 5 = S’ r is a consequence of S p S 9 = S r . The substitution on the symbols of the operations of a group resulting from such a correspondence is called an outer isomorphism. The totality of the isomorphisms of both kinds constitutes the group of isomorphisms of the given group, and within this the group of inner isomorphisms is a self-conjugate subgroup. Every set of conjugate operations of a group is necessarily transformed into itself by an inner isomorphism, but two or more sets may be interchanged by an outer isomorphism.*

A subgroup of a group G, which is transformed into itself by every isomorphism of G, is called a characteristic subgroup. A series of groups G, Gi, G2, ..., 1, such that each is a maximum characteristic subgroup of G contained in the preceding, may be shown to have the same invariant properties as the subgroups of a composition series. A group which has no characteristic subgroup must be either a simple

group or the direct product of a number of simply isomorphic simple groups.

It has been seen that every group of finite order can be represented as a group of permutations performed on a set of symbols whose

number is equal to the order of the group. In general such

Permuta- a representation is possible with a smaller number of

symbols. Let H be a subgroup of G, and let the operations

gmups. £ q k e divided, ; n res p ec t of H, into the sets H, S 2 H,

S3H S m H. If S is any operation of G, the sets SH, SS2H,

SS 3 H, . . . , SS m H differ from the previous sets only in the sequence in which they occur. In fact, if SSj, belong to the set S 3 H, then since H is a group, the set SS P H is identical with the set S q H. Hence, to each operation S of the group will correspond a permutation per- formed on the symbols of the m sets, and to the product of two operations corresponds the product of the two analogous permuta- tions. The set of permutations, therefore, forms a group isomorphic with the given group. Moreover, the isomorphism is simple unless for one or more operations, other, than identity, the sets all remain unaltered. This can only be the case for S, when every operation conjugate to S belongs to H. In this case H would contain a self- conjugate subgroup, and the isomorphism is multiple.

The fact that every group of finite order can be represented, generally in several ways, as a group of permutations, gives special importance to such groups. The number of symbols involved in such a representation is called the degree of the group. In accordance with the general definitions already given, a permutation-group is called transitive or intransitive according as it does or does not contain permutations changing any one of the symbols into any other. It is called imprimitive or primitive according as the symbols can or cannot be arranged in sets, such that every permutatiqn of the group changes the symbols of any one set either among themselves or into the symbols of another set. When a group is imprimitive the number of symbols in each set must clearly be the same.

The total number of permutations that can be performed on re symbols is n !, and these necessarily constitute a group. It is known as the symmetric group of degree re, the only rational functions of the symbols which are unaltered by all possible permutations being the symmetric functions. When

any permutation is carried out on the product of the «(«-i)/2, differences of the n symbols, it must either remain unaltered or its sign must be changed. Those permutations which leave the product unaltered constitute a group of order n !/2, which is called the alternating group of degree re ; it is a self-conjugate subgroup of the symmetric group. Except when re = 4 the alternat- ing group is a simple group. A group of degree n, which is not con- tained in the alternating group, must necessarily have a self-conjugate subgroup of index 2, consisting of those of its permutations which belong to the alternating group.

Among the various concrete forms in which a group of finite order can be presented the most important is that of a group of linear

substitutions. Such groups have already been referred h™"? S ° to ' n connexion with discontinuous groups. Here the

number of distinct substitutions is necessarily finite; and

to each operation S of a group G of finite order there will

correspond a linear substitution s, viz.

linear

*substltu**

lions.

Xi —

SijXj(i, j = i, 2, . . ., m),

on a set of m variables, such that if ST = U, then st = u. The linear substitutions s, t, u, . . . then constitute a group g with which G is isomorphic; and whether the isomorphism is simple or multiple g is said to give a " representation " of G as a group of linear substitu- tions. If all the substitutions of g are transformed by the same substitution on the m variables, the (in general) new group of linear substitutions so constituted is said to be " equivalent " with g as a representation of G; and two representations are called "non- equivalent," or " distinct," when one is not capable of being trans- formed into the other.

A group of linear substitutions on m variables is said to be " re- ducible " when it is possible to choose m' (

It has been seen at the beginning of this section that every group of finite

order N can be presented as a group of permutations {i.e. linear substitutions in a limited sense) on N symbols. This group is obviously reducible; in fact, the sum of the symbols remain un- altered by every substitution of the group. The fundamental theorem in connexion with the representations, as an irreducible group of linear substitutions, of a group of finite order N is the following.

If r is the number of different sets of conjugate operations in the group, then, when the group of N permutations is completely reduced,

(i.) just r distinct irreducible representations occur:

(ii.) each of these occurs a number of times equal to the number of symbols on which it operates:

(iii.) these irreducible representations exhaust all the distinct irreducible representations of the group.

Among these representations what is called the " identical " representation necessarily occurs, i.e. that in which each operation of the group corresponds to leaving a single symbol unchanged. If these representations are denoted by Ti, T2, . . . , f r , then any re- presentation of the group as a group of linear substitutions, or in particular as a group of permutations, may be uniquely represented by a symbol 2a; r,, in the sense that the representation when com pletely reduced will contain the representation I\ just a; times for each suffix i.

A representation of a group of finite order as an irreducible group of linear substitutions may be presented in an infinite o ron „ number of equivalent forms. If character-

x\ = XsijXj (i, j – 1 , 2 , . . . , m) , istlcs.

is the linear substitution which, in a given irreducible repre- sentation of a group of finite order G, corresponds to the operation S, the determinant

S\ — X ˆ12 … S\ m

S21 S22 — X … S 2m

■*Sml*

Sim

. . • S mm X

is invariant for all equivalent representations, when written as a

polynomial in X. Moreover, it has the same value for S and S', if these are two conjugate operations in G. Of the various invariants that thus arise the most important is ˆ11 + ˆ22 + • • • + s«m, which is called the " characteristic " of S. If S is an operation of order p, its characteristic is the sum of m pth roots of unity ; and in particular, if S i r the identical operation its characteristic is m. If r is the number of sets of conjugate operations in G, there is, for each representation of G as an irreducible group, a set of r characteristics: Xi, X2, . . . X„ one corresponding to each conjugate set ; so that for the r irreducible representations just r such sets of characteristics arise. These are

*distinct, in the sense thatif *i, Sfo ¥ r are the characteristics for*

*a distinct representation from the above, then Xi and *,• are not equal {or all values of the suffix i. It may be the case that the r characterjstics for a given representation are all real. If this is so the representation is said to be self-inverse. In the contrary case there is always another representation, called the " inverse " repre- sentation, for which each characteristic is the conjugate imaginary of the corresponding one in the original representation. The characteristics are subject to certain remarkable relations. If k p denotes the number of operations in the pth conjugate set, while Xj, and xJ p are the characteristics of the pth conjugate set in Vi and Tj, then "»-*

*V**

fcpXpXj, = o or «,

according to Vi and r, are not or are inverse representations, n being the order of G.

Again

ˆP'"X'X < = oorw/ft g

according as the pth and gth conjugate sets are not or are inverse; the 5th set being called the inverse of the pth if it consists of the inverses of the operations constituting the pth.

Another form in which every group of finite order can be repre- sented is that known as a linear homogeneous group. If in the equations Linear

x' r = a Tl Xi + a r ix i + . . . + a rm x m , (r = i, 2 m), „™ous

which define a linear homogeneous substitution, the co- rroaos efficients are integers, and if the equations are replaced by congruences to a finite

modulus re, the system of congruences will give a definite operation, provided that the determinant of the coefficients is relatively prime to re. The product of two such operations is another operation of the same kind; and the total number of distinct operations is finite, since there is only a limited number of choices for the coefficients. The totality of these operations, therefore, constitutes a group of finite order; and such a group is known as a linear homogeneous group. If re is a prime the order of the group is

(n m -i) (n m -n) . . . (» m -n m-1).

The totality of the operations of the linear homogeneous group for which the determinant of the coefficients is congruent to unity forms a subgroup. Other subgroups arise by considering those operations which leave a function of the variables unchanged (mod. re). All such subgroups are known as linear homogeneous groups.

When the ratios only of the variables are considered, there arises a linear fractional group, with which the corresponding linear homo- geneous group is isomorphic. Thus, if p is a prime the totality of the congruences

z'zs -^-j, ad— be j=o, (mod. p)

constitutes a group of order p(p — l). This class of groups for various values of p is almost the only one which has been as yet exhaustively analysed. For all values of p except 3 it contains a simple self- conjugate subgroup of index 2.*

A great extension of the theory of linear homogeneous groups has been made in recent years by considering systems of congruences of the form

x'r^a,iXi+OrtX+ . . . +a rm x m , (r = i, 2 m),*

in which the coefficients Or, are integral functions with real integral coefficients of a root of an irreducible congruence to a prime modulus. Such a system of congruences is obviously limited in numbers and defines a group which contains as a subgroup the group defined by the same congruences with ordinary integral coefficients.

The chief application of the theory of groups of finite order is to the theory of algebraic equations. The analogy of equations of the Aoottca- second, third and fourth degrees would give rise to the tlons ' expectation that a

root of an equation of any finite degree could be expressed in terms of the coefficients by a finite number of the operations of addition, subtraction, multiplication, division, and the extraction of roots; in other words, that the equation could be solved by radicals. This, however, as proved by Abel and Galois, is not the case: an equation of a higher degree than the fourth in general defines an algebraic irrationality which cannot be expressed by means of radicals, and the cases in which such an equation can be solved by radicals must be regarded as exceptional. The theory of groups gives the means of determining whether an equation comes under this exceptional case, and of solving the equation when it does. When it does not, the theory provides the means of reducing the problem presented by the equation to a normal form. From this point of view the theory of equations of the fifth degree has been exhaustively treated, and the problems pre- sented by certain equations of the sixth and seventh degrees have actually been reduced to normal form.

Galois (see Equation) showed that, corresponding to every ir- reducible equation of the nth degree, there exists a transitive sub- stitution-group of degree n, such that every function of the roots, the numerical value of which is unaltered by all the substitutions of the group can be expressed rationally in terms of the coefficients, while conversely every function of the roots which is expressible rationally in terms of the coefficients is unaltered by the substitutions of the group. This group is called the group of the equation. In general, if the equation is given arbitrarily, the group will be the symmetric group. The necessary and sufficient condition that the equation may be soluble by radicals is that its group should be a soluble group. When the coefficients in an equation are rational integers, the determination of its group may be made by a finite number of processes each of which involvesonly rational arithmetical operations. These processes consist in forming resolvents of the equation corresponding to each distinct type of subgroup of the symmetric group whose degree is that of the equation. Each of the resolvents so formed is then examined to find whether it has rational roots. The group corresponding to any resolvent which has a rational root contains the group of the equation ; and the least of the groups so found is the group of the equation. Thus, for an equation of the fifth degree the various transitive subgroups of the symmetric group of degree five have to be considered. These are (i.) the alternating group; (ii.) a soluble group of order 20; (iii.) a group of order 10, self-conjugate in the preceding; (iv.) a cyclical group of order 5, self-conjugate in both the preceding. If x , x u x it x 3 , x t are the roots of the equation, the corresponding resolvents may be taken to be those which have for roots (i.) the square root of the discriminant ; (ii.) the function (x»x 1 +x 1 X2+XiXz+x 3 x i +x i Xv)(x <) x 2 +x 2 x i +X4Xi + XiXz+XaXo) ; (iii.) the function x„x l + XiX2+x 2 × 3 +x 3 Xi+x i x ; and (iv.) the

function x t ?Xi+x l 2 × 1 +Xi i x 3 +Xi'x i +Xi' i x l i. Since the groups for which (iii.) and ' (iv.) are invariant are contained in that for which (ii.) is invariant, and since these are the only soluble groups of the set, the equation will be soluble by radicals only when the function (ii.) can be expressed rationally in terms of the coefficients.

(xoXi -t-Xi 2 +Xzx a +X3Xi f*4*o) (X0X2 +x 2 x t +XtXi +x x x 3 x 3 x) is known, then clearly *oXi*i*2-r-*s*s+ *ii*4-|-*4*o can be determined by the solution of a quadratic equation. Moreover, the sum and product (xo+exi+e^+t'xs+e 4 ^^ 5 and (x +c i Xi+e 3 × 2 + e 2 X8+e*u) 6 can be expressed rationally in terms of x Xi+x 1 × 2 +x 2 × 3 + XiXt+XtXo, e, and the symmetric functions; t being a fifth root of unity. Hence (x !> +ex 1 +t 2 × 2 +t 3 × 3 +e 4 x l) i can be determined by the solution of a quadratic equation. The roots of the original equation are then finally determined by the extraction of a fifth root. The problem of reducing an equation of the fifth degree, when not soluble by radicals, to a normal form, forms the subject of Klein's Vorlesungen iiber das Ikosaeder. Another application of groups of finite order is to the theory of linear differential equations whose integrals are algebraic functions. It has been already seen, in the discussion of discontinuous groups in general, that the groups of such equations must be groups of finite order. To every group of finite order which can be represented as an irreducible group of linear substitutions on n variables will correspond a class of irreducible linear differential equations of the Kth order whose integrals are algebraic. The complete determination of the class of linear differ-*

ential equations of the second order with all their integrals algebraic, whose group has the greatest possible order, viz. 120, has been carried out by Klein.

Authorities. — Continuous groups: Lie and Engel, Theorie der Transformationsgruppen (Leipzig, vol. i., 1888; vol. ii., 1890; vol. iii., 1893); Lie and Scheffers, Vorlesungen iiber gevibhnliche Differentialgleichungen mit bekannten infinitesimalen Transformationen (Leipzig, 1891); Idem, Vorlesungen iiber continuierliche Gruppen (Leipzig, 1893); Idem, Geometrie der Beriihrungstransformationen (Leipzig, 1896); Klein and Schilling, Hohere Geometrie, vol. ii. (lithographed) (Gottingen, 1893, for both continuous and discontinu- ous groups). Campbell, Introductory Treatise on Lie's Theory of Finite Continuous Transformation Groups (Oxford, 1903). Dis- continuous groups: Klein and Fricke, Vorlesungen iiber die Theorie der elliptischen Modulfunktionen (vol. i., Leipzig, 1890) (for a full discussion of the modular group); Idem, Vorlesungen iiber die Theorie der automorphen Funktionen (vol. i., Leipzig, 1897; vol. ii. pt. i., 1901) (for the general theory of discontinuous groups); Schoenflies, Krystallsysteme und Krystallstruktur (Leipzig, 1 891) (for discontinuous groups of motions); Groups of finite order: Galois, CEuvres mathematiques (Paris, 1897, reprint); Jordan, Traitk des substitutions el des equations algebriques (Paris, 1870); Netto, Substitutionentheorie und ihre Anwendung auf die Algebra (Leipzig, 1882; Eng. trans, by Cole, Ann Arbor, U.S.A., 1892); Klein, Vorlesungen iiber das Ikosaeder (Leipzig, 1884; Eng. trans, by Morrice, London, 1888) ; H. Vogt, Lecons sur la resolution algebrique des equations (Paris, 1895) ; Weber, Lehrbuch der Algebra (Braunsch- weig, vol. i., 1895; vol. ii., 1896; a second edition appeared in 1898) ; Burnside, Theory of Groups of Finite Order (Cambridge, 1897) ; Bianchi, Teoria dei gruppi di soshtuzioni e delle equazioni algebriche (Pisa, 1899) ; Dickson, Linear Groups with an Exposition of the Galois Field Theory (Leipzig, 1901); De Seguier, Elements de la thiorie des groupes abs traits (Paris, 1904). A summary with many references will be found in the Encyklopddie der mathematischen Wissenschaften (Leipzig, vol. i., 1898, 1899). (W. Bu.)

GROUSE, a word of uncertain origin, 1 now used generally by ornithologists to include all the " rough-footed " Gallinaceous birds, but in common speech applied almost exclusively, when used alone, to the Tetrao scoticus of Linnaeus, the Lagopus scoticus of modern systematists — more particularly called in English the red grouse, but till the end of the 18th century almost invariably spoken of as the Moor-fowl or Moor-game. The effect which this species is supposed to have had on the British legislature, and therefore on history, is well known, for it was the common belief that parliament always rose when the season for grouse-shooting began (August

12th) ; while according to the Orkneyinga Saga (ed. Jonaeus, p. 356; ed. Anderson, p. 168) events of some importance in the annals of North Britain followed from its pursuit in Caithness in the year 1157.

The red grouse is found on moors from Monmouthshire and Derbyshire northward to the Orkneys, as well as in most of the Hebrides. It inhabits similar situations throughout Wales and Ireland, but it does not naturally occur beyond the limits of the British Islands, 2 and is the only species among birds peculiar to them. The word " species " may in this case be used advisedly (since the red grouse invariably " breeds true," it admits of an easy diagnosis, and it has a definite geographical range); but scarcely any zoologist can doubt of its common origin with the willow-grouse, Lagopus albus (L. subalpinus or L. saliceti of some authors), that inhabits a subarctic zone from Norway across the

1 It seems first to occur (O. Salusbury Brereton, Archaeologia, iii. 157) as " grows " in an ordinance for the regulation of the royal household dated "apud Eltham, mens. Jan. 22 Hen. VIII. ," i.e. 1 531, and considering the locality must refer to black game. It is found in an Act of Parliament I Jac. I. cap. 27, § 2, i.e. 1603, and, as reprinted in the Statutes at Large, stands as now commonly spelt, but by many writers or printers the final e was omitted in the 17th and 1 8th centuries. In 161 1 Cotgrave had " Poule griesche. A Moore-henne; the henne of the Grice [in ed. 1673 " Griece "] or Mooregame " (Dictionarie of the French and English Tongues, s.v. Poule). The most likely derivation seems to be from the old French word griesche, greoche or griais (meaning speckled, and cognate with griseus, grisly or grey), which was applied to some kind of partridge, or according to Brunetto Latini (Tres. p. 211) to a quail, " porce que ele fu premiers trovee en Grece." The Oxford Dictionary repudiates the possibility of " grouse " being a spurious singular of an alleged plural " grice," and, with regard to the possi- bility of " grows " being a plural of " grow," refers to Giraldus Cambrensis (c. 1210), Topogr. Hib. opera (Rolls) v. 47: " gallinae campestres, quas vulgariter grutas vocant."

2 It was successfully, though with much trouble, introduced by Mr Oscar Dickson on a tract of land near Gottenburg in Sweden (Svenska Jdgarforbundets Nya Tidskrift, 1868, p. 64 el alibi).

continents of Europe and Asia, as well as North America from the Aleutian Islands to Newfoundland. The red grouse indeed is rarely or never found away from the heather on which chiefly it subsists; while the willow-grouse

in many parts of the Old World seems to prefer the shrubby growth of berry-bearing plants (Vaccinium and others) that, often thickly interspersed with willows and birches, clothes the higher levels or the lower mountain-slopes, and it flourishes in the New World where heather scarcely exists, and a " heath " in its strict sense is unknown. It is true that the willow-grouse always becomes white in winter, which the red grouse never does; but in summer there is a considerable resemblance between the two species, the cock willow-grouse having his head, neck and breast of nearly the same rich chestnut-brown as his British representative, and, though his back be lighter in colour, as is also the whole plumage of his mate, than is found in the red grouse, in other respects the two species are precisely alike. No distinction can be discovered

only the highest and most barren mountains. It is said to have formerly inhabited both Wales and England, but there is no evidence of its appearance in Ireland. On the continent of Europe it is found most numerously in Norway, but at an elevation far above the growth of trees, and it occurs on the Pyrenees and on the Alps. It also inhabits northern Russia.

Red Grouse.

in their voice, their eggs, their build, nor in their anatomical details, so far as these have been investigated and compared. 1 Moreover, the red grouse, restricted as is its range, varies in colour not inconsiderably according to locality.

Though the red grouse does not, after the manner of other members of the genus Lagopus, become white in winter, Scotland possesses a species of the genus which does. This is the ptar- migan, L. mutus or L. alpinus, which differs far more in structure, station and habits from the red grouse than that does from the willow-grouse, and in Scotland is far less abundant, haunting

1 A very interesting subject for discussion would be whether Lagopus scoticus or L. albus has varied most from the common stock of both. Looking to the fact that the former is the only species of the genus which does not assume white clothing in winter, an evolutionist might at first deem the variation greatest in its case; but then it must be borne in mind that the species of Lagopus which turn white differ in that respect from all other groups of the family Tetraonidae. Furthermore every species of Lagopus (even L. leucurus, the whitest of all) has its first set of remiges coloured brown. These are dropped when the bird is about half-grown, and in all the species but L. scoticus white remiges are then produced. If therefore the successive phases assumed by any animal in the course of its

progress to maturity indicate the phases through which the species has passed, there may have been a time when all the species of Lagopus wore a brown livery even when adult, and the white dress donned in winter has been imposed upon the wearers by causes that can be easily suggested. The white plumage of the birds of this group protects them from danger during the snows of a protracted winter. But the red grouse, instead of perpetuating t directly the more ancient properties of an original Lagopus that underwent no great seasonal change of plumage, may derive its ancestry from the widely-ranging willow-grouse, which in an epoch comparatively recent (in the geological sense) may have stocked Britain, and left descendants that, under conditions in which the assumption of a white garb would be almost fatal to the preservation of the species, have reverted (though doubtless with some modifica- tions) to a comparative immutability essentially the same as that of the primal Lagopus.

Ptarmigan.

In North America, Greenland and Iceland it is represented by a very nearly allied form — so much so indeed that it is only at certain seasons that the slight difference between them can be detected. This form is the L. rupestris of authors, and it would appear to be found also in Siberia (Ibis, 1879, p. 148). Spitz- bergen is inhabited by a large form which has received recogni-

Blackcock.

tion as L. hemileucurus, and the northern end of the chain of the Rocky Mountains is tenanted by a very distinct species, the smallest and perhaps the most beautiful of the genus, L. leucurus, which has all the feathers of the tail white.

The bird, however, to which the name of grouse in all strictness belongs is probably the Tetrao tetrix of Linnaeus — the blackcock and greyhen, as the sexes are respectively called. It is distri- buted over most of the heath-country of England, except in East Anglia, where attempts to introduce it have been only partially successful. It also occurs in North Wales and very

generally throughout Scotland, though not in Orkney, Shetland or the Outer Hebrides, nor in Ireland. On the continent of Europe it has a very wide range, and it extends into Siberia. In Georgia its place is taken by a distinct species, on which a Polish naturalist (Proc. Zool. Society, 1875, p. 267) has conferred the name oi T. mlokosiewiczi. Both these birds have

much in common with their larger congener the capercally and its eastern representative.

The species of the genus Bonasa, of which the European B. sylvestris is the type, does not inhabit the British Islands. It is perhaps the most delicate game-bird that comes to table. It is the gelinotte of the French, the Haselhuhn of Germans, and Hjerpe of Scandinavians. Like its transatlantic congener

B. umbellus, the ruffed grouse or birch-partridge (of which there are two other local forms, B. umbelloides and B. sabinii), it is purely a forest-bird. The same may be said of the species of Canace, of which two forms are found in America, C. canadensis, the spruce-partridge, and C. franklini, and also of the Siberian

C. falcipennis. Nearly allied to these birds is the group known as Dendragapus, containing three large and fine forms D. obscurus, D.fuliginosus,a.nd D. richardsoni — all peculiar to North America. Then there are Centrocercus urophasianus, the sage-cock of the plains of Columbia and California, and Pedioecetes, the sharp- tailed grouse, with its two forms, P. phasianellus and P. colum- bianus, while finally Cupidonia, the prairie-hen, also with two local forms, C. cupido and C. pallidicincta, is a bird that in the United States of America possesses considerable economic value, enormous numbers being consumed there, and also exported to Europe.

The various sorts of grouse are nearly all figured in Elliot's Mono- graph of the Tetraoninae, and an excellent account of the American species is given in Baird, Brewer and Ridgway's North American Birds (iii. 414-465). See also Shooting. (A. N.)

GROVE, SIR GEORGE (1820-1900), English writer on music, was born at Clapham on the 13th of August 1820. He was articled to a civil engineer, and worked for two years in a factory near Glasgow. In 1841 and 1845 he was employed in the West Indies, erecting lighthouses in Jamaica and Bermuda. In 1849 he became secretary to the Society of Arts, and in 1852 to the Crystal Palace. In this capacity his natural love of music and enthusiasm for the art found a splendid opening, and he threw all the weight of his influence into the task of promoting the best music of all schools in connexion with the weekly and daily concerts at Sydenham, which had a long and honourable career under the direction of Mr (afterwards Sir) August Manns. Without Sir George Grove that eminent conductor would hardly have succeeded in doing what he did to encourage young com- posers and to educate the British public in music. Grove's analyses of the Beethoven symphonies, and the other works presented at

the concerts, set the pattern of what such things should be; and it was as a result of these, and of the fact that he was editor of Macmillan's Magazine from 1868 to 1883, that the scheme of bis famous Dictionary of Music and Musicians, published from 1878 to 1889 (new edition, edited by J. A. Fuller Maitland, 1904-1907), was conceived and executed. His own articles in that work on Beethoven, Mendelssohn and Schubert are monuments of a special kind of learning, and that the rest of the book is a little thrown out of balance owing to their great length is hardly to be regretted. Long before this he had con- tributed to the Dictionary of the Bible, and had promoted the foundation of the Palestine Exploration Fund. On a journey to Vienna, undertaken in the company of his lifelong friend, Sir Arthur Sullivan, the important discovery of a large number of compositions by Schubert was made, including the music to Rosamunde. When the Royal College of Music was founded in 1882 he was appointed its first director, receiving the honour of , knighthood. He brought the new institution into line with the most useful European conservatoriums. On the completion of the new buildings in 1894 he resigned the directorship, but retained an active interest in the institution to the end of his life. He died at Sydenham on the 28th of May 1900.

His life, a most interesting one, was written by Mr Charles Graves.

(J.A.F. M.)

GROVE, SIR WILLIAM ROBERT (1811-1896), English judge and man of science, was born on the nth of July 18 n at Swansea, South Wales. After being educated by private tutors, he went to Brasenose College, Oxford, where he took an ordinary degree in 1832. Three years later he was called to the bar at Lincoln's Inn. His health, however, did not allow him to devote himself strenuously to practice, and he occupied his leisure with scientific studies. About 1839 he constructed the platinum-zinc voltaic cell that bears his name, and with the aid of a number of these exhibited the electric arc light in the London Institution, Finsbury Circus. The result was that in 1840 the managers appointed him to the professorship of experimental philosophy, an office which he held for seven years. His researches dealt very largely with electro-chemistry and with the voltaic cell, of which he invented several varieties. One of these, the Grove gas-battery, which is of special interest both intrinsically and as the forerunner of the secondary batteries now in use for the " storage " of electricity, was based on his observation that a current is produced by a couple of platinum plates standing in acidulated water and immersed, the one in hydrogen, the other in oxygen. At one of his lectures at the Institution he anticipated the electric lighting of to-day by illuminating the theatre with incandescent electric lamps, the filaments being of platinum and the current supplied by a battery of his nitric acid cells. In 1846 he published his famous book on

The Correlation of Physical Forces, the leading ideas of which he had already put forward in his lectures: its fundamental conception was that each of the forces of nature — light, heat, electricity, &c. — is definitely and equivalently convertible into any other, and that where experiment does not give the full equivalent, it is because the initial force has been dissipated, not lost, by conversion into other unrecognized forces. In the same year he received a Royal medal from the Royal Society for his Bakerian lecture on " Certain phenomena of voltaic ignition and the decomposition of water into its constituent gases." In 1866 he presided over the British Association at its Nottingham meeting and delivered an address on the continuity of natural phenomena. But while he was thus engaged in scientific research, his legal work was not neglected, and his practice increased so greatly that in 1853 he became a Q.C. One of the best-known cases in which he appeared as an advocate was that of William Palmer, the Rugeley poisoner, whom he defended. In 1871 he was made a judge of the Common Pleas in succession to Sir Robert Collier, and remained on the bench till 1887. He died in London on the 1st of August 1896.

A selection of his scientific papers is given in the sixth edition of The Correlation of Physical Forces, published in 1874.

GROVE (O.E. graf, cf. O.E. greefa, brushwood, later " greave "; the word does not appear in any other Teutonic language, and the New English Dictionary finds no Indo-European root to which it can be referred; Skeat considers it connected with " grave," to cut, and finds the original meaning to be a glade cut through a wood), a small group or cluster of trees, growing naturally and forming something smaller than a wood, or planted in particular shapes or for particular purposes, in a park, &c. Groves have been connected with religious worship from the earliest times, and in many parts of India every village has its sacred group of trees. For the connexion of religion with sacred groves see Tree- Worship.

The word " grove " was used by the authors of the Authorized Version of the Bible to translate two Hebrew words: (1) 'eshel, as in Gen. xxi. 33, and 1 Sam. xxii. 6; this is rightly given in the Revised Version as "tamarisk"; (2) asherah in many places throughout the Old Testament. Here the translators followed the Septuagint fiXo-os and the Vulgate lucus. The 'asherah was a wooden post erected at the Canaanitish places of worship, and also by the altars of Yahweh. It may have represented a tree.

GROZNYI, a fortress and town of Russia, North Caucasia, in the province of Terek, on the Zunzha river, 82 in. by rail N.E. of Vladikavkaz, on the railway to Petrovsk. There are naphtha wells close by. The fortifications were constructed in 1819. Pop. (1897) 15,599.

GRUB, the larva of an insect, a caterpillar, maggot. The word is formed from the verb " to grub," to dig, break up the

surface of the ground, and clear of stumps, roots, weeds, &c. According to the New English Dictionary, " grub " may be referred 10 an ablaut variant of the Old Teutonic grab-, to dig, cf . " grave." Skeat (Etym. Diet. 1898) refers it rather to the root seen in " grope," " grab," &c, the original meaning " to search for." The earliest quotation of the slang use of the word in the sense of food in the New English Dictionary is dated 1659 from Ancient Poems, Ballads, &c, Percy Society Publications. " Grub- street," as a collective term for needy hack-writers, dates from the 1 7th century and is due to the name of a street near Moorfields, London, now Milton Street, which was as Johnson says " much inhabited by writers of small histories, dictionaries and temporary poems."

GRUBER, JOHANN GOTTFRIED (1774-1851), German critic and literary historian, was born at Naumburg on the Saale, on the 29th of November 1774. He received his education at the town school of Naumburg and the university of Leipzig, after which he resided successively at Gottingen, Leipzig, Jena and Weimar, occupying himself partly in teaching and partly in various literary enterprises, and enjoying in Weimar the friend- ship of Herder, Wieland and Goei.he. In 181 1 he was appointed professor at the university of Wittenberg, and after the division of Saxony he was sent by the senate to Berlin to negotiate the union of the university of Wittenberg with that of Halle. After the union was effected he became in 1815 professor of philosophy at Halle. He was associated with Johann Samuel Ersch in the editorship of the great work Allgcmeine Encyklopadie der Wissen- schajten und Kiinste; and after the death of Ersch he continued the first section from vol. xviii. to vol. liv. He also succeeded Ersch in the editorship of the Allgemeine Liter aturzeitung. He died on the 7th of August 1851.

Gruber was the author of a large number of works, the principal of which are Charakteristik Herders (Leipzig, 1805), in conjunction with Johann T. L. Danz (1769-1851), afterwards professor of theology at Jena; Qeschichte des menschlichen Geschlechts (2 vols., Leipzig, 1806); Worterbuch der altklassischen Mythologie (3 vols., Weimar, 1810-1815); Wielands Leben (2 parts, Weimar, 1815-1816), and Klopstocks Leben (Weimar, 1832). He also edited Wieland's Samlliche Werke (Leipzig, 1818-1828).

GRUMBACH, WILHELM VON (1503-1567), German adventurer, chiefly known through his connexion with the so-called " Grumbach feuds " (Grumbachsche Handel), the last attempt of the German knights to destroy the power of the territorial princes. A member of an old Franconian family, he was born on the 1st of June 1503, and having passed some time at the court of Casimir, prince of Bayreuth (d. 1527), fought against the peasants during the rising in 1524 and 1525. About 1540 Grumbach became associated with Albert Alcibiades, the turbulent prince of Bayreuth, whom he served both in peace and war. After the conclusion of the peace of Passau in 1552, Grumbach assisted Albert in his career of plunder in Franconia and was thus able to take some revenge upon his enemy, Melchior von Zobel, bishop of Wiirzburg. As a landholder Grumbach was a vassal of the bishops of Wiirzburg, and had held office at the court of Conrad of Bibra, who was bishop from 1540 to 1544. When, however, Zobel was chosen to succeed Conrad the harmonious relations between lord and vassal were quickly disturbed. Unable to free himself and his associates from the suzerainty of the bishop by appealing to the imperial courts he decided to adopt more violent measures, and his friendship with Albert was very serviceable in this connexion. Albert's career, however, was checked by his defeat at Sievershausen in July 1553 and his subsequent flight into France, and the bishop took

advantage of this state of affairs to seize Grumbach's lands.

The knight obtained an order of restitution from the imperial

court of justice (Reichskammergericht), but he was unable to -1

carry this into effect; and in April 1558 some of his partisans

seized and killed the bishop. Grumbach declared he was

innocent of this crime, but his story was not believed, and he

fled to France. Returning to Germany he pleaded his cause in

person before the diet at Augsburg in 1559, but without success.

Meanwhile he had found a new patron in John Frederick,

duke of Saxony, whose father, John Frederick, had been obliged

to surrender the electoral dignity to the Albertine branch of his family. Chafing under this deprivation the duke listened readily to Grumbach's plans for recovering the lost dignity, including a general rising of the German knights and the deposi- tion of Frederick II., king of Denmark. Magical charms were employed against the duke's enemies, and communications from angels were invented which helped to stir up the zeal of the people. In 1563 Grumbach attacked Wiirzburg, seized and plundered the city and compelled the chapter and the bishop to restore his lands. He was consequently placed under the imperial ban, but John Frederick refused to obey the order of the emperor Maximilian II. to withdraw his protection from him. Meanwhile Grumbach sought to compass the assassination of the Saxon elector, Augustus; proclamations were issued calling for assistance; and alliances both without and within Germany were concluded. In November 1566 John Frederick was placed under the ban, which had been renewed against Grumbach earlier in the year, and Augustus marched against Gotha. Assistance was not forthcoming, and a mutiny led to the capitula- tion of the town. Grumbach was delivered to his foes, and, after being tortured, was executed at Gotha on the 18th of April

1567-

See F. Ortloff, Geschichte der Grumbachschen Handel (Jena, 1868-1870), and J. Voigt, Wilhelm von Grumbach und seine Handel (Leipzig, 1846-1847).

GRUMENTUM, an ancient town in the centre of Lucania, a m- S. of

Potentia by the direct road through Anxia, and 52 m. by the Via Herculia, at the point of divergence of a road eastward to Heraclea. It seems to have been a native Lucanian town, not a Greek settlement. In 215 B.C. the Carthaginian general Hanno was defeated under its walls, and in 207 B.C. Hannibal made it his headquarters. In the Social War it appears as a strong fortress, and seems to have been held by both sides at different times. It became a colony, perhaps in the time of Sulla, at latest under Augustus, and seems to have been of some importance. Its site, identified by Holste from the description of the martyrdom of St Laverius, is a ridge on the right bank of the Aciris (Agri) about i960 ft. above sea-level, 5 m. below the modern Saponara, which lies much higher (2533 ft.). Its ruins (all of the Roman period) include those of a large amphi- theatre (arena 205 by 197 ft.), the only one in Lucania, except that at Paestum. There are also remains of a theatre. Inscrip- tions record the repair of its town walls and the construction of thermae (of which remains were found) in 57-51 B.C., the construction in 43 B.C., of a portico, remains of which may be seen along an ancient road, at right angles to the main road, which traversed Grumentum from S. to N.

*See F. P. Caputi in Notizie degli scavi (1877), 129, and G. Patroni, *'&i<2.(i897) 180. (T. As.)*

GRUN. Hans Baldung (c. 1470-1545), commonly called Griin, a German painter of the age of Diirer, was born at Gmiind in Swabia, and spent the greater part of his life at Strassburg and Freiburg in Breisgau. The earliest pictures assigned to him are altarpieces with the monogram H. B. interlaced, and the date of 1496, in the monastery chapel of Lichtenthal near Baden. Another early work is a portrait of the emperor Maximilian, drawn in 150 1 on a leaf of a sketch-book now in the print-room at Carlsruhe. The "Martyrdom of St Sebastian" and the "Epiphany" (Berlin Museum), fruits of his labour in 1507, were painted for the market-church of Halle in Saxony. In 1509 Griin purchased the freedom of the city of Strassburg, and resided there till 1513, when he moved to Freiburg in Breisgau. There he began a series of large compositions, which he finished in 15 16, and placed on the high altar of the Freiburg cathedral. He purchased anew ihe freedom of Strassburg in 1517, resided in that city as his domicile, and died a member of its great town council 1545.

Though nothing is known of Griin's youth and education, it may be inferred from his style that he was no stranger to the school of which Diirer was the chief. Gmiind is but 50 m. distant on either side from Augsburg and Nuremberg. Griin's prints were often mistaken for those of Diirer; . and Diirer himself was well acquainted with Griin's woodcuts and

copper-plates in which he traded during his trip to the Nether- lands (1520). But Griin's prints, though Diireresque, are far below Dtirer, and his paintings are below his prints. Without absolute correctness as a draughtsman, his conception of human form is often very unpleasant, whilst a questionable taste is shown in ornament equally profuse and " baroque." Nothing is more remarkable in his pictures than the pug-like shape of the faces, unless we except the coarseness of the extremities. No trace is apparent of any feeling for atmosphere or light and shade. Though Griin has been commonly called the Correggio of the north, his compositions are a curious medley of glaring and heterogeneous colours, in which pure black is contrasted with pale yellow, dirty grey, impure red and glowing green. Flesh is a mere glaze under which the features are indicated by lines. His works are mainly interesting because of the wild and fantastic strength which some of them display. We may pass lightly over the "Epiphany" of 1507, the "Crucifixion" of 1512, or the " Stoning of Stephen " of 1522, in the Berlin Museum. There is some force in the " Dance of Death " of 1517, in the museum of Basel, or the "Madonna" of 1530, in the Liechtenstein Gallery at Vienna. Griin's best effort is the altarpiece of Freiburg, where the " Coronation of the Virgin," and the " Twelve Apostles," the " Annunciation, Visitation, Nativity and Flight into Egypt," and the " Crucifixion," with portraits of donors, are executed with some of that fanciful power which Martin Schbn bequeathed to the Swabian school. As a portrait painter he is well known. He drew the likeness of Charles V., as well as that of Maximilian; and his bust of Margrave Philip in the Munich Gallery tells us that he was connected with the reigning family of Baden as early as 1514. At a later period he had sittings from Margrave Christopher of Baden, Ottilia his wife, and all their children, and the picture containing these portraits is still in the grand-ducal gallery at Carlsruhe. Like Diirer and Cranach, Griin became a hearty supporter of the Reformation. He was present at the diet of Augsburg in 1518, and one of his woodcuts represents Luther under the protection of the Holy Ghost, which hovers over him in the shape of a dove.

GRUNBERG, a town of Germany, in Prussian Silesia, beauti- fully situated between two hills on an affluent of the Oder, and on the railway from Breslau to Stettin via Kustrin, 36 m. N.N.W. of Glogau. Pop. (1905) 20,987. It has a Roman Catholic and two Evangelical churches, a modern school and a technical (textiles) school. There are manufactures of cloth, paper, machinery, straw hats, leather and tobacco. The prosperity of the town depends chiefly on the vine culture in the neighbour- hood, from which, besides the exportation of a large quantity of grapes, about 700,000 gallons of wine are manufactured annually.

GRUNDTVIG, NIKOLAI FREDERIK SEVERIN (1783-1872), Danish poet, statesman and divine, was born at the parsonage of Udby in Zealand on the 8th of September 1783. In 1791 he was sent to live at the house of a priest in Jutland, and studied at the free school of Aarhuus until he went up to the university of Copenhagen in 1800. At the close of his university life he made Icelandic his special study, until in 1805 he took the position of tutor in a house on the island of Langeland. The next three years were spent in the study of Shakespeare, Schiller and Fichte. His cousin, the philosopher Henrik Steffens, had returned to Copenhagen in 1802 full of the teaching of Schelling and his lectures and the early poetry of Ohlenschlager opened the eyes of Grundtvig to the new era in literature. His first work, On the Songs in the Edda, attracted no attention. Returning to Copen- hagen in 1808 he achieved greater success with his Northern Mythology, and again in 1809-1811 with a long epic poem, the Decline of the Heroic Life in the North. The boldness of the theological views expressed in his first sermon in 18 10 offended the ecclesiastical authorities, and he retired to a country parish as his father's assistant for a while. From 1812 to 1817 he pub- lished five or six works, of which the Rhyme of Roskilde is the most remarkable. From 1816 to 1819 he was editor of a polemical journal entitled Dannevirke, and in 1818 to 1822 appeared his Danish paraphrases (6 vols.) of Saxo Grammaticus and Snorri.

During these years he was preaching against rationalism to an enthusiastic congregation in Copenhagen, but he accepted in 182 1 the country living of Praesto, only to return to the metropolis the year after. In 1825 he published a pamphlet, The Church's Reply, against H. N. Clausen, who was professor of theology in the university of Copenhagen. Grundtvig was publicly prose- cuted and fined, and for seven years he was forbidden to preach, years which he spent in publishing a collection of his theological works, in paying two visits to England, and in studying Anglo- Saxon. In 1832 he obtained permission to preach again, and in 1839 he became priest of the workhouse church of Vartov hospital, Copenhagen, a post he continued to hold until his death. In 1 83 7- 1 84 1 he published Songs for the Danish Church, a rich collection of sacred poetry; in 1838 he brought out a selection of early Scandinavian verse; in 1840 he edited the Anglo-Saxon poem of the Phoenix, with a Danish translation. He visited England a third time in 1843. From 1844 until after the first German war Grundtvig took a very prominent part in politics. In 1 86 1 he received the titular rank of bishop, but without a see. He went on writing occasional poems till 1866, and preached in the Vartov every Sunday until a month before his death. His preaching attracted large congregations, and he soon had a following. His hymn-book effected a great change in Danish church services, substituting the hymns of the national poets for the slow measures

of the orthodox Lutherans. The chief characteristic of his theology was the substitution of the authority of the " living word " for the apostolic commentaries, and he desired to see each congregation a practically independent community. His patriotism was almost a part of his religion, and he established popular schools where the national poetry and history should form an essential part of the instruction. His followers are known as Grundtvigians. He was married three times, the last time in his seventy-sixth year. He died on the 2nd of September 1872. Grundtvig holds a unique position in the literature of his country; he has been styled the Danish Carlyle. He was above all things a man of action, not an artist; and the formless vehemence of his writings, which have had a great influence over his own countrymen, is hardly agreeable or intelligible to a foreigner. The best of his poetical works were published in a selection (7 vols., 1880-1889) by his eldest son, Svend Hersleb Grundtvig (1824-1883), who was an authority on Scandinavian antiquities, and made an admirable collection of old Danish poetry (Danmarks gamle Folkeviser, 1853-1883, 5 vols.; completed in 1891 by A. Olrik).

His correspondence with Ingemann was edited by S. Grundtvig (1882); his correspondence with Christian Molbech by L. Schroder (1888); see also F. Winkel Horn, Grundtvigs Liv og Gjerning (1883); and an article by F. Nielsen in Bricka's Dansk Biografisk Lexikon.

GRUNDY, SYDNEY (1848-), English dramatist, was born at Manchester on the 23rd of March 1848, son of Alderman Charles Sydney Grundy. He was educated at Owens College, Manchester, and was called to the bar in 1869, practising in Manchester until 1876. His farce, A Little Change, was produced at the Haymarket Theatre in 1872. He became well known as an adapter of plays, among his early successes in this direction being The Snowball (Strand Theatre, 1879) from Oscar, ou le mari qui trompe sa fenime by MM. Scribe and Duvergne, and In Honour Bound (1880) from Scribe's Une Chaine. In 1887 he made a popular success with The Bells of Haslemere, written with Mr H. Pettitt and produced at the Adelphi. In 1889-1890 he produced two ingenious original comedies, A White Lie (Court Theatre) and A Fool's Paradise (Gaiety Theatre), which had been played two years earlier at Greenwich as The Mouse- Trap. These were followed by Sowing the Wind (Comedy, 1893), An Old Jew (Garrick, 1894), and by an adaptation of Octave Feuillet's Montjoye as A Bunch of Violets (Haymarket, 1894). In 1894 he produced The New Woman and The Slaves of the Ring; in 1895, The Greatest of These, played by Mr and Mrs Kendal at the Garrick Theatre; The Degenerates (Haymarket, 1899), and A Debt of Honour (St James's 1900). Among Mr Grundy's most successful adaptations were the charming Pair of Spectacles (Garrick, 1890) from Les PeUts Oiseaux of MM. Labiche and

Delacour. Others were A Village Priest (Haymarket, 1890) from 'Le Secret de la terreuse, a melodrama by MM. Busnach and Cauvin; A Marriage of Convenience (Haymarket, 1897) from Un Manage de Louis XV, by Alex. Dumas, pere, The Silver Key (Her Majesty's, 1897) from his Mile de Belle-isle, and The Musqueleers (1899) from the same author's novel; Frocks and Frills (Haymarket, 1902) from the Doigts defies of MM. Scribe and Legouve; The Garden of Lies (St James's Theatre, 1904) from Mr Justus Miles Forman's novel; Business is Business (His Majesty's Theatre, 1905), a rather free adaptation from Octave Mirbeau's Les Affaires sont les affaires; and The Diplo- matists (Royalty Theatre, 1905) from La Poudre aux yeux, by Labiche.

GRUNDY, MRS, the name of an imaginary English character, who typifies the disciplinary control of the conventional " pro- prieties " of society over conduct, the tyrannical pressure of the opinion of neighbours on the acts of others. The name appears in a play of Thomas Morton, Speed the Plough (1798), in which one of the characters, Dame Ashfield, continually refers to what her neighbour Mrs Grundy will say as the criterion of respectability. Mrs Grundy is not a character in the play, but is a kind of " Mrs Harris " to Dame Ashfield.

GRUNER, GOTTLIEB SIGMUND (1717-1778), the author of the first connected attempt to describe in detail the snowy mountains of Switzerland. His father, Johann Rudolf Gruner (1680-1761), was pastor of Trachselwald, in the Bernese Emmenthal (1705), and later (1725) of Burgdorf, and a great collector of information relating to historical and scientific matters; his great Thesaurus topographico-historicus totius ditionis Bernensis (4 vols, folio, 1729-1730) still remains in MS., but in 1732 he published a small work entitled Deliciae urbis Bernae, while he possessed an extensive cabinet of natural history objects. Naturally such tastes had a great influence on the mind of his son, who was born at Trachselwald, and educated by his father and at the Latin school at Burgdorf, not going to Berne much before 1 736, when he published a dissertation on the use of fire by the heathen. In 1739 he qualified as a notary, in 1741 became the archivist of Hesse-Homburg, and in 1743 accompanied Prince Christian of Anhalt-Schaumburg to Silesia and the university of Halle. He returned to his native land before 1749, when he obtained a post at Thorberg, being transferred in 1764 to Landshut and Fraubrunnen. It was in 1760 that he published in 3 vols, at Berne his chief work, Die Eisgebirge des Schweizerlandes (bad French translation by M. de Keralio, Paris, 1770). The first two volumes are filled by a detailed description of the snowy Swiss

mountains, based not so much on personal experience as on older works, and a very large number of communications received by Gruner from numerous friends; the third volume deals with glaciers in general, and their various properties. Though in many respects imperfect, Gruner's book sums up all that was known on the subject in his day, and forms the starting-point for later writers. The illustrations are very curious and interesting. In 1778 he republished (nominally in London, really at Berne) much of the information contained in his larger work, but thrown into the form of letters, supposed to be written in 1776 from various spots, under the title of Reisen durch die merkwiirdigsten Gegenden Helvetiens (2 vols.). (W. A. B. C.)

GRUNEWALD, MATHIAS. The accounts which are given of this German painter, a native of Aschaffenburg, are curiously contradictory. Between 15 18 and 1530, according to statements adopted by Waagen and Passavant, he was commissioned by Albert of Brandenburg, elector and archbishop of Mainz, to produce an altarpiece for the collegiate church of St Maurice and Mary Magdalen at Halle on the Saale; and he acquitted .himself of this duty with such cleverness that the prelate in after years caused the picture to be rescued from the Reformers and brought back to Aschaffenburg. From one of the churches of that city it was taken to the Pinakothek of Munich in 1836. It represents St Maurice and Mary Magdalen between four saints, and displays a style so markedly characteristic, and so like that of Lucas Cranach, that Waagen was induced to call

Grunewald Cranach's master. He also traced the same hand and technical execution in the great altarpieces of Annaberg and Heilbronn, and in various panels exhibited in the museums of Mainz, Darmstadt, Aschaffenburg, Vienna and Berlin. A later race of critics, declining to accept the statements of Waagen and Passavant, affirm that there is no documentary evidence to connect Grunewald with the pictures of Halle and Annaberg, and they quote Sandrart and Bernhard Jobin of Strassburg to show that Grunewald is the painter of pictures of a different class. They prove that he finished before 15 16 the large altar- piece of Issenheim, at present in the museum of Colmar, and starting from these premises they connect the artist with Altdorfer and Diirer to the exclusion of Cranach. That a native of the Palatinate should have been asked to execute pictures for a church in Saxony can scarcely be accounted strange, since we observe that Hans Baldung (Grtin) was entrusted with a com- mission of this kind. But that a painter of Aschaffenburg should display the style of Cranach is strange and indeed incredible, unless vouched for by first-class evidence. In this case documents are altogether wanting, whilst on the other hand it is beyond the possibility of doubt, even according to Waagen, that the

altarpiece of Issenheim is the creation of a man whose teaching was altogether different from that of the painter of the pictures of Halle and Annaberg. The altarpiece of Issenheim is a fine and powerful work, completed as local records show before 1 516 by a Swabian, whose distinguishing mark is that he followed the traditions of Martin Schongauer, and came under the in- fluence of Altdorfer and Diirer. As a work of art the altarpiece is important, being a poliptych of eleven panels, a carved central shrine covered with a double set of wings, and two side pieces containing the Temptation of St Anthony, the hermits Anthony and Paul in converse, the Virgin adored by Angels, the Resurrec- tion, the Annunciation, the Crucifixion, St Sebastian, St Anthony, and the Marys wailing over the dead body of Christ. The author of these compositions is also the painter of a series of mono- chromes described by Sandrart in the Dominican convent, and now in part in the Saalhof at Frankfort, and a Resurrection in the museum of Basel, registered in Amerbach's inventory as the work of Grunewald.

GRUTER (or Gruytere), JAN (1 560-1627), a critic and scholar of Dutch parentage by his father's side and English by his mother's, was born at Antwerp on the 3rd of December 1560. To avoid religious persecution his parents while he was still young came to England; and for some years he prosecuted his studies at Cambridge, after which he went to Leiden, where he graduated M. A. In 1 586 he was appointed professor of history at Wittenberg, but as he refused to subscribe the formula con- cordiae he was unable to retain his office. From 1589 to 1592 he taught at Rostock, after which he went to Heidelberg, where in 1602 he was appointed librarian to the university. He died at Heidelberg on the 20th of September 1627.

Gruter's chief works were his Inscriptiones antiquae totius orbis Rotnani (2 vols., Heidelberg, 1603), and Lampas, sive fax artium liber alium (7 vols., Frankfort, 1602- 1634).

GRUYERE (Ger. Greyerz), a district in the south-eastern portion of the Swiss canton of Fribourg, famed for its cattle and its cheese, and the original home of the " Ranz des Vaches," the melody by which the herdsmen call their cows home at milking time. It is composed of the middle reach (from Mont- bovon to beyond Bulle) of the Sarine or Saane valley, with its tributary glens of the Hongrin (left), the Jogne (right) and the Treme (l elt)i and is a delightful pastoral region (in 1901 it contained 17,364 cattle). It forms an administrative district of the canton of Fribourg, its population in 1900 being 23,111, mainly French-speaking and Romanists. From Montbovon (n m. by rail from Bulle) there are mountain railways lead- ing S.W. past Les Avants to Montreux (14 m.), and E. up the Sarine valley past Chateau d'Oex to Saanen or Gessenay (14 m.), and by a tunnel below a low pass to the Simme valley and Spiez on the Lake of

Thun. The modern capital of the district is the small town of Bulle [Ger. Boll], with a 13th-century castle and in 1900 3330 inhabitants, French-speaking and Romanists. But

the historical capital is the very picturesque little town of Gruyeres (which keeps its final " s " in order to distinguish it from the district), perched on a steep hill (S.E. of Bulle) above the left bank of the Sarine, and at a height of 2713 ft. above the sea-level. It is only accessible by a rough carriage road, and boasts of a very fine old castle, at the foot of which is the solitary street of the town, which in 1900 had 1389 inhabitants.

The castle was the seat of the counts of the Gruyere, who are first mentioned in 1073. The name is said to come from the word gruyer, meaning the officer of woods and forests, but the counts bore the canting arms of a crane (grue), which are seen all over the castle and the town. That valiant family ended (in the legitimate line) with Count Michel (d. 1575) whose extra- vagance and consequent indebtedness compelled him in 1555 to sell his domains to Bern and Fribourg. Bern took the upper Sarine valley (it still keeps Saanen at its head, but in 1798 lost the Pays d'En-Haut to the canton du Leman, which in 1803 became the canton of Vaud). Fribourg took the rest of the county, which it added to Bulle and Albeuve (taken in 1537 from the bishop of Lausanne), and to the lordship of Jaun in the Jaun or Jogne valley (bought in 1502-1504 from its lords), in order to form the present administrative district of Gruyere, which is not co-extensive with the historical county of that name.

See the materials collected by J. J. Hisely and published in suc- cessive vols, of the Memoires et documents de la Suisse romande . . . introa. d, I' hist. (1851); Histoire (2 vols., 1855-1857); and Monu- ments de Vhistoire (2 vols., 1867-1869); K. V. von Bonstetten, Briefe ilber ein schweiz. Hirtenland (1781) (Eng. trans., 1784); J. Reichlen, La Gruyere illustree (1890), seq.; H. Raemy, La Gruyere (1867); and Les Alpes fribourgeoises, by many authors (Lausanne, 1908). (W. A. B. C.)

GRYNAEUS (or. Gryner), JOHANN JAKOB (1540-1617), Swiss Protestant divine, was born on the 1st of October 1540 at Bern. His father, Thomas (151 2-1 564), was for a time professor of ancient languages at Basel and Bern, but afterwards became pastor of Roteln in Baden. He was nephew of the more eminent Simon Grynaeus (q.v.). Johann was educated at Basel, and in 1559 received an appointment as curate to his father. In 1563 he proceeded to Tubingen for the purpose of completing his theo-

logical studies, and in 1565 he returned to Roteln as successor to his father. Here he felt compelled to abjure the Lutheran doctrine of the Lord's Supper, and to renounce the formula concordiae. Called in 1575 to the chair of Old Testament exegesis at Basel, he became involved in unpleasant controversy with Simon Sulzer and other champions of Lutheran orthodoxy; and in 1584 he was glad to accept an invitation to assist in the restoration of the university of Heidelberg. Returning to Basel in 1586, after Simon Sulzer's death, as antistes or superintendent of the church there and as professor of the New Testament, he exerted for upwards of twenty-five years a considerable influence upon both the church and the state affairs of that community, and acquired a wide reputation as a skilful theologian of the school of Llrich Zwingli. Amongst other labours he helped to reorganize the gymnasium in 1588. Five years before his death he became totally blind, but continued to preach and lecture till his death on the 13th of August 161 7.

His many works include commentaries on various books of the Old and New Testament, Theologica theoremata et problemata (1588), and a collection of patristic literature entitled Monumenta S. patrum orlhodoxographa (2 vols., fol., 1569).

GRYNAEUS, SIMON (1493-1541), German scholar and theo- logian of the Reformation, son of Jacob Gryner, a Swabian peasant, was born in 1493 at Vehringen, in Hohenzollern- Sigmaringen. He adopted the name Grynaeus from the epithet of Apollo in Virgil. He was a schoolfellow with Melanchthon at Pforzheim, whence he went to the university of Vienna, distinguishing himself there as a Latinist and Grecian. His appointment as rector of a school at Buda was of no long con- tinuance; his views excited the zeal of the Dominicans and he was thrown into prison. Gaining his freedom at the instance of Hungarian magnates, he visited Melanchthon at Wittenberg, and in 1524 became professor of Greek at the university of Heidelberg, being in addition professor of Latin from 1526. His Zwinglian view of the Eucharist disturbed his relations with

his Catholic colleagues. From 1526 he had corresponded with Oecolampadius, who in 1529 invited him to Basel, which Erasmus had just left. The university being disorganized, Grynaeus pursued his studies, and in 1531 visited England for research in libraries. A commendatory letter from Erasmus gained him the good offices of Sir Thomas More. He returned to Basel charged with the task of collecting the opinions of continental reformers on the subject of Henry VIII. 's divorce, and was present at the death of Oecolampadius (Nov. 24, 1531). He now, while holding the chair of Greek, was appointed extraordinary professor of theology, and gave exegetical lectures on the New Testament. In 1534 Duke Ulrich called him to Wiirttemberg in aid of the reformation there, as

well as for the reconstitution of the university of Tubingen, which he carried out in concert with Ambrosius Blarer of Constanz. Two years later he had an active hand in the so-called First Helvetic Confession (the work of Swiss divines at Basel in January 1536); also in the conferences which urged the Swiss acceptance of the Wittenberg Concord (1536). At the Worms conference (1540) between Catholics and Protestants he was the sole representative of the Swiss churches, being deputed by the authorities of Basel. He was carried off suddenly in his prime by the plague at Basel on the 1 st of August 1 54 1. A brilliant scholar, a mediating theologian, and personally of lovable temperament, his influence was great and wisely exercised. Erasmus and Calvin were among his correspondents. His chief works were Latin versions of Plutarch, Aristotle and Chrysostom.

His son Samuel (1539-1599) was professor of jurisprudence at Basel. His nephew Thomas (i5i2?-i564) was professor at Basel and minister in Baden, and left four distinguished sons of whom Johann Jakob (1540-1617) was a leader in the religious affairs of Basel. The last of the direct descendants of Simon Grynaeus was his namesake Simon (1725-1799), translator into German of French and English anti-deistical works, and author of a version of the Bible in modern German (1776).

See Bayle's Dictionnaire; W. T. Streuber in Hauck's Realency- klopddie (1899); and for bibliography, Streuber's 5. Grynaei epis- lolae (1847). (A. Go.)*

GRYPHIUS, ANDREAS (1616-1664), German lyric poet and dramatist, was born on the nth of October 1616, at Grossglogau in Silesia, where his father was a clergyman. The family name was Greif, latinized, according to the prevailing fashion, as Gryphius. Left early an orphan and driven from his native town by the troubles of the Thirty Years' War, he received his schooling in various places, but notably at Fraustadt, where he enjoyed an excellent classical education. In 1634 he became tutor to the sons of the eminent jurist Georg von Schonborn (1 579-1637), a man of wide culture and considerable wealth, who, after filling various administrative posts and writing many erudite volumes on law, had been rewarded by the emperor Ferdinand II. with the title and office of imperial count-palatine (Pfalzgraf). Schonborn, who recognized Gryphius's genius, crowned him poeta laureatus, gave him the diploma of master of philosophy, and bestowed on him a patent of nobility, though Gryphius never used the title. A month later, on the 23rd of December 1637, Schonborn died; and next year Gryphius went to continue his studies at Leiden, where he remained six years, both hearing and delivering lectures. Here he fell under the influence of the great Dutch dramatists, Pieter Cornelissen Hooft (1581-1647) and Joost van den Vondel (1587-1679), who largely determined the character of his later dramatic works. After travelling in

France, Italy and South Germany, Gryphius settled in 1647 at Fraustadt, where he began his dramatic work, and in 1650 was appointed syndic of Glogau, a post he held until his death on the 16th of July 1664. A short time previously he had been admitted under the title of " The Immortal " into the Fruchtbringende Gesellschaft, a literary society, founded in 1617 by Ludwig, prince of Anhalt-Kothen on the model of the Italian academies.

Gryphius was a man of morbid disposition, and his melancholy temperament, fostered by the misfortunes of his childhood, is largely reflected in his lyrics, of which the most famous are the

Kirchhofsgedanken (1656). His best works are his comedies, one of which, Absurda Comica, oder Herr Peter Squentz (1663), is evidently based on the comic episode of Pyramus and Thisbe in The Midsummer Night's Dream. Die geliebte Dornrose (1660), which is written in a Silesian dialect, contains many touches of natural simplicity and grace, and ranks high among the compara- tively small number of German dramas of the 17th century. Horribilicribrijax (1663), founded on the Miles gloriosus of Plautus, is a rather laboured attack on pedantry. Besides these three comedies, Gryphius wrote five tragedies. In all of them his tendency is to become wild and bombastic, but he had the merit of at least attempting to work out artistically conceived plans, and there are occasional flashes both of passion and of imagination. His models seem to have been Seneca and Vondel. He had the courage, in Carolus Stuardus (1649) to deal with events of his own day; his other tragedies are Leo Armenius (1646); Katharina von Georgien (1657), Cardenio und Celinde (1657) and Papinianus (1663). No German dramatic writer before him had risen to so high a level, nor had he worthy successors until about the middle of the 18th century.*

A complete edition of Gryphius's dramas and lyric poetry has been published by H. Palm in the series of the Stuttgart Literarische Verein (3 vols., 1878, 1882, 1884). Volumes of selected works will be found in W. Muller's Bibliothek der deutschen Dichter des ijten Jahrhunderls (1822) and in J. Tittmahn's Deutsche Dichter des ijten Jahrhunderts (1870). There is also a good selection by H. Palm in Kurschner's Deutsche Nationalliteratur.

See O. Klopp, Andreas Gryphius als Dramatiker (1851); J. Her- mann, Uber Andreas Gryphius (1851) ; T. Wissowa, Beitrage zur Kenntnis von Andreas Gryphius' Leben und Schriflen (1876); J. Wysocki, Andreas

Gryphius et la tragedie allemande au XVII" siecle; and V. Mannheimer, Die Lyrik des Andreas Gryphius (1904).

GUACHARO (said to be an obsolete Spanish word signifying one that cries, moans or laments loudly), the Spanish-American name of what English writers call the oil-bird, the Steatornis caripensis of ornithologists, a very remarkable bird, first described by Alexander von Humboldt (Voy. aux reg. iquinoxiales i. 413, Eng. trans, iii. 119; Obs. Zoologie ii. 141, pi. xliv.) from his own observation and from examples obtained by Aime J. A. Bonpland, on the visit of those two travellers, in September 1799, to a cave near Caripe (at that time a monastery of Aragonese Capuchins) some forty miles S.E. of Cumana. on the northern coast of South America. A few years later it was discovered, says Latham (Gen. Hist. Birds, 1823, vii. 365), to inhabit Trinidad, where it appears to bear the name of Dia- blotin; 1 but by the receipt of specimens procured at.Sarayacu in Peru, Cajamarca in the Peruvian Andes, and Antioquia in Colombia (Proc. Zool. Society, 1878, pp. 139, 140; 1879, p. 532), its range has been shown to be much greater than had been supposed. The singularity of its structure, its curious habits, and its peculiar economical value have naturally attracted no little attention from zoologists. First referring it to the genus Caprimulgus, its original describer soon saw that it was no true goatsucker. It was subsequently separated as forming a sub- family, and has at last been regarded as the type of a distinct family, Sleatomithidae — a view which, though not put forth till 1870 (Zool. Record, vi. 67), seems now to be generally deemed correct. Its systematic position, however, can scarcely be considered settled, for though on the whole its predominating alliance may be with the Caprimulgidae, nearly as much affinity may be traced to the Strigidae, while it possesses some characters in which it differs from both (Proc. Zool. Society, 1873, pp. 5 2 6-S3 5)- About as big as a crow, its plumage exhibits the blended tints of chocolate-colour and grey, barred and pencilled with dark-brown or black, and spotted in places with white, that prevail in the two families just named. The beak is hard, strong and deeply notched, the nostrils are prominent, and the gape is furnished with twelve long hairs on each side. The legs and toes are comparatively feeble, but the wings are large. In habits the guacharo is wholly nocturnal, slumbering by day in deep and dark caverns which it frequents in vast numbers. Towards evening it arouses itself, and, with croaking and

1 Not to be confounded with the bird so called in the French Antilles, which is a petrel (Oestrelata).

clattering which has been likened to that of castanets, it

approaches the exit of its retreat, whence at nightfall it issues

in search of its food, which, so far as is known, consists entirely of oily nuts or fruits, belonging especially to the genera Achras, Aiphanas, Laurus and Psickotria, some of them sought, it would seem, at a very great distance, for Funck(-Bw//. Acad. Sc. Bruxelles xi. pt. 2, pp. 371-377) states that in the stomach of one he obtained at Caripe he found the seed of a tree which he believed did not grow nearer than 80 leagues. The haid, indigestible seed swallowed by the guacharo are found in quantities on the floor and the ledges of the caverns it frequents, where many of them for a time vegetate, the plants thus growing being etiolated from want of light, and, according to travellers, forming a singular feature of the gloomy scene which these places present. The guacharo is said to build a bowl-like nest of clay, in which it lays from two to four white eggs, with a smooth but lustreless surface, resembling those of some owls. The young soon after they are hatched become a perfect mass of fat, and while yet in the nest are sought by the Indians, who at Caripe, and perhaps elsewhere, make a special business of taking them and extracting the oil they contain. This is done about midsummer, when by the aid of torches and long poles many thousands of the young birds are slaughtered, while their parents in alarm and rage hover over the destroyers' heads, uttering harsh and deafening cries. The grease is melted over fires kindled at the cavern's mouth, run into earthen pots, and preserved for use

in cooking as well as for the lighting of lamps. It is said to be pure and limpid, free from any disagreeable taste or smell, and capable of being kept for a year without turning rancid. In Trinidad the young are esteemed s great delicacy for the table by many, though some persons object to their peculiar scent, which resembles that of a cockroach (Blatta), and consequently refuse to eat them. The old birds also, according to E. C. Taylor (Ibis, 1864, p. 90), have a strong crow-like odour. But one species of the genus Steatornis is known.

In addition to the works above quoted valuable information about this curious bird may be found under the following references: L'Herminier, Ann. Sc. Nat. (1836), p. 60, and Nouv. Ann. Mus. (1838), p. 321; Hautessier, Rev. Zool. (1838), p. 164; J. Muller, Monatsb. Berl. Acad. (1841), p. 172, and Archiv fur Anat. (1862), pp. 1-11; des Murs, Rev. zool. (1843), p. 32, and Ool. Orn. pp. 260- 263; Blanchard, Ann. Mus. (1859), xi. pi. 4, fig. 30; Konig-Wart- hausen, Journ. fur Orn. (1868), pp. 384-387; Goering, Vargasia (1869), pp. 124-128; Murie, Ibis (1873), pp. 81-86. (A. N.)

GUACO, Huaco or Guao, also Vejuco and Bejuco, terms applied to various Central and South American and West Indian plants, in repute for curative virtues. The Indians and negroes of Colombia believe the plants known to them as guaco to have been so named after a species of kite, thus designated in imitation of its cry, which they say attracts to it the snakes that serve it principally for food; they further hold the tradition that their antidotal qualities were discovered through the observation that the bird eats of their leaves, and even spreads the juice of the same on its wings, during contests with its prey. The disputes that have arisen as to what is " the true guaco " are to be attributed mainly to the fact that the names of the American Indians for all natural objects are generic, and their genera not always in coincidence with those of naturalists. Thus any twining plant with a heart-shaped leaf, white and green above and purple beneath, is called by them guaco (R. Spruce, in Howard's Neueva Quinologia, " Cinchona succirubra," p. 22, note). What is most commohly recognized in Colombia as guaco, or Vejuco del guaco, would appear to be Mikania Guaco (Humboldt and Bonpland, PI. equinox, ii. 84, pi. 105, 1809), a climbing Composite plant of the tribe Eupatoriaceae, affecting moist and

shady situations, and having a much-branched and deep-growing root, variegated, serrate, opposite leaves and dull- white flowers, in axillary clusters. The whole plant emits a disagreeable odour. It is stated that the Indians of Central America, after having " guaconized " themselves, i.e. taken guaco, catch with impunity the most dangerous snakes, which writhe in their hands as though touched by a-hot iron (B. Seemann, Hooker's Journ. of Bot. v. 76, 1853). The odour alone of guaco

has been said to cause in snakes a state of stupor and torpidity; and Humboldt, who observed that the near approach of a rod steeped in guaco-juice was obnoxious to the venomous Coluber corallinus, was of opinion that inoculation with it imparts to the perspiration an odour which makes reptiles unwilling to bite. The drug is not used in modern therapeutics.

GUADALAJARA, an inland city of Mexico and capital of the state of Jalisco, 275 m. (direct) W.N.W. of the Federal capital, in lat. 20 41′ 10″ N., long. 103 21′ 15″ W. Pop. (1895) 83,934; (1900) 101,208. Guadalajara is served by a short branch of the Mexican Central railway from Irapuato. The city is in the Antemarac valley near the Rio Grande de Santiago, 5092 ft. above sea-level. Its climate is dry, mild and healthy, though subject to sudden changes. The city is well built, with straight and well-paved streets, numerous plazas, public gardens and shady promenades. Its public services include tramways and electric lighting, the Juanacatlan falls of the Rio Grande near the city furnishing the electric power. Guadalajara is an episcopal see, and its cathedral, built between 1571 and 1618, is one of the largest and most elaborately decorated churches in Mexico. The government palace, which like the cathedral faces upon the plaza mayor, is generally considered one of the finest specimens of Spanish architecture in Mexico. Other important edifices and institutions are the university, with its schools of law and medicine, the mint, built in 181 1, the modern national college and high schools, a public library of over 28,000 volumes, an episcopal seminary, an academy of fine arts, the Teatro Degollado, and the large modern granite building of the penitentiary. There are many interesting churches and eleven conventual establishments in the city. Charitable institutions of a high character are also prominent, among which are the Hospicio, which includes an asylum for the aged, infirm, blind, deaf and dumb, foundlings and orphans, a primary school for both sexes, and a girls' training school, and the Hospital' de San Miguel de Belen, which is a hospital, an insane asylum, and a school for little children. One of the most popular public resorts of the city is the Paseo, a beautiful drive and promenade extending along both

banks of the Rio San Juan de Dios for ij m. and terminating in the alameda, or public garden. The city has a good water-supply, derived from springs and brought in through an aqueduct 8 m. long. Guadalajara is surrounded by a fertile agricultural district and is an important commercial town, but the city is chiefly distinguished as the centre of the iron, steel and glass industries of Mexico. It is also widely known for the artistic pottery manufactured by the Indians of the city and of its suburb, San Pedro. Among other prominent industries are the manufacture of cotton and woollen goods, leather, furniture, hats and sweetmeats. Guadalajara was founded in 1531 by Nufio de Guzman, and became the seat of a bishop in 1549. The Calderon bridge near the city was the scene of a serious defeat of the revolutionists under Hidalgo in January 1811. The severe earthquake of the 31st of May 1818 partially destroyed the two cathedral steeples; and that of the nth of March 1875 damaged many of the larger buildings. The population includes large Indian and mestizo elements.

GUADALAJARA, a province of central Spain, formed in 1833 of districts taken from New Castile; bounded on the N. by Segovia, Soria and Saragossa, E. by Saragossa and Teruel, S. by Cuenca and W. by Madrid. Pop. (1900) 200,186; area, 4676 sq. m. Along the northern frontier of Guadalajara rise the lofty Guadarrama mountains, culminating in the peaks of La Cebollera (6955 ft.) and Ocejon (6775 ft.); the rest of the province, apart from several lower ranges in the east, belongs to the elevated plateau of New Castile, and has a level or slightly undulating surface, which forms the upper basin of the river Tagus, and is watered by its tributaries the Tajufia, Henares, Jarama and Gallo. The climate of this region, as of Castile generally, is marked by the extreme severity of its winter cold and summer heat; the soil varies very much in quality, but is fertile enough in many districts, notably the cornlands of the Alcarria, towards the south. Few of the cork and oak forests which formerly covered the mountains have escaped destruction;

and the higher tracts of land are mainly pasture for the sheep and goats which form the principal wealth of the peasantry. Grain, olive oil, wine, saffron, silk and flax are produced, but agriculture makes little progress, owing to defective com- munications and unscientific farming. In 1903, the only minerals worked were common salt and silver, and the total output of the mines was valued at £25,000. Deposits of iron, lead and gold also exist and were worked by the Romans; but their exploitation proved unprofitable when renewed in the 19th century. Trade is stagnant and the local industries are those common to almost all Spanish towns and villages, such as the manufacture of coarse cloth and pottery. The Madrid- Saragossa railway traverses the province for 70 m.; tjie roads are ill-kept and insufficient. Guadalajara (1 1,144) is the capital, and the only town with more than 5000 inhabitants; Molina de Aragon, a fortified town built at

the foot of the Parameras de Molina (2500-3500 ft.), and on the right bank of the Gallo, a tributary of the Tagus, is of some importance as an agricultural centre. Siguenza, on the railway, is an episcopal city, with a fine Romanesque cathedral dating from the nth century. It is probably the ancient Segontia, founded in 218 B.C. by refugees from Saguntum. The population of the province, which numbers only 42 per sq. m., decreased slightly between 1870 and 1900, and extreme poverty compels many families to emigrate (see also Castile).

GUADALAJARA, the capital of the Spanish province of Guadalajara, on the left bank of the river Henares, and on the Madrid-Saragossa railway, 35 m. E.N.E. of Madrid. Pop. (1900) 11,144. Guadalajara is a picturesque town, occupying a somewhat sterile plain, 2100 ft. above the sea. A Roman aqueduct and the Roman foundations of the bridge built in 1758 across the Henares bear witness to its antiquity. Under Roman and Visigothic rule it was known as Arriaca or Caraca; its present name, which sometimes appears in medieval chronicles as Godelfare, represents the Wad-al-hajarah, or " Valley of Stones," of the Moors, who occupied the town from 714 until 1081, when it was captured by Alvar Yafiez de Minaya, a comrade of the more famous Cid. The church of Santa Maria contains the image of the " Virgin of Battles," which accompanied Alphonso VI. of Castile (1072-1109) on his campaigns against the Moors; and there are several other ancient and interesting churches in Guadalajara, besides two palaces, dating from the 15th century, and built with that blend of Christian and Moorish architecture which Spaniards call the Mudejar style. The more important of these is the palace of the ducal house del Infantado, formerly owned by the Mendoza family, whose panteon, or mausoleum, added between 1696 and 1720 to the 13th-century church of San Francisco, is remarkable for the rich sculpture of its tombs. The town and provincial halls date from 1585, and the college of engineers was originally built by Philip V., early in the 18th century, as a cloth factory. Manufactures of soap, leather, woollen fabrics and bricks have superseded the original cloth-weaving industry for which Guadalajara was long celebrated; there is also a considerable trade in agricultural produce.

GUADALQUIVIR (ancient Baetis, Moorish Wadi al Kebir, "the Great River "), a river of southern Spain. What is regarded as the main stream rises 4475 ft. above sea-level between the Sierra de Cazorla and Sierra del Pozo, in the province of Jaen. It does not become a large river until it is joined by the Guadiana Menor (Guadianamenor) on the left, and the Guadalimar on the right. Lower down it receives many tributaries, the chief being the Genii or Jenil, from the left. The general direction of the river is west by south, but a few miles above Seville it changes to south by west. Below Coria it traverses the series of broad fens known as Las Marismas, the greatest area

of swamp in the Iberian Peninsula. Here it forms two subsidiary channels, the western 31 M., the eastern 12 m. long, which rejoin the main stream on the borders of the province of Cadiz. Below Sanlucar the river enters the Atlantic after a total course of 360 m. It drains an area of 21,865 sq. m. Though the shortest of the great rivers of the peninsula, it is the only one which flows at all seasons

with a full stream, being fed in winter by the rains, in summer by the melted snows of the Sierra Nevada. In the time of the Moors it was navigable up to Cordova, but owing to the accumulation of silt in its lower reaches it is now only navigable up to Seville by vessels of 1 200 to 1 500 tons.

GUADELOUPE, a French colony in the West Indies, lying between the British islands of Montserrat on theN., and Dominica on the S., between 15° 59′ and 16 20′ N. and 6i° 31′ and 6i° 50′ W. It consists of two entirely distinct islands, separated by a narrow arm of the sea, Riviere Salee (Salt river), varying from 100 ft. to 400 ft. in width and navigable for small vessels. The western island, a rugged mass of ridges, peaks and lofty uplands, is called Basse-Terre, while the eastern and smaller island, the real low-land, is known as Grande-Terre. A sinuous ridge runs through Basse-Terre from N. to S. In the north-west rises the peak of Grosse Montagne (23 70 ft.) , from which sharp spurs radiate in all directions; near the middle of the west coast are the twin heights of Les Mamelles (2536 ft. and 2368 ft.). Farther south the highest elevation is attained in La Soufriere (4900 ft.). In 1797 this volcano was active, and in 1843 its convulsions laid several towns in ruins; but a few thermal springs and solfataras emitting vapour are now its only signs of activity. The range terminates in the extreme south in the jagged peak of Caraibe (2300 ft.). Basse-Terre is supremely beautiful, its cloud-capped mountains being clothed with a mantle of luxuriant vegetation. On Grande-Terre the highest elevation is only 450 ft., and this island is the seat of extensive sugar plantations. It consists of a plain composed mainly of limestone and a conglomerate of sand and broken shells known as maconne de bon dieu, much used for building. The bay between the two sections of Guadeloupe on the north is called Grand Cul-de-Sac Marin, that on the south being Petit Cul-de-Sac Marin. Basse-Terre (364 sq. m.) is 28 m. long by 12 m. to 15 m.‘wide; Grande-Terre (255 sq. m.) is 22 m. long from N. to S., of irregular shape, with a long peninsula, Chateaux Point, stretching from the south-eastern extremity. Basse-Terre is watered by a considerable number of streams, most of which in the rainy season are liable to sudden floods

(locally called gallons), but Grande-Terre is practically destitute of springs, and the water-supply is derived almost entirely from ponds and cisterns.

The west half of the island consists of a foundation of old eruptive rocks upon which rest the recent accumulations of the great volcanic cones, together with mechanical deposits derived from the denudation of the older rocks. Grande-Terre on the other hand, consists chiefly of nearly horizontal limestones lying conformably upon a series of fine tuffs and ashes, the whole belonging to the early part of the Tertiary system (probably Eocene and Oligocene) . Occasional deposits of marl and limestone of late Pliocene age rest unconformably upon these older beds; and near the coast there are raised coral reefs of modern date.

The mean annual temperature is 78 F., and the minimum 6i° F., and the maximum 101 F. From July to November heavy rains fall, the annual average on the coast being 86 in., while in the interior it is much greater. Guadeloupe is subject to terrible storms. In 1825 a hurricane destroyed the town of Basse-Terre, and Grand Bourg in Marie Galante suffered a like fate in 1865. The soil is rich and fruitful, sugar having long been its staple product. The other crops include cereals, cocoa, cotton, manioc, yams and rubber; tobacco, vanilla, coffee and bananas are grown, but in smaller quantities. Over 30% of the total area is under cultivation, and of this more than 50% is under sugar. The centres of this industry are St Anne, Pointe-a- Pitre and Le Moule, where there are well-equipped usines, and there is also a large usine at Basse-Terre. The forests, confined to the island of Basse-Terre, are extensive and rich in valuable woods, but, being difficult of access, are not worked. Salt and sulphur are the only minerals extracted, and in addition to the sugar usines, there are factories for the making of rum, liqueurs, chocolate, besides fruit-canning works and tanneries. France takes most of the exports; and next to France, the United States, Great Britain and India are the countries most interested in the import trade.

The inhabitants of Guadeloupe consist of a few white officials and planters, a few East Indian immigrants from the French possessions in India, and the rest negroes and mulattoes. These mulattoes are famous for their grace and beauty of both form and feature. The women greatly outnumber the men, and there is a very large percentage of illegitimate births. Pop. (1900)

182,112.

The governor is assisted by a privy council, a director of the interior, a procurator-general and a paymaster, and there is also an elected legislative council of 30 members. The colony forms a department of France and is represented in the French parliament by a senator and two deputies.

Political elections are very eagerly contested, the mulatto element always striving to gain the preponderance of power.

The seat of government, of the Apostolic administration and of the court of appeal is at Basse-Terre (7762), which is situated on the south-west coast of the island of that name. It is a picturesque, healthy town standing on an open roadstead. Pointe-a-Pitre (17,242), the largest town, lies in Grande-Terre near the mouth of the Riviere Salee. Its excellent harbour has made it the chief port and commercial capital of the colony. Le Moule (10,378) on the east coast of Grande-Terre does a considerable export trade in sugar, despite its poor harbour. Of the other towns, St Anne (9497), Morne a l'Eau (8442), Petit Canal (6748), St Francois (5265), Petit Bourg (5110) and Trois Rivieres (5016), are the most important.

Round Guadeloupe are grduped its dependencies, namely, La Desirade, 6 m. E., a narrow rugged island 10 sq. m. in area; Marie Galante 16 m. S.E. Les Saintes, a group of seven small islands, 7 m. S., one of the strategic points of the Antilles, with a magnificent and strongly fortified naval harbour; St Martin, 142 m. N.N.W.; and St Bartholomew, 130 m. N.N.W.

History. — Guadeloupe was discovered by Columbus in 1493, and received its name in honour of the monastery of S. Maria de Guadalupe at Estremadura in Spain. In 1635 l'Olive and Duplessis took possession of it in the name of the French Company of the Islands of America, and l'Olive exterminated the Caribs with great cruelty. Four chartered companies were ruined in their attempts to colonize the island, and in 1674 it passed into the possession of the French crown and long remained a dependency of Martinique. After unsuccessful attempts in 1666, 1691 and 1703, the British captured the island in 1759, and held it for four years. Guadeloupe was finally separated from Martinique in 1775, but it remained under the governor of the French Windward Islands. In 1782 Rodney defeated the French fleet near the island, and the British again obtained possession in April 1794, but in the following summer they were driven out by Victor Hugues with the assistance of the slaves whom he had liberated for the purpose. In 1802 Bonaparte, then first consul, sent an expedition to the island in order to re-establish slavery, but, after a heroic defence, many of the negroes preferred suicide to submission. During the Hundred Days in 1810, the British once more occupied the island, but, in spite of its cession to Sweden by the treaty of 1813 and a French invasion in 1814, they did not withdraw till 1816. Between 1816 and 1825 the cede of laws peculiar to the island was introduced. Municipal institutions were established in 1837; and slavery was finally abolished in 1848.

GUADET, MARGUERITE ELIE (1750-1794); French Revolu- tionist, was born at St Emilion near Bordeaux on the 2cth of July 1758. When the

Revolution broke out he had already gained a reputation as a brilliant advocate at Bordeaux. In 1790 he was made administrator of the Gironde and in 1791 president of the criminal tribunal. In this year he was elected to the Legislative Assembly as one of the brilliant group of deputies known subsequently as Girondins or Girondists. As a supporter of the constitution of 1791 he joined the Jacobin club, and here and in the Assembly became an eloquent advocate of all the measures directed against real or supposed traitors to the constitution. He bitterly attacked the ministers of Louis XVI., and was largely instrumental in forcing the king to accept the Girondist ministry of the 15th of March 1792. He was

an ardent advocate of the policy of forcing Louis XVI. into harmony with the Revolution; moved (May 3) for the dismissal of the king's non-juring confessor, for the banishment of all non-juring priests (May 16), for the disbandment of the royal guard (May 30), and the formation in Paris of a camp of federes (June 4). He remained a royalist, however, and with Gensonne and Vergniaud even addressed a letter to the king soliciting a private interview. Whatever negotiations may have resulted, however, were cut short by the insurrection of the 10th of August. Guadet, who presided over the Assembly during part of this fateful day, put himself into vigorous opposition to the insurrectionary Commune of Paris, and it was on his motion that on the 30th of August the Assembly voted its dissolution — a decision reversed on the following day. In September Guadet was returned by a large majority as deputy to the Convention. At the trial of Louis XVI. he voted for an appeal to the people and for the death sentence, but with a respite pending appeal. In March 1793 he had several conferences with Danton, who was anxious to bring about a rapprochement between the Girondists and the Mountain during the war in La Vendee, but he unconditionally refused to join hands with the man whom he held responsible for the massacres of September. Involved in the fall of the Girondists, and his arrest being decreed on the 2nd of June 1703, he fled to Caen, and afterwards hid in his father's house at St fimilion. He was discovered and taken to Bordeaux, where, after his identity had been established, he was guillotined on the 17th of June 1794.

See J. Guadet, Les Girondins (Paris, 1889); and F. A. Aulard, Les Orateurs de la legislative et de la convention (Paris, 2nd ed., 1906).

GUADIANA (anc. Anas, Moorish Wadi Ana), a river of Spain and Portugal. The Guadiana was long believed to rise in the lowland known as the Campo de Montiel, where a chain of small lakes, the Lagunas de

Ruidera (partly in Ciudad Real, partly in Albacete), are linked together by the Guadiana Alto or Upper Guadiana. This stream flows north-westward from the last lake and vanishes underground within 3 m. of the river Zancara or Giguela. About 22 m. S.W. of the point of disappearance, the Guadiana Alto was believed to re-emerge in the form of several large springs, which form numerous lakes near the Zancara and are known as the " eyes of the Guadiana " (los ojos de Guadiana) . The stream which connects them with the Zancara is called the Guadiana Bajo or Lower Guadiana. It is now known that the Guadiana Alto has no such course, but flows underground to the Zancara itself, which is the true " Upper Guadiana." The Zancara rises near the source of the Jucar, in the east of the tableland of La Mancha; thence it flows westward, assuming the name of Guadiana near Ciudad Real, and reaching the Portuguese frontier 6 m. S.W. of Badajoz. In piercing the Sierra Morena it forms a series of foaming rapids, and only begins to be navigable at Mertola, 42 m. from its mouth. From the • neighbourhood of Badajoz it forms the boundary between Spain and Portugal as far as a point near Monsaraz, where it receives the small river Priega Munoz on the left, and passes into Portuguese territory, with a southerly direction. At Pomarao it again becomes a frontier stream and forms a broad estuary 25 m. long. It enters the Gulf of Cadiz between the Portuguese town of Villa Real de Santo Antonio and the Spanish Ayamonte, after a total course of 510 m. Its mouth is divided by sandbanks into many channels. The Guadiana drains an area of 31,940 sq. m. Its principal tributaries are the Zujar, Jabalon, Matachel and Ardila from the left; the Bullaque, Ruecas, Botoa, Degebe and Cobres from the right.

The Guadiana Menor (or Guadianamenor , i.e. "Lesser Guadiana") rises in the Sierra Nevada, receives two large tributaries, the Fardes from the right and Barbata from the left, and enters the Guadalquivir near Ubeda, after a course of 95 m.

6UADIX, a city of southern Spain, in the province of Granada; on the left bank of the river Guadix, a subtributary of the Guadiana Menor, and on the Madrid- Valdepenas-Almeria railway. Pop. (1900) 12,652. Guadix occupies part of an elevated plateau among the northern foothills of the Sierra Nevada. It is sur- rounded by ancient walls, and was formerly dominated by a

Moorish castle, now in ruins. It is an episcopal see of great antiquity, but its cathedral, built in the 18th century on the site of a mosque, possesses little architectural merit. The city was once famous for its cutlery; but its modern manufactures (chiefly earthenware, hempen goods, and hats) are inconsiderable. It has some trade in wool, cotton, flax, corn and liqueurs. The warm mineral springs of Graena, much frequented during the summer,

are 6 m. W. Guadix el Viejo, 5 m. N.W., was the Roman Acci, and, according to tradition, the seat of the first Iberian bishopric, in the 2nd century. After 7 1 1 it rose to some importance as a Moorish fortress and trading station, and was renamed Wad Ash, " Water of Life." It was surrendered without a siege to the Spaniards, under Ferdinand and Isabella, in 1489.

GUADUAS, a town of the department of Cundinamarca, Colombia, 53 m. N.W. of Bogota on the old road between that city and the Magdalena river port of Honda. Pop. (1900, estimate) 9000, chiefly Indians or of mixed blood. It stands in a narrow and picturesque valley formed by spurs of the Eastern Cordillera, and on a small stream bearing the same name, which is that of the South American bamboo (guaduas), found in great abundance along its banks. Sugar-cane and coffee are cultivated in the vicinity, and fruits of various kinds are produced in great abundance. The elevation of the town is 3353 ft. above the sea, and it has a remarkably uniform temperature throughout the whole year. Guaduas has a pretty church facing upon its plaza, and an old monastery now used for secular purposes. The importance of the town sprang from its position on the old camino real between Bogota and Honda, an importance that has passed away with -the completion of the railway from Girardot to the Bogota plateau. Guaduas was founded in 1614.

GUAIACUM, a genus of trees of the natural order Zygo- phyllaceae. The guaiacum or lignum-vitae tree (Ger. Guajak- baum, Franzosenbaum, Pockenholzbaum; Fr. Gayac, Ga'iac), G. officinale, is a native of the West Indies and the north coast of South America, where it attains a height of 20 to 30 ft. Its branches are numerous, flexuous and knotted; the leaves opposite and pinnate, with caducous (falling early) stipules, and entire, glabrous, obovate or oval leaflets, arranged in 2 or, more rarely, 3 pairs; the flowers are in axillary clusters (cymes), and have 5 oval pubescent sepals, 5 distinct pale-blue petals three times the length of the sepals, 10 stamens, and a 2-celled superior ovary. The fruit is about £ in. long, with a leathery pericarp, and contains in each of its two cells a single seed (see fig.). G. sanctum grows in the Bahamas and Cuba, and at Key West in Florida. It is distinguished from G. officinale by its smaller and narrow leaflets, which are in 4 to 5 pairs, by its shorter and glabrous sepals, and 5-celled and 5-winged fruit. G. arboreunt, the guaiacum tree of Colombia, is found in the valley of the Magdalena up to altitudes 800 metres (2625 ft.) above sea-level, and reaches considerable dimensions. Its wood is of a yellow colour merging into green, and has an almost pulverulent fracture; the flowers are yellow and conspicuous; and the fruit is dry and 4-winged.

The lignum vitae of commerce, so named on account of its high repute as a medicinal agent in past times, when also it was known as lignum sanctum

and lignum Indicum, lignum guaycanum, or simply guayacan, is procured from G. officinale, and in smaller amount from G. sanctum. It is exported in large logs or blocks, generally divested of bark, and presents in transverse section very slightly marked concentric rings of growth, and scarcely any traces of pith; with the aid of a magnifying glass the medullary rays are seen to be equidistant and very numerous. The outer wood, the sapwood or alburnum, is of a pale yellow hue, and devoid of resin: the inner, the heartwood or duramen, which is by far the larger proportion, is of a dark greenish-brown, contains in its pores 26% of resin, and has a specific gravity of i'333, and therefore sinks in water on which the alburnum floats. Owing to the diagonal and oblique arrangement of the successive layers of its fibres, the wood cannot be split; and on account of its hardness, density and durability it is much valued for the manufacture of ships' pulleys, rulers, skittle-balls, mallets and other articles.

Chips or turnings of the heartwood of G. officinale (guaiaci lignum) are employed in the preparation of the liquor sarsae composiius concentratus of British pharmacy. They may be recognized by being either yellow of greenish-brown in colour, and by turning bluish-green when treated with nitric acid, or when heated with corrosive sublimate, and green with solution

From Bentley & Trimen's Medicinal Plants, by permission of J. & A. Churchill.

Guaiacum or Lignum Vitae, Guaiacum officinale shoot-bearing leaves and flowers. 1, Fruit; 2, Vertical section of fruit, showing the solitary pendulous seed in each chamber. All- about \ natural size.

of chloride of lime. They are occasionally adulterated with boxwood shavings. Lignum vitae is imported chiefly from St Domingo, the Bahamas and Jamaica.

The bark was formerly used in medicine; it contains much calcium oxalate, and yields on incineration 23 % of ash. Guaiacum resin, the guaiaci resina of pharmacopoeias, is obtained from the wood as an exudation from natural fissures or from incisions; by heating billets about 3 ft. in length, bored to permit of the outflow of the resin; or by boiling chips and raspings in water to which salt has been added to raise the temperature of ebullition. It occurs in rounded or oval tears, commonly coated with a greyish- green dust, and supposed to be the produce of G. sanctum, or in large brownish

or greenish-brown masses, translucent at the edges; fuses at 85 ° C. ; is brittle, and has a vitreous fracture, and a slightly balsamic odour, increased by pulverization and by heat; and is at first tasteless when chewed, but produces subsequently a sense of heat in the throat. It is readily soluble in alcohol, ether, chloroform, creosote, oil of cloves and solutions of caustic alkalies; and its solution gives a blue colour with gluten, raw potato parings and the roots of horse-radish, carrot and various other plants. The alcoholic tincture becomes green with sodium hypochlorite, and with nitric acid turns in succession green, blue and brown. With glycerin it gives a clear solution, and with nitrous ether a bluish-green gelatinous mass. It is blued by various oxidizing agents, e.g. ozone, and, as Schonbein discovered, by the juice of certain fungi. The chief constituents are three distinct resins, guaiaconic acid, G9H20O5 (70%), guaiac acid, which is closely allied to benzoic acid, and guaiaretic acid. Like all resins, these are insoluble in water, soluble in alkalies, but precipitated on neutralization of the alkaline solution. Guaiacum wood was first introduced into Europe by the Spaniards in 1508, and Nicolaus Poll, writing in 1517 (see Luisinus, De morbo gallico, p. 210, Ven., 1566), states that some three thousand persons in Spain had already been restored to health by it. The virtues of the resin, however, were not known until a later period, and in Thomas Paynel's translation {Of the Wood called Guaiacum, &c, p. 9, ed. of 1540) of Ulrich von Hutten's treatise De morbi gallici curatione per administrationem ligni guaiaci (15 19) we read of the wood: " There foloweth fro it, whan it bourneth a gomme, which we yet knowe not, for what pourpose it serueth." Fliickiger and Hanbury {Pharmacographia, p. 95) state that the first edition of the London Pharmacopoeia in which they find the resin mentioned is that of 1677. The decoction of the wood was administered in gout, the stone, palsy, leprosy, dropsy, epilepsy, and other diseases, but principally in the " morbus gallicus," or syphilis, for which it was reckoned a certain specific, insomuch that at first " the physi- tions wolde not allowe it, perceyuynge that theyr profite wolde decay therby " (Paynel, op. cit. p. 8). Minute instructions are given in old works as to the mode of administering guaiacum. The patient was confined in a closed and heated chamber, was placed on the lowest possible diet, and, after liberal purgation, was made twice a day to drink a milk- warm decoction of the wood. The

use of salt was specially to be avoided. A decoction of 1 lb of guaiacum was held to be sufficient for the four first days of the treatment. The earlier opinions as to the efficacy of guaiacum came to be much modified in the course of time, and Dr Pearson {Observations on the Effects of Various Articles of the Mat. Med. in the Cure of Lues Venerea, c. i., 2nd ed., 1807) says: — " I never saw one single instance in which the powers of this medicine eradi- cated the venereal virus." He found its beneficial effects to

be most marked in cases of secondary symptoms. Guaiacum resin is given medicinally in doses of 5-15 grains. Its important preparations in the British Pharmacopoeia are the mistura guiaci (dose i-l oz.), the ammoniated tincture of guaiacum (dose J-i drachm), in which the resin is dissolved by means of ammonia, and the trochiscus or lozenge, containing 3 grains of the resin. This lozenge is un- doubtedly of value when given early in cases of sore throat, especially of rheumatic origin. Powdered guaiacum is also used.

Guaiacum resin differs pharmacologically from other resins in being less irritant, so that it is absorbed from the bowel and exerts remote stimulant actions, notably upon the skin and kidneys. It affects the bronchi but slightly, since it contains no volatile oil.

The drug is useful both in acute and chronic sore throat, the mixture, according to Sir Lauder Brunton, being more effective than the tincture. The aperient action, which it exerts less markedly than other members of its class, renders it useful in the treatment of chronic constipation. Sir Alfred Garrod has urged the claims of this drug in the treatment of chronic gout. Both in this disease and in other forms of chronic arthritis guaiacum may be given in com- bination with iodides, which it often enables the patient to tolerate. Guaiacum is not now used in the treatment of syphilis.

The tincture of guaiacum is universally used as a test for the presence of blood, or rather of haemoglobin, the red colouring matter of the blood, in urine or other secretions. This test was first sug- gested by Dr John Day of Geelong, Australia. A single drop of the tincture should be added to, say, an inch of urine in a test-tube. The resin is at once precipitated, yielding a milky fluid. If " ozonic ether " — an ethereal solution of hydrogen peroxide — be now poured gently into the test-tube, a deep blue coloration is produced along the line of contact if haemoglobin be present. The reaction is due to the oxidation of the resin by the peroxide of hydrogen — such oxidation occurring only if haemoglobin be present to act as an oxygen-carrier.

GUALDO TADINO (anc. Tadinum, 1 m. to the W.), a town and episcopal see of Umbria, Italy, 1755 ft. above sea-level, in the province of Perugia, 22 m. N. of Foligno by rail. Pop. (1901), town, 4440; commune, 10,756. The suffix Tadino distinguishes it from Gualdo in the province of Macerata, and Gualdo Cattaneo, S.W. of Foligno. The cathedral has a good rose-window and possesses, like several of the other churches, 15th-century paintings by Umbrian artists, especially works by Niccolo Alunno. The town is still surrounded by walls. The ancient Tadinum lay 1 m. to the W. of the modern town. It is mentioned in the Eugubine tablets (see Iguvium) as a hostile city against which imprecations are directed. In its

neighbourhood Narses defeated and slew Totila in 552. No ruins are now visible, though they seem to have been extant in the 17 th century. The new town seems to have been founded in 1237. It was at first independent, but passed under Perugia in 1292, and later became dependent on the duchy of Spoleto.

GUALEGUAY, a flourishing town and river port of the province of Entre Rios, Argentine Republic, on the Gualeguay river, 32 in. above its confluence with the Ibicuy branch of the Parana, and about 120 m. N.N.W. of Buenos Aires. Pop. (1895) 7810. The Gualeguay is the largest of the Entre Rios rivers, traversing almost the whole length of the province from N. to S., but it is of but slight service in the transportation of produce except the few miles below Gualeguay, whose port, known as Puerto Ruiz, is 7 m. lower down stream. A steam tramway connects the town and port, and a branch line connects with Entre Rios railways at the station of Tala. The principal industry in this region is that of stock-raising, and there is a large exportation of cattle, jerked beef, hides, tallow, mutton, wool and sheep-skins. Wood and charcoal are also exported to Buenos Aires. The town was founded in 1783.

GUALEGUAYCHft, a prosperous commercial and industrial town and port of the province of Entre Rios, Argentine Republic, on the left bank of the Gualeguaychu river, n m. above its confluence with the Uruguay, and 120 m. N. of Buenos Aires. Pop. (1892, est.) 14,000. It is the chief town of a department of the same name, the largest in the province. A bar at the mouth of the river prevents the entrance of larger vessels and

compels the transfer of cargoes to and from lighters. The town is surrounded by a rich grazing country, and exports cattle, jerked beef, mutton, hides, pelts, tallow, wool and various by-products. A branch line running N. connects with the Entre Rios railways at Basavilbaso. The town was founded in

1783.

GUALO, CARDINAL (fl. 1216), was sent to England by Pope Innocent III. in 12 16. He supported John with all the weight of papal authority. After John's death he crowned the infant Henry III. and played an active part in organizing resistance to the rebels led by Louis of France, afterwards king Louis VIII. As representing the pope, the suzerain of Henry, he claimed the regency and actually divided the chief power with William Marshal, earl of

Pembroke. He proclaimed a crusade against Louis and the French, and, after the peace of Lambeth, he forced Louis to make a public and humiliating profession of penitence (12 1 7). He punished the rebellious clergy severely, and ruled the church with an absolute hand till his departure from England in 1 2 18. Gualo's character has been severely criticized by English writers; but his chief offence seems to have been that of repre- senting unpopular papal claims.

GUAM (Span. Guajan; Guahan, in the native Chamorro), the largest and most populous of the Ladrone or Mariana Islands, in the North Pacific, in 13 26′ N. lat. and 144 39′ E. long., about 1823 m. E. by S. of Hong Kong, and about 1450 m. E. of Manila. Pop. (1908) about n, 360, of whom 363 were foreigners, 140 being members of the U.S. naval force. Guam extends about 30 m. from N.N.E. to S.S.W., has an average width of about 65 m., and has an area of 207 sq. m. The N. portion is a plateau from 300 to 600 ft. above the sea, lowest in the interior and highest along the E. and W. coast, where it terminates abruptly in bluffs and headlands; Mt Santa Rosa, toward the N. extremity, has an elevation of 840 ft. A range of hills from 700 to nearly 1300 ft. in height traverses the S. portion from N. to S. a little W. of the middle — Mt Jumullong Mangloc, the highest peak, has an elevation of 1274 ft. Between the foot of the steep W. slope of these hills and the sea is a belt of rolling lowlands and to the E. the surface is broken by the valleys of five rivers with a number of tributaries, has a general slope toward the sea, and terminates in a coast-line of bluffs. Apra (formerly San Luis d'Apra) on the middle W. coast is the only good harbour; it is about 3! m. across, has a depth of 4-27 fathoms, and is divided into an inner and an outer harbour by a peninsula and an island. It serves as a naval station and as a port of transit between America and the Philippines, at which army transports call monthly. Deer, wild hog, duck, curlew, snipe and pigeon are abundant game, and several varieties of fish are caught. Some of the highest points of the island are nearly bare of vegeta- tion, and the more elevated plateau surface is covered with sword grass, but in the valleys and on the lower portions of the plateaus there is valuable timber. The lowlands have a rich soil ; in lower parts of the highlands raised corallif erous limestone with a light covering of soil appears, and in the higher part? the soil is entirely of clay and silt. The climate is agreeable and healthy. From December to June the N.E. trade winds prevail and the rainfall is relatively light; during the other six months the monsoon blows and produces the rainy season. Destructive typhoons and earthquakes sometimes visit Guam. The island is thought to possess little if any mineral wealth, with the possible exception of coal. Only a small part of Guam is under cultivation, and most of this lies along the S.W. coast, its chief products being cocoanuts, rice, sugar, coffee and cacao. A United States Agricultural Experiment Station in Guam (at

Agana) was provided for in 1908.

The inhabitants are of the Chamorro (Indonesian) stock, strongly intermixed with Philippine Tagals and Spaniards; their speech is a dialect of Malay, corrupted by Tagal and Spanish. There are very few full-blood Chamorros. The aboriginal native was of a very dark mahogany or chocolate colour. A majority of the total number of natives live in Agana. The natives are nearly all farmers, and most of them are poor, but their condition has been improved under American rule. Public

schools have been established; in 1908 the enrolment was 1700. On the island there is a small colony of lepers, segregated only after American occupation. Gangrosa is a disease said to be peculiar to Guam and the neighbouring islands; it is due to a specific bacillus and usually destroys the nasal septum. The victims of this disease also are segregated. There is a good general hospital.

Agana (or San Ignacio de Agana) is the capital and principal town; under the Spanish regime it was the capital of the Ladrones. It is about 5 m. N.E. of Piti, the landing-place of Apra harbour and port of entry, with which it is connected by an excellent road. Agafia has paved streets and sewer and water systems. Other villages, all small, are Asan, Piti, Sumay, Umata, Merizo and Inarajan. Guam is governed by a " naval governor," an officer of the U.S. navy who is commandant of the naval station. The island is divided into four administrative districts, each with an executive head called a gobernadorcillo (commissioner), and there are a court of appeals, a court of first instance and courts of justices of the peace. Peonage was abolished in the island by the United States in February 1900. Telegraphic communication with the Caroline Islands was established in 1905; in 1908 there were four cables ending at the relay station at Sumay on the Shore of Apra harbour.

Guam was discovered by Magellan in 1321, was occupied by Spain in 1688, was captured by the United States cruiser " Charleston " in June 1899, and was ceded to the United States by the Treaty of Paris on the 10th of December 1898.

See A List of Books (with References to Periodicals) on Samoa and Guam (1901 ; issued by the Library of Congress) ; L. M. Cox, " The Island of Guam," in Bulletin of the American Geographical Society, vol. 36 (New York, 1904) ; Gen. Joseph Wheeler, Report on the Island of Guam, June 1900 (War Department, Document No. 123); F. W. Christian, The Caroline Islands (London, 1899); an account of the flora of Guam by W. E. Safford in the publications of the National Herbarium (Smithsonian Institution) ; and the reports of the naval governor.

GUAN, a word apparently first introduced into trie ornitho— logist's vocabulary about 1743 by Edwards, 1 who said that a bird he figured (Nat. Hist. Uncommon Birds, pi. xiii.) was " so called in the West Indies," and the name has hence been generally applied to all the members of the subfamily Penelopinae, which are distinguished from the kindred subfamily Cracinae or curassows by the broad postacetabular area of the pelvis as pointed out by Huxley (Proc. Zool. Society, 1868, p. 297) as well as by their maxilla being wider than it is high, with its culmen depressed, the crown feathered, and the nostrils bare — the last two characters separating the Penelopinae from the Oreophasinae, which form the third subfamily of the Cracidae? a family belonging to that taxonomer's division Peristeropodes of the order Gallinae.

The Penelopinae have been separated into seven genera, of which Penelope and Ortalis, containing respectively about sixteen and nineteen species, are the largest, the others numbering from one to three only. Into their minute differences it would be useless to enter: nearly all have the throat bare of feathers, and from that of many of them hangs a wattle; but one form, Chamaepetes, has neither of these features, and Stegnolaema, though wattled, has the throat clothed. With few exceptions the guans are confined to the South- American continent; one species of Penelope is however found in Mexico (e.g. at Mazatlan), Pipile cumanensis inhabits Trinidad as well as the mainland, while three species of Ortalis occur in Mexico or Texas, and one, which is also common to Venezuela, in Tobago. Like curassows, guans are in great measure of arboreal habit. They also readily

1 Edwards also gives " quan " as an alternative spelling, and this may be nearer the original form, since we find Dampier in 1676 writing (Voy. ii. pt. 2, p. 66) of what was doubtless an allied if not the same bird as the " quam." The species represented by Edwards does not seem to have been identified.

2 See the excellent Synopsis by Sclater and Salvin in the Pro- ceedings of the Zoological Society for 1870 (pp. 504-544), while further information on the Cracinae was given by Sclater in the Transactions of the same society (ix. pp. 273-288, pis. xl.-liii.). Some additions have since been made to the knowledge of the family, but none of very great importance.

become tame, but all attempts to domesticate them in the full sense of the word have wholly failed, and the cases in which they have even been induced to breed and the young have been reared in confinement are very

few. Yet it would seem that guans and curassows will interbreed with poultry (Ibis, 1866, p. 24; Bull. Soc. Imp. d' Acclimatation, 1868, p. 559; 1869, P- 3S7)i and what is more extraordinary is that in Texas the hybrids between the chiacalacca {Ortalis vetula) and the domestic fowl are asserted to be far superior to ordinary game-cocks for fighting purposes. (A. N.)

GUANABACOA (an Indian name meaning " site of the waters "), a town of Cuba, in Havana province, about 6 m. E. of Havana. Pop. (1907) 14,368. Guanabacoa is served by railway to Havana, with which it is connected by the Regla ferry across the bay. It is picturesquely situated amid woods, on high hills which furnish a fine view. There are medicinal springs in the town, and deposits of liquid bitumen in the neighbouring hills. The town is essentially a residence suburb of the capital, and has some rather pretty streets and squares and some old and interest- ing churches (including Nuestra Sefiora de la Asuncion, 1714- 17 21). Just outside the city is the church of Potosi with a famous " wonder-working " shrine and image. An Indian pueblo of the same name existed here before 1555, and a church was established in 1576. Already at the end of the. 17th century Guanabacoa was the fashionable summer residence of Havana. It enjoyed its greatest popularity in this respect from the end of the 18th to the middle of the 19th century. It was created a villa with an ayuntamiento (city council) in 1743. In 1762 its fort, the Little Morro, on the N. shore near Cojimar (a bathing beach, where the Key West cable now lands), was taken by the English.

GUANACO, sometimes spelt Huanaca, the larger of the two wild representatives in South America of the camel tribe; the other being the vicugna. The guanaco {Lama huanacus), which stands nearly 4 ft. at the shoulder, is an elegant creature, with gracefully curved neck and long slender legs, the hind-pair of the latter bearing two naked patches or callosities. The head and body are covered with long soft hair of a fawn colour above and

almost pure white beneath. Guanaco are found throughout the southern half of South America, from Peru in the north to Cape Horn in the south, but occur in greatest abundance in Patagonia. They live in herds usually of from six to thirty, although these occa- sionally contain several hundreds, while solitary indi- viduals are sometimes met. They are ex- ceedingly timid, and therefore wary and difficult of approach; like many other ruminants, however, their curiosity sometimes overcomes their timidity, so as to bring them within range of the hunter's rifle. Their cry is peculiar, being something between the belling of a deer and the neigh of a horse. The chief enemies of the guanaco are the Patagonian Indians and the puma, as it forms the principal food of both. Its flesh is palatable although wanting in

fat, while its skin forms the chief clothing material of the Patagonians. Guanaco are readily domesticated, and in this state become very bold and will attack man, striking him from behind with both knees. In the wild state they never defend themselves, and if approached from different points, according to the Indian fashion of hunting, get completely bewildered and fall an easy prey. They take readily to the

Head of Guanaco.

water, and have been observed swimming from one island to another, while they have been seen drinking salt-water. They have a habit of depositing their droppings during successive days on the same spot — a habit appreciated by the Peruvian Indians, who use those deposits for fuel. Guanaco also have favourite localities in which to die, as appears from the great heaps of their bones found in particular spots.

GUANAJAY, a town of western Cuba, in Pinar del Rio province, about 36 m. (by rail) S.W. of Havana. Pop. (1907) 6400. Guanajay is served by the W. branch of the United railways of Havana, of which it is the W. terminus. The town lies among hills, has an excellent climate, and in colonial times was (like Holguin) an acclimatization station for troops fresh from Spain; it now has considerable repute as a health resort. The surround- ing country is a fertile sugar and tobacco region. Guanajay has always been important as a distributing point in the commerce of the western end of the island. It was an ancient pueblo, of considerable size and importance as early as the end of the 1 8th century.

GUANAJUATO, or Guanaxuato, an inland state of Mexico, bounded N. by Zacatecas and San Luis Potosi, E. by Queretaro, S. by Michoacan and W. by Jalisco. Area, 11,370 sq. m. It is one of the most densely populated states of the republic; pop. (1895) 1,047,817; (1900) 1,061,724. The state lies wholly within the limits of the great central plateau of Mexico, and has an average elevation of about 6000 ft. The surface of its northern half is broken by the Sierra Gorda and Sierra de Guanajuato, but its southern half is covered by fertile plains largely devoted to agriculture. It is drained by the Rio Grande de Lerma and its tributaries, which in places flow through deeply eroded valleys. The climate is semi-tropical and healthy, and the rainfall is sufficient to insure good results in agriculture and stock-raising. In the warm valleys sugar-cane is grown, and at higher elevations Indian corn, beans, barley and wheat. The southern plains are largely devoted to stock-raising. Guana- juato has suffered much from the destruction of its forests, but there remain some small areas on the higher elevations of the north. The principal industry of the state is mining, the mineral wealth of the mountain ranges of the north being enormous. Among its mineral products are silver, gold, tin, lead, mercury, copper and

opals. Silver has been extracted since the early days of the Spanish conquest, over $800,000,000 having been taken from the mines during the subsequent three and a half centuries. Some of the more productive of these mines, or groups of mines, are the Veta Madre (mother lode), the San Bernabe lode, and the Rayas mines of Guanajuato, and the La Valenciana mine, the output of which is said to have been $226,000,000 between 1766 and 1826. The manufacturing establishments include fiour mills, tanneries and manufactories of leather, cotton and woollen mills, distilleries, foundries and potteries. The Mexican Central and the Mexican National railway lines cross the state from N. to S., and the former operates a short branch from Silao to the state capital and another westward from Irapuato to Guadalajara. The capital is Guanajuato, and other important cities and towns are Leon, or Leon de las Aldamas; Celaya (pop. 25,565 in 1900), an important railway junction 22 m. by rail W. from Queretaro, and known for its manufactures of broadcloth, saddlery, soap and sweetmeats; Irapuato (18,593 in 1900), a railway junction and commercial centre, 21 m. S. by W. of Guanajuato; Silao (JSˆSS), a railway junction and manufacturing town (woollens and cottons), 14 m. S.W. of Guanajuato; Salamanca (13,583), on the Mexican Central railway and Lerma river, 25 m. S. by E. of Guanajuato, with manufactures of cottons and porcelain; Allende (10,547), a commercial town 30 m. E. by S. of Guanajuato, with mineral springs; Valle de Santiago (12,660), 50 m. W. by S. of Queretaro; Salvatierra (10,393), 60 m. S.E. of Guanajuato; Cortazar (8633); La Luz (8318), in a rich mining district; Penjamo (8262); Santa Cruz (7239); San Francisco del Rincon (10,904), 39 m. W. of Guanajuato in a rich mining district; and Acambaro (8345), a prosperous town of the plain, 76 m. S.S.E. of Guanaiuato.

GUANAJUATO, or Santa Fe de Guanajuato, a city of Mexico and capital of the above state, 155 m. (direct) N.W. of the Federal capital, on a small tributary of the Rio Grande de Lerma or Santiago. Pop. (1895) 39,404; (1900) 41,486. The city is built in the Canada de Marfil at the junction of three ravines about 6500 ft. above the sea, and its narrow, tortuous streets rise steeply as they follow the ravines upward to the mining villages clustered about the opening of the mines in the hillsides. Guanajuato is sometimes described as a collection of mining villages ; but in addition there is the central city with its crowded winding streets, its substantial old Spanish buildings, its fifty ore-crushing mills and busy factories and its bustling commercial life. Enclosing the city are the steep, barren mountain sides honeycombed with mines. The climate is semi-tropical and is considered healthy. The noteworthy public buildings and institutions are an

interesting old Jesuit church with arches of pink stone and delicate carving, eight monasteries, the government palace, a mint dating from 181 2, a national college, the fine Teatro Juarez, and the Pantheon, or public cemetery, with catacombs below. The Alhondiga de Granaditas, originally a public granary, was used as a fort during the War of Independ- ence, and is celebrated as the scene of the first battle (1810) in that long struggle. Among the manufactures are cottons, prints, soaps, chemicals, pottery and silverware, but mining is the principal interest and occupation of the population. The silver mines of the vicinity were long considered the richest in Mexico, the celebrated Veta Madre (mother lode) even being described as the richest in the world; and Guanajuato has the largest reduction works in Mexico. The railway outlet for the city consists of a short branch of the Mexican Central, which joins the trunk line at Silao. Guanajuato was founded in 1554- It attained the dignity of a city in 1741. It was celebrated for its vigorous resistance to the invaders at the time of the Spanish conquest, and was repeatedly sacked during that war.

GUANCHES, Guanchis or Guanchos (native Guanchinet; Guan = person, Chinet = Teneriff e, — "man of Teneriffe," cor- rupted, according to Nunez de la Pefia, by Spaniards into Guanchos), the aboriginal inhabitants of the Canary Islands. Strictly the Guanches were the primitive inhabitants of Teneriffe, where they seem to have preserved racial purity to the time of the Spanish conquest, but the name came to be applied to the indigenous populations of all the islands. The Guanches, now extinct as a distinct people, appear, from the study of skulls and bones discovered, to have resembled the Cro-Magnon race of the Quaternary age, and no real doubt is now entertained that they were an offshoot of the great race of Berbers which from the dawn of history has occupied northern Africa from Egypt to the Atlantic. Pliny the Elder, deriving his knowledge from the accounts of Juba, king of Mauretania, states that when visited by the Carthaginians under Hanno the archipelago was found by them to be uninhabited, but that they saw ruins of great buildings. This would suggest that the Guanches were not the first inhabitants, and from the absence of any trace of Mahommedanism among the peoples found in the archipelago by the Spaniards it would seem that this extreme westerly migration of Berbers took place between the time of which Pliny wrote and the conquest of northern Africa by the Arabs. Many of the Guanches fell in resisting the Spaniards, many were sold as slaves, and many conformed to the Roman Catholic faith and married Spaniards.

Such remains as there are of their language, a few expressions and the proper names of ancient chieftains still borne by certain families, connect it with the Berber dialects. In many of the islands signs are engraved on rocks. Domingo Vandewalle, a military governor of Las Palmas, w.as the first, in 1752, to investigate these; and it is due to the perseverance of D.

Aquilino Padran, a priest of Las Palmas, that anything about the inscription on the island Hierro has been brought to light. In 1878 Dr R. Verneau discovered in the ravines of Las Balos some genuine Libyan inscriptions. Without exception the rock inscriptions have proved to be Numidic. In two of the islands (Teneriffe and Gomera) the Guanche type has been retained with

more purity than in the others. No inscriptions have been found in these two islands, and therefore it would seem that the true Guanches did not know how to write. In the other islands numerous Semitic traces are found, and in all of them are the rock-signs. From these facts it would seem that the Numidians, travelling from the neighbourhood of Carthage and intermixing with the dominant Semitic race, landed in the Canary Islands, and that it is they who have written the inscriptions at Hierro and Grand Canary.

The political and social institutions of the Guanches varied. In some islands hereditary autocracy prevailed; in others the government was elective. In Teneriffe all the land belonged to the chiefs who leased it to their subjects. In Grand Canary suicide was regarded as honourable, and on a chief inheriting, one of his subjects willingly honoured the occasion by throw- ing himself over a precipice. In some islands polyandry was practised; in others the natives were monogamous. But every- where the women appear to have been respected, an insult offered any woman by an armed man being a capital offence. Almost all the Guanches used to wear garments of goat-skins, and others of vegetable fibres, which have been found in the tombs of Grand Canary. They had a taste for ornaments, necklaces of wood, bone and shells, worked in different designs. Beads of baked earth, cylindrical and of all shapes, with smooth or polished surfaces, mostly black and red in colour, were chiefly in use. They painted their bodies; the pintaderas, baked clay objects like seals in shape, have been explained by Dr Verneau as having been used solely for painting the body in various colours. They manufactured rough pottery, mostly without decorations, or ornamented by means of the finger-nail. The Guanches' weapons were those of the ancient races of south Europe. The polished battle-axe was more used in Grand Canary, while stone and obsidian, roughly cut, were commoner in Teneriffe. They had, besides, the lance, the club, sometimes studded with pebbles, and the javelin, and they seem to have known the shield. They lived in natural or artificial caves in their mountains. In districts where cave-dwellings were impossible, they built small round houses and, according to the Spaniards, they even practised rude fortification. In Palma the old people were at their own wish left to die alone. After bidding their family farewell they were carried to the sepulchral cave, nothing but a bowl of milk being left them. The Guanches embalmed their dead; many mummies have been found in an extreme state of desiccation, each

weighing not more than 6 or 7 lb. Two almost inaccessible caves in a vertical rock by the shore 3 m. from Santa Cruz (Teneriffe) are said still to contain bones. The process of embalm- ing seems to have varied. In Teneriffe and Grand Canary the corpse was simply wrapped up in goat and sheep skins, while in other islands a resinous substance was used to preserve the body, which was then placed in a cave difficult of access, or buried under a tumulus. The work of embalming was reserved for a special class, women for female corpses, men for male. Em- balming seems not to have been universal, and bodies were often simply hidden in caves or buried.

Little is known of the religion of the Guanches. They appear to have been a distinctly religious race. There was a general belief in a supreme being, called Acoran, in Grand Canary, Achihuran in Teneriffe, Eraoranhan in Hierro, and Abora in Palma. The women of Hierro worshipped a goddess called Moneiba. According to tradition the male and female gods lived in mountains whence they descended to hear the prayers of the people. In other islands the natives venerated the sun, moon, earth and stars. A belief in an evil spirit was general. The demon of Teneriffe was called Guayota and lived in the peak of Teyde, which was the hell called Echeyde. In times of drought the Guanches drove their flocks to consecrated grounds, where the lambs were separated from their mothers in the belief that their plaintive bleatings would melt the heart of the Great Spirit. During the religious feasts all war and even personal quarrels were stayed.

Bibliography. — S. Berthelot, Antiquites canariennes (Paris, 1839) ; Baker Webb and S. Berthelot, Histoire naturelle des ties

Canaries (Paris, 1839) ; Paul Broca, Revue d'anthropologie, iv. (1874) ; General L. L. C. Faidherbe, Quelque mots sur Vetknologie de l'archipel canarien (Paris, 1875); Chil y Naranjo, Estudios historicos, climato- logicos y Paiologicos de lai Islas Canarias (Las Palmas, 1876-1889); " De la pluralite des races humaines de l'archipel canarien," Bull. Soc. Anlhrop. Paris, 1878; " Habitations et sepultures des anciens habitants des iles Canaries," Revue d'anthrop., 1879; R. Verneau, " Sur les Semites aux iles Canaries," and " Sur les anciens habitants de la Isleta, Grande Canarie," Bull. Soc. Anthrop. Paris, 1881 ; Rapport sur une mission scientifique dans l'archipel canarien (Paris, 1887); Cinq annees de sejour aux iles Canaries (Paris, 1891); H. Meyer, Die Insel Tenerife (Leipzig, 1896), " Uber die Urbewohner der canarischen Inseln," in Adolf Bastian Festschrift (Berlin, 1896);

F. von Luschan, Anhang uber eine Schddelsammlung von den canari- schen Inseln; R. Virchow, " Schadel mit Carionecrosis der Sagittal- gegend," Verhandlungen der Berliner Anthrop. Gesellschaft (1896);

G. Sergi, The Mediterranean Race (London, 1901); The Guanches of Tenerife . . . , by Alonso de Espinosa, translated by Sir Clements Markham, with bibliography (Hakluyt Society, 1907).

GUANIDINE, CN3H5 or HN: C(NH 2) 2 , the amidine of amido- carbonic acid. It occurs in beet juice. It was first prepared in 1 86 1 by A. Strecker, who oxidized guanine with hydrochloric acid and potassium chlorate. It may be obtained synthetically by the action of ammonium iodide on cyanamide, CN-NH 2 + NHJ=CN 3 Ho-HI-; by heating ortho-carbonic esters with ammonia to 1 50° C. ; but best by heating ammonium thiocyanate to i8o°-iqo° C, when the thiourea first formed is converted into guanidine thiocyanate, 2CS(NH 2) 2 = HN:C(NH 2) 2 HCNS+H 2 S. It is a colourless crystalline solid, readily soluble in water and alcohol; it deliquesces on exposure to air. It has strong basic properties, absorbs carbon dioxide readily, and forms well defined crystalline salts. Baryta water hydrolyses it to urea. By direct union with glycocoll acid, it yields glycocyamine, NH 2 -(HN): C-NH-CH 2 C0 2 H, whilst with methyl glycocoll (sarcosine) it forms creatine, NHr(NH): C-N(CH 3)-CHrC0 2 H.

Many derivatives of guanidine were obtained by J. Thiele (Ann., 1892, 270, p. 1 ; 1893, 273, p. 133; Ber., 1893, 26, pp. 2598, 2645). By the action of nitric acid on guanidine in the presence of sul- phuric acid, nitroguanidine, HN;C(NH 2)-NH-N0 2 (a substance possessing acid properties) is obtained; from which, by reduction with zinc dust, amidoguanidine, HN :C(NH 2)-NH-NH 2 , is formed. This amidoguanidine decomposes on hydrolysis with the formation of semicarbazide, NH 2 -CO-NH-NH 2 , which, in its turn, breaks down into carbon dioxide, ammonia and hydrazine. Amidoguani- dine is a body of hydrazine type, for it reduces gold and silver salts and yields a benzylidine derivative. On oxidation with potassium permanganate, it gives azodicarbondiamidine nitrate, NH 2 -(HN): C-N : N-C :(NH)-NH 2 2HN0 3 , which, when reduced by sulphuretted hydrogen, is converted into the corresponding hydrazodicarbondi amidine, NH 2 H 2 . By the action of nitrous acid on a nitric acid solution of amidoguanidine, diazoguani dine nitrate, NH 2 -(HN) :C-NH-N 2 -N0 3 , is obtained. This diazo compound is decomposed by caustic alkalis with the formation of cyanamide and hydrazoic acid, CH 4 N5-N03 = N 3 H-|-CN-NH 2 + HNO3, whilst acetates and carbonates convert it into amidotetra-

^

N-N.

zotic acid, H 2 N-C. II . Amidotetrazotic acid yields addition

X NH-N compounds with amines, and by the further action of nitrous acid yields a very explosive derivative, diazotetrazol, CN6. By fusing guanidine with urea, dicyandiamidineH 2 N-(HN) :C-NH-CO-NH 2 ,is formed.

GUANO (a Spanish word from the Peruvian huanu, dung), the excrement of birds, found as large deposits on certain islands off the coast of Peru, and on others situated in the Southern ocean and off the west coast of Africa. The large proportions of phosphorus in the form of phosphates and of nitrogen as ammonium oxalate and urate renders it a valuable fertilizer. Bat's guano, composed of the excrement of bats, is found in certain caves in New Zealand and elsewhere; it is similar in composition to Peruvian guano. (See Manures and Manuring.)

GUANTA, a port on the Caribbean coast of the state of Ber- mudez, Venezuela, 12 m. N.E. of Barcelona, with which it is connected by rail. It dates from the completion of the railway to the coal mines of Naricual and Capiricual nearly 12 m. beyond Barcelona, and was created for the shipment of coal. The harbour is horseshoe-shaped, with its entrance, 1998 ft. wide, protected by an island less than 1 m. off the shore. The entrance is easy and safe, and the harbour affords secure anchorage for Varge vessels, with deep water alongside the iron railway wharf.

These advantages have made Guanta the best port on this part of the coast, and the trade of Barcelona and that of a large inland district have been transferred to it. A prominent feature in its trade is the shipment of live cattle. Among its exports are sugar, coffee, cacao, tobacco and fruit.

GUANTANAMO, the easternmost important town of the S. coast of Cuba, in the province of Santiago, about 40 m. E. of Santiago. Pop. (1907) 14,559. It is situated by the Guazo (or Guaso) river, on a little open plain between the mountains. The beautiful, land-locked harbour, 10 m. long from N. to S. and 4 m. wide in places, has an outer and an inner basin. The latter has a very narrow entrance, and 2 to 2-5 fathoms depth of water. From the port of Caimanera to the city of Guantanamo, 13 m. N., there is a railway, and the city has railway connexion with Santiago. Guantanamo is one of the two ports leased by Cuba to the United States for a naval station. It is the shipping-port and centre of a surrounding coffee-, sugar- and lime-growing district. In 1741 an English force under Admiral Edward Vernon and General Thomas Wentworth landed here to attack Santiago. They named the harbour Cumberland bay. After their retreat fortifications were begun. The history of the region practically dates, how-

ever, from the end of the 18th century, when it gained prosperity from the settlement of French refugees from Santo Domingo; the town, as such, dates only from 1822. Almost all the old families are of French descent., and French was the language locally most used as late as the last third of the 19th century. In recent years, especially since the Spanish-American War of 1898, the region has greatly changed socially and economically. Guantanamo was once a fashionable summer residence resort for wealthy Cubans.

GUARANA, the plant Paullinia Cupana (or P. sorbilis) of the natural order Sapindaceae, indigenous to the north and west of Brazil. It has a smooth erect stem; large pinnate alternate leaves, com- posed of 5 oblong-oval leaflets; narrow panicles of short-stalked flowers; and ovoid or pyriform fruit about as large as a grape, and containing usually one seed only, which is shaped like a minute horse-chestnut. What is commonly known as guarana, guarana bread or Brazilian cocoa, is prepared from the seeds as follows. In October and November, at which time they become ripe, the seeds are removed from their capsules and sun-dried, so as to admit of the ready removal by hand of the white aril; they are next ground in a stone mortar or deep dish of hard sandstone; the powder, moistened by the addition of a small quantity of water, or by exposure to the dews, is then made into a paste with a certain proportion of whole or broken seeds, and worked up sometimes into balls, but usually into rolls not unlike German sausages, 5 to 8 in. in length, and 12 to 16 oz. in weight. After drying by artificial or solar heat, the guarana is packed between broad leaves in sacks or baskets. Thus pre- pared, it is of extreme hardness, and has a brown hue, a bitter astringent taste, and an odour faintly resembling that of roasted coffee. An inferior kind, softer and of a lighter colour, is manu- factured by admixture of cocoa or cassava. Rasped or grated into sugar and water, guarana forms a beverage largely consumed in S. America. Its manufacture, originally confined to the Mauhes Indians, has spread into various parts of Brazil.

The properties of guarana as a nervous stimulant and restorative are due to the presence of what was originally described as a new principle and termed guaranine, but is now known to be identical with caffeine or theine. Besides this substance, which is stated to exist in it in the form of tannate, guarana yields on analysis the glucoside saponin, with tannin, starch, gum, three volatile oils, and an acrid green fixed oil (Fournier, Journ. de Pharm. vol. xxxix., 1861, p. 291).

GUARANIS, a tribe and stock of South American Indians, having their home in Paraguay, Uruguay and on the Brazilian coast. The Guaranis had developed some civilization before the arrival of the Spaniards, and being a peaceable people quickly submitted. They form to-day the chief element in

the populations of Paraguay and Uruguay. Owing to its patronage by the Jesuit missionaries the Guarani language became a

widespread medium of communication, and in a corrupted form is still the common language in Paraguay.

GUARANTEE (sometimes spelt ” guarantie ” or ” guaranty “; an O. Fr. form of ” warrant,” from the Teutonic word which appears in German as wahren, to defend or make safe and binding) , a term more comprehensive and of higher import than either ” warrant ” or ” security,” and designating either some inter- national treaty whereby claims, rights orpossessions are secured, or moie commonly a mere private transaction, by means of which one person, to obtain some trust, confidence or credit for another, engages to be answerable for him.

In English law, a guarantee is a contract to answer for the payment of some debt, or the performance of some duty, by a third person who is primarily liable to such payment or per- formance. It is a collateral contract, which does not extinguish the original liability or obligation to which it is accessory, but on the contrary is itself rendered null and void should the latter fail, as without a principal there can be no accessory. The liabilities of a surety are in law dependent upon those of the principal debtor, and when the latter cease the former do so likewise {per Collins, L.J., in Stacey v. Hill, 1001, -i K.B., at p. 666; see per Willes, J., in Bateson v. Gosling, 1871, L.R. 7 C.P., at p. 14), except in certain cases where the discharge of the principal debtor is by operation of law (see In re Fitzgeorge — ex parte Robson, 1905, 1 K.B. p. 462). If, therefore, persons wrongly suppose that a third person is liable to one of them, and a guarantee is given on that erroneous supposition, it is invalid ab initio, by virtue of the lex contractus, because its foundation (which was that another was taken to be liable) has failed (per Willes, J., in Mountstephen v. Lakeman, L.R. 7 Q.B. p. 202). According to various existing codes civil, a suretyship, in respect of an obligation ” non-valable,” is null and void save where the invalidity is the result of personal incapacity of the principal debtor (Codes Civil, France and Belgium, 2012; Spain, 1824; Portugal, 822; Italy, 1899; Holland, 1858; Lower Canada, 1932). In some countries, however, the mere personal incapacity of a son under age to borrow suffices to vitiate the guarantee of a loan made to him (Spain, 1824; Portugal, 822, s. 2, 1535, 1536). The Egyptian codes sanction guarantees expressly entered into ” in view of debtor’s want of legal capacity ” to contract a valid principal obligation (Egyptain Codes, Mixed

Suits, 605; Native Tribunals, 496). The Portuguese code (art. 822, s. 1) retains the surety's liability, in respect of an invalid principal obligation, until the latter has been legally rescinded.

The giver of a guarantee is called " the surety," or " the guarantor"; the person to whom it is given "the creditor," or "the guarantee"; while the person whose payment or performance is secured thereby is termed " the principal debtor," or simply " the principal." In America, but not apparently elsewhere, there is a recognized distinction between " a surety " and " a guarantor "; the former being usually bound with the principal, at the same time and on the same consideration, while the contract of the latter is his own separate undertaking, in which the principal does not join, and in respect of which he is not to be held liable, until due diligence has been exerted to compel the principal debtor to make good his default. There is no privity of contract between the surety and the principal debtor, for the surety contracts with the creditor, and they do not constitute in law one person, and are not jointly liable to the creditor (per Baron Parke in Bain v. Cooper, 1 Dowl. R. (N.S.) n, 14).

No special phraseology is necessary to the formation of a guarantee; and what really distinguishes such a contract f/om one of insurance is not any essential difference between the two forms of words insurance and guarantee, but the substance of the contract entered into by the parties in each particular case (per Romer, L.J., in Seaton v. Heath — Seaton v. Burnand, 1899, 1 Q.B.' 782, 792, C.A.; per Vaughan Williams, L.J., in In re Denton's Estate Licenses Insurance Corporation and Guarantee Fund Ltd. v. Denton, 1904, 2 Ch., at p. 188; and see Dane v. Mortgage Insurance Corporation, 1894, 1 Q.B. 54 C.A.) In this

connexion it may be mentioned that the different kinds of suretyships have been classified as follows: (1) Those in which there is an agreement to constitute, for a particular purpose, the relation of principal and surety, to which agreement the creditor thereby secured is a party; (2) those in which there is a similar agreement between the principal and surety only, to which the creditor is a stranger; and (3) those in which, without any such contract of suretyship, there is a primary and a secondary liability of two persons for one and the same debt, the debt being, as between the two, that of one of those persons only, and not equally of both, so that the other, if he should be compelled to pay it, would be entitled to reimbursement from the person by whom (as between the two) it ought to have been paid (per Earl of Selborne, L.C., in Duncan Fox and Co. v. North and South Wales Bank, 6 App. Cas., at p. 11). According to several codes civil sureties are made divisible into conventional, legal and judicial (Fr. and Bel., 201.5, 2040 et seq.; Spain, 1823; Lower Canada, 1930), while the Spanish code further divides them into gratuitous and for valuable consideration (art. 1,

823). In England the common-law requisites of a guarantee in no way differ from those essential to the formation of any other contract. That is to say, they comprise the mutual assent of two or more parties, competency to contract, and, unless the guarantee be under seal, valuable consideration. An offer to guarantee is not binding until it has been accepted, being revocable till then by the party making it. Unless, however, as sometimes happens, the offer contemplates an express accept- ance, one may be implied, and it may be a question for a jury whether an offer of guarantee has in fact been accepted. Where the surety's assent to a guarantee has been procured by fraud of the person to whom it is given, there is no binding contract. Such fraud may consist of suppression or concealment or mis- representation. There is some conflict of authorities as to what facts must be spontaneously disclosed to the surety by the ' creditor, but it may be taken that the rule on the subject is less stringent than that governing insurances upon marine, life and other risks (The North British Insurance Co. v. Lloyd, 10 Exch. 523), though formerly this was denied (Owen v. Homan, 3 Mac. & G. 378, 397). Moreover, even where the contract relied upon is in the form of a policy guaranteeing the solvency of a surety for another's debt, and is therefore governed by the doctrine of uberrima fides, only such facts as are really material to the risk undertaken need be spontaneously disclosed (Seaton v. Burnand — Burnand v. Seaton, 1900, A.C. 135)- As regards the competency of the parties to enter into a contract of guarantee, this may be affected by insanity or intoxication of the surety, if known to the creditor, or by disability of any kind. The ordinary disabilities are those of infants and married women — now in England greatly mitigated as regards the latter by the Married Women's Property Acts, 1870 to 1893, which enable a married woman to contract, as a feme sole, to the extent of her separate property. Every guarantee not under seal must according to English law have a consideration to support it, though the least spark of one suffices (per Wilmot, J., in Pillan v. van Mierop and Hopkins, 3 Burr., at p. 1666; Haigh v. Brooks, 10 A. & E. 309; Barrell v. Trussell, 4 Taunt. 117), which, as in other cases, may consist either of some right, interest, profit or benefit accruing to the one party, or some forbearance, detri- ment, loss or responsibility given, suffered or undertaken by the other. In some guarantees the consideration is entire — as where, in consideration of a lease being granted, the surety becomes answerable for the performance of the covenants; in other cases it is fragmentary, i.e. supplied from time to time — as where a guarantee is given to secure the balance of a running account at a banker's, or a balance of a running account for goods supplied (per Lush, L.J., in Lloyd's v. Harper, 16 Ch. Div., at p. 319). In the former case, the moment the lease is granted there is nothing more for the lessor to do, and such a guarantee as that of necessity runs on throughout the duration of the lease and is irrevocable. In the latter case, however, unless the guarantee

stipulates to the contrary, the surety may at any time terminate his liability under the guarantee as to future

advances, &c. The consideration for a guarantee must not be past or executed, but on the other hand it need not comprise a direct benefit or advantage to either the surety or the creditor, but may solely consist of anything done, or any promise made, for the benefit of the principal debtor. It is more frequently executory than concurrent, taking the form either of forbearance to sue the principal debtor, or of a future advance of money or supply of goods to him.

By the Indian Contract Act 1872, sect. 127, it is provided that the consideration for a guarantee may consist of anything done or any promise made for the benefit of the principal debtor by the creditor. Total failure of the consideration stipulated for by the party giving a guarantee will prevent its being enforced, as will also the existence of an illegal consideration. Though in all countries the mutual assent of two or more parties is essential to the formation of any contract (see e.g. Codes Civil, Fr. and Bel. 1108; Port. 643, 647 et seq.; Spain, 1258, 1261; Italy, 1104; Holl. 1356; Lower Canada, 984), a consideration is not every- where regarded as a necessary element (see Pothier's Law of Obligations, Evans's edition, vol. ii. p. 19). Thus in Scotland a contract may be binding without a consideration to support it (Stair i. 10. 7).

The statutory requisites of a guarantee are, in England, prescribed by (1) the Statute of Frauds, which, with reference to guarantees, provides that " no action shall be brought whereby to charge the defendant upon any special promise to answer for the debt, default or miscarriages of another person, unless the agreement upon which such action shall be brought, or some memorandum or note thereof, shall be in writing and signed by the party to be charged therewith, or some other person thereunto by him lawfully authorized," and (2) Lord Tenterden's Act (9 Geo. IV. c. 14), which by § 6 enacts that " no action shall be brought whereby to charge any person upon or by reason of any representation or assurance made or given concerning or relating to the character, conduct, credit, ability, trade or dealings of any other person, to the intent or purpose that such other person may obtain credit, money or goods upon" (i.e. " upon credit," see per Parke, B., in Lyde v. Barnard, 1 M. & W., at p. 104), " unless such representation or assurance be made in writing signed by the party to be charged therewith." This latter enactment, which applies to incorporated companies as well as to individual persons (Hirst v. West Riding Union

Banking Co., 1901, 2 K.B. 560 C.A.), was rendered necessary by an evasion of the 4th section of the Statute of Frauds, accomplished by treating the special promise to answer for another's debt, default or miscarriage, when not in writing, as required by that section, as a false and fraudulent representation concerning another's credit, solvency or honesty, in respect of which damages, as for a tort, were held to be recoverable (Pasley v. Freeman, 3 T.R. 51). In Scotland, where, it should be stated, a guarantee is called a " cautionary obligation," similar enactments to those just specified are contained in § 6 of the Mercantile Law Amendment Act (Scotland) 1856, while in the Irish Statute of Frauds (7 Will. III. c. 12) there is a provision (§ 2) identical with that found in the English Statute of Frauds. In India a guarantee may be either oral or written (Indian Contract Act, § 126), while in the Australian colonies, Jamaica and Ceylon it must be in writing. The German code civil requires the surety's promise to be verified by writing where he has not executed the principal obligation (art. 766), and the Portuguese code renders a guarantee provable by all the modes established by law for the proof of the principal contract (art. 826). According to most codes civil now in force a guarantee like any other contract can usually be made verbally in the presence of witnesses and in certain cases (where for in- stance considerable sums of money are involved) sous signature privee or else by judicial or notarial instrument (see Codes Civil, Er. and Bel. 1341; Spain, 1244; Port. 2506, 2513; Italy, 1341 et seq.; Pothier's Law of Obligations, Evans's ed. i. 257; Burge on Suretyship, p. 19; van der Linden's Institutes of Holland, p. 120); the French and Belgian Codes, moreover, provide that . suretyship is not to be presumed but must always be expressed (art. 2015).

The Statute of Frauds does not invalidate a verbal guarantee, but renders it unenforceable by action. It may therefore be available in support of a defence to an action, and money paid under it cannot be recovered. An indemnity is not a guarantee within the statute, unless it contemplates the primary liability of a third person. It need not, therefore, be in writing when it is a mere promise to become liable for a debt, whenever the person to whom the promise is made should become liable (Wildes v. Dudlow, L.R. 19 Eq. 198; per Vaughan Williams, L.J. in Harburg India-Rubber Co. v. Martin, 1902, 1 K.B. p. 786; Guild v. Conrad, 1894, 2 Q.B. 885 C.A.). Neither does the statute apply to the promise of a del credere agent, which binds him, in con- sideration of the higher commission he receives, to make no sales on behalf of his principal except to persons who are absolutely solvent, and renders him liable for any loss that may result from the non-fulfilment of his promise. A promise to give a guarantee is, however, within the statute, though not one to procure a guarantee.

The general principles which determine what are guarantees within the Statute of Frauds, as deduced from a multitude of decided cases, are briefly

as follows: (1) the primary liability of a third person must exist or be contemplated as the foundation of the contract (Birkmyr v. Darnell, 1 Sm. L.C. nth ed. p. 299; Mounlstephen v. Lakeman, L.R. 7 Q.B. 196; L.R. 7 H.L. 17); (2) the promise must be made to the creditor; (3) there must be an absence of all liability on the part of the surety independently of his express promise of guarantee; (4) the main object of the transaction between the parties to the guarantee must be the fulfilment of a third party's obligation (see Harburg India- rubber Comb Co. v. Martin, 1902, 1 K.B. 778, 786); and (5) the contract entered into must not amount to a sale by the creditor to the promiser of a security for a debt or of the debt itself (see de Colyar's Law of Guarantees and of Principal and Surety, 3rd ed. pp. 65-161, where these principles are discussed in detail by the light of decided cases there cited).

As regards the kind of note or memorandum of the guarantee that will satisfy the Statute of Frauds, it is now provided by § 3 of the Mercantile Law Amendment Act 1856, that " no special promise to be made, by any person after the passing of this act, to answer for the debt, default or miscarriage of another person, being in writing and signed by the party to be charged therewith, or some other person by him thereunto lawfully authorized, shall be deemed invalid to support an action, suit or other proceeding, to charge the person by whom such promise shall have been made, by reason only that the consideration for such promise does not appear in writing or by necessary inference from a written document." Prior to this enactment, which is not retrospective in its operation, it was held in many cases that as the Statute of Frauds requires " the agreement " to be in writing, all parts thereof were required so to be, including the consideration moving to, as well as the promise by, the party to be charged (Wain v. Wallers, 5 East, 10; Saunders v. Wakefield, 4 B. & Aid. 595). These decisions, however, proved to be burdensome to the mercantile community, especially in Scotland and the north of England, and ultimately led to the alteration of the law, so far as guarantees are concerned, by means of the enactment already specified. Any writing embodying the terms of the agreement between the parties, and signed by the party to be charged, is sufficient; and the idea of agreement need not be present to the mind of the person signing (ˆerLindley, L.J., in In re Hoyle — Hoyle v. Hoyle, 1893, 1 Ch., at p. 98). It is, however, necessary that the names of the contracting parties should appear some- where in writing; that the party to be charged, or his agent, should sign the memorandum or note of agreement, or else should sign another paper referring thereto; and that, when the note or memorandum is made, a complete agreement shall exist. Moreover, the memorandum must have been made before action brought, though it need not be contemporaneous with the agreement itself. As regards the stamping of the memorandum or note of agreement, a guarantee cannot, in England,

be given in evidence unless properly stamped (Stamp Act 1891). Aguarantee for the payment of goods, however, requires no stamp, being

within tht exception contained in the first schedule of the act. Nor is it necessary to stamp a written representation or assurance as to character within 9 Geo. IV. c. 14, supra. If under seal, a guarantee requires sometimes an ad valorem stamp and some- times a ten-shilling stamp; in other cases a sixpenny stamp generally suffices; and, on certain prescribed terms, the stamps can be affixed any time after execution (Stamp Act 1891, § 15, amended by § 15 of the Finance Act 1895).

The liability incurred by a surety under his guarantee depends upon its terms, and is not necessarily coextensive with that of the principal debtor. It is, however, obvious that as Extent of j ne sure ty' s obligation is merely accessory to that of liability. trie principal it cannot as such exceed it (de Colyar, Law of Guarantees, 3rd ed. p. 233; Burge, Suretyship, p. 5). By the Roman law, if there were any such excess the surety's obligation was rendered wholly void and not merely void pro tanto. By many existing codes civil, however, a guarantee which imposes on the surety a greater liability than that of the principal is not thereby invalidated, but the liability is merely reducible to that of the principal (Fr. and Bel. 2013; Port. 823; Spain, 1826; Italy, 1900; Holland, 1859; Lower Canada, 1933). By sec. 128 of the Indian Contract Act 1872 the liability of the surety is, unless otherwise provided by contract, coextensive with that of the principal. Where the liability of the surety is less extensive in amount than that of the principal debtor, difficult questions have arisen in England and America as to whether the surety is liable only for part of the debt equal to the limit of his liability, or, up to such limit, for the whole debt {Ellis v. Emmanuel, 1 Ex. Div. 157; Hobson v. Bass, 6 Ch. App. 792; Brandt, Suretyship, sec. 219). The surety cannot be made liable except for a loss sustained by reason of the default guaranteed against. Moreover, in the case of a joint and several guarantee by several sureties, unless all sign it none are liable thereunder (National Pro. Bk. of England v. Brackenbury, 1906, 22 Times L.R. 797). It was formerly considered in England to be the duty of the party taking a guarantee to see that it was couched in language enabling the party giving it to understand clearly to what extent he was binding himself (Nicholson v. Paget, 1 C. & M. 48, 52). This view, however, can no longer be sustained, it being now recognized that a guarantee, like any other contract, must, in cases of ambiguity, be construed against the party bound thereby and in favour of the party receiving it (Mayer v. Isaac, 6 M. & W. 605, 612; Wood v. Priestner, L.R.

2 Exch. 66, 71). The surety is not to be changed beyond the limits prescribed by his contract, which must be construed so as to give effect to what may fairly be inferred to have been the intention of the parties, from what they themselves have expressed in writing. In cases of doubtful import, recourse to parol evidence is permissible, to explain, but not to contradict, the written evidence of the guarantee. As a general rule, the surety is not liable if the principal debt cannot be enforced, because, as already explained, the obligation of the surety is merely accessory to that of the principal debtor. It has never been actually decided in England whether this rule holds good in cases where the principal debtor is an infant, and on that account is not liable to the creditor. Probably in such a case the surety might be held liable by estoppel (see Kimball v. Newell, 7 Hill (N.Y.) 116). When directors guarantee the performance by their company of a contract which is ultra vires, and therefore not binding on the latter, the directors' suretyship liability is, nevertheless, enforce- able against them (Yorkshire Railway Waggon Co. v. Maclure, 21 Ch. D. 309 C.A.).

It is not always easy to determine for how long a time liability under a guarantee endures. Sometimes a guarantee is limited to a single transaction, and is obviously intended to be security against one specific default only. On the other hand, it as often happens that it is not exhausted by one transaction on the faith of it, but extends to a series of transactions, and remains a standing security until it is revoked, either by the act of the parties or else by the death of the surety. It is then termed a continuing guarantee. No fixed rules of interpretation determine

whether a guarantee is a continuing one or not, but each case must be judged on its individual merits; and frequently, in order to achieve a correct construction, it becomes necessary to examine the surrounding circumstances, which often reveal what was the subject-matter which the parties contemplated when the guarantee was given, and likewise what was the scope and object of the transaction between them. Most continuing guarantees are either ordinary mercantile securities, in respect of advances made or goods supplied to the principal debtor or else bonds for the good behaviour of persons in public or private offices or employments. With regard to the latter class of continuing guarantees, the surety's liability is, generally speak- ing, revoked by any change in the constitution of the persons to or for whom the guarantee is given. On this subject it is now provided by section 18 of the Partnership Act 1890, which applies to Scotland as well as England, that " a continuing guarantee or cautionary obligation given either to a firm or to a third person in respect of the transactions of a firm, is, in the absence of agreement to the contrary, revoked as to future transactions by any change in the constitution of the firm to which, or of the firm in respect of the transactions of which the

guaranty or obligation was given." This section, like the enactment it replaces, namely, sec. 4 of the Mercantile Law Amendment Act 1856, is mainly declaratory of the English common law, as embodied in decided cases, which indicate that the changes in the persons to or for whom a guarantee is given may consist either of an increase in their number,.of a diminution thereof caused by death or retirement from business, or of the incorporation or consolidation of the persons to whom the guarantee is given. In this connexion it may be stated that the Government Offices (Security) Act 1875, which has been amended by the Statute Law Revision Act 1883, contains certain provisions with regard to the acceptance by the heads of public departments of guarantees given by companies for the due performance of the duties of an office or employment in the public service, and enables the Commissioners of His Majesty's Treasury to vary the character of any security, for good behaviour by public servants, given after the passing of the act.

Before the surety can be rendered liable on his guarantee, the principal debtor must have made default. When, however, this has occurred, the creditor, in the absence of express agree- ment to the contrary, may sue the surety, without even informing him of such default having taken place, or requiring him to pay, and before proceeding against the principal debtor or resorting to securities for the debt received from the latter. In those countries where the municipal law is based on the Roman civil law, sureties usually possess the right (which may, however, be renounced by them) originally conferred by the Roman law, of compelling the creditor to insist on the goods, &c. (if any) of the principal debtor being first " discussed," i.e. appraised and sold, and appropriated to the liquidation of the debt guaranteed (see Codes Civil, Fr. and Bel. 2021 etseq.; Spain, 1830, 1831; Port. 830; Germany, 771, 772, 773; Holland, 1868; Italy, 1907; Lower Canada, 1941-1942; Egypt [mixed suits] 612; ibid, [native tribunals] 502), before having recourse to the sureties. This right, according to a great American jurist (Chancellor Kent in Hayes v. Ward, 4 Johns. New York, Ch. Cas. p. 132), " accords with a common sense of justice and the natural equity of mankind." In England this right has never been fully recognized. Neither does it prevail in America nor, since the passing of the Mercantile Law Amendment Act (Scotland) 1856, s. 8, is it any longer available in Scotland where, prior to the last-named enactment, the benefit of discussion, as it is termed, existed. In England, however, before any demand for payment has been made by the creditor on the surety, the latter can, as soon as the principal debtor has made default, compel the creditor, on giving him an indemnity against costs and expenses, to sue the principal debtor if the latter be solvent and able to pay (per A. L. Smith, L.J., in Rouse v. Bradford Banking Company, 1894, 2 Ch. 75; per Lord Eldon in Wright v. Simpson, 6 Ves., at p. 733), and a similar remedy is also open to

the surety in America (see Brandt on Suretyship, par. 205,

290) though in neither of these countries nor in Scotland can one of several sureties, when sued for the whole guaranteed debt by the creditor, compel the latter to divide his claim amongst all the solvent sureties, and reduce it to the share and proportion of each surety. However, this beneficium divisionis, as it is called in Roman law, is recognized by many existing codes (Fr. and Bel. 2025-2027; Spain, 1837; Portugal, 835- 836; Germany, 426; Holland, 1873-1874; Italy, 1911-1912; Lower Canada, 1946; Egypt [mixed suits], 615,616).

The usual mode in England of enforcing liability under a guarantee is by action in the High Court or in the county court. It is also permissible for the creditor to obtain redress by means of a set-off or counter-claim, in an action brought against him by the surety. On the other hand, the surety may now, in any court in which the action on the guarantee is pending, avail himself of any set-off which may exist between the principal debtor and the creditor. Moreover, if one of several sureties for the same debt is sued by the creditor or his guarantee, he can, by means of a proceeding termed a third-party notice, claim contribution from his co-surety towards the common liability. Independent proof of the surety's liability under his guarantee must always be given at the trial; as the creditor cannot rely either on admissions made by the principal debtor, or on a judgment or award obtained against him (Ex parte Young In re Kitchin, 17 Ch. Div. 668). Should the surety become bankrupt either before or after default has been made by the principal debtor, the creditor will have to prove against his estate. This right of proof is now in England regulated by the 37th section of the Bankruptcy Act, 1883, which is most comprehensive in its terms.

A person liable as a surety for another under a guarantee possesses various rights against him, against the person to whom the guarantee is given, and also against those R nas w ^° ma y have become co-sureties in respect of the same debt, default or miscarriage. As regards the surety's rights against the principal debtor, the latter may, where the guarantee was made with his consent but not otherwise (see Hodgson, v. Shaw, 3 Myl. & K. at p. 190), after he has made default, be compelled by the surety to exonerate him from liability by payment of the guaranteed debt (per Sir W. Grant, M.R., in Antrobus v. Davidson, 3 Meriv. 569, 579; per Lindley, L.J., in Johnston v. Salvage Association, 19 Q.B.D. 460, 461; and see Wolmershausen v. Gullick, 1893, 2 Ch. 514). The moment, moreover, the surety has himself

paid any portion of the guaranteed debt, he is entitled to rank as a creditor for the amount so paid, and to compel repayment thereof. In the event of the principal debtor's bankruptcy, the surety can in England, if the creditor has not already proved in respect of the guaranteed debt, prove against the bankrupt's estate, not only in respect of payments made before the bankruptcy of the principal debtor, but also, it seems, in respect of the contingent liability to pay under the guarantee (see Ex parte Dclmar re Herepath, 1889, 38 W.R. 752), while if the creditor has already proved, the surety who has paid the guaranteed debt has a right to all dividends received by the creditor from the bankrupt in respect thereof, and to stand in the creditor's place as to future dividends. This right is, however, often waived by the guarantee stipulating that, until the creditor has received full payment of all sums over and above the guaranteed debt, due to him from the principal debtor, the surety shall not participate in any dividends distributed from the bankrupt's estate amongst his creditors. As regards the rights of the surety against the creditor, they. are in England exercisable even by one who in the first instance was a principal debtor, but has since become a surety, by arrangement with his creditor, duly notified to the creditor, though not even sanctioned by him. This was decided by the House of Lords in the case of Rouse v. The Bradford Banking Co., 1894, A.C. 586, removing a doubt created by the previous case of Swire v. Redman, 1 Q.B.D. 536, which must now be treated as overruled. The surety's principal right against the creditor entitles him, after payment of the guaranteed debt, to the benefit of all

securities, whether known to him (the surety) or not, which the creditor held against the principal debtor; and where, by default or laches of the creditor, such securities have been lost, or rendered otherwise unavailable, the surety is discharged pro lanto. This right, which is not in abeyance till the surety is called on to pay (Dixon v. Steel, 1901, 2 Ch. 602), extends to all securities, whether satisfied or not, given before or after the contract of suretyship was entered into. On this subject the Mercantile Law Amendment Act, 1856, § 5, provides that " every person who being surety for the debt or duty of another, or being liable with another for any debt or duty, shall pay such debt or perform such duty, shall be entitled to have assigned to him, or to a trustee for him, every judgment, specialty, or other security, which shall be held by the creditor in respect of such debt or duty, whether such judgment, specialty, or other security shall or shall not be deemed at law to have been satisfied by the payment of the debt or performance of the duty, and such person shall be entitled to stand in the place of the creditor, and to use all the remedies, and, if need be, and upon a proper indemnity, to use the name of the creditor, in any action or other proceeding at law or in equity, in order to obtain from the principal debtor, or any co-surety, co-contractor, or co-debtor, as the case may be,

indemnification for the advances made and loss sustained by the person who shall have so paid such debt or performed such duty; and such payment or performance so made by such surety shall not be pleadable in bar of any such action or other proceeding by him, provided always that no co-surety, co- contractor, or co-debtor shall be entitled to recover from any other co-surety, co-contractor, or co-debtor, by the means aforesaid, more than the just proportion to which, as between those parties themselves, such last-mentioned person shall be justly liable." This enactment is so far retrospective that it applies to a contract made before the act, where the breach thereof, and the payment by the surety, have taken place subsequently. The right of the surety to be subrogated, on payment by him of the guaranteed debt, to all the rights of the creditor against the principal debtor is recognized in America (Tobin v. Kirk, 80 New York S.C.R. 229), and many other countries (Codes Civil, Fr. and Bel. 2029; Spain, 1839; Port. 839; Germany, 774; Holland, 1877 ; Italy, 1916; Lower Canada, 2959; Egypt [mixed suits], 617; ibid, [native tribunals],

5°5)-

As regards the rights of the surety against a co-surety, he is entitled to contribution from him in respect of their common liability. This particular right is not the result of any contract, but is derived from a general equity, on the ground of equality of burden and benefit, and exists whether the sureties be bound jointly, or jointly and severally, and by the same, or different, instruments. There is, however, no right of contribution where each surety is severally bound for a given portion only of the guaranteed debt ; nor in the case of a surety for a surety; (see In re Denton's Estate, 1904, 2 Ch. 178 C.A.); nor where a person becomes a surety jointly with another and at the latter's request. Contribution may be enforced, either before payment, or as soon as the surety has paid more than his share of the common debt (Wolmershausen v. Gullick, 1893, 2 Ch. 514); and the amount recoverable is now always regulated by the number of solvent sureties, though formerly this rule only prevailed in equity. In the event of the bankruptcy of a surety, proof can be made against his estate by a co-surety for any excess over the latter's contributive share. The right of contribution is not the only right possessed by co-sureties against each other, but they are also entitled to the benefit of all securities which have been taken by any one of them as an indemnity against the liability incurred for the principal debtor. The Roman law did not recognize the right of contribution amongst sureties. It is, however, sanctioned by many existing codes (Fr. and Bel. 2033; Germany, 426,474; Italy, 1920; Holland, 1881; Spain, 1844; Port. 845; Lower Canada, 1955; Egypt [mixed suits], 618, ibid, [native tribunals], 506), and also by the Indian Contract Act 1872, ss. 146-147.

may be accomplished in various ways, he being regarded, especially in England and America, as a " favoured debtor " (per Turner, L.J., in Wheatley v. Bastow, 7 De G. M. & G. 279, 280; per Earl of Selborne, L.C., in In re Sherry — London and County Banking Co. v. Terry, 25 Ch. D., at p. 703; and see Brandt on Suretyship, sees. 79, 80). Thus, fraud subsequent to the execution of the guarantee (as where, for example, the creditor connives at the principal debtor's default) will certainly discharge the surety. Again, a material alteration made by the creditor in the instrument of guarantee after its execution may also have this effect. The most prolific ground of discharge, however, is usually traceable to causes originating in the creditor's laches or conduct, the governing principle being that if the creditor violates any rights which the surety possessed when he entered into the suretyship, even though the damage be nominal only, the guarantee cannot be enforced. On this subject it suffices to state that the surety's discharge may be accomplished

(1) by a variation of the terms of the contract between the creditor and the principal debtor, or of that subsisting between the creditor and the surety (see Rickaby v. Lewis, 22 T.L.R. 130) ;

(2) by the creditor taking a new security from the principal debtor in lieu of the original one; (3) by the creditor discharging the principal debtor from liability; (4) by the creditor binding himself to give time to the principal debtor for payment of the guaranteed debt; or (5) by loss of securities received by the creditor in respect of the guaranteed debt.

In this connexion it may be stated in general terms that whatever extinguishes the principal obligation necessarily deter- mines that of the surety (which is accessory thereto), not only in England but elsewhere also (Codes Civil, Fr. and Bel. 2034, 2038; Spain, 1847; Port. 848; Lower Canada, 1956; i960; Egypt [mixed suits], 622, ibid, [native tribunals], s °9; Indian Contract Act 1872, sec. 134), and that, by most of the codes civil now in force, the surety is discharged by laches or conduct of the Creditor inconsistent with the surety's rights (see Fr. and Bel. 2037; Spain, 1852; Port. 853; Germany, 776; Italy, 1928; Egypt [mixed suits], 623), though it may be mentioned that the rule prevailing in England, Scotland, America and India which releases the surety from liability where the creditor, by binding contract with the principal, extends without the

surety's consent the time for fulfilling the principal obligation, while recognized by two existing codes civil (Spain, 1851; Port. 852), is rejected by the majority of them (Fr. and Bel. 2039; Holland, 1887; Italy, 1930; Lower Canada, 1961; Egypt [mixed suits], 613; ib. [native tribunals], 503); and see Morice, English and Dutch Law, p. 96; van der Linden, Institutes of Holland, pp. 120-121). A revocation of the contract of suretyship by act of the parties, or in certain cases by the death of the surety, may also operate to discharge the surety. The death of a surety does not per se determine the guarantee, but, save where from its nature the guarantee is irrevocable by the surety himself, it can be revoked by express notice after his death, or, it would appear, by the creditor becoming affected with constructive notice thereof; except where, under the testator's will, the executor has the option of continuing the guarantee, in which case the executor should, it seems, specifically withdraw the guarantee in order to determine it. Where one of a number of joint and several sureties dies, the future liability of the survivors under the guarantee continues, at all events until it has been determined by express notice. Moreover, when three persons joined in a guarantee to a bank, and their liability thereunder was not expressed to be several, it was held that the death of one surety did not determine the liability of the survivors. In such a case, however, the estate of the deceased surety would be relieved from liability.

The Statutes of Limitation bar the right of action on guarantees under seal after twenty years, and on other guarantees after six years, from the date when the creditor might have sued the surety.

Authorities. — De Colyar, Law of Guarantees and of Principal arid Surety (3rd ed., 1897); American edition, by J. A. Morgan (1875); Throop, Validity of Verbal Agreements; Fell, Guarantees

(2nd ed.); Theobald, Law of Principal and Surety; Brandt, Law of Suretyships and Guarantee; article by de Colyar in Journal of Comparative Legislation (1905), on " Suretyship from the Standpoint of Comparative Jurisprudence." (H. A. de C.)

GUARATINGUETA, a city of Brazil in the eastern part of the state of Sao Paulo, 124 m. N.E. of the city of Sao Paulo. Pop. (1890) of the municipality, which includes a large rural district and the villages of Apparecida and Roseira, 30,690. The city, which was founded in 1651, stands on a fertile plain 3 m. from the Parahyba river, and is the commercial centre of one of the oldest agricultural districts of the state. The district produces large quantities of coffee, and some sugar, Indian corn and beans. Cattle and pigs are raised. The city dwellings are for the most part constructed of rough wooden frames covered with mud, called iaipa by the natives, and roofed with curved tiles. The Sao Paulo branch of the

Brazilian Central railway passes through the city, by which it is connected with Rio de Janeiro on one side and Sao Paulo and Santos on the other.

GUARDA, an episcopal city and the capital of an administra- tive district bearing the same name, and formerly in the province of Beira, Portugal; on the Guarda-Abrantes and Lisbon- Villar Formoso railways. Pop. (1900) 6124. Guarda is situated 3370 ft. above sea-level, at the north-eastern extremity of the Serra da Estrella, overlooking the fertile valley of the river Coa. It is surrounded by ancient walls, and contains a ruined castle, a fine 16th-century cathedral and a sanatorium for consumptives. Its industries comprise the manufacture of coarse cloth and the sale of grain, wine and live stock. In 1199 Guarda was founded, on the site of the Roman Lencia Oppidana, by Sancho I. of Portugal, who intended it, as its name implies, to be a " guard " against Moorish invasion. The administrative district of Guarda coincides with north-eastern Beira; pop. (1900), 261,630; area, 1065 sq. m.

GUARDI, FRANCESCO (1712-1793), Venetian painter, was a pupil of Canaletto, and followed his style so closely that his pictures are very frequently attributed to his more celebrated master. Nevertheless, the diversity, when once perceived, is sufficiently marked — Canaletto being more firm, sotfd, distinct, well-grounded, and on the whole the higher master, while Guardi is noticeable for spirited touch, sparkling colour and picturesquely sketched figures — in these respects being fully equal to Canaletto. Guardi sometimes coloured Canaletto's designs. He had extraordinary facility, three or four days being enough for producing an entire work. The number of his performances is large in proportion to this facility and to the love of gain which characterized him. Many of his works are to be found in England and seven in the Louvre.

GUARDIAN, one who guards or defends another, a protector. The O. Fr. guarden, garden, mod. gardien, from guarder, garder, is of Teutonic origin, from the base war-, to protect, cf. O.H. Ger. warten, and Eng. "ward"; thus "guardian" and "warden" are etymologically identical, as are "guard" and "ward"; cf. the use of the correlatives " guardian " and " ward," i.e. a minor, or person incapable of managing his affairs, under the protection or in the custody of a guardian. For the position of guardians of the poor see Poor Law, and for the legal relations between a guardian and his ward see Infant, Marriage and Roman Law.

GUARDS, and HOUSEHOLD TROOPS. The word guard is an adaptation of the Fr. guarde, mod. garde, O. Ger. ward; see Guardian. The practice of maintaining bodyguards is of great antiquity, and may indeed be considered the beginning of organized armies. Thus there is often no clear distinction between the inner ring of personal defenders and the select corps

of trained combatants who are at the chief's entire disposal. Famous examples of corps that fell under one or both these headings are the " Immortals " of Xerxes, the Mamelukes, Janissaries, the Huscarles of the Anglo-Saxon kings, and the Russian Strelitz (Stryeltsi). In modern times the distinction of function is better marked, and the fighting men who are more intimately connected with the sovereign than the bulk of the army can be classified as to duties into " Household Troops,"

who are in a sense personal retainers, and " Guards," who are a corps d'elite of combatants. But the dividing line is not so clear as to any given body of troops. Thus the British Household Cavalry is part of the combatant army as well as the sovereign's escort.

The oldest of the household or bodyguard corps in the United Kingdom is the King's Bodyguard of the Yeomen of the Guard (q.v.), formed at his accession by Henry VII. The " nearest guard," the personal escort of the sovereign, is the " King's Bodyguard of the Honourable Corps of Gentlemen-at-Arms," created by Henry VIII. at his accession in 1509. Formed possibly on the pattern of the " Pensionnaires " of the French kings — retainers of noble birth who were the predecessors of the Maison du Roi (see below) — the new corps was originally called " the Pensioners." The importance of such guards regiments in the general development of organized armies is illustrated by a declaration of the House of Commons, made in 1674, that the militia, the pensioners and the Yeomen of the Guard were the only lawful armed forces in the realm. But with the rise of the professional soldier and the corresponding disuse of arms by the nobles and gentry, the Gentlemen-at-Arms (a title which came into use in James II. 's time, though it did not become that of the corps until William IV. 's) retaining their noble character, became less and less military. Burke attempted without success in 1782 to restrict membership to officers of the army and navy, but the necessity of giving the corps an effective military character became obvious when, on the occasion of a threatened Chartist riot, it was called upon to do duty as an armed body at St James's Palace. The corps was reconstituted on a purely military basis in 1862, and from that date only military officers of the regular services who have received a war decoration are eligible for appointment. The office of captain, however, is political, the holder (who is always a peer) vacating it on the resignation of the government of which he is a member. The corps consists at present of captain, lieutenant, standard bearer, clerk of the cheque (adjutant), sub-officer and 39 gentlemen-at-arms. The uniform consists of a scarlet swallow- tailed coat and blue overalls, with gold epaulettes, brass

dragoon helmet with drooping white plume and brass box-spurs, these last contrasting rather forcibly with the partizan, an essentially infantry weapon, that they carry.

The Royal Company of Archers. — The king's bodyguard for Scot- land was constituted in its present form in the year 1670, by an act of the privy council of Scotland. An earlier origin has been claimed for the company, some connecting it with a supposed archer guard of the kings of Scotland. In the above-mentioned year, 1676, the minutes of the Royal Company begin by stating, that owing to " the noble and usefull recreation of archery being for many years much neglected, several noblemen and gentlemen did associate themselves in a company for encouragement thereof . . . and did apply to the privy council for their approbation . . . which was granted." For about twenty years at the end of the 17th century, perhaps owing to the adhesion of the majority to the Stuart cause, its existence seems to have been suspended. But in 1703 a new captain-general, Sir George Mackenzie, Viscount Tarbat, afterwards earl of Cromarty (1630-1714), was elected, and he procured for the company a new charter from Queen Anne. The rights and privileges renewed or conferred by this charter were to be held of the crown for the reddendo of a pair of barbed arrows. This reddendo was paid to George IV. at Holyrood in 1822, to Queen Victoria in 1842 and to King Edward VII. in 1903. The history of the Royal Company since 1703 has been one of great prosperity. Large parades were frequently held, and many distinguished men marched in the ranks. Several of the leading insurgents in 1745 were members, but the company was not at that time suspended in any way.

In 1822 when King George IV. visited Scotland, it was thought appropriate that the Royal Company should act as his majesty's bodyguard during his stay, especially as there was a tradition of a former archer bodyguard. They therefore performed the duties usually assigned to the gentlemen-at-arms. When Queen Victoria visited the Scottish capital in 1842, the Royal Company again did duty; the last time they were called out in her reign in their capacity of royal bodyguard was in i860 on the occasion of the great volunteer review in the Queen's Park, Edinburgh. They acted in the same capacity when King Edward VII. reviewed the Scottish Volunteers there on the 18th of September 1905.

King George IV. authorized the company to take, in addition to their former name, that of " The King's Body Guard for Scot- land," and presented to the captain-general a gold stick, thus

constituting the company part of the royal household. In virtue of this stick the captain-general of the Royal Company takes his place at a coronation or similar pageant immediately behind the gold stick of England. The

lieutenants-general of the company have silver sticks; and the council, which is the executive body of the company, possess seven ebony ones. George IV. further ap- pointed a full dress uniform to be worn by members of the company at court, when not on duty as guards, in which latter case the ordinary field dress is used. The court dress is green with green velvet facings, gold epaulettes and lace, crimson silk sash, and cocked hat with green plume. The officers wear a gold sash in place of a crimson one, and an aiguillette on the left shoulder. All ranks wear swords. The field dress at present consists of a dark- green tunic, shoulder -wings and gauntleted cuffs and trousers trimmed with black and crimson; a bow-case worn as a sash, of the same colour as the coat, black waistbelt with sword, and Balmoral bonnet with thistle ornament and eagle's feather. The officers of the company are the captain-generai, 4 captains, 4 lieutenants, 4 ensigns, 12 brigadiers and adjutant.

Corps of the gentlemen-at-arms or yeoman type do not of course count as combatant troops — if for no other reason at least because they are armed with the weapons of bygone times. Colonel Clifford Walton states in his History of the British Standing Army that neither the Yeomen of the Guard nor the Pensioners were ever subject to martial law. The British guards and household troops that are armed, trained and organized as part of the army are the Household Cavalry and the Foot Guards.

The Household Cavalry consists at the present day of three regiments, and has its origin, as have certain of the Footguard regiments, in the ashes of the " New Model " army disbanded at the restoration of Charles II. in 1660. In that year the " 1st or His Majesty's Own Troop of Guards " formed during the king's exile of his cavalier followers, was taken on the strength of the army. The 2nd troop was formerly in the Spanish service as the " Duke of York's Guards," and was also a cavalier unit. In 1670, on Monk's death, the original 3rd troop (Monk's Life Guards, renamed in 1660 the " Lord General's Troop of Guards ") *became the 2nd (the queen's) troop, and the duke of York's troop the 3rd. In 1685 the 1st and 2nd troops were styled Life Guards of Horse, and two years later the blue-uniformed " Royal Regiment of Horse," a New Model regiment that had been disbanded and at once re-raised in 1660, was made a household cavalry corps. Later under the colonelcy of the earl of Oxford it was popularly called " The Oxford Blues." There were also from time to time other troops (e.g. Scots troops 1 700-1 746) that have now disappeared. In 1746 the 2nd troop was dis- banded, but it was revived in 1788, when the two senior corps were given their present title of 1st and 2nd Life Guards. From 1750 to 1819 the Blues bore the name of " Royal Horse Guards Blue," which in 1819 was changed to " Royal Horse Guards (The Blues)." The general distinction between the uniforms of the red Life Guard and the blue Horse Guard still exists. The 1st and the 2nd regiments of Life Guards*

wear scarlet tunics with blue collars and cuffs, and the Royal Horse Guards blue tunics with scarlet collars and cuffs. All three wear steel cuirasses on state occasions and on guard duty. The head-dress is a steel helmet with drooping horse-hair plume (white for Life Guards, red for Horse Guards). In full dress white buckskin pantaloons and long knee boots are worn. Amongst the peculiarities of these corps d'elite is the survival of the old custom of calling non-commissioned officers "corporal of horse" instead of sergeant, and corporal-major instead of sergeant-major, the wearing by trumpeters and bandsmen in full dress of a black velvet cap, a richly laced coat with a full skirt extending to the wearer's knees and long white gaiters. There is little distinction between the two Life Guards regiments' uniforms, the most obvious point being that the cord running through the white leather pouch belt is red for the 1st and blue for the 2nd.

The Foot Guards comprise the Grenadier Guards, the Cold- stream Guards, the Scots Guards and the Irish Guards, each (except the last) of three battalions. The Grenadiers, originally the First Foot Guards, represent a royalist infantry regiment which served with the exiled princes in the Spanish army and returned at the Restoration in 1660. The Coldstream Guards

are a New Model regiment, and were originally called the Lord General's (Monk's) regiment of Foot Guards. Their popular title, which became their official designation in 1670, is derived from the fact that the army with which Monk restored the monarchy crossed the Tweed into England at the village of Coldstream, and that his troops (which were afterwards, except the two units of horse and foot of which Monk himself was colonel, disbanded) were called the Coldstreamers. The two battalions of Scots Foot Guards, which regiment was separately raised and maintained in Scotland after the Restoration, marched to London in 1686 and 1688 arid were brought on to the English Establishment in 1707. In George III.'s reign they were known as the Third Guards, and from 1831 to 1877 (when the present title was adopted) as the Scots Fusilier Guards.

The Irish Guards (one battalion) were formed in 1902, after the South African War, as a mark of Queen Victoria's apprecia- tion of the services rendered by the various Irish regiments of the line. 1 The dress of the Foot Guards is generally similar in all four regiments, scarlet tunic with blue collars, cuffs and shoulder-straps, blue trousers and high, rounded bearskin cap. The regimental distinctions most easily noticed are these. The Grenadiers wear a small white plume in the bearskin, the Cold- streams a

similar red one, the Scots none, the Irish a blue-green one. The buttons on the tunic are spaced evenly for the Grenadiers, by twos for the Coldstreams, by threes for the Scots and by fours for the Irish. The band of the modern cap is red for the Grenadiers, white for the Coldstreams, " diced " red and white (chequers) for the Scots and green for the Irish. Former privileges of foot guard regiments, such as higher brevet rank in the army for their regimental officers, are now abolished, but Guards are still subject exclusively to the command of their own officers, and the officers of the Foot Guards, like those of the Household Cavalry, have special duties at court. Neither the cavalry nor the infantry guards serve abroad in peace time as a rule, but in 1907 a battalion of the Guards, which it was at that time proposed to disband, was sent to Egypt. " Guards' Brigades " served in the Napoleonic Wars, in the Crimea, in Egypt at various times from 1887 to 1898 and in South Africa 1 899- 1 90 2. The last employment of the Household Cavalry as a brigade in war was at Waterloo, but composite regiments made up from officers and men of the Life Guards and Blues were employed in Egypt and in S. Africa.

The sovereigns of France had guards in their service in Mero- vingian times, and their household forces appear from time to time in the history of medieval wars. Louis XI. was, however, the first to regularize their somewhat loose organization, and he did so to such good purpose that Francis I. had no less than 8000 guardsmen organized, subdivided and permanently under arms. The senior unit of the Gardes du Corps was the famous company of Scottish archers {Compagnie ecossaise de la Garde du Corps du Rot), which was originally formed (1418) from the Scottish contingents that assisted the French in the Hundred Years' War. Scott's Quenlin Durward gives a picture of life in the corps as it was under Louis XI. In the following century, however, its regimental history becomes somewhat confused. Two French companies were added by Louis XI. and Francis I. and the Gardes du Corps came to consist ex- clusively of cavalry. About 1634 nearly all the Scots then serving went into the " regiment d'Hebron " and thence later into the British regular army (see Hepburn, Sir John). Thereafter, though the titles, distinctions and privileges of the original Archer Guard were continued, it was recruited from native Frenchmen, preference being (at any rate at first) given to those of Scottish descent. At its disbandment in 1791 along with the rest of the Gardes du Corps, it contained few, if any, native Scots. There was also, for a short time (1643-1660), an infantry regiment of Gardes ecossaises.

In 1671 the title of Maison Militaire du Roi was applied to that portion of the household that was distinctively military. It came to consist of 4 companies of the Gardes du Corps, 2 companies of Mousquetaires (cavalry) (formed 1622 and 1660), I company of Chevaux legers (1570), 1 of Gendarmes de la Maison Rouge, and 1 of Grenadiers d. Cheval

(1676), with 1 company of Gardes de la Porte and" one called the Cent-Suisses, the last two being semi-military. This • large establishment, which did not include all the guard regiments, was considerably reduced by the Count of St Germain's reforms in

1 The " Irish Guards " of the Stuarts took the side of James II., fought against William III. in Ireland and lost their regimental identity in the French service to which the officers and soldiers transferred themselves on the abandonment of the struggle.

1775. all except the Gardes du Corps and the Cent-Suisses being disbanded. The whole of the Maison du Roi, with the exception of the semi-military bodies referred to, was cavalry.

The Gardes jrancaises, formed in 1563, did not form part of the Maison. They were an infantry regiment, as were the famous Gardes suisses, originally a Swiss mercenary regiment in the Wars of Religion, which was, for good conduct at the combat of Arques, incorporated in the permanent establishment by Henry IV. in 1589 and in the guards in 1615. At the Revolution, contrary to expectation, the French Guards sided openly with the Constitutional movement and were disbanded. The Swiss Guards, however, being foreigners, and therefore unaffected by civil troubles, retained their exact discipline and devotion to the court to the day on which they were sacrificed by their master to the bullets of the Marseillais and the pikes of the mob (August 10, 1792). Their tragic fate is commemorated by the well-known monument called the " Lion of Lucerne," the work of Thorvaldsen, erected near Lucerne in 1821. The " Constitutional," " Revolutionary " and other guards that were created after the abolition of the Maison and the slaughter of the Swiss are unimportant, but through the " Directory Guards " they form a nominal link between the household troops of the monarchy and the corps which is perhaps the most famous " Guard " in history. The Imperial Guard of Napoleon had its beginnings in an escort squadron called the Corps of Guides, which accompanied him in the Italian campaign of 1 796-1 797 and in Egypt. On becoming First Consul in 1799 he built up out of this and of the guard of the Directory a small corps of horse and foot, called the Consular Guard, and this, which was more of a fighting unit than a personal bodyguard, took part in the battle of Marengo. The Imperial Guard, into which it was converted on the establishment of the Empire, was at first of about the strength of a division. As such it took part in the Austerlitz and Jena campaigns, but after the conquest of Prussia Napoleon augmented it, and divided it into the " Old Guard " and the " Young Guard." Subsequently the " Middle Guard " was created, and by successive augmentations the corps of the guard had grown to be 57,000 strong in 1811-1812 and 81,000 in 1813. It preserved its general character as a corps d 'elite of

veterans to the last, but from about 1813 the "Young Guard " was recruited directly from the best of the annual conscript contingent. The officers held a higher rank in the army than their regimental rank in the Guards. At the first Restoration an attempt was made to revive the Maison du Roi, but in the constitutional regime of the second Restoration this semi-medieval form of body- guard was given up and replaced by the Garde Royale, a selected fighting corps. This took part in the short war with Spain and a portion of it fought in Algeria, but it was disbanded at the July Revolution. Louis Philippe had no real guard troops, but the memories of the Imperial Guard were revived by Napoleon III., who formed a large guard corps in 1 853-1 854. This, however, was open to an even greater degree than Napoleon I.'s guard to the objection that it took away the best soldiers from the line. Since the fall of the Empire in 1870 there have been no guard troops in France. The duty of watching over the safety of the president is taken in the ordinary roster of duty by the troops stationed in the capital. The " Republican Guard " is the Paris gendarmerie, recruited from old soldiers and armed and trained as a military body. In Austria-Hungary there are only small bodies of household troops (Archer Body Guard, Trabant Guard, Hungarian Crown Guards, &c.) analogous to the British Gentlemen at Arms or Yeomen of the Guard. Similar forces, the " Noble Guard " and the " Swiss Guard," are maintained in the Vatican. The court troops of Spain are called " halberdiers " and armed with the halbert.

In Russia the Guard is organized as an army corps. It possesses special privileges, particularly as regards officers' advancement.

I nGermany the distinction between armed retainers and "Guards " is well marked. The army is for practical purposes a unit under imperial control, while household troops (" castle-guards " as they are usually called) belong individually to the various sovereigns within the empire. The " Guards," as a combatant force in the army are those of the king of Prussia and constitute a strong army corps. This has growm gradually from a bodyguard of archers, and, as in Great Britain, the functions of the heavy cavalry regiments of the Guard preserve to some extent the name and character ef a body guard (Gardes du Corps). The senior foot guard regiment is also personally connected with the royal family. The conversion of a palace-guard to a combatant force is due chiefly to Frederick William I., to whom drill was a ruling passion, and who substituted effective regiments for the ornamental " Trabant Guards " of his father. A further move was made by Frederick the Great in sub- stituting for Frederick William's expensive " giant " regiment of guards a larger number of ordinary soldiers, whom he subjected to the same rigorous training and made a corps d'elite. Frederick the Great also formed the Body Guard alluded to above. Neverthe- less in 1806 the Guard still consisted only of two cavalry regiments and four infantry regiments, and it was the example

of Napoleon's imperial guard which converted this force into a corps of all arms. In 18 13 its strength was that of a weak division, but in i860 by slight but frequent augmentations it had come to consist of an I army corps, complete with all auxiliary services. A few guard

regiments belonging to the minor sovereigns are counted in the line of the German army. In war the Guard is employed as a unit, like other army corps. It is recruited by the assignment of selected young men of each annual contingent, and is thus free from the reproach of the French Imperial Guard, which took the best-trained soldiers from the regiments of the line.

GUARD-SHIP, a warship stationed at some port or harbour to act as a guard, and in former times in the British navy to receive the men impressed for service. She usually was the flagship of the admiral commanding on the coast. A guard-boat is a boat which goes the round of a fleet at anchor to see that due watch is kept at night.

GUARICO, a large inland state of Venezuela created by the territorial redivision of 1904, bounded by Aragua and Miranda on the N., Bermiidez on the E., Bolivar on the S., and Zamora on the W. Pop. (1905 estimate), 78,117. It extends across the northern llanos to the Orinoco and Apure rivers and is devoted almost wholly to pastoral pursuits, exporting cattle, horses and mules, hides and skins, cheese and some other products. The capital is Calabozo, and the other principal towns are Camaguan (pop. 3648) on the Portugueza river, Guayabal (pop. 3146), on a small tributary of the Guarico river, and Zaraza (pop. 14,546) on the Unare river, nearly 150 m. S.E. of Caracas.

GUARIENTO, sometimes incorrectly named Guerkiero, the first Paduan painter who distinguished himself. The only date distinctly known in his career is 1365, when, having already acquired high renown in his native city, he was invited by the Venetian authorities to paint a Paradise, and some incidents of the war of Spoleto, in the great council-hall of Venice. These works were greatly admired at the time, but have long ago disappeared under repaintings. His works in Padua have suffered much. In the church of the Eremitani are allegories of the Planets, and, in its choir, some small sacred histories in dead colour, such as an Ecce Homo; also, on the upper walls, the life of St Augustine, with some other subjects. y A few fragments of other paintings by Guariento are still extant in Padua. In the gallery of Bassano is a Crucifixion, carefully executed, and somewhat

superior to a merely traditional method of handling, although on the whole Guariento must rather be classed in that school of art which preceded Cimabue than as having advanced in his vestiges; likewise two other works in Bassano, ascribed to the same hand. The painter is buried in the church of S. Bernardino, Padua.

GUARINI, CAMILLO-GUARINO (1624-1683), Italian monk, writer and architect, was born at Modena in 1624. He was at once a learned mathematician, professor of literature and philosophy at Messina, and, from the age of seventeen, was architect to Duke Philibert of Savoy. He designed a very large number of public and private buildings at Turin, including the palaces of the duke of Savoy and the prince of Cacignan, and many public buildings at Modena, Verona, Vienna, Prague, Lisbon and Paris. He died at Milan in 1683.

GUARINI, GIOVANNI BATTISTA (1537-1612), Italian poet, author of the Pastor fido, was born at Ferrara on the 10th of December 1537, just seven years before the birth of Tasso. He was descended from Guarino da Verona. The young Battista studied both at Pisa and Padua, whence he was called, when not yet twenty, to profess moral philosophy in the schools of his native city. He inherited considerable wealth, and was able early in life to marry Taddea de' Bendedei, a lady of good birth. In 1567 he entered the service of Alphonso II., duke of Ferrara, thus beginning the court career which was destined to prove a constant source of disappointment and annoyance to him. Though he cultivated poetry for pastime, Guarini aimed at state employment as the serious business of bis life, and managed to be sent on various embassies and missions by his ducal master. There was, however, at the end of the 16th century no oppor- tunity for a man of energy and intellectual ability to distinguish himself in the petty sphere of Italian diplomacy. The time too had passed when the profession of a courtier, painted in such glowing terms by Castiglione, could confer either profit or honour. It is true that the court of Alphonso presented a brilliant spectacle to Europe, with Tasso for titular poet, and

an attractive circle of accomplished ladies. But the last duke of Ferrara was an illiberal patron, feeding his servants with promises, and ever ready to treat them with the brutality that condemned the author of the Gerusalemme liberata to a mad- house. Guarini spent his time and money to little purpose, suffered from the spite and ill-will of two successive secretaries, — Pigna and Montecatini, — quarrelled with his old friend Tasso, and at the end of fourteen years of service found himself half-ruined, with a large family and no prospects. When Tasso was condemned to S. Anna, the duke promoted Guarini to the vacant post of court poet. There is an interesting letter extant from the latter to his friend Cornelio

Bentivoglio, describing the efforts he made to fill this place appropriately. " I strove to transform myself into another person, and, like a player, reassumed the character, costume and feelings of my youth. Advanced in manhood, I forced myself to look young; I turned my natural melancholy into artificial gaiety, affected loves I did not feel, exchanged wisdom for folly, and, in a word, passed from a philosopher into a poet." How ill-adapted he felt himself to this masquerade life may be gathered from the following sentence: " I am already in my forty-fourth year, the father of eight children, two of whom are old enough to be my censors, while my daughters are of an age to marry." Abandoning so un- congenial a strain upon his faculties, Guarini retired in 1582 to his ancestral farm, the Villa Guarina, in the lovely country that lies between the Adige and Po, where he gave himself up to the cares of his family, the nursing of his dilapidated fortunes and the composition of the Pastor fido. He was not happy in his domestic lot; for he had lost his wife young, and quarrelled with his elder sons about the division of his estate. Litigation seems to have been an inveterate vice with Guarini; nor was he ever free from legal troubles. After studying his biography, the conclusion is forced upon our minds that he was originally a man of robust and virile intellect, ambitious of greatness, confident in his own powers, and well qualified for serious affairs, whose energies found no proper scope for their exercise. Literary work offered but a poor sphere for such a character, while the enforced inactivity of court life soured a naturally capricious and choleric temper. Of poetry he spoke with a certain tone of condescension, professing to practise it only in his leisure moments; nor are his miscellaneous verses of a quality to secure for their author a very lasting reputation. It is therefore not a little remarkable that the fruit of his retirement — a disappointed courtier past the prime of early manhood — should have been a dramatic masterpiece worthy to be ranked with the classics of Italian literature. Deferring a further account of the Pastor fido for the present, the remaining incidents of Guarini's restless life may be briefly told. In 1585 he was at Turin superintending the first public performance of his drama, whence Alphonso recalled him to Ferrara, and gave him the office of secretary of state. This reconciliation between the poet and his patron did not last long. Guarini moved to Florence, then to Rome, and back again to Florence, where he established himself as the courtier of Ferdinand de' Medici. A dishonourable marriage, pressed upon his son Guarino by the grand-duke, roused the natural resentment of Guarini, always scrupulous upon the point of honour. He abandoned the Medicean court, and took refuge with Francesco Maria of Urbino, the last scion of the Montefeltro- della-Rovere house. Yet he found no satisfaction at Urbino. " The old court is a dead institution," he writes to a friend; " one may see a shadow of it, but not the substance in Italy of to-day. Ours is an age of appearances, and one goes a-masquerading all the year." This was true enough. Those dwindling deadly-lively little

residence towns of Italian ducal families, whose day of glory was over, and who were waiting to be slowly absorbed by the capacious appetite of Austria, were no fit places for a man of energy and independence. Guarini finally took refuge in his native Ferrara, which, since the death of Alphonso, had now devolved to the papal see. Here, aild at the Villa Guarina, his last years were passed in study, lawsuits, and polemical disputes with his contemporary critics, until 161 2, when he died at Venice in his seventy-fifth year.

The Pastor fido (first published in 1590) is a pastoral drama composed not without reminiscences of Tasso's Aminta. The scene is laid in Arcadia, where Guarini supposes it to have been the custom to sacrifice a maiden yearly to Diana. But an oracle has declared that when two scions of divine lineage are united in marriage, and a faithful shepherd has atoned for the ancient error of a faithless woman, this inhuman rite shall cease. The plot turns upon the unexpected fulfilment of this prophecy, contrary to all the schemes which had been devised for bringing it to accomplishment, and in despite of apparent improbabilities of divers kinds. It is extremely elaborate, and, regarded as a piece of cunning mechanism, leaves nothing to be desired. Each motive has been carefully prepared, each situation amply developed. Yet, considered as a play, the Pastor fido disap- points a reader trained in the school of Sophocles or Shakespeare. The action itself seems to take place off the stage, and only the results of action, stationary tableaux representing the movement of the drama, are put before us in the scenes. The art is lyrical, not merely in form but in spirit, and in adaptation to the re- quirements of music which demands stationary expressions of emotion for development. The characters have been well considered, and are exhibited with great truth and vividness; the cold and eager hunter Silvio contrasting with the tender and romantic Mirtillo, and Corisca's meretricious arts enhancing the pure affection of Amarilli. Dorinda presents another type of love so impulsive that it prevails over a maiden's sense of shame, while the courtier Carino brings the corruption of towns into comparison with the innocence of the country. In Carino the poet painted his own experience, and here his satire upon the court of Ferrara is none the less biting because it is gravely measured. In Corisca he delineated a woman vitiated by the same town life, and a very hideous portrait has he drawn. Though a satirical element was thus introduced into the Pastor fido in order to relieve its ideal picture of Arcadia, the whole play is but a study of contemporary feeling in Italian society. There is no true rusticity whatever in the drama. This corre- spondence with the spirit of the age secured its success during Guarini's lifetime; this made it so dangerously

seductive that Cardinal Bellarmine told the poet he had done more harm to Christendom by his blandishments than Luther by his heresy. Without anywhere transgressing the limits of decorum, the Pastor fido is steeped in sensuousness; and the immodesty of its pictures is enhanced by rhetorical concealments more provocative than nudity. Moreover, the love described is effeminate and wanton, felt less as passion than as lust en- veloped in a veil of sentiment. We divine the coming age of cicisbei and castrati. Of Guarini's style it would be difficult to speak in terms of too high praise. The thought and experience of a lifetime have been condensed in these five acts, and have found expression in language brilliant, classical, chiselled to perfection. Here and there the taste of the 17th century makes itself felt in frigid conceits and forced antitheses; nor does Guarini abstain from sententious maxims which reveal the moralist rather than the poet. Yet these are but minor blemishes in a masterpiece of diction, glittering and faultless like a polished bas-relief of hard Corinthian bronze. That a single pastoral should occupy so prominent a place in the history of literature seems astonishing, until we reflect that Italy, upon the close of the 1 6th century, expressed itself in the Pastor fido, and that the influence of this drama was felt through all the art of Europe till the epoch of the Revolution. It is not a mere play. The sensual refinement proper to an age of social decadence found in it the most exact embodiment, and made it the code of gallantry for the next two centuries.

The best edition of the Pastor fido is the 20th, published at Venice (Ciotti) in 1602. The most convenient is that of Barbera (Florence, • 1866). For Guarini's miscellaneous Rime, the Ferrara edition, in 4 vols., 1737, may be consulted. His polemical writings, Veralo primo and secondo, and his prose comedy called Idropica, were published at Venice, Florence and Rome, between 1588 and 1614.

(J.A.S.)

GUARINO, also known as Varinus, and surnamed from his birthplace Favorinus, Phavorinus or Camers (c. 145°-

IS37), Italian lexicographer and scholar, was born at Favera near Camerino, studied Greek and Latin at Florence under Politian, and afterwards became for a time the pupil of Lascaris. Having entered the Benedictine order, he now gave himself with great zeal to Greek lexicography; and in 1496 published his Thesaurus cornucopiae et horti Adonidis, a collection of thirty-four grammatical tracts in Greek. He for some time acted as tutor to Giovanni dei Medici (afterwards Leo X.), and also held the appointment of keeper of the Medicean library at Florence. In 15 14 Leo appointed him bishop of Nocera. In 1517 he published a translation of the Apopklhegmata of Joannes Stobaeus, and in 1523

appeared his Etymologicum magnum, she thesaurus universae linguae Graecae ex multis variisque autoribus collectus, a compilation which has been frequently reprinted, and which has laid subsequent scholars under great though not always acknowledged obligations.

GUARINO [GUARINUS] DA VERONA (1370-1460), one of the Italian restorers of classical learning, was born in 1370 at Verona, and studied Greek at Constantinople, where for five years he was the pupil of Manuel Chrysoloras. When he set out on his return to Italy he was the happy possessor of two cases of precious Greek MSS. which he had been at great pains to collect ; it is said that the loss of one of these by shipwreck caused him such distress that his hair turned grey in a single night. He supported himself as a teacher of Greek, first at Verona and afterwards in Venice and Florence; in 1436 he became, through the patronage of Lionel, marquis of Este, professor of Greek at Ferrara; and in 1438 and following years he acted as interpreter for the Greeks at the councils of Ferrara and Florence. He died at Ferrara on the 14th of December 1460. His principal works are translations of Strabo and of some of the Lives of Plutarch, a compendium of the Greek grammar of Chry- soloras, and a series of commentaries on Persius, Juvenal, Martial and on some of the writings of Aristotle and Cicero. See Rosmini, Vita e discipline, di Guarino (1805-1806); Sabbadini, Guarino Veronese (1885); Sandys, Hist. Class. Schol. ii. (1908).

GUARNIERI, or Guarnerius, a celebrated family of violin- makers of Cremona. The first was Andreas (c. 1626-1698), who worked with Antonio Stradivari in the workshop of Nicolo Amati (son of Geronimo). Violins of a model original to him are dated from the sign of " St Theresa " in Cremona. His son Joseph (1666-c. 1739) made instruments at first like his father's, but later in a style of his own with a narrow waist; his son, Peter of Venice (b. 1695), was a l s0 a fi ne maker. Another son of Andreas, Peter (Pietro Giovanni), commonly known "as " Peter of Cremona " (b. 1655), moved from Cremona and settled at Mantua, where he too worked " sub signo Sanctae Teresae." Peter's violins again showed considerable variations from those of the other Guarnieri. Hart, in his work on the violin, says, " There is increased breadth between the sound- holes; the sound-hole is rounder and more perpendicular; the middle bouts are more contracted, and the model is more raised."

The greatest of all the Guarnieri, however, was a nephew of Andreas, Joseph del Gesii (1687-1745), whose title originates in the I.H.S. inscribed on his tickets. His master was Gaspar di Salo. His conception follows that of the early Brescian makers in the boldness of outline and the massive construction which aim at the production of tone rather than visual perfection of form. The great variety of his work in size, model, &c, represents his various experiments in the direction of discovering this tone.

A stain or sap-mark, parallel with the finger-board on both sides, appears on the bellies of most of his instruments. Since the middle of the 18th century a great many spurious instruments ascribed to this master have poured over Europe. It was not until Paganini played on a " Joseph " that the taste of amateurs turned from the sweetness of the Amati and the Stradivarius violins in favour of the robuster tone of the Joseph Guarnerius. See Violin.

GUASTALLA, a town and episcopal see of Emilia, Italy, in the province of Reggio, from which it is 18 m. N. by road, on the S. bank of the Po, 79 ft. above sea-level. It is also connected by rail with Parma and Mantua (via Suzzara). Pop.

(1901), 2658 (town); 11,091 (commune). It has 16th-century fortifications. The cathedral, dating from the 10th century, has been frequently restored. Guastalla was founded by the Lombards in the 7th century; in the church of the Pieve Pope Paschal II. held a council in 1106. In 1307 it was seized by Giberto da Correggio of Parma. In 1403 it passed to Guido Torello, cousin of Filippo Maria Visconti of Milan. In 1539 it was sold by the last female descendant of the Torelli to Ferrante Gonzaga. In 1621 it was made the seat of a duchy, but in 1748 it was added to those of Parma and Piacenza, whose history it subsequently followed.

GUATEMALA (sometimes incorrectly written Guatemala), a name now restricted to the republic of Guatemala and to its chief city, but formerly given to a captaincy-general of Spanish America, which included the fifteen provinces of Chiapas, Suchitepeques, Escuintla, Sonsonate, San Salvador, Vera Paz and Peten, Chiquimula, Honduras, Nicaragua, Costa Rica, Totonicapam, Quezaltenango, Solola, Chimaltenango and Sacatepeques, — or, in other words, the whole of Central America (except Panama) and part of Mexico. The name is probably of Aztec origin, and is said by some authorities to mean in its native form Quauhtematlan, " Land of the Eagle," or " Land of Forest "; others, writing it U-ha-tez-ma-la, connect it with the volcano of Agua (i.e. " water "), and interpret it as " mountain vomiting water."

The republic of Guatemala is situated between 13 42′ and 17° 49′ N., and 88° 10′ and 92° 30′ W. (For map, see Central America.) Pop. (1903), 1,842,134; area about 48,250 sq. m. Guatemala is bounded on the W. and N. by Mexico, N.E. by British Honduras, E. by the Gulf of Honduras, and the republic Df Honduras, S.E. by Salvador and S. by the Pacific

Ocean. The frontier towards Mexico was determined by conventions of the 27th of September 1882, the 17th of October 1883, the 1st of April 1895, and the 8th of May 1899. Starting from the Pacific, it ascends the river Suchiate, then follows an irregular line towards the north-east, till it reaches the parallel of 17° 49′ N., along which it runs to the frontier of British Honduras. This frontier, by the convention of the 9th of July 1893, coincides with the meridian of 89 20′ W., till it meets the river Sarstoon or Sarstun, which it follows eastwards to the Gulf of Honduras.

Physical Description. — Guatemala is naturally divided into five regions — the lowlands of the Pacific coast, the volcanic mountains ■ > { the Sierra Madre, the so-called plateaus immediately north of these, the mountains of the Atlantic versant and the plain of Peten. (i) The coastal plains extend along the entire southern seaboard, with a mean breadth of 50 m., and link together the belts of similar territory in Salvador and the district of Soconusco in Chiapas. Owing to their tropical heat, low elevation above sea-level, and marshy soil, they are thinly peopled, and contain few important towns except the seaports. (2) The precipitous barrier of the Sierra Madre, which closes in the coastal plains on the north, is similarly prolonged into Salvador and Mexico. It is known near Guatemala city as the Sierra de las Nubes, and enters Mexico as the Sierra de Istatan. It forms the main watershed between the Pacific and Atlantic river systems. Its summit is not a well-defined crest, but is often rounded or flattened into a table-land. The direction of the great volcanic cones, which rise in an irregular line above it, is not identical with the main axis of the Sierra itself, except near the Mexican frontier, but has a more southerly trend, specially towards Salvador; here the base of many of the igneous peaks rests among the southern foothills of the range. It is, however, impossible to subdivide the Sierra Madre into a northern and a volcanic chain; for the volcanoes are isolated by stretches of com- paratively low country; at least thirteen considerable streams flow down between them, from the main watershed to the sea. Viewed from the coast, the volcanic cones seem to rise directly from the central heights of the Sierra Madre, above which they tower; but in reality their bases are, as a rule, farther south. East of Tacana, which marks the Mexican frontier, and is variously estimated at 13,976 ft. and 13,090 ft., and if the higher estimate be correct is the loftiest peak in Central America, the principal volcanoes are — Tajamulco or Tajumulco (13,517 ft.); Santa Maria (12,467 ft.), which was in eruption during 1902, after centuries of quiescence, in which its slopes had been overgrown by dense forests; Atitlan (11,719), overlooking the lake of that name; AcatenangO (13,615), which shares the claim of Tacana to be the highest mountain of Central America; Fuego (i.e. " fire," variously estimated at 12,795 ft. and 12,582 ft.), which received its name from its activity at the time of the Spanish conquest ; Agua (i.e. " water," 12,139

ft.),

so named in 1 541 because it destroyed the former capital of Guate- mala with a deluge of water from its flooded crater; and Pacaya (8390), a group of igneous peaks which were in eruption in 1870. (3) The so-called plateaus which extend north of the Sierra Madre are in fact high valleys, rather than table-lands, enclosed by moun- tains. A better idea of this region is conveyed by the native name Altos, or highlands, although that term includes the northern declivity of the Sierra Madre. The mean elevation is greatest in the west (Altos of Quezaltenango) and least in the east (Altos of Guatemala). A few of the streams of the Pacific slope actually rise in the Altos, and force a way through the Sierra Madre at the bottom of deep ravines. One large river, the Chixoy, escapes north- wards towards the Atlantic. (4) The relief of the mountainous country which lies north of the Altos and drains into the Atlantic is varied by innumerable terraces, ridges and underfalls; but its general configuration is admirably compared by E. Reclus with the appearance of " a stormy sea breaking into parallel billows " (Uni- versal Geography, ed. E. G. Ravenstein, div. xxxiii., p. 212). The parallel ranges extend east and west with a slight southerly curve towards their centres. A range called the Sierra de Chama, which, however, changes its name frequently from place to place, strikes eastward towards British Honduras, and is connected by low hills with the Cockscomb Mountains; another similar range, the Sierra de Santa Cruz, continues east to Cape Cocoli between the Polochic and the Sarstoon; and a third, the Sierra de las Minas or, in its eastern portion, Sierra del Mico, stretches between the Polochic and the Motagua. Between Honduras and Guatemala the frontier is formed by the Sierra de Merendon. (5) The great plain of Peten, which comprises about one-third of the whole area of Guatemala, belongs geographically to the Yucatan Peninsula, and consists of level or undulating country, covered with grass or forest. Its population numbers less than two per sq. m., although many districts have a wonderfully fertile soil and abundance of water. The greater part of this region is uncultivated, and only utilized as pasture by the Indians, who form the majority of its inhabitants.

Guatemala is richly watered. On the western side of the sierras the versant is short, and the streams, while very numerous, are consequently small and rapid; but on the eastern side a number of the rivers attain a very considerable development. The Motagua, whose principal head stream is called the Rio Grande, has a course of about 250 m., and is navigable to within 90 m. of the capital, which is situated on one of its confluents, the Rio de las Vacas. It forms a delta on the south of the Gulf of Honduras. Of similar importance is the Polochic, which is about 180 m. in length, and navigable about 20 m. above the river-port of Teleman. Before reaching the Golfo Amatique it passes through the Golfo Dulce, or Izabal Lake, and the

Golfete Dulce. A vast number of streams, among which are the Chixoy, the Guadalupe, and the Rio de la Pasion, unite to form the Usumacinta, whose noble current passes along the Mexican frontier, and flowing on through Chiapas and Tabasco, falls into the Bay of Campeche. The Chiapas follows a similar course.

There are several extensive lakes in Guatemala. The Lake of Peten or Laguna de Flores, in the centre of the department of Peten, is an irregular basin about 27 m. long, with an extreme breadth of 13 m. In an island in the western portion stands Flores, a town well known to American antiquaries for the number of ancient idols which have been recovered from its soil. On the shore of the lake is the stalactite cave of Jobitsinal, of great local celebrity; and in its depths, according to the popular legend, may still be dis- cerned the stone image of a horse that belonged to Cortes. The ' Golfo Dulce is, as its name implies, a fresh- water lake, although so near the Atlantic. It is about 36 m. long, and would be of con- siderable value as a harbour if the bar at the mouth of the Rio Dulce did not prevent the upward passage of seafaring vessels. As a contrast the Lake of Atitlan (q.v.) is a land-locked basin en- compassed with lofty mountains. About 9 m. S. of the capital lies the Lake of Amatitlan (q.v.) with the town of the same name. On the borders of Salvador and Guatemala there is the Lake of Guija, about 20 m. long and 12 broad, at a height of 2100 ft. above the sea. It is connected by the river Ostuma with the Lake of Ayarza which lies about 1000 ft. higher at the foot of the Sierra Madre.

The geology, fauna and flora of Guatemala are discussed under Central America. The bird-life of the country is remarkably rich; one bird of magnificent plumage, the quetzal, quijal or quesal (Trogon resplendens), has been chosen as the national emblem.

Climate. — The climate is healthy, except on the coasts, where malarial fever is prevalent. The rainy season in the interior lasts from May to October, but on the coast sometimes continues till December. The coldest month is January, and the warmest is May. The average temperatures for these months at places of different altitudes, as given by Dr Karl Sapper, are shown on the following page. The average rainfall is very heavy, especially on the Atlantic slope, where the prevailing winds are charged with moisture from the Gulf of Mexico or the Caribbean Sea; at Tual, a high station on the Atlantic slope, it reaches 195 in.; in central Guatemala it is only 27 in. Towards the Atlantic rain often occurs in the dry season, and there is a local saying near the Golfo Dulce that " it rains thirteen months in the year." Fogs are not rare. In Guatemala,

GUATEMALA

Locality.

Altitude (Feet).

Fahrenheit Degrees.

January.

May.

Puerto Barrios ….

Salama

Campur

Guatemala

Quezaltenango ….

6 3020 3050 4280 4870 7710

74 68 64 61 60 50

81 77 73 68

67 62

as in other parts of Central America (q.v.), each of the three climatic zones, cold, temperate and hot (tierra fria, tierra templada, tierra caliente) has its special characteristics, and it is not easy to generalize about the climate of the country as a whole.

Natural Products. — The minerals discovered in Guatemala include gold, silver, lead, tin, copper, mercury, antimony, coal, salt and sulphur; but it is uncertain if many of these exist in quantities sufficient to repay exploitation. Gold is obtained at Las Quebradas near Izabal, silver in the departments of Santa Rosa and Chiquimula, salt in those of Santa Rosa and Alta Vera Paz. During the 17th century gold-washing was carried on by English miners in the Motagua valley, and is said to have yielded rich profits; hence the name of " Gold Coast " was not infrequently given to the Atlantic littoral near the mouth of the Motagua.

The area of forest has only been seriously diminished in the west, and amounted to 2030 sq. m. in 1904. Besides rubber, it yields many valuable

dye-woods and cabinet-woods, such as cedar, mahogany and logwood. Fruits, grain and medicinal plants are obtained in great abundance, especially where the Soil is largely of volcanic origin, as in the Altos and Sierra Madre. Parts of the Peten district are equally fertile, maize in this region yielding two hundredfold from unmanured soil. The vegetable products of Guatemala include coffee, cocoa, sugar-cane, bananas, oranges, vanilla, aloes, agave, ipecacuanha, castor-oil, sarsaparilla, cinchona, tobacco, indigo and the wax-plant (Myrica cerifera).

Inhabitants. — The inhabitants of Guatemala, who tend to increase rapidly owing to the high birth-rate, low mortality, and low rate of emigration, numbered in 1903 1,842,134, or more than one-third of the entire population of Central America. Fully 60% are pure Indians, and the remainder, classed as Ladinos or " Latins " (i.e. Spaniards in speech and mode of life), comprise a large majority of half-castes (mestizos) and civilized Indians and a smaller proportion of whites. It includes a foreign population of about 12,000 Europeans and North Americans, among them being many Jews from the west of the United States. There are important German agricultural settlements, and many colonists from north Italy who are locally called Tiroleses, and despised by the Indians for their industry and thrift. About half the births among the Indians and one- third among the whites are illegitimate.

No part of Central America contains a greater diversity of tribes, and in 1S83 Otto Stoll estimated the number of spoken languages as eighteen, although east of the meridian of Lake Amatitlan the native speech has almost entirely disappeared and been replaced by Spanish. The Indians belong chiefly to the Maya stock, which predominates throughout Peten, or to the allied Quiche race which is well represented in the Altos and central districts. .The Itzas, Mopans, Lacandons, Chols, Pokonchi and the Pokomans who inhabit the large settlement of Mixco near the capital, all belong to the Maya family; but parts of central and eastern Guatemala are peopled by tribes distinct from the Mayas and not found in Mexico. In the 16th century the Mayas and Quich6s had attained a high level of civilization (see Central America, Archaeology) , and at least two of the Guatemalan languages, Quiche and Cakchiquel, possess the rudiments or the relics of a literature. The Quiche Popol Vuh, or " Book of History," which was translated into Spanish by the Dominican friar Ximenes, and edited with a French version by Brasseur de Bourbourg, is an important document for students of the local myths. In appearance the various Guatemalan tribes differ very little; in almost all the characteristic type of Indian is short but muscular, with low forehead, prominent cheek-bones and straight black hair. In character the Indians are, as a rule, peaceable, though conscious of their numerical superiority and at times driven to join in the revolutions which so often disturb the course of local politics; they

are often intensely religious, but with a few exceptions

are thriftless, indolent and inveterate gamblers. Their con- fradias, or brotherhoods, each with its patron saint and male and female chiefs, exist largely to organize public festivals, and to purchase wooden masks, costumes and decorations for the dances and dramas in which the Indians delight. These dramas, which deal with religious and historical subjects, are of Indian origin, and somewhat resemble the mystery-plays of medieval Europe, a resemblance heightened by the introduction, due to Spanish missionaries, of Christian saints and heroes such as Charlemagne. The Indians are devoted to bull-fighting and cock-fighting. Choral singing is a popular amusement, and is accompanied by the Spanish guitar and native wind-instruments. The Indians have a habit of consuming a yellowish edible earth containing sulphur; on pilgrimages they obtain images moulded of this earth at the shrines they visit, and eat the images as a prophylactic against disease. Maize, beans and bananas, varied occasionally with dried meat and fresh pork, form their staple diet; drunkenness is common on pay-days and festivals, when large quantities of a fiery brandy called chicha are consumed.

Chief Towns. — The capital of the republic, Guatemala or Guate- mala la Nueva (pop. 1905 about 97,000) and the cities of Quezal- tenango (31,000), Totonicapam (28,000), Coban (25,000), Solola (17,000), Escuintla (12,000), Huehuetanango (12,000), Amatitlan (10,000) and Atitlan (9000) are described under separate headings. All the chief towns except the seaports are situated within the mountainous region where the climate is temperate. Retalhuleu, among the southern foothills of the Sierra Madre, is one of the centres of coffee production, and is connected by rail with the Pacific port of Champerico, a very unhealthy place in the wet season. Both Retalhuleu and Champerico were, like Quezaltenango, Solola, and other towns, temporarily ruined by the earthquake of the 18th of April 1902. Santa Cruz Quiche], 25 m. N.E. of Totoni- capam, was formerly the capital of the Quiche kings, but has now a Ladino population. Livingston, a seaport at the mouth of the Polochic (here called the Rio Dulce), was founded in 1806, and subsequently named after the author of a code of Guatemalan laws; few vestiges remain of the Spanish settlement of Sevilla la Nueva, founded in 1844, and of the English colony of Abbotsville, founded in 1825, — both near Livingston. La Libertad, also called by its Indian name of Sacluc, is the principal town of Peten.

Shipping and Communications. — The republic is in regular steam communication on the Atlantic side with New Orleans, New York and Hamburg, by vessels 'which visit the ports of Barrios (Santo Tomas) and Livingston. On the southern side the ports of San Jose, Champerico and Ocos are visited by the Pacific mail steamers, by the vessels of a Hamburg

company and by those of the South American (Chilean) and the Pacific Steam Navigation Companies. Iztapa, formerly the principal harbour on the south coast, has been almost entirely abandoned since 1853. Gualan, on the Motagua, and Panzos, on the Polochic, are small river-ports. The principal towns are connected by wagon roads, towards the construction and maintenance of which each male inhabitant is required to pay two pesos or give four days' work a year. There are coach routes be- tween the capital and Quezaltenango, but over a great portion of the country transport is still on mule-back. All the railway lines have been built since 1875. The main lines are the Southern, belonging to an American company and running from San Jos£ to the capital; the Northern, a government line from the capital to Puerto Barrios, which completes the interoceanic railroad; and the Western, from Champerico to Quezaltenango, belonging to a Guatemalan company, but largely under German management. For local traffic there are several lines; one from Iztapa, near San Jose\ to Naranjo, and another from Ocos to the western coffee plantations. On the Atlantic slope transport is effected mainly by river tow-boats from Livingston along the Golfo Dulce and other lakes, and the Polochic river as far as Panzos. The narrow-gauge railway that serves the German plantations in the Vera Paz region is largely owned by Germans.

Guatemala joined the Postal Union in 1 881; but its postal and telegraphic services have suffered greatly from financial difficulties. The telephonic systems of Guatemala la Nueva, Quezaltenango and other cities are owned by private companies.

Commerce and Industry. — The natural resources of Guatemala rich but undeveloped; and the capital necessary for their

development is not easily obtained in a country where war, re- volution and economic crises recur at frequent intervals, where the premium on gold has varied by no less than 500% in a single year, and where many of the wealthiest cities and agricultural districts have been destroyed by earthquake in one day (18th of April 1902). At the beginning of the 19th century, Guatemala had practically no export trade; but between 1825 ar >d '850 cochineal was largely exported, the centre of production being the Amatitlan district. This industry was ruined by the competition of chemical dyes, and a substitute was found in the cultivation of coffee.

Guatemala is surpassed only by Brazil and the East Indies in the quantity of coffee it exports. The chief plantations are owned and managed by

Germans; more than half of the crop is sent to Ger- many, while three-fifths of the remainder go to the United States and one-fifth to Great Britain. The average yearly product is about 70,000,000 lb, worth approximately £1,300,000, and subject to an export duty of one gold dollar (4s.) per quintal (101 lb). Sugar, bananas, tobacco and cocoa are also cultivated; but much of the sugar and bananas, most of the cocoa, and all the tobacco are con- sumed in the country. During the colonial period, the cocoa of western Guatemala and Soconusco was reserved on account of its fine flavour for the Spanish court. The indigo and cotton planta- tions yield little profit, owing to foreign competition, and have in most cases been converted to other uses. The cultivation of bananas tends to increase, though more slowly than in other Central American countries. Grain, sweet potatoes and beans are grown for home consumption. Cattle-farming is carried on in the high pasture- lands and the plains of Peten; but the whole number of sheep (77,000 in 1900) and pigs (30,000) in the republic is inferior to the number kept in many single English counties. Much of the wool is sold, like the native cotton, to Indian and Ladino women, who manufacture coarse cloth and linen in their homes.

By the Land Act of 1894 the state domains, except on the coasts and frontiers, were divided into lots for sale. The largest holding tenable by one person under this act was fixed at 50 caballerias, or 5625 acres; the price varies from £40 to £80 per caballeria of 1 12 J acres. Free grants of uncultivated land are sometimes made to immigrants (including foreign companies), to persons who undertake to build roads or railways through their allotments, to towns, villages and schools. The condition of the Indians on the planta- tions is often akin to slavery, owing to the system adopted by some planters of making payments in advance; for the Indians soon spend their earnings, and thus contract debts which can only be repaid by long service.

In addition to the breweries, rum and brandy distilleries, sugar mills and tobacco factories, which are sometimes worked as adjuncts to the plantations, there are many purely urban industries, such as the manufacture of woollen and cotton goods on a large scale, and manufactures of building material and furniture; but these in- dustries are far less important than agriculture.

During the five years 1900 to 1904 inclusive, the average value of Guatemalan imports, which consisted chiefly of textiles, iron and machinery, sacks, provisions, flour, beer, wine and spirits, amounted to £776,000; about one-half came from the United States, and nearly one-fourth from the United Kingdom. The exports during the same period had an average value of £1,528,000, and ranked as follows in order of value: coffee (£1,300,000), timber, hides, rubber, sugar, bananas, cocoa.

Finance. — Within the republic there are six banks of issue, to which the government is deeply indebted. There is practically neither gold nor silver in circulation, and the value of the bank- notes is so fluctuating that trade is seriously hampered. On the 25th of June 1903, the issue of bank-notes without a guarantee was restricted; and thenceforward all banks were compelled to retain gold or silver to the value of 10% of the notes issued in 1904, 20% in 1905 and 30% in 1906. This reform has not, to any appreciable extent, rendered more stable the value of the notes issued. The silver peso, or dollar, of 100 centavas is the monetaiy unit, weighs 25 grammes -900 fine, and has a nominal value of 4s. Being no longer current it has been replaced by the paper peso. The nickel coins include the real (nominal value 6d.), half-real and quarter-real. The metric system of weights and measures has been adopted, but the old Spanish standards remain in general use.

Of the revenue, about 64% is derived from customs and excise; 9% from property, road, military, slaughter and salt taxes; 1-7% from the gunpowder monopoly; and the remainder from various taxes, stamps, government lands, and postal and telegraph ser- vices. The estimated revenue for 1905-1906 was 23,000,000 pesos (about £328,500); the estimated expenditure was 27,317,659 pesos (£390,200), of which £242,800 were allotted to the public debt, £42,000 to internal development and justice, £29,000 to the army and the remainder largely to education. The gold value of the currency peso (75 =£1 in I9°3> 7» = £i in 1904, 58 = £1 in 1905) fluctuates between limits so wide that conversion into sterling (especially for a series of years), with any pretension to accuracy, is impracticable. In 1899 the rate of exchange moved between 710% and 206% premium on gold. According, to the official statement, the gold debt, which runs chiefly at 4% and is held in Germany and England, amounted to £1,987,905 on the 1st of January 1905; the currency debt (note issues, internal loans, &c.) amounted to £704,730; total £2,692,635, a decrease since 1900 of about £300,000.

Government. — According to the constitution of December 1879 (modified in 1885, 1887, 1889 and 1903) the legislative power is vested in a national assembly of 69 deputies (1 for every 20,000 inhabitants) chosen for 4 years by direct popular vote, under universal manhood suffrage. The president of the republic

is elected in a similar manner, but for 6 years, and he is theoretic- ally not eligible for the following term. He is assisted by 6 ministers, heads of government departments, and by a council of state of 13 members, partly appointed by himself and partly by the national assembly.

Local Government. — Each of the twenty-two departments is administered

by an official called a jefe politico, or political chief, appointed by the president, and each is subdivided into municipal districts. These districts are administered by one or more alcaldes or mayors, assisted by municipal councils, both alcaldes and councils being chosen by the people.

Justice. — The judicial power is vested in a supreme court, consisting of a chief justice and four associate justices elected by the people; six appeal courts, each with three judges, also elected by the people; and twenty-six courts of first instance, each consisting of one judge appointed by the president and two by the chief justice of the supreme court.

Religion and Instruction. — The prevailing form of religion is the Roman Catholic, but the state recognizes no distinction of creed. The establishment of conventual or monastic institu- tions is prohibited. Of the population in 1893, 90% could neither read nor write, 2 % could only read, and 8 % could read and write. Primary instruction is nominally compulsory, and, in government schools, is provided at the cost of the state. In 1903 there were 1064 government primary schools. There are besides about 128 private (occasionally aided) schools of similar character, owners of plantations on which there are more than ten children being obliged to provide school accommodation. Higher instruction is given in two national institutes at the capital, one for men with 500 pupils and one for women with 300. At Quezaltenango there are two similar institutes, and at Chiquimula there are other two. To each of the six there is a school for teachers attached, and within the republic there are four other schools for teachers. For professional instruction (law, medicine, engineering) there are schools supported by private funds, but aided occasionally by the government. Other educational establishments are a school of art, a national conservatory of music, a commercial college, four trades' schools with more than 600 pupils and a national library. There is a German school, endowed by the German government.

Defence. — For the white and mixed population military service is compulsory; from the eighteenth to the thirtieth year of age in the active army, and from the thirtieth to the fiftieth in the reserve. The effective force of the active army is 56,900, of the reserve 29,400. About 7000 officers and men are kept in regular service. Military training is given in all public and most private schools.

History. — Guatemala was conquered by the Spaniards under Pedro de Alvarado between 1522 and 1524. Up to the years 1837-1839 its history differs only in minor details from that of the neighbouring states of Central America (q.v.). The colonial period was marked by the destruction of the ancient Indian civilization, the extermination of many entire tribes, and the enslavement of the survivors, who were exploited to the utmost for the

benefit of Spanish officials and adventurers. But although the administration was weak, corrupt and cruel, it succeeded in establishing the Roman Catholic religion, and in introducing the Spanish language among the Indians and Ladinos, who thus obtained a tincture of civilization and ultimately a desire for more liberal institutions. The Central American provinces revolted in 1821, were annexed to the Mexican empire of Iturbide from 1822 to 1823, and united to form a federal republic from 1823 to 1839. In Guatemala the Clerical, Conservative or anti- Federal party was supreme; after a protracted struggle it over- threw the Liberals or Federalists, and declared the country an independent republic, with Rafael Carrera (1814-1865) as pre- sident. In 1845 an attempt to restore the federal union failed; in 1851 Carrera defeated the Federalist forces of Honduras and Salvador at La Arada near Chiquimula, and was recognized as the pacificator of the republic. In 1851 a new constitution was promulgated, and Carrera was appointed president till 1856, a dignity which was in 1854 bestowed upon him for life. His

rivalry with Gerardo Barrios (d. 1865), president of Salvador, resulted in open war in 1863. At Coatepeque the Guatemalans suffered a severe defeat, which was followed by a truce. Honduras now joined with Salvador, and Nicaragua and Costa Rica with Guatemala. The contest was finally settled in favour of Carrera, who besieged and occupied San Salvador and made himself dominant also in Honduras and Nicaragua. During the rest of his rule, which lasted till his death in April 1865, he continued to act in concert with the Clerical party, and en- deavoured to maintain friendly relations with the European governments. Carrera's successor was General Cerna, who had been recommended by him for election. The Liberal party began to rise in influence about 1870, and in May 187 1 Cerna was deposed. The archbishop of Guatemala and the Jesuits were driven into exile as intriguers in the interests of the Clericals. Pres. Rufino Barrios (1835-1885), elected in 1873, governed the country after the manner of a dictator; he expelled the Jesuits, confiscated their property and disestablished and disendowed the church. But though he encouraged education, promoted railway and other enterprises, and succeeded in settling difficulties as to the Mexican boundary, the general result of his policy was baneful. Conspiracies against him were rife, and in 1884 he narrowly escaped assassination. His ambition was to be the restorer of the federal union of the Central American states, and when his efforts towards this end by peaceful means failed he had recourse to the sword. Counting on the support of Honduras and Salvador, he proclaimed himself, in February 1885, the supreme military chief of Central America,

and claimed the command of all the forces within the five states. President Zaldivar, of Salvador, had been his friend, but after the issue of the decree of union he entered into a defensive alliance with Costa Rica and Nicaragua. In March Barrios invaded Salvador, and on the 2nd of April a battle was fought, in which the Guate- malan president was killed. He was succeeded by General Manuel Barillas. ‘ No further effort was made to force on the union, and on the 16th of April the war was formally ended. Peace, however, only provided opportunity for domestic con- spiracy, with assassination and revolution in view. In 1892 General Jose Maria Reina Barrios was elected president, and in 1897 he was re-elected; but on the 8th of February 1898 he was assassinated. Serior Morales, vice-president, succeeded him; but in the same year Don Manuel Estrada Cabrera (b. 1857) was elected president for the term ending 1905. Cabrera promoted education, commerce and the improvement of communications, but his re-election for the term 1905-1911 caused widespread discontent. He was charged with aiming at a dictatorship, with permitting or even encouraging the imprisonment, torture and execution without trial of political opponents, with maladmini- stration of the finances and with aggression against the neigh- bouring states. A well-armed force, which included a body of adventurers from San Francisco (U.S.A.) was organized by General Barillas, the ex-president, and invaded Guatemala in March 1906 from Mexico, British Honduras and Salvador. Barillas (1845-1907) proclaimed his intention of establishing a silver currency, and gained, to a great extent, the sympathy of the German and British residents; he had been the sole Guate- malan president who had not sought to prolong his own tenure of office. Ocos was captured by his lieutenant, General Castillo, and the revolution speedily became a war, in which Honduras, Costa Rica and Salvador were openly involved against Guate- mala, while Nicaragua was hostile. But Cabrera held his ground, and even gained several indecisive victories. The intervention of President Roosevelt and of President Diaz, of Mexico brought about an armistice on the 19th of July, and the so-called ” Marble- head Pact ” was signed on the following day on board the United States cruiser ” Marblehead.” Its terms were embodied in a treaty signed (28th of September) by representatives of the four belligerent states, Nicaragua taking no part in the negotia- tions. The treaty included regulations for the improvement of commerce and navigation in the area affected by the war, and provided for the settlement of subsequent disputes by the arbitration of the United States and Mexico.

Bibliography. — Besides the works cited under Central America see the interesting narrative of Thomas Gage, the English missionary, in Juarros, Compendio de la historia de Guatemala (1808-1818, 2 vols.; new ed., 1857), which in Bailly’s English translation (London, 1823) long formed the chief authority. See also C. Juan Anino, La Republica de Guatemala

(Guatemala, 1894); T. Brigham, Guatemala, The Land of the Quetzal (London, 1887) ; J. M. Caceres, Geografia de Centro- America (Paris, 1882) ; G. Lemale, Guia geografica de los centros de poblacion de la republica de Guatemala (Guatemala, 1882) ; F. A. de Fuentes y Guzman, Historia de Guatemala Recordacion Florida (Madrid, 1882); A. C. and A. P. Maudslay, A Glimpse at Guatemala, and some Notes on the Ancient Monuments of Central America (London, 1899) > Gustavo Niederlein, The Republic of Guatemala (Philadelphia, 1898); Ramon A. Salazar, Historia del disenvolvimiento intelectual de Guatemala, vol. i. (Guate- mala, 1897); Otto Stoll, Reisen und Schilderungen aus den Jahren 1878-1883 (Leipzig, 1886); J. Mendez, Guia del immigrante en la republica de Guatemala (Guatemala, 1895); Karl Sapper, " Grund- ziige der physikalischen Geographie von Guatemala," Erganzungs- heft No. 115, Petermann's Mitleilungen (Gotha, 1894); Anuario de estadistica de la republica de Guatemala (Guatemala) ; Memoria de la Secretaria de Instruction Publica (Guatemala, 1899); Handbook of Guatemala, revised (Bureau of the American Republics, Washing- ton, 1897) ; United States Consular Reports (Washington) ; British Foreign Office Diplomatic and Consular Reports (London).

GUATEMALA, or Guatemala la Nueva {i.e. " New Guate- mala," sometimes written Nueva Guatemala, and formerly Santiago de los Caballeros de Guatemala), the capital of the republic of Guatemala, and until 182 1 of the Spanish captaincy- general of Guatemala, which comprised Chiapas in Mexico and all Central' America except Panama. Pop. (1905) about 97,000. Guatemala is built more than 5000 ft. above sea-level, in a wide table-land traversed by the Rio de las Vacas, or Cow River, so called from the cattle introduced here by Spanish colonists in the 16th century. Deep ravines mark the edge of the table-land, and beyond it lofty mountains rise on every side, the highest peaks being on the south, where the volcanic summits of the Sierra Madre exceed 12,000 ft. Guatemala has a station on the transcontinental railway from Puerto Barrios on the Atlantic (190 m. N.E.) to San Jose on the Pacific (75 m. S. by W.). It is thrice the size of any other city in the republic, and has a corresponding commercial superiority. Its archbishop is the primate of Central America (excluding Panama). Like most Spanish-American towns Guatemala is laid out in wide and regular streets, often planted with avenues of trees, and it has extensive suburbs. The houses, though usually of only one storey, are solidly and comfortably constructed; many of them are surrounded by large gardens and courts. Among the open spaces the chief are the Plaza Mayor, which contains the cathedral, erected in 1730, the archiepiscopal palace, the govern- ment buildings, the mint and other public offices; and the more modern Reforma Park and Plaza de la Concordia, now the favourite resorts of the inhabitants. There are many

large schools for both sexes, besides hospitals and an orphanage. Many of the principal buildings, such as the military academy, were originally convents. The theatre, founded in 1858, is one of the best in Central America. A museum, founded in 183 1, is maintained by the Sociedad Economica, which in various ways has done great service to the city and the country. There are two fortresses, the Castello Matamoros, built by Rafael Carrera (see Guatemala [republic] under History), and the Castello de San Jose. Water is brought from a distance of about 8 m. by two old aqueducts from the towns of Mixco and Pinula; fuel and provisions are largely supplied by the Pokoman Indians of Mixco. The general prosperity, and to some extent the appearance, of Guatemala have procured it the name of the Paris of Central America. It is lighted by electricity and has a good telephone service. Its trade is chiefly in coffee, but it also possesses cigar factories, wool and cotton factories, breweries, tanneries and other industrial establishments. The foreign trade is chiefly controlled by Germans.

The first city named Guatemala, now called Ciudad Vieja or " Old City," was founded in 1527 by Pedro de Alvarado, the conqueror of the country, on the banks of the Rio Pensativo, and at the foot of the volcano of Agua {i.e. " Water "). In 1 541 it was overwhelmed by a deluge of water from the flooded

crater of Agua; and in 1542 Alvarado founded Santiago de los Caballeros la Nueva, now Antigua. This city flourished greatly, and by the middle of the 18th century had become the most populous place in Central America, with 60,000 inhabitants and more than 100 churches and convents. But in 1773 it was ruined by an earthquake. It was rebuilt, and ultimately became capital of the department of Sacatepeques, and a health-resort locally celebrated for its thermal springs. But the Guatemalans determined to found a new capital on the site occupied by the hamlet of Ermita, 27 m. N.E. Here the third and last city of Guatemala was built, and became the seat of government in 1779. The remarkable regularity of the streets is due to the construction of the city on a uniform plan. The wide area covered, and the lowness of the houses, were similarly due to an ordinance which, in order to minimize the danger from earth- quakes, forbade the erection of any building more than 20 ft. high. Many of the belfries of convents or churches, added after the ordinance had fallen into abeyance, were overthrown by the earthquake of 1874, which also destroyed a large part of Antigua.

GUATOS, a tribe- of South American Indians of the upper Paraguay. They are of a European fairness and wear beards. They live almost entirely in canoes, building rough shelters in the swamps. They aided the Brazilians in the war with Paraguay 1865-70. Very few survive.

GUATUSOS, a tribe of American Indians of Costa Rica. They are an active, hardy people, who have always maintained hostility towards the Spaniards and retain their independence. From their language they appear to be a distinct stock. They were described by old writers as being very fair, with flaxen hair, and these reports led to a belief, since exploded, that they were European hybrids. There are very few surviving.

GUAVA (from the Mexican guayaba), the name applied to the fruits of species of Psidium, a genus belonging to the natural order Myrtaceae. The species which produces the bulk of the guava fruits of commerce is Psidium Guajava, a small tree from 15 to 20 ft. high, a native of the tropical parts of America and the West Indies. It bears short-stalked ovate or oblong leaves, with strongly marked veins, and covered with a soft tomentum or down. The flowers are borne on axillary stalks, and the fruits vary much in size, shape and colour, numerous forms and varieties being known and cultivated. The variety of which the fruits are most valued is that which is sometimes called the white guava (P. Guajava, var. pyriferum) . The fruits are pear- shaped, about the size of a hen's egg, covered with a thin bright yellow or whitish skin filled with soft pulp, also of a light yellowish tinge, and having a pleasant sweet-acid and somewhat aromatic flavour. P. Guajava, var. pomiferum, produces a more globular or apple-shaped fruit, sometimes called the red guava. The pulp of this variety is mostly of a darker colour than the former and not of so fine a flavour, therefore the first named is most esteemed for eating in a raw state; both, however, are used in the preparation of two kinds of preserve known as guava jelly and guava cheese, which are made in the West Indies and imported thence to England; the fruits are of much too perishable a nature to allow of their importation in their natural state. Both varieties have been introduced into various parts of India, as well as in other countries of the East, where they have become perfectly naturalized. Though of course much too tender for outdoor planting in England, the guava thrives there in hothouses or stoves.

Psidium variabile (also known as P. Cattleyanum), a tree of from 10 to 20 ft. high, a native of Brazil (the Araca. or Araja de Praya), is known as the purple guava. The fruit, which is very abundantly produced in the axils of the leaves, is large, spherical, of a fine deep claret colour; the rind is pitted, and the pulp is soft, fleshy, purplish, reddish next the skin, but becoming paler towards the middle and in the centre almost or quite white. It has a very agreeable acid-sweet flavour, which has been likened to that of a strawberry.

GUAYAHA, a small city and the capital of a municipal district and department of the same name, on the southern coast of Porto Rico, 53 m. S. of San Juan. Pop. (1899) of the

o"ty, 5334; (191°) 8321; (1899) of the district, 12,749. The district (156 sq. m.) includes Arroyo and Salinas. The city stands about 230 ft. above the sea and has a mild, healthy climate. It is connected with Ponce by railway (1910), and with the port of Arroyo by an excellent road, part of the military road extending to Cayey, and it exports sugar, rum, tobacco, coffee, cattle, fruit and other products of the department, which is very fertile. The city was founded in 1736, but was completely destroyed by fire in 1832. It was rebuilt on a rectangular plan and possesses several buildings of note. Drinking-water is brought in through an aqueduct.

GUAYAQUIL, or Santiago de Guayaquil, a city and port of Ecuador, capital of the province of Guayas, on the right bank of the Guayas river, 33 m. above its entrance into the Gulf of Guayaquil, in 2° 12′ S., 79° 51′ W. Pop. (1890) 44,772; (1897, estimate) 51,000, mostly half-breeds. The city is built on a comparatively level pajonal or savanna, extending south-ward from the base of three low hills, called Los Cerros de la Cruz, between the river and the partially filled waters of the Estero Salado. It is about 30 ft. above sea-level, and the lower parts of the town are partially flooded in the rainy season. The old town is the upper or northern part, and is inhabited by the poorer classes, its streets being badly paved, crooked, undrained, dirty and pestilential. The great fire of 1896 destroyed a large part of the old town, and some of its insanitary conditions were improved in rebuilding. The new town, or southern part, is the business and residential quarter of the better classes, but the buildings are chiefly of wood and the streets are provided with surface drainage only. Among the public buildings are the governor's and bishop's palaces